

2300 Series Vibration Monitors

Datasheet

Bently Nevada Machinery Condition Monitoring

105M0340 Rev. U

Description

The 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 Iconnectivity for Trendmaster SPA interface which enables users to leverage existing DSM SPA infrastructure.

The 2300 Vibration Monitors are designed for use 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.



Monitor Key Features

2300/20

- Two 4–20mA 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, Acceleration pk/rms, Velocity pk, Velocity rms, Displacement pp, Displacement rms, Speed) real-time provided with alarm configuration.
- Each channel has one measurement group and two bandpass measurements.
- 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 channel bypass, configuration lockout, and 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.



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 Proximity switch type sensor.
- Support process variable on all three input channels.
- Key measurements (Acceleration pk, Acceleration rms, Acceleration pk/rms, Velocity pk, Velocity rms, Displacement pp, Displacement rms, Speed) real-time provided with alarm configuration.
- Each channel has one measurement group and two bandpass measurements.
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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.

Specifications

Inputs

Power Input

DC Input	18~36VDC, max 7.5W
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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 $\pm$ 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
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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)
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Configurable Lower OK limit	-0.25 to -22 V (less than upper OK)
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Accuracy: $\pm 1\%$ 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	0.1VDC
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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	$\pm 1\%$ of full scale range
Input Impedance	3-wire Voltage Mode, 10 k Ω
RPM range	6 to 120,000

Proximity Switch Interface

Supply Voltage	-10 to -24 VDC
Lower Not Ok limit	-2.75 $\pm$ 0.05 V
Rpm range	6 to 60,000

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 Latched alarm/relay reset function Monitor Alarm/Relay Inhibit
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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 • LCD contrast adjustment • Reset settings to default
Display Monitor Information	
Reset listed settings to Default	• User account name • IP Address • 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 1 Speed Output
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Relays

Relays provide two dry-contact outputs	May be normally energized or de-energized No output feedback determination
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Relay Circuit Specification in Non-Hazardous Area

Type	Single pole, double throw
Sealing	Epoxy sealed
Contact life	100,000 cycles @ 5 amps 250 VAC 200,000 @ 1 amp, 24 VDC
Insulation resistance	1000 MΩ minimum @ 500 VDC
Relay closed contact resistance	1 Ω maximum
Relay open contact resistance	1 MΩ minimum
Maximum switched contact voltage	250V AC / 250V DC
Maximum breaking contact current	6A @ 250VAC / 6A @ 24VDC
Maximum switched power	1500VA AC / 150 Watts DC

Relay Circuit Specification in Hazardous Area

Maximum switched contact voltage and current	6A @ 24VAC / 5A @ 30VAC / 5.8A @ 24VDC / 4A @ 30VDC
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4-20mA Output (2300/20)

Two 4-20mA outputs with internal current loop power supply
4 to 20mA 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 +12Vdc range across load
Load resistance: 0 to 600Ω

Resolution: 0.3662uA

Accuracy: 1% over operating temperature range

Update rate: 100ms

Configurable with default 2mA clamp current.

No output feedback determination.



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

SPA Output (2300/25)

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

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 RJ-45 for 10Base-T/100Base-TX Ethernet cabling Cable length: 100 meters (328 ft.) maximum
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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	3g
Battery Life for Real Time Clock	Powered: 38 years @ 50°C (122 °F) Un-powered: 12 years @ 50°C (122 °F)

Physical

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

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

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.

CSA/NRTL/C

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) available from Bently.com.

2300 Series Vibration Monitor

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



¹Provided are 3 kinds of power supplies with different temperature and power ranges. Verify the necessary details in the Accessories section to follow.

