

### ELECTRONSYSTEM MD TECHNICAL SHEET

Revision C of 25 July 2024

#### APPLICATIONS

- Prevent internal arc in MV HV switchgear or transformers
- Selective fault detection for fast plant recovery

#### HIGHLIGHTS

- Remote indication by change-over contact for fault condition
- Local fault indication by LEDs on the front of device for quick verification
- Three independents channels to cover the three compartments of a typical switchgear
- Optical fiber sensor up to 10 meters to allow very fast and safe response
- IR and visible radiation sensitivity choice to adapt to dark or open environments
- Very cost effective
- Suitable for GIS with adapter kit PLUG797
- Optional changeover contact for auto-diagnostic
- Dip-switches for selection of operational mode



LAD/HS/3/805



LAD/HS/3/805/P

## APPLICATIONS

The majority of faults in medium or low voltage switchgears are accompanied by an electric arc, which causes significant damage to equipment and is a great hazard to human life. Breaking a fault within up to 100 ms enables the avoidance of most serious damage to equipment and decreases a hazard to people in the vicinity of the place of fault occurrence. In case of long duration of the fault it comes to dangerous bodily injuries (burns, loss of eye-sight) including the loss of life. Besides, it comes to an irreversible and often complete damage to the switchgear.

Because of serious hazards both to people and equipment, according to the regulations of the European countries, in the standards: IEC 364-4-42:1980, IEC 298:1998+AC:1995, IEC 1330:1995 and IEC 439-1+AC:1994, it is recommended to undertake effective protective measures in medium and low voltage switchgears as well as in transformer stations to reduce the effects of arc faults. The fibre optic arc protection system type LAD localises arc fault at once. Considering the time of operation of the presently used circuit breakers (30-50 ms), the protection system type LAD guarantees that the switchgear or its concrete bay will be switched off within up to totally 60 ms thus reducing to minimum the effects of arc faults.

Moreover, to the unique features of arc protection system type LAD there should be included: possibility of selective tripping off the bay where the fault has occurred (LAD Arc Protection System).

Use of a single LAD is able to cover the whole cabinet of a typical switchgear: cable compartment, circuit breaker and bus-bar compartment are completely monitored and remotely selected by optical cables.

Equipping a switchgear or a transformer station with the arc protection system type LAD is an optimum way to meet the requirements of appropriate standards in the scope of assuring the protection of the servicing personnel and equipment against damaging effects of arc faults.

## FUNCTIONS

Light arc detector, LAD, has up to three independent channels suitable for fault arc detection. Each channel has a changeover contact for remote control. On the front of the device you have green leds for local indication of channel ready to react.

Total response time from arc detection to contact activation is less than 10 msec.

Arc detection is made by optical receiver sensible to IR radiation and the arc light is captured by optical plastic fiber inserted into the tank in order to obtain simple cabling between the part under control and LAD device.

The contact of relay subsequently an arc fault changes its state and remains in that situation for 200ms to allow the switch-gear opening.

The device was tested in accordance to IEC 60255-27 to guarantee the ultimate standard compliance to most severe worldwide requirements for safety devices.

**IMPORTANT: for avoiding false tripping the contact of LAD must be always conditioned by overcurrent relay to be sure to distinguish a real potential fault arc from a pure operational arc or flash or sun radiation. Moreover is compulsory to connect to the ground the metal frame as per indicated in the drawing**

## KIT ASSEMBLIES

N°1 LAD/HS/3/805 (multi range voltage 24-230Vdc/Vac)

N°3 OPTICAL CABLE LAD/HS dwg. 43931143 (standard length 1500 or 3000mm)

N°1 LAD CABLE dwg. 43922259 LX=3000mm

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**Technical features**

Rated input voltage :.....24÷220 VDC  
 .....24÷230 VAC  
 Input :..... optical flash visible peak  
 Optical link: FOP (optical plastic fiber):.....1mm core  
 .....2,2mm external cladding  
 Radiation filter:.....Infrared plastic lens  
 Max distance link:.....10m  
 Temperature range :..... -30°C ÷ 70°C  
 IP degree protection :.....IP64(\*)  
 ..... output connector IP30

