



- ▶ **0° to 360° absolute angular position sensing**
- ▶ **Robust non-contacting design**
- ▶ **Rugged nylon reinforced housing**
- ▶ **Choice of analog or PWM output**
- ▶ **Factory programmable analog transfer characteristics**
- ▶ **Reverse polarity protection**
- ▶ **Built-in transient & output short circuit protection**
- ▶ **12 Bit angular resolution**
- ▶ **Operation from -40 °C to 80 °C**
- ▶ **Customizable lead wires, cables, & connectors**
- ▶ **IP67 Rated Design**

The R3 Series absolute rotary position sensors are cost-effective devices to accurately determine absolute positions of rotating shafts. The R3 Series sensors can be configured for analog or PWM output. The analog output mode provides a rail-to-rail ratiometric output with a push-pull output stage that allows the use of pullup or pull-down resistors. The analog transfer characteristic is programmable for sensing any range of angles between 0° and 360°. In addition to numerous standard configurations, custom output slopes and functions are available. Being a non-contact device, the absolute rotary position sensor is very well suited to industrial environments. With sensing technology housed in a rugged, reinforced nylon housing, these sensors provide a low cost solution for demanding applications. Standard electrical protection includes reverse polarity, transient suppression and output short circuit.

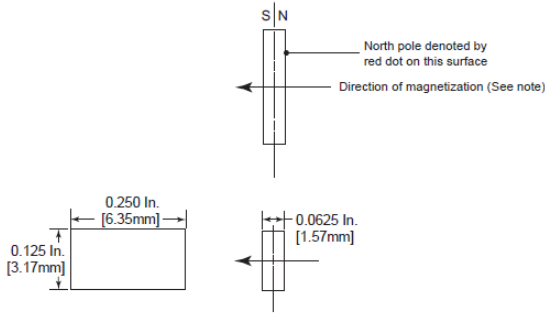
Central to the R3 absolute rotary position sensors are magnetic hall effect sensors that are sensitive to the magnetic flux density applied coplanar to the sensor surface. When utilized with the correct diametrically magnetized target magnet, the R3 Series sensors are able to decode the absolute angular position of the magnet from 0 to 360 degrees.

# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR



## Application Example: Customer Output Shaft- Modified for (M1) Rectangular Magnet Option

### M1 Target Magnet Option - Magnet Dimensions

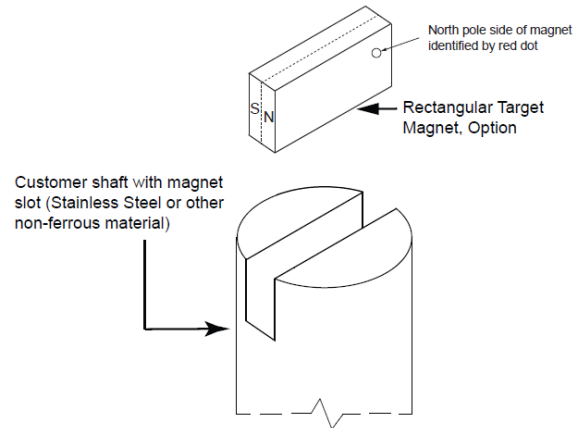


Note: Axially magnetized through the thickness of the magnet

(Note: Other magnet sizes available upon request)

