Plant-wide condition monitoring solutions
Why Bently Nevada?
We have earned your trust. For six decades, Bently Nevada product line has supported the most demanding applications in multiple industries, from oil and gas, power generation and industrial markets. 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, portable analyzers, 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 US
- More than 360 international patents pending, including over 95 in the US
- Over 100,000 monitoring systems installed globally
- 10k+ Overspeed protection systems installed globally

Financial justification
For many 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 plant-wide 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. Condition Monitoring is a planning tool that allows more effective insight in planning and asset management, allowing maintenance to be done in advance of a functional failure.

A move towards predictive maintenance

- 60% of failures are NOT time-based
- 90% of failures of workforce to retire in the next 5 to 10 years. Knowledge & experience is not being transferred
- 50% Estimated increase in EHS spending among global E&P companies
- 6x the cost for unplanned events vs. planned maintenance in process industries

- 1,600+ System 1 users worldwide
- 60,000+ Productive services jobs performed
- 15,000+ Machine diagnostics projects completed
- 140+ Expert machinery diagnostic engineers worldwide
- 20 Sensor monitoring points installed on machines globally
- 60+ Years of condition monitoring experience

Something for every asset
In addition to the most important 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 plant-wide 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 important counterparts—can benefit from Condition Monitoring. Bently Nevada provides affordable, and effective portable and permanent condition monitoring platforms for these assets connected to Bently Nevada’s common System 1 software—proven solutions that are delivering tangible benefits for tens of thousands of customers around the globe.
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 instruments to meet your needs, all fully compatible with our industry-leading System 1 condition monitoring software. These feature-rich data collectors come in multiple form factors, a traditional instrument with buttons-based user interface and a revolutionary Android smartphone/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) is 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 localized server, allowing remote communications for file transfer while in the field. 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**

Bently Nevada’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.
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 six readings simultaneously with spectrum and waveform of:
- Velocity
- Acceleration
- Demodulation

Configuration wizard
Technical Associates of Charlotte’s “Proven Method” with ISO 2372 & 10816 alarming methodology. 30,000+ bearing database.

### 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>
</tr>
<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>
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<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>Balancing</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>2020</td>
<td>2020</td>
<td>2020</td>
<td>2020</td>
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<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 1 &amp; 21</td>
<td>CSA C11 Div1 Grp A,B,C,D,E,F</td>
</tr>
<tr>
<td>Memory</td>
<td>1GB</td>
<td>1GB</td>
<td>1GB</td>
<td>1GB</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
<td>16GB Expandable</td>
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<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>
Ranger pro features

- 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 0
- 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, acceleration enveloping (or demodulation), and casing temperature. Ranger Pro provides a simple and easy to implement solution for use in hazardous (Class 1 Div 1 or ATEX Zone 0) 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 on nearly real-time information, versus spending time capturing data in the field on healthy assets.
1900/65A and 2300 – affordable, continuous vibration and temperature monitoring

For the assets in your plant that warrant continuous monitoring and/or machinery protection, but not the channel count, features and costs associated with a conventional rack-based system, the Bently Nevada 1900/65A and 2300 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 in any combination. 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/relay 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 hazardous area ratings (Class 1, Div 2 and ATEX Zone 2) for field mounted applications. 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 as they complete rounds. The predictive maintenance teams can connect to the BNC connectors on the front of the instrument 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. System 1 expands the value of the monitoring platform by collecting rich dynamic data that can be used to capture machine events and proactively understand the machines conditions prior to instrument 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, 3X tacho 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 tcpp/ip 3X buffered outputs</td>
</tr>
<tr>
<td>System 1 (dynamic data)</td>
<td>✓</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 ccl div2 ATEX zone 2</td>
</tr>
<tr>
<td>Warranty</td>
<td>3 Year</td>
</tr>
</tbody>
</table>

Anomalert* motor anomaly detection

Anomalert Motor Anomaly Detectors continuously identify existing and developing faults on electric motors and their driven equipment. Anomalert utilizes an intelligent, model-based approach to provide anomaly detection by measuring the current and voltage signals from the electrical supply to the motor. It is permanently mounted, generally in the motor control center and is applicable to synchronous and induction motors, both fixed and variable speed. Accompanying Anomalert Software is used to view the data.

