

# CONTROL SIGNAL

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## Flow Meter for Biogas Applications

**F**luid Components International (FCI) has released its new Model ST51 Mass Flow Meter for owners, operators and manufacturers of biogas production and methane capture and recovery systems. The new model ST51 provides the high performance and features required of these applications in an explosion-proof instrument that is easy to install, safe and requires virtually no maintenance to deliver the best cost solution.

"This flow meter is designed specifically to solve the unique challenges to flow metering in bioprocess generated methane," said Randy Brown, FCI's Marketing Manager. "The ST51 is the optimum biogas flow meter solution at an affordable price. It features a no



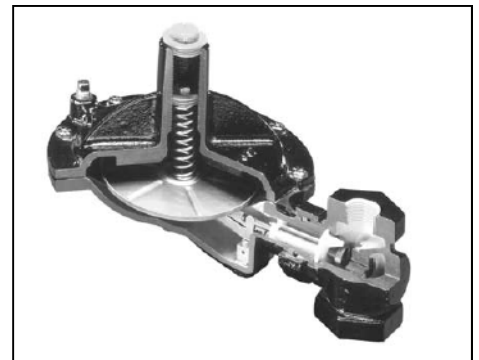
moving parts design that's non-clogging and operates over a wide flow range with low-flow sensitivity. It's packaged in an explosion-proof enclosure, and the calibration is matched to the user's actual gas composition and

*(Continued on page 2)*

## Jordan Control Valves for Tank Blanketing

**T**ank blanketing, also referred to as tank padding is the process of applying a gas (typically nitrogen) to the empty space in a storage container. Nitrogen gas is widely used due to its inert properties as well as its availability and relatively low cost. A blanketing valve (Jordan MK608) uses a supply of nitrogen to maintain a blanket of low pressure gas above the stored material in the tank.

*(Continued on page 6)*



Jordan MK608 self operated control valve

## Hot New Products

### MSA Altair-5 5-Gas Detector

**T**he new MSA Altair 5 Multigas Detector raises the bar once again with 5-gas capability, more than 17 preprogrammed languages, high-resolution, crisp color display option, and MSA's exclusive MotionAlert and InstantAlert features. Many great features plus the outstanding durability and performance you expect from MSA.

Ideal for confined space applications, the MotionAlert feature, when enabled, activates a "man down" alarm if no motion is detected for 30 seconds. The InstantAlert feature allows users to manually activate an audible alarm to alert those around them to potentially dangerous situations.



Using a portable gas detector should never be a challenge! MSA has designed the Altair 5 Multigas Detector with the same ease-of-use logic to ensure that minimal user training, interac-

*(Continued on page 3)*

## Inside This Issue

**Siemens Radar Advantages. P.3**

**4-20 mA or Modbus? P. 4**

**Ultrasonic Flow Meter for Gases, P.5**

## Employee Profile

Introducing Gilson Engineering's newest Applications Engineer, Kendra Mitchell. Kendra is a recent graduate from Ohio University in Athens, Ohio. She received a Bachelor of Science degree in Chemical Engineering. Kendra accepted a full time position with Gilson shortly after graduation, and made a quick move to the state of Pennsylvania from her hometown in Ohio.

Gilson Engineering has opened Kendra up to the world of instrumentation. Each day at the office is full of learning. "I feel that Gilson was the right career choice for me because they believe strongly in the importance of customer service. I am also excited to eventually take my knowledge on instrumentation and be able to help other engineers with their own unique application ... it makes for an interesting work day!"



When Kendra is not working, she is usually exploring downtown Pittsburgh. She is slowly learning her way around the many shops, arenas, and restaurants that Pittsburgh has to offer. Growing up in Columbus, Kendra will always have a special place in her heart for Ohio State and its Buckeyes! She also enjoys shopping and keeping up with fashion trends. The completion of a half marathon is Kendra's goal for 2009.

*(Gas flow meter, continued from p. 1)*  
installation conditions.

