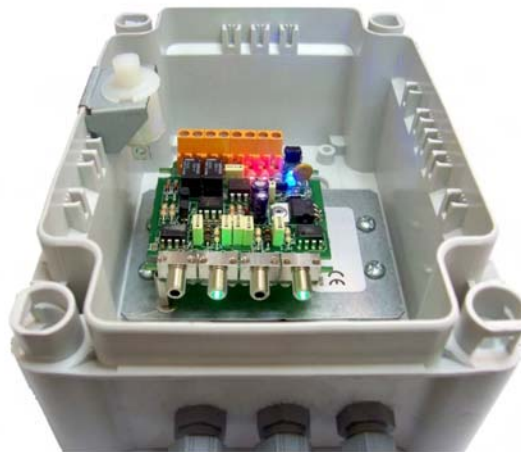


## USER'S MANUAL

# ANTI-THEFT SECURITY DEVICES FOR SOLAR PANELS

## LITE SUN

## LITE SUN PLUS



LiteSUN Single loop Transceiver (Tx+Rx): cod. LSUN300C001S

LiteSUN Double loop Transceiver (Tx+Rx): cod. LSUN300C002S

LiteSUN Single Tx: cod.LSUN300C001T

LiteSUN Single Rx: cod.LSUN300C001R

LiteSUN Double Tx: cod.LSUN300C002T

LiteSUN Double Rx: cod.LSUN300C002R

LiteSUN Amplifier: cod.LSUN300R001R

LiteSUN PLUS: cod. LSUN300P011S

## How to install *Litewire* cable more quickly

\* use shorter cable links and splice them together with a coupler and 2 FSMA connectors

**ATTENTION:** each splice reduces the maximum transmission length by 20m. E.g. if there are 2 splices on a link, the max. transmission length will be reduced by 40m, i.e. from 300m to 260

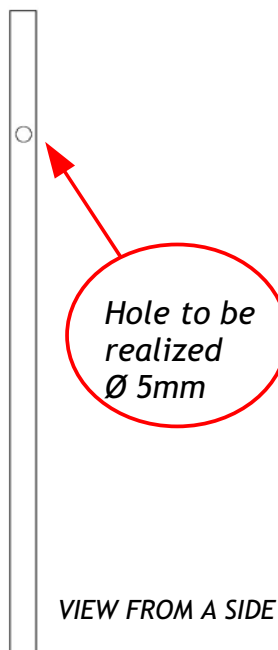


\* when you order solar panels, ask the manufacturer for 2 further holes on the lateral sides of the panel frame.

*Some panel brands already have lateral holes on the frame.*

If the panels don't have any lateral holes, ask permission of the manufacturer before making additional holes, and make sure that the warranty will be granted.

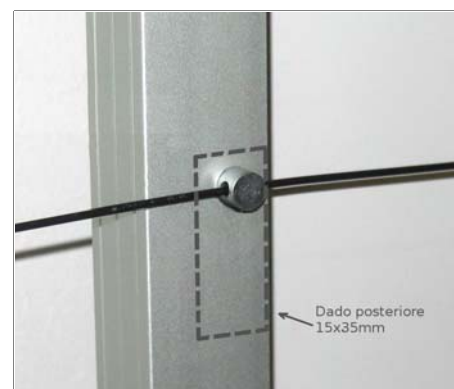
If you make the hole on the mounting bracket, the cable will have a better fixing.



**OR**

you can use special drilled bolts which can be fixed on the mounting holes

The bolt heads are screwed into rectangular nuts (15x35mm). The frame would block the nuts from being unscrewed.



After the cable has been inserted into the bolt head, the bolt head can't be unscrewed without damaging the cable

In this way, the cable will be pulled quickly from one side to the other side of the solar array with no friction against the mounting holes and no bents, increasing the level of protection.

\* use a cable reel to unspool the cable

All Litewire cables are in a spool



# How to install a Litewire cable

## WHAT MUST NOT BE DONE

- \* don't walk on the cable during installation
- \* don't use tight cable ties
- \* don't make tight bends or 90° bends

Plastic fiber is very resistant, but bends and angles may sensibly reduce the maximum link length of the system



OK



NO!

