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Описание на бесконтактные датчики близости. Модель 3300 XL 11mm



BENTLY
Nevada

3300 XL 11mm Proximity Transducer System

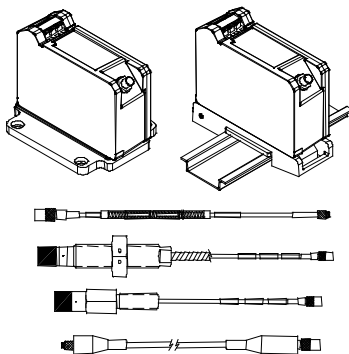
Bently Nevada* Asset Condition Monitoring

Description

Transducer System

The 3300 XL 11 mm Proximity Transducer System consists of:

- 3300 XL 11 mm probe
- 3300 XL 11 mm extension cable
- 3300 XL 11 mm Proximitor* Sensor¹



The 3300 XL 11 mm Proximity Transducer System has a 3.94 V/mm (100 mV/mil) output for non-contacting vibration and displacement measurements on fluid film bearing machines. The large 11 mm tip enables this transducer system to have a longer linear range compared to our standard 3300 XL 8 mm Transducer System. It is primarily used in the following applications where the longer linear range is necessary:

- Axial (thrust) position measurements
- Ramp differential expansion measurements on steam turbines
- Rod position or rod drop measurements on reciprocating compressors
- Tachometer and zero speed measurements
- Phase reference (Keyphasor*) signals

The 3300 XL 11 mm Proximitor Sensor is designed to replace the 7200-series 11 mm and 14 mm Transducer Systems. When upgrading from the 7200-series system to the 3300 XL 11 mm system, every component must be replaced with 3300 XL 11 mm components. In addition, the monitoring system must be updated. If using a 3500 Monitoring System, an updated version of the configuration software that lists the 3300 XL 11 mm Transducer System as a compatible option is required. Existing 3300 Monitoring Systems may need a modification. Contact your local sales and service representative for assistance.

Application Advisory: The 3300 XL 11 mm Proximity Transducer is designed for measuring position or vibration within a frequency range of 0 to 8 kHz. Typical applications of this system include radial vibration and position, axial position and Keyphasor measurements.

Although the terminals and connector on the Proximitor sensor have protection against electrostatic discharge, take reasonable precautions to avoid electrostatic discharge during handling.



Specifications and Ordering Information
Part Number 146256-01
Rev. F (08/14)

Proximitor Sensor

The 3300 XL 11 mm Proximitor Sensor has the same advanced features found in the 3300 XL 8 mm Proximitor Sensor. Its thin design allows it to be mounted in either a high-density DIN-rail installation or a more traditional panel mount configuration. Improved RFI/EMI immunity allows the 3300 XL Proximitor Sensor to achieve European CE mark approvals without any special mounting considerations. This RFI immunity also prevents the transducer system from being adversely affected by nearby high frequency radio signals. SpringLoc terminal strips on the Proximitor Sensor require no special installation tools and facilitate faster, highly robust field wiring connections.

Proximity Probe and Extension Cable

The 3300 XL 11 mm probe comes in varying probe case configurations, including armored and unarmored ½-20, ⅝-18, M14 X 1.5 and M16 X 1.5 probe threads. The reverse mount 3300 XL 11 mm probe comes standard with either ⅜-24 or M10 X 1 threads. All components of the transducer system have gold-plated brass ClickLoc* connectors. ClickLoc connectors lock into place, preventing the connection from becoming loose. The patented TipLoc* molding method provides a robust bond between the probe tip and the probe body. The probe cable is securely attached to the probe tip utilizing our patented CableLoc* design that provides 330 N (75 lb) pull strength.

3300 XL Probes and Extension Cables can also be ordered with a FluidLoc* cable option. This option prevents oil and other liquids from leaking out of the machine through the cable's interior. The connector protector option provides additional protection of the connectors in a humid or moist environment. Connector protectors are recommended for all installations and provide increased environmental protection². Additionally, the 3300 XL 11 mm probe comes standard with a locknut with predrilled safety wire holes.

Notes:

1. Proximitor Sensors are supplied by default from the factory calibrated to AISI 4140 steel. Calibration to other target materials is available upon request.
2. Silicone tape is also provided with each 3300 XL extension cable and can be used instead of connector protectors. Silicone tape is not recommended in applications where the probe-to-extension cable connection will be exposed to turbine oil.

Specifications

Unless otherwise noted, the following specifications are for a 3300 XL 11 mm Proximitor Sensor, extension cable and probe between 0°C and +45°C (+32°F to +113°F), with a -24 Vdc power supply, a 10 kΩ load, our 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 our AISI 4140 steel target.

Electrical

Proximitor Sensor Input

Accepts one non-contacting 3300 XL 11 mm Proximity Probe and Extension Cable.

Power

Requires -17.5 Vdc to -26 Vdc without barriers 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

Probe dc resistance:

Probe Length (m)	Resistance from the Center Conductor to the Outer Conductor (R _{PROBE}) (ohms)
1.0	5.9 ± 0.5
5.0	7.2 ± 0.8
9.0	8.5 ± 1.1

Extension cable dc resistance:

Length of Extension Cable (m)	Resistance from Center Conductor to Center Conductor (R _{CORE}) (ohms)	Resistance from Coaxial Conductor to Coaxial Conductor (R _{JACKET}) (ohms)
4.0	1.0 ± 0.25	0.3 ± 0.1
8.0	2.0 ± 0.5	0.6 ± 0.2

Extension cable capacitance:

69.9 pF/m (21.3 pF/ft) typical

Field wiring:

0.2 to 1.5 mm² (16 to 24 AWG) [0.25 to 0.75 mm² (18 to 23 AWG) with ferrules]. Recommend using three-conductor shielded triad cable. Maximum length of 305 metres (1,000 feet) between the 3300 XL Proximitor Sensor and the monitor. See the frequency response graph for signal rolloff at high frequencies when using longer field wiring lengths.

Linear Range:

4.0 mm (160 mils). Linear range begins at approximately 0.5 mm (20 mils) from target and is from 0.5 to 4.5 mm (20 to 180 mils) (approximately -1 to -17 Vdc). Extended Deviation from Straight Line (DSL) range is from approximately 0.5 to 5.0 mm (20 to 200 mils) (-1 to -19 Vdc). The extended DSL range is not applicable when using zener barriers.

Recommended Gap Setting:

2.5 mm (100 mils)

Incremental Scale Factor (ISF)

3.94 V/mm (100 mV/mil) ±10% including interchangeability error when measured in increments of 0.5 mm (20 mils) over the 4.0 mm (160 mil) linear range.

Deviation from best fit straight line (DSL)

Standard DSL range:

Less than ±0.10 mm (±4 mils).

Extended DSL range:

Less than ±0.15 mm (±6 mils).

System Performance over extended temperatures:

Over a probe temperature range of -35°C to +120°C (-31°F to +248°F) with the Proximito Sensor and extension cable between 0°C to +45°C (+32°F to +113°F), the ISF remains within ±25% of 3.94 V/mm (100 mV/mil), the DSL remains within ±0.51 mm (±20 mils) and the extended range DSL remains within ±0.59 mm (±23 mils)

Over a Proximito*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 ±25% of 3.94 V/mm (100 mV/mil), the DSL remains within ±0.51 mm (±20 mils) and the extended range DSL remains within ±0.59 mm (±23 mils)

Frequency Response:

0 to 8 kHz: +0, -3 dB typical, with up to 305 metres (1000 feet) of field wiring.

Recommended Minimum Target Size:

30.5 mm (1.2 in) diameter (flat target)

Recommended Minimum Shaft Diameter

152 mm (6.0 in)

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 144979 for additional information.

Effects of 60 Hz Magnetic Fields Up to 300 Gauss (5 metre system):

Output voltage in mil pp/gauss:

Gap	Proximito Sensor	Probe	Ext. Cable
0.5 mm (20 mil)	0.006	0.001	0.001
2.5 mm (100 mil)	0.033	0.009	0.005
4.6 mm (180 mil)	0.033	0.027	0.007

Electrical Classification:

Complies with the European CE mark.

Hazardous Area Approvals

Multiple approvals for hazardous areas certified by Canadian Standards Association (CSA/NRTL/C) in North America and by BASEEFA/CENELEC in Europe.


North America:

Class I, Zone 0; Ex ia IIC T1...T5 Ga for Class I, Groups A, B, C and D; Class II, Groups E, F and G; Class III when installed with intrinsically safe Certified barriers, or galvanic isolators, per drawing 141092.

Class I, Zone 2; Ex nA IIC T1...T5 Gc for Class I, Div. 2, Groups A, B, C and D when installed without barriers or galvanic isolators per drawing 140979.

T1 -51°C ≤ Ta ≤ +232°C
T2 -51°C ≤ Ta ≤ +177°C
T3 -51°C ≤ Ta ≤ +120°C
T4 -51°C ≤ Ta ≤ +80°C
T5 -51°C ≤ Ta ≤ +40°C

Europe:

 II 1 G Ex ia IIC T4/T5 Ga, Group IIC, Baseefa certificate number BAS99ATEX1101 when installed with intrinsically safe zener barriers or galvanic isolators.

