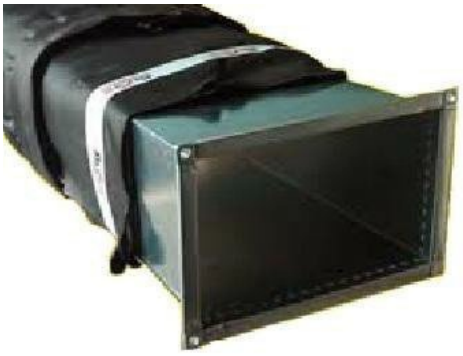
NARIA SECURITY

INSTALLATION MANUAL

LITEFENCE

ANTI-THEFT SECURITY SYSTEM FOR THE PROTECTION OF VENTILATION DUCTS

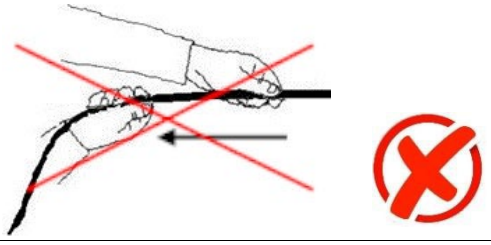
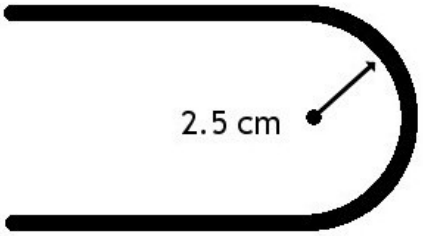
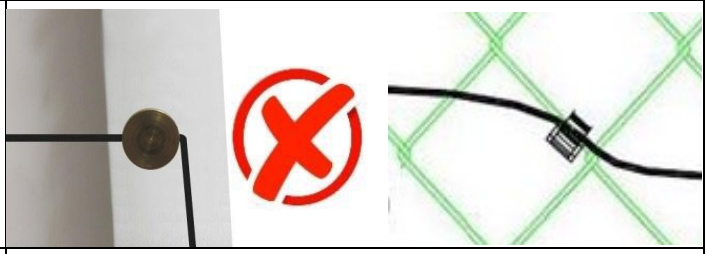
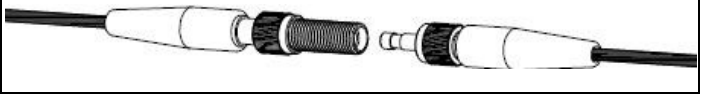


LiteFENCE
Analyser (Tx+Rx)
LFEN300F011S

LiteFENCE TX
Transmitter
LFEN300F011T

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.

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

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

*This manual must be read **before** installation: very often, the problems occurring during installation of Litefence 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.

LiteFENCE – How it works

When an attempt of intrusion in the duct causes flections of the fiber or interrupts it, the optical analyzer LiteFENCE detects the variations of the light signal and triggers an alarm. *After that, if the fiber has remained intact, the system resets automatically, adapting to the (new) position.*

The anti-intrusion system for ventilation ducts is composed of 3 elements:

– **"LiteFENCE"**: an optical analyzer that sends a light signal and analyses the flow of light it receives.

– **"LiteWIRE"**: the cable in plastic optical fiber (with anti-UV filters) which transmits the light signal

– **Tensioning bolts**: opto-mechanic accessories which transform the bending of the cable into a variation of light signal.

It is important to make sure that the LiteWIRE cable is installed correctly, i.e.:

- it is fastened to the duct without introducing attenuation on the light signal;
- it is installed correctly to the duct by means of opto-mechanic accessories to detect attempts of going through without false alarms.

The instructions contained in this manual will enable you to satisfy the above-mentioned conditions.

When the installation includes more than one analyzer, **FIRST** install LiteFENCE and its link of fiber, check that the system works properly and as expected.

ONLY AFTER THAT you may go on installing the system on the rest of the installation.

The conditions mentioned in this manual are suitable for most cases. However many variables may affect the correct detection of intrusion.

If the detection of intrusion in the trial installation is not satisfactory, please contact *Naria Security* per further tips and suggestions on how to make the LiteFENCE system suitable for your case.

