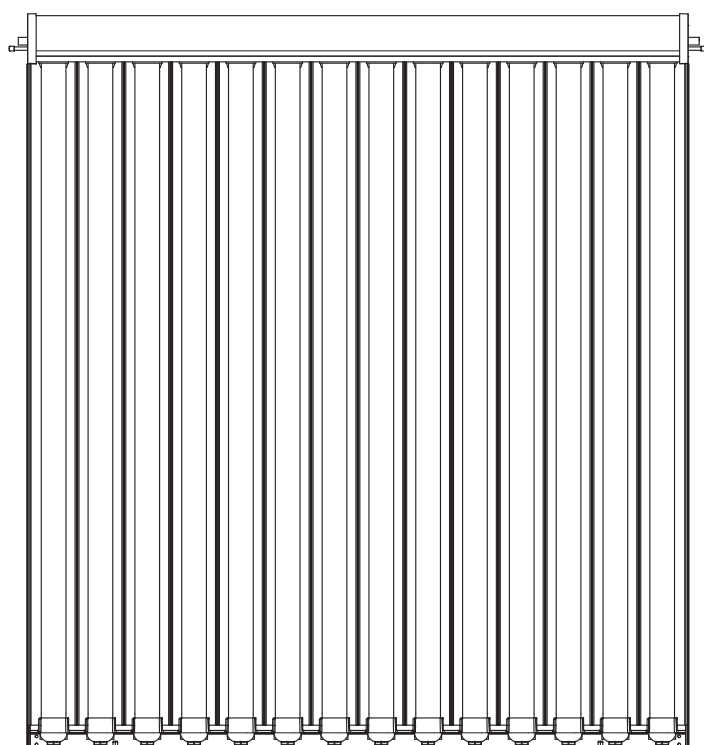


# ETV-10



## Installation & Servicing Instructions



THESE INSTRUCTIONS  
TO BE RETAINED  
BY USER



Vokèra is a licensed member of the Benchmark scheme which aims to improve the standards of installation and commissioning of domestic hot water systems in the UK.

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## CONFORMITY

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*Solar collectors conform to EN 12975 standard*

*and to Solar Keymark certification standard.*

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## RANGE

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MODEL	CODE
ETV-1025	20026323
ETV-1025 conf. x5	20031295
ETV-1035	20031297
ETV-1035 conf. x5	20031298

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The following symbols are used in some parts of this booklet:



**CAUTION** = actions that require special care and suitable preparation













**PROHIBITED** = actions that absolutely must NOT be carried out

This booklet, code 20026421 - Rev. 2 (11/10), contains 20 pages.

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## GENERAL SAFETY INFORMATION AND PRECAUTIONS

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-  As soon as you open the packaging, check immediately that the contents are all present and undamaged. Contact the reseller from whom you purchased the solar collector if you notice any problems.
-  This solar collector must be used only for the proper purpose for which it is designed and made. The manufacturer declines all responsibility, contractual or other, for damage to property or injury to persons or animals caused by improper installation, adjustment, maintenance or use.
-  The solar collector must be serviced every six months.
-  Work near uncovered and live electrical wires, with which it is possible to come into contact, is only permitted under the following conditions:
- wires must be free from voltage for the entire duration of the work
  - parts remaining live must be covered or accidental contact prevented
  - the following minimum safety distances must be respected:
    - 1 m for voltages of up to 1000 Volts
    - 3 m for voltages from 1000 to 11000 Volts
    - 4 m for voltages from 11000 to 22000 Volts
    - 5 m for voltages from 22000 to 38000 Volts
    - over 5 m if the voltage is not known.
- Contact with open, live electrical wires may lead to electrocution and may even be fatal.
-  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.
-  Only wear overalls that have a safety harness (with a suitable safety or fall-arrest belt, ropes or slings, fall dampers or dissipaters). In the absence of adequate fall prevention and security devices, failure to use a proper safety harness may lead to falls from great heights with serious or even fatal consequences.
-  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.
-  Especially when installing the solar collector as part of a domestic hot water system, follow the orientation and angle of the roof to ensure that the collector blends in with the architecture of the building.
-  This instruction manual is an integral part of the solar collector. It must be kept safe and must ALWAYS accompany the solar collector, 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 from your local Technical Assistance Centre.

**ETV-10** collectors are made up of 14 or 20 double sleeved evacuated glass tubes, each of which contains a "U" shaped copper pipe. These copper pipes are connected in parallel and filled with heat transfer fluid that descends and rises to absorb the heat generated by solar radiation, direct and reflected by a mirror known as a compound parabolic concentrator. There is a vacuum inside the double sleeved glass tubes. This provides effective thermal insulation (on the same principle as a vacuum flask) and permits the collectors to generate heat from the sun even in bad weather and in the winter. The outside of the internal pipes is finished in a selective absorbent coating.

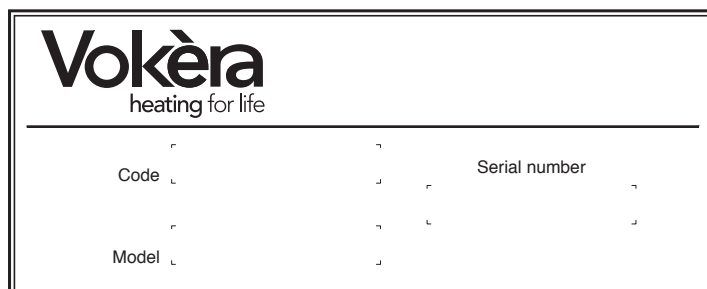
- Evacuated tube technology for high temperatures and high efficiency even in bad weather.
- Circular absorbers and CPC mirrors for maximum absorption even in oblique light.
- Long working life, with no metal parts passing through the glass tubes to cause loss of vacuum.
- Constant absorption over time, thanks to a selective coating that is well protected inside the vacuum environment.
- Easy replacement of glass tubes without having to empty the solar heating circuit.
- Elegant design.