Relays features

Contact material :.....AgCdO  
 Rated current /Max peak current: .....6/15A  
 Rated voltage/Max switching voltage:.....250/400 VAC  
 Rated load AC1:.....1500VA  
 Rated load AC15 (230VAC):.....250VA  
 Single phase motor rating (230VAC):.....0.185kW  
 Breaking capacity DC1 30/110/220V:..... 3/0.35/0.2A  
 Minimum switching load:.....500(10/5) mW(V/mA)  
 Mechanical life AC/DC:.....-/20\*10<sup>6</sup> cycles  
 Electrical life at rated load AC1: ..... 100\*10<sup>3</sup> cycles  
 Insulation between coil and contacts:.....5kV  
 Dielectric strength between open contacts:.....1000VAC  
 Vibration resistance(5-55)Hz,max +/-1mm: .....10g  
 Shock resistance:.....20g

**Material**

External box :..... Insulating Material  
 Filling Material :.....Polyurethan resin (2-component)  
 Connection input :.....snap-in optical fiber connector  
 Output :.....MOLEX MINI FIT 12 poles connector

**Directives and standards applicable**

EMC directive :..... 2004/108/EC  
 RoHS directive :..... 2002/95/EC  
 Low voltage directive: .....2006/95/EC  
 EN 55011: .....(ISM) radio-frequency equipment  
 EN 61000-4-2: .....Imm. to electrostatic discharge (ESD)  
 EN 61000-4-3: .....Imm. to radiated RF electromagnetic fields  
 EN 61000-4-4:.....Imm. to electrical fast transients - Burst  
 EN 61000-4-5: .....Immunity to Surge  
 EN 61000-4-6: .....Imm. to induced by RF fields  
 EN 61000-4-11: .....Imm. to voltage dips and short interruptions  
 EN 61000-6-2:2005: .....(EMC) - Industrial emission  
 EN 61000-6-3:2007: .....(EMC) - Residential emission  
 EN 61000-3-3:2002: .....(EMC) - Flicker

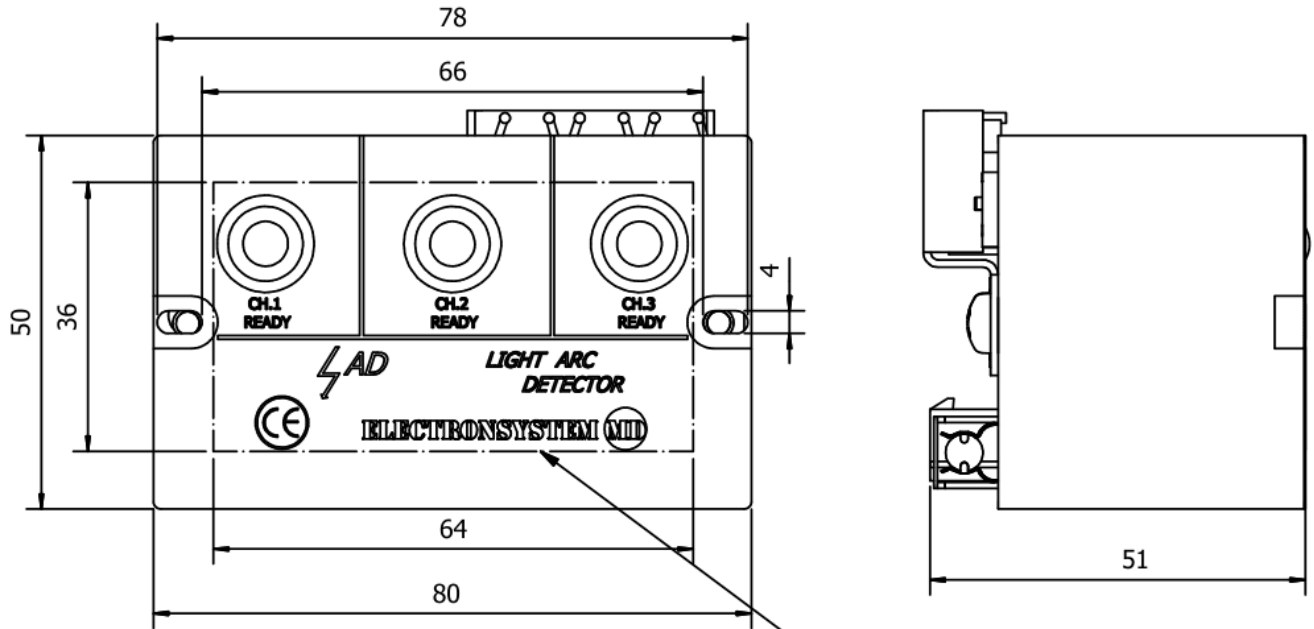
All specs are subject to change without notice

