

GTIDiagnostics System

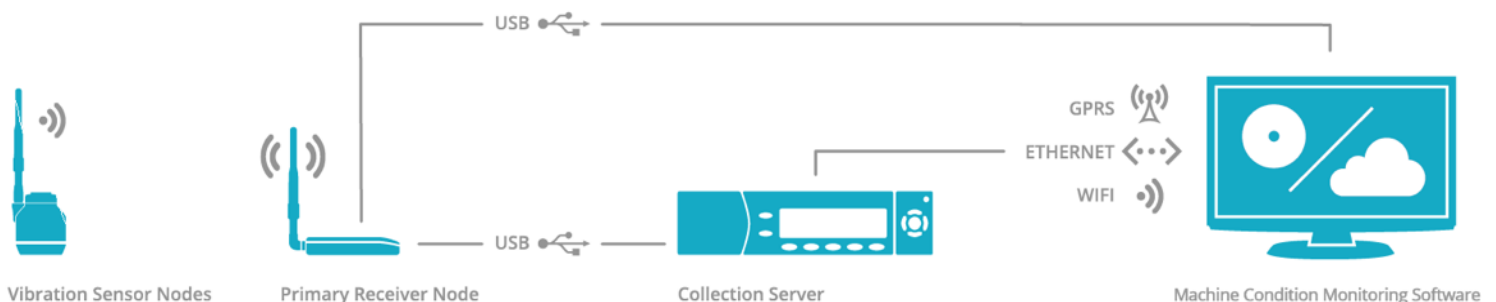
Vibration Sensor Node:

The GTIDiagnostics family of innovative wireless sensor products enables cost-effective predictive maintenance for industrial equipment. The system provides continuous remote monitoring of key performance indicators to track the operating health of equipment.

- Optimized for long battery life
- Full time series data sets up to 5 times per minute
- Expandable to hundreds of nodes per system



<u>Reliable Monitoring</u>	<u>Flexible Configuration</u>	<u>Cost Effective</u>
Vibration Sensor Nodes provide health monitoring in the most hard-to-reach, rugged locations. Each node communicates via a direct wireless link to a Primary Receiver Node, from which the data is imported into GTIDiagnostics Software for viewing and analysis.	The system is highly configurable and scalable. A system can have hundreds of sensor points, each of which can be configured to transmit data on a user-selected frequency, and unique indicators can be implemented to warn users of potential machine health issues.	Easily installed without the downtime, expense, and labor costs of old-fashioned, hard-wired sensors. Simply place the sensors where you need them and in minutes they'll transmit data. GTIDiagnostics can predict failure before it occurs, saving money spent on unnecessary replacements and extending machine life. At the same time, energy costs are reduced, as properly maintained machines are more efficient.



Vibration Sensor Node Specifications

Mechanical	
Weight	4.1 oz (115 g)
Enclosure Material	Anodized aluminum and high-strength polycarbonate

Environmental	
Storage Temperature	-40 to 238 °F (-40 to 120 °C)
Min. Operating Temp.	-4 °F (-20 °C)
Max. Operating Temp.	230 °F (110 °C) surface @ 72 °F (22 °C) ambient 212 °F (100 °C) surface @ 105 °F (40 °C) ambient 167 °F (75 °C) surface @ 167 °F (75 °C) ambient
IP Rating	IP65, dust-tight and impervious to water jets
Impact Resistance	Survives 5-ft drop onto concrete surface
Hazardous Certification	Class I, Division 2

Wireless Radio	
Radio	KCF DARTTM Wireless 2.4GHz ISM band, FCC ID #Z5ISD2
Range	800ft (244m) line-of-sight (site survey recommended for installation)
Antenna	Steerable antenna, providing 360° directional coverage. Optional RP-SMA connector for tethered antenna

Power	
Power Source	3-Volt Lithium Manganese Dioxide (CR123A) KCF Energy Harvester (optional)
Battery Life	Full spectrum acquisition every: <ul style="list-style-type: none">•60 minutes – 8 years•15 minutes – 6 years• 2.5 minutes – 2 years Note: battery life is somewhat reduced at extremely cold temperatures

Vibration Sensor Node Specifications

Accelerometer	
Range	+/- 19 g typical, +/- 16 g nominal
Resolution	13 mg
Noise Floor	5 mg RMS @ 256 Hz / 19 mg RMS @ 8192 Hz
Transverse Sensitivity	10% Typical
Frequency Response	+/- 5% 0-2700 Hz, +/- 3 dB 2700-4000 Hz
Samples per Acquisition	1600
Spectral Lines	800
Anti-Aliasing Filter	4000 Hz low-pass cut-off, 3rd-order Sallen-Key
Sampling frequency	64 Hz – 8192 Hz configurable (see table below)
Number of Axes	2

