



NARIA
SECURITY

INSTALLATION MANUAL



LITESUN PLUS SMART

ANTI-THEFT SECURITY SYSTEM FOR THE PROTECTION
OF PV PANELS

(detection of bend and cut of plastic optical fiber)




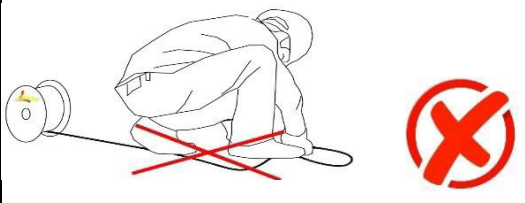

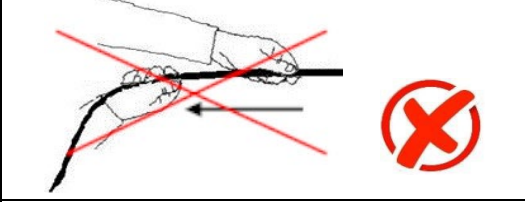


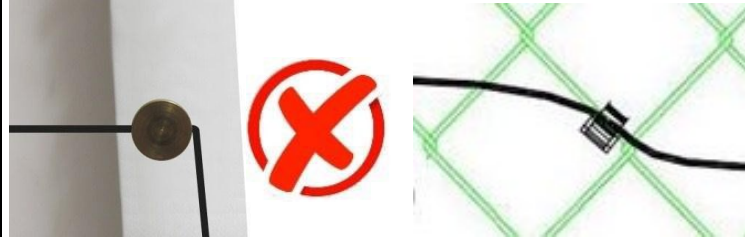



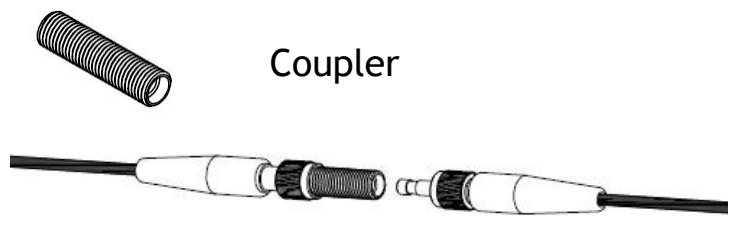
LiteSUN Plus SMART
analyser
LSUN300PSM

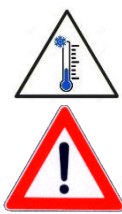
v.024



General precautions

Plastic fiber is very resistant and does not break easily, but bends and passages on edges may reduce, also significantly, the maximum operating range of the system.

<p>Do not tread or walk on the cable LiteWIRE</p> 	
<p>Do not pull hard on the cable LiteWIRE</p> 	
<p>Minimum bending radius of 2.5 cm</p> 	
<p>Do not make narrow angles and do not run the cable in holes with sharp edges</p>	
<p>Do not pull the fiber on edges because it risks straining and damaging inside</p>	
<p>Do not over-tighten cable ties: the fiber must pass without friction</p>	
<p>You can repair the cable mechanically, using 2 FSMA connectors and 1 coupler DO NOT USE HEAT SHRINK TUBING!</p>  <p><i>Please note: every reparation reduces the maximum operating range of the system by 2dB (about 20m)</i></p>	 <p style="text-align: center;">Coupler</p>



These conditions are increased if the fiber is laid at low temperatures.

- Do not insert the fiber directly in the holes of the panel frames: use the recommended special bolts/drilled pins.
- Do not drill the PV panels (it could invalidate the warranty).

This manual must be read before installation of LiteSUN system: very often, the problems occurring during installation are due to mistakes which can be avoided by reading this manual carefully.



Note 1: This equipment design typically applies to commercial or industrial equipment expected to be installed in locations where only adults are normally present.

This equipment is not suitable for use in locations where children are likely to be present

**The device cannot be used where children are present without adult supervision.
The appliance is intended for use by expert and duly trained personnel only.**

LiteSUN Plus SMART - How it works

This system works like a chain: the plastic fiber is attached to the solar panels to link them together and is connected to the analyser LiteSUN Plus SMART which can detect both the cut and the bend of the fiber.

