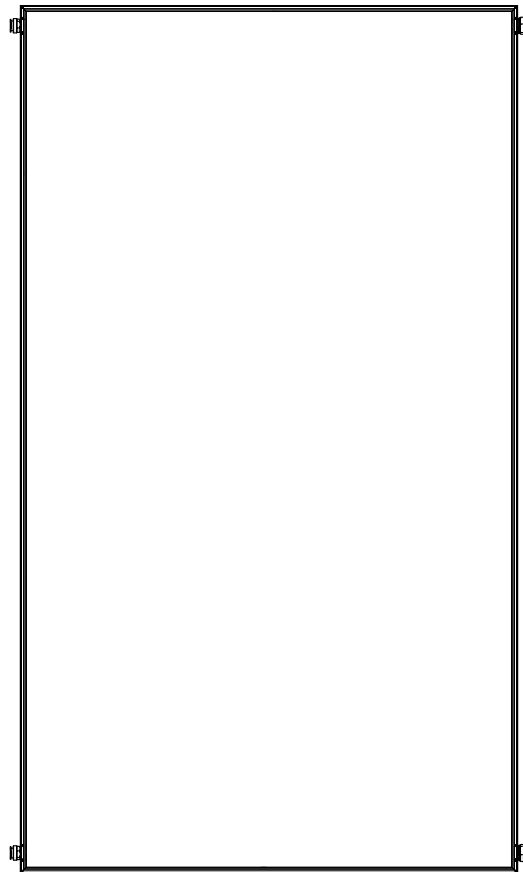


# Installation Manual

## Solar collector



CFS-25/4

**sylber**

## RANGE

MODEL	CODE
CFS-25/4	20184878
CFS-25/4 (pack of 2)	20184879
CFS-25/4 (pack of 5)	20184880

### ACCESSORIES

For a complete list of accessories and details of their compatibility, refer to the Catalogue.

*Dear heating engineer,*

*We would like to congratulate you on having recommended a **sylber** Solar collector unit: a modern product that's capable of ensuring a high degree of reliability, efficiency, quality and safety.*

*This booklet provides the information necessary for a correct and simple installation of the system, whatever your expertise and technical competence.*

*Thank you again, and keep up the good work,*

*Sylber*

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## CONFORMITY

Solar collectors comply with EN 12975-1, ISO 9806 and Solar Keymark certification.

## 1 GENERAL SAFETY INFORMATION



Check that the product is complete, undamaged and as ordered as soon as you receive it. Report any discrepancies or damage to the **sylber** dealer who sold it.



This product must be installed by a legally qualified heating engineer. On completion of the installation, the installer must issue the owner with a declaration of conformity confirming that the installation has been completed to the highest standards in compliance with the instructions provided by **sylber** in this instruction manual, and that it conforms to all applicable laws and standards.



This product must only be used for the purpose for which it is designed and made, as specified by **sylber**. **sylber** declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.



All servicing and repairs must be performed by a qualified heating engineer.



Solar collectors must be installed with the correct mounting kit (which includes all necessary rails and brackets) as listed in the Catalogue.



A protective film is applied to the glass of the solar collector to protect the absorber against solar irradiation and prevent the solar collector from becoming too hot if it is not going to be put into service immediately. Fill the system, but do not remove the film until you are ready to put the system into service. Take care when removing the film as it may be electrostatically charged. Do not leave the protective film in place for longer than 12 months. Once removed, the protective film cannot be re-used. Dispose of the protective film in compliance with legislation governing the disposal of PVC.


The following symbols are used in this manual:





**CAUTION!** = Identifies actions that require caution and adequate preparation.





**STOP!** = Identifies actions that you MUST NOT do.


 The system must be installed by specialist personnel. Use only the assembly material supplied with the solar collector. The supporting framework and all masonry or brickwork fixing points must be checked by a person expert in static loading, and must be suitable for the nature of the installation site.


 The solar collector must only be installed on roofs or frames that are strong enough to support its weight. The strength of the roof or frame must be verified on site by a person expert in static loading before the solar collector is installed. During this process, it is important to verify the suitability of the supporting frame to hold the screw fasteners that fix the solar collector in place. An expert in static loading must verify that the entire frame complies with relevant standards, especially in areas liable to snow and areas exposed to high winds. Conditions (gusts of wind, formation of wind vortices, etc.) at the point where the solar collector is to be installed must be carefully considered since these can increase the loads on the supporting structure.

 Solar collector pipes must be connected through a (yellow-green) connector of at least 16 mm<sup>2</sup> Cu (H07 V-U o R) to the potential compensation main bar. If a lighting rod is already installed, collectors can be integrated in the existing system. If this is not the case, it is possible to carry out earthing with a buried earth cable. The earth duct must be laid outside the house. Furthermore, the earth cable must be connected to the compensation bar through a duct having the same diameter.


 All pipes in the water circuit must be insulated in conformity to relevant standards. Lagging and insulation must be protected against damage by the weather and birds and animals.


 The collector is suitable for a minimum inclination of 15°, up to a maximum of 75°.


 This instruction manual is an integral part of the product. It must be kept safe and must ALWAYS accompany the product, even if it is sold to another owner or transferred to another user or to another installation. If you lose this manual, order a replacement immediately. Keep the product purchase documents to be presented to the **syber** authorised Technical Assistance Centre to request a service call under warranty.


 Size the solar expansion tank so as to ensure complete absorption of the expansion of the fluid contained within the system, with reference to the prevailing regulations on the matter. In particular, consider fluid characteristics, considerable fluctuation of service temperature and vapour that might be generated during solar collector stagnation stage. Proper size of expansion tank ensures setting off of all volume changes of the heat transfer fluid, avoiding excessive pressure increase. Limited pressure changes avoid reaching safety valve opening pressure and the consequent fluid drainage.


## 2 PRECAUTIONS


 Always wear safety goggles when drilling. Always wear safety shoes, cut-proof protective gloves and a safety helmet when performing installation work.


 Before beginning installation work on roofs, install the necessary fall prevention and fall arrest devices and ensure that all applicable safety standards are applied. Use only tools and materials that conform to the safety standards that are applicable in the place of work.


 Use only overalls with harness (with lacing or restraining belt, connection ropes or bands, fall dampeners, heat sinks) certified for the risk detected according to the type of covering and allowing operating in complete safety.


