

# 200150, 200155 and 200157 Accelerometers

## Datasheet

**Cordant™**

164986 Rev. Y



### Description

The 20015x Accelerometers are general purpose, wide frequency, case-mounted seismic transducers designed for use with Trendmaster ProTIMs.

The 200150 Accelerometer also operates with the Trendmaster 2000 system. The accelerometer interfaces with the 200100 Dual Acceleration to Velocity flexiTIM Module and the 89130-01 Acceleration-to-Velocity TIM (Transducer Interface Module), as well as the 1900/25 and 1900/27 monitors.

The 20015x Accelerometers feature a hermetically sealed, stainless steel case. This design provides an extremely rugged transducer that is well suited for harsh industrial environments. The transducer's top-mounted, 5-pin connector allows you to easily install and remove the interconnecting signal cable. A 3/8-24 threaded hole on the bottom of the sensor's casing accommodates several mounting options.

The 20015x Accelerometers contain a piezoelectric sensing device that generates a charge when it is subjected to vibration. The accelerometers electronically convert this charge to a differential voltage signal that is proportional to the acceleration that is parallel to the sensitive axis of the transducer.



**Baker Hughes** 



If you use the 200155 and 200157 Accelerometers with 1900 monitors or with TIMs other than those listed in Table 1, or if you operate the transducers outside their specified limits, machine monitoring may fail or the data obtained may not be accurate.

The maximum allowed cable length for use with the 200155 is 15.24 m (50 ft.). You can install 20015x accelerometers in a Class I, Zone 0 application without a barrier, if you use them with the wSIM.

**Table 1: 20015x Accelerometer Applications**

| Accelerometer | Used with ProTIM Option                                                           | Type of Application                                            |
|---------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------|
| 200150        | Standard Acceleration-to-Velocity channel type (-01)                              | General application                                            |
| 200155        | Low Frequency Acceleration-to-Velocity channel type (-05)                         | Fin-Fan, slow rotating shafts                                  |
| 200157        | Standard Acceleration-to-Velocity with Acceleration Enveloping channel type (-06) | Roller element bearing and certain types of cavitation effects |

Note that the acceleration-to-velocity circuitry in the 200200 and 200250 ProTIMs attenuates frequencies above 1 kHz. You cannot obtain higher frequency data with the 200155 or 200157.

The wider frequency range of the 200155 and 200157 accelerometers may result in increased noise compared to the 200150. We recommend that you use the 200155 transducer for

frequencies of interest below 10 Hz. Use the 200157 only if the application requires acceleration enveloping. Use of the 200155 or the 200157 in place of the 200150 may result in faulty readings. Refer to the ProTIM datasheet for the proper frequency response of the system.



Most common machine malfunctions (unbalance, misalignment, etc.) occur on the rotor and originate as an increase (or at least a change) in rotor vibration. For any individual casing measurement to be effective for overall machine protection, the system must continually transmit a significant amount of rotor vibration to the machine casing, or mounting location of the transducer.

In addition, be careful to install the accelerometer transducer on the bearing housing or machine casing. Improper installation may decrease the transducer amplitude and frequency response and/or generate false signals that do not represent actual vibration. Refer to the appropriate instruction manuals and Application Notes.

Upon request, Bently Nevada provides engineering services that can identify the appropriate machine housing measurements and installation assistance if needed.

## Specifications

All specifications are at +25°C (+77°F), unless otherwise specified.

### Electrical

|                                    |                                        |
|------------------------------------|----------------------------------------|
| Sensitivity @ 80 Hz ( $\pm 12\%$ ) | 10.2 mV/(m/s <sup>2</sup> ) (100 mV/g) |
|------------------------------------|----------------------------------------|

#### Measurement Range

| Accelerometer | Measurement Range in m/s <sup>2</sup> (g) |
|---------------|-------------------------------------------|
| 200150        | $\pm 245$ ( $\pm 25$ )                    |
| 200155        | $\pm 196$ ( $\pm 20$ )                    |
| 200157        | $\pm 245$ ( $\pm 25$ )                    |

#### Frequency Range Referenced to 80Hz ( $\pm 10\%$ )

| Accelerometer | Frequency Range in Hz (cpm)   |
|---------------|-------------------------------|
| 200150        | 10 to 1000 (600 to 60,000)    |
| 200155        | 2.0 to 10,000 (90 to 600,000) |
| 200157        | 10 to 10,000 (600 to 600,000) |

|                                   |                      |
|-----------------------------------|----------------------|
| Mounted Resonant Frequency        | >20 kHz (>1200 kcpm) |
| Amplitude Linearity (1 to 10g pk) | $\pm 2\%$            |
| Transverse Sensitivity            | $\leq 7\%$           |

