Solar Flat Collector

Tecnosun T4 Cu 2,2

Installation Instructions / en

Contents:

1. Description of solar collector, its function

Product:	Flat solar collector
Manufacturer:	
Use:	Conversion of solar radiation into heat, which is used for the heating of DHW, additional heating and heating of swimming pools
Collector inclination:	The permitted collector inclination is between 15° and 75°.
Possible installation:	Vertical and horizontal for gravity systems or forced-circulation systems
Frame:	Weatherproof aluminium structure, EPDM sealing
Absorber construction:	Copper tubes and sheet metal (SFCu)
Glazing:	Safety solar glass with low Fe_2O_3 content
Heat-transfer fluid:	Propylene-glycol-based mixture with corrosion inhibitors

2. Basic technical data

Dimensions and weight	
height/width/thickness	2014 x 1092 x 82
overall surface	2.2 m^2
aperture surface	2.1 m^2
absorber surface	2.1 m^2
dry weight	36 kg
Thermal performance	
Optical eficiency	η_0 = 82%
Peak power per collector unit 1701 W (dle EN 12975)	1701 W (dle EN 12975)
Glazing	
material	Solar glass, safety
thickness	3.2 mm
transmissivity	91.5% ± 1.5%
Frame	
material	AlMgSi alloy
colour	silver or black
Heat insulation	
material	mineral wool
thickness	40 mm
Absorber	
material	copper sheet
surface treatment	highly reflective layer
absorption coefficient	95%
emissivity	5%
test pressure	10 bar
operating pressure	< 6 bar
pressure drop (2,5 l/min)	... mbar (water/glycol – 60/40)
Heat-transfer fluid volume	1.1 litres
Static temperature at 1000 W/m^2 and 30 °C	201 °C

