Ranger* Pro Wireless Condition Monitoring

Datasheet

Bently Nevada* Asset Condition Monitoring

Description

The Ranger* Pro Wireless Condition Monitoring vibration sensor allows you to monitor velocity, acceleration, and temperature plus timebase waveforms, spectra, and PeakDemod spectrum. It's built for plant managers and operators in power generation, oil and gas, and related industrial markets.

The Bently Nevada Ranger* Pro Wireless Condition Monitoring sensor 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.

Ranger* Pro Wireless Condition Monitoring is a simple, easy to implement solution for use in hazardous or difficult to access environments where wired solutions are impractical.

Use Ranger* Pro Wireless Condition Monitoring to get immediate notifications, short- and long-term trending data, and diagnostic reporting. No more "reporting by walking around."

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

Machinery Applications

Ranger* Pro Wireless Condition Monitoring 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 Wireless Condition Monitoring to work in a variety of environments and applications.

- Uniaxial and tri-axial capable velocity and acceleration detection.
- Environment temperature reporting.
- Mounting hardware options to fit most applications.
- Replaceable lithium-thionyl chloride battery.
- IP67 dust and water resistant.
- Embedded sensors connect using the ISA100 wireless network protocol.
- 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

After installing Ranger Pro devices, you can set a start time for multiple devices to begin data acquisition using either third-party tools or Ranger Pro Configuration Software.
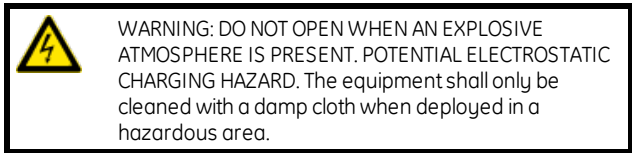
Ranger Pro collects overall vibration, temperature measurements, timebase waveforms, spectra, and Peak Demod spectrum using Generic Client Interface (GCI) with System 1*. You can filter overall and dynamic timebase and spectra data.

Network Installation

A typical network installation uses several Ranger* Pro Wireless Condition Monitoring sensors, Ranger Pro repeaters, wireless device managers, and access points. Ranger Pro is available in either uniaxial or tri-axial vibration detection.

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

Hazardous Area Approvals

> ⚠ WARNING: DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT. POTENTIAL ELECTROSTATIC CHARGING HAZARD. The equipment shall only be cleaned with a damp cloth when deployed in a hazardous area.

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.

CSA	Class I, Division 1 Groups A, B, C, D
ATEX/IECEx	**Standards** Ex ia IIC T4 Ga Ex ia I Ma
ROHS	**Directives** 2011/65/EU

Specifications
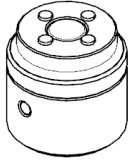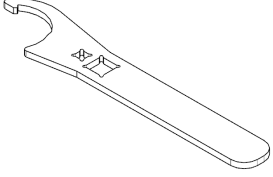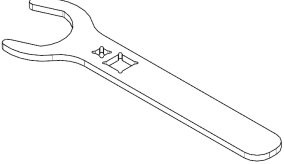
Feature	Characteristic	Value
Accelerometers	Axis	1 or 3 axis
	Sensing element	Piezoelectric ceramic
	Amplitude range	±20 g peak
	Measurement accuracy	±5% (160 Hz) Z-axis ±10% (160 Hz) X and Y axis
	Transverse sensitivity (Typ.)	7% (160 Hz)
Trending Variables	**Acceleration**	
	Acceleration frequency range	Z axis: 5 Hz (±3dB) to 10 kHz (±3dB) X and Y axis: 5 Hz (±3dB) to 4 kHz (±3dB) (tri-axial sensor only)
	Acceleration amplitude range	0 – 200 m/s2 (0 - 20 g)
	Acceleration units / sub units	g or m/s^2 / peak or rms
	Fmin	2, 5, 10, 100, 200 (Hz)
	Fmax	200, 500, 1000, 2000, 5000, 10000‡ Hz ‡ 10,000 only on Z-axis
	Velocity	
	Velocity frequency range	5 – 1000 Hz
	Velocity amplitude range	0 – 50 mm/s (0 - 2 in/s)
	Velocity units / sub units	in/s or mm/s peak or rms
	Fmin	5, 10 Hz
	Fmax	200, 500, 1000, 2000 Hz
	Peak Demod	
	Peak Demod Pk	Z axis only Parameters based on PeakDemod Spectrum settings below
	Measurement interval	10, 20, 30, 60, 120, 180, 240, 360 minutes
	Output data	Overall values using: - Modbus from device gateway - Generic Client Interface (GCI) into System 1
Waveforms and Spectra	**Acceleration**	
	Acceleration waveform	X, Y and Z axis depending on sensor model
	Fmin	2, 5, 10 Hz
	Fmax	200, 500, 1000, 2000, 5000, 10000 ‡ Hz ‡ Z-axis only
	Number of samples	1024, 2048, 4096, 8192
	Units/Sub units	g or m/s^2 / peak or rms
	Velocity	
	Velocity spectra	X, Y and Z axis depending on sensor model
	Fmin	5, 10
	Fmax	200, 500, 1000, 2000

