

## Frequently asked questions: Intelligent Transmitter Series

The Wilcoxon family of intelligent transmitters and relay alarms can be used to implement low-cost online vibration monitoring and simplified machinery monitoring and alarming.

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## 1. What is the Intelligent Transmitter Series?

The Intelligent Transmitter (iT) Series is a complete family of units that provide signal conditioning for simplified online vibration monitoring and provide a total lower cost approach to continuous monitoring. The iT series includes the iT transmitters and iT alarm.

- i. The iT transmitter is a signal conditioning module that interfaces with a traditional IEPE accelerometer to provide a 4-20 mA output signal and a buffered dynamic signal. This allows the user to interface an accelerometer with a PLC, DSC or similar system for condition trending, while still providing a dynamic output for more extensive vibration analysis through the BNC connector on the front of the module. The iT transmitter can be ordered with custom settings to meet user-specific requirements, or with field-configurable settings that can be changed via the front panel Ethernet port where available. iT transmitter models have part numbers in the iT100, iT200 ranges and iT300 ranges.
- ii. The iT transmitter pairs with the iT alarm, a DIN-rail mountable alarm with three programmable relays for use in vibration monitoring or process control systems. The iT401 alarm, which compares the 4-20mA input from the transmitter against user-defined high or low setpoints, triggers the relays and/or provides an alert when the input deviates from acceptable levels. The front panel controls and digital LED readout make this unit very user friendly. The real advantage of this unit is that it can also be used with any 4-20mA sensor including pressure, temperature, flow, speed and especially Wilcoxon's popular LPS® vibration sensors.

## 2. For which applications is the iT series right?

The iT series is appropriate for industrial, commercial, and municipal facilities that all benefit from machinery health monitoring programs. If physical plant assets are doing the work to process a product, then increases in productivity and efficiency can be realized with a continuous online machinery health monitoring program.

Some of the most common processes to benefit from the iT series are pharmaceutical, food and beverage, brewing, water and waste water, petrochemical, pulp and paper, and power generation facilities. The iT series is effective for monitoring pumps, motors, fans, cooling towers, compressors, and gear boxes. Applying predictive maintenance techniques to these operations and machines can result in significant maintenance expense reductions.

## 3. What if my application is special?

The iT series allows maintenance professionals to create a custom vibration monitoring center. Each iT100 or 200 series transmitter is built to user-selected specifications, with options for online monitoring and data trending for every facility, regardless of budget or size.

Options include a selectable full-scale with English or metric units, measurement outputs of acceleration, velocity or displacement, four different outputs of RMS, peak, peak-to-peak and true peak, and various frequency ranges over which to monitor. The iT300 series allows users to field configure their parameters for maximum flexibility. All of the aforementioned options are configurable via Ethernet, giving the power to manually enter, modify and test transmitter configurations directly to the user. The iT300 series also provides a secondary 4-20mA output signal to double the measurement power, while some of the higher-series models offer Modbus support and alarm relay capability.

#### **4. But I don't have a vibration analyst on staff. Can I still use the iT Series?**

Continuous online monitoring is available to large and small facilities alike. For facilities that have a control or monitoring system which accepts 4-20mA analog signals, such as a PLC or DCS, these analog input channels are all that is needed to add the benefit of vibration monitoring to your process control. Plants that do not have an existing process monitoring system in place can use the relay capability present in the iT301 or monitor the dynamic output through the use of a data collector.

Moreover, trending of the overall vibration level does not require any sophisticated analysis skills. Observing a sustained increase in overall vibration usually provides enough evidence to warrant a more detailed inspection of the machine.

#### **5. Does the iT Transmitter only measure acceleration?**

The iT transmitter can measure acceleration, velocity or displacement, depending on what is selected at the time the unit is ordered. The iT100/200 series requires the user to select the input and output types during the part number configuration process. The iT300 series allows the user to field-configure the output based on the input provided. All models are capable of single-integration (i.e. if an acceleration signal is used as the input, only acceleration or velocity outputs are available).

A displacement measurement indicates overall movement. A displacement transmitter is ideal for applications that require the measurement of the machine case movement. Transmitters that measure velocity are most common for measuring overall machine health, and acceleration measurements are best for trending gear mesh or monitoring cavitation where the effect is evidenced in the higher frequency region.

#### **6. What output options are available with the iT Transmitter?**

Output of 4-20 mA data is offered in terms of RMS, peak, and now also in Wilcoxon's exclusive true peak and true peak-to-peak. True peak detection is ideal for measuring short duration vibration, when it is most important to capture and hold maximum absolute instantaneous events. True peak-to-peak detection is designed for use with displacement measurements, which captures and holds the maximum total vibration. The 4-20 mA loop output signal can also represent the true root-mean-square (RMS) value of the vibration signal or the equivalent peak vibration (obtained by multiplying by the ratio of peak to RMS, 1.414). Peak and RMS detection are best for general machine health monitoring, when overall vibration is measured.

