



# VICOTEC320 AIR QUALITY TUNNEL SENSORS

TO CONTROL VENTILATION IN ROAD TUNNELS

Tunnel sensors

**SICK**  
Sensor Intelligence.

# RELIABLE AIR QUALITY MEASUREMENT IN ROAD TUNNELS

Continuously monitoring air quality and visibility in tunnels is a vital factor in ensuring road safety: It is becoming increasingly important to accurately monitor nitrogen dioxide (NO<sub>2</sub>), as even extremely low concentrations (<< 1 ppm) can be harmful. Particles of dust and soot, for example, as well as abrasion from tires and brakes, restrict visibility in tunnels. Plus, the concentration of nitrogen monoxide (NO), produced by diesel-fueled vehicles which are growing in number, needs to be monitored reliably.

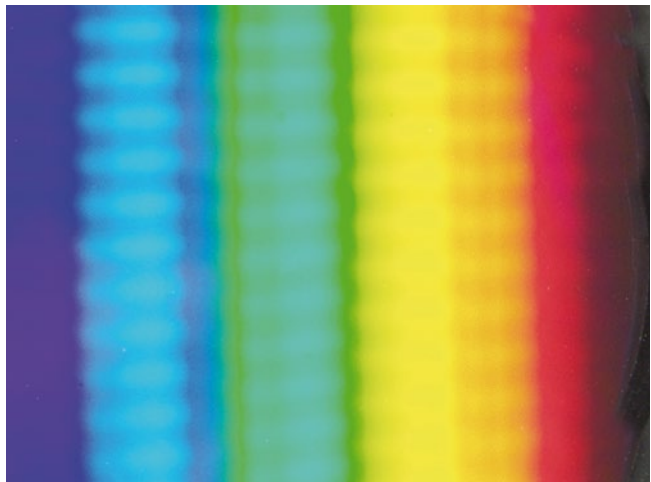
SICK's VICOTEC320 air quality tunnel sensors have long been renowned for accurately monitoring the limit values of NO<sub>2</sub> and NO, and they also use direct, in-situ measurement technology to continuously measure visibility (VIS) in the tunnel atmosphere. These measured values are used to control ventilation in tunnels precisely and reliably. Maintenance-free operation of the VICOTEC320 is possible for more than a year, without compromising on the high level of accuracy and without drifts or cross sensitivities.



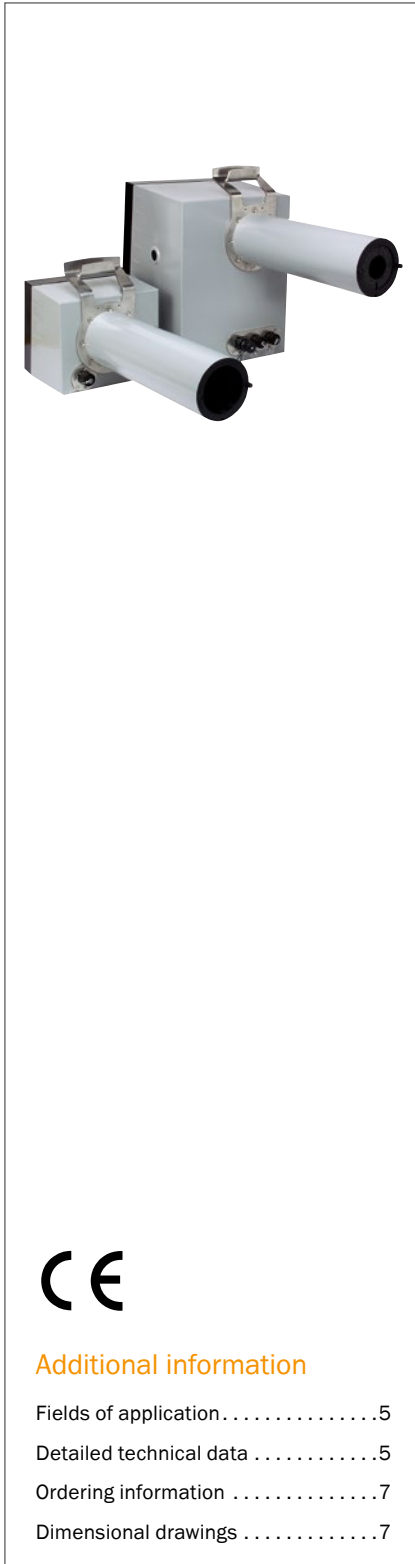
### DOAS spectroscopy for reliable measurement of NO<sub>2</sub> and NO

Gases absorb light with different wavelengths to varying extents. Plotting the intensity of the light beamed through the gas as a function of the wavelength gives a characteristic spectrum for each gas component, which more or less represents the fingerprint of the gas.

