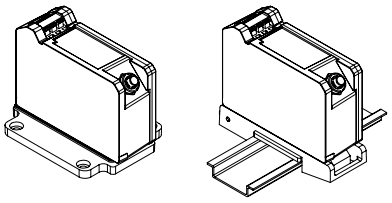
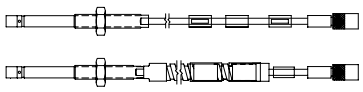
3300 5mm Transducer

Bently Nevada* Asset Condition Monitoring





Description

Transducer System

The 3300 5mm Proximity Transducer System consists of:

- a 3300 5 mm probe [1, 2]
- a 3300 XL extension cable (ref 141194-01)
- a 3300 XL Proximitor* Sensor [3, 4, 5] (ref 141194-01)

When combined with a 3300 XL Proximitor 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 applications[6].

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 Proximitor sensor, eliminating the need for individual component matching or bench calibration.

Proximity Probe

The 3300 5 mm probe improves upon previous designs. A patented TipLoc* molding method provides a more robust bond between the probe tip and the probe body.

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.

You can order 3300 5mm Probes and XL Extension Cables with connector protectors already installed, or we can supply the connector protectors separately for installation in the field (such as when you must run the cable through restrictive conduit). We recommend connector protectors for all installations to provide increased environmental protection[7].

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 8 mm probe. IYou should 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 8 mm 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 you to usea 4-hole mounting base to fit it t 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. Us 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. If you are considering using this transducer system for tachometer or over-speed measurements, consult www.ge-energy.com/bently for the application note regarding the use of eddy current proximity probes for over speed protection.
7. We provide silicone tape i with each 3300 XL extension cable. You can 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 1.27 mm (50 mils).

Electrical

XL Proximitor Sensor Input

Accepts one noncontacting 3300 5 mm 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
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

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).

Recommended Gap Setting

1.27 mm (50 mils).

Incremental Scale Factor

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

Deviation from best fit straight line (DSL)

Less than ±0.038 mm (±1.5 mil) typical deviation from best fit straight line.

Probe Temperature Stability (typical)

Over probe temperature range of -35 °C to +177 °C (-31 °F to +350 °F), the incremental scale factor remains within ±10% of 7.87 V/mm (200 mV/mil) and the deviation from the best fit straight line remains within ±0.076 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

15.2 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 2 separate transducer systems (cross-talk) will be less than 50 mV on shaft diameters of at least 50 mm (2 in) or greater. Care should be taken 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 result in a change in scale factor. Consult Performance Specification 155687 for additional information.

Effects of 60 Hz Magnetic Fields Up to 300 Gauss

See Table 3.

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

Gap	XL Proximitor 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
CSA Div 2	All	0.460	100.0	N/A

North America

3300 XL Proximitor 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 Proximitor 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 @ Ta= -51 °C to +100 °C.

Certificate number 1109248(LR 26744-222)

Europe

3300 XL Proximitor Sensor, ia:

II 1 G EEx ia IIC T4/T5. EC certificate number BAS99ATEX1101, when installed per drawing 141092.

3300 XL Proximitor Sensor, nA:

II 3 G Ex nA II T4/T5. EC certificate number Baseefa 07ATEX0189X, when installed per drawing 140979.

T5 @ Ta= -35 °C to +85 °C

T4 @ Ta= -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 Proximitor 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 Proximitor 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	-51ºC to +232ºC
T2	-51ºC to +177ºC
T3	-51ºC to +120ºC
T4	-51ºC to +80ºC
T5	-51ºC to +40ºC

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 Proximitor® 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

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

0.213 in

Hole Size

0.218 to 0.222 in

Hole Depth

0.376 to 0.750 in

Tap Size

#3

Recommended case hole and tap size for M8x1 case

Drill Size

7.5mm

Hole Size

7.625 to 7.72 mm

Hole Depth

12 to 24 mm

Tap Size

M8x1

Probe case torque

5.1 N·m (45 in·lb) recommended

7.3 N·m (65 in·lb) maximum

Connector-to-connector torque

Recommended torque

See Table 5.

Table 5: 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

Maximum torque

0.565 N•m (0.42 ft•lbf)

Minimum Cable Bend Radius

25.4 mm (1.0 in).

Weight

Total System

0.71 kg (1.6 lbm), 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 Proximitor Sensor

246 g (8.7 oz)

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 5 mm 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 you require a test of the pressure seal for your application.

