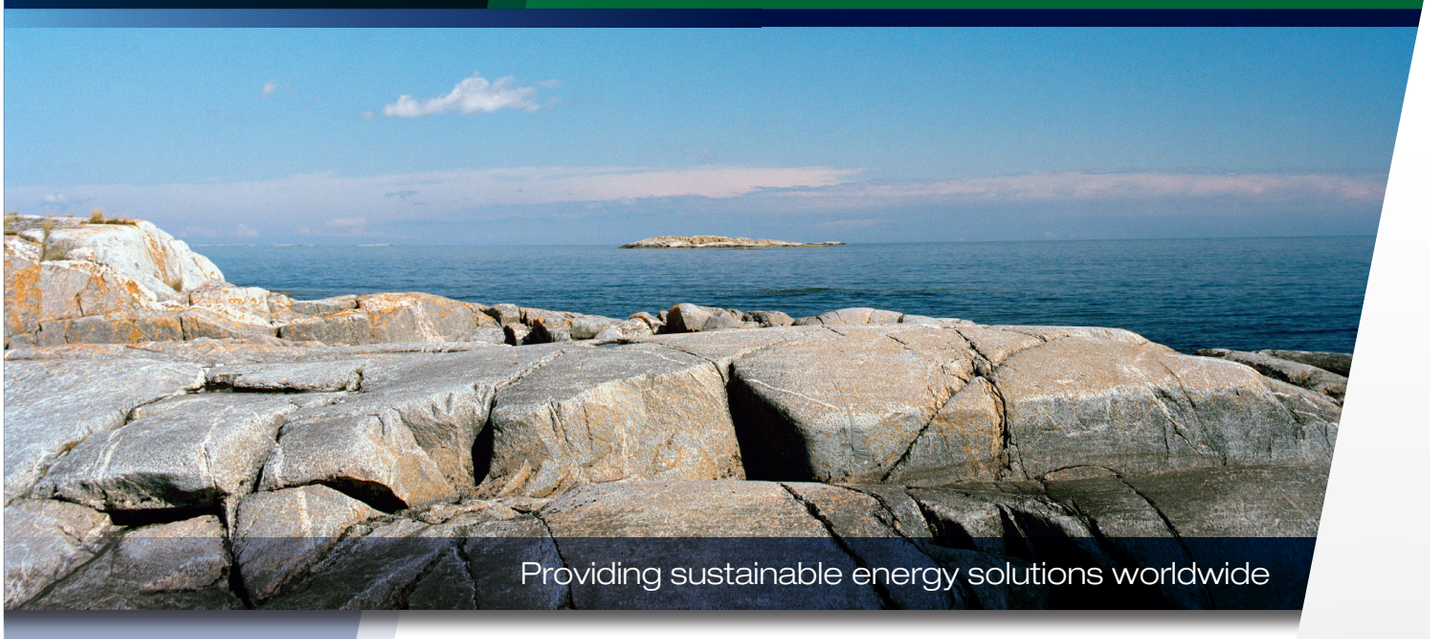
162 105 51-5 2016-07-07



Installation and Maintenance Manual

CTC EcoPart 400

Model 406-417

400V 3N~ / 230V 1N~

IMPORTANT
READ CAREFULLY BEFORE USE
KEEP FOR FUTURE REFERENCE

CTC
Enertech Group

Removing the cooling module

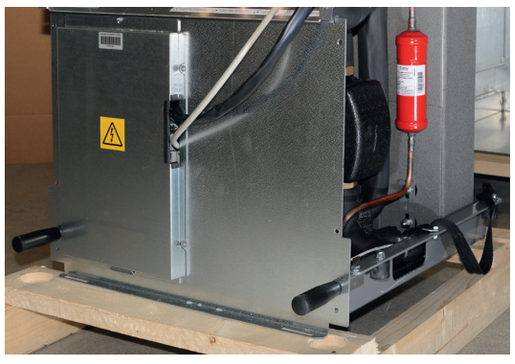
1. Disconnect the cooling module's power cable connector and hoses.

2. Attach the two carrying handles to the bottom of the cooling module.

3. Unscrew the cooling module's screws.

4. Pull the cooling module by first lifting the front edge slightly with the carrying handles.

5. Lift the cooling module using the carrying handles and shoulder straps.



6. Lift the cooling module into the product using the carrying handles and shoulder straps. Remove the carrying handles and reconnect the power cable, hoses and screws.

Installation and maintenance manual

162 105 51-5 2016-07-07

CTC EcoPart 400

Model 406-417

400 V 3N~ / 230 V 1N~

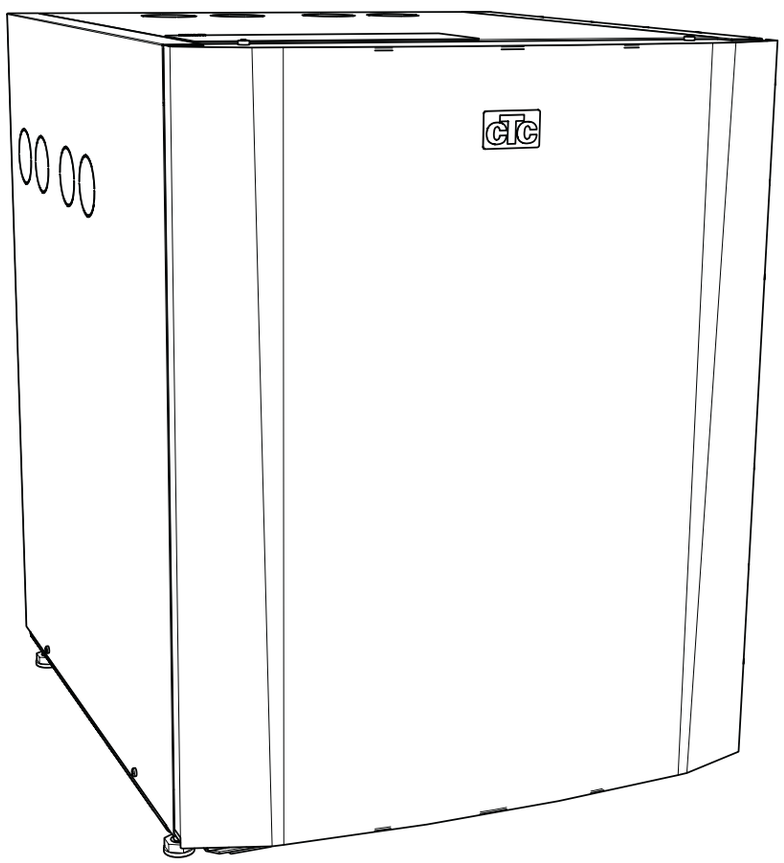


Table of contents

As your own reminder

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

Product :	Manufacturing number :
Installer:	Name:
Date:	Tel. no.:
Electrical installer:	Name:
Date:	Tel. no.:

Enertech AB provides the information with reservation for any typing errors and subject to modification.

Congratulations on buying your new product

The complete heat pump for rock, ground or lake

The CTC EcoPart 400 is a heat pump which takes heat from rock, ground or lake and supplies it to the existing heating system in the house. CTC EcoPart 400 is fully utilised before the normal heating system is switched on and helps heat the house.

The heat pump can be connected to a CTC EcoEl/CTC EcoZenith or to the existing boiler via the CTC EcoLogic control system.

The CTC EcoPart 400 has been designed to operate with high efficiency and low noise level.

Keep this handbook containing the installation and maintenance instructions. If it is looked after properly, you will be able to enjoy the use of your CTC EcoPart 400 for many years. This manual will provide all the information you will need.

CTC EcoPart 400 is available in four different versions

CTC EcoPart 406-417 LEP

- A rated brine pump (Low Energy Pump - LEP)
- No charge pump

CTC EcoPart 414-417 2xLEP

- A rated brine pump (Low Energy Pump - LEP)
- Class-A charge pump (Low Energy Pump - LEP)

Check list

The check list must be completed by the installer.

- If service is needed, you may be required to provide this document.
- Installation must always in accordance with the installation and maintenance instructions.
- Installation must always be carried out in a professional manner.

Following installation, the unit must be inspected and functional checks performed as indicated below:

Pipe installation

- ☐ The heat pump has been filled, positioned and adjusted in the correct manner according to the instructions.
- ☐ The heat pump is positioned so that it can be serviced.
- ☐ Capacity of the charge/radiator pump (depending on type of system) for the flow required.
- ☐ Open radiator valves (depending on type of system) and other relevant valves.
- ☐ Tightness Test
- ☐ Bleed the system.
- ☐ Check proper operation of the requisite safety valves.
- ☐ Requisite waste pipes connected to the floor drain (depending on type of system).

Electrical installation

- ☐ Power switch
- ☐ Correct tight wiring
- ☐ Requisite sensors fitted.
- ☐ Accessories

Customer information (adapted to the relevant installation)

- ☐ Start-up with customer/installer
- ☐ Menus/controls for selected system
- ☐ Installation and maintenance manual supplied to the customer
- ☐ Check and filling, heating system
- ☐ Information on fine adjustments
- ☐ Alarm information
- ☐ Functional test of safety valves fitted
- ☐ Guarantee and insurance
- ☐ Information on procedures for fault registration

_____ _____

Date / Customer Date / Installer

Important to remember!

Check the following points in particular at the time of delivery and installation:

- The product must be transported and stored in a standing position. When moving the product, it can be placed temporarily on its back.
- Remove the packaging and check before installation that the product has not been damaged in transit. Report any transport damage to the supplier.
- Place the product on a solid foundation, preferably made of concrete. **If the product needs to be placed on a soft carpet, base plates must be placed under the adjustable feet.**
- Remember to leave a service area of at least 1 m in front of the product.
- The product must not be placed below floor level either.
- Avoid placing the product in rooms where the walls are of lightweight design, as people in the adjoining room may be disturbed by the compressor and vibrations.
- Ensure that pipes used between the heat pump and the heating system are of adequate dimensions.
- Ensure that the circulating pump has sufficient capacity to pump the water to the heat pump.