The solar collectors are identified by two plates:

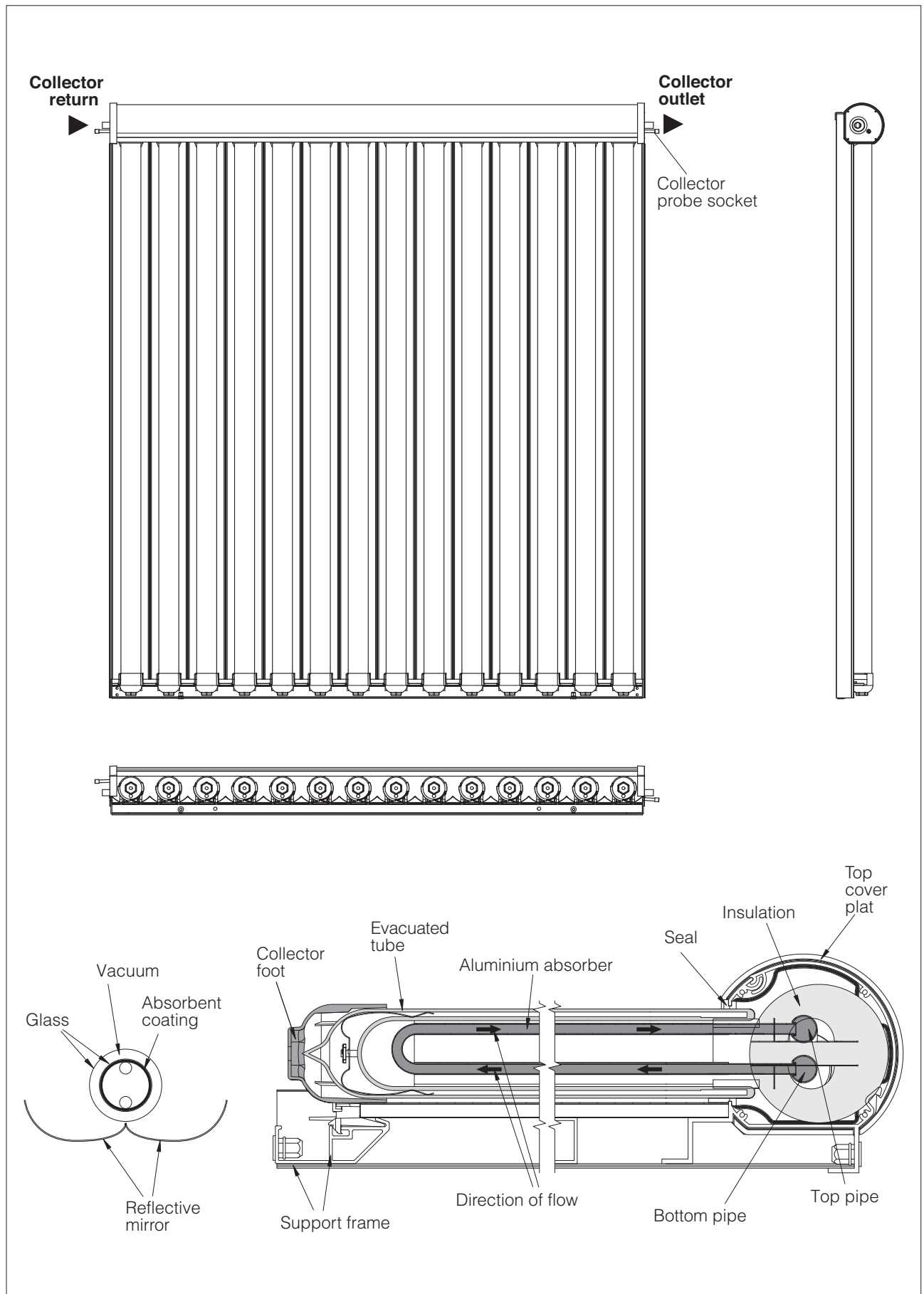
This lists the technical specifications and performance of the product.

Code	<b>CODICE: 20025360</b>			
Serial Number	<b>S/N:</b> 10xxxxxx			
Year of production	Anno di produzione			
Description	<b>DESCRIZIONE: CTE25V</b>			
Evacuated solar collector	FABBRICATO IN ITALIA da Riello S.p.A.			
Dimensions	<b>COLLETTORE SOLARE SOTTOVUOTO</b>			
Gross area	DIMENSIONI: 1600X1730X145 mm		MAX PRESSIONE ESERCIZIO: 10 bar	
Aperture area	SUPERFICIE LORDA: 2,77 m <sup>2</sup>		TEMP. DI STAGNAZIONE: 236°C	
Absorber area	SUPERFICIE DI APERTURA: 2,40 m <sup>2</sup>		CONTENUTO LIQUIDO: 2,05 l	
Empty weight	SUPERFICIE ASSORBITORE: 2,69 m <sup>2</sup>		MAX CONCENTRAZIONE GLICOLE: 50 %	
	PESO A VUOTO: 52 kg		LIQUIDO TERMOMETTORE:	
			ACQUA+GLICOLE PROPYLENICO	
	<b>COLLEGAMENTO IN SERIE FINO AD UN MASSIMO DI 6 COLLETTORI</b>			
			20022981_E1	

This bears the collector's code number, model and serial number.



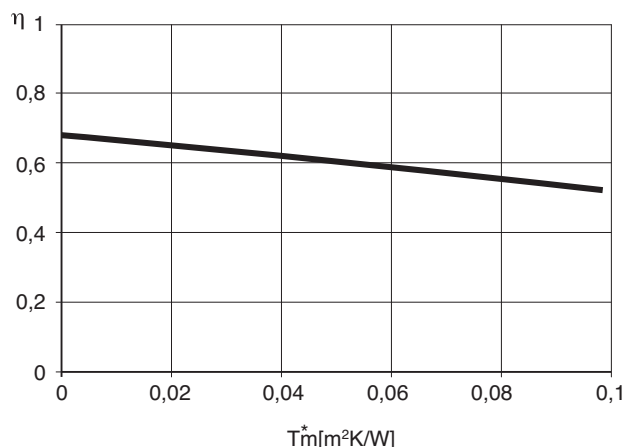
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## TECHNICAL SPECIFICATIONS

DESCRIPTION	ETV-1025	ETV-1035	
Total area	2,77	3,91	m <sup>2</sup>
Exposed area	2,40	3,43	m <sup>2</sup>
Effective absorption area	2,69	3,84	m <sup>2</sup>
Connections	threaded on Ø 18 pipes		mm
Empty weight	52	74	kg
Liquid content	2,05	2,9	l
Recommended flow rate per m <sup>2</sup> of panel	30		l/(m <sup>2</sup> h)
Absorption ( $\alpha$ )	> 94		%
Emissions ( $\epsilon$ )	< 7		%
Maximum permitted pressure	10		bar
Stagnation temperature	236		°C
Maximum number of collectors connectable in series	6		n°

### Efficiency curve referred to exposed area



Optical efficiency ( $\eta_0$ )	Thermal dispersion factor	
	a1 W/(m <sup>2</sup> K)	a2 W/(m <sup>2</sup> K <sup>2</sup> )
0,676	1,15	0,004

Tested according to EN 12975, referred to a flow rate of 0.0196 Kg/(s\*m<sup>2</sup>) and irradiation G = 1000 W/m<sup>2</sup>.

