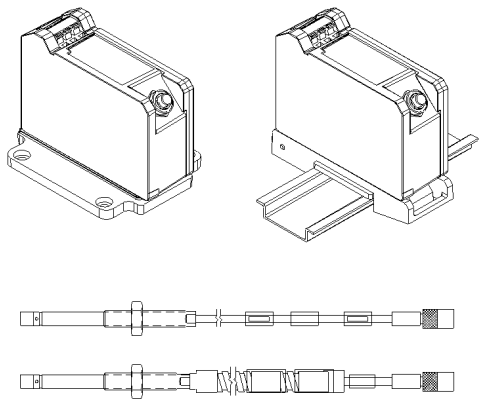
3300 5 mm Transducer System

Datasheet

Cordant™

172036 Rev. T



Description

Transducer System

The 3300 5 mm Proximity Transducer System consists of:

- a 3300 5 mm probe [1, 2]
- a 3300 XL extension cable (ref 141194-01)
- a 3300 XL Proximitor Sensor [3, 4, 5] (ref 141194-01)

When combined with a 3300 XL Proximitor Sensor and XL extension cable, the system provides an output voltage that is directly proportional to the distance between the probe tip and the observed conductive surface. The system can measure both static (position) and dynamic (vibration) data. Its primary use is in vibration and position measurement applications on fluid-film bearing machines, as well as Keyphasor measurement and speed measurement applications[6].

The system provides an accurate, stable signal output over a wide temperature range. All 3300 XL Proximity Transducer Systems achieve this level of performance with complete interchangeability of probe, extension cable, and Proximitor sensor, eliminating the need for individual component matching or bench calibration.

Proximity Probe

The 3300 5 mm probe improves upon previous designs. A patented TipLoc molding method provides a more robust bond between the probe tip and the probe body. The 3300 5 mm system is orderable with Fluidloc cable options for preventing oil and other liquids from leaking out of the machine through the cable's interior.

Baker Hughes

Connectors

The 3300 5 mm probe and 3300 XL extension cable have corrosion-resistant, gold-plated brass 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.

3300 5 mm Probes and XL Extension Cables can be ordered with connector protectors already installed, or we can supply the connector protectors separately for installation in the field (such as when the cable must be run through restrictive conduit). We recommend connector protectors for all installations to provide increased environmental protection[7].

Notes:

1. A 5 mm probe uses smaller physical packaging and provides the same linear range as a 3300 XL 8 mm probe (ref 141194-01). The 5 mm probe does not, however, reduce the sideview clearances or tip-to-tip spacing requirements as compared to an XL 8 mm probe. Use the 5 mm probe when physical (not electrical) constraints preclude the use of an 8 mm probe, such as mounting between thrust bearing pads or other constrained spaces. When your application requires narrow sideview probes, use the 3300 XL NSv probe and extension cable with the 3300 XL NSv Proximitor Sensor (refer to Specifications and Ordering Information p/n 147385-01).
2. XL 8 mm probes provide a thicker encapsulation of the probe coil in the molded PPS plastic probe tip to produce a more rugged probe. The larger diameter of the probe body also provides a stronger, more robust case. We recommend the use of XL 8 mm probes when possible to provide optimal robustness against physical abuse.
3. A 3300 XL Proximitor Sensor is available and provides many improvements over the non-XL version. The XL sensor is electrically and mechanically interchangeable with the non-XL version. Although the packaging of the 3300 XL Proximitor Sensor differs from its predecessor, its design allows for the use of a 4-hole mounting base to fit it in the same 4-hole mounting pattern and to fit within the same mounting space specifications (when the application observes the minimum permissible cable bend radius). Consult Specifications and Ordering Information (p/n 141194-01) or our sales and service professional for more information.
4. Use of XL components with 3300 5 mm Probes will limit system performance to the specifications for the non-XL 3300 system.
5. The factory supplies Proximitor Sensors that are calibrated by default to AISI 4140 steel. Calibration to other target materials is available upon request.
6. When using this transducer system for tachometer or over-speed measurements, consult **Bently.com** for the application note regarding the use of eddy current proximity probes for over-speed protection.
7. We provide silicone tape with each 3300 XL extension cable. Use this tape instead of connector protectors. We do not recommend silicone tape in applications which will expose the probe-to-extension cable connection to turbine oil.

