

## QM35 Optical Encoder

### Design Features:

- Bearingless modular design
- Low profile assembled height
- Resolutions up to 8192 lines per revolution
- 4, 6, 8 or 10 pole commutation
- Easy Lock-n-Twist assembly feature
- Through shaft sizes up to 0.375" Diameter
- Up to 1Mhz Frequency Response
- High Noise Immunity
- RoHS Construction
- Hub to shaft uses two 3-48 set screws
- Hermetically sealed LED
- Multiple mounting options including resolver size 15



Connector: JAE P/N F1-W15P-HFE

### Description:

Quantum Devices QM35 is a high performance, low profile modular design ideal for high volume OEM applications and priced competitively for all sizes of motion control projects. The QM35's versatile electrical configurations include lines counts up to 8192 and several commutation options. The QM35's patent pending lock-n-twist mechanism simplifies installation; saving production time and money. The QM35 is the newest solution to your motion control needs.

## Ordering Information

Sample: M-1000-4-A-A-L-A-A-A

Model Prefix	- PPR -	Poles	- Electrical -	Cover	- Hub Size -	Mounting	- Index -	Hardware
M	360	0	A = RS422	A = Hole in cover	C = 5mm	A = 1.280" BC	A = 90°, AB high	A = English
	500	4	B = RS422 (ABZ),	B = Closed cover	D = 6mm	B = 1.812" BC	B = 90°, AB low	B = Metric
	512	6	Open Collector	(Shaft < .512")	E = 8mm			C = No hardware
	1000	8	(UVW).	C = Closed cover	K = .1875"			D = English with pre-applied thread-lock to mounting screws.
	1024	10	C = Dual Voltage -	(Shaft < .450")	L = .250"			E = Metric with pre-applied thread-lock to mounting screws.
	2000		RS422 (ABZ),		N = .375"			Hardware packaged in bulk.
	2048		Open Collector					
	2500		(UVW).					
	4000							
	4096							
	5000							
	5120							
	8000							
	8192							

Note:  
 1.) 4 Poles has four states per revolution (2 pole pair), or two 360° electrical cycles per revolution.  
 2.) RS422 is compatible with Renco options: TTL, PP, VC or LD. Open collector compatible with VO configurations.  
 3.) Mounting Option A allows for Resolver Size 15.  
 4.) Consult factory for configurations not shown.  
 5.) 360PPR not available with 6, 8 or 10 Poles.

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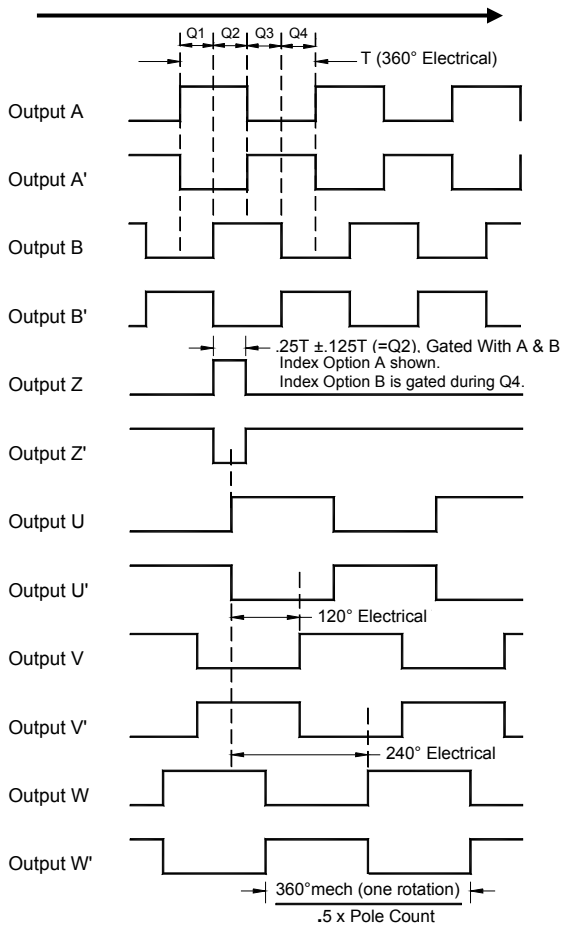
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Email: kaltec@kaltec.com.tw

## Output Waveforms

CCW Shaft Rotation as Viewed Looking at Encoder Top.



