



VISIC100SF

MODERNIZES MEASUREMENT PERFORMANCE
FOR TUNNEL AIR QUALITY

Tunnel sensors

SICK
Sensor Intelligence.



As a full-range supplier of tunnel sensors and traffic measurement technology, SICK offers a compact solution for measuring visibility plus carbon monoxide (CO) and nitrogen monoxide (NO) or nitrogen dioxide (NO₂). The name of this solution is the VISIC100SF tunnel sensor. The product is designed to determine tunnel air quality with precision. You benefit from the high level of quality for which SICK is renowned and can enjoy a secure future thanks to SICK's service and long-term support.

Simple and cost-effective

Because it is so compact, the defining features of the VISIC100SF tunnel sensor are that it is very easy to install and can be commissioned quickly. With this sensor, certain processes are a thing of the past, such as the need to align multiple components or perform configuration. The VISIC100SF starts measuring as soon as you switch it on, because it is preset at the factory. As a result, the measuring point preparation and commissioning work are kept to an absolute minimum. What's more, the VISIC100SF is extremely cost-effective thanks to its long maintenance intervals of at least a year (or even longer).

Ingenious combination of two measurement principles

Improvements in the catalytic converter technology used on vehicles means that pollutant concentrations in tunnels are now very low. Consequently, the main measurement for ventilation control is the level of visibility. Exhaust gas measurement is also used for monitoring purposes (electrochemical sensors are ideal for this).

With its VISIC100SF sensor, SICK has managed to combine the process of measuring scattered light with the measurement principle of electrochemical cells. This forward-looking solution is the first of its kind in the world.

An all-in-one solution for tunnels

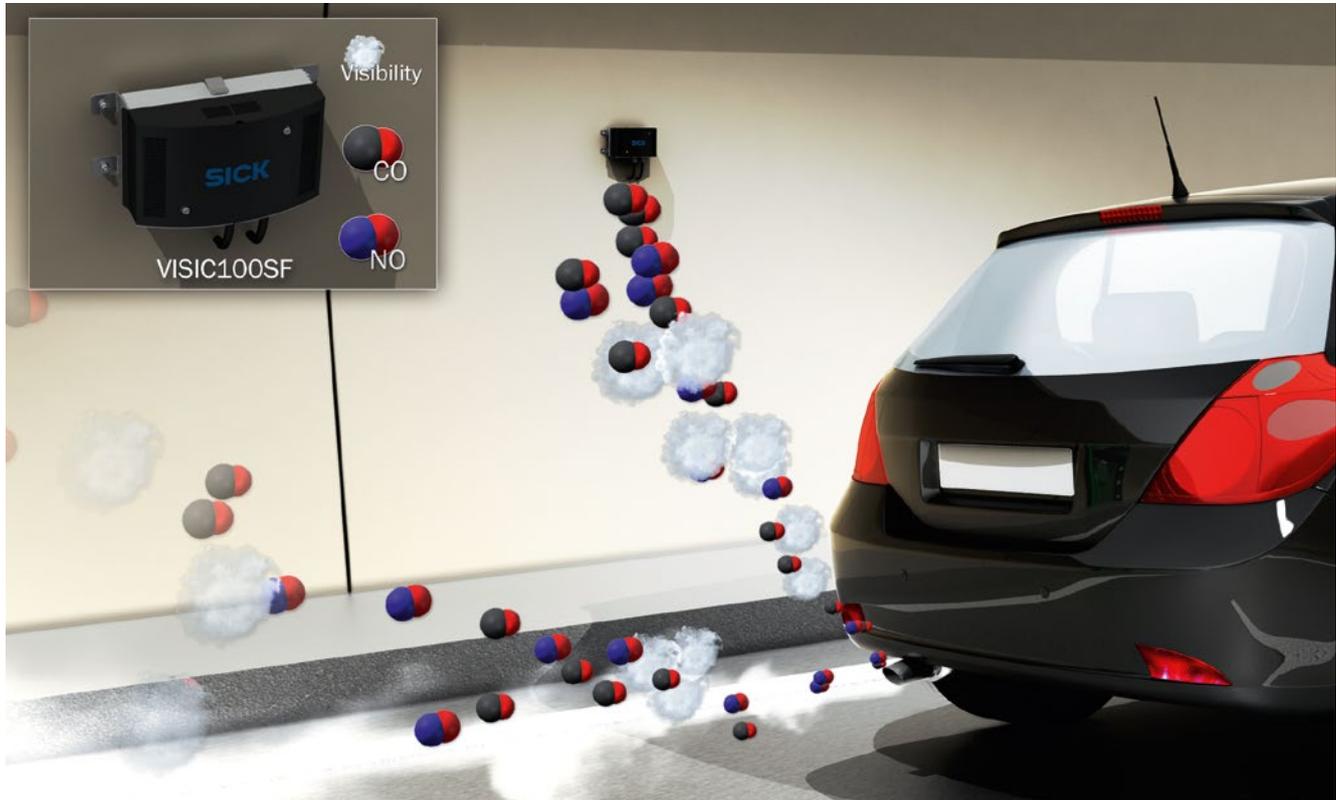
One compact sensor incorporates three different measuring components. In addition to visibility, the VISIC100SF also provides you with the option of accurately measuring the CO and/or NO levels in accordance with the EN 50545 standard. With its integrated heating (option), the VISIC100SF can compensate immediately for fog. The VISIC100SF features flexible interfaces so that it can be adapted to the local mounting conditions or easily integrated into existing networks. Electrochemical sensors can also be retrofitted with ease. In addition to CO or NO there is also an electrochemical sensor for NO₂ available.

