

# Bently Nevada™ Orbit 60 Series

Machinery protection and condition  
monitoring system



# Protection never looked so good

Say hello to Bently Nevada™ Orbit 60. The most advanced machinery protection system we have ever offered, built on 60 years of domain expertise that many strive to emulate, but none can duplicate. Orbit 60 is more than just protection—it's also condition monitoring done in a way that's integrated yet cybersecure. Use Orbit 60 for protection alone, for condition monitoring alone, or both. The choice is yours with Orbit 60.



# Leaders aren't born. They're built.

Cordant™ from Baker Hughes leverages Bently Nevada hardware devices in its asset health solution to help optimize assets, processes, and energy use at scale. The Bently Nevada brand is synonymous with the entire industry of vibration, machinery protection, and condition monitoring. That association isn't lost on us. We're proud to have been a pioneer in this industry—from our humble beginnings in a Berkeley, California garage—to our present world-class capabilities spanning the entire globe.

In the intervening 60+ years, we've learned what works through five successful generations of full-featured, machinery protection platforms culminating in Orbit 60—our new flagship for continuous machinery protection and condition monitoring.



**1956**

Bently Scientific begins in Berkeley, CA

**BENTLY  
NEVADA**

**1961**

Moves to Nevada and becomes Bently Nevada



**1965**

First generation  
5000 Series



**1975**

Second generation  
7200 Series



**1988**

Third generation  
3300 Series



**1995**

Fourth generation  
3500 Series



**2021**

Fifth generation  
Orbit 60 Series



# You spoke. We listened.

Orbit 60 is not just the result of 60 years of know-how. It's the result of more than 200 focused customer engagements where we asked you directly what you needed in a new platform. You told us clearly your three biggest requirements:

- A cybersecure solution for both machinery protection and condition monitoring. A solution that satisfied the needs of not just machinery engineers, but the OT and IT worlds in which data must move
- A reduction in installation costs by using less space for the same channel count, by allowing more flexibility in where the system was located, and by reducing the length and number of wiring runs
- An easier and more cost-effective way to integrate process data into the machinery monitoring ecosystem while delivering machinery data to the process control and monitoring ecosystem

To keep us laser-focused on these customer imperatives, and the resulting technologies, we introduced three new concepts to embody them: Orbit conneX™, Orbit aXess™, and Orbit Xtend™—revolutionary capabilities unique not just to Orbit 60, but to the industry.

conne  
aXess  
tend

## Orbit conneX



Publish alarm, event, and overall values

←..... and .....→



Retrieve high-speed process data (future enhancement)

## Orbit aXess



Isolates condition monitoring network

←..... from .....→

Cordant



Machinery protection network with patented circuit design

## Orbit Xtend™



Extend full bandwidth

←.... digital ....→



Up to 2 km via bridging



# Completely flexible

## Orbit Xtend™

In the age-old debate of centralized versus distributed architectures, we did something profoundly simple: an architecture that delivers both.

Prior generations of monitoring systems limited a “rack” to a single, physical chassis. Not with Orbit 60. Our Xtend technology allows you to connect multiple chassis with a virtual, digital backplane using copper\* or fiber. It’s fast. It’s secure. And it’s flexible. The result is that Orbit 60 can be deployed as not just a conventional “single” rack, but as a distributed rack where I/O is located near the machine to dramatically reduce wiring costs, linked to the master rack and its common controllers, communication gateways, and displays via ultra-fast communications through simplex or redundant bridging modules in each chassis. Xtend™ technology allows two chassis and up to 65 dynamic channels to be connected, with chassis located up to 2 km from one another. Mission-critical protection applications use two redundant bridge modules per chassis; condition monitoring-only applications require only a single cable between chassis.

Orbit 60 is also smaller than our prior generations of monitoring systems—meaning less space is required for the same number of channels. That space savings translates directly to cost savings through cabinets that can be more densely populated and precious panel space that can be more efficiently used. The 3U, 19” rack can hold approximately the same number of channels as 3500 yet in just half the space.

