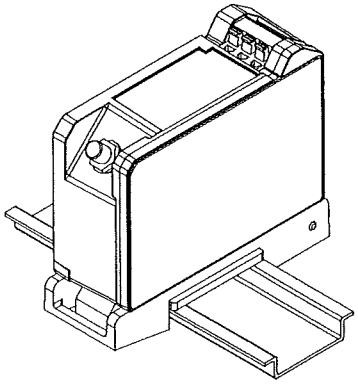
Part number 147357-01
Revision A, January 2001

3300 XL NSv™ Proximity Transducer System

Manual

BENTLY
Nevada



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Contacting Bently Nevada

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

Mailing Address	1631 Bently Parkway Minden, NV 89423 USA
Telephone	1 775 782 3611 1 800 227 5514
Fax	1 775 782 9259
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

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

Installation of Electrical Equipment in Hazardous Areas (AN015).

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, Section 4.1.1.2 and 4.1.1.3: Machine Shaft Requirements for Electrical and Mechanical Runout. Available from the American Petroleum Institute, Publications and Distribution, 1220 L Street NW, Washington DC, 20005, USA.

Reference

Performance Specifications for the 3300 XL NSv^{TM} Transducer System (147347).

Bently Nevada Glossary (133055-01).

European CE mark for the Bently Nevada 3300 XL NSv™ Transducer System

In this Document is a list of the 3300 XL NSv™ 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 NSv™ 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 NSv™ Proximity Transducer System consists of a Proximitor® Sensor, Proximity Probe, and Extension Cable.

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
2	3300 XL NSv	330901, 330902, 330903, 330904, 330905, 330906, 330907, 330908, 330909, 330910, 330930, 330980, **

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

**--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 ⑥	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

⑥ For the purposes of the 3300 XL NSv^{TM} System CE certification, the following criteria are defined as follows:

- Criteria A: Transducer system will output less than one third of a 3 mil p-p meter scale (so 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

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Section 1 -- System Description

Transducer System

The 3300 XL NSv™ Proximity Transducer system is intended for centrifugal air compressors, refrigeration compressors, process gas compressors and other machines with tight installation requirements. The 3300 XL NSv™ Proximity Transducer System consists of:

- a 3300 NSv™ probe
- a 3300 NSv™ extension cable
- a 3300 XL NSv™ Proximitor® Sensor.[1]

The primary uses for the 3300 XL NSv™ Transducer System are for areas where either counterbore, sideview or rearview restrictions limit the use of our standard 3300 and 3300 XL 5 and 8 mm Transducer Systems. It is also ideal for small target applications, such as when measuring radial vibration on shafts smaller than 51 mm (2 in) or axial position on flat targets smaller than 15 mm (0.6 in). It is primarily used in the following applications on fluid-filmed bearing machines where a small shaft or reduced side-view is present:

- Radial vibration and radial position measurements
- Axial (thrust) position measurements
- Tachometer and zero speed measurements
- Phase reference (Keyphasor®) signals

The 3300 XL NSv™ Transducer System is designed to replace both the 3300 RAM Transducer Systems and the 3000-series or 7000-series 190 Transducer System. When upgrading from the 3300 RAM system to the 3300 XL NSv™ system, the existing probe, extension cable, and monitoring system may be used with 3300 XL NSv™ Proximitor® Sensor. When upgrading from the 3000-series or 7000-series Transducer System, the probe, extension cable and Proximitor® Sensor must be replaced with NSv™ components.

The 3300 XL NSv™ Transducer System has an Average Scale Factor of 7.87 V/mm (200 mV/mil), which is the most common output for eddy current transducers. Because of its enhanced side-view and small target characteristics, it has a shorter linear range than our 3300 XL-series 5 and 8 mm Transducer System. With 1.5 mm (60 mils) of linear range, it exceeds the linear range of the 3000-series 190 Transducer System.

Application Alert

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

Proximitor® Sensor

The 3300 XL NSv™ Proximitor® Sensor has similar features to those 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 NSv™ 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 NSv™ probe and extension cable are mechanically and electrically compatible and interchangeable with our previous 3300 RAM proximity probe and extension cable. The NSv™ probe has increased chemical resistance compared to the 3300 RAM probe, allowing it to be used in many process compressor applications. The 3300 NSv™ probe also has superior side-view characteristics compared to the 3000-series 190 probe when gapping the 3300 NSv™ probe at the same distance from the probe target.

The 3300 NSv™ probe comes in varying probe case configurations, including armored and unarmored ¼ -28, ⅜-24, M8 X 1 and M10 X 1 probe threads. The reverse mount 3300 NSv™ 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 loosening. 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 220 N (50 lb) pull strength.

Connector protectors are recommended for use on the probe-to-extension cable connection, as well as on the cable-to-Proximitor® Sensor connection. Connector protectors prevent most liquids from entering into the ClickLoc™ connectors and adversely affecting the electrical signal[2].

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 NSv™ 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, and Handling 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 35 for environmental specifications.

Customer Service

Bently Nevada maintains numerous Sales and Service offices worldwide. To locate the office nearest you, visit our website at www.bently.com <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: 1-775-782-9913 Fax: 1-775-782-9259.

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

techsupport@bently.com <mailto:techsupport@bently.com>

or at the following locations:

Technical Support (North America)

Phone: 1-775-782-1818 Fax: 1-775-782-1815

Technical Support (UK)

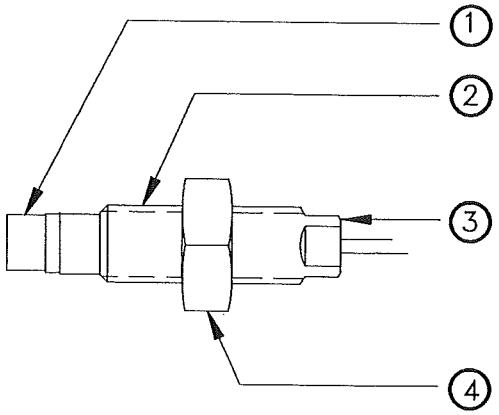
Phone: (44) 1925 818504 Fax: (44) 1925 817819

Section 2 -- Installation

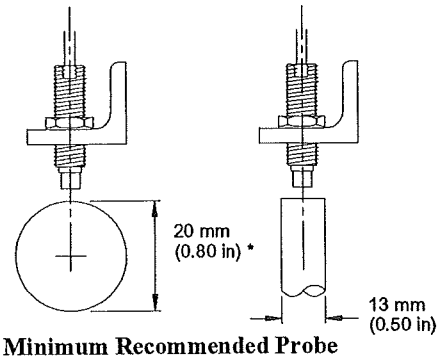
This section contains a checklist of items that you must consider when you install a 3300 XL NSv™ Transducer system. For detailed information about designing installations for specific applications, refer to document AN028.

Installing the Probe

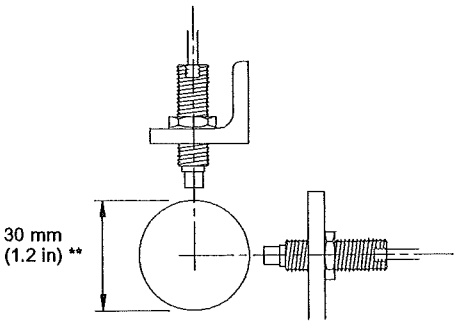
The following figures show the probe sizes and the minimum values for probe separation, side clearance and target configuration. Refer to "Mechanical" on page 33 for proper torque and the dimensions of the thread.

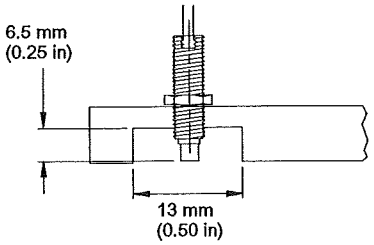


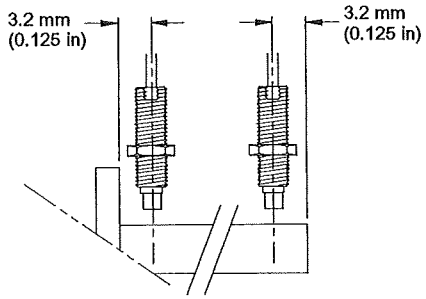
	Part Number	330901 330902	330903 330904	330905 330910	330906	330907	330908 330909
1	Probe tip diameter	5mm	5mm	5mm	5mm	5mm	5mm
2	Thread types	¼ -28 UNF	M8x1	M10x1	3/8 - 24 Rev. Mount	M10x1 Rev. Mount	3/8 - 24
3	Wrench Flats	7/32 in	7 mm	8 mm	7/16 in hex	10 mm	5/16 in hex
4	Lock nut	7/16 in hex	13 mm hex	17 mm	Not Supplied	Not Supplied	9/16 in hex



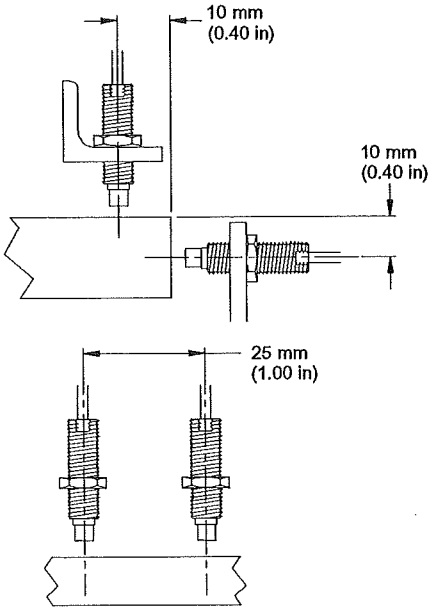
Minimum Recommended Probe Target Sizes







Minimum Recommended Probe Mounting Dimensions



Minimum Recommended Probe to Probe Separation Due to Cross Talk

Note

* At or below 20 mm (0.8 in), an increase in Average Scale Factor (ASF) as the target size is reduced will occur (see figure Figure 6-13."Radial Sensitivity to Shaft Size" on page 54.) See application alert below.

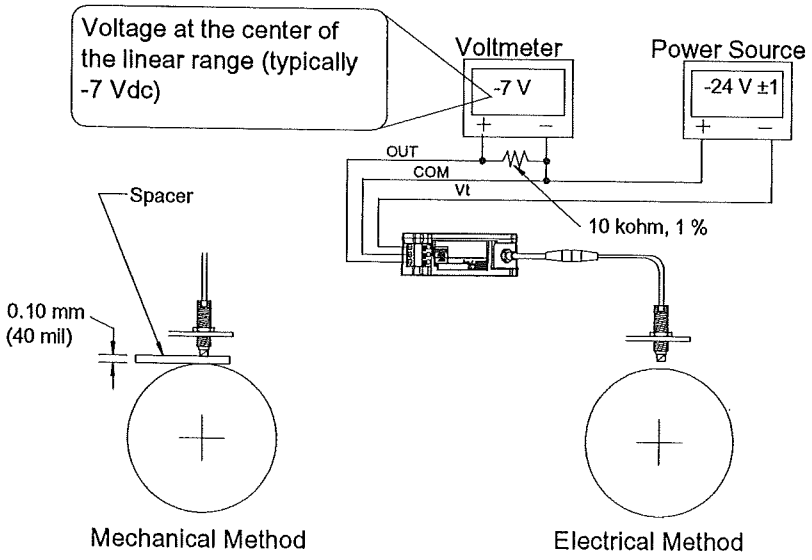
Note

** At or below 30 mm (1.20 in), a small vibration signal will occur due to cross talk (see figure Figure 6-14."Probe Cross-talk with Probes Mounted in Parallel" on page 55 and Figure 6-15."Probe Cross-talk with Probes Mounted in X-Y Configuration" on page 55.

Application Alert

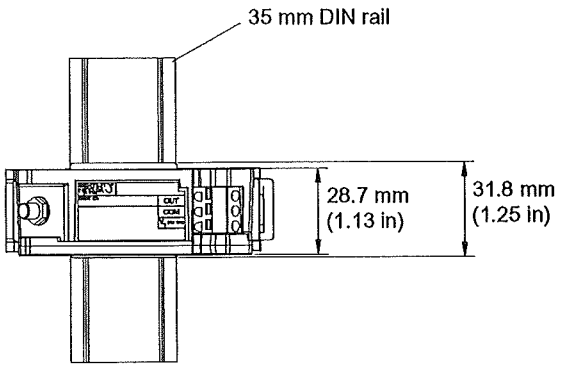
Mounting dimensions and target size affect the Average Scale Factor (ASF) of proximity transducer systems. The minimum recommended dimensions above were chosen to minimize error yet retain flexibility for different mounting situations. Consult system graphs is this document or performance specification 147347 to determine the effect of each of the above factors for your particular installation.

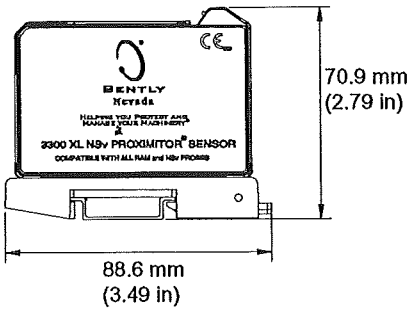
Adjust the distance between the probe tip and the shaft using one of the methods shown in the following figure. The electrical method for setting the probe gap is preferred.

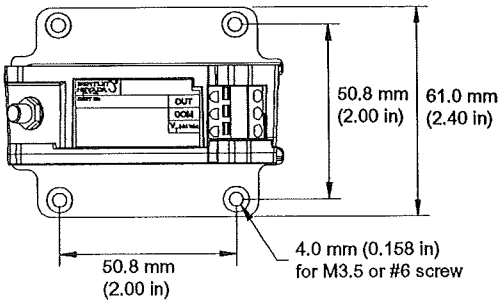


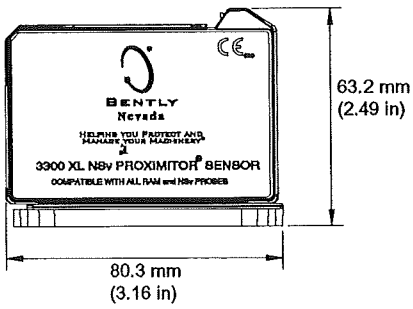
Mounting the Proximitor® Sensor

Mount the Proximitor® Sensor in a location that is compatible with its environmental specifications (see "Environmental Limits" on page 35). Consider the local electrical codes and the presence of hazardous or explosive gas at the installation site. (Refer to document AN015.)



