

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 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.

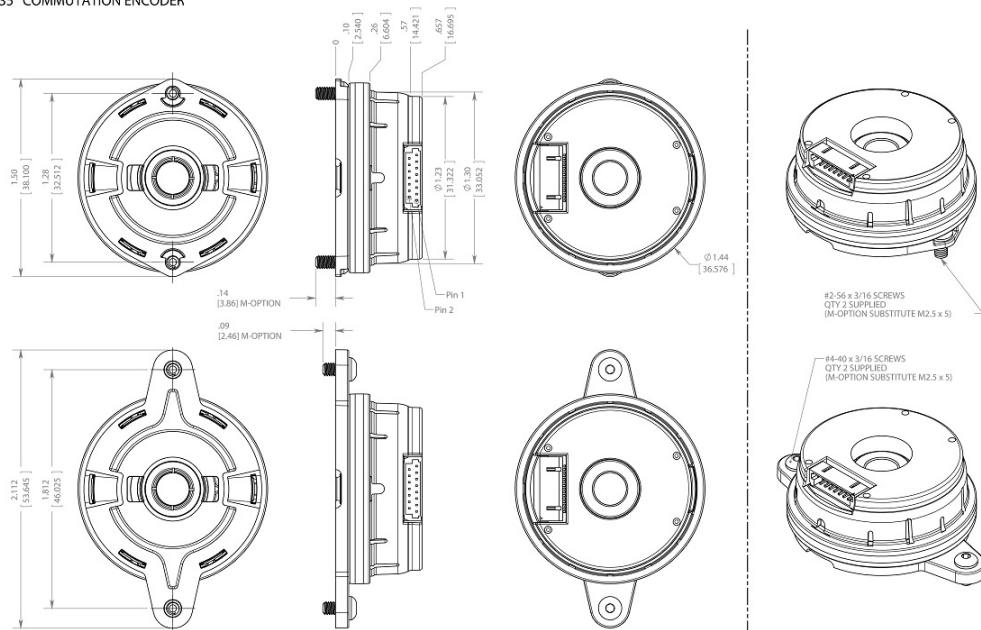


Features

- ▶ Quick, simple assembly
- ▶ A/B/Z differential outputs
- ▶ U/V/W commutation outputs (differential or open-collector)
- ▶ Frequency response from DC up to 1 MHz
- ▶ 500 to 10000 cycles per rev. (CPR)
- ▶ 2000 to 40000 quadrature states per rev.
- ▶ Fits shaft diameters from 0.197" (5mm) to 0.375" (3/8")
- ▶ Single 5V supply

Mechanical Drawing

EC35 COMMUTATION ENCODER



RELEASE DATE: 3/7/2012

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UNITS: INCHES (MM) METRIC DIMENSIONS FOR REFERENCE ONLY

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	Min.	Max.	Units
Codewheel Moment of Inertia		6.48 x 10 ⁻⁵	oz-in-s ²
Required Shaft Length (for center hole encoder cover)	0.5	0.565	in.
Shaft Axial Play	-0.003	0.003	in.
Mounting Shaft Total Runout	-	0.001	in.
Acceleration	-	250000	rad/sec ²
Maximum RPM, CPR ≤ 2500 e.x. CPR = 2500, max. rpm = 9600	-	2400000/CPR	RPM
Maximum RPM, CPR = 4000		12000	RPM
Maximum RPM, CPR = 10000		6000	RPM

Parameter	Min.	Max.	Units
Base to Mounting Surface Screw Torque	-	3	in-lbs
Technical Bulletin TB1001 - Shaft and Bore Tolerances			Download

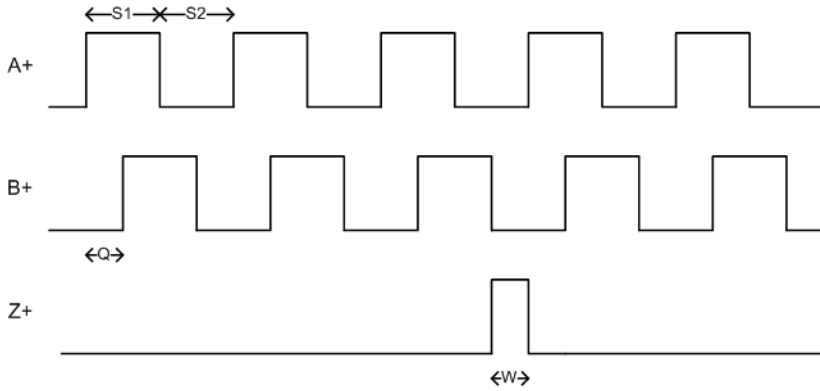
Materials

Part	Material
Base/Housing	20% glass filled PBT
Codewheel	Aluminum/Mylar

Electrical

Specifications	Min.	Typ.	Max.	Units	Notes
Supply Current					
CPR ≤ 2500		13	17	mA	no output load, max. frequency output
CPR > 2500		37	44		
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 ≤ 2500			400	kHz	
Frequency Response, CPR = 4000			800	kHz	
Frequency Response, CPR = 10000			1	MHz	

