

# 330450 High Temperature Acceleration System

## Datasheet

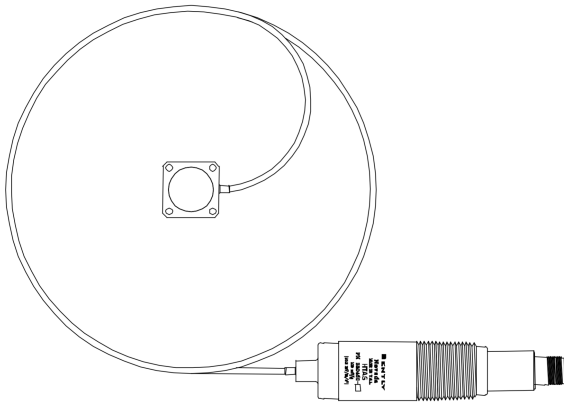
Bently Nevada Machinery Condition Monitoring

169885 Rev. F

### Description

The standard 330400 Accelerometer has a limited temperature range it can be exposed to, due to its signal conditioning electronics being located in the same case as the sensing element. Temperature limitations of the electronics limit its maximum operating temperature to +100°C (+212°F).

The 330450 High Temperature Acceleration System (HTAS) has a fundamentally different construction to solve this problem. Its design segregates the sensing element from the signal conditioning electronics, with the two permanently connected via a hardline cable. Current versions (see note below) of these sensors allow the sensing head to be mounted on surfaces with temperatures as high as +400°C (+752°F). Due to the segregated design, the signal conditioning electronics can be installed in a cooler location. This achieves overall transducer system performance comparable to other acceleration transducers, but permits use at significantly higher temperatures. By eliminating connections between the sensing head and its associated signal conditioning electronics, a significant source of potential transducer failures (connector problems) is eliminated.



If housing measurements are being made for overall protection of the machine, thought should be given to the usefulness of the measurement for each application. Most common machine malfunctions (imbalance, misalignment, etc.) originate at the rotor and cause an increase (or at least a change) in rotor vibration. In order for any housing measurement alone to be effective for overall machine protection, a significant amount of rotor vibration must be faithfully transmitted to the bearing housing or machine



casing, or more specifically, to the mounting location of the transducer.

In addition, care should be exercised in the physical installation of the transducer. Improper installation can result in a degradation of the transducer's performance, and/or the generation of signals which do not represent actual machine vibration.

Upon request, Bently Nevada can provide engineering services to determine the appropriateness of housing measurements for the machine in question and/or to provide installation assistance.



The previous version limited the sensor head to +300°C (+572°F). The current versions will have the letter "G" preceding the serial number.

## Specifications

Parameters are specified from +20 to +30°C (+68 to +86°F) and 100Hz unless otherwise indicated.



Operation outside the specified limits may result in false readings or loss of machine monitoring.

## Electrical

Sensitivity	10.2 mV/m/s <sup>2</sup> (100 mV/g) ±5%.
Acceleration Range	785 m/s <sup>2</sup> (80 g) peak overall acceleration within the 15 to 10000 Hz frequency span.
Amplitude Linearity	±2% to 785 m/s <sup>2</sup> (80 g) peak.
Broadband Noise Floor (10 Hz to 15 kHz)	0.059 m/s <sup>2</sup> (0.006 g) rms.
Frequency Response	15 to 10000 Hz (900 to 600,000 cpm) ±3dB; 40 to 4000 Hz (2400 to 240,000 cpm) ±5%
Transverse Sensitivity	Less than 5% of axial.
Mounted Resonant Frequency	Greater than 15 kHz.
Maximum Cable Length	305 metres (1000 ft) with no degradation of signal.
<b>Power requirements</b>	
Input Voltage	-24 ± 0.5 Vdc.
Bias Current	2 mA nominal.
Output Bias Voltage	-12 ± 0.5 Vdc.
Grounding	Case isolated.

## Environmental Limits

<b>Operating and storage temperature range</b>	
Sensing Head	Maximum mounted surface temperature -55°C to +400°C (-67°F to +752°F)
Integral Hardline Cable	-55°C to +400°C (-67°F to +752°F)
Electronics	-55°C to +100°C (-67°F to +212°F)
Shock Survivability	24,535 m/s <sup>2</sup> (2500 g) peak
Relative humidity:	To 100% non-submerged; case is hermetically sealed.

