ENGINEERING
TOMORROW

Technical documentation | Air and ground source heat pumps

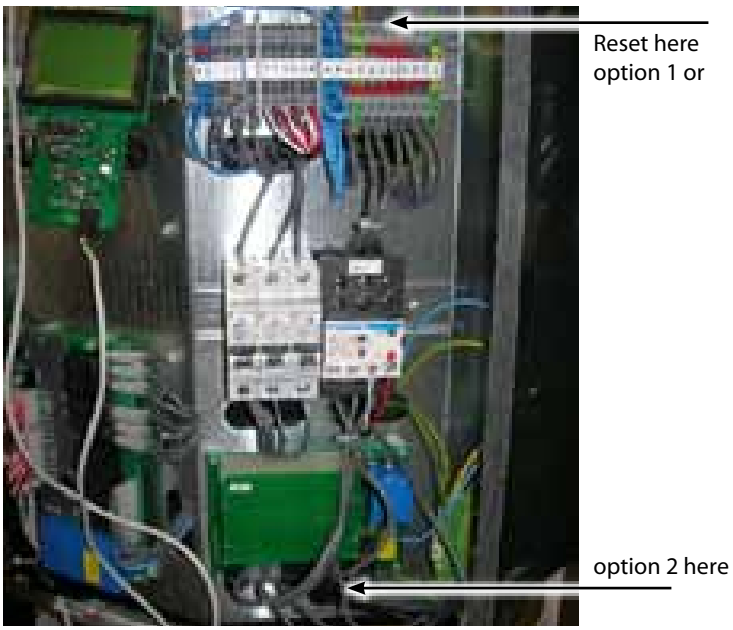
Looking for **support?** Heat Pump **Troubleshooting Guide**

Error phase sequence	02	Alarm communication	16
Working pressostat and high pressure pipe	03	Alarm Aux.heater	17
Alarm high pressure	05	Sound	18
Alarm low pressure	08	Temperature or the quantity of hot water	22
Alarm motor protection	10	Thermal comfort	24
Alarm Circulation pump	12	High operating time additional heater	28
Alarm Brinepump	13	Outdoor unit and defrosting problems	30
Alarm Brine	14	Room sensor digital	32
Alarm Sensor	15	Electric hot water heaters	33

The incoming phases have the incorrect sequence (only applies to 3-phase heat pumps).

Action:

Reset the phases



When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling).
If the compressor for some reason runs backwards it cannot raise the temperature.
When the compressor runs, check the discharge pipe temperature by feeling it with your hand.



The discharge pipe must be hot (not lukewarm) even slightly away from the compressor if the phases are in the correct sequence.
If the phases are in the incorrect order, switch two of the incoming phases to the heat pump.
with incoming phases option 1 or down at soft starter option 2.
And repeat the procedure by checking the discharge pipe temperature

The operating pressure switch does not close

Switch off the main switch for the heat pump, wait until the compressor has been stationary for at least 10-15 minutes. Using the buzzer, check if the operating pressure switch is closed or not.

Action:

Check that both the cables for the operating pressure switch are in position If the pressure switch is closed, bridge the operating pressure switch cables temporarily and switch on the voltage to the heat pump again. if the compressor now starts in auto or in manual test there might be a fault in the operating pressure switch, replace the operating pressure switch.



The image shows bridging on the operating pressure switch

If the indication 0 is displayed in the lower left hand corner of the display it means that the operating pressure switch or discharge pipe sensor has broken the circuit. In normal operation this is displayed after completed hot water production but can also be shown at high supply temperature in the heating system or if one has too low a flow over the heat pump.



The image shows an open operating pressure switch or too high discharge pipe temperature

If the pressure switch is open, try carefully tapping the head of the operating pressure switch with a screwdriver and use a buzzer test to see if it has closed again.
Replace the pressure switch if it appears to jam repeatedly in the open position.

Fault in sensor, it shows the factory setting value or equivalent >120-140°C

Check what the sensor shows. Is it a plausible/actual value? The factory set stop value is within brackets.
Measure the resistance of the sensor, check against the ohm table in the installation instructions or see the end of the document.

Action:

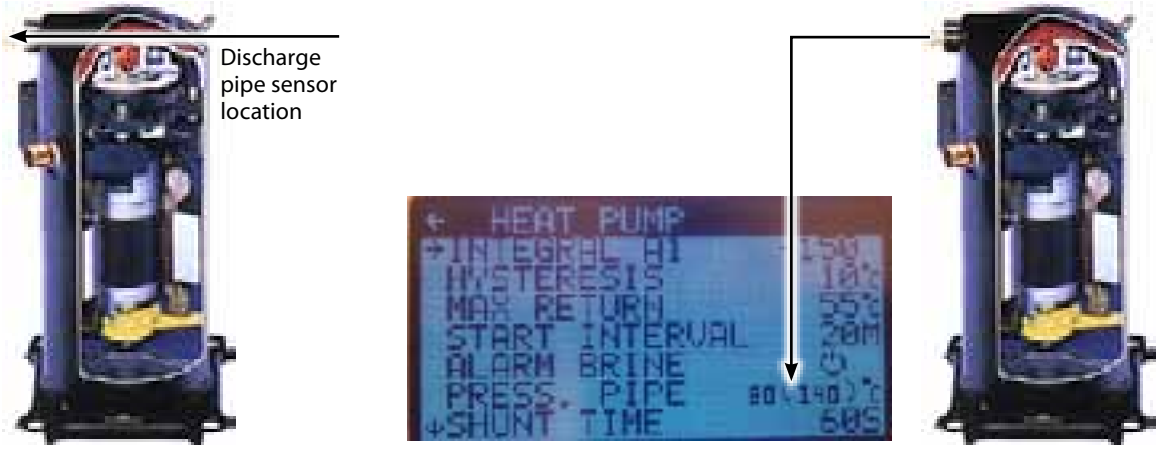
If the sensor is defective, replace it.

Hot gas temperature too high

See in service under heat pump also check using own digital thermometer.

Action:

Check the refrigerant circuit see section below



The discharge pipe sensor displays correctly but still has high overheating

Action:

Using manometer apparatus and a digital thermometer check what the cooling and overheating reading of the unit is.
Also check that bulb and capillary tube are undamaged and that the bulb is correctly positioned. (Bulb is positioned at two o'clock in the suction pipe).

If the cooling is correct according to the instructions try adjusting the overheating using the expansion valve, if the overheating cannot be adjusted using the expansion valve or if the capillary tube or bulb are damaged replace it.

Lack of refrigerant, not enough refrigerant in the hp cooling circuit.

Action:

Using manometer apparatus and a digital thermometer, check that the unit's cooling and overheating is correct for the specific refrigerant.
If cooling is not at the correct level compared with the specific refrigerant and is too low, there is insufficient refrigerant in the unit.
If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action. If leak tracer is not available, brush soap water on the suspected leak and look for bubbles.
Also check if oil has leaked. In event of leakage oil usually comes from the refrigerant circuit.