$T_m = (\text{Coll\_inlet\_temp.} + \text{Coll\_outlet\_temp.})/2$

$T^*m = (T_m - \text{ambient\_temp})/G$

- ⚠ Minimum recommended slope is 15° (to ensure efficient self-cleaning and minimise snow pressure).  
 Installation in locations liable to frequent snow and hail is not recommended.  
 Do not install outlet pipe probes that could limit flow, because this could cause overheating.

### Diameter of connection pipes for a specific flow rate of 30 lt/m<sup>2</sup>h

Total surface area (m <sup>2</sup> )	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"

### WIND AND SNOW LOADS ON COLLECTORS

	Installation height above ground	Wind speed	Mass in kg to secure collector against lifting by wind		Load on roof from wind, snow, and collector weight	
			At angle of 45°	At angle of 20°	At angle of 45°	At angle of 20°
ETV-1025	0 - 8 m	100 km/h	80 kg	40 kg	320 kg	345 kg
	8 - 20 m	130 km/h	130 kg	70 kg	470 kg	430 kg
	20 - 100 m	150 km/h	180 kg	100 kg	624 kg	525 kg
ETV-1035	0 - 8 m	100 km/h	150 kg	80 kg	500 kg	540 kg
	8 - 20 m	130 km/h	240 kg	130 kg	740 kg	680 kg
	20 - 100 m	150 km/h	340 kg	180 kg	980 kg	820 kg

- ⚠ These specifications are purely indicative. The entire structure must be inspected by an expert in static loading in compliance with applicable standards.

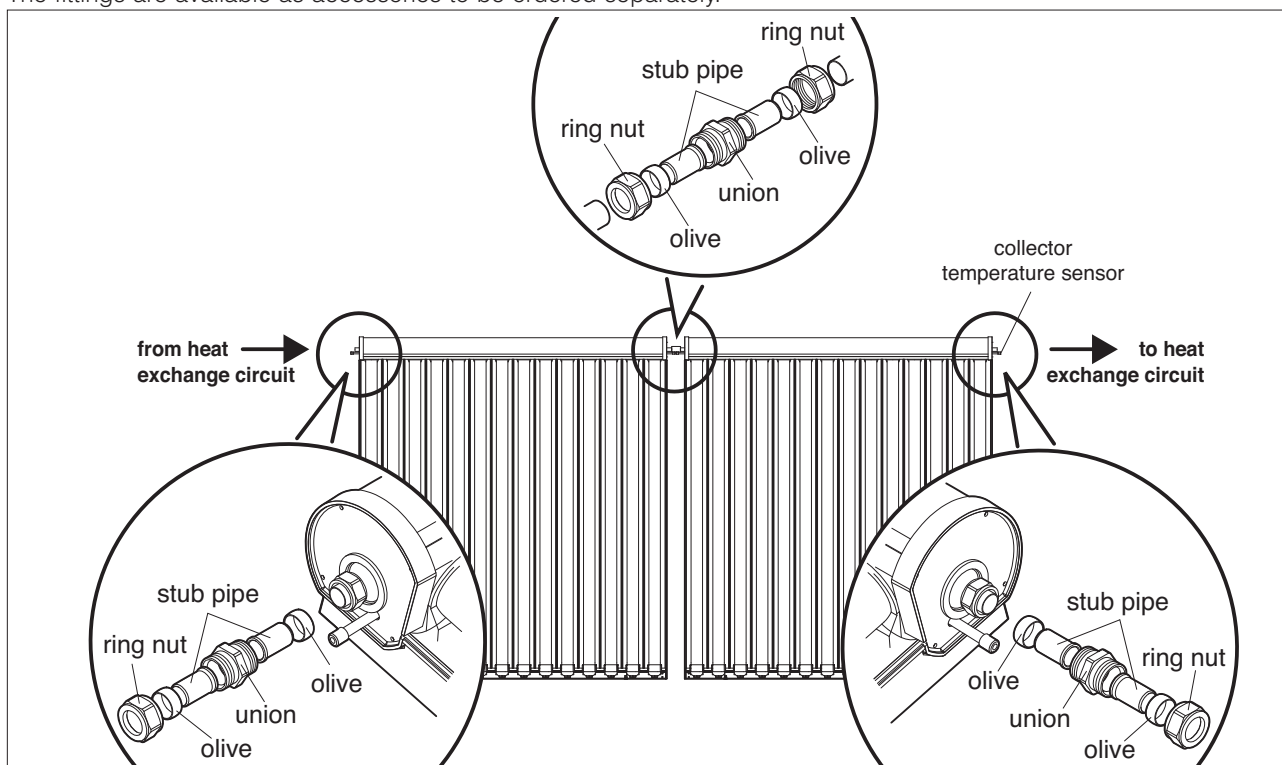
## ACCESSORIES

The following accessories are available, to be ordered separately.

ACCESSORY	CODE
Glycol anti-freeze	4383118
Connections kit for copper pipes	20027281
Connections kit for flexible hoses	20027289
Support rail kit for 1 x 2.5 m <sup>2</sup> collector	20026236
Support rail kit for 2 x 2.5 m <sup>2</sup> collectors	20026240
Support rail kit for 1 x 3.5 m <sup>2</sup> collector	20026238
0° installation kit	4383543
45° installation kit	20024357
Connecting piece kit	4383545

## COLLECTORS CONNECTION

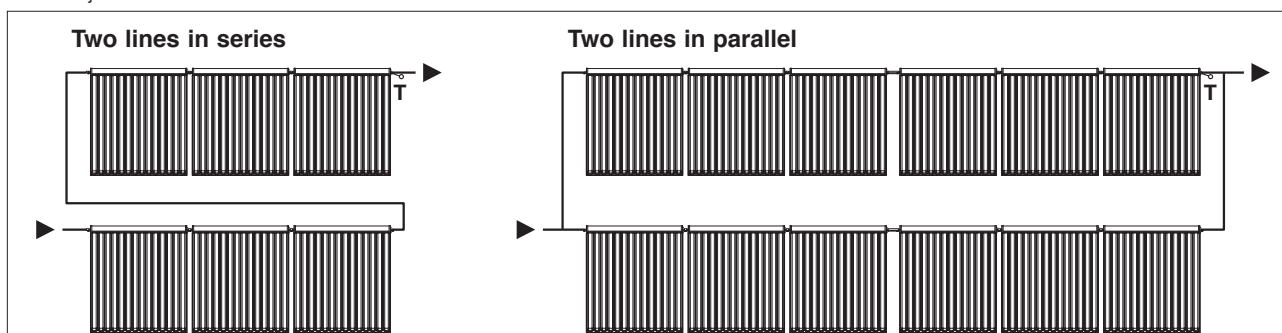
The diagram below illustrates the connections between solar collectors in lines.  
The fittings are available as accessories to be ordered separately.



