

# Ranger Pro Sensor Interface

## Datasheet

Bently Nevada Machinery Condition Monitoring

165M4206 Rev. A



## Description

The Ranger Pro Sensor Interface and external sensor combination is a smart wireless device that is engineered for quick installation and setup to monitor machine health and compliments existing Ranger Pro solutions (datasheet 125M5237). An applicable sensor is connected to the Ranger Pro Interface module by a short cable. Using industry standard wireless protocols such as ISA 100.11a and WirelessHART, the device complies with international, industrial wireless networking standards engineered to serve the needs of process industries.

The Ranger Pro Sensor Interface enables one applicable sensor to connect via cable to a single Ranger Pro interface module (two sensor connectivity will be available in a future release). This system measures overall velocity, acceleration, with spectrums/waveforms plus temperature ranging from low to high speed applications. Other measurement modalities are forthcoming.

The Bently Nevada Ranger Pro Sensor Interface enables you to:

- Monitor and optimize the reliability of low- and medium-criticality machines.
- Establish or expand existing reliability programs.
- Make maintenance decisions based on current data.
- Reduce maintenance costs.
- Decrease unplanned machine failures.
- Increase machinery life.
- Multi-channel support

Ranger Pro Sensor Interface is a simple, easy to implement solution for use in hazardous or difficult to access



environments such as elevated temperatures and tight or enclosed installations.

Use the Ranger Pro Sensor Interface to get short- and long-term trending data, and diagnostic reporting.

Quickly publish overall data through Modbus to third-party tools or spectra and waveform data through Generic Client or Hart IP Interface to Bently Nevada System 1 software. Configure Ranger Pro devices over-the-air using third-party tools or the Ranger Pro Configuration software.

## Machinery Applications

Ranger Pro Sensor Interface is a vibration sensor for machines with roller-element bearings including:

- Agitators
- Air compressors
- Ball mills
- Blowers
- Centrifuges
- Cooling tower fans and pumps
- Motors
- Small reciprocating compressors
- Small hydro and steam turbines

## Hardware Features

You can configure Ranger Pro Sensor Interface to work in a variety of environments and applications.

- Tri-axial capable velocity and acceleration detection.
- Machine surface temperature measurement.
- Mounting hardware options to fit most applications and integral alignment capability
- Replaceable lithium-chloride battery.
- IP67 dust and water resistant.
- Embedded sensors connect using the ISA100 wireless or WirelessHART network protocols.
- Can act as a router for other Ranger Pro sensors.

Wireless range varies depending on environmental obstacles, gateway antenna type, and the orientation of the sensor relative to the gateway antenna.

## System 1 Support

Ranger Pro collects overall vibration, temperature measurements, timebase waveforms, spectra, and Peak Demod spectrum using Generic Client Interface (GCI) for ISA100 Ranger Pro devices and HART IP for WirelessHART Ranger Pro devices with System 1 software. You can filter overall and dynamic timebase and spectra data.

## Network Installation

A typical network installation uses several Ranger Pro Sensor Interface sensors, Ranger Pro repeaters, wireless device managers, and access points. Ranger Pro Interface Module is available in either WirelessHART or ISA100 configuration.

You can use third-party tools or the Ranger Pro Configuration software to quickly provision and configure Ranger Pro devices over-the-air.

## Compliance and Certifications

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

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

|                                   |  |
|-----------------------------------|--|
| <b>EMC conformity standards</b>   | IEC 61326-1, ETSI EN 301 489-1, CISPR22, ETSI EN 301 489-17  |
| <b>Radio spectrum</b>             | ETSI EN 300 328  |
| <b>Safety</b>                     | ETSI EN 61010-1, IEC 62479   |
| <b>Hazardous Atmosphere</b>       | CSA<br>Class I, Division1, Group A, B, C, D T4<br>Class II, Division1, Group F, G T135°<br>ATEX/IECEX Zone 0 |
| <b>Conformity</b>                 | Compliant with all CE and FCC/IC requirements  |
| <b>Valid for RangerPro BN P/N</b> | 147M7136-01-11<br>147M7136-02-11<br>160M0016-01  |

## Hazardous Area Approvals

### WARNING

**HAZARDOUS ENVIRONMENT**

**Risk of explosive atmosphere.**

Avoid electrostatic potential, especially on plastic components. Adapters, isolation valves, or sealing rings that are not compatible with process gasses will corrode and fail. This failure may result in gas leaks, fire, explosion, or projectiles.

De-energize all devices before placement or removal. To prevent corrosion and failure, verify that all components are compatible. Verify that hazardous materials, atmospheres, and conditions have been removed or that relevant risk mitigation measures have been implemented.

|                                      |   |
|--------------------------------------|---|
| <b>North America (US and Canada)</b> | CSA<br>Class I, Zone 0, AEx ia IIC T4 Ga<br>Zone 20, AEx iaD IIIB T135°C Da<br>Class I, Division1, Group A, B, C, D T4<br>Class II, Division1, Group F, G T135° |
| <b>IECEX</b>                         | Ex ia IIC T4 Ga<br>Ex ia I Ma<br>Ex ia IIIB T135°C Da   |
| <b>ATEX</b>                          | II 1G Ex ia IIC T4 Ga<br>I M1 Ex ia I Ma<br>II 1D Ex ia IIIB T135°C Da  |

