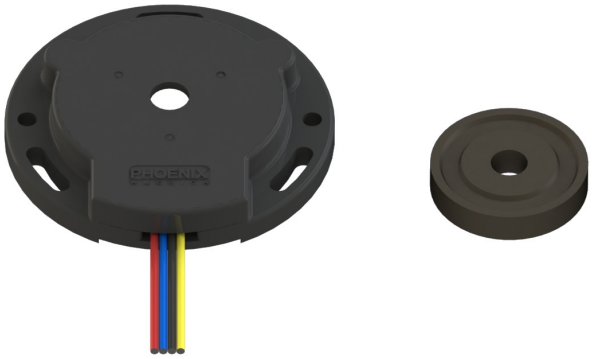
Features and Benefits

- 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 (target magnet + encoder) for easy alignment and installation.
- Bi-directional two channel incremental quadrature output.
- Mounting holes for a 2-bolt or 3-bolt pattern Ø 1.811” BHC x 0.125” O.D.
- Magnet rotor for standard shaft sizes from 2 mm to 1/2”. Custom bore sizes available.
- Options up to 30 pulse per channel per revolution.
- Customizable lead wires, cables, and or connectors.



Kit - Encoder with Target Magnet

Shown with shaft pass through hole

Wire color order varies with part configuration

Application Example

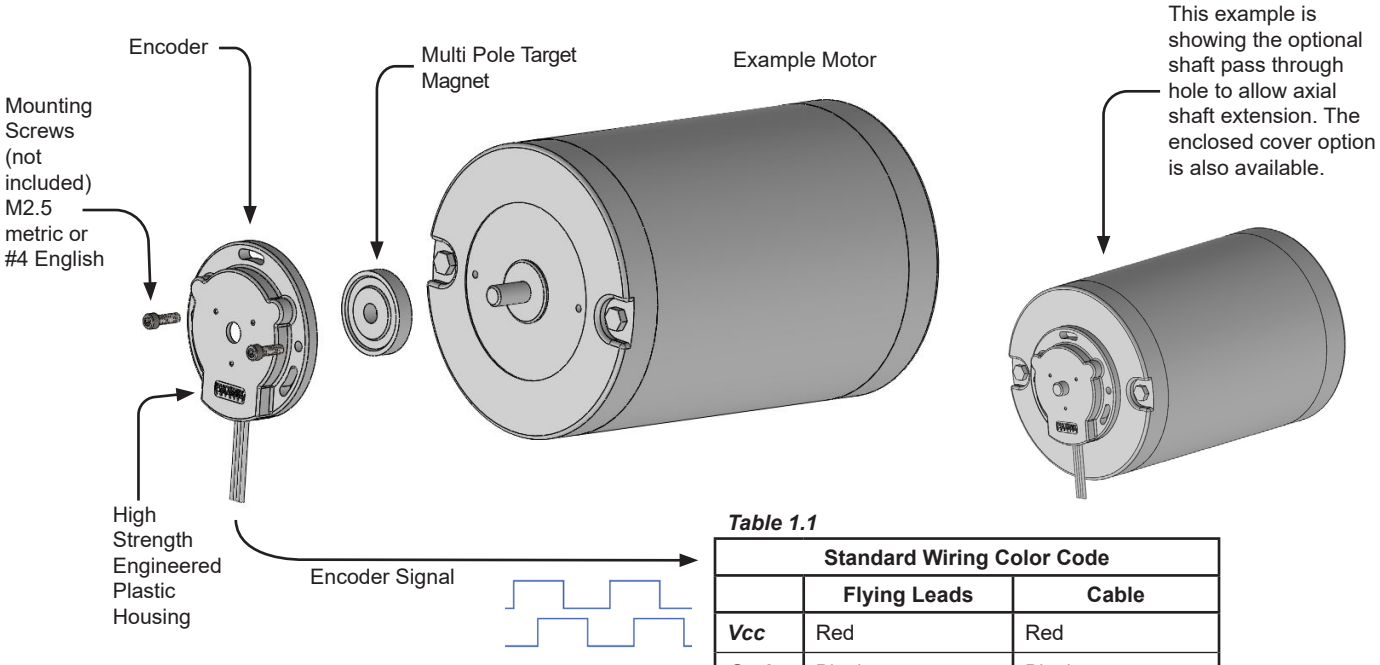


Table 1.1

Standard Wiring Color Code		
	Flying Leads	**Cable**
Vcc	Red	Red
Gnd	Black	Black
Ch A	Yellow	Brown
Ch B	Blue	Orange

