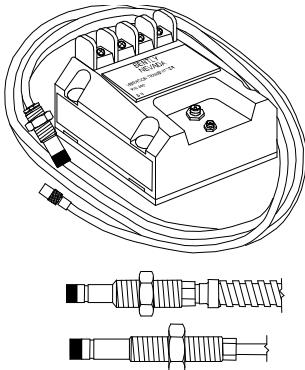


991 Thrust Transmitter

Bently Nevada* Asset Condition Monitoring

Description



The 991 Thrust 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 axial displacement (thrust) signal as the input to their machinery control system. The transmitter is a 2-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 engineering units proportional to the shaft's axial position¹, and provides it as a 4 to 20 mA industry-standard signal for input to the control system where machinery protection alarming and logic occurs².

The 991 transmitter provides the following notable features:

- Integrated Proximitor* Sensor requires no external unit
- Non-isolated "PROX OUT" and "COM" terminals plus a coaxial connector provide a dynamic vibration and gap voltage signal output for diagnostics³.
- Non-interacting zero and span potentiometers under the Transmitter label supports loop adjustment.
- Test Input pin allows quick verification of loop signal output, using a variable DC voltage source as the input.
- A Power-up Inhibit circuit eliminates signal errors due to line voltage transients.
- 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.
- 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. Probe adjustment and range are critical in thrust position measurements. Incorrect probe gap settings may prevent the transmitter from reaching full-scale in either the normal or counter directions (no machinery monitoring). For proper adjustment, follow the instructions in the manual.
2. Thrust transmitters have many limitations when compared to a continuous monitoring system. They are a practical solution in some applications for measuring rotor axial position and are a valuable tool for trending thrust readings. While the transmitter is capable of alarming on thrust position and non-OK checking, monitor functions such as Timed OK channel defeat, Danger Bypass, and Trip Multiply cannot be used. In addition, PLCs attached to the thrust transmitter are not suitable for plant-wide diagnostic systems such as System 1 or Rule Paks.
3. The 991 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.



imagination at work

Specifications and Ordering Information

Part Number 141618-01

Rev. G (03/13)

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**Intrinsically Safe
Hazardous area
locations**

68 metres (225 ft.) maximum
between transmitter and receiving
device for signal output.

**Electrical
Classification**

General Purpose Approval by
Canadian Standards Association
(CSA/NRTL/C) in North America and
by VDE in Europe. The 991 has the CE
mark for Europe.

Hazardous Area Approvals

CSA/NRTL/C

Class I, Div 2
Groups A, B, C, D
T5 @ $T_a = 85^{\circ}\text{C}$, Type 4
Per Drawing 128838

ATEX

 II 1 G

Ex ia IIC T4 Ga
 $T_4 @ -20^{\circ}\text{C} \leq T_a \leq +85^{\circ}\text{C}$

 II 3 G

Ex nA IIC T4 Gc
 $T_4 @ -20^{\circ}\text{C} \leq T_a \leq +85^{\circ}\text{C}$

KTL/KC

 Ex ia IIC T4 Ga
 $T_4 @ -40^{\circ}\text{C} \leq T_a \leq +100^{\circ}\text{C}$

 Ex nA IIC T4 Gc
 $T_4 @ -40^{\circ}\text{C} \leq T_a \leq +100^{\circ}\text{C}$

Maritime Approvals

**American Bureau of Shipping (ABS) Type
Approval**

*Certification
Number*

06-HS177078-3-PDA

Environmental Limits

**Transmitter
Temperature**

-35 °C to +85 °C (-31 °F to +185 °F)

**Operating
Temperature**

-51 °C to +100 °C (-60 °F to +212 °F).

**Storage
Temperature**

-35 °C to +177 °C (-31 °F to +350 °F).

Probe Temperature

**Operating
Temperature**

-51 °C to +177 °C (-60 °F to +350 °F).

**Storage
Temperature**

-51 °C to +177 °C (-60 °F to +350 °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.

