FLOWSIC500

CUSTODY TRANSFER MEASUREMENT IN NATURAL GAS DISTRIBUTION

Gas flow meters

SICK
Sensor Intelligence.

ULTIMATE MEASUREMENT CERTAINTY.
FOR MUNICIPAL GAS SUPPLIERS AND
INDUSTRIAL CONSUMERS

Local authorities purchase natural gas and sell it to users such as power stations, primary industries, and other industrial consumers. Because considerable volumes of gas are involved, the input and output measurement should be precise, but above all, reliable in the long term. Conventional mechanical gas meters are very difficult to monitor. On top of that, they require costly maintenance and are not as easy to handle. Now, the FLOWSIC500, the world's first ultrasonic gas meter for the natural gas distribution market, changes all that. FLOWSIC500 comes from SICK, one of the leading German sensor specialists.

High level of measurement certainty

FLOWSIC500 measures the gas flow with ultrasonic technology. It operates with no mechanical moving parts, and is not liable to wear. This provides stable measurement certainty in the long term. SICK developed ultrasonic transducers especially for the FLOWSIC500, which are not sensitive to interferences. FLOWSIC500: ideal for fiscal metering.

Increased measurement reliability

FLOWSIC500 is self-monitoring, in the event of an issue, such as change in electronics performance or contamination, the meter will generate an alarm. This means that there is no need for maintenance on a timed basis – resulting in a reduced cost of ownership.

Easy handling

FLOWSIC500 is more straightforward than conventional gas meters. Due to its exceptional design, the recalibration procedure on-site is much easier and quicker. The measuring components are installed in a "cartridge", which is replaced in only a few steps.

Compact design

FLOWSIC500 operates without straight inlet or outlet piping requirements. It can be equipped with an integrated volume corrector. Thus, the FLOWSIC500 requires considerably less space than conventional gas meters.

Suitable for demanding applications

With the FLOWSIC500, no part of the measurement device interferes with the gas flow. Therefore, it can be used in applications where a continuous gas supply is vital, for example in hospitals.

Power supply: No problem

Due to PowerIn Technology™, FLOWSIC500 measures fail-safe in intrinsically safe line powered operation with battery back-up. Alternatively, the meter operates by battery as an energy self-sufficient configuration for a period of at least five years.

Insensitive to overload

FLOWSIC500 does not get harmed by overloading. It processes dynamic load changes without any loss in accuracy.

Exact replacement fitting

FLOWSIC500 is designed to mount easily where a conventional gas meter has been in place.

Approved worldwide

FLOWSIC500 complies with all relevant standards and regulations for natural gas distribution. This also includes the international requirements for explosion-proof areas.

FLOWSIC500

Meter size: 50 mm (2") Meter size: 80 mm (3") Meter size: 100 mm (4") Meter size: 150 mm (6")

- FLOWSIC500 is available in four meter sizes, all fitting to the common flange-to-flange dimensions used in natural gas distribution: DN50, DN80, DN100 and DN150 (2", 3", 4" and 6").

- The electrical connections for the transfer of measurement data and power supply are easily accessible and can be installed in just a few steps. Removing the "cartridge" requires just loosening of a few screws.

- It is possible to install the gas meter horizontally or vertically. The display can be rotated for easier reading of metering data.

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

A GAS METER AND VOLUME CORRECTOR IN ONE – SIMPLE, CONVENIENT, RELIABLE. MORE THAN JUST ONE OPTION.

Why use two devices for one task? Gas flow measurement and volume correction have the same goal: providing a precise measurement of the quantity of gas supplied. It makes sense to combine both into one device saving 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.

Volume correction in line with MID
The volume corrector can be integrated into the FLOWSIC500 on request and supports all typical correction algorithms, such as SGERG88, AGA 8, and AGA NX-19. There is the option of TZ or pTZ correction, with the pTZ version approved in accordance with MID. The right temperature and pressure sensors always come with the meter.

