FLOWSIC
Volume Flow and
Gas Flow Measuring Devices

Natural Gas Metering
Process Applications
Emission Monitoring
Apart from measurement of temperature and pressure, there is also a great demand in industry for solutions for measurement of volume flow in air and exhaust gas ducts as well as in pipelines. SICK offers a great range of measuring devices for these applications. By manufacturing a wide variety of ultrasonic transducers and devices in-house, SICK is able to meet most industrial specifications. Specifically challenging requests are “cracked” by specific solutions.

Environmental protection and combating climate change – these topics are two of the greatest global challenges for politics and the economy. That is why the implementation of the German Federal Immission protection law (BImSchG) receives much attention. The FLOWSIC100 line contributes significantly to the realization of the continuous measurement of the exhaust gas flow rate in e.g. power and cement plants. This highly accurate measuring data forms the basis for quantifying pollutants and is a technological base to implement the global emission trading scheme.

The natural gas market is divided in four segments: production, transport, storage and distribution. In each of these segments the quantity of natural gas flowing through the pipelines must be metered. The FLOWSIC600 is suitable for all applications in all four segments, thanks to the great versatility of the materials, the measurement accuracy and the temperature and pressure resilience. Be it as a measuring device in the process chain, or as an adjustable gas meter for billing of natural gas in the customer end business.

Very important in the process instrumentation is the availability of flow measurement values online that also meet the high accuracy level required for continuous transfer control. With its variation of construction the FLOWSIC100 line and the FLOWSIC600 can be used for almost all measuring tasks. We consolidate requirement with budget: measurement accuracy, temperature and pressure range. SICK offers the right solution.
Two ultrasonic transducers, mounted at a certain angle to the flow axis function alternately as sender and as receiver. That means, that they each send and receive alternately ultrasonic pulses which are either accelerated or slowed down depending on their travel direction, with ("forward direction" $t_f$) or against ("reverse direction" $t_r$) the gas flow. The resulting difference in transit times is used to determine the mean gas velocity. The cross-sectional area yields the volumetric flow during operation.

Advantages:
- The measuring result is independent of pressure, temperature and gas composition
- No moving parts means low maintenance
- No interference on flow, minimal loss of pressure.

\[
\begin{align*}
  v &= \frac{L}{2 \cdot \cos \alpha} \cdot \left( \frac{1}{t_f} - \frac{1}{t_r} \right) \\
  Q &= v \cdot \frac{D^2 \cdot \pi}{4}
\end{align*}
\]

- $v$ ... Speed of gas
- $L$ ... Path length
- $\alpha$ ... Mounting angle
- $Q$ ... Flow rate
- $D$ ... Diameter
- $t_f$ ... Transit time in direction of flow
- $t_r$ ... Transit time against direction of flow
## Continuous emission monitoring

