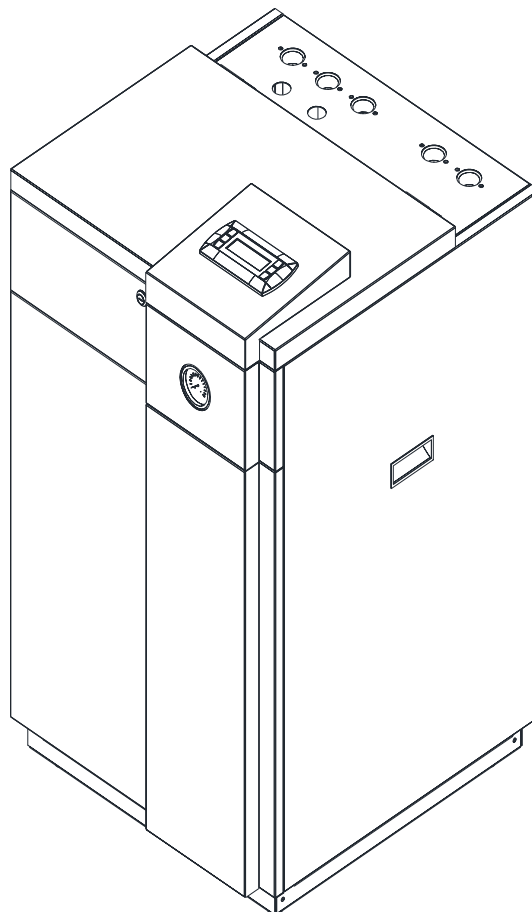


GEO THERMAL HEAT PUMP



----- Standard series : GS07 GS09 GS10 GS12 GS13 GS15 GS20 GS26 GS30
GS07B GS09B GS10B GS12B GS13B GS15B GS20B GS26B GS30B

Installation ,Operation &Maintenance Manual V.20150901

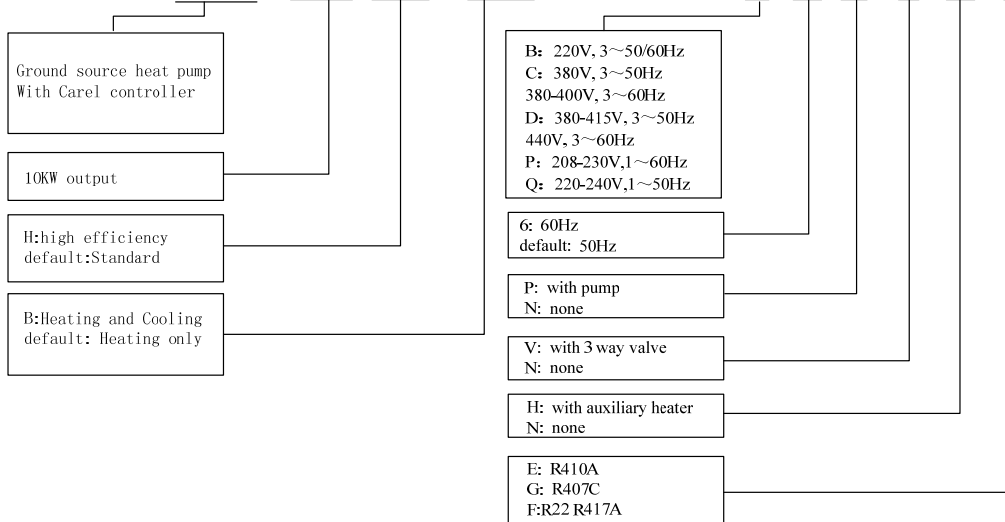
The Installation of this unit is to adhere to all Local
Building Codes and Standards

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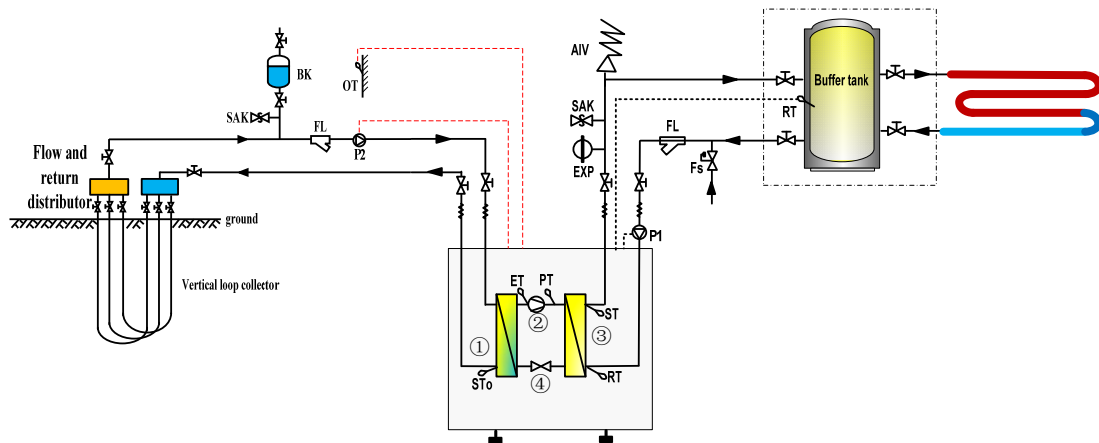
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Nomenclature

GS10H/B — D6PVHE



Working principle



1. The low pressure and low temperature liquid refrigerant coming out of expansion valve ④ extracts heat energy from the ground which is drawn by circulation water pump P2 in vertical ground loop and evaporates into gas state in plate type heat exchanger evaporator ① .
2. The gas state refrigerant is sucked into compressor ② and compressed to high pressure and high temp. gas .
3. The high pressure and high temp. gas discharged by compressor releases its heat energy to space heating or domestic hot water in plate exchanger condenser ③ and condensed to liquid state.
4. The liquid state refrigerant is expanded in thermostatic expansion valve ④ and become low pressure and low temperature liquid refrigerant.
5. The cycle repeats.

Specialist Tools

Specialist tools that might be used on installation, commissioning and maintenance.

The tools as exclusive tools for R410A refrigerant.

1 Gauge manifold ·Only for R410A

- Use the existing fitting specifications.(G1/4")
- Use high-tension side pressure of 5.3MPa·G or over.

2 Charge hose ·Only for R410A

- Use pressure performance of 5.09MPa·G or over.

3 Electronic scale

4 Gas leak detector ·Use the detector for R410A.

5.Vacuum pump (pump with reverse flow preventive function)

6 Refrigerant charge base

7 Refrigerant cylinder ·Only for R410A Top of cylinder (Pink)Cylinder with syphon

8 Refrigerant recovery equipment

9. Torque wrench

10. Multi-meter

11. screwdrivers

Pre-Installation

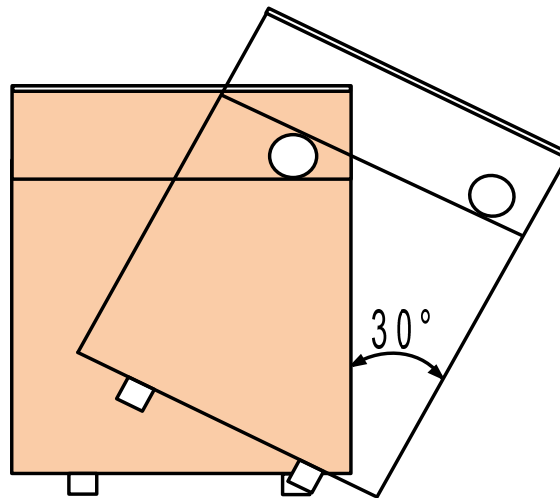
Pre-Installation

Important Site Instructions

- The installation, commissioning, inspection, maintenance and repairs must only be carried out by a qualified person.
- All electrical wiring must be completed by a licensed electrical contractor in accordance with the appropriate standards.
- The drilling work requires a permit from your local council.
- The heating system and heat source must be properly designed and dimensioned to ensure an efficient operation. It is particularly important to keep heat pump outlet water temperatures as low as possible.
- The minimum heating water flow rate through the heat pump must be assured in all operating states of the heating system.

Movement and storage

The unit must not be transported, moved or stored at greater than a 30° angle from the upright position. Install and store the unit in a dry area. They are not rated for outdoor use.



Safety

If a refrigerant leak occurs, remove the complete charge using a recovery unit and store the refrigerant in mobile container.

Note: care is to be taken as the refrigerant can breakdown due to high temperature, these refrigerants by-products are dangerous.

Once the leak has been repaired recharge the unit with the correct filling weight and the type found on the unit's nameplate.

Pre-Installation

Note: ensure the correct refrigerant gas is used to recharge the unit as an incorrect gas can cause damage beyond repair to the compressor.

Do not use oxygen to purge lines or to pressurize a unit for any purpose.

Oxygen gas reacts violently with oil, grease and other common substances. Use only refrigerant or dry nitrogen for testing.

Never exceed the specified maximum operating pressures.

Do not un-weld or flame cut the refrigerant lines including any refrigerant circuit components until the entire refrigerant (liquid and vapour) has been removed from unit. Traces of vapour should be displaced with dry nitrogen.

Refrigerant in contact with an open flame will produce toxic gases.

Ensure that the necessary safety protection equipment is available when servicing. Have the appropriate fire extinguishers for that system.

Do not siphon refrigerant.

Avoid spilling liquid refrigerant onto the skin or splashing it into the eyes. Use safety goggles. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, immediately and abundantly flush the eyes with water and consult medical advice.

Note: Never apply an open flame or live stream to a refrigerant container. This can dangerously overpressure and cause an explosion.

Compressor oil type : 3MA POE

The heating system must be pressure tested and air vented completely.

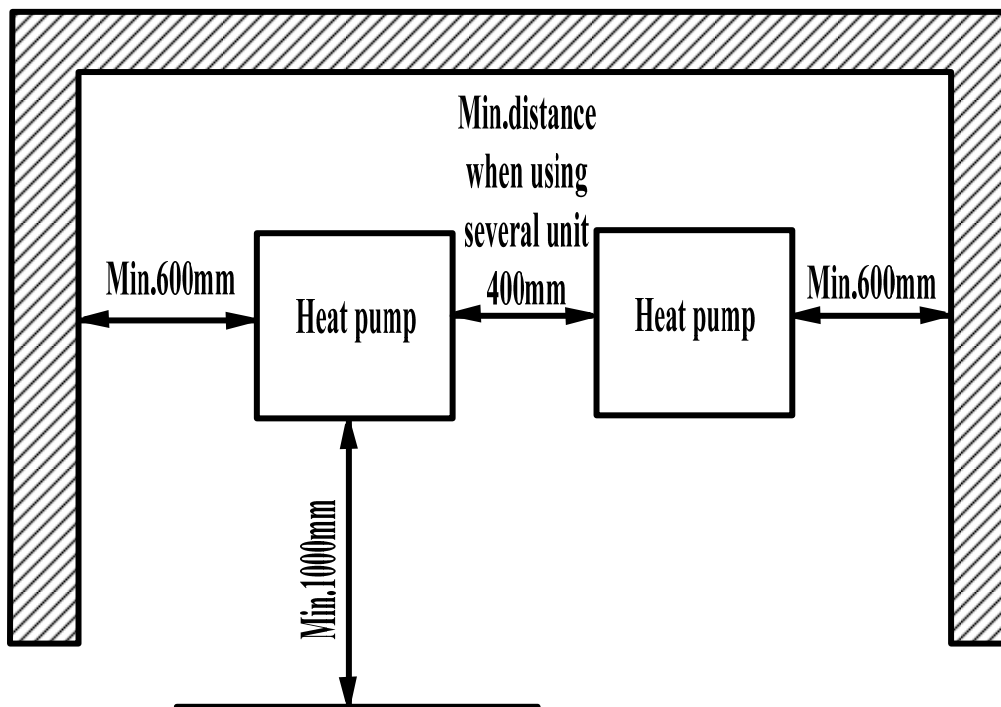
Filling water and supplemented water must be drinking water quality (colourless, clear, free from sediments)

Filling water and supplemented water must be pre-filtered. (pore size max. 5µm)

Installation Location and Positioning

Installation Location and Positioning

- The unit must be installed in a protected area that is free from rain and water penetration.
- The unit must be installed on a solid level surface, preferably on a concrete pad not connected to the main house slab foundation.
- Allowances for good ventilation around the installation must be provided.
- In normal operations to prevent condensation collecting on cold pipes the thermal insulation of any cold components should be to a high level.
- The unit will produce noise that is above the minimum 45 decibel rating. Therefore the unit should be located so that it is well away from bedrooms, offices, living areas or noise sensitive areas including neighbour's bedrooms.
- There must be suitable distances between the unit and the building to ensure normal operation and enough room for maintenance requirements.



Buffer Tank

Buffer Tank

A buffer tank is recommended to ensure a trouble free heat pump operation. A suitable buffer tank can avoid excessive heat pump cycling (switching on and off).

The buffer tank provides a hydraulic separation from the volume flow in the heat pump and heating circuits. The volume flow in the heat pump circuit remains constant, even if the heating circuit volume flow is reduced by thermostatic valves.

If the total of the systems water volume is less than 12L/KW then a buffer tank should be added to reduce the compressor from ON/OFF cycling. This will prolong the compressor life span.

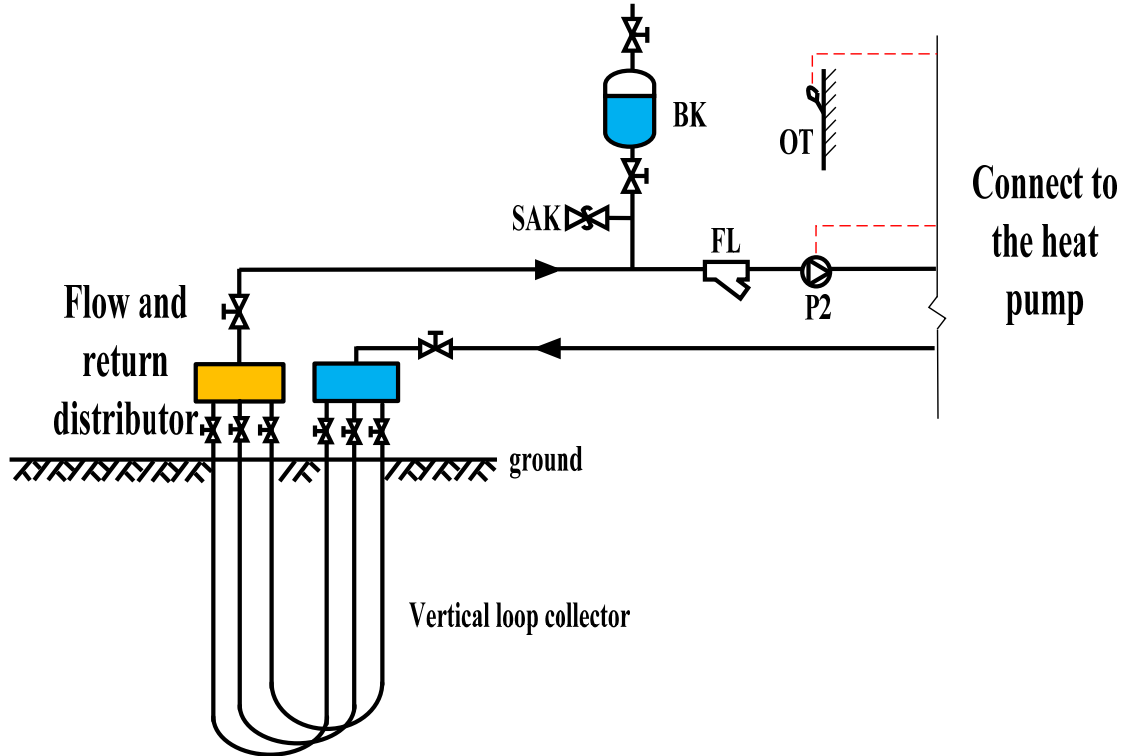
When a buffer tank is installed, the heating system will absorb energy from the buffer tank first. To save energy consumption, install the indoor pump P1 that is switched on only when compressor is on. This is by changing EV01 indoor pump mode to “work by regulation”.

RT sensor should be taken out of the unit and put into buffer tank’s sensor pocket. The RT sensor is located at lower submerged sensor pocket of the plate heat exchanger. The RT sensor in the buffer tank will control the tank temperature by starting and stopping the compressor and pump together as required.

If RT sensor has not been changed to buffer tank’s sensor pocket when EV01 has been changed to “work by regulation”, when the unit reaches its set temperature, the compressor will stop, pump P1 will also stop accordingly due to EV01 being set to “work by regulation”. When this occurs, there is no water circulation between the heat pump and buffer tank. RT will keep its stopped temperature, not the buffer tank water temperature. RT then can not switch on compressor and pump P1 even when buffer tank water is getting cold. Changing the RT sensor into the buffer tank will avoid this problem.

Systems Overview (Outdoor side)

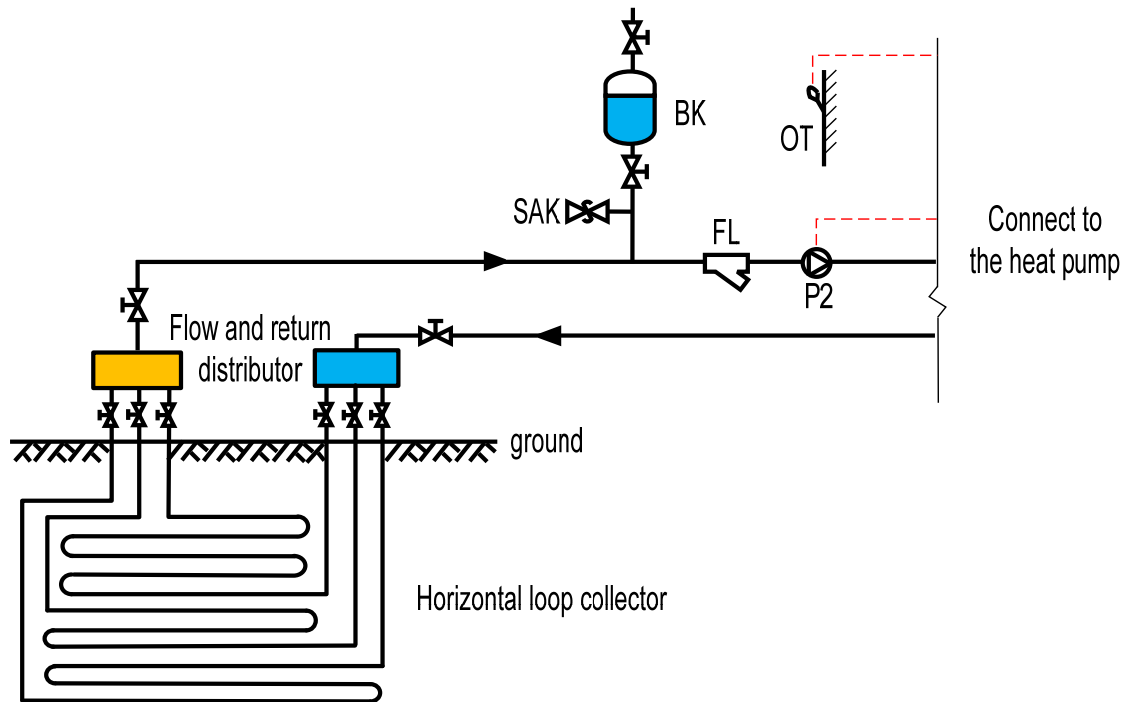
System Overview 1: Vertical Ground Loop System



Name	Description	Location	Name	Description	Location
P2	Outdoor side water pump	External	OT	Outdoor temperature sensor	Internal
SAK	Safety valve	External	FL	Particle filter	External
BK	Brine tank/expansion tank	External			

Systems Overview (Outdoor side)

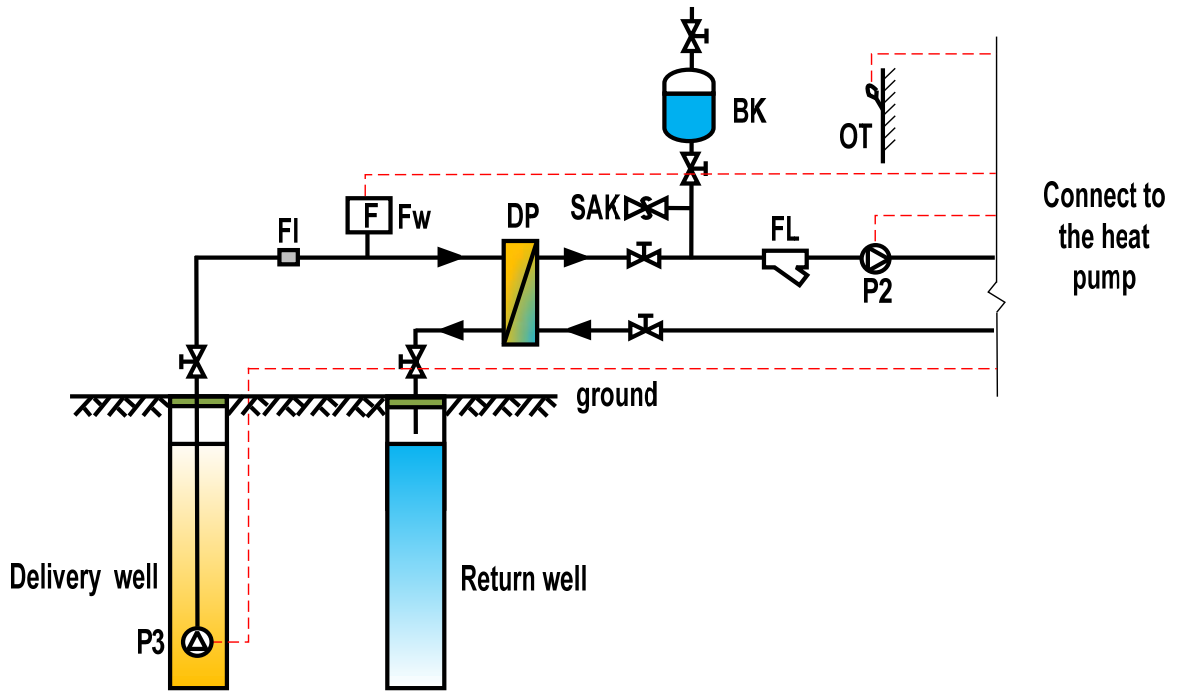
System Overview 2: Horizontal Ground Loop System