The collectors in a line are connected so that the heat transfer fluid goes through them in series.

It is also possible to connect more than one line of solar collectors both in series (max 6 collectors in series) or in parallel. Anyway the circuit must be hydraulically balanced (see the following schemes as an example).

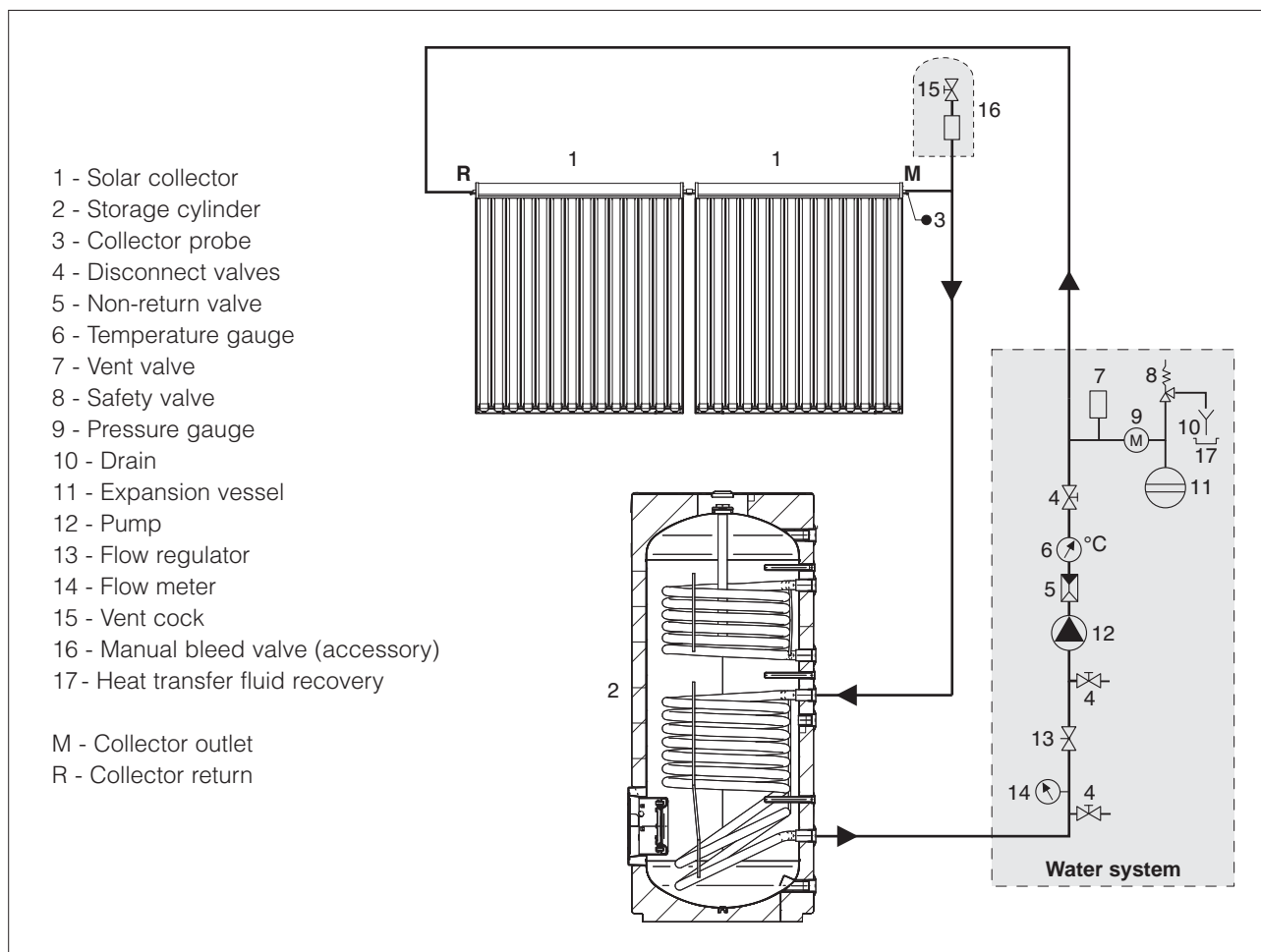
If more than 4 solar collectors are installed in a row, fit an expansion joint of the sort designed for solar collectors at the central join.





## WATER CIRCUIT

The diagram below illustrates the water connections between solar collectors and a storage cylinder.



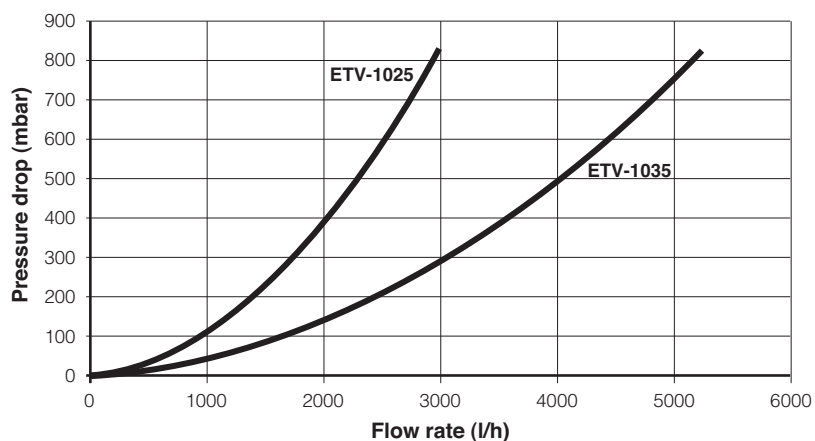
⚠ Connect no more than 6 collectors in series.

⚠ Do not use plastic or multistrata pipes. Operating temperature can exceed 180°C.

⚠ 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.

