MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

BENTLY NEVADA

## 2300/25-00

**TRENDMASTER SPA VIBRATION MONITOR**

Used with the applicable 2300 Series SPA vibration monitor configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Bently Nevada 2300/20 and 2300/25 Monitors, 105M0340 Rev. AD.

# 2300/20 and 2300/25 2300 Vibration Monitors

## Datasheet

Cordant™

105M0340 Rev. AD




## Description

The Bently Nevada™ 2300 Vibration Monitors provide cost-effective continuous vibration monitoring and protection capabilities for less critical and spared machinery. They are specifically designed to continuously monitor and protect essential medium to low criticality machinery in a wide range of industries including: oil & gas, power generation, water treatment, pulp and paper, manufacturing, mining, cement, and other industries.

The 2300 Vibration Monitors deliver vibration monitoring and high vibration level alarming. They include two channels of seismic or proximity measurement inputs from various accelerometer, Velomitor and Proximitor types, a speed input channel for time-synchronous measurements, and outputs for relay contacts. The 2300/20 monitor features a configurable 4-20 mA output which interfaces more points to a DCS. The 2300/25 monitor features System 1 Classic connectivity for Trendmaster SPA interface which enables users to leverage existing DSM SPA infrastructure.

The 2300 Vibration Monitors are designed for using on a broad range of machine trains or individual casings where the sensor point count fits the monitor's channel count and where advanced signal processing is desired.

Baker Hughes

## Monitor Key Features

### 2300/20

- Two 4-20 mA outputs with internal current loop power supply.
- Continuous monitoring and protection
- Two acceleration/velocity/proximity inputs with synchronized sampling for advanced diagnostics.
- One dedicated speed channel supporting Proximity probes, Magnetic pickup and Proximity switch type sensors.
- Supports process variable on all three input channels.
- Key measurements (Acceleration pk, Acceleration rms, Velocity pk, Velocity rms, Displacement pp, Displacement rms, Speed) real-time provided with alarm configuration.
- Each channel has one measurement group, and can add additional two bandpass measurements and several nX measurements (depends on the device availability).
- LCD and LED for real time value and status display.
- Ethernet 10/100 Base-T communication for configuration using Bently Nevada Monitor Configuration software (Included) with RSA encryption.
- Local contacts for positive engagement of monitor bypass, configuration lockout, and latched alarm/relay reset.
- Two relay outputs with programmable setpoints.
- Three buffered transducer outputs (including Keyphasor signal) providing short circuit and EMI protection. Buffered outputs for each signal are through BNC connectors.
- Modbus over Ethernet.
- Alarm Data Capture

Caution: Two 4-20 mA outputs will **NOT** work with an external powered loop.

### 2300/25

- Trendmaster SPA interface.
- Continuous monitoring and protection.
- Two Acceleration/Velocity/Proximity inputs with synchronized sampling for advanced diagnostics.
- One dedicated speed channel supporting Proximity probes, Magnetic pickup and Proixmity switch type sensor.
- Support process variable on all three input channels.
- Key measurements (Acceleration pk, Acceleration rms, Velocity pk, Velocity rms, Displacement pp, Displacement rms, Speed) real-time provided with alarm configuration.
- Each channel has one measurement group, and can add additional two bandpass measurements and several nX measurements (depends on the device availability).
- LCD and LED for real time value and status display.
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- Two relay outputs with programmable setpoints.
- Three buffered transducer outputs (including Keyphasor signal) providing short circuit and EMI protection. Buffered outputs for each signal are through BNC connectors.
- Modbus over Ethernet.
- Alarm Data Capture

# Specifications

## Inputs

| Power Input | |
|---|---|
| DC Input | 18~36 Vdc, max 7.5 W |

| Channel Types | |
|---|---|
| **ICP Accelerometers** | |
| Configurable Bandpass filter | 0.2 Hz to 20 kHz |
| Scale Factor range | 5 to 1000 mV/g |
| Full scale range | 2 to 80 g peak |
| Current Sink Source | 3.3 mA ± 5% |
| Open Circuit Voltage | -21 to -24 Vdc |
| **Velocity** | |
| Configurable Bandpass filter | 0.2 Hz to 20 kHz |
| Scale Factor range | 5 to 1000 mV/in/s |
| Full scale range | 0 to 50 in/s peak |
| **Radial Vibration** | |
| Configurable Bandpass filter | 0.2 Hz to 20 kHz |
| Scale Factor range | 5 to 1000 mV/mil |
| Full scale range | 0 to 160 mil peak-peak |
| **Thrust Channel** | |
| Scale Factor range | 5 to 1000 mV/mil |

| Channel Types | |
|---|---|
| **Process Variable Channel** | |
| Support most of unit with default on Temperature | |
| **Channel Hardware Specification** | |
| Configurable Upper OK limit | -0.25 to -22 V (greater than lower OK) |
| Configurable Lower OK limit | -0.25 to -22 V (less than upper OK) |
| Accuracy: ±1% of full scale range | |
| Independent 24-bit ADCs on input channels | |
| Supports Bently transducer or 2/3 wires custom transducer for Accelerometers, Velomitor and Proximitor. | |
| **Speed/Keyphasor** | |
| Keyphasor transducers support multiple events per revolution and event ratios for speed inputs up to 20 kHz. | |
| Threshold voltage resolution | 0.1 Vdc |

