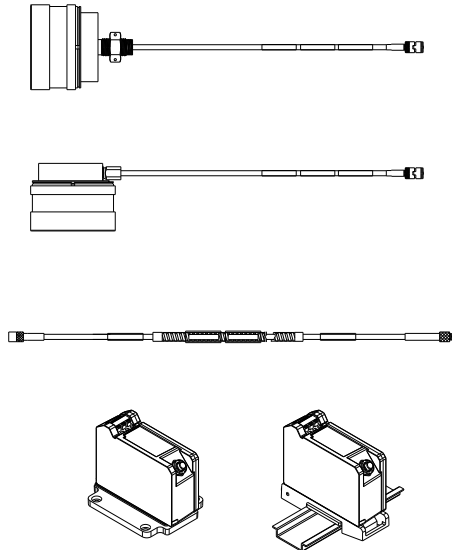


3300 XL 50mm Proximity Transducer System

Product Datasheet

Bently Nevada* Asset Condition Monitoring



Description

The 3300 XL 50 mm Transducer System consists of a separate 50 mm probe, an extension cable, and a 3300 XL 50 mm Proximator* Sensor. The large diameter coil gives this system a maximum linear range of 27.9 mm (1100 mils), the longest linear range of our eddy current transducer line. This linear range makes the 3300 XL 50mm Transducer System ideal for measuring the differential expansion (DE) or rotor expansion (RX) of large steam turbine generators that results from the difference in growth rates between the turbine rotor and the machine stator (casing).

Measuring Differential Expansion

The Differential Expansion measurement is made by using two proximity transducers that observe a collar or ramp some distance from the thrust bearing. Typical transducer mounting arrangements that require the 3300 XL 50 mm Transducer's long linear range include:

- Two transducers observing the same side of a collar.
- Two complementary input transducers observing opposite sides of a collar, effectively doubling the measurable DE range.

The criteria for selecting a mounting method are the size of the available target, the expected amount of rotor axial movement, and the type of DE target that exists in the machine. If the collar height is sufficient and the required total measurement range is less than 27.9 mm (1.1 inches), the preferred configuration for redundant measurements is to use two transducers observing the same side of a collar. When 28 mm to 56 mm (1.1 to 2.2 inches) of total range are required, install the transducers in a complementary fashion on opposite sides of the differential expansion collar or other target material.

System Compatibility

The 3300 XL 50 mm probe comes in three case & thread configurations to physically replace all standard 7200 50 mm systems (including side and rear exit probes). The standard 7200 style mounting brackets are still available as accessories. In addition, a new bracket to adapt the probe to the 50mm DE Integral transducer sliding mount base is also available. The Proximator Sensor has a 0.394 V/mm (10 mV/mil) output that is identical to that of the 7200 and 50 mm DE Integral systems, which allows customers to upgrade without requiring any changes in the monitor configuration. When upgrading from previous systems, every transducer system component (probe, extension cable, and



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Rev: F

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Proximitior Sensor) must be replaced with 3300 XL 50 mm components.

Proximity Probe and Extension Cable

The 3300 XL 50 mm probe is designed to survive the harshest steam turbine DE environments. It can continually operate and maintain its accuracy in high temperatures up to 200 °C (392 °F), and can withstand intermittent high temperatures up to 250 °C (482 °F). The 50 mm probe has both a front and rear seal which, combined with the High Temperature FluidLoc[®] cable (standard on all 50 mm probes), prevent moisture from entering the probe tip. Special high-temperature ClickLoc[®] connectors are also standard on the probe and extension cable. Each probe and cable comes with connector protectors and a disposable connector protector installation tool to ensure that the connectors remain free of contamination. The ClickLoc connector on the probe lead features a removable collar that facilitates routing the cable through tight clearances.

The 3300 XL 50 mm probe is available in straight exit case styles with ½-20 English threads or M14x1.5 metric threads, including a locknut with predrilled safety wire holes. The side exit probe has two ¼-20 mounting holes in the rear of the probe case. For both straight exit and side exit probes the overall case diameter is 1.99 inches.

Proximitior Sensor

The 3300 XL 50 mm Proximitior Sensor¹ has the same advanced features as all 3300 XL Proximitior Sensors. Its thin design allows it to be mounted in either a high-density DIN-rail installation or a more traditional panel mount configuration. Improved RFI/EMI immunity allows the 3300 XL Proximitior Sensor to achieve European CE mark approvals without any special mounting considerations. This RFI immunity prevents the transducer system from being adversely affected by nearby high frequency radio signals. SpringLoc terminal strips on the Proximitior Sensor require no special installation tools and facilitate faster, highly robust field wiring connections.

