

Installation and maintenance

CTC EcoAir

Modell 105 | 107 | 109 | 111

Outdoor air/water heat pump

161 505 23/3
2009-10-05



Table of contents

General information	
Introduction	3
Important points!	4
Safety instructions	5
Installation options Eco Air	6
Control panel	7
End user information	
Operation and maintenance	8
Placements of components	8
Fault tracing/suitable measures	9
Further information	10
Installation	
Introduction	15
Hydraulic installation	15
Electrical installation*	17
First start	19
Technical data	
Technical data	20
Measurements	20
Sound data	20
Declaration of conformity	21

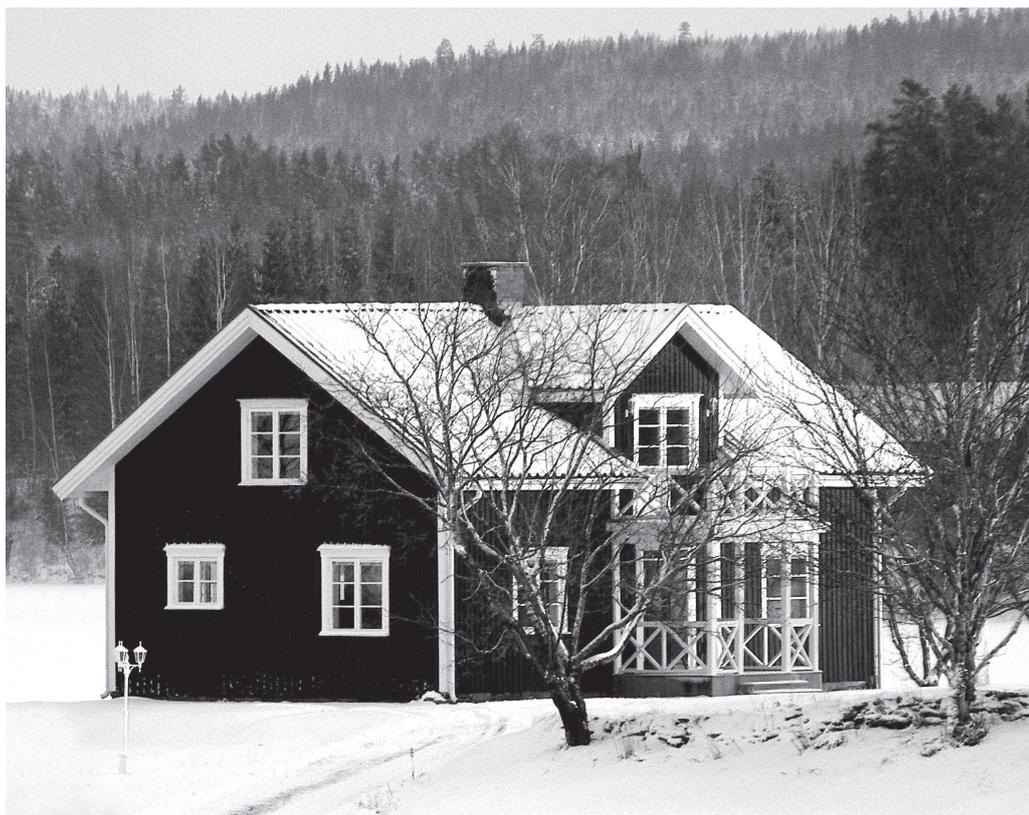
*) The wiring diagram is placed centre-spread.

With reservation for typing errors. Subject to alterations in design.

For your own memory

Fill in the information below. It may be useful if anything should happen

Product	Manufacturing No
Installer	Telephone No
Date of installation	



Welcome

Congratulations! You have just bought a CTC EcoAir, which we hope you will be very pleased with. In the following handbook, you can read about how to operate your heat pump. One chapter is written End user information and one chapter Installation.

Keep this handbook with the installation and maintenance instructions. If you take care of and correctly operate your CTC EcoAir, you will be able to enjoy it for many years. The information you need to look after and operate your heat pump can be found in this handbook.

The complete outdoor air heat pump

CTC EcoAir is an outdoor air heat pump which extracts heat from outdoor air and transfers it to an existing house heating system. CTC EcoAir operates at outdoor temperatures down to -15°C . At and below this temperature, the ordinary heating system fully takes over building heating.

The heat pump can be connected to a CTC EcoEl or to an existing boiler via the CTC EcoLogic control system. Cables for connecting the heat pump, CTC EcoEl and the indoor units are included with the delivery.

CTC EcoAir is designed to operate at high levels of efficiency and with low noise levels. The heat pump has built in hot gas defrosting which ensures the condenser battery is kept ice free. This ensures high efficiency levels are maintained.

Important points!

Upon delivery and installation carefully check the following important points:

- ▶ The CTC EcoAir must be transported and stored standing.
- ▶ Unpack and check before installation that the product has not been damaged during transport. Report eventual transport damages to the transporter.
- ▶ Placement of the outdoor unit must be accomplished in order to minimize disturbance from compressor and fan on the neighbourhood.
- ▶ **The arrangement must be made on concrete- block or bed close to the outer wall. The bedding must be performed for drainage of condensing water and melted snow. Make a stone curb under the outdoor heat pump unit.**

Remove 50-100 cm and fill up with macadam (crushed stone) in order to optimize the drainage. The outdoor unit must be placed level – check with water level.

For more information about placement of the product, see chapter "Hydraulic installation/Placement".

- ▶ Flexible tubes must be mounted closest the heat pump. Outdoor plumbing must be insulated with weatherproof insulation. Make sure that pipes mounted between the heat pump and indoor unit has the correct dimensions.
- ▶ Make sure that the charging pump which pumps water to the heat pump has sufficient capacity.

Safety instructions

The following safety instructions must be observed upon handling, installation and use of the heat pump:

- ▶ Ensure that the product is currentless before any interventions.
- ▶ When handling the product with a crane etc., make sure that the lifting equipment, loops etc. are not damaged. Never place yourself under the elevated product.
- ▶ Never risk your safety by dismantling casings, covers etc that are screwed tight.
- ▶ Never risk your safety by setting safety equipment out of function.
- ▶ Interventions in the electric or cooling system must be done only by a qualified person.

