



# Entek 2100 Series Family of Non Contact Pickups



# A variety of systems to meet your specific needs

## Measurement systems for:

- Radial Vibration • Eccentricity
- Axial Vibration • Case Expansion
- Speed Reference • Differential Expansion
- Phase Reference • Thrust



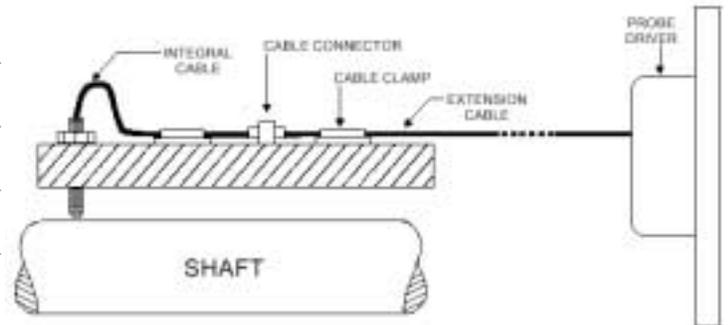
The 2100 Series from Rockwell Automation Entek is a family of sensors designed to meet the stringent requirements of the American Petroleum Institute (API) Standard 670.

The sensors are non-contacting eddy-current type transducers that measure the dynamic and/or static displacement of the target relative to the mounting fixture. These systems are typically used to measure the vibration of rotating machinery such as turbines, compressors, large pumps and other, usually critical, machines.

## Why Choose Entek Probe Systems?

Entek has been designing and supplying probes for over 20 years. This vast experience has culminated in the 2100 Series - one of the most advanced Non-Contact Probe Sensing System available today. The 2100 Series has introduced new standards in terms of accuracy, reliability and ease of machinery monitoring system integration.

The Entek non-contact probe systems are widely used to measure vibration in high-speed machines with relatively lightweight rotors and rigid bearings (turbines, centrifugal pumps and compressors). The probe system, consisting of a non-contact pickup probe, oscillator/demodulator (probe driver) and interconnecting cable, can be used to measure shaft radial and axial vibration, shaft eccentricity, shaft axial position, case expansion, differential expansion and other instances where non-contacting, relative measurements must be made. The Entek probe/driver systems are designed to meet the requirements of API 670 assisting you with the applicability, capability and reliability that you require in your machinery monitoring and protection systems.



## Non-Contact Pick-Up Probe

Entek's non-contact pick-up probes are an encapsulated wire configuration that reads the relative position of the equipment by introducing eddy currents into the target material and measuring the change in the current as the target surface moves. The energy loss into the target increases / decreases as the target moves nearer to or further away from the probe. The change in energy loss is detected as a change in the modulated signal, which produces a voltage proportional to the gap between the probe tip and the target. This signal is fed to the monitoring system providing a continuous, and very accurate measure of the relative distance to the target surface.

## Extension Cable

The extension cable provides flexibility for placement of the probe by allowing extended lengths between the driver and the non-contact pick-up. A variety of Teflon-insulated and Armour coaxial extension cables adapt the sensor system to most installations. To insure the accuracy of the measurement, the extension cables are 'electrically matched' to the selected probe system.

## Probe Driver

Entek's stainless steel probe drivers provide the 'radio frequency' which powers the probe system. The driver is the primary component responsible for signal conditioning, providing accurate linearity over the operating range of the system. Entek's probe driver systems are case grounded and therefore must be isolated during installation.

**The 2100 Series of probes are available in two designs, standard and advanced depending on your application requirements.**

### Entek's Standard 2100 Series Probes

Offered in 5mm, 8mm and a variety of long-range designs, these probes satisfy the requirements of API 670 with respect to scale factor error, interchangeability, and sensor size. These sensors are well suited for most typical shaft vibration monitoring applications.

### Entek's Advanced Design 2190 Series Probes

Offered in 8mm sizes only, these probes satisfy the requirements of API 670 in all respects. These probes, which offer the necessary low temperature drift and stability necessary for bearing position measurements, are well suited for the bearing position and differential expansion measurements required by many Turbine Supervisory Instrumentation (TSI) systems.

### Intrinsic Safety Explosion Proof Rating

**CSA International:** Class I, Division 2, Groups A, B, C and D.  
CSA Certificate No.: 216284  
Date Issued: June 4, 2002

**Factory Mutual (FM):** Class I, II, and III, Division 1,  
Groups A, B, C D, E, F and G.  
Application for 2100 series is pending.