Redefining user-friendliness
The FLOWSIC500 operating display offers full access to all settings and measured values of the FLOWSIC500. However, it is the FLOWgate™ software that makes this device really stand out. Using simple step-by-step instructions, it guides the operator through the key functions, so commissioning or "cartridge" replacement during recalibration couldn't be easier.

Simple installation
Just attach and connect. That's how easy it is to install the FLOWSIC500. With the integrated volume corrector and the internal pressure and temperature sensors, only the signal for the standard flow needs to be led through the system. There is no need for the usual process of connecting the gas meter to the volume corrector.

Everything from a single source
Featuring a gas meter, volume correction, and pressure and temperature sensors all in one, the FLOWSIC500 offers everything you need, making integration simple and keeping installation costs low. SICK is your ideal partner for any application.

FLOWSIC500 variant overview

Simply an outstanding gas meter
- Simple installation in the pipeline
- Connection to all standard volume correctors via LF, HF, encoder, or RS-485 output

Volume a.c.

Gas meter with volume corrector and external p/T sensor technology
- Minimal installation costs
- The meter is preconfigured in line with the p/T sensor technology supplied with it
- Easy access to the p/T sensors for field verification
- Option of using the p/T tappings on the meter for connecting the sensors

Temperature T
Pressure p
Volume s.c.

Gas meter with volume corrector and internal p/T sensor technology
- Maximum convenience during installation
- Integrated sensor technology for p/T fully pre-configured
- Just install, connect the signal output, and you're done

Temperature T
Pressure p
Volume s.c.
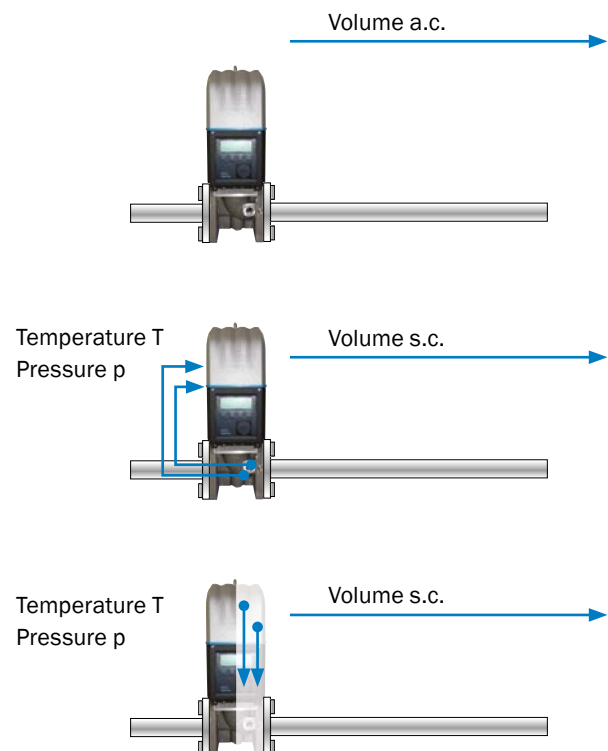
FLOWSIC500 installation

Never lose anything – comprehensive data archive and log books

Monthly archive

- Monthly actual, minimum, maximum, and Ø values
- Up to 25 entries

Daily archive

- Daily actual values
- Up to 600 entries

Measurement period archive

- Adjustable measuring period between 5 and 60 min
- Up to 6,000 entries

Event log book

- All events have time stamps
- Up to 1,000 entries

Parameter log book

- All parameter changes are recorded
- Up to 250 entries

Metrology log book

- Recording of all calibration-related changes
- Up to 100 entries

Intuitive user program – software platform FLOWgate™

Software platform FLOWgate™ – FLOWSIC500 "Overview"