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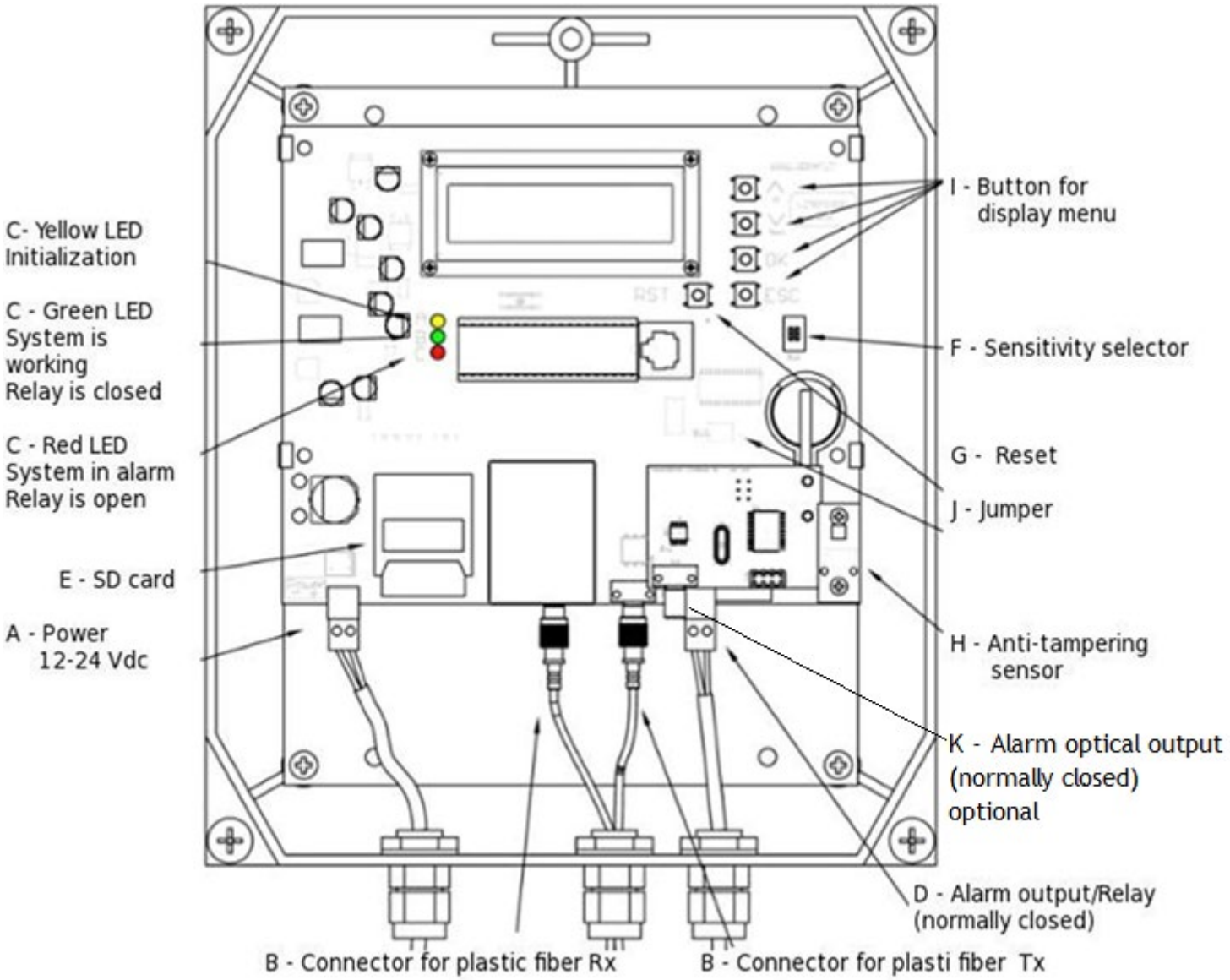
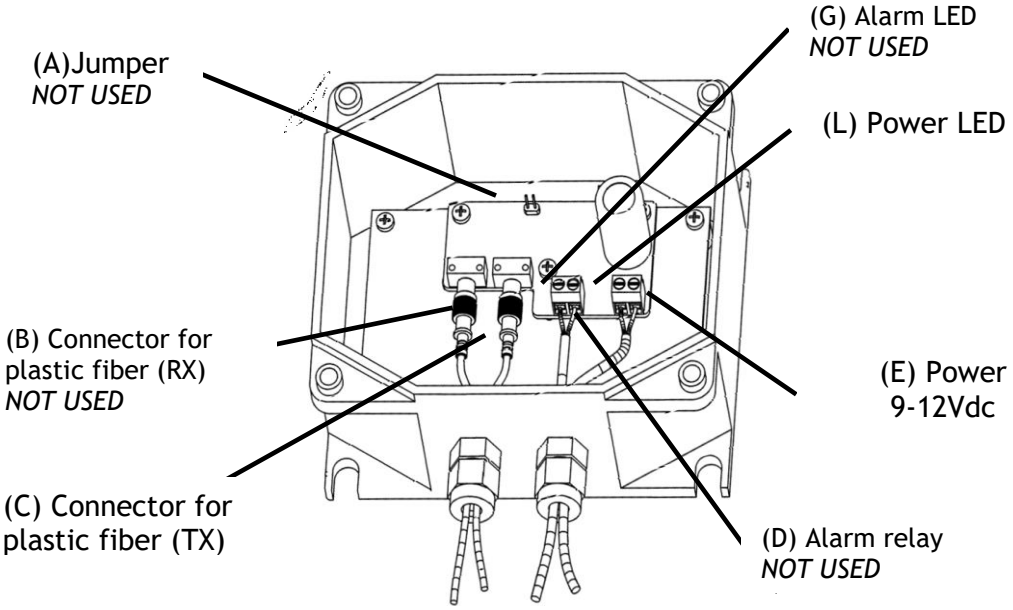
LiteFENCE – Analyzer

