

# **Inverter for Life**



**Technical Manual for String Boxes SB20** 



**Inverter for Life** 

Via J.F. Kennedy 20871 Vimercate (MB) Italy Phone: +39 039 98981 Fax +39 039 6079334

www.fimer.com solar@fimer.com



INFOLINE Tel. +39-039-6079326



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### **GENERAL INFORMATION**

Document Title:Technical Manual for FIMER String Box<br/>Type SB20 @ 1500Vdc with 1 OUT per single DC poleDocument Classification:User and Installation Manual ORIGINAL INSTRUCTIONS

### Manufacturer's information

FIMER S.p.A Via J.F. Kennedy, - 20871 Vimercate – (MB) - Italy Tel. +39 039 98981 r.a. - Fax +39 039 6079334 - www.FIMER.com - solar@FIMER.com

#### Information on the manual

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FIMER shall not assume any liability for any damages caused by its improper use, the same applies to people or companies involved in the preparation or production of this manual. The product specifications are subject to change without notice. The images are only indicative.

### Environmental impact declaration

The FIMER products offer lower consumption of raw materials and lower amounts of waste throughout their entire working life. In typical applications, these positive effects on the environment far outweigh the negative impacts of the manufacturing of the products and final disposal.

The packaging of the products is of a good quality and can be reused. All the products are placed inside sturdy cardboard and wooden boxes, which are themselves made with a high percentage of fibre and recycled materials. If not reused, the packaging can be recycled. Polyethylene used to make the protective film and bags for wrapping the products can be recycled for the same purpose. The packaging strategy adopted by FIMER is based on easily recyclable products with low environmental impact and, thanks to regular controls and analysis, aims at identifying new improvement opportunities in this area.



At the end of their life and operation, the FIMER products can be dismantled very easily by separating the main components which can then be recycled. Some parts of these devices are snap-locked to each other and therefore can be separated without the use of tools, while many other components are secured with normal screws and therefore can be easily disassembled with the use of common screwdrivers. In any case, virtually every part of the product is recyclable. Do not dispose of the device or its parts with

household waste. In accordance with European Directive 2012/19/UE on electric and electronic waste and its application in national law (The Italian DLGS 14 march 2014 N° 49), used electronic devices must be collected separately and recovered ecologically. The device must be disposed of in compliance with the collection and disposal system adopted and authorised in your area. Failure to comply with this EU Directive may adversely affect the environment and human health!

### INTRODUCTION

#### Dear Customer,

Congratulations on choosing our string box, whose characteristics of high technology and reliability make it a highly innovative and durable product.

This manual contains all the information necessary to install and use the product safely. It is recommended to carefully read its contents before connecting and operating the machine.

Proper use of the product guarantees the reliability and quality of the system over time, which is indispensable to obtain excellent performances and outputs.

The contents of the manual will help you resolve most doubts and problems. Do not hesitate to contact your usual installer, distributor or sales representative if you experience problems during the use and installation which are not clearly described or documented in the manual. To obtain the latest information on the product or the latest version of the manual, please visit our website.

Keep this manual in a safe place near the machine for quick reference. This manual is an integral part of the machine; in case of resale of the product this manual should also be given to the purchaser.

The manual must accompany the product each time it is moved.

Thank you again for choosing our products.

### **GENERAL INFORMATION**

### Symbols used in the manual

Â	INFORMATION: It is recommended that the user carefully considers what is described and pays attention to the instructions contained in the manual.
$\wedge$	CAUTION or DANGER: The user is asked to pay the utmost attention to what is described in order to prevent the occurrence of situations that may cause serious damage or malfunctions to the equipment, as well as accidents, injuries or death to people.
A	RISK OF ELECTRIC SHOCK: It is compulsory to follow the instructions to avert the danger of electric shock and electric discharges.
	PACKAGING INSTRUCTIONS
	INSTALLATION INSTRUCTIONS: Describes the installation procedure of the product.
¢¢¢	OPERATING INSTRUCTIONS: Describes the use of the product.
X	DISPOSAL: Contains useful information for disposing of the product.