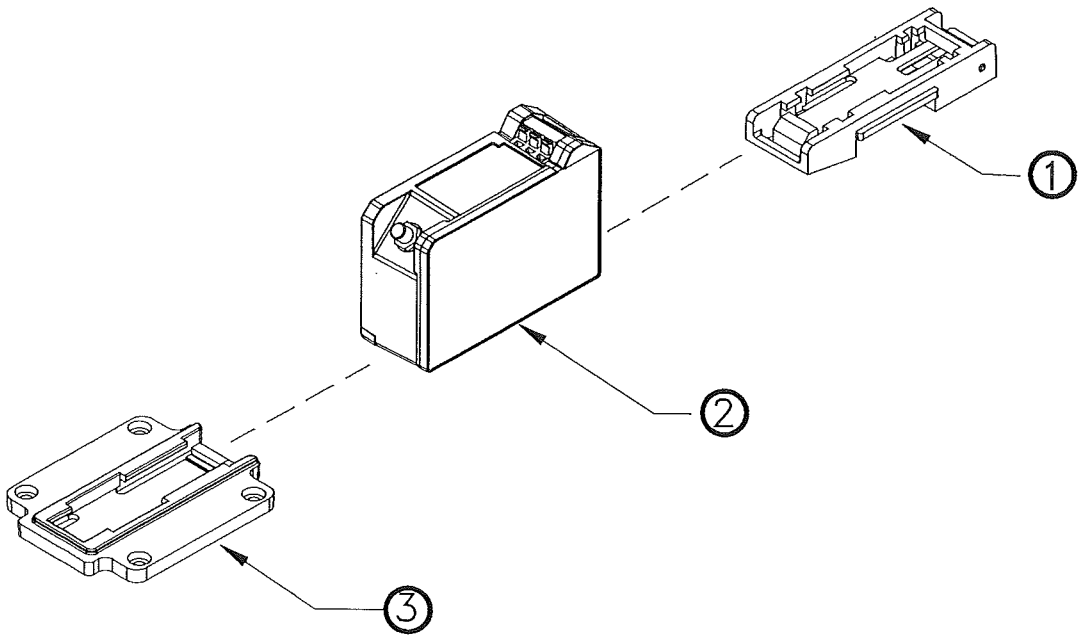






Interchangeable Mounting Feet

The mounting feet for the 3300 XL NSv™ Proximitor® Sensor are interchangeable. If a Proximitor® Sensor is purchased with 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.

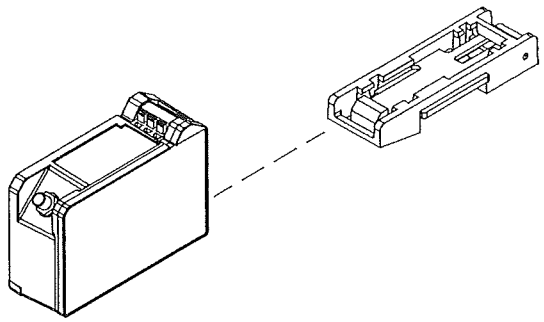


(1) DIN Mounting Foot (part number 138493-01)
(2) 3300 XL NSv™ Proximitor® Sensor
(3) Panel Mounting Foot (part number 138492-01)

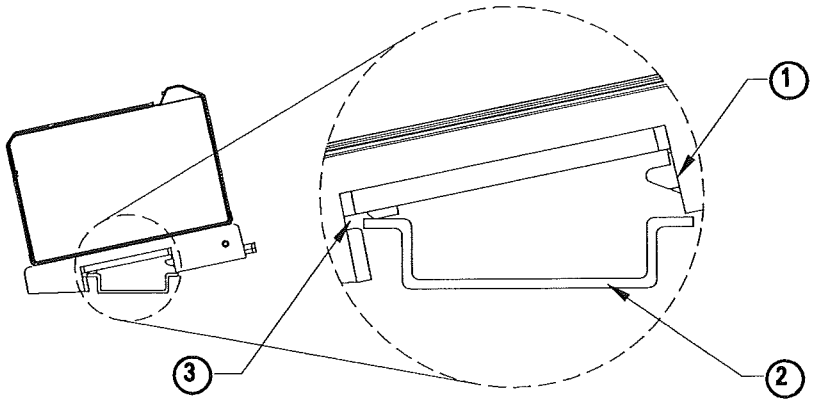
Mounting the Proximitor® Sensor with DIN Mounting Foot

To mount the 3300 XL NSv™ Proximitor® Sensor with a DIN Mounting Foot on a DIN rail:

1. Install the Proximitor® Sensor into the DIN Mounting Foot (if not already installed).

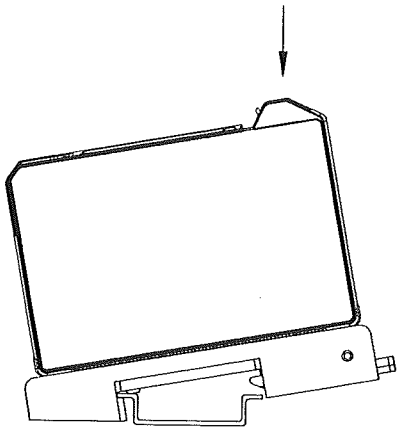


2. Examine the underneath side of the DIN Mounting Foot. There is a spring-loaded clip on one side and two protrusions that will catch the edge of the DIN rail on the other side. The side with the two protrusions will need to be installed so that the edge of the DIN rail fits into the gap.



(1) Spring-loaded clip
(2) DIN rail
(3) Edge of DIN rail must fit into this gap

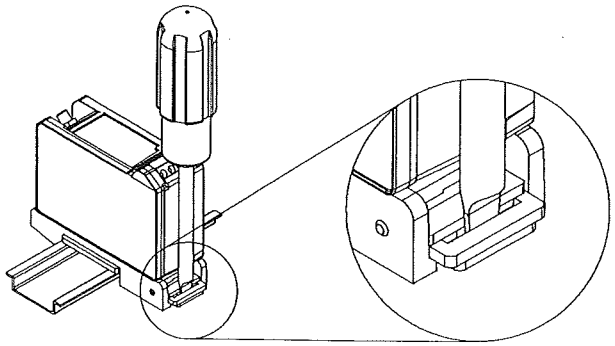
3. Push down on the Proximitor® Sensor until the unit "snaps" into place. The unit is now installed.



Removing the Proximitor® Sensor from the DIN Rail

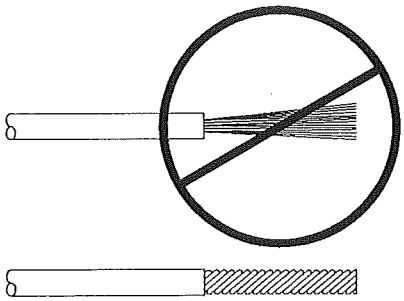
Remove the Proximitor® Sensor from the DIN rail by using a regular screwdriver to unclip the unit from the rail.

Insert 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

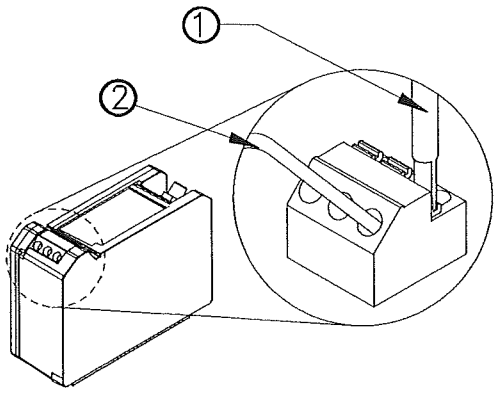
1. Strip the insulation from the field wiring to be installed into the terminal block. The recommended strip length is 10 mm (0.4 in.).



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

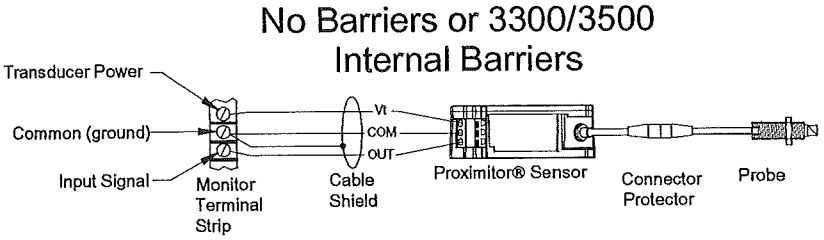
Removal of the field wire is accomplished by pushing down on the orange lever and pulling on the field wire to remove it from the terminal block. If stranded wire is used for the field wiring and a strand is broken off inside the terminal block, turn the Proximitor® Sensor upside down while pushing down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

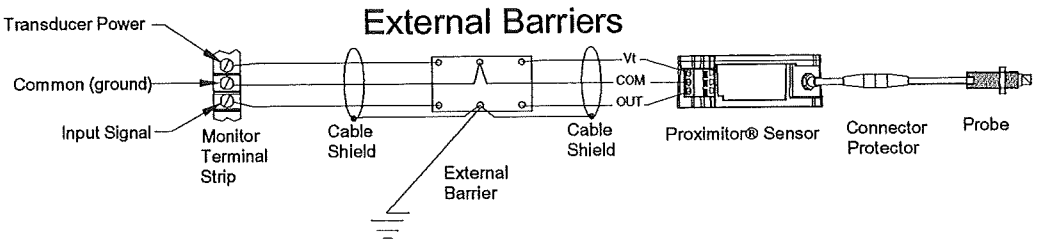
Routing the Extension Cable and Field Wiring

Route the extension cable using the following guidelines. (Refer to document AN028).

- Check that the sum of the extension cable and probe lead length equals the Proximitor® Sensor system length. For example, a 7 metre Proximitor® Sensor will work with an 6 metre extension cable and a 1 metre probe. The color code of all components must also be consistent. For the 3300 XL NSv™ system, components will be marked with a gray color code.
- 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 to finger tight.
- Use either a connector protector or self-fusing silicone tape to protect the connection between the probe lead and the extension cable. For additional protection, place a female connector protector over the cable to Proximitor® Sensor connection. **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 NSv™ 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 NOT OK condition (light is **not** illuminated), either a fault has occurred in the field wiring/transducer system/power source and/or the probe is gapped incorrectly or detecting material other than the 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 NSv™ 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

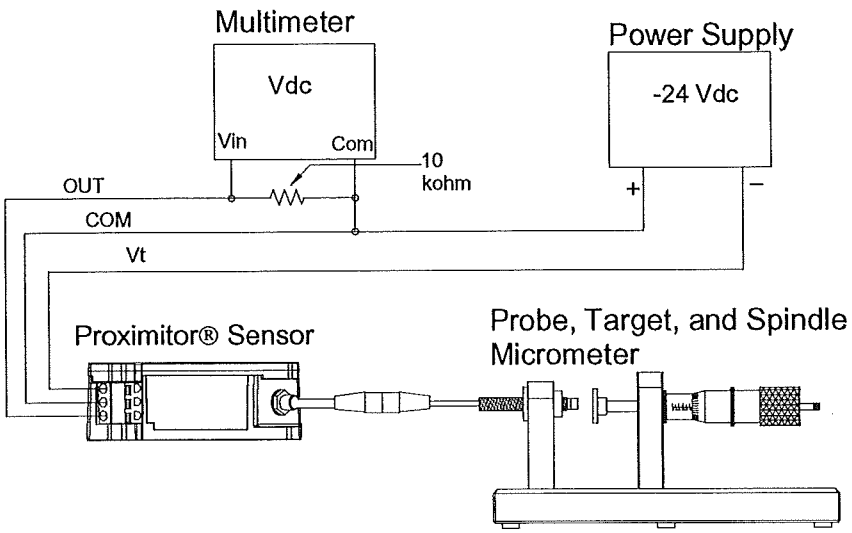
Hazardous Locations: Area must be free of hazardous material before any maintenance or troubleshooting can be performed.

Scale Factor Verification

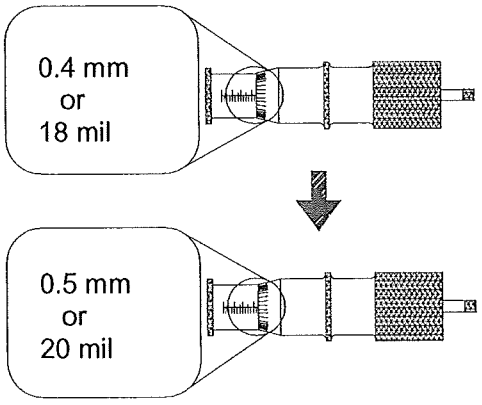
Scale factor verification requires the following instruments and equipment:

- Digital multimeter
- Spindle micrometer (Precision Micrometer Kit p/n 330185 recommended)
- AISI 4140 precision target, p/n 136534-01 (included in 330185)
- Fixed resistor, 10 kΩ
- Power supply (-24 Vdc ±1)

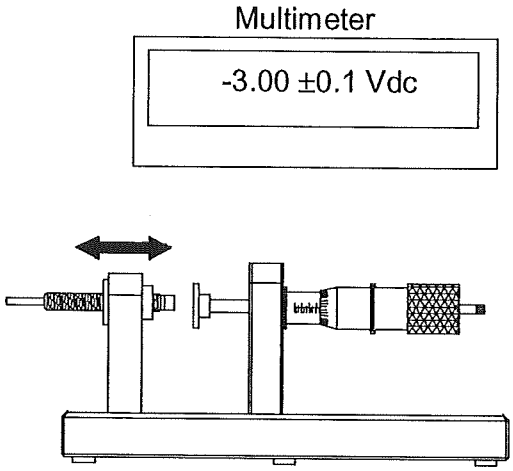
Scale factor verification uses the test setup as shown in the following figure:



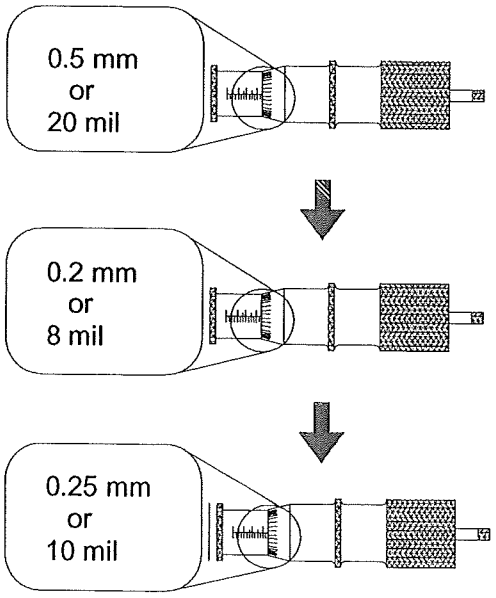
1. Compensate for mechanical backlash and adjust the spindle micrometer for electrical zero.



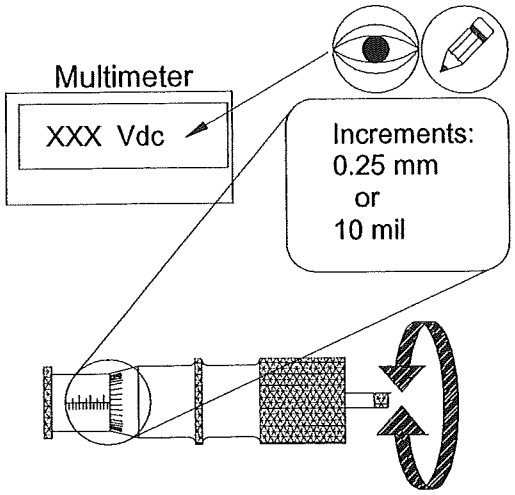
2. Adjust the gap to electrical zero by moving the probe.



