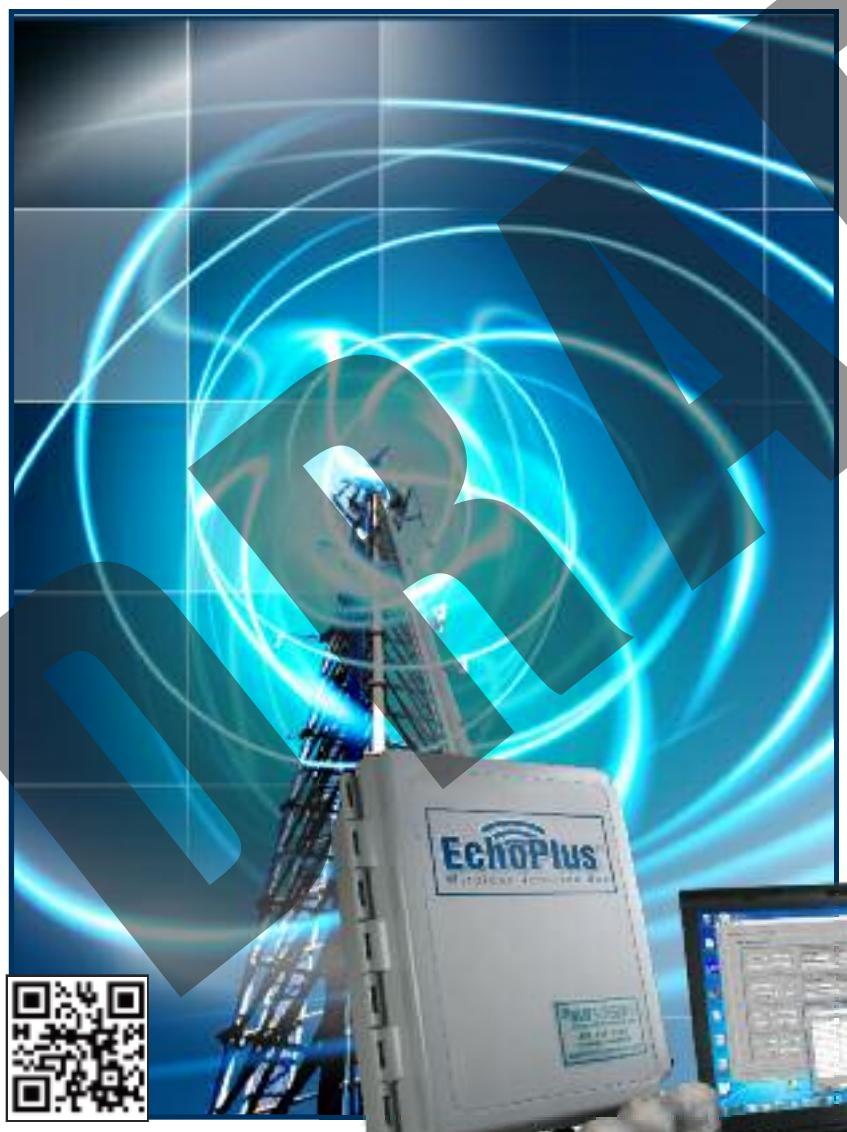
Echo® Wireless Vibration System

A simple, affordable, effective wireless vibration system



Why use valuable manpower to collect vibration data on healthy machines? Why settle for measurements once a month when you can have them multiple times daily? Why have people venture into unsafe areas to collect routine measurements? Echo® Wireless Vibration Sensors can safely "look" at the machine's health several times per day and provide immediate notification when warning or critical levels are reached. This frees up technical experts, like certified vibration analysts, for higher value tasks such as fault analysis.

- Transmits very long distances
- Batteries last up to 10 years
- Eliminates expensive cable runs
- Requires no repeaters, networks, or mesh
- Run stand alone or with junction box
- Stores data in ODBC format
- Easily installed

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Echo® Wireless Vibration System

Introduction

The Echo® Wireless Vibration Sensor and the EchoPlus® Wireless Junction Box make the set of overall vibration measurements, listed below, that are sure to provide early warning of most common machine faults. In addition to these measurements, Echo® provides accurate battery status. Using a user programmable vibration threshold, Echo® can detect if the machine is not running, and if not, skip a measurement to conserve battery power. It also has an optional Raw Vibration Output (requires optional Model 070A86 cable) for use with a portable data collector.

