Quantum Devices, Inc.

"Improving the Quality of Life through the Power in Light"

®

QPhase ä

QR12 (1.22") Diameter Optical Encoder

Design Features:

- Low profile assembled height
- Bearing design simplifies encoder attachment
- Resolutions up to 20,000 lines per revolution
- 4, 6 or 8 pole commutation
- 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

Description:

Quantum Devices, Inc. Model QR12 provides an improved feedback solution in applications typically using modular encoders. With an over all height of less than one inch and the stability of a bearing encoder design, the model QR12 can provide significant performance upgrades in applications limited by traditional modular encoder solutions. Outputs consist of a quadrature with index pulse and three-phase commutation. 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: QR12-1000-4-A-B-L-C-A

Model	- PPR		- Poles	- Electrical	- Hub Configuration	- Hub Size	- Mounting	- Index
QR12	24 *	2048	0= 0	A= RS422 (TTL)	B= Bottom Mount Hub with Hole in Cover	C= 5mm	A= SS 1.812" Flex	A= Gated to AB, 90deg
	256	2500	4= 4	B= oc UVW		D= 6mm	B= SS 1.575" Flex	
	360	4000	6= 6			E= 8mm	C= SS 1.280" Flex	
	500	4096	8= 8		C= Bottom Mount Hub with NO Hole in Cover	F= 10mm		
	512	5000						
	1000	8192				L= .25"		
	1024	10000				M= .3125"		
	1250	16384				N= .375"		
	2000	20000						

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

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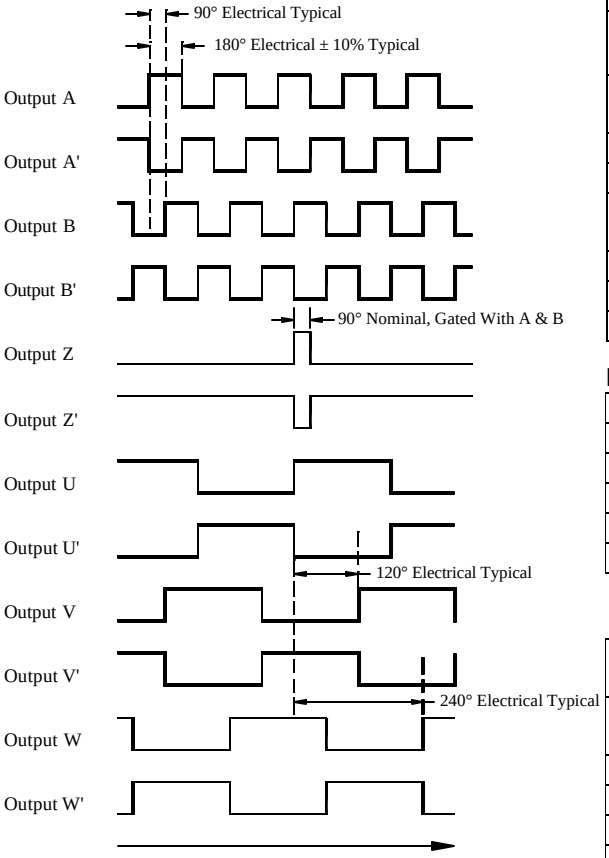
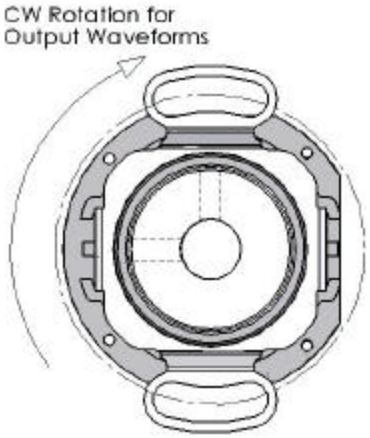
Output Waveforms



