

HR12 HEDS Compatible Optical Encoder

Design Features:

- Mount compatible with HEDS encoders
- Bearing design simplifies encoder attachment
- Resolutions up to 20,000 lines per revolution
- 4, 6 or 8 pole commutation
- Differential line drivers
- Protective enclosure
- Multiple Bolt Circle mounting
- Through shaft sizes up to 0.375" (10mm) Diameter
- High Noise Immunity
- Cost Competitive with Modular Encoders
- 500 kHz Frequency Response
- RoHS Construction
- No Centering Tools Required For Easy Assembly



Description:

Encoder Model HR12 provides an improved feedback solution in applications typically using modular encoders. The HR12 provides feedback capabilities where the others leave off – high line count resolution, high temperature operation, rugged bearing construction, large tolerance to radial and axial shaft play, commutation for brushless motor control, with a strain relieved cable. Quadrature output with index pulse and three-phase commutation provided with industrial 26C31 differential drivers. A flexible member allows for much greater tail shaft run out and TIR than can be tolerated by modular encoder designs, plus it provides 30 degrees of rotation for commutation timing.

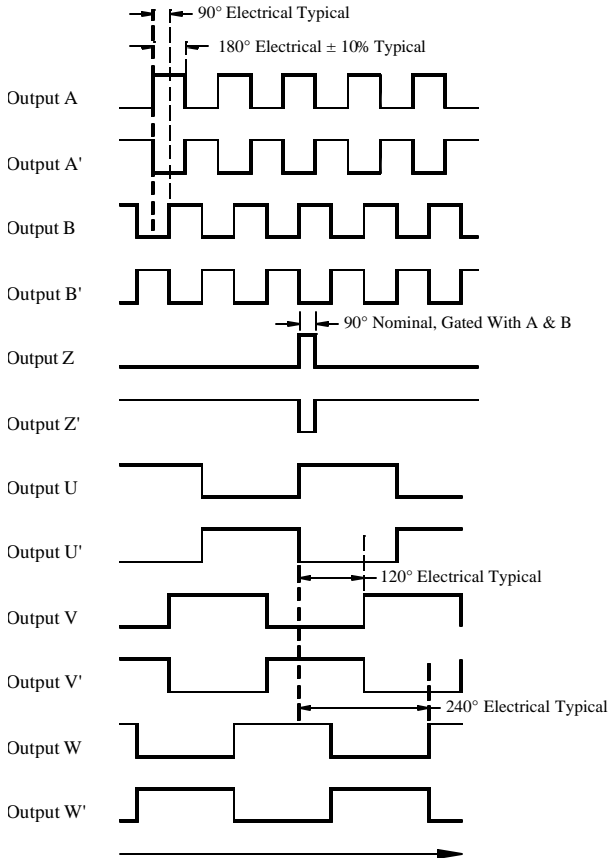
Ordering Information

Sample: HR12-1000-4-A-B-L-C-A

Model	PPR	Poles	Electrical	Hub Configuration	Hub Size	Mounting	Index
HR12	24*	2048	0= 0	A= RS422 (TTL)	H= HEDS Compatible Configuration	C= 5mm	A= Gated to AB, 90deg
	256	2500	4= 4	B= oc UVW	D= 6mm	H= HEDS	
	360	4000	6= 6		E= 8mm		
	500	4096	8= 8		F= 10mm		
	512	5000			L= .25"		
	1000	8192			M= .3125"		
	1024	10000			N= .375"		
	1250	16384					
	2000	20000					

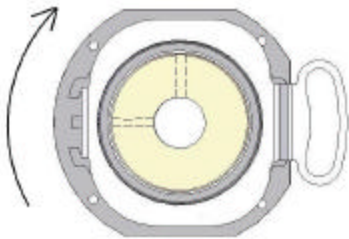
Consult Factory For Configurations Not Shown, * 24PPR only available 0 poles.

Output Waveforms



Clockwise Shaft Rotation as Viewed Looking at the Encoder Face. See Figure Below.

