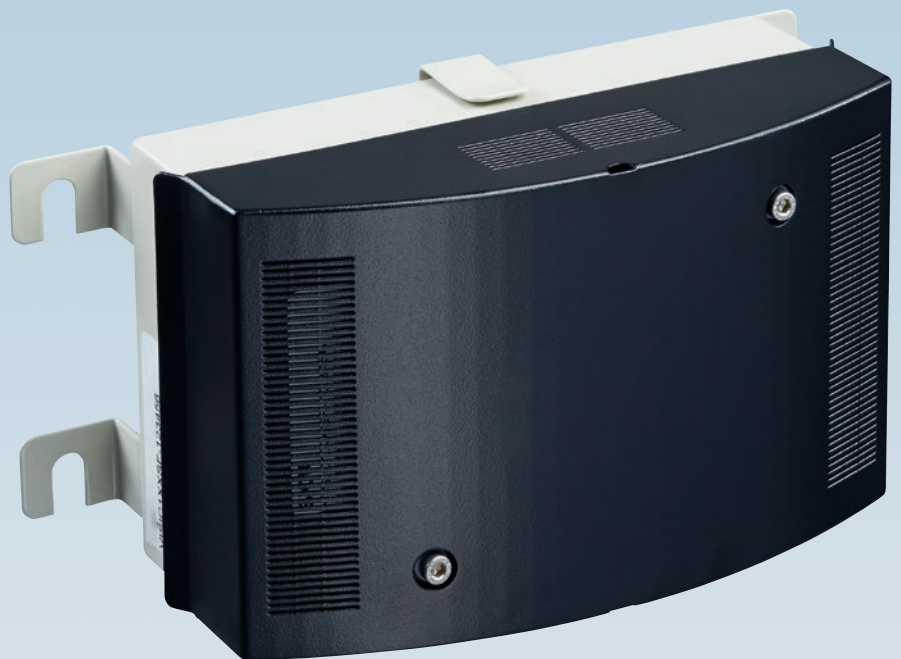# VISIC100SF
Air quality measuring device for improved measurement performance in tunnels

Modernizes measurement performance for tunnel air quality

- 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 wih checking tool
- Low level of effort required thanks to easy mounting and quick commissioning

Endress+Hauser

People for Process Automation

As a full-service supplier of tunnel sensors and traffic measurement technology, we make available with the VISIC100SF a compact air quality measuring device for measuring visibility plus carbon monoxide (CO) and nitrogen monoxide (NO) or nitrogen dioxide (NO_2). For the accurate determination of air quality in tunnels, of a high quality, and future proof with regard to service and long-term support.

Simple and cost-effective

As a compact air quality measuring device, 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).

VISIC100SF combines scattered light measurement 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. Electrochemical sensors can also be retrofitted with ease. In addition to CO or NO there is also an electrochemical sensor for NO_2 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 $^1/_{km}$.

