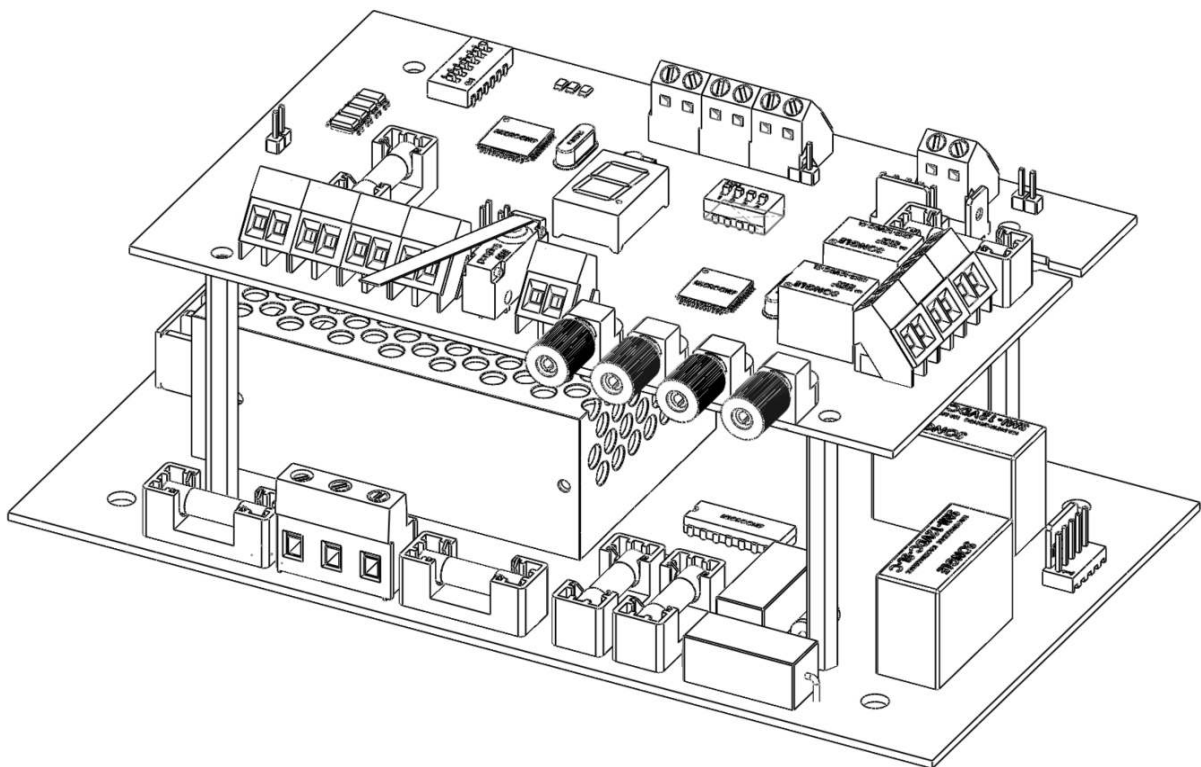


# ALM-6813/6812

## INSTALLATION AND PROGRAMMING MANUAL



## MARSS Solar Defender ® SYSTEM

This guidebook provides the essential instructions to install and configure the concentrator model ALM-6813/6812, operating in stand-alone mode. About operation mode on BUS RS-485, please refer to the control panel ALM-6800 installation and configuration manual.

**Important: Marss srl reserves the right to make changes to the product, specifications, or guide without prior notice, in order to improve quality and performance for product and system installation.**

# Table of Contents

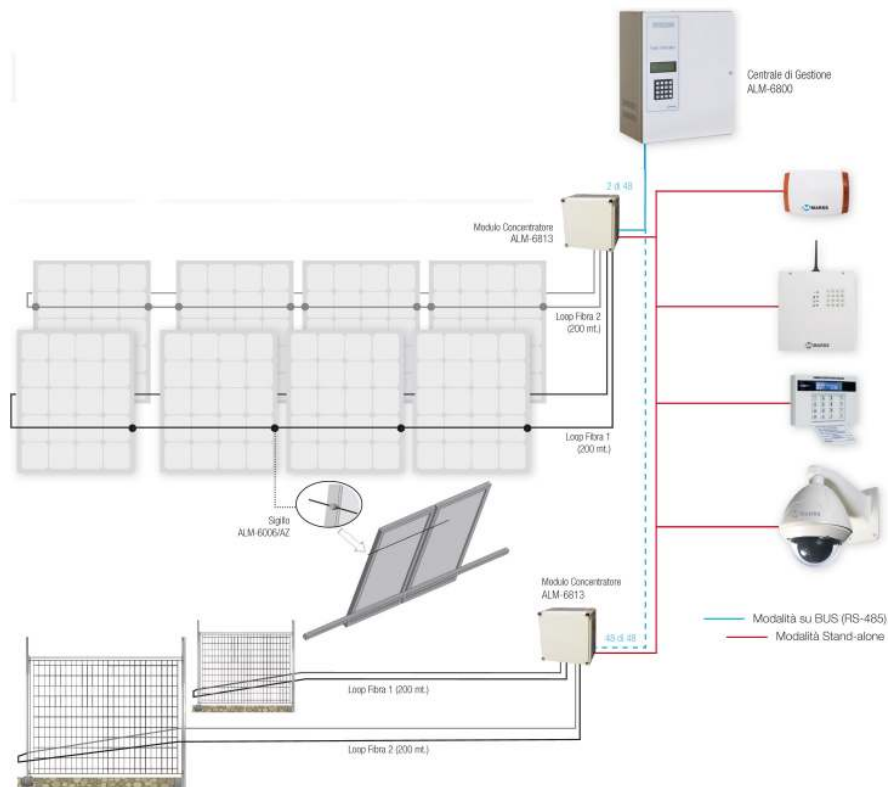
Optical Fiber anti-theft system Solar Defender for panels .....	4
Optical Fiber module Solar Defender.....	5
Cautions for installation.....	5
Module Description.....	6
Bus Input Terminal Block.....	6
Fuse F4.....	7
Bus Output Terminal Block.....	7
Tamper Terminal Block.....	8
TX and RX Fiber optic connector.....	9
Loop Fiber 1 and Loop Fiber 2 relays.....	10
Reset Button.....	10
Open Collector OC1 and OC2 outputs.....	11
Open Collector OC1 use.....	11
First mode to use.....	12
Second mode to use.....	12
Third mode to use.....	13
X7 auxiliary power supply terminal block.....	14
Dip-switch SW2 Function.....	15
Dip-switch SW1 Address.....	16
Jumper JP3.....	18
Seven segment display.....	18
Fiber stripping.....	18
Optical Fiber cabling by .....	20
Fiber minimum curvature.....	22
Power Supply features.....	23
Power supply terminal blocks description.....	23
Spetification.....	25

## Optical Fiber anti-theft system Solar Defender for panels

The system MARSS Solar Defender operates with POF (Plastic Optical Fiber).

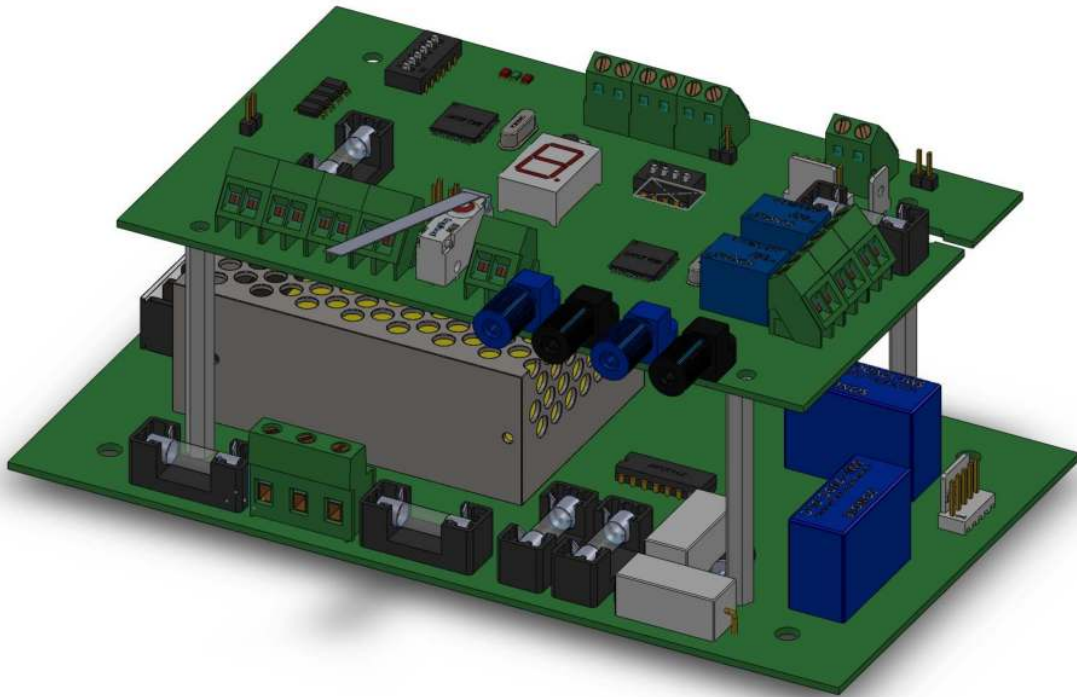
The main features that make the optical fiber the best support for data transmission are: the immunity at electric noise and weather conditions, the low sensibly at the temperature changes.

