



TRAFFIC SENSORS

TRAFFIC AND TUNNEL SAFETY SOLUTIONS

Traffic Sensors

SICK
Sensor Intelligence.

60 YEARS OF TUNNEL EXPERTISE – AND SETTING ITS SIGHTS ON THE FUTURE

As the density of the traffic on our roads increases, the future is all about finding ways to increase the availability of tunnels while at the same time improving safety for road and tunnel users. For 60 years, SICK has been helping road and tunnel operators to take on this challenge, offering innovative products not only for measuring visibility and air quality in routine operation but also for air flow measurement and smoke detection in emergency situations.

1960

- Introduction of the SM4 visibility measurement system



1980

- First ultrasonic measuring device: the VMA2



1990

- First visual range measuring device for visual range measurement in tunnels: the VISIC620
- First combined device for measuring CO and visibility: the VICOTEC400



Let the innovation leader help you ensure tunnel safety

As a leading provider of tunnel sensor technology, SICK is setting its sights on the future. And as the first manufacturer, SICK offers standard product families for both routine operation and emergency situations in tunnels.

The **VISIC100SF**, see page 13 is a compact all-in-one solution for measuring visibility and carbon monoxide (CO) as well as nitrogen monoxide (NO) or nitrogen dioxide (NO₂) in tunnels. The **VISIC50SF**, see page 13 smoke detector is SICK's reliable and extremely fast solution for early fire detection.

Thanks to their plug-and-measure capability, both sensors are very easy to commission.

SICK is the first manufacturer to develop a system to detect overheating vehicles and vehicle components even before they enter a tunnel: the VHD (Vehicle Hot Spot Detector) profiling system. This enables dangerous vehicles to be kept out of tunnels, thereby preventing hazardous situations from arising, and permanently increasing the safety levels inside.

2000

- First high-precision solutions for measuring NO₂: the VICOTEC320, VISIC50SF



2010

- First smoke detector with one concept for both air quality measurement and smoke detection
- First technology to combine scattered light measurement and measurement with electrochemical cells to measure CO and NO



2020

- First hot-spot detector to detect overheated vehicles
- Condition monitoring for air quality measurements in tunnels, including data-driven services



SAFE DRIVING IN TUNNELS – FROM START TO FINISH

The portfolio of tunnel sensors from SICK is designed for urban tunnels, overland tunnels, and tunnels in rail and subway systems. Whether it be routine operation or emergency situations, SICK is your one-stop-shop for virtually all tunnel monitoring applications.

We measure

- Air flow: velocity and direction
- Air quality: carbon monoxide CO, nitrogen monoxide NO, nitrogen dioxide NO₂
- Fog monitoring: visual range
- Visibility: K value
- Traffic safety: overheight detection, hot-spot detector
- Early fire detection: smoke

MEASUREMENTS BEFORE TUNNELS

Overheight check

Detection of vehicles that are too high

To protect the infrastructure, vehicles that are too high must be reliably detected and removed from the flow of traffic even before they enter the tunnel.

→ HISIC450, see page 14

Fog monitoring

Monitoring visual range to avoid accidents

To avoid accidents in fog, a maximum speed limit is set based on the measured visual range and indicated on variable-message signs.

→ VISIC620, see page 15

Overheating check

Avoiding fires

The VHD system detects overheated vehicles. This enables them to be stopped before they enter the tunnel.

→ VHD, see page 13

MEASUREMENTS INSIDE THE TUNNEL

Air quality

NO₂ measurement in ppb

Continuous and precise measurement of minute NO₂ concentrations provides the basis for ventilation control inside the tunnel.

→ [VICOTEC320](#), see page 12



Air quality

Measurement of CO, NO, NO₂ and visibility for ventilation control

By capturing exact measured values, monitoring the atmosphere inside the tunnel provides the basis for effective ventilation control.

→ [VISIC100SF](#), see page 13

→ [VICOTEC410](#), see page 12



Air flow

Monitoring of the air speed and direction for ventilation

The speed and direction of the air flow inside the tunnel have to be measured to control ventilation. In the event of an emergency, this is the most important measurement to enable the fans to be controlled.

→ [FLAWSIC200](#), see page 16



Early fire detection

Smoke detection for early fire detection

In the event of a fire inside a tunnel, every second counts: As fires manifest themselves in the form of smoke much earlier than heat, smoke detectors are able to detect fires in the very early stages of their development.