Feature	Characteristic	Value
	Number of lines	400, 800, 1600, 3200
	Units/sub-units	in/s or mm/s / rms
	Peak Demod	
	Peak Demod spectrum	Z-Axis only
	Fmax	200, 500, 1000, 2000, 5000 Hz
	Demod Band Min	500, 1000, 2000, 5000 Hz Max 40000 Hz
	Units	g, m/s^2
	Sub-units	Peak
	Waveforms and spectra measurement intervals	6, 8, 12, 24, 48, 168, 336, 672 hours
	Output data	Waveforms and spectra via gateway Generic Client Interface (GCI) into System 1
Temperature sensor	Measurement range	-40 °C to 120 °C (-40 °F to 248 °F) (Temperature sensor range. Not to be confused with allowable operating temperatures. Limited by battery and ambient conditions.)
	Resolution	0.1°C
	Output data	Overall temperature values via Modbus from device gateway.
Wireless	Network standard	ISA100.11a
	Network topology	Star or mesh
	Radio standard	IEEE 802.15.4
	Radio frequency	2.45 GHz ISM band
	Provisioning/ firmware updates	Over-the-air using ISA100 network or via the USB docking station.
	Encryption/ security	128-bit AES encrypted packets
	Output power (peak)	10 mW, maximum
	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.)
Battery and Power	Type	Replaceable D size 3.6V lithium-thionyl chloride.

		Warning: Use only one of the following batteries: Tadiran TLH-5930/S, Tadiran TL-5930/S, Tadiran SL-2780, or Xeno Energy XL-205F.

Feature	Characteristic	Value
	Life	Up to five years depending on the operating mode and configuration.

Characteristic	Battery models	Temperature range
Hazardous area temperature range (Ta)	TLH-5930/S	-40 °C < Ta < 80 °C
	TL-5930/S, Xeno XL-205F, Tadiran SL-2780	-40 °C < Ta < 70 °C

Feature	Characteristic	Value
Operating conditions	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 sensor.)
	Vibration limit	20g peak
	Chemical resistance	Stainless steel and high temperature, solvent-resistant PPS plastic.
	Shock resistance	0.5 meter drop onto concrete

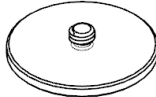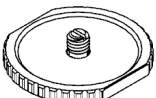| Feature	Characteristic	Value
Physical	Weight	230 grams (without battery; 300 grams with battery)
	Dimensions	Height: 88 mm; diameter: 40 mm
	Case material	316 stainless steel body and glass-reinforced, impact-resistant PPS top
	Mounting hole	M6 x 1mm X 5mm deep internal thread
	IP rating	IP67 dust and water resistant (pending)
Regulatory compliance	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 ATEX/IECEx Zone 0
	Conformity	Compliant with all CE and FCC/IC requirements
	Applies to RangerPro BN P/N:	121M6466, 121M6469, 121M6470
Compatible Gateways	Yokogawa	YFGW 410 Field Wireless Management Station
		YFGW 510 Field Wireless Access Points
	Honeywell	WDM Wireless Device Manager
		FDAP Field Device Access Point

Accessories

The installation kit (130M5452) includes a battery installation tool, two installation wrenches, and five spare O-rings. You can optionally order it with a USB docking station. These parts can also be ordered individually.