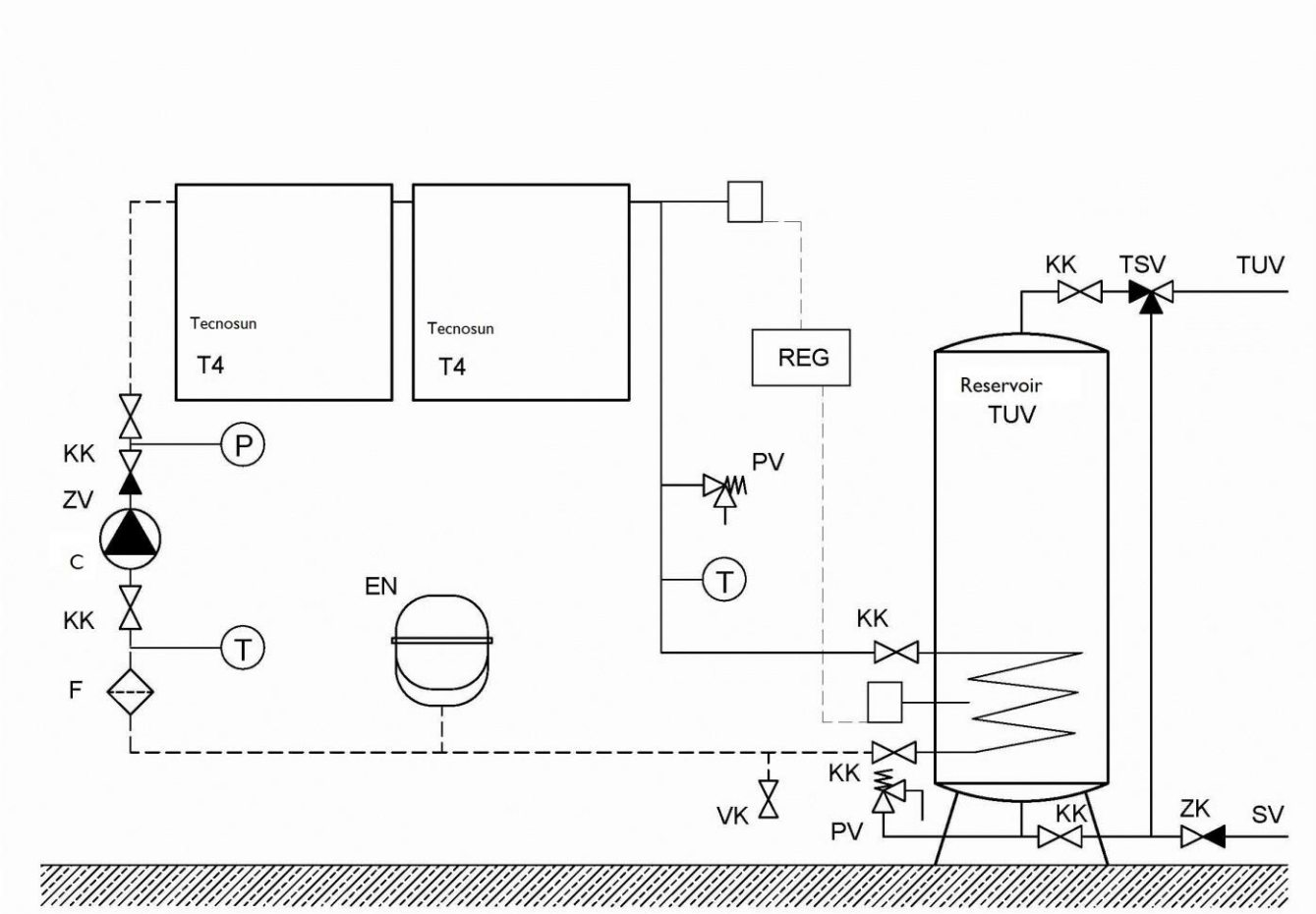
3. Transport, handling of collectors

The collectors are transported in original packaging, always in horizontal position, glass up. It is forbidden to transport the collectors in vertical position, as this may cause insulation damage.

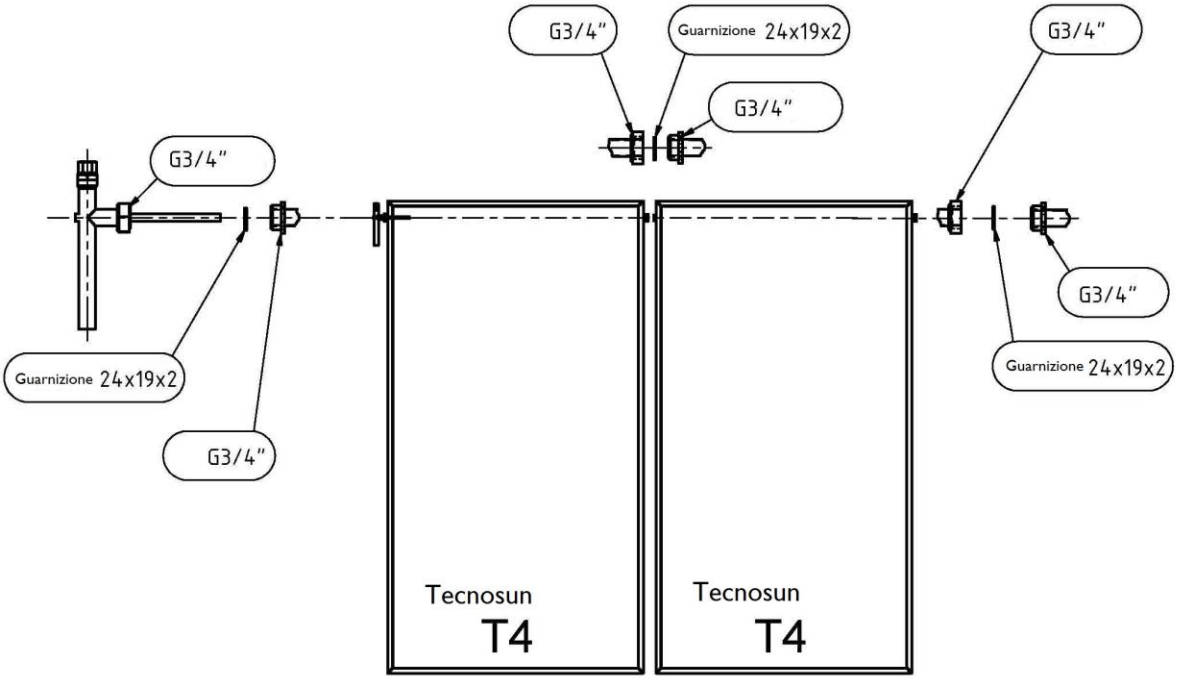
The collector must be always handled glass up. During storage, the collector must not be exposed to rain and it must be protected from solar radiation by covering.