150 ohm sensor
Outdoor / Defrost sensor

temperatur	ohm
-30	1884
-25	1443
-20	1115
-15	868
-10	681
-5	538
0	428
5	343
10	276
15	224
20	183
25	150
30	124
35	103
40	86

22 kohm sensor
Supply line, return line, hot water, brine in, brine out, discharge pipe sensor

temperatur	kohm
0	66.3
5	52.4
10	41.8
15	33.5
20	27.1
25	22
30	18
35	14.8
40	12.2
45	10.1
50	8.5
55	7.1
60	6
65	5
70	4.2
75	3.7
80	3.1
85	2.7

Blocked strainer in the heating system return

Action:

Shut off and clean the strainer on the return row

Air in the heating system, outer jacket or in the Tws coil

Action:

Run the circulation pump in manual mode and listen for air. Switch between hot water and heating modes to check the whole heating system. Bleed the heating system according to the heat pump installation instructions.

Closed taps or partially closed thermostats/valves in the heating system

Action:

Open any closed taps. Check that the thermostats/valves are open.



The circulation pump is defective or has jammed

Action:

Check that there is there voltage to the circulation pump. If there is no current to the circulation pump, measure at the fuse and the relay card (See wiring diagram).

If there is current there check the wiring between relay card and circulation pump.
If there is current the circulation pump has jammed.

If this is the case, open the bleed screw and try to release the shaft using a screwdriver for example (Does not apply to the optimum models). If it still jams, take the drive side apart, clean the drive side using a dish brush and degreaser

Reinstall the motor on the lower connection , fill with water carefully through the upper connection of the pump.
Reinstall the upper connection , open the ball valve, test run the circulation pump in a manual test.

If it is still bad or there is no flow close the ball valves and remove the screws that hold the motor. Check that the paddle wheel is secure on the shaft.
If the paddle wheel is loose replace the circulation pump.
If the circulation pump does not function or sounds bad after cleaning replace the circulation pump.

Tip!
Be careful not to spill water because there are electronics under the radiator pump; use something to protect the electronics.



NOTE! This does not apply to the Optimum series of circulation pumps
On Optimum one measures 0-10V (DC) at the molex switch (marked 0-10V) at the circulation pump while one runs it in a manual test. If there is no signal measure directly on the relay card terminals (See wiring diagram).

Exchange valve jamming

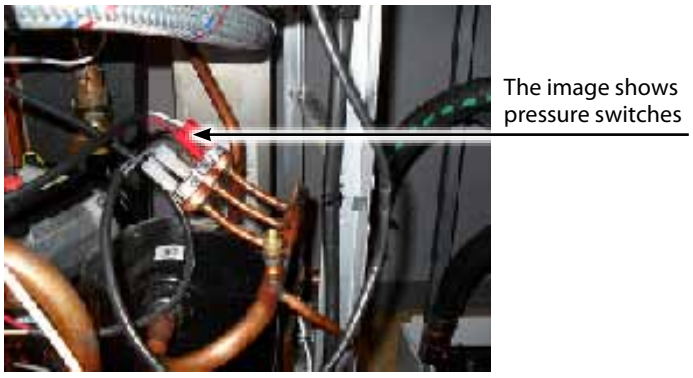
Action:

Check that the exchange valve moves to its limit positions by running it manually in the service menu.
If yes, disconnect the motor and check that the cone moves easily without jamming.
If it jams, clean/ replace the insert or replace with a newer LK exchange valve (Note! When changing to LK one must replace both motor and valve because this is the twisting type)

Cable break or loose cable to high pressure switch

Action:

Check that both cables are connected to the high pressure switch. If yes, use a buzzer to check for cable breaks. (disconnect the cables from the high pressure switch and relay card to do this).



The operating pressure switch does not open but the heat pump opens at high pressure

Action:

Check that the operating pressure switch opens at the correct pressure, check using manometer apparatus.
If the break pressure is higher than the correct pressure there is a fault in the pressure switch.

The operating pressure switch does not open but the heat pump opens at high pressure

Action:

Check that the operating pressure switch opens at the correct pressure, using manometer apparatus.
If the high pressure switch opens at a lower pressure than indicated there is a fault in the high pressure switch
If the high pressure switch opens at the incorrect pressure, replace it.

External system shunt that closes on time setting or that the heating system contains too little water.

Action:

Check for timer-controlled shunts or valves in the system that close down the entire or too large a part of the heating system.
Ensure that there is a sufficiently large water volume for the heat pump to work against, i.e. for the heat pump to give off its heat to. (approx). 14-15 litres/kw heat pump) at smaller volumes there is a lot of starting and stopping and a risk of the high pressure alarm deploying.

Incorrectly facing non-return valve with too high opening pressure

Action:

Check that the non-return valve is in the correct direction of flow.
Check that the heat pump's external available pressure exceeds the non-return valve's opening pressure.

Large pressure drop in the heating system

Action:

Check the system for closed taps or valves inside or out of the heat pump.
Check for dirt in the heating system.
Check that the heat pump's external available pressure exceeds the heating system's pressure drop.
Check if the heating system is under dimensioned



Blocked strainer on the brine circuit.

Action:

Check for brine in strainer (if necessary clean the strainer)

Closed taps, main tap or filler cock on the brine circuit

Action:

Check that all taps are open, if not open them

Air in the brine circuit

Action:

Start the brine pump in manual mode and listen for air in both the brine circuit and the heat pump.
If necessary, bleed according to the installation instructions

The circulation pump for the brine circuit is defective or has jammed

Action:

Check if the circulation pump has jammed
Check the 230V signal
Measure the 0-10V signal while running the pump in manual test (only applies to optimum)

Cable break or loose cable to low pressure switch

Action:

Check that both the cables are connected to the low pressure switch. If yes, use a buzzer to check for cable breaks.
(disconnect the cables from the low pressure switch and relay card to do this).

The low pressure switch opens too soon

Action:

Check that the low pressure switch opens at the right pressure (done with a manometer apparatus) It varies depending on the refrigerant and model year) see installation instructions.

Incorrect type of anti-freeze or incorrectly mixed

Action:

Check that the correct type of anti-freeze is used.
Measure the frost protection using a refractometer
For the Atria model it is very important that the ethylene glycol used for the cooling system is mixed for -32°C +/- 1°C.

If when measuring the frost protection it should be above or below the guidelines,
It is necessary to mix in an external reservoir of the filler barrel type.
This is because brine has particular difficulty in mixing with ethylene glycol.

Note! Bear in mind that if one uses the same barrel for ethanol and ethylene glycol it must be rinsed well so that there is no residue left in the barrel and filler pump.

