



INTELLIGENCE CLAMPED ON

The industry has always wanted clamp-on flow and fraction meters, but accuracy has been an issue.

Now XSENS cutting edge measurement technology is changing the perception.

XSENS®
FLOW SOLUTIONS

XRATE®

Single phase flow meter combining high performance at low cost.

XACT™
LIQUID
RATE &
FRACTION

Flowrate and fluid fraction measurement in challenging applications.

ACCURACY | COST | RELIABILITY

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XRATE & XACT LIQUID 09052022

THE FLOW MEASUREMENT DREAM

TRUE FLOW PROFILE AND FLUID PROPERTY MEASUREMENT - FROM OUTSIDE OF THE PIPE

The industry has always wanted clamp-on flow measurement technology, but clamp-on flow meters have until now not matched industry accuracy requirements. XSENS cutting edge technology is about to change such perception.

XSENS AS has together with Christian Michelsen Research AS (CMR) in Norway developed and patented a disruptive ultrasonic flow meter technology providing helical signal transmission, enabling off-center measurement and the ability of almost tomographic pattern measurement. This

provides accuracy similar to in-line multipath flow meters. The technology developed started 16 years ago with world-leading acoustics and flow measurement researchers from CMR, and since 2013 through CMR spin-off company XSENS AS.

The new ground-breaking clamp-on flow meter simplifies installation, commissioning and maintenance compared to existing flow meters, at comparable performance. Installed cost is significantly lower and potential leakage and clogging points are eliminated.



XSENS FLOW SOLUTIONS VS COMPETITION

	In-line flow meters	XSENS flow meters
Accuracy <ul style="list-style-type: none">- Initial- Long term- Flow disturbance tolerant	<div>Coriolis</div> <div>Multi-path ultrasound</div> <div>✓</div> <div>Turbine meters</div> <div>dP flow meters</div> <div>✗</div>	<div>✓</div>
Cost <ul style="list-style-type: none">- Low Installation cost- Long calibration intervals- Low Weight- Limited space- No signal wiring- Low Documentation cost- Low service cost	<div>✗</div> <div>✗</div> <div>✗</div> <div>✗</div> <div>✗</div> <div>✗</div> <div>✗</div>	<div>✓</div> <div>✓</div> <div>✓</div> <div>✓</div> <div>✓</div> <div>✓</div> <div>✓</div>
Reliability <ul style="list-style-type: none">- No potential leakage points- No erosion- No clogging of sensors	<div>✗</div>	<div>✓</div>

XSENS TECHNOLOGY

DISRUPTIVE INNOVATION

XSENS Clamp-on Flow Meter accurately measures flow rate and fluid fraction from outside of the pipe. The disruptive XSENS ultrasound technology adds the required accuracy and fluid quality measurement capabilities to clamp-on flow measurement, demanded by the industry for decades.

Our goals are to significantly reduce cost for trustworthy measurement in any industry, along with other clamp-on benefits, such as safety and retrofit installation.

PRINCIPLE OF OPERATION

The XSENS flow meter is a lamb-wave type non-invasive transit-time flowmeter, which means that it uses the pipe wall in a guided-wave resonant mode as the acoustic signal transmission. Among the benefits are good signal amplification, broader volume coverage and almost no susceptibility to beam drift.

The major technology step forward is the XSENS utilization of helical signal transmission, providing acoustic off-centre transmission. Off-centre signal information (fig 1 c) allows for full flow profile interrogation (fig 1 a), hence accuracy performance at the level of in-line flow meters (fig 1 b).

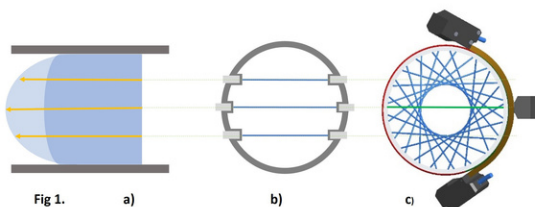


Fig 1.

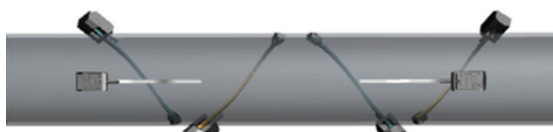


Fig 2

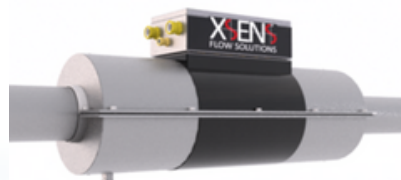


Fig 3

RELIABILITY

The XSENS technology combines two types of signal transmission, axial and helical (fig 2) to obtain unrivalled accuracy performance. XSENS flow meters include three to six pairs of independent transducers for measurement validation and redundancy. The rugged transducers are designed for survival in any industry environment. The transducer assembly is easily installed in robust mechanical fixtures, hence covered by a stainless steel protection cover (fig. 3). The XSENS clamp-on flow meters are designed for 20 years life time.

ACCURACY

Where traditional clamp-on flowmeters fail by poor accuracy, due to limited information on flow profile and fluid properties, the XSENS flow meters obtain detailed flow and fluid information at the level of high performance in-line flow meters. The XSENS flow meter thoroughly investigates flow velocity by multiple points along the profile curve by helical and axial signal transmission. Furthermore, each transducer pair forms an advanced gateway, as the pipe between sensors is interrogated for signal changes induced by variation in fluid properties. In combination, the ground-breaking features of XSENS flow technology lifts non-invasive flow meter accuracy to another level.

COST

XSENS clamp-on flow meter offers significant reduction in "installed cost". In addition to the advantageous meter cost, cost of pipe engineering is negligible and installation/commissioning cost is a fraction of traditional flow meters. During operation and maintenance/calibration, no production interrupt is required. In total, "installed cost" is expected to fall in the range of 50% of comparable inline flow meters.

SAFE OPERATION AND HSE COMPLIANCE

By installation of XSENS clamp-on meter, pipe integrity is never broken; XSENS clamp-on meter have no potential leak points and will not cause any risk for leakage of oil or gas. Installation does not cause any harm or risk for personnel, as the Meter is clamped to the outside of the pressurized pipe. Flow meter size and weight is just a fraction of traditional meters, easy to install and reducing the CO2 footprint both in production and transport.

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XSENS PRODUCTS

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FLOW/FRACTION METER SPECIFICATION

Service	XRATE: Single fluid rate XACT LIQUID: Single fluid rate and fraction (Flowrate and WLR)
Technology	Clamp-on guided wave ultrasound
Transducers	3-6 pairs, axial and helical (application accuracy, functionality and/or redundancy dependent)
Accuracy flow	+/- 1 % of flow (Add +/-0.01m/s)
Repeatability flow	Not yet available
Flow velocity range	0,1 - 40 m/s
WLR (Water Liquid Ratio) range	0-100% WLR (for XACT only)
WLR accuracy	+/- 1% abs.
Max process temperature	100 deg C (higher on request)
Environment temperature	-20 deg C to 60 deg C (higher on request)
IP class	IP 66 (higher on request)
Pipe size / pipe spec	1,5 inch (DN40) - 30 inch (DN750) / most metal pipe specs (larger pipe sizes on request)
Power supply / consumption	12-24V / 9,5 Watt
Output signal / communication	4-20mA / Modbus (WiFi, Canbus, Profibus and others on request)
Measurement output	Volumetric Flow rate and WLR [%] (any engineering units)
Hazardous area approvals	ATEX and IECEx Zone 1 and 2
Straight pipe requirements	2-5D upstream and downstream (target)
Signal Inputs (options)	2 x Pt100, 2 x 4-20mA (others on request)

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