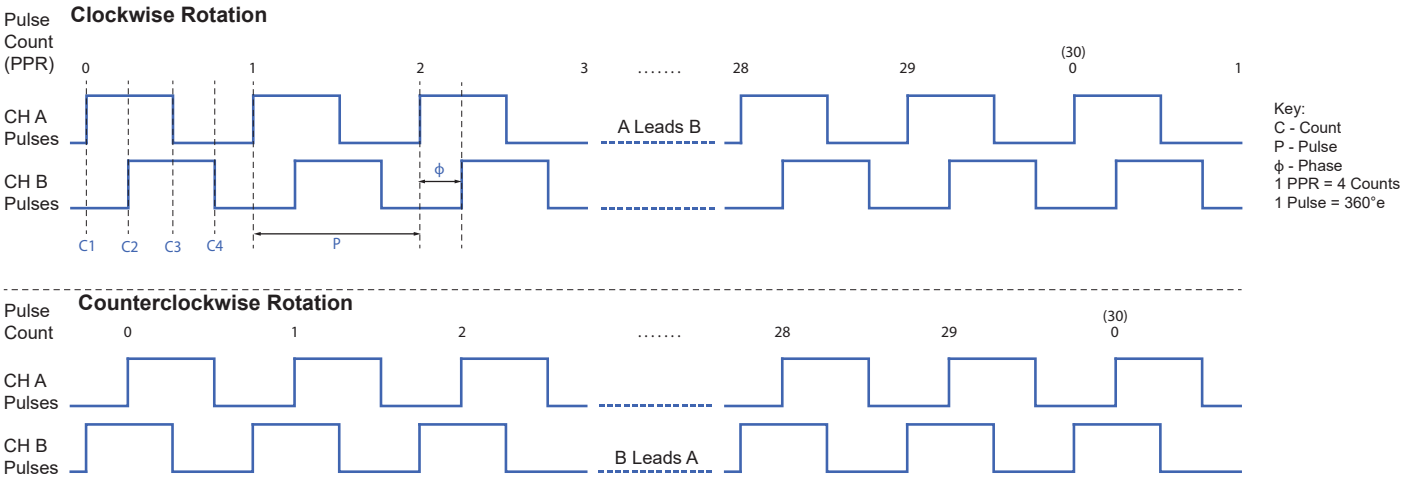
Other colors available upon request.
Contact sales@phoenixamerica.com.

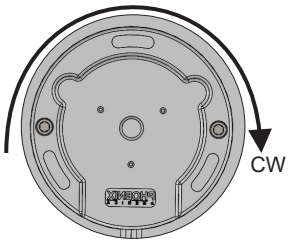
Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com

Output Waveforms





Phase direction is dependent on specified resolution. Shaft rotation is defined when looking at the branded face of the encoder. See Table 2.1 below.

