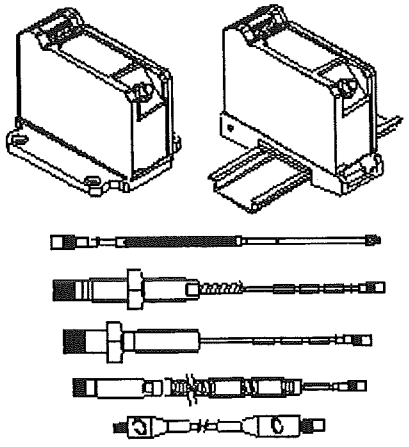
Part Number 141078-01
Revision E, July 2003

3300 XL 8mm Proximity Transducer System
Manual

BENTLY
Nevada



The following ways of contacting Bently Nevada are provided for those times when you cannot contact your local Bently Nevada representative:

Mailing Address	1631 Bently Parkway South Minden, NV 89423 USA
Telephone	1 775 782 3611 1 800 227 5514
Fax	1 775 215 2876
Internet	www.bently.com

Related Documents

The following documents contain additional information that you may find helpful when you install the transducer.

Installing the Transducer

Best Practices Document - Proximity Probes and Related Accessories: The Installation and Application of Eddy Current Proximity Transducers (AN028).

Guidelines for Grounding (Earthing) Bently Nevada Rotating Machinery Information Systems (AN013).

Installation of Electrical Equipment in Hazardous Areas (AN015).

Considerations when using Eddy Current Proximity Probes for Overspeed Protection Applications (AN085)

Transducer Installation Accessories

31000/32000 Proximity Probe Housing Manual (124200-01).

31000/32000 Proximity Probe Housing Data Sheet (141610-01)

3300 XL Proximitor® Housing Data Sheet (141195-01)

3300 XL Monitor and Transducer Verification Kits Data Sheet (141196-01)

Electrical and Mechanical Runout

"Glitch": Definition of and Methods for Correction, Including Shaft Burnishing to Remove Electrical Runout (AN002).

API 670, Fourth Edition, Sections 6.1.1 (Location and Orientation – Radial Shaft Vibration Probes) and 6.1.2 (Location and Orientation – Axial Position Probes. Available from the American Petroleum Institute, Publications and Distribution, 1220 L Street NW, Washington DC, 20005, USA.

Reference

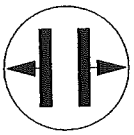
Performance Specifications for the 3300 XL 8 mm Transducer System (159484).

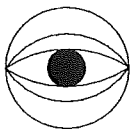
Bently Nevada Glossary (133055-01).

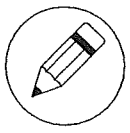
Symbols

Procedures in this manual use the following symbols:


Connect


Disconnect


Observe


Record Value

European CE mark for the Bently Nevada 3300 XL Transducer System

In this Document

is a list of the 3300 XL Transducer Assemblies that have the CE mark, applicable standards used for certification, and installation instructions required for compliance.

Proximity Transducer Systems

are electronic devices typically used in industrial applications. The 3300 XL Transducer System has been certified using the same Technical Construction File (TCF) and Declaration of Conformity as the 3300 8mm Transducer System because they are similar in design and application. The 3300 XL Proximity Transducer System consists of a Proximitor® Sensor, Proximity Probe, and Extension Cable.

TCF through TUV Rheinland of North America

A Technical Construction File has been prepared through TUV Rheinland of North America (TUV Rheinland File Number: P9472350.07). The Certificate of Compliance is for Directive 89/336/EEC (EMC Directive). The applicable Generic Norms are: EN50081-2 and EN50082-2.

Installation Instructions

These instructions are an addition to the Installation Instructions in Section 2.

Proximity Probes

All probe cases must have a solid connection to earth ground.

Compliant Systems and Component Part Numbers

#	Model	Model Numbers
1	3300 XL	330180, 330101*, 330102*, 330103*, 330104*, 330105*, 330106*, 330140, 330141, 330145, 330171, 330172, 330173, 330174, 330191, 330192, 330193, 330194, 330195, 330196, 330197, 330198, 330255, 330130, and 330190**

Includes all options and all approval versions of the base model numbers listed

*--Pre XL probes and cables may be used as part of a CE XL system.

**--any proximity probe, or extension cable which works correctly with the listed module.

Testing and Test Levels

Title	EN 55011 Emission	EN 61000-4-2 ESD	ENV 50140 (EN 61000-4-3) Rad. RFI	ENV 50204 Rad. RFI	EN 61000-4-4 EFT	ENV 50142 (EN 61000-4-5) Surge	ENV 50141 (61000-4-6) Cond. RFI	EN 61000-4-8 Mag. Fields
Test Levels	Emission Class A	4kV; 8kV①	10V/m②	10V/m③	2kV④	0.5kV④	10V⑤	30A/m, 50Hz
Criteria †	N/A	A	A	A	B	A	B	A

These notes listed below apply only to the table "Testing and Test Levels"

① discharge method: Contact; Air

② 80-1000 MHz sweep with 80% 1 kHz sine wave amplitude modulation

③ 900 MHz dwell with 100% 200 Hz square wave modulation

④ lines tested: I/O

⑤ 150 kHz-80 MHz sweep with 80% 1 kHz sine wave amplitude modulation

† For the purposes of the 5/8mm 3300 XL System CE certification, the following criteria are defined as follows:

- Criteria A: Transducer system will output less than one third of a 3mil p-p meter scale (less than 1 mil p-p) and will return to steady state after test completion.
- Criteria B: Transducer system may react in any manner during test, but must self recover after test completion.
- Criteria C: N/A

Contents

Section 1 — System Description

Transducer System

The 3300 XL 8 mm Proximity Transducer System consists of:

- a 3300 XL 8 mm probe
- a 3300 XL extension cable
- a 3300 XL Proximitor® Sensor[1]

The system provides an output voltage directly proportional to the distance between the probe tip and the observed conductive surface. It is capable of both static (position) and dynamic (vibration) measurements, and is primarily used for vibration and position measurement applications on fluid-film bearing machines, as well as Keyphasor® and speed measurement applications[2].

The 3300 XL 8 mm system represents our most advanced performance in an eddy current proximity transducer system. The standard 3300 XL 8 mm system is also 100% compliant with the American Petroleum Institute's (API) 670 Standard (4th Edition) for such transducers. All 3300 XL 8 mm Proximity Transducer Systems achieve this level of performance while allowing complete interchangeability of probe, extension cable, and Proximitor® Sensor without the need for individual component matching or bench calibration.

Each component of the 3300 XL 8 mm Transducer System is backward compatible and interchangeable[3] with other non-XL 3300 series 5 and 8 mm transducer system components[4]. This includes the 3300 5 mm probe, which is used when an 8 mm probe is too large for the available mounting space[5,6].

Proximitor® Sensor

The 3300 XL Proximitor® Sensor incorporates numerous improvements over previous designs. Its physical packaging permits high-density DIN-rail installation. It can also be mounted in a traditional panel mount configuration, where it shares an identical "footprint" to older 4-hole mounted 3300 Proximitor® Sensor. The mounting base for either option provides electrical isolation, eliminating the need for separate isolator plates. The 3300 XL Proximitor® Sensor is highly immune to radio frequency interference, allowing installation in fiberglass housings without adverse effects from nearby radio frequency signals. Improved RFI/EMI immunity allows the 3300 XL Proximitor® Sensor to achieve European CE mark approvals without requiring special shielded conduit or metallic housings, resulting in lower installation costs and complexity.

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

Proximity Probe and Extension Cable

The 3300 XL probe and extension cable also reflect improvements over previous designs. A patented TipLoc™ molding method provides a more robust bond between the probe tip and the probe body. The probe's cable is more securely

attached as well, incorporating a patented CableLoc™ design that provides 330 N (75 lbf) pull strength where the probe cable attaches to the probe tip.

3300 XL 8 mm Probes and Extension Cables can also be ordered with an optional FluidLoc® cable option. This option prevents oil and other liquids from leaking out of the machine through the cable's interior.

Connectors

The 3300 XL probe, extension cable, and Proximitor® Sensor have corrosion-resistant, gold-plated ClickLoc™ connectors. These connectors require only finger-tight torque (connectors will "click"), and the specially engineered locking mechanism prevents the connectors from loosening. They do not require any special tools for installation or removal.

3300 XL 8 mm Probes and Extension Cables can also be ordered with connector protectors already installed. Connector protectors can also be supplied separately for installation in the field (such as when the cable must be run through restrictive conduit). Connector protectors are recommended for all installations and provide increased environmental protection[7].

Extended Temperature Range Applications

An Extended Temperature Range (ETR) Probe and Extension Cable are available for applications where either the probe lead or extension cable may exceed the 177 °C (350 °F) temperature specification. The Extended Temperature Range Probe has an extended temperature rating for up to 260 °C (500 °F) for the probe lead and connector. The probe tip must remain below 177 °C (350 °F). The Extended Temperature Range Extension Cable is also rated for up to 260 °C (500 °F). Both the ETR probe and cable are compatible with standard temperature probes and cables. For example, you can utilize an ETR probe with the 330130 extension cable. The ETR system uses the standard 3300 XL Proximitor® Sensor. When using any ETR component as part of your system, the accuracy is limited to the accuracy of the ETR system.

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. Consult Bently Nevada Applications Note AN085 when considering this transducer system for tachometer or overspeed measurements.
3. 3300 XL 8 mm components are both electrically and physically interchangeable with non-XL 3300 5 and 8 mm components. Although the packaging of the 3300 XL Proximitor® Sensor differs from its predecessor, it is designed to fit in the same 4-hole mounting pattern when used with the 4-hole mounting base, and will fit within the same mounting space specifications (when minimum permissible cable bend radius is observed).
4. When XL and non-XL 3300-series 5 and 8 mm system components are mixed, system performance is limited to the specifications for the non-XL 3300 5 and 8 mm Transducer System.

5. The 3300-series 5 mm probe (refer to Specifications and Ordering Information p/n 141605-01) uses smaller physical packaging, but does not permit reduced sideview clearances or tip-to-tip spacing requirements compared to an 8 mm probe. It is used when physical (not electrical) constraints preclude the use of an 8 mm probe. When narrow sideview probes are required, use the 3300 NSv™ Proximity Transducer System (refer to Specifications and Ordering Information p/n 147385-01).
6. 8 mm probes provide a thicker encapsulation of the probe coil in the molded PPS plastic probe tip. This results in a more rugged probe. The larger diameter of the probe body also provides a stronger, more robust case. Bently Nevada recommends the use of 8 mm probes when possible to provide optimal robustness against physical abuse.
7. 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.

Receiving, Inspecting, Handling and Disposing of the System

The probe, extension cable and Proximitor® Sensor are shipped as separate units and must be interconnected at the installation site by the user. Carefully remove all equipment from the shipping containers and inspect the equipment for shipping damage. If shipping damage is apparent, file a claim with the carrier and submit a copy to the nearest Bently Nevada office. Include part numbers and serial numbers on all correspondence. If no damage is apparent and the equipment is not going to be used immediately, return the equipment to the shipping containers and reseal until ready for use.

Store the equipment in an environment free from potentially damaging conditions such as high temperature or a corrosive atmosphere. See Environmental Limits on page 34 for environmental specifications.

Customers and third parties who are in control of the product at the end of its life or at the end of its use are solely responsible for the proper disposal of the product. No person, firm, corporation, association or agency that is in control of product shall dispose of it in a manner that is in violation of United States state laws, United States federal laws, or any applicable international law. Bently Nevada® LLC is not responsible for the disposal of the product at the end of its life or at the end of its use.

Customer Service

Bently Nevada maintains numerous Sales and Service offices worldwide. To locate the office nearest you, visit our website http://www.bently.com. Here, you can also find specifications on all standard product offerings.

Support for products and services should be directed to one of these departments:

For product quotations, product applications, product ordering, scheduling on-site Services, and questions regarding existing orders, please contact your nearby Bently Nevada Sales and Service Office.

For general product pricing, delivery, or other ordering information, contact your local BNC office or contact Customer Service Department, Minden, Nevada, USA Phone: 1-775-215-1011 Fax: 1-775-215-2873.

For technical questions or problems regarding installed BNC products, contact our Technical Support Staff at:

techsupport@bently.com

or at the following locations:

Technical Support (North America)

Phone: 1-775-782-1818 Fax: 1-775-215-2890

Technical Support (UK)

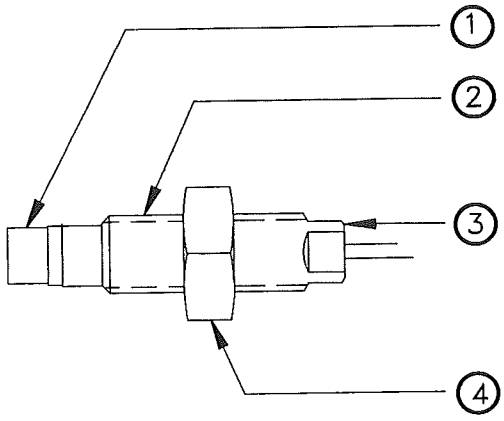
Phone: (44) 1925 818504 Fax: (44) 1925 817819

Section 2 — Installation

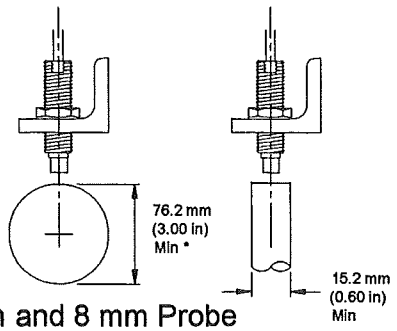
This section contains a checklist of items that you must consider when you install a 3300 XL Transducer system.

Installing the Probe

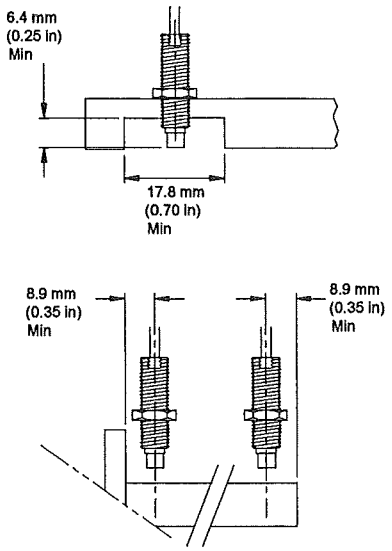
The following figures show the probe sizes and the minimum values for probe separation, side clearance and target configuration. Refer to Probe Case Torque on page 33, for proper torque and the dimensions of the thread.



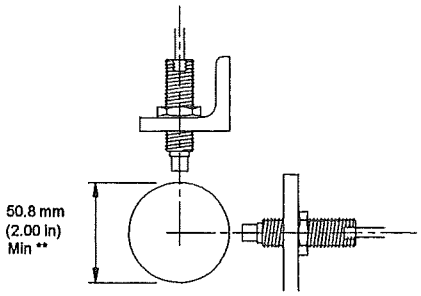
	Description	8 mm probe	5 mm probe
1	Probe tip	8 mm	5 mm
2	Thread types	M10x1, 3/8-24, or unthreaded	M8x1 or ¼-28
3	Wrench Flats	8 mm or 5/16 in	7 mm or 7/32 in
4	Lock nut	17 mm or 9/16 in Hex	13 mm or 7/16 Hex

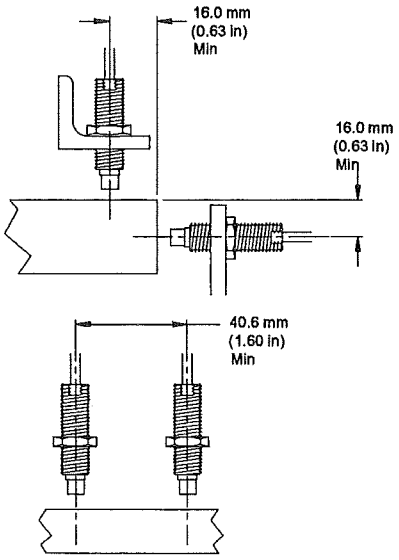


5 mm and 8 mm Probe Target Sizes



5 mm and 8 mm Probe Mounting Dimensions





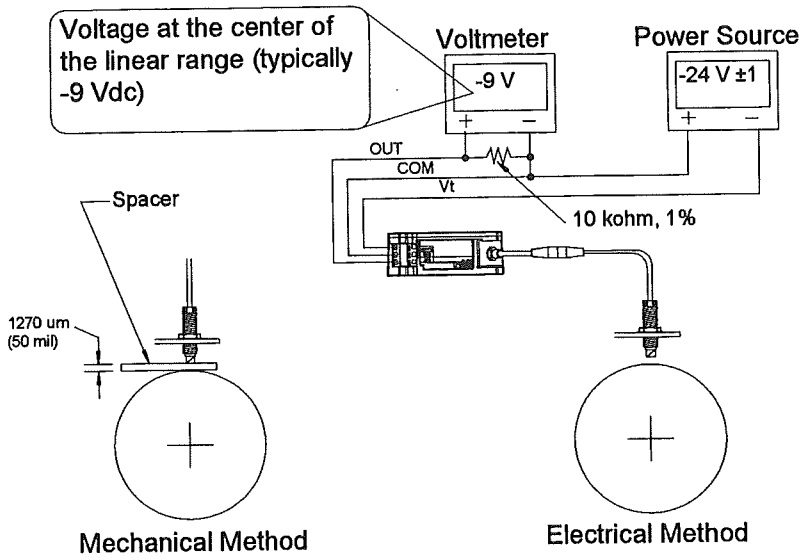
5 mm and 8 mm Probe-to-Probe Separation Due to Cross Talk

Notes:
* At or below 76.2 mm (3.00 in), an increase in scale factor as the target size is reduced will occur per performance specification 159484. See application alert below.

** At or below 50.8 mm (2.00 in), a small vibration signal will occur per performance specifications 159484, due to cross talk

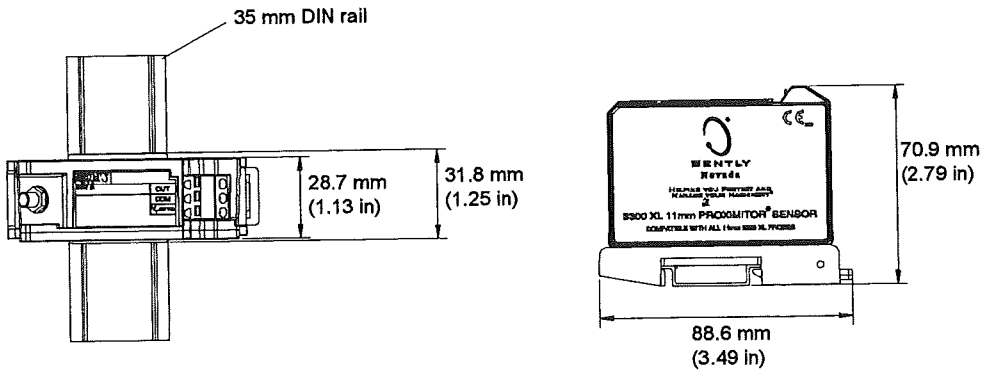
Application Alert: Mounting dimensions and target size affect the scale factor of proximity transducer systems. The minimum recommended dimensions above were chosen to minimize error yet retain flexibility for different mounting situations. Consult performance specification 159484 to determine the effect of each of the above factors for your particular installation.

