

Photovoltaic water heating

Photovoltaic modules can effectively generate electricity for heating water

2 kW solar modules generate as much energy as 2 thermal solar collectors with common surface 4m² at a better price and with many other advantages



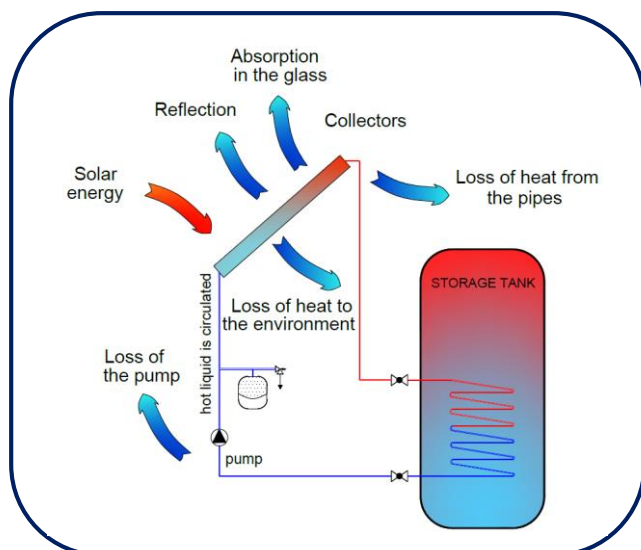
- better proportion of energy harvested between summer and winter (ratio 4:1) compared to flat solar thermal collectors (ratio 13:1),
- simple installation with a cable instead of isolated pipes, no pipes, valves, pumps),
- no antifreeze fluid, no fluid leaking and boiling during your holidays,
- PV solar modules are completely resistant to hail,
- lifespan of solar modules is more than 40 years, with almost no maintenance costs,
- no connection to electric grid necessary
- greater distance between solar modules and water tank is possible

Efficiency comparison

Solar thermal collectors:

Highest efficiency is reached by warm surrounding air and cold water in the tank.

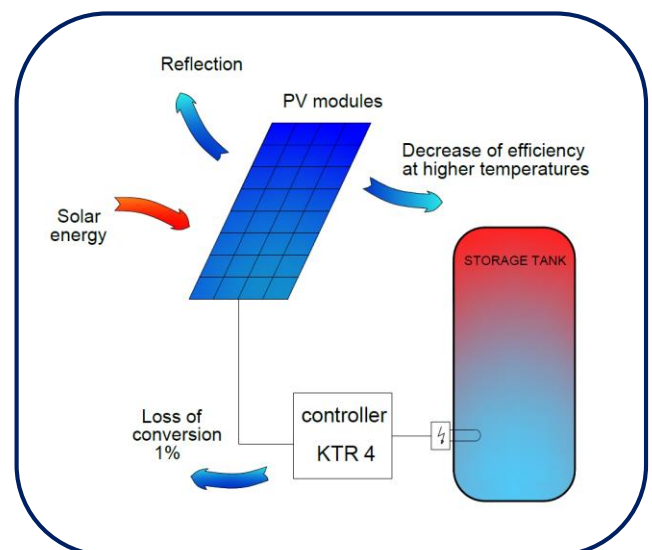
Efficiency decreases when the water temperature in tank rises and the surrounding air is cooled, especially by wind.



