

Installation and Maintenance Instructions



GENERAL

S2 D-X constitutes a complete heat-pump installation for surface ground heat extraction. D-X means direct vaporisation, also called direct expansion, which entails the vaporisation of the refrigerant directly in the heat absorbing ground collector coils. S2 D-X consists of a separate compressor unit which is connected to an accumulator tank with a condenser coil, coil for domestic hot water and an electric immersion heater for additional heating capacity. Included in the delivery is also a regulator for the normal operation of the heat-pump and the ground collector coils consisting of tinplated copper pipes for heat absorption from the soil.

The accumulator tank is delivered with a manual shunt valve as standard. The automatic control, type "VSE", is available as an addition and can be delivered upon request. The tank can also be fitted with a circuit for solar heating as an addition.

S2 D-X is normally the only heat source for the dwelling, but may be combined with an existing boiler or other heat source.

Transport

The heat-pump is delivered on a pallet and shall be transported standing. Storage must be in a dry room.

Placement

The heat-pump must stand on a firm base. The compressor unit is placed on a floor or foundation of concrete in order to minimise sound and vibration transmission. If the heat-pump is situated in a space where the walls adjoin other habitable space, then the heat-pump should be placed in such a way that sound transmission is minimised to adjoining rooms. Never place the heat-pump against a wall adjoining a bedroom.

Accumulator tank

The accumulator tank must be placed in a dry space and stand on a firm base which can withstand the total load of the filled tank of about 650kg for a 500 litre tank.

The various units which are delivered as separate units do not need to be placed next to each other, which allows for greater flexibility when choosing location. The cover of the heat-pump is manufactured in galvanised and subsequently powder lacquered steel plate. This allows the heat-pump to even be placed outdoors provided it is well protected from weather.

Practically it is an advantage the shorter the distance is between the heat-pump and the accumulator tank. The maximum recommended distance between the units is 10m.

Technical Data

Heating capacity	4850 W
Power consumption	1500 W
Voltage	380 V
Current	3.5 A
Length of ground collector	2 x 60m
Refrigerant	R-407C
Amount of refrigerant	ca 2 kg
External dimensions of HP HxWxD	49x50x45cm
Limit of pressure switch at high pressure	26 bar
Limit of pressure switch at low pressure	1.5 bar
Weight	65kg

HEAT CARRIER

Heat-pump as sole heat source

Radiator system

The radiators must be designed as a low temperature hot water (LTHW) heating system since the heat-pump does not yield more than approximately 50 centigrade for the flow.

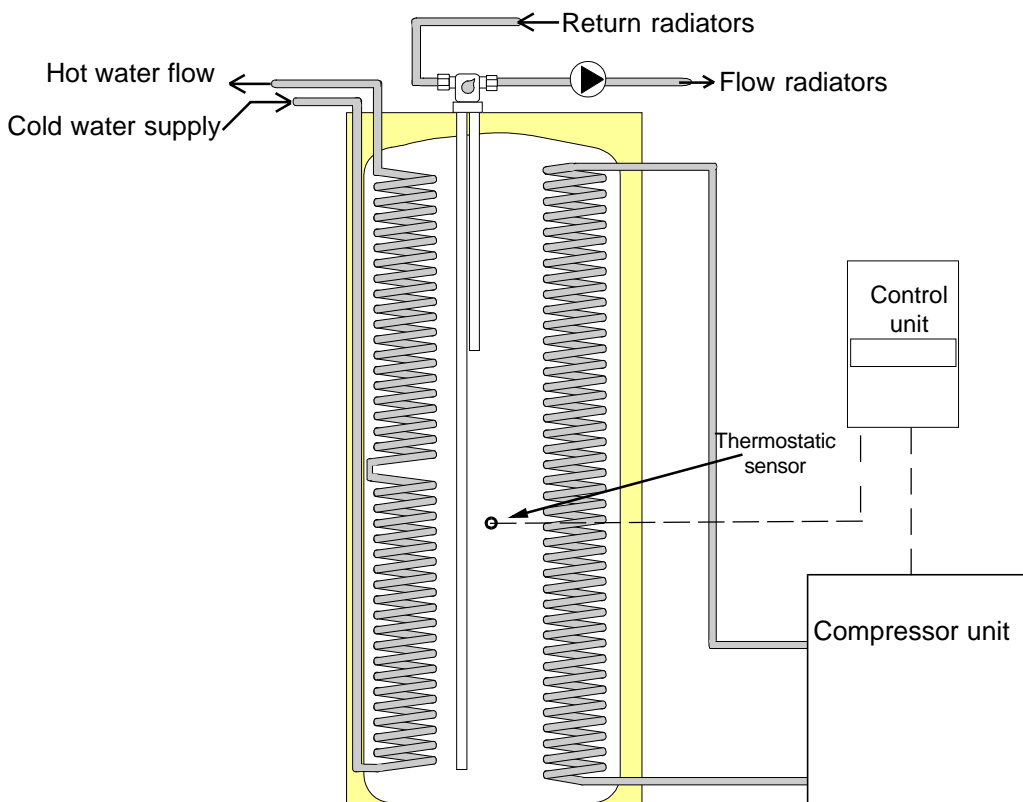
The radiator system is connected to the shunt valve of the accumulator tank. The shunt valve is of a rotating type with the flow connection placed on the right as viewed from the front of the tank. The expansion vessel and other safety equipment is installed according to relevant regulations.

