FLUID SENSORS
OVERVIEW OF THE PRODUCTS

Level sensors, pressure sensors, flow sensors, temperature sensors
FLUID SENSORS AT SICK

An essential basis for increasing efficiency while saving on resources is the best possible monitoring of the relevant process parameters. Regardless of whether this concerns the pressure, temperature, level or flow – SICK provides a wide range of solutions for process control, stock supply or the monitoring of liquids, gases and bulk materials. In doing so, SICK places an emphasis on rugged sensors which measure as many of the particular variables as possible, regardless of the ambient conditions.

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Intelligent solutions for level and point level measurement

Whether it is continuous level measurement, point level measurement, or a combination of the two – SICK provides a wide spectrum of solutions for process control, stock supply, or protection. Based on the installation situation, medium properties, and ambient conditions, SICK provides sensors that ensure efficient processes. As the provider of one of the broadest technology portfolios, SICK brings its knowledge to the forefront.

Universal pressure measurement in liquids and gases

SICK offers a portfolio of electronic pressure measurement transmitters and switches that can be adapted to individual customer requirements because of intelligent and varied configuration options. Typical of all SICK equipment are the use of high-quality materials, robustness and precise measurement technology, easy to operate and install.

Rugged and exact – flow measurement technology from SICK

SICK provides innovative sensor solutions for flow measurement technology which combine flexible measuring methods and rugged equipment design with cost-efficient connection concepts for higher-order systems. Whether you need to detect the current flow rate using analog values or find the quantity using pulse detection – SICK’s flow sensors are always reliable and safe, with a wide range of media and under difficult process and ambient conditions.

Universal temperature measurement for liquids and gases

The SICK range of screw-in and insertion thermometers, along with temperature switches provides high-quality solutions for in-contact temperature measurement of fluids and gases. Due to the various installation lengths and the variable mechanical configuration options, the devices can be optimally adapted to individual requirements.
Level and point level measurement using efficient technology

The innovative offer comprises, for example, guided wave radar sensors (TDR), ultrasonic equipment, capacitive sensors, vibrating equipment and various optical technologies. With SICK, the focus is on the optimum solution for your application. To achieve this, we can refer to our broad sensor portfolio.

Level measurement with LFP Inox

LFP Inox detects the level of storage containers in order to guarantee the supply to the filling machine. Besides the aseptic design, the most important feature of this application is fast, precise measurement.

Benefits:
- Fast response time
- High reproducibility
- Hygienic design
- High enclosure rating IP69
- Simple installation

Pressure measurement for liquids and gases

In many branches of machine and plant engineering, the production industry, machine tool construction, process technology, and the manufacture and refinement of foodstuffs and beverages, measurement of variable state pressure plays a central role.

Monitoring of the workpiece clamping by PBS plus with IO-Link

In CNC machines, the workpieces are often clamped hydraulically. Electronic pressure switches like the PBS make sure that the clamping pressure is correct.

Benefits:
- Pressure switch, pressure transmitter and display in one device
- Quick product changes through switching point setting via IO-Link
- Ergonomic: clearly legible display, large push-buttons and rotating housing
- Rugged and reliable
- Wide range of installation variants
Universal temperature measurement

Whether it is the monitoring of operating conditions in machine and plant engineering or the control and regulation of sensitive processes, the reliable and accurate determination of temperature is of fundamental importance in many industries.

Cooling lubricant temperature control with TSP

Temperature sensors are used in many areas. One example is the machine tool industry. Reliability and long-term stability of the thermometers are indispensable for reliable plant operation. The temperature of the cooling lubricant is regulated in order to guarantee high quality machining of the workpiece.

• Reliable
• Small dimensions
• Simple installation
• Inexpensive

Flow and throughput measurement with modern technologies

SICK flow rate sensor systems rely on innovative run-time measurement processes based on ultrasonic and laser technology. These non-contact technologies are particularly notable for their flexible fields of application and their great variety.

Bulkscan®

The non-contact measuring Bulkscan® device detects the profile of the bulk material on the conveyor belt. The flow rate is calculated using the belt speed and the bulk material profile. This makes it possible to create a feedback control system that provides optimal belt speed and ensures economic belt utilization.

