

Consolar Thermal Heat Stores

for solar hot water and heating



How the Consolar Thermal Heat Store works

The diagrams below are based on the Conus store

Diagram 1. shows input from solar and output for hot water, plus support for under floor heating.

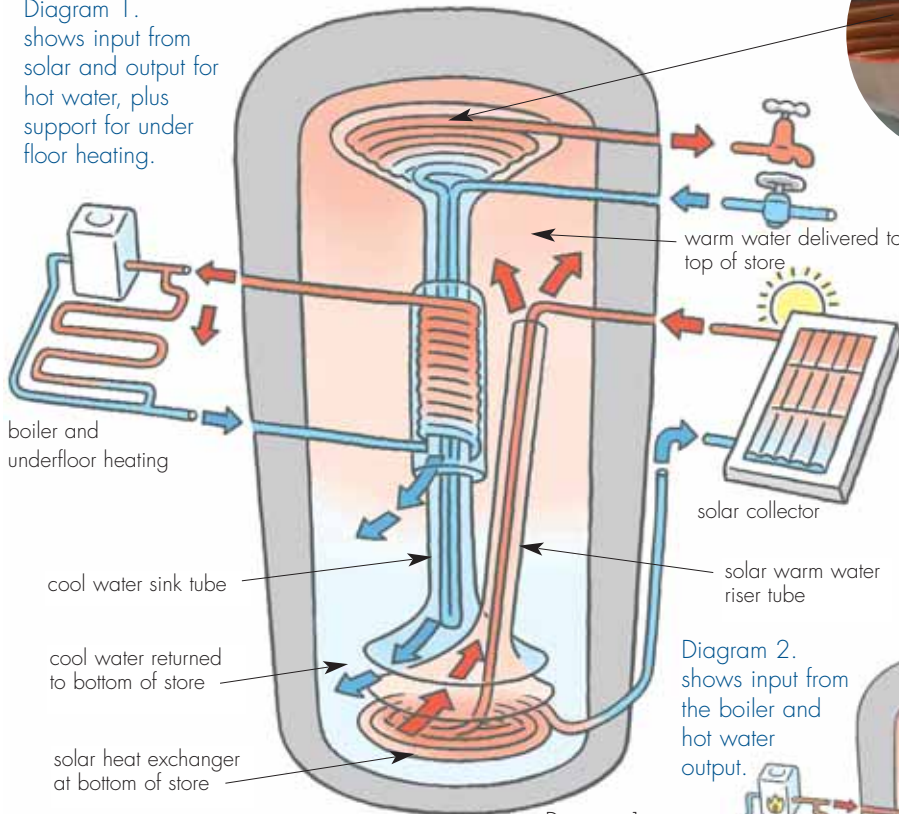


Diagram 1.

In diagram 1 the primary heat input to the store is from the solar thermal collectors, supplemented by the boiler only when needed.

This varies with the seasons:

- In summer it's unlikely that the boiler will be required.
- In spring and autumn the boiler may be required depending on the weather and space heating requirements.
- In winter the boiler is the primary input. On bright days when solar input is available this will be used to store as much heat as possible and reduce the load on the boiler.

Temperature sensors in the tank allow different modes of operation during the year:

- **Summer:** hot water only. When solar input is available the store will continue to absorb solar input until the whole store is fully heated. For hot water production just the top third of the store is important: if there is insufficient stored heat, just the top third of the store will be heated by the boiler.
- **Autumn, Spring and Winter:** if the space heating system is on, the top two thirds of the store are heated and solar gain is used by the central heat exchanger to assist space heating.

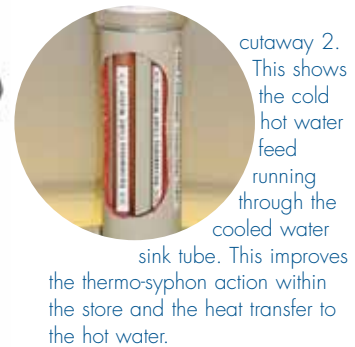
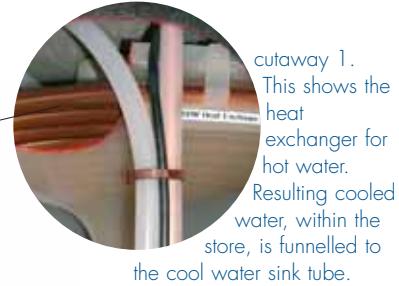
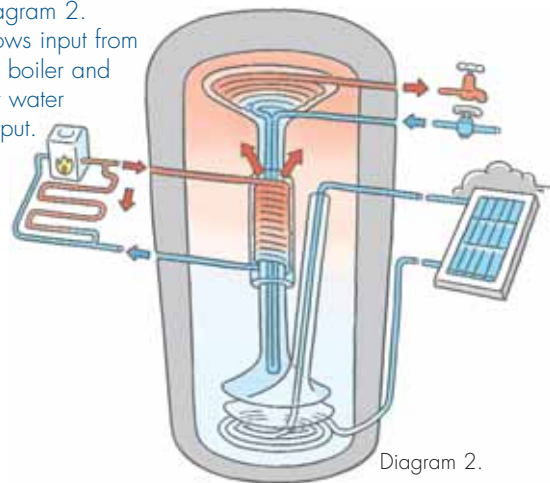


Diagram 2. shows input from the boiler and hot water output.



The boiler heats the store as and when required.

In diagram 2 there is little solar input and limited stored heat. The boiler heats (charges) the top third of the store to allow hot water output. Notice how, when the store is charging from the boiler, the flow is reversed through the central heat exchanger.

