CONTROLOTRON® Solenvis
experts in energy metering

WideBeam® Field Clamp-On Ultrasonic Flowmeter For Natural and Process Gas

Ideal for Checkmetering and Allocation Applications with Field Proven Accuracy

Description

Controlotron's **SonicGas™** field clamp-on ultrasonic flowmeter accurately measures the flow rate of gases while providing the added performance, safety, economy and convenience of a non-intrusive design. This new high-precision **Transit-time** Ultrasonic flowmeter provides capability for custody transfer accuracy on your pipe. Precise temperature and pressure sensing enables computation of standard volume (mass) totals, as well as absolute volume. Internal AGA-8 computation for defined gas composition is available. For variable gas composition applications, volumetric flow, pressure and temperature data can be provided to an external flow computer that utilizes a gas chromatograph.

SonicGas eliminates the complex and expensive maintenance typical of intrusive type sensors and provides a completely non-intrusive design for better reliability and performance. The system uses Controlotron's award winning WideBeam® transducer technology and includes Zeromatic Path™ capability which eliminates all zero drift and allows zero to be set without shutting flow and blocking lines.

The externally mounted transducers require virtually no maintenance, yet can be removed or inspected without stopping flow or depressurizing the pipeline. Models are available with one to four beams which, in diametric reflect-mode configuration, are at least as insensitive to crossflow and swirl errors as two to eight chordal paths of flow data. A wide variety of safety certifications, communications options and control outputs are also available.

Installs Without Shutting Flow for Survey, Checkmetering and LAUF Gas Analysis

Application Profile

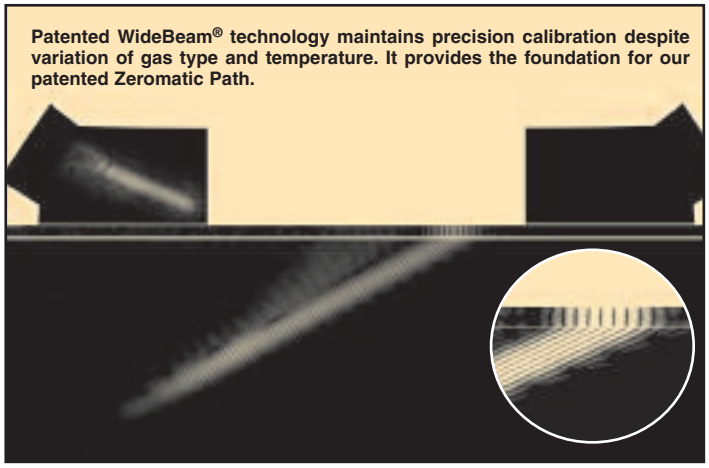
Controlotron's SonicGas™ field clamp-on system provides superior performance for checkmetering, flow survey verification and allocation applications in gas pipelines. It provides a unique solution to your lost and unaccounted for (LAUF) gas balance. A choice of 1, 2, 3 or 4 beam systems is available to accommodate convoluted flow profiles or applications with minimal straight run. Controlotron's exclusive WideBeam® transducers assure consistent calibration even with variable gas pressure, temperature and composition. In addition, the system is tolerant of most wet-gas conditions.

Principle of Operation

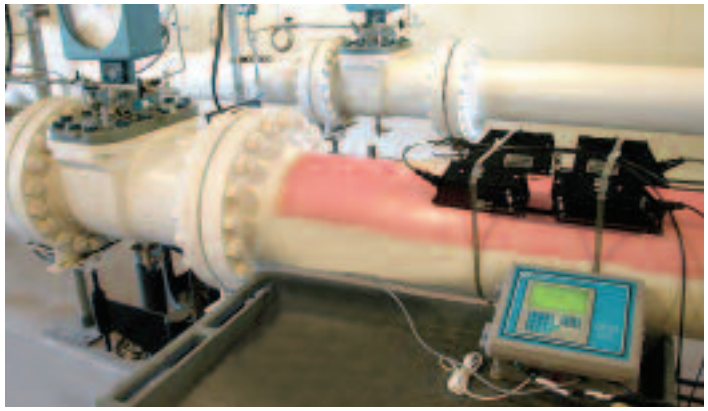
Sonic pulses are sent both upstream and downstream between pairs of WideBeam transducers mounted on the same side of the pipe. The transducers are matched to the pipe's sonic properties to produce a wide sonic beam. The beam travels axially through the pipe wall, transmitting a precise, stable waveshape into the gas. These pulses travel between transducers through two separate paths.

