



EC35 Features

- Now 500 to 60,000 CPR
- 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. The EC35 can obtain single-ended output 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.

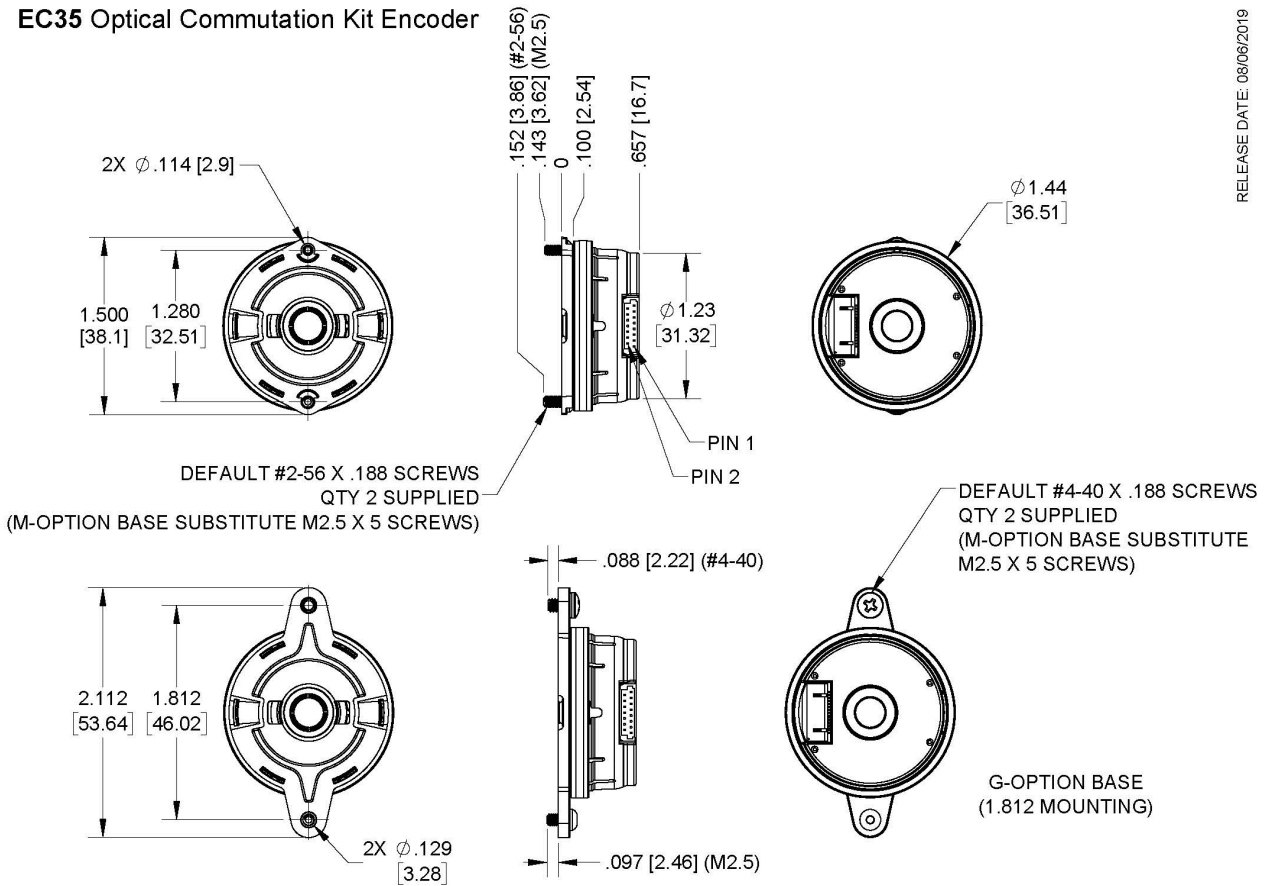
Mechanical Drawings



EC35 Optical Commutation Kit Encoder

RELEASE DATE: 08/09/2019

EC35 Optical Commutation Kit Encoder



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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 | \pm 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/) | |

