FLOWSIC500

HIGH PERFORMANCE FLOW MEASUREMENT FOR A DIGITAL GAS DISTRIBUTION NETWORK
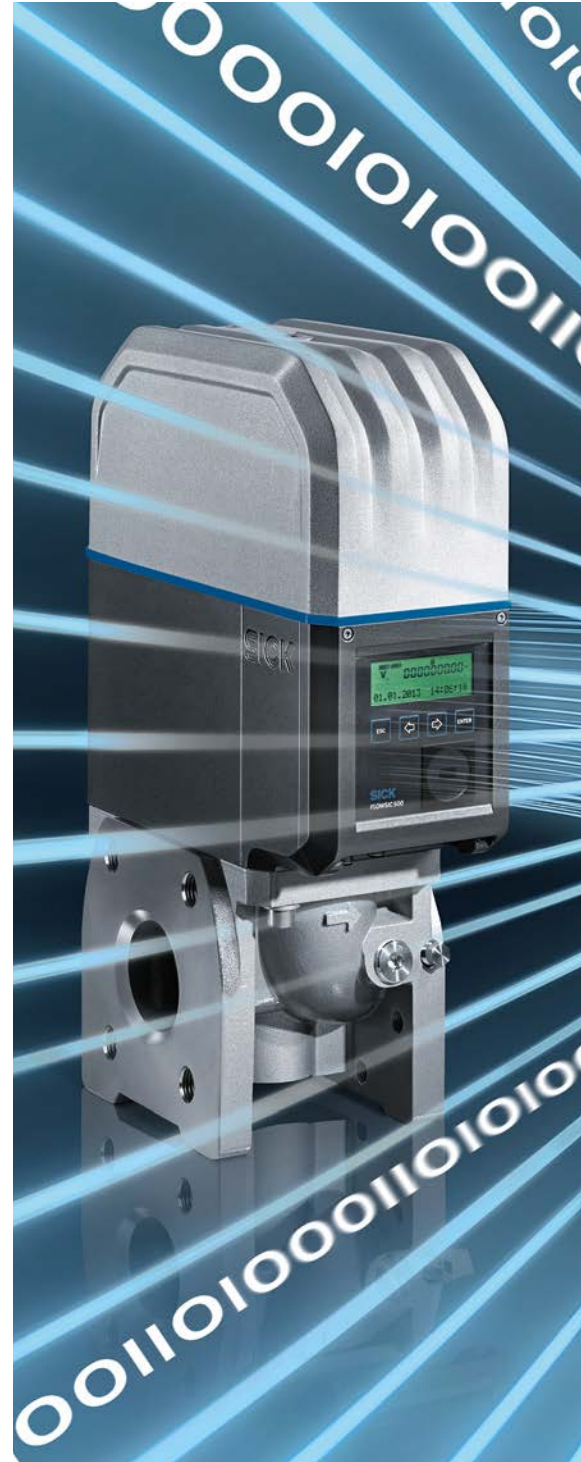
Gas flow meters

SICK
Sensor Intelligence.

INTO THE DIGITAL AGE WITH ULTRASOUND

The world is becoming ever more networked and digitalization offers new opportunities, including in the energy sector. Managing the challenging energy revolution is a global concern in this area. A large number of possibilities for modernizing company-internal processes exist, however.

The digital transformation is driving technological developments thereby providing new measurement techniques and services even for more efficient and intelligent processes. The gas flow meters from SICK make a digital transformation of the gas network possible. After releasing the FLOWSIC500, the world's first ultrasonic gas flow meter for natural gas distribution, SICK has taken the next innovative step with its second generation device, which is setting new standards in connectivity and transparency.

MORE VALUE

The advantages that characterized the previous version continue to be available: FLOWSIC500 is a gas flow meter and volume corrector in one – and it is virtually wear and tear and maintenance-free thanks to the absence of mechanically moving components.

Six powerful features support you on your path to the digital future of flow measurement.

⊕ Reduced costs thanks to absence of mechanically-moving components

FLOWSIC500 measures the gas flow using ultra-sound, which makes the device virtually wear and tear and maintenance-free in use.

⊕ Low operating costs due to high measurement certainty and measurement accuracy

Besides its low wear and tear characteristics, the lack of susceptibility of the FLOWSIC500 to interference ensures long-term stable measurement certainty and therefore low operating costs.

Time and cost savings thanks to remote control

Digital interfaces and wireless communication enable the FLOWSIC500 to be integrated perfectly into high-level control systems.

Full transparency through digital transformation of the gas network

FLOWSIC500 takes the gas distribution network into the digital age. Its i-diagnostics™ function provides real-time monitoring of the gas quality, which makes it possible to increase the system performance through optimization of the network balance.

Compact design saves space

FLOWSIC500 operates without straight inlet and outlet piping requirements. Equipped with an integrated volume corrector, it requires considerably less space than conventional solutions.

Perfect fit

The construction of the FLOWSIC500 enables it to be effortlessly mounted anywhere where a conventional gas flow meter was previously installed.

DIGITAL REMOTE CONTROL AND FLEET MONITORING IN REAL TIME

With its extensive and state-of-the-art communication options, FLOWSIC500 is optimally equipped for the digital age. The modern digital interfaces and the option of wireless communication via the 4G / 5G mobile telecommunication standard make it easy to integrate into higher-level control systems. The remote control feature offers significant time and cost advantages.

It enables all deployed devices to be monitored remotely from a control station using a real-time fleet control system. Continuous monitoring provides a transparent picture of the current device status thereby allowing condition-based maintenance. This eliminates any unnecessary on-site maintenance checks.

# GAS QUALITY INDICATOR (GQI)

The modern gas market is characterized by the presence of a large number of different gas suppliers. With the FLOWSIC500, plant and network operators are prepared for this challenge because the Gas Quality Indicator allows the hydrogen content in the natural gas to be monitored. If the configured limit value is exceeded due to fluctuations in the gas qualities, the FLOWSIC500 reports this automatically to a control center. This enables changes in the hydrogen content and therefore also the heating value to be detected in real time and substantial savings in time and costs to be achieved.

The Gas Quality Indicator, which is based on the i-diagnostic™ technology, assists in optimizing the network balance. It thereby makes a significant contribution to guaranteeing the contractually agreed gas qualities when measuring the gas quality using a gas chromatograph or measuring the hydrogen content is not possible.