The first measurement path travels through the pipe wall and diagonally through the gas, reflecting off the far pipe wall to the other transducer. Gas flow causes a proportional time difference between upstream and downstream transmissions. The system measures this time difference and converts it to volumetric or mass flow rate. The second sonic path passes between the transducers through the pipe wall only. Since gas flow does not affect the timing of the pulses in the pipe wall, this path serves as a stable zero flow reference. It eliminates zero drift and allows zero to be set automatically without the need to stop flow. (See wide beam animation on Web at www.controlotron.com/transit.htm).

Controlotron's patented WideBeam transmission produces strong, stable signals that extend far beyond the footprint of the transducers. This allows operation over wide flow velocities, pressures and temperatures, and permits operation even with wet-gas, since droplets do not block the entire WideBeam.



Computer simulation of WideBeam wave shapes showing beam collimation that transforms pipe into an ultrasonic sensor.



Clamp-on sensors are quickly installed, without interrupting gas flow.

Functions Provided

- √ **Standard volumetric & mass flow totals for defined gas composition per AGA-8 (requires PC programming)**
- √ **Gas Pressure and/or Temperature (optional)**
- √ **Complete application & operation diagnostics, to assure calibration and operational integrity**
- √ **Upward compatibility & compliance with expected AGA-10 Speed of Sound measurement practice.**
- √ **Internal Datalogger**

SonicGas™ Features

- √ **Non-Intrusive Design with WideBeam Sensors**
- √ **Immune from most pressure reducing valve noise**
- √ **Provides calibratible accuracy for custody transfer applications**
- √ **In diametric reflect mode, each beam provides insensitivity to crossflow and swirl error at least as good as two chordal paths**
- √ **System provides digital and analog outputs**
- √ **Operation assured even with wet-gas**
- √ **Zeromatic Path™ prevents zero drift and eliminates need to shut flow and block-in line for zero setting**

System Components

- √ **1010GC NEMA 4X or 7 Flow Display Transmitter**
- √ **1011G field clamp-on transducers**
- √ **Optional 1000 ohm platinum RTD temperature sensor**
- √ **Rugged stainless steel enclosure for permanent installations (also designed for direct burial)**

Underground, submersible installation for 56 inch (1425 mm) pipe.

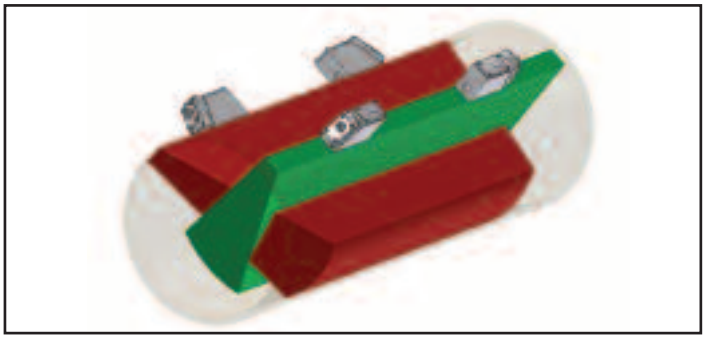
The Field Clamp-On WideBeam Gas Meter You Can Count On

The Non-Intrusive Advantage

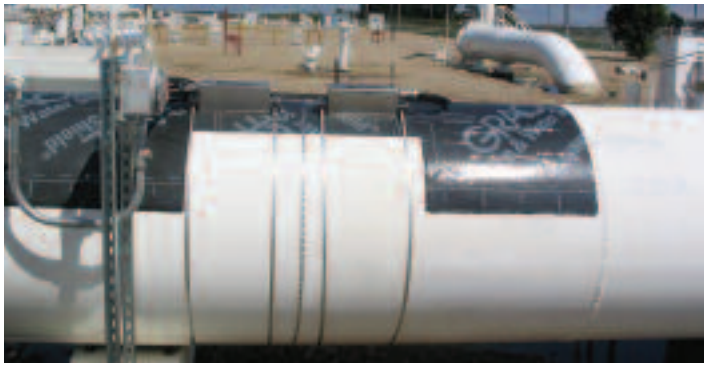
Controlotron's WideBeam transducers offer major performance advantages over conventional insert hot tap flowmeters.