### FLOWSIC100

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>FLOWSIC100 H HIGH POWER</th>
<th>FLOWSIC100 M MEDIUM POWER</th>
<th>FLOWSIC100 S SMALL SIZE</th>
<th>FLOWSIC100 PR PROBE TYPE</th>
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<tbody>
<tr>
<td>Version</td>
<td>• Standard: unpurged</td>
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<td>• Standard: unpurged</td>
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<tr>
<td></td>
<td>• Internal cooling (AC)</td>
<td>• Internal cooling (AC)</td>
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<td>• Internal cooling (AC)</td>
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<tr>
<td>Configuration</td>
<td>1-path measurement, 2-path measurement</td>
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<tr>
<td>Application</td>
<td>• High power version for large stack diameters up to 13 m</td>
<td>• Medium power version – best suitable for stack diameters up to 3.4 m</td>
<td>• Special small size transducers optimized for small stack diameters of 0.15 up to 1.7 m</td>
<td>• For stack diameters greater than 0.4 m</td>
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<tr>
<td></td>
<td>• Suitable for high dust application</td>
<td></td>
<td>• Probe type with two transducers for the installation from one side only</td>
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<tr>
<td>Product features</td>
<td>• Rugged titanium transducers for higher device durability</td>
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<tr>
<td></td>
<td>• Corrosion resistant probe materials</td>
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<td></td>
<td>• Innovative internal cooling (&quot;AC&quot; types)</td>
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<tr>
<td></td>
<td>• Integral measurement over the entire stack diameter</td>
<td>• Integral measurement over the entire stack diameter</td>
<td>• Integral measurement over the entire stack diameter</td>
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<tr>
<td>Customer benefits</td>
<td>• Use in aggressive gases</td>
<td>• Use in aggressive gases</td>
<td>• Very low maintenance thanks to no moving parts, corrosion resistant probe materials and no purge air is used</td>
<td>• Very low maintenance and low operation costs</td>
</tr>
<tr>
<td></td>
<td>• Very low maintenance requirements and low operation costs</td>
<td>• Very low maintenance and low operation costs</td>
<td></td>
<td>• For gas temperatures up to 260 °C (standard); with internal cooling up to 350 °C and no purge air</td>
</tr>
<tr>
<td></td>
<td>• For gas temperatures up to 260 °C (standard); with internal cooling up to 450 °C</td>
<td>• For gas temperatures up to 150 °C and no purge air</td>
<td></td>
<td>• For gas temperatures up to 260 °C (standard); with internal cooling up to 350 °C and no purge air</td>
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<tr>
<td></td>
<td>• No purge air</td>
<td>• No purge air</td>
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<tr>
<td>Conformities</td>
<td>2001/80/EC, 2000/76/EC, 27th BImSchV³, Air Quality Control (TA Luft)</td>
<td>–</td>
<td>2001/80/EC, 2000/76/EC, 27th BImSchV³, TA Luft</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>• Very low maintenance thanks to no moving parts, corrosion resistant probe materials and no purge air is used</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>System components</td>
<td>• Sender/receiver units</td>
<td>• MCU control unit</td>
<td>• Sender/receiver unit with measuring probe</td>
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<tr>
<td></td>
<td>• MCU control unit</td>
<td>• Connection box</td>
<td>• MCU control unit</td>
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<td></td>
<td>• Connection cables</td>
<td>• Connection cables</td>
<td>• Connection cables</td>
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<tr>
<td></td>
<td>• Flanges with tube</td>
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<td>• Flanges with tube</td>
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</table>

³ Federal Immission Control Ordinance
# Gas flow measurement for process applications

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<tr>
<th>FLOWSIC100 PROCESS</th>
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<tr>
<td>CL150/PN16</td>
<td>EX-Z2/EX-Z2-RE</td>
<td>PR-EX-Z2</td>
</tr>
</tbody>
</table>

- **Pressure version**
- **Ex-protected version**
- **Ex-protected probe version**

### 1-path measurement, 2-path measurement

- Ambient pressure up to 16 barg
- Material: hermetically sealed stainless steel or titanium
- Ex-protected version for use in hazardous area zone 2

### Additional Features

- Rugged titanium transducers for higher device durability
- Corrosion resistant probe materials
- Integral measurement over the entire stack diameter
- Contact-free measurement
- High measuring accuracy even at gas velocity near zero

- **Use in aggressive gases also possible**
- Representative measuring results
- Independent of pressure, temperature and gas composition
- No purge air

### ATEX Compliance

- II 3 G Ex nA e IIC T4 according to ATEX guideline 94/9/EC (manufacturer licence)

### Maintenance

- Very low maintenance thanks to no moving parts, corrosion resistant probe materials and hermetically sealed transducer design

### Optional Features

- Sender/receiver units
- MCU control unit, optional 24 V DC type and ex-protected version for zone 2
- Connection box (FLOWSIC100 CL150/PN16 only)
- Connection cables
- Flanges with tube

**Fully automatic zero and span check**

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* Zone 1 on request
## Gas flow meters for process and custody applications

**FLOWSIC600 2-path**

**FLOWSIC600 4-path**

### Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>FLOWSIC600 2-PATH</th>
<th>FLOWSIC600 4-PATH</th>
</tr>
</thead>
</table>
| **Version**                    | ![2" ... 48"