Notes:

Proximitior Sensors are supplied by default from the factory calibrated to AISI 4140 steel. Calibration to other target materials is available upon request.

Mounting Accessories

The correct operation of the transducer system must be initially verified during installation and periodically

thereafter. This is done by physically moving the transducer to simulate the motion of the shaft collar. This requires a mounting bracket that allows the transducer system to slide relative to the shaft rotor and collar.

An optional Sliding Bracket can be ordered for the 3300 XL 50 mm Transducer for both single transducer and complementary input applications. This mounting bracket allows you to verify the transducer system and gap the probes by sliding the transducer system through its linear range. The base plate of the sliding bracket is installed on the inner surface of the turbine case near the differential expansion collar. Probes are installed in the probe clamp that attaches to the sliding carriage. The sliding carriage slides onto and is secured to the base plate with bolts and safety wire. To verify and install the transducer, loosen the bolts securing the sliding carriage to the base plate and move the sliding carriage and probes. A verification kit with spindle micrometer can be temporarily secured to the base plate to provide a reference for axial verification measurements. The spindle micrometer measures the movement of the transducer system relative to the collar during these verification tests.

Specifications

Unless otherwise noted, the following specifications are for a 3300 XL 50 mm Proximitior Sensor, extension cable and probe between 0°C and +45°C (+32°F to +113°F), with a -24 Vdc power supply, a 10 kΩ load, a Bently Nevada supplied AISI 4140 steel target that is 102 mm (4.0 in) diameter or larger. The system accuracy and interchangeability specifications do not apply when using a transducer system calibrated to any target other than a Bently Nevada AISI 4140 steel target.

Electrical

**Proximitior
Sensor Input**

Accepts one non-contacting 3300 XL 50 mm Proximity Probe and Extension Cable.

Power

Requires -17.5 Vdc to -26 Vdc without barriers at 12 mA maximum consumption, -23 Vdc to -26 Vdc with barriers.

Operation at a more positive voltage than -23.5 Vdc can result in reduced linear range.

Output resistance

50 Ω

Extension cable capacitance:

69.9 pF/m (21.3 pF/ft) typical

Field wiring:

0.2 to 1.5 mm² (16 to 24 AWG)
Recommend using three-conductor shielded triad cable.

Linear Range:

27.9 mm (1100 mils). Linear range begins at approximately 1.3 mm (50 mils) from target and is from 1.3 to 29.2 mm (50 to 1150 mils) (approximately -1.5 to -12.5 Vdc).

Average Scale Factor (ASF)

394 mV/mm (10 mV/mil) nominal

Deviation from best fit straight line (DSL)

Less than ± 0.74 mm (± 29 mils)

System performance over extended temperatures:

Over a probe temperature range of -35°C to +120°C (-31°F to +248°F) with the Proximitior Sensor and extension cable between 0°C to +45°C (+32°F to +113°F), the DSL remains within ± 2.03 mm (± 80 mils).

Over a Proximitior Sensor and extension cable temperature range of -35°C to +65°C (-31°F to +149°F) with the probe between 0°C to +45°C (+32°F to +113°F), the DSL remains within ± 2.03 mm (± 80 mils).

Recommended Minimum Target Size:

102 mm (4.0 in) diameter (flat target)

Compliance and Certifications

Note: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

EMC

European Community Directives:

EMC Directive 2014/30/EU

Standards:

EN61000-6-2

EN61000-6-4

RoHS

European Community Directives:

RoHS Directive 2011/65/EU

Maritime

ABS 2009 Steel Vessels Rules
1-1-4/7.7, 4-8-3/1.11.1, 4-9-7/13

Hazardous Area Approvals

For the detailed listing of country and product specific approvals, refer to the **Approvals Quick Reference Guide**, document 108M1756, at www.GEmeasurement.com.

CSA/NRTL/C

3300 XL Proximity Sensor

ia:

Class I, Zone 0: AEx/Ex ia IIC T4/T5 Ga;
Class I, Groups A, B, C, and D,
Class II, Groups E, F and G,
Class III;

When installed with intrinsically safe
zener barriers per drawing 141092 or
when installed with galvanic isolators.

nA, ec:

Class I, Zone 2: AEx/Ex nA IIC T4/T5 Gc;
Class I, Division 2, Groups A, B, C, and D;

Class I, Zone 2: AEx/Ex ec IIC T4/T5 Gc;
Class I, Division 2, Groups A, B, C, and D;

When installed without barriers per
drawing 140979.