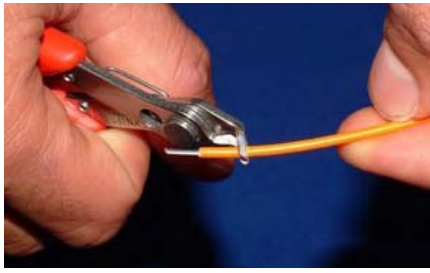
- \* if possible, don't insert the fiber into the mounting holes on the back of the panel

It is better to use drilled bolts: the cable will be installed quickly with no risk of damaging it against the cutting edges of the mounting holes, and it will be fixed to the panel faster.



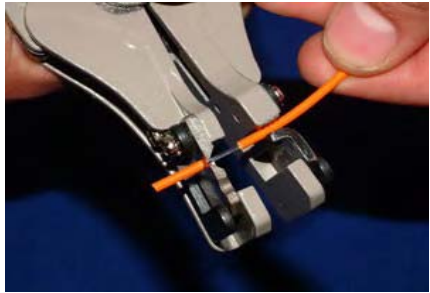
TO AVOID

## How to put a connector



### 1- Cutting the fiber

The fiber can be cut with any cutting tool.



### 2 - Removing the cable jacket

Remove about 10mm of the cable jacket

The cable jacket is 2.2 mm thick.

The optical fiber is 1.0 mm thick.

#### **WARNING**

You can remove the jacket with a standard cable stripper with a wire gauge diameter of at least 1.0 mm to avoid damaging the fiber.



### 3 - Crimping the Connector

Insert the rear boot.

Insert the FSMA connector onto the previously stripped cable; the fiber should come 2mm out of the connector.

*Crimp the FSMA connector on the cable jacket.*

#### **WARNING**

The FSMA connector cannot be crimped directly over the optical fiber. *The crimping tool for the FSMA connector must have a hexagonal crimping diameter of 3mm.*

*In case you use a Luceat crimping tool SMAT.001.M22M, choose the 0.122" hole.*



### 4 - Final polish

To level the fiber with the connector, use the polishing disc on 1,000 grit sand paper .