The operating principle of the MARSS system at optical fiber is very simple: the fiber is passed through the fastening holes on the panels' frame, using the locking system ALM-6006 patented by MARSS srl.



*ALM-6813/6812 wiring diagram*

## Optical Fiber module Solar Defender



The module ALM-6813/6812 manages up to 2 lines of 200mt linear POF (Plastic Optical Fiber), by 2 Loop. It can operate in *stand-alone mode* or in centralized mode *on BUS RS-485*.

ALM-6813: Optical Fiber module with supervised power supply.

ALM-6812: Optical Fiber module without supervised power supply.

**This guide is related to the only *stand-alone* operation mode.**

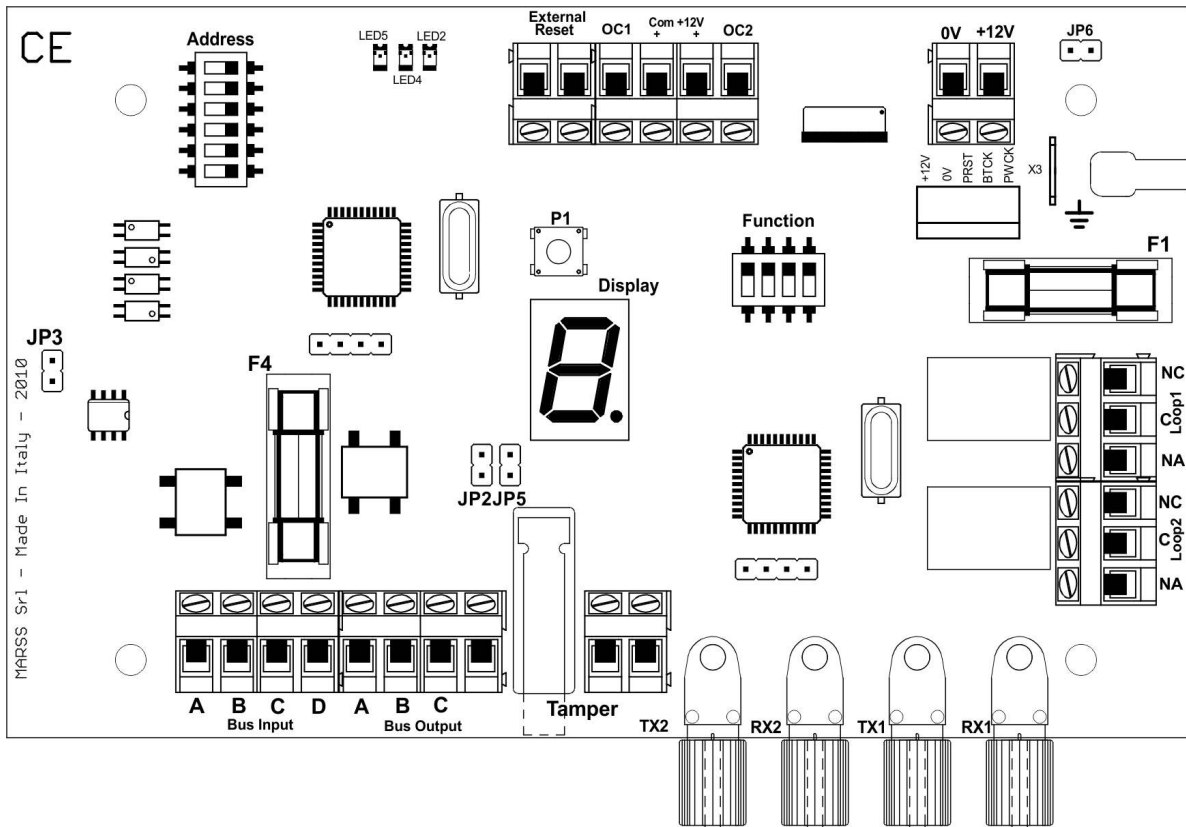
About operation mode *on BUS RS-485*, please refer to the control panel ALM-6800 installation and configuration guide.

### Cautions for installation

Take the following precautions to prevent your own and other safety:

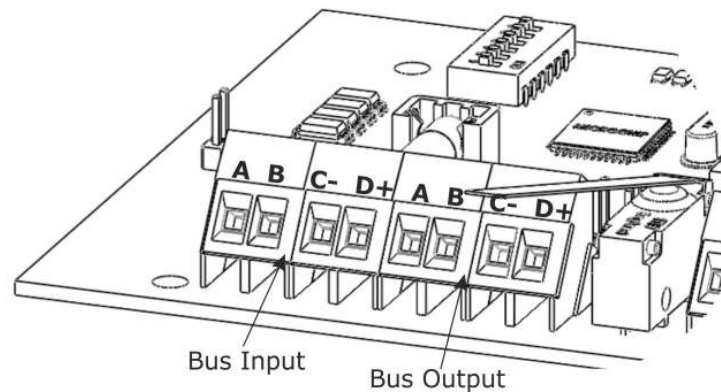
- To connect the 230v electric line, use cables with additional sheath to guarantee a larger protection.
- To avoid fire risks, replace the fault fuses on the panel's motherboard with fuses of the same value and model.
- To avoid explosion risks, replace the backup battery with battery of the same model.
- To protect the user and the equipments from over voltage or air discharges, connect the ground wire at any device.

## Module Description



### “Bus Input” A B C D Terminal Block

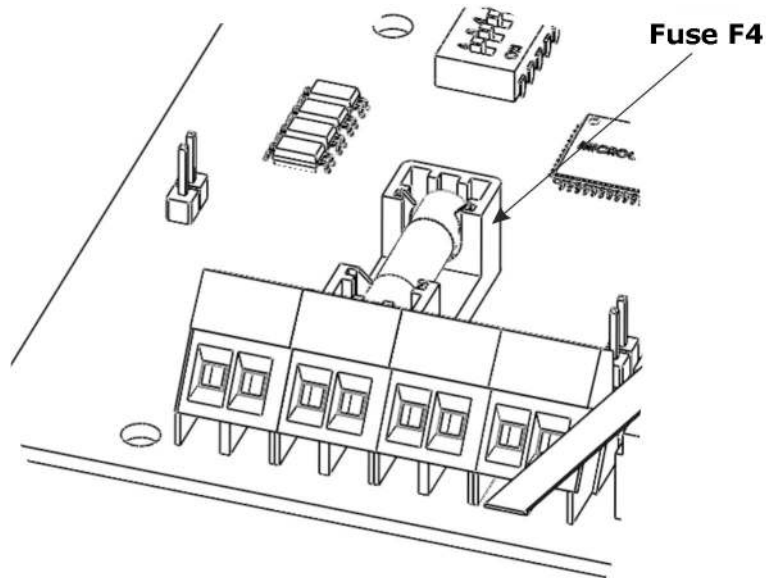
Terminal block to connect the BUS RS-485 comes from the panel. (Only when the concentrator operates in *on Bus mode*; in *stand-alone mode*, it is not used).



- A** Data Bus “A” (GREEN with MARSS cable model ALM-6021)
- B** Data Bus “B” (YELLOW with MARS’ cable model ALM-6021)
- C** Negative of supply towards the next concentrator (BLACK with MARSS cable model ALM-6022 and with any other cable)
- D** Positive +24V towards the next concentrator (RED with MARSS’ cable ALM-6022 is used)

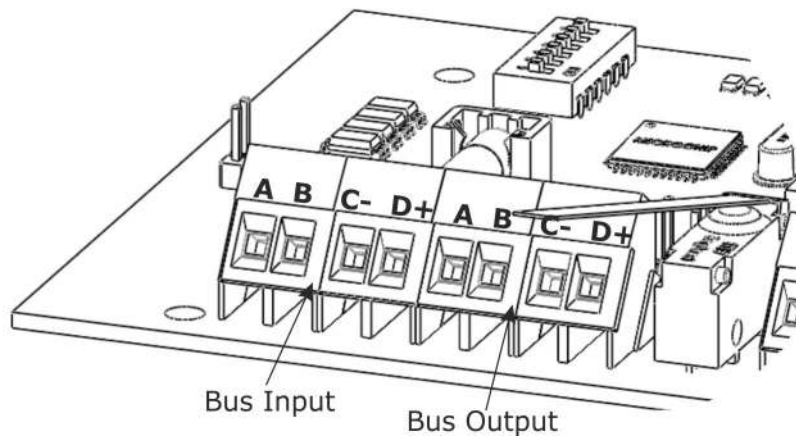
## Fuse "F4"

Rapid Fuse 1A to protect the BUS supply coming from the control panel.



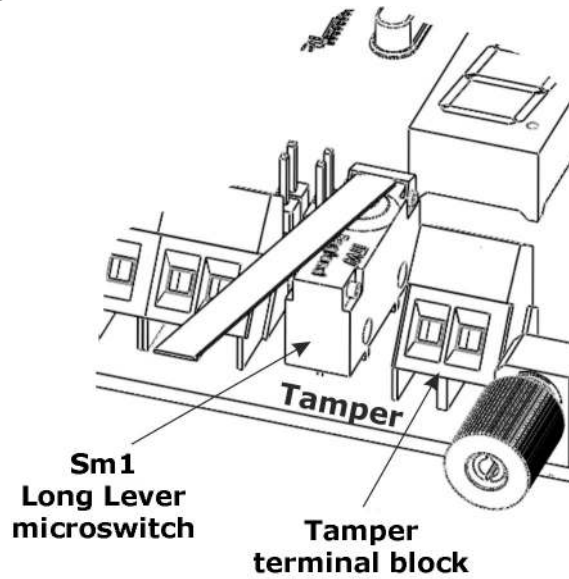
## "Bus Output" A B C D Terminal Block

Terminal block to connect the BUS RS-485 to the next concentrator.

