Gas and steam turbines can produce temperatures hot enough to damage or destroy conventional proximity probes. The 3300 XL High Temperature Proximity System (HTPS) is designed to withstand the extreme temperatures found inside gas turbines, steam turbines and other types of rotating machinery. The HTPS measures vibration, thrust position, differential expansion and other parameters inside the hot areas of these machines. High temperature installations include:

- Near a labyrinth seal in steam turbines.
- Differential expansion in steam turbines.
- When probe cables are routed through struts that support the bearing housing of a gas turbine.
- When probe cables are routed out through the exhaust path of a gas turbine.
- Monitoring a troublesome bearing in a high temperature area.
- Mode shape analysis at the mid-span location on steam and gas turbines for online machinery diagnostics.
- Interstage radial and axial seal clearance measurements at the mid-span location of multi-stage steam turbines to minimize seal rubs.
- Most hot bearing locations that can destroy conventional proximity probes.
High Temperature Transducer with a Rugged Design

The 3300 XL High Temperature Proximity System can be used for proximity measurements at hot locations with excellent results. Customer benefits include:

- Proximity probe with integral hardline cable rated for +350°C (+662°F) continuous service in extreme conditions.
- 4 mm (160 mils) of linear range for most measurements in the hot sections of the machine.
- Hermetically-sealed ceramic probe tip seals out moisture and contaminants for added durability.
- Ceramic tip and stainless steel construction resists heat, moisture and corrosion.
- Threaded and smooth case styles for various types of probe mounting.
- Hardline cable available in lengths of 1, 2 and 5 metres for routing cable through hot sections of the machine.
- 3.94 V/mm (100 mV/mil) signal output compatible with virtually all new and existing Bently Nevada monitors and diagnostic equipment.

Mode Shape Analysis

The 3300 XL High Temperature Proximity System is used to protect and manage critical machines in your facility for increased safety and efficiency. It is also used for mode shape analysis when measurements are taken at the turbine mid-span location. Mode shape analysis is important for research and development of a new steam or gas turbine design or when troubleshooting an existing design. Mode identification probes provide lateral mode shape information which is extremely valuable for balancing rotating machinery and identifying faults such as shaft cracks, bearing failures, rotor-to-stator rubs and other machine problems.

For test and measurement applications, the HTPS will meet or exceed most requirements for making proximity measurements in high temperature environments. It is a viable option for your most challenging test problems.

The Bently Nevada 3300 XL High Temperature Proximity System is an advanced transducer designed for making proximity measurements at hot bearing locations in your machine. This transducer delivers dependable service in severe environments and is an ideal solution when using proximity probes at elevated temperatures.

Because of its thick hardline cable, the HTPS probe can be difficult to gap using a traditional threaded probe and bracket. Therefore, we recommend using smooth case probes, particularly if ordering a longer (2-metre or 5-metre) probe. The smooth case probes come with a clamp style mounting bracket to allow the probe to be gapped without turning.
Specifications

Unless otherwise noted, the following specifications are for a 3300 XL 16 mm HTPS Proximitor* Sensor, matched extension cable and probe at 22 +4.4°C (72 +8°F), with a -24 Vdc power supply, a 10 kΩ load, a Bently Nevada supplied AISI 4140 steel target that is 31 mm (1.2 in) diameter or larger, and a probe gap of 2.5 mm (100 mils). 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

