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Features and Benefits

- Magnetic technology offers robust performance.
- 100% Non-contacting design (no bearings or bushings) provides an extremely long life and is tolerant to harsh environments.
- Simple two piece design (magnet rotor + encoder) for easy alignment and installation.
- Bi-directional two channel incremental quadrature output.
- Mounting holes for a 2-bolt pattern 1.00" BHC x 0.120" O.D.
- Target magnet for standard shaft sizes from 2 mm to 3/8". Custom bore sizes available.
- Options for 32 2500 pulse per channel per revolution.
- Customizable lead wires, cables, and or connectors.



Kit - Encoder with Target Magnet Shown with shaft pass through hole and single ended wiring Wire color order varies with part configuration



Other colors available upon request. Contact sales@phoenixamerica.com.

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Electrical Circuit



Absolute Maximum Ratings

Table 2.1			
Characteristic	Symbol	Rating	Units
Forward Supply Voltage	V _{cc}	12	V
Reverse Supply Voltage	V _{RCC}	-0.3	V
Storage Temperature	Τ _s	150	°C
ESD (HMB, 100pF/1.5Kohm)		2	kV
Operating Temperature		-40 to 125	°C

Electrical Specifications - (Vcc = 5V, Ambient Temperature = 23 °C)

Table 2.2

Characteristic	Symbol	Min.	Тур.	Max.	Unit
Supply Voltage	V _{cc}	3.3	5	6	V
Supply Current	I _{cc}	-	14	20	mA
Duty Cycle	-	40	50	60	%
Phase	-	70	90	110	°e
Output Frequency	f _{out}	-	-	42	kHz

Output Waveforms



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Encoder Physical Outline



Motor Shaft Diameter	Shaft Pass Through Hole Size (options/ recommendation)		
-	No Hole		
2 mm	2.06 mm	0.081 in	
3 mm	3.06 mm	0.120 in	
1/8 in	3.26 mm	0.127 in	
5/32 in	4.06 mm	0.160 in	
4 mm	4.06 mm	0.160 in	
3/16 in	4.83 mm	0.190 in	
5 mm	5.06 mm	0.199 in	
6 mm	6.06 mm	0.239 in	
1/4 in	6.40 mm	0.252 in	
7 mm	7.06 mm	0.278 in	
5/16 in	8.05 mm	0.317 in	
8 mm	8.05 mm	0.317 in	
3/8 in	9.59 mm	0.378 in	

Other shaft pass through hole sizes available upon request. Contact sales@phoenixamerica.com.

Encoder Mounting Guidelines

Concentricity of the encoder housing to the target magnet is critical for optimal encoder performance. Considering the following during the design phase will ensure concentricity and ease of assembly.

Tight molding tolerances allow for the outside diameter of the encoder to be used to locate the encoder housing concentric to the motor shaft and target magnet. A machined pocket on the motor endbell works well for alignment. Recommended pocket is 0.015" to 0.020" deep and 1.215" in diameter. Extending the shaft through the optional shaft pass through hole is an easy way to align the encoder housing to the motor shaft and target magnet. Simply position the encoder so that the shaft is centered concentrically in the shaft pass through hole. If previous two methods of alignment are not used it is recommended that the encoder be fastened to the motor using #5-40 or M3 mounting screws. The slightly larger diameter of the #5-40 and M3 screws will compensate for some of the tolerance allowed when using the standard recommended #4-40 or M2.5 mounting screws.

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Target Magnet Physical Outline - Molded (Mounting Style A)



Table 4.1					
Bore Size (.inch)	Motor Shaft OD Size (nominal)	NEMA Guide Shaft Tolerance	Magnet Bore MIN. (inch)	Magnet Bore MAX. (inch)	
079	2 mm (.0787")		.0777	.0807	
118	3 mm (.1181")	+0.0000"/-0.0005"	.1171	.1201	
125	1/8 in (.1250")		.1240	.1270	
156	5/32 in (.1563")		.1553	.1583	
157	4 mm (.1575")		.1565	.1595	
188	3/16 in (.1875")		.1865	.1895	
197	5 mm (.1969")		.1959	.1989	
236	6 mm (.2364")		.2354	.2384	
250	1/4 in (.2500")		.2490	.2520	
276	7 mm (.2758")		.2747	.2777	
313	5/16 in (.3125")		.3115	.3145	
315	8 mm (.3150")		.3140	.3170	
375	3/8 in (.3750")		.3740	.3770	

Other bore sizes available upon request. Contact sales@phoenixamerica.com.

