JOLIET

energies renouvelables

Technical Manual and Installation details

AIRPAC™

Air source, reversible Heat Pumps with hot water production

With **SIEMENS** controller

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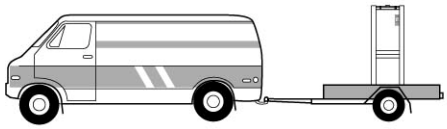
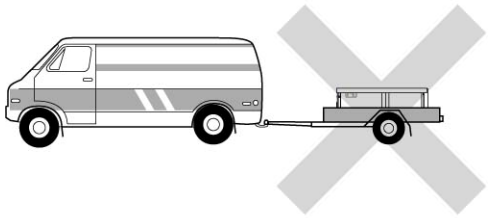
info@joliet-europe.com

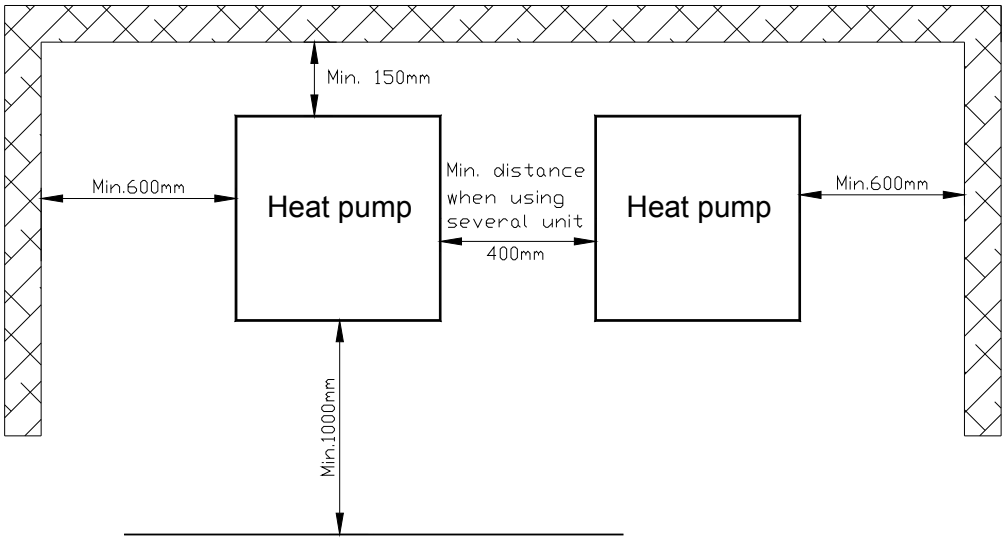
Pre Installation

The heat pump must be transported in an upright position and stored in at dry area.





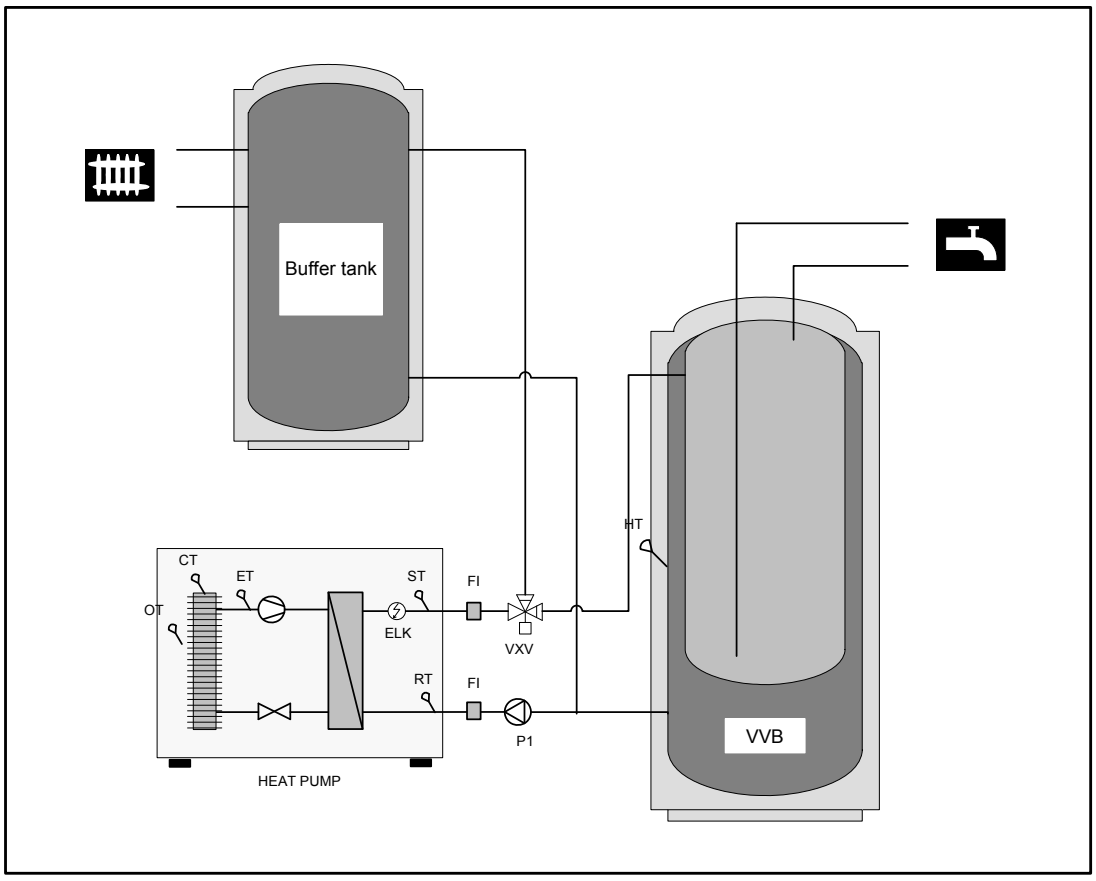
The heat pump must be installed on concrete plinth
If the unit is installed outside please ensure that rain water cannot fall directly on to the heat pump.
Keep a suitable distance between the unit and the building to ensure the normal running and enough maintenance space.



Installation should be carried out according to local regulations by a competent heating engineer.

Hydraulic configurations

Using a heat pump for heating and domestic hot water production



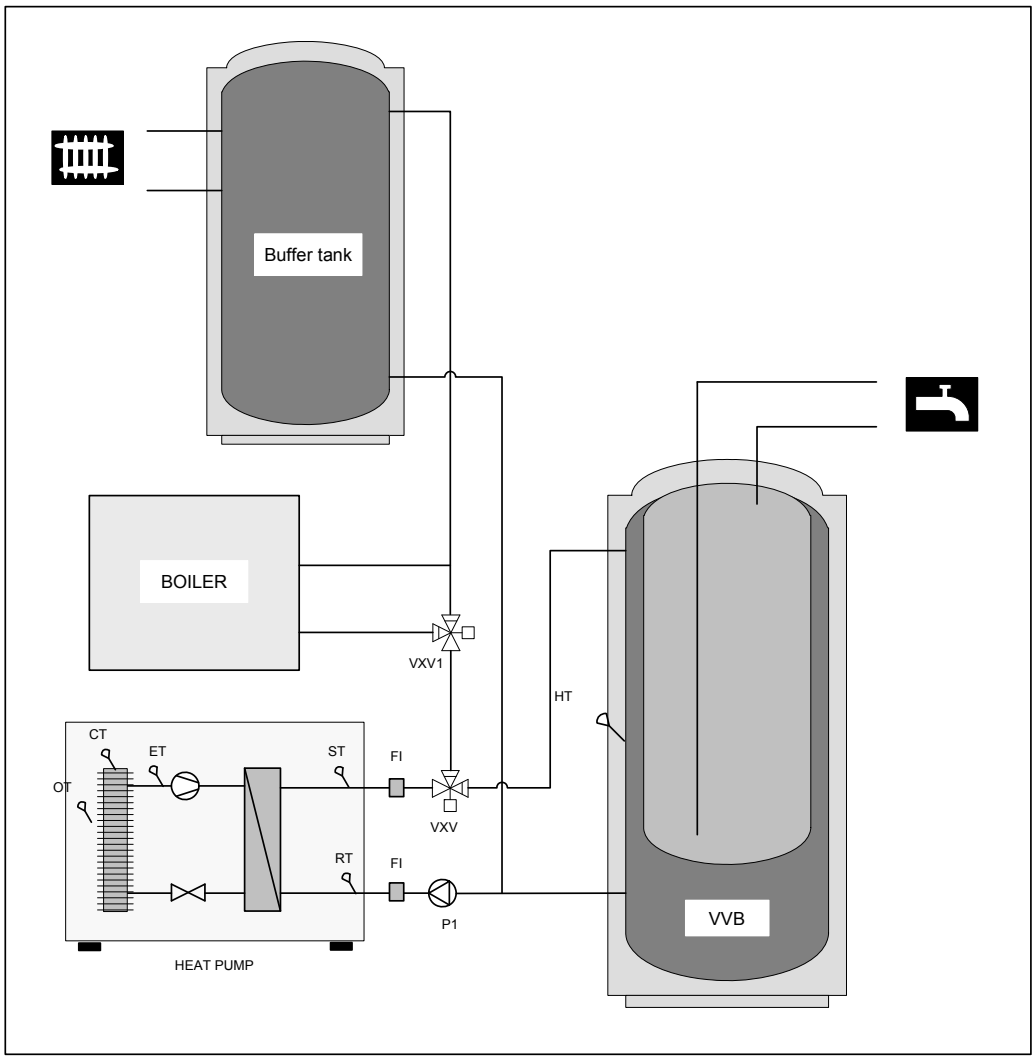
Name	Description	Included	Name	Description	Included
P1	Circulation pump	Internal(Option)	RT	Return temperature sensor	Internal
ELK	Electric heater	Internal(Option)	ST	Flow temperature sensor	Internal
VXV	Change over Valve	External(Option)	OT	Outdoor temperature sensor	Internal
VVB	Hot water tank	-	HT	Hot water temperature	Internal
FI	Soft joint	-	CT	Condenser temperature	Internal
			ET	Evaporating temperature	Internal

Using a heat pump for heating and domestic hot water production

This configuration requires a three way valve (VXV) and an external water pump. The three way valve should be installed to give priority to domestic hot water provision. When the operator set temperature is achieved the three way valve will revert to supply the heating circuit.