- RMS Velocity - for "balance-of-plant" faults such as unbalance, misalignment, and flow problems
- RMS Acceleration - for higher frequency faults and high frequency energy (HFE) such as high speed gear mesh, broken rotor bars, and loss of bearing lubrication
- True Peak Acceleration - for bearing, gear, and impulsive faults, including looseness
- Crest Factor – for fault severity indication

Echo® Wireless Vibration Sensor

Model 670A01
Wireless Vibration Sensor

- Placeholder Bullet Point One
- Placeholder Bullet Point Two
- Placeholder Bullet Point Three

The Echo® Wireless Vibration Sensor is a stand alone, battery powered, industrial vibration sensor. At the default setting of three measurements per day (user programmable) battery life approaches 10 years. A Raw Vibration (RV) output version includes an integral connector that can be used with an optional cable and a standard vibration data collector for fault analysis. The sensor can be programmed via RS-232 to set the transmission (collection) interval and a Residual Vibration Level (RVL) if desired. Echo® has an LED that provides visual feedback on the status of the sensor, including: on, off, measuring, transmitting, or changing states. The sensor has an embedded magnetic switch and can be activated or deactivated by holding a strong magnet next to the sensor. Upon activation, the sensor makes and transmits a set of measurements.

EchoPlus®
Wireless Junction Box

Model 627A01
Wireless Vibration Sensor

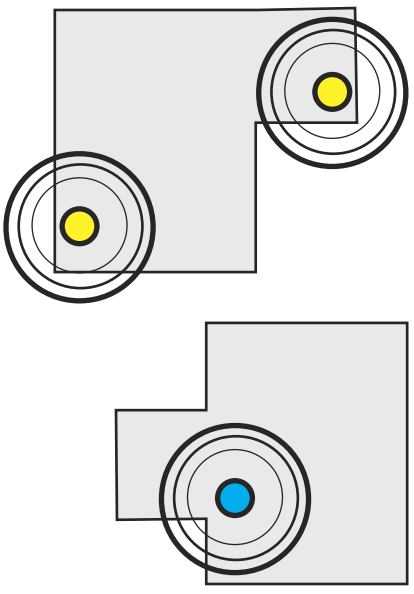
- Placeholder Bullet Point One
- Placeholder Bullet Point Two
- Placeholder Bullet Point Three

The EchoPlus® Wireless Junction Box is an 8-channel junction box that instantly converts installed industrial sensors to wireless operation. This incredibly economical device periodically powers each sensor, makes the same set of overall measurements as Echo®, and transmits them wirelessly. The default transmission interval is 8-hours but is user programmable. Additionally, it operates as a standard junction box allowing full data collection with a portable data collector at the box. It can be powered using either standard 24 VDC or any battery between 6 and 14 VDC. The unit can be used by itself or in conjunction with an existing junction box by simply jumping wires between them.

