

# JES t/LUM-A luminance meter

## Features

• Photometer to measure the luminance in the
  ◦ Access zone L20 (acc. CIE 88:2004)
  ◦ Threshold zone Lth
  ◦ Interior zone Lin
• Zoom lens to adjust the focus areas
• Sensor with V(λ) filter and sili-con photo element
• Temperature compensated and long term stable amplifier for the photoelectric current using live zero
• Heated housing with protec-tion class IP65 either made of polycarbonate or stainless steel 1.4571
• Electronically controlled heat-ing and temperature monitoring
• Mounting flange to adjust hori-zontal and vertical angle
• Fault indication by relay isolat-ed contact (NC)
• Optional second output chan-nel for increased resolution at low lighting levels
• Surge protection

## System

• Photometer in camera housing (luminance meter) mounted on the tunnel wall or a pole in front of the tunnel portal
• Power supply 230 or 115 VAC
• Signal outputs connected to lighting control system or tun-nel control system

## Operation

The requirements for tunnel lighting are determined by the nature of the human eye. How well the eye recognises vehicles and other obstacles in a tunnel depends on the lighting and visibility as well as the reflexion characteristics of the road surface and the tunnel walls. Tunnel lighting needs to be adapted to these environmental conditions. The tunnel lighting must be controlled such that users, both during the day and by night, can approach, pass through and exit the tunnel without changing direction or speed with a degree of safety equal to that on the approach road. Especially the lighting of a tunnel entrance should be adequate to avoid the “black hole effect” when a driver enters the tunnel. Luminance is the measure representing what a human being perceives as brightness and as such is the main control variable for the tunnel lighting. The luminance photometer comes with a zoom lens that is focussed to measure the relevant area. Light from this area through the lens is directed to the photo element de-tecting its intensity. The integrated evaluation unit then calculates the luminance and provides it through the analogue output(s)

## Advantanges

• Specifically designed for tunnel applications
• Customisable measuring ranges
• No moving parts
• Sensor can be replaced easily without tools
• Housing resistant against cor-rosion, UV, oil und acid

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

# Technical Specifications

## Sensor device

| Sensor device smart/AQM (Basic variant) | |
|---|---|
| Type | smart/AQM |
| Variant | Basic (visibility only, no Ethernet connectivity) |
| Measuring method | Dual beam scattered light |
| Light source | Laser, class 2 in accordance with EN 60825-1<br>< 1 mW at 650 nm |
| Measured value | Scattered light intensity expressed as extinction coefficient, transmission, etc. |
| Measuring range | Configurable typically 0 .. 15 / km |
| Resolution | 0.001 / km |
| Accuracy | 0.01 / km |
| Power supply | 24 VDC ± 10 % |
| Current consumption | max. 800 mA (without heater) @ 24 VDC<br>max. 2 A @ 24 VDC (with heater) |
| Appliance class | Class III (PELV) |
| Material | Stainless steel 1.4404 (AISI 316L) |
| IP rating | IP 69 |
| Dimensions | 300 x 220 x 100 mm |
| Weight | approx. 5.8 kg |
| Analogue/relay outputs (standard) | 3 x 4 – 20 mA (2-wire, active)<br>3 x SPST-NO (max. 60 VDC / 25 VAC, max. 0.5 A) |
| Temperature range | -40 .. +60 °C |
| Pressure range | 640 .. 1060 hPa |
| Humidity range | 0 .. 100% relative humidity (non-condensing) |
| Storage temperature | -40 .. +85 °C (without gas sensor modules) |

| Luminance meter with 1 analogue output | |
|---|---|
| Model | t/LUM-A1 |
| Measured value | Luminance |
| Measuring range | Customisable (to be specified with the order)<br>typically 0 .. 10,000 cd/m², 0 .. 6,000 cd/m² (for $L_{20}$) or 0 .. 10 cd/m² (for $L_{fi}$) |
| Angle of view | 8° .. 34° |
| Analogue output | 1 x 4 – 20 mA |
| Relay contact | 1 x operation (closed) / fault (open) |
| Operating voltage | 230 VAC or 115 VAC ± 10 %<br>50/60 Hz ± 10 % |
| Power consumption | approx. 50 W |
| Overvoltage protection | varistors (mains)<br>surge arrestor and varistors (meassurand output) |
| Dimensions | 180 x 180 x 445 mm (stainless steel)<br>~~245 x 180 x 485 mm (polycarbonate)~~*<br>without mounting flange |
| Protection class | IP 67 |
| Materials | Stainless steel 1.4404 (AISI 316L) or 1.4571 (AISI 316Ti)<br>~~Polycarbonate MAKROTECH UV®~~*<br>ZTV-ING Anforderungsklasse I (all of the above)<br><br>Custom-made: Stainless steel 1.4547 (AISI 254SMO)<br>ZTV-ING Anforderungsklasse II |
| Weight | Luminance meter: 9.6 kg (stainless steel)<br>Mounting console: 4.0 kg |
| Temperature range | -40°C ... +70°C |

* currently not available

Luminance meter with 1 analogue output

| | |
|---|---|
| Model | t/LUM-A2 |
| Measured value | Luminance |
| Measuring range 1 | Customisable (to be specified with the order)<br>typically 0 .. 500 cd/m² (example for $L_{fe}$ at daytime) |
| Measuring range 2 | Customisable (to be specified with the order)<br>typically 0 .. 50 cd/m² (example for $L_{fe}$ at night) |
| Angle of view | 8° .. 34° |
| Analogue output | 2 x 4 – 20 mA |
| Relay contact | 1 x operation (closed) / fault (open) |
| Operating voltage | 230 VAC or 115 VAC ± 10 %<br>50/60 Hz ± 10 % |
| Power consumption | approx. 50 W |
| Overvoltage protection | varistors (mains)<br>surge arrestor and varistors (meassurand output) |
| Dimensions | 180 x 180 x 445 mm (stainless steel)<br>~~245 x 180 x 485 mm (polycarbonate)~~*<br>without mounting flange |
| Protection class | IP 67 |
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## Conformities

| Conformities and applied standards | |
|---|---|
| Markings | |
| EU guidelines | 2014/30/EU EMC directive<br>2014/35/EU Low voltage directive |
| Harmonised standards | EN 61000-2 Electromagnetic immunity<br>EN 61000-3 Emission limits<br>EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use<br>EN 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements |
| Tunnel safety | RVS 09.02.41 2014<br>RABT 2006 |
| Lighting standards | CIE 88:2004<br>CEN report CR14380 |