A: Configuration

001	2 Sensors and 1 Housing 1 - 2300/20 Monitor 1 - 6 ft. (1.8 m) shielded Ethernet
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	cable 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. 2 - Accelerometer sensors (200350) 2 - 17 ft. (5.2 m) cables (9571) (Excluding Keyphasor sensor and 24 VDC power supply¹)
002	1 Sensor and 1 Housing 1 - 2300/20 or 2300/25 Monitor 1 - 6 ft. (1.8 m) shielded Ethernet cable 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. 1 - Accelerometer sensor (200350) 1 - 17 ft. (5.2 m) cable (9571) (Excluding Keyphasor sensor and 24VDC power supply¹)
003	2 Sensors 1 - 2300/20 Monitor 1 - 6 ft. (1.8 m) shielded Ethernet cable 2 - Accelerometer sensors (200350) 2 - 12 ft. (3.6m) cables (9571) (Excluding Keyphasor sensor and 24VDC power supply¹)
004	2 Velomitors and 1 Housing 1 - 2300/20 Monitor 1 - 6 ft. (1.8 m) shielded Ethernet cable 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. 2 - Velomitor sensors (330500) 2 - 17 ft. (5.2 m) cable (9571)

	• (Excluding Keyphasor sensor and 24VDC power supply)
005	1 Velomitor and 1 Housing • 1 - 2300/20 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. • 1 - Velomitor sensor (330500) • 1 - 17 ft. (5.2 m) cable (9571) • (Excluding Keyphasor sensor and 24VDC power supply)
006	2 Velomiters • 1 - 2300/20 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 2 - Velomitor sensors (330500) • 2 - 12 ft. (3.6 m) cable (9571) • (Excluding Keyphasor sensor and 24VDC power supply)
B: Approvals Options	
00	None
02	Multiple Explosive Atmosphere Certifications (ATEX/IECEx/CSA)

2300/25_KIT-AAA-BB

Bently Nevada 2300/25 Condition Monitoring System Kit

A: Configuration

001	2 Sensors and 1 Housing • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-
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	02 (stainless steel housing for hazardous area) 12 x 14 in. • 2 - Accelerometer sensors (200350) • 2 - 17 ft. (5.2 m) cables (9571) • (Excluding Keyphasor sensor and 24 VDC power supply 1)
002	1 Sensor and 1 Housing • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. • 1 - Accelerometer sensor (200350) • 1 - 17 ft. (5.2 m) cable (9571) • (Excluding Keyphasor sensor and 24VDC power supply)
003	2 Sensors • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 2 - Accelerometer sensors (200350) • 2 - 12 ft. (3.6m) cables (9571) • (Excluding Keyphasor sensor and 24VDC power supply)
004	2 Velomiters and 1 Housing • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. • 2 - Velomitor sensors (330500) • 2 - 17 ft. (5.2 m) cable (9571) • (Excluding Keyphasor sensor and

	24VDC power supply ¹)
005	1 Velomitor and 1 Housing • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 1 - Housing Kit: 105M6193-01 (fiberglass housing for nonhazardous area) or 105M6193-02 (stainless steel housing for hazardous area) 12 x 14 in. • 1 - Velomitor sensor (330500) • 1 - 17 ft. (5.2 m) cable (9571) • (Excluding Keyphasor sensor and 24VDC power supply¹)
006	2 Velomiters • 1 - 2300/25 Monitor • 1 - 6 ft. (1.8 m) shielded Ethernet cable • 2 - Velomitor sensors (330500) • 2 - 12 ft. (3.6 m) cable (9571) • (Excluding Keyphasor sensor and 24VDC power supply¹)

B: Approvals Option

00	None
02	Multiple Explosive Atmosphere Certifications (ATEX/IECEX/CSA)



¹Provided are 3 kinds of power supplies with different temperature and power ranges. Verify the necessary details in the Accessories section to follow.

System 1 Software

2300/20 can interface to System 1 V16.2 or higher for expanded condition monitoring and analysis. System 1 software and the 2300 device connectivity (P/N 3071/13) are sold separately. Refer to document 108M5214 for System 1 detailed information.