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, average scale factor and difference voltages using the equations.



n	Adjust Micrometer to...		Record Voltages	Calculate Scale Factors and Difference Voltages	
	mm_n	mil_n	Vdc_n	ISF_n (Incremental Scale Factor)	$Vdiff_n$ (Difference Voltage)
1	0.25	10	>>		>>
2	0.5	20	>>	>>	>>
3	0.75	30	>>	>>	>>
4	1.0	40	>>	>>	>>
5	1.25	50	>>	>>	>>
6	1.5	60	>>	>>	>>
7	1.75	70	>>	>>	>>
8	2.0	80	>>	>>	>>
>> = Enter values into these cells				**ASF** (Average Scale Factor)	
				>>	

$$ISF_{n\ (V/mm)} = \frac{Vdc_{\,n-1} - Vdc_{\,n}}{0.25} \qquad ASF_{(V/mm)} = \frac{Vdc_{\,0.25\,mm} - Vdc_{\,1.75\,mm}}{1.5}$$

$$Vdiff_n = Vdc_{\,n} + (mm_n \bullet 7.87)$$

$$ISF_{n\,(mV/mil)} = \frac{Vdc_{\,n-1} - Vdc_{\,n}}{0.01} \qquad ASF_{(mV/mil)} = \frac{Vdc_{\,10\,mil} - Vdc_{\,70\,mil}}{0.06}$$

$$Vdiff_n = Vdc_{\,n} + (mil_n \bullet 0.2)$$

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

   Note: include the last difference voltage (n = 8) for extended DSL range only.

$$DSL_{(mm)} = \frac{Vdif_{\,(max)} - Vdif_{\,(min)}}{15.75} = \_\_\_\_\_ mm$$

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

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

A Bently Nevada TK-3 unit can be used to perform the scale factor verification, however, this is only suitable for rough verification. For system verification to the performance specification, 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™ transducer system up to the 3300 XL 11 mm transducer system. 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 ASF. The transducer systems also have maximum 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 Corporation office for assistance.

Power

Common

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

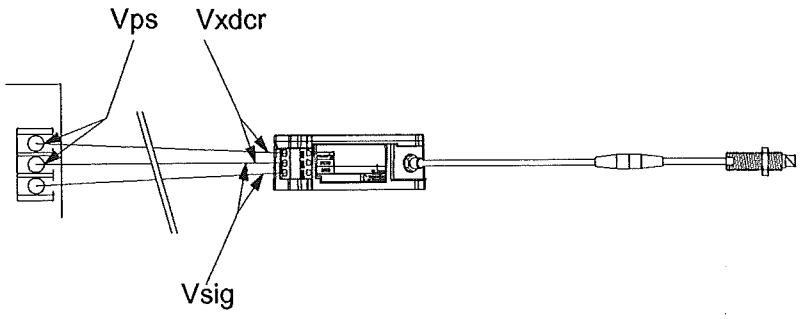


Table 3-1. Symbols for Measured Voltages

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.

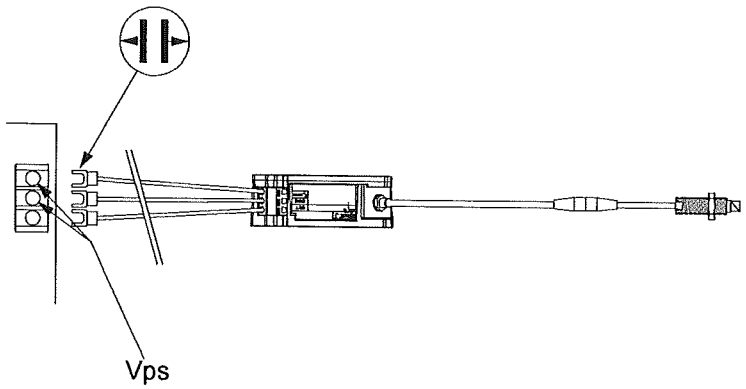
Table 3-2. Definitions

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

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

Possible causes:

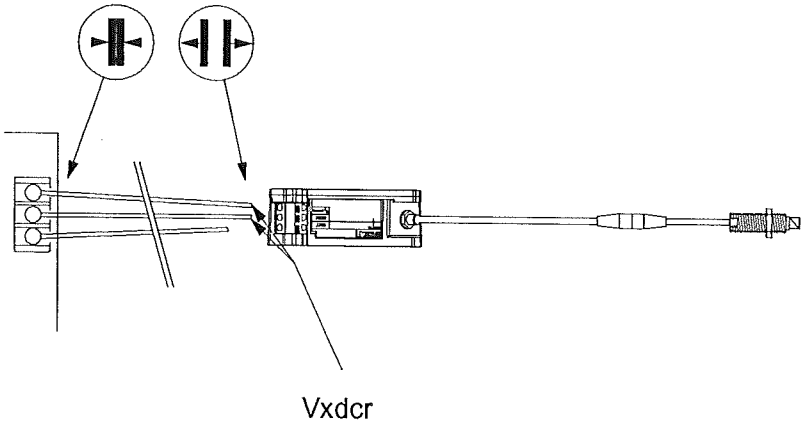
- Faulty power source
- Faulty field wiring
- Faulty Proximitor® Sensor



Measure V_{PS}: Is V_{PS} > -17.5 Vdc or V_{PS} < -26 Vdc?

Yes: Faulty power supply.

No: Go to next step.



Measure V_{XDCR}: Is $V_{XDCR} > -17.5$ Vdc or $V_{XDCR} < -26$ Vdc?

Yes: Faulty Field wiring.

No: Faulty Proximitor® Sensor.

Fault Type 2: V_{SIG} = 0 Vdc

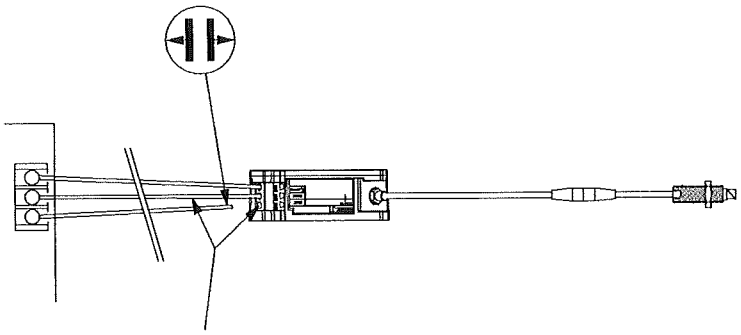
Possible causes:

- 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?

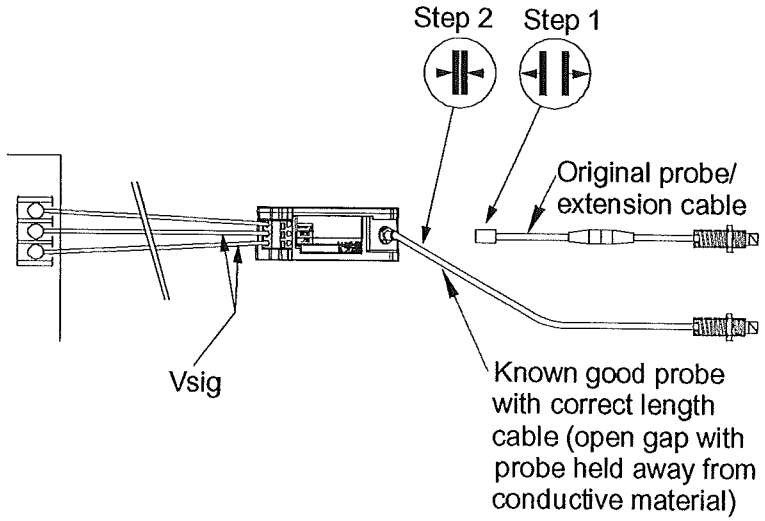
Yes: Use the procedure for fault type 1

No: Go to the next step

Is the probe gapped correctly? Do counterbore dimensions meet recommended minimum? (See "Installing the Probe" on page 4.)

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

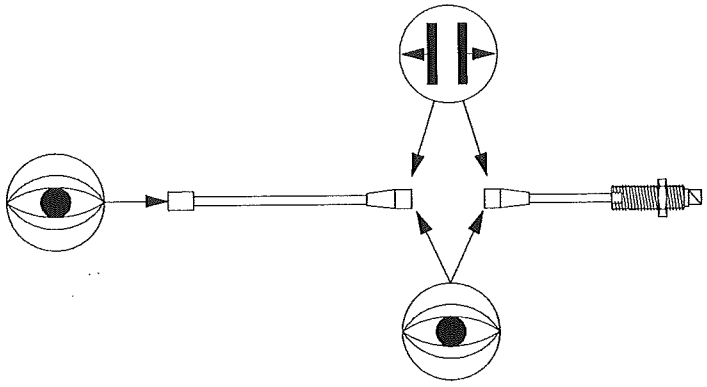
Yes Go to the next step.



Measure V_{SIG}: Is $V_{SIG} < V_{XDCR} + 2$ Vdc?

No: Faulty Proximitor® Sensor

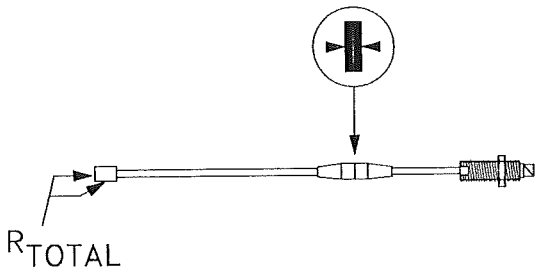
Yes: Go to next step



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.



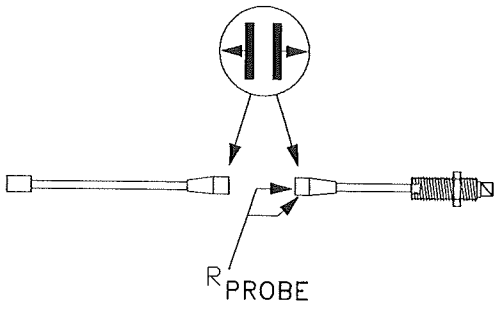
Measure resistance R_{TOTAL}: Is R_{TOTAL} within specifications?

5 m system: 5.3 ± 0.7 Ω

7 m System: 5.9 ± 0.9 Ω

Yes: Retest original system

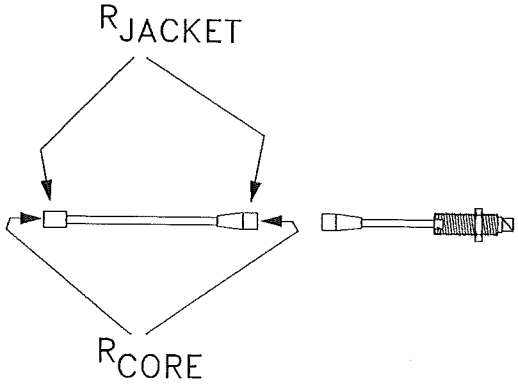
No: Go to the next step



Measure resistance, R_{PROBE}: Is R_{PROBE} within specifications (see "Probe dc resistance:" on page 31)?

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:" on page 31)?

No: Faulty extension cable

Yes: Retest the original system

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

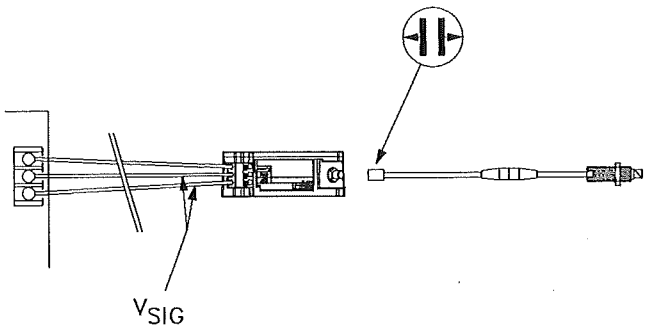
Possible causes:

- 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: $V_{SIG} = V_{XDCR}$

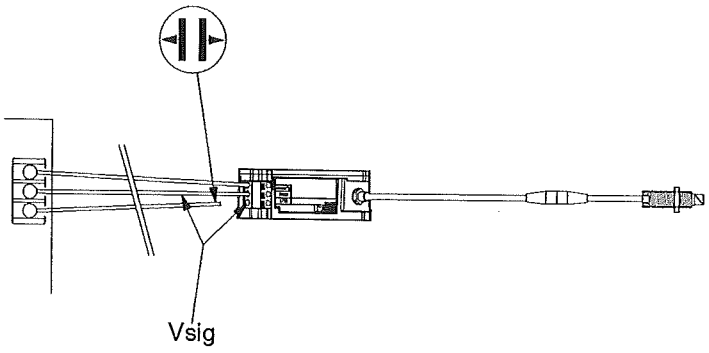
Possible causes:

- 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. 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 Corporation

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.

