

E6 Features

- Kit Version for mounting on a motor or other shaft
- Supports 22 shaft sizes (2 to 25 mm and 1/8 in. to 1 in.)
- For NEMA 23 to NEMA 34 and larger motors
- 21 Resolutions from 64 to 10,000 CPR (256 to 40,000 PPR)
- Optional Index channel, Differential and High-Voltage Outputs
- Choice of 2 base styles and 2 cover options
- Secure latching connector/cable (sold separately)



E6 Product Description

US Digital's E6 motor encoder mounts directly to a motor or other rotating shaft. This optical encoder features a rugged, glass-filled polymer housing and is designed for easy installation and removal.



The E6 rotary encoder contains a precision-machined aluminum hub with a specially patterned Mylar disk. This disk, in combination with our proprietary optical encoder module, creates a system that is highly tolerant to mechanical misalignment.

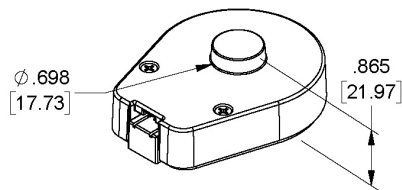
The E6 is a versatile motor encoder with two base configurations and two cover styles, which allows it to fit a wide range of applications. This optical rotary encoder also has four available outputs—single-ended, single-ended High-Voltage, differential, and Avago single-ended and differential. This incremental encoder is designed for use with a secure latching connector—connector/cable sold separately.

Mechanical Drawings

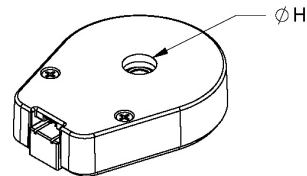
E6 Optical Kit Encoder (Base & Cover Options, 5-Pin Version Shown)

RELEASE DATE: 10/31/2025

E-OPTION COVER
(EXTENSION FOR SHAFT
LENGTHS UP TO .750 [19.05])

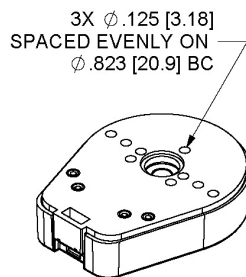


H-OPTION COVER
(COVER HOLE FOR SHAFT
LENGTHS OVER .750 [19.05])

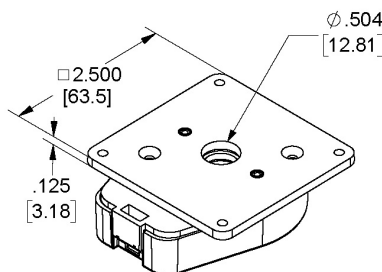


H=.438 [11.13] FOR BORE SIZES $\leq \phi .394$ [10]
H=1.047 [26.59] FOR BORE SIZES $> \phi .394$ [10]

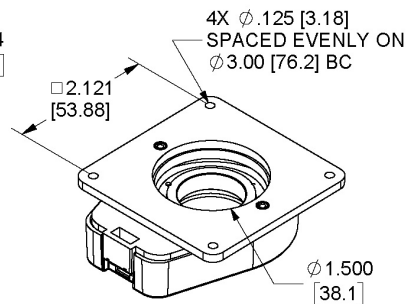
3-OPTION BASE
(LARGER MOUNTING HOLES)



M-OPTION BASE
(MOUNTING PLATE)
REQUIRES MINIMUM .570 [14.48] SHAFT LENGTH



FOR BORES $\leq \phi .394$ [10]



FOR BORES $> \phi .394$ [10]

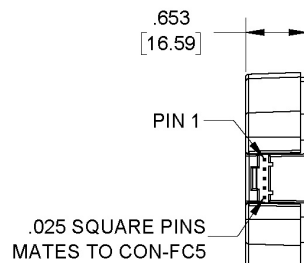
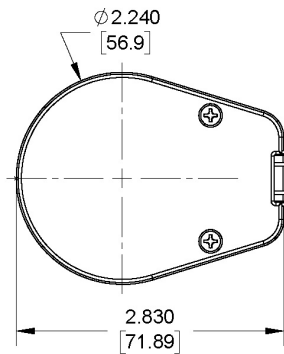
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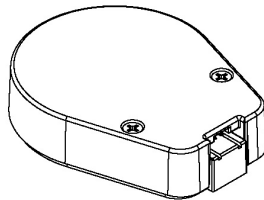
Local: 360.260.2468
Toll-free: 800.736.0194

UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

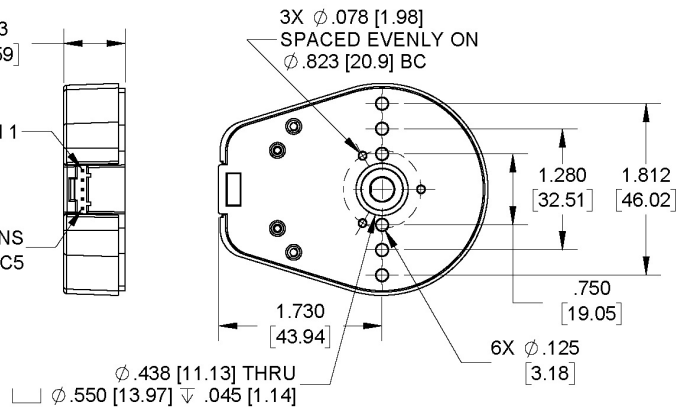
E6 Optical Kit Encoder, 5-Pin Version (Default)



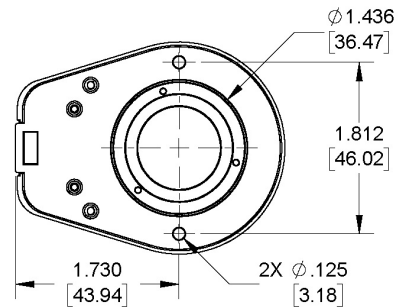
.025 SQUARE PINS
MATES TO CON-FC5



DEFAULT BASE FOR BORES $\leq \phi .394$ [10]



DEFAULT BASE FOR BORES $> \phi .394$ [10]



RELEASE DATE: 10/31/2025

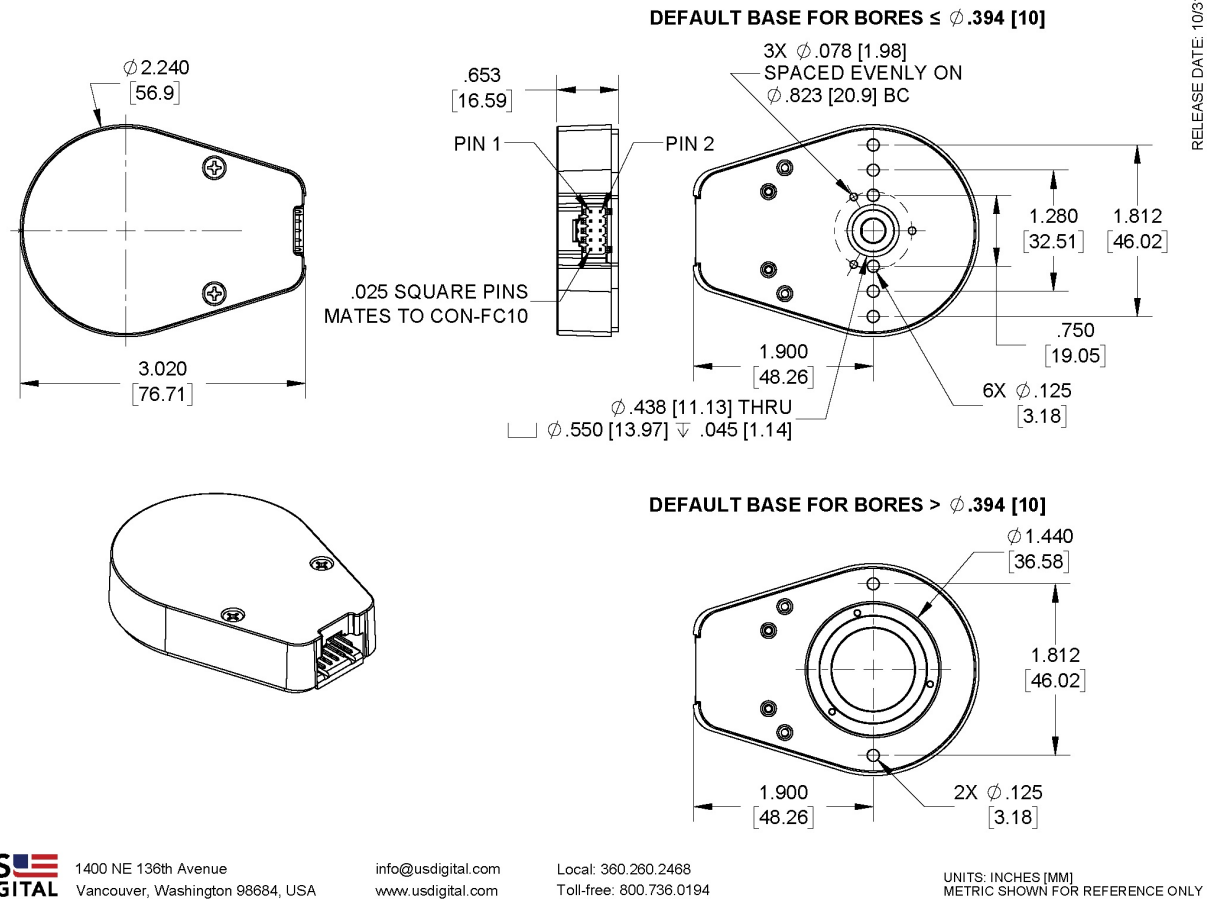
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UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