 The use of ladders leaned against walls can lead to serious falls if the ladder slips, slides or falls. When using ladders, always ensure that they are stable, and that suitable ladder stops are present. If possible secure the ladder with hooks. Make sure that there are no live electrical wires near the ladder.

 Never attempt to install the system without using suitable personal protection equipment and without following all applicable occupational safety standards.

 Do not touch the product when barefoot or wet if it has any electrical accessories installed in it.

 Never clean or service the storage cylinder without first turning the mains power switch OFF to disconnect all electrical accessories (if fitted) from the mains electricity supply.

 If solar plant pressure decreases, it is forbidden to top up with only water as there is a danger of freezing and overheating.

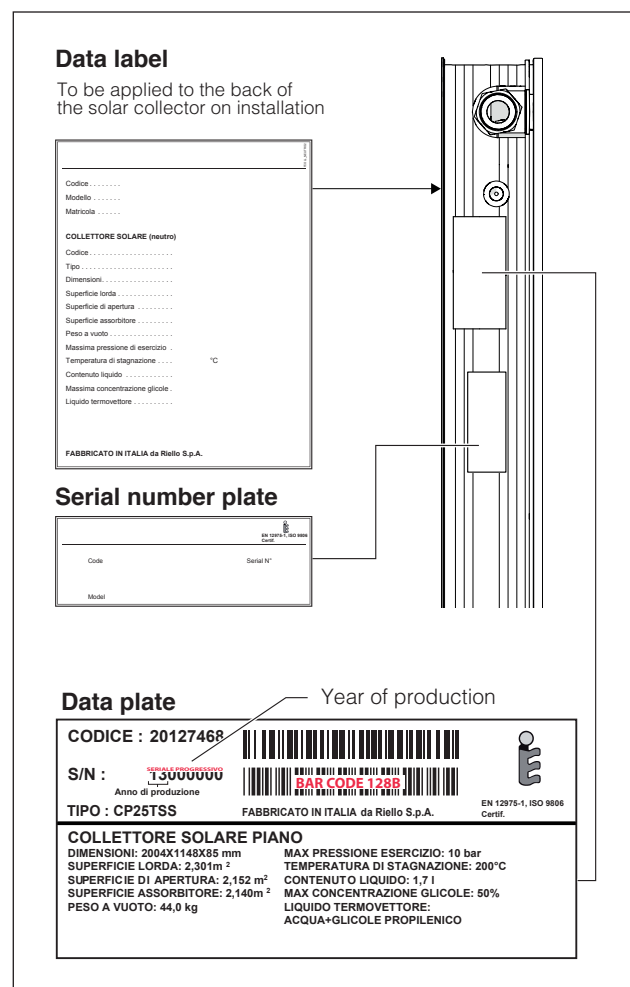
 Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.

### 3 DESCRIPTION OF THE APPLIANCE

The solar collector is a device able to intercept solar radiation and convert it into thermal energy used to heat up a heat transfer fluid, composed of a mix of water and glycol. Solar collectors can be used in systems for domestic hot water production or as a supplement to the heating system. The main technical elements in the design of the solar collector are:

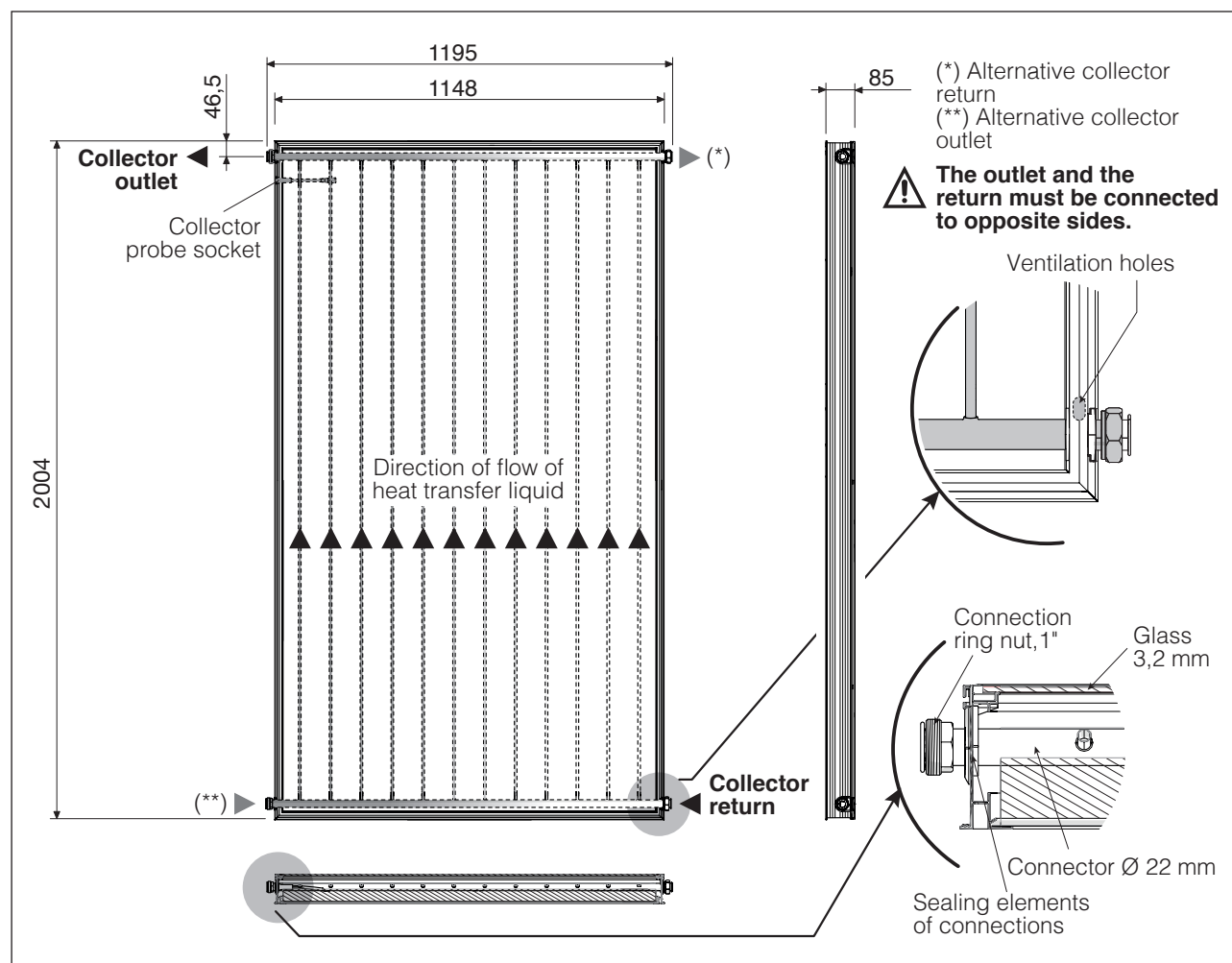
- the intercepting plate (called absorber) that allows a high energy absorption and limits its emission.
- the rock wool insulation
- the easy and flexible installation
- the integrability of the element with various covering technologies
- the long lifespan.