H₂READY

Measuring capability up to 30% hydrogen in the natural gas

FLOWSIC500

FLOWSIC600-XT

Gas chromatograph
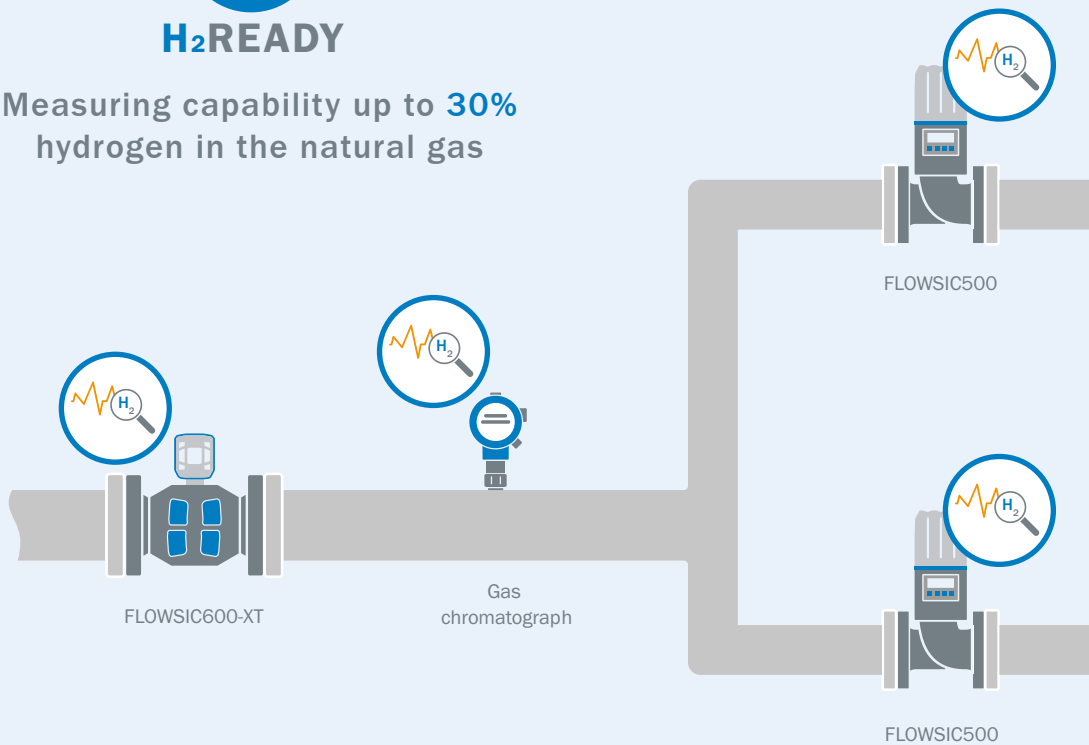
FLOWSIC500

FOUR NOMINAL DIAMETERS – AND ALL EASY TO OPERATE

- SICK offers the FLOWSIC500 in four nominal diameters, all fitting the common flange-to-flange dimensions used in natural gas distribution: DN50, DN80, DN100 and DN150.

- The electrical connections for the transfer of measurement data and voltage supply are easily accessible and installed in just a few steps. The measuring components are installed in a "cartridge" that can be removed in just a few steps.

- The gas flow meter can be installed either horizontally or vertically, and the display rotated to make meter reading easier.

- The most important functions of the measurement device can be accessed directly from the display using the key pad. The user-friendly FLOWgate™ software supports FLOWSIC500 via an optical interface.

Meter size: 50 mm   Meter size: 80 mm   Meter size: 100 mm   Meter size: 150 mm
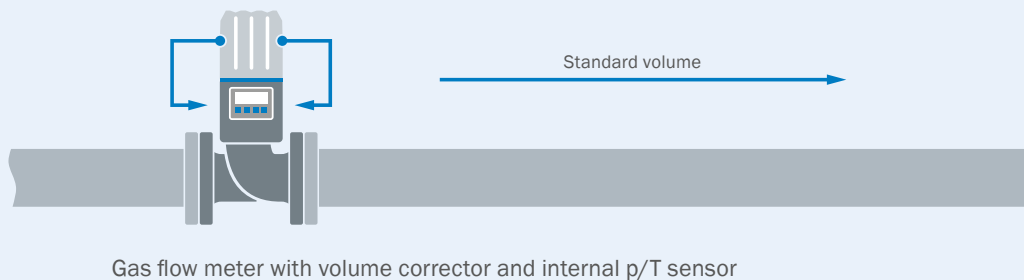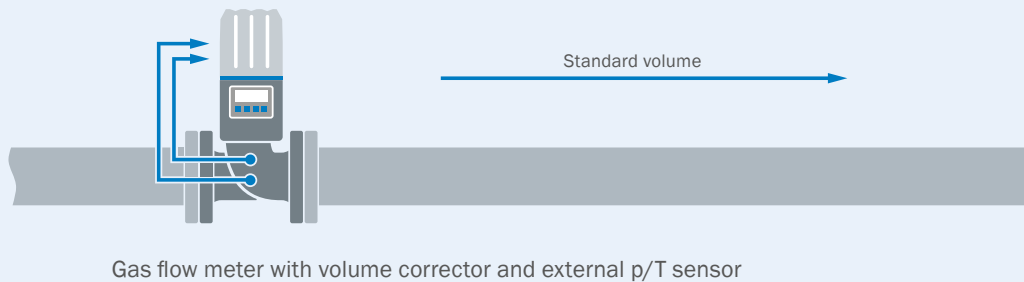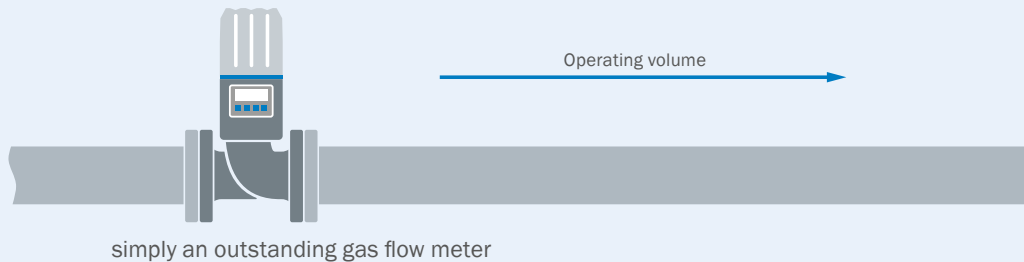
PRINCIPLE OF OPERATION

- Thanks to the use of ultrasound technology and the absence of mechanical components, the FLOWSIC500 offers clear cost advantages over conventional turbine and rotary displacement meters.

- The gas flow meter works without any loss of performance during operation. No part of the measurement device interferes with the gas flow. The FLOWSIC500 can therefore also be used in applications where a continuous gas supply is vital, for example in hospitals.

- In the event of a fault, e.g., a change in the performance of the electronic components or in case of contamination, the device issues an alarm via its self-monitoring feature. This eliminates the need for regular maintenance.

- Furthermore, being insensitive to excessive loads, the gas flow meter offers a broad measurement range and also processes dynamic load changes with no loss in accuracy. The FLOWSIC500 is therefore ideal for custody gas flow measurements.

