The WiVib family of vibration acquisition units from Icon Research provides wireless and ethernet multi-channel vibration monitoring on standard networks.

The WiVib range communicates via the WiFi 802.11 standard and is fully compatible with all low-cost access points and accessories used on this popular medium, including full security. Ethernet connectivity is also provided for convenient hooking up to cabled networks where they are available. The devices can be powered from permanent external power or from internal batteries. We invite you to browse the specifications of these devices to fully appreciate the powerful features available.

“I think it’s great that the data comes to me, rather than me having to go and fetch it.”
Why go with the WiVib Family?

Monitoring of the condition of plant machinery is done in one of two ways, with walk-around data collectors or with an on-line system. For reasons of regular monitoring and reliability of data, an on-line system is usually preferred. However, the cost is often prohibitive because of the installation requirements.

This is where the WiVib family from Icon Research comes into play. WiVib’s offer both ethernet and wifi connectivity. This provides a choice of installation options to optimise the installation budget. Lower cost means that less critical, but still important, machinery can be monitored.

Ethernet or Wireless - what should I be thinking about?

ETHERNET
- make use of an existing cabled network;
- extend existing network with low-cost cabling and hubs, or install a new network where there is a concentration of machinery;
- use if network security is an issue.

WIFI
- use where there is no network infrastructure;
- quickly replace existing switch boxes previously used for walk-around data collection;
- use in remote areas.

Both options provide simple mounting of hardware—just four screws using the brackets provided with the unit.

The diagram below shows the two connectivity methods. The WiVib on the left is connected into an ethernet network via a single cable. The one on the right is communicating wirelessly via a standard access point.

Typically, a WiVib on an ethernet network will be continuously powered from an external low voltage DC supply in the range 10-30Vdc. A WiVib with wireless connection can be powered externally or from batteries fitted inside the unit.

How are measurements made?

When taking measurements, WiVib’s can operate in one of two modes, namely continuous and wakeup. In continuous mode, the device is permanently on and is powered by a DC supply in a range from 10V to 30Vdc. So measurements can be taken at any time.

However, when using batteries, it is important to conserve power to maximise battery life. This is where wakeup mode is used. Each WiVib contains a real-time-clock which can be instructed to wake the WiVib up at any interval varying from one minute to one day. The WiVib takes its measurements as instructed by the application and then “goes to sleep” until woken at the next interval. However, the unit can be instructed to remain on if prolonged machinery diagnostics are required. In wakeup mode, battery life measured in years can be expected.
The WiVib’s incorporate an ICP power supply on each of the dynamic channels so that any standard compatible accelerometer can be connected. Alternatively, the inputs can be AC coupled to interface with buffered signals from other systems. High-resolution acceleration and velocity measurements can be made, together with bearing condition using the built-in demodulator or “enveloper” as it is sometimes called. Accelerometer bias voltage checking is incorporated.

The dynamic inputs are also compatible with standard eddy current (proximity) probes allowing direct measurement of displacement, including gap voltage.

Digital and analog trigger inputs offer flexible triggering options allowing synchronised readings to be taken. The triggers can also be configured to operate as tachometer inputs, PLL’s for ordered spectra, and gates for conditional initiation of measurements.

The WiVib-4/4 Pro and WiVib-8x8pro-EW operate on the universal WiFi 802.11b/g/n standard and offer full WEP, WPA and WPA2 security. Network configuration is straightforward by connecting to the on-board USB port and running the WiVibConfig software utility on any laptop or PC.

Power is provided by two internal ‘D’ size batteries or a DC supply in the range 10 to 30V. Under battery power, the device requires no connections apart from the sensors and it can be powered up and down by its internal real-time-clock.

The unit is housed in a compact rugged enclosure and is sealed to IP66. It is fitted with stainless steel brackets for easy mounting. The twelve sealed glands allow cables of varying diameter to be routed to the unit.

The WiVib family is supplied with a comprehensive suite of support software enabling the device to be configured on your network and useful measurements to be taken right away.

