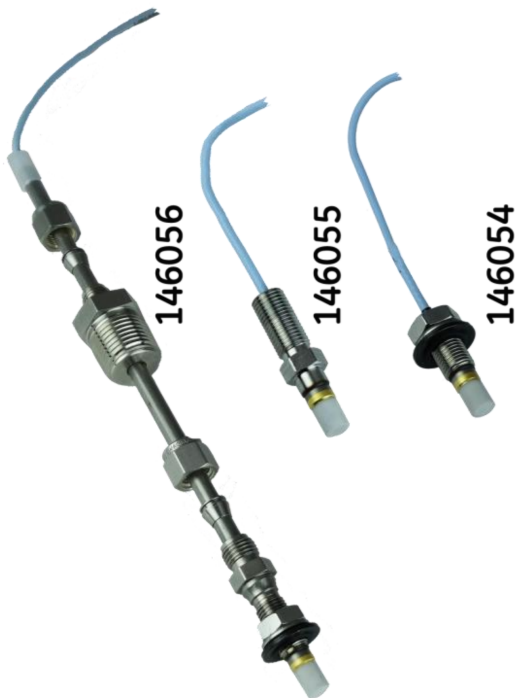


# 3300 Ceramic Capped Probe

## Datasheet

Bently Nevada Machinery Condition Monitoring

172932 Rev. G



## Description

The 3300 Ceramic Capped Probe is a state-of-the-art solution for monitoring machinery in aggressive chemical or high-pressure environments. The alumina cap and 304 stainless steel probe case provide robust protection and increased life for applications in anhydrous ammonia or other extreme pH environments. The ceramic capped probe is compatible with the 3300 Proximitor Sensor and extension cable.

Our Bently Nevada ceramic-capped probes are rated to 34 Bar (500 psi) pressure. Modifications are available for applications involving higher pressures.

The 146054, 146055, and 146056 probes were developed for applications that expose only the front of the probe case assembly to corrosive gases and liquids. These ceramic probe assemblies prevent corrosive gases and liquids from entering the front end of the probe case. We leak test the front-end ceramic to metal interface with helium to ensure a hermetic seal. These probes do not have a rear fitting or stainless steel tube, so that the rear of the probes are not sealed. You must not expose the rear of these probes to destructive environments such as water,  $\text{NH}_3$ ,  $\text{NH}_4\text{OH}$ , hydrogen sulfide, etc.

The 146056 ceramic probe assembly has the rear fitting and stainless steel tubing to prevent corrosive gases and liquids from entering both the front and rear of the probe case. We leak test the front-end ceramic to metal interface with helium to ensure a hermetic seal. The fitting at the rear end of the probe is unsealed when it leaves the factory. You can disconnect the tubing and the fittings from the probe case and slide them out of the way while gapping and installing the probe. Once you have secured and correctly gapped the probe, you should tighten the fittings to completely seal the rear of the probe.



## Specifications

Unless otherwise noted, the following specifications are for a 3300 5mm system including Proximator Sensor, extension cable and probe between +18 °C and +27 °C (+64 °F to +80 °F), with a -24 Vdc power supply, a 10 kW load, and an AISI 4140 steel target. Performance characteristics apply to systems that consist solely of 3300 XL components. The system accuracy and interchangeability specifications do not apply when using a transducer system calibrated to any target other than our AISI 4140 steel target.

## Electrical

### Probe Nominal DC Resistance

| Probe Length | Resistance from the Center Conductor to the Outer Conductor (ohms) |
|--------------|--|
| 0.5          | 7.45 ± 0.50  |
| 1.0          | 7.59 ± 0.50  |
| 2.0          | 7.88 ± 0.50  |
| 5.0          | 8.73 ± 0.70  |
| 9.0          | 9.87 ± 0.90  |

|                         |   |
|-------------------------|---|
| Linear Range            | 1.52 mm (60 mils). Linear range begins at approximately 0.25 mm (10 mils) from target and is from 0.25 to 1.78 mm (10 to 70 mils) (approximately -4 to -16 Vdc).  |
| Recommended Gap Setting | 1.0 mm (40 mils)<br><br>The linear range of the ceramic-capped probes are shifted compared with standard 3300 XL probes. The probes are very robust but cannot withstand direct mechanical loads on the probe tip. Gap the probe electrically and avoid contact |

with the target surface.