## Physical

<b>Weight (typical)</b>	
2 metres	635 grams (1.40 lb)
4 metres	794 grams (1.75 lb)
6 metres	953 grams (2.10 lb)
8 metres	1111 grams (2.45 lb)
Mounting	<a href="#">See Graphs and Figures on page 8.</a>
Case material	300 series stainless steel.
Connector	3-pin Mil-C-5015 receptacle, hermetically-sealed, 304 stainless steel shell.
Polarity	Pin A goes positive with respect to Pin C when the applied force is from the base to the top of the sensing head.
Bend Radius	Minimum bend radius of 51mm (2.0in) Please read and understand the 330450 User Guide (document 139976) before attempting to install and use this product.

## 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.

### EMC

EMC Directive 2014/30/EU

### RoHS

RoHS Directive 2011/65/EU

### Maritime

#### 330400 and 330425 only

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**, Document 108M1756, at [Bently.com](http://Bently.com).

### CSA/NRTL/C

<b>330450</b>	<p>Ex ia IIC T4:                  AEx ia IIC T4:                  Class I, Div 1, Groups A, B, C, D.                  Class II, Div 1, Groups E, F, G;                  Class III, Div 1</p> <p>Install per drawing 168078                  T4 @ Ta (-40°C to 100°C)                  Enclosure Type 4X</p> <p>Ex nL IIC T4:                  Ex ec IIC T4:                  Class I, Zone 2                  Class II, Div 2, Groups A, B, C and D</p> <p>Install per drawing 168078                  T4 @ Ta (-40°C to 100°C)                  Enclosure Type 4X</p>
<b>350900</b>	<p>Ex ia IIC T4                  AEx ia IIC T4                  Class I, Zone 0                  Class I, Division 1, Groups A, B, C and D;                  Class II, Division 1, Groups E, F, and G; Class III,                  Division 1</p> <p>When installed with an approved zener barrier per                  BN drawing 167923.                  T4 @ T4 = 100°C</p> <p>Ex nL IIC Class 1, Zone 2                  Ex ec IIC Class 1, Zone 2                  Class I, Division 2 (non-incendive),                  Groups A, B, C, and D</p> <p>when installed per BN drawing 168077.</p>
<b>330750, 330752</b>	<p>Ex ia IIC                  Class I, Zone 0, AEx ia IIC</p> <p>Class I, Division 1, Groups A, B, C and D                  Class II, Division 1, Groups E, F and G                  Class III, Division 1</p> <p>Ex nL IIC                  Ex ec IIC                  Class I, Division 2, Groups A, B, C and D</p>

## ATEX/IECEx

### 330450, 350900, 330750, 330752

<b>330450, 350900, 330750, 330752</b>	<p>Ex ia IIC or IIB Ta, T4 492°C</p>
	<p>Ex na IIC or IIB Ta, T4, T1                  492°C Gc                  Ex ec IIC or IIB Ta T4, T1                  492°C Gc</p> <p>Ta, T1, T4 492°C                  Ta, T4, T1 492°C</p>

Temperature Class	Temperature Range	Equipment
T4	-40°C to +100°C	Electrical Housing
T1	-40°C to +400°C	Sensor and Cable
T1	-40°C to +482°C	Sensor and Cable (3509000)

### Entity Parameters for Zone 0/1 and Zone 2

Group	IIC			IIB	
	330450 Type S	330750 Type S	330752 Type S	350900	350900
Ui	30V	28V	28V	28V	29.2V
Ii	200mA	120mA	120mA	153mA	279mA
Pi	1.5W	1.0W	1.0W	.84W	1.95W
Ci	7 ηF	1 ηF	1 ηF	37 ηF	37 ηF
Li	30 μH	30 μH	30 μH	30 μH	30 μH

## Hazardous Area Conditions of Safe Use

### ATEX/IECEX

#### Zone 0/1:

Equipment must be connected to equipment, which meets the above listed entity parameters.

The cables type A or B (in compliance with EN 60079-25) must respect the cable parameters listed with the entity parameters.

#### Special Notes for 330450, 330750, 330752 and 350900

- This equipment is intrinsically safe and can be used in potentially explosive atmospheres.
- This system is intrinsically safe when connected to an associated intrinsically safe power supply meeting the entity parameters.
- Operating ambient temperature -40°C to +100°C (Electronic Housing)
- Operating ambient temperature -40°C to +400°C (Sensor and Cable)
- Operating ambient temperature -40°C to +482°C (Sensor and Cable for 350900).

