PROTECTION & RELIABILITY
OPTIMIZATION INSTRUMENTS
A CTC COMPANY

PRODUCT MANUAL

DX3309 / DP1009 / DD100980 / DC1009 Series

FFv Proximity Probe Assembly

Connection Technology Center, Inc. ● 7939 Rae Boulevard ● Victor, NY 14564 ● (585) 924-5900

C O N T E N T S

FIGURES

SECTION 1: OVERVIEW

Introduction

This document contains information on the operation, installation and maintenance of the DX3309 / DP1009 / DC1009 / DD100980 proximity probe series products.

Description

The DX3309 / DP1009 / DC1009 / DD100980 series proximity probe products utilize an eddy current that produces a negative voltage that is directly proportional to the “gap” distance between the probe and measured surface. The assembly consists of a proximity probe, extension cable and driver. The driver is a 3 or 4 wire device with connections for power, common, and signal output. The driver is intended for use with a DC negative power supply.

Proximity Probe Ordering Information

DP1009 [ ][ ] - [A][A] - [B][B] - [C][C] - [ ][ ] - [0][0]

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
01 = 1/4-28 No Armor 02 = 1/4-28 Armor	00 = 0.0 in 05 = 0.5 in 10 = 1.0 in 20 = 2.0 in 30 = 3.0 in 40 = 4.0 in 50 = 5.0 in 60 = 6.0 in 70 = 7.0 in 80 = 8.0 in NOTE: 0.5 in. Increments up to 1 in. less than the case length	15 = 1.5 in 20 = 2.0 in 30 = 3.0 in 40 = 4.0 in 50 = 5.0 in 60 = 6.0 in 70 = 7.0 in 80 = 8.0 in 95 = 9.5 in	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	01 = mini coax, with connector protector 02 = mini coax	00 = CE Certified

Figure 1 - PRO FFv, 1/4-28 Case Thread, Eddy Current / Proximity Probe

DP1009 [ ][ ] - [A][A] - [B][B] - [C][C] - [ ][ ] - [0][0]

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
03 = M8x1 No Armor 04 = M8x1 Armor	00 = 0 mm 01 = 10 mm 02 = 20 mm 03 = 30 mm 04 = 40 mm 05 = 50 mm 06 = 60 mm 07 = 70 mm 08 = 80 mm 10 = 100 mm 12 = 120 mm 14 = 140 mm 16 = 160 mm 18 = 180 mm 20 = 200 mm 22 = 220 mm NOTE: 10 mm Increments up to 30 mm less than the case length	03 = 30 mm 04 = 40 mm 05 = 50 mm 06 = 60 mm 07 = 70 mm 08 = 80 mm 10 = 100 mm 12 = 120 mm 14 = 140 mm 16 = 160 mm 18 = 180 mm 20 = 200 mm 22 = 220 mm 25 = 250 mm	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	01 = mini coax, with Connector Protector 02 = mini coax	00 = None

Figure 2 - PRO FFv, M8x1 Case Thread, Eddy Current / Proximity Probe

DP1009 [0][6] - [0][2] - [1][2] - [C][C] - [0][2] - [0][0]

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
06 = reverse mount with 3/8-24 threaded body	02 = 0.2 in	12 = 1.2 in	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	02 = mini coax	00 = None

Figure 3 - PRO FFv, 3/8-24 Reverse Mount Eddy Current / Proximity Probe

DP1009 07 - 05 - 30 - CC - 02 - 00

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
07 = reverse mount with M10x1 threaded body	05 = 5 mm	30 = 30 mm	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	02 = mini coax	00 = None

Figure 4 - PRO FFv, M10x1 Reverse Mount Eddy Current / Proximity Probe

DP1009 11 - 02 - 12 - CC - 02 - 00

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
11 = reverse mount with 1/4-28 threaded body	02 = 0.2 in	12 = 1.2 in	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	02 = mini coax	00 = CE Certified