#### Settling Time (Within 5% of Bias)

| Accelerometer | Settling Time (ms) |
|---------------|--------------------|
| 200150        | $\leq 300$         |

|           |             |
|-----------|-------------|
| 200155(1) | $\leq 2000$ |
| 200157    | $\leq 300$  |



(1) Because of its long settling time, you can use the 200155 only with low frequency acceleration-to-velocity channel types on a ProTIM, DSM, or System I system.

|                                                |                                     |
|------------------------------------------------|-------------------------------------|
| Excitation Voltage                             | 4.7 to 5.5 Vdc                      |
| Polarity (Acceleration from Base to Connector) | SIG+ positive with respect to SIG-. |
| Quiescent Current                              | <800 $\mu$ A                        |
| Output Bias Voltage                            | +2.5 $\pm$ 0.23 Vdc                 |

#### Broadband Electrical Noise (1 Hz to 15 kHz)

| Accelerometer | Measurement Range in mm/s <sup>2</sup> (mg) |
|---------------|---------------------------------------------|
| 200150        | 14.7 (1.5)                                  |
| 200155        | 24.5 (2.5)                                  |
| 200157        | 14.7 (1.5)                                  |

|                      |          |
|----------------------|----------|
| Electrical Isolation | 600 Vrms |
|----------------------|----------|

### Environmental

|                    |                                                                                    |
|--------------------|------------------------------------------------------------------------------------|
| Axial Shock Limit  | 49,050 m/s <sup>2</sup> pk (5,000 g pk)                                            |
| Temperature Range  | -40°C to +105°C (-40°F to +221°F)                                                  |
| Sealing (Hermetic) | 5X10 <sup>-8</sup> atm•cc/s (3.1X10 <sup>-9</sup> atm•in <sup>3</sup> /s), maximum |

|                   |                                          |
|-------------------|------------------------------------------|
| Relative Humidity | 100% relative, condensing, non-submerged |
|-------------------|------------------------------------------|

## Physical

|                     |                                       |
|---------------------|---------------------------------------|
| Size (Hex x Height) | 17.5 mm x 45.7 mm (11/16 in x 1.8 in) |
| Weight              | 58 g (2.0 oz), typical                |
| Mounting Thread     | 3/8-24 female                         |
| Mounting Torque     | 2.7 to 6.8 N•m (2 to 5 ft•lbf)        |
| Sensing Element     | Ceramic                               |
| Sensing Geometry    | Shear                                 |

### Housing and connector material

|        |                      |
|--------|----------------------|
| 200150 | 316L stainless steel |
| 200155 | 316L stainless steel |
| 200157 | 316L stainless steel |

|                            |              |
|----------------------------|--------------|
| Electrical Connector (Top) | 5-pin 1/2-20 |
|----------------------------|--------------|

## Cables

|                             |                                                                                                                                                                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating Temperature Range | -20°C to +100°C (-4°F to +212°F)<br><br>These cables may be used at lower temperatures if the installation prevents the cable from flexing or bending. Flexing these cables at temperatures below -20°C (-4°F) may damage the cables.                |
| Construction                | 4-conductor, 22 AWG with braided shield and drain wire (85% coverage, minimum), PVC outer jacket. Nickel-plated coupling nuts.                                                                                                                       |
| Seal                        | Connectors provide an IP67 seal to transducers and mating hardware. Connectors are molded to the cable. The addition of DC4 electrical insulating compound in the connectors provides additional protection against moisture during a thermal shock. |

### Minimum Bend Radius

|                      |                                                                                                                           |
|----------------------|---------------------------------------------------------------------------------------------------------------------------|
| 200151               | 63.5 mm (2.5 in)                                                                                                          |
| 200152               | 73.7 mm (2.9 in)                                                                                                          |
| Maximum Cable Length | 25 m (82 ft)<br><br>Custom products may be able to provide longer cable lengths for the 200150 and 200157 accelerometers. |

## Adhesive (see Mounting Hardware Options)

|                   |                                   |
|-------------------|-----------------------------------|
| Temperature Range | -55°C to +121°C (-67°F to +250°F) |
| Cure Time         | 24 hours                          |

## Compliance and Certifications

### China RoHS

Cables associated with the product(s) mentioned in this datasheet have an EFUP designation of 15 years, in accordance with SJ/T 11364-2024.