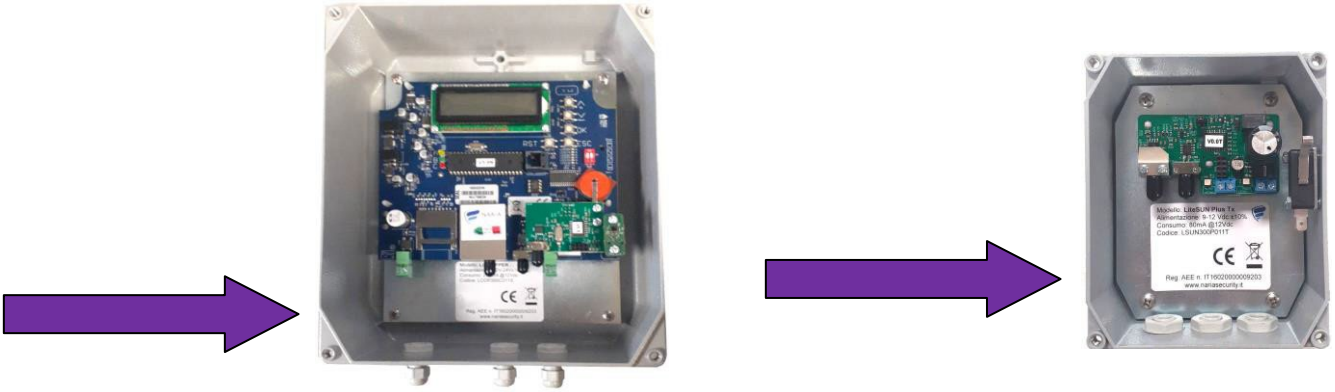


LiteFENCE TX- transmitter(used only in particular connection schemes)



Equipment markings

The identification plate 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

LiteFENCE - Analyser

Protection rating	IP55
Operating range	0-300m* (max 30dB) *In installations 8 tensioning bolts are normally used on every duct.*
Optical power budget	30dB
Power Meter	Built-in
Alarm output	0.5A/24Vdc NC or optical output
Power (DC)	12V-24V±10% *Power supply: max. 15 watt*
Operating temperature	-20°+70°C
Humidity	from 5 to 90%
Consumption at 12VDC	250mA
Max. power	3W
Weight and dimensions in IP55 casing	2065g; 270 x 215 x 95 mm
Optical connector	FSMA
Immunity to EMI/RFI	EMC 2014/30/UE FCC Class B: verification level part 15

LiteFENCE TX - Transmitter

Protection rating	IP55
Operating range	0-300m* (max 30dB) *In installations 8 tensioning bolts are normally used on every duct.*
Optical power budget	30dB
Power (DC)	9-12V±10% *Power supply: max. 15 watt*
Operating temperature	-20°+70°C
Humidity	from 5 to 90%
Consumption at 12VDC	80mA
Weight and dimensions in IP55 casing	620g ; 115 x 160 x 60 mm
Optical connector	F-SMA
Immunity to EMI/RFI	EMC 2014/30/UE FCC Class B: verification level part 15