Configuring the monitor when using ceramic- capped probes requires extra care. Due to the shift in the curve from that of a standard 3300 XL probe, the probe tip may contact the shaft before the probe reaches lower OK limit. Your installation may require a monitor modification to accommodate this condition.

### Incremental Scale Factor (ISF)

|                                    |   |
|------------------------------------|---|
| Standard 5-metre or 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 60 mil linear range from 0 °C to +45 °C (+32 °F to +113 °F).. |
|------------------------------------|---|

## Mechanical

|                     |                                     |
|---------------------|-------------------------------------|
| Probe Tip Material  | Alumina ceramic (AlO <sub>3</sub> ) |
| Probe Case Material | AISI 304 stainless steel.           |

### Probe Cable Specifications

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


## Connectors

The 3300 XL probe has 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. The connectors require no special tools for installation or removal. The connector can be ordered in a removable nut configuration, or as the standard ClickLoc connector on probe 146056.

You can also order 3300 XL Probes with connector protectors already installed or supplied separately for installation in the field (such as when you must run the cable through restrictive conduit). We recommend connector protectors for all installations to provide increased environmental protection.

|                    |  |
|--------------------|--|
| Connector Material | Gold-plated brass or gold-plated beryllium copper. |
|--------------------|--|

|          |   |
|----------|---|
| Pressure | nitrogen. Modifications are available for higher-pressure applications. Contact our custom design department if you require a test of the pressure seal for your application. |
|----------|---|

 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. Bently Nevada will not be held responsible for any damages resulting from leaking proximity probes.

**Table 1: Connector Tightening Instructions**

| Connector Type   | Tightening Instructions                 |
|--|---|
| 2 3300 XL gold "click" type connectors                     | Finger tight                            |
| 1 non-XL stainless steel connector and 1 3300 XL connector | Finger tight plus 1/8 turn using pliers |
| Maximum Torque   | 0.565 N•m (5 in•lbf)                    |
| Cable Minimum Bend Radius                                  | 25.4 mm (1.0 in)                        |

**Environmental Limits**

| Probe Temperature Range           |                                       |
|-----------------------------------|---------------------------------------|
| Operating and Storage Temperature | -51 °C to +177 °C (-60 °F to +351 °F) |
| Probe                             | Rated to seal 34 Bar (500 psi)        |

## Compliance and Certifications

### FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

### RoHS

RoHS Directive 2011/65/EU

### Maritime

ABS 2009 Steel Vessels Rules

1-1-4/7.7,4-8-3/1.11.1,4-9-7/13

## Hazardous Area Approvals



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from [Bently.com](http://Bently.com).

### CSA/NRTL/C

#### 3300 XL Proximitors Sensor

##### ia

When installed with intrinsically safe zener barriers per drawing 141092 or when installed with galvanic isolators.

Class I, Zone 0: AEx/Ex ia IIC T4/T5 Ga;  
Class I, Groups A, B, C, and D,  
Class II, Groups E, F and G,  
Class III;  
T5 @ Ta= -55°C to + 40°C.  
T4 @ Ta= -55°C to + 80°C.

##### nA, ec

When installed without barriers per drawing 140979.

Class I, Zone 2: AEx/Ex nA IIC T4/T5 Gc;  
Class I, Division 2, Groups A, B, C, and D;  
Class I, Zone 2: AEx/Ex ec IIC T4/T5 Gc;  
Class I, Division 2, Groups A, B, C, and D;  
T5 @ Ta= -55°C to + 40°C  
T4 @ Ta= -55°C to + 80°C

#### 3300 XL Probe

##### ia

When installed with intrinsically safe zener barriers per drawing 141092 or when installed with galvanic isolators.