**ATEX:** Application for 2100 series is pending

### Probe System Selection

A probe system is composed of three elements including the probe, the extension cable, and the oscillator/demodulator, usually referred to as simply the driver. Selections for each of these are included in the following tables. To select a probe system, first choose the probe that is right for your application. Then select a compatible extension cable, of the desired length, and a suitable driver.

First determine if your applications requirements can be met with the Standard 2100 Series probes, usually it can, or if it will require the Advanced Design 2190 Series probes. Next, consider the probe size requirements. A probes most important feature, the tip diameter, normally characterizes the probe. For example, an '8mm probe system' refers to a probe with a tip diameter of 8mm. In general, the wider the tip, the longer the sensing range of the probe. Of course there are other characteristics that are important as well such as the body length and the thread size. Basically, choose the tip size based on the application. Choose the remaining characteristics based on the specifics of the installation.

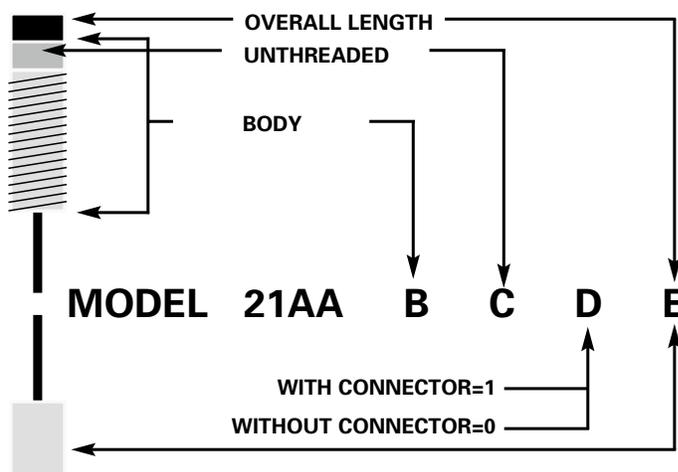


Figure 1

**CE**  
COMPLIANT

		<b>210X</b>	<b>2111-2114</b>	<b>2118</b>
		<b>80 mil Transducer</b>	<b>180 mil Transducer</b>	<b>Thrust Position</b>
<b>Linear Range*</b>		Apx. 80 mils (2,000 $\mu$ m)	Apx. 180 mils (4,500 $\mu$ m)	Apx. 236 mils
<b>Sensitivity*</b>		200m V/mil (787mV/100 $\mu$ m)	100m V/mil (394mV/100 $\mu$ m)	63.5m V/mil
<b>Sensitivity Error*</b>				
<b>Scale Factor Error*</b>		Within $\pm$ 5% of 200mV/mil (if calibrated as a system)	Within $\pm$ 10% of 100mV/mil (if calibrated as a system)	
<b>Linearity*</b>		Within $\pm$ 0.8 mils of 200mV/mil (if calibrated as a system)	Within $\pm$ 2.9 mils of 100mV/mil (if calibrated as a system)	Within $\pm$ 0.5 mils (if calibrated as a system)  Within $\pm$ 0.5 mils (When interchangeable)
<b>Operating Temperature Range</b>	<b>Sensor</b>	-40 to +350°F (-40 to +177°C)		
	<b>Extension cable</b>	Connector: max. 257°F (+125°C)		
	<b>Driver</b>	-36 to +176°F (-38 to +80°C)		
<b>Operating Humidity Range</b>		30 to 95% RH (noncondensing, non-submerged)		
<b>Power Supply</b>		-17.5VDC to -26VDC		
<b>Max. Output Voltage</b>		Apx. -22VDC (at -24VDC power supply voltage)		
<b>Current Consumption (at 10k <math>\Omega</math> load resistance)</b>		Max: -16mA	Max: -20mA	Max: -20mA
<b>Frequency response</b>		DC to 20kHz (-3dB)	DC to 10kHz (-3dB)	DC to 10kHz
<b>Output Impedance</b>		50 $\Omega$		
<b>Sensor Tip Diameter</b>		Apx. 5mm or Apx. 8mm	Apx. 11mm	Apx. 11mm
<b>Cable Tip Diameter</b>				
<b>Connector Tip Diameter</b>				
<b>Connector Material</b>		Stainless steel, gold plated finish		
<b>Sensor Cable Length</b>		0.5m or 1m		
<b>System Cable Length</b>		Sensor cable length + Extension cable length= 5m $\pm$ 10% or 9m $\pm$ 10%		

\* At -24VDC power supply, 77°F (25°C) and calibrated to a flat surface of AISI 4140 steel (thickness  $\geq$  200mils or 5mm).