<table>
<thead>
<tr>
<th>Proximitor Sensor Input</th>
<th>Accepts one noncontacting 3300 XL HTPS 16 mm Proximity Probe with matched Extension Cable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Requires -19.6 Vdc to -26 Vdc at 9 mA maximum consumption. Operation at a more positive voltage than -22.0 Vdc can result in reduced linear range.</td>
</tr>
<tr>
<td>Supply Sensitivity</td>
<td>Less than 13 mV change in output voltage per volt change in input voltage.</td>
</tr>
<tr>
<td>Output Resistance</td>
<td>50 Ω</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probe dc Resistance</th>
<th>Resistance from the Center Conductor to the Outer Conductor (RPROBE) (ohms)</th>
<th>Resistance from Coaxial Conductor to Coaxial Conductor (RJACKET) (ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe Length (m)</td>
<td>Probe Length (m)</td>
<td>Resistance from the Center Conductor to the Outer Conductor (RPROBE) (ohms)</td>
</tr>
<tr>
<td>1.0</td>
<td>5.06</td>
<td>0.88</td>
</tr>
<tr>
<td>2.0</td>
<td>5.82</td>
<td>1.62</td>
</tr>
<tr>
<td>5.0</td>
<td>8.11</td>
<td>1.84</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extension Cable dc Resistance</th>
<th>Length of Extension Cable (m)</th>
<th>Resistance from CenterConductor to Center Conductor (R CORE) (ohms)</th>
<th>Resistance from Coaxial Conductor to Coaxial Conductor (RJACKET) (ohms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension Cable dc Resistance</td>
<td>Length of Extension Cable (m)</td>
<td>Resistance from CenterConductor to Center Conductor (R CORE) (ohms)</td>
<td>Resistance from Coaxial Conductor to Coaxial Conductor (RJACKET) (ohms)</td>
</tr>
<tr>
<td>4.0</td>
<td>0.88</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>7.0</td>
<td>1.62</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>1.84</td>
<td>0.55</td>
<td></td>
</tr>
</tbody>
</table>

Measurements on shaft diameters smaller than 76 mm (3.0 in) usually require close spacing of radial vibration or axial position transducers with the potential for their electromagnetic emitted fields to interact with one another (cross talk), resulting in erroneous readings. Care should be taken to maintain minimum separation of transducer tips, generally at least 64 mm (2.5 in) for dual axial position measurements or 54 mm (2.1 in) for radial vibration measurements to prevent cross talk. Radial vibration or position measurements on shaft diameters smaller than 152 mm (6.0 in) will generally result in a change in scale factor due to the curvature of the shaft surface. Consult Performance Specification 125M6031 for additional information.
Effects of 60 Hz Magnetic Fields Up to 300 Gauss

<table>
<thead>
<tr>
<th>Gap</th>
<th>Proximitor Sensor</th>
<th>Probe</th>
<th>Ext. Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mm (20 mil)</td>
<td>0.0020</td>
<td>0.0030</td>
<td>0.0011</td>
</tr>
<tr>
<td>2.5 mm (100 mil)</td>
<td>0.0042</td>
<td>0.0034</td>
<td>0.0046</td>
</tr>
<tr>
<td>4.5 mm (180 mil)</td>
<td>0.0096</td>
<td>0.0070</td>
<td>0.0157</td>
</tr>
</tbody>
</table>

Electrical Classification
Complies with the European CE mark.

**Mechanical**

<table>
<thead>
<tr>
<th>Probe Tip Material</th>
<th>Ceramic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe Case Material</td>
<td>AISI 316L stainless steel (SST)</td>
</tr>
<tr>
<td>Probe Cable</td>
<td>1, 2 or 5 metre length of AISI 304L SST hardline cable</td>
</tr>
<tr>
<td>Extension Cable Material</td>
<td>75 Q triaxial, fluoroethylene propylene (FEP) insulated</td>
</tr>
<tr>
<td>Proximitor Sensor Material</td>
<td>Aluminum with epoxy powder coat finish</td>
</tr>
<tr>
<td>System Length</td>
<td>9 meters including extension cable</td>
</tr>
<tr>
<td>Extension Cable Armor (optional)</td>
<td>Flexible AISI 302 SST with FEP outer jacket</td>
</tr>
<tr>
<td>Tensile Strength (maximum rated)</td>
<td>289 N (65 pounds) probe to extension cable</td>
</tr>
<tr>
<td>Connector Material</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>Probe Case Torque (maximum rated)</td>
<td>81 N.m (720 in.lb)</td>
</tr>
<tr>
<td>Connector-to-connector Torque</td>
<td>Recommended torque: Finger tight + 1/8 turn Maximum torque: 0.565 N.m (5 in.lb)</td>
</tr>
<tr>
<td>Minimum Bend Radius (with or without sst armor)</td>
<td>25.4 mm (1 in)</td>
</tr>
<tr>
<td>System Weight (typical)</td>
<td>Probe 117 g/m (1.26 oz/ft) of hardline cable + 12 g/cm (1.07 oz/in) of case</td>
</tr>
<tr>
<td></td>
<td>Extension Cable 45 g/m (0.5 oz/ft)</td>
</tr>
<tr>
<td></td>
<td>Armored Extension cable 140 g/m (1.5 oz/ft)</td>
</tr>
<tr>
<td></td>
<td>Proximitor Sensor 255 g (9 oz)</td>
</tr>
</tbody>
</table>

**Environmental**

**Probe Temperature Range**
Operating and Storage Temperature: -34°C to +350°C (-30°F to +662°F)

**Extension Cable Temperature Range**
Operating and Storage Temperature: -51°C to +177°C (-60°F to +351 °F)

**Proximitor 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)

**Probe Relative Humidity**
100% condensing, submersible when connectors are protected.

**Extension Cable and Proximitor Sensor Relative Humidity**
100% condensing, non-submerged when connectors are protected.

