Quantum Devices, Inc.

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

QPhase ä

LP12 (1.22") Diameter Optical Encoder

Design Features:

- Low profile assembled height of 0.816"
- Bearing design simplifies encoder attachment
- Incremental Resolutions up to 20,000 LC
- SIN/COS Outputs available up to 1250 LC
- Standard 4, 6 or 8 pole commutation
- Multiple Bolt Circle mounting
- Through shaft sizes up to 0.3125" (8mm) Diameter
- High Noise Immunity
- Cost Competitive with Modular Encoders
- 500 kHz Frequency Response
- RoHS Construction

Description:

Quantum Devices, Inc. Model LP12 provides an improved feedback solution in applications typically using modular encoders. With an over all height of less than an inch and the stability of a bearing encoder design, the model LP12 can provide significant performance upgrades in applications limited by traditional modular encoder solutions. Outputs consist of a quadrature with index pulse (Incremental or Sinusoidal) 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: LP12-1000-4-A-B-L-C-A

Model	-	PPR	-	Poles	-	Electrical	-	Hub Configuration	Hub Size	-	Mounting	-	Index
LP12	24 * †	2048		0= 0	A=	RS422	B=	Bottom Mount Hub with Hole in Cover	C= 5mm	A=	SS 1.812" Flex	A=	Gated to AB, 90deg
	256 †	2500		4= 4					D= 6mm	B=	SS 1.575" Flex		
	360 †	4000		6= 6	B=	ABZ Line Driver			E= 8mm	C=	SS 1.280" Flex	C=	Ungated Square Wave
	500 †	4096		8= 8		UVW O.C.	C=	Bottom Mount Hub with NO Hole in Cover					(Sine/Cosine Only)
	512 †	5000			C=	Sine/Cosine & RS422 (TTL) UVW			L= .25"				
	1000†	8192							M= .3125"			D=	Ungated Sinusoidal
	1024†	10000											(Sine/Cosine Only)
	1250†	16384											
	2000	20000			D=	Sine/Cosine & OC UVW							

Consult Factory For Configurations Not Shown, * 24PPR only available 0 poles. † Sin/Cos limited to these resolutions

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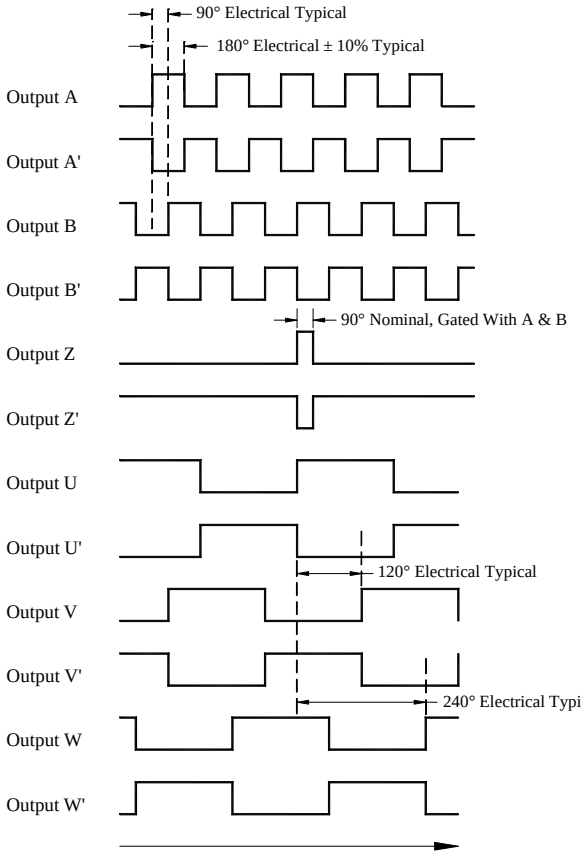
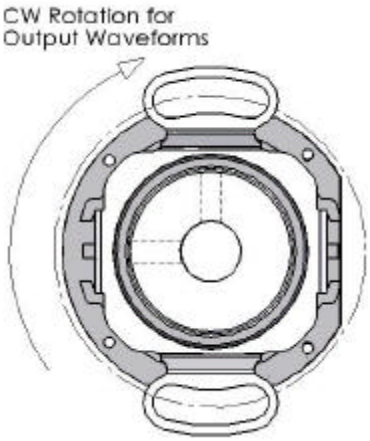
Incremental Output Waveforms



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



Incremental Electrical Specifications

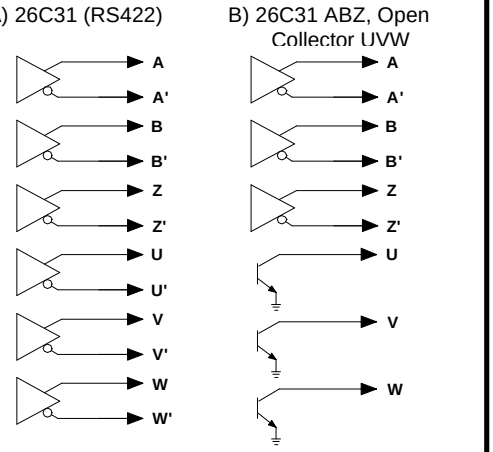
Input Voltage	5 VDC ± 5%
Input Current Requirements	65mA Typ., 100mA Max Plus Interface Loads
Input Ripple	2% Peak to Peak @ 5 VDC
Output Circuits	(A) 26C31 RS 422A Line Driver (TTL Compatible) (B) ABZ Line Driver, UVW Open Collector (No U' V' W')
Incremental Output Format	Quadrature with A leading B 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

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.