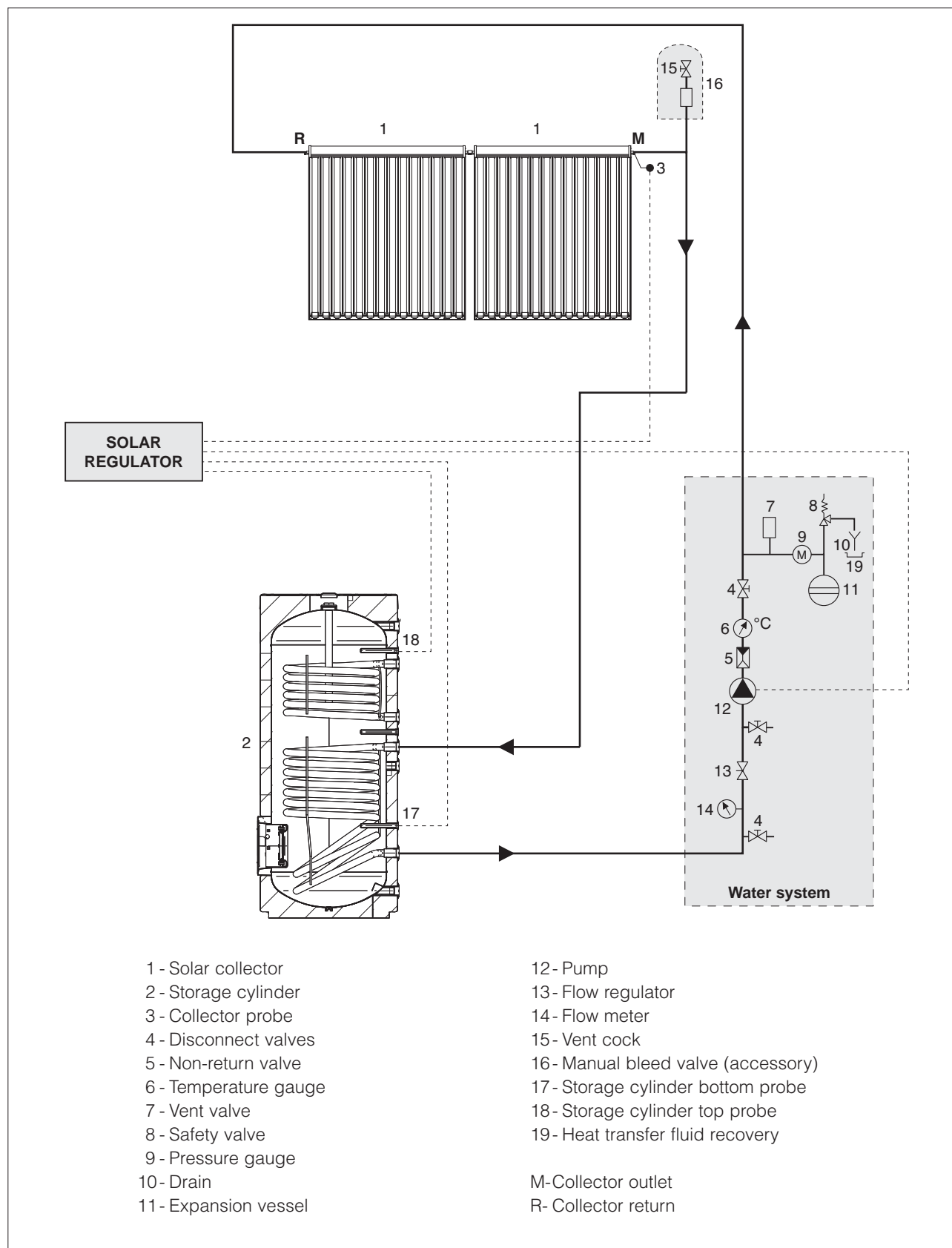
⚠ Pipe lagging must be able to resist high temperatures (180°C).

### Pressure drop in solar collectors



## LOCATION OF PROBES

The temperature sensor must be installed in a socket as near as possible to the collector outlet. Make sure that the sensor makes good contact with the socket. Materials (sensor, cables, seals and insulation) used to install the temperature sensor must be able to withstand high temperatures (up to 300°C).



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## UNPACKING THE COLLECTOR

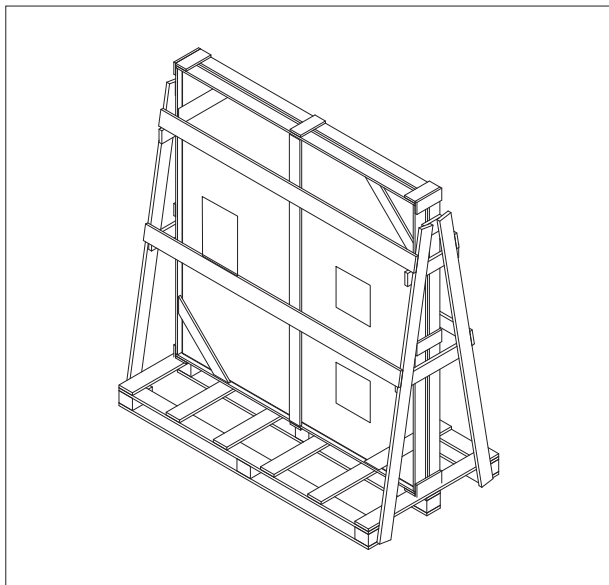
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The solar collectors are packed in various ways depending on the number of units supplied.

### A - Individually packaged collectors

Pallet contents:

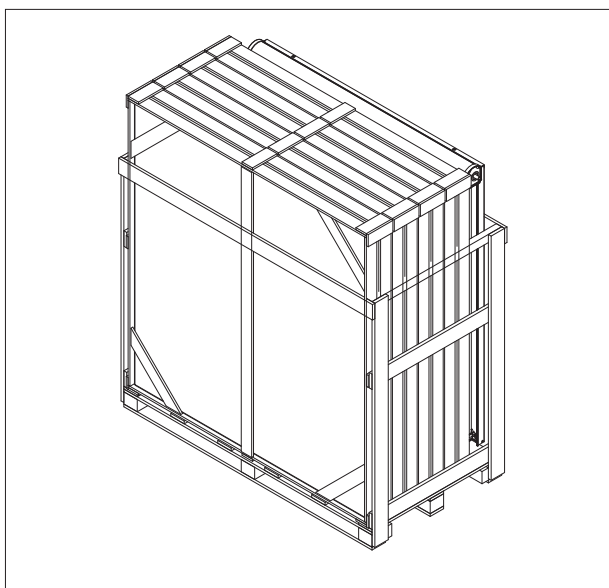
- collector
- Documentation envelope containing:
  - certificate of warranty and label with bar code.





### B - Packages of 5 collectors

Pallet contents:

- 5 collectors
- Documentation envelope containing:
  - certificate of warranty and label with bar code.