The hot water temperature sensor (HT) must be connected to the PC board and connected with the hot water tank.
The internal electric immersion heater (ELK) start is determined by ST07 and ST08

Using a heat pump for heating and domestic hot water production, in relay with an existing boiler.

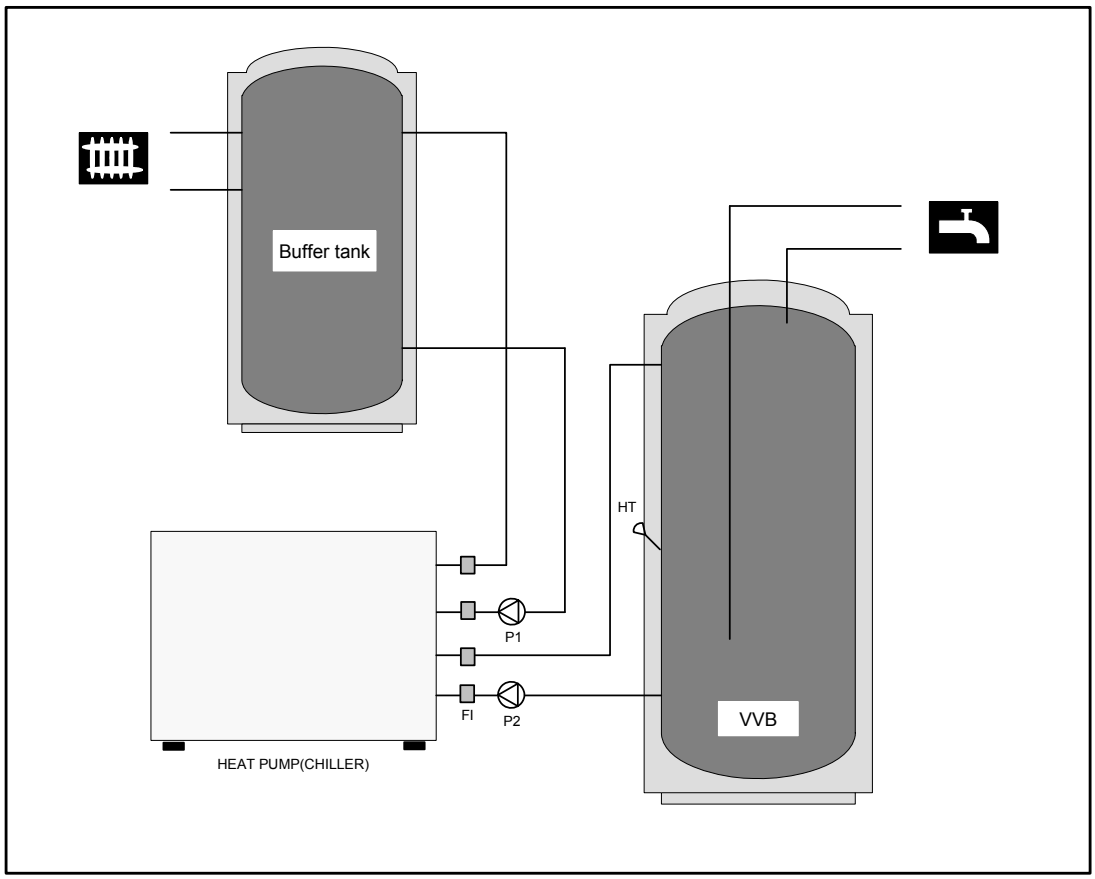


Name	Description	Included?	Name	Description	Included?
P1	Circulation pump	Internal(Option)	RT	Return temperature sensor	Internal
VXV	Change over Valve	External(Option)	ST	Flow temperature sensor	Internal
VVB	Hot water tank	-	OT	Outdoor temperature sensor	Internal
FI	Soft joint	-	HT	Hot water temperature	Internal
			CT	Condenser temperature	Internal
			ET	Evaporating temperature	Internal

This configuration requires a three way valve (VXV) and an external water pump. The three way valve should be installed to give priority to domestic hot water provision. When the operator set temperature is achieved the three way valve will revert to supply the heating circuit.

The hot water temperature sensor (HT) must be connected to the PC board and connected with the hot water tank.
When the boiler is started, change over valve VXV transfers to Boiler to make the heating water go through Boiler.
Boiler's start is set by ST07 and ST08. When you set ST07=SF02 and ST08=SF03, the unit will automatically transfer to Boiler heating or revert to Heat Pump heating.

Using a heat pump for cooling + heat recovery



When cooling, A/C water pump P1 runs, hot water pump P2 runs for daily hot water.
When heating, only A/C water pump P1 runs.
When only hot water is required, only hot water pump P2 runs, the daily hot water is priority.
The daily hot water sensor has already put into the electric box, one side is already connected with the controller, the other side should be put into the daily hot water tank.

Pipe connections

Pipework installation must be carried out in accordance with current norms and directives.

The heat pump has a max return temperature of approximately 50℃ and an outgoing max temperature from the heat pump of approximately 60℃.

It is recommended that the installation is fitted with shutoff valves (AV) these must be fitted outside of the heat pump to facilitate future service.

The pipe work must be flushed before the heat pump is connected, so that any contaminants do not damage the components parts.

Connections

The equipment must not be connected without the permission of the electricity supplier and must be connected under the supervision of a qualified electrician.

When the building is equipped with an earth-fault breaker the heat pump should be equipped with a separate one.

The equipment must be protected by a dedicated fused switch. All internal electrical equipment except the outdoor temperature sensor are pre connected at the factory. The heat pump must be fitted with a dedicated earth fault breaker.

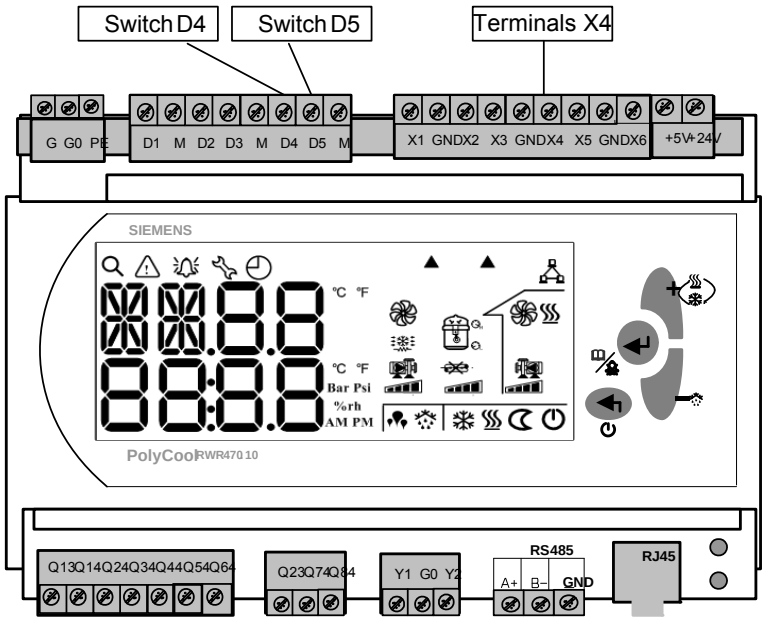
Disconnect the heat pump from the mains supply before any maintenance work.

Pay attention to phase connections in three phase applications.

Electrical installation and service must be carried out under the supervision of a qualified electrician. Electrical installation and wiring must be carried out in accordance with local regulations.

Power connection

Before connecting the power supply, please confirm the power requirement of the heat pump. European models are supplied with 230V/1/50Hz (1 phase) and 400V/3/50Hz (3 phase) supply.



Temperature sensor for hot water

The supplied sensor is connected using a two-wire cable to terminal positions X4 on the main board. The sensor is placed in a submerged tube on the accumulator tank.

A/C and heating main switch

The air conditioner's switch D4 must be ON when it is to be started. An external ON/OFF switch could be connected to start or stop the air conditioner port .

Hot water switch

The hot water switch D5 must be ON if you want to start the hot water function. An external ON/OFF switch could be connected to start or stop the hot water function.

Indoor side water flow switch

The water flow switch is to check if the water is flowing or not in the pipe system. If it is ON, the water is flowing and the compressor can be started; otherwise, the compressor is prohibited to start. The connection of the water flow switch, please refer to the unit electric diagram.

Alarm output

In case of an internal problem with the unit, there is alarm signal output. The user can connect an alarm unit (such as an indicator light, bell etc), for detailed information, please refer to the units electric diagram.

Controller functions

SIEMENS POLYCOOL™

AC&R Controller

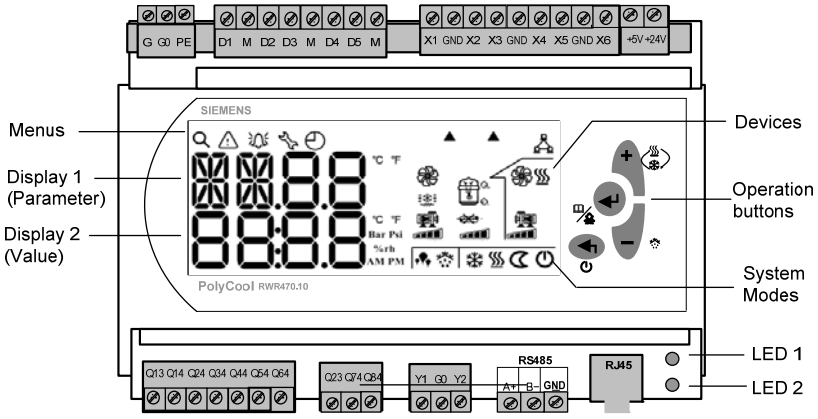
RWR470.10 for AIRPAC heat pump models

Key features are as follows:

- Non-programmable stand-alone controller, or networked via the communication of PCLBUS
- Strict user privilege control
- Multiple applications can be configured by setting parameters
- Control of inlet/outlet water/water temperature
- Fast application (with parameters) uploading and downloading via Poly Stick
- Complete alarm and warning management
- User-friendly icon HMI, LCD display and light blue backlight

LCD Display

Operation of RWR470.10 is fully driven by buttons and menus.