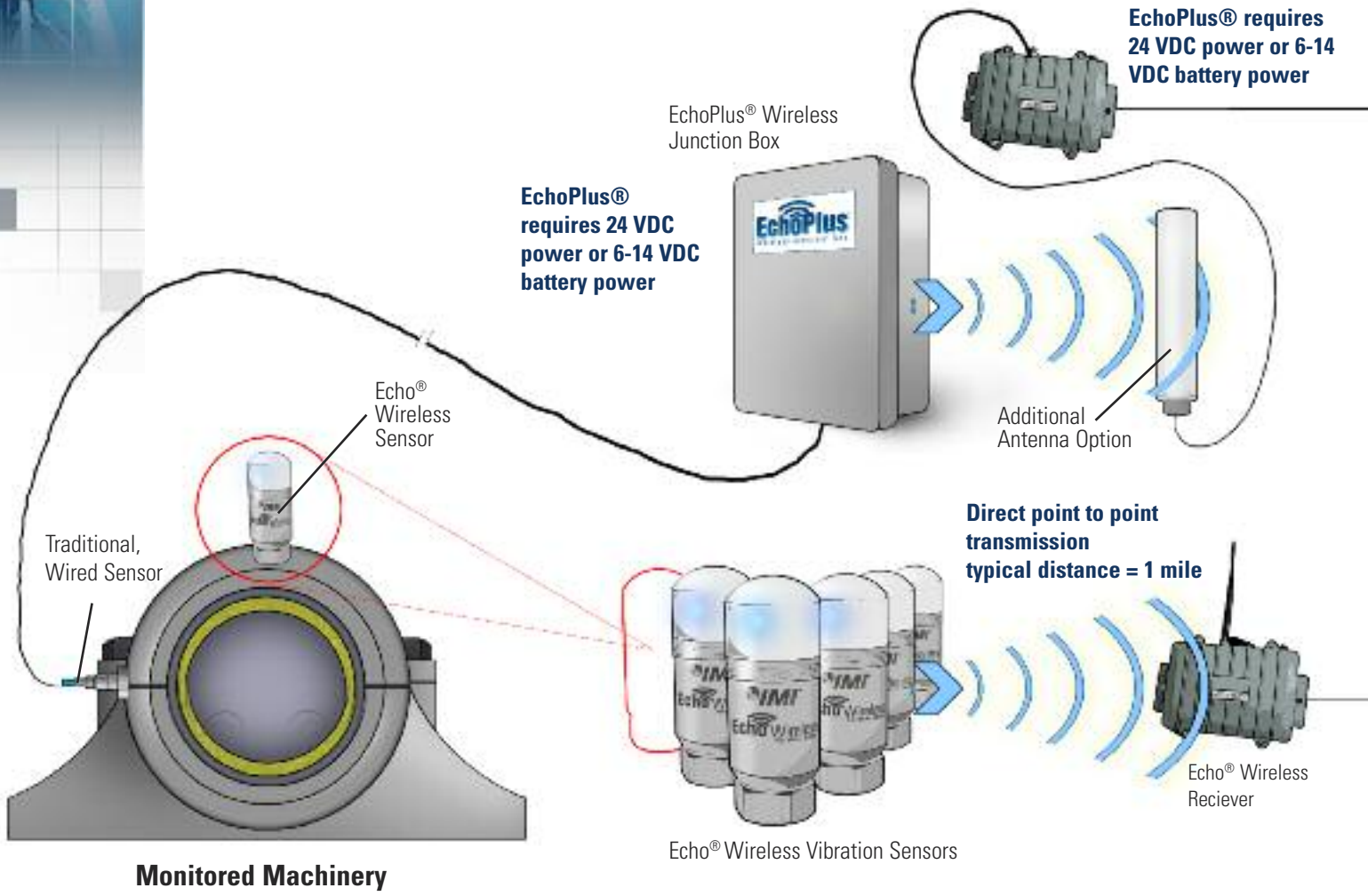
Model 673A01
Wireless Reciever

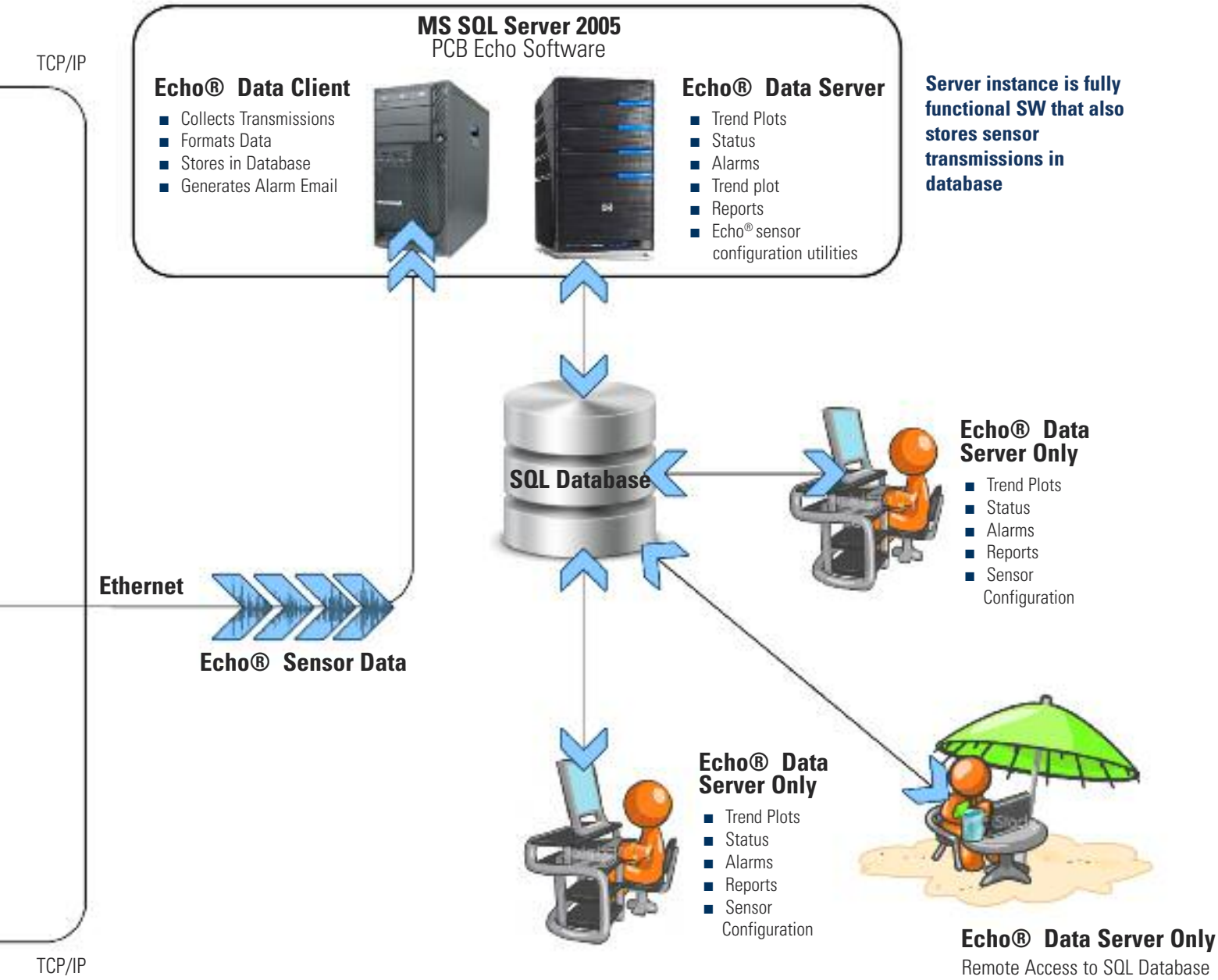
- Placeholder Bullet Point One
- Placeholder Bullet Point Two
- Placeholder Bullet Point Three

The Echo® Wireless Vibration Sensor and the EchoPlus® Wireless Junction Box make the set of overall vibration measurements, listed below, that are sure to provide early warning of most common machine faults. In addition to these measurements, Echo® provides accurate battery status. Using a user programmable vibration threshold, Echo® can detect if the machine is not running, and if not, skip a measurement to conserve battery power. It also has an optional Raw Vibration Output (requires optional Model 070A86 cable) for use with a portable data collector.