High levels of availability and operational safety

With the VISIC100SF, no additional protective measures are required for tunnel washing. Tunnel cleaning can be carried out without any problems at all, because the sensor's stainless steel housing features the IP 6K9K enclosure rating.

In terms of the measurements, it is able to ensure high operational safety, because the software is developed according to the requirements of the SIL1 safety integrity level. A checking tool is available for the purpose of monitoring the visibility measurements. This can easily be used to check real values of between $K = 0$ and $15 \frac{1}{\text{km}}$.

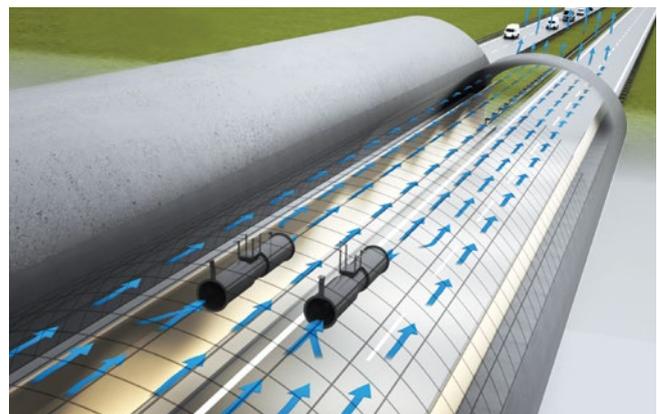
SIMPLE AND COST-EFFECTIVE: VISIC100SF – THE ALL-IN-ONE SOLUTION



Efficient ventilation control

The VISIC100SF tunnel sensor directly monitors the tunnel atmosphere on a continuous basis and provides accurate measured values for reliable and effective ventilation control. In other words, optimum air quality can be achieved with the minimum expenditure of energy.

But what about fog? Thanks to its optimized heating, the VISIC100SF is able to selectively measure just the air pollution. As a result, the ventilation can be correctly controlled even when the mouth of the tunnel is shrouded in the thickest fog.



Longitudinal ventilation thanks to efficient ventilation control

MODERNIZES MEASUREMENT PERFORMANCE FOR TUNNEL AIR QUALITY



Product description

The VISIC100SF tunnel sensor is an all-in-one solution for measuring visibility, CO, NO, and NO₂ concentrations. It is the only product of its kind in the world to combine the scattered light measurement principle with electrochemical cells – all in one compact housing. The VISIC100SF is very easy to mount, operate, and maintain. There is no need for alignment or configuration – so you can start measuring right away. With its IP6K9K enclosure rating, not only is the

VISIC100SF able to withstand the harsh ambient conditions inside the tunnel; it can also endure tunnel washing operations without any problems. During the design phase, particular importance was attached to ensuring reliable operation and long maintenance intervals. To compensate for fog, there is an optional version available with heating. Thus, the VISIC100SF is an elegant solution that meets the desired requirements and is ideal for any tunnel application.