Name	Description	Location	Name	Description	Location
P2	Outdoor side water pump	External	OT	Outdoor temperature sensor	Internal
SAK	Safety valve	External	FL	Particle filter	External
BK	Brine tank/expansion tank	External			

Systems Overview (Outdoor side)

System Overview 3: Ground Water with Intermediate Heat Exchanger System



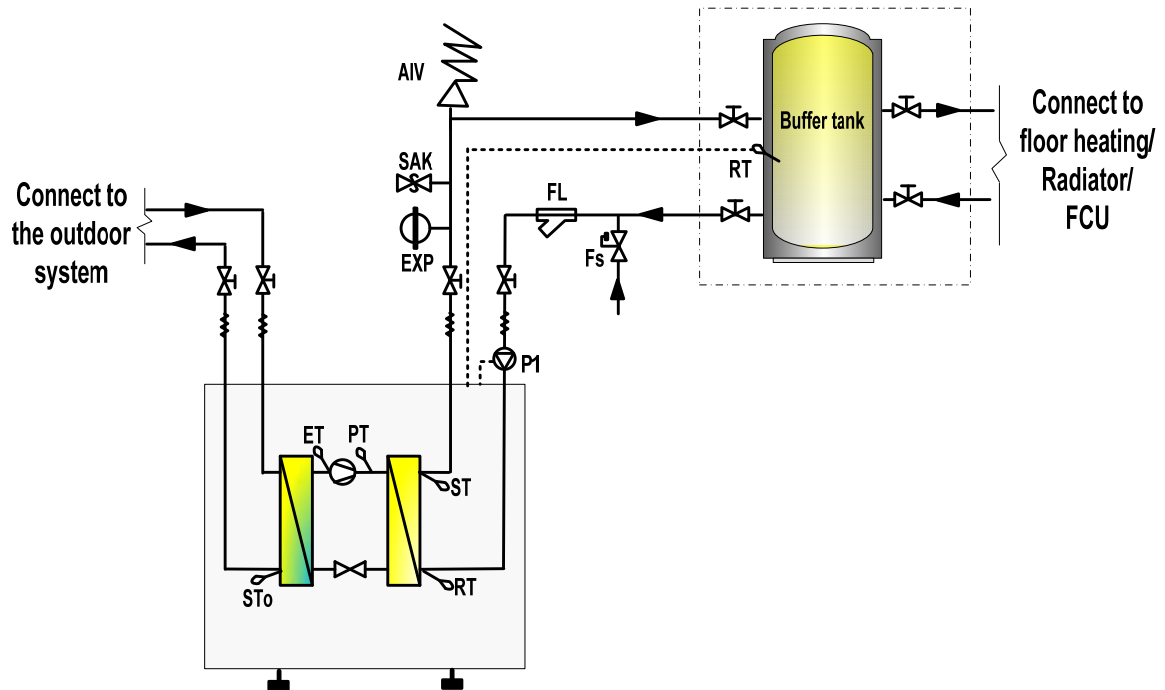
Name	Description	Location	Name	Description	Location
P2	Outdoor side water pump	External	OT	Outdoor temperature sensor	Internal
P3	Ground water pump	External	FL	Particle filter	External
BK	Brine tank/expansion tank	External	SAK	Safety valve	External
FW	Water flow switch	External	FI	filter	External
DP	Intermediate heat exchanger	External			

Principle of Operation:

An intermediate heat exchanger (DP) should be installed to prevent ground water damaging or contaminating the unit's internal heat exchanger. A plate heat exchanger that is able to be cleaned is recommended for this situation that can be disassembled for cleaning and repair or any damage plates can be replaced. Anti-freezing measurement must be adopted to protect the ground water circuit.

Systems Overview (Indoor side)

System Overview 1: Floor Heating Only



Name	Description	Location	Name	Description	Location
P1	Indoor side water pump	External	RT	Indoor side inlet water temperature sensor	Internal
EXP	Expansion tank	External	ST	Indoor side outlet water temperature sensor	Internal
AIV	Air vent valve	External	STo	Outdoor side outlet water temperature sensor	Internal
SAK	Safety valve	External	PT	Exhaust gas temperature sensor	Internal
ET	Suction temp.	Internal			
FS	Automatic water supplement valve	External	FL	filter	External

Systems Overview (Indoor side)

System Overview 1: Floor Heating Only

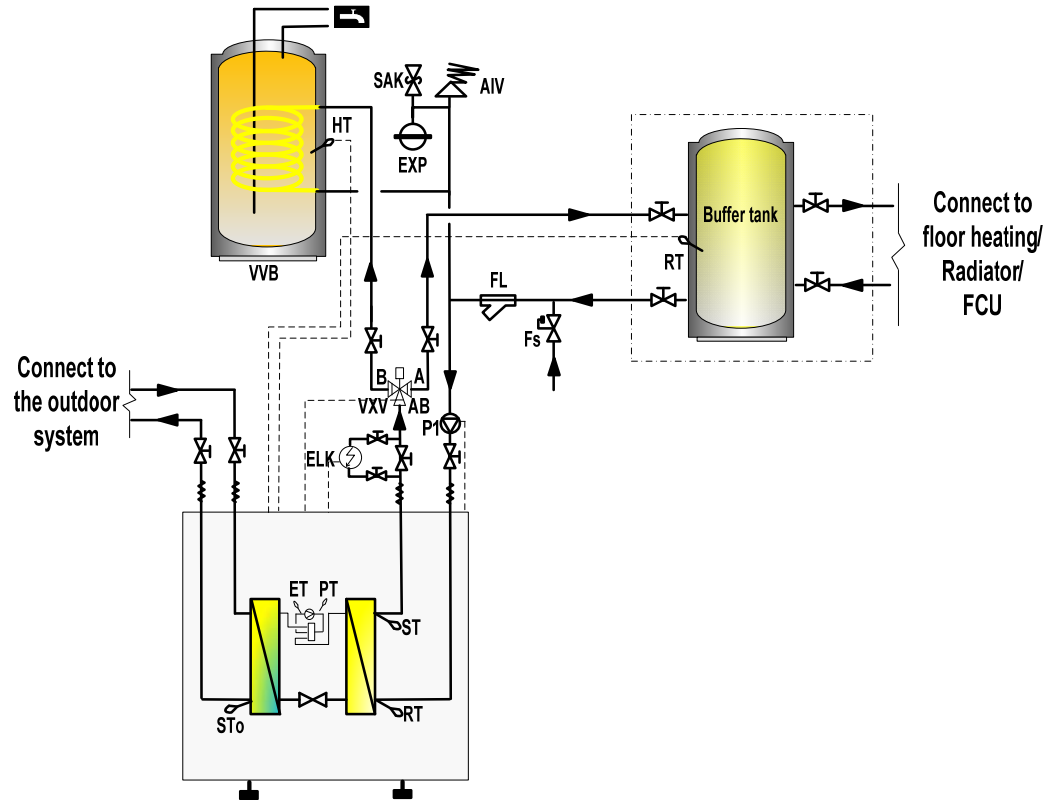
1. Heating Mode Working Principle:

a. When SF04:enable compensation=NO,
When the Inlet water temperature \leq RTc-ST04 (RTc is the actual Inlet water temperature of the last stop) ,the compressor will start to heat. After outlet water temp. $B2 \geq$ ST02, compressor will stop. The Compressor will start again when Inlet water temperature \leq RTc-ST04,.

b. When SF04 enable compensation=YES,
ST02 is replaced by “Set temperature at heating” =ST05+ST06 *(ST05-OT). Refer to chapter “Heating compensation curve setting” .

Systems Overview (Indoor side)

System Overview 2: Heating ,Cooling& Hot Water (*External water pump, three way valve and electric heater*)



Name	Description	Location	Name	Description	Location
P1	Indoor side water pump	External	RT	Indoor side inlet water temperature sensor	Internal
ELK	Electric heater/boiler	External	ST	Indoor side outlet water temperature sensor	Internal
EXP	Expansion tank	External	STo	Outdoor side outlet water temperature sensor	Internal
VXV	Three way valve	External	HT	Hot water temperature sensor	Internal
FS	Automatic water supplement valve	External	ET	Suction temperature sensor	Internal
FL	Particle filter	External	PT	Exhaust gas temperature sensor	Internal
SAK	Safety valve	External			
VVB	Hot water cylinder	External	AIV	Air vent valve	External

Systems Overview (Indoor side)

System Overview Heating Cooling & Hot Water (*External water pump, three way valve and electric heater*)

1. Heating Mode Working Principle:

On heating mode, Three way valve (VXV) will open AB-A.

- 1.) When SF04 enable compensation=NO:
 - a. When the Inlet water temperature $\leq RTc-ST04$ (RTc is the actual Inlet water temperature of the last stop) ,the compressor will start to heat. After outlet water temp. $B2 \geq ST02$, compressor will stop. The Compressor will start again when Inlet water temperature $\leq RTc-ST04$.
 - b. When the outdoor temperature $OT \leq ST07$,compressor has run over 300s and $ST \leq ST02-ST04-1$, the electric heater (ELK) will be activated as heating booster. It will stop heating when $ST \geq ST02-ST04$.

2.) When SF04 enable compensation=YES:

$ST02$ is replaced by “Set temperature at heating” $= ST05 + ST06 * (ST05 - OT)$. Refer to chapter “Heating compensation curve setting” ..

2. Cooling Mode Working Principle:

On cooling mode, Three way valve (VXV) will open AB-A.

When the $RT \geq RTc + ST03$ (RTc is the actual RT value of unit’s last stop), the compressor will start to cool until $ST \leq ST01$. Then compressor will stop. The Compressor will start again when $RT \geq RTc + ST3$.

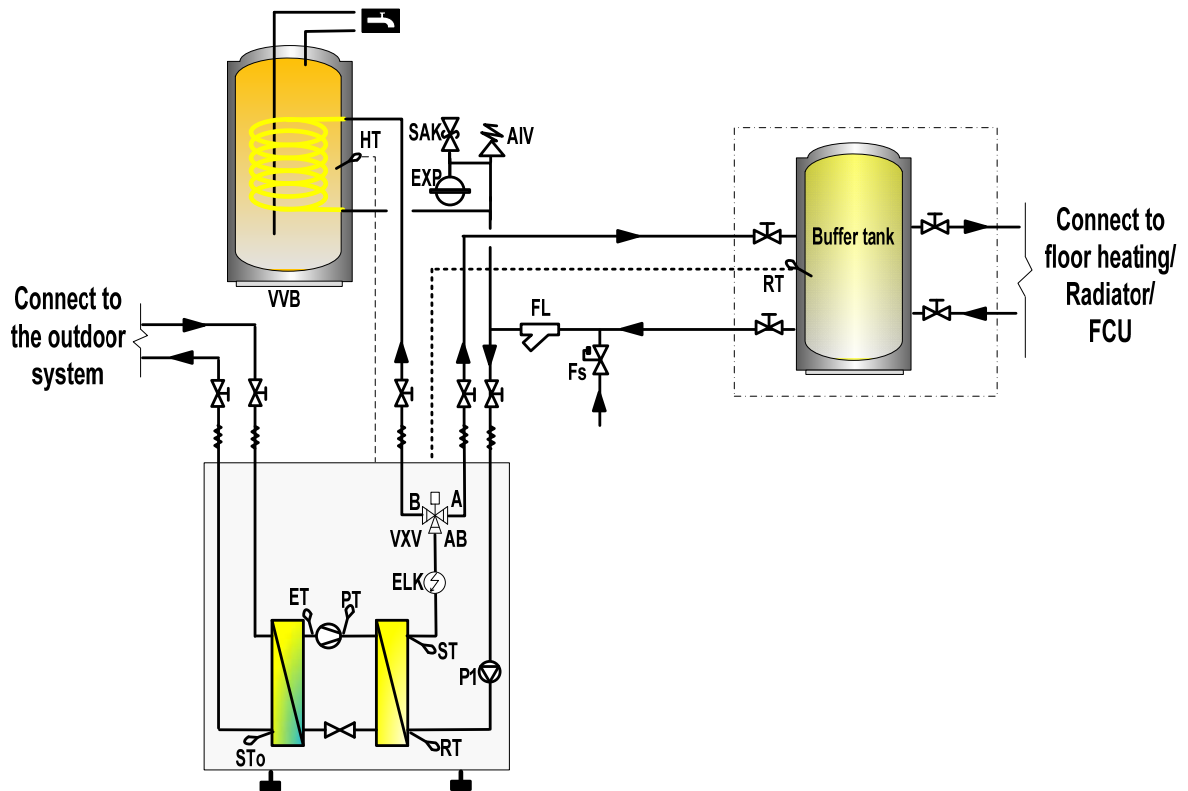
3. Hot water production working principle:

On hot water mode, Three way valve (VXV) will open AB-B.

When domestic hot water requirement calls, the three way revert valve (VXV) will have the priority to revert to the hot water tank (VVB). After the domestic hot water reach its set temperature $ST09$, the three way revert valve (VXV) return to its heating position. After $HT \leq ST09 - ST10$, three way revert valve (VXV) will revert to hot water circuit again.

Systems Overview (Indoor side)

System Overview 3: Floor Heating with Hot Water (Internal water pump, electric heater and three way valve)



Name	Description	Location	Name	Description	Location
P1	Indoor side water pump	Internal(Optional)	RT	Indoor side inlet water temperature sensor	Internal
EXP	Expansion tank	External	ST	Indoor side outlet water temperature sensor	Internal
VXV	Three way valve	Internal(Optional)	STo	Outdoor side outlet water temperature sensor	Internal
ELK	Electric heater	Internal (option)	HT	Hot water temp. sensor	Internal
SAK	Safety valve	External	ET	Suction temp. sensor	Internal
FL	Particle filter	External	PT	Exhaust gas temperature sensor	Internal
FS	Automatic water	External			
VVB	Hot water tank	External	AIV	Air vent valve	External

Systems Overview (Indoor side)

System Overview 3: Floor Heating with Hot Water (*Internal water pump ,electric heater and three way valve*)

1. Heating Mode Working Principle:

On heating mode, Three way valve (VXV) will open AB-A.

1.) When SF04 enable compensation=NO:

- a. When the $RT \leq RTc-ST04$, (RTc is the actual RT value of unit's last stop) the compressor will start to heat until $ST \geq ST02$. Then compressor will stop. The Compressor will start again when $RT \leq RTc-ST04$.
- b. When the outdoor temperature $OT \leq ST07$, compressor has run over 300s and $ST \leq ST02-ST04-1$, the electric heater (ELK) will be activated as heating boost. It will stop heating when $ST \geq ST02-ST04$.

2.) When SF04 enable compensation=YES:

$ST02$ is replaced by "Set temperature at heating" = $ST05+ST06 *(ST05-OT)$.
Refer to page chapter "Heating compensation curve setting".

2. Hot water production working principle:

On hot water mode, Three way valve (VXV) will open AB-B.

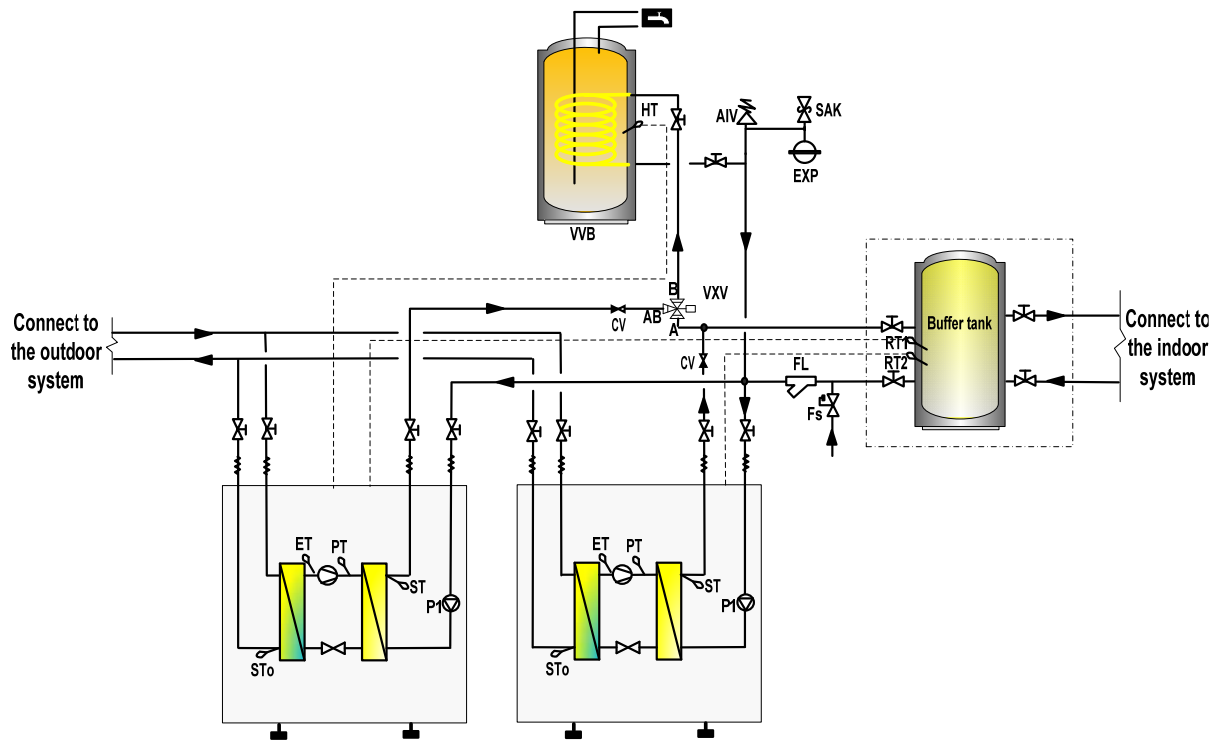
When domestic hot water requirement calls, the three way revert valve (VXV) will have the priority to revert to the hot water tank (VVB). After the domestic hot water reach its set temperature $ST09$, the three way revert valve (VXV) return to its floor heating position. After $HT \leq ST09 - ST10$, three way revert valve (VXV) will revert to hot water circuit again.

Important

The coil heat exchanger inside the hot water cylinder VVB should be well selected to have big enough diameter and heat exchange capacity. Otherwise, heat pump will have high outlet water temperature protection alarm AL05 frequently.

Systems Overview (Indoor side)

System Overview 4: Multiple Units in Series Cascade Connection



Name	Description	Location	Name	Description	Location
P1	Indoor side water pump	Internal (option)	RT	Indoor side inlet water temperature sensor	Internal
EXP	Expansion tank	External	ST	Indoor side outlet water temperature sensor	Internal
SAK	Safety valve	External	HT	Hot water temperature sensor	Internal
FS	Automatic water supplement valve	External	STo	Outdoor side outlet water temperature sensor	Internal
CV	Non-return valve	External	ET	Suction temp. sensor	Internal
FL	Particle filter	External	PT	Exhaust gas temperature sensor	Internal
VVB	Hot water cylinder	External	AIV	Air vent valve	External

Systems Overview (Indoor side)

System Overview 4: Multiple Units in Series Cascade Connection

(1) Heating working principle

To set two or more units in parallel operation, set the primary unit to the required parameters, other units could have 2~5°C difference of ST01,ST02 and ST05 to allow for energy stage control.

1. When SF04:ENABLE COMPENSATION=NO:

a). if the RT (inlet water temperature) is lower than RTc-ST04 of the unit, then the unit will start to heat. The unit with the lower ST02 will stop first, the others will stop if their ST continue to rise and reach its pre-set ST02.

b). RT will drop when units stop. The unit with the higher RTc-ST04 will start first again to heat . If this unit can meet the heating capacity then its ST will not drop any further, only this unit will run as required. If the heating load is bigger than the capacity of one unit then the RT will continue to drop to below the second unit RTc-ST04 , the second unit will be switched on and start increasing the heating capacity.

2. When SF04:ENABLE COMPENSATION=YES:

ST02 is replaced by “Set temperature at heating” =ST05+ST06 *(ST05-OT). Refer to chapter “Heating compensation curve setting” .

(2) Hot water production working principle:

On hot water mode, Three way valve (VXV) will open AB-B.

When domestic hot water requirement calls, the three way revert valve (VXV) will have the priority to revert to the hot water tank (VVB). After the domestic hot water reach its set temperature ST09, the three way revert valve (VXV) return to heating circuit position. After $HT < ST09 - ST10$, three way revert valve (VXV) will revert to hot water circuit again.

Important

The coil heat exchanger inside the hot water cylinder VVB should be well selected to have big enough diameter and heat exchange capacity. Otherwise, heat pump will have high outlet water temperature protection alarm AL05 frequently.

Installation

Installation

Installation must be carried out in accordance with current Standards and Building Codes. The heat pump does not come fitted with shutoff valves and these must be fitted outside of the heat pump to facilitate future service.

Important

The pipe work must be flushed before the heat pump is connected so that any contaminant does not damage the unit's internal component parts .

Ground Loops:

1. When dimensioning the ground collectors, consideration must be given to the geothermal location, type of rock, soil structure and the size of the heat pump.
2. When installing the collector pipe ensure it rises constantly towards the heat pump to avoid air pockets. If this is not possible install high points to vent the air. The ground collectors must be free of all air.
3. All brine pipes that enter any rooms must be insulated against condensation. The expansion tank (BK) must be installed as the highest point in the collector system and on the incoming pipe before the brine pump. Note: Condensation may drip from the expansion tank. Position the expansion tank so that it isn't in the way of other equipment.
4. When installing the circulation pump for the brine circuit, position the electric connection at the 12 o'clock position to prevent ingress of condensate.
5. Ensure adequate thermal and sound insulation of all pipes routed through wall apertures.
6. Thermally insulate pipes on the inside buildings and installed with a vapour seal. As the temperature of the ground collector system can fall below 0°C, the fluid must be protected against freezing down to -15°C. The details of the types of antifreeze used are to be left near the unit for future servicing.
7. Shut-off valves should be installed as close to the heat pump as possible.
8. In the case of a connection to an open ground water system, an intermediate frost-protected circuit must be provided, due to the risk of dirt and freezing that could occur in the evaporator, this requires an extra exchanger.

IMPORTANT:

The recommended ground loop pipe length must be adjusted according to the local conditions. The length of the collector pipe varies depending on the rock/soil conditions and on the heating system, i.e. radiators or floor heating. Max length per collector should not exceed 200m.

