



LUMINANCE PHOTOMETER

# SFLINT

**MEASUREMENT AND CONTROL  
SYSTEM FOR TUNNELS LIGHTING**

**sifisa**

[www.sifisa.es](http://www.sifisa.es)

c/criba 17 - 47193 cistérniga (valladolid)  
tel. 983 37 10 29 / 692 484 525  
e-mail: [info@sifisa.es](mailto:info@sifisa.es)



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## INTRODUCTION

Luminance measurement system and control system for tunnels lighting developed by SIFISA Ingeniería Electrónica e Informática, S.L., by means of modularity exemplify the ability to set up its main parameters and the ability to specific application's demands, all of which signify the right complement for projects based on Tunnels Lighting allowing to the user to guarantee a suitable visibility degree.

To control the required level of luminance at the threshold zone in practice, a luminance photometer with a measurement field of 20 degree must be used, centered in the top of the tunnel portal and sited at a stop distance, in front of the tunnel portal.

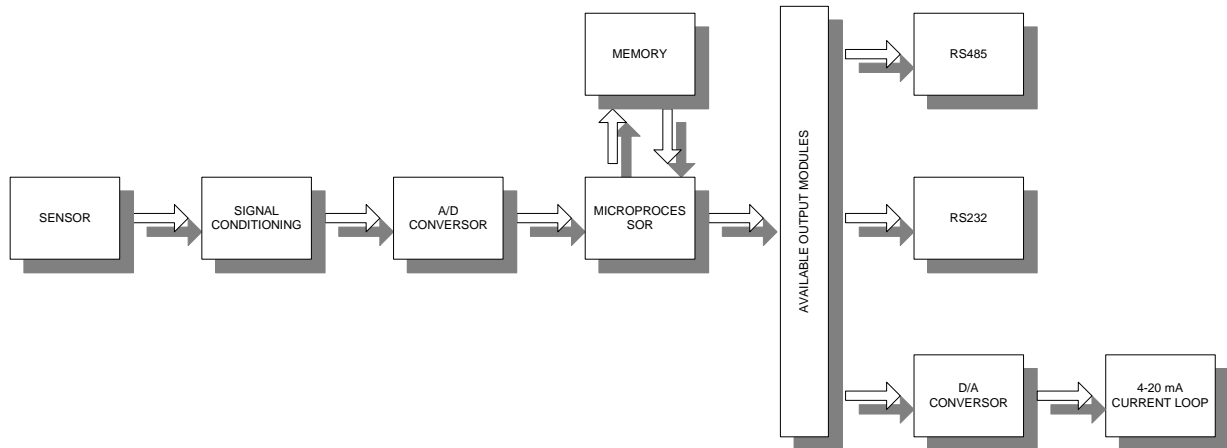
This is the task of luminance photometer developed by SIFISA: to find the average luminance measure, its conversion to digital values and its transmission to the register and control system.

## SENSOR FEATURES

Strictly, this is a luminance photometer of a 20 degree average value in the cone, according to CIE normative, inserted in an aluminum casing with adjustable mount in elevation and azimuth. To avoid windows or internal optics misting the sensor has available an internal heating system with connecting and disconnecting values of 10 and 25 degree centigrade respectively.

The luminance photometer is arranged with the adequate optics for the 20-degree cone measure, a silicon photo detector of a spectral curve closely eye-shaped, conditioning electronics of highly sensitive signal and twelve bits analog-to-digital converter. The output interface offers different options:

- SFLINT-485: Digital series of two wires in standard RS-485. This connection allows the configuration of a multiple sensors bus which may be run by same control unit as long as the specified maximum dimension is not exceeded.
- SFLINT-232: Digital series of three wires in standard RS-232. Usually it is used at short distances or in case the luminance photometer is intended to be connected straight to the computer.
- SFLINT-C: Analog in 4-20mA current loop. Receives the voltage supply from the current loop itself.



The equipment contains a microcontroller capable of calibrate and edit the measures as they are being obtained from the sensor.