### ATEX

60079-01

60079-07

60079-11

60079-15

ATEX Directive 2014/34/EU

## Hazardous Area Approvals



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](http://bntechsupport.com) and access the Bently Nevada Media Library.

### cNRTLus

Ex nL IIC T4:  
AEx nA IIC T4:  
Class I, Div 2, Groups A, B, C, D.

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

Install per drawing 177234

T4 @ Ta ≤ 80°C

### ATEX/IECEx

| 177230            | <div><div><div>Ex</div></div><div>II 1 G<br/>Ex ia IIC T4 Ga</div></div>                                                                                                                                                                                          |            |        |          |          |            |            |         |         |      |  |              |  |  |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------|----------|----------|------------|------------|---------|---------|------|--|--------------|--|--|
|                   | <div><div><div>Ex</div></div><div>II 3 G<br/>Ex na IIC T4 Gc<br/>T4@ Ta = -40°C to 80°C</div></div>                                                                                                                                                               |            |        |          |          |            |            |         |         |      |  |              |  |  |
| Entity Parameters | <table><tr><th>Zone 0/1</th><th>Zone 2</th></tr><tr><td>Ui= 28 V</td><td>Ui= 28 V</td></tr><tr><td>Ii= 120 mA</td><td>Ii= 120 mA</td></tr><tr><td>Pi= 1 W</td><td>Pi= 1 W</td></tr><tr><td>Ci=0</td><td></td></tr><tr><td>Li=121.06 μh</td><td></td></tr></table> | Zone 0/1   | Zone 2 | Ui= 28 V | Ui= 28 V | Ii= 120 mA | Ii= 120 mA | Pi= 1 W | Pi= 1 W | Ci=0 |  | Li=121.06 μh |  |  |
|                   | Zone 0/1                                                                                                                                                                                                                                                          | Zone 2     |        |          |          |            |            |         |         |      |  |              |  |  |
|                   | Ui= 28 V                                                                                                                                                                                                                                                          | Ui= 28 V   |        |          |          |            |            |         |         |      |  |              |  |  |
|                   | Ii= 120 mA                                                                                                                                                                                                                                                        | Ii= 120 mA |        |          |          |            |            |         |         |      |  |              |  |  |
|                   | Pi= 1 W                                                                                                                                                                                                                                                           | Pi= 1 W    |        |          |          |            |            |         |         |      |  |              |  |  |
|                   | Ci=0                                                                                                                                                                                                                                                              |            |        |          |          |            |            |         |         |      |  |              |  |  |
| Li=121.06 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.

#### Zone 2:

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

## 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).

### 200150-AA-BB

#### General Purpose Trendmaster 2000 or Trendmaster Pro Accelerometer

### 200155-AA-BB

#### Low Frequency Trendmaster Pro Accelerometer

### 200157-AA-BB

#### Enveloping Trendmaster Pro Accelerometer

Refer to Table 6 for detailed specifications.

#### A: Mounting Stud Option

|           |                                                      |
|-----------|------------------------------------------------------|
| <b>00</b> | No mounting stud provided                            |
| <b>01</b> | 3/8-24 thread, 2 adhesive mount frames with adhesive |
| <b>02</b> | 3/8-24 to 3/8-24 UNF 1-3/8 inch hex plate stud       |
| <b>03</b> | 3/8-24 to 1/2-20 UNF 1-3/8 inch hex plate stud       |
| <b>04</b> | 3/8-24 to 1/4 NPT 1-3/8 inch hex plate stud          |
| <b>05</b> | 3/8-24 to 1/4-28 UNF 1-3/8 inch hex plate stud       |
| <b>06</b> | 3/8-24 to 1/4 NPT, 3/4 inch hex stud                 |
| <b>07</b> | 3/8-24 to 3/8 NPT, 3/4 inch hex stud                 |