#### **7. iT Transmitter highlights**

Maintenance professionals can order the intelligent transmitter with a custom frequency band to meet specific requirements based upon their intended use. The programmed frequency band in the iT100/200 series has a 2-pole high-pass filter and an 8-pole low-pass filter, operates at superior low-noise performance, and measures sensor BOV to monitor sensor performance. Combined, these features ensure the most accurate readings of machinery vibration. The iT300 series features field-configurability, enabling the user to make field adjustments easily with no hardware modifications. Savable configuration files allow for multiple configurations to be stored for recall, making reprogramming no more than just a few clicks of the mouse.

### **8. Can one sensor be used with multiple *iT* Transmitter modules?**

Yes. The transmitter modules have a provision for sharing a sensor. Also, the TBUS can be used for this sharing as one of the TBUS lines is for the analog sensor signal sharing. The iT100/200 series transmitter manual contains the details for setting up the sharing arrangement.

### **9. If two, or more, *iT* Transmitter modules share a sensor, can they be set up with different parameters?**

Yes. An accelerometer can be connected to one transmitter module and the sensor input of another transmitter module can be directed to get the signal from the TBUS. The first module could output an acceleration 4-20 mA signal across any desired bandwidth, and the second module could be set up to output velocity across a different bandwidth.

### **10. What's the TBUS?**

The TBUS is a rear-board connector on each module in the iT series. The transmitter modules place 24 VDC power onto the TBUS along with digital and analog signals. The transmitter only transmits digital data; it does not receive any digital data from the TBUS. In turn, the alarm module only receives data from the TBUS. It does not transmit data to the transmitter through the TBUS. The alarm module also receives its power through the TBUS connection.

### **11. I have a 3-wire (power, common, signal-out) sensor that is biased from 0-5VDC, $\pm$ 5VDC, or $\pm$ 10VDC. Can I use the *iT* Transmitters with this?**

Absolutely. The transmitter modules contain jumpers which allow you to switch from IEPE (2-wire sensor operation) to 3-wire operation. You may need to capacitively-couple the signal-output of your sensor. Contact Wilcoxon Applications Engineering for assistance.

### **12. What kind of filtering exists inside the *iT* Transmitters?**

The transmitter modules contain 2-6 poles of "real" high-pass (low-frequency) filtering, depending on calibration frequency. The modules contain 9-12 poles of "real" low-pass (high-frequency) filtering, based on calibration frequency. RC-filters, multiple-feedback (active) filters, and switched-capacitor filters ensure low-power operation with no digital artifacts in the processed signal.

**13. If the “manual” mode for setting the filter frequencies is used, is there a way to know for sure what frequency the potentiometer is set to select?**

There is no way to determine exactly to what frequency the potentiometer is set once the filter frequencies have been modified, unless the user has some sort of frequency monitoring device that can be connected to the transmitter output.

If the monitoring frequency is expected to be modified, it is recommended to use the iT300 series for manual entry and ease of configuration.

**14. Does the fuse inside an iT Transmitter adequately protect the modules?**

The fuse is designed to protect the main transmitter module connected to the power supply – in the event too many modules or a module-fault exists anywhere on the TBUS connector. The fuse provides adequate protection if you supply power to the input power-connector of the transmitter module. The fuse is NOT adequate if you supply power directly to the TBUS-connector using a wired-plug.

**15. Is the dynamic output (BNC, TBUS, or wired-plug) buffered from the sensor?**

Yes. A fault on the TBUS, dynamic-output socket, or front-panel BNC will not impair the 4-20mA loop-current determination from a sensor.

**16. Can the Dynamic Output be AC-coupled or DC-coupled in an iT Transmitter module?**

Yes, in the iT100/200 series. Jumper J10 exists inside the transmitter to select AC- or DC-coupling of the buffered sensor output. AC-coupling makes the output +/- with reference to common, DC-coupling makes the output +/- with respect to ½ of the power supply (not sensor BOV).

The iT300 series is automatically DC-coupled.

**17. Is the sensitivity or internal integration of the iT Transmitter field-programmable?**

Yes, for the iT300 series. The sensitivity, internal integration, frequency range, output type, and 4-20mA parameters are all field-programmable via Ethernet.

For the iT100/200 series, these features are all selected at the time of purchase and cannot be modified in the field.

## 18. *iT* Alarm highlights

The *iT* alarm includes three programmable relays – high and low setpoints, and a BOV monitor to alert the user when a sensor or cable connection malfunctions. Each relay can be user-programmed independently to activate if the signal exceeds user-defined limits. The *iT* alarm connects directly to a plant PLC or DCS network to provide additional capability in process control programs.

Each relay can be user-programmed with delay timers up to 99 seconds to eliminate false alarms that may result from temporary irregular vibrations (such as those that occur when a machine is starting up). Users can set hysteresis levels, allowing alarms to remain active if vibration levels have not returned to normal, but dropped below the alarm setpoint. Each relay can be user-programmed to 1%-accurate high and low alarm setpoints, with a 1V-accurate windowing for a third, BOV-type alarm.