Safety Instructions

The following safety instructions must be observed when handling, installing and using the heat pump:

- Close the safety switch before doing any work on the product.
- Correct flushing of the system shall be carried out before the system is filled with a recommended brine/heating fluid.
- When handling the product with a hoist ring or similar device, make sure that the lifting equipment, eyebolts etc. are not damaged. Never stand under the hoisted product.
- Never jeopardize safety by removing bolted covers, hoods or similar.
- Never jeopardize safety by deactivating safety equipment.
- Any work done on the product's cooling system should be done by authorised personnel only.
- This product is intended for indoor installation only.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

! If these instructions are not followed when installing, operating and maintaining the system, Enertech's commitment under the applicable warranty terms is not binding

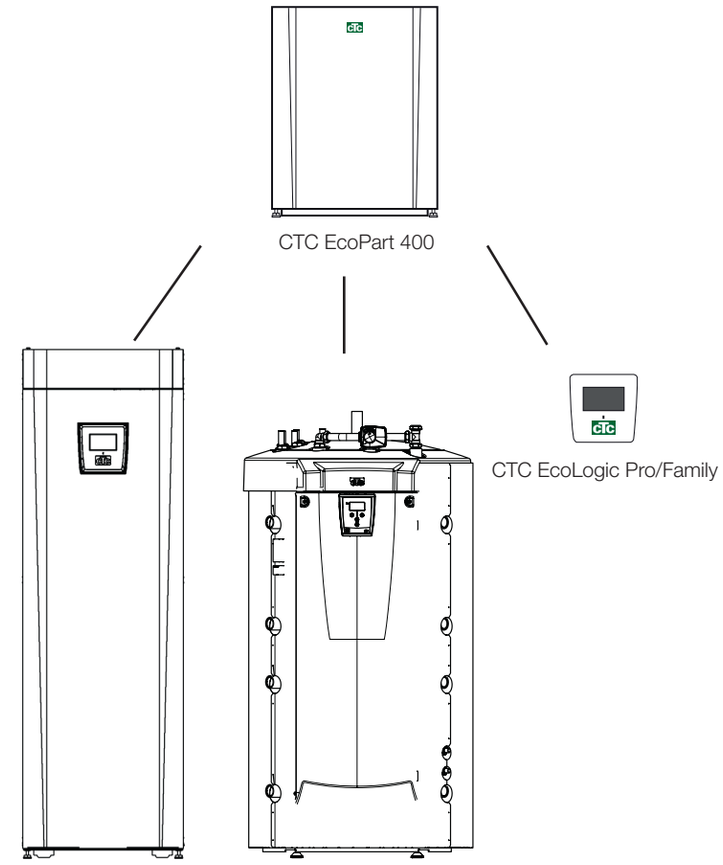
1. Connection alternative CTC EcoPart 400

1.1 General

Below are illustrations of the different connection alternatives available for the CTC EcoPart 400. In some cases a CTC Converter and CTC Basic Display may be needed. See the chapter on Connecting the control system

Alternative A

The CTC EcoPart 400 can be connected to the products below.



2. Technical data

2.1 Table 400V 3N~

Electrical data		EcoPart 406	EcoPart 408	EcoPart 410	EcoPart 412
Electrical data		3x400V			
Rated power	kW	2.7	3.5	4.2	5.1
Rated current	A	5.8	6.5	8.1	9.6
Max starting current	A	16.6	17.7	19.8	23.5
Maximal group fuse	A	10	10	10	16
IP class		IPX1			

Operational data for heat pump			EcoPart 406	EcoPart 408	EcoPart 410	EcoPart 412
Output from compressor [1]	@ -5/45	kW	4.68	6.84	8.33	9.88
COP [1]	@ -5/45	-	3.09	3.34	3.30	3.30
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	5.90 | 5.48 5.17	8.19 | 7.87 7.55	9.97 | 9.55 9.28	11.75 | 11.24 10.97
Input power [1]	@ 0/35 | 0/45 0/55	kW	1.29 | 1.55 1.87	1.79 | 2.16 2.53	2.17 | 2.60 3.11	2.55 | 3.07 3.71
COP [1]	@ 0/35 | 0/45 0/55	-	4.57 | 3.54 2.76	4.58 | 3.64 2.99	4.60 | 3.68 2.98	4.60 | 3.66 2.96
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	6.81 | 6.49 6.08	9.44 | 9.05 8.65	11.42 | 10.99 10.58	13.53 | 12.95 12.57
COP [1]	@ 5/35 | 5/45 5/55	-	5.24 | 4.15 3.18	5.02 | 4.04 3.30	5.20 | 4.16 3.28	5.11 | 4.11 3.35
Max. operating current Compressor		A	4.5	5.2	6.8	8.2
Sound power according to EN12102		dB(A)	43.0	42.5	48.5	48.0

[1] EN14511:2007, incl. heating medium pump and brine pump

Heating system		EcoPart 406	EcoPart 408	EcoPart 410	EcoPart 412
Max temperature heating medium (TS)	°C	110			
Heating medium system min flow [2]	l/s	0.14	0.20	0.24	0.28
Heating medium system nominal flow [3]	l/s	0.28	0.39	0.48	0.56

[2] At Δt = 10 K and 0/35 °C heat pump operation.
[3] At Δt = 5 K and 0/35 °C heat pump operation.

Brine system		EcoPart 406	EcoPart 408	EcoPart 410	EcoPart 412
Water volume (V)	l	2.3	2.9	2.9	3.4
Brine system min./max. temp. (TS)	°C	-5/20			
Brine system min./max. pressure (PS)	bar	0.2/3.0			
Brine system min. flow, Δt = 5 K	l/s	0.22	0.31	0.38	0.44
Brine system nominal flow, Δt = 3 K	l/s	0.37	0.51	0.64	0.73
Brine system pump		Class A circulation pump (LEP)			
Pump capacity		See diagram in the Pipe installation chapter			

Other data		EcoPart 406	EcoPart 408	EcoPart 410	EcoPart 412
Refrigerant quantity (R407C, fluorinated greenhouse gases GWP 1774)	kg	1.9	1.9	1.9	2.3
CO2 equivalent	ton	3.370	3.370	3.370	4.080
Compressor oil		FV50S	Polyolester (POE)		
Interrupt value switch HP	MPa	3.1 (31 bar)			
Weight	kg	138	143	148	164
Width x Height x Depth	mm	600 x 760 x 672			

No annual leakage control of the refrigerant is required

Electrical data		EcoPart 414	EcoPart 417
Electrical data		3x400V	
Rated power	kW	6.0	7.4
Rated current	A	12.2	13.9
Max starting current	A	29.1	32.0
Maximal group fuse	A	16	16
IP class		IPX1	

Operational data for heat pump			EcoPart 414	EcoPart 417
Output from compressor [1]	@ -5/45	kW	12.09	14.05
COP [1]	@ -5/45	-	3.24	3.19
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	14.47 | 13.93 13.40	16.24 | 16.14 15.87
Input power [1]	@ 0/35 | 0/45 0/55	kW	3.19 | 3.83 4.54	3.72 | 4.47 5.17
COP [1]	@ 0/35 | 0/45 0/55	-	4.54 | 3.64 2.95	4.36 | 3.61 3.07
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	16.48 | 15.98 15.28	19.25 | 18.42 18.16
COP [1]	@ 5/35 | 5/45 5/55	-	5.13 | 4.11 3.28	5.02 | 4.05 3.38
Max. operating current Compressor		A	9.14	11.5
Sound power according to EN12102		dB(A)	53.0	55.5

[1] EN14511:2007, incl. heating medium pump and brine pump

Heating system		EcoPart 414	EcoPart 417
Max temperature heating medium (TS)	°C	110	
Heating medium system min flow [2]	l/s	0.34	0.40
Heating medium system nominal flow [3]	l/s	0.68	0.81
Heating medium pump (2xLEP only)		UPM GEO 25-85	

[2] At Δt = 10 K och 0/35 °C heat pump operation.
[3] At Δt = 5 K och 0/35 °C heat pump operation.

Brine system		EcoPart 414	EcoPart 417
Water volume (V)	l	4.07	4.07
Brine system min./max. temp. (TS)	°C	-5/20	
Brine system min./max. pressure (PS)	bar	0.2/3.0	
Brine system min. flow, Δt = 5 K	l/s	0.53	0.63
Brine system nominal flow, Δt = 3 K	l/s	0.88	1.05
Brine system pump		Class A circulation pump (LEP)	
Pump capacity		See diagram in the Pipe installation chapter	

Other data		EcoPart 414	EcoPart 417
Refrigerant quantity (R407C, fluorinated greenhouse gases GWP 1774)	kg	2.7	2.7
CO_2 equivalent	ton	4.790	4.790
Compressor oil		Polyolester (POE)	
Interrupt value switch HP	MPa	3.1 (31 bar)	
Weight	kg	168	168
Width x Height x Depth	mm	600 x 760 x 672	

No annual leakage control of the refrigerant is required

2.2 Table 230V 1N~

Electrical data		EcoPart 406	EcoPart 408	EcoPart 410
Electrical data		1x230V		
Rated power	kW	2.7	3,4	4.4
Rated current	A	14.0	19,5	21.6
Max starting current	A	30	30	30
IP class		IPX1		

Operational data for heat pump			EcoPart 406	EcoPart 408	EcoPart 410
Output from compressor [1]	@ -5/45	kW	4.68	6.84	8.33
COP [1]	@ -5/45	-	3.09	3.34	3.30
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	5.90 | 5.48 5.17	8.19 | 7.87 7.55	9.97 | 9.55 9.28
Input power [1]	@ 0/35 | 0/45 0/55	kW	1.29 | 1.55 1.87	1.79 | 2.16 2.53	2.17 | 2.60 3.11
COP [1]	@ 0/35 | 0/45 0/55	-	4.57 | 3.54 2.76	4.58 | 3.64 2.99	4.60 | 3.68 2.98
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	6.81 | 6.49 6.08	9.44 | 9.05 8.65	11.42 | 10.99 10.58
COP [1]	@ 5/35 | 5/45 5/55	-	5.24 | 4.15 3.18	5.02 | 4.04 3.30	5.20 | 4.16 3.28
Max. operating current Compressor		A	13.0	18.5	20.6
Sound power according to EN12102		dB(A)	43.0	42.5	48.5

[1] EN14511:2007, incl. heating medium pump and brine pump

Heating system		EcoPart 406	EcoPart 408	EcoPart 410
Max temperature heating medium (TS)	°C	110		
Heating medium system min flow [2]	l/s	0.14	0,20	0,24
Heating medium system nominal flow [3]	l/s	0.28	0,39	0,48

[2] At Δt = 10 K and 0/35 °C heat pump operation.
[3] At Δt = 5 K and 0/35 °C heat pump operation.

Brine system		EcoPart 406	EcoPart 408	EcoPart 410
Water volume (V)	l	2.3	2,9	2,9
Brine system min./max. temp. (TS)	°C	-5/20		
Brine system min./max. pressure (PS)	bar	0.2/3.0		
Brine system min. flow, Δt = 5 K	l/s	0.27	0,31	0,38
Brine system nominal flow, Δt = 3 K	l/s	0.37	0,51	0,64
Brine system pump		Class A circulation pump (LEP)		
Pump capacity		See diagram in the Pipe installation chapter		

Other data		EcoPart 406	EcoPart 408	EcoPart 410
Refrigerant quantity (R407C, fluorinated greenhouse gases GWP 1774)	kg	1,9	1,9	1,9
CO_2 equivalent	ton	3.370	3.370	3.370
Compressor oil		FV50S	Polyolester (POE)	
Interrupt value switch HP	MPa	3.1 (31 bar)		
Weight	kg	138	143	148
Width x Height x Depth	mm	600 x 760 x 672		

No annual leakage control of the refrigerant is required

Electrical data		EcoPart 412	EcoPart 414
Electrical data		1x230V	
Rated power	kW	5.2	6.3
Rated current	A	27.1	33.2
Max starting current	A	30	30
IP class		IPX1	

Operational data for heat pump			EcoPart 412	EcoPart 414
Output from compressor [1]	@ -5/45	kW	9,88	12.09
COP [1]	@ -5/45	-	3,30	3.24
Output from compressor [1]	@ 0/35 | 0/45 0/55	kW	11.75 | 11.24 10.97	14.47 | 13.93 13.40
Input power [1]	@ 0/35 | 0/45 0/55	kW	2.55 | 3.07 3.71	3.19 | 3.83 4.54
COP [1]	@ 0/35 | 0/45 0/55	-	4.60 | 3.66 2.96	4.54 | 3.64 2.95
Output from compressor [1]	@ 5/35 | 5/45 5/55	kW	13.53 | 12.95 12.57	16.48 | 15.98 15.28
COP [1]	@ 5/35 | 5/45 5/55	-	5.11 | 4.11 3.35	5.13 | 4.11 3.28
Max. operating current Compressor		A	25.0	27.1
Sound effect according to EN12102		dB(A)	50.3	53.0

