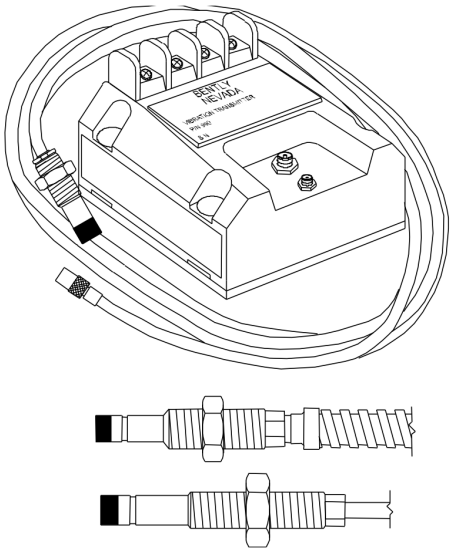
990 Vibration Transmitter

Datasheet

Cordant™

141612 Rev. Y



Description

The 990 Vibration Transmitter is intended primarily for the original equipment manufacturers (OEMs) of centrifugal air compressors or small pumps, motors, or fans who prefer to provide a simple 4 to 20 mA proportional vibration signal as the input to their machinery control system.

The transmitter is a two-wire, loop-powered device that accepts input from our 3300 NSv proximity probe and its matching extension cable (available in 5 m and 7 m system length options).

The transmitter conditions the signal into appropriate peak-to-peak vibration amplitude engineering units, and provides this value as a proportional 4 to 20 mA industry-standard signal as the input to the control system where machinery protection alarming and logic occurs.[1]

The 990 transmitter provides the following notable features:

- Integrated Proximitor Sensor requires no external unit
- Non-isolated PROX OUT and COM terminals plus a coaxial connector to provide a dynamic vibration and gap voltage signal output for diagnostics.[2]
- Non-interacting zero and span potentiometers under the Transmitter label supports loop adjustment.
- Test Input pin for quick verification of loop signal output, using a function generator as the input.
- A Not OK/Signal Defeat circuit prevents high outputs or false alarms due to a faulty proximity probe or loose connection.
- Choice of DIN-rail clips or bulkhead mounting screws as standard options simplifies mounting.

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- Potted construction for high humidity (up to 100% condensing) environments. Compatibility with 3300 NSv proximity probe allows transducer installation in small areas with minimal clearance, typical of centrifugal air compressors.

Notes

[1] Vibration transmitters have many limitations when compared to a continuous vibration monitoring system. They are a practical solution in some applications for measuring general vibration levels and are a valuable tool for overall vibration trending. However, they provide limited capability for machinery diagnostics using the vibration signal and do not capture dynamic vibration signals (used for diagnostics) in the event of a vibration alarm. While the transmitter is capable of peak vibration alarming and non-OK checking, the 4-20 mA signal cannot be used to determine the phase of vibration, and monitor functions such as gap alarms, phase alarms, Timed OK channel defeat, Danger Bypass, and Trip Multiply cannot be used. In addition, PLCs attached to the vibration transmitter can only provide peak-to-peak trending data and are not suitable for plant-wide diagnostic systems such as System 1 or Rule Paks.

[2] The 990 Vibration Transmitter's PROX OUT coaxial connector provides a non-isolated dynamic transducer signal for machinery diagnostics. You can connect this signal directly to battery-powered or isolated test equipment to diagnose machinery problems. However, since the PROX OUT signal is not isolated from the 4 to 20 mA loop signal, an interface is available (and strongly recommended) for signal isolation. The 990/991 Test Adapter conditions the 990 Transmitter's PROX OUT signal for use with ac-powered test equipment. It also inverts and isolates the 990's transducer signal, making it suitable for equipment such as oscilloscopes and analyzers, and preserving industry-standard conventions for signal polarity. We strongly recommend the use of this test adapter for all applications to maintain isolation between test equipment and the loop signal, and ensure that the installation maintains machinery protection integrity.

Specifications

Unless otherwise noted, the following specifications apply at +22°C (+72°F) using a 3300 NSv Probe and Extension Cable, and an AISI 4140 steel target.

These specifications also apply to 990 with modifications 147202-01 (RMOD 4140 3300XL 8MM 5M) and 165335-01 (MOD 4140 3300 XL 8MM 9M).

