User manual

DHP-S Cam

VUIFM102

If these instructions are not followed during installation and service, Danfoss A/Sliability according to the applicable warranty is not binding. Danfoss A/S retains the right to make changes to components and specifications without prior notice.

The Swedish language is used for the original instructions. Other languages are a translation of original instructions.
(Directive 2006/42/EG)

Contents

1 Important information

Note! If the installation is not used during the winter, the heating system must be drained of water, otherwise there is a risk of frost damage to the installation.

The system can be considered maintenance free but certain checks are necessary.

Before changing the control computer's settings, first find out what these changes mean.

Contact your installer for any service work.

Caution! This apparatus is not intended for persons (including children) with reduced physical, sensory or psychological capacity, or who do not have knowledge or experience, unless supervised or they have received instructions on how the apparatus functions from a safety qualified person.

Note! Children are not permitted to play with the apparatus.

1.1 Safety precautions

1.1.1 Installation and maintenance

DANGER! Only authorized installers may install, operate and carry out maintenance and repair work on the heat pump.

DANGER! Only authorized electricians may modify the electrical installation.

DANGER! DANGER TO LIFE! Only authorized refrigeration technicians may work on the refrigerant circuit.

1.1.2 System modifications

Only authorized installers may carry out modifications on the following components:

- The heat pump unit
- The pipes for the refrigerant, brine, water and power
- The safety valve

Do not carry out construction installations that may affect the operational safety of the heat pump.

1.1.3 Safety valve

The following safety precautions apply to the hot water circuit's safety valve with corresponding overflow pipe:

- Never block the connection to the safety valve's overflow pipe.
- Water expands when it is heated, this means that a small amount of water is released from the system via the overflow pipe. The water that exits the overflow pipe can be hot! Therefore, allow it to flow to a floor drain where there is no risk of burning yourself.

1.2 Protection

1.2.1 Corrosion Protection

Due to the risk of corrosion, avoid using different types of sprays in the vicinity of the heat pump. This particularly applies to:

- Solvents
- Chlorinated cleaning agents
- Paints
- Adhesives

2 About your heat pump

2.1 Product description

The heat pump is a heating system for heating and hot water if an external water heater is installed (accessory). It has a compressor developed solely for heat pumps.

The heat pump is equipped with control equipment which is presented in a graphical display. The control equipment is also prepared for monitoring via the internet.

Heat enters the house via a water borne heating system. The heat pump supplies as much of the heat demand as possible before auxiliary heating is engaged and assists. Additional heater is an accessory.

The heat pump heating system consists of two basic units:

- Heat pump unit
- Control equipment

The heat pump unit consists of the following components:

- Scroll compressor
- Stainless steel heat exchanger: condenser, evaporator and de-superheater
- Circulation pumps for collector- and heating system

The control equipment controls the components included in the heating installation (compressor, circulation pumps and exchange valve) and determines when to start and stop the pump as well as producing heat for the house or hot water. If the additional heat (accessory) is installed the additional heating is controlled by the control equipment. The control equipment unit consists of the following components:

- Control computer, as well as operator's panel with graphical display
- Temperature sensors (outdoor, supply line, return line and hot water)
- Room sensor (option)

2.2 The principles of the heat pump

A heat pump utilises the energy found in a natural heat source. Simply put, it obtains energy in the form of heat from a heat source.

The heat pump is, therefore, a very environmentally friendly and economical way of heating a house.