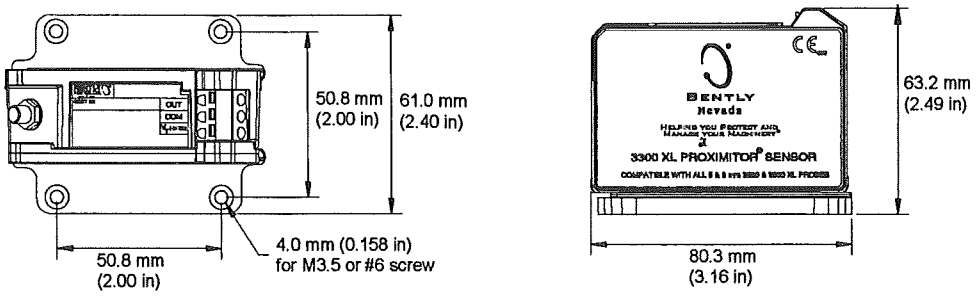
Adjust the distance between the probe tip and the shaft using one of the methods shown in the following figure. The electrical method for setting the probe gap is preferred.



Mounting the Proximitor® Sensor

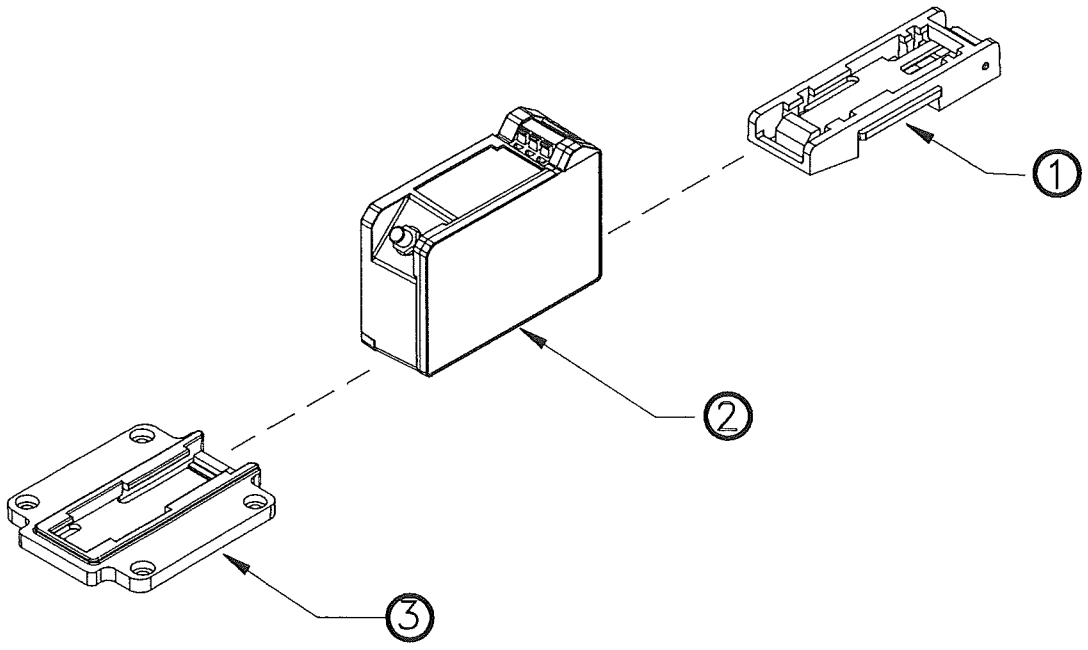
Mount the Proximitor® Sensor in a location that is compatible with its environmental specifications (see Environmental Limits on page 34). Consider the local electrical codes and the presence of hazardous or explosive gas at the installation site. (Refer to document AN015.)





Interchangeable Mounting Feet

The mounting feet for the 3300 XL Proximitor® Sensor are interchangeable. If a Proximitor® Sensor is purchased with one mounting option, either the DIN mount option or the panel mount option, the mounting hardware can be changed simply by removing the mounting foot that is currently on the Proximitor® Sensor and replacing it with the other type mounting foot.



(1) DIN Mount Part (part number 138493-01)

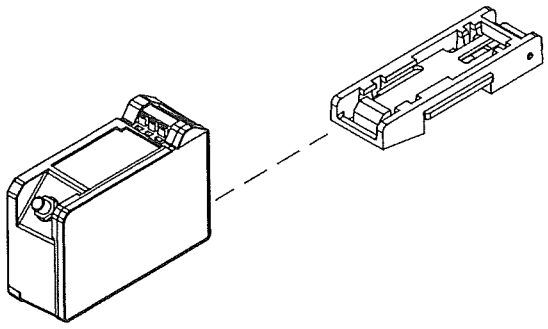
(2) 3300 XL Proximitor® Sensor

(3) Panel Mount Part (part number 138492-01)

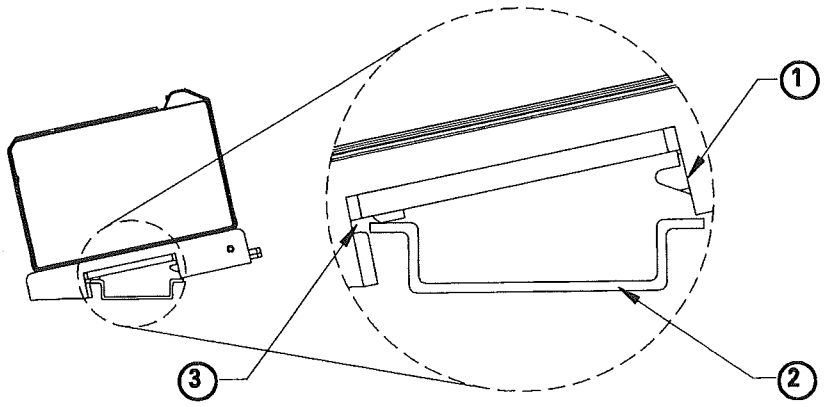
Mounting the Proximitor® Sensor with DIN Mount Part

To mount the 3300 XL Proximitor® Sensor with a DIN Mount Part on a DIN rail:

8. Install the Proximitor® Sensor into the DIN Mount Part (if not already installed).



9. Examine the underneath side of the DIN Mount Part. There is a spring-loaded clip on one side and two protrusions that will catch the edge of the DIN rail on the other side. The side with the two protrusions will need to be installed so that the edge of the DIN rail fits into the gap.

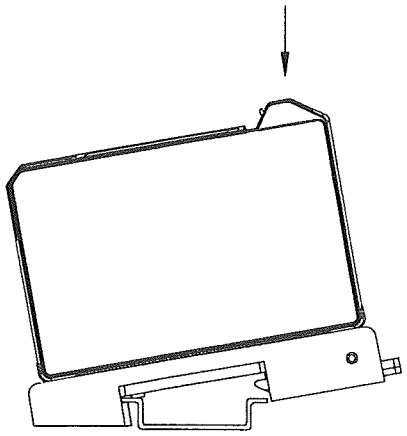


(1) Spring-leaded clip

(2) DIN rail

(3) Edge of DIN rail must fit into this gap

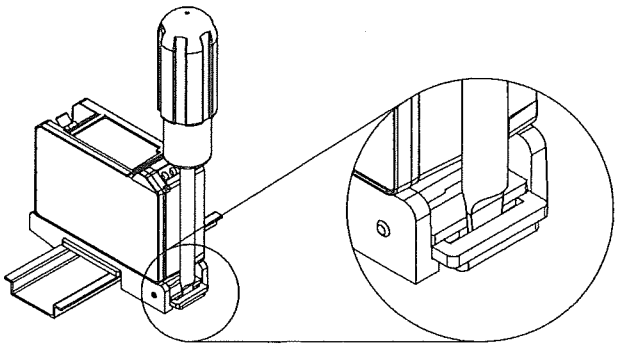
10. Push down on the Proximitor® Sensor until the unit "snaps" into place. The unit is now installed.



Removing the Proximitor® Sensor from the DIN Rail

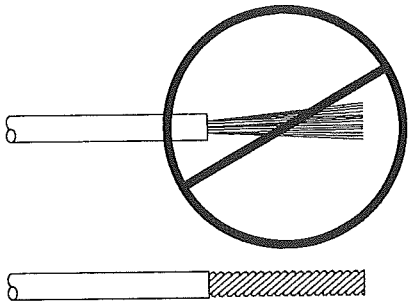
Remove the Proximitor® Sensor from the DIN rail by using a regular screwdriver to unclip the unit from the rail.

Install a regular screwdriver into the rear of the spring-loaded clip and push the top of the screwdriver towards the Proximitor® Sensor to pry the spring-loaded clip back so that the Proximitor® Sensor can be removed from the DIN rail.



Termination of Field Wiring in the Terminal Block

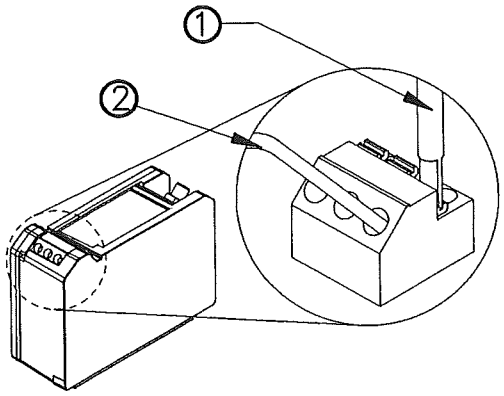
1. Strip the insulation from the field wiring to be installed into the terminal block. The recommended strip length is 10 mm (0.4 in.).



2. If ferrules will not be used on the stripped conductor and a stranded wire is being used, then the strands of the conductor must be twisted together before installing the field wire into the terminal block.

   The terminal block can accommodate field wiring conductor sizes of 0.2 – 1.5 mm^2 (16 – 24 AWG). The terminal block can also accommodate field wiring with ferrules ranging in size from 0.25 – 0.75 mm^2 (18 – 23 AWG).

3. Using a small regular screwdriver push down on the orange lever corresponding to the position in the terminal block where the field wire will be installed and insert the field wire.



(1) Small screwdriver

(2) Field wiring

Removal of the field wire is accomplished by pushing down on the orange lever and pulling on the field wire to remove it from the terminal block. If a stranded wire is used for the field wiring and a strand is broken off inside the terminal block, turn the Proximitor® Sensor upside down while pushing down the orange lever to remove the strand from the terminal block.

Routing the Extension Cable and Field Wiring

Route the extension cable using the following guidelines.

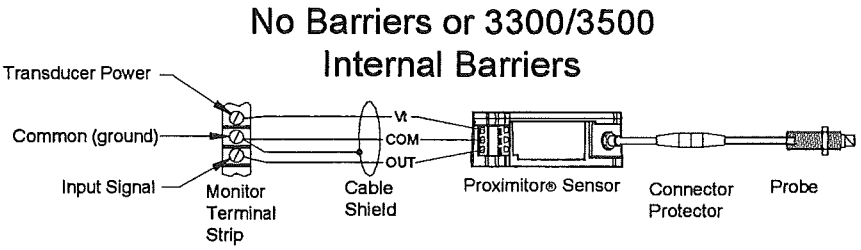
- Check that the sum of the extension cable and probe lead length equal the Proximitor® Sensor system length. (For example, a 9 metre Proximitor® Sensor will work with an 8 metre extension cable and a 1 metre probe.)

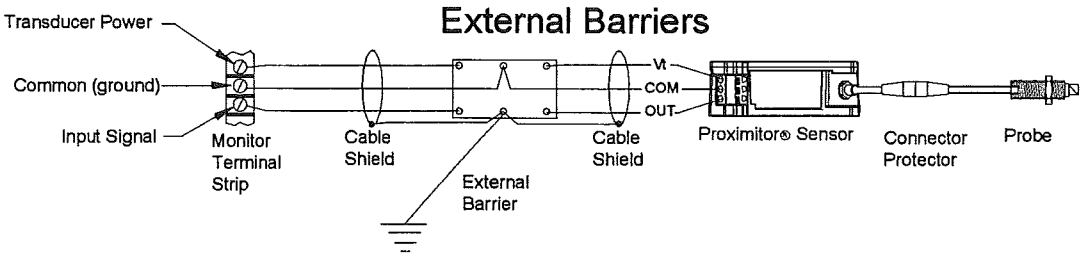
- Check component compatibility by verifying system color identification on all system components.
- Secure the extension cable to supporting surfaces by using mounting clips or similar devices.
- Identify the probe and both ends of the extension cable by inserting labels under the clear Teflon® sleeves and applying heat to shrink the tubing.
- Join the coax connectors between the Proximitor® Sensor, extension cable and probe lead. Tighten connectors as follows:

Connector Type	Tightening Instruction
Two 3300 XL gold ClickLoc™ connectors	Finger tight
Two non-XL stainless steel connectors (non-ClickLoc™) or one non-XL connector and one 3300 XL connector	Finger tight plus 1/8 turn using pliers

- Use either a connector protector or self-fusing silicone tape to insulate the connection between the probe lead and the extension cable. **Do not use self-fusing silicone tape to insulate a connection made inside of a machine.**
- If the probe is in a part of the machine that is under pressure or vacuum, seal the hole where the extension cable leaves the machine by using appropriate cable seals and terminal boxes.

Use the following wiring diagrams to connect the field wiring between the Proximitor® Sensor and the monitoring instruments. (Refer to documents AN013 and AN015.)





Section 3 — Maintenance and Troubleshooting

This section shows how to verify that the system is operating properly and identify parts of the system that are not working properly.

The 3300 XL Transducer System (probe, cable and Proximitor® Sensor), when correctly installed and verified, does not need calibration or verification at regular intervals. If the monitor OK light (green) indicates a NOTOK condition (light is **not** illuminated), either a fault has occurred in the field wiring/transducer system/power source and/or probe is too close to target or detecting other material than target.

Bently Nevada recommends the following practices to assure continued satisfactory operation. Verify operation by using the scale factor verification method on the following page, if:

- Any of the system components (probe, cable or Proximitor® Sensor) are replaced.
- Any of the components are removed and reinstalled or moved and remounted.
- Any of the components appear to be damaged.
- Whenever the machine being monitored is over-hauled.

Please note that a step change in the output of the transducer system, or other output that is not consistent with the associated machinery's trended data is, in most instances, not a transducer problem but a machinery problem. Verification of the transducer system under these conditions can be done at the user's discretion.

Under harsh operating conditions some users prefer to verify all transducers at a regular interval. As noted above, this is not required with the 3300 XL Transducer System. Users who wish to verify the system on a regular interval should use an interval consistent with their own practices and procedures, which may or may not be based upon ISO 10012-1 "Quality Assurance Requirements for Measuring Equipment" (section 4.11).

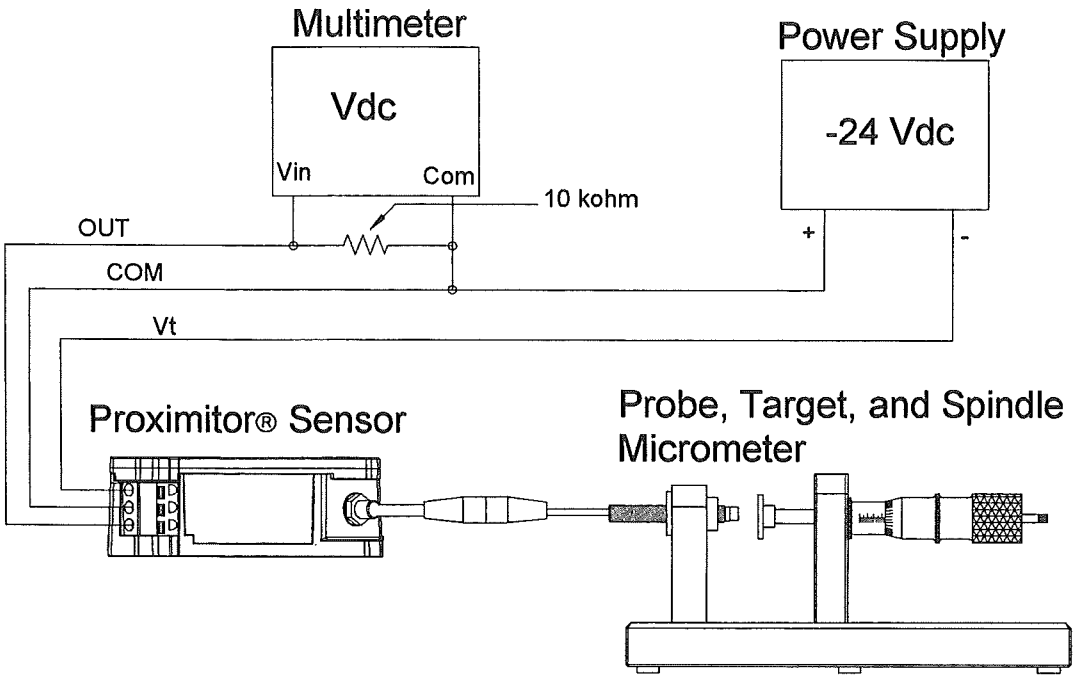
For target materials other than AISI 4140 steel and for other special applications, contact your local Bently Nevada office.

Note:
Hazardous Locations: Area must be free of hazardous material before any maintenance or troubleshooting can be performed.

The scale factor verification requires the following instruments and equipment:

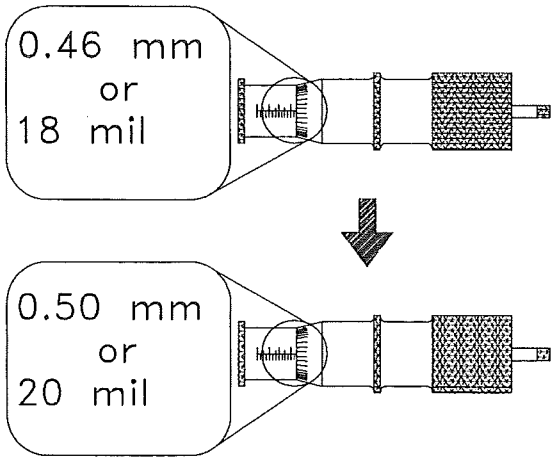
- Digital multimeter
- Spindle micrometer
- Fixed resistor, 10 kΩ
- Power supply (-24 Vdc ± 1)

The scale factor verification uses the test setup as shown in the following figure:

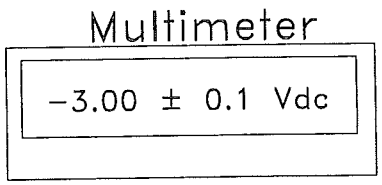


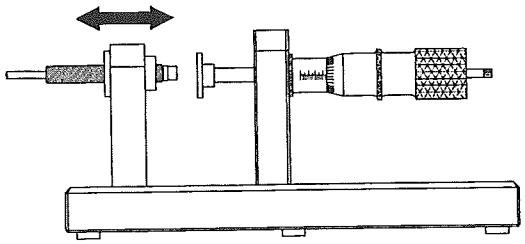
Scale Factor Verification

1. Compensate for mechanical backlash and adjust the spindle micrometer for electrical zero.

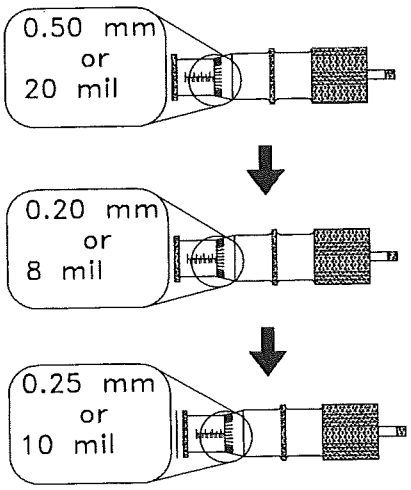


2. Adjust the gap to electrical zero by moving the probe.

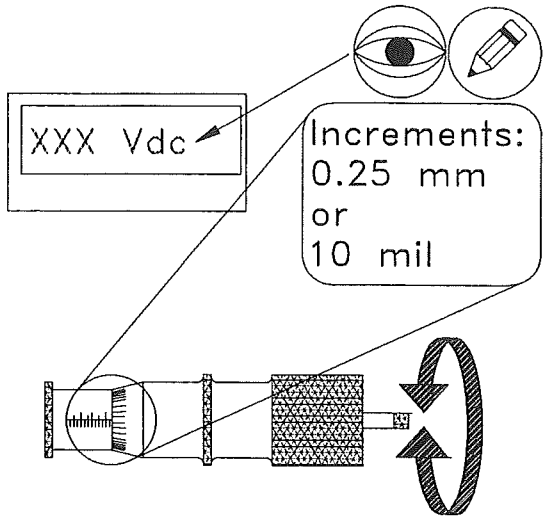




3. Compensate for mechanical backlash in the micrometer and adjust to the start of the linear range.



4. Record voltages in the following table and calculate incremental scale factors and average scale factor using the equations.



