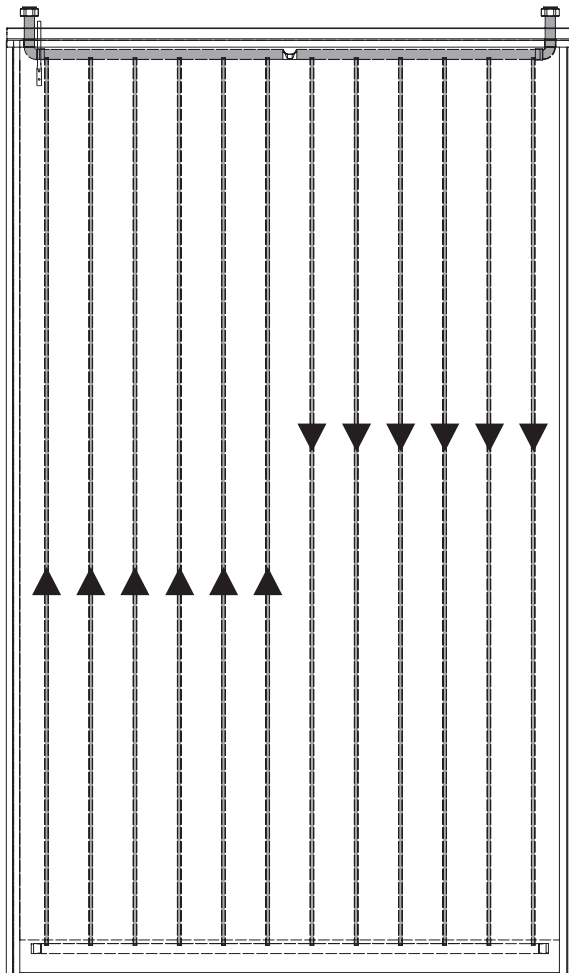


Zenith Inset

Solar thermal collectors



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.

CONFORMITY

ICV08 solar collectors conform to EN 12975 standard.

RANGE

MODEL	CODE
Kit of 2 collectors ICV08	50-37685-13573-9
Kit of 4 collectors ICV08	50-37685-13574-6

CONTENTS

General safety information and precautions	page 4
Description of the solar collector	“ 5
Identification	“ 5
Design	“ 6
Technical specifications	“ 7
Accessories	“ 7
Water circuit	“ 8
Location of probes	“ 9
Unpacking the collector	page10
Dimensions and weight	“ 11
Handling the collector	“ 11
Installation	“ 12
Filling the circuit	“ 13
Checks	“ 14

The following symbols are used in this manual:













CAUTION! = Indicates actions that require caution and adequate preparation.



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

This manual, Code xxxxxxEN - Rev. 0 (04/08) is made up of 16 pages.

GENERAL SAFETY INFORMATION AND PRECAUTIONS

-  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 two years.
-  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 damage or lose this manual, order a replacement immediately from your local Technical Assistance Centre.

DESCRIPTION OF THE SOLAR COLLECTOR

These panel type solar collectors have two water fittings and consist of a wooden tray covered with a single-piece copper absorber plate. This has a highly selective finish obtained by a special vacuum treatment called "SUN-SELECT", which guarantees excellent collector performance. The absorber plate is ultrasonically welded to 12 copper pipes through which the heat transfer fluid flows. The two main pipe connection manifolds are also in copper. The top manifold has a central choke to allow the first 6 pipes to be fed in parallel. After the heat transfer fluid reaches the bottom manifold, it rises through the second group of 6 pipes to the top manifold again. This effectively doubles the thermal length of the collector.

Each panel is protected by solar, hail-proof, tempered glass with low iron oxide content and a high energy transmission factor. The bottom and walls of the tray are lined with 5.5 cm of rock wool insulation. The temperature probe is installed in a special copper socket.


These solar collectors are easy to install recessed in the roof. Provided they are properly installed, they provide reliable, long lasting and extremely efficient service.

