



Gas monitoring in-situ

Air quality monitoring to improve safety in tunnels

Features

- Mounted directly in the tunnel's driving area
- Electrochemical sensing of the gas concentration
- Sensor cells for different gases: CO, NO, NO₂ and others
- Passive, analogue 2-wire transmitter 4-20 mA
- LCD to display measured value
- Membrane keypad
- Selectable measuring range
- Menu guided recalibration with zero and reference gas without the need to open the sensor housing
- Simulation of output values
- Stainless steel housing for wall or flush mounting
- Protection against splash water and water jets during tunnel wash events

System setup

- Electrochemical sensor in ABS plastic with display and membrane keypad
- Stainless steel housing for protection against splash water and water jets
- Connection either to tunnel control system, evaluation unit or visibility sensor

Operation

CO concentrations of over 50 ppm in breathing air lead after a short time lead to impacts well-being, concentration and health. To avoid such impacts by a proper ventilation CO concentration in the tunnel's driving area is monitored.

The sensor is directly mounted at the measuring point. Air is fed into an electrochemical gas sensor by a capillary. The CO gas reacts at the sensor's sensing electrode and a current proportional to the gas concentration is generated.

Given this current the sensor calculates the gas concentration and shows it on its display in ppm. The output current depends on the chosen measuring range and the measured gas concentration.

The sensor by a menu guided process can be recalibrated with zero and reference gas such that long time drift can be compensated.

Advantages

- Specifically developed for tunnel applications
- Durable, corrosion free stainless steel housing with protection against water jets occurring at tunnel wash
- Low maintenance requirements, stable and accurate
- Flexible integration into the tunnel control system
- Sensor cell can be recalibrated by a menu guided process

Application

Tunnels are important infrastructure elements in road networks and facilitate the connection of regions.

Environmental conditions in tunnels are influenced by fog, particles and emissions and need to be monitored to protect people on their passage through the tunnel from danger and impacts on their health. Accidents in tunnels, and particularly fires, can have dramatic consequences and can prove extremely costly in terms of human life, increased congestion, pollution and repair costs.

At every time people in the tunnel need to be supplied with breathable air and sufficient visibility.

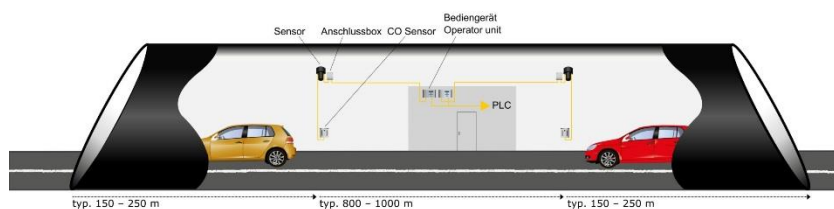
Since 1990 JES Elektrotechnik GmbH develops, installs and maintains systems to monitor air quality and lighting conditions in tunnels. Our systems are robust, durable and resistant against the corrosive atmosphere in a tunnel. They operate reliably and have a high accuracy in measurement.

All systems fulfil the requirements of the EC guideline 2004/54/EC (Minimum safety requirements for tunnels in the trans-European road network) and the more precise national guidelines and provisions:

- Austria: RVS 09.02 Tunnelausrüstung
- Germany: RABT Richtlinien für die Ausstattung und den Betrieb von Straßentunneln
- Switzerland: ASTRA Richtlinien und Fachhandbuch Betriebs- und Sicherheitsausrüstungen (BSA)

Our range of products for tunnel covers systems for monitoring of

- Toxic gases like CO, NO, NO₂ (extractive or in-situ)
- Visibility (extractive or in-situ)
- Air speed, direction and temperature
- Luminance (access, threshold and interior zone)
- Illuminance



Combined CO and visibility monitoring

Technical Specifications

Gas measurement	
Measuring method	Electrochemical gas analysis
Measured value	Gas concentration in ppm
Measuring range	Selectable, typically (default): 0 .. 300 ppm CO 0 .. 20 ppm NO ₂ 0 .. 50 ppm NO
Resolution	Optimised for measuring range, at least 1 ppm CO (500 ppm CO cell) 0.1 ppm NO ₂ (20 ppm NO ₂ cell) 0.5 ppm NO (250 ppm NO cell)
Long term drift	< 5 % per year
Accuracy	± 2 % end of measuring range
T90 time	< 30 s
Temperature range	-20 .. +50 °C, sensor temperature compensated
Pressure range	900 .. 1100 hPa
Humidity range	15 .. 90% relative humidity (non condensing)
Settling time	30 min

Sensor	
Type	t/ECS-A
Power supply	12 .. 36 VDC via current loop
Housing material	Stainless steel 1.4571 (AISI 316Ti) or 1.4404 (AISI 316L) optional 1.4547
Dimensions	200 (250) x 200 x 118,5 mm
Protection class	IP 66
Weight	approx. 3 kg
Analogue output	4 – 20 mA, 2-wire, passive

Conformities	
Electrical standards	2014/30/EC EMC directive 2014/35/EC Low voltage directive EN 61000-2 Electromagnetic immunity EN 61000-3 Emission limits EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements
Tunnel safety	AT: RVS 09.02.22 DE: RABT 2006 CH: ASTRA RL 13001, Fachhandbuch BSA
Gas monitoring	AT: ÖNORM M9418, ÖNORM M9419 DE: VDI 2053



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