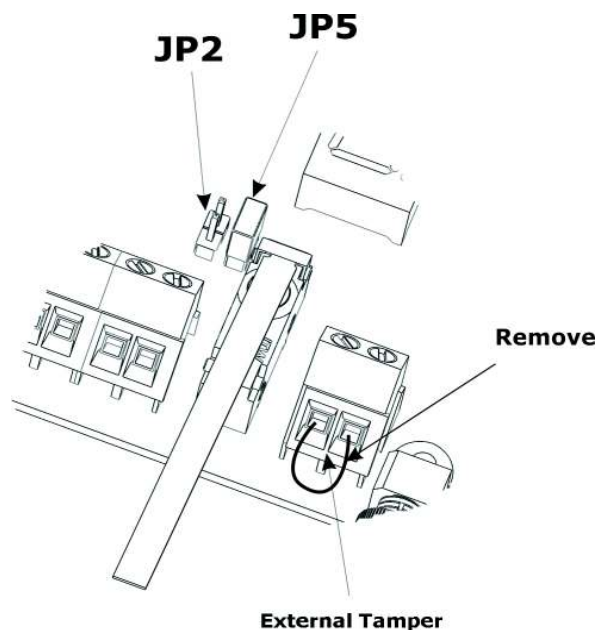


- A** Data Bus "A" ( GREEN with MARSS cable model ALM-6021)
- B** Data Bus "B" ( YELLOW with MARSS cable model ALM-6021)
- C** Negative of supply towards the next concentrator ( BLACK with MARSS cable model ALM-6022 and with any other cable)
- D** Positive +24V towards the next concentrator( RED with MARSS cable ALM-6022)

## "Tamper" Terminal Block



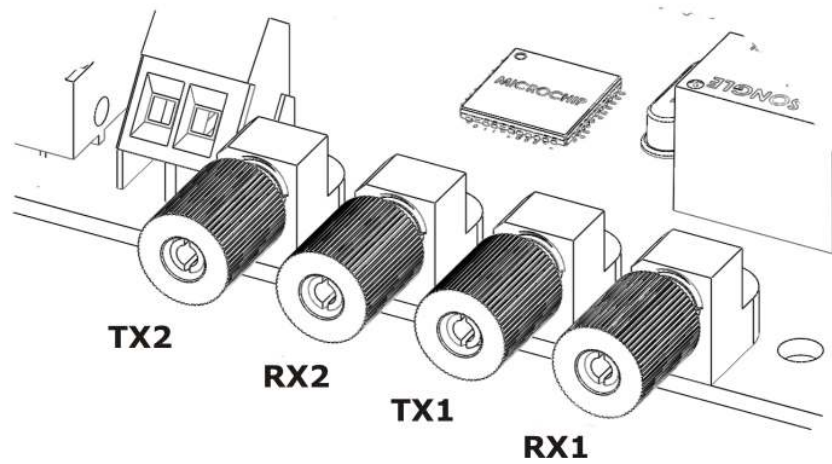
The concentrator is equipped with a long lever microswitch, to protect the case from possible openings. In *on BUS* operating mode, the concentrator will signal the manomission to the panel by BUS. In *stand-alone* mode, it's possible to use the terminal block to connect at any anti-theft panel or alarm communication device (dialer, radio link, etc...): in this case, the jumper JP2 and JP5 have to be removed.



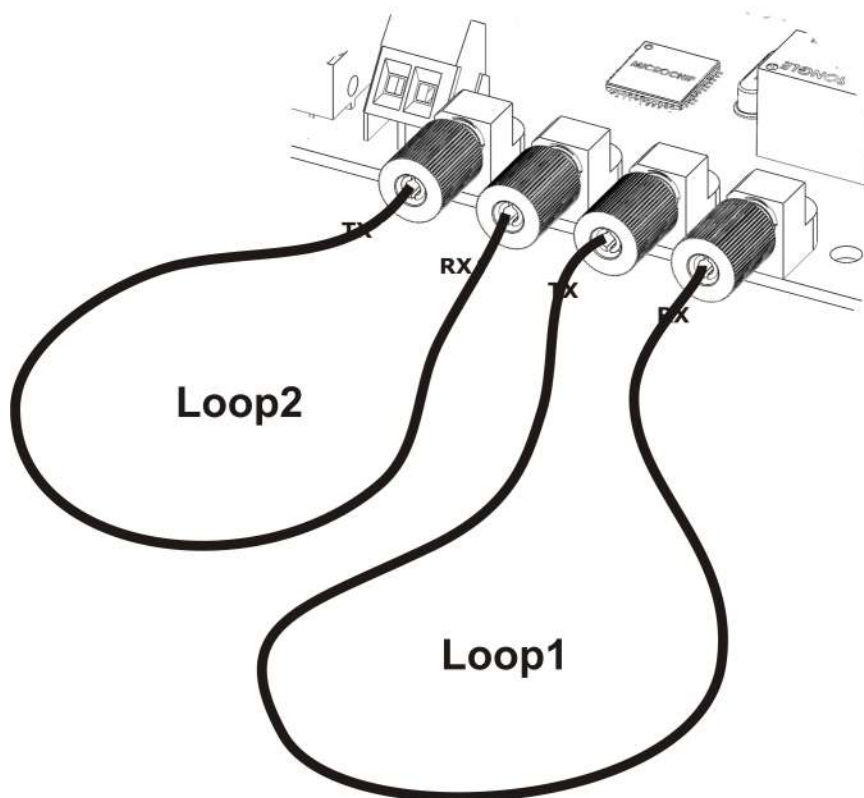
**Note: In both operation modes, on BUS and stand-alone, after the installation and testing of the module , please remove the jumper on the external tamper terminal block, otherwise the tamper will remain inactive.**



## TX and RX Fiber optic connector

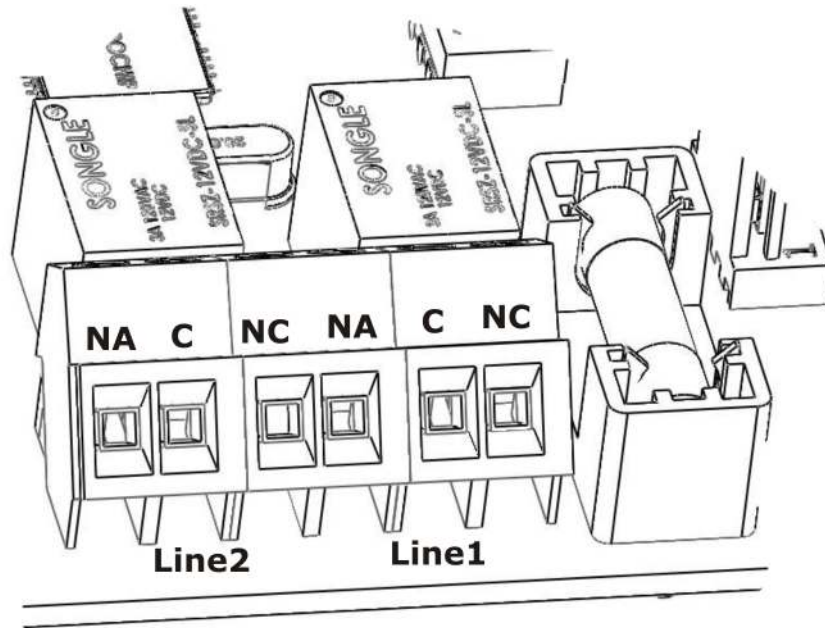


The concentrator is equipped with 4 fiber connectors: 2 for TX and 2 for RX (it's not necessary to make a perfect lapping before to connect the fiber).



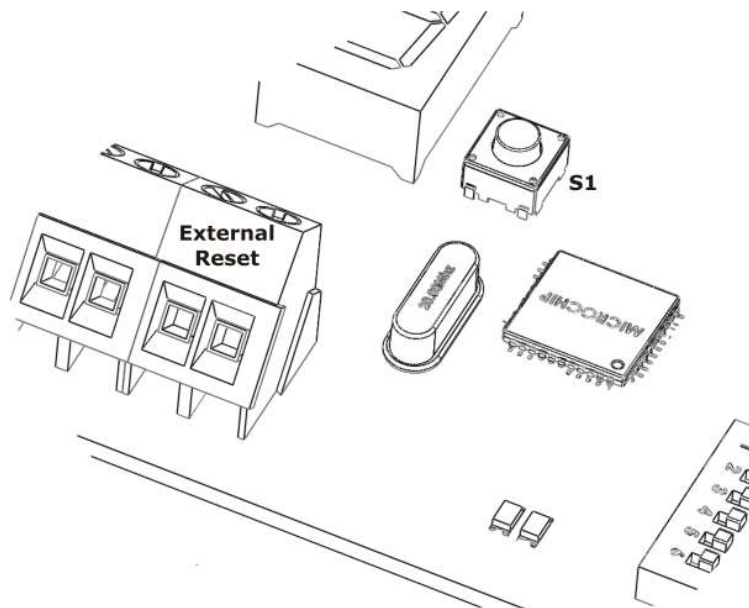
The TX and RX are calibrated to use POF of 200mt maximum length. In case of fiber interruption, the optical transmitter detects the light change and sends information at the module. In *BUS* operating mode, the control panel Solar Defender (ALM-6800) inquires "*in polling*" the single modules, detects the status and manages the events as an alarm. In *stand-alone* mode, the alarm relay related the interested Loop fiber, will activate.

