MAINTENANCE INSTRUCTIONS

DHP-H Opti Pro, DHP-H, DHP-C, DHP-L, DHP-A, DHP-AL

Navigate through the control computer's menu by: < + - >

To increase or reduce the set values use: + -

To adjust the room temperature: starting by pressing +

The degree information that now appears in the display is the last desired room temperature.

To increase the temperature: press +

To lower the temperature: press -

The temperature you now require is registered immediately.

(After approximately ten seconds the desired room temperature appears in the display again, together with other information.) The heat pump now starts to work to reach the new temperature.

Want to know more? Read the Maintenance instructions!

Contents

These instructions are valid for the following models of Danfoss heat pumps:

DHP-H, DHP-H Opti, DHP-H Opti Pro,
DHP-C, DHP-L, DHP-L Opti,
DHP-A, DHP-A Opti, DHP-AL, DHP-AL Opti.

If these instructions are not followed during installation, operation and maintenance, Danfoss AS's liability according to the applicable warranty is not binding.

Danfoss AS retains the right to make changes to components and specifications without prior notice.

1 Important information

- 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. (Contact an authorized installer, see the section 13 "References")
- The installation can be considered maintenance free but certain checks are necessary (see "8 Regular checks").
- Before changing the control computer's settings, first find out what these changes mean.
- Contact your installer for any service work.

⚠ 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.

⚠ Children are not permitted to play with the apparatus.

1.1 Safety precautions

Installation and maintenance

- Only authorized installers may install, operate and carry out maintenance and repair work on the heat pump. (See the section 13 "References")
- Only authorized electricians may modify the electrical installation. (See the section 13 "References")

⚠ **DANGER TO LIFE!** Only authorized refrigeration technicians may work on the refrigerant circuit. (See the section 13 "Reference".)

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

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

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

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 Principles of function

A heat pump utilises the free energy found in a natural heat source, such as rock, ground, or ground water. The heat pump can be compared to a reversed refrigerator. In a refrigerator, heat is transferred from the inside of the refrigerator to the outside. In a heat pump the heat that is stored in a heat source is transferred to the inside of the house. The heat pump uses the energy in the heat source and gives back two to three times more heat energy than what it uses in electrical energy. The heat pump is, therefore, a very environmentally friendly and economical way of heating a house.

In order for the heat pump to be able to retrieve heating energy from the heat source and transfer it to the heating system of the house, three separate fluid circuits are required.

The circuit that retrieves the heating energy from the heat source is called the brine circuit and it maintains a low outgoing temperature to be heated by the heat source.

The next circuit is called the refrigerant circuit and is a closed circuit which takes the retrieves heating energy and transfers it to the last circuit, the heat transfer fluid circuit.

The heat transfer fluid circuit holds the fluid that circulates in the heating system of the house and in the heat pump's water heater.

The figure below shows how the different circuits work together in the transfer of heating energy.

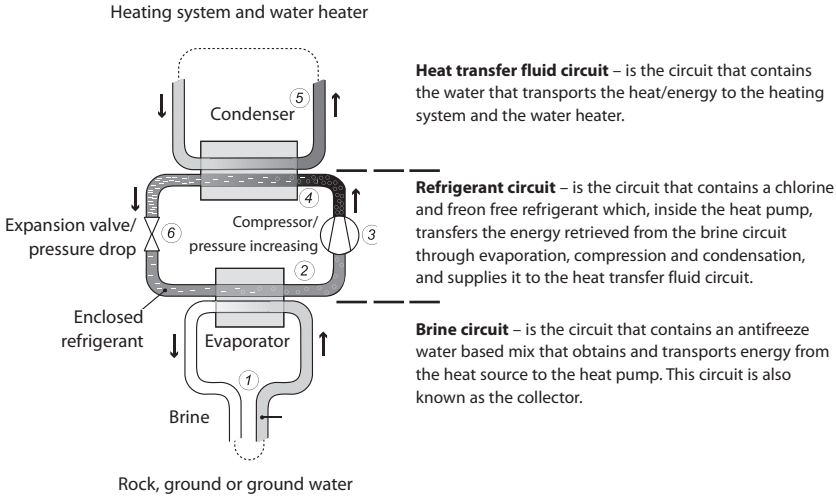


Figure 1: Function principles of a heat pump.

1 A fluid (brine) filled hose is lowered into a lake, buried in the ground or lowered into bedrock. The brine obtains energy from the heat source by the fluid temperature in the hose being heated a few degrees by the surrounding heat source. The fluid filled hose is also known as a collector.

2 The brine is guided into the heat pump's evaporator. The enclosed refrigerant in the refrigerant circuit is forced to boil as the pressure in the expansion valve drops and later evaporates to a gas in the evaporator. The energy produced during this process is released by the heated brine.

3 The refrigerant that now contains a large quantity of energy in the form of heat is transferred to the compressor, which both increases its temperature and pressure.

4 The refrigerant then continues to the condenser. When condensing, the refrigerant supplies its heat energy to the heat transfer fluid circuit. The refrigerant's temperature decreases and returns to a liquid state.

5 The heat transfer fluid circuit transports the heat energy out to the water heater, radiator or the under floor heating system, which heat up.

6 The refrigerant is then transported through the expansion valve where the pressure drops and the refrigerant starts to boil and then the process starts again.

2.2 Components

The Danfoss heat pump is a complete heat pump installation for heating and hot water. It has the market's first compressor developed solely for heat pumps. It has an integrated 180 litre water heater and auxiliary heating. The water heater uses TWS, which stands for Tap Water Stratificator, which is technology that results in more effective heat transfer and effective layering of the water in the water heater.

The Danfoss heat pump is equipped with control equipment, which is controlled via a control panel.

Heat enters the house via a water borne heating system, a low temperature system. The heat pump supplies as much of the heat demand as possible before auxiliary heating is engaged and assists.

The Danfoss heat pump unit consists of five basic units:

1 Heat pump unit

- Scroll compressor
- Stainless steel heat exchanger
- Circulation pumps for brine and heating systems
- Valves and safety equipment for cooling systems and corresponding electrical components.

2 Water heater

- 180 litres
- Internal anti-corrosion protection with copper or stainless steel
- It has an anode that does not require replacing, which means that it is maintenance-free

3 Exchange valve

- The heated water either passes through to the heating system or to the water heater depending on whether heating or hot water is to be produced

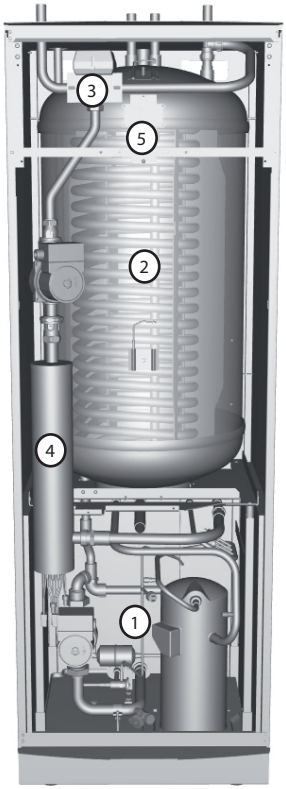


Figure 2: Heat pump components.

4 Auxiliary heat

- 9 kW electric heating element (400V 3N DHP-A, -AL: 15 kW electric heating element)
- Electric heating element control in a maximum of three steps (400V 3N DHP-A, -AL: maximum of five steps)
- Installed on the heating system's supply pipe
- Covers the demand of extra energy if the heat pump's capacity is exceeded
- Automatically connected in the heat pump unit if operating mode AUTO is selected.

5 Control equipment

- Control computer with graphic display
- Temperature sensors (outdoor, supply pipe, return pipe, brine in, brine out and hot water)
- Room sensor (option)

The control equipment controls the heat pup unit's included components (compressor, circulation pumps, auxiliary heaters and exchange valve) and determines when to start and stop the pump as well as producing heat for the house or hot water.

2.3 Outdoor and defroster function*, DHP-A, -AL*

The DHP-A and DHP-AL heat pumps are equipped with an outdoor unit that makes use of the energy in the air outdoors down to -20°C. The outdoor unit has a coil where brine recovers free energy from the outside air. It also has a fan that increases the airflow through the coil. During operation the coil is cooled by the energy exchange at the same time as the humidity causes it to become covered in frost. DHP-A, AL models have an automatic function to defrost the coil using the produced heat energy. If necessary, a defrosting sequence starts which means the following:

- The defrosting sequence starts when the temperature of the brine reaches its set parameter for defrosting.
- The compressor is stopped so that the defrosting sequence should not load the compressor unnecessarily. On the other hand the compressor is not stopped when it produces hot water because the water heater is cooled when defrosting. The fan on the outdoor unit is stopped in conjunction with defrosting to shorten the time of defrosting.
- The shunt valve in the heat pump opens so that hot brine from the defrosting tank is mixed with the cold brine circulating to the outdoor unit. The mixture has a temperature of about 15°C.
- The fifteen degree heated brine melts the frost on the outside of the coil at the same time as the liquid is cooled.
- When the brine is no longer cooled to temperatures below 11°C the coil is sufficiently defrosted.
- The shunt valve closes the flow of hot brine from the defrosting tank.
- Operation returns to normal.

A DHP-A, -AL installation consists of three basic units:

1 Heat pump unit

- Scroll compressor
- Stainless steel heat exchanger
- Circulation pumps for brine and heating systems
- Valves and safety equipment for cooling systems and corresponding electrical components.

2 Water heater

- 180 litres
- Internal anti-corrosion protection with copper or stainless steel
- It has an anode that does not require replacing, which means that it is maintenance-free
- Defrosting tank containing heated brine for defrosting the outdoor unit

3 Outdoor unit

- Heat exchanger
- Fan

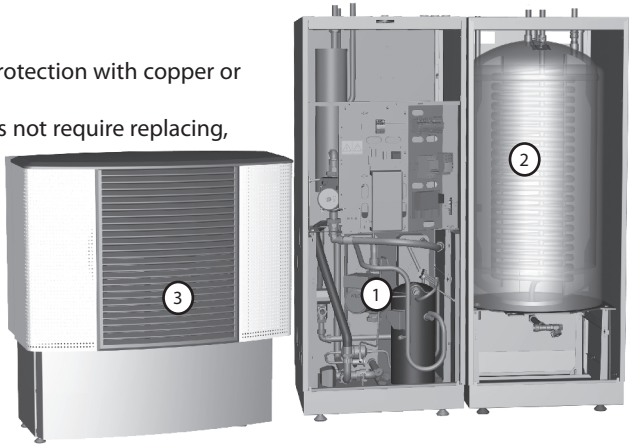


Figure 3: The figure shows DHP-AL, equipped with a separate water heater.