Installation options CTC EcoAir

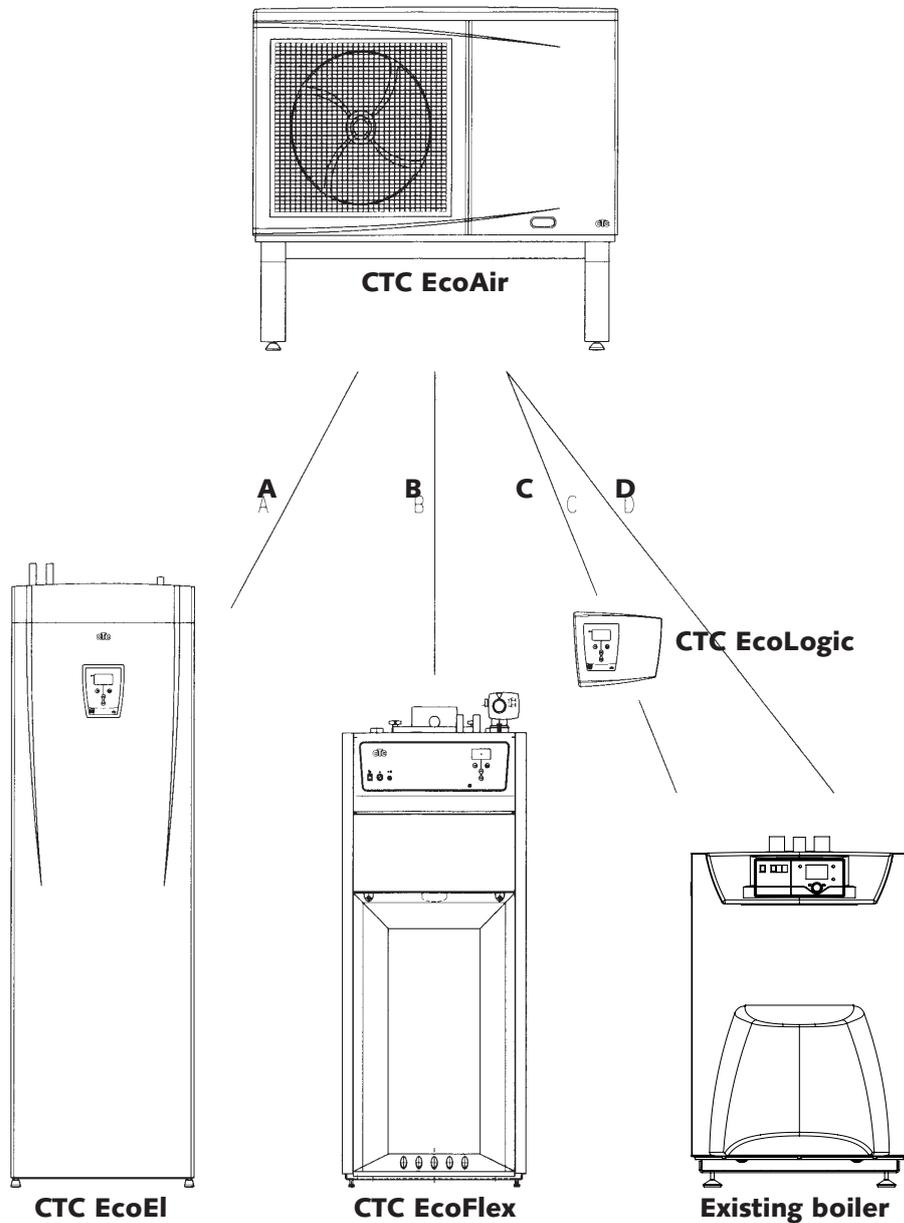
The picture below describes the different installation options for CTC EcoAir:

Option A & B: Both EcoEl and EcoFlex (Swedish version) are prepared for EcoAir which implies connection in an easy way.

Option C & D: In cases when the EcoAir shall be connected to an existing heating boiler (oil, wood, electric power or gas) are two different installation possibilities available:

By option C is EcoAir connected to EcoLogic implying the same functionality as by option A and B.

The EcoAir can also be connected direct to the heating boiler, though with a limited functionality and energy saving.



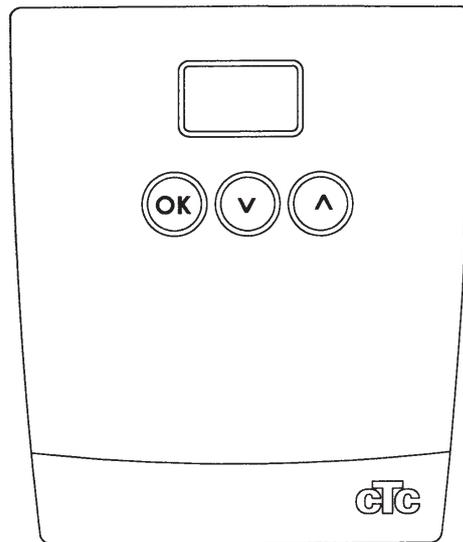
Control panel

A control panel is located, on the EcoAir unit, behind the service hatch. Where EcoAir is connected to EcoEl, EcoFlex or EcoLogic, heat pump settings are adjusted from the control panels on these units. The control panel on EcoAir is therefore not used. For more information, refer to the instruction book for the relevant product.

When EcoAir is connected to a heating boiler other than EcoEl, EcoFlex or EcoLogic, heat pump settings must be set on the control panel on the CTC EcoAir unit.

A description of control panel functions is given below.

The picture shows the EcoAir control panel:



You can scroll between the eight menus using the arrow keys. To access the menus, depress the OK button for three seconds. Menus 2–8 are displayed for ten minutes, after which the screen returns to menu 1.