→ [VISIC50SF](#), see page 13

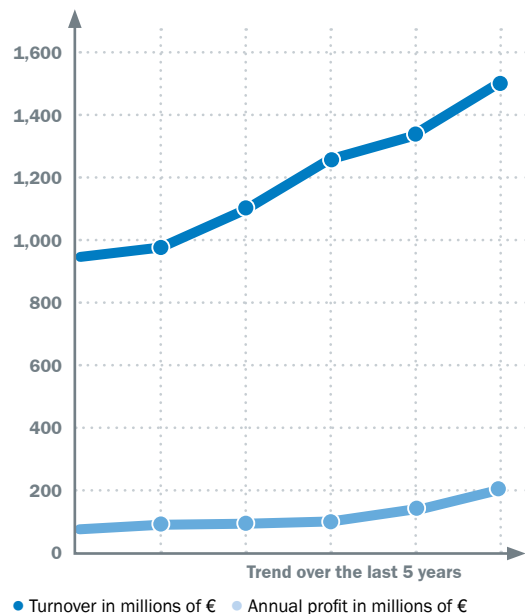


SICK – A SUCCESSFUL HISTORY PROVIDING A STRATEGIC BASIS FOR THE FUTURE

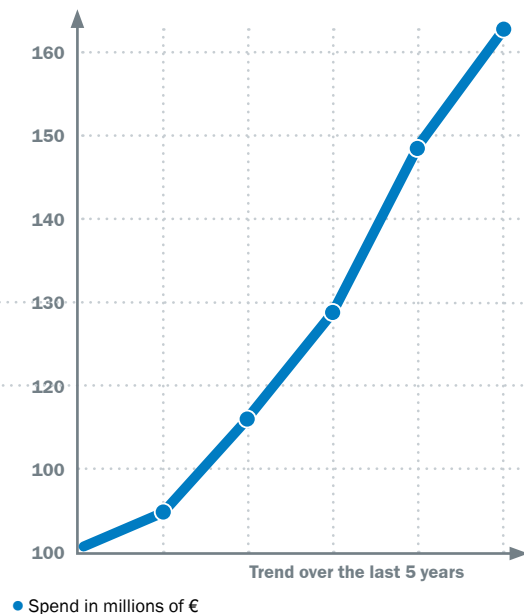
Most projects involving building and upgrading tunnel systems are long-term undertakings. Therefore, it is both important and critical to know that you have a strong and reliable partner at your side. With over 60 years of experience in tunnel sensor technology and evidence of more than 1,000 successfully implemented tunnel projects worldwide, SICK has precisely this solid foundation to offer.

Year-on-year sales growth, a continuous upward trend in investment in research and development, and increasing employee numbers make SICK a stable partner for the long term. A commitment to the continuous development of its product portfolio and global presence guarantee continuity and investment security.

