Model 702 Ultra Rugged 50.80mm Diameter

BRITISH ENCODER PRODUCTS COMPANY

Ø50.80

Features
- Standard Size 20 Package (50mm x 50mm)
- Flange, and Servo Mounting
- Up to 30,000 PPR
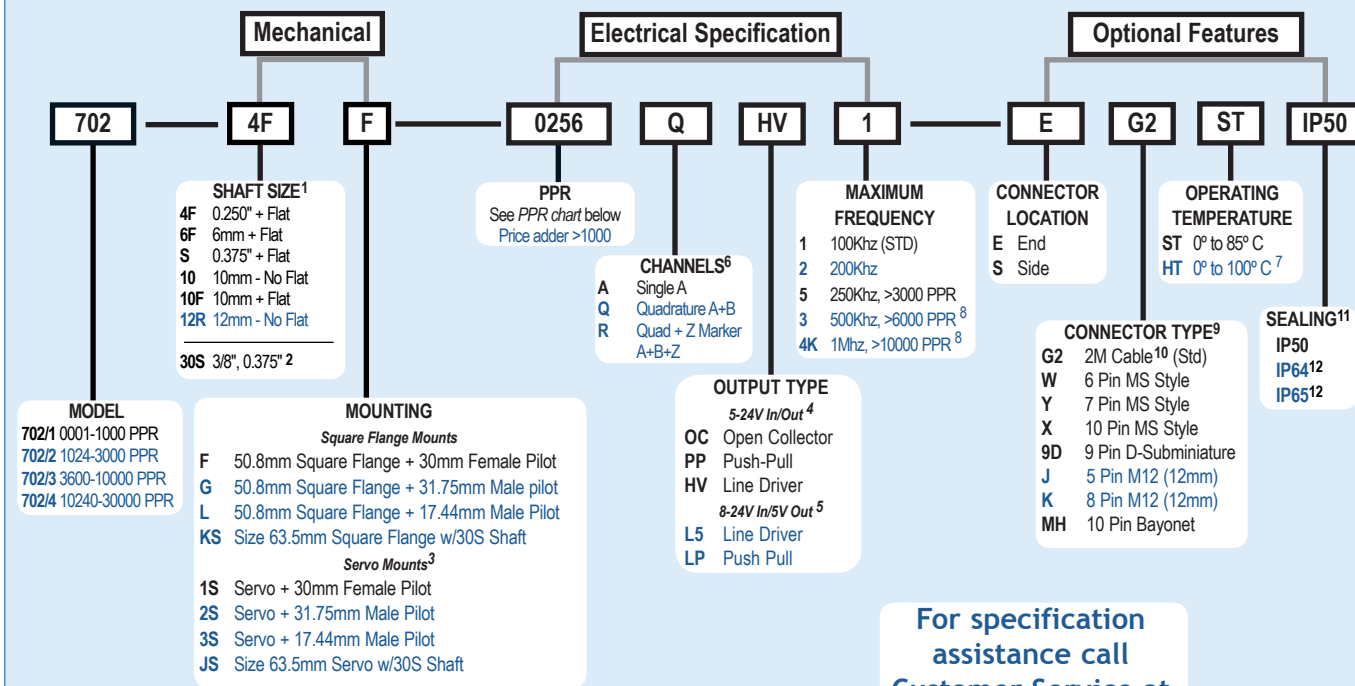- 35Kg Max. Axial and Radial Shaft Loading
- IP67 Sealing Available

The Model 702 Size 20 is a heavy duty, extremely rugged, reliable, yet compact industry standard 50.80mm diameter encoder, designed for harsh factory and plant floor environments. The double shielded ball bearings are rated at 35Kg maximum axial and radial shaft loading to ensure a long operating life. Made to withstand the harsh effects of the real world, both the flange and servo models are rated IP67 with the optional heavy duty shaft seal. With a variety of mounting options in both the flange and servo models, the Model 702 is ideal for both new applications and replacements. If you need an encoder that won't let you down, the Model 702 is it.

Common Applications
Motion Control Feedback, Conveyors, Elevator Controls, Machine Control, Food Processing, Process Control, Robotics, Material Handling, Textile Machines

Model 702 Ordering Guide
Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.