Simple and cost-effective.
VISIC100SF – The all-in-one solution
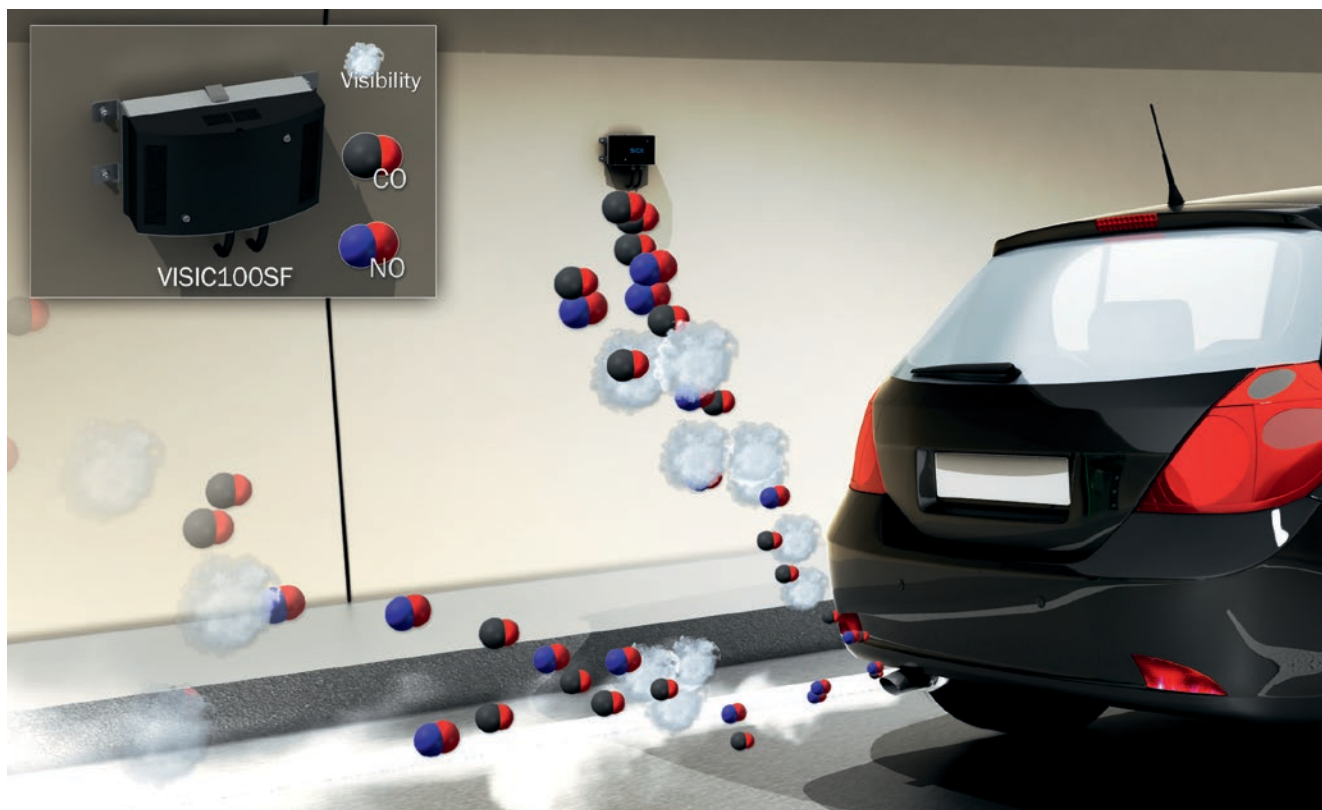
Efficient ventilation control

The VISIC100SF air quality measuring device continuously and directly monitors the tunnel atmosphere and provides accurate measured values for reliable and effective ventilator 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.
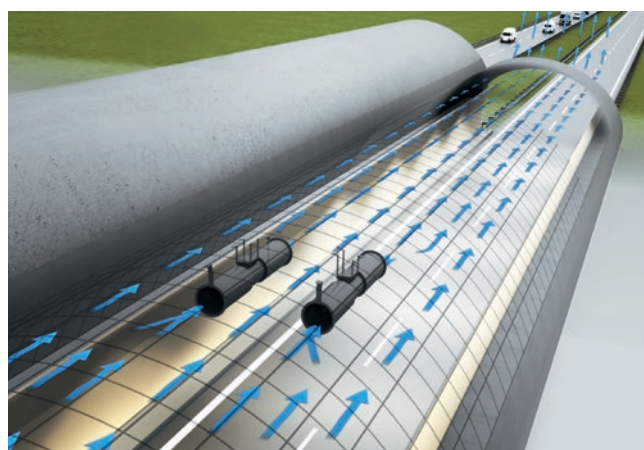
Longitudinal ventilation thanks to efficient ventilation control

VISIC100SF: modernizes measurement performance for tunnel air quality

Product description

The VISIC100SF air quality measuring device is an all-in-one solution for measuring visibility, CO, NO, and NO_2 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 wih checking tool
- Low level of effort required thanks to easy mounting and quick commissioning

Fields of application

- For monitoring visibility as well as CO, NO, and NO_2 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

CE   EN 15267 certified   EN 14181 certified

More Information online
For more information, enter the link or scan the QR code to get direct access to technical data, operating instructions, software, application examples, and much more.
www.endress.com/visic100sf

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

Measured values	Visibility (K-value), CO, NO, NO_2
Measurement principles	Scattered light forward, electrochemical cell
Measuring ranges	
Visibility (K-value)	0 ... 15 /km
CO	0 ... 300 ppm
NO	0 ... 100 ppm
NO_2	0 ... 5 ppm
Response time	≤ 60 s
Accuracy	
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 cabelling 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