Ordering Information

991-AXX-BXX-CXX-DXX

A: Full-scale Option

Specifications and Ordering Information
Part Number 141618-01
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10	1.0 metre (3.25 feet)
50	5.0 metres (16.4 feet)
70	7.0 metres (23 feet)

D: Connector Option

01	Miniature coaxial ClickLoc connector with connector protector, standard cable
02	Miniature coaxial ClickLoc connector, standard cable
11	Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable
12	Miniature coaxial ClickLoc connector attached, FluidLoc cable

E: Agency Approval Option

00	Not required
05	Multiple Approvals (CSA NRTL/C and BASEEFA/CENELEC, which includes CSA Division 2)

3300 NSv Reverse Mount Probe

330906-02-12-CXX-DXX-EXX, 3/8-24 UNF threads

330907-05-30-CXX-DXX-EXX, M10 x 1 UNF threads

Option Descriptions

C: Total Length Option

05	0.5 metre (1.67 feet)
10	1.0 metre (3.25 feet)
50	5.0 metres (16.4 feet)
70	7.0 metres (23 feet)

D: Connector Option

02	Miniature coaxial ClickLoc connector, standard cable
12	Miniature coaxial ClickLoc connector attached, FluidLoc cable

E: Agency Approval Option

00	Not required
05	Multiple Approvals (CSA NRTL/C and BASEEFA/CENELEC, which includes CSA Division 2)

Extension Cable

330930-AXXX-BXX-CXX

A: Cable Length Option

040	4.0 metres (13.1 feet)
045	4.5 metres (14.8 feet)
060	6.0 metres (19.7 feet)
065	6.5 metres (21.3 feet)

B: Armor Option

00	Without stainless steel armor
01	With FEP covered stainless steel armor
02	With stainless steel armor

03	Without stainless steel armor, with connector protector
04	With FEP covered stainless steel armor and connector protector
05	With stainless steel armor and connector protector

C: Agency Approval Option

00	Not required
05	Multiple Approvals (CSA NRTL/C and BASEEFA/CENELEC (which includes CSA Division 2)

Accessories

122115-01

990/991 Test Adapter. Package includes: 990/991 Test Adapter, 9V battery, Universal ac Adapter, Power Cord (North American), User Guide and Soft Carrying Case.

The 990/991 Test Adapter inverts and isolates the PROX OUT signal from the 991 Transmitter so you can connect 991 Transmitters to ac-powered diagnostic equipment. The Adapter modifies the PROX OUT signal so that it matches our Proximity Sensor signals by performing these functions:

- Shifts the phase of the PROX OUT signal by 180° by changing the voltage from positive to negative
- Isolates the transmitter from diagnostic equipment so that equipment with different grounds will not affect the transmitter's 4-20 mA loop signal
- Reduces noise in the surrounding area from affecting the PROX OUT signal

The 990/991 Test Adapter provides the following benefits:

- Small size and weight for portable operation
- Battery or ac adapter power options

- Automatic shutoff circuit that powers down the unit when the battery is low
- 2 channels, so that you can display an orbit for XY probe configurations.

163356

Connector Crimp Tool Kit. Includes one set of 75 Ω ClickLoc inserts and connector installation instructions. Supplied with carrying case.

330951-01

991 Mounting Screws (spares). Contains 4 screws.

284726

DIN rail mounting kit. Installed on the 990 Transmitter to allow mounting on 35 mm DIN rail.

990/991 Test Adapter Accessories

123266-01

Coaxial Cable Kit. Includes 4 cables with length of 1.5 metres (5 feet) each.

02211505

Single coaxial cable with length of 1.5 metres (5 feet).

990/991 Test Adapter Spare Parts

01810700

Battery (9 volt alkaline).

02270056

Ac adapter. Has universal ac input to 9 volts dc output. Input is 108 to 132 Vac with 120 Vac nominal, or 207 to 253 Vac with 240 Vac nominal.

02198937

Power cord (for North American ac power outlet).

123133-01

User Guide.

Probe and Transmitter Accessories

02173006

Bulk Cable (specify length in feet). 1.0 mm² (18 AWG), 2-conductor, twisted, shielded cable used for the 4 to 20 mA loop. Also used for the PROX OUT signal on the 991 Transmitter's terminal strip.

123655-01

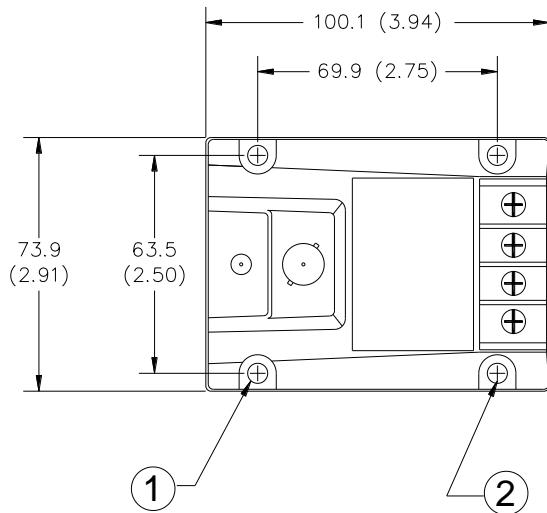
Manual.

