Plant-wide Condition Monitoring Solutions
Something for every Asset
In addition to the process-critical equipment assets found in industrial facilities, there are often a host of “supporting” assets that make up the balance of the plant such as pumps, motors, blowers, heat exchangers, fans, and others. This auxiliary or plantwide equipment may be spared or unspared, and its impact on the process stream may vary from moderate to minor. Regardless, such machines—just like their more highly critical counterparts—can benefit from condition monitoring. Bently Nevada provides affordable, effective portable and permanent condition monitoring platforms for these assets through System 1 condition monitoring hardware and software—proven solutions that are delivering tangible benefits for tens of thousands of customers around the globe.

Financial Justification
For highly critical assets, failure can mean substantial or total loss of production, often worth millions per day. Or it can lead to the release of hazardous substances, fires, and even explosions—resulting in a severe safety hazard as well as fines for violating environmental regulations.

Maintenance Costs
When viewed on a per-asset basis, maintenance costs for plantwide assets can appear modest. However, when viewed collectively across the dozens, hundreds, or even thousands of assets in a typical plant, these costs can be appreciable. Reducing the maintenance costs on each asset through effective condition monitoring—even by a mere 10%—has a large impact on plant profitability.

Why Bently Nevada?
We have earned your trust. For five decades Bently Nevada product line has supported the most demanding applications in multiple industries, from oil and gas to power generation. And even as we protect and monitor your most critical machinery, we constantly strive to refine and improve our offerings—and help enable your success.

We design and deliver solutions for all of your monitoring needs—including sensors, distributed and rack-based monitors, software, and supporting services—with the following goals in mind:

- Increased availability and production
- Lowered maintenance costs
- Reduced risk in terms of safety, environmental, and asset upsets

And we have impressive statistics to back up our extensive experience:

- More than 240 international patents issued, including over 150 in the U.S.
- More than 360 international patents pending, including over 95 in the U.S.
- Over 75,000 3500 Series monitoring systems installed globally
- Over 4 million sensor monitoring points
- Over 20 years of offering overspeed detections systems

50+ years of condition monitoring experience
70+ EXPERT Machinery Diagnostic Engineers Worldwide
20 MILLION + Sensor Monitoring Points installed on machines all over the globe
15,000 + Machine diagnostics projects completed
60,000 + Productive services jobs performed

SYSTEM 1*
5,600+ Software licenses worldwide
108 System 1 certified field engineers
35 Customer Sites enabled with remote connectivity

89% of failures are NOT time-based
+25% Production
-70% Machinery Breakdowns
-40% Downtime
-50% Maintenance Costs

49% Cite maintenance and reliability as a top priority
50% Of workforce to retire in the next 5 to 10 years. Knowledge & experience is not being transferred

60% Estimated increase in EH&S spending among global E&P companies
6X the cost for unplanned events vs. planned maintenance in process industries

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SCOUT and COMMTEST Family of Portable Instruments – Offline, Route-Based Data Collection and Analysis

Not every asset is best addressed by online monitoring. For some, a portable approach is ideal, allowing operators, machinery specialists, and others to collect data at regular intervals and on-demand. Bently Nevada offers a wide range of data collection and analysis instruments to meet your needs, all fully compatible with our industry leading System 1 condition monitoring software. These feature-rich data collections come in two form factors: a revolutionary Android smartphone or tablet interface to open up Wi-fi, cellular and Bluetooth networks.

SCOUT 200 Series
Bently Nevada’s SCOUT200 series is comprised of easy to use, small form-factor portable vibration data collectors. The SCOUT220-IS (2 channel) and SCOUT240-IS (4 channel) are Intrinsically Safe (IS) hazardous-rated portable data collector designed for ATEX Zone 1 and CSA Class 1 Zone 1 hazardous areas.

The SCOUT200 series represents the next generation of smarter, intrinsically safe portable data collectors from Bently Nevada. The SCOUT200 Series comes with a choice of industrial handheld devices which eliminates the need for a PC or other software packages at the data collection site. Fully supported by System 1 condition monitoring and diagnostic software, the SCOUT200 series integrates with your suite of Bently Nevada portable and monitoring products for a comprehensive condition based maintenance solution.