### SAFETY INSTRUCTIONS AND WARNINGS

The failure to follow these instructions may have serious consequences, such as the destruction of the device, personal injury or death due to electrocution. Therefore, the following safety instructions must be read and understood before installation and use of the device. For any clarifications or additional information, contact the FIMER technical service.



Once the product has been removed from its original packaging, visually inspect for damage that may have occurred during shipment. If damage is found, contact the dealer or manufacturer.



This manual is an integral and essential part of the product.

Carefully read the recommendations contained in it since they provide important information on safe use and maintenance. Following the sale to a new owner of the device or the complete PV system it is required to transfer to a new owner this document.



This product must only be used for the purpose for which it has been designed.

Any other use is considered improper and therefore dangerous. The manufacturer is not liable for possible damage caused by improper, incorrect or unreasonable use.



FIMER holds itself responsible only for the product in its original configuration. FIMER declines all responsibility for consequences deriving from non-original spare parts.

Any intervention that alters the structure or the operating cycle of the product must be carried out or authorized by the FIMER Technical Office. Any improper or not notified modification performed to the device without explicit authorization from FIMER result in immediate forfeiture of the warranty conditions and the cessation of the manufacturer's responsibility for the consequences derived from it. Failure to comply with the environmental conditions of the installation of the first field parallel string box operation described in this manual can cause damage to the equipment or system and are considered equal to the inadequate use of the device for which FIMER declares itself exempt from all responsibility.



FIMER may make technical changes in this manual and to the product at any time without notice. In case of typing errors or other types of errors, the corrections will be included in the new versions of the manual.



FIMER holds itself responsible for the information reported in the original version of the manual in Italian.



All safety instructions and warning signs attached to the frequency

- must be kept readable
- must not be damaged
- must not be removed
- must not be covered with stickers or written



The nameplate of the product contain the apparatus part number, serial number and technical data; it can be accessed by opening the front door of the device. For any communication related to the apparatus please indicate the serial number affixed on the above data plate.



Do not insert any foreign objects within the device and avoid contact with any liquid; cleaning should be performed only with a dry cloth. These precautions must be observed also to the device installed and not running.



Foot walked on: the coffers of string boxes are not designed to support heavy weights. Never climb on the equipment, do not place trestles and from acting as support for additional equipment (runways, ducts, ventilation ducts etc. ...).



Hazardous voltage: Inside the combiner boxes there are high voltages that can cause damage, even severe, to the people. The conductors and components with dangerous voltages are segregated in special areas only accessible using tools not supplied with the device. The combiner boxes should always be used with all the protection panels installed present in it duly secured and closed the front door to ensure the IP protection as declared. All maintenance or repair operations that require access inside the device, they can only be carried out by technical staff or by a person skilled and appropriately trained by FIMER. Before de-installing the protective panels (operation reserved only for the personal trained by FIMER), it is absolutely necessary to first open the output switch and then the input fuse from the PV array modules. Always ensure by measuring with a multimeter, that there are no hazardous voltages.



In addition to installation and operating instructions please note the mandatory compliance with the local rules of safety and security for the prevention of accidents and environmental protection.



In performing the connection of devices always follow the indications and guidelines given by the panel manufacturers, which make up the photovoltaic generator, and the distribution company roles and the power grid management recommendations.



Check that the input and output cables to the devices are of a suitable section. Make the same verifies also to the remaining plant cables. The connections, the section of the used cables and the installation must comply with the regulations in force at the national and / or local level where the devices are installed.



Repairs:

- Do not repair the device by yourself, always contact the manufacturer, its authorized service center or a suitably trained and experienced staff.
- <u>Any attempt to repair derogating from the above, as well as being objectively dangerous,</u> <u>determines the immediate warranty expiration and termination of any responsibility of the</u> <u>manufacturer for any malfunctions and for the consequences that may result from them</u>.
- If repairs are required please use only original spare parts and of any non-original parts used that is not specified or authorized by the manufacturer does not provide any guarantee that they can withstand the stresses to which they are subjected during normal operation.
- Never bypass in any circumstances the safety devices and provide for their recovery before restarting up the combiner boxes; involving specialized personnel for repairs.