 II 3 G Ex nA IIC T4/T5 Gc, Group IIC, Baseefa certificate number Baseefa07ATEX0189X.

T4 @ Ta = -51°C to +100°C
T5 @ Ta = -35°C to +85°C

Mechanical

Probe Tip Material:

Polyphenylene sulfide (PPS).

Probe Case Material:

AISI 304 stainless steel (SST).

Probe Cable Specifications:

75 Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 1, 5 or 9 metres.

Extension Cable Material:

75 Ω triaxial, fluoroethylene propylene (FEP) insulated.

Proximator*

Sensor Material:

A380 aluminum

System Length:

5 or 9 metres including extension cable

Extension Cable Armor (optional):

Flexible AISI 302 SST with FEP outer jacket.

Tensile Strength (maximum rated):

330 N (75 pounds) probe case to probe lead. 270 N (60 pounds) at probe lead to extension cable connectors.

Connector material:

Gold-plated brass

Probe case torque:	Maximum Rated	Recommended
½-20 and ⅝-18 probe cases	45.2 N•m (400 in•lb)	15.0 N•m (133 in•lb)
M14x1.5 and M16x1.5 probe cases	63.3 N•m (560 in•lb)	21.1 N•m (187 in•lb)
Reverse mount probes	22.6 N•m (200 in•lb)	7.5 N•m (66 in•lb)

Connector-to-connector torque

Recommended torque:

Finger tight

Maximum torque:

0.565 N•m (5 in•lb)

Minimum Bend Radius (with or without sst armor):

25.4 mm (1.0 in)

System Weight (typical):

Probe:

70 g (2.5 oz) (minimum length case, 1m lead, no armor)

170 g (6.0 oz) (minimum length case, 1m lead, with armor)

For longer case lengths add 1.1 g/mm (1.0 oz/in).

For 5 m probe length add 180 g (6 oz) for non-armored probe or 560 g (20 oz) for armored probe.

For 9 m probe length add 360 g (12 oz) for non-armored probe or 1120 g (40 oz) for armored probe.

Extension Cable:

45 g/m (0.5 oz/ft)

Armored Extension cable:

140 g/m (1.5 oz/ft)

Proximator Sensor:

255 g (9 oz)

Environmental Limits

Probe Temperature Range

Operating and Storage Temperature:

-51°C to +177°C (-60°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

Operating and Storage Temperature:

-51°C to +177°C (-60°F to +351°F)

Proximator 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)

Relative Humidity:

100% condensing, non-submersible when connectors are protected. Tested to IEC 68-2-3 damp heat.

Probe Pressure:

3300 XL 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

Note: 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 LLC will not be held responsible for any damages resulting from leaking 3300 XL proximity probes. In addition, 3300 XL proximity probes will not be replaced under the service plan due to probe leakage.

Patents:

5,016,343

5,126,664

5,351,388

5,685,884

Components or procedures described in these patents apply to this product.

Ordering Information

3300 XL 11 mm Proximity Probes:

330701 3300 XL 11 mm Probe, 1/2-20 UNF thread, without armor

330702 3300 XL 11 mm Probe, 1/2-20 UNF thread, with armor

330707 3300 XL 11 mm Probe, 5/8-18 UNF thread, without armor

330708 3300 XL 11 mm Probe, 5/8-18 UNF thread, with armor

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

Option Descriptions

A: Unthreaded Length Option

Note: Unthreaded length must be at least 1.0 inch less than the case length.

Order in increments of 0.1 in

Length configurations:

Maximum unthreaded length: 8.9 in

Minimum unthreaded length: 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: 9.9 in

Minimum case length: 1.0 in

Example: 2 4 = 2.4 in

C: Total Length Option

1 0 1.0 metre (3.3 feet)

5 0 5.0 metres (16.4 feet)

9 0 9.0 metres (29.5 feet)

Note: Five metre probes are designed for use with the five metre Proximator Sensor only.

D: Connector and Cable-Type Option

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

0 2 Miniature coaxial ClickLoc connector, standard cable

1 1 Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable

1 2 Miniature coaxial ClickLoc connector, FluidLoc cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 XL 11 mm Proximity Probes, Metric:

330703 3300 XL 11 mm Probe, M14 x 1.5 thread, without armor

330704 3300 XL 11 mm Probe, M14 x 1.5 thread, with armor

330709 3300 XL 11 mm Probe, M16 x 1.5 thread, without armor

330710 3300 XL 11 mm Probe, M16 x 1.5 thread, with armor

Part Number-AXXX-BXXX-CXX-DXX-EXX

Option Descriptions

A: Unthreaded Length Option

Note: Unthreaded length must be at least 26 mm less than the case length.

Order in increments of 2 mm.

Length configuration:

Maximum unthreaded length: 224

mm

Minimum unthreaded length: 0 mm

Example: 0 6 0 = 60 mm

B: Overall Case Length Option

Order in increments of 2 mm.

Metric thread configurations:

Maximum length: 250 mm

Minimum length: 26 mm

Example: 0 6 0 = 60 mm

C: Total Length Option

1 0 1.0 metre (3.3 feet)

5 0 5.0 metres (16.4 feet)

9 0 9.0 metres (29.5 feet)

Note: Five metre probes are designed for use with the five metre Proximator Sensor only.

D: Connector and Cable-Type Option

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

0 2 Miniature coaxial ClickLoc connector, standard cable

1 1 Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable

1 2 Miniature coaxial ClickLoc connector, FluidLoc cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 XL 11 mm Reverse Mount Probe

330705-02-18- CXX-DXX-EXX, 3/8-24 UNF threads

330706-005-046- CXX-DXX-EXX, M10 x 1 threads

Option Descriptions

C: Total Length Option

10	1.0 metre (3.3 feet)
50	5.0 metres (16.4 feet)
90	9.0 metres (29.5 feet)

Note: Five metre probes are designed for use with the five metre Proximity Sensor only.

D: Connector Option

02	Miniature ClickLoc coaxial connector
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E: Agency Approval Option

00	Not required
05	Multiple Approvals

Note: For a shorter delivery time, order commonly stocked probes. Currently, stocked probes consist of the following part numbers: 330701-00-10-10-02-00, 330701-00-20-10-02-00, 330703-000-050-10-02-00, 330705-02-18-10-02-00, 330706-005-046-10-02-00.

3300 XL 11 mm Proximity Sensor

330780-AXX-BXX

Option Descriptions

A: Total Length and Mounting Option

50	5.0 metre (16.4 feet) system length, panel mount
51	5.0 metre (16.4 feet) system length, DIN mount
52	5.0 metre (16.4 feet) system length, no mounting hardware
90	9.0 metres (29.5 feet) system length, panel mount
91	9.0 metres (29.5 feet) system length, DIN mount
92	9.0 metres (29.5 feet) system length, no mounting hardware

B: Agency Approval Option

00	Not required
05	Multiple approvals

Country specific approvals may be available, consult your local Customer Care Representative for more information.

3300 XL 11 mm Extension Cable

330730-AXXX-BXX-CXX

Note: Make sure that the extension cable length and the probe length, when added together, equal the Proximity Sensor total length.

Option Descriptions

A: Cable Length Option

040	4.0 metres (13.1 feet)
080	8.0 metres (26.2 feet)

B: Connector and Cable Option

00	Standard cable
01	Armored cable
02	Standard cable with connector protectors
03	Armored cable with connector protectors
10	FluidLoc cable
11	Armored FluidLoc cable
12	FluidLoc cable with connector protectors
13	Armored FluidLoc cable with connector protectors

C: Agency Approval Option

00	Not required
05	Multiple Approvals

Accessories

146255-01

Manual

144979

Performance Specification

02120015

Bulk field wire. 1.0 mm² (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.

02173009

Bulk field wire. 1.0 mm² (18 AWG), 3 conductor, twisted, shielded cable. Specify length in feet.

138492-01

Replacement panel-mount mounting pad

138493-01

Replacement DIN-mount mounting pad

Specifications and Ordering Information
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01609137	BNC (F) to banana plugs	40180-02	Connector Protectors. Package contains 10 pairs of connector protectors.
01609138	Proximitor Connector Test Pin wiring (two test pins to a BNC (F) connector)	03839410	
40971-04	50 Ω cable with two BNC (M) connectors. Use this cable in combination with adapter 01609137 and adapter 01609138 when checking performance of the transducer system from the Proximitor Sensor test pin holes.	03839420	Male Connector Protector. Placed on the extension cable to connect to the female connector protector on the probe and provide environmental protection of connectors.
04310310	3300 XL Proximitor Sensor Panel-mount Screws. Package includes four 6-32 UNC thread forming mounting screws (Supplied standard with 3300 XL Proximitor Housings [3300 XL option]).		Female Connector Protector. Placed on the probe lead to connect to the male connector protector on the extension cable and provide environmental protection of connectors. Also placed on the extension cable to slide over the Proximitor Sensor connection and protect it from the environment.
03200006	Silicone self-fusing tape. A 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.	330153-01	3300 XL Connector Kit. Used on 3300 XL probes and extension cables. Contains one set of male and female ClickLoc* connectors, sleeves and one strip of silicone tape.
40113-02	Connector Protector Kit. Connector Protector Kit for 3300 XL probes and extension cables, including connector protectors and installation tools.	163356	Connector Crimp Tool Kit. Includes one set of 75 Ω 3300 XL ClickLoc* inserts and connector installation instructions. Supplied with carrying case.
136536-01	Connector Protector Adapter. Makes our previous 3300 connector protector kits compatible with 3300 XL probes and extension cable connectors.		