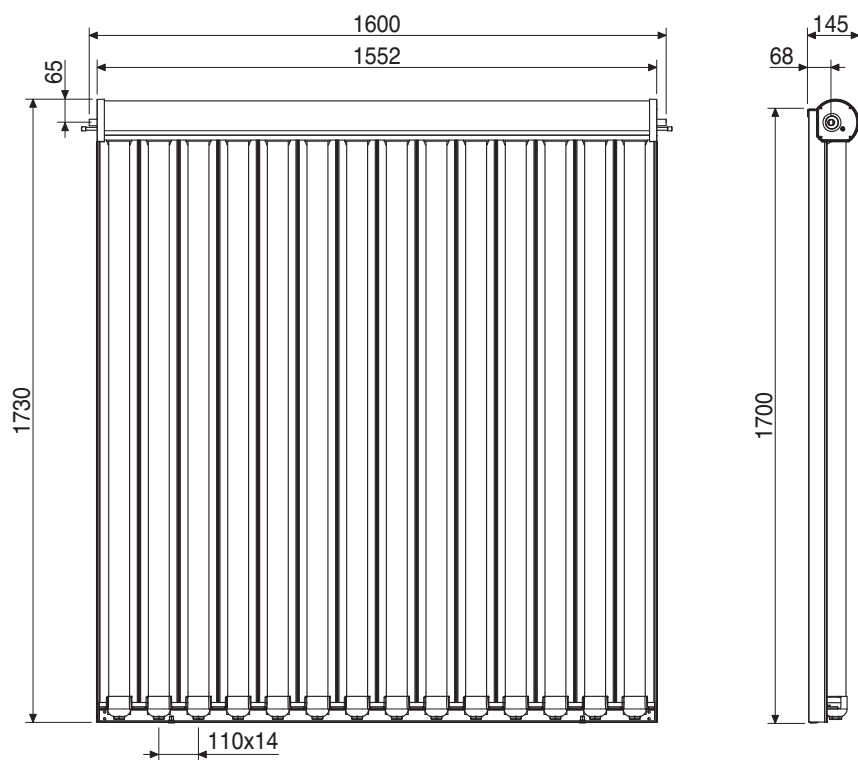


 Keep the front of the packaging and use it to shade the glass tubes before the system is started up. If the solar collectors are not going to be put into operation immediately, and there is any risk of their being exposed to rain, do not use the packaging to shade them as it is not water-proof.

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

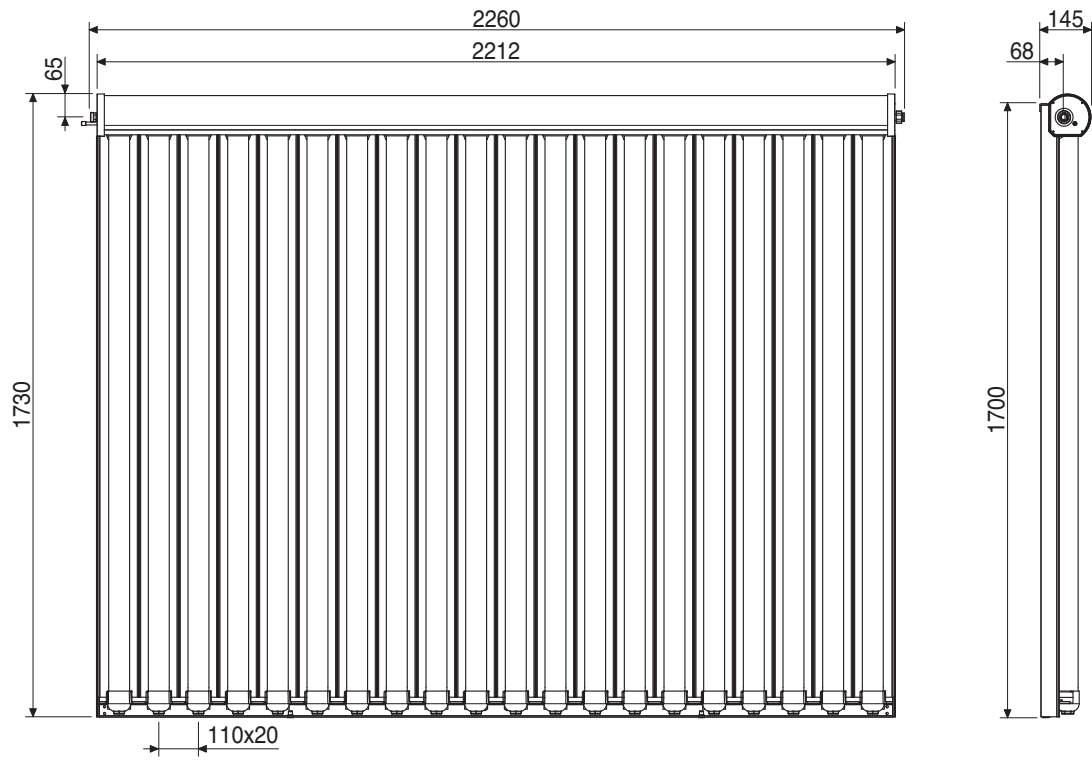
# DIMENSIONS AND WEIGHT

ETV-1025



	ETV-1025	ETV-1035	
Net weight	52	74	kg

ETV-1035




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## HANDLING THE COLLECTOR


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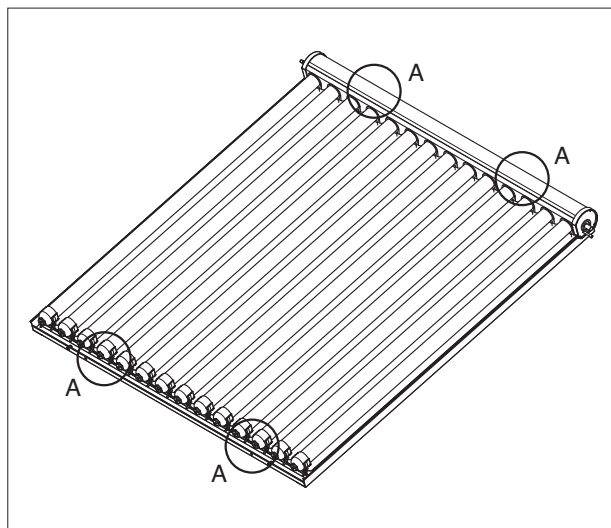
Once you have removed the outer packaging, proceed as follows to unpack and handle the solar collector:

- Remove the PVC wrapping to free the solar collector from the pallet
- 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.

 **Never lift the collector by its threaded water fittings.**

 Wear suitable personal protective equipment and use suitable safety devices.

 Do not dispose of the packaging material into the environment where it can become a potential hazard. Dispose of the packaging material in compliance with applicable legislation.



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## INSTALLATION

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### GENERAL INSTRUCTIONS

#### Assembly

The solar collector must be fitted 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.

#### Static load

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.


#### Lightning protection

The metal piping of the solar heating circuit must be connected to the main potential compensation bar by a (yellow-green) copper wire (H07 V-U or R) of at least 16 mm<sup>2</sup>. If a lightning conductor system is already installed, the solar collectors may be connected to the existing system. Alternatively, the solar collector piping may be connected to ground via a ground wire sunk into the earth. Ground wires must be sunk outside the house. The ground wire must be connected to the potential compensation bar through a wire of the same diameter.

#### Connections

Solar collectors must be connected in series using the threaded unions provided.