Accelerometer Sampling		
Sampling Frequency	Sample Duration	Spectral Resolution
8192 Hz	0.2 seconds	5.0 Hz
4096 Hz	0.4 seconds	2.5 Hz
2048 Hz	0.8 seconds	1.24 Hz
1024 Hz	1.6 seconds	0.62 Hz
512 Hz	3.2 seconds	0.31 Hz
256 Hz	6.4 seconds	0.16 Hz
128 Hz	13 seconds	0.08 Hz
64 Hz	26 seconds	0.04 Hz

Temperature Sensor	
Range	-4 to 167 °F (-20 to 75 °C)
Resolution	+/- 1 °F (+/- 0.5 °C)

GTIDiagnostics Family of Products

Primary Receiver Node:

The GTIDiagnostics family of innovative wireless sensor products enables cost-effective predictive maintenance for industrial equipment. The system provides continuous remote monitoring of key performance indicators to track the operating health of equipment.

- Communicates with and controls sensor nodes
- Local or cloud installation
- Plug-and-play USB operation
- Expandable to hundreds of sensor nodes per system



No Interference

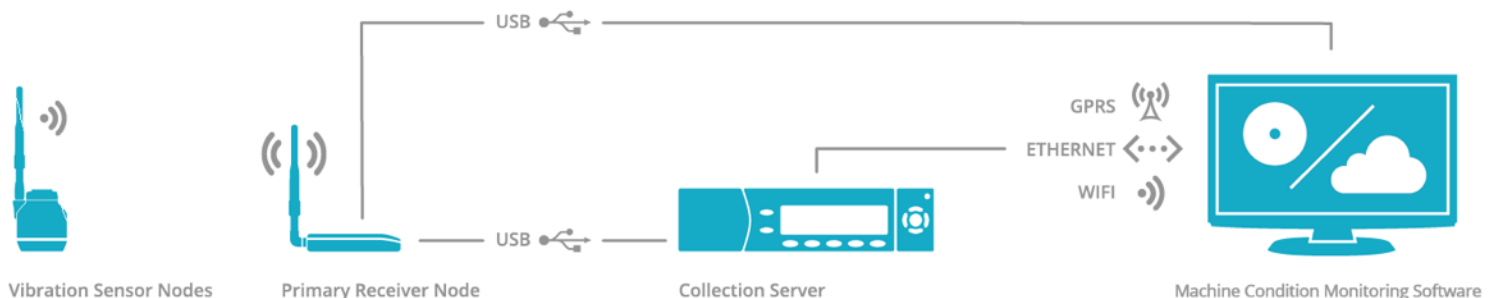
GTIDiagnostics wireless receivers and sensors coexist with existing wireless networks without interference due to their small data packet size and extremely low overhead, making them indispensable in a wide variety of industrial settings. The sensors and receivers can adapt for optimal transmission success, and nodes can automatically rejoin the network if they are moved.

Scalable

Each Collection Server can host many Primary Receiver Nodes and each PRN can be configured to collect data from up to 50 sensors, enabling a single system to monitor hundreds of machines with multiple sensors on each one. This system allows you to scale your predictive maintenance system to the size of your plant, no matter how large or small it is.

Efficient

Receivers are powered and communicate via USB with their host server. Each receiver can collect information from many sensor nodes, increasing system efficiency and keeping implementation costs low. Sensors can be set up to deliver data to receivers continuously or collect large amounts of data in short bursts, giving more versatile results.



Primary Receiver Node Specifications

Mechanical	
Weight	5.3 oz (151 g)
Cable Length	3 ft (0.91m)
Material	Overmolded polyamide

Environmental	
Storage Temperature	-40 to 185 °F (-40 to 85 °C)
Operating Temperature	-40 to 185 °F (-40 to 85 °C)
IP Rating	IP65, dust-tight and impervious to water jets (excluding USB connector)
Impact Resistance	Survives 5-ft drop onto concrete surface

Wireless Radio	
Radio	KCF DARTTM Wireless 2.4GHz ISM band, FCC ID #Z5ISD2
Range	800ft (244m) line-of-site (site survey recommended for installation)
Antenna	Steerable antenna, providing 360° directional coverage. Optional RP-SMA adapter for tethered antenna

