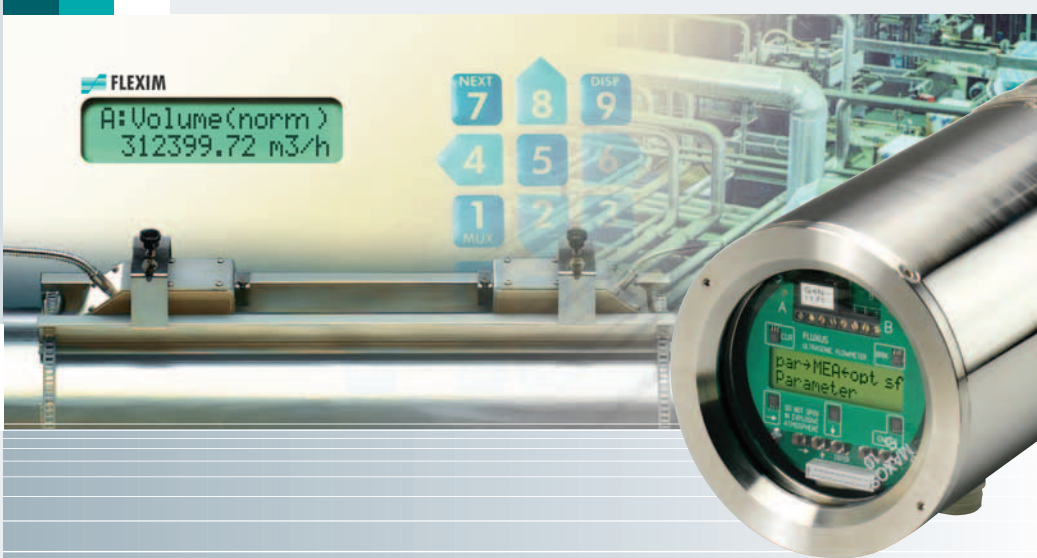
FLEXIM

FLUXUS® G

Non-Invasive
Gas Flow Measurement

- Gas Storage Facilities
- Gas Transmission
- Natural Gas Extraction
- Chemical Industry
- Petrochemical Industry
- Offshore
- Manufacturing Industry



Measure from outside what's flowing inside

Non-Invasive Gas Flow Measurement with FLUXUS® G

FLEXIM's ultrasonic gas flow meters use the proven clamp-on transit-time correlation technique also employed for the F series liquid meters. Special ultrasonic transducers are simply clamped onto the outside of the pipe and never come in contact with the gas.

The FLUXUS® G series contains a broad variety of transmitters and transducers: from basic models for standard applications up to robust measuring systems for offshore use or for use in hazardous areas.

Our tradition is innovation

Ever since its inception, FLEXIM has been among the pioneers in the field of ultrasonic flow measurement. Many years of application experience combined with innovative concepts and solutions have allowed FLEXIM to extend the scope of the ultrasonic technology to non-invasive measurement of gases.

Now, with the **FLUXUS® G** series, FLEXIM sets a new standard. Special transmission technology combined with powerful software algorithms and intelligent adaptive signal processing gives these instruments the dependability you have come to expect from FLEXIM.

Adaptive Signal Processing

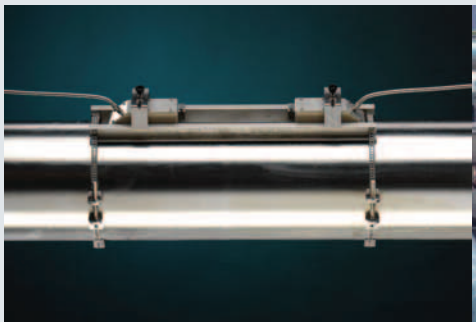
In order to maximize the signal to noise ratio, an optimized transmission process featuring **multipulse excitation** was developed. The versatile measurement algorithm automatically adapts to the varying application conditions. Thus, disturbing factors such as beam dispersal and structure-borne pipe noise can be effectively compensated.

The **FLUXUS® G** series instruments use digital signal processing. This enables them to adapt easily to a great variety of measuring tasks. Up to 1000 raw signals per second are transmitted for signal processing and analysis.

FLEXIM's signal processing algorithms reflect many years of experience in extracting desired signals and rejecting unwanted noise signals. Thus, even weak signals of only a few µV are reliably detected and processed.

Wide dynamic range amplifier

The **FLUXUS® G** measurement amplifier offers a uniquely wide dynamic range by including various frequency filters which are automatically tuned to the appropriate transducer frequency. This is particularly advantageous in the case of clamp-on ultrasonic gas flow measurement, which has to contend with very low signal levels.