Hot water production

Domestic hot water is produced in coils which are placed in the left side of the tank and consist of a pre-heat and a post-heat coil. The normal procedure is to connect the outgoing end of the pre-heat coil with the incoming end of the post-heat coil. Both the cold water supply connection and the hot water flow connection consist of 22 mm copper tube as per diagram below.

Only the post-heat coil (the top coil) shall be included in the circuit if a pumped secondary hot water re-circulating circuit is connected. The flow of the hot water re-circulating circuit is joined to the outgoing domestic hot water. The return of the hot water re-circulating circuit is joined by a T-connection to the connector between the pre-heat and post-heat coils. (It is necessary to remove the external cover plates of the tank in order to access the connector pipe). A non-return valve must be installed which closes against the pre-heat coil. The circulation must be as small as possible in order to reduce the return temperature.

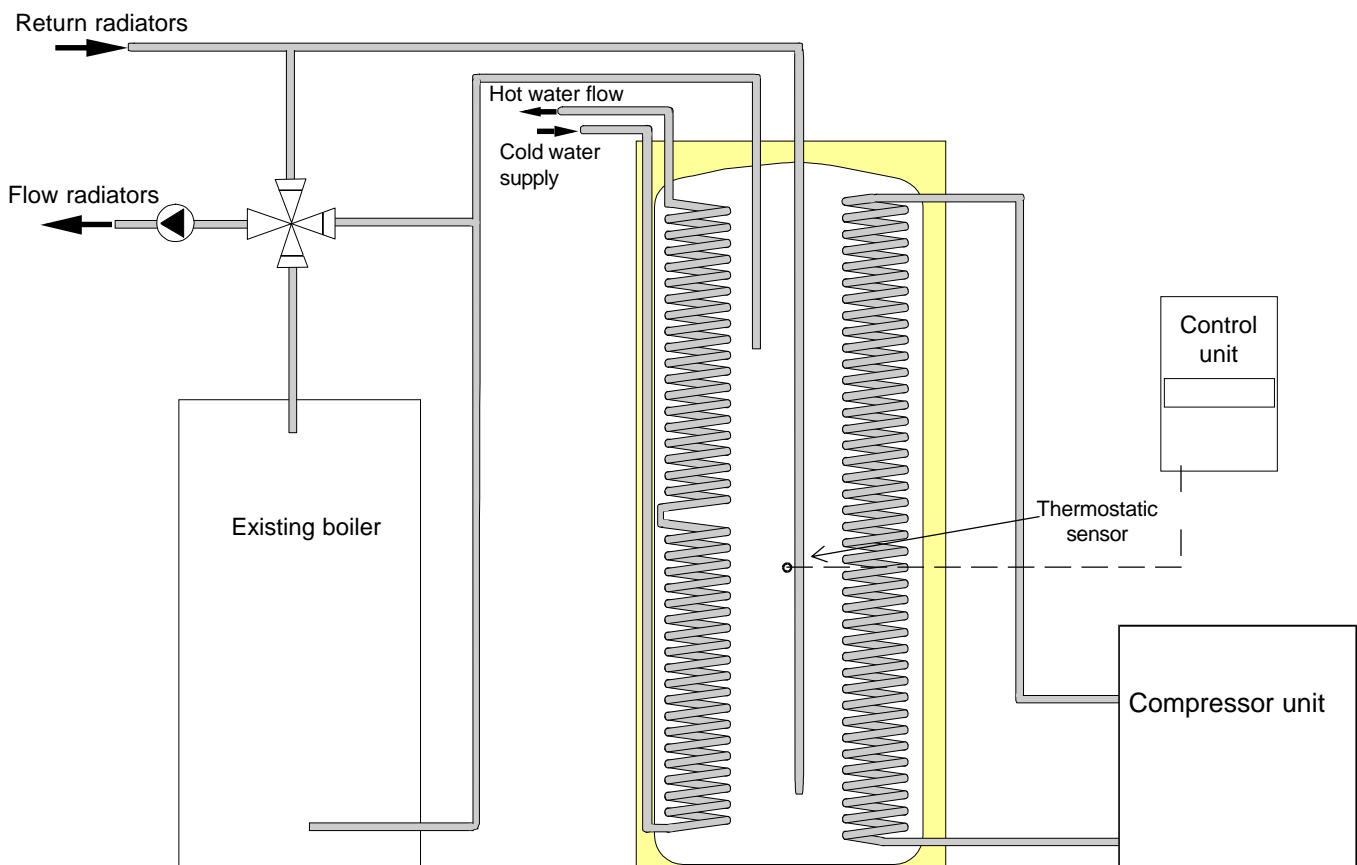
Thanks to the hot gas exchange which occurs in the condenser coil of the tank, high domestic hot water temperatures are obtained even during solely operation of the heat-pump. The mixer valve must therefore always be installed according to relevant regulations.