Specifications

Unless otherwise noted, the following specifications are for a proximity transducer system between +18°C and +27°C (+64°F to +80°F) with a -24 Vdc power supply, a 10 kW load, an AISI 4140 steel target, and a probe gapped at 1.27 mm (50 mils).

Electrical

XL Proximitor Sensor Input	Accepts one noncontacting 33005 mm Proximity Probe and XL Extension Cable.
Power	Requires -17.5 Vdc to -26 Vdc at 12 mA maximum consumption. 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 W

Probe DC Resistance	
Probe Length (m)	**Resistance from the Center Conductor to the Outer Conductor (Ω)**
0.5	7.45 ± 0.50
1.0	7.59 ± 0.50
1.5	7.73 ± 0.50
2.0	7.88 ± 0.50
5.0	8.73 ± 0.70
9.0	9.87 ± 0.90

Extension Cable DC Resistance		
Length of Extension Cable (m)	**Resistance from Center Conductor to Center Conductor (R_{CORE}) (Ω)**	**Resistance from Outer Conductor to Outer Conductor (R_{JACKET}) (Ω)**
3.0	0.66 ± 0.10	0.20 ± 0.04
3.5	0.77 ± 0.12	0.23 ± 0.05
4.0	0.88 ± 0.13	0.26 ± 0.05
4.5	0.99 ± 0.15	0.30 ± 0.06
7.0	1.54 ± 0.23	0.46 ± 0.09
7.5	1.65 ± 0.25	0.49 ± 0.10
8.0	1.76 ± 0.26	0.53 ± 0.11
8.5	1.87 ± 0.28	0.56 ± 0.11

Outer conductor refers to the shielded conductor that is attached to the connector, not the armor braid.

Extension Cable Capacitance	69.9 pF/m (21.3 pF/ft) typical.
Field Wiring	Recommend using 3-conductor shielded triad cable 0.2 mm to 1.5 mm (16 AWG to 24 AWG). 305 meters(1,000 feet) maximum length between 3300 XL Proximity Transducer and monitor. Consult Performance Specification, document 155687, for signal rolloff at high frequencies when using longer field wiring lengths or external safety barriers located some distance from the monitoring system.

Linear Range	2 mm (80 mils). Linear range begins at approximately 0.25 mm (10 mils) from target and is from 0.25 to 2.3 mm (10 to 90 mils).
Recommended Gap Setting	1.27 mm (50 mils).
Incremental Scale Factor	7.87 V/mm (200 mV/mil) ±6.5% typical, including interchangeability error when measured in increments of 0.25mm (10 mils) over the linear range.
Deviation from Best Fit Straight Line (DSL)	Less than ±0.038 mm (±1.5 mil) typical deviation from best fit straight line.
Probe Temperature Stability (typical)	Over probe temperature range of -35°C to +177°C (-31°F to +350°F), the incremental scale factor remains within ±10% of 7.87 V/mm (200 mV/mil) and the deviation from the best fit straight line remains within ±0.076 mm (±3 mils).
Frequency Response	0 to 10 kHz: +0, -3 dB, with up to 305 meters (1000 feet) of field wiring.
Minimum Target Size	15.2 mm (0.6 in) diameter (flat target)
Shaft Diameter	
Minimum	50.8 mm (2 in)
Recommended minimum	76.2 mm (3 in)

When gapped at the center of the linear range, the interaction between 2 separate transducer systems (cross-talk) will be less than 50 mV on shaft diameters of at least 50 mm (2 in) or greater. Care should be taken to maintain minimum separation of transducer tips, generally at least 40 mm (1.6 in) for axial position measurements or 38 mm (1.5 in) for radial vibration measurements to limit cross-talk to 50 mV or less. Radial vibration or position measurements on shaft diameters smaller than 76.2 mm (3 in) will generally result in a change in scale factor. Consult Performance Specification 155687 for additional information.