If flexible pipes are not used to connect the solar collectors, the piping must be fitted with expansion joints (U-type expansion joints, flexible hoses) to absorb thermal expansion. Provided adequate expansion joints are used, up to 6 solar collectors may be connected in series. Make sure that the unions are located correctly when tightening them. When tightening a union with a pipe wrench or spanner, always hold the opposite union steady with a second tool to avoid twisting the pipe to which the union is attached.

 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.

### Angle of collectors / General

Solar collectors are designed to be installed at angles of between 15° (minimum) and 75° (maximum).

Make sure that the bleed and vent valves of the collectors remain open while the collectors are being installed.

Take care to protect all fittings, connections, bleed and vent valves against dirt and dust etc..

In installations which serve primarily to produce domestic hot water in the summer, install the collectors facing from east to west at an angle of between 20 and 60°. The ideal orientation is southwards, at an angle equal to the latitude of the location minus 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°.


### Flushing and filling

For safety reasons, the solar collector must be covered, using the packaging it came in, for at least two hours before it can be filled.

In areas liable to frost, fill the collector with an anti-freeze heat transfer fluid.

### DO NOT ADD WATER TO THE GLYCOL PREMIX.

The glycol premix supplied for use with solar collectors comes ready to use. It provides anti-freeze protection down to -28°C. IT MUST NOT BE MIXED WITH WATER.


 Take care if you flush the system out, because water trapped inside the circuit before filling with glycol premix may freeze.


### Bleeding

Bleed the circuit:

- On startup (after initial filling) (see the figure on page 16).
- Whenever necessary, as in the event of system malfunctioning.

Make quite sure that all air has been bled out of the system.

 Risk of burns from hot fluid inside the collectors!

 Only open the vent valve if the temperature of the fluid in the circuit is below 60°C.


Make sure that the collectors are not hot before you start bleeding the circuit. Always cover the solar collectors before bleeding the circuit. Always perform bleeding in the morning.

### Checking the heat transfer liquid

Check the anti-freeze effect and the pH level of the heat transfer liquid every 2 years.

- Use an instrument like a refractometer or densimeter to check the anti-freeze effect (which must have a nominal protection value of approx. -28°C). If density is other than 1.030 kg/dm<sup>3</sup>, replace the mix, or add anti-freeze as required.

- Use litmus paper to check the pH (nominal value 9 to 10.5). If the measured value is below 7, change the mix.

 At the end of its useful life, dispose of the product in compliance with applicable legislation.

# FILLING THE CIRCUIT

Perform the following steps before starting up the system.

## 1 - FLUSHING AND SEAL TESTING THE SYSTEM

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 anti-freeze heat transfer liquid immediately after flushing it out, because flushing water may remain trapped in the circuit (with a consequent risk of freezing).

⚠ The glycol premix supplied is specially formulated for solar collector applications and is efficient throughout the -28 to +170°C temperature range. The mix is also non-toxic, biodegradable and bio-compatible.

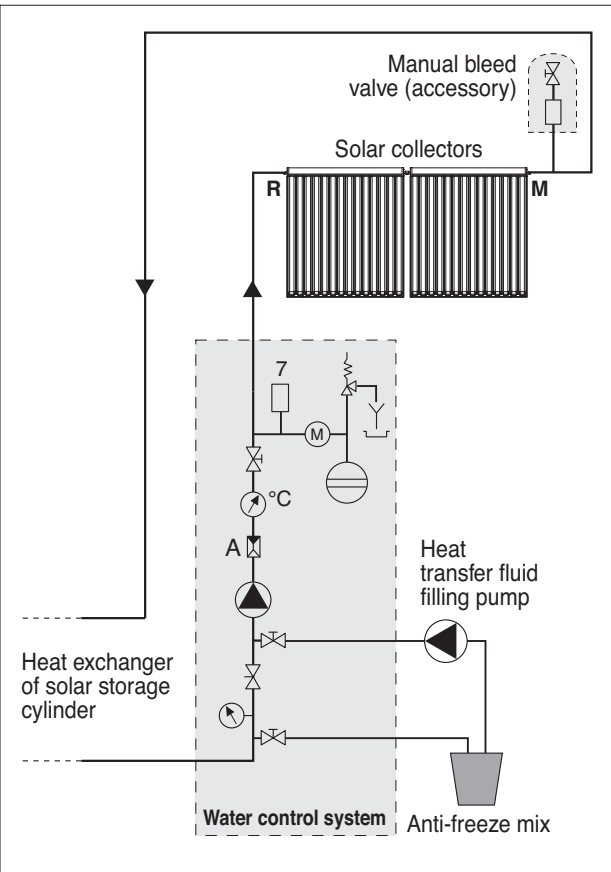
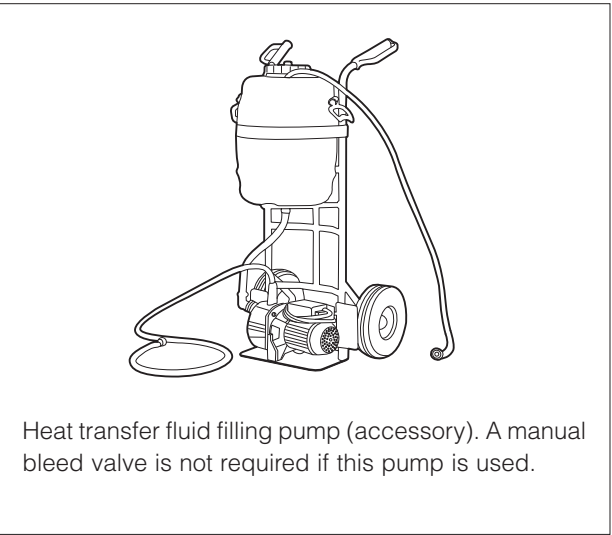
⚠ Do NOT part fill the circuit with glycol then top up with water.

⚠ Temperatures in excess of 200°C can cause the glycol mix to break down. This is easily visible because the liquid becomes darker.

Anti-freeze	Temperature	Density
Glycol premix	20°C	1,032÷1,035 kg/dm³

## 2 - FILLING

- 1 - Open the non-return valve (A).
- 2 - Open the air vent at the highest point in the system (see figure alongside) and keep it open throughout the filling operation.
- 3 - Open the vent valve (7).
- 4 - Pump the heat transfer fluid around the circuit with an external filling pump until all air bubbles have been eliminated. Close the manual bleed valve.
- 5 - Temporarily raise the pressure in the system to 4 bar.
- 6 - Start up the system for about 20 minutes.
- 7 - Bleed the system again from step 2 until all the air has been removed.
- 8 - Set the pressure in the system to 3 bar.
- 9 - Close the non-return valve (A) and any open vent valves to prevent the heat transfer fluid from evaporating.