In the VICOTEC320, there is an optical grid that spectrally disperses the beam of light reflected by the reflector. A highly sensitive, stabilized line scan camera is used to determine the intensity of each wavelength and record the spectrum. This is then analyzed using the DOAS (Differential Optical Absorption Spectroscopy) principle, which makes it possible to determine the concentration of individual gases.



## FOR THE CONTROL OF VENTILATION AND FOR FILTER MONITORING IN ROAD TUNNELS



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### Product description

The VICOTEC320 measures very small concentrations of NO<sub>2</sub> and NO as well as the visibility and temperature in road tunnels simultaneously and fast using proven components without test gases for zero and reference point. An automatic, cyclic adjustment ensures correct values. The robust enclosure withstands thorough tunnel cleanings without problems. Product requires minimal upkeep:

maintenance and cleaning once a year. The VICOTEC320 can be optionally equipped with an electrochemical cell for CO measurement. This is useful to perform the plausibility checks which some tunnel standards (e.g. German RABT2006) recommend – even when NO<sub>2</sub> is measured as lead gas component.

### At a glance

- Very low detection limits for NO and NO<sub>2</sub>
- Automatic function monitoring and self-adjustment
- Very sturdy design in stainless steel
- Automatic beam alignment between sender/receiver unit and reflector

### Your benefits

- Energy and cost savings for ventilation control due to very low zero offset and accurate measurement
- Low operational costs because no air aspiration system, no test gases and no ambient air required
- Low maintenance requirements due to long maintenance interval (approx. 1 year)

→ [www.mysick.com/en/VICOTEC320](http://www.mysick.com/en/VICOTEC320)

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

- Monitoring of air quality in road tunnels
- Ventilaton control and filter monitoring in tunnels

## 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.

### VICOTEC320 system

<b>Measured values</b>	Visibility (K-value), NO, NO <sub>2</sub> , NO <sub>x</sub> , CO, temperature										
<b>Maximum number of measurands</b>	6										
<b>Measurement principles</b>	Differential optical absorption spectroscopy (DOAS), transmittance measurement, electrochemical cell, Resistance thermometer										
<b>Length of measuring path</b>	10 m										
<b>Measuring ranges</b>	<table> <tbody> <tr> <td>K-value</td> <td>0 ... 15 km<sup>-1</sup> / 0 ... 200 km<sup>-1</sup></td> </tr> <tr> <td>NO</td> <td>0 ... 20 ppm / 0 ... 45 ppm</td> </tr> <tr> <td>NO<sub>2</sub></td> <td>0 ... 1 ppm / 0 ... 5 ppm</td> </tr> <tr> <td>CO</td> <td>0 ... 100 ppm / 0 ... 300 ppm</td> </tr> <tr> <td>Temperature</td> <td>-20 ... +55 °C / -25 ... +75 °C</td> </tr> </tbody> </table>	K-value	0 ... 15 km <sup>-1</sup> / 0 ... 200 km <sup>-1</sup>	NO	0 ... 20 ppm / 0 ... 45 ppm	NO <sub>2</sub>	0 ... 1 ppm / 0 ... 5 ppm	CO	0 ... 100 ppm / 0 ... 300 ppm	Temperature	-20 ... +55 °C / -25 ... +75 °C
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<b>Response time (t<sub>90</sub>)</b>	<table> <tbody> <tr> <td>Visibility (K-value):</td> <td>5 s ... 360 s Adjustable (45 s pre-configured)</td> </tr> <tr> <td>NO, NO<sub>2</sub>:</td> <td>5 s ... 360 s Adjustable (45 s pre-configured)</td> </tr> <tr> <td>CO:</td> <td>≤ 60 s</td> </tr> </tbody> </table>	Visibility (K-value):	5 s ... 360 s Adjustable (45 s pre-configured)	NO, NO <sub>2</sub> :	5 s ... 360 s Adjustable (45 s pre-configured)	CO:	≤ 60 s				
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<b>Storage temperature</b>	<table> <tbody> <tr> <td></td> <td>-25 °C ... +75 °C</td> </tr> <tr> <td>CO sensor:</td> <td>0 °C ... +20 °C</td> </tr> </tbody> </table>		-25 °C ... +75 °C	CO sensor:	0 °C ... +20 °C						
	-25 °C ... +75 °C										
CO sensor:	0 °C ... +20 °C										
<b>Ambient pressure</b>	700 hPa ... 1,200 hPa										
<b>Ambient humidity</b>	10 % ... 95 % Relative humidity; non-condensing										