Service:

- The assistance and service must be required when the apparatus has been damaged in any case if there has penetrated the liquid, if have fallen objects into it, when it has been exposed to rain or moisture (outside the specified values), if the devices does not operate normally, where it offers clear performance changes, or when it has been dropped.
- Faults that may affect the security apparatus and the whole system must be made to repair and resolved before turning on the system again.



Maintenance:

- In order to ensure the effective life expectancy for which the apparatus is designed, it is necessary to carry out the maintenance described in this manual.
- The routine maintenance of the apparatus must be periodically carried out by qualified technical personnel (such as the PV system installer) that visually check the state of the machine and internal components and verifying the tightening of the screws and fuse disconnectors; for further details refer to the information in separate sections of this manual.
- The extraordinary maintenance of the equipment must always be carried out by FIMER or persons that are from an authorized service center; this is the only way to make sure that they use new and original spare parts and that the device is constantly updated (according to the service contract signed) to incorporate improvements in the meantime made (according to the state).
- In particular, the apparatus in which non-original parts have been used, not new or nonaligned state of the art, will be considered "modified" with legal and practical consequences.

### **TECHNICAL DATA**

TECHNICAL DATA STRING BOX SB20 @ 1500Vdc						
GENERAL DATA						
Max Voltage (U <sub>N</sub> )	DC 1500V <sup>1</sup>					
Max Input short-circuit Current (I <sub>scSTC</sub> )	15 A					
Max Output short-circuit Current (I <sub>scSTC</sub> )	355 A					
MECHANICAL DATA						
Housing	GRP (Glass Fiber Reinforced Polyester)					
Housing Dimensions (W x D x H in mm)	550 x 300 x 650					
Weight	29 kg					
Degree of Protection	IP 65 (outdoor installation)					
Protection Class	CLASS II					
Color (RAL)	RAL 7035					
ENVIRONMENT DATA						
Ambient Temperature Normal Operation	-25 °C 60 °C <sup>2</sup>					
Ambient Temperature Storage	-40 °C 70 °C					
Humidity	0 % 95 % (not - condensing)					
Altitude	up to 4000m					
DC INPUT DATA						
Number Strings	20					
Sealing range cable entry (per input)	5 8 mm					
Input Cable Glands entry (per pole)	Nr. 6 PG32 with 4 input each one					
Input Connection	Directly on Fuse Holder					
Conductor cross section	4 6 mm <sup>2</sup>					
Fuse Holder	DIN Rail Mounting - 1 pole - 1500Vdc					
Fuse Type	10.3 x 85 - 1500Vdc - gPV					
Fuse Size	Available 6 20 A – installed 15A					
DC OUTPUT DATA						
Output Cable Glands	Nr. 2 M50x1,5 per pole					
Clamping Area	Up to 38 mm					
Conductor Material	Copper					
Terminal Type	Copper bus-bar with M12 screw					
Switch Type	Under Load Switch-Disconnector - 3 pole - 1500Vdc					
SPD Protection	SPD Type II 20kA/40kA <sup>3</sup>					

 $<sup>^1</sup>$  Derating of  $\rm U_N$  according to altitude. Reduction of 1% per 100m from 2001m to 3000m and 1.2% per 100m from 3001m to 4000m.

 <sup>&</sup>lt;sup>2</sup> Derating of 1%/K of max current from 50°C to 60°C.
<sup>3</sup> Optional on request SPD Type I + II 20kA/40kA.

Code: 910.400.216GB REV00

### **BLOCK DIAGRAM OF STRING BOX**

In the following Picture 1 is shown the block diagram of the combiner box model SB20:





### **TOPOLOGICAL DESCRIPTION**

Figure 2 describes the main internal components present within the SB20 string box of FIMER:



Fig. 2. Topological description of string box.