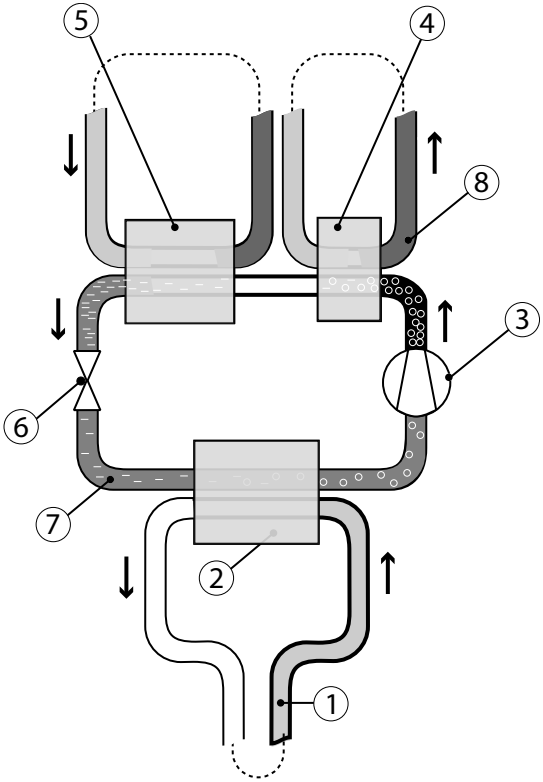


Figure 1. The principles of the heat pump

The heat pump has four separate fluid circuits

- **Brine circuit** (1) – is a fluid (brine) filled hose lowered into a lake, buried in the ground or lowered into bedrock. The brine obtains energy from the surroundings by the fluid temperature in the hose being heated a few degrees.
- **Refrigerant circuit** (7) – is a circuit in the heat pump that through evaporation, compression and condensation takes energy from the brine circuit and supplies it to the heat transfer fluid circuit. The refrigerant is chlorine free.

- **Heat transfer fluid circuit** (8) – is the water that transports the heat/ energy to the heating system and the hot water tank.
- **Hot gas circuit** – is a high temperature circuit for the hot water circuit's final heater. If the heat pump is not connected to any water heaters, the hot gas circuit does not need to be connected.

1. The brine circuit (1) evaporates the refrigerant in the evaporator (2), using heat from lake, ground or rock. The refrigerant is turned to gas.
2. The refrigerant passes the compressor (3) where the pressure and temperature are raised.
3. The refrigerant then continues to the de-superheater (4). Here a small high temperature output is used, for example, to top up the hot water temperature.
4. The heat transfer fluid circuit (hot gas circuit) condenses refrigerant to liquid form in the condensor (5), by giving off heat to the house and hot water.
5. The refrigerant then passes through the expansion valve (6) where the pressure and temperature drop and converts the refrigerant from liquid to liquid and gas. The process then starts again.

2.3 Hot water tank (option)

The heat pump can also produce hot water for an external water heater. The water temperature of the hot water tank is controlled by the control switch and cannot be adjusted.

Hot water production stops when the control switch reaches its maximum operating pressure.

2.4 Room sensor (option)

The heat pump system can be equipped with a room sensor as an option.

Only authorised electricians may carry out the installation.

See wiring diagram for connections.

3 Operating instructions

3.1 Control panel

3.1.1 Function description

The heat pump has an integrated control system which automatically calculates the heat demand in the house to ensure that the correct amount of heat is produced and emitted where necessary. There are many different values (parameters), which are required in order to do the calculation of the heat demand.

During installation and service, the control panel is used to set and change values that have to be adapted according to the house demand. The control panel is integrated into the front of the heat pump and consists of a display, a keypad and an indicator. In the display, a simple menu system is used to navigate the desired settings and values. During operation, the

display always shows the set ROOM value, the operating mode and the status of the heat pump.

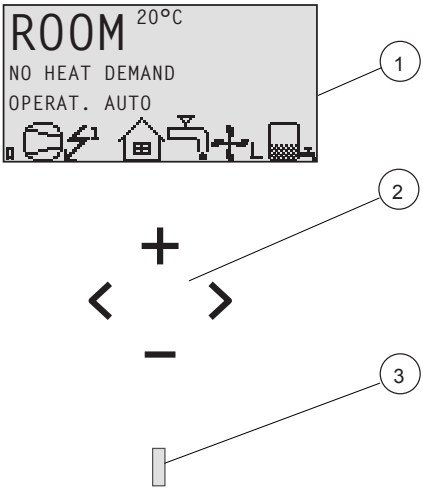


Figure 2. Display, keypad and indicator.