In digital models, luminance instant values are included during the programmed cycle time to obtain the average value of this magnitude which allows avoiding lighting vibrations produced by measure irregularities as a result of transitory external conditions (glints, clouds that briefly block the sun etc...)

The control system (PLC) may question each sensor about instants as well as average measures.

In the analog model the response time lasts 1 second, thought in case of sudden variations of luminance the time may reach a 5 seconds period. If this happens, the equipment automatically adjusts the gain scale to the average magnitude and repeats the measure while keeping the last value.

## CONTROL UNIT

The control system of SFLINT luminance photometers is based on a Siemens PLC. It will question every equipment about its average luminance measures and, as a function of these values, activate or deactivate different illumination levels.

At start up, PLC will check the communication with SFLINT-485 luminance photometers (RS-485), that could be 1 or 2, and cycle time for average luminance is programmed. If there is any problem with communications, a

PLC contact is activated. The program will continue its execution if there is almost one luminance photometer working.

The PLC reads average luminances, which allows avoiding lighting vibrations produced by measure irregularities as a result of transitory external conditions: glints, clouds that briefly block the sun, etc...

As a function of these luminances, up to 6 contacts per equipment are switched on/off depending on preset luminance values for different illumination levels: day, night, cloudy day, etc.

This equipment is optional and independent of SFLINT luminance photometers.

## MAINTENANCE AND CARE

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There is no need for a special care action, except for periodic cleaning of exterior casing's window. You should only use water and neutral detergent.

Do not ever use abrasive products neither sharp objects.

In preventive maintenance you should include connections checking and correct operating of internal heater.

Equipment calibration must be done in SIFISA facilities, however, due to the stability of components can be done every 5 years.

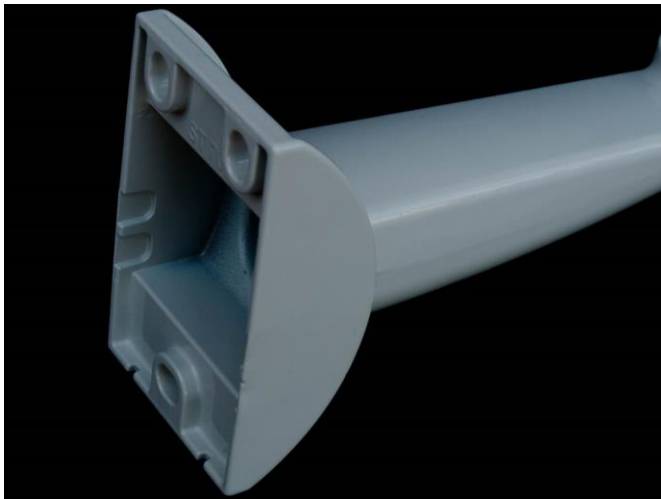
## SYSTEM DIAGRAM

Regarding this matter, the mains supply and the transceiver cable, which complies with the selected standard, must reach the luminance photometer establishing the link with PLC or control element sited in the plugboard.



The luminance photometer should be placed at stopping distance from tunnel entrance. It is usually fixed to a luminaire column at 4 or 5 meters high.

## ASSEMBLY INSTRUCTIONS



The unit is supplied with one arm for wall mounting. The image shows the side areas where the base can be opened for cables, both power and the current loop or communications.

If you want to be attached to a pole, also includes an adapter consisting of two pieces joined by paths threaded rods, which allows adaptation to any pole diameter goes from 50 to 140 mm.



The arm is attached to the pole adapter and, as can be seen, there is a hole in the base through which cables can pass.

For any operation inside the cabin of the luminance photometer must be verified that the power is cut.