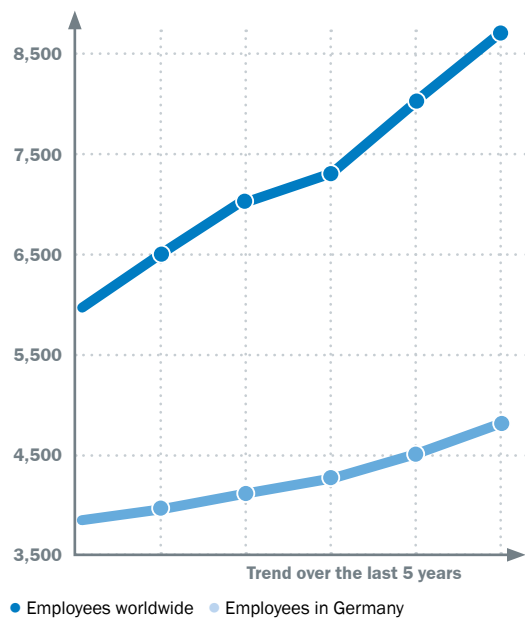
Sales trend



Investment in research and development



Employee trend



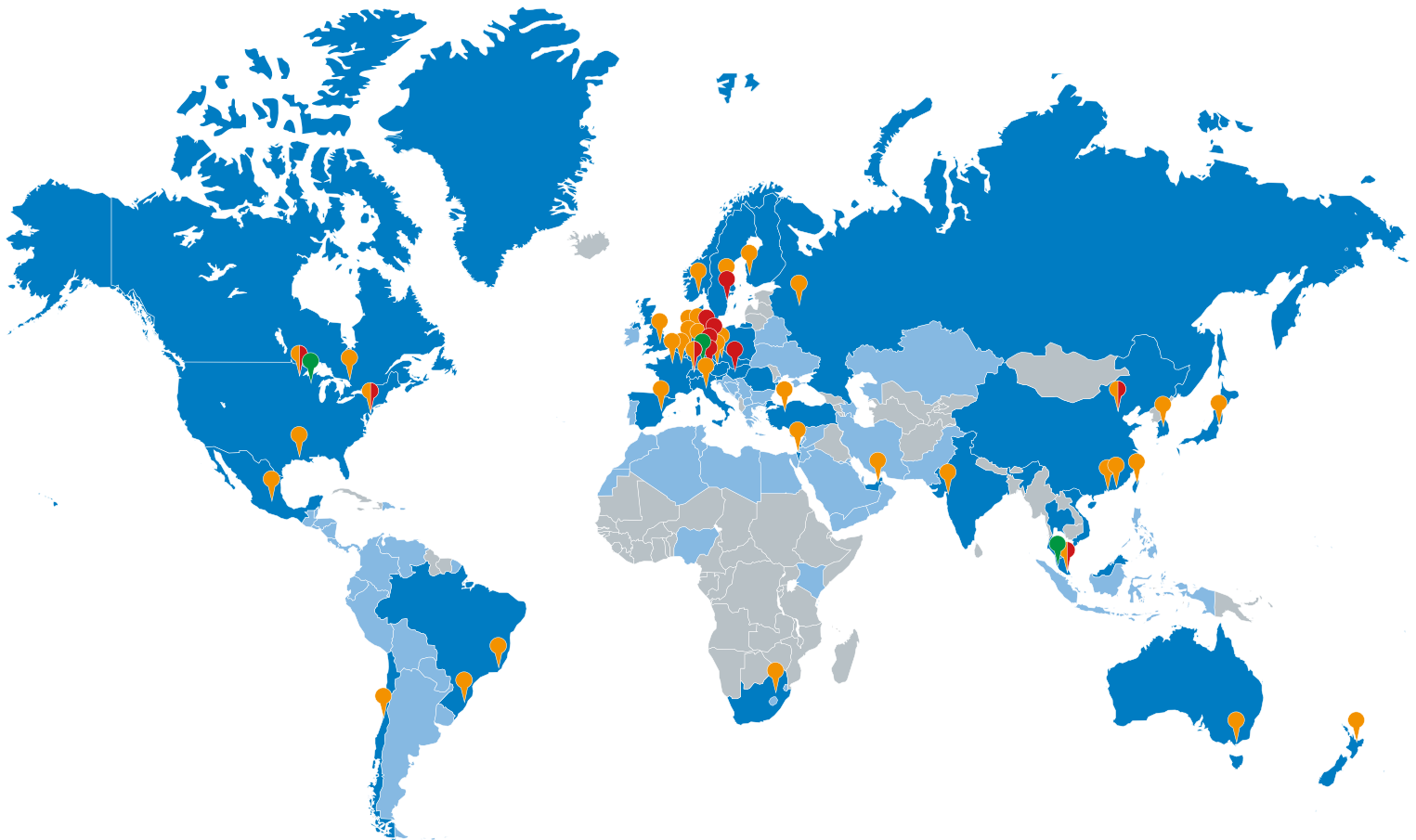
WITH SICK ON YOUR SIDE, YOU´RE IN SAFE HANDS

Guideline compliant products available worldwide

SICK offers a comprehensive portfolio of products, systems, and services worldwide. In everything that we do, we are always acutely aware of the need to comply with national guidelines and standards. Examples of these include the Guidelines for the Equipment and Operation of Road Tunnels in Germany (RABT for short), the Guideline and Regulation for Highway Construction in Austria (RVS for short), and the standards issued by the Federal Roads Office in Switzerland (FEDRO for short).

Always close by – Short distances save time and money

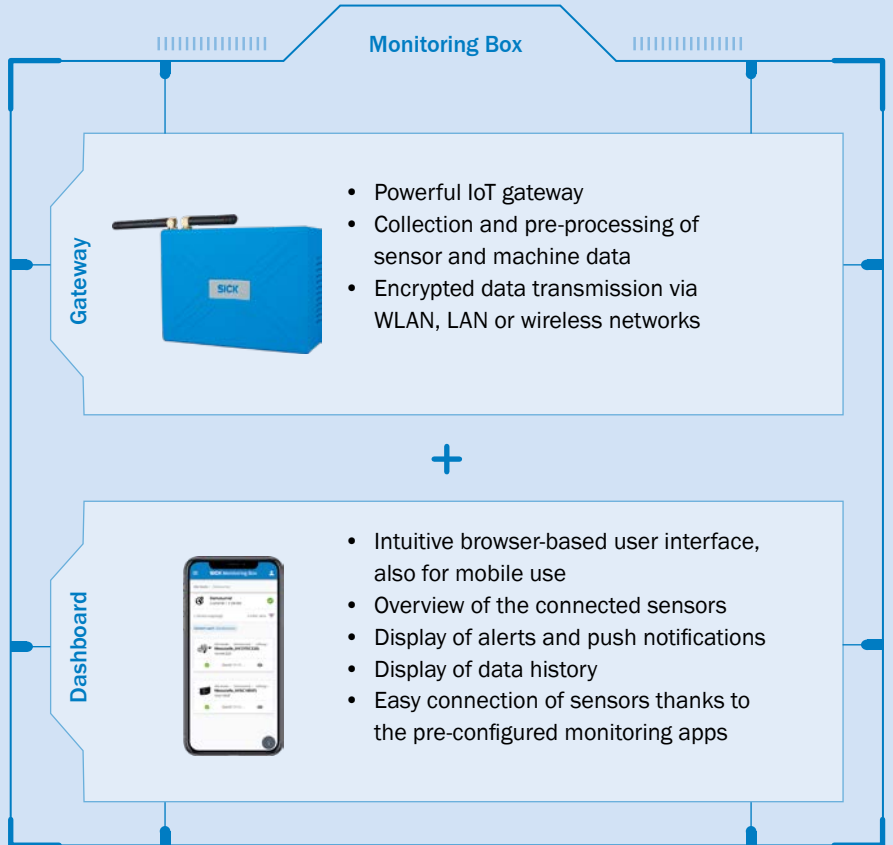
With more than 600 service engineers worldwide, SICK can get to you quickly should your sensor installation require maintenance or repairs. This reduces downtimes and ensures a highly availability for the devices.



