Quadrature Speed and Direction Sensors
UPI-S Series

PIKTEC

Datasheet

DESCRIPTION

PIKTEC UPI-S Series Quadrature Speed and Direction Sensors are designed to provide both speed and direction information. Speed information is provided from digital square wave outputs; direction is provided using a quadrature output with signals 90° phase shifted from each other. With the quadrature output, target direction is determined by output lead/lag phase shifting.

VALUE TO CUSTOMERS

Higher reliability: IP69K rating, EMC radiated immunity protection, O-ring seal and wide operating temperature range:
- Improves equipment uptime
- Minimizes service costs
- Provides resistance to high electrical noise
- Provides resistance to moisture intrusion
- Wide operating temperature range
- Attempts to substantially reinforce the customers brand equity

Cost-competitive: Designed and manufactured using a platform-based approach that enables better cost-competitiveness and mechanical and electrical configurability for customers.

Enhanced accuracy: Dual differential Hall-effect sensor IC technology allows an enhanced ability to detect small target features.

Flexible: Wide operating temperature range, robust electrical noise immunity and enhanced environmental sealing capability allow flexibility of use in the application.

Expedites installation: O-ring seal for use in pressure applications and a fixed mounting flange allows for a simpler installation process, using one fastener.

FEATURES

Wide operating temperature range: -40°C to 150°C [-40°F to 302°F]

Environmental sealing: Moisture ingress protection rated to IP69K

Robust electrical noise immunity: Electrical noise radiated immunity (EMC) rated to 100 V/m

High frequency switching capability: 3 Hz to 20 kHz

Direction information: From phase-shifted dual output signals

O-ring seal: Enables environmental sealing to mounting surface

Supply voltage range: 4.5 V to 26 V

CE certified

POTENTIAL APPLICATIONS

:

AC induction motors in material handling, agriculture, and construction machines: May be used to help control power delivered by the ac induction motor

Escalators and elevators: May be used to help control speed and position

Tr:

Hybrid electric transmissions in heavy duty trucks, buses, agriculture and construction machines: May be used to help control power regulation of the hybrid system

Wheel speed detection in material handling, agriculture, and construction machines: May be used to detect the speed and direction of the wheels, which translates to the speed and direction of the machine

Hybrid engines in heavy duty trucks, buses, agriculture and construction machines: May be used to help control power regulation of the hybrid system

Not recommended for Aerospace or Defense applications.

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Table 1. Electrical Specifications

Characteristic	Parameter	Comment
Supply voltage	4.5 V to 26 V	
Output signal:		
type	square wave	Two channel, phase shifted by 90° either channel, may lead or lag.
duty cycle[1]	50% ±10%	Dependent on target geometry and sensor-to-target orientation; see Figures 2, 3, 4, 5, 6, 7, 8, 9 for recommended orientation.
phase shift	90° ±45°	Dependent on target geometry and sensor-to-target orientation; see Figures 2, 3, 4, 5, 6, 7, 8, 9 for recommended orientation.
high	≥Vs - 0.5 V	
low:		
	≤0.5 V	
	≤1.75 V	
load current	40 mA max.	Applies to each output at all conditions.
rise time	10 us max.	1 kOhm pull-up resistor, dependent on load resistor.
fall time	5 us max.	1 kOhm pull-up resistor, dependent on load resistor.
frequency	3 Hz to 20 kHz	Frequencies >10 kHz may be dependent on target geometry and air gap.
Short circuit protection	50 mA max.	
Supply current:		
normal	12 mA	all conditions
max.	18 mA	
Reverse voltage	-26 V max.	10 min duration

[1]Duty cycle = Time high/time total.

Table 2. Mechanical Specifications

Characteristic	Parameter
Sensing air gap	0,0 mm to 2,0 mm [0.0 in to 0.08 in]
Target:	
width[1]	>5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.
slot width[2]	2,0 mm [0.08 in] min.
tooth width[2]	2,0 mm [0.08 in] min.
tooth height[3]	>3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.
Materials:	
housing	PBT
bushing	brass
O-ring	fluorocarbon with PTFE coating, Ø11,8 mm [Ø0.47 in] OD x Ø1,80 mm [Ø0.07 in] CS
cable[4]	EVA, four conductor, 36 AWG, 28 strand, Ø5,2 mm [Ø0.20 in] jacket
Mounting:	
bore size[5]	Ø15,15 mm to Ø15,40 mm [Ø0.60 in to Ø0.61 in]
torque	10 N m [88.5 in-lb] max. with M6 X 1.0 bolt