CUSTODY TRANSFER MEASUREMENT IN NATURAL GAS DISTRIBUTION
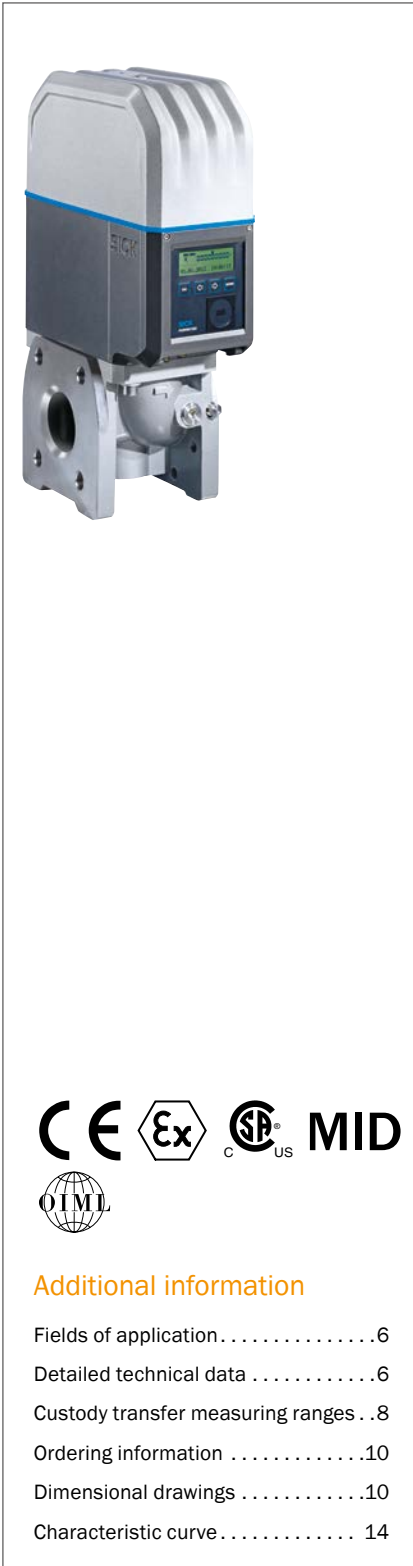
Product description

The cutting-edge technology for natural gas measurement:
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 robust, fail-safe 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.

Recalibration is simple and straightforward by replacing the "cartridge". FLOWSIC500 can easily be integrated into existing measuring stations. The FLOWSIC500 operates either in an energy self-sufficient configuration or failsafe in network operation with battery backup. It complies with all relevant standards and regulations. When utilized in transfer and measuring stations, FLOWSIC500 ensures a continuous and blockage free gas supply.

At a glance

- Cutting-edge technology: ultrasound
- Diagnostics and permanent operational check
- Durable and reliable without moving parts
- Replacable "cartridge"
- Straight inlet/outlet piping not required
- Overload-proof
- Optional integrated volume correction/data registration
- Battery or intrinsically safe power supply

Your benefits

- Ultimate measurement certainty and safety of continuous gas supply
- Reduction of installation costs due to integrated volume correction
- Simple installation, compatible with conventional technologies (turbine and rotary displacement meters)
- Minimal operating costs due to being nearly maintenance-free
- Easy recalibration due to straightforward "cartridge" replacement
- Reliable under dynamic load changes
- Self-sufficient operation

Additional information

➜ **www.mysick.com/en/FLOWSIC500**

For more information, just enter the link and get direct access to technical data, CAD design models, operating instructions, software, application examples and much more.

Fields of application

- Natural gas distribution in transfer and measuring stations for municipal and regional gas suppliers
- Applications where continuous gas supply must be ensured
- Measuring stations in industrial and commercial applications

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.