In combination with an existing boiler

The accumulator tank of the heat-pump is connected to the existing boiler and heating system with a four way mixing valve type BIV which with rising heat demand in the first instance opens against the accumulator tank of the heat-pump and thereafter against the boiler. When the shunt valve is completely open the total flow of the radiator system first flows to the accumulator tank and thereafter via the boiler to the heating system.

The operating temperature of the boiler is not dependant upon the heating demand of the radiator system and the boiler can therefore be completely isolated by an outdoor thermostat when the external temperature allows the heat-pump to fully supply the heating demand.



REFRIGERANT

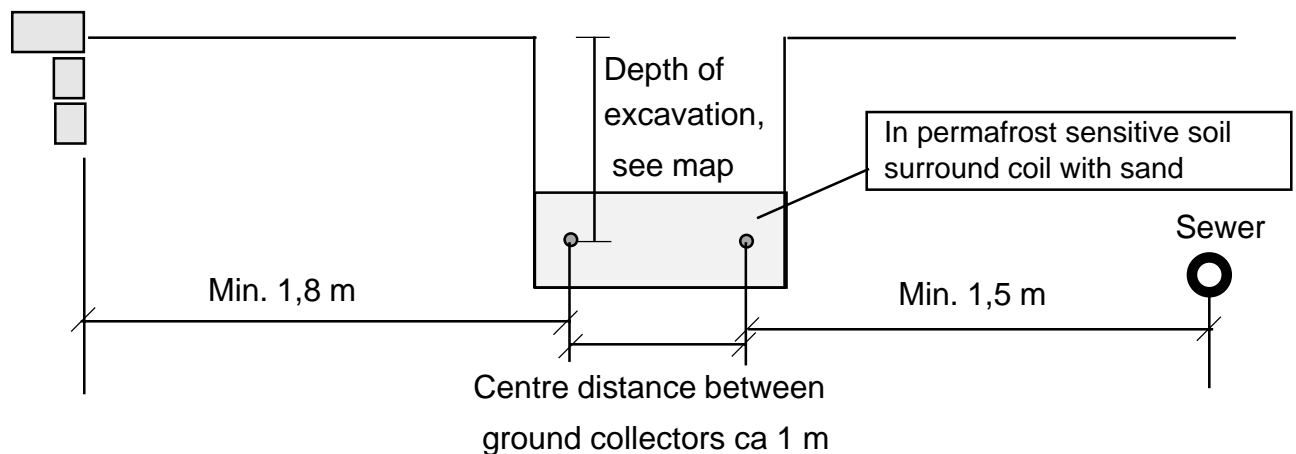
Ground collectors

PLACING GROUND COLLECTORS

The ground collectors consist of two number 60 m long coils of ½" tinplated copper tube. The coils shall be laid as horizontal as possible with a minimum distance between the coils of about 1.0m.