### 4 IDENTIFICATION



If these plates or any other means of clearly identifying the product are defaced, removed or lost, proper installation and servicing may be rendered difficult.

## 5 SYSTEM LAYOUT

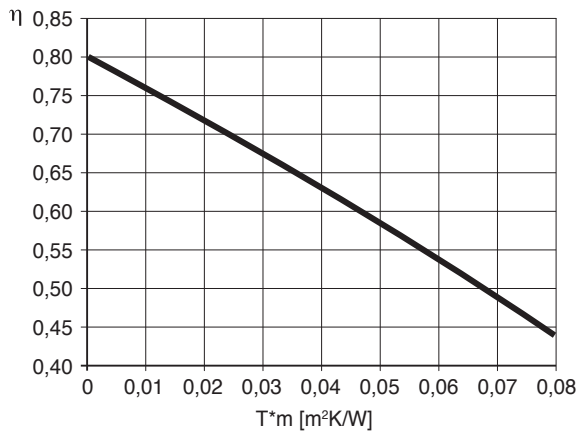


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## 6 TECHNICAL SPECIFICATIONS

DESCRIPTION	CFS-25/4	
Total area	2,301	m <sup>2</sup>
Exposed area	2,152	m <sup>2</sup>
Effective absorption area	2,140	m <sup>2</sup>
Water connections	2x 1" M / 2x 1" F	Ø
Empty weight	44,0	kg
Liquid content	1,7	l
Recommended flow rate for each line per m <sup>2</sup> of collector	30	$\frac{l}{(h \times m^2)}$
Minimum flow rate for each line per m <sup>2</sup> of collector	20	$\frac{l}{(h \times m^2)}$
Maximum flow rate for each line per m <sup>2</sup> of collector	200	$\frac{l}{(h \times m^2)}$
Glass thickness	3,2	mm
Thickness of glass wool insulation	40	mm
Absorption (α)	95	%
Emissivity (ε)	4	%
Maximum permitted pressure	10	bar
Stagnation temperature	200	°C
Maximum number of collectors in a line	10 Vertical / 6 Horizontal	n°
Installation	Vertical/Horizontal	-
Glass class	U1	-

### Efficiency curve



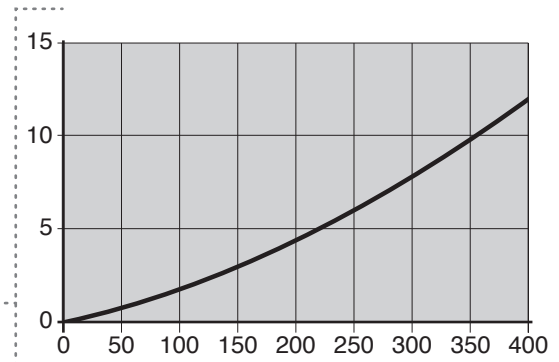
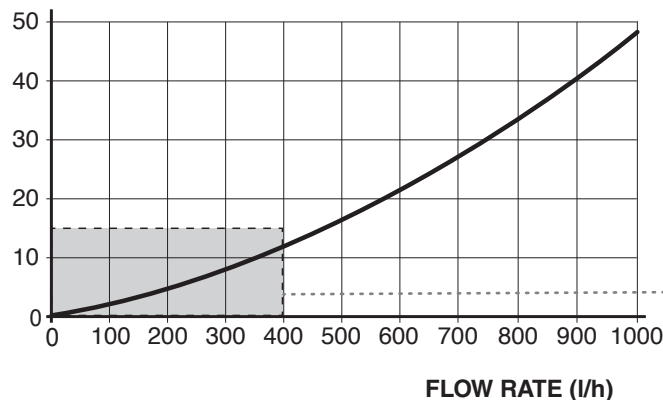
Description	CFS-25/4	
Optical efficiency ( $\eta_0$ ) (*)	0,802	-
Thermal dispersion factor (a1) (*)	4,28	W/(m²K)
Thermal dispersion temperature dependence factor (a2) (*)	0,0064	W/(m²K²)
IAM (50°) (*)	0,95	-
Efficiency ( $\eta_{col}$ ) (**)	62,0	%

(\*) Value referred to the opening area. Test according to ISO 9806 referred to mix of water and 33.3% glycol, flow rate 160 l/h and direct exposure  $G = 800 \text{ W/m}^2$ .  
 $T_m = (\text{Coll.}_{inlet\_temp.} + \text{Coll.}_{outlet\_temp.})/2$   
 $T^*m = (T_m - T_{ambient})/G$

(\*\*) Calculated with a temperature difference of 40K between the solar collector and the surrounding air, and with total solar radiation of  $1000 \text{ W/m}^2$  referred to the exposed area.

### Pressure drop in solar collectors (\*)

#### PRESSURE DROP (mbar)



(\*) With antifreeze-water mix of 33,3% / 66,7% and heat transfer medium temperature = 20°C.

### WIND AND SNOW LOADS ON COLLECTORS

The maximum allowable load for wind and snow (possibly combined) on the collector surface is 1500 Pa (corresponding to the wind speed of 175 km/h).

To determine the maximum wind speed consider:

- building height
- solar system site
- exposure and topography (area/buildings)

The maximum snow load depends on the region and the altitude of the area.



