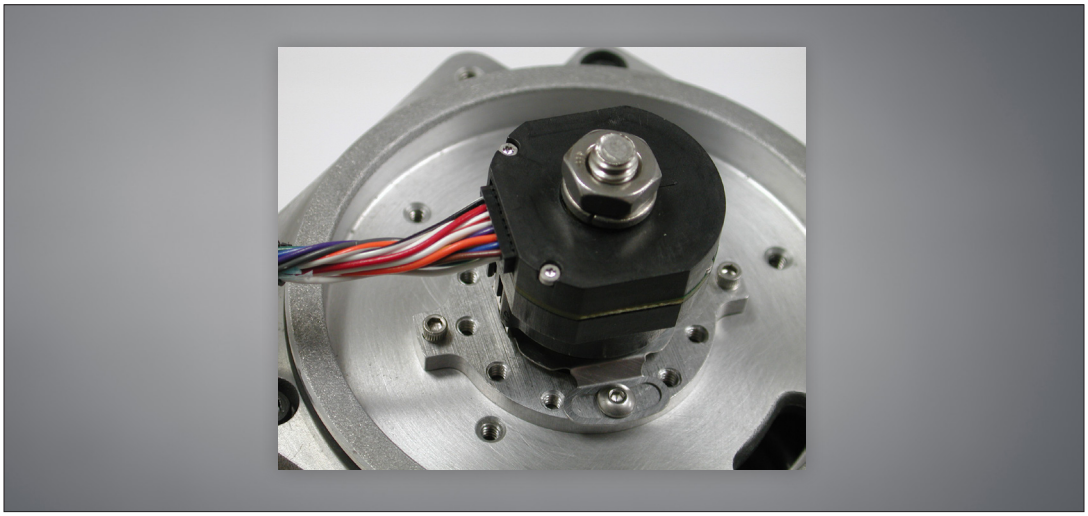
Quantum Devices

QPhase™ Encoders

JR12

DESIGN FEATURES

- Replaces size 15 pancake resolver
- Bearing design simplifies encoder attachment
- Incremental resolutions up to 20,000 PPR
- 4, 6 or 8 pole commutation[1]
- Eliminates expensive mounting servo clamps
- Accommodates resolver type ¼" threaded shafts
- High noise immunity
- Cost competitive with modular encoders
- 500 kHz frequency response
- RoHS construction



Quantum Devices, Inc. Model JR12 provides an improved feedback solution in applications typically using pancake resolvers with same threaded shaft and jam nut mounting. With an overall height of less than one inch and the stability of a bearing encoder design, the model JR12 can provide significant performance upgrades in applications limited by traditional resolvers or modular encoder solutions. Output options 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 the mounting flange eliminates the need for expensive servo mounting clips.

JR12	-	1000	-	4	-	A	-	B	-	R	-	C	-	A
		Resolution		Commutation		Output		Hub Configuration		Bore Size		Mounting		Index

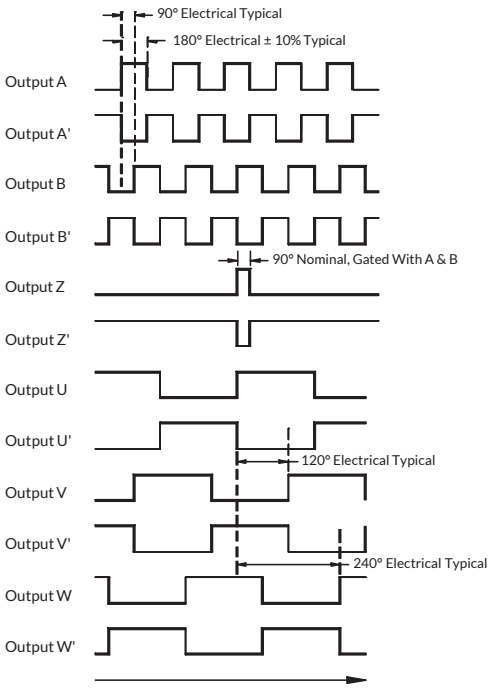
Configuration Options:

Resolution[1]	Commutation[1]	Output[1]	Hub Configuration	Bore Size	Mounting	Index
24[2], 256, 360, 500, 512, 1000, 1024,1250, 2000, 2048, 2500, 4000, 4096, 5000, 8192, 10000, 16384, 20000	0 = No Comm 4 = 4 Pole 6 = 6 Pole 8 = 8 Pole	A = Line Driver B = Line Driver ABZ / Open Collector UVW	B = Hole in Cover	R = 0.250"	C = 1.280"	A = 90° gated to A & B

Note:
1.) Consult factory for configuration options not shown (e.g. resolution, commutation, output, etc.)
2.) 24 PPR only available with No Comm (Commutation option 0)

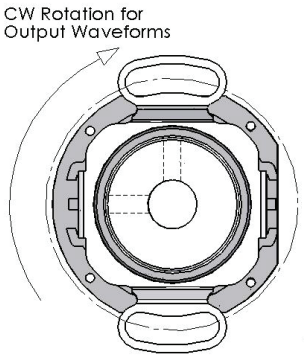
ISO 9001
CERT. NO. FM 52711

OUTPUT WAVEFORMS



Clockwise Shaft Rotation as Viewed Looking at the Encoder Face *(see figure below)*

Note: *Relationship of Z signals to U, V, W signals is not to scale. A & B signals have no relationship to U, V, W signals.*



ELECTRICAL SPECIFICATIONS

Input Voltage	5 VDC ± 5%
Input Current Requirements	65 mA typical, 100 mA max plus interface loads
Input Ripple	2% peak to peak @ 5 VDC
Output Circuits	A = 26C31 line driver (RS-422 or single-ended TTL) B = ABZ 26C31 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
Max Operating Frequency	500 kHz
Symmetry	180° electrical ± 10% typical
Minimum Edge Separation	<4000 PPR = 54° electrical ≥4000 PPR = 45° electrical
Commutation Format	Three phase 4, 6 or 8 poles (other pole counts upon request)
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	IP40
Humidity	90% non-condensing
Vibration	20 g's @ 50 to 500 CPS
Shock	50 g's @ 11 ms duration

MECHANICAL SPECIFICATIONS

Bore Diameter (Tolerance)	0.250" (+0.0010/-0.0000")
Allowable Shaft Runout	0.007" TIR
Axial Shaft Movement	± 0.030"
Maximum Shaft Speed	8000 RPM
Interface Connector	Connector: JAE P/N FI-W15P-HFE
Mounting	Size 15 pancake resolver
Moment of Inertia	9.1×10^{-5} oz·in·s²
Acceleration	1×10^{5} radians/s²
Accuracy	Instrument error 1.5 arc minutes max

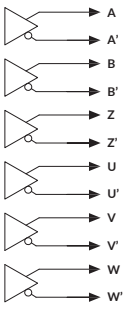
15 PIN CONNECTOR
JAE P/N: FI-W15P-HFE

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	NC

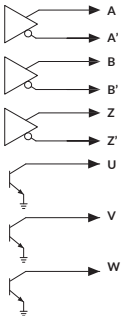
* U', V' and W' are "no connect" for Output option B (open collector UVW)

ELECTRICAL OUTPUT CIRCUITS

Output Option A:
ABZ = 26C31 line driver (RS-422)
UVW = 26C31 line driver (RS-422)



Output Option B:
ABZ = 26C31 line driver (RS-422)
UVW = open collector



- 26C31 line driver is TTL compatible (can be wired single-ended)
- 26C31 sink/source 20 mA max (meets RS-422 at 5 VDC supply)
- Open collector sink 30 mA max, pull up voltage 30 VDC max
- U, V and W are "no connect" for Commutation option 0