### Flexible deployments



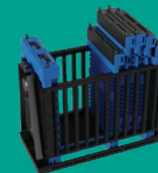
Extend the virtual backplane through bridge modules



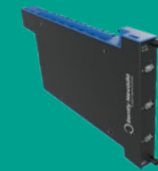
Expand to remote i/o, reduce field wiring lengths



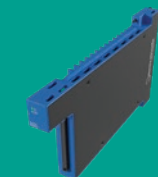
The 3U form factor holds 60+ channels and fits in just 19” x 5.2” x 9.7”



Racks can be mounted in panel cutouts using integral clamps, on 19” EIA rails, or bulkhead-style



The utility side of modules gives access to wiring, buffered outputs, and all status LEDs



The public side of modules provides buffered outputs and LEDs while leaving room for an optional integral display\*

\* Future

# Ultra-secure

## Orbit aXess™

Customers told us loud and clear that today's number one priority is cybersecurity. They needed an architecture that was SIL-capable for machinery protection, yet fully segregated from the condition monitoring environment so that one does not interfere with the other. One way to do this is with entirely separate platforms—one for condition monitoring and one for protection—but that would take the industry backwards in time nearly 25 years to an era of stand-alone condition monitoring boxes connected to protection racks. Surely there had to be a better way.

There is.

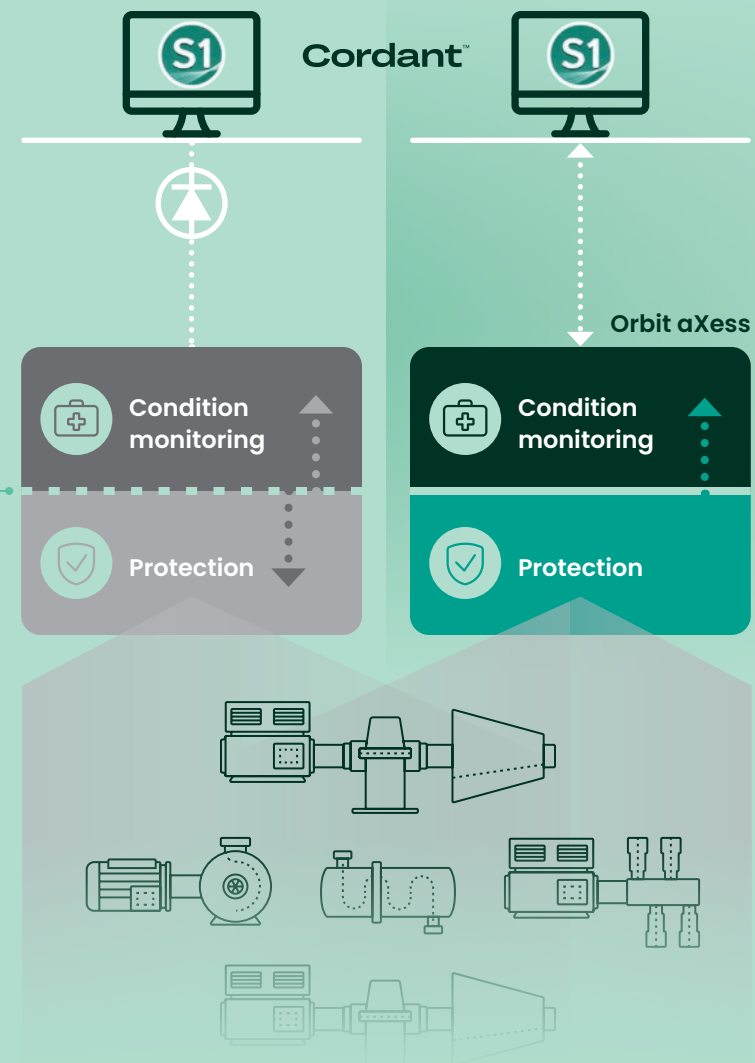
We call it Orbit aXess technology. It allows the protection and condition monitoring functions to coexist in the same rack and use the same I/O, yet function completely independent of one another. The protection components are able to publish their data for consumption by the condition monitoring system, but without any physical circuit board traces that allow the data to move from the condition monitoring components back to the protection components. The data moves one direction, and one direction only, without any digital handshaking. It's like a diode—only better. And, it's patented.