### **TECHNICAL DESCRIPTION OF THE COMBINER BOXES**

The FIMER string boxes, SB series, allow the creation of the parallel output of all the strings of PV modules connected to them. Each string box is equipped with protections against overvoltage implemented by SPD varies and in output is implemented by the fuse holders and in output by a switch; these devices allow to isolate the single sub-field PV or the individual strings from the solar generator, allowing operators to work safely.

### STORAGE

If the device is not installed immediately, it must be stored in its original packaging and protected against humidity and weather conditions.

The storage room must meet the following requirements:

- Ambient temperature: -25°C ÷ +60°C
- Relative humidity: 95% max

The recommended storage temperature is between +5°C and +40°C.

### **BOX AND EXTERNAL ENCLOSURE**

<u>Material</u> :	hot molded monolithic enclosure made by polyester resin reinforced with glass fiber (fiberglass), completely insulated and equipped with e solid door
<u>Color</u> :	White (RAL 7035)
Mode of installation:	Vertical
Antifire self-extinguishing:	UL94 V0
Approvals:	CEI 23-48
	CEI 23-49
	IEC 60670-24



Self-extinguishing and highly insulated boxes for household and industrial application equipped with:

- a door with polyurethane gasket
- external hinges nylon and 120 ° opening
- triangular locks made in sealed-resin or cockerel with key
- internal reinforced supports that make the structure strong and resistant ease to be drilled by tools and to be equipped with cable glands.

The maximum external dimensions of the box (excluded the cable glands and the fixing tool for wall mounting) are indicated in Table 1 expressed in mm:

Code	Width	Height	Deep	Use for	Type of lock
SB20	550mm	650mm	265mm	Electrical installations	Triangular lock

### **MOUNTING OF STRING BOXE**

#### **Preliminary precautions**

When you receive the device at first you have to verify that the packaging has not been damaged during the shipment and transport; the same in case the device has been stored, before reaching the PV plant, in the storehouse of the customer or of the installer.

Be careful when removing the carton packaging to avoid scratches to the external housing of the enclosure or damage of the cable glands. The device must be handled with care, any bumps and falls could damage it.

Check that the equipment is intact without dents so as to ensure the degree of protection. If the unit is damaged DO NOT CONNECT and contact immediately the manufacturer.



The casing is made of fibreglass with IP65 protection rating of degree; the inputs ways for cables from PV modules and outputs ways for output cables from the string box are made using cable glands that can also ensure, if tightened and occluded if not used , the degree of protection IP65 of the entire device.



If positioning in a closed environment, make sure the area is ventilated and allows regular recirculation of air. If installing in an open environment, position the casing in an area that is constantly shaded and protected from exposure to direct sunlight. These precautions are important for preventing unnecessary and excessive overheating, which prolonged in time impairs the duration and operation of parts present inside the string box, since the casing supports the correct dissipation of heat developed by the energy coming from the strings at a maximum temperature of 50°C.



The symbol indicates that the enclosure is designed and manufactured so as to provide protection against indirect contacts via complete insulation (according to EN 61439-1 and EN 61439-2). For this purpose, the electrical panels must be correctly installed according to the instructions that accompany the product and using the special accessories (screw cover caps, mounting brackets are included in the supply purpose).



Make sure the wall where the string box is to be mounted is suitable to support the weight. The weight of the combiner ox SB20 is 29 kg.

For the installation of the string box please refer to Figure 4 and in Table 2 where are described the indications for the realization of the drilling template:

### Drilling template





Table 2 Dimensions for mounting the string box

		Dimensions (mm)										
		Α	В	С	D	E	F	G	H	К	L	М
Model	SB20	500	550	580	600	650	680	300	340	290	250	12

### **ELECTRICAL CONNECTION OF STRING BOXE**

#### Preliminary precautions

The operations and items described in this chapter can be carried out only by experienced and properly trained personnel.

### **Preliminary Checks**



Before connecting the panel to the grid, make sure that:

- The fuses are not inserted in the fuse boxes.
- The disconnecting switch is open (lever on OFF).
- The panel is in good condition and there was no damage during transport.
- The panel is firmly anchored to walls and stable supports.
- Ensure that there are no remaining metallic parts, chips and derivatives from the installation activities.