E6 Optical Kit Encoder, 10-Pin Version (Default)



RELEASE DATE: 10/31/2025

Specifications

ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature (CPR < 3600)	-40 to 100	C
Operating Temperature (CPR $\geq$ 3600)	-25 to 100	C
Electrostatic Discharge		
Single-ended (-A, -S version), IEC 61000-4-2	± 4	kV
Differential (-D, -L version), Human Body Model	± 2	
High-Voltage, Open-collector (H, C option), IEC 61000-4-2	± 4	
Vibration (10Hz to 2kHz, sinusoidal)	20	G
Shock (6 milliseconds, half sine)	75	G



E6 Optical Kit Encoder

SHOCK (0.1 millisecond, half-sine)

PARAMETER

VALUE

UNITS

MECHANICAL

PARAMETER	VALUE	UNITS
Max. Shaft Axial Play	±0.010	in.
Max. Shaft Runout	0.004 T.I.R.	in.
Max. Acceleration	250000	rad/sec ²
For CPR ≤ 2500: Max. RPM (1) Max. A/B Frequency e.x. CPR=2500, Max. RPM=7200 e.x. CPR=100, Max. RPM=60000	minimum value of ((18 x 10 ⁶) / CPR) and (60000) 300	RPM kHz
For CPR = 3600, 4000, 4096, 5000: Max. RPM (1) Max. A/B Frequency	(21.6 x 10 ⁶) / CPR 360	RPM kHz
For CPR = 7200, 8000, 8192, 10000: Max. RPM (1) Max. A/B Frequency	(43.2 x 10 ⁶) / CPR 720	RPM kHz
Typical Product Weight Single-Ended (S option) Differential (D, L option) High-Voltage, Open-Collector (H, C option)	1.55 1.83 1.83	oz.
Codewheel Moment of Inertia	8.9 x 10 ⁻⁵ for bore < 12mm 4.0 x 10 ⁻⁴ for bore ≥ 12 mm	oz-in-s ²
Hub Set Screw	#3-48 or #4-48	
Hex Wrench Size	0.050	in.
Encoder Base Plate Thickness	0.135	in.
3 Mounting Screw Size	#0-80	
2 Mounting Screw Size	#2-56 or #4-40	
3 Screw Bolt Circle Diameter (2)	0.823 ± 0.005	in.
2 Screw Bolt Circle Diameter	0.750 ± 0.005	in.
Required Shaft Length (3) With E-option (2) With H-option	0.445 to 0.570 0.445 to 0.750 > 0.445	in.
Index Alignment to Hub Set Screw	180 Typical	degrees

(1) 60000 RPM is the maximum rpm due to mechanical considerations. The maximum RPM due to the module's maximum frequency

response is dependent upon the module's resolution (CPR).

(2) Only for shaft diameters < 0.472".

(3) Add 0.125" to all required shaft lengths when using M-option.

TORQUE SPECIFICATIONS

PARAMETER	VALUE	TORQUE
Hub Set Screw	2-3	in-lbs
Cover Screw	2-4	in-lbs
Base Mounting Screw (#0-80)	1-2	in-lbs
Base Mounting Screw (#2-56)	2-3	in-lbs
Base Mounting Screw (#4-40)	4-6	in-lbs
Adapter Plate Mounting Surface (#2-56 screws)	2-3	in-lbs
Adapter Plate Mounting Surface (#4-40 screws)	4-6	in-lbs
Module Mounting Screw	3.5-4	in-lbs

PHASE RELATIONSHIP

SINGLE-ENDED (S) / DIFFERENTIAL (D) / HIGH-VOLTAGE (H) / OPEN-COLLECTOR (C) OPTION:

A leads B for clockwise shaft rotation, and B leads A for counterclockwise rotation as viewed from the cover side of the encoder.