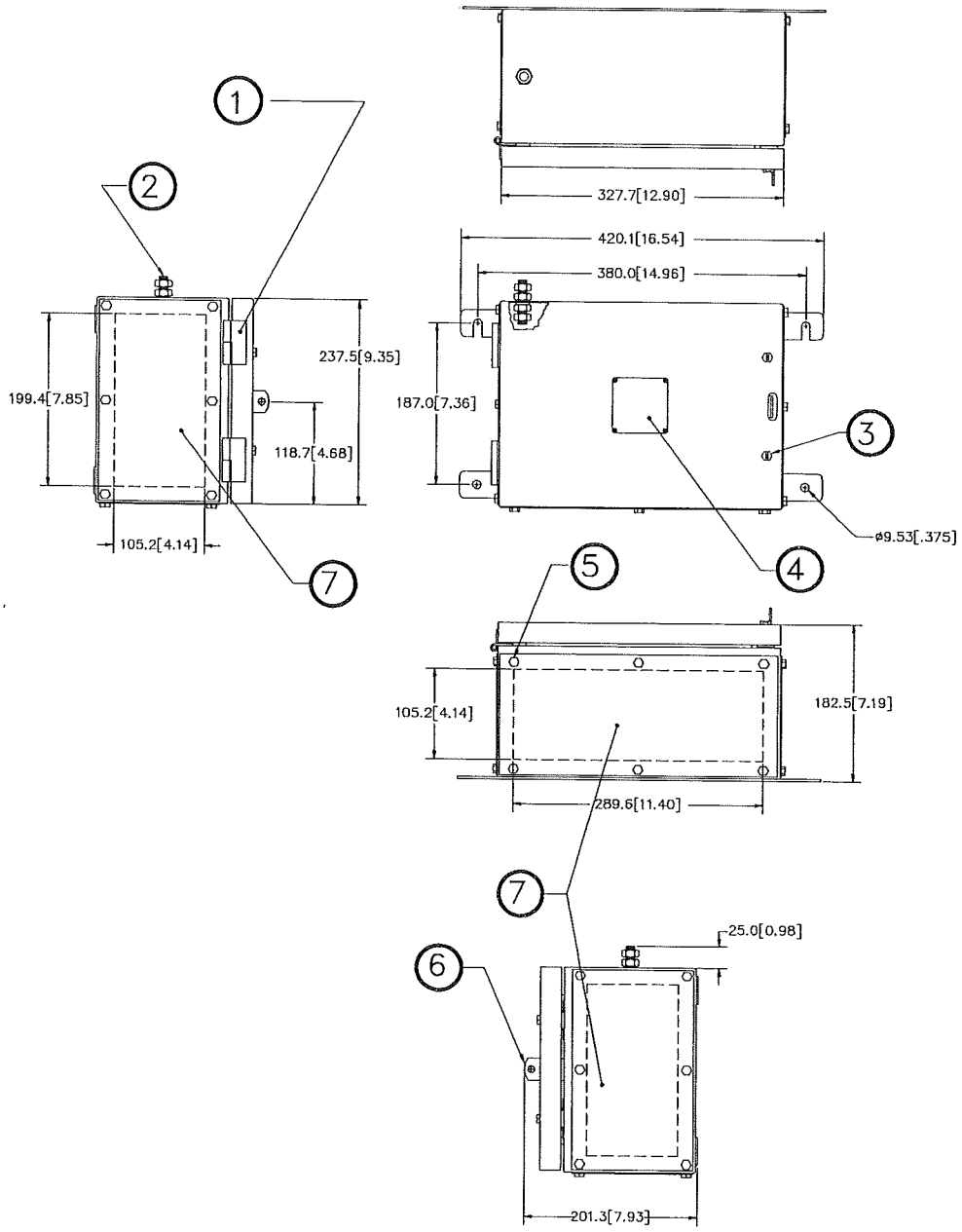
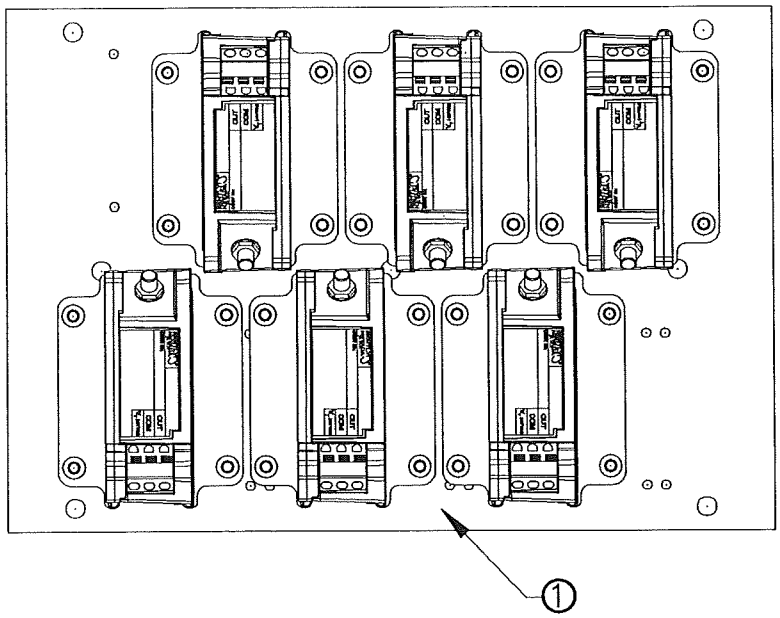


Figure 4-1. 3300 XL Housing Outline Drawing

(1) Stainless steel slip hinge. Allows cover to be removed from housing
(2) M10 x 1.5 – 6 g grounding 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

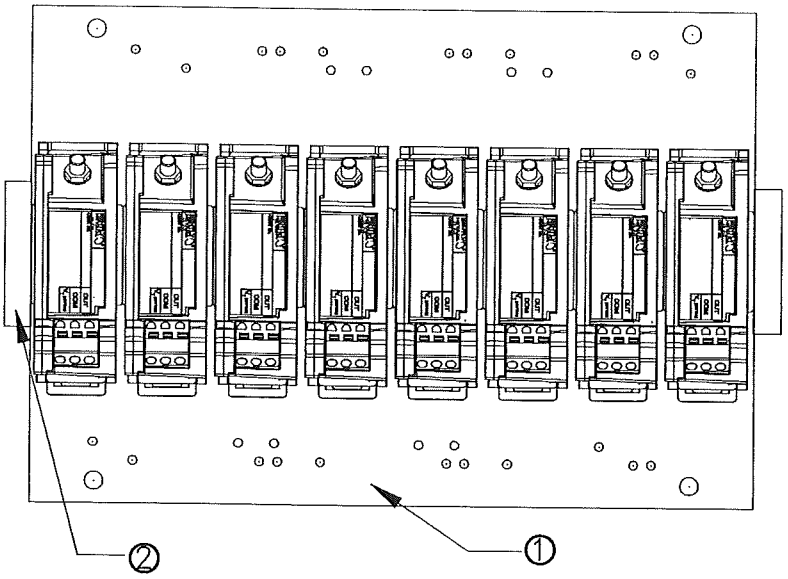
The following illustration shows the correct orientation for six panel mounted 3300 XL Proximitor® Sensors in the 3300 XL Proximitor® Housing:



(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 -- Specifications

Unless otherwise noted, the following specifications are for a 3300 XL NSv™ 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, a Bently Nevada supplied AISI 4140 steel target that is 31 mm (1.2 in) diameter or larger, and a probe gap of 1.0 mm (40 mils). 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 RAM or 3300 NSv™ 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)
0.5	4.0 ± 0.5
1.0	4.2 ± 0.5
5.0	5.3 ± 0.7
7.0	5.9 ± 0.9

Extension cable dc resistance: Center conductor: 0.220Ω/m (0.067 Ω/ft)

Shield: 0.066 Ω/m (0.020 Ω/ft)

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 NSv™ Proximitor® Sensor and the monitor. See the fre-

quency response graphs Figure 6-16, page 55 and Figure 6-17, page 55 for signal rolloff at high frequencies when using longer field wiring lengths.

Linear Range: 1.5 mm (60 mils). Linear range begins at approximately 0.25 mm (10 mils) from target and is from 0.25 to 1.75 mm (10 to 70 mils) (approximately -1 to -13 Vdc).

Recommended Gap Setting: 1.0 mm (40 mils)

System performance over ambient temperature range (0°C to 45°C):

Incremental Scale Factor (ISF): 7.87 V/mm (200 mV/mil) +12.5%/-20% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 1.5 mm (60 mil) linear range.

Deviation from best fit straight line (DSL): Less than ±0.06 mm (±2.3 mils).

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

Target Size (flat target): Minimum: 8.9 mm (0.35 in) diameter

Recommended minimum: 13 mm (0.5 in) diameter

Axial position measurements on shaft diameters smaller than 13mm (0.5 in) will generally result in a change in scale factor. Reducing the gap between the probe and target will help limit the change in scale factor. See Figure 6-12, page 53 for additional information.

Shaft Diameter: Minimum (standard X-Y probe configuration): 30 mm (1.2 in)

Minimum (X-Y proximity probes offset axially by 23 mm (0.9 in)): 20 mm (0.8 in)

Measurements on shaft diameters smaller than 30 mm (1.2 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. To prevent cross-talk, maintain minimum separation of transducer tips of at least 25 mm (1.0 in) for axial position measurements or 23 mm (0.9 in) for radial vibration measurements (see Figure 6-14, page 54 and Figure 6-15, page 54 for additional information.) Radial vibration or radial position measurements on shaft diameters smaller than 20 mm (0.8 in) will generally result in greater than a 10% change in Average Scale Factor (ASF). See Figure 6-13 "Radial Sensitivity to Shaft Size" on page 53 for additional information.

Counterbore: Minimum: 9.5 mm (0.375 in)

Recommended minimum: 13 mm (0.5 in)

Counterbores smaller than 13 mm (0.5 in) generally result in a change in scale factor at far gaps. Reducing the gap between the probe and the target will allow the transducer system to maintain

its Average Scale Factor (ASF) over a reduced linear range. See Figure 6-9 "Effect of Counterbore Side Clearance (4140 Material)" on page 50 for additional information.

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

Output voltage in mil pp/gauss:

Gap	Proximitor® Sensor	Probe	Ext. Cable
0.25 mm (10 mil)	0.006	0.001	0.001
1.0 mm (40 mil)	0.007	0.002	0.001
1.75 mm (70 mil)	0.008	0.002	0.003

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: 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 Class I 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, BASEEFA 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, BASEEFA certificate number BAS99ATEX3100U.

Mechanical

Probe Tip Material: Polyphenylene sulfide (PPS).

Probe Case Material: AISI 304 stainless steel (SST).

Probe Cable Specifications: 75 Ω coaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 0.5, 1, 5, or 7 metres.

Extension Cable Material: 75 Ω coaxial, fluoroethylene propylene (FEP) insulated.

Proximitor® Sensor Material: A380 aluminum

System Length: 5 or 7 metres including extension cable

Extension Cable Armor (optional): Flexible AISI 302 SST with/without FEP outer jacket.

Tensile Strength (maximum rated): 220 N (50 lb) probe case to probe lead. 220 N (50 lb) at probe lead to extension cable connectors. 220 N (50 lb) probe case to stainless steel armor.

Connector material: Gold-plated brass

Probe case torque:	Maximum Rated	Recommended
¼ -28 or M8x1 probe cases	7.3 N•m (65 in•lb)	5.1 N•m (45 in•lb)
3/8-24 or M10x1 probe cases	33.9 N•m (300 in•lb)	11.3 N•m (100 in•lb)
3/8-24 or M10x1 probe cases – first three threads	22.6 N•m (200 in•lb)	7.5 N•m (66 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: 0.56 N•m (5 in•lb)

Minimum Bend Radius (with or without sst armor): 25.4 mm (1.0 in)

System Weight (typical):

Probe: Approximately 14 to 150 g (0.5 to 5 oz)

Extension Cable: 45 g/m (0.5 oz/ft)

Armored Extension Cable: 64 g/m (0.7 oz/ft)

Proximitor® Sensor: 255 g (9 oz)

Environmental Limits

Probe Temperature Range:
Operating Temperature: -34°C to +177°C (-30°F to +351°F)

Storage Temperature: -51°C to +177°C (-60°F to +351°F)

Note

Exposing the probe to temperatures below -34°C (-30°F) for a sustained period of time 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)

Proximitor® Sensor Temperature Range:
Operating Temperature: -35°C to +85°C (-31°F to +185°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 NSv™ 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 Corporation will not be held responsible for any damages resulting from leaking 3300 NSv™ Proximity Probes. In addition, 3300 NSv™ 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.

Section 6 -- Ordering Information

3300 NSv™ Proximity Probes

330901 **3300 NSv™ Probe, 1/4-28 UNF thread, without armor**

330902 **3300 NSv™ Probe, 1/4-28 UNF thread, with armor**

330908 **3300 NSv™ Probe, 3/8-24 UNF thread, without armor**

330909 **3300 NSv™ Probe, 3/8-24 UNF thread, with armor**

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

Option Descriptions

A: *Unthreaded Length Option*

Note

Unthreaded length must be at least 0.7 inch less than the case length.

Order in increments of 0.1 in

Length configurations:

Maximum unthreaded length: 9.2 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: 0.8 in

Example: 2 4 = 2.4 in

C: *Total Length Option*

0 5 0.5 metre (20 in)

1 0 1.0 metre (39 in)

5 0 5.0 metres (16.4 feet)

7 0 7.0 metres (23.0 feet)

D: Connector and Cable-Type Option

0 0 No connector provided, standard cable

0 1 Miniature coaxial ClickLoc™ connector with connector protector

0 2 Miniature coaxial ClickLoc™ connector

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 NSv™ Proximity Probes, Metric

330903 3300 NSv™ Probe, M8 x 1 thread, without armor

330904 3300 NSv™ Probe, M8 x 1 thread, with armor

330905 3300 NSv™ Probe, M10 x 1 thread, without armor

330910 3300 NSv™ Probe, M10 x 1 thread, with armor

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 (20 in)

1 0 1.0 metre (39 in)

5 0 5.0 metres (16.4 feet)

7 0 7.0 metres (23.0 feet)

D: Connector and Cable-Type Option

0 0 No connector provided

0 1 Miniature coaxial ClickLoc™ connector with connector protector

0 2 Miniature coaxial ClickLoc™ connector

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

3300 NSv™ Reverse Mount Probe

330906-02-12- CXX-DXX-EXX, 3/8-24 UNF threads

330907-05-30- CXX-DXX-EXX, M10 x 1 threads

Option Descriptions

C: Total Length Option

0 5 0.5 metre (20 in)

1 0 1.0 metre (39 in)

5 0 5.0 metres (16.4 feet)

7 0 7.0 metres (23.0 feet)

D: Connector Option

0 0 No connector provided

0 2 Miniature ClickLoc™ coaxial connector

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

Note

For a shorter delivery time, order commonly stocked probes. Currently, stocked probes consist of the following part numbers: 330901-00-24-05-02-00, 330901-00-90-05-02-00, 330902-00-50-05-02-00, 330902-00-95-05-02-00, 330903-00-02-10-02-00, 330903-00-03-10-02-00, 330906-02-12-05-02-00.

3300 XL NSv™ Proximitor® Sensor

330980-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[1]

7 0 7.0 metres (23.0 feet) system length, panel mount

7 1 7.0 metres (23.0 feet) system length, DIN mount

7 2 7.0 metres (23.0 feet) system length, no mounting hardware[1]

B: Agency Approval Option

0 0 Not required

0 5 Multiple approvals

3300 NSv™ Extension Cable

330930-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 4 0 4.0 metres (13.1 feet)

0 4 5 4.5 metres (14.8 feet)

0 6 0 6.0 metres (19.7 feet)

0 6 5 6.5 metres (21.3 feet)

B: Connector and Cable Option

0 0	Without stainless steel armor
0 1	With stainless steel armor, with FEP jacket
0 2	With stainless steel armor, without FEP jacket
0 3	Without stainless steel armor, with connector protectors
0 4	With stainless steel armor, with FEP jacket, with connector protectors
0 5	With stainless steel armor, without FEP jacket, with connector protectors

C: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

Accessories

147357-01:	**Manual**
147347:	**Performance Specification**
02120015:	**Bulk field wire.** 1.0 mm^2 (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.
138492-01:	**Replacement panel-mount mounting pad**
138493-01:	**Replacement DIN-mount mounting pad**
01609137:	**BNC (F) to banana plugs**
01609138:	**Proximitor® Connector Test Pin wiring** (two test pins to a BNC (F) connector)
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.
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]).
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.
40113-03:	**Connector Protector Kit.** Connector Protector Kit for 3300 NSv™ probes and extension cables, including connector protectors and installation tools.
136536-01:	**Connector Protector Adapter.** Connector Protector Adapter. Allows connector protector installation tools manufactured prior to 1998 to be used with 75 Ω ClickLoc™ connectors.