Benefit:
• Low-maintenance throughput measurement
• Flexible use
• Optimum belt usage
• Belt monitoring to reduce belt wear
  (Bulkscan® LMS511)
### Level sensors

#### PRODUCT FAMILY OVERVIEW

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<th>Product</th>
<th>Description</th>
<th>Technical Data Overview</th>
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<tr>
<td>LFR SicWave</td>
<td>Simply brilliant – level measurement in liquids with 80 GHz radar</td>
<td>Measurement principle: Radar sensor, Detection principle: Electro-sensitive, Medium: Liquids, Detection type: Continuous, Process temperature: -196 °C ... +200 °C, Process pressure: -1 bar ... 25 bar, Output signal: –, Accuracy of the sensor element: ≤ 1 mm, Measuring width: up to 30 m</td>
</tr>
<tr>
<td>LBR SicWave</td>
<td>Simply brilliant – level measurement in bulk materials with 80 GHz radar</td>
<td>Measurement principle: Radar sensor, Detection principle: Electro-sensitive, Medium: Solids, Detection type: Continuous, Process temperature: -40 °C ... +200 °C, Process pressure: -1 bar ... 20 bar, Output signal: –, Accuracy of the sensor element: ≤ 5 mm, Measuring width: up to 120 m</td>
</tr>
<tr>
<td>LFC</td>
<td>Flexible and straightforward point level measurement – the economic solution</td>
<td>Measurement principle: Capacitive level switch, Detection principle: Touching, Medium: Liquids, Detection type: Point level measurement, Process temperature: -20 °C ... +100 °C, Process pressure: -1 bar ... +20 bar, Output signal: –, Accuracy of the sensor element: approx. 1 mm, Measuring width: –</td>
</tr>
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</table>

#### Technical data overview

<table>
<thead>
<tr>
<th>Feature</th>
<th>LFR SicWave</th>
<th>LBR SicWave</th>
<th>LFC</th>
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<tbody>
<tr>
<td>Measurement principle</td>
<td>Radar sensor</td>
<td>Radar sensor</td>
<td>Capacitive level switch</td>
</tr>
<tr>
<td>Detection principle</td>
<td>Electro-sensitive</td>
<td>Electro-sensitive</td>
<td>Touching</td>
</tr>
<tr>
<td>Medium</td>
<td>Liquids</td>
<td>Solids</td>
<td>Liquids</td>
</tr>
<tr>
<td>Detection type</td>
<td>Continuous</td>
<td>Continuous</td>
<td>Point level measurement</td>
</tr>
<tr>
<td>Process temperature</td>
<td>-196 °C ... +200 °C</td>
<td>-40 °C ... +200 °C</td>
<td>-20 °C ... +100 °C, +135 °C</td>
</tr>
<tr>
<td>Process pressure</td>
<td>-1 bar ... 25 bar</td>
<td>-1 bar ... 20 bar</td>
<td>-1 bar ... 25 bar</td>
</tr>
<tr>
<td>Output signal</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Accuracy of the sensor element</td>
<td>≤ 1 mm</td>
<td>≤ 5 mm</td>
<td>approx. 1 mm</td>
</tr>
<tr>
<td>Measuring width</td>
<td>up to 30 m</td>
<td>up to 120 m</td>
<td>–</td>
</tr>
</tbody>
</table>

#### At a glance

- 80 GHz free-space radar with various antennas
- Process connection: thread, flange, clamp
- Housing: plastic (IP66 / IP67), aluminum (IP66 / IP68) or stainless steel (IP69)
- With or without display and WPAN
- Certificates: Ex d, Ex ia, WHG, shipbuilding
- Capacitive level switch based on electrical impedance spectroscopy
- Plug and play: preset to watery media
- Two digital PNP outputs
- Enclosure ratings IP66, IP67 and IP69
- Ideal for hygienic applications (easy to clean, EHEDG, 3 A, EG1935/2004, FDA, CIP- and SIP-capable, hygienic adapter available)

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**Detailed information**

- [www.sick.com/LFR_SicWave](http://www.sick.com/LFR_SicWave)
- [www.sick.com/LBR_SicWave](http://www.sick.com/LBR_SicWave)
- [www.sick.com/LFC](http://www.sick.com/LFC)

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**Subject to change without notice**
### PRODUCT FAMILY OVERVIEW: Level sensors