2119 on Transducer	2125-2128 Diff. Expansion Transducer	2150-2151 Diff Expansion Transducer	219X Vibration transducer
6mm (152.4mm)	Apx. 531 mils (13.5mm)	Apx. 1022 mils (26mm)	>79 mils (2mm) (begins at Apx. 12 mils (0.3mm) from sensor tip)
1 (2.5V/mm)	20.3m V/mil (0.8V/mm)	10.15m V/mil (0.4V/mm)	200mV/mil (787mV/100µm)
Within ±4%		Within ±4%	
		Within ±4% of 200mV/mil (if calibrated as a system) Within ±10% of 200mV/mil (including interchangeability errors)	
±3.5 mils (if calibrated as a system) ±4.7 mils (interchangeability errors are included)	Within ±7.8 mils (if calibrated as a system) Within ±10.6 mils (When interchangeability errors are included)	Within ±9.8mils (±250µm) (if calibrated as a system) Within ±15.7mils (±400µm) (when interchangeability errors are included)	Within ±1mil (±25µm) (if calibrated as a system) Within ±1.8mils (±45µm) (when interchangeability errors are included)
-40 to +257°F (-40 to +125°C)		-40 to +257°F (-40 to +125°C)	
Connector: max. 257°F (+125°C)		Connector: max. 257°F (+125°C)	
-36 to +176°F (-38 to +80°C)		-36 to +176°F (-38 to +80°C)	
30 to 95% RH (noncondensing, non-submerged)		30 to 95% RH (noncondensing, non-submerged)	
		(sensor body: 100%)	
-24VDC ±10%		-24VDC ±10%	
Apx. -22VDC (at - 24VDC power supply voltage)		Apx. -22VDC (at - 24VDC power supply voltage)	
Max: -13mA	Max: -15mA	Max: -13mA	Max: -16mA
DC to 3kHz (-3dB)	DC to 3kHz (-3dB)	DC to 3kHz (-3dB)	DC to 10kHz (-3dB)
50Ω		50Ω	
18mm	Apx. 25mm	Apx. 50mm	Apx. 8mm
Max. Apx. 6mm		Max. Apx. 6mm	
Max. Apx. 9.5mm (gold plated SMA connector)		Max. Apx. 9.5mm (gold plated SMA connector)	
Stainless steel, gold plated finish		Stainless steel, gold plated finish	
Sensor cable length + Extension cable length= 5m ±10% or 9m ±10%		Sensor cable length + Extension cable length= 5m ±10% or 9m ±10%	

**Probe Configurations (Refer to Figure 1 for identification)**

**2100 Series Standard 5mm Probes**

Part Number	Probe Tip Dia.	Range	Sensitivity (mV/mil)	Body Length "B" Dim	Non-Thread Length "C" Dim	Probe/Cable Length "E" Dim	Thread Size	Armour Cable	Rev. Mount	Right Angle
2101/30/03/1/10	5mm	80mils	200	30mm	3mm	1.0 meter	1/4-28	No	No	No
2101/50/03/1/10	5mm	80mils	200	50mm	3mm	1.0 meter	1/4-28	No	No	No
2101/70/03/1/10	5mm	80mils	200	70mm	3mm	1.0 meter	1/4-28	No	No	No
2101/90/03/1/10	5mm	80mils	200	90mm	3mm	1.0 meter	1/4-28	No	No	No
2101/120/03/1/1	5mm	80mils	200	120mm	3mm	1.0 meter	1/4-28	No	No	No
2101/150/03/1/1	5mm	80mils	200	150mm	3mm	1.0 meter	1/4-28	No	No	No
2102/30/03/1/10	5mm	80mils	200	30mm	3mm	1.0 meter	1/4-28	Yes	No	No
2102/50/03/1/10	5mm	80mils	200	50mm	3mm	1.0 meter	1/4-28	Yes	No	No
2102/70/03/1/10	5mm	80mils	200	70mm	3mm	1.0 meter	1/4-28	Yes	No	No
2102/90/03/1/10	5mm	80mils	200	90mm	3mm	1.0 meter	1/4-28	Yes	No	No
2102/120/03/1/1	5mm	80mils	200	120mm	3mm	1.0 meter	1/4-28	Yes	No	No
2102/150/03/1/1	5mm	80mils	200	150mm	3mm	1.0 meter	1/4-28	Yes	No	No
2103/30/03/1/10	5mm	80mils	200	30mm	3mm	1.0 meter	M8x1	No	No	No
2103/50/03/1/10	5mm	80mils	200	50mm	3mm	1.0 meter	M8x1	No	No	No
2103/70/03/1/10	5mm	80mils	200	70mm	3mm	1.0 meter	M8x1	No	No	No
2103/90/03/1/10	5mm	80mils	200	90mm	3mm	1.0 meter	M8x1	No	No	No
2103/120/03/1/10	5mm	80mils	200	120mm	3mm	1.0 meter	M8x1	No	No	No
2103/150/03/1/10	5mm	80mils	200	150mm	3mm	1.0 meter	M8x1	No	No	No
2104/30/03/1/10	5mm	80mils	200	30mm	3mm	1.0 meter	M8x1	Yes	No	No
2104/50/03/1/10	5mm	80mils	200	50mm	3mm	1.0 meter	M8x1	Yes	No	No
2104/70/03/1/10	5mm	80mils	200	70mm	3mm	1.0 meter	M8x1	Yes	No	No
2104/90/03/1/10	5mm	80mils	200	90mm	3mm	1.0 meter	M8x1	Yes	No	No
2104/120/03/1/10	5mm	80mils	200	120mm	3mm	1.0 meter	M8x1	Yes	No	No
2104/150/03/1/10	5mm	80mils	200	150mm	3mm	1.0 meter	M8x1	Yes	No	No