40180-03:	**Connector Protectors.** Package contains 10 pairs of connector protectors.
03800000:	**Male Connector Protector.** Placed on the extension cable to connect to the female connector protector on the probe and provide environmental protection of connectors.
03800001:	**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.
330152-05:	**3300 NSv™ Connector Kit.** Used on 3300 NSv™ probes and extension cables. Contains one set of male and female ClickLoc™ connectors, sleeves and one strip of silicone tape.
136540-01:	**Connector Crimp Tool Kit.** Includes one set of 75 Ω ClickLoc™ inserts and connector installation instructions. Supplied with carrying case.

Notes:

1. 330980 Proximitor® Sensor A: options 52 and 72 come without a mounting pad and should be ordered only as spares. Each Proximitor® Sensor needs a mounting pad to ensure that it is properly isolated from the housing ground.

Graphs and Dimensional Drawings

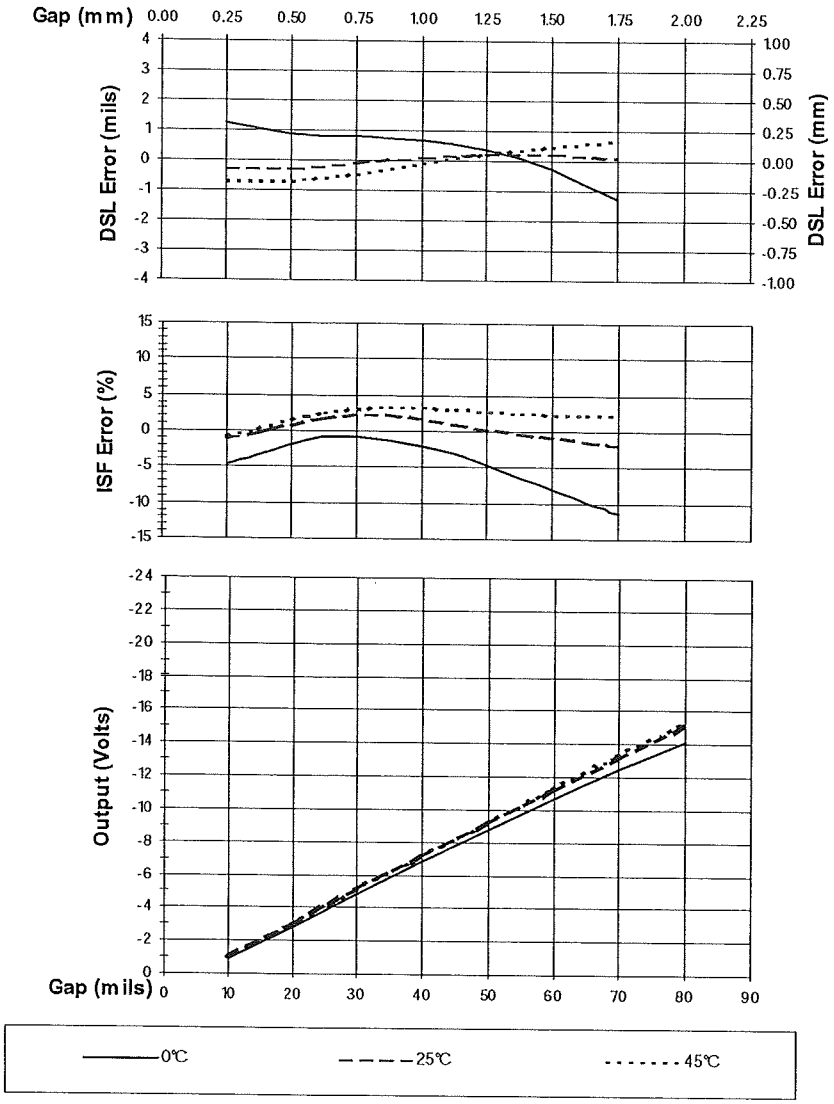


Figure 6-1 Typical 3300 XL NSv™ 5 m System Over Ambient Temperature Range

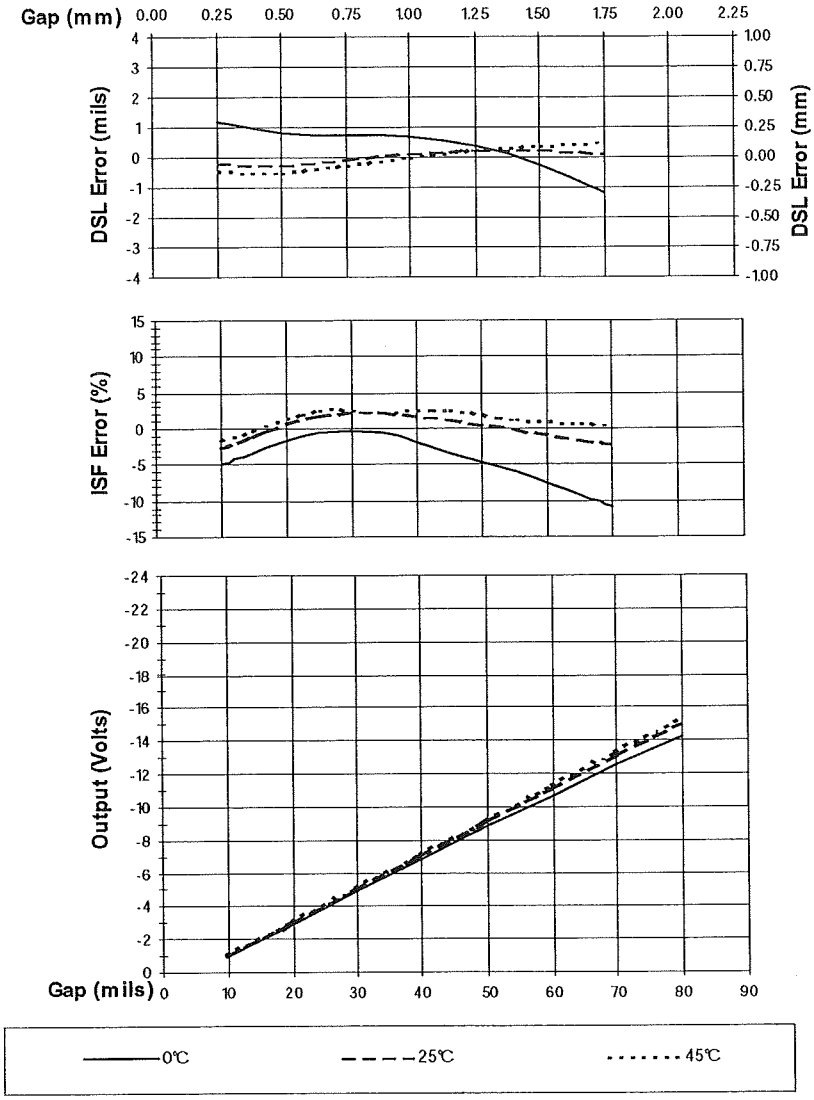


Figure 6-2 Typical 3300 XL NSv™ 7 m System Over Ambient Temperature Range

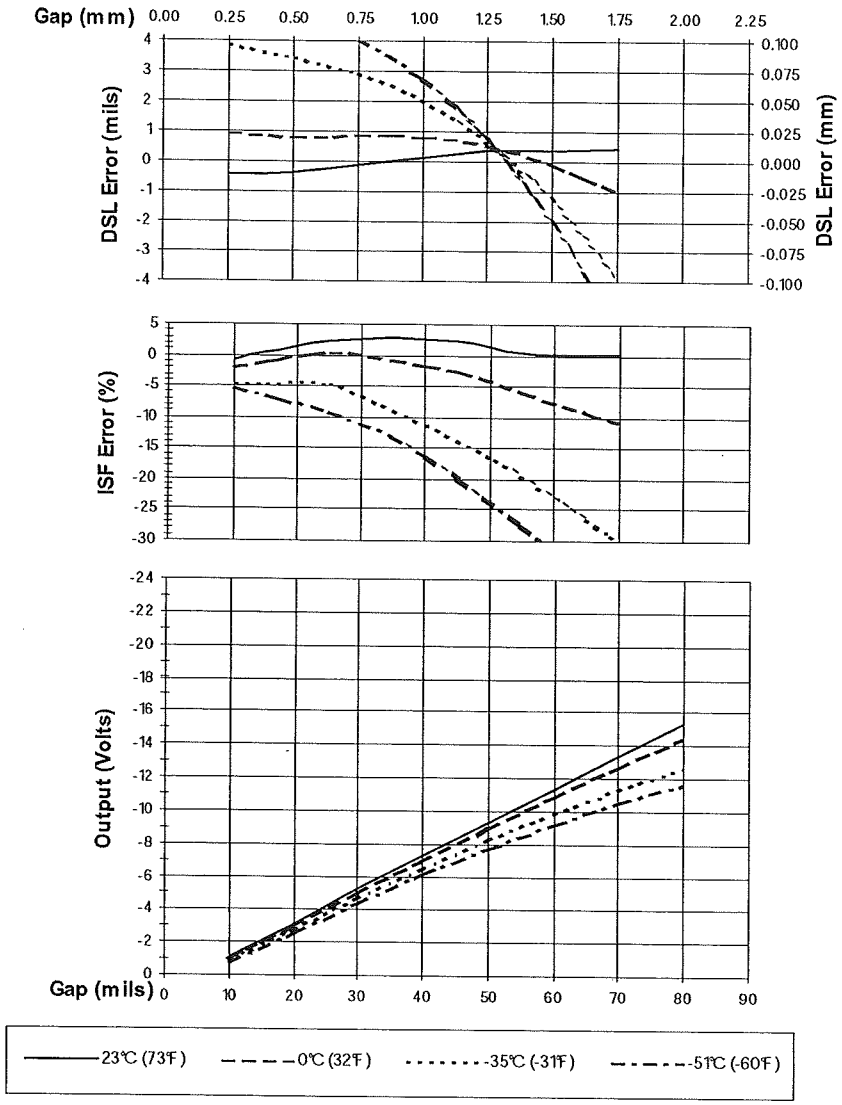


Figure 6-3 Typical 3300 NSv™ Probe + 1m Cable @ Low Temperature (Proximitor® Sensor + 4m of Extension Cable @ 25 °C)

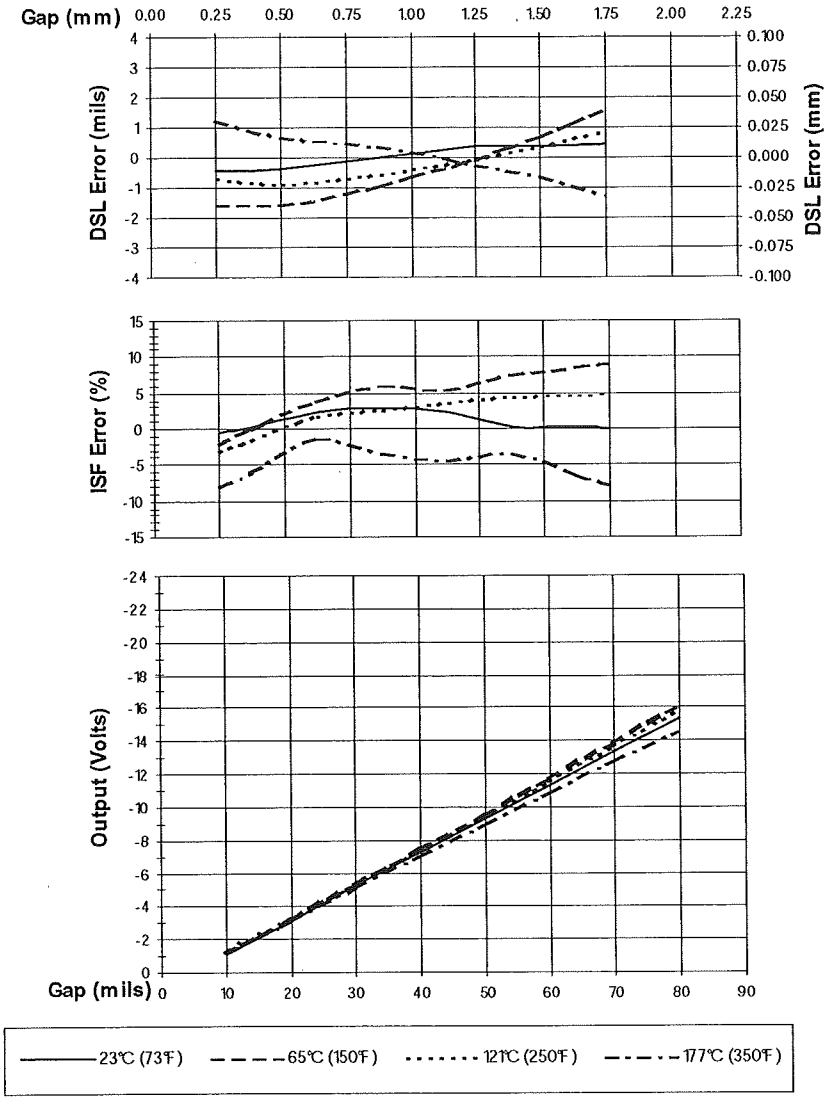


Figure 6-4 Typical 3300 NSv™ Probe + 1m Cable @ High Temperature (Proximitor® Sensor + 4m of Extension Cable @ 25 °C)

