



EC35 Features

- Quick, simple assembly
- A/B/Z differential outputs
- U/V/W commutation outputs (differential or open-collector)
- 2,000 to 240,000 quadrature states per rev.
- Frequency response from DC up to 1 MHz
- Fits shaft diameters from 0.197 in. (5mm) to 0.375 in. (3/8 in.)
- Single 5V supply



EC35 Product Description

The EC35 quick assembly optical commutation encoder is designed for high volume, low cost, OEM motion control applications. The EC35 provides A/B/Z incremental outputs and U/V/W outputs for brushless motor commutation.



The EC35 is designed to be a one-time installation that mounts to the motor using 2 screws on a 1.28" or 1.812" diameter bolt circle. The precision machined encoder hubdisk pushes on when the encoder assembly is put on the motor shaft. This design securely grips the shaft without set screws. 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.

The EC35 is powered by a single 5V supply and comes with a 15-pin connector that provides differential outputs for A/B/Z and U/V/W. Open-collector U/V/W outputs are available as an option. Single ended output can be obtained by only using the + outputs of each differential pair. The internal 26C31 line drivers can source and sink 20 mA at TTL levels. The recommended differential receiver is the industry standard 26C32. Maximum noise immunity is achieved when the differential receiver is terminated with a 150 Ω resistor in series with a .0047 μ F capacitor placed across each differential pair.

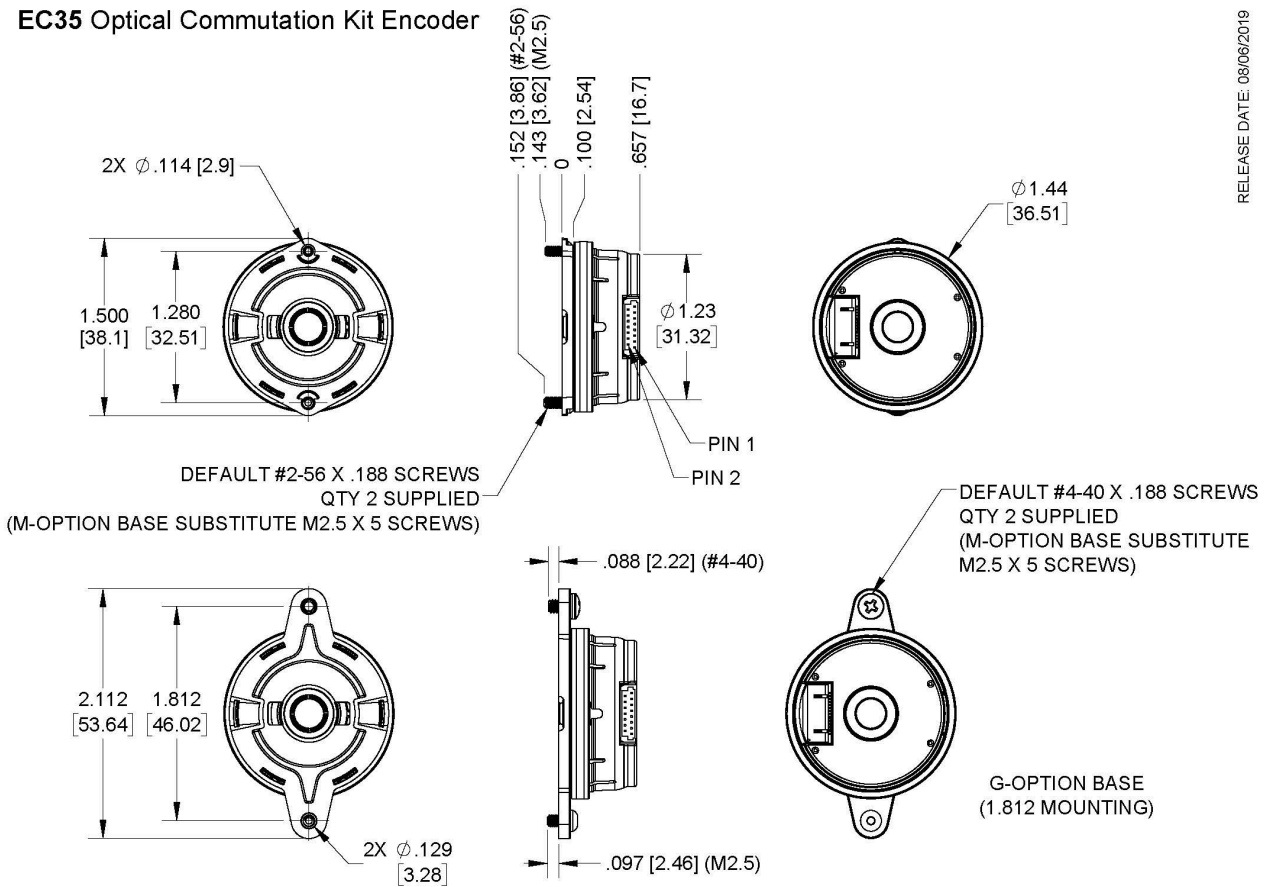
Please Note: Due to the EC35's push-on hub design, it is recommended for use as a one-time installation.