FCI's ST51 flow meter is designed specifically to measure biogas and all methane composition gases including natural gas. The ST51 features a thermal mass, insertion-style flow element with flow accuracy to +/- 1% of reading over a broad range from 0.3 to 400 SFPS (0.08 to 122 MPS), and repeatability of +/-0.5% of reading. The flow element is available for use in line sizes from 2 to 24 inches (51 to 610 mm) diameters. It operates over a wide turndown range of 100:1, which is essential due to the variation in gas generation.

The thermal dispersion flow meter offers the following advantages over traditional differential pressure style flow meters:

- Up to 100:1 turndown. Differential pressure accurately measures with a 5:1 turndown.
- Thermal dispersion flow meters do not require additional temperature or pressure compensation. This

reduces the overall cost of installation.

- The thermal dispersion sensor creates a minimal pressure drop.

The transmitters has several features that include, dual 4-20 mA outputs that are assignable to flow rate and/or temperature, and a 0-1kHz pulse output for totalized flow. The transmitter's digital communications include an RS-232C port. Units that have the optional digital display include a wireless IR port for PDA use. The digital display features a two-line, 16 character LCD screen that is easy to read and can be rotated in 90-degree increments for optimum viewing and installation flexibility. The LCD's top line is assigned to flow rate and the bottom line is user assignable to temperature or totalized flow. A remote mount transmitter is also available.

FCI Also offers the ST75 in-line flow meter for 1/4" through 2" line sizes. Where short pipe runs are a problem, the ST75V includes an integral flow conditioner.



*ST75 in-line flow meter, and ST75V in-line flow meter with integral flow conditioner*

## General News, Schedule of Events

### Pittsburgh

March 10 Pittsburgh ISA Show. Regional Learning Alliance,

### Toledo

March 18 Toledo ISA Show. Holiday Inn French Quarter, 11:00 am—7:00 pm

### Ohio

Marwin Valve has selected Gilson Engineering as their exclusive representative for Northern and Central Ohio.

## Siemens Radar Level Transmitter Replaces Competitive Units

A local chemical company chose the Siemens LR250 radar level transmitter to measure level on a liquid resin tank after competitive units failed them. Rosemount Saab, Ohmart Vega, and E&H radar units were all tried on this application before the customer made the change to the Siemens LR250 radar level unit for this tough liquid level application.

Siemens LR250 has advanced signal processing on board, which allows it to provide a very reliable signal under heavy condensate conditions within the horn area (which this customer was experiencing problems with). Siemens has designed and tested the LR250 for these harsh conditions where others have failed with false high readings.

The LR250's signal processing, commonly referred to as "Process Intelligence", enables the LR 250 to maintain its actual raw processed signal when a situation arises like heavy vapors or condensation in the airspace as its smarts adjust the unit to read the correct level accordingly. Additionally, this product is so good in performance that it produces a great signal even recessed 8" up into a 2 inch pipe nozzle without any advanced programming.

Figure 1 shows a typical echo return of the LR250 with a dry horn. Figure 2 shows the return from the same unit, but with condensate formed inside the nozzle. This condensate has caused



Radar level transmitter mounted on nozzle

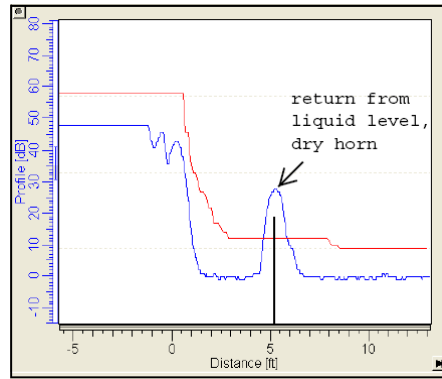


Fig 1

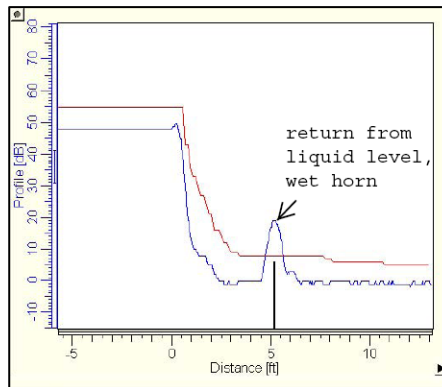


Fig 2

other radar level transmitters to fail in this application.