330153-05

Cable Connector Kit. Package Includes 1 set of 75 Ω miniature male and female connectors, shrink tubing and 3300 Isolator Seal for protection of coaxial connectors.

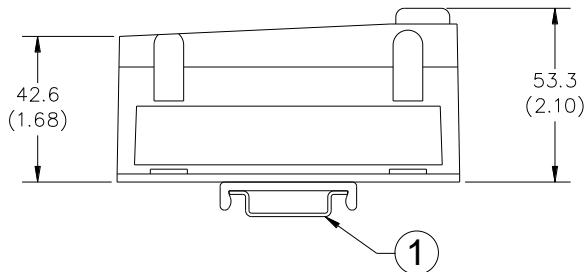
Dimensional drawings

Note: All dimensions shown in millimetres (inches) unless noted otherwise.



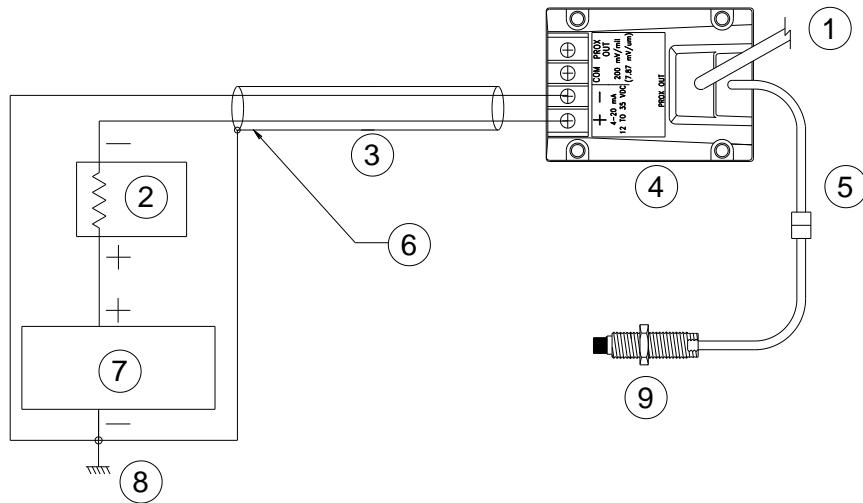
1. Mounting holes, 5.8 mm (0.23 in) diameter, 4 places
2. Bulkhead mount holes, 4 each. 6-32 x 1.326 screws provided when mounting option specified

Figure 1: 991 Thrust Transmitter Dimensions (Top View)



1. 35mm DIN rail DIN mount clips (when DIN rail mounting is specified)

Figure 2: 991 Thrust Transmitter Dimensions (Side View)

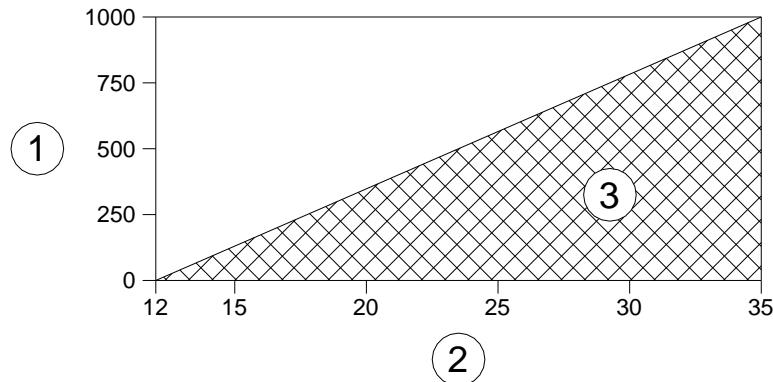


1. To test adapter 122115-01
2. Receiver
3. Cable shield
4. Transmitter
5. Extension cable
6. Recommended wiring is shielded, twisted-pair, 1.0 mm (18 AWG) (part number 02173006). Maximum length is 13 km (8 miles).
7. Power supply, $V_{PS} = 17$ to 35 Vdc
8. Common (ground)
9. Probe

Figure 7: 991 Thrust Transmitter loop wiring connections

Application Advisory

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: 991 Thrust Transmitter maximum loop resistance

Note:

$R_{LOOP} = 43.5 \times (V_{PS} - 12) \Omega$ maximum. If the maximum loop resistance is exceeded, then the full scale current will not reach 20 mA.

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