The plastic fiber cable LiteWIRE makes a loop all through the panels and gets back to the analysing board.

When an attempt of theft results in deformation or interruption of the fiber, the optical analyser LiteSUN Plus SMART detects the variation of the light signal and triggers an alarm.

After that, if the fiber has remained intact, the system resets automatically, adapting to the possibly new position.

ZERO FALSE ALARMS: the plastic fiber must be bent or cut in order for the analyser to trigger an alarm. For this reason, all the stresses due to weather conditions (like wind, rain or snow) or leaves, do not trigger any false alarms.

In addition, plastic fiber is an electrical insulator and it is not influenced by any electro-magnetic noise.

This anti-theft system is composed of 3 elements:

- **“LiteSUN Plus SMART” analyser**, which sends a light signal and analyses the flow of light received, generating an alarm both when the cable is cut and when the cable is bent or stretched out.
- **Plastic fiber cable “LiteWIRE”** (with anti-UV filters for installation in the direct sunlight), which transmits the light signal.
- **Affixing items** which secure the fiber to the solar panels (drilled bolts, drilled pins, fast bolts or adhesive tape).

It is important to make sure that the cable LiteWIRE is installed correctly.

The instructions contained in this manual will enable you to install the plastic fiber cable correctly.

If your plant has more than one analyser, FIRST install one analyser with its link of fiber, and check that the system works properly and as expected.

ONLY AFTER THAT, install all the fiber and analysers.

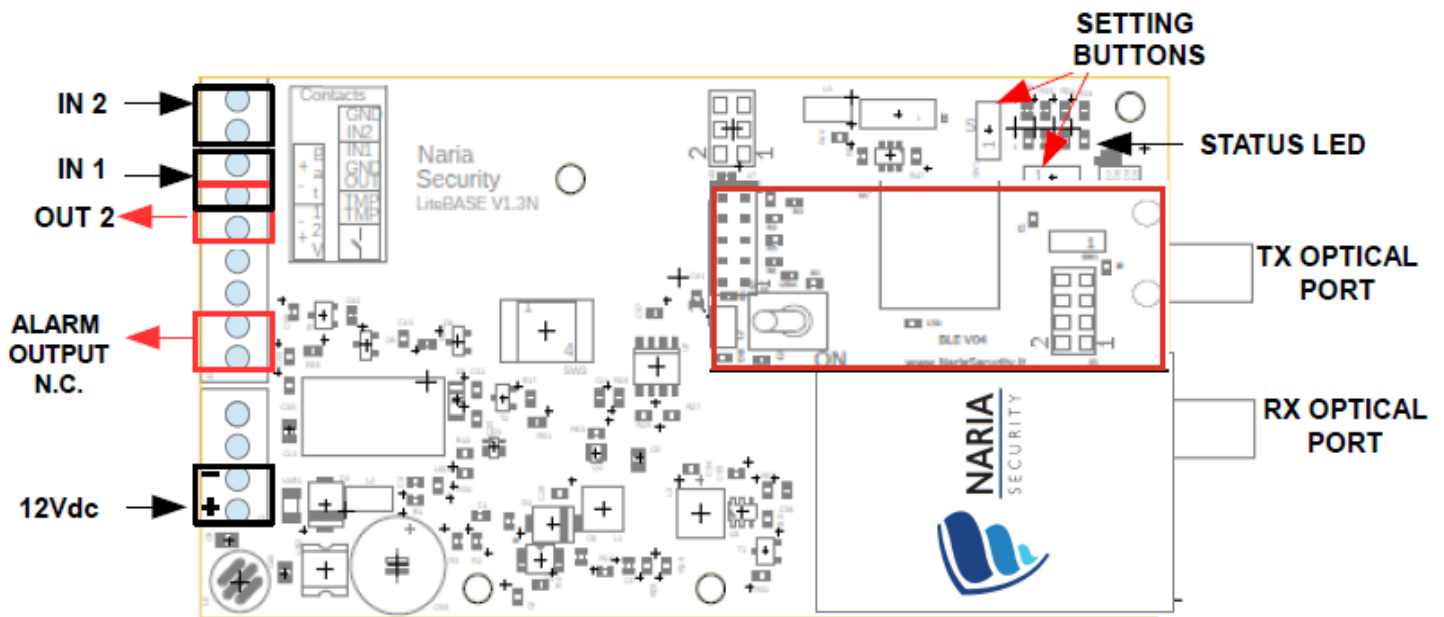
The conditions mentioned in this manual are suitable for most photovoltaic plants. However, there may be variables which are not taken into account in this manual.