#### Technical data overview

<table>
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<tr>
<th>Sensor Type</th>
<th>Description</th>
<th>Measurement Principle</th>
<th>Accuracy of the Sensor</th>
<th>Process Temperature</th>
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<th>Output Signal</th>
<th>Medium</th>
<th>Element</th>
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</thead>
<tbody>
<tr>
<td>GRF18S</td>
<td>Simple, compact and rugged</td>
<td>80 GHz free-space radar</td>
<td>≤ 1 mm</td>
<td>–25 °C ... +55 °C</td>
<td>Touching</td>
<td>–0.5 bar ... 16 bar</td>
<td>–0.5 mm ... 3 bar</td>
<td>1 x PNP / 1 x NPN</td>
<td>4 mA … 20 mA / 0 V … 10 V</td>
<td>Liquids</td>
<td>Capacitive</td>
</tr>
<tr>
<td>CFP Cubic</td>
<td>Multifunctional sensor for level and temperature measurement</td>
<td>Capacitive sensor</td>
<td>± 15 mm</td>
<td>–20 °C ... +80 °C</td>
<td>Touching</td>
<td>–0.5 bar ... 3 bar</td>
<td>± 5 mm</td>
<td>2 x PNP/NPN/push-pull</td>
<td>4 mA … 20 mA / 0 V … 10 V</td>
<td>Liquids</td>
<td>Capacitive</td>
</tr>
<tr>
<td>LFP Cubic</td>
<td>Flexible up to the probe tip: The clean solution</td>
<td>TDR sensor</td>
<td>± 5 mm</td>
<td>–20 °C ... +100 °C</td>
<td>Touching</td>
<td>–1 bar ... +10 bar</td>
<td>± 5 mm</td>
<td>1 x PNP + 1 x PNP/NPN + 4 mA ... 20 mA / 0 V ... 10 V</td>
<td>4 mA ... 20 mA / 0 V ... 10 V</td>
<td>Liquids</td>
<td>Capacitive</td>
</tr>
<tr>
<td>LFP Inox</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>4 x PNP/NPN/push-pull</td>
<td>4 mA ... 20 mA / 0 V ... 10 V</td>
<td>Liquids</td>
<td>Capacitive</td>
</tr>
</tbody>
</table>

#### Key Features

- **Rugged fill level measurement in fluid media**
- **Small, compact design; no medium calibration required**
- **Enclosure rating IP 67 and IP 69**
- **Process connection G ½**
- **Highly medium resistant due to stainless steel housing 1.4404, polysulphone apex**
- **Output available as PNP or NPN transistor**
- **FDA compliant, UL**
- **Continuous level measurement and temperature measurement as well as level and temperature switches**
- **Measurement irrespective of container material**
- **Display and intuitive menu navigation**
- **No mechanical moving parts**
- **IP 67 enclosure rating and IO-Link 1.1**
- **No dead zone along the measuring range**
- **Level sensor for liquids**
- **No mechanical moving parts**
- **Exchangeable and cuttable probe and cable probe**
- **Resistant to deposit formation**
- **3 in 1: combines display, analog output (according to NAMUR NE 43), and binary output**
- **High enclosure rating IP67, rotating housing, remote electronics and IO-Link**
- **Level measurement in hygienic applications**
- **Manually cuttable rod probe length with Ra ≤ 0.8 µm**
- **CIP/SIP-resistant**
- **High enclosure rating IP67 and IP69, autoclavable**
- **Interchangeable hygienic process connections**
- **3 in 1: combines display, analog output, and binary output**
- **Remote amplifier with process connection, IO-Link**

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## Level sensors

### PRODUCT FAMILY OVERVIEW

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<th>UPS6</th>
<th>UPS6 Pure</th>
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<td></td>
<td>At a high level</td>
<td>Rugged, non-contact and pressure-resistant</td>
<td>Pure reliability</td>
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<td><strong>Detection type</strong></td>
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<td><strong>Process pressure</strong></td>
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<td><strong>Output signal</strong></td>
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<tr>
<td><strong>Accuracy of the sensor element</strong></td>
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<tr>
<td><strong>Measuring width</strong></td>
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**At a glance**

- Immersion depth up to 100 m
- Available with various lengths of cable
- Measurement ranges from 0 bar to 0.1 bar up to 0 bar to 25 bar
- Stainless steel membrane
- Hermetically sealed stainless steel housing with PA protective cap
- Cable material PUR, FEP cable for aggressive media optionally available
- Optional temperature measurement with integrated Pt100 element
- Optional surge protection

- Non-contact level measurement up to 3.4 m operating distance / 8.0 m scanning distance limit
- Pressure resistant up to 6 bar
- Converter protected by PVDF cover for increased resistance
- 3-in-1: continuous measurement, switching signal and display
- Analog output selectable between 4 mA to 20 mA and 0 V to 10 V
- Process connections G 1 and G 2
- IP 67 enclosure rating
- Simple operation, also via Connect+