At a glance

- Visibility (K value) measured according to the scattered light measurement principle
- CO and NO measurement using electrochemical cells in accordance with EN 50545
- Software developed in accordance with EN 61508 (SIL1)
- Highly reliable (no moving parts)
- Combines visibility measurement with two different gas measurements
- IP6K9K enclosure rating thanks to rugged stainless steel housing
- Fog compensation thanks to integrated heating (option)

Your benefits

- One sensor for three measuring components
- High levels of availability and operational safety
- No protective measures required for tunnel washing
- No impairment of ventilator control when tunnel portal is shrouded in fog
- Flexible connection options and easy to extend, can be easily integrated into existing networks
- Visibility measurement can be easily verified with checking tool
- Low level of effort required thanks to easy mounting and quick commissioning



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→ www.mysick.com/en/VISIC100SF

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

- For monitoring visibility plus CO and/or NO concentrations in road tunnels for the purpose of ventilator control
- For the selective measurement of visibility when the tunnel portal is shrouded in fog
- In railroad tunnels (on request)
- Anywhere where air quality has to be measured and improved

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.

VISIC100SF system

| | | | | | | | | | |
|-------------------------------|--|----------------------|---|-----|---|-------------------|---|-----------------|-------------|
| Measured values | Visibility (K-value), CO, NO, NO ₂ | | | | | | | | |
| Measurement principles | Scattered light forward, electrochemical cell | | | | | | | | |
| Measuring ranges | <table> <tr> <td>Visibility (K-value)</td> <td>0 ... 15 /km</td> </tr> <tr> <td>CO</td> <td>0 ... 300 ppm</td> </tr> <tr> <td>NO</td> <td>0 ... 100 ppm</td> </tr> <tr> <td>NO₂</td> <td>0 ... 5 ppm</td> </tr> </table> | Visibility (K-value) | 0 ... 15 /km | CO | 0 ... 300 ppm | NO | 0 ... 100 ppm | NO ₂ | 0 ... 5 ppm |
| Visibility (K-value) | 0 ... 15 /km | | | | | | | | |
| CO | 0 ... 300 ppm | | | | | | | | |
| NO | 0 ... 100 ppm | | | | | | | | |
| NO ₂ | 0 ... 5 ppm | | | | | | | | |
| Response time | ≤ 60 s | | | | | | | | |
| Accuracy | <table> <tr> <td>CO:</td> <td>≤ 3 % Of measuring range full scale (according EN 50545)</td> </tr> <tr> <td>NO:</td> <td>≤ 3 % Of measuring range full scale (according EN 50545)</td> </tr> <tr> <td>NO₂:</td> <td>≤ 2 % Of measuring range full scale (according EN 50545)</td> </tr> </table> | CO: | ≤ 3 % Of measuring range full scale (according EN 50545) | NO: | ≤ 3 % Of measuring range full scale (according EN 50545) | NO ₂ : | ≤ 2 % Of measuring range full scale (according EN 50545) | | |
| CO: | ≤ 3 % Of measuring range full scale (according EN 50545) | | | | | | | | |
| NO: | ≤ 3 % Of measuring range full scale (according EN 50545) | | | | | | | | |
| NO ₂ : | ≤ 2 % Of measuring range full scale (according EN 50545) | | | | | | | | |
| Resolution | Visibility (K-value): 0.001 /km CO: 0.5 ppm NO: 0.5 ppm NO ₂ : 0.05 ppm | | | | | | | | |
| Repeatability | Visibility (K-value): ≤ 2 % | | | | | | | | |
| Ambient temperature | -20 °C ... +55 °C | | | | | | | | |
| Storage temperature | Measuring device without electrochemical cells: -30 °C ... +85 °C CO, NO and NO ₂ sensor: +5 °C ... +20 °C | | | | | | | | |
| Ambient pressure | 860 hPa ... 1,080 hPa | | | | | | | | |
| Ambient humidity | 10 % ... 100 % Relative humidity; non-condensing | | | | | | | | |
| Conformities | ASTRA "Guideline - Ventilation of Road Tunnels" (2008) RABT 2006 RVS 09.02.22 EN 50545 EN 61508 (SIL 1) | | | | | | | | |
| Electrical safety | CE | | | | | | | | |
| Test functions | Contamination monitoring of glass pane Drift and plausibility check Automatic self-test Functional monitoring of the optional heating | | | | | | | | |
| Options | CO sensor NO sensor NO ₂ sensor Internal heating TAD tunnel adapter device Terminal box | | | | | | | | |

