# 3300 XL 8 mm Proximity Transducer System

## Datasheet

Cordant™

141194 Rev. AN




## Description

The 3300 XL 8 mm Proximity Transducer System consists of:

- One 3300 XL 8 mm probe,
- One 3300 XL extension cable[1], and
- One 3300 XL Proximitor Sensor[2].

The system provides an output voltage that is directly proportional to the distance between the probe tip and the observed conductive surface and can measure both static (position) and dynamic (vibration) values. The system's primary applications are vibration and position measurements on fluid-film bearing machines, as well as Keyphasor reference and speed measurements[3].

The 3300 XL 8 mm system delivers the most advanced performance in our eddy current proximity transducer systems. The standard 3300 XL 8 mm 5-meter system also fully complies with the American Petroleum Institute's (API) 670 Standard for mechanical configuration, linear range, accuracy, and temperature stability. All 3300 XL 8 mm proximity transducer systems provide this level of performance and support complete interchangeability of probes, extension cables, and Proximitor sensors, eliminating the need to match or bench calibrate individual components.

Each 3300 XL 8 mm Transducer System component is backward compatible and interchangeable[4] with other non-XL 3300 series 5 mm and 8 mm transducer system components[5]. This compatibility includes the 3300 5 mm probe, for applications in which an 8 mm probe is too large for the available mounting space[6,7].

Baker Hughes

## Proximitor Sensor

The 3300 XL Proximitor Sensor incorporates numerous improvements over previous designs. Its physical packaging allows you to use it in high-density DIN-rail installations. You can also mount the sensor in a traditional panel mount configuration, where it shares an identical 4-hole mounting “footprint” with older Proximitor Sensor designs. The mounting base for either option provides electrical isolation and eliminates the need for separate isolator plates. The 3300 XL Proximitor Sensor is highly immune to radio frequency interference, allowing you to install it in fiberglass housings without adverse effects from nearby radio frequency signals. The 3300 XL Proximitor Sensor’s improved RFI/EMI immunity satisfies European CE mark approvals without requiring special shielded conduit or metallic housings, resulting in lower installation costs and complexity.

The 3300 XL’s SpringLoc terminal strips require no special installation tools and facilitate faster, more robust field wiring connections by eliminating screw-type clamping mechanisms that can loosen.

## Proximity Probe and Extension Cable

The 3300 XL probe and extension cable also reflect improvements over previous designs. A patented TipLoc molding method provides a more robust bond between the probe tip and the probe body. The probe’s cable incorporates a patented CableLoc design that provides 330 N (75 lbf) pull strength to more securely attach the probe cable and probe tip.

You can also order 3300 XL 8 mm probes and extension cables with an optional FluidLoc cable option. This option prevents oil and other liquids from leaking out of the machine through the cable’s interior.

## Connectors

The 3300 XL probe, extension cable, and Proximitor sensor have corrosion-resistant, gold-plated ClickLoc connectors. These connectors require only finger-tight torque (the connectors will "click" when tight), and the specially-engineered locking mechanism prevents the connectors from loosening. These connectors require no special tools for installation or removal.

You can order the 3300 XL 8 mm probes and extension cables with connector protectors already installed. We can also supply connector protectors separately for field installations (such as when an application must run the cable through restrictive conduit). We recommend connector protectors for all installations to provide increased environmental protection[8].

## Extended Temperature Range Applications

An extended temperature range (ETR) probe and ETR extension cable are available for applications in which either the probe lead or extension cable may exceed the standard 177°C (350°F) temperature specification. The ETR probe has an extended temperature rating for up to 218°C (425°F). The ETR extension cable rating is up to 260°C (500°F). Both the ETR probe and cable are compatible with standard temperature probes and cables, for example, you can utilize an ETR probe with the 330130 extension cable. The ETR system uses the standard 3300 XL Proximitor Sensor. Note that when you use any ETR component as part of your system, the ETR component limits the system accuracy to the accuracy of the ETR system.