3071/13-AA-BB

System 1 2300 Series Device Import

A: Not available for 2300 monitor

00

B: Quantity of 2300 Monitoring Systems

##

Numeric [1->n]

Accessories

106M7607-01	Power supply for DIN rail mounting, 100/240AC to 24DC/1.5ACertifications (ATEX) (-25°C ~70°C, 35*99*95 mm) (One power can drive max 4 monitors)
110M7102-01	power supply for DIN rail mounting, 100/240AC to 24DC/1.3ACertifications (CID2 by UL) (-25°C ~70°C, 22.5*99*107 mm) (One power can drive max 4 monitors.)
106M6694-01	Power supply for DIN rail mounting, 110/220AC to 24VDC/5ACertifications (ATEX, IECEX, CID2 by UL) (-40°C ~70°C, 40*130*125 mm) (One power can drive max 10 monitors.)
105M6193-02	Stainless Steel Housing for 2300 KIT (can be used in hazardous area)
105M6193-01	Fiberglass NEMA 4X/IP66 weatherproof housing with window in door (includes mounting plate for monitor)

Dimensions

	Width: 338.3 mm (13.3 in) Height: 389.1 mm (15.3 in) Depth: 209.8 mm (8.2 in) (used in nonhazardous area)
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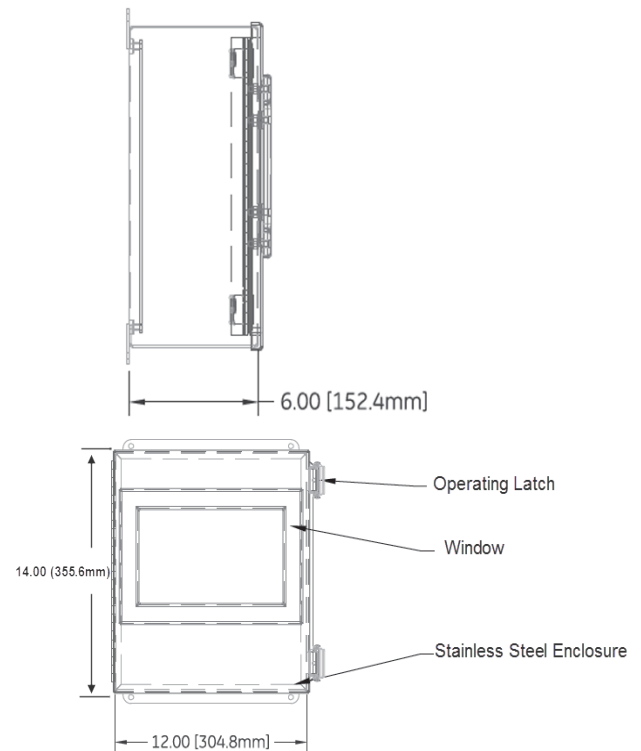