Electrical

Input	Accepts 1 non-contacting 3300 NSv Proximity Probe and extension cable.
Power	Requires +12 to +35 Vdc input at the transmitter terminal.
4 to 20 mA signal output	4 to 20 mAdc over specified full-scale range in 2-wire configuration.
4 to 20 mA loop accuracy	Within ±1.5% over specified full-scale range. Accuracy is rated from the TEST signal input to the voltage measured across a 250 Ω loop resistance. The ±1.5% error is in addition to the Prox Out Incremental Scale Factor.
Probe gap	Probe must be gapped between 0.5 and 1.75 mm (20 and 55 mils) from target to ensure full scale range.
Maximum loop resistance	1,000 Ω including cable at 35 Vdc.
Current limiting	23 mA typical.
Zero and span	Non-interacting external adjustments.
NOT OK/signal defeat	Signal output will go to less than 3.6 mA within 100 µs after a Not OK condition occurs. Signal output is restored within 2-3 seconds after the Not OK condition is removed.
Power-up inhibit	Signal output stays at less than 3.6 mA (NOT OK) for 2 to 3 seconds after power is applied. The purpose is to signal that the device is not yet ready. Transients may be observed when device goes O.K.
Proximitor sensor output	Compatible with ungrounded, portable test equipment. When using grounded, ac-powered test equipment, use the 122115-01 Test Adapter for signal isolation.
Output impedance	Prox Out has a 10 kΩ output impedance calibrated for a 10 MΩ load.
Prox out linear range	1.4 mm (55 mils). Begins at approximately 0.25 mm (10 mils) from target surface.
Prox Out incremental scale factor	7.87 mV/µm (200 mV/mil) ±6.5% typical including interchangeability errors when measured in increments of 0.25 mm (10 mils) over the linear range using a flat 30 mm (1.2 inch) target. Worst case 7.87 mV/µm ±10%. Typical Noise Level: 50 mV/pp.
Temperature stability	Incremental scale factor remains within ±10% of 7.87 mV/µm (200 mV/mil) from 0°C to +70°C (+32°F to +158°F).
Frequency response	5 Hz to 6,000 Hz +0, 3 dB.
Minimum target size	9.5 mm (0.375 in) diameter.
Leadwire length	Maximum for Proximitor Sensor Output (BNC connector), maximum cable distance is 3 meters (10 feet).
Non-Hazardous, Zone 2 or Div 2 Hazardous area locations	Power Supply: 28 V

Environmental Limits

Transmitter Temperature	
Operating temperature	-35°C to +85°C (-31°F to +185°F)
Storage temperature	-52°C to +100°C (-62°F to +212°F).
Probe Temperature	
Operating temperature	-52°C to +177°C (-62°F to +351°F)
Storage temperature	-52°C to +177°C (-62°F to +351°F)
Relative humidity	100% condensing, non-submerged, with protection of coaxial connectors.

Mechanical

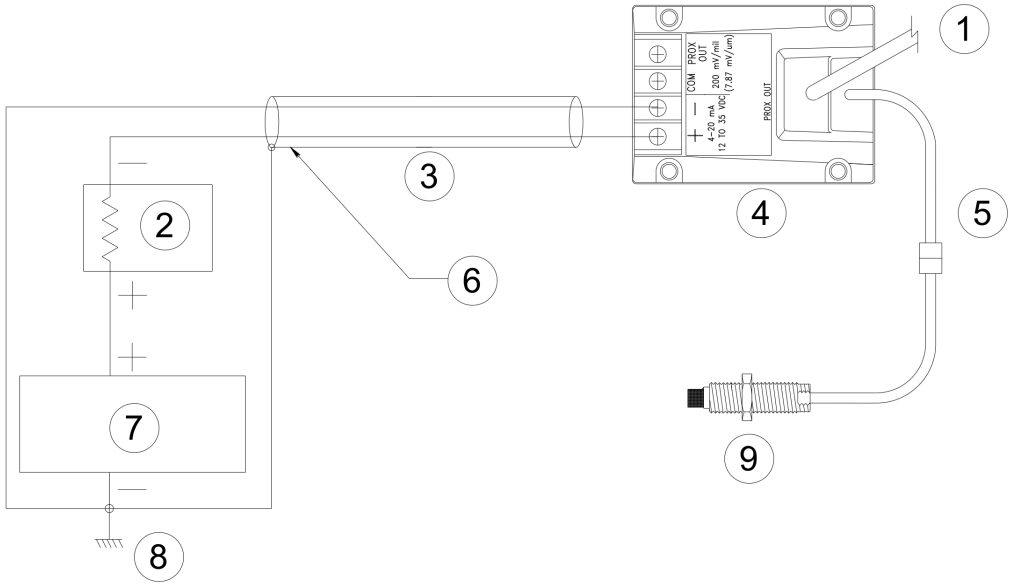
Transducer tip material	Polyphenylene sulfide (PPS).
Transducer case material	AISI 303 or 304 Stainless Steel (SST).
Probe Cable	75Ω coaxial, fluoroethylene propylene (FEP) insulated.
Cable armor (optional)	Flexible AISI 302 SST with optional FEP outer jacket.
Tensile strength	222 N (50 lbf) probe case to probe lead, maximum.
Transmitter weight	0.43 kg (0.9 lbm).
Total system weight	0.82 kg (1.8 lbm) typical.

