

INFORMATION FOR INSTALLERS



A Panasonic air-to-air heatpump consist of an external unit, an internal unit and a remote control. (And insulated copper pipes to connect the two)

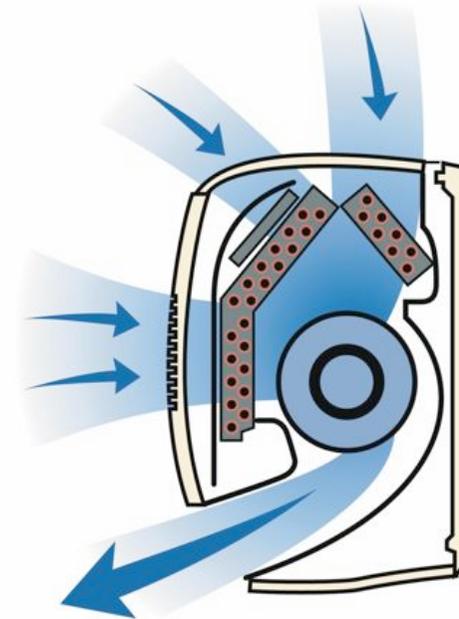
The heatpump heats the air in the room and distributes it via the built-in fan so that the warm air can spread around the house.

Scandinavian Heatpumps by Panasonic Air-air heatpumps 2007

Distributed to trade only by Scandinavian Homes Ltd. Galway www.heatpumps.scanhome.ie

WHERE DOES THE HEAT COME FROM?

- The liquid medium R410A will boil in the external unit at a low temperature, usually around 15°C colder than the external temperature.
- Energy is taken from the outside air when the liquid is boiling. The fluid circulates around the system and gives off its heat in the internal part of the heatpump.



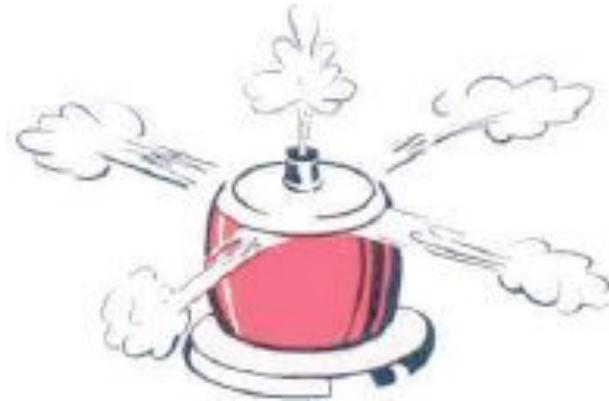
PHYSICS

To understand the underlying physics one needs to realize that there is a relation between liquid, gas-pressure and temperature.

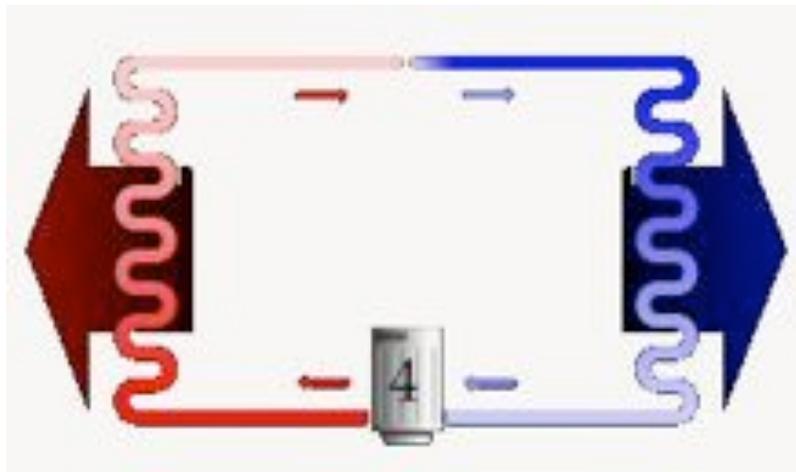
Example:

Water will boil at 100°C at normal air pressure.