Table 2.1

Shaft Rotation	Resolution PPR - Pulses Per Revolution
Channel A leads Channel B	3, 7, 12, 14, 15, 19, 22, 30
Channel B leads Channel A	1, 2, 4, 5, 6, 8, 9, 10, 16, 17, 18, 20, 25, 26

Absolute Maximum Ratings

Table 2.2

Characteristic	Symbol	Rating	Units
Forward Supply Voltage	V_{CC}	26.5	V
Reverse Supply Voltage	V_{RCC}	-30	V
Output Off Voltage	V_{OUT}	26	V
Continuous Output Current	I_{OUT}	25	mA
Reverse Output Current	I_{ROUT}	-50	mA
Operating Temperature	T_A	-40 - 125	ºC
Storage Temperature	T_S	-40 - 150	ºC

Electrical Characteristics

Table 2.3

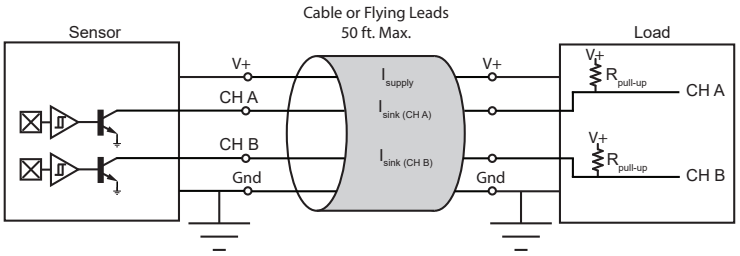
Characteristic	Symbol	Test Conditions	Min.	Typ.[1]	Max.	Unit[2]
Forward Supply Voltage	V_{CC}	Operating, T_J < 165 ºC	3.3	-	24	V
Power-On Time	t_{PO}	V_{CC} > 3.3V	-	-	25	µs
Supply Current	$I_{CC(ON)}$	B > B_{OP}, V_{CC} = 12V	-	-	8	mA
	$I_{CC(OFF)}$	B < B_{RP}, V_{CC} = 12V	-	-	8	mA
Reverse Supply Current	I_{RRC}	V_{RRC} = -30V	-	-	-5	mA

Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com

Electrical Circuit



Output channels require customer supplied pull-up resistors unless internal pull-up option is selected. See Table 3.1 for recommended resistor values.

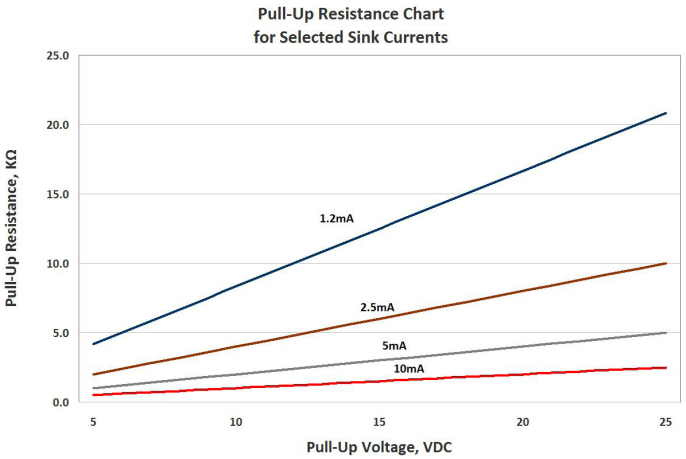


Table 3.1

Recommended Pull-Up Resistor Values			
	Supply Voltage		
Current, I_{sink}	5	12	24
1.2 mA	4.3K	10.0K	20.0K
2.5 mA	2.0K	4.7K	10.0K
5 mA	1.0K	2.4K	4.7K
10 mA	510Ω	1.2K	2.4K

I_{sink} is application dependent. It is recommended to use the lowest possible sink current when selecting a pull-up resistor.

Theoretical Pull-Up Resistor Calculation: $R_{pullup} = \frac{V_{supply}}{I_{sink}}$

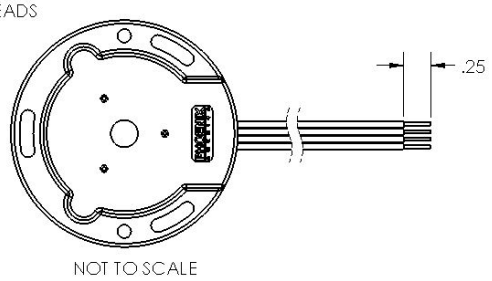
Resistance values based on closest standard 5% resistor values

Absolute Maximum I_{sink} = 20mA

4.7 K pull-up is available as a standard option. If an alternative pull-up value is preferred, contact sales@phoenixamerica.com.

