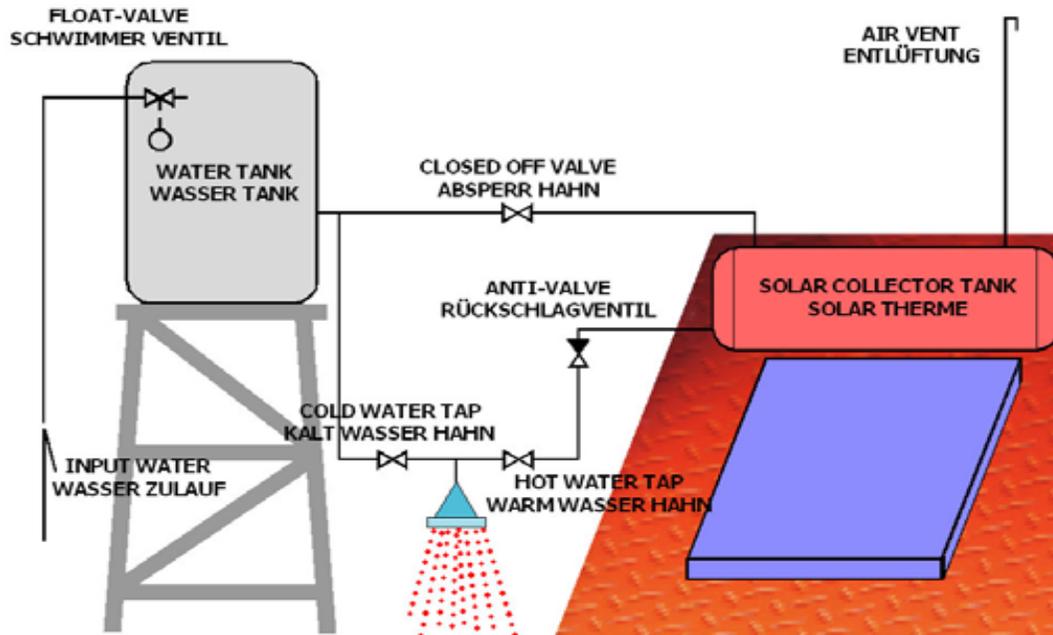


## How to install Solar Water Heater Systems?

There are several system configurations possible. The following graphics aimed to show you the differences between; and advantages or disadvantages of the systems. After you should be able to choose the right set-up for your purpose. There is no much different between vacuum tube or flat panel systems in regards to the system's setup.