|           |                                                                        |
|-----------|------------------------------------------------------------------------|
| <b>08</b> | 3/8-24 to 1/2 NPT 1 inch hex stud                                      |
| <b>09</b> | 3/8-24 to 3/4 NPT, 1-1/4 inch hex stud                                 |
| <b>10</b> | 3/8-24 to 1 NPT, 1-3/8 inch hex stud                                   |
| <b>11</b> | 3/8-24 to 1-1/4 NPT, 1-3/4 inch hex stud                               |
| <b>12</b> | 3/8-24 to 1/4-20 UNC, 3/4 inch hex stud                                |
| <b>13</b> | 3/8-24 to 5/16-18 UNC, 3/4 inch hex stud                               |
| <b>14</b> | 3/8-24 to 3/8-24 UNF, 3/4 inch hex stud                                |
| <b>15</b> | 3/8-24 to 3/8-16 UNC, 3/4 inch hex stud                                |
| <b>16</b> | 3/8-24 to 1/2-13 UNC, 3/4 inch hex stud                                |
| <b>17</b> | 3/8-24 to 3/8-16 UNC 1-3/8 inch hex plate stud                         |
| <b>18</b> | 3/8-24 to M8x1 1-3/8 inch hex plate stud                               |
| <b>19</b> | Quick-Set XDCR adapter, 1-inch hex stud                                |
| <b>20</b> | 3/8-24 thread, 1 magnetic mount base                                   |
| <b>21</b> | 3/8-24 outer diameter to M6x1 inner diameter 1-3/8 inch hex plate stud |
| <b>22</b> | 3/8-24 to M8x1.25 1-3/8 inch hex plate stud                            |
| <b>23</b> | 3/8-24 to M16x2.0 1-3/8 inch hex plate stud                            |

#### B: Approvals

|           |                                           |
|-----------|-------------------------------------------|
| <b>05</b> | Multiple Approvals (CSA, ATEX, and IECEx) |
|-----------|-------------------------------------------|



Adhesive studs (Options **01** and **20**) are sold in kits containing frames to hold the studs to the substrate while the adhesive cures. The kit also contains provides a scouring pad and alcohol wipe to prepare the mounting surface and a packet of acrylic adhesive and materials to mix the two components.



Using adhesives and magnetic mounts attenuates high frequency signals that may be present.

## 200151-AA-BB-CC

### Accelerometer Interface Standard Cable, Connectors on Both Ends

#### A: Cable Length

|           |            |
|-----------|------------|
| <b>20</b> | 2.0 meters |
| <b>40</b> | 4.0 meters |
| <b>60</b> | 6.0 meters |

#### B: Armor Option

|           |                          |
|-----------|--------------------------|
| <b>02</b> | Blue cable without armor |
| <b>03</b> | Blue cable with armor    |

#### C: Coupling Nut

|           |                                                                                                                                                                    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>00</b> | Standard coupling nut (see Figure 9)                                                                                                                               |
| <b>02</b> | Nylon coupling nut                                                                                                                                                 |
| <b>10</b> | Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on both ends of the cable (see Figure 11). |

## 200152-AA-BB

### Accelerometer Interface Standard Cable, Connector on Accelerometer End Only

#### A: Cable Length

|           |            |
|-----------|------------|
| <b>04</b> | 4.0 meters |
| <b>15</b> | 15 meters  |
| <b>25</b> | 25 meters  |

#### B: Coupling Nut

|           |                                                                                                                                                                        |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>00</b> | Standard coupling nut (see Figure 10)                                                                                                                                  |
| <b>10</b> | Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on the accelerometer end only (see Figure 12). |

## Accessories

| Part Number | Description                                                                    |
|-------------|--------------------------------------------------------------------------------|
| 164985      | 200150, 200155, and 200157 Accelerometers User Guide.                          |
| 162411      | Trendmaster System User Guide                                                  |
| 149831      | Trendmaster Dynamic Scanning Module datasheet.                                 |
| 163662      | 200200 ProTIM-R Module datasheet.                                              |
| 163663      | 200250 ProTIM-C Module datasheet.                                              |
| 126709      | Trendmaster 2000 for Windows Installation Guide.                               |
| 141574-01   | 200100 Acceleration-to-Velocity flexiTIM Module datasheet.                     |
| 137230      | flexiTIM Operation Manual.                                                     |
| 190125      | 1900/25 Vibration Monitor User Guide                                           |
| 141485      | 1900/25 Vibration Monitor datasheet.                                           |
| 190127      | 1900/27 Vibration Monitor User Guide                                           |
| 141486      | 1900/27 Vibration Monitor datasheet.                                           |
| 141556      | 89130-01 and 89546-01 Accel-to-Velocity Transducer Interface Module datasheet. |
| 142485-01   | Housing cable adapter. See Figure 13.                                          |
| 141887-01   | Conduit cable adaptor, single. See Figure 14.                                  |
| 141887-02   | Conduit cable adapter, double. See Figure 15.                                  |