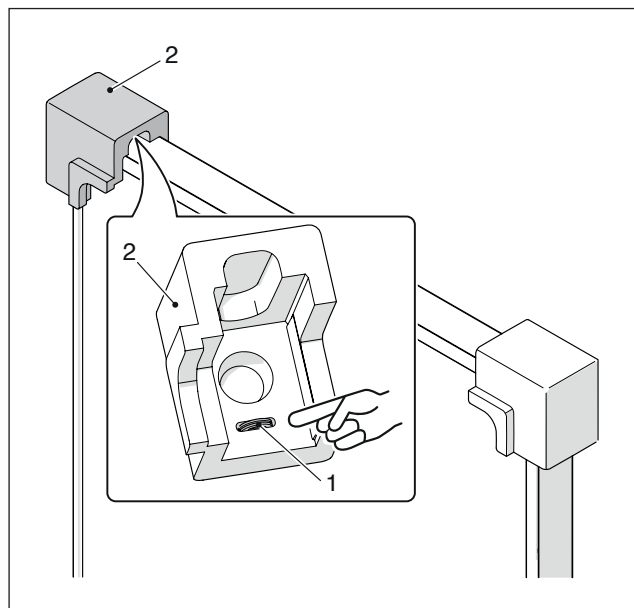
Prevent the accumulation of snow on collectors by installing a snow-guard grille over collectors, or remove snow on a regular basis

## 7 UNPACKING THE PRODUCT

Solar collectors are supplied in packages containing 1, 2 or 5 panels

Pallet contents:

- collector
- document envelopes containing instruction manual, bar code labels and data label.



Be careful not to lose the two flat gaskets (1) in the corner (2) of each collector.



The instruction manual is an integral part of the solar connector. Once located, read it thoroughly and keep it safe.



**STORE IN A DRY PLACE AND DO NOT EXPOSE TO DIRECT SUNLIGHT UNTIL THE TIME OF INSTALLATION!**

The packaging is not designed to protect the product against rain or humidity. It can also degrade if exposed to direct sunlight. Failure to comply with these precautions could lead to irreparable damage to the product.



**A protective film is applied on the collector glass, general and handling information is written on it. It must be removed after the installation of the solar collector, only when the operation of the system is required.**

## 8 HANDLING

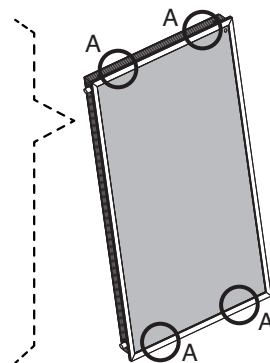
- Separate the solar collector from the wooden pallet by removing the film wrapping
- Apply the data label (provided in the document envelope) to the back of the solar collector

Once you have removed the outer packaging, proceed as follows to unpack and handle the solar collector:

- Tilt the solar collector slightly and grip it at the four points shown (A) to lift it.
- Use a hoist or other suitable lifting equipment to hoist the solar collector on to the roof.

### Data label

Codice .....	
Modello .....	
Manuale .....	
<b>COLLETTORE SOLARE (neutro)</b>	
Codice .....	
Tipo .....	
Dimensioni .....	
Superficie totale .....	
Superficie di apertura .....	
Superficie assorbibile .....	
Peso a vuoto .....	
Massima pressione di esercizio .....	
Temperatura di stagnazione .....	
Contenuto liquido .....	
Massima concentrazione glicole .....	
Liquido termovettore .....	
FABBRICATO IN ITALIA da Rialto S.p.A.	



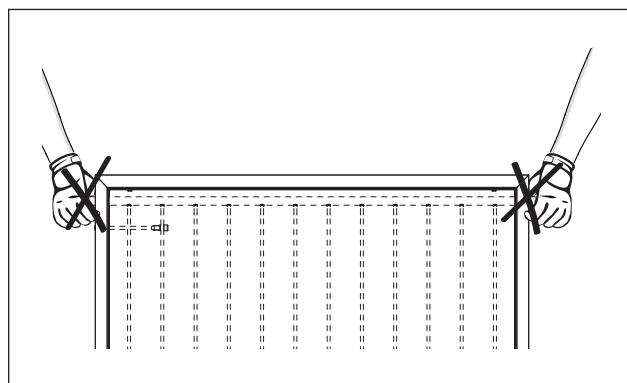
Wear suitable personal protective equipment and use suitable safety devices.



Do not dispose of packaging material into the environment, or leave it within the reach of children, since it can become a potential hazard. Dispose of packaging material in compliance with applicable legislation.



Do not lift the solar collector by its water fittings.



## 9 INSTALLATION AREA

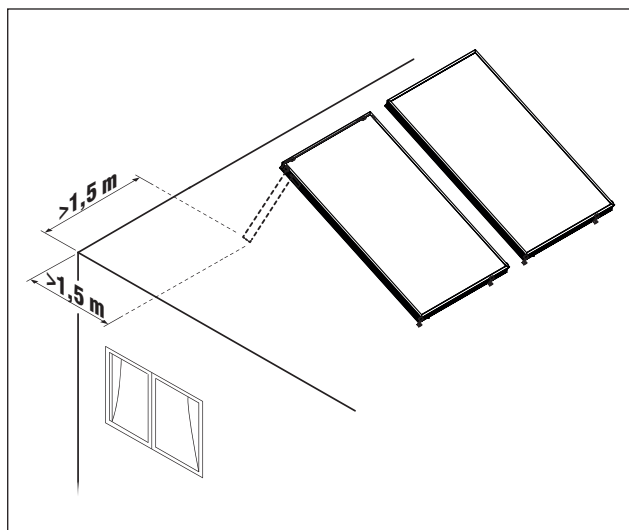
Select the best possible orientation for the solar collectors (ideally facing south). Avoid positions that are shaded by plants, trees, buildings or hills, etc. during the day.

In systems in which the summer load is predominant (production of domestic hot water) aim the collector from east to west with a variable inclination from 20° to 60°. The ideal direction is southwards, with inclination equal to the latitude of the location -10°. If the system sustains the greatest thermal load in the winter (as in systems that combine domestic hot water production with central heating), install the collectors facing south (or south-east or south-west) at an angle greater than 35°. The ideal orientation is southwards, at an angle equal to the latitude of the location plus 10°.

Remove all gravel and detritus from the surface on which the system is to be installed.