Table 3. Environmental Specifications

Characteristic	Condition	Parameter
EMI: radiated immunity bulk current injection ESD	 ISO 11452-2, 400 MHz to 1 GHz ISO 11452-4, 1 MHz to 400 MHz ISO 10605, Section 9 conforms to CE Mark standards EN60947-5-2:2007 and EN 60947-5-2/A1:2012	 100 V/m 100 mA ±8 kV contact, ±15 kV air
Operating temperature		-40°C to 150°C [-40°F to 302°F]
Thermal shock, air to air	-40°C to 150°C [-40°F to 302°F], 60 min. soak, <3 s transfer	500 cycles
Humidity	95% humidity at 38 °C [100 °F]	240 hr
Salt fog	5% salt solution by mass at 35 °C [95 °F]	96 hr
Thermal saline dunk	100°C to 25°C [212°F to 77°F] air to liquid, 5% saline	10 cycles
High temperature exposure with power	150°C [302°F], 13.5 Vdc, 1 kOhm load	500 hr
Vibration	3 perpendicular axes, 48 hr per axis	29.28 GMS, 50 Hz to 2000 Hz MIL-STD-202-214
Degree of protection		IP69K
Resistance to fluids		general under-the-hood automotive fluids

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Figure 2. Sensor Output (All catalog listings)

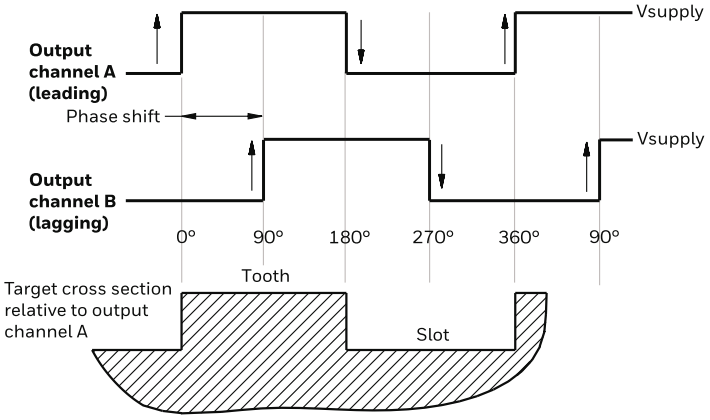
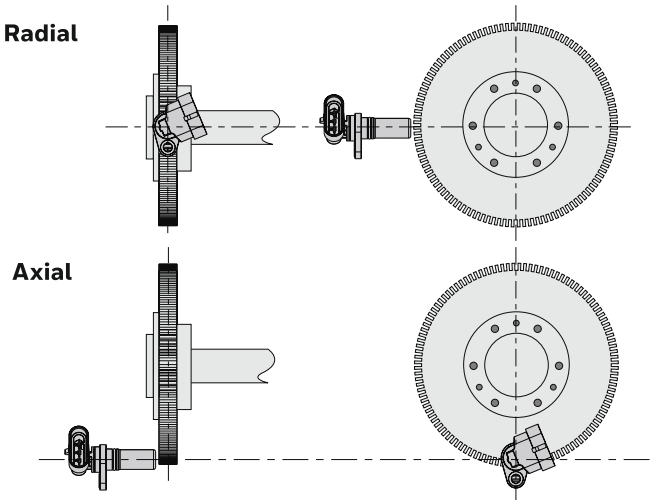
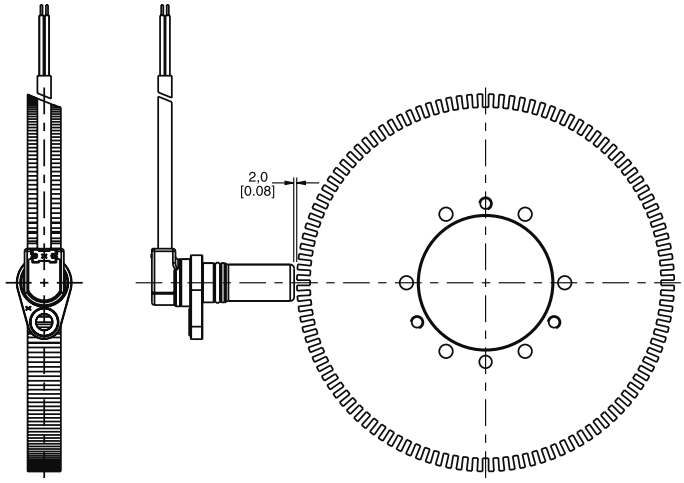
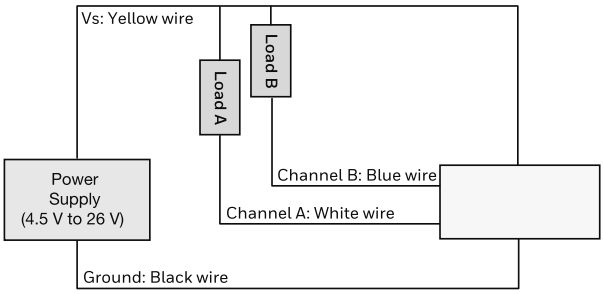