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



ISO 9001
CERT. NO. FM 52711

Electrical Specifications

Input Voltage	5 VDC ± 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 ± 10% Typical
Minimum Edge Separation	<4000PPR = 54 electrical degrees ≥4000PPR = 45 electrical degrees
Commutation Format	Three Phase 4, 6 or 8 poles
Commutation Accuracy	± 1° mechanical
Z channel to U channel	± 1° mechanical

Environmental Specifications

Storage Temperature	-40 to 125° C
Operating Temperature	-20 to 115° C
IP Rating	40
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	0.007" TIR
Axial Shaft Movement	± 0.030"
Maximum Shaft Speed	8000 RPM, Contact Customer Service for Higher RPM
Interface Connector	Connector: JAE P/N F1-W15P-HFE
Mounting	1.28", 1.575", 1.812" Bolt 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

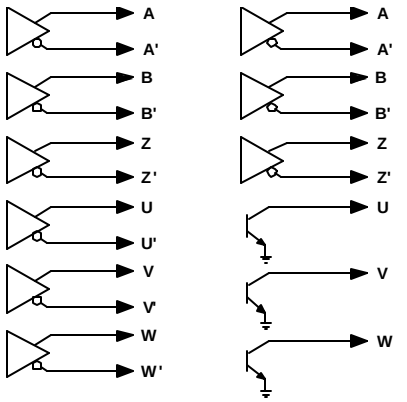
15 Pin Connector
JAE P/N: F1-W15P-HFE

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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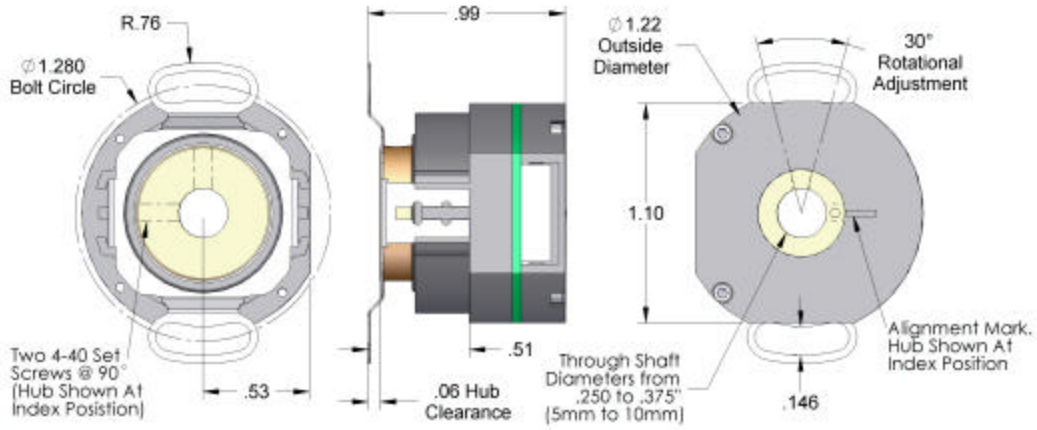
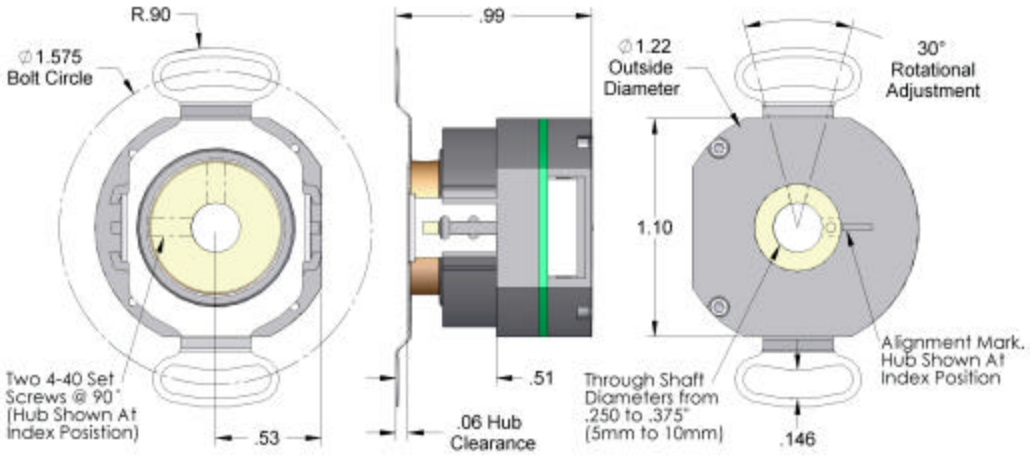
DIMENSIONS