It is most usual practice for laying of the coils to dig two ditches by machine with a length of each 30 m and 1 m wide. The depth of placement varies from 0.8 m to 1.2 m depending upon geographical location. (refer to map on next page). The coils are laid along the outer edges of the ditch to form a closed looped.

House foundation



Make sure that there are no stones near to the coils and backfill manually with at least 20 cm material free from stones before using machines to backfill. Make sure that the material closest to the coils are finely graded in order to ensure that the coils achieve good contact with the surrounding soil to facilitate heat absorption into the coils. Avoid putting coils closer than 1.5m from water mains and sewage pipes. Where pipes cross each other the coils must be insulated with standard tube insulation for about 1.0m on either side of the crossing.

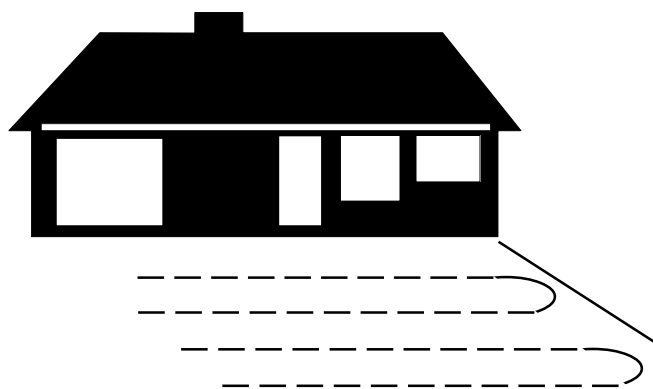
There exists in connection with permafrost sensitive soil (clay, silt etc.) a risk for frost heave. In order to minimise this risk it is possible to use sand around the coils for about 30 to 40 cm. The sand must have a grain size of 08 or less. It is generally desirable to place the coils under surfaces where a possible frost heave can be tolerated and it is important to avoid hard surfaces like garage drives and walkways. If possible frost heave cannot be tolerated, it is recommended to choose bore-hole heat-pumps.

Ground collectors may not be placed closer than 1.8m from any part of a building. At wall penetration the four ends of the coils are insulated at least 1.0m from the wall.

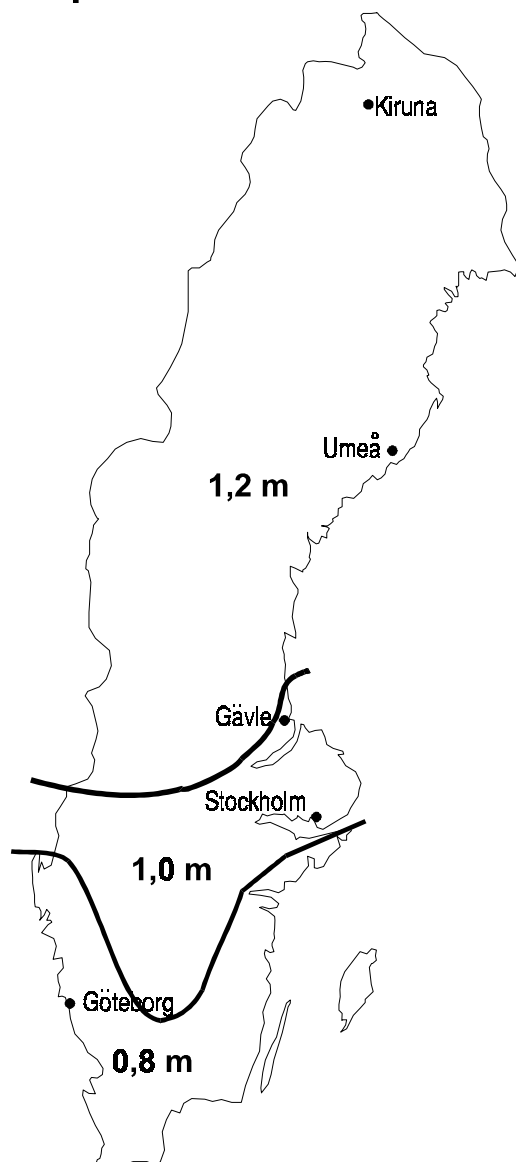
It is recommended to mark the ends of the coils with coloured tape or similar in order to be able to identify the coils.