[1] EN14511:2007, inclusive:
Heating medium pump (EP406/408 - Stratos Tec 25/6 and EP410/412 - Stratos Tec 25/7)
Brine system pump (EP406/410 - Wilo Stratos Para 25/8 and EP412 - Wilo Stratos Para 25/12)

Heating system		EcoPart 412	EcoPart 414
Max temperature heating medium (TS)	°C	110	
Heating medium system min flow [2]	l/s	0.28	0.34
Heating medium system nominal flow [3]	l/s	0.56	0.68

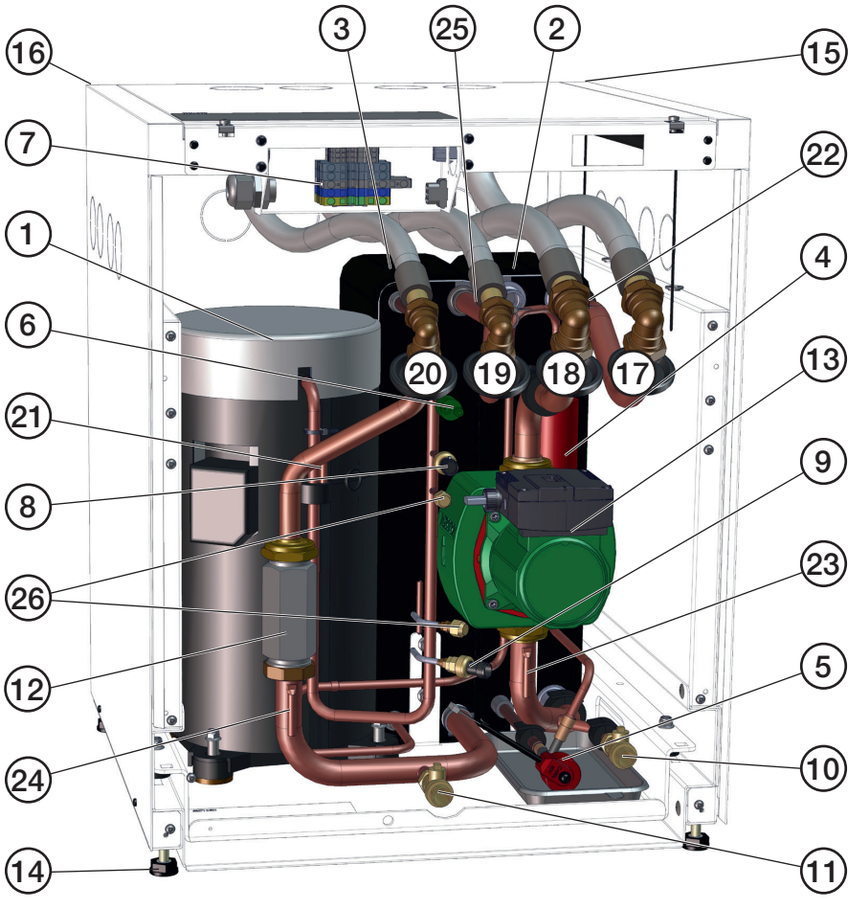
[2] At Δt = 10 K and 0/35 °C heat pump operation.
[3] At Δt = 5 K and 0/35 °C heat pump operation.

Brine system		EcoPart 412	EcoPart 414
Water volume (V)	l	3.4	4.07
Brine system min./max. temp. (TS)	°C	-5/20	
Brine system min./max. pressure (PS)	bar	0.2/3.0	
Brine system min. flow, Δt = 5 K	l/s	0.44	0.53
Brine system nominal flow, Δt = 3 K	l/s	0.73	0.88
Brine system pump		Class A circulation pump (LEP)	
Pump capacity		See diagram in the Pipe installation chapter	

Other data		EcoPart 412	EcoPart 414
Refrigerant quantity (R407C, fluorinated greenhouse gases GWP 1774)	kg	2.3	2.7
CO_2 equivalent	ton	4.080	4.790
Compressor oil		Polyolester (POE)	
Interrupt value switch HP	MPa	3.1 (31 bar)	
Weight	kg	164	164
Width x Height x Depth	mm	600 x 760 x 672	

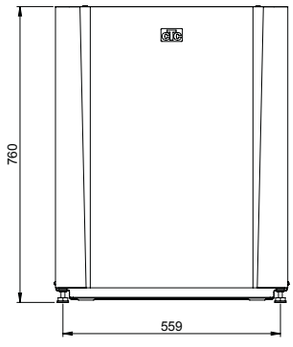
No annual leakage control of the refrigerant is required

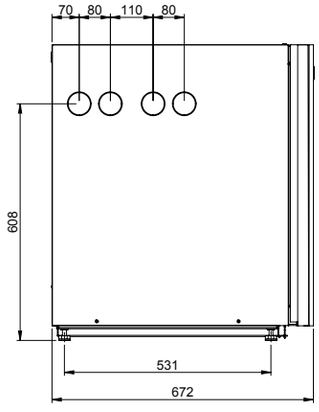
2.3 Component location

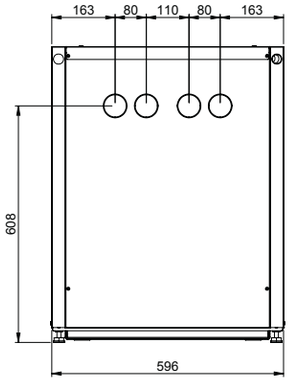


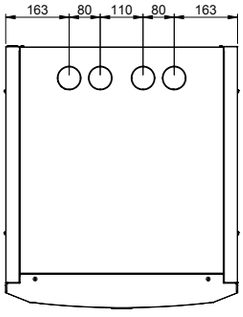
1. Compressor
2. Evaporator
3. Condenser
4. Drying filter
5. Expansion valve
6. High pressure switch
7. Terminal board
8. High pressure sensor
9. Low pressure sensor
10. Drain valve cold side/Brine
11. Drain valve warm side/Water
12. Adapter for pump installation
13. Circulation pump cold side
14. Adjustable feet
15. Conduit for communication cable
16. Conduit for mains cable
17. Brine in Ø28 mm (from rock)
18. Brine out Ø28 mm (to rock)
19. Heat medium out Ø22 (EcoHeat 406-412)
    Heat medium out Ø28 (EcoHeat 414-417)
20. Heat medium in Ø22 (EcoHeat 406-412)
    Heat medium in Ø28 (EcoHeat 414-417)
21. Hot gas sensor
22. Brine sensor in
23. Brine sensor out
24. Condenser sensor in
25. Condenser sensor out
26. Service socket

2.4 Dimensional drawing

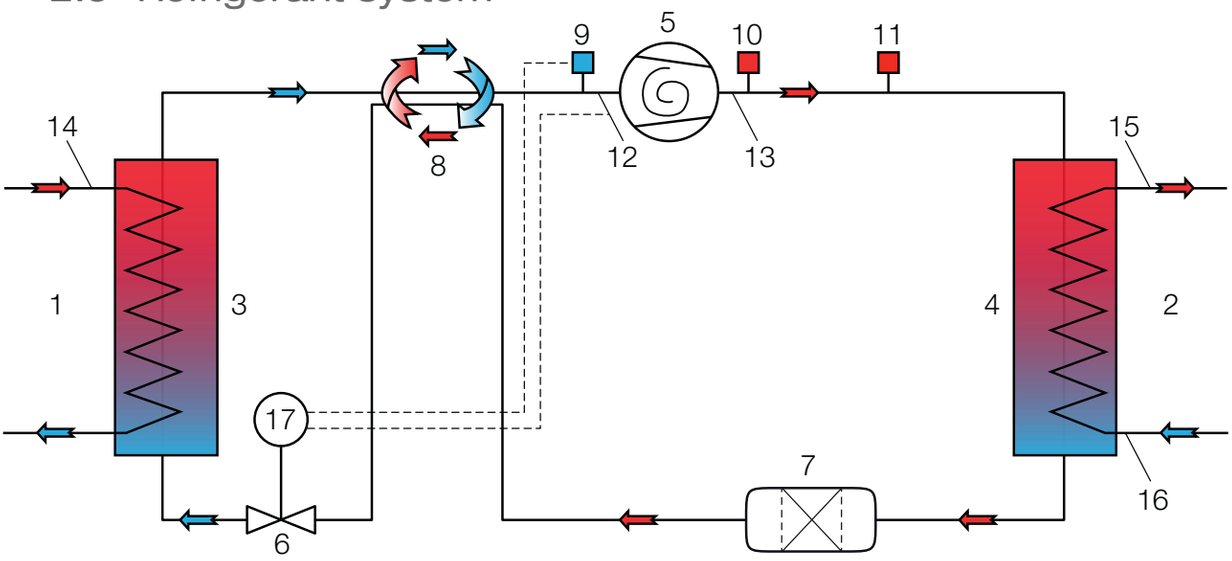








2.5 Refrigerant system



1. Brine (heat source)
2. Water
3. Evaporator
4. Condenser
5. Compressor
6. Expansion valve (electronic)
7. Drying filter
8. Refrigerant exchanger
9. Low pressure sensor
10. High pressure sensor
11. High pressure switch
12. T suction gas
13. T discharge
14. T brine
15. T water out
16. T water in
17. Control expansion valve

2.6 Operating range

CTC EcoPart's pressure-controlled operations monitoring means that the brine temperature (B) and heat medium temperature (H) can automatically be increased where this is possible.

Operating condition:	B temp/H temp °C
1	-5 / 25
2	20 / 25
3	-5 / 61
4	20 / 64

Operating limits as per the table above are defined in accordance with EN 14511-4.

3. Installation

This chapter is aimed at anyone responsible for one or more of the installations required to ensure that the product works the way the property owner wants.

Take your time going through functions and settings with the property owner and answer any questions. Both you and the heat pump benefit from a user who has completely understood how the system operates and should be maintained.

The installation must be carried out in accordance with current standards and regulations, see BS EN6700 and building regulations. The product must be connected to an expansion vessel in an open or closed system in accordance with vented and unvented regulations (G3 or G4 in 2011 amendments). **Do not forget to flush the radiator system clean before connection.** Apply all the installation settings based on the description in the chapter on First start.

The heat pump operates with a primary flow/return temperature across the condenser of up to 65/58 °C.

! The product must be transported and stored in a standing position.

Transportation

Transport the unit to the installation site before removing the packaging. Handle the product in the following manner:

- Forklift
- Lifting band around the pallet. **Note!** Can only be used with the packaging on.

Unpacking

Unpack the heat pump when it is placed next to its installation site. Check that the product has not been damaged in transit. Report any transport damage to the supplier. Also check that the delivery is complete according to the list below.