If the detection of attempt of theft in the trial installation is not satisfactory, please contact Naria Security for further tips and suggestions on how to make the LiteSUN Plus SMART analyzers suitable for your photovoltaic system.

Table of contents

- General precautions p. 2
- LiteSUN Plus SMART - How it works p. 3
- Reference figures p. 4
- LiteSUN Plus SMART - Equipment markings..... p. 4
- Technical specifications..... p. 5
- Attenuation of plastic fiber cable LiteWIRE p. 6
- How to install LiteSUN Plus SMART p. 6
- Status LEDs / Auxiliary Inputs p. 9
- Termination of LiteWIRE with standard FSMA connectors p. 10
- Declaration of conformity p. 11

Reference figures

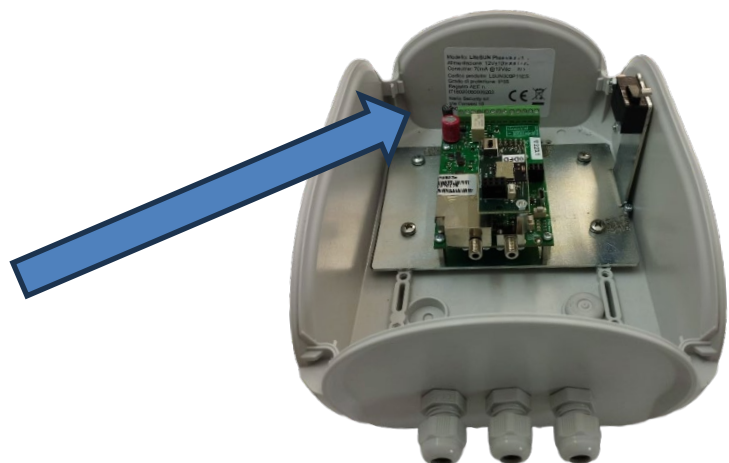


The board is in an IP55 casing with mechanical opening sensor.

LiteSUN Plus SMART - Equipment markings

The identification label of the product is placed inside the protective case, as the installation could be exposed to the elements.

To locate the CE tag, remove the housing cover.



Technical specifications

LiteSUN Plus SMART

Protection rating of casing	IP55; IK07; glow wire temperature: 650°C
Operating range	0-300m <i>This distance can be reached if the installation is carried out correctly (attenuation of the fiber lower than 0.1dB/m at 525nm). Bends, passages on edges, misplaced or over-tightened cable ties and mechanical stresses on the fiber can increase the attenuation of the optical signal, reducing, even considerably, the maximum operating range, even preventing the system from working correctly.</i>
Optical power budget	>30dB
Alarm relay output	0.5A/24Vdc
Power (DC)	12VDC - Power supply: 15W max
Operating temperature	-20° +70° C
Humidity	from 5 to 90%
Consumption at 12VDC	70mA (120mA peak)
Anti-tampering sensor	mechanical
Weight and dimensions in IP55 casing	680g 230x150x95mm
Optical connector	FSMA
Immunity to EMI/RFI	EMC 2014/30/UE

LiteWIRE Simplex - Plastic optical fiber

Plastic fiber	SI-POF (980/1000)
Numerical aperture (NA)	0.46+-0.025
Max. attenuation	100dB/km @525nm 150dB/km @650nm
Bandwidth	30MHz at 100m
Diameter of bare/jacketed plastic fiber	1mm/2.2mm ± 0.1mm
Min. bending radius	25mm at 25° C <i>During installation at low temperatures, the fiber tends to be more rigid and less elastic, so more care is required</i>
Jacket	Anti UV with <i>meter marking</i>
Weight	6kg/km
Max pulling force	65N at 25° C
Operating temperature	-40° C +85° C
Immunity to EMI/RFI	Total
Reaction to fire	ECA