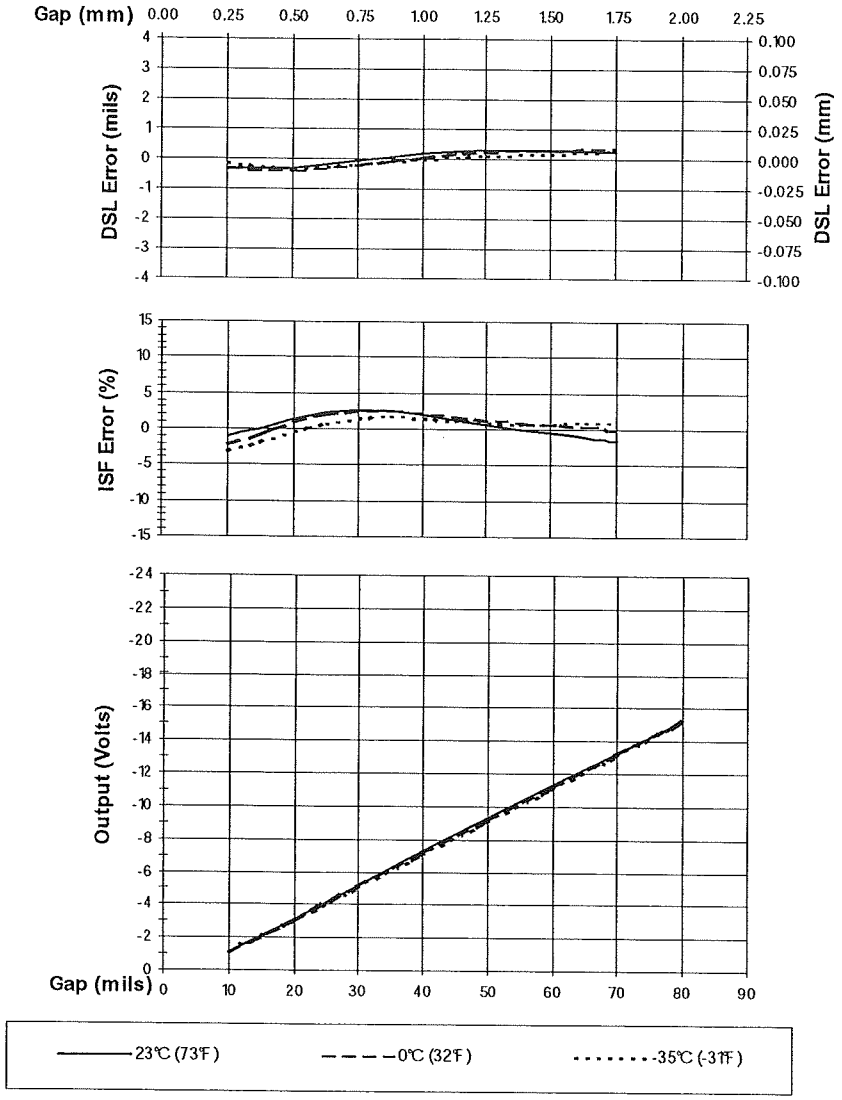


Figure 6-5 Typical 3300 XL NSv™ 5 m Proximitor® Sensor with 4 m of Extension Cable @ Low Temperature (Probe is at 25°C)

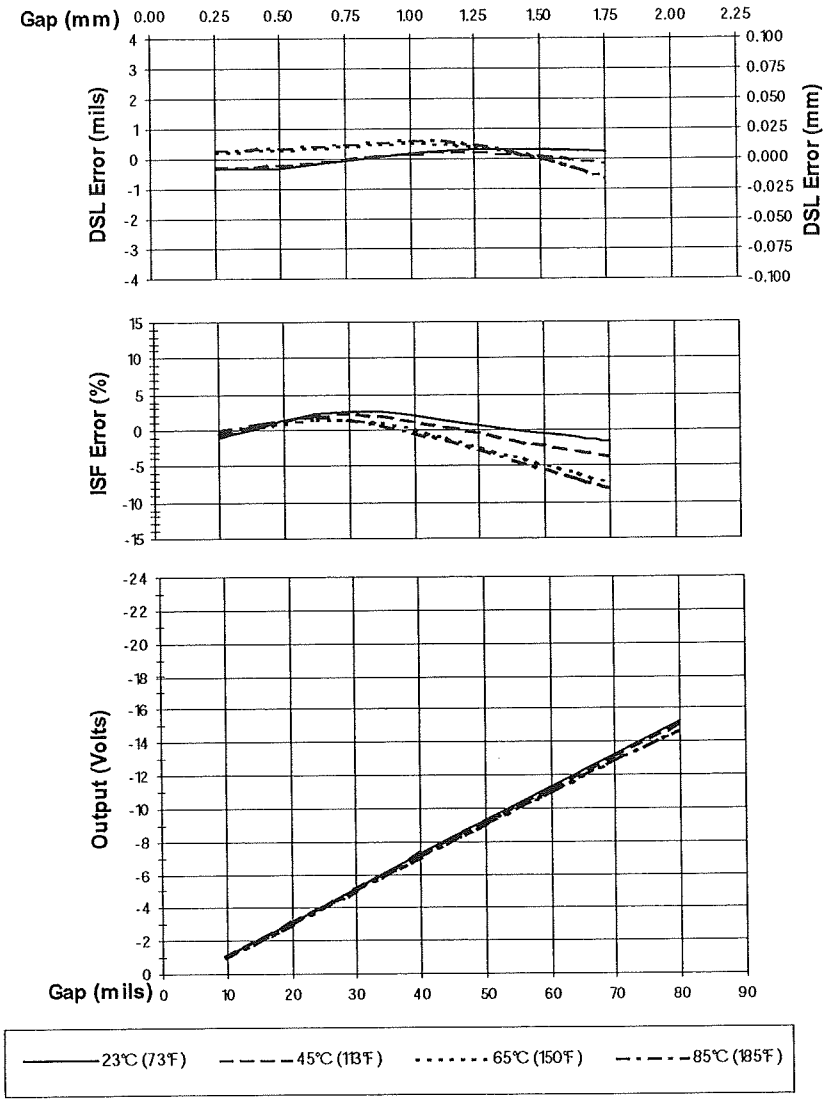


Figure 6-6 Typical 3300 XL NSv™ 5 m Proximitor® Sensor with 4 m Extension Cable @ High Temperature (Probe is at 25°C)

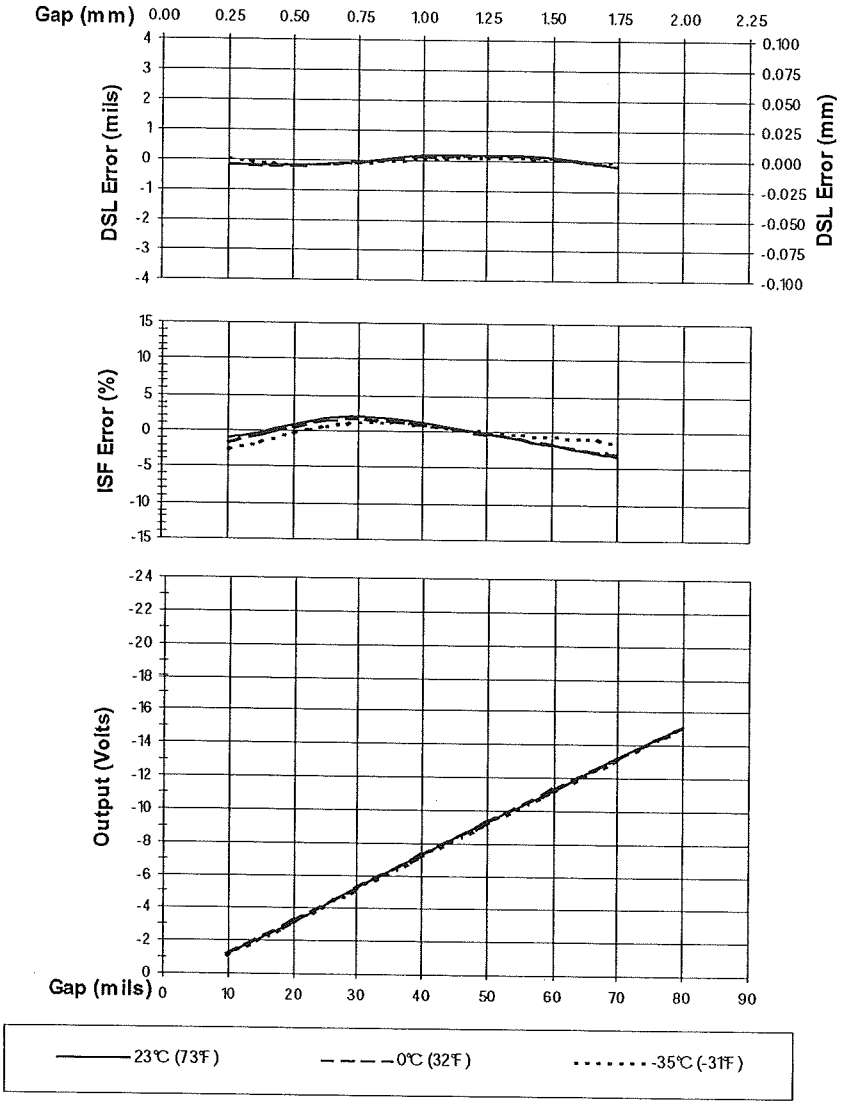


Figure 6-7 Typical 3300 XL NSv™ 7 m Proximitor® Sensor with 6 m of Extension Cable @ Low Temperature (Probe is at 25°C)

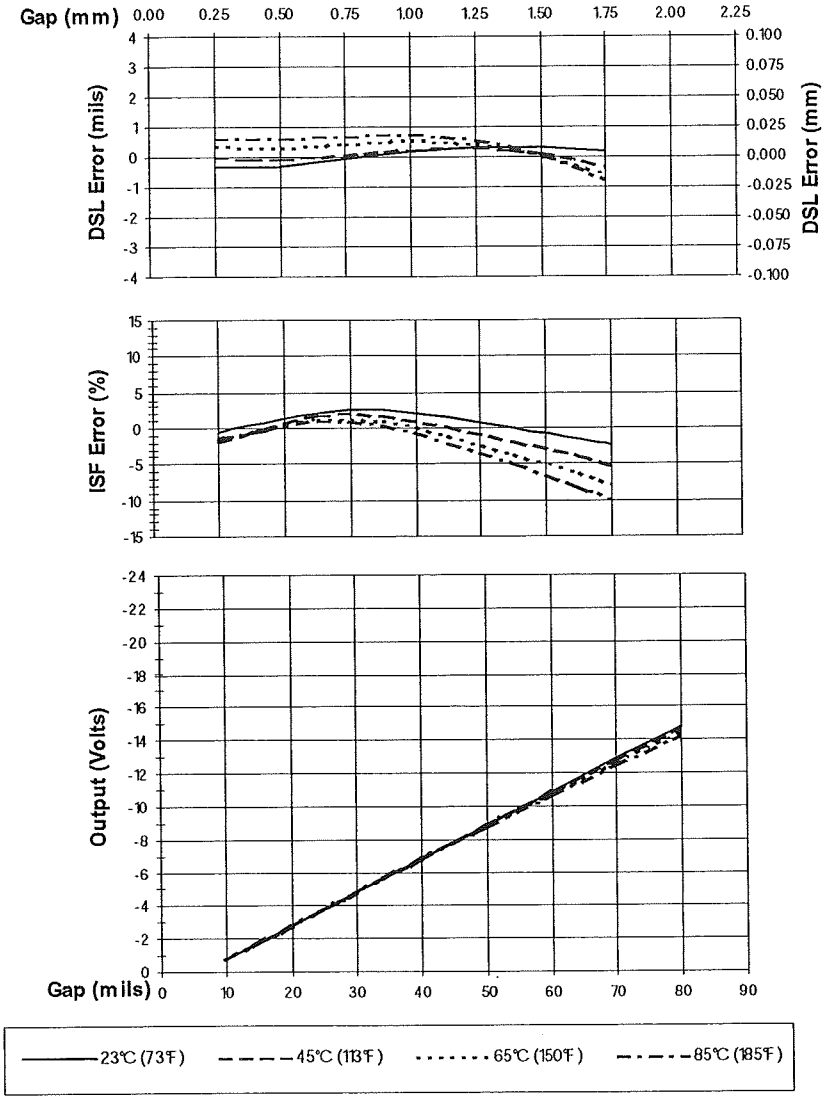


Figure 6-8 Typical 3300 XL NSv™ 7 m Proximitor® Sensor with 6 m of Extension Cable @ High Temperature (Probe is at 25°C)

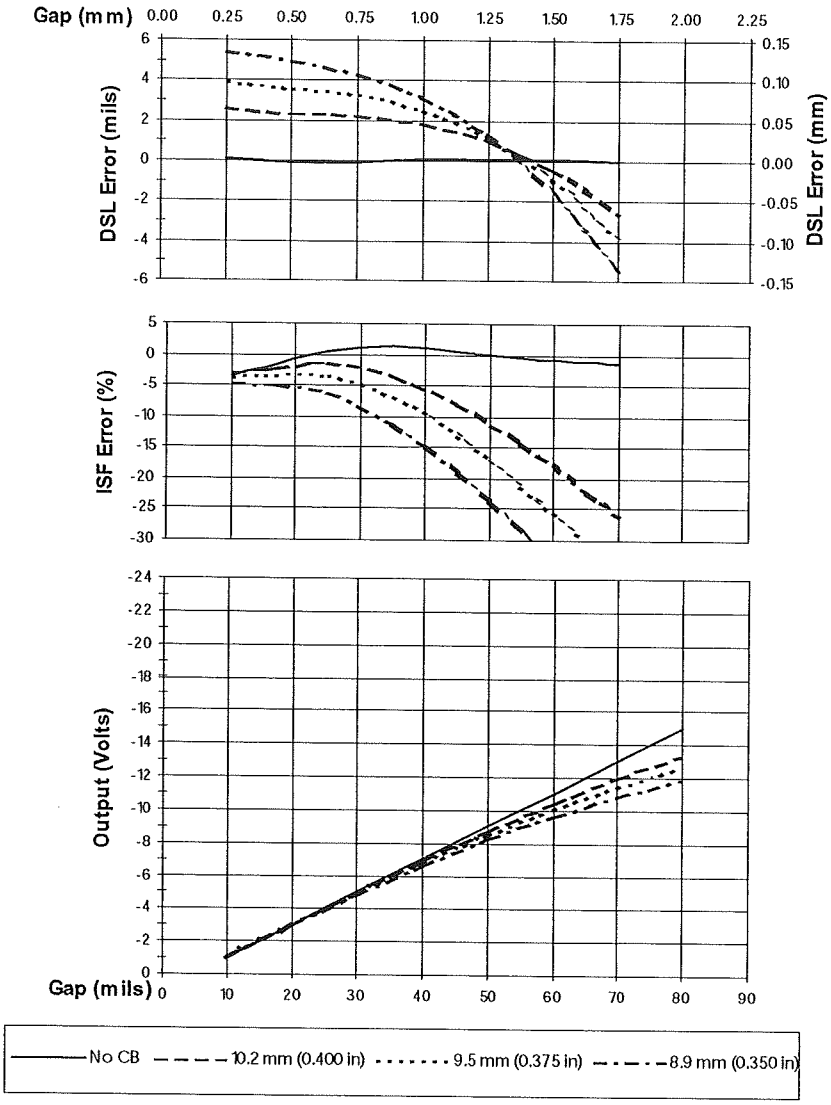


Figure 6-9 Effect of Counterbore Side Clearance (4140 Material)

