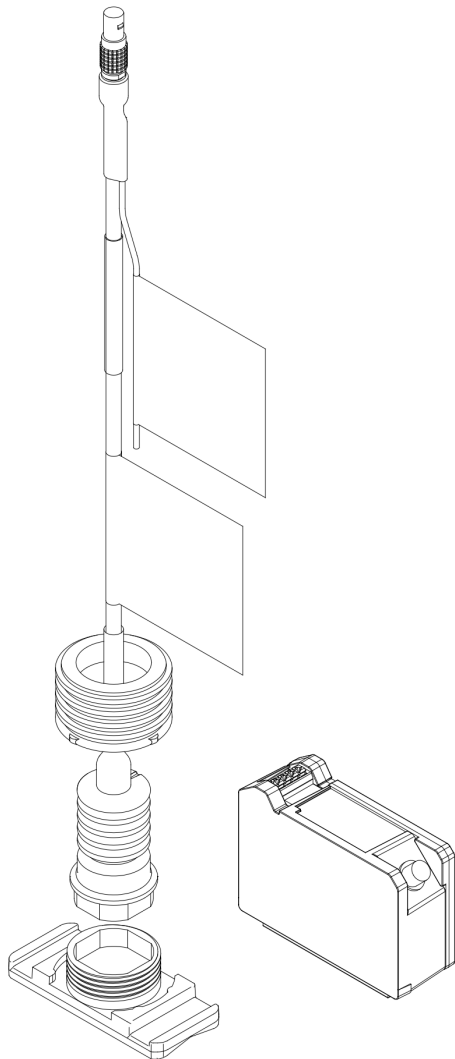


# 330446 and 330447 Hydro Stator End Winding

## Datasheet

Bently Nevada Machinery Condition Monitoring

283388 Rev. D



## Description

The hydro Stator End Winding Accelerometer (SEW Accel) system provides a cost effective and reliable method for monitoring Stator End Winding vibration. This product utilizes a dual axis MEMS capacitive accelerometer encapsulated in a highly electrically insulated probe housing and mounting system. This unique sensor system provides flexibility and simplicity of installation. The hydro SEW Accel system is safe, reliable and durable for hydro applications.

The hydro SEW Accel system consists of two major components (Sold Separately):

- 330446 Accelerometer Sensor
- 330447 Accelerometer Probe

The Bently Nevada hydro SEW Accel system provides vibration monitoring suited for the high electric fields of hydro generators by being designed to resist electrical tracking, corona damage, partial discharge, magnetic field interference and electric field interference. The 330447 SEW Accelerometer probe is mounted to the ground wall system using epoxy and glass roving.

The hydro SEW Accel system is designed to interface to the Bently Nevada 3500 monitoring system using the 46M Hydro monitor. The 3500/46M Hydro monitor has been enhanced to provide Stator End Winding measurements and displays. A key feature is the measurement of the Pole Passing Frequency (or Forcing Frequency) amplitudes. Additionally, the 3500/46M will display the resultant acceleration measurements for the combined X and Y-axis to provide a complete vibration overview.

Monitoring of hydro stator end windings can prevent catastrophic failure and help determine proper maintenance cycles if used properly. Defects caused by prolonged exposure to electrical tracking and ozone will wear down

stator end winding insulation, which can lead to increased vibration. The hydro SEW Accel system can monitor the vibration of select stator end windings in a hydro generator. This data can be trended to aid in determining the integrity of the hydro generator insulation as it ages.

## Specifications



Unless otherwise noted, the following specifications apply to the Hydro SEW Accel system which is a combination of the 330447 Accelerometer probe and the 330446 Accelerometer Sensor.

Parameters are specified from +20°C to +30 °C (+68°F to +86 °F), 100 Hz, and with a 10 kΩ load unless otherwise indicated.

## Electrical

Sensitivity	10.19 mV/m/s <sup>2</sup> (100 mV/g) ±5%
	10.19 mV/m/s <sup>2</sup> (100 mV/g)
	±10% 5°F to +167°F [-15°C to +75°C]



Accuracy calculated with 95% confidence factor. Please refer to the Product User Guide for proper mounting instructions.