**Probe Pressure**
3300 XL high temperature probes are designed to seal differential pressure between the probe tip and case. 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 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, LLC will not be held responsible for any damages resulting from leaking 3300 XL high temperature proximity probes. In addition, 3300 XL high temperature proximity probes will not be replaced under the service plan due to probe leakage.

**Hazardous Area Approvals**
Not available.
Ordering Information


3300 XL High Temperature Probe, 3/4-16 UNF Threads


A: Unthreaded Length Option
Unthreaded length must be at least 1.1 inch less than the case length. Order in increments of 0.1 inch.

- Maximum unthreaded length: 5.4 in
- Minimum unthreaded length: 0.0 in

Example: 0 1 2 = 1.2 in

B: Overall Case Length Option:
Order in increments of 0.1 inch.

- Maximum unthreaded length: 6.5 in
- Minimum unthreaded length: 1.1 in

Example: 0 6 0 = 6.0 in

C: Hardline Length Option
1 0: 1.0 metre (3.3 ft.)
2 0: 2.0 metres (6.6 ft.)
5 0: 5.0 metres (16.4 ft.)

D: Total Length Option
The extension cable is included with the proximity probe.
9 0: 9.0 metres (30 ft.)

E: Extension Cable Armor Option
0 0: Without stainless steel armor
0 1: With stainless steel armor

F: Agency Approval Option
0 0: Not required

3300 XL High Temperature Probe, M18 x 1.5 Threads


A: Unthreaded Length Option
Unthreaded length must be at least 30 mm less than the case length. Order in increments of 10 mm.

- Maximum unthreaded length: 130 mm
- Minimum unthreaded length: 0.0 mm

Example: 0 5 0 = 50 mm

B: Overall Case Length Option:
Order in increments of 10 mm.

- Maximum unthreaded length: 160 mm
- Minimum unthreaded length: 30 mm

Example: 1 3 0 = 130 mm

C: Hardline Length Option
1 0: 1.0 metre (3.3 ft.)
2 0: 2.0 metres (6.6 ft.)
5 0: 5.0 metres (16.4 ft.)

D: Total Length Option
The extension cable is included with the proximity probe.
9 0: 9.0 metres (30 ft.)

E: Extension Cable Armor Option
0 0: Without stainless steel armor
0 1: With stainless steel armor
3300 XL High Temperature Probe, Smooth Case


A: Overall Case Length Option

Mounting bracket is included with the proximity probe. Order in increments of 0.1 inch (2.54 mm).

- Maximum case length: 9.9 in (251.5 mm).
- Minimum case length: 0.6 in (15.2 mm).

Example: 060 = 6.0 in (152.4 mm).

B: Hardline Length Option

1 0: 1.0 metre (3.3 ft.)
2 0: 2.0 metres (6.6 ft.)
5 0: 5.0 metres (16.4 ft.)

C: Total Length Option

The extension cable is included with the proximity probe.

9 0: 9.0 metres (30 ft.)

D: Extension Cable Armor Option

0 0: Without stainless steel armor
0 1: With stainless steel armor

E: Agency Approval Option

0 0: Not required

3300 XL High Temperature Proximitr Sensor

330380–AXX–BXX

A: Total Length & Mounting Option

Note: Extension cable is included with the proximity probe.