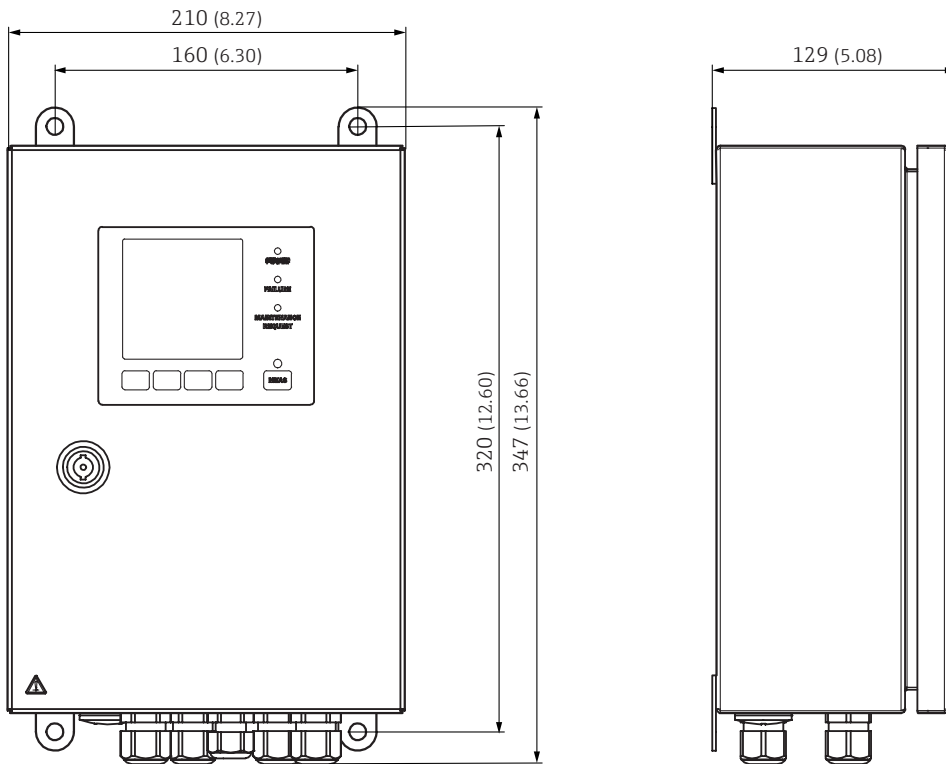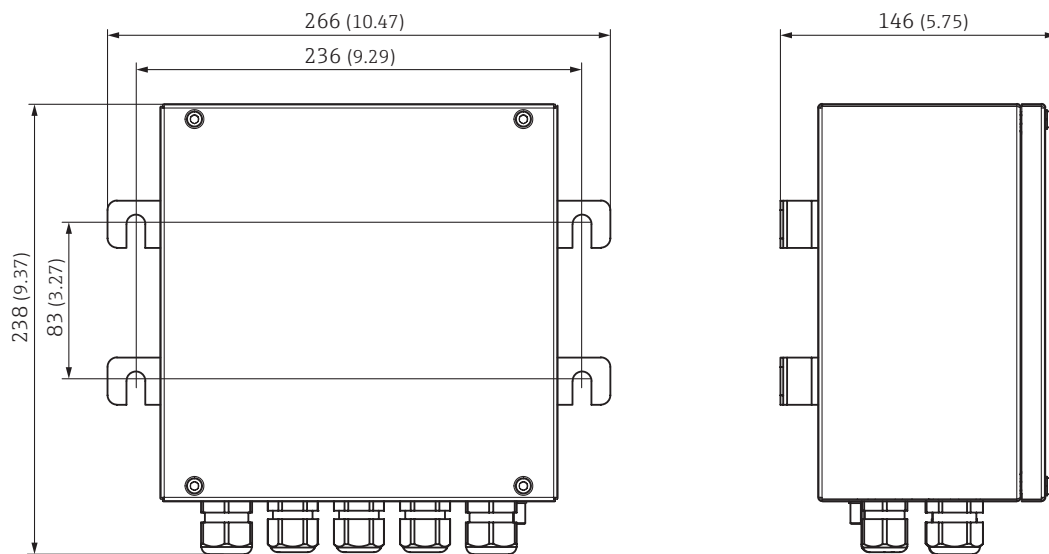## VISIC100SF sensor unit closed (dimensions in mm (inch))
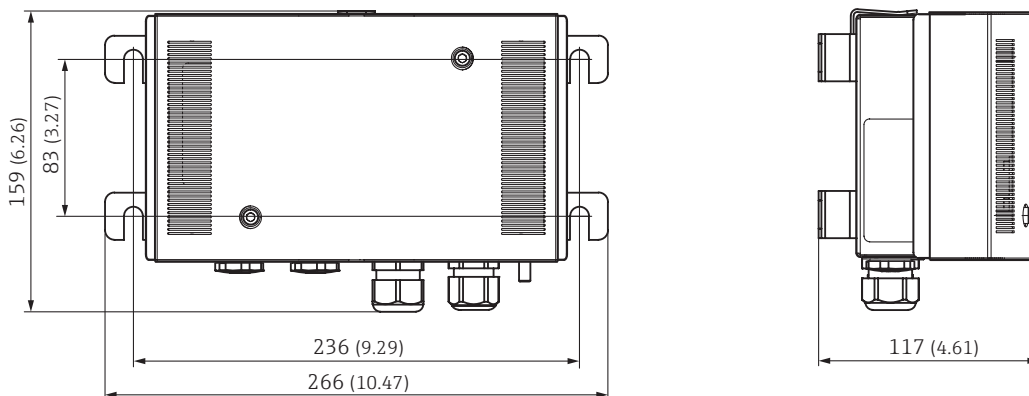
VISIC100SF sensor unit open with clipped-on front cover (dimensions in mm (inch))