Additionally, the customer intends to purchase more of these Siemens LR250 radar level devices as budgets permit for other tough liquid level applications. Installation of this unit has saved the customer money by avoiding potential spills the other radar units were presenting.

(Altair-5, Continued from page 1)

tion, or maintenance, is required. The intuitive menu-driven display and 3 large and tactile buttons make operation easy – even while wearing gloves. Numerous customization options are offered to fit many budgets and experience levels, from personal monitoring and pre-entry checks within confined space to industrial hygienist use.

MSA's new generation of miniature catalytic combustion sensors will reliably detect up to 100% LEL of combustible gases, including many solvents. MSA's high-performing electrochemical duo-tox hydrogen sulfide/carbon monoxide sensor allows for an additional sensor slot. Many other toxic sensor choices are available, including ammonia, chlorine, hydrogen cyanide, phosphine, and sulfur dioxide. A lithium-ion rechargeable battery provides enough runtime to cover double shifts.

The Altair 5 Multigas Detector is Galaxy® System-compatible for easy calibration and record keeping. Vibrating alarm and datalogging are standard features, and the unit is MSA Link™ Software ready for easy transfer of stored information to a connected PC. The ergonomically designed rubber overmolded housing provides unsurpassed durability, is IP65-rated for dust and water ingress, and passes a 6-foot drop test. The unit is also equipped with a 95+ dB audible alarm and ultra-bright alarm LEDs for maximum visibility.



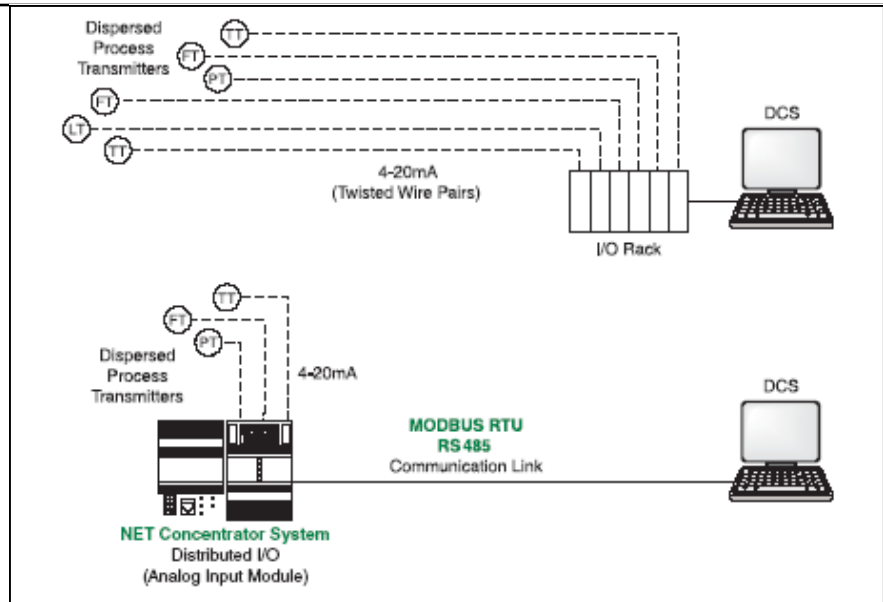
Galaxy automated test and calibration system

## 4-20 mA or Modbus?

Many process instruments now have the ability to transmit either a 4-20ma signal, Modbus over RS485, or Modbus over Ethernet. Most of us shy away from Modbus communications as this requires interfacing and terminology that is new to us and we do not understand. Hopefully this article will shed some light on Modbus communications and make connecting Modbus devices as simple as connecting 4-20ma devices.