Effects of 60 Hz Magnetic Fields Up to 300 Gauss

Output Voltage in Mil (pk-pk)/Gauss (5-Meter System)			
Gap	**XL Proximitor Sensor**	**Probe**	**XL Ext. Cable**
10 mil	0.0119	0.0004	0.0004
50 mil	0.0131	0.0014	0.0014
90 mil	0.0133	0.0045	0.0045

Electrical Certification

Complies with the European CE mark.

Mechanical

Probe Tip Material	Polyphenylene sulfide (PPS)
Probe Case Material	AISI 303 or 304 stainless steel (SST)
Probe Cable	75 Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following lengths: 0.5, 1, 2, 5, or 9 meters (1.6, 3.3, 16.4, or 29.5 feet)
System Length	5 or 9 meters (16.4 or 29.5 feet) including extension cable
Extension Cable Material	75 W triaxial, fluoroethylene propylene (FEP) insulated
Probe and Extension Cable Armor	Flexible AISI 302 or 304 SST with FEP outer jacket

5mm Probe Tensile Strength	222 N (50 lbf) probe case to probe lead. 222 N (50 lbf) probe lead to extension cable connectors
Connector material	Gold-plated brass or gold-plated beryllium copper
Probe case torque	5.1 N·m (45in·lb) recommended 7.3 N·m (65 in·lb) maximum
Connector-to-connector torque	Refer to the table below: Recommended Torque
Maximum torque	0.565 N·m (0.42 ft•lbf)
Minimum Cable Bend Radius	25.4 mm (1.0in)
Weight	
Total System	0.71 kg (1.6 lb), typical
3300 5mm Probe	323 g (11.39 oz).
XL Extension Cable	34 g/m (0.4 oz/ft) 103 g/m (1.5 oz/ft) (armored)
XL Proximitor Sensor	246 g (8.7 oz)

Recommended Torque	
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

Thread Engagement Limits

Probe Case Thread	Maximum Length of Thread Engagement
1/4-28	0.375 in
M8x1	12 mm

Maximum thread engagement lengths are per the industry standard of 1.5 times the nominal thread diameter. A fit class matching that of the external probe thread is assumed for all internal threads. Applications with thread engagement lengths exceeding the values in the table above may exhibit binding during installation. Contact your Bently Nevada representative if you require probe thread engagement lengths exceeding the values above. Bently Nevada does not replace proximity probes under warranty due to excessive thread engagement lengths.

When drilling and tapping a mounting hole **for a 1/4-28 probe**, a **#3 or larger tap drill** is recommended.

Environmental Limits

Probe Temperature Range	-35°C to +177°C (-31°F to +351°F)

Exposing the probe to temperatures below –34°C (-30°F) may cause premature failure of the pressure seal.

Extension Cable Temperature Range	-51°C to +177°C (-60°F to +351°F) for standard extension cable. ref 141194-01

Ordering Information

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

3300 5mm Proximity Probes

330171 3300 5mm Probe, 1/4-28 UNF thread, without armor

330172 3300 5mm Probe, 1/4-28 UNF thread, with armor

Part Number-AA-BB-CC-DD-EE	
A: Unthreaded Length Option	

Unthreaded length must be at least 0.8 in. less than the case length. Order in increments of 0.1 in.

Length configurations: Maximum unthreaded length:
8 8 = 8.8 in. Minimum unthreaded length:
0 0 = 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 unthreaded length: **9 6** = 9.6 in. Minimum unthreaded length: **0 8** = 0.8 in. **Example:2 4** = 2.4 in.	
C: Total Length Option	
0 5	0.5 meter (1.6 feet)
1 0	1.0 metre (3.3 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet)[1]
9 0	9.0 metres (29.5 feet)
D: Connector Option	
0 1	Miniature coaxial ClickLoc connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc connector, standard cable
1 1	Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable
1 2	Miniature coaxial ClickLoc connector, FluidLoc cable
E: Agency Approval Option	
0 0	Agency Approval Option
0 5	Multiple Approvals

3300 5mm Proximity Probes, Metric

330173 3300 5mm Probe, M8 x 1 thread, without armor

330174 3300 5mm Probe, M8 x 1 thread, with armor

Part Number-AA-BB-CC-DD-EE
A: Unthreaded Length Option

Unthreaded length must be at least 20mm less than the case length. Order in increments of 10mm.