IDENTIFICATION

The solar collectors are identified by two plates:

- Serial number plate

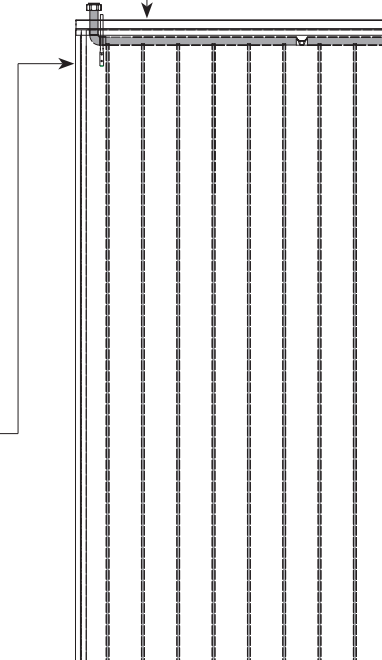
This bears the collector's code number, model and serial number.


	
Code	Serial number
Model	

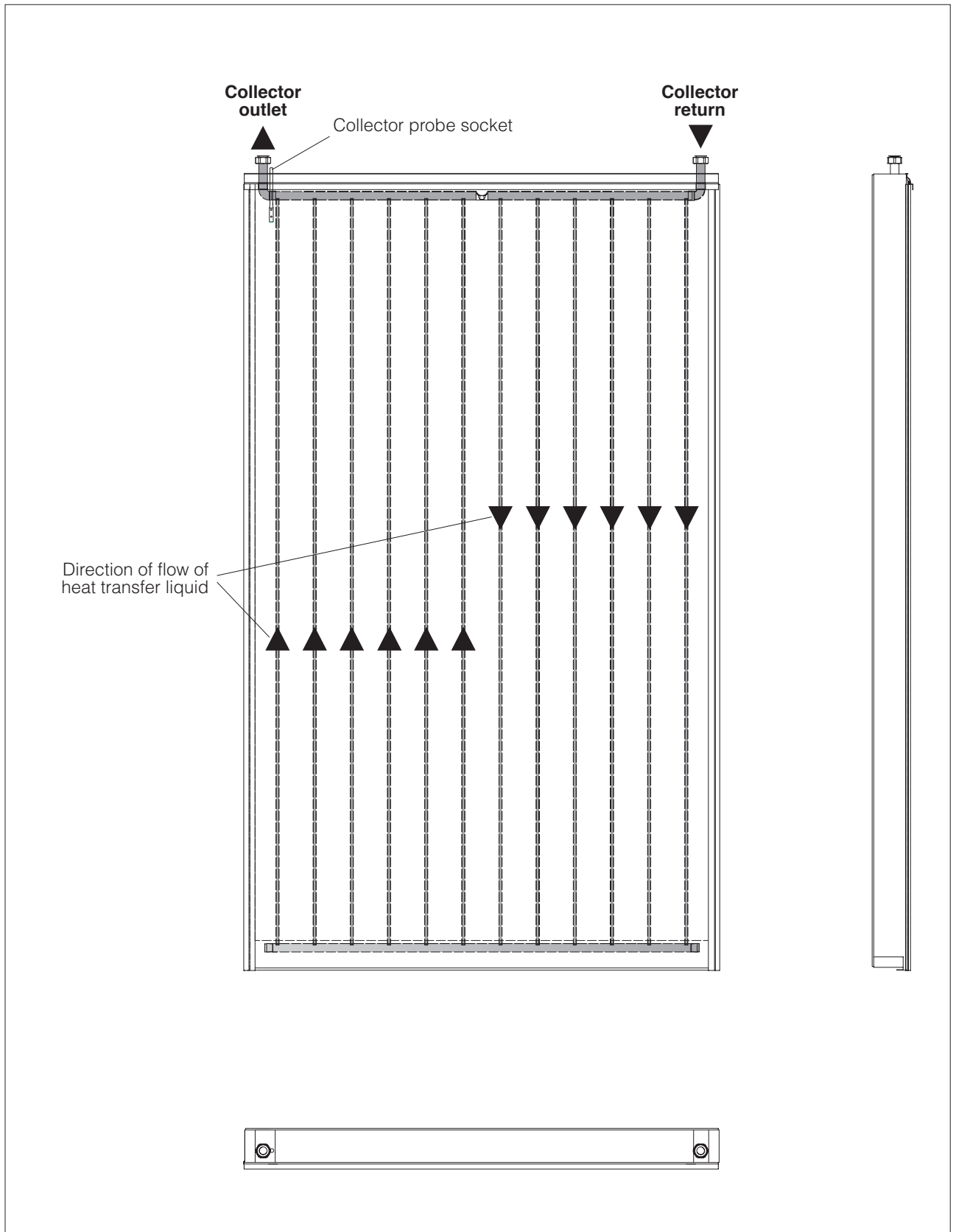
- Data plate

This lists the technical specifications and performance of the product.