Superior Functionality

FLUXUS® G represents the ideal solution for non-invasive gas flow measurement. FLEXIM's non-invasive technology is an advantageous and cost-effective alternative to conventional methods, particularly with chemically aggressive, poisonous or high pressure media. With their extremely wide turn-down ratios, the instruments of the **FLUXUS® G** series register even the smallest flows.

Non-invasive measurement

- No contact with the medium, therefore no possibility of chemical attack. No need for expensive special materials (sour gas applications for example)
- No wear and tear, even with high flow velocities or with gas containing particles
- No clogging of small bore impulse lines with deposits, condensate, inhibitors, oil vapors, dust (as happens when using impulse lines in the measuring system)
- Insensitive to dust and humidity

Transducers are mounted on the pipe

- Very cost-effective installation
- Easy installation without process interruption
- No welding work
- No risk of leakage
- Cost-advantageous, especially in high-pressure applications and for large pipe diameters
- Absolutely no pressure loss, thus low operating costs
- No pipe diameter reduction, therefore no pipe clogging

No moving mechanical or pressure loaded parts

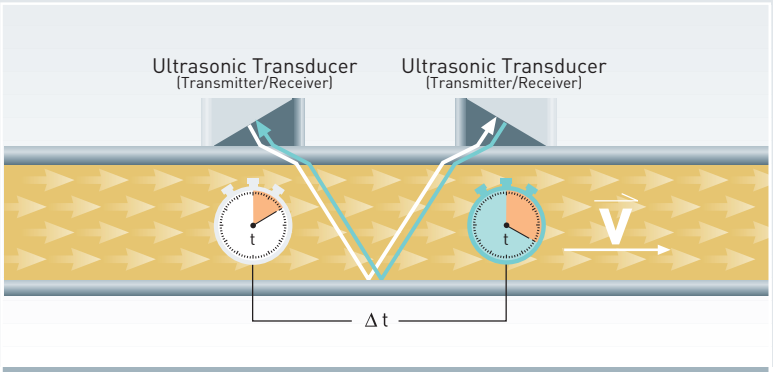
- Safe and maintenance-free
- Measurements can be made even at high operating pressures
- Unharmed by pressure peaks (for example at the onset of condensation)

Precise, bi-directional flow measurement with high measurement dynamics

- Even minute flows are measurable
- Measurement is unaffected by gas density, viscosity and composition, dust, humidity, temperature or pressure
- Not sensitive to velocity peaks, swirling flows or transverse flows
- Long-term stable measurement results
- High measurement rate, fast response time

Hazardous area approved

Technical Data



Ultrasonic flow meters natively measure the actual volumetric flow.
The transmitters feature an integrated flow computer which makes use of external temperature and pressure data to convert the actual volumetric flow into standard volume (mass) flow based on AGA-8 for defined gas compositions.

In principle, flow measurement is possible on all types of gases. However, when measuring on metal pipes, a certain minimum pressure is required, depending on the composition of the gas and the pipe material. Plastic pipes will support operation at atmospheric pressure.

Our application engineers will be pleased to advise you.

The **Transit Time Difference Correlation Principle** makes use of the fact that the time of flight of an ultrasonic signal is affected by the flow velocity of the carrier medium. Like a swimmer working his way across a flowing river, an ultrasonic signal travels slower upstream than downstream.

Our instruments work according to this transit-time principle: an ultrasonic pulse is sent downstream through the medium, another pulse is sent upstream. By measuring the transit-time difference, the flow velocity can be determined. The volumetric flow is then calculated out of the flow velocity and the pipe parameters.

General Technical Data

Measuring principle:	Transit time difference correlation principle
Flow velocity:	(0.01 to 80) ft/s, pipe size dependent
Flow sensitivity:	0.001 ft/s
Repeatability:	0.15 % of reading ± 0.03 ft/s
Accuracy (given a fully developed rotationally symmetric flow profile)	Volume flow: ± 1 % to 3 % of reading ± 0.03 ft/s, depending on the application Calibrateable Accuracy: ± 0.5 % of reading ± 0.03 ft/s with process calibration Path velocity: ± 0.5 % of reading ± 0.03 ft/s
Rangeability:	100:1 nominal to 1000:1 extended
Measurable gases:	Ratio of the characteristic acoustic impedance of the pipe wall material to that of the gas < 3000
Operating pressure:	Measurement does not restrict the maximum operating pressure
Pipe size range:	(0.8 to 63) in
Gas temperature:	(–4 to 248) °F or (–40 to 338) °F depending on the transducer type

Applications

Oil and Gas

Measurement on natural gas pipelines

Measurement in natural gas storage installations (storage and extraction)

Management of gas storage facilities (efficiency maximization, performance optimization, salt cavern leaching)

Regulation and control of drilling sites in natural gas extraction

Control of compressor stations

Dimensioning of extraction sites and drilling probes (efficiency maximization)

Measurement of sour gas

Measurement for the gas supply industry

Measurement of injection gas in the petroleum industry

Allocation and checkmetering

Inventory control /
Lost and unaccounted for gas analysis

Measurement of injection media in gas processing (monoethylamine, TEG, etc.) with upgraded instrument.
Ask FLEXIM!

