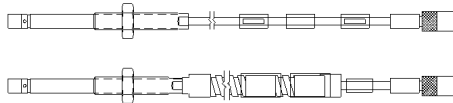
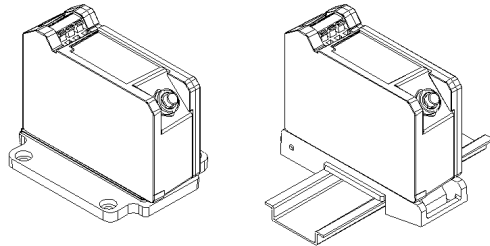


3300 5mm Transducer Product Datasheet

Bently Nevada* Asset Condition Monitoring



Description

Transducer System

The 3300 5mm Proximity Transducer System consists of:

- a 3300 5mm probe ^{1,2}
- a 3300 XL extension cable (ref 141194-01)
- a 3300 XL Proximator* Sensor ^{3,4,5} (ref 141194-01)

When combined with a 3300 XL Proximator Sensor and XL extension cable, the system provides an output voltage that is directly proportional to the distance between the probe tip and the observed conductive surface. The system can measure both static (position) and dynamic (vibration) data. Its primary use is in vibration and position measurement applications on fluid-film bearing machines, as well as Keyphasor* measurement and speed measurement applications⁶.

The system provides an accurate, stable signal output over a wide temperature range. All 3300 XL Proximity Transducer Systems achieve this level of performance with complete interchangeability of probe, extension cable, and Proximator sensor, eliminating the need for



imagination at work

Part Number 172036

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individual component matching or bench calibration.

Proximity Probe

The 3300 5mm probe improves upon previous designs. A patented TipLoc* molding method provides a more robust bond between the probe tip and the probe body. The 3300 5mm system is orderable with Fluidloc cable options for preventing oil and other liquids from leaking out of the machine through the cable's interior.

Connectors

The 3300 5mm probe and 3300 XL extension cable have corrosion-resistant, gold-plated brass ClickLoc* connectors. These connectors require only finger-tight torque (connectors will "click"), and the specially engineered locking mechanism prevents the connectors from loosening. The connectors require no special tools for installation or removal.

3300 5mm Probes and XL Extension Cables can be ordered with connector protectors already installed, or we can supply the connector protectors separately for installation in the field (such as when the cable must be run through restrictive conduit). We recommend connector protectors for all installations to provide increased environmental protection⁷.

Notes:

1. A 5mm probe uses smaller physical packaging and provides the same linear range as a 3300 XL 8mm probe (ref 141194-01). The 5mm probe does not, however, reduce the sideview clearances or tip-to-

tip spacing requirements as compared to an XL 8mm probe. Use the 5mm probe when physical (not electrical) constraints preclude the use of an 8mm probe, such as mounting between thrust bearing pads or other constrained spaces. When your application requires narrow sideview probes, use the 3300 XL NSv* probe and extension cable with the 3300 XL NSv Proximitor Sensor (refer to Specifications and Ordering Information p/n 147385-01).

2. XL 8mm probes provide a thicker encapsulation of the probe coil in the molded PPS plastic probe tip to produce a more rugged probe. The larger diameter of the probe body also provides a stronger, more robust case. We recommend the use of XL 8mm probes when possible to provide optimal robustness against physical abuse.
3. A 3300 XL Proximitor Sensor is available and provides many improvements over the non-XL version. The XL sensor is electrically and mechanically interchangeable with the non-XL version. Although the packaging of the 3300 XL Proximitor Sensor differs from its predecessor, its design allows for the use of a 4-hole mounting base to fit it in the same 4-hole mounting pattern and to fit within the same mounting space specifications (when the application observes the minimum permissible cable bend radius). Consult Specifications and Ordering Information (p/n 141194-01) or our sales and service professional for more information.
4. Use of XL components with 3300 5mm Probes will limit system performance to the specifications for the non-XL 3300 system.
5. The factory supplies Proximitor Sensors that are calibrated by default to AISI 4140 steel. Calibration to other target materials is available upon request.
6. When using this transducer system for tachometer or over-speed measurements, consult <http://www.GEmeasurement.com> for the application note regarding the use of eddy current proximity probes for over-speed protection.
7. We provide silicone tape with each 3300 XL extension cable. Use this tape instead of connector protectors. We do not recommend silicone tape in applications which will expose the probe-to-extension cable connection to turbine oil.