Expansion valve defective or incorrectly set

Action:

Check that the cooling is correct for the specific heat pump model using manometer apparatus.
Also check that the capillary tube is undamaged and that the bulb is correctly installed.

Short active collector, e.g. short or dry bore hole, short surface soil collector

Action:

Check the length of the collector that is being used and compare with the collector length in the dimensioning documentation.
If the active collector is too short, the heat pump cannot receive enough energy from the heat source, which results in the heat pump requiring an addition to cover the energy requirement for the building.

Collector too long, pressure drop too great

Action:

Check the length of the collector that is being used and that it is connected in parallel, not connected in series, if more than one coil is being used. Should not differ by more than approx 5°C between brine in and out.NOTE! If a longer collector is being used than recommended for the specific heat pump, it must be divided into several parallel connected coils.See the instructions for maximum coil lengths.

Phase drop or blown fuse

Action:

Check that all phases are present on the terminal block for incoming supply.
If not, check the fuses in the cabinet and in the safety breaker for the heat pump.

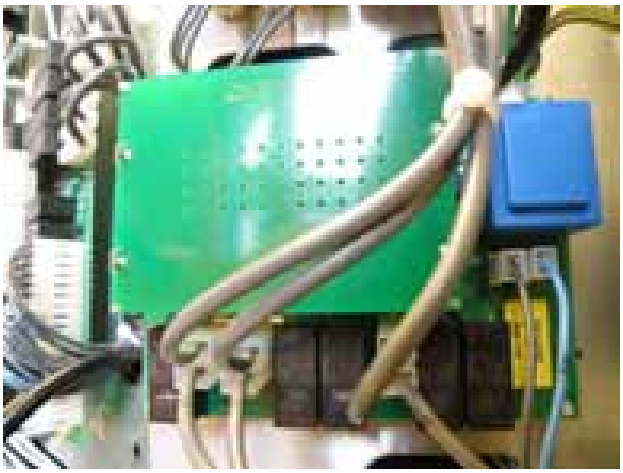
Also check that all wiring is secure.
If screw terminals are used they must be properly tightened.
If phoenix flat spring terminals are used, the cables must be secure in the correct hole with load on the cable.
Disconnect the cables from the incoming terminal block for the heat pump, ensure that they are correctly stripped.
If any of the phases are not present, check backwards towards the building's main electrical cabinet. If the phase is missing there, contact the network supplier.

Defective soft start

Action:

Measurement check and establish that when the control card gives a signal (there must be voltage between A1 & A2 on the soft-starter), the soft-starter releases all three phases down to the compressor.
If the soft starter has signal but is "unevenly loaded" by amperes on the phases or if it breaks to MS alarm.
Try connecting (bridging all three phases) past the soft starter. See if it is the soft starter that is not passing the current through, but be aware that the compressor will start immediately when the safety breaker is switched on.
Go quickly to service - manual test and start circ. pump and brine pump.
If the soft-starter does not release the phases when it receives signals from the control computer, replace it.





Defective contactor (Older models without soft starter)

Action:

Measurement check and establish that when the control computer gives a signal (there must be voltage between A1 & A2 on the contactor)

The contactor releases all three phases down to the compressor.
If the contactor does not release the phases when it receives signals from the control computer, replace the contactor.

Defective or incorrectly set motor protection

Action:

Use a hook-on ammeter to establish when the motor protection deploys, check what the motor protection is set to. Compare with table.
To ensure that the alarm deploys "mechanically" one can twin the red and the white cable that are marked 95-96 on the motor protection (see image).
If the motor protection alarm disappears one knows that the motor protection is deploying





Defective or incorrectly set motor protection

Action:

Check the supply to the motor protection/soft-starter/compressor. Measure so that one can see where the supply disappears, try pulling at the cables to see if there is any play.
If a cable is damaged, replace it.

Defective compressor

Action:

Check the Ampere level of all phases after the soft starter, deviation should not be more than approx 12% between the three phases.

If it is suspected that the compressor is about to break down feel the compressor to see if it is hot around the motor or whether the discharge pipe temperatures are abnormally high.

Measure the resistance between the linings so that there is no open-circuit between the linings, and that there is no contact between phase and ground.





The circulation pump's integrated alarm has deployed

Action:

Check if there is air in the heat transfer fluid circuit that can gather in the circulation pump
Bleed the radiator circuit according to the installation instructions.

Check if the circulation pump has jammed.
If the circulation pump has jammed, there is an integrated shake function that attempts to shake itself loose up to a maximum of 5 times, if it does not succeed, an alarm will occur.

Try cutting the voltage to the heat pump to stop the alarm and then manually run the circulation pump.

If the alarm recurs, repeat the procedure several times.

Check the circulation pump's 0-10V signal
Measure the 0-10V signal between terminals 329 and 330.
Go into the service menu and run the circulation pump in manual mode 30%=3V 40%=4V 50%=5V etc.

If the correct control signal is obtained there is a relay card fault.
If the correct control signal is not obtained from the control board the control board must be replaced.
If one obtains 0-10V in all operating modes and the alarm remains the internal alarm circuit in the circulation pump has probably broken or there is a broken cable.

One can then bridge the alarm signal between 327 and 328 to remove the circulation pump's internal alarm protection. The internal alarm function will then be completely absent.

Replace the circulation pump if the heat transfer fluid circuit has been fully bled and the relay card measured so that it transmits the correct signals but the alarm remains.



The circulation pump's integrated alarm has deployed

Action:

Check if there is air in the brine circuit that can gather in the circulation pump.
Bleed the brine circuit according to the installation instructions.

Check if the circulation pump has jammed.
If the circulation pump has jammed, there is an integrated shake function that attempts to shake itself loose up to a maximum of 5 times, if it does not succeed, an alarm will occur.

Try cutting the voltage to the heat pump to stop the alarm and then manually run the circulation pump.

If the alarm recurs, repeat the procedure several times.

Check the circulation pump's 0-10V signal
Measure the 0-10V signal between terminal 333 and 334. Go into the service menu and run the circulation pump in manual mode 30%=3V 40%=4V 50%=5V etc.

If the correct control signal is obtained there is a relay card fault.
If the correct control signal is not obtained from the control board the control board must be replaced.

If one obtains 0-10V in all operating modes and the alarm remains the internal alarm circuit in the circulation pump has probably broken or there is a broken cable.

One can then bridge the alarm signal between 331 and 332 to remove the circulation pump's internal alarm protection. The internal alarm function will then be completely absent.

Replace the circulation pump if the brine circuit has been fully bled and the relay card measured so that it transmits the correct signals but the alarm remains.



Alarm Brine

Action:

Check the set value on ALARM BRINE in the heat pump's control computer under service-heat pump-temperatures-alarm brine.
Check that the brine sensor displays the correct value! See section sensor.
The alarm is triggered when the temperature on BRINE OUT is as low or lower than the set value on ALARM BRINE. In the factory setting this function is inactive.