Model:	Made in Austria
Code:	Reg. no.:
Serial number:	
SOLAR COLLECTOR WITH ABSORBER PLATE	
Dimensions: 2058 x 1227 x 105 mm	Maximum operating pressure: 10 bar
Gross area: 2,52 m ²	Maximum temperature: 230°C
Exposed area: 2,32 m ²	Heat transfer fluid: water + propylene glycol
Absorber area: 2,28 m ²	Liquid content: 1,70 l
Empty weight: 54 kg	Max glycol concentration: 50%
Up to max 6 collectors can be connected in series.	



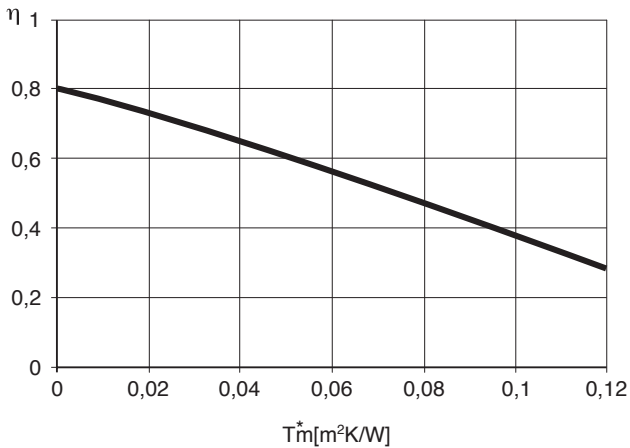
 If these plates or any other means of clearly identifying the product are defaced, removed or lost, proper installation and servicing may be rendered difficult.



TECHNICAL SPECIFICATIONS

DESCRIPTION		
Total area	2,52	m ²
Exposed area	2,32	m ²
Effective absorption area	2,28	m ²
Connections (F) – (F)	1"	
Empty weight	54	kg
Liquid content	1,70	l
Recommended flow rate per m ² of panel	30	l/h
Glass type - thickness	safety glass with anti-reflective surface - 4 mm	
Absorption (α)	~ 0,95	%
Emissions (ϵ)	~ 0,05	%
Maximum permitted pressure	10	bar
Maximum temperature	230	°C
Maximum number of collectors connectable in series	6	n°

Efficiency curve



Optical efficiency of absorber (η_0)	Thermal dispersion factor of absorber	
	a1 W/(m ² K)	a2 W/(m ² K ²)
0,806	3,68	0.0072

Tested according to EN 12975, referred to a 33.3% water-glycol mix, flow rate of 300 l/h, and irradiation $G = 800\text{W/m}^2$.

$$T_m = (\text{Coll.}_{\text{inlet_temp.}} + \text{Coll.}_{\text{outlet_temp.}}) / 2$$

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

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

Total surface area (m ²)	approx. 5	approx. 7,5	approx. 12,5
Diameter of copper pipe (mm)	10-12	15	18
Diameter of steel pipe	DN16		DN20