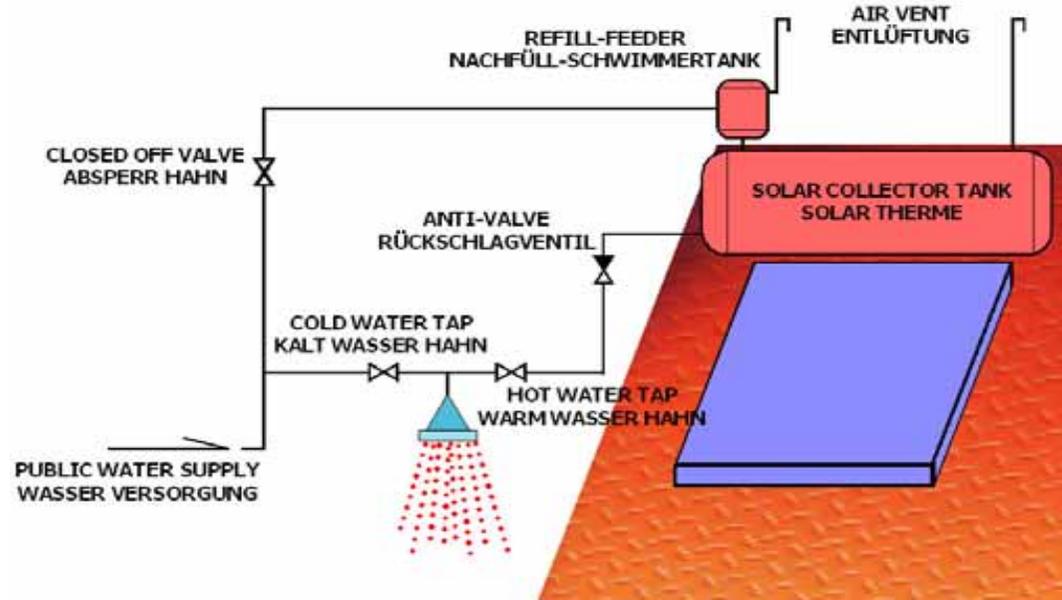
### The Natural Gravitation System



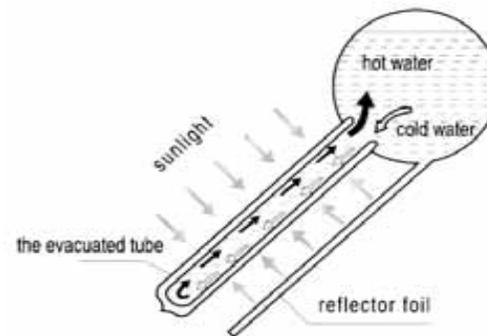
The most simple and reliable configuration is the classical gravitation system. Like at old style Thai houses you have a elevated water tank, either at a tower or at your roof top. The water tank must be a bit higher than the solar panel to allow the water to flow just by the natural gravitation. The pressure at your tap is the pressure of the gravitation from the water tank. 10 meters in elevation are equivalent of 1 bar of pressure. There is no pump needed to increase the pressure in your system, but may you need a pump to fill your water tank. This system is very economical as you save not only heating energy, you also do not need a pressure pump. This system guarantee you enough water for many hours or even days, even when the water supply stops or the electricity is power off.

The solar collector should install at the roof, facing in southern direction. The piping from the solar collector tank to your tap should not be to small, to allow the water to flow with small flow resistance. We suggest to use at least 3/4" (or better 1") pipes to allow sufficient amount on water to flow (especially for the shower tap).

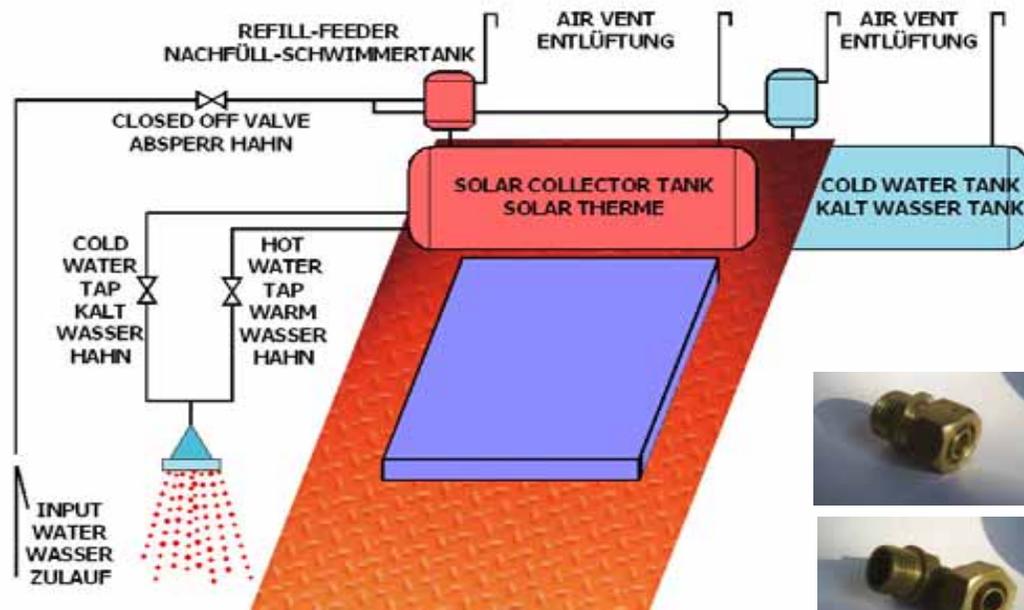
## The Gravitation System without water tank