Frequency Response	DC to 360 Hz, -3 dB, minimum
	DC to 400 Hz, -3 dB, typical
	DC to 440 Hz, -3 dB, maximum
	DC to 130 Hz; -10%, minimum
	DC to 195 Hz, -10%, typical
Typical Measured Acceleration	DC to 245 Hz; -10%, maximum
	±1.5% at 100 Hz at 1 g
Acceleration Range	±343 m/s <sup>2</sup> pk (±35 g pk)
Non-linearity	±2% to ±343 m/s <sup>2</sup> pk (±35 g pk)
Transverse Sensitivity	< 5mV/g for vibration applied in the orthogonal plane from the sensitive axis
Resonant Frequency	Greater than 1 kHz
Power Consumption	24 ma or 0.58 W Maximum
Power Supply	24 Vdc
Electrical Insulation	48 kVac of dielectric strength

Output	Single ended
	-11.6 Vdc bias voltage ±5% ±3.5 Volts dynamic range
Broadband Noise Floor	0.0082 m/s <sup>2</sup> pk (0.08 g pk) Typical

## Environmental



Operation outside the specified limits may result in false readings or loss of machine monitoring.

### Temperature Ranges

330446 Accelerometer Sensor	
Operating	5°F to +167°F [-15°C to +75°C]
Storage	-40°F to +185°F [-40°C to +85°C]
330447 Accelerometer Probe	
Operating	5°F to +203°F [-15°C to +95°C]
Storage	-40°F to +203°F [-40°C to +95°C]
System Relative Humidity Performance	Less than 5% deviation in the transducer sensitivity when tested in 93% humidity in accordance with IEC standard 68-2-3 for up to 56 days.

## Mechanical

Kinetic Impact Resistance (330447 Package)	Up to 5.5 Joules
Integral Cable Pull Axial Strength (At 330446 SEW Accelerometer Probe)	60 lbf [267 N]
Integral Cable Bend Radius	1 inch [25.4 mm]
Threaded Cap Torque	4-6 lb-ft [5-8 N-m]

## Physical

Field Wire	305 m [1000 ft] maximum with 80 nF maximum (between one conductor and drain wire, with all other conductors connected to drain wire)
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See recommended field wire in Accessories. Using field wire not similar to the recommended field wire may result in false readings or loss of machine monitoring.

### Component Materials

330447 Housing, Threaded Cap and Mounting Base	Polytron E102
330447 Integral Cable Outer Jacket	Santoprene
330447 Grounding Strap Outer Jacket	PVC
330446 Housing	A380 Aluminum

### Component Weights

330446 Accelerometer Sensor	0.5 lbf [2.4 N]
330447 6- Meter Assembly	0.8 lbf [3.6 N]
330447 10- Meter Assembly	1.2 lbf [5.4 N]
330447 Accelerometer Probe, Cap and Mounting Base	0.2 lbf [1 N]

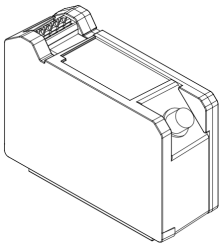
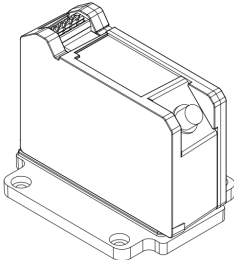
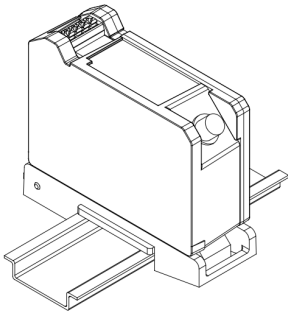
## Ordering Information



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from [Bently.com](http://Bently.com).