Standard delivery

- CTC EcoPart 400 heat pump
- Safety valve 1/2" 3 bar
- Filler manifold 520-G25
- Brine vessel
- Rubber grommet D=60
- 2 x Edge mouldings 186 mm
- Communications cable 5 m
- Connector straight 28 x G32 *****

***** CTC EcoPart 414-417 only

3.1 Connection of the heat medium side

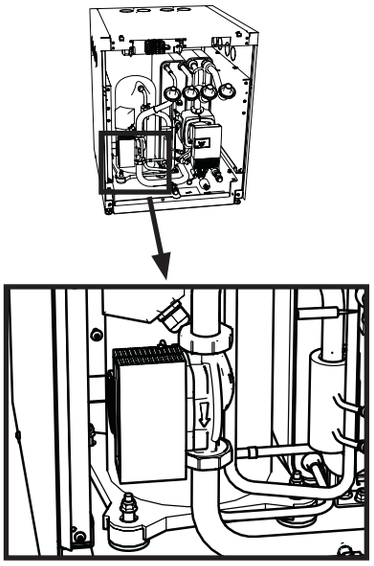
Primary and return lines of at least Ø22 mm copper pipe are to be connected to the heat pump for CTC EcoPart 406-412, for CTC EcoPart 414-417, at least Ø28 mm must be used. Route the pipes so that no other highest point is present where air can collect and obstruct circulation. If however this cannot be done, provide this highest point with an automatic bleeder.

3.1.1 Charge pump

The choice of charge pump depends on the type of system. To ensure proper operation the flow in the heat medium circuit should not be less than the value in the table under Technical data. Ensure that the circulation pump is large enough, so that there is sufficient flow through the heat pump. If the flow is too low, there is a risk the high pressure switch will trigger.

The charge pump can either be connected to the CTC EcoPart 400 (provided it is installed internally) or connected to the product which is used to control it. For internal installation one of the following is normally selected:

CTC EcoPart 406 - 408	Yonos Para PWM 7,0	Item no 586396 303
CTC EcoPart 410 - 412	Yonos Para PWM 7,5	Item no 586396 302
CTC EcoPart 414 - 417	UPM GEO 25-85	Item no 586396 301



3.1.2 Control/power supply

CTC EcoLogic Pro

Up to 10 heat pumps can be connected to a CTC EcoLogic Pro. In such a case, the charge pumps in heat pumps 1 and 2 can be connected to the CTC EcoLogic Pro. A charge pump for heat pumps 3-10 must be installed and connected to the CTC EcoPart 400.

CTC EcoLogic v3

The charge pump (not speed-controlled) must be connected to the CTC EcoLogic v3.

CTC EcoZenith v3

Use a 0-10 V pump from CTC or a non speed-controlled pump connected to the CTC EcoZenith.

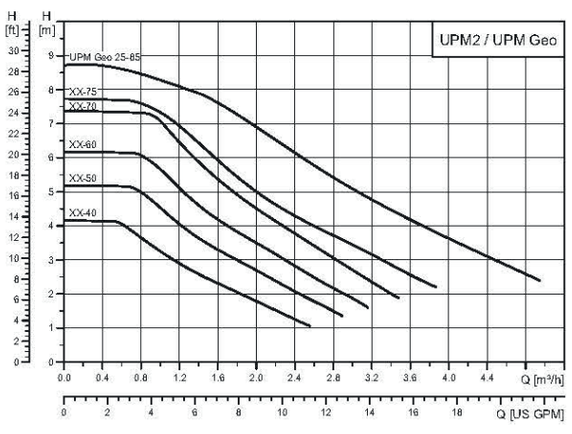
CTC EcoEl v3

The charge pump (not speed-controlled) must be connected to the CTC EcoEl v3.

3.1.3 Pump curve

Grundfos UPM GEO 25-85

(CTC EcoPart 414-417 2xLEP only)



3.2 Connecting the brine system

The brine system, i.e. the ground collector loop, must be assembled and connected by a qualified tradesman in accordance with current regulations and design guidelines.

Extreme care must be taken to ensure that no dirt gets on the collector hoses, which must be washed clean before being connected. The protective caps must remain in place at all times while work is in progress.

The temperature in the brine system can go below 0 °C. This is why it is important not to use any water-based lubricant etc. during installation. It is also important that all the components are insulated against condensation to prevent the build-up of ice.

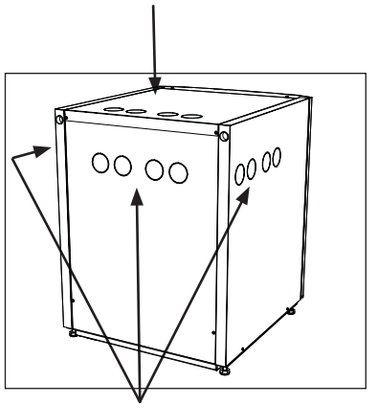
> **!** We recommend that you follow the installation instructions from the local Heat Pump Association.

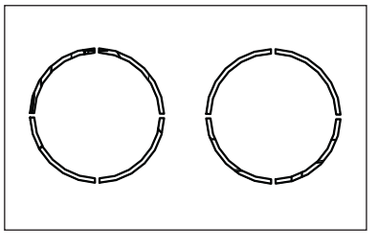
Connections

The brine system may be connected to the right, left or top of the heat pump, as well as to its rear. Cut away the cover plate on the side where the brine system is to be connected. The insulation on the inside of the cover plate has been grooved to enable an opening to be cut for the brine hoses provided. When the opening has been made through both the insulation and cover plate, carry out the installation as follows:

1. In order to protect the hoses, fasten the protective edging provided around the edge of the opening in the insulation plate. Adjust the length of the protective edging to suit the opening as required.
2. Pass the hoses through the opening in the side cover plates and connect them. Ensure that the insulation covers all parts of the brine connection to prevent ice and condensation forming.
3. Then install the collector system according to the schematic diagram below.

You can also connect the primary flow on one side and the return on the other. See the chapter on Measurement details for measurements and dimensions. The pipe between the heat pump and brine loop should be not less than Ø28 mm in dimension.

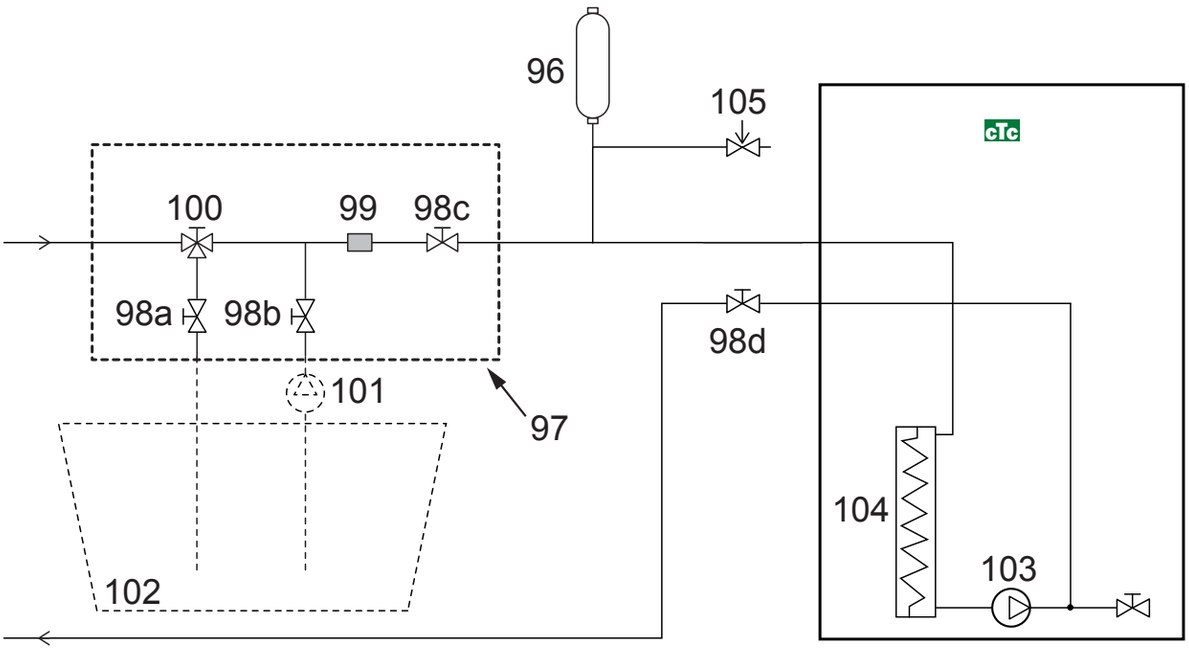




Schematic diagram

The filling equipment is represented by the parts displayed with dashes. Note! Collector hoses must have a bleeding facility as air pockets can occur. Always check the filter (99) when filling and bleeding the brine system.

! The mixing vessel and pump must be of a good size.



96	Level/expansion vessel	101	External filling pump
97	CTC filling kit	102	Mixing vessel
98	Shut-off valve	103	Brine pump
99	Filter	104	Evaporator
100	3-way valve	105	Safety valve 3 bar

Valves

To facilitate servicing of the cooling unit, shut-off valves must be fitted to both the incoming and outgoing connections. Fit bifurcated valves so that you can fill and bleed the collector circuit later on.

Bleeding

The collector circuit must not contain any air. Even the smallest amount of air can jeopardise the heat pump's operation. See the section Refilling and venting below.

Insulation against condensation

All pipes in the brine system must be insulated against condensation to prevent the possibility of severe build-up of ice and condensation.

Refilling and venting

Mix water and antifreeze solution in an open vessel. Connect hoses to the shut-off valves (98a and 98b) as shown in the figure. Note! The hoses must have a minimum diameter of 3/4”. Connect a powerful external pump (101) for refilling and bleeding. Then reset the three-way valve (100) and open the valves (98a and 98b) so that the brine passes through the mixing container (102). Also make sure that the valve (98d) is open.

For start up of the brine pump, see the relevant manual for the CTC EcoPart 400’s controller.

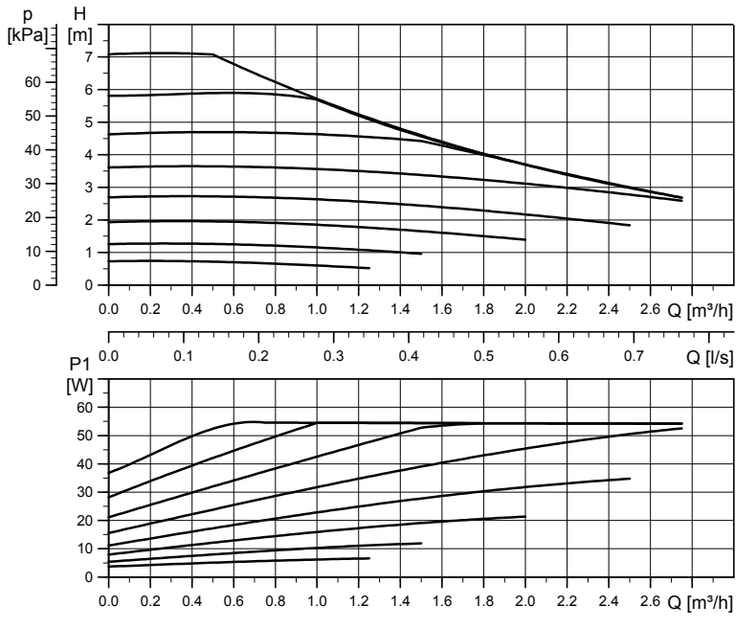
Allow the brine to circulate in the system for a long period of time until it is completely free of air. There can still be air in the system, even though no air accompanies the liquid out. Reset the three-way valve (100) so that any remaining air can come out.
Bleed the level vessel (96) by loosening the plug on top of the level tank.
Now close the valve (98a) while the filling pump continues to run. The filling pump (101) now pressurises the system. Also close the valve (98b) and shut off the filling pump.
If the level in the level vessel is too low, close the valves (98c and 98d). Unscrew the plug and fill the vessel to around 2/3 full. Screw the plug back in and open the valves (98c and 98d).