Operating buttons

Button	*Name*	*Use*
	<Esc>	In Menu /parameter setting mode, press it to return to the previous menu level, or to reject the value entered
	<Enter>	Press down it for more than 2 seconds and release it to enter the Menu mode
		In Menu/parameter setting mode, press it to confirm the selected menu level, or the value entered
		Press it to acknowledge/reset warnings and alarms
	<Plus>	Press it for 2 seconds to activate the System Mode in stop mode
		Or, press it to select the menu level, or to increase the value in Menu/parameter setting mode
	<Minus>	Press it to select the menu level, or to decrease the value in Menu/parameter setting mode

Legend for menus

Icon	*Meaning*	*Function*
	Query/view	Actual values of all temperature
	Warning	Existence of warning, and the latest 10 warnings
	Alarm	Existence of alarm and the latest 20 alarms
	Parameters	Set parameters and values (see also Menu Tree)

The unit of compressor and pump running time is 100 hours.
As for how to access the Query/Warning/Alarm/Parameter menus above, see also < Accessing the Menus>

Parameters listed under the menu vary with the password privileged user.

Before accessing the Parameter menu, select the user group ("**NO**" "**EU**" or "**ID**") first and input the corresponding password that is required for the service men and factory users.

See also <Chapter 10.2 Accessing the Parameter Menu>

Legend for system Mode and status

On the right lower side, nine icons are used to indicate system modes and status.

Icon	*Meaning*		*Icon*	*Meaning*
	Power on/Off			Hot water(The icon is displayed in house)
	Cooling			compressor
	Heating			Defrost
	House (All devices within this icon are called indoor devices.)			

When the device is activated, the corresponding icon will be lit.

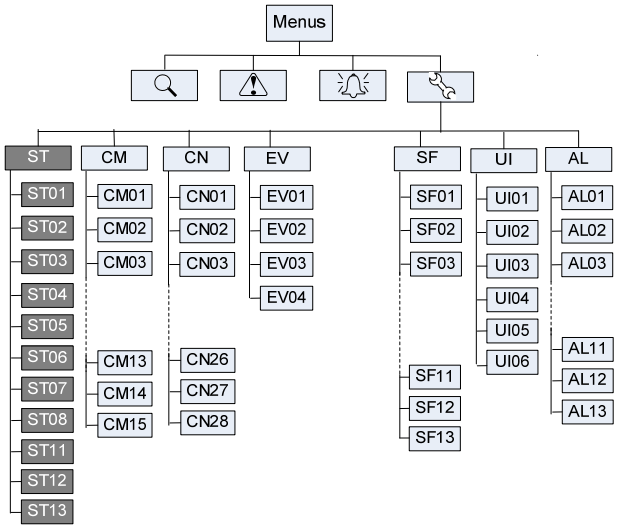
Legend for devices

On the right middle area, the icons are used to indicate the work status of the devices.

Icon	*Meaning*	*Status and Indication*
	Compressor	On solid: Running Blinking : Alarms related to compressor
	Flow switch	Blinking: flow switch alarm
	Indoor pump	On solid: running Blinking: alarms detected
	condenser fan	

For any warning/alarm detected, the corresponding device icon and the / icon will blink continuously until the alarm is acknowledged or reset

Menu Tree



By default, end users can access all parameters in ST group.

Legend for parameter groups

Code	*Indication*	*Code*	*Indication*
CM	Compressor settings	ST	Set points
CN	Condenser settings	UI	User interface
EV	Evaporator settings	AL	Alarm settings
SF	Special functions	DF	Defrost settings

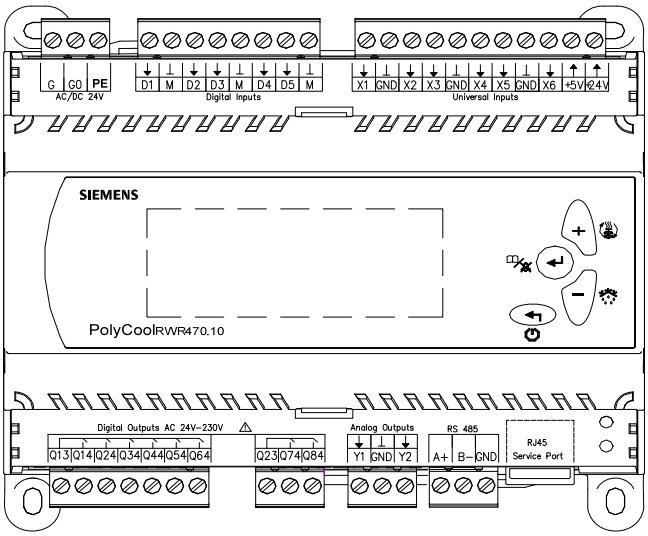
Access Rights

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

Privilege Level	*User*	*Main Activities Special*	*All*
ID	Factory User	• Password required • Configure and commission applications by setting/adjusting parameter values	• View information and status • Acknowledge warnings and alarms • Heating /Cooling changeover
EU	Service Men	• Password required • Configure and commission applications by setting/adjusting parameter values	
NO	End User	• No password is required • Adjust limited values of parameters (by default , can only adjust values of parameters in the “ST” group)	

Wiring Examples

Connection Terminals

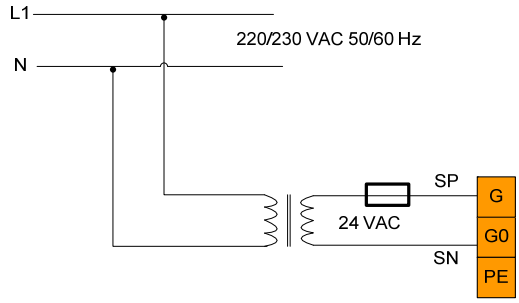


Brief descriptions of the inputs and the outputs are summarized as follows.

	Terminal Assignments		*Terminal Assignments*
G	Power supply AC/DC 24 V	Q13	Supply 1 (AC 24 V …230 V)
G0	Power supply ground	Q14	Compressor1
PE	Safety ground	Q24	Compressor2
		Q34	Indoor water pump
X1	Inlet water temperature of indoor side	Q44	Condenser fan
X2	Outlet water temperature of indoor side	Q54	4-way valve
X3	Atmospheric temperature of outdoor	Q64	Boiler
X4	Hot water temperature		
X5	Condenser temperature	Q23	Supply 2 (AC 24 V …230 V)
X6	evaporating temperature	Q74	3 way valve
GND	Common reference point for analogue input	Q84	Alarm
+5 V	DC 5 V power output for active sensor	Y1	Condenser fan 2
+24 V	DC 24 V power output for active sensor	GND	Common reference point
		Y2	Analogue output 2, 0...10 V
D1	Water flow switch		
D2	Low pressure switch	A+	A+ connector for RS485
D3	high pressure switch	B-	B- connector for RS485
D4	Air condition switch	GND	Optional for RS485 communication
D5	Hot water switch	RJ45	Service interface for parameters uploading and downloading
M	Common reference point for digital input		

Wiring with Power Supply

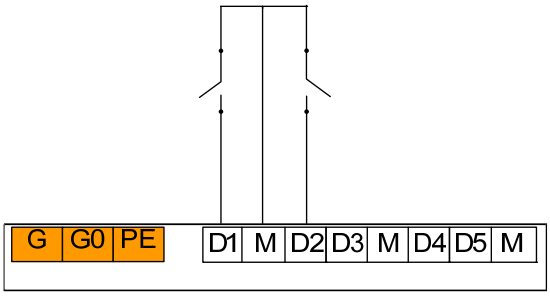
RWR470.10 is supplied with 24 VAC ± 20 % or 24 VDC ± 10 % via plug-in terminals G and G0



Wiring with Digital Inputs

RWR470.10 offers five digital inputs for connecting safety devices, alarms, device status, and remote switches. These digital inputs are voltage free.

The following figure represents an example of wiring the digital input

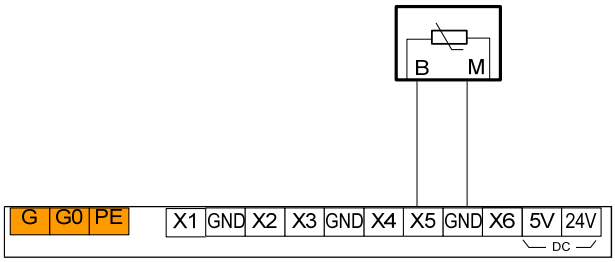


Digital Inputs

Wiring with Passive Temperature Sensors

Before wiring with passive sensor, pay attention to the following:

- Terminals X1…X6 can be wired with NTC 10K sensor.



QAZ36.526/109, NTC 10 kΩ
temperature sensor

General Device Settings

Modes of Operation

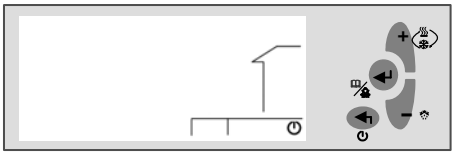
The current RWR470.10 controller consists of three kinds of operation modes:

	Mode	*Function*
1	Normal working mode	Display all running devices and measured values
2	Menu mode*	View configured analogue inputs, warning and alarm logs Set/adjust parameter values and also user privilege to parameters
3	Stop mode**	Normally shut-down status (all units stop running.)

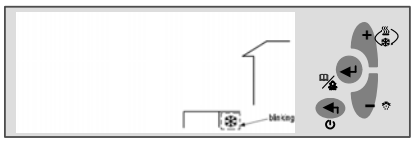
*To enter menu mode, see also <Chapter 4.2. Accessing the Menus>.

