



Commercial Plant Heating and Cooling

[Kensa Heat Pumps](#) is the leading UK manufacturer of ground source heat pumps. Kensa produces a complete range of units from small domestic systems to large commercial plant, all designed specifically for the UK climate. Kensa has vast technical expertise at applying ground source heat pump technology in commercial applications.

In many modern commercial buildings, with the improvement in energy saving measures such as insulation, the requirement for cooling is now almost as great (if not greater) than the requirement for heating. This cooling requirement is generally being driven by the use of heat emitting devices such as computers, printers and even the staff themselves.

[Kensa's commercial ground source heat pump range](#) can be designed as reverse cycle modules which can provide heating or cooling. This option needs to be specified at time of order as it cannot be field fitted.

The modular design of Kensa Plantroom models enables the system to closely match the required loads. Each unit should be configured via the BMS to operate sequentially to allow part operation to match the heat/cooling demand of the building. With multiple units it is possible to provide heating and cooling to different parts of the building simultaneously. The multiple unit approach also offers a degree of redundancy in the unlikely event of a problem with one of the units.

Depending on the system design it might be necessary to incorporate a [buffer vessel](#) to avoid short cycling problems - to improve overall efficiency of the system it is recommended that this is a twin connection buffer vessel. The vessel should be sized for 10 litres per kW of the smallest heat pump module. For example for a 60kW heating load using 3 x 20kW heat pumps the buffer vessel should be approximately $20 \times 10 = 200$ litres. (If low loss headers are used which provide sufficient volume then an additional buffer vessel might not be required).

Facts at a glance:

- **Low CO₂ emissions**
As ground source heat pumps use renewable technology they inherently have low CO₂ emissions, helping compliance with planning requirements.
- **High efficiency at flow**
temperatures of 35°C COPs of 4 can be generated at a flow temperature of 35°C. The heat pumps can operate up to a maximum of 50°C, however at these flow temperatures the efficiencies are reduced.
- **Simple installation**
Designed for simple installation allowing competent M&E contractors to install the heat pumps without specialist training.
- **7-12°C cooling temperature**
Industry standard cooling temperatures of 7 – 12°C can easily be achieved and non standard temperatures can also be used.
- **Large range of units**
Kensa's product range covers heating and cooling loads from 4kW to many MWs.

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Kensa heat pumps can work equally as well with horizontal, vertical or lake arrays as the energy source. Although Slinky ground arrays are shown on the drawing, in large commercial projects it can be more usual to use a [borehole](#) field design due to space considerations. Kensa can offer a thermal response test on a trial borehole to provide data to enable an accurate borefield design to be produced. For any loads above 100kW this is highly recommended. Please contact Kensa for further details.

The following schematic details how a heating and cooling system can be designed.

Principle of Operation

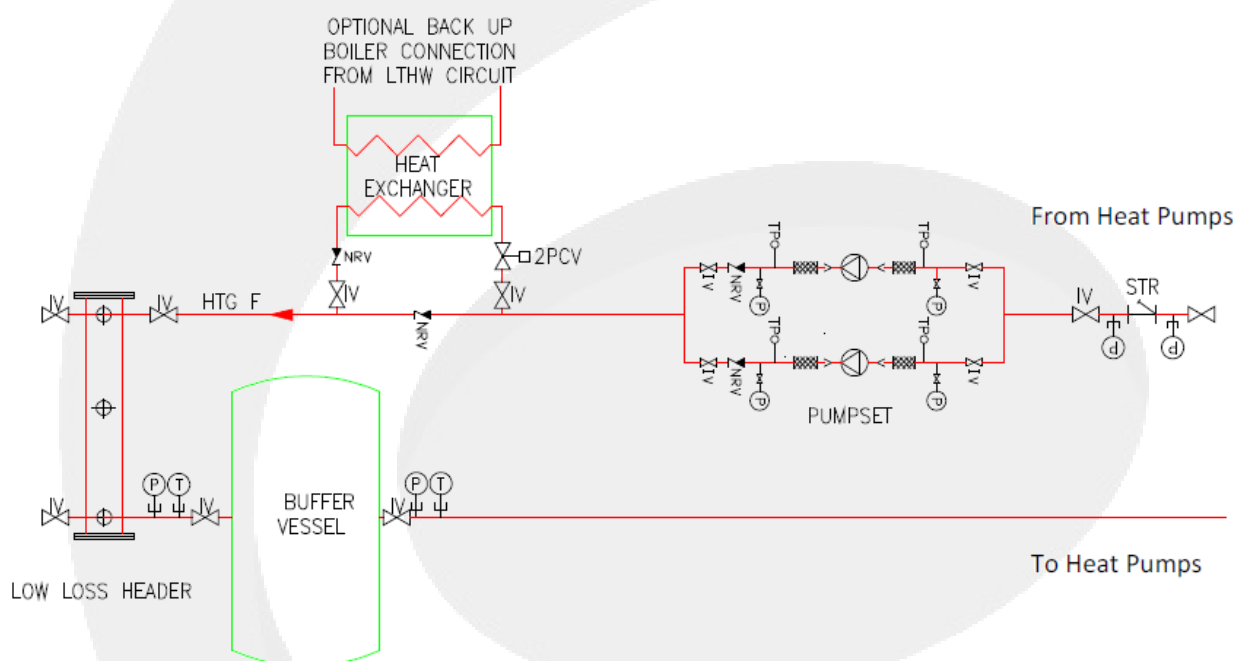
In the following example two of the ground source heat pumps are designed as reverse cycle units and one as heating only.