Specifications

Unless otherwise noted, the following specifications are for a proximity transducer system between +18°C and +27°C (+64 °F to +80 °F) with a -24 Vdc power supply, a 10 kΩ load, an AISI 4140 steel target, and a probe gapped at 1.27mm (50 mils).

Electrical

XL Proximator Sensor Input

Accepts one noncontacting 3300 5mm Proximity Probe and XL Extension Cable.

Power

Requires -17.5 Vdc to -26 Vdc at 12 mA maximum consumption. 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

Table 1: Probe DC Resistance

Probe Length (m)	Resistance from the Center Conductor to the Outer Conductor (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

Probe Length (m)	Resistance from the Center Conductor to the Outer Conductor (Ω)
5.0	8.73 ± 0.70
9.0	9.87 ± 0.90

Table 2: Extension Cable DC Resistance

Length of Extension Cable	Resistance from Center Conductor to Center Conductor (R _{CORE}) (Ω)	Resistance from Outer Conductor to Outer Conductor (R _{JACKET}) (Ω)
3.0	0.66 ± 0.10	0.20 ± 0.04
3.5	0.77 ± 0.12	0.23 ± 0.05
4.0	0.88 ± 0.13	0.26 ± 0.05
4.5	0.99 ± 0.15	0.30 ± 0.06
7.0	1.54 ± 0.23	0.46 ± 0.09
7.5	1.65 ± 0.25	0.49 ± 0.10
8.0	1.76 ± 0.26	0.53 ± 0.11
8.5	1.87 ± 0.28	0.56 ± 0.11

Note:

Outer conductor refers to the shielded conductor that is attached to the connector, not the armor braid.

Extension cable capacitance

69.9 pF/m (21.3 pF/ft) typical.

Field Wiring

Recommend using 3-conductor shielded triad cable 0.2mm to 1.5mm (16 AWG to 24 AWG). 305 metres (1,000 feet) maximum length between 3300 XL Proximity Transducer and monitor. Consult

Performance Specification 155687 for signal rolloff at high frequencies when using longer field wiring lengths or external safety barriers located some distance from the monitoring system.

Linear Range

2mm (80 mils). Linear range begins at approximately 0.25mm (10 mils) from target and is from 0.25 to 2.3mm (10 to 90 mils).

Recommended Gap Setting

1.27mm (50 mils).

Incremental Scale Factor

7.87 V/mm (200 mV/mil) $\pm 6.5\%$ typical, including interchangeability error when measured in increments of 0.25mm (10 mils) over the linear range.

Deviation from best fit straight line (DSL)

Less than $\pm 0.038\text{mm}$ (± 1.5 mil) typical deviation from best fit straight line.

Probe Temperature Stability (typical)

Over probe temperature range of $-35\text{ }^{\circ}\text{C}$ to $+177\text{ }^{\circ}\text{C}$ ($-31\text{ }^{\circ}\text{F}$ to $+350\text{ }^{\circ}\text{F}$), the incremental scale factor remains within $\pm 10\%$ of 7.87 V/mm (200 mV/mil) and the deviation from the best fit straight line remains within $\pm 0.076\text{mm}$ (± 3 mils).

Frequency Response

0 to 10 kHz: +0, -3 dB, with up to 305 metres (1000 feet) of field wiring.

Minimum Target Size

15.2mm (0.6 in) diameter (flat target).

Shaft Diameter

Minimum

50.8mm (2 in)

Recommended minimum

76.2mm (3 in)

When gapped at the center of the linear range, the interaction between 2 separate transducer systems (cross-talk) will be less than 50 mV on shaft diameters of at least 50mm (2 in) or greater. Care should be taken to maintain minimum separation of transducer tips, generally at least 40mm (1.6 in) for axial position measurements or 38mm (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 76.2mm (3in) will generally result in a change in scale factor. Consult Performance Specification 155687 for additional information.

Effects of 60 Hz Magnetic Fields Up to 300 Gauss

Refer to table 3.

Table 3: Output Voltage in Mil (pk-pk)/Gauss (5-metre System)

Gap	XL Proximito Sensor	Probe	XL Ext. Cable
10 mil	0.0119	0.0004	0.0004
50 mil	0.0131	0.0014	0.0014
90 mil	0.0133	0.0045	0.0045

Electrical Certification

Complies with the European CE mark.

Hazardous Area Approvals

Note:

Multiple approvals for hazardous areas certified by Canadian Standards Association (C/US) in North America and by Baseefa for Europe and IEC Ex.