Installation

9. Where there is more than one ground loop these must be connected in parallel with a means of adjusting the flow. For surface soil heat, the pipe should be buried at a depth of about 1.8 meters and the distance between the hoses should be at least 1 meter.
10. For bore holes the distance between the holes must be at least 15m.
11. Installation should be inspected before it is commissioned. The inspection must be carried out by a suitably qualified person and should be documented. The above applies to closed loop heating systems as well. If the heat pump is replaced the installation must be re-inspected again.
12. After filling the brine ,check circuit pressure. The pressure should be approx 2 bar. Minimum system pressure 1 bar, Max pressure should not be over 3 bar.

Pipe Connections (Indoor Side):

1. Pipe connections for the indoor side are located on the top of the unit.
2. Ensure all required safety devices, shut-off valves (as close to the heat pump as possible) and particle filter are fitted. The safety valve must have a maximum 3 bar opening pressure and be installed on the water outlet.
3. An expansion vessel that is the correct size for the system must be installed. Ensure that the diaphragms and seals of the expansion vessel including any safety valves are suitable for the heat transfer medium.
4. The entire length of the overflow water pipe from the safety valves must be inclined to prevent water pockets and must also be frost proof if required.
5. Thoroughly flush the heating system.
6. Carry out a leak test.
7. Operating pressure: 2 bar. Max pressure must not be over 3 bar.

IMPORTANT:

When connecting to a system with thermostats on all radiators a bypass valve must be fitted, or some of the thermostats must be removed to ensure sufficient flow through the heat pump.

Electrical Connection

Warning:

Electrical connections and servicing must be carried out under the supervision of a qualified electrician. Electrical installation and wiring must be carried out in accordance with Local Standards.

Power Connection:

Before connecting the power supply please confirm the unit suits the power supply as unit nameplate.

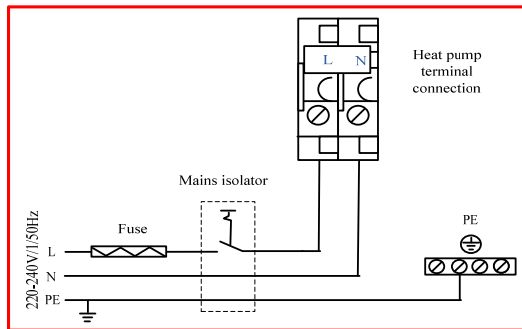
- Breaker protection must be installed according to the max value stated in the nameplate attached to the unit inside of front panel.
- The equipment must be installed via an isolator switch with a minimum breaking gap of 3 mm.
- Disconnect the heat pump before insulation testing the house wiring.
- The unit may be single or three phase, the power supply must conform to the specification on the unit's nameplate. The supply voltage must be within the range specified in the electrical data table. For wiring connection, refer to the electric wiring diagram on the inside panel of the unit.
- When the building is equipped with an earth-fault breaker the heat pump should be equipped with a separated one.

- **WARNING:**
- *Disconnect the main power supply switch before servicing the system or handling any internal parts of the unit.*
- *In case of any major malfunction turn the unit off, disconnect the mains power supply and contact a qualified service engineer.*

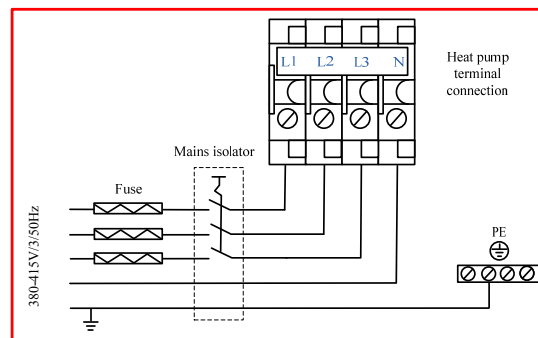
Electrical Connection

Mains Connection Diagram

Single phase:



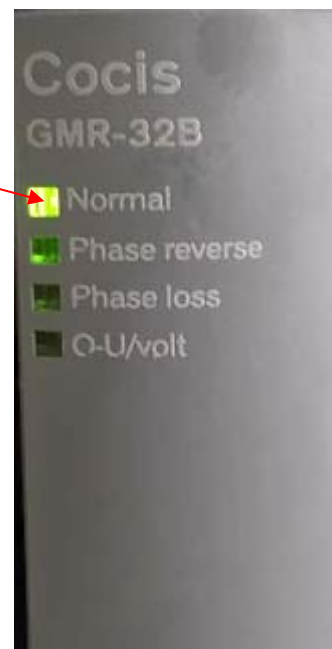
Triple phase:



Phase relay:

There is a phase relay for three phase units. If there is phase relay alarm AL23, check the indication lights on the device.

- “Normal” green light on means that phase connection is correct



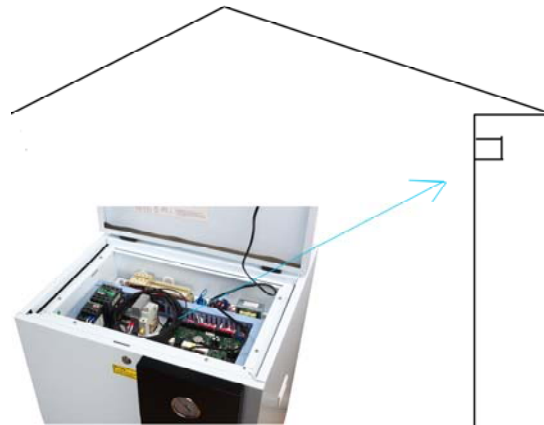
- “Phase reverse” red light on means that phase connection is in reversal.
- “Phase loss” red light on means that there is a loss of one or more phases.
- “O-U/volt” red light on means that power supply voltage is too high/low.

Electrical Connection

Outdoor Ambient Temperature Sensor:

The outdoor temperature sensor (OT) is a standard part placed inside the electric box. One terminal is connected with the PC board B3 and GND, its probe must be installed outdoors. It should be mounted on a wall that has the mean outdoor temperature which can accurately measure the outdoor temperature and not to be exposed the rain, sun and snow.

If the outdoor ambient temperature sensor cable runs close to power cables a shielded cable should be used. If a conduit is used, it should be sealed to avoid condensation in the outdoor temperature sensor probe.



Temperature sensor for hot water:

The hot water sensor (HT) is connected to terminal positions B4 and GND on the main board, its probe must be put into hot water cylinder temperature sensor probe inlet pocket if required.



Electrical Connection

Indoor Side Inlet Water Temperature Sensor:

The indoor side inlet water sensor (RT) from factory is placed in the submerged tube of pipe near the plate heat exchanger.

If a buffer tank is installed, the RT sensor can be moved to the buffer tank temperature sensor inlet pocket and EV01 parameter value can be set to “work by regulation”. This stops the pump running when compressor is OFF.

If the RT sensor can not be moved to the buffer tank temperature sensor inlet, the EV01 parameter value must be set to “continuous work” (factory default setting). This allows the pump to continue to run so RT measured the same as buffer tank water temperature.

Important:

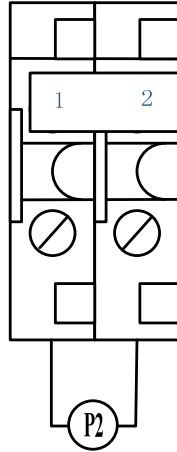
All temperature sensor must be separated (min 200 mm) from high voltage power cables to avoid interference which will cause measured temperature fluctuating and the heat pump may operate incorrectly.

If the sensors are not long enough. You could source longer one to replace it. Just use NTC 10K sensor. The sensors resistance and temp. value table refer to chapter Temperature and sensor resistance table.

Electrical Connection

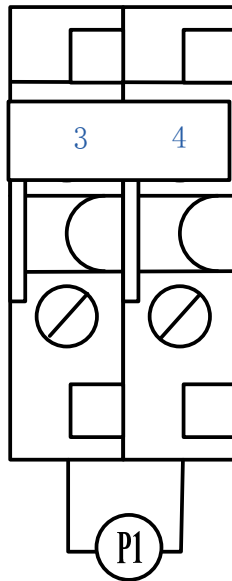
Outdoor Side Water Pump:

Outdoor side water pump is connected to terminal port (1-2).



Indoor Side Water Pump:

Indoor side water pump is connected to terminal port (3-4).

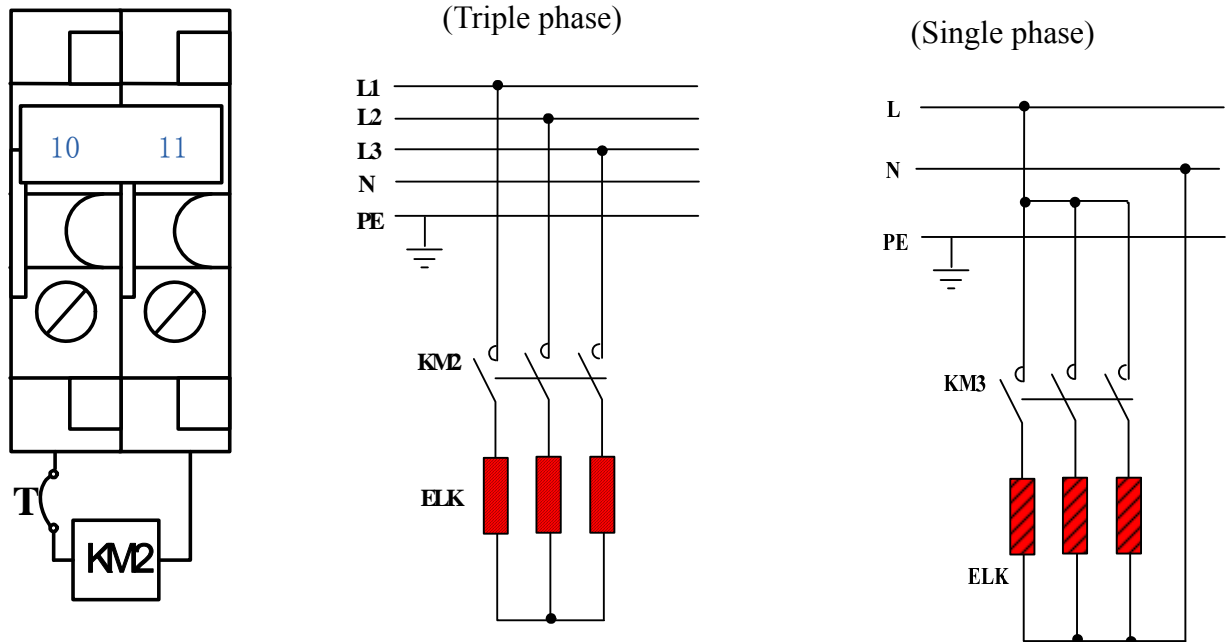


If a PWM pump is used, PWM is connected to D1-D2

Electrical Connection

A/C electric Heater:

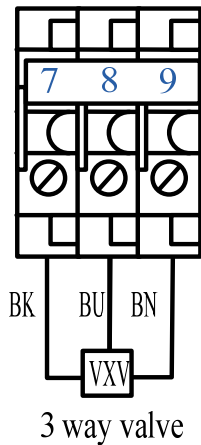
An A/C electric heater could be connected to boost heating capacity. An A/C contactor must be used to activate the electric heater. A/C contactor signal is connected to terminal port (10-11). A thermostat T should be attached on the outer container of heater to prevent heater from overheating.



Electrical Connection

Three Way Valve:

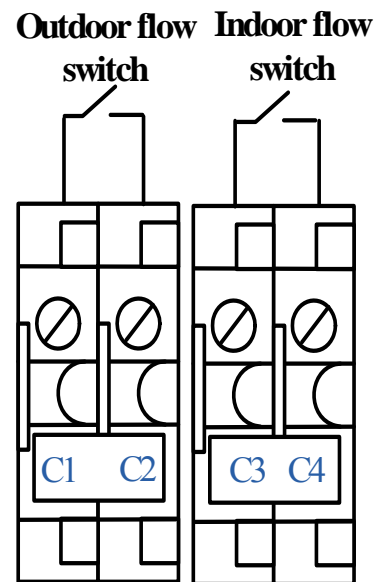
If the unit has no a 3 way valve fitted in factory, an external 3 way valve could be connected to terminal (7-8-9) for domestic hot water production.



Water flow switch

The indoor side and outdoor side water flow switch is connected across C1-C2 and C3-C4. It is used to check if the water is flowing or not in the system. If the water flow switch operates correctly when there is flow, the compressor will operate as normal. If the switch does not closes due to poor or no flow then the compressor will stop in a safety alarm. The unit will not start until this fault has been cleared.

If water flow switch is not fitted, it needs to be installed at site.



Note

This is a potential free input contact only. DO NOT PUT 230VAC INTO THIS CONTACT

Electrical Connection

The unit has two ways to turn ON/OFF heating functions.
SF14: A/C On/Off way 1.) remote 2.) keyboard

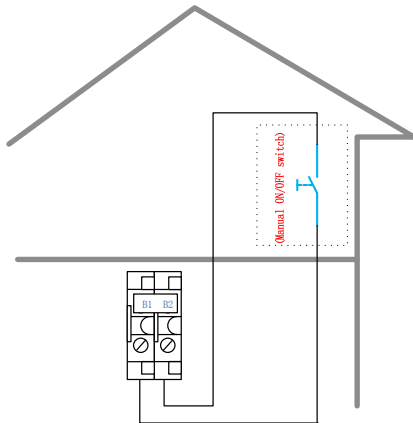
A/C Switch:

If SF14 set = “remote”. Keyboard can not be used to turn On/Off the heating and no heating timezone On/Off function.

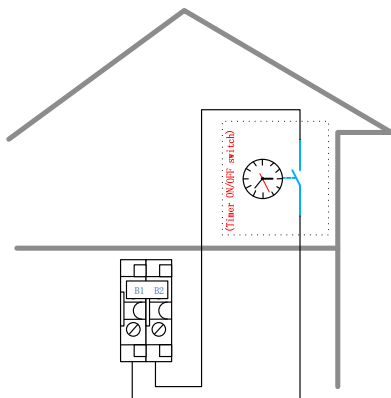
B1-B2 switch is activated to turn On/Off the unit.

When the A/C switch B1-B2 is bridged, the unit’s heating function is activated. An external signal like a timer or thermostat, etc could be connected to B1-B2 to activate or deactivate the unit’s heating function. This external signal must be voltage free.

Case 1 : Install a manual switch inside the house to switch on/off heating.



Case 2: Install a timer switch inside the house to switch on/off heating automatically in due time.



Note

This is a potential free input contact only. DO NOT PUT 230VAC INTO THIS CONTACT

Electrical Connection

The unit has two ways to turn ON/OFF domestic hot water functions.
SF13: HW On/Off way 1.) remote 2.) keyboard

Hot Water Switch:

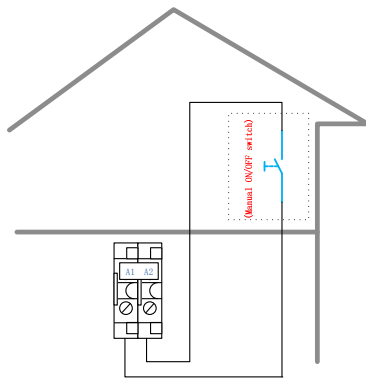
When SF13 set= “remote”, Keyboard can not be used to turn On/Off the DHW and no DHW timezone On/Off function.

A1-A2 switch is activated to turn On/Off the hot water function.

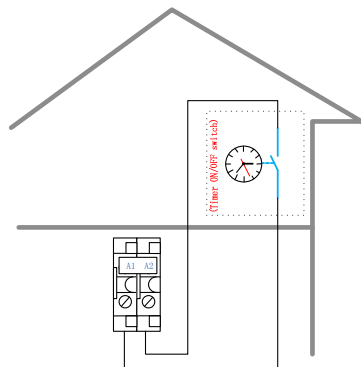
hot water switch A1-A2 is bridged, the unit’s hot water function is activated.

An external signal like a timer or thermostat, etc could be connected to A1-A2 to activate or deactivate the unit’s hot water function. This external signal must be voltage free.

Case 1 : Install a manual switch inside the house to switch on/off hot water production



Case 2: Install a timer switch inside the house to switch on/off hot water production automatically in due time.

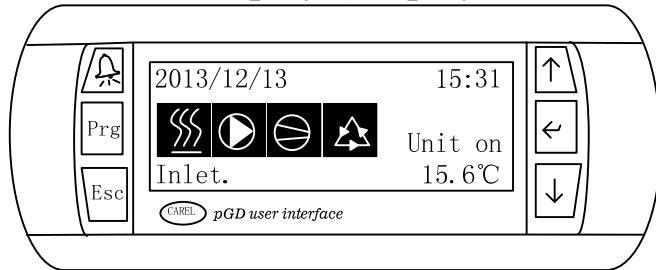


Note

This is a potential free input contact only. DO NOT PUT 230VAC INTO THIS CONTACT

User Guide

Controller Display (Display window & button area)



Operating buttons

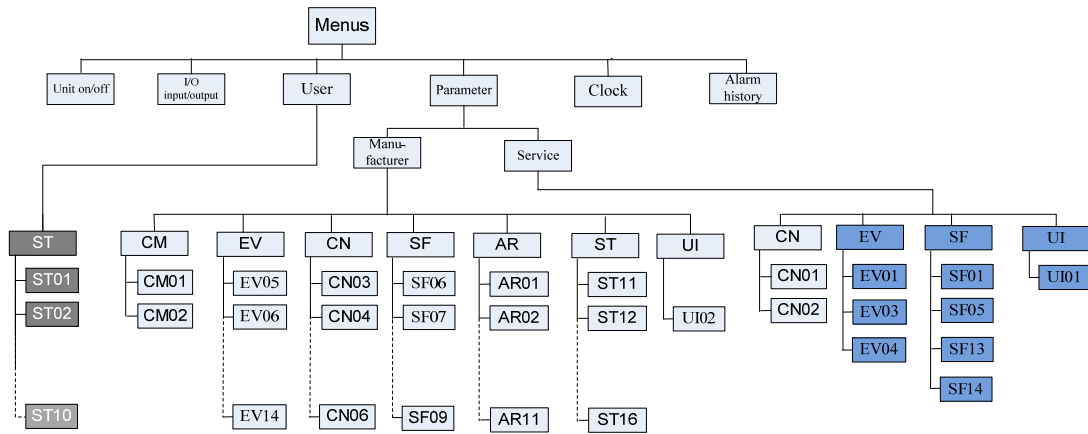
Button	Name	Operation
	<Alarm>	It will flash to indicate when any alarm happens. Press it to re-set manual re-set alarms after the fault is removed.
	<Program>	Press it to enter main menu
	<Esc>	In Menu /parameter setting mode, press it to return to the previous menu level.
	<Enter>	In Menu/parameter setting mode, press it enter the menu , or the value entered or scroll to next parameter data.
	<Up>	Press it to scroll to another menu or to increase the value in Menu/parameter setting mode
	<Down>	Press it to scroll to another menu or to decrease the value in Menu/parameter setting mode On stop, standby or On mode, press it to read actual temp. from inlet water temp. to outlet water temp.....

Symbol explanation

	Heating mode
	Cooling mode
	Domestic hot water mode
	Domestic hot water mode + Heating mode
	Domestic hot water mode + Cooling mode
	Indoor pump
	Compressor
	Outdoor pump

User Guide

Menu Tree



Code	Indication	Code	Indication
CM	Compressor settings	ST	Setpoints
CN	Condenser settings	UI	User interface
EV	Evaporator settings	AR	Alarm settings
SF	Special functions		


Access Rights

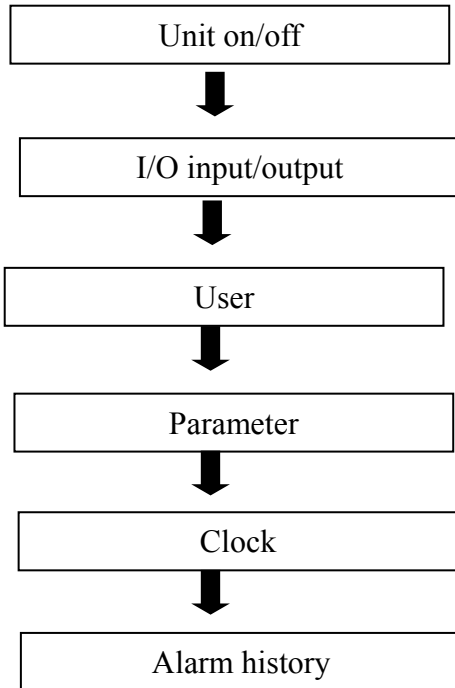
Three groups of users with different privilege levels are described below.

Privilege Level	Main Activities <i>Special</i>	All
Manufacturer	<ul style="list-style-type: none"> • Password required • Configure and commission applications by setting/adjusting parameter values 	<ul style="list-style-type: none"> • View information and status • Acknowledge warnings and alarms • Heating /Cooling changeover
Service	<ul style="list-style-type: none"> • Password required • Configure and commission applications by setting/adjusting parameter values 	
User	<ul style="list-style-type: none"> • No password is required • Adjust limited values of parameters 	


User Guide

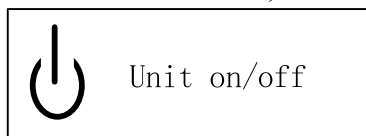
Main menu


Press  button to enter main menus:

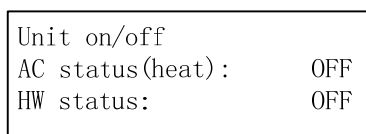



Unit on/off

Press  button, it display




Press  button, it display the unit current air conditioning (AC) and domestic hot water (HW) On/Off status. If the pre-set mode is heating, it display AC status(heat).



Black cursor flashes on "OFF" on AC status(heat), press  button, it display

User Guide


Unit on/off	
AC status(heat) :	OFF
HW status:	OFF
Sure to switch on?	

Press  button to enter. It displays

Unit on/off	
AC status(heat) :	ON
HW status:	OFF

Press  button, black cursor flashes on “OFF” on HW status , press  button, it display

Unit on/off	
AC status(heat) :	ON
HW status:	OFF
Sure to switch on?	

press  button to enter, it will display

Unit on/off	
AC status(heat) :	ON
HW status:	ON

Unit A/C and DHW are successfully switched on. “Starting “ displays on screen ,water pump turns on and display pump symbol on screen, with some minutes’ delay, compressor will turn on and display the symbol on screen.

Inlet ,outlet, ambient temperature ,etc could be checked via pressing up and down button .

Switching the unit Off is same operation.