COMMTEST 200 Series
The COMMTEST220 (2 channel) and COMMTEST240 (4 channel) share the same performance and functionality specifications as the SCOUT220/240-IS but without the hazardous area rating and at a lower cost.

vbX and SCOUT 100 Series
GE’s SCOUT and vbSeries portable vibration analyzer instruments are built to robust professional standards, with thousands of users globally today. SCOUT models are certified for an ATEX Zone 2 hazardous rating, whereas the vb series models are rated for CSA Class 1, Division 2.
**SCOUT and COMMTEST Family of Portable Instruments Feature Comparison**

<table>
<thead>
<tr>
<th>Key Feature/Function</th>
<th>vb7</th>
<th>vb8</th>
<th>SCOUT100-EX</th>
<th>SCOUT140-EX</th>
<th>COMMTEST 220</th>
<th>COMMTEST 240</th>
<th>SCOUT 220</th>
<th>SCOUT 240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Fmax (Max)</td>
<td>40 KHz</td>
<td>80 KHz</td>
<td>40 KHz</td>
<td>80 KHz</td>
<td>40 KHz</td>
<td>80 KHz</td>
<td>40 KHz</td>
<td>80 KHz</td>
</tr>
<tr>
<td>Lines of Resolution</td>
<td>6,400</td>
<td>12,800</td>
<td>6,400</td>
<td>12,800</td>
<td>6,400</td>
<td>12,800</td>
<td>6,400</td>
<td>12,800</td>
</tr>
<tr>
<td>System 1</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Cellular, Wifi &amp; Bluetooth</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Integrated Camera w/ color display</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Tri-axial sensor</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Signal Processing</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
<td>Demodulation</td>
</tr>
<tr>
<td>Form Factor</td>
<td>Traditional</td>
<td>Traditional</td>
<td>Traditional</td>
<td>Traditional</td>
<td>Two-piece, single handed</td>
<td>Two-piece, single handed</td>
<td>Two-piece, single handed</td>
<td>Two-piece, single handed</td>
</tr>
<tr>
<td>Hazardous Area Ratings</td>
<td>CSA C11 Div2</td>
<td>CSA C11 Div2</td>
<td>ATEX Zone 2</td>
<td>ATEX Zone 2</td>
<td>General Purpose</td>
<td>General Purpose</td>
<td>ATEX Zone 0</td>
<td>CSA C11 Div1</td>
</tr>
<tr>
<td>Memory</td>
<td>1GB Expandable</td>
<td>1GB Expandable</td>
<td>1GB Expandable</td>
<td>1GB Expandable</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
</tr>
<tr>
<td>Warranty</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
<td>5 year</td>
</tr>
</tbody>
</table>

**Intrinsically Safe**
SCOUT 200 series are Intrinsically Safe, no need for a hot work permit.

**Multipurpose Device**
COMMTEST and SCOUT 200 series accommodate the Android OS – Additional apps and functionality can be added to your smartphone or tablet.

**6Pack* Data Collection**
With a press of a button, capture twelve readings simultaneously (dual channel) with spectrum and waveform of:
- Normal Frequencies
- High Frequencies
- Demodulation

**Configuration Wizard**
Technical Associates of Charlotte’s “Proven Method” with ISO 2372 & 10816 alarming methodology. 30,000+ bearing database.
1900/65A and 2300 – Affordable, Continuous Vibration and Temperature Monitoring

For the assets in your plant that warrant continuous monitoring and/or machinery protection 24/7, but not the channel count, features and costs associated with a conventional rack-based system, the Bently Nevada 1900/65A and 2300 General Purpose Equipment Monitor is the right fit.

The 1900/65A and 2300 are stand-alone, self-contained packages incorporating the functionality and integrity necessary for auto-shutdown protection of general purpose machinery. 1900/65A has a compact 8-channel design that accepts up to four vibration (proximity, accelerometer and velocity) and four temperature inputs. The 2300 has a compact 3-channel design that accepts up to two vibration inputs (proximity, accelerometer and velocity), one speed or three process variable inputs. Both these platforms provide the level of alarming programmability, configuration flexibility, and signal processing normally associated with larger, more expensive systems.

Both platforms contain 4-20mA outputs and ability to communicate via Modbus over Ethernet back to the plant historian for trending and integration to plant historians and DCS systems.