Table 4: Field Wiring Limitations

Type Approval	Gas Group	Capacitance (μF)	Inductance (mH)*	L/R Ratio (μH/Ω)
ATEX and IEC Zone 0/1	IIC	0.078	0.99	29.2
	IIB	0.645	7.41	117.0
	IIA	2.144	15.6	234.0
CSA Div 1	A and B	0.070	1.0	29.2
	C	0.600	5.0	117.0
	D	2.09	11.0	234.0
	All	0.460	100.0	N/A

North American

3300 XL Proximito Sensor and probe, ia:	Ex ia IIC T4/T5; Class I Zone 0 or Class 1 Division 1; Groups A, B, C, and D, when installed with intrinsically safe zener barriers per drawing 141092 or when installed with galvanic isolators. Certificate number 1109248(LR 26744-222)
3300 XL Proximito Sensor and probe, nA:	Ex nA IIC T4/T5 Class I Zone 2 or Class I, Division 2, Groups A, B, C, and D when installed without barriers per drawing 140979. T ₅ @ T _a = -35 °C to +85 °C. T4 @ T _a = -51 °C to +100 °C. Certificate number 1109248(LR 26744-222)

Europe

3300 XL Proximito Sensor, ia:	 II 1 G EEx ia IIC T4/T5. EC certificate number BAS99ATEX1101, when installed per drawing 141092.
3300 XL Proximito Sensor, nA:	 II 3 G Ex nA II T4/T5. EC certificate number Baseefa 07ATEX0189X, when installed per drawing 140979. T5 @ T _a = -35 °C to +85 °C T4 @ T _a = -51 °C to +100 °C.
3300 XL 8mm probe, ia:	II 1 G EEx ia IIC, Temperature Classification per table 4-5, EC certificate number BAS99ATEX1099 when installed per drawing 142491.
3300 XL 8mm probe, nA:	II 3 G EEx nA II, Temperature Classification per table 4-5, EC certificate number BAS99ATEX3098 when installed per drawing 142491.

IEC Ex	
3300 XL Proximity Sensor, ia	IECEX BAS04.0055X Ex ia IIC T4 (-51°C ≤ Ta ≤ +100°C) / T5 (-35°C ≤ Ta ≤ +85°C)
Terminal Block Connections	Ui = -28V Ci = 0 Ii = 140mA Li = 10μH Pi = 0.84W
3300 XL Proximity Sensor, nA:	IECEX BAS04.0057X Ex nA II T4 (-51°C ≤ Ta ≤ +100°C) / T5 (-35°C ≤ Ta ≤ +85°C) Ui = -28V
3300 XL 8mm and 3300 5mm Eddy Current Probes, ia:	IECEX BAS04.0056 Ex ia IIC Temperature Classification per table 5. Ui = -28V Ci = 1.5 nF Li = 140 mA Li = 200 μH Pi = 0.84 W
3300 XL 8mm and 3300 5mm Eddy Current Probes, nA	IECEX BAS04.0058X Ex nA II for Zone 2 Temperature Classification per table 5.

Table 5: Probe Ex ia and Ex nA Temperature Classification

Temperature Classification	Ambient Temperature (Probe Only)
T1	-51°C to +232°C
T2	-51°C to +177°C
T3	-51°C to +120°C
T4	-51°C to +80°C
T5	-51°C to +40°C

Hazardous Area Conditions of Safe Use:

ATEX

Follow the conditions of safe use included on the Declaration of Conformance sent with each product.

Canadian Standards Association (CSA)

Division 1 (Intrinsically safe): Install per Bently Nevada drawing 141092.

Division 2 (non-Incendive): Install per Bently Nevada drawing 140979.

IECEX

Zone 0 (Intrinsically safe): The Proximity® Sensor must be installed to minimize the risk of impact or friction with other metallic surfaces.

Zone 2 (non-Incendive): The probe must be supplied from a voltage-limited source.

Compliance and Certifications

EMC

European Community Directives	EMC Directive 2004/108/EC
Standards	EN61000-6-2
	EN61000-6-4

American Bureau of Shipping (ABS) Type Approval

Certification Number	09-HS446965B-PDA
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Mechanical

