

Hot Water Cylinder Selection Guide

Performance

The performance of any hot water (DHW) cylinder is dependant on a number of factors which all combine to provide the final temperature produced at the cylinder. It is very important to get these factors correct or the performance of the cylinder may be compromised and end-user expectations not reached.

Two main factors which can affect the final temperature of the hot water cylinder are coil size and flowrate.

Coil Size

As heat pumps require higher flow rates, the transfer of heat into the water within the cylinder requires a larger coil surface area. This has to be the true surface area of the coil and not 'fins' attached to the coil. A minimum guide of 0.25m² coil surface area is recommended per kW thermal output of the heat pump.

Flowrate

Again due to the higher flow rates required as opposed to a fossil boiler, hot water cylinders generally require a larger diameter coil. If the coil in the tank is of too small diameter, this high flowrate can increase the pressure drop across the coil. If care isn't taken the pressure drop can exceed the amount of pressure available from the water pump within the heat pump and result in lower stored temperatures within the tank.

Other factors which can also affect the final stored temperature within the tank include: distance of the hot water cylinders from the heat pump; distance from the point of usage; and the plumbing configuration of any secondary returns or towel rails.

The following pages show different tables for the types of hot water cylinder configurations and shows a single coil tank and a twin coil tank for use with solar.

It is important in both twin tank configurations that a reverse return piping arrangement is used for the piping to and from the coils and the domestic hot water tank outlets and inlets, otherwise the tanks will not reach the correct temperatures together.

Kensa has partnered with leading cylinder manufacturers to provide mains pressure cylinders featuring enhanced surface area coils which are designed specifically for heat pumps. Selection charts of Kensa heat pumps designed specifically for heat pumps. Advance Appliance, McDonald and Joule hot water cylinders are contained within this document taking into account testing results. (However this is a guide only as the installation can also affect performance.)

Any pairing of EVO and Shoebox NX heat pump ranges with any manufacturers cylinders may require immersion boost for legionnaires protection

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Advance Appliances Hot Water Cylinders

Single Tank

	Single Coil						
	150	215	250	305	400	500	
Kensa Part Number	95-060A	95-061A	95-069A	95-070A	95-071A	95-072A	
	25	25	32	32	32	32	Coil size (mm)
Heat Pump Load Size	2	3	3	3	3	3	Meter Coil size (m ²)
3	✓	✓	✓(LR)	✓(LR)	✓(LR)	✓(LR)	
5 (NX range)	✓	✓	✓	✓	✓(LR)	✓(LR)	
6	✓	✓	✓	✓	✓(LR)	✓(LR)	
7	✓	✓	✓	✓	✓	✓	
9	✓	✓	✓	✓	✓	✓	
13	✗	✗	✓	✓	✓	✓	
15	✗	✗	✓	✓	✓	✓	
17	17kW Evo should not be used for DHW						

LR—Long Reheat Time

Hot Water Cylinder Selection Guide

McDonald Hot Water Cylinders

Single Tank

Kensa Part Number	ECOFlow Single Coil								Coil size (mm)	Meter Coil size (m ²)	STEELflow Single Coil						
	150	180	210	250	300	400	300	400			150	170	200	250	300	400	500
	95-225A	95-226A	95-227A	95-228A	95-229A	95-230A	95-231A	95-232A			95-233A	95-234A	95-235A	95-236A	95-237A	95-238A	95-196A
Heat Pump Load Size	28	28	28	28	28	28	28	28			32	32	32	32	32	32	32
	1.32	1.32	1.76	1.76	1.76	1.76	3	3			2	2	3	3	3	4	4
3	✓	✓	✓	✓(LR)	✓(LR)	✓	✗	✗			✓	✓	✓	✓(LR)	✓(LR)	✓(LR)	✓(LR)
5 (NX)	✓	✓	✓	✓	✓	✓	✓(LR)	✓(LR)			✓	✓	✓	✓	✓	✓(LR)	✓(LR)
6	✓	✓	✓	✓	✓(LR)	✓	✗	✗			✓	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)
7	✓	✓	✓	✓	✓	✓	✓(LR)	✓(LR)			✓	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)
9	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓(LR)	✓(LR)
13	✗	✗	✓	✓	✓	✓	✓	✓			✗	✗	✗	✗	✗	✓	✓
15	✗	✗	✓	✓	✓	✓	✓	✓			✗	✗	✗	✗	✗	✓	✓
17	17kW Evo should not be used for DHW										17kW Evo should not be used for DHW						