N	Adjust Micrometer to...		Record Voltages	Calculate Scale Factor	
	mm_n	mil_n	Vdc_n	ISF_n (Incremental Scale Factor)	$Vdiff_n$ (Difference Voltage)
1	0.25	10	>>		>>
2	0.50	20	>>	>>	>>
3	0.75	30	>>	>>	>>
4	1.00	40	>>	>>	>>
5	1.25	50	>>	>>	>>
6	1.50	60	>>	>>	>>
7	1.75	70	>>	>>	>>
8	2.00	80	>>	>>	>>
9	2.25	90	>>	>>	>>
>> = Enter values into these cells				ASF (Average Scale Factor)	
				>>	

$$ISF_{n\ (V/mm)} = \frac{Vdc_{n-1} - Vdc_n}{0.25}$$

$$ASF_{(V/mm)} = \frac{Vdc_{0.25mm} - Vdc_{2.25mm}}{2}$$

$$ISF_{n\ (mV\ /\ mil)} = \frac{Vdc_{n-1} - Vdc_n}{0.01} \qquad ASF_{(mV\ /\ mil)} = \frac{Vdc_{10\ mil} - Vdc_{90\ mil}}{0.08}$$

5. Use the following formula to determine maximum Deviation from Straight Line (DSL):

$$DSL_{(mm)} = \frac{Vdif_{(max)} - Vdif_{(min)}}{15.74} = \_\_\_\_\_ mm$$

$$DSL_{(mil)} = \frac{Vdif_{(max)} - Vdif_{(min)}}{0.4} = \_\_\_\_\_ mil$$

If the ISF or DSL of the system is out of tolerance, contact Bently Nevada®, LLC for further information on possible calibration problems.

The preceding pages indicate scale factor verification using a TK-3. This is suitable for rough verification. For API 670 system verification a more precise micrometer and target must be used. There are two different 3300 XL Micrometer Kits that can be used to verify the calibration of our transducer systems or to check the scale factor of specific shafts. Both micrometer kits will work with Bently Nevada eddy current transducers ranging in size from the 3300 XL NSv™ and 3300 RAM Transducer Systems up to the 3300 XL 11 mm and the 7200 14 mm Transducer Systems. Both micrometers also have options for either a metric or English micrometer.

The **3300 XL Precision Micrometer** (part number 330185) is a highly accurate verification device. It should be used when performing acceptance testing on our transducer systems. All of our transducer systems have a specified linear range and average scale factor (ASF). The transducer systems also have a maximum deviation from straight line (DSL) and ISF tolerances for ambient and extended temperatures. The 3300 XL Precision Micrometer comes with a high precision 4140 steel target and is used to make precise measurements and verify whether the transducer system is working properly and within published specifications.

The **3300 XL Shaft Micrometer** (part number 330186) is used to check the scale factor of the transducer system directly on your shaft. You can compare the scale factor of your transducer system with that of a Bently Nevada supplied 4140 steel target to check whether errors in the measurement are due to runout, target material or a problem in the transducer system.

Troubleshooting

This section shows how to interpret a fault indication and isolate faults in an installed transducer system. Before beginning this procedure, be sure the system has been installed correctly and all connectors have been secured properly in the correct locations.

When a malfunction occurs, locate the appropriate fault, check the probable causes for the fault indication and follow the procedure to isolate and correct the fault. Use a digital voltmeter to measure voltage. If you find faulty transducers, contact your local Bently Nevada®, LLC office for assistance.

The troubleshooting procedures use measured voltages as shown in the following figure and tables:

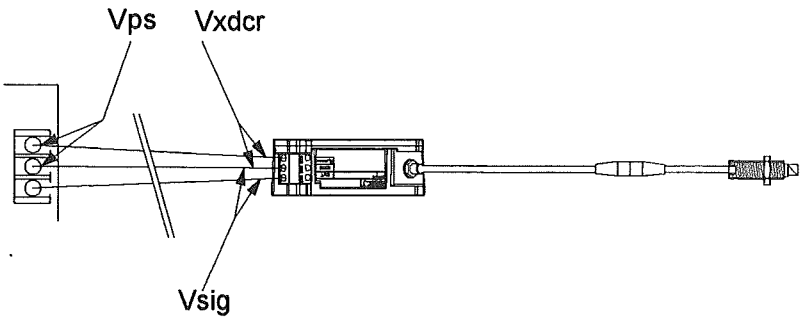


Table 3-1. Symbols for Measured Voltages

Symbol	Meaning	Voltage measured between...
V_{SIG}	Signal voltage from the transducer	OUT and COM
V_{PS}	Power supply voltage	Power Source and Common
V_{XDCR}	Supply voltage at transducer	$-V_T$ and COM

Note: V_{SIG}, V_{PS}, and V_{XDCR} are all negative voltage values.

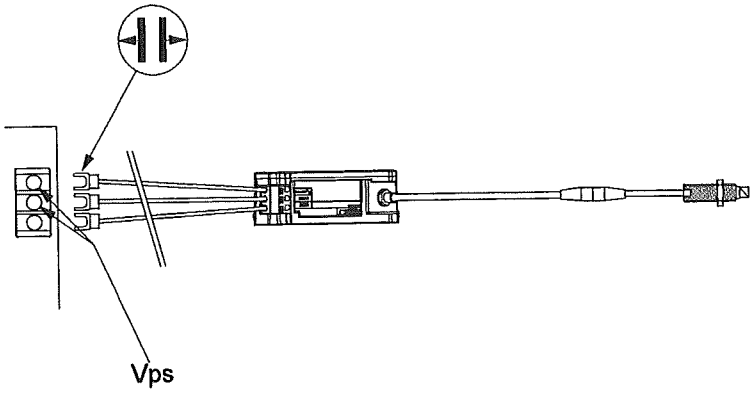
Table 3-2 Definitions

Symbol	Definition	Example
A > B	"A" value is more positive than "B"	-21 > -23
A < B	"A" value is more negative than "B"	-12 < -5
A = B	"A" same value (or very close) to "B"	-24.1 = -24.0

Fault Type 1: V_{XDCR} > -17.5 Vdc or V_{XDCR} < -26 Vdc

Possible causes:

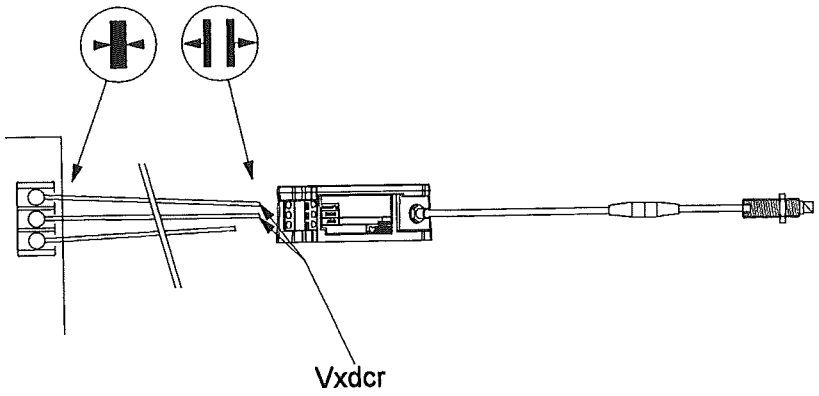
- Faulty power source
- Faulty field wiring
- Faulty Proximitor® Sensor



Measure V_{PS}: Is V_{PS} > -23 Vdc or V_{PS} < -26 Vdc?

Yes: Faulty power supply.

No: Go to next step.



Measure V_{XDCR}: Is V_{XDCR} > -23 Vdc or V_{XDCR} < -26 Vdc?

Yes: Faulty Field wiring.

No: Faulty Proximitor® Sensor.

Fault Type 2: V_{SIG} = O Vdc

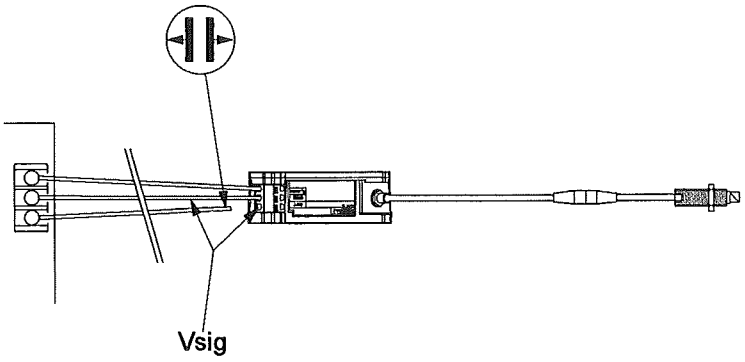
Possible causes:

- Incorrect power source voltage
- Short circuit in field wiring
- Short circuit at Proximitor® Sensor terminal connection
- Faulty Proximitor® Sensor

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



Measure V_{SIG}: Is V_{SIG} = 0 Vdc?

No: Incorrect power source voltage or short in field wiring or short at Proximitor® sensor terminal connection.

Yes: Faulty Proximitor® Sensor.

Fault Type 3: -1 Vdc < V_{SIG} < 0 Vdc

Possible causes:

- Probe is incorrectly gapped (too close to target)
- Incorrect power source voltage
- Faulty Proximitor® Sensor
- Probe is detecting other material than target (counterbore or machine case)
- Short or open circuit in a connector (dirty or wet) or loose connectors
- Short or open circuit in the probe
- Short or open circuit in extension cable

Does fault condition type 1 exist?

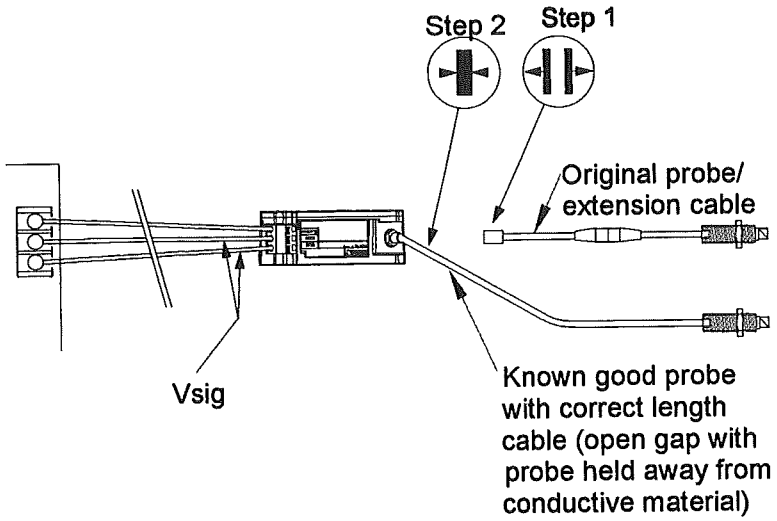
Yes: Use the procedure for fault type 1

No: Go to the next step

Is the probe gapped correctly? Are counterbore dimensions correct? (See Installing the Probe on page 5.)

No: Regap the probe or check counterbore. Retest system.

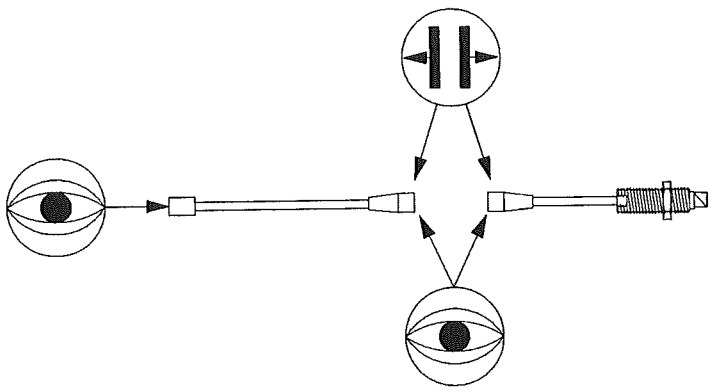
Yes Go to the next step.



Measure V_{SIG}: Is $V_{SIG} < V_{XDCR} + 1$ Vdc?

No: Faulty Proximitor® Sensor

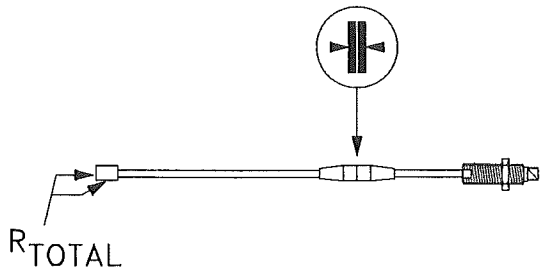
Yes: Go to next step



Inspect for clean connection: Is the connection dirty, rusty, or a poor connection?

Yes: Clean the connector using isopropyl alcohol or electronic terminal cleaner, reassemble and retest the system.

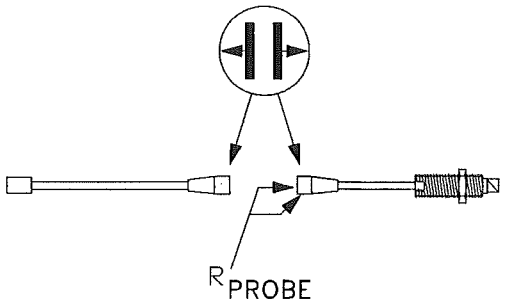
No: Go to the next step.



Measure resistance R_{TOTAL}: Is R_{TOTAL} within specifications?
5 m system: 8.75 ± 0.70 Ω
9 m System: 9.87 ± 0.90 Ω

Yes: Retest original system

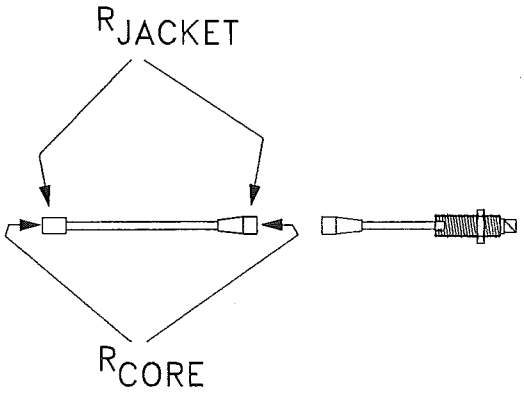
No: Go to the next step



Measure resistance, R_{PROBE}: Is R_{PROBE} with specifications (see "Probe dc resistance (nominal) (R_{PROBE} table" on page 29)?

No: Faulty probe.

Yes: Go to next step.



Measure the resistance, R_{JACKET} and R_{CORE}: Is the resistance within specifications (see Extension cable dc resistance [nominal] table on 29)?

No: Faulty extension cable

Yes: Retest the original system

Fault Type 4: $V_{XDCR} < V_{SIG} < V_{XDCR} + 2.5$ Vdc

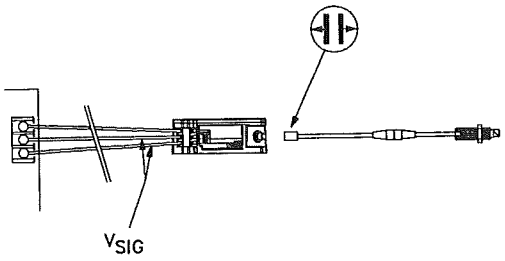
Possible causes:

- Faulty Proximitor® Sensor
- Probe is incorrectly gapped (too far from target)

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



Measure V_{SIG}: Is $-1.2 < V_{SIG} < -0.3$ Vdc?

No: Faulty Proximitor® sensor

Yes: Reconnect the system. Regap the probe. Retest the system.

Fault Type 5: $V_{SIG} = V_{XDCR}$

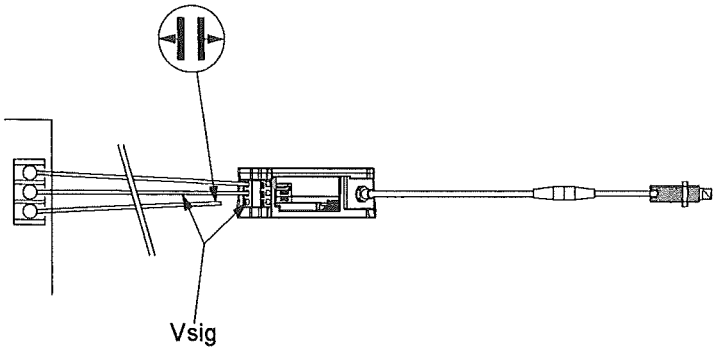
Possible causes:

- Incorrect power source voltage
- Faulty Proximitor® Sensor
- Faulty field wiring (between Out and V_T)

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



Measure V_{SIG}: Is $V_{SIG} = V_{XDCR}$?

Yes: Faulty Proximitor® Sensor

No: Faulty field wiring (short between Out and V_T)

Bently Nevada performs failure analysis on all returned transducers that are in warranty. The information gained during analysis of failed products is used to improve our current and future products. If you encounter a part that has failed, return the part with a brief description of the product application and symptoms observed to our corporate headquarters in Minden, Nevada for analysis:

Bently Nevada®, LLC
Attn: Product Repair Department
1631 Bently Parkway South
Minden, Nevada 89423 USA

Section 4 — 3300 XL Proximitor® Housing

The 3300 XL Proximitor® Housing allows you to protect Proximitor® Sensors, interface modules and electrical terminal blocks in areas that would otherwise be subjected to possible damage from moisture or other adverse environmental conditions.

Mounting Options

The 3300 XL Proximitor® Housing is designed to accommodate both DIN-rail and panel mounted Proximitor® Sensors. The housing holds up to **eight** DIN-rail 3300 XL Proximitor® Sensors or **six** panel-mounted Proximitor® Sensors.