Figure 5 - PRO FFv, 1/4-28 Reverse Mount Eddy Current / Proximity Probe

DP1009 12 - 05 - 30 - CC - 02 - 00

Case Thread	Unthreaded Case Length	Case Length	Total Length	Connector	Regulatory Approval
12 = reverse mount with M8x1 threaded body	05 = 5 mm	30 = 30 mm	05 = 0.5 meter 10 = 1.0 meter 50 = 5.0 meter 70 = 7.0 meter	02 = mini coax	00 = CE Certified

Figure 6 - PRO FFv, M8x1 Reverse Mount Eddy Current / Proximity Probe

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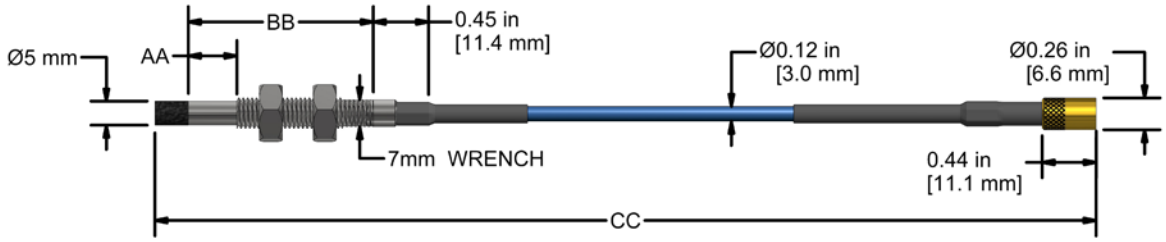

Figure 7 - PRO FFv Standard Case Dimensions

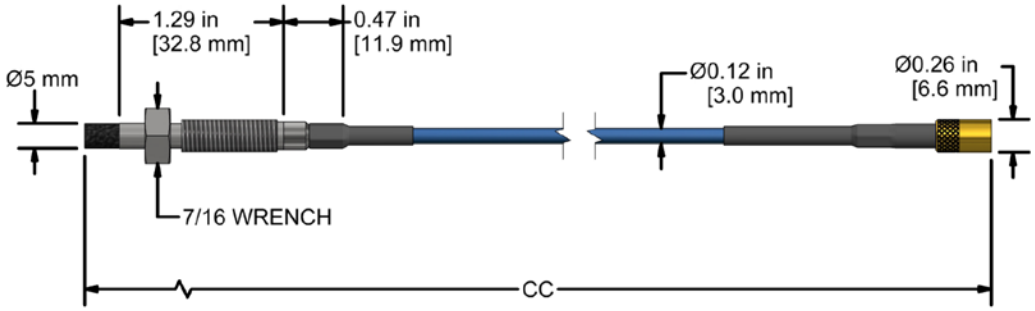

Figure 8 - PRO FFv Reverse Mount Case Dimension

Proximity Probe Specifications

PRO Model: DP1009 Series
Bently™ Compatible Model: DX3309 Series

Environmental

Temperature Range: -31°F(-35°C) to 350°F(177°C)
Humidity Range: 0-95% Relative, Non-condensing

Electrical*

Note: All specifications acquired through use of a AISI 4140 Steel target, 0.5" in Diameter.

Linear Range

Calibrated Linear Range: 10 to 70 mils (0.25 mm to 1.75 mm)
Nominal Output: -1 to -13 VDC
Nominal Sensitivity: 200 mV/mil (7874 mV/mm)

Incremental Scale Factor (ISF)

Note: When measured over calibrated linear range in increments of 10 mils

32°F(0°C) to 113°F(45°C)
5 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%
7 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%

-31°F(-35°C) to 248°F(120°C)
5 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%
7 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%

Deviation from best fit Straight Line (DSL)