9 0: 9.0 metres (29.5 ft.) Panel Mount
9 1: 9.0 metres (29.5 ft.) DIN Mount
9 2: 9.0 metres (29.5 ft.) No Mounting Hardware

B: Agency Approval Option

0 0: Not required

Accessories

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>125M6030-01</td>
<td>3300 XL 16mm High Temperature Proximity System Installation Manual</td>
</tr>
<tr>
<td>125M6031</td>
<td>Performance Specifications</td>
</tr>
<tr>
<td>134835-01</td>
<td>Mounting Bracket for 330303 Smooth Case Probe (spare)</td>
</tr>
<tr>
<td>02120015</td>
<td>Bulk field wire. 1.0 mm² (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.</td>
</tr>
<tr>
<td>138492-01</td>
<td>Replacement Panel Mount Mounting Pad</td>
</tr>
<tr>
<td>138493-01</td>
<td>Replacement DIN Mount</td>
</tr>
<tr>
<td>Bently Manuals</td>
<td>Customer DVD containing all Bently Manuals, FWD, App Notes, and Install Guides in all available languages</td>
</tr>
</tbody>
</table>
Graphs and Figures

Figure 1: Typical Transducer Curve
Figure 2: 3300 XL HTPS Proximitor Over High Temperature
Figure 3: 3300 XL HTPS Proximiton Over Low Temperature
Figure 4: 3300 XL HTPS Probe Over Low Temperature
Figure 5: 3300 XL HTPS Probe Over High Temperature
Figure 6: Typical 3300 XL HTPS Amplitude Response vs. Frequency (No Field Wiring)

Figure 7: Typical 3300 XL HTPS Phase Response vs. Frequency (No Field Wiring)
1: M18X 1.5 or 3/4-16 UNF-2A thread.
2: Lock nuts 27 mm or 1 1/8 in Hex
3: 15mm or 5/8 in Wrench Flats 4 pl.
4: SMA connector, 9.1 (0.360) dia. max.
5: "Matched to" probe serial number
6: Extension cable armor "E"
7: Armor 7.7 (0.301) dia. max.
8: 75 ohm triaxial cable, 3.7 (0.145) dia. max.
9: BNC part and serial numbers
10: Hardline cable 5.9 (0.232) dia. max.
11: Unthreaded length "A"
12: Case length "B"
13: Probe hardline length "C"
14: 9.0 +1.8 -0.5 metres "D"(9.0 +1.8, -1.5 metres for 5 metre probe systems)

**Figure 8: 330301 and 330302 HTPS Probe, English and Metric Thread Versions**
1: 19.0 (0.750) smooth case, 19.2 (0.755) dia. max.
2: Hardline cable, 5.9 (0.232) dia. max.
3: SMA connector, 9.1 (0.360) dia. max.
4: "Matched to" probe serial number
5: Extension cable armor "D"
6: Armor 7.7 (0.301) dia. max.
7: 75 ohm triaxial cable, 3.7 (0.145) dia. max.
8: BNC part and serial numbers
9: Case length. "A"
10: Probe hardline length "B"
11: 9.0 +1.8 -0.5 metres "C" (9.0 +1.8, -1.5 metres for 5 metre probe systems)

**Figure 9: 330303 HTPS Smooth Case Probe**
Figure 10: Mounting Clamp for 330303 Smooth Case Probe

1: Mounting option "A", options -50 or -90

Figure 11: Panel Mount 3300 XL Proximitor Sensor
1: Mounting option "A", options -51 or -91
2: 35mm DIN rail (not included)
3: 89.4 mm (3.52 in). Additional 3.05 mm (0.120 in) clearance required to remove DIN rail.

Figure 12: DIN Mount 3300 XL HTPS Proximitior Sensor
1: Mounting option "A", options -50 or -90

**Figure 13: Physical Mounting Characteristics Showing Interchangeability of 3300 and 3300 XL Proximator Sensors when 4-Hole Mounting Option is Used**
1: Connector 7.2 (0.285) dia. max.
2: Miniature coaxial connector
3: Armor, "B", FEP insulated 7.7 (0.301) dia. max.
4: 75 ohm triaxial cable, FEP insulated 3.7 (0.145) dia. max.
5: Connector 7.6 (0.30) dia. max.
6: SMA connector
7: Armor length, see Table 1 in Ordering Information
8: Cable length +1.8 -0.5 metres "A" (+1.8 -1.5 metres for 5 metre probe systems)

**Figure 14: Spare Extension Cable, Part Number 330300**

Notes:

1. All dimensions on figures are in millimetres (inches) unless otherwise noted.
2. Letters inside quotation marks on figures refer to probe ordering options.
3. Stainless steel armor is supplied with the FEP outer jacket.