Power	
Power Source	USB connection to host computer or Collection Server

GTIDiagnostics Family of Products

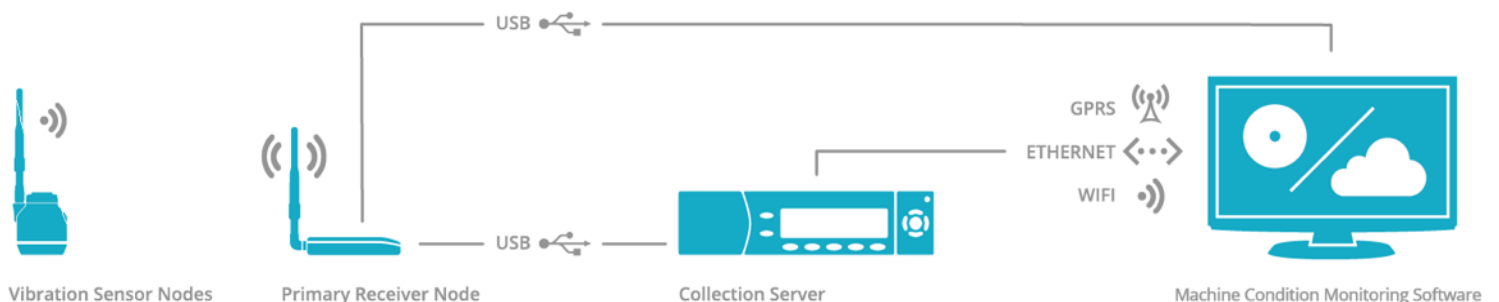
Collection Server:

The GTIDiagnostics family of innovative wireless sensor products enables cost-effective predictive maintenance for industrial equipment. The system provides continuous remote monitoring of key performance indicators to track the operating health of equipment.



- Relays data from sensor nodes to GTIDiagnostics analysis software
- Hosts Primary Receiver Nodes
- Allows systems to be set up far away from data analysis computer

<u>Remote Access</u>	<u>Reliable Data</u>	<u>Simple Networking</u>
<p>GTI's Collection Server enables the user to place wireless sensors in remote locations, providing communication to the cloud or local data analysis computer. A single Collection Server can interface with multiple Primary Receiver Nodes to gather data from various locations in a plant. Collection Servers can operate unattended and may be managed remotely.</p>	<p>The Collection Server is a mini industrial computer used to manage and organize the data collected from sensor nodes, providing guaranteed delivery of sensor information even when the data analysis computer is offline. The collection server complements the data analysis software by pre-processing sensor data before conveying the information to the software database.</p>	<p>The Collection Server relays data to the analysis software, either on a local computer or in the cloud, through a network connection. This can be accomplished via:</p> <ul style="list-style-type: none">• Ethernet (IEEE 802.3)• Wi-Fi (IEEE 802.11)• Cellular Data Network <p>Each option has its own benefits depending on the setup of the plant.</p>



Collection Server Specifications

Mechanical	
Size	10.x 7.8 x 2.1 in (254 x 199 x 53 mm) without cables
Weight	2.5 lb (1.2 kg)

Environmental	
Storage Temperature	-4 to 158 °F (-20 to 70 °C)
Operating Temperature	32 to 122 °F (0 to 50 °C)
IP Rating	Environmental Enclosures available separately

Software And Connectivity	
Software	Ubuntu Linux 12.05
Network Communications	<ul style="list-style-type: none"> • Ethernet (IEEE 802.3) • Wi-Fi (IEEE 802.11) • Cellular (call for data plan specifics and pricing)
PRN Connectivity	Tested up to 6 PRNs per Collection Server

Power	
Power Source	110-240 VAC 50/60 Hz
Power Consumption	≤65 Watts

Data Reliability	
Offline Data Caching During Network Outage	<ul style="list-style-type: none"> • Stores up to 1.5 million vibration data samples • Automatic retransmission of cache when communication is restored

	Collection Frequency	Days of Offline Storage
Example: 50 Vibration Sensors with 1 Collection Server	<ul style="list-style-type: none"> • 1 hour • 10 minutes • 1 minute 	<ul style="list-style-type: none"> • 1250 days • 208 days • 20 days

GTIDiagnostics Family of Products

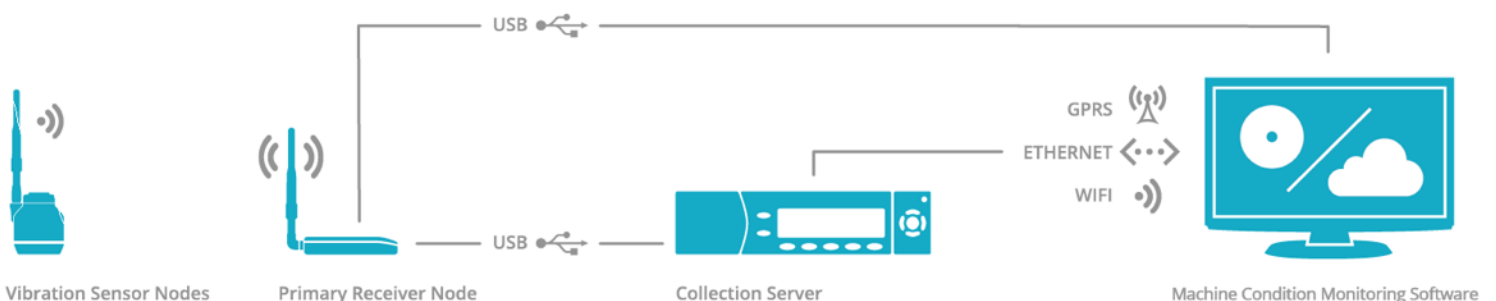
GTIDiagnostics Software :