#### ELECTRONSYSTEM MD TECHNICAL SHEET

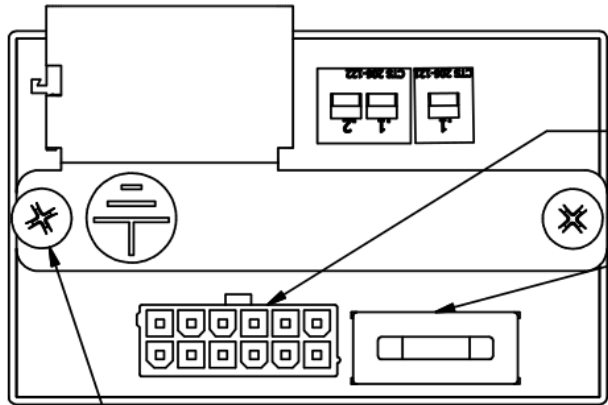
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LAD/HS

Drawing:  
43911758



Drilling template of front panel



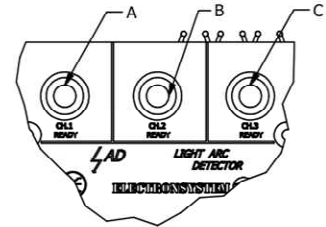
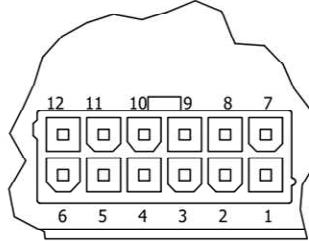
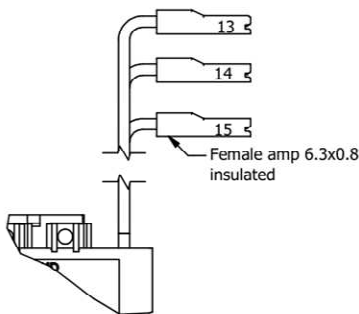
Electrical connector for wiring connection  
(43922259 optional)

1,6A fuse for overload protection

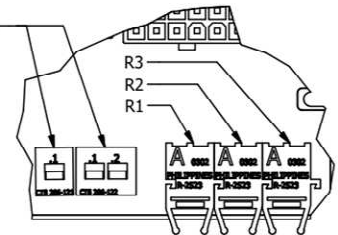
Connect here a ground cable with eyelet Ø5mm

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Dip-switches for functions selection



ORDERING CODE:

Code: LAD/HS/□/□/□/□/□

P: WITH PLATE dwg 43931313  
(page 6)

DI : special version, with diagnostic  
changeover contact (13,14,15)

group 805 : auxiliary power voltage 24÷220 Vdc  
±15% and 24÷230 Vac ±15% 50Hz

1 : 1 changeover contact  
2 : 2 changeover contacts  
3 : 3 changeover contacts (default)

DESCRIPTION:

A : Green Led - Channel 1 ready

B : Green Led - Channel 2 ready

C : Green Led - Channel 3 ready

R1 : Optical input channel 1

R2 : Optical input channel 2

R3 : Optical input channel 3

1 : Power (+)

7 : Power (-)