Figure 3. Possible Mounting Orientations





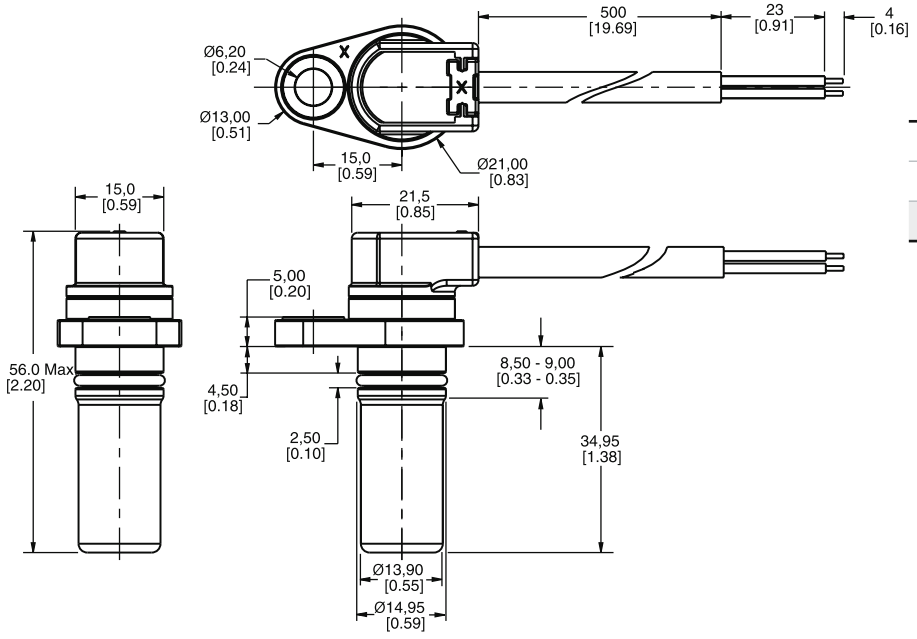
Circuit Diagram



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

Use OhmPs Law to calculate the load resistor based on the supply/load voltage used:

R = V / 0.04 A



Leadwire Assignment			
Yellow	**Black**	**White**	**Blue**
Vsupply	Ground	Channel A	Channel B

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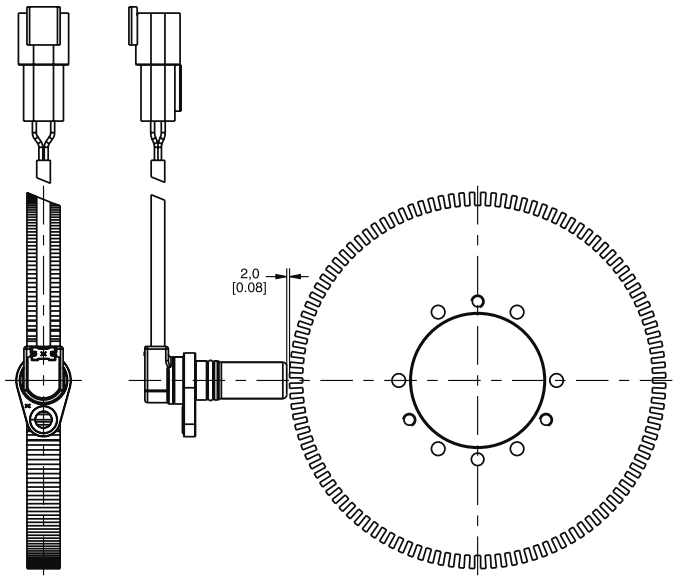