The same water would boil at a much lower temperature if located high up on the top of a mountain where the air-pressure is much lower



PHYSICS



Inside

Outside

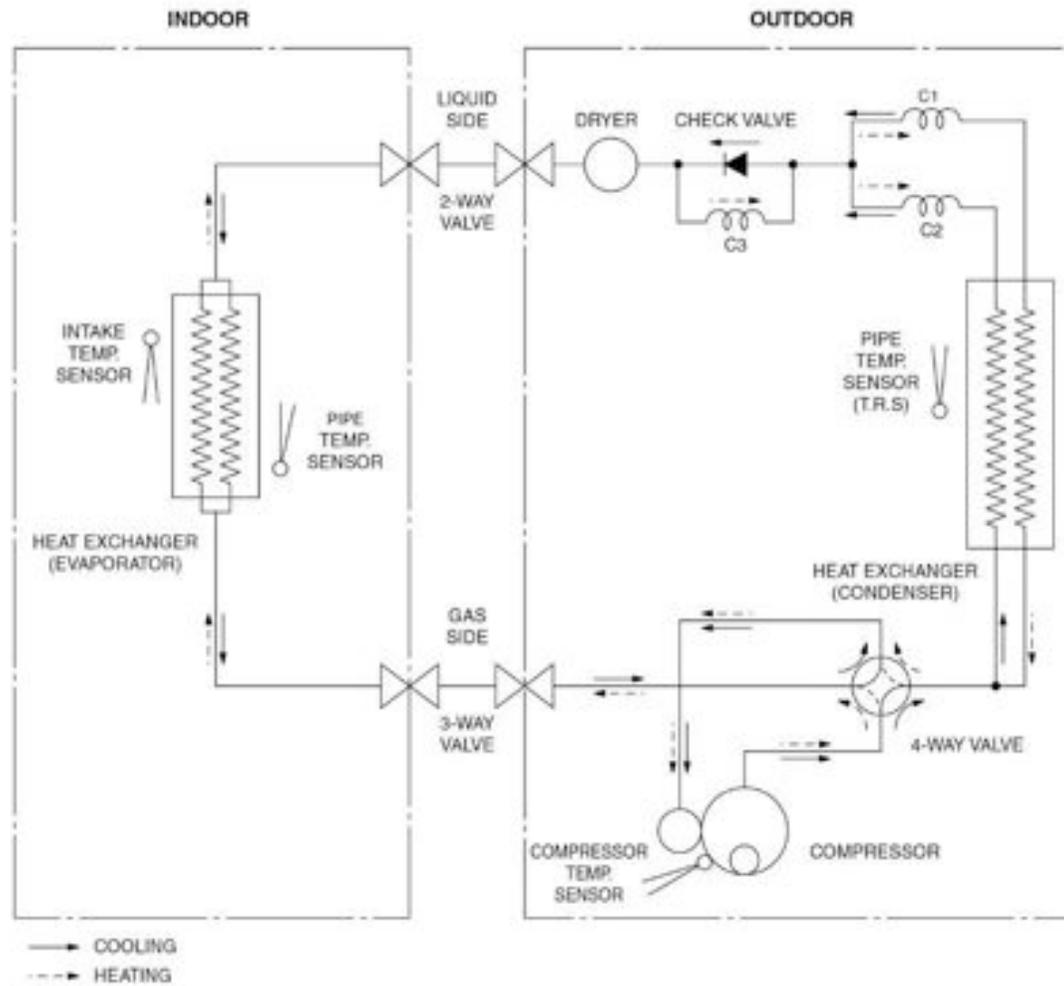
- This phenomenon is utilized in the evaporator of the heatpump.
- An expansion valve allows the liquid to boil at a low temperature.
- The medium in liquid phase is expanding into an evaporator, the pressure is reduced so that the medium boils and changes from liquid to gas, hence absorbing energy from the external air.
- Example: When water is brought to boil on a cooker the heat is coming from the hob. The flow of energy is always from the high temperature source (the hob) to a less hot medium (the water). In the heatpump the outside air is providing the heat for the boiling of the liquid medium.

PHYSICS

- This process will go on as long as the outside air is warmer than the boiling point of the coolant medium.
- In the winter, at exterior temperatures colder than -20° to -25°C , the efficiency of the heatpump is reduced dramatically.
- It is not economical to run the heatpump at such low temperatures.
- All heatpumps work on the same principle as a refrigerator. In the fridge the heat is taken from inside the cabinet and is given off at the back.