After performing the checks listed in the points above, you can proceed to wire the cables according to what is shown in the wiring diagram of the PV installation, taking care to use suitable sections and colors for cable conductors corresponding to what is reported and described in the specifications of the PV installation project. Before connecting the wires coming from PV strings at the bottom of the fuse boxes inside the casing, it is recommended to join them end-to-end with suitable tips in order to prevent possible short circuits between adjacent wires.

In the below figure and its description it is specified in detail the input and output way of cables:



1: Cable entry for positive pole from PV strings

2: Cable entry for negative pole from PV strings

- **3**: Cable positive entry to the output main switch
- 4: Cable negative entry to the output main switch
- 5: Cable entry for ground cable (GND)
- 6: Protective Vents

Fig. 4. Input/output cable glands for string box



Close with proper plugs or pieces of wire all the holes of the glands that are not used in order to ensure compliance with the declared IP protection degree.

#### Electrical connection of the cables within the string box



For the implementation of the electrical connections it is necessary to keep in mind the following precautions:

- 1. The first connection to be made is to fix the ground wire that arrives from the installation to the yellow / green screw terminals clamp within the enclosure, the standard clamp supplied is suitable for connecting cables whose max size is up to 35mmq.
- 2. Before connecting the cables coming from the PV strings to the DC fuse holders, it is recommended to use an adequate tip to lug every single cord, in order to avoid possible short circuits between adjacent wires.
- 3. The attestation of the cables to the output DC switch of the string box is achieved by using M12 ring terminals, so that the wires can be connected to appropriate fastening screws present on the output copper bar.



<u>Note</u>: After the electrical connection of all DC cables please verify that all the wires are tight screwed inside their terminals in order to prevent overheating or malfunctions that may cause in dangerous situations.

Use tools with control torque and the following data:

Fuse holders:	2 Nm	-
Output DC cable:	Screw M8 type	20 Nm
	Screw M10 type	40 Nm
	Screw M12 type	70 Nm

Note:



Please remind that inside the string box is not present and installed any blocking diode, which may reduce the entire system's performance.

If the photovoltaic array has zones that are not irradiated evenly (for example, due to partial shading), it could be necessary to use blocking diodes to prevent the circulation of inverse currents in the strings which may lower the system's performance

For the final decision of the use of such devices must be follow and keep in consideration the instructions given in the executive design of the PV installation provided by the designer of the PV plant.

In the next figure and corresponding description are given the fastening points to which must be connected to the electric wires into the string box:



Fig. 5. Electrical connection of the string box

- 1: Connect the input cables of the negative PV strings directly to the appropriate fuse holder F i -.
- 2: Connect the input cables of the positive PV strings directly to the appropriate fuse holder F i + .
- 3: Connect the output cables coming out of the switch called Q0 to the proper + and terminals.
- 4: Connect the ground cable (GND) to the proper Yellow/Green screw terminal.

### Final electric check

# Voltage check – reverse polarity check of PV strings and not homogeneous length of the PV strings



Before closing the fuse holders, proceeding with all the checks PV field side using a voltmeter with voltage range up to 1500  $V_{DC}$ , so check and correct any wiring errors such as reversal polarity connection of strings or excessive DC voltage values, higher than the maximum permissible value allowable by the project of PV plant. Such wiring errors strings can cause serious damage to the system or create dangerous situations for people.

Wiring errors of this type can cause fire and damages of the devices.

#### Voltage check - Measuring Procedure

Equip yourself with a voltmeter with a voltage range up to 1500  $V_{DC}$ . This check is made by measuring the open-circuit voltage of the panels obtained at current solar irradiation; for a correct operation of the strings in order to avoid problems of mismatching is necessary that the strings connected to the same box field are uniformly radiating.



Make sure that:

- the inverter is OFF and disconnected on the DC side.
- the disconnecting switch of the string box is in OFF.
- the fuse box holders are open.