## Loop Fiber 1 and Loop Fiber 2 relays



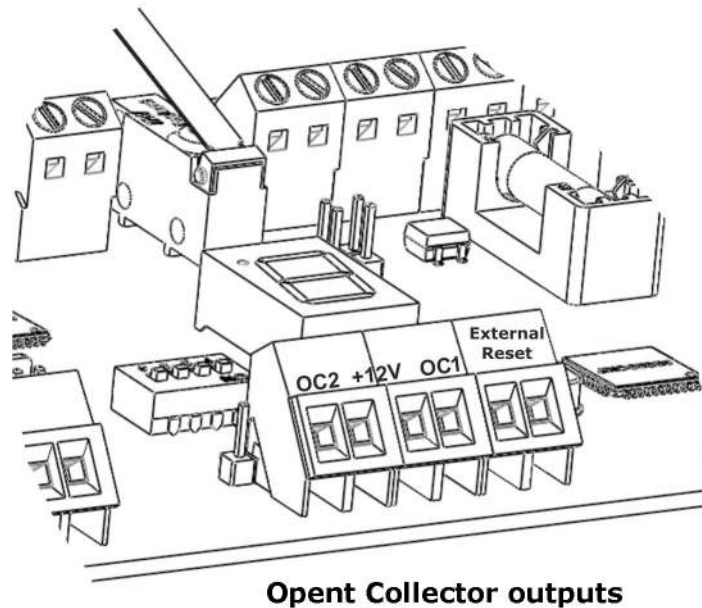
The module is equipped with two signalling relays: Line1 for the Loop1 (TX1-RX1) and Line2 for the Loop2 (TX2-RX2). The two relays will be active in case of fiber break or cut.

## Reset Button

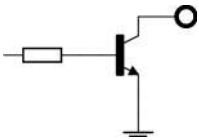


The S1 button is used to reset the concentrator after an alarm signal. It can also be resetted by an external device (GSM dialer, etc ...), using the "External Reset" terminal block (normally open contact).

## "OC1 and OC2" Open Collector Outputs



Open collector outputs with negative closing. The operating scheme is as follows:



When the transistor is at rest, on the collector there is no tension. When it is activated through the base resistor, the transistor enters in conduction, giving out a negative voltage. To test the output operation, just connect a voltmeter between the positive and the collector (on the positive of the module there is a voltage of +12 V). When the open collector output is switched on, between the collector and the positive of supply, will measure a voltage of 12V.

**Note:** *On the module is active only the OC1 output. The OC2 output is currently not used.*

### OC1 Open Collector Output use

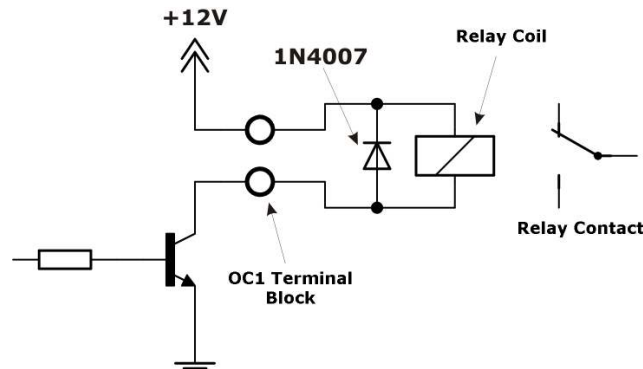
The output OC1 is a module operation security check. It 's always-on until the module is plugged on 230V and / or backup battery and is in function. In case of lack of the both power supplies, or Fuse F1 failure (module ALM-6812), there will be no tension on the OC1 output. It 's very important to use this output when using theconcentrator ALM6813 or ALM6812 in stand-alone mode. In on BUS mode these reports, are managed by the control panel ALM-6800.

**Important Note: Use the output OC1 is necessary for reporting the failure of the module.**

The following article describes three ways to use this output. These rules also apply to any open collector output of any system, with close to negative.

### First mode to use

Open collector output direct connection to a 12V relay

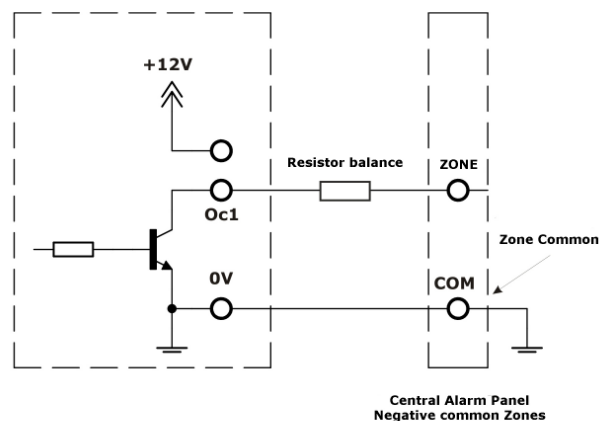


This is the easiest way to connect an open collector output with negative closing. The transistor on the ALM-6813/6812 is always on. It is disabled when there is the complete lack of 230V and backup battery. In this case the connected relay is always on. It switches off only with the absence of the power. This affects of about 20mA on the total absorption of the concentration (the absorption varies with the type of relay used).

**Note:** When the concentrators operate *on BUS*, all these signals are automatically managed by the control panel. This connection is used only in stand-alone mode.

### Second mode to use

Open Collector output direct connection to an alarm input

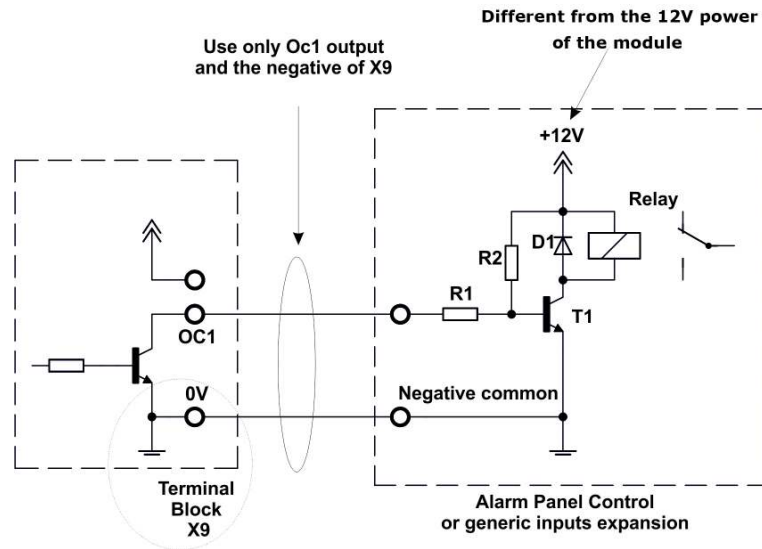


The OC1 open collector output can be directly connected to an alarm input of any burglar alarm system or telephone dialer with the zones operate at negative. To verify this, just check on the panel, the dialer or the expansion input at issue, the continuity between the common-base of the alarm zones and the negative power: if there is continuity, is possible to connect the OC1 as the above wiring diagram. 0V is any negative power on the module (for convenience, use the negative of the X9 auxiliary power terminal described on next page). Otherwise, avoid this method of connection.

**Note:** In *on BUS* mode, all these signals are automatically managed by the control panel. This connection is used only in stand-alone mode.

### Third mod to use

Open Collector output connection to a relay separate form the concentrator



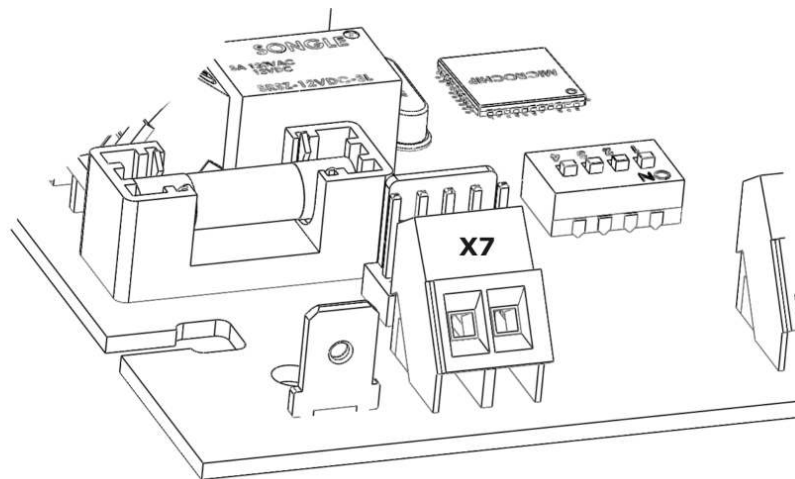
The main problem of the first connection method described above, is that the relay is always on, increasing of about 20mA (it depends on the type of relay connected) the power consumption for each module. To resolve this problem just use, in addition to the relay, some components easy to find and use.