The units also could be switched on/off via digital switch A1-A2, B1-B2, referring to chapter Electric connection – A/C switch & hot water switch

User Guide

I/O input/output

B1	RT	AC inlet temp
B2	ST	AC outlet temp.
B3	OT	Ambient temp.
B4	HT	Hot water temp.
B5	PT	Discharge temp.
B6	ET	Suction temp.
B7	STO	Outdoor outlet temp.
DI1		AC flow switch
DI2		LP switch
DI3		HP switch
DI4		AC switch
DI5		DHW switch
DI6		Power fault
DI7		Outdoor flow
NO1		Compressor
NO2		Indoor pump
NO3		4-way valve
NO4		AC heater
NO5		Outdoor pump
NO6		Inject valve
NO7		3-way valve
Y3		Indoor pump PWM

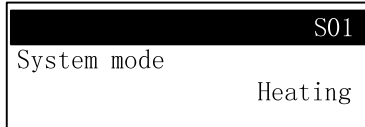
User Guide

Change System mode

Button Operation: Prg → User → System mode

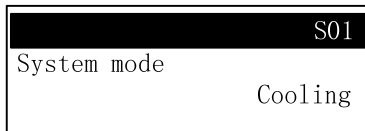
System mode only could be changed on heating/cooling unit (SF01 unit type setting cooling + heating).

When unit is off state, press “Prg” to main menu, press up or down button to User, press Enter button to enter, it display


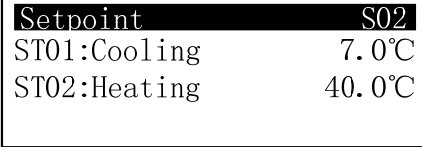


Press Enter button, Heating will flash, press up or down button to change to Cooling, Press Enter button to confirm.

It will display:



Changing Set points (for user)

Display	Procedures
 <p>User</p>	<p>press <Prg> to main menu, press Down button to User, Press Enter button, Press Down button to the desired parameter.</p>
	<p>Press Enter button, when 7.0 is flashing, press Up or Down button to change the value. Press Enter to confirm. Cursor will move to next parameter data 40, 40 will flash and could be changed via up or down button. Press Enter to confirm, Cursor will move to setpoint, When setpoint is flashing, press Down button to next parameters.</p>
<p>Or, continuously press <Esc> to exit out of the current level and back to the desired menu level.</p>	

User Guide

User Parameters

Parameter	Descriptions	De-fault	Min.	Max.	Unit	Res
ST01	Setting temperature at Cooling mode	12	ST11	ST12	°C	0.1
ST02	Setting temperature at heating mode	40	ST13	ST14	°C	0.1
ST03	Setting temperature difference at cooling mode	2	0	10	°C	0.1
ST04	Setting temperature difference at Heating mode	2	0	10	°C	0.1
ST05	Setting temperature at heating for compensation function	25	0	30	°C	0.1
ST06	Compensation factor for heating compensation function	0.6	0	30	-	0.1
ST07	Outdoor temperature to start the boiler or electric heater	0	-20	20	°C	0.1
ST09	Hot water temperature	50	ST15	ST16	°C	0.1
ST10	Hot water temperature difference	3	1	10	°C	0.1
TR09	AC timezone On/Off	NO	YES or NO			
TR10	HW timezone On/Off	NO	YES or NO			
SF04	Enable weather compensation	NO	YES or NO			

User parameter could be changed when unit is on or off.

User Guide

Heating compensation curve setting

The control temperature for heating mode has two methods: fixed and changeable temperature. The fixed temperature is a fixed value and directly set by the user from the set area. The changeable temperature is determined by values of ST05, ST06 and the actual outdoor temperature measured by the OT sensor probe.

This function is selected by SF04:

when SF04:ENABLE COMPENSATION=NO, it is fixed temperature;

when SF04:ENABLE COMPENSATION=YES, it is changeable temperature.

When SF04:ENABLE COMPENSATION=NO, the set temperature at heating is ST02;

When SF04:ENABLE COMPENSATION=YES, the set temperature at heating will be controlled by ambient temperature (OT), ST05 and ST06 according to the following formula:

Set temperature at heating = $ST05 + ST06 * (ST05 - OT)$.

- ST05 is indoor temperature that the user feel comfortable
- ST06 is the heating compensation coefficient curve factor you select for the heat pump to work with. Increasing ST06 will increase compensation temperature and RT will increase relatively.
- OT is the outside temperature.

The calculated temperature can be used for the control reference, but the maximum data will not exceed ST14

For example:

Set the heating compensation coefficient $ST06 = 0.7$, $ST05 = 20$

When outdoor temperature is 0°C , the control temperature is

$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - 0) = 34^{\circ}\text{C}$;

When outdoor temperature is -10°C , the control temperature is

$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - (-10)) = 41^{\circ}\text{C}$;

When outdoor temperature is -20°C , the control temperature is

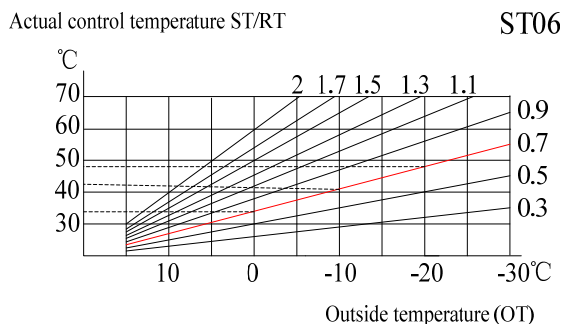
$ST05 + ST06 * (ST05 - OT) = 20 + 0.7 * (20 - (-20)) = 48^{\circ}\text{C}$;

User does not need to calculate it .Just check from below curves.

There are three curves with ST05 from 18 to 22 and ST06 from 0.3 to 2.

Calculated result as above can not check from curve below.

Heating curve $ST05 = 20^{\circ}\text{C}$



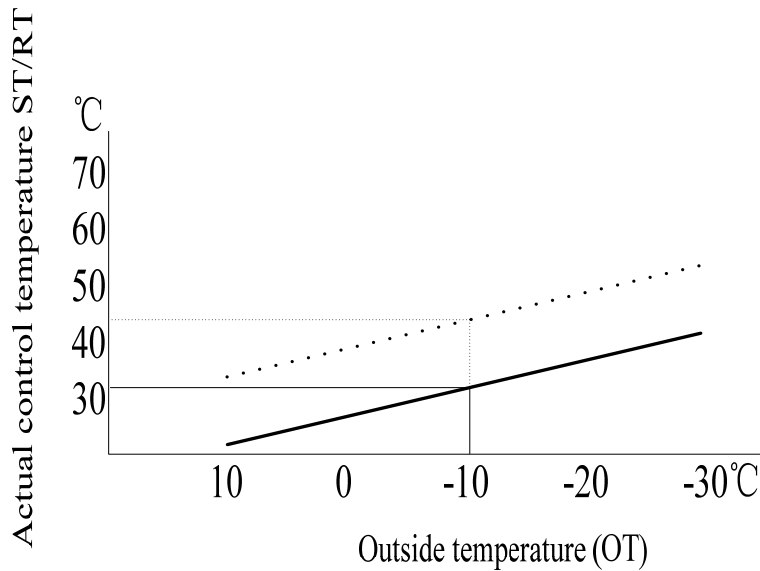
User Guide

With the drop of the outdoor temperature, the control temperature become higher and higher to meet the large heating requirement.

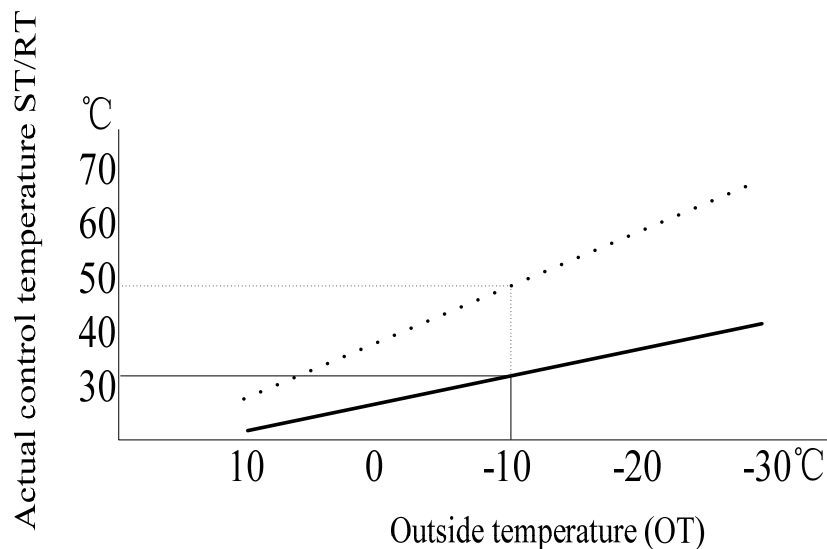
With the increase of the outdoor temperature, the control temperature become lower and lower, so that the heat pump works under low pressure to keep low energy consumption.

Changing ST05 or ST06 could change the heating curve .

Increase ST05 will lift up the curve

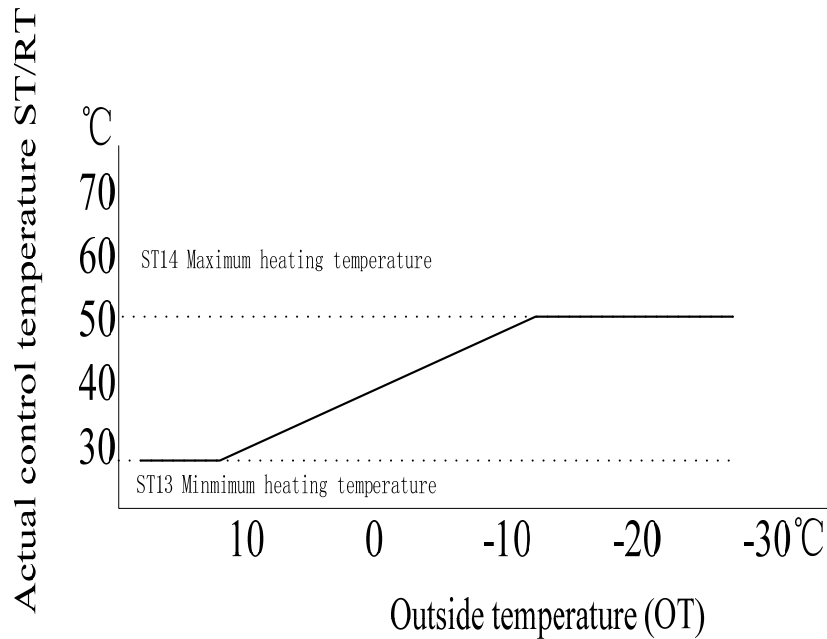


Increase ST06 will increase the grade of the curve



User Guide

The calculated control water temperature will not be over ST14 Maximum heating temperature and will not be lower than ST13 Minimum heating temperature



Cold weather conditions

- When the room temperature is too low, You could increase ST06 .
- When the room temperature is too high, you could decrease ST06.

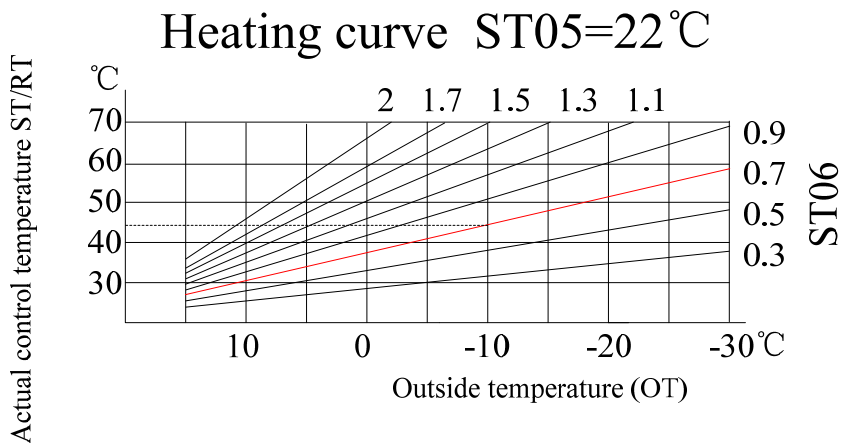
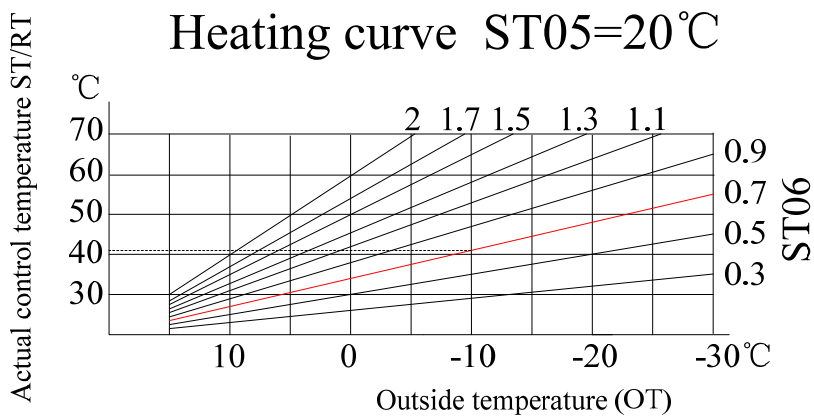
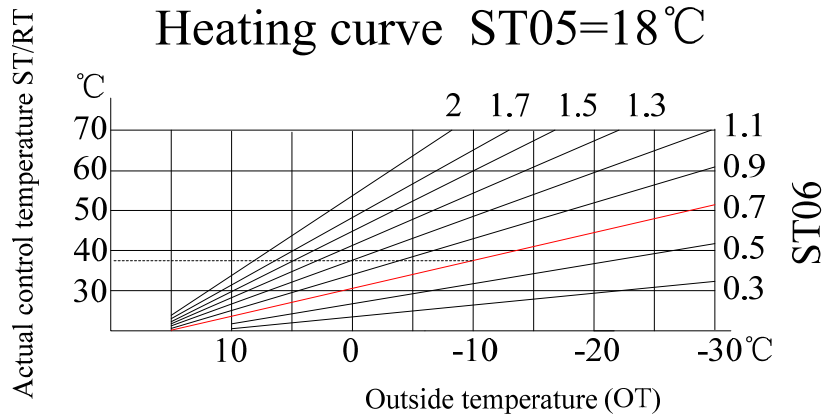
Warm weather conditions

- If the room temperature is too low, You could increase ST05 .
- If the room temperature is too high, you could decrease ST05.

The temp. of the room with floor heating need a long time to stabilize .After a ST05 ST06 adjustment, Pls wait 24 hours before you take another adjustment again.

User Guide

Three curves of different ST05 setting:





User Guide

If SF04: Enable compensation =Yes,


S10 menu is popped up :

S10	
ST05=25.0°C	ST06=0.6
OT:	-09.3°C
Actual setp:	45.6°C

Press  to change ST05 and ST06, OT is actual measured ambient temp. Actual control temp. ST will be displayed.

Press  to menu S11:

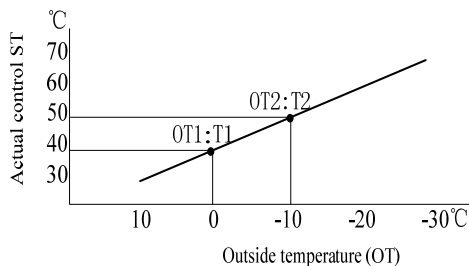
S11	
ST05=25.0°C	ST06=0.6
OT:	00.0°C
Heat setp. =	40.0°C

You could input any OT value ,press  and relative heating control temp. will be calculated.

If OT=-15.0°C, actual control temp. is 49.0°C

S11	
OT:	-15.0°C
Heat setp. =	49.0°C

If you have your own curve as below, you want to have ST =38°C when OT=0°C and ST=49°C when OT=-10°C



You could use S12 menu to calculate relative ST05 and ST06 setting. Then go to menu S10 to input ST05=18.1 ST06=1.1 and you will get the desired weather compensation setting .

S12	
T1: 38°C	OT1: 00.0°C
T2: 49°C	OT2: -10.0°C
ST05=18.1	ST06=1.1

User Guide

Timezone on/off

Timezone on/off		
TR09:	AC timezone	No
TR10:	HW timezone	No

Timezone activates the pre-set timer programs. Timezone function is only valid when unit ON/OFF method is “by keyboard”.

TR09:AC timerzone is for space heating

When TR09 is set YES, two different time periods is available to set in every day from Sunday to Saturday.

Timezone on/off		
Monday:	ON	OFF
AC-1:	00:00	00:00
AC-2:	00:00	00:00

After finishing timer setting for Monday , then scroll to “Monday” and press up or down button to change to Tuesday to set its timer , then Wednesday and so on. If ON and OFF data is same, the timer function is not activated.

TR10:HW timezone is for domestic hot water.

When TR10 is set YES, two different time periods is available to set in every day from Sunday to Saturday

Timezone on/off		
Monday:	ON	OFF
HW-1:	00:00	00:00
HW-2:	00:00	00:00

If the unit is manually turned on by keyboard before the automatic turning on by the timer, this timer ON program is implemented and unit will be turned off automatically when the time of timer OFF has come.

If the unit is manually turned off by keyboard before the automatic turning off by the timer, this timer OFF program is implemented .

If everyday timezone setting is same, do not need to set day by day, just go to

Timezone on/off	
Monday:	
Copy from Monday	
Confirm:	NO

Change Monday to Tuesday, and change “No” to “Yes” ,then Tuesday’s timezone setting will be same as Monday.

With the same method to change Wednesday....etc.

Compressor Operating hours

Display compressor operating hours.

Compressor Operating hours 000000hour

Service Guide

Access Service Level Parameter data

<i>Display</i>	<i>Procedures</i>
<div style="border: 1px solid black; padding: 5px;"> <p>■ Enter password 0000</p> </div>	<p>press <Prg> to main menu, press Down button to Parameter, Press Enter button, Press Enter and 0 will flash, press Down button to the correct figure, press Enter to confirm. Likewise, change the other 3 figure .After 4 correct figure are inputted, It will enter Service level parameter.</p>
<div style="border: 1px solid black; padding: 5px;"> <p>Information E01 CNHISmVAIE Ver. : 1.0.7 2015/03/10</p> </div>	<p>Press Enter button, It display controller version information.</p>
<div style="border: 1px solid black; padding: 5px;"> <p>E02 SF01:Unit type Cooling+Heating</p> </div>	<p>Press Down button, it goes to Unit type setting. Press Enter to confirm, when Cooling+heating is flashing, press Up or Down button to change the value. Press Enter to confirm. Cursor will move to E02 When E02 is flashing, press Down button to next parameters.</p>
<p>Or, continuously press <Esc> to exit out of the current level and back to the desired menu level.</p>	

Service setup

Outdoor Side Anti-Freezing Setting

Ground water with immediate heat exchanger system

- AR02 (outdoor side low outlet water temperature protection), factory default setting is 5 °C.

Ground loop system

- If brine is adopted as an outdoor side heating medium, AR02 needs to be changed according to brine freezing point. AR02 parameter set value should be 10°C higher than the brine freezing point. If the brine freezing point is -15°C, then AR02 could be set to -5°C.

Temperature sensor calibration.

If the temperature sensor readings is with some error. Service parameter come with calibration function.

Insert default setting

Among User, service and manufacturer parameters, there is a function to insert each privilege level factory default setting . Change “NO” to “YES”, press <Enter> , it will display “Operation succeed” .

Initialization

On manufacturer parameter, initialization function could restore all user, service and manufacturer parameters to factory default settings. Change “NO” to “YES”, press <Enter> , it will display “Are you sure?” ,press <Enter> to confirm. It display “Loading... ”. then “Warning Initialization done, please switch-off !. The controller needs to be power off and then power on again.

Reset comp operating hours

Change “No” to “Yes” could reset compressor operating hours to 0.

Service Parameters

Service Parameters:

Parameter	Descriptions	De-fault	Min.	Max.	Unit	Res
SF01	Unit type		Only heating or Cooling + Heating			
EV01	Indoor pump control mode	Continuous work	Continuous work or work by regulation			
EV03	Water pump set temp. difference on cooling	5	1	10	°C	0.1
EV04	Indoor side pump set temp. difference on heating	5	1	10	°C	0.1
SF05	Enable domestic hot water function	YES	YES or NO			
SF10	Outdoor loop with brine	NO	YES or NO			
SF13	HW On/Off way	Keyboard	Keyboard or remote			
SF14	AC On/Off way	Keyboard	Keyboard or remote			
UI01	Service password		0000	9999	-	1

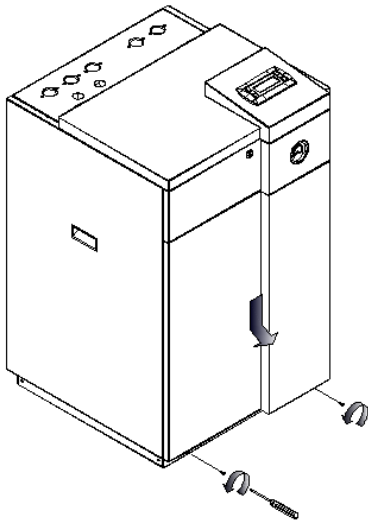
Service parameters is code protected and only could be changed when unit is off.

Service Guide

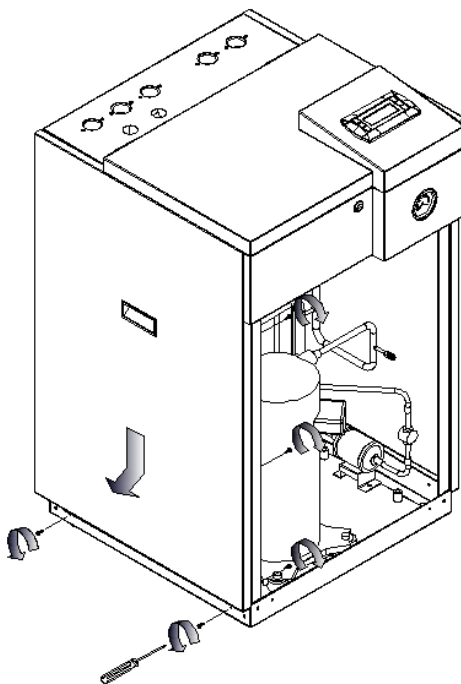
Steps to open the cabinets:

The panels must be removed as the order : front panel – left panel – right panel – back panel

1. Unscrew the two screws at the bottom of front panel as below indication and then Front panel could be removed by pressing the panel downward.