| Interfaces | |
|---|---|
| **Proximity Transducer Interface** | |
| Supply Voltage | -22.8 to –25.2 Vdc |
| Maximum Rated Current | 15 mA |
| Short Circuit Current | 15.1 mA to 23.6 mA |
| Accuracy | ±1% of full scale range |
| Input Impedance | 3-wire Voltage Mode, 10 kΩ |
| RPM range | 1 to 120,000 |
| **Proximity Switch Interface** | |
| Supply Voltage | -10 to -24 Vdc |

| Interfaces | |
|---|---|
| Lower Not Ok limit | -2.75 ±0.05 V |
| Rpm range | 1 to 60,000 |

| Other Inputs | |
|---|---|
| **Magnetic Pick up** | |
| Input voltage | Adapt to sensor 284947 output |
| RPM range | 200 to 120,000 |
| **Contact Inputs** | |
| Monitor provides 3 contact capabilities with input terminals | Configuration lock<br>Latched alarm/relay reset function<br>Monitor Bypass |
| Activate | 0 to 10 kΩ |
| De-activate | 150 kΩ to infinite |
| **Button Inputs** | |
| External button to reset latched alarm and relay | |
| One buried button provides 3 functions | • Display monitor information<br>• LCD contrast adjustment<br>• Reset settings to default |
| **Display Monitor Information** | |
| Reset listed settings to **Default** | • User account name<br>• IP Address<br>• FW/HW version |
| **Jumper Between COM & Chassis GND** | |
| Jumpers are 2-pin terminal interfaces that connects COM to the Chassis ground (GND). | |
| Alternatively, COM can be connected to an earth ground separately through a terminal. | |

# Outputs

| Buffered Output | |
|---|---|
| Three buffered outputs are available on the monitor through BNC connectors | 2 Vibration Outputs<br>1 Speed Output |
| **Relays** | |
| Relays provide two dry-contact outputs | May be normally energized or de-energized<br>No output feedback determination |

| Relay Circuit Specification in Non-Hazardous Area | |
|---|---|
| Type | Single pole, double throw |
| Sealing | Epoxy sealed |
| Contact life | 100,000 cycles @ 5 amps<br>250 Vac<br>200,000 @ 1 amp, 24 Vdc |
| Insulationresistance | 1000 MΩ minimum @ 500 Vdc |
| Relay closed contact resistance | 1 Ω maximum |
| Relay open contact resistance | 1 MΩ minimum |
| Maximum switched contact voltage | 250 Vac / 250 Vdc |
| Maximum breaking contact current | 6 A @250 Vac / 6 A @24 Vdc |
| Maximum switched power | 1500VA AC / 150 Watts DC |

| Relay Circuit Specification in Hazardous Area | |
|---|---|
| Maximum switched contact voltage and current | 6 A @24 Vac / 5 A @ 30 Vac / 5.8 A @24 Vdc / 4 A @30 Vdc |

**4-20mA Output (2300/20)**

Two 4-20 mA outputs with internal current loop power supply

4 to 20 mA output values are proportional to the full-scale of the associated measurement.

Software configuration may determine the variable of each output. Voltage compliance: 0 to +12 Vdc range across load.

Load resistance: 0 to 600 Ω

Resolution: 0.3662 µA

Accuracy: 1% over operating temperature range

Update rate: 100 ms

Configurable with default 2 mA clamp current

No output feedback determination

Caution: Two 4-20 mA outputs will **NOT** work with an external powered loop.

**SPA Output (2300/25)**

| | |
|---|---|
| Input signal range | High AC: 8 Vpp Low AC: 1.6 Vpp DC GAP: 0 to -20 Vdc (max measurable AC signal is 1 Vpp). |
| Accuracy | High/Low AC: ±1% of Full-Scale at 100 Hz DC GAP: ±0.5 V (measurable AC accuracy: ±20 mV) |
| Frequency response | 10 Hz to 3000 Hz ±5% |

| Relay Circuit Specification in Hazardous Area | |
|---|---|
| **LEDs** | |
| OK | Indicates when the monitor is operating properly. |
| Protection fault | Indicates hardware fault that is impacting alarm determination. |
| User inhibit | Indicates the alarm/relays have been intentionally inhibited from operation. |
| Bypass | Indicates user initiated bypass action. |
| Relay status | Indicates if relays have been activated. |
| TX/RX | Indicates the Ethernet status and monitor communicating with remote software. |
| SPEED/AUX channel status | Indicates the speed channel has valid speed signal input OR operating correctly when AUX. |
| **Channel Alarm Status** | |
| Alert LED | Engages if any channel is in alert state. |
| Danger LED | Engages if any channel is in danger state. |

**LCD Display**

Allows viewing machine speed, vibration measurements value, setpoints, and configuration information.