Mechanical			Electrical Specification				Optional Features			
702	4F	F	0256	Q	HV	1	E	G2	ST	IP50

PPR
See *PPR chart* below
Price adder >1000

SHAFT SIZE [1]
4F	0.250" + Flat
6F	6mm + Flat
S	0.375" + Flat
10	10mm - No Flat
10F	10mm + Flat
12R	12mm - No Flat
30S	3/8", 0.375" [2]

MODEL
702/1	0001-1000 PPR
702/2	1024-3000 PPR
702/3	3600-10000 PPR
702/4	10240-30000 PPR

MOUNTING
Square Flange Mounts
F	50.8mm Square Flange + 30mm Female Pilot
G	50.8mm Square Flange + 31.75mm Male pilot
L	50.8mm Square Flange + 17.44mm Male Pilot
KS	Size 63.5mm Square Flange w/30S Shaft

Servo Mounts [3]
1S	Servo + 30mm Female Pilot
2S	Servo + 31.75mm Male Pilot
3S	Servo + 17.44mm Male Pilot
JS	Size 63.5mm Servo w/30S Shaft

CHANNELS [6]
A	Single A
Q	Quadrature A+B
R	Quad + Z Marker A+B+Z

OUTPUT TYPE
5-24V In/Out [4]
OC	Open Collector
PP	Push-Pull
HV	Line Driver

8-24V In/5V Out [5]
L5	Line Driver
LP	Push Pull

MAXIMUM FREQUENCY
1	100Khz (STD)
2	200Khz
5	250Khz, >3000 PPR
3	500Khz, >6000 PPR [8]
4K	1Mhz, >10000 PPR [8]

CONNECTOR LOCATION
E	End
S	Side

CONNECTOR TYPE [9]
G2	2M Cable [10] (Std)
W	6 Pin MS Style
Y	7 Pin MS Style
X	10 Pin MS Style
9D	9 Pin D-Subminiature
J	5 Pin M12 (12mm)
K	8 Pin M12 (12mm)
MH	10 Pin Bayonet

OPERATING TEMPERATURE
ST	0º to 85º C
HT	0º to 100º C [7]

SEALING [11]
IP50	
IP64 [12]	
IP65 [12]	

For specification assistance call Customer Service at +44 (0)1978 262100

Model 702 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*	0010*	0011*
0012*	0014*	0020	0021*	0024*	0025*	0028*	0030*	0032*
0033*	0034*	0035*	0038*	0040*	0042*	0045*	0050*	0060
0064*	0100	0120	0125	0128*	0144*	0150*	0160*	0192*
0200	0240*	0250	0254*	0256*	0300	0333*	0360	0400
0500	0512	0600	0625*	0635	0665*	0720	0768*	0800
0889	0900*	1000	1024	1200	1201*a	1203*a	1204*a	1250a
1270a	1440	1500	1800	2000	2048	2400a	2500	2540a
2880a	3000a	3600a	4000a	4096a	5000a	6000a	7200a	7500a
9000a	10,000a	10,240a	12,000a	12,500a	14,400a	15,000a	18,000a	20,000a
20,480a	25,000a	30,000a						

* Contact Customer Service for High Temperature Option.
a High Temperature Option (H) limited to 85° C maximum for these PPR options.
New PPR values are periodically added to those listed. Contact Customer Service to determine all currently available PPR values. Special disk resolutions are available upon request. A one-time NRE fee may apply.

NOTES:
1. Contact Customer Service for additional options not shown.
2. Shaft Size 30S ONLY available with KS and JS Mountings.
3. Please make sure you state the type of Servo option for 1S, 2S and 3S - See opposite page for mounting hole arrangements for the 2 Versions (Servo #1 and Servo #2)
4. Not available with 5-Pin & HV option / Marker not available with 6-Pin (HV-Q) or 7-Pin MS Connector & HV option.
5. 24Vcc Max for High Temperature Option / Standard Temperature 60 to 3000 PPR only.
6. Contact Customer Service for non-standard marker gating or phase relationship options.
7. 0º to 85ºC for certain PPR resolutions - See PPR options.
8. Standard Cable Length Only.
9. For Mating Connectors & Cables please refer to Accessories pages.
10. For non-standard cable lengths contact sales for availability and cost.
11. Increased starting torque with IP64, IP65 sealing.
12. IP66 & IP67 available in certain configurations - Please contact sales office for information and availability.