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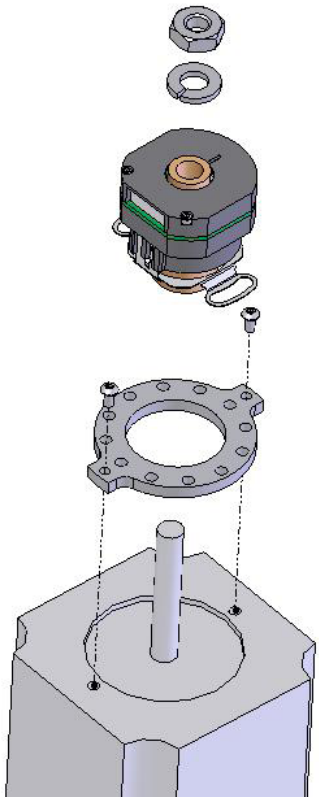
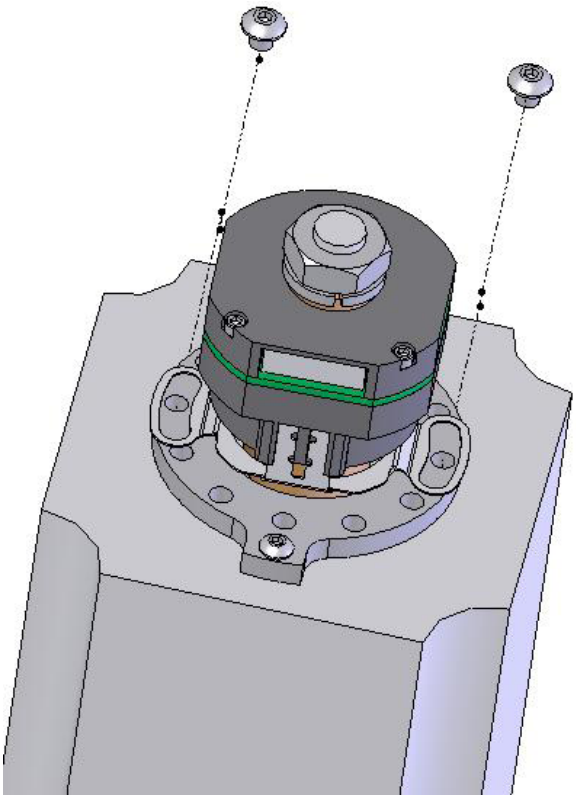
MOUNTING

Motor resolver pocket to be same depth as motor shaft shoulder used as a mounting stop for the encoder, 0.062" (± 0.025") below motor rear face.

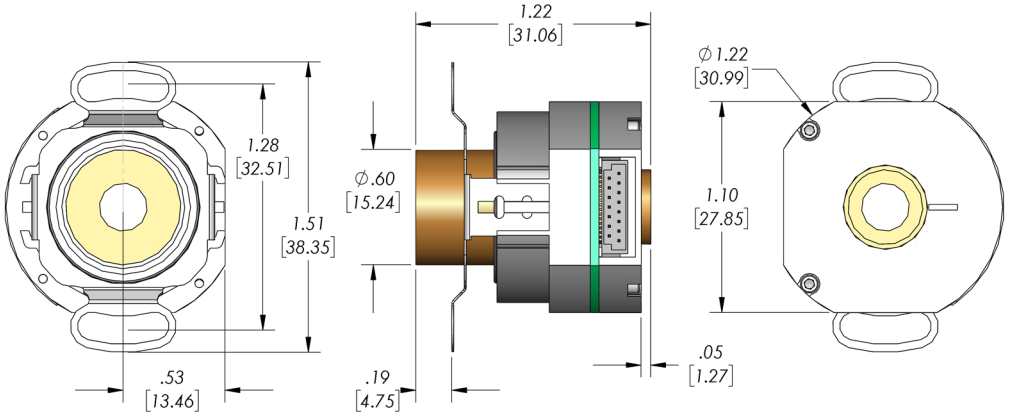




Install resolver adapter with #2-56 socket head screws. Slide encoder over 1/4" threaded shaft and secure with lock washer and jam nut to a torque of 40 to 60 in·lbs. Use thread lock or second jam nut if additional retention is required. Install (2) #4-40 button head screws to encoder flex mount to secure encoder body.

