DC INVERTER SERIES AIR TO WATER

INSTALLATION AND OPERATING INSTRUCTIONS

MODELS: KS50-DC / KS70-DC / KS90-DC / KS120-DC / KS150-DC





Introduction

The Heat pump uses the warmth of the air outside as a heat source.

The Air to Water Heat pump is split system consisting of one indoor and one outdoor unit. Some manufacturers have only one outside unit. This has two major disadvantages:

• All water pipes need to be heavily insulated to avoid freezing in the event of a power failure.

• This method (monobloc)suffers heat loss as hot water has to flow outside through the unit

Please feel free to contact us or your supplier if, having read this guide, you are unclear on any issue.

Thank you for choosing our Heat Pump

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1. Warnings 2. Safety Instructions 3. How it Works 4. Checking Before & After Starting

I.Warnings

This manual is an integral part of the machine's operation and must be kept safe and available.

This heat pump is meant exclusively for heating . Any other use is dangerous.

The assembly, electrical connection and start-up must be carried out by a qualified professional.

It is essential to keep the temperature in the DC inverter lower than the value recommended by the manufacturer.

Tell your retailer of any breakdown or error message. Have any maintenance work carried out by a qualified professional.

Our products are constantly being improved. For that reason the pictures or the characteristics described in this manual are not contractual.

2. Safety Instructions

- Do not try to move the pump once installed.
- Never cover (risk of overheating).
- Keep out of the reach of children. Inform them of the dangers of this machine.
- Never introduce a stick or your fingers into the protective grille.
- Never clean the machine with a water jet.
- Never disconnect the machine when it is working. For any intervention - even cleaning
 stop the machine by pressing the OFF key. In the event of an emergency cut off the current.
- Do not draw on the electric wire (risk of electric shock)

WARNING (Only For KS120-DC Single Phase)

WHEN THE HEAT PUMP RUNS AT MAXIMUM FREQUENCY THE MAXIMUM CURRENT COULD BE CLOSE TO 50A.THE HEAT PUMP MUST BE INSTALLED IN ACCORDANCE TO LOCAL WIRING REGULATIONS.

3. How it Works

The heat pump uses the free heat contained in the air outside and transmits it to the water. This then allows you to choose the temperature of your water.

The fans condense the heat collected from the air outside and send it to a radiator.

When heating, the unit expels colder air than the outside temperature. When cooling it expels hotter air.(Cooling is a factory fitted option special order in UK and Ireland)

4. Checking Before and After Starting

Before starting

Your machine is tested and regulated in the factory. Nonetheless, we advise you to carry out the following controls before starting:

- Electric connections correctly carried out
- Installation carried out according to our recommendations
- Correct connection of arrival and exit water pipes according to the written instructions
- No foreign objects on any part of the machine

After starting

Ensure the operation is regular. If high vibrations occur stop the heat pump and call your fitter.

5. Pump Capacity Diagrams



6. Installation Outdoor Unit



The following procedure must be observed before connecting pipes or electric cables:

- Decide which is the best position on the wall or a flat surface and leave enough space to be able to carry out maintenance.
- Fasten the outdoor unit support to the wall using screw anchors which are particularly suited to that type of wall.
- Use more screw anchors than you would normally require for the weight they have to bear. During operation the machine vibrates and has to remain fastened in the same position for many years without the screws becoming loose.
- Mount the outdoor unit on the support using the four bolts supplied.
- Ensure Rubber feet are fitted to reduce vibration

Piping Connection

- I. Open the cover of the outdoor unit.
- 2. Connect the pipe to the indoor unit and

outdoor unit. Wipe the quick connectors with a clean cloth to prohibit dust or other impurities entering the pipes. Align the centre of the pipe and fully screw in the angular nuts.

3. Use a vacuum pump to remove the air from the indoor unit and connection pipe.



- 4. Connect the electric cable as per circuit diagram, and bundle it with the connecting pipe.
- 5. Take off the nuts in the mouths of high valve and low valve. Turn the valve's core anticlockwise with hexagon spanner until the valves are opened completely. Recover and tighten the nuts.
- 6. Check to see if there are any leaks at each connection of the pipes or nuts. If there is, remedial measures must be taken. No leaks can be allowed

7. Guide to Collecting Refrigerant

WARNINGS:

• When connecting the pipe, a suitable pitching spanner must be used. If any other spanner is used, it may damage the joint.

On connecting the pipe, ensure the pipe's insulating material closely fits the nuts at the joint.

- On connecting to the external unit, the pipe should be wrapped with sponge padding to prevent rain water from flowing in.
- When bending the pipe, the radius cannot be too small. It should be above 150-160 mm.

Important:

KS50/70/90-DC, to add20g refrigerant per meter after 10 meter pipe runs; suggest not more than 20 meters;

KS120/150-DC, to add 30g refrigerant per meter after 10 meter pipe runs; suggest not more than 20 meters.

7 - Guide to collecting refrigerant

If the machine needs to be moved or refrigerant needs charging, recycle the gas back into the compressor according to the following steps before disconnecting:





3. Tighten the core of the liquid valve (the smaller one) with valve key at first. After about 30 seconds, tighten the core of the gas (the bigger one) with a valve key

7. Guide to Collecting Refrigerant



8. Diagram for installation and Connection



9. Filling and venting the water circuit system

- I.Check the heating system for leaks.
- 2.Connect the pipe, the water filling pump and the service connections. The capacity of external filling pump must be at least 3 m3/h.
- 3. The three-way valve should be in "A" state. First, close the drain valve and AV valve between the service connections. Open AV1 and AV2 valves. Start the external water filling pump to evacuate the air inside the floor or radiator system. Carry on until there is no more air to come out.

USE FLOW GAUGE TO ENSURE CORRECT

4.The three-way valve's gears will turn automatically when the "B" port is open. Turn the white gear of three-way valve to the middle position then press it in. Both port A and port B should then be open. Evacuate the air in the water system. Carry on until there is no more air to come out.

- 5.After the air evacuation use a screwdriver to unclench the white gear of three-way valve. It will turn back to port B automatically.
- 6.Shut the external water filling pump and close AVI and AV2 valves, then

RECOMMENDATION

ENSURE INLINE FILTER ON THE RETURN LINE



Push the white gear into the middle position and then use your thumb to press it inside. Ports A and B are in open state.



Use a screwdriver to release the white gear in the three way valve.

The white gear should then move back to the original position. The three way valve will turn to port B automatically.

WARNING

WARNING

FLOW FOR EACH UNIT

CLEAN SYSTEM WITH A POWER FLUSH PRIOR TO INSTALLATION

RECOMMENDATION

IT IS ADVISED THAT INSTALLATION OF THE EVACUATION VALVE SHOULD BE AT THE HIGHEST POINT

10. Installation Master Plan



WARNING

EVEN WHEN NO CONNECTION IS REQUIRED TO A HOT WATER CYLINDER THE SENSOR MUST BE CONNECTED TO THE FLOW LINE

IF THE OUTDOOR UNIT IS SITUATED ON THE GROUND, RUBBER FEET MUST BE FIXED TO THE BOTTOM OF THE UNIT

and menu

Control Panel

The control panel of DC inverter series features a graphic display with five control buttons.



Functions

The control computer is operated via a menu system displayed on the control panel.

There is a main menu and several sub-menus accessible from the main menu. The menus are described in detail later.

To be able to select the desired menu and adjust the commands, you will use the five buttons.

- One button marked with a up arrow
- One button marked with a down arrow
- One button marked with a right arrow
- One button marked with a left arrow
- One button pointing to ON/OFF

Operating Instructions General Information Menu Navigation

The Right button on the control panel is used to open the desired menu. The Left button is used to return to the previous menu.

II. Description of the display panel The Up and Down buttons are used to navigate between the parameters of a menu.

> A cursor (arrow) on the left side of the display indicates which menu can be opened. The Up and Down buttons are also used if you wish to increase or reduce a pre-set value.

> Pressing and holding the Right and Left buttons down for five seconds both locks and unlocks the display. This prevents accidental changes.

Display of current operating mode

During normal operation, the following information will be displayed:

- Desired (pre-set) room temperature
- Date / time / timer
- Whether there is a heating demand or not. If there is, there will also be symbols telling which heat source is working, heat pump or auxiliary heater or both (see "Symbols").
- Which operating mode has been selected.

Symbols

So that you may see at a glance the operating mode, the following symbols will be appear in the lower part of the display depending on which part of the unit is working:





The heat pump is running.



The auxiliary heater is activated.



There is a room heating demand.



Warm water is being produced.

Indicates the status of hot water production.

If the symbol is empty, hot water temperature is under the setting temperature. It does not mean that there is no water in the water tank. The tank is always full.



If the symbol is full, it means the hot water temperature has reached the setting temperature.



There is a room cooling demand. * for heating and cooling unit type

NOTE

If the water tank symbol blinks once every second it means the tank temperature is too low and the unit in anti freeze protection mode. Hot water heating will automatically start until the water temperature reaches 20°C. It will then revert to the previous running mode.

CSP reading on display

The "CSP" reading stands for "Compressor Stopped for pressure Protection". This message will automatically disappear.

Menus

Main Menu INFORMATION

To open the main menu INFORMATION, press the Right button once. To select the desired submenu, use the Up or Down button.

Open the menu by pressing the Right button once.

To return to the main menu, press the Left button once.



