

# CONTROL SIGNAL

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## DO Measurement without the Maintenance

**D**issolved oxygen control is the key to the BNR (Biological Nutrient Reduction) process because specific DO levels must be maintained to achieve phase efficiency. However, there are other benefits that come with DO control, such as a reduction in power required to run the blowers for aeration. This, in turn, significantly reduces plant operating costs. Up to 70% of a wastewater treatment facility's power consumption is taken up with aeration alone. The average treatment facility could save up to 30% by automating the control of aeration levels by



*DO sensor and transmitter*

actively and accurately measuring DO levels.

Membrane style sensors have  
*(Continued on page 2)*

## Turck Enhances Proximity Switch Sensing Ranges

**T**URCK's new M8 sensors incorporate 316 stainless steel housings to provide superior strength and corrosion resistance. They are available with extended 2 mm sensing ranges for flush mount versions, or 6 mm ranges for non-flush applications.

All sensors are 3-wire DC, 10 to 30 VDC, with PNP normally open or closed, or NPN normally open versions. Numerous cable options are also available, including M8 picofast® or M12

*(Continued on page 6)*



*Miniature Prox sensor, up to 6 mm range*

## Hot New Products

### Banner Engineering's SureCross™ Wireless Product Line

**B**anner Engineering, long known for its exceptional line of sensing and safety products, now offers its own unique version of wireless products. Based upon industry accepted Frequency Hopping Spread Spectrum (FHSS) radio technology, the SureCross™ product series is offered in 900MHz and 2.4GHz frequencies. The product is designed to accept numerous types of Input/Output (I/O) signals. Designed for bi-directional communications, the devices both transmit (TX) and receive (RX) signals for monitoring or control of local or remote systems. Accessories and pre-configured kits are offered to allow complete project solutions.



SureCross is offered as two product series; DX80 or DX70. Both are designed as a Node/Gateway configuration. Both accept I/O for analog  
*(Continued on page 5)*

## Inside This Issue

**Tachometers (P3)**

**Wireless I/O Enhancement (P3)**

**Basics of Air Flow Measurement (P4)**

## Employee Profile

With a background in international telex sales and customer service with MCI International and FTC Communications, Betty Lacey joined Gilson Engineering in June 1989.

After joining Gilson, Betty established and subsequently managed the inside sales team. Betty works with her inside sales assistants, the application specialists and the salesmen to provide customers with the best service possible. To better serve customers, inside sales assistants are assigned specific sales territories. Betty works with Tim Kendrick in the Pittsburgh office and Shawn Gilson in the eastern Florida office.

The highlight of her day is making the customer's job a little easier. Since most of her time is spent on the telephone talking to customers, she is happiest when she can "hear" their smile. When time allows, Betty enjoys going out on sales calls with the salesmen. "It is always good to put a face to the voice," says Betty.



When not working, you will find Betty dancing ballet or working out. As an adult student of Ballet Baroque, she has had the opportunity to dance at Carnegie Hall, Alice Tully Hall at Lincoln Center, an Off Broadway Nutcracker performance where she appeared on stage with a live pig (she doesn't like to talk about that one!), and local performances with Ballet Baroque, as well as the unique distinction of appearing on the Oprah Show.

When a customer calls and Betty answers, you can count on the best possible service; she is always willing and able to help with your everyday requirements!

### *(Insite DO, Continued from page 1)*

been the dominating technology for measuring DO in wastewater treatment facilities. Due to the delicate membrane and the contamination of the electrolyte, these sensors require regular diligent maintenance. The maintenance level can be frustrating and, at times, has left the measurement's benefit questionable.

About seven years ago, Insite-IG introduced a sensor using fluorescence technology for the wastewater industry. With several thousand installations worldwide, the system has proven very reliable and also greatly reduces the level of maintenance for DO measurement. Fluorescence technology itself is not new. It has been used to measure oxygen uptake in the medical industry for over 20 years. Within the last seven years, Insite-IG has adapted the technology to measure DO in biological reactors. Unlike the medical sensors, the Insite probes are rugged and fairly inexpensive.

DO sensors that use the Luminescence technology require periodic maintenance of the sensor, and may be damaged by direct sunlight. Their performance is also dependent on the flow rate past the sensor. These are not issues with the fluorescence technology.