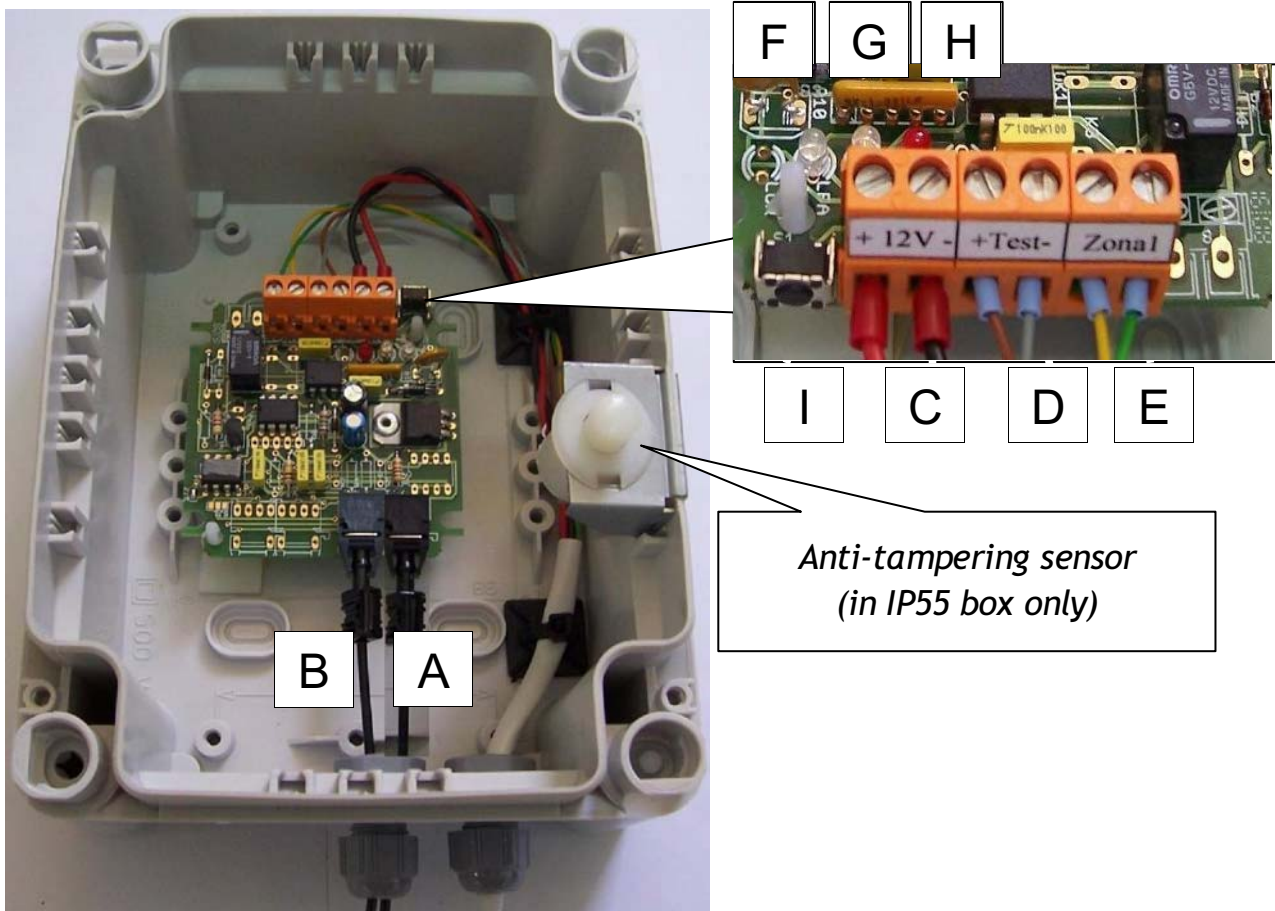
#### **WARNING**

For better results, make "8" shapes with the connector on sand paper.

*All the tools for cable connectorization are contained in the tool case **Litewire connectorization kit**.*

*Blue plastic HFBR connectors are put on a cable in the same way: use a 0.188" hole in the crimp tool and the white plastic polishing disc.*

Example of Single loop transceiver (Tx+RX) in IP55 box



- A - Transmitter (Tx) for *Litewire simplex* cable, metal FSMA connector
- B - Receiver (Rx) for *Litewire simplex* cable, plastic HFBR connector
- C - 12VDC input
- D - Remote test
- E - Relay (alarm output)
- F - Blue led (= power on)
- G - Orange led (= remote test on)
- H - Red led (= alarm)
- I - Test button

**Devices available (IP40 and IP55 versions)**

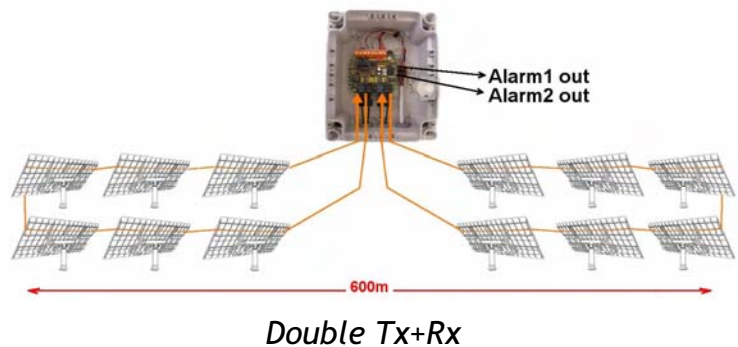
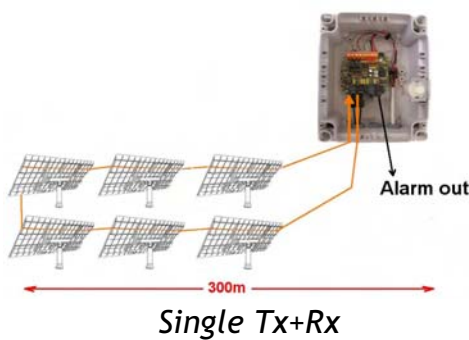
- Single loop transceiver
- Single transmitter
- Single receiver
- Amplifier
- Double loop transceiver
- Double transmitter
- Double receiver

