Secondary Hot Water Returns

Secondary hot water returns are generally used in domestic hot water applications where the point of usage (i.e. taps) are a distance away from the hot water cylinder. They are used to remove the need to draw off a large quantity of cool water, (left in the pipe run), before hot water actually reaches the tap.

Secondary returns generally consist of a bronze pump which pumps the DHW around the system and back to the DHW cylinder. This ensures that hot water is always immediately available at the point of usage. To avoid excessive pump costs it is usual to time the pump operation to coincide with the periods of maximum DHW usage i.e. early morning and evening.

Although secondary returns work well with traditional boilers, when used with a heat pump they can lead to the DHW dropping in temperature quickly. The returning water to the hot water cylinder promotes mixing in the cylinder which destroys stratification. This mixing (when combined with the incoming cold water) lowers the overall stored water temperature. As the heat pump is a low temperature device, the stored water is already at a lower temperature than a system using a traditional boiler, resulting in a noticeable drop of temperature in the DHW. As the stored water temperature in a traditional boiler system is higher and the re-heat time usually much shorter, any drop in temperature is less noticeable.

When a heat pump is being used, and if there is a need to avoid excessive water draw off at the point of usage it is recommended that one of the arrangements over is used.

Facts at a glance:

Secondary Returns—These are used to avoid excessive water draw off before the hot water at the tap is at the correct temperature.

Heat Pumps and Secondary Returns—Any pumped return promotes mixing, destroying stratification within the hot water tank. This, due to the lower stored temperature, can result in noticeable cooler hot water at the taps.

Trace Heating Tape—The ideal arrangement to reduce the temperature drop of the hot water is to use trace heating tape, which is self regulating and linked to a time clock.

Flow Boiler—As an alternative to trace heating tape a flow boiler in the return pipe can be used. However this is less efficient and more costly due to the water pump and additional pipework required.

Insulation—To keep the additional energy required to maintain the hot water temperature, to a minimum, all the hot water pipework needs to be well insulated.

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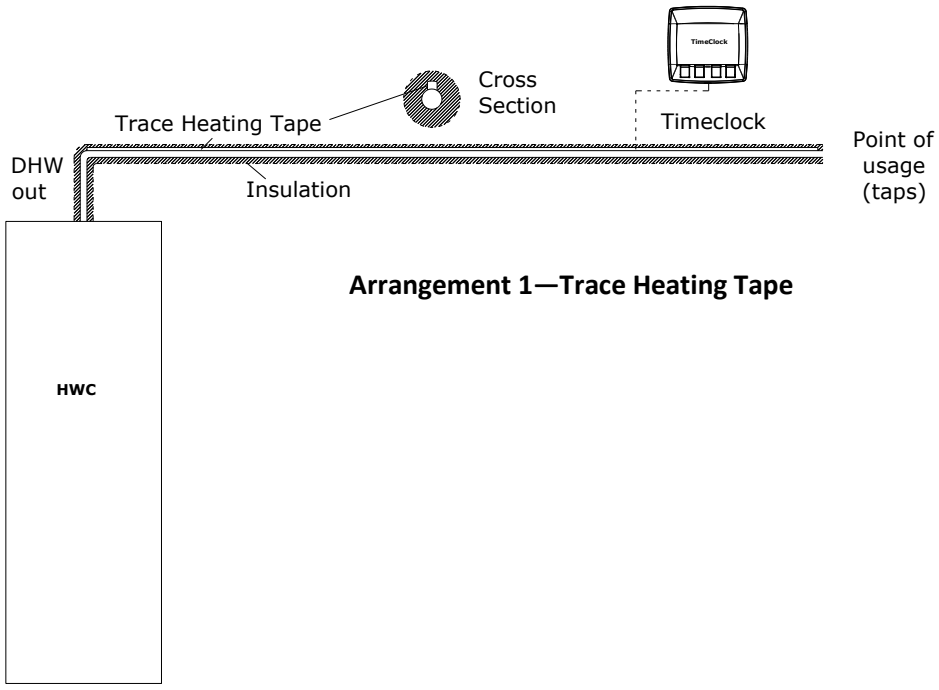
The preferred choice would be arrangement 1, using trace heating tape. This tape maintains the temperature of the water in the pipe, is self regulating and should be linked to a time clock to operate only with the periods of maximum DHW usage. This arrangement removes the need for the water pump and also reduces the amount of installation costs as secondary pipework is not required.

Arrangement 2 and 2a uses a return loop, however instead of connecting to the tank it is connected to the tank outlet. A timed water pump is also used and a flow boiler, which makes up any losses to atmosphere from the pipework. The return pipe should also be a smaller diameter than the flow pipe. It is important that an automatic air vent is installed at the highest point of the system.