Q1 + Q2 = 0.5T ± 0.125T  
 Q2 + Q3 = 0.5T ± 0.125T  
 Qn = 0.25T ± 0.125T (n = 1, 2, 3, 4)

## 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	26C31 RS 422A Line Driver (TTL Compatible) Optional UVW Open Collector (No U' V' W')
Incremental Output Format	Quadrature A leading B for CCW rotation viewed from encoder top.
Max Operating Frequency	<ul style="list-style-type: none"> <li>&lt; 5000PPR = 500KHz or 15,000RPM</li> <li>5000PPR – 7999PPR = 675KHz</li> <li>≥8000PPR = 1.0Mhz</li> </ul>
Commutation Format	Three Phase 4, 6, 8 or 10 poles
Commutation Accuracy (U-V-W)	± 2° mechanical
Interpolation Factors	1000/1024PPR = 2x,      2000/2048PPR = 4x 2500PPR = 5x,          4000/4096PPR = 8x 5000/5120PPR = 10x,    8000/8192PPR = 16x

## Environmental Specifications

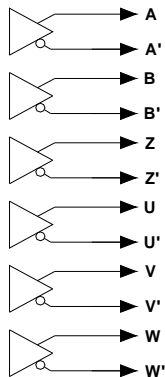
Storage Temperature	-40 to 125° C
Operating Temperature	-30 to 115° C
IP Rating	40
Humidity	90% Non-Condensing
Vibration	20 g's @ 25 to 2,000 Hz
Shock	100 g's @ 6mS Duration

## Mechanical Specification

Hub Minimum Diameter	Hub Size +0.0002"
Recommended Shaft Tolerance	-0.0005, + 0.0000"
Minimum Shaft Engagement	.400" [10.2mm]
Allowable Shaft Run Out	0.05mm, 0.002" TIR [+/- .0010" shaft radial play from initial shaft position of assembled encoder]
Allowable Axial Shaft Movement	± 0.25mm, ± 0.010"
Mounting	1.28", 1.812" Bolt Circle, Resolver mount
Dynamic Commutation Adjustment Range	30° mechanical
Moment of Inertia	8.0 x 10 <sup>-6</sup> oz-in-S <sup>2</sup>

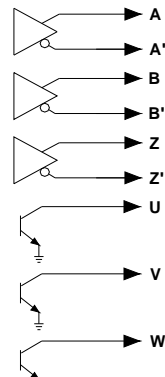
## Electrical Options:

Option A) 26C31 (RS422)



- ◆ 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
- ◆ U V and W are "no connect" for Pole option 0.

Option B & C) 26C31 ABZ, Open Collector UVW. Option C) U V and W referenced to GND2.



## Electrical Pin Functions:

Pin Number	Electrical Option		
	Option A	Option B	Option C
1	A	A	A
2	A-	A-	A-
3	B	B	B
4	B-	B-	B-
5	Z	Z	Z
6	Z-	Z-	Z-
7	U	U	U
8	U-	NC	GND2
9	V	V	V
10	V-	NC	+5v2
11	W	W	W
12	W-	NC	NC
13	Vcc	Vcc	Vcc
14	GND	GND	GND
15	NC	NC	NC

Option C: Commutation power +5v2 & GND2 is isolated from GND. U V and W outputs are referenced to GND2. +5v2 provides power to U, V and W internal pull up resistors (normally not installed) – call factory for this configuration.

## Hardware Options:

Option A – English:

- 2ea Hub set screw: SS 3-48 x 1/16" (.05" hex driver).
- 2ea Cover screw: Plastite 48-2, thread 2-28, length 1/4", Torx Plus IP7.
- For Mounting "A" 1.280 BC - 2ea Mounting Screw: 2-56x1/4" Button Head (.05"hex driver).
- For Mounting "B" 1.812 BC - 2ea Mounting Screw: 4-40x5/16" Button Head (.062"hex).

Option D – English: Components same as Option A hardware. Mounting screws have pre-applied threadlock.