Probe Tip Material	Polyphenylene sulfide (PPS)
Probe Case Material	AISI 303 or 304 stainless steel (SST)
Probe Cable	75Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following lengths: 0.5, 1, 2, 5, or 9 metres (1.6, 3.3, 16.4, or 29.5 feet)
System Length	5 or 9 metres (16.4 or 29.5 feet) including extension cable
Extension Cable Material	75 Ω triaxial, fluoroethylene propylene (FEP) insulated
Probe and Extension Cable Armor	Flexible AISI 302 or 304 SST with FEP outer jacket
5mm Probe Tensile Strength	222 N (50 lbf) probe case to probe lead. 222 N (50 lbf) probe lead to extension cable connectors
Connector material	Gold-plated brass or gold-plated beryllium copper
Recommended case hole and tap size for 1/4-28 case	
Drill Size	0.213in
Hole Size	0.218 to 0.222in
Hole Depth	0.376 to 0.750in
Tap Size	#3
Recommended case hole and tap size for M8x1 case	
Drill Size	7.5mm
Hole Size	7.625 to 7.72mm
Hole Depth	12 to 24mm
Tap Size	M8x1
Probe case torque	5.1 N·m (45in·lb) recommended 7.3 N·m (65 in·lb) maximum
Connector-to-connector torque	Refer to the following table: Recommended Torque

Table 6: Recommended Torque

Connector Type	Tightening Instructions
2 3300 XL gold "click" type connectors	Finger tight
1 non-XL stainless steel connector and 1 3300 XL connector	Finger tight plus 1/8 turn using pliers
Weight	
Maximum torque	0.565 N•m (0.42 ft•lbf)
Minimum Cable Bend Radius	25.4mm (1.0in)
Total System	0.71kg (1.6 lb), typical
3300 5mm Probe	323 g (11.39 oz).
XL Extension Cable	34 g/m (0.4 oz/ft) 103 g/m (1.5 oz/ft) (armored)
XL Proximito Sensor	246g (8.7oz)

Environmental Limits

Probe Temperature Range

-35°C to +177°C (-31°F to +351°F)

Note:

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

Extension Cable Temperature Range

-51° C to +177° C (-60° F to +351° F) for standard extension cable. ref 141194-01

Probe Pressure

3300 5mm probes are designed to seal differential pressure between the probe tip and case. The probe sealing material consists of a fluorocarbon O-ring. We do not pressure test probes prior to

shipment. Contact our custom design department if a test of the pressure seal for your application is required.

Note:

It is the responsibility of the customer or user to ensure that all liquids and gases are contained and safely controlled should a proximity probe leak. In addition, solutions with high or low pH values may erode the tip assembly of the probe causing media to leak into surrounding areas. Bently Nevada, Inc. will not be held responsible for any damages resulting from leaking 3300 5 mm proximity probes. In addition, Bently Nevada, Inc. will not replace 3300 5mm proximity probes under the service plan due to probe leakage.

Patents

One or more components or procedures described in the following patents apply to this product: 5,016,343; 5,126,664; 5,351,388; and 5,685,884.

Ordering Information

For a detailed listing of country and product specific approvals, refer to the Approvals Quick Reference Guide (document 108M1756) located at the following website: www.GEmeasurement.com.

3300 5mm Proximity Probes

330171 3300 5mm Probe, 1/4-28 UNF thread, without armor

330172 3300 5mm Probe, 1/4-28 UNF thread, with armor

Part Number-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

Note: Unthreaded length must be at least 0.8in. less than the case length.

Order in increments of 0.1in

Length configurations:

Maximum unthreaded length:

8 8 = 8.8in

Minimum unthreaded length:

0 0 = 0.0in

Example: 0 4 = 0.4in

B: Overall Case Length Option

Order in increments of 0.1in

Threaded Length configurations:

Maximum case length:

9 6 = 9.6in

Minimum case length:

0 8 = 0.8in

Example: 2 4 = 2.4in

C: Total Length Option

05 0.5 metre (1.6 feet)

10 1.0 metre (3.3 feet)

20 2.0 metres (6.6 feet)

50 5.0 metres (16.4 feet)¹

90 9.0 metres (29.5 feet)

D: Connector 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 Multiple Approvals

3300 5mm Proximity Probes, Metric

330173 3300 5mm Probe, M8 x 1 thread, without armor

330174 3300 5mm Probe, M8 x 1 thread, with armor

Part Number-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

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

Order in increments of 10mm

Length configurations:

Maximum unthreaded length:

2 3 = 230mm

Minimum unthreaded length:

0 0 = 0.0mm

Example: 0 6 = 60mm

B: Overall Case Length Option

Order in increments of 10mm

Metric thread configurations:

Maximum case length:

2 5 = 250mm

Minimum case length:

0 2 = 20mm

Example: 0 6 = 60mm

C: Total Length Option

05 0.5 metre (1.6 feet)

10 1.0 metre (3.3 feet)

20 2.0 metres (6.6 feet)