SUB MENU

OPER.TIME RESET MAN TEST ALARM RECORD LANGUAGE

Sub-Menu OPERATION

	OPERATION	
	WARMWATER	1
	ROOMHEAT	
	Roomheat I	
	ROOMHEAT 2	
k	ROOMCOOL	
k	ROOMCOOL I	
	HEATPUMP	ON
7	ADD HEAT	ON

WARMWATER

Water tank heating mode: When activated this mode only heats the water tank. The unit stops running as soon as water tank's temperature reaches setting temperature. The unit re-starts when the temperature drops back.

ROOMHEAT

Room heating mode: Similar to the mode above, but this time only heating the room. In this mode the heat pump runs according to the relationship between Time and Feed water temperature. You can change the feed water temperature through slope of the CURVE.

ROOMHEATI

Room heating mode I heats the room only. In this mode the heat pump runs according to feed water temperature. You can set the feed water temperature directly. Adjustable from 20°C to 65°C. Factory setting is 45°C.

ROOMHEAT2

Room heating mode 1 heats the room only. In this mode the heat pump runs according to room air

temperature. You can set the room air temperature directly. Adjustable from 16° C to 31° C. Factory setting is 27° C.

ROOMCOOL *

Room cooling mode I cools the room only. In this mode the heat pump runs according to feed water temperature. You can set the feed water temperature directly. Adjustable from 7° C to 30° C. Factory setting is 18° C.

ROOMCOOL | *

Room cooling mode I cools the room only. In this mode the heat pump runs according to room air temperature. You can set the room air temperature directly. Adjustable from 16°C to 31°C. Factory setting is 24°C.

WARMWATER+ROOMHEAT, ROOMHEATI or ROOMHEAT2 or ROOMCOOL or ROOMCOOL I

Auto mode: Select water tank heating and room heating at the same time to enter Auto mode. After you enter this mode, water tank heating has the priority. When the water tank reaches the set temperature a three-way valve will send it to to heat the room automatically. If the water tank temperature decreases the three-way valve's direction will revert to water tank heating.

HEATPUMP ON or OFF

ON select ON	Outdoor unit is on (normal
	operation)

OFF select OFF Outdoor unit is OFF indoor unit still running

ADD.HEAT ON or OFF

ON select ON Add Heat is on

OFF select OFF Add Heat is off

If you wish to change operating mode:

- 1.Open the main menu INFORMATION by pressing the Right button once. You will find the cursor at the sub-menu named OPERATION.
- 2.Open the OPERATION menu by pressing the Right button once. You will find the cursor at the previously selected operating mode.
- 3.Select the desired mode by pressing either the Up or Down button. Return to the main menu by pressing the Left button twice.

Sub-Menu HEAT CURVE

This menu is used for making adjustments to affect the room temperature. For more information, please refer to "Adjustments to be made regularly" on page 26.

	HEATCURVE	
	CURVE	40°
	MIN	22°
	MAX	70°
	CURVE 5	0°
	CURVE 0	0°
	CURVE -5	0°
▼	CURVE ROOM	16°

SUB MENU

HIGH	T°	STOP	50°C
LOW	т	STOP	-50°C

Menu Text	Description	Adjustable by
CURVE	The value entered shows the temperature of the water to be distributed to the radiators (feed water temperature) when the outside air temperature is 0°C.	User. See ''Adjustment of CURVE value'' on p26.
MIN	Adjustment of value for lowest feed water temperature allowed.	User. See "Adjustment of MIN & MAX value" on p30.
MAX	Adjustment of value for highest feed water temperature allowed.	User. See "Adjustment of MIN & MAX value" on p30.
CURVE 5	Adjustment of room temperature when the outside air temperature is +5°C.	User. See "Adjustment of CURVE value" on p26.
CURVE 0	Adjustment of room temperature when the outside air temperature is 0°C.	User. See "Adjustment of CURVE value" on p26.
CURVE – 5	Adjustment of room temperature when the outside air temperature is -5°C.	User. See "Adjustment of CURVE value" on P26.
CURVE ROOM	The translation of heat curve origin: change Room value also can change Curve valve, in this way, the Curve's slope is not change. if change the Curve directly, its slope will change. to change every Room value, the translation of Curve is 1°C.	User. See "Adjustment of CURVE value" on p26.
HIGH T STOP	When outdoor ambient temperature is higher than this setting, the hot water to room or water tank will be stopped.	This setting is adjustable from 0°C to 50°C,factory setting is 50°C.
LOW T STOP	When outdoor ambient temperature is lower than this setting, the hot water to room or water tank will be stopped	This setting is adjustable from 0°C to -50°C, factory setting is -50°C.

NOTE

Please note during the Summer if you leave the heating ON please set the display to ROOM HEAT 2 (Only applicable to radiator system)

ES			



Sub-Menu TEMPERATURE

This menu shows the different temperatures of the heating system. All temperature changes registered over

the last 60 minutes are stored in the control system and can be viewed in the shape of graphs.

← TEMPERATURE	
ROOM	27(31)°C
WARMWT	45(50)°C
FEED	45(65)°C
RETURN	30 °C
PIPE	22°C
OUT	25°C
▼ CMPDIFTEMP	5°C



ROOM: Room air temperature. The first value is room real air temperature, the second value in '()' is room air setting temperature. The setting temperature is adjustable from 16°C to 31°C. Factory setting is 27°C.

WARMWT: Water tank temperature. The first value is water tank real temperature, the second value in "()" is water tank setting temperature. The setting temperature is adjustable from 20°C to 65°C. Factory setting is 45°C. (compressor restart must follow the program 'CMPDIFTEMP')

FEED: The first value is real feed water temperature.The second value in '()' is feed water setting temperature in ROOMHEAT MODE which is adjusted by slope of Curve according to outdoor ambient temperature. Factory setting is a feed water temperature of 40°C when the outdoor ambient temperature is 0°C. That is to say Curve=40. The value of Curve is adjustable from 22°C to 56°C. This setting is only available for Room heating, not for water tank heating.

Under ROOMHEATI mode, FEED setting can be adjust directly from 20°C to 65°C. Factory setting is 45°C. This setting is only available for room heating, not for water tank heating.

RETURN: Display real return water temperature.

PIPE: Display outdoor unit evaporator temperature (for defrosting)

OUT: Display outdoor ambient temperature.

CMPDIF TEMP: Compressor restart determined by the cooling of the water tank. This setting is only for water tank heating, it is adjustable from 3°C to 15°C. The factory setting is 5°C.

When at item WARMWT or ROOM or RETURN or FEED, or PIPE, press the Right button for five seconds to display the information as a chart showing temperature over one hour.

CONSTANT:

This setting is to slow down the compressor speed when heat pump is doing room heating such as under floor heating. It is adjustable from 0°C to 12°C. Factory setting is 6°C. For example, if you set it 6°C, and the feed water temperature is set to 35°C, then when the water reach 35-6=29°C, the compressor will slow down its speed. This function is only for room heating mode, not for WARMWATER.

Sub menu – INTEGRAL

	00
OFF	00
CMPA	-60 (00)
ADD	-500

Integral (DM) is a program to set the start-up time and distance between compressor and electrical heater according to heat demand and heat output. It also sets the stop conditions of the compressor and electrical heater. This program is depends on the "feed water temperature degeneration" and Time.

Enter this to change the factory settings:

Menu Text	Description	Adjustable by
ODD	When the value (testing) reaches the value setting by user, the system will be closed.	USER
CMPA	When the value (testing) reaches the value setting by user, the compressor will be start-up. And the value	USER
ADD	When the value (testing) reaches the value setting by user, the ADD will be start-up.	USER

Instruction of Integral (DM)

Temperature difference between the feed water and the desired water (°C)	The corresponding value
-31 ~ -40	-40
-21 ~ -30	-30
-11 ~ -20	-20
-1 ~ -10	-10
I ~ I0	10
I I ~ 20	20
21 ~ 30	30

°C Minute = The corresponding value of temperature difference between the Feed water and the Desired water X Running time. It is calculated by integral to change. Every minute is cumulative.

For example:

(Under desired temperature)

Feed water temperature decrease of $1^{\circ}C$ (under desired temperature) in 1 minutes $^{\circ}C$ Minute=-10 X 1= -10

Feed water temperature continue decrease of $2^{\circ}C$ (under desired temperature) in another I minutes

°C Minute=-10 X I + (-10) = -20

Feed water temperature continue decrease of $3^{\circ}C$ (under desired temperature) in another I minutes

°C Minute=-10 X I + (-20) = -30

Feed water temperature continue decrease of $4^{\circ}C$ (under desired temperature) in another I minutes

°C Minute=-10 X I + (-30) = -40

Before the °C Minute reaches -60 (adjustable) the compressor is off. But when the °C Minute reaches -60 (adjustable) the compressor starts automatically and the flow temperature will increase.

Higher than desired temperature: When the actual water supply temperature reaches a level higher than the desired temperature the DM will be changed.

For example : if the DM was set to -160

I minute later when the feed water temperature is higher than desired temperature by $1^{\circ}C$, $10XI=10^{\circ}C$ Minute= -150.

Another minute later when the feed water temperature is higher than desired temperature by 2° C. $10XI=10^{\circ}$ C Minute= -140.

Another minute later when the feed water temperature is higher than desired temperature by 3° C. $10 \times 1 = 10^{\circ}$ C Minute = -130.

The relationship between compressor (on and off) and DM. The relationship between heater (on and off) and DM.

The chart below describes the running of compressor and electrical heater depending on Integral

The compressor's DM is -60 start, 0 is off, A0=-60 start-up

Electrical heater's DM is -500 start, when the feed water temperature reaches the setting value the electrical heater is off.A0+A2=-60-440=-500 start up.



The constant temperature function is only available in Room heating, but not in water tank heating.