### Better than diodes

Data diodes are highly effective because they preclude any inbound communications, allowing only outbound. This one-directional design comes at a price, however: it means that on-the-fly changes to the condition monitoring system cannot be done. Thus, while protecting the protection system from intrusion, they also prevent the condition monitoring functions from being accessed. Our aXess technology enables segregation between the protection system and the condition monitoring functions—not between the condition monitoring functions and the outside world. The result is that users can access full configuration flexibility over the condition monitoring capabilities of Orbit 60, while keeping the protective capabilities safely and securely isolated from intrusion of any kind. With aXess technology, cybersecurity is assured and IT infrastructure costs are lowered.

#### Without aXess technology

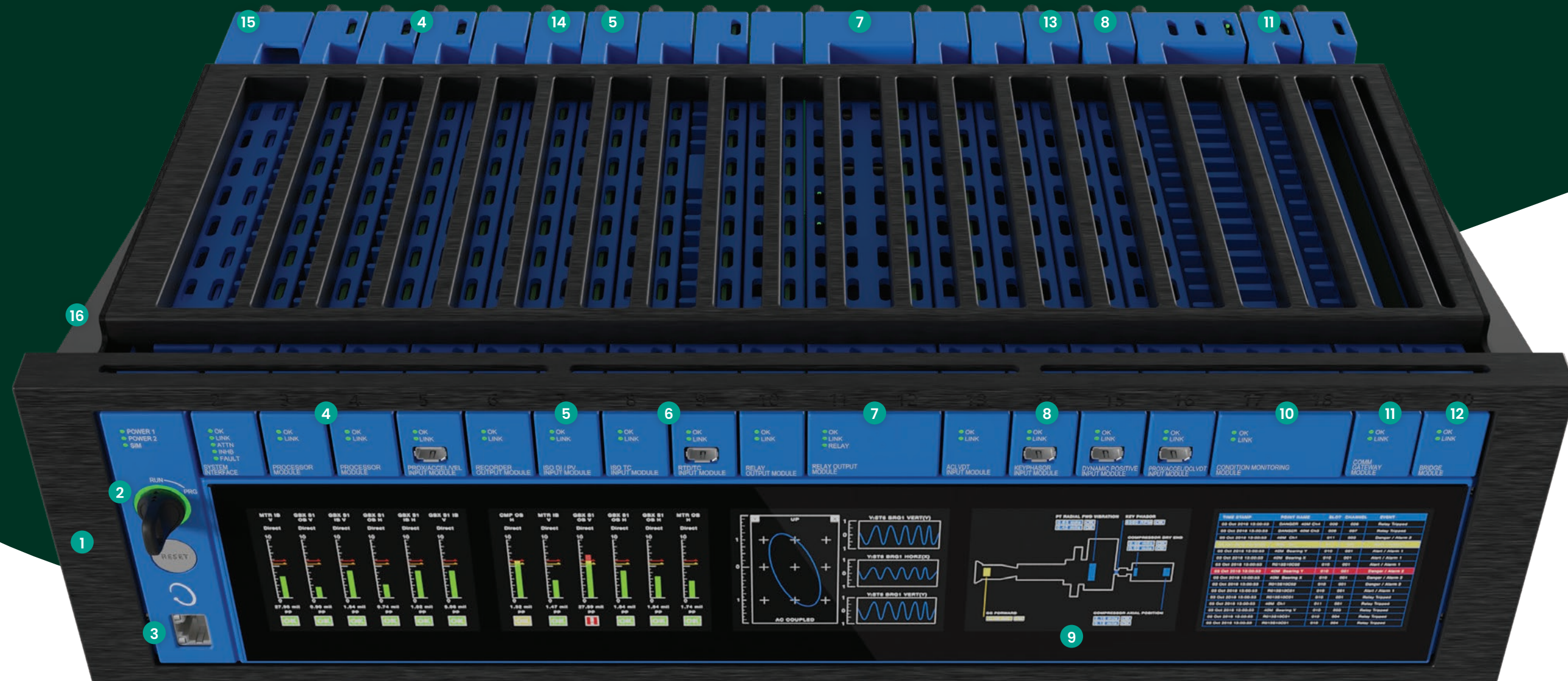
Conventional technology leaves a porous boundary between the protection and condition monitoring systems. The data diode's location blocks **all** 2-way communication with the **entire** system—including condition monitoring. Security is maintained at the expense of usability.