"Cartridge"

Straightener

Flow conditioning

Measurement section incl. diagnostics
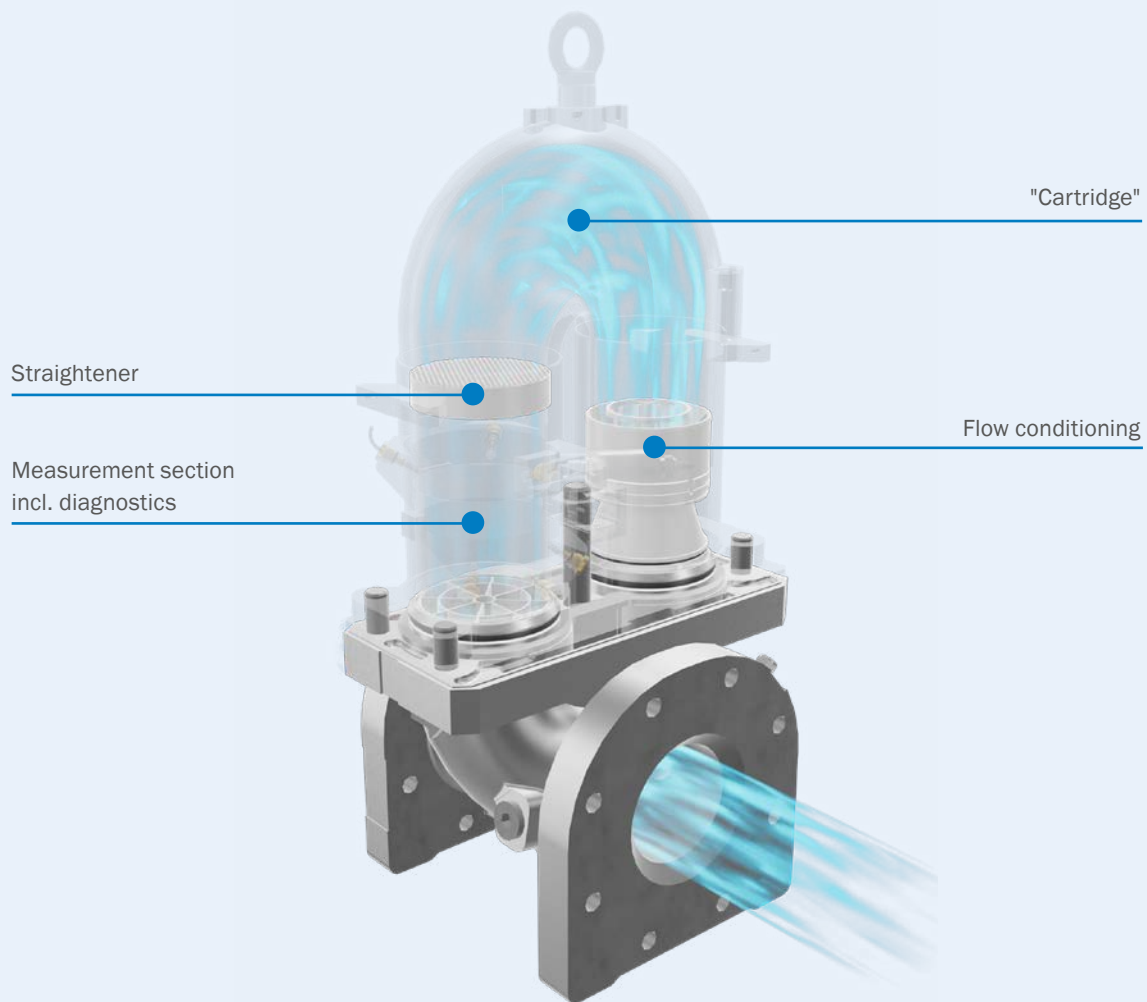
GAS FLOW METER, VOLUME CORRECTOR, AND LOAD RECORDING – ALL IN ONE

- Gas flow measurement and volume correction have the same goal: providing a precise measurement of the quantity of gas supplied. The FLOWSIC500 combines all functions into one device thereby helping to save on installation costs and reducing the number of interfaces. Everything is conveniently available from a single source, with the same end result: precise and reliable measurement of the gas quantity in line with recognized, approved processes.

- The integratable volume corrector supports all typical correction algorithms, such as SGERG88, AGA 8, and AGA NX-19.

- There is the option of TZ or pTZ correction. The pTZ variant approved in accordance with MID. The meter always comes with suitable temperature and pressure sensors. A wide-range pressure sensor covers the range from 0.8... 20 bar(a).

- FLOWSIC500 now incorporates not only a volume corrector function but also load recording and indicating device for the maximum load. The technology of the innovative ultrasonic gas meter makes this possible. Install once, operate once – complete solution. Any kind of modem can be connected to implement the digital data transmission.

simply an outstanding gas flow meter

Gas flow meter with volume corrector and external p/T sensor

Gas flow meter with volume corrector and internal p/T sensor

FLOWGATE™ OPERATING SOFTWARE

- The FLOWgate™ user software offers a user-friendly and results-oriented solution for all life cycle management tasks of the FLOWSIC500.

- FLOWgate™, with its wizards for calibration, commissioning and device diagnostics, supports the almost maintenance-free operation of the gas flow meter and can also be used to remotely monitor the gas flow meter.

- The Device Manager shows all registered devices, and offers device grouping and a convenient data backup function. Thanks to the integrated database you can access the stored data anytime offline or online.

- The intuitive operation and multi-language support of FLOWgate™ makes the FLOWSIC500 gas flow meter easy to use.
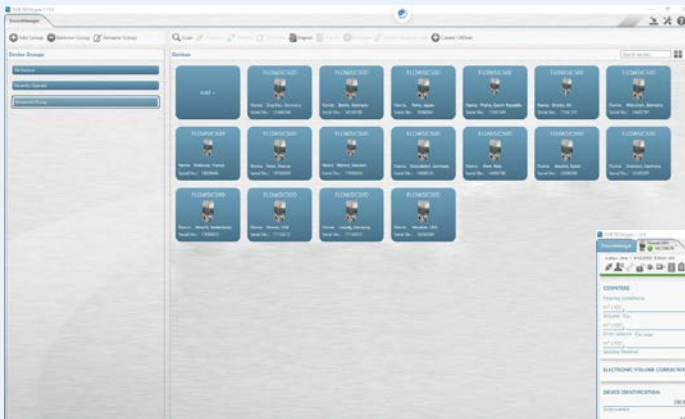
Device Manager
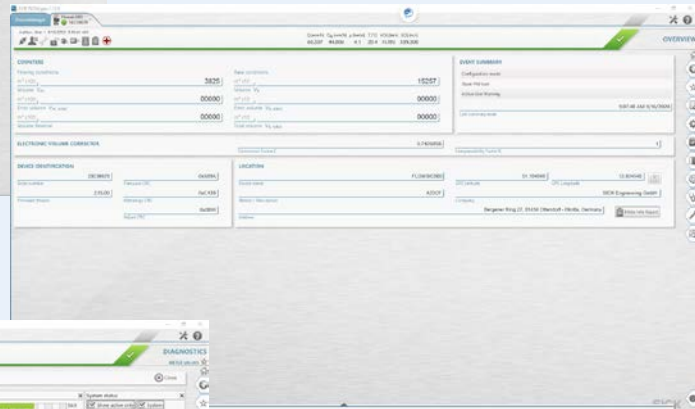
Overview
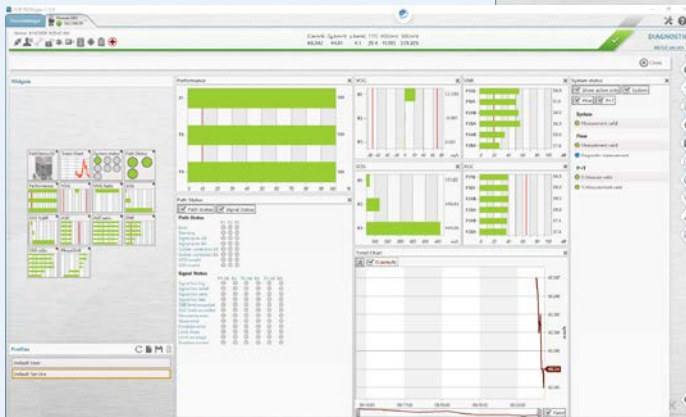
Meter values