CW Rotation for Output Waveforms



Hub set screw location at Z index position

ISO 9001
CERT. NO. FM 52711

Electrical Specifications

Input Voltage	5 VDC \pm 5%
Input Current Requirements	65mA Typ., 100mA Max Plus Interface Loads
Input Ripple	2% Peak to Peak @ 5 VDC
Output Circuits	(A) 26C31 RS 422A Line Driver (TTL Compatible) (B) ABZ Line Driver, UVW Open Collector (No U' V' W')
Incremental Output Format	Quadrature with A leading B for CW rotation. Index Pulse true over A and B High.
Frequency Response	500 kHz
Symmetry	180 Degrees \pm 10% Typical
Minimum Edge Separation	<4000PPR = 54 electrical degrees \geq 4000PPR = 45 electrical degrees
Commutation Format	Three Phase 4, 6 or 8 poles
Commutation Accuracy	\pm 1° mechanical
Z channel to U channel	\pm 1° mechanical

Environmental Specifications

Storage Temperature	-40 to 125° C
Operating Temperature	-20 to 115° C
IP Rating	52
Humidity	90% Non-Condensing
Vibration	20 g's @ 50 to 500 CPS
Shock	50 g's @ 11mS Duration

Mechanical Specification

Through Shaft Diameter	0.250", 0.3125", 0.375", 5mm 6mm .8mm, 10mm Tolerance: -0.0000, + 0.0006"
Recommended Shaft Engagement	.50" Minimum
Radial Shaft Movement Max.	0.007" TIR (Shaft eccentricity plus radial play)
Axial Shaft Movement	\pm 0.030"
Maximum Shaft Speed	8000 RPM
Interface Connector	Connector: JAE P/N F1-W15P-HFE
Mounting	HEDS Compatible: 0-80 screw 3 places on .823" circle 2-56 screw 2 places on .750" circle
Moment of Inertia	9.1×10^{-5} oz-in-S ²
Acceleration	1×10^5 Radians/S ²
Accuracy	Instrument Error 1.5 arc min. max

15 Pin Connector

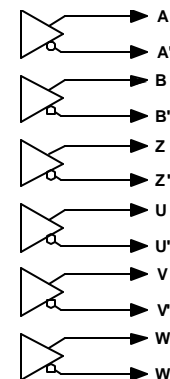
JAE P/N: F1-W15P-HFE

Pin Number	Function
1	A
2	A -
3	B
4	B -
5	Z
6	Z -
7	U
8	U - *
9	V
10	V - *
11	W
12	W - *
13	Vcc
14	GND
15	Open

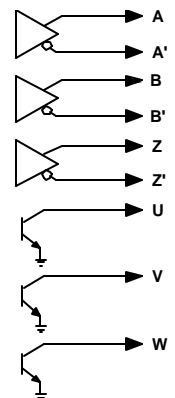
* U-, V- and W- not present for open-collector UVW Electrical Option.

Electrical Output Circuits

A) 26C31 (RS422)



B) 26C31 ABZ, Open Collector UVW



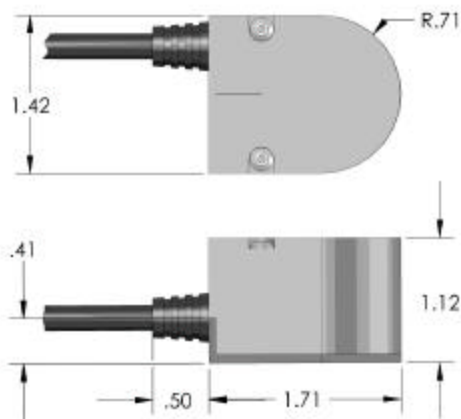
- ◆ 26C31 Sink/Source Current (max) = 20ma (meets RS-422 at 5vdc supply).
- ◆ Open Collector Sink Current (max) = 30ma
- ◆ Open Collector Pull Up Voltage (max) = 30vdc

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*Quantum Devices, Inc. reserves the right to make changes in design, specifications and other information at any time without prior notice.