50 5.0 metres (16.4 feet)¹

90 9.0 metres (29.5 feet)

D: Connector 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 Multiple Approvals

Probe Accessories

Aluminum probe mounting bracket

The aluminum probe threaded mounting bracket is the standard mounting bracket for most 3300 5 mm probe installations. The -02 option is supplied with 2 10-24 UNC-2A mounting screws. The -03 option is supplied with 2 M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

137492 -AXX

A: Thread size

02 1/4-28

03 M8 x 1

Phenolic Probe Mounting Bracket

The phenolic mounting bracket is recommended if additional electric isolation from the mounting location is required (as in some generator and electrical motor bearing locations). The -02 option is supplied with 2 10-24 UNC-2A mounting screws. The -03 option is supplied with 2 M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

27474 -AXX

- A:** Thread size
02 1/4-28
03 M8 x 1

75Ω ClickLoc Connector Kit

330153-AA

75Ω ClickLoc Connector Kit for 3300 series probes and extension cables. Each kit contains 1 color-coded sleeve per connector.

- A:** Kit Type
02 1 ClickLoc male connector for 3300 XL 5mm and 8mm extension cable.
03 1 ClickLoc female connector for 3300 XL 5mm and 8mm extension cable.
04 1 ClickLoc male connector for 3300 5mm probe.

Accessories

02120015	<p>Bulk field wire</p> <p>1.0mm² (18 AWG), 3-conductor, twisted, shielded cable for connections between Proximitor Sensor and monitor.</p>
03200006	<p>Silicone self-fusing tape</p> <p>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.</p>
40113-03	<p>Connector Protector Kit</p> <p>Connector Protector Kit for 3300 5mm probes, including connector protectors and installation tools.</p>
136536-01	<p>Connector Protector Adapter</p> <p>Makes connector protector kits purchased prior to 1998 compatible with ClickLoc extension cable connectors.</p>

40180-03	<p>Connector Protectors</p> <p>Package containing 10 pairs of 75Ω Coaxial Connector Protectors.</p>
03839410	<p>75Ω Triaxial/95 ohm Coaxial Male Connector Protector</p> <p>Placed onto the extension cable; attaches to the female connector protector on the 5 mm probe to provide environmental protection of connectors.</p>
03800001	<p>75Ω Coaxial Female Connector Protector</p> <p>Placed onto 3300 5mm probe leads; attaches to the male connector protector on the extension cable to provide environmental protection of connectors.</p>
163356	<p>Connector Crimp Tool Kit</p> <p>Includes 1 set of multi-connector inserts and connector installation instructions. Compatible only with 330153 connector kits or with probes shipped in 2003 or later with ClickLoc connectors uninstalled. Supplied with carrying case.</p>