	LiteSUN single loop	LiteSUN double loop	Amplifier, single and double transmitter, single and double receiver
Certification	EMC 2004/108/CE		
Protection rate	IP40, IP55 (optional)		
Transmission distance	20-300m		
Optical power budget	30 dB		
Alarm output	0,25A / 50VDC max		
Power	+12VDC		
Operating temperature	-37 ~ +70 °C		
Humidity	from 5 to 95 %		
Max. consumption	54 mA max	96 mA max	40 mA max
Max. power	650 mW	1,2 W	500 mW
Weight	420g (in IP55 box)		
Dimensions in IP40 box	70 x 70 x 27 mm		
Dimensions in IP55 box	175 x 130 x 80 mm		
Output plastic fiber connector	F-SMA (Tx) and HFBR (Rx)		
Immunity to EMI/RFI	100%		

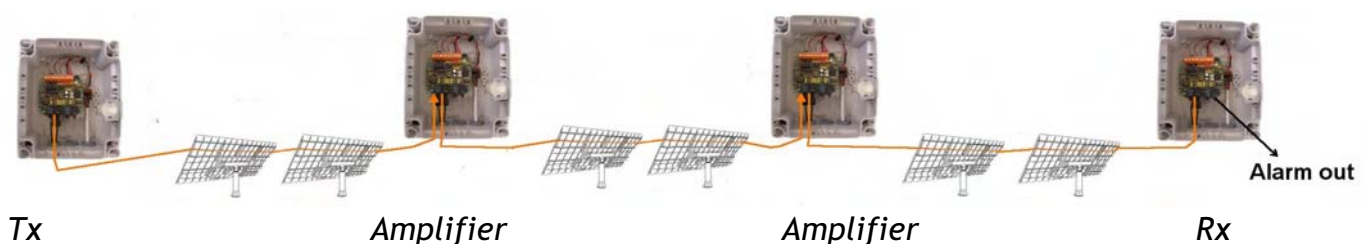
LiteSUN transmits and/or receives a light signal over plastic optical fiber.

*Single loop connection*

*Double loop connection*



*Point-to-point connection (with amplifier)*



### 1) Connect Litewire cable to the device

Insert the cable ends into the cable glands, crimp the connectors and connect them to the device (A) and (B).

### 2) Connect the alarm zone/s

Single receivers and single loop transceivers have 1 alarm output.

Double receivers and double transceivers have 2 alarm outputs (E).

*The circuit is usually closed*, so the relay output is also closed.

In case of no power or of cable cut, the circuit opens.

Connect the relays (alarm outputs) to your alarm set.

An additional "anti-tampering" resistance can also be placed in series on the alarm set.

### 3) Connect to power supply (e.g. battery of alarm set) at 12VDC

#### A. Single/Double loop Transceiver

*Single/Double Transmitter*

*Single/Double Receiver*

Standard operating status: blue led glows (F).

The transmission output (Tx, metal connector) emits an encoded signal going through the plastic fiber to the receiving output (Rx, blue plastic connector). The device constantly checks that the transmitted and the received signals are the same.

If no signal is received (due to no power or to cut/break of the fiber), or if the signal is totally different (due to a damage of the cable, not just to movement), the circuit opens and gives an alarm: the red led glows (H).

#### B. Amplifier

Standard operating status: blue led glows (F).

From this moment on, any signal going into the Rx will be repeated and emitted from the Tx with the same power as it is generated from the original device. This device is an in-between amplifier when the total link length is over 300m.

