

Frequently asked questions: Intelligent Transmitter Series

The Wilcoxon family of Intelligent Transmitters, relay alarms, and communication modules can be used to implement low-cost online vibration monitoring and simplified machinery monitoring and alarming.

Click on a question below for the answer.

1. What is the Intelligent Transmitter Series?
2. What applications are the *iT* Series right for?
3. What if my application is special?
4. But I don't have a vibration analyst on staff. Can I still use the *iT* Series?
5. Does the *iT* Transmitter only measure acceleration?
6. What output options are available with the *iT* Transmitter?
7. *iT* Transmitter highlights
8. Can one sensor be used with multiple *iT* Transmitter modules?
9. If two, or more, *iT* Transmitter modules share a sensor, can they be set up with different parameters?
10. What's the TBUS ?
11. I have a 3-wire (power, common, signal-out) sensor that is biased from 0-5VDC, ± 5 VDC, or ± 10 VDC. Can I use the *iT* Transmitters with this?
12. What kind of filtering exists inside the *iT* Transmitters?
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?
14. Does the fuse inside an *iT* Transmitter adequately protect the modules?
15. Is the dynamic output (BNC, TBUS, or wired-plug) buffered from the sensor?
16. Can the Dynamic Output be AC-coupled or DC-coupled in an *iT* Transmitter module?
17. Is the sensitivity or internal integration of the *iT* Transmitter field-programmable?
18. *iT* Alarm highlights
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?
20. You mean the IT401 can be used with the *iT* Transmitter or any 4-20 mA sensor?
21. The *iT* Alarm has a digital display. What is possible to display on it?
22. Why does the *iT* Alarm use 7-Segments for a display?
23. Why does the *iT* Alarm only have two-digits for a display?
24. There are no potentiometers to adjust on the *iT* Alarm. What does a user access to make alarm setting adjustments?
25. Can the latched alarm be remotely acknowledged?
26. *iT* Communication Module Highlights
27. Can the *iT* Communication Module be used to change settings in the *iT* Transmitter?
28. Can one *iT* Communication Module be used with multiple *iT* Transmitters?
29. What kind of software is needed to use the *iT* Communication Module?
30. Why would someone use a vibration transmitter when loop-powered 4-20 mA sensors are available?
31. Why would the *iT* Series generally be used instead of other techniques?
32. What certifications are there for the *iT* Series modules?
33. What accessories are there for the *iT* Series?
34. Can an *iT* Series module operate at 12VDC, for battery-applications?
35. Can I get *iT* Series modules in any color other than green?

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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* Transmitter, *iT* Alarm and *iT* Communication Module.

- ▶ 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/DCS 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 is ordered with custom settings to meet user-specific requirements. *iT* Transmitter models have part numbers in the iT100 and iT200 ranges.
- ▶ The *iT* Transmitter pairs with the *iT* Alarm, a DIN-rail mountable alarm with three programmable relays for use in vibration monitoring systems or process control systems. The iT401 Alarm, which compares the 4-20 mA 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 4-20 mA sensor, including pressure, temperature, flow, speed and especially Wilcoxon's popular LPS® vibration sensors.
- ▶ The *iT* Communication Module is the only stand-alone digital communication unit for vibration transmitters available today. The *iT* Communication Module receives digital vibration data from the *iT* Transmitter and sends that data to a computer via an RS232 serial port. Using Wilcoxon's new VibeLink™ software program – provided with the communication module – users have instant online vibration monitoring directly from their desktop for up to eight sensor installations.

2. What applications are *the iT* Series right for?

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 *iT* Transmitter is built to user specifications, and there are options for online monitoring and data trending for every facility, regardless of budget or size.

Options for the *iT* Transmitter now include a selectable full scale that can be specified in English or metric units; measurement of acceleration, velocity or displacement; and four different outputs of r.m.s., peak, true peak, and true peak-to-peak.

Continuous online monitoring is available to large and small facilities alike. For facilities that have a control or monitoring system that accepts four-to-twenty milliamp 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 *iT* Communication Module and any computer to achieve the same monitoring benefits for up to eight sensor installations.

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

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 now measures acceleration, velocity or displacement, as selected at the time the unit is ordered. Displacement measurements indicate overall movement. A displacement transmitter is ideal for applications that requiring 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 r.m.s., 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 (r.m.s.) value of the vibration signal or the equivalent peak vibration (obtained by multiplying by the ratio of peak to r.m.s., 1.414). Peak and r.m.s. 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 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. Flexible filter frequencies allow users to make field adjustment easily, with no hardware changes; and it is easy to revert back to factory settings.

