

Visibility monitoring scattered light, in-situ

Air quality monitoring to improve tunnel safety

Features

- Mounted directly in the tunnel's driving area
- Extraction of air to be analysed by integrated suction pump
- Connection either to
 - Control unit for 1 sensor
 - Multichannel control unit for up to 8 sensors
 - Field bus system via bus coupler
- Visibility measurement using scattered light principle, optionally with integrated fog compensation
- Operating unit to display measured values and to provide signal outputs to the tunnel control system
- Delivered ready for operation

System setup

- Sensor to be mounted directly in the tunnel's driving area (either on wall or ceiling)
- Connection to control unit (power supply through system cable from control unit) or to field bus system via bus coupler (separate power supply of sensor necessary)
- Optional t/GAS-CO sensor connected to visibility sensor

Operation

Visibility monitoring is used to control the tunnel ventilation at normal operation. If and with how much power artificial ventilation by jet fans is operated depends on the measured visibility.

Visibility is stated in the form of an extinction coefficient that corresponds to the light attenuation caused by air pollution.

Air is extracted from the tunnel by the integrated suction pump and fed into the visibility sensor. The sensor then detects the intensity of light scattered at an angle of 30° by this sample and sets it into relation with the light passing through. The scattered light intensity is then multiplied by a factor to obtain the extinction coefficient.

Advantages

- Specifically designed for application in tunnels
- Single sensor pair instead of transmitter/receiver pair requiring exact alignment
- Effective fog compensation by optional heating
- Easy recalibration by recalibration plug
- Special air flow design keeps the optics clean and prevents drift
- Low maintenance requirements, stable, accurate
- Flexible integration into tunnel control system
- Optional combined monitoring of CO gas

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.

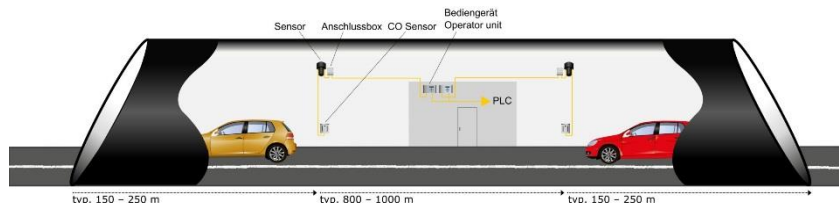
Since 1990 JES Elektrotechnik GmbH develops, installs and maintains systems to monitor air quality and lighting conditions in tunnels. Our systems are robust, durable and resistant against the corrosive atmosphere in a tunnel. They operate reliably and have a high accuracy in measurement.

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 in-situ CO and visibility monitoring

Technical Data

Visibility measurement	
Measuring method	30° scattered light intensity
Measured value	0 to 100 PLA
Measuring range	0 to 0,015 E/m
Resolution	< ± 0,25 % of end of measuring range
Air flow	5 l/min
Temperature range	- 20 °C bis + 50 °C

Sensor	
Model	VisGuard in-situ
Power supply	24 VDC via system cable to control unit
Material	Stainless steel 1.4435
Protection class	IP 65
Dimensions	Ø 209 x 367 mm
Weight	6,5 kg
Heating (optional fog compensation)	230 VAC; 25 W
Digital interface	RS-485 MODBUS RTU

Control unit for 1 sensor	
Model	SIREL
Power supply	85 to 264 V / 47 to 440 Hz
Power consumption	20 W
Material	Plastic (ABS)
Protection class	IP 65
Dimensions	200 x 157 x 96 mm 220 x 142 x 91 mm (Variant „robust“)
Weight	1,5 kg
Analogue output	0 / 4 – 20 mA
Digital interface	RS-485 MODBUS RTU
Contacts	2 configurable isolated contacts (250 V, 4 A)

Conformities	
Electrical standards	2006/95/EC Low Voltage Directive (LVD) 2004/108/EC Electromagnetic compatibility (EMC) IEC 61000-6:2001 IEC 61010-1:2001
Tunnel safety standards	AT: RVS 09.02.22 DE: RABT 2006 CH: ASTRA RL 13001, Fachhandbuch BSA



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