T5 @ Ta= -55 °C to +85 °C.
T4 @ Ta= -55 °C to +100 °C.

3300 XL Probe

ia:

Class I, Zone 0: AEx/Ex ia IIC T5...T1 Ga;
Class I, Groups A, B, C, and D,
Class II, Groups E, F and G,
Class III;

When installed with intrinsically safe
zener barriers per drawing 141092 or
when installed with galvanic isolators.
(see Table 1: Temperature Schedule)

nA, ec:

Class I, Zone 2: AEx/Ex nA IIC T5...T1 Gc;
Class I, Division 2, Groups A, B, C, and D;

Class I, Zone 2: AEx/Ex ec IIC T5...T1 Gc;
Class I, Division 2, Groups A, B, C, and D;

When installed without barriers per
drawing 140979. (see Table 1:
Temperature Schedule)

ATEX/IECEX

3300 XL Proximity Sensor

ia:

 II 1 G	
Ex ia IIC T4/T5 Ga	
Ui= -28V	Uo= -28V
Ii= 140mA	Io= 140mA
Pi= 0.91W	Po= 0.742W
Ci= 47nF	Co= 1.5nF
Li= 1460µH	Lo= 610µH

nA,ec:

 II 3 G	
Ex nA IIC T4/T5 Gc	
Ex ec IIC T4/T5 Gc	
Ui= -28V	Ii= 140 mA

T5 @ Ta= -55 °C to +85 °C
T4 @ Ta= -55 °C to +100 °C

3300 XL Probe

Note: Probe entity parameters are met
when used with BN extension cables and
connected to BN Prox.

ia:

 II 1 G	
Ex ia IIC T5...T1 Ga, (see Table 1: Temperature Schedule)	
Ui = -28V	Ci = 1.5 nF
Ii = 140 mA	Li = 610 µH
Pi = 0.91 W	

nA, ec:

Ex II 3 G
Ex nA IIC T5...T1 Gc,
Ex ec IIC T5...T1 Gc,

(see Table 1: Temperature Schedule).
Ui = -28V Ii = 140 mA

Table 1: Temperature Schedule

Temperature Classification	Ambient Temperature (Probe Only)
T1	-55°C to +232°C
T2	-55°C to +177°C
T3	-55°C to +120°C
T4	-55°C to +80°C
T5	-55°C to +40°C

Hazardous Area Conditions of Safe Use:

CSA/NRTL/C:

ia:

Install per Bently Nevada drawing 141092.

nA, ec:

Install per Bently Nevada drawing 140979.

ATEX/IECEx:

ia:

Install per Bently Nevada drawing 141092.

nA, ec :

The Prox must be installed so IBas to provide the terminals with a degree of protection of at least IP54.

Mechanical

Probe Tip Material:

Polyphenylene Sulfide (PPS).

Probe Case Material:

AISI 304 stainless steel (SST).

Probe Cable Specifications:

75 Ω triaxial,
perfluoroalkoxyethylene (PFA)
insulated FluidLoc probe cable in
the following total probe lengths:
1, 5 or 9 metres.

Extension Cable Material:

75 Ω triaxial,
perfluoroalkoxyethylene (PFA)
insulated FluidLoc cable.

Proximator Sensor Material:

A380 aluminum

Sliding Bracket Material:

Anodized aluminum and stainless
steel

System Length:

5 or 9 metres including extension
cable

Probe and Extension Cable Armor (optional):

Flexible SST with PFA outer jacket.

Tensile Strength (maximum rated):

330 N (75 pounds) probe case to
probe lead. 270 N (60 pounds) at
probe lead to extension cable
connectors.

Connector material:

Gold-plated brass and gold-plated
beryllium copper

Torque Specifications

Description	Maximum Rated
All threaded probe cases	45 N•m (400 in•lbf)
M5x.8 sliding bracket cap screws	9.6 N•m (85 in•lbf)

Connector-to-connector torque

Recommended torque:

Finger tight

Maximum torque:

0.565 N•m (5 in•lb)

Minimum Bend Radius (with or without sst armor):

25.4 mm (1.0 in)

Environmental Limits

Probe Temperature Range

Operating
and Storage
Temperature:

-35°C to +200°C (-31°F to +392°F)

Short-term
Operating
and Storage
Temperature:

+250°C (+482°F) for less than 24 hours.