Refer to the specifications overleaf for full details of the WiVib devices.
**WIVIB-4/4PRO TECHNICAL SPECIFICATION**

**MEASUREMENT**

**Dynamic Channels**
- No of Channels: 4, simultaneous
- Coupling: ICP interface or AC, jumper configurable
- ICP Interfaces: 2.4mA at 20Vdc
- Bias/Gap Measurement: +/-25V range for ICP bias voltage and eddy probe gap measurement
- Measurements: acceleration, bearing demod, (velocity by external s/w integration)
- Gain Ranges: gain steps 1, 2, 5, 10, 20 and 50
- Amplitude Accuracy: ±2% typical in passband
- Demodulation Function: digital demodulator (HP and LP bandpass filter edges programmable in steps from 50Hz to 40kHz)
- ADC: 24 bit
- Sampling Rate: 64Hz to 102.4kHz
- Bandwidth Ranges: 0.5Hz–25Hz to 0.5Hz–40kHz
- Data Block Lengths: 256 to 32768
- Spectral lines: up to 12800

**Process Channels**
- No of Channels: 4, multiplexed
- Ranges: 0 to +3V and 0 to +10V, jumper selectable
- 4-20mA Input Option: 100 ohm load, jumper selectable
- ADC: 16 bit
- Sampling Rate: 64Hz to 25.6kHz
- Bandwidth Ranges: 0.5Hz–25Hz to 0.5Hz–10kHz
- Data Block Lengths: 256 to 32768
- Spectral lines: up to 12800
- Fixed Sampling Option: 200 samples at 2kHz, averaged (50/60Hz mains pickup cancellation)

**TRIGGERS**
- No of Channels: 2 (one analog/digital, one digital/Namur)
- Coupling: digital: 3.3V to 24V digital pulse, analog: +/-25V, Namur: two-wire
- Available Functions: external trigger, tacho speed, gated acquisition, pre- and post-trigger delay to 32768 samples

**PROCESSING**
- Processor: ARM9 running Linux operating system
- Memory: 16MByte SDRAM, 32-bit wide
- Program/Settings Storage: 8 MByte dataflash and 128K EEPROM
- RTC: internal real-time-clock for time-stamping of data

**COMMUNICATIONS**
- Network: 802.11b/g/n WiFi compatible, FCC and IC certified
- Speed: up to 54 Mbits/sec
- Encryption: WEP (64, 128 bit) and WPA/WPA2 PSK (TKIP, AES)
- Wake-up Mode: programmable from one minute to one day via internal RTC
- Interface Port: USB user port

**MECHANICAL**
- Enclosure: die-cast aluminium, NEMA 4, IP66, external antenna
- Dimensions: 26cm (10.2") x 16cm (6.3") x 9cm (3.6")
- Weight: 2.6kg (6 lbs) approx
- Cable Entries: 12 glands, IP68 rated
- Cable Diameter: 3mm to 6.5mm

**POWER**
- Battery: 2 x LSH20 cells ('D' size)
- Battery Monitor: internal battery monitor with critical level shutdown

**ENVIROMENTAL**
- Operating Temperature: -20ºC to +70ºC (-4ºF to +158ºF)
- Compliance: CE, RoHS

**COMPLIANCE (Wireless)**
- FCC: CFR47 Part 15(c)
- IC: RSS-210
- ETSI: EN 300 328 V1.8.1
**WIVIB-8X8PRO TECHNICAL SPECIFICATION**

**INPUTS**

**Dynamic Channels**

- No of Channels: 8, simultaneous
- Coupling: ICP interface or AC, jumper configurable
- ICP Interfaces: 2.4mA at 24Vdc nominal
- Input Voltage Range: 20Vp-p (+/-10V when AC coupled)
- Bias/Gap Measurement: +/-25V range for ICP bias voltage and eddy probe gap measurement
- Gain Ranges: gain steps 1, 2, 5, 10, 20 and 50
- Amplitude Accuracy: ±2% typical in passband
- Demodulation Function: software demodulator (HP and LP bandpass filter edges in programmable steps from 50Hz to 40kHz)
- ADC: 24 bit
- Sampling Rate: 64Hz to 102.4kHz
- Bandwidth Ranges: 0.5Hz–25Hz to 0.5Hz–40 kHz
- Data Block Lengths: 64 to 250,000
- Spectral lines: up to 51200

**Process Channels**

- No of Channels: 8, multiplexed
- Ranges: 0 to +3V and 0 to +10V, jumper selectable
- ADC: 16 bit
- Sampling Rate: 64Hz to 25.6kHz
- Bandwidth Ranges: 0.5Hz–25Hz to 0.5Hz–10 kHz
- Data Block Lengths: 64 to 250,000
- Spectral lines: up to 51200
- Fixed Sampling Option: 200 samples at 2kHz, averaged (50/60Hz mains pickup cancellation)

