Specialty Gas Equipment

Wireless Monitoring System

Description: Airgas' wireless monitoring system automates the monitoring and data-logging of gauges that are either not being monitored or are being recorded manually. The Airgas system enables wireless remote monitoring of virtually any analog transducer or instrument with the following outputs: 4-20mA, 0-5V, or 0-10V, RS-232, RS-485, thermocouple, thermistor. Non-disruptive – no need to change out transducers, break pressure seals, or run wires. Compatible with most existing flow meters, current meters, particle counters, thermocouples, weigh scales etc. Enables data logging to enable trend analysis, notification, or statistical process control. Optional Class 1 Div 2 and IP65/NEMA 4 enclosures available. Battery life of three years under typical sampling rates. Optional OPC or BACnet interface to existing building or plant automation system.

This system is very cost effective because it does not require users to replace standard pressure gauges with transducers, which has historically been cost prohibitive due to:

- Cost of disruption to existing operations (shutting down flows, depressurizing).
- Cost installation, wiring, and design.
- Cost of labor for leak checking and other process revalidation.
- Cost of specifying and procuring the appropriate transducers.

The Airgas Wireless Gauge Reader (WGR) system measures rate of change and does not incur costs related to wiring, leak checking, revalidation or other costs related to down time. This is accomplished by using wireless, optical units which simply attach to the front face of an existing gauge (Figure 1).

These units can transmit data wirelessly to an Airgas "Blue Box" (Figure 2) receiver which sends data to operator stations, cell phones and PDA's for alarming, trending and notification. Compared with wired or wireless transducers, the WGR requires significantly lower cost to put into operation (Figure 3).

The benefits of automating gauge and transducer monitoring (Figure 4) include:

- Timely notification of excursions and trends (rate of change) to avoid cost of downtime or lost yield.
- Reduce labor costs associated with manual gauge reading "rounds" and charting.

- Reduce cost of gas by more fully using each cylinder before returning to supplier.
- Enable temporary audits/troubleshooting without need to install new transducers and associated process disruption and revalidation effort.

Based on these benefits, the cost of installing a WGR system can typically be paid back within months.

Technology: The overall architecture of the Wireless Monitoring System is shown in Figure 5. Airgas understands the need to "get the right data, to the right people, at the right time" is what our customers require. In particular, we strive to accomplish this with the minimum of disturbance or changes required to any existing IT infrastructure or processes already in use.

As a result, the Wireless Monitoring System is designed for flexibility and ease of interfacing with a variety of existing plant control systems, IT systems and protocols. Our architecture conforms to typical plant Supervisory Control and Data Acquisition (SCADA) layered architectures which include a Field Devices Layer, Data Acquisition and Control Layer, Plant Information Layer, and Human Machine Interface Layer.

We use industry open standards and protocols such as OPC (used by process industries and manufacturing), SECS/GEM (used by Semiconductor Fabs), BACNet (used in Building Automation) and also Microsoft ODBC and ADO.NET for database connectivity. We also accommodate analog signals as 0-5V, 0-10V and 4-20mA current loop for interfacing with legacy PLC's and automation controllers.

For CML, we propose the "Standalone WGR" option shown on the right side of Figure 5.

Specialty Gas Equipment

Wireless Monitoring System Cont.

This schematic provides details on the architecture for the Airgas Wireless Monitoring System. Near-future development includes wireless devices that can read seven-segment LED displays, linear gauges, float flow indicators, remote alarm lights, etc.

| Option A — Integration w/Existing Automation | Option B — Standalone Configuration | Option C — Legacy I/O Configuration |

Human Machine Interface Layer: HMI Client, PC Browser (Option A); PDA/Cell Phone, PC Browser (Option B); HMI Client, PC Browser (Option C)

Plant/Bldg Automation System Layer: LAN, BACNet/IP or OPC, BMS/Plant Database (Option A); LAN (Option B); Plant LAN, Automation System Server (Option C)

Data Acquisition Layer: Blue Box, Cypress Wireless (Option A); Blue Box, Cypress Wireless (Option B); PLC or Controller, Analog Receiver, Cypress Wireless (Option C)

Field Devices

Equipment supplied by Airgas
Existing equipment supplied by customer