

GE Energy

Condition Monitoring for Essential Assets



imagination at work

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 balance-of-plant (BOP) 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 “critical” counterparts—can benefit from condition monitoring. GE Energy provides affordable, effective portable and permanent condition monitoring systems for these assets through its Bently Nevada* condition monitoring hardware and software—proven solutions that are delivering tangible benefits for tens of thousands of customers around the globe.

Value

Improved

- Maintenance planning, scheduling, “wrench time”
- Safety and environmental compliance
- Asset reliability/availability
- Throughput/quality

Reduced

- Maintenance costs
- Energy consumption
- Spare parts inventory
- Catastrophic asset failures
- Downtime

Financial Justification

The financial justification for monitoring auxiliary assets is different from that of critical assets. For critical assets, failure means substantial or total loss of production, often worth millions per day. For these assets, the impact of an individual failure is generally less dramatic, but nonetheless important when the following are considered:

• Maintenance Costs

When viewed on a per-asset basis, maintenance costs for BOP 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.

• Safety and Environmental Costs

Undetected failures of seals and bearings in pumps are just one example of scenarios that can lead to release of hazardous substances, fires, and even explosions. The impact of such incidents needs no elaboration and can be enormous—often resulting in total plant shutdowns and consequent loss of production.



1900/65A—Affordable, Continuous Vibration and Temperature Monitoring

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

The 1900/65A is a stand-alone, self-contained package incorporating the functionality and integrity necessary for auto-shutdown protection of general purpose machinery. Its compact 8-channel design accepts up to four vibration and four temperature inputs, providing the level of alarming programmability, configuration flexibility, and signal processing normally associated with larger, more expensive systems.

Available with or without an optional display, the 1900/65A provides the flexibility of full indication, or “blind” monitoring when addressing the most cost-conscious installations. The display can be mounted directly on the monitor, or mounted remotely up to 76 meters (250 feet) away using a single cable. This modular design allows users to reduce installation costs by mounting the monitor close to the asset(s) where input transducer wiring lengths can be minimized, and mounting the display in a more conveniently viewable location—such as an instrument shelter or control room.

Using the optional fiberglass housing (or steel door for panelmount applications), weatherproof installation requirements can be easily addressed. The monitor, display, and associated transducers can also be installed in hazardous areas (certifications pending) as required in many chemical and petrochemical facilities.

Snapshot* 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. Three different data collection instruments are available to meet your needs, all fully compatible with our System 1* condition monitoring software:

Snapshot* for Windows® CE

The most full-featured member of the Snapshot family, this instrument provides 2-channel (plus phase) data collection and analysis capabilities in one of the industry's most rugged and compact packages. Long battery life, large touch-screen display, powerful analysis and data collection functionality, and compatibility with a wide variety of vibration, temperature, process, and other signals make it a must-have tool for your predictive maintenance program.



Snapshot* IS

An intrinsically safe, single-channel (plus phase) version of Snapshot CE, our Snapshot IS instrument features a similar user interface and many of the same features, yet in a package that is CENELEC certified for use in hazardous areas—eliminating the need for a “hot work” permit when collecting data in such environments.



Clipboard* Industrial PDA with System 1 Notes

The basic manual data entry and note-taking features of our larger Snapshot instruments are provided on this high-performance ultra-portable device running Windows® Mobile™ and a special version of System 1 software. Available in I.S. and non-I.S. versions, it eliminates the need for operators to carry pencil and paper for routine plant walk-downs where meter readings, visual observations, and notes are entered. The device uses an intuitive stylus-based user interface and supports full wireless connectivity to your System 1 network, simplifying data transfer and saving valuable time.



Trendmaster* Pro — Online Condition Monitoring at a Fraction of the Price

Many assets in a plant are somewhere between critical and non-critical. While they may not warrant continuous, dedicated machinery protection such as from Bently Nevada 3500 or 1900/65A Monitoring Systems, they require more frequent 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 Bently Nevada Trendmaster Pro System is specifically designed to address such assets. 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.

Signal Processing Hardware

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.



Sensors

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.

Hazardous Areas

Unlike many other so-called “sensor bus” or “field bus” networks, the Trendmaster Pro system is specifically designed to handle the large bandwidth requirements of condition monitoring data—and requires just a single IS barrier or galvanic isolator for hundreds of points, allowing its use in hazardous areas without prohibitive installation costs.

Software

DSMs can be connected directly to your process control system using industry-standard Modbus® protocol. This provides an extremely cost-effective entry-level system that uses your existing plant control platform for archiving, alarming, and display—resulting in a totally integrated condition monitoring and process control environment for your operators.