DIMENSIONS



Motor Mounting Considerations

3 SCREW MOUNTING 0-80
3 PLCS-EQUALLY SPACED
ON .823 DIAMETER CIRCLE

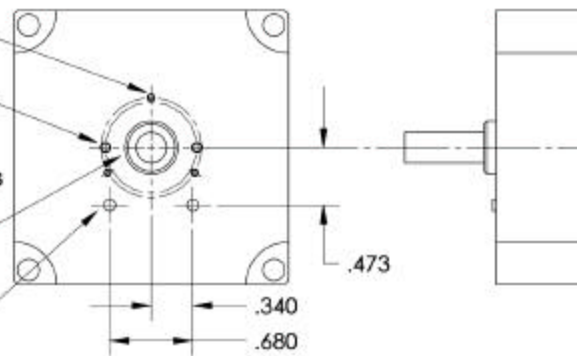
2 SCREW MOUNTING 2-56
2 PLCS-EQUALLY SPACED
ON .750 DIAMETER CIRCLE

± 0.010 " Motor Shaft Center

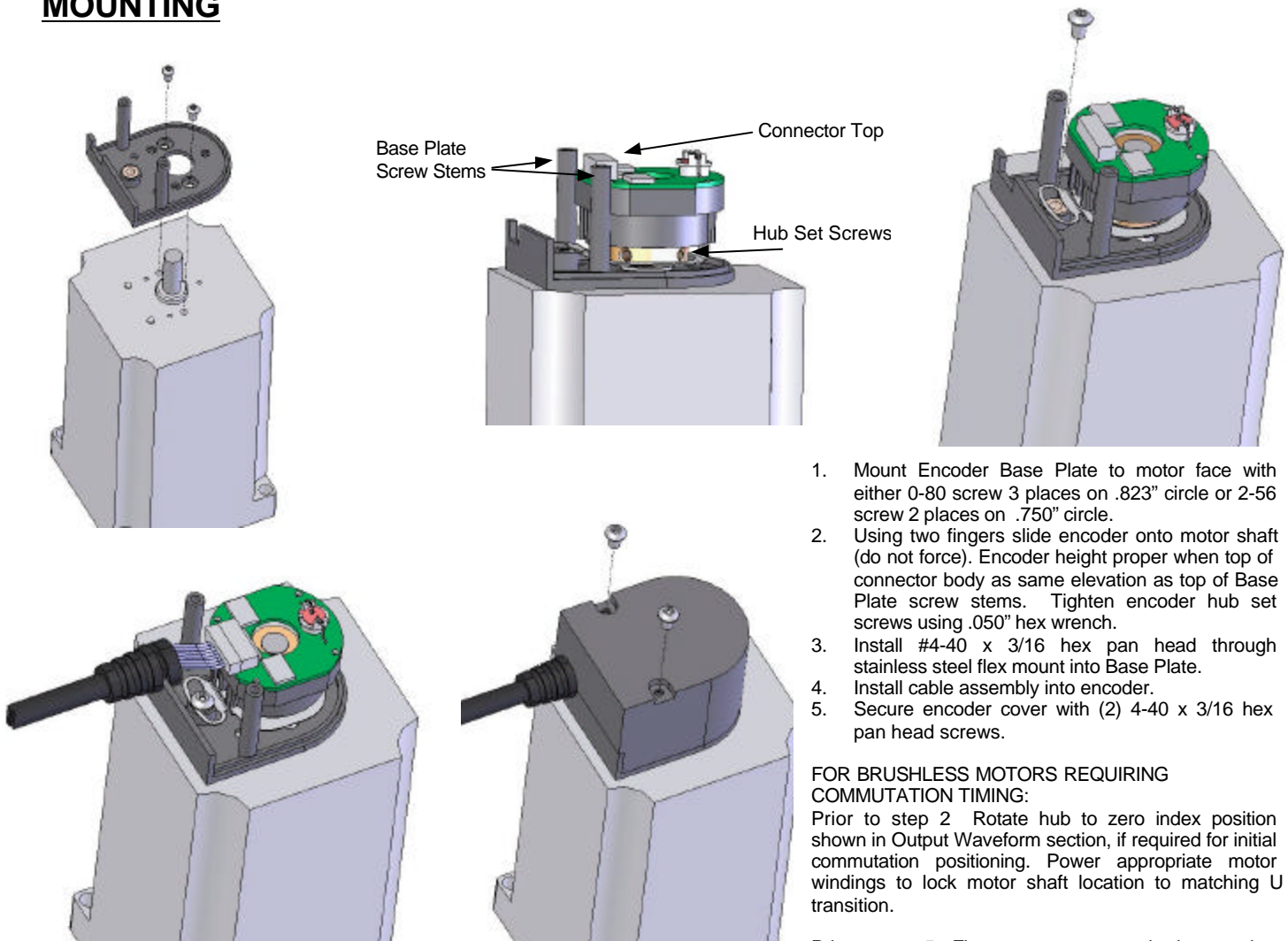
OPTIONAL MOUNTING AIDS

MOTOR BOSS:
DIAMETER = 0.431" - 0.438"
HEIGHT = 0.10"
CHAMFER = 0.03" X 45°

ALIGNING PINS:
DIAMETER = 0.092" - 0.096"
HEIGHT = 0.30"
CHAMFER = 0.01" X 45°



MOUNTING



Base Plate
Screw Stems

Connector Top

Hub Set Screws

1. Mount Encoder Base Plate to motor face with either 0-80 screw 3 places on .823" circle or 2-56 screw 2 places on .750" circle.
2. Using two fingers slide encoder onto motor shaft (do not force). Encoder height proper when top of connector body as same elevation as top of Base Plate screw stems. Tighten encoder hub set screws using .050" hex wrench.
3. Install #4-40 x 3/16 hex pan head through stainless steel flex mount into Base Plate.
4. Install cable assembly into encoder.
5. Secure encoder cover with (2) 4-40 x 3/16 hex pan head screws.

FOR BRUSHLESS MOTORS REQUIRING COMMUTATION TIMING:

Prior to step 2 Rotate hub to zero index position shown in Output Waveform section, if required for initial commutation positioning. Power appropriate motor windings to lock motor shaft location to matching U transition.