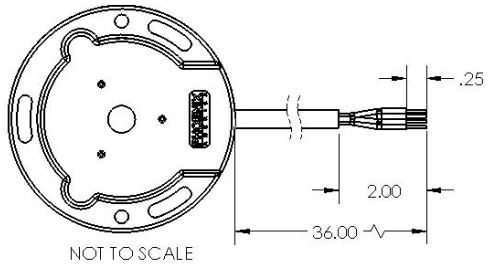
Wiring

FLYING LEADS



- 24 AWG
- 7x32 Strands, Tinned Copper
- PVC Insulation
- MIL M16878/1
- Temperature Rating: 105ºC

CABLE



- 24 AWG
- 4 Conductor with Foil Shield and Drain
- Stranded Tinned Copper
- PVC Insulation
- Grey PVC Jacket
- UL Style 2464, CSA
- Temperature Rating: 105ºC

Table 3.2

Standard Wiring			
	Leads	**Cable**	**Connector Pin-Out**
Ch A	Yellow	Brown	1
Ch B	Blue	Orange	2
Gnd	Black	Black	3
Vcc	Red	Red	4

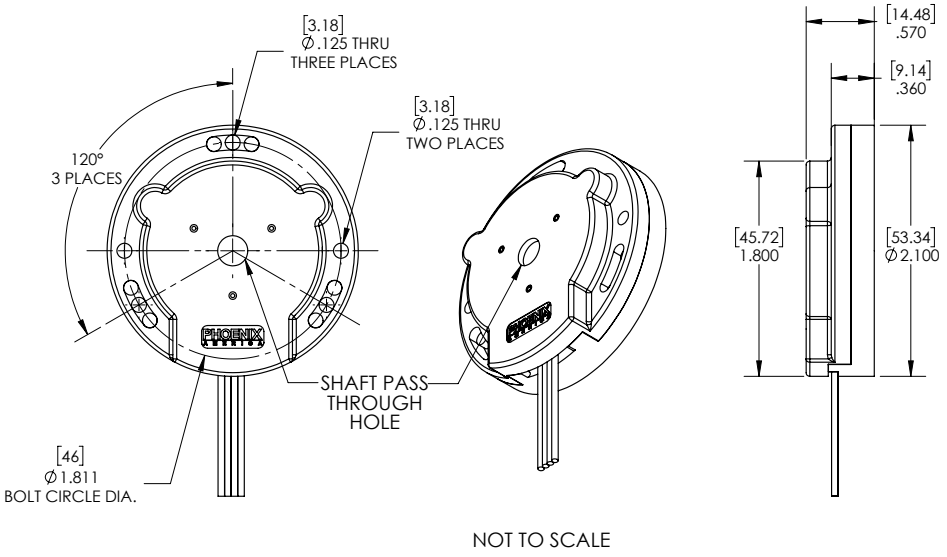
Custom lengths and insulation materials available. Contact sales@phoenixamerica.com.

Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com

Encoder Physical Outline



NOT TO SCALE

Table 4.1

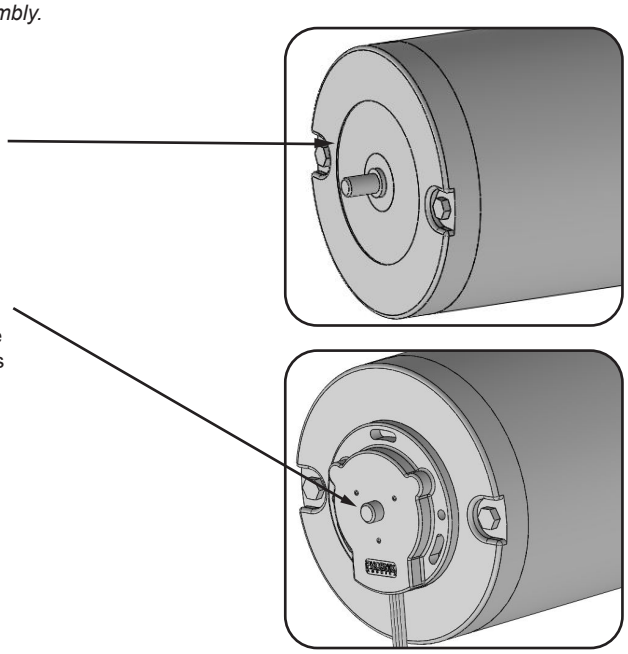
Motor Shaft Diameter	Shaft Pass Through Hole Size (options/ recommendation)	
-	No Hole	
2 mm	2.06 mm	0.081 in
3 mm	3.06 mm	0.120 in
1/8 in	3.26 mm	0.127 in
5/32 in	4.06 mm	0.160 in
4 mm	4.06 mm	0.160 in
3/16 in	4.83 mm	0.190 in
5 mm	5.06 mm	0.199 in
6 mm	6.06 mm	0.239 in
1/4 in	6.40 mm	0.252 in
7 mm	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
10 mm	10.06 mm	0.396 in
12 mm	12.06 mm	0.475 in
1/2 in	12.76 mm	0.502 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 2.11” 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.



Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com

Target Magnet Physical Outline - AS Molded (Mounting Style A)

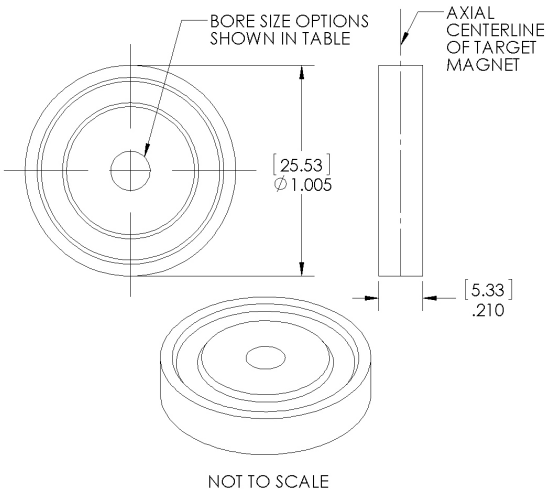


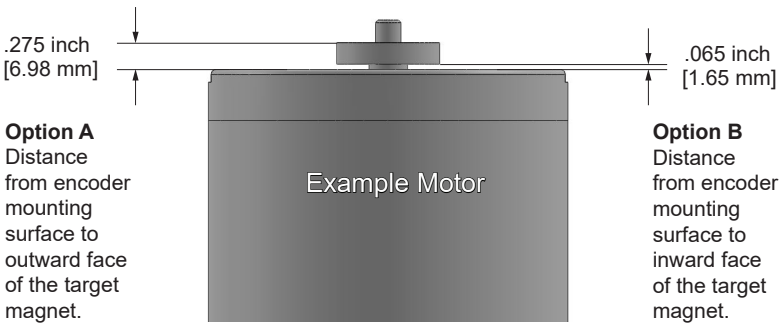
Table 5.1

Bore Size (.inch)	Motor Shaft OD Size (nominal)	NEMA Guide Shaft Tolerance	Magnet Bore MIN. (inch)	Magnet Bore MAX. (inch)
079	2 mm (.0787")	+0.0000"/-0.0005"	.0777	.0807
118	3 mm (.1181")		.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
394	10 mm (.3940")		.3930	.3960
473	12 mm (.4728")		.4718	.4748
500	1/2 in (.5000")		.4990	.5020

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

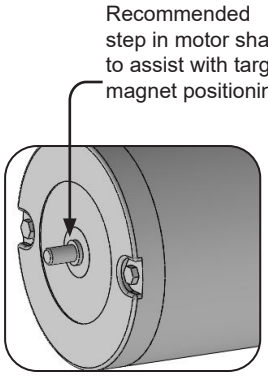
Target Magnet Mounting Guidelines - Molded (Mounting Style A) For Slip Fit Application

- Proper alignment of the magnet rotor 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 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 proven 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.