Note: When measured over calibrated linear range in increments of 10 mils

32°F(0°C) to 113°F(45°C)
5 Meter System ± 2.3 mil
9 Meter System ± 2.3 mil

-31°F(-35°C) to 248°F(120°C)
5 Meter System ± 2.3 mil
9 Meter System ± 2.3 mil

***If using a CTC Bentley Compatible driver with a Bentley Nevada probe, tolerances are extended to ±10%**

Physical

Materials:

5mm Tip: 40% Glass Filled PPS (Polyphenylene Sulfide)
Threaded Case: Stainless Steel
Coaxial Cable: FEP (Fluorinated Ethylene Propylene)
Connector Material: Gold plated Brass with Teflon Insulators

SECTION 2: PROBE DETAILS

Dimensions:

Cable Lengths:	0.5, 1.0, 5.0, 7.0 Meters **All probes have length tolerance of (-0% / +30%)**
1/4-28 Standard Case:	Available from 1.5” to 9.5” total length Non-threaded lengths available in 0.5” increments up to 1” less than total case length 7/32” wrench flats at rear of probe 2 x 7/16” hex nuts for mounting
M8x1 Standard Case:	Available from 30mm to 250mm total length Non-threaded lengths available in 10mm Increments up to 30mm less than total case length 7mm wrench flats at rear of probe 2 x 13mm hex nuts for mounting
3/8-24 Reverse Mount:	Available in 1.2” total length Integrated 7/16” wrench flats at front of probe body
M10x1 Reverse Mount:	Available in 30mm total length Integrated 11mm wrench flats at front of probe body
1/4-28 Reverse Mount:	Available in 1.2” total length Integrated 7/16” wrench flats at front of probe body
M8x1 Reverse Mount:	Available in 30mm total length Integrated 11mm wrench flats at front of probe body

Extension Cable Ordering Information

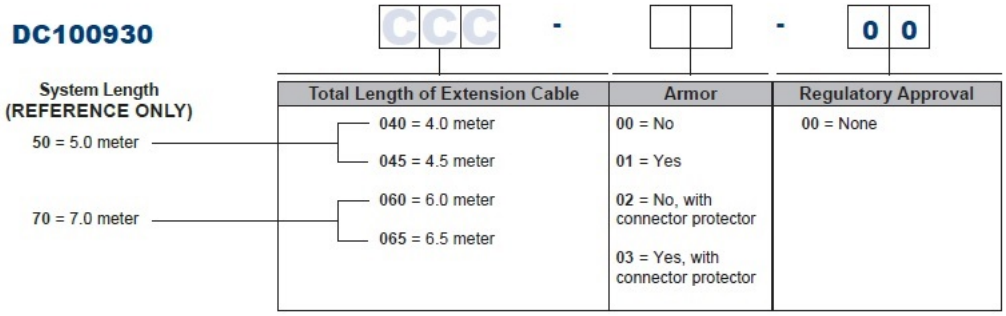

Figure 9 - PRO FFv Extension Cable

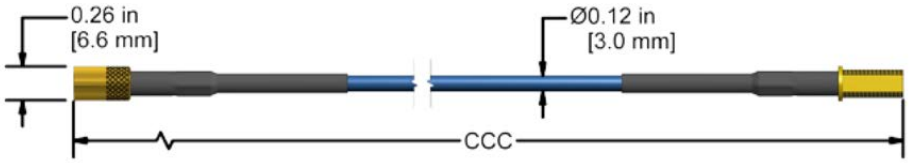

Figure 10 - PRO FFv Extension Cable Dimensions

Proximity Extension Cable Specifications

PRO Model: DC100930 Series
Bently™ Compatible Model: DX330930 Series

Environmental

Temperature Range: -31°F(-35°C) to 350°F(177°C)
Humidity Range: 0-95% Relative, Non-condensing

Physical

Materials:
Coaxial Cable: FEP (Fluorinated Ethylene Propylene)
Connector Material: Gold plated Brass with Teflon Insulators