VISIC100SF sensor unit

| | |
|-------------------------------------|--|
| Description | Analyzer unit of the measuring system |
| Enclosure rating | IP 6K9K |
| Analog outputs | 3 outputs: 4 ... 20 mA, 500 Ω Electrically isolated; short-circuit proof |
| Digital outputs | 2 relay contacts: 48 V DC, 0.5 A, 24 W Preset for failure and maintenance request |
| Interfaces and bus protocols | RS-485 Modbus RTU (not available when a TAD is used) RS-485 PROFIBUS DP (option) |
| Indication | LC display, inside Status LEDs: "Operation", "Maintenance request" and "Failure" |
| Input | Functional keys |
| Operation | Via LC-display and function keys |
| Dimensions (W x H x D) | 266 mm x 159 mm x 117 mm (for details see dimensional drawings) |
| Weight | ≤ 2.8 kg |
| Material | Stainless steel 1.4571 |
| Mounting | Wall-mounting, vertical, up to a wall inclination of 45° |
| Power supply | Voltage 18 ... 28 V DC Other voltages with optional terminal box or Tunnel Adapter Device TAD |
| | Current consumption ≤ 1 A |
| | Power consumption Without heating: ≤ 5 W With heating: ≤ 20 W |

TAD tunnel adapter device

| | |
|-------------------------------|---|
| Description | Unit for displaying data, for operation and for connecting data cables |
| Enclosure rating | IP 66 |
| Analog outputs | 4 outputs (option): 4 ... 20 mA, 500 Ω Electrically isolated |
| Digital outputs | 3 outputs (option): 125 V AC, 0.6 A / 30 V DC, 2 A |
| Digital inputs | 1 input (option): 30 V DC |
| Indication | LC display and status LEDs |
| Input | Functional keys |
| Dimensions (W x H x D) | 210 mm x 347 mm x 129 mm (for details see dimensional drawings) |
| Weight | 5 kg |
| Material | Stainless steel 1.4571 |
| Power supply | Voltage 88 ... 264 V AC Frequency 47 ... 63 Hz Power consumption 15 W |

VISIC100SF terminal box

| | |
|-------------------------------|---|
| Description | Serves for connection of power supply, data and signal cabling provided by the customer |
| Enclosure rating | IP 6K9K |
| Dimensions (W x H x D) | 266 mm x 238 mm x 146 mm (for details see dimensional drawings) |