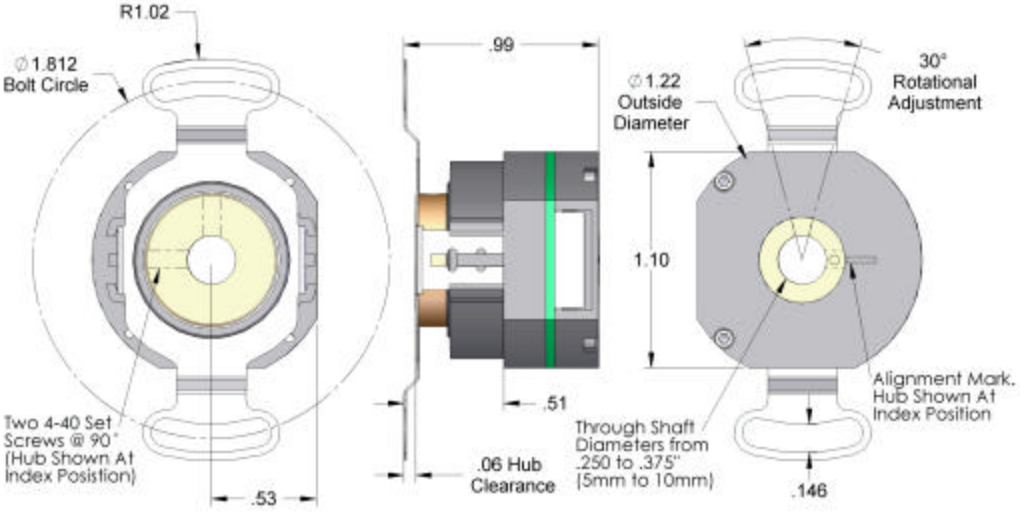
1.28 BOLT CIRCLE WITH BOTTOM MOUNT HUB



1.575 BOLT CIRCLE WITH BOTTOM MOUNT HUB



1.812 BOLT CIRCLE WITH BOTTOM MOUNT HUB



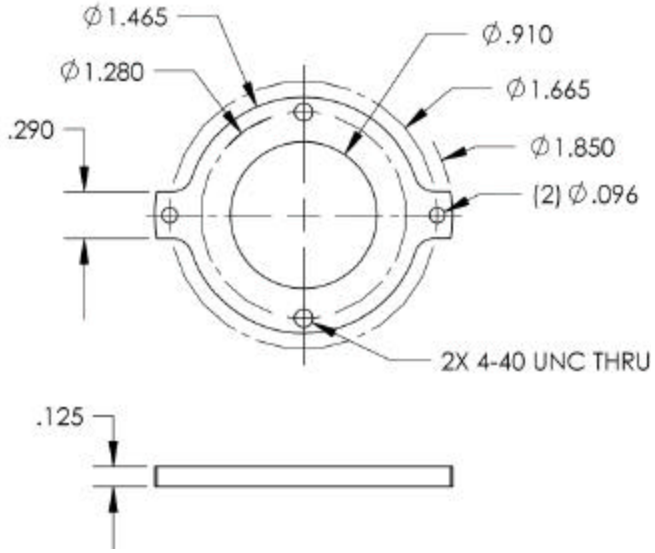
SIZE 15 RESOLVER MOUNTS

Utilize the optional resolver mount adapters to mate the QR12 - 1.280" Flex mount option to Size 15 Pancake Resolver motor configurations. Eliminate the expensive mounting servo clamps by attaching either the two or three point adapters directly to the servo clamp holes. Assemble the QR12 to the adapter plate using (2) 4-40 screws. For jam nut attachment to threaded motor shafts, refer to JR12 Jam Nut Mount Optical Encoder Literature.