When more in-depth analysis capabilities are required, DSMs can also be connected to System 1 software via conventional wired or wireless Ethernet networks where all condition monitoring data is archived and displayed. This allows your Trendmaster Pro installation to seamlessly integrate with portable data collectors and continuous monitoring systems, such as Bently Nevada Snapshot instruments and 3500 Series Machinery Protection Systems.



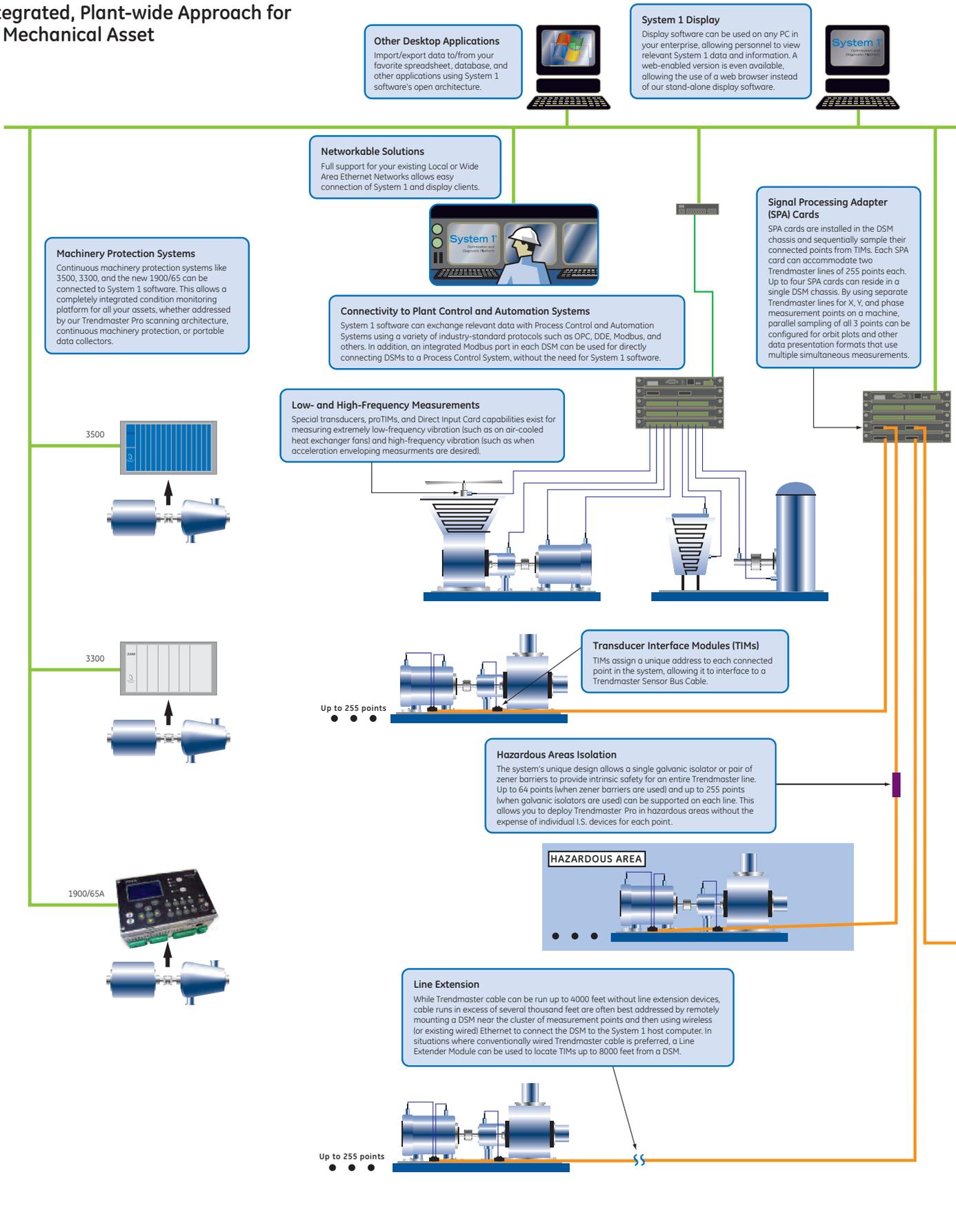
Applications

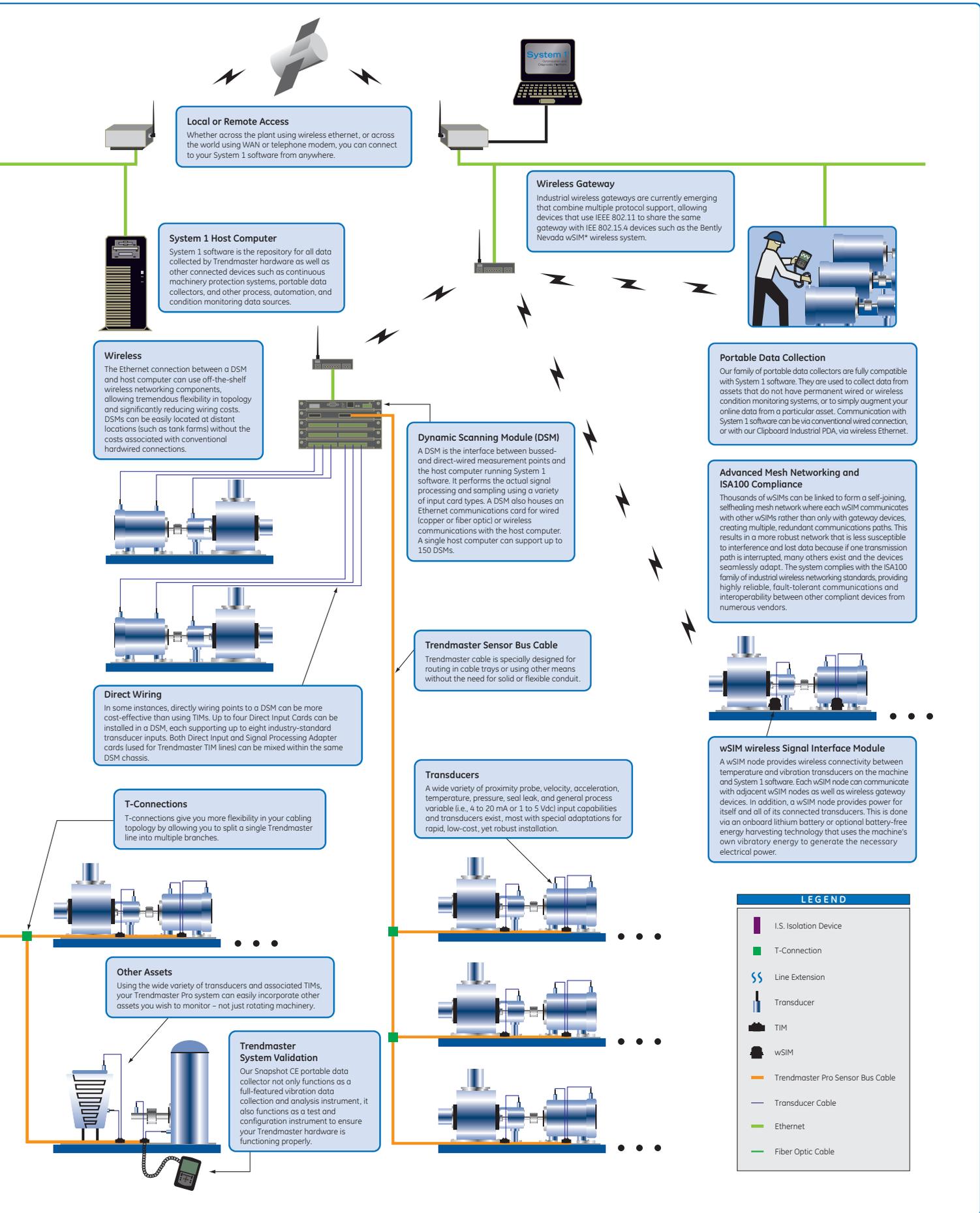
The Trendmaster Pro System is ideal for applications such as the following:

- Installations where manual data collection is dangerous or impossible due to environmental or physical constraints
- Remote or un-staffed facilities where manual data collection is cumbersome or impractical (for example, wind turbine farms)
- “Pump alley” installations where frequent data collection is desirable to prevent seal, bearing, and other problems that could result in toxic or hazardous substance releases, fires, or explosions
- Any assets for which more frequent data collection is required, allowing online cause/effect correlation between mechanical health and process conditions

Condition Monitoring Solutions

An Integrated, Plant-wide Approach for Every Mechanical Asset





Local or Remote Access
Whether across the plant using wireless ethernet, or across the world using WAN or telephone modem, you can connect to your System 1 software from anywhere.

Wireless Gateway
Industrial wireless gateways are currently emerging that combine multiple protocol support, allowing devices that use IEEE 802.11 to share the same gateway with IEEE 802.15.4 devices such as the Bently Nevada wSIM* wireless system.

System 1 Host Computer
System 1 software is the repository for all data collected by Trendmaster hardware as well as other connected devices such as continuous machinery protection systems, portable data collectors, and other process, automation, and condition monitoring data sources.

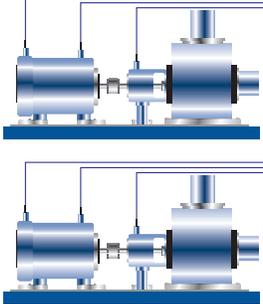


Portable Data Collection
Our family of portable data collectors are fully compatible with System 1 software. They are used to collect data from assets that do not have permanent wired or wireless condition monitoring systems, or to simply augment your online data from a particular asset. Communication with System 1 software can be via conventional wired connection, or with our Clipboard Industrial PDA, via wireless Ethernet.