Class I, Zone 0: AEx/Ex ia IIC T5...T1 Ga;  
Class I, Groups A, B, C, and D,  
Class II, Groups E, F, and G,  
Class III;  
(see Temperature Schedule table to follow)


##### nA, ec

When installed without barriers per drawing 140979.


Class I, Zone 2: AEx/Ex nA IIC T5...T1 Gc;  
Class I, Division 2, Groups A, B, C, D;  
Class I, Zone 2: AEx/Ex ec IIC T5...T1 Gc; Class I, Division 2, Groups A, B, C, and D;  
(see Temperature Schedule table to follow)

## ATEX/IECEX

### 3300 XL Proximito Sensor

 II 1 G  
 Ex ia IIC T4/T5 Ga  
 Ex ia IIIC T90C/T105C Dc  
 For EPL Dc:

**ia**  
 T105C @ Ta = -55°C to 100°C  
 T90C @ Ta = -55°C to +85°C  
 Ui = -28V Uo = -28V  
 Ii = 140mA Io = 140mA  
 Pi = 0.91W Po = 0.742W  
 Ci = 47nF Co = 1.5nF  
 Li = 1460µH Lo = 610µH

 II 3 G  
 Ex nA IIC T4/T5 Gc  
 Ex ec IIC T4/T5 Gc


**nA,ec**  
 Ui = -28V Ii = 140 mA  
 T5 @ Ta = -55°C to + 40°C  
 T4 @ Ta = -55°C to + 80°C

| Temperature Classification | Ambient Temperature (Probe Only) |
|----------------------------|----------------------------------|
| For EPL Ga and Gc          |                                  |
| T1                         | -55°C to +232°C                  |
| T2                         | -55°C to +177°C                  |
| T3                         | -55°C to +120°C                  |
| T4                         | -55°C to +80°C                   |
| T5                         | -55°C to +40°C                   |
| For EPL Dc                 |                                  |
| T280°C @ Ta                | -55°C to +232°C                  |
| T225°C @ Ta                | -55°C to +177°C                  |
| T170°C @ Ta                | -55°C to +120°C                  |
| T130°C @ Ta                | -55°C to +80°C                   |
| T105°C @ Ta                | -55°C to +100°C                  |
| T90°C @ Ta                 | -55°C to +40°C                   |


### 3300 XL Probe



Probe entity parameters are met when used with BN extension cables and connected to BN Prox.

 II 1 G  
 Ex ia IIC T5...T1 Ga,  
 (see Temperature Schedule table to follow)

**ia**  
 Ex ia IIIC T90°C ... T280°C Dc  
 For EPL Dc:  
 Ui = -28V Ci = 1.5 nF  
 Ii = 140 mA Li = 610 µH  
 Pi = 0.91 W

 II 3 G  
 Ex nA IIC T5...T1 Gc,  
 Ex ec IIC T5...T1 Gc,  
 (see Temperature Schedule table to follow)

**nA,ec**  
 Ui = -28V Ii = 140 mA

### Temperature Schedule

## Hazardous Area Conditions of Safe Use

### CSA/NRTL/C:

**ia**

Install per Bently Nevada drawing 141092.

**nA, ec**

Install per Bently Nevada drawing 140979.

### ATEX/IECEx:

**ia**

Install per Bently Nevada drawing 141092.

**nA, ec**

The Prox must be installed so as to provide the terminals with a degree of protection of at least IP54.

## Ordering Information



For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from [Bently.com](http://Bently.com).