- Subsidiaries
- Agencies
- Sales / Service
- Production / R&D
- Regional Competence Center

CONDITION MONITORING FOR TUNNEL SENSORS

The Monitoring Box from SICK provides an effective solution for monitoring and maintaining devices and sensors in tunnels. Device and sensor states can be monitored in real time, and undesired operational states predicted ahead of time. If required, every significant change to the device states is visualized concisely and clearly in a browser-based dashboard, thereby enabling the operating staff to intervene in a timely manner. This ensures the availability of critical device components.



THE BENEFITS

The Monitoring Box from SICK contributes significantly to the trouble-free utilization of tunnels. The intelligent remote diagnostics feature significantly improves the planning of maintenance and servicing tasks. It reduces the number of service interventions, and allows for better and more efficient preparation of the necessary service deployments. This increases the availability of measuring devices, thereby leading to lower costs.



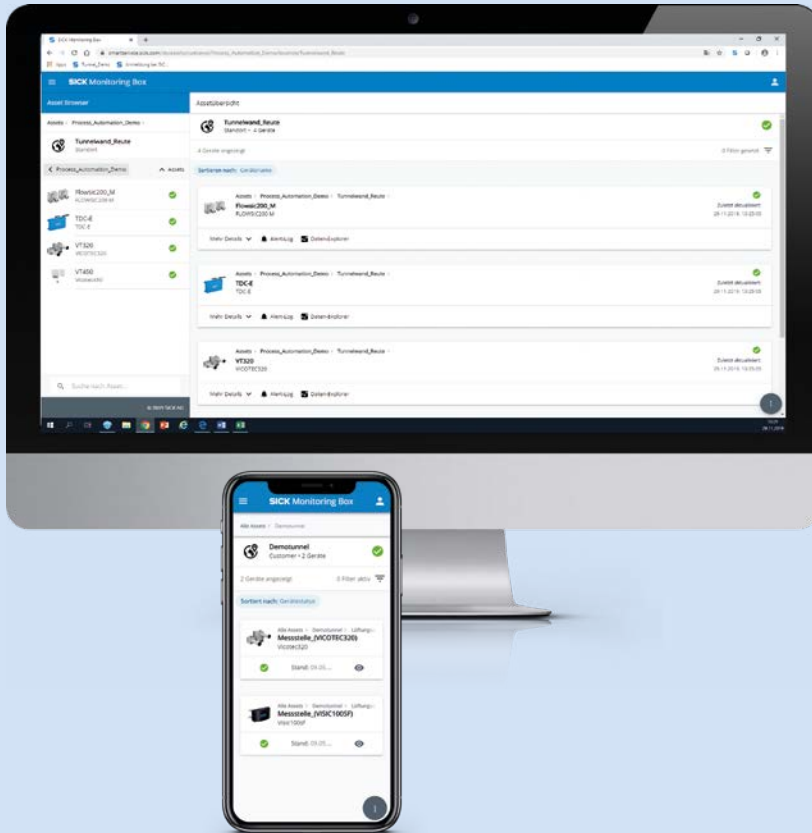
Optimized maintenance through data analysis

By continuously monitoring the device state, it is possible to plan the maintenance deployments much more efficiently, e.g. grouping maintenance tasks. State-dependent maintenance also eliminates unnecessary servicing. The fault causes are known before an on-site service deployment needs to be carried out.



Predictive maintenance

Changes in the tunnel devices during a particular time period can be monitored and informative prognoses made. By processing and analyzing historical data, it is possible to predict the device state and the required maintenance tasks.



Features

- Easy integration thanks to pre-configured monitoring apps
- Can be used on mobile end devices
- Clearly organized event log including evaluation
- Collection and saving of diagnostic data
- Data history
- E-mail alarms



Evidence of compliance with standards and requirements

The states of the devices before and after interventions are documented thereby making it easier to prove or document compliance with standards or requirements.



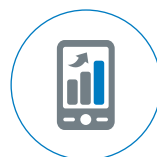
High availability

With the Monitoring Box from SICK, you can take timely action before a device failure occurs. This significantly increases the availability of the devices in the tunnel.



Efficient use of resources

Different maintenance tasks can be grouped depending on the status. You know which servicing tasks are required for which devices before you get to the device in the tunnel.