Graphs and Dimensional Drawings

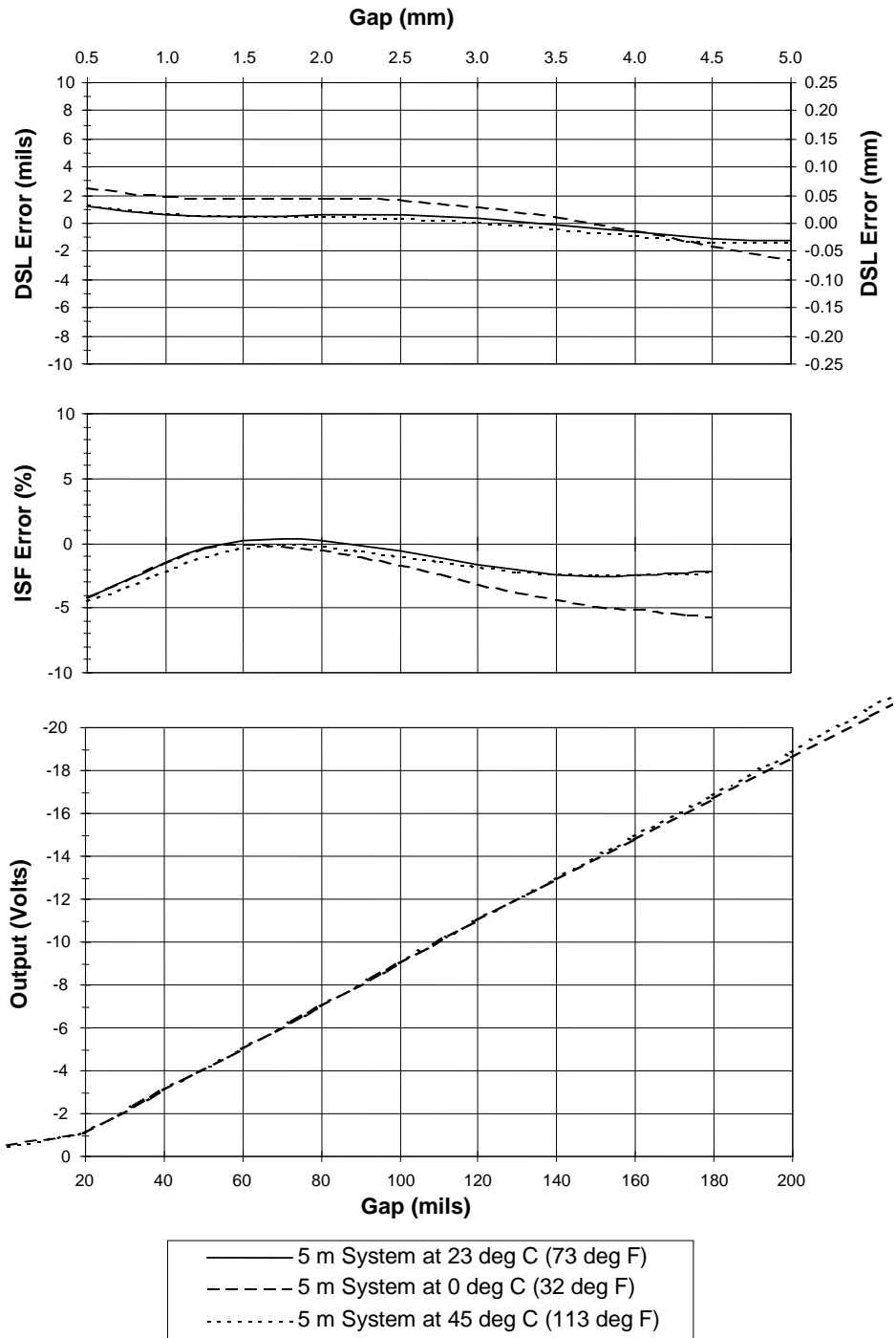


Figure 1 Typical 3300 XL 11 mm 5 m System Over Ambient Testing Range

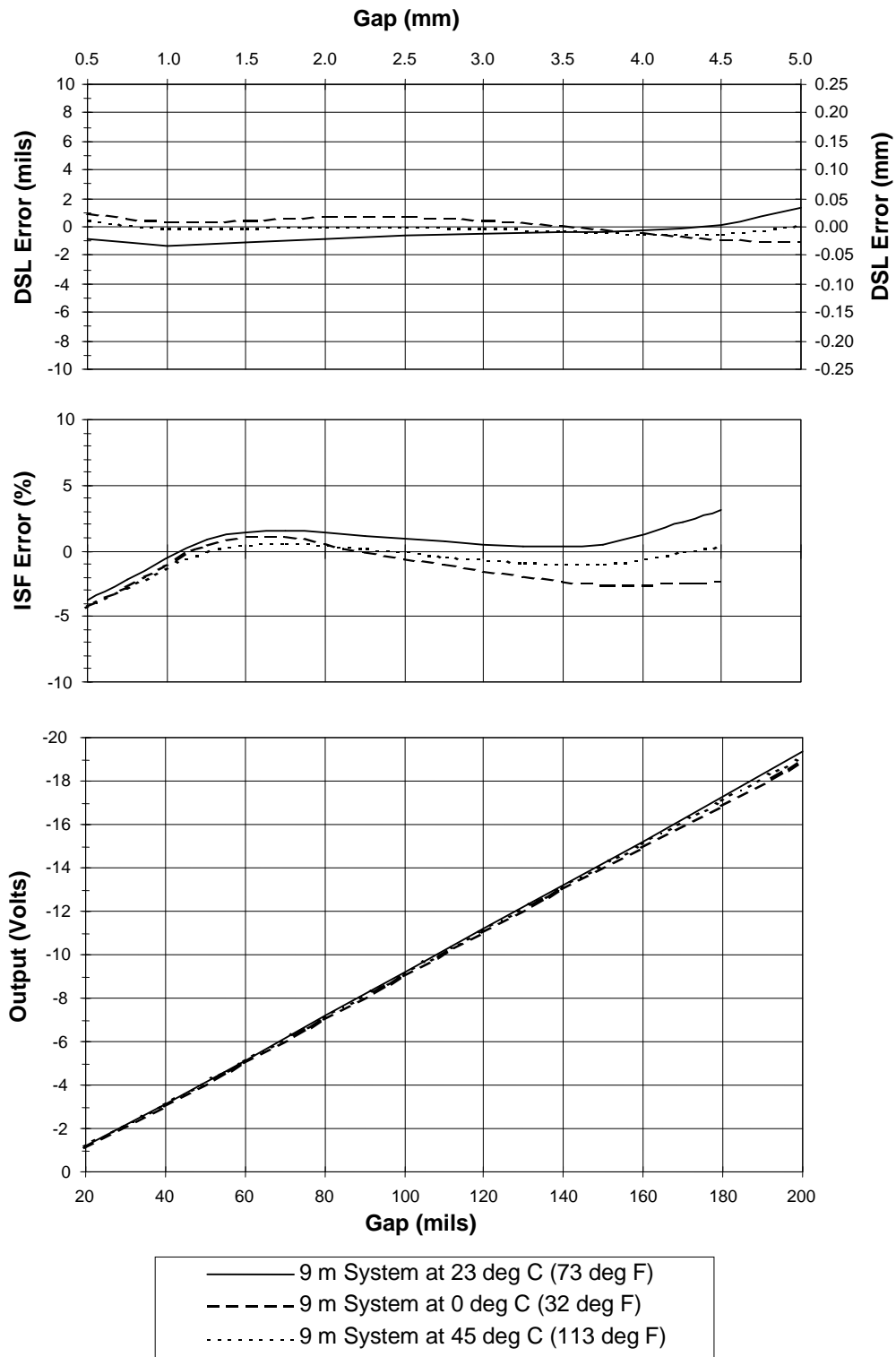


Figure 2 Typical 3300 XL 11 mm 9 m System Over Ambient Testing Range

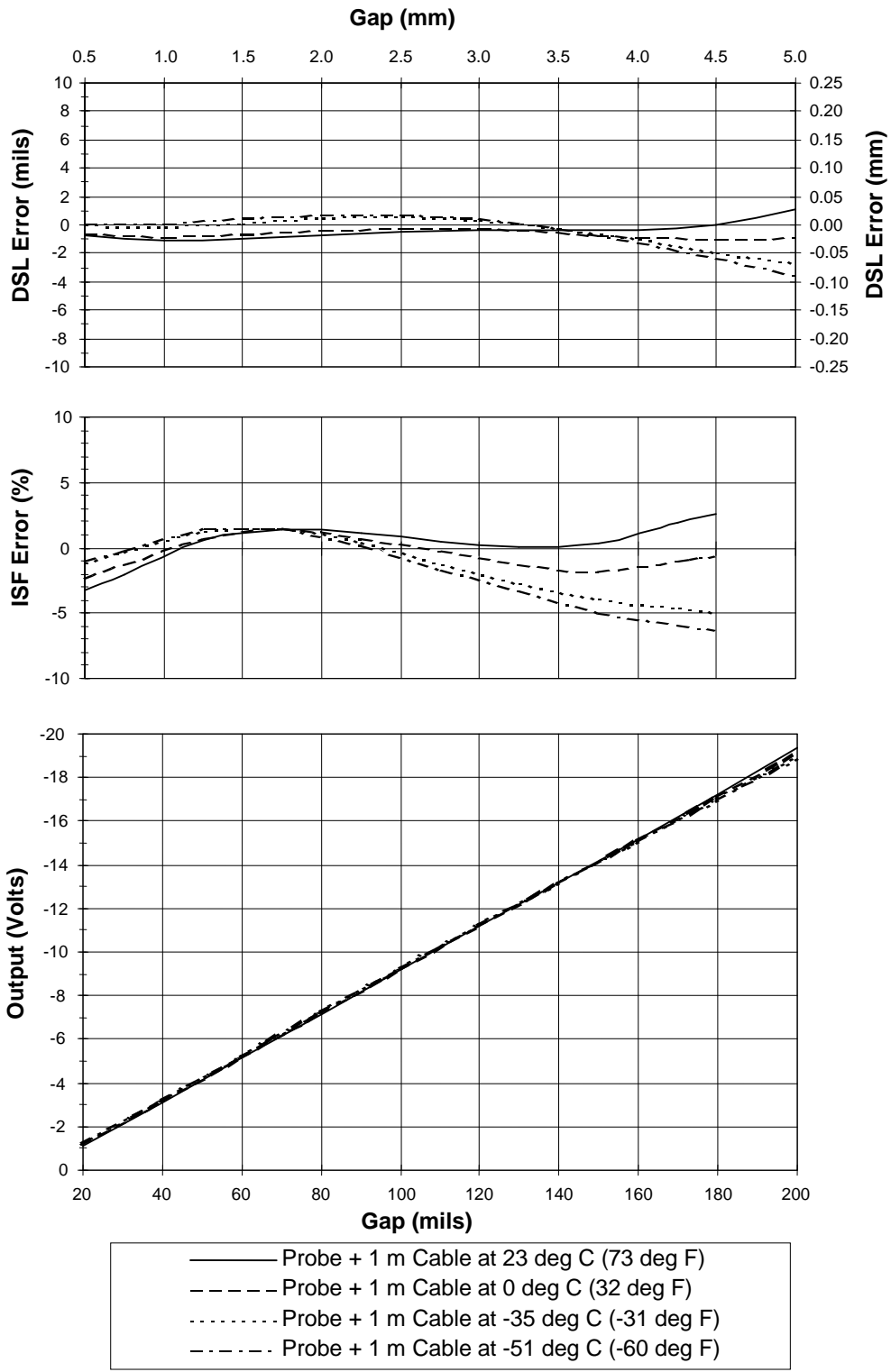