Extension Cable Temperature Range

Operating
and Storage
Temperature:

-51°C to +200°C (-31°F to +392°F)

Proximito Sensor Temperature Range

Operating
Temperature:

-51°C to +100°C (-60°F to +212°F)

Storage
Temperature:

-51°C to +105°C (-60°F to +221°F)

Sliding Bracket Temperature Range

Operating
and Storage
Temperature:

-35°C to +200°C (-31°F to +392°F)

Relative
Humidity:

Less than a 3% change in Average Scale Factor (ASF) when tested in accordance with IEC standard 68-2-66.

Probe Pressure:

3300 XL probes are designed to seal differential pressure between the probe tip and case. The probe is sealed with Viton® O-rings. Probes are not pressure tested prior to shipment. Contact our custom design department if you require a test of the pressure seal for your application

Note: It is the responsibility of the customer or user to ensure that all liquids and gases are contained and safely controlled should leakage occur from a proximity probe. In addition, solutions with high or low pH values may erode the tip assembly of the probe causing media leakage into surrounding areas. Bently Nevada will not be held responsible for any damages resulting from leaking 3300 XL proximity probes. In addition, 3300 XL proximity probes will not be replaced under the service plan due to probe leakage.

Patents:

5,685,884
6,293,005
6,643,909
7,239,133

Components or procedures described in these patents apply to this product.

Ordering Information

For the detailed listing of country and product specific approvals, refer to the **Approvals Quick Reference Guide**, document 108M1756, at www.GEmeasurement.com

3300 XL 50 mm Proximity Probe: 330876-AXX-BXX-CXX-DXX

A: Probe Case Type Option

- 01** ½-20 Thread - Straight Exit
- 02** M14x1.5 Thread - Straight Exit
- 03** Smooth 1.99 in dia - Side Exit

B: Total Length Option

- 10** 1.0 metre (3.3 feet)
- 50** 5.0 metres (16.4 feet)
- 90** 9.0 metres (29.5 feet)

Note: Five meter probes are designed for use with the five meter Proximity Sensor only.

C: Armor Option

- 00** High Temperature FluidLoc Cable
- 01** High Temperature FluidLoc Cable with Armor

D: Agency Approval Option

- 00** No Approvals
- 05** Multiple Approvals

3300 XL 50 mm Proximity Sensor 330878-AXX-BXX

A: Total Length and Mounting Option

- 50** 5.0 metres (16.4 feet) system length, panel mount
- 51** 5.0 metres (16.4 feet) system length, DIN mount
- 90** 9.0 metres (29.5 feet) system length, panel mount
- 91** 9.0 metres (29.5 feet) system length, DIN mount

B: Agency Approval Option

- 00** No Approvals
- 05** Multiple Approvals

3300 XL 50 mm Extension Cable 330877-AXXX-BXX-CXX

Note: Make sure that the extension cable length and the probe length, when added together, equal the Proximity Sensor total length.

A: Cable Length Option

- 040** 4.0 metres (13.1 feet)
- 080** 8.0 metres (26.2 feet)

B: Armor and Cable Option

- 36** FluidLoc-ext cable
- 37** FluidLoc ext. cable w/ armor

C: Agency Approval Option

- 00** No Approvals
- 05** Multiple Approvals

Mounting Brackets

Each Sliding Mounting Bracket comes with

- One sliding plate
- One base plate
- Sliding plate securing bolts with safety wire holes
- Lock washers

The material used for the mounting brackets is T6061-T6 aluminum. Base plate securing bolts are not provided; recommended bolt size is 3/8in or M8 socket head bolts.

3300 XL 50 mm Sliding Probe Bracket and Clamp:

330879-AXX-BXX

A: Probe Clamp Style

- 01** Left Exit
- 02** Right Exit
- 03** Two clamps (used for CIDE applications)¹

B: DE Mounting Bracket

- 00** No Mounting Bracket; Clamp Only
- 01** Single DE Mounting Bracket²
- 02** Short CIDE Mounting Bracket³
- 03** Long CIDE Mounting Bracket³

This bracket is recommended for most installations. While any probe may be used, the smooth side exit probe is most often used with this bracket.