DIAGRAM



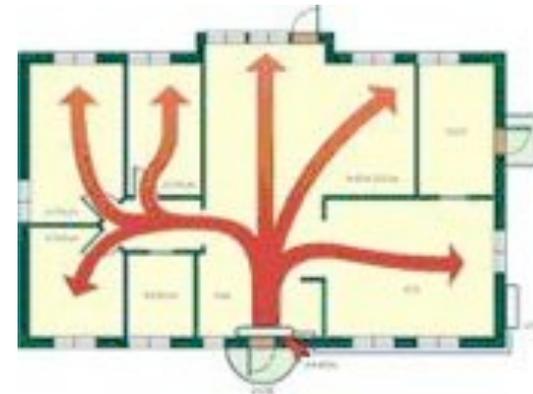
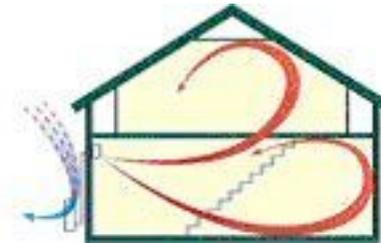
COEFFICIENT OF PERFORMANCE (COP)

- A heatpump utilizes the low level heat in the earth, a lake or the air, amplifies it and heats the house.
- For every kWh of electric usage one usually gets between 3 – 5 kWh heat to the house. In such a case the COP (Coefficient of Performance) is between 3 and 5.
- Air-to-air heatpumps are usually rated with a COP of 3 to 5.
- COP is usually measured at an external temperature of +7°C and an internal temperature of +20°C. At less favourable conditions the COP is smaller.



EXISTING SYSTEM

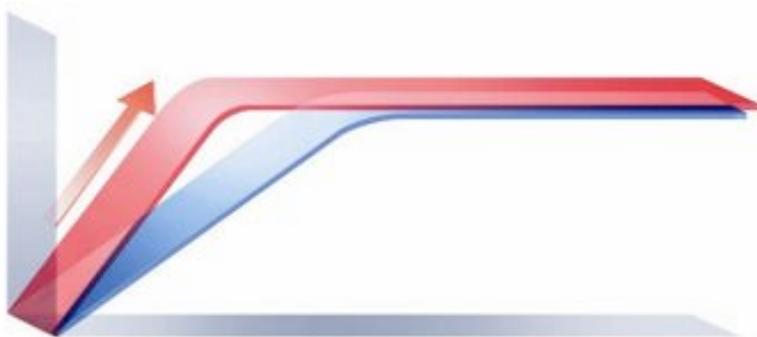
- In a conventional house with a large heat requirement, the heatpump should be considered a complement to the existing heating system.
- In a low-energy house one air-air heatpump can be the sole source of heat.
- Especially if the house has an open plan layout and is equipped with a ventilation system with heat-recovery.
- An air-air heatpump works well in the Irish climate with relatively mild and humid winters.



COMPRESSOR

ON/OFF or INVERTER

- The compressor can be controlled in two alternative ways: by a simple on/off switch or it can be of the inverter type.
- Inverter control means that the compressor will adjust the usage of energy to maintain the desired output. **The advantages** are: fewer cold-starts and longer lifespan (12-15 years), more constant temperatures, less power consumption.
- On/off means that the compressor will start and stop more frequently with higher wear-factor, higher energy usage and varying temperatures in the living area. Lifespan around 8-10 years.



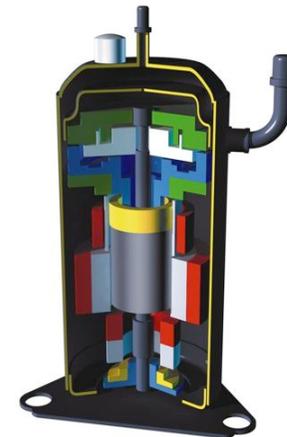
COMPRESSOR

Two different types of compressors are used.

The Twin rotary type and the Scroll type.

(Panasonic manufacture both types)

- A twin rotary compressor is divided in two parts that rotate in different directions. Resulting in very high output and broad field of applications. A low sound level is achieved when the vibrations are minimized
- A scroll compressor utilizes a new type of bearings and only one part is rotating. Fewer rotating parts lessen the mechanical losses and the wear and tear. A scroll compressor is very compact and lightweight as well as energy efficient. The result is a long lifespan.