### 330446 SEW Accelerometer Sensor

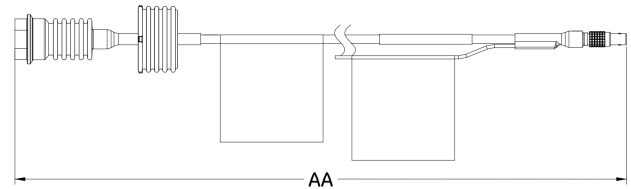
#### 330446 -AA-BB-CC

A: Sensor Type	
0 1	Standard SEW Accelerometer Sensor (Default)
B: Mounting Option	
0 0	No Mounting Hardware 
	Panel Mount Hardware 
	Din Mount Hardware 
C: Approvals	
0 0	None (Default)

### 330447 SEW Accelerometer Probe

#### 330447-AA-BB

A: Cable Length	
0 6	6-Meters [19.7ft] ± 0.15 [0.5]
1 0	10-Meters [32.8ft] ± 0.15 [0.5]



B: Approvals	
0 0	No Approvals



The 330447 includes one mounting base and one threaded cap per order. If extras are needed, they can be ordered as spares.

### Mounting Epoxy and Glass Roving



Proper mounting of the 330447 SEW Accelerometer Probe requires the use of epoxy and glass roving material. Additionally, both are required to validate the warranty policy. Depending on the specific ground wall material, the type of epoxy and glass roving resin may vary from machine to machine. Plant personnel should qualify their own selection. For convenience, Bently Nevada has identified the following vendor and materials:

Vendor Information	
Company	Astro Chemical Company
Website	<a href="http://www.astrochemical.com">www.astrochemical.com</a>
Recommended Vendor Products	
Mounting Base Epoxy	Barco Bond MB100X Kit

Glass Roving	Astro 7000R
Glass Roving Resin	Astro 6021 Quart Kit

## Accessories



Some accessories may have options. Please contact Bently Nevada for assistance in ordering.

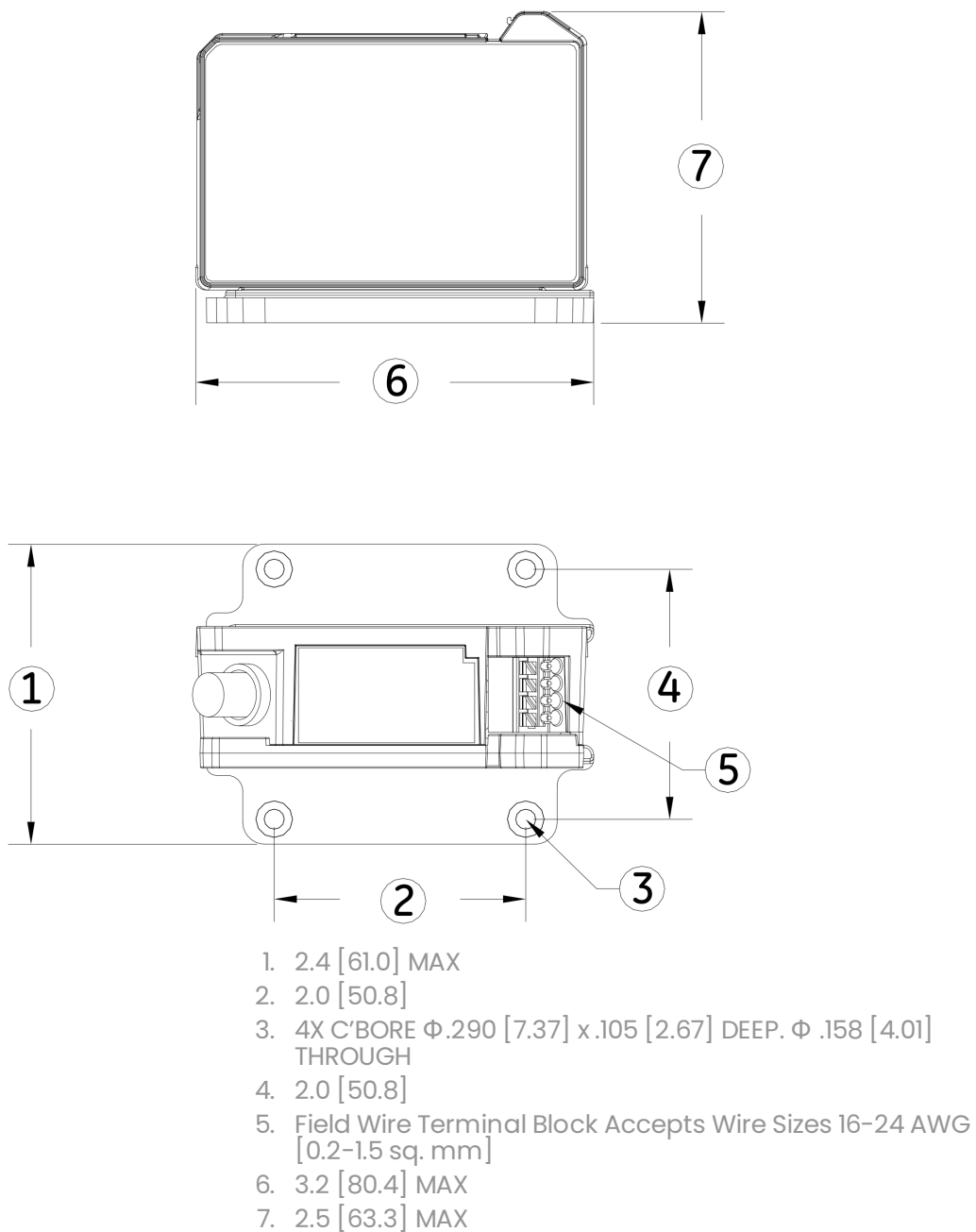
181789	SEW User Guide
175751	3300 XL Multi-Purpose HSG 12"X12"X6" SST
176467	3300 XL Multi-Purpose Hsg 12"X8"X6" SST
181429-01	Spare, SEW Accel Threaded Cap
181430-01	Spare, SEW Accel Mounting Base
167276	RTV for Locking Threaded Cap
148168	Recommended SEW Field Wire