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)
Measuring ranges	
Volume flow, a. c., (2")	35 … 5,650 ft^3/hr
Volume flow, a. c., (3")	88 … 14,125 ft^3/hr
Volume flow, a. c., (4")	141 … 22,954 ft^3/hr
Volume flow, a. c., (6")	141 … 35,314 ft^3/hr
Reproducibility	≤ 0.1 %
Accuracy	Accuracy class 1, typical error limits:
Q_{min} up to 0.1 Q_{max}:	≤ ± 1 %
0.1 Q_{max} up to Q_{max}:	≤ ± 0.5 % Accuracy class 1, maximum allowed error limits:
Q_{min} up to 0.1 Q_{max}:	≤ ± 2 %
0.1 Q_{max} up to Q_{max}:	≤ ± 1 % After high pressure flow calibration: ±0.2 % at test pressure; otherwise ±0.5 %
Diagnostics functions	Permanent monitoring of measured values
Gas temperature	
	−40 °C … +70 °C (-40 °F … +158 °F)
Operating pressure	Class 150 (ASME B16.5): 0 bar (g) … 20 bar (g) (0 PSI (g) … 290 PSI (g)) PN16 (EN 1092-1): 0 bar (g) … 16 bar (g) (0 PSI (g) … 232 PSI (g))
Ambient temperature	
:	−40 °C … +70 °C (-40 °F … +158 °F)
Storage temperature	−40 °C … +80 °C (-40 °F … +176 °F)
Conformities	OIML R137 1&2, 2012 EN 12405 : 2010 (with integrated volume correction) MID: 2014/32/EU PED: 2014/68/EU ATEX: 2014/34/EU EMC: 2014/30/EU
Ex-approvals	
NEC/CEC (US/CA)	CSA: I.S. for Class 1 Division 1 Groups C & D T4; Ex/AEx ia IIB T4 Ga, Class I, Division 2, Groups A, B, C, and/or D, T4
IECEx	Ex ia [ia] IIC T4 Gb, Ex op is IIC T4 Gb
ATEX	II 2G Ex ia [ia] IIC T4 Gb, II 2G Ex op is IIC T4 Gb
Enclosure rating	
	IP 66

Digital outputs	Configurations: • LF pulses + malfunction, electrically isolated (f_{max} = 100 Hz) • HF pulses + malfunction, electrically isolated (f_{max} = 2 kHz) • Encoder + LF pulses, electrically isolated (f_{max} = 100 Hz) • Encoder, electrically isolated + HF pulses, not electrically isolated (f_{max} = 2 kHz) • 2 x LF pulses, electrically isolated (f_{max} = 100 Hz)
Interfaces (Optional)	RS-485 module (externally powered) alternative to digital outputs, Modbus RTU protocol, Optical interface (according to EN62056-21 (Section 4.3)
Dimensions (W x H x D)	See dimensional drawings
Weight	See dimensional drawings
Material in contact with media	Aluminum AC-42100-S-T6
Mounting	Horizontal or vertical installation with 0 D straight inlet/outlet piping
Electrical connection	
Voltage	Intrinsically safe supply: 4.5 … 16 V DC
	Inclusive 3-months back-up battery
Options	Battery powered meter configuration (more than 5 years battery runtime)

Volume correction

Accuracy	Accuracy class 0.5; Maximum allowed error limits:
Correction 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 NX-19 AGA NX-19 mod. GERG91 Fixed value
Data archives	Measurement period archive (6,000 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)

Pressure sensor

Measuring ranges	
Relative pressure	0 … 290 PSI (g)

Temperature sensor

Measuring ranges	
Temperature	-40 °C … 70°C (-40 °F … +158 °F)
Sensor type	Platinum resistance sensor Pt1000 in stainless steel protective tube
Ambient temperature	-40 °C … +85°C (-40 °F … +185 °F)

Custody transfer measuring ranges

Nominal pipe size	Meter rating	Measuring range				Rangeability
		min. [cfh] ±1%	max. [cfh]	min. [m³/h] ±1%	max. [m³/h]	
2" 5.5M285 (DN50)	5.6 M (G 100)	35	5,650	1.6	160	160:1
3" 14M285 (DN80)	14 M (G 250)	88	14,126	2.5	400	160:1
4" 23M285 (DN100)	23M (G 400)	141	22,956	4.0	650	160:1
6" 35M285 (DN150)	35 M (G 650)	141	35,315	4.0	1,000	250:1

Sizing tables

Corrected Capacity at Metering Pressure in MSCFH at Various Operating Pressures (psig)

