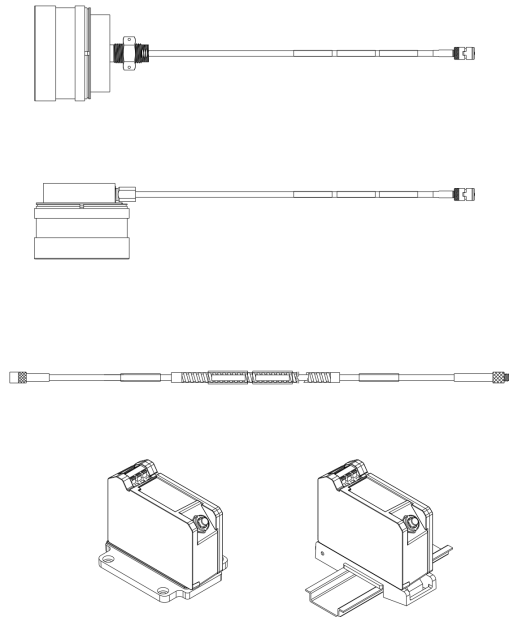


# 3300 XL 50 mm Proximity Transducer System

## Datasheet

Cordant™

174014 Rev. L



## Description

The 3300 XL 50 mm Transducer System consists of a separate 50 mm probe, an extension cable, and a 3300 XL 50 mm Proximitor 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 50 mm 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 50 mm DE Integral transducer sliding mount base is also available. The Proximitor 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 Proximitor 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.

## Proximitor Sensor

The 3300 XL 50 mm Proximitor Sensor has the same advanced features as all 3300 XL Proximitor 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 Proximitor 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 Proximitor Sensor require no special installation tools and facilitate faster, highly robust field wiring connections.



Proximitor 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 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 Proximitor Sensor, extension cable and probe between 0°C and +45°C (+32°F to +113°F) at a maximum altitude of 2000 meters, 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

|                             |  |
|-----------------------------|--|
| Proximitor 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 mm <sup>2</sup> (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 Proximitor Sensor and extension cable between 0°C to +45°C (+32°F to +113°F), the DSL remains within ±2.03 mm (±80 mils).<br><br>Over a Proximitor 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)  |

| Probe DC Resistance       | Probe Length                        | Resistance from Center to Coaxial Conductor |  |
|---------------------------|-------------------------------------|---|--|
|                           | 1.0 m                               | 6.4 ± 0.5 Ω                                 |  |
|                           | 5.0 m                               | 7.6 ± 0.8 Ω                                 |  |
|                           | 9.0 m                               | 8.9 ± 1.1 Ω                                 |  |
| Cable DC Resistance       | Cable Length                        | Resistance from Center to Coaxial Conductor | Resistance from Coaxial to Coaxial Conductor |
|                           | 4.0 m                               | 1.0 ± 0.25 Ω                                | 0.3 ± 0.1 Ω                                  |
|                           | 8.0 m                               | 2.0 ± 0.5 Ω                                 | 0.6 ± 0.2 Ω                                  |
| Electrical Classification | Complies with the European CE mark. |   |  |

## 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 meters. |
| Extension Cable Material   | 75 Ω triaxial, perfluoroalkoxyethylene (PFA) insulated FluidLoccable.   |
| Proximator Sensor Material | A380 aluminum   |
| Sliding Bracket Material   | Anodized aluminum and stainless steel   |
| System Length              | 5 or 9 meters 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)    |

## Thread Engagement Limits

| Probe Case Thread | Maximum Length of Thread Engagement |
|-------------------|-------------------------------------|
| <b>1/2-20</b>     | 0.750 in                            |
| <b>M14x1.5</b>    | 21 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.

Relative Humidity

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

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.



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 does not be held responsible for any damages resulting from leaking 3300 XL proximity probes. In addition, 3300 XL proximity probes does not be replaced under the service plan due to probe leakage.

## 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) |
|-----------------------------------|------------------------------------|

### Proximitior 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) |
|-----------------------------------|-----------------------------------|

## Compliance and Certifications

### FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

### EMC

European Community Directive:

EMC Directive 2014/30/EU

Standards

EN 61000-6-2; Immunity for Industrial Environments

EN 61000-6-4; Emissions for Industrial Environments

### RoHS

European Community Directive:

RoHS Directive 2011/65/EU

### China RoHS

Cables associated with the product(s) mentioned in this datasheet have an EFUP designation of 15 years, in accordance with SJ/T 11364-2024.



### Maritime

2019 Rules for Conditions of Classification,  
Part 1, 1-1-1/7.7, 1-1-A3, 1-1-A4

2019 Rules for Conditions of Classification,  
Part 1, Offshore Units and Structures  
1-1-4/9.7, 1-1-A2, 1-1-A3

## 3300 XL 50 mm Proximito Sensor

### 330878-AA-BB

#### A: Total Length and Mounting Option

|            |   |
|------------|---|
| <b>5 0</b> | 5.0 meters (16.4 feet) system length, panel mount |
| <b>5 1</b> | 5.0 meters (16.4 feet) system length, DIN mount   |
| <b>9 0</b> | 9.0 meters (29.5 feet) system length, panel mount |
| <b>9 1</b> | 9.0 meters (29.5 feet) system length, DIN mount   |

#### B: Agency Approval Option

|            |                    |
|------------|--------------------|
| <b>0 0</b> | No Approvals       |
| <b>0 5</b> | Multiple Approvals |

## 3300 XL 50 mm Extension Cable

### 330877-AAA-BB-CC



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

#### A: Cable Length Option

|              |                        |
|--------------|------------------------|
| <b>0 4 0</b> | 4.0 meters (13.1 feet) |
| <b>0 8 0</b> | 8.0 meters (26.2 feet) |

#### B: Armor and Cable Option

|            |                              |
|------------|------------------------------|
| <b>3 6</b> | FluidLoc cable               |
| <b>3 7</b> | FluidLoc ext. cable w/ armor |

#### C: Agency Approval Option

|            |                    |
|------------|--------------------|
| <b>0 0</b> | No Approvals       |
| <b>0 5</b> | 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.