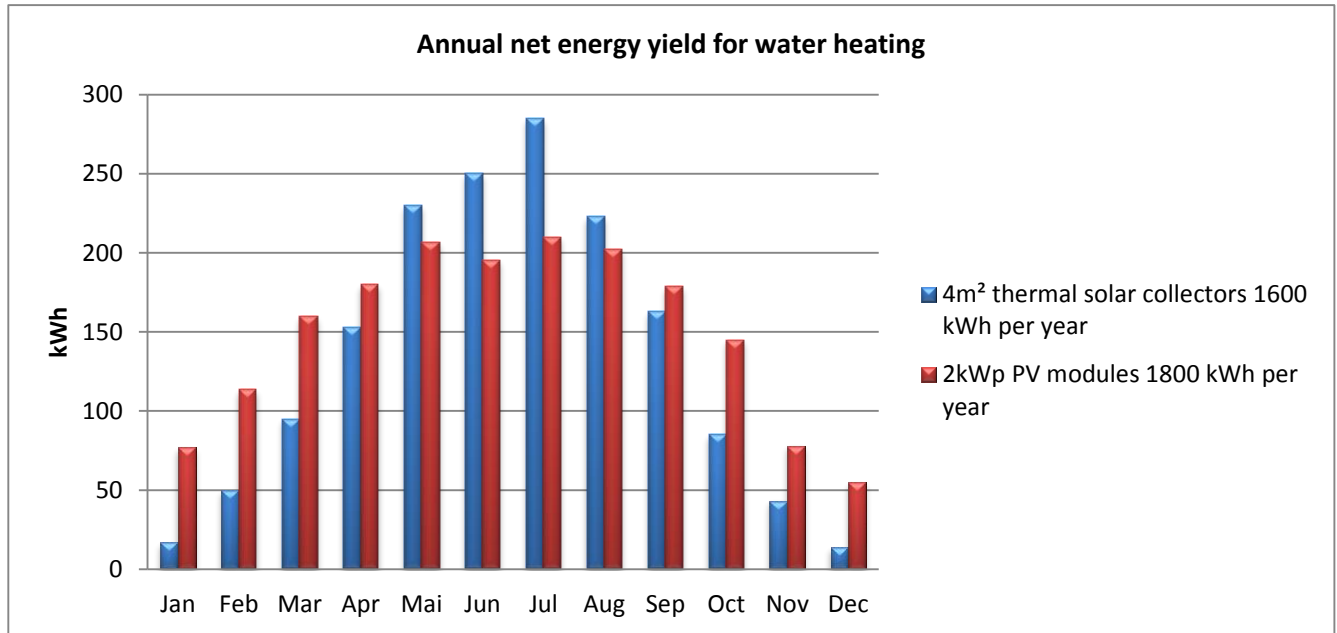
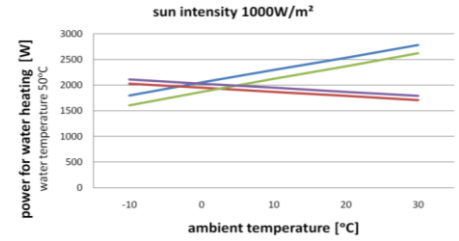
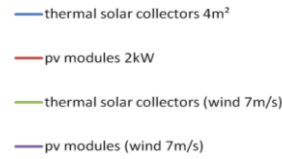
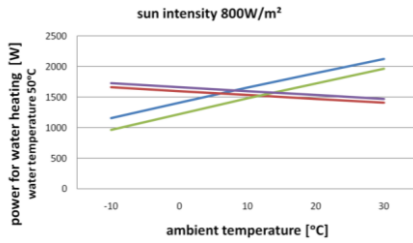
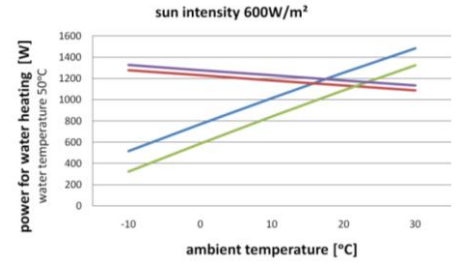
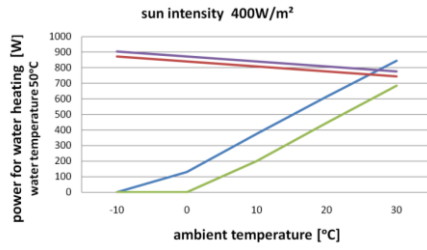
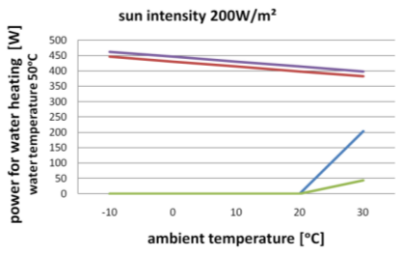
Photovoltaic modules:

Highest efficiency is reached in sunny, cold and windy weather.

Nearly all (99%) energy from PV modules flows through the resistive heater regardless of the water temperature.



Efficiency graphs



Photovoltaic water heating controller KTR4



Technical description

Solar water heating controller KTR4 powers resistive heater up to 4 kW of power from PV panels up to 4,5 kWp in heating water tanks and/or other heating devices.