Constant temperature function has two options : Integral (DM) and Constant room temperature

I. The constant area diagram: TI, room return water temperature, Ts, room air setting temperature or feed water temperature.



of the return water temperature will be the ADD HEAT function. actual temperature of the return line. A constant

After the compressor starts running the setting temperature setting selected will disable the

The temperature and its frequency during constant temperature program as seen on the chart on the previous page

 $\Sigma T = TI - Ts + 2\dot{c}$, ΣT has 10 areas, from 0 to 9, the rule of constant follows

a) When ΣT is changing

- i) When δT is increasing, the frequency increases I to run
- ii) When ΣT is decreasing, the frequency decreases I to run
- b) When δT stays within an area for 3 minutes, the rules are as follows:
- 4 8: the present frequency increase I (keep 10 min to increase I) until the maximum frequency is reached.

3: Frequency is unchanged

- 0 2: the present frequency decreases I to run, until the frequency reaches FI
- 2' Constant temperature of Integral +

The constant area is from 00 to -500 (DM) It is running as integral.

I + When integral is negative , the frequency is increased by I to run. the frequency will run automatically until maximum integral is reached.

2+ When integral is positive, the frequency is decreased I to run. the frequency will run automatically until minimum integral is reached.

3+ Room air constant temperature a When δT

	00
OFF	00
CMPA	-60 (00)
ADD	-500

is increasing, the frequency increases I to run. $\ensuremath{ \ensuremath{ \ensur$

b) When ξT is decreasing, the frequency is decreased I to run. If the present frequency is FI, the frequency is automatic even if ξT decreases.

Sub-Menu TIMESETTING

How to enter the Sub-Menu TIMESETTING:

Choose "TIMESETTING" on the main menu (INFORMATION).

Press the right button.The "TIMESETTING" menu can then be seen.

+	TIME SETTING	
	DATE	2010-10-10
	DAY	MONDAY
	TIME	15:04
	ROOM TIME I ON	\checkmark
		8:00
	ROOM TIME I OFF	\checkmark
▼		11:00
	ROOM TIME 2 ON	2/
		10.00
		√
		18.30
	WARMWATER I ON	√
		14:25
	WARMWATER I OFF	\checkmark
		21:10
		1
	WARNWATER 2 ON	V
		13.00
	WARITWATER 2 OFF	v 22.00
		22.00
		00:00
	ADD TIME OFF	\checkmark

00:00

effective.

TIMESETTING+ use the Up and Down buttons to select each item.

DATE

To display year, month, day.

DAY

To display the day of the week.

TIME

To display or adjust the time.

ROOM TIME I ON

When you choose the symbol " $\sqrt{}$ ", the Auto start function of Room heating is active. Select "x" to cancel this function. If this function is active the heat pump will start heating room at the time of your choosing.

ROOM TIME | OFF

When you choose the symbol " $\sqrt{}$ ", the Auto stop function of Room heating is active. Select "x" to cancel this function. If this function is active the heat pump will stop heating room at the time of your choosing.

ROOM TIME 2 ON

same with **ROOM TIME I ON.**

ROOM TIME 2 OFF

The second timer for room heating; Function the time of your choosing. same with **ROOM TIME I OFF**.

WARMWATER TIME I ON

When you choose the symbol " $\sqrt{}$ ", the Auto start function of Water tank heating is active. Select "x" to cancel this function. If this function is active the heat pump will start heating water tank at the time of your choosing.

WARMWATER TIME | OFF

When you choose the symbol " $\sqrt{}$ ", the Auto stop function of Water tank heating is active. Select "x" to cancel this function. If this function is active the heat pump will stop heating water tank at the time of your choosing.

WARWMATER TIME 2 ON

The second timer for water tank heating; Function the same with WARMWATER TIME I ON.

WARWMATER TIME 2 OFF

The second timer for water tank heating; Function the same with WARMWATER TIME I OFF.

FURTHER INFORMATION ON THE TIMERS

When setting the timers please note Hot Water can be set separately and will over ride any Hot Water settings on the ROOM HEAT timers.

ADD TIME ON

When you choose the symbol " $\sqrt{}$ ", the Auto start function of Supplementary electrical heater is active. Select "x" to cancel this function. If this function is active the heat pump will start heating by Supplementary electrical heater at the time of your choosing.

ADD TIME OFF

When you choose the symbol " $\sqrt{}$ ", the Auto stop function of Supplementary electrical heater The second timer for room heating; Function the is active. Select "x" to cancel this function. If this function is active the heat pump will stop heating by Supplementary electrical heater at the

Sub-Menu DEFROST

How to enter the Sub-Menu DEFROST:

Choose "DEFROST" on the main menu (INFORMATION). Press the Right button. The "DEFROST" menu can then be seen.

You can choose "Intelligent Defrost" or "Manual Defrost"



•	DEFROST		
	INTELL. DEF	\checkmark	
	MANUAL. DEF.		
	DEF. TIME	15M	
	INTERVAL	40M	
	START TEMP	-4°C	
	EXIT TEMP	I5°C	
	SINCETIME	0M	

BETW. TIME OM

INTELLELLIGENT DEFROST

Intelligent defrost. Once you choose this function defrosting is intelligent and automatic.

When outdoor unit's heat changer (evaporator) pipe temperature is less than 3°C continuously for 40 minutes and the temperature is lower than the setting temperature, it will start the defrosting. In Intelligent defrost mode the operator can adjust the setting of defrosting according to different ambient temperature and humidity



Select START TELLI, then press button right for a long time, to enter the demosting setting.					
Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)
2	-3	-7	-11	-16	-20
I	-3	-8	-12	-17	-21
0	-4	-9	-13	-18	-22
-1	-5	-10	-14	-19	-23
-2	-6	-11	-15	-20	-24
-3	-7	-12	-16	-21	-25
-4	-8	-13	-17	-22	-26
-5	-9	-14	-18	-23	-27
-6	-10	-15	-19	-24	-28

Select START TEMP, then press button Right for a long time, to enter the defrosting setting

When the ambient temperature is lower than 2° C all the values of the table above are the factory settings. They are adjustable from 0° C to -30° C. Press the Right button for five seconds to select any defrost start temperature and revise it.

Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)	Outdoor ambient temperature	Defrost start temperature (pipe at evaporator)
-3	Change to -12	-6	Change to -12	-16	Change to -12
-4	Change to -12	-7	Change to -12	-17	Change to -12
-5	Change to -12	-8	Change to -12	-18	Change to -12

After confirmation, the factory setting will change to be a new default.

MANUAL.DEF:

Manually defrost (adjustable defrost program)

This function is semi-automatic. For example, the operator can change the value of INTERVAL (the distance between defrosting) to be 40 minutes, and the START TEMP (the start temperature of defrosting) to be -4° C. If the defrosting time request and temperature request meet, the heat pump goes to defrost.

Defrost finish

When the outdoor evaporator pipe temperature (EXITTEMP) setting is 15°C or EXITTIME (defrosting timing) is reached, the defrosting will finish.

DEF.TIME:

Duration of defrosting adjustable from 2 to 20 minutes. Factory setting is 15 minutes defrosting duration.



INTERVAL:

Interval of defrosting adjustable from 25 to 70 minutes. Factory setting is 40 minutes.

START TEMP+

Start temperature of defrosting (pipe temperature of outdoor evaporator) adjustable from 2° C to -30° C. Factory setting is -4° C.

EXIT TEMP+

Exit temperature of defrosting (pipe temperature of outdoor evaporator) adjustable from 0°C to 20°C. Factory setting is 15°C.

SINCE TIME:

Start and exit time of defrosting, to indicate whole time of defrosting.

BETW.TIME:

To record the interval between the ending of first defrosting and the beginning of second defrosting.

Sub menu – SETTING

♦ SETTING	
EMERGENCY I	OFF
EMERGENCY 2	OFF
STERILIZE	
ADD START	50°C
ADD DELAY	30M
INTEGRAL	ON
▼ ADD DIF TEMP	4°C

OUTADD.HEAT	ON
ADD ENFORCE	OFF
WATERPUMP	0/0

EMERGENCYI

Is either ON or OFF Factory setting is OFF. If you select emergency mode the unit will continuously execute the same objective, namely room heating only, water tank heating only or auto.

If you select ON the compressor will switch off. Only the electrical heater, water pump or other temperature protections are available. When in water tank heating, the electrical heater will function instead of the compressor.

When in room-heating mode, the electrical heater will run depending on Integral.

When in room heating mode 1, the electrical heater will run depending on Integral.

When in room heating mode 2, the electrical heater automatically starts.

EMERGENCY2

EMERGENCY 2	OFF
CMP STOP	-25°C

Is either ON or OFF Factory setting is OFF If you select ON the compressor will stop in a way determined by outdoor temperature. The temperature setting is from 0°C to -50°C and adjustable. Factory setting is -25°C.

If you select emergency mode the unit will continuously execute the same objective, namely room heating only, water tank heating only or auto.

Once active only the electrical heater, water pump or other temperature protections are available.

- When in water tank heating, the electrical heater will function instead of the compressor.
- When in room-heating mode, the electrical heater will run depending on Integral.
- When in room heating mode 1, the electrical heater will run depending on Integral.
- When in room heating mode 2, the electrical heater automatically starts.

INGTERAL ON

When set it to ON, the intergral function is avaiable. When set it to OFF, the intergral function is not available

STERILIZE:

← STERILIZE	
WATER TEMP	60°C
DURATION	IOM
PERIOD	I5D
TIME	
← TIME	
10:00 - 14:00	
14:00 - 18:00	·
18:00 - 22:00	
22:00 - 02:00	
02:00 - 06:00	
06:00 - 10:00	
IOTE The stepiling estion only	well has a shire a

NOTE: The sterilize action only will be actives during the select time period of the day. Sterilize water temperature: $60^{\circ}C - 90^{\circ}C$.