LiteWIRE Simplex - Plastic optical fiber (POF)

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

Attenuation of LiteWIRE cable

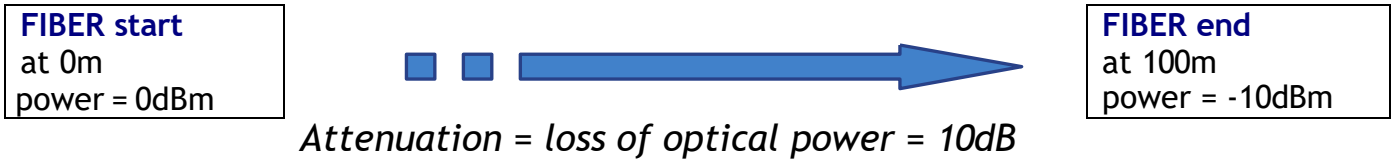
Plastic optical fiber is a polymeric material which transmits light inside and it also permits the transmission of a light signal. While this signal propagates along the fiber, it gradually loses power: this is called ***attenuation***.

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:



Attenuation = loss of optical power = 10dB

LiteFENCE analyser works correctly if optical power is between 0 and -30dBm.

In a standard installation, the following elements are considered:

25dB= attenuation of 250m of fiber

5dB= attenuation of the tensioning bolts (0.2 dB each bolt for 24)

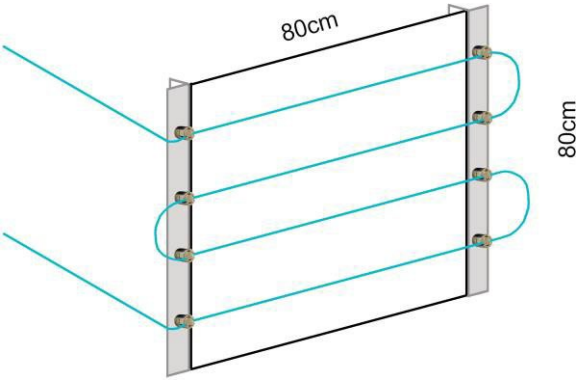
LiteFENCE has a built-in optical Power Meter: the installer is able to monitor the attenuation rate constantly, in every stage of installation and solve any mistakes promptly.

The distances mentioned 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.

LiteFENCE for ventilation ducts

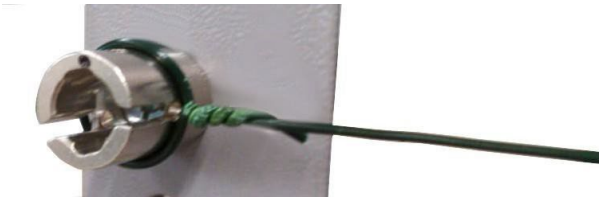
It is essential that the tensioning bolts are installed sheltered from the air flow and fixed on the frame. If this is not available, "L" profiles must be added to allow the fixing of the bolts away from the air flow.

Tensioning bolts on frame



Tensioning bolts on "L" profiles added

If the air flow is considerable, it would be useful to hook the fiber to a metal support wire.

