Factsheet

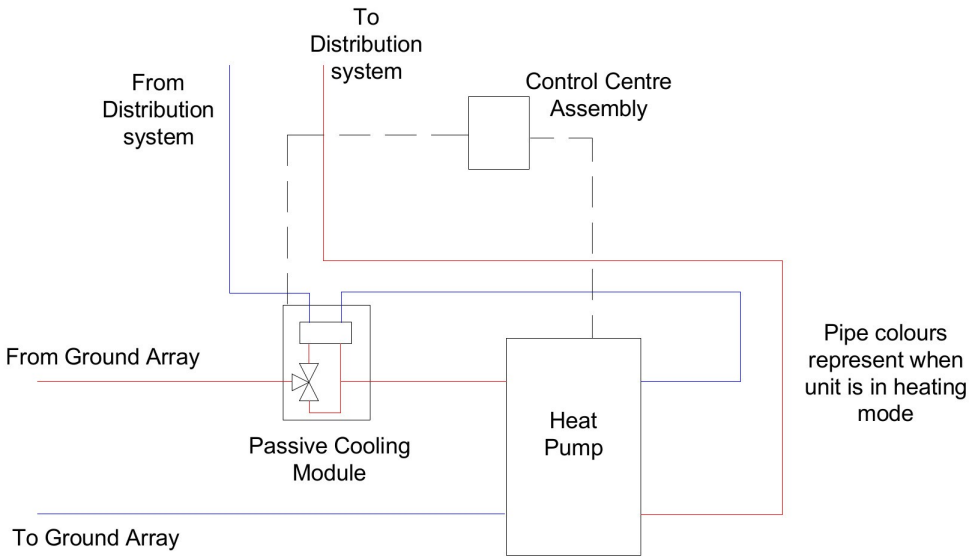
Passive Cooling Module v2

Page(s)

At the end of a heating season the ground arrays will normally be operating at around 0 to 5 °C. The amount of time for the array to return to 'normal' ground temperatures depends upon the type of array (drilled vertical ground arrays will generally remain cool for a period of time, where as horizontal ground arrays will quickly return to the surrounding ground temperature due to a higher solar gain and especially after a period of rain). However the ground temperature will generally be cooler than the surrounding air temperature in Summer.

This colder temperature can allow a degree of passive or 'free' cooling to occur if the building has passive beams or an underfloor cooling system. This is simply achieved by passing the contents of the cooling system through a plate heat exchanger with the ground array fluid passing through the other side. While the contents of the cooling system still goes through the heat pump, the heat pump is inactive and the only energy used is the power required by the water pumps. How effective this cooling is and for how long depends upon the amount of cooling required and again the type of ground array. Whilst not as effective as active cooling, passive cooling will allow a degree of cooling at low cost.

To help with the installation of passive cooling systems Kensa has developed a Passive Cooling module and Control Centre wiring centre which when linked to Kensa's range of Ground Source Heat Pumps provides the components for a cost effective cooling system.



Facts at a glance:

Cooling performance
How effective the cooling is largely dependant on the cooling distribution system.

