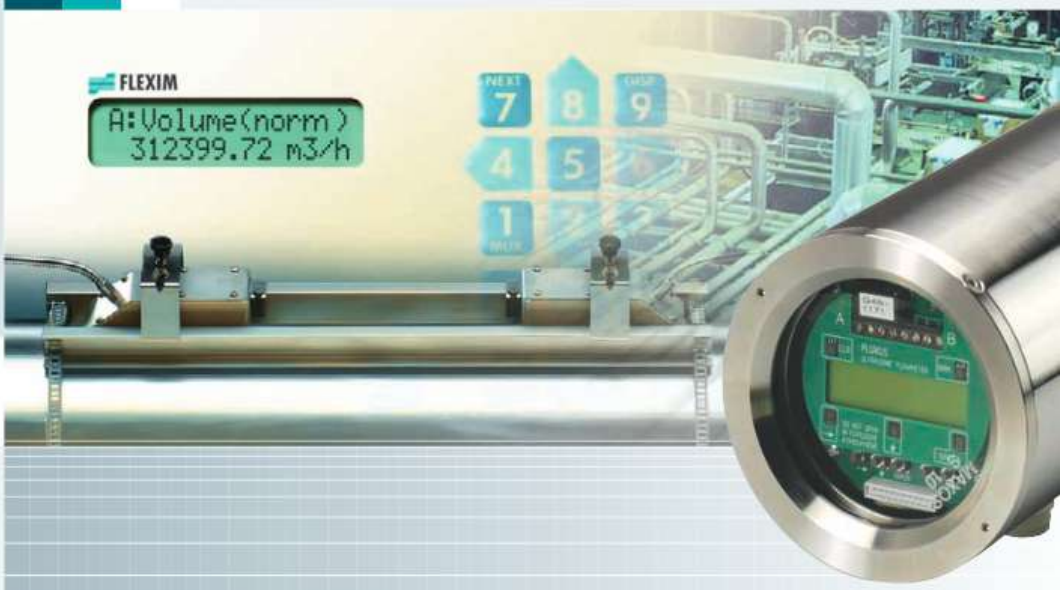
FLEXIM

FLUXUS® G

Non-Invasive Gas Flow Measurement

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



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 vapours, dust (as happens when using impulse lines in the measuring system)
- Insensitive to dust and humidity



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)

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

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

- **Approved for explosion hazard areas**



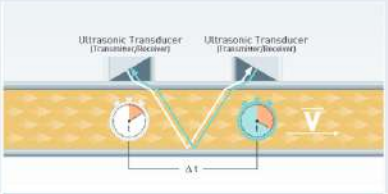


Technical Data

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 ISO 12213-1.

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 25) m/s, pipe size dependent
Flow sensitivity:	0.025 cm/s
Repeatability:	0.15% of reading ± 0.01 m/s
Accuracy (given a fully developed rotationally symmetric flow profile)	Volume flow: ± 1% to 3% of reading ± 0.01 m/s, depending on the application ± 0.5% of reading ± 0.01 m/s with process calibration
	Path velocity: ± 0.5% of reading ± 0.01 m/s
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:	(76 to 1525) mm
Gas temperature:	(-30 to 130)°C or (-40 to 170)°C depending on the transducer type

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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 process)
- Measurement of HCl gas during methanol synthesis
- Measurement of HCl gas during the production of Macrolon® (polycarbonate)

Service

- Supervision of permanently installed meters
- Error diagnostics
- Service and maintenance


Gas storage facility Kalle, Germany, © RWE

The Transmitters



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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.



	The Portable All-round Meter FLUXUS® G6725	The Multi-function Meters FLUXUS® G704 / FLUXUS® G709	The Explosion-proof Experts FLUXUS® G800 / FLUXUS® G801
			
	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.	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.	**FLUXUS® G800** and **G801** are ATEX certified for use in hazardous areas. The especially robust **G812Z** is completely seawater-resistant and therefore ideal for offshore applications.

Technical Data

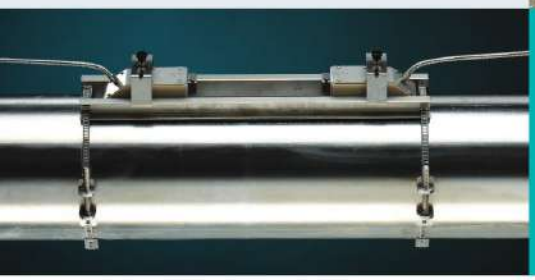
Operating temperature:	-10 °C to 60 °C	-10 °C to 60 °C	-10 °C to 60 °C
Measuring channels:	2	1 or 2	1 or 2
Protection degree acc. to EN60529:	IP54	G704: IP65 G709: IP20	IP66
Explosion protection in:	ATEX Zone 2	ATEX Zone 2, FM Class I Div II for G704	ATEX Zone 1 and 2
Outputs:	A variety of combinations are available from the following: current (0/4 mA to 20 mA), voltage, frequency, pulse, alarm	A variety of combinations are available from the following: current (0/4 mA to 20 mA), voltage, frequency, pulse, alarm	1 current output, 1 binary output (OC). Also available: 1 or 2 binary outputs (relay), 1 binary output (OC) and 1 current output
Inputs:	Maximum 4. Available are: temperature (4-wire Pt 100), current, voltage	Maximum 4. Available are: temperature (4-wire Pt 100), current, voltage	—
Calculation of the standard volume flow according to ISO 12213-1:	Yes	Yes	Yes

The Transducers



The flow transducers of type G have been especially engineered for gas measurement. The appropriate choice of transducers for a particular application depends amongst others on the pipe's wall thickness, diameter and material as well as on the gas flow velocity.

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





High degree of protection, robust construction

All **FLEXIM clamp-on transducers** are watertight and especially made for use in harsh industrial environments. The transducer housing is made of PEEK with a stainless steel protection cap. 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 (including the transducer identification and parameters) is stored in a transducer-resident non-volatile memory and is transferred to the transmitter automatically upon connection. Consequently, parameterization errors are eliminated and there is never a need for a zero adjustment.

Robust transducer mounting fixtures

The **Variofix** mounting fixtures hold the transducers safely in place and ensure continuous and constant contact pressure between the transducers and the pipe surface, even if temperature variations cause the pipe diameter to change. Made of stainless steel, they are corrosion-proof and wear resistant. The transducers can be removed and remounted onto the Variofix rail without readjustment.

The **offshore mounting rail** is made to meet the highest operational demands – right down to the very last bolt.
The rail is seawater-proof and provides your transducers the highest protection they deserve.



General Technical Data of the Transducers

Operating temperature:	Gas temperature:	(-30 to 130)°C or (-40 to 170)°C depending on the transducer type
	Ambient temperature:	(-30 to 130)°C or (-40 to 170)°C depending on the transducer type
Protection degree acc. to EN60529:	IP65	
Material:	PPSU or PEEK with stainless steel	
Use in explosion hazard area:	Transducers for ATEX Zone 1 and 2 as well as for FM Div 2 available	



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A short portrait

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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