Measure the open-circuit voltage of each string and check that:

- the maximum deviation between the voltages is less than 10%.
- no values higher than the maximum allowable are measured.
- no negative values are measured



Only if the previous test results were positive you can insert the fuses in the fuse holders and proceed with the start up the PV system.



Immediately correct the wiring if one of the upper said conditions is not valid because <u>continuation</u> of this situation may cause serious damage to the system and people.



The fuse holders are not suitable for isolating the on-load string current. Therefore, these fuse holders should only be opened or closed if there is no passage of current (<u>main disconnecting</u> <u>switch must be put in OFF</u>) in order to prevent the formation of electrical arches that are dangerous to the health and safety of people and the integrity of the materials.

### MAINTENANCE

#### Preventive and periodic maintenance

FIMER recommend to their customers to comply with a correct and constant preventive maintenance of string boxes, so that we can maximize the reliability of service and minimize repair costs not prevented.

Through a proper preventive maintenance, the availability of string boxes has lengthened the life cycle.

Preventive maintenance if has not been delegated to a separate and appropriate maintenance contract with the manufacturer of the device is usually in charge of the customer, to whom are entrusted all the operations of periodic verification. By qualified service personnel may be carried out of the routine operations that can assess the state of the string box, with a frequency of intervention that varies according to the environmental conditions in which the drive is installed. In Italy or in country that has the same weather and environmental conditions an average of a single visits per year of preventive maintenance are recommended, including the controls of all the parts that make up the system including any replacement of consumables, if necessary. Any exceptions or variations to the frequency and number of annual maintenance inspections are subject to specific problems or needs related to the installation requirement.



We remind all operators authorized to carry out maintenance that before entering the converter be sure to be aware of the safety regulations specified in manual and control all of the personal protective equipment required by the manufacturer or by the local and national norms and rules.

	When installing or servicing the devices in a plant with suspended materials handling wear helmet.
	Wear appropriate protective gloves before working on the device
	Wear appropriate shoes that can prevent accident to guard against falling heavy objects.
G	In the event of prolonged exposure to noise wear hearing protection devices
PROTEZIONE OBBLICATORIA DEGLI OCCHI	Be careful! Before performing any maintenance, disconnect the inverter from the grid line and from the PV field.
	All maintenance operations must be carried out safely, and verifying previously that the internal components are not under voltage! Before performing any maintenance disconnect the device from the DC panels and from the auxiliary power supply line.

Preventive and periodic maintenance includes the following procedures:

- Visual inspection of the device for the purpose of determining that:
  - there are no obvious signs of rust or corrosion that may compromise the operation and safety of the equipment.
  - There are no water infiltration or residues and traces due to condensation.
- Cleaning the exterior structure of the enclosure with a special focus on the seal installed on the front door.
- Cleaning of the inside of the device to remove dust, pollen, insects and all kinds of dirt that, if it was introduced in the equipment, it can damage the internal device or create short circuits.
- Check that there is insulation between electrical circuits and internal ground masses or metal structures.
- Check the correct functioning and safety of the DC switches present inside.
- Check that all DC connection cables are tight and are not obvious signs of overheating.
- Check that there are no burn marks on terminal blocks and fuse holders present inside the string box.
- Check that the grounding cable of the SPD arrester is effective.
- Check that the SPD pads not give visual indication of being exhausted.
- Check that the fuses in the string box are not burned or fault for excessive overheat.
- Check at the end of all the checks and maintenance job that:
  - The lexan and the internal protection present inside the string box for ensuring IP20 protection degree is mounted.
  - The door of the enclosure is firmly closed

# It is recommended to perform the inspection and maintenance only by personnel trained or qualified.

#### Extraordinary maintenance

If damaged components need to be replaced (for example, fuses, SPD pads, etc.) use only materials identic to those originally supplied. A list of these materials is available in the wiring diagram or, if in doubt, please contact the manufacturer.

If the electrical connections are damaged due to mechanical or electrical causes or due to the attack of rodents, immediately disconnect the system or at least the damaged part. After verifying that no failures were caused to the equipment, proceed with the replacement of the wires and of the others material using similar materials.