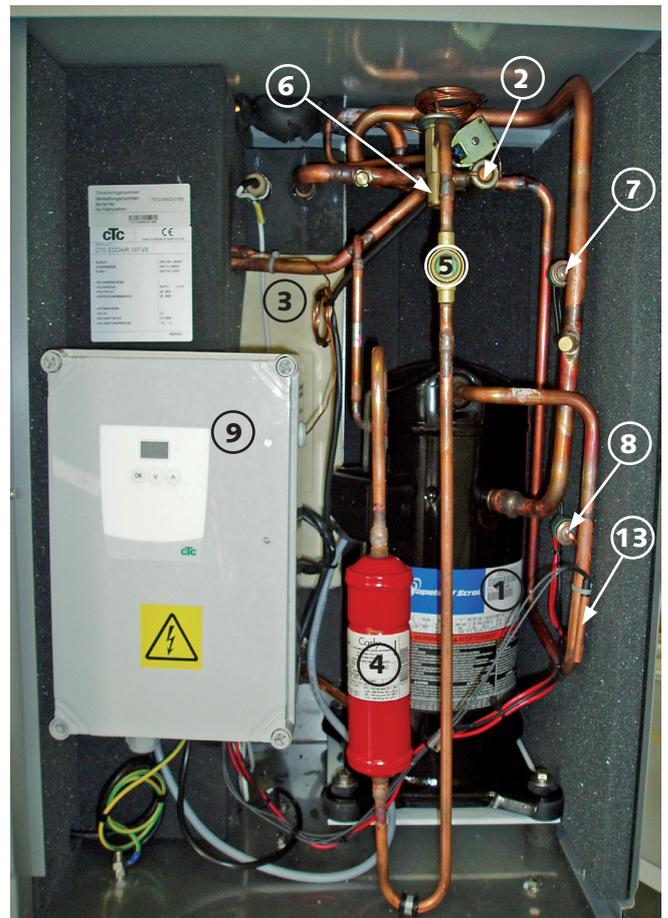
- Menu 1:* Specifies the return temperature at which the heat pump is to stop. Settings range 20–48°C. Where the heat pump is connected to EcoEl, EcoFlex or EcoLogic, the parameter should be set to automatic position A by carrying out the following:
Depress the OK button for around 3 seconds. Menu 1 is then displayed. Press the up arrow until A is displayed (step above 48). Depress the OK button for 3 seconds. A should now flash = ready.
- Menu 2:* Specifies how many degrees the return temperature is to be permitted to fall before the heat pump starts. Setting interval 5–10°C. (Menu not available in automatic position.)
- Menu 3:* Displays hot gas temperature (°C).
- Menu 4:* Displays outdoor temperature (°C).
- Menu 5:* Displays the last fault.
- Menu 6:* Inactive port.
- Menu 7:* Inactive port.
- Menu 8:* Displays primary flow temperature (°C).

Operation and maintenance

As the installer has installed your new heat pump, check together that the installation is in perfect condition. Let him show you the switch, the controls, the fuses etc. so that you have a full understanding of how the equipment functions and must be maintained. Free the air from the radiators after about three days of operation and fill water according to need.

Standstill

The heat pump is being shut off with the operating switch. If there is a risk of freezing, make sure that circulation flow is maintained through the heat pump, otherwise drain all water from the CTC EcoAir.



Placement of components

- | | |
|--------------------------------|---------------------------|
| 1. Compressor | 8. High pressure governor |
| 2. 4-way diverting valvel | 9. Control pane |
| 3. Condensor | 10. Defrosting clock |
| 4. Drying filter / Accumulator | 11. Capacitor for the fan |
| 5. Sight glass | 12. Terminal block |
| 6. Expansion valve | 13. Hot gas sensor |
| 7. Low pressure governor | |

Fault tracing/suitable measures

CTC EcoAir is designed to provide reliable operation, high levels of comfort and have a long lifetime. Below are a number of suggestions and guidelines which can be useful in the event of malfunction.

If a fault occurs, you should always contact the installation contractor who installed your unit. If the contractor believes the malfunction is due to a materials or design fault, the installation contractor will contact us to check and rectify the fault. Always provide the product's production number.

Fault tracing/suitable measures

If a fault occurs, a fault message will be displayed in the display screen on the control panel (for EcoEl, EcoFlex or EcoLogic the fault is also shown in these displays). The following fault codes are used:

- E01: High pressure pressure governor triggered.
- E02: Low pressure pressure governor triggered.
- E03: Motor protection triggered (E04, E07, 150 and the return temperature flash alternately in the display screen).
- E04: Fault on hot gas sensor (not connected, short circuited or outside range).
- E05: Fault on return sensor (not connected, short circuited or outside range) (E05 flashes alternately with 0 in the display screen).
- E06: Fault on outdoor sensor (not connected, short circuited or outside range).
- E07: Hot gas above 130°C (E07 flashes alternately with the hot gas sensor).
- E08: Primary flow sensor outside range. Temperature below 0°C or above 80°C (E08 flashes alternately with the return temperature in the display screen).

All faults except E08 result in the product stopping. Where operation stops, the product must be reset for operation to restart.

Resetting alarms

To reset the product after an error message has been displayed, depress the OK button and the down arrow at the same time. (Where connected to EcoEl, EcoFlex or EcoLogic, the product is reset via the indoor units.)

Circulation and defrosting

The high pressure pressure switch is triggered if circulation between the indoor unit and the outdoor unit falls substantially or ceases. The cause of this can be:

- ▶ *Fault on circulation pump/too small circulation pump.*
- ▶ *Air in lines.*
- ▶ *Blocked condenser.*
- ▶ *Other intermediary obstacle to water flow.*

The heat pump is normally automatically defrosted once an hour. All ice should be melted away during defrosting. If the heat pump does not provide sufficient heat, check that there is no abnormal ice accumulation. The cause of this can be:

- ▶ *Fault on the defrosting system.*
- ▶ *Lack of refrigerant (leakage). Check that the sight glass (see previous page) is clean and that there are no gas bubbles.*
- ▶ *Extreme weather conditions.*

Keep in mind that CTC EcoAir is an outdoor air heat pump. It supplies less heat when outdoor temperatures fall. A building's heating requirement however increases with falling outdoor temperatures. The heat pump may therefore supply inadequate levels of heating where outdoor temperatures fall rapidly.

The fan stops during defrosting. However, the compressor continues to run and melt water runs down to the ground below the heat pump. When defrosting stops, the fan restarts. A steam cloud can initially form, which is a result of damp air condensing in the cold outdoor air. This is normal and stops after a few seconds.