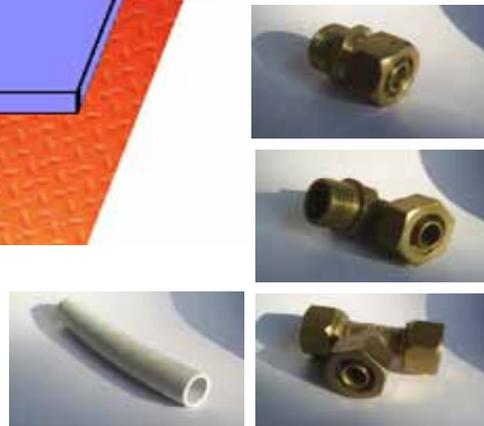
This system is more or less similar to the Natural Gravitation System, but there is no water tank. You are depend to a constant supply from your water source. If the pressure from your water supply is not constant, for example because many user are using water at the same time, or/and if you at the end of the supply system, than the temperature you adjust with your hot and cold shower tap will change with any change of the supply pressure.



## The Gravitation System with an additional tank under the roof

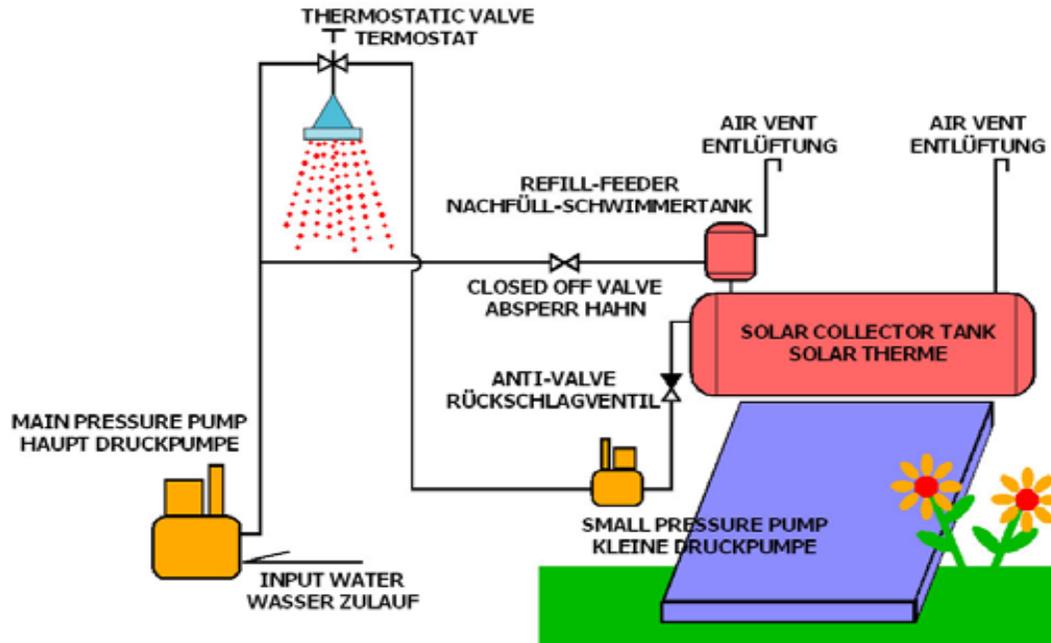


To eliminate the disadvantage of the Gravitation system without water tank you can add a small tank under you roof, but at the same elevation as the solar collector tank. In such a way you will have always the same pressure at the hot water and cold water system. For that the temperature that you adjust with your hot and cold shower tap will be quite stable as long no other consumer uses a lot of cold water. For that we suggest to use an independent cold water supply for the toilet flushing or washing machine, etc.



Please take care that all hot water pipes are from heat resistance material. During intensive sunshine and by low water consumption the water in the collector tank can reach up to 100° Celsius. Normal blue PVC pipes can stand a while, but they will bending wherever they have no support as the plastic will get very soft. You should use galvanized steel or copper pipes. To insulate the pipes is suggested. PIK-ASS offers a special piping and fitting system that is easy to connect and heat resistant. The pipes are from aluminium reinforced PVC. For piping inside the wall we only recommend soldered copper piping.