Figure 1: 105M6193-02 Weatherproof Housing

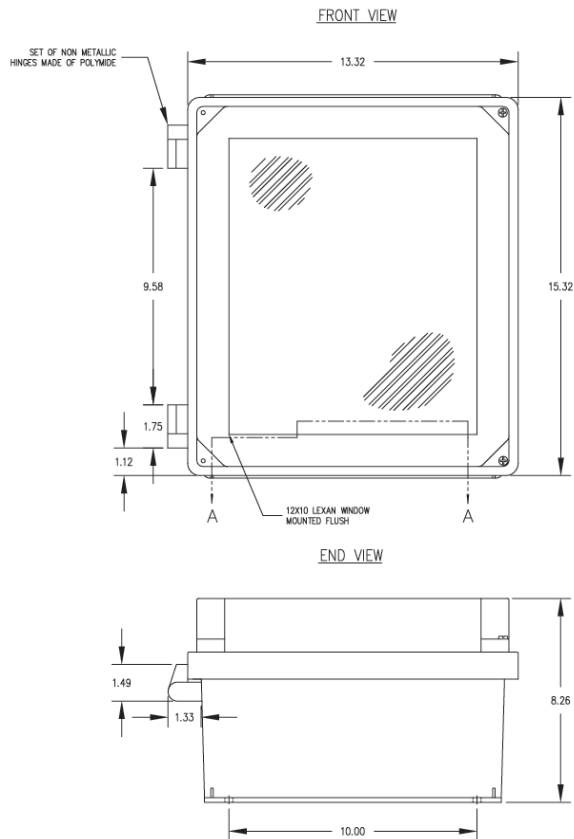


Figure 2: 105M6193-01 Weatherproof Housing

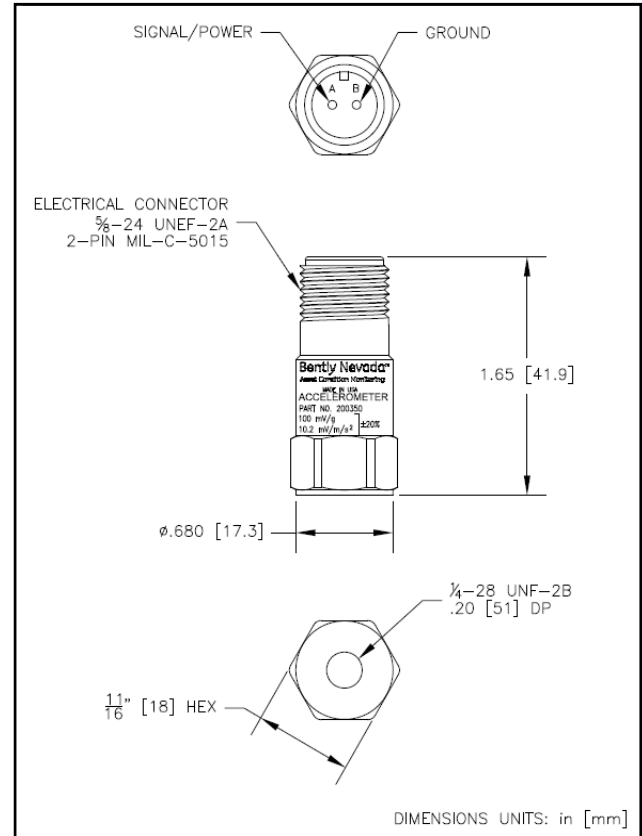


Figure 3: 200350 Accelerometer Sensor

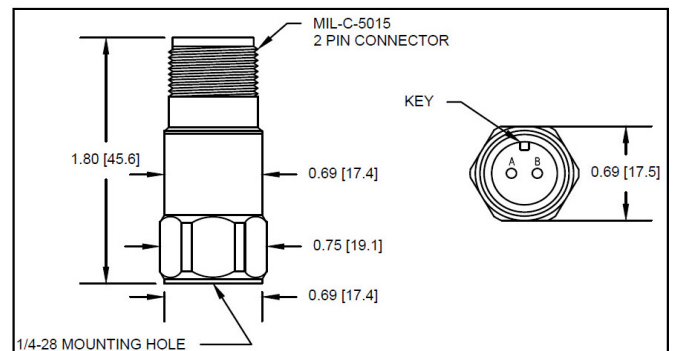


Figure 4: AM3100T2-Z2 Accelerometer Sensor

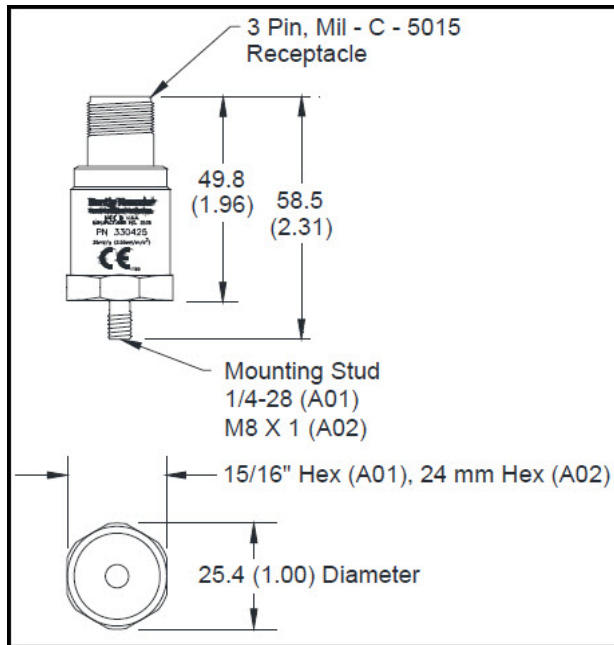


Figure 5: 330400/330425 Accelerometer Sensor

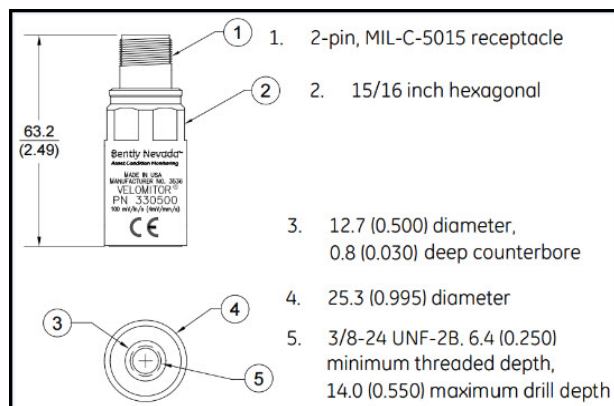


Figure 6: 330500 Velomitor

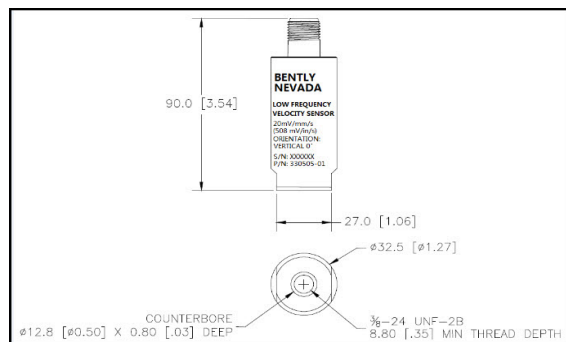


Figure 7: 330505 Velomitor

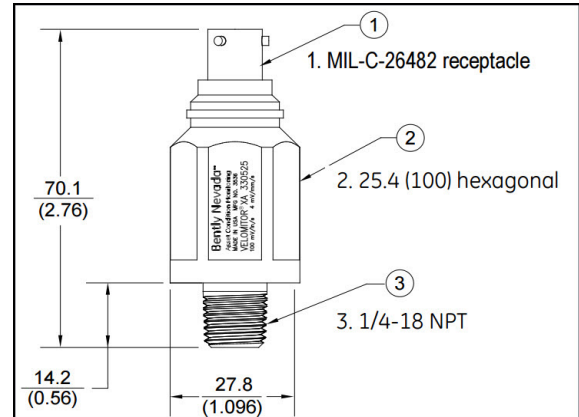


Figure 8: 330525 Velomitor

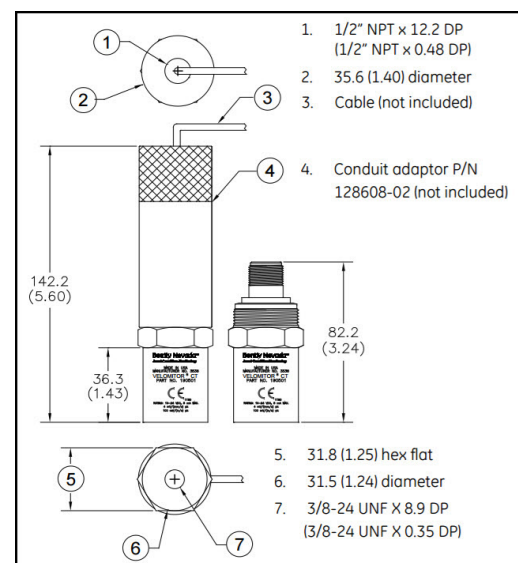


Figure 9: 190501 Velomitor

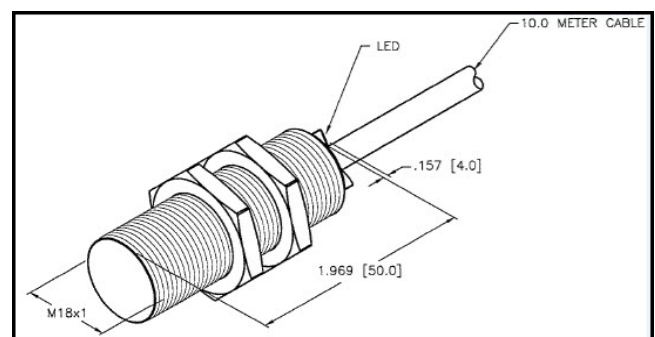


Figure 10: 100M0741 Proximity Switch

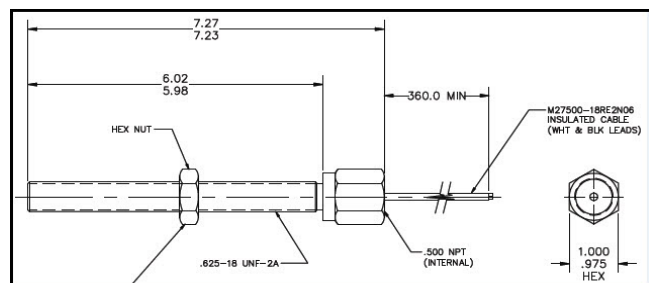


Figure 11: 284947 Magnetic Pickup

Proximity Transducer System

Refer to the following proximity transducer system datasheets for details.

172036	3300 5mm
141194	3300 XL 8mm
146256	3300 XL 11mm
147385	3300 XL NSV

02120015	Bulk Cable from Proximity sensor to monitor (500 ft.)
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9571-AA2	Low cost cable for accelerometer
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A: From "02" to "99" Increments of 1.0 foot