Here are some advantages of using Modbus communications over individual 4-20ma signals:

- Wiring 485 Modbus devices is nothing more than 2 wires (same as 4-20ma). Difference is that units can be daisy chained. This means that one can wire to node 1, and Node 1 can be connected to node 2. This does not require individual pair of wires for each node. Therefore, for 31 devices, only 2 wires are required to communicate to all 31 devices. 4-20ma devices would require 31 pairs of wires. (Ethernet Modbus follows Ethernet wiring practices and would require homeruns into an Ethernet hub),
- With Modbus, one has access to all the variables in the connected device. For example with a MSA Ultima X gas detector, not only can we see the current gas concentration, but we can also see the alarm status of the device, the scaling of the instruments, last calibration date, the date of the sensor, etc.
- Most devices today are digital devices. You hear terms such as 12 or 16 bit resolution. This means that a 12 bit resolution is 2 to the power of 12 or 1bit out of 4096, or 16 bit resolution would be 2 to the power of 16 or 65536. The processors in today's instruments are digital.
- For 4-20ma transmitters we have to add a digital to analog conversion, and output the signal. An example of this would be a type J-type T/C de-



*Wiring savings using Moore Industries Net Concentrator with Modbus communications, versus direct wiring*

vice. The range of type J T/C is from -328 to 1400 Deg F. Total span is 1,728 and using 12 bit resolution the resulting accuracy is  $1728/4096 = .42$  deg F. This means that the best resolution one could hope for is .42 deg F. This can be worse if you have lower than 12 bit resolution or even a R or S type thermocouple that has a much greater span than a type J thermocouple. With Modbus communication one reads the actual digital value and is not subject to the additional inaccuracies due to the Analog to Digital conversion. Analogous to this would be to buy a High Definition TV and use regular analog cable or even digital cable and not the High definition cable box.

- Most devices accepting Modbus now have an OPC driver. The OPC driver is a Software program that maps the registers of all your devices on the network to registers on your PC that are now easily accessible to any OPC compliant software such as Wonderware, Citect, and Intellution. Make sure there is an OPC driver for the receiving device.

Now that we uncovered some differences, let's see if we can simplify

the mystery behind communicating with Modbus.

Each individual device on the Modbus network must have a unique Node ID. Assign Node IDs from 1 to 32. Do not use 0. We will only discuss a master / slave communications. This means that the master controls the communications and will send out request to individual nodes, and in return wait for the answers from the nodes. The master is typically the PLC, recorder or the gateway Device. Node IDs on the devices are set by dip switches, configuration software, or by some type of programming device.

Once the nodes on the devices are set, the communications must be set. Typically, communications are 19,200 baud rate, 8 data bits, with one stop bit and parity can be none, even or odd. Make sure that all devices along with the master have the same values for the communication parameters.

The next step is making sure that the master device (recorder, PLC, DCS, etc.), can interpret correctly the values in the register. The values that we typically want to read are held in the "holding registers". Each Modbus device includes a register map. This register map shows the locations for the parameters of interest. There is always a base address, typically 40,000 or 40,001. The data map typically will say base + 401.

*(Continued on page 5)*

(Modbus, continued from page 4)

Then it will identify the type of register. Following are the most common register types along with the number of registers:

Type	Number of Registers
16 bit signed integer	1
16 bit un-signed integer	1
32 bit signed integer	2
32 bit un-signed integer	2
IEEE floating point	2
Big endian/Little endian	1 or 2
Byte swap for all above	1 or 2

Notes: Each register consist of 16 bits divided up into 8 bits called a byte or a word. Big Endian is the most popular method. When a register is sent, the most significant byte (MSB) is sent first and the least significant byte (LSB) is sent second. Little Endian is the reverse with the LSB being sent first and the MSB being sent second. I believe that Byte swap, Little Endian and Modbus- X are the same.

The master device needs to know the node, then the register address of the stored value, along with the format and or type of register to interpret. If the value on the receiving device is different than the value at the device, then chances are you are reading the incorrect register location or have not identify the correct type of register. At Gilson Engineering

we can supply both the receiving device as well as the sensor communicating by Modbus. Following are some Modbus devices that Gilson currently offers:

- MSA Ultima X Gas monitors for toxics, combustibles and Oxygen detection.
- Siemens Milltronics Multi Ranger, Hydorranger Level monitors/controllers.
- Siemens Milltronics LU10 multi-point level controller.
- Siemens Sirec paperless recorders.
- Banner Wireless 4-20ma. T/C's, RTD's and humidity devices.
- Elpro Wireless Gateways.
- Unitronics HMI/PLC combination device.
- B/W Controls Magnetostrictive Level and/or interface monitor
- Siemens Magnetic flow meters and Massflow meters
- Siemens Moore 353 controllers
- Moore Industries NCS Net concentrator multiplexer device
- Siemens Milltronics Weigh scales and impact flow meters

When possible work with a company that provides both the receiving device as well as the sensor or monitoring device. Most importantly work with a company that can provide the technical resources and knowledge to support you in efforts of getting all your devices communicating with each other.