## Communications

| | |
|---|---|
| Ethernet | Ethernet, 10Base-T and 100Base-TX. Conforms to IEEE802.3<br>RJ-45 for 10Base-T/100Base-TX Ethernet cabling<br>Cable length: 100 meters (328 ft.) maximum |

## Environmental Limits

| | |
|---|---|
| Operating Temperature | -30°C to +65°C (-22°F to +149°F) |
| Storage Temperature | -40°C to +85°C (-40°F to +185°F) |
| Humidity | Up to 95%, non-condensing |
| Vibration Limitation | 3 g |
| Battery Life for Real Time Clock | Powered: 38 years @ 50°C (122°F)<br>Un-powered: 12 years @ 50°C (122°F) |

## Physical

| | |
|---|---|
| Dimensions (Width x Depth x Height) | 127 mm x 127 mm x 76.2 mm (5 in. x 5 in. x 3 in.) |
| Weight | 1.03 kg (2.26 lbs) |
| Mounting | Panel mount or DIN rail (adapter included) |

## System 1 Evolution Connectivity

2300 monitors connect to System 1 Evolution and support current value and time-based data collection of all static values, waveforms, and spectral data. This includes System1 Software's full suite of plots and tools for condition monitoring and asset management.

When an alarm is triggered on the 2300 monitor, the following high-resolution alarm data is forwarded to System 1.

## Trend Measurements:

| | Duration | Intervals |
|---|---|---|
| Pre-Event Data | 10 minutes | 1 second |
| | 20 seconds | 100 milliseconds |
| Post-Event Data | 10 seconds | 100 milliseconds |
| | 1 minute | 1 second |

## Spectrums/Waveforms:

| | Duration | Intervals |
|---|---|---|
| Pre-Event Data | 2.5 minutes | 10 seconds |
| Post-Event Data | 1 minute | 10 seconds |

In the event of a network disruption between the 2300 and System 1, the 2300 can store up to at least 5 alarm data captures. (This requires System 1 Evolution 21.1 or newer and Firmware release 3.2 or newer for 2300.)

# 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

EN 61000-6-2 : 2005

EN 61000-6-4: 2007 +A1

EN 61326-1: 2013

EN 61326-2-3: 2013

EMC Directive 2014/30/EU

## Electrical Safety

EN 61010-1: 2010

LV Directive 2014/35/EU

## ATEX

EN 60079-0: 2012/A11:2013

EN 60079-11: 2012

EN60079-15: 2010

EN60079-7: 2015

ATEX Directive 2014/34/EU

## RoHS

RoHS Directive 2011/65/EU

## India - Battery EPR Marking

GE Oil & Gas India Private Limited

EPR Certificate No.: 1.1595372902047E+20

# Hazardous Area Approvals

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

## cNRTLus

Class I, Division 2/ Zone 2

AEx nA nC [ic] IIC T4 Gc
Class I, Division 2, Groups A, B, C, and D; T4

## ATEX/IECEx

***2300/20***

II 3 G
Ex na nC [ic] IIC T4 Gc
Ex ec nC [ic] IIC T4 Gc

T4 @ Ta = -30°C to +65°C

***2300/25***

II 3 G
Ex na nC ic [ic] IIC T4 Gc
Ex ec nC ic [ic] IIC T4 Gc

T4 @ Ta = -30°C to +65°C

# Ordering Information

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

# 2300 Series Vibration Monitor

## 2300/20-AA: Monitor with 4-20 ma Outputs

(including DIN rail mount assembly, manual and monitor configuration software)

| A: Approvals Option | |
|---|---|
| **00** | None |
| **02** | Multiple Explosive Atmosphere Certifications(ATEX/IECEx/CSA) |

## 2300/25-AA: Monitor with SPA Outputs

(including DIN rail mount assembly, manual and monitor configuration software)

| A: Approvals Option | |
|---|---|
| **00** | None |
| **02** | Multiple Explosive Atmosphere Certifications (ATEX/IECEx/CSA) |

## 2300/20 KIT-AAA-BB

Bently Nevada 2300/20 Condition Monitoring System Kit

| A: Configuration | |
|---|---|
| **001** | **2 Sensors and 1 Housing**<br>• 1 - 2300/20 Monitor<br>• 1 - 6 ft. (1.8 m) shielded Ethernet cable<br>• 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-03 (stainless steel housing for hazardous area) 18.03 x 15.04 x 6.3 in.<br>• 2 - Accelerometer sensors (AM3100T2-Z2)<br>• 2 - 17 ft. (5.2 m) cables (9571)<br>• (Excluding Keyphasor sensor and 24 Vdc power supply1) |
| **002** | **1 Sensor and 1 Housing**<br>• 1 - 2300/20 or 2300/25 Monitor<br>• 1 - 6 ft. (1.8 m) shielded Ethernet cable<br>• 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-03 (stainless steel housing for hazardous area) 18.03 x 15.04 x 6.3 in.<br>• 1 - Accelerometer sensor (AM3100T2-Z2)<br>• 1 - 17 ft. (5.2 m) cable (9571)<br>• (Excluding Keyphasor sensor and 24 Vdc power supply1) |
| **003** | **2 Sensors**<br>• 1 - 2300/20 Monitor<br>• 1 - 6 ft. (1.8 m) shielded Ethernet cable<br>• 2 - Accelerometer sensors (AM3100T2-Z2)<br>• 2 - 12 ft. (3.6 m) cables (9571)<br>• (Excluding Keyphasor sensor and 24 Vdc power supply1) |