- Insert systems cannot include Zeromatic Path™ as a dynamic zero reference, so they are subject to zero drift and must be zeroed at actual zero flow rate. ZeroClear and Deadband functions simply approximate zero and mask zero offsets.

- Using the pipe as a WideBeam wave guide greatly extends the aperture of the sonic signal. This produces a wider beam with less beam spreading. The result is more flow information per transmission. This is evident in the greater stability, better flow profile averaging and faster response rate of the WideBeam system. WideBeam transmission operates at a higher frequency than conventional insertion meters, providing better immunity to valve noise and ambient pipeline noise.



Larger path volume provides more data and greater pipe coverage allowing fewer paths for better performance and less cost.



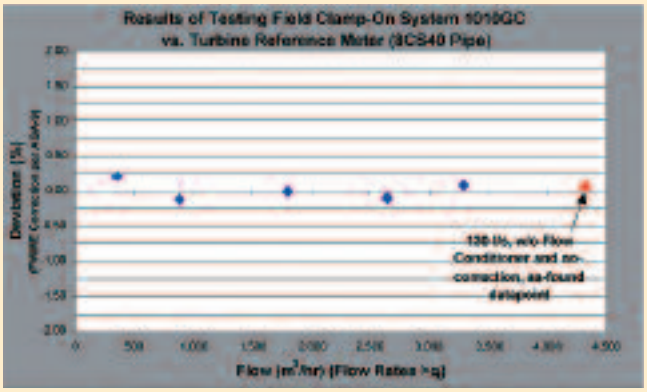
In-situ calibration for less-than-ideal upstream piping is built in.

WeldSeal™ mounting assembly completely covers and protects transducers.

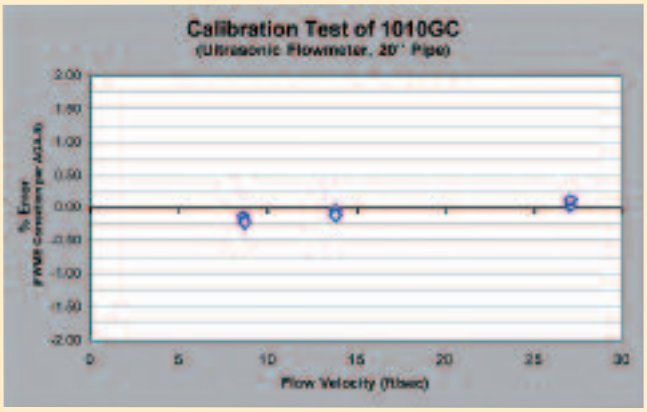
Performance Data

Typical performance of field clamp-on System 1010GC, installed without pre-calibration or special conditioning, as compared to precision calibrated reference custody transfer meters in the same location, is illustrated by the following data.

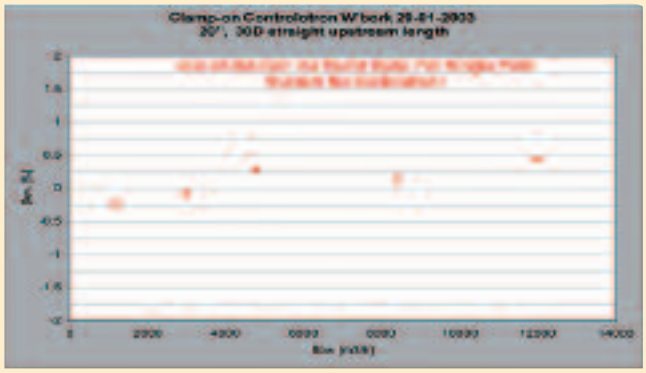
Calibration Results from Independent Test Laboratories



8" Pipe intrinsic calibration without flow conditioner.



20" pipe shows better than 0.1% repeatability.



Intrinsic calibration of 20" single path meter.