CUSTODY TRANSFER MEASUREMENT IN NATURAL GAS DISTRIBUTION

Product description

The cutting-edge technology for the ultimate in measurement accuracy: The FLOWSIC500 ultrasonic compact gas meter from SICK ensures highly accurate metering in natural gas distribution. In absence of mechanical moving parts, the FLOWSIC500 is a rugged, reliable, and low-maintenance device – allowing for a significant reduction in operating costs. It is overload-proof, accurate and is monitored by an intelligent diagnostics system.

The modern interfaces and the option of wireless communication make it easy to integrate into remote data management systems. Continuous monitoring provides a transparent picture of the current device status as well as changes in the gas quality. When used in transfer stations and measuring stations, the FLOWSIC500 provides the security of a continuous and blockage-free gas supply.

At a glance

- Rugged and time-proven technology: ultrasound technology
- Diagnostics and continuous operational checks
- Measuring capability up to 30% H_2 in the natural gas
- Gas Quality Indicator for quantifying the H_2 content
- Integrated volume conversion and load recording
- No straight inlet/outlet piping required
- Large measuring span, no moving parts
- Extended interfaces and protocols
- Remote communication (DATCOM)

Your benefits

- Ability to digitize the gas network
- Unique remote gas network monitoring based on i-diagnostics™
- Ultimate measurement certainty and safety of continuous gas supply
- Simple installation, compatible with conventional technologies (turbine and rotary meters)
- All-in-one solution: gas flow meter + volume correction + data registration + data communication (DATCOM)
- Autarkic operation or failsafe network operation with battery backup
- Reduced maintenance effort thanks to remote maintenance
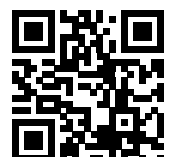- Simplified recalibration through straightforward "cartridge exchange"

CE ⟨Ex⟩ CSA C US

MID OIML

More information

➜ www.sick.com/FLOWSIC500

For more information, simply visit the above link to obtain direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Fields of application

- Natural gas distribution
- Metering stations in industrial and commercial applications
- Building and area metering for municipal and regional gas suppliers
- Critical applications where a continuous gas supply must be ensured, e.g., in hospitals
- Natural gas measurement; complies with all applicable directives and guidelines

Detailed technical data

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications. Please contact your local SICK representative for information about the performance of the FLOWSIC500 for your application.

System

Measured values	Volume a.c., volume flow a.c., gas velocity In addition, for integrated volume correction: volume s.c., volume flow s.c.
Measurement principle	Ultrasonic transit time difference measurement
Measuring medium	Natural gas (dry, odorized), natural gas containing up to 30% hydrogen
Measuring ranges Volume flow, a. c., DN 50 Volume flow, a. c., DN 80 Volume flow, a. c., DN 100 Volume flow, a. c., DN 150	 1.0 … 160 m³/h 2.5 … 400 m³/h 4.0 … 650 m³/h 4.0 … 1,000 m³/h
Repeatability	≤ 0.1%
Accuracy Q_{min} up to 0.1 Q_{max} 0.1 Q_{max} up to Q_{max} Q_{min} up to 0.1 Q_{max} 0.1 Q_{max} up to Q_{max}	Accuracy class 1; typical error limits ≤ ± 1% ≤ ± 0.5% Accuracy class 1; maximum allowed error limits ≤ ± 2% ≤ ± 1% After high pressure flow calibration: ± 0.2% at test pressure, otherwise ± 0.5%
Diagnostic functions	Permanent monitoring of measured values, Gas Quality Indicator
Gas temperature	–25 °C … +60 °C –40 °C … +70 °C (optional)
Operating pressure	PN16 (EN 1092-1): 0 bar(g) … 16 bar(g) Class 150 (ASME B16.5): 0 bar(g) … 20 bar(g)
Ambient temperature	–25 °C … +60 °C –40 °C … +70 °C (optional)
Storage temperature	–40 °C … +80 °C
Conformities	MID: 2014/32 / EU OIML R 137-1&2:2012 EN 12405: 2010 (for integrated volume correction) PTB-A-50.7 (load profile memory)
Ex approvals IECEx ATEX NEC/CEC (US/CA)	 Ex ia [ia] IIC T4 Gb, Ex op is IIC T4 Gb II 2G Ex ia [ia] IIC T4 Gb, II 2G Ex op is IIC T4 Gb I.S. for Class I Division 1 Groups C and D T4; Ex/AEx ia IIB T4 Ga Class I, Division 2, Groups A, B, C, and/or D, T4
Enclosure rating	IP66

Digital outputs	Configurations:
	malfunction, electrically isolated LF pulse + (f_{max} = 100 Hz)
	malfunction, electrically isolated HF pulse + (f_{max} = 2 kHz)
	Encoder + LF pulse, electrically isolated (f_{max} = 100 Hz)
	Encoder + HF pulse, electrically isolated (f_{max} = 2 kHz)
	2x LF pulse, electrically isolated (f_{max} = 2 kHz / 100 Hz)
	LF pulse + RS485 (externally powered)
	HF pulse + RS485 (externally powered)
	RTU RS485 (externally powered)
RS485 protocol	Modbus RTU, Modbus Enron, ISO-17089.1 (DSfG)
Optical interface	According to EN 62056-21, Section 4.3
Dimensions (W x H x D)	See dimensional drawings
Material in contact with media	Aluminum AC-42100-S-T6
Mounting	Horizontal or vertical mounting with 0 D straight inlet/outlet piping
Electrical connection Voltage	Intrinsically safe supply: 4.5 … 16 V DC Includes 3-month backup battery
Options	Autarkic meter configuration (5-year battery life)

Volume correction

Accuracy	Accuracy class 0.5
	Maximum permitted error limits of
Conversion factor C	≤ ± 0.5% (at reference conditions)
Correction method	PTZ or TZ
Compressibility	SGERG88
	AGA 8 Gross method 1
	AGA 8 Gross method 2
	AGA 8 DC92
	AGA NX-19
	AGA NX-19 mod.
	GERG91
	Fixed value
Data archives	Measurement period archive (5867 entries)
	Daily archive (600 entries)
	Monthly archive (25 entries)
Log books	Event log book (1,000 entries)
	Parameter log book (250 entries)
	Metrology log book (100 entries)
	Gas parameters log book (150 entries)