- In normal working mode, the back light will be timed out after 30seconds without any operation.

Accessing the Menus

Display	*Procedures*
	In Stop mode, press the <Enter> button for 2 seconds and release it to enter the Menu mode. By default, the Query icon is blinking, waiting for further instructions.
To view the latest 10 warnings generated: • Navigate to the ⚠ menu by pressing <Plus> or <Minus>, and then press <Enter> to confirm and proceed.	
To view the latest 20 alarms generated: • Navigate to the menu by pressing <Plus> or <Minus>, and then press <Enter> to confirm and proceed.	
To set parameter values: • Navigate to the menu by pressing <Plus> or <Minus>, and then press <Enter> to confirm and proceed. Contents under this menu may vary with the privilege right of the user. – For **end users**, select "**NO**," and press <Enter > to proceed. – For **service men and factory users**, select **"EU"** or "**ID"** and press <Enter> to input the password.	

Selection of System Modes

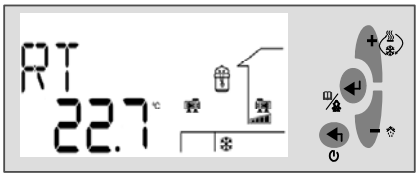
Display	*Procedures*
	In stop mode, press the <Plus> button for 2 seconds, and release it to activate the selection of system mode. The currently system mode will start flashing. Press <Plus> or <Minus> to select the desired system mode, and then press<Enter > to confirm.

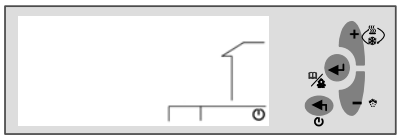
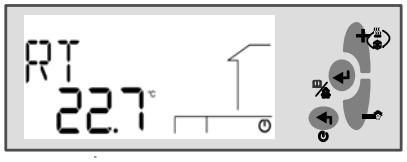
The selection sequence of system modes varies with the <Plus> or <Minus> button you selected based on the current system mode (SF01). The corresponding icon(s) for system mode will blink once selected.
If the current system is heating and cooling (when SF01=1) , the full sequence of selecting the system modes will be as follows.

Activity	*Sequence*
Press <Plus>	❄ ⇨ ♨ ⇨ ❄ ♨ ⇨ ❄

❄ ♨ appear at the same time, it is auto mode, the actual running mode is decided by ST18 and ST19.

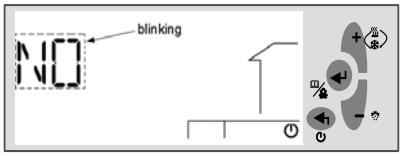
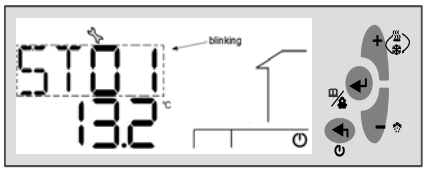
Viewing temperature

Display	*Procedures*
	In normal working mode, press <plus> or <minus>to look into the temperature.

Display	*Procedures*
	In stop mode, press the <Enter> button for 2 seconds and release it to enter the Menu mode. By default, the Query 🔍 icon is blinking, waiting for further instructions.
	Press the <Enter> button to enter the query mode. Press <plus> or <minus>to look into the temperature.

Code	Describe
RT	Inlet water temperature of indoor side
ST	Outlet water temperature of indoor side
OT	Atmospheric temperature of outdoor
HT	Hot water temperature
CT	Condenser temperature
ET	Evaporating temperature

Changing Set points (for end users)

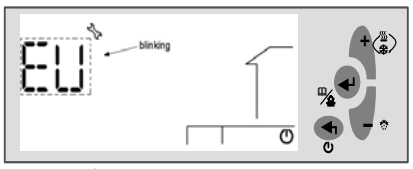
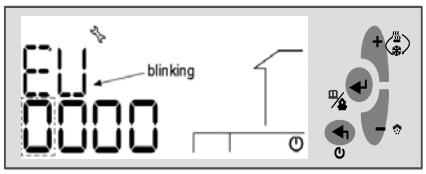
Display	*Procedures*
In stop mode, press <Enter> for 2 seconds and release it to activate the Menu mode.	
	When the 🔍 icon is blinking, press <Plus> or <Minus> to navigate to the 🔧menu, and then press <Enter> to proceed.
Contents under the 🔧 Parameter Menu may vary with the privilege right of the user. • For end users, select "**NO**," and press <Enter > to proceed. • For service men and factory users, select "**EU**" or "**ID**" and press <Enter> to input the 4-digit password .	
	For end users, parameters in the "ST" group will by default be displayed. Press <Plus> and <Minus> to navigate to the parameter and press<Enter> to continue.
Or, continuously press <Esc> to exit out of the current level and back to the desired menu level.	

The following list is parameters contained in the "ST" group.

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res*	*Privilege*
ST01	Set point of compressors in cooling mode (End User)	12	ST11	ST12	°C/	0.1	0
ST02	Set point of compressors in heating mode (End User)	40	ST13	ST14	°C/	0.1	0
ST03	Adjustable temperature band of compressor in Cooling mode	1	0	10	°C	0.1	0
ST04	Adjustable temperature band of compressor in Heating mode	1	0	10	°C	0.1	0
ST05	Setting temperature for heating temperature compensate function	20	0	30	°C	0.1	0
ST06	Compensate factor for heating temperature compensate function	6	0	30	-	0.1	0
ST07	Temperature Scope of outside when the boiler started	0	-10	20	°C	0.1	0
ST08	Set point of outside temperature when the boiler started	5	1	20	°C	0.1	0
ST09	Set point of hot water temperature in the life	50	ST15	ST16	°C	0.1	0
ST10	Band of hot water temperature in the life	3	1	10	°C	0.1	0
ST11	Minimum set point in cooling	10	0	ST12	°C	0.1	0
ST12	Maximum set point in cooling	40	ST11	60	°C	0.1	0
ST17	Band of adjusting time	30	1	1000	Sec	1	0
ST18	Set point of running mode	25	15	30	°C	0.1	0
ST19	Temperature Scope of running mode	5	1	10	°C	0.1	0

Customizing Application by Adjusting Parameter Values

Accessing the Parameter Menu

Display	*Procedures*
In Stop mode, press <Enter> for 2 seconds and release it to activate the Menu mode.	
When the icon is blinking, press <Plus> or <Minus> to navigate to the menu, and then press <Enter> to proceed.	
Contents under the menu may vary with the privilege right of the user. • For end users, select "**NO**" and press <Enter > to proceed. • For service men and factory users, select "**EU**" or "**ID**" and press <Enter>. Input the 4-digit password when the following screen is displayed	
	Press <Enter> to confirm and continue to input the password.
	Password is required for the sevice man and factory users.

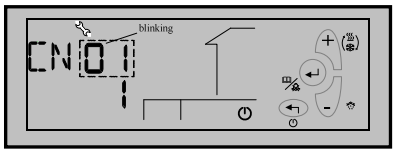
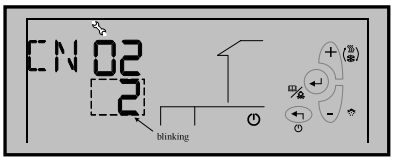
Input Password

To input password, follow the instructions below:

- When the digit is blinking, press <Plus>/<Minus> to select the value. Then, press <Enter> to confirm, and proceed to the next digit.
- Or, press <Esc> at any time to cancel the input and return to the previous blinking digit.
- Repeat steps above to input other three numbers.
- After inputting the password, press <Enter> to confirm, and proceed to setting parameter values.

Adjusting Parameter Values

Procedures

Display	*Procedures*
After inputting password and enter into the parameter setting mode, the “ST” parameter group will by default be displayed.	
	Press <Plus> or <Minus> to select the parameter code, and press <Enter> to confirm.
	The default value of the parameter will start flashing, allowing you to make a change. Press <Plus> or <Minus> to increase or decrease the value, and press <Enter> to confirm.
Continuously press <Esc> to exit out of the current level and back to the desired menu level.	

Warning Management

When a warning is detected, the corresponding warning code will be displayed on the LCD. The warning icon ⚠ will flash simultaneously.

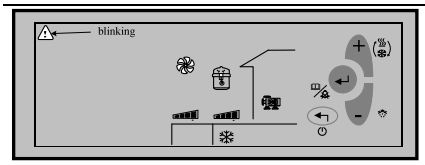
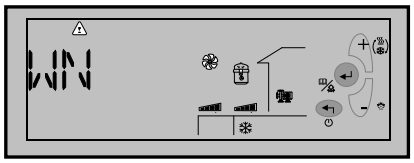
Only the latest 10 warnings will be kept under the ⚠menu.
Upon power failure of the controller, the warning logs will be erased and recounted

Codes for Warnings

Ten types of warnings are used to monitor the system.

Codes	*Meaning*
WN00	
WN01	

Viewing Warning Logs

Display	*Procedures*
Press down <Enter> for 2 seconds and release it to activate the Menu mode.	
	When the 🔍 icon is flashing, press <Plus>/ <Minus> to navigate to the ⚠ menu, and then press <Enter> to confirm.
	Two letters “WN” will be displayed on the LCD, continuously flashing. Press <Enter> again to view the last 10 warning codes generated, if any. If no warning is generated, the word “None” will be displayed.
Continuously press <Exit> to exit out of the current level, and back to the normal running mode.	

Alarm Management

Alarms in PolyCool470.10 are divided into two groups: auto reset alarms and manual reset alarms.

- For an auto reset alarm, users are not required to acknowledge and reset it. The corresponding device will be automatically restarted once the alarm status disappears.
- Once a manual reset alarm is detected, the system will be stopped. Users need acknowledge and reset it, and also manually restart the corresponding device after the fault status is cleared.

When an alarm is detected, the corresponding device icon (if any) and 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 until the alarm status disappears, or until they are manually acknowledged or reset (only for manual reset alarms).
- If the system detects warnings and alarms at the same time, the warning codes will NOT be displayed on the LCD.
- The latest 20 normal alarms and manual reset alarms generated in total are separately kept under the auto reset alarm (AR) and manual reset alarm (MR) categories in the 🔔 menu.