4. Connection diagram

The solar photothermic system uses highly-selective collectors to convert solar radiation to heat for the heating of hot domestic water (DHW) in a reservoir.
The basic system elements are the collectors, the reservoir with a heat exchanger, a pump, a control unit, and a distribution system. The additional safety installation includes safety valves, expansion vessels, a mixing valve, relief valves, an electric heater, etc.



Key: T4 -solar collector Tecnosun, Certified TUV - DHW reservoir, REG – electronic regulatog, C – circulation pump, EN – expansion vessel, F – solar sytem filtration, PV – safety valve, VK – draining cock, TSV – mixing valve, ZV – return valve, P – manometr, T – termometer, TUV – hot domestic water (DHW), SV – cold water



Connection of G3/4" nut
Gasket 24x19x2 - 24x19x2 packing
Connection of G3/4" screw union
G3/4" connection
Connection of G3/4" nut, packing, plug
Connection of screw union, packing, connection of G3/4" nut
The solar collector is turned by 180 degrees (the compensators must always be inside the connection).

Recommended accessories of the T3 solar collector (upper part from the left):

- G3/4" connection with JS6 receiver and air venting
- 24x19x2 packing
- Connection of G3/4" screw union (part of collector structure)

- Connection of G3/4" nut (part of collector structure)
- 24x19x2 packing
- Connection of G3/4" screw union (part of collector structure)

- Connection of G3/4" nut (part of collector structure)
- 24x19x2 packing
- G3/4 cover with external thread

- Connection of G3/4" nut (part of collector structure)
- 24x19x2 packing
- G3/4 cover with internal thread

- Connection of G3/4" nut (part of collector structure)
- 24x19x2 packing
- Connection of G3/4" screw union (part of collector structure)

5. Instructions for collector interconnection

Installation works on the solar system must be carried out solely by authorised person. Primary circuit distribution is made using copper tubes, recommended are stainless-steel corrugated hoses.

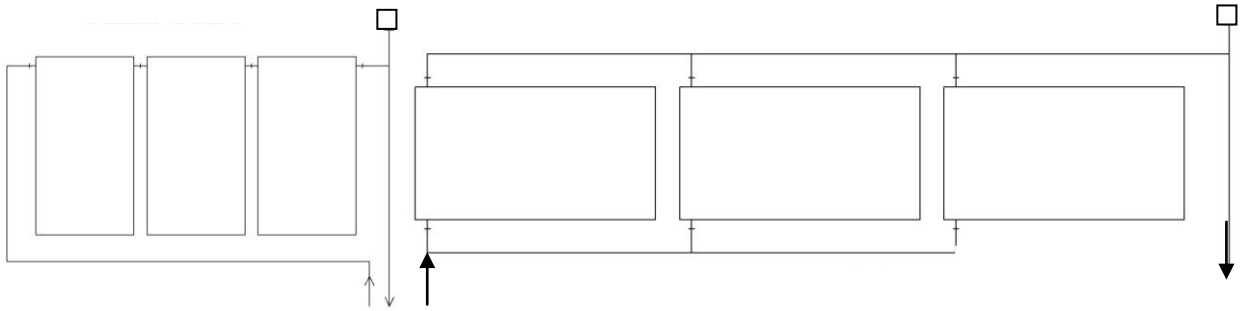
Collector surface (m^2)	Maximum piping length (m)	Maximum recommended flow rate	Tube diameters	
			Copper	Combiflex
4	27*	2 l/min.	ø15x1	DN 12
up to 6	20*	6 l/min.	ø18x1	DN 16
up to 8	18*	8 l/min.	ø22x1	DN 20
up to 16	15*	16 l/min.	ø28x1.5	DN 25
up to 20	as per project	18 l/min.	ø28x1.5	DN 25

*) indicative, recommended to verify the calculation

The recommended heat-transfer fluid flow is 60 l/hr. at 100% pump output. The heat transfer-fluid service life is max. 7 years; in our weather conditions, it is recommended to replace the heat-transfer fluid after 5 years.

The primary circuit heat-insulation materials must withstand operating temperatures up to 180 °C and they must be UV-stable.
Within the collector circuit, it is recommended to seal the threaded joints by sealing twine resistant to temperatures up to 240 °C or using packing materials of similar properties suitable for solar applications.