#### Zone 2 :

The supply electrical parameters shall not exceed the values mentioned in the tables above.

#### Special Notes for 330450, 330750, 330752 and 350900

- The equipment is safe when connected to an associated source, containing a reliable material limiting current and voltage meeting the entity parameters.
- Operating ambient temperature -40°C to +100°C (Electronic Housing)
- Operating ambient temperature -40°C to +400°C (Sensor and Cable)

- Operating ambient temperature -40°C to +482°C (Sensor and Cable for 350900).
- The mating part of the connector shall provide IP54 ingress protection or better according to requirements of IEC 60079-0 and IEC 60079-7 or IEC 60079-15.
- Provisions shall be made for ensuring that the rated voltage and current are not exceeded while in service.
- Shall be supplied from Class II limited energy source according to requirements of C22.2 No 61010-1-12 and UL 61010-1 3rd Edition.
- Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment.

## Ordering Information

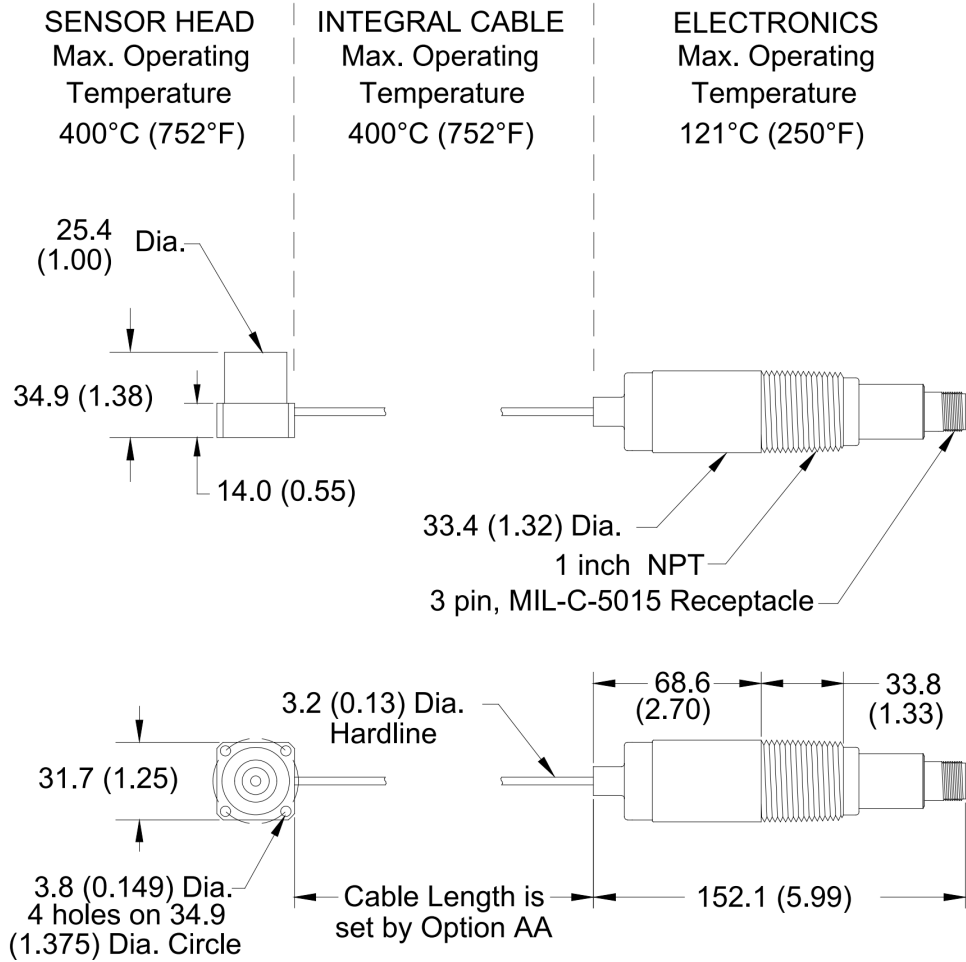


For the detailed listing of country and product specific approvals, refer to the **Approvals Quick Reference Guide**, Document 108M1756, at [Bently.com](http://Bently.com).