2.4 Auxiliary heat*, DHP-H, DHP-L, DHP-C, 230V 1N DHP-A, -AL*

If the heat demand is greater than the heat pump's capacity, the auxiliary heater engages automatically. The auxiliary heater is made up of an electric heating element on the supply pipe that has two outputs, ADD.HEAT 1 and ADD.HEAT 2, and can be controlled in three steps:

- Step 1 = ADD.HEAT 1 = 3 kW
- Step 2 = ADD.HEAT 2 = 6 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 9 kW

To calculate the total energy consumption, see the sections 7.8 - 7.9 "Settings - Calculating energy consumption".

In the event of an alarm, the auxiliary heater engages automatically.

2.5 Auxiliary heat*, 400V 3N DHP-A, -AL*

The auxiliary heater is made up of an electric heating element on the supply pipe that has three outputs, ADD.HEAT 1, ADD.HEAT 2 and ADD.HEAT 3, and can be controlled in five steps:

- Step 1 = ADD.HEAT 1 = 3 kW
- Step 2 = ADD.HEAT 2 = 6 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 9 kW
- Step 4 = ADD.HEAT 2 + ADD.HEAT 3 = 12 kW
- Step 5 = ADD.HEAT 1 + ADD.HEAT 2 + ADD.HEAT 3 = 15 kW

To calculate the total energy consumption, see the sections 7.8 - 7.9 "Settings - Calculating energy consumption".

In the event of an alarm, the auxiliary heater engages automatically.

2.6 **Water heater**, *DHP-H, DHP-C*

Danfoss heat pumps DHP-H, DHP-C, are supplied with an integrated 180 litre water heater.

Position	Name
1	Hot water line
2	Temperature sensors
3	Water heater
4	TWS coil
5	Start temperature sensor

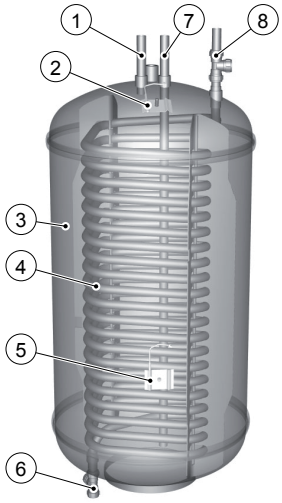


Figure 4: Water heater in DHP-H and DHP-C.

Using a regular time interval, the water in the water heater is heated to 60°C to prevent the build up of bacteria (legionella function). The factory set time interval is seven days.

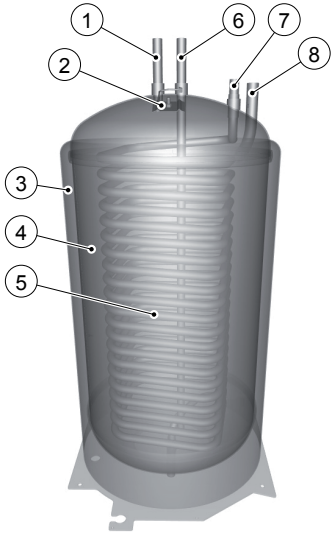
Hot water production is prioritised ahead of heat production, i.e. no heat is produced if there is a hot water demand at the same time.

The temperature of the hot water cannot be adjusted. Hot water production does not cease at a determined temperature but when the compressor's operating pressure switch reaches its maximum operating pressure, which corresponds to a hot water temperature of approximately 50-55°C.

In the control computer's TEMPERATURE menu, a number of measured and calculated temperatures for the hot water and supply are displayed. There you can see the current hot water temperature and the temperature of the supply pipe during heating and hot water production. The temperature of the supply pipe often exceeds the maximum permitted hot water temperature, but usually during hot water production.

2.7 Water heater, *DHP-A, -AL*

Danfoss DHP-A is supplied with an integrated 180 litre water heater. Danfoss DHP-AL is supplied with an external 180 litre water heater positioned to the side of the heat pump. Both hot water heaters require a tank on the outside of the water heater that contains defrosting liquid. The difference between these water heaters and other models is the defrost function of the outdoor unit, otherwise they are the same and have the same functions.



Position	Name
1	Hot water line
2	Temperature sensors
3	Tank for anti-freeze
4	Water heater
5	TWS coil

Figure 5: Water heater in DHP-A, -AL.

3 Regulation information

Heat production - calculating

The indoor temperature is adjusted by changing the heat pump's heat curve, which is the control computer's tool for calculating what the supply temperature should be for water that is sent out in the heating system. The supply temperature is calculated from the outdoor temperature and two adjustable values: CURVE and ROOM. The lower the outdoor temperature, the higher the supply temperature required. In other words, the supply temperature of the water fed to the heating system will increase exponentially as the outside air temperature falls.

The heat curve will be adjusted in connection with installation. It must be adapted later on, however, to obtain a pleasant indoor temperature in any weather conditions. A correctly set heat curve reduces maintenance and saves energy.

CURVE

The control computer shows the value for CURVE by means of a graph in the display. You can set the heat curve by adjusting the CURVE value. The CURVE value indicated which supply temperature the heating system is to have at an outdoor temperature of 0°C.

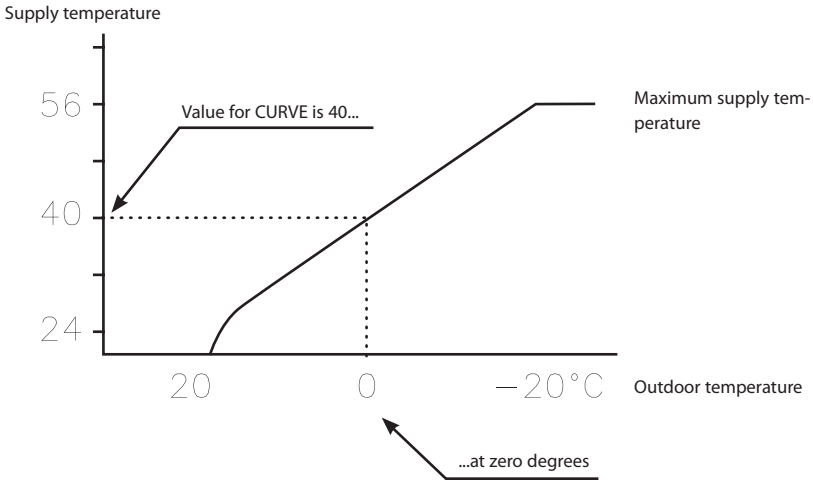


Figure 6: Graph showing the set value 40 for CURVE.

At outdoor temperatures colder than 0°C, supply water hotter than 40°C is sent out to the heating system and at outdoor temperatures greater than 0°C, supply water cooler than 40°C is sent out.

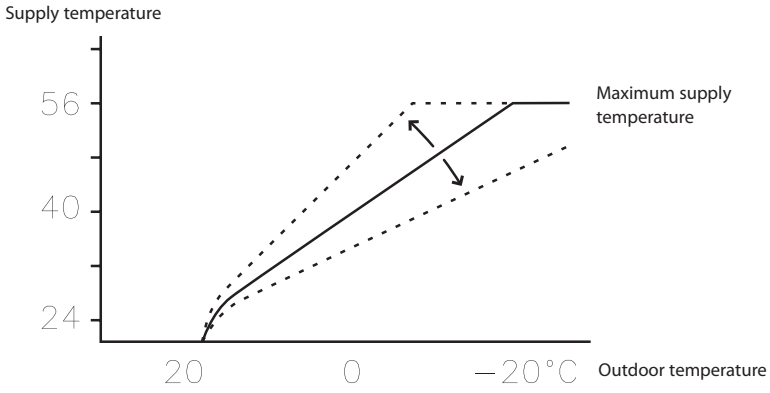


Figure 7: Increasing or reducing the CURVE changes the slope of the curve

If you increase the CURVE value, the heat curve will become steeper and when you reduce it, it will become flatter.
The most energy efficient and cost effective setting is achieved by changing the CURVE value to adjust the temperature in the house to an even and constant temperature. For a temporary increase or reduction, adjust the ROOM value instead.

ROOM

If you wish to increase or reduce the indoor temperature, change the ROOM value. The difference between changing the ROOM value and the CURVE value is that the system's heat curve does not become steeper or flatter if the ROOM value is changed, which the curve becomes if the CURVE value changes, instead the entire heat curve is moved by 3°C for every degree change of the ROOM value. The reason that the curve is adjusted 3° is that an approximate 3° increase in supply temperature is needed to increase the indoor temperature 1°.

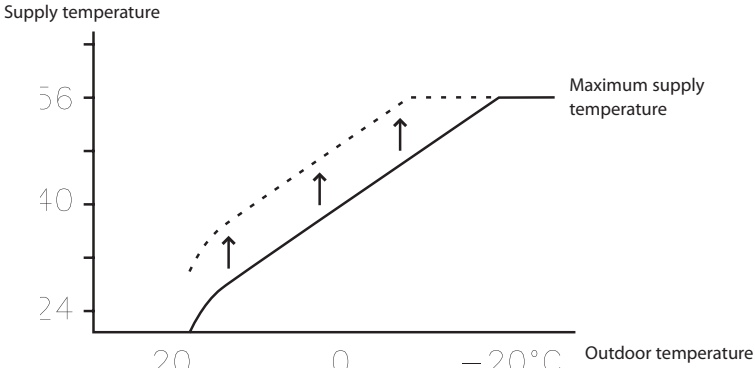


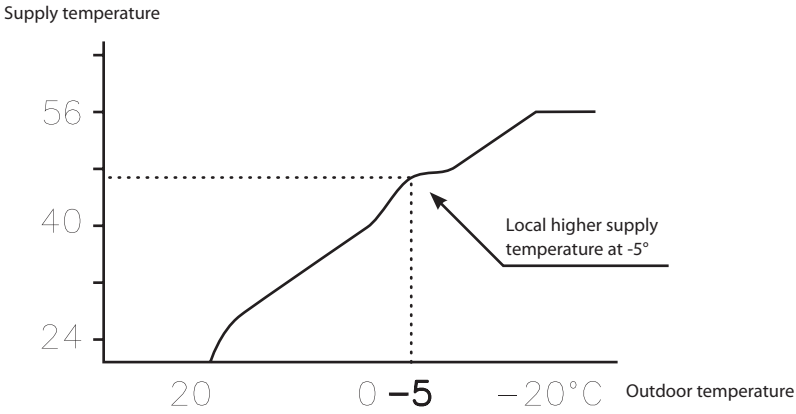
Figure 8: Changing the ROOM value changes the heat curve upwards or downwards.

The relationship of the supply temperature to outdoor temperature will not be affected. The supply temperature will be increased or reduced by the same number of degrees all along the heat curve. I.E. the entire heat curve rises or drops instead of the curve gradient changing.

This method of adjusting the indoor temperatures can only be for a rise or fall.

Sometimes, at outdoor temperatures between -5°C and +5°C, part of the heat curve may need adjusting if the indoor temperature is not constant. For this reason, the control system includes a function adjusting the curve at three outdoor temperatures: -5°C, 0°C and +5°C. If, for example, the outdoor temperature is -5°C, the supply temperature will change gradually between 0°C and -10°C, maximum adjustment being reached at -5°C. The figure below displays the adjusted CURVE -5. The adjustment can be seen on the graph in the form of a bump.