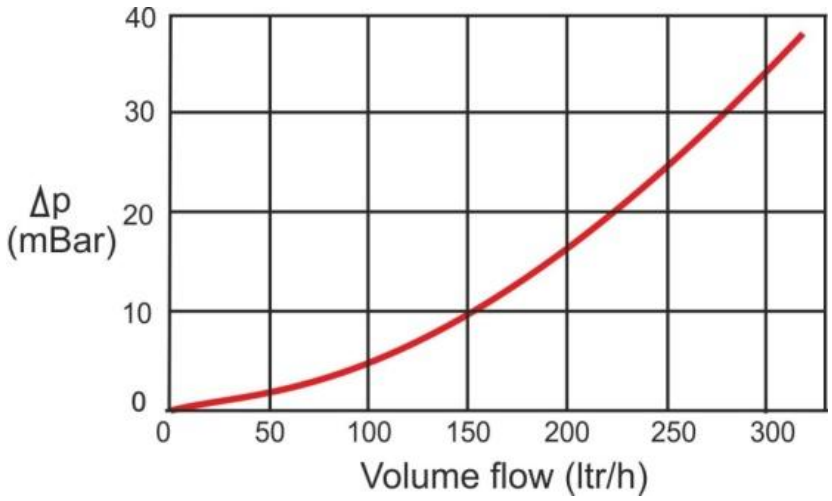
Variants of collector connection: a) vertical installation b) horizontal installation



The solar circuit pressure ranges from 1.5 bar to 2.5 bar. The system pressure increases in proportion to the temperature rise. The pressure may fluctuate slightly during the solar system operation.
In case of system shifting to stagnation condition, the pressure in the primary distribution increases, which is balanced by the expansion vessel. The expansion vessel balances the pressure increase above the permitted value of 2.5 bar up to 6.0 bar. The expansion vessel pressure must be adjusted by a specialist.

The solar circuit safety valve maintains the pressure under 6.0 bar. If the set pressure is exceeded, the valve opens and releases a small volume of the heat-transfer fluid into a catch vessel. In case the pressure drops below the set minimum value of 1.5 bar after the release and cooling of the primary circuit, it is necessary to pressurise and check the system. It is forbidden to blind the safety valve outlet!

Pressure drop diagram of T3 solar collector:



Pressure drop diagram calculated with antifreeze mixtures of propylene-glycol and water (60%/40%).

6. Collector installation

With the use of installation accessories (mounting kit), the collectors may be installed to horizontal as well as sloping roofs and to house facades. The recommended collector inclination is between 15° and 75°. Observe the instructions given in the applicable installation instructions.
The collectors are to be placed on the roof after the piping installation to prevent the collectors overheating. Prior to putting the whole system into operation, it is necessary to cover the collectors, e.g. by a tarpaulin. When filling the system by the operating fluid, it is necessary to be careful to prevent gasification of the fluid and damage to the collector absorber.
If the building is protected against static electricity, it is necessary to discuss the connection of the collectors and their supporting structure to the lightning conductor with an authorised person.

The placement and attachment of the solar collectors to the mounting kit must be carried out carefully, while observing instructions given in the manuals. When installing the collectors, prevent damage to the sealing rings, and tighten the collector screwed joints by two open-end wrenches in a way preventing distortion of the absorber tube.
It is recommended to fill the solar system only by original heat-transfer fluid; the system is filled after the installation is finished and the reservoir is filled with water. Do not fill the equipment in case of intense solar radiation, the collectors must be covered.
The solar system pressure testing must be carried out using the heat-transfer fluid with the maximum test pressure of 5 bar. The authorised person must issue a written certificate of testing.

7. Electrical circuitry

Electrical equipment must be connected in line with the type of electronic regulation used. Connections between the collector sensor and the regulator must be soldered together and then insulated in water-proof manner. The complete equipment function is secured only after connecting all electronic elements. The implementing person must observe any and all valid regulations and standards.