### Description Notes:

1. One-meter systems do not use an extension cable.

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

3. Consult Bently Nevada Applications Note, Considerations when using Eddy Current Proximity Probes for Overspeed Protection Applications, when considering this transducer system for tachometer or overspeed measurements.

4. 3300 XL 8 mm components are both electrically and physically interchangeable with non-XL 3300 5 mm and 8 mm components. Although the packaging of the 3300 XL Proximitor Sensor differs from its predecessor, its design fits in the same 4-hole mounting pattern when used with the 4-hole mounting base, and will fit within the same mounting space specifications (when minimum permissible cable bend radius is observed).

5. Mixing XL and non-XL 3300-series 5 mm and 8 mm system components limits system performance to the specifications for the non-XL 3300 5 mm and 8 mm Transducer System.

6. The 3300-series 5 mm probe (refer to Document 141605) uses smaller physical packaging, but does not reduce the side view clearances or tip-to-tip spacing requirements as compared to an 8mm probe. It is used when physical (not electrical) constraints preclude the use of an 8 mm probe. When your application requires narrow side view probes, use the 3300 NSv Proximity Transducer System (refer to Document 147385).

7. 8 mm probes provide a thicker encapsulation of the probe coil in the molded PPS plastic probe tip. This results in a more rugged probe. The larger diameter of the probe body also provides a stronger, more robust case. We recommend that you use 8 mm probes when possible to provide optimal robustness against physical abuse.

8. Each 3300 XL extension cable includes silicone tape that you can use instead of connector protectors. We do not recommend silicone tape for applications that will expose the probe-to-extension cable connection to turbine oil.

# Specifications

Unless otherwise noted, the following specifications are for a 3300 XL 8 mm Proximitor Sensor, extension cable and 8 mm probe between +18°C and +27°C (+64°F to +80°F) at a maximum altitude of 2000 meters, with a -24 Vdc power supply, a 10 kΩ load, an AISI 4140 steel target, and a probe gapped at 1.27 mm (50 mils). Performance characteristics apply to systems that consist solely of 3300 XL 8 mm components. The system accuracy and interchangeability specifications do not apply to transducer systems that are calibrated to any target other than our AISI 4140 steel target.

## Electrical

| | |
|---|---|
| Proximitor Sensor Input | Accepts one non-contacting 3300-series 5 mm, 3300 XL 8 mm Proximity Probe and Extension Cable. |
| Power | Requires -17.5 Vdc to -26 Vdc when installed with non-incendive circuit connected per installation drawing 140979 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. |
| Supply Sensitivity | Less than 2 mV change in output voltage per volt change in input voltage. |
| Output Resistance | 50 Ω |

| Nominal Probe DC Resistance | |
|---|---|
| Resistance ($R_{PROBE}$) from Center Conductor to Outer Conductor | |
| Probe Length (m) | $R_{PROBE}$(Ω) |
| 0.5 | 7.45 ± 0.50 |
| 1.0 | 7.59 ± 0.50 |
| 1.5 | 7.73 ± 0.50 |
| 2.0 | 7.88 ± 0.50 |
| 3.0 | 8.17 ± 0.50 |
| 5.0 | 8.73 ± 0.50 |
| 9.0 | 9.87 ± 0.50 |

| Nominal Extension Cable DC Resistance | |
|---|---|
| Resistance ($R_{CORE}$) from Center Conductor to Center Conductor | |
| Length of Extension Cable (m) | RCORE (Ω) |
| 3.0 | 0.66 ± 0.10 |
| 3.5 | 0.77 ± 0.12 |
| 4.0 | 0.88 ± 0.13 |
| 4.5 | 0.99 ± 0.15 |
| 6.0 | 1.32 ± 0.21 |
| 7.0 | 1.54 ± 0.23 |
| 7.5 | 1.65 ± 0.25 |
| 8.0 | 1.76 ± 0.26 |
| 8.5 | 1.87 ± 0.28 |