Environmental Certifications

The 3300 XL Proximitor® Housing has been tested and certified to meet stringent **IP66** and **Type 4X** environmental ratings for protecting enclosed electronic equipment in harsh conditions. The 304L stainless steel construction resists moisture, corrosion and impacts in virtually all installations. The Housing may be hosed down for cleaning when necessary. The 3300 XL Proximitor® Housing can be used for North American Division 1 and 2 and European Zone 0, 1, and 2 hazardous area applications when used with approved fittings. However, it is **not** an explosion-proof housing.

Removable gland plates

The 3300 XL Proximitor® Housing is our only housing with removable gland plates. This feature makes it easy to remove the side plates or bottom gland plate for drilling or punching conduit holes. In addition, the door can be easily unlatched and removed due to its stainless steel slip hinge.

The gland plates have four thickness options to suit various conduit installation requirements. If you want a threaded conduit hole, a gland plate thickness of 3.05 mm (0.120 in) or greater is required in order to properly drill and tap the holes.

The conduit fittings come with a lock nut and O-ring to firmly tighten and seal the conduit fitting into both tapped and untapped holes. Fittings are available in stainless steel, brass, aluminum or chrome-plated zinc.

Dimensional Drawings

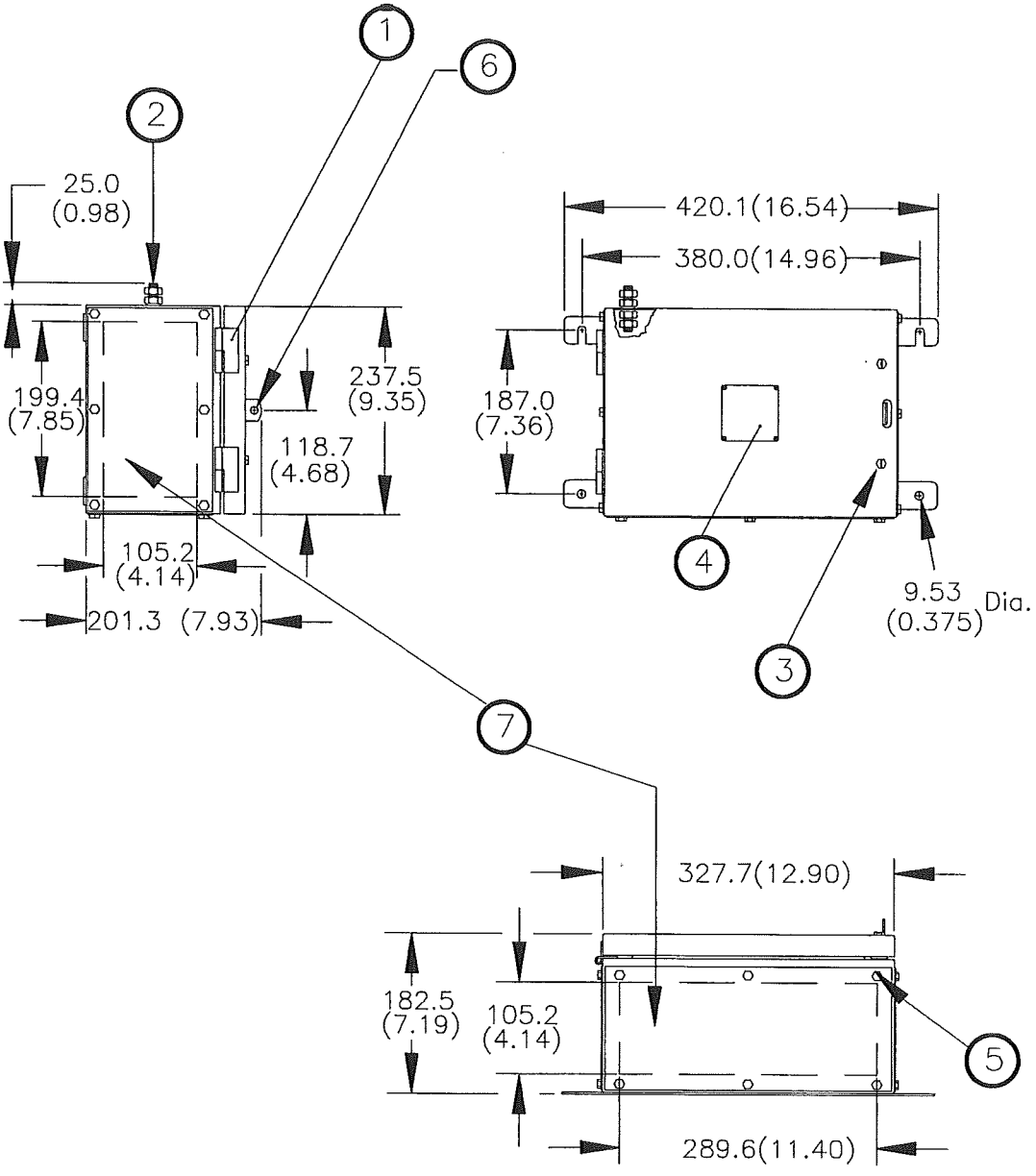


Figure 4-1 3300 XL Housing Outline Drawing

(1) Stainless steel slip hinge. Allows cover to be removed from housing

(2) M10 x 1.5 – 6 g ground stud, stainless steel

(3) M6 slotted hex head captive fastener, stainless steel

(4) Approval/ identification label

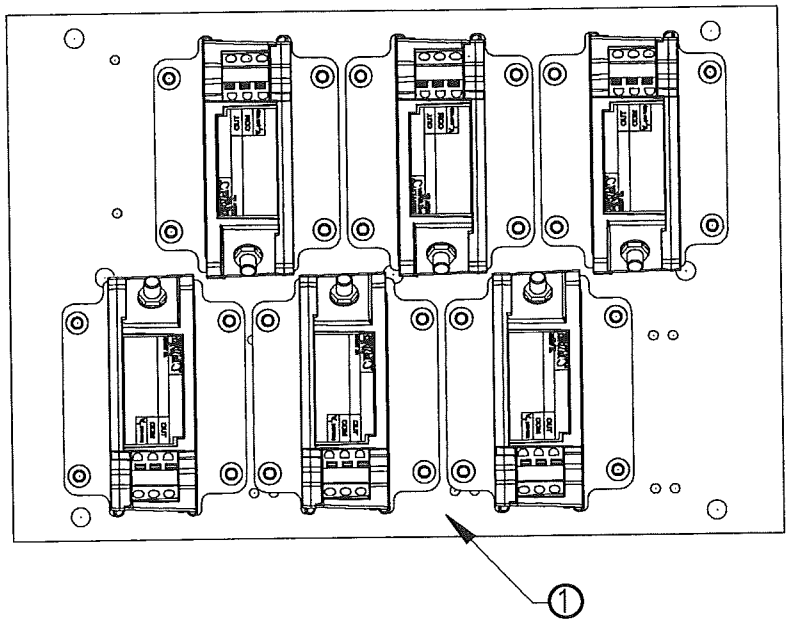
(5) M6 x 16 mm hex head bolt, stainless steel

(6) ϕ 8.33 [0.328] padlock hasp

(7) Removable gland plate, 3 places

Panel Mount Orientation

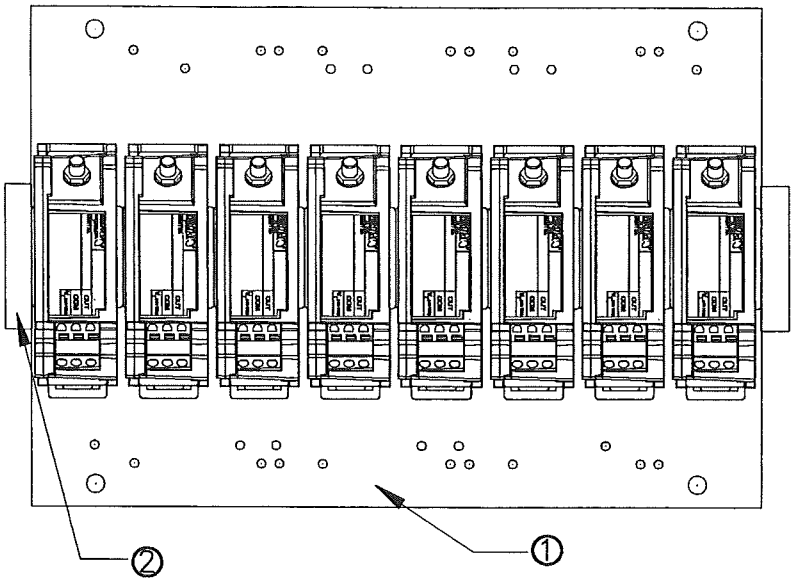
The following illustration shows the correct orientation for six panel mounted 3300 XL Proximitor® Sensors in the 3300 XL Proximitor® Housing:



(1) Mounting plate, 3300 XL Proximitor® Housing

DIN Mount Orientation

The following illustration shows the correct installation for eight DIN-mounted 3300 XL Proximitor® Sensors in a 3300 XL Proximitor® Housing:



(1) Mounting plate, 3300 XL Proximitor® Housing

(2) DIN rail end cap

Section 5 — System 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), with a -24 Vdc power supply, a 10 kilo Ω load, an AISI 4140 steel target, and a probe gapped at 1.27 mm (50 mils). Performance characteristics are applicable for systems that consist solely of 3300 XL 8 mm components. The system accuracy and interchangeability specifications do not apply when using a transducer system calibrated to any target other than a Bently Nevada AISI 4140 steel target.

Electrical

Proximitor® Sensor Input:

Accepts one noncontacting 3300-series 5 mm, 3300 8 mm **or** 3300 XL 8 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 (nominal) (R_{PROBE}) table:

Probe Length	Resistance from the Center Conductor to the Outer Conductor (R_{PROBE}) (ohms)
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

Extension cable dc resistance (nominal):

Length of Extension Cable	Resistance from Center Conductor to Center Conductor (R_{CORE}) (ohms)	Resistance from Outer Conductor to Outer Conductor (R_{JACKET}) (ohms)
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

Extension cable capacitance:

69.9 pF/m (21.3 pF/ft) typical

Field wiring:

0.2 to 1.5 mm^2 (16 to 24 AWG) [0.25 to 0.75 mm^2 (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 graphs Figure 7-10 Frequency Response, typical 3300 XL 8 mm 5 m System with varying lengths of field wiring attached, no barriers, Figure 7-11 Phase Response, typical 3300 XL 8 mm 5 m System with varying lengths of field wiring attached, no barriers, Figure 7-12 Frequency Response, typical 3300 XL 8 mm 9 m System with varying lengths of field wiring attached, no barriers, and Figure 7-13 Phase Response, typical 3300 XL 8 mm 9 m System with varying lengths of field wiring attached, no barriers 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:

1.27 mm (50 mils)

Incremental Scale Factor (ISF)

Standard 5 metre 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 to +45 °C (+32 °F to +113 °F).

Standard 9 metre 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 to +45 °C (+32 °F to +113 °F).

Extended Temperature Range (ETR) 5 and 9 metre 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 to +45 °C (+32 °F to +113 °F).

Deviation from best fit straight line (DSL)

Standard 5 metre system:

Less than ±0.025mm (±1 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

Standard 9 metre system:

Less than ±0.038mm (±1.5 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

Extended Temperature Range 5 and 9 metre systems:

Less than ±0.038mm (±1.5 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

Standard 5 metre system performance over extended temperatures:

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).

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 metre system performance over extended temperatures:

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).

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 system performance over extended temperatures:

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 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)

Measurements on shaft diameters smaller than 50 mm (2 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 40 mm (1.6 in) for axial position measurements or 38 mm (1.5 in) for radial vibration measurements. 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 159484 for additional information.

Effects of 60 Hz Magnetic Fields Up to 300 Gauss:

Output voltage in mil pp/gauss:

Gap	5 metre Proximitor® Sensor	9 metre Proximitor® Sensor	Probe	Ext. Cable
10 mil	0.0119	0.0247	0.0004	0.0004
50 mil	0.0131	0.0323	0.0014	0.0014
90 mil	0.0133	0.0348	0.0045	0.0045

Electrical Classification:

Complies with the European CE mark.

Hazardous Area Approvals

Note: Multiple approvals for hazardous areas certified by Canadian Standards Association (CSA/NRTL/C) in North America and by Baseefa (2001) in Europe.

North America:

Ex ia IIC T5; Class I Zone 0 or Exia IIC T5 for 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.

ExnA IIC T5 Classl Zone 2 or ExnA IIC T5 for 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.

Europe:

EExia IIC T5 for Zones 0, 1 and 2, Group IIC, EC certificate number BAS99ATEX1101, when installed with intrinsically safe zener barriers or galvanic isolators,

T5 @ Ta= -35 °C to +85 °C.

EEx nA for Zone 2, Group IIC, EC certificate number BAS99ATEX3100U.

Mechanical

Probe Tip Material:

Polyphenylene sulfide (PPS).

Probe Case Material:

AISI 304 stainless steel (SST) for forward mount and smooth case probes; AISI 303 SST for reverse mount probes.

Probe Cable Specifications:

Standard cable:

75 Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 5, or 9 metres.

Extended Temperature Range cable:

75 Ω triaxial, perfluoroalkoxy (PFA) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 5, or 9 metres.

Extension Cable Material:

75 Ω triaxial, fluoroethylene propylene (FEP) insulated.

Extended Temperature Range (ETR) Extension Cable Material:

75 Ω triaxial, perfluoroalkoxy (PFA) insulated.

Proximitor® Sensor Material:

A308 aluminum

System Length:

5 or 9 metres including extension cable

Standard Probe and Extension Cable Armor (optional):

Flexible AISI 302 or 304 SST with FEP outer jacket.

Extended Temperature Range Probe and Extension Cable Armor (optional):

Flexible AISI 302 or 304 SST with PFA outer jacket.

Tensile Strength (maximum rated):

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

Connector material:

Gold-plated brass or gold-plated beryllium copper.

Probe case torque:	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)

Connector-to-connector torque

Recommended torque:

see table:

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

Maximum torque:

0.565 N•m (5 in•lbf)

Minimum Bend Radius:

25.4 mm (1.0 in)

Total System Mass (typical):

0.7 kg (1.5 lbm)

Probe:

323 g (11.38 oz)

Extension Cable:

34 g/m (0.4 oz/ft)

Armored Extension cable:

103 g/m (1.5 oz/ft)

Proximitor® Sensor:

246 g (8.7 oz)

Environmental Limits

Probe Temperature Range

Operating and Storage Temperature:

Standard probe:

-51 °C to +177 °C (-60 °F to +351 °F)

Extended Temperature Range probe:

-51 °C to +177 °C (-60 °F to +351 °F) for the probe tip; -51 °C to +260 °C (-60 °F to +500 °F) for the probe cable and connector.

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:

Standard cable:

-51 °C to +177 °C (-60 °F to +351 °F)

Extended Temperature Range cable:

-51 °C to +260 °C (-60 °F to +500 °F)

Proximitor® Sensor Temperature Range

Operating Temperature:

-35 °C to +85 °C (-31 °F to +185 °F)

Storage Temperature:

-51 °C to +100 °C (-60 °F to +212 °F)

Relative Humidity:

100% condensing, non-submersible when connectors are protected.

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.

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 8 mm proximity probes. In addition, 3300 XL 8 mm proximity probes will not be replaced under the service plan due to probe leakage.

Patents:

5,016,343;

5,126,664;

5,351,388, and

5,685,884.

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

Section 6 — System Ordering Information

3300 XL 8 mm Proximity Probes:

330101 3300 XL 8 mm Probe, 3/8-24 UNF thread, without armor[3]
330102 3300 XL 8 mm Probe, 3/8-24 UNF thread, with armor[3]
Part Number-AXX-BXX-CXX-DXX-EXX
Option Descriptions

A: Unthreaded Length Option

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

Order in increments of 0.1 in

Length configurations:

Maximum unthreaded length: 8.8 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: 9.6 in

Minimum case length: 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)
1 5	1.5 metre (4.9 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 and Cable-Type Option

0 0	Connector provided but not installed, standard cable
0 1	Miniature coaxial ClickLoc™ connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc™ connector, standard cable
1 0	Connector provided but not installed, FluidLoc® 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 8 mm Proximity Probes, Metric:

330103 3300 XL 8 mm Probe, M10 x 1 thread, without armor[3]
330104 3300 XL 8 mm Probe, M10 x 1 thread, with armor[3]
Part Number-AXX-BXX-CXX-DXX-EXX
Option Descriptions
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:

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 length: 250 mm

Minimum length: 20 mm

Example: 0 6 = 60 mm

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metres (4.9 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 and Cable-Type Option

0 0	Connector provided but not installed, standard cable
0 1	Miniature coaxial ClickLoc™ connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc™ connector, standard cable
1 0	Connector provided but not installed, FluidLoc® 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 8 mm Reverse Mount Probes

330105-02-12-CXX-DXX-EXX, 3/8-24 UNF threads[3]
330106-05-30-CXX-DXX-EXX, M10 x 1 threads[3]
Option Descriptions
C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metre (4.9 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 0 Connector provided but not installed

0 2 Miniature ClickLoc™ coaxial connector

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 XL 8 mm Proximity Probes, Smooth Case:

330140 3300 XL 8 mm Probe without armor[2]
330141 3300 XL 8 mm Probe with armor[2]
Part Number-AXX-BXX-CXX-DXX
Option Descriptions

A: Overall Case Length Option
Order in increments of 0.1 in

Length configurations:

Maximum length: 9.6 in

Minimum length: 0.8 in

Example: 2 4 = 2.4 in

B: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metres (4.9 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)

C: Connector and Cable-Type Option

0 0 Connector provided but not installed, standard cable

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

0 2 Miniature coaxial ClickLoc™ connector, standard cable

1 0 Connector provided but not installed, FluidLoc® cable

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

1 2 Miniature coaxial ClickLoc™ connector, FluidLoc® cable

D: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes:

330191 3300 XL 8 mm ETR Probe, 3/8-24 UNF thread, without armor
330192 3300 XL 8 mm ETR Probe, 3/8-24 UNF thread, with armor
Part Number-AXX-BXX-CXX-DXX
Option Descriptions
A: Unthreaded Length Option

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

Order in increments of 0.5 in

Length configurations:

Maximum unthreaded length: 8.5 in

Minimum unthreaded length: 0.0 in

Example: 1 5 = 1.5 in

B: Overall Case Length Option
Order in increments of 0.5 in

Threaded length configurations:

Maximum case length: 9.5 in

Minimum case length: 1.0 in

Example: 2 5 = 2.5 in

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metre (4.9 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: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes, Metric:

330193 3300 XL 8 mm Probe, M10 x 1 thread, without armor
330194 3300 XL 8 mm Probe, M10 x 1 thread, with armor
Part Number-AXX-BXX-CXX-DXX
Option Descriptions
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:

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 length: 250 mm

Minimum length: 20 mm

Example: 0 6 = 60 mm

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metres (4.9 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: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

3300 XL 8 mm Extended Temperature Range (ETR) Reverse Mount Probes

330195-02-12-CXX-DXX, 3/8-24 UNF threads
330196-05-30-CXX-DXX, M10 x 1 threads
Option Descriptions

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metre (4.9 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: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes, Smooth Case:

330197 3300 XL 8 mm Probe without armor[2]
330198 3300 XL 8 mm Probe with armor[2]
Part Number-AXX-BXX-CXX
Option Descriptions

A: Overall Case Length Option
Order in increments of 0.5 in

Length configurations:

Maximum length: 9.5 in

Minimum length: 1.0 in

Example: 3 5 = 3.5 in

B: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metres (4.9 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)

C: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 XL Proximitor® Sensor

330180-AXX-BXX

Option Descriptions

A: Total Length and Mounting Option

5 0 5.0 metre (16.4 feet) system length, panel mount

5 1 5.0 metre (16.4 feet) system length, DIN mount

5 2 5.0 metre (16.4 feet) system length, no mounting hardware

9 0 9.0 metres (29.5 feet) system length, panel mount

9 1 9.0 metres (29.5 feet) system length, DIN mount

9 2 9.0 metres (29.5 feet) system length, no mounting hardware

B: Agency Approval Option

0 0 Not required

0 5 Multiple approvals

3300 XL Extension Cable

330130-AXXX-BXX-CXX

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

Option Descriptions

A: Cable Length Option

0 3 0 3.0 metres (9.8 feet)

0 3 5 3.5 metres (11.5 feet)

0 4 0 4.0 metres (13.1 feet)

0 4 5 4.5 metres (14.8 feet)

0 7 0 7.0 metres (22.9 feet)

0 7 5 7.5 metres (24.6 feet)

0 8 0 8.0 metres (26.2 feet)

0 8 5 8.5 metres (27.9 feet)

B: Connector Protector and Cable Option
- **0 0** Standard cable
- **0 1** Armored cable
- **0 2** Standard cable with connector protectors
- **0 3** Armored cable with connector protectors
- **1 0** FluidLoc® cable
- **1 1** Armored FluidLoc® cable
- **1 2** FluidLoc® cable with connector protectors
- **1 3** Armored FluidLoc® cable with connector protectors

C: Agency Approval Option
- **0 0** Not required
- **0 5** Multiple Approvals

3300 XL Extended Temperature Range (ETR) Extension Cable

330190-AXXX-BXX-CXX

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

Option Descriptions

A: Cable Length Option
- **0 3 0** 3.0 metres (9.8 feet)
- **0 3 5** 3.5 metres (11.5 feet)
- **0 4 0** 4.0 metres (13.1 feet)
- **0 4 5** 4.5 metres (14.8 feet)
- **0 7 0** 7.0 metres (22.9 feet)
- **0 7 5** 7.5 metres (24.6 feet)
- **0 8 0** 8.0 metres (26.2 feet)
- **0 8 5** 8.5 metres (27.9 feet)

B: Cable Option
- **0 0** Standard cable
- **0 1** Armored cable

C: Agency Approval Option
- **0 0** Not required
- **0 5** Multiple Approvals

Accessories

141078-01	**Manual**
159484	**Performance Specification** – 3300 XL Proximity Transducer System
162735	

Performance Specification – 3300 XL ETR probes and extension cables

02120015

Bulk field wire. 1.0 mm^2 (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.