Air problem

If a chafing sound is heard from the heat pump, check that it is fully bled. Add water where required, so that the correct pressure is achieved. If this occurs repeatedly, call a technician to check the system.

Overload cut out

CTC EcoAir is fitted with a power overload cut out for the compressor, which is triggered if the compressor draws abnormally high currents. The cause of this fault can be as follows:

- ▶ *Loss of phase or loss of electricity grid power. Check the fuses. This is the most common cause of this fault.*
- ▶ *Compressor overloaded. Call out a service technician.*
- ▶ *Faulty compressor. Call out a service technician.*
- ▶ *Faulty overload cut out. Call out a service technician.*

EcoAir is equipped with start delay to avoid the compressor starting too frequently. The right point in the display on the control panel flashes when start delay is activated. Start delay is set to 10 minutes.

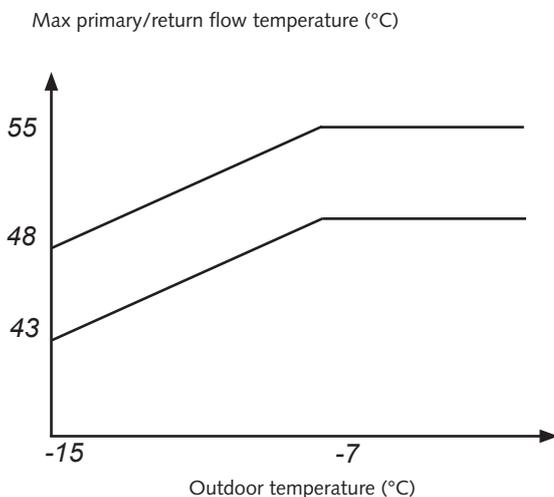
Press the up arrow and the down arrow buttons at the same time to override the start delay, for example during service.

Further information

Check that there are no bubbles/gas bubbles in the sight glass during continuous operation (not immediately after start or defrosting as gas bubbles can occur before operation has stabilised). Clear and continuous gas bubble generation is a sign of too little gas or refrigerant, which results in a lower heating power. Contact service.

Ice can be formed on the evaporator/cooling battery in the months when outdoor temperatures fluctuate between -10 and +10°C. This can be viewed on the rear of the heat pump where air enters. The cooling battery is defrosted every hour automatically. Check that all ice has been removed after defrosting.

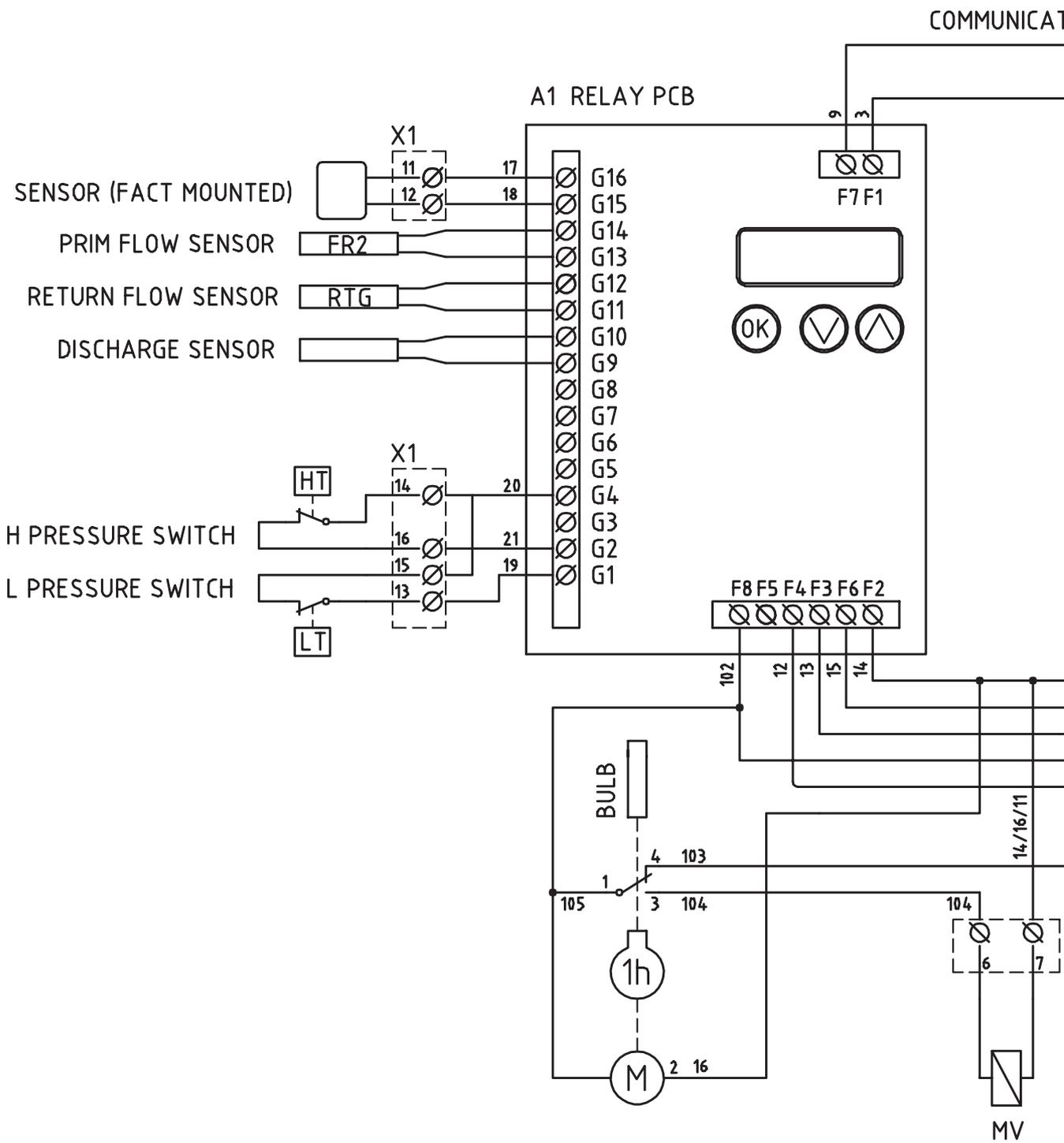
CTC EcoAir has two fan speeds, to avoid unnecessarily high noise levels from the product. The fan speed is reduced where outdoor temperatures are higher than 10°C, which results in much quieter operation.