Auto Reset Alarms

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

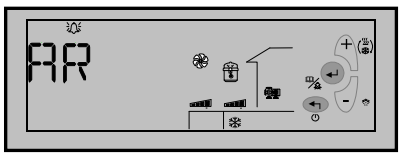
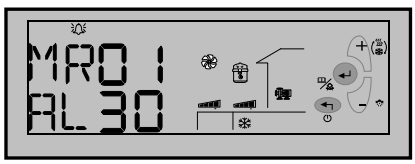
Codes	*Meaning*
AL01	Compressor low pressure (DI2)
AL02	Compressor high pressure (DI3)
AL03	Low inside supply water temperature protection (when less than AL01 in cooling mode)
AL05	Inside supply temperature is over the high limit in heating mode(when over than AL03 in heating mode)

Manual Reset Alarms

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

Codes	*Meaning*
AL17	Flow switch alarm after the delay (AL05)
AL18	Alarm number of compressor low pressure within 24 hours is over the limit (AL06)
AL19	Alarm number of compressor high pressure within 24 hours is over the limit (AL07)
AL20	Low evaporator temperature protection (AL08)

Viewing Alarm Logs

Display	*Procedures*
Press down <Enter> for 2 seconds, and release it to activate the Menu mode.	
	Press <Plus> or <Minus> to navigate to the menu, and then press <Enter> to confirm. By default, auto reset alarm “AR” will be displayed on the LCD, flashing.
To view auto reset alarms generated, press <Enter> to continue when “AR” is displayed.	
To view manual reset alarms, press<Minus> or <Plus> to navigate to the “MR” group, and then press <Enter> to continue. By default, the first manual reset alarm “MR01” will be displayed as follows. Press <Enter> to view the first manual reset alarm code. Or, press<Minus> or <Plus> to view other numbered alarms, and press<Enter> to view the specific code.	
	If no alarm is generated, the word “NoNE” will be displayed.
Continuously press <Exit> to exit out of the current level, and back to the normal running mode.	

MR01 and AR01 are respectively the latest information of manual reset alarm and auto reset alarm.

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.

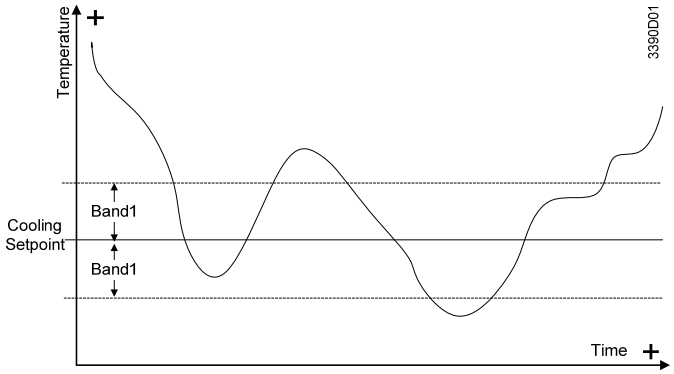
To do this, follow the steps below:

- Press <Enter> 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.

Main Control Logic

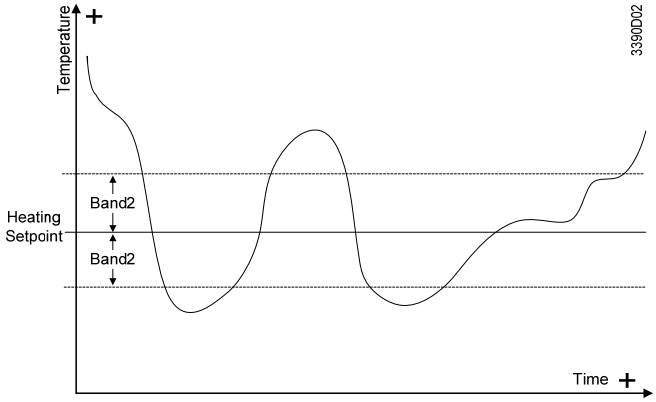
Compressor Capacity Control

For the compressor with stages, it will be started with full capacity when the system on.



In cooling mode:

- When the actual supply/return temperature is higher than the cooling set point (ST01) + temperature band (ST03), the compressor capacity will be gradually increased by stages every a preset time (ST17).
- When the actual supply/return temperature is lower than the cooling set point (ST01) - temperature band (ST03), the compressor capacity will be gradually decreased by stages every a preset time (ST17).



In heating mode:

- When the actual supply/return temperature is lower than the heating set point (ST02) - temperature band (ST04), the compressor capacity will be gradually increased by stages every a preset time (ST17).
- When the actual supply/return temperature is higher than the heating set point (ST02) + temperature band (ST04), the compressor capacity will be gradually decreased by stages every a preset time (ST17).

Temperature compensation at HEAT

- The controller offers two type of temperature control mode at heat mode.
- When SF04=0, the set-temperature at heat will be controlled by ST02;
- When SF04=1, the set-temperature at heat will be controlled by ambient-temperature (OT) ,ST05 and ST06 according to the following formula:
  Set-temperature at HEAT =ST05+ST06 (ST05-OT)
- The calculated temperature can be used for the control reference, but the maximum date will not exceed ST14

Boiler

When heating mode is operating, BOILER will run as follows:
When OT ＜ ST07
BOILER will run as a energy stage by temperature requirement, but BOILER is the last to be activated, the first to quite from working.
When OT ＞ ST07+ST08, BOILER function is cancelled.

When OT ＜ SF02, heat pump (compressor) is not running and will not react if asked for hot water. If asked for heating, it woks as follows:
Start indoor side water pump, BOILER works, BOILER's running follows the temperature requirement.
When OT ＞ SF02+SF03, heat pump reverts to normal working.

3 way valve control

- When SF10=0, DO7 will control the 3 way valve. Both the indoor side water pump and 3 way valve will be turned on when running the daily hot water mode.
- When SF10=1, DO7 will control the daily hot water pump. The indoor side water pump is OFF, the daily hot water pump will be ON when running daily hot water mode.

Alarm

The alert Produced namely output, the alert clearance namely stop exportation.

Defrost at heating or hot water mode

Access defrost condition (to be meet at the same time)

- Outdoor temperature (OT) ＜DF03
- The interval time of defrost between the first and second time ＞ DF06
- Temperature difference (OT-CT) ＞ DF04 time, last DF05

Quit defrost condition (quit when any of the following appear)

- High pressure protection
- Coil temperature ≥ DF09
- Defrost time ≥ DF10

Fan defrost

If DF01=1, and the outdoor temperature (OT) ＞ DF02, after defrost conditions appear, get into fan defrost process

- Turn OFF compressor
- Outdoor fan runs until the coil temperature ＞ 3℃, finish defrost.

Protection function

9.7.1 Anti-freeze protection at stop situation

The anti-freeze function will be valid only at the following conditions:

- The controller keeps at stop mode, but the unit is still connected with power supply.
- OT≤SF06 (During anti-freeze working, when OT≥SF06+SF07, it will quite from the anti-freeze running.)
- At the above conditions, and SF02=1, when ST≤SF08, the indoor side water pump is turned ON, a continuous blink warning code WN01 will appear on the LCD, until ST≥SF08+SF09, it will quite from the anti-freeze work.
- At the above conditions, and SF03=1. when STO≤SF08, the outdoor side water pump is turned ON, a continuous blink warning code WN02 will appear on the LCD, until ST≥SF08+SF09, it will quite from the anti-freeze work.

9.7.2 Low pressure protection (Code: AL01)

After starting the compressor, it will check the low pressure at AL09 delay. If DI2=OFF, all the compressors will be stopped, 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.

9.7.3 High pressure protection (Code: AL02)

Whenever DI3=OFF is checked out, all the compressors will be stopped, other parts will keep its original state. A continuous blink code AL02 will appear on the LCD, until DI2=ON, the unit will turn to its normal work.

9.7.4 Low outlet water temperature protection at COOL (Code: AL03)

At cool mode, if ST≤AL01, all the compressors will be stopped, other parts will keep its original state. A continuous blink warning code AL03 will appear on the LCD, until ST≥AL01+AL02, the unit will turn to its normal work.

9.7.5 High outlet water temperature protection at HEAT (Code: AL05)

At heat mode running, ST≥AL03, all the compressors will be stopped, other parts will keep its original state. A continuous blink code AL05 will appear on the LCD, until ST≤AL03+AL04, the unit will turn to its normal work.

9.7.6 Water flow switch protection (Code: AL17)

At normal working condition, if there is no signal from water flow switch within AL05 after starting the outdoor side water pump, a continuous blink warning code AL017 will appear on the LCD.

During unit working, when check FS=OFF, all the compressors will be stopped, other parts will keep its original state, a continuous blink warning code AL017 will appear on the LCD.

9.7.7 Low evaporate temperature protection (Code: AL20)

The protection function will be valid at COOL mode as well as at HEAT mode when SF03=1

During normal working, if ET≤AL08, all the compressors will be stopped, other parts will keep its original state, a continuous blink warning code AL20 will appear on the LCD.