Incremental Output Circuits



- 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

ISO 9001
CERT. NO. FM 52711

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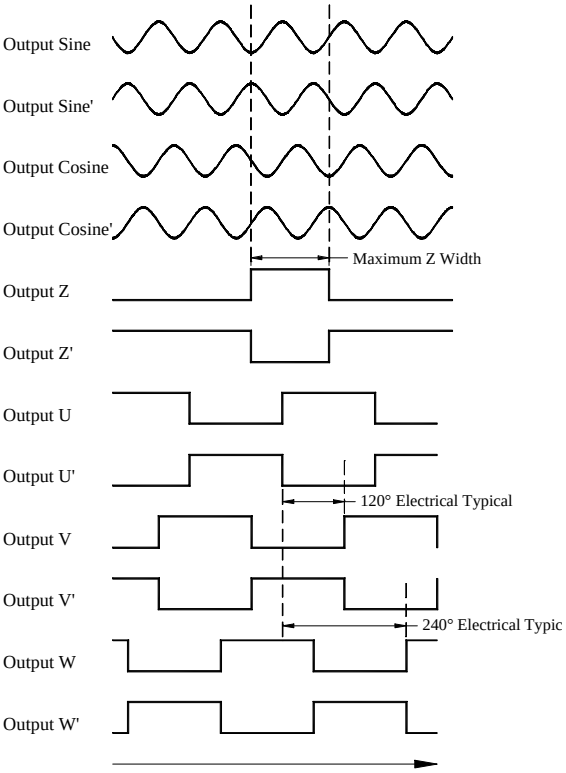
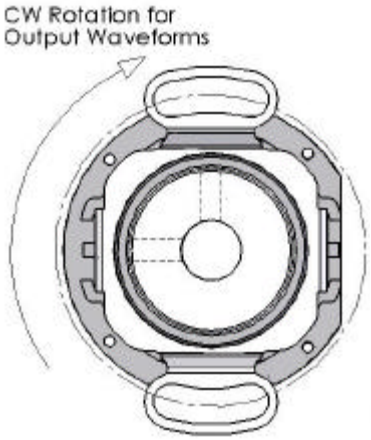
Sin/Cos Output Waveforms



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



Sin/Cos 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	(C) Sine/Cosine, Index & RS422 UVW (TTL Compatible) (D) Sine/Cosine, Index & UVW Open Collector
Incremental Output Format	Quadrature Sine/ Cosine with A leading B for CW rotation. Ungated Index Pulse.
Frequency Response	500 kHz
Sine/Cosine & Index Amplitude	1 Vpp ± 5% (Measured Differentially)
Commutation Format	Three Phase 4, 6 or 8 poles
Commutation Accuracy	± 1° mechanical
Z channel to U channel	± 1° mechanical

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

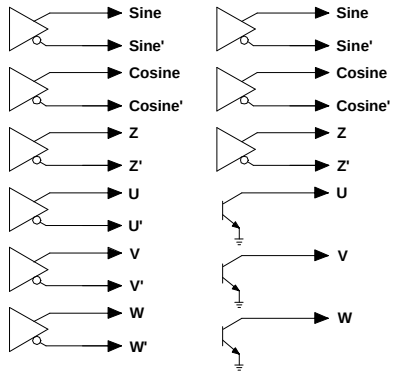
Pin Number	Function
1	Sine
2	Sine -
3	Cosine
4	Cosine -
5	Z
6	Z -
7	U
8	U - *
9	V
10	V - *
11	W
12	W - *
13	Vcc
14	GND
15	Open

