Commutation Motor Encoder

Product ID | EC35 »



Features of the EC35 Commutation Motor Encoder

- Kit version for mounting on a motor or other rotating shaft
- U/V/W commutation outputs (differential or open-collector)
- 0-12 poles or custom
- 11 Resolutions from 500 to 60,000 CPR (2,000 to 240,000 PPR)
- For NEMA 17 to 34 and larger motors
- Supports 5 shaft sizes (5 to 8 mm and 1/4 to 3/8 in.)
- Index output is standard
- High retention cable (sold separately)

Description

The US Digital EC35 motor encoder mounts directly to a motor but can also be installed on any rotating shaft. This incremental encoder uses a specially patterned optical disk on a precision-machined aluminum hub. In addition to a quadrature and differential index output, this encoder also provides a commutation output (differential or open-collector) for brushless motors with various pole counts.

RoHS COMPLIANT

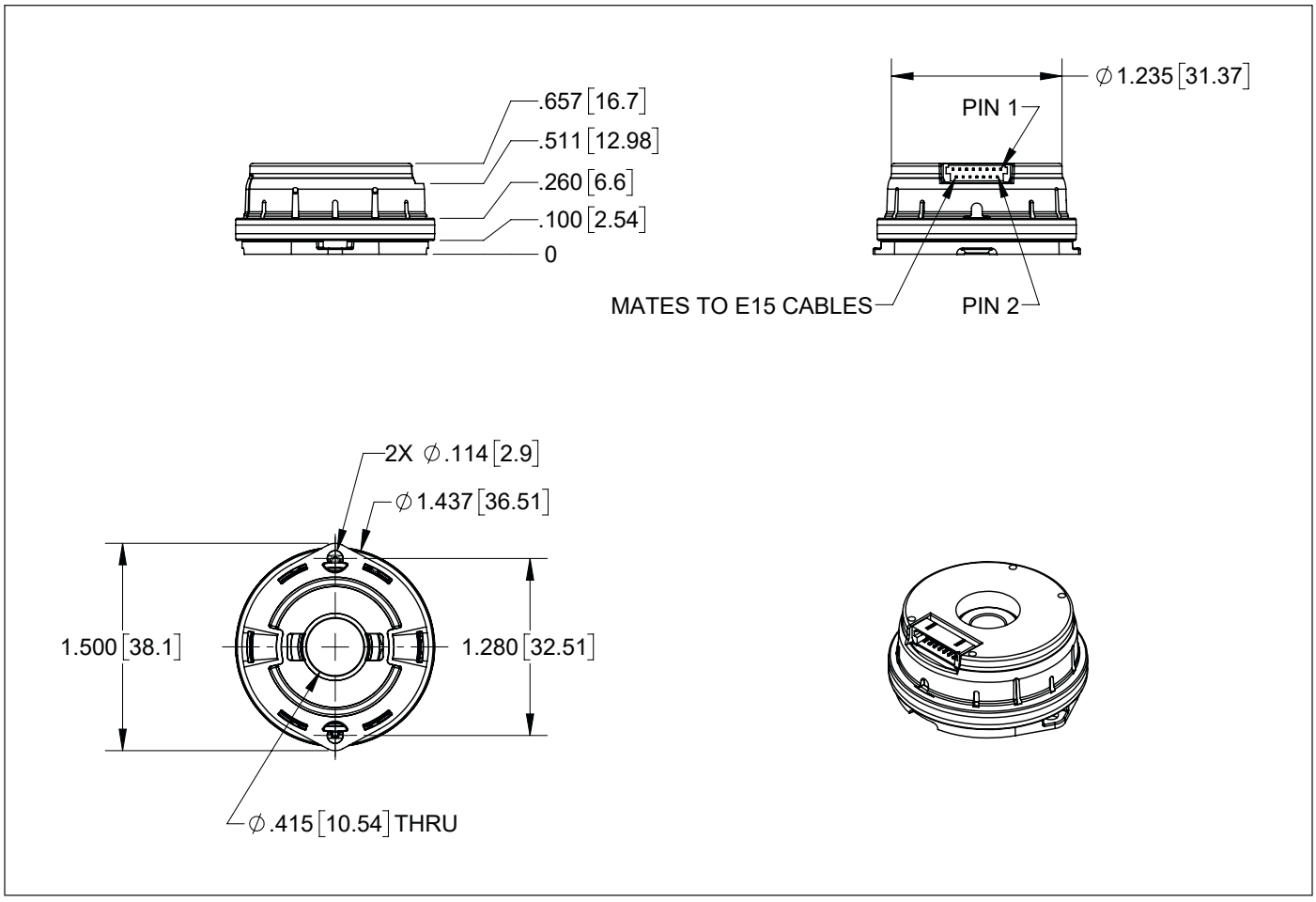
This disk, in combination with an IC detector, creates a system that provides high resolution up to 60,000 CPR and is tolerant to mechanical misalignment. A push-on hub design securely grips the shaft without set screws, and a robust, glass-filled polymer housing provides easy installation in space-limited applications.