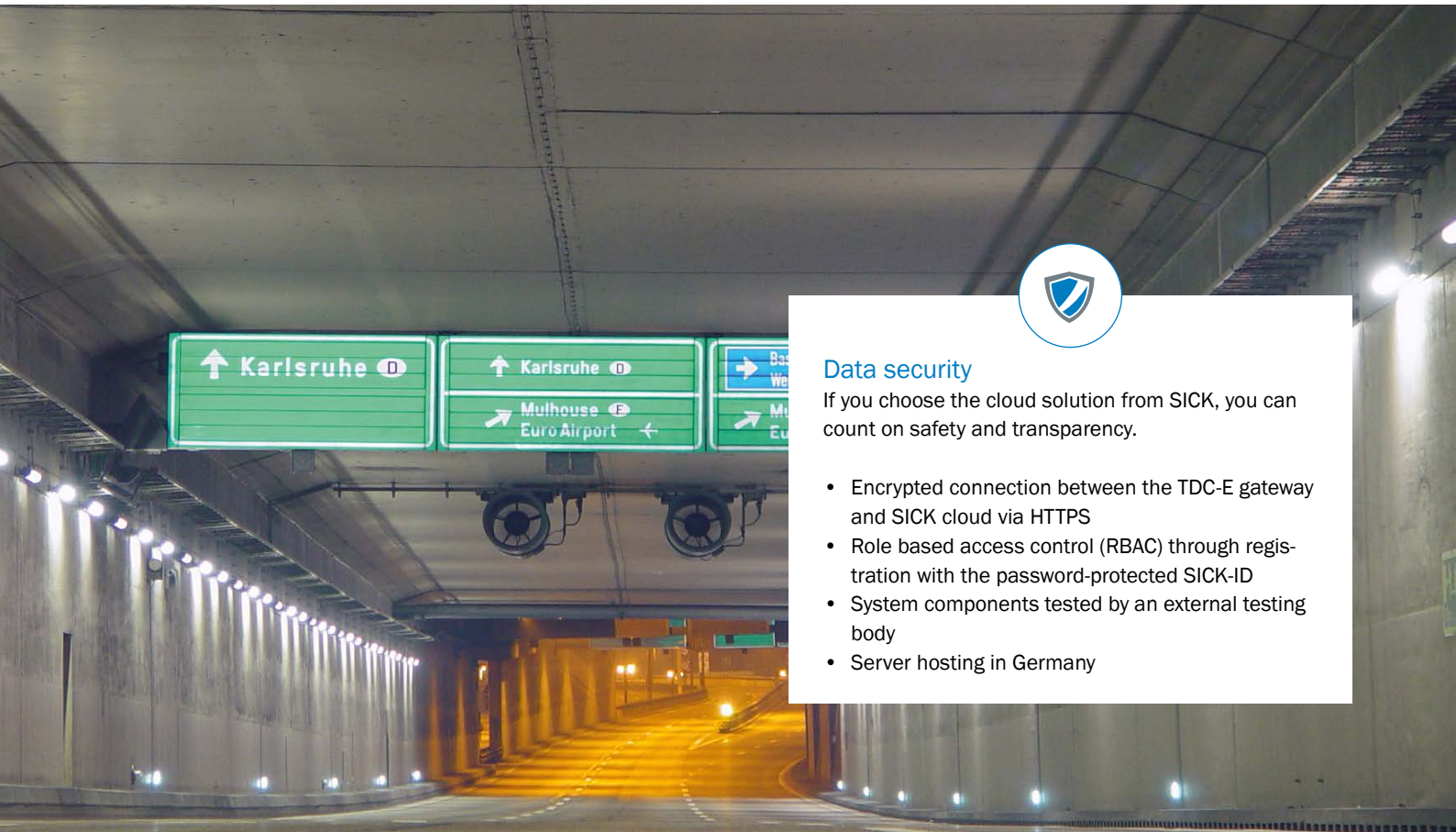
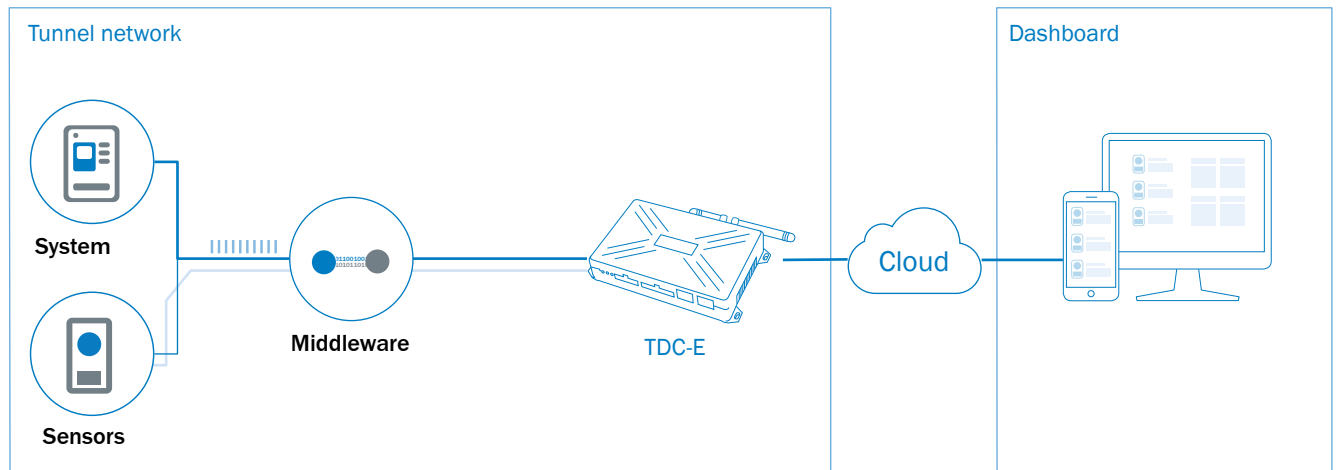
Increase in performance

You always operate your devices in the optimal performance range.