BROADCOM / AVAGO COMPATIBLE PIN-OUT (A, L) OPTION:

B leads A for clockwise shaft rotation, and A leads B for counterclockwise rotation as viewed from the cover side of the encoder.

SINGLE-ENDED OPTION

- S option provides 5V TTL compatible outputs
- Specifications apply over the entire operating temperature range
- Typical values are specified at $V_{CC} = 5.0V_{DC}$ and 25°C
- For complete details, see the EM1 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em1/>) and EM2 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em2/>) product pages

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	33	mA	CPR < 1000, no load
		54	62	mA	CPR ≥ 1000 and < 3600, no load
		72	85	mA	CPR ≥ 3600, no load
Low-level Output			0.5	V	I _{OL} = 8mA max., CPR < 3600
			0.5	mA	I _{OL} = 5mA max., CPR ≥ 3600
		0.05		mA	no load, CPR < 3600
		0.25		mA	no load, CPR ≥ 3600
High-level Output	2.0			V	I _{OH} = -8mA max., CPR < 3600
	2.0			V	I _{OH} = -5mA max., CPR ≥ 3600
		4.8		V	no load, CPR < 3600
		3.5		V	no load, CPR ≥ 3600
Output Current Per Channel	-8		8	mA	CPR < 3600
	-5		5	mA	CPR ≥ 3600
Output Rise Time		110		nS	CPR < 3600
		50		nS	CPR ≥ 3600
Output Fall Time		35		nS	CPR < 3600
		50		nS	CPR ≥ 3600

DIFFERENTIAL OPTION

- D Option provides differential line driver output
- Specifications apply over the entire operating temperature range
- Typical values are specified at $V_{CC} = 5.0V_{DC}$ and $25^{\circ}C$
- For complete details, see the EM1 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em1/>) and EM2 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em2/>) product pages

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		29	36	mA	CPR < 1000, no load
		56	65	mA	CPR $\geq$ 1000 and < 3600, no load
		74	88	mA	CPR $\geq$ 3600, no load
Low-level Output		0.2	0.4	V	$I_{OL} = 20mA$ max.
High-level Output	2.4	3.4		V	$I_{OH} = -20mA$ max.
Differential Output Rise/Fall Time			15	nS	

HIGH-VOLTAGE OPTION

- H option uses a higher supply voltage and provides both single-ended and open-collector outputs
- Single-ended outputs are 5V TTL compatible (same as S option). See Pin-out.
- Specifications apply over the entire operating temperature range
- For complete details, see the EM1 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em1/>) or EM2 (<https://www.usdigital.com/products/encoders/incremental/components/modules/em2/>) product pages

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Voltage	7.5		30.0	V	
Supply Current, 24V power		8	10	mA	CPR < 500, no load
		16	19	mA	CPR $\geq$ 500 and < 2000, no load
		22	25	mA	CPR $\geq$ 2000, no load
Open Collector "On" Resistance		2		ohms	
Open Collector Sink Current			200	mA	
Output Low Voltage		0.4		V	200 mA sink current

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Open Collector Pullup Voltage			50	V	

PIN-OUTS

5-PIN SINGLE-ENDED S OPTION (1)		10-PIN DIFFERENTIAL D OPTION (2)		10-PIN DIFFERENTIAL L OPTION (2)(3)		10-PIN SINGLE-ENDED A-OPTION (2)(3)	
Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	Ground	1	Ground	1	No connection	1	A channel
2	Index	2	Ground	2	+5VDC power	2	+5VDC power
3	A channel	3	Index-	3	Ground	3	Ground
4	+5VDC power	4	Index+	4	No connection	4	No connection
5	B channel	5	A- channel	5	A- channel	5	No connection
		6	A+ channel	6	A+ channel	6	Ground
		7	+5VDC power	7	B- channel	7	+5VDC power
		8	+5VDC power	8	B+ channel	8	B+ channel
		9	B- channel	9	Index-	9	+5VDC power
		10	B+ channel	10	Index+	10	Index

10-PIN HIGH-VOLTAGE H OPTION (2)

Pin Description

1	Ground
2	Ground
3	Index- (open collector)
4	Index+ (single-ended)
5	A- channel (open collector)
6	A+ channel (single-ended)
7	7.5-30V power
8	7.5-30V power
9	B- channel (open collector)

10-PIN HIGH-VOLTAGE (Single-ended) H OPTION (2)

- (1) 5-pin single-ended mating connector is CON-FC5 (<https://www.usdigital.com/products/accessories/connectors/con-fc5/>).
 (2) 10-pin differential mating connector is CON-FC10 (<https://www.usdigital.com/products/accessories/connectors/con-fc10/>).
 (3) Broadcom / Avago compatible version.

