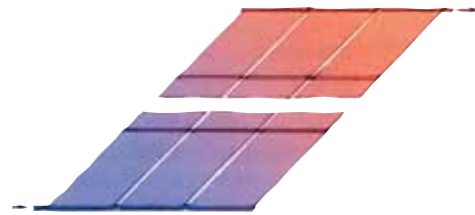
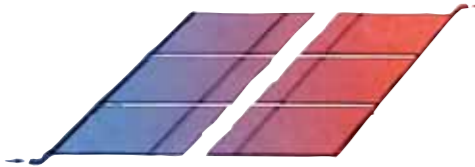


# solar heating for swimming pools



Swimming pool water can flow through the solar panels in either direction, so they can be mounted both lengthwise or side by side. The individual rows of absorbers are connected on Tichelmann principle (same routes for each row). It is not advisable to connect more than seven panels in series.



## DESIGN

Recommended absorber area in % of pool surface for open-air pools with cover or indoor swimming pools (early May through end of September) Temperature increase 4-7 °C compared to unheated swimming pools

Angle of inclination	Direction of inclination					Collector area in % of pool surface
	E	SE	S	SW	W	
90°	90	80	70	75	85	
60°	80	65	55	60	70	
45°	70	60	50	55	65	
30°	60	55	45	50	55	
15°	55	50	50	50	55	
0°	50	50	50	50	50	

The collector area should be 50% bigger if there is no cover. Regional variation due to hours of sunshine can influence the collector area by ± 20%.

## Pump Performance

The flow rate should be 150 to 250 l/m<sup>2</sup> collector area per hour. The delivery rate is calculated from the collector area x 200 l. The delivery head is the difference in height between the water level and the solar panel plus approx. 5m.