## Specifications

### Ranger Pro Tethered Accelerometer 70M503

| Feature                          | Characteristic                   | Value   |
|----------------------------------|----------------------------------|---|
| Axis                             | X, Y, Z                          | 3   |
| Sensing element                  |                                  | Micro-electromechanical sensors (MEMS)          |
| Transverse sensitivity (Typical) | Transverse sensitivity (Typical) | < 7% (160 Hz)                                   |
| Sensitivity tolerance            |                                  | ±5% (160 Hz)                                    |
| Sensitivity                      | Z                                | 39 mV/g   |
|                                  | X, Y                             | 35 mV/g   |
| Amplitude linearity              |                                  | ± 2%  |
| Frequency response               | Z (± 3 dB)                       | 0.3 Hz to 10 kHz                                |
|                                  | X, Y (± 3 dB)                    | 0.3 Hz to 2.5 kHz                               |
| Resonant frequency               | Z                                | > 15 kHz  |
|                                  | X, Y                             | 5 kHz   |
| Total noise (acceleration rms)   | Z: 0.3 to 10 kHz                 | 0.003 g   |
|                                  | X, Y: 0.3 to 2 kHz               | 0.004 g   |
| Total noise (velocity rms)       | Z: 1-200 Hz                      | 0.18 mm/s [0.007 in/s]                          |
|                                  | Z: 10-1000 Hz                    | 0.09 mm/s [0.004 in/s]                          |
|                                  | X,Y: 1-200 Hz                    | 0.57 mm/s [0.022 in/s]                          |
|                                  | X,Y: 10-1000 Hz                  | 0.11 mm/s [0.004 in/s]                          |
| Temperature                      | Sensor type                      | Digital Resistance Temperature Device (RTD)     |
|                                  | Measurement range                | -40°C to 125°C (-40°F to 257°F)                 |
|                                  | Resolution                       | 0.1°C (0.06°F)                                  |
|                                  | Accuracy                         | ±1°C (typical), ±2°C (maximum)                  |
|                                  | Measurement Interval             | 10 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h |

| Feature       | Characteristic        | Value                           |
|---------------|-----------------------|---------------------------------|
| Electrical    | Supply Current        | 2.09 mA (max)                   |
|               | Output                | Multiplexed output              |
|               | Grounding             | Case isolated                   |
|               | Connector             | Top-exit, M12 A-coded, 5 pin    |
| Mechanical    | Material              | 316 Stainless                   |
|               | Mounting              | Integral M20x1.0 Coupling Nut   |
|               | Weight                | 62 g                            |
|               | Sealing               | Hermetic                        |
| Environmental | Operating temperature | -40°C to 125°C (-40°F to 257°F) |
|               | IP Rating             | IP66/67 when mated to connector |
|               | Shock                 | 5000 g                          |
|               | Altitude              | < 3000 m                        |

## Ranger Pro Sensor Interface: P/N 70M323 and 70M423

### Trended Variables



Trend Variables apply when connected to a 70M503 Ranger Pro accelerometer.

| Characteristic                | Value  |
|-------------------------------|--|
| <b>Temperature</b>            |  |
| Measurement range             | -40°C to 125°C (-40°F to 257°F)                                |
| Resolution                    | 0.1°C (0.06°F)   |
| Measurement Interval          | 10 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h                |
| <b>Acceleration</b>           |  |
| Acceleration amplitude range  | 0 – 200 m/s <sup>2</sup> (0 – 20 g)                            |
| Acceleration units / subunits | g or m/s <sup>2</sup> / peak or rms                            |
| F <sub>min</sub>              | 0.3, 2, 5, 10, 100, 200 (Hz)                                   |
| F <sub>max</sub>              | 200, 500, 1000, 2000, 5000, 10000±Hz<br>‡10,000 only on Z-axis |
| Measurement Interval          | 10 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h                |

| Characteristic            | Value  |
|---------------------------|--|
| <b>Velocity</b>           |  |
| Velocity amplitude range  | 0 – 50 mm/s (0 – 2 in/s)   |
| Velocity units / subunits | in/s or mm/s peak or rms   |
| F <sub>min</sub>          | 1, 5, 10 Hz  |
| F <sub>max</sub>          | 200, 500, 1000, 2000 Hz  |
| Measurement Interval      | 10 min, 20 min, 30 min, 1 h, 2 h, 3 h, 4 h, 6 h                      |
| <b>Peak Demod</b>         |  |
| Peak Demod Pk             | Z axis only<br>Parameters based on PeakDemod Spectrum settings below |
| Measurement interval      | 6 h, 8 h, 12 h, 1 d, 2 d, 7 d, 14 d, 28 d                            |

## Waveforms and Spectra

| Characteristic        | Value   |
|-----------------------|---|
| <b>Acceleration</b>   |   |
| Acceleration waveform | X, Y and Z axis   |
| F <sub>min</sub>      | 0.3, 2, 5, 10 Hz  |
| F <sub>max</sub>      | 200, 500, 1000, 2000, 5000, 10000 ‡ Hz<br>‡ Z-axis only |
| Number of samples     | 1024, 2048, 4096, 8192                                  |
| Units/subunits        | g or m/s <sup>2</sup> / peak                            |
| Measurement Interval  | 6 h, 8 h, 12 h, 1 d, 2 d, 7 d, 14 d, 28 d               |
| <b>Velocity</b>       |   |
| Velocity spectra      | X, Y and Z axis depending on sensor model               |
| F <sub>min</sub>      | 5, 10   |
| F <sub>max</sub>      | 200, 500, 1000, 2000                                    |
| Number of lines       | 400, 800, 1600, 3200                                    |
| Units/subunits        | in/s or mm/s / rms                                      |
| Measurement Interval  | 6 h, 8 h, 12 h, 1 d, 2 d, 7 d, 14 d, 28 d               |

| Characteristic       | Value                                     |
|----------------------|---|
| <b>Peak Demod</b>    |   |
| Peak Demod spectrum  | Z-Axis only                               |
| Fmax                 | 200, 500, 1000, 2000, 5000 Hz             |
| Demod Band Min       | 500, 1000, 2000, 5000 Hz                  |
| Units/subunits       | g, m/s <sup>2</sup> / peak                |
| Measurement Interval | 6 h, 8 h, 12 h, 1 d, 2 d, 7 d, 14 d, 28 d |

**Output Data**

| Characteristic           | Value  |
|--------------------------|--|
| <b>Trended Variables</b> |  |
| ISA100 Temperature       | Modbus: Supported<br>GCI: Supported                      |
| wHART Temperature        | Modbus: Supported<br>HART-IP: Supported                  |
| ISA100 Acceleration      | Modbus: Not supported<br>GCI: Future Release             |
| wHART Acceleration       | Modbus: Supported<br>HART-IP: Supported                  |
| ISA100 Velocity          | Modbus: Supported<br>GCI: Supported                      |
| wHART Velocity           | Modbus: Supported<br>HART-IP: Supported                  |
| ISA100 Peak Demod        | Modbus: Not supported<br>GCI: Future Release             |
| wHART Peak Demod         | Modbus: Supported (Channel 1 only)<br>HART-IP: Supported |

**Waveforms and Spectra**

Requires System 1 and either Generic Client Interface (GCI) or HART IP.