Graphs

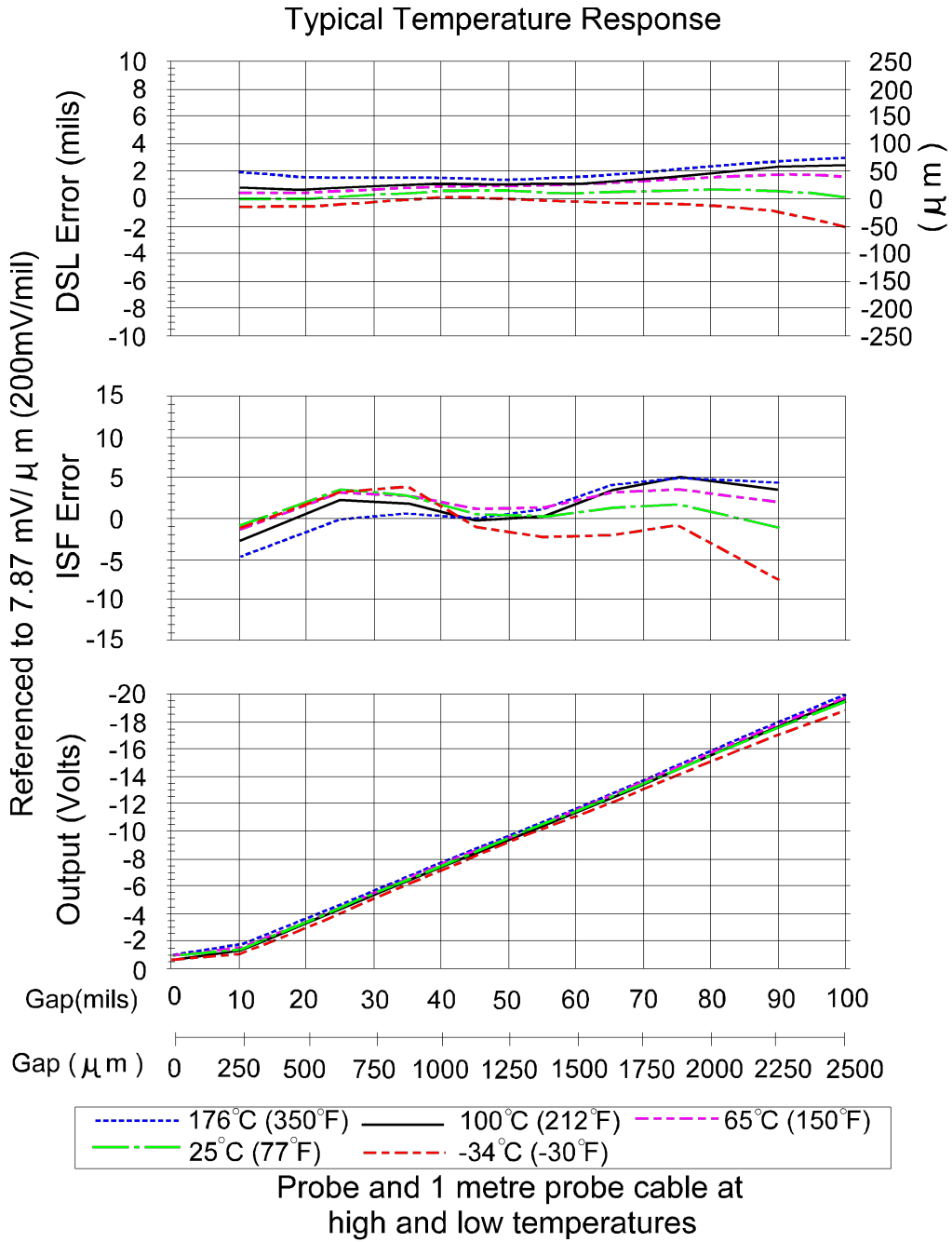


Figure 1: Typical 3300 5mm probe and 1 metre of cable at high and low temperatures (XL Proximitor Sensor and XL extension cable are at 25°C)

