200150, 200155 and 200157 Accelerometers

Datasheet

Bently Nevada Machinery Condition Monitoring

164986 Rev. V

Description

The 20015x Accelerometers are general purpose, wide frequency, case-mounted seismic transducers designed for use with Trendmaster ProTIMs.

The 200150 Accelerometer also operates with the Trendmaster 2000 system. The accelerometer interfaces with the 200100 Dual Acceleration to Velocity flexiTIM Module and the 89130-01 Acceleration-to-Velocity TIM (Transducer Interface Module), as well as the 1900/25 and 1900/27 monitors.

The 20015x Accelerometers feature a hermetically sealed, stainless steel case. This design provides an extremely rugged transducer that is well suited for harsh industrial environments. The transducer's top-mounted, 5-pin connector allows you to easily install and remove the interconnecting signal cable. A 3/8-24 threaded hole on the bottom of the sensor's casing accommodates several mounting options.

The 20015x Accelerometers contain a piezoelectric sensing device that generates a charge when it is subjected to vibration. The accelerometers electronically convert this charge to a differential voltage signal that is proportional to the acceleration that is parallel to the sensitive axis of the transducer.

If you use the 200155 and 200157 Accelerometers with 1900 monitors or with TIMs other than those listed in Table 1, or if you operate the transducers outside their specified limits, machine monitoring may fail or the data obtained may not be accurate.

The maximum allowed cable length for use with the 200155 is 15.24 m (50 ft.). You can install 20015x

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accelerometers in a Class I, Zone 0 application without a barrier, if you use them with the wSIM.

Table 1: 20015x Accelerometer Applications

Accelerometer	Used with ProTIM Option	Type of Application
200150	Standard Acceleration-to-Velocity channel type (-01)	General application
200155	Low Frequency Acceleration-to-Velocity channel type (-05)	Fin-Fan, slow rotating shafts
200157	Standard Acceleration-to-Velocity with Acceleration Enveloping channel type (-06)	Roller element bearing and certain types of cavitation effects

Note that the acceleration-to-velocity circuitry in the 200200 and 200250 ProTIMs attenuates frequencies above 1 kHz . You cannot obtain higher frequency data with the 200155 or 200157.

The wider frequency range of the 200155 and 200157 accelerometers may result in increased noise compared to the 200150. We recommend that you use the 200155 transducer for frequencies of interest below 10 Hz. Use the 200157 only if the application requires acceleration enveloping. Use of the 200155 or the 200157 in place of the 200150 may result in faulty readings. Refer to the ProTIM datasheet for the proper frequency response of the system.

If you are measuring a machine housing to determine where to install transducers, consider what kinds of data you need to obtain. Most common machine malfunctions (imbalance, misalignment, and so forth) originate at the rotor and cause a change in rotor vibration. The location you select on the housing must accurately conduct rotor vibration to the transducer.

Install the transducer carefully. If you don't, the transducer may not accurately detect vibrations and can transmit invalid data. Bently Nevada provides engineering services to accurately measure machine housings and to install transducers.

Specifications

All specifications are at +25°C (+77°F), unless otherwise specified.

Electrical

Sensitivity @ 80 Hz (± 12%)	10.2 mV/(m/s²) (100 mV/g)

Measurement Range

Accelerometer	Measurement Range in m/s² (g)
200150	±245 (±25)
200155	±196 (±20)
200157	±245 (±25)

Frequency Range Referenced to 80Hz (±10%)

Accelerometer	Frequency Range in Hz (cpm)
200150	10 to 1000 (600 to 60,000)
200155	1.5 to 10,000 (90 to 600,000)
200157	10 to 10,000 (600 to 600,000)

Mounted Resonant Frequency	>20 kHz (>1200 kcpm)
Amplitude Linearity (1 to 10g pk)	±2%
Transverse Sensitivity	≤7%

Settling Time (Within 5% of Bias)

Accelerometer	Settling Time (ms)
200150	≤300
200155(1)	≤2000
200157	≤300

(1) Because of its long settling time, you can use the 200155 only with low frequency acceleration-to-velocity channel types on a ProTIM, DSM, or System 1 system.

Excitation Voltage	4.7 to 5.5 Vdc
Polarity (Acceleration from Base to Connector)	SIG+ positive with respect to SIG-.
Quiescent Current	<800 µA
Output Bias Voltage	+2.5 ± 0.23 Vdc

Broadband Electrical Noise (1 Hz to 15 kHz)

Accelerometer	Measurement Range in mm/s² (mg)
200150	14.7 (1.5)
200155	24.5 (2.5)
200157	14.7 (1.5)

Electrical Isolation	600 Vrms

Environmental

Axial Shock Limit	49,050 m/s² pk (5,000 g pk)
Temperature Range	-40 °C to +105 °C (-40 °F to +221 °F)
Sealing (Hermetic)	5X10⁻⁸ atm•cc/s (3.1X10⁻⁹ atm•in³/s), maximum
Relative Humidity	100% relative, condensing, non-submerged

Physical

Size (Hex x Height)	17.5 mm x 45.7 mm (11/16 in x 1.8 in)
Weight	58 g (2.0 oz), typical
Mounting Thread	3/8-24 female
Mounting Torque	2.7 to 6.8 N•m (2 to 5 ft•lbf)
Sensing Element	Ceramic
Sensing Geometry	Shear
Housing and connector material	
200150	316L stainless steel
200155	316L stainless steel
200157	316L stainless steel

Electrical Connector (Top)	5-pin 1/2-20

Cables

Operating Temperature Range	-20 °C to +100 °C (-4 °F to +212 °F) These cables may be used at lower temperatures if the installation prevents the cable from flexing or bending. Flexing these cables at temperatures below –20 °C (-4 °F) may damage the cables.
Construction	4-conductor, 22 AWG with braided shield and drain wire (85% coverage, minimum), PVC outer jacket. Nickel-plated coupling nuts.
Seal	Connectors provide an IP67 seal to transducers and mating hardware. Connectors are molded to the cable. The addition of DC4 electrical insulating compound in the connectors provides additional protection against moisture during a thermal shock.
Minimum Bend Radius	
200151	63.5 mm (2.5 in)
200152	73.7 mm (2.9 in)
Maximum Cable Length	25 m (82 ft) Custom products may be able to provide longer cable lengths for the 200150 and 200157 accelerometers.

Adhesive (see Mounting Hardware Options)

Temperature Range	-55 °C to +121 °C (-67 °F to +250 °F)
Cure Time	24 hours

Adhesive studs (Options **0 1** and **2 0**) are sold in kits containing frames to hold the studs to the substrate while the adhesive cures. The kit also contains provides a scouring pad and alcohol wipe to prepare the mounting surface and a packet of acrylic adhesive and materials to mix the two components.

Using adhesives and magnetic mounts attenuates high frequency signals that may be present.

200151-AA-BB-CC

Accelerometer Interface Standard Cable, Connectors on Both Ends

A: Cable Length	
20	2.0 meters
40	4.0 meters
60	6.0 meters
B: Armor Option	
02	Blue cable without armor
03	Blue cable with armor
C: Coupling Nut	
00	Standard coupling nut (see Figure 9)
02	Nylon coupling nut
10	Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on both ends of the cable (see Figure 11).

200152-AA-BB

Accelerometer Interface Standard Cable, Connector on Accelerometer End Only

A: Cable Length	
04	4.0 meters
15	15 meters
25	25 meters
B: Coupling Nut	
00	Standard coupling nut (see Figure 10)
10	Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on the accelerometer end only (see Figure 12).