

## THERMALLY STRATIFIED CYLINDERS

**HEATBANK - THERMAL STORE** The basic principle behind both is that the 'primary' heating fluid is shared between all energy input sources and the cylinder content - It is thermal heat that is stored – as opposed to the consumable hot water.

All heat inputs and output emitters – radiators and underfloor circuits – all share the same 'primary' fluid - everything is connected directly to the cylinder – No coils = 100% heat exchange.

The difference between HEATBANK and THERMAL STORE is the method used to extract the heat from the store - to provide clean hot water for use at taps  
See options CX PX below



- Any and all inputs can contribute/ provide heat for both DHW & Radiators/ Underfloor.
- Variable – Min/Max summer/ winter - variable gas/oil 'top up' volumes possible
- Open vented solid fuel burners AND mains pressure hot water now possible
- Mains pressure/ un-vented storage legal/safety issues effectively side stepped
- Infinite life - as cylinder is filled with corrosion inhibitor
- Future proof life investment – add new/ change heat sources if as when required

**With multiple energy inputs and outputs  
HEATBANK THERMAL STORES make sense**

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

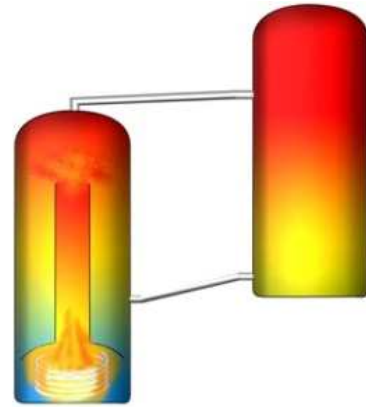
Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

# THERMALLY STRATIFIED CYLINDERS

A taller cylinder will be 10 - 20% more effective than a shorter fatter – for given volume.

A well stratified cylinder with managed volume flows can increase effective volume - by 20-30% or more.

What use is a 1000 liter store if the temperature is not enough for a hot bath?  
Size alone is not enough!



Cylinder and rotational tapping positions  
Custom designed to best suit your building layout  
Providing a compact easy fit that looks good!

The T'store volume only really needs\* to 'accumulate or buffer' the difference between the 'rate' at which you burn logs/fuel - and the 'rate' at which you may want to draw off – bath/shower for example.

For space heating, you will burn fuel at more or less the same time/ rate as needed.

However, a thermal volume for morning radiator circulation is great and 'batch' burning increases efficiencies

With underfloor, your thermal store is also embedded within the screed.

Note that energy is stored in your logs/ gas/ oil and suffering no standing losses

Ideally we unlock this energy as and when needed 'just in time'

Managed temperatures – stratification is as important as volume

A well designed 'system' will take all the above factors into account and more

We typically talk through functions required with home owner and help design overall system\*

We then talk technical detail with plumber both before and during installation.

Once installed, user guide & phone support to help you fine tune to best optimize the system

\*Larger 'buffers' or 'accumulator stores' are necessary for serious batch burning and wood gasification units only – please ask

\*Solar will often require a heat exchange coil because antifreeze is required for certain collectors

\* 22 years experience of solar/wood from humble domestics to 600 tube/ 8000 liter - Welsh assembly

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

## HEAT EXCHANGE - TO DOMESTIC HOT WATER

Choose either the PX plate heat exchanger or CX Passive coil

### PX - 165KW PHE = EQUAL TO 5 COMBI BOILERS!

- Commercial heat exchanger & full installation kit.
- Threads straight onto cylinder connections
- Mains cold water (at full pressure) is instantaneously heated using an extremely efficient, externally mounted, commercial stainless steel flat plate heat exchanger.
- Provides up to 50 Litres a min @ 55°C < up to 10 bar pressure!!
- Turbulent fluid flow in opposing directions gives 95% + heat exchange in most domestic situations
- Tripped by a flow switch, heat is pumped from the very top of the thermal store, and through the 40 plate heat exchanger.
- Hot and cold pressures will be same/ balanced
- Full kit, includes 'O' ring swivel couplings and allows for multiple configurations and rotational positions Thermostatic mixer and temp dial isolators included



To be used in conjunction with 'solar flume'

Designed for direct mount onto cylinder, straight out of the box

Kits will be pre assembled (as per pic). Threads are not sealed/ pressure tested.