Option A
Distance from encoder mounting surface to outward face of the target magnet.

Option B
Distance from encoder mounting surface to inward face of the target magnet.



Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com

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

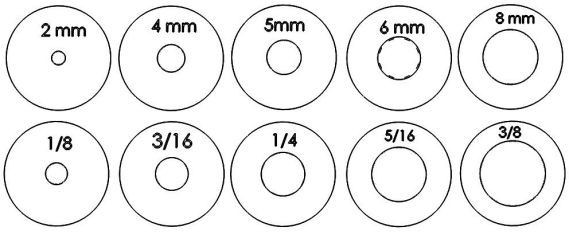
A universal hub kit is available to provide a range of bore sizes to fit several popular industry shaft diameters.

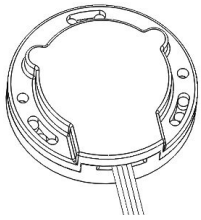
Kit contents *(not shown to scale)*

Hubs

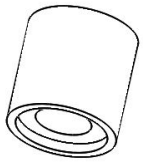
Includes 2 of each size for closed cover option.

Includes 3 of each size for shaft pass through option.

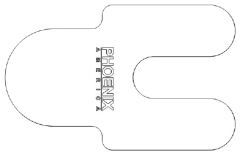




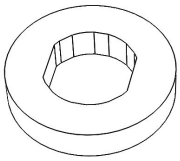
Encoder



Magnet Insertion Tool



Spacer Gap Tool



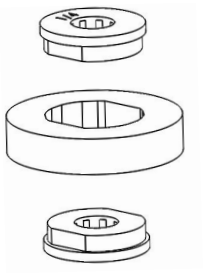
Target Magnet

Assembly Guidelines

Without shaft pass-through option

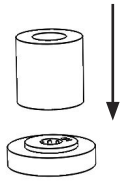
Step 1

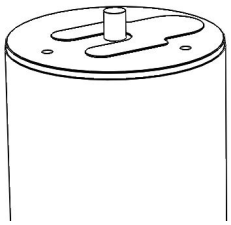
Attach two of the desired hub size on each side of the magnet. Make sure the flats are in-line with each other.



Step 2

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

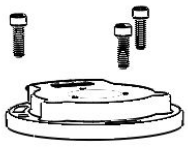


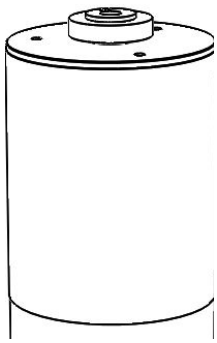


tip - Support the bottom of the motor with a fixture or holding clamp.

Step 3

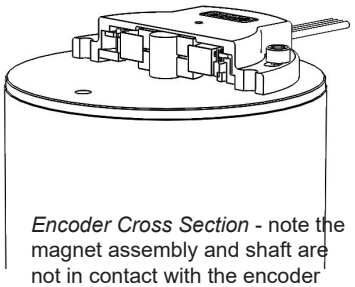
Place the encoder onto the motor and secure with #4 or M3 screws.





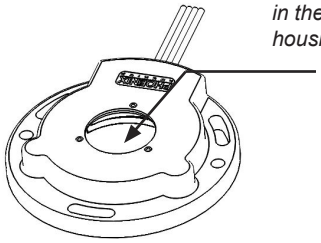
Step 4

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

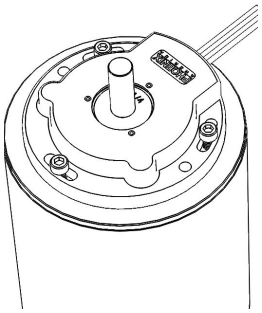


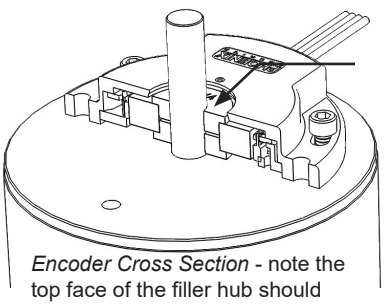
Encoder Cross Section - note the magnet assembly and shaft are not in contact with the encoder housing or the motor housing.