### 3300 Ceramic Capped Proximity Probes

**146054** 3300 Ceramic Capped Probe, 3/8-24 UNF thread, without armor

**146054 with Modification 164523** 3300 Ceramic Capped Probe, 3/8-24 UNF thread, with armor

#### Part Number-AA-BB-CC-DD

| A:      | Overall Case Length Option   |
|---------|--|
|         | Order in increments of 0.1 in<br>Threaded length configurations:<br>Maximum case length: 4.0 in<br>Minimum case length: 0.8 in |
| Example | <b>2 4</b> = 2.4 in  |

#### B: Total Length Option

|            |                                     |
|------------|-------------------------------------|
| <b>0 5</b> | 0.5 metre (1.6 feet)                |
| <b>1 0</b> | 1.0 metre (3.3 feet)                |
| <b>2 0</b> | 2.0 metres (6.6 feet)               |
| <b>5 0</b> | 5.0 metres (16.4 feet) <sup>1</sup> |
| <b>9 0</b> | 9.0 metres (29.5 feet)              |

#### C: Connector and Cable-Type Option

|            |   |
|------------|---|
| <b>0 1</b> | Miniature coaxial ClickLoc connector with connector protector, standard cable |
| <b>0 2</b> | Miniature coaxial ClickLoc connector, standard cable                          |

#### D: Agency Approval Option

|            |                  |
|------------|------------------|
| <b>0 0</b> | Not required     |
| <b>0 5</b> | CSA, ATEX, IECEx |

### 3300 Ceramic Capped Proximity Probes, Metric

**164517**, 3300 Ceramic Capped Probe, M10 x1 thread, without armor

**164517 with Modification 172330**, 3300 Ceramic Capped Probe, M10 x1 thread, with armor

#### Part Number-AA-BB-CC-DD

| A:      | Overall Case Length Option   |
|---------|--|
|         | Order in increments of 1 mm.<br>Metric thread configurations:<br>Maximum length: 100 mm<br>Minimum length: 20 mm |
| Example | <b>0 6 0</b> = 60 mm   |

#### B: Total Length Option

|            |                                     |
|------------|-------------------------------------|
| <b>0 5</b> | 0.5 metre (1.6 feet)                |
| <b>1 0</b> | 1.0 metre (3.3 feet)                |
| <b>2 0</b> | 2.0 metres (6.6 feet)               |
| <b>5 0</b> | 5.0 metres (16.4 feet) <sup>1</sup> |
| <b>9 0</b> | 9.0 metres (29.5 feet)              |

#### C: Connector and Cable-Type Option

|            |   |
|------------|---|
| <b>0 1</b> | Miniature coaxial ClickLoc connector with connector protector, standard cable |
| <b>0 2</b> | Miniature coaxial ClickLoc connector, standard cable                          |

#### D: Agency Approval Option

|            |                    |
|------------|--------------------|
| <b>0 0</b> | Not required       |
| <b>0 5</b> | Multiple Approvals |



## 3300 Ceramic Capped Reverse Mount Probes

**146055**, 3/8-24 UNF threads<sup>2</sup>

### 146055-AA-BB-CC

#### A: Total Length Option

|            |                                     |
|------------|-------------------------------------|
| <b>0 5</b> | 0.5 metre (1.6 feet)                |
| <b>1 0</b> | 1.0 metre (3.3 feet)                |
| <b>2 0</b> | 2.0 metres (6.6 feet)               |
| <b>5 0</b> | 5.0 metres (16.4 feet) <sup>1</sup> |
| <b>9 0</b> | 9.0 metres (29.5 feet)              |

#### B: Connector Option

|            |  |
|------------|--|
| <b>0 2</b> | Miniature ClickLoc coaxial connector, standard cable |
|------------|--|

#### C: Agency Approval Option

|            |                    |
|------------|--------------------|
| <b>0 0</b> | Not required       |
| <b>0 5</b> | Multiple Approvals |

## 3300 Ceramic Capped Proximity Probes, Special Cable Protection:

**146056**, 3300 Ceramic Capped Probe, 3/8-24 thread with Stainless Steel tubing

### 146056-AA-BB-CC-DD-EE

#### A: Overall Case Length Option

|         |  |
|---------|--|
|         | Order in increments of 0.1 in<br>Threaded length configurations:<br>Maximum case length: 4.0 in<br>Minimum case length: 0.8 in |
| Example | <b>2 5</b> = 2.5 in  |