NB! When laying the coils the tubing must be unwound without any kinks developing.

For sloping sites the coils must be laid parallel to slope as shown on the figure to the right.



Map for excavation depths



Refrigeration installation

Connecting ground collectors

The four ends of the ground collector coils shall normally end about 50 cm inside the room where the heat-pump is located. The manifold, t-connectors and bends are included in the delivery.

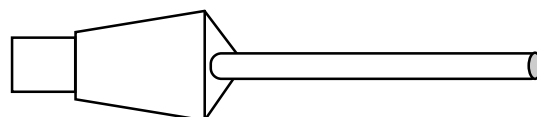
The joining is done according to the diagram below. The manifold must be placed within 1 m of the expansion valve.

The division can be achieved in entirely different places than next to the heat-pump like e.g. in a concrete pipe segment outside. However the expansion valve must accompany the manifold. The expansion valve can be delivered separately on demand.

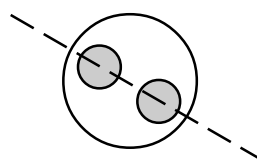
The joining is made either by soldering in nitrogen flow or with compression fittings. The suction side of the gas pipe must be increased in dimension if the distance is long between the heat-pump and the manifold.

The manifold shall preferably be placed vertically with the ends downwards.

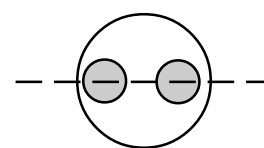
NB! The outlets shall be horizontal if the manifold is installed horizontally.