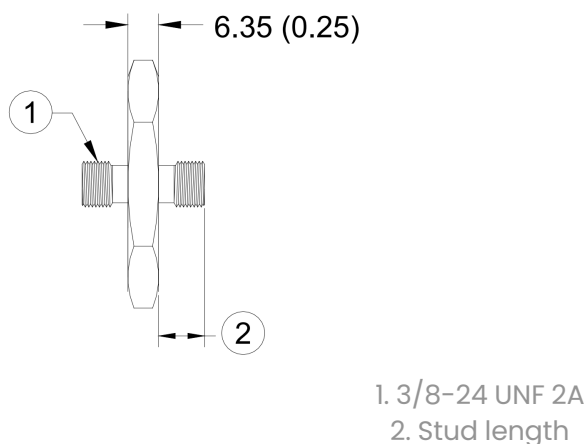
## Graphs and Figures

Note: All dimensions shown in millimeters (inches) except as noted.

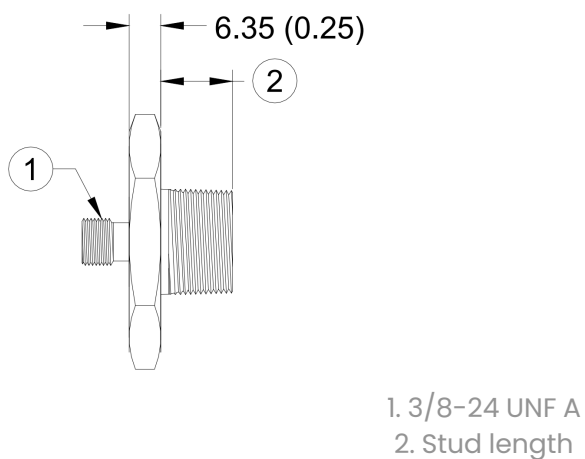
**Table 1: Mounting Stud Specifications**

| Option "A" | Stud Length in mm (in) | Recommended Torque in N•m (in•lbf) | Maximum Torque in N•m (in•lbf)                                               | Replacement Part Number | Notes                                 |
|------------|------------------------|------------------------------------|------------------------------------------------------------------------------|-------------------------|---------------------------------------|
| 0 1        | N/A                    | N/A                                | N/A                                                                          | 04284020                | 2 adhesive mount frames with adhesive |
| 0 2        | 6.0 (0.235)            | N/A                                | 22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface | 107756-01               | See Figure 1                          |
| 0 3        | 12.1 (0.475)           | N/A                                | 22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface | 107755-01               | See Figure 1                          |
| 0 4        | 16.5 (0.650)           | N/A                                | 22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface | 107754-01               | See Figure 2                          |
| 0 5        | 8.3 (0.325)            | N/A                                | 7.3 (65) for curved mounting surface, 14.6 (130) for flat mounting surface   | 128038-01               | See Figure 1                          |
| 0 6        | 18.2 (0.715)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-01               | See Figure 3                          |
| 0 7        | 18.4 (0.725)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-02               | See Figure 3                          |
| 0 8        | 23.0 (0.905)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-03               | See Figure 3                          |
| 0 9        | 23.2 (0.915)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-04               | See Figure 3                          |
| 10         | 28.1 (1.105)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-05               | See Figure 3                          |
| 11         | 28.8 (1.135)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-06               | See Figure 3                          |
| 12         | 11.6 (0.457)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131562-01               | See Figure 4                          |
| 13         | 13.0 (0.512)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131562-02               | See Figure 4                          |