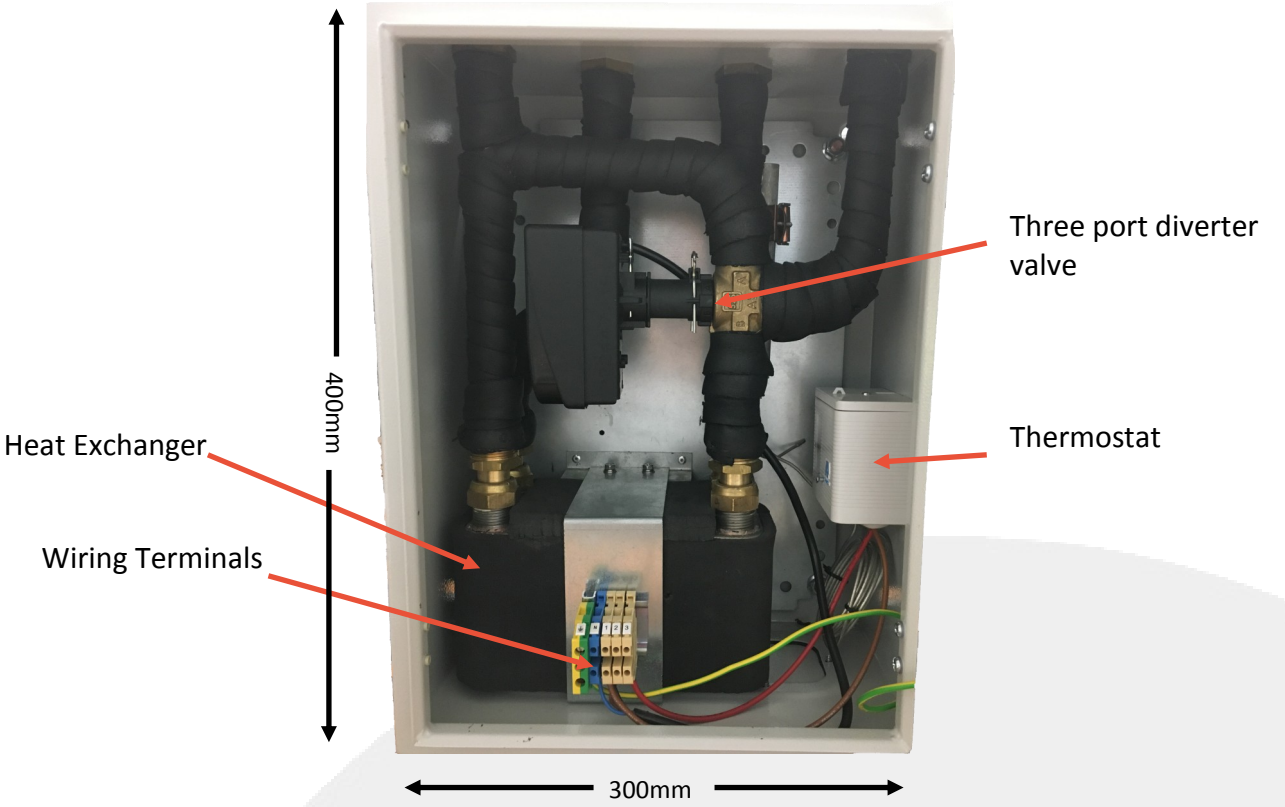
Underfloor distribution
Underfloor is not that good at providing cooling as it is slow to react, has poor cooling densities and condensation can occur.

Passive cooling
Passive or 'free cooling' effectiveness depends on the type of ground array with boreholes being most effective.

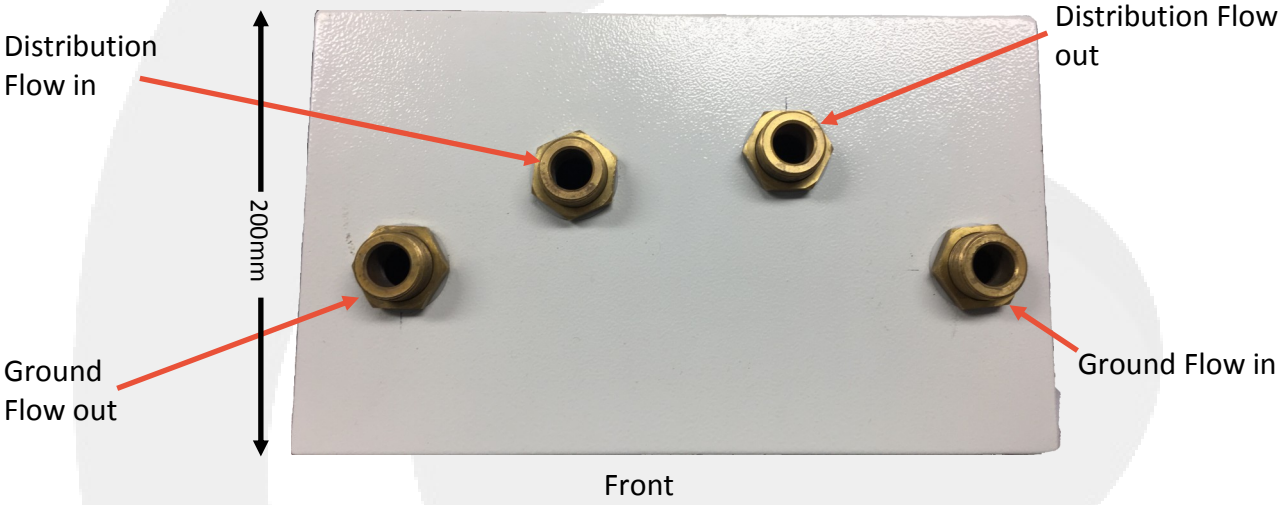
Factsheet

Passive Cooling Module v2

Page(s)



Passive Cooling Module (Internals)



Passive Cooling Module Connections

The Passive Cooling Module should be installed with the connections at the top of the unit.

Methodology.

In heating mode the warm fluid from the ground array bypasses the heat exchanger within the Passive Cooling Module. The return from the distribution system flows around the primary side of the heat exchanger, however as there is no flow around the secondary side of the heat exchanger no heat is transferred.