Attenuation of plastic fiber cable LiteWIRE

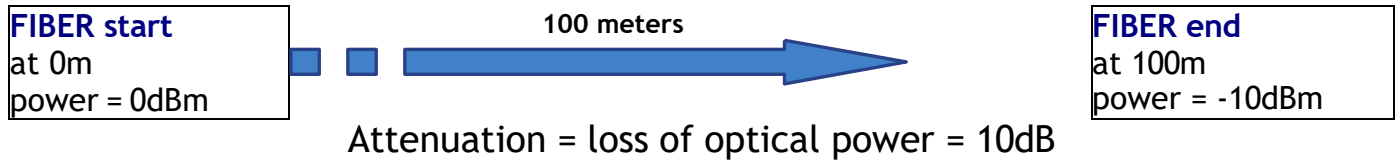
Plastic optical fiber is a polymeric material which transmits light inside and it also permits the transmission of a light signal. While this signal propagates along the fiber, it gradually loses power: this is called **attenuation**.

Every meter of plastic fiber introduces an attenuation (= loss of optical power): the more fiber is installed, the more attenuation is introduced, the lower will the optical power be at the end of the fiber.

Some factors related to the installation of the fiber (e.g. over-tightened cable ties, tensioning bolts, etc.) increase its attenuation.

The power of the light signal is measured in dBm.

Example:



LiteSUN Plus SMART analyser works correctly if optical power is between 0 and -30dBm.

In a standard installation, please consider the following elements:

25dB = attenuation of 250m of fiber

2dB = attenuation due to a possible future junction on the cable after attempts of theft (every junction attenuates around 2dB)

These distances can be reached if the installation is carried out correctly (attenuation of the fiber lower than 0.1dBm at 525nm). Bends, passages on edges, misplaced or over-tightened cable ties and mechanical stresses on the fiber can increase the attenuation of the optical signal, reducing, even considerably, the maximum operating range, even preventing the system from working correctly.

How to install LiteSUN Plus SMART

1 - Fix the bolt or the drilled pin to the panel

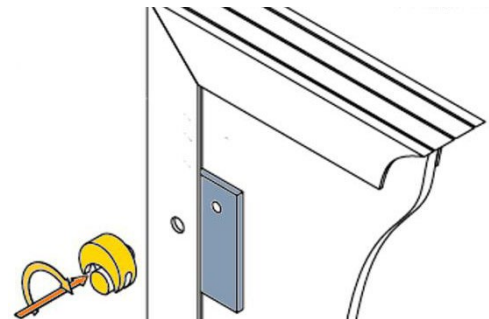
Fast bolt

Recommended with LiteSUN Plus SMART because:

- it halves installation time (in comparison to drilled bolts for ground mounted panels).
- in case of maintenance to the panel the fiber can be easily removed and re-positioned: no need to unthread and thread it into the bolts

Dimensions:

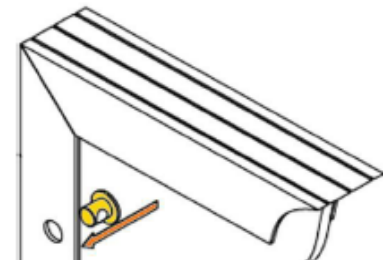
M6x6, head ø 20mm, nut 15x35mm



Drilled pin for rooftop mounted panels

Dimensions:

ø 7mm, length 9mm, head ø 12mm, hole for fiber ø 5mm

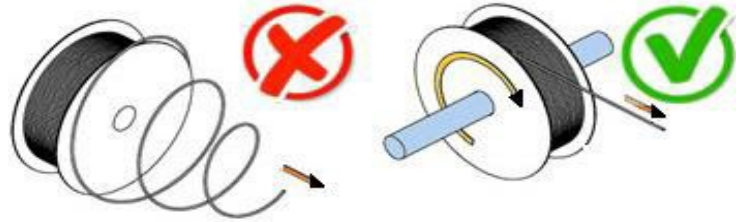


Customized solutions

In case of panels with standard holes not available, please contact Naria Security to check the alternative solutions (as M4 bolts, structural tape...)

