The OpsWatch monitoring system delivers real-time vibration and shock information which allows you to spot anomalies in trends and detect indications of developing faults before they result in costly failures and unplanned downtime.

Both Bently Nevada, Fluke, and Emerson AMS utilize battery powered sensor nodes that communicate to a hub, while OpsWatch is an “all in one” design that requires direct power (typically available on the equipment being monitored). The benefit of the wired OpsWatch vs. the battery powered solutions offered by the competitors are:

- **10x** more transmit power to ensure superior radio link reliability
- Significantly more volume of data communication (not constrained by battery power)
- Less machine maintenance (no need for battery replacement)
- No battery temperature constraints

- Lowest frequency floor enables monitoring a wider class of equipment including slowly rotating equipment
- Lower frequency vibrations have higher damage potential

OpsWatch detects vibrations that competitors cannot.
• Vibration damage happens in harsh environments

• Gateway temperature specifications of competing devices limit environments where the unit can be utilized

-40°C/-40°C
-25°C/-13°C
-40°C

FULL SYSTEM TEMPERATURE RANGE (SENSOR + GATEWAY)

BENTLY NEVADA RANGER PRO
FLUKE 3561 FC
SPOTSEE OPSWATCH
EMERSON AMS

Widest temperature range for harsh environments.

- **40x** times greater velocity range available than competitive set

- Scale Range: 1cm/s to 200cm/s
  - Provides measurements as small as 7mm/s up to 2000mm/s

- FFT Analysis Capability
  - Streaming data can be analyzed in FFT or PSD formats

allows you to continue measuring when other units have reached their maximum.

*Future option
<table>
<thead>
<tr>
<th>Feature</th>
<th>Bently Nevada Ranger Pro</th>
<th>FLUKE 3561 FC</th>
<th>Emerson AMS</th>
<th>Spotsee OpsWatch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vibration Range (± G)</strong></td>
<td>20</td>
<td>32</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td><strong>Vibration Accuracy (over full range)</strong></td>
<td>10%</td>
<td>5%</td>
<td>5% (partial range)</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Low Vibration Frequency (Hz)</strong></td>
<td>5</td>
<td>10</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Vibration Highest Frequency</strong></td>
<td>4000 Hz</td>
<td>1000 Hz</td>
<td>1000 Hz</td>
<td>1000 Hz</td>
</tr>
<tr>
<td><strong>Number of Axis</strong></td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Velocity Range (cm/s)</strong></td>
<td>5</td>
<td>Not specified</td>
<td>Not specified</td>
<td>200*</td>
</tr>
<tr>
<td><strong>Measurement Interval</strong></td>
<td>Constrained by battery life</td>
<td>Constrained by battery life</td>
<td>Unconstrained on ext. power</td>
<td>Unconstrained</td>
</tr>
<tr>
<td><strong>Sensor Temperature Range</strong></td>
<td>-30° to +85°C (but operation above 30°C severely reduces battery life)</td>
<td>-30° to +85°C (but operation above 30°C severely reduces battery life)</td>
<td>-40° to +85°C (without LCD screen)</td>
<td>-40° to +85°C</td>
</tr>
<tr>
<td><strong>Full System (Sensor + Gateway) Temperature Range (Low) (°C)</strong></td>
<td>-40°</td>
<td>-25°</td>
<td>-40°</td>
<td>-40°</td>
</tr>
<tr>
<td><strong>Full System (Sensor + Gateway) Temperature Range (High) (°C)</strong></td>
<td>65°</td>
<td>65°</td>
<td>70°</td>
<td>85°</td>
</tr>
<tr>
<td><strong>Minimum System Configuration</strong></td>
<td>1 Sensor + 1 Gateway</td>
<td>1 Sensor + 1 Gateway</td>
<td>1 Sensor + 1 Gateway</td>
<td>Single unit</td>
</tr>
<tr>
<td><strong>System Parts</strong></td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Sensor Power</strong></td>
<td>Lithium Battery 3.6V</td>
<td>Lithium Battery 3.6V</td>
<td>Lithium Battery/Mains</td>
<td>Mains</td>
</tr>
<tr>
<td><strong>Sensor Battery Life</strong></td>
<td>Weeks to months (but operation at elevated machine temperatures severely reduces battery life)</td>
<td>Weeks to months (but operation at elevated machine temperatures severely reduces battery life)</td>
<td>Years at room temp with highly constrained readings per hour (weeks to months with operation at elevated machine temperatures)</td>
<td>Unlimited - no battery required</td>
</tr>
<tr>
<td><strong>Sensor to Gateway Link Type</strong></td>
<td>ISA100.11a</td>
<td>BlueTooth Low Energy</td>
<td>IEC62591</td>
<td>No link required</td>
</tr>
<tr>
<td><strong>Sensor to Gateway Frequency Band</strong></td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
<td>No sensor-to-gateway radio required</td>
</tr>
<tr>
<td><strong>Sensor to Gateway Transmit Power (mW)</strong></td>
<td>10</td>
<td>10</td>
<td>10 (optional)</td>
<td>100</td>
</tr>
<tr>
<td><strong>Sensor to Gateway Security</strong></td>
<td>AES 128-bit</td>
<td>AES 128-bit</td>
<td>AES 128-bit</td>
<td>No link required</td>
</tr>
<tr>
<td><strong>Sensor to Gateway per-country Radio Certification Required</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>IP67 dust/water resistant</td>
<td>IP67 dust/water resistant</td>
<td>IP66 Instrinsically safe</td>
<td>IP67 dust/water resistant (optional)</td>
</tr>
<tr>
<td><strong>Internet Connectivity</strong></td>
<td>Ethernet (cabled)</td>
<td>WiFi</td>
<td>WiFi</td>
<td>WiFi</td>
</tr>
</tbody>
</table>