**2100 Series Standard 8mm Probes**

Part Number	Probe Tip Dia.	Range	Sensitivity (mV/mil)	Body Length "B" Dim	Non-Thread Length "C" Dim	Probe/Cable Length "E" Dim	Thread Size	Armour Cable	Rev. Mount	Right Angle
2105/30/00/1/10	8mm	80mils	200	30mm	0	1.0 meter	3/8-24	No	No	No
2105/50/00/1/10	8mm	80mils	200	50mm	0	1.0 meter	3/8-24	No	No	No
2105/70/00/1/10	8mm	80mils	200	70mm	0	1.0 meter	3/8-24	No	No	No
2105/90/00/1/10	8mm	80mils	200	90mm	0	1.0 meter	3/8-24	No	No	No
2105/120/00/1/10	8mm	80mils	200	120mm	0	1.0 meter	3/8-24	No	No	No
2105/150/00/1/10	8mm	80mils	200	150mm	0	1.0 meter	3/8-24	No	No	No
2106/30/00/1/10	8mm	80mils	200	30mm	0	1.0 meter	3/8-24	Yes	No	No
2106/50/00/1/10	8mm	80mils	200	50mm	0	1.0 meter	3/8-24	Yes	No	No
2106/70/00/1/10	8mm	80mils	200	70mm	0	1.0 meter	3/8-24	Yes	No	No
2106/90/00/1/10	8mm	80mils	200	90mm	0	1.0 meter	3/8-24	Yes	No	No
2106/120/00/1/10	8mm	80mils	200	120mm	0	1.0 meter	3/8-24	Yes	No	No
2106/150/00/1/10	8mm	80mils	200	150mm	0	1.0 meter	3/8-24	Yes	No	No
2107/30/00/1/10	8mm	80mils	200	30mm	0	1.0 meter	M10x1	No	No	No
2107/50/00/1/10	8mm	80mils	200	50mm	0	1.0 meter	M10x1	No	No	No
2107/70/00/1/10	8mm	80mils	200	70mm	0	1.0 meter	M10x1	No	No	No
2107/90/00/1/10	8mm	80mils	200	90mm	0	1.0 meter	M10x1	No	No	No
2107/120/00/1/10	8mm	80mils	200	120mm	0	1.0 meter	M10x1	No	No	No
2107/150/00/1/10	8mm	80mils	200	150mm	0	1.0 meter	M10x1	No	No	No
2108/30/00/1/10	8mm	80mils	200	30mm	0	1.0 meter	M10x1	Yes	No	No
2108/50/00/1/10	8mm	80mils	200	50mm	0	1.0 meter	M10x1	Yes	No	No
2108/70/00/1/10	8mm	80mils	200	70mm	0	1.0 meter	M10x1	Yes	No	No
2108/90/00/1/10	8mm	80mils	200	90mm	0	1.0 meter	M10x1	Yes	No	No
2108/120/00/1/10	8mm	80mils	200	120mm	0	1.0 meter	M10x1	Yes	No	No
2108/150/00/1/10	8mm	80mils	200	150mm	0	1.0 meter	M10x1	Yes	No	No
2109/30/05/1/05	8mm	80mils	200	30mm	5mm	0.5 meter	3/8-24	No	Yes	No
2109/30/05/1/10	8mm	80mils	200	30mm	5mm	1.0 meter	3/8-24	No	Yes	No