2 - Un-spool the cable

Use a cable de-reeler to prevent the cable from twirling. In order to make the installation easier and quicker with the fast bolts, un-spool the cable and lay it on the ground in front of the panels to be protected.



3 - Insert the LiteWIRE cable through the cable glands of the water tight box and crimp the connectors on the fiber

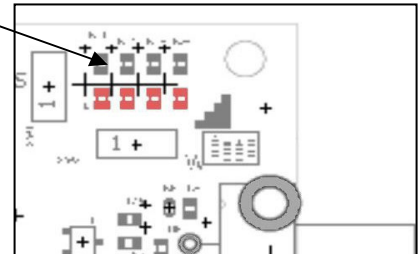
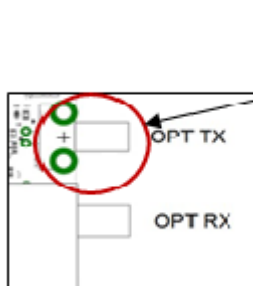
See “Termination of LiteWIRE cable”. Connect the cable to the device.

4 - Connect the fiber to the board and turn on the LiteSUN Plus SMART

To avoid damaging the board, make sure it is not powered before touching and handling it.

Power: 12Vdc Consumption: 70mA

When you connect the board to power, the status LEDs will twinkle and the LED on the transmission port will glow.



TIP:

First insert one end of the fiber into the TX port: you will see vivid green light coming out of the other end. If not, there will probably be an installation mistake: make sure that the fiber cable is installed correctly, no overtightened cable ties, nothing pressing the fiber, no sharp bends... Then connect the other end to the RX port: the analyser sets up automatically within 40 seconds and is fully operative. Now all status LEDs are off.

From this moment, the transmission port (TX) emits a codified light signal which runs through the plastic optical fiber and arrives at the receiving port (RX). The analyser will continually control the power of the signal received. When the device detects a difference in power, due to cable cut or bends on the fiber, an alarm will go off.

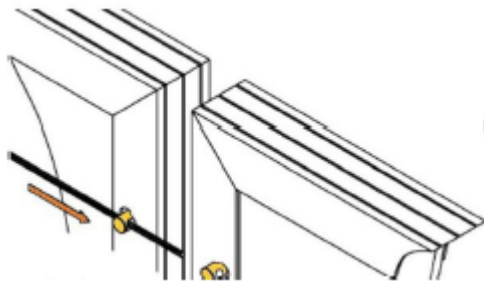
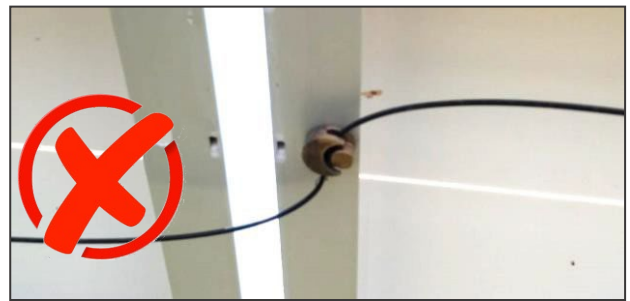
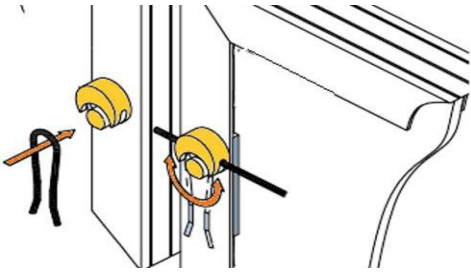
5 - Installation monitoring

Install APP LiteBASEN on your smartphone and follow the instructions in the dedicated manual.

6 - Pass the fiber through the bolts or the pins

Fast bolt - Recommended for LiteSUN Plus SMART

Hook the fiber to the fast bolts on the panels as straight as possible avoiding useless curves and monitoring the fiber's attenuation by the Power Meter's function on the APP.



Drilled pins for roof mounted panels

When drilled pins are used the fiber is threaded into the holes while it is un-spooled.