3.3 Brine pump

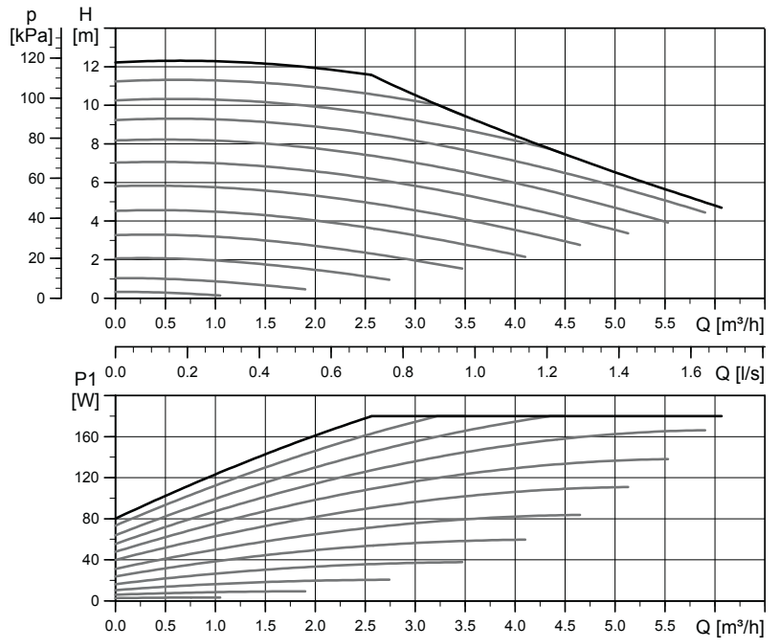
The circulation pumps in CTCs products are of the energy efficiency class A.

- CTC EcoHeat/EcoPart 406-408 has pump UPM2K 25-70 180.
- CTC EcoHeat/EcoPart 410-417 & CTC GSi 12 has pump UPMXL GEO 25-125 180.

UPM2K 25-70 180, 1 x 230 V, 50/60 Hz



UPMXL GEO 25-125 180 PWM, 1 x 230 V, 50/60 Hz



Post-installation check on brine system

After a few days, you must check the fluid level in the vessel. Fill if necessary and close the valves (98c and 98d) when filling.

Level/expansion vessel

The level vessel should be fitted to the incoming line from the borehole or ground loop, at the system's highest point. Bear in mind that the tank can produce condensate on its exterior. Fit the safety valve (105) as shown in the schematic diagram and fit a suitable plug to the top of the vessel.

If the vessel cannot be fitted at the highest point, a closed expansion vessel must be fitted.

Filling kit with dirt filter

Arrows on the valve housing indicate the flow direction. Close valves (98c and 100) when cleaning the filter. Unscrew the filter cap and flush the filter clean. When refitting, the pin under the filter holder should be fed into the designated hole in the filter housing. Top up with a little brine, if necessary, before fitting the cap.
The filter should be checked and cleaned after a short period of operation.

! Check the dirt filter after bleeding has been completed.

Brine

The brine circulates in a closed system. The fluid consists of water and antifreeze solution. Sentinel R500 & R500C are recommended for use in the brine circuit on all CTC EcoHeat/Part heat pumps. The glycol is mixed at a concentration of slightly less than 30%, which is equivalent to fire risk class 2b and a freezing point of around –15 °C.

! The fluid must be thoroughly mixed before the heat pump is started.

It is a CTC recommendation that around 1 litre of brine/glycol is required per metre of collector hose, i.e. around 0.3 litres of antifreeze solution will be needed per metre of hose, for a hose diameter of 40 mm.

Air pockets

To avoid air pockets, make sure that the collector hoses constantly rise towards the heat pump. If this is not possible, it must be possible to bleed the system at the high points. The filling pump usually manages smaller local height discrepancies.

Checking brine difference

When the heat pump is running, regularly check that the temperature difference between incoming and outgoing brine temperatures is not too large. If there is a large difference, one of the causes may be due to air in the system or a blocked filter. If this is the case, the heat pump triggers the alarm.

The alarm factory setting is 7 °C, but 9 °C is permitted for the first 72 hours while the compressor is running, as microbubbles in the system can reduce brine flow.

4. Electrical installation

The installation and heat pump connection must be done by an authorised electrician. All wiring must be installed according to valid requirements.

4.1 Electrical installation 400 V 3N~

The CTC EcoPart 400 must be connected to 400 V 3N~ 50 Hz and protective earth.

When connecting to a CTC EcoZenith i250, the power rating of the electric boiler must also be allowed for, as the CTC EcoPart 400 is supplied with power via the CTC EcoZenith i250.

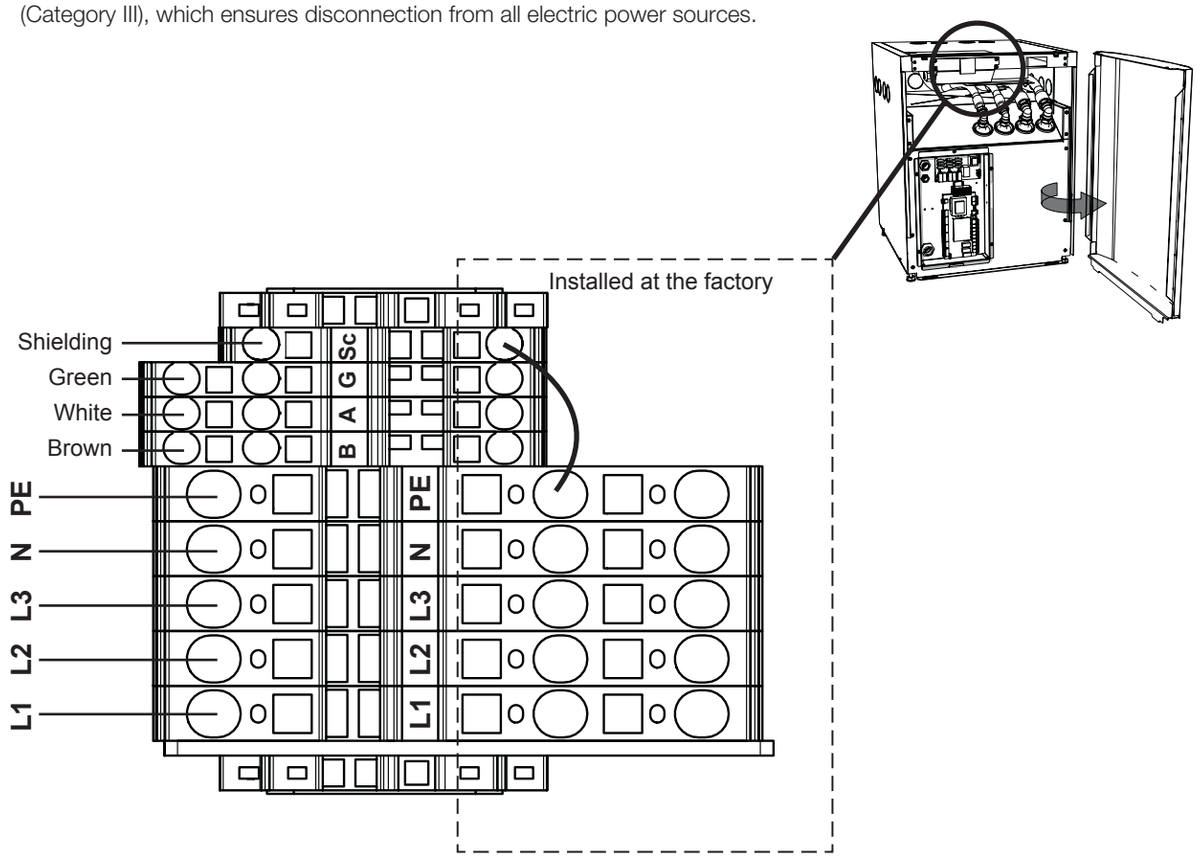
The 2 m long power supply cable is pre-connected to the product.

The size of the group fuse is specified in the technical data.

The connection to the CTC EcoPart 400 is made using a 5-conductor cable which provides the heat pump with electric power for the compressor (400 V 3N~) and brine pump (230 V 1N~).

Safety switch

The installation should be preceded by a omnipolar safety switch (Category III), which ensures disconnection from all electric power sources.



4.2 Electrical installation 230 V 1N~

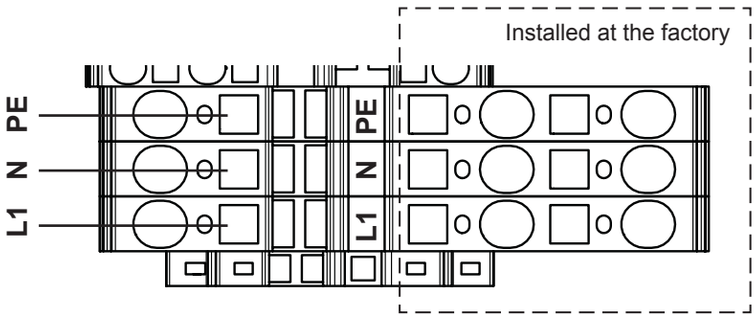
The CTC EcoPart 400 must be connected to 230 V 1N~ 50 Hz and protective earth.

When connecting to a CTC EcoZenith i250, the power rating of the electric boiler must be allowed for, as the CTC EcoPart 400 is supplied with power via the CTC EcoZenith i250; a cable.

The connection to the CTC EcoPart 400 is made using a 3-conductor cable which provides the heat pump with electric power for the compressor (230 V 1N~) and brine pump (230 V 1N~).

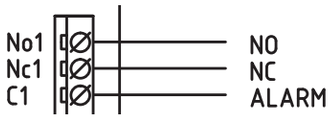
Safety switch

The installation should be preceded by a dual pole isolating safety switch which ensures disconnection from all electric power sources.



4.3 Alarm output

The EcoPart is provided with a potential-free alarm output which is activated if any alarm is active in the heat pump. This output may be connected to a maximum load of 1 A 250 V AC. An external fuse should also be used. Cable approved for 230 V AC must be used for connecting this output, irrespective of the load that is connected. For connection information, see the wiring diagram.



Detailed illustration from wiring diagram

4.4 Groundwater heating

Groundwater, too, can be used as a heat source for CTC's heat pumps. The groundwater is pumped up to an intermediate heat exchanger that transfers the energy to the brine liquid. It is important that an intermediate heat exchanger is installed in the system. The intermediate heat exchanger prevents the product evaporator from becoming damaged due to deposits from groundwater particles and minerals, which could otherwise involve expensive work on the product's refrigerant system. Water requirements analysis should always be undertaken for intermediary heat exchangers. Local regulations and permit requirements must be taken into account. The return water is discharged elsewhere, to a drilled return flow well or similar.