Parameter Tables

Compressor Settings

<Second: Sec; Minute: Min; Hour: Hr>

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res.*	*Privilege*
CM01	Compressor minimum ON time	180	1	1000	Sec	1	1
CM02	Compressor minimum OFF time	180	1	1000	Sec	1	1
CM03	Start Delay between two compressors	10	0	100	Sec	1	1
CM04	Shut down delay between two compressors	30	0	1000	Sec	1	1
CM05	Compressor ON delay (outdoor pump ON)	10	0	150	Sec	1	1
CM06	The number of compressors	2	1	2	-	1	2
CM07	The direction indicator of four-way valves(1 or 0 indicates heating mode)	1	0	1			1
CM08	Compressor consecutive running time for discard	30000	0	50000	Hr	10	1

Condenser Settings

Para-meter	*Descriptions*	*De-fault*	*Min*	*Max*	*Unit*	*Res.*	*Privilege*
CN01	Outdoor pump ON delay (indoor pump ON)	10	0	150	Sec	1	1
CN02	Outdoor pump ON delay (compressor OFF)	10	0	150	Sec	1	1
CN03	Control mode - 0= fix fan speed - 1= two fan speed	0	0	1	-	1	1
CN04	Adjustable outdoor temperature band of fan speed at cooling	25	15	50	℃	0.1	1
CN05	Adjustable outdoor temperature band of fan speed at heating	20	0	30	℃	0.1	1
CN06	Adjustable outdoor temperature band of fan speed at hot water mode	25	15	30	℃	0.1	1
CN07	Adjustable hot water temperature band at hot water mode	45	40	50	℃	0.1	1

Evaporator Settings

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res.*	*Privilege*
EV01	Control Mode - 0=pump with circulate continuously - 1= The water pump with the compressor ON/ OFF but ON/ OFF	0	0	1	-	1	1
EV02	Indoor reference sensor: - - 0=RT (return temperature sensor) - 1=ST (supply temperature sensor)	0	0	1	-	1	1
EV03	Indoor pump Off delay (compressor OFF)	60	CN02	1000	Sec	1	1

Special Functions

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res.*	*Privilege*
SF01	System mode - 0=Cooling only - 1=Heating & Cooling - 2=Heating only	2	0	2	-	1	2
SF02	Temperature point to prohibit heat pump working	-10	-20	20	℃	0.1	1
SF03	Temperature scope to prohibit heat pump working	2	1	10	℃	0.1	1
SF04	The compensates function of heating temperature - 0=Disabled - 1=Enabled	1	0	1	-	1	1
SF05	Heat Recovery function - 0=Disabled - 1=Enabled	0	0	1	-	1	2
SF06	Outside temperature point for antifreeze turned on	2	0	10		1	1
SF07	Outside temperature scope for antifreeze turned off	1	1	10		1	1
SF08	Temperature point of inlet/outlet water for antifreeze turned on	3	1	10		1	1
SF09	Temperature point of inlet/outlet water for antifreeze turned off	3	1	10		1	1

User Settings

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res*	*Privilege*
ST01	Set point of compressors in cooling mode (End User)	12	ST11	ST12	°C/	0.1	0
ST02	Set point of compressors in heating mode (End User)	40	ST13	ST14	°C/	0.1	0
ST03	Adjustable temperature band of compressor in Cooling mode	1	0	10	°C	0.1	0
ST04	Adjustable temperature band of compressor in Heating mode	1	0	10	°C	0.1	0
ST05	Setting temperature for heating temperature compensate function	20	0	30	°C	0.1	0
ST06	compensate factor for heating temperature compensate function	6	0	30	–	0.1	0
ST07	Temperature Scope of outside when the boiler started	0	-10	20	°C	0.1	0
ST08	Set point of outside temperature when the boiler started	5	1	20	°C	0.1	0
ST09	Set point of hot water temperature in the life	50	ST15	ST16	°C	0.1	0
ST10	band of hot water temperature in the life	3	1	10	°C	0.1	0
ST11	minimum set point in cooling	10	0	ST12	°C	0.1	0
ST12	maximum set point in cooling	40	ST11	60	°C	0.1	0
ST13	minimum set point in heating	20	0	ST14	°C	0.1	1
ST14	maximum set point in heating	55	ST13	80	°C	0.1	1
ST15	minimum set point of hot water temperature in the life	20	0	ST16	°C	0.1	1
ST16	maximum set point hot water temperature in the life	55	ST15	80	°C	0.1	1
ST17	band of adjusting time	30	1	1000	Sec	1	0
ST18	Set point of running mode	25	15	30	°C	0.1	0
ST19	Temperature Scope of running mode	5	1	10	°C	0.1	0

Defrost Settings

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res*	*Privilege*
DF01	Fan defrost - 0=Disabled - 1=Enabled (when outdoor temperature ≥DF02)	1	0	1	-	1	1
DF02	Set point of outdoor temperature when fan defrost (When outdoor temperature ≥the set point and DF01=1, adopt fan defrost)	5.0	1.0	10.0	℃	0.1	1
DF03	Set point of outdoor temperature	10.0	3.0	20.0	℃	0.1	1
DF04	Set point of defrost temperature difference (outdoor temperature-coil temperature)	10	5	20	℃	0.1	1
DF05	Running time （compressor continuous running time when coil temperature ≤DF04）	5	1	60	Min	1	1
DF06	Minimum defrost interval	30	15	60	Min	1	1
DF07	Compressor transfers delay from OFF to ON before defrost, from heating to cooling	10	6	180	Sec	1	1
DF08	Compressor transfers delay from OFF to ON after defrost, from heating to cooling	10	6	180	Sec	1	1
DF09	Coil temperature when quite from defrost	5	1	20	℃	0.1	1
DF10	Defrost time (from compressor ON)	300	1	1000	Sec	1	1
DF11	Minimum air conditioner's keep temperature	15	10	40	℃	0.1	1

User Interface

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res.*	*Privilege*
UI01	Password for service user	1234	0	9999	-	1	1
UI02	Password for factory user	4321	0	9999	-	1	2

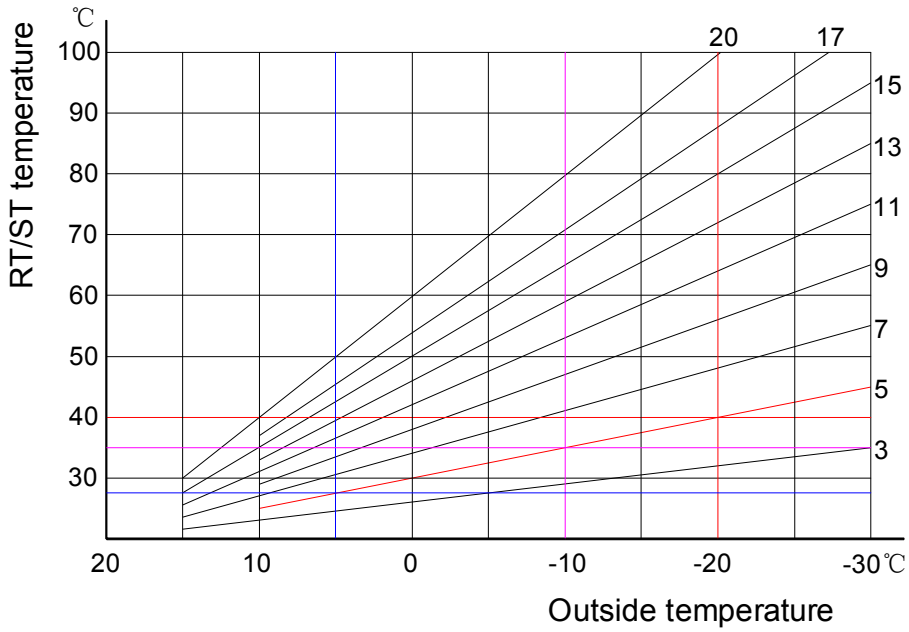
Alarm Settings

Para-meter	*Descriptions*	*De-fault*	*Min.*	*Max.*	*Unit*	*Res.*	*Privilege*
AL01	Protecting Set point for low outlet water temperature	3	1	10	℃	1	1
AL02	Band of low outlet water temperature	2	1	10	℃	1	1
AL03	Protecting Set point for high outlet water temperature	55	1	100	℃	1	1

AL04	Band of high outlet water temperature	15	1	20	ºC	1	1
AL05	Feedback Delay for water current switch	10	1	100	Sec	1	1
AL06	total alarm number within 24 hours in low pressure (Over this limit, alarm “AL18” will be reported.)	4	1	10	-	1	1
AL07	total alarm number within 24 hours in high pressure (Over this limit, alarm “AL19” will be reported.)	6	1	10	-	1	1
AL08	Protecting Set point for low evaporator temperature	-2	-10	10	ºC	0.1	1
AL09	Time rang during which low pressure will be ignored when compressor ON.	300	0	1000	Sec.	10	1

Heating compensation curve（SF04=1）

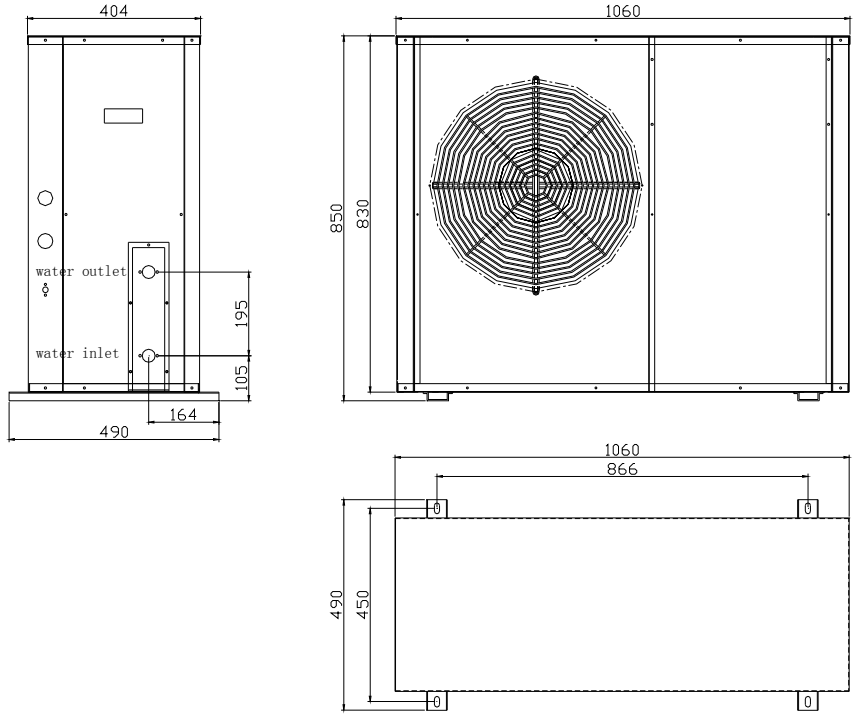
The control temperature for heating mode has two methods: fix and changeable temperature. The fix temperature is a fixed value and directly set by the end user from the set area. The changeable temperature is determined by values of ST05, ST06 and the tested outdoor temperature by the controller.
This function is selected by SF04, when SF04=0, it is fix temperature; when SF04=1, it is changeable temperature.
The following curve will show the detail of changeable mode when ST05=20℃