## Wireless

| Characteristic                 | Value  |
|--------------------------------|--|
| Network standard               | ISA100.11a, WirelessHART   |
| Network topology               | Star (ISA100) or mesh (ISA100 or WirelessHART)   |
| Radio standard                 | IEEE 802.15.4  |
| Radio frequency                | 2.45 GHz ISM band  |
| Provisioning/ firmware updates | Over-the-air or via the USB docking station.   |
| Encryption/ security           | 128-bit AES encrypted packets  |
| Output power                   | 5.13 dBm, typical  |
| Wireless range                 | 150 meters sensor to access point, 100 meters sensor to sensor, line of sight. (Actual range depends on obstacles present, gateway antenna type, and orientation of the sensor relative to the gateway antenna.) |


### 147M7136-01 ISA100 Device

|                         |                   |
|-------------------------|-------------------|
| Typical Conducted Power | 8.7 dBm (7.4 mW)  |
| Modulation              | OQPSK, DSSS       |
| Channel BW              | 5 MHz,            |
| Operating Frequency     | 2.405 to 2.48 GHz |

### 147M7136-02 WirelessHART Device

|                         |                    |
|-------------------------|--------------------|
| Typical Conducted Power | 5.1 dBm (3.3 mW)   |
| Modulation              | OQPSK, DSSS        |
| Channel BW              | 5 MHz              |
| Operating Frequency     | 2.405 to 2.475 GHz |

## Battery and Power

| Characteristic                         | Value   |                   |                   |          |                   |  |                   |
|--|---|-------------------|-------------------|----------|-------------------|--|-------------------|
| Type                                   | Replaceable D size 3.6V lithium-thionyl chloride with standard button-top termination. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <b>Warning: Use only one of the following batteries: Tadiran TLH-5930, Tadiran TL-5930, Tadiran SL-2780, or Xeno Energy XL-205F.</b> </div>   |                   |                   |          |                   |  |                   |
| Life                                   | Up to five years depending on the operating mode and configuration.   |                   |                   |          |                   |  |                   |
| Hazardous area temperature range (Ta)  | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #008080; color: white;">Battery models</th> <th style="background-color: #008080; color: white;">Temperature range</th> </tr> </thead> <tbody> <tr> <td>TLH-5930</td> <td>-40°C &lt; Ta &lt; 80°C</td> </tr> <tr> <td>TL-5930, Xeno XL-205F, Tadiran SL-2780</td> <td>-40°C &lt; Ta &lt; 70°C</td> </tr> </tbody> </table> | Battery models    | Temperature range | TLH-5930 | -40°C < Ta < 80°C | TL-5930, Xeno XL-205F, Tadiran SL-2780 | -40°C < Ta < 70°C |
|  | Battery models  | Temperature range |                   |          |                   |  |                   |
| TLH-5930                               | -40°C < Ta < 80°C   |                   |                   |          |                   |  |                   |
| TL-5930, Xeno XL-205F, Tadiran SL-2780 | -40°C < Ta < 70°C   |                   |                   |          |                   |  |                   |

## Environmental Conditions

| Characteristic        | Value   |
|-----------------------|---|
| Operating temperature | -40°C to 85°C (-40°F to 185°F) (Operating at extreme temperatures or beyond negatively affects battery life and may damage the device.) |
| Vibration limit       | 20 g peak   |
| Chemical resistance   | Stainless steel and high temperature, solvent- and UV-resistant PPS plastic.  |
| Shock resistance      | 0.5 meter drop onto concrete  |
| Altitude              | Maximum 3,000 m (9,842 ft.) outdoors  |
| IP rating             | IP67 dust and water resistant   |

## Physical/Mechanical

| Characteristic | Value   |
|----------------|---|
| Weight         | 400 grams with battery  |
| Dimensions     | Height: 100 mm; diameter: 40 mm   |
| Case material  | 316 stainless steel body and glass-reinforced, impact-resistant PPS top |
| Mounting hole  | M6 x 1 mm X 6.5 mm deep internal thread                                 |

## Regulatory Compliance

| Characteristic              | Value   |
|-----------------------------|---|
| EMC conformity standards    | IEC 61326-1, ETSI EN 301 489-1, CISPR22, ETSI EN 301 489-17   |
| Radio spectrum              | ETSI EN 300 328   |
| Safety                      | ETSI EN 61010-1, IEC 62479  |
| Hazardous Atmosphere        | CSA Class 1 Division 1 Groups A, B, C, D T4<br>ATEX/IECEX Zone 0<br>Class II, Division1, Group F, G T135° |
| Conformity                  | Compliant with all CE and FCC/IC requirements   |
| Valid for Ranger Pro BN P/N | 70M323, 70M423, 70M503  |

## Entity Parameters

| Characteristic                    | Value  |
|-----------------------------------|--|
| Ranger Pro Interface Modules      | Lo: 800 $\mu$ H Co: 3.78 $\mu$ F<br>Uo: 5.88V Io: 196 mA<br>Po: 288 mW |
| Ranger Pro Triaxial Accelerometer | Lo: 0 $\mu$ H Co: 1.87 $\mu$ F<br>Uo: 11.1V Io: 249 mA<br>Po: 450 mW   |