A built-in, removable spacer tool ensures that the encoder disk is automatically set to the correct gap when the encoder housing is mounted. The encoder can be “timed” by rotating a ring on the assembly and pressing the ring in with a simple tool to lock everything into place.

This optical encoder is designed for use with a high-retention connector. After making each selection in the Product Configurator, a compatible cable will be displayed below and must be purchased separately.

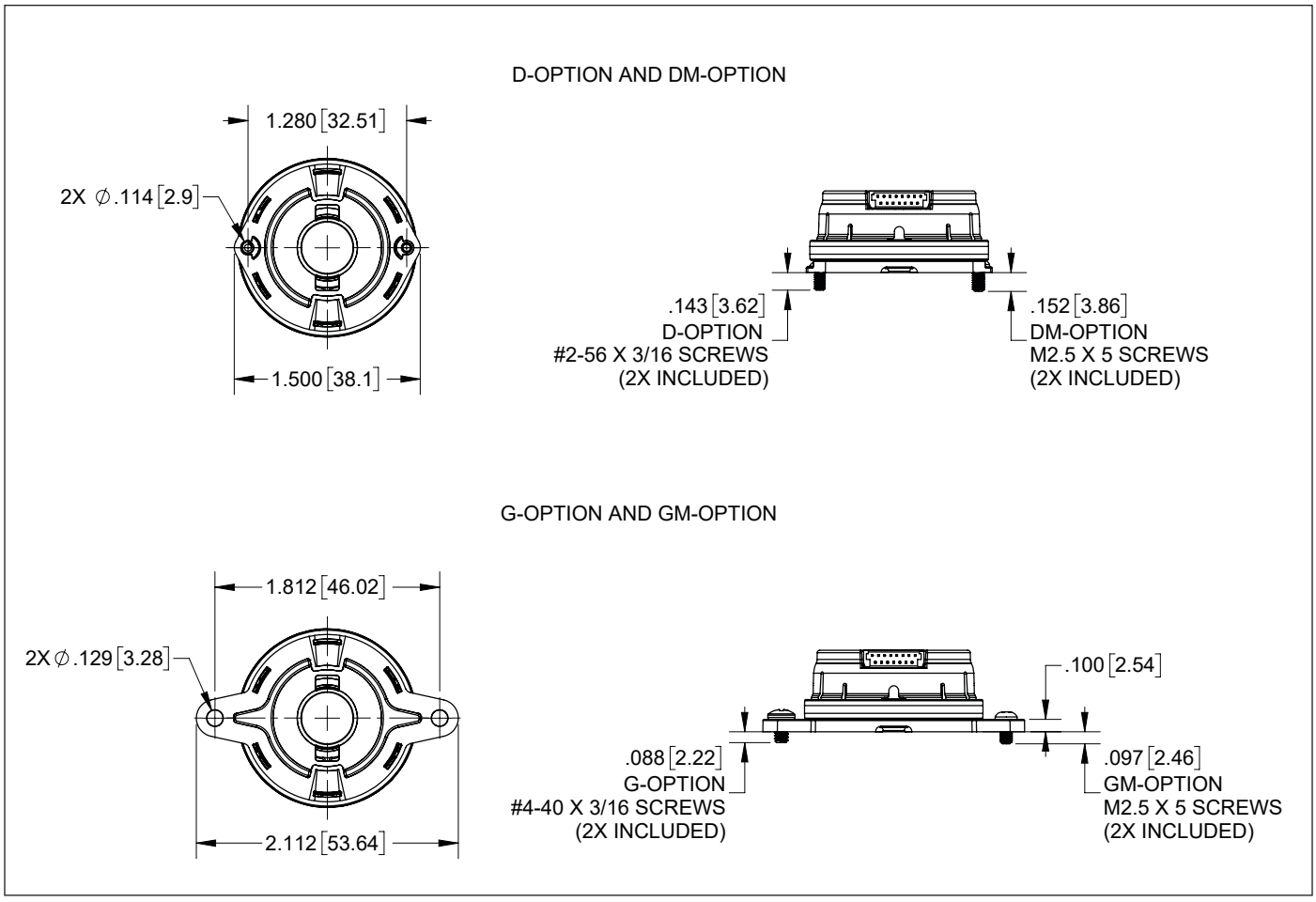
Please Note: Due to the EC35’s design, it is recommended for use as a one-time installation.