Process](image)                                                                 | ![3" ... 48"

Fiscal](image)                                                                 |
| **Measuring task**             | An ultrasonic gas flow meter for process and technological measurements. Applicable for non-custody metering where uncertainties of up to ±1 % are requested. | A custody approved ultrasonic gas flow meter for fiscal metering with:   • an uncertainty of ±0.5%   • an uncertainty of ±0.2% after calibration at a flow test facility |
| **Application**                | • Gas processing and consumptive industries  • Chemical and petrochemical industries  • All sections of the natural gas industry, such as gas production, transport, distribution and storage  • Natural gas and process gases such as N₂, O₂, H₂, Cl₂, sour or bio gases |   |
| **Product characteristics**    | ● Non-intrusive measurement  ● Uni or bidirectional measurement  ● Overload safe  ● No mechanical wear  ● Large measuring range (max. 1 : 130) |   |
| **Approvals**                  | ATEX, CSA, PED                                                                    | ATEX, CSA, PED, OIML, AGA, API, PTB, NMI, GOST, ...                             |
| **Maintenance**                | No periodical maintenance                                                          |                                                                                   |
| **System components**          | • Meter body  • Signal processing unit  • Ultrasonic transducers                    |                                                                                   |
## Gas flow meters for custody applications

**FLOWSIC600 2plex**

- **3" ... 48" Fiscal**

A custody approved ultrasonic gas flow meter together with a check flow meter in one meter body. The FLOWSIC600 2plex detects piping caused error influences (piping and flow plate contamination) before they affect the fiscal metering.

**Fiscal metering with:**
- an uncertainty of ±0.5% or
- an uncertainty of ±0.2% after calibration at the flow test facility

- Gas processing and consumptive industries
- Chemical and petrochemical industries
- All sections of the natural gas industry, such as gas production, transport, distribution and storage
- Natural gas and process gases such as N₂, O₂, H₂, Cl₂, sour or bio gases

- Non-intrusive measurement
- Uni and bidirectional measurement
- Overload safe
- No mechanical wear
- Large measuring range (max. 1 : 130)

ATEX, CSA, PED, OIML, AGA, API, PTB, NMI, GOST, ...

No periodical maintenance

- Meter body
- Signal processing unit
- Ultrasonic transducers

**FLOWSIC600 Quatro**

- **3" ... 48" Fiscal**

Two custody approved ultrasonic gas flow meters within one meter body for redundant fiscal metering each with:
- an uncertainty of ±0.5% or
- an uncertainty of ±0.2% after calibration at the flow test facility

- Gas processing and consumptive industries
- Chemical and petrochemical industries
- All sections of the natural gas industry, such as gas production, transport, distribution and storage
- Natural gas and process gases such as N₂, O₂, H₂, Cl₂, sour or bio gases
- As 8-path version applicable at flow test facilities

**FLOWSIC600**

- **2plex**
- **Quatro**

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AT HOME IN THE INDUSTRIAL SECTOR

We can build on years of experience in the field of Analyzers and Process Instrumentation. That is why we are at home in the natural gas industry (production, transport, storage and distribution) as well as in the chemical or petrochemical industry. Be it custody measurement or simple monitoring tasks – we offer tailor-made solutions.

WE OFFER YOU A CHOICE

SICK offers a number of sensor-based techniques for analysis, ranging from the continuous gas and dust measurement to specialized applications for water and liquid analysis. Within the process measurement technology our products play a central role in determining volume flow of gases and level of bulk materials.

AROUND THE WORLD TO YOUR SERVICE

Wherever you are, our global network of subsidiaries and representatives is able to supply qualified support when you need it. We deliver the equipment for your measuring tasks, provide documentation and training. Our highly skilled service staff offers support during installation, commissioning and maintenance of the appliances.

SICK GROUP

The SICK process automation segment is part of the SICK group, one of the worlds leading manufacturer of intelligent sensors and sensor solutions. With its 5,000 employees, SICK offers an extensive portfolio of products and services on the market of factory, logistics and process automation.

www.sick.com