7 - Protect the fiber exposed to possible weather damages

Especially on roofs or between the rows, where the fiber might be dragged by snow, branches, leaves or exposed to birds, we recommend protecting it with an appropriate support (example: inside a corrugated pipe). The LiteWire cable sheath has Anti-UV filters, so it can be exposed continuously to sunlight.



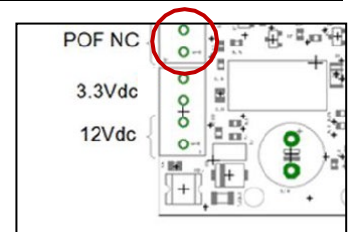
In this case, the cable in plastic fiber risks triggering unwanted alarms due to birds or weather conditions. The cable can be run under the structure of the panels and fastened with cable ties (NOT overtightened! The cable must be able to flow).



8 - Connect the alarm control unit

Connect the alarm zone NC (0.5A/24Vdc) to the alarm panel or to a GSM dialer. It is recommended to add balancing resistors in series, following the instructions of the alarm panel it connects to.

The circuit is normally closed, so the relay is closed when there are no alarms. In case of disconnection, cable break, no power or cable bending, the circuit opens.



MAINTENANCE NOTE

If the board were in permanent alarm status, e.g. after the fiber was cut, we recommend disconnecting power until the system is restored.

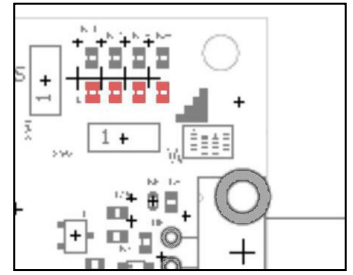
Status LEDs

The analyser is in alarm status whenever the fiber is cut, bent or stretched out.

When there is an alarm, the status LEDs twinkle and the alarm lasts around 40 seconds (i.e. alarm contact remains open for around 40 seconds).

If the fiber cable is cut, LEDs will go on twinkling and alarm contact remains open until the cable is repaired and the loop closed.

When the board is normally operative, the status LEDs are off.



Buttons for settings without APP

The board parameters are already set: the system is “plug & play” and pre-set values are suitable for most cases.

Button “A” sets sensitivity.

Press once to see current sensitivity: a steady LED glows as listed below.

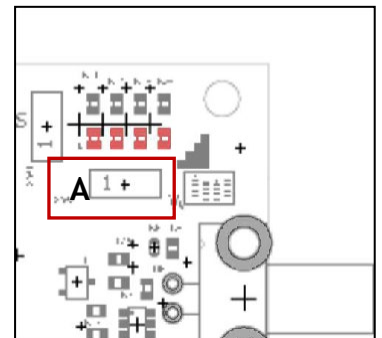
x000= low sensitivity

0x00= medium low sensitivity

00x0= medium high sensitivity (used in most cases)

000x= high sensitivity

Press twice to change sensitivity



Button B sets time window.

Press once to see current time window, a LED twinkles as listed below.

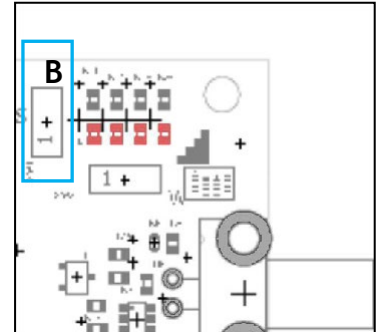
x000= long

0x00= medium-long

00x0= medium-short

000x= short

Press twice to change time window*



***Before changing any default settings for time window, please contact Naria Security**

Auxiliary inputs

The board has two auxiliary inputs to connect external sensors.

IN1: attivo basso ($V_{in} < 1V$) / $V_{in} \text{ max} = 24V$

IN2: attivo basso ($V_{in} < 1V$) / $V_{in} \text{ max} = 24V$

OUT2: 50mA / 24V ac/dc

IN1	O	O	C	C
IN2	O	C	O	C
OUT2	O	O	O	C

O = open - C = closed

Termination of LiteWIRE with standard FSMA connectors

FIRST insert the LiteWIRE cables through the cable glands of the water tight box, **THEN** crimp the connectors. All the tools are contained in the “LiteWIRE termination kit”.