(20°C)

Position	Description
1	The display text and symbols are only shown as examples. Certain symbols cannot be displayed at the same time.
2	Keypad: + Plus sign used to scroll up a menu or increase the values. - Minus sign used to scroll down a menu or reduce the values. > Right arrow used to select a value or open a menu. < Left arrow to cancel selection or exit a menu.
3	Indicator

The control system is operated via a user-friendly menu system, which is shown in the display. Use the keypad's four navigation symbols to navigate the menus and increase or reduce the set values.

The INFORMATION menu is opened by pressing the left or right buttons. The INFORMATION menu has a number of sub menus, see Menyinformation.

For installation and service, the SERVICE menu is used, which is opened by pressing the left button for five seconds. The SERVICE menu has a number of sub menus, see Menu information.

The INFORMATION and SERVICE menus are intended for two categories of user, customers and installers. Customers may only open the INFORMATION menu with a limited number of settings. Installers have to be able to change many settings in the control settings. The SERVICE menu is therefore hidden from the customers.

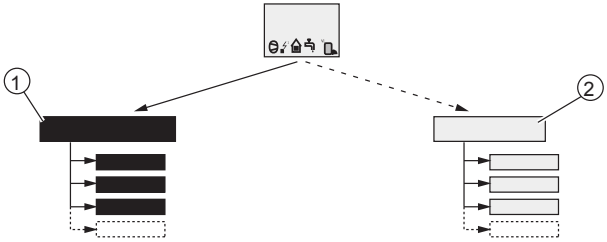


Figure 3. The menus are reached by pressing different buttons.

Position	Description
1	Information menu Press the left or right buttons.
2	Service menu Press and hold the left button for at least five seconds

The indicator at the bottom of the control panel has three modes:

- Not lit, means that the heat pump is not powered.
- When the light shines continuously, the heat pump has power and is ready to produce heat or hot water.
- Flashing, means an active alarm

Caution! During a service that consists of replacing the display card, all heat pump settings are reset to factory settings. Therefore note current settings before replacement.

3.1.2 Display

The display shows information about the heat pump's operation, status and any alarms, in text form. Operating mode and status, indicated by symbols, are also shown in the lower part which shows the heat pump's active processes.

Note! To change the display language, press the following sequence of buttons: right arrow, arrow down to bottom menu, arrow right, scroll between languages using + or -. Then select language using right arrow.

3.1.2.1 Operating modes

Table 1. Shows the set operating mode of the heat pump.

Operating mode	Meaning
(OFF)	The installation is fully switched off. This mode is also used to acknowledge certain alarms. Caution! If the operating mode OFF is to be used for long periods during the winter, the water in the heating system in the heating system must be drained, otherwise there is a risk of frost damage.
AUTO	The heat pump and the auxiliary heater are automatically controlled by the control system.
HEAT PUMP	The control system is controlled so that only the heat pump unit (compressor) is allowed to operate. In this operating mode peak heating charging (anti-legionella function) of the hot water will not run because the auxiliary heater is not used.

Operating mode	Meaning
AUX. HEATER	The control system only permits the auxiliary heater to be in operation.
HOT WATER	In this mode the heat pump only produces hot water, no heat goes to the heating system.

3.1.2.2 Symbols

Table 2. Symbols shown in the display.

Symbol		Meaning
	HP	Indicates that the compressor is in operation.
	LIGHTNING	Indicates that the auxiliary heater is in operation. The number indicates what additional step is activated.
	HOUSE	Indicates that the heat pump produces heat for the heating system.
	TAP	Indicates that the heat pump produces heat for the water heater.
F	FLOW SENSOR	An F indicates that a flow sensor is installed.
	CLOCK	Indicates that tariff control is active.
	TANK	Indicates the level of hot water in the water heater. When hot water is produced for the water heater, this is indicated by a flashing icon for the tank. A lightning symbol by the symbol indicates peak heating charging (anti-legionella function).
	SQUARE	Either indicates that the operating pressure switch has deployed, or that the pressure pipe temperature has reached its maximum temperature.

3.1.2.3 Operational information

Table 3. Shows information about the heat pump.