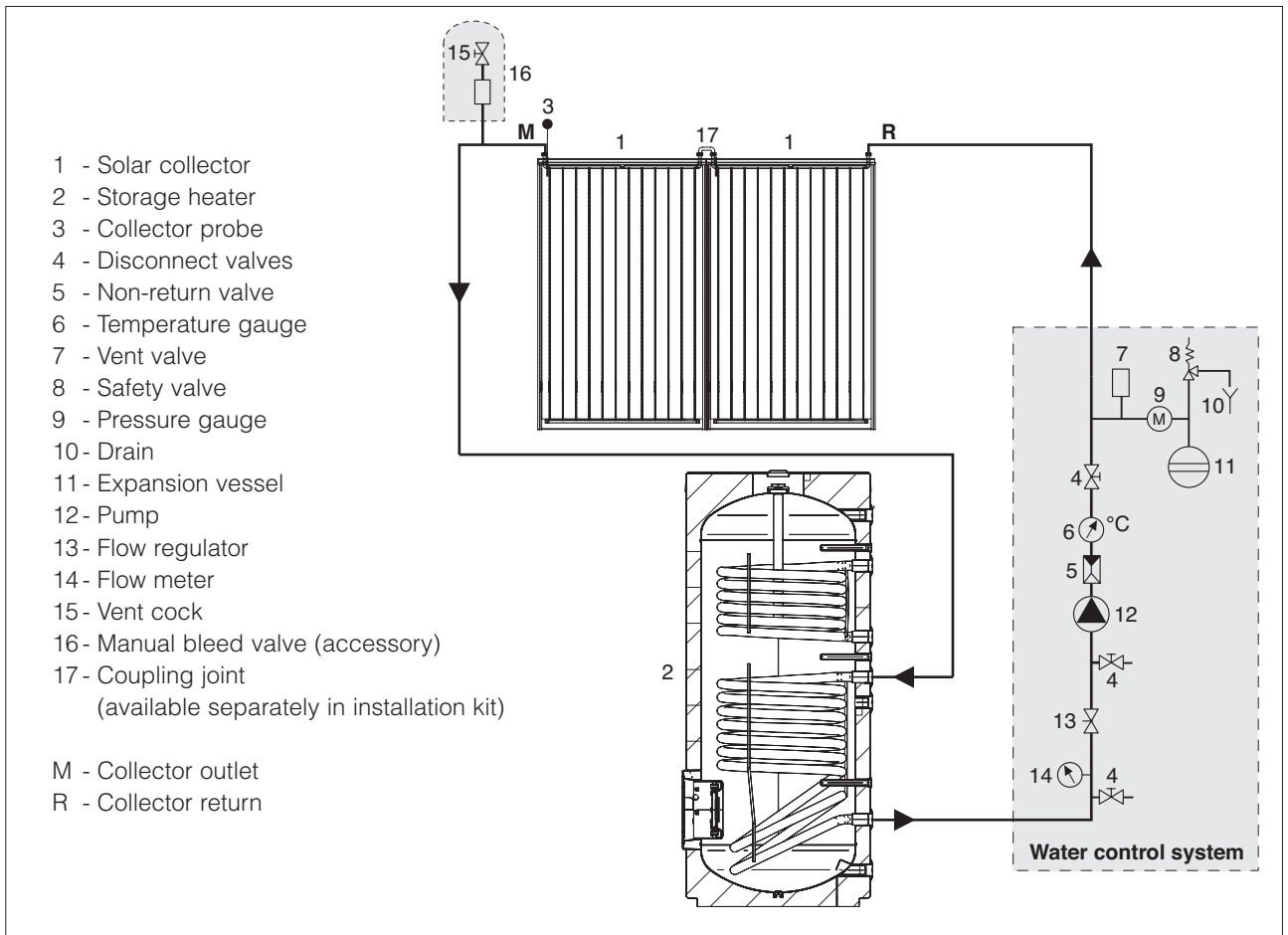
ACCESSORIES

The following accessories are available, to be ordered separately.

ACCESSORY	CODE
kit basic inset collector TL	20001441
kit basic cover inset collector TL	20001442
kit additional cover inset collector TL	20001444
kit additional inset collector TL	20001443

WATER CIRCUIT

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



⚠ Connect no more than 6 collectors in series.

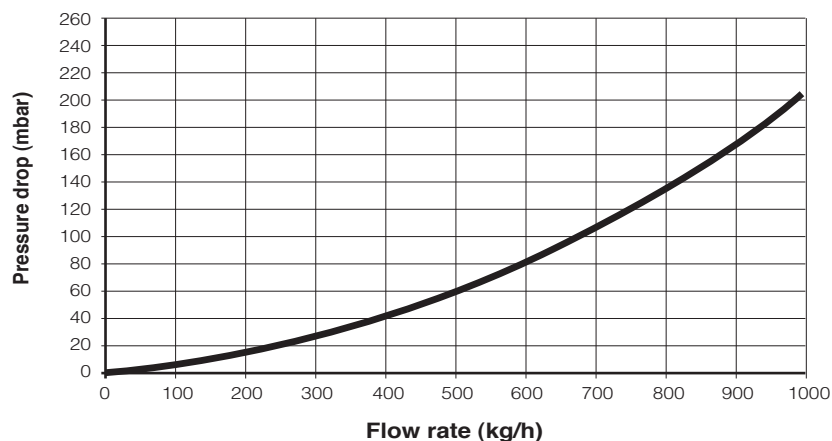
⚠ If copper pipes are used, joints must be hot brazed.