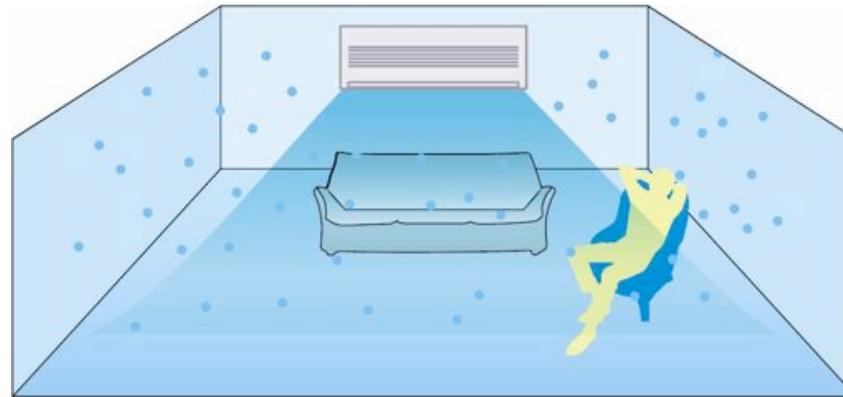


TYPE OF HOUSE

- **A poorly insulated house** will lose heat quickly. The heat will be lost before it finds its way to the rest of the house. In such situations one heatpump can heat only one room.
- Air-air heatpumps perform **best in open plan** houses or in houses with a large central room. If the interior unit is located in a small space, the efficiency is reduced significantly
- If the internal unit is located high up on the wall it will spread the heat more evenly. Another advantage is that there is less dust higher up in a room.
- The **cooling function** will not work for the upstairs if the internal unit is located at ground floor level.
- Warm air will rise but cold air will sink. This fact needs only to be considered if the heat-pump is going to be used to cool the interior of the upstairs in the summer

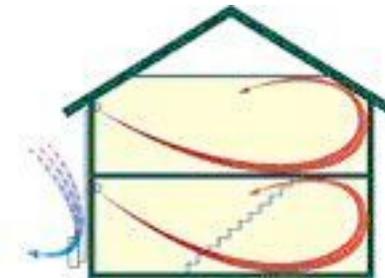
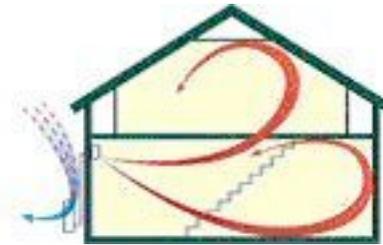
LOCATION

- Internal part. The fixing plate is fixed to the wall around 70mm from the ceiling. The unit is hung on the fixing plate.
- The inside unit must not be positioned in a small space or a long narrow hallway. Reason: the heat generated will not spread around fast enough if the unit is located in a tight space



LOCATION

- In houses with more than one floor, the interior unit should be located in the area of the stairs. The warm air is blown slightly downwards. The heat will automatically rise to heat the upstairs.
- The external unit must be positioned absolutely level.
- The external unit should be located minimum 100mm from the external wall and minimum of 500mm up from the ground.
- The copper pipes should be minimum 3m long and maximum 7m long
- The external part is not to be built in under any circumstances. It cannot be located in a shed or a basement. Reason is that it constantly cools the surrounding air. In defrosting mode, a lot of water can pour from the unit. Consider this if it is located near an entrance or near plants.



FAQ – BEFORE PURCHASE:

- How does the heat spread ?
Warm air tends to mix with cold air. A house contains several hundred cubic meters of air that circulate more or less all the time.
- How low external temperatures are ok ?
Our heat-pumps are designed to work in the cold Scandinavian climate and they work down to -20°C. The efficiency is best at +7°C and this makes it ideal for the relatively mild Irish winter.
- What size unit do I need ?
An inverter type of heatpump will automatically adjust the speed of the compressor to the heat-requirement. For this reason the 5kW pump is suitable for most houses. It is more the interior layout that is critical.
- How often must it be cleaned ?
The more often the better. A heat pump loses around 20% of its efficiency if it is not cleaned regularly. Vacuum clean the filters every 2-5 weeks. The external unit must be kept clean from leaves and similar debris. A service with complete cleaning is recommended after around 3 years of usage.
- Can I use it for my holiday home?
A Panasonic heatpump can be set to a minimum of +16°C. You could set it to +16°C and a low fan-speed and get full function with automatic defrost. Another advantage is that the house will be much dryer and it will be quickly heated up when you need it.
- How much will I save?
Difficult to give exact figures, but usually around 50% of the heating cost. Remember that it takes about 5% more energy to increase the interior temperature with 1°C.
- How high COP factor do I need?
The higher the better. A cheap simple heatpump might deliver a COP of 3 compared to a top model with a COP of 5

SALES TALK

- **Requirements**

Identify the requirements of the customer and his/her individual house. This is important – all houses are different.

- **Small rooms**

Houses divided into many small rooms will not benefit as much as houses with open plan and / or a large stairwell.

- **Poorly insulated**

If the house is poorly insulated – do not pretend that the heatpump can do magic – it only gives off the stated amount of heat (at a very low cost).