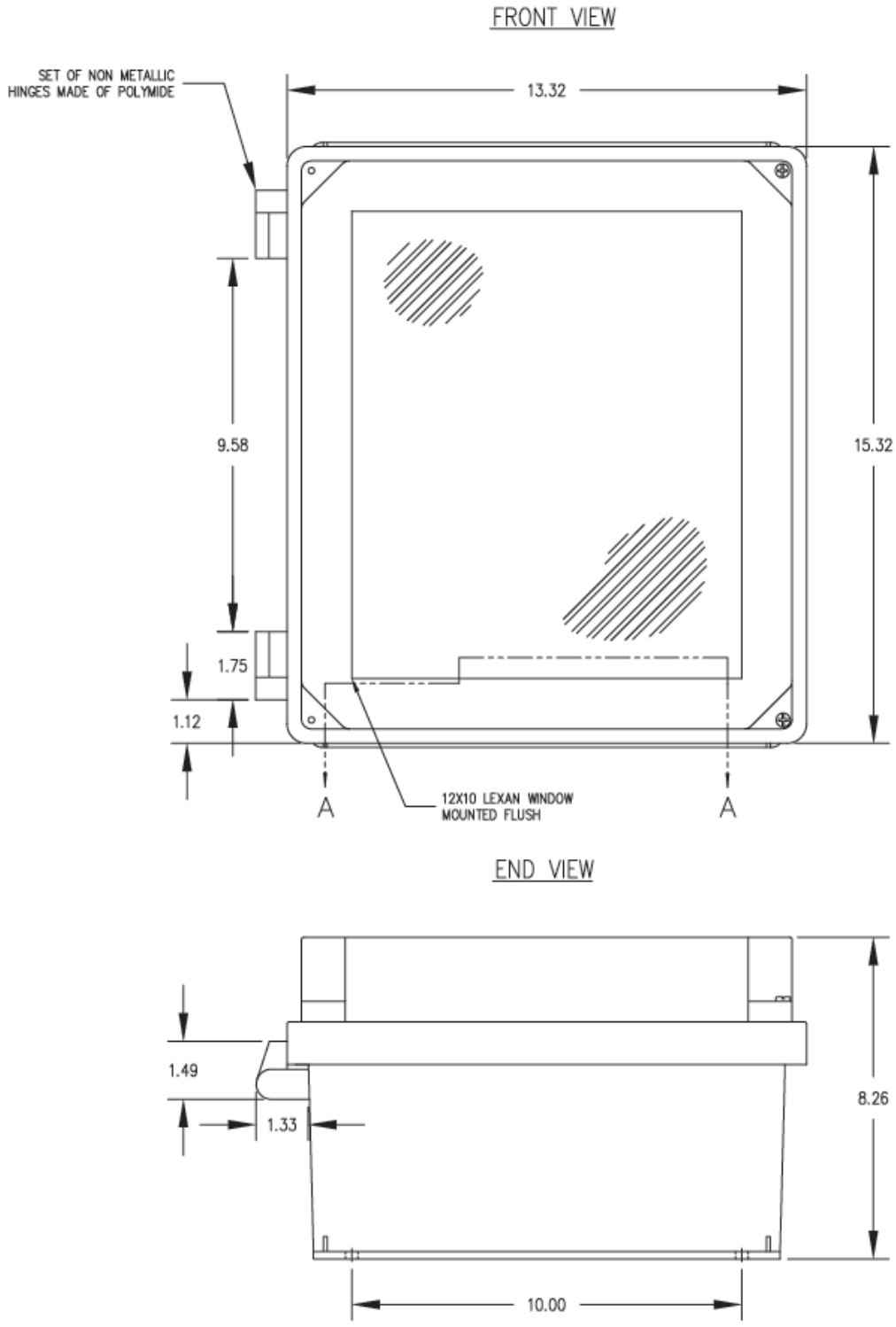



**Figure 2: 105M6193-01 Weatherproof Housing**

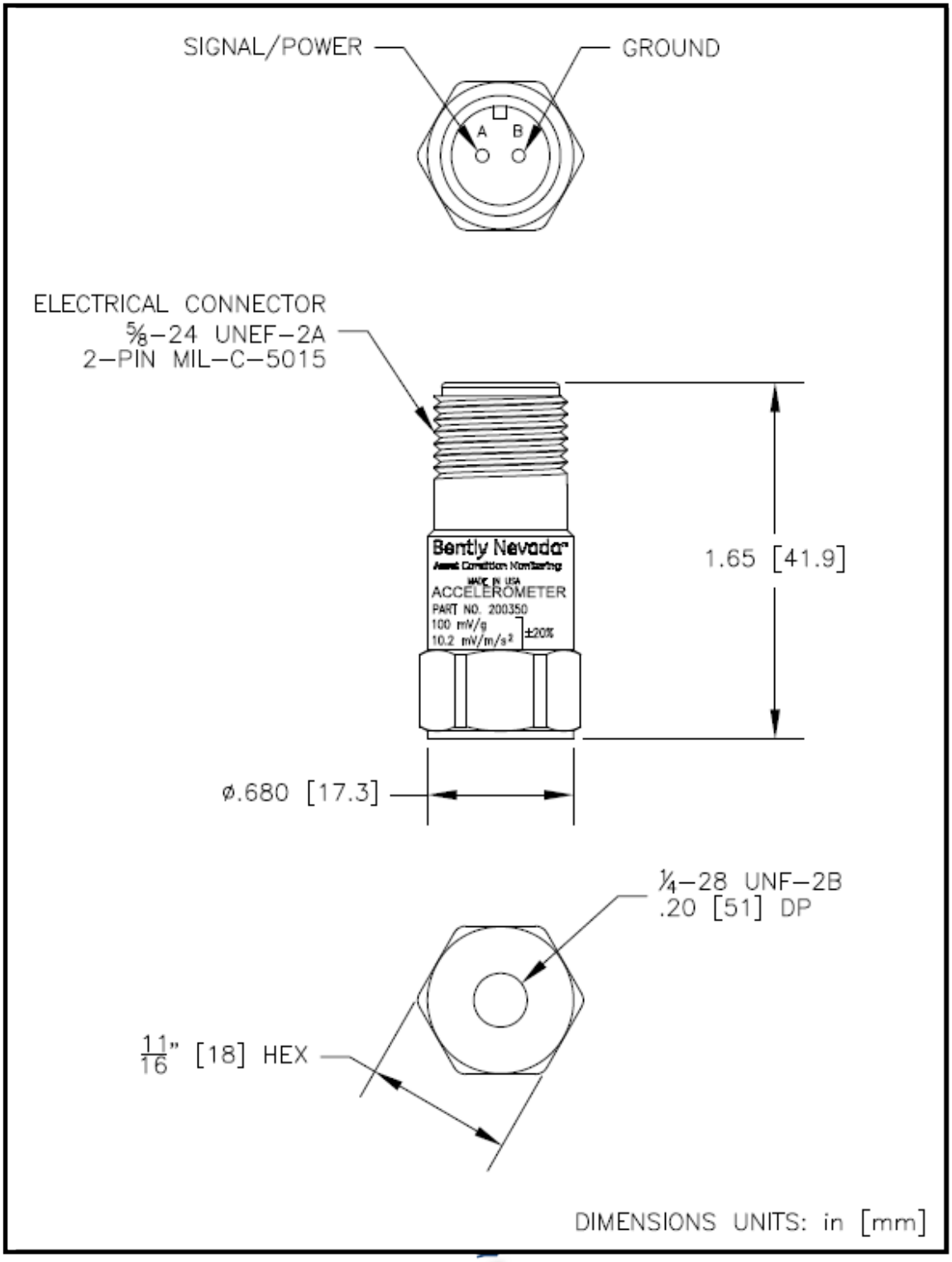