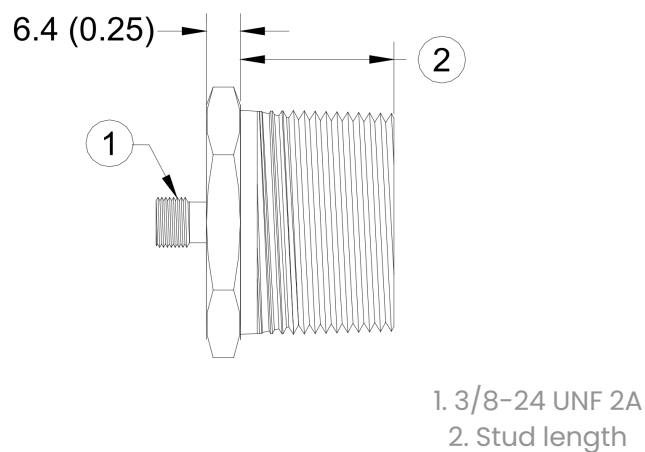
| Option "A" | Stud Length in mm (in) | Recommended Torque in N•m (in•lbf) | Maximum Torque in N•m (in•lbf)                                               | Replacement Part Number | Notes        |
|------------|------------------------|------------------------------------|------------------------------------------------------------------------------|-------------------------|--------------|
| 14         | 6.1 (0.240)            | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131562-03               | See Figure 4 |
| 15         | 13.7 (0.540)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131563-04               | See Figure 4 |
| 16         | 16.8 (0.660)           | 16.9 to 22.6 (150 to 200)          | 22.6 (200)                                                                   | 131562-05               | See Figure 4 |
| 17         | 10.2 (0.400)           | N/A                                | 22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface | 161961-01               | See Figure 4 |
| 18         | 8.3 (0.325)            | N/A                                | 10.2 (90) for curved mounting surface, 20.4 (180) for flat mounting surface  | 125094-01               | See Figure 1 |
| 19         | 6.4 (0.250)            | 3.9 (35)                           | 3.9 (35)                                                                     | 138648-01               | See Figure 5 |
| 20         | N/A                    | N/A                                | N/A                                                                          | 139153-01               | See Figure 6 |
| 21         | N/A                    | N/A                                | N/A                                                                          | 87055-01                | See Figure 7 |
| 22         | 8.3 (0.325)            | N/A                                | 10.2 (90)                                                                    | 125094-02               | See Figure 8 |
| 23         | 16.8 (0.66)            | N/A                                | 22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface | 107755-02               | See Figure 1 |



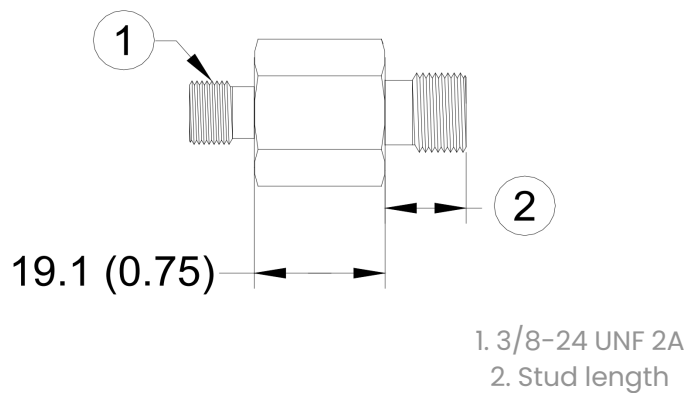
**Figure 1: Hex Plate Stud for "A" Options 02, 03, 05, 17, 18, and 23.**