7

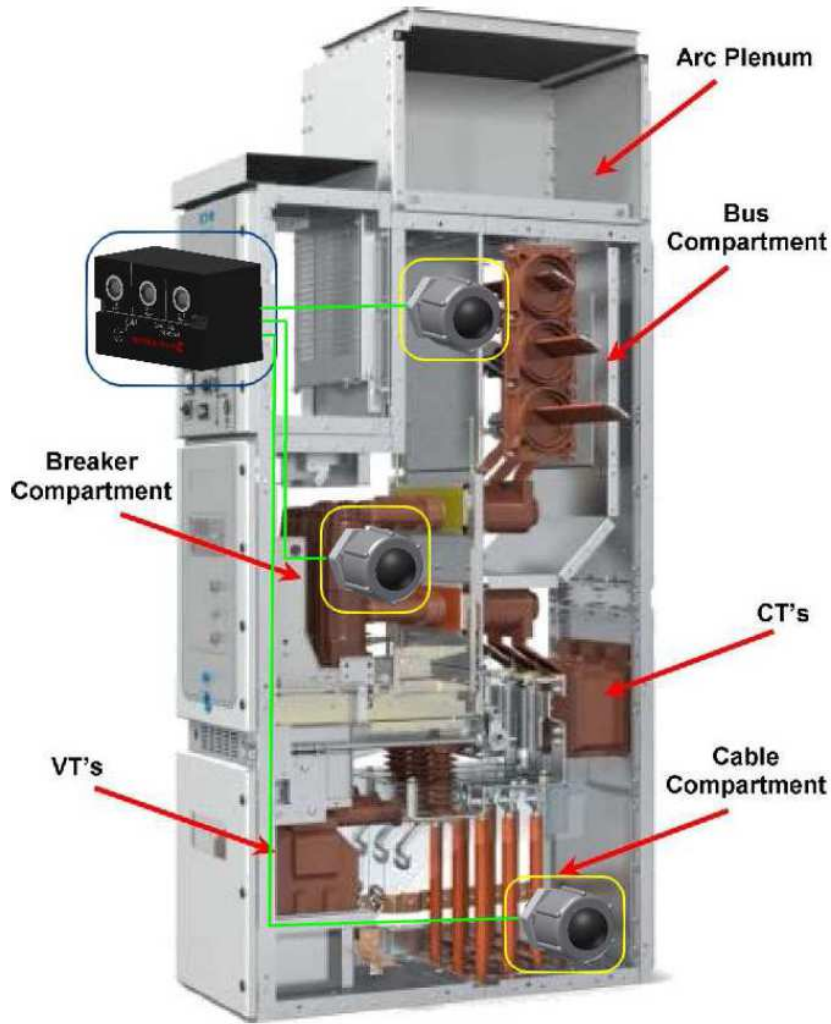
STANDARD VERSION					
DIP-SW CONFIGURATION	STATUS	CH1	CH2	CH3	CH4**
	OFF				
	ON WITHOUT ARC				
	ON WITH ARC				
SPECIAL VERSION (Contacts change the status only with arc presence) *					
DIP-SW CONFIGURATION	STATUS	CH1	CH2	CH3	CH4**
	OFF				
	ON WITHOUT ARC				
	ON WITH ARC				

\* COMPATIBLE WITH OLD CODE LAD/HS/3/805/S

\*\* ONLY FOR DI

Note :

- The contacts have a breaking capacity of 5A
- The duration of arc contact signalation is 200msec
- Operating time is less than 10 msec