## ISA100.11a compatible gateways †

| Characteristic | Value   |
|----------------|---|
| Bently Nevada  | Bently Nevada 70M320 ISA100.11a Gateway<br>Up to 50 Ranger Pro devices per Gateway<br>See the Ranger Pro Gateway Datasheet 157M8584 |
| Yokogawa       | YFGW 410 Field Wireless Management Station<br>Up to 4 access points = 160 sensors   |
|                | YFGW 510 and YFGW 520 Field Wireless Access<br>Points. Up to 40 Ranger Pro sensors per access<br>point.                             |

| Characteristic   | Value  |
|--|--|
| Honeywell  | WDM Wireless Device Manager R310.2-4 or newer<br>Up to 8 access points = 320 sensors |
|  | FDAP Field Device Access Point<br>Up to 40 Ranger Pro sensors per access point       |
| Ranger Pro sensor catalog number 70M323 is recommended for ISA100a Gateway<br><br>Number of Hops<br>(Depth to Gateway) | 3  |

### WirelessHART compatible gateways.†

| Characteristic  | Value  |
|---|--|
| Emerson 1410S   | 1410S (compatible with firmware version 6.4.5 or newer) up to 200 Ranger Pro sensors per gateway   |
| Emerson 1410A/B/D   | 1410 (compatible with firmware version 4.7.84 or newer)<br>up to 70 Ranger Pro sensors per gateway |
| Emerson 1420  | 1420 (compatible with firmware version 4.7.84 or newer)<br>up to 70 Ranger Pro sensors per gateway |
| Ranger Pro sensor catalog number 70M423 is recommended for WirelessHART Gateway<br><br>Number of Hops<br>(Depth to Gateway) | 3  |

† Generic Client Interface (GCI) or HART IP required. Order when new or license as necessary.

### Accelerometer to Interface Module Cable

| Characteristic        | Value                                      |
|-----------------------|--|
| <b>Mechanical</b>     |  |
| Length                | 5 m, 10 m                                  |
| Number of Conductors  | 5  |
| Connector Type        | M12 A-Code 5-Pin Plug and socket, straight |
| Connector Contact Pin | Gold Plated Copper Alloy                   |

| Characteristic        | Value   |
|-----------------------|---|
| Connector Housings    | Stainless Steel   |
| Cable Jacket          | Black XLPE  |
| Cable Shield          | Braided ( $\geq 90\%$ coverage), Tinned-Copper. Electrically terminated to Interface module connector only. |
| Cable Diameter        | 0.3 in, typical   |
| Bend Radius           | Diameter x 12   |
| <b>Electical</b>      |   |
| Rated Voltage         | 300 Vdc   |
| <b>Environmental</b>  |   |
| Operating Temperature | -40°C to 125°C  |
| IP Rating             | IP67 when mated   |
| RoHS                  | Compliant   |
| REACH                 | Compliant   |
| UV Resistance         | Yes   |
| Flamability           | FT2   |

## System 1

v21.1 or higher. Refer to System 1 121M7997 release notes for compatibility guidelines.

## Advanced Features

| Characteristic           | Value   |
|--------------------------|---|
| <b>Data on Demand</b>    |   |
| Mode                     | User-initiated. Acquisition initiated from Ranger Pro Configuration Software. |
| Status                   | Idle, Requested or Busy   |
| <b>Data on Vibration</b> |   |
| Threshold                | User settings. Range: 0 to 0.1 in/s rms                                       |
| Mode                     | Enabled/Disabled  |
| Detection                | XYZ vector sum or Z axis only   |

| Characteristic           | Value                                      |
|--------------------------|--|
| Status                   | On or Off                                  |
| <b>Data on Severity</b>  |  |
| Mode                     | Enabled/Disabled                           |
| TA Proven Method Level 3 | User settings. Range: 0.05 to 2.5 in/s rms |
| TA Proven Method Level 4 | User settings. Range: 0.05 to 2.5 in/s rms |
| Detection                | XYZ vector sum or Z axis only              |
| Status                   | Green, Yellow or Red when enabled          |

## 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).

### Ranger Pro Accelerometer

#### 70M503-AA-BB-CC-DD

##### A: Mounting Options

- 00 No Stud
- 01 M20x1.0 to 1/4-28
- 02 M20x1.0 to 3/8-24
- 03 M20x1.0 to 10-32
- 04 M20x1.0 to M6x1.0
- 05 M20x1.0 to M8x1.25
- 06 M20x1.0 to Cementing pad
- 07 M20x1.0 to 0.25x1.0 in Motor fin mount
- 08 M20x1.0 to 0.25x1.75 in Motor fin mount
- 09 M20x1.0 to 0.5x1.25 in Motor fin mount
- 10 M20x1.0 to 0.5x2.0 in Motor fin mount

##### B: Connector Type

- 01 Top Exit

##### C: Cable: Battery Option

- 00 No Cable
- 05 5 meter
- 10 10 meter

##### D: Approvals: Agency Approval Option

- 01 North America CII Div1
- 02 ATEX/IECEX

## Ranger Pro Acceleration Interface

### WirelessHART 70M423-AA-BB

### ISA100 70M323-AA-BB



Ranger Pro versions 70M323, 70M423 use the same ordering information.

#### A: Battery Option

| A: Battery Option |                                 |
|-------------------|---------------------------------|
| 00                | No battery                      |
| 01                | Battery supplied, not installed |

#### B: Agency Approval Option

|    |                        |
|----|------------------------|
| 01 | North America CII Div1 |
| 02 | ATEX/IECEX             |

## Ranger Pro Installation Kit

### 130M5452 – AA

Description: Installation kit including battery installation tool, O-rings, wrenches, and USB readers.

#### A: Installation Package

|    |                                   |
|----|-----------------------------------|
| 00 | Installation Tools                |
| 01 | Installation Tools and USB Reader |
| 02 | USB Reader only                   |

## System 1 Ranger Pro Device License

### 3071/13 – AA-BB-CC

Description: System 1 device license for Ranger Pro installed for use with System 1. One device license is required per interface module.

|   |                                |
|---|--------------------------------|
| <b>A: Not Applicable for Ranger Pro</b> |                                |
| <b>00</b>                               |                                |
| <b>B: Not Applicable for Ranger Pro</b> |                                |
| <b>00</b>                               |                                |
| <b>C: Ranger Pro Device</b>             |                                |
| <b>00</b>                               | ## Number of licenses required |



Option 3071/13 is only applicable to Ranger Pro devices that are installed for use with System 1. To order System 1, see **System 1 Software Package Datasheet** (document 108M5214). The AA option is only for vbOnline Pro device licenses. The BB option is only for 2300 monitor device licenses.