**Figure 3: 200350 Accelerometer Sensor**

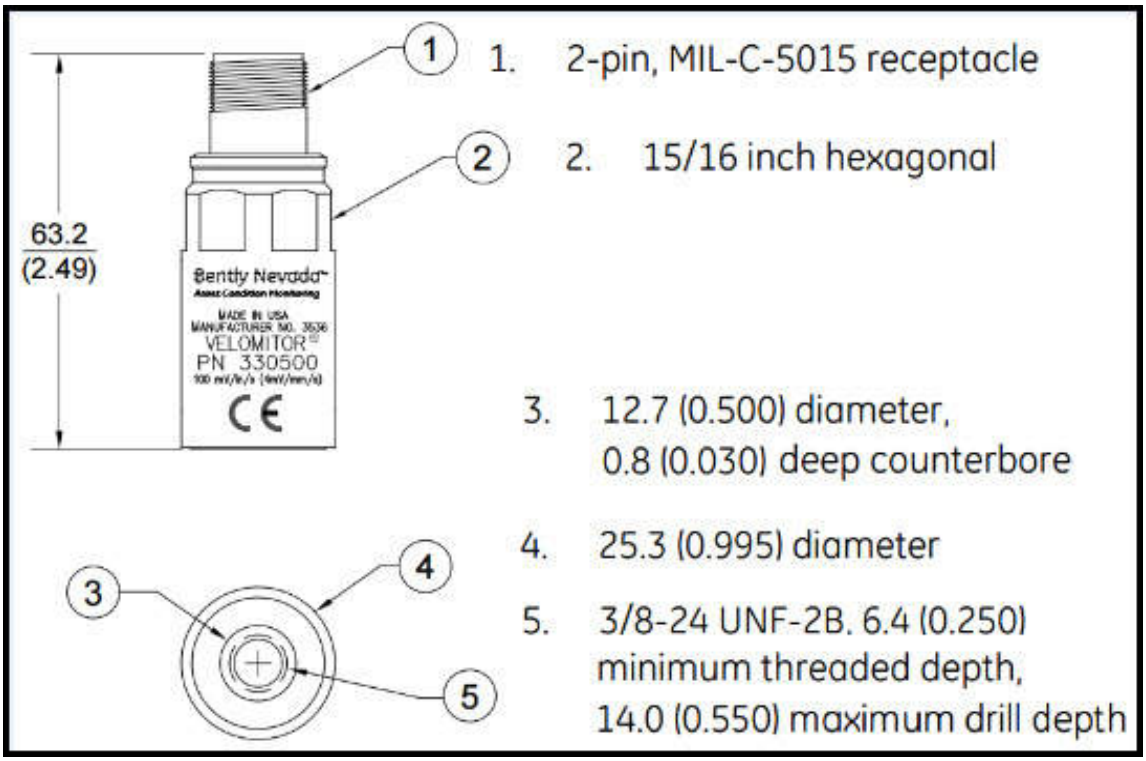



**Figure 6: 330500 Velomitor**

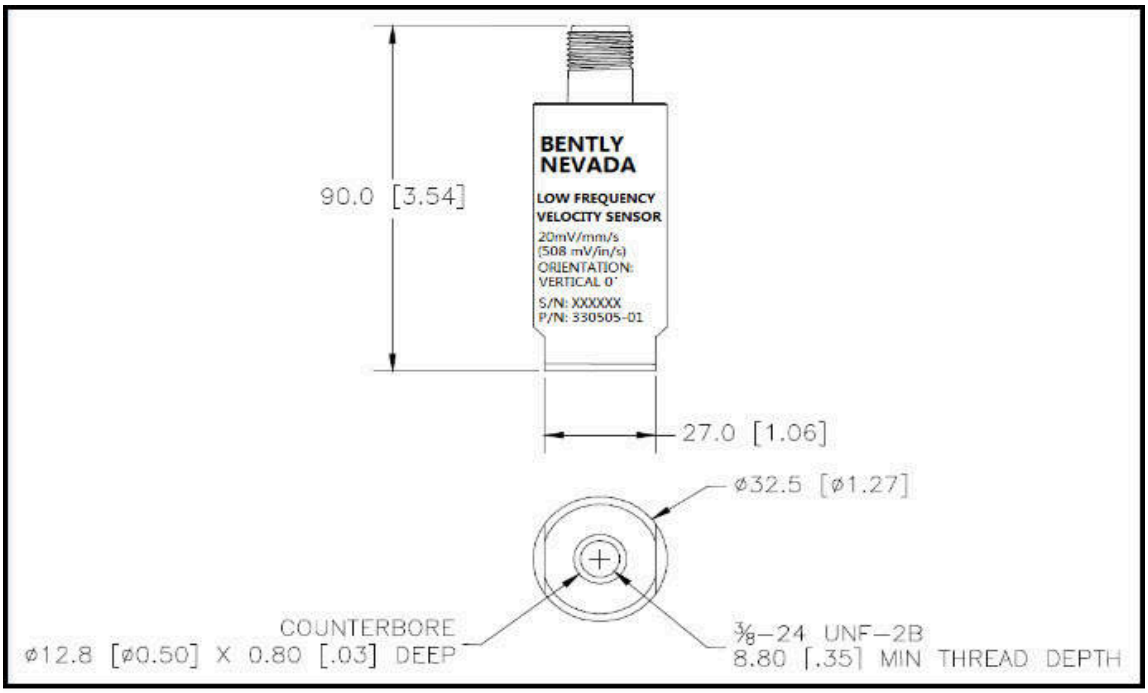