B

Model 702 Ultra Rugged
50.80mm Diameter

Incremental Shaft Encoders

Model 702 Specifications

Electrical

|	
Input Voltage	4.75 to 24 Vcc max for temperatures up to 70° C
	4.75 to 24 Vcc for temperatures between 70° C to 100° C
Input Current	100 mA max with no output load
Input Ripple	100 mV peak-to-peak at 0 to 100 kHz
Output Format	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the encoder mounting face. See *Waveform Diagrams*.
Output Types	Open Collector- 100 mA max per channel Pull-Up- 100 mA max per channel Push-Pull- 20 mA max per channel Line Driver- 20 mA max per channel (Meets RS 422 at 5 Vcc supply)
Index	Occurs once per revolution. The index for units >3000 PPR is 90° gated to Outputs A and B. See *Waveform Diagrams*.
Max Frequency	Up to 1 MHz.
Noise Immunity	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2
Symmetry	1 to 6000 PPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 PPR: 180° (±36°) electrical
Quad Phasing	1 to 6000 PPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 PPR: 90° (±36°) electrical
Min Edge Sep	1 to 6000 PPR: 67.5° electrical at 100 kHz output 6001 to 20,480 PPR: 54° electrical >20,480 CPR: 50° electrical
Rise Time	Less than 1 microsecond
Accuracy	Instrument and Quadrature Error: For 200 to 1999 PPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 PPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 PPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)

Mechanical

Max Shaft Speed	8000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Shaft Size	0.250", 0.375", 10 mm or 12 mm
Shaft Rotation	Bi-directional
Radial Shaft Load	35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Axial Shaft Load	35 Kg max. Rated load of 10 to 20 Kg for bearing life of 1.5×10^9 revolutions
Starting Torque	7.0615×10^{-3} Nm Typical with IP64 or no seal 2.0118×10^{-2} Nm Typical with IP65 Seal 4.0943×10^{-2} Nm Typical with IP67 Seal
Connector Type	6-, 7-, and 10-pin MS Style, 5- or 8-pin M12 (12 mm), 9-pin D-subminiature, or gland with 2 Metres of cable (foil and braid shield, 24 AWG conductors), 10-pin Bayonet
Housing	Black non-corrosive finish
Bearings	Precision ABEC ball bearings
Mounting	Various flange or servo mounts
Weight	320 grams typical

Environmental

|	
Operating Temp	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see PPR Options.)
Storage Temp	-25° to +85° C
Humidity	98% RH non-condensing
Vibration	20 g @ 58 to 500 Hz
Shock	75 g @ 11 ms duration
Sealing	IP50 standard; IP64, IP66 or IP67 optional

Model 702 Servo Mounts
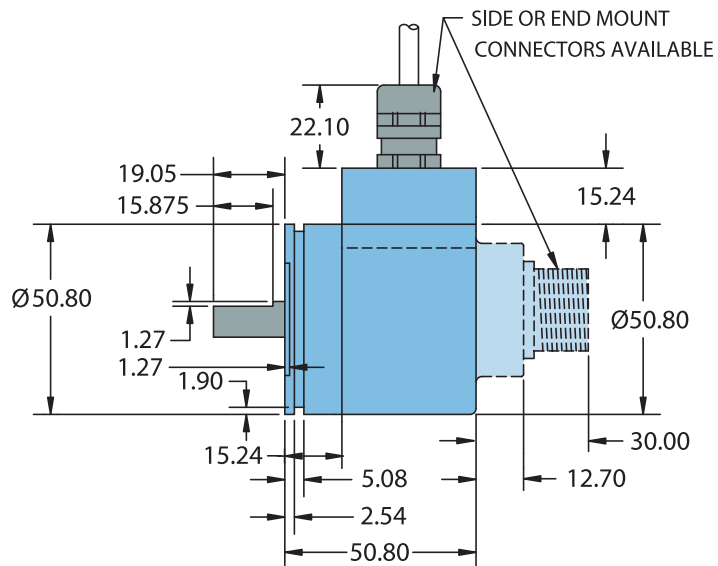
Servo #1 (S)
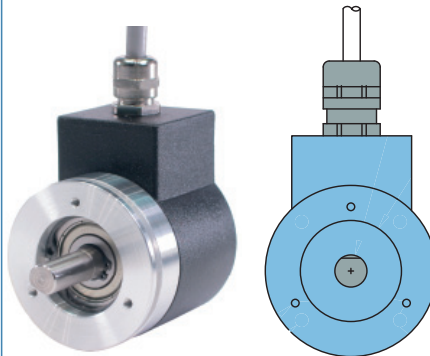
SERVO MOUNT #1
4-40 UNC-2B 6.35mm DEEP
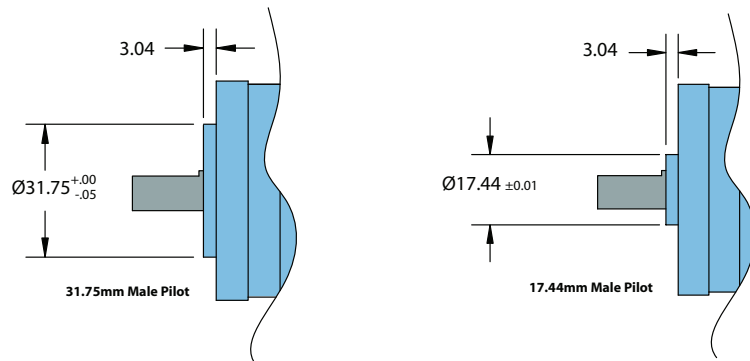3 x 120° on a 38.20mm PCD

