

Expro's PassiveSONAR™ clamp-on meter for gas void fraction (GVF) measurement of bubbly liquids

The PassiveSONAR flow meter is a member of the sonar class of clamp-on flow meters.

Developed in the 1990s, sonar flow meters combine sophisticated submarine sonar array processing techniques with state-of-the-art digital signal processors and transducers. The PassiveSONAR flow meter employs an array of passive strain-based sensors to track the velocity of turbulent eddies in the fluid flow. The PassiveSONAR meter has the unique ability to also measure the gas void fraction (GVF) of well-mixed bubbly liquid flows. To measure GVF, the PassiveSONAR meter detects sound waves in the fluid as they pass through the sensor array. The speed of sound of the mixture is then computed and the GVF is derived.

The PassiveSONAR meter has been widely utilised for GVF measurement in oil and gas applications around the world. See the PassiveSONAR VF Flow Meter data sheet for details on the volumetric flow measurement capabilities of the PassiveSONAR meter.



Applications targeted by PassiveSONAR GVF meters:

- Gas carry-under from separator liquid outlets
- Net oil measurement for GLCCs
- Correct for entrained gas errors in existing flow meters – turbine, coriolis, positive displacement meters
- Correct for entrained gas errors in existing watercut devices – coriolis, microwave
- Correct for entrained gas errors in existing density devices
- Gas breakout detection
- Contact Expro Meters to discuss other applications

Features and Advantages of PassiveSONAR GVF meters:

- Applicable to well-mixed bubbly liquid flows
- Applicable to a wide range of flow rates
- Excellent performance on large diameter pipes
- Completely non-intrusive, clamp-on design
- No pressure drop or leak risk
- Unaffected by corrosive or erosive fluids
- Designed for permanent installation in harsh environments

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Technical specifications:		
Parameter	Specification	Comments
Pipe diameter range	2" to 30" NPS Enquire about other sizes	Meter is pipe size specific
Gas Void Fraction	0 to 20%	By volume for bubbly flow
Gas Void Fraction accuracy	+/-5% of reading. 0.01-20% GVF	Repeatability of +/-0.01%
Sensor head	Clamp-mounted onto existing pipe section, designed for permanent installation	Sensor head requires 1m (3ft) of straight pipe free of fittings
Transmitter	Programmable by keypad or PC interface, self-diagnostic and datalogging capability.	LCD display w/backlight Provides flow rate, status, and diagnostics See note (a)
Transmitter to sensor cable	Unarmoured cable connected at one end	Cable lengths up to 90m (300ft) Optional armoured cable
Operating temperature range	Ambient temp – sensor head -40° to +60°C (-40° to 140°F) Ambient temp – transmitter -20° to +60°C (-4° to 140°F) Process temperature -40° to +100°C (-40° to 212°F)	Can be remote from sensor See note (b)
Digital outputs	Serial communications port Pulse/frequency and alarm	RS232/485, half-duplex Isolated solid-state switches
Serial communication protocol	Modbus (slave) RTU/ASCII	Ask about other protocols
Analog outputs	Two (2) isolated 4-20mA outputs	One (1) with HART protocol See note (c)
Analog Inputs	Two (2) 4-20mA inputs	For use with 2-wire transmitters
Diagnostic Interfaces	USB port 10Base-T ethernet	For data history, config, and diag data via USB memory stick only For setup/diags using laptop
Ingress protection (IP) rating	Transmitter: IP-55 Sensor head: IP-55	US/Canadian model is Type 4X After installation on pipe
Power requirements	AC version: 100-240Vac, 25W DC version: 18 to 36Vdc, 25W	
Methods of protection	Non-sparking (nA) and Intrinsic safety (ic)	Intrinsic safety applies to sensor Head cable and 4-20mA inputs
Hazardous area classification	US/Canada model Class I, Div 2, Groups A-D ATEX model ATEX Zone 2, Group IIB	Also suitable for Class I, Zone 2 Suitable for Groups IIA and IIB

Notes: (a) For Zone 2: no transmitter window for display
 (b) For Zone 2: -20° to +57°C (-4° to +135°F)
 (c) Certain restrictions apply for Zone 2 applications