## Safety

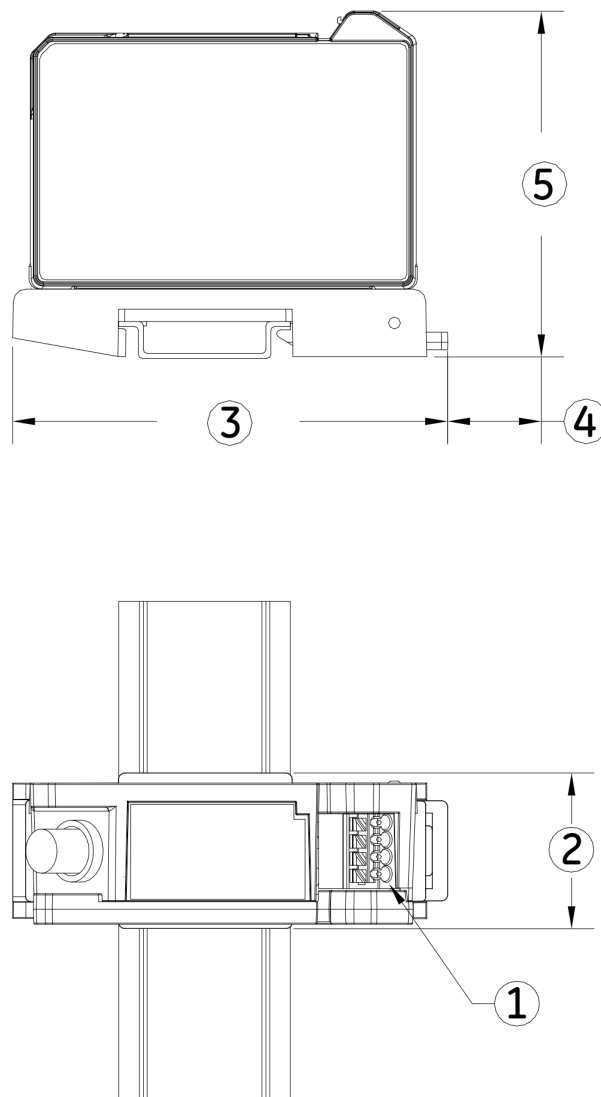
Proper installation is required to avoid hazardous conditions. Please refer to the Product User Guide before installing the hydro SEW Accel system. A multi purpose housing (175751/176467) should be used to enclose the 330446 Accelerometer Sensor in the rare case that a grounding fault should occur. Plant personnel should pay close attention to the following:

- Mounting Location
- Mounting Procedure
- Cable Routing
- Earth Grounding

## Graphs and Figures



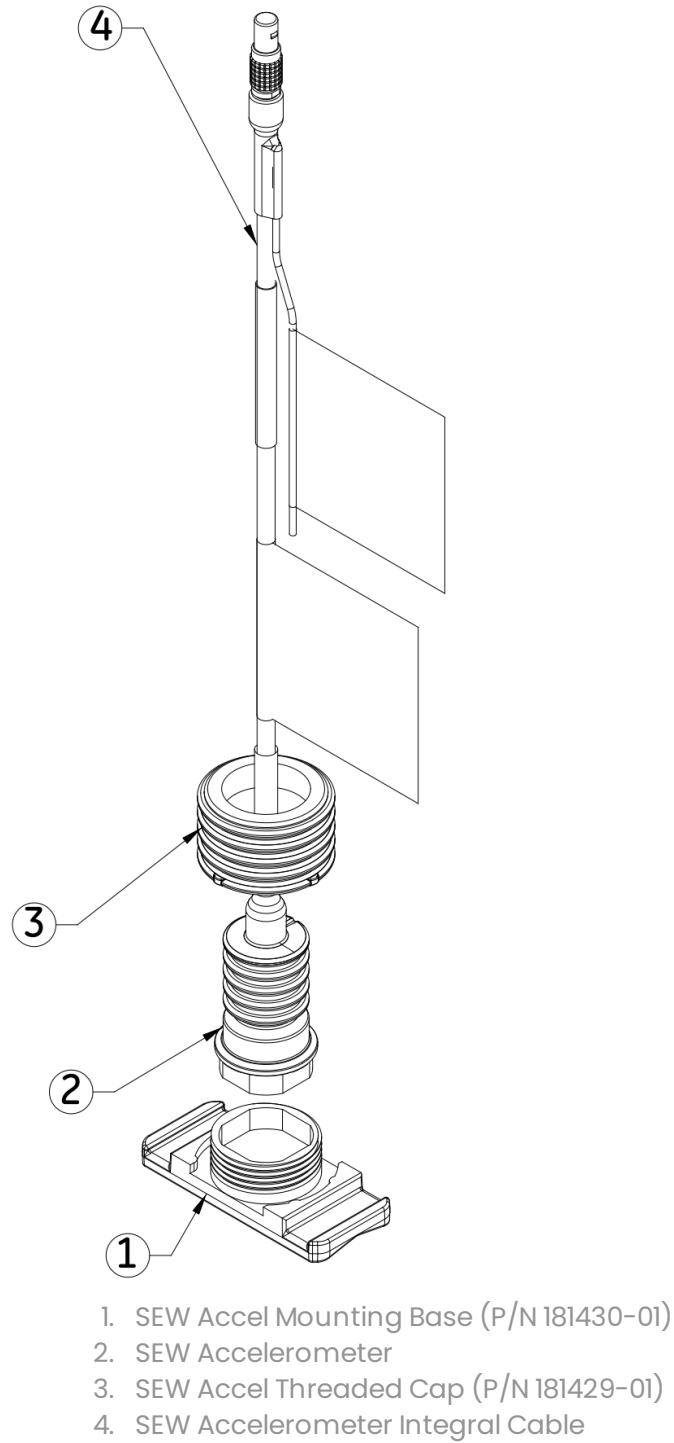
**Figure 1: 330446 Accelerometer Sensor Panel Mount Dimensions**



