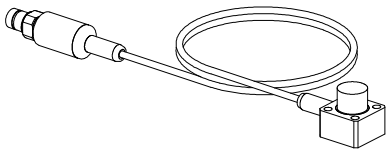
350900 High Temperature Velocity and Acceleration Sensor

Bently Nevada™ Asset Condition Monitoring



Description

The 350900 High Temperature Velocity and Acceleration Sensor (HTVAS) provides a continuous acceleration and velocity output, allowing the customer to protect their machine with an velocity signal while simultaneously capturing the acceleration signal for machinery diagnostics. Its design is primarily for use with the 3500/42M and 3500/44M monitors. When attaching the HTVAS to a 3500/42M or 3500/44M monitor you must use the acceleration and velocity signals from the transducer on a separate channel pair (such as channels 1 and 3) or on separate monitors.

The 350900 High Temperature Velocity and Acceleration Sensor (HTVAS) separates the high-temperature sensing element from the signal conditioning electronics, with the two permanently connected via a hardline cable. This arrangement allows you to mount the sensing head on surfaces with temperatures as high as +482 °C (+900 °F), while installing the signal conditioning electronics in a cooler location. Eliminating connections between the sensing head and its associated signal conditioning electronics also eliminates a significant source of potential transducer failures (connector problems). This achieves overall transducer system performance comparable to other case-mounted vibration transducers, but permits use at significantly higher temperatures. The main features of the 350900 HTVAS are as follows:

- Velocity and acceleration output
- High temperature operation up to +482°C (+900 °F)
- Electronics rated to +125°C (+257°F), survivable to +155°C (+311°F)

Application Advisory

If housing measurements are being made for overall protection of the machine, give thought to the usefulness of the measurement for each application. Most common machine malfunctions (imbalance, misalignment, etc.) originate at the rotor and cause an increase (or at least a change) in rotor vibration. For any housing measurement alone to be effective for overall machine protection, the machine must faithfully transmit a significant amount of rotor vibration to the bearing housing or machine casing, or more specifically, to the mounting location of the transducer.

In addition, exercise care in the physical installation of the transducer. Improper installation can degrade the transducer's performance, and/or generate signals which do not represent actual machine vibration.

Upon request, we can provide engineering services to determine the suitability of housing measurements for the machine in question and/or to provide installation assistance.

Specifications

Specifications are between +20 °C and +30 °C (+68 °F to +86 °F) with machine casing vibration at 100 Hz (6000 cpm) and with a 10 kΩ load unless otherwise indicated.

Electrical

Power Requirements

Input Voltage

-18 to -30 Vdc; -18 to –28 Vdc for hazardous area approval options.

Quiescent Current

6 mA nominal, no load.

Transverse Sensitivity

Less than 5% of axial sensitivity.

Amplitude Linearity

± 1% to 4900 m/s^2 (500 g) peak overall acceleration.

Mounted Resonant Frequency

Greater than 15 kHz.

Maximum Cable Length

305 metres (1000 ft).

Grounding

Case isolated.

Velocity Output

Sensitivity

3.94 mV/mm/s (100 mV/in/s) ±5%.

Frequency Response

40 Hz to 1 kHz (2400 cpm to 60 kcpm) ±5% with 305 metres (1000 ft) of cable.

25 Hz to 2 kHz (1500 cpm to 120 kcpm) ±3 dB with 305 metres (1000 ft) of cable.

System Sensitivity over Extended Temperatures

Over a sensor temperature range of –54 °C to +399 °C (-65 °F to +750 °F) and with the electronics between –54 °C to +125 °C (-65 °F to +257 °F), the output remains within ± 10% of 3.94 mV/mm/s (100 mV/in/s).

Over a sensor temperature range of –54 °C to +482 °C (-65 °F to +900 °F) and with the electronics between –54 °C to +125 °C (-65 °F to +257 °F), the output remains within ± 15% of 3.94 mV/mm/s (100 mV/in/s).

Output Bias Voltage

-10.0 ± 2.0 Vdc.