### 330450-AA

A: Length	
2 0	2 metres
4 0	4 metres
6 0	6 metres
8 0	8 metres

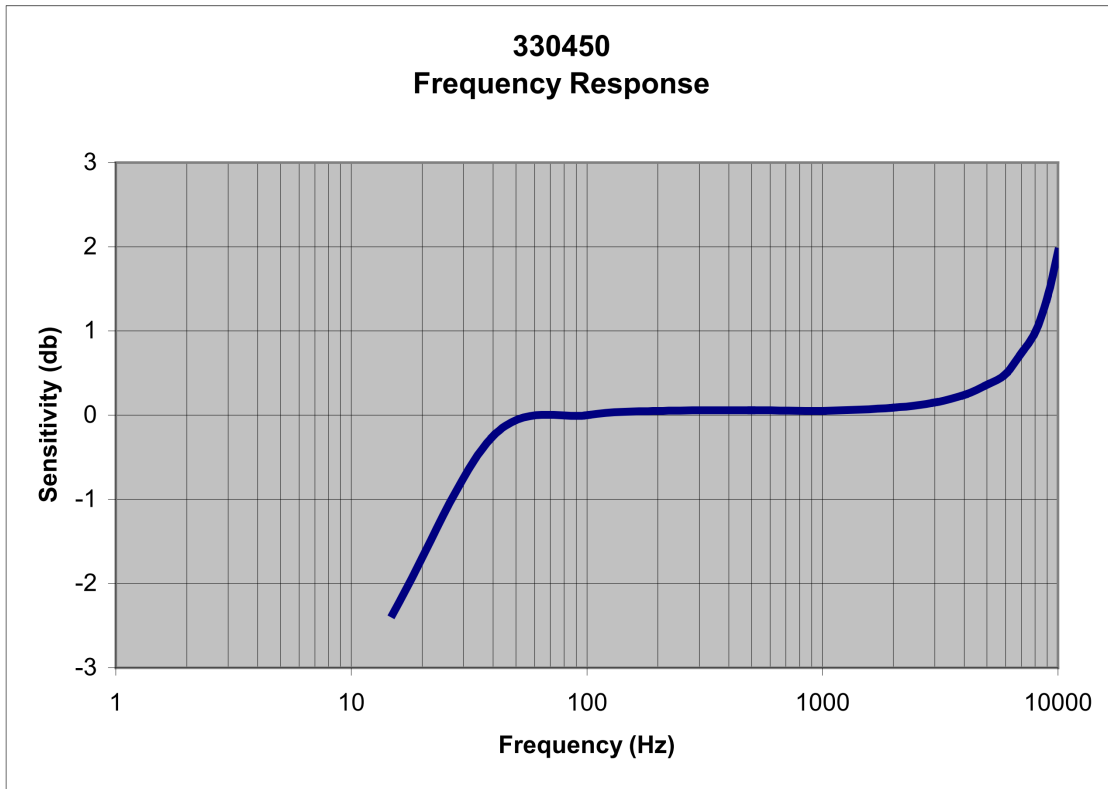
## Graphs and Figures



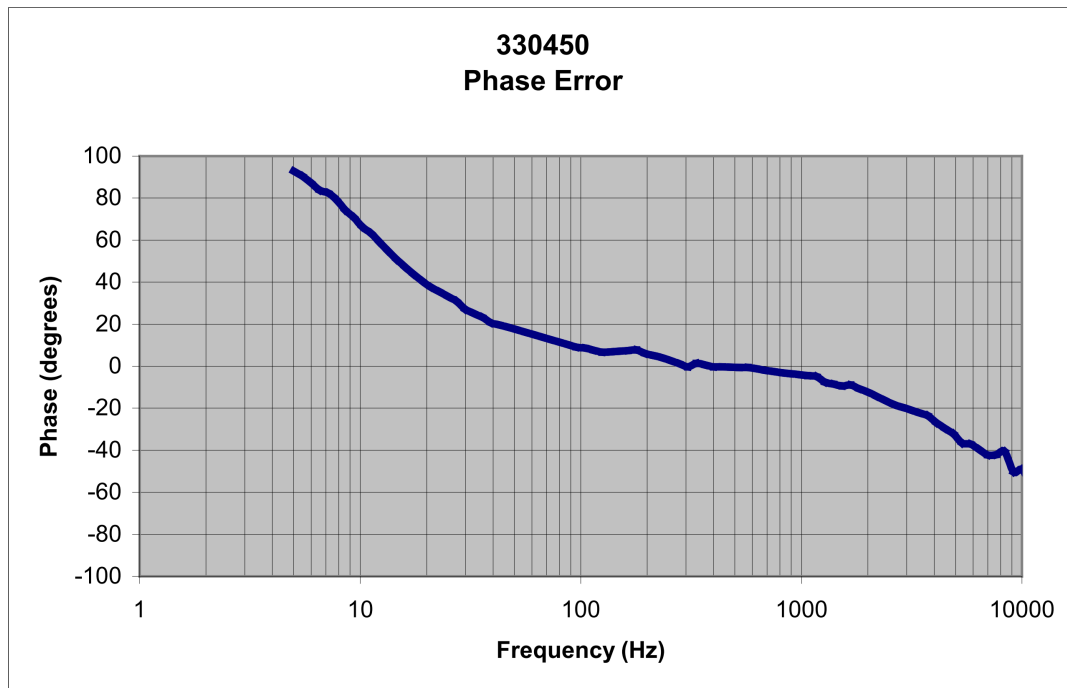
**Figure 1: 330450 System Dimensional Drawing**