Adjustable default is 60°C.

Sterilize duration: 10 – 90 minutes default is 10 minutes.

Sterilize period: 7 – 99 days. Default is 15 days. Time: Default is 10:00 - 14:00

If the water tank temperature is less than 60° C over 360 hours, the heat pump will start the sterilize function. The electrical heater will start as soon as water reaches 50° C and carry on until it reaches 60° C for a period of 10 minutes.

If after three hours the water temperature still cannot reach 60°C the sterilize function will end. **ADD START:**

10°C to 65°C adjustable. Factory setting is 40°C The compressor heats the water temperature to above 40°C then allow the electrical heater to start. This setting is for energy-saving and water tank heating (WARMWATER) only.

ADD DELAY:

Three minutes to 10 minutes adjustable.

Factory setting is 10 minutes.

Sets how long the compressor will work alone before employing the electrical heater for extra power.

ADD DIF TEMP

Additional electrical heater restart determined by water temperature drop. Adjustable from 1° C to 10° C. Factory setting is 4° C.

The electrical heater will stop when the water get to setting temperature, then re-starts as soon as the water temperature decreases by the setting you have chosen.

OUTADD.HEAT ON (OFF)

To control outdoor unit electrical heater (bottom electrical heater, evaporator heater),

Factory setting is ON

The heater will start when ambient temperature is lower than 0° C, and stop when ambient temperature is more than 2° C. When the outdoor electrical heater is select OFF the outdoor heater can not start automatically.

Display : OUT ADD . HEAT OFF

ADD ENFORCE

This function is only available for WARMWATER (water tank heating); when you select"ON", the ADD (additional electrical heater) will start enforcedly as soon as compressor start, then stop as soon as water reach setting temperature; when you select "OFF", the ADD only start after fulfill two other conditions

(ADD START and ADD DELAY).

WATER PUMP ON (OFF)

Press button RIGHT once will change from 0/0 to 3/10, press the button again will change to 3/10, press again will change to 3/15, press again will change to 3/20, press again will return to 0/0.

0/0 means water pump (for heating) will keep running when house or water tank reach setting temperature in ROOMHEAT 1 and ROOMHEAT2.

3/10 means that under ROOMHEAT 1 and ROOM HE-AT 2; if the setting temperature reach and the compressor stop, the water pumps (for heating) will runs 3 minutes to detect the water temperature, if no need to keep running the water pump will stop 10 minutes, then runs 3 minutes again to see if need to restart compressor and keep water pump running.

3/15 means that under ROOMHEAT 1 and ROOM HE-AT 2; if the setting temperature reach and the compressor stop, the water pumps (for heating) will runs 3 minutes to detect the water temperature, if no need to keep running the water pump will stop 15 minutes, then runs 3 minutes again to see if need to restart compressor and keep water pump running.

3/20 means that under ROOMHEAT 1 and ROOM HE-AT 2; if the setting temperature reach and the compressor stop, the water pumps (for heating) will runs 3 minutes to detect the water temperature, if no need to keep running the water pump will stop 20 minutes, then runs 3 minutes again to see if need to restart compressor and keep water pump running.

Sub-Menu OPERATING TIME

HEATPUMP	3 H
	IЦ

Menu Text	Description	Adjustable by
HEATPUMP	Total operating hours of heat pump since installation. Operating time will not be reset to zero.	USER
ADD	Total operating hours of auxiliary heater (2kW/3kW/4kW) since installation. Operating time will	USER

Sub-Menu RESET

Reset to factory setting value.

Sub-Menu MAN TEST

How to enter the Sub-Menu MANTEST:

MANTEST	
ADD	OFF
3 WAY	OFF
4 WAY	OFF
WARM PUMP	OFF
OUT FAN (H)	OFF
OUT FAN (L)	OFF
CMP	OFF

MANTEST

ADD	ON/OFF	ADD electrical heater*
3-WAY	ON/OFF	3-WAY VALVE
3-WAY	ON/OFF	3-WAY VALVE
WARM PUMP	ON/OFF	WATER PUMP
OUT FAN (H)	ON/OFF	OUTDOOR FAN H Speed
OUT FAN (L)	ON/OFF	OUTDOOR FAN L Speed
CMP	ON/OFF	COMPRESSOR

NOTE

The compressor only runs for five minutes in testing, and its its frequency is 45Hz. This menu is for an installation engineer. **Owner operation is prohibited.** The testing function will dissolve as soon as the menu is off the interface. Select "MAN TEST" on the main menu (INFORMATION) And press the Right button for three seconds.

Adjustments made regularly:

- Selection of operating mode
- Adjustment of desired room temperature by changing the ROOM value.
- Adjustment of heat curve
- Adjustment of maximum and minimum values for feed line temperature
- Heat Generation General

The indoor temperature should be adjusted by changing the heat curve.

The control computer uses the heat curve to determine the correct temperature of the water to be distributed to the heating system.

The heat curve will be set during **installation**. It must be adapted later on, however, to obtain a pleasant indoor temperature under varying weather conditions. A correct heat curve reduces maintenance and saves energy.

The heat curve determines the feed line temperature, depending on the outside air temperature. The lower the outside air temperature, the higher the feed line temperature. In other words, the temperature of the water feed to the radiators will increase sharply as the outside air temperature falls.

Sub-Menu ALARM RECORD

To see Alarm history press the right directional button, the latest message will be at the top.

Sub-Menu LANGUAGE

If you select CURVE in the sub-menu named HEAT CURVE, a diagram will be displayed. It represents the relation of outside air temperature to feed line temperature. This relationship is the heat curve.



Adjustment of the CURVE value

The heat curve is adjusted by the CURVE value. This value indicates the feed line temperature to the radiators at 0°C outside temperature. When you increase the CURVE value, the heat curve will become steeper and when you reduce it, it will become flatter.

At outside air temperatures lower than 0° C, the water sent to the radiators will be warmer than 40° C.

At outside temperatures higher than 0° C, the water will be colder than 40° C.

This is the most energy and cost efficient way to set the indoor temperature and should therefore be used for long term temperature settings.

If you wish to make a temporary change of temperature, you can simply change the ROOM value (see "Adjustment of the ROOM value" on page 28).

CURVE is program that adjusts feed water temperature according outdoor ambient temperature. Factory setting is ambient temperature 0° C and feed water temperature 40° C.That is represented as: CURVE = 40.

The value of CURVE is adjustable from 22°C to 56°C.

How to change the slope: Two points decide one beeline, point one is (0,40), the other point could be (18,24), the point (18,24) is not changing when changing the slope, because factory setting is that heat pump stops when outdoor ambient temperature is 18° C, so the feed water temperature should be 24° C.



If you wish to change the CURVE value:

- I.Open the main menu INFORMATION by pressing the Right button once. You will find the cursor at the sub-menu named OPERATION
- 2.Press the Down button to move the cursor to the sub-menu called HEAT CURVE.
- 3.Press the Right button once to open the menu. You will find the cursor at the parameter CURVE
- 4.Open the selected parameter by pressing the Right button once.
- 5. Increase or reduce the pre-set value using the Up or Down button. You will see from the diagram how the gradient of CURVE changes.
- 6.Press the Left button three times to return to the main menu.

Adjustment of ROOM value (CURVE ROOM)

You can also adjust the heat curve and indoor temperature by changing the ROOM value.

If you use ROOM value to adjust the heat curve the gradient does not change, meaning it does not become steeper or flatter. Instead, the whole curve is moved by 1°C for every°C by which the ROOM value is changed.

The relationship between feed line temperature and outside air temperature will not be affected. The feed water temperature will be increased or reduced by the same number of °Cs all along the heat curve. See the following diagram.

IMPORTANT

Adjustment of the ROOM value should only be used for temporary changes of the indoor temperature.

For long term settings, the CURVE value should be adjusted as this is the most energy and cost efficient way to set the indoor temperature. For adjusting the heat curve, please refer to the chapter "Adjustment of the CURVE value" on page //.

Select "ROOM CURVE" on the Sub-menu (HEATCURVE), then press the right button. Use UP and DOWN button to adjust the "ROOM CURVE".

Factory setting of ROOM value is 20°C.



Changing the ROOM CURVE

If you wish to change the ROOM CURVE:

- 1.1. Press the Up or Down button once to open the ROOM CURVE for adjustment.
- 2. Increase or reduce the pre-set value using the Up or Down button so that the desired room temperature is reached.
- 3. Wait for 10 seconds or press the Left button once to return to the main menu.

When you enter "Room heat" mode you may control compressor and electrical heater through regulating the heat curve or DM (°C minute).

Under a certain ambient temperatures the time start of compressor is determined by °C minute (DM).

Following are two examples for guidance:

"Start quickly" is determined by FEED (heat curve).

Suppose the feed water temperature is 25° C. Regulate the heat curve to make the water temperature a high value such as 55° C – that is FEED25 (55).

The DM (°C minute) will then decrease to -30 per minute. When the DM reaches -60 the compressor will start.

NOTE

If the water temperature setting is lower than feed water temperature DM would turn to positive number, meaning the compressor will not start. For that reason you also can regulate the DM to be near the value for compressor start, such as -20.



"Slow Start" is determined by FEED (heat curve) Again, suppose the feed water temperature is 25° C.You may regulate the heat curve to set the water temperature to be a lower value such as 30° C – that is FEED25(30). When that happens the DM would decrease to -10 per minute.

The time it takes to -60 becomes longer, meaning it takes that much longer for the compressor to start.