ACCESSORIES

1. Centering Tool

Part #: CTOOL - (Shaft Diameter)

This reusable tool centers the shaft within the encoder base during assembly. It is required for the proper functioning of the encoder.

2. Hex Tool

Part #: HEXD-050

Hex driver, 0.050" flat-to-flat for #3-48 or #4-48 set screws. Included with **-B** or **-1** packaging options for order quantities of 10 or more.

Part #: HEXW-050

Hex wrench, 0.050" flat-to-flat for #3-48 or #4-48 set screws. Included with **-B** or **-1** packaging options for order quantities of 9 or less.
 Included with **-3** packaging option for all order quantities.

3. Spacer Tool

This reusable tool sets the proper spacing between the disk and sensor during assembly. It is required for the proper functioning of the encoder.

Part #: SPACER-E6S

Description: For shaft sizes < 0.472"

Part #: SPACER-E6L

Description: For shaft sizes 12mm to 1"

4. Screws

Part #: SCREW-080-250-PH

Description: Pan Head, Philips #0-80 UNF x 1/4"

Use: Base Mounting

Quantity Required: 3

Screws are not included

Part #: SCREW-256-250-PH

Description: Pan Head, Philips #2-56 UNC x 1/4"

Use: Base Mounting

Quantity Required: 2

Screws are not included

Part #: SCREW-348-125-SS

Description: Socket Head Set Screw, 3-48 UNC x 1/8"

Use: Hub/Disk Mounting for 12mm - 1" Bore

Quantity Required: 2

Screws are included

Part #: SCREW-440-250-PH

Description: Pan Head, Philips #4-40 UNC x 1/4"

Use: Base Mounting

Quantity Required: 2

Screws are not included

**Part #: SCREW-440-500-PH**

Description: Pan Head, Phillips #4-40 UNC x 1/2"

Use: Module Mounting

Quantity Required: 2

Screws are included

Part #: SCREW-440-625-FH

Description: Flat Head, Phillips 4-40 UNC x 5/8"

Use: Cover Mounting

Quantity Required: 2

Screws are included

Part #: SCREW-448-063-SS

Description: Socket Head Set Screw, 4-48 UNC x 1/16"

Use: Hub/Disk Mounting for 5/16" - 10mm Bore

Quantity Required: 1

Screw is included

Part #: SCREW-448-125-SS

Description: Socket Head Set Screw, 4-48 UNC x 1/8"

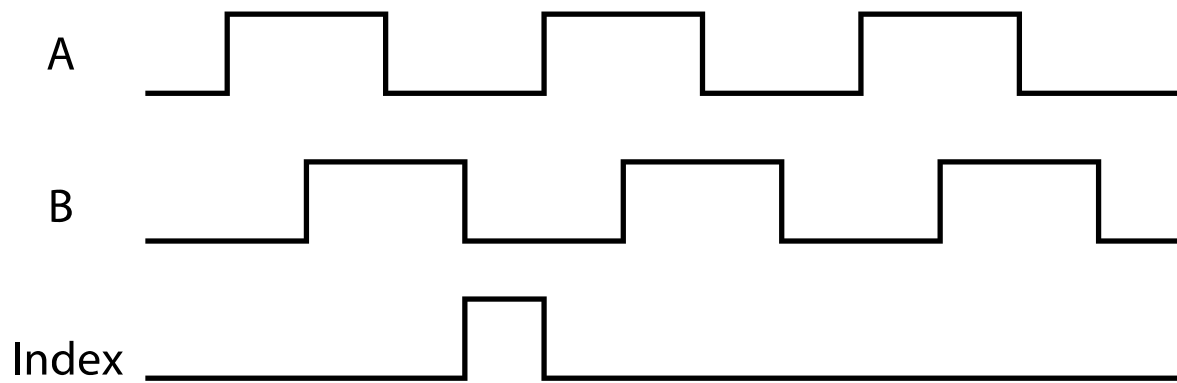
Use: Hub/Disk Mounting for 2mm - 1/4" Bore