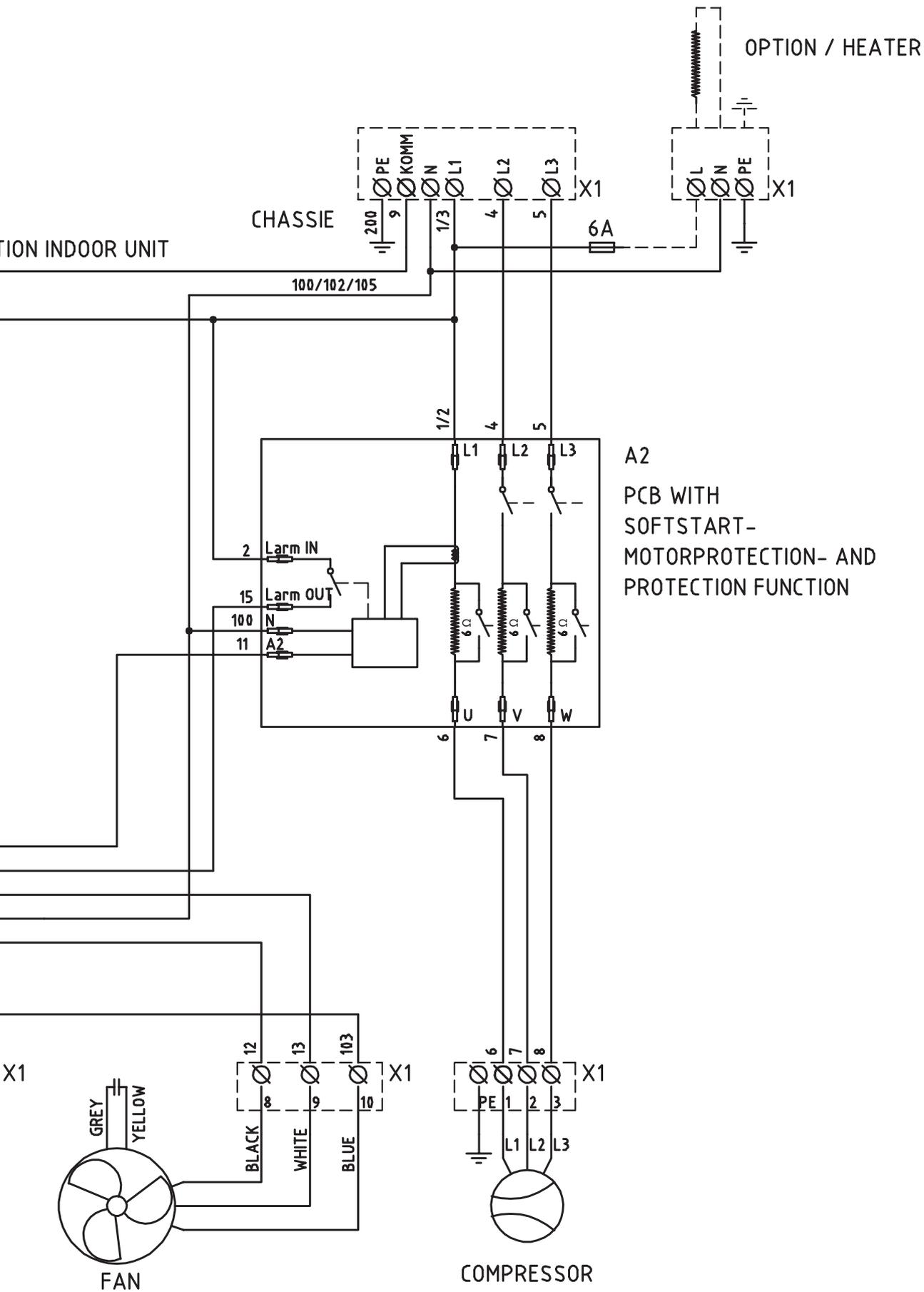


Wiring diagram

CTC EcoAir







Enertech AB
Näsvägen, 341 26 Ljungby, Sweden
www.ctc-heating.com

Installation

This chapter is for those responsible for one or more of the installations required for CTC EcoAir to function as the property owner wishes.

Take the time required to go through the functions, controls and settings with the property owner and answer any questions they may have. Both you and the heat pump benefit from ensuring that the user fully understands how the system works and how it should be operated.

! The product should be stored and transported in the vertical position.

Transport

Transport the heat pump to the installation site before removing the packaging. Move the CTC EcoAir in one of the following ways:

- ▶ Forklift truck.
- ▶ Lifting strap around the pallet. **NB! Only to be used with packaging in place.** Handle with care.

Removal of packaging

The packaging can be removed when the heat pump is alongside the installation point. Check that the product has not been damaged in transport. Report any transport damage to the shipping agent. Also check that the below items are included in the delivery.

Standard delivery

- ▶ Outdoor air heat pump CTC EcoAir.
- ▶ Electrical connection cabling, 15 m, to CTC EcoEl.

Hydraulic installation

Should be installed in accordance with existing engineering standards and building regulations. The boiler should be connected to an expansion tank in open or closed systems. Do not forget to flush the radiator system clean before connection. Set all settings as described in the Initial start up chapter.

The heat pump operates with radiator return temperatures up to around 50°C and supplies water temperatures of maximum 55°C. EcoAir is not damaged by higher return temperatures, but the compressor stops and the intended savings are not realised.