## 2100 Series Standard Long Range Probes

Part Number	Probe Tip Dia.	Range	Sensitivity (mV/mil)	Body Length "B" Dim	Non-Thread Length "C" Dim	Probe/Cable Length "E" Dim	Thread Size	Armour Cable	Rev. Mount	Right Angle
2111/40/00/1/10	11mm	180mils	100	40mm	5mm	1.0 meter	1/2-20	No	No	No
2112/40/00/1/10	11mm	180mils	100	40mm	5mm	1.0 meter	1/2-20	Yes	No	No
2113/40/00/1/10	11mm	180mils	100	40mm	5mm	1.0 meter	M14x1.5	No	No	No
2114/40/00/1/10	11mm	180mils	100	40mm	5mm	1.0 meter	M14x1.5	Yes	No	No
2118/50/00/1/10	18mm	6mm	2.5v/mm	50mm	5mm	1.0 meter	7/8-14	Yes	No	No
2119/50/00/1/10	18mm	6mm	2.5v/mm	50mm	5mm	1.0 meter	M20x1.5	Yes	No	No
2125/50/00/1/10	25.4mm	13.5mm	0.8v/mm	50mm	5mm	1.0 meter	1-1/4x12	Yes	No	No
2126/50/00/1/10	25.4mm	13.5mm	0.8v/mm	50mm	5mm	1.0 meter	M30x1.5	Yes	No	No
2127/76/00/1/10	25.4mm	13.5mm	0.8v/mm	76mm	0	1.0 meter	N/A	Yes	No	Yes
2150/50/00/1/10	50mm	26mm	0.4v/mm	50mm	0	1.0 meter	1-12	Yes	No	No
2151/50/00/1/10	50mm	26mm	0.4v/mm	50mm	0	1.0 meter	M24x1.5	Yes	No	No

## 219X Series Advanced Design Probes

Part Number	Probe Tip Dia.	Range	Sensitivity (mV/mil)	Body Length "B" Dim	Non-Thread Length "C" Dim	Probe/Cable Length "E" Dim	Thread Size	Armour Cable	Rev. Mount	Right Angle
2197/40/00/1/10	8mm	80mils	200	40mm	0	1.0 meter	M10x1	No	No	No
2198/40/00/1/10	8mm	80mils	200	40mm	0	1.0 meter	M10x1	Yes	No	No
2195/40/00/1/10	8mm	80mils	200	40mm	0	1.0 meter	3/8-24	No	No	No
2196/40/00/1/10	8mm	80mils	200	40mm	0	1.0 meter	3/8-24	Yes	No	No

## 2100 Series Standard Probe Extension Cables

Part Number	Probe Tip Dia.	Cable Length	Armour Cable
2170/0/40	5/8mm	4.0m	No
2170/1/40	5/8mm	4.0m	Yes
2170/0/45	5/8mm	4.5m	No
2170/0/80	5/8mm	8.0m	No
2170/1/80	5/8mm	8.0m	Yes
2170/0/85	5/8mm	8.5m	No
2171/0/40	11mm	4.0m	No
2171/1/40	11mm	4.0m	Yes
2171/0/80	11mm	8.0m	No
2171/1/80	11mm	8.0m	Yes
2172/1/40	18mm	4.0m	Yes
2172/1/80	18mm	8.0m	Yes
2173/1/40	25.4mm	4.0m	Yes
2173/1/80	25.4mm	8.0m	Yes
2174/1/40	50mm	4.0m	Yes
2174/1/80	50mm	8.0m	Yes

## 219X Series Advanced Design Probe Extension Cables

Part Number	Probe Tip Dia.	Cable Length	Armour Cable
2190/0/40	8mm	4.0m	No
2190/1/40	8mm	4.0m	Yes
2190/0/80	8mm	8.0m	No
2190/1/80	8mm	8.0m	Yes