Prior to step 5: Flex mount screw can be loosened to allow final commutation timing adjustment. Rotate encoder to match commutation signals to back driven EMF motor windings. Retighten flex mount screw.

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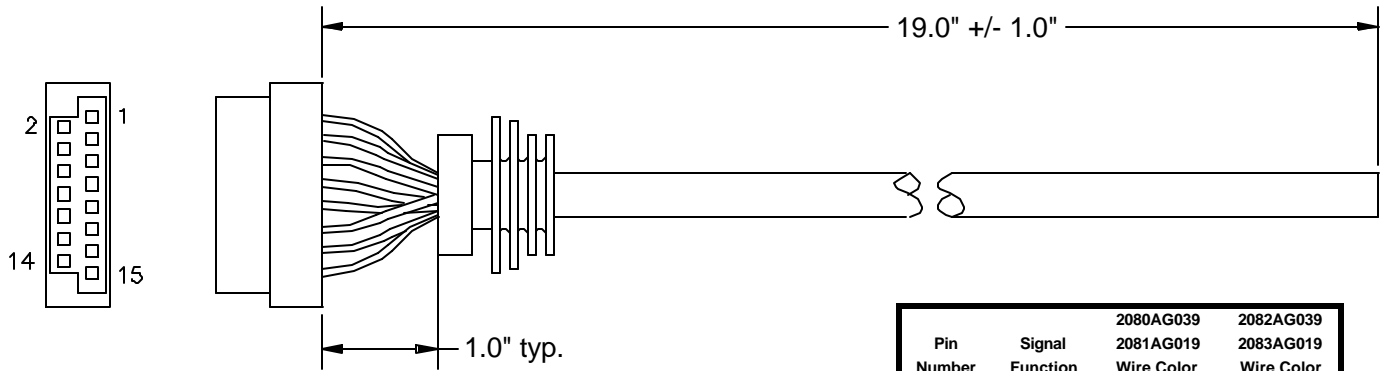
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CABLE OPTIONS

(2085G019, 2087AG019)

Consult Factory for Custom Lengths



Half Meter Cable One End Terminated:

2085AG019 = 14 Conductor 28awg for UVW Commutation

2087AG019 = 8 Conductor 28awg for Non-Commutation

Connector = JAE FI-W15S

Pin Number	Signal Function	2080AG039	2082AG039
		2081AG019	2083AG019
		Wire Color	Wire Color
1	A	Brown	Brown
2	A -	White	White
3	B	Blue	Blue
4	B -	Green	Green
5	Z	Orange	Orange
6	Z -	Yellow	Yellow
7	U	Violet	
8	U -	Gray	
9	V	White/Brown	
10	V -	White/Red	
11	W	White/Orange	
12	W -	White/Yellow	
13	Vcc	Red	Red
14	GND	Black	Black
15	No Connect		

Note:

1. Cable has internal foil shield with 28awg drain wire trimmed to jacket edge.
2. Unused wires to be locally isolated from adjacent signal wires, Vcc and GND to prevent damage to encoder signals.

Additional installation and handling instruction available at: www.quantumdev.com

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