Anomalert provides both mechanical (unbalance, misalignment, roller bearings, etc.) and electrical (loose windings, short circuits, etc.) anomaly detection as well as electrical parameters such as voltage and current imbalances and power factor. In addition, it can detect changes in the load the motor is experiencing due to anomalies in the driven equipment or process such as cavitations or plugged filters and screens. Since it doesn't require any sensor installation on the motor itself or associated load, Anomalert is especially attractive for inaccessible driven equipment and is applicable to most types of pumps, compressors, and similar loads.
vbOnline Pro

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 roller element bearings and gearboxes, where machinery protection is not warranted.

The vbOnline Pro has a built-in memory storage to capture up to 8 hours of waveform data in the event of network loss, automatically synchronizing with System 1 when connection is restored. This buffer will capture data in the event the network connection is lost, allowing the instrument 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 machinery problems on variable speed and load 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 fault detection.

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 4000 ft.

Compact, centralized signal processing stations, known as Dynamic Scanning Modules (DSMs) are strategically placed throughout your plant and accept from one to eight 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. Wireless Ethernet connectivity can be implemented for timely, cost effective installations.

The TIM input card connects to Bently Nevada TIM, FlexiTIM, and proTIM modules. Each TIM input card provides 2 TIM lines, and each TIM line supports up to 255 TIMs and transducers. Additionally, 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.

Key feature/function | vbOnline Pro | Trendmaster
--- | --- | ---
Input channels | 12X vibration 2X speed | Up to 255 sensors per spa line
Vibration input types | 2 Wire accel Tachometer Keyphasor* | Accel, velocity, proximity, pressure, keyphasor, speed & temperature
Outputs | Dual ethernet modbus | Ethernet modbus
System 1 (dynamic data) | ✓ | ✓
Signal processing | Acceleration enveloping | Acceleration enveloping
Hazardous area ratings | CSA CL1 DIV2 ATEX Zone 2 | CSA CL1 DIV2 ATEX Zone 0
Warranty | 3 Year | 3 Year
Orbit 60 series distributed platform
The next generation of condition monitoring, protection and data integration

The Orbit 60 Series is Bently Nevada’s most advanced condition monitoring and protection system that will help you make smarter decisions faster—and accelerate your journey to digital transformation. It collects and processes data on the edge at high speed—equipping operators with the right analytics and machine-health information needed to optimize performance and maintenance.

Key features:
- Intrinsically cyber secure
- Remote I/O
- Flexible deployments
- Multiple machine trains

- Advanced roller element bearing analysis
- API 670 protection / SIL certified
- Cloud connectivity
- High-speed process data integration

Flexible deployments
Extend the virtual backplane through bridge modules – star or daisy chain configurations

Direct connection to business network

Bi-direction control system communication, capturing high-speed process data

Coming in late 2020

Control system/DCS

Expand to remote I/O, reduce field wiring lengths
The 3500 and ADAPT flagship platforms are our most flexible and feature rich machinery protection and condition monitoring systems, which can be utilized on any type of machinery in any industry. Our 3701 ADAPT distributed architecture builds on the rich features of 3500, designed for specific applications with built in machine-specific algorithms. With a smaller footprint, the ADAPT platform is typically installed on the machine skid.

Certifications
Both of these platforms combine over five decades of condition monitoring expertise, designed to fully comply with the American Petroleum Institute’s Standard API 670, the world’s most widely used specification for machinery protection systems. For reciprocating compressor applications, the 3500 meets API 618 requirements as well. These systems can be ordered with DNV and Class NK certifications for maritime applications such as offshore platforms and ship propulsion. Further, used as part of a safety instrumented system, TÜV Functional Safety Certification can be supplied for applications requiring up to Safety Integrity Level (SIL) 3. In addition, the 3500 is approved to meet relevant Canadian Standards Association (CSA), Factory Mutual (FM), GOST, ATEX, and CE requirements.

