

# 330500 Velomitor Piezo-velocity Sensor

## Datasheet

Bently Nevada Machinery Condition Monitoring

141632 Rev. P

## Description



Bently Nevada Velomitor Piezo-velocity Sensors are designed to measure absolute (relative to free space) bearing housing, casing, or structural vibration. The 330500 is a specialized piezoelectric accelerometer that incorporates embedded integrated electronics in a solid-state design.

Because the 330500 incorporates solid-state electronics and has no moving parts, it does not suffer from mechanical degradation and wear, and can be mounted vertically, horizontally, or at any other angle of orientation

### Measuring Housings for Transducer Placement

If you are measuring a machine housing to determine where to place transducers, consider the types of measurements you want to obtain. Most common machine malfunctions like imbalance or misalignment originate at the rotor and cause a change—usually an increase—in rotor vibration.



If you integrate the 330500 Velomitor output to measure displacement, electrical noise from interference and the transducer circuit can be amplified. The noise can degrade performance of 330500 transducers and produce inaccurate displacement data.

To obtain high quality data, place the transducer in a location where it can best detect machine vibration through the bearing housing or machine casing. Choose a location, grounding, and shielding that maximizes amplitude and frequency response and lessens data that doesn't represent actual machine vibration.

Bently Nevada provides engineering services to determine the optimum location to install transducers. For assistance, visit [Bently.com](http://Bently.com).



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# Specifications

Parameters are specified from +20 °C to +30 °C (+68 °F to +86 °F) and at 100 Hz unless otherwise indicated.



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

## Electrical

Sensitivity	3.94mV/mm/s (100 mV/in/s) ±5%.
Frequency Response	4.5 Hz to 5 kHz (270 cpm to 300 kcpm) ±3.0 dB. 6.0 Hz to 2.5 kHz (360 cpm to 150 kcpm) ±0.9 dB.
Temperature Sensitivity	-14% to +7.5% typical over the operating temperature range.
Velocity Range	1270 mm/s (50 in/s) peak.
Transverse Sensitivity	Less than 5% of sensitivity.
Amplitude Linearity	±2% to 152 mm/s (6 in/s) peak.
Mounted Resonant Frequency	Greater than 12 kHz.
Output Bias Voltage	-12 ±3.0 V <sub>DC</sub> , over temperature referenced to Pin A.
Dynamic Output Impedance	Less than 2400 Ω
Broadband Noise Floor (4.5 Hz to 5 kHz)	0.004 mm/s (160 μin/s) rms, nominal
Grounding	Case isolated
Maximum Cable Length	305 metres (1,000 feet) of cable, part number 02173006, with no degradation of signal.

## Environmental Limits

Operating Temperature Range	-55°C to 121°C (-67°F to 250°F)
Shock Survivability	5,000 g peak, maximum
Relative Humidity	To 100% non-submerged; case is hermetically-sealed.

Base Strain Sensitivity	0.005 in/s/μstrain.
Magnetic Field Susceptibility	<51 μin/s/gauss (50 gauss, 50-60Hz).

## Physical

Weight	142 grams (5.0 oz), typical.
Diameter	25.3 mm (0.995 in).
Height	63.2 mm (2.49 in).
Case Material	316L stainless steel.
Connector	2-pin Mil-C-5015 hermetically-sealed, 316L stainless steel shell.
Mounting Torque	32-46 kg cm (24-40 in-lb) max.
Polarity	When the sensor case motion is toward the connector, Pin A becomes positive with respect to pin B.

# Compliance and Certifications

## FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

## EMC

EMC Directive 2014/30/EU

## RoHS

RoHS Directive 2011/65/EU

## Maritime

### 330400 and 330425 only

ABS 2009 Steel Vessels Rules

1-1-4/7.7.4-8-3/1.11.1.4-9-7/13

# Hazardous Area Approvals

 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).