**Figure 2: Hex Plate Stud for "A" Option 04**



**Figure 3: Hex Stud for "A" Options 06 Through 11**



**Figure 4: Hex Stud for "A" Options 12 Through 17**

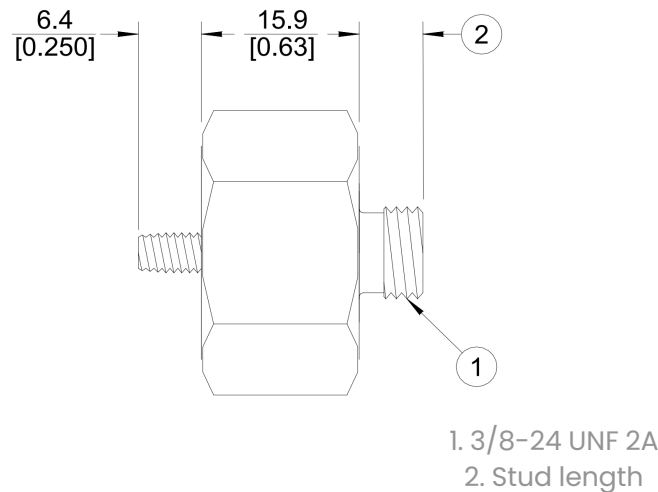


Figure 5: Quick-Set XDCR Adapter

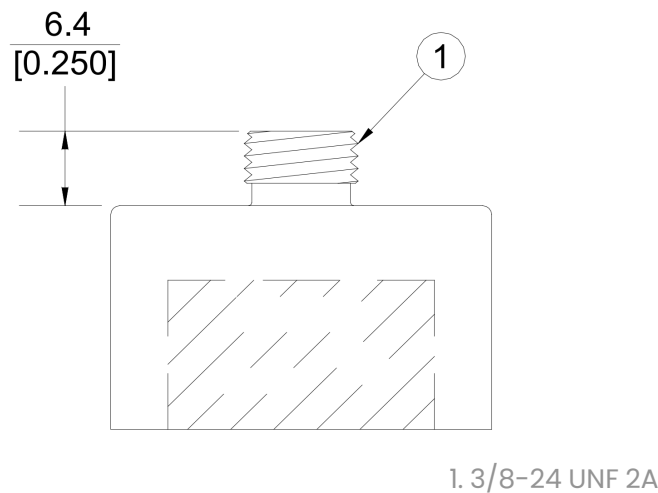


Figure 6: Magnetic Mount Base

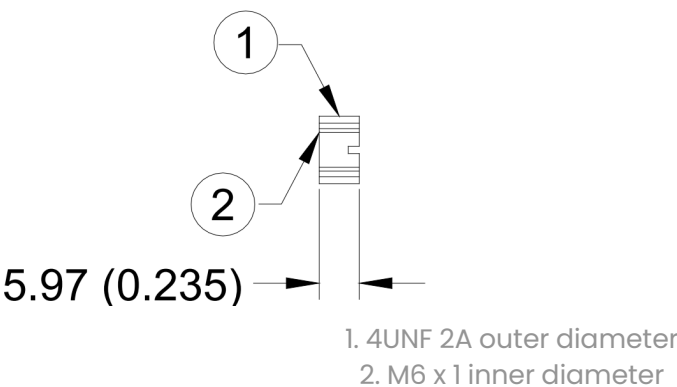


Figure 7: Hex Plate Stud for "A" Option 21

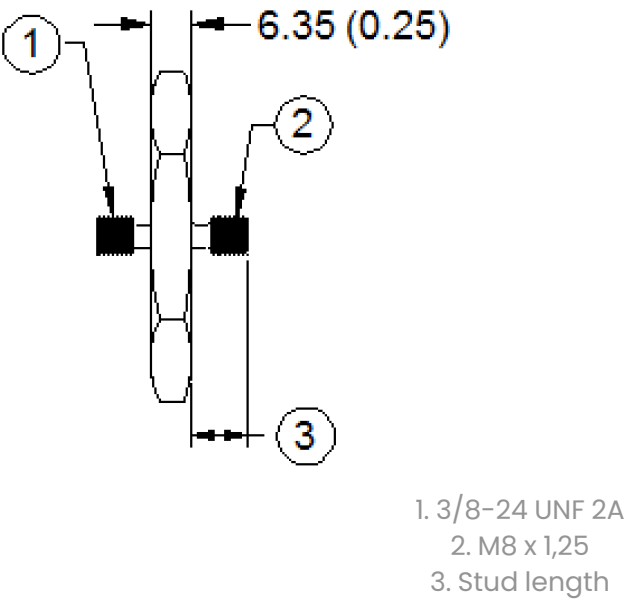


Figure 8: Hex Plate Stud for "A" Option 22

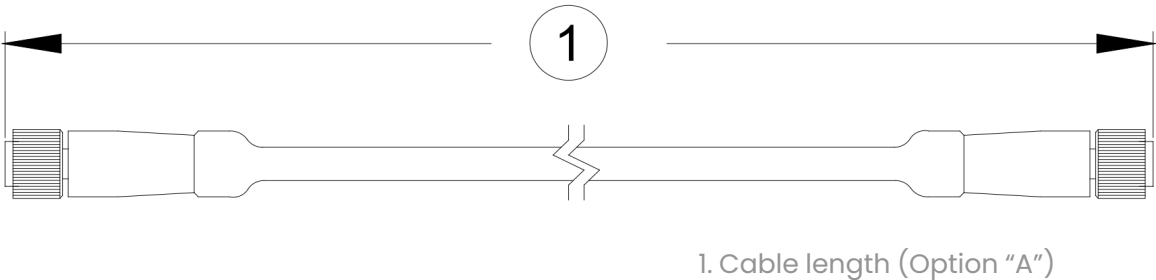