Chemical Industry

Measurement of synthesized gas

Gas measurement in the plastics production process (high pressure)

Measurement of HCl gas during methanol synthesis

Measurement of HCl gas during the production of Macrolon®

Manufacturing industry

Measurement of compressed air

Service

Supervision of permanently installed meters

Error diagnostics

Service and maintenance

Gas storage facility Xanlo, Germany, © RWE

The Transmitters

A FLUXUS® G for all purposes

Whether for portable use, for rack-mounting or for permanent installation, or even for offshore use: FLEXIM offers the appropriate **FLUXUS® G** to meet each measurement challenge. ATEX and FM certified measurement systems for use in hazardous areas are available. Versatile process interfaces assure optimal integration into the user's process.

Guaranteed user friendly

No complex and elaborate instructions are required in order to use the intuitively structured menu of the **FLUXUS® G**. The pipe and material parameters are easily entered, thanks to the internal media and materials data bank. Explosion-proof instruments can be operated without opening the housing and without requiring any additional devices.

Technical Data

Measuring channels:	
Protection degree:	
Hazardous area classification:	
Outputs:	
Inputs:	
Calculation of the standard volume flow flow based on AGA-8	

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The Portable All-round Meter
FLUXUS® G601

Unmatched in performance, this handy and versatile instrument is ideal in support of service and maintenance activities. It may also be used for the control or even the temporary replacement of permanently installed meters.

2

NEMA 4X

—

Standard: 2 x current, 2 x binary
Multifunctional: 2 x current, 2 x binary, 1 x frequency, 1 x temperature

Standard: —
Multifunctional: 2 x current, 1 x voltage

Yes

The Multi-function Meters
FLUXUS® G704 / FLUXUS® G709

Permanently installed and freely configurable: The **FLUXUS® G704** is designed for permanent installation. With its range of electrical inputs and outputs, it can handle a variety of process parameters. Although technically identical to the **G704**, **FLUXUS® G709** is designed for permanent installation in 19" rack systems.

1 or 2

G704: NEMA 4X G709: NEMA 1

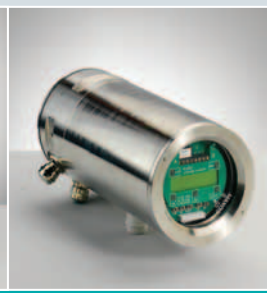
FM Class I Div II for G704

A variety of combinations are available from the following: current (0/4 mA ... 20 mA), voltage, frequency, pulse, alarm

Maximum 4. Available are: temperature (4-wire Pt 100), current, voltage

Yes

The Explosion-proof Experts
FLUXUS® G800 / FLUXUS® G801



FLUXUS® G800 and **G801** are ATEX certified for use in hazardous areas. The especially robust **G801** is completely seawater-resistant and therefore ideal for offshore applications.

1 or 2

NEMA 4X

ATEX Zone 1 and 2

1 current output, 1 binary output (OC).
Also available: 1 or 2 binary outputs (relay), 1 binary output (OC) and 1 current output