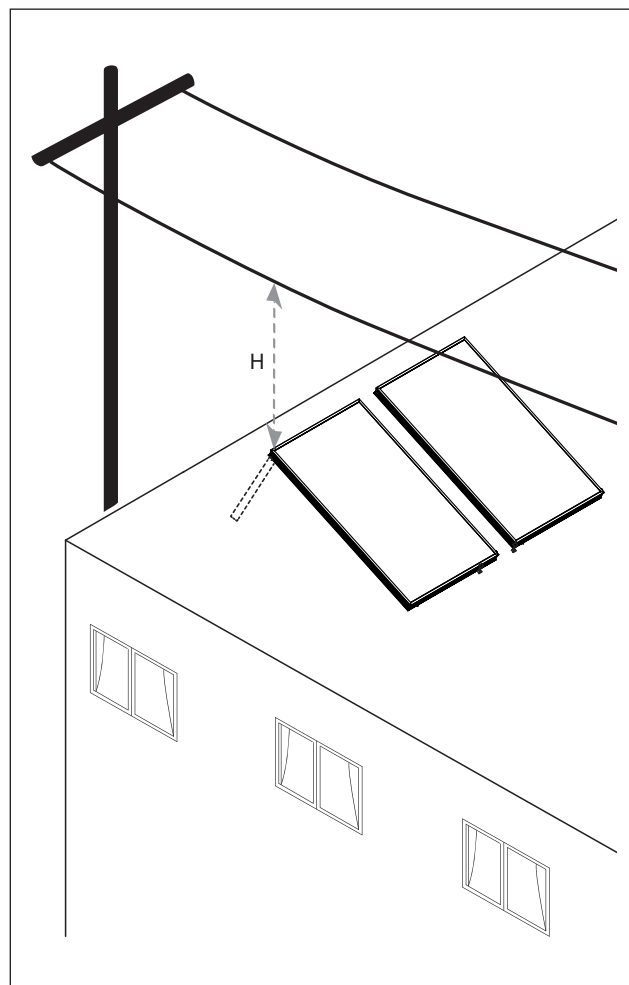
Do not use flat roof or sloping roof mounting frames to install any other equipment. They are designed only for use with **syber** solar water heating systems.

The installation of the solar field changes the pre-existing structure of the roof. It is necessary to check and possibly adapt all the roof elements to prevent any seepages or damages caused by wind and/or snow.



Collectors must be installed at a safety distance from active parts of electric lines and electric systems as required by the laws and regulations in force in the country of installation.

In the absence of specific rules, the minimum installation distance required minus the side movements of conductors due to the action of the wind and of the lowering in height due to thermal conditions is as follows:



Voltage range	H	
< 1 kV	3	m
1 ÷ 30 kV	3,5	m
30 ÷ 132 kV	5	m
< 132 kV	7	m



Contact with open, live electrical wires may lead to electrocution and may even be fatal.

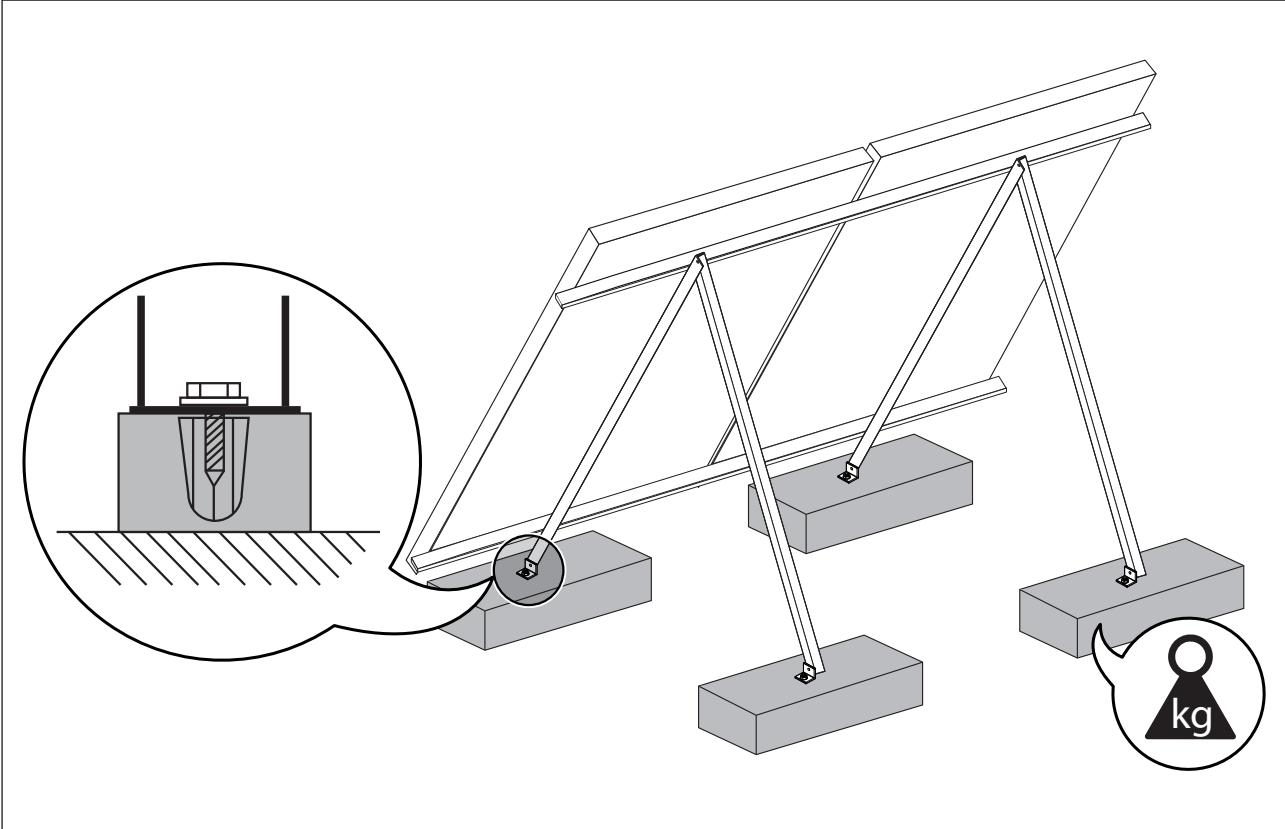


Non-electrical works near live unprotected electric ducts with which a contact is possible must be carried out in accordance with laws and regulations in force in the country of installation.



## 10 INSTALLATION ON FLAT ROOFS WITH BALLAST

For checks of allowable loads contact a specialised technician.  
In case of installations on flat roofs that cannot be drilled use ballasts (not supplied) fairly distributed on all the bearing points, as shown in the figure.



