

TeKSOL

Installation and user's manual
Swimming pool solar heater

TeKSOL

1. Sustainable heating system	2
1.1 Solar Panel model TeKSOL	2
1.2 Battery solar panel in a traditional installation	2
1.3 Traditional solar system with heat pump (s)	2
1.4 Comments on simultaneous warming and filtering	2
2. Technical specifications	3
2.1 Applications	3
2.2 Technical data	3
3. Dimensioning - Number of solar panels	4
3.1 Dimensioning formula	4
3.2 Table of climates	4
4. Dimensioning - Water pump and pipes	4
5. Recommendations on the solar panels positioning	5
6. Installation	5
6.1 Necessary pieces to install the solar panels	5
6.2 Solar panels assembling	6
7. Cleaning and conservation	6
7.1 Verification	6
7.2 User instruction	6
8. Freeze Protection	7
8.1 – Purge Valve (Air Eliminator).....	7
8.2 – CDT Controller (Differential temperature controller).....	7
8.3 – Bypass and perforated retention valve	7
9. Uninstallation	8
10. Warranty	8
10.1 Deadlines	8
11. Procedures	8

This installation and user's manual contains important product information and safety recommendations.

Read this manual carefully before installing, operating or starting any work, observing the safety and protection instructions, always following national and regional rules and regulations.

Observation: This manual is applied in systems with the following solar panels: TK 20, TK30, TK40 and TK50.

1. Sustainable heating systems

1.1 Solar Panel TeKSOL model

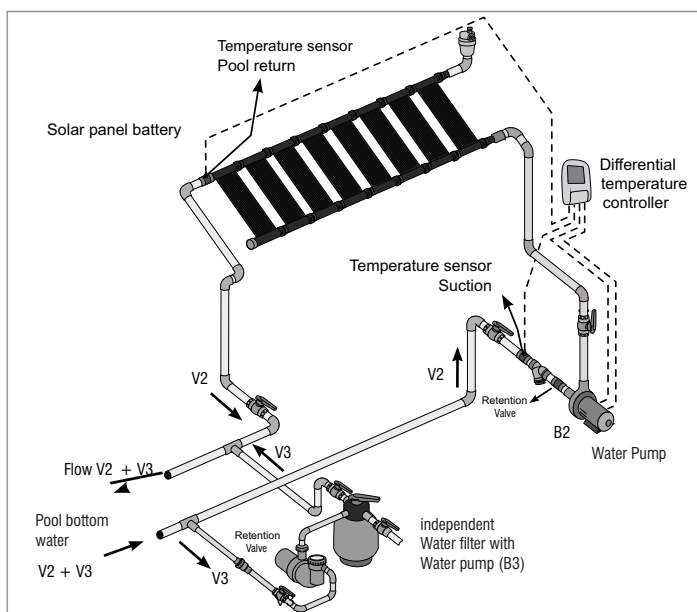
KS AQUECEDORES, through several studies, developed a product with the highest quality by applying the greatest technologies and latest generation machines.

In the industrialization together with the use of raw materials developed for great durability and thermal efficiency, we managed to develop a product with a standard of production, high technical level and quality.

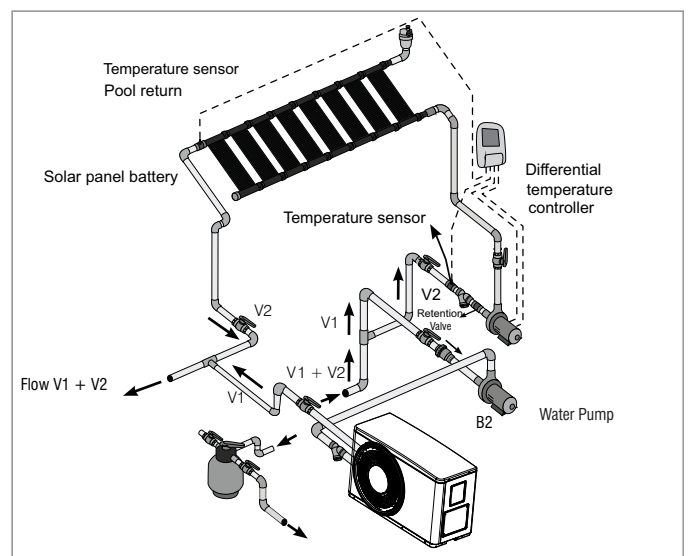
The **KS Aquecedores** solar panels were developed to heat pool water up to 35 ° C.