Servo #2 (C)
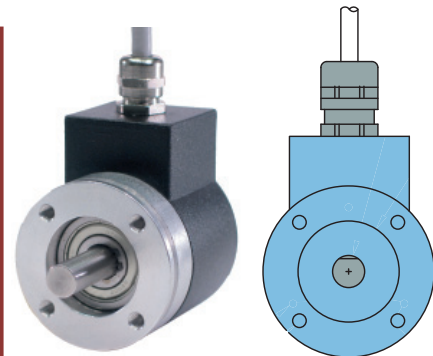
SERVO MOUNT #2
10-32 UNF-2B 6.35mm DEEP
4 x 90° on a 41.27mm PCD

Body Dimensions for Servo Mounts #1 and #2

SIDE OR END MOUNT CONNECTORS AVAILABLE

22.10
19.05
15.875
15.24
Ø50.80
Ø50.80
1.27
1.27
1.90
15.24
5.08
2.54
50.80
30.00
12.70

Optional Male Pilots for Flange and Servo Mounts

3.04
Ø31.75 +.00 / -.05

31.75mm Male Pilot

3.04
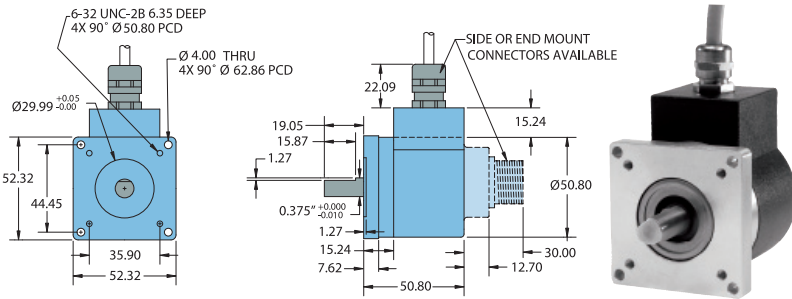Ø17.44 ±0.01

17.44mm Male Pilot

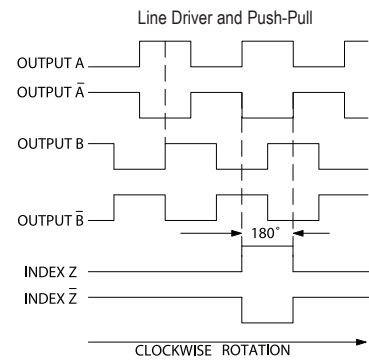All dimensions are in mm with a tolerance of ±0.127mm or ±0.254 unless otherwise specified