- R1: Resistor 470ohm 1/4W 5%
- R2: Resistor 15Kohm 1/4W 5%
- T1: Transistor NPN type BC337B
- D1: Diode type 1N4007
- Relay: Relay 12V DC coil, type SMI-12VDC-SL-C

With this connection mode, the relay will be activated only when the modules turn-off themselves totally, by starting an alarm signal for "lack of supply on the concentrators".

**Note:** When the module operates *on BUS* mode, all these reports are automatically managed by the control panel ALM-6800. This connection is used only in *stand-alone* mode.

## X7 auxiliary power supply terminal block

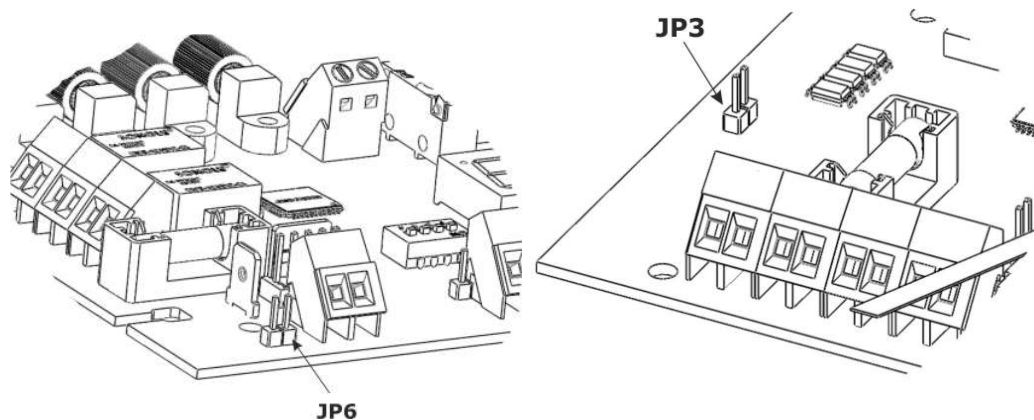


The power supply on board is equipped with backup battery charging circuit with load and operation test. In *on Bus* mode, all modules have the control of the power supply and batteries. In case of a fault, the optical fiber module ID number with the power supply in fault is reported directly on the control panel by Bus. However it's possible to use any other 12V power supply brand model (1.5 A minimum). In this case it is not possible to manage the control of power presence and efficiency of the backup battery.

## Fuse F1

Rapid Fuse 1A to protect the auxiliary power. Replace only with equal value.

## Jumper JP6

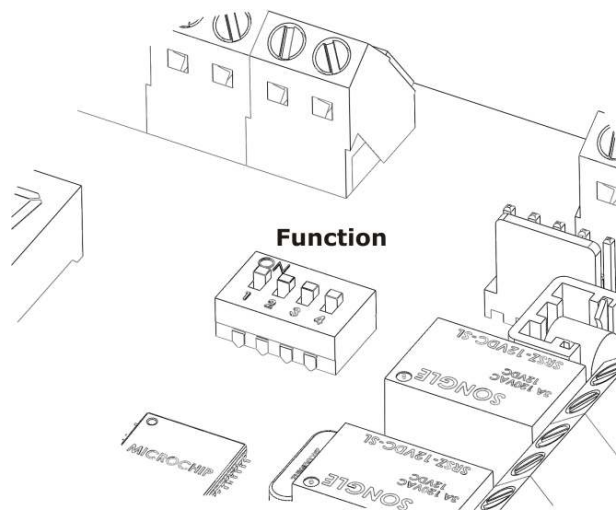


**JP3:** Activates the line termination. To be activated only if requested by MARSS' Technical Service

**JP6:** Enables the module starting in *stand-alone* mode. *On Bus* mode only, it must be removed.

## Dip-switch SW2 "Function"

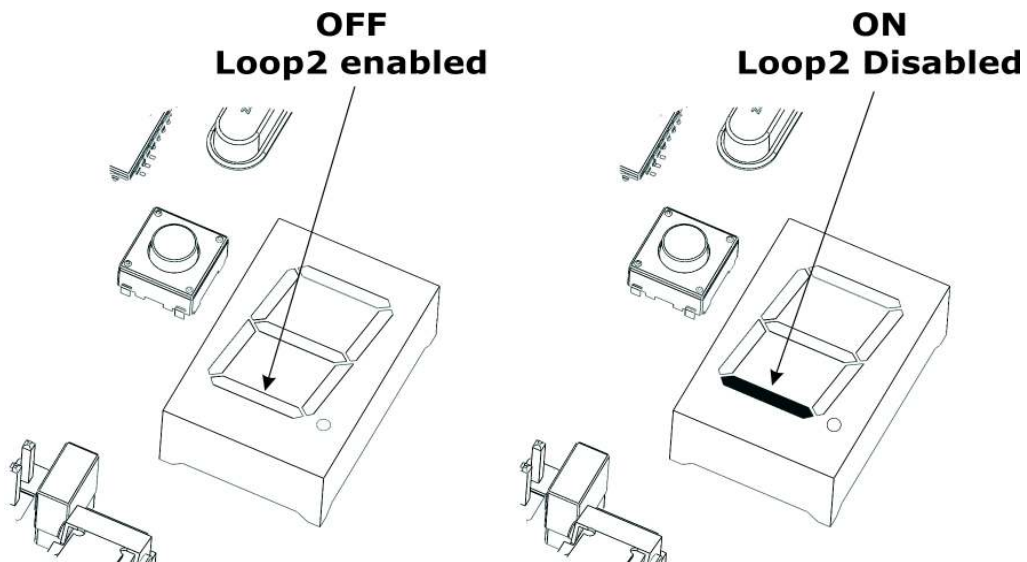
The dip-switch SW2 has 4 micro switches. The microswitch 2 is not used.



The microswitch 1 is used to disable the Loop fiber 2. This function is used when on the concentrator is active a Loop fiber only.

Micro switch 1 on ON => Loop2 Off (Dot 7-segment display on)

Micro switch 1 on OFF => Loop2 On (Dot 7-segment display off)



The micro switch 3 and 4 are used to activate the function "control of the fiber signal level reading". In this way you can be sure of the best reading/transmission of the signal through the fiber. When the function is enabled (for single channel), the 7-segment display will show a value between 0 - 9.

0  
1  
2  
3  
4  
5  
6  
7  
8  
9

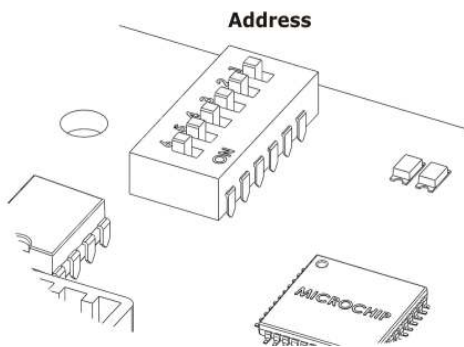
- Reading/transmission value **too low**
- Reading/transmission value **too low**
- Reading/transmission value **acceptable**
- Reading/transmission value **medium**
- Reading/transmission value **medium**
- Reading/transmission value **optimal**
- Reading/transmission value **optimal**
- Reading/transmission value **optimal**
- Reading/transmission value **optimal**
- Reading/transmission value **optimal**

Micro switch 3 => ON Control Function active on Loop1  
Micro switch 4 => ON Control Function active on Loop2

**Important Note:** *The control function must be enabled one Loop for time. After the test on Loop1, return the micro-switch 3 on OFF position and proceed with the micro switch 4. After testing, make sure both the micro switch (3 and 4) are OFF.*

### Dip-switch SW1 "Address" micro switch 1, 2, 3, 4, 5, 6

The module can be connected *on Bus* mode and managed by the control panel ALM-6800. In this way an only panel can manage up to 48 concentrator modules connected on a single RS-485 Bus. In *On Bus* mode, each concentrator module must have its own unique ID address.





The following table shows all combinations to address the module.  
Remember: made **the addressing operation with the module off**