Meter Size	2"	3"	4"	6"
Model	5.5M	14M	23M	35M
Rating (ACFH)	5600	14,000	23,000	35,000
1	5.85	14.64	24.05	36.59
3	6.62	16.54	27.17	41.34
5	7.38	18.44	30.29	46.10
10	9.28	23.19	38.10	57.98
15	11.18	27.94	45.91	69.86
20	13.08	32.70	53.71	81.74
25	14.98	37.45	61.52	93.62
30	16.88	42.20	69.33	105.50
40	20.68	51.70	84.94	129.26
50	24.48	61.21	100.56	153.02
60	28.29	70.71	116.17	176.78
70	32.09	80.22	131.79	200.54
80	35.89	89.72	147.40	224.30
90	39.69	99.23	163.01	248.07
100	43.49	108.73	178.63	271.83
110	47.29	118.23	194.24	295.59
120	51.10	127.74	209.86	319.35
130	54.90	137.24	225.47	343.11
140	58.70	146.75	241.09	366.87
150	62.50	156.25	256.70	390.63
175	72.01	180.01	295.74	450.03
200	81.51	203.77	334.77	509.44
225	91.01	227.54	373.81	568.84
250	100.52	251.30	412.84	628.24
275	110.02	275.06	451.88	687.64
285	113.82	284.56	467.49	711.41

Operating Pressure (psig)

Corrected Capacity at Metering Pressure in MSCMH at Various Operating Pressures (kPag)

Model			G100	G250	G400	G650
Rating	kPa	Bar	0.16 / 160	0.4 / 400	0.65 / 650	1 / 1000
1	6.9	0.1	0.17	0.42	0.68	1.05
3	20.7	0.2	0.19	0.47	0.77	1.18
5	34.5	0.3	0.21	0.53	0.86	1.32
10	69.0	0.7	0.27	0.66	1.08	1.66
15	103.4	1.0	0.32	0.80	1.30	2.00
20	137.9	1.4	0.37	0.93	1.52	2.34
25	172.4	1.7	0.43	1.07	1.74	2.67
30	206.9	2.0	0.48	1.21	1.96	3.01
40	275.8	2.7	0.59	1.48	2.40	3.69
50	344.8	3.4	0.70	1.75	2.84	4.37
60	413.7	4.1	0.81	2.02	3.28	5.05
70	482.7	4.8	0.92	2.29	3.72	5.73
80	551.6	5.5	1.03	2.56	4.17	6.41
90	620.6	6.2	1.13	2.84	4.61	7.09
100	689.5	6.9	1.24	3.11	5.05	7.77
110	758.5	7.6	1.35	3.38	5.49	8.45
120	827.4	8.3	1.46	3.65	5.93	9.12
130	896.4	9.0	1.57	3.92	6.37	9.80
140	965.3	9.6	1.68	4.19	6.81	10.48
150	1034.3	10.3	1.79	4.46	7.25	11.16
175	1206.6	12.1	2.06	5.14	8.36	12.86
200	1379.0	13.8	2.33	5.82	9.46	14.56
225	1551.4	15.5	2.60	6.50	10.56	16.25
250	1723.8	17.2	2.87	7.18	11.67	17.95
275	1896.1	18.9	3.14	7.86	12.77	19.65
285	1965.1	19.6	3.25	8.13	13.21	20.33

Operating Pressure (kPag)

Ordering information

Our regional sales organization will help you to select the optimum device configuration.