⚠ 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).

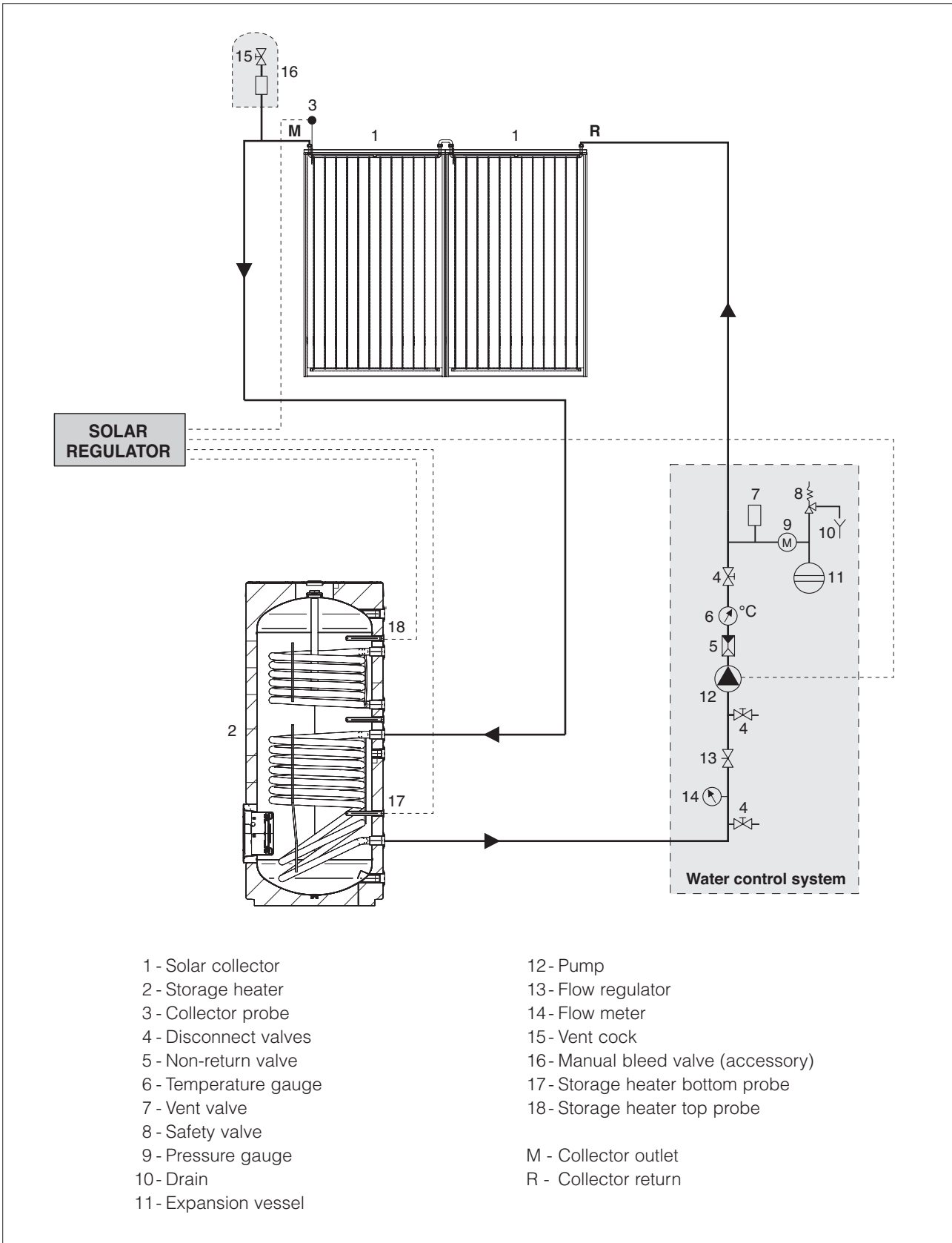
Pressure drop in solar collectors (*)



(*) Test referred to a 40/60% glycol/water mix and a heat transfer liquid temperature of 50°C.

