

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 silicon photo element
• Temperature compensated and long term stable amplifier for the photoelectric current using live zero
• Heated housing with protection class IP67 made of stainless steel 1.4404 or polycarbonate (optional)
• Electronically controlled heating and temperature monitoring
• Mounting flange to adjust horizontal and vertical angle
• Fault indication by relay contact (NC)
• Optional second output channel 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

Luminance meter with 1 analogue output	
Model	t/LUM-A1
Measured value	Luminance
Measuring range	Customisable (to be specified with the order) 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 % 50/60 Hz ± 10 %
Power consumption	approx. 50 W
Overvoltage protection	varistors (mains) surge arrestor and varistors (analogue output)
Dimensions	180 x 180 x 445 mm (stainless steel) 245 x 180 x 485 mm (polycarbonate) without mounting flange
IP rating	IP 67
Materials	Stainless steel 1.4404 (AISI 316L) or 1.4571 (AISI 316Ti) Polycarbonate MAKROTECH UV® (on request if Class II appliance is required) ZTV-ING Anforderungsklasse I (all of the above) Custom-made: Stainless steel 1.4547 (AISI 254SMO) ZTV-ING Anforderungsklasse II
Weight	Luminance meter: 9.6 kg (stainless steel), 6.2 kg (polycarbonate) Mounting console: 4.0 kg
Temperature range	-40°C ... +70°C

Luminance meter with 2 analogue outputs	
Model	t/LUM-A2
Measured value	Luminance
Measuring range 1	Customisable (to be specified with the order) typically 0 .. 500 cd/m² (example for L_{fe} at daytime)
Measuring range 2	Customisable (to be specified with the order) 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 % 50/60 Hz ± 10 %
Power consumption	approx. 50 W
Overvoltage protection	varistors (mains) surge arrestor and varistors (analogue output)
Dimensions	180 x 180 x 445 mm (stainless steel) 245 x 180 x 485 mm (polycarbonate) without mounting flange
IP rating	IP 67
Materials	Stainless steel 1.4404 (AISI 316L) or 1.4571 (AISI 316Ti) Polycarbonate MAKROTECH UV® (on request if Class II appliance is required) ZTV-ING Anforderungsklasse I (all of the above) Custom-made: Stainless steel 1.4547 (AISI 254SMO) ZTV-ING Anforderungsklasse II
Weight	Luminance meter: 9.6 kg (stainless steel), 6.2 kg (polycarbonate) Mounting console: 4.0 kg
Temperature range	-40°C ... +70°C

Conformities

Conformities and applied standards	
Markings	
EU guidelines	2014/30/EU EMC directive 2014/35/EU Low voltage directive
Harmonised standards	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	RVS 09.02.41 2014 RABT 2006
Lighting standards	CIE 88:2004 CEN report CR14380