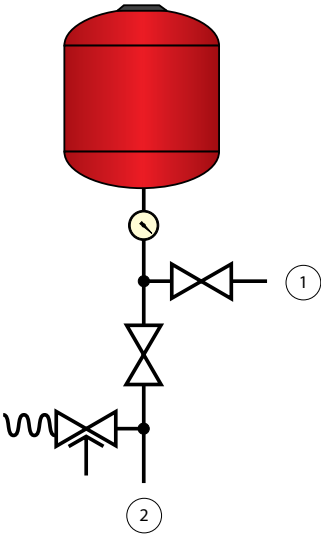
Message	Meaning
ROOM	Shows the set ROOM value. Standard value: 20°C. If the accessory room sensor is installed it shows the actual temperature and the desired indoor temperature is shown within brackets.
START	Indicates that there is a need for heat production and that the heat pump will start.
EVU STOP	Indicates that the additional function EVU is active. This means that the heat pump is off as long as EVU is active.
NO HEAT DEMAND	Indicates that there is no heating production demand.
HEAT PUMP START -- XX	Indicates that there is a heating production demand and will start in XX number of minutes.
HEAT PUMP+AUX. HEAT	Indicates that heat production is active with both compressor and auxiliary heater.
AUX. HEATER	Indicates that there is an auxiliary heater demand.

3.2 Checking the coolant circuit pressure

The brine circuit must be filled with the correct amount of fluid otherwise the installation may become damaged.

Ensure that system has the necessary pressure, however, not above maximum pressure of 6 bar.

See the installation instructions when filling brine.



Symbol explanation

1 Used when filling

2 Connected to brine circuit

Figure 4. Filling the brine system

3.3 Checking the water level in the heating system

The line pressure of the installation must be checked once a month. Ensure that heating system has the necessary pressure, however, not above maximum pressure of 6 bar.

You can use normal tap water when topping up the heating system. In certain exceptional cases the water quality may be so poor (for example very hard water) that it is not suitable for filling the heating system. If unsure, contact your installer.

Do not use any additives for water treatment in the heating system's water!

3.4 Checking safety valves

Both the safety valves for the heating system must be checked at least four times a year to prevent lime deposits clogging the mechanism.

The safety valve of the water tank protects the enclosed heater against over pressure in the water tank. It is mounted on the cold water inlet line, its outlet opening facing downwards. If the safety valve is not checked

regularly, the water tank might be damaged. It is quite normal that the safety valve lets out small amounts of water when the water tank is being charged, especially if a lot of hot water was used previously.

Both safety valves can be checked by turning the cap a quarter of a turn clockwise until the valve lets out some water through the overflow pipe.

If a safety valve does not work properly, it must be replaced. Contact your installer.

The opening pressure of the safety valves is not adjustable.

3.5 In the event of leakage

In the event of leakage in the hot water pipes between the unit and water taps, close the shut-off valve on the cold water inlet immediately. Contact your installer, see References, Page 28.

In the event of leakage in the brine circuit, turn off the heat pump and call your installer immediately, see References, Page 28.

4 Menu information

4.1 INFORMATION menu

Open the menu by pressing the left or right button. The menu also shows history and operating times.

Menus in italics are only visible if the expansion card (accessory) is installed.

Table 4. Used to change the heat pump's operating modes and to adjust the heat curve.

Menu	Sub menu	Sub menu	Sub menu
INFORMATION			
	OPERAT.		
		Ø	**CANCEL** **Ø**
		AUTO **HEAT PUMP** **AUX. HEATER (must be activated)** **HOT WATER (must be activated)** **MANUAL TEST**	
	HEAT CURVE		
		CURVE **MIN** **MAX** **CURVE 5** **CURVE 0** **CURVE -5** **HEAT STOP** **REDUCTION** **TANK TEMP (if buffer tank is activated)** **OVERCHARGE (if buffer tank is activated)** **ROOM FACTOR (if a room sensor is installed)** *POOL (expansion card)* *POOL HYSTERESIS (expansion card)*	
	HEAT CURVE 2 (if shunt group is activated)		