Typical Temperature Response

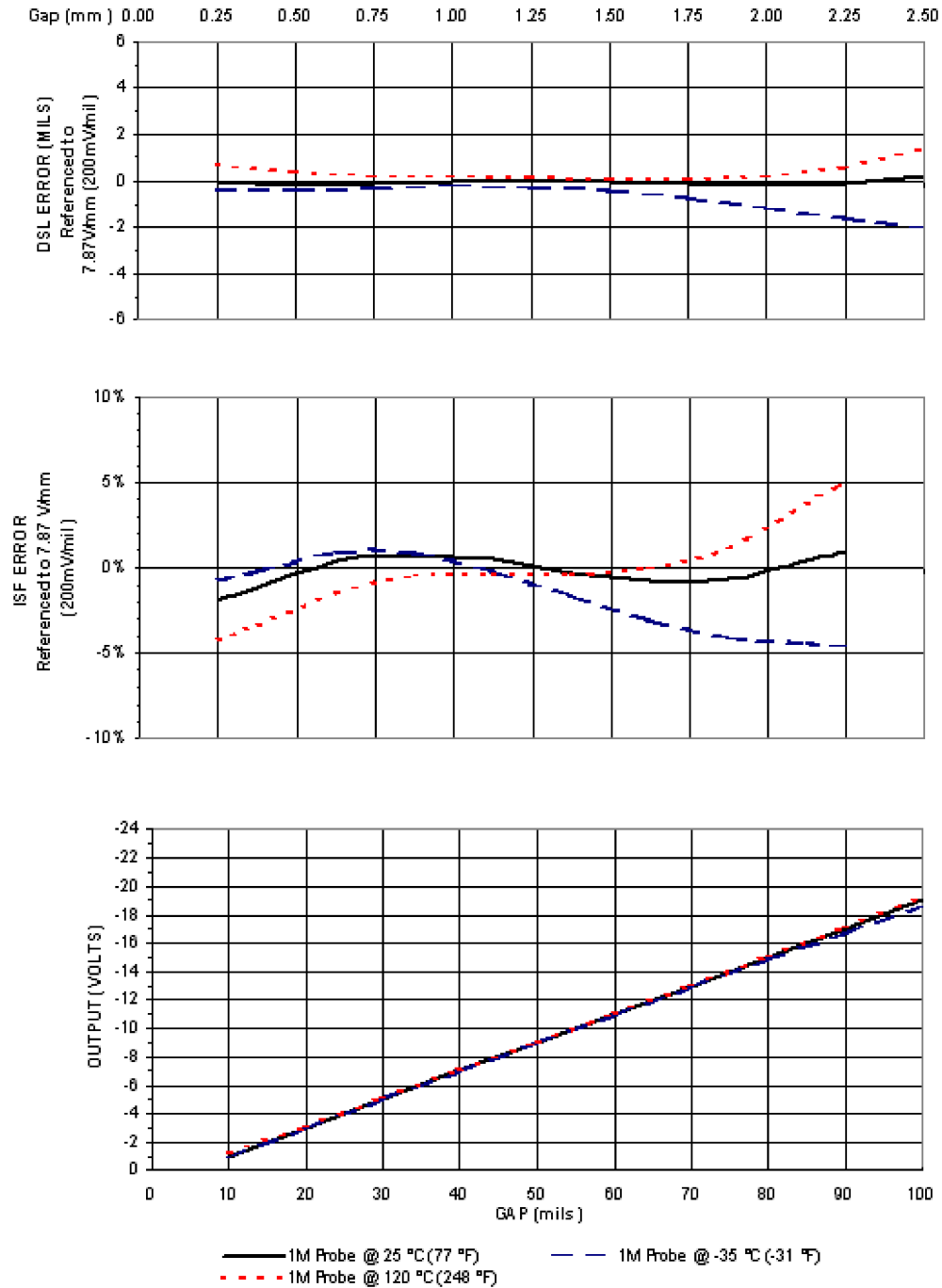
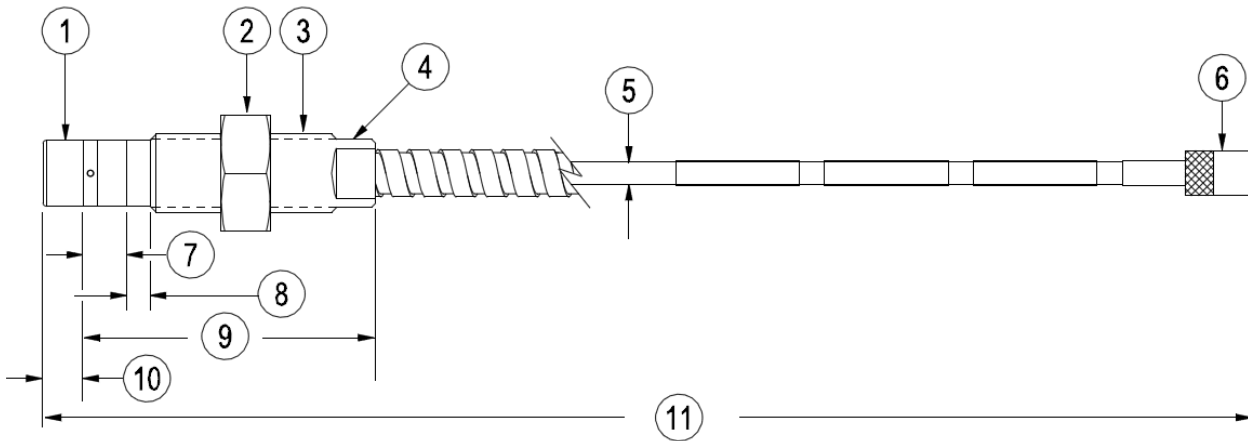


Figure 2: 3300 5 metre XL Proximity Sensor at high temperatures (3300 5mm probe and XL extension cable at 25° C)

Dimensional Diagrams



1. Probe tip, 5.2mm [0.21 in] diameter
2. 11.1 mm [7/16in] for 1/4-28 threads, 13.0mm [0.51in] for M8 thread. See Note 3.
3. Case thread
4. 5.6 [7/32] wrench flats for 1/4-28 threads, 7.0 [0.28] for M8 threads
5. 75Ω cable, 2.8mm [0.11 in] maximum outside diameter, 7.6mm [0.3 in] outside diameter of armor, 9.0mm [0.35in] maximum diameter of armor ferrule.
6. Miniature male coaxial connector, 7.23mm [0.285 in] maximum outside diameter "D"
7. 3.2 [0.13in]
8. Unthreaded length "A"
9. Case length "B"
10. 6.0mm [0.235in] maximum
11. Total length "C", =30%, -0%. See Note 8.

