Application Information Sheet

Commercial Plant Heating and Cooling

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 such as the Merton Rule.

High efficiency at flow temperatures of 35C
COPs of 4 can be generated at a flow temperature of 35C. The heat pumps can operate up to a maximum of 50C, however at these flow temperatures the efficiencies are reduced.

Simple installation
Designed for simple installation allowing competent M and E contractors to install the heat pumps without specialist training.

7-12C cooling temperature
Industry standard cooling temperatures of 7 –12C 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.

Kensa Engineering are the leading UK manufacturer of ground source heat pumps. Kensa produce a complete range of units from small domestic systems to large commercial plant, all designed specifically for the UK climate and Kensa have 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 plantrooms 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 if the units.

Depending on the system design it might be necessary to incorporate a buffer vessel to avoid short cycling problems and it is recommended, to improve overall efficiency of the system, 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 approx 20 x 10 = 200 litres. (If low loss headers are used which provide sufficient volume then an additional buffer vessel might not be required).

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 trail 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

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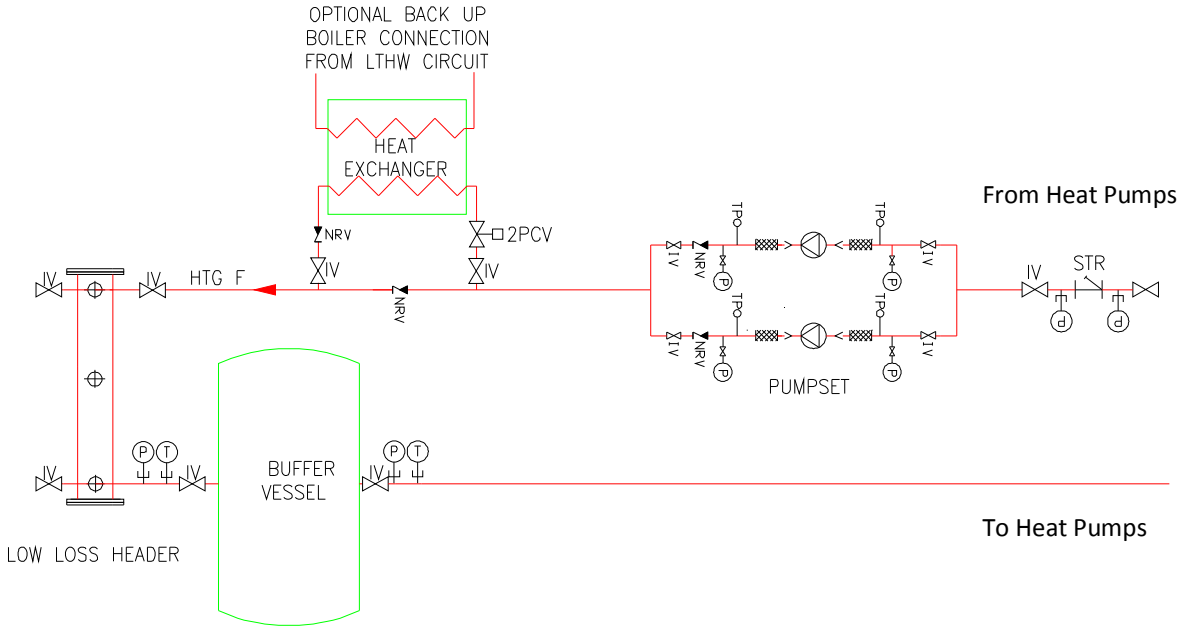
units and one as heating only.

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

Please note:- The attached drawings are schematics only and additional valves and fittings maybe required.

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

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