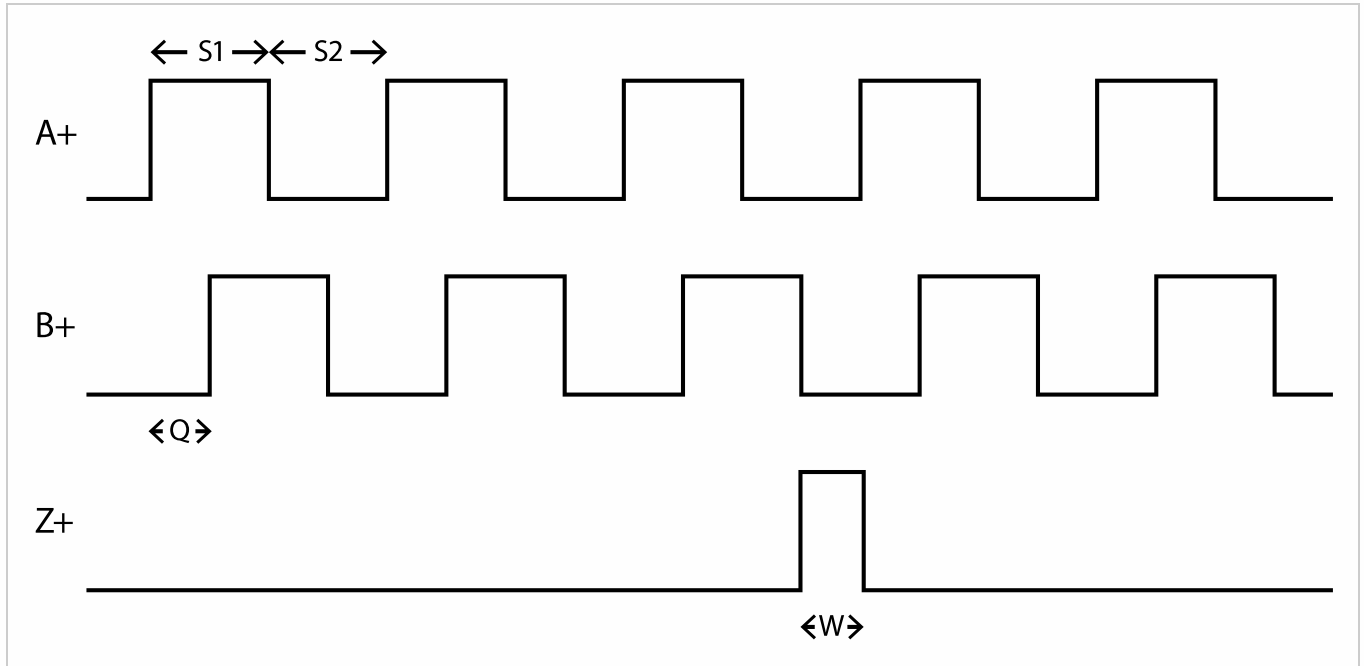


ELECTRICAL

| 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 | $I_{oh} = -8 \text{ mA}$ |
| Differential Low Level Output | | | 0.5 | V | $I_{ol} = 8 \text{ mA}$ |
| Differential Rise/Fall Time | | 100 | | ns | |
| Open collector pullup voltage | | | 30 | V | $I_{load} = 100 \text{ mA}$ |
| Open collector "on" resistance | | 0.2 | | ohm | $I_{load} = 100 \text{ mA}$ |
| 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