137491-AXX

Aluminum probe clamp bracket[2]

Option Descriptions
A: Mounting screw option
- **0 1** 10-24 UNC-2A mounting screws
- **0 2** M5 x 0.8-6g mounting screws

The aluminum clamp bracket is an unthreaded mounting bracket designed to use with the smooth case probes (330140, 330141, 330197 and 330198). After gapping the probe, tighten the clamp bracket by tightening the screws. The mounting screws have pre-drilled holes for safety wire.

137492-AXX

Aluminum probe threaded mounting bracket

Option Descriptions
A: Thread size
- **0 1** 3/8-24
- **0 4** M10 x 1

The aluminum probe threaded mounting bracket is the standard mounting bracket for most 3300 and 3300 XL probe installations. The -01 option is supplied with two 10-24 UNC-2A mounting screws. The -04 option is supplied with two M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

27474-AXX

Phenolic threaded probe mounting bracket

Option Descriptions
A: Thread size
- **0 1** 3/8-24
- **0 4** M10 x 1

The phenolic threaded mounting bracket is recommended if additional electric isolation from the mounting location is required (as in some generator and electrical motor bearing locations). The -01 option is supplied with two 10-24 UNC-2A mounting screws. The -04 option is supplied with two M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

138492-01

Replacement panel-mount mounting pad

138493-01

Replacement DIN-mount mounting pad

148722-01

3300 XL Test Plug. The 3300 XL Test Plug is contains three small test pins attached to three color-coded wires 1 metre in length, each terminated in a banana plug. The three-pin adapter plugs into the test pin holes on 3300 XL-style Proximitor® Sensors. It is used to check the performance of the Proximitor® Sensor from the test

pin holes in the terminal strip without requiring the removal of the field wiring.

04310310

3300 XL Proximitor® Sensor Panel-mount Screws. Package includes four 6-32 UNC thread forming mounting screws. (Supplied standard with Proximitor® Housings [3300 XL panel-mount option]).

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.

40113-02

Connector Protector Kit. Connector Protector Kit for 3300 XL 8 mm probes and extension cables, including connector protectors and installation tools.

136536-01

Connector Protector Adapter. Allows connector protector installation tools manufactured prior to 1998 to be used with 75 Ω ClickLoc™ connectors.

40180-02

Connector Protectors. Package contains 10 pairs of connector protectors for 3300 XL 8 mm probes and 3300 XL 5 and 8 mm extension cables.

03839410

75 ohm Triaxial Male Connector Protector. Male connector protectors are installed onto the extension cable and attach to the female connector protector on the probe, providing environmental protection of connectors.

03839420

75 ohm Triaxial Female Connector Protector. Female connector protectors are installed onto the probe lead and attach to the male connector protector on the extension cable, providing environmental protection of connectors. Also placed on the extension cable to slide over the connection to the Proximitor® Sensor and protect it from the environment.

04301007

3/8-24 Probe Lock Nut with safety wire holes. Single probe lock nut with two holes drilled through the nut in order to secure the lock nut in place with safety wire.

04301008

M10 x 1 Probe Lock Nut with safety wire holes. Single probe lock nut with two holes drilled through the nut in order to secure the lock nut in place with safety wire.

330153-01

3300 XL Connector Kit. Used on 3300 XL 8 mm probes and extension cables. Contains one pair of male and female ClickLoc™ connectors, two color-coded sleeves, two pieces of slit FEP tubing, and one strip of silicone tape.

163356

Connector Crimp Tool Kit. Includes one set of multiconnector 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.

Notes:

1. Five metre probes are designed for use with the five metre Proximitor® Sensor only.
2. Mounting clamps must be ordered separately for 330140, 330141, 330197, and 330198.
3. For a shorter delivery time, order commonly stocked probes. Currently, stocked probes consist of the following part numbers:

   330101-00-08-05-02-00, 330101-00-08-05-02-05, 330101-00-08-10-02-00, 330101-00-08-10-02-05, 330101-00-12-10-02-00, 330101-00-12-10-02-05, 330101-00-16-10-02-00, 330101-00-16-10-02-05, 330101-00-20-05-02-00, 330101-00-20-10-02-00, 330101-00-20-10-02-05, 330101-00-30-10-02-00, 330101-00-30-10-02-05, 330101-00-40-05-02-00, 330101-00-40-10-02-00, 330101-00-40-10-02-05, 330101-00-60-10-02-00, 330101-00-60-10-02-05, 330102-00-20-10-02-00, 330103-00-02-10-02-05, 330103-00-03-10-02-05, 330103-00-04-10-02-00, 330103-00-04-50-02-00, 330103-00-05-10-02-00, 330103-00-06-10-02-00, 330104-00-06-10-02-00, 330104-01-05-50-02-00, 330105-02-12-05-02-00, 330105-02-12-05-02-05, 330105-02-12-10-02-00, 330105-02-12-10-02-05, 330106-05-30-05-02-00, 330106-05-30-05-02-05, 330106-05-30-10-02-00 and 330106-05-30-10-02-05.