Model 702 Ultra Rugged 50.80mm Diameter
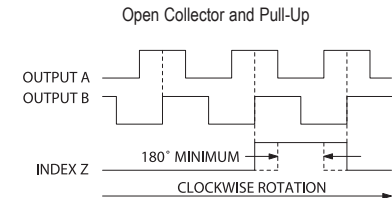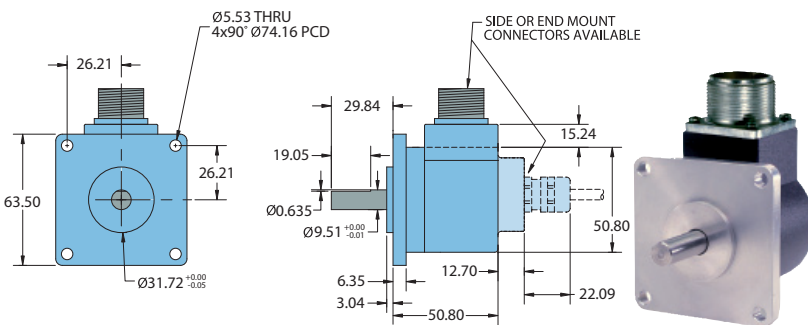
Model 702 Square Flange Mount (F)

- 6-32 UNC-2B 6.35 DEEP 4X 90° Ø 50.80 PCD
- Ø 4.00 THRU 4X 90° Ø 62.86 PCD
- Ø29.99 +0.05 -0.00
- SIDE OR END MOUNT CONNECTORS AVAILABLE
- 52.32
- 44.45
- 35.90
- 52.32
- 22.09
- 19.05
- 15.87
- 1.27
- 15.24
- 0.375" +0.000 -0.010
- 1.27
- 15.24
- 7.62
- Ø50.80
- 30.00
- 12.70
- 50.80

Model 702 63.5mm Square Flange (KS)

- Ø5.53 THRU 4x90° Ø74.16 PCD
- SIDE OR END MOUNT CONNECTORS AVAILABLE
- 26.21
- 63.50
- 26.21
- Ø31.72 +0.00 -0.05
- 29.84
- 19.05
- Ø0.635
- Ø9.51 +0.00 -0.01
- 6.35
- 3.04
- 50.80
- 15.24
- 12.70
- 50.80
- 22.09

Model 702 63.5mm Servo Mount (JS)

- 10-32 UNF-2B 7.62 DEEP 6 x 60° Ø47.62 PCD
- SIDE OR END MOUNT CONNECTORS AVAILABLE
- Ø63.50
- Ø31.72
- Ø58.42
- Ø9.51 +0.00 -0.01
- 29.84
- 19.05
- 0.635
- 15.24
- 3.05
- 2.54
- 5.08
- 7.62
- 12.70
- 50.80
- Ø50.80
- 22.09

All dimensions are in mm with a tolerance of +0.127mm or +0.254 unless otherwise specified

Waveform Diagrams

Line Driver and Push-Pull

- OUTPUT A
- OUTPUT Ā
- OUTPUT B
- OUTPUT B̄
- INDEX Z
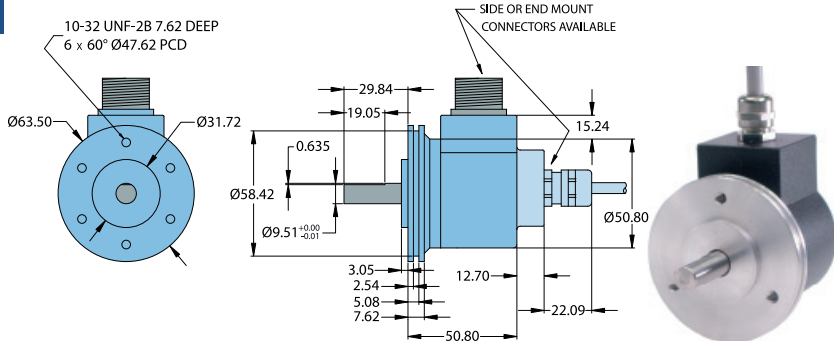- INDEX Z̄
- 180°
- CLOCKWISE ROTATION
- NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: PUSH-PULL OUTPUT DOES NOT INCLUDE COMPLEMENTARY CHANNELS