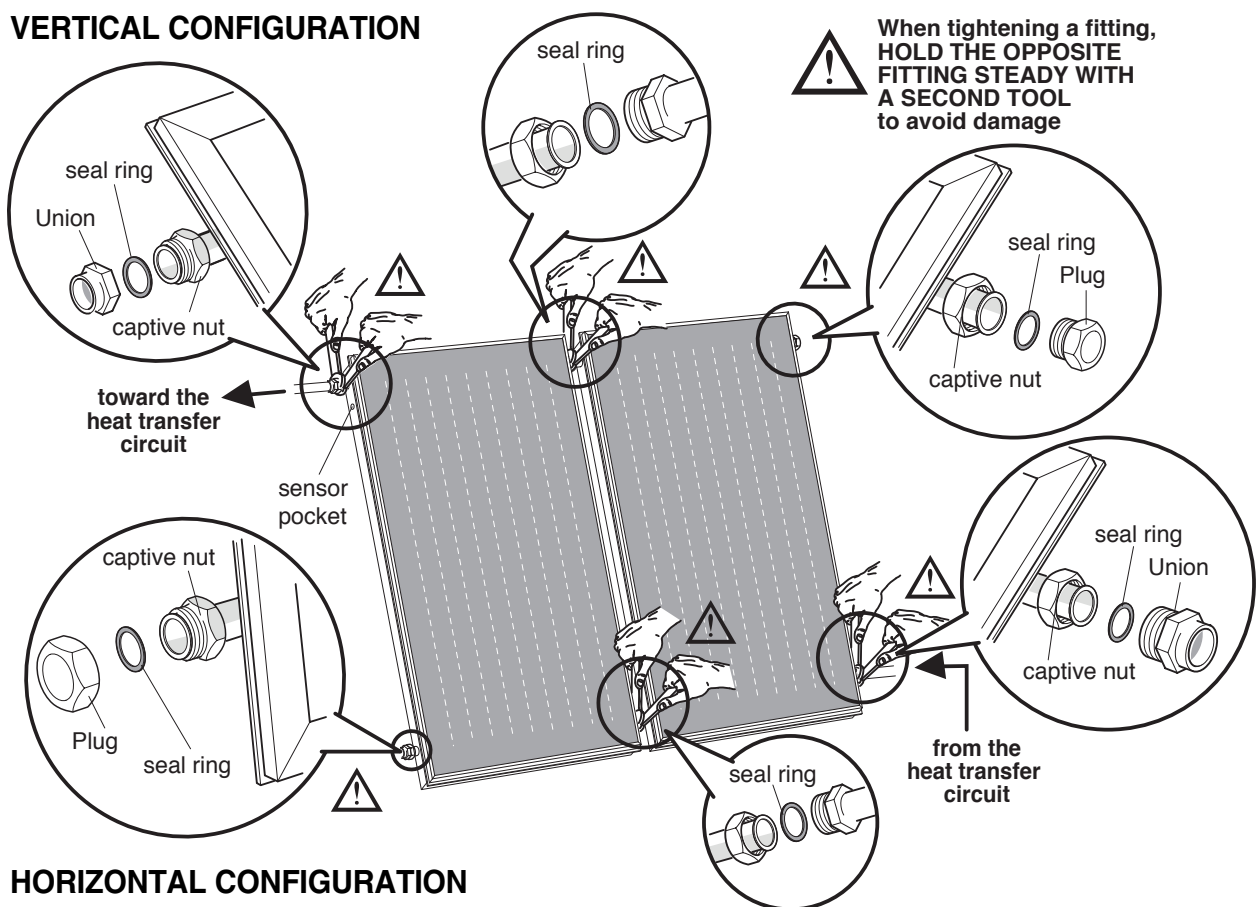
Wind speed, km/h	Inclination angle of solar collectors	Mass in kg, distributed on the various bearing points, to secure a collector from wind lifting
100	30°-45°	135
130	30°-45°	255
150	30°-45°	355

The indicated values are valid both for vertical and horizontal installation.

## 11 WATER CONNECTIONS

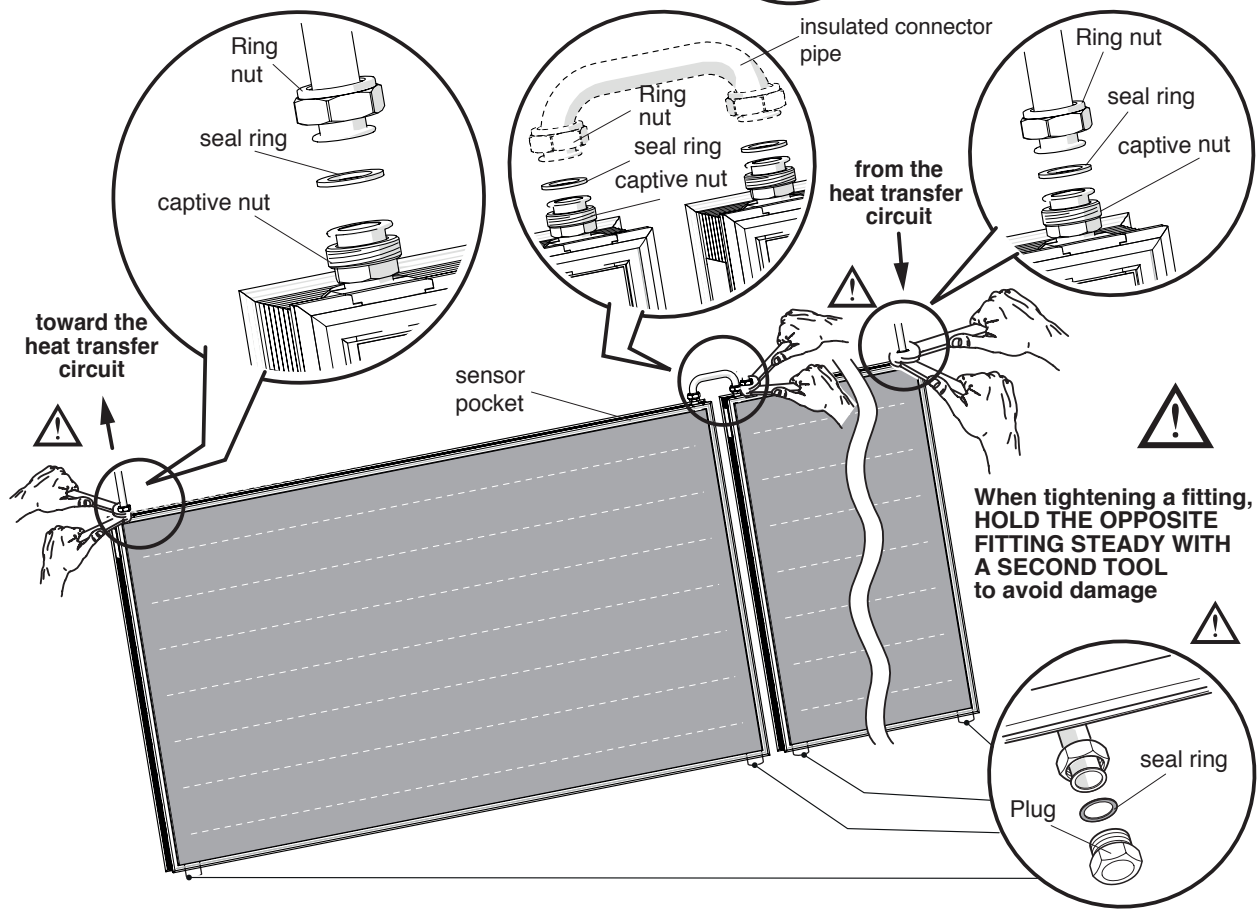
⚠ During installation, pay attention to the position of the probe with respect to the collector. The collector probe must always be in the upper section of the panel as indicated in the figures below.