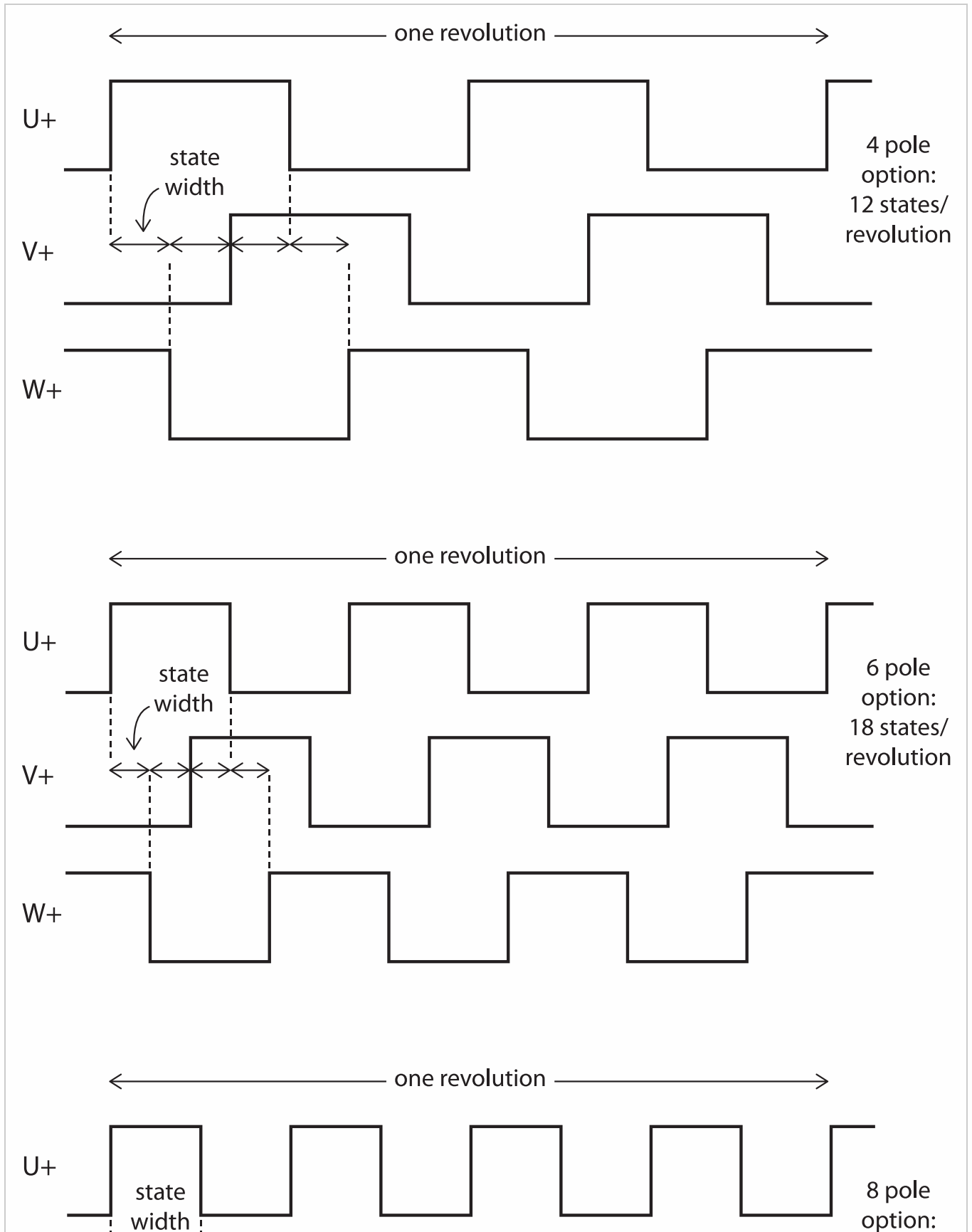
Use: Base Mounting

Quantity Required: 2

Screws are included

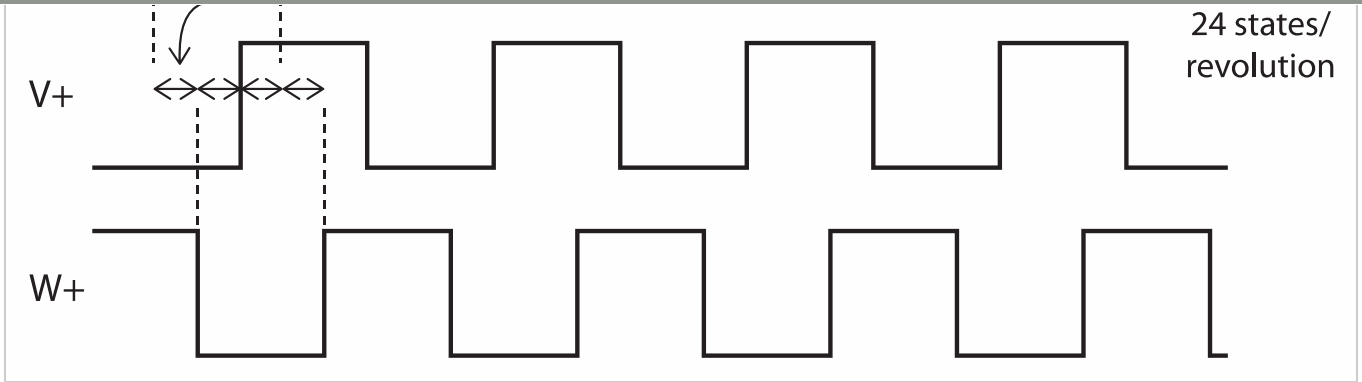


COMMUTATION OUTPUT TIMING





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 |

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.