Certifications, Installation and Field Installation

Both these platforms are designed and contain ratings (Class 1, Div 2 and ATEX Zone 2) to be installed near the machinery, with the optional fiberglass housing, weatherproof installation requirements can be easily addressed to meet IP66 ratings. The local displays will allow operators to verify vibration data while in the unit and predictive maintenance teams can connect to the BNC connectors on the front of the unit for further data collection through a portable data analyzer.

Diagnostic Capabilities

In addition to the built in alarming capabilities at the hardware level, the 2300 monitoring system can connect to our System 1 Condition Monitoring platform through our Advanced Package. System 1 expands the value of the monitoring platform by capturing rich dynamic data that can be used to capture machine events and proactively understand the machines conditions prior to hardware alarms.

Key Feature/Function

<table>
<thead>
<tr>
<th>2300</th>
<th>1900/65A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Channels</td>
<td>2x vibration 1x tach or 3x process variable</td>
</tr>
<tr>
<td>Vibration input types</td>
<td>Accel, Velocity, Tachometer, Proximity</td>
</tr>
<tr>
<td>Outputs</td>
<td>2x relays 3x 4-20mA Modbus TCP/IP 3x Buffered Outputs</td>
</tr>
<tr>
<td>System 1 (Dynamic Data)</td>
<td>S1</td>
</tr>
<tr>
<td>Machinery Protection</td>
<td>✓</td>
</tr>
<tr>
<td>Local Display</td>
<td>✓</td>
</tr>
<tr>
<td>Signal Processing</td>
<td>Acceleration Enveloping</td>
</tr>
<tr>
<td>Configuration</td>
<td>BNMC Config Software</td>
</tr>
<tr>
<td>Hazardous Area Ratings</td>
<td>CSA CI1 Div2 ATEX Zone 2</td>
</tr>
<tr>
<td>Warranty</td>
<td>3 year</td>
</tr>
</tbody>
</table>
Trendmaster Pro*, vbOnline Pro* and Ranger Pro* – Online Scanning Condition Monitoring at a Fraction of the Price

Machinery that does not warrant continuous, dedicated machinery protection such as from the Bently Nevada 3500, 2300, ADAPT or 1900/65A Monitoring Systems, may still require more frequent condition monitoring surveillance than the weekly, monthly, or quarterly rounds generally made with a portable data collection program. Getting actionable Information to operations in a timely manner so that corrective action can be taken results in huge preventive savings. The Trendmaster Pro, Ranger Pro and vbOnline Pro each have unique features and capabilities for the wide range of assets and locations around your plant.

Trendmaster Pro

The Bently Nevada Trendmaster Pro System has been validated by thousands of customers and is specifically designed to address Zone 0 applications. Using an innovative “sensor bus” architecture, a single cable can host hundreds of permanently mounted sensors ranging from pressure to vibration, temperature to seal leak, and virtually any other compatible signal up to 8000 ft.

Compact, centralized signal processing stations, known as Dynamic Scanning Modules (DSMs) are strategically placed throughout your plant and accept from one to four sensor bus cables, resulting in a distributed network of condition monitoring sensors. All sensors on each bus are polled sequentially every few minutes, allowing the system to collect condition monitoring data from thousands of connected points, yet without the installation and hardware costs associated with traditional, centralized architectures relying on point-to-point wiring rather than a distributed bus. Wireless Ethernet connectivity can be implemented for timely, cost effective installations.

Although the Trendmaster Pro System can accept signals from virtually any commercially available sensor or monitoring device, a wide range of special vibration, temperature, seal leak, pressure, and other sensors have been specially developed to complement the system. These sensors offer the ideal balance of robustness, ease of installation, and low cost, allowing the benefits of permanent monitoring while remaining highly affordable.

vbOnline Pro

While the Trendmaster Pro system allows for up to 256 various sensors to be connected in series to provide periodic data collection, the vbOnline Pro has twelve channels that can accommodate 2-wire acceleration measurements, all sampled simultaneously along with two channels dedicated to speed. The vbOnline Pro system is more appropriately applied to a grouping of machines or larger machine trains with rolling element bearings and gearboxes, where machinery protection is not warranted. The vbOnline Pro has a built in buffer to store event information before, during and after events, which is then sent over the network to our System 1 software platform. This buffer will capture data in the event the network connection is lost, allowing the platform to be ideally situated for hard to reach and wireless communication methods.