### VERTICAL CONFIGURATION



10

### HORIZONTAL CONFIGURATION



**Vertical configuration**

Collectors are connected with each other so that the heat transfer fluid crosses them in parallel. Connection with the heat exchange circuit towards the exchanger must be made on the side of probe socket (T) of the last collector of the series (see figure). The positioning of the socket on the collector allows the maximum transfer of heat accumulated in the panels.

It is also possible to connect more than one line of solar collectors, both in series (provided that the number of solar collectors does not exceed 10 units per each series) and in parallel. In any case the circuit must be hydraulically balanced (see the following example diagrams).

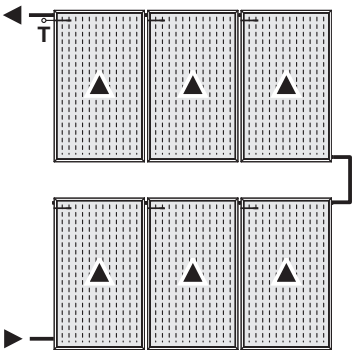
**Horizontal configuration**

Collectors in the same line must be connected so that the heat transfer fluid flows through them in series. Connection with the heat exchange circuit towards the exchanger must be made on the side of probe socket (T) of the last collector of the series (see figure).

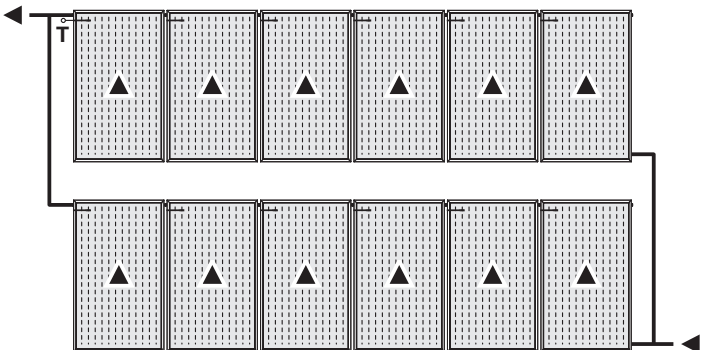
Lines of solar collectors can be connected either in series (provided each line contains no more than 6 collectors) or in parallel. The complete circuit must always be hydraulically balanced. See the following sample layouts.

Connection between collectors must be carried out only using the junction connector (including the proper insulation) supplied separately. This connector is used as expansion joint between collectors.

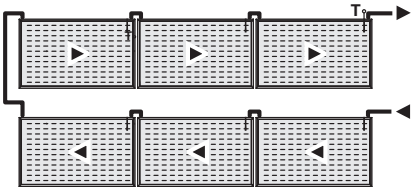
**Two lines in series  
Vertical configuration**



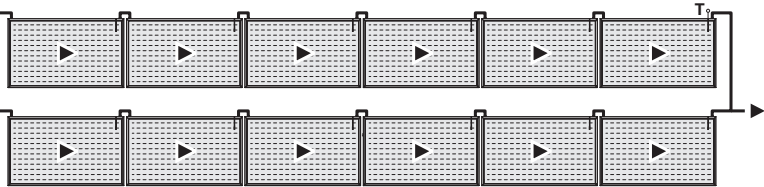
**Two lines in parallel  
Vertical configuration**



**Horizontal configuration**




**Horizontal configuration**



**Diameter of connection pipes for a specific flow rate of 30 lt/m²h**

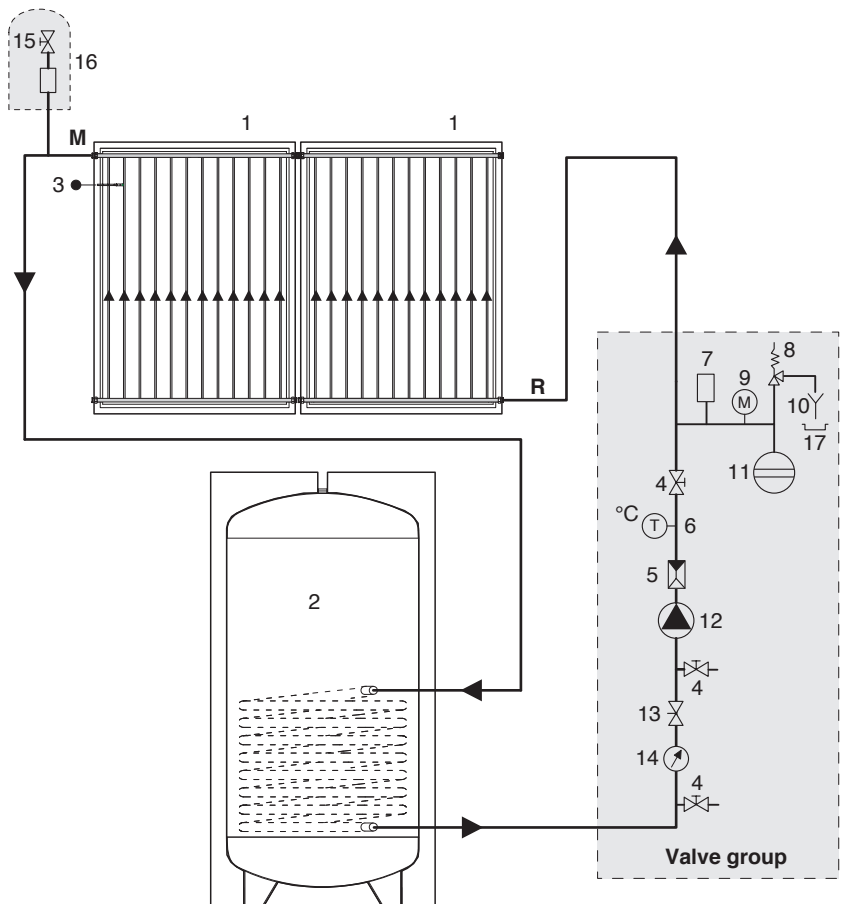
Total surface area (m²)	2 - 4	6 - 12	14 - 20
Diameter of copper pipe (mm)	10 - 12	14	18
Diameter of steel pipe (inch)	3/8" - 1/2"	1/2"	3/4"

 Do not fix the ends of lines of solar collectors rigidly: leave them free to absorb thermal expansion. If this is not possible, fit an expansion joint at each end.