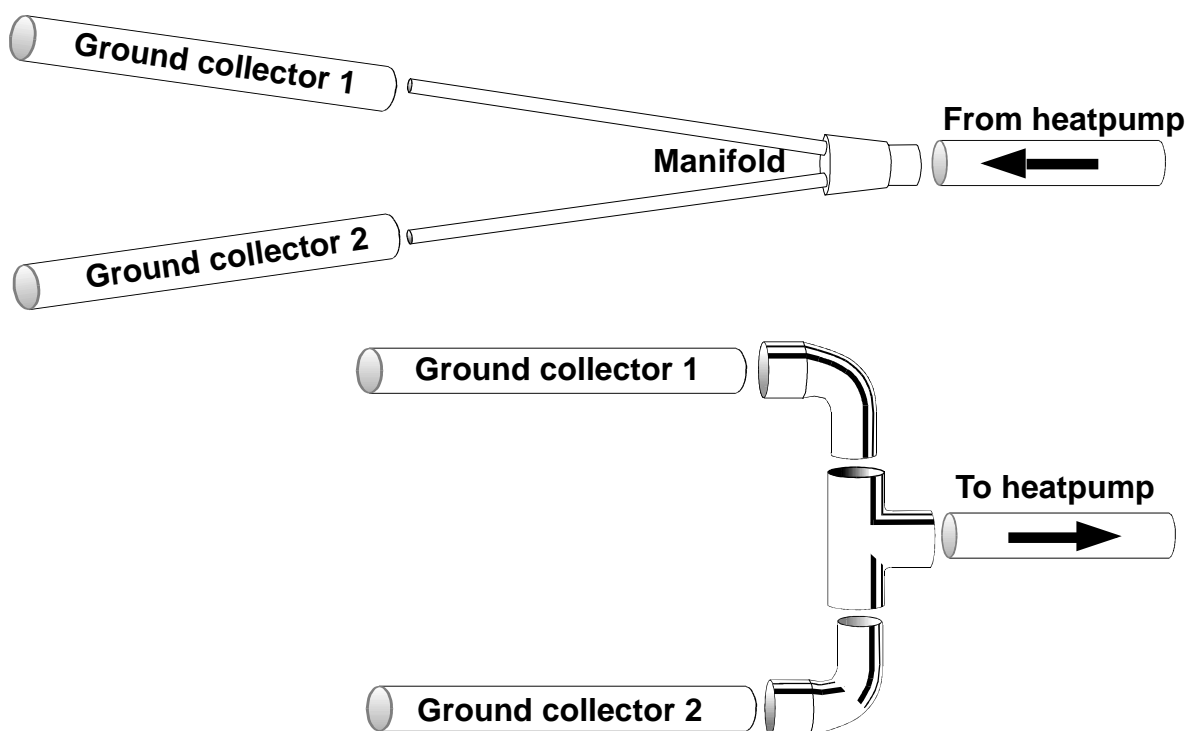
For horizontal installation



INCORRECT



CORRECT



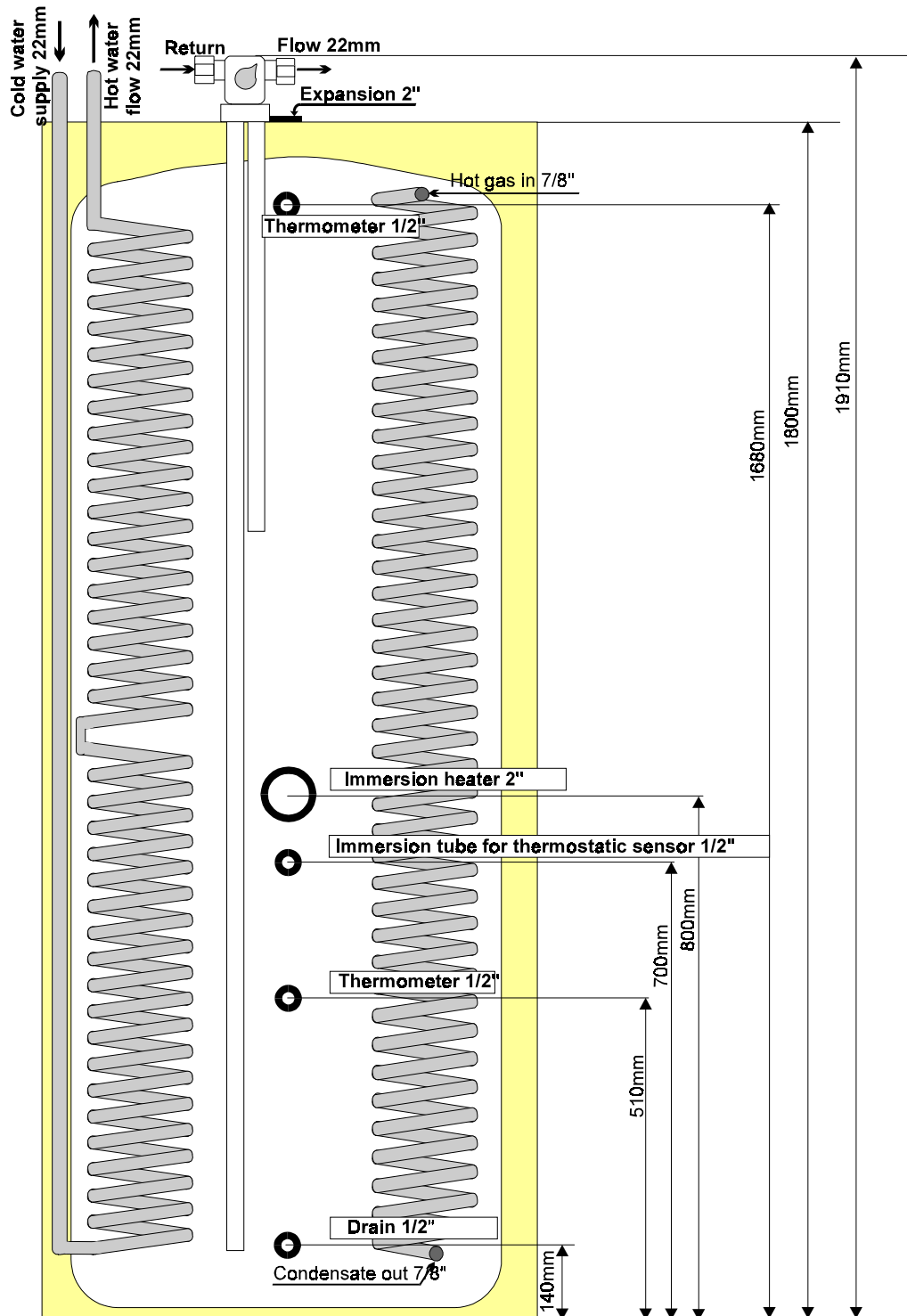
Connecting accumulator tank

The hot gas connection from the heat-pump shall be insulated and connected to the top coil connection on the tank. The thickness of insulation shall be increased to a minimum of 15mm and the