1. When ordering two clamps, one right exit and one left exit clamp will be provided so that the cables exit from the same side of the CIDE bracket.
2. The B01 probe mounting bracket option is only available with the A01 or A02 probe clamp style options.
3. The B02 and B03 probe mounting bracket options are only available with the A03 probe clamp style options.
4. When replacing 50mm DE 130713, part number 330879-AA-00 should be ordered. Ordering with

BB=00 will prevent unnecessary parts from being ordered with the clamp.

Sliding Mounting Brackets without clamps

131071-01

Single Transducer
Mounting Bracket

131030-01

Short Complementary
Input Differential
Expansion (CIDE) Mounting
Bracket

131031-01

Long Complementary Input
Differential Expansion
(CIDE) Mounting Bracket

Non-sliding Mounting Brackets

167285

Kit, 50 mm Clamp Mount
(used with smooth-case
side exit or threaded
straight exit probes).

167286

Kit, 50 mm Bolt Mount
(used only with smooth-
case side exit probes).

Verification Kits

Each verification kit comes with:

- a verification kit bracket
- a spindle micrometer with either 0 to 2 in or 0 to 50 mm range
- two set screws
- a bracket securing bolt

The material used for the verification kit bracket is T6061-T6 aluminum.

131036-01

Verification Kit, Spindle
Micrometer with English
Units

131036-02

Verification Kit, Spindle
Micrometer with Metric
Units

Accessories

173959

Manual

148722-01

3300 XL Test Plug. The 3300 XL Test Plug has three self-contained test pins attached to three color-coded wires 1 metre in length, each terminated in a banana plug. The three-pin adapter plugs into the test pin holes on 3300 XL-style Proximitor Sensors. It is used to check the performance of the Proximitor Sensor from the test pin holes in the terminal strip without requiring the removal of the field wiring.

Extended Range Micrometer Kit

The extended range micrometer kit contains a precision micrometer and a 100 mm (4 inch) AISI 4140 target and is intended for acceptance testing of Bently Nevada extended range transducers. Bracket options are available to hold 8mm – 50mm probes as well as the 50 mm Integral DE transducer.

330187-AXX-BXX

A: Probe options

- 01** 8 mm to 50 mm probe threaded or smooth cases
- 03** 8 mm to 50 mm probe threaded or smooth cases and an adapter for 50 mm Integral DE probes

B: Micrometer Option

- 01** Standard English 0-2 inch micrometer
- 02** Standard metric 0-50 mm micrometer

02120015

Bulk field wire. 1.0 mm² (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.

02173009

Bulk field wire. 1.0 mm² (18 AWG), 3 conductor, twisted, shielded cable. Specify length in feet.

138492-01

Replacement panel-mount
mounting pad

138493-01

Replacement DIN-mount
mounting pad

04310310

**3300 XL Proximity Sensor
Panel-mount Screws.** Package
includes four 6-32 UNC thread
forming mounting screws
(Supplied standard with 3300 XL
Proximity Housings [3300 XL
option]).

03200006

Silicone self-fusing tape. A 9.1
metre (10 yard) roll of silicone
tape to protect connectors. It is
easy to install and provides
excellent electrical isolation and
protection from the environment.
It is not recommended for use
inside the casing of the machine.

40180-02

Connector Protectors. Package
contains 10 pairs of connector
protectors.

03839410

Male Connector Protector.
Placed on the extension cable to
connect to the female connector
protector on the probe and
provide environmental protection
of connectors.

03839420

Female Connector Protector.

Placed on the probe lead to
connect to the male connector
protector on the extension cable
and provide environmental
protection of connectors. Also
placed on the extension cable to
slide over the Proximity Sensor
connection and protect it from
the environment.

330153-10

3300 XL 50 mm Connector Kit.

Used on 3300 XL 50 mm probes
and extension cables. Contains
one male (removable nut) and
female ClickLoc connectors, color-
coded sleeves and two pieces slit
PFA tubing.

163356

Connector Crimp Tool Kit.

Includes one set of multi-
connector inserts and connector
installation instructions. Supplied
with carrying case.

173873

High Temperature Cable Zip-

Ties. PEEK® cable tie is rated for
use up to 200 C continuous
temperature. Available in bags of
50 zip ties.

174804-01

Side Exit Probe Adapter Kit.

Used to adapt side exit probes for
the 330187 Extended Range
Verification Kit.