## 12 SOURCE WATER SYSTEM

- 1 Solar collector
- 2 Storage cylinder
- 3 Collector probe
- 4 Disconnect valves
- 5 Non-return valve
- 6 Temperature gauge
- 7 Vent valve
- 8 Safety valve
- 9 Pressure gauge
- 10 Drain
- 11 Expansion vessel
- 12 Pump
- 13 Flow regulator
- 14 Flow meter
- 15 Vent cock
- 16 Manual bleed valve (accessory)
- 17 Heat transfer fluid recovery

**M** Collector outlet  
**R** Collector return



12

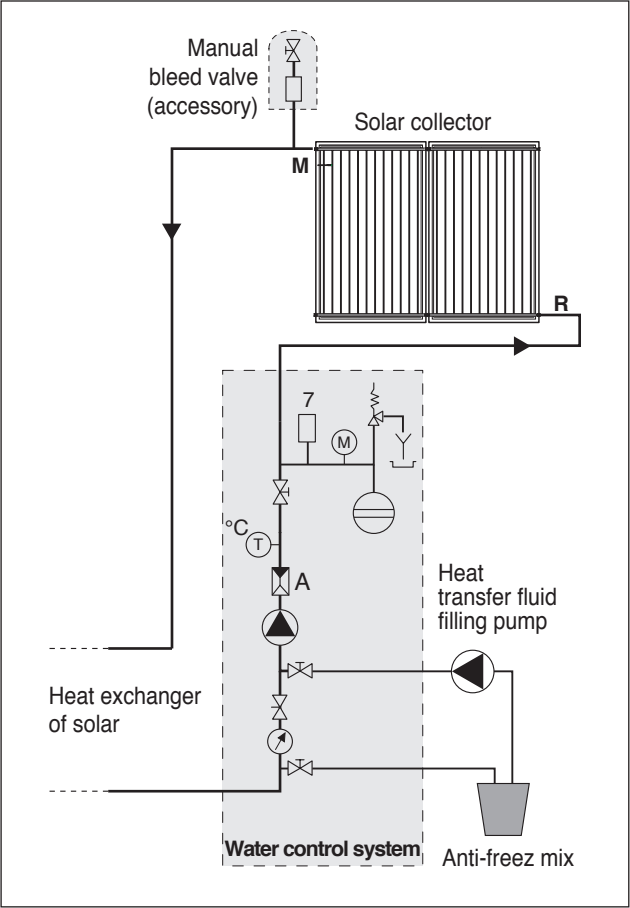
- ⚠ If copper pipes are used, joints must be hot brazed.
- ⚠ We recommend the use of stainless steel pipes specially made for solar collectors for the outlet, return and probe pipes. The probe cable should be of the shielded type.
- ⚠ Do not use plastic or multistrata pipes. Operating temperature can exceed 180°C.
- ⚠ Pipe lagging must be able to resist high temperatures (180°C).

### 13 FILLING AND EMPTYING

Before system commissioning it is necessary to wash and fill it.

Solar collectors are exposed to the risk of frost during winter, as they are installed outdoor. Moreover, they can reach high temperatures in stagnation conditions, consider these things when choosing the heat transfer fluid.

- ⚠ If copper piping has been used and joints have been hot brazed, flush out the system to remove any brazing residues. Seal test the system after you have flushed it out. Fill the solar collector with glycol/water mix immediately after flushing it out, because flushing water may remain trapped in the circuit (with a consequent risk of freezing).
- ⚠ For system washing, filling and emptying, follow the instructions contained in the manual of the matched solar station.
- ⚠ Filling, emptying and venting must be carried out with collectors at ambient temperature and protected from solar radiation.



### 14 DEVICE CLEANING AND MAINTENANCE

- ⚠ The following operations must be exclusively performed by Technical Assistance Centre

It is recommended to clean the glass once a year, as the deposit of dust and leaves reduces system efficiency. The collector must be cleaned with water or water and soap. Dry the collector at the end of cleaning operations.

- ⊖ Do not use abrasive products, petrol or triethylene.

The heat transfer fluid must be checked every 2 years to verify the effectiveness of water and glycol mix, including its pH value.

- Check the antifreeze with the suitable instrument - refractometer or hydrometer- (nominal value approx. -30°C): if the limit value of -26°C is exceeded, replace or top-up the antifreeze.
- Use litmus paper to check the pH (nominal value approx. 7.5). If the measured value is below 7, change the heat transfer liquid.

Check the integrity of insulation and expansion joints.

### 15 RECYCLING AND DISPOSAL

The device is primarily composed of:

At the end of the device's useful life, these components must be separated and disposed of according to current regulations in the country of installation.

Material	Component
Glass	Cover
Brass - Copper - Aluminium	Absorber
Rock wool	Insulation
Aluminium - Steel	External frame
Silicone - PA66	Sealing elements of connections

## **END USER INSTRUCTIONS**

**Refer to the GENERAL SAFETY INFORMATION and PRECAUTIONS section for safety-related information.**

### **16 EXTERNAL MAINTENANCE**

It is recommended:

- To clean the glass once a year, as the deposit of dust and leaves reduces system efficiency
- To check the heat transfer fluid to verify its effectiveness every two years
- To check the integrity of solar collector insulations and any expansion joints, every two years.

**For cleaning operations and solar collector efficiency check, contact the nearest Technical Assistance Centre.**





Via Risorgimento, 23 A  
23900 - Lecco (LC)

[www.sylber.it](http://www.sylber.it)

The manufacturer strives to continuously improve all products. Appearance, dimensions, technical specifications, standard equipment and accessories are therefore liable to modification without notice.