Dimensions are in millimeters (inches)




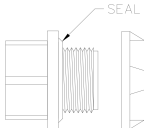
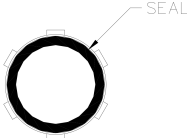
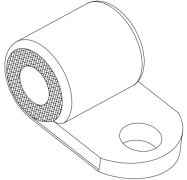


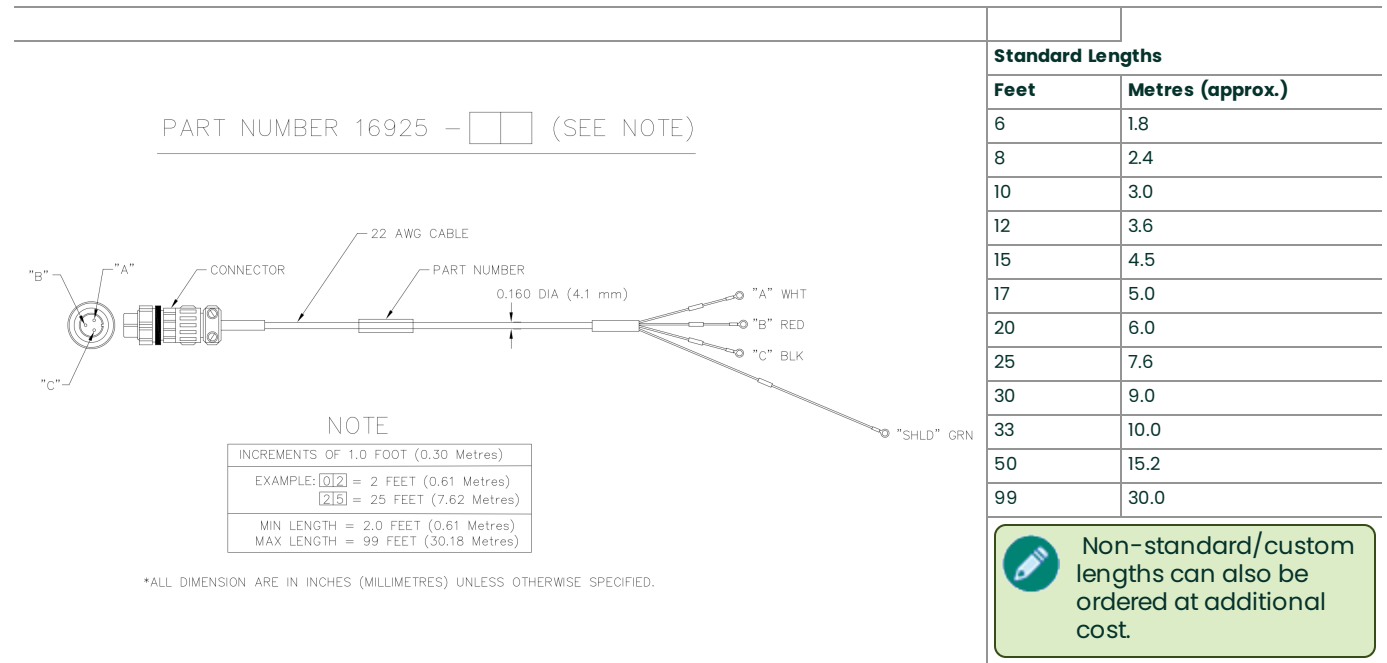
**Figure 2: Acceleration Amplitude**



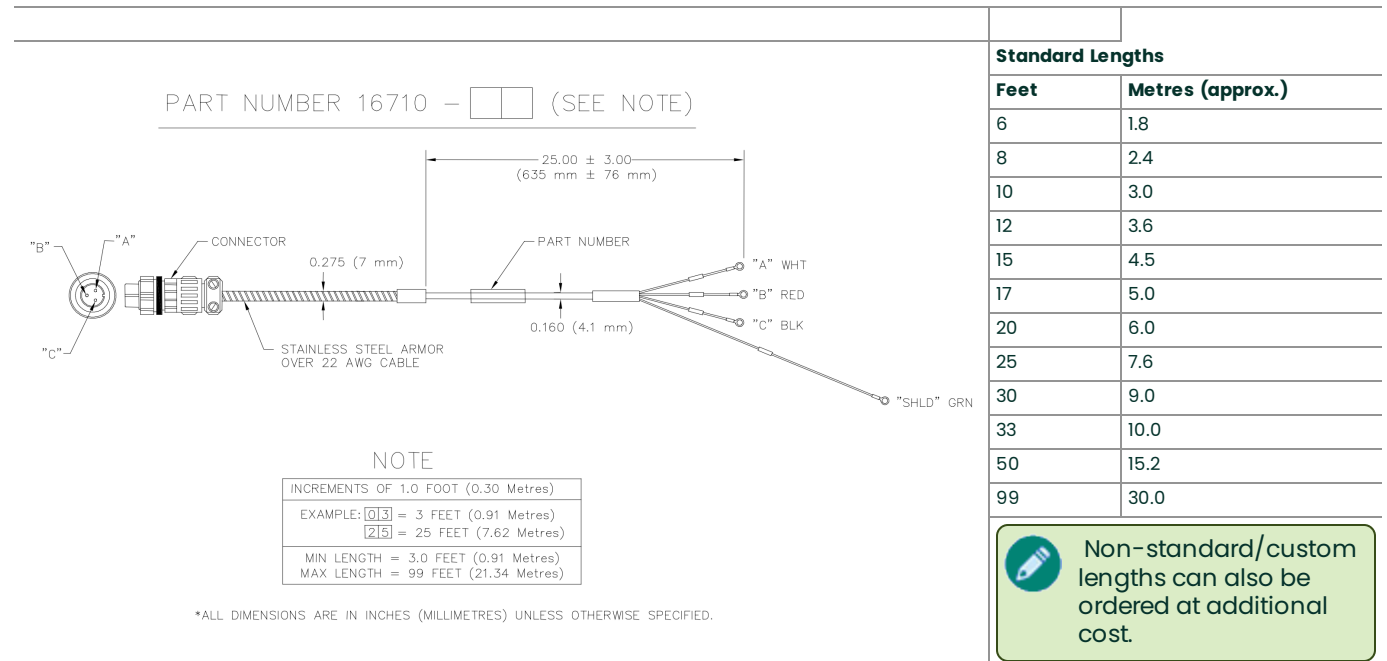
**Figure 3: Acceleration Phase Error**

**Table 1: Interconnection Cables and Accessories**

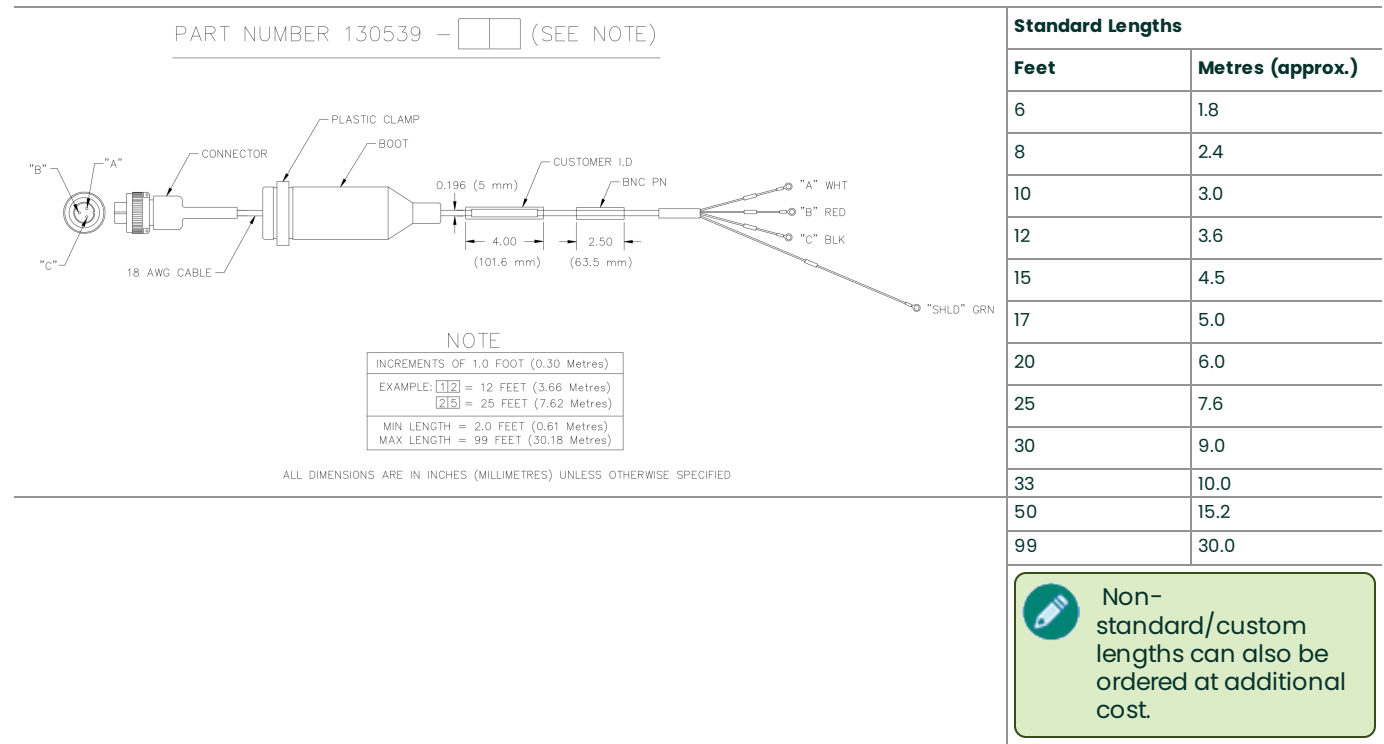
APPLICATION	PART NUMBER	DESCRIPTION
†Note: AA - Specifies the length (in feet) of cable required		
Standard Interconnect Cable	16925-AA†	3-conductor shielded 22 AWG (0.5 mm <sup>2</sup> ) cable with 3-socket plug at one end, terminal lugs at the other end. Minimum length of 2.0 ft (0.6 m), maximum length of 99 ft (30 m). See Figure 4