## 19. Why is the *iT* Alarm module separate? Can't it just be part of the *iT* Transmitter module so there's only one module?

If the alarms were integral to the transmitter, then the overall cost would be higher and many users would buy a function they do not want. There are also several features that result from the alarm being a separate module:

- i. Modularity allows several alarm units to operate off of one signal source.
- ii. The alarm is able to directly operate small motors and valves, eliminating the need to link up with a PLC or DCS. Only the *iT* alarm uses power relays with the capacity to switch 250 VAC, 8A-resistive or 1/3HP inductive machines.
- iii. Having the alarm as a separate unit allows use with an LPS 4-20 mA vibration sensor or any 4-20 mA sensor, such as temperature, pressure, level, flow, force or speed.

## 20. You mean the *iT401* can be used with the *iT* Transmitter or any 4-20 mA sensor?

Yep! (You've gotta love a short answer!)

## 21. The *iT* Alarm has a digital display. What is possible to display on it?

During normal operation, the display can be set to indicate the current in the sensor loop in terms of integer values of milliamps, from 2 to 25 mA. It can also be set to display in terms of 0% to 99% of the full-scale 4-20 mA input or transmitter input.

## 22. Why does the *iT* Alarm use 7-Segments for a display?

Readability. A 7-segment display is readable at greater distances and extreme temperatures over using an LCD (liquid-crystal) display. It costs more to implement, but we thought you were worth it!

**23. Why does the *iT* Alarm only have two-digits for a display?**

Cost, size, and power-dissipation of more digits are some of the mechanical reasons, but the main reason is accuracy of the display. True, integer values of 4-20mA are potentially large steps, but the display is 1%-accurate when in “percentage-mode.” 1%-steps equates to 0.16mA accuracy!

**24. There are no potentiometers to adjust on the *iT* Alarm. What does a user access to make alarm setting adjustments?**

The front panel has three “membrane” switches. These are used to access and change the settings for the alarm. They are also used to acknowledge an alarm to reset a latched relay.

**25. Can the latched alarm be remotely acknowledged?**

Yes. There is an input on the module for a remote reset using dry contacts.

**26. Why would someone use a vibration transmitter when loop-powered 4-20 mA sensors are available?**

If the only need is to have a loop-powered sensor for monitoring the overall vibration, then sensors like Wilcoxon’s 4-20 mA LPS series will suffice. However, if very low or very high frequency monitoring is desired, the *iT* transmitter series is necessary because they have the wide frequency response required. Also, a transmitter is required when it is desired to trend vibration in a limited portion of the frequency spectrum, and also have the full spectrum available for detailed FFT analysis.

**27. Why would the *iT* Series generally be used instead of other techniques?**

Generally, 4-20 mA vibration monitoring is used for equipment that ought to be monitored for vibration, but where access or infrequent servicing is an issue. The *iT* modules present options for installing vibration monitoring. The transmitter allows a 4-20 mA signal to be used for simplified monitoring, while preserving access to the full bandwidth of an accelerometer for detailed vibration spectrum analysis.

The *iT* alarm allows for local alarm and shutdown capability. The fact that the *iT*401 can be used with either the intelligent transmitter or any 4-20 mA sensor offers users greater flexibility. A system can be built for monitoring that utilizes both vibration and process variables for alarming.

Many plant process computers have already utilized all available analog input channels. Adding even just a couple more analog channels may be prohibitively expensive. With the *iT* alarm, the local processing offered by a combination of an *iT* transmitter with an *iT* alarm allows the use of spare digital inputs to the plant process computer. Frequently, there are many unused digital inputs when the analog inputs are full.

### **28. What certifications are there for the *iT* Series modules?**

iT series modules are certified by CSA for CE-compliance. Additional certifications may be possible with proper junction-box enclosures and barrier devices.

### **29. What accessories are there for the *iT* Series?**

Wilcoxon offers DIN enclosures, power supplies, TBUS connectors, fuses and custom cables to complement the iT series. We have developed a great iT accessories guide, available [here](#). This guide details the setup and required accessories to start an iT series solution. It discusses the size of the DIN enclosure and modules, as well as which TBUS connectors are correct for each setup. It also gives current, voltage, and power supply information.

### **30. Can an *iT* Series module operate at 12VDC, for battery-applications?**

Yes, within limits. Without the recommended +24VDC power, there is insufficient voltage to operate a typical 2-wire IEPE sensor, but the transmitter can certainly operate off +12VDC supply with 3-wire capacitively-coupled sensors. The communication module also operates at +12VDC. The alarm can be special-ordered with 12VDC relays (instead of typical +24VDC relays). Contact Wilcoxon for more information. Note that no certification currently exists for these modules at low-voltage operation.