Section 7 — 3300 XL 8mm System Graphs and Dimensional Drawings

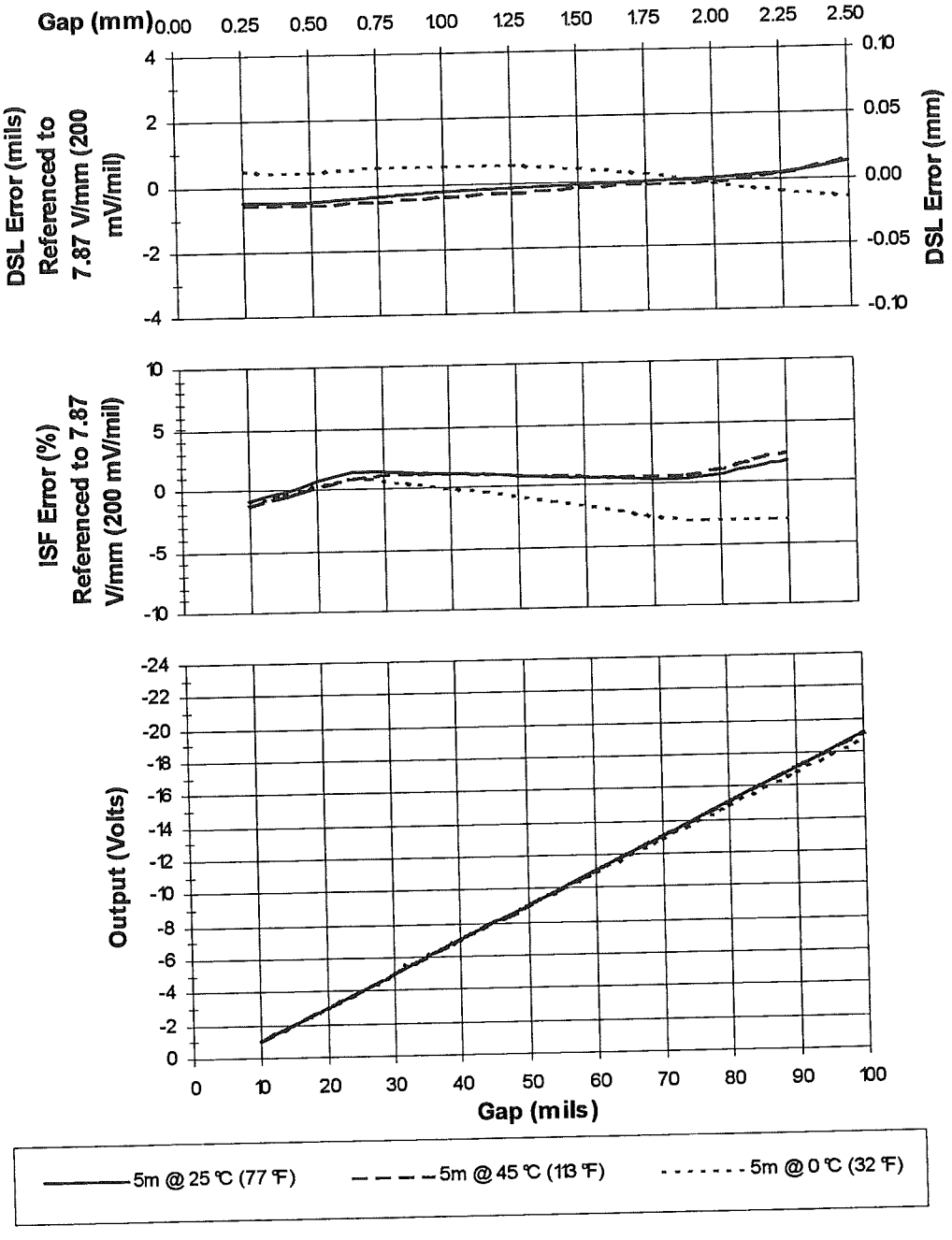


Figure 7-1 Typical 3300 XL 8 mm 5 m System over API 670 Testing Range

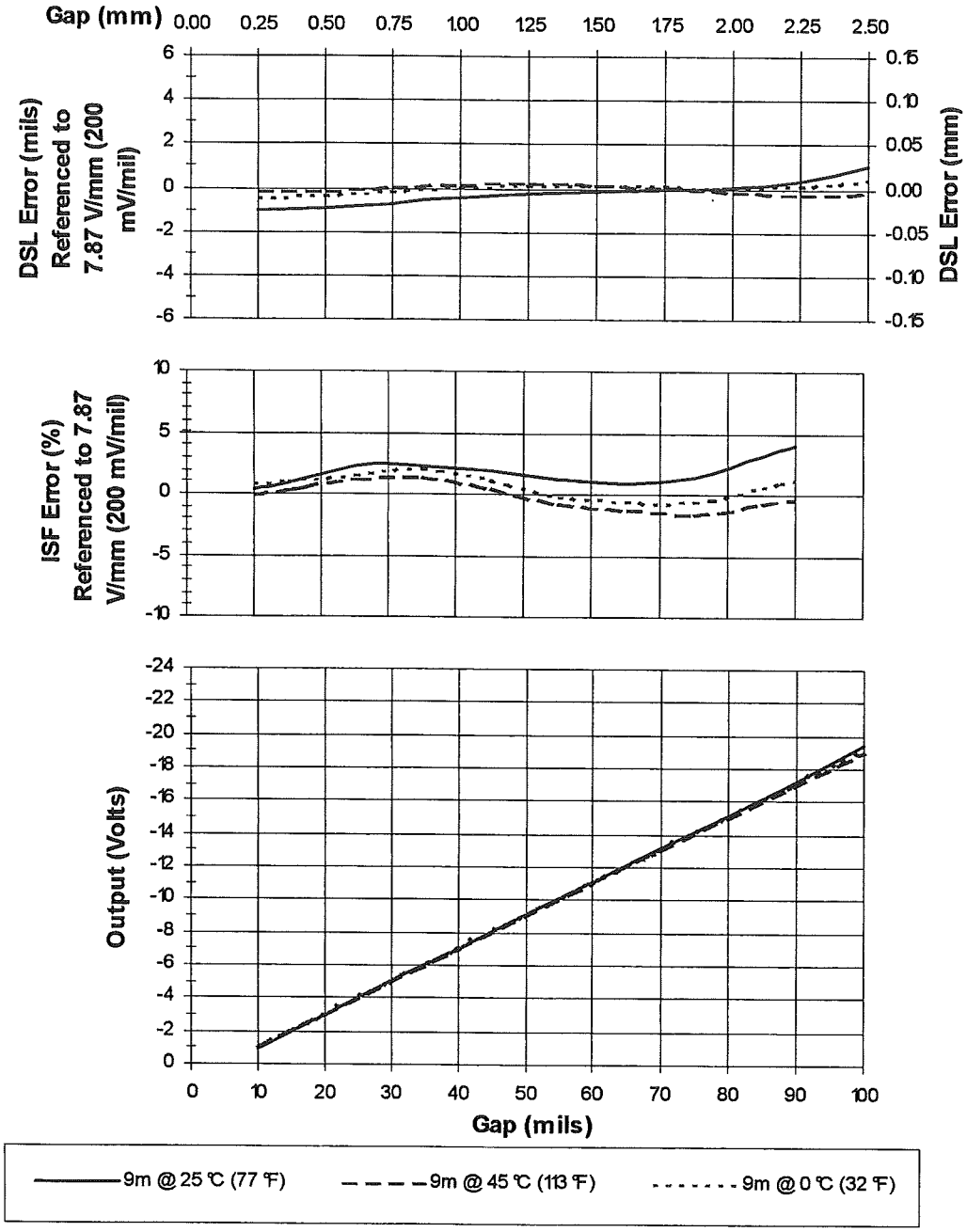


Figure 7-2 Typical 3300 XL 8 mm 9 m System over API 670 Testing Range

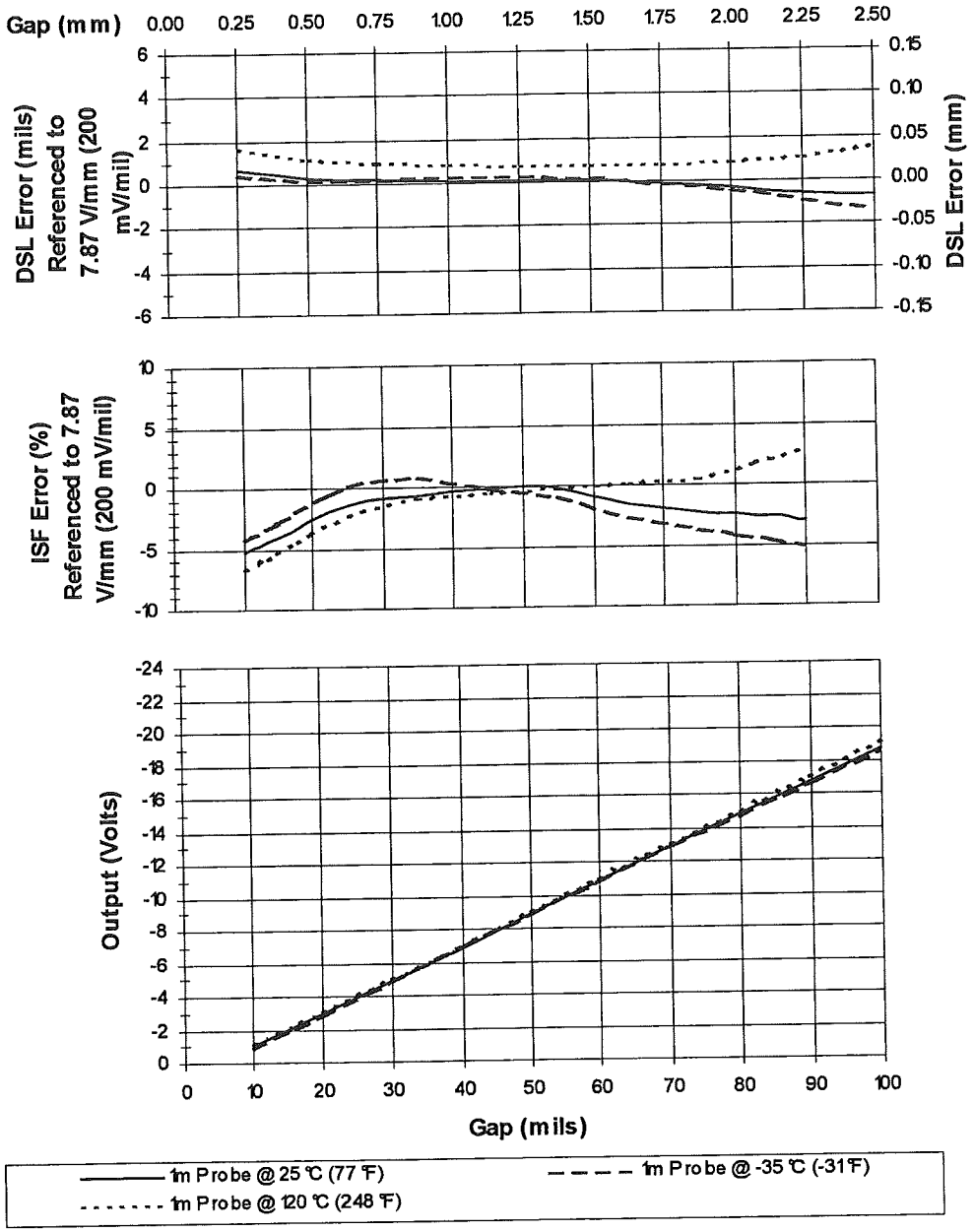


Figure 7-3 Typical 3300 XL 8 mm Probe over API 670 Operating Range

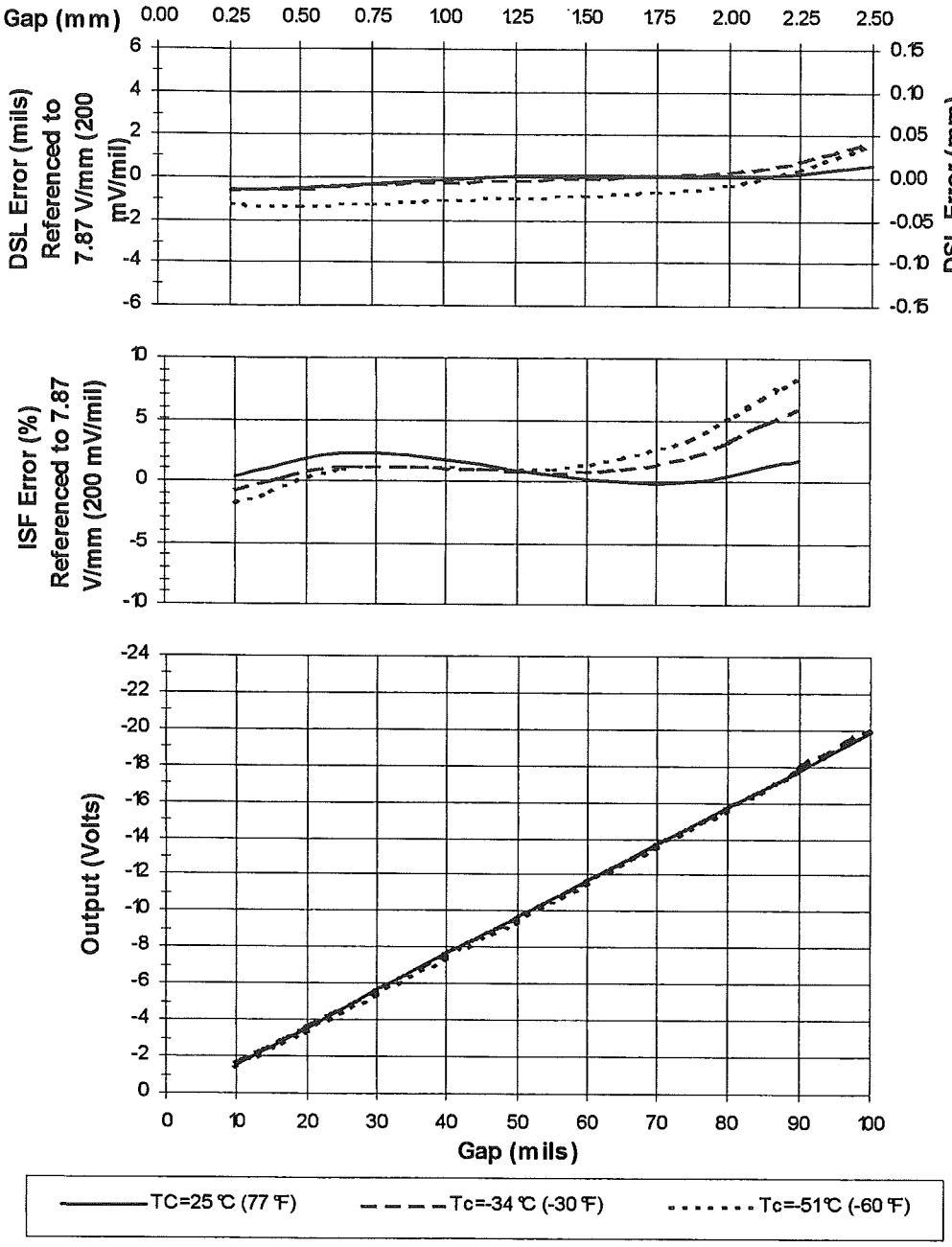


Figure 7-4 Typical 3300 XL 8 mm 5 m Proximitor® Sensor with 4 m of Extension Cable @ Tc (Probe is at 25 °C)

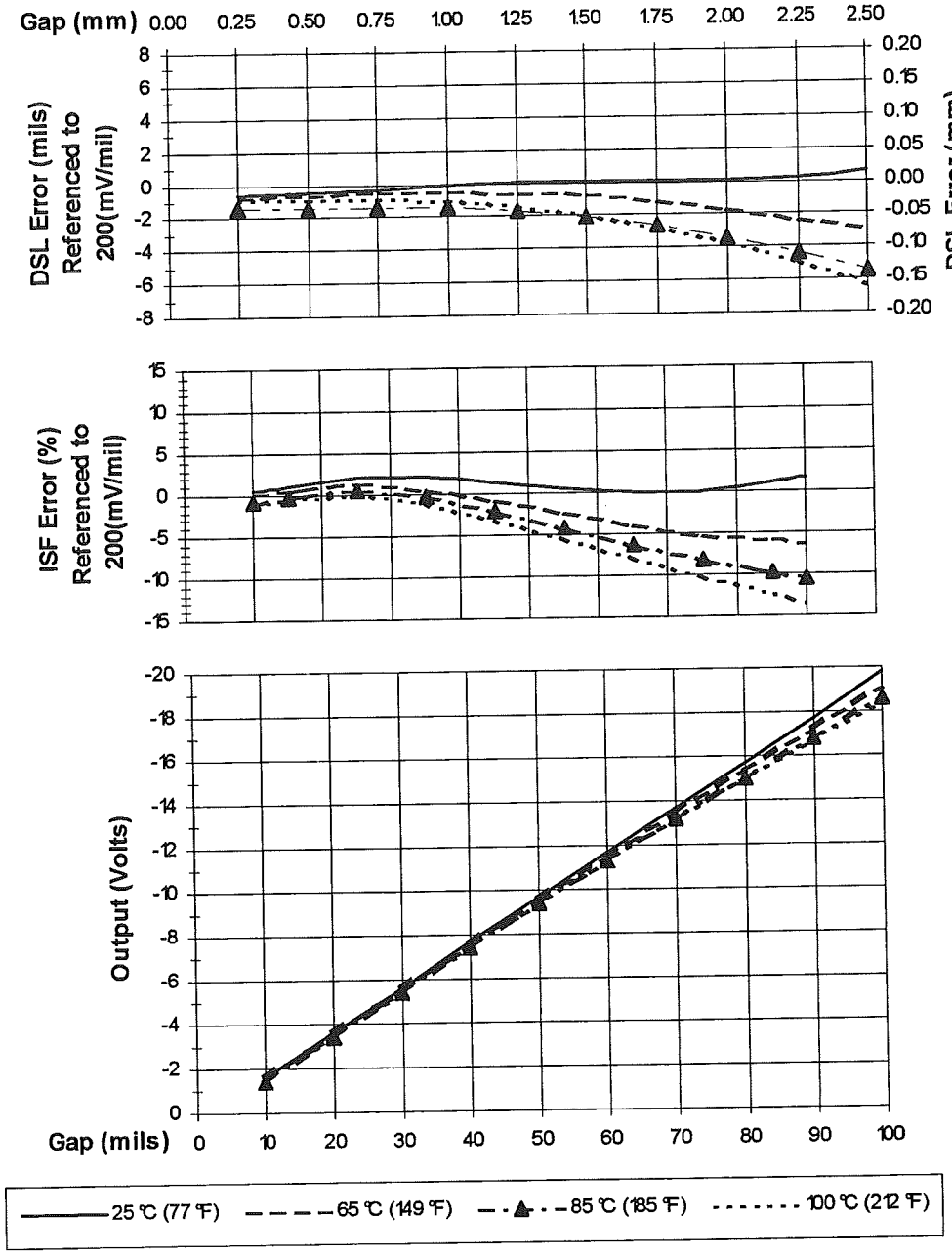


Figure 7-5 Typical 3300 XL 8 mm 5 m Proximitor® Sensor with 4 m Extension Cable @ Th (Probe is at 25°C)

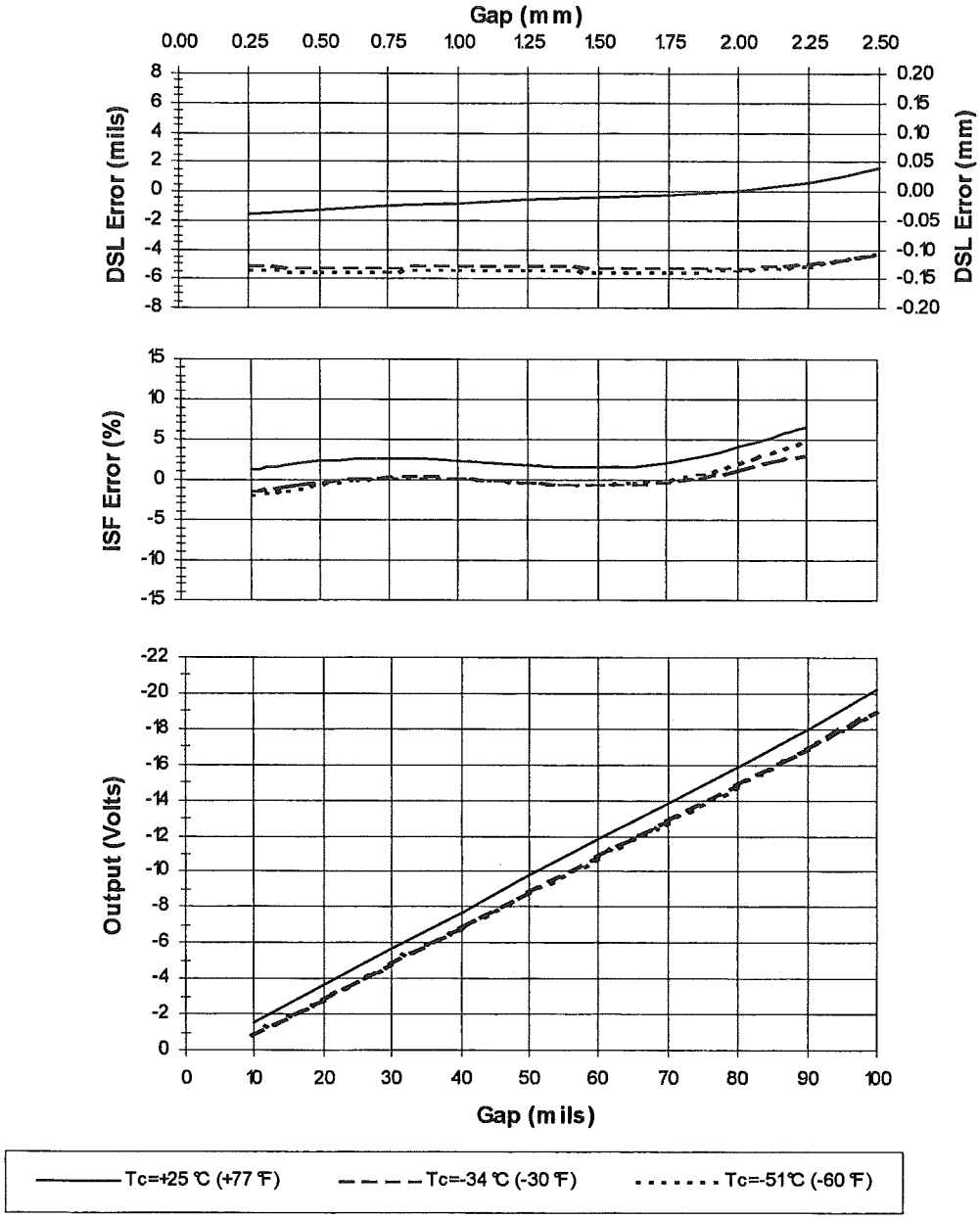


Figure 7-6 Typical 3300 XL 8 mm 9 m Proximitor® Sensor with 8 m of Extension Cable @ Tc (Probe is at 25 °C)

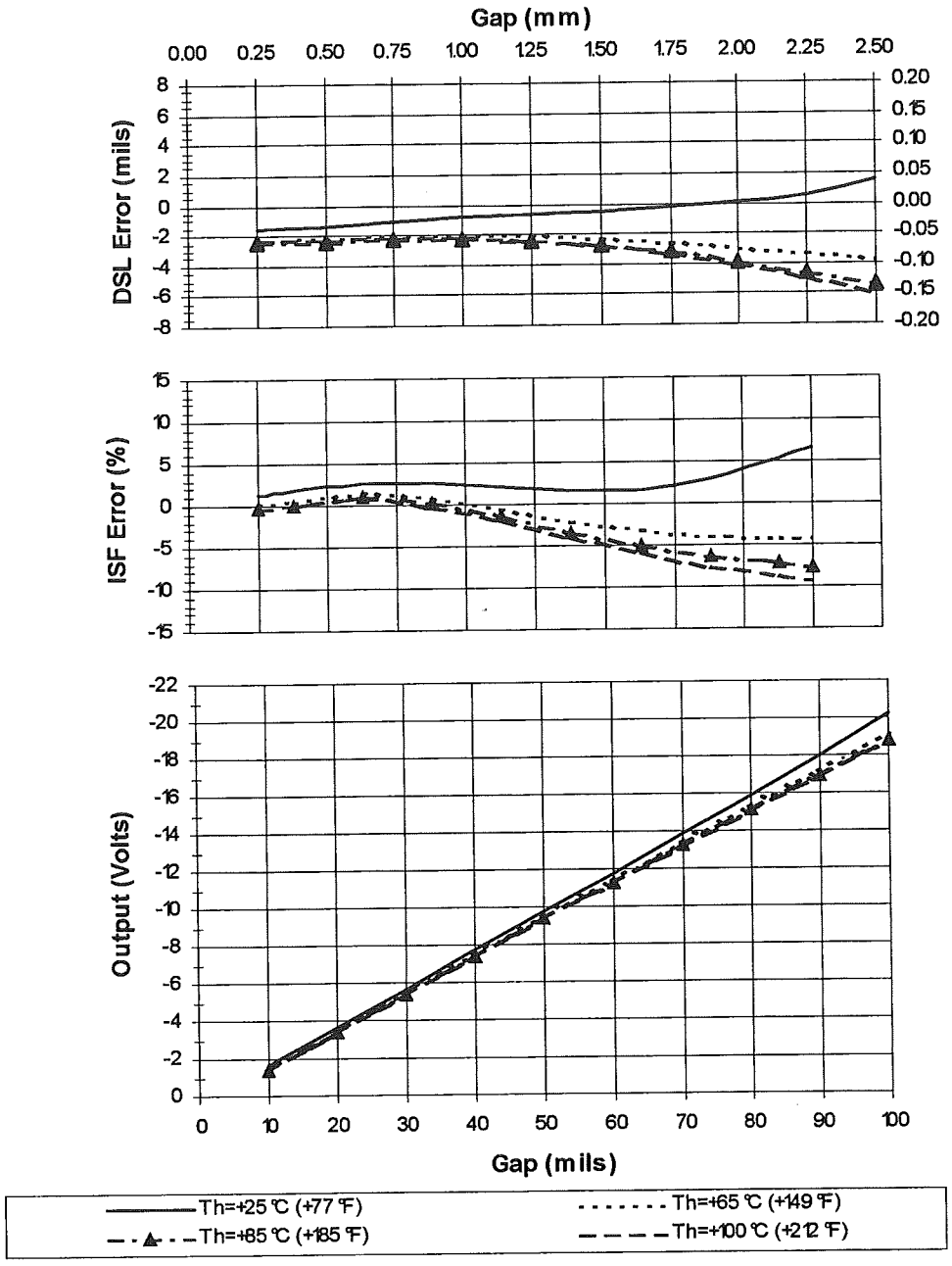


Figure 7-7 Typical 3300 XL 8 mm 9 m Proximitor® Sensor with 8 m of Extension Cable @ Th (Probe is at 25 °C)

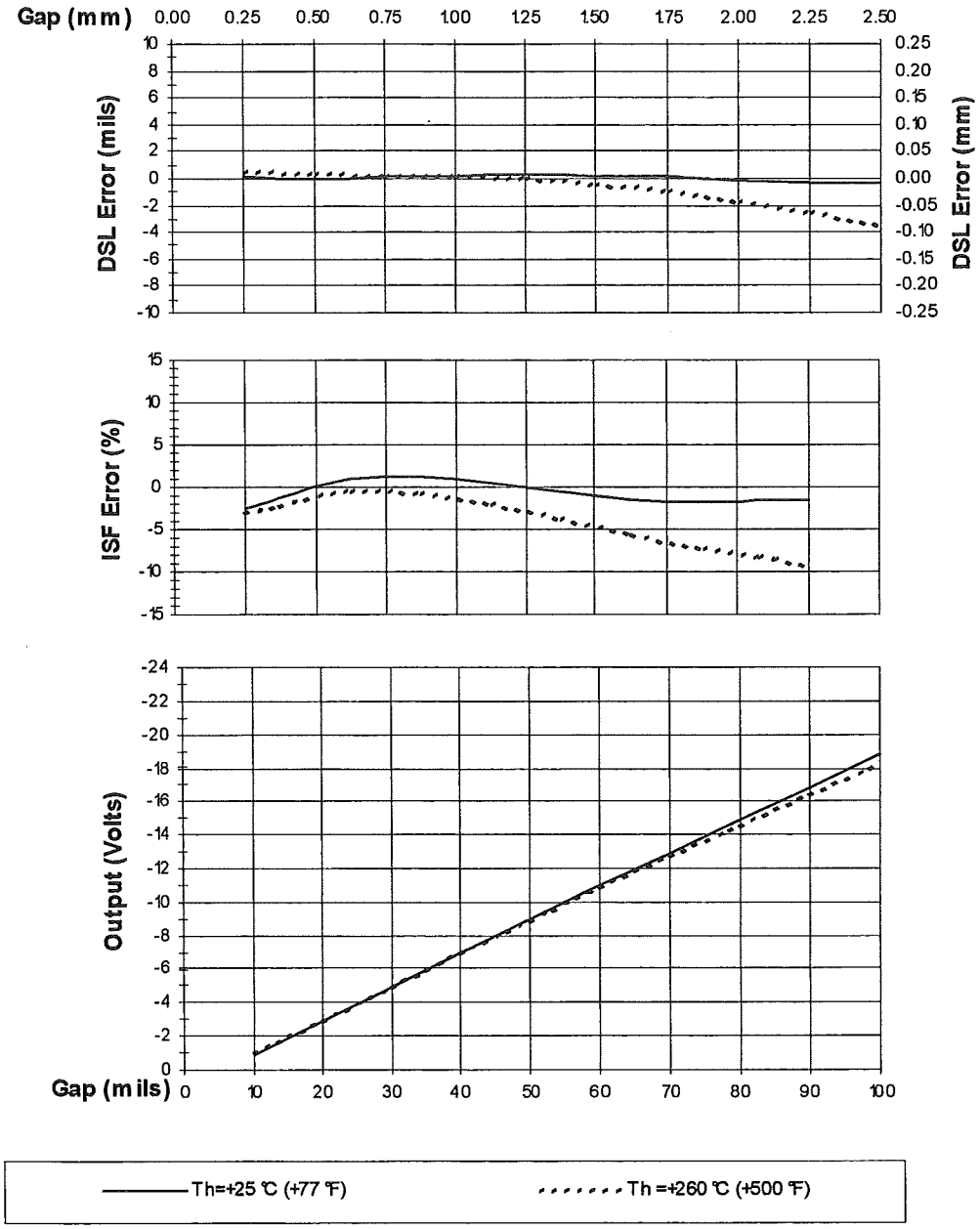


Figure 7-8 Typical 3300 XL Extended Temperature Range Probe and 4 metres of Extended Temperature Range Extension Cable @ Th (Proximitor® Sensor and probe tip with 1 foot of cable are at +25 °C)