Below in the next page there is a typical example of table to describe and fix the verification operations and control performed during maintenance:

### SHEET:String Box

Stri	String Box sheet Year: SN progressive nr. of sheet							
STRING BOX: (Routine maintenance requires to put the system out of service and will only concern the parts of the plant directly served by them)								
N.B.	Refer to the manufacturers' datasheets, if existing or available. Operations are performed after visual and / or instrumental inspection.	Maximum frequency	Date of control	Signature of technician	Measures taken or suggested			
1	STRING BOX – Checks / interventions: check the status of the exterior of the enclosure: cleaning, damage to the "case", the absence of rust on metal parts and verify that the general conditions of maintenance are good	Yearly						
2	<b>STRING BOX</b> – Checks / interventions: Check for signs of infiltration of liquids or condensation within the device and in that case restore the seal installed necessary for ensure the correct IP degree on the front door of the box; exclude infiltration of pollen or rodents	Yearly						
3	<b>STRING BOX</b> – Checks / interventions: Verify that there are no signs of tampering or forced entry to the enclosures or the cable glands of the string box, so that it may have changed the technical specifications of the device	Yearly						
4	STRING BOX – Checks / interventions: Verify the data plate of the device	Yearly						
5	<b>STRING BOX</b> – Checks / interventions: Clean the inside of the apparatus to remove dust, pollen, insects and all kinds of dirt introduced in the equipment and it can damage the internal device or block the string box functioning mode	Yearly						
6	<b>STRING BOX</b> – Checks / interventions: Check of the safety disposal installed inside the string box and the correct mode of functioning of the output DC switch	Yearly						
7	<b>STRING BOX</b> – Checks / interventions: Check the tightness of the DC input and output cables and check the perfect insulation of each individual connections	Yearly						
8	STRING BOX – Checks / interventions: Check the integrity of the Surge Protection Device present in the string box cy visually checking the appropriate warning window of the SPD so that SPD pads are not exhausted	Yearly						
9	STRING BOX – Checks / interventions: Check the integrity and the perfect condition of the fuses and fuse holders	Yearly						
10	STRING BOX – Checks / interventions: Check that the GND connection is done correctly	Yearly						
11	STRING BOX – Checks / interventions: Make sure at the end of the maintenance to fit correctly the internal protection transparent cover (in lexan material) and the closing of the front door of the string box	Yearly						
12								
13								
14								
15								
NOTE : Signature of responsible of maintenance								



Questo manuale ottempera agli obblighi del DLgs 14 marzo 2014, n. 49 sulla attuazione della direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE) Per RAEE s'intendono i rifiuti di Apparecchiature Elettriche ed Elettroniche (AEE) incluse di tutti i componenti, i

sottoinsiemi ed i materiali di consumo che sono parte integrante del prodotto nel momento in cui si assume la decisione di disfarsene.



La Legislazione prevede la suddivisione in 2 categorie principali chiamate RAEE PROFESSIONALI o RAEE DOMĚSTICI

#### Per lo smaltimento di un RAEE DOMESTICO

L'utente detentore di un'apparecchiatura elettrica ed elettronica domestica, nel momento in cui decide di disfarsene, può:

· conferirla gratuitamente presso il Centro di Raccolta pubblico (CdR) del proprio Comune (la "piattaforma ecologica"); consegnarla al negoziante (distributore) nel caso l'apparecchiatura venga sostituita, tramite l'acquisto di, nuovo prodotto con equivalenti funzioni, con una nuova; tale opportunità sarà praticabile solo quando entreranno in vigore le semplificazioni operative per i distributori.