Unlike traditional Membrane style or other types of designs for optical probes, it is possible to obtain systems that have no consumables. The sensor has a life expectancy of up to 10 years based on accelerated wear testing and boasts **no consumables, no spare parts, no recharging kits, no replacement films, and no membranes or membrane cartridges!**

### **Fluorescent benefits**

Maintenance frequency is not only reduced by eliminating consumables, but so is the calibration frequency. A traditional membrane probe requires frequent calibration due to



*Portable DO meter*

changes in the membrane/cathode geometry and the electrochemical effect. This effect is eliminated in the Insite-IG probe. Due to the stability of the internal electronics and optics, the sensor will drift less than 1% per year and, therefore, calibration verification is only required once or twice a year.

All sensors come with a 1/4-inch quick-disconnect that allows an air or water line to be attached for automated cleaning. The analyzer will open or close a solenoid valve or turn an air compressor on or off at user-defined intervals.

In the rare circumstance that the measuring surface is damaged, it can be replaced. The sensors are interchangeable, they are not analyzer specific, so the sensors can be moved or a replacement sensor added if required with no required configuration. Essentially, the microprocessor in the sensor "talks" to the analyzer to identify itself and enable the analyzer to adapt to operate with that sensor.

Insite-IG has so much confidence in their ruggedness that they cover the product with a FIVE YEAR WARRANTY.

## General News, Schedule of Events

Dave Snyder. Promoted to outside sales, Pittsburgh office

[www.gilsoneng.com](http://www.gilsoneng.com)

## Advanced Tachometers from AI-Tek

The new generation TACHPAK and TACHTROL series tachometers have been designed with all of the functions and durability embodied in the previous tachometer series as well as improvements to extend performance, accuracy and function. Both TACHPAK and TACHTROL now share a common processing platform. This commonality allows both to perform identical tachometry functions, streamlines programming and minimizes the learning curve.

The main physical difference between the two is the characteristic integrated display function found in all TACHTROL series tachometers. The TACHPAK is a DIN rail mountable control unit. It may be configured by a TACHTROL Plus control unit, or TACHLINK Windows based configuration software.



*Tachpak control in DIN rail mountable enclosure*



*Tachtrol in panel mount enclosure*



*Explosion proof version of Tachtrol*

The TACHTROL has an integral backlit LCD display to indicate speed, period, equation, and alarm status.

TACHLINK is a Windows based software package used in conjunction with the TACHPAK and TACHTROL units. All configuration data can be saved in a file for retrieval at a later date, or to copy to another controller. The datalogging function allows the user to view controller parameters in graphical or spreadsheet format.

While only the TACHPAK is available in DIN rail mount Both units are available in Panel, wall mount NEMA 4X, and explosion proof. The explosion proof TACHTROL unit may be programmed remotely via a remote via an infrared handheld that simulates the TACHPAK keypad.

## Elpro Expands Wireless I/O Offering with the L-Series

Elpro technologies has expanded their offering of wireless I/O and Gateway products with the introduction of the L-Series, filling in on lower point count locations. The L-Series includes a transmit only module model 905U-L-T with 2 DI, 1 AI, and 1 TC selectable for J, K or T thermocouple inputs, as well as a receive only module with the 905U-L-R with 3 DO and 1 AO.

The L-Series units may be ordered as a preconfigured pair for anyone with a simple point to point stand alone application, so right out of the box they are mounted, powered, and up and running without any field configuration.

The L-Series retains the flexibility of being field configured and may be integrated into a larger existing Elpro system of the 905U/105S/115S I/O modules and /or 905U-G Gateway modules, handling small point drops cost effectively. Gilson offers the PULS Din rail mounting power supplies for a complete package.



The L-Series transmitter is the first I/O product to allow temperature sensor inputs. Cold junction correction and linearization are performed on the module and may be sent to any of the I/O product output points, or to a Gateway without any additional conditioning. When combining a 4-20mA input simultaneous with a t/c input, many monitoring applications are possible like temperature compensated flows.

The Elpro products continue to expand to the most complete and innovative wireless product line on the market.

## Air Flow Measurement 101

Air flow is probably the most common measurement made in industry. Although air itself is free, the need to precisely measure air flows is important for several economic, and process oriented reasons.

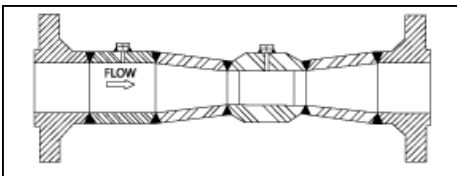
In waste water plants the cost of compressing air for the aeration basins is a significant part of the monthly electric bill. It is common in larger manufacturing and process facilities to monitor compressed air usage, again due to the cost of providing compressed air.