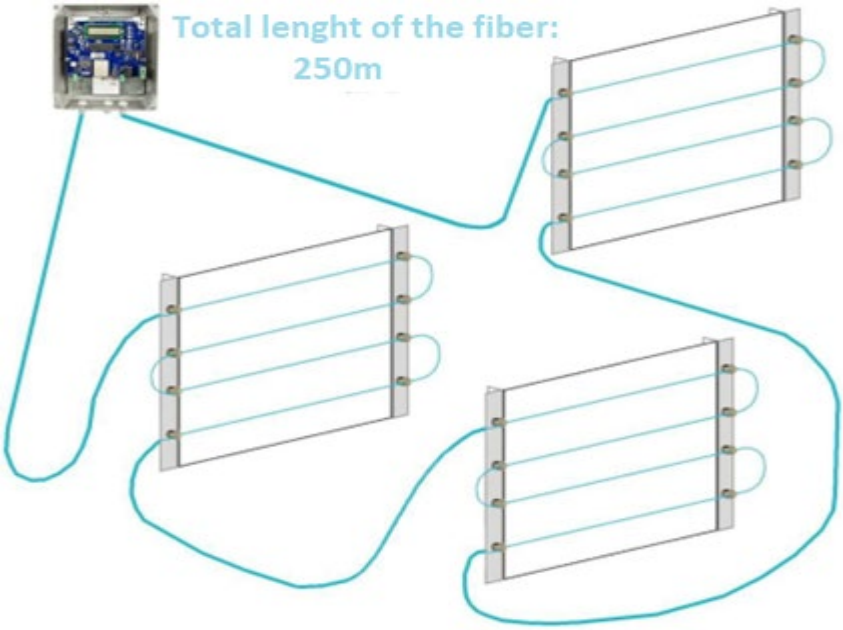


Metal wire

Fiber on metal wire

The fiber is fixed to the metal wire with a cable tie approximately every 20cm.
The cable ties must not be tightened so as not to increase the attenuation of the signal.

The total length of the fiber, considering about 24 bolts, is 250m.



How to install

1. Fix the tensioning bolts to the frame or to the "L" profiles added to the duct

Only fix the body of the bolt (see paragraph 7).

The fiber will be fixed later when the bolt is closed with the bayonet.

2. Pass the fiber through the bolt without closing it and place all the fiber

3. Connect LiteWIRE cable to the LiteFENCE analyzer

Insert the Litewire cables through the glands of the waterproof box and crimp the FSMA connectors on the fiber.

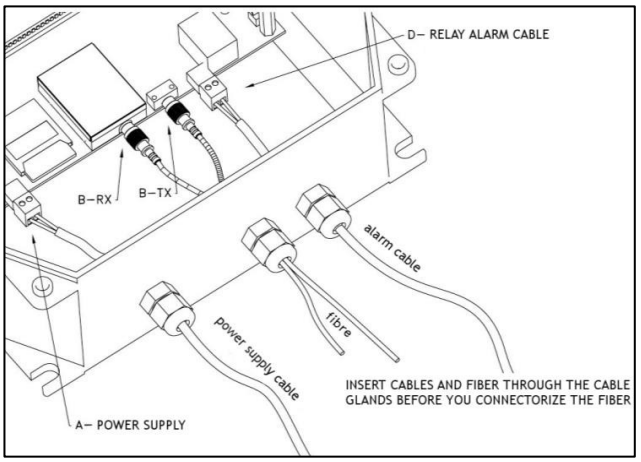
See "Termination of LiteWIRE cable".

Connect cables to the device (B).

4. Power LiteFENCE analyzer

Connect power (A) (e.g. from the battery of the alarm panel).

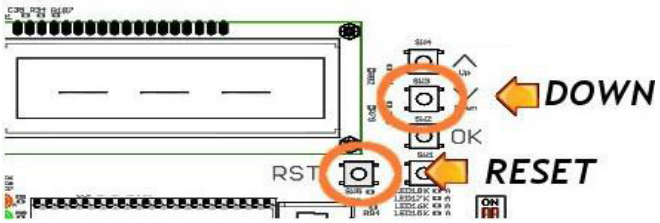
The yellow LED glows for some seconds. From now on, the transmission output (Tx) sends an encrypted light signal which crosses the plastic fiber and arrives the receiving input (Rx). The analyzer continuously compares the power of the emitted signal with the received one. When the analyzer locks onto the signal, the green LED (C) glows (see "LED indicators").



5. Set LiteFENCE to POWER METER mode

To prevent increase of attenuation of the fiber during installation of the cable in the tensioning bolts, it is VERY IMPORTANT to keep the optical power received by LiteFENCE constantly monitored.

Keep the DOWN button pressed while you switch on or reset the system, until a dashed line appears on the display.



6. Check that the attenuation corresponds with the fiber installed

Before fastening the fiber to the bolts and tightening the cable ties, check that the attenuation rate of the fiber matches with the length of the fiber installed (see "Attenuation of the plastic fiber LiteWIRE")

EXAMPLE: if installed correctly, 210m of fiber should have an attenuation rate of 21dBm ± 2dB on the *Power Meter*. If the attenuation rate were lower (e.g.-24dBm), check that the fiber has no angles and that it hasn't been damaged during installation.

7. Fasten the fiber to the bolts, while monitoring the attenuation with LiteFENCE

A) Adjust the the tensioning bolts according to the direction the fiber will be pulled and make sure that all the bolts are oriented correctly.

Engraving up, hooking hole up,
the fiber can be pulled to the left.

Engraving down, hooking hole down,
the fiber can be pulled to the right.