Reliable
We understand that our systems are routinely used not just for indication, but to provide auto-shutdown protection. That’s why – even in simplex mode – the 3500 and ADAPT are the most reliable monitoring systems we have ever offered with extensive self checking and fault tolerant design features. It’s also why the system can be configured with various levels of redundancy, ranging from the addition of a second fully redundant power supply to complete triple modular redundant (TMR) configuration of selected or all channels – allowing even your most mission-critical applications to be addressed with confidence.

Connected
Connecting to condition monitoring and diagnostic software has never been easier. With the 3500 and ADAPT there are no bulky external modules, no additional wiring, and no extra rack slots required. Simply use the Ethernet port on the system module and a single network cable to communicate with our System 1 software. Connecting to plant control and automation systems is straightforward as well. Simply add a communication gateway interface. You can even add multiple gateways when communication redundancy is required or when multiple systems must be supported with differing protocols.

Sensors, probes and transducers
Bently Nevada offers vibration, position, speed, pressure, power sensors, transmitters, and rugged probes of various tip diameters and thread sizes/configurations. Our sensor, probe and transducer solutions are built on a legacy of premier condition monitoring from heritage companies like Druck, Bently Nevada and Naxys and are designed to last even in the harshest industrial environments.

Flexible
The 3500 and ADAPT Series features the industry’s most extensive selection of machinery measurement parameters combined with software configuration for virtually all monitor options. A variety of locally or remotely mounted displays are available, or you can operate the 3500 or ADAPT without a display. The result is unparalleled flexibility to address almost any application.

Field proven
Year after year, the 3500 and ADAPT Series updates systems have proven their value and dependability with customers globally with more than 90,000+ racks are installed globally.
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 these 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.

Bently Nevada network

Orbit 60 Series
3500
3701 ADAPT
2300/20
Trendmaster & AnomAlert
vbOnline Pro
Ranger Pro
Portables
Process data

Sensor

Continuous
Periodic

Installation services
System integration engineering
Machinery diagnostics
Technical training
Product support
Remote monitoring & diagnostics
# Bently Nevada service menu

## Implementation services

**Get it right the 1st time**
- Ensure your assets are protected and monitored when you’re ready to startup
- Avoid costly delays and rework
- One source to design, plan, manage, and execute the installation
- Avoid startup trips due to improper installation and configuration

## Proactive support

**Keep your System healthy and optimized**
- Prevent instrumentation related false trips
- Prevent and minimize potential data loss events
- Keep up to date and compliant with the best technologies available
- Access the expert support you need when you need it most

## Asset health and consulting

**Actionable insights you can trust**
- Understand your asset health to optimize outage and maintenance planning
- Plug in to our global network of machinery experts with remote monitoring
- Professional OEM agnostic machinery diagnostics when and where you need it
- Custom analytic development and tuning to pinpoint specific conditions

## Cybersecurity

**Stay ahead of evolving cyber threats**
- Ensure your system is up to date and protected as threats continually evolve
- Identify and mitigate cybersecurity risks to your operation
- Keep your system both secure and accessible with advanced security technologies and architectures leveraging data diodes and database replication

## Training and education

**Critical skills that amplify your machinery management capabilities**
- Enable your personnel to operate and maintain your monitoring and protection system
- Enable your operation to maximize the value of your system leveraging expert product and application training and knowledge

## Key benefits

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Get it right the 1st time</strong></td>
<td>Up to $1M/day Avoided cost from lost production, secondary process &amp; equipment damage</td>
</tr>
<tr>
<td><strong>Ensure your assets are protected and monitored when you’re ready to startup</strong></td>
<td>100% Service work guarantee 1 year warranty standard on all service work</td>
</tr>
<tr>
<td><strong>Avoid costly delays and rework</strong></td>
<td>80% Industry wide machinery alarms &amp; events are due to instrumentation</td>
</tr>
<tr>
<td><strong>One source to design, plan, manage, and execute the installation</strong></td>
<td>&gt;90% Typical reduction in non-actionable alarms &amp; events</td>
</tr>
<tr>
<td><strong>Avoid startup trips due to improper installation and configuration</strong></td>
<td></td>
</tr>
</tbody>
</table>

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