Figure 9: The adjusted curve at -5°C



You can choose to adjust the heat curve individually at three specified outdoor temperatures: -5°C, 0°C and +5°C. The supply temperature can be changed by plus/minus 5 degrees.

HEATSTOP

The HEATSTOP function automatically stops all production of heat when the outdoor temperature is equal to, or higher than, the value entered for heat-stop.

When the heat-stop function is activated, the circulation pump will be turned off - except when hot water is being produced. The circulation pump will be "exercised" for 1 minute per day. The factory set value for activating heat-stop is an outdoor temperature of 17°C. If the heat-stop function is active, the outdoor temperature must drop 3°C when setting, before the heat-stop stops.

MIN and MAX

The MIN and MAX values are the lowest, respectively highest set point values that are allowed for the supply temperature.

Adjusting the minimum and maximum supply temperatures is particularly important if your home has under floor heating.

If your house has under floor heating and parquet floors, the supply temperature must not exceed the recommendations of the floor manufacturer. Otherwise there is a risk that the parquet floors might be damaged. If you have under floor heating and stone tiles, the MIN value should be 22-25°C, even in summer when no heating is required. Also remember that the value for HEATSTOP needs adjusting upwards for summer heating. This is to achieve a

comfortable floor temperature.

If your house has a basement, the MIN value should be adjusted to a suitable temperature for the basement in summer. A condition for maintaining the heat in the basement in the summer is that all radiators have thermostat valves that switch off the heat in the rest of the house. It is extremely important that the heating system in the house is trimmed correctly, see the section 6 "Trimming the heating system" for further information. Also remember that the value for HEATSTOP needs adjusting upwards for summer heating.

TEMPERATURES

The heat pump can display a graph showing the history of the various sensors' temperatures and you can see how they have changed over 100 measurement points in time. The time interval between the measurement points can be adjusted between one minute and one hour, factory setting is one minute.

History is available for all sensors, but only the set value is shown in the display for the room sensor. The integral value that may appear is the heating system's energy balance.

INTEGRAL

The information below tells you how your heat pump works, there are no values that you as a customer have to set.

The heat demand in the house depends on the season and weather conditions and is not constant. The heat demand can be expressed as temperature difference over time and can be calculated giving an integral value as a result (heat demand). To calculate the integral value, the control computer uses several parameters.

A heat deficit is needed to start the heat pump, and there are two integral values, A1 and A2, which start the compressor and auxiliary heater. During heat production, the deficit reduces and when the heat pump stops, the inertia in the system causes a surplus of heat.

The integral value is a measurement of the surface under the time axis and is expressed in degree minutes. The figure below shows the factory settings for the integral values that the heat pump has. When the integral value has reached the set value for INTEGRAL A1, the compressor starts and if the integral value does not drop but continues to rise, the auxiliary heater starts when the integral value has reached the set value for INTEGRAL A2.

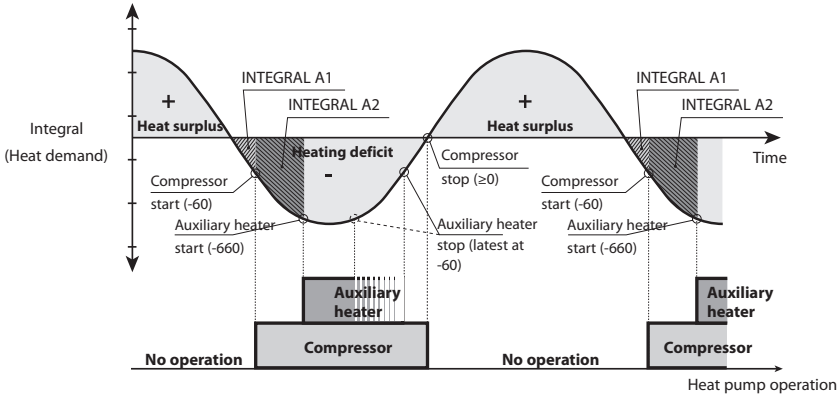


Figure 10: Starting and stopping heat pump operation based on integral values.

The integral value calculation stops during hot water production and during heat-stop. Integral value calculation resumes two minutes after completed hot water production to give the heating system time to stabilise the temperature.

HYSTERESIS

The information below tells you how your heat pump works, there are no values that you as a customer have to set.

In order to start the heat in advance during sudden changes of the heat demand, there is a value, HYSTERESIS, which controls the difference between the actual supply temperature, t_1 and the calculated supply temperature, t_2. If the difference is the same or greater than the set HYSTERESIS value (x), i.e. there is a heat demand, or the heat demand disappears, quicker than the usual integral calculation, the integral value is forced to either the start value INTEGRAL A1 or to the stop value 0°min.

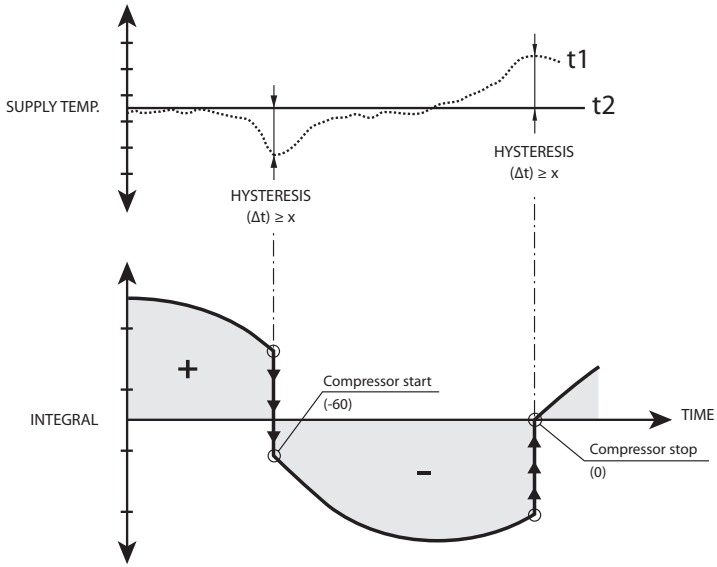


Figure 11: Conditions for HYSTERESIS to force the integral value to change.

DEFR CURVE, defrosting curve for DHP-A, -AL

When defrosting the outdoor unit of DHP-A, -AL, the control computer makes a calculation using a combination of the temperature on the incoming supply line and outdoor temperature.

What guides the calculation is a linear defrosting curve that can be set so that the heat pump and outdoor unit work optimally. The setting of three different values can be changed: OUTDOOR STOP, DEFR CURVE 0 and DEFR CURVE [*value OUTDOOR STOP*]. The defrosting sequence starts when the temperature of the incoming brine line reaches the outdoor temperature somewhere along the set defrosting curve. The control computer shows the value for DEFR CURVE 0 and DEFR CURVE [*value OUTDOOR STOP*] by means of a graph in the display.

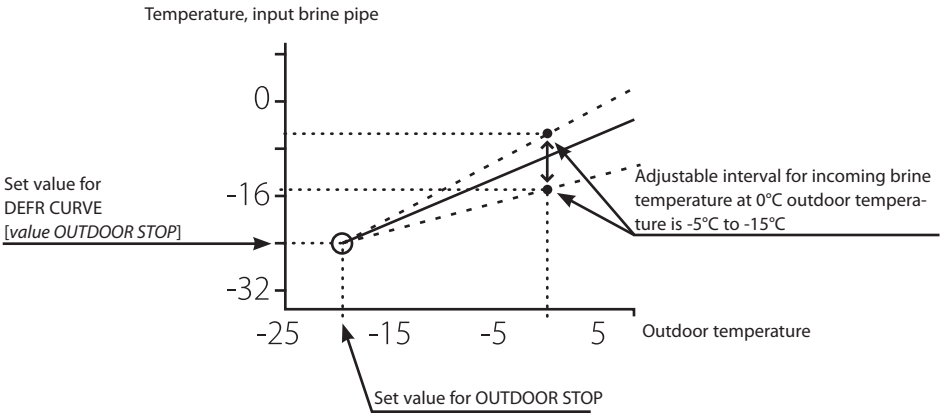


Figure 12: Graph that shows how the value for DEFR CURVE 0 can be set.

The value for OUTDOOR STOP that is set means that outdoor unit is no longer used for heating or hot water production if the outdoor temperature is the same as or lower than the value. Heating and hot water production then occurs with the help of the auxiliary heater.

The value for DEFR CURVE 0 is the temperature that the input brine return has when a defrost must start at outdoor temperature 0°C.

In the corresponding way the value for DEFR CURVE [*value OUTDOOR STOP*] is the temperature that the incoming brine return has when a defrost should start at the set outdoor temperature for OUTDOOR STOP.

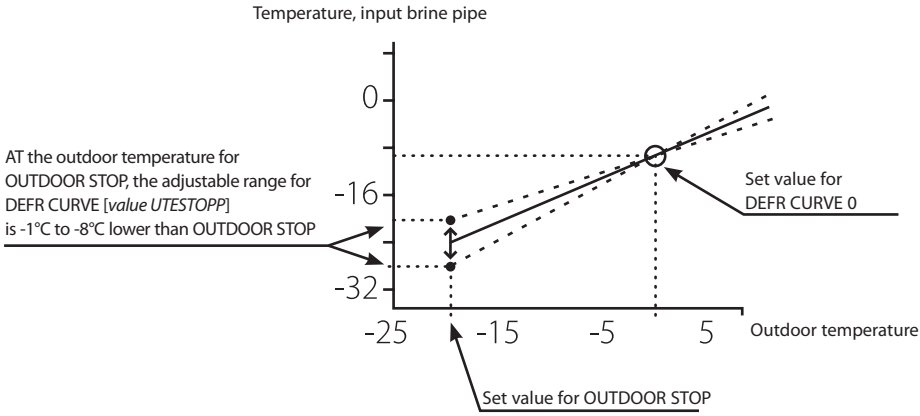


Figure 13: Graph that shows how the value for DEFR CURVE [OUTDOOR STOP] can be set.

These three settings together create the defrosting curve and all three values have an effect on when the defrosting will start.

4 Installation principle

4.1 DHP-H

The image shows the principles of a piping installation with all components.

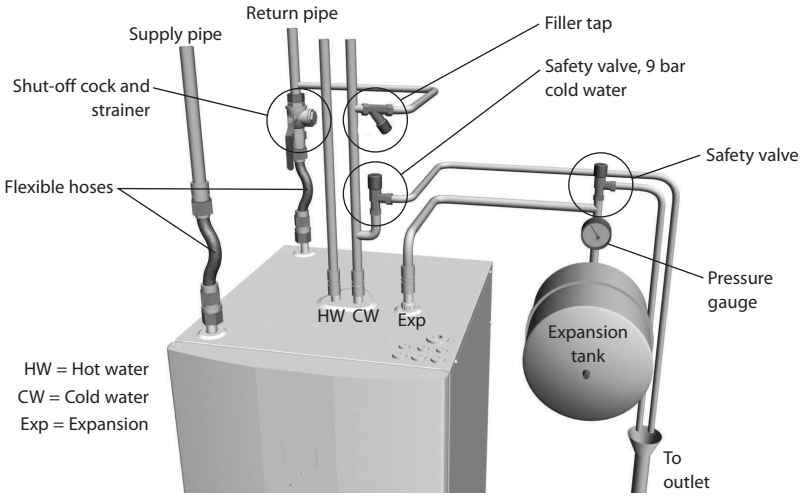


Figure 14: Principle solution for a piping installation.