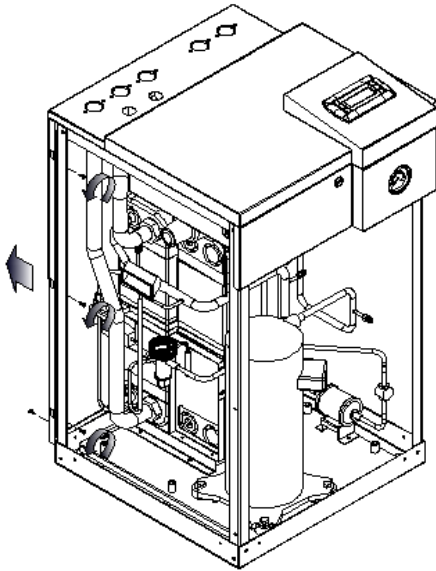


2. Unscrews the screws as below indication to remove left panel.

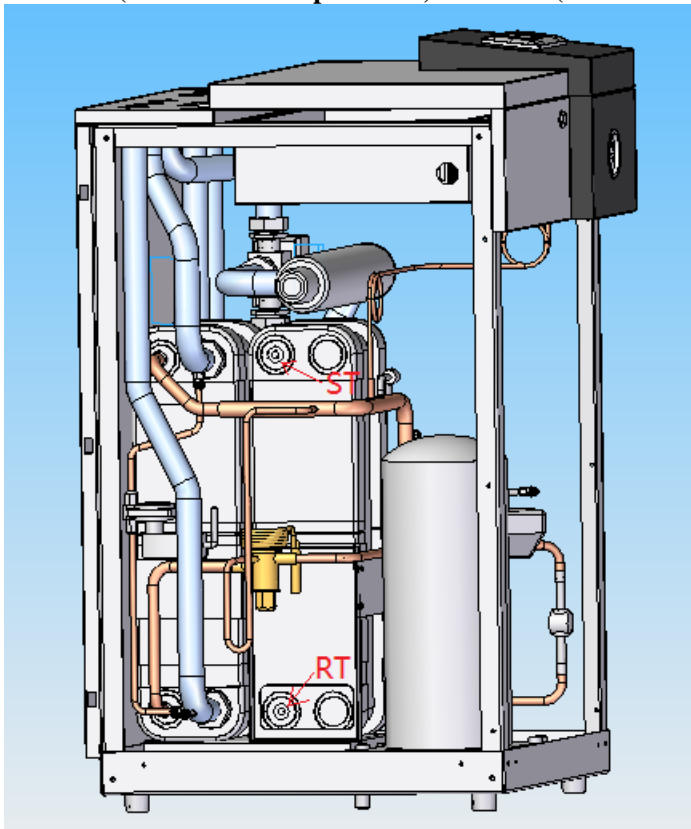


Service Guide

3. The right panel could be removed as the same way of removing the left panel.
4. Unscrew the screws as below and then back panel could be removed.

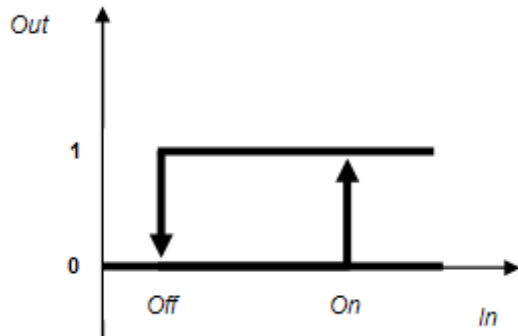


5. The RT (inlet water temperature) and ST (outlet water temperature) sensor location



Service Guide

Cooling demand

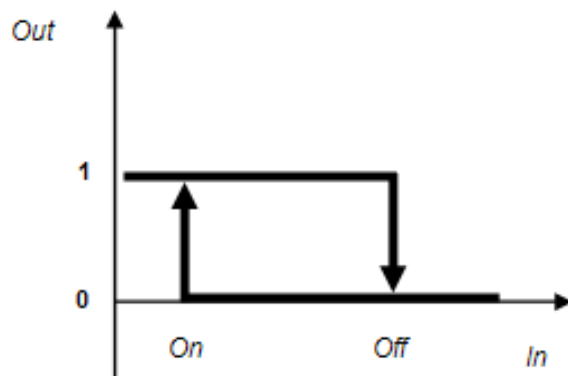


In: B1, B2

On: $B1 > B1a + ST03$ (B1a is the measured sensor B1 temperature of unit's last stop. The first time unit on condition $B1a = ST01 + 5$)

Off: $B2 < ST01$

Heating demand

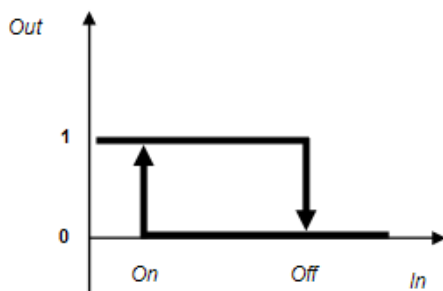


In: B1, B2

On: $B1 < B1c - ST04$ (B1c is the measured sensor B1 temperature of unit's last stop. The first time unit on condition $B1c = ST02 - 5$)

Off: $B2 > ST02$

Domestic hot water demand



In: B4 (HT)

On: $B4 < ST09 - ST10$

Service Guide

Control process

Turn on process at heating mode

- 1.) Start water pumps , check water flow switch
- 2.) 5 seconds after water flow switch closes, if there is heating demand, start compressor

Turn off process at heating mode

- 1.) Switch off compressor
- 2.) After 5 second's delay, switch off outdoor pump
- 3.) After 30 seconds' delay, switch off indoor water pump .

Turn on process at cooling mode

- 1.) Start water pumps and 4 way valve, check water flow switch
- 2.) 5 seconds after water flow switch closes, if there is cooling demand, start compressor

Turn off process at cooling mode

- 1.) Switch off compressor
- 2.) After 5 second's delay, switch off outdoor side pump.
- 3.) After 30 seconds' delay, switch off indoor side water pump .
- 4.) After 60 seconds' delay, switch off 4 way valve.

Turn on process at hot water mode

- 1.) start 3 way valve and water pumps, check water flow switch.
- 2.) 5 seconds after water flow switch closes, start compressor

Turn off process at hot water mode

- 1) Switch off compressor
- 2) After 5 second's delay, switch off outdoor side pump.
- 3) After 30 seconds' delay, switch off indoor side water pump and 3 way valve.

Hot water priority:

- When unit is heating, if there is a call for hot water , it start 3 way valve at once and turn to hot water mode directly. It will revert back to heating mode after hot water reach set temperature.
- When unit is cooling, if there is a call for hot water , it stops compressor first and then start at hot water mode , it stops compressor again when hot water reach set temperature before it revert back to cooling mode.

Indoor side Water pump control (NO2)

Indoor side water pump runs as below from stop to running mode:

EV01=Continuous work, water pump will continue to run until unit stops on heating and cooling mode. Compressor stop when hot water set temp. is reached and hot water mode.

EV01=work by regulation, water pump will be ON when compressor is ON, will be OFF when compressor is OFF.

4 way valve control (NO3)

4 way valve is OFF on below conditions. It is ON at other conditions.

- 1.) Heating mode, hot water mode, or heating + hot water mode

- 2.) Producing hot water on cooling + hot water mode.

Service Guide

Auxiliary Electric heater or boiler control (NO4)

Auxiliary heater or boiler only could be switched on when all of conditions below are met.

- 1.) Heating mode running;
- 2.) Compressor has run over 300s
- 3.) $OT \leq ST07$;
- 4.) $ST \leq ST02-ST04-1$;

Auxiliary heater or boiler could be switched off when any of conditions below is met.

- 1.) A/C flow switch cut off over 2s;
- 2.) $ST \geq ST02-ST04$;
- 3.) unit is switched off
- 4.) ST sensor probe trouble

Outdoor side pump running control (N05)

When there is cooling, heating or domestic hot water demand, outdoor side water pump will be switched on.

Solenoid by pass valve running control (NO6)

When Ambient temperature is very low and water outlet temperature is high, discharge gas temp. will be high and compressor will be too hot due to great compression ratio and small gas flow that could not cool compressor down . The solenoid by pass valve is used to pass some gas into the gas-liquid separator via a capillary tube and then to compressor suction inlet to increase gas flow to cool down the compressor.

When $PT \geq 105^{\circ}\text{C}$, solenoid valve is on (NO5);

When $PT \leq 85^{\circ}\text{C}$, solenoid valve is off (NO5);

When $85^{\circ}\text{C} < PT < 105^{\circ}\text{C}$, keep original state.

3 way valve control (NO7)

3 way valve is OFF when unit is cooling or heating .3 way valve is ON when unit is producing domestic hot water.

Service Guide

The indoor side pump PWM running control (Y3)

On cooling mode, after compressor is on, indoor side pump PWM runs as EV05 for 3 minutes, then runs with (Inlet temperature-Outlet temperature) =EV03 as target via PID control . when compressor is off, indoor side pump PWM runs as EV06.

On heating mode, after compressor is on, indoor side pump PWM runs as EV05 for 3 minutes, then runs with (outlet temperature - Inlet temperature) =EV04 as target via PID control; when compressor is off, indoor side pump PWM runs as EV06.

On DHW mode, indoor side pump PWM runs as EV05. After DHW temperature reaches preset temperature, if the unit does not need to do cooling or heating, indoor side pump PWM is off.

At other situations, when indoor side pump is on, PWM is EV06, PWM is off when indoor side pump is off.

Pump PWM will starts running for 3 minutes when pump is off for 24 hours to avoid seizure

Manufacturer parameters

Access Manufacturer Level Parameter data

<i>Display</i>	<i>Procedures</i>						
<div style="display: flex; justify-content: space-between; align-items: center;"> ■ Enter password 0000 </div>	<p>press <Prg> to main menu, press Down button to Parameter, Press Enter button, Press Enter and 0 will flash, press Down button to the correct figure, press Enter to confirm.</p> <p>Likewise, change the other 3 figure .After 4 correct figure are inputted, It will enter Service level parameter.</p>						
Service	<p>If the inputted password is service, it will just enter Service level parameters.</p> <p>If the inputted password is manufacturer, it will access both service and manufacturer level parameter.</p>						
Manufacturer	<p>press Down button to Manufacturer Parameter</p>						
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">Comp. management</td> <td style="border: 1px solid black; padding: 2px; text-align: right;">P02</td> </tr> <tr> <td style="padding: 2px;">CM01:Min on</td> <td style="padding: 2px; text-align: right;">180s</td> </tr> <tr> <td style="padding: 2px;">CM02:Min off</td> <td style="padding: 2px; text-align: right;">300s</td> </tr> </table>	Comp. management	P02	CM01:Min on	180s	CM02:Min off	300s	<p>Press Down button, it display parameter and data.</p> <p>Press Enter to confirm, when data is flashing, press Up or Down button to change the value.</p> <p>Press Enter to confirm.</p> <p>Cursor will move to P02</p> <p>When P02 is flashing, press Down button to next parameters.</p>
Comp. management	P02						
CM01:Min on	180s						
CM02:Min off	300s						
<p>Or, continuously press <Esc> to exit out of the current level and back to the desired menu level.</p>							

Warning : Manufacturer parameter is related to the unit safe running and reliability. It is not supposed to be changed without manufacturer's permission. Any wrong change could possibly cause the unit broken.

Manufacturer parameters

Manufacturer parameters

Parameter	Descriptions	De-fault	Min.	Max.	Unit	Res
CM01	Compressor minimum ON time	180	90	900	Sec.	1
CM02	Compressor minimum OFF time	300	90	1000	Sec.	1
EV05	Indoor side PWM pump Max. speed	100	10	100	-	1
EV06	Indoor side PWM pump Min. speed	30	10	100	-	1
EV07	Pump integral time	300	0	900	Sec.	1
EV08	Pump derivative time	1	0	90	Sec.	1
EV13	Indoor Pump control band on cooling	4	0.5	20	°C	0.1
EV14	Indoor pump control band on heating	4	0.5	20	°C	1
SF06	Antifreeze external start temp.	2	0	10	°C	0.1
SF07	Antifreeze external end temp. difference	1	1	10	°C	0.1
SF08	Antifreeze start outlet water temp.	10	1	20	°C	0.1
SF09	Antifreeze end outlet water temp. difference.	2	1	10	°C	0.1
AR01	low indoor side outlet water temperature protection	5	1	10	°C	0.1
AR02	low outdoor side outlet water temperature protection	3	-10	10	°C	0.1
AR03	High indoor side outlet water temperature protection	58	1	100	°C	0.1
AR04	Indoor side water flow switch start-up delay time	30	1	300	Sec.	1
AR05	Outdoor side water flow switch start-up delay time	30	1	300	Sec.	1
AR06	Low pressure alarm times within 24 hours	4	1	10	-	1
AR07	High pressure alarm times within 24 hours	6	1	10	-	1
AR08	low suction temperature protection	0	-10	10	°C	0.1
AR09	Low pressure switch start-up delay time	300	10	1000	Sec.	1
AR10	High discharge gas temperature protection	115	100	130	°C	0.1
AR11	Antifreeze detect interval	30	1	1000	Min.	1
ST11	Minimum user setup cooling temperature	6	0	ST12	°C	0.1
ST12	Maximum user setup cooling temperature	40	ST11	60	°C	0.1
ST13	Minimum heating temperature	20	0	ST24	°C	0.1
ST14	Maximum heating temperature	55	ST13	80	°C	0.1
ST15	Minimum hot water temperature	20	0	ST16	°C	0.1
ST16	Maximum hot water temperature	55	ST15	80	°C	0.1
UI02	Manufacturer password		0000	9999	-	1

manufacturer parameters is code protected and only could be changed when unit is off.

Commissioning and Adjusting

2. Check Refrigerant Circuit for Leaks.

- a. Check heat pump gas pressure gauge reading for any leak.
- b. Open the front door with the key. Check the heat pump interior with a refrigerant leak detector or leak detection spray for refrigerant leaks.

3. Filling the Heating System

- a. Open any installed non-return valves
- b. Check the inlet pressure of diaphragm expansion tank.
- c. Thoroughly flush the heating system.
- d. Fill the heating system with water and check the pressure. Minimum system pressure is 1 bar, maximum pressure is 3 bar. Only use an anti-corrosion additive which has been approved for heat pumps with DHW heating via single-walled heat exchangers.
- e. Return the non-return valves into the operation position.

4. Checking the Diaphragm Expansion Tank and the System Pressure

- a. Drain the indoor primary side of the heat pump system and reduce pressure until pressure gauge indicates “0”.
- b. If the inlet pressure of the diaphragm expansion tank is lower than the static system pressure, replenish with sufficient nitrogen to raise the inlet pressure above the static system pressure.
- c. Re-fill with water until the filling pressure is higher than the inlet pressure of the diaphragm expansion tank.
- d. During the initial start-up, mark this value on the pressure gauge as minimum filling value. Only use anti-corrosion additive which has been approved for heat pumps with DHW heating via single-walled heat exchangers.

5. Check the Function of all Safety Valves

6. Check the Water Connections for Leaks

7. Filling the Outdoor Side Circuit and Checking the Pressure

- a. Fill the outdoor side circuit with brine and vent.
- b. Check the circuit pressure. The pressure in outdoor side circuit should be approximate 2 bar.
- c. Check and if required, adjust the inlet pressure of the diaphragm expansion tank.

Commissioning and Adjusting

8. Checking the Tightness of Electrical Connections

9. Checking the Input Terminals and Contactors

- a. Check the voltage and cycle at the mains connection, at the inlet terminals and at the contactors. Interchange phases L1 and L3, if the phase sequence protector red light illuminates.

10. Checking the Sensor Connections

- a. Check whether all sensors have been connected correctly.

11. Checking the Anti-Freeze Concentration in the Brine Circuit

- a. Check and record anti-freeze concentration

12. Checking Water Flow Switch

- a. Stop water flow with a valve on the outdoor side or indoor side pump, the controller should display flow switch alarm AL17 each time. Adjust as required.

13. Checking Outdoor Side Flow Rate

- a. Close A/C switch and hot water switch
- b. Check the settings on the control system, and adjust so there is a heating requirement.
- c. Check that the outdoor side and indoor side pumps are vented and if necessary help the pumps to start.
- d. Press the plus or minus key to check the STo temperature, ensure that the temperature corresponds with the soil/rock temperature, which indicates the brine flow.
- e. The indoor side water pump will start first, some minutes later the outdoor side water pump will start and then compressor should start within a few minutes after.
- f. Press the plus or minus key to read STo, and measure brine inlet temperature (ET could be moved to brine inlet pipe to measure brine inlet temp). The difference between these two temperatures should be 2 – 5°C when the system has come into balance. A high difference indicates a low brine flow. A low difference indicates a high brine flow. If the flow rate is too low, then increase the pumping rate.
- g. Particular attention should be given to the level in the brine system when initially using the heat pump. Some topping up may be necessary.

14. Checking Indoor Side Flow Rate

- a. Read the indoor side water temperature RT and ST. The difference between these two temperatures should be 5 - 10°C when the heat pump heats the heating water without additional heat. A high difference could depend on a low indoor side water flow. Then vent the heating circuits further and increase the

speed of indoor side water pump and heating circuit pump.

Commissioning and Adjusting

15. Checking the Refrigerant Circuit

- a. Observe the sight glass in refrigerant circuit. Bubbles >5 mm should not be visible, when heating flow has stabilized at 35°C . If large bubbles are visible, search and repair the leak in respective stage and refill with refrigerant.
- b. Check the humidity indicators on the sight glass. The refrigerant circuit has a leak if that indicate a high level of humidity.

16. Checking the Suction Gas Superheating

- a. Check and if required, adjust the suction gas superheating for each compressor.

17. Checking the HP Switch

- a. Deliberately choke the heating flow until the flow temperature rises above 55°C , each compressor should be stopped by its HP switch.

18. Checking Heat Pump Cabinet

- a. Seal any holes that might have been drilled into the cabinet with permanently flexible sealant, to prevent condensation forming in the heat pump inside.

19. Checking the Cooling Operation (Heating & cooling unit only)

- a. Check the settings on the control system, and adjust so there is a cooling requirement.
- b. Check that the external circulation pumps start and that the compressor cools.

20. Commissioning the DHW Cylinder System

- a. Fill domestic hot water cylinder. Check the RT, ST, HT parameters.
- b. DHW cylinder should has enough heat exchanging capacity and flow rate so temperature difference ΔT between HT and ST will not be over 5°C .


Commissioning Form

Commissioning Form			
Client / Installation address:		Telephone Number	
Installer:		Commissioned by	
Heat pump Model:		Heat pump serial number:	
Commissioning date:			
The heating system has been filled and pressure tested			YES ()
Expansion vessel for heating is sized, fitted & charged in accordance with manufacturer's instructions			YES ()
The heat pump is fitted on a solid/stable surface capable of taking its weight			YES ()
The system has been flushed and cleaned in accordance with heat pump manufacturer's instructions			YES ()
What system cleaner was used?			
What inhibitor was used?			Qty:() litres
Are all exposed external pipeworks insulated?			YES ()
Central heating mode (10 minutes after compressor start to run)			
Is buffer tank installed			Capacity:() litres
Inlet	()°C	discharge	()°C
outlet	()°C	suction	()°C
ambient	()°C	Outdoor outlet	()°C
Power voltage	()V		
Pressure gauge reading	()Mpa	Current	()A
Domestic hot water mode (10 minutes after compressor start to run)			
Is a hot water cylinder installed	Capacity:() litres	Heating coil diameter ()mm,	length ()m
Inlet	()°C	discharge	()°C
outlet	()°C	suction	()°C
ambient	()°C	Outdoor outlet	()°C
hot water	()°C		
Power voltage	()V	Current	()A
Pressure gauge reading	()Mpa		
Additional heat sources connected: Gas Boiler () Oil Boiler () Electric Heater () Solar Thermal ()			YES ()
The heating, hot water and ventilation systems complies with the appropriate Building Regulations			YES ()
All electrical work complies with the appropriate Regulations			YES ()
The heat pump and associated products have been installed and commissioned as the manufacturer's instructions			YES ()
The operation of the heat pump and system controls have been demonstrated to the customer			YES ()
The operation, installation and maintenance manual has been explained and left with the customer			YES ()
Commissioning Engineer's Signature			
Customer's Signature (To confirm demonstration of equipment and receipt of appliance instructions)			




Alarms

Alarm Management

The alarms are divided into two groups: auto reset alarms and manual reset alarms.

1. Auto reset alarm, the user is not required to acknowledge and reset it.
2. The corresponding device will be automatically restarted once the alarm status disappears.
3. Once a manual reset alarm is detected, the system will be stopped automatically. The user needs to record and contact the supplier on actions what to do.
4. To acknowledge and reset the alarm press the  button.
5. Ensure that the fault has been fixed before the alarm has been reset.

When an alarm is detected:

- The  icon will continuously flash. An alarm code will be displayed on the screen.
- If more than one alarm is detected, the alarm codes will be displayed successively on the LCD screen. These will be seen by using the  or  buttons, or they are manually acknowledged or reset (only for manual reset alarms).

Alarms

Auto Reset Alarms

The following are codes for auto reset alarms with their meanings.

Codes	Meaning
AL01	Low pressure
AL02	High pressure
AL03	Low indoor side outlet water temperature (ST<AR01)
AL04	Low outdoor side outlet water temperature (STO<AR02)
AL05	High indoor side outlet water temperature (ST>AR03)
AL17	Indoor side flow switch
AL26	Indoor antifreeze
AL27	Outdoor antifreeze
AL30	Outdoor side flow switch
Display offline	Wired remote control and main board communication trouble.
AL71	RT sensor trouble (over 150 °C or lower than -35 °C) (B1)
AL72	ST sensor trouble (over 150 °C or lower than -35 °C) (B2)
AL73	OT sensor trouble (over 150 °C or lower than -35 °C) (B3)
AL74	HT sensor trouble (over 150 °C or lower than -35 °C) (B4)
AL75	PT sensor trouble (over 150 °C or lower than -35 °C) (B5)
AL76	ET sensor trouble (over 150 °C or lower than -35 °C) (B6)
AL77	STO sensor trouble (over 150 °C or lower than -35 °C) (B7)

Manual Reset Alarms

The following are codes for manual reset alarms with their meanings.