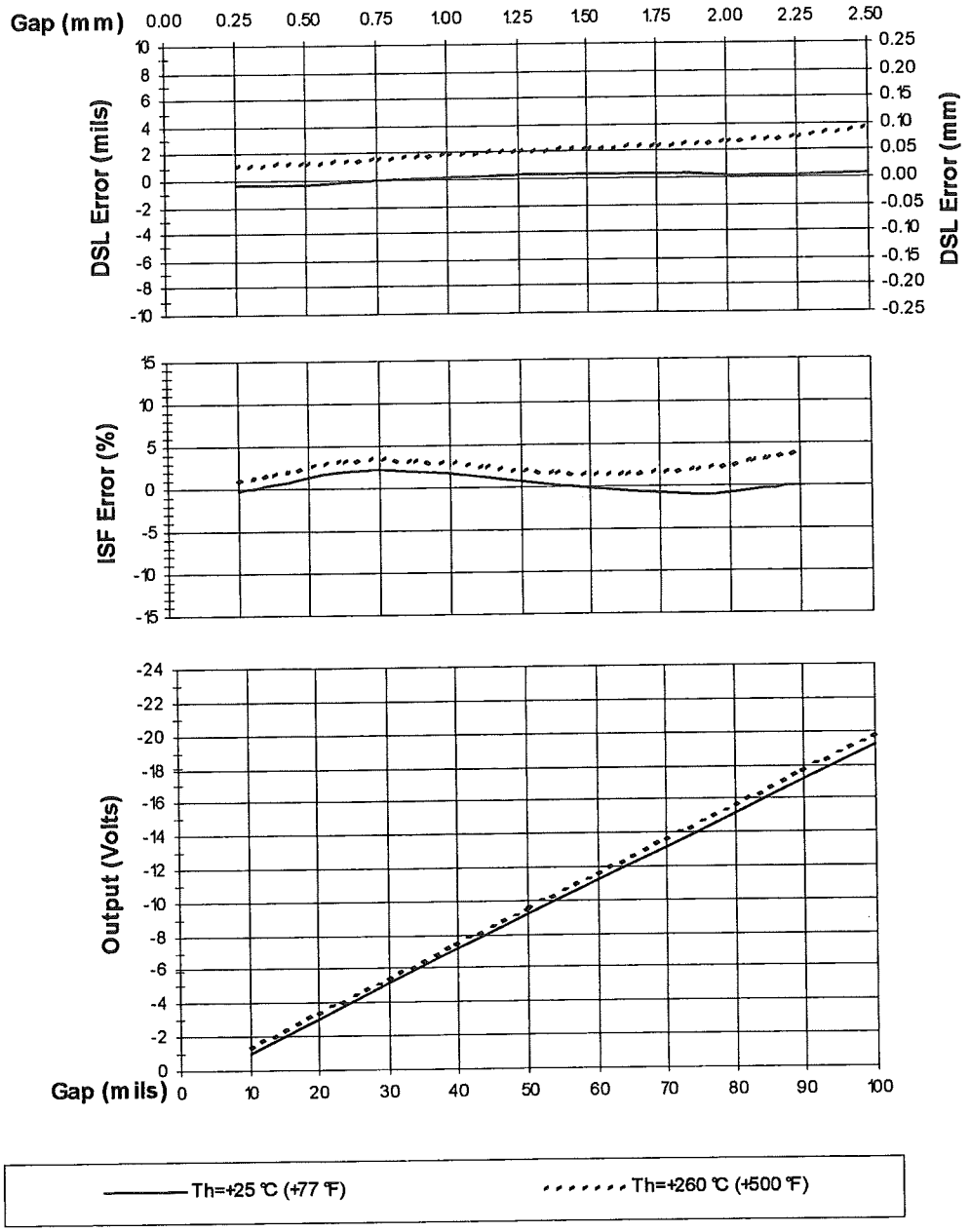


Figure 7-9 Typical 3300 XL Extended Temperature Range Probe and 8 metres of Extended Temperature Range Extension Cable @ Th (Proximitor® Sensor and probe tip with 1 foot of cable are at +25 °C)

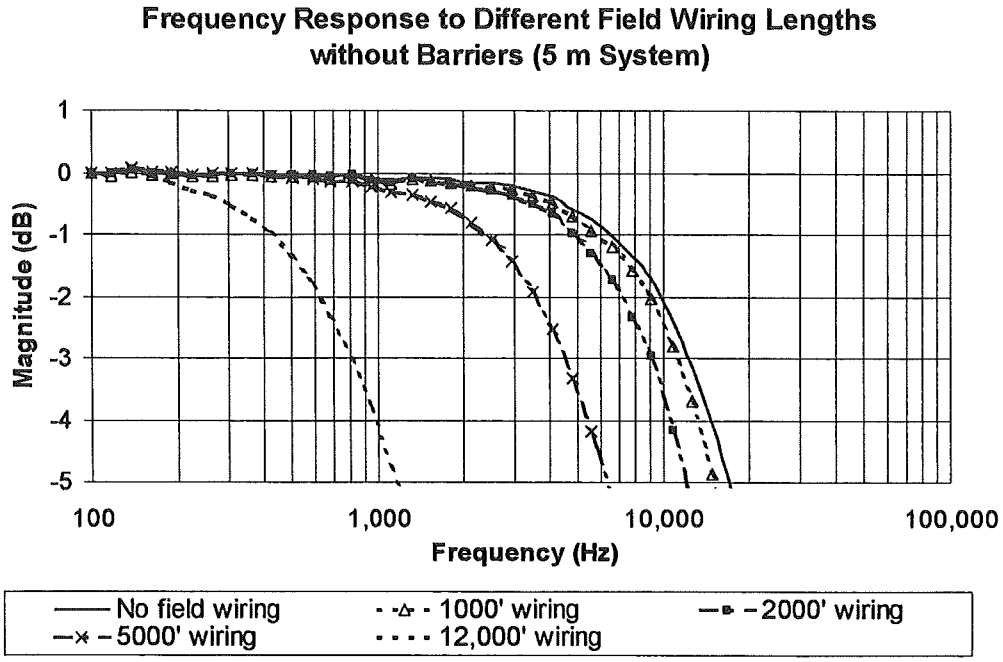


Figure 7-10 Frequency Response, typical 3300 XL 8 mm 5 m System with varying lengths of field wiring attached, no barriers

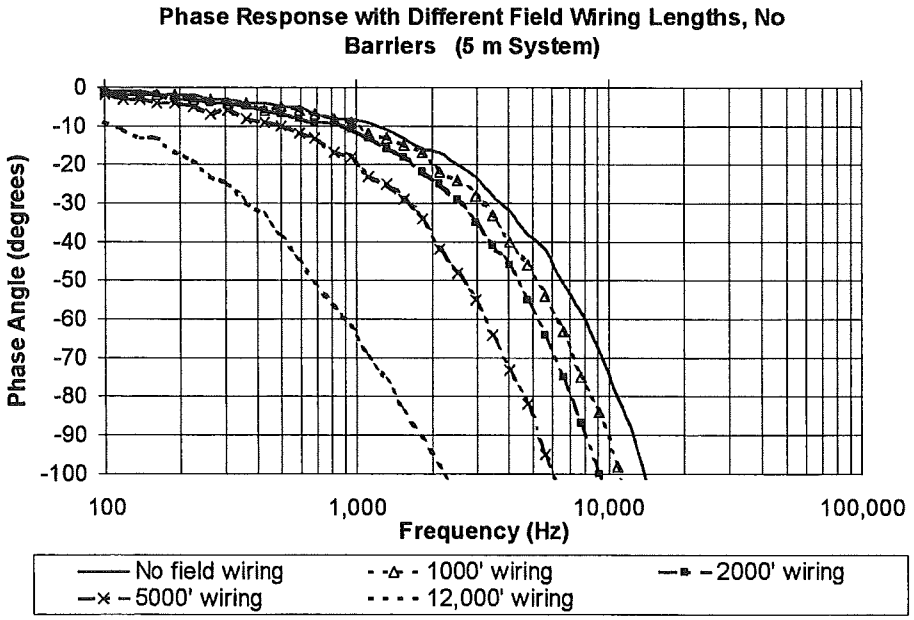


Figure 7-11 Phase Response, typical 3300 XL 8 mm 5 m System with varying lengths of field wiring attached, no barriers

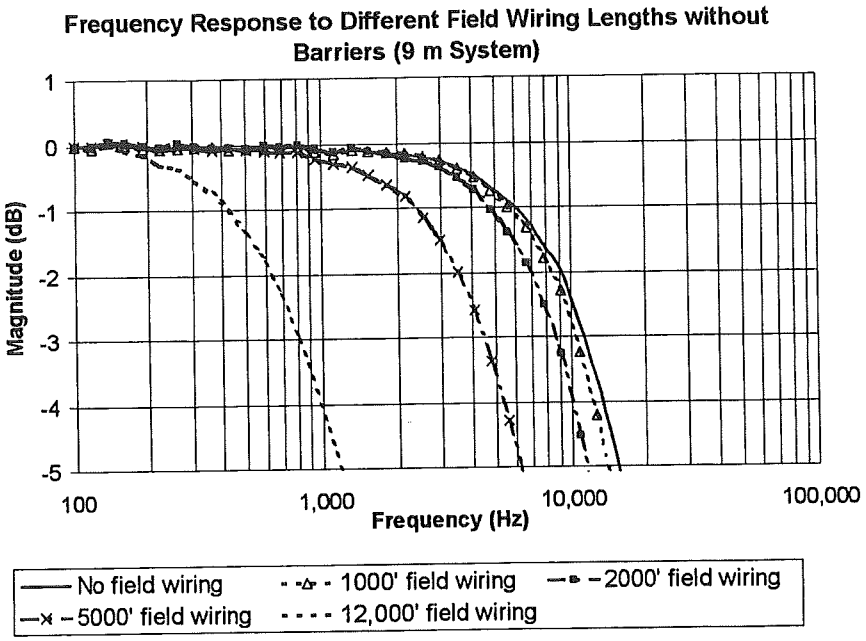


Figure 7-12 Frequency Response, typical 3300 XL 8 mm 9 m System with varying lengths of field wiring attached, no barriers

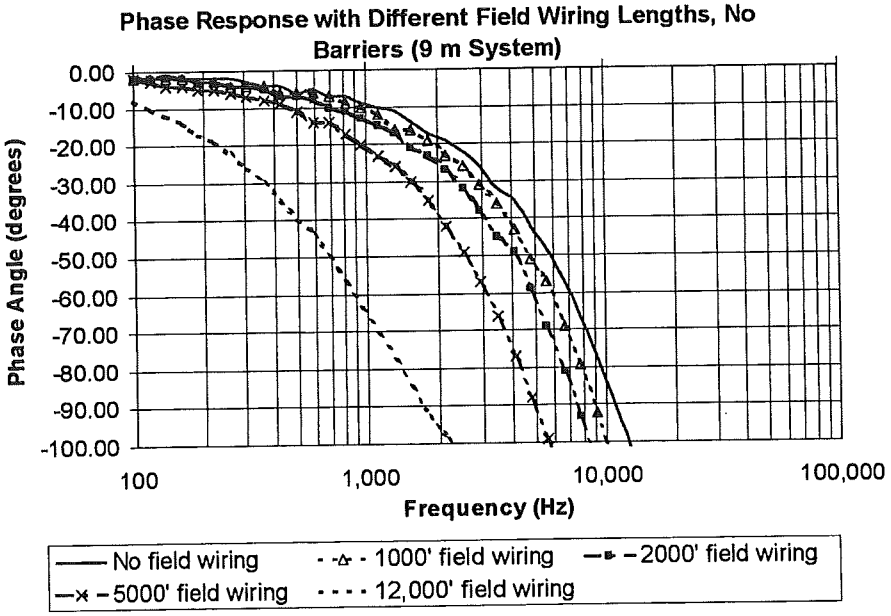


Figure 7-13 Phase Response, typical 3300 XL 8 mm 9 m System with varying lengths of field wiring attached, no barriers

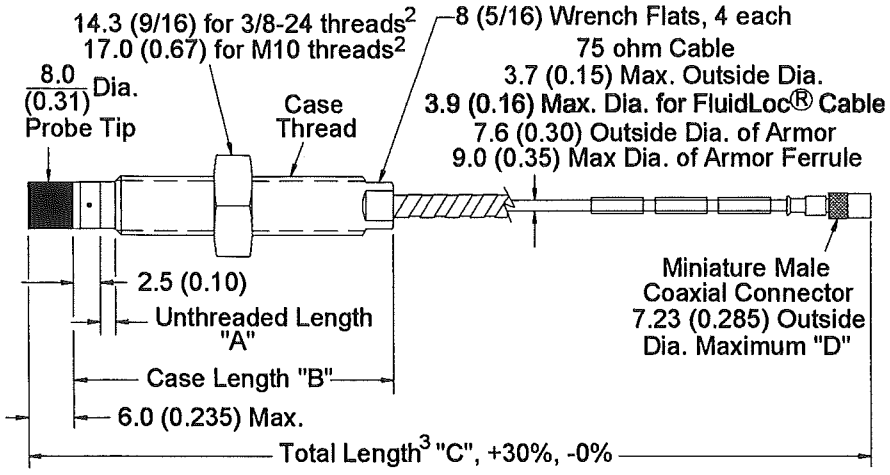


Figure 7-14 3300 XL 8 mm Proximity probes, Standard Mount

330101 and 330191, 3/8-24 UNF-2A, without armor [7]

330102 and 330192, 3/8-24 UNF-2A, with armor [6]

330103 and 330193, M10X1 thread, without armor [7]

330104 and 330194, M10X1 thread, with armor [6]

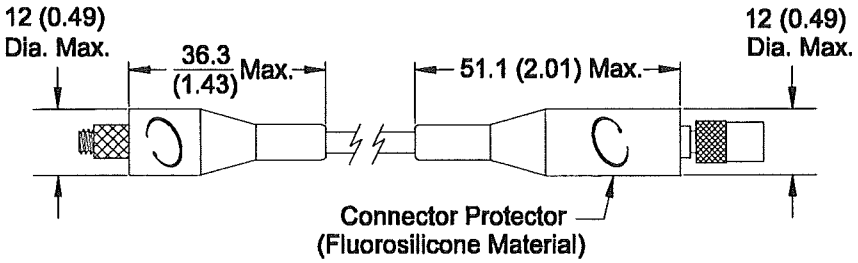


Figure 7-15 stalled Connector Protectors

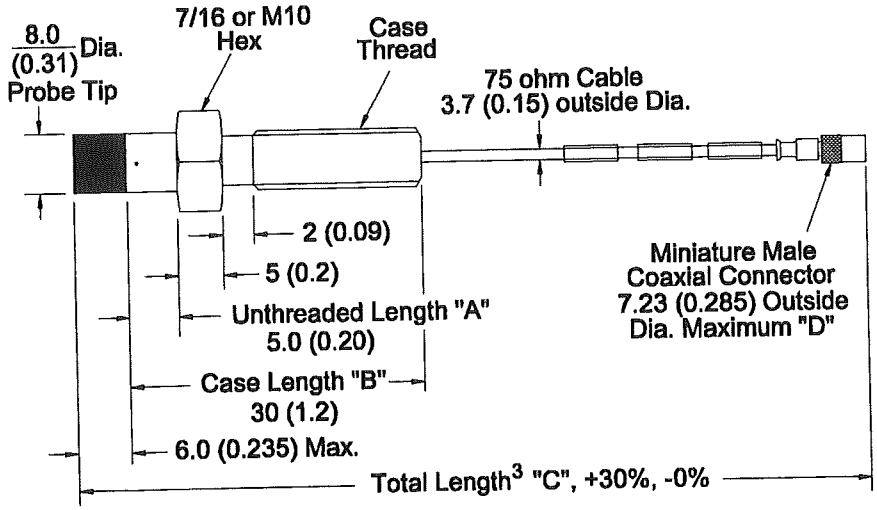


Figure 7-16 00 XL 8 mm Proximity Probes, Reverse Mount [4, 7]

330105 and 330195, 3/8-24 UNF-2A threads

330106 and 330196, M10X1 threads

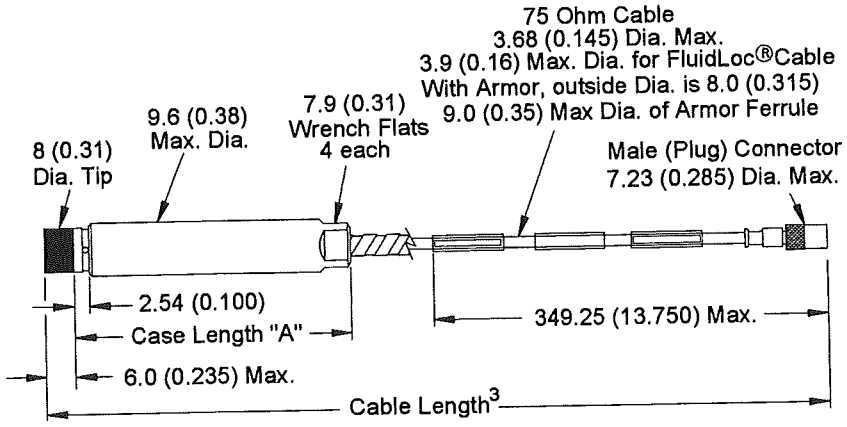


Figure 7-17 00 XL 8 mm Proximity Probes, Smooth Case

330140 and 330197, without armor [7]

330141 and 330198, with armor [6]

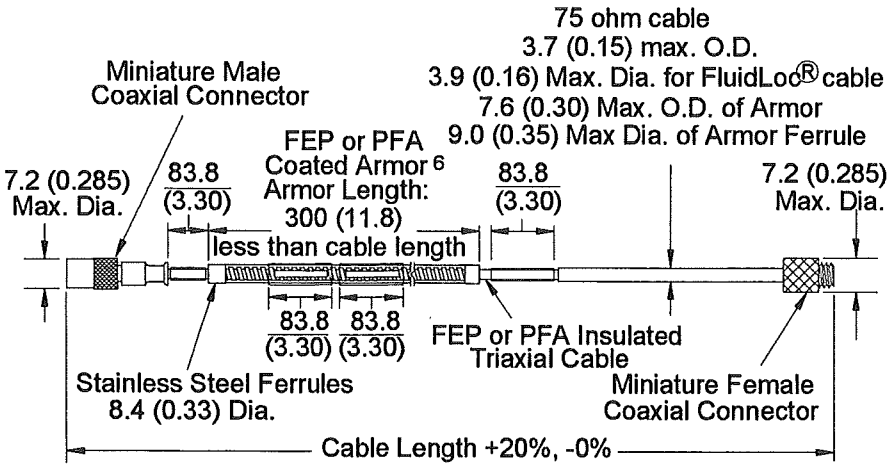


**Figure 7-18 0130, 3300 XL Extension Cable (FEP armor and insulation)
30190, 3300 XL ETR Extension Cable (PFA armor and insulation)**