EXAMPLES OF QUESTIONS

- **How much is the current energy consumption?**
Figure out the current usage and cost
- **What does the customer think about his/her energy consumption?**
Is he/she looking for cost savings or other advantages such as; cleaner air, dryer house, possibility to cool in summer
- **What does the customer think about future energy costs?**
The savings will be bigger if the energy prices increase and the payback is faster
- **Is the house too warm in the summer?**
If they think about this, the dual function as an air-conditioner is usually much appreciated)
- **Are the floors cold?**
The heat-pump reduces the temperature difference between ceiling and floor. In most houses there is a temperature difference of around 4-5°C between ceiling and floor, with an air to air heatpump the difference is reduced to around 2°C)
- **Is the air in the house too dry ?**
Electric radiators and electric fan heaters dry the air.
- **Is there a lot of dust in the house ?**
The built in micro-filtration improves the situation by reducing the amount of air borne particles. The filters clean the internal air from air borne particles and dust, this reduces the amount of dust accumulating on furniture, TV and bookshelves
- **Ionizing ?**
The ionizing process creates charged molecules called ions. Particles in the air will be drawn to each other if they have opposite charges. They get heavier and fall to the floor. It is easier to clean the house. (less dusting)
Tip! Set the unit to only ionizing position with no heat or cold. Perfect if the customer use a stove or other fireplace.

USAGE

- Lower the thermostats
Switch off or lower the setting on central heating or other forms of heat to 5° lower than the setting of the heat pump. Otherwise the savings can be reduced if the old system is still running.
- Defrosting
The external unit uses the cold damp exterior air and condensation occurs on the "battery" of the external unit. This is normal. Frost can form on the element. Sometimes the pump will defrost itself, a lamp will blink on the internal unit when this happens. In this mode, the external unit will keep the heat for itself for a little while. This procedure can happen 1 – 2 times per hour, depending on the exterior temperature and the external humidity.

USAGE



Remote control

- All adjustments are done with the remote control from the inside. Direct the remote control towards the internal unit. (just like a TV remote) A little beep is heard to confirm every adjustment that is done.

TIP: If you do not know if the internal unit has received the signal from the remote control, you can turn it off and on again with the remote control. When the heatpump starts again it will start with the current setting of the remote control.

- Modes of operation: heating, cooling, fan, dehumidification or automatic. The desired mode of operation is changed by pressing the button on the remote control that is marked "MODE" The current setting is displayed on the display panel of the remote control. We do not recommend automatic mode. Temperature: range between 16-30°C. Use the up and down buttons to increase or decrease the desired temperature.
- Fan speed: five speeds + automatic (OBS! The automatic position is not recommended because it can cause unnecessary wear on the machine and also produce un-even temperatures inside.)
- The fan speed is regulated with the button marked "FAN SPEED". The display show the current setting.
- The direction of the air is changed with the "Air-swing"-buttons.
Direction of air: height + sideways (not on all models)

TIP: Remember that warm air will raise and cold air will sink. Automatic direction of the air does not work when used as a heater!

- Quiet mode activate a very quiet mode and the sound levels are reduced with 3dB in the internal part. This is not considered to be a normal mode of operation.

MAINTENANCE

- Cleaning (internal unit)
The filters of the internal unit (the large plastic mesh filters on the top of the unit) need regular cleaning to keep the efficiency up. Make a habit of doing the following once every two or five weeks.
 1. Take out the filters
 2. Vacuum clean the filters
 3. Use washing up liquid when it is dirty.
 4. Let the filters dry before you put them back. Check so that they are not reversed.

To clean other filters, see the instructions for your model.

- Cleaning (external unit):
Remove foreign objects from the external unit!
- Check every autumn:
Check that the air intake and outlets are not blocked
Clean and dry the filters
Check the batteries in the remote control

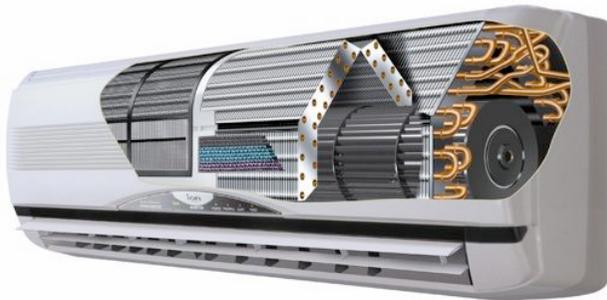
TIP: A sign of weak batteries is that the display is hard to read and that the internal unit does not respond.