**Figure 7: 330505 Velomitor**

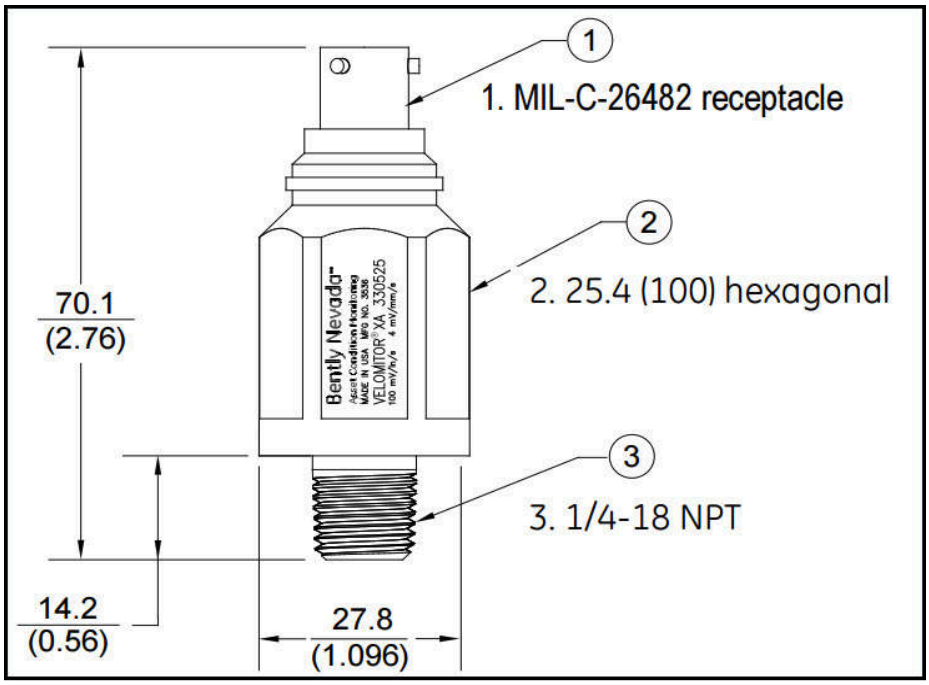



**Figure 8: 330525 Velomitor**

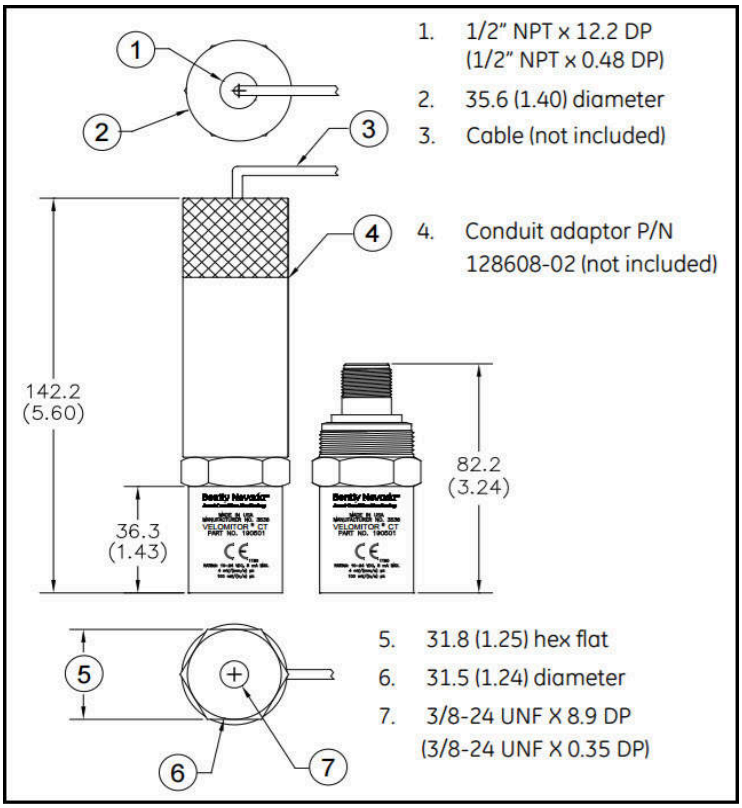