- Ultrasonic level sensor with very high chemical resistance
- Non-contact measurement in immersion pipe of up to 1,500 mm
- PTFE-coated membrane and GF D40 process connection made of PTFE
- Pressure resistant up to 6 bar, temperature resistant up to 85 °C
- Different sizes available
- Analog output selectable between 4 mA to 20 mA and 0 V to 10 V
- Switching output for monitoring the maximum and minimum limit

**Detailed information**

- [www.sick.com/LFH](http://www.sick.com/LFH)
- [www.sick.com/UP56](http://www.sick.com/UP56)
- [www.sick.com/UP56_Pure](http://www.sick.com/UP56_Pure)
# Technical Data Overview

**Level Probe**
- Temperature range: -10 °C ... +50 °C
- Process pressure: 0 bar ... 6 bar, overpressure 0 bar ... 6 bar
- Measuring width: ≤ 3.4 m ≤ 1,500 mm
- Process connections: G 1, G 2
- Connection made of PTFE and GF D40 process connections
- PTFE-coated membrane
- Pressure resistant up to 6 bar
- Distance limit: 8.0 m scanning
- Ultrasonic sensor
- 1 x PNP + 4 mA … 20 mA / 0 V … 10 V / 0 V … 10 V / 4 mA … 20 mA
- Analog output selectable
- Converter protected by stainless steel membrane
- PTFE cover for increased pressure resistance
- Temperature resistant up to 100 m

### Measurement Principle
- Continuous measurement
- Liquid measurement
- Vibro-probe measurement
- Ultrasonic measurement
- Range: from -25 °C ... +85 °C
- Enhanced variant: p ≥ 0.25 bar
- Non-contact measurement with very high chemical resistance

### Features
- Commissioning without container filling or medium calibration
- Immune to deposit formation
- Two electrical output signals and IO-Link available
- Pipe extension up to 6 m
- Polished monoprobe for food applications
- Choice of various housing materials and electrical output signals
- Hygienic designs according to EHEDG and FDA, CIP and SIP-capable
- ATEX certification available
- Tube extension model (LBV330) up to 6 m and cable extension model (LBV320) up to 80 m available for vertical mounting
- Rugged device design
- Compact sensor from 1" thread onward
- Rod design prevents bulk materials from sticking or jamming
- Polished monoprobe for food applications
- Choice of various housing materials and electrical output signals
- Immune to deposit formation
- Very high repeatability
- Very high repeatability
- ATEX certifications (1D / 2D / 1G / 2G) available
- Tube extension model (LBV331) up to 6 m and cable extension model (LBV332) up to 80 m available for vertical mounting

### Additional Information
- www.sick.com/FVF200
- www.sick.com/LFV300
- www.sick.com/LBV300
- www.sick.com/LBV301

### Specifications

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<th>LFV300</th>
<th>LBV300</th>
<th>LBV301</th>
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<tr>
<td>The intelligent limit switch for all kinds of liquids</td>
<td>Flexible and rugged – vibrating level switch for liquids</td>
<td>Reliable and rugged in bulk materials</td>
<td>Rugged, flexible and cleanable</td>
</tr>
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Pressure sensors  PRODUCT FAMILY OVERVIEW

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<th>PBS plus</th>
<th>PBS Hygienic</th>
<th>PAC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multifunctional IO-Link sensor for pressure measurement, control and monitoring</td>
<td>The compact pressure switch for hygienic applications</td>
<td>Turns pressure into colors</td>
</tr>
</tbody>
</table>