In cooling mode, the three port valve diverts the flow from the ground array around the heat exchanger within the Passive Cooling Module. The flow from the distribution side is passed around the other side of the heat exchanger. As there is a difference in the temperature between the two flows, heat is transferred from the return of the distribution system into the flow from the ground.

Flows are then passed through the heat pump, which is inactive (other than the water pumps) back to the distribution system and ground array.

Within the Passive Cooling Module the flow temperature of the distribution system fluid is monitored via a thermostat. When this drops below a set value the thermostat diverts the flow from the ground array away from the heat exchanger and stops the distribution side water pump from running, avoiding issues with condensation in the distribution system.

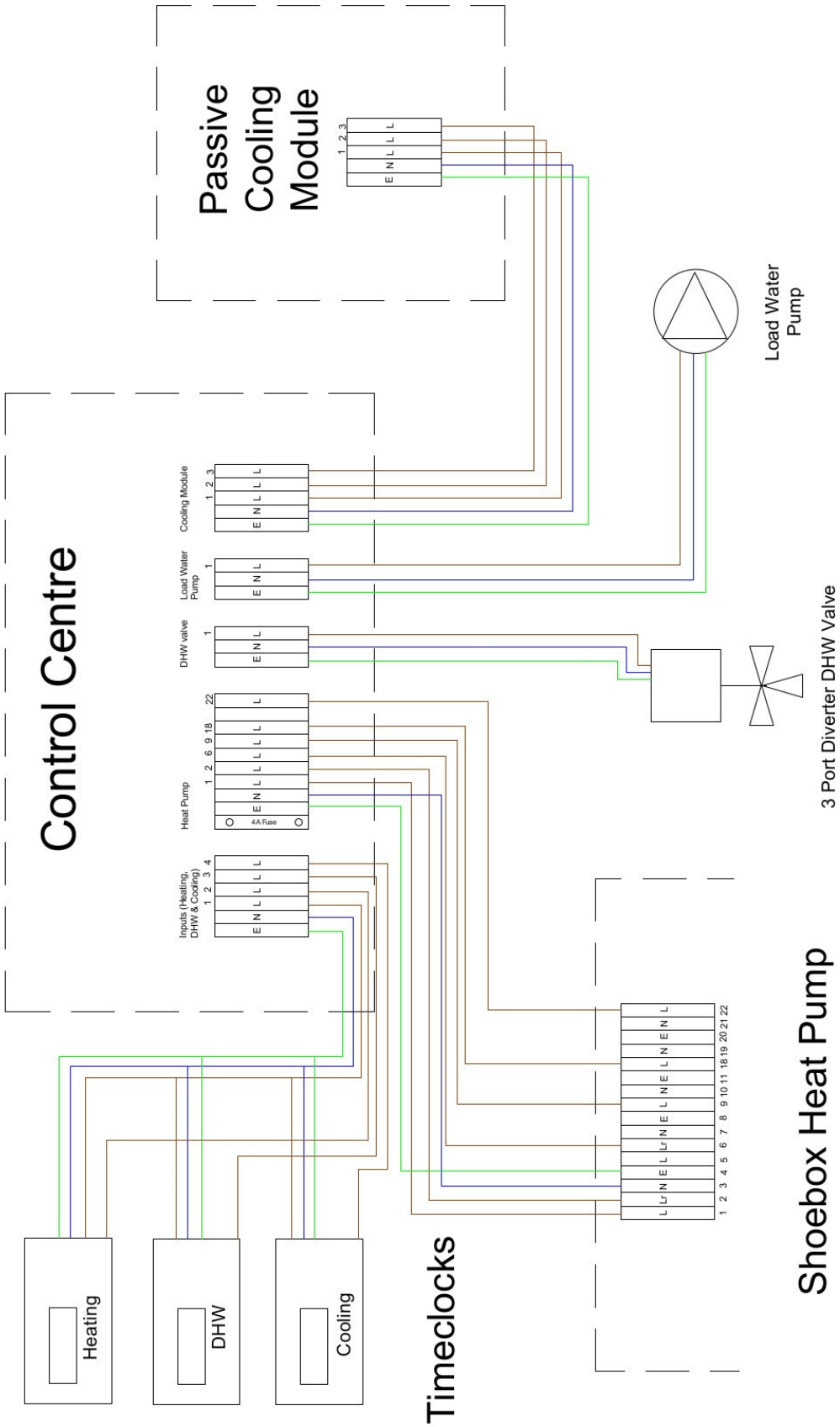
Passive Cooling Control Centre.

In order that the Passive cooling module works with Kensa heat pumps a central wiring control unit is also required. This should be installed between the heat pump and Passive Cooling Module.

Kensa Heat Pumps
A KENSA GROUP COMPANY

Passive Cooling Module v3

Page(s)



Passive Cooling Module and Control Centre Wiring.