Pressure sensor

Measuring ranges	
Absolute pressure	0.8 … 5.2 bar(a) / 2.0 … 10 bar(a) / 4.0 … 20 bar(a) / 0.8… 20 bar(a)
Gauge pressure	0 … 4 bar(g) / 0 … 10 bar(g) / 0 … 20 bar(g)

Temperature sensor

| Measuring ranges	
Temperature	–25 … +60 °C
	–40 … +70 °C
Sensor type	Platinum resistance sensor, Pt1000 in stainless steel protective pipe
Ambient temperature	–40 … +85 °C

Custody transfer measuring ranges

Nominal size	Meter size	Measuring range [m³/h]		Measuring span
		Min.	Max.	
DN 50 (2")	G 40	1.3	65	1 : 50
	G 65	2.0	100	1 : 50
	G 100	3.2	160	1 : 50
	G 100	1.6	160	1 : 100
	G 100	1.0	160	1 : 160
DN 80 (3")	G 100	3.2	160	1 : 50
	G 160	5.0	250	1 : 50
	G 160	2.5	250	1 : 100
	G 250	8.0	400	1 : 50
	G 250	4.0	400	1 : 100
	G 250	2.5	400	1 : 160
DN 100 (4")	G 160	5.0	250	1 : 50
	G 250	8.0	400	1 : 50
	G 250	4.0	400	1 : 100
	G 400	13	650	1 : 50
	G 400	6.5	650	1 : 100
	G 400	4.0	650	1 : 160
DN 150 (6")	G 250	8.0	400	1 : 50
	G 250	4.0	400	1 : 100
	G 400	13	650	1 : 50
	G 400	6.5	650	1 : 100
	G 400	4.0	650	1 : 160
	G 650	20	1,000	1 : 50
	G 650	10	1,000	1 : 100
	G 650	6.2	1,000	1 : 160
	G 650	5.0	1,000	1 : 200
	G 650	4.0	1,000	1 : 250

Ordering information

Our regional sales organization would be happy to advise you on what device configuration is best for you.
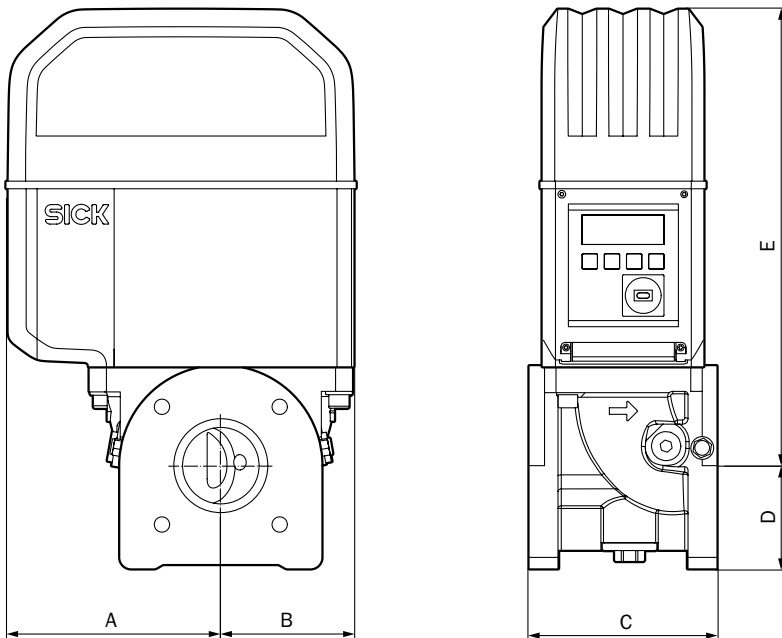
Dimensional drawing (Dimensions in mm)
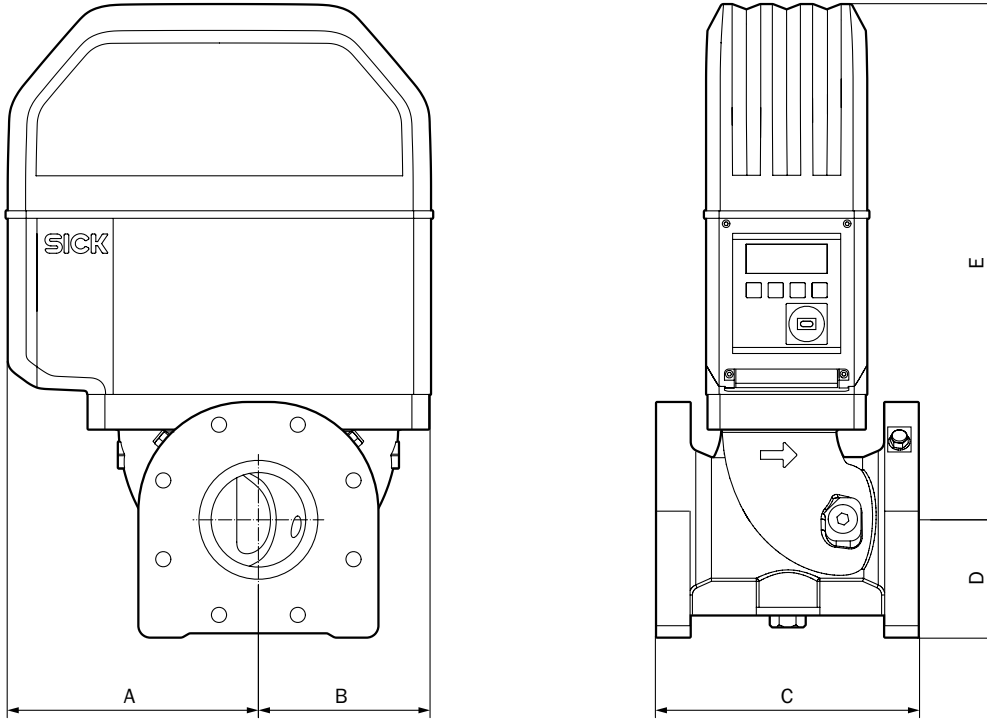
FLOWSIC500, nominal size DN 50
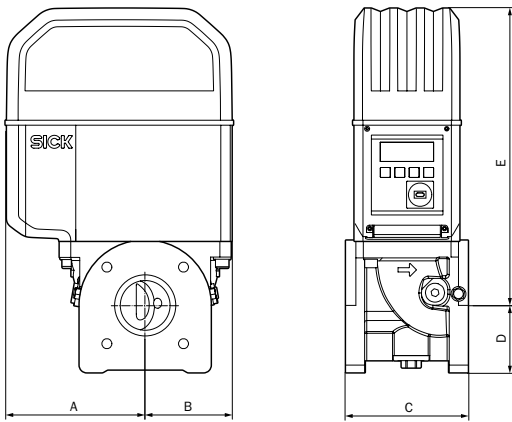
Nominal size	Weight	Dimensions				
		A	**B**	**C**	**D**	**E**
DN 50	10.6	153	78	150	71	272
	11.4			171		
All dimensions in mm. All weights in kg.						