Echo® System Diagram



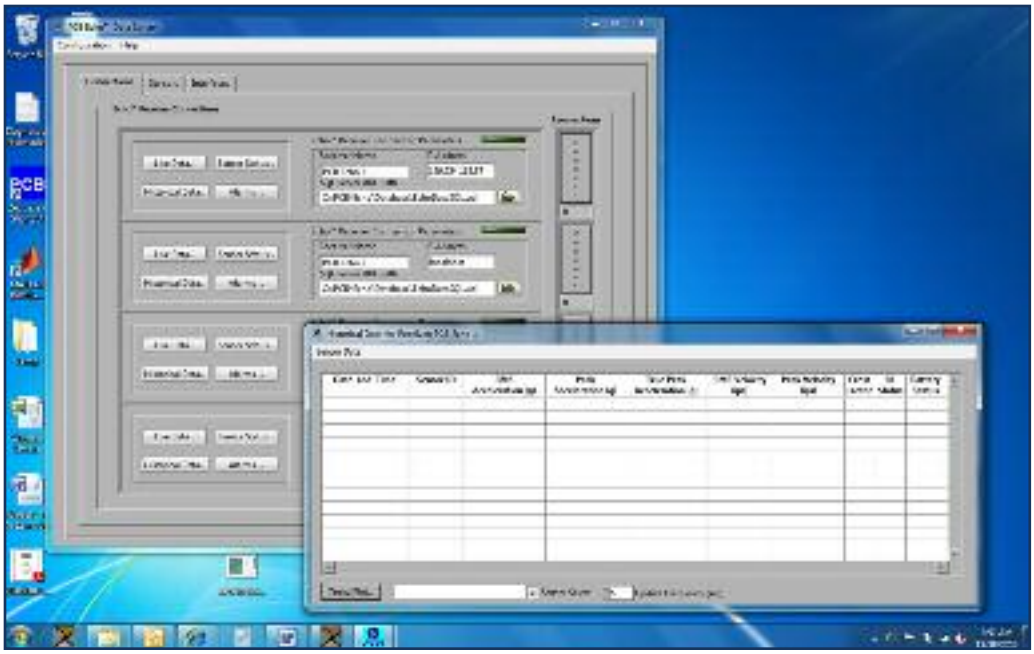

MS SQL Server 2005
PCB Echo Software
Echo® Data Client
Collects Transmissions
Formats Data
Stores in Database
Generates Alarm Email
Echo® Data Server
Trend Plots
Status
Alarms
Trend plot
Reports
Echo® sensor configuration utilities
Server instance is fully functional SW that also stores sensor transmissions in database
TCP/IP
SQL Database
Echo® Data Server Only
Trend Plots
Status
Alarms
Reports
Sensor Configuration
Ethernet
Echo® Sensor Data
Echo® Data Server Only
Trend Plots
Status
Alarms
Reports
Sensor Configuration
TCP/IP
Echo® Data Server Only
Remote Access to SQL Database through internet with VPN
Trend Plots
Status
Alarms
Reports
Sensor Configuration
PC's Running WinXP or Win7 & Echo™ Data Server SW Robust data presentation SW including Plots, reports, alarms, and status
Monitor stations have all the same functionality of server, but do not store data

Echo® Data Server and Database

Echo® sensor data is stored in a Microsoft SQL Server 2005 database. The format is published in the User's Manual so it can be accessed by users directly using any ODBC compliant application. The data can also be exported to a tab delimited spreadsheet file that is suitable for use with Excel or other data viewing applications for post processing. Additionally, IMI is working on interfaces to legacy condition monitoring programs and plant monitoring systems. Contact IMI for details.

The Echo® Data Server Software provides two major functions

- Collect transmission data reported by the receiver and store in in the SQL database
- Present Echo® sensor data to the user through an intuitive and concise interface the includes:
  - Configuration utilities to setup a machinery database and set alarms levels
  - Tabular displays to view live and historical data.
  - System level sensor status display to warn of low batteries, low RF signal, or missed measurements
  - Alarm reporting - graphically via system status screens and electronically via email
  - Single and multi-sensor plot displays with alarm levels to show trends
  - Hardcopy report generation for last transmission and alarm events
  - Additional utilities to query and program Echo® Sensors, EchoPlus® Junction Boxes, and Echo® Receivers.



Common Specifications

Measurements & Data Provided	Specifications
Date / Time	
Sensor ID	
RMS Velocity	
Derived Peak Velocity	1.414 x RMS Velocity
RMS Acceleration	
Derived Peak Acceleration	1.414 x RMS Acceleration
True Peak Acceleration	3.7 sec time sample @ 61.4 kHz sample rate
Crest Factor	True Peak / RMS Acceleration Maximum Value = 16
Battery Status	4-levels, status on previous transmission @ max load
RF Status	4 - levels
Noise Power	Instantaneous power level of the RF background noise
Average Power	Average power level of the transmission
Average SNR	Average SNR of transmission
Radio & Standard	Specification
Radio Standard	Extended Range RF (ERRF)
Modulation Mode	Binary Frequency Shift Keying (BFSK)
Receiver Noise Floor	-155dBm
Radio Sensitivity	-145 dBm
Frequency Band (unlicensed ISM)	902-928 MHz (FCC Part 15.249)
Effective Radiated Power (ERP)	0.75 mW (50 mV / m @ 3 meters)
Transfer Rate	20 bps
Number of Frequency Bands	12
Number of receivers handled by a host computer	Network capability dependent
Sensors per receiver @ 3 meas/day, 1% miss rate typical	~400
Sensors per receiver @ 3 meas/day, 5% miss rate typical	~2000
Sensor/Junction Box Antenna	Integral 0.433 inch Ceramic Chip
Certifications	FCC (USA) & IC (Canada)
Performance	Specification
RMS Velocity	Analog Integration
Velocity HP Filter	2 Hz, 1-pole RC
Velocity LP Filter	2400 Hz, 3-pole Chebyshev
Velocity Resolution	0.001 ips
Velocity Range	± 4.096 ips
Derived peak velocity	1.414 x RMS Velocity
RMS Accleleration (HFE)	Time Sample Sum
Acceration HP Filter	2000 Hz, 4-pole Chebyshev
Acceration LP Filter	15k Hz, 3-pole Chebyshev + 1-pole RC
Acceleration Resolution	0.005 g
Acceleration Range	± 20.48 g
Derived Peak Acceleration	1.414 x RMS Acceleration
True Peak Acceleration (absolute value) @ 61.4 kHz sample rate	≥50 s pulse width
Crest Factor	True Peak / RMS Acceleration Maximum Value = 16
ADC/dynamic range	16 bit / >90 dB
Residual Vibration Level (RVL)	
If RVL = 0	Collect on normal transmission period
If RVL > 0	Check at normal transmission period and collect data only if RMS velocity > RVL
Operation Status Indicator	LED