During power cuts, low flow possible ie wash hand basin

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

## HEAT EXCHANGE - TO DOMESTIC HOT WATER

Choose either the PX plate heat exchanger or CX Passive coil

### CX - COIL EXCHANGER (INTERNAL COIL/PASSIVE) - GOOD FOR 2-3 PEOPLE

110kw 'finned' coil fitted inside the cylinder with a huge 3.24M2 surface area that works in reverse. Mains pressure cold water is heated as it passes up and through coil, absorbing heat from the body of hot water. (passive transfer from the hot side) Hot drinking water to shower/ taps – no pumps

Generic terms as used by other manufacturers include;-

***Torrent Tornado ThermaFlow Thermo Store Mains Flow Mains Heat***

The above companies suggest this product is good for bath, showers – up to 25-30 Liters per minute. However, above 10-15, will need far higher store temps than with the pumped external exchanger option. This is because there is no 'turbulent flow' on the hot side of the coil.

Think of 'wind chill' and what difference that makes even if the actual temperature remains the same.

In my opinion, I recommend this option for low flow hot water consumers and or oversize store slightly

With twin/ staggered cylinders a smaller version of this coil may be used inside the lower cylinder to preheat mains cold before entering PX – This would be the ultimate of all thermal stores.

Advantages: No pump/flow switch Works without power Extracts heat from the bottom up.

Info;- Normal shower 5-9 L'pm Power shower circa 15-20 L'pm

PX Includes pressure reducing valve 3.5 bar (PRV) shock arrestor, thermostatic mixing valve, temp gauge, isolator.

Cold supply to taps/shower will have to be taken after the PRV if/ where balanced pressure is wanted.

Users with high calcium or acidic 'aggressive' water should consider the external PHE option.

Full flow available without mains electric

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

## ADD MODULAR COMPONENTS AS REQUIRED

### BB - BOILER BENDER KIT

Allows for variable summer/ winter/ peak buffer volumes.

Possible because boiler heating is direct and heating volume is not set by a fixed coil.

With 4 cylinder connections, a clever mixing valve arrangement allows for the blending of the boiler return in such a way that the store is heated progressively from the top down and at 100% exchange/ heat transfer

Default setting (top thermostat) only heats the top 20-30 liters and will do so almost instantaneously and continuously.

In this mode, hot water can be provided/ maintained/guaranteed much like a 'combi' but with a small buffer – As per the top range Worcester Bosch heat slave/ heat bank.

By blending and controlling the boiler return temperature we can optimize the boiler flow/return temperature difference i.e. the Delta of 'lift' at boiler thus maximizing burn efficiency or condensing mode.

Simple adjustment of cylinder thermostat dials will allow you to increase stored volume when required –guests/ Christmas or if too ill to light stove.

This ability to vary and minimise the boiler heated volume when possible will fully maximise contributions from solar/ wood/ heatpump whilst at the same time guaranteeing hot water (albeit at a reduced volume)

This gives you the ability to fine tune your system to your needs and lifestyle.

No electronic programming required and much better than a fixed coil arrangement that must typically heat 50% of cylinder, wanted or not – and consequent wait for hot water at top of cylinder.

### BC-BOILER CONTROLS PACK

A unique arrangement involving three thermostats.

A single top thermostat for small volume 'top up'

A linked pair of individual accurate Immersion type cylinder stats for boiler batch firing.

Thermostats 2 and 3 coupled together with relays at a wiring centre, the middle stat provides the boiler signal to switch on; the lower stat provides the switch off.

You can now easily dictate both the temperature as well as volume heated. Useful when circumstances change such as small boiler top up to solar during spring/ autumn and then Christmas when large volumes may be required. Having 'satisfied' the lower stat, boiler wont re fire until upper stat calls again – giving solar/ heat pump/ wood best chance to contribute.

This also means that the boiler has a chance to run at full burn or optimum efficiency and for a longer time thus minimising wasteful boiler on/off cycling as with single stats.

In a conventional system, this is particularly inefficient when a 20-30kw gas boiler is called upon for 5 mins to top up heat for radiators/ underfloor circuits.

By 'batch' heating and providing heat for both from the same store – this feature will have a significant impact on the whole system.

The top cylinder stat also incorporates a safety stat as used on unvented systems and is configured with relays in such a way that should the cylinder reach 90°C - then signal to boiler is cut and programmers bypassed.

All radiator/ heating pumps are then powered to automatically dissipate possible 'overheat' (from wood or solar).

## SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

### RM - RADIATOR PUMP AND RETURN MIXER KIT

Radiators are fed direct from store having been heated by any/all sources.

As special 4 port mixing valve with pump sends a fixed temperature around the radiator loop (ports 1,2)

The mixing valve at store blends in the additional top up heat as required whilst greatly minimizing flow/disturbance through store (ports 3,4)

This also has the effect of creating a stratification layer, moving up the cylinder.

### UM - UNDERFLOOR PUMP AND RETURN MIXER KIT

Same as the radiator RM kit and fitted to store at a lower height.

To mount this way avoids the need for two pumps and line losses.

You will now only need the distribution manifolds which may now be split to better suit building as opposed to being centralized.

We can design systems incorporating screed within overall thermal mass/ volume calcs and supply multi distribution manifold kits with high conductivity pipe.

### WM - WOOD PUMP AND THERMO STATIC LOADING VALVE KIT (SIMILAR TO "LADDOMAT")

Fitted parallel to cylinder with 1 x flow and 3 x returns, works to accelerate flow, heating from top down after having priority heated the top hot water volume.

When you first light the stove and fluid at stove reaches 45 then hot water is pumped from top of store to help bring the fire up to optimum burn temperature. (we are no longer cooling fire with cold water from bottom of store!)

We are now heating the top ¼ of store and when the return reaches 60 (adjustable) then the store will be heated progressively from the top down whilst keeping the back boiler at 60+

Added benefits include much faster warm up, priority loading to top 25% of store, reduced smoke/ condensation and around 30% more heat extracted per log! (when used with WC)

Default on power failure to gravity circulation with additional buffer volume - Giving you time to reduce wood burn rate.

### HM – HEAT PUMP

Similar to RM UM – Only heating from the bottom up, working on the coolest fluid first to optimise COP  
To be used in conjunction with the 'solar flume'

### WC – VARIABLE SPEED PUMP CONTROLLER UNIT

Pump will start automatically at 45°C - and at 25% of full pump speed.

As temperature then increases the pump speed will fully modulate up - then down and stop (pump(s) as fire dies down. (flue stat)

Digital temp display and overheat alarm at 90°C

### QC - QUENCH COIL AND SAFETY VALVE

When top of cylinder reaches 95°C - mains pressure cold water is allowed into a cylinder cooling coil - running to waste until temperature reduced to below 95. This will also protect against solar overheat.

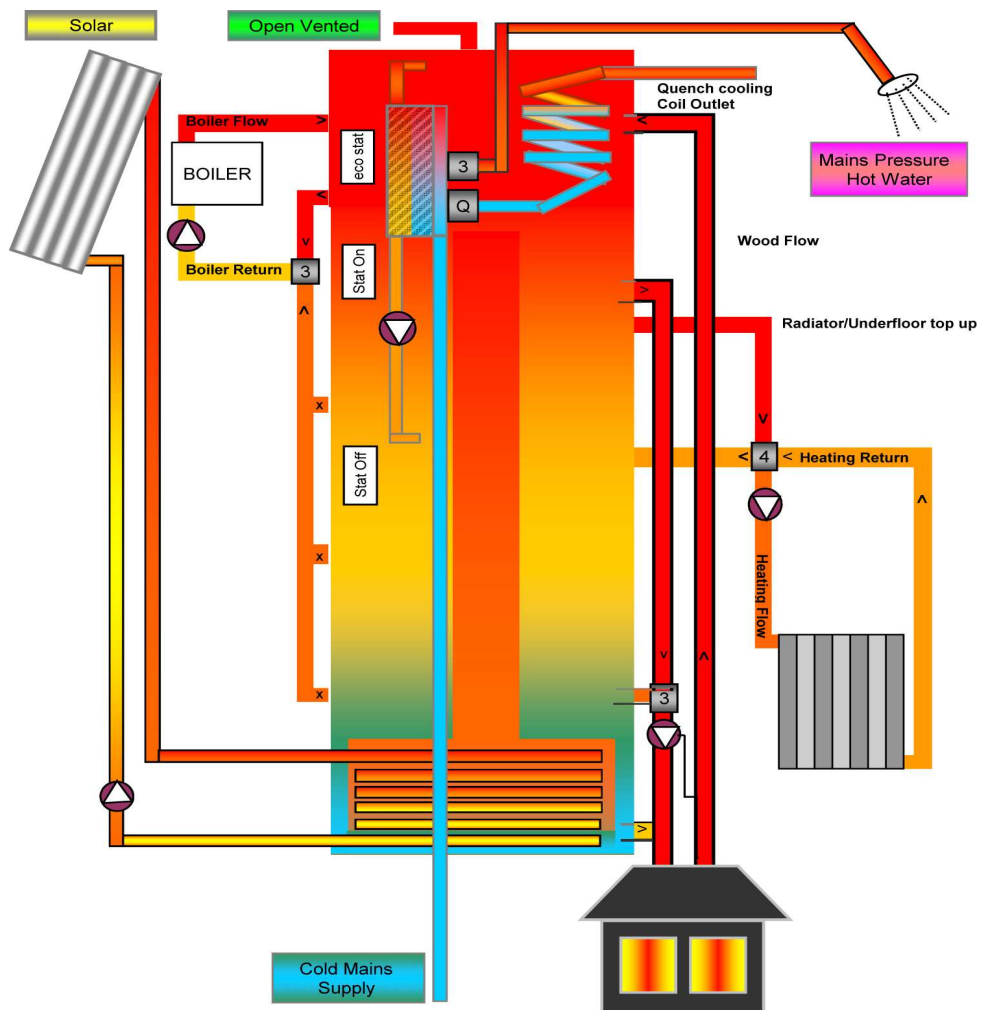
**All kits are supplied loosely assembled for self install**