Velocity Range

1270 mm/s (50 in/s).

Broadband Noise Floor (5 Hz to 2 kHz)

0.05 mm/s rms (0.002 in/s rms), max.

Acceleration Output

Sensitivity

1.02 mV/m/s^2 (10 mV/g) ± 5%.

Frequency Response

25 Hz to 4 kHz (1500 cpm to 240 kcpm) ± 5% with 305 metres (1000 ft) of cable.

10 Hz to 10 kHz (600 cpm to 600 kcpm) ± 3 dB with 305 metres (1000 ft) of cable.

System Sensitivity over Extended Temperatures

Over a sensor temperature range of -54 °C to +399 °C (-65 °F to +750 °F) and with the electronics

between –54 °C to +125 °C (-65 °F to +257°F), the output remains within ± 10% of 1.02 mV/m/s2 (10 mV/g).

Over a sensor temperature range of –54 °C to +482 °C (-65 °F to +900 °F) and with the electronics between –54 °C to +125 °C (-65 °F to +257 °F), the output remains within ± 15% of 1.02 mV/m/s2 (10 mV/g).

Output Bias Voltage

-10.0 ± 2.0 Vdc.

Acceleration Range

4900 m/s^2 (500 g).

Broadband Noise Floor (5 Hz to 2 kHz)

147 mm/s^2 (1.5 mg) rms, max.

Hazardous Area Classification

Multiple approvals for hazardous areas certified by Canadian Standards Association (CSA/NRTL/C) in North America and by LCIE/CENELEC in Europe.

North America

Ex ia/AEx ia for Class I Zone 0 IIC T4C @ Ta = 100ºC or

Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; and Class III, Division 1, when installed with an approved zener barrier per BN drawing 168077.

Ex nL/AEx nL IIC Class 1, Zone 2

Class I, Division 2 (non-incendive), Groups A, B, C, and D when installed per BN drawing 168077.

Europe/CENELEC

Ex II 1 G

EEx ia IIC T4

LCIE 04ATEX6140X

T4 @ Ta = -40ºC - 100ºC

Ex II 3 G

EEx nA II T4

LCIE 04ATEX6141X

Zone 0, Group IIC when installed with an approved zener barrier/galvanic isolators.

T4 @ Ta = -40ºC - 100ºC.Electromagnetic Compatibility

Electrostatic Discharge

EN 61000-4-2, Criteria A.

Electrical Fast Transients

EN 61000-4-4, Criteria A.

Radiated Susceptibility

EN 61000-4-3, Criteria A.

Conducted Susceptibility

EN 61000-4-6, Criteria A.

Surge Capability

EN 61000-4-5, Criteria A.

Magnetic Field

EN 61000-4-8, Criteria A.

Environmental Limits

Operating and Storage Temperatures

Sensor

-54°C to +482°C (-65°F to +900°F).

Mineral Insulated Cable

-54°C to +482°C (-65°F to +900°F).

Electronics

-54°C to +125°C (-65°F to +257°F).

Soak Back Temperature

The electronics will survive temperature exposure of +155°C (+311°F) for four hours without failure. Electrical performance will not be met during this period.

Shock Survivability

19,620 m/s^2 (2000 g) peak, maximum.

Relative Humidity

100% condensing, non-submerged. Case is hermetically sealed.

Physical

Sensor

Dimensions

See Figure 1.

Mounting

30.2 mm (1.188 in) square mounting hole pattern, 7.2 mm (0.283 in) mounting holes (4 holes).

Mounting Surface

32 microinch rms.

Material

Nickel alloy 600.

Integral Cable

Diameter

6.35 ± 1.27 mm (0.25 ± 0.05 in)

Material

300 Series Stainless Mineral Insulated Integral Cable with Stainless Steel Overbraid.

Bend Radius

Minimum bend radius of 51 mm (2.0 in).

Integral Electronics

Dimensions

See Figure 1.

Mounting

Patch panel hub mount.