These solar panels are produced of Polypropylene, being nontoxic and able to withstand the chemicals used in swimming pool water treatment.

1.2 A battery collectors in a traditional instalation



1.3 Traditional solar system with heat pump (s)



*Sand filter installed in series with the heat or independent pump with its own water pump. (See item 1.2 and 1.4).

1.4 Comments on simultaneous warming and filtering.

Traditionally, heat pump manufacturers for pool water conditioning recommend to use the same water pump for filtering and water heating.

This practice is quite convenient because the hydraulic filtering circuit provided would be theoretically used and only the heat pump would be installed in the sand filter output.

The greatest inconvenience of this assembly system would be the fact that heat pumps need a specific flow for their own operation and better performance.

This flow is often not attended by the low capacity of the filter water pump, which is aggravated by the sum of the filter load losses added to the heat pump, apart from the elevation of the losses, if the pipe is originally sized just for the filtering system.

Another disadvantage would be the fact that filtering and heating are different events and in case there is a filtering programming, this same programming will be imposed on the heat pump, limiting the periods of its operation or consequently, the heating of the pool. And if the programming is scheduled for heating, then filtering periods may be longer than necessary.

Filtering depends on the water volume

Heating depends on water temperature

In cases where the hydraulic circuit and the filtering system (including its water pump) is subdimensioned it is better to separate into two different hydraulic circuits. One for the filtering with its own command to drive the water pump (B3) and another one only for the heat pump with its own drive command and its water pump (B1).

For the solar heating system, the hydraulic circuit with the water pump (B2) must be exclusive, since its differential temperature controller will drive the system only with the incidence of solar rays.

Observation: Any water circulation through the solar panel at night or period without sun will cool the water, to some degree depending on the ambience temperature, if it's windy and also it may depend on the temperature of the pool and the circulation period.

2. Technical specifications

2.1 Applications

- Water heating and conservation in swimming pools;
- Preheating or thermos-water accumulation up to 35 ° C.

2.2 Technical data

	TK 20	TK 30	TK 40	TK 50
Dimensions (mm)	2000x330	3000x330	4000x330	5000x330
Total area (m ²)	0,66	0,99	1,32	1,65
Net weight (kg)	1,32	2,00	2,64	3,33
Weight in operation (kg)	3,908	5,870	7,748	9,682
Monthly energy production by solar panel (kWh/month)*	57	97,4	129,9	162,4
Monthly energy production per m ² (kWh/month.m ²)*	98,4	98,4	98,4	98,4
Daily energy production per solar panel (BTU´s)	7.500	11.200	15.000	18.700
Average energy efficiency (%)	76	76	76	76
Water flow recommended per solar panel m ² (l/h)	200	200	200	200
Work pressure rate (MCA)	20	20	20	20
Work pressure rate (PSI)	28,4	28,4	28,4	28,4
Maximum number of solar panels per battery	30	20	15	12
Maximum inclination (°)	30	30	30	30

*Important: Maximum working pressure on the battery 10 MCA.

3. Dimensioning - Number of solar panel

It is important to know that solar thermal heating for swimming pools is different from solar thermal heating for bathroom. In the pool system there should always be considered the kind of swimming pools and the use to which they are intended:

- Residential pools, clubs and gym
Ideal temperature: between 28°C and 32°C.
- Training and competition swimming pools: 28C
- Physiotherapeutic treatment pools: between 33C and 35C

3.1 Dimensioning formula

$$\text{Solar panels quantity} = \frac{\text{Pool area} \times \text{Regional coeficient}}{\text{Solar panels area instaled}}$$



Attention: Icnorrect dimension may damage the water pump

3.2 Table of climates

TEMPERATURE	CLIMATE			
	Very warm	Warm	Mild weather	Cold
28°C to 30°C	0,80M ²	1,00M ²	1,10M ²	1,30M ²
30°C to 32°C	0,90M ²	1,10M ²	1,20M ²	1,50M ²
32°C to 34°C	1,20M ²	1,40M ²	1,30M ²	1,70M ²

- Verify what will be the use of the pool
Example: residential = 30C.
- Verify in the table of climates and calculate according to the region located: example Mild weather = 1.0
- Verify what the area of the swimming pool surface is.
Example 8 x 4 = 32m²
- Verify the acquired model:
TK-30 Size: 3,00 x 0,33 = 0,99m² (1m² Aprox)

4. Dimensioning - Water pump and pipes

Bearing in mind how many m² the project is, you can calculate the right power of a water pump to be installed and the pipes caliber to be used in the hydraulic circuit.