#### With aXess technology

Bently Nevada's patented aXess technology allows data to flow from protection to condition monitoring, but not the other way around—all while preserving bi-directional communications between users and the condition monitoring layer. Neither usability nor security are sacrificed.





# Capably equipped

1. Global Div 2/Zone 2 hazardous area approvals
2. Physical keylock security
3. Ethernet port (1 public, 2 utility) for use by config SW and external displays
4. Protection processing module (PPM)
  - One PPM typically supports 32 dynamic and hundreds of static points
  - Supports multiple PPMs for larger channel counts, redundancy, and API 670 and/or SIL-2 compliance
5. Discrete and process variable inputs
  - Supports discrete inputs for state-base measurements and annunciation
6. RTD and TC inputs
7. SIL-rated electromagnetic and/or solid-state relays
  - Fully programmable relay logic
8. Buffered outputs and status LEDs on both utility and public sides
9. Integral display options\*
  - Use multiple CMMs for additional processing power
10. Condition monitoring module
  - Suitable for use in protection loop if desired; multiple CGMs per system supported
  - Serial\* or ethernet versions of CGM available for maximum compatibility with new and existing networks
  - Supports Modbus TCP, Modbus RTU (future release), and EGD protocols; others in future
11. Communications gateway module
  - Bi-directional connEX™ digital communications with plant control, historian, and other automation platforms\*
  - Supports Modbus TCP, Modbus RTU (future release), and EGD protocols; others in future
12. Bridge module links multiple chassis into a “virtual” rack (Future release. Currently not available)
13. Works with virtually all proximity and seismic sensors—including +24V IEPE accelerometers, AC and DC LVDTs
14. SIL-rated recorder outputs (4–20mA, 1–5Vdc, 0–10Vdc); fully programmable (available 2024)
15. Energized with std +24Vdc instrument power—simplex or redundant
16. Integral panel clamps

\* Future



# Modularly designed

## Protection

We take machinery protection seriously, and have for over 60 years. That's why the protective functions in Orbit 60 are completely independent of non-protective functions, ensuring the integrity of machinery protection loops is never compromised. We've also designed the system from the ground up to fully meet SIL-2 requirements, reflecting the large number of installations now requiring SIL-1 or SIL-2 rated loops\*.

### API 670

We meet the API 670 requirement that a single module failure may only impact 4 dynamic channels or 6 static channels. Orbit 60 has also removed the channel pair requirements making it easy to configure X and Y sensors on separate modules. Redundant Protection Processor Modules (PPMs) are required to ensure a failure of the PPM itself will have no impact on any channels.

## Condition monitoring

Condition monitoring isn't an afterthought in Orbit 60. In fact, it's such an integral part of the architecture that you can use Orbit 60 for condition monitoring alone if desired—without a protection processing module.

In those instances where Orbit 60 is used for both protection and condition monitoring, our aXess™ technology segregates the two systems without constraining your ability to make on-the-fly changes to condition monitoring measurements and signal processing parameters. Total security and total flexibility perfectly co-exist.

And because Orbit 60 is an Edge device, all of that condition monitoring horsepower is inside the rack—not in some distant cloud or server. It's an architecture that delivers the results you need today without limiting tomorrow's possibilities.

### Typical module



### The public side

The "exposed" side of the rack normally accessed by personnel for day-to-day usage such as connection of portable instruments, viewing of integral display, etc.

### The utility side

The side of the rack where wiring connections are made. LEDs and buffered output connections appear on both public and utility sides for maximum convenience.