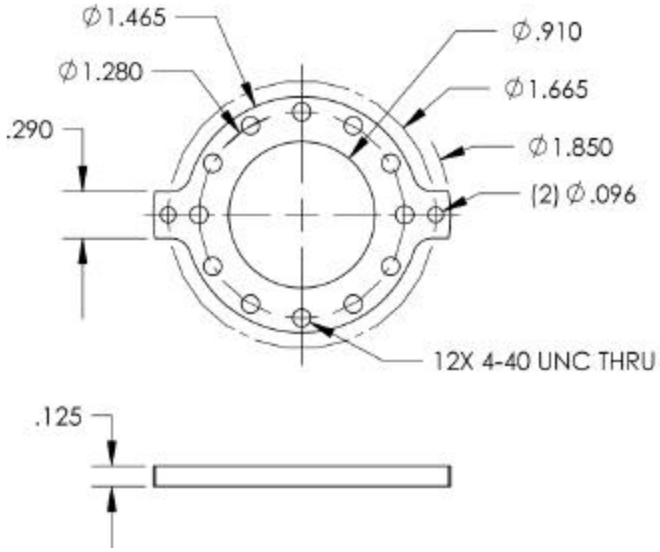
DIMENSIONS

Optional Aluminum Resolver Adapters

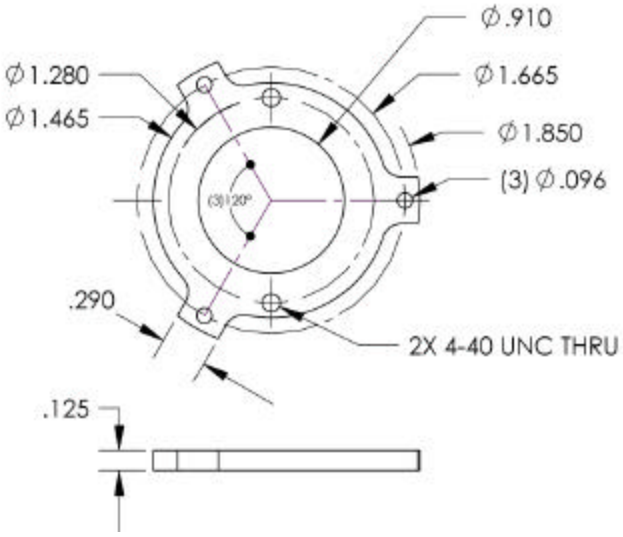
2074D024 – Two Point 30 Degree Commutation Adjustment Range



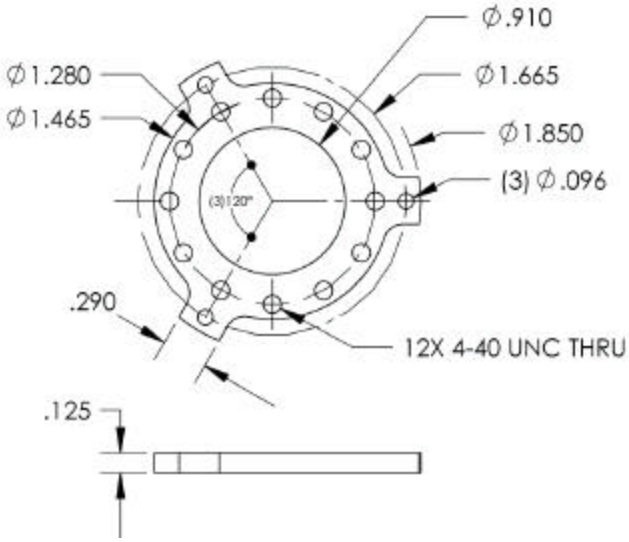
2074D025 – Two Point 360 Degree Commutation Adjustment Range