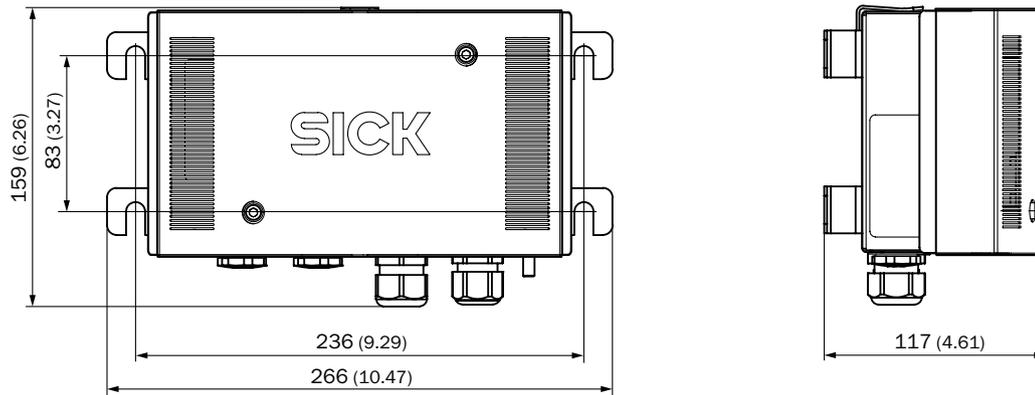
| | | |
|---------------------|------------------------|-----------------|
| Weight | ≤ 2.8 kg | |
| Material | Stainless steel 1.4571 | |
| Power supply | Voltage | 85 ... 264 V AC |
| | Frequency | 45 ... 65 Hz |
| | Current consumption | 0.1 A |

Ordering information

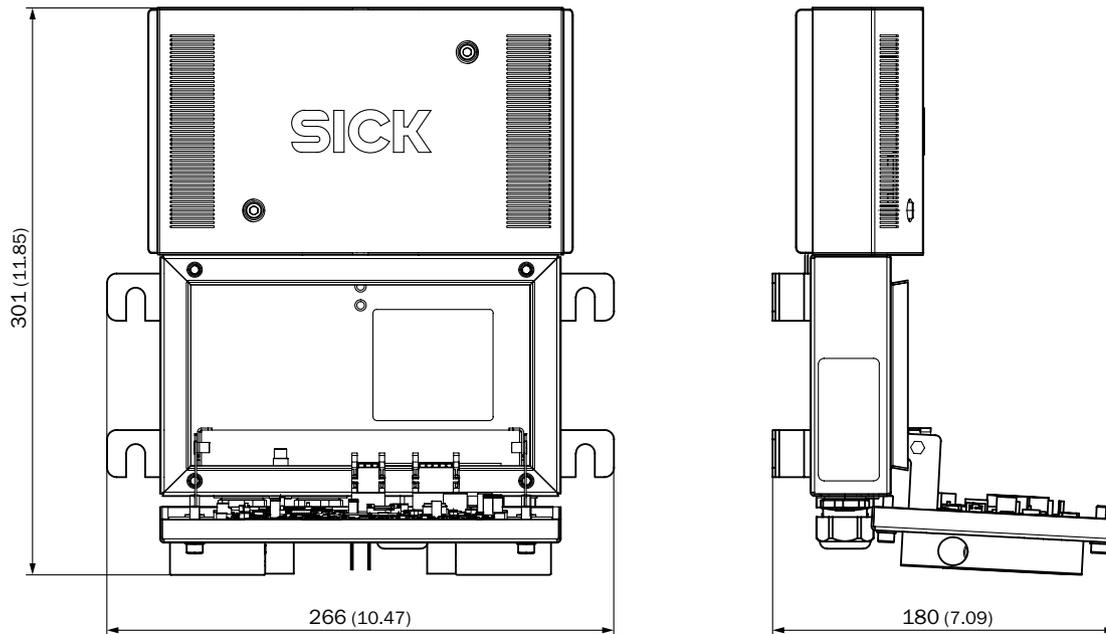
Our regional sales organization will help you to select the optimum device configuration.

Dimensional drawings (dimensions in mm (inch))