If the problem is caused by a faulty setting in the ALARM BRINE try adjusting the temperature down.

NOTE! Bear in mind that if one sets the alarm temperature lower than what the liquid in the Brine circuit is freeze protected against it will result in low pressure alarm problems.



Alarm sensor

Action:

Measure the resistance of the sensor, check the ohm value against the temperature according to the table below.. If the actual temperature and the temperature displayed do not correspond, calibrate or replace the sensor.

When measuring the resistance of the sensor the sensor must be released before measuring!

If a fault in the outdoor sensor is suspected, check that the cable between the heat pump and outdoor sensor is not damaged in anyway by nails, pins or another cable securing device. This is a commonly occurring fault.

If the sensor does not give a correct value, the sensor is defective.

150 ohm sensor
Outdoor / Defrost sensor

temperatur	ohm
-30	1884
-25	1443
-20	1115
-15	868
-10	681
-5	538
0	428
5	343
10	276
15	224
20	183
25	150
30	124
35	103
40	86

22 kohm sensor
Supply line, return line, hot water,
brine in, brine out, discharge pipe sensor

temperatur	kohm
0	66.3
5	52.4
10	41.8
15	33.5
20	27.1
25	22
30	18
35	14.8
40	12.2
45	10.1
50	8.5
55	7.1
60	6
65	5
70	4.2
75	3.7
80	3.1
85	2.7

Alarm communication

Action:

Check if the communication between the display card and relay card is broken.
Test with another TP cable or communication cable between display and control card
If the alarm remains test with another I/O card using the old cable.

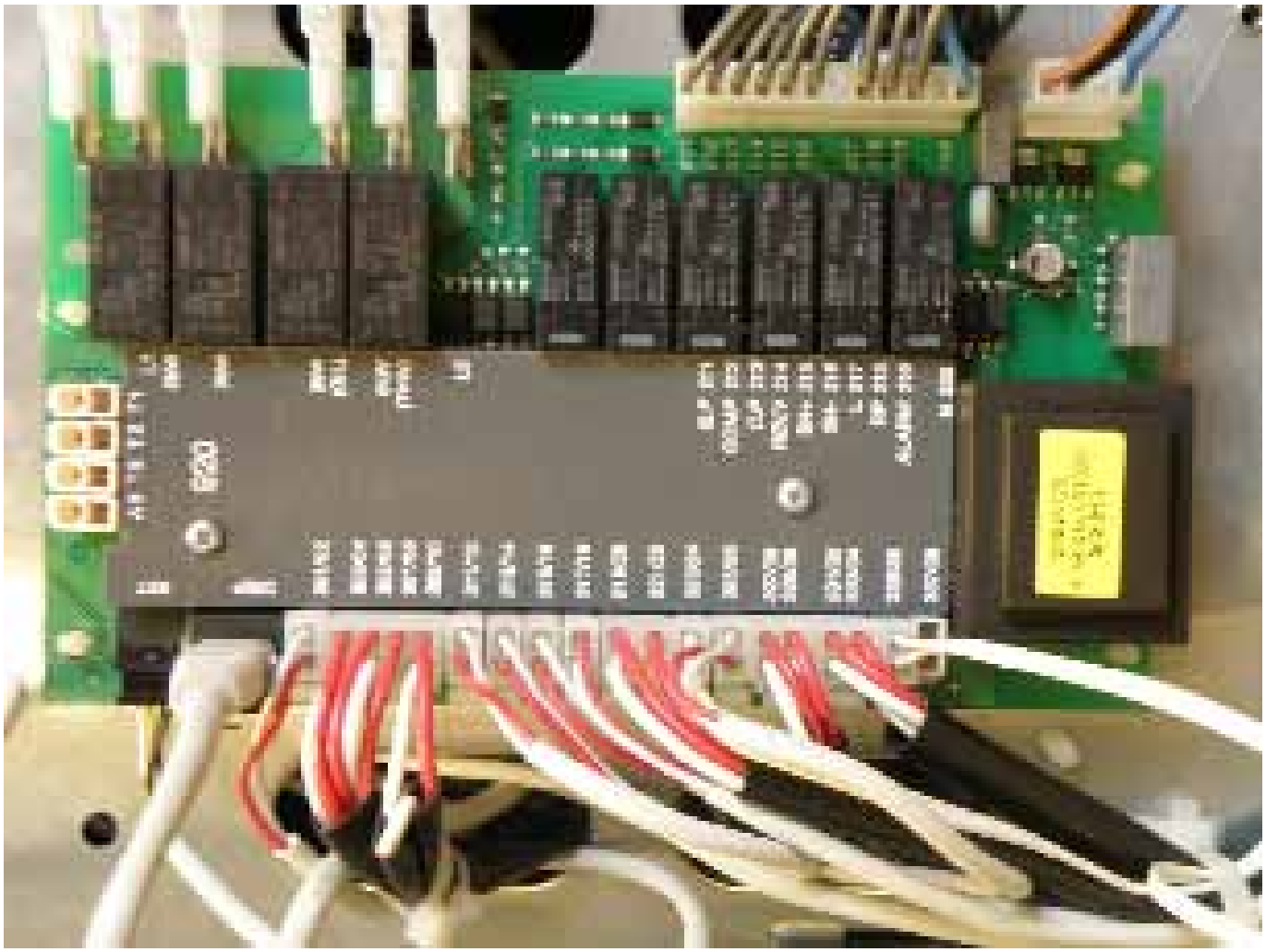
Newer heat pumps with 901 921 display card (Control card) have all thinking/functions in the display.
So if the communication between the display card and the relay card drops the heat pump will stop, while older heat pumps produced before Autumn 2008 will run as usual with the most recent setting.

Alarm com Air, DHP-A

Action:

Check if the cable between the relay card and the defrost card is properly located and is the 4-core type (this is important if the heat pump is equipped with the online accessory)
Measure incoming voltage to the defrost card (230V)
Check that air is selected as heat source
If there is voltage to the defrost card but the card still does not function, replace the card.

The card illustrated is an I/O card 901-920



Phase drop

Action:

Check that there is 230 V between incoming L2 on the circuit board and neutral on block 220.
Check if the overheating protection has tripped.
Check if any cables at the circuit board or overheating protection are loose or damaged.
Check that the thin, gas filled wire to the bulb is intact.

The overheat protection has tripped

Action:

Check if the overheat protection (T1) has tripped by pressing the red button until clicks.
The overheat protection breaks all input phases to the electric heating element.
If the overheat protection cannot be reset and the alarm remains, replace the overheat protection



No or insufficient circulation in the heating system

Action:

Check that the circulation pump rotates or if the circulation pump has jammed. If it has jammed open the bleed screw and try to release the paddle wheel using a screwdriver for example (does not apply to optimum pumps).
Check that all the shut off valves are open, if not open all closed valves and taps
Check that the strainer is not blocked, clean if necessary
Check that there is no air in the heating system, bleed any air according to the installation instructions
Check that the supply sensor displays the correct value, see ohm table
Check that the return sensor displays the correct value, see ohm table

If both the HP and AH have deployed it is likely that there is a flow problem!