The Solus store has no central heat exchanger and the stored water is heated directly by the boiler. The stratification principle in the Solus is the same.

Efficient hot water production - the patent stratification system

The design of the Consolar store ensures solar input is made available for hot water generation as quickly as possible, and at a usable temperature. The key to this is the patent stratification system.

In a conventional hot water cylinder warmed water rises to the top of the tank mixing with cooler water on the way. This results in the whole tank being heated evenly with only a mild heat gradient from bottom to top. This saves energy but with low solar input the store temperature would all be too low to be useful without further heat input. The Consolar store uses an innovative stratification system to resolve this problem.

This is how it works

Water heated by the solar collectors is passed through a heat exchanger at the bottom of the store and the heated water is carried directly to the top of the store by the "solar riser tube". This minimises mixing with cooler water in the middle of store and delivers the solar heat to where it is needed for hot water production. As hot water is extracted, water immediately adjacent to

the top heat exchanger is cooled. The denser cool water is returned to the bottom of the store by the "cool water sink tube". The cold feed to the heat exchanger runs through a copper pipe within this larger diameter "cool water sink tube" (see cutaway 2). This helps create a strong thermo-syphon action that takes cooler water to the solar heat exchanger at the bottom of the store and hotter water to the hot water heat exchanger at the top.

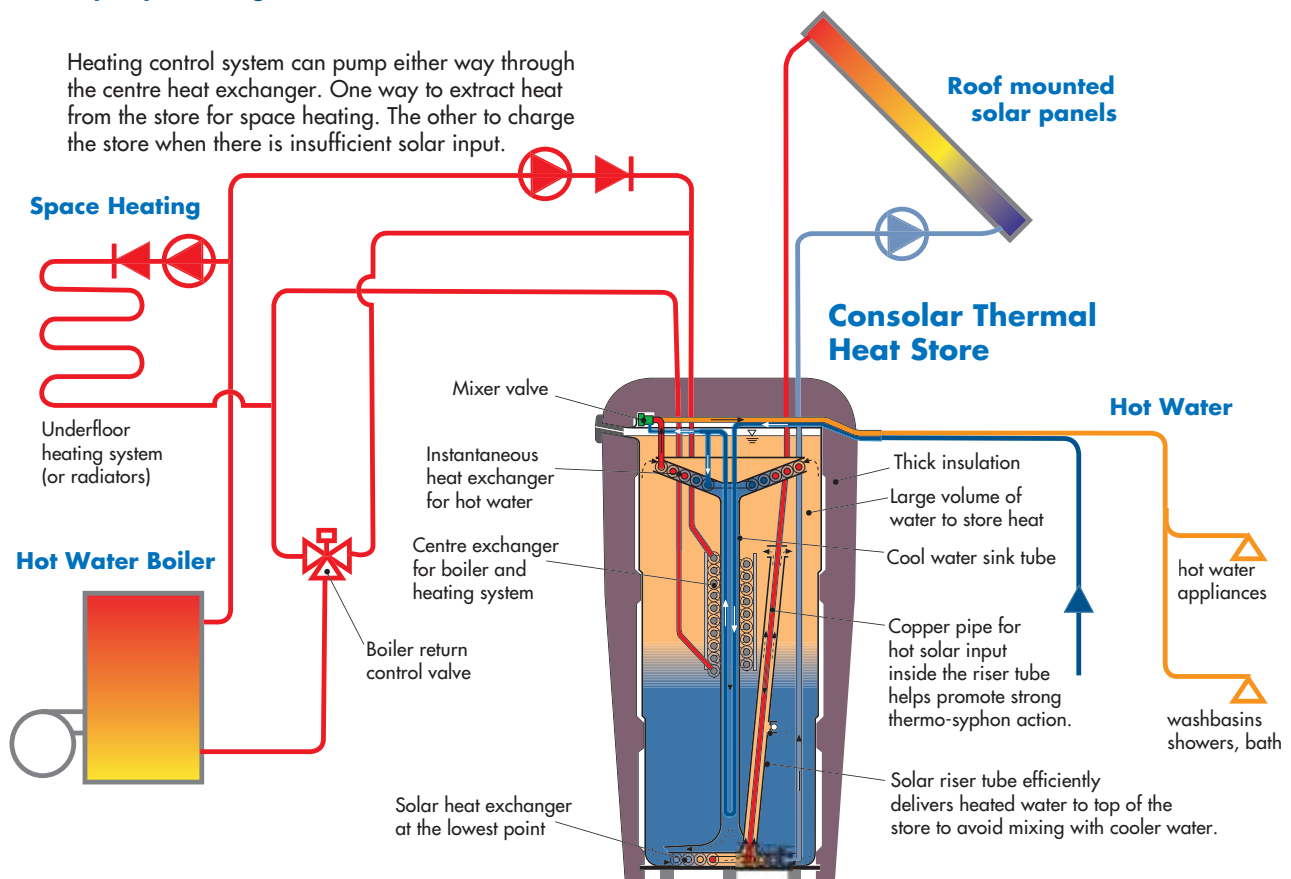
In a similar manner warm water from the solar collector passes through a copper pipe within the solar riser tube maximising the temperature of the solar water delivered to the top of the store.

The stratification system is entirely powered by thermo-syphon action.

The Conus and the Solar Pur stores need the water level in the store checked every couple of years, the Solus and the Coax are pressurised systems requiring no maintenance.

Example plumbing schematic for the Conus store

Heating control system can pump either way through the centre heat exchanger. One way to extract heat from the store for space heating. The other to charge the store when there is insufficient solar input.



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