Figure 3 Typical 3300 XL 11 mm Probe + 1m Cable @ Low Temperature
(Proximitor Sensor + 4m of Extension Cable @ 25 °C)

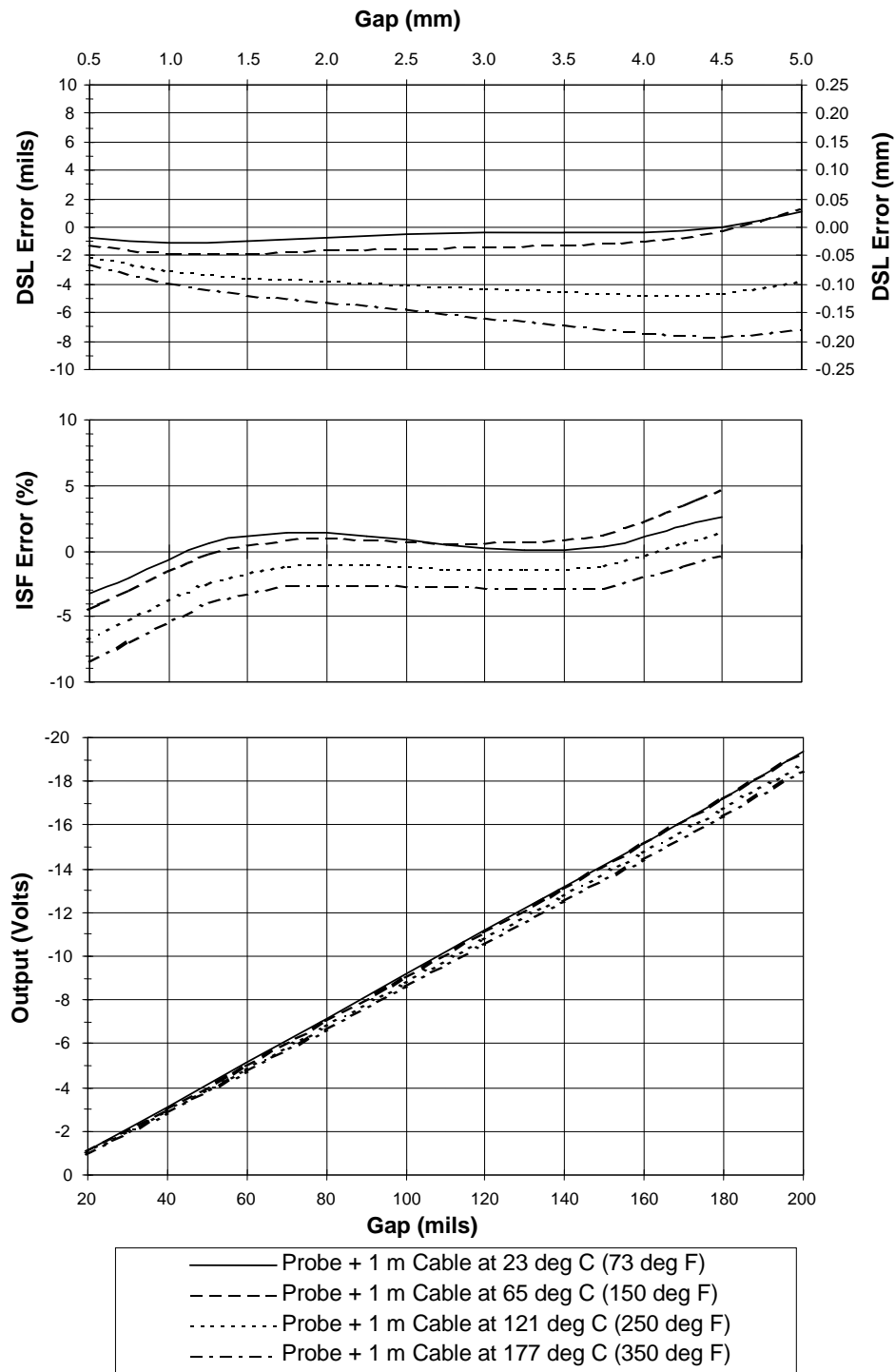


Figure 4 Typical 3300 XL 11 mm Probe + 1m Cable @ High Temperature
 (Proximitor Sensor + 4m of Extension Cable @ 25 °C)