Dimensions:
Cable Lengths: 4.0, 4.5, 6.0, 6.5 Meters Nominal
All cables have length tolerance of (-0% / +30%)

Proximity Driver Ordering Information

DD1 [ ][ ] 980 - [ ] [ ] - 0 0

Calibrated Material	System Length	Mounting Type	Regulatory Approval
00 = 4140 Steel 10 = 17-4 Stainless Steel 11 = 420 Stainless Steel 20 = 360 Brass Alloy 30 = AL7075-T6	5 = 5.0 meter 7 = 7.0 meter	0 = Panel (Mounting Screws Are Not Included) 1 = DIN 2 = None	00 = None

Figure 11 - PRO FFv, Voltage Driver Assembly

DX330980 - [ ] [ ] - 0 0

System Length	Mounting Type	Regulatory Approval
5 = 5.0 meter 7 = 7.0 meter	0 = Panel (Mounting Screws Are Not Included) 1 = DIN 2 = None	00 = None

Figure 12 - Bently Compatable Driver Assembly

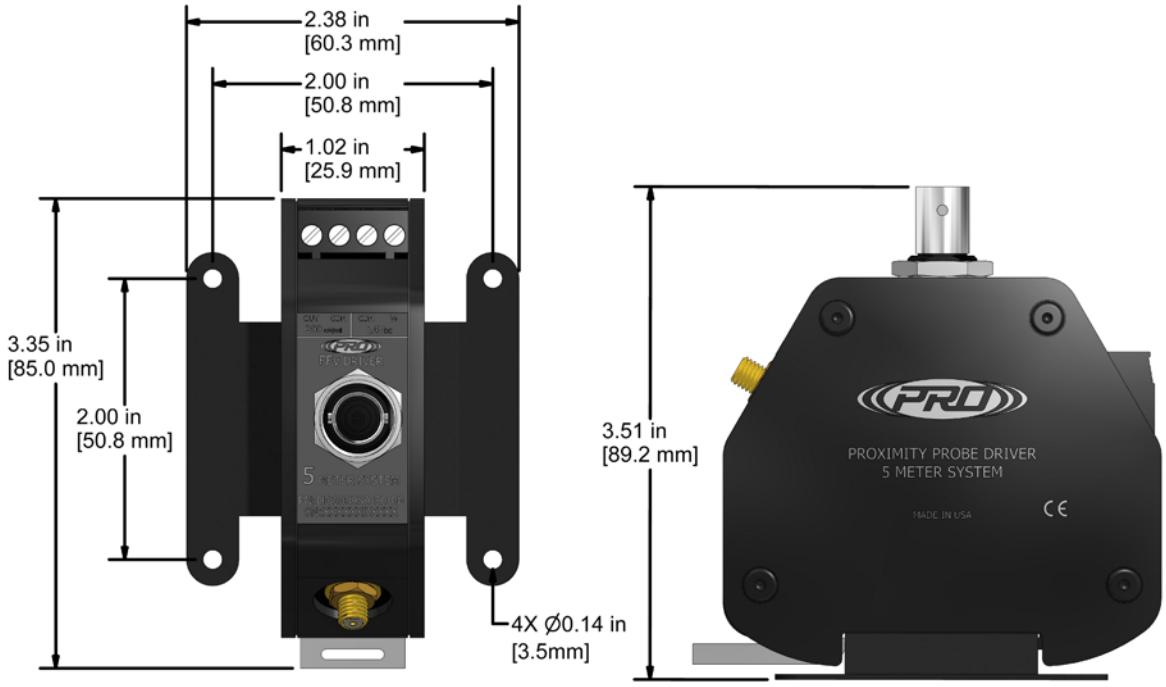

Figure 13 - PRO FFv Driver Assembly Dimensions

Proximity Driver Specifications

PRO Model: DD100980 Series
Bently Compatible Model: DX330980 Series

Environmental

Temperature Range: -31°F(-35°C) to 185°F(85°C)
Humidity Range: 0-95% Relative, Non-condensing

Electrical

Note: All specifications acquired through use of a AISI 4140 Steel target, 0.5" in Diameter.