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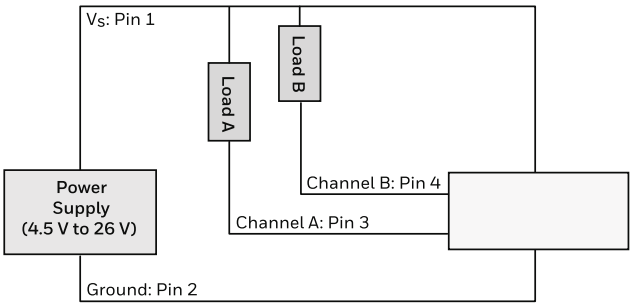

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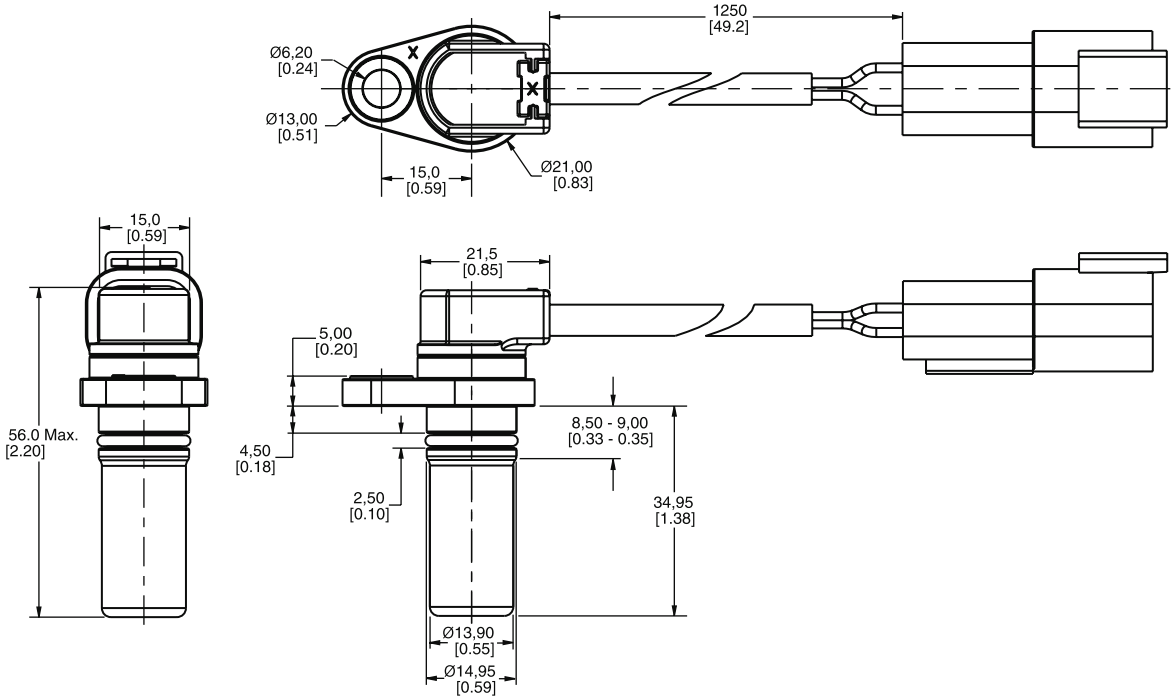

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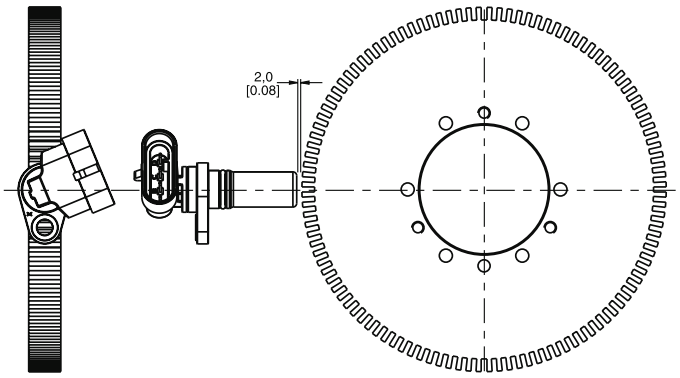