A power plant, refinery, or any other facility with a large boiler may need to monitor combustion air.

The following is a description of the more common methods of measuring airflow:

### Differential Pressure

This is the most common method of air flow measurement. Orifice plates, pitot tubes, venturis, and flow nozzles are all types of differential pressure devices. Although thought to be

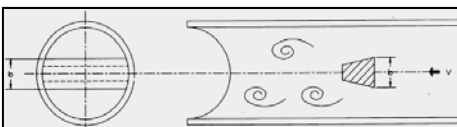


*Venturi flow element*

fairly inexpensive, the total installed costs can be quite high. If pressure and temperature vary, an accurate measurement requires the measurement of differential pressure, pressure, and temperature. Manifold valves and piping add to the installed cost.

### Vortex

The vortex meter may be used in gas, liquid, or steam applications. Vortex meters are not often used in air flow applications with pipe sizes larger

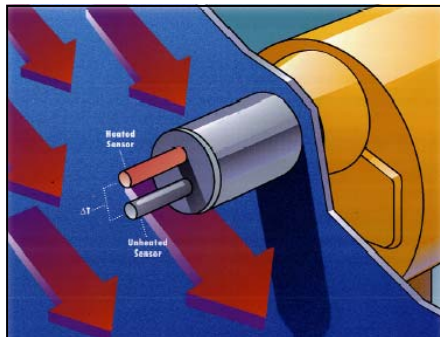


*Alternating vortices shed from obstruction in pipe*

than 4" for economic reasons. Vortex meters will also require pressure and temperature compensation for true mass flow.

### Thermal Dispersion

Thermal Dispersion meters are very versatile, and in many cases offer the lowest installed cost. No additional pressure or temperature compensation is required, and only one process entry is required. Thermal dispersion also offers turndown ratios of over 100:1.



*Thermal dispersion flow sensor*

In larger pipes or ducts, the thermal dispersion flowmeter can be provided in a multipoint design to improve accuracy.

### Turbine

Turbine flow meters are among the most accurate gas flow meters available. Total installation costs can be high due to the requirement for pressure and temperature compensation. Clean dry air is also a requirement, as the turbine assembly can be damaged.

### Variable Area

Variable area flowmeters, or rotameters, can give an indication of air flow in small lines. Their simplicity and low cost make them an excellent choice where high accuracy is not required. A common application for variable area flowmeters is in measuring air flow to an analyzer. In these applications it is only necessary to adjust the flow to the analyzer, and there is no need for an analog output.

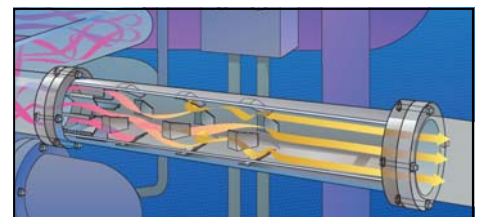
The variable area flowmeter may also have an adjustment to manually control air flow rate.



*Variable area flow meter with integral flow regulator*

### Flow Conditioning

Most air flow measurement devices require an adequate amount of straight run in order to meet optimal performance. In many cases 20 diameters upstream and 10 diameters downstream of straight run are required to achieve best accuracies. Elbows, valves, fans, pipes tees, etc. are all items that can cause skewed flow profiles, swirl, and vortices, which may introduce error into



*FCI's Vortab flow conditioner*

the flow measurement.

Many times there is not enough length of straight run to meet these requirements. In these cases, one may consider a flow straightener to condition the flow before it reaches the sensor. The Vortab flow conditioner from FCI is a flow conditioning device with a length of 7 pipe diameters. The swirl reduction

*(Continued on page 5)*

*(Air flow, Continued from page 4)*

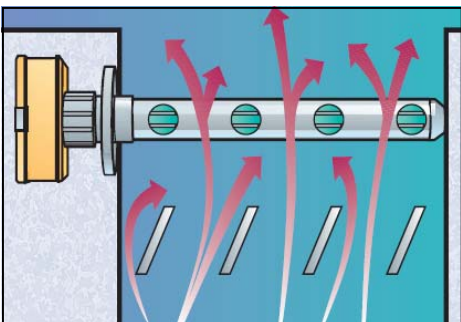
tabs remove swirl by generating small vortices (swirls) opposite to the main swirl. These cumulatively cancel the larger main swirl.