INCREMENTS OF 1.0 FOOT EXAMPLE: $\begin{bmatrix} 1 & 2 \end{bmatrix} = 12 \text{ FEET}$ $\begin{bmatrix} 2 & 5 \end{bmatrix} = 25 \text{ FEET}$ MIN LENGTH = 2.0 FEET MAX LENGTH = 99 FEET	
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84661-AA2	Armored cable for 2 -wire transducer
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A: From "03" to "99" Increments of 1.0 foot

INCREMENTS OF 1.0 FOOT EXAMPLE: $\begin{bmatrix} 1 & 2 \end{bmatrix} = 12 \text{ FEET}$ $\begin{bmatrix} 2 & 5 \end{bmatrix} = 25 \text{ FEET}$ MIN LENGTH = 3.0 FEET MAX LENGTH = 99 FEET	
--	--

CB2W100-AAA

Cable for 2 -wire transducer



The CB2W100 cable is not recommended for use with the 200350 Accelerometer. The O-ring will not form a proper seal with the accelerometer.

A: Cable Length

015	15 ft. (4.8 m)
032	32 ft. (9.8 m)
064	64 ft. (19.5 m)
112	112 ft. (34.1 m)
125	125 ft. (38.1 m)
150	150 ft. (45.7 m)
200	200 ft. (61.0 m)
250	250 ft. (76.2 m)

Splash Proof Cable for 2-wire transducer

9571 Mod : 285031-AA2

Cable for 2-wire extension with Splash Proof Connection. This cable assembly provides an equivalent IP66 level of protection.

A: Cable Lengths

16	16 ft. (4.8 m)
32	32 ft. (9.8 m)
64	64 ft. (19.5 m)



For conducted RF performance, metal conduit with both ends grounded is required for Proximitor 3300-NSV cables and Accelerometer 330400 cable.