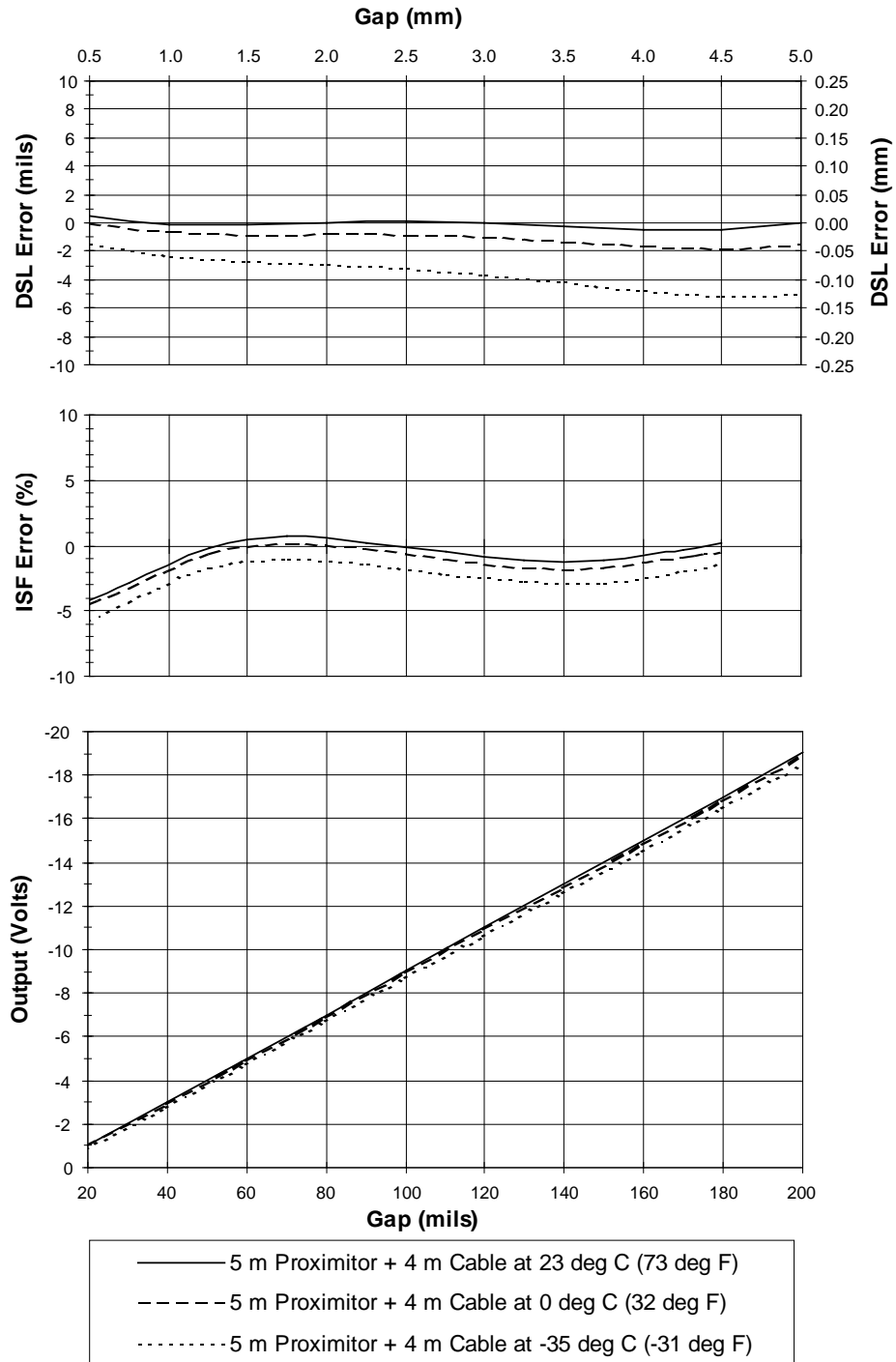


Figure 5 Typical 3300 XL 11 mm 5 m Proximito Sensor with 4 m of Extension Cable @ Cold Temperature (Probe is at 25°C)

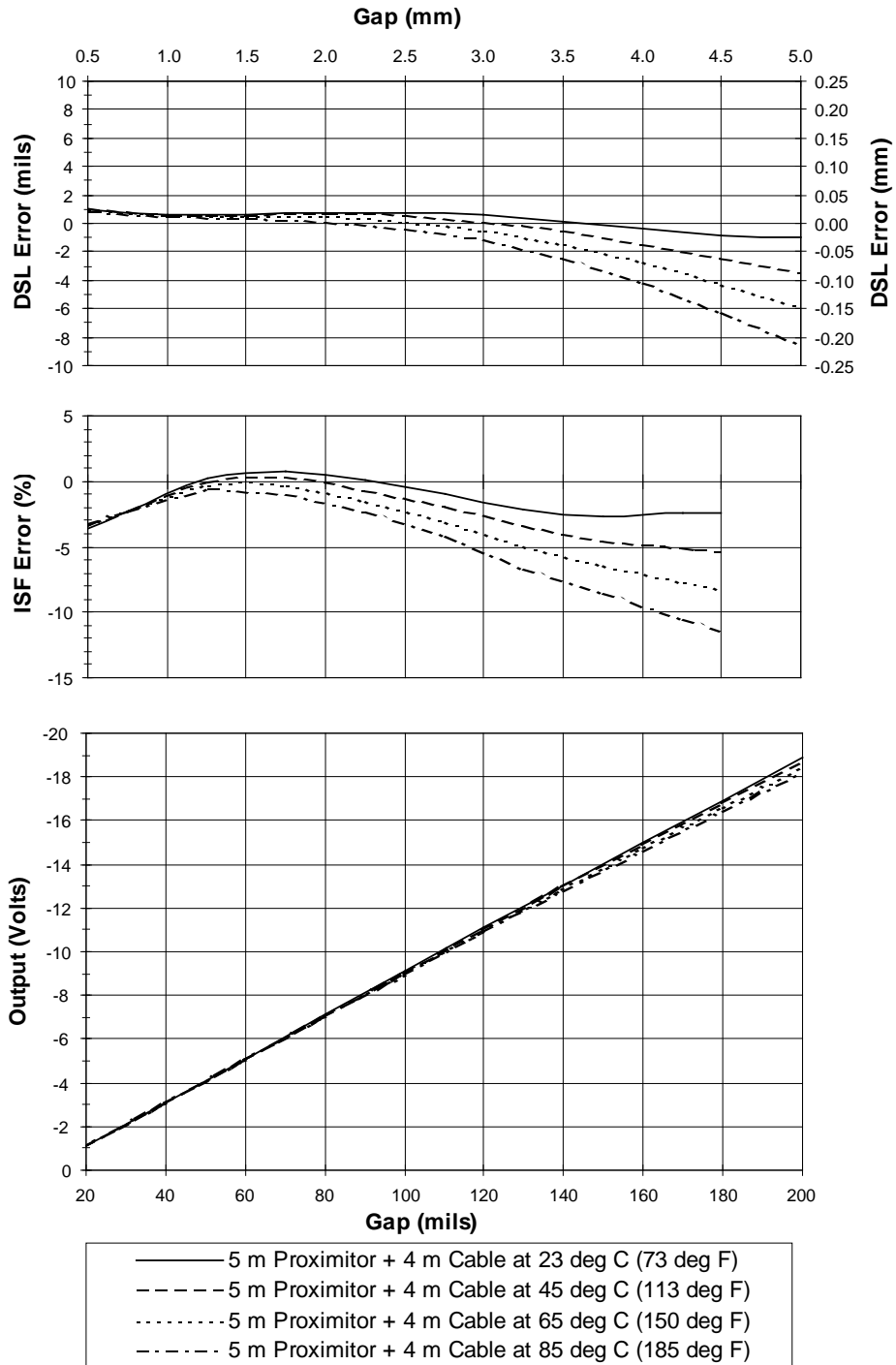


Figure 6 Typical 3300 XL 11 mm 5 m Proximator Sensor with 4 m Extension Cable @ High Temperature
(Probe is at 25°C)