To view more test results go to: http://gastests.controlotron.com

Performance Specifications

TYPICAL ACCURACY	0.5% to 1% of rate (pipe condition and flow profile dependent)
CALIBRATABLE ACCURACY	within 0.10% to 0.25% of measured value, application dependent
REPEATABILITY	<0.05% - 0.10% (pipe condition dependent)
RANGEABILITY/TURNDOWN	100:1 nominal to 1000:1 extended
GAS TEMPERATURE	-40˚F to 250˚F (-40˚C to 120˚C)
FLOW RANGE	± 100 f/s,(± 30 m/s) bi-directional (see sizing chart from 1010GCS data sheet)
FLOW SENSITIVITY	0.001 f/s, (0.0003 m/s) flow rate independent
DATA REFRESH RATE	80 hz
MINIMUM PRESSURE	4-10 bar (55-145 psi), typical (gas composition and application dependent)*
PIPE SIZE RANGE	1 inch to 60 inches (25mm to 1525mm)**

*Plastic pipes support operation at atmospheric pressure. **Smaller and larger pipe capability available on special order.

Feature Specifications

		Nema 4X, IP 65		Nema 7, IP 66	
		1 or 2 Beam*	3 or 4 Beam*	1 or 2 Beam*	3 or 4 Beam*
DISPLAY	128 x 240 Pixel, Back-lit LCD	X	X		
	2 x16 Character LCD			X	**
RTD TEMP SENSOR	Optional 1000 Ohm, High Precision 4-wire	2	2	1	2
MENU ACCESS	32 Key Keypad	X	X		**
	5 Position Magnetic Wand			X	
	RS-232 Serial Port	X	X	X	X
	PDA Interface	X	X	X	X
OUTPUTS	Isolated 4 to 20 mA, Programmable Standard	2	2	2	2
	Isolated 4 to 20 mA, Programmable Optional	+2	+2	-	+2
	0 to 10 VDC, Menu Programmable	2	2	-	2
	Open Collector Digital Pulses (Quadrature)	4	4	-	4
	Optically Isolated Digital Pulse & Source	-	-	1	-
	0 to 5 KHz - TTL Pulse Square Wave✦	2	2	-	2
	RS-232 Serial Port	X	X	X	X
ANALOG INPUTS	4 to 20 mA, Programmable (Pressure, Temp., etc.)	4	4	2	4
OPTIONAL OUTPUTS	Modbus	X	X	***	X
	Ethernet	X	X	***	X
	RS422	X	X	***	X
	Telephone Modem	X	X	***	X
STATUS/ALARM I/O	Programmable, 4 Form C Relays	4	4	-	4
	Programmable 4 N.O. Mer. Wet. Relays (Opt.)	(4)	(4)	-	(4)
	Optically Coupled Output Logic Gates	-	-	2	-
	Totalizer Clear Switch Input	1	1	-	1
	Totalizer Hold Switch Input	1	1	-	1
	Opto Iso. Totalizer Clear Switch Input			1	
	Opto Iso. Totalizer Hold Switch Input			1	
DATALOGGER	1 Megabyte, Programmable for 17 Data Functions	X	X	X	X

*Equivalent to 4 chordal paths per reflect mode beam. **Internal Display Only. ***Requires separate enclosure. ✦For non-custody transfer option.

	1 or 2 Beam* NEMA 4X/IP65 Wall Mount	3 or 4 Beam* NEMA 4X/IP65 Wall Mount	1 or 2 Beam* NEMA 7/IP66 Integral	3 or 4 Beam* NEMA 7/IP66 Wall Mount
DIMENSIONS (inch)	11.31 x 9.31 x 5.50	13.31 x 11.31 x 5.62	10.50 x 13.40 x 6.25	17.7 x 13.4 x 8.7
POWER	'S' Version: 90-240 VAC @ 24 VA / 'Z' Version: 9-36 VDC @ 24 Watt			

CE 0344

ATEX MARKINGS:

1010N/101MN (AKA - NEMA 4X/IP65) Flow Display Computer:
- II (1) G [EEx ia] IIC
- II 3(1) G EEx nC [ia] IIC

1010X (AKA - NEMA 7/IP65) Flow Display Computer:
- II 2 (1) G EEx d [ia] IIC T5

Transducers:
- II 1 G EEx ia IIC T5
- II 2 G EEx m II T5

CONTROLOTRON®

Controlotron Corporation, an ISO 9001 : 2000 Company
155 Plant Avenue, Hauppauge, New York 11788-3801
Tel. +1 (631) 231-3600 • Toll Free +1 (800) 275-8479 • Fax +1 (631) 231-3334
Website: www.controlotron.com • E-mail: info@controlotron.com