Mechanical Drawings



EC35 Commutation Motor Encoder (Default)

Mechanical Drawings



EC35 Commutation Motor Encoder (Base Options)

Specifications

Environmental

Parameter	Value	Units
Operating Temperature	-20 to 105	C
Electrostatic Discharge, IEC 61000-4-2	±12	kV
Vibration (10Hz to 2kHz, sinusoidal)	20	G
Shock (6 milliseconds, half-sine)	75	G

Mechanical

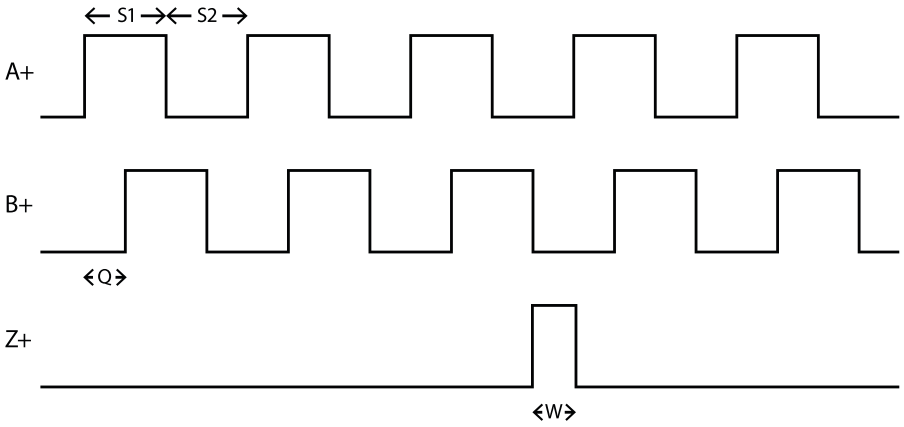
Parameter	Value	Units
Max. Shaft Axial Play	±0.003	in.
Max. Shaft Runout	0.001 T.I.R.	in.
Max. Acceleration	250000	rad/sec^2
Maximum RPM, CPR ≤ 2500 e.x. CPR = 2500, max. rpm = 9600	((24 x 10^6) / CPR)	RPM
Maximum RPM, CPR = 4000	12000	RPM
Maximum RPM, CPR = 5000	9600	RPM
Maximum RPM, CPR = 10000	6000	RPM
Maximum RPM, CPR = 20000	3000	RPM
Maximum RPM, CPR = 40000	1440	RPM
Maximum RPM, CPR = 60000	960	RPM
Codewheel Moment of Inertia	6.48 x 10^{-5}	oz-in-s^2
Required Shaft Length	0.500 to 0.565	in.
Mounting Screw Torque	2-3	in-lbs
	Technical Bulletin TB1001 - Shaft and Bore Tolerances	*Download*(1)

Specifications

Electrical

Specifications	Min.	Typ.	Max.	Units	Notes
Supply Current CPR ≤ 2500 CPR > 2500		 13 37	 17 44	mA	no output load, max. frequency output
Supply Voltage	4.5	5.0	5.5	V	
Differential High Level Output	2.5	3.5		V	I_{oh} = -8 mA
Differential Low Level Output			0.5	V	I_{ol} = 8 mA
Differential Rise/Fall Time		100		ns	
Open collector pullup voltage			30	V	I_{load} = 100 mA
Open collector “on” resistance		0.2		ohm	I_{load} = 100 mA
Frequency Response, CPR ≤ 2,500			400	kHz	
Frequency Response, CPR = 4,000 & 5000			800	kHz	
Frequency Response, CPR = 10,000			1	MHz	
Frequency Response, CPR = 20,000 / 40,000 / 60,000			960	kHz	

Incremental Output Timing



Specifications

Incremental Output Timing

Parameter	Min.	Typ.	Max.	Units
Symmetry, S1, S2	108	180	252	elec. deg.
Quadrature Delay, Q	45	90	135	elec. deg.
Index Width, W	45	90	135	elec. deg.