The submersible tube in the electric heating element is against the coils

Action:

Check what the flow temperature is when the overheating protection trips. This normally trips at 95°C.
The submersible tube can be withdrawn a few centimetres if the tube is too close to the coils in the heating element.



Whistling expansion valve

Action:

Try tapping gently on the expansion valve.
Open and close the valve fully in and out and adjust the expansion valve to the recommended overheating.
(Gas R134-404A 4-8 K, Gas R407C 4 K +-0,5K) Note! Manometer apparatus required!
Check if the noise has stopped.

If the problem persists, replace the expansion valve.

Loud compressor noise

Action:

Check that there is 400V between incoming phases on the heat pump.
Check that there is supply to the heat pump, measure the voltage for all electrical components all the way to the compressor.

In event of phase drop, check where the phase drop is and rectify.
Go into the service menu and activate manual test and run the heat pump

Ensure that the contactor for the compressor is engaged by measuring the control signal
During operation there should be 230V on A1/A2.
On newer heat pumps with soft starter the control signal is on (K1) soft starter A1/A2

The compressor runs backwards

Action:

Check that the incoming phases do not have the incorrect sequence (only applies to 3-phase heat pumps).
If the compressor runs backwards, it will not cope with compressing the refrigerant and therefore does not produce the correct output, which leads to the control computer requesting auxiliary heating.
If the text Err Phase Seq. is displayed L1 and L3 are incorrectly connected but still correct!
Check if the discharge pipe temperature rises quickly, if it does not switch L1 and L3

When the compressor is running, check the discharge pipe temperature by feeling the discharge pipe. If the phases are correctly sequenced it should be hot, not just warm, even a distance from the compressor.
When the compressor runs with the phases incorrectly sequenced a strange loud, rattling noise may be heard when the compressor runs backwards.
If the phases are in the incorrect order, switch two incoming phases at the main terminal block and recheck the troubleshooting.

Measuring current of input supply to heat pump 1L1-0 must display 230V 1L2-0 must display 230V 1L3-0 must display 230V	1L1-1L2 must display 400V and similar between the others in different combinations
Motor protection incoming 1L1-0 must display 230V 3L2-0 must display 230V 5L3-0 must display 230V	1L1-3L2 must display 400V and similar between the others in different combinations
Motor protection outgoing 2L1-0 must display 230V 4L2-0 must display 230V 6L3-0 must display 230V	2L1-4L2 must display 400V and similar between the others in different combinations
Soft starter L1-0 must display 230V L2-0 must display 230V L3-0 must display 230V	L1-L2 must display 400V and similar between the others in different combinations
Compressor T1-0 must display 230V T2-0 must display 230V T3-0 must display 230V	T1-T2 must display 400V and similar between the others in different combinations

The compressor's IPR valve opens

Action:

When the valve opens, this is indicated by the pressure on the low pressure side rising and reaching the pressure of the high pressure side. Check at what pressure the valve starts to open.

The compressor has an integrated IPR valve that opens at 28 ±3 bar. When the valve opens, pressure equalize between the compressor's high and low pressure sides and a milling, whistling sound is heard.
To establish whether the valve opens at the correct pressure, connect a manometer on the high and low pressure sides.
If it opens at too low a pressure, replacing the compressor may be the solution.

Compressor fault

Action:

If the compressor is loud and you have ruled out other reasons for loud compressor noise the compressor itself may be defective and needs to be replaced

Noise from the soft-starter

Action:

Measurement check the input and output phases for the soft-starter as well as the control signals from the control computer.



Circulation noise

Action:

Check the heating system for closed valves or other restrictions that could cause circulation noise.
Check if the heating system is correctly adjusted for flow, make adjustments if necessary.
High flow in the heating system can cause circulation noise, see if it is possible to run at a lower flow

Clicking

Action:

Establish when clicking occurs, during heating or hot water production. A surge tank can be installed on the supply line to mix the hot water with the existing, slightly cooler, water, before it goes out to the radiators.

Locate the clicking noises. Try lubricating lead-ins in walls, ceilings and floors with silicone spray.

Touching pipes – vibrations

Action:

Establish which pipe(s) causes vibrations and try to remove the tension that is causing the vibrations by, for example, ensuring that no pipes or flexible hoses are too rigid, if that does not help one can install vibration damping rubber compensators on the vibrating pipe(s)



Incorrectly installed flexible hoses - vibrations

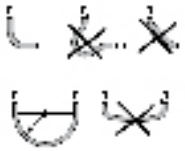
Action:

All pipes should be routed in such a way that vibrations cannot be transmitted from the heat pump through the piping and out into the building. This also applies to the expansion pipe. To prevent transmitting vibration it is recommended that flexible hoses are used for all pipe connections.

To avoid noise caused by pipe mountings, a rubber-coated pipe clamp should be used to prevent the transmission of vibrations. However, installation should not be too rigid and the pipe clamp must not be too tight



Do not twist the flexible hoses as they are installed. At threaded connections, use a counter hold spanner.



Cut the hose to the correct length to avoid excess bowing-out or stretching at bends



Cut the hose to the correct length to avoid excess bowing-out or stretching and offset the ends so that the hose is installed completely straight.



Use fixed pipe bends to avoid excess stress on bends next to connections

Vibrating protective sleeves on the pressure switches

Action:

Establish where the vibration noise occurs, if the vibration is in the protective sleeve one can prevent the vibration with insulating tape for example

Vibration noise from the electrical installation

Action:

Check for electrical steps or similar devices screwed to the heat pump and wall. These can cause vibrations and noise.

The heat pump is not level

Action:

Check that the heat pump is level by using a spirit level, if necessary adjust the heat pump feet

Bubbling sound in the radiators

Action:

Bleed the radiators

Defective 3-way valve motor

Action:

Check that the motor can be run to the limit positions in a manual test.
If it is still, measure at the molex switch to see if there is current to it. Measure between 2 and 3 where there should always be 230V and between 2 and 6 where there should be 230V in switching mode
If there is voltage replace the motor.

Jammed 3-way valve insert (applies to Honeywell inserts)

Action:

The valve does not seal and releases heat to the radiators during hot water production.
Pull off the motor and press down the spring loaded shaft on the valve
If it jams, clean or replace the insert. (It can be screwed out with a wrench intended for these 3-way valves)

Air in TWS coil or water outer jacket

Action:

During hot water production listen for air
Check the difference between supply and return line. A large difference can indicate air in the system.
If necessary, bleed the system

Start temperature set too high for hot water production

Action:

Check set start value for HW production. (should be 40-44°C)
If the start value is too high it results in short running times, set the value down to factory setting
If the system has a high (>+8°C) brine temperature, you may have to reduce the start value further for a longer running time.