You also can regulate the DM to extend the time before the compressor starts, such as -100.



Adjustment of Part of the Heat Curve

At outdoor temperatures of between -5° C and $+5^{\circ}$ C, part of the heat curve may need adjusting if the indoor temperature does not stay at the pre-set ROOM value.

For this reason, the control system includes a function adjusting the curve at three outside temperatures: -5° C, 0° C, $+5^{\circ}$ C. This function will allow you to increase or reduce the feed line temperature without affecting the heat curve at these three specific outdoor temperatures.

If, for example, the outside temperature is -5° C the feed line temperature will change gradually in the outdoor temperature range of 0°C to -10° C, maximum adjustment being reached at -5° C.

The diagram below shows an adjusted CURVE -5. The point of maximum adjustment is clearly visible.

As we have seen, you can choose to adjust the heat curve at three specified outside air temperatures: $-5^{\circ}C,0^{\circ}C$ and $+5^{\circ}C$. The feed line temperature can be changed by plus or minus $3^{\circ}C$.

When the outdoor ambient temperature is 5° C this setting allows you to change the feed water





temperature. The heat curve will not change but the point on the curve near $5^{\circ}C$ (strictly speaking, from $0^{\circ}C$ to $10^{\circ}C$) can be adjusted. As you can see the variable is the biggest around $5^{\circ}C$.

In the same way, when the outdoor ambient temperature is 0° C this setting allows you to change the feed water temperature. The heat curve will not change but the point on the curve near 0° C (from -5°C to +5°C) can be adjusted. The variable is the biggest at 0° C.

Finally (you should be seeing a pattern here) when outdoor ambient temperature is -5° C this setting



allows you to change the feed water temperature. The heat curve will not change but the point on the curve near $-5^{\circ}C$ (from $0^{\circ}C$ to $-10^{\circ}C$) can be adjusted. The variable is the biggest at $-5^{\circ}C$.

If you wish to change a specific part of the heat curve:

- I.Open the main menu INFORMATION by pressing the Right button once. You will find the cursor at the sub- menu OPERATION.
- 2.Press the Down button to move the cursor to the sub-menu HEAT CURVE.
- 3. Open the menu by pressing the Right button once. You will find the cursor at the parameter CURVE.
- 4.Using the Up or Down buttons, select either CURVE 5, CURVE 0 or CURVE -5.

- 5.Open the selected curve by pressing the Right button once.
- 6.Raise or lower the value using the Up or Down buttons.
- 7.To return to the main menu, press the Left button three times.

Adjustment of the HIGHT STOP and LOWT STOP

The HIGH T STOP and LOW T STOP function stops all production of radiator heat when the outside air temperature is equal to, higher or lower than the value entered for HIGH T STOP or LOW T STOP.

Essentially, it tells the unit when it has become either too hot or too cold outside to carry on working. When activated the circulation pump will be turned off.

The factory setting of the HIGHT STOP is 50° C. It is adjustable from 0° C to 50° C.

The factory setting of the LOWT STOP is -50° C. It is adjustable from -50° C to 0° C.

If you wish to change the HIGH T STOP OR LOW T STOP value:

- I.Open the main menu INFORMATION by pressing the Right or Left button once.You will find the cursor at the sub-menu OPERATION
- 2.Press the Down button to move the cursor to the sub-menu HEAT CURVE
- 3.Open the selected menu by pressing the Right button once.
- 4. You will find the cursor at the parameter CURVE.
- 5.Press the Down button to move the cursor to HIGH T STOP or LOW T STOP.
- 6.Open the selected parameter by pressing the Right button once. The cursor moves to HIGH T STOP or LOW T STOP.
- 7.Raise or lower the value using the Up or Down buttons.

8.Press the Left button three times to return to the main menu.

Adjustment of the MIN and MAX value

The MIN and MAX value are, respectively, the lowest and highest values allowed for the supply line temperature.

Adjusting the minimum and maximum supply line temperature is particularly important if your home has underfloor heating.

If your house has underfloor heating and a parquet floor, the supply line temperature should not be higher than 45°C. If you have floor coils and stone tiles, the MIN value should be 22-25°C in summer when no heating is required to obtain a comfortable floor temperature.

WARNING

IGNORING THIS ADVICE RISKS DAMAGE TO YOUR FLOOR. IF YOU HAVE A BASEMENT THE MIN VALUE SHOULD BE ADJUSTED TO A SUITABLE TEMPERATURE IN SUMMER. IN SUCH CASES, THE VALUE FOR HEAT STOP SHOULD BE ADJUSTED UPWARDS.

If you wish to change the MIN or MAX value:

MIN

MIN is the minimum setting of feed water temperature. It is adjustable by operator from 10°C to 30°C. The factory setting is 22°C.

If the room has ceramic tile flooring the MIN setting should not be less than 22°C. The heat pump will restart as soon as feed water temperature drops below the MIN setting.

MAX

MAX is the maximum setting of feed water temperature and is adjustable from 30° C to 70° C. The factory setting is 70° C.

If the heat pump is used for underfloor heating this setting is very important. Under these circumstances the feed water temperature must not rise higher than 70°C. **Ignoring this advice could be dangerous.** The heat pump will stop as soon as the feed water temperature reaches the MAX setting.

- 1.Open the main menu INFORMATION by pressing the Right or Left button once. You will find the cursor at the sub-menu OPERATION.
- 2.Press the Down button to move the cursor to the sub-menu HEAT CURVE.
- 3.Open the selected menu by pressing the Right button once. You will find the cursor at the parameter CURVE.
- 4.Press the Down button to move the cursor to MIN.
- 5.Open the selected parameter by pressing the Right button once. The cursor is at MIN.
- 6.Raise or lower the value using the Up or Down button.
- 7.Press the Left button three times to return to the main menu.
- 8.Repeat the procedure to change the MAX value, replacing MIN by MAX at step 4.

Graph of recent changes in TEMPERATURE

All temperatures registered during the last hour can be viewed in the sub-menu TEMPERATURE in the shape of a graph. This will enable you to monitor changes in the different system temperatures.

When at item WARMWT or ROOM or RETURN or FEED, or PIPE, pressing the Right button for five seconds will display the information as a chart covering one hour.

There is a graph available for all temperatures, where you can only view the set point value. The integral value displayed represents the heating system's energy balance.



If you wish to check the **TEMPERATURE** graphs:

- I.Open the main menu INFORMATION by pressing the Right or Left button once. You will find the cursor at the sub-menu OPERATION.
- 2.Press the Down button to move the cursor to the sub-menu TEMPERATURE.



- 3.Open the menu by pressing the Right button once.
- 4. You will find the cursor at the parameter OUT.
- 5.Press the Down or Up button to move the cursor to the desired temperature.
- 6.Open the selected value by pressing the Right button for five seconds. A graph will be shown in the display.
- 7. Move the cursor along the time axis using the Up or the Down buttons. The exact temperature at the selected point of time appears at the top of the display.
- 8.Press the Left button three times to return to the main menu.

12. Pipe Connection for Floor Heating only



I3. Error Codes

This table explains the error codes caused by a defective regulating component or by a security operation. If they occur you will need to call your retailer.									
DISPLAY EEPROM	EEPROM reading error from display								
DISPLAY-TRANSITION COMMUNICATE	The communications failure between display and indoor transition circuit board								
TRANSITION EEPROM	EEPROM reading error from indoor transition board								
TRANSITION-MAIN COMMUNICATE	The communications failure between outdoor main circuit board and indoor transition circuit board								
MAIN-MODULE COMMUNICATE	The communications failure between outdoor main circuit board and module								
OUTDOOR TEMP.	Outdoor ambient temperature sensor error								
MODULE VOLTAGE OVER	Outdoor module voltage over-low error								
IPM MODULE	IPM module error								
CMP TOP OVER	Compressor top temperature over								
CMP TEMP.	Compressor exhausts temperature sensor error								
RETURN TEMP.	Return water temperature sensor error								
WARM WATER TEMP.	Water tank temperature sensor error								
FEEDLINE TEMP.	Feed water temperature sensor error								
PIPE TEMP.	Pipe temperature sensor error(defrosting)								
WATER FLOW TROUBLE	Water flow error								
HIGH PRESS	Pressure over high								
LOW PRESS	Pressure over low								
ROOM TEMP.	Room air temperature sensor error								
WARMWATERTEMP.TOOLOW	The water tank temperature is too low								

14. Copper Tube Sizes

Pipe Connect Model	ion KS50-DC	KS70-DC	KS90-DC	KSI20-DC	KSI50-DC
Gas tube	I/ 2"	5/ 8"	5/ 8"	3/ 4"	3/ 4"
Liquid tube	I/ 4"	3/ 8"	3/ 8"	I/ 2"	I/ 2"

15. Alarm Messages and What To Do

The cause of alarm 'IPM MODULE' could be:

- I.The communications between Module and outdoor main circuit board is jamming
- 2. Module is jamming and can not detect current or compressor
- 3. Module can not start compressor
- 4. Module's rated 15VDC voltage is not steady
- 5. Module's current is overloaded

What to do:

- I.Check if all terminal connections on the circuit boards are good and if any wires are damaged.
- 2.Check if any of the compressor's wire connections are loose. They are found on the top of compressor.
- 3. Measure the compressor connections' resistance. If the resistance is always the same it means the compressor is fine. There are three connections on the top of compressor. You need to measure each combination. Let us say the connections are called A, B and C, then you need to measure the resistance of AB, AC and BC.
- 4. Check the wire connection between the outdoor circuit board and the module. See the image for guidance.