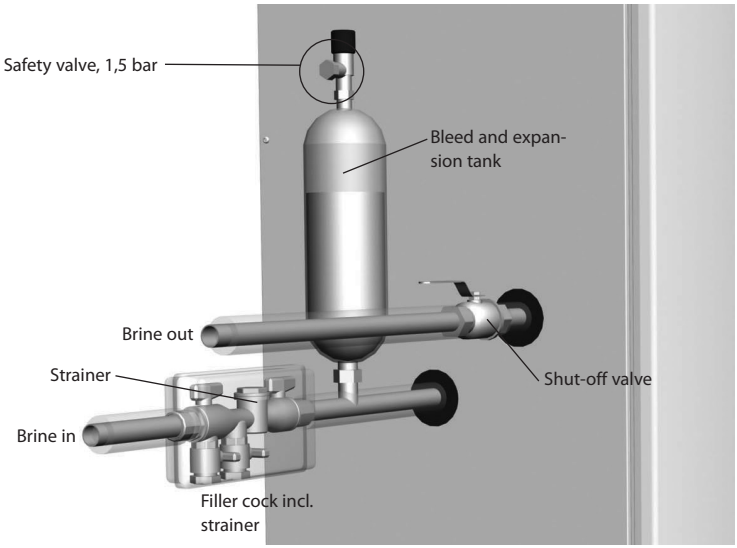


Figure 15: Principle solution for a brine installation.

4.2 DHP-C

The image shows the principles of a piping installation with all components.

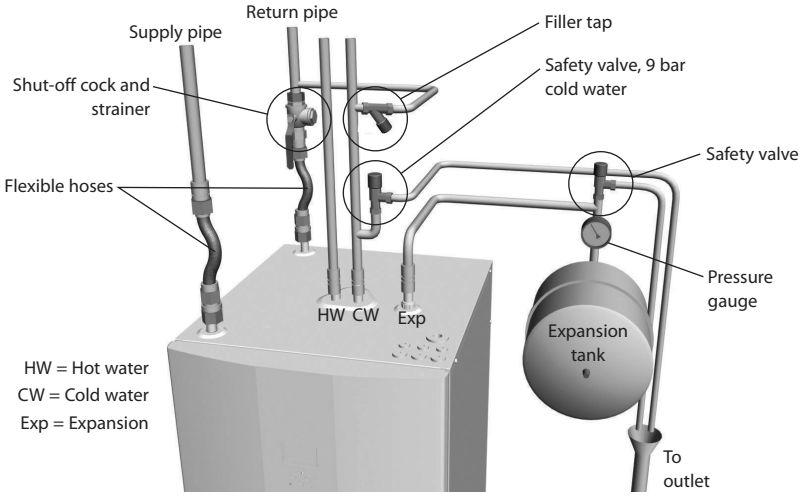


Figure 16: Principle solution for a piping installation.

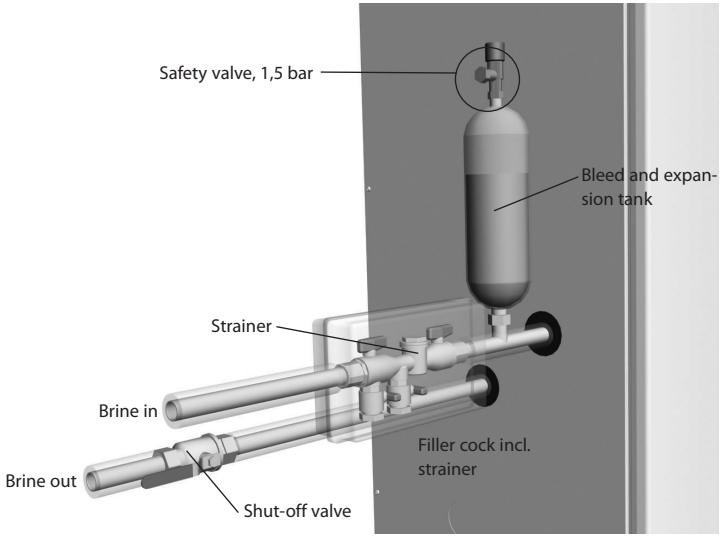


Figure 17: Principle solution for a brine installation.

4.3 DHP-L

The image shows the principles of a piping installation with all components.

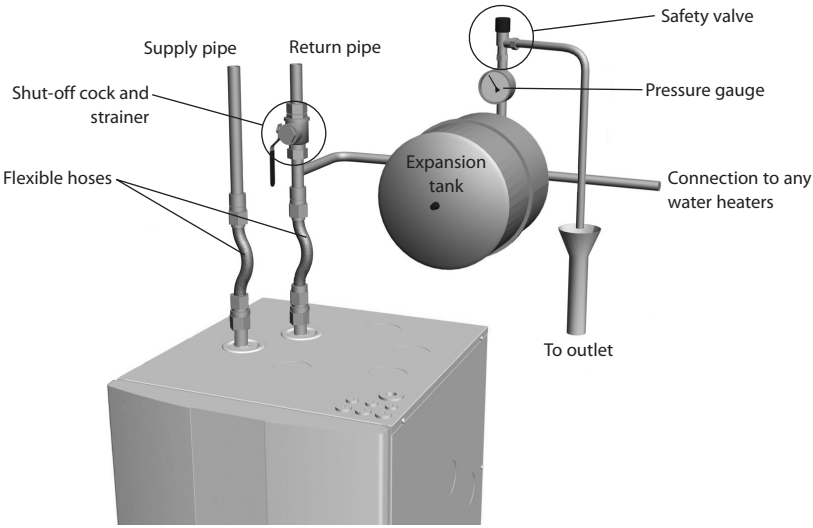


Figure 18: Principle solution for a piping installation.

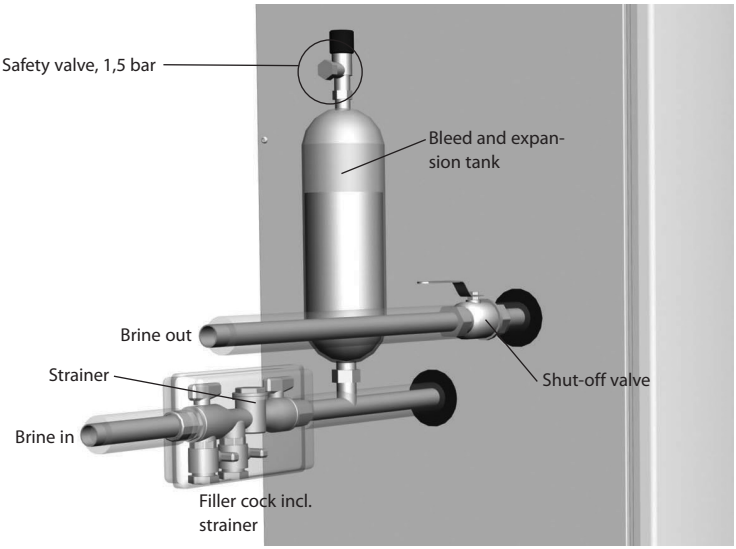


Figure 19: Principle solution for a brine installation.

4.4 DHP-A

The image shows the principles of a piping installation with all components.

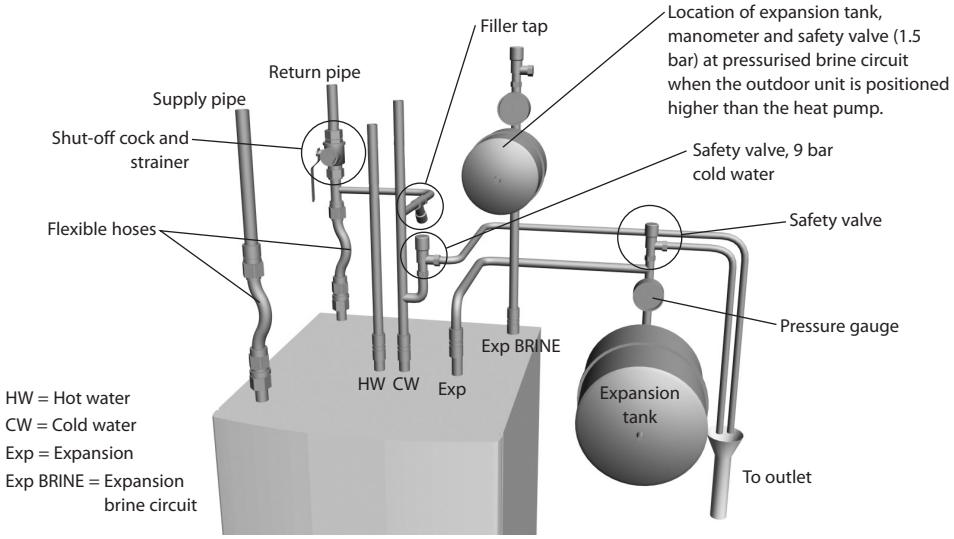


Figure 20: Principle solution for a piping installation.

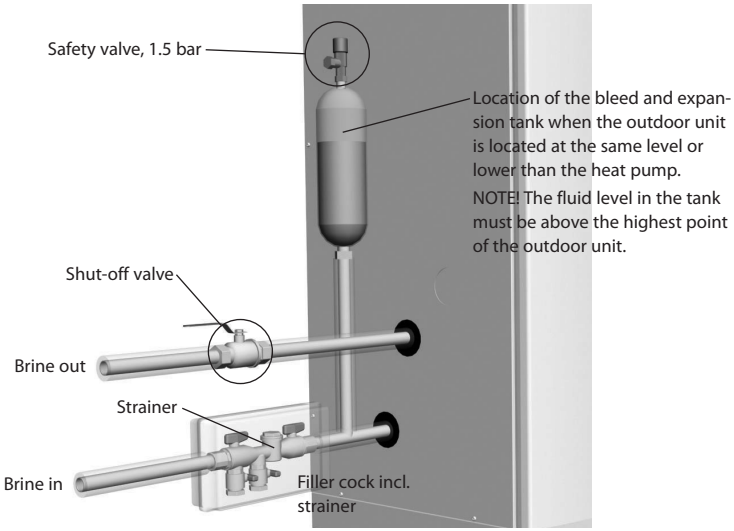


Figure 21: Principle solution for a brine installation.

4.5 DHP-AL

The image shows the principles of a piping and brine installation with all components.