Figure 9: 200151 With Standard Coupling Nut and No Armor

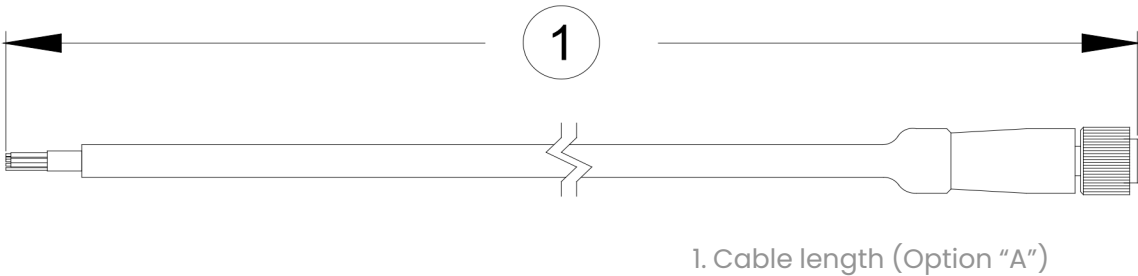
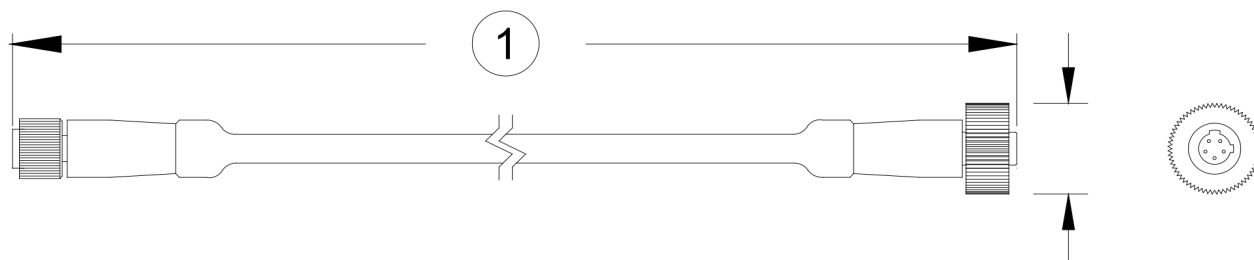
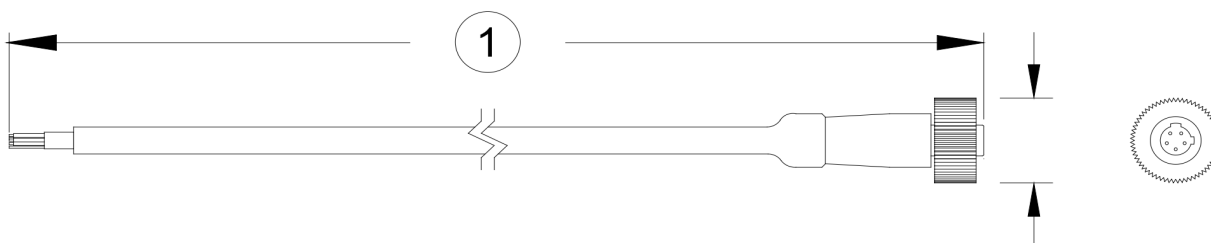


Figure 10: 200152 With Standard Coupling Nut and No Armor



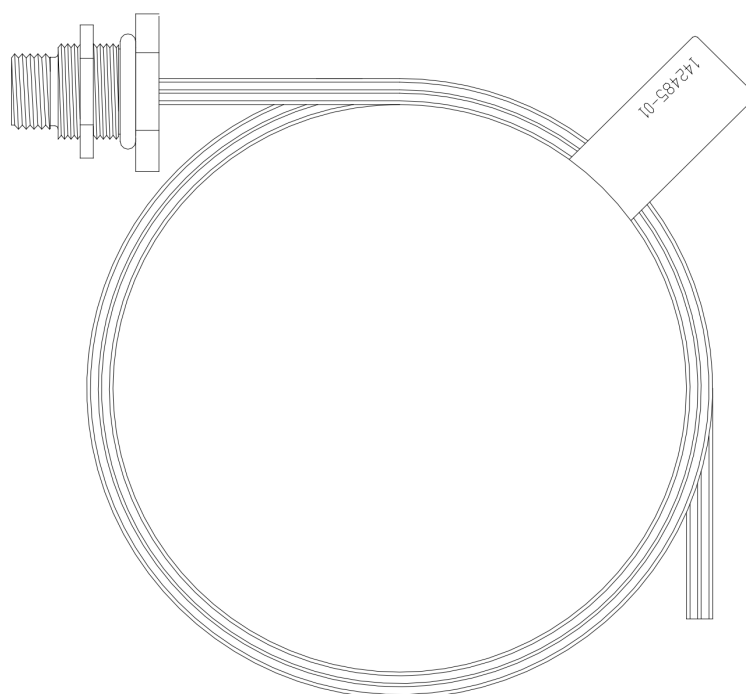
1. Cable Length (Option "A")

**Figure 11: 200151 With Enhanced Coupling Nut and No Armor**



1. Cable length (Option "A")

**Figure 12: 200152 With Enhanced Coupling Nut and No Armor**



**Figure 13: Housing Cable Adapter (Part Number 142485-01)**