The brine pump and groundwater pump must be connected to run simultaneously in order to avoid risk of freezing. For connection information, see the wiring diagram.

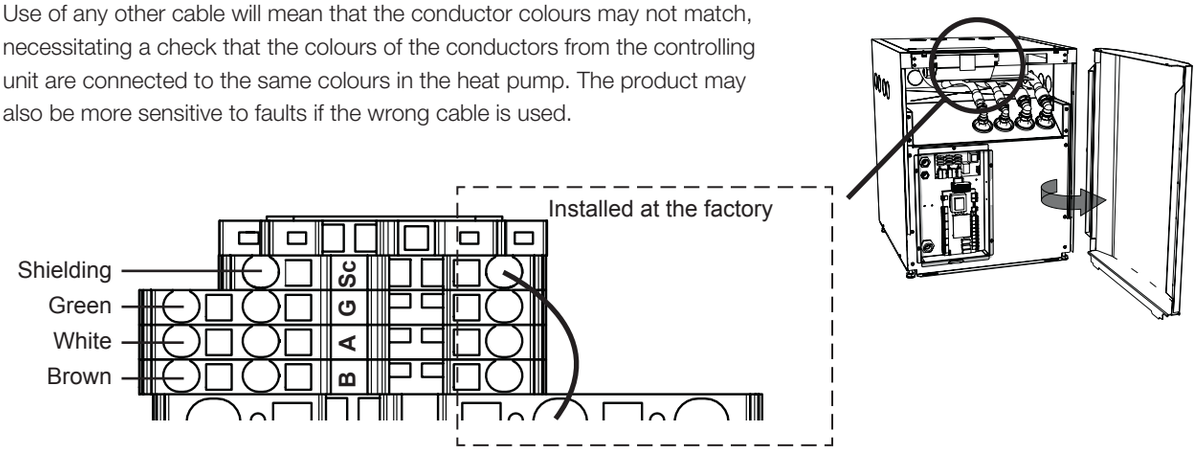
Also pay attention to the intermediary heat exchanger supplier's instructions.

5. Communication connections

When connecting the CTC EcoPart 400 to products with different control systems, accessories are sometimes needed to control the products. The various alternatives available are described in this section.

The communication cable used is an LiYCY (TP) which is 4-conductor shielded cable, where the communication-bearing conductors are of twisted pair type.

Use of any other cable will mean that the conductor colours may not match, necessitating a check that the colours of the conductors from the controlling unit are connected to the same colours in the heat pump. The product may also be more sensitive to faults if the wrong cable is used.

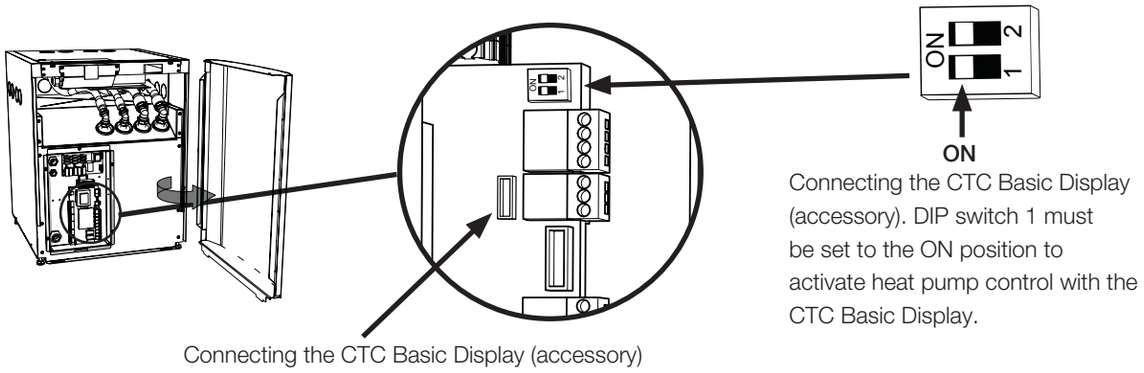


5.1 CTC Basic Display (accessory)

Given that the CTC EcoPart 400 does not have its own controller, the CTC Basic Display accessory is required.

- When connecting more than one heat pump to a CTC EcoLogic Pro or CTC EcoZenith i550 Pro, the CTC Basic Display accessory must be used to address the various heat pumps A1, A2, A3, etc.

For connection, see the manual for the CTC Basic Display.

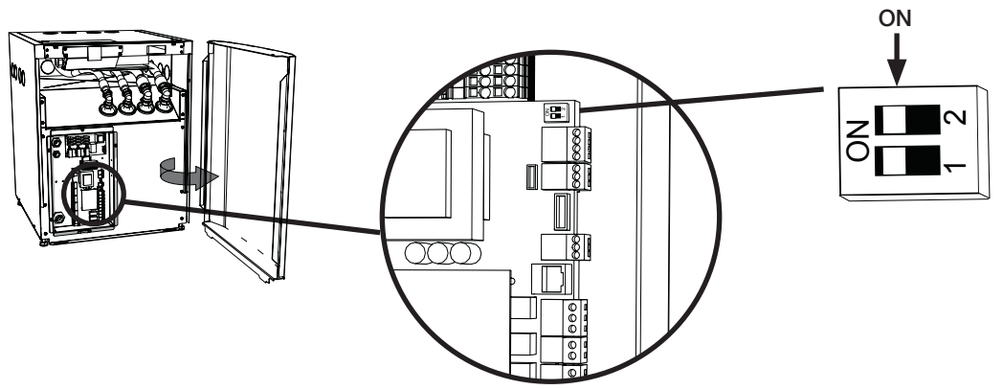


Connecting the CTC Basic Display (accessory)

Connecting the CTC Basic Display (accessory). DIP switch 1 must be set to the ON position to activate heat pump control with the CTC Basic Display.

5.2 Option 1 – Connection of one heat pump

When connecting a CTC EcoPart 400 to a CTC EcoZenith i250, CTC EcoZenith i550 Pro or CTC EcoLogic Pro/Family, the communication cable (LiYCY (TP)) is connected directly to each product. When installing only one heat pump, make sure that DIP switch 2 is in the ON position.



5.3 Option 2 – Series connection of heat pumps

When connecting more than one heat pump to a CTC EcoLogic Pro or CTC EcoZenith 550 Pro, the CTC Basic Display accessory must be used to address the various heat pumps A1, A2, A3, etc. All CTC EcoPart 400 units are factory-set addressed to A1. For connection, see the manual for the CTC Basic Display.

When connected in series, the shielding of the communication cable on the last heat pump must be connected to earth and the heat pump itself must be terminated. This is done by making sure DIP switch 2 is in the ON position on the heat pump that is to be terminated.

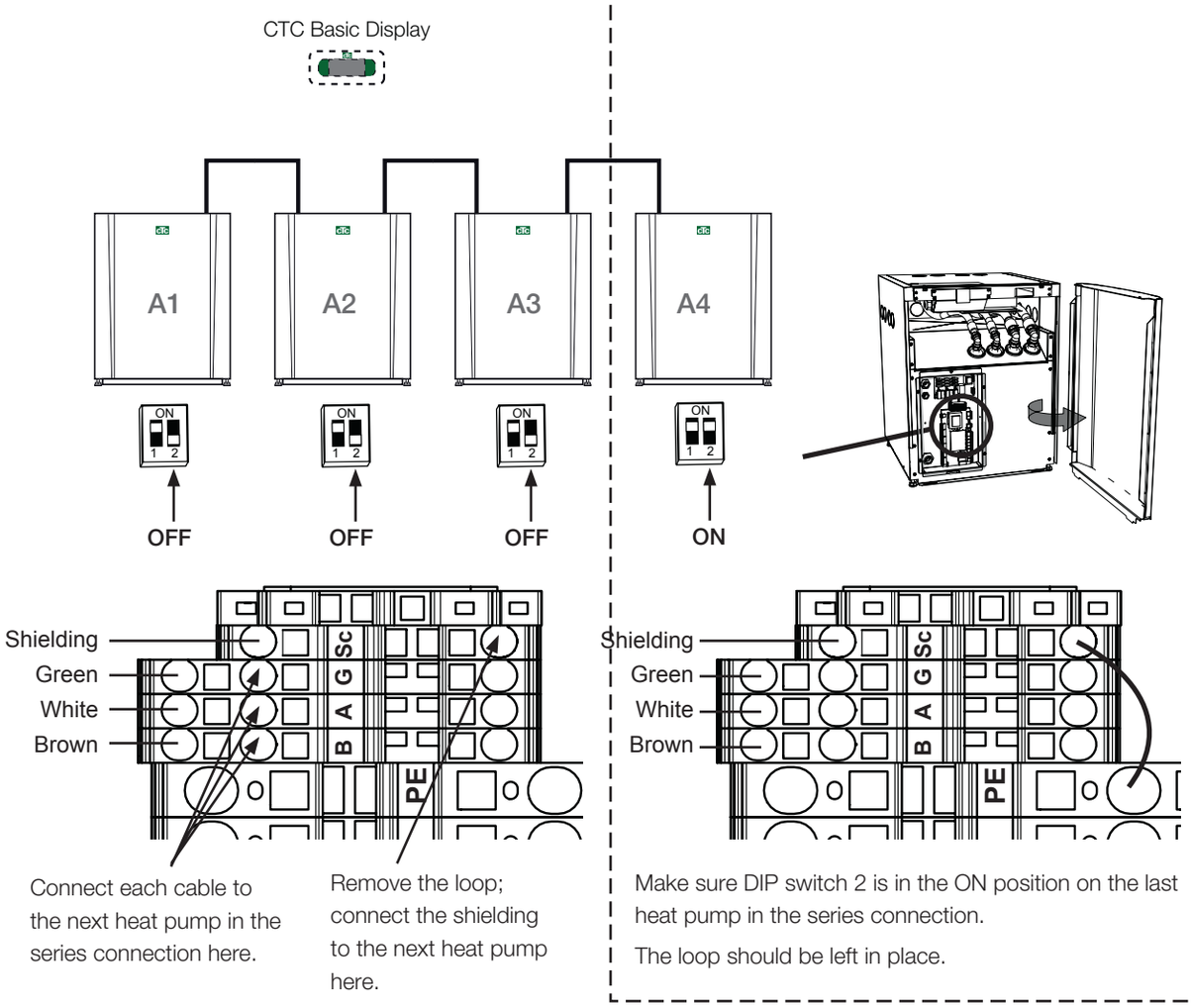
The loop which connects position Sc of the control terminal block and PE on the mains terminal block must be removed on all heat pumps in the series connection except the last and replaced by the shielding, which is then connected up to the next heat pump (control terminal block position Sc).

CTC Basic Display (accessory)

! When connected in series, the last heat pump must be set to terminated position.

Heat pumps connected in series

The last heat pump in the series connection



Connect each cable to the next heat pump in the series connection here.

Remove the loop; connect the shielding to the next heat pump here.

Make sure DIP switch 2 is in the ON position on the last heat pump in the series connection.

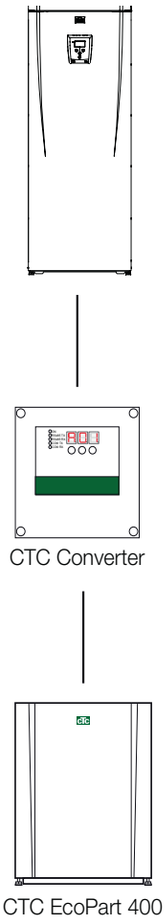
The loop should be left in place.