Material

300 series stainless steel.

Connector

MIL-DTL-83723/90 - 1006N with gold-plated 300 series stainless steel.

System Weight (without field wiring)

0.545 kg + 0.10 kg/m cable length (1.200 lb + 0.006 lb/in cable length), typical.

Mounting Angle

Any orientation

Ordering Information

High Temperature Velocity and Acceleration Sensor

350900 – AXXX

A: Integral Cable Length Option

023	23 inches (0.58 metres)
026	26 inches (0.66 metres)
027	27 inches (0.69 metres)
044	44 inches (1.12 metres)
077	77 inches (1.96 metres)
083	83 inches (2.11 metres)
158	158 inches (4.0 metres)
237	237 inches (6.0 metres)
315	315 inches (8.0 metres)
394	394 inches (10.0 metres)

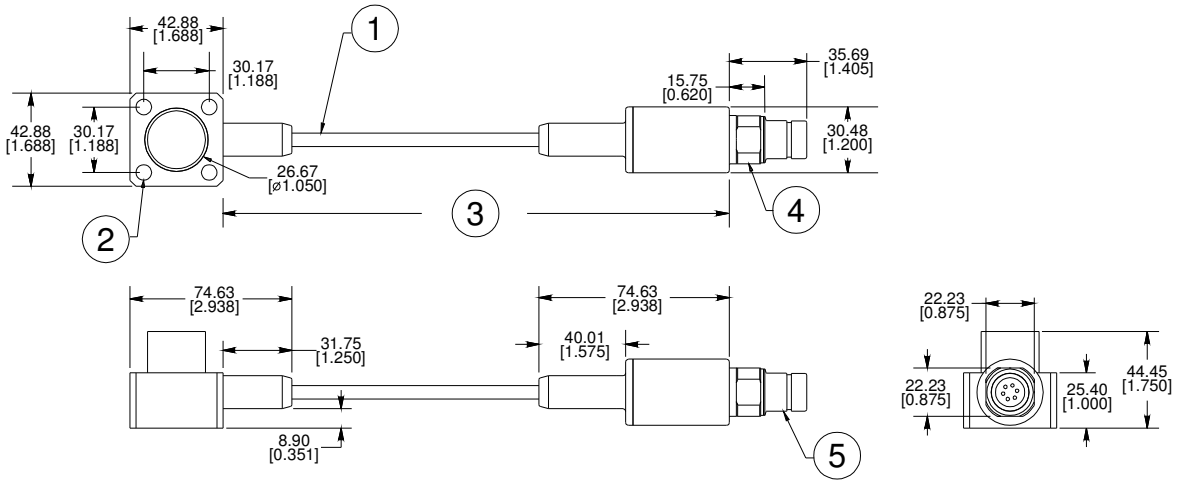
High Temperature Off-Engine Cable

350901 – AXXX

A: Transducer Cable with 83723 Connector

040	40 ft (12.2 metres)