### Technical data overview

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<th>Pressure switch</th>
<th>Pressure switch</th>
<th>Pressure switch</th>
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<td>Measuring ranges</td>
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<tr>
<td>Gauge pressure</td>
<td>0 bar ... 0.4 bar (0 psi ... 6 psi) up to 0 bar ... 1.000 bar (0 psi ... 14,504 psi)</td>
<td>0 bar ... 1 bar up to 0 bar ... 25 bar</td>
<td>0 bar ... 6 bar; 0 bar ... 10 bar</td>
</tr>
<tr>
<td>Absolute pressure</td>
<td>0 bar ... 0.4 bar (0 psi ... 6 psi) up to 0 bar ... 25 bar (0 psi ... 363 psi)</td>
<td>0 bar ... 1 bar up to 0 bar ... 25 bar</td>
<td>–</td>
</tr>
<tr>
<td>Vacuum and ± measuring ranges</td>
<td>–1 bar ... 0 bar (-14.5 psi ... 0 psi) up to –1 bar ... +24 bar (-14.5 psi ... +348 psi)</td>
<td>–1 bar ... 0 bar up to –1 bar ... +24 bar</td>
<td>–1 bar ... 0 bar; –1 bar ... +1 bar; 0 bar ... 6 bar; 0 bar ... 10 bar; –1 bar ... +10 bar</td>
</tr>
<tr>
<td>Pressure unit</td>
<td>bar (can be switched to psi, MPa, kPa, kg/cm²)</td>
<td>bar, MPa, psi and kg/cm²</td>
<td>–</td>
</tr>
<tr>
<td>Accuracy</td>
<td>≤ ± 0.5% of the range</td>
<td>≤ ± 1% of the range</td>
<td>≤ ± 1.5% of the range incl. temperature error</td>
</tr>
<tr>
<td>Output signal</td>
<td>Output 1: PNP/IO-Link, output 2 (optional); PNP/NPN selectable, analog output (optional): 4 ... 20 mA / 0 ... 10 V selectable</td>
<td>Switching outputs PNP or NPN, analog output as well as optional IO-Link</td>
<td>Configurable switching outputs PNP, NPN or push-pull, analog output and optional IO-Link</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Round connector M12 x 1</td>
<td>Round connector M12 x 1</td>
<td>Round connector M12 x 1</td>
</tr>
</tbody>
</table>

### At a glance

- Switchable switching outputs (PNP/NPN) and analog output (current/voltage)
- Scalable analog output (5:1 turn down)
- High measurement accuracy
- IO-Link for transmitting process data to the control as measured values in bar
- Housing can be twisted in two places (process connection/display) and display can be rotated by 180°
- Hygienically-graded pressure switch with display for the food and beverage industry
- Wetted parts are made from stainless steel 1.4435
- Pressure values indicated on display
- Unit of pressure value in the display can be switched
- Output states are indicated separately via wide-angle LEDs
- Electronic pressure switch for pneumatic applications
- Large display shows system pressure, output states and set switching points
- Three large function keys and intuitive menu navigation
- Installation on a mounting rail, wall or in a control panel

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**Detailed information**

- [www.sick.com/PBS_plus](http://www.sick.com/PBS_plus)
- [www.sick.com/PBS_Hygienic](http://www.sick.com/PBS_Hygienic)
- [www.sick.com/PAC50](http://www.sick.com/PAC50)

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**Subject to change without notice**
Pressure sensors

At a glance

Technical data overview

- Vacuum and ± measuring
- Electrical connection
  - Round connector M12 x 1

Measuring ranges

- Absolute pressure: 0 bar … 0.4 bar (0 psi … 6 psi) up to 0 bar … 25 bar (0 psi … 363 psi)
- Gauge pressure: 0 bar … 0.4 bar (0 psi … 6 psi)
- Output signal: Analog (current/voltage) and optional IO-Link

Pressure unit

- bar, MPa, psi, kg/cm²

Accuracy

- ≤ ± 0.6% of the range
- ≤ ± 0.5% of the range
- ≤ ± 1% of the range
- ≤ ± 1.2% of the range

Switching outputs

- PNP or NPN, configurable
- Push-pull
- Analog as well as optional IO-Link

- Various output signals and electrical connections can be supplied
- Common process connections available
- High overload resistance. Pressure peak damping available on request for selected process connections
- Circularly welded, hermetically sealed stainless steel membrane
- Stainless steel housing with enclosure rating up to IP67