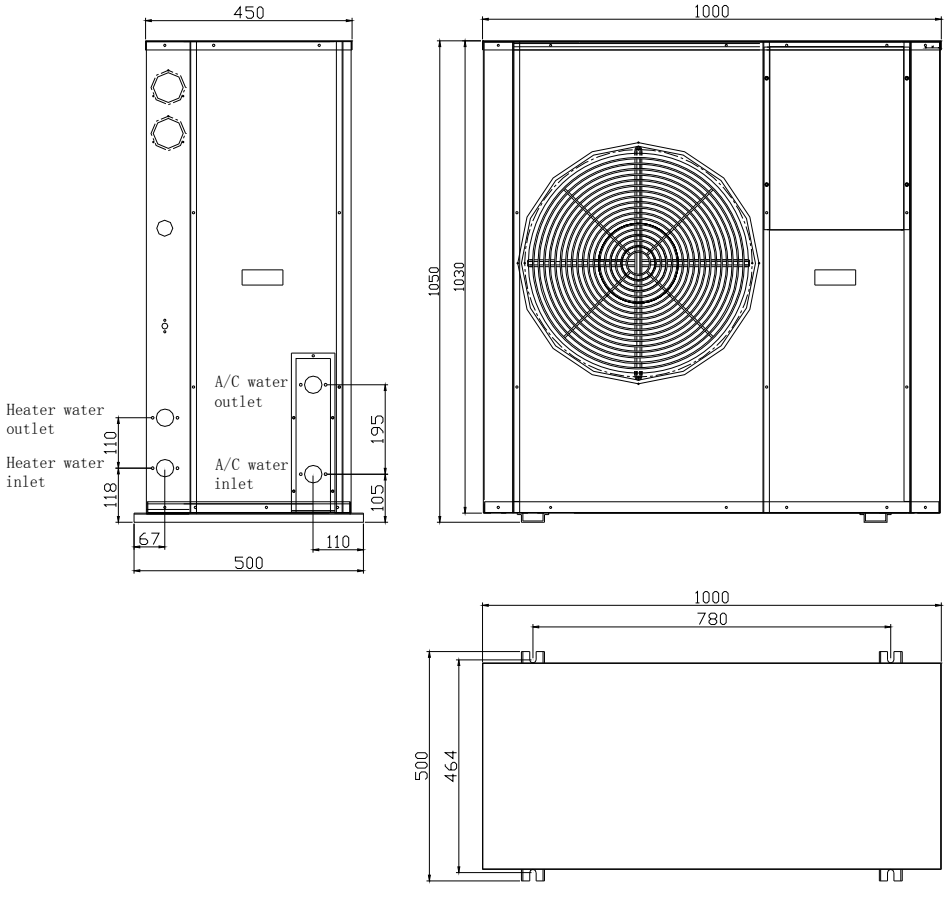
Set the heating compensation coefficient ST06 is 5,
When outdoor temperature is 5℃, the control temperature is 28℃;
When outdoor temperature is -10℃, the control temperature is 35℃;
When outdoor temperature is –20℃, the control temperature is 40℃;
With the drop of the outdoor temperature, the control 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.

Dimensions

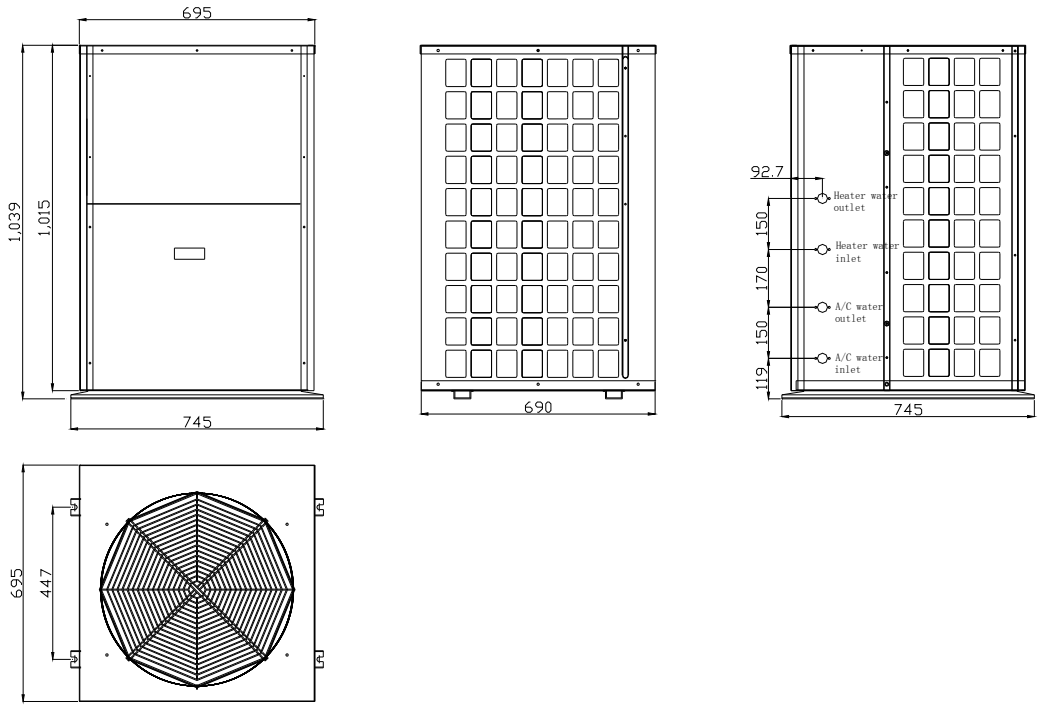
LSQ06R1/C



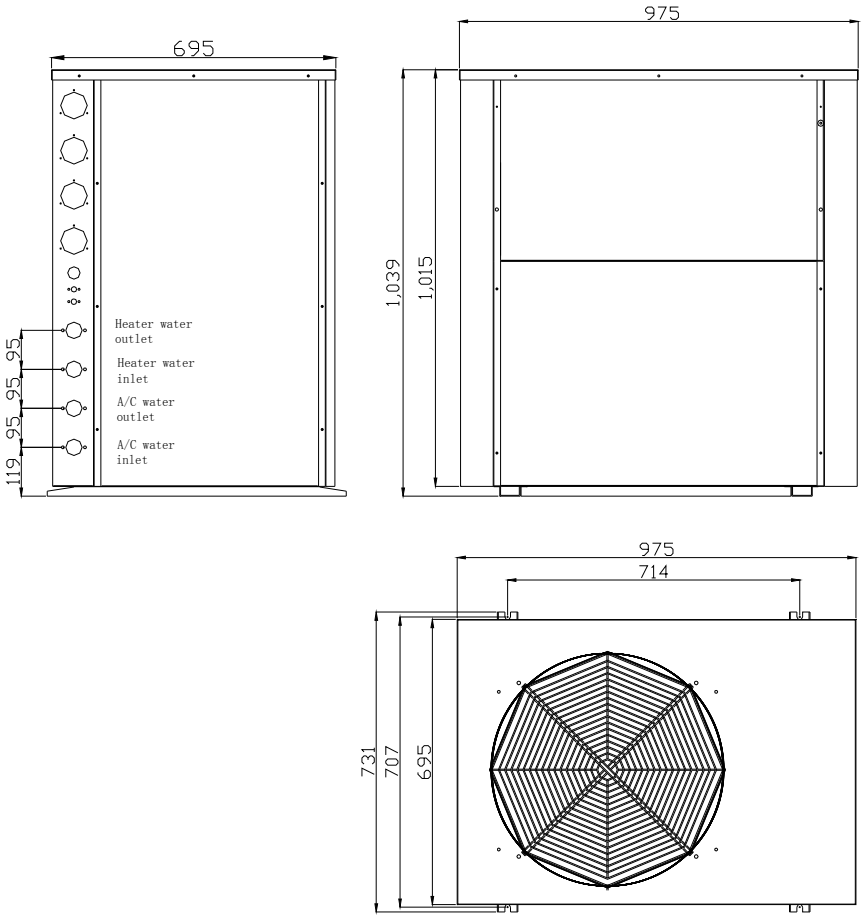
LSQ08R1/C, LSQ10R1/C, LSQ08R1/CR, LSQ10R1/CR