Always consider the quantity of m² of each battery and multiply by **200 liters**.

Example:

In a 32 m² system of solar panels, multiplied by 200 = 6,400 liters per hour, this is the water pump flow to be used, verifying in the manufacturer table the ratio of the height and distance of the pump in relation to the solar panels.

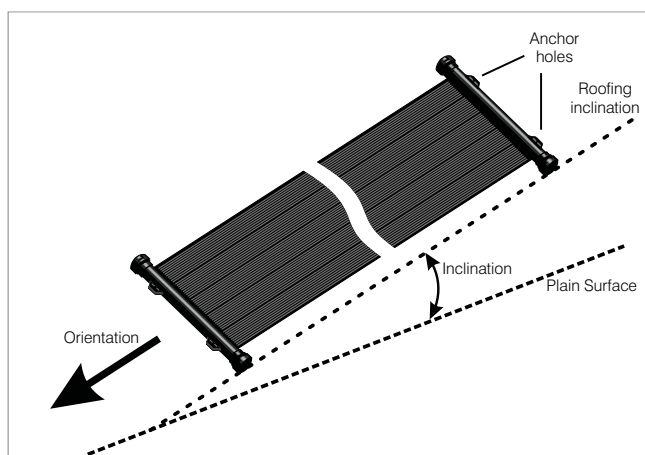
With this information and using the flow table below you can choose the necessary caliber to build the hydraulic system.

Caliber (mm)	Flow (M ³ x Hore)	Caliber (Inches)	Flow (M ³ x Hore)
25	2,80	3/4"	2,02
32	5,80	1"	3,60
40	9,00	1 1/2"	8,10
50	14,40	2	14,40
60	17,30	2 1/2"	22,50
75	28,4	3	32,4
85	43,20	4	57,60



Attention: Check the total system operation weight, and verify that the place supports this weight.
The wrong dimensioning of pipes will considerably harm product performance.
Never exceed the maximum quantity of solar panels in a battery, this will cause considerable losses in their performance.

5. Recommendations on the solar panels positioning



- Always respect the maximum inclination of 30 ° for TeKSOL model.
- Inclinations from 10 ° to 30 ° must be oriented for the geographical north.
- The orientation of the solar panels should be in the direction of the roof inclination.
- On flat surfaces without inclination, panels may be oriented in any direction.



Attrntion: TeKSOL solar panels cannot be installed under the upper level of pool water.
Avoid installing the solar panels batteries higher than 12 meters from the pool water level.
Avoid installing batteries in irregular places since this can compromise the solar panels conection generating drip and losses.

6. Instalation

6.1 Necessary pieces to install the solar panels.



Male nozzle

TeKSol male nozzles have a double O'ring seal to guarantee that the system does not have water losses at the end of the installation.



Security lock

It provides a quick installation without the need to use screws or tools that complicate the assembly.



Female nozzle

TeKSol nozzles are produced in expansion-resistant ABS to facilitate the bonding of 32 or 40mm and 1" tubes.



Plug cap

Use PVC water plugs for pipes to seal the end of course of the collector batteries



O´ring seal

Produced of thermotechnical rubber specially developed to withstand various temperatures and chemicals, with flexibility ideal for correct sealing.

6.2 Solar panels assembling

1

First, apply Vaseline over the O'ring seals in order to reduce friction at the time of fitting between the male/female parts, avoiding damage to the O'ring seals.



2

Insert the male nozzles into the female nozzles of the collectors until the holes where the locks will be inserted to face each other.



3

Helping with pliers, insert the security locks in the corresponding holes and make sure that they have reached the end, making them lock and preventing them from coming out over time.



4

Repeat processes 2 and 3 with the male and female nozzles on the end of each battery.



5

To finish the batteries, apply PVC glue on the opposite nozzles as well as on the inlets and outlets of each battery and place the PVC plugs cap to seal the end of the water course.