A genuine all-round talent

The flexible solution

A clean solution

For that little bit extra

<table>
<thead>
<tr>
<th>Pressure transmitters</th>
<th>Pressure transmitters</th>
<th>Pressure transmitters</th>
<th>Pressure transmitters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 bar ... 1 bar up to 0 bar ... 600 bar</td>
<td>0 bar ... 0.1 bar up to 0 bar ... 600 bar</td>
<td>0 bar ... 0.25 bar up to 0 bar ... 25 bar</td>
<td>0 bar ... 6 bar up to 0 bar ... 600 bar</td>
</tr>
<tr>
<td>0 bar ... 1 bar up to 0 bar ... 25 bar</td>
<td>0 bar ... 0.25 bar up to 0 bar ... 25 bar</td>
<td>0 bar ... 0.25 bar up to 0 bar ... 16 bar</td>
<td>–</td>
</tr>
<tr>
<td>–1 bar ... 0 bar up to –1 bar ... +24 bar</td>
<td>–1 bar ... 0 bar up to –1 bar ... +30 bar</td>
<td>–1 bar ... 0 bar up to –1 bar ... +15 bar</td>
<td>–1 bar ... +5 bar up to –1 bar ... +59 bar</td>
</tr>
<tr>
<td>bar, MPa, psi and kg/cm²</td>
<td>bar, MPa, psi and kg/cm²</td>
<td>bar, MPa, psi and kg/cm²</td>
<td>bar, psi, kg/cm², kPa and MPa</td>
</tr>
<tr>
<td>≤ ± 1% of the range</td>
<td>≤ ± 0.5% of the range</td>
<td>≤ ± 0.25% of the range</td>
<td>≤ ± 1.2% of the range (at room temperature)</td>
</tr>
<tr>
<td>≤ ± 0.5% of the range</td>
<td>≤ ± 0.25% of the range</td>
<td>≤ ± 1.2% of the range</td>
<td>≤ ± 1.2% of the range</td>
</tr>
<tr>
<td>Analog</td>
<td>Analog</td>
<td>Analog</td>
<td>Analog</td>
</tr>
<tr>
<td>Round plug connector M12 x 1, angled plug, cable connection</td>
<td>Round plug connector M12 x 1, angled plug, cable connection</td>
<td>Round plug connector M12 x 1, angled plug, cable connection, field housing</td>
<td>Round connector M12 x 1, 4-pin, for angled plug according to DIN EN 175301-803 A</td>
</tr>
</tbody>
</table>

- A large variety of process connections available
- No mechanical moving parts – Hence no wear, fatigue or maintenance
- Circularly welded, hermetically sealed stainless steel membrane
- Electrical connection M12 x 1, angled plug (DIN 175301-803 A) or cable connection
- Also with flush-mounted membrane
- Media temperature up to 150 °C (optional)
- Large number of common process connections
- Particularly shock and vibration resistant
- Accuracy 0.5% or 0.25%
- Zero point and range adjustable
- Round connector M12 x 1, angled plug (DIN 175301-803 A) or cable connection
- Rugged and precise pressure measuring technology
- Flush-mounted, hermetically sealed stainless steel membrane with roughness Ra < 0.4 μm
- Parts in contact with media made of stainless steel 1.4435, housing made of stainless steel 1.4571
- Suitable for CIP and SIP
- Large number of hygienic process connections can be supplied
- Stainless-steel housing with enclosure rating up to IP 68
- Can also supplied with field housing IP67

↔ www.sick.com/PBT
↔ www.sick.com/PFT
↔ www.sick.com/PHT
↔ www.sick.com/PET
## Product Family Overview

<table>
<thead>
<tr>
<th>Flow Sensor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkscan®</td>
<td>Non-contact and maintenance-free volume flow measurement</td>
</tr>
<tr>
<td>FTMg</td>
<td>Flow sensor with leakage detection</td>
</tr>
</tbody>
</table>

### Technical Data Overview

<table>
<thead>
<tr>
<th>Measurement Principle</th>
<th>Medium</th>
<th>Output Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time-of-flight laser technology</td>
<td>Bulk materials</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Calorimetric (flow, temperature), piezoresistive (pressure)</td>
<td>Compressed air (air quality ISO 8573-1:2010 [3:4:4]), helium, argon, nitrogen, carbon dioxide</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. belt speed</th>
<th>Measuring tube nominal width</th>
<th>Max. adjustable measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 m/s / ≤ 20 m/s</td>
<td>–</td>
<td>5.3 l/min ... 4,417.9 l/min (according to DIN 1343)</td>
</tr>
<tr>
<td>–</td>
<td>DN 15, DN 20, DN 25</td>
<td></td>
</tr>
</tbody>
</table>

### At a Glance

- Efficient and cost-effective non-contact measurement of volume and mass flow of bulk materials
- Laser pulses with high angular resolution ensure outstanding image resolution
- Multi-echo pulse evaluation produces highly reliable measurements
- Integrated function for determining the center-of-gravity of the bulk material
- Rugged design for harsh ambient conditions
- Integrated heater allows measurement even at low temperatures
- Compact IP67 rated housing

- Measures compressed air and non-corrosive gases such as argon, helium, carbon dioxide and nitrogen
- Calorimetric measurement principle with a measurement accuracy of ± 3% M.V. and ± 0.3% M.E.V.
- Measurement of gas flow and temperature as well as process pressure and energy consumption with only one sensor
- Low pressure loss
- High measurement dynamics for cylinder and leakage monitoring