**TRIGGERS**

- No of Channels: 2 (one analog/digital, one digital/Namur)
- Coupling: digital: 3.3V to 24V digital pulse, analog: +/-25V, Namur: two-wire
- Available Functions: external trigger, tacho speed, ordered data (by phase-lock-loop), gated acquisition, pre- and post-trigger delay to 32768 samples

**PROCESSING**

- Processor: ARM9 running Linux operating system
- Memory: 64MByte SDRAM, 32-bit wide
- Program/Settings Storage: 8 MByte dataflash and 128K EEPROM
- Additional Storage: up to 32GByte on-board removable USB flashdrive
- RTC: internal real-time-clock for time-stamping of data

**COMMUNICATIONS**

- Network (LAN): 100BaseT ethernet via CAT5/6 cable (-E and -EW version)
- Network (WLAN): 802.11b/g/n WiFi compatible, FCC and IC certified (-EW model only)
- Speed: up to 54 Mbits/sec
- Encryption: WEP (64, 128 bit) and WPA/WPA2 PSK (TKIP, AES)
- Wake-up Mode: programmable from one minute to one day via internal RTC
- Interface Port: USB user port

**INDICATORS**

- LCD Display: backlit LCD display, 7 lines x 21 characters
- Relays: 2 x SPST isolated relay contacts for external LED’s/indicators

**MECHANICAL**

- Enclosure: die-cast aluminium, NEMA 4, IP66, external antenna
- Dimensions: 36cm (14.2") x 16cm (6.3") x 9cm (3.6")
- Weight: 3.2kg (7 lbs) approx
- Cable Entries: 12 glands, IP68 rated
- Cable Diameter: 3mm to 6.5mm

**POWER**

**Battery**

- Input Power (battery): 2 x LSH20 cells (‘D’ size)
- Battery Monitor: internal battery monitor with critical level shutdown

**External Power**

- Supply: DC power, 10-30Vdc
- Isolation: external power input isolated to 1500V

**ENVIRONMENTAL**

- Operating Temperature: -20ºC to +70ºC (-4ºF to +158ºF)
- Compliance: CE, RoHS

**COMPLIANCE (Wireless)**

- FCC: CFR47 Part 15(c)
- IC: RSS-210
- ETSI: EN 300 328 V1.8.1
**Application Software for WiVib’s**

**WiVibConfig**

Easy-to-use tool for configuring your WiVib to work on a wireless network

Configuring your WiVib’s to communicate on a wireless network is made easy with the WiVibConfig utility. Simply edit the network settings (eg. IP address, SSID etc) and then click **Save and Connect** to enable the WiVib onto your network. The panel on the right monitors network activity so you can quickly see if the WiVib has connected to your network, or if further editing of the settings is required. Security settings can be entered and modified as required. Configurations can be saved to file and reloaded so you don’t have to re-type all of your settings each time you introduce a new WiVib onto your network. Communication is via a cable from any USB port on your laptop or PC.

**WiVibScope**

Turns your WiVib into a fully featured spectrum analyser

WiVibScope enables both time and spectrum graphs to be displayed from any selected channel of a WiVib. Measurements can be displayed in standard engineering units such as g and ips as well as user-defined units. Simply select the WiVib and the channels that you want to monitor and live traces stream to the high-resolution display. Zoom and cursor with readout function are provided. Settings such as number of spectral lines, bandwidth etc are easily changed with drop-down menus. Any acquisition setting (eg. gain, integration to velocity etc) can be adjusted also. WiVibScope is ideal for detailed analysis, system checks and installation setup. Both continuous and wakeup modes are supported.
**Application Software for WiVib’s**

**WiVibTrend Lite**

Easy plant monitoring and analysis with OPC interface

*WiVibTrend Lite* provides the core functionality of on-line monitoring systems with features such as trending, alert/alarm indication and full analysis capability. It can support any number of channels with multiple measurements (for example, velocity vibration and bearing condition) being available on each channel. An OPC server is incorporated for export of measurement data to factory-wide systems.

Its straightforward setup-and-go interface means that you can be logging and trending within minutes of loading the application. A moving chart-recorder updates current measurements while historical pan and zoom functions let you examine previously measured data.