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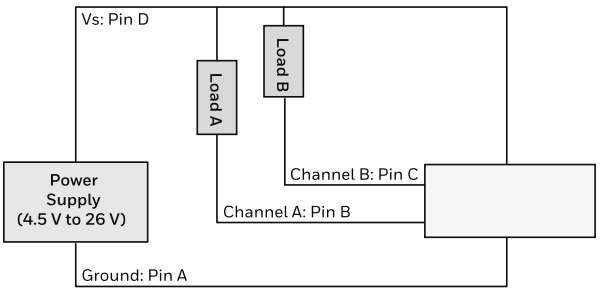

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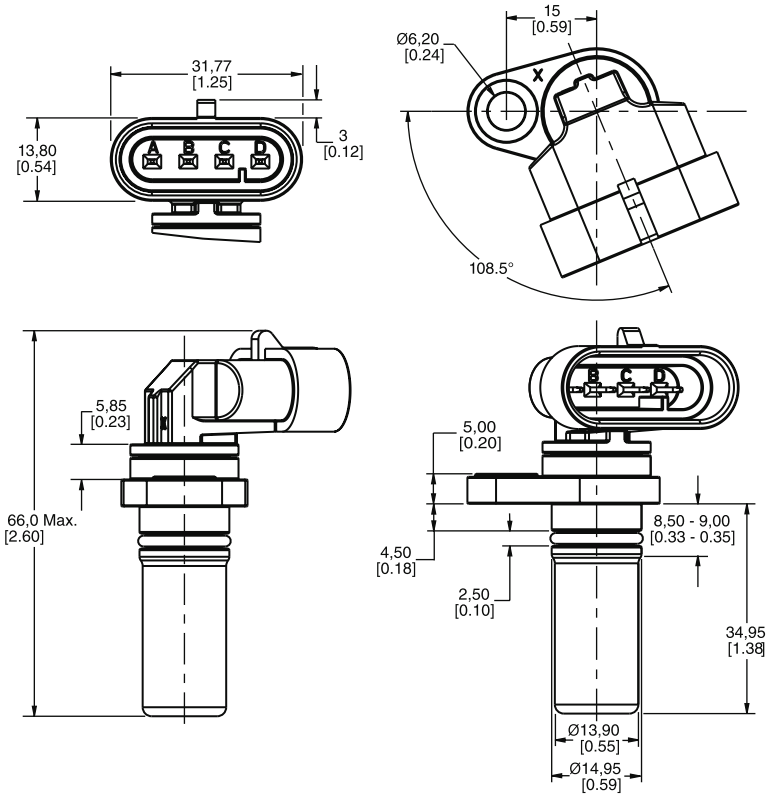

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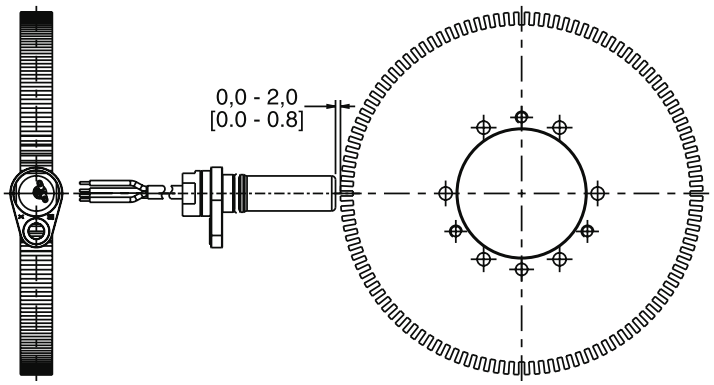

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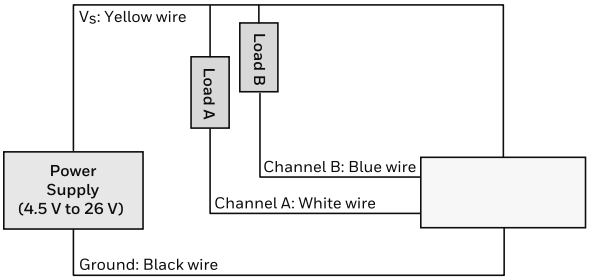