With shaft pass-through option



For applications that require the shaft to pass through the encoder, an optional hole is located in the top of the encoder housing.





Encoder Cross Section - note the top face of the filler hub should be slightly below the top face of the encoder housing as shown by the arrow pointer.

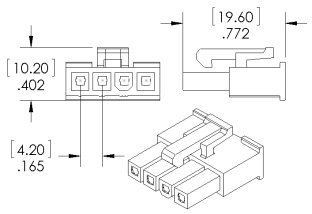
Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

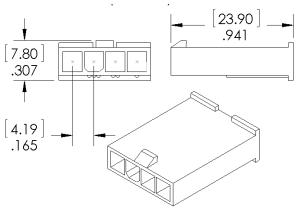
www.phoenixamerica.com
sales@phoenixamerica.com

Connector Options

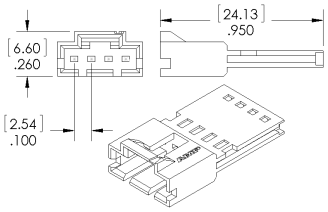
Molex Mini-Fit Jr. (Male)



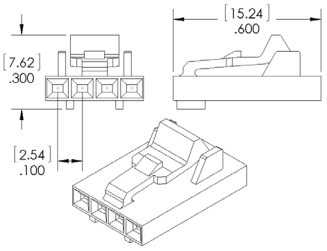
Molex Mini-Fit Jr. (Female)



TE AmpModu MTE (Male)



TE AmpModu MTE (Female)



Need a different connector? Contact sales@phoenixamerica.com.

Part Number Description

L8-0030-0188-05-N-C-N-A-F-B-XX

Series	PPR	Bore Size	Supply Voltage	Index	Output Type	Shaft Pass Through Hole	Target Magnet Mounting	Wiring	Length (Meters)	Connector
L8	**0001** **0016** **0002** **0017** **0003** **0018** **0004** **0019** **0005** **0020** **0006** **0022** **0007** **0025** **0008** **0026** **0009** **0030** **0010** **0012** **0014** **0015**	**0000** Universal Hub **0079** 2 mm **0118** 3 mm **0125** 1/8 in **0156** 5/32 in **0157** 4 mm **0188** 3/16 in *(default)* **0197** 5 mm **0236** 6 mm **0250** 1/4 in **0276** 7 mm **0313** 5/16 in **0315** 8 mm **0375** 3/8 in **0394** 10 mm **0473** 12 mm **0500** 1/2 in	**05** 5V *(default)*	**N** No *(default)* **Y** Yes	**C** *Open Collector (default)* **S** *Open Collector with Internal 4.7k Pull Up Resistor*	**N** *None (default)* **Y** *Size will match bore shown in Table 4.1*	**A** *AS Molded (default)* **U** *Universal Hub*	**F** Flying Leads *(default)* **C** Cable	**A** .5 *(19.685")* **B** 0.914 *(36") (default)* **C** 1 *(39.370")* **D** 2 *(78.740")*	**XX** *None (default)* **A1** *TE AmpModu MTE (Male)* **A2** *TE AmpModu MTE (Female)* **M1** *Molex Mini-Fit Jr. (Male)* **M2** *Molex Mini-Fit Jr. (Female)*

Example: L8-0030-0188-05-N-C-N-A-F-B-M2

Phoenix America, LLC
4717 Clubview Drive
Fort Wayne, IN 46804

Tel: (888)-801-1422
Local: (260)-432-9664
Fax: (260)-432-9967

www.phoenixamerica.com
sales@phoenixamerica.com