2074D026 – Three Point 30 Degree Commutation Adjustment Range



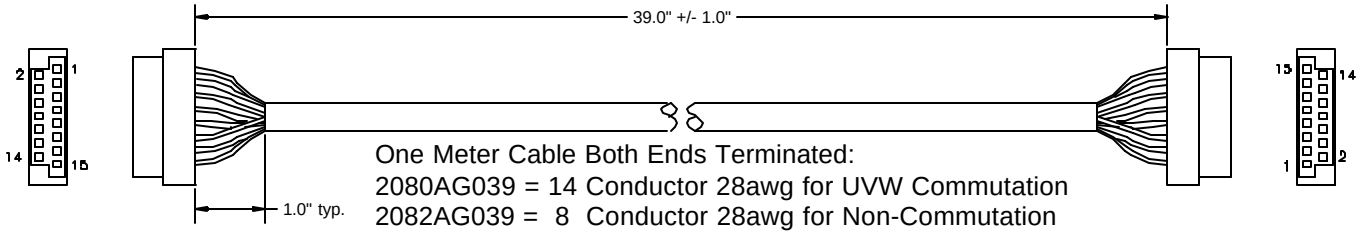
2074D027 – Three Point 360 Degree Commutation Adjustment Range



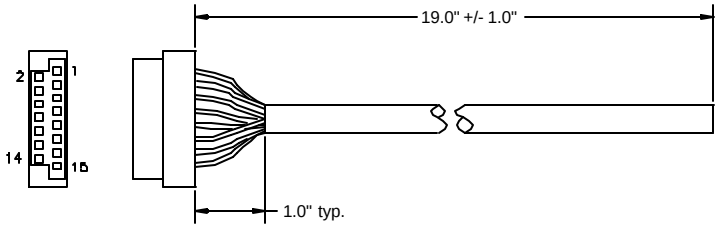
CABLE OPTIONS

(2080AG039, 2082AG039, 2081AG019, 2083AG019)

Consult Factory for Custom Lengths



One Meter Cable Both Ends Terminated:
2080AG039 = 14 Conductor 28awg for UVW Commutation
2082AG039 = 8 Conductor 28awg for Non-Commutation
Connector = JAE FI-W15S



Half Meter Cable One End Terminated:
2081AG019 = 14 Conductor 28awg for UVW Commutation
2083AG019 = 8 Conductor 28awg for Non-Commutation
Connector = JAE FI-W15S

Pin Number	Signal Function	2080AG039 2081AG019 Wire Color	2082AG039 2083AG019 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.

ENCODER INSTALLTION INSTRUCTIONS

1. Using two fingers slide the encoder onto shaft.
2. For additional security, Loctite can be applied to the encoder hub set screws. Remove the encoder's set screws and using tip of toothpick apply appropriate amount of Loctite thread locking adhesive. A non-permanent adhesive is recommended.
3. Insert and tighten encoder set screws using a .050" hex wrench. Typical torque range of 50 to 80 oz-in.
4. Fixture the stainless steel flex mount to the mounting surface with #6-32 button head screws.

For brushless motors requiring commutation timing:

- Encoder drawings indicate position of encoder hub to encoder body at Z (index). Rotating the hub to this position allows for known U channel transition state (prior to step one above).
- Powering appropriate motor windings allow for locking motor shaft location to match the appropriate U transition (prior to step one above).
- While mechanically back driving the motor, monitor motor winding EMF position to the powered encoder position. Rotate the encoder stainless steel flex mount to achieve accurate timing of encoder commutation feedback channels to the appropriate motor winding EMF. Tighten the screws retaining the encoder stainless steel flex mounts.

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

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