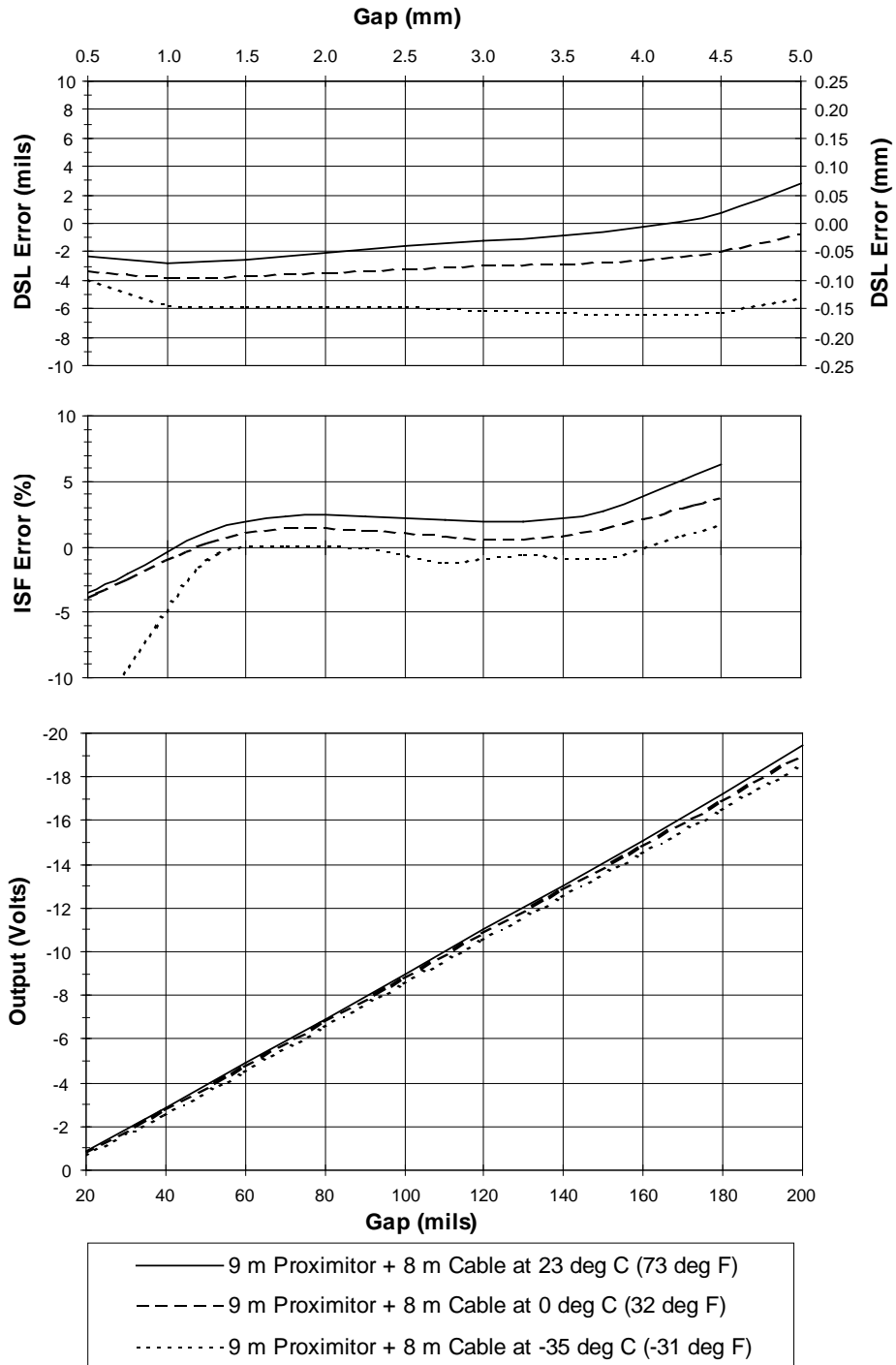


Figure 7 Typical 3300 XL 11 mm 9 m Proximator Sensor with 8 m of Extension Cable @ Low Temperature
(Probe is at 25°C)

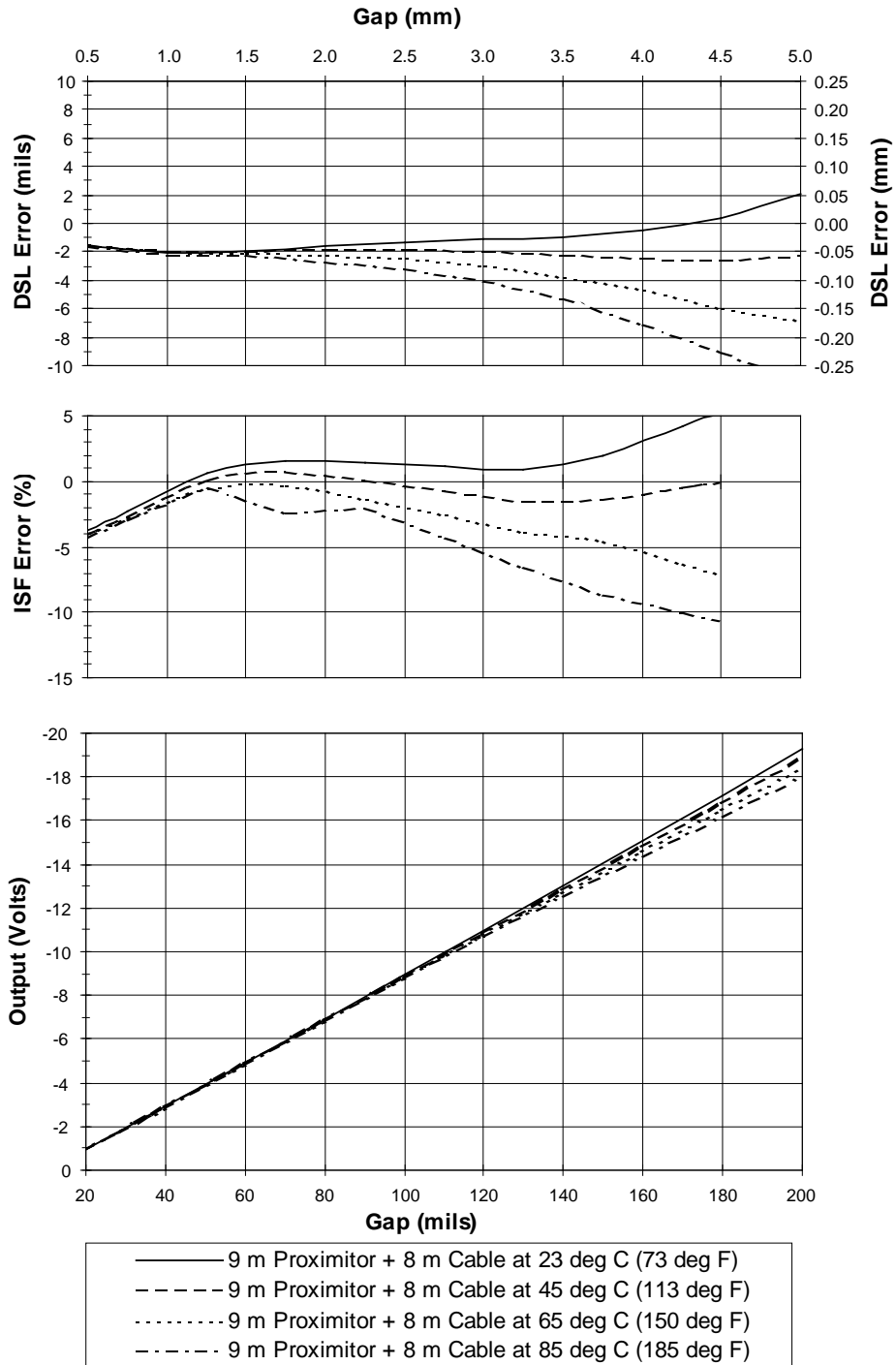


Figure 8 Typical 3300 XL 11 mm 9 m Proximito with 8 m of Extension Cable @ High Temperature
(Probe is at 25°C.)

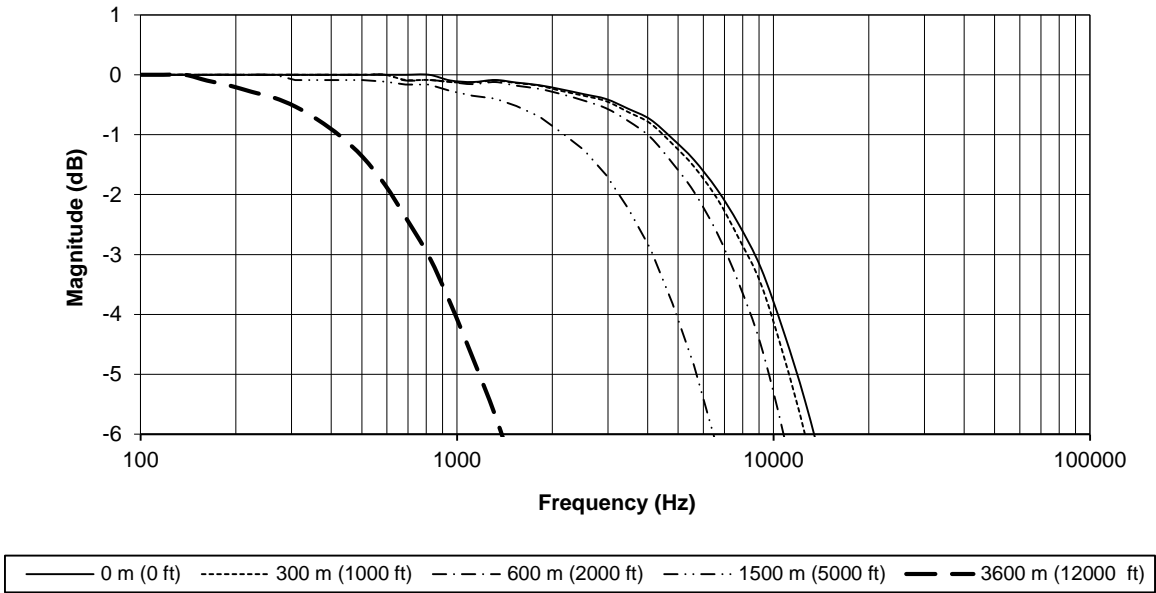


Figure 9 Frequency Response, magnitude of typical 3300 XL 11mm System with various lengths of field wiring, no barriers