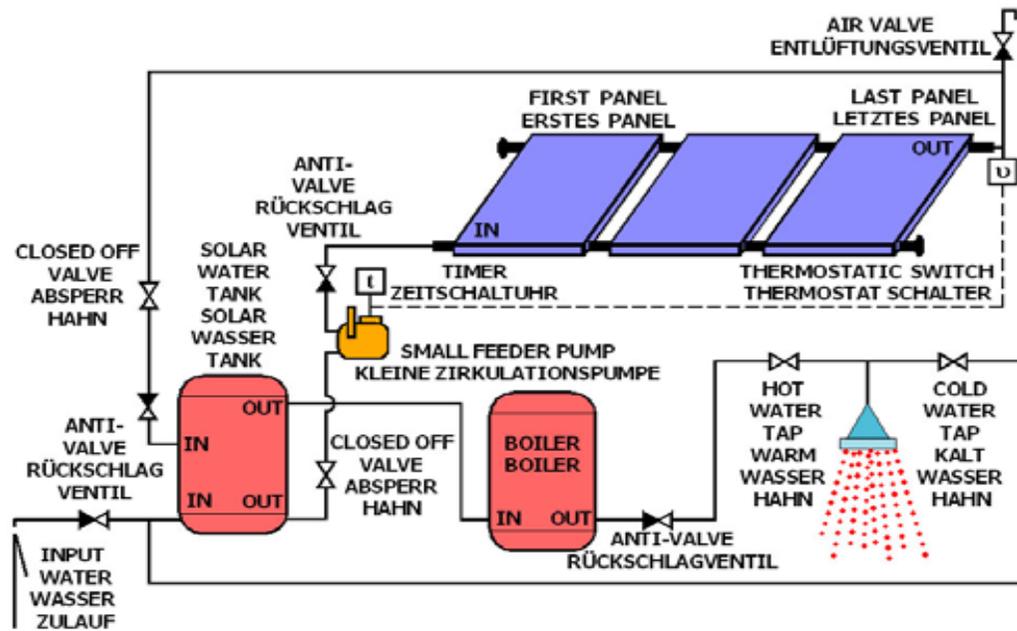
## The Independent System with pressure pumps



This system is using pressure pumps to pump the cold water into the buildings system and to refill the solar water heater. The solar collector tank is always without pressure what is guaranteed by the refill feeder. The pressure at the cold and hot water system will not be constant, the way to guaranteed a constant temperature is by adding an automatic thermostatic valve. This setup can be used on the roof top, but also can be placed in the garden or at any the south facing elevation. For the hot water pressure pump, a quite small and low cost balloon pump should be chosen (may be 125 W), because regarding to the heat from the water, the lifetime of the small pump is less than a usual pump while the electrical consumption is insignificant. If you place the system in the garden, check that the collector will not stand in the shade of trees or other buildings. The piping can be smaller than at the usual gravitation system. Pipes of a 1/2" till 3/4" are sufficient.



## The Pre-Heating Flat-Panel System



This is may the most complex system at all. It is based on a common heating system where an electric or gas operated water boiler is applied. Here you enjoy all advantages of a boiler system, high pressure at all taps, unlimited water heating also during night time, etc. Only the solar flat panels (not the vacuum tube systems) can be applied to such kind of pressure system. In such a way the boiler is the back-up system and the solar flat panels are used to pre-heat the water for the boiler, so the energy consumption (electric or gas) is minimized. If the temperature at the outlet of the solar panel is higher than 45° Celsius (for example), a small pump will circulate a small amount of water from the solar heat collector tank via the solar flat panels, and feed the hot water again into the solar heat collector tank. The pump will just run long enough (may be 30 seconds) to exchange the amount of water inside the solar flat panel (7 liter per each panel). The circulation system will only work if the desired temperature in the solar panels has been reached, which can be depend on the intensively of the sun shine, every 15 to 20 minutes. If during night time the pre-heated water from the solar heat collector tank is used finish and the temperature is not more sufficient, the electric or gas boiler will back up.



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