Linear Range

Calibrated Linear Range: 10 to 70 mils (0.25 mm to 2.30 mm)
Nominal Output: -1 to -13 VDC
Nominal Sensitivity: 200 mV/mil (7874 mV/mm)

Incremental Scale Factor (ISF)

Note: When measured over calibrated linear range in increments of 10 mils

32°F(0°C) to 113°F(45°C)
5 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%
7 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%

-31°F(-35°C) to 185°F(85°C)
5 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%
7 Meter System 200mV/mil (7.87 V/mm) +12.5% / -20%

Deviation from best fit Straight Line (DSL)

Note: When measured over calibrated linear range in increments of 10 mils

32°F(0°C) to 113°F(45°C)
5 Meter System ± 2.3 mil
7 Meter System ± 2.3 mil

-31°F(-35°C) to 185°F(85°C)
5 Meter System ± 2.3 mil
7 Meter System ± 2.3 mil

Operating Power:

Input Voltage Range: -17.5 to -30 VDC
Power Consumption: 0.81W Max
Note: The Driver is protected against reversed polarity.

Isolation:

Case Isolation: Isolated from all connections

Physical

Materials:

Case:	Aluminum
Panel/Din Mount Hardware	Aluminum
Gasket:	Neoprene
Prox Connector:	Gold plated Brass with Teflon Insulators
BNC Connector:	Polyester Housing, Gold plated center contact, Polymethylpentene dielectric, Zinc or Nickel plated shell
Terminal Block:	Polyamide

Mounting:

Din Rail:	35mm Standard Din Rail
Panel:	2.0” x 2.0” Panel mount hole pattern **Note: Mounting screws not included**

Installation Information

For most applications, it is recommended that the driver be mounted in a protective housing. More than one driver may share a single housing/enclosure to simplify installation (see PXE Series Enclosures). Drivers are typically din rail mounted in the enclosure. Connection to the probe is established when the integral cabling of a proximity probe or an extension cable are connected to the prox connector on the driver. Excess proximity probe cables should be coiled up inside the housing/enclosure. **Do NOT cut any cable in a probe system, doing so will affect system accuracy.**

Note: Only PRO DP series and DC series proximity products should be used with the PRO DD series drivers. Only Bently™ Compatible DX series products should be used with each other. Bently™ 3300XL products can be used with the PRO DX series. Substitute cables from other sources should not be used. PRO products are not electrically compatible with other sources and will affect system accuracy.

All connector connections should be tight and secure. Snug the connector screw collar, applying 5 in-lbs. (0.6 N-m) of torque.

Note: Do not overtighten the probe cable connection. Do not exceed a torque of 8 in-lbs. (0.9 N-m). Too much torque can cause damage. Probe connectors must not touch any machine metal parts. Proper steps should be taken to isolate connectors from metal surfaces. Connector covers are available per request.

Probes are provided with a threaded SST case. These can be mounted directly through the machine housing via threaded hole. When installing this way, proper clearance (1.5 x tip diameter; e.g. 1.5 x 5mm probe tip = 8mm clearance) around the probe tip must be provided. Refer to the figure below.