Fig. 1

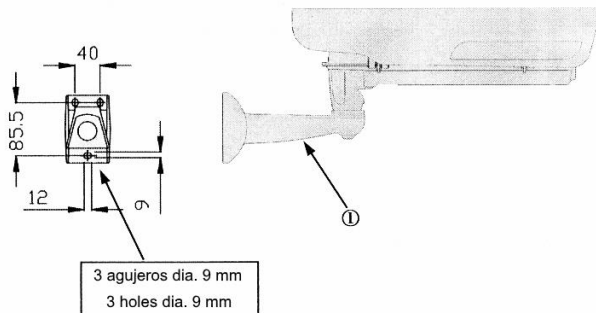


Fig. 2

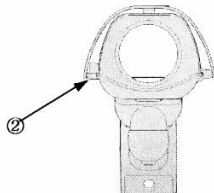
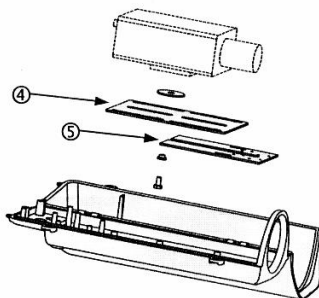
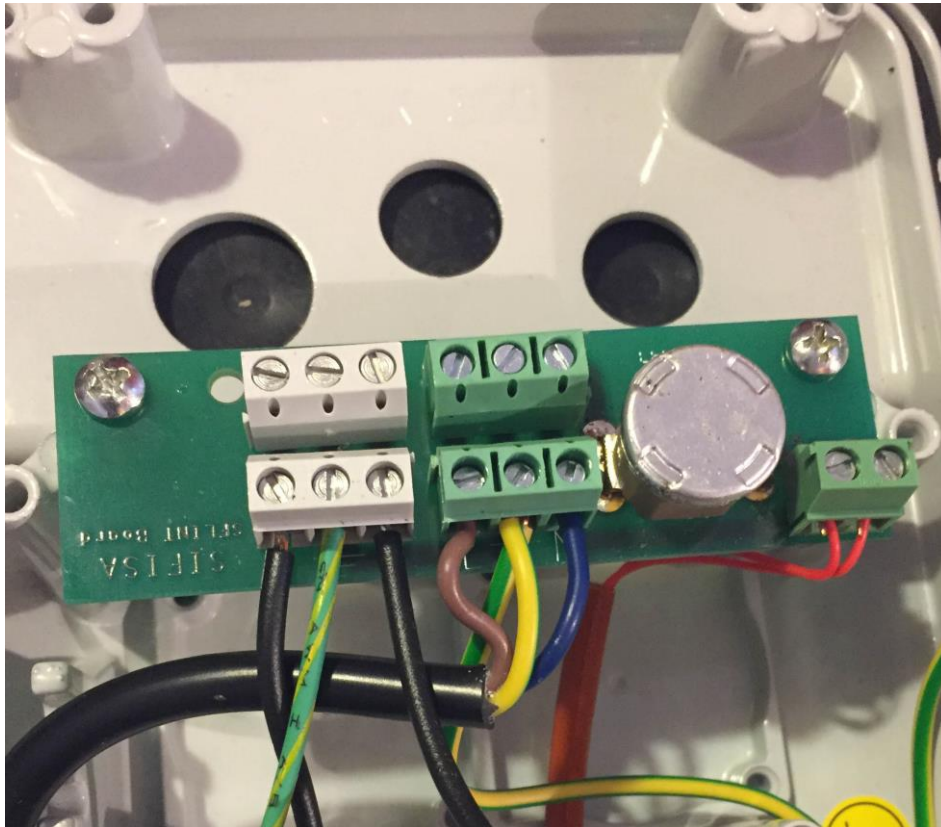


Fig. 3



- a) Fix the support (Fig. 1) in the desired position using the supplied 8 mm diameter screws.
- b) Unscrew the two screws on the left side of the housing (Fig. 2) and proceed with the opening. The upper lid rotates 180° by means of a hinge.
- c) Pass the cables through the support (Fig. 1).
- d) Make the electrical connections (see the diagram on the next page), paying attention to the silkscreen on the board.
- e) If you need to remove the luminance meter, loosen the 4 locking screws on the internal slide and remove it by sliding it slightly towards the back (Fig. 3).
- f) Install the luminance photometer in the desired position, fixing it with the appropriate screw and the insulating washer (Fig. 3), then replace the internal plate (4) and fix the four screws.
- g) Make the electrical connections between the luminance meter and the supply circuit, taking special care not to interchange the power lines (green connectors) and the data lines (gray connections).
- h) Close the housing in the reverse order to the opening and tighten the two screws on the left side. Then tighten the cable glands well.