The vbOnline Pro provides dual Ethernet connections to System 1 and to transmit overall values to the plant DCS via Modbus. The system can be configured for state based applications to alarm and pinpoint bearing fault frequencies on variable speed applications. The vbOnline Pro also has built in patented algorithms to detect fault modes on complex gearboxes, in addition to high and low speed bearing detection.

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**Key Feature/Function**

<table>
<thead>
<tr>
<th>vbOnline Pro</th>
<th>Trendmaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Channels</td>
<td>12x vibration 2x Speed</td>
</tr>
<tr>
<td>Vibration input types</td>
<td>2 wire accel Tachometer Keyphasor*</td>
</tr>
<tr>
<td>Outputs</td>
<td>Dual Ethernet Modbus</td>
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<tr>
<td>System 1 (Dynamic Data)</td>
<td>✓</td>
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<tr>
<td>Signal Processing</td>
<td>Acceleration Enveloping</td>
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<td>3 year</td>
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</table>
Ranger Pro Features

- ATEX/IECEx Zone 0 (ia IIC T4) Class 1 Div 1
- Truly wireless: sensors embedded in package
- Velocity (5-1kHz), Acceleration (5-10kHz)
- ISA100 Wireless Network Protocol
- Replaceable lithium-thionyl chloride battery
- IP67 hermetically sealed electronics
- Class 1, Division 1, Groups A,B,C,D
- IECEx and ATEX Zone 1
- Temperature: -20°C to + 85°C
- Modbus for static values
- Range: 200 meters (line of sight)
- Security: 128-bit AES encryption
- Battery life: up to 5 years
- System 1 Connectivity

Ranger Pro Wireless

The wireless sensor Ranger Pro is available in a single or triaxial form to measure velocity, acceleration and casing temperature. Ranger Pro provides a simple and easy to implement solution for use in hazardous (Class 1 Div 1 or ATEX Zone 1) or hard-to-reach environments where wired solutions are impractical or cost prohibitive. You no longer have to traverse and collect data from each unit and address the safety aspects of data collection in hard to reach or hazardous environments. This technology allows your qualified personal to spend time analyzing data based nearly real-time information, versus spending time capturing data in the field on healthy assets.
System 1 – Improve Equipment Reliability, Uptime and Efficiency

System 1 represents Bently Nevada’s flagship condition monitoring solution that seamlessly integrates with our industry leading products including online and portable devices. System 1 provides scalability by adapting to the condition monitoring requirements at your facility, as well as flexibility by connecting to any Bently Nevada field devices. Our products are designed for diverse applications and equipment failure modes at industrial facilities. We offer flexible packages ranging from portable to comprehensive plant-wide condition monitoring. We recommend understanding your equipment and defining your operation and maintenance goals first. Then, choose the software package and field devices that help you achieve those goals.

User Experience

Modern consumer software applications have pushed the envelope when it comes to user experience; we believe the same expectations apply for industrial Condition monitoring applications:

• Modern and intuitive interface
• Continuous user involvement
• User driven condition monitoring and diagnostic workflows

Capability

System 1 provides scale when it comes to database management, diagnostics, and work prioritization:

• High resolution trend, alarm and startup/shutdown data
• Bulk template configuration
• Best in-class rolling element and hydrodynamic bearing diagnostics

Accessibility

Successful Condition monitoring programs require collaboration between departments and controlled access to the tools:

• Distributed client/server deployment model
• Data replication to view data on a business network
• Remote portable data transfer
• User security profiles

Embedded Expertise

Bently Nevada differentiates itself by providing equipment focused solutions and best practice configuration and diagnostics:

• Equipment templates
• Technical Associates proven method wizard
• Embedded iso 10816-3, 10816-7, and 14694 wizards
Bently Nevada Architecture – One Solution, Endless Possibilities

Bently Nevada machine condition monitoring solutions combine advanced hardware, intelligent software and trusted service and support – providing a broader, connected view of your operations. Together, they enable you to mitigate risk, boost safety and reduce maintenance costs. From highly critical to less critical equipment, our technology enables better data collection and improved insights across your operations.
Condition Monitoring Solutions
An Integrated, Plant-wide Approach for Every Mechanical Asset