**Figure 9: 190501 Velomitor**

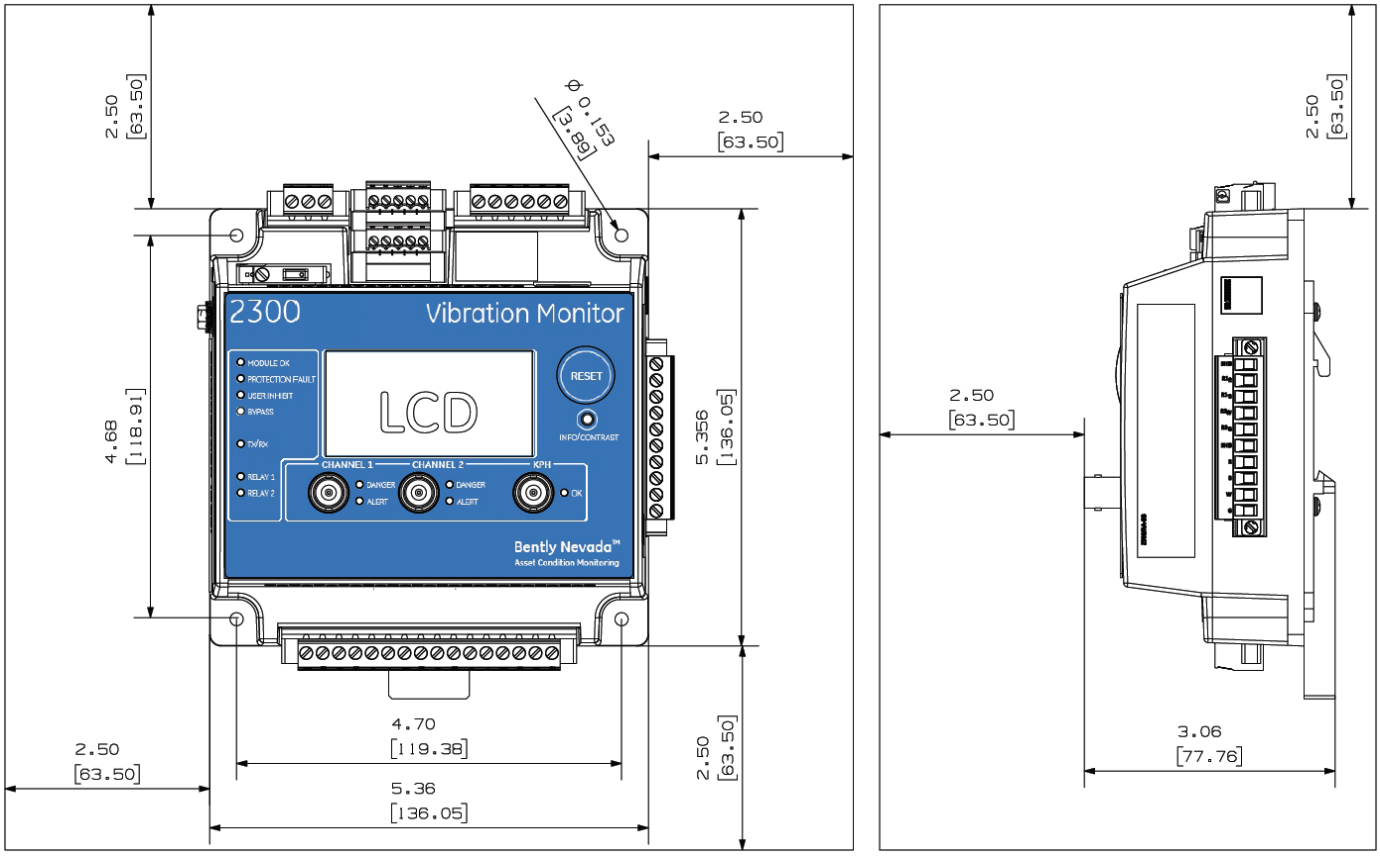



**Figure 12: 2300 Series Monitor Recommended Clearance**