MECHANICAL DIMENSIONS

JR12 JAM NUT MOUNT 0.250" BORE



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

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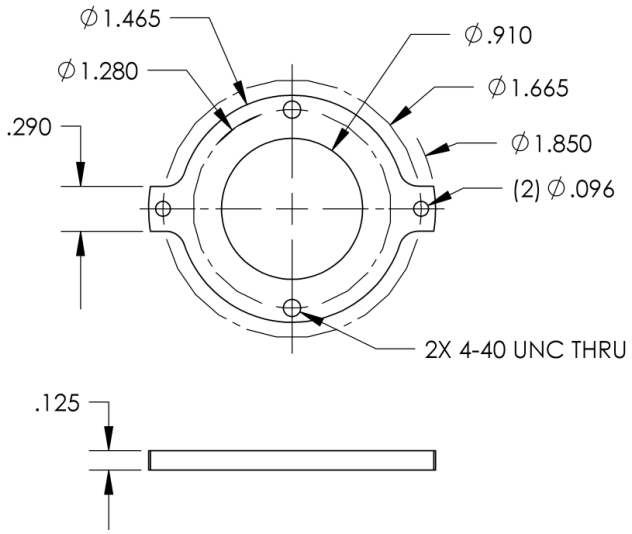
SIZE 15 RESOLVER MOUNTS

Utilize the optional resolver mount adapters to mate the JR12 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 JR12 to the adapter plate using (2) #4-40 screws.

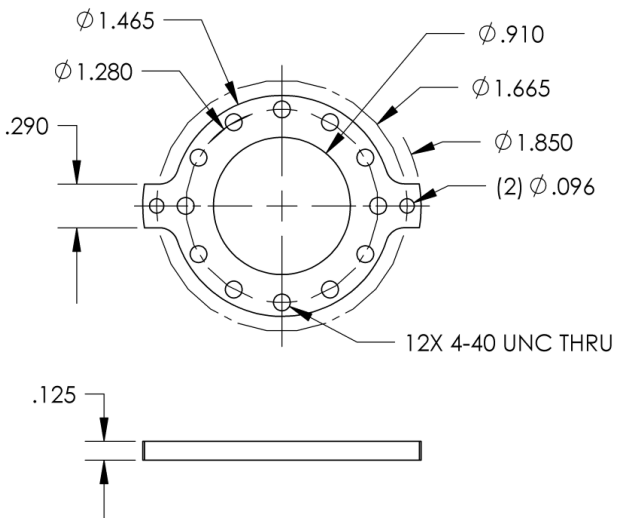
DIMENSIONS

Optional Aluminum Resolver Adapters

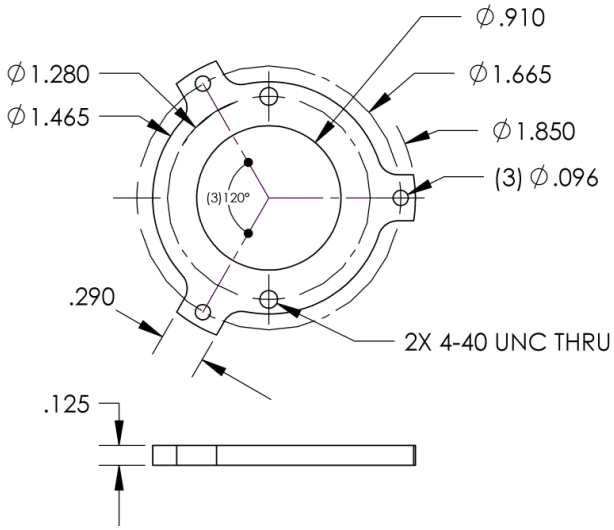
2074D024 – Two Point 30 Degree Commutation Adjustment Range