Menu	Sub menu	Sub menu	Sub menu
		CURVE **MIN** **MAX**	
	TEMPERATURE		
		OUTDOOR **ROOM (if a room sensor is installed)** **SYSTEM SUPPLY (if buffer tank is activated)** **SUPPLY LINE** **RETURN LINE** **BUFFER TANK (must be activated)** **HOT WATER (must be activated)** **INTEGRAL** **BRINE IN** **BRINE OUT** *POOL (expansion card)* **COOLING** **SHUNT GROUP (must be activated)** **2ND HEAT CIR.** *CURRENT (expansion card)*	
	OPERAT. TIME		
		HEAT PUMP **AUX. HEAT 1** **AUX. HEAT 2** **AUX. HEAT 3** **HOT WATER (must be activated)** **COOLING** **ACT COOLING**	
	LANGUAGE		
		SVENSKA **ENGLISH** **DEUTSCH** **NEDERLANDS** **FRANÇIS** **ESPAÑOL** **ITALIANO** **NORSK** **DANSK** **SUOMI** **EESTI** **POLSKI** **ČEŠTINA**	

4.1.1 Sub-menu OPERAT.

Table 5. Used to select operating mode.

Menu selection	Meaning	Factory setting
⏻ **(OFF)**	The installation is fully switched off. This mode is also used to acknowledge certain alarms. CANCEL = starting point, no changes made. To select OFF as operating mode, press the minus sign once to scroll down one step and press the right arrow once.	-
AUTO	Automatic operation with both heat pump and auxiliary heater permitted. If the number of power stages for auxiliary heating are set to zero (SERVICE -> AUX. HEATER -> MAX STEP) only AUTO or OFF can be selected as operating mode.	-
HEAT PUMP	Operation with only heat pump permitted. Note! No peak heating charging (anti-legionella function) with only heat pump operation.	-
AUX. HEATER	Operation with only auxiliary heater permitted.	-
HOT WATER	Operation with heat pump for hot water production and auxiliary heater during peak heating charging (anti-legionella function).	-
MANUAL TEST	Only displayed when the value for MANUAL TEST is set to 2 in The SERVICE menu. Outputs that control components are activated manually.	-

4.1.2 Sub-menu HEAT CURVE

Table 6. Used to change settings for the heat curve.

Menu selection	Meaning	Factory setting
CURVE	Calculated supply temperature at 0°C outdoor temperature. Shown as a graphic curve. The curve will be limited by the set values of MIN and MAX.	40°C (for under floor heating 30°C) (range: 22°C / 56°C)
MIN	Minimum permitted supply temperature, if the temperature for heat stop has been reached and the heat pump has stopped.	10°C (range: 10°C / 50°C)
MAX	Maximum calculated setpoint value of the supply temperature.	55°C (for under floor heating 45°C) (range: 40°C / 85°C)
CURVE 5	Local increase or reduction of CURVE at an outdoor temperature of +5°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
CURVE 0	Local increase or reduction of CURVE at an outdoor temperature of 0°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
CURVE -5	Local increase or reduction of CURVE at an outdoor temperature of -5°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
HEAT STOP	Maximum outdoor temperature when heat production is permitted. If the heat stop has been activated the outdoor temperature must drop 3°C below this setting before the heat pump resumes the heating cycle.	17°C (range: 0°C / 40°C)
REDUCTION	Only appears if the tariff control function has been activated. Lowering set room temperature. Active when a 10 kΩ connection is placed across the EVU input connections.	2°C (range: 1°C / 10°C)