Length configurations: |
Maximum unthreaded length: **2 3** = 230mm
Minimum unthreaded length: **0 0** = 0.0mm
Example: 0 6 = 60mm

B: Overall Case Length Option	
Order in increments of 10mm **Metric thread configurations:** Maximum unthreaded length: **2 5** = 250mm Minimum unthreaded length: **0 2** = 20mm **Example:0 6** = 60mm	
C: Total Length Option	
0 5	0.5 meter (1.6 feet)
1 0	1.0 metre (3.3 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet)[1]
9 0	9.0 metres (29.5 feet)
D: Connector Option	
0 1	Miniature coaxial ClickLoc connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc connector, standard cable
1 1	Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable
1 2	Miniature coaxial ClickLoc connector, FluidLoc cable
E: Agency Approval Option	
0 0	Agency Approval Option
0 5	Multiple Approvals

Ordering Information for Proximitor Sensor

3300 XL Proximitor Sensor

330180-AA-BB

A: Total Length and Mounting Option	
10	1.0 meter (3.3 feet) system length, panel mount
11	1.0 meter (3.3 feet) system length, DIN mount
12	1.0 meter (3.3 feet) system length,no mounting hardware
50	5.0 meters (16.4 feet) system length, panel mount
51	5.0 meters (16.4 feet) system length, DIN mount
52	5.0 meters (16.4 feet) system length, no mounting hardware
90	9.0 meters (29.5 feet) system length, panel mount
91	9.0 meters (29.5 feet) system length, DIN mount
92	9.0 meters (29.5 feet) system length, no mounting hardware
B: Agency Approval Option	
00	Not required
05	CSA, ATEX, IECEx Approvals

Ordering Information for Extension Cables

3300 XL Standard Extension Cable

330130-AAA-BB-CC

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

A: Cable Length Option	
030	3.0 meters (9.8 feet)
035	3.5 meters (13.1 feet)
040	4.0 meters (11.5 feet)
045	4.5 meters (14.8 feet)

060	6.0 meters (19.7 feet)
070	7.0 meters (22.9 feet)
075	7.5 meters (24.6 feet)
080	8.0 meters (26.2 feet)
085	8.5 meters (27.9 feet)
B: Connector Protector and Cable Option	
00	Standard cable
01	Armored cable
02	Standard cable with connector protector
03	Armored cable with connector protector
10	FluidLoc cable
11	Armored FluidLoc cable
12	FluidLoc cable with connector protector
13	Armored FluidLoc cable with connector protector
C: Agency Approval Option	
00	Not required
05	CSA, ATEX, IECEx Approvals

Probe Accessories

Aluminum probe mounting bracket

The aluminum probe threaded mounting bracket is the standard mounting bracket for most 3300 5 mm probe installations. The -02 option is supplied with 2 10-24 UNC-2A mounting screws. The -03 option is supplied with 2 M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

137492 -AA

A: Thread Size	
0 2	1/4-28
0 3	M8 x 1

Phenolic Probe Mounting Bracket

The phenolic mounting bracket is recommended if additional electric isolation from the mounting location is required (as in some generator and electrical motor bearing locations). The -02 option is supplied with 2 10-24 UNC-2A mounting screws. The -03 option is supplied with 2 M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

