# 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

# 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.

| Effects of 60 Hz Magnetic Fields Up to 300 Gauss | | | | |
|---|---|---|---|---|
| **Output Voltage in Mil pp/Gauss** | | | | |
| Gap | 5 or 1-meter Proximitor Sensor | 9 meter Proximitor Sensor | Probe | Ext. Cable |
| 10 | 0.0119 | 0.0247 | 0.0004 | 0.0004 |
| 50 | 0.0131 | 0.0323 | 0.0014 | 0.0014 |
| 90 | 0.0133 | 0.0348 | 0.0045 | 0.0045 |

## Mechanical

| | |
|---|---|
| Probe Tip Material | Polyphenylene sulfide (PPS). |
| Probe Case Material | AISI 303 or 304 stainless steel (SST). |
| **Probe Cable Specifications** | |
| Standard cable | 75Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 3, 5, or 9 meters. |
| Extended Temperature Range cable | 75Ω triaxial, perfluoroalkoxy (PFA) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 5, or 9 meters. |
| Armor (optional on both) | Flexible AISI 302 or 304 SST with FEP outer jacket. |
| Tensile Strength (Maximum Rated) | 330 N (75 lbf) probe case to probe lead.<br>270 N (60 lbf) at probe lead to extension cable connectors. |
| Connector Material | Gold-plated brass or gold-plated beryllium copper. |

| Probe Case Torque | | |
|---|---|---|
| **Probe Type** | **Maximum Rated** | **Recommended** |
| Standard forward mounted probes | 33.9 N•m (300 in•lbf) | 11.2 N•m (100 in•lbf) |
| Standard forward-mount probes - first three threads | 22.6 N•m (200 in•lbf) | 7.5 N•m (66 in•lbf) |
| Reverse-mount probes | 22.6 N•m (200 in•lbf) | 7.5 N•m (66 in•lbf) |

| Extension Cable Material | |
|---|---|
| Standard cable | 75 Q triaxial, fluoroethylene propylene (FEP) insulated |
| Extended Temperature Range cable | 75Ω triaxial, perfluoroalkoxy (PFA) insulated. |
| Minimum Cable Bend Radius | 25.4 mm (1.0 in) |



3300 XL 8 mm components are both electrically and physically interchangeable with non-XL 3300 5 mm and 8 mm components when minimum permissible cable bend radius is observed.

| | |
|---|---|
| Connector Material | Gold-plated brass or gold-plated beryllium copper. |
| Maximum Connector Torque | 0.565 N•m (5 in•lbf) |

| Connector-to-Connector Recommended Torque | |
|---|---|
| **Connector Type** | **Tightening Instructions** |
| Two 3300 XL gold "click" type connectors | Finger tight |
| One non-XL stainless steel connector and one 3300 XL connector | Finger tight plus 1/8 turn using pliers |
| **Materials** | |
| Proximitor Sensor Material | A308 aluminum |
| Connector Material | Gold-plated brass or gold-plated beryllium copper. |
| **Length** | |
| System Length | 5 or 9 meters (including extension cable) or 1 meter (probe only). |
| **Weight** | |
| Total System Weight (Typical) | 0.7 kg (1.5 lb m) |
| Probe | 323 g/m (11.4 oz) |
| Extension Cable | 34 g/m (0.4 oz/ft) |
| Armored Extension Cable | 103 g/m (1.5 oz/ft) |
| Proximitor Sensor | 246 g (8.67 oz) |

## Thread Engagement Limits

| Probe Case Thread | Maximum Length of Thread Engagement |
|---|---|
| **3/8-24** | 0.563 in |
| **M10x1** | 15 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.

## Environmental Limits

| Probe Temperature Range | |
|---|---|
| **Operating and Storage Temperature** | |
| Standard Probe | -52°C to +177°C (-62°F to +350°F) |
| Extended Temperature Range Probe | -52°C to +218°C (-62°F to +425°F) for the probe tip; -51°C to +260°C (-60°F to +500°F) for the probe cable and connector. |

Exposing the probe to temperatures below –34˚C (-30˚F) may cause premature failure of the pressure seal.

### Probe Pressure

3300 XL 8 mm probes are designed to seal differential pressure between the probe tip and case. The probe sealing material consists of a Viton® O ring. 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 8 mm proximity probes. In addition, 3300 XL 8 mm proximity probes does not be replaced under the service plan due to probe leakage.

| Extension Cable Temperature Range | |
|---|---|
| **Operating and Storage Temperature** | |
| Standard Cable | -52°C to +177°C (-62°F to +350°F) |
| Extended Temperature Range Cable | -52°C to +260°C (-62°F to +500°F) |

| Proximitor Sensor Temperature Range | |
|---|---|
| Operating Temperature | -52°C to +100°C (-62°F to +212°F) |
| Storage Temperature | -52°C to +105°C (-62°F to +221°F) |

### Probe Relative Humidity

Less than a 3% change in Average Scale Factor (ASF) when tested in 93% humidity in accordance with IEC standard 68 2 3 for up to 56 days.

# Ordering Information

**Apter Power model selection**

330104-00-10-20-12-05

3/8-24 UNF; 0.0 in / 3.8 in

9.0 m lead; standard ClickLoc

No approval option selected

## 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 |