## CONNECTIONS

Inside the outer casing, where luminance photometer is placed, there is a backplane. The terminals at the bottom of the image are pre-wired from our facilities.

Those on the top are the ones that should be handled at the final installation.

The 230 VAC @ 50-60 Hz should be placed in the green terminal of three contacts, screen-printed as "L-Earth-N". It should be as applicable regulations Low Voltage. We will also need to install a circuit breaker protection.

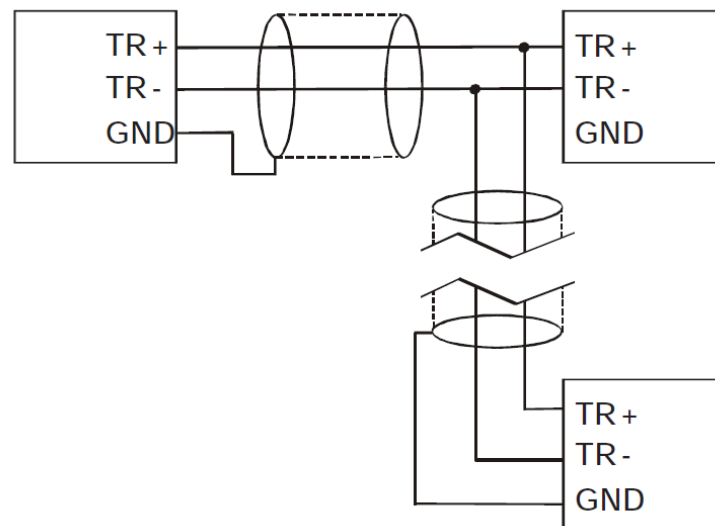
As for the data line, it should be set at the terminal screen-printed as "+ Earth -", taking into account the positive and negative positions.

A shielded twisted pair should be used for digital communications (SFLINT-485), for example BELDEN 9841. Main characteristics are:

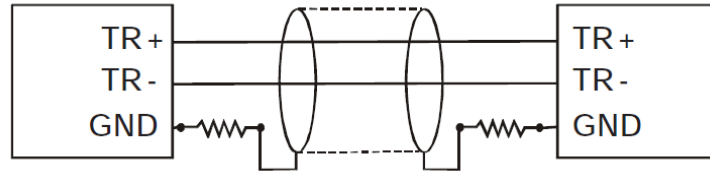
Wires:	Shielded twisted pair
Loop resistance:	< 115 $\Omega$ /km
Capacitance:	30 pF/m
Nominal impedance:	Aprox. 135 $\Omega$ to 160 $\Omega$ (f: 3 MHz to 20 MHz)
Attenuation:	0.9 dB/100 m (f: 200 kHz)
Section:	0.3 mm <sup>2</sup> to 0.5 mm <sup>2</sup>

The RS485 standard uses differential transmitters and receivers, i.e. they do not need to have a reference to ground. The ground wire connection is made only when the ground difference between devices is very large or to improve insulation against noise. However, certain precautions must be taken before making this connection, as the union of earth cable between devices of the line can generate significant current flow, due to different ground potentials that may exist between these devices.

To solve this problem, you can connect the ground wire to a single device or connect it to everyone, but with a series resistor of 100  $\Omega$  or more.