- Check every spring:
 1. Note to self: fix this
 2. Turn the pump off with the remote control and switch off the power to the unit.
 3. Clean, dry and replace the filters.
 4. Dry the internal unit by running in fan only mode for 2 hours.
 5. Remove the batteries from the remote control

MAINTENANCE

- As well as the cleaning / maintenance that you do yourself, it is recommended to have the heat pump checked by a refrigeration service contractor on a regular basis. This is to make sure that the unit is properly clean so that peak performance can be maintained. This check can be performed on a 2 – 3 year basis.



FUNCTIONS

All functions are activated by pressing buttons on the remote control, and deactivated by pressing again.

- **ION – ionising**
Charges the outgoing air with negative ions. Dust and particles will fall to the floor and are easily cleaned up. The air feels fresher.
- **O2 Shower/Oxygen – added oxygen (flagship models only)**
An oxygen enriching membrane system takes in exterior air and increase the levels of oxygen to around 30%. The internal air feels more natural when the levels of oxygen are the same as outside in the nature.
- **Quiet mode**
By depressing this button the sound levels of the internal unit is reduced with around 3 dB(A)
- **Powerful mode**
Is used when you quickly want to change the temperature inside. Works in both heating and cooling mode. The system works at full capacity with a strong air-flow. This gives a faster change of temperature.



FAQ – AFTER THE PURCHASE

HEATING MODE

Problem: Power lamp is flashing and there is no heat from the unit.

Reason: The system is temporarily in defrost mode to melt ice that has formed on the element of the external unit.

Completely normal.

Problem: Water is dripping from the external unit.

Reason: The system is temporarily in defrost mode to melt ice that has formed on the element of the external unit.

Completely normal.

Problem: External unit is iced over.

Reason / action: This can happen with the best of units in certain weather conditions in the winter. The customer can melt the ice by pouring warm water over the coil or by changing over to cooling mode (AC). The option of running at AC mode will not work if there is so much ice accumulated that the rotation of the fan is hampered. If this condition is recurring, an extra de-ice heater can be added to the external unit. (All units sold by Scandinavian Homes in Ireland are supplied with a defrost heater and thermostat)

Problem: *The house is not warm.*

Question / action: Is the unit set to heating mode? If not, change the settings with the remote control. Action: Try to increase the temperature and fan speed with the remote control. Also check that the airflow is not directed too steeply downwards, or directed towards an internal wall.

Question / action: What external temperatures and wind conditions did you experience? In poorly insulated houses an output of 5kW might not be enough in all conditions. Supplement the heatpump with other forms of heat. Better again; add insulation to the roof and seal off drafts. Question/action: Are the filters clean?

Problem: *There is clicking noise coming from the unit.*

Reason: Completely normal. When the temperature in the internal unit is changing, clicking sounds can be heard. These sounds will decrease after a few years.

FAQ – AFTER THE PURCHASE

COOLING MODE

Problem: Water is dripping from a hose on the outside

Reason: Completely normal. When the air in the house is cooled, condensation happens in the internal unit. This water is directed to the outside through a hose.

Problem: The house will not get cool

Reason / action: Cold air will not spread as easily as warm air does. Close the windows and doors, pull down blinds on the sunny side of the house. (better again: add attic insulation).

Problem: Water is dripping from the internal unit

Reason / action: The water that should be leaving the internal unit through the little hose is not flowing. Switch off the unit and contact your installer.

EXAMPLE OF CALCULATIONS

Make the calculation to see how much you can save with a heat-pump.

Remember that a large investment in a ground-source heatpump take a long time to pay off. The attractive price of the Scandinavian Air-air heatpump gives a short pay-off time!

Comparison between two standard storage heaters of 2,5kW each and one Scandinavian heatpump E9KDE-5. Both alternatives give off the same amount of heat, 5kW, but please note that the storage heater will accumulate some of the heat that will be given off over a longer time.

	Two regular storage heaters of 2.5kW	One Panasonic heat-pump E9KDE-5
Hours used at night-rate:	8 hours	8 hours
Hours used at day-rate:	4 hours	4 hours
Watt used:	5 kW	1,36 kW
Heat developed	5 kW	5 kW
Cost at night-rate for night usage	2,80 Euro	0,76 Euro
Cost day-rate for day usage	2,89 Euro	0,79 Euro
Cost for one day+night	5,69 Euro	1,55 Euro
Cost for 4 months winter	682,32 Euro	185,59 Euro
Saving in money per 4 months:		496,73 Euro

ESB price January 2007:

Nightrate 6.16 + 13,5% VAT = 6.99 C/kWh Dayrate 12.73 + 13,5% VAT = 14.45 C/kWh

INSTALLATION

Open external unit to install the extra antifrost heater and thermostat. This can be done in the workshop.