Circulation pump

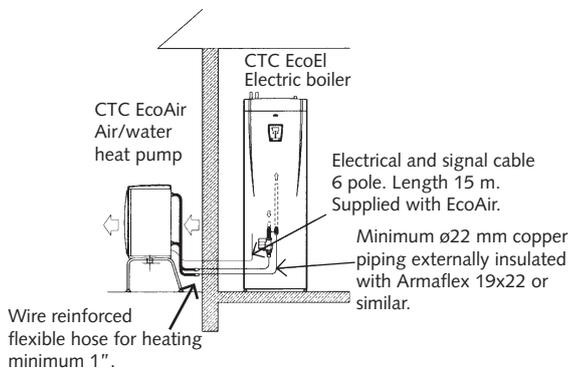
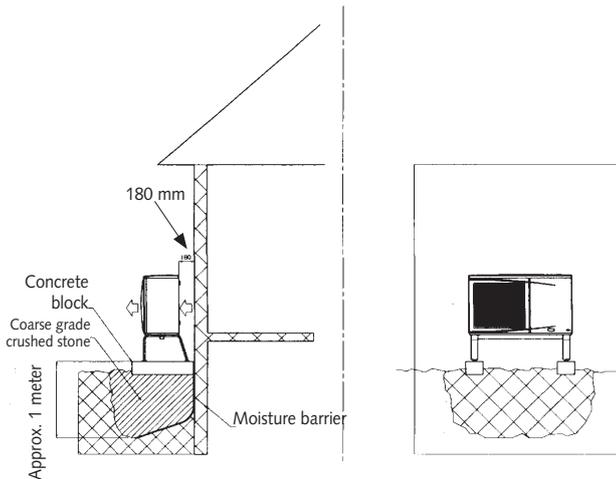
Make sure a sufficiently large circulation pump is fitted, so that the flow across the heat pump is sufficient. We recommend a pump with a 6 meter pressure head, for example Wilo RS 25/6 or Grundfos UPS 25-60, which are suitable for most installations.

! Circulation pump, minimum 6 meter pressure head.

To ensure reliable functioning, flows should not be less than as follows:

CTC EcoAir 105: 1,000 l/hour CTC EcoAir 107: 1,200 l/hour
 CTC EcoAir 109: 1,400 l/hour CTC EcoAir 111: 1,600 l/hour

CTC EcoAir stops where flow is too low, due to the high pressure governor being triggered. This is avoided by ensuring that all the house's thermostat valves are always fully open, except in a few rooms such as bedrooms, where cooler temperatures are required. If thermostat valves are not fitted, the element valves should be open.



Positioning

Normal installation is against an outer wall.

Note that there must be 180 mm clearance between the wall and the product, so that outdoor air can flow unhindered through the evaporators. If the heat pump is installed in a corner, the distance between the end plate and the wall must be minimum 250 mm.

Installing the unit in an outhouse or carport is not recommended. This is because air should flow as freely as possible through the heat pump, and because the used air should not be able to be recycled through being drawn into the intake on the rear of the unit.

Distance to bushes or similar in front of the product should be minimum 1 meter. The heat pump is designed for outdoor installation and does not require additional protection or a roof. The unit stand should be mounted on a concrete block underlay or similar which in turn lies on a crushed stone or shingle surface. This is so that condensation water can drain into the ground, so avoiding the formation of large pools or areas of sheet ice in the winter months.

The heat pump should be installed level. Use a spirit level.

The stand's design and heat pump weight mean that it does not need to be anchored to the ground or attached to a wall.

Pipe connection CTC EcoAir

Pipes of minimum 22 mm copper piping are laid to and from the heat pump. Lay pipes so that there is no other highest point where air can collect and hinder circulation. If this is unavoidable, install an automatic bleeder at this highest point.

Pipes installed outside should be insulated with at least 15 mm thick insulation which is not sensitive to water, such as Armaflex or similar. Insure that the insulation is sealed tightly everywhere and that joints are thoroughly taped. 10 mm insulation is sufficient indoors. Heating line water normally does not need frost protection.

Wire reinforced hosing should be used for heat pump connections, length around 1,000–1,500 mm, to prevent noise from the heat pump being transmitted into the house and to accommodate any heat pump movement.

General advice

Lead throughs should be above ground level, to avoid the risk of moisture damage. If lead throughs cannot be installed above ground level and you are forced to install these below ground level, it is important that great care is exercised to ensure the fitting of reliable moisture proofing. If the outer walls are fitted with moisture barrier matting, any holes made in these are to be sealed in accordance with manufacturer instructions.

Bleeding exchanger (condenser)

The pipe system and the condenser are bled by removing the upper connection fitting on the rear of the unit.

Connection to CTC EcoEl electric boiler

The circulation pump is fitted to the electric boiler left connection and should pump the water out to the heat pump. This ensures that the pump is supplied with water on system start up.

CTC EcoLogic

If CTC EcoAir is connected to a different, existing boiler using EcoLogic, the installation should follow the instructions and alternatives specified in the CTC EcoLogic instruction book.

⚠ Don't forget to equip CTC EcoEl with a ● draw off point under the product.

Electrical installation

Installation and change over of heat pumps should be carried out by a qualified electrician. All wiring should be installed in accordance with relevant regulations. The boiler is internally connected at the factory.