Note: Drawing not to scale

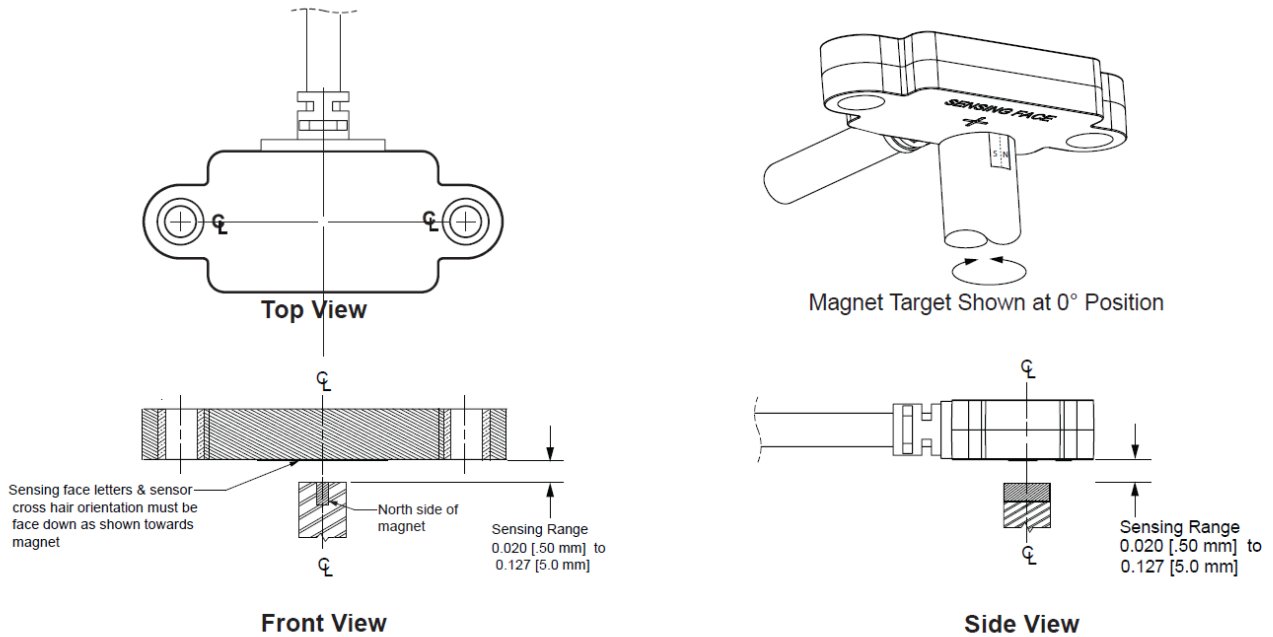
### Shaft Modification Example - M1 Magnet Magnet



Note: Secure target magnet to shaft with adhesive compound (Locktite 648 Retaining compound or equivalent)

Note: Drawing not to scale

### M1 Target Magnet Option - Front & Side View Sensor and Magnet Orientation

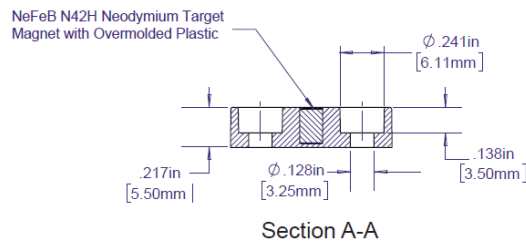
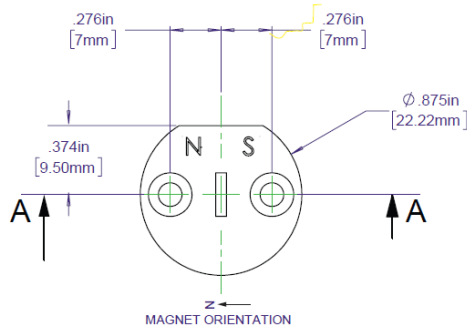