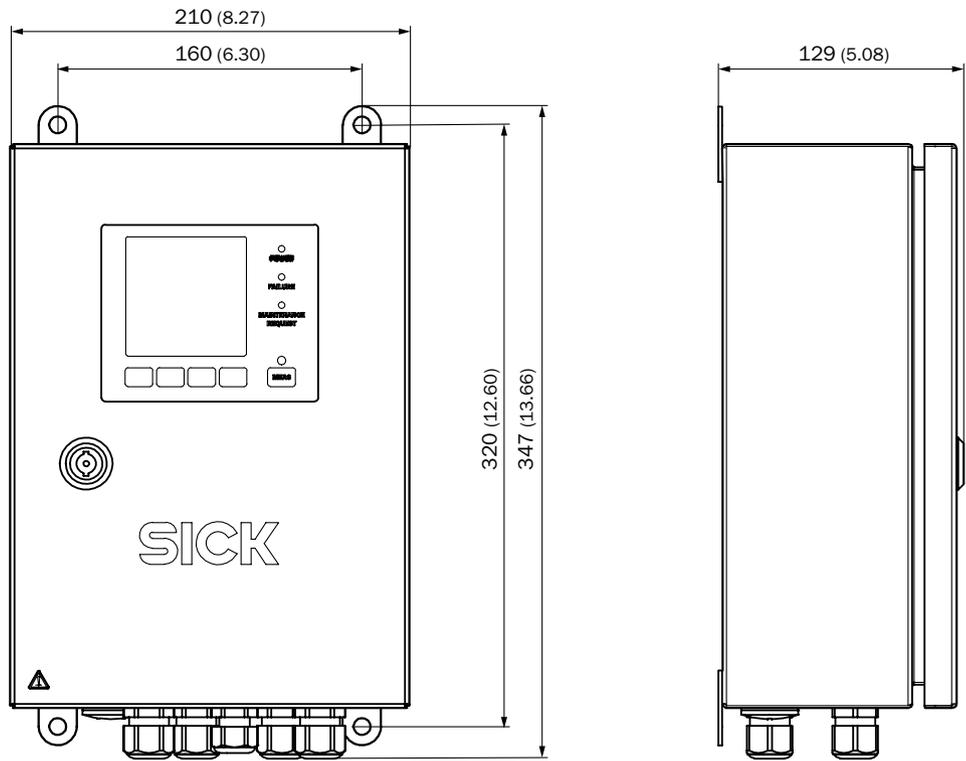
VISIC100SF sensor unit closed



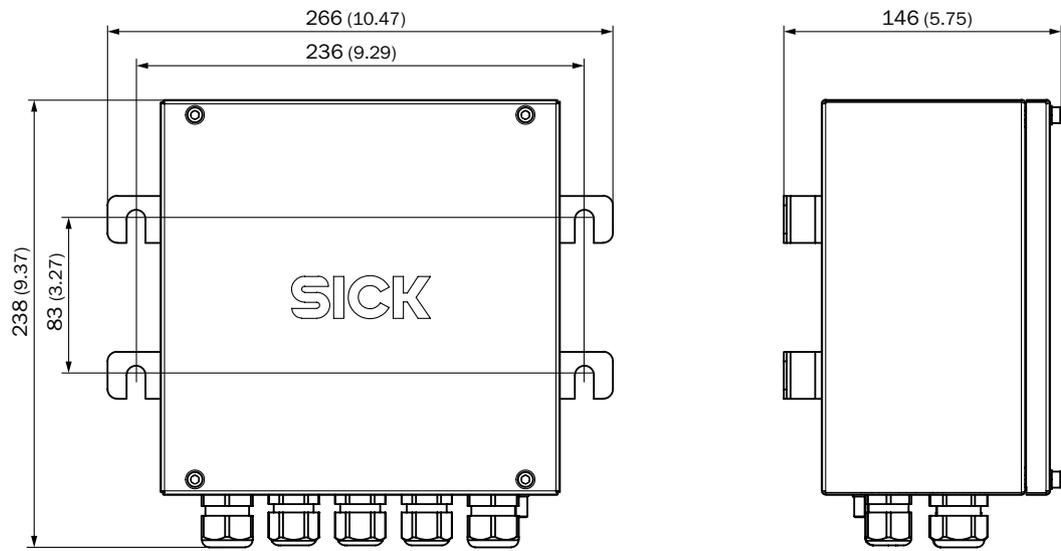
VISIC100SF sensor unit open with clipped-on front cover