Option B - Metric:

- 2ea Hub set screw: SS 3-48 x 1/16" (.05" hex driver).
- 2ea Cover screw: Plastite 48-2, thread 2-28, length 1/4", Torx Plus IP7.
- For Mounting "A" 1.280 BC - 2ea Mounting Screw: M2.5x6mm (Max head diameter=4.5mm), Button Head (1.5mm Hex).
- For Mounting "B" 1.812 BC - 2ea Mounting Screw: M2.5x8mm Button Head (1.5mm Hex).

Option E – Metric: Components same as Option B hardware. Mounting screws have pre-applied threadlock.

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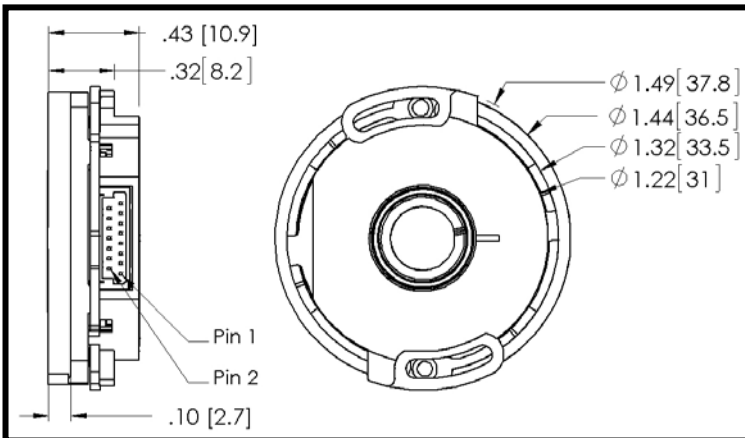
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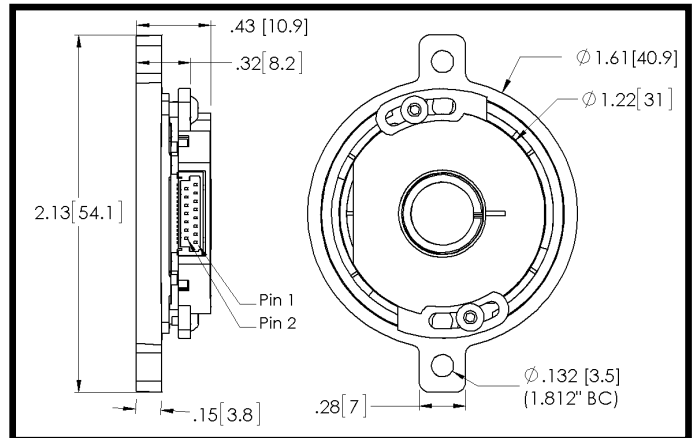
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## Mechanical Dimensions

Model QM35 – 1.280" Bolt Circle (Mounting Option A)



Model QM35 – 1.812" Bolt Circle (Mounting Option B)