Note: Illustrations not to scale

# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR

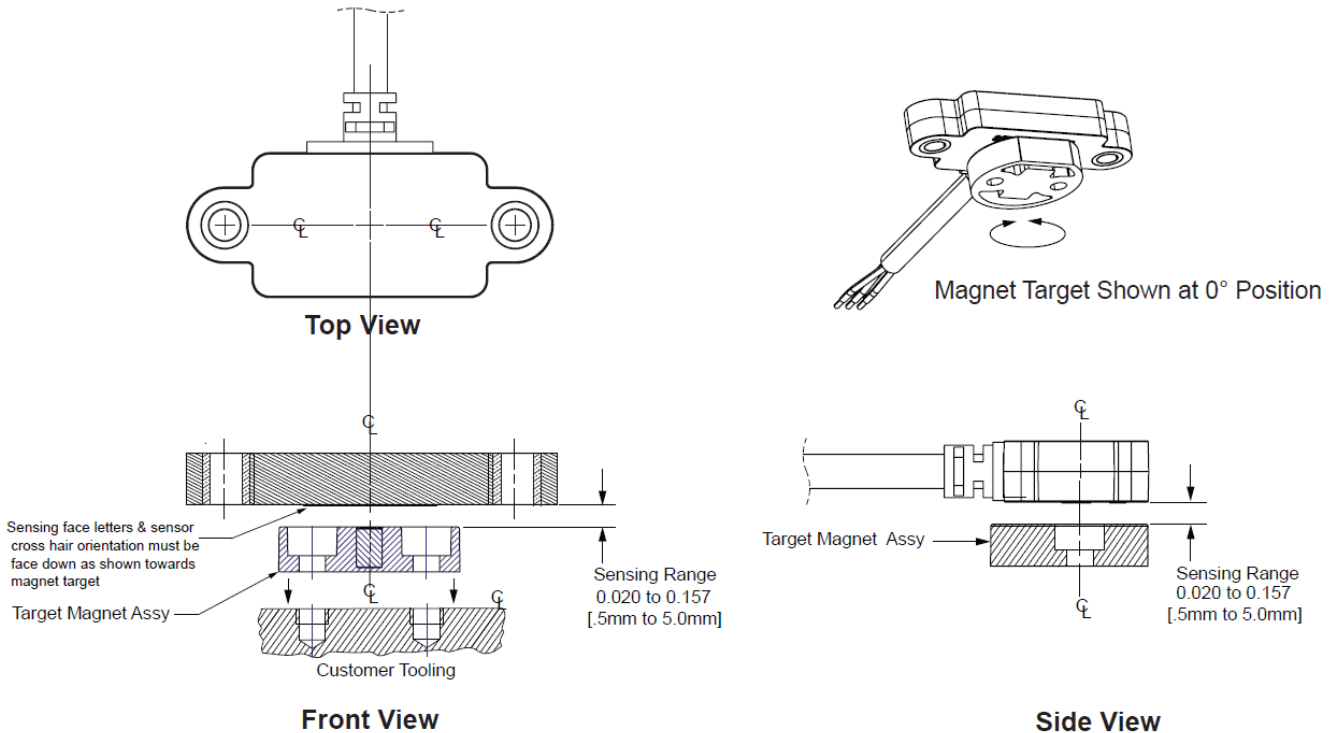


## Application Example: R3 Sensor Application with Optional (M2) Target Magnet Assembly



Note: Drawing not to scale

## M2 Target Magnet Option - Front & Side View Sensor and Magnet Orientation



Note: Illustrations not to scale

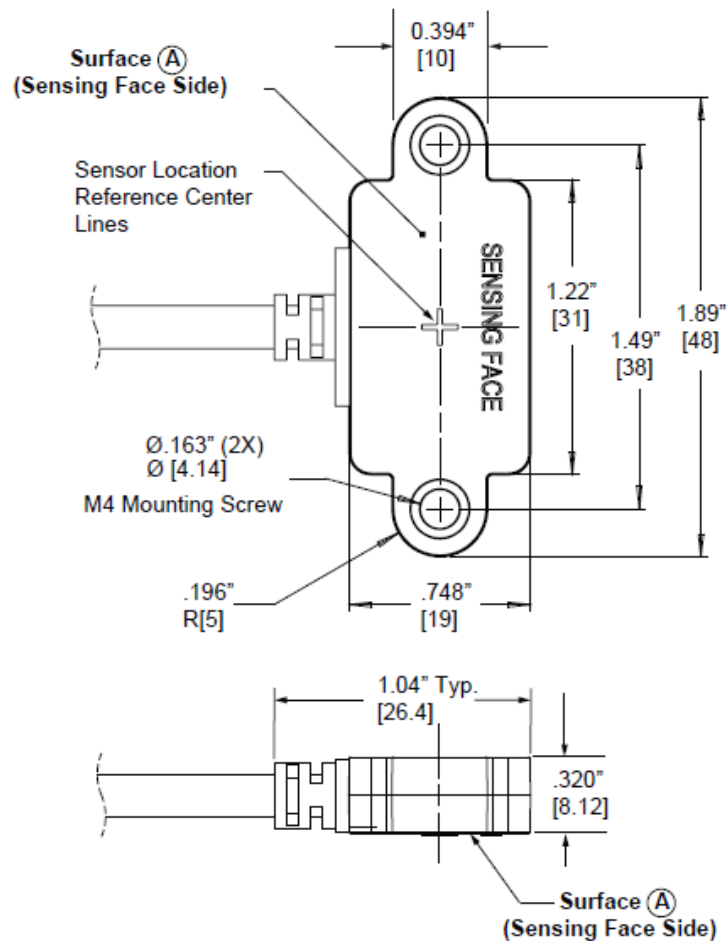
# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR



## Electrical Characteristics: (T = -40 to 80 °C)

Characteristics	Symbols	Test Condition	Limits			
			Min.	Typ.	Max.	Units
Supply Voltage	$V_{CC}$	Operating	4.5	5	5.5	VDC
Supply Current	$I_S$	Power Saving Mode		8.5	10	mA
		Normal Mode		13.5	16	mA
Output Current	$I_{OUT}$	Analog Output Mode	-8		8	mA
		PWM Output Mode	-20		20	mA
Output Load	$R_L$	Pull Down to Ground	4	10		$k\Omega$
		Pull-up to 5V	4	5.6		$k\Omega$
Clamped Output Level	Clamp_lo	Programmable	0		100	$\%V_{CC}$
	Clamp_hi	Programmable	0		100	$\%V_{CC}$
Linearity (Without misalignment)	-	-		$\pm 0.05$		%
PWM Frequency	-	-		1000		Hz

## Physical Outline

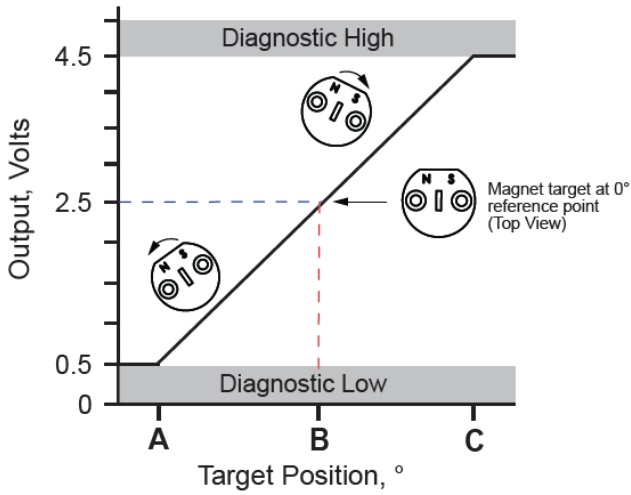


Note: Drawing not to scale

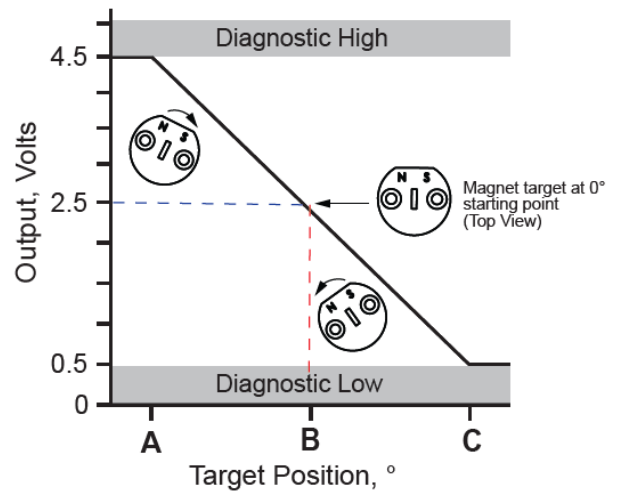


## Output Curves for Factory Programmed Angles and Magnet Target Positions

### Standard Output Curves



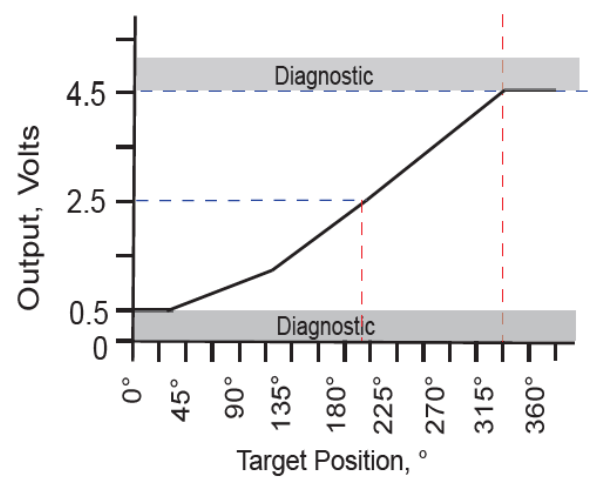
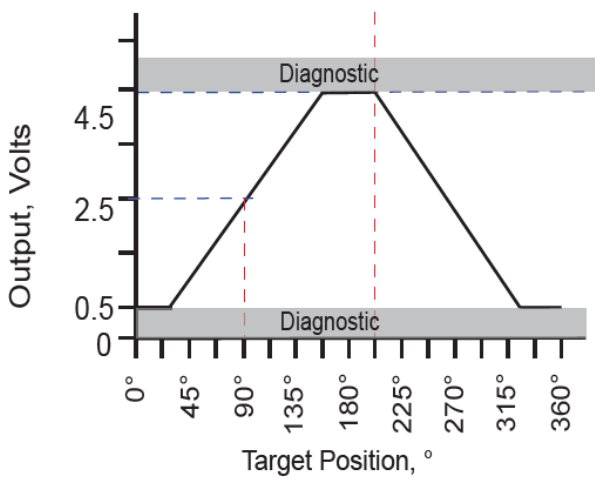
### Inverted Output Curves