| Resistance ($R_{JACKET}$) from Outer Conductor to Outer Conductor | |
|---|---|
| **Length of Extension Cable (m)** | **$R_{JACKET}$ (Ω)** |
| 3.0 | 0.20 ± 0.04 |
| 3.5 | 0.23 ± 0.05 |
| 4.0 | 0.26 ± 0.05 |
| 4.5 | 0.30 ± 0.06 |
| 6.0 | 0.39 ± 0.08 |
| 7.0 | 0.46 ± 0.09 |
| 7.5 | 0.49 ± 0.10 |
| 8.0 | 0.53 ± 0.11 |
| 8.5 | 0.56 ± 0.11 |

| | |
|---|---|
| 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 3 conductor shielded triad cable and tinned field wiring. Maximum length of 305 meters (1,000 feet) between the 3300 XL Proximitor Sensor and the monitor. See the frequency response graphs, Figures 10 and 12, for signal rolloff at high frequencies when using longer field wiring lengths. |
| Linear Range | 2 mm (80 mils). Linear range begins at approximately 0.25 mm (10 mils) from target and is from 0.25 to 2.3 mm (10 to 90 mils) (approximately –1 to –17 Vdc). |
| Recommended Gap Setting for Radial Vibration | -9 Vdc [approximately 1.27 mm (50 mils)] |
| **Incremental Scale Factor (ISF)** | |
| Standard 5 or 1 meter System | 7.87 V/mm (200 mV/mil) ± 5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0°C to +45°C (+32°F to +113°F). |
| Standard 9 meter System | 7.87 V/mm (200 mV/mil) ± 6.5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0°C to +45°C (+32°F to +113°F). |
| Extended Temperature Range (ETR) for 5 and 9 Meter Systems | 7.87 V/mm (200 mV/mil) ± 6.5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0°C to +45°C (+32°F to +113°F). |
| **Deviation from best fit straight line (DSL)** | |
| Standard 5 or 1 meter System | Less than ±0.025 mm (±1 mil) with components at 0°C to +45°C (+32°F to +113°F). |
| Standard 9 meter System | Less than ±0.038 mm (±1.5 mil) with components at 0°C to +45°C (+32°F to +113°F). |
| Extended Temperature Range 5 and 9 meter Systems | Less than ±0.038 mm (±1.5 mil) with components at 0°C to +45°C (+32°F to +113°F). |

| Performance over Extended Temperatures | |
|---|---|
| Standard 5 or 1 meter System | 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 ISF remains within ±10% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.076 mm (±3 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 ISF remains within ±10% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.076 mm (±3 mils). |
| Standard 9 meter System | 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 ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 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 ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 mils). |
| Extended Temperature Range 5 and 9 meter Systems | Over a probe and extension cable temperature range of –35°C to +260°C (-31°F to +500°F) with the Proximitor sensor between 0°C to +45°C (+32°F to +113°F), the ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 mils). |
| Frequency Response | (0 to 10 kHz), +0, -3 dB, with up to 305 meters (1000 feet) of field wiring. |
| Minimum Target Size | 15.2 mm (0.6 in) diameter (flat target) |
| **Shaft Diameter** | |
| Minimum | 50.8 mm (2 in) |
| Recommended Minimum | 76.2 mm (3 in) |

When gapped at the center of the linear range, the interaction between two separate transducer systems (cross-talk) will be less than 50 mV on shaft diameters of at least 50 mm (2 in) or greater. You should take care to maintain minimum separation of transducer tips, generally at least 40 mm (1.6 in) for axial position measurements or 38 mm (1.5 in) for radial vibration measurements to limit cross-talk to 50 mV or less. Radial vibration or position measurements on shaft diameters smaller than 76.2 mm (3 in) will generally change the scale factor.