FLOWSIC500, nominal size DN 80

Nominal size	Weight	Dimensions				
		A	**B**	**C**	**D**	**E**
DN 80	18.3	194	121	171	94	417
	20.5			241		
All dimensions in mm. All weights in kg.						

FLOWSIC500, nominal size DN 100

Nominal size	Weight	Dimensions				
		A	**B**	**C**	**D**	**E**
DN 100	27,2	231	159	241	108	476
	29,4			300		
All dimensions in mm. All weights in kg.						

FLOWSIC500, nominal size DN 150
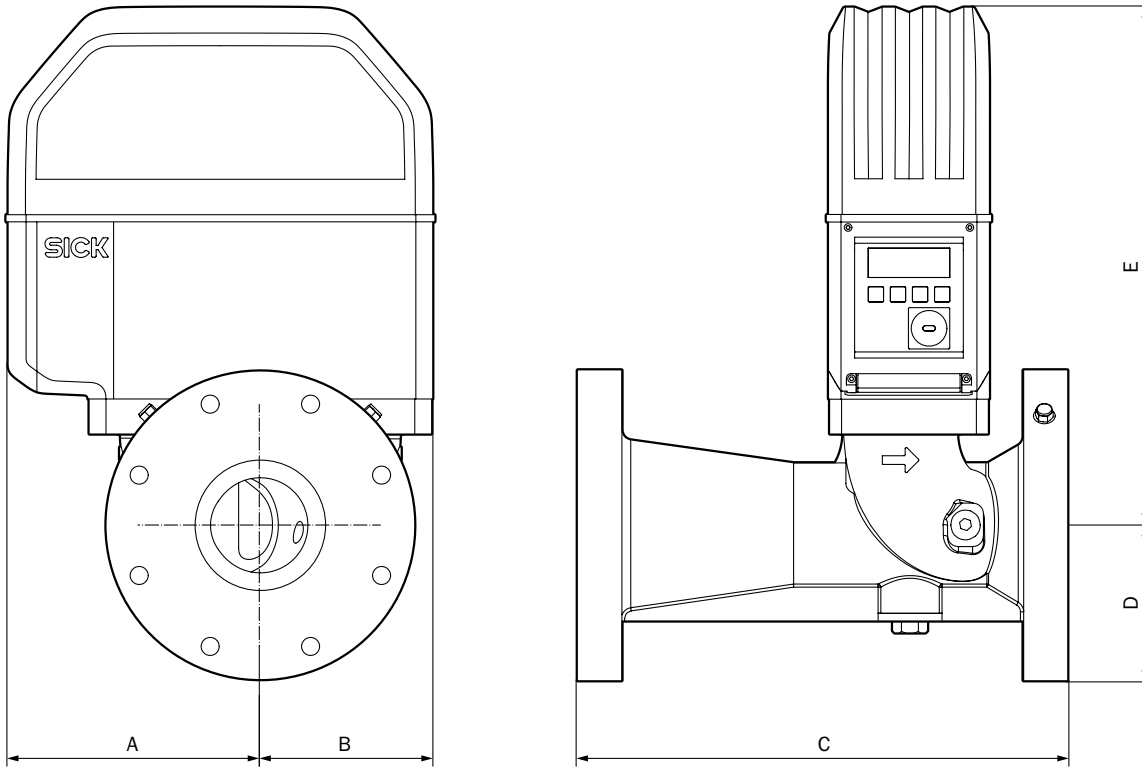
Nominal size	Weight	Dimensions				
		A	**B**	**C**	**D**	**E**
DN 150	35.0	232	158	450	143	476
All dimensions in mm. All weights in kg.						

Pressure sensor
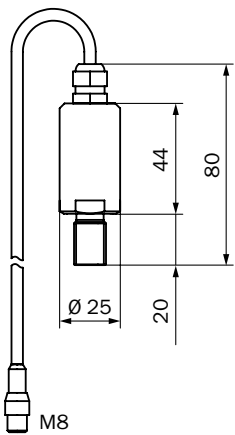
Temperature sensor
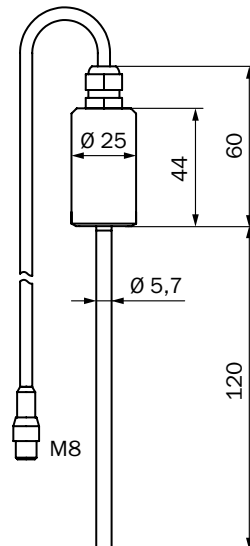
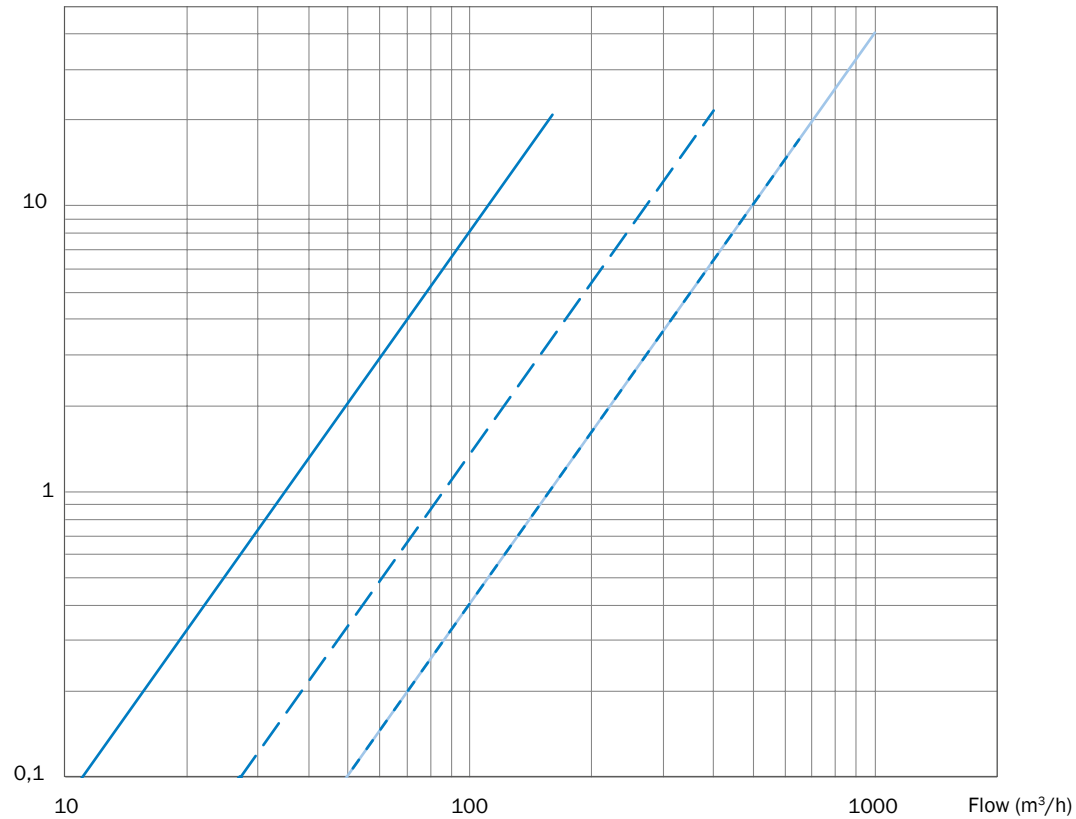## Application areas