Product or Document	Item	
121M7993	Battery installation tool	
121M7994	C-spanner wrench, for Ranger* Pro Wireless Condition Monitoring sensor and M6x1 to ¼-28 and M6x1 to 3/8-24 25 tri-axial alignment stud	
121M7995	Wrench, for M6x1 to M8x1.25 tri-axial alignment stud	
129M0166	Sony USB configuration docking station	
121M7998	0-ring (each)	
125M3923	Xeno XL-205F D-size lithium-thionyl chloride 3.6V battery	
121M7997	Ranger* Pro Wireless Condition Monitoring configuration software (available for download from **BN technical support**)	
125M6113	*Ranger* Pro Wireless Condition Monitoring User Guide*	
125M7374	*Ranger* Pro Wireless Condition Monitoring Quick Start Guide*	

Spare Mounting Adapters

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

Part Number	Size	Illustration
Standard Studs		
121M7987	M6x1 to M6x1 stud	
121M7988	M6x1 to 1/4-28 adapter stud	
121M7989	M6x1 to M8x1.25 adapter stud	
121M7990	M6x1 to 10-32 adapter stud	
125M3920	M6x1 to 3/8-24 adapter stud	
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 A04.	
Cementing Pads and Adhesive		
121M7991	M6x1 epoxy cementing pad	
167236-01	3.5 g Click Bond CB200 acrylic adhesive for use with epoxy cementing pads. Sufficient for about four pads.	
Tri-axial Alignment Studs		
121M7986	M6x1.0 to M8x1.25	
125M3921	M6x1 to ¼-28	
125M3922	M6x1 to 3/8-24	

Ordering Information

For a detailed list of country- and product-specific approvals, refer to the *Approvals Quick Reference Guide* (document 108M1756) at **www.bently.com**.

Ranger Pro Tri-Axial Sensor

70M303 – AXX – BXX – CXX - DXX

Description: Tri-axial wireless accelerometer and integral temperature sensor.

A: Mounting hardware options
- **00** No stud
- **01** M6x1 to M8x1.25 tri-axial Alignment Stud
- **02** M6x1 to M8x1.25 Adapter Stud
- **03** M6x1 to M6x1 Stud
- **04** M6x1 to ¼-28 Adapter Stud
- **05** M6x1 to 10-32 Adapter Stud
- **06** M6x1 to 3/8-24 Adapter Stud
- **07** M6x1 to ¼-2 8 tri-axial Alignment Stud
- **08** M6x1 to 3/8-24 tri-axial Alignment Stud
- **09** M6x1 Epoxy Cementing Pad

B: Radio Option
- **01** ISA 100

C: Battery Option
- **00** No battery
- **01** Battery supplied, not installed

D: Agency Approval Option
- **01** CSA North America
- **02** ATEX/IECEx

Ranger Pro Single Axis Sensor

70M301 – AXX – BXX - CXX - DXX

Description: Uniaxial wireless accelerometer and integral temperature sensor.

A: Mounting Hardware Option
- **00** No stud
- **01** M6x1 to M8x1.25 tri-axial Alignment Stud
- **02** M6x1 to M8x1.25 Adapter Stud
- **03** M6x1 to M6x1 Stud
- **04** M6x1 to ¼-28 Adapter Stud
- **05** M6x1 to 10-32 Adapter Stud
- **06** M6x1 to 3/8-24 Adapter Stud
- **07** M6x1 to ¼-28 tri-axial Alignment Stud

- **08** M6x1 to 3/8-24 tri-axial Alignment Stud
- **09** M6x1 Epoxy Cementing Pad

B: Radio Option
- **01** ISA 100

C: Battery Option
- **00** No battery
- **01** Battery supplied, not installed

D: Agency Approval Option
- **01** CSA North America
- **02** ATEX/IECEx

Ranger Pro Repeater

70M300 – AXX – BXX - CXX - DXX

Description: Wireless repeater.