pipe dimension to 1/2" if the pipe length between the compressor and the accumulator tank exceeds 2.0 m.

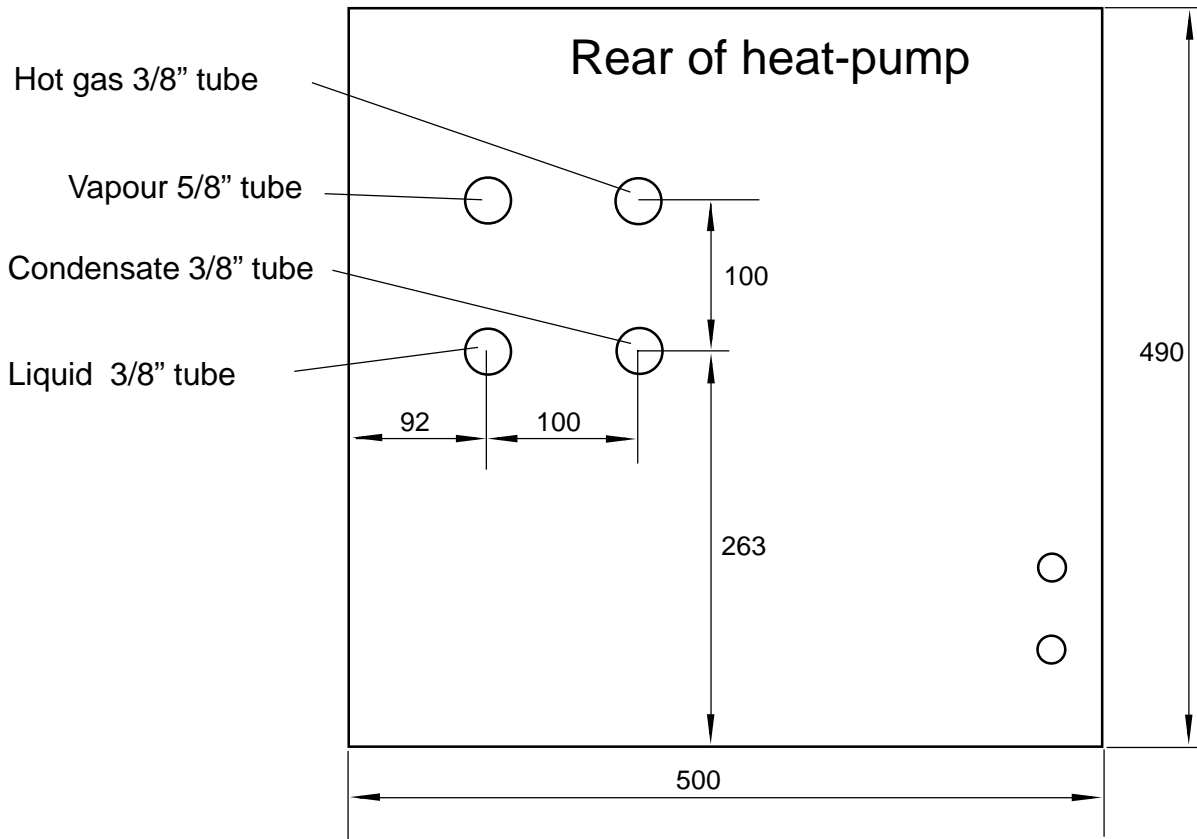
The system shall be tested to a pressure of 20 bar after joining and leak test joints after which the system must be vacuum cleaned carefully before filling with refrigerant. (amount of refrigerant, see page 2)