Three sets of profile conditioning tabs produce vigorous cross-stream mixing which rapidly mixes faster velocity regions with slower regions. This mixing quickly produces a homogeneous (i.e., conditioned) velocity profile. In addition, uneven particulate distributions or temperature profiles are made more uniform through this process.

Brandt's patented NZP1000 Series nozzle pitot flow sensor combines integral flow straighteners, a nozzle and a pitot averaging array to form a flowmeter requiring "No Upstream Straight Run With  $\pm 0.5\%$  Reading Accuracy". The nozzle eliminates distortions in the velocity profile caused by upstream obstructions and also doubles the velocity before it is measured by the pitot averaging ar-



*Brandt multipoint pitot flow sensor with integral flow straightener*



*FCI's MT86 multipoint thermal dispersion flow sensor*

ray.

Installation costs should be considered when selecting an air flowmeter. Turbine and thermal dispersion flow sensors can normally be installed through a

single entry point in the line. They can also be mounted through an isolation valve for insertion and removal without shutting down the process. An in-line flowmeter may be cost effective for smaller lines, but get quite expensive as you get into the larger pipe and duct sizes.

The following is a short list of points to consider when selecting an air flow sensor:

- Required accuracy. Is absolute accuracy required, or in the case of aeration basins, is repeatability sufficient?
- Straight run requirements. Normally 20 diameters up and 10 down are required. Flow conditioners or multipoint sensors may be used in non-ideal applications.
- Is pressure or temperature compensation required? This can substantially increase the cost of some flow measurement systems.
- Is flow dirty or wet? These conditions could damage a turbine meter. Wet flow may effect thermal dispersion.

No one flow technology will work for every air flow application. Doing your homework ahead of time will prevent poor flowmeter performance and a lot of headaches.

*(Banner, Continued from page 1)*

and/or discrete signals. The DX80 series is configurable for one (1) up to as many as thirteen (13) Nodes tied wirelessly to one (1) Gateway. The DX70 series, known as a "wireless cord set", is a simple one (1) Node to one (1) Gateway configuration.

The DX80 series accepts 0-20mA, 0-10Vdc, Thermocouple, RTD, PNP and NPN inputs. Outputs available include; 0-20mA, 0-10Vdc, NMOS, PNP and NPN. Serial communications capabilities are available through Gateways with Modbus or Modbus/TCP. Special modules are available for Banner M-GAGE™, MINI-BEAM™ and QT50U ultrasonic products. Strain gage and Temperature/Humidity sensing modules are being designed for release later this year. The DX70 series accommodates 0-20mA or PNP signals.

Accessories available for Banner SureCross™ products include antennae and low-loss cables capable of providing up to 3 miles of signal transmission. Antennae brackets are included for ease of installation. Surge suppressors



for outdoor antennae installations. FlexPower™ Battery modules to supply DC power to FlexPower™ Nodes where line power is unavailable. AC to DC power supply options includes modules with 120mA to 700mA's available for powering sensors some of which include relay outputs. The DX85 I/O expansion module is available for increasing I/O capabilities of DX80 Gateways. Banner EZ-Light™ products and cord sets round out the offering for complete project solutions.

For more information go to: [www.bannerengineering.com](http://www.bannerengineering.com). Use the "Search Banner Engineering" feature or click the "Wireless Products" designer.

*(Turck, Continued from page 1)*

eurofast® connections to match any application. All sensors are IP 68, NEMA 6p rated for use in harsh environments. The M8 Miniature Proximity Sensors have up to a 6 mm Sensing Range on Any Metal, including Steel, Iron, Brass, Copper, and Aluminum.

TURCK's CQ80 high temperature inductive proximity sensor is now available. These devices feature a separate sensing head assembly and electronic amplifier assembly to facilitate quick, cost-effective installation and maintenance. Sensors used in high temperature applications have a limited life



*CQ80 sensor with remote amplifier*

due to environmental conditions. TURCK's newly released CQ80 (and previously released CQ40) sensors are rated for 2,000 hours of life at a constant 250 C, and are the first in the industry to incorporate a sensing head

separate from the electronic amplifier. Therefore, when a replacement is needed, only the sensing head exposed to the high temperature environment will need to be replaced.

TURCK's high temperature sensors give you the freedom to replace only part of the sensor instead of the entire unit, significantly reducing operating costs, while lessening maintenance down time.



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