Power supply

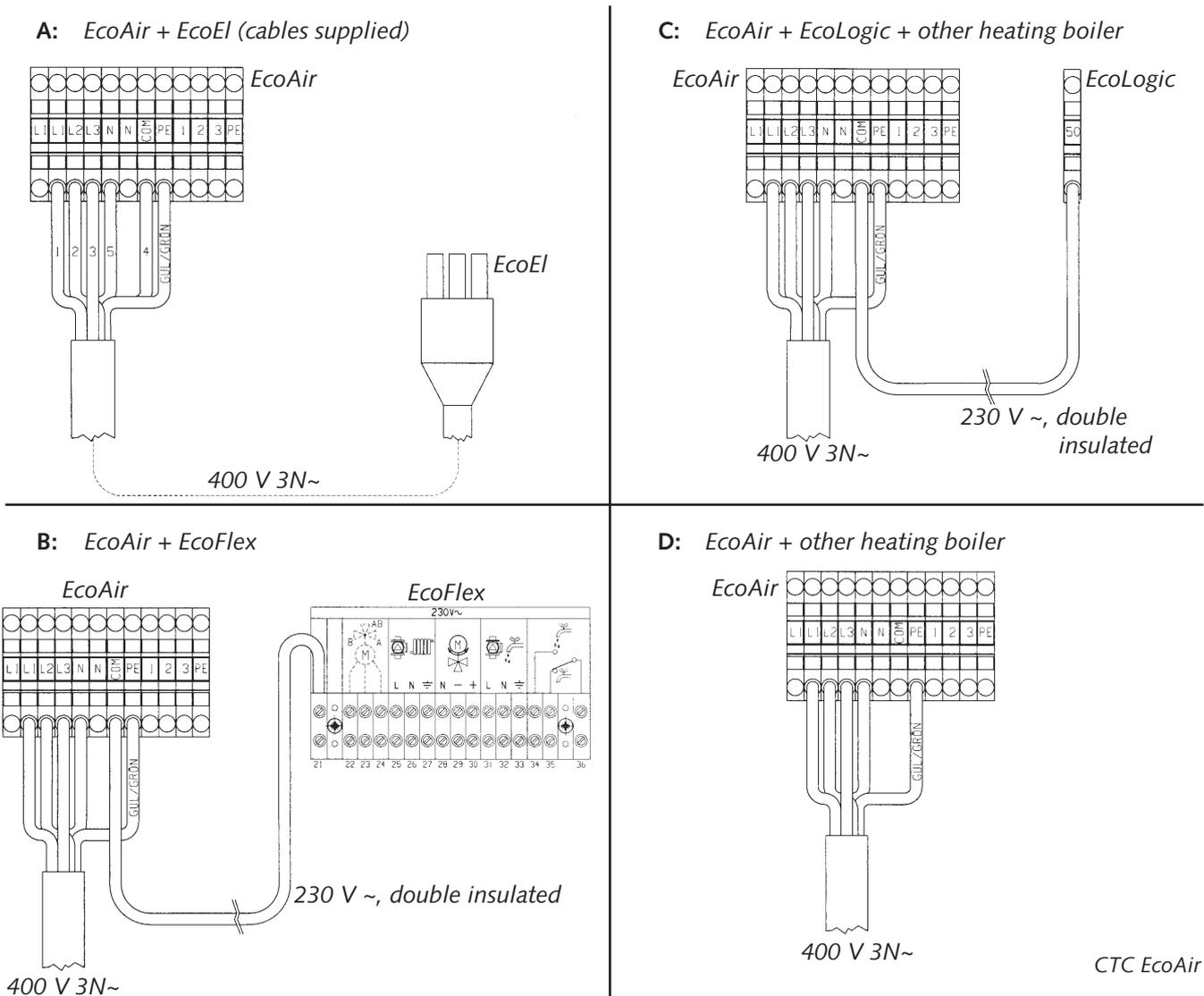
CTC EcoAir should be connected to 400 V 3N~ and protective earth. Group fuse size is specified in the technical data. When connecting CTC EcoEl, the electric boiler's power should be included, as CTC EcoAir is supplied power via CTC EcoEl.

Safety switch

The installation should be preceded by an all pole safety switch which ensures disconnection from all electrical power sources.

Connection to boiler (indoor unit) EcoEl, EcoLogic

The electrical connection between the heat pump and the indoor units should use the enclosed 6 pole cable. Where the indoor system consists of an EcoEl, the switch should be connected at the point specified. The fuse in EcoEl is 10 A. When EcoAir is connected to a different heating boiler, electrical power is supplied separately using a 5-conductor. If the EcoLogic control unit is used, these units are connected together using a 1-conductor (230 V~ double insulated) on the communication port. The different connection alternatives for CTC EcoAir are shown in the picture below.



Connection of the heat pump (outdoor unit)

Power supply

Electrical connection to CTC EcoAir is as shown in picture A–D, which supplies the heat pump with electricity to the compressor (400 V 3N~) and fan (230 V 1N~), defroster timer, 4-way valve and control lever.

There is an electrical switchbox on the heat pump which contains:

- ▶ Defrosting timer.
- ▶ Connection card.
- ▶ Control panel.
- ▶ The heat pump is supplied with a 15 meter cable for EcoEI.

On CTC EcoEI, the circulation pump is connected using a 3-pole plug for the corresponding female socket. The circulation pump, which circulates hot water between the boiler and the heat pump, should be fitted to the left ball valve under the boiler.

Heating circuit pump

CTC EcoEI: heating circuit pump is connected to the connection block on the top of the boiler.

CTC EcoLogic: the house's ordinary circulation pump is used as a heating circuit pump.

NB: The circulation pump should in this case always be in operation.

Setting main fuse and power limitation

Settings when connecting to CTC EcoEI

To be as specified in the CTC EcoEI instruction book.

Settings when connecting to CTC EcoLogic

To be as specified in the CTC EcoLogic instruction book.

First start

1. Check that the heating boiler and system are full of water and have been bled (CTC EcoAir is bled by undoing the upper water connection on the rear of the unit).
2. Check that all connections are tight.
3. Check that sensors and heating circuit pump are connected to the power source.

When the system is warm, check that all connectors are tight, that the various systems are bled, that heat comes out into the system and that hot water comes out of the tapping point.

Go through the settings with the user.

Checking heat pump performance

Measure the temperature difference between the heat pump outgoing and incoming water connectors to check that the heat pump supplies the correct power:

At outdoor temp (°C)	-10	-5	0	+5	+10
CTC EcoAir 105	2	2.5	3	4	5
CTC EcoAir 107	3	4	5	6	7
CTC EcoAir 109	4	5	6	7.5	9
CTC EcoAir 111	4.5	6	7.5	9	10.5

Note that the method is very approximate and deviations downwards and upwards of a few degrees can occur without this necessarily indicating a fault.