Thread Engagement Limits

Probe Case Thread	Maximum Length of Thread Engagement
1/4-28	0.375 in
3/8-24	0.563 in
M8x1	12 mm
M10x1	15 mm

Maximum thread engagement lengths are per the industry standard of 1.5 times the nominal thread diameter. A fit class matching that of the external probe thread is assumed for all internal threads. Applications with thread engagement lengths exceeding the values in the table above may exhibit binding during installation. Contact your Bently Nevada representative if you require probe thread engagement lengths exceeding the values above. Bently Nevada does not replace proximity probes under warranty due to excessive thread engagement lengths.

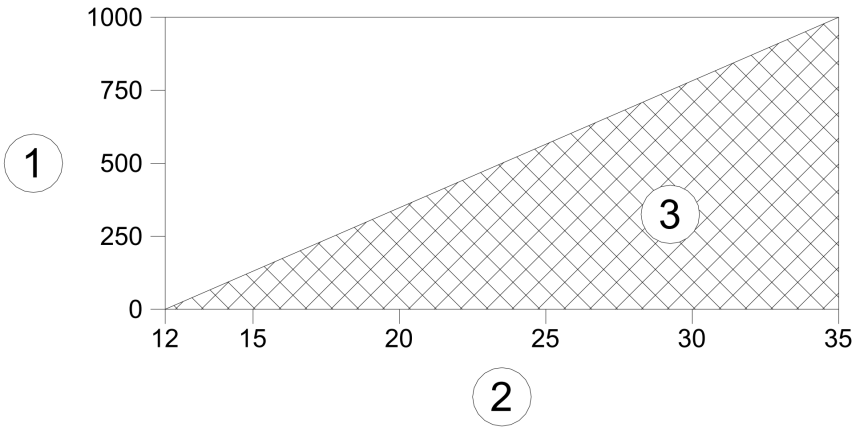
When drilling and tapping a mounting hole **for a 1/4-28 probe**, a **#3 or larger tap drill** is recommended.



1. To test adapter 122115-01
2. Receiver
3. Cable shield
4. Transmitter
5. Extension cable
6. Recommended wiring is shielded, twisted-pair, 1.0 mm (18 AWG) (part number 02173006). Maximum length is 13 km (8 miles).
7. Power supply, V_{PS} = 17 to 35 Vdc
8. Common (ground)
9. Probe

Figure 7: 990 Vibration Transmitter Loop Wiring Connections

The phase of the PROX OUT signal is inverted from the standard for Bently Nevada products. Also, connecting grounded AC-powered equipment to PROX OUT may result in a false alarm. Use test adapter 122115-01 to connect AC equipment to the transmitter. Note that the 122115-01 also inverts the PROX OUT signal.



1. Maximum loop resistance in ohms (R_{LOOP})
2. Power supply voltage (V_{PS})
3. Operating region

Figure 8: 990 Vibration Transmitter Maximum Loop Resistance

RLOOP = 43.5 x (Vps – 12) W maximum. If the maximum loop resistance is exceeded, then the full-scale current does not reach 20 mA.