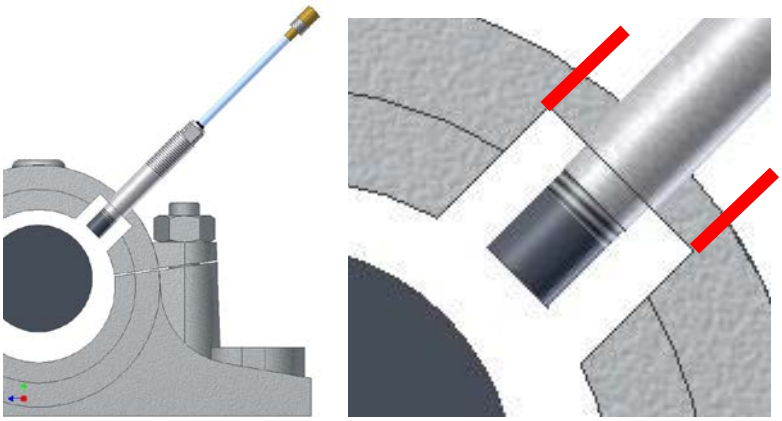

Figure 14 - Probe Tip Clearance

Standard mounting blocks and bushings are also available. Mounting blocks are available in anodized aluminum or phenolic material, all bushings are SST.

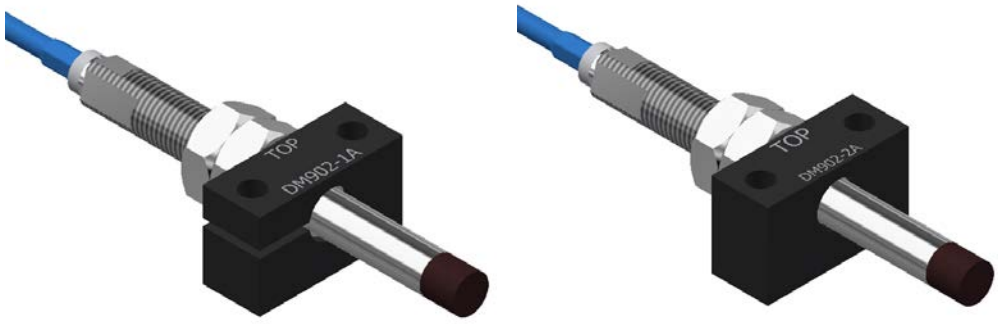

Figure 15 - Standard Aluminum Mounting Blocks Clamping & Non-clamping

Figure 16 - Standard SST Mounting Bushings

Electrical Connections

The driver has four terminal connections: V_t, COM, COM and Out. The -24VDC power is connected to the V_t and COM terminals.

The COM (signal common or signal ground) terminal is isolated from the driver case. COM is not directly connected to the probe cable connectors.

The OUT terminal is the output signal connection, and is a negative voltage output, with the voltage moving more negatively (higher in magnitude) as the gap between the probe and the machine shaft increases. COM is used for the output as well.