## Spare Mounting Adapters

Illustrations shown are not to scale. All mounting adapters are made from 316 stainless steel.

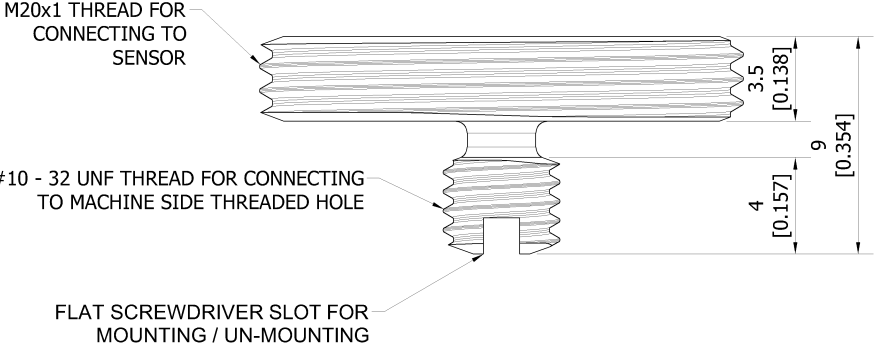
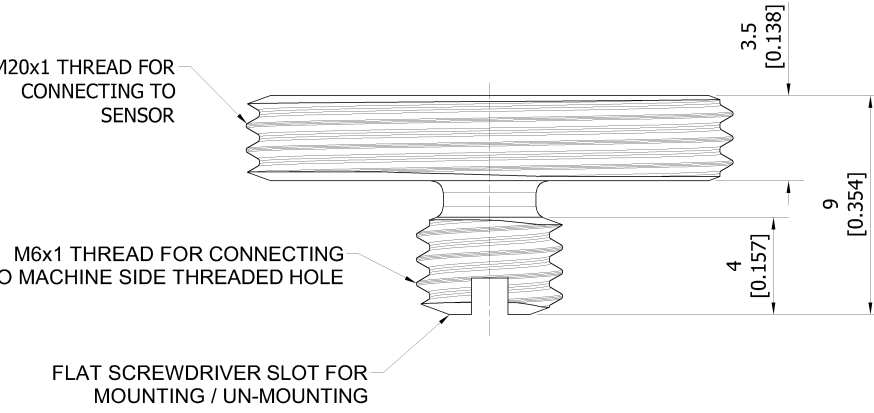
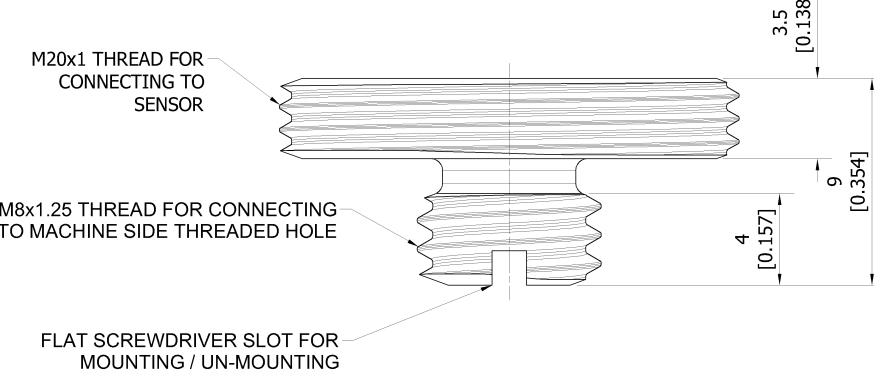
Units are mm[in]

| Part Number           | Size | Illustration |
|-----------------------|------|--------------|
| <b>Standard Studs</b> |      |              |



**Applies to all standard studs.**

|          |                         |  |
|----------|-------------------------|--|
| 164M6491 | M20x1.0 to 1/4-28 UNF   |  |
| 164M6495 | M20x1.0 to 3/8 - 24 UNF |  |

| Part Number | Size               | Illustration   |
|-------------|--------------------|--|
| 164M6487    | M20x1.0 to #10-32  |  <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>#10 - 32 UNF THREAD FOR CONNECTING TO MACHINE SIDE THREADED HOLE</p> <p>FLAT SCREWDRIVER SLOT FOR MOUNTING / UN-MOUNTING</p> <p>Dimensions: 3.5 [0.138], 4 [0.157], 9 [0.354]</p> |
| 164M6489    | M20x1.0 to M6x1.0  |  <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>M6x1 THREAD FOR CONNECTING TO MACHINE SIDE THREADED HOLE</p> <p>FLAT SCREWDRIVER SLOT FOR MOUNTING / UN-MOUNTING</p> <p>Dimensions: 3.5 [0.138], 4 [0.157], 9 [0.354]</p>        |
| 164M6493    | M20x1.0 to M8x1.25 |  <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>M8x1.25 THREAD FOR CONNECTING TO MACHINE SIDE THREADED HOLE</p> <p>FLAT SCREWDRIVER SLOT FOR MOUNTING / UN-MOUNTING</p> <p>Dimensions: 3.5 [0.138], 4 [0.157], 9 [0.354]</p>    |

| Part Number | Size | Illustration |
|-------------|------|--------------|
|-------------|------|--------------|