27474 -AA

A: Thread Size	
0 2	1/4-28
0 3	M8 x 1

75Ω ClickLoc Connector Kit

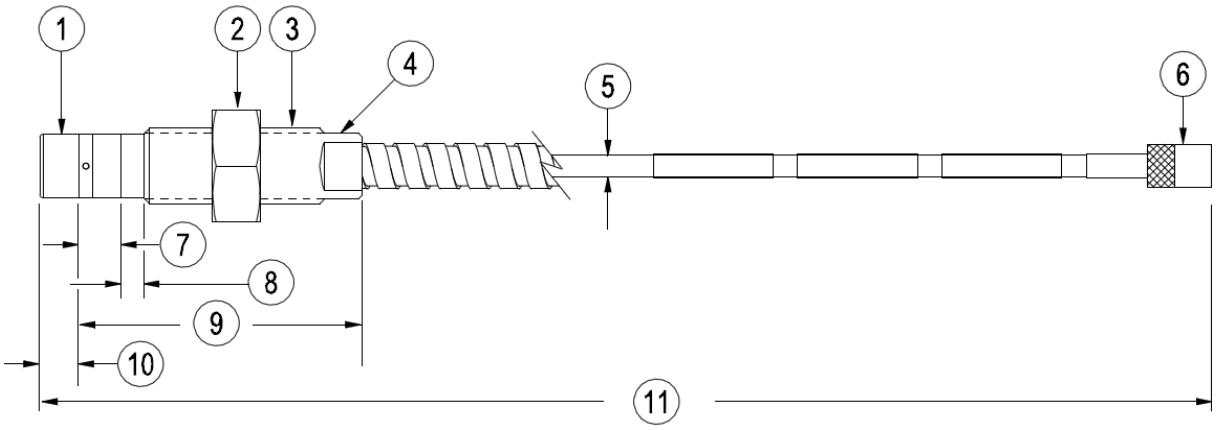
330153-AA

75Ω ClickLoc Connector Kit for 3300 series probes and extension cables. Each kit contains 1 color-coded sleeve per connector.

A: Kit Type	
0 2	1 ClickLoc male connector for 3300 XL 5mm and 8mm extension cable.
0 3	1 ClickLoc female connector for 3300 XL 5mm and 8mm extension cable.
0 4	1 ClickLoc male connector for 3300 5mm probe.

Accessories

02120015	**Bulk field wire** 1.0mm2 (18 AWG), 3-conductor, twisted, shielded cable for connections between Proximitor Sensor and monitor.
03200006	**Silicone self-fusing tape** 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 5mm probes, including connector protectors and installation tools.
136536-01	**Connector Protector Adapter** Makes connector protector kits purchased prior to 1998 compatible with ClickLoc extension cable connectors.
40180-03	**Connector Protectors** Package containing 10 pairs of 75Ω Coaxial Connector Protectors.
03839410	**75Ω Triaxial/95 ohm Coaxial Male Connector Protector** Placed onto the extension cable; attaches to the female connector protector on the 5 mm probe to provide environmental protection of connectors.
03800001	**75Ω Coaxial Female Connector Protector** Placed onto 3300 5mm probe leads; attaches to the male connector protector on the extension cable to provide environmental protection of connectors.
163356	**Connector Crimp Tool Kit** Includes 1 set of multi-connector inserts and connector installation instructions. Compatible only with 330153 connector kits or with probes shipped in 2003 or later with ClickLoc connectors uninstalled. Supplied with carrying case.



1. Probe tip, 5.2mm [0,21 in] diameter
2. 11.1 mm [7/16in] for 1/4-28 threads, 13.0mm [0.51in] for M8 thread. See Note 3.
3. Case thread
4. 5.6 [7/32] wrench flats for 1/4-28 threads, 7.0 [0.28] for M8 threads
5. 75Ω cable, 2.8mm [0.11 in] maximum outside diameter, 7.6mm [0.3 in] outside diameter of armor, 9.0mm [0.35in] maximum diameter of armor ferrule.
6. Miniature male coaxial connector, 7.23mm [0.285 in] maximum outside diameter “D”
7. 3.2 [0.13in]
8. Unthreaded length “A”
9. Case length “B”
10. 6.0mm [0.235in] maximum
11. Total length “C”, =30%, -0%. See Note.