301 (11.85)

266 (10.47)

180 (7.09)
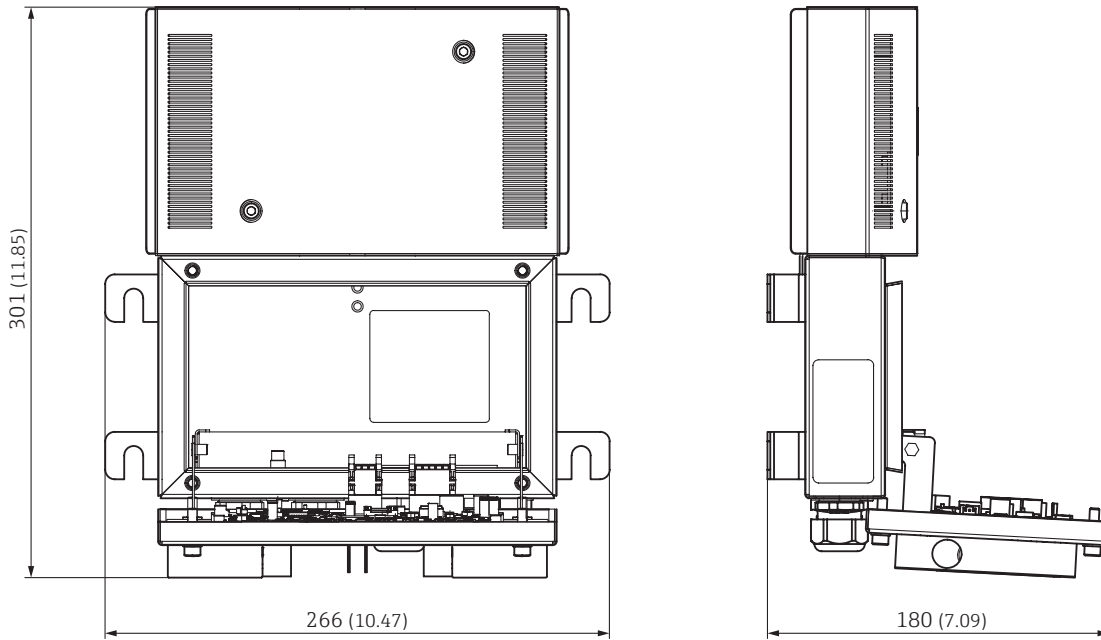
TAD tunnel adapter device (dimensions in mm (inch))

210 (8.27)

160 (6.30)

129 (5.08)

320 (12.60)

347 (13.66)

VISIC100SF terminal box (dimensions in mm (inch))

Connection types

Standard version

① VISIC100SF sensor unit
② Power supply (24 V)
③ Analog and digital signals or data bus
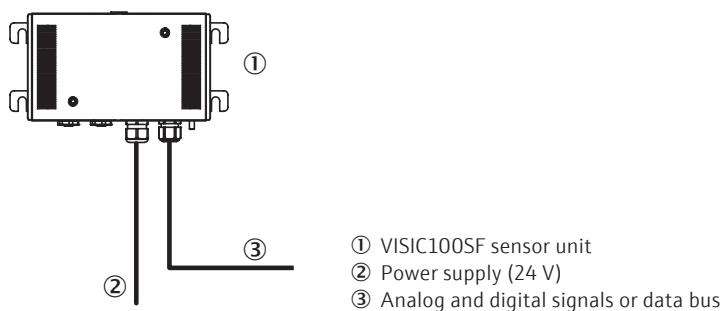
Version with Tunnel Adapter Device TAD