Menu selection	Meaning	Factory setting
TANK TEMP	Displayed if buffer tank is active. Charges the buffer tank to the set temperature. AUTO setting charges the tank to the supply line setpoint value.	AUTO (range: 30°C / 55°C)
OVER-CHARGE	Displayed if the buffer tank is active and TANK TEMP is set to AUTO. Charges the buffer tank to supply line setpoint value + the value of OVER-CHARGE.	0°C (range: 0°C / 5°C)
ROOM FACTOR	Only displayed if an accessory Room temperature sensor is installed. Determines how great an impact the room temperature is to have when calculating the supply temperature. For under floor heating it is recommended that ROOM FACTOR is set to 1, 2 or 3. For radiator heating it is recommended that ROOM FACTOR is set to 2, 3 or 4.	2 (range: 0 / 4) (0 = no impact, 4 = very large impact)
POOL (Expansion card)	Only appears if POOL is selected. The temperature in the pool is controlled by a separate sensor regardless of the heating and hot water system.	20°C (range: 5°C / 40°C)
POOL HYSTERESIS (Expansion card)	Only appears if POOL is selected. The difference between the desired charge value (adjustable) and actual value to the pool sensor. Pool hysteresis does not affect the integral value.	0°C (range: 5°C / 40°C)

4.1.3 Sub menu HEAT CURVE 2

Only appears if shunt group sensor is connected and activated in menu SERVICE -> INSTALLATION -> SYSTEM -> SHUNT GROUP.

Table 7. Used to change settings for heat curve 2.

Menu selection	Meaning	Factory setting
CURVE 2	Calculated shunt group temperature at 0°C outdoor temperature. Shown as a graphic curve. The curve will be limited by the set values of MIN and MAX.	40°C (range: 22°C / 56°C)
MIN	Minimum permitted shunt group temperature, if the temperature for heat stop has not been reached.	10°C (range: 10°C / 50°C)
MAX	Maximum permitted shunt group temperature.	55°C (range: 15°C / 70°C)

4.1.4 Sub-menu TEMPERATURE

The history of different temperature measurements can be viewed by pressing the right arrow key. The graph shows the last 60 measurement points for the set time interval (SERVICE -> INSTALLATION -> LOG TIME). In the event of an alarm, history stops being logged until the alarm is reset by changing the operating mode to OFF.

Table 8. Used to indicate the prevailing temperatures, history and set/calculated values.

Menu selection	Meaning	Factory setting
OUTD	Shows the actual outdoor temperature.	-
ROOM	Shows the actual set temperature.	-
SYSTEM SUPPLY	Displays system supply temperature at the buffer tank system.	-

Menu selection	Meaning	Factory setting
SUPPLY LINE	Shows the actual supply temperature. The calculated supply temperature to the heating system group is within brackets. During hot water production in operating mode AUX. HEATER the value for HOT WATER STOP + 10° is shown within brackets.	-
RETURN LINE	Shows the actual return temperature. The stop temperature, MAX RETURN is within brackets.	-
BUFFER TANK	Indicates the buffer tank temperature.	-
HOT WATER	Shows the actual hot water temperature.	-
INTEGRAL	Shows the actual calculated value for integral.	-
REFR 1	Shows the actual temperature of refrigerant sensor 1.	-
REFR 2	Shows the actual temperature of refrigerant sensor 2.	-
POOL (Expansion card)	Only appears if POOL is selected. Shows the actual pool temperature. The set pool temperature is shown in brackets.	-
SHUNT GROUP	Only appears if SHUNT GROUP is selected. Shows the actual supply temperature. The calculated supply temperature to the shunt group is within brackets.	-
2ND HEAT CIR.	Shows the temperature of the second heating circuit if installed by the buffer tank system.	
CURRENT (Expansion card)	Only appears if CURRENT LIMITER is selected. Shows the actual current consumption. The set value for MAX CURRENT is shown between brackets.	-

4.1.5 Sub-menu OPERAT.TIME

Table 9. Used to show the operating time for each component. Time given in hours.

Menu selection	Meaning	Factory setting
HEAT PUMP	Compressor operating time for both heating and hot water production.	-
AUX. HEATER	Operating time of auxiliary heater.	-
HOT WATER	Operating time for hot water with compressor.	-

4.1.6 Sub-menu LANGUAGE

Table 10. Used to set the language of the menu system.