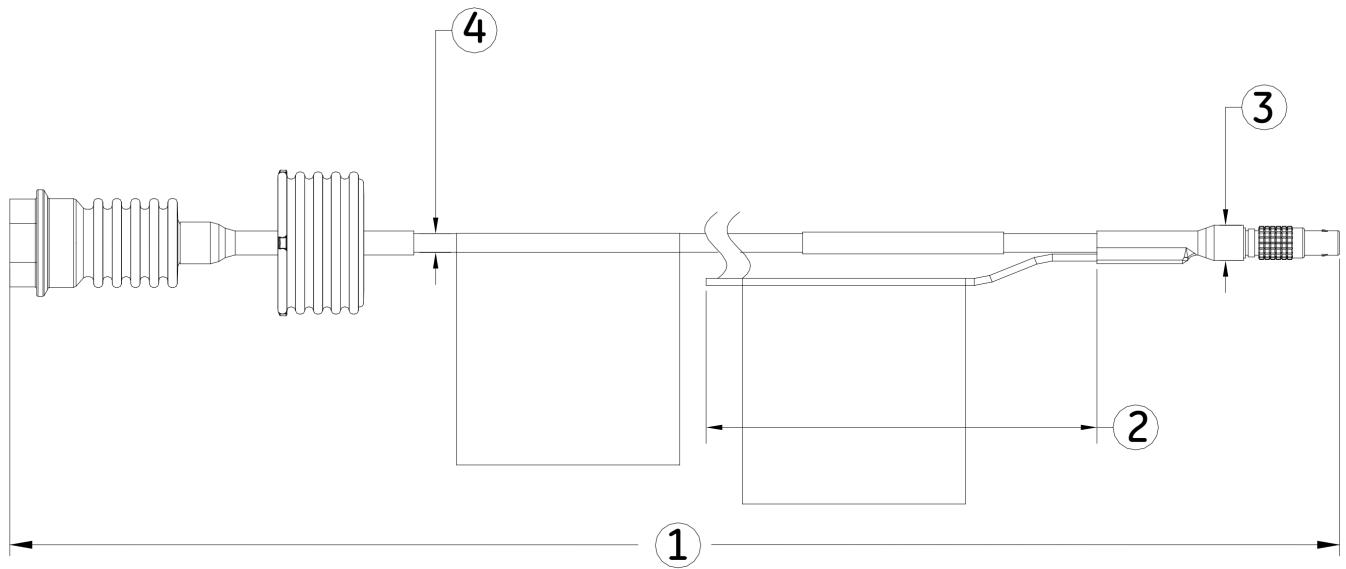
1. Field Wire Terminal Block Accepts Wire Sizes 16-24 AWG [0.2-1.5 sq. mm]
2. 1.2 [31.7] MAX
3. 3.5 [88.7] MAX
4. .12 [3.05] MINIMUM CLEARANCE REQUIRED FOR MOVEMENT OF DIN CLIP TO ALLOW REMOVAL OF 330446 ACCELEROMETER SENSOR FROM 35mm DIN RAIL
5. 2.8 [70.4] MAX