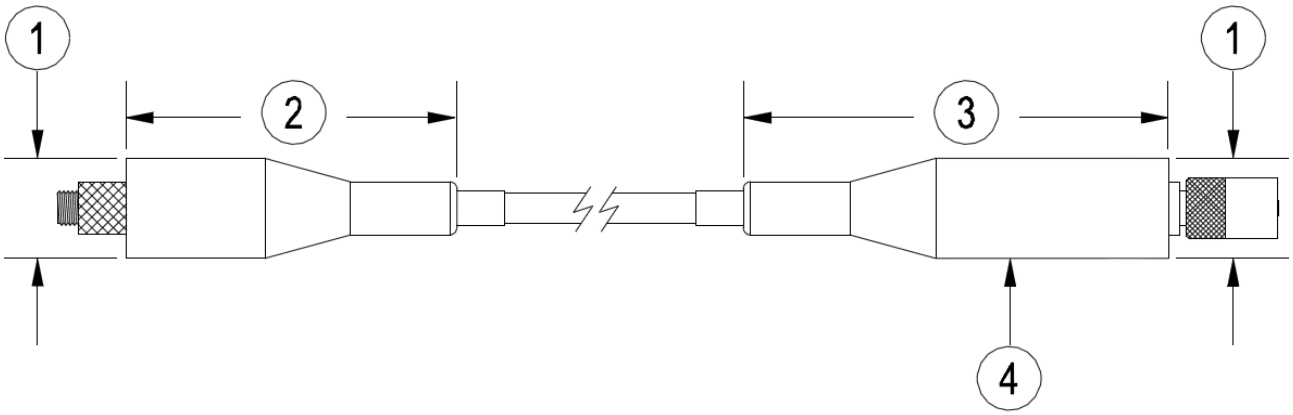
Figure 3: 3300 5mm Proximity Probes, Standard Mount3

330171, 1/4-28 UNF-2A, without armor[7]

330172, 1/4-28 UNF-2A, with armor[6]

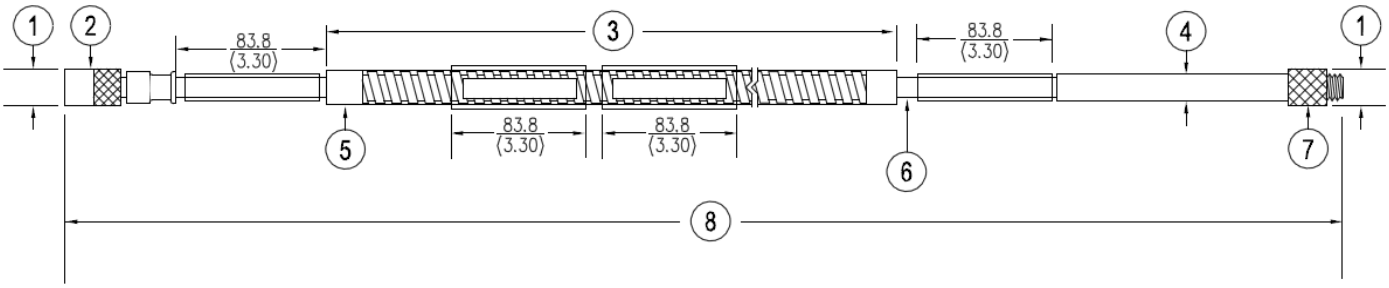
330173, M8X1 thread, without armor[7]

330174, M8X1 thread, with armor[6]



1. 12mm [0.40in] maximumd diameter
2. 36.3mm [1.43in] maximum
3. 51.1mm [2.01in] maximum
4. Connector protector (fluorosilicone material)

Figure 4: Installed Connector Protectors



1. 7.2mm [0.25 in] maximum diameter
2. Miniature male coaxial connector
3. FEP or PFA coated armor. Armor length is 300mm [11.8in] less than cable length. See Note 5.
4. 75Ω cable, 3.7mm [0.15 in] maximum outside diameter, 3.9mm [0.16in] maximum diameter for FluidLoc cable, 7.6mm [0.30in] maximum outside diameter or armor, 9.0mm [0.35in] maximum diameter of armor ferrule.
5. Stainless steel ferrules, 8.4mm [0.33in] diameter
6. Miniature female coaxial connector
7. Cable length, +20%, -0%

Figure 5: 3300 XL Extension Cable