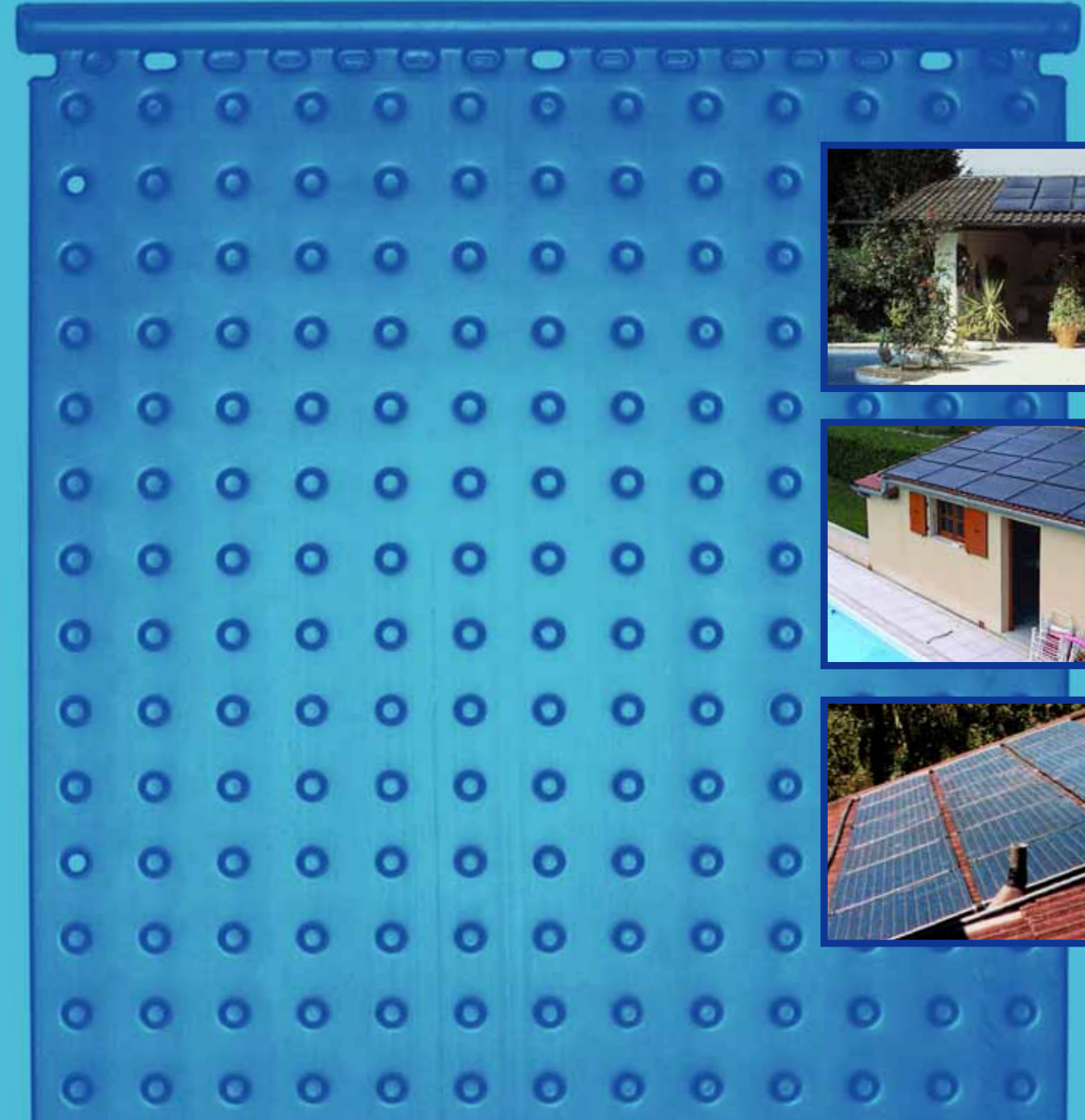
Temperature differential controller



3-way motorised valve



Pump



The performance characteristics of the collector is independently tested in accordance to the German TÜV standard and is registered with the Clear Skies authorities in the UK.

Reliable and efficient



# RayOku Solar Heating for Swimming Pools

Unheated Outdoor pools are often only at a comfortable swimming temperature in the height of summer. This is surprising short period considering the investment and maintenance needed for most pools.

Heating a pool by conventional means of energy can prove to be very expensive and a burden on our environment. Solar power can be used effectively to extend the swimming season and reduce your dependency on fossil fuels.

The RayOku solar absorber panels for swimming pools are designed and manufactured in Germany from a high strength, homogeneous polyethylene material that is frost resistance and are strong enough to take the weight of an adult. The panels are interlocking and join together to form the solar heating array. The array can be installed near the pool on a flat or sloping roof or even on the ground.

**Pool water can be pumped directly through the RayOku swimming pool solar heating panels providing optimum performance efficiency. Solar energy can be used as the only source of heat or as preheating before being topped up by your conventional heating source.**



**Item no. 1000**  
with integrated collecting pipe  
dia.40mm and two couplings dia 25mm

Length: 1320mm x width 820mm  
Area: 1.08m<sup>2</sup>



**Item no. 1001**  
with four couplings dia. 25 mm

Length 1280 mm x Width 820 mm  
Area: 1.05 m<sup>2</sup>



**Item no. 1002**  
with 2 integrated collecting pipe  
dia. 40 mm

Length 1360 mm -x Width 820 mm  
Area: 1.12 m<sup>2</sup>

**RayOku solar panels with high molecular polyethylene provide an excellent choice for heating swimming pools**

TÜV-checked

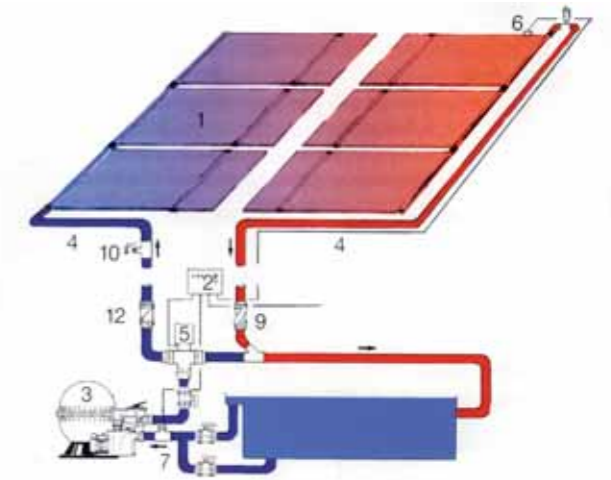


Low pressure drop - approx.0.003 bar at 200 l/h/m<sup>2</sup>  
Flow rate 150 to 250 l/m<sup>2</sup>/h  
Moulded in one piece - homogeneous black  
Weight approx. 6 kg/m<sup>2</sup> - water content 6 l/m<sup>2</sup>  
Test pressure 4.5 bar at NT  
Working pressure up to 1.2 bar - 40°  
Efficiency up to approx. 80% - power up to 0.8 kWh/m<sup>2</sup>  
Average value 0.5 to 0.6 kWh/m<sup>2</sup>  
Operation often possible with existing filter pump  
Non-corroding – resistant to swimming-pool water  
Pool water pumped direct through absorber  
Idling-proof  
Temperature-resistant from -50 to + 115°C  
Full-area through-flow - frost-resistant - supports the weight of a person