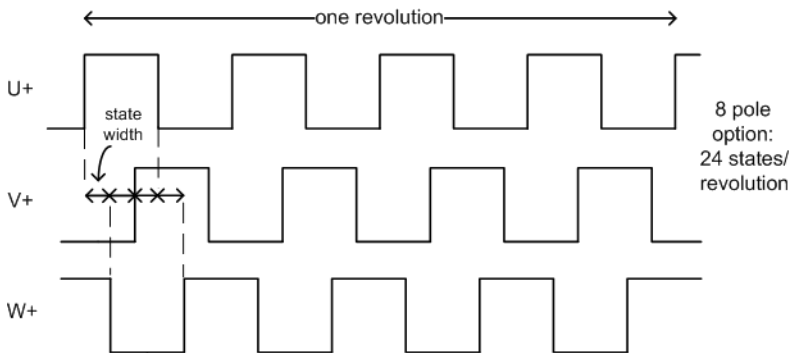
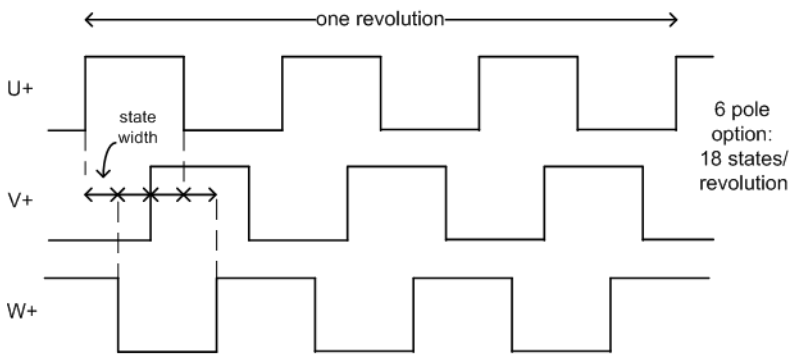
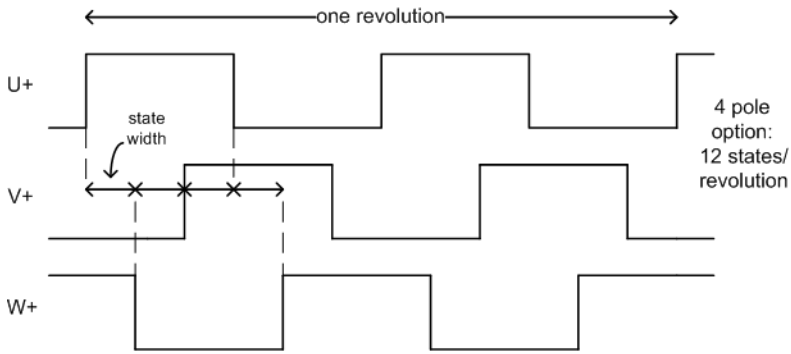
Incremental Output Timing



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.

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

Assembly Instructions

EC35 Assembly Instructions - <http://usdigital.com/assets/assembly/EC35%20Assembly%20Instructions.pdf>

EC35 Removal Instructions - <http://usdigital.com/assets/assembly/EC35%20Removal%20Instructions.pdf>

Ordering Information

EC35 - - - - - - -

CPR	Motor Poles	Bore	Index Gating	Output	Base	Packaging
500 =	0	197 =	H =A/B High	D =Differential	D =1.28" diam. bolt	B =Encoder components packaged in bulk - One centering tool per 10 encoders
1000 =	4 =	5mm	L =A/B Low	A/B/Z and	circle mount, #2-56	
2000 =	6 =	236 =		Differential U/V/W	x 3/16 screws (qty.	
2500 =	8 =	6mm		C =Differential	2)	
4000 =	10 =	250 =		A/B/Z and Open-	DM =1.28" diam.	
10000 =	12 =	1/4"		collector U/V/W	bolt circle mount,	
		315 =			M2.5 x 5 screws	
		8mm			(qty. 2)	
		375 =			G =1.812" diam.	
		3/8"			bolt circle mount,	
					#4-40 x 3/16	
					screws (qty. 2)	
					GM =1.812" diam.	
					bolt circle mount,	
					M2.5 x 5 screws	
					(qty. 2)	

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 for details.