Address	Dip-6	Dip-5	Dip-4	Dip-3	Dip-2	Dip-1
<b>00 (not used)</b>	OFF	OFF	OFF	OFF	OFF	OFF
<b>01</b>	OFF	OFF	OFF	OFF	OFF	ON
<b>02</b>	OFF	OFF	OFF	OFF	ON	OFF
<b>03</b>	OFF	OFF	OFF	OFF	ON	ON
<b>04</b>	OFF	OFF	OFF	ON	OFF	OFF
<b>05</b>	OFF	OFF	OFF	ON	OFF	ON
<b>06</b>	OFF	OFF	OFF	ON	ON	OFF
<b>07</b>	OFF	OFF	OFF	ON	ON	ON
<b>08</b>	OFF	OFF	ON	OFF	OFF	OFF
<b>09</b>	OFF	OFF	ON	OFF	OFF	ON
<b>10</b>	OFF	OFF	ON	OFF	ON	OFF
<b>11</b>	OFF	OFF	ON	OFF	ON	ON
<b>12</b>	OFF	OFF	ON	ON	OFF	OFF
<b>13</b>	OFF	OFF	ON	ON	OFF	ON
<b>14</b>	OFF	OFF	ON	ON	ON	OFF
<b>15</b>	OFF	OFF	ON	ON	ON	ON
<b>16</b>	OFF	ON	OFF	OFF	OFF	OFF
<b>17</b>	OFF	ON	OFF	OFF	OFF	ON
<b>18</b>	OFF	ON	OFF	OFF	ON	OFF
<b>19</b>	OFF	ON	OFF	OFF	ON	ON
<b>20</b>	OFF	ON	OFF	ON	OFF	OFF
<b>21</b>	OFF	ON	OFF	ON	OFF	ON
<b>22</b>	OFF	ON	OFF	ON	ON	OFF
<b>23</b>	OFF	ON	OFF	ON	ON	ON
<b>24</b>	OFF	ON	ON	OFF	OFF	OFF
<b>25</b>	OFF	ON	ON	OFF	OFF	ON
<b>26</b>	OFF	ON	ON	OFF	ON	OFF
<b>27</b>	OFF	ON	ON	OFF	ON	ON
<b>28</b>	OFF	ON	ON	ON	OFF	OFF
<b>29</b>	OFF	ON	ON	ON	OFF	ON
<b>30</b>	OFF	ON	ON	ON	ON	OFF
<b>31</b>	OFF	ON	ON	ON	ON	ON
<b>32</b>	ON	OFF	OFF	OFF	OFF	OFF
<b>33</b>	ON	OFF	OFF	OFF	OFF	ON
<b>34</b>	ON	OFF	OFF	OFF	ON	OFF
<b>35</b>	ON	OFF	OFF	OFF	ON	ON
<b>36</b>	ON	OFF	OFF	ON	OFF	OFF
<b>37</b>	ON	OFF	OFF	ON	OFF	ON
<b>38</b>	ON	OFF	OFF	ON	ON	OFF
<b>39</b>	ON	OFF	OFF	ON	ON	ON
<b>40</b>	ON	OFF	ON	OFF	OFF	OFF
<b>41</b>	ON	OFF	ON	OFF	OFF	ON
<b>42</b>	ON	OFF	ON	OFF	ON	OFF
<b>43</b>	ON	OFF	ON	OFF	ON	ON
<b>44</b>	ON	OFF	ON	ON	OFF	OFF
<b>45</b>	ON	OFF	ON	ON	OFF	ON
<b>46</b>	ON	OFF	ON	ON	ON	OFF
<b>47</b>	ON	OFF	ON	ON	ON	ON
<b>48</b>	ON	ON	OFF	OFF	OFF	OFF

**Addressing the module, the stand-alone operation mode and the P1 reset button will be automatically disabled. In case of lock of the module, a reset is possible by switching off and switching on after a few seconds the power supply. To reactivate the stand-alone mode, just put all the addressing micro switches (1, 2, 3, 4, 5, and 6) on OFF with the module turned off.**

## Jumper JP3

Use only if requested by MARSS' Technical Service

### 7-Segments Display

The 7-segment display on board of the module, displays which of the 2 Loops fiber is tripped. The displayed alarms are:

1 Alarm Loop fiber 1

2 Alarm Loop fiber 2



Alarm Loop fiber 1



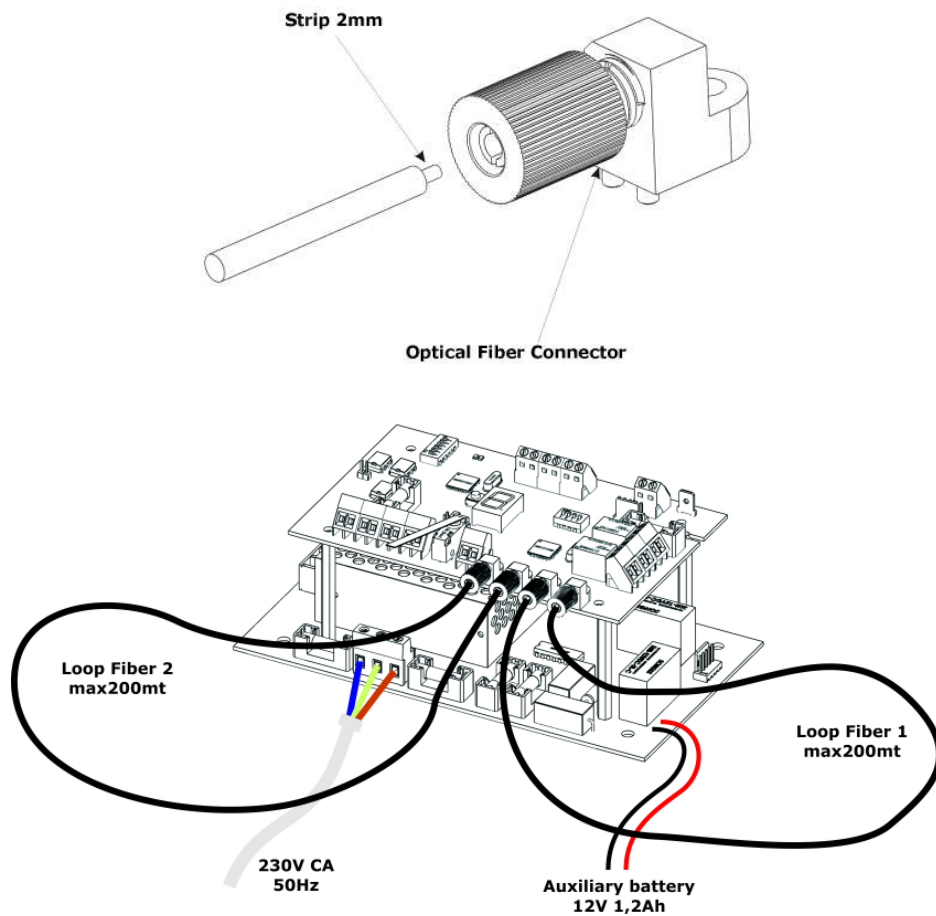
Alarm Loop fiber 2



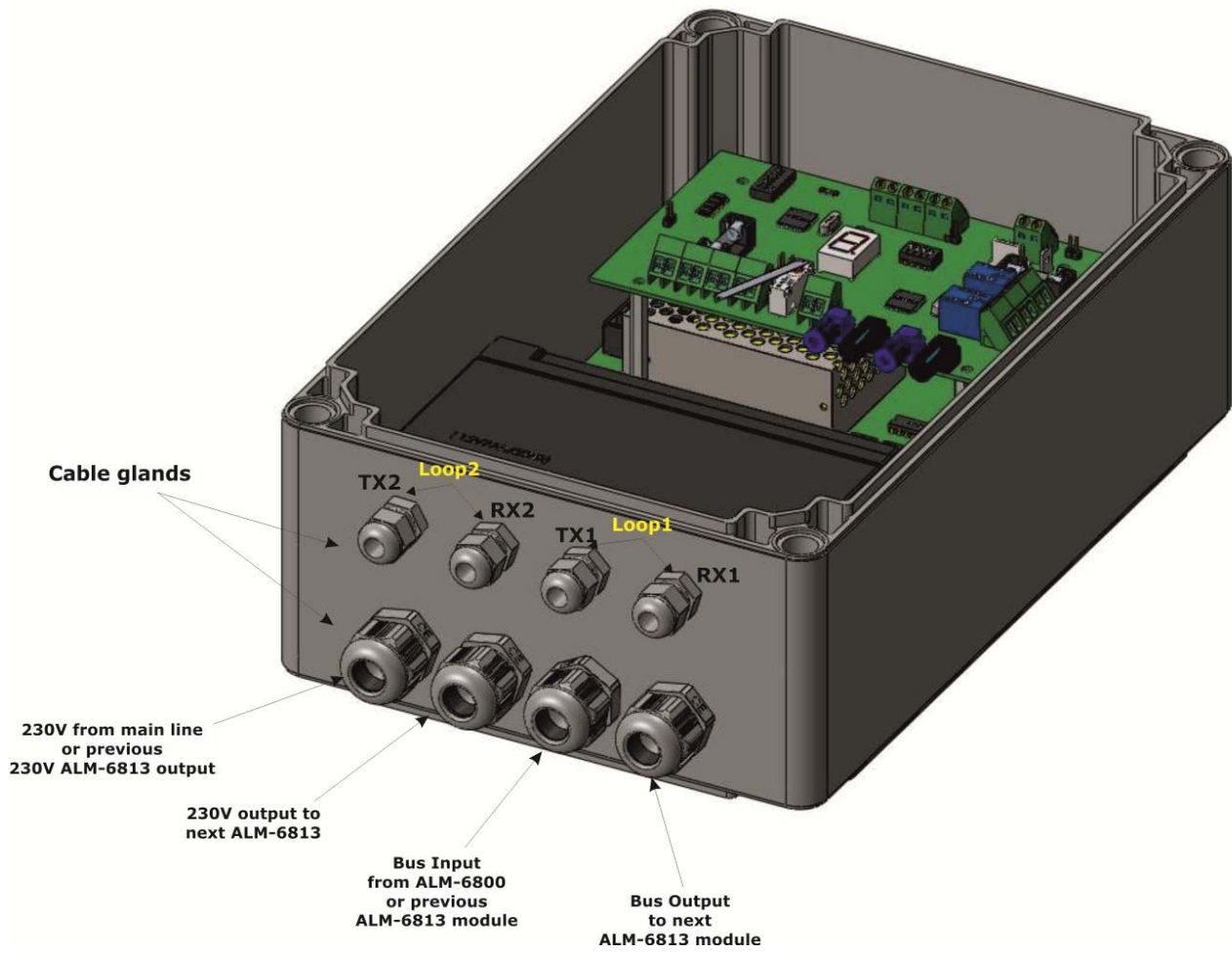
Segment ON: Loop2 disabled. Segment OFF: Loop2 active.

The module is now active and ready to operate H24.