Target Magnet Mounting Guidelines - Molded (Mounting Style A) For Slip Fit Application

- Proper alignment of the target magnet to the encoder sensing element is critical for optimal encoder performance. Insure that the target magnet is mounted to the specified height shown in the diagram below.
- A machined step on the motor shaft provides a quick and repeatable method for positioning the target magnet. Spacers or other fixturing should be used to properly position the target magnet if no mechanical locating features are on the shaft.
- Various adhesives can be used to bond the target magnet to the motor shaft. Shaft alloys, operating environment, and shaft speed and acceleration should be taken into consideration when selecting an appropriate bonding agent. Loctite threadlockers and retaining compounds have proved effective in bonding the target magnet to the motor shaft. Loctite 263 and 2760 threadlockers and Loctite 638 and 680 retaining compounds are good candidates. These materials have been effective in past experience; testing under actual operating conditions should be used to qualify any bonding material.
- · For best results, the motor shaft should be clean and free of any oils, lubricants, or solvents.
- Apply adhesive around the leading edge of the shaft and inside the hole in the rotor. Use a rotating motion when assembling the target magnet to the shaft to insure good adhesive coverage.
- The use of primers and activators can be used to improve bond strength and cure rate.
- For non-critical applications or for fast bonding for evaluation, a cyanoacrylate adhesive (super glue) can be used. Loctite 401 and 410 have proven effective for quick bonding applications.



Recommended step in motor shaft to assist with target magnet positioning

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Target Magnet Physical Outline - Universal Hub (Mounting Style U)

Hubs A universal hub kit is available to provide a range of bore sizes to fit several popular industry shaft diameters. Includes 2 of each 2mm 3mm 1/8 size for closed cover 0 option. Kit contents (not shown to scale) 3/16 Includes 3 of each 5mm 6mm size for shaft pass L8 / H8 .015 IN through option. L2 / H2 2 mm L9 / HS 2 mm 032 IN 14 / H4 Encoder Gap Tool (.025" needed for H4) Magnet Insertion Tool Target Magnet

Assembly Guidelines

Step 1

Attach two of the desired hub size on each side of the magnet. Make sure the flats are in-line with each other.



Use the insertion tool to push the target magnet assembly straight onto the shaft until the bottom face of the hub is resting on the 2 mm gap tool.

Step 2

tip - Support the bottom of the motor with a fixture or holding clamp.



Without shaft pass-through option



Step 4

Manually spin the shaft to verify that the shaft/magnet is not interfering with the encoder.



Encoder Cross Section - note the magnet assembly and shaft are not in contact with the encoder housing or the motor housing.

With shaft pass-Step 3a through option Place the Step 2a encoder onto the motor and Insert an additional hub secure with #4 piece as shown. This or M3 screws. is used as a space filler to match the opening in the encoder housing. Encoder Cross Section - note the top face of the filler hub should be flush with the top face of the encoder housing as shown by the arrow pointer.

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Wiring (Single ended option depicted)



NOT TO SCALE

- 7x32 Strands, Tinned Copper
- Temperature Rating: 105°C
- 4 (or 6) Conductor with Foil
- Stranded Tinned Copper
- **PVC** Insulation
- Grev PVC Jacket
- UL Style 2464, CSA
- Temperature Rating: 105°C

Table 6.1				
	Single Ended Wiring			
	Leads	Cable	Connector Pin-Out	
Ch A	Yellow	Brown	1	
Ch B	Blue	Orange	2	
Gnd	Black	Black	3	
Vcc	Red	Red	4	

Custom lengths and insulation materials available. Contact sales@phoenixamerica.com.

Connector Options (Single ended option depicted) Molex Mini-Fit Jr. (Male) Molex Mini-Fit Jr. (Female) TE AmpModu MTE (Male) TE AmpModu MTE (Female) [23.90] [15.24] [19.60] 24.13 .941 .600 772 1 1 7.80 .950 7.62 [6.60] .260 .307 [10.20] .300 i .402 ł ł [4.19] .165 4 2.54 [4.20 .165 2.54 .100 .100 Need a different connector? Contact sales@phoenixamerica.com.

Part Number Description



Example: H4-0160-0125-05-A-N-A-F-B-XX

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