*Future option*
## OpsWatch Competitive Comparison

<table>
<thead>
<tr>
<th></th>
<th>BENTLY NEVADA RANGER PRO</th>
<th>FLUKE 3561 FC</th>
<th>EMERSON AMS</th>
<th>SPOTSEE OPSWATCH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uplink Frequency Band</strong></td>
<td>N.A. (wired)</td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td><strong>Uplink Power Source</strong></td>
<td>Mains</td>
<td>Mains</td>
<td>Mains</td>
<td>Mains</td>
</tr>
<tr>
<td><strong>Uplink Operating Temperature</strong></td>
<td>-40° to 65°C</td>
<td>-25° to 65°C</td>
<td>-40° to 70°C</td>
<td>-40° to 85°C</td>
</tr>
<tr>
<td><strong>Uplink Security</strong></td>
<td>N.A. (wired)</td>
<td>WPA2/AES</td>
<td>N.A. (wired)</td>
<td>WPA2/AES</td>
</tr>
<tr>
<td><strong>Uplink RF Transmit Power</strong></td>
<td>N.A. (wired)</td>
<td>100mW</td>
<td>N.A. (wired)</td>
<td>100mW</td>
</tr>
<tr>
<td><strong>Uplink Range</strong></td>
<td>Limited by ethernet</td>
<td>100m line-of-sight</td>
<td>Limited by ethernet</td>
<td>100m line-of-sight</td>
</tr>
<tr>
<td><strong>Uplink per-country Radio</strong></td>
<td>N.A. (wired)</td>
<td>Yes (WiFi module)</td>
<td>Yes</td>
<td>Yes (WiFi module)</td>
</tr>
<tr>
<td><strong>Intrinsically Safe</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Temperature Measuring Range</strong></td>
<td>Full operating range</td>
<td>Full operating range</td>
<td>Full operating range</td>
<td>Full operating range</td>
</tr>
<tr>
<td><strong>Temperature Resolution</strong></td>
<td>0.1° C</td>
<td>0.1° C</td>
<td>Unspecified</td>
<td>0.1° C</td>
</tr>
<tr>
<td><strong>Temperature Accuracy (over full operating range)</strong></td>
<td>Unspecified</td>
<td>Unspecified</td>
<td>+ 2° C</td>
<td>+ 2° C</td>
</tr>
<tr>
<td><strong>Installation Time</strong></td>
<td>Unspecified</td>
<td>Less than 1 hour</td>
<td>Unspecified</td>
<td>Less than 1 hour</td>
</tr>
<tr>
<td><strong>Sensor Size (inches)</strong></td>
<td>3.46 x 1.57 x 1.57</td>
<td>2.42 x 0.95 x 1.1</td>
<td>5.51 x 4.2 x 12.43</td>
<td>4.8 x 3.1 x 2.2 (excluding antenna)</td>
</tr>
<tr>
<td><strong>Sensor Length (inches)</strong></td>
<td>3.46</td>
<td>2.42</td>
<td>5.51</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Sensor Width (inches)</strong></td>
<td>1.57</td>
<td>0.95</td>
<td>4.2</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Sensor Height (inches)</strong></td>
<td>1.57</td>
<td>1.1</td>
<td>12.43</td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Gateway Length (inches)</strong></td>
<td>9.5</td>
<td>2.26</td>
<td>6.72</td>
<td>0</td>
</tr>
<tr>
<td><strong>Gateway Width (inches)</strong></td>
<td>8.66</td>
<td>1.55</td>
<td>9.02</td>
<td>0</td>
</tr>
<tr>
<td><strong>Gateway Height (inches)</strong></td>
<td>5.27</td>
<td>1.82</td>
<td>15.54</td>
<td>0</td>
</tr>
<tr>
<td><strong>Gateway Size (inches)</strong></td>
<td>9.5 x 8.66 x 5.27</td>
<td>2.26 x 1.55 x 1.82</td>
<td>6.72 x 9.02 x 12.03 (excluding antenna)</td>
<td>No gateway required</td>
</tr>
<tr>
<td><strong>Subscription terms</strong></td>
<td>Unspecified</td>
<td>Annually</td>
<td>Unspecified: gateway license required</td>
<td>Annually</td>
</tr>
</tbody>
</table>