Pressure loss

FLOWSIC500 causes a typical pressure loss of:

$\Delta p_{Natural\ gas}$ [mbar]

Nominal size

———— DN 50	- - - - - DN 100	
— — — DN 80	———— DN 150	

Reference density for natural gas: ρ = 0.83 kg/m3

Speed of sound

The speed of sound in the measured gas must be within the range of **300 m/s to 600 m/s**.
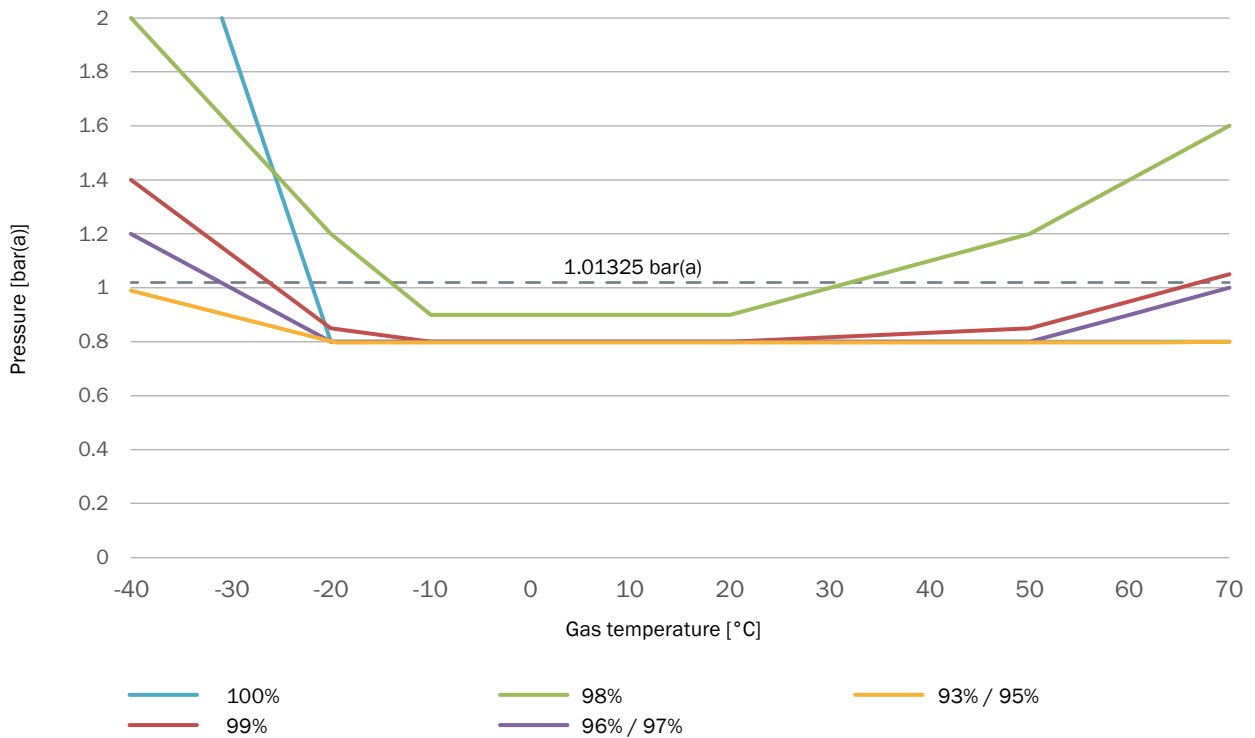
Methane concentration (CH$_4$) in natural gas