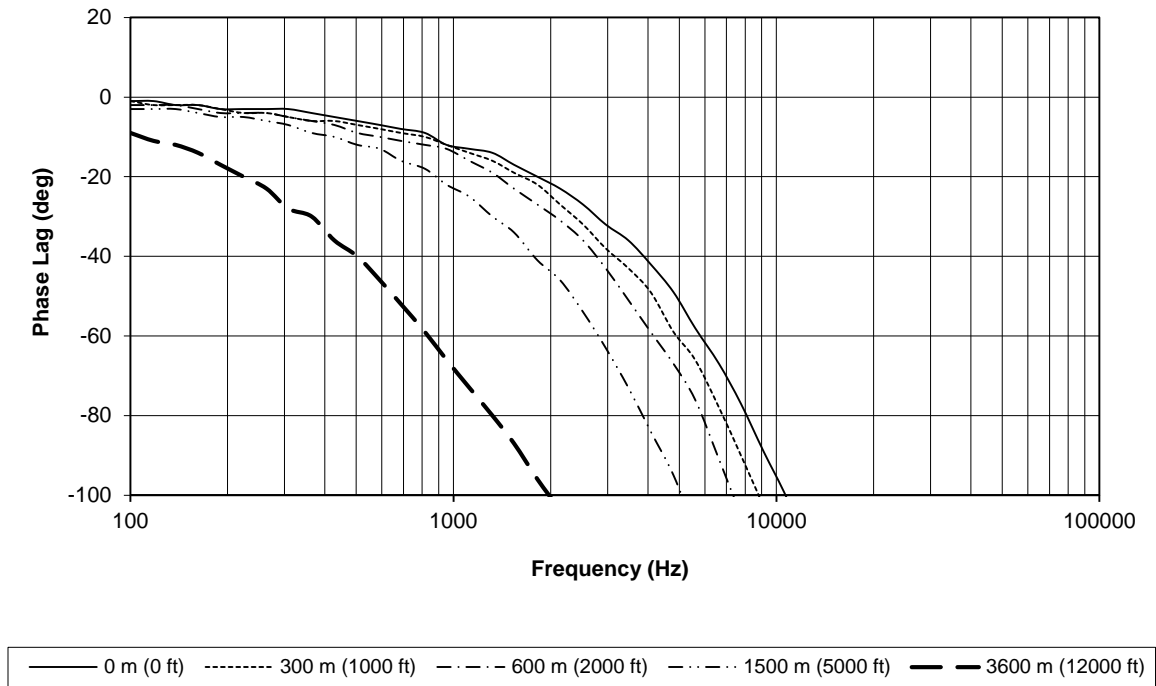


Figure 10 Frequency Response, phase change of typical 3300 XL 11mm System with various lengths of field wiring, no barriers