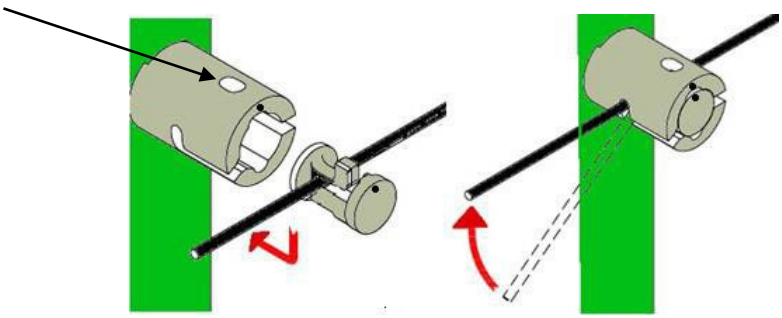
Reference engraving

Reference engraving

B) Insert the fiber into the bayonet, pull the fiber and insert the bayonet into the bolt
The bayonet must be inserted into the bolt so that the engravings match.

The fiber must be slightly in tension but not taut, because it would risk damaging.

Release hole



C) **Monitor the attenuation** every time you secure the fiber to the bolt, making sure that every bolt introduces a maximum attenuation of 0.1/0.2dB (equivalent to 1-2m of fiber LiteWIRE).

If the attenuation measured by the Power Meter is higher, check that the fiber in the bolt is straight and that the bolts mounted correctly.

To open the bolt correctly, put a screwdriver into the hooking hole and press.

VIDEO: "How to open a tensioning bolt"

8 – Set sensitivity level

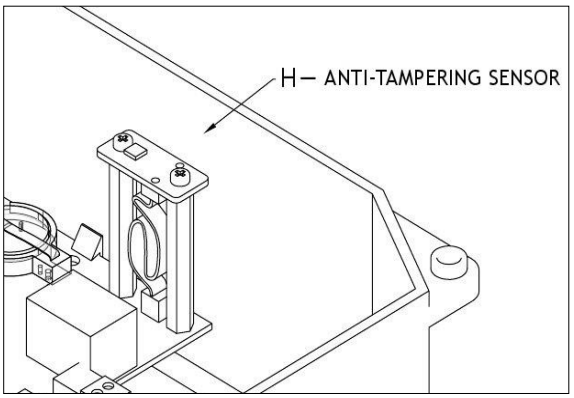
This device has 4 sensitivity settings you can select according to your application using the selector (F).

S1 = High sensitivity
S2 = Medium-high sensitivity
S3 = Medium-low sensitivity
S4= Low sensitivity
Usually, S1 or S2 are selected.

RESET after every change of sensitivity

9 – Connect the alarm zone

Connect the alarm control unit (D) to the alarm panel (0.5A/24Vdc). It is recommended to add balancing resistors in series. **The relay of the anti-tampering sensor is connected in series to the alarm output.**



Normally, the **jumper** (J) is on: in this way, every alarm zone is separate and alarm is not propagated (Number of LiteFENCE analyzers – Number of alarm zones).
If the **jumper** is off, the alarm is propagated over to the next device, creating one single alarm zone (Number of LiteFENCE analyzers – 1 single alarm zone).

After setting the jumpers on/off, press RESET.

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.

10. Remove the battery film and set date/time

For any analysis of the SD card on board the device, it is essential to reset the alarms when the installation is completed, by holding down the "/\" key when switching on or resetting the device and set the correct date and time, following the instructions of the video.

VIDEO: "How to set date and time"

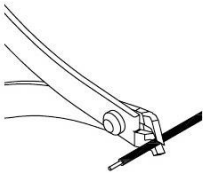
11. After installation is finished, insert the SD card.

When the SD card is inserted correctly, the 18K LED will glow.

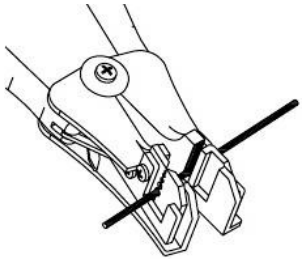
Termination of LiteWIRE

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".

SCAN ME

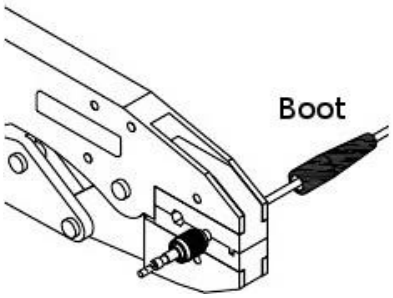


1- Cut the fiber with a cutter.



