



Improve Flow Meter Flexibility and Simplify Maintenance By Combining Wired and Wireless Technologies

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Tech Article

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While wireless technology has grown rapidly in terms of devices, functionality and availability in the consumer and commercial electronics markets, the wireless revolution is today a bit further behind in terms of adoption in the process control markets. Reliability and security remain primary concerns for adoption in critical production process measurement and control applications, including flow. The industrial landscape, however, is changing as availability of wireless control systems, networking products and field devices increase and as industry standards become a reality.

Some market analysts predict the demand for wireless communication in the automation industry to grow more than 25 percent per year over the next 3 to 5 years. Many of the applications will revolve around monitoring, data collection and programming. The known industry concerns about reliability and data security are barriers to wider adoption that wireless technology developers will continue to try to overcome and no doubt strengthen their products.

If you've been thinking that wireless technology for process control is still too far away or not as reliable as you would like for critical or hazardous applications in your plant, there's a new reason that you might still want to evaluate it. Now you can get the best of both the "wired" and "wireless" world in a flow meter that let's you read and send flow data with high reliability of conventional hard wire communications while at the same time simplifying maintenance and other routine tasks with wireless technology.



Fig 1—ST50 Wireless Flow Meter

With this approach, you won't achieve the major cost advantage of wireless—eliminating the wire and reducing installation labor—but you will get the flexibility and portability advantages of wireless while maintaining a high reliability operating environment. Employing a dual combination of wired/wireless flow measurement gives you the best of both technologies. At the same time, you'll be gaining experience with wireless technology for potential future application in your plant.

This dual technology approach is likely to gain traction with many field devices, where there is a need for local technician monitoring, trouble-shooting and/or maintenance of the device at the point of installation. It is particularly effective for devices installed in crowded, hard-to-reach areas or when access is unsafe and will save field technician's time and improve their safety.

How A Wired/Wireless Flow Meter Works

The newest generation of mass flow meters, such as FCI's Models ST50 and ST75, come with conventional hard-wired 4-20mA analog outputs and an RS232C serial I/O communication link, and they offer an optional built-in wireless infrared (IR) link. The hard-wired 4-20mA signal and serial I/O provide well established and highly reliable means of communicating the process flow data to the DCS and control room.

The IR link provides both an auxiliary device for reading the same measured data as well as access to the electronics for set-up and system diagnostics at the field installation. This replaces the need and eliminates the extra cost for an on-board keyboard, hardwired PC or custom field device to gain access to the flow meter. The IR link communicates with any Palm-OS-based personal digital assistant (PDA). With the wireless IR link, the PDA facilitates the performance of a wide range of common flow meter tasks, such as:

- Field Readings of Measurements
- Changing configuration settings
- Reviewing self-diagnostic codes
- Downloading calibration updates

With a PDA and a wireless flow meter, you are free to view measurements independently in the field any time and without any disruption to the flow meter's normal operation or hardwired 4-20mA signal output. You may need to adjust your process, which might mean updating the configuration settings on your flow meter. All readings as well as any adjustments or changes can be done easily from a distance without ladders, scaffolds, or even opening the enclosure, with a few clicks on the PDA via the wireless IR link.

Trouble-shooting is another potential application of wireless flow meter technology. To resolve some problems in a process, field technicians must have accurate flow data at their fingertips. Sometimes, it can be really handy for a maintenance technician to obtain local, instant flow measurement data. This also eliminates the need for remote displays,

ancillary readout devices and additional long wiring runs to suitable viewing locations.



Fig 2—ST75 Wireless Flow Meter

If the field technician wants to test and validate the flow meter, the wireless PDA provides a list of instrument self-diagnostic codes that can simplify resolution of the issue. Routine factory calibration updates also can be downloaded directly from the factory and delivered to the flow meter without removing it from service or opening the device's enclosure.

Choosing A Flow Meter

In selecting a wired or a wireless flow meter for any application, the first step is choosing the appropriate flow technology. There are multiple flow sensing technologies available, and the major ones now include:

- Differential Pressure
- Positive Displacement
- Turbine
- Electro Magnetic
- Ultrasonic
- Vortex Shedding
- Thermal (Mass)
- Coriolis (Mass)

All these technologies have their advantages/disadvantages, depending on the media (air, liquid, gas or steam) and your application's requirements. Some may be the only choice in certain media for your application. By looking at these factors, as well as your plant's layout, environmental conditions, maintenance schedules, energy cost and ROI, you will quickly be able to narrow the field to one or two best choices. When looking at any flow technology, after

you consider the media, there are several other factors to always consider:

- Accuracy and repeatability
- Plant environment
- Installation requirements
- Maintenance and life

Accuracy and Repeatability. You need to know the accuracy, repeatability and flow range of the flow meter that you plan to use. The specifications for these parameters in water, air or a specific gas are provided by most manufacturers. For example a typical air flow meter, such as FCI's insertion-style, thermal mass ST50 Series, operates in air over a flow range from 1.5 to 150 SFPS (0.46 to 46 NMPS) with an accuracy of $\pm 2\%$ of reading, $\pm 0.5\%$ of full scale, with a repeatability of $\pm 0.5\%$ of reading.

You'll want to be sure that the accuracy, repeatability and flow range in the manufacturer's specification aligns with your process media. Accuracy and range can be different in water, air or gas. Don't forget to check out a flow meter's repeatability specification, which tells you how reliably the device will maintain its specified accuracy level.

Plant Environment. Your plant's operating conditions can play a major role in accurate flow measurement. When considering factors such as climate (hot/cold extremes), specific process requirements for humidity levels, etc., you will find that some flow measurement technologies are better able over time to measure extremely low flows accurately, deal with wide swings in flow volume (turn-downs) and pressure drop.

In addition, your flow meter's packaging and electronics housings can widely vary. Where a plastic housing may be fine for protected and climate controlled indoor applications, a rugged, metal and appropriately rated NEMA/IP enclosure will ensure longest service life in non-climate controlled or outdoor applications.

Installation Requirements. Some flow meters are more straightforward than others when it comes to installation. Be sure to ask if the flow device can be inserted directly into the process pipe or if it requires an inline configuration that will require you to cut and splice your pipes in multiple places. The more penetrations required into the pipeline or duct-work the greater the risk of pressure drop and increase in the complexity and overall cost of the installation. Some flow measurement devices feature minimally invasive or non-intrusive sensing technology, which make them much easier to install and require the least amount of installation time and labor cost.

Wireless Flow Meters—The Future?

If for no other reason than simplifying troubleshooting and maintenance for flow meters that are in difficult to reach or hazardous locations, a flow meter with wireless capability is worth considering for your next flow meter retrofit or upgrade. The use of dual wired/wireless configuration field devices is a practical solution in many flow and other sensing or monitoring applications where high reliability is a major requirement.