### TYPICAL APPLICATION



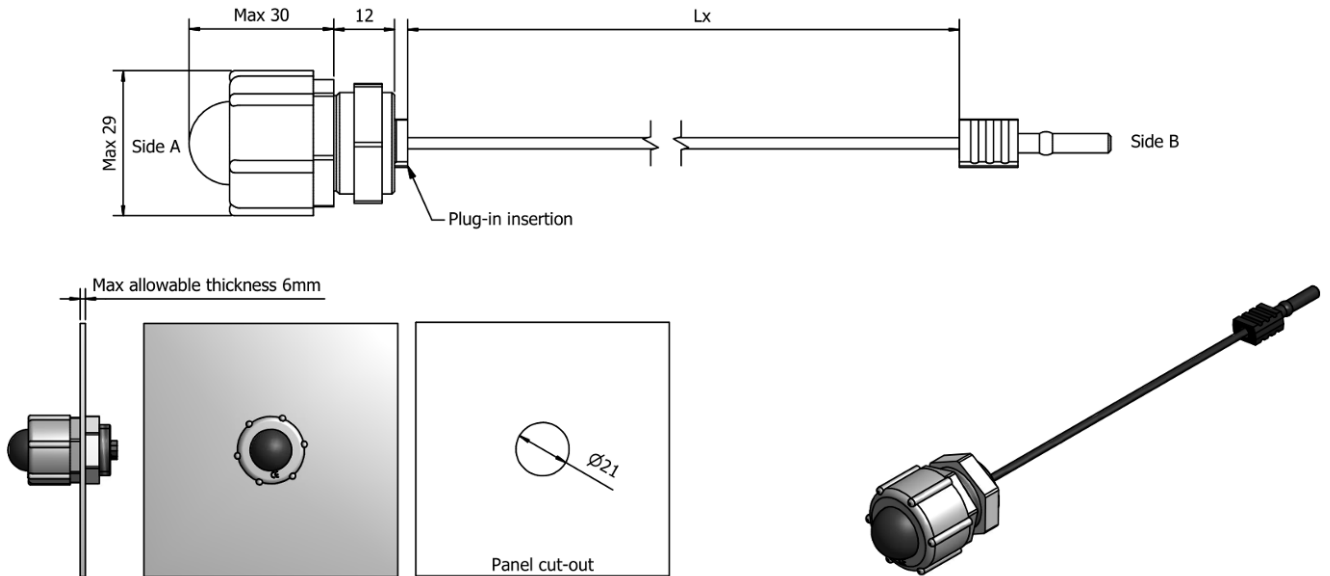
LAD/HS DWG. 43911758



OPTICAL CABLE LAD/HS DWG. 43931143

### Accessories LAD: Optical cable LAD

Drawing:  
43931143



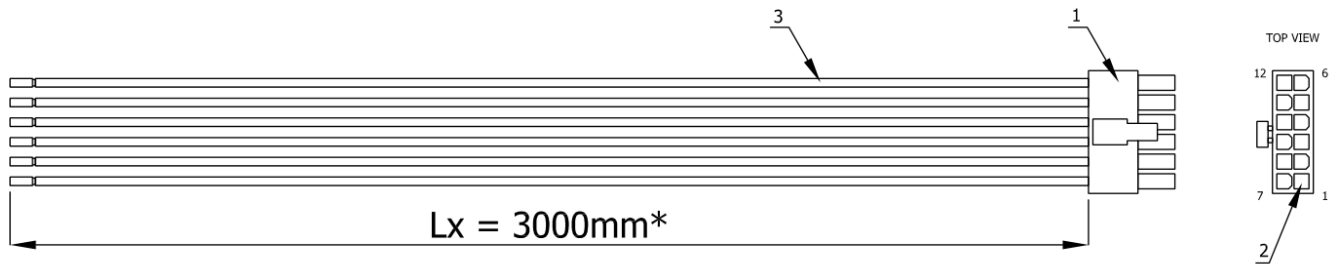
Standard length 1500 or 3000mm. Other lengths available on request.

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#### Accessories LAD: Electrical cable LAD

Drawing:  
43922259



NOTE:

\* ALTRE LUNGHEZZE A RICHIESTA

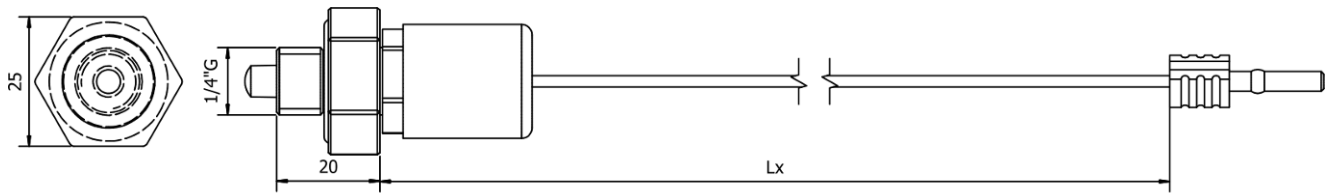
POS.	DESCRIZIONE	Q.tà
1	Connettore Molex Minifit 12 poli cod. 5557-12R	1
2	Contatto femmina per connettore Molex Minifit cod. 5556-T	12
3	Cavo unipolare sezione 1mmq (nero)	12