5. Check that the DC voltage between terminal P and N are normal. The DC voltage should be: KS70 / 90-DC : 380VDC KS120 / 150-DC (single phase): 280VDC KS120 / 150-DC (triple phase): 540VDC



6.Check to see if the DC voltage between A (first wire) and B (third wire) is normal. It should be $13.5V \sim 16.5V$



The cause of alarm 'TRANSITION-MAIN COMMUNICATE ' could be:

- I.The connection between transition board (indoor circuit board) and outdoor circuit board is wrong
- 2. The connection between transition board (indoor circuit board) and outdoor circuit board is not good
- 3. The transition board (indoor circuit board) or outdoor circuit board is damaged.

15. Alarm Messages & What to Do

What do do:

- I. Check the connection wire between the indoor circuit board and outdoor circuit board. Ensure their live wires and zero curves are connected correctly.
- 2.Check the connection wire between the indoor circuit board and outdoor circuit board. The wire must be less than 20 meters. The terminals must be waterproof.
- 3. If the connection is fine, then the cause could be the indoor circuit board or outdoor circuit board. Check their lights.

The cause of alarm 'MODULE VOLTAGE OVER' could be:

- I.Water flow is insufficient.
- 2. One of the sensors has a problem.
- 3. Ambient temperature is too high.

What to do:

Check if the water flow is insufficient.

Check all the sensors to see if they are functioning normally.

The cause of alarm 'CMP TOP OVER' could be:

I.Water flow is not enough

- 2.Refrigerant was not enough.
- 3. Ambient temperature is too high.

What to do:

- I.Check if the water flow was not enough, so that the heat exchange efficiency was not good.
- 2. Check the refrigerant quantity, and make sure the system has not any leak.

The cause of alarm 'ADD OVER OR WATER FLOW TROUBLE ' could be:

I.Water flow is insufficient.

2. The connection of water flow switch is loose,

or the water flow switch is broken.

- 3. There is air inside the water system, meaning the heat exchange area is insufficient
- 4. The thermostat switch of the electrical heater is broken.

What to do:

- I.Ensure a sufficient water flow. If there is not the flow switch cannot open.
- 2.Check the wire connection of water flow switch is normal.
- 3. Check the water flow switch.
- 4. Vent the air from the water system following this manual's instructions.
- 5. Measure the thermostat switch of electrical heater by ampere meter.

The cause of 'LOW PRESS' could be:

- I.Insufficient refrigerant.
- 2. The low pressure switch connection is loose, or the switch is broken.
- 3. The outdoor fan can not run.

What to do:

- I. Check to find any leaking refrigerant especially on the connections valves.
- 2. Check if the wire connection of the low pressure switch is okay. Replace the low pressure switch if necessary.
- 3. Check if the outdoor unit's fan is running. If it is not check if the fan is running normally.

The cause of 'HIGH PRESS' could be:

- I. The water flow is insufficient
- 2. The high pressure switch's connection is not good or the switch is broken
- 3. The ambient temperature is too high.



What to do:

- I. Ensure a sufficient water flow. If there is not sufficient water the flow switch can not open.
- 2. Check to see if the wire connection of the high pressure switch is okay. Replace if necessary.

The cause of alarm 'WARM WATER TEMP.' could be:

- I. The connection of water tank temperature sensor is loose
- 2. The water tank temperature sensor is broken

What to do:

- I. Find the connection and make sure it is fine.
- 2. Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

The cause of alarm 'FEEDLINE TEMP' could be:

- I.The connection of feed water temperature sensor is loose.
- 2. The feed water temperature sensor is broken.

What to do:

I. Make sure the connection is fine.

2. Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

The cause of alarm 'RETURN TEMP.' could be:

I. The connection of return water temperature sensor is loose.

2. The return water temperature sensor is broken.

What to do:

- I. Make sure the connection is fine.
- 2. Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

The cause of alarm 'PIPE TEMP.' could be:

I. The connection of pipe temperature sensor

(on evaporator, for defrosting) is loose.

2. The pipe temperature sensor is broken.

What to do:

I. Make sure the connection is fine.

2.Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

The cause of alarm 'OUTDOOR TEMP.' could be:

The connection of outdoor ambient temperature sensor is loose.

The outdoor ambient temperature sensor is broken.

What to do:

I.Make sure the connection is fine.

2.Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

The cause of alarm 'CMP TEMP' could be:

- I.The connection of compressor exhaust air temperature sensor is loose.
- 2. The compressor exhaust air temperature sensor is broken.

What to do:

- I.Make sure the connection is fine.
- 2.Use the resistance table to measure each sensor's resistance. Replace any faulty sensors.

15.Alarm Messages & What to Do



Cockwise left to right: Module PCB , Display PCB , Transition PCB , Main PCB

Circuit Board Picture For KSI20-DC, KSI50-DC



16. Sensors Resistance Table

Con	npressor	exhaus	st te	mperat	ure	sensor	[,] resis	stance			
		Unit	:+ ć K	ồ (comp	oresso	or exhaus	t tempe	rature se	ensor ~55K		
† ć	R(Kồ)	AD	† ć	R(Kồ)	AD	† ć	R(Kồ)	AD	† ć	R(Kồ)	AD
-20	542.7	3	20	68.66	26	60	13.59	95	100	3.702	175
-19	511.9	3	21	65.62	28	61	13.11	97	101	3.595	177
-18	483	4	22	62.73	29	62	12.65	99	102	3.492	178
-17	455.9	4	23	59.98	30	63	12.21	101	103	3.392	180
-16	430.5	4	24	57.37	31	64	11.79	103	104	3.296	181
-15	406.7	4	25	54.89	32	65	11.38	106	105	3.203	183
-14	384.3	5	26	52.53	34	66	10.99	108	106	3.113	184
-13	363.3	5	27	50.28	35	67	10.61	110	107	3.025	186
-12	343.6	5	28	48.14	36	68	10.25	112	108	2.941	187
-11	325.I	6	29	46.11	38	69	9.902	114	109	2.86	188
-10	307.7	6	30	44.17	39	70	9.569	117	110	2.781	190
-9	291.3	6	31	42.33	40	71	9.248	119		2.704	191
-8	275.9	7	32	40.57	42	72	8.94	121	112	2.63	193
-7	261.4	7	33	38.89	43	73	8.643	123	113	2.559	194
-6	247.8	8	34	37.3	45	74	8.358	125	114	2.489	195
-5	234.9	8	35	35.78	47	75	8.084	127	115	2.422	196
-4	222.8	8	36	34.32	48	76	7.82	129	116	2.357	198
-3	211.4	9	37	32.94	50	77	7.566	132	7	2.294	199
-2	200.7	9	38	31.62	52	78	7.321	134	118	2.233	200
-1	190.5	10	39	30.36	53	79	7.086	136	119	2.174	201
0	180.9	10	40	29.15	55	80	6.859	138	120	2.117	202
- I	171.9	II -	41	28	57	81	6.641	140	121	2.061	203
2	163.3	12	42	26.9	59	82	6.43	142	122	2.007	204
3	155.2	12	43	25.86	60	83	6.228	144	123	1.955	206
4	147.6	13	44	24.85	62	84	6.033	146	124	1.905	207
5	140.4	13	45	23.89	64	85	5.844	148	125	1.856	208
6	133.5	14	46	22.89	66	86	5.663	150	126	1.808	209
7	127.1	15	47	22.1	68	87	5.488	152	127	1.762	210
8	121	15	48	21.26	70	88	5.32	154	128	1.717	211
9	115.2	16	49	20.46	72	89	5.157	156	129	1.674	211
10	109.8	17	50	19.69	74	90	5	157	130	1.632	212
11	104.6	18	51	18.96	76	91	4.849	159			256
12	99.69	19	52	18.26	78	92	4.703	161			256
13	95.05	20	53	17.58	80	93	4.562	163			256
14	90.66	20	54	16.94	82	94	4.426	165	B(25/50)=3	950K+-3%	256
15	86.49	21	55	16.32	84	95	4.294	167			256
16	82.54	22	56	15.73	86	96	4.167	168	R(90 c)=	5K0+-3%	256
17	78.79	23	57	15.16	88	97	4.045	170			256
18	75.24	24	58	14.62	90	98	3.927	172			256
19	71.86	25	59	14.09	93	99	3.812	173			256