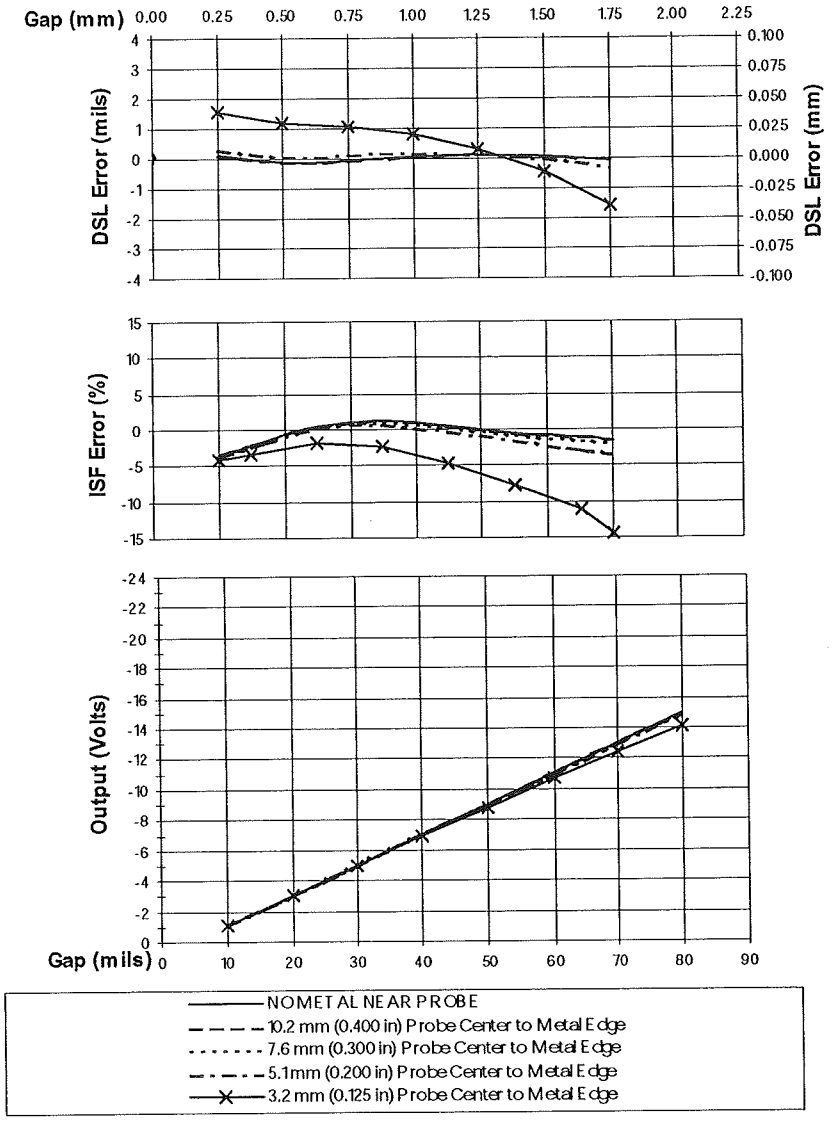


Figure 6-10 Effect of Flat Surface Side Clearance (4140 Material)

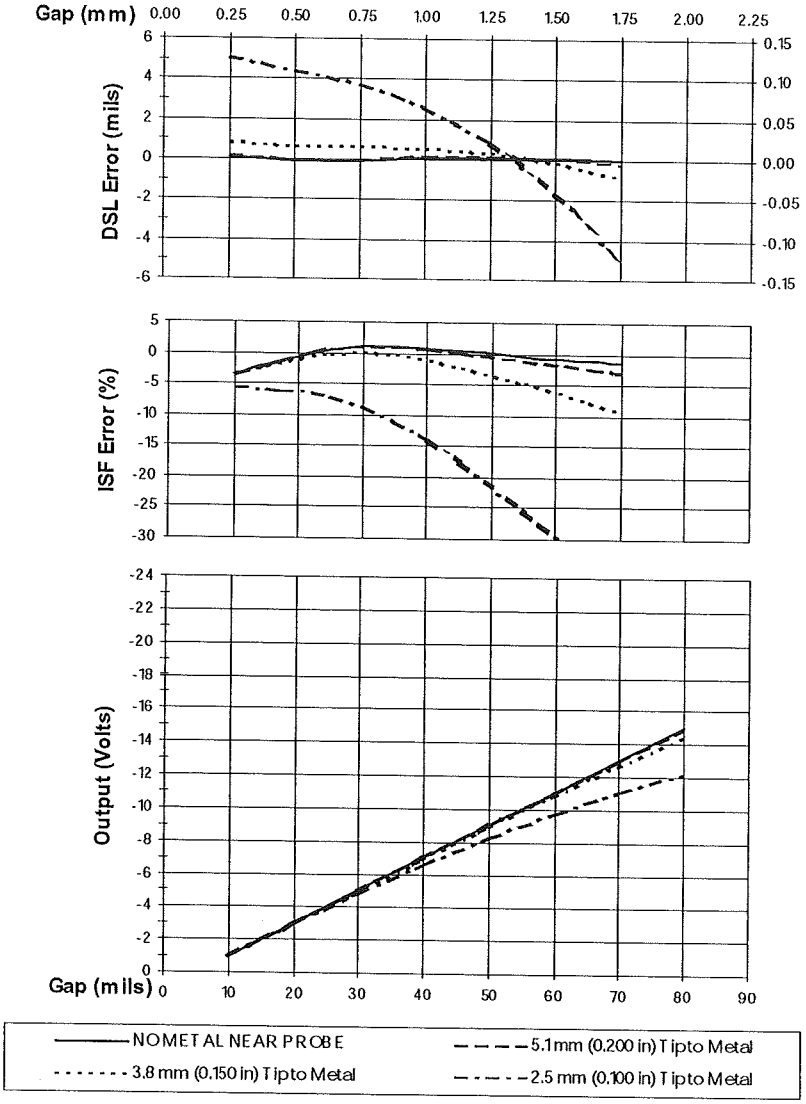


Figure 6-11 Effect of Rear Surface Clearance (4140 Material)

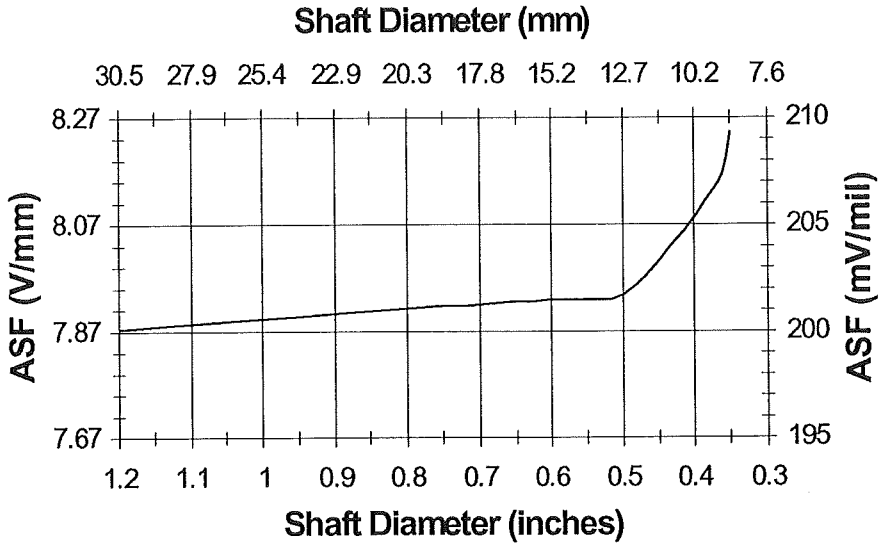


Figure 6-12 Axial Sensitivity to Shaft Size

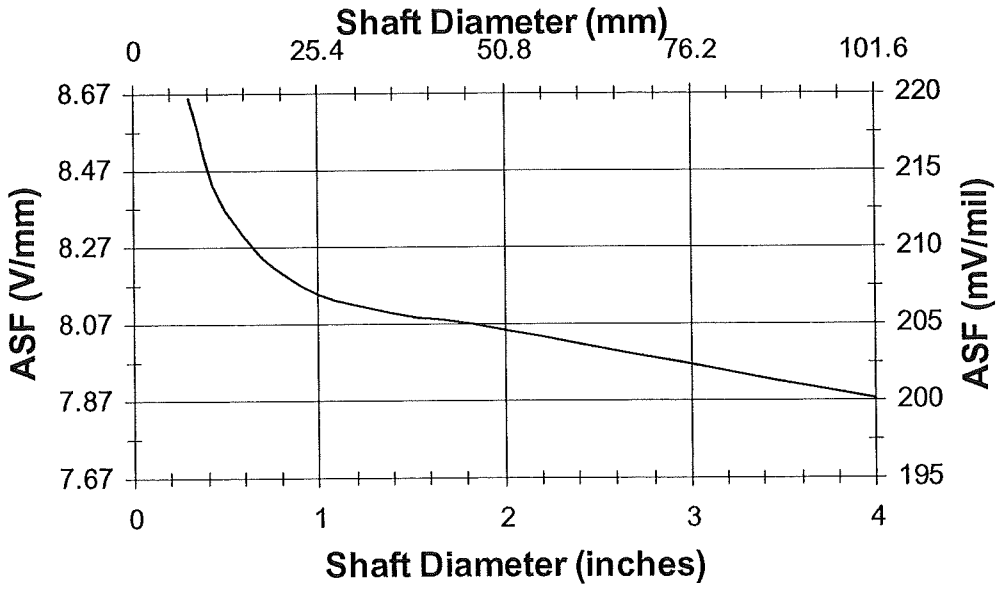


Figure 6-13 Radial Sensitivity to Shaft Size

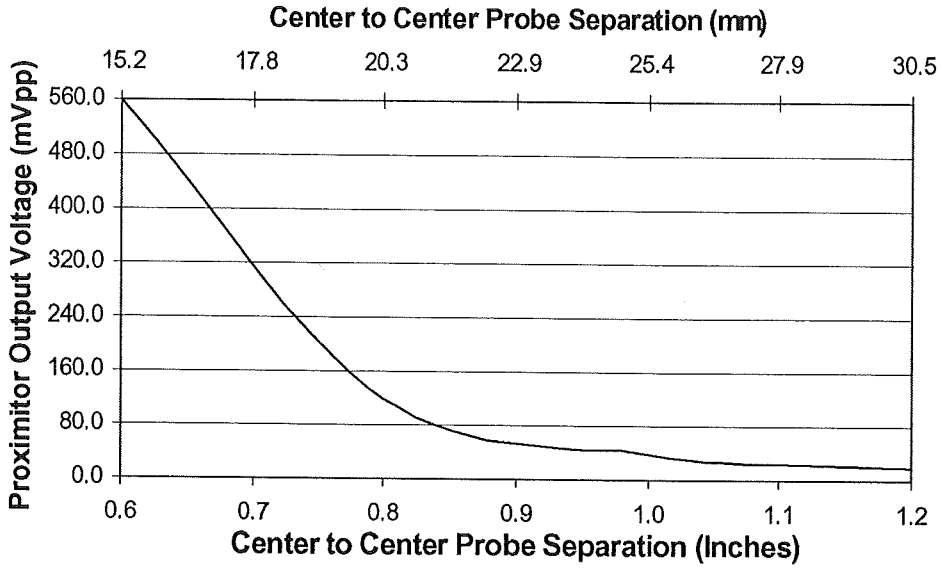


Figure 6-14 Probe Cross-talk with Probes Mounted in Parallel

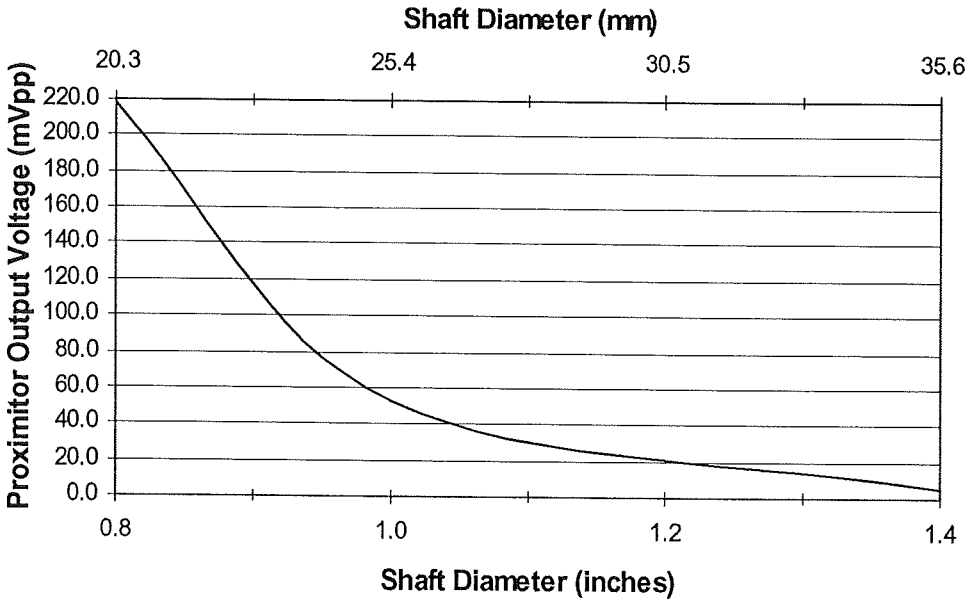


Figure 6-15 Probe Cross-talk with Probes Mounted in X-Y Configuration

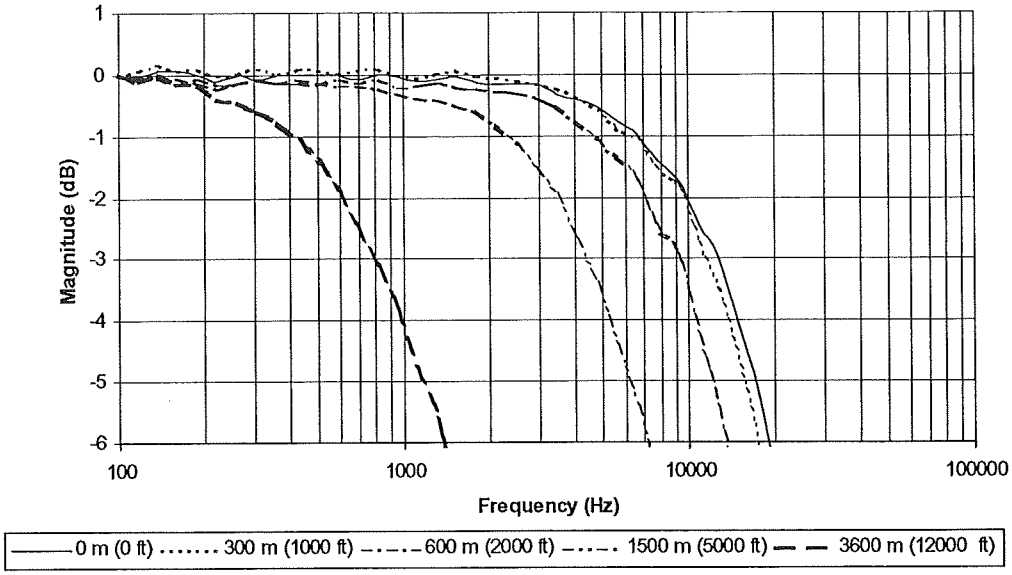


Figure 6-16 Frequency Response, magnitude of typical 3300 XL NSv™ System with various lengths of field wiring, no barriers