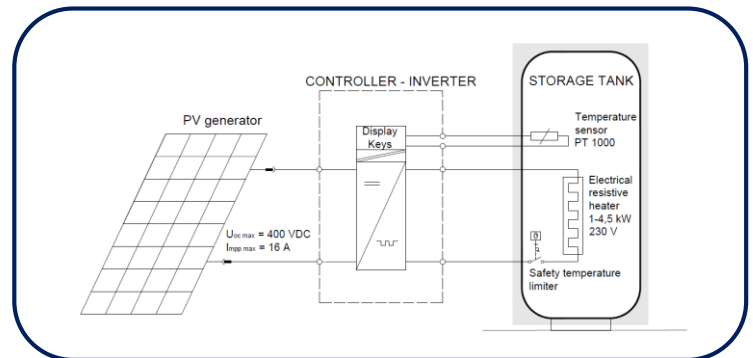
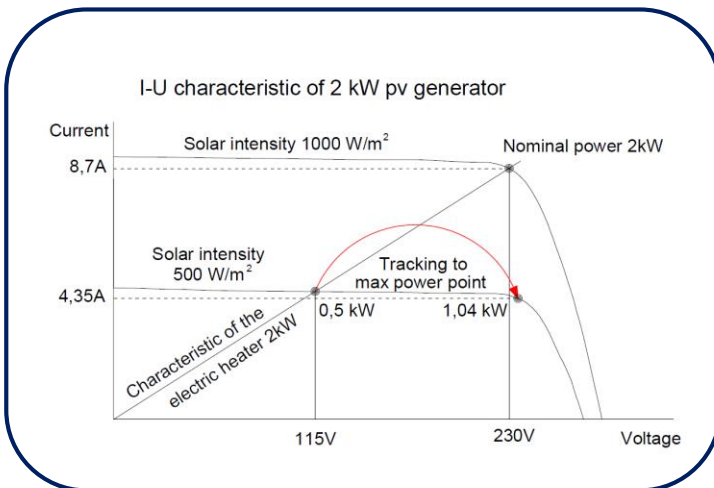
The controller converts DC voltage from PV modules into alternating voltage to supply the resistive heater.

The microcontroller commands the inverter to continuously seek the maximum power peak (MPPT).

The controller has two power outputs:

- output 1 is connected to the primary heater
- output 2 is connected to the heater which uses the residual energy.

The controller has two measuring inputs. Each of the inputs is connected to the temperature sensor PT1000 in the heating device. The integrated temperature controller ensures that the temperature in the heating device is not higher than the set maximum temperature.



Controlling elements

The controller has a dashboard with three buttons and following functions:

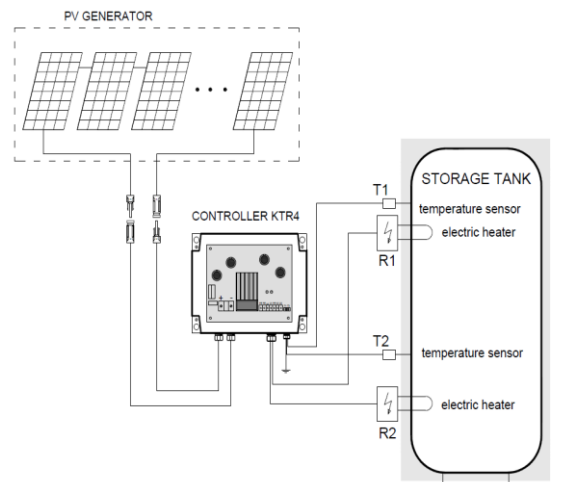
- Turn on/ Turn off,
- setup of the maximum temperature of both heaters,
- setup of the power of both heaters,
- data reading,

The LCD display shows:

- water temperature in the water tank and its current power,
- daily generated and total generated energy,
- daily maximum power,
- current power, input voltage, input current,
- set values

Option: WiFi connection

Application example



Electric heaters

For photovoltaic heating of water via the KTR4 controller, standard electrical resistance heaters for 230V voltage with a safety temperature limiter are used.



Technical data

Set up parameters		
Language option default (other languages optionally)		english, deutsch, slovensko, hrvatski
Maximum temperature of heated water T1		20-90 °C
Maximum temperature of heated water T2		20-90 °C
Power of electric heater 1		1000-4000 W
Power of electric heater 2		1000-4000 W
Limits of PV generator (STC)		
P _{mpp_max}	Peak power of solar modules	5500W
I _{mpp_max}	Maximum power point (limited by controller)	20A
U _{mpp_max}	Maximum power point voltage	270 V
U _{mpp_min}	Minimum power point voltage	210 V
U _{OC_max}	Maximum open circuit voltage	340V
U _{OC(-25°C)}	Maximum open circuit voltage at low temperature	400V
Output characteristics		
PL _{max}	Maximum power of the connected resistive heater 230V	4000W
η	Efficiency of conversion at the longterm use	>98%
TL	Maximal value of the controlled temperature	90°C
Mechanical characteristics		
Dimension without(with) cable glands LxWxH		240x191(217)x158mm
Weight		2,8kg
Ambient storage temperature		-30°C - +70°C
Ambient usage temperature		-10°C - +40°C
Air humidity at storage (non condensing)		20% - 90%
Air humidity at usage (non condensing)		10% - 95%
Standard and certificate		
Product standard		EN 62109-1 in EN 60950-1
EMC		EN 61000-6-1EN 61000-6-3

We hold the right to changes due to the technical development and delivery options.

Production and maintenance

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