LOCATION OF PROBES

The temperature sensor must be installed in the nearest socket 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 250°C).




UNPACKING THE COLLECTOR

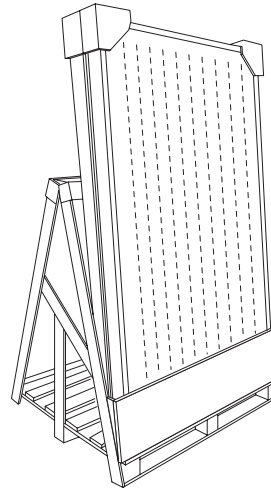
ICV08 solar collectors are packed in various ways depending on the number of units supplied.

Pallet contents:

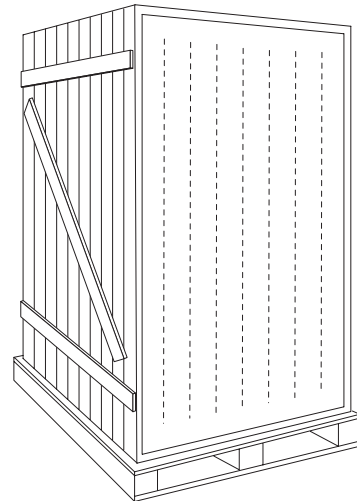
- 2, 3 or 10 collectors
- Documentation envelope containing:
 - certificate of warranty and label with bar code.