A leads B for CCW shaft rotation, and B leads A for CW rotation viewed from the top side of the encoder.

Accessories

Screws

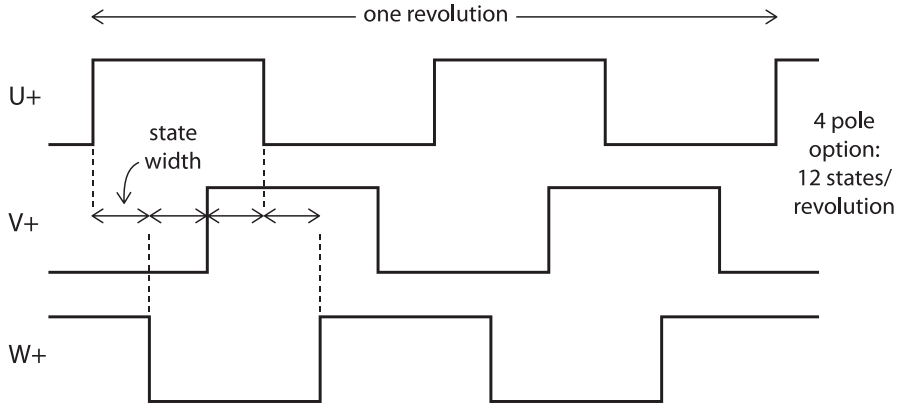
Part #: SCREW-256-188-SH
Description: Socket Head Cap, #2-56 UNC x 3/16 in.
Use: Base Mounting
Quantity Required: 2
Screws are included

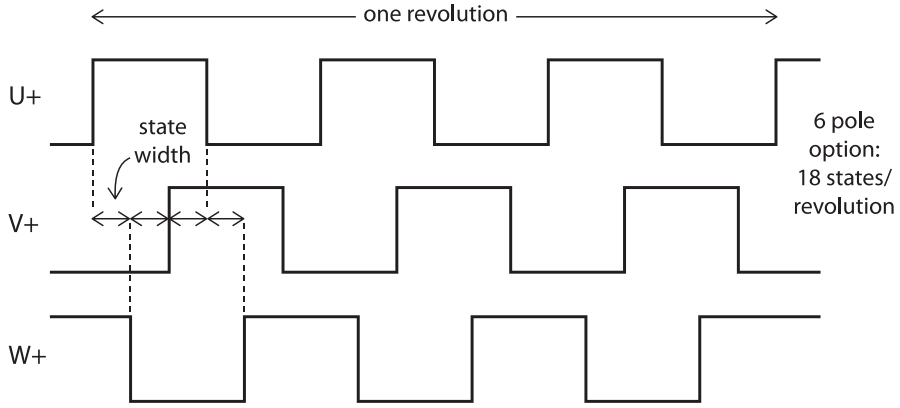
Part #: SCREW-M25-5MM-PH
Description: Pan Head, Phillips M2.5 x 0.45 x 5mm
Use: Base Mounting
Quantity Required: 2