5.4 Option 4 – CTC EcoEl v3

When connecting products with different control systems (version 3 (v3) and version 4 (v4)), the CTC Converter accessory will be needed to interpret the signals between the two products. For connection, see the manual for the CTC Converter.

A CTC EcoEl may only be connected to a CTC EcoPart 406-412.

! Version 3 (v3) relates to models manufactured from 2006 onwards.



CTC Converter

CTC EcoPart 400

5.5 Option 5 – CTC EcoZenith i550 v3

When connecting products with different control systems (version 3 (v3) and version 4 (v4)), the CTC Converter accessory will be needed to interpret the signals between the two products. For connection, see the manual for the CTC Converter.

The CTC EcoZenith v3 is available in two different variants. An earlier variant with only one communication port, and a later one with three such ports.

The earlier one will have a serial number starting from:

Serial no.	Item no.	Model
7250-1222-0138	583700001	CTC EcoZenith I 550 3x400V
7250-1222-0168	584892001	CTC EcoZenith I 550 3x230V
7250-1222-0171	584890001	CTC EcoZenith I 550 BBR
7250-1222-0171	584893001	CTC EcoZenith I 550 1x230V

The later one will have a serial number starting from:

Serial no.	Item no.	Model
7250-1222-0139	583700001	CTC EcoZenith I 550 3x400V
7250-1222-0169	584892001	CTC EcoZenith I 550 3x230V
7250-1222-0172	584890001	CTC EcoZenith I 550 BBR
7250-1222-0172	584893001	CTC EcoZenith I 550 1x230V

! Version 3 (v3) relates to models manufactured from 2006 onwards.

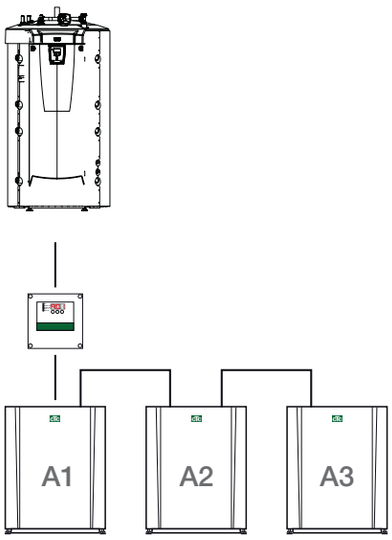
! If new (version 4) and old (version 3) heat pumps are combined in an installation, the new ones must be addressed using the lowest numbers of A1, A2.

! When connected in series, the last heat pump must be set to terminated position.

Early model with one input

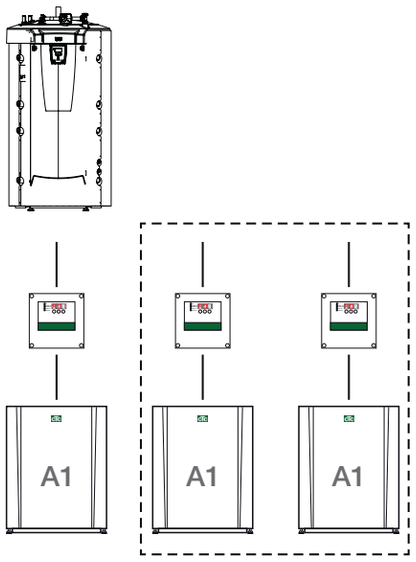
Connect the CTC EcoPart 400 through the CTC Converter accessory. The CTC EcoPart 400 can then be connected in series to up to three CTC EcoPart 400 units.

The connected heat pumps must then be addressed using the CTC Basic Display accessory.



Later model with three inputs

Connect the CTC EcoPart 400 through the CTC Converter accessory. Connect the heat pumps to separate inputs. These do not need to be addressed since they are all factory-set addressed to A1.

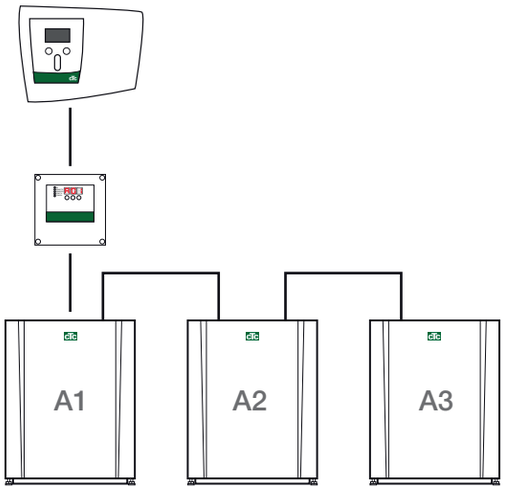


5.6 Option 6 – CTC EcoLogic v3

When connecting products with different control systems (version 3 (v3) and version 4 (v4)), the CTC Converter accessory will be needed to interpret the signals between the two products.

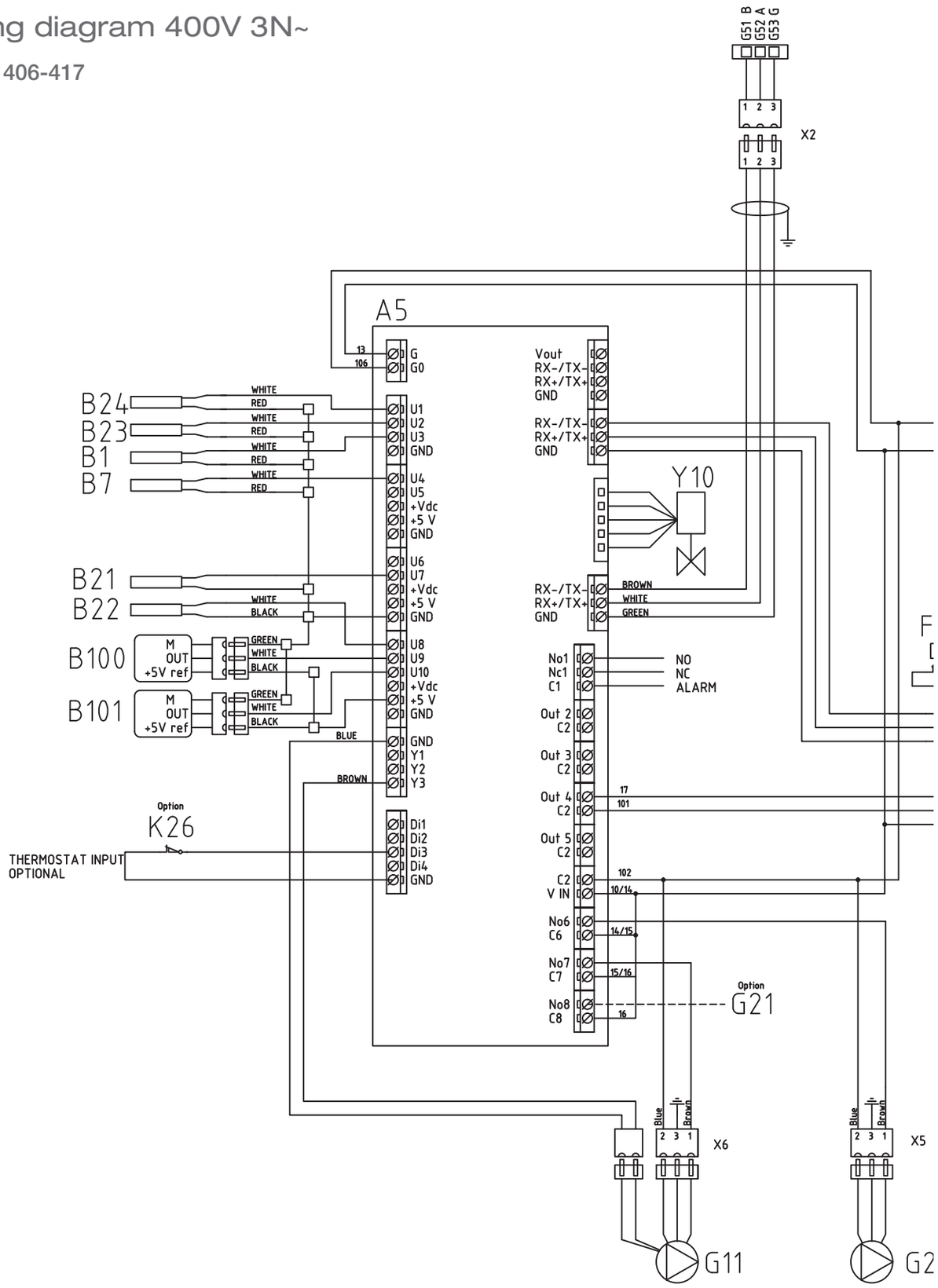
The CTC EcoPart 400 can then be connected in series to up to three CTC EcoPart 400 units. The connected heat pumps must then be addressed using the CTC Basic Display accessory. For connection, see the manual for the CTC Converter.

! Version 3 (V3) relates to models manufactured from 2006 onwards.