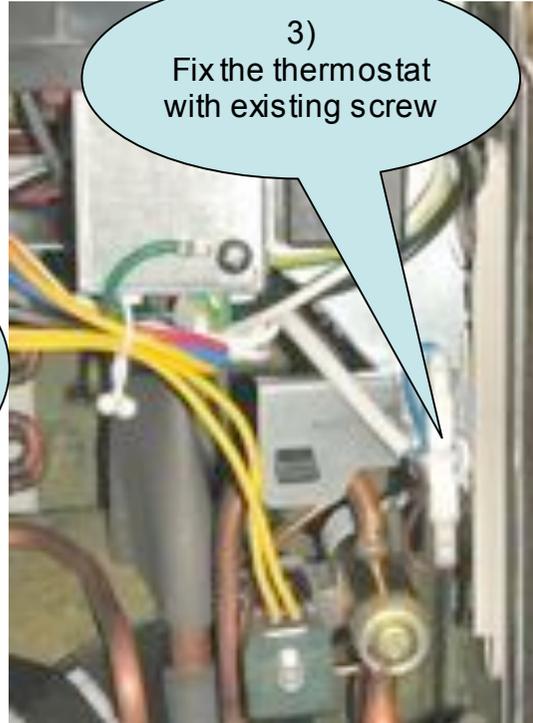


1)
Install
heatcable with
tape, let the
end go into the
drain-hole

2)
Lead the
connecting end
of heatcable up
to the plinth



3)
Fix the thermostat
with existing screw



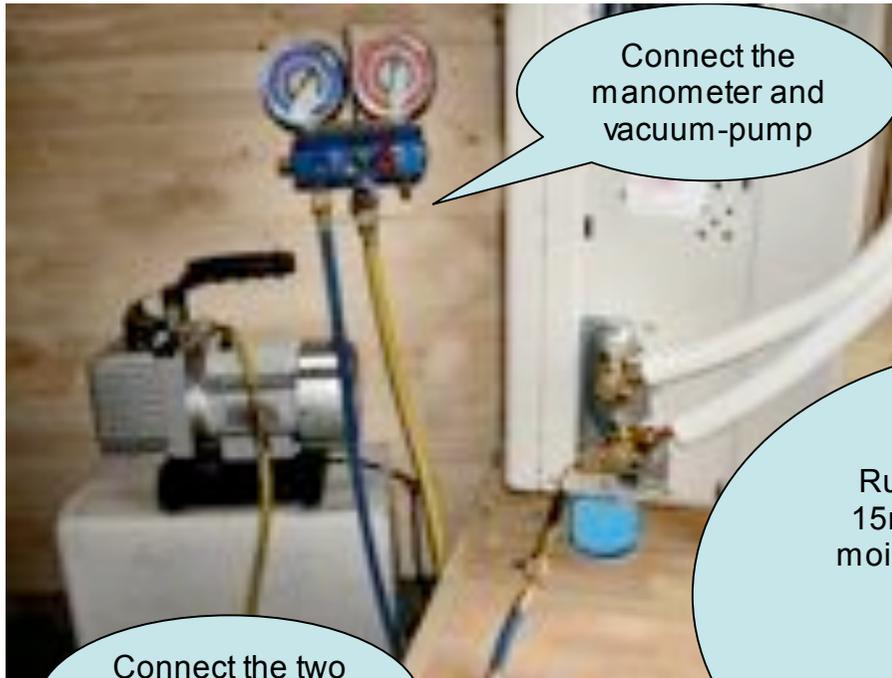
5)
Connect the other
two leads to L and
N
(does not matter
which)



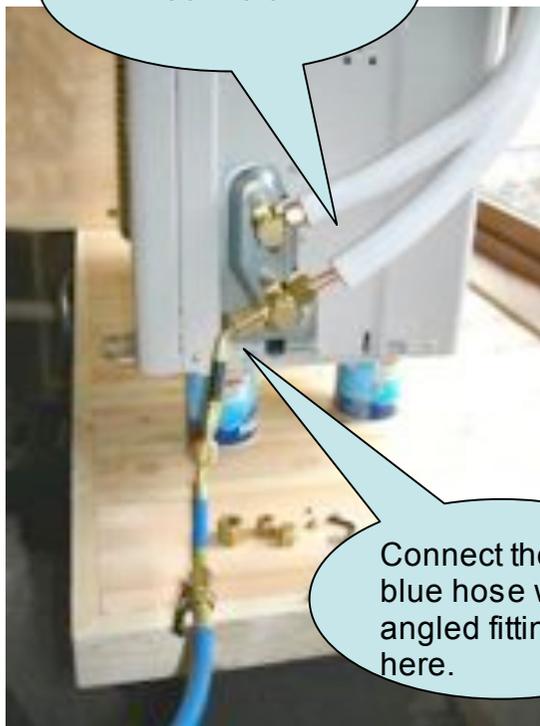
4)
Use a sugarlump
connector to make a
serial connection of one
lead from thermostat
and one lead from
heatcable