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
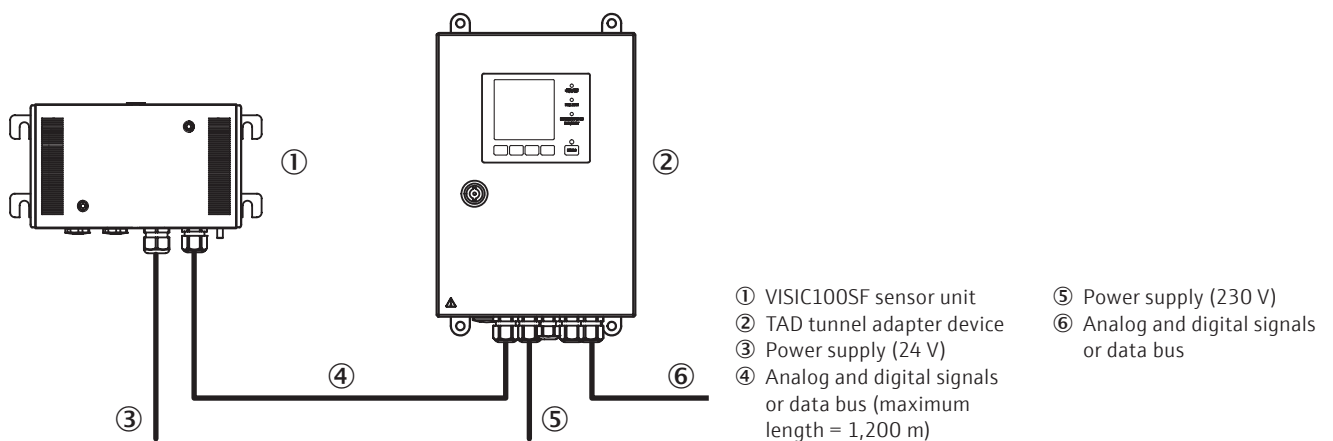
Version with terminal box

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
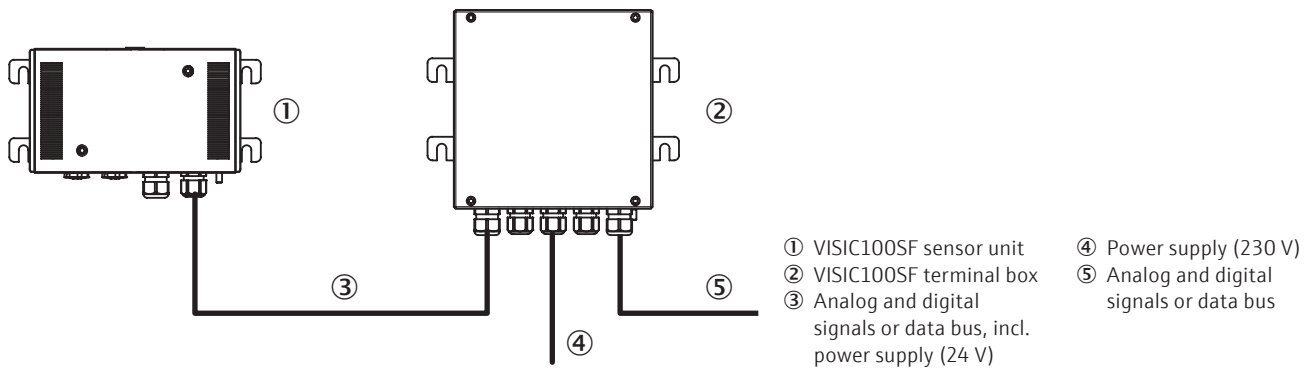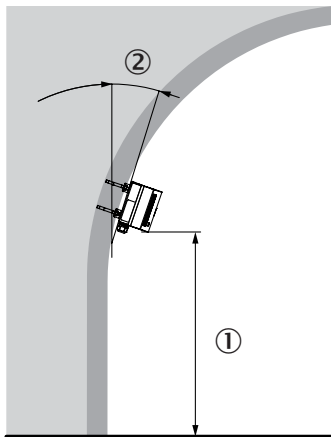
Instruction for installation

VISIC100SF sensor unit allowed inclination and installation heigth

① The mounting heigth
   depends on the applica-
   tion. Recommendation:
   installation above the
   splash water zone.

② Maximum allowed
   inklination 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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