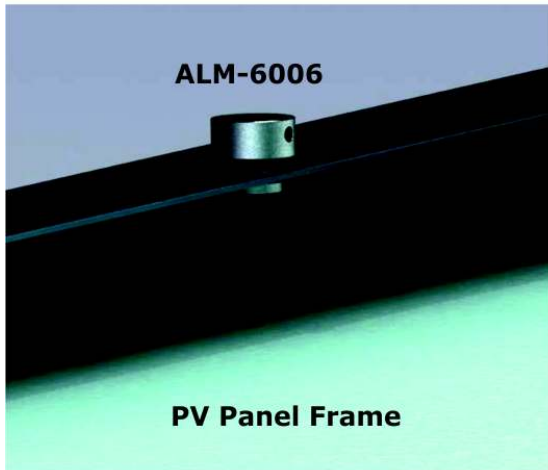
### Fiber Stripping



## Case grommets



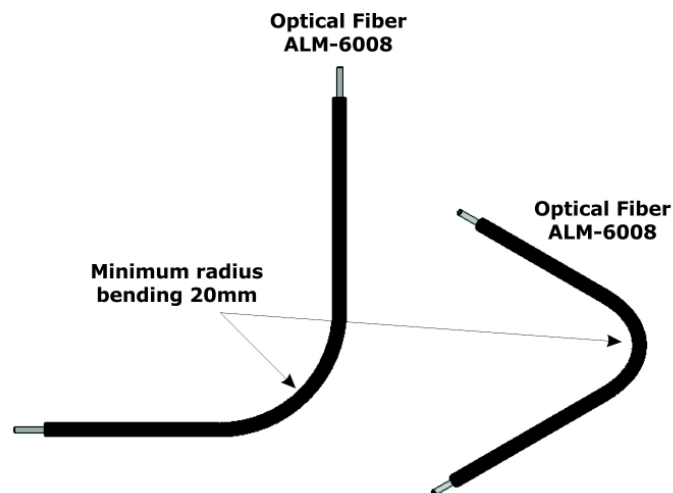
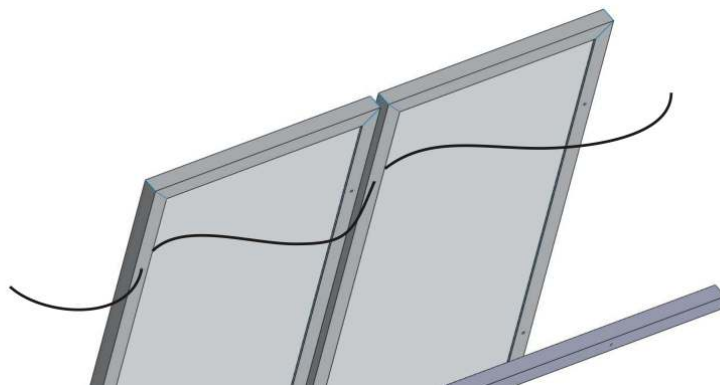
**Optical Fiber cabling by "Sigillo" ALM6006**



**ALM-6006  
MARSS Patented**

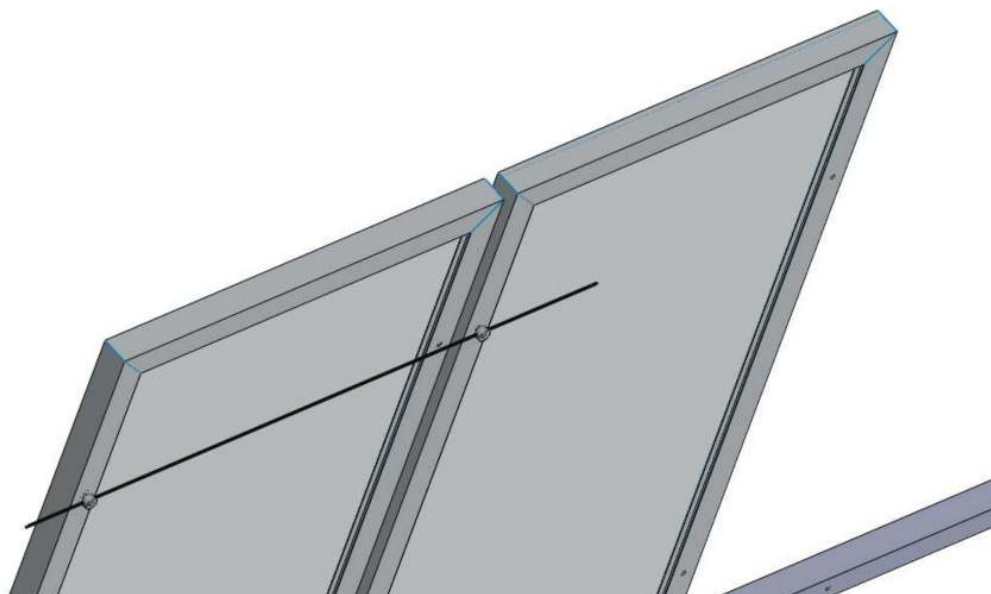
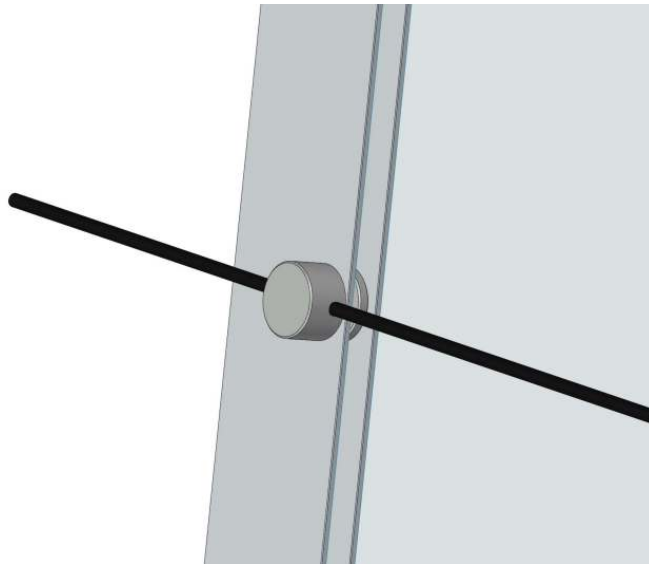


Most of the photovoltaic panels have holes on the frame often not used. Through these holes you can pass the optical fiber, but with the risk of getting too tight curves that can drastically affect the transmission of optical signal. The passage of the fiber presents many difficulties and risks of excessive abrasion of the same.



“Sigillo” Solar Defender model ALM-6006 has made to facilitate the installation of the optical fiber on the panels; it allows obtaining various advantages:

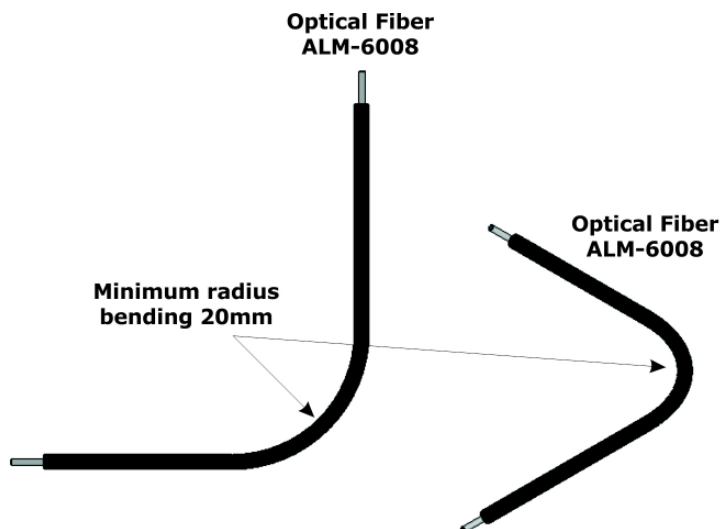
- 70% reduction of installation times.
- An accurate installation of the optical fiber.
- Mechanical protection of the panel.



The optical fiber must be passed through the four cable glands on the module case. After the fiber installation, the cable glands must be tightened.

### **Minimum curvature of the fiber**

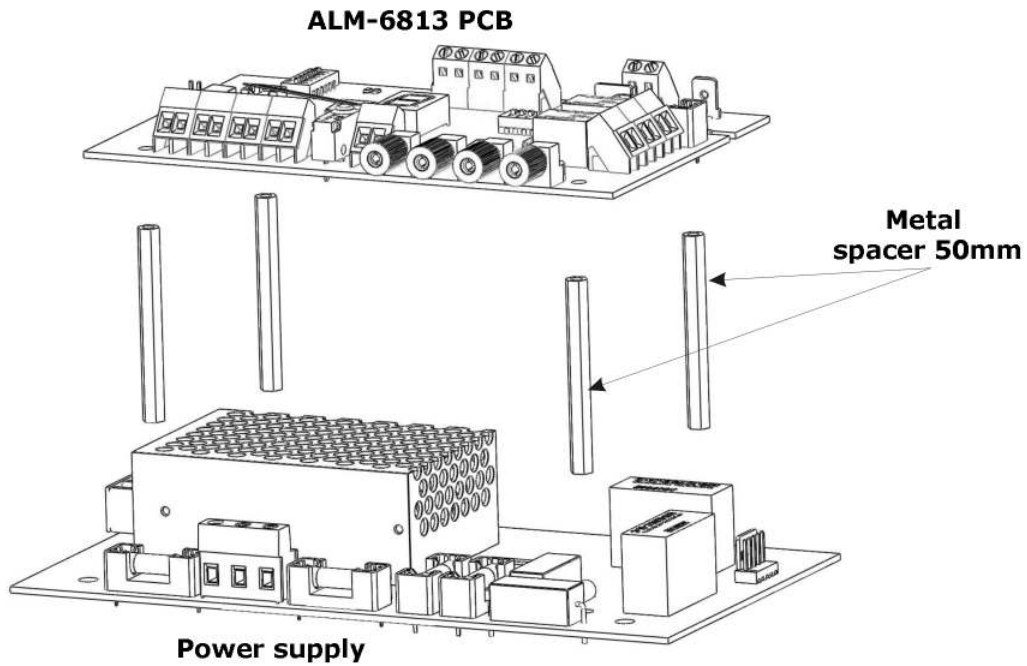
The minimum radius for transmitting and reading the optical signal through the fiber must be greater than or equal to 50mm. A curvature radius lower than can cause damage to the fiber with the inevitable replacement of the same, and drastically reduce the transmission and reading signal, causing alarms cut fiber.