#### ELECTRONSYSTEM MD TECHNICAL SHEET

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#### Accessories LAD: PLUG797

Drawing:  
43911797

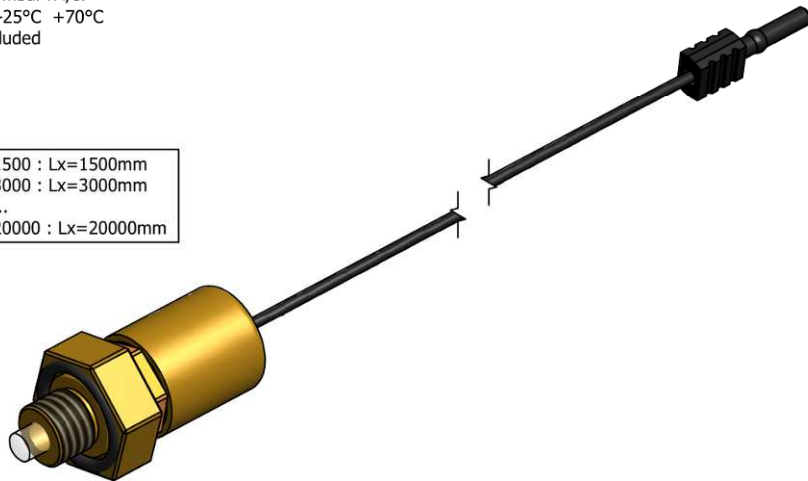


TECHNICAL DATA:  
Description : PLUG FOR AVAGO OPTICAL RECEIVER  
Body material: brass  
O.Ring Material: NBR70  
Leakage rate :  $<1 \times 10^{-8}$  mbar x l/s.  
Operating temperature: -25°C +70°C  
O.ring type OR03075 included

ORDERING CODE:

PLUG797 /

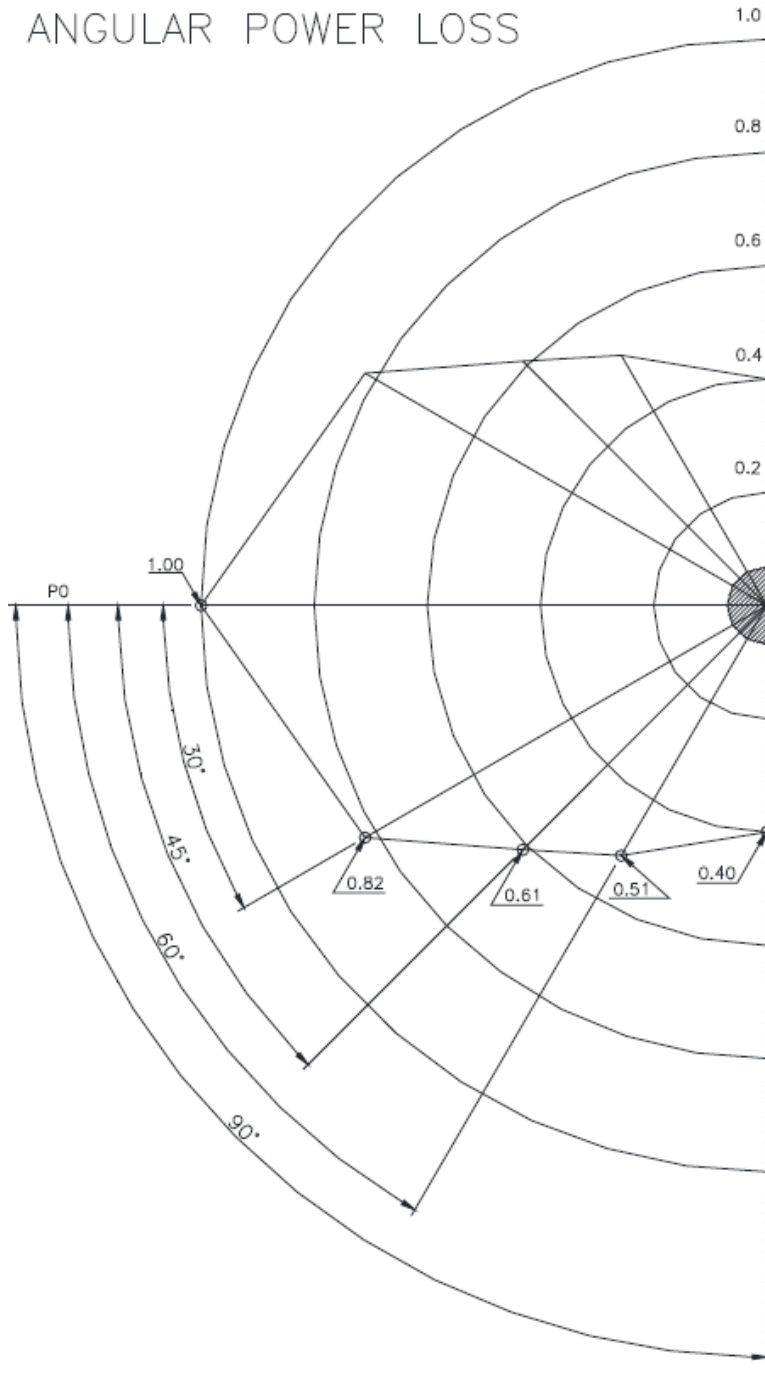
1500 : Lx=1500mm  
3000 : Lx=3000mm  
...  
20000 : Lx=20000mm