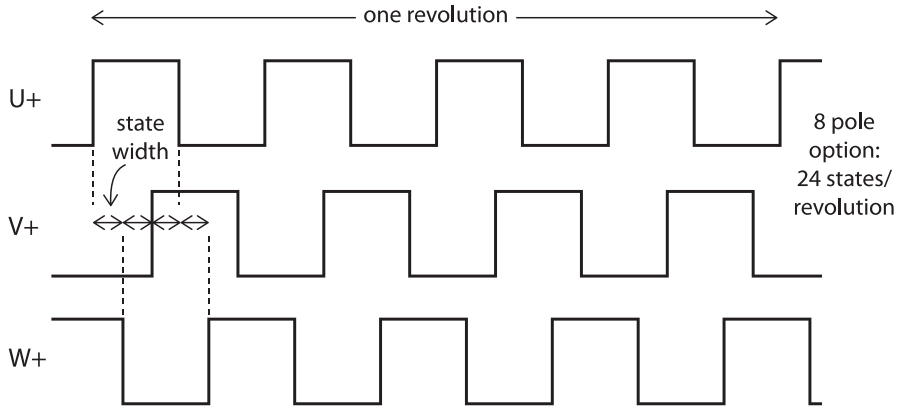
Part #: SCREW-M25-5MM-BH
Description: Button Head Cap, M2.5 x 0.45 x 5mm
Use: Base Mounting
Quantity Required: 2
Screws are included

Specifications

Commutation Output Timing







Specifications

Commutation Output Timing

Parameter	Min.	Typ.	Max.	Units
State width, 4 pole	27	30	33	angular deg.
State width, 6 pole	17	20	23	angular deg.
State width, 8 pole	12	15	18	angular deg.
State width, 10 pole	9	12	15	angular deg.
State width, 12 pole	7	10	13	angular deg.

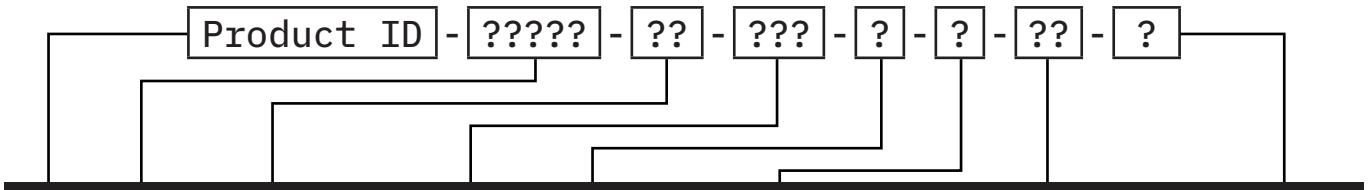
Pin-Outs

Pin	"D" Output Option	"C" Output Option	"0" pole Option
1	A+ (A Quadrature)	A+ (A Quadrature)	A+ (A Quadrature)
2	A-	A-	A-
3	B+ (B Quadrature)	B+ (B Quadrature)	B+ (B Quadrature)
4	B-	B-	B-
5	Z+ (Index)	Z+ (Index)	Z+ (Index)
6	Z-	Z-	Z-
7	U+ (U Commutation)	U (Open collector)	no connection
8	U-	no connection	no connection
9	V+ (V Commutation)	V (Open collector)	no connection
10	V-	no connection	no connection
11	W+ (W Commutation)	W (Open collector)	no connection
12	W-	no connection	no connection
13	+5V power	+5V power	+5V power
14	GND	GND	GND
15	no connection	no connection	no connection

Notes

- Cables and connectors are not included and must be ordered separately.
- US Digital® warrants its products against defects in materials and workmanship for two years. See complete *warranty*[2] for details.

Part Number Guide and Configuration Options



EC35	CPR	Motor Poles	Bore Size	Index Gating	Output	Base	Packaging
	500 1000 1250 2000 2500 4000 5000 10000 20000 40000 60000	0 4 6 8 10 12	197 (5.0mm) 236 (6.0mm) 250 (1/4 in.) 315 (8.0mm) 375 (3/8 in.)	**H** (A/B High) **L** (A/B Low)	**C** (Open-Collector U/V/W) **D** (Differential U/V/W)	**D** (1.28 in. Diameter Bolt Circle, #2-56 x 3/16 in. Screws) **DM** (1.28 in. Diameter Bolt Circle, M2.5 x 5 Screws) **G** (1.812 in. Diameter Bolt Circle, #4-40 x 3/16 in. Screws) **GM** (1.812 in. Diameter Bolt Circle, M2.5 x 5 Screws)	**B** (Bulk)

PLEASE NOTE: This chart is for informational use only. Certain product configuration combinations are not available. Visit the *EC35 product page*[3] for pricing and additional information.

Reference Links

(1) Technical Bulletin TB1001 - Shaft and Bore Tolerances

(2) Legal Terms and Conditions, Warranty

(3) EC35 Commutation Motor Encoder