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 LLC will not be held responsible for any damages resulting from leaking 3300 5 mm proximity probes. In addition, Bently Nevda LLC 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

3300 5 mm Proximity Probes

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

330172 3300 5 mm 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 0.8 in less than the case length.

Order in increments of 0.1in
Length configurations:
Maximum unthreaded length:
8 8 = 8.8 in
Minimum unthreaded length:
0 0 = 0.0 in
Example: 0 4 = 0.4 in

B: Overall Case Length Option

Order in increments of 0.1 in
Threaded length configurations:
Maximum case length:
9 6 = 9.6 in
Min. case length:
0 8 = 0.8 in
Example: 2 4 = 2.4 in

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet)[1]
9 0	9.0 metres (29.5 feet)

D: Connector Option

0 1	Miniature coaxial ClickLoc connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc connector, standard cable

E: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

3300 5mm Proximity Probes, Metric

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

330174 3300 5 mm 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 20 mm less than the case length.

Order in increments of 10 mm.
Length configuration:
Max. unthreaded length: **2 3** = 230 mm
Min. unthreaded length: **0 0** = 0.0 mm
Example: 0 6 = 60 mm.

B: Overall Case Length Option

Order in increments of 10 mm.
Metric thread configurations:
Maximum length:
2 5 = 250 mm
Minimum length:
0 2 = 20 mm
Examples: 0 6 = 60 mm.

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet) [1]
9 0	9.0 metres (29.5 feet)

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

0 2	1/4-28
0 3	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

0 2	1/4-28
0 3	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

0 2	1 ClickLoc male connector for 3300 XL 5mm and 8mm extension cable.
0 3	1 ClickLoc female connector for 3300 XL 5mm and 8mm extension cable.
0 4	1 ClickLoc male connector for 3300 5mm probe.

Accessories

02120015

Bulk field wire. 1.0 mm^2 (18 AWG), 3-conductor, twisted, shielded cable for connections between Proximitor Sensor and monitor.

03200006

Silicone self-fusing tape. 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.

40113-03

Connector Protector Kit. Connector Protector Kit for 3300 5mm probes, including connector protectors and installation tools.

136536-01

Connector Protector Adapter. Makes connector protector kits purchased prior to 1998 compatible with ClickLoc extension cable connectors.

40180-03

Connector Protectors. Package containing 10 pairs of 75Ω Coaxial Connector Protectors.

03839410

75Ω Triaxial/95 ohm Coaxial Male Connector Protector. Placed onto the extension cable; attaches to the female connector protector on the 5 mm probe to provide environmental protection of connectors.

03800001

75Ω Coaxial Female Connector Protector. Placed onto 3300 5mm probe leads; attaches to the male connector protector on the extension cable to provide environmental protection of connectors.

163356

Connector Crimp Tool Kit. 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.