Dimensional drawings

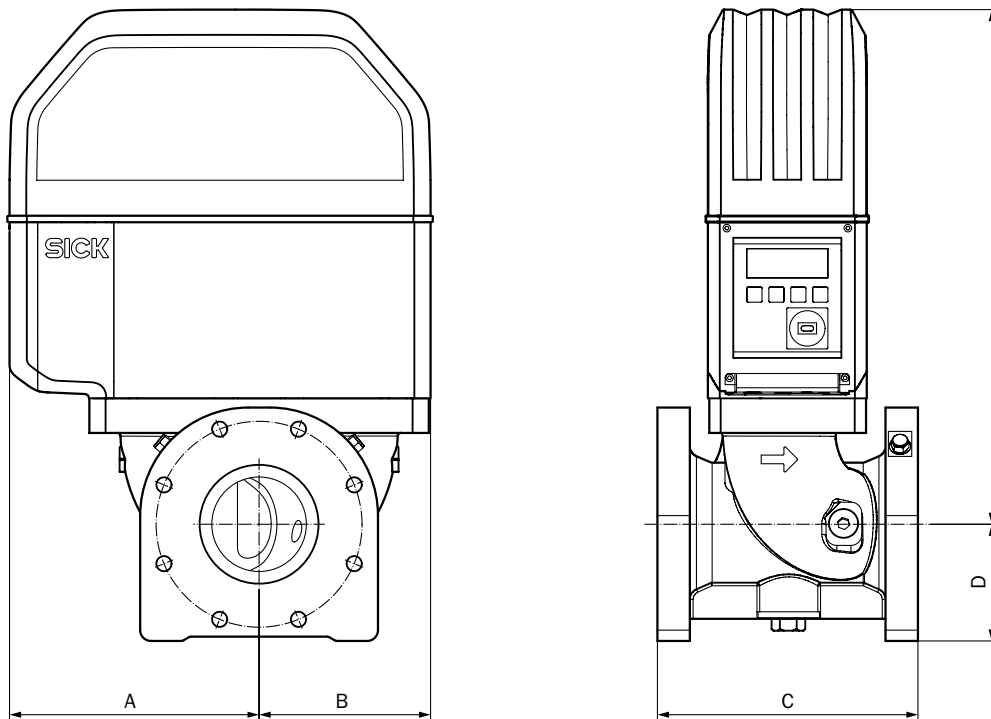FLOWSIC500, nominal size 2"
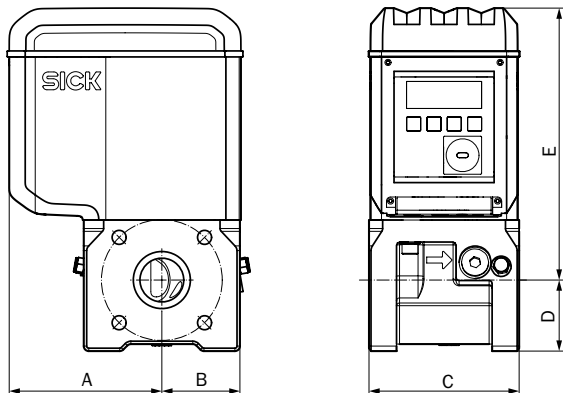
Nominal size	Weight	Dimensions				
		A	B	C	D	E
2"	23.4	6.02	3.07	5.91	2.80	10.71
				6.73		
All dimensions in inch. All weights in lbs.						

FLOWSIC500, nominal size 3"
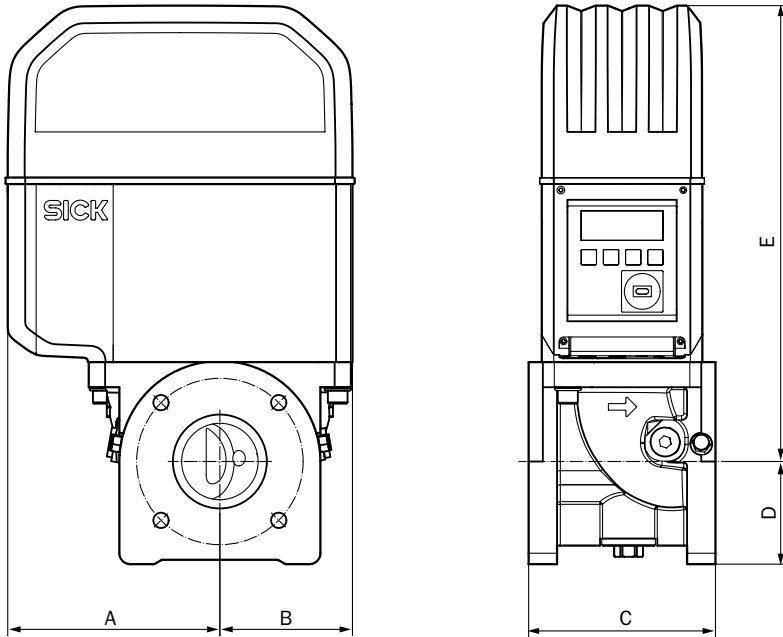
Nominal size	Weight	Dimensions				
		A	**B**	**C**	**D**	**E**
3"	40.3	7.64	4.76	6.73	3.70	16.42
	45.2			9.49		
		All dimensions in inch. All weights in lbs.				