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

Electrical Output Circuits

A) 1Vpp Sine/Cosine, Line Driver UVW

B) 1Vpp Sine/Cosine, 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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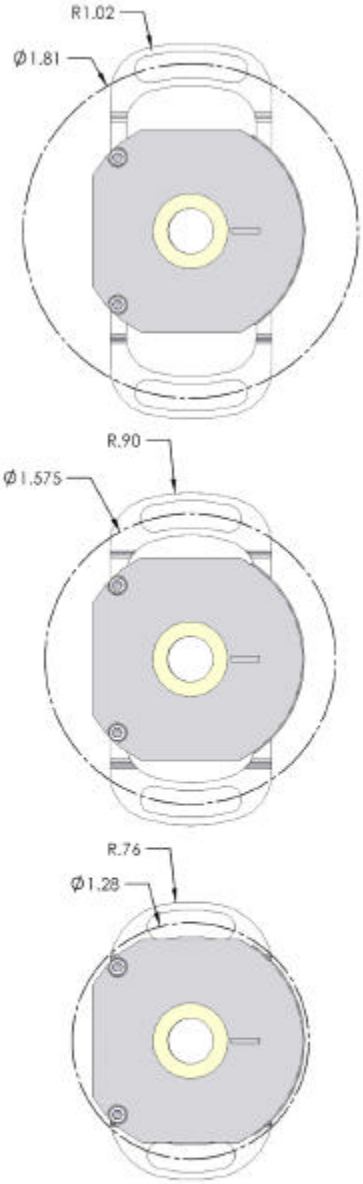
Physical Specifications

Standard Bolt Circles



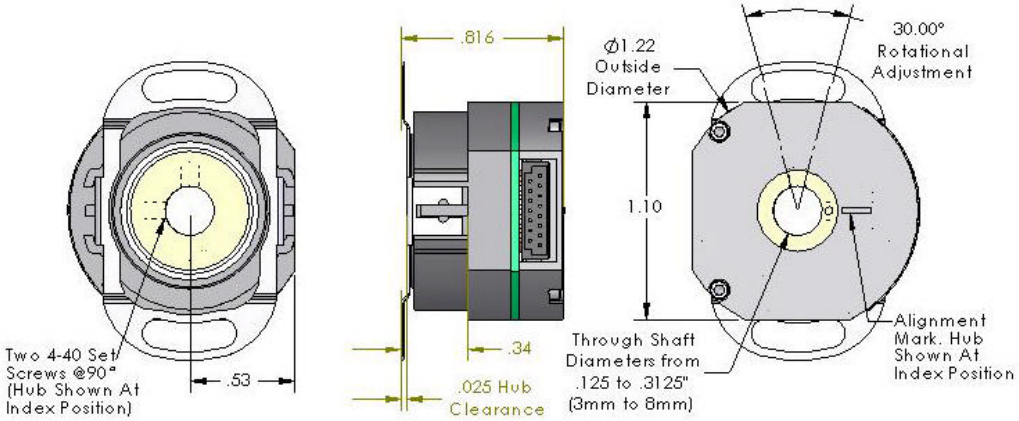
Environmental Specifications

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

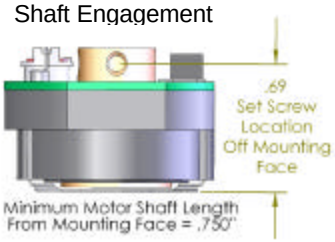
Mechanical Specification

Through Shaft Diameter	0.250", 0.3125", 0.375", 5mm 6mm ,8mm, 10mm Tolerance: -0.0000, + 0.0006"
Recommended Shaft Engagement	.750" 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	$1x10^5$ Radians/S^2
Accuracy	Instrument Error 1.5 arc min. max

Physical Dimensions



Shaft Engagement



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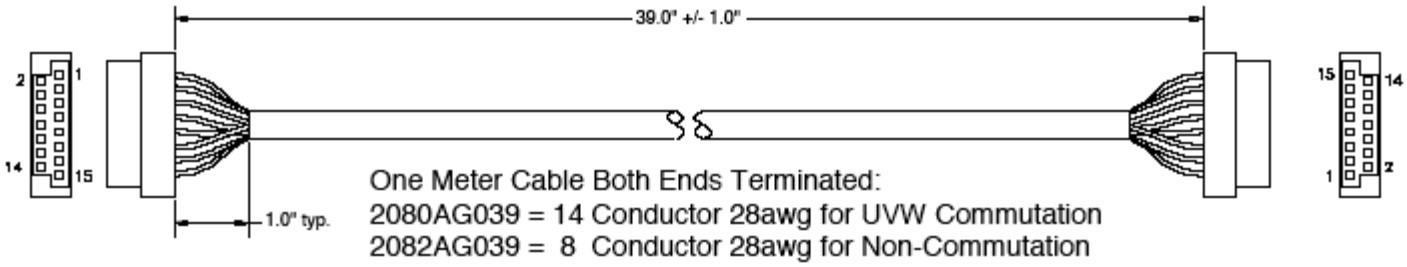
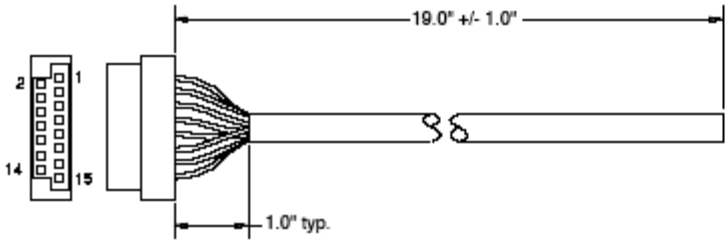
CABLE OPTIONS

(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.