Attention: The product can dilatate from 1.5% to 2.5% depending on the temperature that it may reach, it may increase or decrease from 1.5 to 2.5cm per linear panel meter.

7. Cleaning and conservation

Our solar panels were developed to have the minimum possible maintenance, in order to guarantee a good functioning, some cares are necessary:

- Only if those solar panels are dirty to the point of affecting their efficiency, clean them with water and neutral soap.



Attention: Do not step, pull or scrape the solar panels

- Verify and retighten connections to prevent losses and droplets. Period: 30 days after installation and subsequently every six months.
- Check the solar panels clamps and anchors on the roof or surface where the batteries were installed.
- In colder regions, when there is a possibility of temperatures below 10°C and is not installed an antifreeze system, leave the system off and empty to avoid the freezing of water inside the tubes, which may damage the system.



Attention: The maintenance and/or cleaning should be carried out only by qualified and trained professionals to avoid accidents.

7.1 Verification

- The user is responsible for the security and proper functioning of the system.
- To carry out the installation, we recommend hiring specialized and authorized companies.
- Replace defective components immediately.
- Use only original parts.

7.2 User instruction

- The installer must inform the user about the operating mode of the system
- Any modification made to the project must be previously authorized by the company that carried out the project or by the store that sold it.

8. Freeze Protection



Attention: In regions below the tropics it is very common that the ambience temperature may drop below 0°C. When it happens, water freezes, we see frost on the grass and roofs.

This is extremely detrimental to solar panels, the water stored inside freezes. When it happens, the water expands and generates cracks, mainly in the riser tubes.

8.1 – Purge Valve (Air Eliminator)

This valve must be installed at the installation highest point.

The purge valve is an essential part of the installation, it removes the air from the pipes, and allows the water to drain into the pool when the water pump stops, leaving the solar panels completely empty, preventing water stored inside the collector overnight.

Also, if the system pipes are completely empty, when the water pump is turned on, after the water rises to the solar panels, when it begins to go down by the return pipe, the water speed of descent may be higher than the ascent speed, generating negative pressure, causing damages if the pipes are warm.

8.2 – CDT controller

(Differential temperature controller)

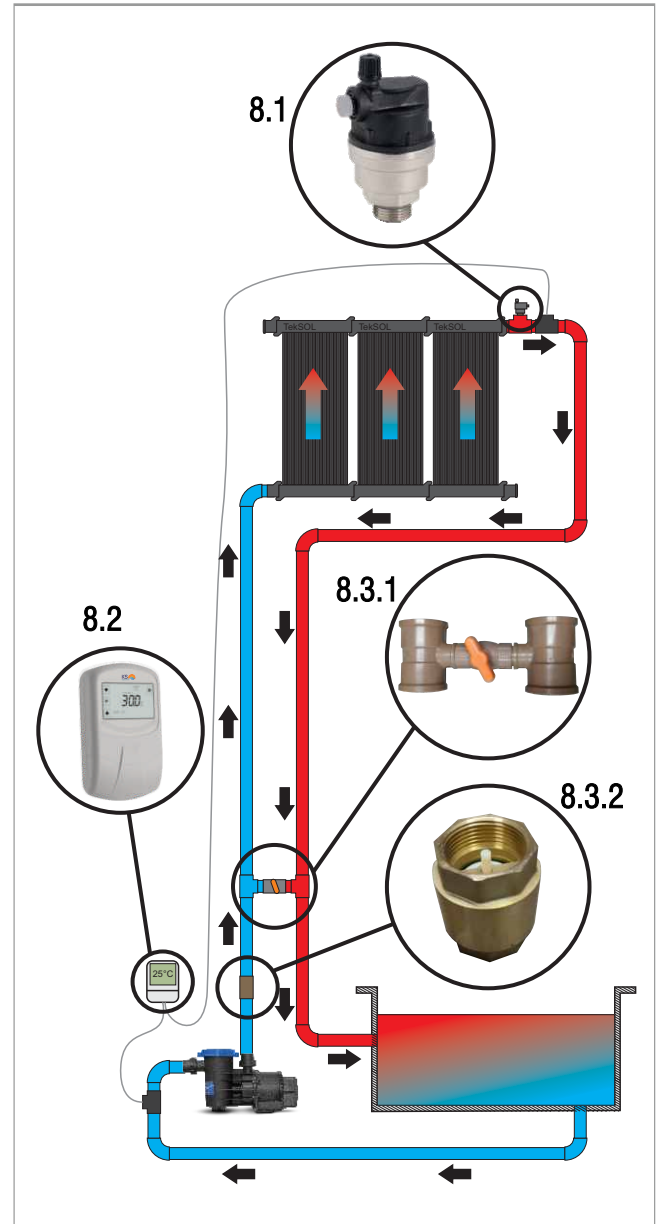
The CDT's has an internal protection system that activates the pump if the water in the solar panel reaches very low temperatures, such as 5°C, it is important that this temperature is never very close to the freezing limit, since the water can have different temperatures at different points on the panel, and the sensor is always located at the highest point of the project.