### 4) Test

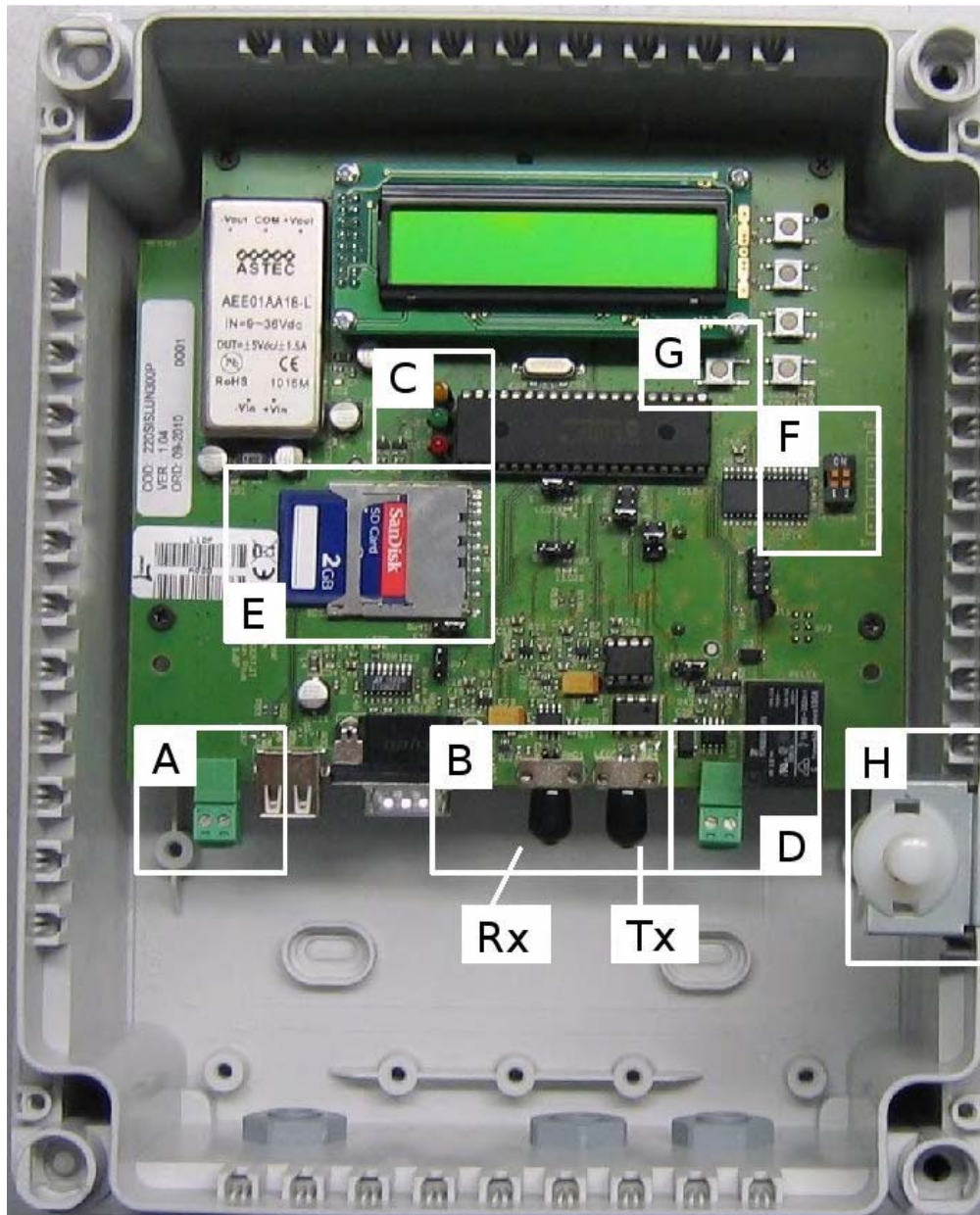
You can simulate a cut of fiber to check that the device operates correctly when the light signal doesn't get to the receiver. To check that the alarm goes off in case of no light signal or no power, press "Test" button (I).

For a remote test, power the remote test output (D) at 12VDC. The result is the same as if "Test " button (I) were pressed on each device of the installation.

The orange led glows (D).

"Remote test" makes test easier when the installation is composed of a great number of devices.

*In short, if you connect all the devices in parallel by means of this output at 12VDC, you can test simultaneously the whole installation.*



A - Power connector 12VDC

B - Optical ports

Tx - Transmitter for *Litewire* cable, FSMA connector

Rx - Receiver for *Litewire* cable, FSMA connector

C - Operating leds

*Green* = device is operating, closed contact

*Red* = device in alarm, open contact

*Yellow* = device initialization

D - Relay (alarm output)