Open Collector and Pull-Up

- OUTPUT A
- OUTPUT B
- INDEX Z
- 180° MINIMUM
- CLOCKWISE ROTATION

NOTE: ALL DEGREE REFERENCES ARE ELECTRICAL DEGREES
NOTE: INDEX IS POSITIVE GOING

Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS L5 HV-Q	7-pin MS PP OC, LP HV-R	6-pin MS PP OC, LP HV-R	6-pin MS L5 HV-Q	9-pin D-sub	10-pin Bayo-net
Com	Black	3	7	F	F	F	F	F	9	F
+Vcc	White	1	2	D	D	D	D	D	1	D
A	Brown	4	1	A	A	A	A	A	2	A
A'	Yellow	---	3	H	C	---	---	C	3	H
B	Red	2	4	B	B	B	B	B	4	B
B'	Green	—	5	I	E	---	---	E	5	J
Z	Orange	5	6	C	---	C	C	—	6	C
Z'	Blue	—	8	J	—	—	—	—	7	K
Case	—	---	---	G	G	G	---	---	8	G
Shield	Screen	—	—	—	—	---	---	---	---	—

CAUTION - Always check wiring colour code against Encoder Label due to changes in specification since September 2006

Connector Pin-Outs

- 5-pin M12
- 8-pin M12
- 13.97 MAX HEIGHT
- 13.20 MAX HEIGHT
- 10-pin Bayonet
- 7.23 MAX HEIGHT
- 9-pin D-SUB
- 21.60 MAX HEIGHT
- 10-pin MS
- 0.680 MAX HEIGHT
- 7-pin MS
- 0.675 MAX HEIGHT
- 6-pin MS
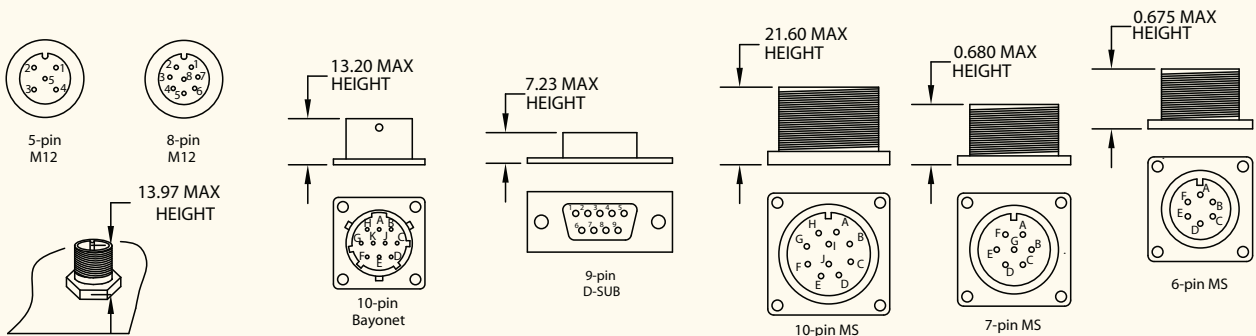
Ultra Rugged 50.80mm
Encoder & Related Products

Quick Specs

- Rugged Industrial Encoder
- 50.80mm x 50.80mm Housing
- PPR to 30,000
- Many Output Types
- RPM to 8000
- Sealing to IP66
- High Temperature Option

Mounting Options

The 702 Motor Mount comes with coupling and available with a Bossed Hub to attach directly to fast revving motors.

The 702 Shaft has many different servo mounts and mounting flanges available and able to handle heavy loads.

Other Related Products

The Model 802S is an industry standard Size 20 (50.80mm diameter) encoder housed in a heavy duty 316 stainless steel package. It's specifically designed for harsh factory and plant floor environments. A variety of flange and servo mounting styles, make it easy to use in a broad range of applications.

Model 725 Size 25 optical shaft encoder is specifically designed for the challenges of an industrial environment. But don't let its tough, industrial package fool you! it still has the performance to reach resolutions up to 30,000 pulses per revolution.

The Model 858S European Size 58 is a heavy duty, extremely rugged, reliable encoder, in a 316 stainless steel package. Its compact design is well suited for harsh factory and plant floor environments, calling for a metric solution.

The Best Choice

- A 3-Year Satisfaction Guaranteed Warranty

- Encoder Products Company has Specialised in Building Only Durable, Dependable Encoders for More Than 40 Years

- Superior Customer Service

- More Configurations Than Any Other Encoder Manufacturer

- Expert Cross Reference Service

- Next Day Expedite Delivery Available

For specification assistance call Customer Service at +44 (0)1978 262100