Sensors resistance table 2

Unitġ §Kồ ^water/ambient/pipe sensor) T R AD T R AD T R AD 20 115.266 16 20 12.6431 99 60 2.35774 197 100 0.6148 237 -18 101.517 18 22 11.5 105 62 2.1973 200 102 0.59386 237 -16 89.5865 21 24 10.4736 110 64 2.0372 203 104 0.56038 238 -15 84.219 22 25 10 113 65 1.96532 205 105 0.54448 238 -14 79.311 23 26 9.55074 116 66 1.89627 206 106 0.52912 239 -12 70.1688 24 27 9.18356 125 69 1.70547 210 109 0.486 240 -12 70.1688 26 </th <th>Wat</th> <th>er ambi</th> <th>ent</th> <th>pipe s</th> <th>sensor</th> <th>resista</th> <th>nce</th> <th></th> <th></th> <th></th> <th></th> <th></th>	Wat	er ambi	ent	pipe s	sensor	resista	nce					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					Unitġ §	K ồ ^wa	ter/am	nbient/pipe s	sensor)			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	т	R		т	R		т	R		т	R	
119 108 14 17 103 103 104 104 104 104 104 104 104 104 104 104 104 104 105 123 -118 101.517 18 22 11.5 105 62 2.19073 200 102 0.59386 237 -16 89,5865 21 24 10.4736 110 64 2.03732 203 104 0.56038 238 -15 84,219 22 25 10 113 65 1.96532 205 105 0.54448 238 -12 70,1698 26 28 8,71983 122 68 1.70647 210 109 0.486 240 -10 62,2756 29 30 7.97078 128 70 1.64691 211 11 0.47256 240 -9 58.7079 30 31 7.62411 133 72 1.53668 2	-20	115 266	16	20	12 6431	99	60	2 35774	197	100	0.62973	236
.18101.517182211.5105622.190732001020.59386237.1796.3423192310.9731107632.112412021030.57683237.1689.5865212410.4736110642.037322031040.56038238.1884.219222210113651.965322051050.54448238.1479.31123269.55074116661.896272061060.52912239.1374.53624279.12445119671.830032071070.51426239.1062.275629307.97078128701.646912111100.47256240.958.707930317.62411131711.590682121110.44699241.752.243834336.98142133721.566682141120.44699241.752.2438346.68355139741.434982161140.42304242.546.572537356.40021142751.387032171150.41164242.546.572537356.40021142751.387032171150.41164242.546.572537356.40021 <td< td=""><td>-19</td><td>108,146</td><td>17</td><td>21</td><td>12.0561</td><td>102</td><td>61</td><td>2.27249</td><td>198</td><td>101</td><td>0.61148</td><td>237</td></td<>	-19	108,146	17	21	12.0561	102	61	2.27249	198	101	0.61148	237
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-18	101.517	18	22	11.5	105	62	2.19073	200	102	0.59386	237
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-17	96.3423	19	23	10.9731	107	63	2.11241	202	103	0.57683	237
-15 84.219 22 25 10 113 65 1.96532 205 105 0.54448 238 -14 79.311 23 26 9.55074 116 66 1.89627 206 106 0.52912 239 -13 74.536 24 27 9.12445 119 67 1.83003 207 107 0.51426 239 -12 70.1698 26 28 8.71983 122 68 1.76647 209 108 0.49989 240 -10 62.2756 29 30 7.97078 128 70 1.64691 211 110 0.47256 240 -9 58.7079 30 31 7.62411 131 71 1.59068 212 111 0.45957 241 -8 56.3694 31 32 7.29464 133 72 1.53668 214 112 0.44699 2411 -7 52.2438 34 33 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 147 77 1.29078 119 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 2	-16	89.5865	21	24	10.4736	110	64	2.03732	203	104	0.56038	238
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-15	84.219	22	25	10	113	65	1.96532	205	105	0.54448	238
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-14	79.311	23	26	9.55074	116	66	1.89627	206	106	0.52912	239
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-13	74.536	24	27	9.12445	119	67	1.83003	207	107	0.51426	239
-11 66.0898 27 29 8.33566 125 69 1.70547 210 109 0.486 240 -10 62.2756 29 30 7.97078 128 70 1.64691 211 110 0.47256 240 -9 58.7079 30 31 7.62411 131 71 1.59068 212 111 0.45957 241 -8 56.3694 31 32 7.29464 133 72 1.53668 214 112 0.44699 241 -7 52.2438 34 33 6.98142 136 73 1.48481 215 113 0.43482 241 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 177 1.2133 221 10 0.35042 244 <td>-12</td> <td>70.1698</td> <td>26</td> <td>28</td> <td>8.71983</td> <td>122</td> <td>68</td> <td>1.76647</td> <td>209</td> <td>108</td> <td>0.49989</td> <td>240</td>	-12	70.1698	26	28	8.71983	122	68	1.76647	209	108	0.49989	240
-10 62.2756 29 30 7.97078 128 70 1.64691 211 110 0.47256 240 -9 58.7079 30 31 7.62411 131 71 1.59068 212 111 0.45957 241 -8 56.3694 31 32 7.29464 133 72 1.53668 214 112 0.44699 241 -7 52.2438 34 33 6.98142 136 73 1.48481 215 113 0.43482 241 -6 49.3161 35 34 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 31.8278 41 37 5.87359 147 77 1.29078 219 117 0.35982 </td <td>-11</td> <td>66.0898</td> <td>27</td> <td>29</td> <td>8.33566</td> <td>125</td> <td>69</td> <td>1.70547</td> <td>210</td> <td>109</td> <td>0.486</td> <td>240</td>	-11	66.0898	27	29	8.33566	125	69	1.70547	210	109	0.486	240
-9 58.7079 30 31 7.62411 131 71 1.59068 212 111 0.45957 241 -8 56.3694 31 32 7.29464 133 72 1.53668 214 112 0.44699 241 -7 52.2438 34 33 6.98142 136 73 1.48481 215 113 0.43482 241 -6 49.3161 35 34 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.6261 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 10 0.3542	-10	62.2756	29	30	7.97078	128	70	1.64691	211	110	0.47256	240
-8 56.3694 31 32 7.29464 133 72 1.53668 214 112 0.44699 241 -7 52.2438 34 33 6.98142 136 73 1.48481 215 113 0.43482 241 -6 49.3161 35 34 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38951 243 -2 39.8239 42 38 5.6261 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 </td <td>-9</td> <td>58.7079</td> <td>30</td> <td>31</td> <td>7.62411</td> <td>131</td> <td>71</td> <td>1.59068</td> <td>212</td> <td></td> <td>0.45957</td> <td>241</td>	-9	58.7079	30	31	7.62411	131	71	1.59068	212		0.45957	241
-7 52.2438 34 33 6.98142 136 73 1.48481 215 113 0.43482 241 -6 49.3161 35 34 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 243 0 35.2024 47 40 5.17519 155 80 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3113	-8	56.3694	31	32	7.29464	133	72	1.53668	214	112	0.44699	241
-6 49.3161 35 34 6.68355 139 74 1.43498 216 114 0.42304 242 -5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 10.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43	-7	52.2438	34	33	6.98142	136	73	1.48481	215	113	0.43482	241
-5 46.5725 37 35 6.40021 142 75 1.38703 217 115 0.41164 242 -4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 200 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 119 0.36954 243 0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.31324	-6	49.3161	35	34	6.68355	139	74	1.43498	216	114	0.42304	242
-4 44 39 36 6.13059 144 76 1.34105 218 116 0.4006 242 -3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 119 0.36954 243 0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.3239	-5	46.5725	37	35	6.40021	142	75	1.38703	217	115	0.41164	242
-3 41.5878 41 37 5.87359 147 77 1.29078 219 117 0.38991 243 -2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 119 0.36954 243 0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239	-4	44	39	36	6.13059	144	76	1.34105	218	116	0.4006	242
-2 39.8239 42 38 5.62961 150 78 1.25423 220 118 0.37956 243 -1 37.1988 45 39 5.39689 152 79 1.2133 221 119 0.36954 243 0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559	-3	41.5878	41	37	5.87359	147	77	1.29078	219	117	0.38991	243
-1 37.1988 45 39 5.39689 152 79 1.2133 221 119 0.36954 243 0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754	-2	39.8239	42	38	5.62961	150	78	1.25423	220	118	0.37956	243
0 35.2024 47 40 5.17519 155 80 1.17393 222 120 0.35982 244 1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754 245 7 24.1932 63 47 3.88673 172 87 0.93662 228 127 0.29974	-1	37.1988	45	39	5.39689	152	79	1.2133	221	119	0.36954	243
1 33.3269 49 41 4.96392 157 81 1.13604 223 121 0.35042 244 2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754 245 7 24.1932 63 47 3.88673 172 87 0.93662 228 127 0.29974 245 8 22.5662 67 48 3.73476 174 88 0.90753 229 129 0.28482	0	35.2024	47	40	5.17519	155	80	1.17393	222	120	0.35982	244
2 31.5635 51 42 4.76253 160 82 1.09958 224 122 0.3413 244 3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754 245 7 24.1932 63 47 3.88673 172 87 0.93662 228 127 0.29974 245 8 22.5662 67 48 3.73476 174 88 0.90753 229 129 0.28482 246 10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777	1	33.3269	49	41	4.96392	157	81	1.13604	223	121	0.35042	244
3 29.9058 54 43 4.5705 162 83 1.06448 225 123 0.33246 244 4 28.3459 56 44 4.38736 165 84 1.03069 226 124 0.3239 245 5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754 245 7 24.1932 63 47 3.88673 172 87 0.93662 228 127 0.29974 245 8 22.5662 67 48 3.73476 174 88 0.90753 229 128 0.29216 246 9 21.8094 68 49 3.58962 176 89 0.8795 229 129 0.28482 246 10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777	2	31.5635	51	42	4.76253	160	82	1.09958	224	122	0.3413	244
428.345956444.38736165841.030692261240.3239245526.877858454.21263167850.998152261250.31559245625.495461464.04589169860.966812271260.30754245724.193263473.88673172870.936622281270.29974245822.566267483.73476174880.907532291280.29216246921.809468493.58962176890.87952291290.284822461020.718471503.45097178900.852482301300.27772461119.689174513.31847180910.826432311310.270782461218.717776523.19183182920.801322311320.264082461317.800579533.07075184930.777092321330.257572471416.934182542.95896186940.753732331340.251252471516.115685552.84421188950.731192331350.245122471615.341887562.73823 <td>3</td> <td>29.9058</td> <td>54</td> <td>43</td> <td>4.5705</td> <td>162</td> <td>83</td> <td>1.06448</td> <td>225</td> <td>123</td> <td>0.33246</td> <td>244</td>	3	29.9058	54	43	4.5705	162	83	1.06448	225	123	0.33246	244
5 26.8778 58 45 4.21263 167 85 0.99815 226 125 0.31559 245 6 25.4954 61 46 4.04589 169 86 0.96681 227 126 0.30754 245 7 24.1932 63 47 3.88673 172 87 0.93662 228 127 0.29974 245 8 22.5662 67 48 3.73476 174 88 0.90753 229 128 0.29216 246 9 21.8094 68 49 3.58962 176 89 0.8795 229 129 0.28482 246 10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777 246 11 19.6891 74 51 3.31847 180 91 0.82643 231 131 0.27078 246 12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 <td>4</td> <td>28.3459</td> <td>56</td> <td>44</td> <td>4.38736</td> <td>165</td> <td>84</td> <td>1.03069</td> <td>226</td> <td>124</td> <td>0.3239</td> <td>245</td>	4	28.3459	56	44	4.38736	165	84	1.03069	226	124	0.3239	245
625.495461464.04589169860.966812271260.30754245724.193263473.88673172870.936622281270.29974245822.566267483.73476174880.907532291280.29216246921.809468493.58962176890.87952291290.284822461020.718471503.45097178900.852482301300.27772461119.689174513.31847180910.826432311310.270782461218.717776523.19183182920.801322311320.264082461317.800579533.07075184930.777092321330.257572471416.934182542.95896186940.753732331340.251252471516.115685552.84421188950.731192331350.245122471615.341887562.73823190960.709442341360.23916247	5	26.8778	58	45	4.21263	167	85	0.99815	226	125	0.31559	245
724.193263473.88673172870.936622281270.29974245822.566267483.73476174880.907532291280.29216246921.809468493.58962176890.87952291290.284822461020.718471503.45097178900.852482301300.27772461119.689174513.31847180910.826432311310.270782461218.717776523.19183182920.801322311320.264082461317.800579533.07075184930.777092321330.257572471416.934182542.95896186940.753732331340.251252471516.115685552.84421188950.731192331350.245122471615.341887562.73823190960.709442341360.23916247	6	25.4954	61	46	4.04589	169	86	0.96681	227	126	0.30754	245
8 22.5662 67 48 3.73476 174 88 0.90753 229 128 0.29216 246 9 21.8094 68 49 3.58962 176 89 0.8795 229 129 0.28482 246 10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777 246 11 19.6891 74 51 3.31847 180 91 0.82643 231 131 0.27078 246 12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 246 13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512<	7	24.1932	63	47	3.88673	172	87	0.93662	228	127	0.29974	245
9 21.8094 68 49 3.58962 176 89 0.8795 229 129 0.28482 246 10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777 246 11 19.6891 74 51 3.31847 180 91 0.82643 231 131 0.27078 246 12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 246 13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916	8	22.5662	67	48	3.73476	174	88	0.90753	229	128	0.29216	246
10 20.7184 71 50 3.45097 178 90 0.85248 230 130 0.2777 246 11 19.6891 74 51 3.31847 180 91 0.82643 231 131 0.27078 246 12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 246 13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	9	21.8094	68	49	3.58962	176	89	0.8795	229	129	0.28482	246
11 19.6891 74 51 3.31847 180 91 0.82643 231 131 0.27078 246 12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 246 13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	10	20.7184	71	50	3.45097	178	90	0.85248	230	130	0.2777	246
12 18.7177 76 52 3.19183 182 92 0.80132 231 132 0.26408 246 13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	11	19.6891	74	51	3.31847	180	91	0.82643	231	131	0.27078	246
13 17.8005 79 53 3.07075 184 93 0.77709 232 133 0.25757 247 14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	12	18.7177	76	52	3.19183	182	92	0.80132	231	132	0.26408	246
14 16.9341 82 54 2.95896 186 94 0.75373 233 134 0.25125 247 15 16.1156 85 55 2.84421 188 95 0.73119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	13	17.8005	/9	53	3.07075	184	93	0.77709	232	133	0.25757	24/
15 16.1156 85 55 2.84421 188 95 0./3119 233 135 0.24512 247 16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	14	16.9341	82	54	2.95896	186	94	0.75373	233	134	0.25125	24/
16 15.3418 87 56 2.73823 190 96 0.70944 234 136 0.23916 247	15	16.1156	85	55	2.84421	188	95	0.73119	233	135	0.24512	24/
	16	15.3418	8/	56	2.73823	190	96	0.70944	234	136	0.23916	24/
17 14.6181 90 57 2.63682 192 97 0.68844 234 137 0.23338 247 10 12.010 02 50 2.62072 102 00 0.44010 225 120 0.20774 247	1/	14.6181	90	5/	2.63682	192	9/	0.68844	234	13/	0.23338	247
	18	13.918	73	58	2.537/3	193	98	0.66818	235	138	0.22776	247