Accumulator tank

Dimensions and connections



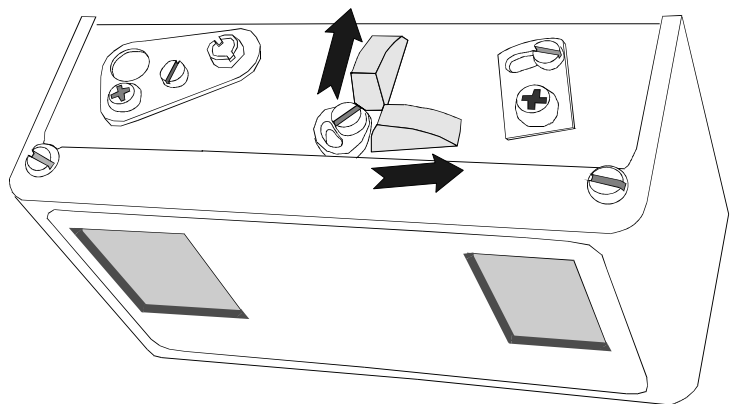
Connections and dimensions of the heat-pump



Fault detection

Re-instatement of pressure switch

If the compressor doesn't work when it normally should, it could be due to the pressure switch, also called the pressure guard, having released. The pressure switch is situated inside the heat-pump on the back of the box. The pressure switch is re-instated by pressing both the green buttons in the directions indicated by the arrows. If this occurs only occasionally it may be due to some eventuality, but if it happens repeatedly an engineer should attend to the installation.



ANVÄNDAR-ANVISNING FÖR RD-21 DUBBELTERMOSTAT



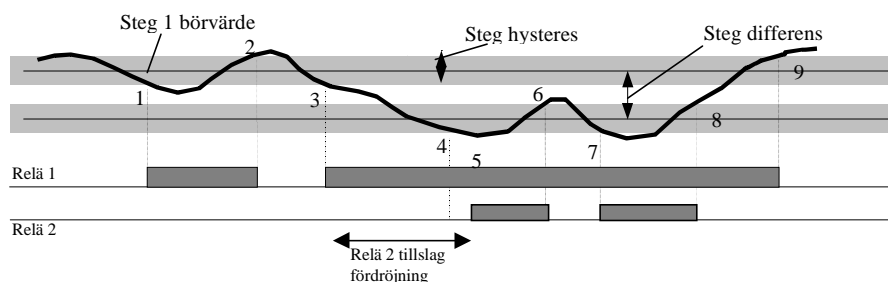
RD-21 har en meny med fem rader. Du når menyerna med UPP ▲ och NED ▼ knapparna. Tänk på menylistan som om den satt på väggen bredvid RD-21, NED-knappen gör att du kommer till nästa menyrad och UPP-knappen till den föregående i listan.

OBS! Om du skall ändra någon inställning använd ett finger, för om två knappar trycks in samtidigt kan man hamna i undermenyer där det normalt inte ska ändras något.

Användarmeny

MENYRAD Betydelse

- 0 Standard rad, här visas normalt aktuell temperatur.
- 1 Aktuell temperatur i grader
- 2 Börvärde för steg 1 i grader
- 3 In- / Ur-kopplingsdifferens för steg 1 och 2 i grader (steg hysteres)
- 4 Differens mellan stegen i grader
- 5 Relä 2 tillslagsfördröjning i minuter. Räknas från när RELÄ 1 slår till.



Alla rader utom rad noll blinkar med omväxlande radnummer och värde på raden.

Rad 2 till 5 har värden som kan ändras, använd PLUS-⊕ och MINUS-⊖ tangenterna för detta. Om du försöker ändra en rad som inte kan ändras visar RD21 detta med två minustecken.

En ändring av ett värde på rad 2 till 5 blir giltig fem sekunder efter att du tryckt på PLUS eller MINUS eller då du byter till en annan rad med UPP eller NED.

RD21 återgår till standard rad 30 sekunder efter sista knapptryckning.

En ganska vanlig inställning är:

MENYRAD

- 2 43 - 45 (ska aldrig överstiga 49 för då stannar värmepumpen)
- 3 2
- 4 2
- 5 20

Om strömmen bryts till RD-21 så är det en fördröjning inbyggd i den så när strömmen återkommer tar det en stund innan det startar.