SECURE DATA SYSTEM

SICK provides gateways for the encrypted transmission of data to a server. Either the existing network structure in the tunnel can be used for this, or a method of transmission independent

of the tunnel network can be selected. In either case, a number of different IT security standards are employed to ensure a secure data transmission.



Data security

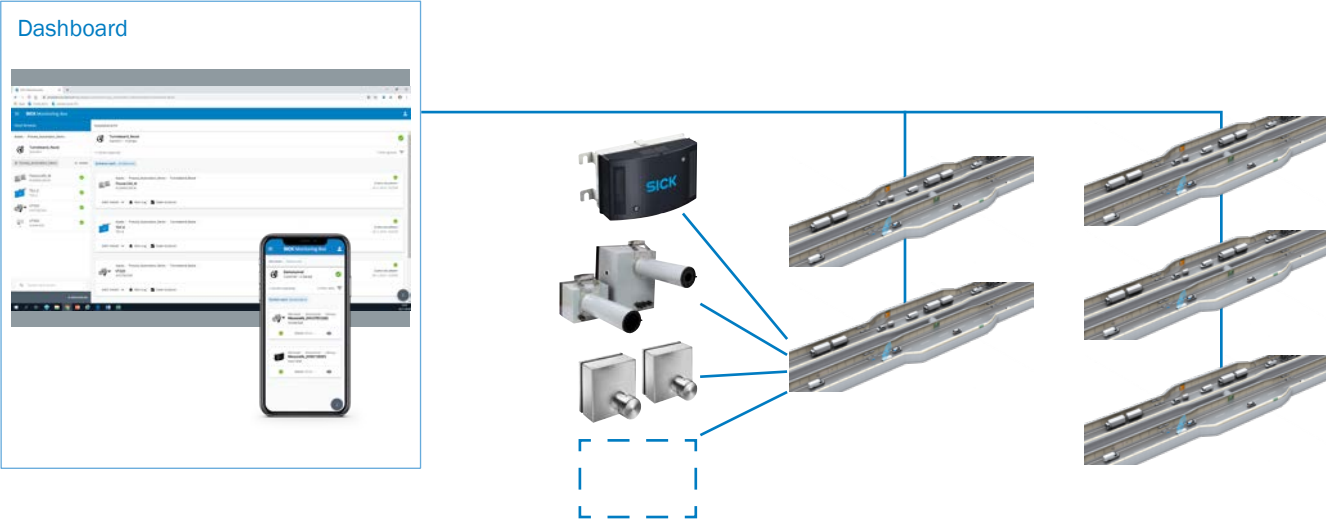
If you choose the cloud solution from SICK, you can count on safety and transparency.

- Encrypted connection between the TDC-E gateway and SICK cloud via HTTPS
- Role based access control (RBAC) through registration with the password-protected SICK-ID
- System components tested by an external testing body
- Server hosting in Germany

USE AND SCALABILITY

The Monitoring Box allows several tunnels in an area to be grouped together in a clear manner. The devices in a tunnel can be subdivided by ventilation sections.

The current tunnel measurement devices from SICK come with a data app and can be integrated with ease. The Monitoring Box also provides the ability to very easily add further sensors.



JUST A FEW STEPS TO A DIGITAL OVERVIEW



1 A SICK service employee installs and activates the gateway. Your devices are connected and data transmission begins immediately.

2 You register with your SICK ID and select the appropriate SensorApps according to the base device to start condition monitoring.

3 You get e-mail alerts if there are error messages, status changes or overshooting of limit values, meaning you can react quicker and easier.



Monitoring Service – device monitoring by SICK

The monitoring of your devices can, if you wish, be completely taken care of by SICK. SICK will perform all monitoring tasks for you as a part of your service contract. We not only monitor devices from the SICK product range, but also integrate third-party devices.




Forecasts for predictive maintenance

As soon as you have collected sufficient data using the Monitoring Box, you can analyze that data and use it for prediction purposes.

	 <p>VICOTEC320</p>	 <p>VICOTEC410</p>	
	For ventilation control and nitric oxide monitoring in road tunnels	For ventilation control in road tunnels	

Technical data overview			
Measurands	Visibility (K value), NO, NO ₂ , NO _x , CO, temperature	Visibility (K value), CO	
Measurement principles	Differential optical absorption spectroscopy (DOAS), transmittance measurement, electrochemical cell, resistance thermometer	Transmittance measurement, gas filter correlation	
Measuring ranges	K value: 0 ... 15 km ⁻¹ / 0 ... 200 km ⁻¹ NO: 0 ... 20 ppm / 0 ... 45 ppm NO ₂ : 0 ... 1 ppm / 0 ... 5 ppm CO: 0 ... 100 ppm / 0 ... 300 ppm Temperature: -25 ... +55 °C / -25 ... +75 °C	Visibility (K value): 0 ... 15 km ⁻¹ CO: 0 ... 300 ppm	
Ambient temperature	-20 °C ... +55 °C CO sensor: -10 °C ... +40 °C	-30 °C ... +60 °C	
Enclosure rating	IP69K	IP65	
Options	CO sensor	-	