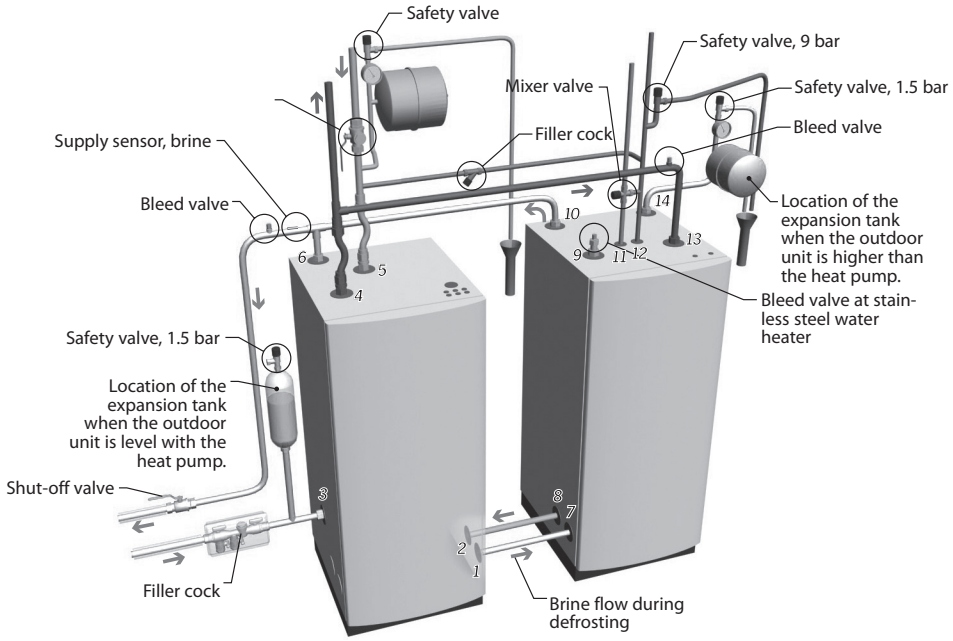
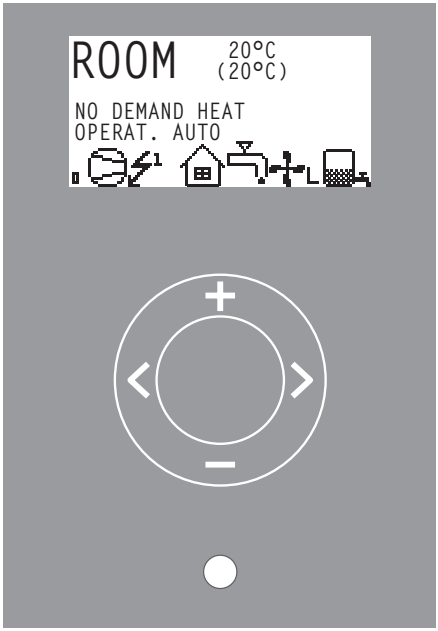


Figure 22: Principle solution for a pipe and brine installation DHP-AL.

5 Control computer

A control computer is used to automatically calculate the heat demand in the house where the heat pump is installed and to ensure that the correct amount of heat is produced and emitted where necessary. There are many different values (parameters) that must be referred to during the calculation of the heat demand. Use the control computer to set and change certain values that have to be adapted according to the house demand.

The display window, navigation symbols and an indicator are on the front of the control computer. It consists of a simple menu system that is used to navigate the desired settings and values.



The symbols in the display are only examples. Certain symbols cannot be displayed at the same time.

Figure 23: Display, navigation symbols and indicator for the heat pump.

The control computer is controlled using a user-friendly menu system, displayed in the display. Use the four navigation symbols to navigate the menus and increase or reduce the set values:

- A plus sign to scroll upwards or increase the values +
- A minus sign to scroll downwards or decrease the values -
- A right arrow to select value or menu >
- A left pointing arrow to cancel selection or exit menu <

The display always shows the set ROOM value and the status of the heat pump.

The menu, INFORMATION, is opened by pressing the left or right buttons. From INFORMATION one of the four sub-menus can be opened: OPERAT.; HEAT CURVE; TEMPERATURE and OPERAT. TIME.

5.1 Display

The display of the control computer shows information about the heat pump's operation, status and any alarms, in text form. The status, indicated by symbols, is also shown in the lower section which shows the heat pump's active process.

Operating mode

Appears with applicable heat pump operating status text.

Operating mode	Meaning
⏻ (OFF)	The installation is fully switched off. ⚠ **Remember that if the operating mode OFF is to be used for long periods during the winter, the water in the heating system in the installation must be drained, otherwise there is a risk of frost damage.**
AUTO	Automatic operation with both heat pump and auxiliary heater permitted. If no auxiliary heating is permitted only AUTO or OFF can be selected as operating mode.
HEATPUMP	The control computer is controlled so that only the heat pump unit (compressor) is allowed to operate. NOTE! No peak heating charging (legionella function) with only heat pump operation.
ADD. HEAT	The control computer only permits the auxiliary heater to be in operation.
HOT WATER	The control computer permits operation with heat pump for hot water production and auxiliary heat during peak heating charging (legionella function). No heat goes to heating system.

Symbols

Displays the operating status of the heat pump using symbols.

Symbol		Meaning
	HP	Indicates that the compressor is in operation. An "F" next to the symbol indicates that a flow switch is installed.
	LIGHTNING	Indicates that the auxiliary heater is in operation. Number of auxiliary power stages indicated by digit.
	HOUSE	Indicates that the 3-way valve position is for heat production for the house.
	TAP	Indicates that the 3-way valve's position is for hot water production.
	CLOCK	Indicates that tariff control is active.

Symbol		Meaning
	TANK	Indicates the temperature level in the water heater. During charging, the tank is filled and filling starts at the set start temperature. A lightning symbol by the symbol indicates peak heating charging (legionella function).
	SQUARE	Either indicates that the operating pressure switch has deployed, or that the hot gas temperature has reached its maximum temperature.

Symbols specific to DHP-C

Displays the operating status of the heat pump using symbols.

Symbol		Meaning
	COOLING	Indicates Cooling. A indicates active cooling.

Symbols specific to DHP-A, -AL

Displays the operating status of the heat pump using symbols.

Symbol		Meaning
	DEFROST	Displayed if defrosting is active.
	FAN	Displayed if the fan is active L=Low speed and H= High speed.

Text

Appears with applicable heat pump operating status text.

Message	Meaning
ROOM --°C	Shows the set ROOM value. Factory setting: 20°C. If the accessory room sensor is installed it first shows the actual temperature and then the desired indoor temperature within brackets.
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	Indicates that the high return temperature prevents the compressor's operation.
START	Indicates that there is a demand for heating production and that no start delay is active.
EVU STOP	Indicates that the additional function EVU is active. This means that the heat pump compressor and addition are off as long as EVU is active.
NO DEMAND HEAT	Indicates that there is no heating production demand.

Message	Meaning
HIGHPRESS ERROR	Alarm that indicates that the high pressure switch has deployed.
LOWPRESS ERROR	Alarm that indicates that the low pressure switch has deployed.
MOTOR P ERROR	Alarm that indicates that the motor protection has deployed.
BRINEFLOW LOW	Appears if the accessory flow switch is installed. Indicates that the flow in the brine system is low.
SENSOR	Alarm that indicates a faulty sensor.
HEATPUMP START	Indicates that the compressor will start within 30 seconds. The brine pump has started.
HEATPUMP+ ADD.HEAT	Indicates that heat production is active with both compressor and auxiliary heater.
START --MIN	Indicates that there is a heating production demand and will start in the specified number of minutes.
ADD. HEAT	Indicates that there is an auxiliary heater demand.

Texts specific to DHP-A, -AL

Appears with applicable heat pump operating status text.

Message	Meaning
DEFROST	Indicates the temperature for defrost.

5.2 Menus

5.2.1 Main menu INFORMATION

The control computer's main menu, INFORMATION, is opened by pressing the right or left button once.

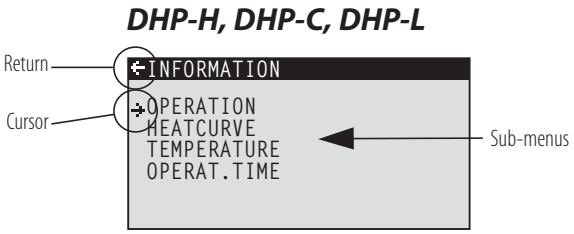


Figure 24: The main menu INFORMATION for DHP-H, DHP-C and DHP-L with sub menus.

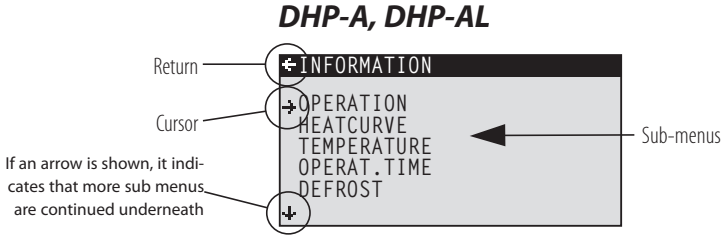
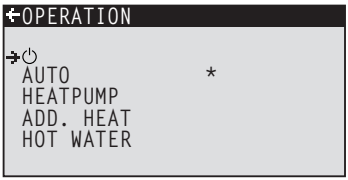


Figure 25: The menu INFORMATION for DHP-A and DHP-AL with sub menus.

Use the up and down buttons to select the desired sub-menu and open the menu by pressing the right button once. To go back to the display's starting point, press the left button once.

5.2.2 Sub-menu OPERATION



In the OPERATION menu you can set the operating mode of the heat pump.

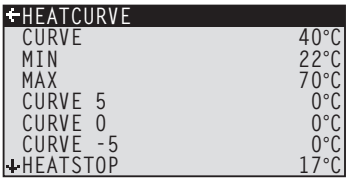
When changing operating mode, confirm your choice by pressing the right button once. The asterisk moves to the selected operating mode.

For further information, see the section 7.1 “Setting operating mode”.

⏻ (OFF)	The installation is fully switched off. Any active alarms reset. ⚠ **Remember that if the operating mode OFF is to be used for long periods during the winter, the water in the heating system in the installation must be drained, otherwise there is a risk of frost damage.**	By the customer, if necessary.
AUTO	Automatic operation with both heat pump and auxiliary heater permitted. If no auxiliary heating is permitted only AUTO or OFF can be selected as operating mode.	By the customer, if necessary.
HEATPUMP	The control computer is controlled so that only the heat pump unit (compressor) is allowed to operate. NOTE! No peak heating charging (legionella function) with only heat pump operation.	By the customer, if necessary.
ADD. HEAT	The control computer only permits the auxiliary heater to be in operation.	By the customer, if necessary.
HOT WATER	The control computer permits operation with heat pump for hot water production and auxiliary heat during peak heating charging (legionella function). No heat goes to heating system.	By the customer, if necessary.