The GTIDiagnostics® family of innovative wireless sensor products enables cost-effective predictive maintenance for industrial equipment. The system provides continuous remote monitoring of key performance indicators to track the operating health of equipment.

- Continuous monitoring of machine health
- Simple, user-friendly interface
- Time series and frequency spectrum analysis
- Powerful alarm and notification capabilities
- Valuable features for both expert and novice users



<u>Open Interface</u>	<u>Easy to Use</u>	<u>Scalable</u>
<p>GTIDiagnostics has an open interface to allow data to be passed to a wide range of Enterprise Asset Management (EAM) software for maintenance and reliability programs. Support is built in for industry standard communication protocols like OPC and ODBC, with custom interfaces available for software packages such as SAP, IBM Maximo, and Oracle Enterprise Asset Management</p>	<p>GTIDiagnostics software features intuitive navigation and powerful configuration templates that make it very easy to learn and use. Everything is designed with the goal of simplifying the user experience and making it easy to get from one screen to another, allowing a new user to quickly become an expert.</p>	<p>GTI's software uses a multi-tiered hierarchy structure that easily accommodates installations with thousands of measurement points. Navigation through the system is quick and easy, and expanding an existing system to include new monitoring points is simple and straightforward.</p>



GTIDiagnostics Software Specifications

Cloud Version	
Description	Web-based application, allowing viewing of data by authorized users from any internet-enabled computer. Data is collected by GTIDiagnostics PRNs and Collection Servers and uploaded continuously to a secure web server.
Supported Web Browsers	<ul style="list-style-type: none"> • Internet Explorer 9.0 or above • Google Chrome • Mozilla Firefox • Opera 11.0 or above • Apple Safari

Local Version	
Description	Locally-hosted application on an individual customer PC, allowing viewing of data on that computer only. Data is collected by a PRN connected to the local computer and stored directly on that machine.
Operating System	Windows Vista, 7, or 8
Minimum Requirements	<ul style="list-style-type: none"> • 1.6 GHz processor • 1 GB (32-Bit) or 2 GB (64-Bit) RAM • 3 GB of available hard drive space

Features and Capabilities	
System Configuration	Fully customizable system setup with multi-level hierarchy ideally suited for both small diagnostic kits and large, multi- facility installations.
User Access	Selective permission levels for users and administrators allowing varying degrees of access and control.
Sensor Control	Full control of sensor functions including sampling rate, collection frequency, averaging, and site survey mode.
Data Storage	Storage of every complete time series data set collected from a sensor node. Data is consolidated in an intelligent database structure that is seamless to the user, allowing instant access to any data that has been collected since system startup.
Data Analysis	<ul style="list-style-type: none"> • Trending of advanced user-specified health indicators • Viewing of individual time series or spectrum data points • Multiple data views including customizable system maps and trend charts • Intelligent single-point or time-averaged baselining
Alarms and Notifications	<ul style="list-style-type: none"> • On-screen health icons with warnings and alarms for thresholds • Email notification of warnings and alarms
Vibration Indicators	Peak and RMS Acceleration and Velocity, Peak and RMS Acceleration and Velocity within a frequency band, Crest Factor, Kurtosis, and Skewness

Also Available from GTI

Handheld Vibration Analysis VibePro 7 for iPad



VibePro is a vibration analyzer application that collects and analyzes vibration signals to the iPad. The application can be used either for single readings or doing full vibration analysis routes. Route data can be post-processed directly in VibePro or in a myriad of apps available for other platforms including: Windows, Mac or through a web application. Version 7 adds iOS 8 support, high resolution mode, editing functions in route, and a machine point library for faster route creation.

Remote Data Analysis for GTIDiagnostics and VibePro

GTI Predictive technicians are standing by ready to do the vibration analysis work for you. GTI provides this service for both GTIDiagnostics users as well as VibePro users. Our technicians provide in-depth reports and personalized guidance for how to proceed problematic assets. Pricing varies based on size of plant and frequency of analysis needed.