### Power Input Module

Supports simplex or redundant +24Vdc supplies; failure of a single supply in redundant configurations will not affect system operation



### System Interface Module

Provides functions common to the entire system and interfaces to displays and configuration software



### Protection Processing Module

Provides protection functionality from any mix of dynamic, static, and CGM inputs; multiple PPMs supported per system for handling large channel counts and/or redundancy requirements



### Condition Monitoring Module

Provides fully integrated condition monitoring functionality. Multiple CMMs supported per system



### Comm Gateway Module

Provides two independent ethernet or serial ports (future enhancement) for bi-directional Modbus (future enhancement) or EGD communications with process control, historian, and other automation platforms



### Bridge Module

Links multiple chassis together in distributed architectures using Xtend™ technology; supports simplex and redundant link media



### High-Speed Keyphasor® Input Module

4 channels; while standard Dynamic Input Modules can be used for most Keyphasor® measurements, this module is recommended for shaft rotative speeds above 12,000 rpm



### Dynamic Input Modules

4 channels; supports most commercially available proximity, DC LVDT, speed, dynamic pressure, and 2- and 3-wire velocity and acceleration transducers



### AC LVDT Input Module

4 channels; accepts 4-, 5-, and 6-wire AC LVDTs; routinely used for valve position and case expansion measurements



### Static Input Modules

6 channels; accepts RTDs, TCs, wet or dry discrete contacts/signals, and process variable signals



### Recorder Output Module

8 channels; provides proportional analog output of measured variables in 4-20mA, 1-5Vdc, or 0-10Vdc signal formats; fully programmable



### Relay Output Modules

8 SPDT relays; available in solid-state and electromechanical versions; pairs of relays can be ganged into DPDT configurations

\* For SIL-3 overspeed and/or ESD applications, our independent 3701/55 system is available, providing both overspeed and emergency shutdown logic-solver functionality

# Perfectly paired

Let's face it—no matter how good a protection system might be, deficiencies in the condition monitoring capabilities and the relative pain or ease of configuring the system can be more than just inconvenient—they can be show-stoppers. With Orbit 60, you don't have to expend so much as a single second worrying about either. Both are world-class—just like Orbit 60.



## Configuration with Orbit Studio

Configuration software should be effortless, requiring you to know only what you want your settings to be—not an endless parade of dialog boxes and cryptic navigation requiring special training. It should work whether you are connected to a system or not, allowing you to build an offline configuration and then simply upload it when connected. It should be intuitive. It should be powerful. It should provide on-the-fly guidance to keep you from making mistakes—like loading a protection processor module too heavily or selecting incompatible options. It should allow you to connect to multiple systems at the same time, allowing you to cut and paste between them instead of tedious retyping of repetitive configuration parameters. And, it should allow you to view live data to validate that your configuration settings are correct during system installation and Factory Acceptance Testing. With Orbit Studio, you get all of this and more. We've completely re-engineered our configuration environment by listening to our customers, making it easier, faster, and more intuitive. In fact, we're so impressed with the results that Orbit Studio will emerge as the configuration environment for all of our systems in the future.

## Cordant™ Asset Health built on System 1™

We launched System 1 in 2000 and more than two decades later, it's better than ever. After all, we've invested more than 5 million developer hours transforming input from customers like you into a feature set that is unmatched in the industry. Turbomachinery. Gears. Rolling element bearings. Reciprocating compressors. Wind turbines. Hydro turbines. Slow-speed rolling mills. And so much more. Our Cordant™ Asset Health solution has all the tools you need for optimized assets, processes, and energy use at scale. And, because it is built to accept any kind of data source from our broad range of wired and wireless continuous, intermittent surveillance, and portable instruments, you never have to worry about multiple software packages to address your ecosystem of machinery types and associated instrumentation. We bring it all together in one solution.