E - SD card

F - Manual sensitivity adjust buttons

G - Reset button

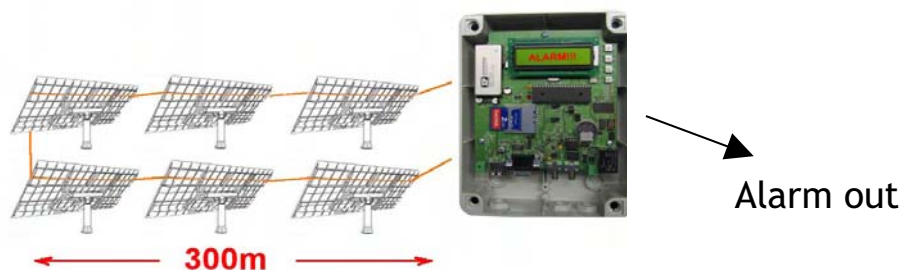
H - Anti-tampering sensor



Protection rate	IP55
Transmission distance	0-300m*
Optical power budget	30dB
Alarm output	10A/240 VAC
Power	9-18VDC
Operating temperature	-20° ~ +70° C
Humidity	from 5 to 90%
Consumption at 12VDC	140mA
Max. power	2,4W
Weight in IP55 box	640g
Dimensions IP55 box	220 x 170 x 86 mm
Output optical connector	F-SMA
Immunity to EMI/RFI	100%

\* In case of installation as perimeter protection on a mesh fence, we suggest considering 250m as max. distance, due to the several bends/curves brought to the fiber.

**"Loop" connection**



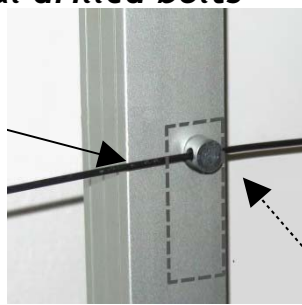
**"Bus" or "chain" connection**



## LiteSUN Plus How to fix the cable to the panels

### Using special drilled bolts

Fiber prevents a cut of the frame



The nut cannot be unscrewed (blocked by the frame)

### Making cable "buttonholes"



Fixing the cable with "buttonholes" is not recommended because if the cable is blocked with adhesive tape, the device may not detect a cut of the frame on the mounting hole.

The use of drilled bolts is more reliable because they couldn't be removed without causing variations in the light signals over the fiber.

## LiteSUN Plus How to fix the cable to a mesh fence



### Mesh fence

*recommended*: it emphasizes the natural bending of the fence in case somebody climbs over it, so the device is more sensitive



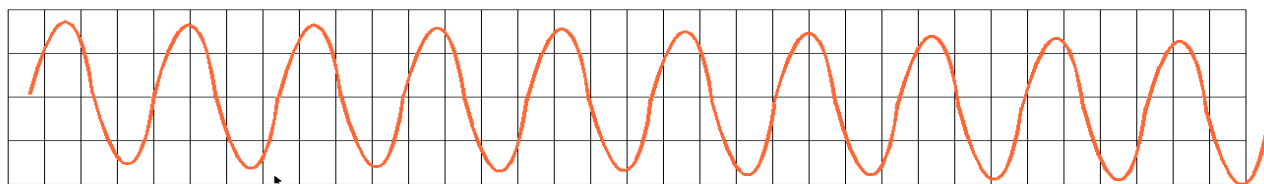
### Welded mesh fence

it can be used, though it has a lower sensitivity as it doesn't deform much in case somebody climbs over it

The cable should be inserted through the mesh - cable ties should be avoided

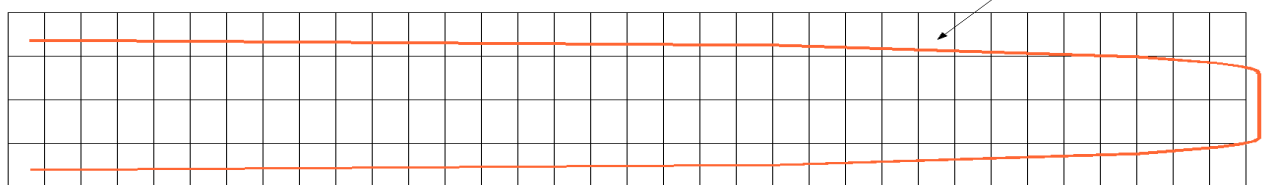
The Litewire cable may be inserted through the mesh in two different ways:

- **zig-zag**: in this way the device is more sensitive and it guarantees a better protection, though it increases the length of cable required.
- **ring**



cable is 3 or 4 x length of fence

cable is 2 x length of fence



LiteSUN Plus detects a possible bend caused by the movement of the mesh, activating an alarm. The device doesn't detect any vibrations of the mesh so it doesn't give any

*false alarms* caused e.g. by wind.