17. List of Components

INDOOR UNIT KS50-DC KS70-DC KS90-DC KS120-DC KS150-DC



- I ENCLOSURE
- 2 WATER FLOW SWITCH
- 3 STAINLESS STEEL HEAT EXCHANGER
- 4 WATER PUMP

- 5 LIQUID VALVE
- 6 GAS VALVE
- 7 ELECTRICAL HEATER
- 8 THREE WAY VALVE

17. List of Components

OUTDOOR UNIT



- CONDENSER HEATER
- **10 PARTITION BOARD**
- **II REACTOR**

- VALVE
- 20 REV.VALVE COIL
- 21 SIDE PANEL

- 30 RADIATOR
- **31 MOTOR BRACKET**
- 32 OUTDOOR MOTOR



18. Dimensions



18. Dimensions

OUTDOOR UNIT





18. Dimensions

OUTDOOR UNIT

KSI50-DC

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19.Wiring Diagrams



OUTDOOR UNIT KS50-DC Single Phase



OUTDOOR UNIT KS90-DC Single Phase



OUTDOOR UNIT KSI 20-DC Single Phase





19. Wiring Diagrams

OUTDOOR UNIT KS150-DC Three Phase



Technficafl Characterfistfics for HEATING AND COOLING

Model Item	KS50-DC	KS70-DC	KS90-DC	KS120-DC	KS120-DC	KS150-DC	KS150-DC
Heating Capacity	5000W	6900W	8900W	11850W	11850W	14800W	14800W
Heating Power Input	1140W	1564W	2020W	2700W	2700W	3600W	3600W
CoolingCapacity	4520W	6400W	8100W	10900W	10900W	13400W	13400W
CoolingPowerInput	1585W	2210W	2840W	3650W	3650W	4730W	4730W
Current (heating/cooling)	5.0A/6.8A	6.8A/9.8A	8.9A/12.3A	12.0A/15.6A	4.5A/5.8A	15.0A/21.5A	5.8A/7.3A
Voltage	220-240V~	220-240V~	220-240V~	220-240V~	380-415V~	220-240V~	380-415V~
Frequency	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz
Phase	single	single	single	single	trinal	single	trinal
Electrical Heater Power	2000W	3000W	3000W	4000W	4000W	4000W	4000W
Electrical Heater Current	8.8A	13.0A	13.0A	17.3A	17.3A	17.3A	17.3A
Max. Input Power(heatpump)	2250W	2500W	3200W	5100W	5100W	5700W	5700W
Max Discharge Pressure	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa
Max Suction Pressure	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa
Refrigerant	R410a/1.55kg	R410a/1.75kg	R410a/2.05kg	R410a/2.8kg	R410a/2.8kg	R410a/3.6kg	R410a/3.6kg
Water Pump Flux	1 m ³ /h	1.25 m ³ /h	1.6 m ³ /h	2.2 m ³ /h	2.2 m ³ /h	2.55 m ³ /h	2.55 m ³ /h
Water Proof Class	IPX4	IPX4	IPX4	IPX4	IPX4	IPX4	IPX4
Ambient Condition	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C
Net Weight (indoor)	26kg	37kg	39kg	41kg	41kg	42kg	42kg
Net Weight (outdoor)	40kg	53kg	61kg	96kg	96kg	106kg	106kg

Technficafl Characterfistfics for HEATING ONLY

Model Item	KS50-DC	KS70-DC	KS90-DC	KS120-DC	KS120-DC	KS150-DC	KS150-DC
Heating Capacity	5000W	6950W	8900W	11850W	11850W	14800W	14800W
Heating Power Input	1140W	1700W	2020W	2700W	2700W	3600W	3600W
Current (heating)	5.0A	7.5A	8.9A	12.0A	4.5A	16.5A	5.8A
Voltage	220-240V~	220-240V~	220-240V~	220-240V~	380-415V~	220-240V~	380-415V~
Frequency	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz	50Hz
Phase	single	single	single	single	trinal	single	trinal
Electrical Heater Power	2000W	3000W	3000W	4000W	4000W	4000W	4000W
Electrical Heater Current	8.8A	13.0A	13.0A	17.3A	17.3A	17.3A	17.3A
Max. Input Power(heatpump)	2250W	2650W	3200W	5100W	5100W	5700W	5700W
Max Discharge Pressure	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa	4.0MPa
Max Suction Pressure	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa	0.95MPa
Refrigerant	R410a/1.55kg	R410a/1.75kg	R410a/2.05kg	R410a/2.8kg	R410a/2.8kg	R410a/3.6kg	R410a/3.6kg
Water Pump Flux	1 m ³ /h	1.25 m ³ /h	1.6 m ³ /h	2.2 m ³ /h	2.2 m ³ /h	2.55 m ³ /h	2.55 m ³ /h
Water Proof Class	IPX4	IPX4	IPX4	IPX4	IPX4	IPX4	IPX4
Ambient Condition	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C	-20 ~ 43 ° C
Net Weight (indoor)	26kg	29kg	39kg	41kg	41kg	42kg	42kg
Net Weight (outdoor)	43kg	45kg	61kg	96kg	98kg	106kg	106kg



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