Sensor error, hot water sensor.

Action:

Check that the hot water sensor (the start sensor) shows the correct value?
On newer models the peak sensor is also included and determines the start for hot water start (weighted value). Measure the resistance of the sensors, check against the ohm table in the installation manual.
Start sensor is on terminal block 311-312 and peak sensor is on 325-326 (remove the sensor from the block before measuring)
If the sensor is defective, replace it

Large drain flow (>12 l/min)

Action:

Carry out a drain test using a stopwatch and a bucket. Set it so that you lose 12 l/min/40°C hot water.
One should drain approx 190-220 litres hot water at 40°C
If the drain water flow is greater than 12 l/min, stratification in the water heater is affected, which reduces the hot water capacity.
Install the pressure reduction valve on the incoming cold water, replace with a mixer with a lower flow, adapt the drain flow on the existing mixer do not open the tap fully.
Mix and drain always to the temperature that it should be from the beginning.

Water heater too small in relation to requirement

Action:

Check the requirement and the water heater capacity.
Replace with a larger heater or supplement with an extra heater if necessary.
For example, supplement with an MBH TWS with a connector or an electric heater

The operating pressure switch opens too soon, hot water production is stopped

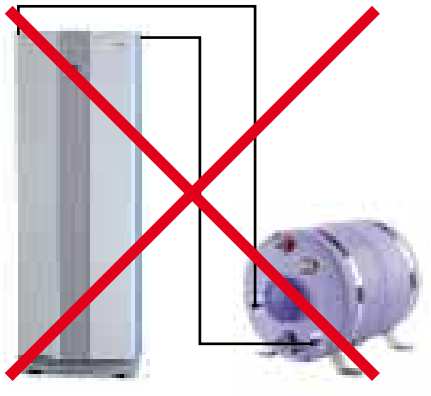
Action:

Check at what supply temperature the operating pressure switch opens (use refrigerant gauge for opening temp of different refrigerants to get an indication of the opening pressure. To assure accurate opening pressure, use manometer apparatus which is most correct.
If the operating pressure switch opens too early, replace it. There is a replacement pressure switch that screws directly onto the schrader socket (service outlet) to avoid having to open the refrigerant circuit.

Insufficient exchange surface to transfer the heat pump's output to the heater

Action:

Check that the heater is adapted to cope with the heat pump's output. (7L/kW)
If not, replace the heater (with a larger exchange surface) or supplement with another to pick up the output.

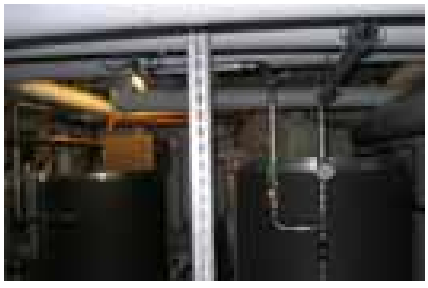


Heat loss in the hot water pipe

Action:

The temperature differential measured between the heat pump and drain point should not be more than max 1-2 degrees.

Examples of heat loss causes that can be remedied:
Uninsulated hot water pipes - insulate the pipes
Too low temperature set on mixing valve – increase setting
Leaking mixing valve – replace mixing valve
Fault in the tap – replace or remedy the fault
Leakages in the thermostat mixer – replace or remedy the fault



The house heating comfort is not adjusted to the customer's requirements

Action:

Check the ROOM, CURVE and MIN settings. Adjust incorrect values in the heat pump's control computer.

ROOM = Desired indoor temperature
CURVE = Should be set so that the desired indoor temperature is maintained regardless of the outdoor temperature.
MIN = Lowest set-point value on the supply line regardless of the outdoor temperature, except with heat stop.

Sensor fault, Outdoor, room, supply line

Action:

Check what the relevant sensor shows. Is it a plausible/actual value?
Measure the resistance of the sensor, check against the ohm table in the installation instructions. If it is not correct calibrate or replace the sensor.



Defective Honeywell 3-way valve

Action:

The motor should set the valve to the relevant end position depending on operating conditions. If it does not, hot water from the water heater will mix with the radiator water.

Check the function of the 3-way valve motor by test running it manually.

MANUAL TEST - REV.V. HOT WATER
0=Radiator mode, arm out from the valve. (terminal 6 no voltage)
1=Hot water mode, arm positioned towards the valve. (Both terminal 3 and 6 voltage)

If the motor does not shift mode during manual test operation, check that there is voltage to the motor.

Terminal 3 =Continuous phase 230Vac
Terminal 6 =signal at hot water production
Plinth N =Neutral

If there is voltage to the motor but the arm does not shift mode,
Replace either the 3-way insert or the whole 3-way.

NOTE! If the white lever on the motor goes up and down all the time there is a short circuit in the motor, replace the motor.



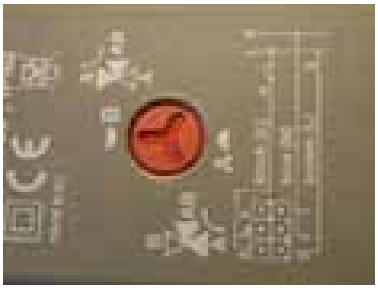
Defective 3-way valve LK armature

Action:

Check the function of the 3-way valve motor by test running it manually.
If the motor does not shift mode during manual test operation, check that there is voltage to the motor, Terminal 3 =continuous phase 230Vac.
Terminal 6 = signal HW
Plinth N =Neutral

MANUAL TEST - REV.V. HOT WATER
0=Radiator mode, the red marker should be on AB/B. (terminal 6 no voltage)
1=Hot water mode, The red marker should be on AB/A. (Both terminal 3 and 6 voltage)
Detach the motor and test closing and opening the valve by turning the shaft.

If there is no voltage replace the motor.
If it is sluggish or jams, replace with a new 3 way valve.



Defective G2 shunt (HGW)

Action:

Check the function of the HGW shunt by test running it manually.
If the motor does not shift mode during manual test operation, check that there is voltage to the motor.

Terminal 221 brown/N (- signal open to RAD) 230Vac
Terminal 222 black/N (+ signal open to HW) 230Vac

Remember to measure with and without load. (With and without motor connected to the relay card)

Use multimeters with buzzer to fault trace the cable between the control card and the shunt.

If there is voltage to the motor and the motor shifts mode as it should, replace the 3-way.
If there is voltage to the motor but the shunt motor does not shift mode, replace the motor.
If there is no voltage to the shunt motor replace the circuit card or the cable.

The HGW shunt shifts from the one end position to the other in 30 seconds and the total voltage time is approx 35 secs.