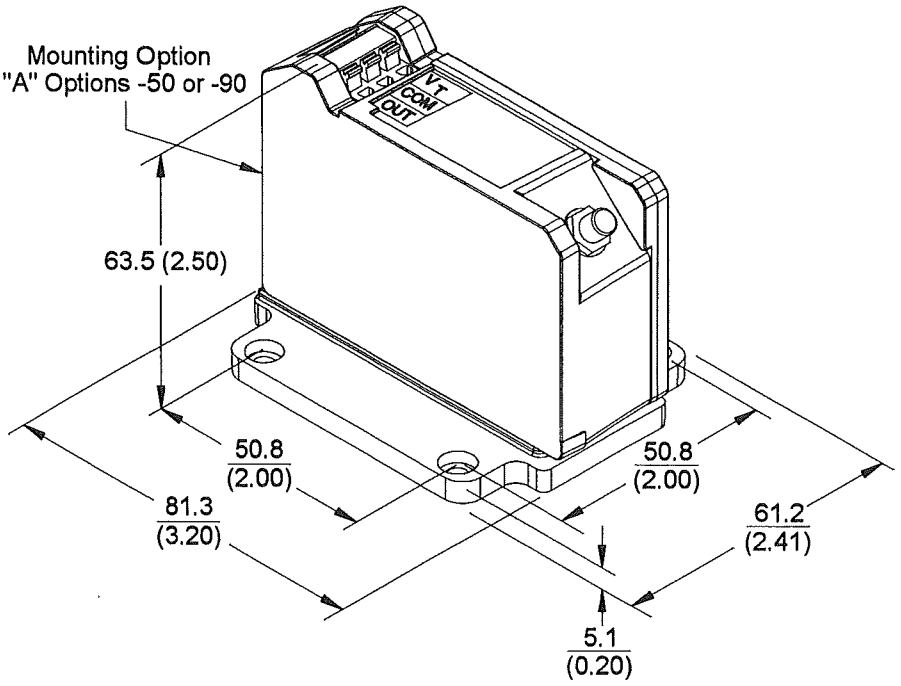


Figure 7-19 nel Mount 3300 XL Proximitor® Sensor

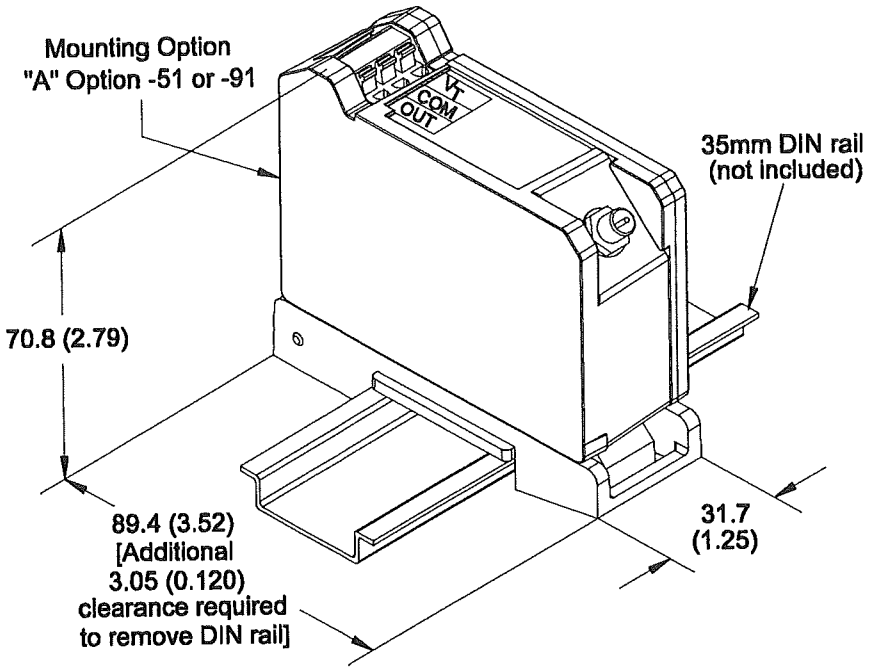


Figure 7-20 N Mount 3300 XL Proximitor® Sensor

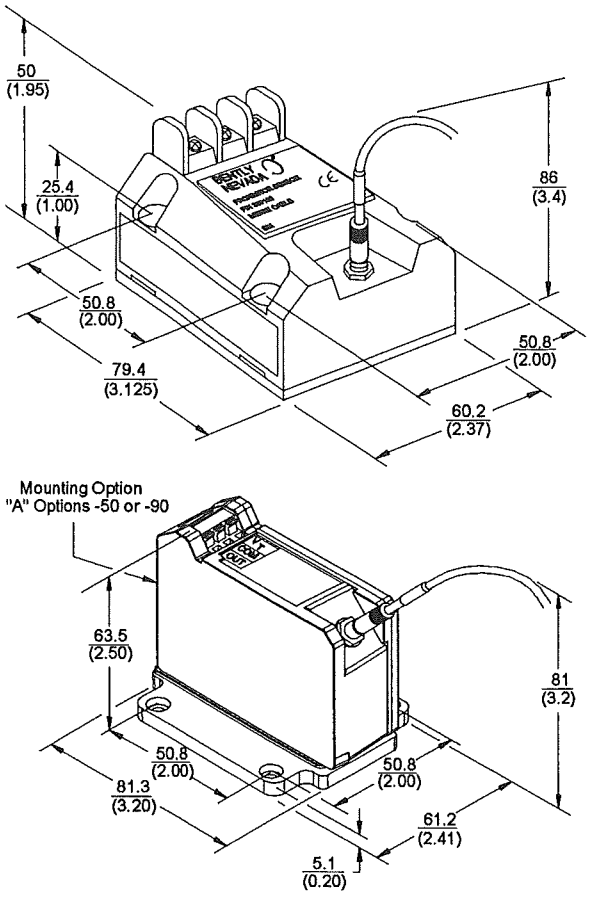


Figure 7-21 ysical mounting characteristics showing interchangeability of 3300 and 3300 XL Proximitor® Sensors when 4-hole mounting option is used[8]

Notes:

1. All dimensions on figures are in millimetres (inches) unless otherwise noted.
2. Standard mount 8 mm probes supplied with 17 mm or 9/16 inch lock nut.
3. Probes ordered with 5 or 9 metre integral cables have a length tolerance of +20%, -0%.
4. Reverse mount probes not available with armor or connector protector options.
5. Letters inside quotation marks on figures 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. Use M3.5 or #6 screws for panel-mount Proximitor® Sensors (screws provided when purchasing Bently Nevada housings).

Section 8 — Micrometer Specifications and Ordering Information

Mechanical

Target Buttons:

AISI 4140 Alloy Steel, 30.5 mm (1.20 in) diameter flat target

Note: Contact your nearest Bently Nevada Sales Professional for details on special target materials.

Casing Material:

3300 XL Precision Micrometer:

Fiberglass and Plastic.

3300 XL Shaft Micrometer:

ABS Plastic.

Micrometer specifications:

Table 8-1 3300 XL Precision Micrometer:

Part number	Resolution	Accuracy	Range
330185-01	0.000020 in	± 0.000015 in	0-1 in
330185-02	0.0005 mm	± 0.0004 mm	0-25 mm

Table 8-2 3300 XL Shaft Micrometer

Part number	Resolution	Accuracy	Range
330186-01	0.001 in	±0.0001 in	0-1 in
300186-02	0.01 mm	±0.003 mm	0-25 mm

Size

3300 XL Precision Micrometer (case dimensions)

Height:

226 mm (8.9 in)

Width:

274 mm (10.8 in)

Length:

356 mm (14.0 in)

3300 XL Shaft Micrometer (case dimensions)

Height:

152 mm (6.0 in)

Width:

246 mm (9.7 in)

Length:

356 mm (14.0 in)

Total System Mass

3300 XL Precision Micrometer:

6.8 kg (14.5 lbm)

3300 XL Shaft Micrometer:

2.8 kg (6.2 lbm)

Ordering Information

3300 XL Precision Micrometer

330185-AXX
Option Descriptions
A: Scale Units

0 1	Micrometer in English units	(0-1 in)
0 2	Micrometer in metric units	(0-25 mm)

3300 XL Shaft Micrometer

330186- AXX
Option Descriptions
A: Scale Units

0 1	Micrometer in English units	(0-1 in)
0 2	Micrometer in metric units	(0-25 mm)

Note: The 3300 shaft micrometer and precision micrometer come with probe mounting adapters for ¼ inch, $^{3}/_{8}$ inch, ½ inch, $^{5}/_{8}$ inch, M8, M10, M14 and M16 probe thread sizes.

Accessories

Part Number	Description
138751-01	3300 XL Precision Micrometer Instruction Sheet
140273-01	3300 XL Shaft Micrometer Instruction Sheet
27505-01	Target button: A replacement 4140 target button that comes standard with the 3300 XL shaft micrometer. There can be a variation of up to 5% in the average scale factor (ASF) between each target button.
136534-01	High Precision target button: A replacement 4140 target button that comes standard with the 3300 XL precision micrometer. There can be a variation of up to 0.6% in the Average Scale Factor (ASF) between each target button.
02200218	Shaft Micrometer Strap: A replacement strap for the 3300 XL Shaft Micrometer.

Part Number	Description
49478-01	Probe mounting adapter, M5 threads.
49478-02	Probe mounting adapter, 1/4 inch threads.
49478-03	Probe mounting adapter, M8 threads.
49478-04	Probe mounting adapter, M10 threads.
49478-05	Probe mounting adapter, 3/8 inch threads.
49478-06	Probe mounting adapter, M11 threads.
49478-07	Probe mounting adapter, 1/2 inch threads.
49478-08	Probe mounting adapter, M14 threads.
49478-09	Probe mounting adapter, 5/8 inch threads.
49478-10	Probe mounting adapter, M16 threads.

Dimensional Drawings

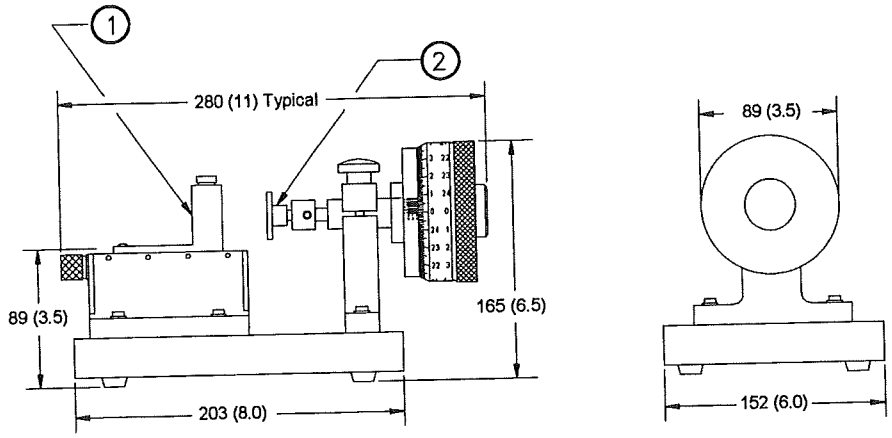


Figure 8-1 3300 XL Precision Micrometer

(1) Collets to fit both metric and English 5mm, 8mm, 11mm, and 14mm probes.

(2) Removeable AISI 4140 target

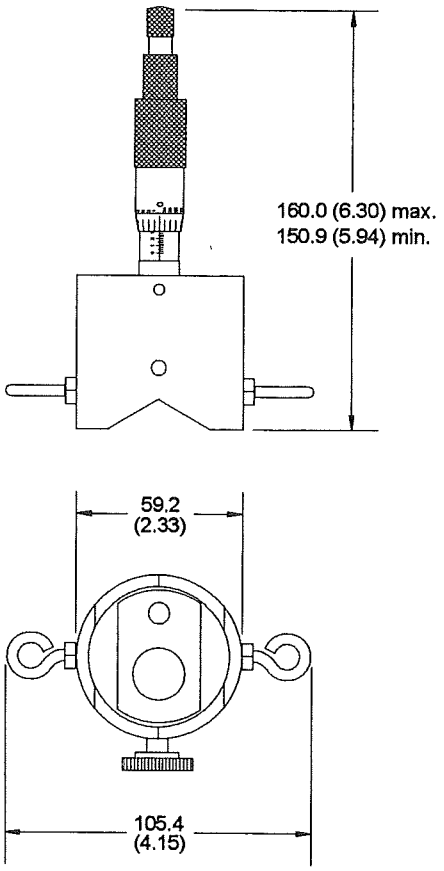


Figure 8-2 - 3300 XL Shaft Micrometer

Note: Dimensions for figures are in millimetres (inches)

Section 9 — Housing Specifications and Ordering Information

Mechanical

Housing Rating:

For North America, the Canadian Standards Association (CSA) tested and certified the housing to a **Type 4X** waterproof and corrosion-resistant rating. For Europe, the Canadian Standards Association (CSA) also tested and certified the housing to meet the **IP66** waterproof and dust-proof rating along with the 7 joule high impact mechanical risk test required by CENELEC standard **EN50 014**. Verified by Baseefa (2001) certificate number Ex85122 for use in ExN applications and by certificate number BAS99ATEX3102 for EEx n applications.

Housing Material:

304L stainless steel.

Gland Plate Gasket Material:

Neoprene®.

Cover Gasket Material:

Poron.

Total System Mass:

6.4 kg (14.0 lbm) with standard gland plates but without conduit fittings installed; 8.0 kg (17.5 lbm) with standard gland plates and conduit fittings installed.

Ordering Information

3300 XL Proximitor® Housing

330181 -AXX - BXX - CXX – DXX

The 3300 XL Proximitor® Housing is rated for IP66 and Type 4X environmental conditions. It can accommodate up to eight 3300 XL Proximitor® Sensors in the DIN-mount configuration or six panel-mount Proximitor® Sensors. It has three removable gland plates, making it easier to install conduit fittings and cable gland seals.

Option Descriptions

A: Transducer Type Option

0 0	No mounting hardware
0 1	3300 XL Proximitor® Sensors (DIN mount), DIN-rail terminal blocks
0 3	3300 XL Proximitor® Sensors (panel mount)
0 4	3300 Proximitor® Sensors
0 5	3000 or 7200 Proximitor® Sensors, VDCs, and Interface Modules

Note: Proximitor® Sensors, Interface Modules, and Velocity-to-Displacement Converters are not included and must be ordered separately.

Application Advisory: Care must be taken during system length selection to avoid having excess cable length coiled up inside of the housing. Excess cable coiled up in the housing may cause chafing and premature failure of the cables. Additional conduit boxes, armored cable or special provisions are recommended for long lengths of cable that must be coiled in the 330181 housing.

B: Conduit Fitting Option

0 0 Without fittings.

0 1 One brass M32 cable gland seal outlet, six brass M25 cable gland seal inlets.

0 2 One brass M32 cable gland seal outlet, eight brass M25 cable gland seal inlets.

0 3 One aluminum 1¼-11½ NPT conduit outlet, six aluminum ¾-14 NPT conduit inlets, six aluminum ¾-14 to ½-14 NPT reducers.

0 4 One aluminum 1¼-11½ NPT conduit outlet, eight aluminum ¾-14 NPT conduit inlets, eight aluminum ¾-14 to ½-14 NPT reducers.

0 5 One 316 stainless steel 1¼-11½ NPT conduit outlet, six 316 stainless steel ¾-14 NPT conduit inlets, six 303 stainless steel ¾-14 to ½-14 NPT reducers.

0 6 One 316 stainless steel 1¼-11½ NPT conduit outlet, eight 316 stainless steel ¾-14 NPT conduit inlets, eight 303 stainless steel ¾-14 to ½-14 NPT reducers.

0 7 One chrome-plated zinc 1¼-11½ NPT conduit outlet, six chrome-plated zinc ¾-14 NPT conduit inlets, six 303 stainless steel ¾-14 to ½-14 NPT reducers.

0 8 One chrome-plated zinc 1¼-11½ NPT conduit outlet, eight chrome-plated zinc ¾-14 NPT conduit inlets, eight 303 stainless steel ¾-14 NPT to ½-14 NPT reducers.

C: Gland Plate Thickness

0 1 Standard 2.34 mm (0.092 in)

0 2 3.05 mm (0.120 in)

0 3 4.76 mm (0.188 in)

0 4 6.35 mm (0.250 in)

D: Terminal Mounting Block Option

0 0 No terminal blocks

0 1 4 DIN rail terminal blocks

0 2 8 DIN rail terminal blocks

0 3 12 DIN rail terminal blocks

0 4 16 DIN rail terminal blocks

0 5 20 DIN rail terminal blocks

0 6 24 DIN rail terminal blocks

0 7 28 DIN rail terminal blocks

0 8 32 DIN rail terminal blocks

2 1 1 terminal block

2 2	2 terminal blocks
2 3	3 terminal blocks
2 4	4 terminal blocks
2 5	5 terminal blocks
2 6	6 terminal blocks

Note: Each DIN rail terminal block accepts only one wire. The standard terminal blocks each accept four wires. Thus, four DIN rail terminal blocks equal one standard terminal block.

Accessories

Part number	Description
137936-01	**Brass cable gland seal, M32**
137937-01	**Brass cable gland seal, M25**
03818111	**Nickel-plated brass conduit fitting, PG21 x M20**
03839130	**Aluminum conduit fitting, ¾ -14 NPT**
03839132	**Aluminum conduit fitting, 1¼ -11½ NPT**
03850021	**Aluminum reducer, ¾ -14 to ½ -14 NPT**
03813103	**Chrome-plated zinc conduit fitting, ¾ -14 NPT**
03813105	**Chrome-plated zinc conduit fitting, 1-11½ NPT**
03813106	**Chrome-plated zinc conduit fitting, 1¼ -11½ NPT**
03818099	**AISI 316 stainless steel conduit fitting, 1¼ -11½ NPT**
03818100	**AISI 316 stainless steel conduit fitting, ¾ -14NPT**
26650-01	**AISI 303 stainless steel reducer, ¾ -14 to ½ -14 NPT**
26650-03	**AISI 303 stainless steel reducer, 1¼ -11½ to 1-11½ NPT**
03818102	**AISI 316 stainless steel conduit fitting, PG21 x M20**
03818103	**AISI 316 stainless steel conduit fitting, PG21 x PG11**
03818104	**AISI 303 stainless steel conduit seal, PG11**
03818105	**AISI 316 stainless steel conduit seal, M20**
103537-01	**Terminal Mounting Block** This 4-wire terminal mounting block includes screws and is easily installed. Terminal mounting blocks are used to connect transducer cables to field wiring that is routed back to the monitoring system. These blocks are used with the PROXPAC™ Transducer Assembly, integral 25 mm and 50 mm DE transducers, temperature sensors, Velomitor® Sensors, and seismic transducers.
01691029	**DIN-rail Terminal Strip**
01691028	**DIN-rail Terminal Strip Cover** The DIN-rail terminal strip with cover is a single wire terminal strip that snaps onto a 35 mm DIN rail.
04490104	**Conduit Seal Punch Tool** A punch tool set is used when installing conduit seals. The conduit seals come with a rubber insert, with markings for where to "punch" holes. Use the punch tool set to punch the number of holes you need for the cables going through each conduit seal.

Sealtite® Flexible Conduit Assembly

14847-XX	½-14 NPT Threads
14848-XX	¾-14 NPT Threads

Option Descriptions

A: Length Option

Order in increments of 1 foot (300 mm)

Minimum length: 1 foot = **0 1**

Maximum length: 99 feet = **9 9**