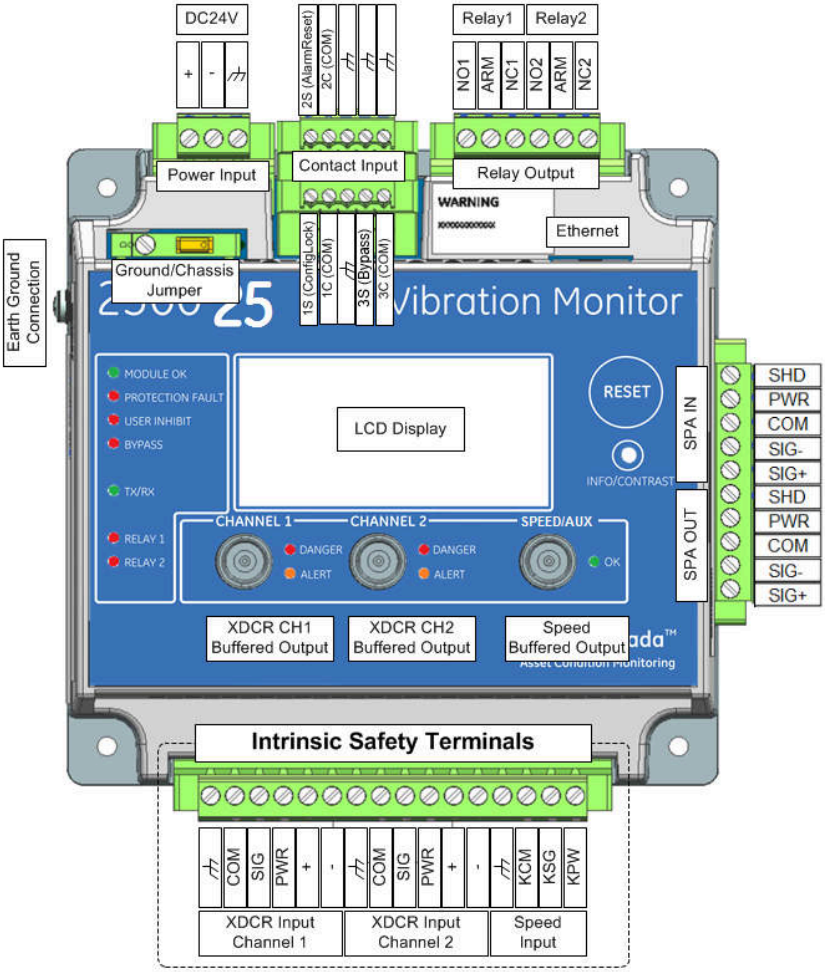



**Figure 14: 2300/25 Wiring Diagram**

2300/20 and 2300/25 use the same interface connector for recorder output or SPA output.