# Ordering Information

## Ordering Information for Probes

### 3300 XL 8 mm Proximity Probes:

**330101** 3300 XL 8 mm Probe, 3/8-24 UNF thread, without armor(2)

**330102** 3300 XL 8 mm Probe, 3/8-24 UNF thread, with armor(2)

**Part Number-AA-BB-CC-DD-EE**

| **A: Unthreaded Length Option** | |
|---|---|
| Unthreaded length must be at least 0.8 in. less than the case length. | |
| Order in increments of 0.1 in.<br>**Length configurations:**<br>Maximum unthreaded length: 8.8 in.<br>Minimum unthreaded length: 0.0 in.<br>Example: **0 4** = 0.4 in. | |
| **B: Overall Case Length Option** | |
| Order in increments of 0.1 in.<br>**Standard thread configurations:**<br>Maximum case length: 9.6 in.<br>Minimum case length: 0.8 in.<br>Example: **2 4** = 2.4 in. | |
| **C: Total Length Option** | |
| **05** | 0.5 meter (1.6 feet) |
| **10** | 1.0 meter (3.3 feet) |
| **15** | 1.5 meter (4.9 feet) |
| **20** | 2.0 meters (6.6 feet) |
| **30** | 3.0 meters (9.8 feet) |
| **50** | 5.0 meters (16.4 feet) |
| **90** | 9.0 meters (29.5 feet) |

3-meter length option is only available on 330101 probes, and is designed for use with the 9 meter Proximitor sensor only.

5-meter probes are designed for use with the 5 meter Proximitor sensor only.

| **D: Connector and Cable-Type 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, FluidLoc cable |
| **E: Agency Approval Option** | |
| **00** | Not required |
| **05** | CSA, ATEX, IECEx Approvals |

### 3300 XL 8 mm Proximity Probes, Metric:

**330103** 3300 XL 8 mm Probe, M10 x 1 thread, without armor (2)

**330104** 3300 XL 8 mm Probe, M10 x 1 thread, with armor (2)

**Part Number-AA-BB-CC-DD-EE**

| **A: Unthreaded Length Option** |
|---|

Unthreaded length must be at least 20 mm less than the case length.

Order in increments of 10 mm
**Length configurations:**
Maximum unthreaded length: 230 mm
Minimum unthreaded length: 0 mm
Example: **0 6** = 60 mm

**B: Overall Case Length Option**

Order in increments of 10 mm
**Metric thread configurations:**
Maximum case length: 250 mm
Minimum case length: 20 mm
Example: **0 6** = 60 mm

**C: Total Length Option**

| | |
|---|---|
| **05** | 0.5 meter (1.6 feet) |
| **10** | 1.0 meter (3.3 feet) |
| **15** | 1.5 meter (4.9 feet) |
| **20** | 2.0 meters (6.6 feet) |
| **50** | 5.0 meters (16.4 feet) |
| **90** | 9.0 meters (29.5 feet) |

5-meter probes are designed for use with the 5 meter Proximitor sensor only.

**D: Connector and Cable-Type 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, FluidLoc cable |

**E: Agency Approval Option**

| | |
|---|---|
| **00** | Not required |
| **05** | CSA, ATEX, IECEx Approvals |

## 3300 XL 8 mm Reverse Mount Probes

**330105-02-12-CC-DD-EE**3/8-24 UNF threads(2)

**330106-05-30-CC-DD-EE** M10 x 1 threads(2)

**Option Descriptions**

**C: Total Length Option**

| | |
|---|---|
| **05** | 0.5 meter (1.6 feet) |
| **10** | 1.0 meter (3.3 feet) |
| **15** | 1.5 meter (4.9 feet) |
| **20** | 2.0 meters (6.6 feet) |
| **50** | 5.0 meters (16.4 feet) |
| **90** | 9.0 meters (29.5 feet) |

5-meter probes are designed for use with the 5 meter Proximitor sensor only.

**D: Connector and Cable-Type Option**

| | |
|---|---|
| **02** | Miniature ClickLoc coaxial connector |
| **12** | Miniature ClickLoc coaxial connector , FluidLoc cable |

The FluidLoc cable option –12 is not necessary on the vast majority of 330105 and 330106 installations due to the presence of the probe sleeve. Consider carefully the application before ordering the FluidLoc cable option for these probes.

**E: Agency Approval Option**

| | |
|---|---|
| **00** | Not required |
| **05** | CSA, ATEX, IECEx Approvals |