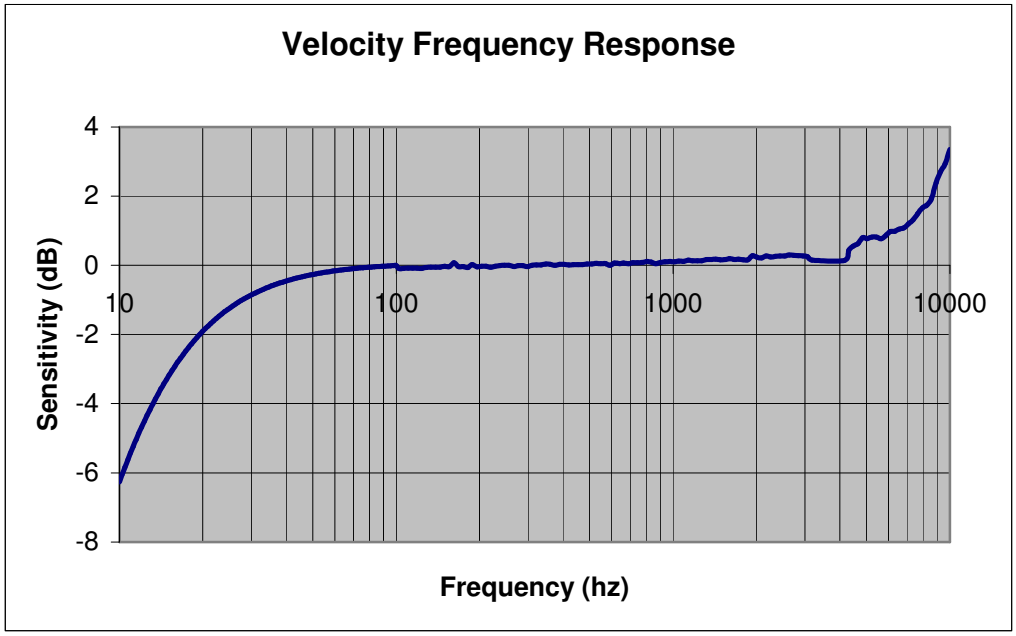
Graphs and Figures



1. Stainless steel overbraided MI cable
2. 0.283 diameter through (typical), 4 places
3. Length
4. 1-12 UNF-2A
5. MIL-DTL-83723/90 connector

Figure 1: Transducer Dimensional Drawing

Dimensions are in millimetres [inches]



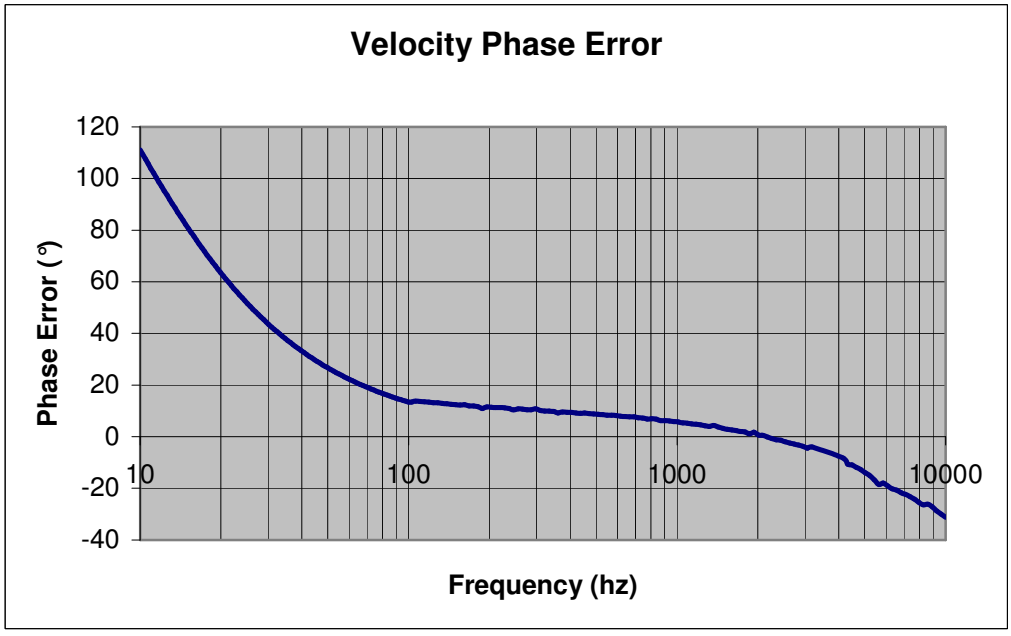
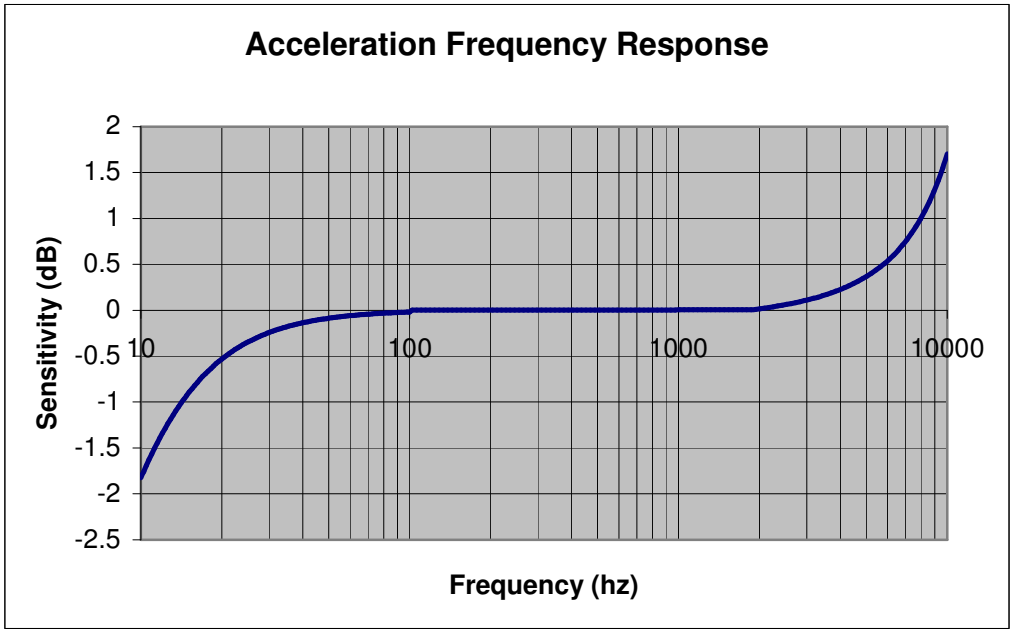