Graphs

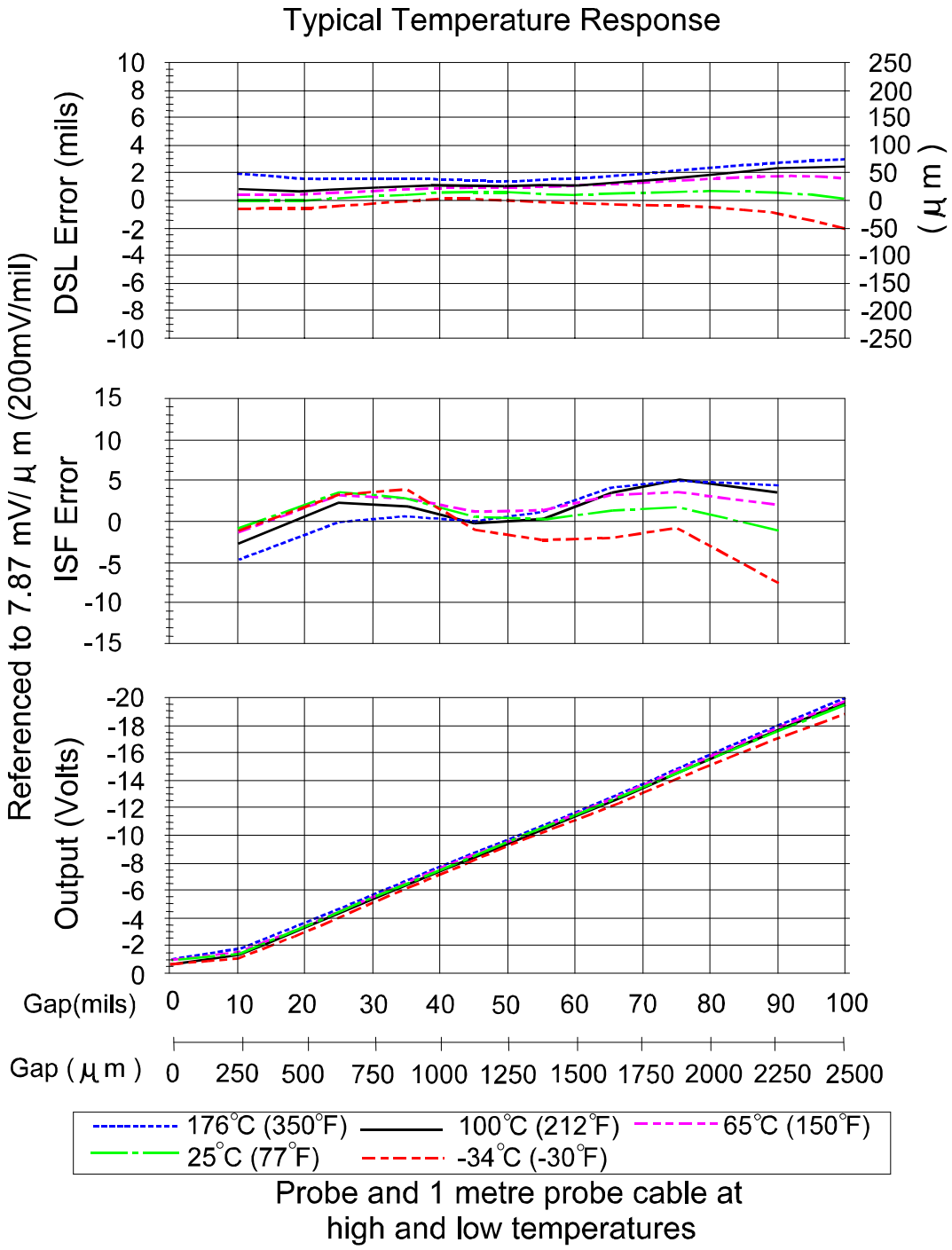


Figure 1 - Typical 3300 5 mm probe and 1 metre of cable at high and low temperatures (XL Proximitor Sensor and XL extension cable are at 25°C)