#### B: Total Length Option

|            |                                     |
|------------|-------------------------------------|
| <b>0 5</b> | 0.5 metre (1.6 feet)                |
| <b>1 0</b> | 1.0 metre (3.3 feet)                |
| <b>2 0</b> | 2.0 metres (6.6 feet)               |
| <b>5 0</b> | 5.0 metres (16.4 feet) <sup>1</sup> |
| <b>9 0</b> | 9.0 metres (29.5 feet)              |

#### C: NPT Exit Fitting

|            |          |
|------------|----------|
| <b>0 1</b> | 1/4" NPT |
| <b>0 2</b> | 1/2" NPT |

#### D: Connector Option

|            |  |
|------------|--|
| <b>0 2</b> | Miniature ClickLoc coaxial connector, standard cable     |
| <b>03</b>  | Removable nut ClickLoc coaxial connector, standard cable |

#### E: Agency Approval Option

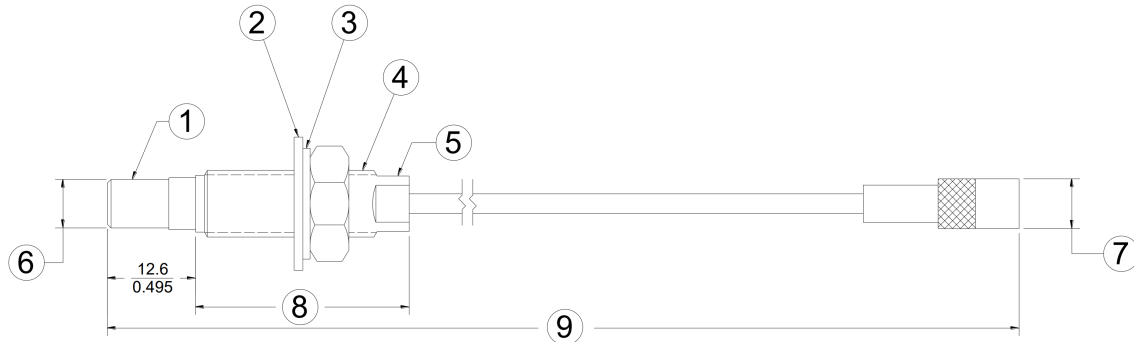
|            |                    |
|------------|--------------------|
| <b>0 0</b> | Not required       |
| <b>0 5</b> | Multiple Approvals |

## Accessories

|                 |  |
|-----------------|--|
| 40113-02        | <p><b>Connector Protector Kit</b><br/>         Connector Protector Kit for probes and extension cables, including installation tools. You must order the 03800001 connector protector separately.</p>  |
| 136536-01       | <p><b>Connector Protector Adapter</b><br/>         Allows you to use connector protector installation tools manufactured prior to 1998 with 75 Ω ClickLoc connectors.</p>  |
| 03839410        | <p><b>75 Ω Triaxial Male Connector Protector</b> Male connector protectors are installed onto the extension cable and attach to the female connector protector on the probe, providing environmental protection of connectors.</p>   |
| 03800001        | <p><b>75 Ω Coaxial Female Connector Protector</b> 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.</p> |
| 04301007        | <p><b>3/8-24 Probe Lock Nut with safety wire holes</b> Single probe lock nut with two holes drilled through the nut in order to secure the lock nut in place with safety wire.</p>   |
| Bently_ Manuals | <p><b>Customer DVD</b> containing all Bently Manuals, FWD, App Notes, and Install Guides in all available languages.</p>   |