**Comprehensive and complete, no additional items should be required other than pipe, cable, insulation.**

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

# HEAT BANK – THERMAL STORE



Underfloor Heating and Radiators – Both shown as ‘Heating’ with one mixer/ pump kit for Rads/ UfH and per programmed ‘zone’  
 This method eliminates the need for additional pump(s) and greatly reduces the disturbance/ flow through store whilst actually enhancing stratification.

Unlike a ‘normal’ Thermal Store where the entire volume between flow/return gets averaged – We are also working with stored ‘temperature’.  
 Mixing valve [3] provides the top up temperature only as needed – increasing the effective ‘thermal’ capacity of your store.

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
 TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
 EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)

## Based on 20 years experience – Optimising low temperature heat sources and intelligent integration with fossil ‘top up’ solutions

Cylinders fall outside of MCS – As they form part of the overall heating system and are not solar specific  
T'store also falls outside the stringent pressurised cylinder requirements  
WRAS applies to the potable water side only - the heat exchanger/mixer only

### NO NEED

- No unvented regulation requirements
- No annual servicing costs
- No motor valves
- No pressure limit
- No flow rate limit
- No fixed heated volume
- No coil inefficiencies
- No need for boiler sealed expansion kit – everything direct/ shared
- No need for heat pump sealed expansion kit – direct/ shared
- No need for separate wood burner F&E – everything direct/ shared

### NEEDED

- Header/ F&E tank 5-10% of total volume including rads/ boiler etc
- Corrosion and Inhibitor solution

Far superior to regular ‘unvented’ – and looks it too! – Only let down is perhaps the green foam.  
Only other negative is during possible power cut (when boiler, rads would also stop)  
However the unit will thermo siphon to provide a small constant flow to one wash hand basin with no power.  
Cylinder is copper, but filled with inhibitor solution - so NO corrosion issues.  
Cylinder and exchanger should last forever, pumps are standard central heating type and easily replaceable  
Heat exchanger is stainless steel and self cleaning, lime scale rarely an issue.  
Unlike a coil, the heat exchanger is removable and may be cleaned with mild acid – vinegar

### LEGAL DISCLAIMER

*The above is for information & guidance purposes only. No responsibility will be taken for actions taken as a result of the above  
Installation to be carried out by appropriate, responsible & competent persons only.  
System purchaser installer must assure themselves of all appropriate regulations & requirements.*

**SOLARHOTWATER | SOLARCYLINDER | SOLARSENSE**

Energy Parc Sandy Lane Pennard Swansea South Wales UK SA3 2ER  
TECHNICAL – David Lloyd-Jones TEL 0 1792 828 591 MOB 0 7880-55-33-18  
EMAIL - [INFO@SOLARSENSE.CO.UK](mailto:INFO@SOLARSENSE.CO.UK) WEB - [WWW.SOLARCYLINDER.CO.UK](http://WWW.SOLARCYLINDER.CO.UK)