Menu selection
SVENSKA
ENGLISH
DEUTSCH
NEDERLANDS
FRANÇAIS
ESPAÑOL
ITALIANO
NORSK
DANSK
SUOMI
EESTI
POLSKI
ČEŠTINA

5 Troubleshooting

5.1 Alarm

In event of alarm this is indicated in the display with the text ALARM and an alarm message, see following table. For alarms that are not reset automatically acknowledgement is required. Acknowledge the alarm by setting the heat pump to operating mode OFF.

Message	Meaning
HIGH PRESSURE ERROR	Tripped high pressure switch. Compressor stopped.
LOW PRESSURE ERROR	Tripped low pressure switch. Compressor stopped.
MOTOR P ERROR	Deployed overload relay (Overcurrent relay compressor), or deployed overload relay for outdoor unit fan. Compressor stopped.
OUTDOOR SENSOR	Fault in outside sensor. When the control system calculates the heat demand, zero degrees is used.
SUPPLY LINE SENSOR	Supply line sensor error. Everything stops except the heating system's circulation pump.
RETURN LINE SENSOR	Return sensor fault. Return temperature = Supply line – 5 is used. Calculated supply temperature limited to maximum 45°C.
HOT WATER SENSOR	Fault on sensor for start temperature. No hot water production.
ERR PHASE SEQ.	Alarm that indicates that there is an incorrect phase sequence to the compressor. Only display and only the first 10 minutes.
HIGH RETURN	Alarm that indicates that high return temperature prevents the compressor's operation.
BRINEFLOW LOW	The flow sensor produces an alarm when the ambient temperature of the brine circuit becomes too low.

In event of alarm the heat pump will if possible supply heating to the house, primarily with the compressor, secondarily with the additional heater. Hot water will stop to indicate that something noteworthy has occurred.

6 Terms and abbreviations

Table 11. Terms and abbreviations

Term	Explanation
Evaporator	In the evaporator, energy is retreived from the heat source and the refrigerant passing through the evaporator turns to gas.
De-superheater	In the de-superheater part of the total heating output is released (approx. 15%). A higher temperature than the normal condensation temperature can found here.
Integral	INTEGRAL is the heating system's energy balance. Heat generation is controlled by a calculated requirement. This value is determined by comparing the actual supply temperature with its calculated supply temperature. The difference between the temperatures is added over time. The resulting value is referred to as the integral. The integral is calculated automatically. The value of the integral can be viewed in the display under the sub-menu TEMPERATURE.
Compressor	The compressor raises the temperature and pressure of the refrigerant.
Condenser	In the condenser, the refrigerant supplies its heat energy to the heat transfer fluid circuit.
Curve	The CURVE value is set via the display. The set value is the calculated set point value of the flow line at outdoor temperature of 0°C.
Brine	Is a water based mixture that transports energy from the heat source to the heat pump.
Brine circuit	The fluid circuit transports energy from the heat source to the heat pump.
Refrigerant circuit	Is the circuit in the heat pump that through evaporation, compression and condensation takes energy from the brine circuit and supplies it to the heat transfer fluid circuit.
Refrigerant	Is the fluid that transports heat from the brine circuit and supplies it to the heat transfer fluid circuit.
Radiator	Heater element, element.

Term	Explanation
Control computer	The control computer controls the entire heating installation. All settings are stored and the history of the installation is registered here. The control computer's settings can be changed via the display.
Room	If ROOM shows 20°C the heat curve is unaffected. If ROOM shows higher or lower, this indicates that the heat curve has been adjusted up or down to change the indoor temperature.
Heat transfer fluid circuit	The heat transfer fluid circuit obtains heat/energy from the refrigerant circuit, which it then transports to the water tank or heating system.
Heat curve	The control computer determines the correct temperature of the water to be distributed to the heating system based on the heat curve. The indoor temperature is adjusted by changing the gradient of the heating system's CURVE.

7 References

Piping installation

Date .....

Company .....

Name .....

Tel. No. .....

Electrical Installation

Date .....

Company .....

Name .....

Tel. No. .....

System adjustment

Date .....

Company .....

Name .....

System adjustment

Tel. No. .....

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