Codes	Meaning
AL18	Low pressure alarms times within 24 hours is over the limit(AR06)
AL19	High pressure alarms times within 24 hours is over the limit(AR07)
AL20	Low suction temperature (AR08)
AL21	High exhaust gas temperature (over AR10)
AL23	Phase relay
AL24	Compressor overload

Alarms


Viewing Alarm history

<i>Display</i>	<i>Procedures</i>
Press <Prg> button , then then press down button to Alarm History, press <Enter> to confirm.	
<div data-bbox="260 669 625 797" style="border: 1px solid black; padding: 5px;"> <p>Alarm history</p> <p>No 014 16:58 18/12/13</p> <p>AL02</p> <p>High pressure</p> </div>	Press <up> or <down> to view other alarms
<div data-bbox="260 963 625 1090" style="border: 1px solid black; padding: 5px; text-align: center;"> <p>No alarm!</p> </div>	If no alarm is generated, the word “No alarm!” will be displayed.

Acknowledging and Resetting Manual Reset Alarms

Any alarm detected by the system, either an auto reset alarm or a manual reset alarm will be displayed on the LCD. However, only manual reset alarms require user’s acknowledgement and reset.

- To clear the alarm press <> to acknowledge the alarm.

If the alarm status is cleared, the corresponding device icon and alarm icon  that are flashing will accordingly disappear.

- Restart the system, as appropriate.

Alarms

Low pressure protection (Code: AL01)

After starting the compressor, it will check the low pressure after AR09 delay. If DI2=OFF, the compressor is off, 5 seconds later, outdoor side pump will be stopped, PWM water pump will run as EV06, other parts will keep its original state. A continuous blink code AL01 will appear on the LCD, until DI2=ON, the unit will turn to its normal work.

Low pressure protection (serious) (Code: AL18)

If in 24 hours time, AL01 happening times is over AR06, manual reset alarm AL18 will happen, the compressor is off, 5 seconds later, outdoor side pump will be stopped, PWM water pump will run as EV06, other parts will keep its original state. A continuous blink code AL18 will appear on the LCD.

High pressure protection (Code: AL02)

It does not scan high pressure switch on defrosting period and within 10 seconds after defrosting stop.

At other time if DI3=OFF, the compressor is off, after 5 seconds delay, the outdoor side pump will be stopped, PWM water pump will run as EV06, other parts will keep its original state. A continuous blink code AL02 will appear on the LCD, until DI3=ON, the unit will turn to its normal work.

High pressure protection (serious) (Code: AL19)

If in 24 hours time, AL02 happening times is over AR07, manual reset alarm AL19 will happen, the compressor is off, 5 seconds later, outdoor side pump will be stopped, PWM water pump will run as EV06, other parts will keep its original state. A continuous blink code AL19 will appear on the LCD.

Low indoor side outlet water temperature protection (Code: AL03)

At any mode, if $ST \leq AR01$, the compressor is off, after 5 seconds delay, the outdoor side pump will be stopped, indoor side PWM water pump will run as EV05, other parts will keep its original state. A continuous blink warning code AL03 will appear on the LCD, it will record the instant inlet water temperature RT1 and will return to normal working after inlet water temperature $RT \geq RT1 + ST03$.

High indoor side outlet water temperature protection (Code: AL05)

If $ST \geq AR03$, the compressor is off, after 5 seconds delay, the outdoor side pump will be stopped, Indoor side PWM water pump will run as EV05, other parts will keep its original state. A continuous blink code AL05 will appear on the LCD, it records instant inlet water temperature RT2 and will return to normal working after inlet water temperature $RT \leq RT2 - ST04$.

Alarms

Indoor side Water flow switch protection (Code: AL17)

At starting process, if indoor side water flow switch does not close after AR04 time (DI1=OFF) after starting the indoor side water pump, a continuous blink warning code AL17 will appear on the LCD. If DI1=ON and last 5 seconds, it will return back to work.

During unit working, if DI1=OFF and lasts 5s, the compressor is off ,after 5 seconds delay, the outdoor side pump will be stopped, indoor side PWM water pump will run as EV06, other parts will keep its original state, a continuous blink warning code AL17 will appear on the LCD.

After AL17 alarm happen, if DI1=ON and lasts 5s, unit will return to normal working.

Low evaporate temperature protection (Code: AL20)

The protection function will be valid at COOLING mode .

20 seconds after compressor working, if suction temperature \leq AR08, the compressors is off , 5 seconds later, outdoor side pump will be stopped, indoor side PWM pump runs as EV06, other parts will keep its original state, a continuous blink warning code AL20 will appear on the LCD.

High exhausted gas temperature protection (code: AL21)

Discharge gas temperature $>$ AR10 and lasts 5 seconds, the compressors is off , 5 seconds later, outdoor side pump will be stopped, indoor side PWM pump runs as EV06 , other parts keep original state. LCD display AL21 and flash.

Indoor side Anti-freeze protection (Code : AL26)

When indoor side water pump is off and ambient temperature \leq SF06, indoor side water pump will be switched on in every AR11 interval ,indoor side pump PWM is EV05. 180 seconds later,

If indoor side outlet water temperature $>$ SF08, switch off indoor side water pump.

If indoor side outlet water temperature \leq SF08 and unit is off state, if water flow switch is closing, A/C auxiliary heater is switched on .If indoor side water flow switch is opening, it does not switch on A/C auxiliary heater and displays AL26 . Until indoor side outlet water temperature \geq SF08+Sf09, it switches off A/C auxiliary heater , 10 seconds later, switches off indoor side water pump. If the units is switched on, it will be on.

When the unit is on standby state at hot water mode, if ambient temperature \leq SF06, indoor side water pump and 3 way valve will be switched on in every AR11 interval , indoor side PWM is EV05. It will switch indoor side water pump when indoor side outlet water temperature $>$ SF08.

If indoor side outlet water temperature sensor is out of order, indoor side inlet water temperature sensor will be replaced as antifreeze water temperature reference. If indoor side inlet water temperature sensor is out of order too, indoor side water pump will continue to run until OT $>$ SF06+Sf07

Alarms

If SF10 Outdoor loop with brine = No.

When outdoor side water pump is off and ambient temperature \leq SF06, outdoor side water pump will be switched on in every AR11 interval, 180 seconds later,

If outdoor side outlet water temperature $>$ SF08, switch off outdoor side water pump.

If outdoor side outlet water temperature \leq SF08 and unit is off state, it displays AL27. Until outdoor side outlet water temperature \geq SF08+SF09, it switches off outdoor side water pump. If the units is switched on, it will be on.

If outdoor side outlet water temperature sensor is out of order, outdoor side inlet water temperature sensor will be replaced as antifreeze water temperature reference. If outdoor side inlet water temperature sensor is out of order too, outdoor side water pump will continue to run until $OT > SF06 + SF07$

Low Outdoor side outlet water temperature protection (Code: AL04)

At any mode, if $STO \leq AR02$, the compressor is switched off, the outdoor side pump is switched on, other parts will keep its original state. A continuous blink warning code AL04 will appear on the LCD, it will return to normal working after outdoor side outlet water temperature $STO \geq AR02 + 2$.

Outdoor side Water flow switch protection (Code: AL30)

At starting process, if outdoor side water flow switch does not close after AR05 time (DI7=OFF) after starting the outdoor side water pump, a continuous blink warning code AL30 will appear on the LCD. If DI7=ON and last 5 seconds, it will return back to work.

During unit working, if DI7=OFF and lasts 5s, the compressor is off, other parts will keep its original state, a continuous blink warning code AL30 will appear on the LCD.

After AL30 alarm happen, if DI7=ON and lasts 5s, unit will return to normal working.

Display offline - Wired remote control and main board communication trouble.

After this trouble happen, unit still can work normally but the wired remote control can not be used to operate the unit.

Alarms

Temperature Sensor trouble (auto reset)

If the temperature sensor is below -35C or higher 150C in 4.5 seconds, it will display sensor trouble.

sensor	code	Trouble fixing
B1	AL71	Unit will continue to run until it reaches preset temperature. CM02 later, it will start again.
B2	AL72	Switch off the unit and display alarm code
B3	AL73	Unit will continue to run according to SF04=0 on heating mode.
B4	AL74	Hot water mode is invalid. Alarm code displays if SF05=1. Alarm code does not display if SF05=0.
B5	AL75	Switch off the unit and display alarm code
B6	AL76	Cancel AL20 protection, increase ST01 2 degree Celsius more.
B7	AL77	Switch off the unit and display alarm code

Trouble Shooting

Trouble shooting

Description	Possible cause	Check
Power failure	faulty or disconnected fuse	Check the mains supply phases and active/replace fuse
	Mains fault, voltage fluctuations	notify your electricity supplier
Compressor has no sound, no action	wrong phase sequence	check phase sequence protector
	Thermal relay has tripped	Check thermal relay and active/re set thermal relay
	A/C contactor has not closed	Check A/C contactor
	Compressor internal thermal protection	wait until compressor cool down
	controller trouble	check controller compressor signal NO1 output
Compressor make a sound but no action	Compressor high/low pressure not balanced	check HP and LP readings
	Voltage is too low	check voltage
	Low starting voltage (single phase)	check start capacitor, soft-starter
	Compressor broken or stuck	check compressor windings
Compressor can not stop	A/C contactor stuck	replace
	controller trouble	check controller compressor signal NO1 output
Unit heating efficiency is low	heat exchanger is contaminated	clean
	gas filling not enough	check and add gas
	compressor trouble	replace

Maintenance

To prevent faults due to sediment in the heat exchangers, care must be taken to ensure that no impurities can enter either the heat source system or the heating system. In the event that operating malfunctions due to contamination occur nevertheless the system should be cleaned as described below.

Cleaning the Heating System

The ingress of oxygen into the heating water circuit may result in the formation of oxidation products (rust), particularly if steel components are used. This oxygen enters the heating system via the valves, the circulating pumps and/or plastic pipes. It is therefore essential - in particular with respect to the piping of under-floor heating systems - that only diffusion-proof materials are used.

A suitable corrosion protection system to prevent the formation of deposits (e.g. rust) in the heat exchanger of the heat pump is recommended.

Residue from lubricants and sealants may also contaminate the heating water. In the case of severe contamination leading to a reduction in the performance of the heat exchanger in the heat pump, the system must be cleaned by a heating technician. We recommend flushing the heat exchanger in the direction opposite to the normal flow direction. To prevent acidic cleaning agents from entering the heating system circuit, we recommend connecting the flushing device directly to the flow and return flow of the heat exchanger. It is important that the system be thoroughly flushed using appropriate neutralizing agents to prevent any damage from being caused by the cleaning agent residue remaining in the system. Acids must be used with great care and all relevant regulations of the employers' liability insurance associations must be adhered to. If in doubt, contact the manufacturer of the chemicals to be used.

Cleaning the Heat Source System

A particle filter is inserted in the heat source inlet of the heat pump to protect the heat exchanger against the ingress of impurities. When the system is first put into operation, the filter screen of the particle filter should be cleaned in relatively short intervals. These intervals can be prolonged once the amount of impurities decreases.

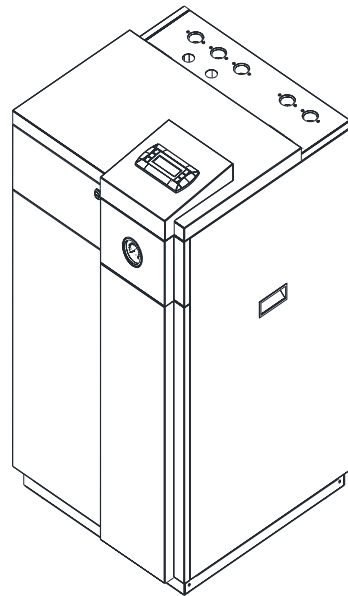
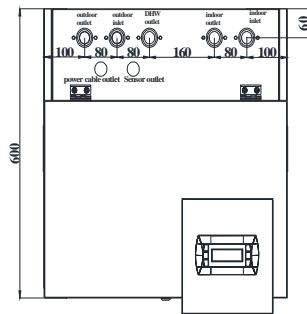
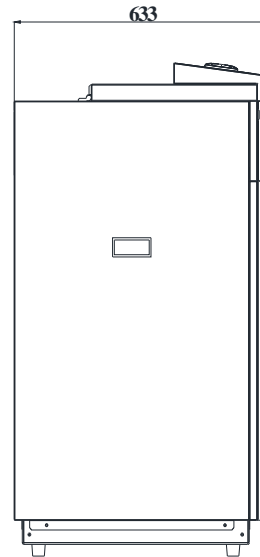
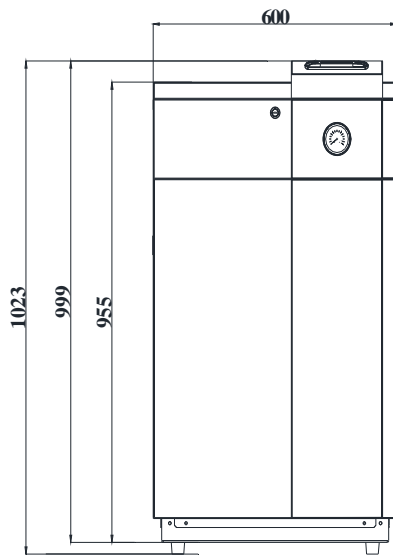
Water Quality Requirements

The ground water should not contain any substances that could form deposits.

The use of surface water or water containing salt is not permissible. Your local water utility can provide you with general information regarding the possible use of ground water. Water analyses are carried out by specially-equipped laboratories.

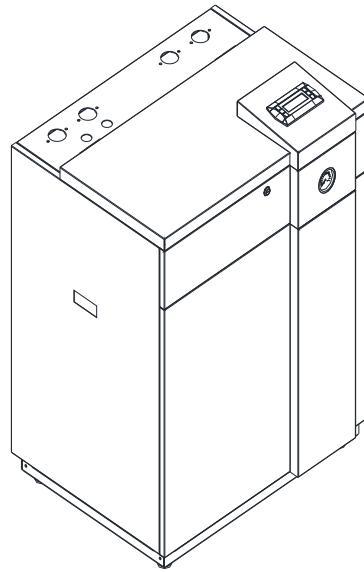
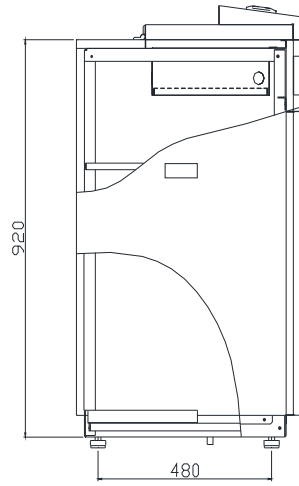
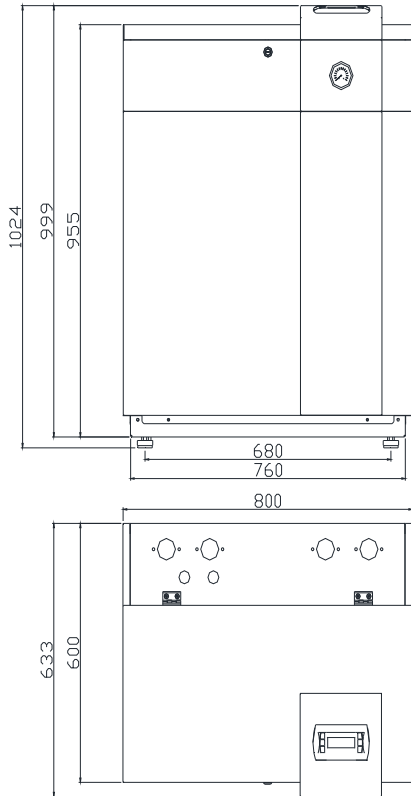
Dimension

GS04- GS20 Dimension



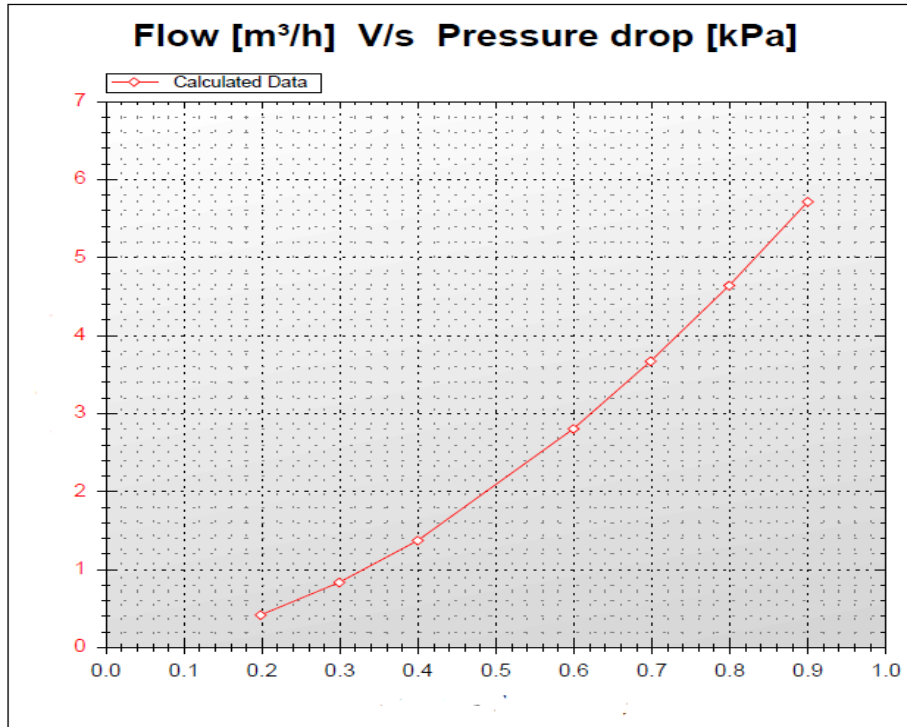
Dimension

GS26- GS30 Dimension

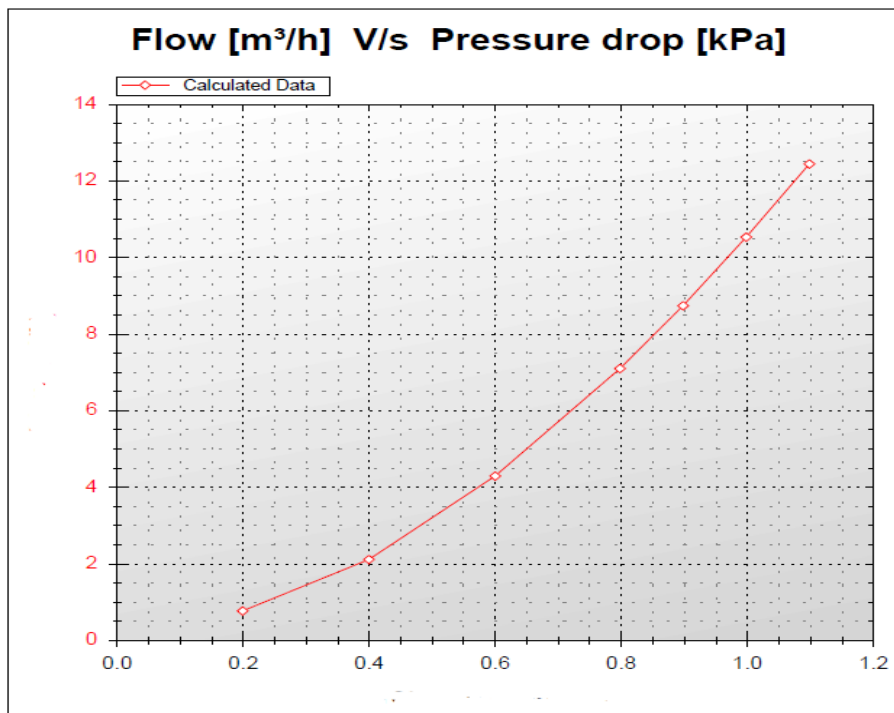


Pressure Drop Curve

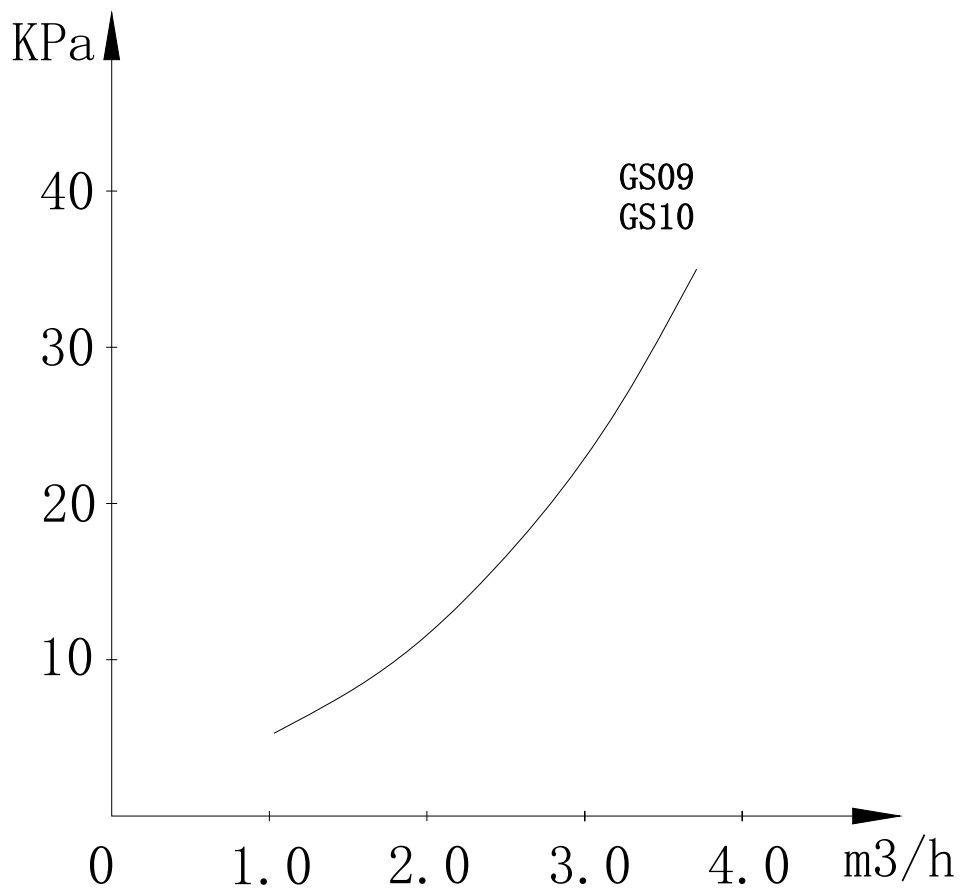
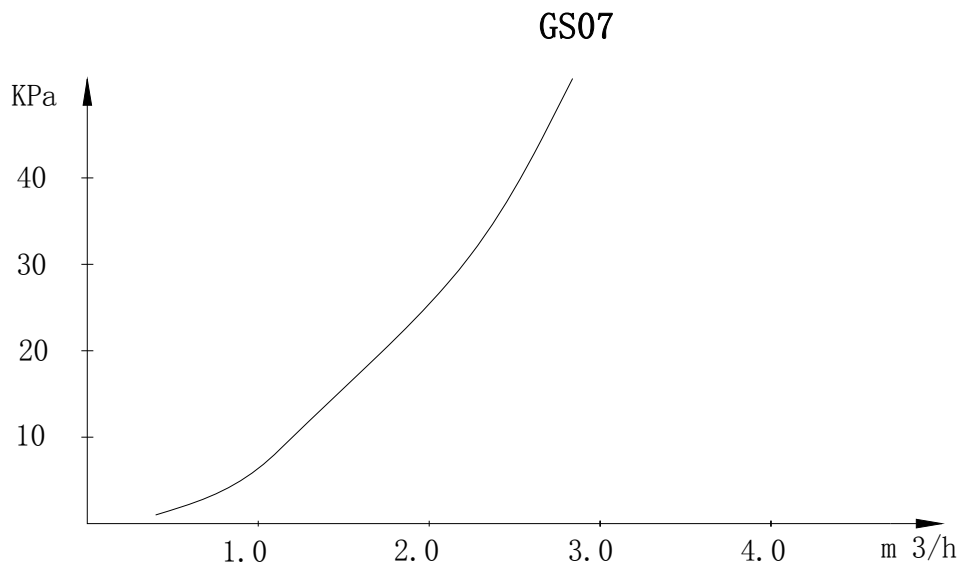
GS04 indoor pressure drop