### Angular power loss LAD

Drawing:  
43911758

## ANGULAR POWER LOSS



Minimum threshold optical power

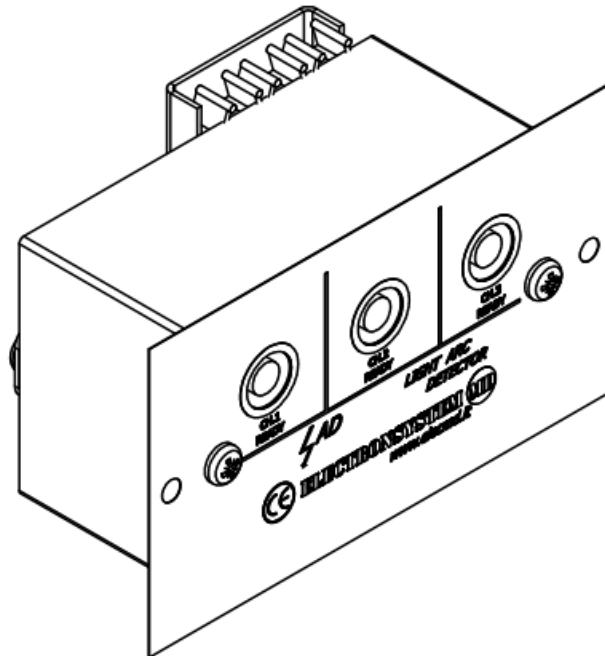
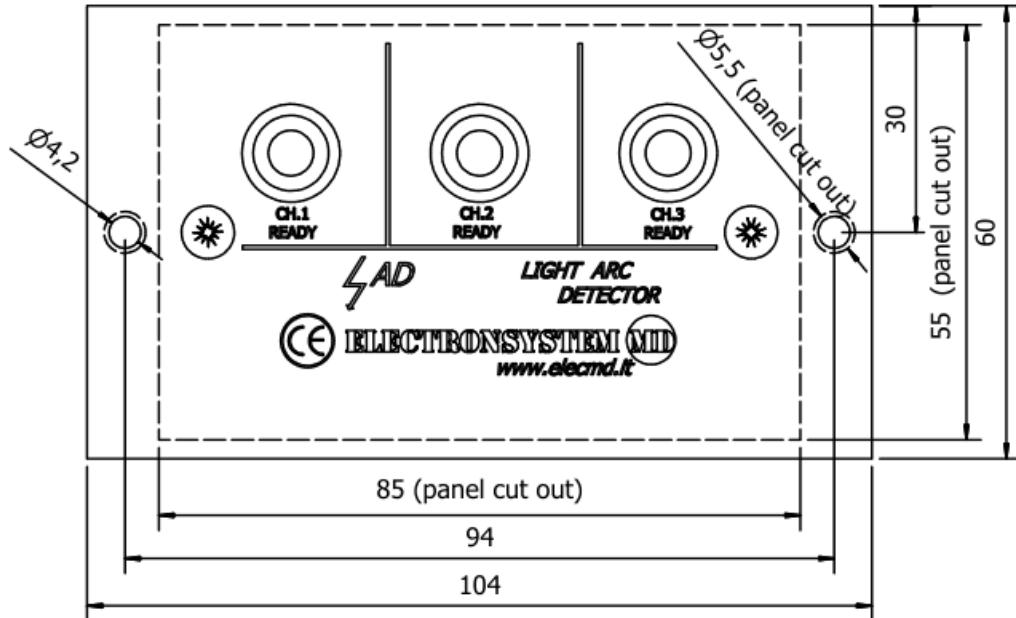
Optical fiber length (m)	Optical luminance (threshold) (lux)
5	100
10	240
20	590
50	1100
100	7500