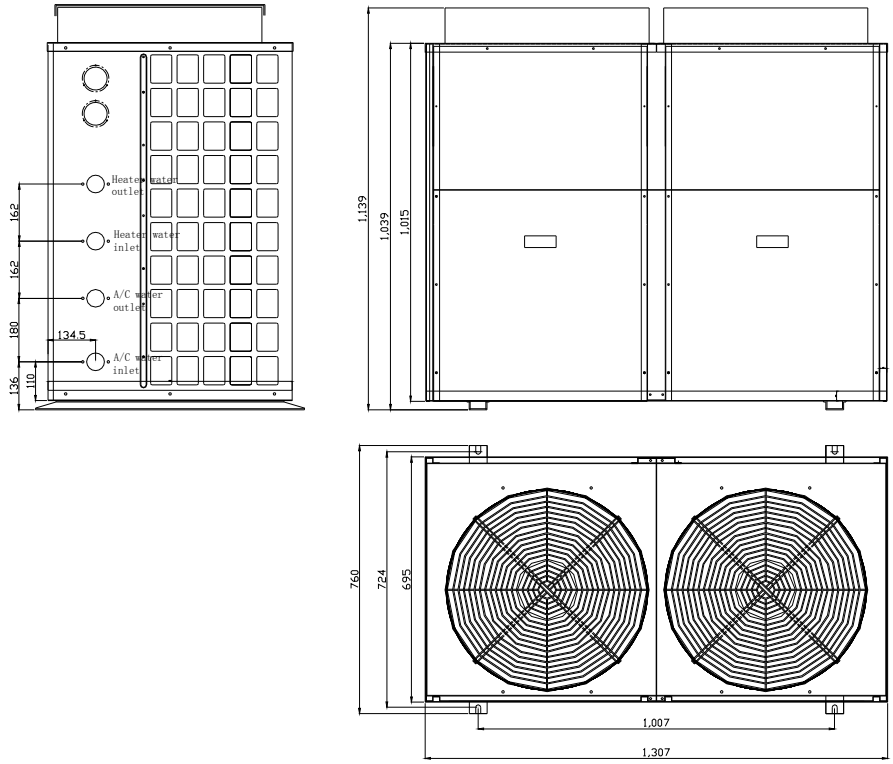
LSQ10R1, LSQ10R1/R



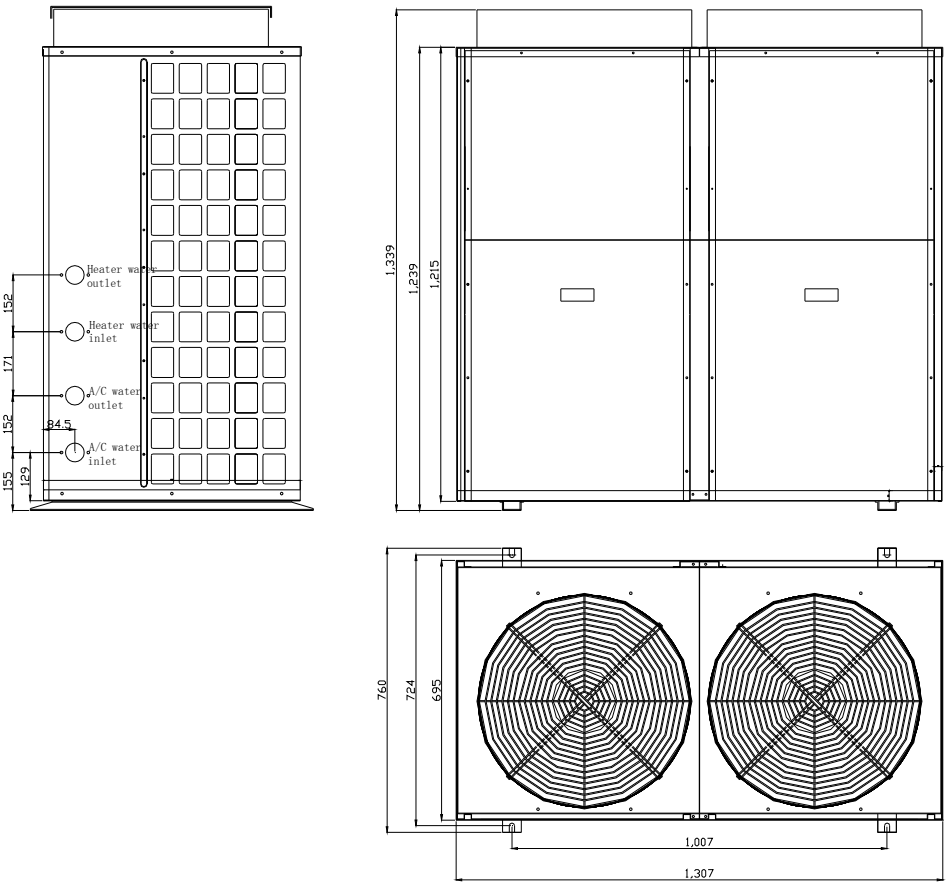
LSQ13R1, LSQ15R1, LSQ13R2, LSQ15R2, LSQ13R1 /R, LSQ15R1/R, LSQ13R2/R, LSQ15R2/R



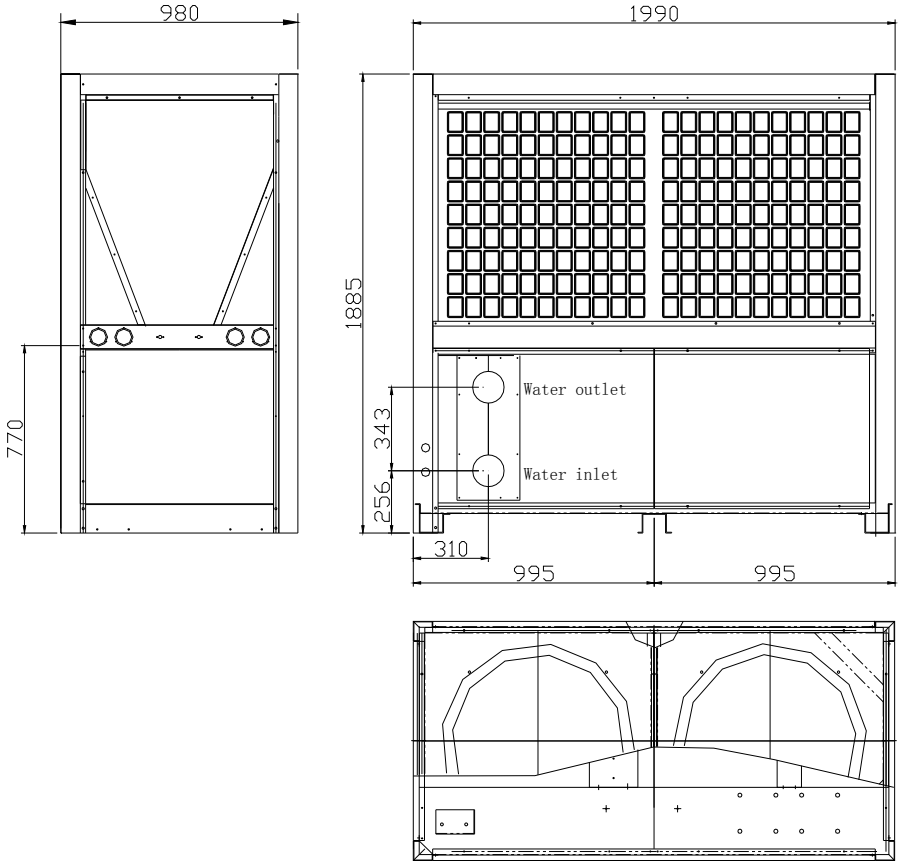
LSQ20R2, LSQ20R2/R

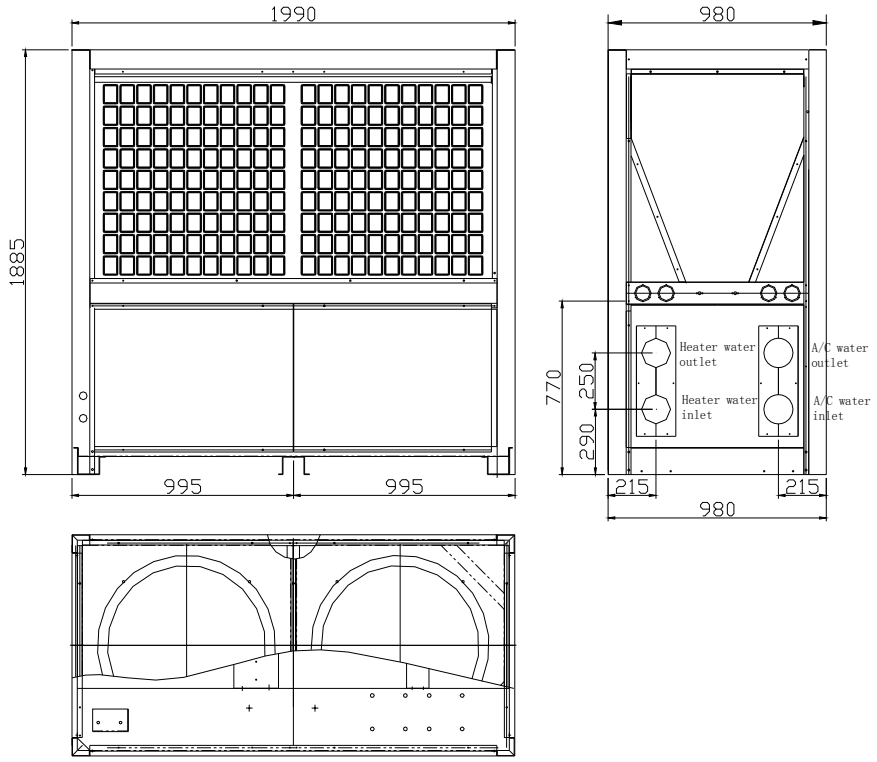


LSQ25R2, LSQ31R2, LSQ25R2/R, LSQ31R2/R



LSQ66R2


980
1990
1885
770
343
256
310
995
995
Water outlet
Water inlet


1990
1885
995
995
980
770
250
290
215
215
980
Heater water outlet
Heater water inlet
A/C water outlet
A/C water inlet

Standards

EC Directives:
73/23/EEC
89/336/EEC

Household and similar electrical appliances. Electromagnetic fields

EMC Low voltage directive 2006/95EC
BS EN 60335-1-:2002+A1 : 2004+A11 : 2004+A12 : 2006+A2 : 2006
BS EN 60335-2-40:A1 : 2006+A11 : 2004+A12 : 2005

Specification for safety of household and similar electrical appliances.

EMC Directive 2004/108/EC

EN55014-1 : 2000+A1 :2001+A2 : 2002 Power disturbances test & Terminal voltage test
EN55014-2 : 1997+A1 : 2002
EN55014-2 (EN61000-4-2), ESD test
EN55014-2 (EN61000-4-3), Radio frequency electromagnetic fields test
EN55014-2 (EN61000-4-4), Fast transients test
EN55014-2 (EN61000-4-5), Surges test
EN55014-2 (EN61000-4-6), Injected currents test
EN55014-2 (EN61000-4-11), Voltage dips and interruptions test
EN61000-3-2 : 2006 Harmonics test
EN61000-3-3 : 1995+A1 : 2001+A2 : 2005 Voltage fluctuation test

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