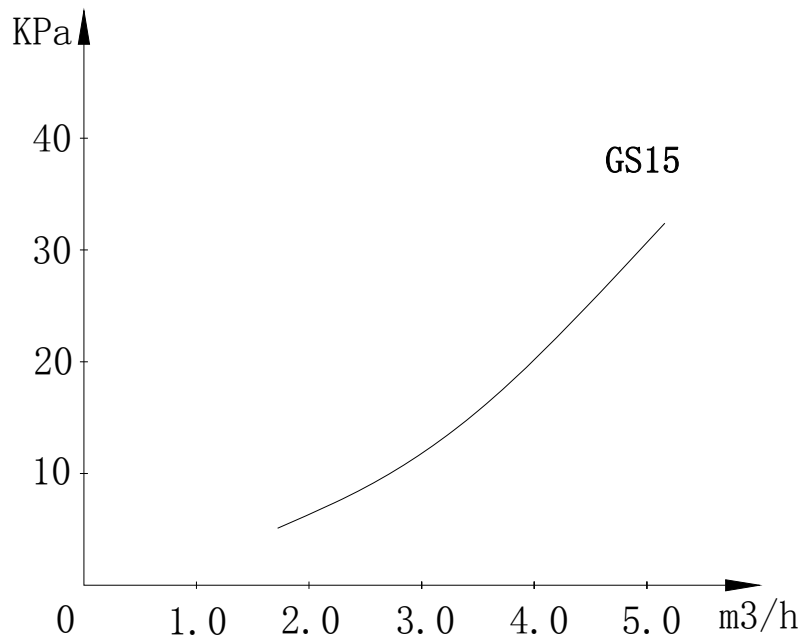
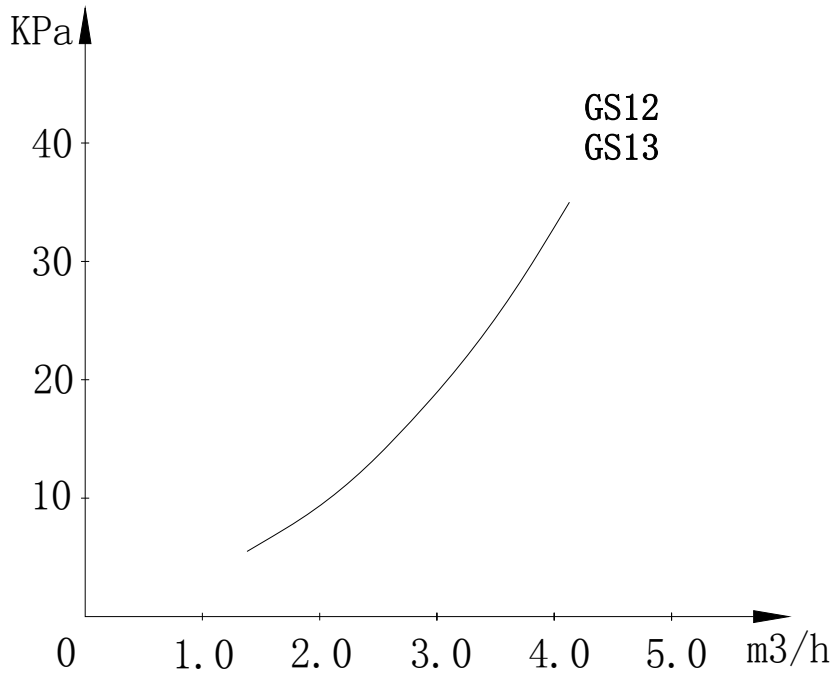
GS04 Outdoor pressure drop



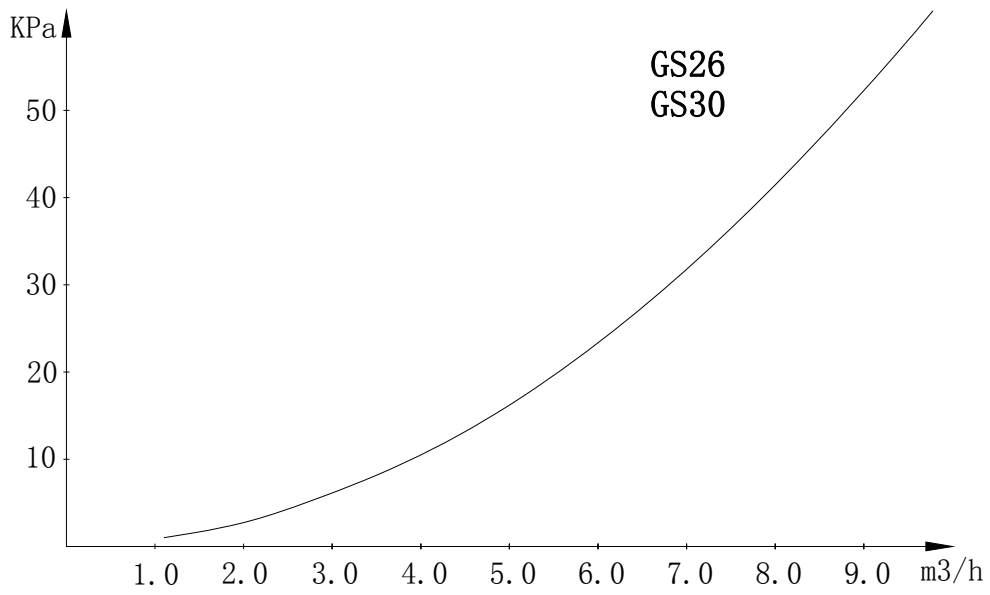
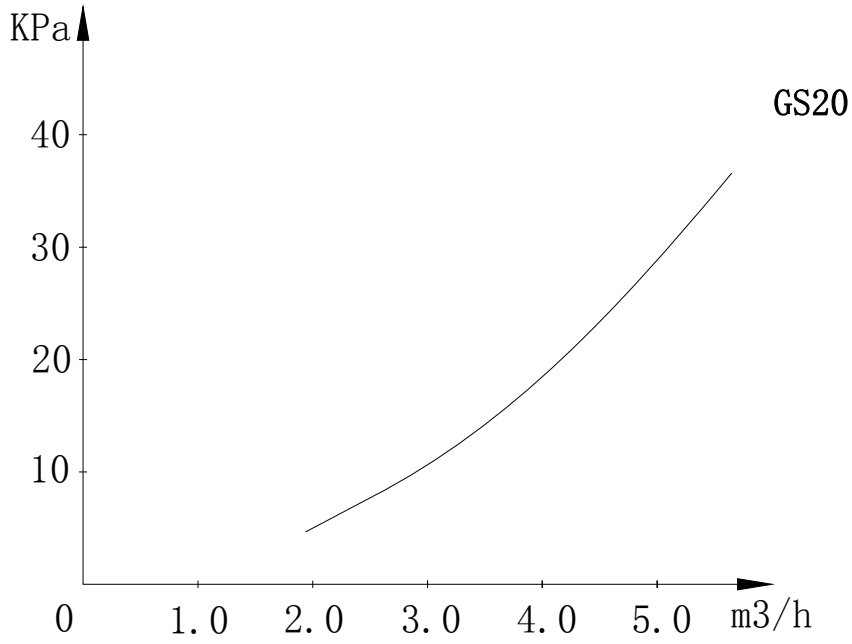
Pressure Drop Curve



Pressure Drop Curve



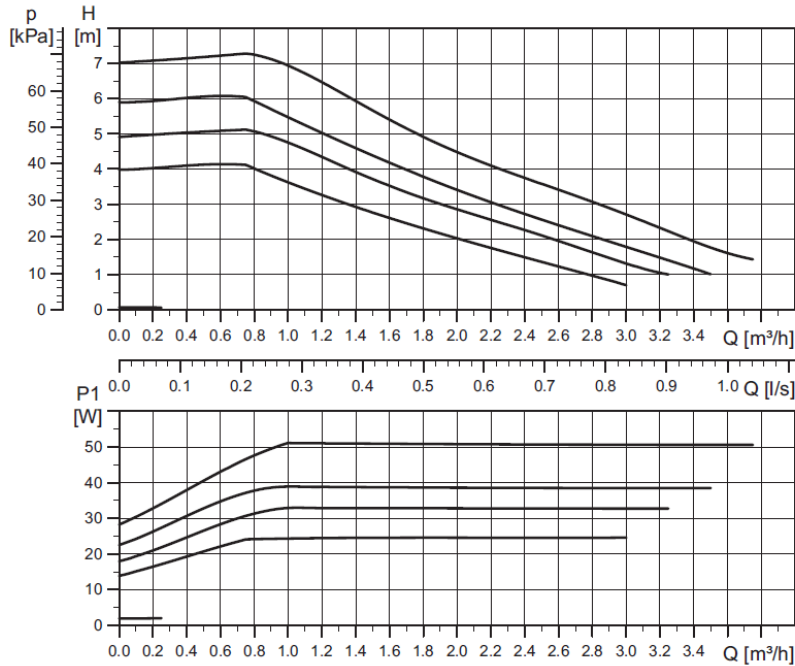
Pressure Drop Curve



Optional pump curve

GS04-GS10 Optional high efficiency pump curve

UPM3 FLEX AS 15-70 130, 25-70 130, 25-70 180



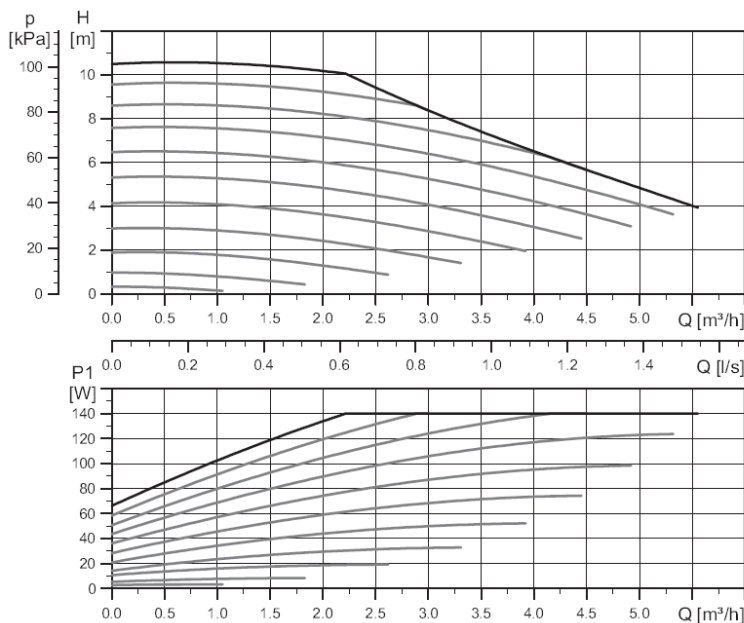
High efficiency

Ready for Ecodesign
2015

$EEl \leq 0.20$ Part 3
 $P_{L,avg} \leq 23$ W

GS12-GS15 Optional high efficiency pump curve

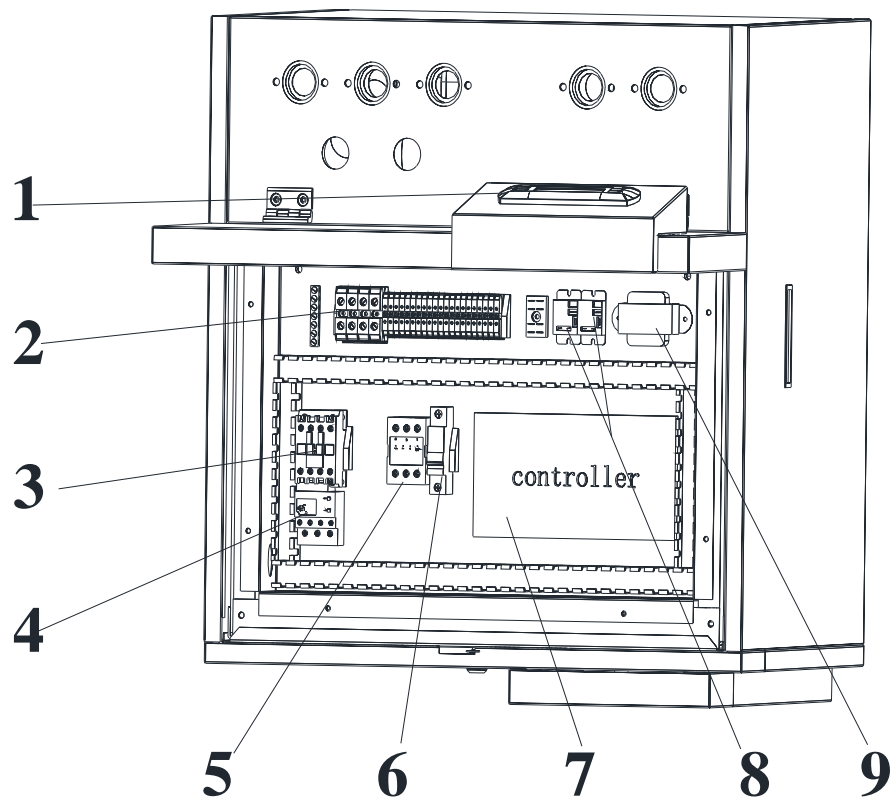
UPML 25-105 130 PWM, 1 x 230 V, 50/60 Hz



$EEl \leq 0.23$

Components

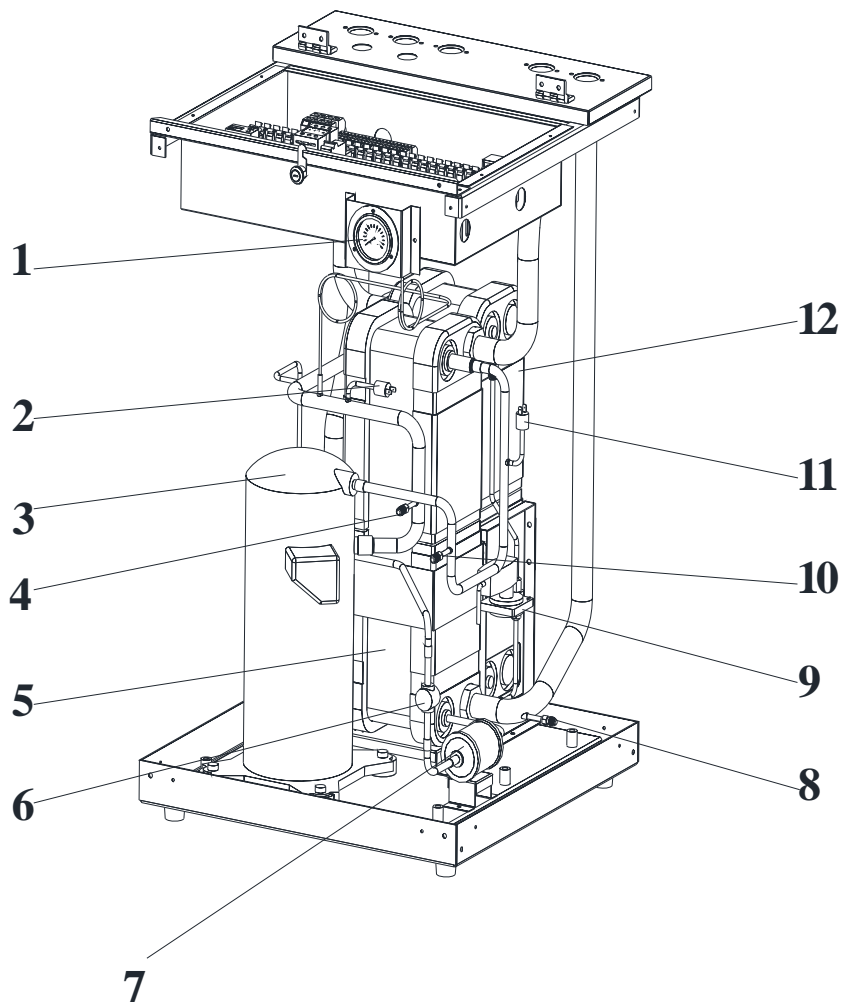
Triple phase units control board



- | | |
|------------------------------|---|
| 1. Interface | 2. Circuit breaker |
| 3. Connection terminal strip | 7. Carel PCB |
| 4. A/C contactor | 8. 30A relay (only for units $\leq 20\text{KW}$) |
| 5. Thermal overload relay | 9. Transformer 230V/24V |
| 6. Phase relay | |

Components

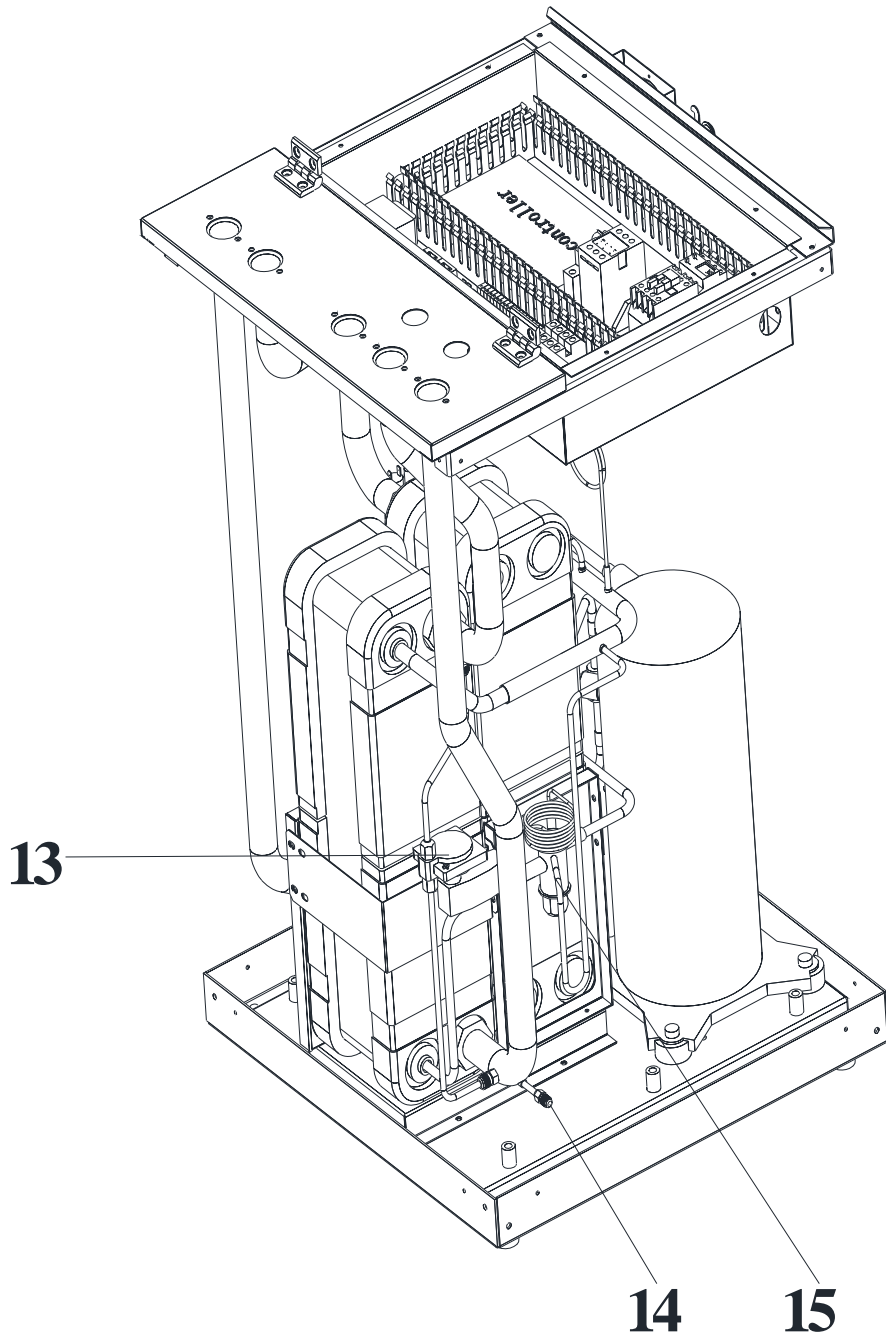
Heating only units



- | | |
|-------------------------------------|---|
| 1. Low Pressure Gauge | 7. Filter Dryer |
| 2. Low Pressure Switch | 8. Indoor Side Drain Valve |
| 3. Compressor | 9. Indoor Side Differential Pressure Flow Switch (option) |
| 4. Service Connection, Low Pressure | 10. Service Connection, High Pressure |
| 5. Indoor Side Heat Exchanger | 11. High Pressure Switch |
| 6. Refrigerant Liquid Indicator | 12. Outdoor Side Heat Exchanger |