## 2100 Series Standard Probe Drivers

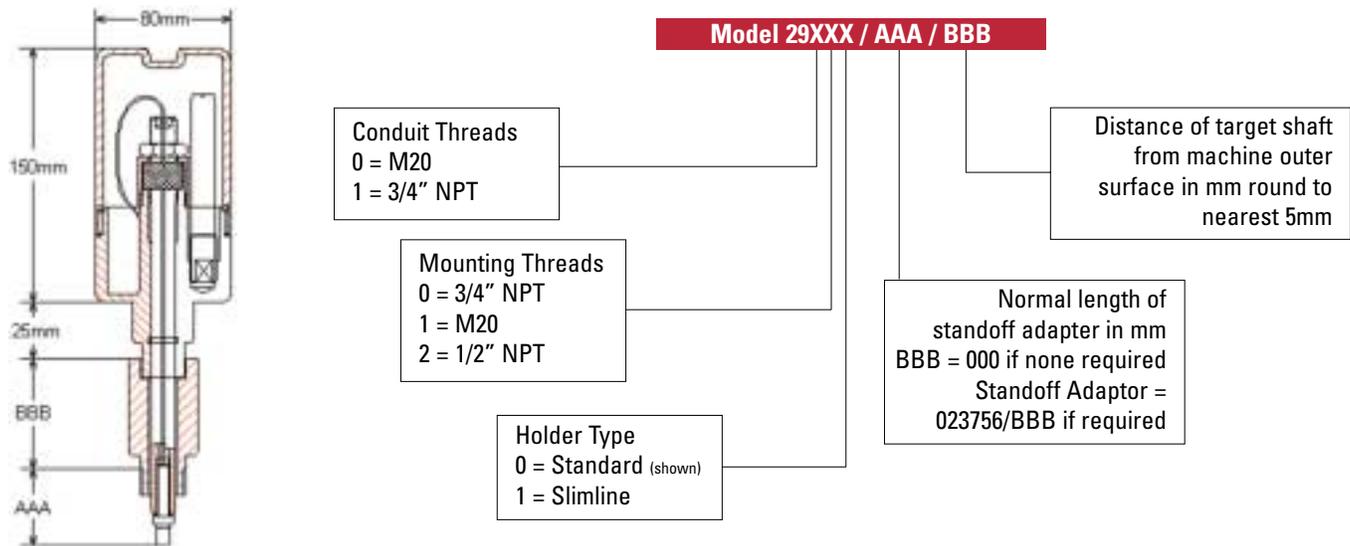
Part Number	Probe Tip Dia.	System Length	Target
2108/5/001	5/8mm	5.0m	4140 (SCM440)
2108/9/001	5/8mm	9.0m	4140 (SCM440)
2111/5/001	11mm	5.0m	4140 (SCM440)
2111/9/001	11mm	9.0m	4140 (SCM440)
2118/5/001	18mm	5.0m	4140 (SCM440)
2118/9/001	18mm	9.0m	4140 (SCM440)
2125/5/001	25mm	5.0m	4140 (SCM440)
2125/9/001	25mm	9.0m	4140 (SCM440)
2150/5/001	50mm	5.0m	4140 (SCM440)
2150/9/001	50mm	9.0m	4140 (SCM440)

## 219X Series Advanced Design Probe Drivers

Part Number	Probe Tip Dia.	System Length	Target Material
2198/5/001	8mm	5.0m	4140 (SCM440)
2198/9/001	8mm	9.0m	4140 (SCM440)

# Accessories

## 29000 Series Probe Holders



## Probe Driver Housings

Offered in two standard sizes for 1-4 or 5-9 probe drivers, these probe driver housings are made of painted steel (NEMA 4) or stainless steel (NEMA 4X). If special sizes and requirements exist, contact Rockwell Automation Entek On-Line System Group for specific needs.

Part Number	Product Description	Dimensions
NPDH2	Probe Driver Housing for 2 Drivers (NEMA 4)	11.50" x 9.44" x 4.29"
NPDH4	Probe Driver Housing for 4 Drivers (NEMA 4)	11.50" x 9.44" x 4.29"
NSPDH2	Probe Driver Housing for 2 Drivers (NEMA 4X)	11.50" x 9.44" x 4.29"
NSPDH4	Probe Driver Housing for 4 Drivers (NEMA 4X)	11.50" x 9.44" x 4.29"
NPDH6	Probe Driver Housing for 6 Drivers (NEMA 4)	15.50" x 13.44" x 6.79"
NPDH9	Probe Driver Housing for 9 Drivers (NEMA 4)	15.50" x 13.44" x 6.79"

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