TAD tunnel adapter device

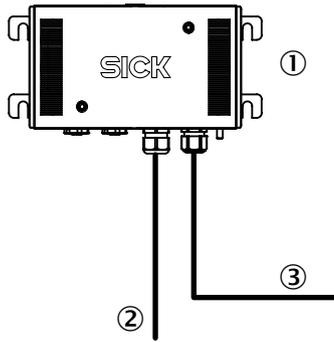


VISIC100SF terminal box



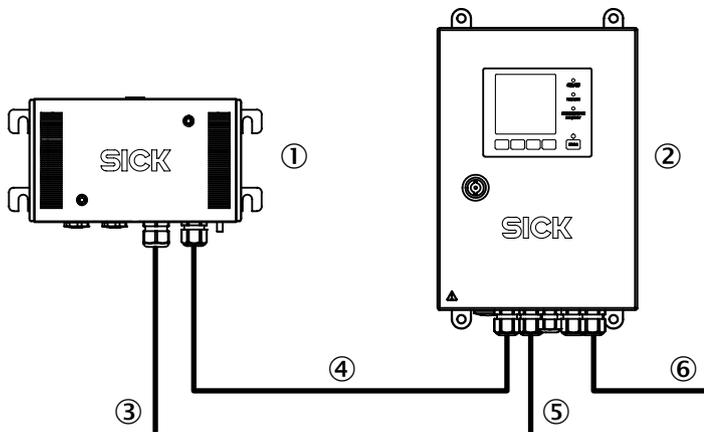
Connection types

Standard version



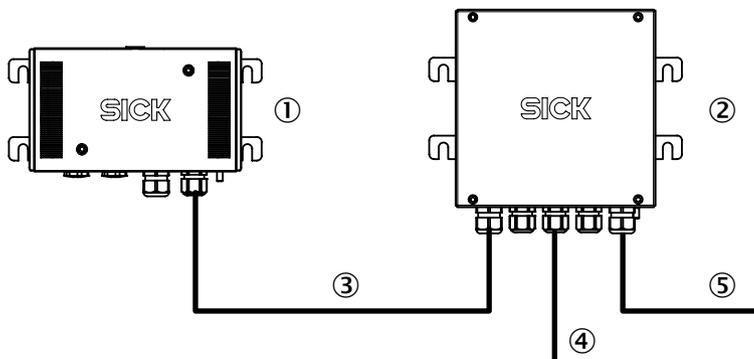
- ① VISIC100SF sensor unit
- ② Power supply (24 V)
- ③ Analog and digital signals or data bus

Version with Tunnel Adapter Device TAD



- ① VISIC100SF sensor unit
- ② TAD tunnel adapter device
- ③ Power supply (24 V)
- ④ Analog and digital signals or data bus (maximum length = 1,200 m)
- ⑤ Power supply (230 V)
- ⑥ Analog and digital signals or data bus

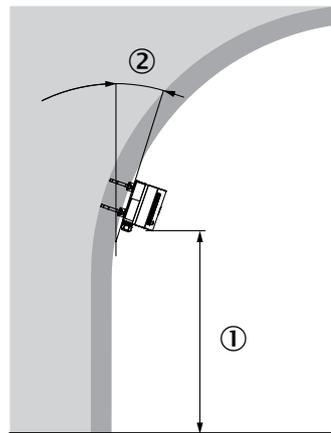
Version with terminal box



- ① VISIC100SF sensor unit
- ② VISIC100SF terminal box
- ③ Analog and digital signals or data bus, incl. power supply (24 V)
- ④ Power supply (230 V)
- ⑤ Analog and digital signals or data bus

Instruction for installation

VISIC100SF sensor unit allowed inclination and installation height



- ① The mounting height depends on the application. SICK recommends an installation above the splash water zone.
- ② Maximum allowed inclination angle = 45°

Accessories

Hardware

| Brief description | Part no. |
|---|----------|
| CO-Sensor, electrochemical, for installation in the VISIC100SF, measuring range: 0 ... 300 ppm, fully adjusted and calibrated | 2071008 |
| CO-Sensor, electrochemical, for installation in the VISIC100SF, measuring range: 0 ... 200 ppm, fully adjusted and calibrated | 2080844 |
| NO-Sensor, electrochemical, for installation in the VISIC100SF, measuring range: 0 ... 100 ppm, fully adjusted and calibrated | 2071007 |
| NO2-Sensor, electrochemical, for installation in the VISIC100SF, measuring range: 0 ... 5 ppm, fully adjusted and calibrated | 2079979 |