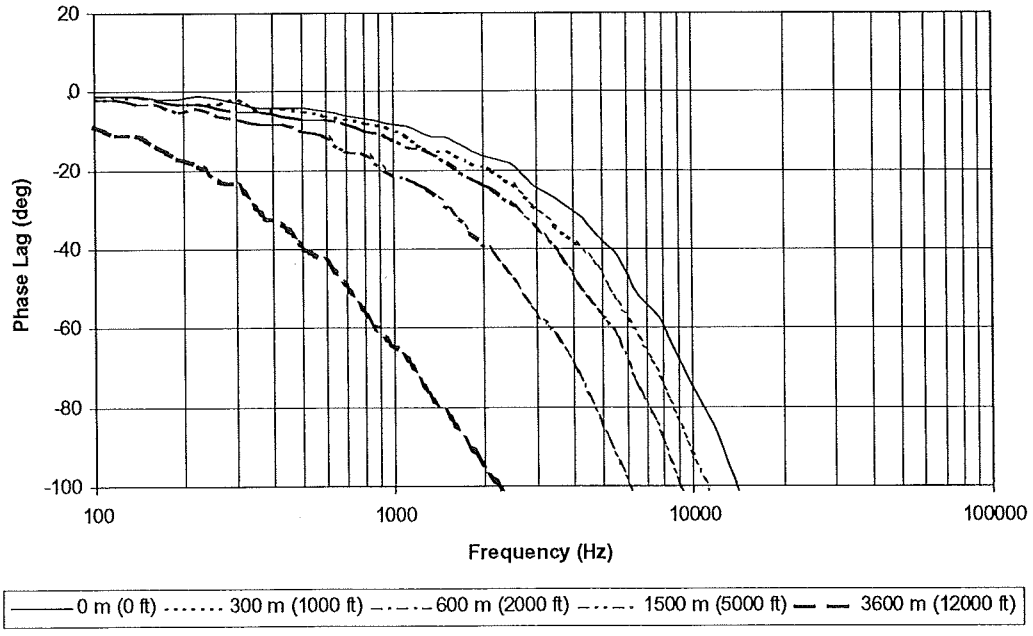


Figure 6-17 Frequency Response, phase change of typical 3300 XL NSv™ System with various lengths of field wiring, no barriers

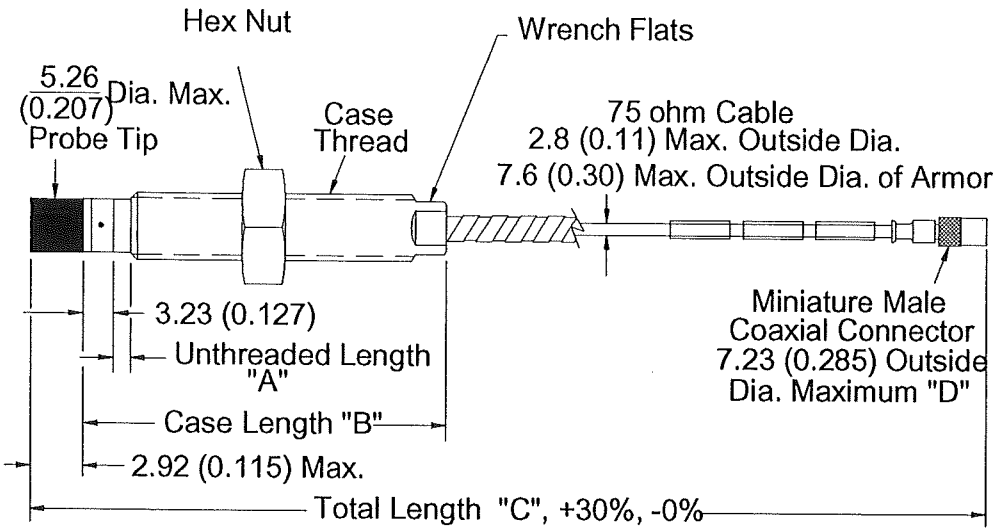


Figure 6-18 3300 NSv™ Proximity probes, Standard Mount

330901, ¼ -28 UNF-2A, without armor

330902, ¼ -28 UNF-2A, with armor

330903, M8x1 thread, without armor

330904, M8x1 thread, with armor

330905, M10x1 thread, without armor

330908, 3/8-24 UNF-2A, without armor

330909, 3/8-24 UNF 2A, with armor

330910, M10x1 thread, with armor

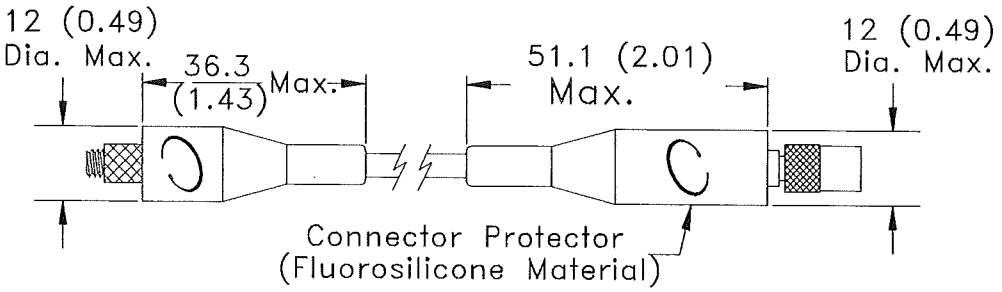


Figure 6-19 Installed Connector Protectors

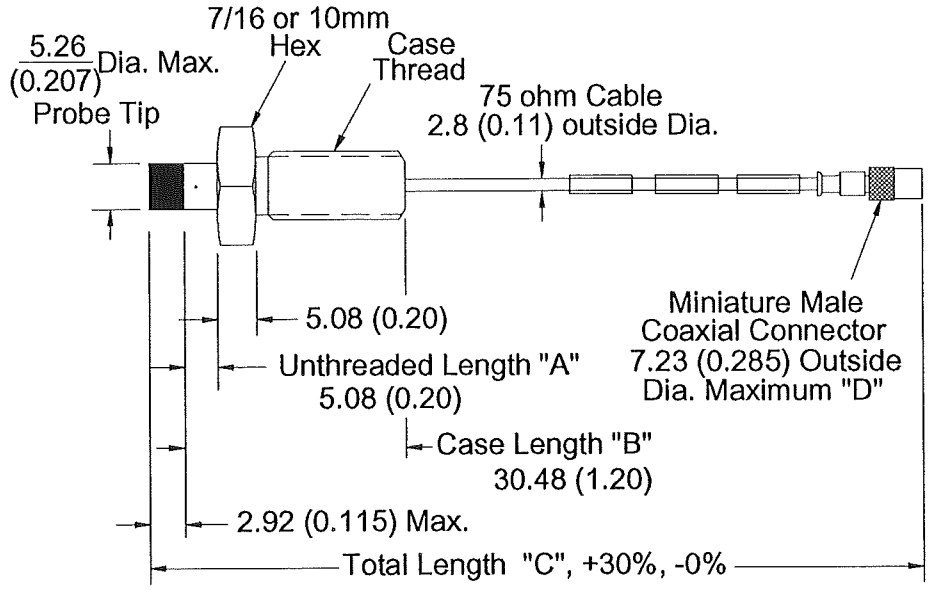


Figure 6-20 3300 NSv™ Proximity Probes, Reverse Mount

330906, 3/8-24 UNF-2A threads

330907, M10x1 threads

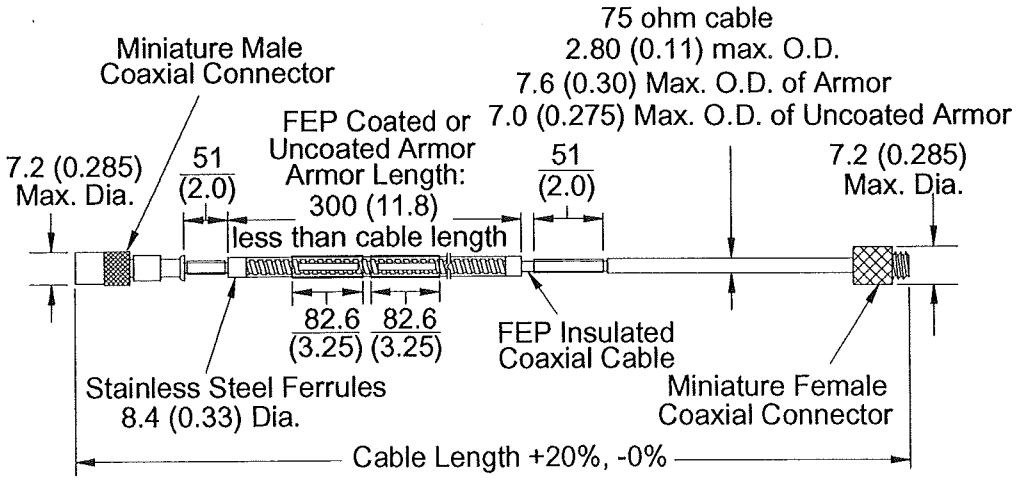


Figure 6-21 330930, 3300 NSv™ Extension Cable

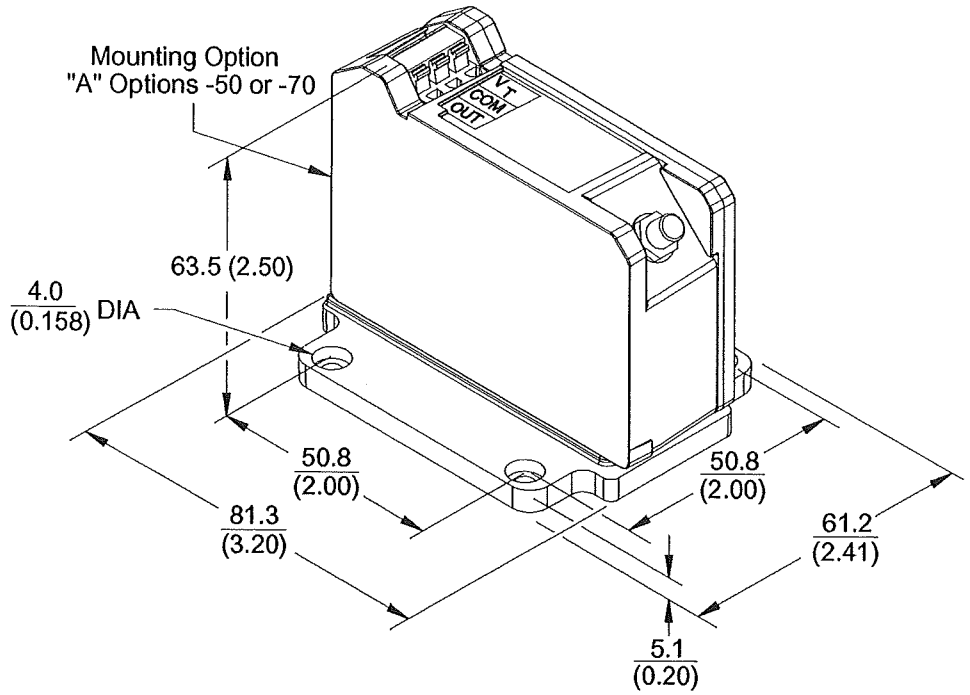


Figure 6-22 Panel Mount 3300 XL NSv™ Proximitor® Sensor

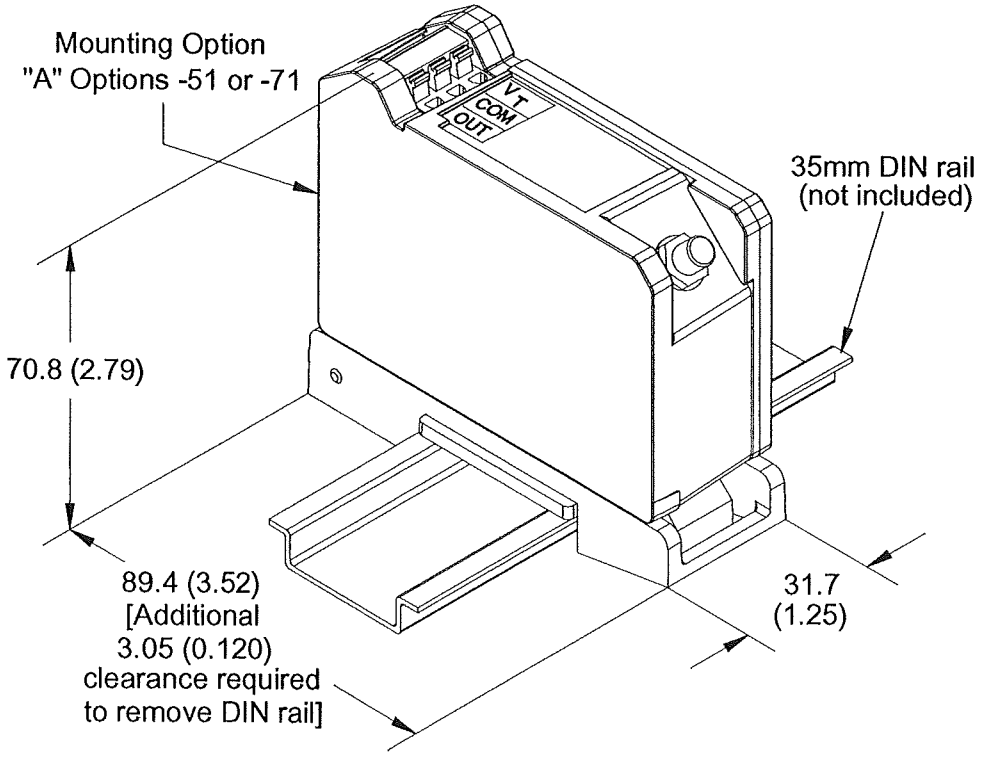


Figure 6-23 DIN Mount 3300 XL NSv™ Proximitor® Sensor

Notes:

1. All dimensions on figures are in millimetres (inches) unless otherwise noted.
2. Standard mount ¼ -28 UNF thread probes are supplied with $^{7}/_{16}$ inch lock nut and $^{7}/_{32}$ wrench flats.
3. Standard mount M8x1 thread probes are supplied with 13 mm lock nut and 7 mm wrench flats.
4. Standard mount $^{3}/_{8}$-24 UNF thread probes are supplied with $^{9}/_{16}$ inch lock nut and $^{5}/_{16}$ wrench flats.
5. Standard mount M10x1 thread probes are supplied with 17 mm lock nut and 8 mm wrench flats.
6. Reverse mount probes are not available with armor or connector protector options.
7. Letters inside quotation marks on figures refer to probe ordering options.
8. Stainless steel armor is supplied with or without FEP outer jacket.
9. FEP jacket is standard on all non-armored probes.