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

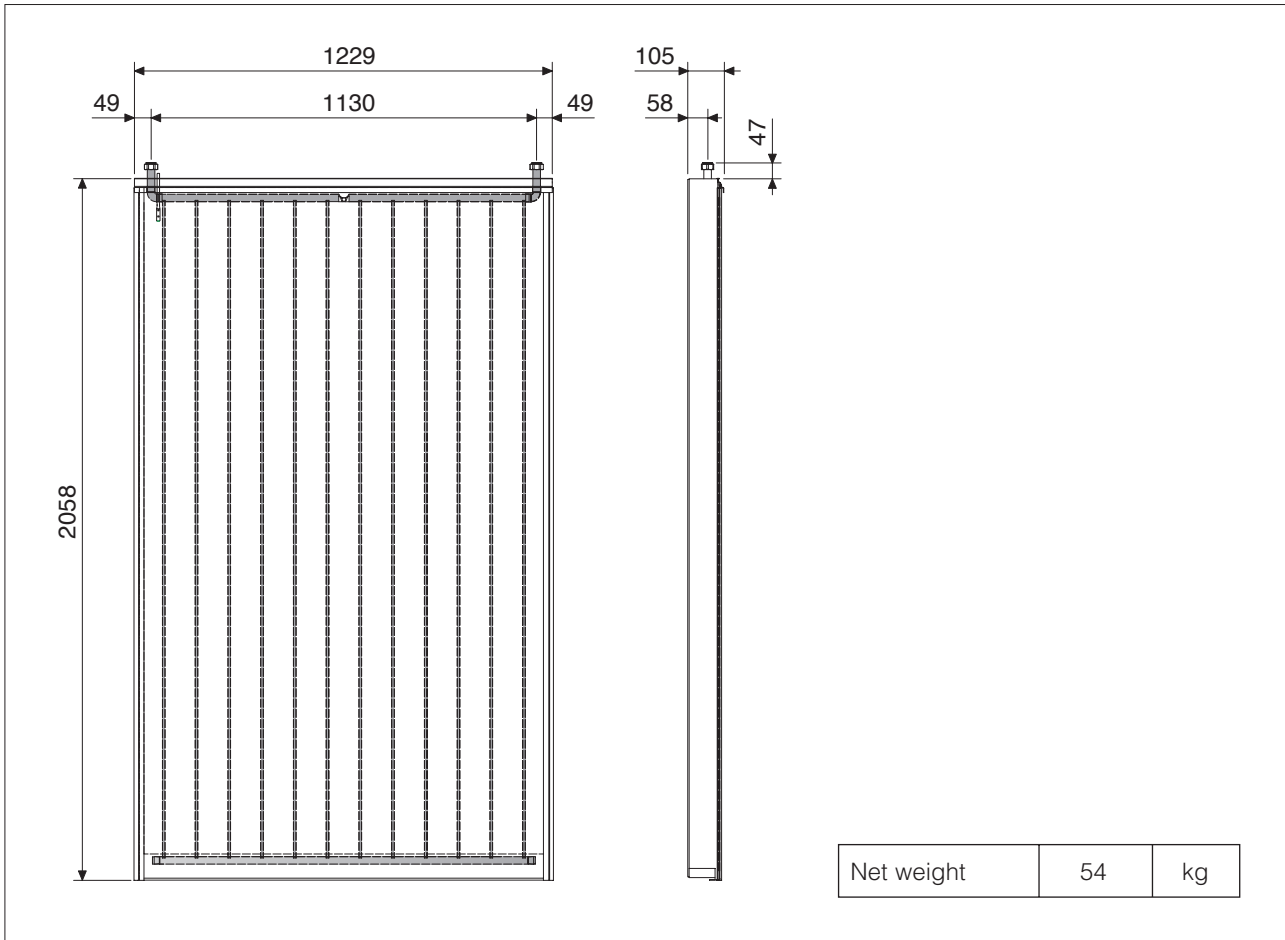
Pallet with 2 or 3 collectors



Palletised crate containing 10 collectors




DIMENSIONS AND WEIGHT




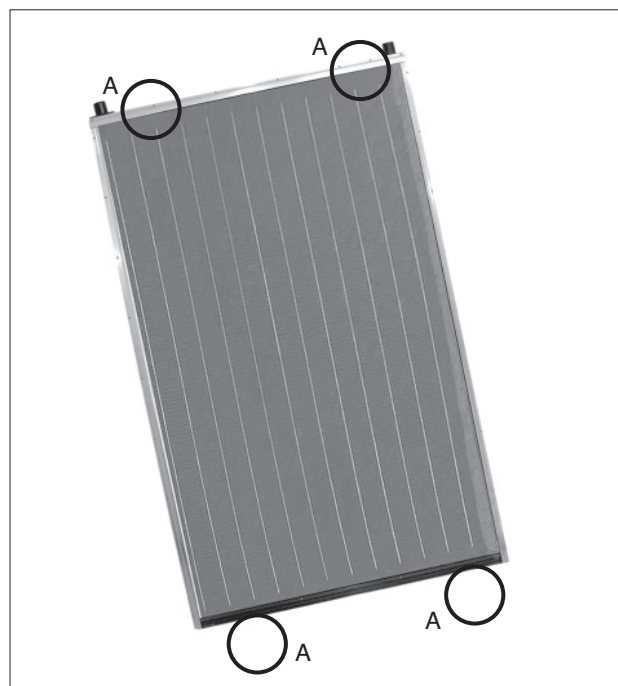
HANDLING THE COLLECTOR

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.

 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.



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 mm². 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.

Water connections

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 seal rings are correctly positioned in their seats. When tightening a fitting with a pipe wrench or spanner, always hold the opposite fitting steady with a second tool to avoid damaging the absorber.



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 20° (minimum) and 65° (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, only fill the system when the sun is not shining.

In areas liable to frost, fill the circuit with a 40% glycol solution for solar panels.



The anti-freeze solution must be mixed with water prior to filling the system.




Take care if you flush the system out, because any trapped water may freeze if the circuit is not filled immediately with anti-freeze.


Bleeding

Bleed the circuit:

- On start-up (after initial filling) (see the figure on page 10).
- 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. -30°C). If the protection threshold is higher than -26°C, replace the mix, or add anti-freeze as required.


- Use litmus paper to check the pH (nominal value approx. 7.5). If the measured value is below 7, change the mix.

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 glycol/water mix immediately after flushing it out, because flushing water may remain trapped in the circuit (with a consequent risk of freezing).