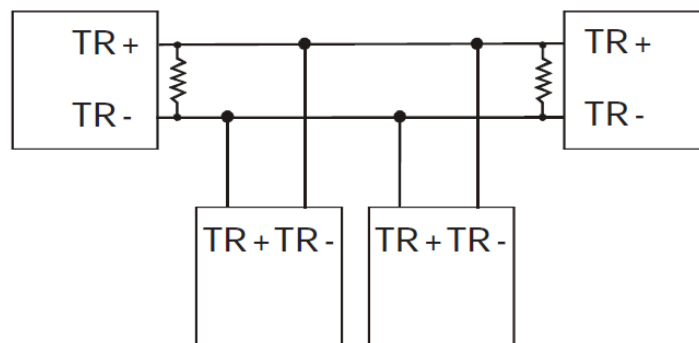


**Ground connection to one device**



**Ground connection through resistor**

In addition, the RS485 standard also states that termination resistors should be placed at both ends of the transmission-reception line, and the same impedance of the line ( $120 \Omega$ ). This is done to avoid unwanted reflections or echoes that may disrupt or distort the information.



**End resistors connection**

For connection to the mains must comply with regulations applicable to Low Voltage. We will also need to install a circuit breaker protection.

It is recommended the installation of surge protective devices in power and communication lines.

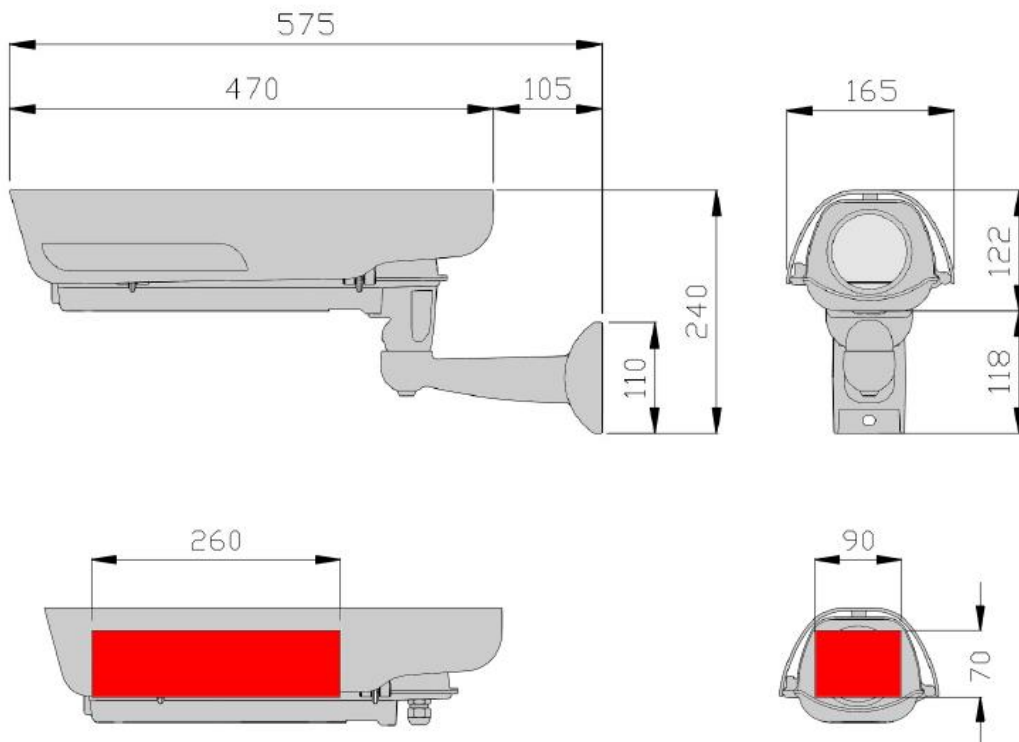
## TECHNICAL SPECIFICATIONS OF SFLINT SENSORS:

Power supply:	230 VAC @ 50-60 Hz / 0.2 A
Temperature range:	From -40° C to +70° C.
Box:	Aluminum, with sunshield in technopolymer UV.
Mount:	Included. Adjustable in elevation and azimuth.
Protection:	IP-66
Rangeability:	0 - 500 cd/m <sup>2</sup> (Interior model) 0 - 60000 cd/m <sup>2</sup> (Exterior model) Ready to be adjust to particular needs in calibration stage
Warranty:	2 years
Price:	Contact us.