8.3 – Bypass and perforated retention valve

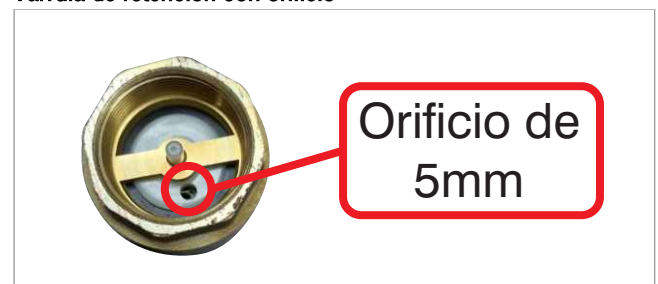
8.3.1 - The Bypass guarantees that when the pump stops, water from the pipe returns to the pool, leaving the solar panels and the installation pipes completely empty when the system is turned off. The Bypass register must allow passing from 3 to 10% of the flow. For safety, after regulating, remove the handle to avoid the system deregulation.

8.3.2 - The perforated check valve ensures that even with a bypass failure, the water slowly returns to the pool.

If this valve is not placed, the water may quickly return through the water pump in the opposite direction, loosening the pump rotor and generating a kind of backwash in the filter, causing dirt to come out through the nozzles in the pool.



Válvula de retención con orificio



9. Uninstallation



Attention: Uninstallation must be done barely by trained and enabled professionals

- Before uninstallation of the equipment, disconnect the heat pump circuit breakers, hydraulic circulation and filtrate pumps when there is one.
 - Put warning tag and block the circuit breakers so that they are not activated while the work is not finished.
 - On the heat pump, check with a multimeter if the electrical connections are not energized. If they are energized, check the circuit breakers again or locate the correct point for disconnection from the electrical network.
- With the heat pump and circulation water pumps de-energized, disconnect the electrical connections and isolate the cables individually in order to guarantee that they do not represent a risk of electric shock.
- Disconnect the hydraulic connections and let the water located inside the solar panels to drain.
 - Adjust hydraulic connections and registers to let water flow through the system.

10. Warranty

10.1 Deadlines

KS AQUECEDORES give garranty to the equipment for 5 (FIVE) years from the manufacturing date according to the commercial invoice.

This guarantee is against manufacturing defects, therefore, the following conditions must be observed:

- The equipment is properly packed for transport to the destination, there is NO guarantee for cases of damage due to breaks or crushed pipes.
- When the product suffers pressure above bearable (see Dimensioning - Water pump and pipe), there is NO guarantee.
- When the equipment is not properly fixed to the roofing or installation surface, there is NO guarantee.
- When the dimensioning is not correct, there is NO heating guarantee.
- When a thermal cover is not used, mainly in the first heating, there is NO guarantee of heating.
- When the equipment in very hot regions is exposed to the sun without water in the system for a long time, there is no guarantee for the equipment.
- There is NO guarantee against natural phenomena such as freezing, hail or storms.

11. Procedures

- Always read this installation manual carefully and if you have any questions, contact us to clarify your doubts.
- When there is a guarantee, this will be on the parts that will be duly replaced.
- For all the equipment that is replaced, the labor must be previously authorized by KS AQUECEDORES.
- Whenever an authorized technician/installer is requested, the client will be aware that, in the event of incorrect installation, and there is no warranty coverage, he must cover travel costs, including airfare, gasoline cost, travel expenses and cost of lodging.
- The product installation manual is an integral part of this Guarantee Certificate.



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Modification description	Revision date
Inclusion of assembly details	Version 01/09/2023

Made by Fabiano Bolsan - Revised by Evandro Pagnoncelli