At a glance			
	<ul style="list-style-type: none"> • Very low detection limits for NO and NO₂ • Automated function monitoring and self-adjustment • Very rugged design in stainless steel • Automated beam alignment between sender/receiver unit and reflector 	<ul style="list-style-type: none"> • AutoAdjust (automated adjustment function) • Contamination check • Menu-guided operation via control unit 	
			

Detailed information	→ www.sick.com/VICOTEC320	→ www.sick.com/VICOTEC410	
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VICOTEC450

Extractive visibility measurement for increased safety in tunnels



VISIC50SF

Early and reliable fire detection in tunnels



VISIC100SF

Modernizes the tunnel air quality measurement process

Visibility (K value) Light scattering forward	Visibility (K value) Light scattering forward	Visibility (K value), CO, NO, NO ₂ Light scattering forward, electrochemical cell
K value: 0 ... 15 km ⁻¹ / 0 ... 5,000 km ⁻¹ Temperature: -50 ... +250 °C	Visibility (K value): 0 ... 150 km ⁻¹ Temperature measurement (option): -30 ... +70 °C	Visibility (K value): 0 ... 15 km ⁻¹ CO: 0 ... 300 ppm NO: 0 ... 100 ppm NO ₂ : 0 ... 5 ppm
-30 °C ... +55 °C	-20 °C ... +55 °C	-20 °C ... +55 °C
IP66	IP6K9K / IP66	IP6K9K / IP66
Temperature measurement Interface module(s) I/O module(s)	Internal heating element Connection unit TAD Tunnel Adapter Device Temperature sensor	CO sensor NO sensor NO ₂ sensor Internal heating element TAD Tunnel Adapter Device Connection unit

- Regular function test with contamination measurement
- Linearity test can be carried out with filter set
- Internal purge air for long intervals between cleaning
- Maintenance signal (filter and cleaning)
- Logbook function
- Can be expanded with the addition of various interfaces or I/O modules (e. g., PROFIBUS, Ethernet, analog module, etc.)



→ www.sick.com/VICOTEC450

- Visibility (K value) measured according to the scattered light measurement principle
- Highly available – no moving parts
- Quick and reliable smoke detection
- Software developed in accordance with EN 61508 (SIL1)
- Low faulty alarm rate
- IP 6K9K enclosure rating due to rugged stainless-steel housing
- Fog evaporation through integrated heating element (optional)

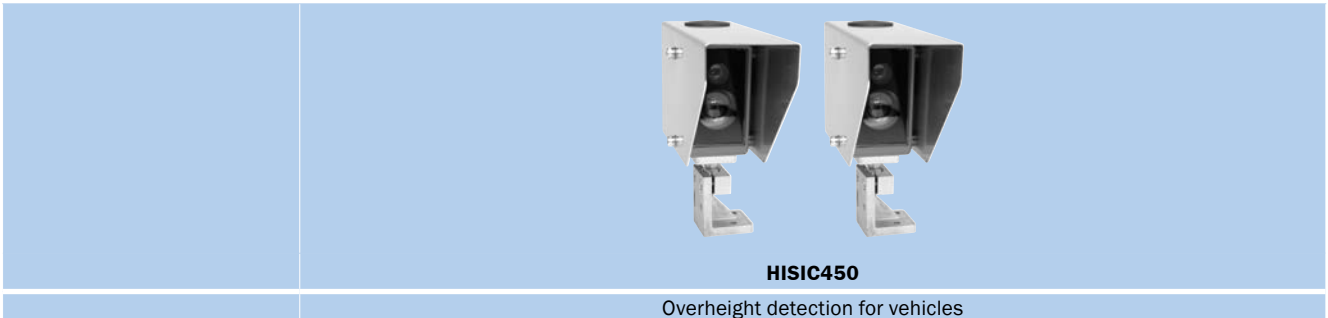


→ www.sick.com/VISIC50SF

- Visibility (K value) measured according to the scattered light measurement principle
- CO, NO, and NO₂ concentration measured using electrochemical sensors 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
- IP 6K9K enclosure rating due to rugged stainless-steel housing
- Fog compensation through integrated heating (option)



→ www.sick.com/VISIC100SF



Technical data overview	
Measurands	Overheight
Measurement principles	Dual photoelectric sensor
Ambient temperature	-25 °C ... +55 °C
Enclosure rating	IP67

At a glance

- Aluminum housing with anti-corrosion coating and high enclosure rating
- Built-in lens heaters to prevent condensation/icing
- Weather protection against snow, rain, and dust
- Accessories (weather hood, mounting bracket) made of stainless steel
- Adjustable sensitivity
- Ambient light immunity