5.2.3 Sub-menu HEATCURVE

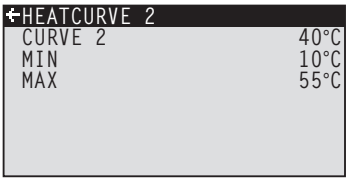
In the HEATCURVE menu the settings that affect the indoor temperature are made. For further information, see the section 2 "About your heat pump".



CURVE	The set value indicates the supply line temperature of the water that is transported to the heating system at an outdoor temperature of 0°C.	By the customer, if necessary.
MIN	Sets the lowest permitted supply temperature.	By the customer, if necessary.
MAX	Sets the highest permitted supply temperature.	By the customer, if necessary.
CURVE 5	Used to adjust the heat curve at an outdoor temperature of +5°C.	By the customer, if necessary.
CURVE 0	Used to adjust the heat curve at an outdoor temperature of 0°C.	By the customer, if necessary.
CURVE - 5	Used to adjust the heat curve at an outdoor temperature of -5°C.	By the customer, if necessary.
HEATSTOP	This function stops all production of heat when the outdoor temperature is equal to, or higher than, the set heat-stop value.	By the customer, if necessary.
REDUCTION	The temperature can be lowered using an outside timer. The control computer lowers the indoor temperature using the set value.	By the customer, if necessary.
ROOM FACTOR (Only displayed if a Room sensor is installed.)	Determines how large an impact the room temperature is to have when calculating the supply temperature. For underfloor heating we recommend a setting between 1-3 and for radiator heating between 2-4.	Factory setting: 2 (interval: 0 - 4) (0 = no impact, 4 = large impact)
POOL (Only displayed if an Expansion card is installed)	The temperature in the pool is controlled by a separate sensor regardless of the heating and hot water system.	By the customer, if necessary.
POOL HYSTERESIS (Only displayed if an Expansion card is installed)	The temperature range between start and stop for the pool's heat production.	Authorized installer. Adjusted for each installation.

5.2.4 Sub menu HEAT CURVE 2

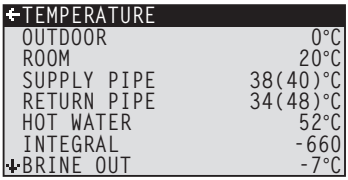
The menu only applies if the expansion card is installed and only appears if shunt group sensor is connected and activated. Used to change settings for heat curve 2.



Menu text	Description	Adjusted by:
CURVE 2	Calculated shunt group temperature at 0°C outdoor temperature. Shown as a graph that also shows MIN and MAX values.	By the customer, if necessary.
MIN	Minimum permitted shunt group temperature, if the temperature for heat stop has not been reached.	Authorized installer. Adjusted for each installation.
MAX	Maximum permitted shunt group temperature.	Authorized installer. Adjusted for each installation.

5.2.5 Sub-menu TEMPERATURE

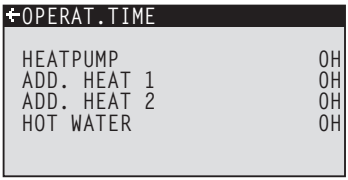
In the TEMPERATURE menu you are able to view the various temperatures that the installation has had. All temperatures are stored 100 minutes (factory setting) back in time so that they can also be displayed in the form of graphs.



OUTDOOR	Shows the actual outdoor temperature.	
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.	By the customer, if necessary.
SUPPLY PIPE	Shows the actual supply temperature. (The desired value is shown between brackets.) Read the section 3 "Regulation information" for more information. (In operating mode ADD.HEAT the stop temperature for hot water production is shown in brackets, increased by 5°.)	Not adjustable (The computer calculates the temperature required to maintain the indoor temperature.)

RETURN PIPE	Shows the read return temperature. (The highest permitted temperature is shown between brackets.)	Authorized installer. Adjusted for each installation.
HOT WATER	Shows the actual hot water temperature.	Not adjustable
INTEGRAL	Heat production is controlled by a calculated demand that is automatically calculated when the installation is in operation. The value for the integral displays the heating system's actual energy balance. Read the section 3 "Regulation information" for more information.	Not adjustable
BRINE OUT	The temperature of the brine circuit going out from the heat pump.	Not adjustable
BRINE IN	The temperature of the brine circuit going into the heat pump.	Not adjustable
POOL (Only displayed if an Expansion card is installed)	Shows the actual pool temperature. The set pool temperature is shown in brackets.	Not adjustable
SHUNT GROUP (Only displayed if an Expansion card is installed)	Shows the actual supply temperature. The calculated supply temperature to the shunt group is within brackets.	Not adjustable
COOLING (Only displayed if an Expansion card is installed)	Shows the actual supply temperature. The set point value is shown in brackets.	Not adjustable
CURRENT (Only displayed if an Expansion card is installed)	Shows the actual current consumption. The set value for MAX CURRENT is shown between brackets.	Not adjustable

5.2.6 Sub-menu OPERAT.TIME, *DHP-H, DHP-L, DHP-C*



In the OPERAT.TIME menu you are able to view the operating time of the installation. Operating times cannot be reset but are accumulated during the service life of the heat pump. The control computer calculates the operating time in minutes but only complete hours are shown in the display.

HEATPUMP	Shows the total time in hours that the heat pump has been in operation since installation. The number of operating hours includes the time for both heat production and hot water production.	Not adjustable
ADD. HEAT 1	Shows the total time in hours that the auxiliary heater (3 kW) has been in operation since installation.	Not adjustable
ADD. HEAT 2	Shows the total time in hours that the auxiliary heater (6 kW) has been in operation since installation.	Not adjustable
HOT WATER	Shows a part of the time that is included in the HEAT PUMP value. The number of hours that hot water production has been in operation since installation are shown here.	Not adjustable
COOLING (Only displayed if an Expansion card is installed)	Operating time passive cooling.	Not adjustable
ACT COOLING (Only displayed if an Expansion card is installed)	Operating time active cooling.	Not adjustable

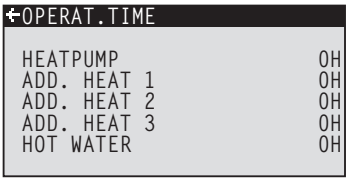
The auxiliary heater is made up of an electric heating element on the supply pipe that has two outputs, ADD.HEAT 1 and ADD.HEAT 2, and can be controlled in three steps. For three phase 400V heat pumps the outputs are in the different steps:

- Step 1 = ADD.HEAT 1 = 3 kW
- Step 2 = ADD.HEAT 2 = 6 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 9 kW

For single phase 230V heat pumps the outputs are in the different steps:

- Step 1 = ADD.HEAT 1 = 1.5 kW
- Step 2 = ADD.HEAT 2 = 3 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 4.5 kW

5.2.7 Sub-menu OPERAT.TIME, *DHP-A, -AL*



This menu is specific to DHP-A and DHP-AL.

In the OPERAT.TIME menu you are able to view the operating time of the installation. Operating times cannot be reset but are accumulated during the service life of the heat pump. The control computer calculates the operating time in minutes but only complete hours are shown in the display.

HEATPUMP	Shows the total time in hours that the heat pump has been in operation since installation. The number of operating hours includes the time for both heat production and hot water production.	Not adjustable
ADD. HEAT 1	Shows the total time in hours that the auxiliary heater (3 kW) has been in operation since installation.	Not adjustable
ADD. HEAT 2	Shows the total time in hours that the auxiliary heater (6 kW) has been in operation since installation.	Not adjustable
ADD. HEAT 3	Shows the total time in hours that the auxiliary heater (6 kW) has been in operation since installation.	Not adjustable
HOT WATER	Shows a part of the time that is included in the HEAT PUMP value. The number of hours that hot water production has been in operation since installation are shown here.	Not adjustable

The auxiliary heater is made up of an electric heating element on the supply pipe that has three different outputs, ADD.HEAT 1 (3 kW), ADD.HEAT 2 (6 kW) and ADD.HEAT 3 (6 kW), and can be controlled in five steps: For three phase 400V heat pumps the outputs are in the different steps:

- Step 1 = ADD.HEAT 1 = 3 kW
- Step 2 = ADD.HEAT 2 = 6 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 9 kW
- Step 4 = ADD.HEAT 2 + ADD.HEAT 3 = 12 kW
- Step 5 = ADD.HEAT 1 + ADD.HEAT 2 + ADD.HEAT 3 = 15 kW

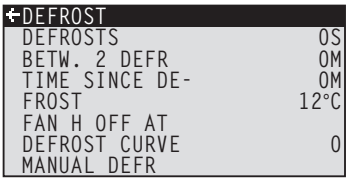
For single phase 230V heat pumps the additional heat output can be controlled three steps with the following effects:

- Step 1 = ADD.HEAT 1 = 1.5 kW
- Step 2 = ADD.HEAT 2 = 3 kW
- Step 3 = ADD.HEAT 1 + ADD.HEAT 2 = 4.5 kW

5.2.8 Sub-menu DEFROST, *DHP-A, -AL*

This menu is specific to DHP-A and DHP-AL.

In the DEFROST menu it is possible to view miscellaneous information about defrosting the outdoor unit and also possible to make adjustments.



DEFROSTS	Total number of defrosts carried out since installation, i.e. the number not reset.	Not adjustable
BETW. 2 DEFR	The operating time of the compressor in minutes between the 2 last defrosts.	Not adjustable
TIME SINCE DEFROST	The operating time of the compressor in minutes since last defrost. Reset after a defrost is completed.	Not adjustable
FAN H OFF AT	Fan high speed is deactivated at this outdoor temperature and low speed is activated.	By the customer, if necessary.
DEFROST CURVE	Here, the angle of the defrost curve can be changed using the right-hand arrow and by either pressing + or -. (Change the start temperature for when defrosting is to begin).	By the customer, if necessary.
MANUAL DEFR	By using the right-hand arrow and then pressing +, defrost can be started manually. During defrosting heated brine (+20°C) is circulated to the outdoor unit for 10 minutes.	By the customer, if necessary.

6 Trimming the heating system

To obtain a heating system balance and obtain an even and comfortable indoor temperature, you must adjust your heating system according to the example below.

⚠ Adjust the heating system during the winter to obtain the greatest possible output.

⚠ Trimming must be carried out over a few days as the inertia in the heating system causes the indoor temperature to change slowly.

1 Choose one of the house's rooms as a reference room for the indoor temperature, where the highest temperature is required, 20-21°C.

2 Place a thermometer in the room.

3 Open all the heating system's radiator valves fully.

4 Leave the heat pump's ROOM value set at 20°C. See the section 7.2 "Instructions – Setting the ROOM value" for further information.

5 Note the temperature in the reference room at different points in time over a 24 hour period.

6 Adjust the ROOM value so that the reference room reaches your desired indoor temperature of 20-21°C. Remember that other rooms will have different temperatures during trimming, but these can be adjusted later.