60° (±30°)	-30	0	+30
90° (±45°)	-45	0	+45
120° (±60°)	-60	0	+60
180° (±90°)	-90	0	+90
270° (±135°)	-135	0	+135
360° (±180°)	-180	0	+180

60° (±30°)	-30	0	+30
90° (±45°)	-45	0	+45
120° (±60°)	-60	0	+60
180° (±90°)	-90	0	+90
270° (±135°)	-135	0	+135
360° (±180°)	-180	0	+180

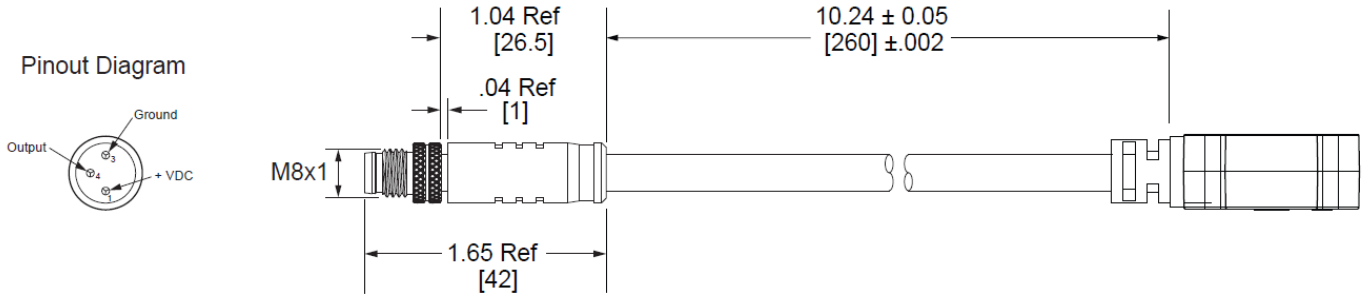
## Custom and Multi-slope Output Curve Examples for Specific Applications



# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR



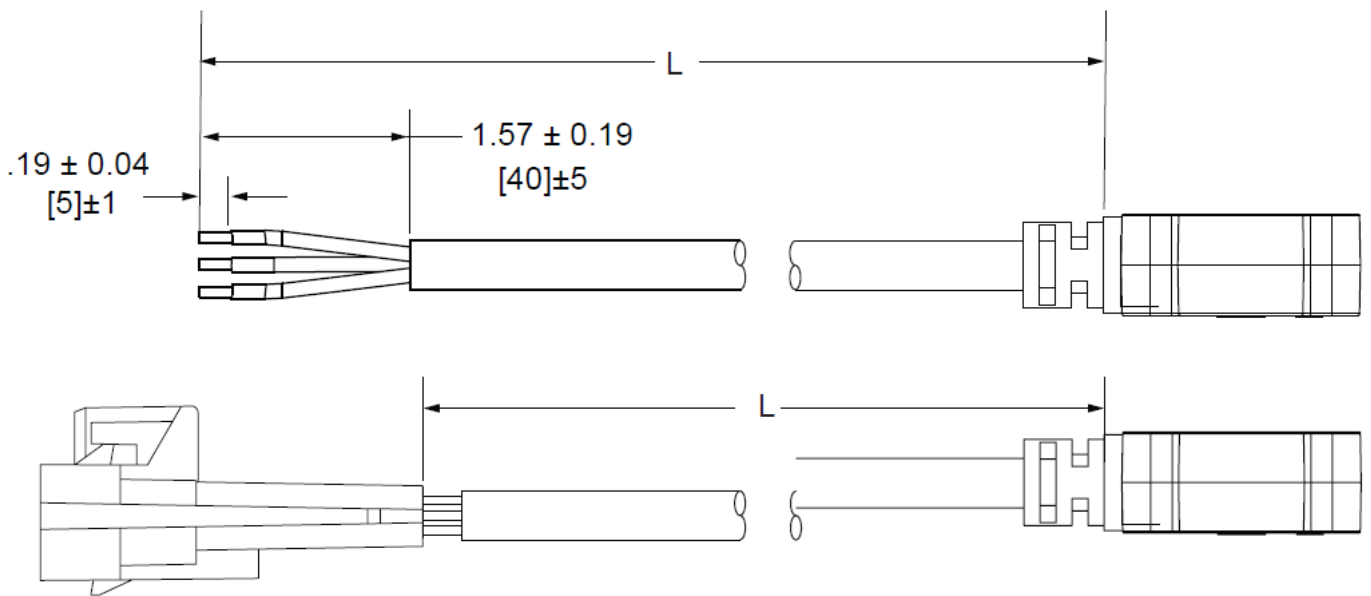
## 8 mm Molded Threaded Connector Option