For very high methane concentrations, the FLOWSIC500 requires a minimum operating pressure for meter sizes of DN 80 to DN 150. Methane has a damping effect on the signal transmission.
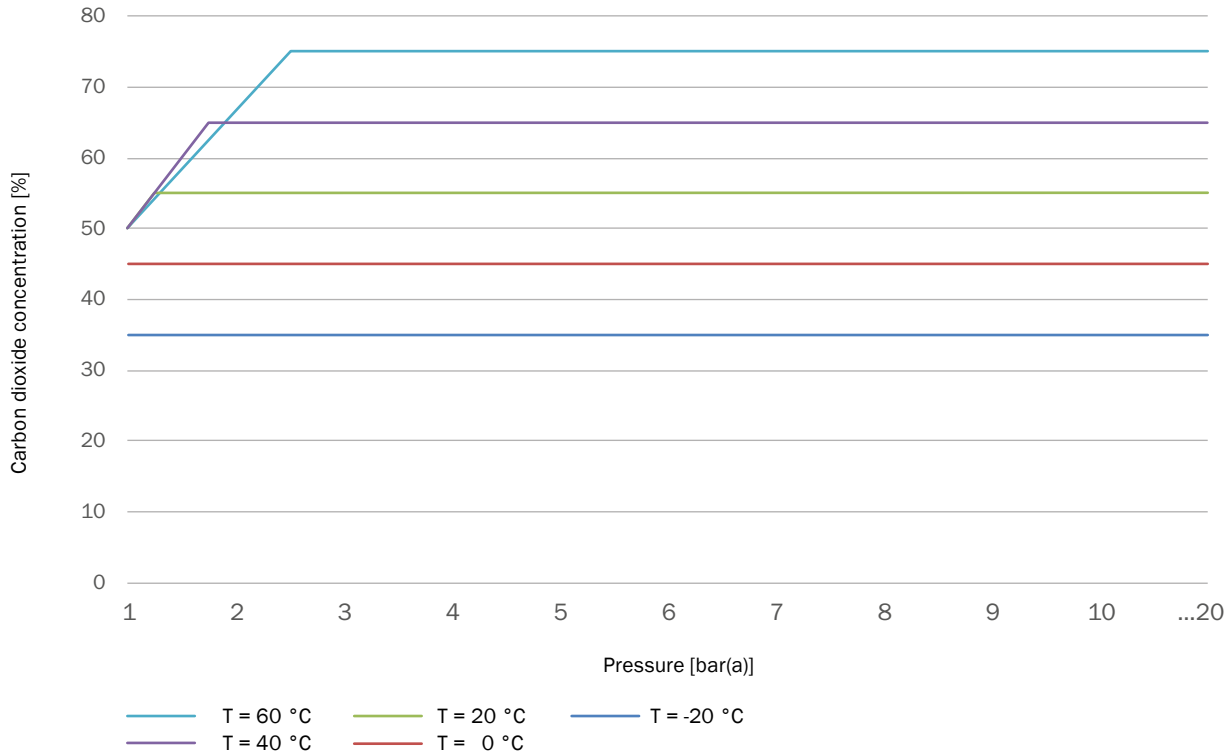
Meter size DN 50
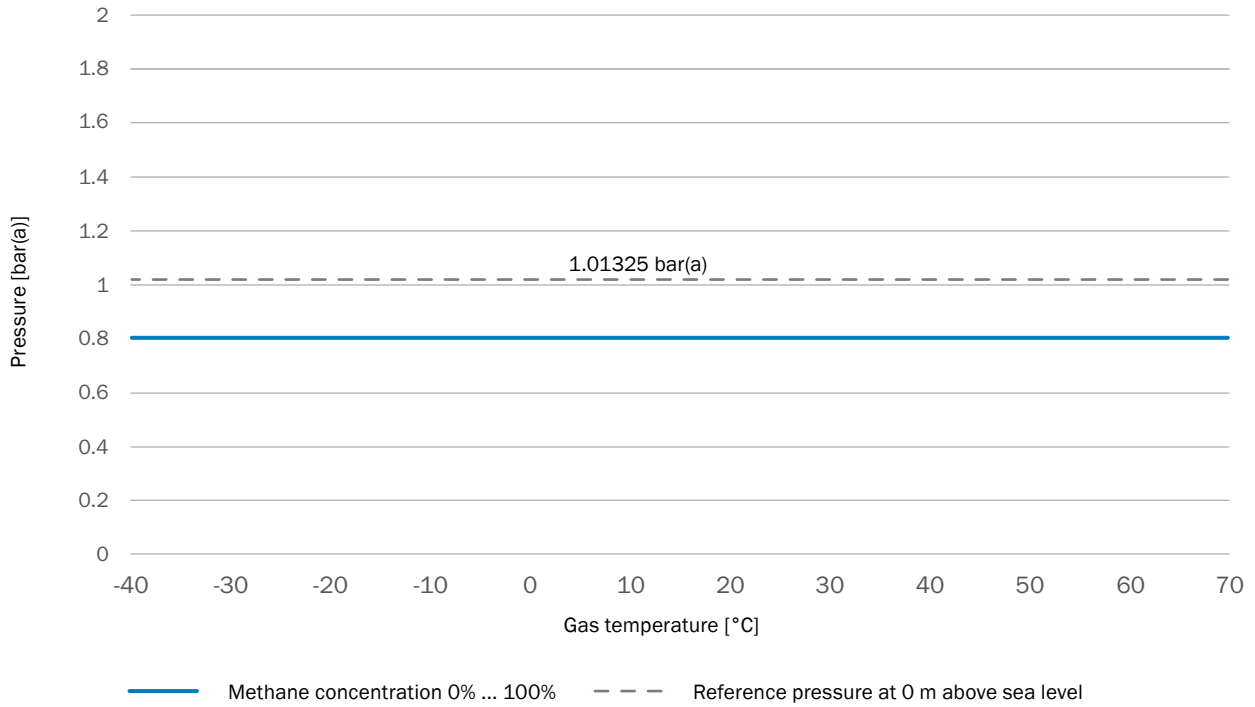
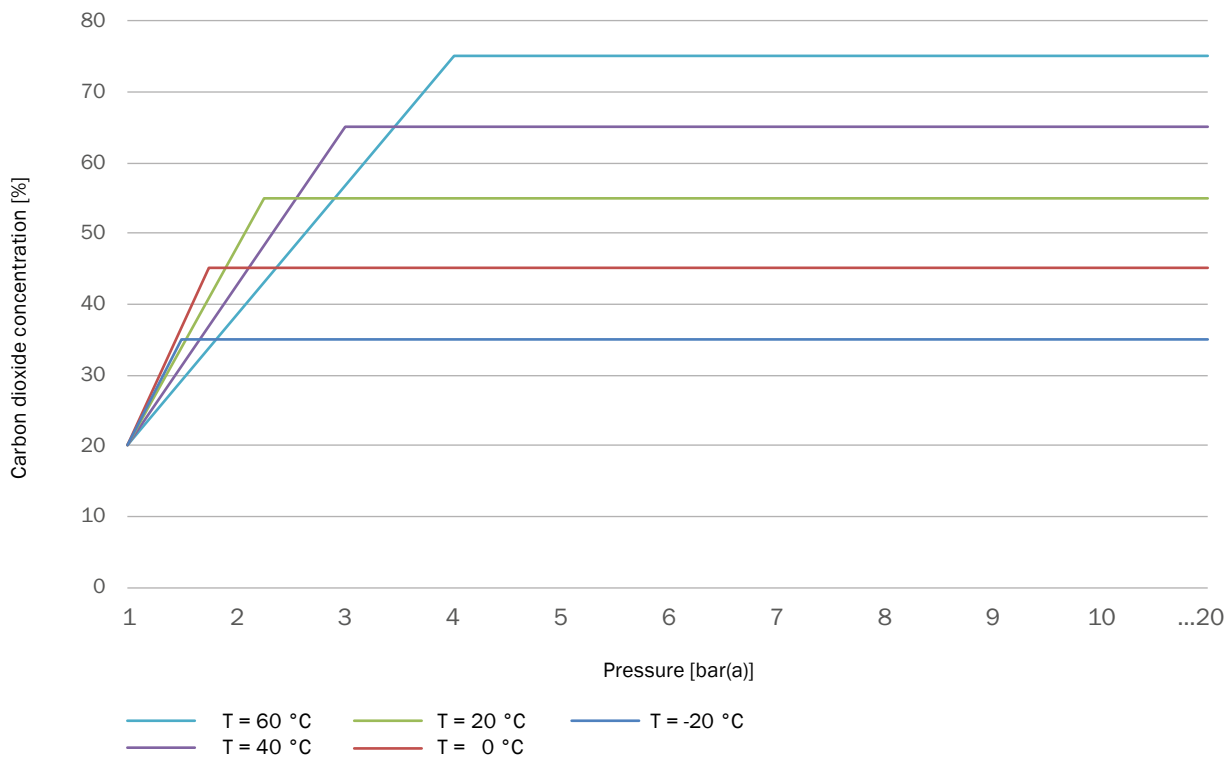

Meter size DN 80 / DN 100 / DN 150

Carbon dioxide concentration (CO_2) in natural gas

The measuring capability of the FLOWSIC500 is limited by a maximum carbon dioxide concentration.

Meter size DN 50

Meter size DN 80 / DN 100 / DN 150

WORKING WITH SICK IN A DIGITAL WORLD

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- Document overview
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Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.

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Safe and professional

Product and system support
Reliable, fast, and on-site

Verification and optimization
Safe and regularly inspected

Upgrade and retrofits
Easy, safe, and economical

Training and education
Practical, focused, and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 11,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations ➜ **www.sick.com**

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