Quantity Required: 1

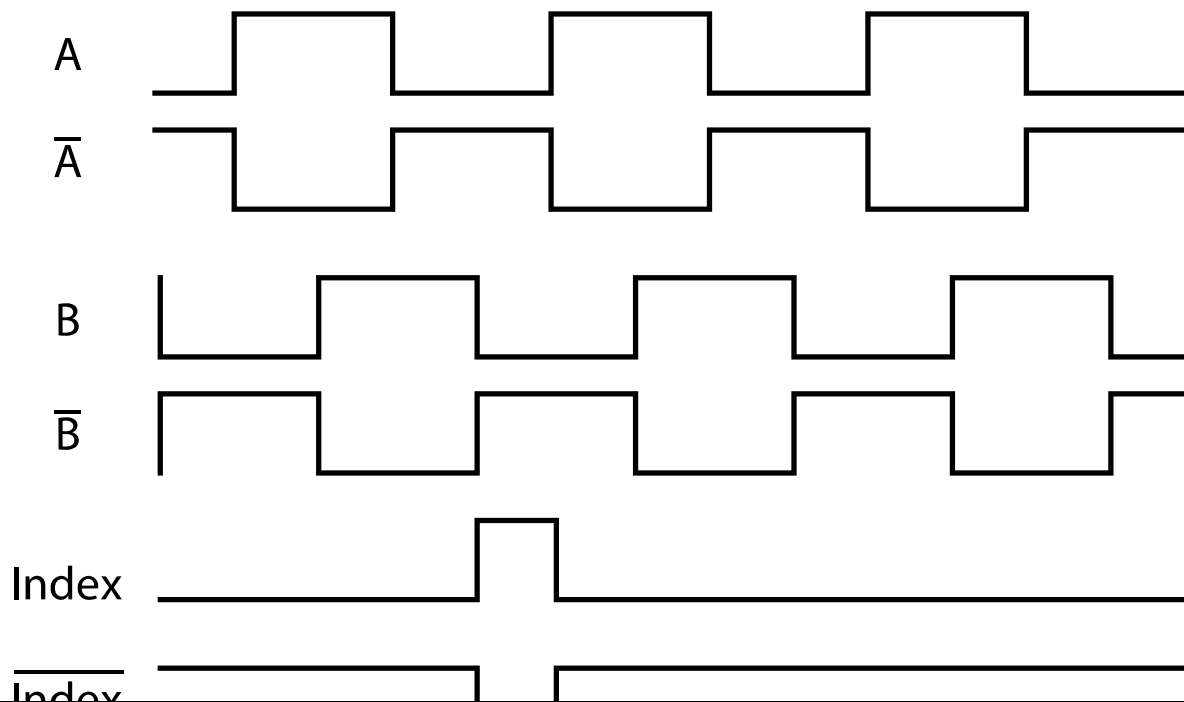
Screw is included

OUTPUT WAVEFORMS

SINGLE-ENDED



DIFFERENTIAL





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.

Configuration Options

E6	CPR (Cycles Per Revolution)	Bore Size	Index	Output	Cover	Base	Packaging
		079 (2.0mm)	IE (Index)	S (Single-Ended)	D (Default)	D (Default)	Bulk (B) - Includes one centering, hex and spacer tool per order, plus an extra set per 100 encoders.
	64	118 (3.0mm)	NE (Non-Index)	H (Single-Ended High-Voltage)	E (Extended)	3 (1/8" Mounting Holes)	Individual (1) - Includes one centering, hex, and spacer tool per order, plus an extra set per 100 encoders.
	100	125 (1/8")			H (Through-Hole)	M (3" Diameter Bolt Circle)	Individual (3) - Includes one centering, hex, and spacer tool with each encoder.
	200	156 (5/32")		D (Differential)			
	400	157 (4.0mm)		L (Avago 10-pin Differential)			
	500	188 (3/16")		A (Avago 10-pin Single-Ended)			
	512	197 (5.0mm)					
	800	236 (6.0mm)					
	1000	250 (1/4")					
	1024	313 (5/16")					
	1800	315 (8.0mm)					
	2000	375 (3/8")					
	2048	394 (10.0mm)					
	2500	472 (12.0mm)					
	3600	500 (1/2")					
	4000	551 (14.0mm)					
	4096	625 (5/8" Bore)					
	5000	750 (3/4" Bore)					
	7200	787 (20.0mm)					
	8000	875 (7/8")					
	8192	984 (25.0mm)					
	10000	1000 (1")					

PLEASE NOTE: This chart is for informational use only. Certain product configuration combinations are not available. Visit the E6 product page (<https://www.usdigital.com/products/E6>) for pricing and additional information.