**BENTLY NEVADA RANGER PRO**
- Uplink Frequency Band: N.A. (wired)
- Uplink Power Source: Mains
- Uplink Operating Temperature: -40° to 65°C
- Uplink Security: N.A. (wired)
- Uplink RF Transmit Power: N.A. (wired)
- Uplink Range: Limited by ethernet cable length
- Uplink per-country Radio Certification Required: N.A. (wired)
- Intrinsically Safe: Yes
- Temperature Measuring Range: Full operating range
- Temperature Resolution: 0.1° C
- Temperature Accuracy (over full operating range): Unspecified
- Installation Time: Unspecified
- Sensor Size (inches): 3.46 x 1.57 x 1.57
- Sensor Length (inches): 3.46
- Sensor Width (inches): 1.57
- Sensor Height (inches): 1.57
- Gateway Length (inches): 9.5
- Gateway Width (inches): 8.66
- Gateway Height (inches): 5.27
- Gateway Size (inches): 9.5 x 8.66 x 5.27 (excluding antenna)
- Subscription terms: Unspecified

**FLUKE 3561 FC**
- Uplink Frequency Band: 2.4 GHz
- Uplink Power Source: Mains
- Uplink Operating Temperature: -25° to 65°C
- Uplink Security: WPA2/AES
- Uplink RF Transmit Power: 100mW
- Uplink Range: 100m line-of-sight
- Uplink per-country Radio Certification Required: Yes (WiFi module)
- Temperature Measuring Range: Full operating range
- Temperature Resolution: 0.1° C
- Temperature Accuracy (over full operating range): Unspecified
- Installation Time: Less than 1 hour
- Sensor Size (inches): 2.42 x 0.95 x 1.1
- Sensor Length (inches): 2.42
- Sensor Width (inches): 0.95
- Sensor Height (inches): 1.1
- Gateway Length (inches): 2.26
- Gateway Width (inches): 1.55
- Gateway Height (inches): 1.82
- Gateway Size (inches): 2.26 x 1.55 x 1.82 (excluding antenna)
- Subscription terms: Annually

**EMERSON AMS**
- Uplink Frequency Band: 2.4 GHz
- Uplink Power Source: Mains
- Uplink Operating Temperature: -40° to 70°C
- Uplink Security: N.A. (wired)
- Uplink RF Transmit Power: N.A. (wired)
- Uplink Range: Limited by ethernet cable length
- Uplink per-country Radio Certification Required: Yes
- Intrinsically Safe: Yes
- Temperature Measuring Range: Full operating range
- Temperature Resolution: Unspecified
- Temperature Accuracy (over full operating range): + 2° C
- Installation Time: Less than 1 hour
- Sensor Size (inches): 5.51 x 4.2 x 12.43
- Sensor Length (inches): 5.51
- Sensor Width (inches): 4.2
- Sensor Height (inches): 12.43
- Gateway Length (inches): 6.72
- Gateway Width (inches): 9.02
- Gateway Height (inches): 15.54
- Gateway Size (inches): 6.72 x 9.02 x 12.03 (excluding antenna)
- Subscription terms: Unspecified: gateway license required

**SPOTSEE OPSWATCH**
- Uplink Frequency Band: 2.4 GHz
- Uplink Power Source: Mains
- Uplink Operating Temperature: -40° to 85°C
- Uplink Security: WPA2/AES
- Uplink RF Transmit Power: 100mW
- Uplink Range: 100m line-of-sight
- Uplink per-country Radio Certification Required: Yes (WiFi module)
- Intrinsically Safe: Yes
- Temperature Measuring Range: Full operating range
- Temperature Resolution: 0.1° C
- Temperature Accuracy (over full operating range): + 2° C
- Installation Time: Less than 1 hour
- Sensor Size (inches): 4.8 x 3.1 x 2.2 (excluding antenna)
- Sensor Length (inches): 4.8
- Sensor Width (inches): 3.1
- Sensor Height (inches): 2.2
- Gateway Length (inches): 0
- Gateway Width (inches): 0
- Gateway Height (inches): 0
- Gateway Size (inches): No gateway required
- Subscription terms: Annually