2- Fase: 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.

ATTENTION!
Use a standard cable stripper with a hole of more than 1.0 mm, so you will not damage the fiber.

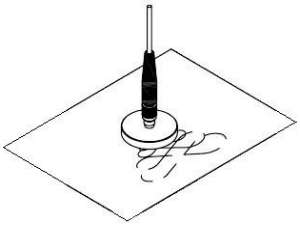


Connector

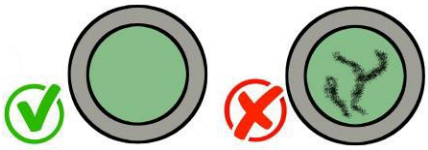
3 - Crimp the connector
Insert the protection boot.
Insert the FSMA connector onto the cable till the jacket stops against the connector; the fiber should come 2mm out of the connector. Crimp the FSMA connectors on the cable jacket.

ATTENTION
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 0,122" hexagonal hole.

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



5 - Fiber polishing
Level the fiber by polishing the connector on sand paper using the metal polishing disc.
ATTENTION!
You should make some "8" shapes with the connector on the sand paper. Wipe the connector with a finger.



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.

Coupler

You can repair the cable mechanically, using 2 FSMA connectors and 1 coupler.
DO NOT USE HEAT SHRINK TUBING!
N.B. Every reparation reduces the maximum operating distance by 0.2dB (about 20m)

Data analysis

LiteFENCE continually logs the attenuation rates over the cable (one log every second) as well as alarms, recording them to an SD memory card (E). It is important that DATE and TIME are set correctly on the device.

After one month of operation, you can send the SD memory card in the device to Naria Security: we will give you free support about the most appropriate level of sensitivity that should be selected on the device.

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

Disconnect power before removing the SD card, otherwise the card could be damaged.

LED indicators

YELLOW: initialization of device; wait till the device starts working and the green LED turns on. If the received signal is too low, the device doesn't star working and the yellow LED stays on.

GREEN: system working, closed relay.

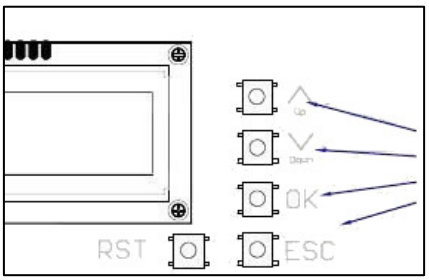
YELLOW+GREEN: the device is working but the maximum attenuation rate has been reached, with the following alert on the display "ATTENTION LOW SIGNAL"
>>>check that the fiber and the bolts are installed correctly and do not increase attenuation; in case, set a lower sensitivity level with the dip switches (F).

YELLOW+RED: Alarm in progress; the anti-tampering sensor is triggering the alarm OR the light signal has been modified (e.g. fiber bend or cut).

The system resets itself in 30/40 seconds, in the event of a permanent alarm check that the light comes out of the plastic fiber optic cable.