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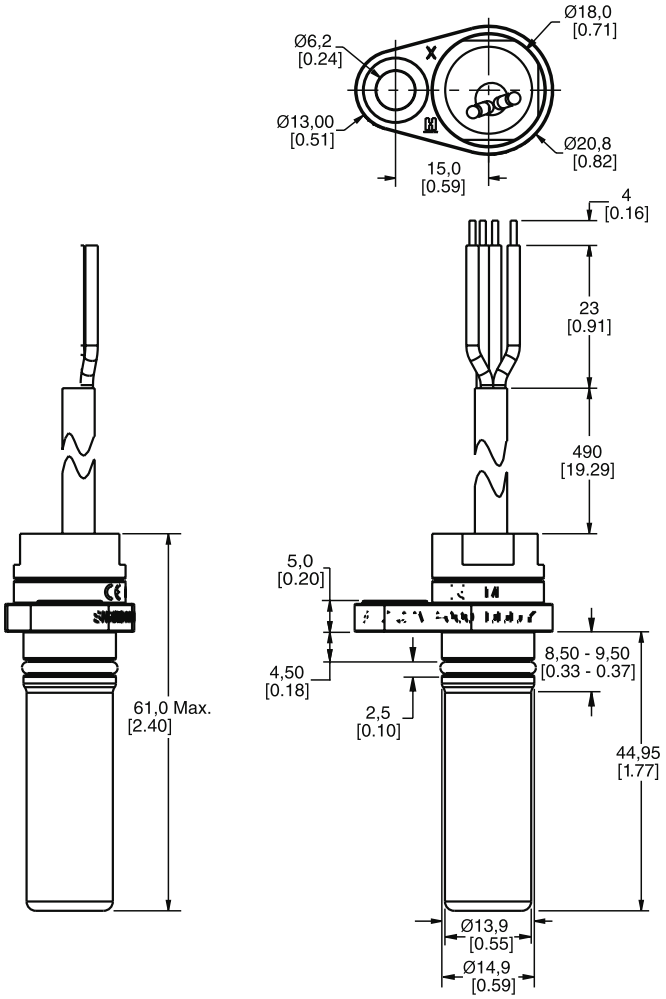

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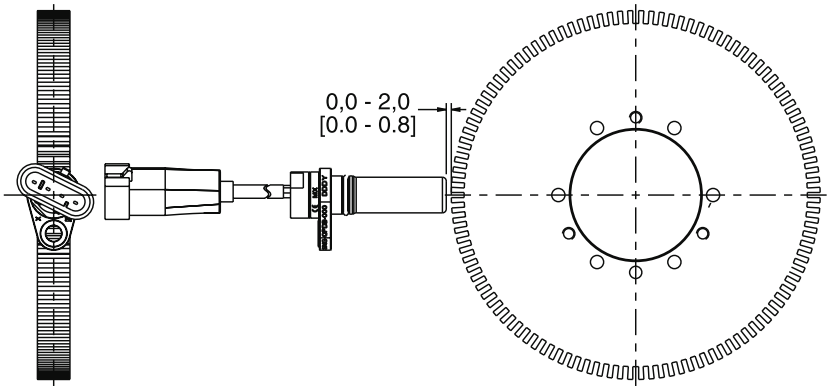

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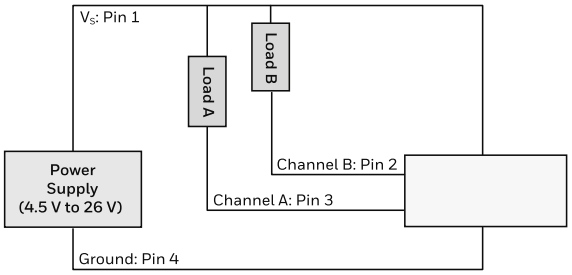