The optimal reading of the signal through the fiber, is adjusted on a maximum length of about 200m. If you use greater lengths, the transmission/reading of the signal can be less of the threshold value setted on the module: "cut fiber" false alarms will be possible.

**The fiber can be fixed with cable ties, paying attention because all the curves made during installation will be the most possible "soft" (50mm minimum radius).**

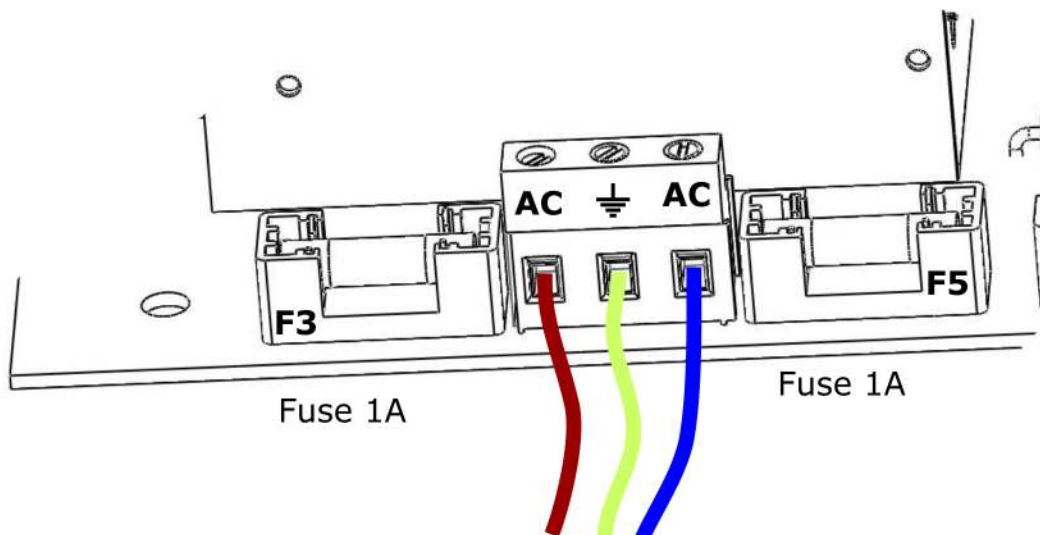
## Power supply features (only ALM-6813)



## Description of the terminal blocks

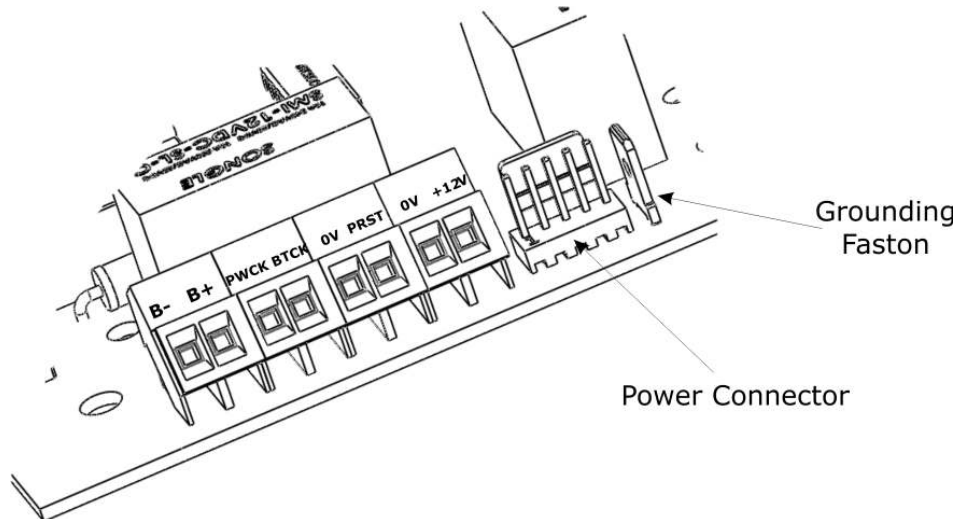
### 230V Terminal block

7.62 mm pitch terminal block to connect the mains voltage 230V AC 50Hz. The 230V line is protected by two rapid fuses 1A (F3, F5). Replace fuses F3 and F5 only with ones of equal values.



**Important:** All the concentrators must be grounded through the power supply terminal block 230V. The absence of the connection can be cause of damage in case of lightning or surges.

## Connection Terminal Block



The concentrator is powered by the 5-pin connector. The power supply has on board also an 8-pin terminal block

TERMINAL BLOCK	DESCRIPTION
B-	Negative Backup Battery Terminal Block
B+	Positive Backup Battery Terminal Block
PWCK	OC output 230v line lack
BTCK	OC output battery fault
PRST	Input to reset the concentrator by BUS
+12V	Auxiliary output 12V max500mA

## Backup Battery autonomy

Operating autonomy tested with 12V 7Ah battery is 60 hours (battery efficiency). The data refer to the concentrator ALM-6813.

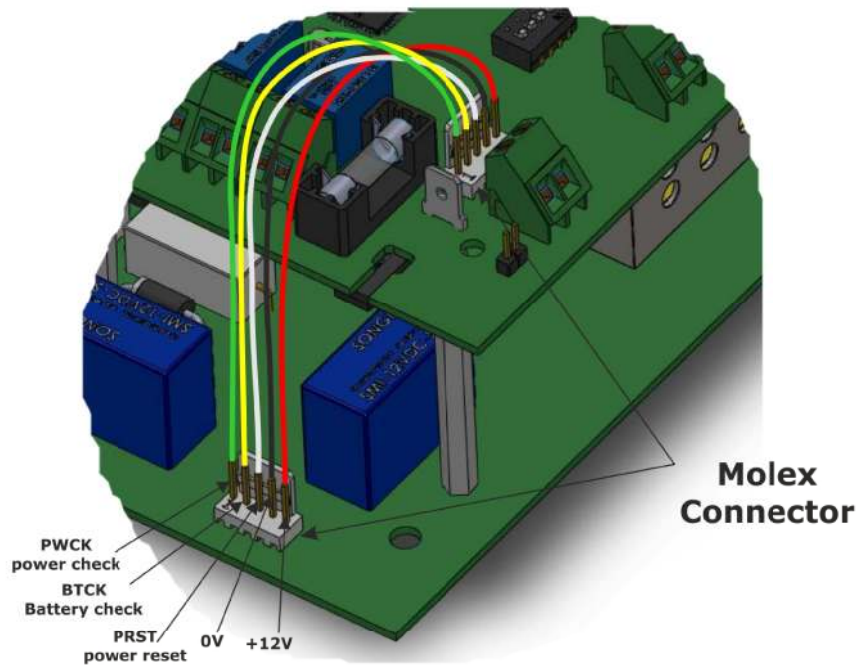
**Note: The autonomy of battery depends on:**

- the type of battery used;
- the condition of the battery used (recommended periodic replacement battery within 2 years and beyond, from installation);
- the possible load on the +12 V (500mA max).

## Switching power supply on board: Features

- Input Voltage 88 ~ 264VA
- Frequency 47 ~ 63Hz
- Output Voltage 15V (13.5 ~ 16.5V settable)
- Max power 1,7A
- Rated power 25W
- Dimensions 78x51x28mm
- Operating Temperature -20°C ~ 70°C
- Operating Humidity 20 ~ 90%
- Protection Input and Output Overcurrent and Overvoltage





## SPECIFICATIONES

- |   |  |
|---|--|
| • Loop Number on board:                     | 2 (Loop 1, Loop 2)                       |
| • POF managed by each Loop:                 | Max. 200 (mt.)                           |
| • POF type managed:                         | POF model ALM-6008                       |
| • Loop Alarm Outputs:                       | 2 (Loop 1, Loop 2)                       |
| • Auxiliary Outputs:                        | 3 (power failure, battery fault, tamper) |
| • Mains Power:                              | 230 Vac, 50Hz                            |
| • Backup power:                             | Battery 12Vdc/1,2Ah                      |
| • Absorption in stand-by (no alarm):        | 80mA max                                 |
| • Absorption in alarm for both fiber Loops: | 100mA max                                |
| • Average life with battery power:          | >8 hours in alarm                        |
| • Dimensions (mm) (WxHxD):                  | 200x300x132                              |