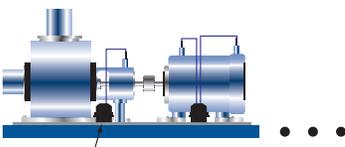
Wireless
The Ethernet connection between a DSM and host computer can use off-the-shelf wireless networking components, allowing tremendous flexibility in topology and significantly reducing wiring costs. DSMs can be easily located at distant locations (such as tank farms) without the costs associated with conventional hardwired connections.

Dynamic Scanning Module (DSM)
A DSM is the interface between bussed and direct-wired measurement points and the host computer running System 1 software. It performs the actual signal processing and sampling using a variety of input card types. A DSM also houses an Ethernet communications card for wired (copper or fiber optic) or wireless communications with the host computer. A single host computer can support up to 150 DSMs.

Advanced Mesh Networking and ISA100 Compliance
Thousands of wSIMs can be linked to form a self-healing, self-healing mesh network where each wSIM communicates with other wSIMs rather than only with gateway devices, creating multiple, redundant communications paths. This results in a more robust network that is less susceptible to interference and lost data because if one transmission path is interrupted, many others exist and the devices seamlessly adapt. The system complies with the ISA100 family of industrial wireless networking standards, providing highly reliable, fault-tolerant communications and interoperability between other compliant devices from numerous vendors.



Trendmaster Sensor Bus Cable
Trendmaster cable is specially designed for routing in cable trays or using other means without the need for solid or flexible conduit.

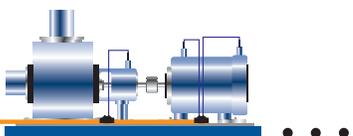


wSIM wireless Signal Interface Module
A wSIM node provides wireless connectivity between temperature and vibration transducers on the machine and System 1 software. Each wSIM node can communicate with adjacent wSIM nodes as well as wireless gateway devices. In addition, a wSIM node provides power for itself and all of its connected transducers. This is done via an onboard lithium battery or optional battery-free energy harvesting technology that uses the machine's own vibratory energy to generate the necessary electrical power.

Direct Wiring
In some instances, directly wiring points to a DSM can be more cost-effective than using TIMs. Up to four Direct Input Cards can be installed in a DSM, each supporting up to eight industry-standard transducer inputs. Both Direct Input and Signal Processing Adapter cards (used for Trendmaster TIM lines) can be mixed within the same DSM chassis.

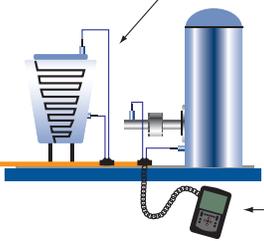
Transducers
A wide variety of proximity probe, velocity, acceleration, temperature, pressure, seal leak, and general process variable (i.e., 4 to 20 mA or 1 to 5 Vdc) input capabilities and transducers exist, most with special adaptations for rapid, low-cost, yet robust installation.

T-Connections
T-connections give you more flexibility in your cabling topology by allowing you to split a single Trendmaster line into multiple branches.



Other Assets
Using the wide variety of transducers and associated TIMs, your Trendmaster Pro system can easily incorporate other assets you wish to monitor - not just rotating machinery.

Trendmaster System Validation
Our Snapshot CE portable data collector not only functions as a full-featured vibration data collection and analysis instrument, it also functions as a test and configuration instrument to ensure your Trendmaster hardware is functioning properly.



LEGEND	
	I.S. Isolation Device
	T-Connection
	Line Extension
	Transducer
	TIM
	wSIM
	Trendmaster Pro Sensor Bus Cable
	Transducer Cable
	Ethernet
	Fiber Optic Cable

Please visit us at www.ge-energy.com/bently or call +1 775 782 3611 for more information.

* Bently Nevada, Snapshot, System 1, Trendmaster, Actionable Information, and wSIM are property of General Electric Company in the United States and other countries.

Microsoft, Windows, and Windows Mobile are trademarks and/or registered trademarks of Microsoft Corporation in the United States and other countries.

Modbus is a registered trademark of Schneider Automation, Inc.



©2008, General Electric Company. All rights reserved. The contents of this document are the property of General Electric Company. No part of this work may be reproduced or transmitted in any form or by any means, except as permitted in written license agreement with General Electric Company. General Electric Company has made every reasonable attempt to ensure the completeness and accuracy of this document. However, the information contained in this document is subject to change without notice, and does not represent a commitment on the part of General Electric Company. The GE logo is a registered trademark of General Electric Company.

GEA-13979C (11/08)