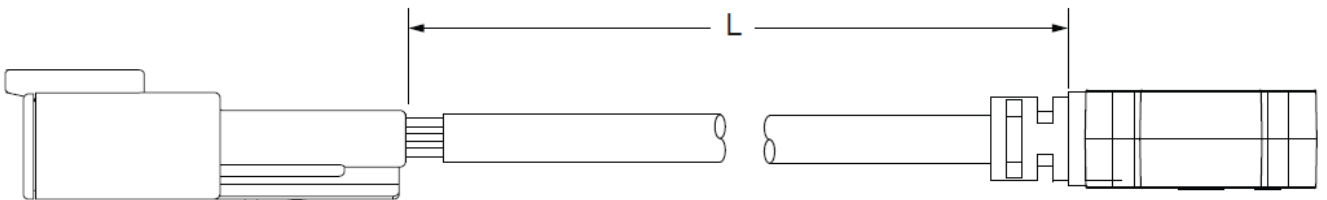
\* Contact sales@phoenixamerica for alternative cable length options

Note: Drawing not to scale

## Leaded Connector Options



### Aptiv Metri-Pack 150 Male Connector



### Deutsch DTM04-3P Male Connector

Note: Drawing not to scale

**Cable Specifications:** 24AWG, 3 Conductor, Voltage Rating: 300 Volts, Temperature Rating: 70° C  
 Jacket Pressure Extruded PUR-Flame Retardant, Conductor Insulation: PVC  
 Jacket Diameter: 0.177 Nominal, 0.170 Min / 0.184 Max, Color: Black

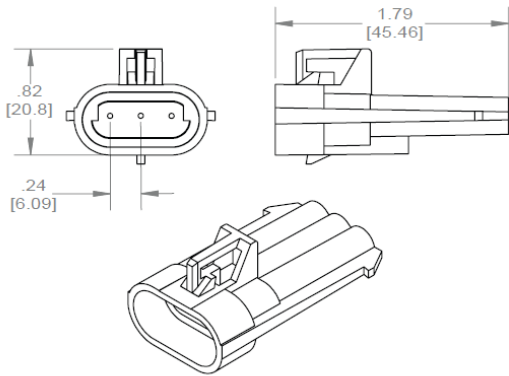
\* Contact sales@phoenixamerica for alternative wire and cable options

# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR

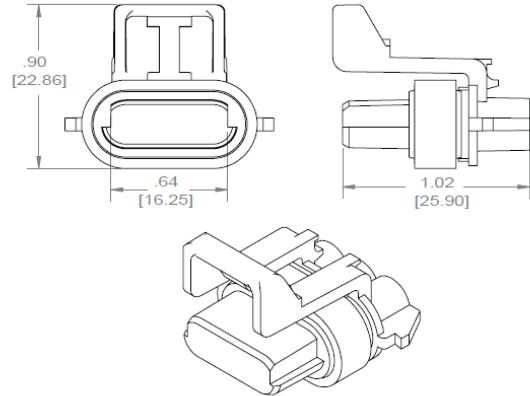


## Aptiv Metri-Pack & Deutsch Connector Dimensions

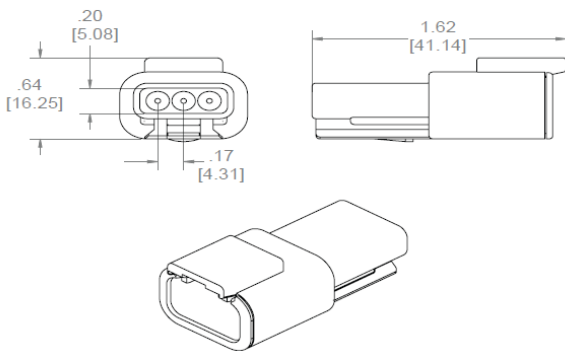
Aptiv (Delphi-Packard) Metri-Pack 150, Male Terminal