**Universal Magnetic Mounting Adapter**

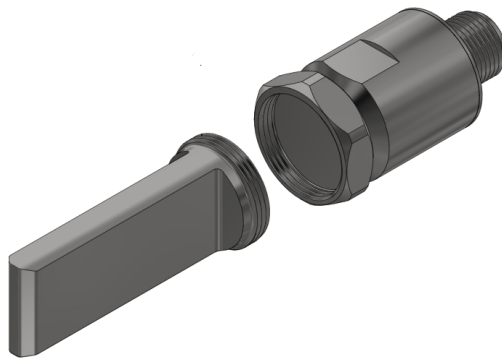
|          |  |
|----------|--|
| 02200371 | 1.85" Ø x 1.09" H (47 x 27.7 mm), 100 lbf (45kg) pull, 2-pole, ¼-28 female UNF thread. Requires mounting option -01. |
|----------|--|

**Cementing Pads and Adhesive**

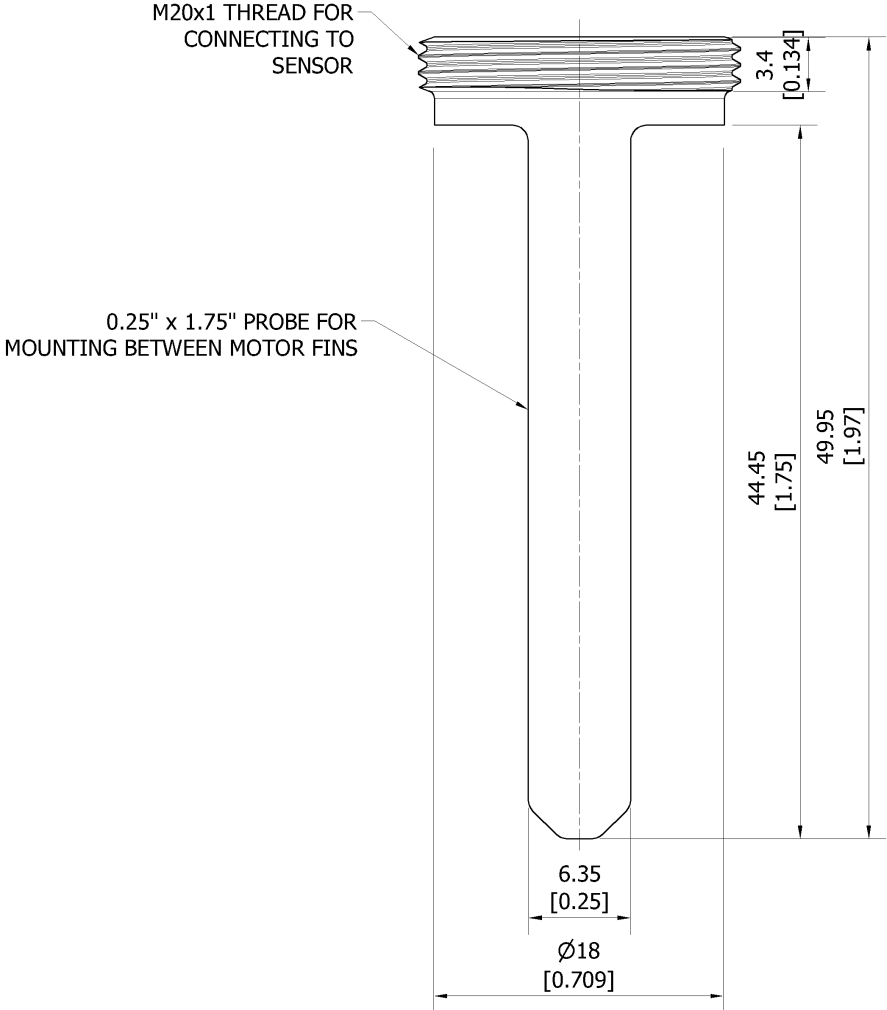
|          |                                |  |
|----------|--------------------------------|--|
| 164M6490 | M20x1.0 to epoxy cementing pad |  |
|----------|--------------------------------|--|

|           |  |
|-----------|--|
| 167236-01 | 3.5 g Click Bond CB200 acrylic adhesive for use with epoxy cementing pads. Sufficient for about four pads. |
|-----------|--|

**Motor Fin Adhesive Mounts**



| Part Number | Size                    | Illustration   |
|-------------|-------------------------|--|
| 164M6492    | M20x1.0 to 0.25" x 1.0" | <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>0.25" x 1.0" PROBE FOR MOUNTING BETWEEN MOTOR FINS</p> <p>3.4 [0.134]</p> <p>25.4 [1]</p> <p>30.9 [1.22]</p> <p>6.35 [0.25]</p> <p>∅18 [0.709]</p> |

| Part Number | Size                     | Illustration   |
|-------------|--------------------------|--|
| 164M6486    | M20x1.0 to 0.25" x 1.75" |  <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>0.25" x 1.75" PROBE FOR MOUNTING BETWEEN MOTOR FINS</p> <p>3.4<br/>[0.134]</p> <p>44.45<br/>[1.75]</p> <p>49.95<br/>[1.97]</p> <p>6.35<br/>[0.25]</p> <p>Ø18<br/>[0.709]</p> |

| Part Number | Size                    | Illustration  |
|-------------|-------------------------|---|
| 164M6488    | M20x1.0 to 0.5" x 1.25" | <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>0.5" x 1.25" PROBE FOR MOUNTING BETWEEN MOTOR FINS</p> <p>3.4<br/>[0.134]</p> <p>31.75<br/>[1.25 in]</p> <p>37.25<br/>[1.467]</p> <p>12.7<br/>[0.5 in]</p> <p>Ø18<br/>[0.709]</p> |

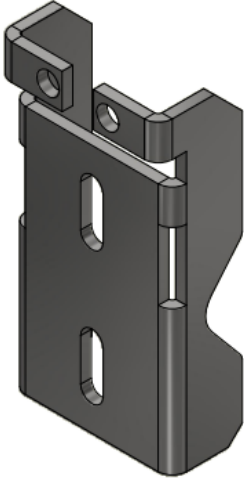
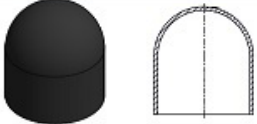
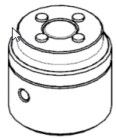
| Part Number | Size                       | Illustration   |
|-------------|----------------------------|--|
| 164M6485    | M20x1.0 to 0.5"<br>x 2.00" | <p>M20x1 THREAD FOR CONNECTING TO SENSOR</p> <p>0.5" x 2.0" PROBE FOR MOUNTING BETWEEN MOTOR FINS</p> <p>3.4<br/>[0.134]</p> <p>50.8<br/>[2]</p> <p>56.3<br/>[2.22]</p> <p>12.7<br/>[0.5]</p> <p>∅18<br/>[0.709]</p> |
















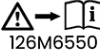




Expect a decrease in X, Y, Z accuracy when using fin type mounts.