Echo® Wireless Vibration Sensor Specs

Echo® Environmental	Specifications
Overload Limit (Shock)	100 g
Temperature Range (Electronics)	-20° to 70° C (-4 to 158° F)
Temperature (Base)	-54° to 121° C (-65° to 250° F)
Humidity	5% - 95%, non-condensing
Enclosure Rating	IP66
Echo® Electrical	**Specifications**
Power	Saft 7.2V Lithium Battery, 100-9206-10
Replaceable	Yes
Electrical Isolation (Case)	>108 ohm
Frequency Response (±3 dB)	3 Hz to 15 kHz
Channels	1 (single channel)
Raw Vibration Output Connector	4-pin optional, also requires optional 070A86 cable
Echo® Physical	**Specifications**
Sensor Module Dimensions	
Base Assembly	1-3/8" Hex
Housing	1.65" Dia
Height (overall)	4.4"
Mounting Surface	0.87" Dia
Weight (including battery pack)	450 g (15.9 Oz)
Mounting Thread	1/4-28 Female
Mounting Torque	2 to 5 ft-lb
Sensing Element (IMI 66213LPZ1)	Ceramic Shear
Sensor Module Material	
Base	304 Stainless Steel

Echo®Plus Wireless Junction Box Specs

Echo®Plus Environmental	Specifications
Temperature Range (Electronics)	-20° to 70° C (-4 to 158° F)
Humidity	5% - 95%, non-condensing
Enclosure Rating	NEMA 4x
Echo®Plus Electrical	**Specifications**
Power	24 VDC or 6 - 14 V Battery
Channels	8
Raw Vibration Output Connector	BNC Jack
Sensors Supported	ICP® (IEPE) 10 - 500 mV/g or PE with inline charge converter
Sensors Settling Time	≤5 s
Frequency Response	Sensor dependent
Echo® Physical	**Specifications**
Input Connector	Terminal Strip
Enclosure Material	Fiberblass
Size (h x w x d)	8 x 6 x 4 in
Weight (including battery pack)	2.9 lb

Echo® Wireless Accessories

Model 07086
Echo® RV Output Cable

When used in conjunction with a portable data collector, it converts standard sensor power to the low voltage required by Echo® and allows normal broadband data collection with the RV Echo® Sensor.

Model 07087
Echo® Programming Cable

This special RS-232 to Micro USB cable allows serial communication with the mating Micro USB connector in the Echo® Sensor.

Model 070A88
Echo® RV Shorting Cap

This is used on the RV670A01 Echo® Sensor for normal wireless use. When removed, the Model 070A86, Echo® RV Output Cable can be used for data collection with a portable data collector.

Additional Items to be added

Model 073A2D
Echo® Replacement Battery Kit

The kit includes a battery pack, o-ring, silicon grease, foam compressor, and instructions.

Model 07086
Echo® RV Output Cable

When used in conjunction with a portable data collector, it converts standard sensor power to the low voltage required by Echo® and allows normal broadband data collection with the RV Echo® Sensor.

Antennas, Low Loss Antenna Cable, and Antenna Accessories are available through many commercial outlets such as L-com. IMI Sensors can, however, quote these if desired. Contact IMI for details.

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