If there is a demand for cooling the heat pump modules can be switched by the Building Management System (BMS) to cooling mode by the use of a simple volt free relay. At the same time the BMS system will divert the flow from the heating circuit to the cooling circuit by means of a three port diverting valve (3PDV) in the flow line. The return flow to the heat pump is also diverted from the heating circuit to the cooling circuit and the heating pumps turned off and the cooling pumps started.

It is important that a sufficient quantity of glycol [antifreeze](#) is added to the cooling and heating circuit fluid to avoid freezing of the fluid in cooling mode.

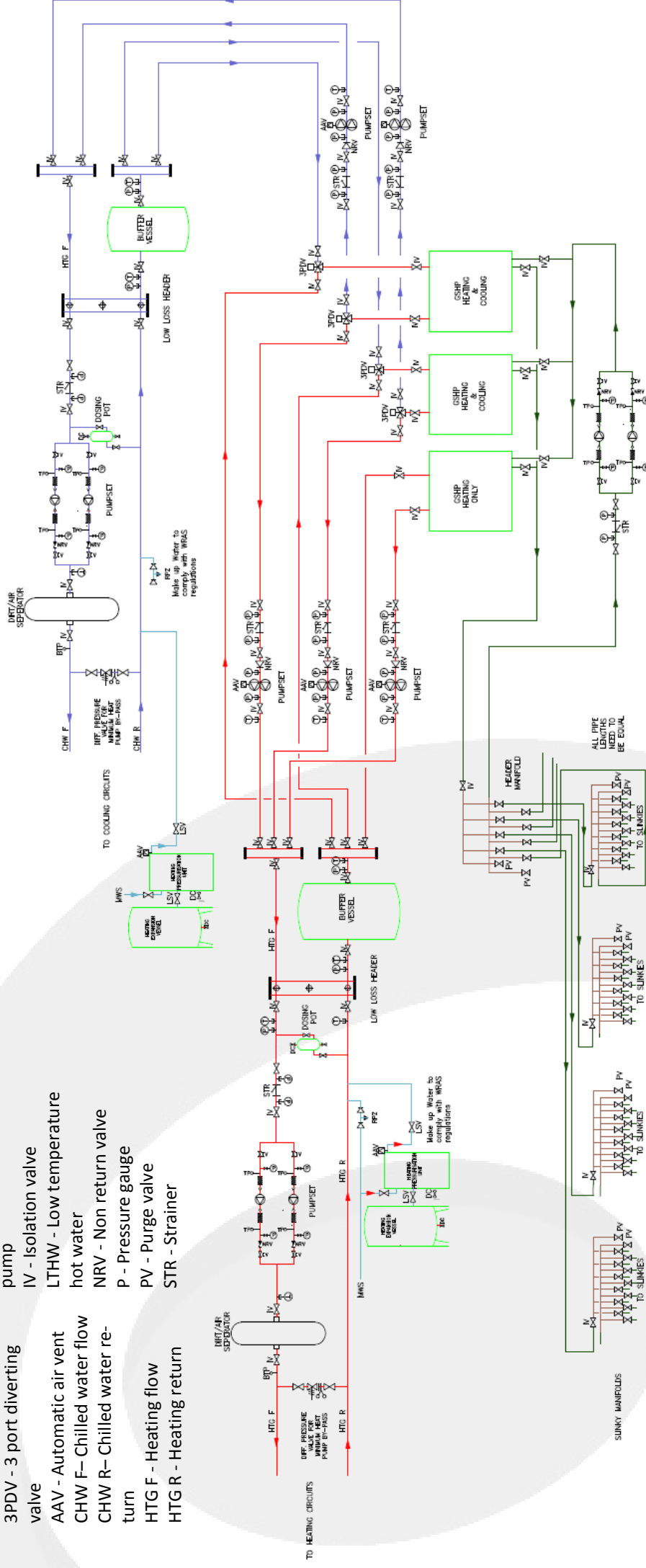
Secondary Boiler Back Up Systems

For plant where a secondary back up is required this can be achieved by the use of a plate heat exchanger placed within the flow line. By using a plate heat exchanger the two systems are hydraulically separated.



Abbreviations

2PCV - 2 port control valve	GSHP - Ground source heat pump
3PDV - 3 port diverting valve	IV - Isolation valve
AAV - Automatic air vent	LTHW - Low temperature hot water
CHW F - Chilled water flow	NRV - Non return valve
CHW R - Chilled water return	P - Pressure gauge
HTG F - Heating flow	PV - Purge valve
HTG R - Heating return	STR - Strainer



Please note: Kensa supplies the ground source heat pumps and slinky and header manifolds. Kensa also supplies the horizontal ground arrays and antifreeze (not shown above).

Please note: The attached drawings are schematics only and additional valves and fittings may be required.