7 If the ROOM value must be adjusted more than 3°C upwards or downwards the CURVE value must be adjusted instead. See the section 7.3 "Instructions – Adjusting the CURVE value" for further information.

8 If the indoor temperature varies several degrees despite trimming, a specific part of the heat curve may need adjusting. Check at what outdoor temperature the variation is greatest and adjust the curve at the corresponding value (CURVE 5, CURVE 0, CURVE -5). See the section 7.4 "Instructions – Adjusting a specific part of the heat curve" for further information.

9 When the reference room has an even temperature of 20-21°C over a 24 hour period, you can adjust the radiator valves in the other rooms so that their indoor temperatures are the same temperature or lower than the reference room.

7 Instructions

An authorized installer carries out the basic settings of the heat pump at installation. You can carry out the following yourself:

- Setting operating mode
- Setting ROOM values
- Adjusting CURVE values
- Adjusting a specific part of the heat curve
- Setting the desired maximum and minimum supply temperature
- Setting HEATSTOP
- Reading off the hot water temperature or different temperatures in the heat pump
- Calculate the heat pump's total energy consumption
- For DHP-A, -AL: defrost the outdoor unit

7.1 Setting operating mode

In the control computer you can choose between five operating modes:

To change the operating mode:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.

2 Open your selection by pressing the right button once. An asterisk indicates the current operating mode..

3 Mark the new desired operating mode using the up or down button.

4 Press the right button once to confirm your choice. The asterisk moves to your selected operating mode.

5 Press the left button twice to exit the menu.

7.2 Setting ROOM values

If the indoor temperature is too high or too low, you can adjust the ROOM value to change the indoor temperature.

To change the ROOM value:

1 Press either the up or the down button once to open and change the ROOM value.

2 Raise or reduce the ROOM value using the up or down buttons to change the indoor temperature.

3 Wait ten seconds or press the left button once to exit the menu.

7.3 Adjusting CURVE values

To change the CURVE value:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.

2 Press the down button to move the cursor to the HEATCURVE menu option.

3 Open the menu by pressing the right button once.. The cursor is at CURVE.

4 Open your selection by pressing the right button once.
5 Raise or reduce the value with the up or down buttons. The graph shows how the curve slope changes.
6 Press the left button three times to exit the menu.

7.4 Adjusting a specific part of the heat curve

To change a specified part of the heat curve:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the HEATCURVE menu option.
3 Open the menu by pressing the right button once. The cursor is at the CURVE value.
4 Select CURVE 5, CURVE 0 or CURVE -5 using the up or down buttons.
5 Open your selection by pressing the right button once.
6 Raise or reduce the value with the up or down buttons.
7 Press the left button three times to exit the menu.

7.5 Setting MAX and MIN values

To change MIN or MAX:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the HEATCURVE menu option.
3 Open the menu by pressing the right button once. The cursor is at the CURVE value.
4 Press the down button to move the cursor to MIN.
5 Open your selection by pressing the right button once. The text row MIN is marked.
6 Raise or reduce the value with the up or down buttons.
7 Press the left button three times to exit the menu.

Repeat the procedure to change the MAX value, but select MAX instead of MIN at step 4.

7.6 Setting HEATSTOP

To change HEATSTOP:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the HEATCURVE menu option.
3 Open the menu by pressing the right button once. The cursor is at the CURVE value.
4 Press the down button to move the cursor to HEATSTOP.
5 Open your selection by pressing the right button once. The text row HEATSTOP is marked.
6 Raise or reduce the value with the up or down buttons.
7 Press the left button three times to exit the menu.

7.7 Reading off temperatures

Reading the hot water temperature.

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the TEMPERATURE menu option.
3 Open your selection by pressing the right button once.
4 Press the down button to move the cursor to HOTWATER. The value shown at the HOTWATER menu option is the hot water's current value.
5 Open your selection by pressing the right button once. A graph of the hot water temperature over the last hour is shown.
6 Press the left button three times to exit the menu.

To view the TEMPERATURE history:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the TEMPERATURE menu option.
3 Open the menu by pressing the right button once.
4 The cursor is at the OUTDOOR value.
5 Press the up or down button to move the cursor to the desired value.
6 Open your selection by pressing the right button once. A graph appears in the display.
7 Move the cursor along the time axis using the up (plus) or down (minus) buttons. An exact value at the relevant time is shown at the top of the display.
8 Press the left button three times to exit the menu.

7.8 Calculating energy consumption*, DHP-H, DHP-L, DHP-C*

The energy consumption calculation is difficult to specify exactly, but the average output for a normal house with normal hot water consumption in the following tables gives a relatively accurate result for each heat pump and heating system. Remember that the operating time for the heat pump installation must exceed one year before the specified values in the table are valid.

The energy consumption for legionnella operation is included in the hours for ADD.HEAT 1.

The indicated outputs include circulation pumps.

DHP-H, DHP-L	**4**	**6**	**8**	**10**	**12**	**16**
Under floor heating	1.13 kW	1.59 kW	2.00 kW	2.55 kW	2.90 kW	4.31 kW
Radiators	1.39 kW	1.88 kW	2.36 kW	3.03 kW	3.43 kW	5.11 kW

DHP-C	4	5	6	7	8	10
Under floor heating	1.15 kW	1.40 kW	1.59 kW	1.70 kW	2.00 kW	2.55 kW
Radiators	1.30 kW	1.55 kW	1.88 kW	1.95 kW	2.36 kW	3.03 kW

To calculate the energy consumption:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the OPERAT.TIME menu option.
3 Open the menu by pressing the right button once.
4 Note how many hours the following values have: HEATPUMP, ADD.HEAT 1 and ADD.HEAT 2.
5 In the tables above find the value for the average output that corresponds to your heat pump and heating system, and multiply it by the number of HEAT PUMP- hours. Note the result.
6 Multiply the number of ADD.HEAT 1 hours by 3. Note the result.
7 Multiply the number of ADD.HEAT 2 hours by 6. Note the result.
8 Add up the multiplied values to obtain the total energy consumption.

7.9 Calculating energy consumption*, DHP-A, -AL*

The energy consumption calculation is difficult to specify exactly, but the average output for a normal house with normal hot water consumption in the following tables gives a relatively accurate result for each heat pump and heating system. Remember that the operating time for the heat pump installation must exceed one year before the specified values in the table are valid.

The energy consumption for legionella operation is included in the hours for ADD.HEAT 1.

The specified outputs include the circulation pumps and also the outdoor unit's fan.

DHP-A, -AL	6	8	10	12
Under floor heating	1,90 kW	2,60 kW	3,00 kW	3,50 kW
Radiators	2,30 kW	3,05 kW	3,50 kW	4,10 kW

To calculate the energy consumption:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.
2 Press the down button to move the cursor to the OPERAT.TIME menu option.
3 Open the menu by pressing the right button once.
4 Note how many hours the following values have: HEAT PUMP, ADD.HEAT 1, ADD.HEAT 2 and ADD.HEAT 3.

5 Find the value for the average output that corresponds to your heat pump and heating system in the table above, and multiply it by the number of HEAT PUMP hours. Note the result.

6 Multiply the number of ADD.HEAT 1 hours by 3. Note the result.

7 Multiply the number of ADD.HEAT 2 hours by 6. Note the result.

8 Multiply the number of ADD.HEAT 3 hours by 6. Note the result.

9 Add up the multiplied values to obtain the total energy consumption.

7.10 Manual defrost*, DHP-A, -AL*

If DHP-A, -AL's outdoor unit needs defrosting you can run a defrosting procedure manually from the control computer.

To defrost manually:

1 Press either the right or left button once to open the INFORMATION menu. The cursor is in the OPERAT. menu option.

2 Press the down button to move the cursor to the DEFROST menu option.

3 Open the menu by pressing the right button once.

4 Press the down button to move the cursor to the MANUAL DEFROST menu option.

5 Press the right button once.

6 Press the up button once to start defrost.

7 Press the left button three times to exit the menu.

8 Regular checks

8.1 Checking operation

During normal operation, the alarm indicator lights green continuously to show that everything is OK. When the alarm is triggered, it flashes green at the same time as a text message is shown in the display.

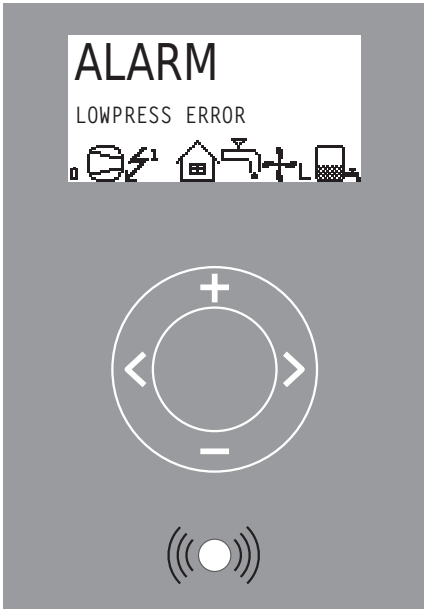


Figure 26: Flashing alarm indicator in the event of an alarm.

Regularly check the alarm indicator to ensure that the installation is working correctly. It is not always the case that you will notice a problem with the installation, for example, in the event of a fault with the compressor the auxiliary heater starts automatically (operating mode AUTO). For further information about alarms, see the section 10 "Troubleshooting".

8.2 Checking the brine level

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

The brine must be topped up when the level drops so that it is no longer visible in the expansion tank.

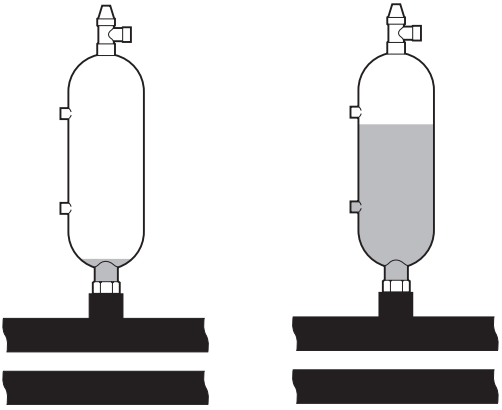


Figure 27: Level in expansion tank.

During the first month of operation the brine level might drop a little, which is quite normal. The fluid level may also vary depending on the temperature of the heat source. Under no circumstances, however, must the fluid level be allowed to drop so much that it is no longer visible in the expansion tank.

For DHP-A, -AL with pressurized brine circuit the manometer on the expansion tank must show approx. 1.0 bar, see figure in section "4 Installation principle" for more information about the location of the expansion tank.

Always call your installer to refill brine, see the section 13 "References".

8.3 Checking the water level in the heating system

The line pressure of the installation must be checked once a month. The external manometer must show a value between 1-1.5 bar. If the value is below 0.8 bar, when the water in the heating system is cold, the water must be topped up (applies in the event of an empty expansion tank). See the section 4 "Installation principle" for information on where the manometer is located.

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, see the section 13 "References".