## Accessories

The installation kit (121M7992) includes a battery installation tool, two installation wrenches, spare O-rings, and USB docking station. These parts can also be ordered individually.

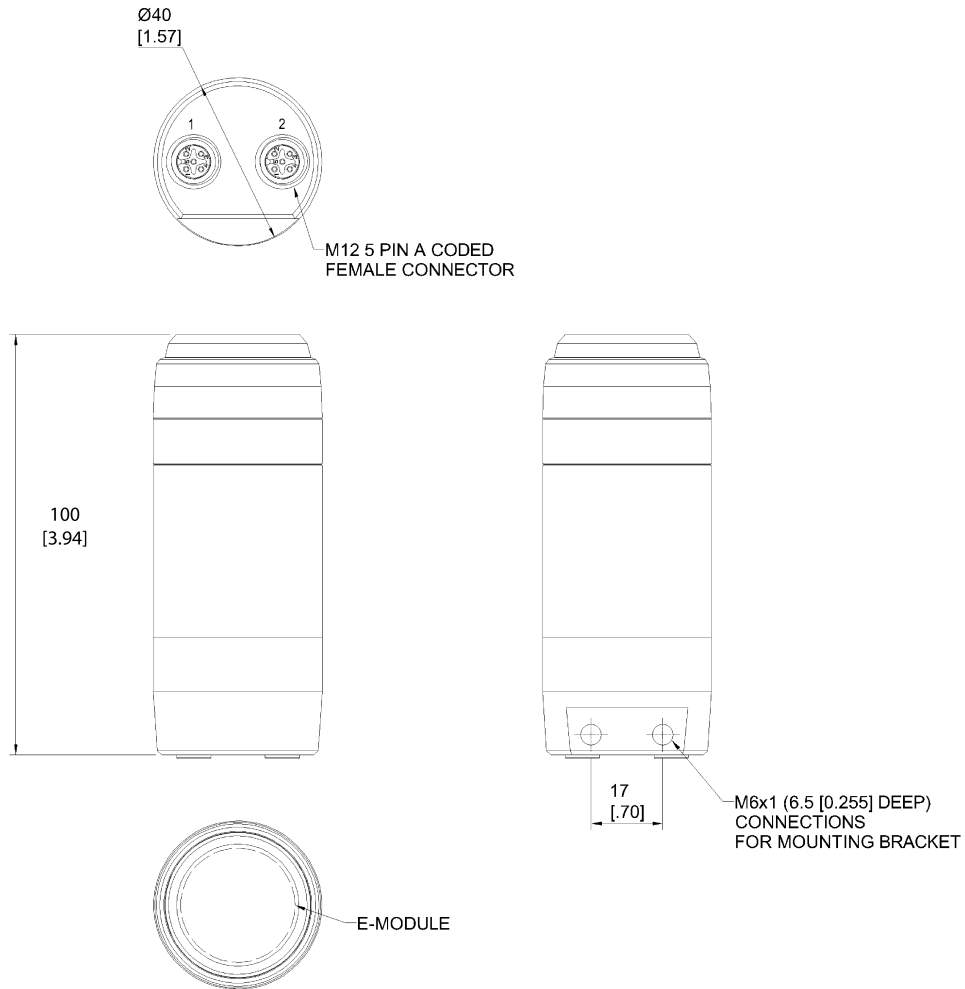
| Product or Document | Item   |   |
|---------------------|--|---|
| 164M6494            | Ranger Pro Interface Module Mounting Bracket and fasteners   |    |
| 159M7787            | Ranger Pro Cap: additional protection for high moisture installations  |  |
| 121M7993            | Battery installation tool  |  |
| 160M0017            | 5 meter cable  |   |
| 160M0018            | 10 meter cable   |   |
| 129M0166            | Sony USB configuration docking station   |   |
| 146M4035            | Case O-ring 35 x 1 mm (qty. 20)  |   |
| 146M4036            | E-module O-ring 34 x 1 mm (qty. 20)  |   |
| 125M3923            | D-sized lithium-thionyl chloride 3.6 V battery   |   |
| 121M7997            | Ranger Pro Sensor Interface configuration software (not available for order, it is available for no charge from Bently Nevada Technical Support) |   |
| 125M6113            | Ranger Pro Sensor Interface User Guide   |   |