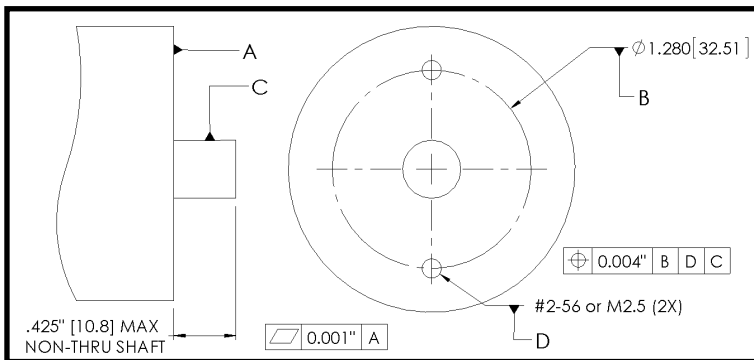


**Note:**

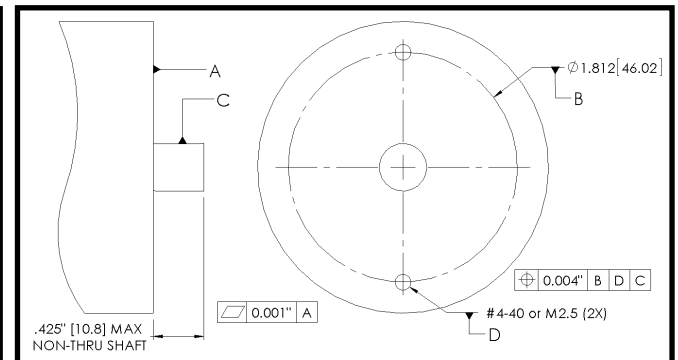
- Closed Cover Option B – Maximum shaft engagement up to .512" [13.0]. Overall height increases from .43 [10.9] to .57 [14.5]. This additional height has a cylinder diameter .56 [14.2], centered on the cover top.
- Closed Cover Option C – Maximum shaft engagement up to .450" [11.4]. Overall height increases from .43 [10.9] to .51 [13.0]. This additional height has a cylinder diameter .56 [14.2], centered on the cover top.

## Mounting Requirements

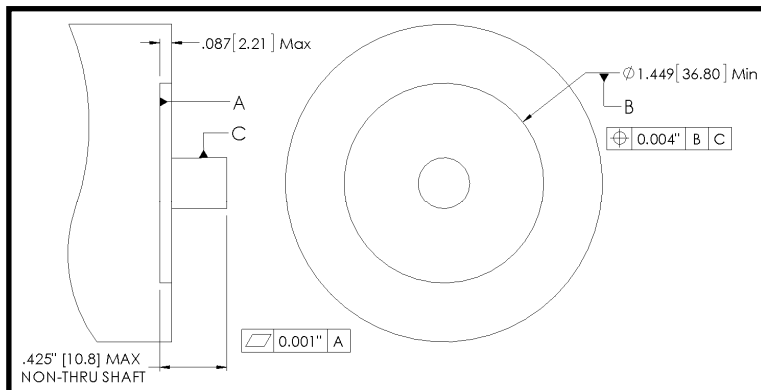
Mounting Option A (1.280" Bolt Circle)



Mounting Option B (1.812" Bolt Circle)



Servo Size 15 Mounting (Mounting Option A)



**Patent Protection:**

- Patent Pending
- US Patent 6,563,108

**ISO 9001**  
CERT. NO. FM 52711

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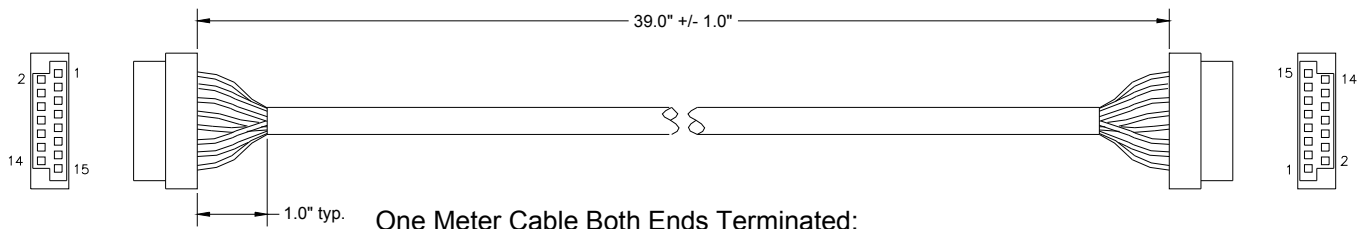
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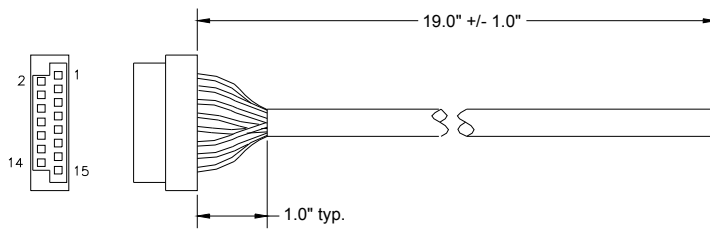
# CABLE ACCESORIES

(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	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 user isolated from adjacent signal wires, Vcc and GND to prevent damage to encoder signals.

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