#### Per lo smaltimento di un RAEE PROFESSIONALE

L'utilizzatore professionale, ovvero l'impresa o l'ente che decide di dismettere un'apparecchiatura elettrica ed elettronica deve preliminarmente effettuare una valutazione volta a: individuare se i RAEE, pur provenendo da un'attività commerciale, industriale, istituzionale e di altro tipo, possano essere considerati analoghi ai RAEE originati dai

nuclei domestici e quindi procedere come descritto per lo smaltimento domestico. Nel caso in cui, invece, non vi sia dubbio che l'apparecchio dismesso debba essere qualificato come "RAEE professio-nale", ovvero rifiuto derivante dall'attività lavorativa e non assimilabile a domestico, è possibile scegliere tra due opzioni: • contestualmente alla sostituzione dell'apparecchiatura obsoleta con una nuova di equivalente funzione (1 contro 1), l'utilizzatore professionale può richiedere al Produttore dell'apparecchiatura nuova, attraverso l'aiuto del distributore, di gestire la dismissione del suo RAEE professionale;

· l'avvio al recupero secondo le procedure previste per tutti i rifiuti speciali e, di conseguenza, con oneri a carico del produttore del rifiuto



This product contains electrical or electronic materials.

Fimer as producer of electric and electronic components is in compliance with the European directive 2012/19/UE following the italian DLGS 14 march 2014 N°49.

The presence of these materials may have, if not disposed properly, potential adverse affects on the environment. Presence of this label on the product means it must not be disponed in normal household waste and must be disposed separately.

As a consumer you are responsible for ensuring that this product is disposed properly.

If your supplier offers a disposal facility please use it or alternatively contact your local authority/council to find out how to properly dispose this product.



Dieses Produkt beinhaltet elektrische oder elektronische Materialien.

Fimer als Hersteller von elektrischen und elektronischen Komponenten befolgt die europäische Richtlinie 2012/19/UE nach dem italienischen DLGS 14. März 2014 Nr. 49.

Die Präsenz dieser Materialien konnte negativ die Umwelt beeinflussen, wenn diese nicht richtig entsorgt werden. Dieses Etikett auf dem Produkt bedeutet, es darf nicht im normalen Hausmüll entsorgt werden sondern muss es separat entsorgt werden.

Als Verbraucher sind Sie verantwortlich, dieses Produkt ordnungsgemäß zu entsorgen. Wenn Ihr Lieferant bietet eine Entsorgungsanlage, bitte verwenden Sie diese oder kontaktieren Sie die Behörde

/ Gemeinde, um dieses Produkt richtig zu entsorgen.



Ce produit contiéne electriques ou electroniques materiau

Fimer comme producteur de electriques et electroniques composants se conforme à la directive européenne 2012/19/UE sélon le italien DLGS 14 mars 2014 N°49.

La présence de ces matériaux peut avoir, si non éliminés régulièrement, un effet nocif sur l'environnement. La présence de ce marque sur le produit signifie que il n'a pas d'etre éliminé dans une domestique conteneur et doit etre eliminé séparément.

Comme consumateur Vous etes responsable de l'élimination de ce produit.

Si Votre fournisseur offre un service d'élimination pouvez le utiliser ou pouvez contacter l'autorité locale pour trouver une solution pour éliminer ce produit.



Este producto contiene materiales eléctricos o electrónicos.

Fimer como productor de componentes eléctricos y electrónicos está en conformidad con la Directiva 2012/19/UE europeo siguiendo en italiano DLGS 14 de marzo 2014 N º 49.

La presencia de estos materiales puede tener si no se eliminan adecuadamente cualquier posible efecto adverso sobre el medio ambiente

La presencia de esta etiqueta en el producto significa que no se debe colocar en la basura doméstica y debe ser tratado separadamente.

Como consumidor, usted es responsable de asegurarse de que este producto se desecha correctamente. Si el proveedor tiene una instalación de eliminación por favor, utilice o bien, póngase en contacto con el consejo de la institución / local para averiguar cómo desechar correctamente este producto.



## Inverter for Life

Via J.F. Kennedy 20871 Vimercate (MB) Italy Phone: +39 039 98981 Fax +39 039 6079334

www.fimer.com solar@fimer.com



INFOLINE Tel. +39-039-6079326







CERTIFICATI N°1617 ISO 9001 N°1618 ISO 14001 N°1619 BS OHSAS 18001