User's interface

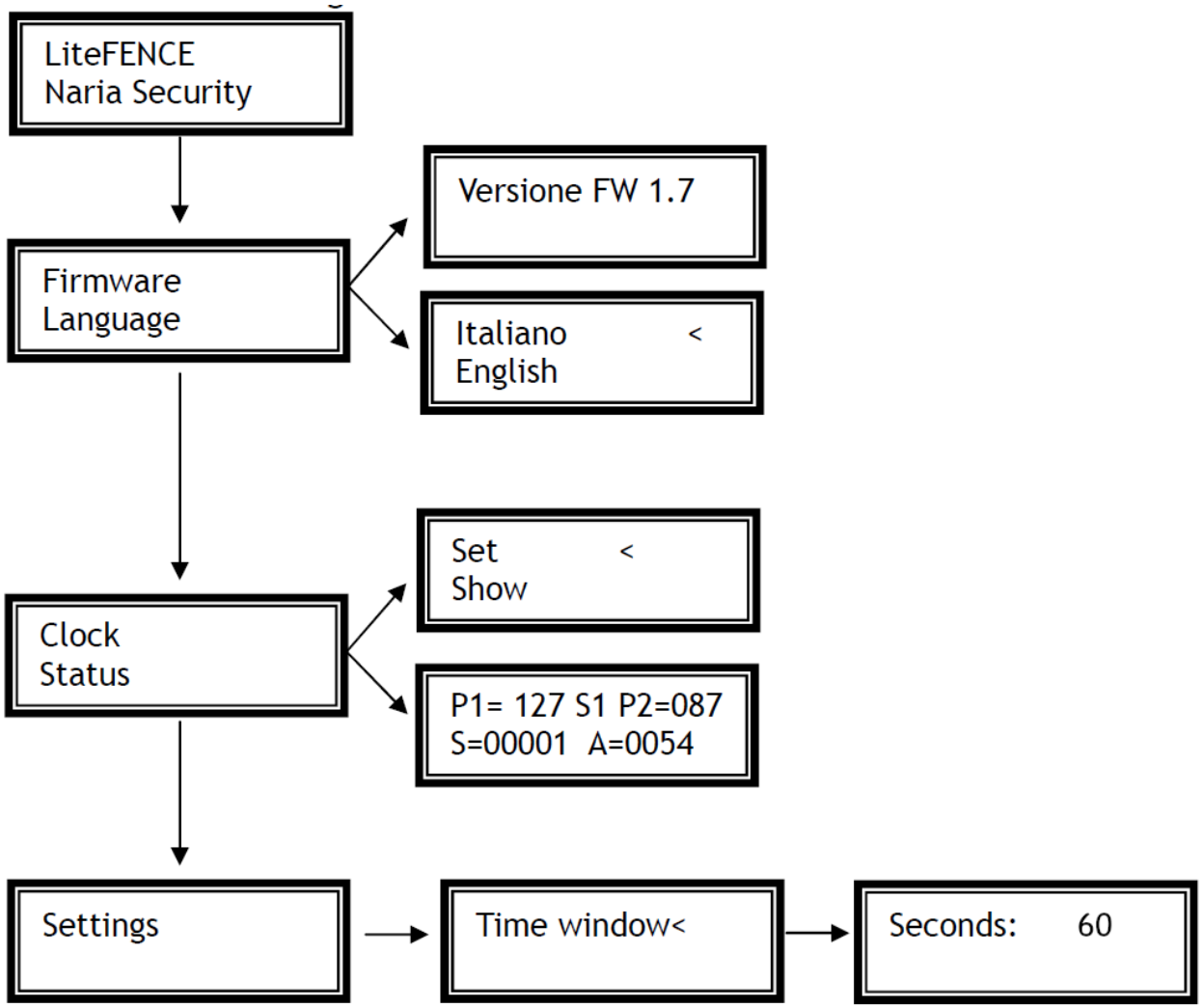
LiteFENCE features a text interface which you can access using the button on the right of the display.



- **Up** - menu scroll upwards
- **Down** - menu scroll downwards
- **OK** - option selection
- **ESC** - menu exit
- **RST** - Reset

Sub-menus:

- ***Firmware***: shows current firmware version
- ***Language***: shows the language/set
- ***Clock***: shows date/time, which can also be set
- ***Status***: reports statistical data on how the device is working
- ***Settings:*** You can set the analysis time window of the light signal attenuation. Rates range from 1s a 60s.



In “Status” menu you can see the following parameters

- **P1 and P2 :**

Statistical data on how the device is working – it cannot be modified

- **S**: (on the top line) **Sensitivity** set with selector (F)

S1 = High sensitivity
S2 = Medium-high sensitivity
S3 = Medium-low sensitivity
S4 = Low sensitivity

- **S :** (on the bottom line) **Status**

S=00001 Fiber not connected (no light signal received)
S=00002 Fiber connected (light signal received): attenuation analysis/initialization
S=00003 Device is active

- **A: Number of alarms** reported by the analyser

This counter can be reset by keeping button UP pressed while switching on or while resetting the device.

After the installation, we recommend to RESET the alarm log.

DICHIARAZIONE DI CONFORMITA'

Declaration of conformity

No.: 002/2021

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.LFEN300F011S LiteFENCE
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***

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 marzo 2021

(firma)

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

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

EN50130-4 Alarm systems Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder and social alarm system

EN61000-6-3 Electromagnetic compatibility (EMC) Part 6-3: Generic standards - Emission standard for residential, commercial and light industrial environments

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declares under its responsibility that the product

320.SIS.LFEN300F011L LiteFENCE Lite
320.SIS.LFEN300F011T LiteFENCE Trasmettitore/LiteCOPPER Trasmettitore

scheda per controllo sistema anti intrusione

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

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

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

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