## Ultrasonic Flow Meter for Gas Applications

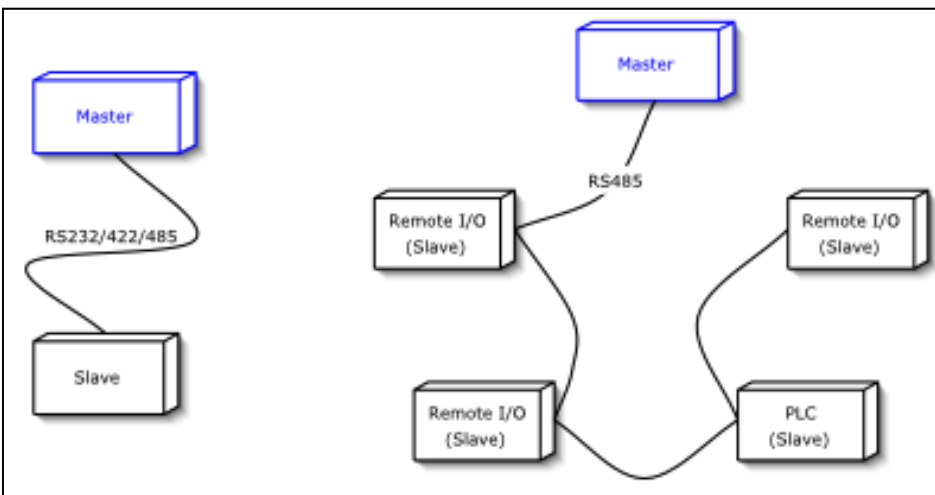
Siemens has selected the Gilson Engineering offices in Pennsylvania, Ohio and West Virginia to be the exclusive representative for their line of clamp-on ultrasonic flow meters for natural and process gas applications. These meters are ideal for gas check metering, cost allocation, gas production, LUF (lost and unaccounted for) gas measurement, storage and other gas measurement applications. With the simple clamp-on design, there's no need to cut the pipe or stop flow, and there are no moving parts to foul or wear out. Pressure losses are eliminated.



For demanding applications, multiple beam versions provide higher accuracies for installations with limited straight run and poor flow profile conditions. Siemens' patented Zeromatic Path (TM) automatically adjusts the zero point of the meter without stopping flow. The meter is tolerant of many wet gas conditions, and is immune to most pipe and valve noise. For natural gas industry users, an internal AGA-8 is available, and the instrument is compliant with AGA-10 speed of sound measurement practice. Both portable and permanently mounted instruments are available.



Siemens FUG1010 electronics in explosion proof enclosure



**(Blanketing valve, continued from P.1)**

Tank blanketing is used for a variety reasons:

- Reduce the hazards associated with flammable/combustible products.
- Minimize contamination of the product that may result from drawing air or moisture into the tank's vapor space.
- Keeps oxygen levels low in and around the product reducing the amount of oxidation that occurs within the product.

When considering the application with combustible products, the greatest benefit is process safety. Since

fuels require oxygen to combust, reduced oxygen content in the tanks vapor space lowers the risk of unwanted combustion.

Tank blanketing is widely used in the food and beverage industry to keep contaminants out of the storage space. The positive pressure maintained inside the vessel (typically less than 1 psig) ensures that if a leak should occur, the nitrogen gas will leak out rather than having contaminants and moisture entering the tank. Also, nitrogen blanketing greatly increases the shelf life of the stored product.

Once the blanket has been established, a small flow of nitrogen is

continually admitted to the tank to keep the blanket fresh. These valves are often used in conjunction with Jordan's MK 508 Back Pressure Gas Regulator, used to vent gas from the tank to prevent blanketing pressure from rising to a level that could damage the tank.



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