The voltage for the HGW shunt is measured here

Basic setting G2 shunt + motor

Action:

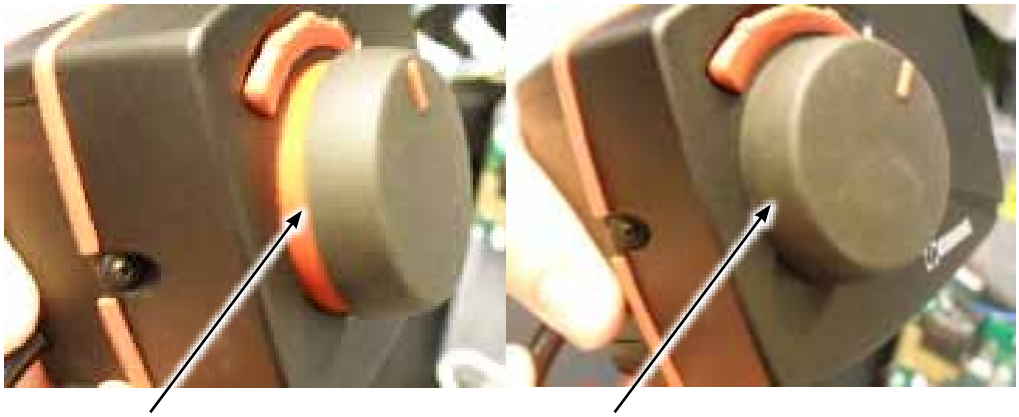
Important to reset the shunt after taking the shunt apart!



The groove of the white six edged sleeve must be towards 3 o'clock in unaffected mode.



Adjust the motor as illustrated. Then screw the motor into place and press the knob to Auto mode.



Manual mode when the button is not pressed in. Auto when the button is pressed.

Only runs on the additional heat

Action:

Ensure that the heat pump is not in additional heater only mode. If additional heater only mode is selected change to auto, the heat pump then regulates both the compressor and the additional heater.

The compressor cannot run due to an alarm

Action:

Check the alarm that is indicated in the display.
See chapter Alarm in the installation instructions or the fault tracing guide.
Rectify the problem.

The integral value has reached the start level for the auxiliary heater

Action:

Check what integral value is set in the control computer.
If the auxiliary heater is in operation because the integral value has counted down to the start value, the computer reacts as it should, see the Installation instructions for further information.

Peak heat operation (anti-legionella function) is running

Action:

Check the heat pump settings for peak heat. See the instructions for the relevant model. Peak heat operation occurs in connection with hot water production with the set interval.

Room

Action:

Reduce the Room set-point value. 1 degree increase in room set point value affects the curve incline by 3 degrees. The heat pump has been adjusted for a room temperature of 20 degrees and curve 40 set. If the room value has increased to ROOM 23 it means that there has been an increase in the curve of 9 degrees, that is corresponds to CURVE 49 and the addition will interrupt earlier.

Curve min

Action:

Check the curve min, because it is the lowest supply temperature. If it is set at 30 degrees it is 30 degrees that the compressor works to if the heat pump is in heat stop.

Incorrect flow over hot side of the heat pump

Action:

Adjust the system to obtain the correct delta t. Check the difference between the heat pump supply and return line using a digital thermometer. The difference should be about 7-10°C (can vary depending on refrigerant). A lower delta-t results in reduced efficiency in the heat pump

Incorrect flow in the brine circuit

Action:

Check the difference between the supply and return line using a digital thermometer. The difference should not be more than 4°C . A greater delta-t results in reduced efficiency in the heat pump. If the difference is greater than 4°C note what is causing it.
Example: Dirt in the filter, system restrictions, system with high pressure drop.

The interval for peak heat operation has changed to a lower value than the factory set value. This results in the heat pump going into peak heat operation more often than calculated

Action:

Check the specified interval for peak heat operation in the control computer, see instructions for relevant model.

If there is a shorter interval between the peak heat productions, this explains why the unit consumes more current than calculated, but this does not mean for sure that it should be increased, there might be a reason why the interval has been changed.

The heat pump has stopped on HIGH RETURN

Action:

Check what the MAX RETURN value is set at in the heat pump's control computer.
Check what the return line sensor shows. Is it a plausible/actual value? If not, take a resistance reading from the sensors and check against the ohm table in the installation instructions.
The value of MAX RETURN in the heat pump control computer should be adapted to the unit's maximum supply temperature and the system's temperature delta. It must not break at too high return temperature when the highest supply temperature is sent out. If the MAX RETURN value is
not adjusted for the system according to the troubleshooting window, adjust it. If the sensor is defective, replace it.

The compressor runs backwards

Action:

Check that the phases for the heat pump are correctly connected (only applies to 3-phase heat pumps).
If the compressor runs backwards, it will not cope with compressing the refrigerant and therefore does not produce the correct power, which leads to the control computer requesting auxiliary heating.

If the phases are in the incorrect order,
reset the two incoming phases at the main terminal block L1 and L3.

When the compressor is running, check the pressure pipe temperature by feeling the pressure pipe. If the phases are correctly sequenced it should be hot (not just warm) even a distance from the
compressor if the phases are in the correct order.
When the compressor runs with the phases incorrectly sequenced a strange noise may be heard (loud, rattling) when the compressor runs backwards.

Lack of refrigerant, not enough refrigerant in the system

Action:

NOTE! A refrigeration technician with the correct qualifications is required for work on the refrigerant circuit

Using manometer apparatus and digital thermometer, check that the unit's overheating is correct for the specific refrigerant.
Check that the unit cooling is correct in the same way. See separate instructions for cooling techniques.
If cooling is not at the correct level compared with the specific refrigerant and is too low, there is insufficient refrigerant in the unit.
Add the correct amount of refrigerant (depending on type of refrigerant).
If there appears to be a leak in the refrigerant circuit, carry out leak tracing and any necessary corrective action.
If leak tracer is not available, brush soap water on the suspected leak and look for bubbles. Also check for oil as this can come out from the refrigerant circuit.

Build-up of ice under and around the outdoor unit or water collecting

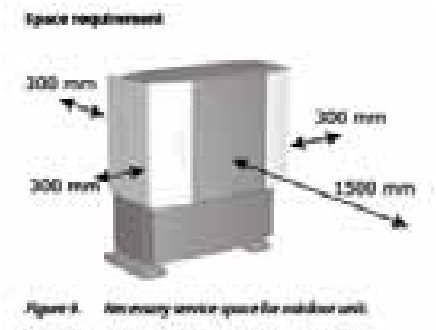
Action:

Drain the ground under and around the outdoor unit so that it can cope with the extra amount of water produced because of defrosting. During some periods when the outdoor unit is being defrosted, large amounts (20-40 L/day) of water can run off. One can also install a drip tray with a drainpipe routed to an indoor drain or gully.
NOTE! A heating cable will probably have to be installed in the drainpipe.
If one has an Atria newer than week 34 2008 there is a base for the driptray and a further terminal block to connect a heating cable for the drip tray but it is conditional on the drip tray having a relay kit.
If one has an Atria older than week 34 2008 there is not a drip tray with electricity that is suitable for the stand.