## CSA/NRTL/C

### 190501 (Agency Approval Options 01 through 04)

Intrinsically Safe	Ex ia IIC T4: Class I, Div 1, Groups A, B, C, D. Class II, Group E, F and G Class III	330525	Class I, Div 2, Groups A, B, C, D Install per dwg 167537 T4 @ -40°C ≤ Ta ≤ 100°C
	AEx ia IIC T4: Class I, Div 1, Groups A, B, C, D; Class II, Groups E, F, G Class III		Ex ia IIC T4 AEx ia IIC T4 Class I, Division 1, Groups A, B, C and D Class II, Groups E, F, G Class III
	Install per drawing 167536 T4 @ -40 °C ≤ Ta ≤ +100 °C (-40 °F ≤ Ta ≤ +212 °F)		T4 @ -40°C ≤ Ta ≤ 100°C
Intrinsically Safe and Non-Incendive	Ex nL IIC T4 Class I, Division 2, Groups A, B, C and D	190501	Ex nL IIC T4 Class I, Division 2, Groups A, B, C and D
	AEx nA T4 Class I, Division 2, Groups A, B, C and D		Ex ia IIC T4 Ga
	Install per drawing 167536 T4 @ -40 °C ≤ Ta ≤ +100 °C (-40 °F ≤ Ta ≤ +212 °F)		Ex na IIC T4 Gc Ex tc III T130°C Dc
330400, 330425	Ex ia IIC T4 AEx ia IIC T4 Class I, Div 1 Groups A, B, C and D Class II, Groups E, F, and G Class III	330400, 330425, 330500, 330525	T4 @ Ta = -55°C to 121°C
	T4 @ -40°C ≤ Ta ≤ 100°C Install per dwg 167538		Zone 0/1      Zone 2
	Ui= 30V Ii= 200mA Pi= 0.75W Ci= 27.2nF Li= 0		Ui= 30V Ii= 200mA Pi= 1.14W
330500	Ex ia IIC T4 AEx ia IIC T4 Class I, Division 1, Groups A, B, C and D Class II, Groups E, F, G Class III	Entity Parameters	Ex ia IIC T4 Ga
	Install per dwg 167537 T4 @ -40°C ≤ Ta ≤ 100°C		Ex na IIC T4 Gc Ex tc III T130°C Dc
	Ex nL IIC T4 AEx nA IIC T4		T4 @ Ta = -55°C to 121°C

Class I, Div 2, Groups A, B, C, D

Install per dwg 167537  
T4 @ -40°C ≤ Ta ≤ 100°C

Ex ia IIC T4  
AEx ia IIC T4  
Class I, Division 1, Groups A, B, C and D  
Class II, Groups E, F, G  
Class III

T4 @ -40°C ≤ Ta ≤ 100°C

Ex nL IIC T4  
AEx nA IIC T4  
Class I, Div 2, Groups A, B, C, D

Install per dwg 167539  
T4 @ -40°C ≤ Ta ≤ 100°C

## ATEX/IECEx

### 190501, 330400, 330425, 330500, 330525

 Ex ia IIC T4 Ga

 Ex na IIC T4 Gc  
Ex tc III T130°C Dc

T4 @ Ta = -55°C to 121°C

Entity Parameters	Zone 0/1	Zone 2
Ui= 30V	Ui= 30V	
Ii= 200mA	Ii= 200mA	
Pi= 0.75W	Pi= 1.14W	
Ci= 27.2nF		
Li= 0		

### 330400, 330425, 330500, 330525

 Ex ia IIC T4 Ga

 Ex na IIC T4 Gc  
Ex tc III T130°C Dc

T4 @ Ta = -55°C to 121°C

Entity Parameters	Zone 0/1	Zone 2
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Ui= 28V	Ui= 28V
Il= 150mA	Il= 150mA
Pi= 0.84W	Pi= 1.26W
Ci=10.8nF	
Li= 0	

# Hazardous Area Conditions of Safe Use

## ATEX/IECEx

### Zone 0/1:

Equipment must be connected to equipment, which meets the abovelisted entity parameters.