8. Putting into operation

Prior to putting into operation, it is recommended to re-check and re-tighten all connections and inspection openings. The equipment may be put into operation after it has been filled with the heat-

transfer fluid and deaerated.
The minimum charging pressure is determined by the formula: $\mathbf{P_p = (h \times 0.1) + 0.7}$ **[bar]**

P_p = pressure in the primary heat-transfer fluid system
h = hydrostatic head, i.e. difference in height between the pump unit manometer and the upper collector edge; min. 0.5 bar

After filling and deaeration, it is possible to begin with test operation. Heavy fluctuation at the manometer indicates air in the collector circuit – deaerate (e.g. flush using the filling pump unit for approx. 20 minutes).
When setting the solar system regulator, activate the solar system safety elements – collector protection, night cooling, etc.
In automatic operation, the equipment starts after the conditions set in the electronic regulation are satisfied – per the collector temperature and temperature difference.

9. Lightning protection

The collector field must be grounded in accordance with valid legislation. The grounding must be carried out by an authorised person only.

10. Equipment shutdown

The solar equipment is so dimensioned that even during long-term shutdown, when no heat is taken, no special measures are necessary. To have the solar equipment protection work properly, it is forbidden to disconnect the electronic regulation from the electric power supply.

11. Permitted wind and snow loading

It is recommended to install the collectors as close as possible to the sloping roof crest. If it is not possible, then snow-slide preventing barriers must be installed above the collectors.
Maximum permitted loading by pressure caused by wind and snow: **≤ 1.8 kN/m^2**
Maximum loading by wind – underpressure: **≤ 1.0 kN/m^2**

12. Maintenance requirements

The solar system is maintenance-free equipment, requiring periodical checks of working conditions. It is not necessary to clean or otherwise maintain the solar collectors. In case of reservoir cleaning, do not use water or solvents, especially when cleaning the pump station and regulator. There is a risk of electrical accident! Any repairs should be carried out by a specialised company.

In case of a solar system with a current protective adapter, do not operate the equipment without this additional protection. There is a risk of electrical accident!
The solar system must not be refilled with water; always refill the system with a prescribed solar fluid. Check the functionality and attachment of the collectors, their tightness, system pressure and pump operation once a year. Check the solar fluid frost resistance at least once in five years, while the system must be refilled with the same fluid it has been filled before. **In order to retain the guarantee, maintenance (fefilling os solar fluid) must be carried out by an authorised person.**

13. Operation safety

Solar collectors are equipped with special tempered glass, withstanding current mechanical impacts like hail and frozen snow, or static loading like wind or snow pressure. However, it is necessary to protect the collector from impacts of sharp objects like falling hand tools etc.
In case of any glass damage, contact the supplier immediately for the collector replacement.

Solar system is a heat installation absorbing thermal energy from the solar radiation. In case of power failure, the so-called stagnation condition occurs. Once the power supply is restored, the solar system returns to fully automatic operation. Electronic regulation prevents the release of temperatures >110 °C, thus protecting the system from damage. Once the temperature in the collectors drops below this value, the system starts. The solar system is designed for such conditions, but if such conditions occur more frequently (3–5x/month), please contact the supplier for a solution (e.g. installation of a backup power unit).
The installation and use of collectors must be in accordance with this manual and in accordance with respective valid regulations and standards, as amended.

14. Guarantee conditions

For the exercise of guarantees for faultless function of all system elements, the guarantee conditions valid at the time of supply/installation of the equipment shall apply.
The guarantee for faultless function of the solar system and/or its elements does not apply to cases where there occurred violation of specified conditions and methods described in the instructions or guarantee certificates.

The following rules must be adhered to for the guarantees to be admitted:

1. Adhere to the recommended rules of the solar system maintenance as described herein.
2. Use only the recommended solar fluid in the solar system; said fluid must never be replenished by water.
3. The system must be connected in accordance with the principles described herein, in particular, the use of safety elements and the prohibition of use of galvanised components.
4. The expansion vessel must be of dimensions described in the manual – the minimum vessel volume must be observed.
5. The emergency maximum pressure in the collector must not exceed 20 bar.
6. The guarantee shall not be admitted if the collector screw union is damaged during assembly as a result of not adhering to the rules stated in the manual and the recommended method (two-wrench assembly).
7. The collector frame must not be subjected to bending stress (e.g. poor roof condition), otherwise pre-springing occurs causing damage to the collector cover glass.
8. No stop valves between the collector, the expansion vessel and the safety valve.
9. Provide for a service examination by the assembly organisation once in five years.
10. The guarantee does not apply to damages caused by natural disasters and other consequences of Force Majeure.