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

⚠ The closed expansion tank contains an air filled bladder that absorbs variations in the heating system's volume. Under no circumstances may it be emptied of air.

8.4 Checking the safety valve

Both the safety valves for the heating system must be checked at least four times a year to prevent lime deposits clogging the mechanism. See the section 4 "Installation principle" for information on where the safety valves are located.

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 an authorized installer, see the section 13 "References".

The opening pressure of the safety valves is not adjustable.

8.5 In the event of leakage

In the event of leakage in the hot water pipes between the heat pump and water taps, close the shut-off valve on the cold water inlet immediately. Contact an authorized installer, see the section 13 "References".

8.6 Cleaning the strainer for the heating system

⚠ The heat pump must be switched off at the main switch before cleaning can be started.

⚠ The brine circuit's strainer must be cleaned twice a year after installation. The interval can be extended if there is evidence that cleaning twice a year is not necessary.

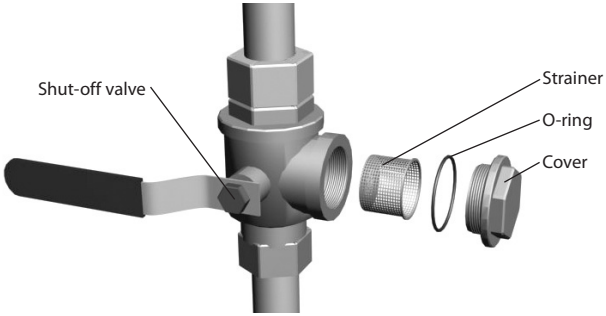


Figure 28: Shut-off cock and strainer on the return pipe.

NOTE! Have a cloth to hand when opening the strainer cover as a small amount of water usually escapes.

To clean the strainer:

1 Switch off the heat pump.

2 Turn the shut-off cock to the closed position (see figure above).

3 Unscrew the cover and remove it.

4 Remove the strainer.

5 Rinse the strainer.
6 Reinstall the strainer.
7 Check that the o-ring on the cover is not damaged.
8 Screw the cover back into place.
9 Turn the shut-off cock to the open position.
10 Start the heat pump.

8.7 Cleaning the strainer for the brine circuit

The heat pump must be switched off at the main switch before cleaning can be started.

The brine circuit's strainer must be cleaned twice a year after installation. The interval can be extended if there is evidence that cleaning twice a year is not necessary.

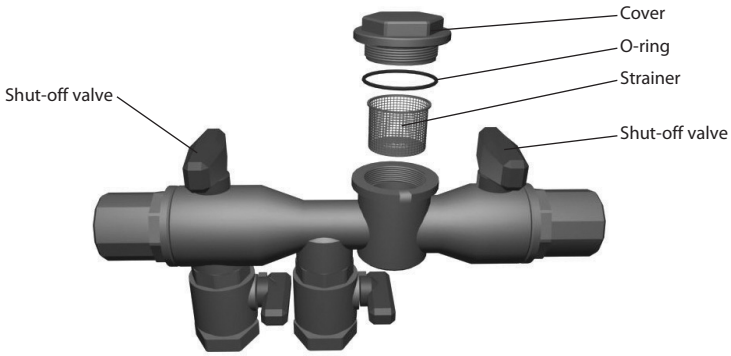


Figure 29: Strainer in the filler cock.

To clean the strainer:
1 Switch off the heat pump.
2 Remove the insulation around the filler cock.
3 Turn both shut-off cocks to the closed position (see figure above).
4 Unscrew the cover and remove it.
5 Remove the strainer.
6 Rinse the strainer.
7 Reinstall the strainer.
8 Check that the o-ring on the cover is not damaged.
9 Screw the cover back into place.
10 Turn both shut-off cocks to the open position.
11 Reinstall the insulation around the filler cock.
12 Start the heat pump.

9 Accessories

9.1 Room temperature sensor

Contact your installer if you wish to supplement your heat pump installation with a room temperature sensor, see the section 13 “References”.

The room sensor is an accessory that is used to set a desired indoor temperature. It can be installed in the house where the room temperature is relatively constant, not in a hallway, kitchen or a room with alternative heating. On the room sensor you can set the desired room temperature and view the outdoor temperature.

The room temperature sensor has a temperature sensor that provides a further value that the control computer can use when calculating the supply temperature. The influence of the room sensor in the calculation can be set in the menu HEAT CURVE-> ROOM FACTOR. Default setting for ROOM FACTOR is 2 but can be adjusted from 0 (no effect) to 4 (great effect).

The difference between the desired and actual indoor temperature is multiplied by the set value for ROOM FACTOR. The set point on the heating system’s supply line increases or decreases with the result depending on whether there is a deficit or surplus of heat. The table below shows examples of how the set point for the supply line is affected at CURVE 40 with different settings for ROOM FACTOR.

In the event of a heating deficit:

0	22	20	40
1	22	20	42
2	22	20	44
3	22	20	46
4	22	20	48

In the event of a surplus of heat the conditions are the opposite:

0	20	22	40
1	20	22	38
2	20	22	36
3	20	22	34
4	20	22	32

- The room sensor’s display shows the actual indoor temperature in normal mode.
- To display the outdoor temperature press the up and down buttons at the same time.
- To set the desired indoor temperature press either the up or down button.
- If the heat pump has an active alarm the text AL appears in the display.

10 Troubleshooting

10.1 Alarm

In the event of an error message try restarting the installation using the installation's safety switch. If restarting the heat pump does not help try rectifying the problem using the table below. Contact your installer, see the section 13 "References", if you are unable to rectify the problem yourself.

LOWPRESS ERROR	LOWPRESS ERROR - The compressor stops and there is no hot water production.	Not enough fluid in the brine system. Air in the brine system. Blocked filter in the brine system.	Contact your installer
HIGHPRESS ERROR	HIGHPRESS ERROR - The compressor stops and there is no hot water production.	Insufficiently opened radiator/floor loop thermostats. Air in the heating system. Blocked strainer in the heating system.	Open radiator / floor loop thermostats. Top up and bleed the heating system or contact your installer.
MOTOR P ERROR	Motor protection cut out. The compressor stops and there is no hot water production.	Power failure caused by a blown fuse or the safety switch has deployed.	Check the fuses and reset the safety switch.
ALARM AUXILIARY HEATER	Overheating protection deployed.	Electrical fault. The safety switch has tripped.	Contact your installer
SENSOR OUTDOOR	Fault in outside sensor. To calculate the supply temperature's desired value, use 0°C instead.	Electrical fault.	Contact your installer
SENSOR FRONT	Incorrect supply pipe sensor. Everything stops except the circulation pump for the heating system.	Electrical fault.	Contact your installer
SENSOR RETURN	Return sensor fault.	Electrical fault.	Contact your installer
SENSOR HOT WATER	Fault in the hot water sensor. No hot water production.	Electrical fault.	Contact your installer

ALARM ROOM SENSOR	The actual room temperature is not displayed. To calculate the supply temperature's desired value, use 20°C instead.	Electrical fault.	Contact your installer
ERR PHASE SEQ.	The compressor in the heat pump is operating in the wrong direction and this means that only the auxiliary heater is maintaining heating.	The phase sequence changed when changes were made in the electrical installation of the house.	Contact your installer
HIGH RETURN	The temperature of the water that returns from the radiators is too high and prevents the heat pump from working.	Insufficiently opened radiator/floor loop thermostats.	Ensure that all thermostat valves are fully open.

The following table applies only for installations that use groundwater as brine.

BRINE OUT	Brine lower than set temperature. The compressor stops and there is no hot water production.	The lowest set brine temperature has been reached.	The system resets itself when the temperature has risen to the set value.
BRINEFLOW LOW	The flow switch was not active during the latest start. The compressor stops and there is no hot water production.	Brine's flow is low.	Contact your installer

11 Terms and abbreviations

Brine	Is a water based mixture that transports energy from the heat source to the heat pump. (See the section 2 "About your heat pump" for further information).
Brine circuit	The fluid circuit transports energy from the heat source to the heat pump. (See the section 2 "About your heat pump" for further information).
Compressor	The compressor raises the temperature and pressure of the refrigerant. (See the section 2 "About your heat pump" for further information).
Condenser	In the condenser, the refrigerant supplies its heat energy to the heat transfer fluid circuit. (See the section 2 "About your heat pump" for further information).
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.
CURVE	The CURVE value is set via the display. The set value indicates the supply temperature of the water that is transported to the radiators at an outdoor temperature of 0°C.
Evaporator	In the evaporator, energy from the heat source is absorbed by the refrigerant passing through the evaporator. The refrigerant turns into gas. (See the section 2 "About your heat pump" for further information).
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.
Heat transfer fluid circuit	The fluid circuit obtains heat/energy from the refrigerant circuit, which it then transports to the water tank or heating system. See the section 2 "About your heat pump" for further information.
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 multiplied by the time during which the difference is active. The resulting value is referred to as the integral. The integral value is automatically established when the heating system is in use. The value of the integral can be viewed in the display under the submenu TEMPERATURE.
Radiator	Heater element, element.

Refrigerant	Is the fluid that transports heat from the brine circuit and supplies it to the heat transfer fluid circuit. (See the section 2 “About your heat pump” for further information).
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. (See the section 2 “About your heat pump” for further information).
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.

12 Default settings in the control computer

The first column in the table below shows the parameters that can be adjusted by the User. The second column shows settings made at the factory, and the third column the settings made by the installation contractor in connection with installation of the heat pump.

Make sure that the installation contractor enters any settings made during installation that are particular to your heat pump. This will make it easier for you when you make your own adjustments.

ROOM	20°C	
OPERATION	AUTO	
CURVE	40°C	
MIN	10°C	
MAX	55°C	
CURVE 5	0°C	
CURVE 0	0°C	
CURVE -5	0°C	
HEATSTOP	17°C	

13 References

13.1 Check list

Installed model: . . . . . .

- Setting up
  - ☐ Surface adjustment
- Piping installation
  - ☐ Leak test
  - ☐ Bleeding
  - ☐ Open radiator valves
  - ☐ Function test safety valve
- Electrical Installation
  - ☐ Direction of rotation of the compressor
  - ☐ Outdoor sensor
  - ☐ Accessories: . . . . . .
- Brine installation
  - ☐ Type of brine: . . . . . .
  - ☐ Filling, number of litres: . . . . . .
  - ☐ Leak test
  - ☐ Function test safety valve
- Control computer
  - ☐ Basic settings
- Test operation
  - ☐ Manual test carried out
  - ☐ Noise check
- Customer information
  - ☐ Control computer, menus, maintenance instructions
  - ☐ Checking and filling, heating system
  - ☐ Alarm information
  - ☐ Function test safety valve
  - ☐ Strainers, cleaning
  - ☐ Trimming information
  - ☐ Warranties

13.2 Installation carried out by:

PIPE INSTALLATION

Date .....

Company .....

Name .....

Tel. No. .....

ELECTRICAL INSTALLATION

Date .....

Company .....

Name .....

Tel. No. .....