The cables type A or B (in compliance with EN 60079-25) must respect the cable parameters listed with the entity parameters.

### Zone 2 :

The supply electrical parameters shall not exceed the values mentioned in the tables above.

# 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).

## Velomitor Piezo-velocity Sensor

### 330500-AA-BB

#### A: Mounting Thread Adaptor Option

<b>00</b>	No adapter
<b>01</b>	1/2 - 20 UNF
<b>02</b>	M8 x 1
<b>03</b>	1/4 - 28 UNF
<b>04</b>	1/4 - 20 UNC
<b>05</b>	Unavailable for 330500.

Note: For 1/4-18 NPT mounting, order 330525.

<b>06</b>	5/8 - 18 UNF
<b>07</b>	3/8 - 16 UNC
<b>08</b>	1/2 - 13 UNC

#### B: Agency Approval Option

<b>00</b>	Not required
<b>01</b>	CSA/US/C
<b>02</b>	ATEX (European)
<b>04</b>	Multiple approvals (CSA, ATEX)

## Interconnection Cables

### Standard Cable Lengths

Feet	Meters (approximate)
6 ft	1.8 m
8 ft	2.4 m
10 ft	3.0 m
12 ft	3.6 m
15 ft	4.5 m
17 ft	5.0 m
20 ft	6.0 m

Feet	Meters (approximate)
25 ft	7.6 m
30 ft	9.0 m
33 ft	10.0 m
50 ft	15.2 m
99 ft	30.0 m

### Custom Cable Part Numbers

You can order custom cable lengths in increments of 1.0 ft (305 mm) at additional cost. Some cables have a minimum and maximum length.

 Use 'NN' in these part numbers to specify the length (in feet) of the cable you want to order.

Part Number	Description
9571-NN	Two-conductor twisted, shielded 22 AWG cable with two-socket moisture-resistant female connector at one end, terminal lugs at the other end. Used with monitors. Not for use with 21128 Velocity Transducer Housing. Min. length: 2.0 ft (0.6 m) Max. length: 99 ft (30 m)
84661-NN	Two-conductor twisted, shielded 22 AWG armored cable with two-socket moisture-resistant female connector at one end, terminal lugs at the other end. Used with monitors. Not for use with 21128 Velocity Transducer Housing. Min. length: 3.0 ft (0.9 m) Max. length: 96 ft (29 m)
89477-NN	Two-conductor 18 AWG twisted, shielded cable with right angle two-socket plug at one end, terminal lugs at the other end. Used with monitors and with 21128 Velocity Transducer Housing. Min. length: 2.0 ft (0.6 m) Max. length: 99 ft (30 m)
125065-NN	Two-conductor 18 AWG twisted, shielded cable with two-socket plug and fluorosilicone elastomer boot at one end, terminal lugs at the other. Used with monitors. Not for use with 21128 Velocity Transducer Housing.

Part Number	Description
	Min. length: 2.0 ft (0.6 m) Max. length: 99 ft (30 m)

## Velocity Transducer Housing Assembly

### 21128-AA-BB

#### A: Mounting Thread Option

<b>01</b>	Unthreaded
<b>02</b>	3/4 - 14 NPT
<b>03</b>	1/2 - 14 NPT
<b>04</b>	1/2 - 12 BSP

#### B: Cable Exit Fitting Option

<b>01</b>	1/2 - 14 NPT plug
<b>02</b>	1/2 - 14 NPT explosion-proof
<b>03</b>	1/2 - 14 NPT explosion-proof with cable gland seal



When using the 21128 Housing, cable part number 89477-AA is necessary to connect the Velomitor Sensor to a monitor.

## Velocity Transducer Housing – CENELEC approved

### 107770-AA-BB

This version is a combination of the 330500 Velomitor Sensor and a 21128 Housing pre-installed at the factory. It is also rated for CENELEC Zone 1, Group IIIC hazardous area applications.