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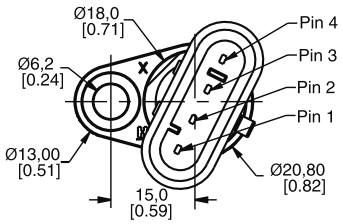
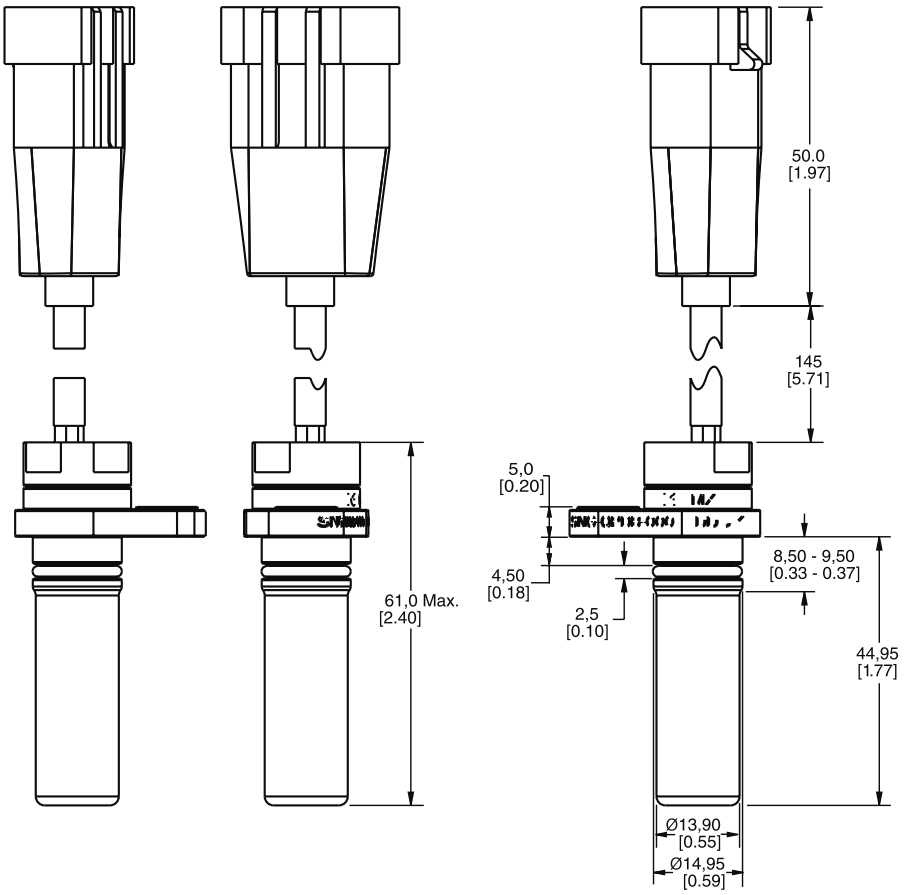


Pin 1	Pin 2	Pin 3	Pin 4
Vsupply	Channel B	Channel A	Ground



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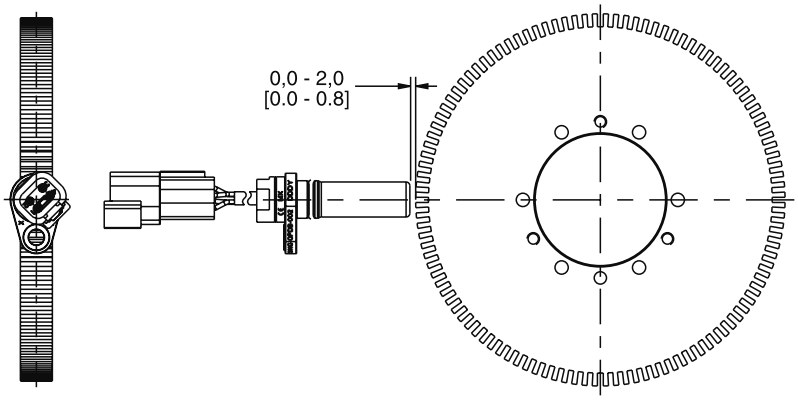

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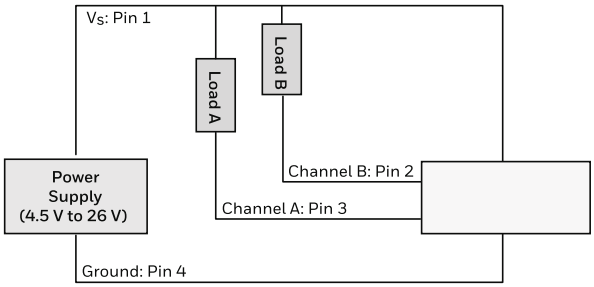

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