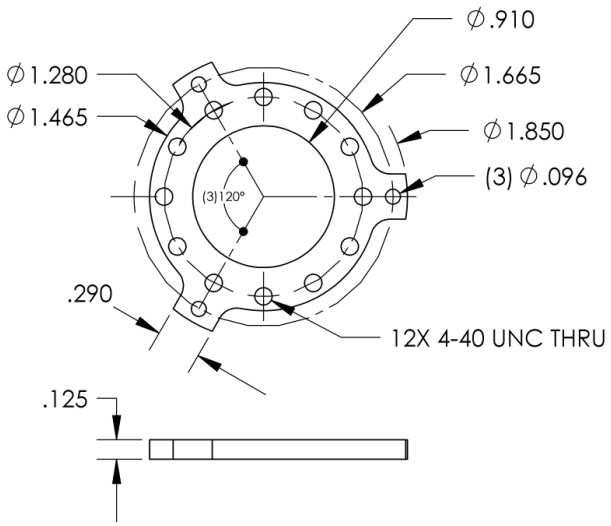
2074D025 – Two Point 360 Degree Commutation Adjustment Range



2074D026 – Three Point 30 Degree Commutation Adjustment Range

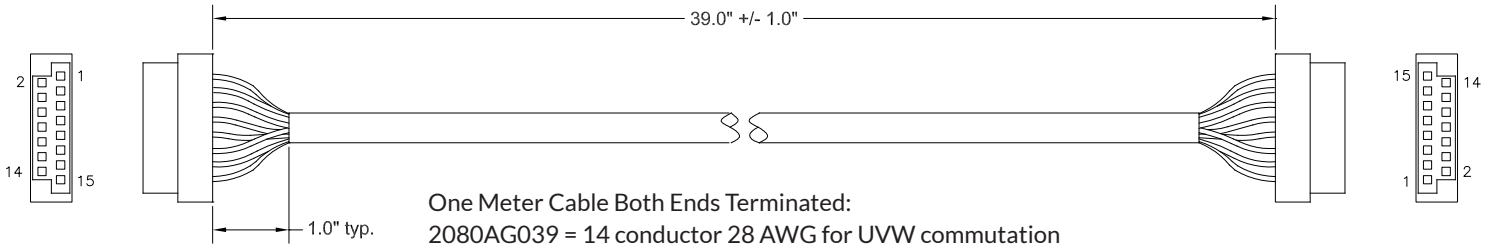


2074D027 – Three Point 360 Degree Commutation Adjustment Range

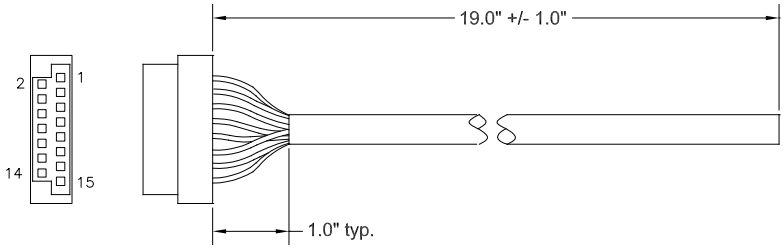


CABLE ACCESSORIES

(2080AG039, 2082AG039, 2081AG019, 2083AG019)
Consult Factory for Custom Lengths



One Meter Cable Both Ends Terminated:
2080AG039 = 14 conductor 28 AWG for UVW commutation
2082AG039 = 8 conductor 28 AWG for non-commutation
Connector = JAE FI-W15S



Half Meter cable One End Terminated:
2081AG019 = 14 conductor 28 AWG for UVW commutation
2083AG019 = 8 conductor 28 AWG for non-commutation
Connector = JAE FI-W15S

Pin Number	Encoder Pin 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 28 AWG 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

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 assembling to motor shaft.
- Power appropriate motor windings to lock motor shaft location to match the appropriate U transition, prior to assembly to motor shaft.
- Flex mount screws can be loosened to allow rotation of encoder body. While mechanically back driving the motor, monitor motor winding EMF position to the powered encoder commutation position. Rotate the encoder body to achieve accurate timing of encoder commutation feedback channels to the appropriate motor winding EMF. Mounting slots in encoder flex mount allow for 30 mechanical degrees of rotation. Re-tighten the flex mount screws.