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. 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 and communication modules only receive data from the TBUS. They do not transmit data to the transmitter through the TBUS. The alarm and communication modules also receive their power through their TBUS connection.

11. I have a 3-wire (power, common, signal-out) sensor that is biased from 0-5VDC, ±5VDC, or ±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 a 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?

It is possible to know the exact frequency to which the potentiometer is set when the transmitter is used in conjunction with the communication module. One of the pieces of data transmitted to the communication module is the exact frequency setting of the filters. All a user needs to do is to change the filter jumper to “manual” mode, move the potentiometer, then re-connect the transmitter to the communication module and apply power. When the transmitter completes initialization, the frequency setpoints will be available through the communication module.

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. 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 1/2 of power-supply (not sensor BOV).

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

No. You can not alter the sensitivity (input sensor-calibration) or integration settings in the field. These are fixed during calibration at Wilcoxon. You can, however, alter the operating pass-band frequencies of the transmitter by switching the unit to "manual" mode and adjusting the two potentiometers.

18. *iT* Alarm highlights

The *iT* Alarm includes three programmable relays – high and low setpoints, and a BOV monitor to alert the customer 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:

- ▶ Modularity allows several alarm units to operate off of one signal source.
- ▶ 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 250VAC, 8A-resistive or 1/3HP inductive machines.
- ▶ Having the alarm as a separate unit allows using it with an LPS® 4-20 mA vibration sensor or any 4-20 mA sensor such as temperature, pressure, level, flow, force, and speed.

20. You mean the IT401 can be used with the *iT* Transmitter or any 4-20 mA sensor?

Yep! (You've got t' 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. *iT* Communication Module Highlights

The *iT* Communication Module is currently the only stand-alone digital communication unit for vibration transmitters. It transmits data from the transmitter to any PC or laptop via an RS232 serial port.

The *iT* Communication Module works in conjunction with Wilcoxon's free VibeLink™ software to display data in real time on a monitor, and provides the capability to trend data over time without an external monitoring system. VibeLink™ software displays the information on your PC with both graphing and datalogging capabilities. Up to eight *iT* Communication Modules can be "daisy chain" linked to one serial port allowing up to eight sensor points to be monitored by one computer.

27. Can the *iT* Communication Module be used to change settings in the *iT* Transmitter?

No. The communication module only listens to the transmitter's digital output. Communication between modules is not bi-directional. The communication module takes data that the transmitter continually sends over the TBUS and retains it to respond when it receives a request for data through the RS232 interface.

28. Can one *iT* Communication Module be used with multiple *iT* Transmitters?

No. Since the transmitter only sends data to the TBUS, there is no provision for “negotiating” a bi-directional communication. Therefore, every one transmitter uses one communication module. It is a one-to-one correspondence.

29. What kind of software does my computer need to use the *iT* Communication Module?

Wilcoxon ships a run-time program, VibeLink™, with every communication module. This software will run on Windows XP systems. Otherwise, a simple telnet terminal window can be opened and ASCII commands can be sent to the communication module. The iT501 Communication Module manual outlines the simple command set required. The VibeLink™ software makes all the transmitter module’s parameter data available in a window and allows for quick set-up and running of trend data from transmitters.

30. 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 the Wilcoxon 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, but have the full spectrum available for detailed FFT analysis.

31. 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 IT401 can be used with either the *iT* 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.

By the same token, it may be easier to input data to a plant process computer using an RS232 line. Here is where the *iT* Communication Module can be useful. Since eight (8) modules can be daisy-chained together, it allows eight vibration sensors to be added to a process computer using just one RS232 port. Provisions exist for (64) communication modules to be daisy-chained. Contact Wilcoxon for custom OEM applications.

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

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

33. What accessories are there for the *iT* Series?

Wilcoxon offers DIN enclosures, power supplies, TBUS connectors, fuses and custom cables to complete the *iT* Series. We have developed a great guide to all of the accessories, “iT051 Mounting Box and Configurations.” 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.

34. 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.

35. Can I get *iT* Series modules in any color other than green?

Only high-volume OEM applications can be custom-colored. Contact Wilcoxon for more information.