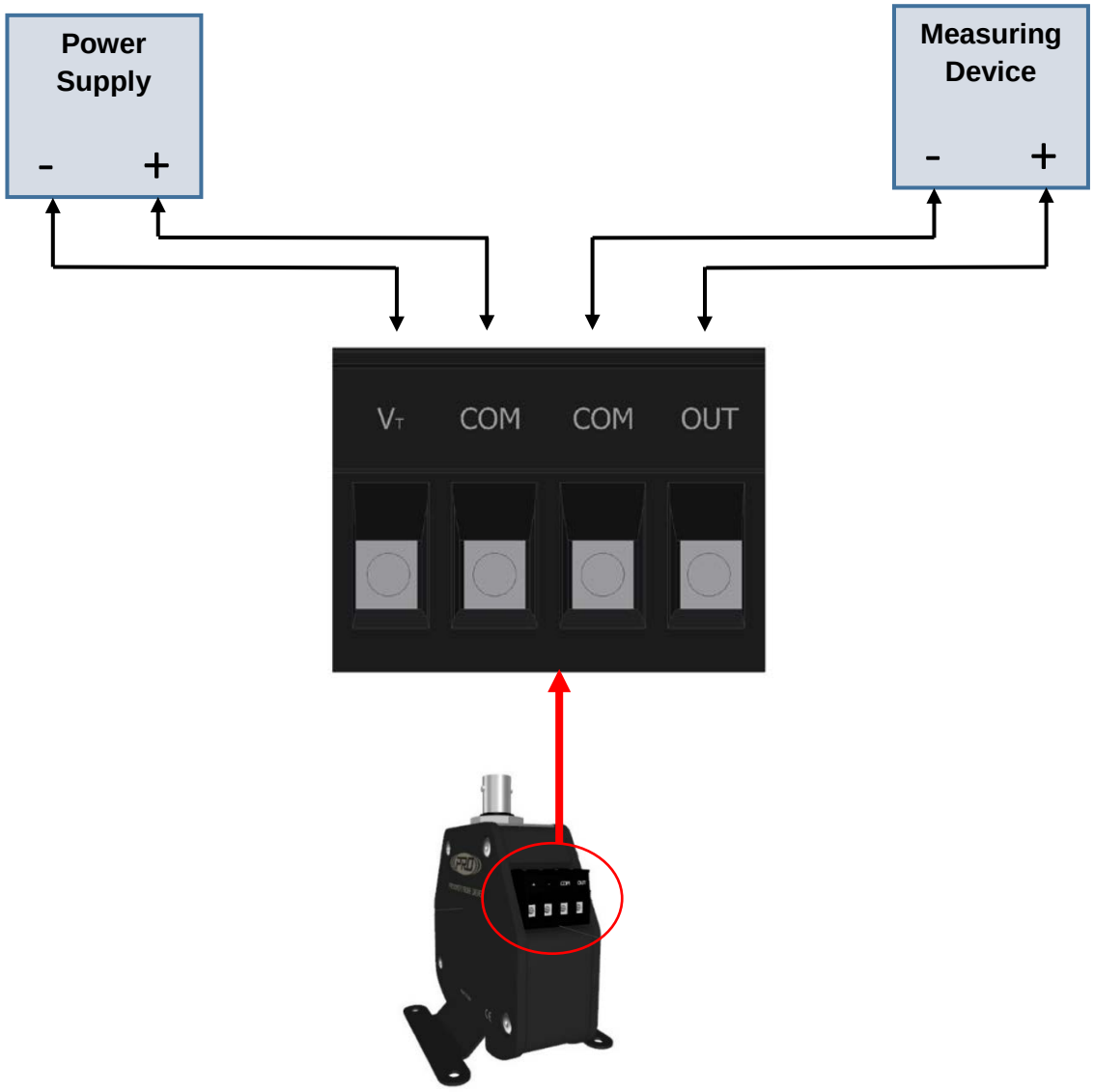

Figure 17 - 4 Wire Connection

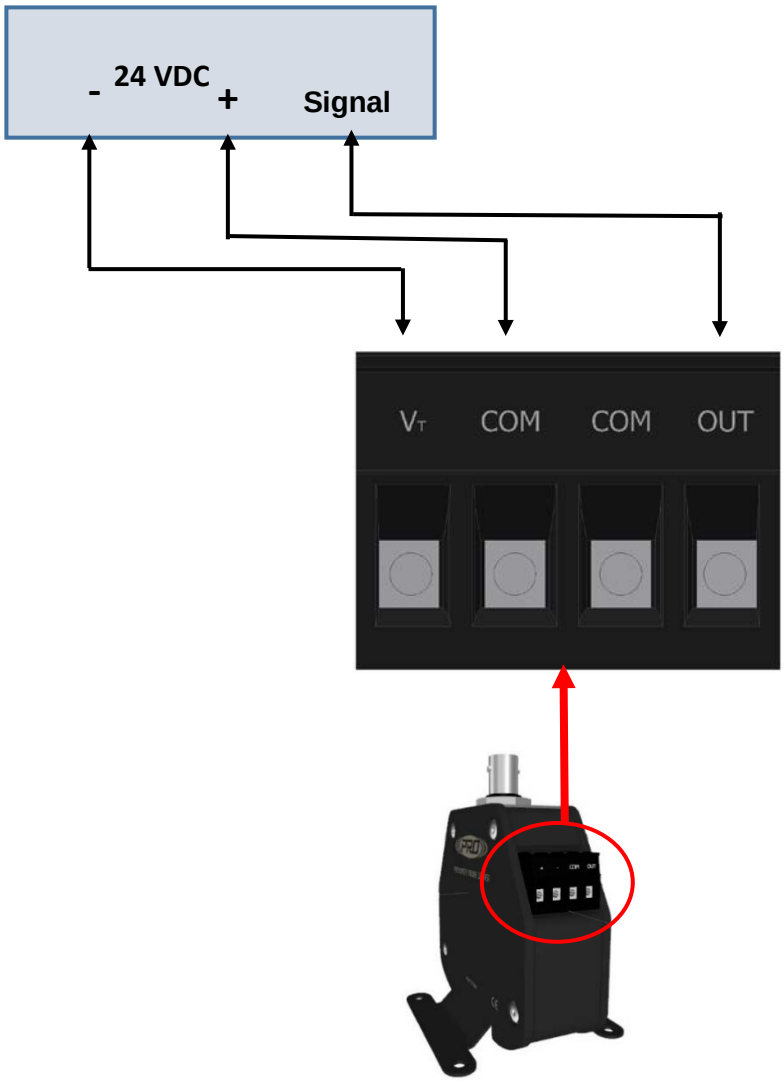

Figure 18 - 3 Wire Connection

Target Surfaces

The target material directly affects the output from the system. Drivers are calibrated for SAE 4140 steel. If the target material differs from SAE 4140 steel, the output will become non-linear.

For vibration monitoring of rotating shafts, the observed surface must have a roughness not to exceed 32 micro inches (<1 microns) and must be concentric. If the surface is rough or has discontinuities or there is excessive mechanical run-out, false vibration readings will result. To insure measurement accuracy, the target area should be at the circumference of a shaft and perpendicular to the probe tip.

Linear range may be reduced if the target diameter < 0.5 inches or shaft diameter < 1.2 inches.

NOTE: Shaft diameters should be uniform in target area, and free of keyways & oil slingers or mechanical damage.

Setup and Adjustment

When all connections to the driver have been made, and the probe is in place, apply power to the system. For applications where the only data of interest is vibration level, where measuring the gap is not important, the voltage at the OUT (signal output) terminal, relative to the COM (common) terminal should be -7.0 +/- 0.5 volts for a mid-range gap. Adjust the probe until this reading is obtained.

For applications where the actual gap needs to be measured, adjust the probe until a reading is obtained that reflects the desired initial gap setting.

Operation

A PRO FFv DP Probe Assembly operates in combination with a PRO FFv extention cable and PRO FFv DD Probe Driver. For the Bently™ DX compatible series all DX series components can be interchanged with the Bently™ 3300XL Series components. The driver outputs a signal that is proportional to the gap between the probe tip and the target. The average gap corresponds to the DC component of the output. Vibration is measured by monitoring the DC variation of the signal simulating an AC component. All drivers have the same 13 volt output span. The output sensitivity of the FFv driver is 200 mV/mil.

Troubleshooting Chart

Problem	Recommended Action
-0.5 to -0.6 VDC Signal Output	Check Probe Cable / Ext Cable Connection
No Signal Output	Check Power Supply

Note: For specific problem resolution, please call an Applications Engineer at 1-585-924-5900.

Maintenance

Once the FFv proximity probe assembly have been installed, minimal maintenance will be required. Basic visual checks to ensure integrity and proper function should be made periodically.

General

There are no customer replaceable parts. The proximity probe assembly has been designed for trouble-free service under normal operating conditions.

Warranty

PRO will repair or replace any of our products under warranty so long as the product was not subjected to misuse, neglect, natural disasters, improper installation or modification which caused the defect.

Contact Information

Connection Technology Center, Inc. (CTC)

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