FLOWSIC500, nominal size 4"

Nominal size	Weights	Dimensions				
		A	B	C	D	E
4"	60	9.09	6.26	9.49	4.25	18.74
	64.8			11.81		
All dimensions in inch. All weights in lbs.						

FLOWSIC500, nominal size 6"
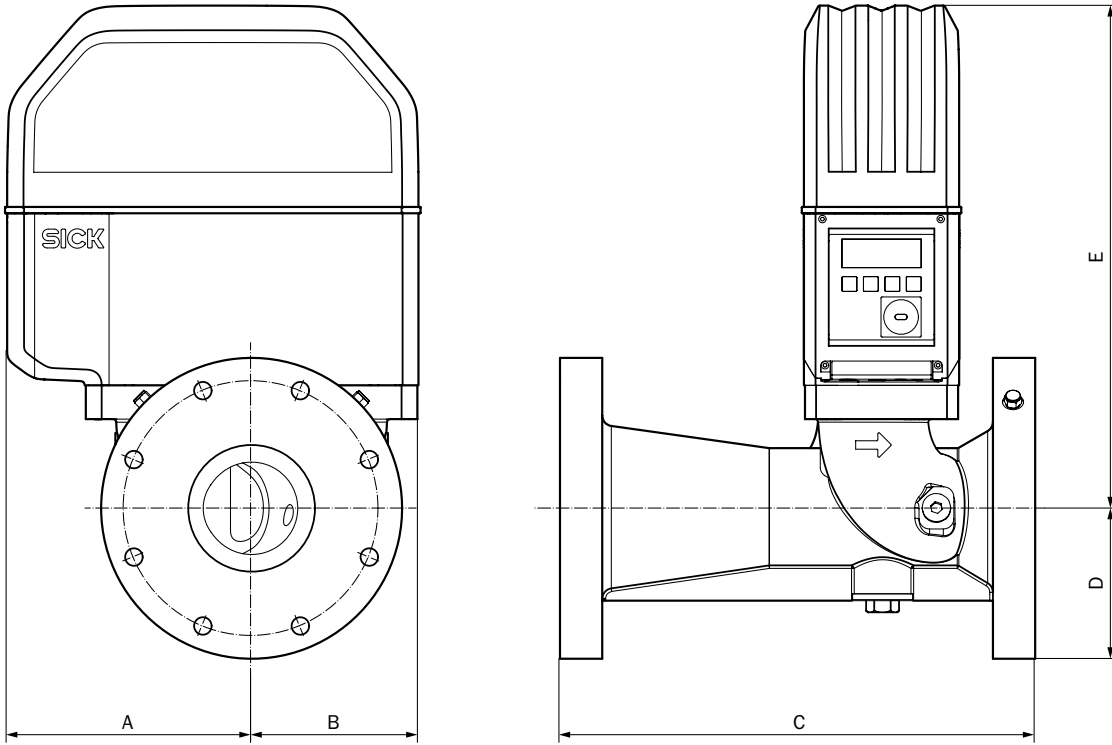
Nominal size	Weight	Dimensions				
		A	B	C	D	E
6"	77.2	9.13	6.22	17.72	5.63	18.74
All dimensions in inch. All weights in lbs.						