Standard Armored Interconnect Cable	16710-AA†	3-conductor shielded 22 AWG (0.5 mm <sup>2</sup> ) armored cable with 3-socket plug at one end, terminal lugs at the other end. Minimum length of 3.0 ft (0.9 m), maximum length of 99 ft (30 m). See Figure 5
Interconnect Cable with Boot	130539-AA†	3-conductor shielded 18 AWG (1.0 mm <sup>2</sup> ) cable with 3-socket plug and fluorosilicone elastomer boot at one end, terminal lugs at the other end. Minimum length of 2.0 ft (0.6 m), maximum length of 99 ft (30 m). A manual is available to assist with installation of this cable (part number 133080-01). See Figure 6
Spare Mating Connector	00531080	Mating connector for 330450 HTAS.
Electronics Housing Strap	03818073	1 inch rigid conduit strap for securing the electronics housing. 
Electronics Mounting Hub	03818071	1 inch weather tight hub used to mount the electronics housing in a weatherproof enclosure. 
Seal Ring	03818072	1 inch sealing lock ring used to mount the electronics housing. Two rings are required to mount the electronics. 
Cable Clamp	169546	Stainless steel mesh tie down clamp for the hardline cable. For temperatures greater than 260°C (500°F). 



**Figure 4: Standard Interconnect Cable**



**Figure 5: Standard Armored Interconnect Cable**



**Figure 6: Standard Right Angle Interconnect Cable**

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