Space Heating and Domestic Hot Water with Radiators

Principle of Operation

The Kensa compact heat pump is specifically designed to provide space heating at the highest efficiency possible with the simplest installation.

In space heating mode the system provides hot water into the radiator heating system at generally a flow temperature of 45—50oC. For heating in a well insulated building this will provide adequate heating into the building, however the sizing of the radiators will need to be checked. If the insulation of the building is below current regulations then this flow temperature might not be higher enough to provide sufficient heat into the building.

To avoid short cycling of the heat pump in space heating mode, it is advisable that approximately 25% of the radiators are used as bypass radiators, i.e. with no thermostatic controls on them. These bypass radiators should be in areas which do not require close temperature control such as hallways. If close temperature control is required in all zones a buffer vessel should be used.

The radiators should ideally be connected using a reverse return system as this will ensure even heat flow through the radiators without the use of balancing valves and the resulting increase in water pump energy. Any microbore pipe will need to be removed as this does not allow the correct flow rate of hot water into the radiators and systems will also need to be power flushed before the system is commissioned.

Heat pumps will operate with radiators, however due to the higher flow temperatures (45-50°C) the efficiency of such systems are lower than underfloor systems. COP's for radiator systems due to this higher flow temperature are generally around 3.

When the DHW time clock calls for production of DHW, the three-port valve diverts the flow from the heating distribution circuit into the indirect coil within the hot water cylinder. The temperature of the water from the heat pump is raised to approximately 50°C.

When the DHW production time period ends, the three port valve switches back to the underfloor distribution and the temperature drops back to its space heating design temperature. The heat pump then reverts to space heating mode or switches off if no zones are calling for heat.

The maximum DHW temperature that the heat pump can achieve will be approximately 50- 55°C. If 65°C is required all year round, it is recommended that an immersion heater is linked to a second channel on the DHW timeclock and this is programmed to operate for a period immediately following the DHW production. This means that the majority of the heating load for the DHW is produced using the heat pump, as opposed to using only the direct immersion heater. If 50°C water is acceptable, then it is recommended that the immersion heater is programmed to raise the temperature to 65°C once a week using the DHW timeclock.

Facts at a glance

45-50°C flow temperature - Heat pumps with radiators require to increase their flow temperatures to 45-50°C which reduces the COP and hence efficiency.

Oversized hot water coils are required - The larger size the coil within the tank, the better the heat transfer area and hence the better the DHW performance will be. Due to the low flow temperatures generated by the heat pump the hot water tank must have an oversized coil to provide the correct heat transfer.

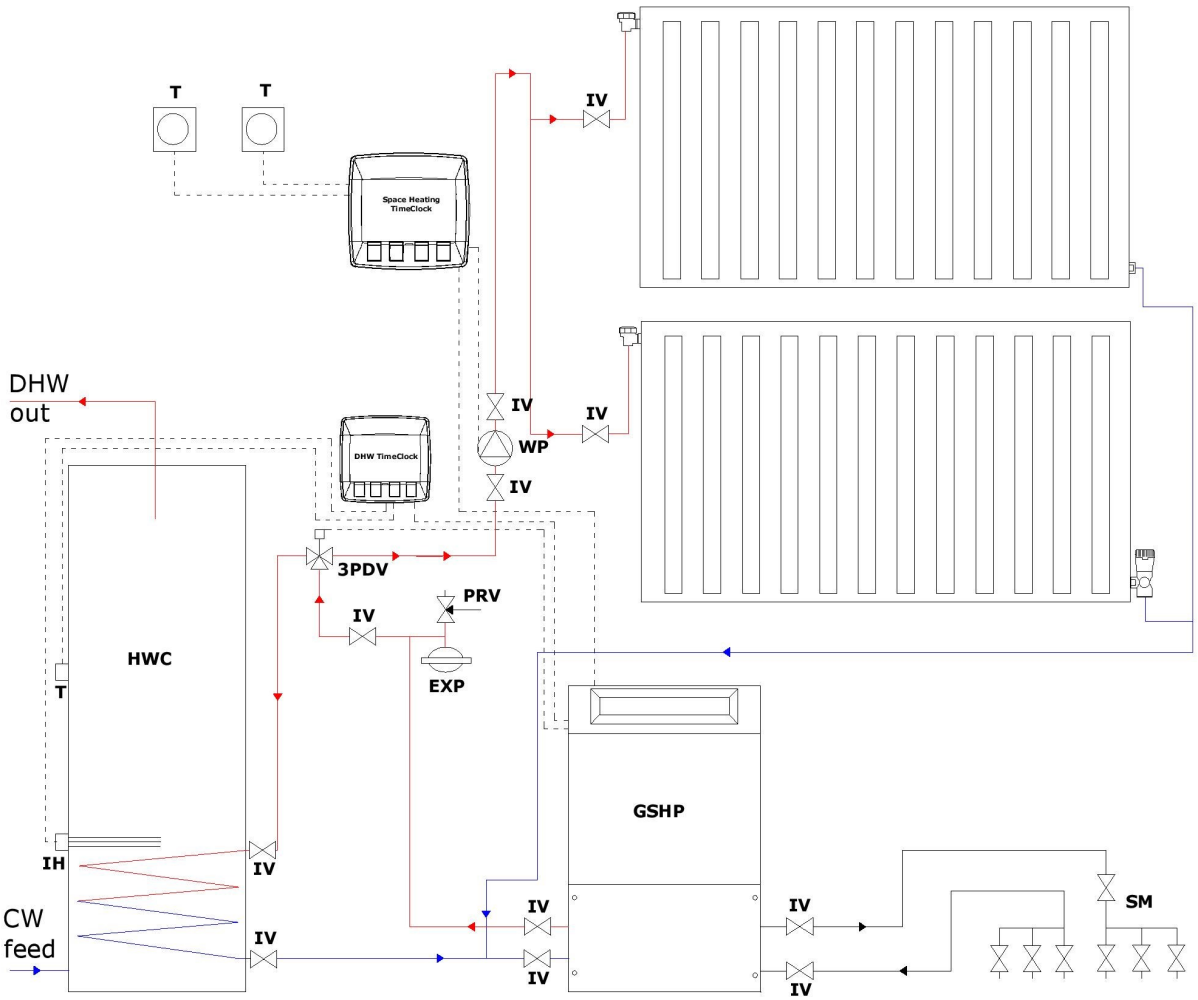
Simple Installation - Designed to simplify installation by removing the need for complicated control logic.

Off-Peak Tariffs - Due to the low water content of radiator systems and hence low thermal storage, off-peak tariffs such as Economy 10 can not be effectively used and a flat rate tariff might be more effective.

50°C DHW flow temperature - Domestic Hot Water flow temperatures achieved at approximately 50°C.

Application (AIS)

Application - Space Heating and DHW with Rads V1



Abbreviations

3PDV - 3 port diverting valve
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

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, DHW cylinder and slinky manifold. Kensa also supplies the horizontal ground arrays and antifreeze (not shown above).

Please note:- Running the GSHP to produce DHW with off-peak tariffs might result in the GSHP needing to operate during peak electricity periods for space heating with higher associated running costs.