2Cable lengths greater than 30 meters (100 feet) will experience some attenuation of amplitudes at higher



frequencies when using the AM3100T2-Z2 Accelerometer.

286244	Magnetic mounting base ¼-28 threaded hole
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Ethernet Cables

138131-AAA

Standard 10 Base-T/100 Base-TX Shielded Category 5 Cable with RJ-45 connectors (solid conductor)

A: Cable Length

006	6 ft. (1.8 m)
010	10 ft. (3.0 m)
025	25 ft. (7.6 m)
040	40 ft. (12.2 m)
050	50 ft. (15.2 m)
075	75 ft. (22.9 m)
085	85 ft. (25.9 m)
100	100 ft. (30.5 m)

Spares

105M6203-01	35mm DIN rail mount and screws (included with 2300/20 monitor)
106M3210	10-pin 4-20mA output connector
106M2223	5-pin contact input connector (Alarm Reset)
106M3408	5-pin contact input connector (Alarm Inhibit, Config lock)
106M3211	16-pin transducer input connector
106M3212	6-pin relay output connector
106M2231	3-pin power input connector

Accessories

02120015	Bulk Cable from Proximity sensor to monitor (500 ft.)
9571-AA²	Low cost cable for 2-wire transducer

Software

100M9465-01	BN Monitor Configuration SW/FW DVD • BNMC version 5.2 or greater • 2300 series monitor firmware • (DVD includes 2300 Series Software Guide)
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Additional Information