#### A: Mounting Thread Option

<b>01</b>	Unthreaded
<b>02</b>	3/4 - 14 NPT
<b>03</b>	1/2 - 14 NPT
<b>04</b>	1/2 - 14 BSP

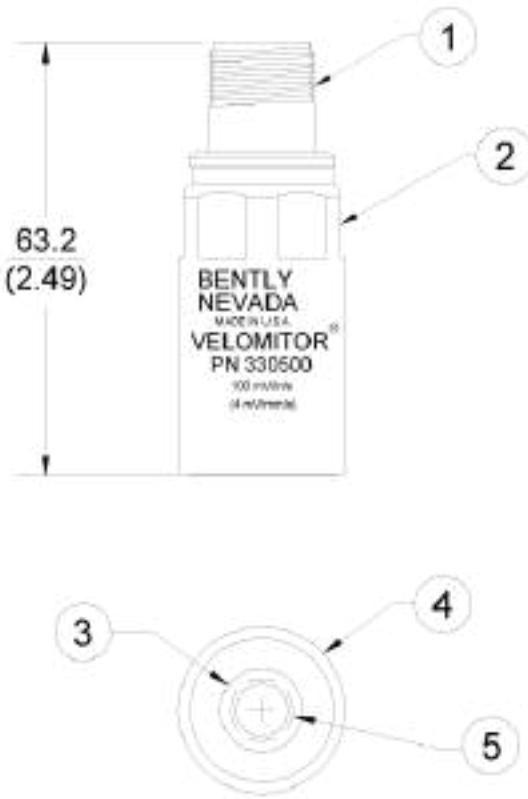
#### B: Cable Exit Fitting Option

<b>01</b>	1/2 - 14 NPT plug
<b>02</b>	1/2 - 14 NPT explosion-proof
<b>03</b>	1/2 - 14 NPT explosion-proof with cable gland seal

# Accessories

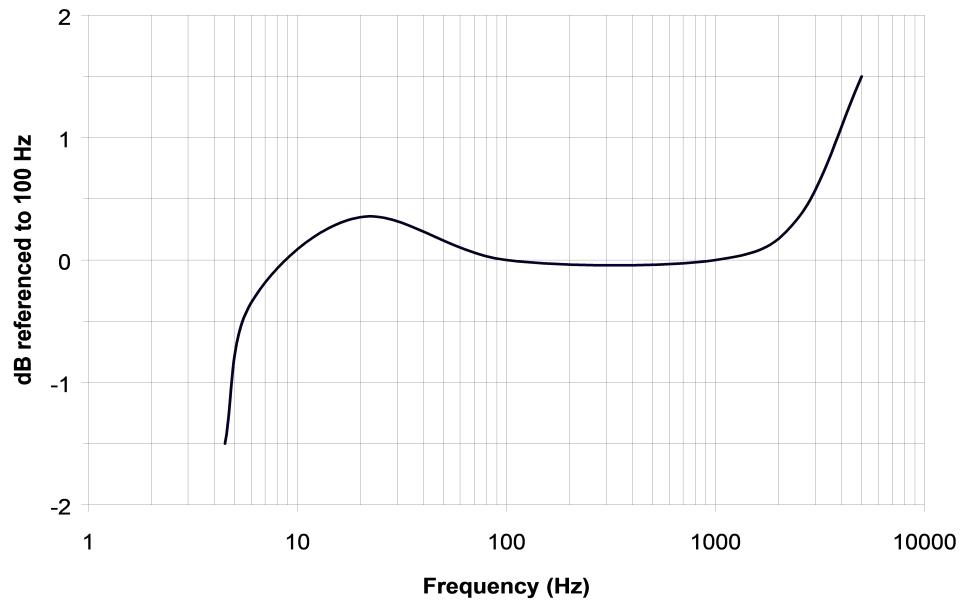
Part number	Description
100076	330500 Velomitor Sensor and Velomitor XA Sensor User Guide
02173006	Bulk cable; 2 conductor 18 AWG twisted, shielded cable without connectors or terminal lugs. Specify number of feet.
46000-01	Magnetic Base for temporary mounting of Velomitor Sensors. Used with 1/4 - 28 UNF mounting thread adapters.
46122-01	Quick Connect for semi-permanent mounting of Velomitor Sensors. Used with 1/2 - 20 UNF mounting thread adapters.
89409-01	Individual 1/2 - 20 UNF mounting adapter.
89410-01	Individual M8 x 1 mounting adapter.
89411-01	Individual 1/4 - 28 UNF mounting adapter.
89412-01	Individual 1/4 - 20 UNC mounting adapter.
89413-01	Individual 1/4 - 18 NPT mounting adapter. Spares only. For new installations, order 330525 velometer.
04300015	Individual 5/8 - 18 UNF mounting adapter.
161191	Individual 1/2 - 13 UNC mounting adapter.  The Velomitor Sensor is shipped with an adapter. Individual adapters are available as spares.
101212-01	Velomitor Sensor connector kit. Used with housings and retrofits.
123135-01	Velomitor Sensor Power Module.