## Different configurations of RayOku Swimming-Pool Solar Heating

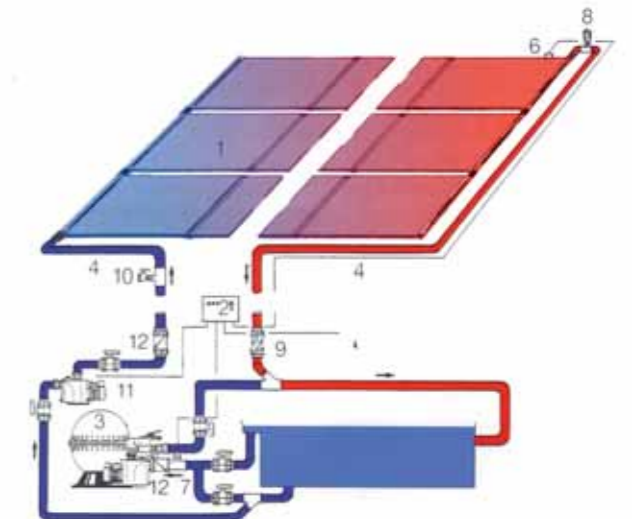
### 1. Operation with filter via three-way motorized valve with temperature differential controller

This configuration can usually be selected if the solar panels are not to be set up higher than 6m above the surface of the water. The three way motorized valve is integrated into the flow line of the filter installation. When the temperature of the water in the solar panels is higher than the temperature of the swimming pool the ball valve changes over. The water is then pumped through the panels and into the swimming pool. The water flows back into the filter circuit by way of a tee.



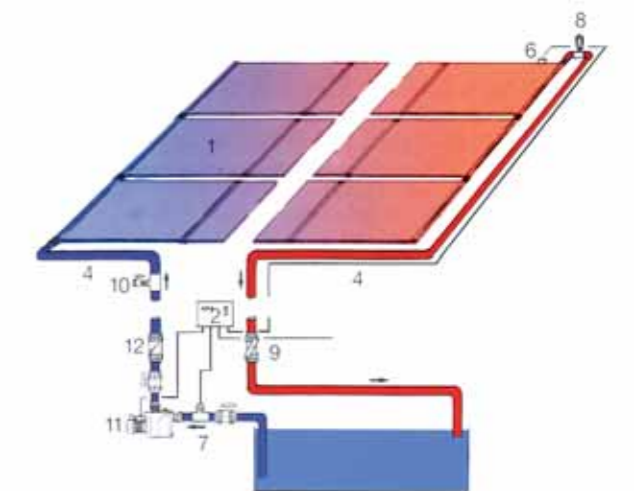
### 2. Operation with pool's own pump and temperature differential controller integrated into filter circuit

In many cases it may be sensible or even necessary to install a separate pump for the solar heating circuit i.e. when the delivery head from the water level to the solar panel is more than 6 m. The water is diverted from the filter by way of a Tee and pumped through the solar panels by the auxiliary pump. This pump will switch on only when there is a solar energy gain and a temperature difference. The filter and solar pump are separately regulated. It is usually advisable to integrate non-return valves in both solar and filter circuit.



### 3. Operation with own pump and temperature differential controller piping independent of filter circuit

This configuration is chosen when the filter piping is difficult to access. The water is sucked out of the swimming pool by an immersion pipe and pumped through the panels. The heated water is then conducted back into the swimming pool. Once again the pump will run when there is an energy gain and therefore a temperature difference. If the pump is mounted above the water level and the delivery head is more than 5m, a non return valve should be incorporated.



#### The components:

- |                                       |                               |
|---------------------------------------|-------------------------------|
| 1 RayOku absorber                     | 7 Temperature sensor for pool |
| 2 Temperature differential controller | 8 Vent valve                  |
| 3 Filter installation                 | 9 Stop cock (downdraft brake) |
| 4 Solar circuit flow and return       | 10 Drain cock                 |
| 5 Three-way motor ball valve          | 11 Pump for solar circuit     |
| 6 Temperature sensor for panels       | 12 Non-return valve           |