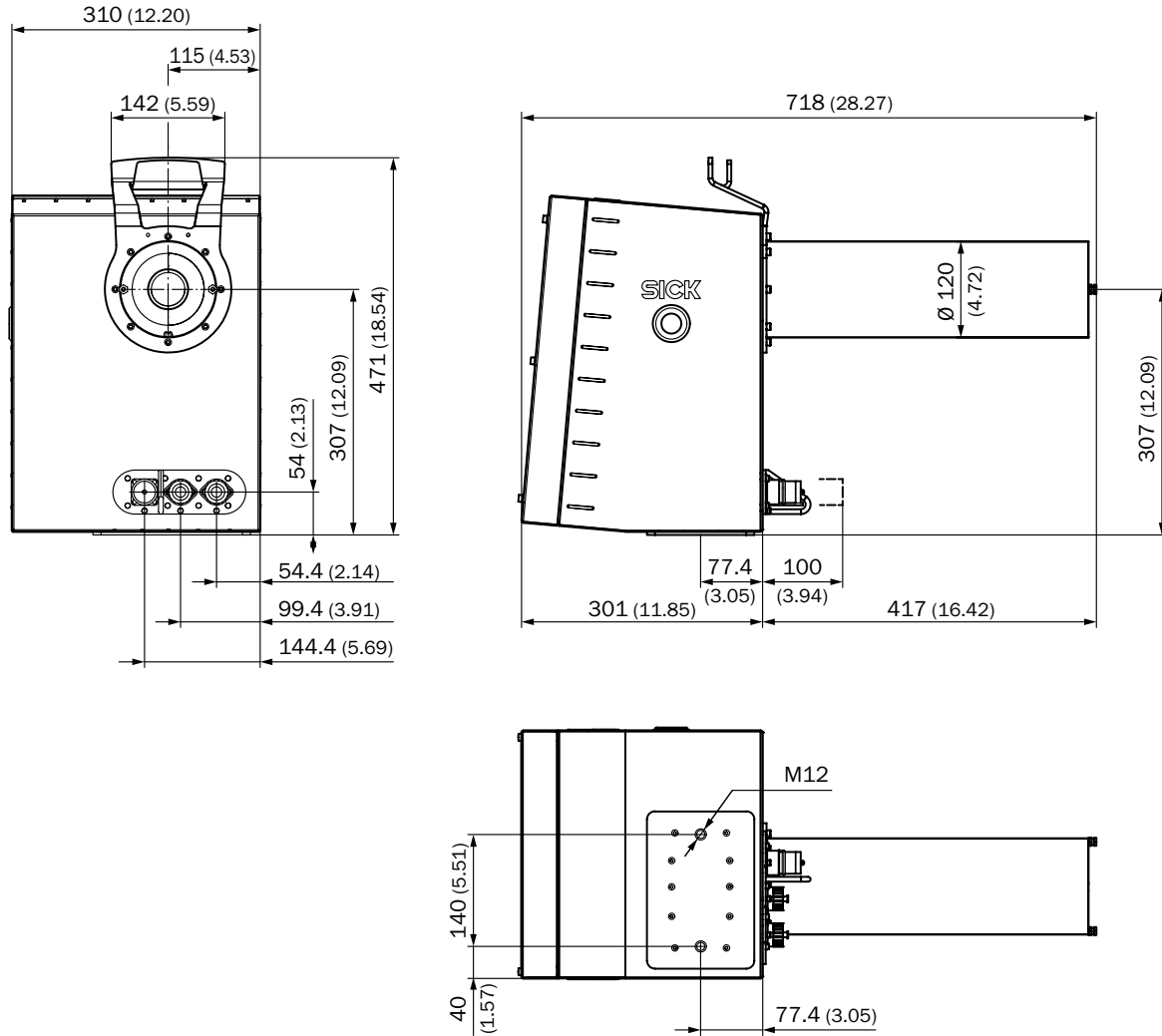
<b>Conformities</b>		ASTRA "Guideline - Ventilation of Road Tunnels" (2008) RABT 2006 RVS 09.02.22
<b>Electrical safety</b>		CE
<b>Enclosure rating</b>		IP69K
<b>Analog outputs</b>		6 outputs: 0 ... 20 mA Depending on device version
<b>Digital outputs</b>		4 relay contacts:  Depending on device version
<b>Digital inputs</b>		4 potential-free contacts
<b>Ethernet</b>	Function	✓ Connection to SOPAS ET software or OPC server
<b>Modbus</b>	Type of fieldbus integration	✓ TCP
<b>CAN bus</b>	Function	✓ For connection of a SCU control unit
<b>Operation</b>		Via software SOPAS ET
<b>Dimensions (W x H x D)</b>	Sender/receiver unit Reflector unit Connection unit	718 mm x 470 mm x 310 mm 617 mm x 278 mm x 245 mm 450 mm x 254 mm x 148 mm
<b>Weight</b>	Sender/receiver unit: Reflector unit: Connection unit:	± 20 kg ± 9 kg ± 8 kg
<b>Material</b>		Stainless steel 1.4571, powder-coated
<b>Power supply</b>	Voltage Frequency Power consumption	115 V / 230 V 50 Hz / 60 Hz ≤ 200 W
<b>Test functions</b>		Automatic check cycle for zero and span point Contamination check Manual linearity check
<b>Options</b>		CO sensor