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LAD/HS/3/805/P (with front plate dwg 43931313)

Drawing:  
43911758



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## **STORAGE**

If the complex must be storage before use, please keep dry and packed with OEM box.  
Do not leave outdoor.

STORAGE TEMPERATURE:  $-30^{\circ}\text{C} \div +70^{\circ}\text{C}$

RELATIVE HUMIDITY: max 90% @  $+40^{\circ}\text{C}$

## **MAINTENANCE**

Maintenance of LAD assembly is subjected to periodic verification with at least 24 months interval, in particular the len on optical cable must be kept clean from dust to avoid to reduce sensitivity

## **WARRANTY**

Device is covered by 24 months after installation or max 36 months after delivery.

In case of service the LAD must be sent back to factory for inspection.

Warranty void if precautions of use are not fulfilled.

## **PRECAUTIONS OF USE**

IMPORTANT: for avoiding false tripping the contact of LAD must be always conditioned by overcurrent relay to be sure to distinguish a real potential fault arc from a pure operational arc or flash or sun radiation. Moreover is compulsory to connect to the ground the metal frame as per indicated in the drawing

Moreover on the startup for the first 10 seconds the optical fibers inputs are not enabled, this is due to the diagnostic that the device made at startup

## **WARNINGS**

### CAUTION

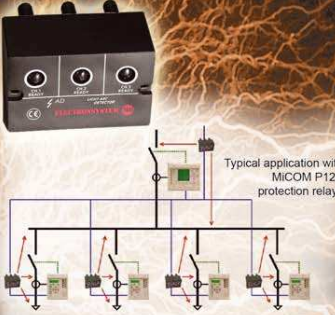
Do not drop or hit the LADS. The piece is fragile and may break from sudden shock. In particular the plug in connection of optical cable is very delicate and caution must be provided.

When transporting the piece, use the original shipping box from Electronsistem MD.

Leading companies trust in  
**ELECTRONSYSTEM MD** superior knowledge

Protect switchgear and personnel from internal arc faults  
ALSTOM Light Arc Detector (LAD)\*

**Cost effective arc detection**  
**Ease of use guaranteed**  
**Fast, reliable operation**



Typical application with MICOM P12X protection relays

Optical fibre sensing  
Relay interface (to PSL, enabling/blocking)  
CB control

**Advantages**


- can be retrofitted in existing switchgear
- easily integrated into protection schemes
- arc trip as fast as 20ms when used with MiCOM P12x relays
- distributed solution - no central units required

**Features**

- senses natural light (sensitive version) or infrared light
- 3 optical sensors per unit / panel
- high speed (<10ms) changeover contact per optical sensor
- LED indication with reset button
- Fibre optic sensor up to 4 meters
- used in conjunction with MiCOM protection relay

**ALSTOM Protection & Control**  
Knights, Boksburg (011) 820 5382  
e-mail: [marius.van-reensburg@alstom.co.za](mailto:marius.van-reensburg@alstom.co.za)

[www.alstom.co.za](http://www.alstom.co.za)



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While we provide application assistance it is up to the customer to determine the suitability for its use.

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However we assume no responsibility for its use.

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