Model VF/GVF-100

CiDRA

Data Sheet

SONARtrac® Volumetric Flow and Entrained Air Measurement System

CiDRA's *SONARtrac* Volumetric Flow and Entrained Air Measurement System is a breakthrough in process measurement technology. The *SONARtrac* clamp-on, non-contact system allows for on-line real-time measurement of the volumetric flow in difficult to measure slurries and fluids; and the amount of entrained air present in any liquid-continuous-phase process flow. The system also provides a measurement of only the liquid portion of the flow by compensating for the amount of entrained air in the process line.

SONARtrac measurement systems do not utilize ultrasonics; they employ patented sonar array processing techniques to listen to, and interpret, flow turbulence and sound fields generated by the machinery, piping and process flow. This passive listening approach results in measurement of the flow rate and amount of entrained air with a high degree of accuracy and repeatability.

Passive Sonar Technology

CiDRA's *SONARtrac* technology represents an innovative new class of industrial measurement instrumentation. This sonar technology utilizes array processing techniques similar to those used in the field of sonar processing. CiDRA's patented sonar technology was initially developed for flow and compositional measurement in one of the world's most demanding environments: downhole, offshore oil and gas production.

CiDRA has taken the proven reliability of its *SONARtrac* technology to provide new measurement capabilities and provide insight into the monitoring and optimization of homogeneous slurries in many industrial processes.

The *SONARtrac* Volumetric Flow and Entrained Air Measurement System utilizes an array of sensors that are wrapped around the pipe. The flow rate and percent of entrained air by volume is determined using CIDRA's array processing techniques and are available as meter outputs. Liquid flow rate is measured by analyzing the flow turbulence in the process stream, while the sound field is used to determine the sound speed, or velocity at which sound propagates, through the process medium. The entrained air percentage is then calculated directly from the measured sound speed.

CiDRA's clamp-on, non-contact *SONARtrac* VF/GVF-100 system enables users to realize the following measurable benefits:

- Increased measurement accuracy and certainty
- Low installation and life cycle costs
- Increased process efficiency and uptime
- Lower maintenance and operating costs

SONARtrac® Technology

Industries:

- Oil Sands Processing
- Minerals Processing
- Power Generation

SONARtrac® PFM™ Phase Fraction Management

Features:

- ♦ Entirely non-contact, "wrap-around" flow sensor design
- ♦ Transmitter with integrated flow processor
  - Programmable by keypad or PC interface
  - Self-diagnostics capability
- ♦ USB Port and memory stick
  - Remote data logging retrieval
  - Diagnostic reporting to CiDRA technical support
- ♦ Analog /Digital Outputs
  - Two (2) 4-20 mA current outputs
  - Pulse output
  - Alarm output
  - HART® protocol
- ♦ Options:
  - FOUNDATION Fieldbus™
  - PROFIBUS® PA
  - MODBUS®

Benefits:

- Entrained air measurement enables correction of errors in density meters caused by bubbly flows thereby providing a tighter mass balance
- Volumetric flow measurement of liquid continuous phase process flows
- Entrained air measurement resulting in ability to monitor and/or assess effect of process disruptions
- Measurement of entrained air in combination with volumetric flow enables a measurement of true liquid flow
- Detects changes in process operation due to low pump box levels, air leaks caused by pump, pump/valve packing or other sources of entrained air
- Accurate and reliable operation over a wide range of process flows, including homogeneous, dispersive and corrosive/abrasive slurries
- Quick, simple installation with no alignment or coupling gels required
  - Installs while process is running
- No moving parts, no inherent drift mechanism
  - Requires no recalibration
- Maintenance free operation
- Indifferent to pipe material or liners
  - Measurements on Teflon®, Urethane, fiberglass, rubber, HDPE, double-pass chromium, ceramic and concrete-lined pipes

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SONARtrac® Volumetric Flow and Entrained Air Measurement System Specifications — VF/GVF-100

Parameter	Specifications	Comments
Flow velocity range	Liquid: 3 to 30 ft/s (0.91 to 9.1m/s)[a,b]	Liquid-Only flow conditions may permit flow measurements below 3 ft/sec [a]
Flow rate accuracy	±1% of reading [c]	
Repeatability	±0.3% of reading	
Entrained air/gas range	0 to 20 %	By volume
Entrained air/gas accuracy	±5% of reading, 0.01% to 20%	Assumes on-line process pressure available
Entrained air/gas repeatability	±1% of reading, 0.01% to 20%	
Pipe diameters	2" to 60" (50.8mm to 1524.0mm)	Metric and custom sizes available
Sensor head	Clamp-mounted onto the existing pipe section; designed for single installation Certified to IP55	2"-36" Sensor Length–34.7" (91.4cm) Over 36" Sensor– 51.2" (130.0cm) Height within flange diameter of pipe Lightweight (22 lbs./10 kg for 8" meter) Stainless Steel designed to IP55
Transmitter with integrated flow processor	Programmable by keypad or PC interface Self-diagnostics capability	
Operating Temperature Range: Transmitter Sensor head process temp. Sensor head ambient temp.	 -4°F to +140°F (-20°C to +60°C)[d] -40°F to +212°F (-40°C to +100°C) -40°F to +140°F (-40°C to +60°C)	 Inquire with CiDRA for temperatures outside these specific ranges
Storage Temperature Range: Transmitter Sensor head	 -22°F to +176°F (-30°C to +80°C) -40°F to +185°F (-40°C to +85°C)	
Cable between transmitter and sensor head	PLTC or armored cable with one End connectorized	Cable lengths up to 300ft (90m)
Analog input	Two (2) 4-20 mA	Enables internal logging of optional process parameters
Analog output	Two (2) isolated 4-20 mA current outputs	One (1) with HART® protocol[e]
Digital outputs	Pulse output Alarm output	
Digital interfaces	10Base-T Ethernet USB/Memory Stick RS232 serial	
Communication interfaces	Standard: RS232/485 Optional: MODBUS® RTU/ASCII Optional: PROFIBUS® PA Optional: FOUNDATION Fieldbus™	
Transmitter local display	LCD with backlight[f]	Provides flow rate, entrained air/gas, system status, system diagnostics
Data logging capability	Yes	
Transmitter enclosure	NEMA 4X, IP66	
Power requirements	AC Version: 100 to 240 VAC, 50/60 Hz, 25 Watts DC Version: 18 to 36 VDC, 25 Watts	
Area classification	Standard: Ordinary Location Optional: Class I Division 2,Groups A-D Optional: Class I Zone 2, Group IIB ATEX	
Altitude	5000 meters	Certified for high altitude regions

(a) Inquire with CiDRA for qualifying your application.
(b) Minimum flow velocity may be affected by pipe type and/or fluid characteristic.
(c) Inquire with CiDRA for availability and specifications on sizes greater than 36".
(d) For Zone 2: -4°F to +134°F (-20°C to +57°C).
(e) Certain restrictions apply for Zone 2 applications.
(f) For Zone 2: No transmitter window for display.

Contact CiDRA

To speak with an applications engineer about CiDRA's *SONARtrac* systems or other CiDRA industrial process measurement solutions, call +1.203.265.0035 or visit our web site at www.cidra.com.

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