Temperature sensor (Dimensions in mm (inch))

Ø 25 (.98)
1.73
2.36
Ø 5,7 (0.22)
4.72
M8
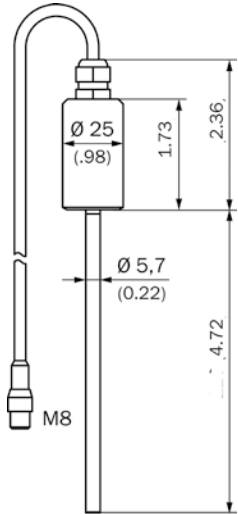
Digital temperature transmitter

Sensor type	Platinum resistance sensor Pt1000 in stainless steel protective tube
Ambient temperature	-40 °F ... 185 °F (-40 °C ... +85°C)
Accuracy	± 0.5°F (0.3°C) throughout the temperature range

Pressure sensor (Dimensions in mm (inch))

1.73
3.15
Ø 25 (.98)
79
M8
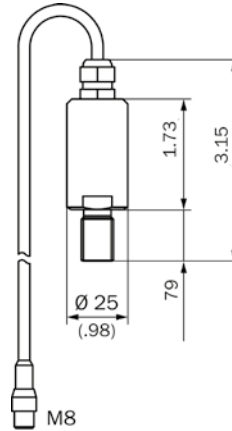
Digital pressure transmitter

Ambient temperature	-40 °F ... 185 °F (-40 °C ... +85°C)
Accuracy	± 0.1% of the full scale reading (all ranges)

Reference

Pressure loss (typical)

$\Delta p_{natural\ gas}$ in inH$_2$O

Flow in cft/h
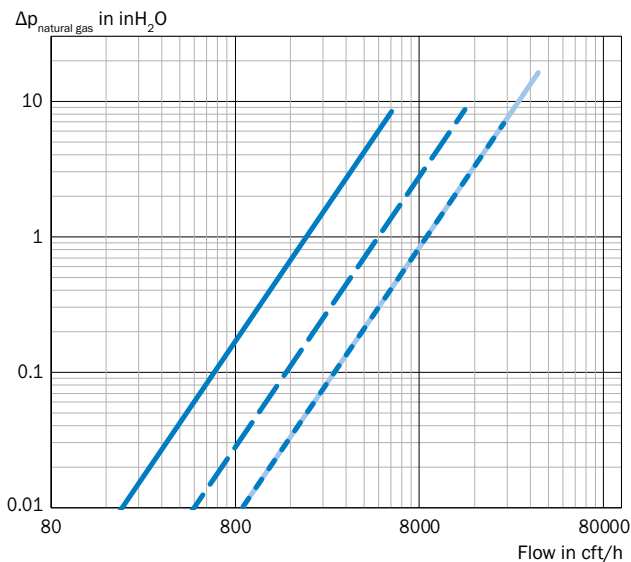
Nominal size
—— 2"
– – – 3"
· · · · 4"
—— 6"

Reference density natural gas: ρ = 0.052 lb/ft³

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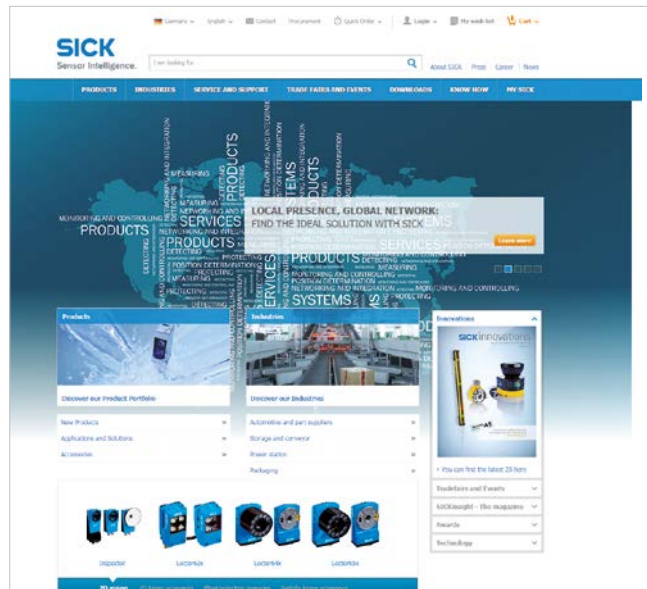
SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

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.

Consulting and design
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 almost 8,800 employees and over 50 subsidiaries and equity investments as well as numerous representative offices worldwide, we are always close to our 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.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our 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 us a reliable supplier and development partner.

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

For us, that is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, 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.

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