This application is ideal for smaller stand-alone wireless on-line systems while larger installations can utilize the OPC feature. *WiVibTrend Lite* supports a simple Plant ... Machine ... Point ... Measurement hierarchy. Alerts and alarms are indicated on the hierarchy and summarised in the table underneath. The red/yellow/green traffic light summary lets you know the status of your plant at a glance.

The application supports wakeup and continuous modes on the *WiVib’s*, so you can choose how often you want to scan your machinery. This can be from several times a minute to once a day. A historical trace, such as a spectrum, can be viewed by selecting the time at which it was gathered on the trend graph. Alternatively, live/latest spectra can be viewed with full cursor readout.

Setting up the machine hierarchy is very straightforward. First, use *WiVibConfig* to connect your *WiVib’s* to the network and then use the single screen setup in *WiVibTrend Lite* to specify what you want to measure and when.

Hardcopies of trends and traces can be printed, or traces can be written to file for emailing or inserting in reports.

*WiVib* hardware and *WiVibTrend Lite* software combine to produce a powerful machinery monitoring package that is low-cost, quick to install and easy to use. *WiVibTrend Lite* has been developed by Icon Research to exploit the advantages that wireless monitoring brings to industry. You can get started with a single *WiVib* and be monitoring your plant within minutes.
Integrating WiVib’s With Your System

System Integration

WiVib users may wish to interface their WiVib devices to applications other than those supplied by Icon Research. There are three basic methods by which a systems integrator can gain access to a WiVib and the measurements that it takes, namely:

1. Accessing the WiVibTrend Lite OPC Server
2. Controlling the WiVib Server
3. Programming the WiVib directly

The options are listed by ease of implementation (easiest first). The trade-off is usually the flexibility of the solution versus the time and effort to implement it. However, Icon Research is always available to assist regardless of which interface method is chosen.

1. Accessing the WiVibTrend Lite OPC Server

WiVibTrend Lite provides the user with the means to configure measurements, and provides a simple display of the data that has been taken. It makes use of an embedded copy of the WiVib Server to control the sampling process.

The OPC Server component of WiVibTrend Lite allows the contents of the samples taken to be easily exported to external systems by means of the standard OPC interface.

When enabled, the OPC server runs in the background of WiVibTrend Lite, and provides OPC tags for the information that is provided by WiVibTrend Lite locally.

Using this method the integrator has just to configure his existing OPC clients to request the required tags from the WiVibTrend Lite OPC Server.

The structure and contents of these tags can be found in the WiVibTrend Lite OPC DA Server Data Dictionary, and include:

- Status information for all levels of the system hierarchy;
- Values, and alarm status, for all of the trends;
- Traces for both time domain and spectrum measurements;
- Status information for the WiVibs and sensors to detect failures in the monitoring equipment.

2. Controlling the WiVib Server

The WiVib Server provides the means to control a network of WiVib devices and thus realise a surveillance system by performing the following tasks:

- Scheduling when the WiVib is to be sampled.
- Controlling the sampling of the required measurements.
- Processing the samples by scaling them to the correct units and performing post sampling processes such as FFTs and integration.
- Testing the sensors and checking the sampled data for validity.
- Deriving trend values from the samples.
- Determining alarm conditions.

Using this method enables the integrator to concentrate on the user interface for the setup of the measurements and the display of the results, without having to have a detailed knowledge of how to control the WiVib.

The Server is controlled by means of an XML document which contains the definitions of the measurements and the order in which these measurements are to be taken. Once the route of measurements has been sampled, the same document is returned to the application with these definitions and the results of the sampling process.

The Server can operate in a number of different ways, which allow for wide variety of design options.

The Server can be provided either as a .NET assembly for direct linking to the designers application, or as a self contained Windows Service which may run on the same machine as the application or on a remote machine as required.

For transfer of data, the XML document can be passed to the server either across an open TCP socket connection, through a defined Message Queue, or into a shared folder.

These configuration options along with the description of the XML document can be found in the WiVibServer Programmer’s Manual.

3. Programming the WiVib Directly

When using this method, individual instructions are sent to the device using the specified WiVib command set. This therefore offers the most flexible and efficient interface to the WiVib devices but it also involves the integrator with the most amount of effort to implement and verify.

The protocol that is required to control the WiVib is contained within the Programmers Manual for the corresponding device.

We suggest this method should only be used if the WiVib Server does not provide the specific functionality that you require for your system.