Positioning the outdoor unit

Action:

Determine whether the outdoor unit can be moved to a more suitable location.
When positioning the outdoor unit, its direction does not affect its performance. The outdoor unit does not need to be positioned as close to the heat pump as possible. See the following instruction for distance between the heat pump and outdoor unit.



Connection/wall lead-ins

Action:

Check that the unit is installed according to the installation instructions and that the outdoor unit is secured to the wall.
Rigid mountings can generate noise from the outdoor section via walls in the house.

Defrosting problems

Action:

For a defrosting to occur the control computer calculates the difference between the defrost sensor and brine in. On older models there is no defrost sensor, the outdoor sensor is used. So when the brine in is too cold compared to the outdoor temperature the control computer knows that the outdoor unit is frosted with too much frost to retrieve the energy in the air and then wants to defrost the outdoor unit to obtain as efficient energy retrieval as possible. When brine in reaches the limit for defrosting the defrost shunt starts to open and will send out a defrosting temperature on brine out of between 11-20 degrees (depending on model year). Defrosting stops when the brine in reaches 9-11 degrees (depending on model year) or time, which is 10 minutes. Our recommendation is to use temperatures as close to each other as possible for example 15 degrees out and 11 degrees in. During defrosting the compressor stops if it runs against the heating system. If the heat pump runs against the hot water when the defrosting starts the compressor continues to run. Because one uses the outer jacket for the hot water when defrosting.

Brine temperature in/out displays faults

Action:

Measurement check the temperatures with a digital thermometer.
Go into manual test and only start the brine pump and see if the sensors display the same after a few minutes.
If necessary, calibrate Brine In and Brine Out in the heat pump's control computer or replace sensors.

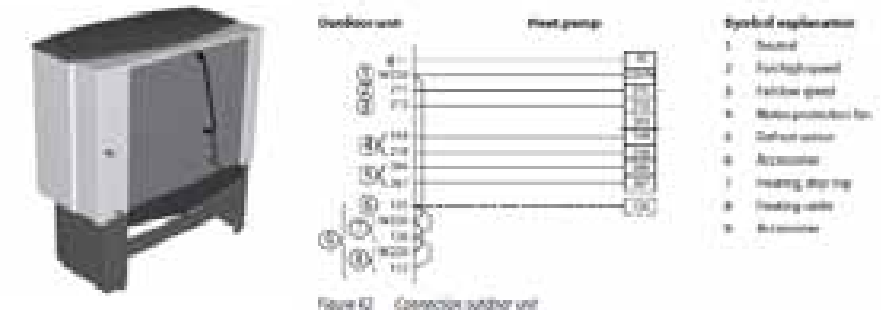
Outdoor sensor/Defrost sensor

Action:

Check that the outdoor sensor/defrost sensor is installed according to the installation instructions and that it is correctly calibrated. Measure the ohms at the sensor to check it displays the correct value.

temperature	ohm
-30	1884
-25	1443
-20	1115
-15	868
-10	681
-5	538
0	428
5	343
10	276
15	224
20	183
25	150
30	124
35	103
40	86

Install according to the instructions and calibrate, if necessary. Or replace the defrost sensor.



The defroster shunt does not regulate as it should

Action:

Manually test to check if the defroster shunt opens and closes the flow over the defroster tank. If the motor switches position when testing, but defrosting still does not function, remove the motor and try closing and opening the valve by hand by pressing in the spring loaded spindle. If it should be stuck or not spring back replace the insert.
If the shunt motor does not react, check measure the signals to the shunt. These are 24vac + and - signal. See wiring diagram!

If the motor is defective, replace it. If the insert jams, remove and clean/lubricate it, or replace it.



Motor for shunt Defrosting 24Vac Photograph taken from left side.

Room sensor

The image shows one of the models of room sensor available



The room temperature sensor has a temperature sensor that provides a further value that the control system can use when calculating the supply temperature. The impact 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 impact) to 4 (large impact).

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 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 0-4.

In the event of a heating deficit:

ROOM FACTOR DESIRED	ROOM TEMPERATURE	ACTUAL ROOM TEMPERATURE	SETPOINT VALUE FOR SUPPLY
0	20°C	18°C	40°C
1	20°C	18°C	42°C
2	20°C	18°C	44°C
3	20°C	18°C	46°C
4	20°C	18°C	48°C

In the event of a heating surplus:

ROOM FACTOR DESIRED	ROOM TEMPERATURE	ACTUAL ROOM TEMPERATURE	SETPOINT VALUE FOR SUPPLY
0	20°C	22°C	40°C
1	20°C	22°C	38°C
2	20°C	22°C	36°C
3	20°C	22°C	34°C
4	20°C	22°C	32°C

Installation

The cover for the screw is removed and rear front is installed.
The terminal block is removed for easier installation.
The cable is screwed in (2-core can be connected on any terminal, max 100m)
The terminal block is reinstalled on the pin and the cover installed.
In the heat pump the room sensor must be connected to terminal 303-304, does not apply to Atec or Robust. See wiring diagram for relevant heat pump.
If the heat comfort does not correspond to the set desired temperature the
Room temperature can be calibrated by holding in both buttons for 15 seconds until it starts to flash.
Then set the actual room temperature and wait 10 seconds until it has stopped flashing.
If `--` is displayed it indicates that no outdoor temperature has been received and it may indicate that there is no contact with the outdoor sensor's resistor or that there is a cable break.
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 buttons.
If the heat pump has an active alarm the text AL appears in the display of the room sensor.

Water does not get hot

Action:

Check fuse(s).
Check if there is cold water supply, if not, check why and rectify the fault.
Check if the overheat protection has tripped, reset by pressing the button until it clicks.

Extremely long heating time

Action:

Check fuses so that all are intact at heaters with two phases or three phases. If not change fuse(s).
Clean coils or replace electric heating element / shield

The heater is hot but no hot water comes out of it

Action:

Check if the mixing valve is defective, remedy or replace.
Check if there is cold water supply, if not, check why and rectify the fault.

The safety valve leaks

Action:

It is completely normal, but if it leaks the whole time at a cold heater, replace the safety valve.

Water runs from the heater

Action:

Check where the water comes from
Replace the gasket or O-ring at leakage from couplings
Replace the electric heating element in event of leakage in the electric heating element
Replace the water heater if there is a hole in the water heater



ENGINEERING
TOMORROW

Danfoss Värmepumpar AB • 671 33 Arvika • Sweden • Tel.: + 46 570 813 00 • E-mail: heating@danfoss.com • heating.danfoss.com

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are registered trademarks of Danfoss A/S. All rights reserved

VMIFB202