	<p>1- Cut the fiber with a cutter.</p>
	<p>2 - Remove the jacket Remove about 1 cm of jacket. The jacket of the optical cable has a diameter of 2.2mm. The fiber has a diameter of 1 mm.</p> <p>ATTENTION! <i>Use a standard cable stripper with a hole of 1.0 mm or more, so you will not damage the fiber.</i></p>
	<p>3 - Crimp the connector Insert the protection boot. Insert the FSMA connector onto the cable till the jacket stops against the connector; the fiber should come 2mm out of the connector. Crimp the FSMA connectors on the cable jacket.</p> <p>ATTENTION <i>The connector must be crimped on the cable jacket and must not be crimped directly on the fiber. The crimp tool for FSMA connectors must have a hexagonal crimping diameter of 3mm. Use the 1.22" hexagonal hole.</i></p>
	<p>4 - Cut excess fiber. It is NECESSARY to leave 1mm or 2mm of excess fiber out of the connector: this prevents micro-fractures on the fiber, which would increase fiber attenuation.</p>
	<p>5 - Fiber polishing Level the fiber by polishing the connector on sandpaper using the metal polishing disc.</p> <p>ATTENTION! <i>You should make some "8"-shapes with the connector on the sand paper. Wipe the connector with a finger</i></p>
	<p>6 - Visual check Put the other end of the fiber on a light source (e.g. LED of the transmitter), watch the light coming out of the connector and make sure that there are no cracks on the surface of the fiber. If there are cracks, remove the connector and put a new one on.</p>

<p>Coupler</p>	<p>You can repair the cable mechanically, using 2 FSMA connectors and 1 coupler.</p> <p>DO NOT USE HEAT SHRINK TUBING! <i>Please note: every reparation reduces the maximum operating range of the system by 2dB (about 20m)</i></p>
----------------	---



DICHIARAZIONE DI CONFORMITA'

Declaration of conformity

No.: 001/2024

Naria Security S.r.l.

Con sede legale in Via Cefalonia, 70 - 25124 Brescia

e sede operativa in Via A. Canossi, 18 - 25030 Torbole Casaglia (BS) Italy

dichiara qui di seguito che il prodotto

declares under its responsibility that the product

320.SIS.LSUN300PSM LiteSUN Plus SMART analizzatore

scheda per controllo sistema anti intrusione

risulta in conformità a quanto previsto dalla seguente direttiva comunitaria

complies with the following EEC-directives

Electromagnetic Compatibility: EMC 2014/30/UE


ETSI 2014/53/UE

Reduction of Hazardous Substances: 2015/863/UE, ROHS III

e che sono state applicate tutte le norme indicate di seguito.

and is in conformity with the standards listed below.

Data: 10 ottobre 2024


(firma)

Norme, o parti di esse, utilizzate per la presente dichiarazione di conformità:

Regulations, or part of them, used for this declaration of conformity

EN61000-4-2

EN61000-4-6

EN61000-4-3

ETSI 301489-1

EN61000-4-4

ETSI 301489-17

EN61000-4-5

ETSI 301328 V2.2.2



Read this manual carefully before installing the devices and follow all the instructions and suggestions.

Keep the manual in a safe place after reading
so that you can refer to it later.

Subject to technical modifications with corresponding follow-up certifications. Do not throw the package away before checking that the devices work correctly.



NARIA SECURITY SRL

Headquarter: Via Angelo Canossi 18 - 25030 Torbole Casaglia (BS) Italy

R/O: Via Cefalonia 70 - 25124 Brescia (BS) Italy

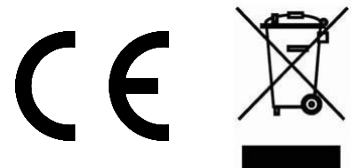
VAT no. 03757240985

[Tel:+39 0309771125](tel:+390309771125) email: info@nariasecurity.it



Whatsapp for support : +39 375 5813029

www.nariasecurity.it



AEE registration no.:

IT1602000009203