## LiteSUN Plus Installation

### 1) Connect the cable to the device

Insert the Litewire cable ends through the cable glands of the IP55 box, put the FSMA connectors and connect them to the device (B).

### 2) Connect to the alarm set

Connect the alarm output (D) to your alarm set; if LiteSUN Plus devices are placed in "bus" or "chain", only the last item of the chain must be connected.

*The circuit is usually closed*, so the contact is closed.

*The circuit opens in case of disconnection, breaking of the fiber, no power or bending of the fiber.* Connect the relays (alarm outputs) to the alarm set. An additional "anti-tampering" resistance could also be placed in series on your alarm set.

### 3) Connect to power supply (e.g. battery of alarm set)

After connecting the fiber and the alarm set to the device, connect to the power supply. The yellow led will glow for some seconds, then the green led will glow.

From this moment on, the transmission output (Tx) emits an encoded signal going through the plastic fiber to the receiving output (Rx). LiteSUN Plus regularly checks the power of the signal received.

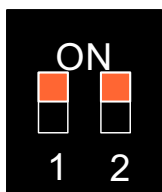
When the device detects a difference in power of the light signal received (due to a cut or bend of the fiber), the circuit opens, giving an alarm (D). Alarm will be signalled on the display and with a red led.

*The alarm relay receives 10A at 240VAC. In case of no power, the contact opens and the alarm goes off.*

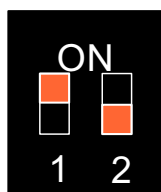
### 4) Select sensitivity

LiteSUN Plus has 4 levels of sensitivity which can be selected according to the type of installation by means of manual sensitivity selectors (F).

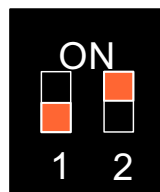
High sensitivity



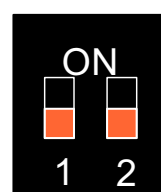
Middle-high sensitivity



Middle-low sensitivity



Low sensitivity



Perimeter protection: select "high sensitivity", both selectors up.

Protection of solar panels: select "low sensitivity", both selectors down.

The levels middle-high and middle-low can be selected to decrease sensitivity, e.g. in case of alarms due to weather conditions, or to increase the level of protection in case of protection of solar panels.

After selecting sensitivity, reset the device pressing the reset button (G).

## Monitoring the data on light power variation

LiteSUN Plus continually logs the attenuation rates over the cable as well as alarms, recording them in an SD memory card (E). Date and time are already set.

After one month that the device has been operating, you can send the SD memory card to Luceat: we will give you free support about the most appropriate level of sensitivity that should be selected on the device. For this reason, there are 2 SD memory cards in the package.

**WARNING:** the files reporting the logs can only be read by a special software of Luceat. Do not try to open the SD memory card, as all data could be cancelled.

## Accessories



F-SMA metal connectors (for Tx and splices) and blue HFBR plastic connectors (for Rx)

SMAC.001.M22M and HFBR5411052P



Litewire connectorization kit  
(Crimp tool, automatic cable stripper, cutter, 10 connectors, 1000 grit sand paper, polishing disc)

SMAK.001.M22L



Metal coupler for F-SMA splices. Each splice also requires 2 FSMA connectors.

SMAA.001.M22M



Plastic fiber cable *LiteWire simplex*



Drilled bolt for fixing the cable to the mounting holes of solar panels + rectangular nut 15x35mm

- BULS010M005I: Drilled bolt (ø 8mm, M5x10) + Nut
- BULS020M005I: Drilled bolt (ø 15mm, M5x10) + Nut



Drilled mounting bolts with drilled head:

- BULS050M08I: Bolt M8x50
- BULS050M10I: Bolt M10x50
- BULS050M12I: Bolt M12x50