### Ordering information

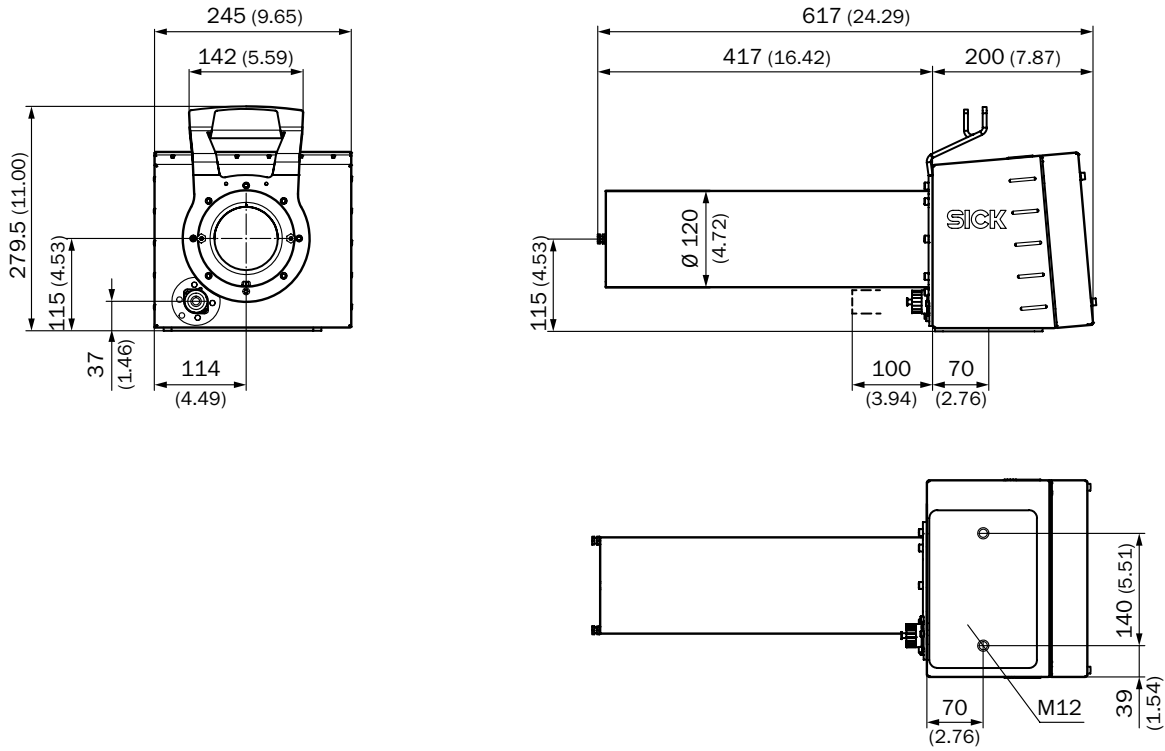
Our regional sales organization will help you to select the optimum device configuration.

### Dimensional drawings (Dimensions in mm (inch))

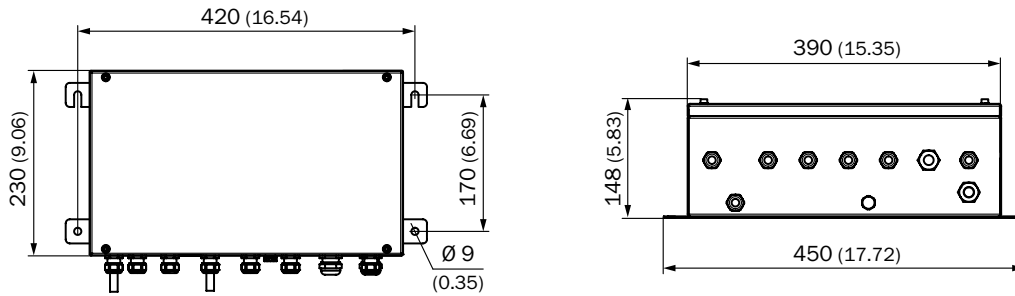
VICOTEC320 sender/receiver unit



VICOTEC320 reflector unit



VICOTEC320 connection unit









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## SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies 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, Hong Kong, 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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