

SONARtrac[®]

Flow Measurement



CiDRA[®]

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SONARtrac System Product Range

Highlights:

- Non-intrusive
- Clamp-on design
- No moving parts or drift mechanism
- No recalibration
- No wear
- No signal degradation
- 2"-60" pipe diameters
 - *metric and custom sizes available
- Accuracy $\pm 1.0\%$ of reading
- Repeatability $\pm 0.3\%$ of reading

Benefits:

- No process downtime required for installation
- Improves material balance accuracy and reliability
- Reduces operational costs
- Increases product quality
- Improves process control
- Compatible with most pipe materials/schedules
- Maintenance free
- No pressure drops



SONARtrac VF-100

Volumetric Flow Monitoring System

The SONARtrac VF-100 is the original passive sonar flow meter and serves as the technology platform for the SONARtrac product line. This passive listening approach enables our sonar flow meter to measure single phase and multiphase flows as well as slurries, with the same level of accuracy and performance. By installing on existing process lines, SONARtrac clamp-on monitoring systems eliminate the process disruptions associated with installing other types of flow meters. The VF-100 is the only flow meter of its kind to provide accurate and repeatable volumetric flow measurements for applications such as clear or dirty liquids and slurries, as well as corrosive and erosive liquids.



SONARtrac VF/GVF-100

Volumetric Flow and Entrained Air Monitoring System

The SONARtrac VF/GVF-100 is CiDRA's combination flow meter that has the capability to calculate both volumetric flow and gas volume fraction to provide the customer with a true flow measurement. The VF/GVF-100 utilizes the same passive sonar technology as the SONARtrac VF-100 with the added ability to calculate the entrained air/gas measurement in any slurry or liquid. As a result, these dual measurements enable the customer to monitor and assess the effects of process changes on efficiency and quality.

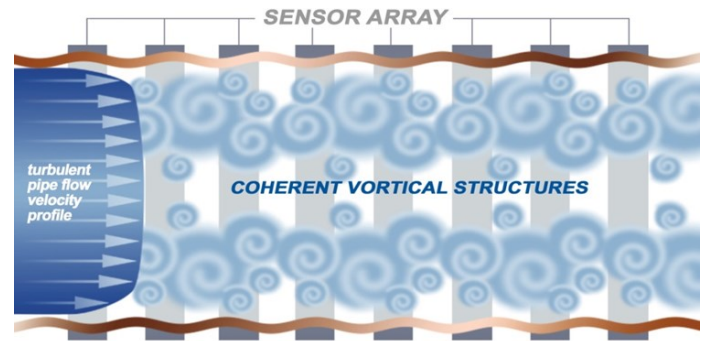


SONARtrac Measurement Technology– How It Works

CiDRA's patented sonar technology utilizes array processing techniques to measure volumetric flow and entrained air.

The SONARtrac system measures volumetric flow rate by combining phase and frequency components of the turbulent eddies as they convect past the array of sensors.

In order to determine the amount of entrained air present, the SONARtrac system measures the speed at which acoustic waves pass through the sensor array. The measured sound speed is then correlated to the phase fraction of the two component mixture.



The SONARtrac system's non-intrusive design includes:

Wrap-around sensor band

Lightweight environmental enclosure

Transmitter with digital signal processor



How Does SONAR Technology Compare?

	CiDRA Sonar Flowmeter	Electromagnetic Flowmeter	Ultrasonic (Doppler) Flowmeter
Installs without process shutdown or pipe cutting	yes	no	yes
Accurate flow measurement in complex pipes	yes	no	no
Measurement of slurries (mag/ non-magnetic materials)	yes	sometimes	sometimes
Works on fiberglass pipes	yes	yes Needs flanges	sometimes
Continues working in presence of scale buildup	yes	no	no
Re-calibration and / or maintenance requirements	none No drift mechanism Does not wear out	periodic	periodic Requires reapplication of ultrasonic gel (couplant)
Can handle multiple pipe sizes	no Universal transmitter Sensor bands and covers are pipe size specific	no	yes May be pipe diameter restricted
Works in presence of entrained air bubbles	yes	no	Low levels – yes High levels - no
Can measure level of entrained air	yes	no	no
Capital cost	Varies by pipe size > small/medium magmeters < Coriolis flowmeters	Varies by pipe size	> small magmeters < large magmeters
Life cycle cost	lowest	varies	medium

SONARtrac System Specifications

Parameter	Specifications	Comments
Pipe diameters	2" to 60"	Metric and custom sizes available ^(a)
Flow velocity range	Liquid: 3 to 30 ft/s (0.91 to 9.1 m/s)	Liquid-Only flow conditions may permit flow measurements below 3 ft/sec ^(b)
Flow rate accuracy	±1.0% of reading	
Repeatability	±0.3% of reading	
Entrained air/gas range (VF/GVF-100)	0 to 20 %	By volume
Entrained air/gas accuracy (VF/GVF-100)	±5% of reading, 0.01% to 20%	Assumes on-line process pressure 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	-4°F to +140°F (-20°C to +60°C) ^(c)	Inquire with CiDRA for temperatures outside these specified ranges.
Sensor head process temp.	-40°F to +212°F (-40°C to +100°C)	
Sensor head ambient temp.	-40°F to +140°F (-40°C to +60°C)	
Storage Temperature Range:		
Transmitter	-22°F to +176°F (-30°C to +80°C)	
Sensor head	-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 ^(d)
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: FOUNDATION Fieldbus™ Optional: PROFIBUS® PA	
Transmitter local display	LCD with backlight ^(e)	Provides flow rate, 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 availability and specifications on sizes greater than 36". ^(b) Inquire with CiDRA for qualifying your application under 3 feet/second. ^(c) For Zone 2: -4°F to +134°F (-20°C to +57°C). ^(d) Certain restrictions apply for Zone 2 applications. ^(e) For Zone 2: No transmitter window for display.		

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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.

All information contained herein is believed to be accurate and is subject to change without notice. No responsibility is assumed for its use. Specifications are preliminary and CiDRA reserves the right to make changes, without notice to product designs, specifications, functions, components and manufacturing methods.



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