Other mounting accessories

| Brief description | Part no. |
|---|----------|
| Mounting kit, 4 x M8 steel wall plug for VISIC100SF/VISIC50SF and/or Terminal Box, Stainless steel 1.4529 | 2071034 |

Power supply units and power cord connectors

| Brief description | Part no. |
|--|----------|
| Power supply set consisting of: power supply, plastic housing, terminal, gland | 2081372 |
| TAD for VISIC100/VISIC50SF with LC-display, power supply and connection terminals, data transfer: analog and digital, distance to sensor: max. 20 m | 1069505 |
| TAD for VISIC100/VISIC50SF with LC-display, power supply and I/O-module, data transfer: digital (RS-485) distance to sensor: max. 1200 m by separate power supply for Sensor and TAD | 1069507 |
| Terminalbox without power supply, connection terminals for the analog outputs and relay of the VISIC100SF/VISIC50SF | 2069653 |
| Terminalbox with power supply for the VISIC100SF, connection terminals for the analog outputs and relay of the VISIC100SF/VISIC50SF | 2069660 |

Test and monitoring tools

| Brief description | Part no. |
|--|----------|
| Testset consisting of: case, 2x filter for checking the K-value (high, > 7 /km and low, < 7 /km) | 2073014 |
| Testset consisting of: case, 1x filter for checking the K-value (low, < 7 /km) | 2071542 |
| Testset consisting of: case, 1x filter for checking the K-value (high, > 7 /km) | 2071541 |

Mounting brackets and mounting plates

Mounting plates

| Brief description | Part no. |
|--|----------|
| Adaption mounting bracket for mounting the VISIC100SF on VICOTEC-console with the article number 2045456, Stainless steel 1.4529 | 2073272 |
| Adaption mounting bracket for mounting the VISIC100SF on VICOTEC-console with the article number 2045455, Stainless steel 1.4571 | 2075594 |

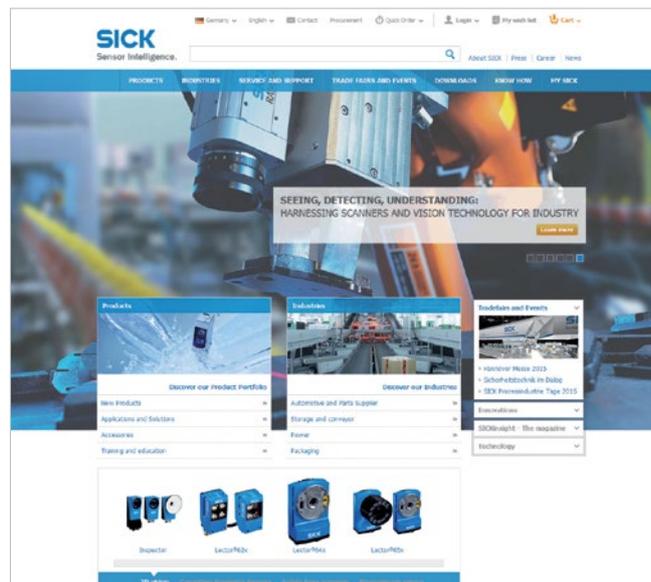
Plug connectors and cables

Other connectors and cables

| Brief description | Part no. |
|--|----------|
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 12-wire, 10 m | 2076478 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD with core cable end, 12-wire, 2 m | 2076476 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 12-wire, 20 m | 2076479 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 12-wire, 5 m | 2076477 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 6-wire, 10 m | 2076483 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 6-wire, 2 m | 2076481 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 6-wire, 20 m | 2076484 |
| Connection cable between VISIC100SF/VISIC50SF and Terminal Box/TAD, with core cable end, 6-wire, 5 m | 2076482 |

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With almost 7,000 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.

Detailed addresses and additional representatives → www.sick.com