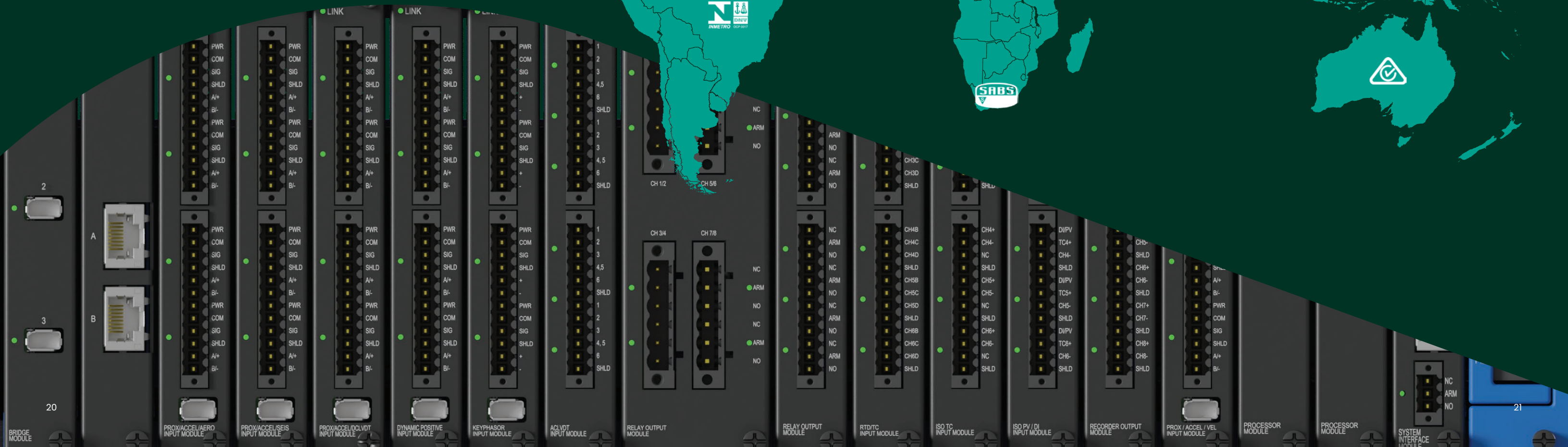
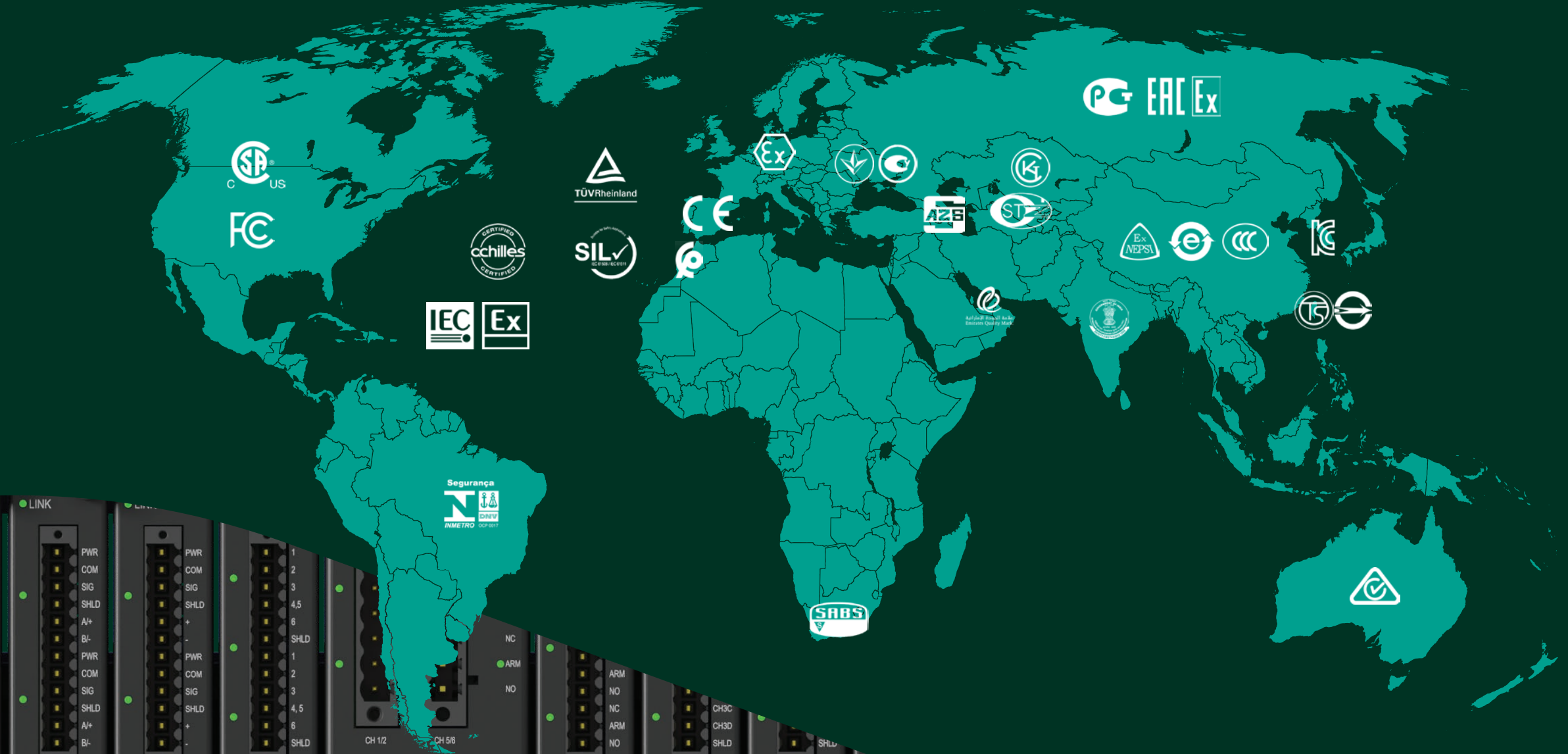
## Unify autonomous, AI-powered asset health—connected, proactive, and actionable