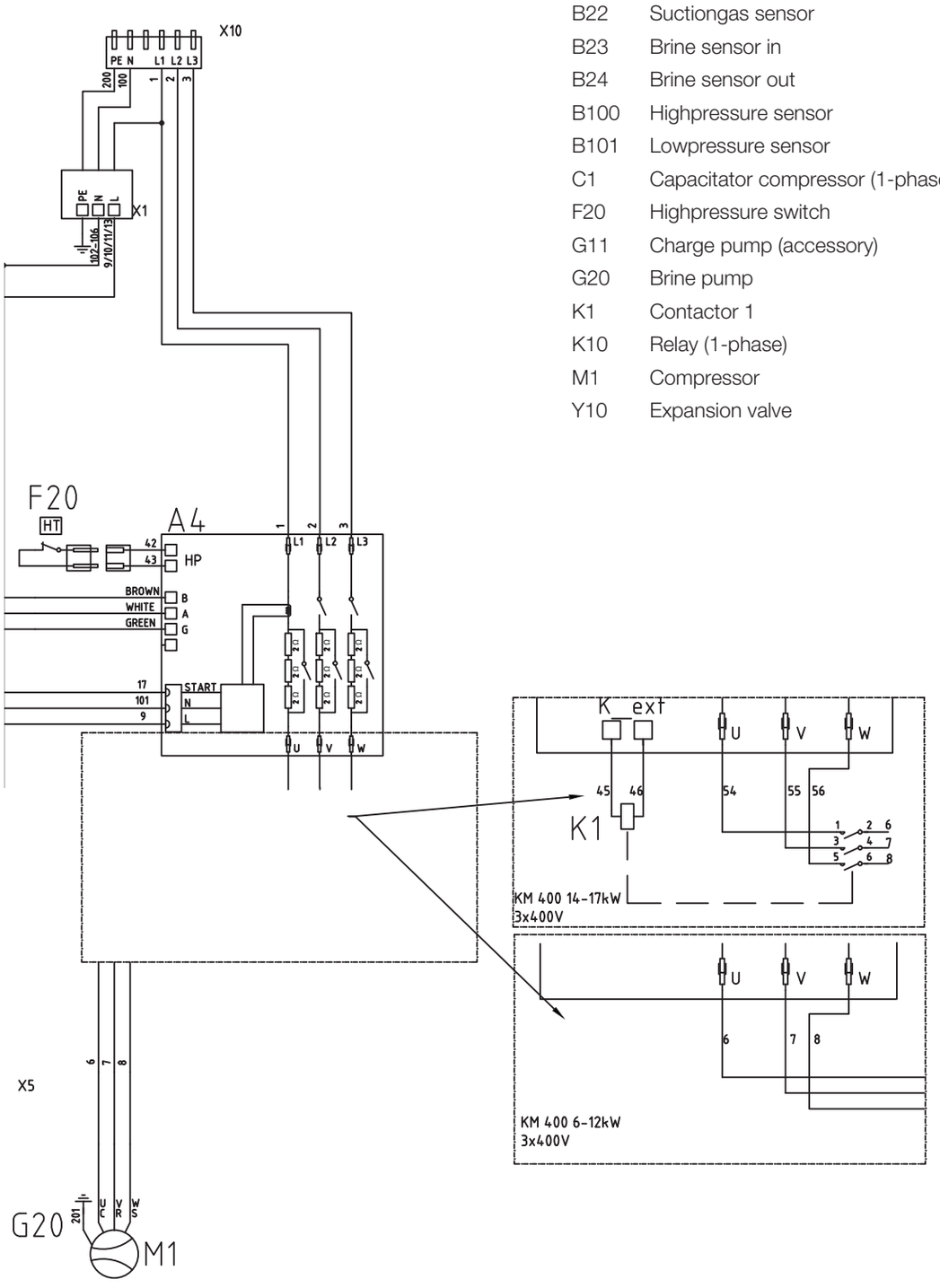
5.7 Wiring diagram 400V 3N~

CTC EcoPart 406-417

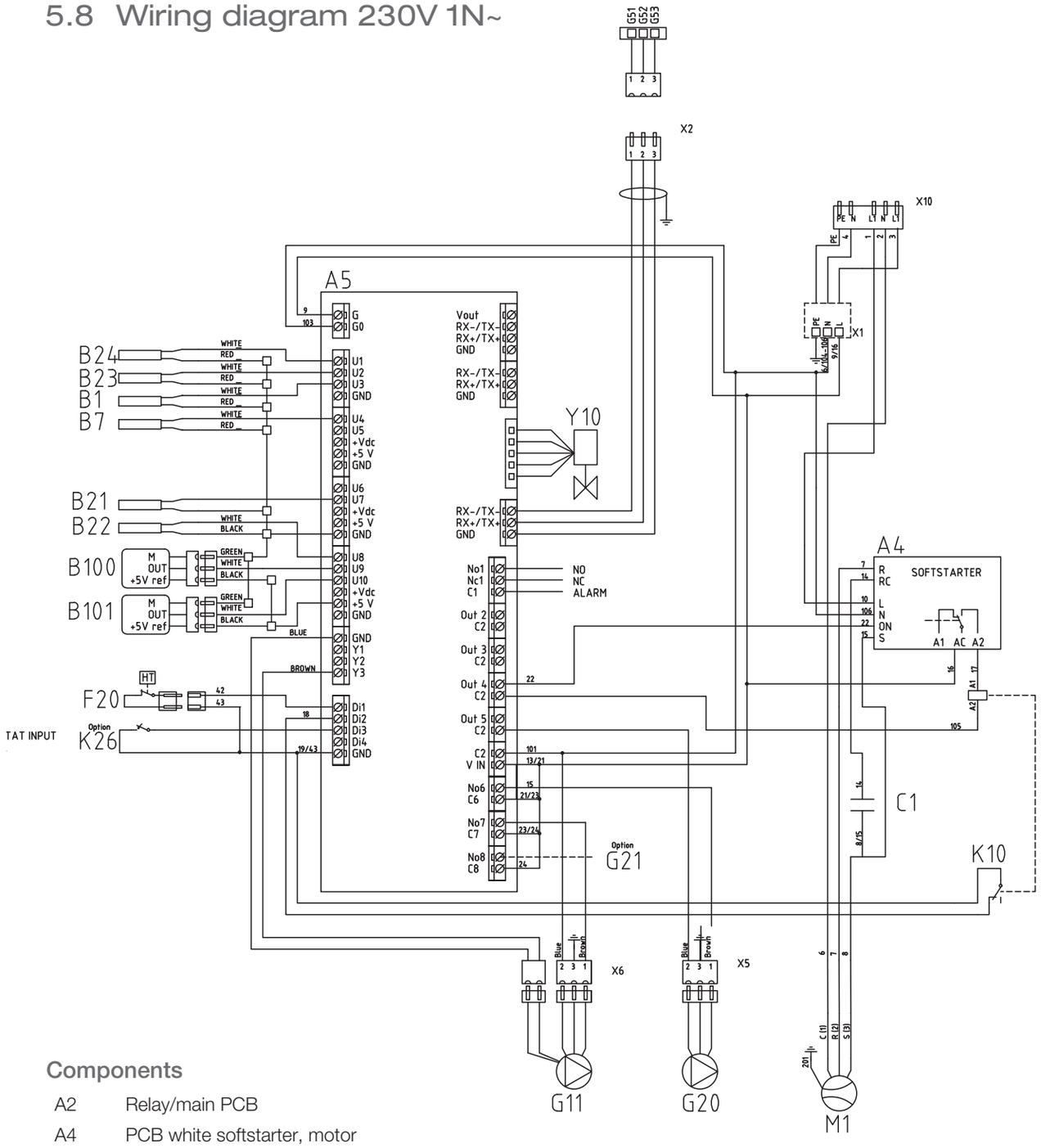


Components

A2	Relay/main PCB
A4	PCB white softstarter, motor protection and contactor function
B1	Primary flow sensor 1
B7	Return sensor
B21	Hotgas sensor
B22	Suctiongas sensor
B23	Brine sensor in
B24	Brine sensor out
B100	Highpressure sensor
B101	Lowpressure sensor
C1	Capacitator compressor (1-phase)
F20	Highpressure switch
G11	Charge pump (accessory)
G20	Brine pump
K1	Contactor 1
K10	Relay (1-phase)
M1	Compressor
Y10	Expansion valve



5.8 Wiring diagram 230V 1N~



Components

A2	Relay/main PCB		
A4	PCB white softstarter, motor protection and contactor function		
B1	Primary flow sensor 1	C1	Capacitator compressor (1-phase)
B7	Return sensor	F20	Highpressure switch
B21	Hotgas sensor	G11	Charge pump (accessory)
B22	Suctiongas sensor	G20	Brine pump
B23	Brine sensor in	K1	Contactor 1
B24	Brine sensor out	K10	Relay (1-phase)
B100	Highpressure sensor	M1	Compressor
B101	Lowpressure sensor	Y10	Expansion valve

6. First start

1. Check that the heating boiler and system are full of water and have been bled.
2. Check that all connections are tight.
3. Check that sensors and the radiator pump are connected to the power source.
4. Energise the heat pump by switching on the safety switch (the main switch).

Once the system has heated up, check that all connections are tight, the various systems have been bled, heat is coming out into the system and warm water is coming out at the tap locations.

7. Operation and Maintenance

When the installer has installed your new heat pump, you should check along with the installer that the system is in perfect operating condition. Let the installer show you where the power switches, controls and fuses are so that you know how the system works and how it should be maintained. Bleed the radiators (depending on type of system) after around three days of operation and top up with water if required.

7.1 Periodic maintenance

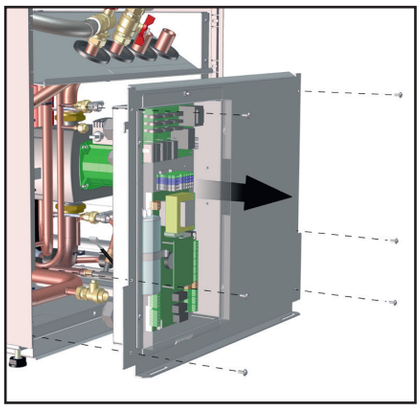
After three weeks' operation and then every three months during the first year. Then once a year:

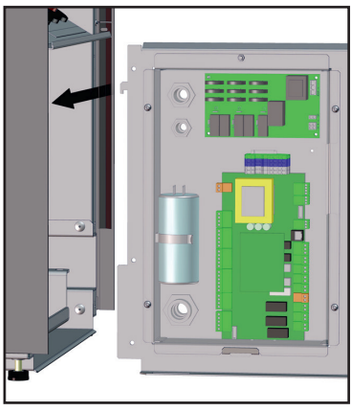
- Check that the installation is free of leaks.
- Check that the product and system are free of air; bleed if needed – see the section Connecting the brine system.
- Check that the brine system is still pressurised and that the fluid level in the brine vessel is adequate/correct.
- No annual leakage control of the refrigerant is required

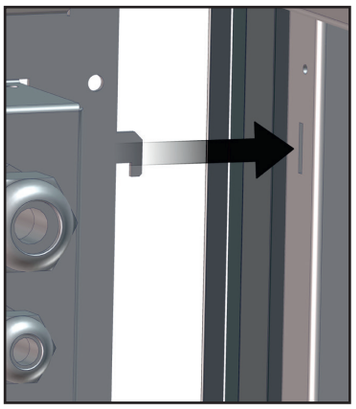
7.2 Operation stop

The heat pump is shut down using the operating switch. If there is a risk of the water freezing, drain out all the water from the CTC EcoPart 400.

7.3 Service mode







8. Fault Tracing/ Appropriate Measures

The CTC EcoPart 400 is designed to provide reliable operation and high levels of comfort, as well as have a long service life. Various tips are given below which may be helpful and guide you in the event of an operational malfunction.
If a fault occurs, you should always contact the installer who installed your unit. If the installer believes the malfunction is due to a materials or design fault, then they will contact Enertech AB to check and rectify the issue. Always provide the product's serial number.

8.1 Air Problems

If you hear a rasping sound from the heat pump, check that it is fully bled. Top up with water where required, so that the correct pressure is achieved. If this noise recurs, call a technician to check the cause.

8.2 Alarms

Any alarms and information texts from the CTC EcoPart 400 are displayed in the product which is used to control it; you should therefore consult the manual for that product.

Enertech AB
Box 313
S-341 26 LJUNGBY

CE

Försäkran om överensstämmelse
Déclaration de conformité
Declaration of conformity
Konformitätserklärung

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,

EcoPart 400

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) 2004/108/EC

Low Voltage Directive (LVD) 97/23/EC

Ecodesign Directive 2009/125/EC
(regulations (EU) 811/2013, 812/2013, 813/2013, 814/2013 where applicable)

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,

EMC

Emission: EN55014-1:2007 EN61000-3-2:2006 -A1:2009 -A2:2009 EN61000-3-3:2008

Immunity: EN55014-2:1997 -A1:2001 -A2:2008 EN61000-4-3 -4 -5 -6 -11*)

***) Maximum permissible system impedance :**
Zsys1 (dmax) = 0.349Ω

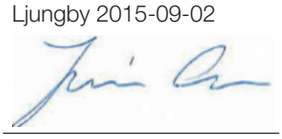
LVD

SS-EN 60 335-1

SS-EN 60 335-2-40

Detailed ecodesign information can be downloaded at: www.ctc.se/ecodesign

Ljungby 2015-09-02



Joachim Carlsson

Technical Manager

162 105 51-5 2016-07-07

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Enertech Group