Typical Temperature Response

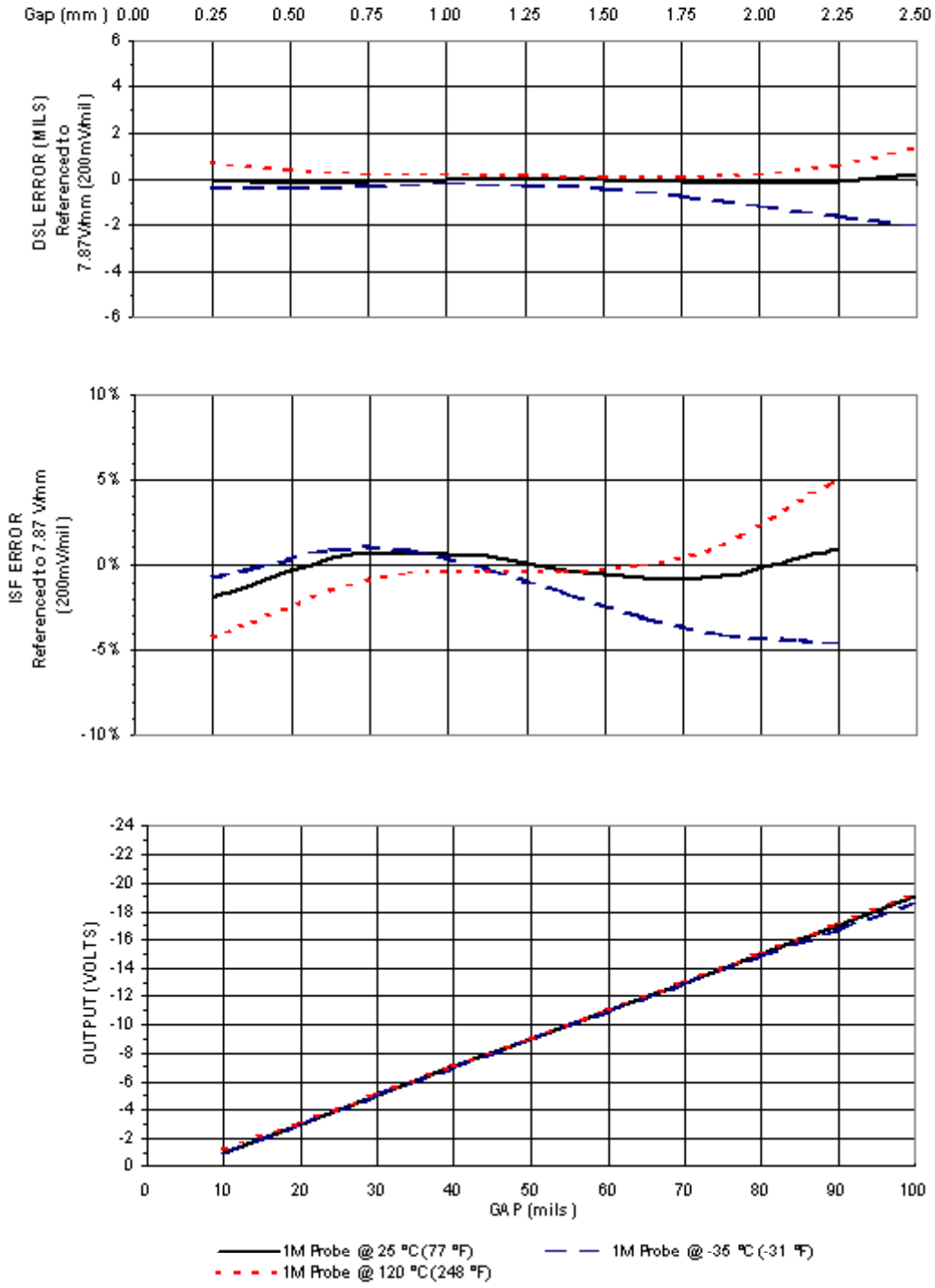
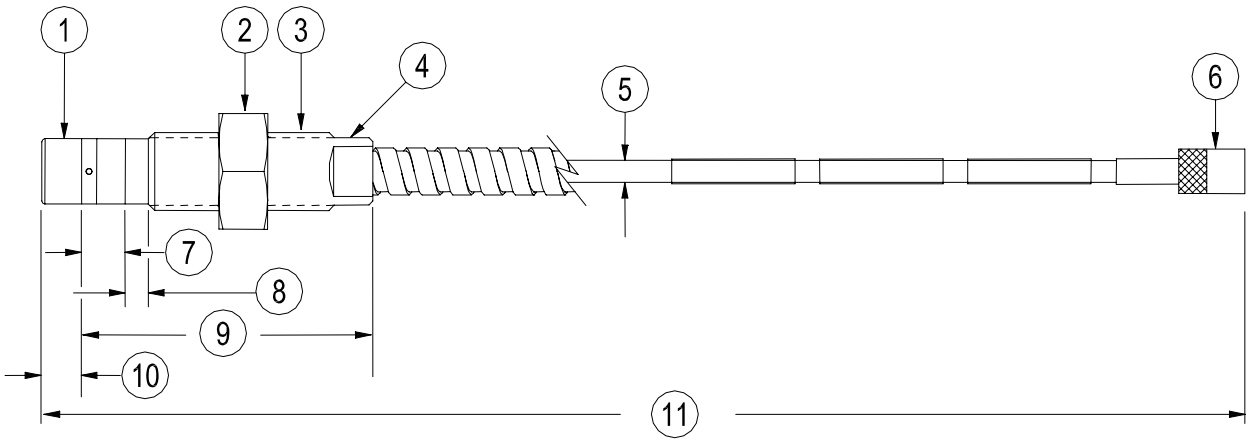


Figure 2 - 3300 5 metre XL Proximitor Sensor at high temperatures (3300 5mm probe and XL extension cable at 25° C)