2300 Series Operation and Maintenance Manual (Document 105M0341)

2300 Field Wiring Diagram (Document 106M5801)

2300 Series Software Guide (Document 107M7626)

2300 Series Monitor Installation Guide (Document 121M3029)

Graphs and Figures

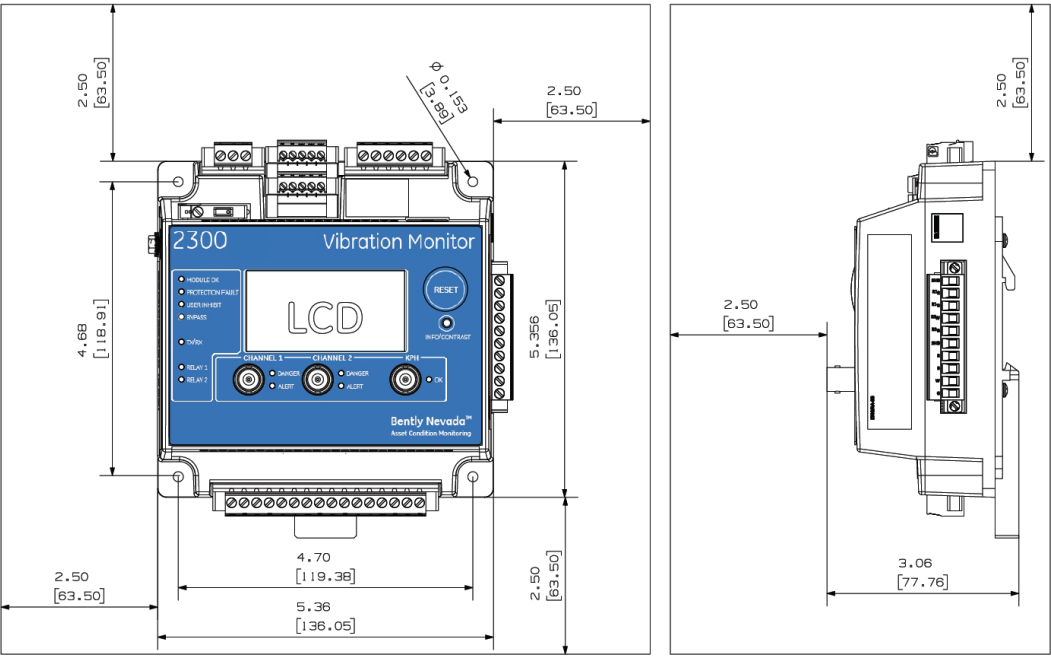


Figure 12: 2300 Series Monitor Recommended Clearance