Mechanical Drawings

EC35 Optical Commutation Kit Encoder

RELEASE DATE: 08/06/2019



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UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

Specifications

ENVIRONMENTAL

PARAMETER	PARAMETER	UNITS
Operating Temperature	-20 to 105	C
Vibration, 10Hz to 2kHz, sinusoidal	20	G
Shock, 6 millisecond, half-sine	75	G
Electrostatic Discharge, IEC 61000-4-2	±12	kV



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	$((24 \times 10^6) / \text{CPR})$	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	6.48×10^{-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 (https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/)	

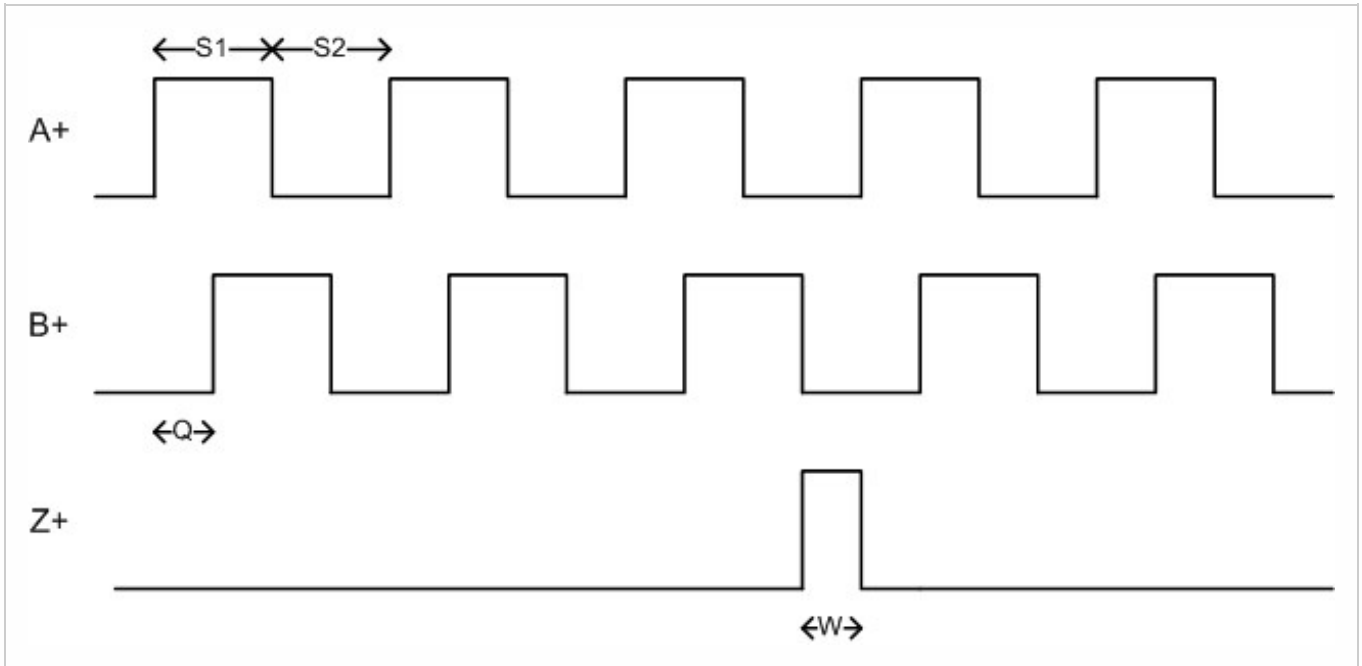


ELECTRICAL

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



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"