Cordant™ Asset Health Analytics extends the power of System 1 by automatically reviewing asset data using embedded intelligence grounded in more than 60 years of machinery expertise and AI driven tools. Built on System 1's ability to monitor both mechanical condition and thermodynamic performance, Cordant™ Asset Health is a modern, cloud-based solution that connects vast amounts of disparate asset health data across machines, sites, and systems

into a unified, action-oriented workflow. It enables a holistic, proactive approach to asset management through continuous autonomous monitoring, early detection of mechanical degradation, and advanced intelligence models that support diagnostics and corrective decision-making. Seamless integration with work execution systems further ensures maintenance and repair activities are carried out and validated as efficiently as possible.

# Globally certified

Selecting the right system for protecting and managing your machinery shouldn't represent a compromise when it comes to approvals. Our broad portfolio of products allows you to apply the right product with the confidence that it has the right approvals, wherever you might be located. Orbit 60 continues our commitment to globally certified products by addressing not just hazardous areas and general electrical safety, but also functional safety, cybersecurity, and environmental standards—not to mention numerous industrial standards from IEEE, API, ISO, ABS (target February 2024), and many others. And we also pay attention to country-specific certifications that may not apply globally, but are essential for your country. We make it our business to understand, obtain, and maintain the right approvals so you can focus on what's most important to you: the machinery that powers your business.



# Fully supported



We don't just build the best products in the industry. We stand behind them with a comprehensive suite of services that goes well beyond the monitoring system and extends all the way from the sensors in and on your machines to the software on top of your desk to data repositories in the cloud to all the infrastructure in between.

We pride ourselves in the support we offer, anchored by deeply experienced professionals in every region of the world, ensuring you receive competent help when you need it—in your own language and time zone.

Our customers represent a broad cross-section of internal capabilities and competencies, ranging from fully self-sufficient to fully dependent. Our service offerings are structured to fit every scenario whether it is augmenting your own capabilities or doing it all for you—including project management and arranging/supervising all required subtrades.

We also believe that knowledgeable customers make the best customers—which is why we invest so heavily in training. In fact, we have trained more than 10,000 customers over the last 60 years in more than a dozen languages across 80 countries. It ensures that when we leave the jobsite, you possess the skills to put our systems fully to work, fully delivering the results you expect.

-  Enclosures and cabinets
-  Machinery diagnostic services
-  Product service and repairs
-  Site and factory acceptance testing
-  System integration
-  Design and installation services
-  Remote machinery diagnostics
-  Hosted condition monitoring

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Rewriting The Energy Equation™

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