A: Mounting Hardware Option
- **00** No stud
- **01** M6x1 to M8x1.25 tri-axial Alignment Stud
- **02** M6x1 to M8x1.25 Adapter Stud
- **03** M6x1 to M6x1 Stud
- **04** M6x1 to ¼-28 Adapter Stud
- **05** M6x1 to 10-32 Adapter Stud
- **06** M6x1 to 3/8-24 Adapter Stud
- **07** M6x1 to ¼-28 tri-axial Alignment Stud
- **08** M6x1 to 3/8-24 tri-axial Alignment Stud
- **09** M6x1 Epoxy Cementing Pad

B: Radio Option
- **01** ISA 100

C: Battery Option
- **00** No battery
- **01** Battery supplied, not installed

D: Agency Approval Option
- **01** CSA North America
- **02** ATEX/IECEx

Ranger Pro Installation Kit

130M5452 – AXX

A: Installation package
- **00** Without USB docking station
- **01** With USB docking station (P/N 129M0166)

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

System 1 Ranger Pro Device License

3071/13 – AXX– BXX– CXX

Description: System 1 device license for Ranger Pro sensors installed for use with System 1*. One device license is required per Ranger Pro sensor.

A: Not applicable for Ranger Pro
>   **00**

B: Not applicable for Ranger Pro
>   **00**

C: Ranger Pro Device
>   **00**   ## 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* v18.1 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.

Drawings and Figures

Note: Dimensions are given in inches [millimeters] unless noted otherwise.
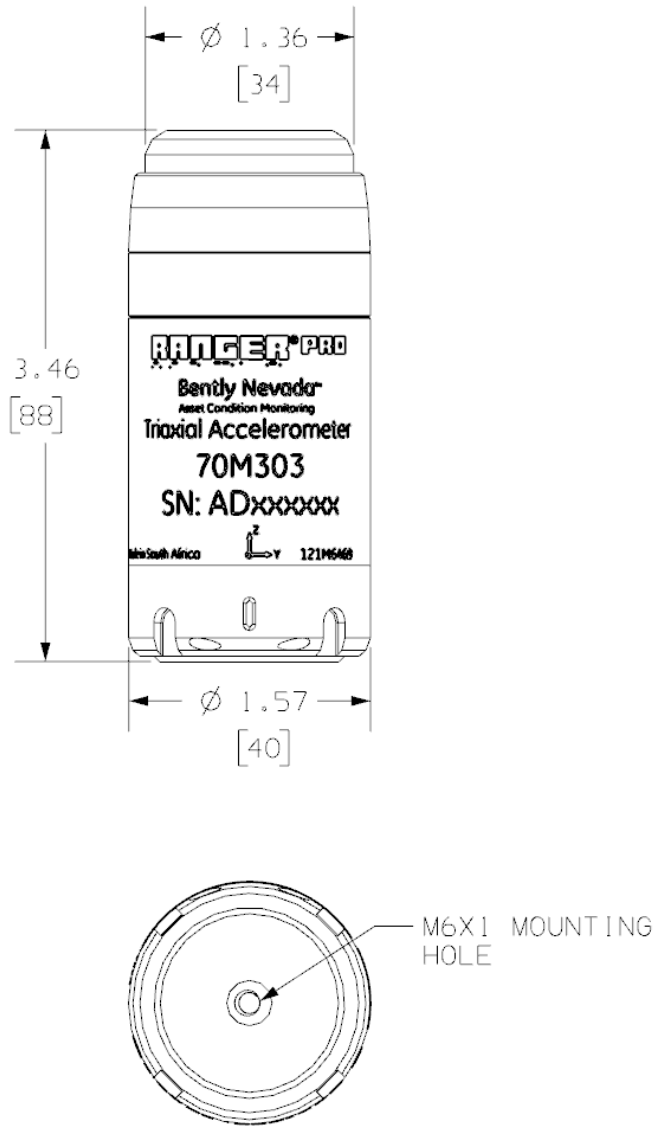
**Figure 1: Ranger* Pro Wireless Condition Monitoring 70M303 sensor
(Identical specifications for the 70M300 and 70M301)**