**VISIC620**

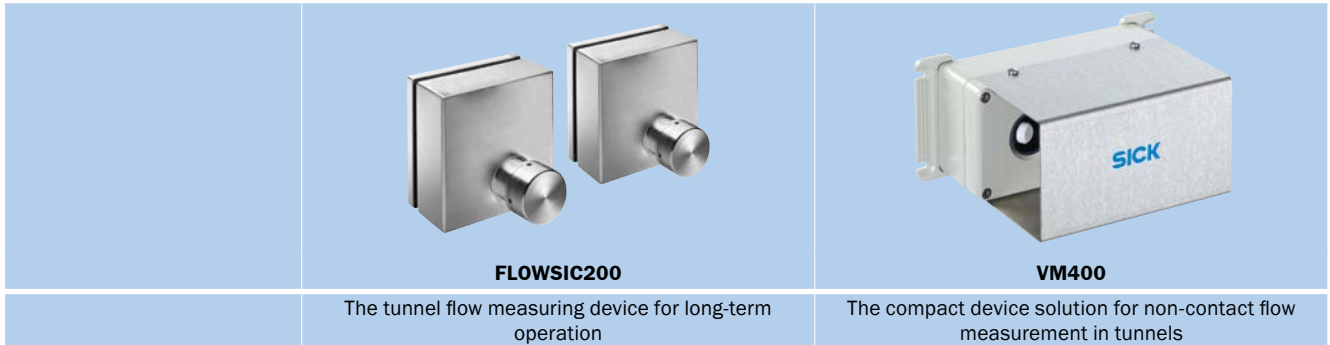
Visual range measurement for roads, tunnels, sea routes, and in weather stations

Technical data overview

Measurands	Standard visual range
Measurement principles	Light scattering forward
Measuring ranges	Standard visual range: 10 ... 500 m / 10 ... 16,000 m Freely configurable output range
Ambient temperature	-30 °C ... +55 °C
Enclosure rating	IP69K

At a glance

- Large measuring range for visibility
- Precipitation detector as an option
- Contamination check
- Minimum space requirements and low weight
- Self-sufficient design possible with solar panel and battery
- Rugged housing, even for salty air





Technical data overview		
Measurands	Flow velocity, flow direction, temperature	Air velocity, flow direction, temperature
Measurement principles	Ultrasonic transit time difference measurement	Ultrasonic transit time difference measurement
Measuring ranges	Flow velocity: 0 ... ± 20 m/s	Air velocity: -20 ... 20 m/s
Ambient temperature	-40 °C ... +60 °C	-30 °C ... +60 °C
Enclosure rating	IP66	IP66 / IP67

At a glance		
	<ul style="list-style-type: none"> • Very large measuring distances possible • Non-contact measurement • Extremely rugged components made of titanium, stainless steel, or die cast • Versions for very corrosive tunnel atmospheres • Determination of flow direction • No mechanical moving parts 	<ul style="list-style-type: none"> • Modern ultrasonic technology for non-contact measurement • Large measuring range • Compact device design • Very easy mounting and commissioning • Immune to contamination



Detailed information	→ www.sick.com/FLOWSIC200	→ www.sick.com/VM400
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	 <p style="text-align: center;">VHD</p>	 <p style="text-align: center;">Monitoring Box</p>
	<p style="text-align: center;">Prevent vehicle fires where they are at their most dangerous</p>	<p style="text-align: center;">Continuous state monitoring for measuring devices and sensors</p>
Technical data overview		
<p>Measurands</p>	<p>Vehicle class, vehicle segmentation, temperature distribution, and excess temperature by segment, ambient temperature Optional: Overheight, vehicle dimensions</p>	<p>The Monitoring Box is a browser application and enables visualization of sensor and machine data as well as diagnosis and monitoring of error states.</p>
<p>Measurement principles</p>	<p>2D LiDAR, infrared camera, CCD camera, PT1000, optional: through-beam photoelectric sensors</p>	<p>Condition monitoring for measuring devices and sensors with Ethernet-based communication interfaces.</p>
At a glance		
	<ul style="list-style-type: none"> • Fully automated measurement of overheated vehicles under free traffic conditions • Individual alarm thresholds for different vehicle parts • 3D visualization of hot spots on vehicles • Can be upgraded, for example, to include the detection of hazardous goods plates or overheight • Communication via TCP/IP interface • Reliable operation in all weather conditions 	<ul style="list-style-type: none"> • Visualization and evaluation of status data • Logbook for a clear overview and documentation of events • Configurable alarms • Presentation of limit value deviations • Can be done at the customer's site or in the SICK cloud • Can be used on mobile end devices • Password-protected access
<p>Detailed information</p>	<p style="text-align: center;">→ www.sick.com/VHD</p>	<p style="text-align: center;">→ www.sick.com/Monitoring_Box</p>



REGISTER NOW AT WWW.SICK.COM AND ENJOY THE FOLLOWING BENEFITS






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- ✔ Simple ordering and delivery tracking.
- ✔ Overview of all quotes and orders.
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- ✔ Simple reuse of previous orders.
- ✔ Convenient export of quotes and orders in the right format for your systems.



SERVICES FOR MACHINES AND SYSTEMS: SICK LifeTime Services

The sophisticated and versatile LifeTime Services perfectly complement SICK’s comprehensive product range. Services range from product-independent consulting to traditional product services.



- 
Consulting and design
 Secure and professional
- 
Product and system support
 Reliable, fast, and on-site
- 
Verification and optimization
 Safe and regularly tested
- 
Upgrade and retrofits
 Simple, safe, and economical
- 
Training and education
 Practical, focused, and professional

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:

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.

Detailed addresses and further locations → www.sick.com