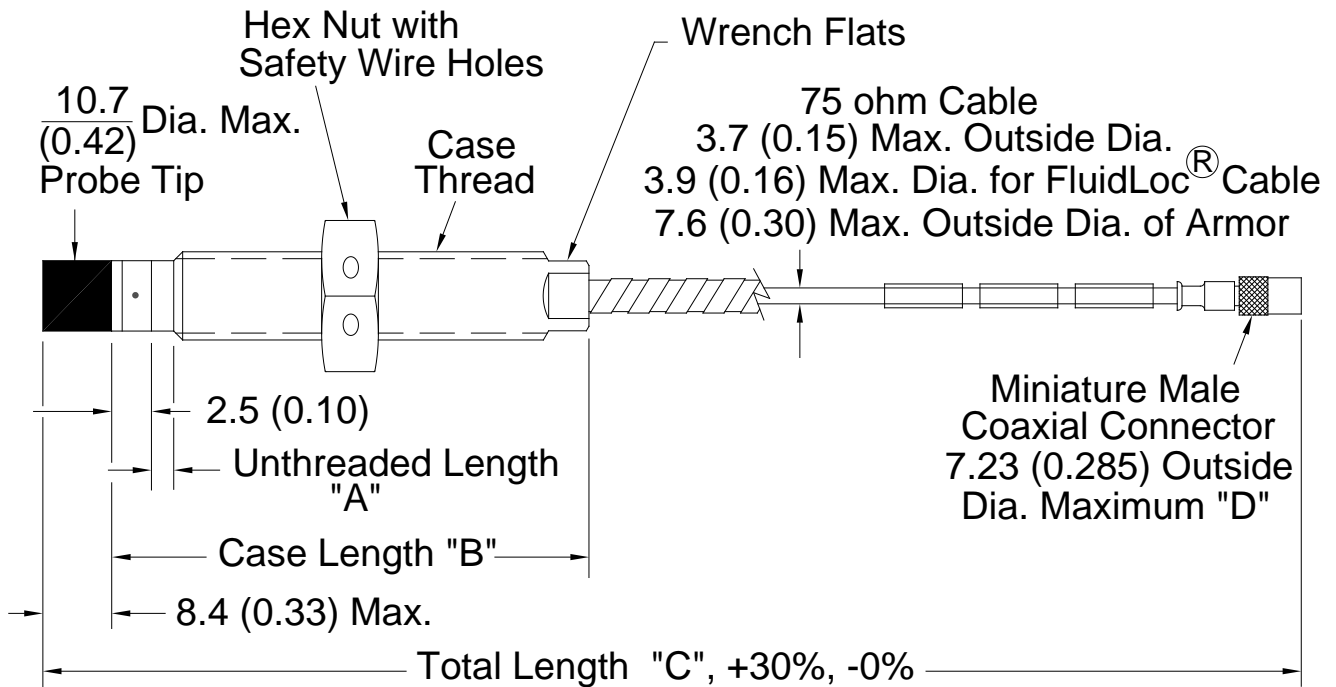


Figure 11 3300 XL 11 mm Proximity probes, Standard Mount

330701, ½-20 UNF-2A, without armor

330702, ½-20 UNF-2A, with armor

330703, M14X1.5 thread, without armor

330704, M14X1.5 thread, with armor

330707, 5/8-18 UNF-2A, without armor

330708, 5/8-18 UNF-2A, with armor

330709, M16X1.5 thread, without armor

330710, M16X1.5 thread, with armor

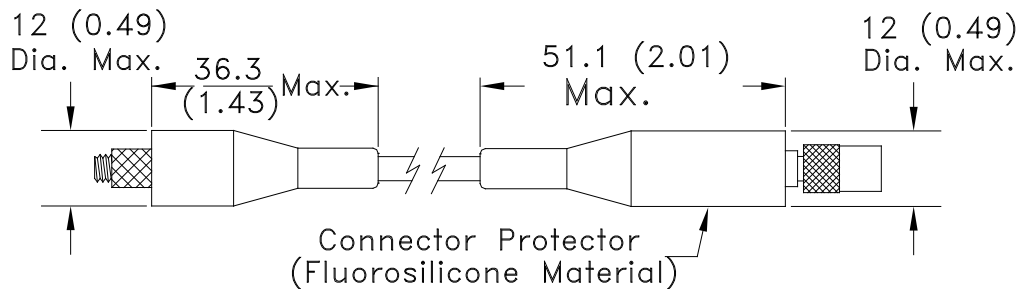


Figure 12 Installed Connector Protectors

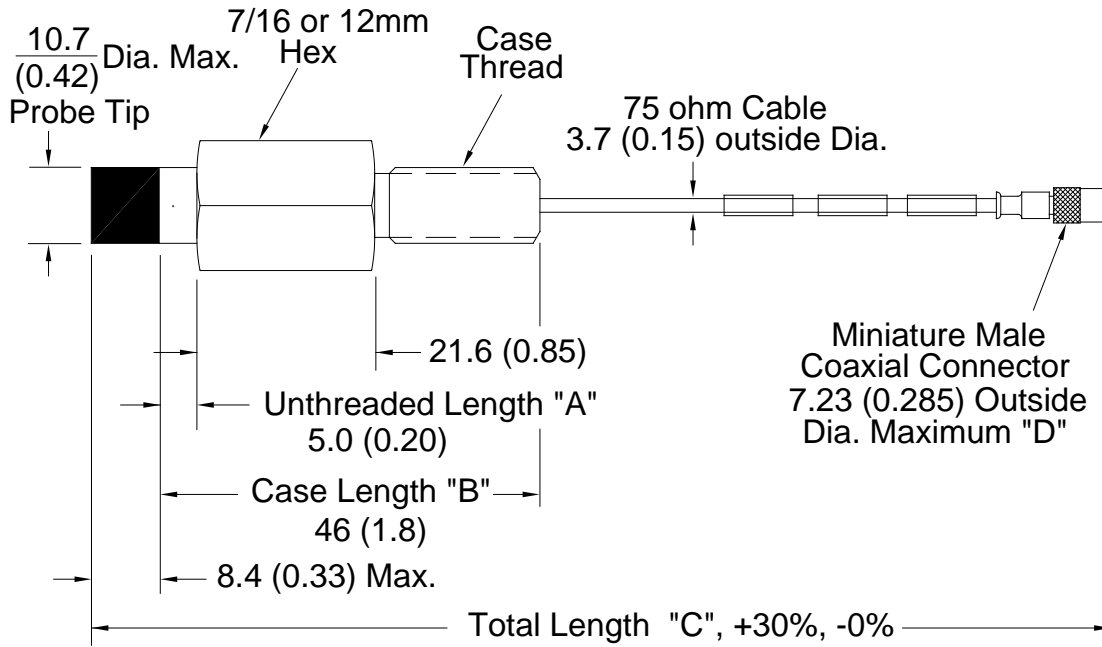


Figure 13 3300 XL 11 mm Proximity Probes, Reverse Mount

330705, 3/8-24 UNF-2A threads

330706, M10X1 threads

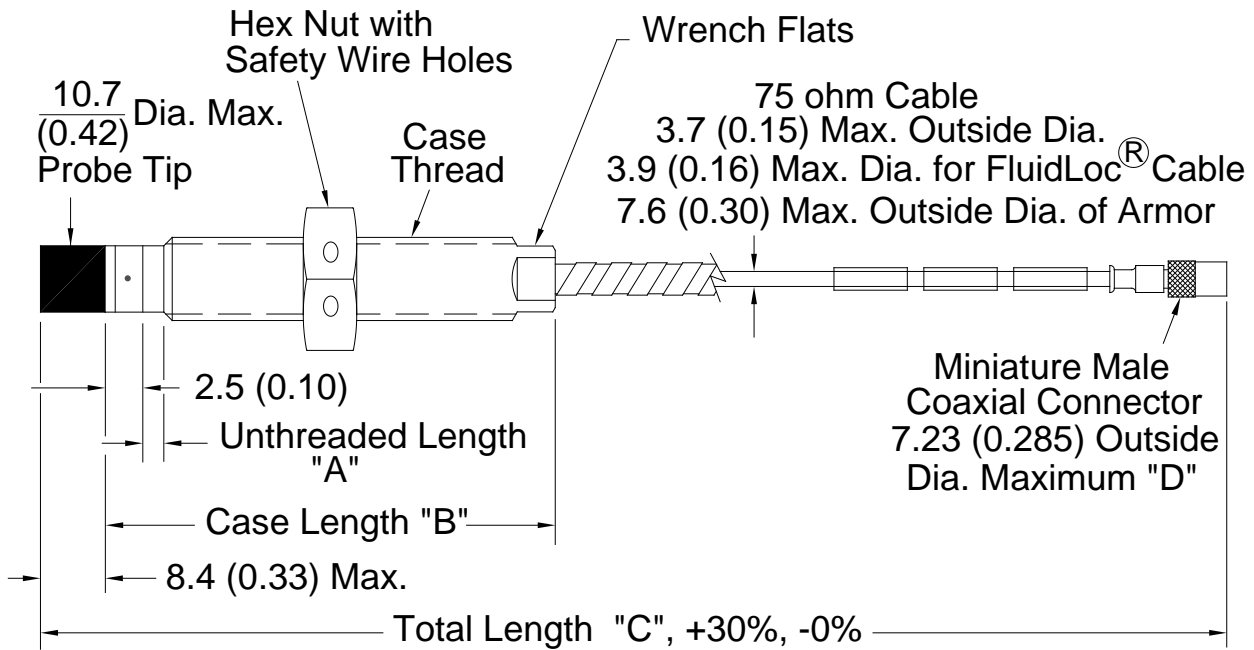


Figure 14 330730, 3300 XL 11 mm Extension Cable

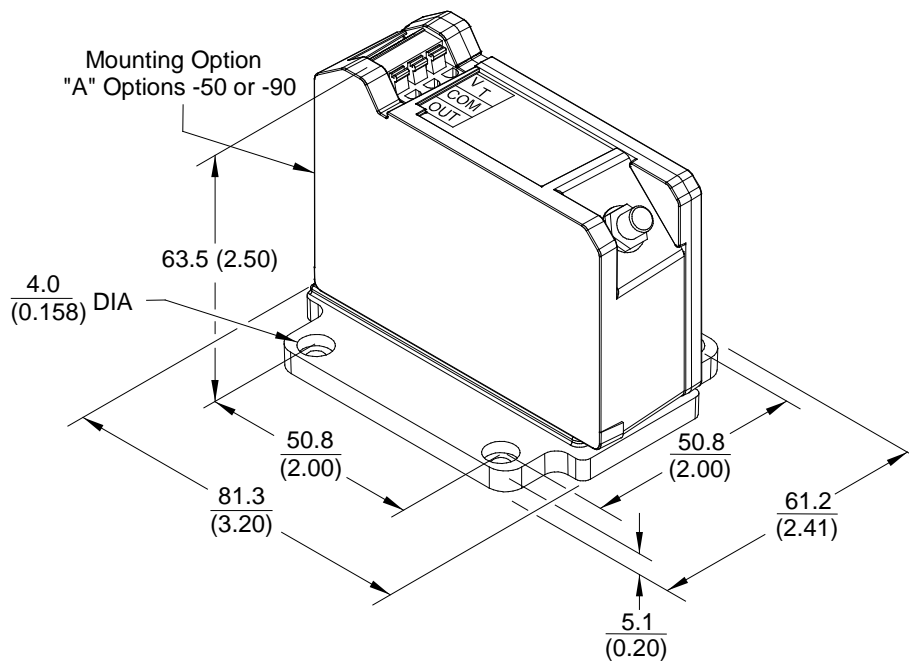


Figure 15 Panel Mount 3300 XL 11 mm Proximity* Sensor

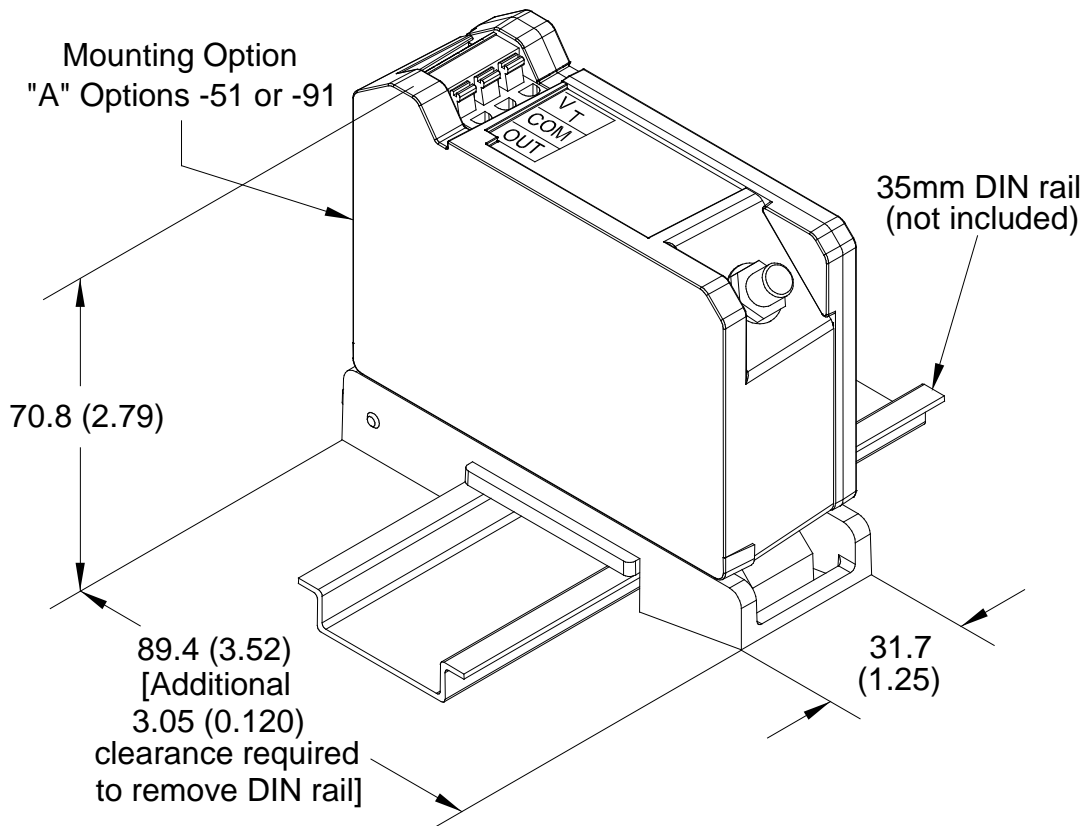


Figure 16 DIN Mount 3300 XL 11 mm Proximity Sensor

Notes:

1. All dimensions on figures are in millimetres (inches) unless otherwise noted.
2. Standard mount $\frac{1}{2}$ -20 UNF thread probes are supplied with $\frac{3}{4}$ inch lock nut and $\frac{7}{16}$ wrench flats.
3. Standard mount M14×1.5 thread probes are supplied with 22 mm lock nut and 12 mm wrench flats.
4. Standard mount $\frac{5}{8}$ -18 UNF thread probes are supplied with $\frac{15}{16}$ inch lock nut and $\frac{9}{16}$ wrench flats.
5. Standard mount M16×1.5 thread probes are supplied with 24 mm lock nut and 14 mm wrench flats.
6. Reverse mount probes are not available with armor, FluidLoc* cable or connector protector options.
7. Letters inside quotation marks on figures refer to probe ordering options.
8. Stainless steel armor is supplied with FEP outer jacket.
9. FEP jacket is standard on all non-armored probes.
10. Probes ordered with 5 or 9 metre integral cables have a length tolerance of +20%, -0%.

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