



# Top 10 Considerations When Going Wireless

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With a myriad of wireless sensors available, it can become confusing to determine which one is best for you. This paper outlines the most important considerations when selecting a wireless sensor, to ensure that you choose the solution that best meets your application requirements.



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## **1 Executive Summary**

From light switches to sensors, the Internet of Things is pushing everything to go wireless. The need to turn to wireless sensors may already be apparent for your application, but there are many considerations when selecting which wireless sensor to turn to. This paper outlines all of these considerations, to help you ensure that you have selected the wireless sensor that best meets your application requirements.

## **2 Top 10 Considerations When Going Wireless**

### **2.1 Why do “wireless” sensors have wires?**

The reality is that wireless sensor systems require some form of wires. These sensors will transmit data wirelessly, but many require closely placed inductive coils to keep them running, or lack sufficient transmission strength to overcome signal attenuation from surrounding metal. If you’re trying to take data on a rotating shaft, particularly in a confined space, these sensors won’t be up to the task. Make sure that the wires in your “wireless” sensor won’t interfere with your application needs.

### **2.2 Battery life vs. data rate**

If you have followed the first consideration, and your sensor has minimal wiring, then chances are that it is battery powered. Many sensors will indicate the maximum possible battery life on the technical specifications. But what you really need to know is the battery life for the data rate that you need. A higher data rate will result in shorter battery life, while a lower data rate will increase that life significantly. Make sure you know what battery life you can expect for the data rate required for your application.

### **2.3 Range considerations**

Depending on your application, you may need to transmit data from a foot away, to a mile away. Make sure that your wireless sensor selection is more than up for the task. If you are right at the edge of the wireless range, you may experience frequent data drop outs. Depending on your application, this may or may not be acceptable.

### **2.4 Analog vs. digital**

The type of data you need, analog or digital, will also be application specific. If, for example, you are using a data acquisition system (DAQ) to collect a wide range of data, you will likely need to have analog outputs to be compatible with your DAQ. If these are coming from D-A conversion because the wireless transmission is digital, ensure that the digital signal has sufficient resolution. However, if you are able to import your data directly to a PC, digital data will be needed. Be sure to select the sensor that offers the type of output you need, or, better yet, one that offers both analog and digital outputs.

### **2.5 Data vs. Information**

There are wireless sensors, and then there are wireless smart sensors. A wireless sensor transmits data, while a wireless smart sensor transmits information. 'Smart sensors' combine a base sensing element with signal conditioning and signal processing, sending the processed signal to the data acquisition system. Therefore, a smart sensor is providing information – not just data. For example, a strain gauge is a sensor that sends a voltage output. To make meaning of this voltage output, a microcontroller must take this information and translate it to actual strain on the component being measured. By placing the microcontroller directly with the strain gauge, and transmitting the processed data, you now have information.

### **2.6 Real-time, triggers, and storing options**

Different applications dictate when and how you need to view your sensor information. Is it vital that you see the information in real-time? You'll want to ensure that your sensors can transmit continuously, at the data rate appropriate for your application.

Maybe you need to see real-time continuous data, but not until after a specific event occurs. Triggering options help to eliminate data that doesn't apply, while capturing the important events. For example, say you wish to collect driveline torque on a vehicle under real-world conditions. You're not interested in the data collected at idle, but you need to capture the information as soon as the vehicle takes-off. By setting triggers, you can ensure that the data capture commences the instant the driveline begins to spin. This can also help to save battery life, by only transmitting information when it is needed.

Finally, perhaps you can't place a receiver close enough to retrieve the data, so you need to collect it, and then download it for analysis. In this case, you'll want a sensor solution that is capable of on-board storage.

All three options have their place, and only a few sensors offer all three. When making a selection, be sure that your wireless sensor can meet your data streaming and data storage needs.

## **2.7 Temperature drift**

Most wireless sensor applications need to account for temperature drift. In many cases, this is done with a significant amount of error, because the temperature is measured at the remote microcontroller location, not at the actual sensor location. The microcontroller is often a significant distance away from the sensor due to packaging constraints, and therefore temperature measured at the microcontroller could be vastly different from the temperature at the sensor.

The best method to account for changing temperature is to place a temperature sensor directly with the primary sensing device. One way to achieve this is to add a temperature sensor and route the signal cable back to the remote transceiver. This option, however, increases installation time and makes packaging more complex. A better method is to place a MEMs temperature sensor on a remote transceiver that is small enough to be packaged directly at the primary sensing location. This leads us to the next important consideration.

## **2.8 Portability and ‘Packagability’**

Not all ‘portable’ sensors will meet your definition of portable! Be sure to check actual dimensions and weights of the complete sensor system prior to purchasing. Some systems claim to be portable while requiring two large suitcases for the complete system. Others can fit in your pocket. And while your investigating the portability, be sure to check the packagability as well. The greatest sensor in the world will be useless to you if it doesn’t fit in the available package space for your application.

## **2.9 Minimizing your down time – recharging and installation**

Downtime on a functioning wireless sensor system includes the time that it takes to install the sensor, remove it again, and the time to recharge the batteries. Technician time is scarce and increasingly expensive. You need to ensure that your wireless sensor can be quickly removed, recharged, and re-installed, with minimal training.

## **2.10 Data security and integrity**

Is your data confidential? If so, you’ll want to make sure that your wireless sensors keep it that way. Some systems use unique identifiers to ensure that only one remote can talk to one base. Some use encryption. Verify that the sensors you are buying offer the level of security that you need to protect your confidential information.

# **3 How TECAT Performance Systems can help**

TECAT Performance Systems makes the smallest, lightest, most power efficient wireless sensors available. Systems are powered with a lithium battery, packaged directly with the sensor, for minimal wires. User configurable data rates ensure that you get the

longest possible battery life, while meeting both high-speed and low-speed acquisition needs. TECAT's systems have a 100 foot range, and offer both analog and digital outputs. These systems offer real-time data, trigger options, and on-board storage options. The remote microcontroller boards are small enough to package directly with the sensing unit, so temperature compensation is highly accurate. The complete system can literally fit in your pocket for a truly portable solution. And with that portability comes the ability to install the system quickly and easily, so that the same system can be moved from one application to the next, minimizing downtime. For more information on TECAT sensing solutions, visit our website at [www.tecatperformance.com](http://www.tecatperformance.com).