LR—Long Reheat Time

Twin coil tanks are tested using the primary coil only

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Joule Hot Water Cylinders

Single Tank and twin coil operation

Kensa Part Number	Joule Cyclone Cylinder Single Coil							28mm Coil Pressure drop (bar)	Meter Coil size (m ²)	Joule Cylinder Twin Coil				
	150	180	210	250	300	400	500			200	250	300	400	500
	95-162A	95-163A	95-164A	95-165A	95-166A	95-168A	95-169A			95-197A	95-198A	95-199A	95-200A	95-201A
Heat Pump Load Size	1.7	2	2	2.5	2.5	4	4			2.8	2.8	3.2	4	4
3	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)	✓(LR)			✓	✓(LR)	✓(LR)	✓(LR)	✓(LR)
5 (NX)	✓	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)			✓	✓	✓(LR)	✓(LR)	✓(LR)
6	✓	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)			✓	✓	✓(LR)	✓(LR)	✓(LR)
7	✓	✓	✓	✓	✓(LR)	✓(LR)	✓(LR)			✓	✓	✓(LR)	✓(LR)	✓(LR)
9	✓	✓	✓	✓	✓	✓(LR)	✓(LR)			✓	✓	✓	✓(LR)	✓(LR)
13	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
15	✗	✗	✓	✓	✓	✓	✓			✗	✗	✓	✓	✓
17	17kW Evo should not be used for DHW									17kW Evo should not be used for DHW				

Twin coil tanks are tested using the primary coil only

LR—
Long

Phase Change Material Heat Batteries and Evos.

It is possible to replace the hot water cylinder with a Phase Change Material unit from Sunamp for various sizes of Evo heat pump (see table below). PCM heat batteries offer an alternative DHW storage solution, they compete to replace hot water tanks in heating systems, particularly where space is limited. The heat battery stores and releases energy during melting and freezing of the PCM. This process occurs at a constant temperature, which means that the PCM can store a large amount of energy at a lower temperature (or lower volume) than an indirect hot water tank. The potential for lower storage temperatures makes PCM an attractive prospect for heat pumps, which are more efficient at lower flow temperatures.

Heat Pump	Sunamp Unit	Energy Stored (kWh)	Volume of Water to 40C (l)	Volume of Water at 40C (l)	Notes
7kW Evo	Thermino i 210	6.18	113	152	HP connected to smaller coil, DHW connected to larger coil. No additional water pump.
9kW Evo	Thermino i 210	5.74	110	141	HP connected to larger coil. DHW connected to smaller coil. No additional water pump.
7kW Evo	Thermino i 150	4.3	86	106	HP connected to smaller coil, DHW connected to larger coil. No additional water pump.
9kW Evo	Thermino i 150	4.21	84	104	HP connected to smaller coil, DHW connected to larger coil. No additional water pump.

The volume of hot water to 40°C is the total volume that passed through the PCM and came out at a temperature above 40°C. The volume of hot water at 40°C, is the total volume that would be obtained if a mixing valve were used to maintain a 40°C output, by mixing in 5°C mains water.

Evo - connected to the smaller coil, DHW connected to the larger coil with the exception of the 9kW Evo & Thermino i 210 pairing which is connected to the large coil, DHW connected to the small coil

Phase Change Material Heat Batteries and Shoebox Heat Pumps.

It is possible to replace the hot water cylinder with a Phase Change Material unit from Sunamp for various sizes of shoebox heat pump (see table below). However it is recommended that the 6kW Shoebox is not combined with the Sunamp Phase Change Heat Batteries, without changes at commissioning.

Heat Pump	Sunamp Unit	Energy Stored (kWh)	Volume of Water to 40C (l)	Volume of Water at 40C (l)	Notes
3kW Shoebox	Thermino i 150	4	n/a	100	
3kW Shoebox	Thermino i 210	8	n/a	170	Long Reheat time
6kW Shoebox	Thermino i 150	Not recommended unless the second compressor set point is lowered In effect changing back to a three kW.			
6kW Shoebox	Thermino i 210	Not recommended unless the second compressor set point is lowered In effect changing back to a three kW.			

For the shoeboxes, charging should be via the heat battery large coil and discharge via the small coil.

The volume of hot water to 40°C is the total volume that passed through the PCM and came out at a temperature above 40°C. The volume of hot water at 40°C, is the total volume that would be obtained if a mixing valve were used to maintain a 40°C output, by mixing in 5°C mains water.