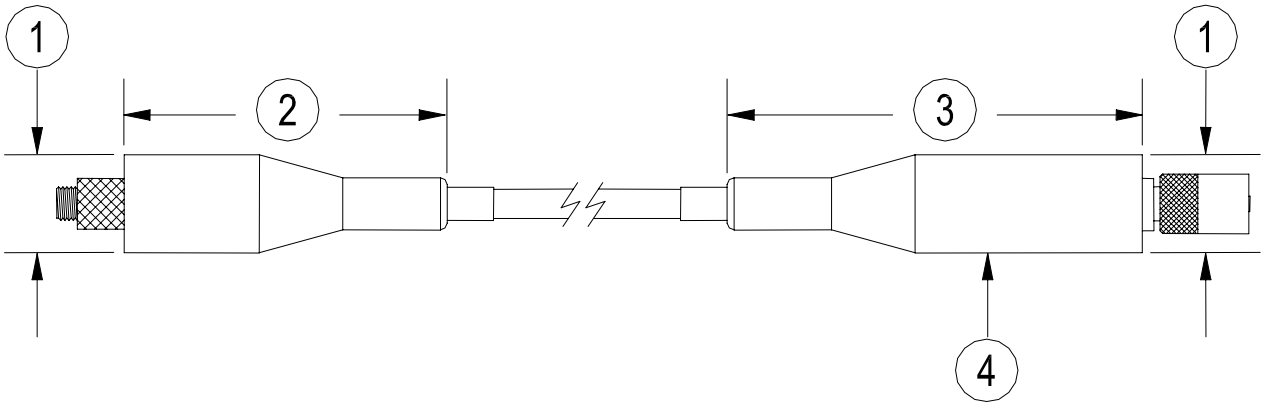
Dimensional diagrams



1. Probe tip, 5.2 mm [0,21 in] diameter
2. 11.1 mm [7/16 in] for 1/4-28 threads, 13.0 mm [0.51 in] 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, 2.8 mm [0.11 in] maximum outside diameter, 7.6 mm [0.3 in] outside diameter of armor, 9.0 mm [0.35 in] maximum diameter of armor ferrule.
6. Miniature male coaxial connector, 7.23 mm [0.285 in] maximum outside diameter "D"
7. 3.2 [0.13 in]
8. Unthreaded length "A"
9. Case length "B"
10. 6.0 mm [0.235 in] maximum
11. Total length "C", =30%, -0%. See Note 8.

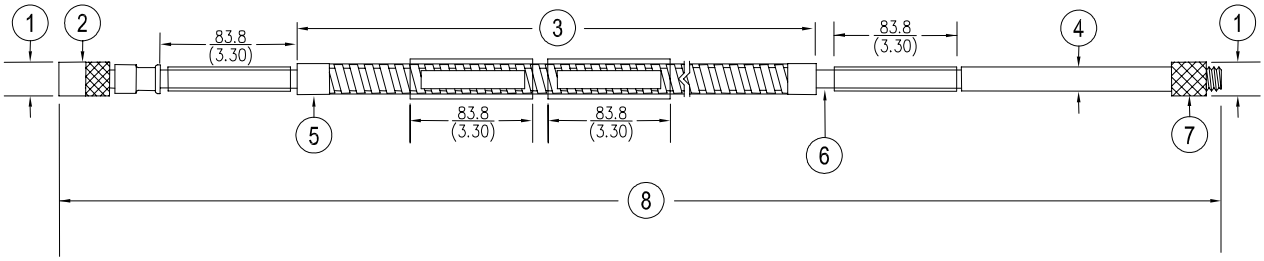
Figure 3 - 3300 5 mm Proximity Probes, Standard Mount[3]

330171, 1/4-28 UNF-2A, without armor[7]
330172, 1/4-28 UNF-2A, with armor[6]
330173, M8X1 thread, without armor[7]
330174, M8X1 thread, with armor[6]



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

Figure 4 - Installed Connector Protectors



1. 7.2 mm [0.25 in] maximum diameter
2. Miniature male coaxial connector
3. FEP or PFA coated armor. Armor length is 300 mm [11.8 in] less than cable length. See Note 6.
4. 75Ω cable, 3.7 mm [0.15 in] maximum outside diameter, 3.9 mm [0.16 in] maximum diameter for FluidLoc* cable, 7.6 mm [0.30 in] maximum outside diameter or armor, 9.0 mm [0.35 in] maximum diameter of armor ferrule.
5. Stainless steel ferrules, 8.4 mm [0.33] 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.
3. Standard mount 5 mm probes supplied with 13 mm or 7/16-in lock nut.
5. Letters inside quotation marks refer to probe ordering options.
6. Stainless steel armor is supplied with FEP outer jacket for standard probes, PFA outer jacket for ETR probes.

7. FEP jacket is standard non-armored portion of the cable for standard probes, PFA jacket on non-armored portion for ETR probes.

8. Probes ordered with 5 or 9 metre integral cables have a length tolerance of +20%, -0%.

9. Five metre probes are designed for use with the five metre Proximitor Sensor only.

Add notes for missing numbers, even if it is something like “Deleted” or “Note removed”, or renumber the notes in the document.

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