### Detailed Information

- [www.sick.com/Bulkscan](http://www.sick.com/Bulkscan)
- [www.sick.com/FTMg](http://www.sick.com/FTMg)
## Product Family Overview: Flow Sensors

<table>
<thead>
<tr>
<th>FFU</th>
<th>DOSIC®</th>
<th>T-Easic® FTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-contact flow measurement</td>
<td>The compact stainless-steel sensor for flexible flow measurement</td>
<td>Clever dry-run protection in pumps</td>
</tr>
</tbody>
</table>

### Ultrasonic Sensors

<table>
<thead>
<tr>
<th>Liquids</th>
<th>Conductive and non-conductive liquids</th>
<th>Water and oil-based liquids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog output 4 mA … 20 mA, 0 mA … 20 mA, 1 pulse/status output Analog output: 4 mA … 20 mA, 0 mA … 20 mA, 2 pulse/status outputs, 1 switching input</td>
<td>1 x analog output: 4 mA … 20 mA, 2 x digital outputs or inputs (configurable) 2 x analog output: 4 mA … 20 mA, 2 x digital outputs or inputs (configurable)</td>
<td>2 x push-pull digital outputs for flow and temperature (Q2 can be selected as digital input)</td>
</tr>
<tr>
<td>DN 10 DN 15 DN 20 DN 25 DN 32 DN 40 DN 50</td>
<td></td>
<td>IO-Link 1.1</td>
</tr>
<tr>
<td>0 l/min ... 900 l/min</td>
<td>0 l/min ... 250 l/min</td>
<td>≥ DN25</td>
</tr>
</tbody>
</table>

### Features

- **Flow sensor for conductive and non-conductive liquids**
- **Compact design with no moving parts**
- **Process temperature up to 80 °C, process pressure up to 16 bar**
- **High chemical resistance due to seal-free sensor design**
- **Large display with membrane keyboard**
- **Integrated empty tube detection**

- **Flow measurement for water and oil-based liquids**
- **Seal-free stainless-steel 316L sensor with Ra ≤ 0.8**
- **Straight, self-draining measuring tube**
- **Compact design with short installation lengths**
- **Configurable digital outputs**
- **Temperature measurement**
- **IP 67/69 enclosure rating, CIP/SIP-compatible, IO-Link version 1.1**

- **Flow monitoring and temperature measurement in one sensor**
- **Optimized for water and oil; teach-in option of other liquids**
- **IP 67/IP 69 enclosure rating and IO-Link 1.1**
- **Industrial design in VISTAL® housing with 180°-rotatable OLED display**
- **Stainless steel hygienic variant, completely CIP-/SIP-capable, process temperatures up to 150 °C**

### Models

- [www.sick.com/FFU](http://www.sick.com/FFU)
- [www.sick.com/DOSIC](http://www.sick.com/DOSIC)
- [www.sick.com/T-Easic_FTS](http://www.sick.com/T-Easic_FTS)
Temperature sensors

<table>
<thead>
<tr>
<th>TBS</th>
<th>TBT</th>
<th>TCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature monitoring made easy</td>
<td>The proven temperature measurement</td>
<td>Compact, tough, precise</td>
</tr>
</tbody>
</table>

**Technical data overview**

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>Measuring range</th>
<th>Measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20 °C ... +80 °C</td>
<td>-50 °C ... +150 °C</td>
<td>-50 °C ... +150 °C</td>
</tr>
<tr>
<td>-20 °C ... +250 °C</td>
<td>-50 °C ... +250 °C</td>
<td></td>
</tr>
</tbody>
</table>

Accuracy of the sensor element

- ≤ ± 0.1% of the range
- ≤ ± 0.2% of the range
- ≤ ± 0.2% of the range

Accuracy of the opt. measuring transducer

- ≤ ± 0.1% of the range
- ≤ ± 0.2% of the range

Output signals and maximum permissible load resistance $R_a$

- Transistor outputs PNP/NPN (1x IO-Link 1.1), optional analog output 4 mA ... 20 mA or 0 V ... 10 V
- Pt100, 4-wire, 4 mA ... 20 mA, 2-wire ($R_a \leq (L^+ - 10 V) / 0.028 A$ [ohm])
- Pt100, 4-wire, 4 mA ... 20 mA, 2-wire ($R_a \leq (L^+ - 9 V) / 0.023 A$ [ohm])