INSTALLATION

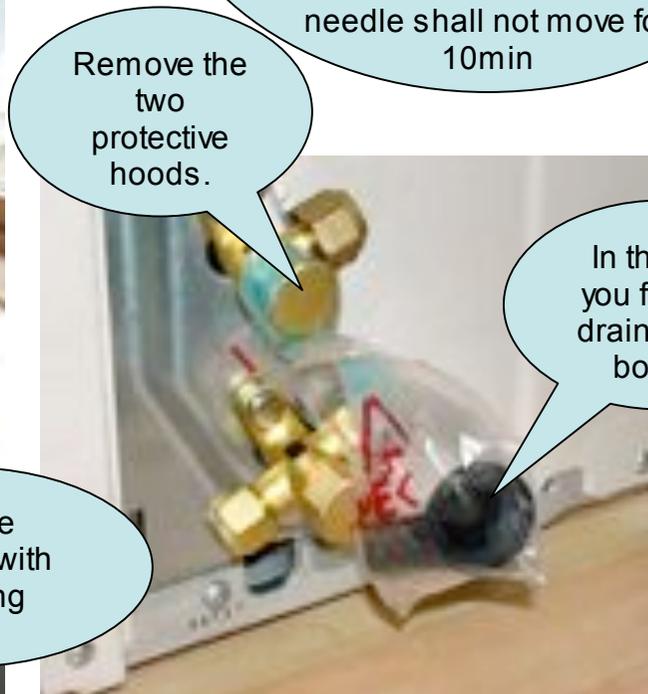
Connect the refrigerant lines to the external unit. This is done after both interior and exterior units are permanently installed



Connect the manometer and vacuum-pump



Connect the two copper pipes



Remove the two protective hoods.

In the bag you find the drain for the bottom

Connect the blue hose with angled fitting here.

1)
Run the compressor for 15min to remove air and moisture from internal unit and lines.

2)
Close the valve at manometer over the blue hose. Observe that the left needle shall not move for 10min

3)
If there are no leaks, close valve on blue hose and open both allen key screws fully. You can hear the refrigerant move into the lines.

4)
Check with leak-detector while you do this.



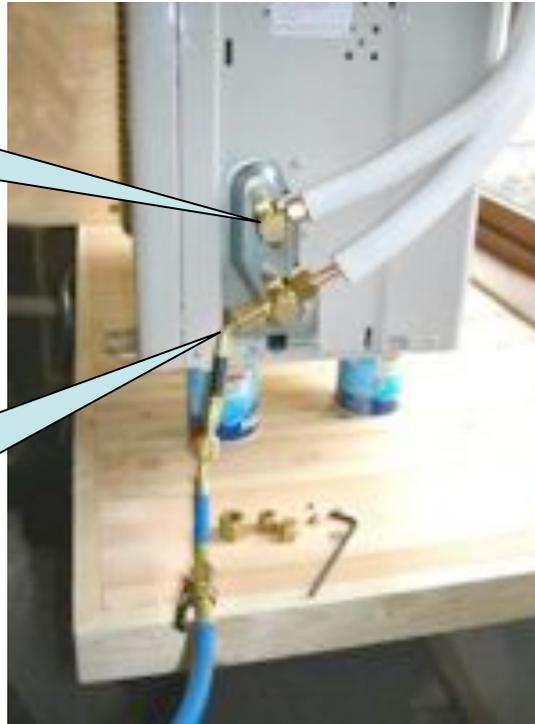
INSTALLATION

Finish the installation

- 5)
Start the unit with the remote-control.
Run with heat for 5min to see that it works. (It takes a little while to start up.)
- 6)
With the remote: change to cooling for 5min and then switch off.

- 7)
Replace the protective hoods.

- 8)
Disconnect the blue line and quickly reinstall the plug.



Put the plastic cover back.

Tidy up and shape the pipes and cables.

Seal around the hole in the wall.

Protect the cables properly

Clean up, take away all packing materials and leave a perfect installation.