Application Information Sheet

GSHP with Underfloor Heating and DHW via Solar Thermal.

Facts at a glance:

Highest possible efficiency
By keeping the heat pump operating at a low flow temperature for space heating, it runs at its maximum efficiency.

Free DHW in the summer
The solar thermal will provide around 70% of the DHW requirements free.

Off-peak tariffs
Off-peak tariffs can be used to reduce the costs of running the heat pump and the immersion heater (if required).

Ground Arrays
As the additional load on the ground for DHW from the heat pump is not required the amount of ground arrays can be decreased.

Simplified installation
Keeping the two systems separate simplifies the installation and keeps the installation costs lower.

A heat pump's efficiency depends on its outlet temperature into the heating system. The lower the flow temperature the higher the efficiency. As underfloor heating systems mounted in screed have a low flow temperature requirement, due to the large surface area, it is an ideal partner for heat pumps. The Kensa compact heat pump is specifically designed to provide space heating and domestic hot water (DHW), however due to the higher temperature requirements for DHW, when producing DHW the heat pump will be less efficient. To obtain the highest efficiency for the whole heating system, it is better to completely separate the DHW from the space heating and use solar thermal backed up with an off-peak immersion heater to provide the DHW.

Principle of Operation
The heat pump provides hot water into the underfloor heating system at generally a flow temperature of 35°C. If the insulation of the building is below current regulations then this flow temperature might need to be increased reducing the system's efficiency. Insulative floor coverings such as wood or thick carpets can also require higher flow temperatures.

To avoid short cycling of the heat pump it is advised that 25% of the zones on the underfloor manifolds are left hydraulically open to provide a minimum load on the heat pump. These zones are usually the bathrooms and halls. (Alternatively a buffer vessel can be used). Any mixing valves on manifolds should also be removed to provide maximum heat into the underfloor zones.

The underfloor manifolds should ideally be connected using a reverse return system as this will ensure even heat flow through the underfloor zones without the use of balancing valves and the resulting increase in water pump energy.

During the summer all of the DHW production is provided free by the solar thermal system, however during the winter when the solar cannot produce a high enough temperature the off-peak immersion heater is used.

The advantages of keeping the two systems separate are that:-

- It simplifies the installation.
- Lower running costs, as it allows the heat pump to fully operate on off-peak tariffs for space heating (if the heat pump was producing DHW during off-peak periods, the amount of space heating is reduced, meaning that the heat pump might have to operate during peak electricity periods, significantly increasing the running costs).
- Reduced amount of ground arrays, as the demand on the ground is reduced.

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Heat Pumps

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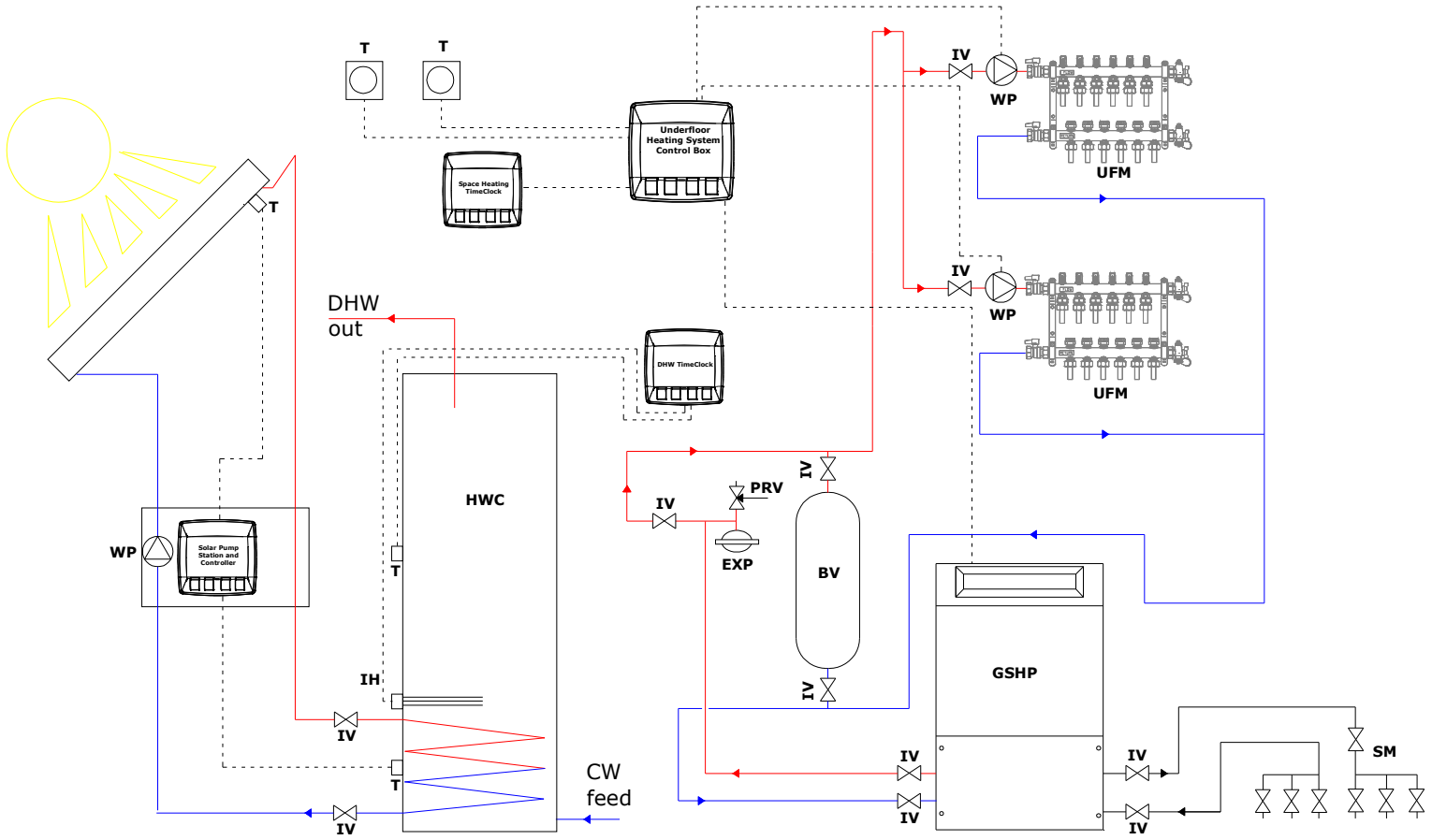

Abbreviations

3PDV - 3 port diverting valve
BV - Buffer Vessel
DHW - Domestic Hot Water
CW - Cold Water
EXP - Expansion vessel
GSHP - Ground source heat pump
IH - Immersion heater
IV - Isolation valve
PRV - Pressure relief valve
SM - Slinky manifold
T - Thermostat
UFM - Underfloor manifold
WP - Water pump

The Buffer Vessel (BV) is an optional item and can be fitted to reduce short cycling of the heat pump and provide close temperature control for all zones. If 25% of the underfloor zones and radiators are left open this is not required.

Please note:- The above drawing is a schematic only and additional valves and fittings maybe required.

Please note:- Kensa supply is the ground source heat pump and slinky manifold. Kensa also supplies the horizontal ground arrays and antifreeze (not shown above).