⚠ Do not fill the system in bright, sunny conditions or if the collectors are hot. Cover the solar collector with the packaging it came in for at least two hours before filling it.

⚠ Make sure that you have bled all the air out of the system, using the water control system vent too.

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## CHECKS

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On completion of the installation, perform the checks listed in the table below.

DESCRIPTION	OK
<b>Collector circuit</b>	
Cold pressure 3 bar	
Collector circuit seal test	
Safety valve check	
Anti-freeze checked to - ____ °C	
pH of heat transfer fluid = ____	
Collector circuit bled	
Flow rate of 30l/h per m <sup>2</sup> checked	
Non-return valve functioning	

DESCRIPTION	OK
<b>Solar collectors</b>	
Visual check of collectors	
Collectors cleaned if necessary	
Visual check of collector fixing points	
Visual check of roof impermeability	
Visual check of insulation/lagging	



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## MAINTENANCE

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The collector must be cleaned and all parts (reflector, glass tubes, etc.) inspected every six months.

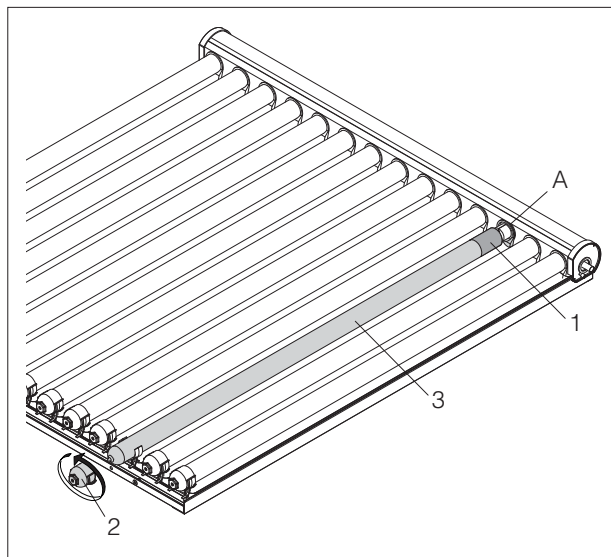
### REPLACING EVACUATED TUBES

The evacuated tubes are fully functional when delivered. Nevertheless, if problems occur, they can be replaced quickly and easily.

**Defective tubes are easy to recognise because their undersides turn white and their surfaces become extremely hot.**

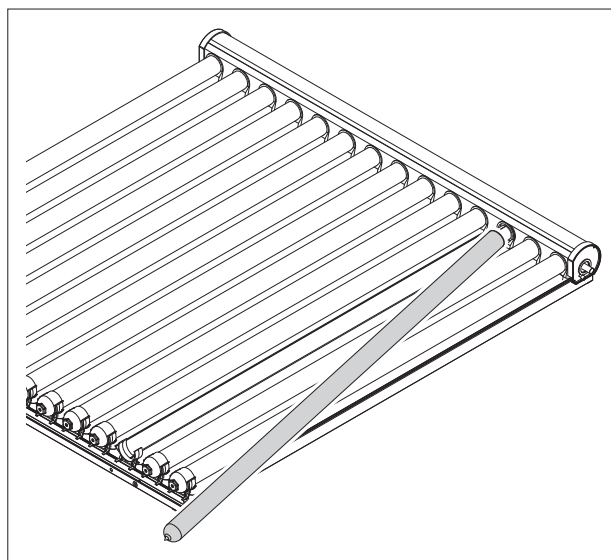
Proceed as follows to remove an evacuated tube. Wear gloves and take all the necessary precautions.

- Smear the top of the tube (1) near the seal ring with a lubricant paste
- Unscrew and remove the plug (2) from the foot of the tube
- Pull the tube (3) downwards, twisting it gently to release it from the top seal
- Remove the tube from the bottom of the collector



If you do not have sufficient room to remove the tube downwards, proceed as follows.

- Remove the tube from the collector foot as instructed above
- Pull the tube down about 20 cm
- Hold the tube in a glove, lift it gently and swivel it to the left or right. This bends the copper pipes inside the glass tube. Take care not to damage them, however
- Pull the tube out diagonally across the collector to remove it.



Reverse the above steps to fit the new tube.



Remove any pieces of broken glass without damaging the surface of the mirror. Also remove any residues that might have formed around the copper pipes.



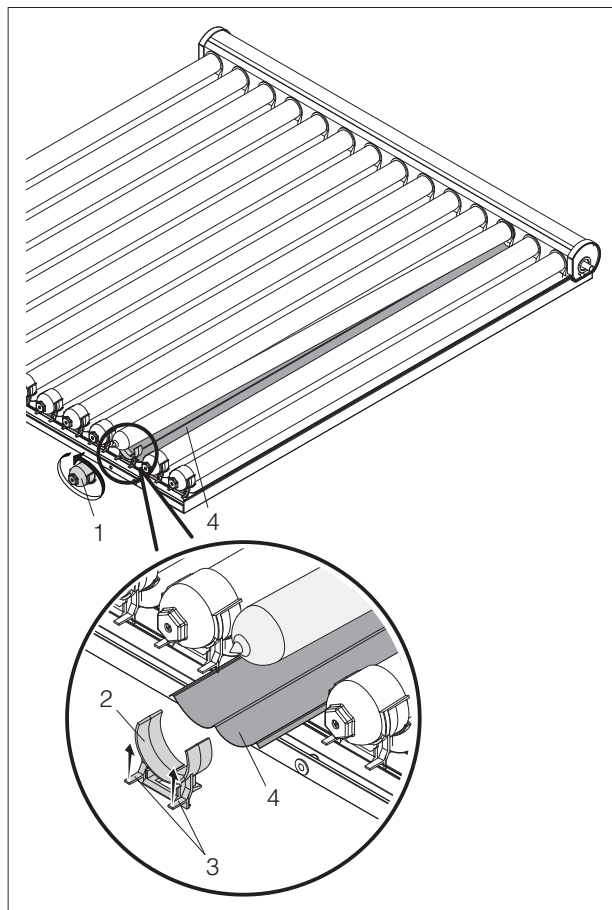
Make sure that the silicon seal ring is still correctly seated. silicone.

## REPLACING THE CPC REFLECTOR

Our CPC reflectors are manufactured and delivered under the best possible conditions. Nevertheless, if a fault (e.g. a large dent) is found, they can be replaced quickly and easily.

Proceed as follows, taking all the necessary precautions, to remove a damaged reflector:

- Unscrew and remove the plug (1) from the foot of the collector.
- Remove the bracket (2) into which the plug was screwed by bending back the clips (3).
- Remove the reflector (4) without moving its glass tube.







Cod. 20026421 - Rev. 2 (11/10)

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