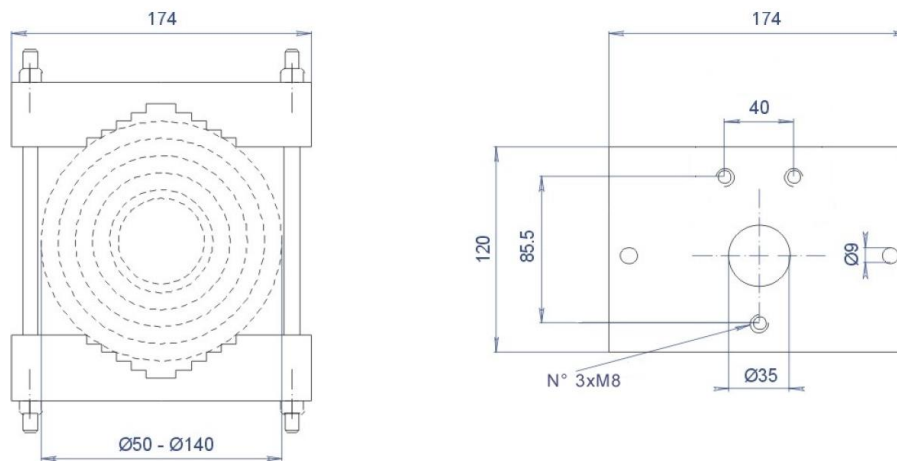
## TECHNICAL SPECIFICATIONS OF MODEL SFLINT-485

Output signal:	Digital 2 wires. RS-485
Output signal maximum range:	1000 m
Parameters:	1200 bauds, 8 bits data bits, 1 stop bit, no parity.
Protocol:	See specific document
Integration time:	1-60 minutes (5 minutes at switching on)
Wires:	Shielded twisted pair. Impedance: 120Ω (BELDEN 9841)

## DIMENSIONS



Pole adapter:



the values are in millimeters

For any question or doubt, further explanation on characteristics or particular requirements of designs, please contact us at:

SIFISA Ingeniería Electrónica e Informática, S.L.U.

Phone: 34 - 983371029

34 - 692484525

E-mail: [info@sifisa.es](mailto:info@sifisa.es)

The specifications and design of this product are subject to change without notice, due to improvement.

**DECLARACIÓN DE CONFORMIDAD  
DECLARATION OF CONFORMITY**

Nombre del fabricante:  
Manufacturer's name: SIFISA S.L.U.  
C/Criba 17.  
Dirección:  
Manufacturer's Address: 47193 - Cistérniga (Valladolid)  
Tlf: +34 983 371 029  
e-mail: [info@sifisa.es](mailto:info@sifisa.es)  
CIF: B47328943

**Declaramos bajo nuestra exclusiva responsabilidad la conformidad del producto:**

***Declare under our sole responsibility that the product:***

Luminancímetro SFLINT, modelos SFLINT-c y SFLINT-485  
SFLINT Luminance Photometer, models SFLINT-c and SFLINT-485

**al que se refiere esta declaración, con las normas:**

***which this declaration relates to standards:***

UNE-EN 61326: Material eléctrico para medida, control y uso en laboratorio.  
UNE-EN 61010-1: Requisitos de seguridad de equipos eléctricos de medida, control y uso en laboratorio. Parte 1: Requisitos generales.

**de acuerdo con las disposiciones de la Directiva 99/05/CE, del Parlamento Europeo y del Consejo de 9 de marzo de 1999, transpuesta a la legislación española mediante el Real Decreto 1890/2000 de 20 de noviembre de 2000.**

***in accordance with the provisions of Directive 99/05/CE of the European Parliament and Council of March 9, 1999, transposed into Spanish law by Royal Decree 1890/2000 of November 20, 2000.***

**Valladolid, mayo de 2001**

**Enrique Manzano  
SIFISA, S.L.U.**