**Figure 2: 330446 Accelerometer Sensor DIN Mount Dimensions**



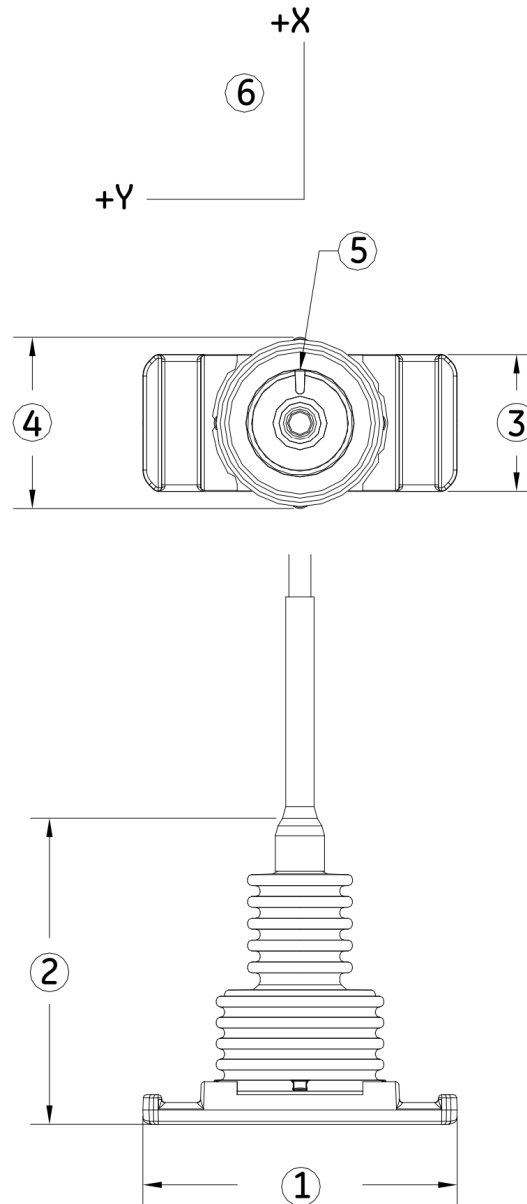


**Figure 3: 330447 Accelerometer Bill of Materials**



1. Cable Length Ordering Option (See Ordering Option For Dimensions).
2. Ground Strap Length is 24 in [609.6 mm]  $\pm$  2.0 in [50 mm]
3. Maximum Diameter with Heat Shrink over connector is .4 inches [10.2]
4. Maximum Outer Cable Diameter is 0.22 inches [5.6]

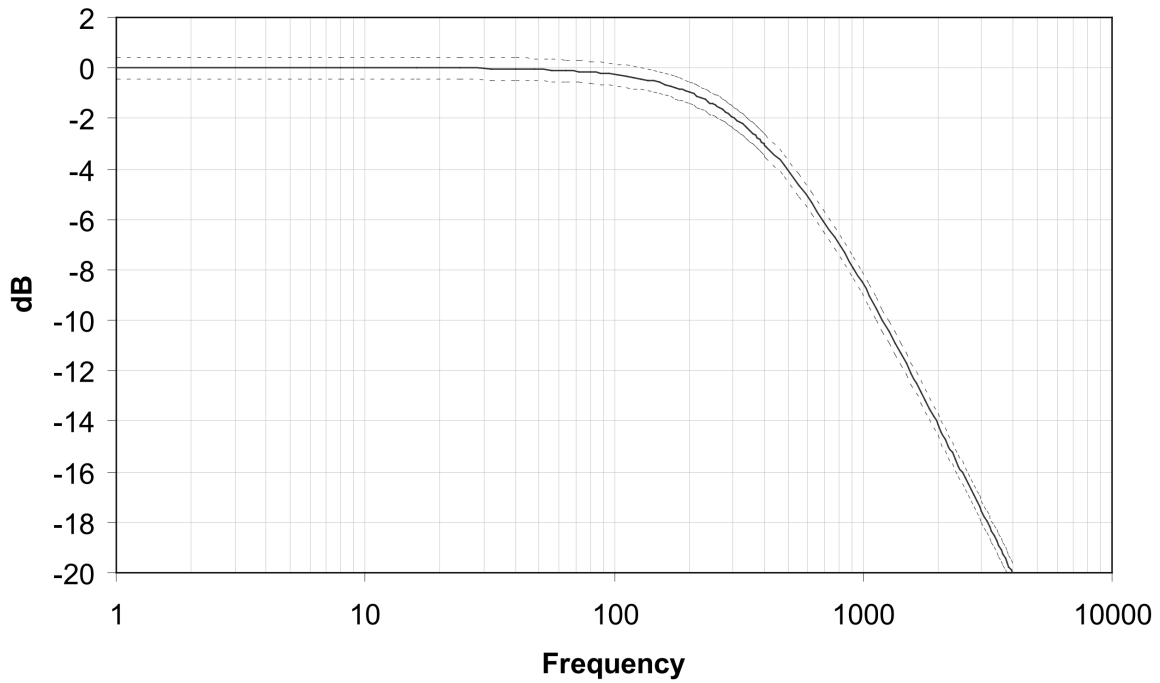
**Figure 4: 330447 Accelerometer Cable Dimensions**



1. Max 3.01 [76.5]
2. Max 2.88 [73.2]
3. Max 1.32 [33.5]
4. Max 1.65 [41.9]
5. Notch on Top of 330447 Accelerometer Probe Housing  
Corresponds to +X Axis of accelerometer
6. +Y Axis of accelerometer is 90 degrees counterclockwise  
from +X Axis when displayed as shown in this figure

**Figure 5: 330447 Accelerometer Probe Overall Dimensions and Sensitive Axes**

### SEW Accel Freq Response



**Figure 6: Typical 330447 Frequency Response with Upper and Lower Limits Shown**

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