Discrepancies can be due to number of factors:

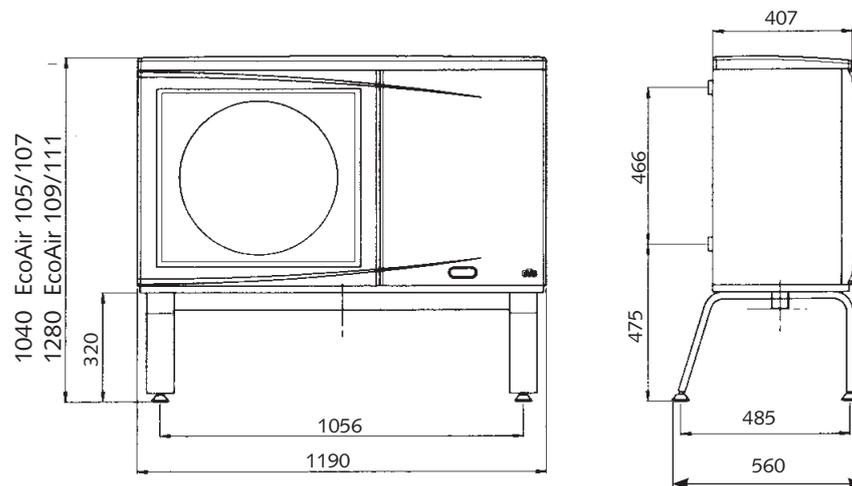
- ▶ *Water flow through the heat pump.*
- ▶ *Ice accumulation on the evaporators.*
- ▶ *Temperature of the water (the higher the temperature, the lower the temperature difference).*

Technical data

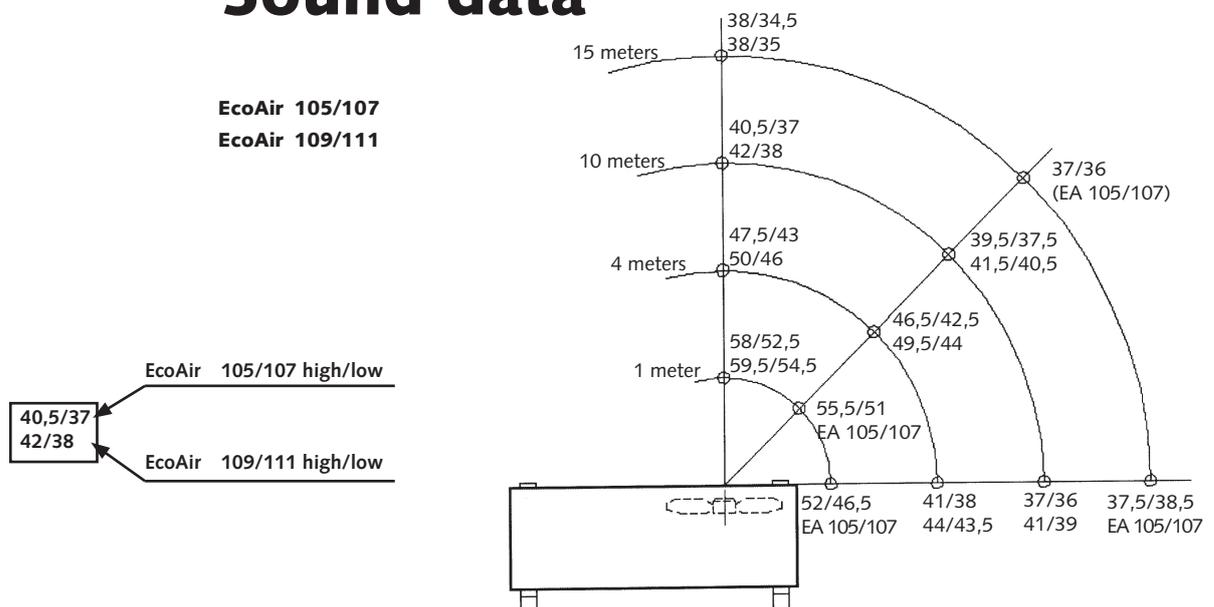
	EcoAir 105	EcoAir 107	EcoAir 109	EcoAir 111
Electrical data	400V 3N~	400V 3N~	400V 3N~	400V 3N~
Power input compressor at 50°C water temp. and -10/0/+8°C outdoor temp	kW 1,5/1,7/1,9	2,1/2,4/2,5	2,6/2,8/3,0	2,9/3,2/3,4
Emitted output compressor at: 50°C water temp. and -10/0/+8°C outdoor temp..	kW 3,6/4,8/5,7	4,9/6,1/7,1	5,7/7,4/8,6	6,6/8,3/9,8
Min group fuse	A 10	10	10	10
Max op. current	A 5	7	9	11
Water volume	l 2	2	2,9	2,9
Refrigerator (R407C)	kg 1,2	1,4	*)1,8	*)2,0
Interrupt value pressure governor HP/LP	bar 28/0,1	28/0,1	28/0,1	28/0,1
Max op. pressure water (PS)	bar 2,5	2,5	2,5	2,5
Weight	kg 100	105	135	140

*) Applies to products manufactured after 2008-02-04

Measurements



Sound data





Försäkran om överensstämmelse
Déclaration de conformité
Declaration of conformity
Konformitätserklärung

Enertech AB
Box 313
S-341 26 LJUNGBY

försäkrar under eget ansvar att produkten
confirme sous sa responsabilité exclusive que le produit,
declare under our sole responsibility that the product,
erklären in alleiniger Verantwortung, dass das Produkt,

CTC EcoAir 5,9 / 7,9 / 10,9 / 105 / 107 / 109 / 111 / 115 / 120 / 125

som omfattas av denna försäkran är i överensstämmelse med följande direktiv,
auquel cette déclaration se rapporte est en conformité avec les exigences des normes suivantes,
to which this declaration relates is in conformity with requirements of the following directive,
auf das sich diese Erklärung bezieht, konform ist mit den Anforderungen der Richtlinie,

EC directive on:
Pressure Equipment Directive (PED) 97/23/EC, Modul A
Electromagnetic Compatibility (EMC) 89/336/EEC
Low Voltage Directive (LVD) 2006/95/EG

Överensstämmelsen är kontrollerad i enlighet med följande EN-standarder,
La conformité a été contrôlée conformément aux normes EN,
The conformity was checked in accordance with the following EN-standards,
Die Konformität wurde überprüft nach den EN-normen,

EN ISO 14731	EN 55014-1 –A1, -A2 / -2
EN ISO 3834-2	EN 61 000-4-2, -4, -5, -6, -11
EN ISO 15614-1	EN 60335-1 / -2-40
EN 13133	EN 378
EN 13134	EN 60529
EN 287-1	
EN 10 204, 3.1B	

Ljungby 2008-05-08

Kent Karlsson
Technical Manager