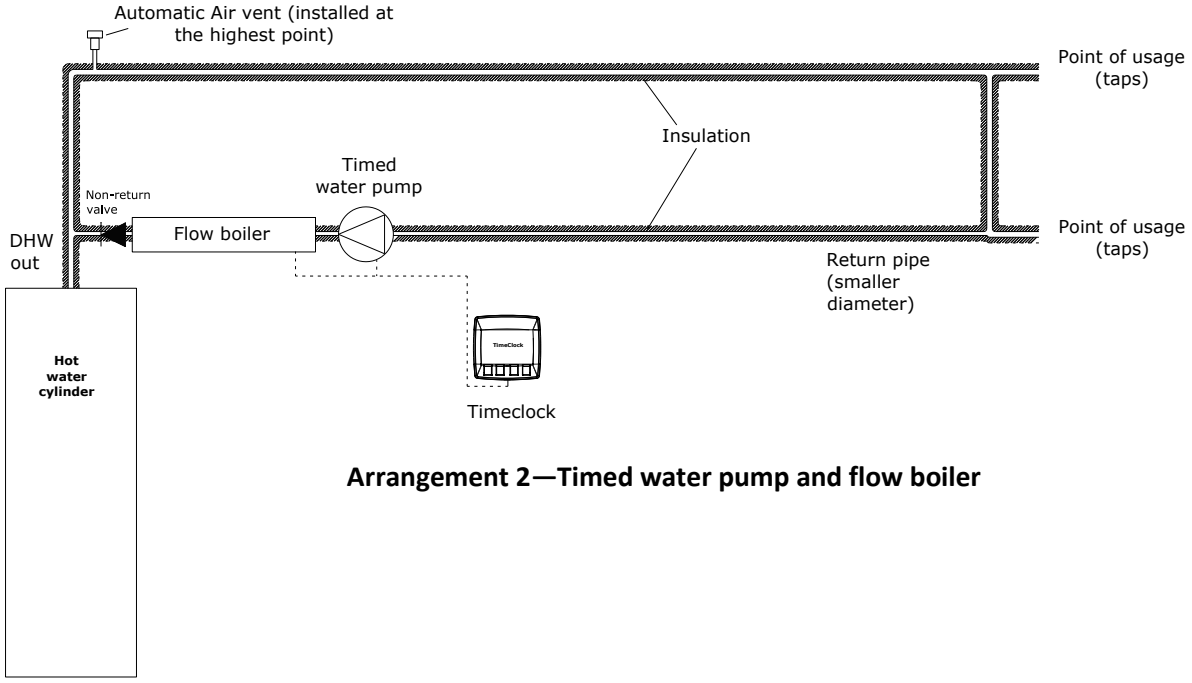
In both cases, (and for any pipes going through voids) it is important that the pipe is well insulated. This will reduce the losses from the pipe to atmosphere and hence reduce the amount of time that the tracing tape or flow boiler operates, reducing running costs.

Although the flow boiler /trace heating tape is using energy, this is energy that is being lost to the atmosphere and increasing the pipe insulation will reduce this. The flow boiler / trace heating tape if correctly installed will only operate when required.



Arrangement 1—Trace Heating Tape

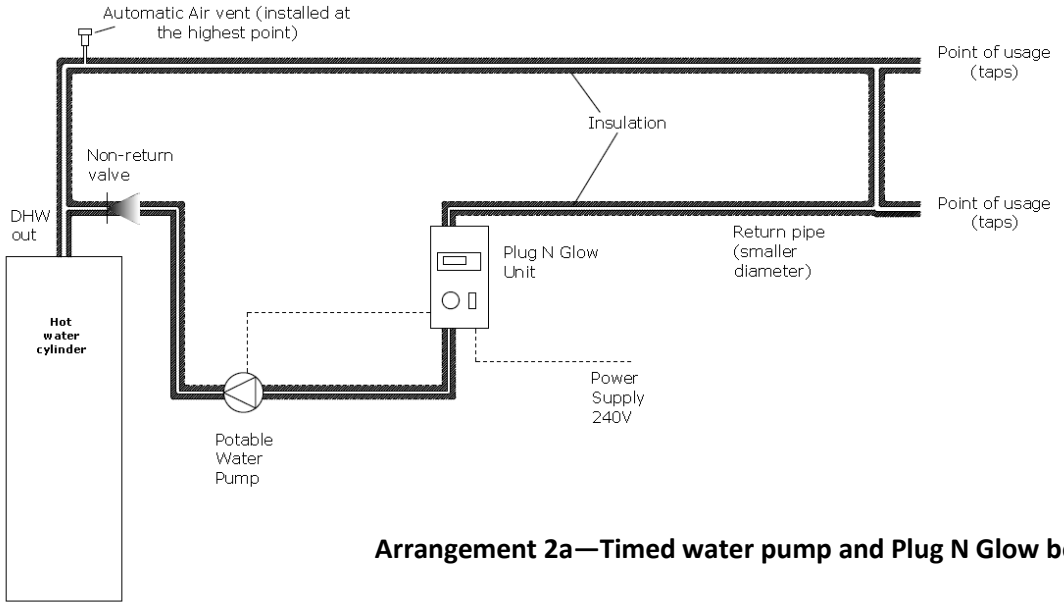
Secondary Hot Water Returns



Arrangement 2—Timed water pump and flow boiler

To avoid high energy bills it is important that the setting on the thermostat in the flow boiler is reduced in temperature. This should be reset to approximately 45– 50°C.

As a guide for a heat loss that gives a 5 degree temperature loss in a secondary loop of 28mm, a 1kW flow boiler will maintain the temperature in approx 78m of pipework. For a 3kW the pipework can be increased to 233m.



Arrangement 2a—Timed water pump and Plug N Glow boiler