## Graphs and Figures

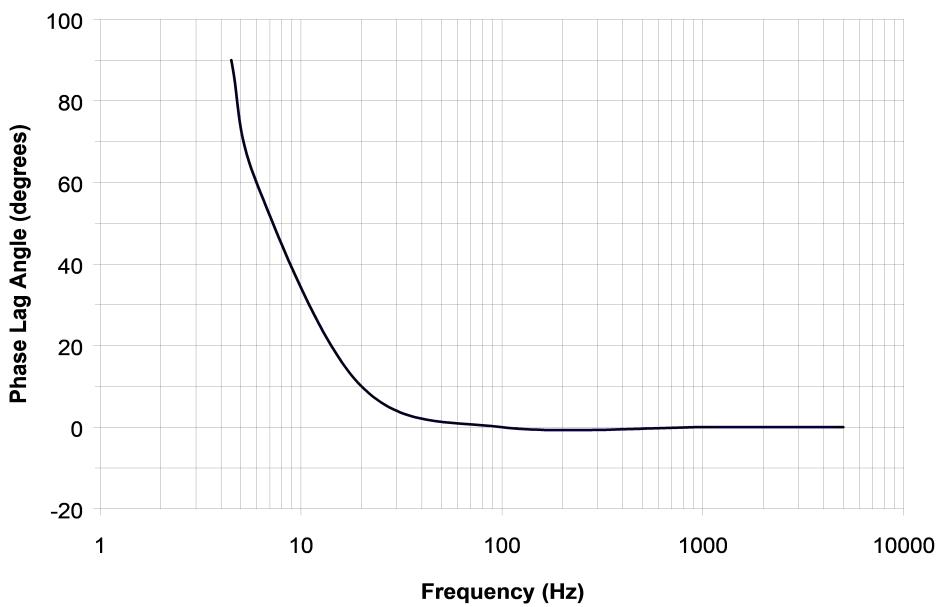


1. 2-pin, MIL-C-5015 receptacle
2. 15/16 inch hexagonal
3. 12.7 (0.500) diameter, 0.8 (0.030) deep counterbore
4. 25.3 (0.995) diameter
5. 3/8-24 UNF-2B, 6.4 (0.250) minimum threaded depth, 14.0 (0.550) maximum drill depth

**Figure 1: Velomitor Piezo-Velocity Sensor Dimensional Drawing**



**Figure 2: Typical Amplitude Response**



**Figure 3: Typical Phase Response**

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1631 Bently Parkway South, Minden, Nevada USA 89423  
Phone: 1.775.782.3611 or 1.800.227.5514 (US only)  
[Bently.com](http://Bently.com)