Components

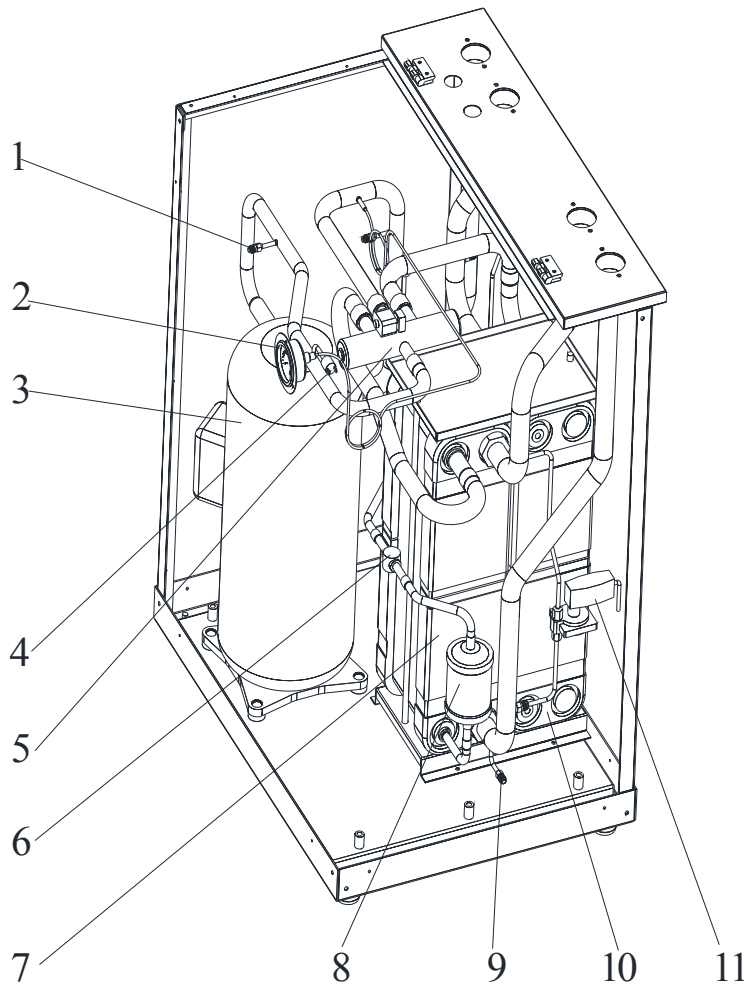
Heating only units



- 13. Outdoor Side Differential Pressure Flow Switch (option)
- 14. Outdoor Side Drain Valve
- 15. Expansion Valve

Components

Heating and cooling units

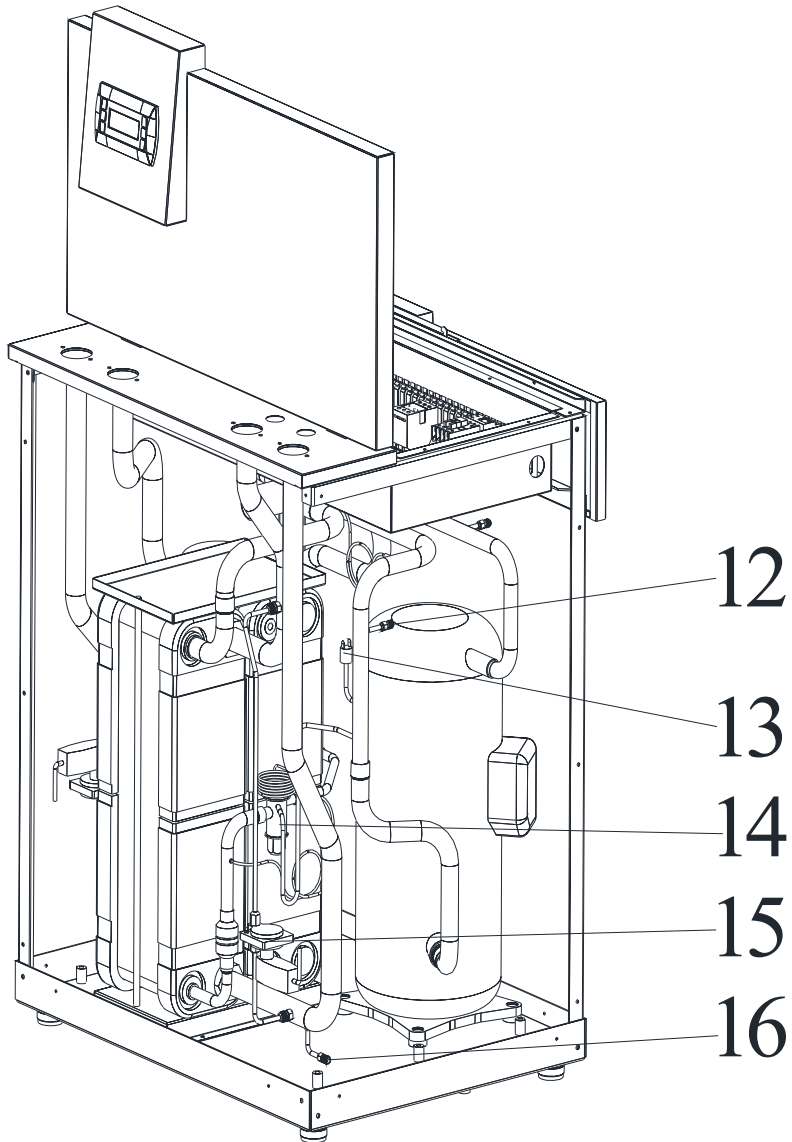


1. Service Connection, High Pressure
2. Low Pressure Gauge
3. Compressor
4. High Pressure Switch
5. 4 way valve
6. Refrigerant Liquid Indicator

7. Indoor Plate Heat Exchanger
- 8.. Filter Dryer
9. Indoor Side Drain Valve
10. Outdoor Side Heat Exchanger
11. Indoor Side Differential Pressure Flow Switch (option)

Components

Heating and cooling units



- 12. Service Connection, Low Pressure.
- 13. Low Pressure Switch
- 14. Expansion Valve
- 15. Outdoor Side Differential Pressure Flow Switch (option)
- 16. Outdoor Side Drain Valve

Temperature and sensor resistance table

Temperature and sensor resistance table

Except B5 PT sensor, other temperature sensors from B1 to B8 is NTC10K

NTC10K@25°C B 3435

Temp. °C	resistant KΩ		
	Max	standard	Min.
-50	344.40	329.20	314.70
-49	324.70	310.70	297.20
-48	306.40	293.30	280.70
-47	289.20	277.00	265.30
-46	273.20	261.80	250.60
-45	258.10	247.50	237.20
-44	244.00	234.10	224.60
-43	230.80	221.60	212.70
-42	218.50	209.80	201.50
-41	206.80	198.70	191.00
-40	195.90	188.40	181.10
-39	185.40	178.30	171.59
-38	175.50	168.90	162.00
-37	166.20	160.10	154.10
-36	157.50	151.80	140.20
-35	149.30	144.00	138.80
-34	141.60	136.60	131.80
-33	134.40	129.70	125.20
-32	127.60	123.20	118.90
-31	121.20	117.10	113.10
-30	115.10	111.30	107.50
-29	109.30	105.70	102.20
-28	103.80	100.40	97.16
-27	98.63	95.47	92.41
-26	93.75	90.80	87.93
-25	89.15	86.39	83.70
-24	84.82	82.22	79.71
-23	80.72	78.29	75.93
-22	76.85	74.58	72.36
-21	73.20	71.07	68.99
-20	69.74	67.74	65.80
-19	66.42	64.54	62.72
-18	63.27	61.52	59.81
-17	60.30	58.66	57.05
-16	57.49	55.39	51.97
-15	54.83	53.39	51.97
-14	52.31	50.96	49.83
-13	49.93	48.65	47.12
-12	47.67	46.48	45.31
-11	45.53	44.41	43.32
-10	43.50	42.25	41.43
-9	41.54	40.56	39.59
-8	39.68	38.76	37.85
-7	37.91	37.05	36.20
-6	36.24	35.43	34.02
-5	34.65	33.89	33.14
-4	33.14	32.43	31.73
-3	31.71	31.04	30.39
-2	30.35	29.72	29.11
-1	30.00	28.47	27.89
0	27.83	27.28	26.74

Temp. °C	resistant KΩ		
	Max	Standard	Min.
1	26.64	26.13	25.52
2	25.51	25.03	24.55
3	24.24	23.99	23.54
4	23.42	22.99	22.57
5	22.45	22.05	21.66
6	21.52	21.15	20.78
7	20.64	20.29	19.95
8	19.80	19.40	19.15
9	19.00	18.70	18.40
10	18.24	17.96	17.67
11	17.51	17.24	16.97
12	16.80	16.55	16.31
13	16.13	15.90	15.87
14	15.50	15.28	15.06
15	14.89	14.68	14.48
16	14.31	14.12	13.93
17	13.75	13.57	13.40
18	13.22	13.06	12.89
19	12.72	12.56	12.41
20	12.23	12.09	11.95
21	11.77	11.63	11.57
22	11.32	11.20	11.07
23	10.90	10.78	10.60
24	10.49	10.38	10.27
25	10.10	10.00	9.90
26	9.73	9.63	9.52
27	9.38	9.28	9.18
28	9.04	8.94	8.84
29	8.72	8.62	8.52
30	8.41	8.31	8.21
31	8.11	8.01	7.91
32	7.82	7.72	7.62
33	7.55	7.45	7.35
34	7.28	7.19	7.09
35	7.03	6.94	6.84
36	6.79	6.69	6.60
37	6.56	6.46	6.37
38	6.33	6.24	6.15
39	6.12	6.03	5.94
40	5.92	5.82	5.73
41	5.72	5.63	5.54
42	5.53	5.43	5.35
43	5.34	5.25	5.17
44	5.16	5.08	4.99
45	4.99	4.91	4.82
46	4.83	4.74	4.66
47	4.67	4.59	4.51
48	4.52	4.44	4.36
49	4.38	4.30	4.22
50	4.24	4.16	4.08
51	4.10	4.02	3.95
52	3.97	3.90	3.82
53	3.84	3.77	3.69
54	3.72	3.65	3.57
55	3.61	3.53	3.46

Temp. °C	resistant KΩ		
	Max	Standard	Min.
56	3.49	3.42	3.35
57	3.39	3.31	3.24
58	3.28	3.21	3.14
59	3.18	3.11	3.04
60	3.09	3.02	2.95
61	2.99	2.92	2.86
62	2.90	2.83	2.77
63	2.81	2.75	2.69
64	2.73	2.66	2.60
65	2.65	2.58	2.52
66	2.57	2.51	2.45
67	2.49	2.43	2.37
68	2.42	2.36	2.30
69	2.35	2.29	2.24
70	2.28	2.22	2.17
71	2.21	2.16	2.10
72	2.15	2.10	2.04
73	2.09	2.04	1.98
74	2.03	1.98	1.93
75	1.97	1.92	1.87
76	1.92	1.87	1.82
77	1.86	1.81	1.78
78	1.81	1.76	1.71
79	1.76	1.71	1.68
80	1.71	1.66	1.62
81	1.66	1.62	1.57
82	1.62	1.57	1.53
83	1.57	1.53	1.49
84	1.53	1.49	1.44
85	1.49	1.45	1.40
86	1.45	1.41	1.37
87	1.41	1.37	1.33
88	1.37	1.33	1.29
89	1.34	1.30	1.26
90	1.30	1.26	1.22
91	1.27	1.23	1.19
92	1.23	1.20	1.16
93	1.20	1.16	1.13
94	1.17	1.13	1.10
95	1.14	1.10	1.07
96	1.11	1.08	1.04
97	1.08	1.05	1.01
98	1.05	1.02	0.99
99	1.03	0.99	0.96
100	1.00	0.97	0.94
101	0.98	0.94	0.91
102	0.95	0.92	0.89
103	0.93	0.90	0.87
104	0.91	0.87	0.84
105	0.88	0.85	0.82
106	0.86	0.83	0.80
107	0.84	0.81	0.78
108	0.82	0.79	0.76
109	0.80	0.77	0.74
110	0.78	0.75	0.73

+03C220655 - rel.1.3 - 23.08.2010

Temperature and sensor resistance table

B5 PT is NTC 50K sensor

NTC 50K@25°C B 3977

Temp. -resistant

Temp. °C	resistant KΩ	TCR %/°C	Min.		Max.		% tolerance		°C tolerance	
			KΩ	KΩ	KΩ	KΩ	Min.	Max.	Min.	Max.
-40	1630.77	-6.623	1559.17	1705.49	-4.39	4.58	0.66	-0.69		
-35	1178.11	-6.385	1130.05	1228.08	-4.08	4.24	0.64	-0.66		
-30	860.97	-6.161	828.44	894.68	-3.78	3.92	0.61	-0.64		
-25	636.08	-5.950	613.91	658.99	-3.49	3.60	0.59	-0.61		
-20	474.78	-5.751	459.57	490.44	-3.20	3.30	0.56	-0.57		
-15	357.83	-5.562	347.35	368.59	-2.93	3.01	0.53	-0.54		
-10	272.18	-5.384	264.93	279.59	-2.66	2.73	0.49	-0.51		
-5	208.83	-5.214	203.81	213.96	-2.41	2.45	0.46	-0.47		
0	161.56	-5.053	158.08	165.10	-2.15	2.19	0.43	-0.43		
5	125.97	-4.900	123.56	128.41	-1.91	1.94	0.39	-0.40		
10	98.96	-4.755	97.30	100.63	-1.67	1.69	0.35	-0.36		
15	78.29	-4.616	77.16	79.43	-1.44	1.45	0.31	-0.31		
20	62.37	-4.483	61.61	63.13	-1.22	1.22	0.27	-0.27		
25	50.00	-4.357	49.50	50.50	-1.00	1.00	0.23	-0.23		
30	40.34	-4.236	39.85	40.83	-1.21	1.22	0.29	-0.29		
35	32.73	-4.120	32.27	33.20	-1.42	1.43	0.34	-0.35		
40	26.71	-4.009	26.28	27.15	-1.62	1.64	0.40	-0.41		
45	21.92	-3.903	21.52	22.32	-1.81	1.84	0.46	-0.47		
50	18.08	-3.801	17.72	18.45	-2.00	2.03	0.53	-0.53		
55	14.99	-3.704	14.66	15.32	-2.19	2.22	0.59	-0.60		
60	12.48	-3.610	12.19	12.78	-2.36	2.41	0.65	-0.67		
65	10.44	-3.519	10.18	10.72	-2.54	2.59	0.72	-0.74		
70	8.78	-3.433	8.54	9.02	-2.71	2.77	0.79	-0.81		
75	7.41	-3.349	7.20	7.63	-2.87	2.95	0.86	-0.88		
80	6.28	-3.269	6.09	6.48	-3.03	3.12	0.93	-0.95		
85	5.34	-3.191	5.17	5.52	-3.19	3.28	1.00	-1.03		
90	4.56	-3.117	4.41	4.72	-3.34	3.45	1.07	-1.11		
95	3.91	-3.045	3.78	4.05	-3.49	3.61	1.15	-1.18		
100	3.37	-2.975	3.24	3.49	-3.64	3.76	1.22	-1.26		
105	2.91	-2.908	2.80	3.02	-3.78	3.92	1.30	-1.35		
110	2.52	-2.843	2.42	2.62	-3.92	4.06	1.38	-1.43		
115	2.19	-2.781	2.10	2.28	-4.05	4.21	1.46	-1.51		
120	1.91	-2.720	1.83	1.99	-4.18	4.35	1.54	-1.60		
125	1.67	-2.662	1.59	1.74	-4.31	4.50	1.62	-1.69		
130	1.46	-2.605	1.40	1.53	-4.44	4.63	1.70	-1.78		
135	1.28	-2.551	1.22	1.34	-4.56	4.77	1.79	-1.87		
140	1.13	-2.498	1.08	1.19	-4.68	4.90	1.87	-1.96		
145	1.00	-2.446	0.95	1.05	-4.80	5.03	1.96	-2.06		
150	0.89	-2.396	0.84	0.93	-4.91	5.16	2.05	-2.15		

Technical specifications

Heating only models:

Heat pump	Type	GS07	GS09	GS12	GS10	GS13	GS15	GS20	GS26	GS30	
Dimensions, weights, connection dimensions											
Dimensions	HxWxD	1040x640X600							1040x640X800		
Weight	kg	105	130	140	130	140	150	160	190	195	
Refrigerant	Type	R410A							R410A		
Filling weight	kg	1.30	1.60	1.70	1.60	1.70	2.10	2.15	2.80	3.30	
Permissible operating pressure	Mpa	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	
Pipe connector-hot side	Inch	G1"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/2"	G1 1/2"	G1 1/2"	
Pipe connector-cold side	Inch	G1"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/4"	G1 1/2"	G1 1/2"	G1 1/2"	
Evaporator	Type	Braze plate heat exchanger									
Condenser	Type	Braze plate heat exchanger									
Compressor		1xRotary	1xScroll								
Performance Heat pump											
Heat output	at B0/W35	kW	7.0	8.6	11.5	9.7	12.8	14.8	19.4	27.6	34.2
Power consumption		kW	1.76	2.21	2.93	2.45	3.26	3.75	4.92	7.10	8.76
Performance factor			3.98	3.89	3.92	3.96	3.93	3.95	3.94	3.89	3.9
Indoor side volume flow		m3/h	1.20	1.48	1.98	1.67	2.20	2.55	3.34	4.75	5.88
Indoor side pressure drop		kpa	10	12	15	13	21	22	29	36	39
Outdoor side volume flow		m3/h	1.60	1.83	2.46	2.08	2.73	3.17	4.15	5.88	7.29
Outdoor side pressure drop		kpa	13	14	22	20	23	27	34	40	46
Heat output		at W10/W35	kW	10.2	11.7	15.5	13.0	17.5	19.9	26.0	35.6
Power consumption	kW		1.85	2.17	2.88	2.38	3.20	3.66	4.8	6.6	8.39
Performance factor			5.51	5.39	5.38	5.46	5.47	5.44	5.42	5.39	5.36
Indoor side volume flow	m3/h		1.75	2.01	2.67	2.24	3.01	3.42	4.47	6.12	7.74
Indoor side pressure drop	kpa		14	15	23	19	26	29	38	42	49
Outdoor side volume flow	m3/h		2.53	2.73	3.62	3.04	4.10	4.66	6.08	8.31	10.49
Outdoor side pressure drop	kpa		20	22	29	25	32	37	45	54	61
Power	Type	Single phase with Panasonic compressor	Single phase with Daikin compressor		Triple phase with Hitachi compressor				Triple phase with Copeland compressor		
Sound power level	dB(A)	49	47	48	47	48	48	48	51	52	

The above data is tested by EN14511

Technical specifications

Heating and cooling models:

Heat pump	Type	GS07/B	GS09/B	GS12/B	GS10/B	GS13/B	GS15/B	GS20/B	GS26/B	GS30/B	
Dimensions, weights, connection dimensions											
Dimensions	HxWxD	1040x640X600							1040x640X800		
Weight	kg	107	132	142	132	142	130	162	192	197	
Refrigerant	Type	R410A									
Filling weight	kg	1.60	1.75	1.90	1.80	1.80	2.20	2.75	3.10	3.60	
Permissible operating pressure	Mpa	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	
Pipe connector-hot side	Inch	G1"	G1¼"	G1¼"	G1¼"	G1¼"	G1¼"	G1½"	G1½"	G1½"	
Pipe connector-cold side	Inch	G1"	G1¼"	G1¼"	G1¼"	G1¼"	G1¼"	G1½"	G1½"	G1½"	
Evaporator	Type	Braze plate heat exchanger									
Condenser	Type	Braze plate heat exchanger									
Compressor		1xRotary	1xScroll								
Performance Heat pump											
Heat output	at B0/W35	kW	6.9	8.6	11.4	9.5	12.6	14.7	19.2	27.3	34.0
Power consumption		kW	1.75	2.25	2.96	2.42	3.23	3.80	4.92	7.05	8.80
Performance factor			3.94	3.82	3.85	3.93	3.9	3.87	3.9	3.87	3.86
Indoor side volume flow		m3/h	1.19	1.48	1.96	1.63	2.17	2.53	3.30	4.70	5.85
Indoor side pressure drop		kpa	10	12	15	13	21	22	29	36	39
Outdoor side volume flow		m3/h	1.48	1.82	2.42	2.03	2.69	3.12	4.09	5.81	7.22
Outdoor side pressure drop		kpa	13	14	22	20	23	27	34	40	46
Heat output		at W10/W35	kW	10.0	11.4	15.2	12.8	17.3	19.8	25.8	35.2
Power consumption	kW		1.82	2.12	2.85	2.36	3.2	3.72	4.85	6.58	8.38
Performance factor			5.49	5.38	5.33	5.42	5.41	5.32	5.32	5.35	5.33
Indoor side volume flow	m3/h		1.72	1.96	2.61	2.20	2.98	3.41	4.44	6.05	7.69
Outdoor side volume flow	m3/h		2.23	2.66	3.54	2.99	4.04	4.61	6.01	8.20	10.41
Cool output	at W30/W7	kW	7.5	9.3	12.8	10.2	12.9	15.0	20.4	28.1	34.2
Power consumption		kW	1.85	2.32	3.20	2.58	3.28	3.78	5.00	7.08	8.60
Performance factor			4.05	3.99	4.01	3.95	3.92	3.96	4.08	3.97	3.98
Inside volume flow		m3/h	1.29	1.59	2.21	1.75	2.21	2.57	3.51	4.83	5.88
Outside volume flow		m3/h	1.61	1.99	2.76	2.20	2.78	3.22	4.37	6.05	7.36
Power	Type	Single phase	Single phase r			Triple phase			Triple phase		
Sound power level	dB(A)	49	47	48	47	48	48	48	51	52	

The above data is tested by EN14511

B0/W35 means heating source brine inlet temp. 0°C, heating flow temp. 35°C

W10/W35 means heating source water inlet temp. 10°C, heating flow temp. 35°C

W35/W7 means Cooling source water inlet temp. 35°C, Cooling flow temp. 7°C

R410A saturated pressure vs temperature table

On the side cabinet of the unit, there is a pressure gauge indicating the evaporation pressure



R410A saturated pressure vs temperature table

R410A saturated pressure and temp.