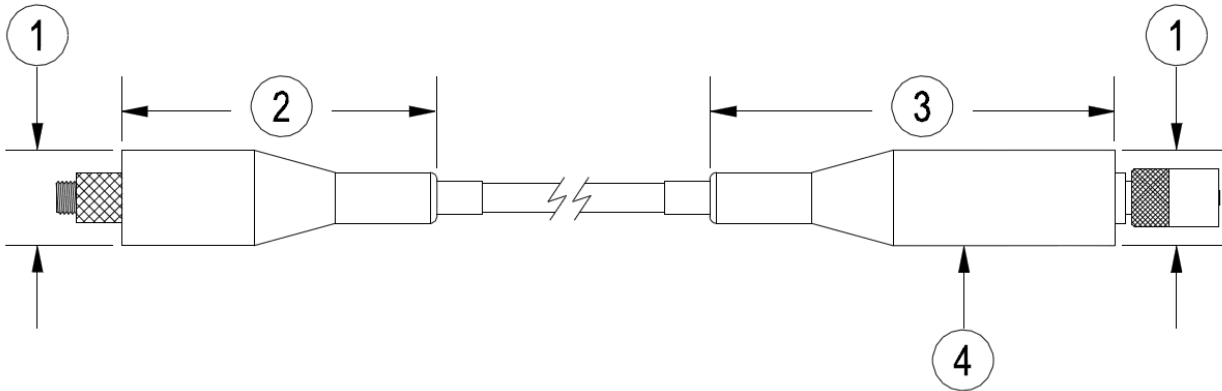
Figure 3: 3300 5mm Proximity Probes, Standard Mount³

330171, 1/4-28 UNF-2A, without armor⁷

330172, 1/4-28 UNF-2A, with armor⁶

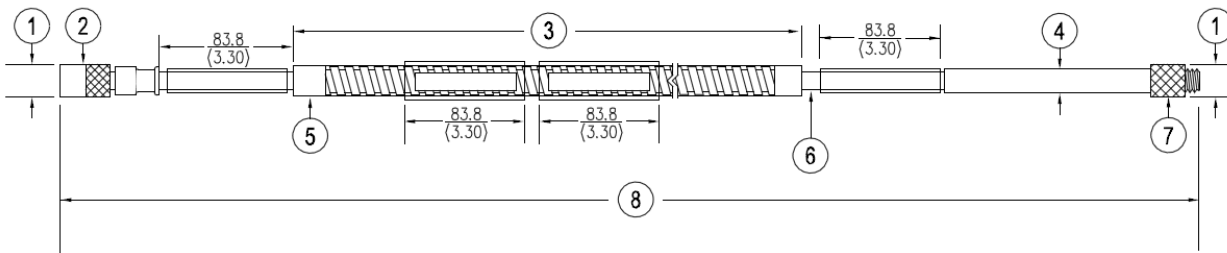
330173, M8X1 thread, without armor⁷

330174, M8X1 thread, with armor⁶



1. 12mm [0.40in] maximum diameter
2. 36.3mm [1.43in] maximum
3. 51.1mm [2.01in] maximum
4. Connector protector (fluorosilicone material)

Figure 4: Installed Connector Protectors



1. 7.2mm [0.25 in] maximum diameter
2. Miniature male coaxial connector
3. FEP or PFA coated armor. Armor length is 300mm [11.8in] less than cable length. See Note 5.
4. 75Ω cable, 3.7mm [0.15 in] maximum outside diameter, 3.9mm [0.16in] maximum diameter for FluidLoc* cable, 7.6mm [0.30in] maximum outside diameter or armor, 9.0mm [0.35in] maximum diameter of armor ferrule.
5. Stainless steel ferrules, 8.4mm [0.33in] diameter
6. Miniature female coaxial connector
7. Cable length, +20%, -0%

Figure 5: 3300 XL Extension Cable

330130, 3300 XL Extension Cable (FEP armor and insulation)

Notes:

1. All dimensions are in millimetres (inches) unless otherwise noted.
2. Standard mount 5mm probes supplied with 13 mm or 7/16-in lock nut.
3. Letters inside quotation marks refer to probe ordering options.
4. Stainless steel armor is supplied with FEP outer jacket for standard probes, PFA outer jacket for ETR probes.
5. FEP jacket is standard non-armored portion of the cable for standard probes, PFA jacket on non-armored portion for ETR probes.
6. Probes ordered with 5 or 9 metre integral cables have a length tolerance of +20%, -0%.
7. Five metre probes are designed for use with the five metre Proximity Sensor only.

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