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

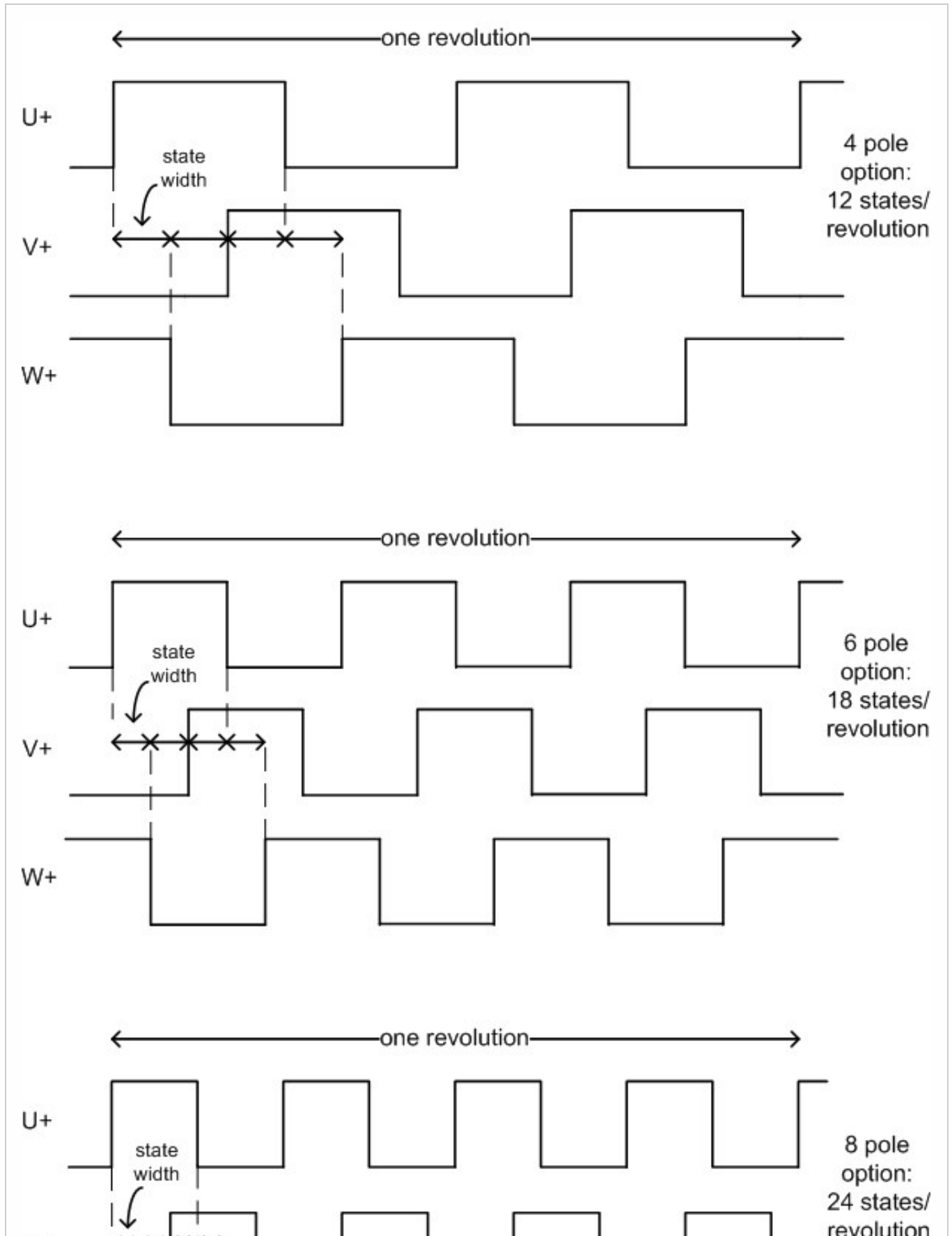
Use: Base Mounting

Quantity Required: 2

Screws are included

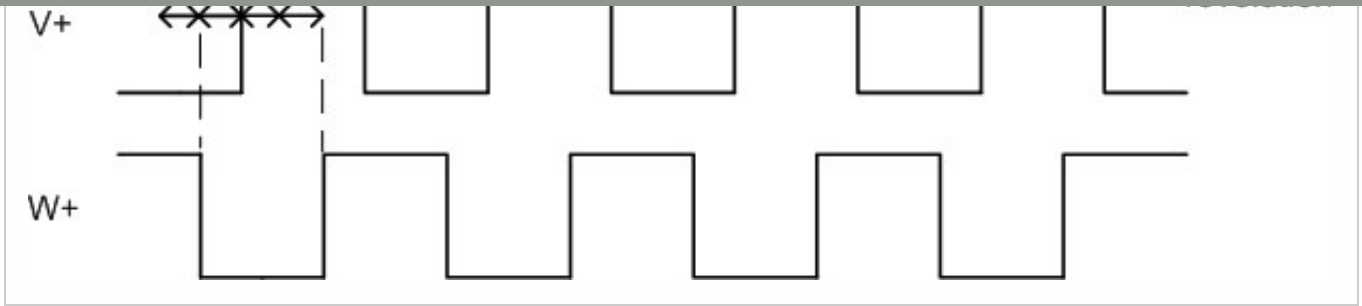


COMMUTATION OUTPUT TIMING





EC35 OPTICAL COMMUTATION KIT ENCODER



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



ASSEMBLY INSTRUCTIONS



Download the EC35 Assembly Instructions (<https://www.usdigital.com/media/2ywoyys5/ec35-assembly-instructions.pdf>)

Download the EC35 Removal Instructions (<https://www.usdigital.com/media/4k1f3oyw/ec35-removal-instructions.pdf>)

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 (<https://www.usdigital.com/company/warranty>) for details.