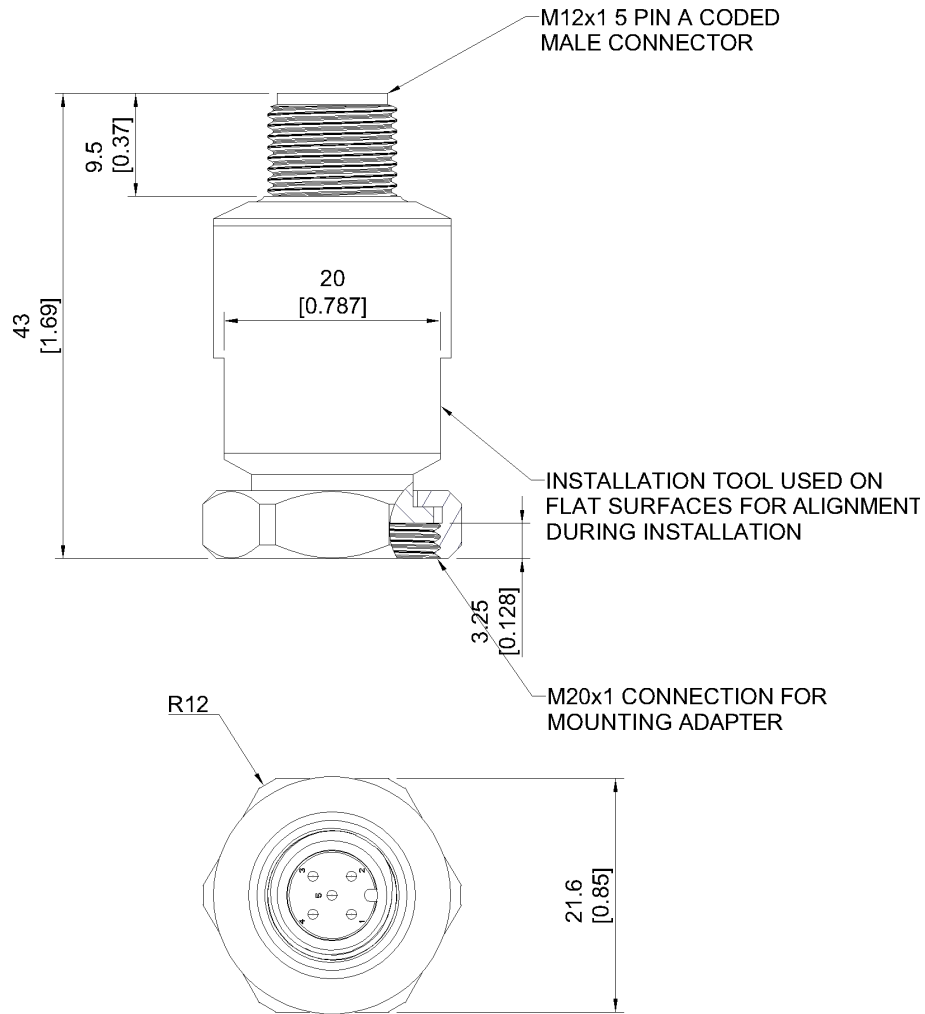
| Catalog Order Number (1) | Part Number    | Figure  |
|--------------------------|----------------|---|
| 70M323-XX-XX             | 147M7136-01-11 | <p>S/N: ADYYM###</p> <p> CSA18CA70178198 P/N: 147M7136-01-11<br/>                 CI I Div 1 Gr ABCD T4<br/>                 c<sub>us</sub> CI II Div 1 Gr FG T135°C<br/>                 CI I Zn 0 AEx ia IIC T4 Ga<br/>                 Zn 20 AEx iaD IIIB T135°C Da</p> <p> II 1G Ex ia IIC T4 Ga Uo: 5.88V Io: 196mA<br/>  I Ml Ex ia I Ma Po: 288mW<br/>  II 1D Ex ia IIIB T135°C Da Lo: 800uH Co: 3.78µF<br/>                 Sira 18ATEX2151X -40°C ≤ Ta ≤ +100°C<br/>                 0598 IECEx CSA 18.0021X</p> <p>FCC ID XFU-147M71B<br/>                 IC: 8349A-147M71B</p> <p><b>ISA100</b><br/> </p> <p><b>RANGER PRO</b><br/> <br/>                 1631 Bently Parkway South<br/>                 Minden, NV 89423 USA<br/>                 AIM<br/>                 70M323<br/>                 Made in South Africa</p>  |
| 70M423-XX-XX             | 147M7136-02-11 | <p>S/N: ADYYM###</p> <p> CSA18CA70178198 P/N: 147M7136-02-11<br/>                 CI I Div 1 Gr ABCD T4<br/>                 c<sub>us</sub> CI II Div 1 Gr FG T135°C<br/>                 CI I Zn 0 AEx ia IIC T4 Ga<br/>                 Zn 20 AEx iaD IIIB T135°C Da</p> <p> II 1G Ex ia IIC T4 Ga Uo: 5.88V Io: 196mA<br/>  I Ml Ex ia I Ma Po: 288mW<br/>  II 1D Ex ia IIIB T135°C Da Lo: 800uH Co: 3.78µF<br/>                 Sira 18ATEX2151X -40°C ≤ Ta ≤ +100°C<br/>                 0598 IECEx CSA 18.0021X</p> <p>FCC ID XFU-147M71A<br/>                 IC: 8349A-147M71A</p> <p><b>RANGER PRO</b><br/> <br/>                 1631 Bently Parkway South<br/>                 Minden, NV 89423 USA<br/>                 AIM<br/>                 70M423<br/>                 Made in South Africa</p>  |
| 70M503-XX-XX-XX-XX       | 160M0016-01    | <p>S/N: ADYYMG##</p> <p> <b>RANGER PRO</b><br/> <b>Bently Nevada</b><br/>                 Triaxial Accelerometer<br/>                 P/N: 160M0016-01<br/>                 1631 Bently Parkway South<br/>                 Minden, NV 89423 USA<br/>                 Made in South Africa</p> <p><br/> </p> <p> CSA18CA70178198<br/>                 CI I Div 1 Gr ABCD T4<br/>                 c<sub>us</sub> CI II Div 1 Gr FG T135°C<br/>                 CI I Zn 0 AEx ia IIC T4 Ga<br/>                 Zn 20 AEx iaD IIIB T135°C Da</p> <p> II 1G Ex ia IIC T4 Ga<br/>  I Ml Ex ia I Ma<br/>  II 1D Ex ia IIIB T135°C Da<br/>                 Sira 18ATEX2151X<br/>                 0598 IECEx CSA 18.0021X<br/>                 Ui: 11.1V Ii: 249mA Pi: 550 mW<br/>                 Li: 0H Ci: 1.87µF -40°C ≤ Ta ≤ +100°C</p> |

## Drawings and Figures

Dimensions are given in mm [inches] unless noted otherwise.



**Figure 1: 70M323 and 70M423 Ranger Pro Sensor Interface Modules**



**Figure 2: Ranger Pro 70M503 Accelerometer Top Exit**

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