Wiring Diagram

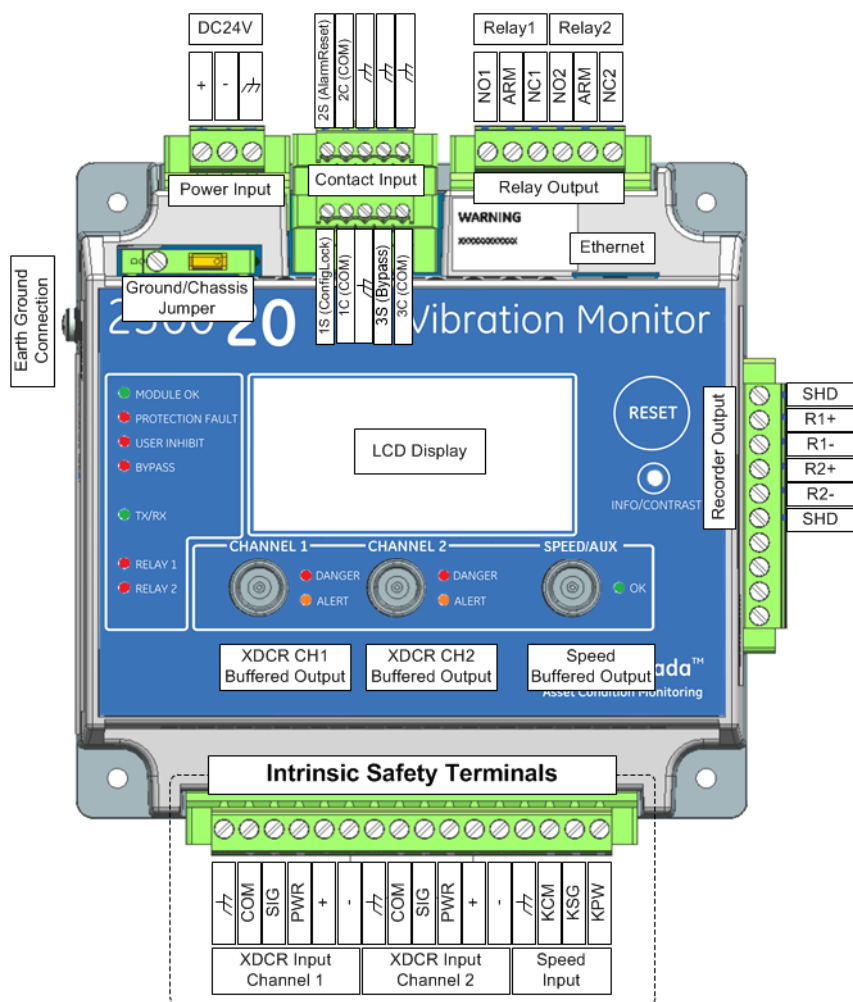


Figure 13: 2300/20 Wiring Diagram



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

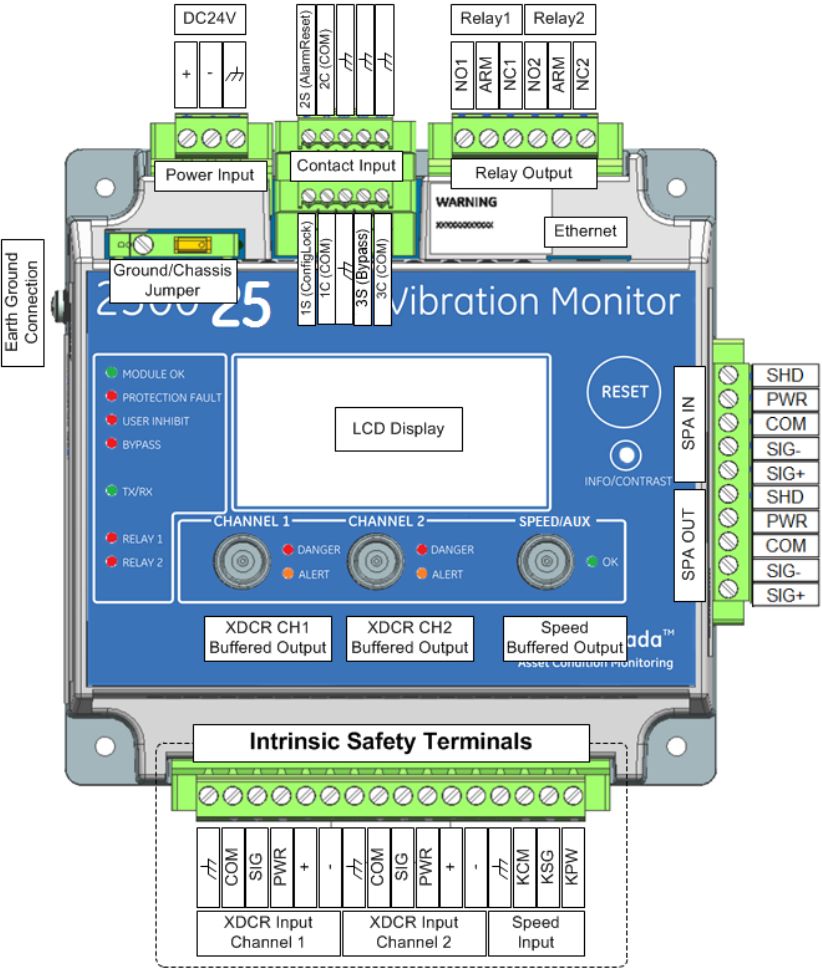


Figure 14: 2300/25 Wiring Diagram

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

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