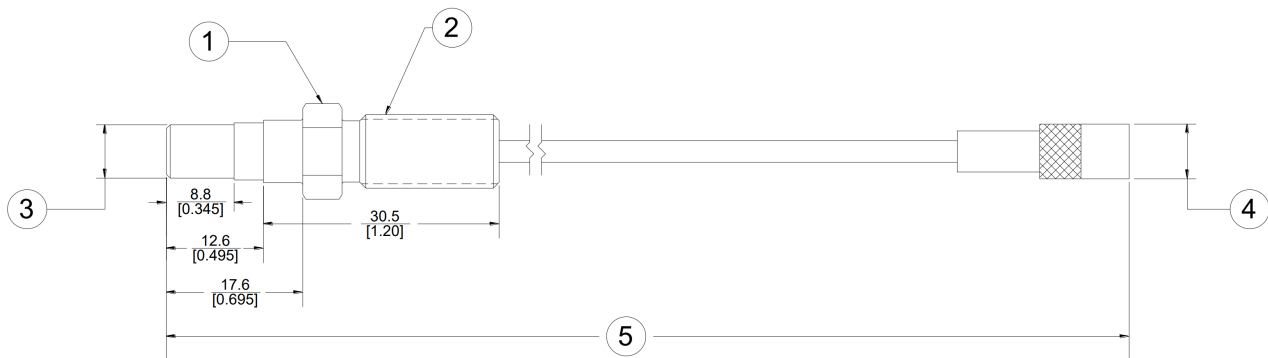
## Graphs and Figures

Note: All dimensions shown in millimetres [inches] except as noted



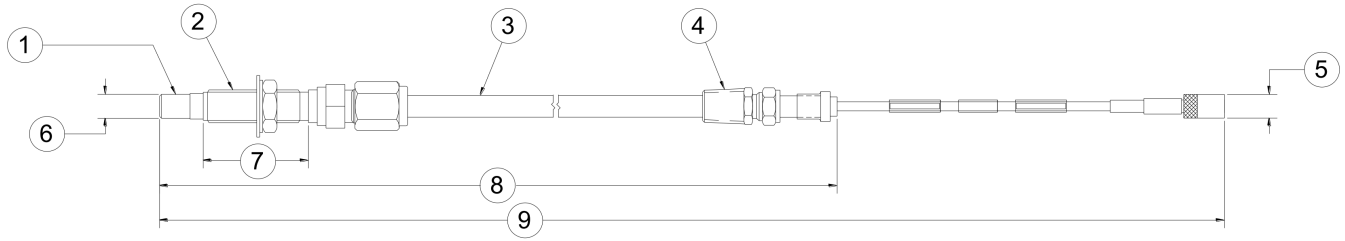
1. Ceramic capped tip
2. Pressure sealing washer
3. Flat washer
4. Probe threads, 3/8-24 UNF 2A
5. 5/16-in wrench flats
6. 7.0 mm [0.273 in] diameter
7. 7.2 mm [0.285 in] diameter
8. Case length, 102 mm [4.0 in] maximum length
9. Total length

**Figure 1: Probe 146054, 3/8-24 Thread Forward Mount (Note 4-inch maximum case length)**



1. 7/16-in Wrench flats
2. 3/8-24 UNF 2A Mounting threads
3. 7.0 mm [0.273 in] diameter
4. 7.2 mm [0.285 in] diameter
5. Total length

**Figure 2: Probe 146055, 3/8-24 Thread Reverse Mount, Suitable For Use In 31000 or 21000 Housings.**



1. Ceramic capped tip
2. 3/8-24 UNF 2A mounting threads
3. Stainless steel tubing, 6.3 mm (0.25 in) outside diameter
4. 1/4-in or 1/2-in NPT exit fitting
5. 7.2 mm (0.285 in) diameter
6. 6.9 mm (0.273 in) diameter
7. Case length
8. 9.50 ± 0.25 in for 0.5 m length probes, 20 ± 1 in for 1.0 m length probes, 60 ± 1.0 in for 2.0 m and longer length probes
9. Total length

**Figure 3: Probe 146056, 3/8-24 Thread, Forward Mount With Stainless Steel Tubing Protecting Probe Cable.**



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



Reverse mount probes are not available with armor or connector protector options.



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



Proximitor Sensors are supplied (by default) from the factory calibrated to AISI 4140 steel. Calibration to other target materials is available upon request

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