Figure 2: Typical Velocity Amplitude and Phase Response



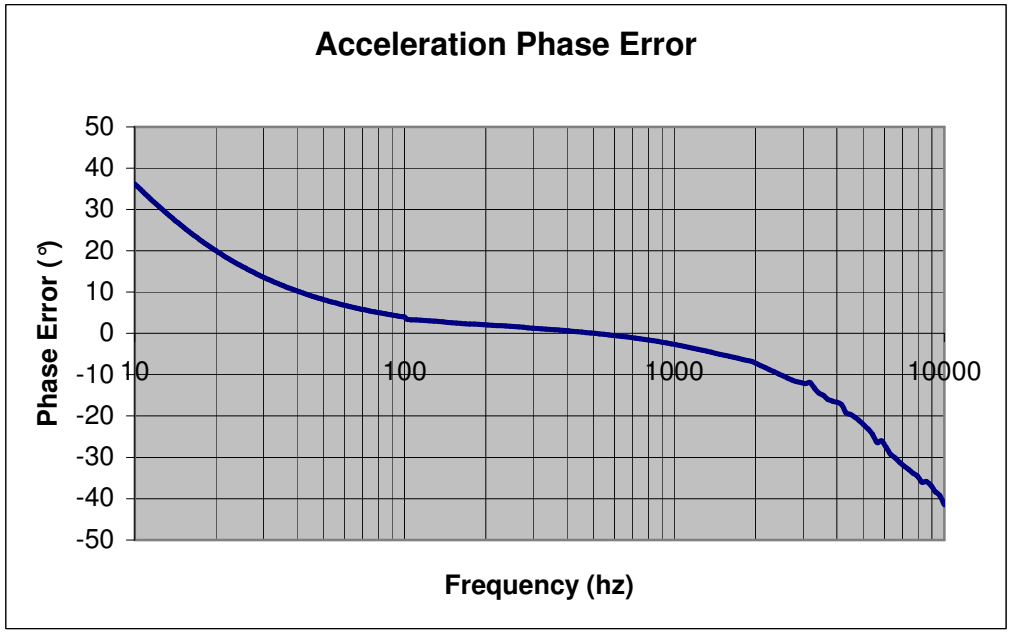


Figure 3: Typical Acceleration Amplitude and Phase Response