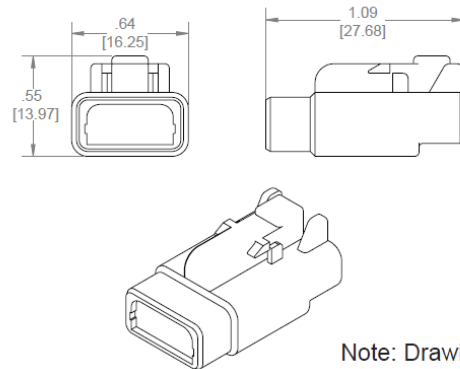
Aptiv (Delphi-Packard) Metri-Pack 150, Female Terminal



Deutsch DTM04-3P, Male Terminal



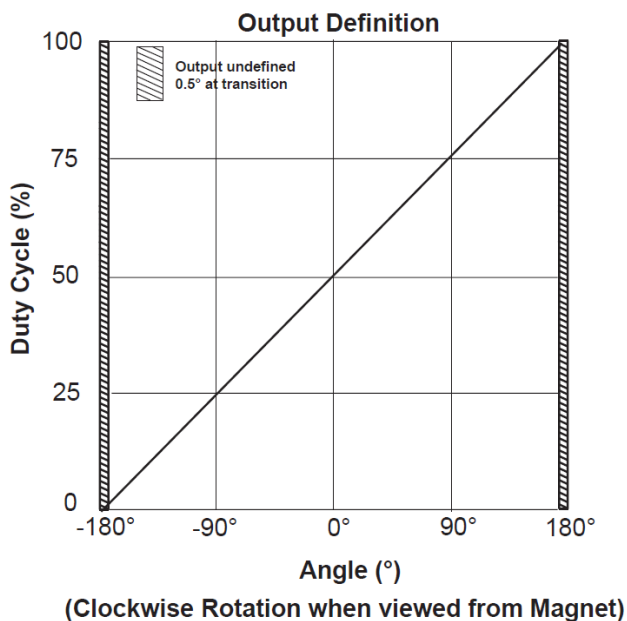
Deutsch DTM06-3S, Female Terminal



Note: Drawing not to scale

\* Contact sales@phoenixamerica for alternative connector options

## PWM Output Definition Reference Graph



# R3 SERIES ABSOLUTE ROTARY POSITION SENSOR



## Electrical Connection Color Code & Pinout Table

Function	Cable	Metri-Pack Connector	Deutsch Connector	8 mm Threaded Connector
+VDC	Brown	A	1	Pin 1
Output	Black	B	2	Pin 4
Ground	Blue	C	3	Pin 3

## Ordering Information

(Please use the characters in the chart below to create your product code)

### Sample Code

R3 - 060 - 05 - A - C - A - X - X

<b>Series</b> R3	<b>Target Magnet</b> X None (Default) M1 Rectangular Target Magnet M2 Overmolded Target Magnet Assy.
<b>Sensing Angle</b> 060 ±30° 090 ±45° 120 ±60° 180 ±90° 270 ±135° 360 ±180°	<b>Connector</b> X None (Default) M8 8 mm, 3 Pin Threaded Male Connector P1 Aptiv/Packard Metri-Pack 150 (Male) P2 Aptiv/Packard Metri-Pack 150 (Female) D1 Deutsch DTM04-3P (Male) D2 Deutsch DTM06-3S (Female)
<b>Supply Voltage</b> 05 5 V (default)	<b>Length (meters)</b> A .5 (19.685") B .914 (36") C 1 (39.37") D 2 (78.74") E* .26 (10.24")
<b>Output Type</b> A Analog P PWM	
<b>Wiring</b> C Cable	

\*Applies only to M8 Connector Option

## Example Part Numbers

R3-06-05-A-C-A-X-X

R3-120-05-A-C-E-M8-M2

R3-360-05-P-C-B-X-X

\* Contact sales@phoenixamerica for alternative options