2 - PREMIXING WATER + GLYCOL

Glycol anti-freeze is supplied separately in standard volumes and must be premixed with water in a suitable container before being used to fill the system. For example, a mix of 40% glycol and 60% water provides anti-freeze protection down to a temperature of -21°C.


 The propylene glycol supplied is specially formulated for solar collector applications and remains fully efficient throughout the -32 to +180°C temperature range.

It is also non-toxic, biodegradable and biocompatible.

 Do NOT part fill the circuit with pure glycol then add water later.

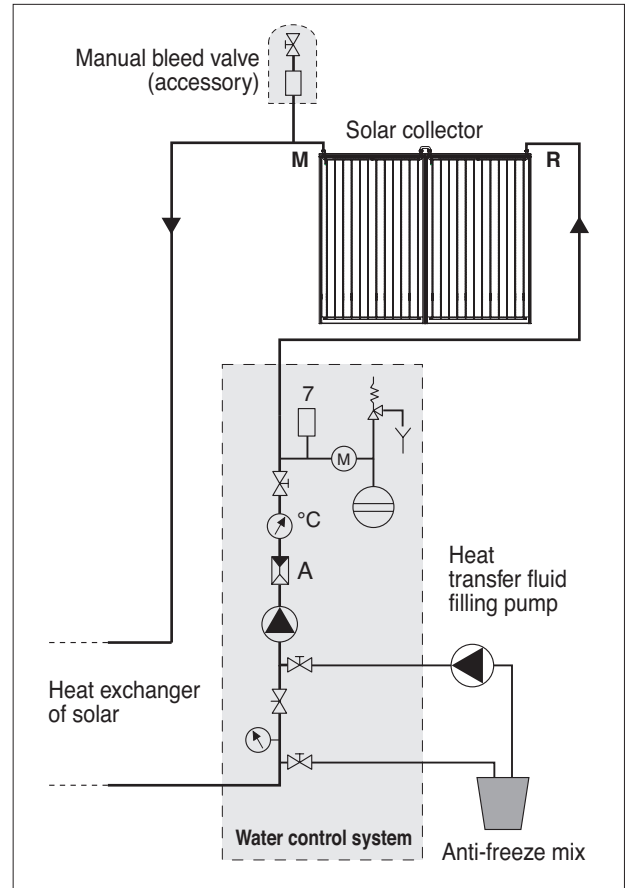
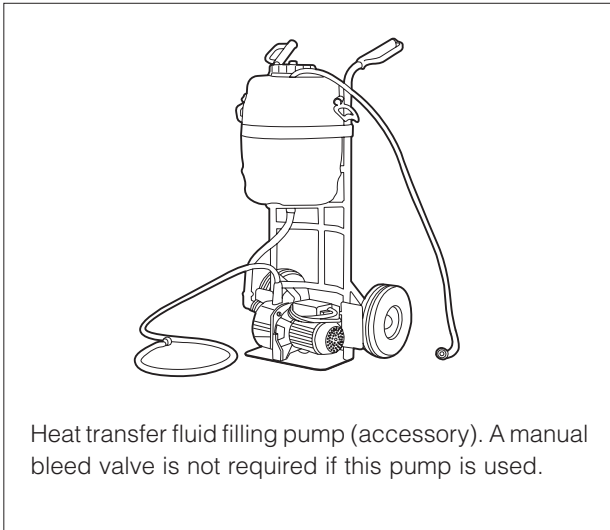
Anti-freeze	Temperature	Density
50%	-32°C	1,045 kg/dm ³
40%	-21°C	1,037 kg/dm ³
30%	-13°C	1,029 kg/dm ³

 Do not use automatic or manual filling systems.

 If the water supply is highly chlorinated, use distilled water to prepare the glycol/water mix.

3 - 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.

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

CHECKS

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

DESCRIPTION	OK
Collector circuit	
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 ² checked	
Non-return valve functioning	

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



Registered address:

Vokèra Ltd
Borderlake House
Unit 7 Riverside Industrial Estate
London Colney
Herts AL2 1HG

enquiries@vokera.co.uk

www.vokera.co.uk
www.vokera.ie

Sales, General Enquires

T 0844 391 099
F 0844 391 0998

Vokèra Ireland
West Court, Callan
Co Kilkenny
T 056 7755057
F 056 7755060

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