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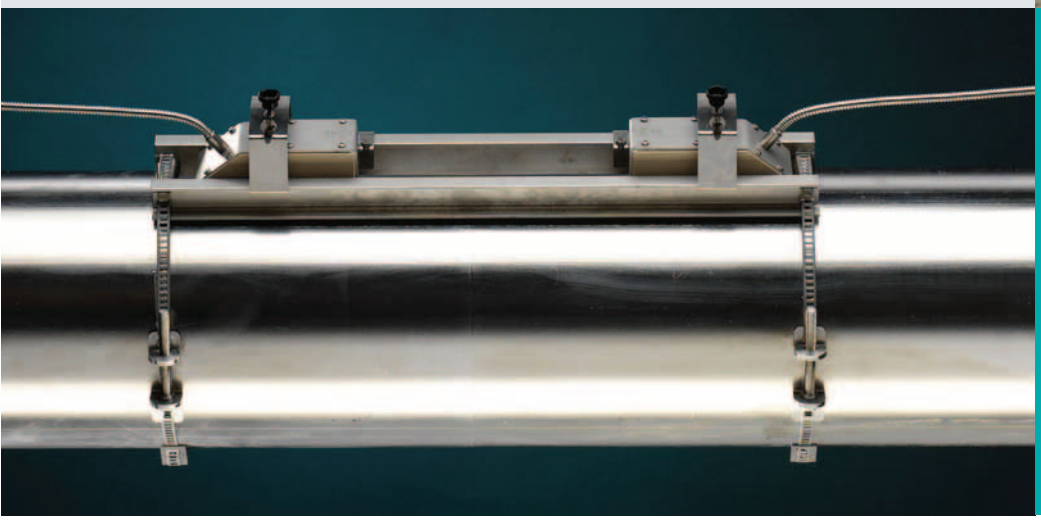
Yes

The Transducers



Two transducers types providing a uniquely wide application range

All **FLUXUS® G** transmitters support both lamb wave and shear wave transducers at all transducer frequencies. In this way the measuring system can be optimized to the process. The Lamb wave transducer is ideal for high velocity gas measurement as found in natural gas pipelines. The shear wave transducer covers a wide range of pipe diameters and wall thicknesses. It's the best choice for mobile measurement and application diagnostics, as well as for thick-wall pipes.

Robust construction

All **FLEXIM clamp-on transducers** are watertight and especially made for use in harsh industrial environments. The transducer housings are made of PEEK or PPSU with stainless steel protection caps. Robust construction and rugged wiring guarantee long-term stability and measuring reliability.

Paired, calibrated transducers

Each pair of transducers has been wet-flow calibrated at the factory. All calibration data is stored in a transducer-resident non-volatile memory and is automatically transferred to the transmitter upon connection. Consequently, parameterization errors are eliminated and there is never a need for a zero adjustment.

Our application engineers will be glad to offer you expert advice. Call for an application review today!

Robust transducer mounting fixtures

The **PermaLok** track mounting system provides complete protection for the transducers – not only for extreme environments like offshore platforms but also for all applications. The track is made of 304 stainless steel and gasketed for water tightness in harsh environments. It ensures a maintenance free installation.

For FLEXIM, clamp-on does not mean temporary. **PermaLok** contains all of the mounting elements necessary to effectively lock the transducer into place. The installation of the FLEXIM gas transducers with the **PermaLok** Track creates the robust installation required for demanding gas applications. It is as solid as a spool meter without its inconvenience and cost.

General Technical Data of the Transducers

Application range*:	Shear wave transducers: Transducers available for diameters from 1.2 to 43 in. A minimal pipe wall thickness is required. Lamb wave transducers: Transducers available for diameters from 0.8 to 63 in and wall thicknesses from 0.04 to 0.9 in mm. Each transducer type is assigned to a given wall thickness range.
Operating temperature:	Gas temperature and ambient temperature: between (–4 to 248) °F and (–40 to 338) °F depending on the transducer type.
Use in explosion hazard area:	Transducers for ATEX Zone 1 and 2 as well as for FM Div 2 available
Explosion protection temperature:	Depends on the transducer type and on the atmosphere type. The explosion protection range is usually wider than the operating temperature range.
Protection degree acc. to EN60529:	NEMA 4X
Material:	PPSU or PEEK with stainless steel caps

* the specified range is valid for natural gas in steel pipes, under the conditions defined in the specification sheets.

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A short portrait

FLEXIM

For over 15 years FLEXIM has been an active leader in many areas of process instrumentation in both national and international markets. In addition to non-invasive flow measurement systems, FLEXIM specializes in innovative online process analysis using ultrasonic technology and refractometry.

Year after year, the Berlin based company continues its substantial investment in research and development in order to maintain and further improve its position as an industry leader. As a result, our customers benefit greatly from our cutting edge patented technology.

Competent and professional associates in our sales offices and regional headquarters in Europe and overseas ensure the worldwide distribution of FLEXIM's proven technology and guarantee you qualified service.

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FLEXIM AMERICAS Corporation

General Office:
250-V Executive Drive
Edgewood, New York 11717
Tel.: (631) 492-2300
Fax: (631) 492-2117
Toll free: 1-888-852-7473
(North America only)

California Office:
1936 University Avenue # 355
Berkeley CA 94704
Tel.: (510) 704 8353
Fax: (631) 492 2117

Houston Office:
Cell: (281) 635-2423
Fax: (281) 220-6416

usinfo@flexim.com
www.flexim.com