Electrical connection

- M12 x 1 round connector, 4-pin
- M12 x 1 round connector, 5-pin
- Cable gland M16 x 1.5, IP65
- Cable gland M16 x 1.5, IP67
- Round connector M12 x 1, 4-pin, IP 67, angled plug (DIN EN 175301-803 A), 4-pin, IP65

At a glance

- Large display, IO-Link 1.1
- Individually programmable transistor outputs PNP or NPN, optional analog output 4 mA ... 20 mA or 0 V ... 10 V
- Round connector M12 x 1
- Measuring ranges from -20 °C ... +120 °C
- Pt1000 element, accuracy class A (IEC 60751)
- Various installation lengths and connection threads
- Parts in contact with media made from corrosion-resistant stainless steel 1.4571
- Enclosure rating IP 65 and IP 67

- Pt100 resistance, accuracy class A according to IEC 60751
- Measuring ranges -50 °C ... +150 °C and -50 °C ... +250 °C
- Parts in contact with media made from corrosion-resistant stainless steel 1.4571
- Various mechanical adaptations and installation lengths
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Cable gland M16 x 1.5

- Pt100 resistance, accuracy class A according to IEC 60751
- Measuring ranges -50 °C ... +150 °C and -50 °C ... +250 °C
- Parts in contact with media made from corrosion-resistant stainless steel 1.4571
- Various mechanical adaptations and insertion lengths, also available with protective tube
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Round connector M12 x 1 (IP 67) or angled plug according to DIN EN 175301-803 A (IP 65)

Details: [www.sick.com/TBS](http://www.sick.com/TBS)  [www.sick.com/TBT](http://www.sick.com/TBT)  [www.sick.com/TCT](http://www.sick.com/TCT)
<table>
<thead>
<tr>
<th>TSP</th>
<th>THTS</th>
<th>TTHE</th>
<th>THTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient and space saving temperature measurement</td>
<td>Simple, hygienic temperature measurement</td>
<td>Hygienic and flexible: temperature sensor with protective pipe</td>
<td>Perfectly fitted: hygienic temperature measurement in pipelines</td>
</tr>
</tbody>
</table>

- **Temperature sensors**

### Measuring range

<table>
<thead>
<tr>
<th>TSP</th>
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<th>TTHE</th>
<th>THTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>–30 °C ... +130 °C</td>
<td>–50 °C ... +150 °C</td>
<td>–50 °C ... +150 °C</td>
<td>–50 °C ... +150 °C</td>
</tr>
</tbody>
</table>

#### Class B acc. to IEC 60751

- Pt100, 2-wire or Pt1000, 2-wire
- Pt100, 3-wire or Pt1000, 3-wire
- Round connector M12 x 1, 4-pin, IP67

### Temperature measurement

- Platinum resistor (Pt100 or Pt1000, 2-wire or 3-wire), accuracy class B according to IEC 60751
- Measuring range –30 °C ... +130 °C
- Various connection threads and insertion lengths
- Parts in contact with media: corrosion-resistant stainless steel 1.4305
- Round connector M12 x 1 (IP 67)

### Temperature measurement

- Pt100 resistor, accuracy class A (IEC 60751)
- Measuring ranges –50 °C ... +150 °C and –50 °C ... +250 °C
- Parts in contact with media: corrosion-resistant stainless steel 316L / 1.4435, Rs ≤ 0.8 µm
- Various hygienic process connections and installation lengths
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Round connector M12 x 1

### Temperature measurement

- Pt100, accuracy class A (IEC 60751)
- Measuring ranges –50 °C ... +150 °C and –50 °C ... +250 °C
- Measurement probe press-fitted into protective pipe under spring load
- In contact with media: corrosion-resistant stainless steel 316L / 1.4435, Rs ≤ 0.8 µm
- Hygienic process connections
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Round connector M12 x 1

### Temperature measurement

- Pt100, accuracy class A (IEC 60751)
- Measuring ranges –50 °C ... +150 °C and –50 °C ... +250 °C
- Through housing for orbital welding into pipeline
- Measurement probe press-fitted into protective pipe under spring load
- In contact with media: corrosion-resistant stainless steel 316L / 1.4435, Rs ≤ 0.8 µm
- Pt100 (4-wire) or 4 mA ... 20 mA (2-wire)
- Round connector M12 x 1

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**www.sick.com/TSP**  
**www.sick.com/THTS**  
**www.sick.com/TTHE**  
**www.sick.com/THTL**
SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 9,700 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:

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Detailed addresses and further locations ➔ www.sick.com