

Service

Operation control function by the indoor unit control

Operation mode

General

The modes mentioned below can be chosen from the control panel.

Mode	Function
(1) Auto	<ul style="list-style-type: none"> The mode is automatically switched over between (3) Heating mode and (4) Cooling mode. Automatic switching rule is mentioned below.
(2) Manual	<ul style="list-style-type: none"> In this operating mode, you can select what functions are permitted. You can't deselect "compressor" in manual mode.
(3) Heating	<ul style="list-style-type: none"> Hot water is supplied for heating. Hot water operation will be made when the tank water temperature lowers. When the outdoor unit can not cover the heat load, electric heater use is allowed and water in the tank is supplied for heating to fulfill the required heat load.
(4) Cooling (Super Cooling)	<ul style="list-style-type: none"> Cold water is supplied for cooling. Hot water operation will be made when the tank water temperature lowers;
(5) Add. Heat only	<ul style="list-style-type: none"> Outdoor unit is not allowed to operate. Only electric heater is exclusively used for Heating and Hot water operation.

Note 1 : The measured value of outdoor air temperature (BT1) which is used for control, is averaged in accordance with the prescribed formula.

Note 2 : Heating/Cooling demand is calculated as numeric DM (Degree Minutes) from the supply water temperature (BT12) and its target temperature in accordance with the prescribed formula.

Note 3 : Electric heater can be replaced with external heat source of the docking feature. See Menu 5.1.12 and 5.3.6 for setting.

Note 4 : Two sets of climate system can be controlled with different heating curve. See Menu 1.9.1 for setting.

Operation control function by the indoor unit control

Actuator operation according to the operation mode

State	Function	Run status	Outdoor unit side			Indoor unit side			
			Compressor CM	Outdoor fan FMO1	4-way valve 20S	Electric heater EB1	Circulation pump GP12	Reversing valve QN10	Cooling shift valve QN12
Heating Alternating mode	Switching between heating and hot water	Heating	ON/OFF	ON/OFF	ON	OFF	ON	Closed	Closed
		Hot water						Active	
Heating Combined mode	Outdoor unit produces heating and electric heater supports lack of capacity	Heating	ON	ON	ON	ON	ON	Active	Closed
Cooling	Switching between cooling and hot water	Cooling	ON/OFF	ON/OFF	OFF	OFF	ON	Closed	Open
		Hot water			ON			Active	Closed
Add. Heat only	Producing heating and hot water with electric heater	Heating	OFF	OFF	ON/OFF	ON	ON	Closed	Closed
		Hot water						Active	
Defrost	Defrosting outdoor unit heat exchanger	Defrost	ON	OFF	OFF	OFF	ON	Closed	Closed
		Tank defrost				ON		Active	
Shutdown	Only in the event of serious alarms	Stop	OFF	OFF	ON/OFF	OFF	ON/OFF	Closed	Closed

Mode transition in Auto mode

Change-over of Heating/Cooling operation is controlled by detection with outdoor air temperature sensor (BT1) of the indoor unit. Threshold value depends on setting on Menu 4.9.2.

Start cooling

If outdoor air temperature is above setting value on Menu 4.9.2, cooling mode is chosen.

If outdoor air temperature is below setting value on Menu 4.9.2 it switches to heating mode.

Default of setting value is 25°C .

Stop heating

If outdoor air temperature is below setting value on Menu 4.9.2, heating mode is chosen.

If outdoor air temperature is above setting value on Menu 4.9.2, it switches to cooling mode.

Default of setting value is 17°C .

Mode transition in Auto/manual mode to hot water operation

Change-over of Heating or Cooling/Hot water operation is controlled by detection with temperature sensor (BT6) of the tank unit. Threshold value depends on setting on Menu 5.1.1.

Setting range start temp. economy/normal/luxury

If tank temperature is below setting value on Menu 5.1.1, hot water mode is chosen.

Default of setting value is the following table.

Hot operation mode	Default value
Economy	42°C
Normal	46°C
Luxury	49°C

Setting range stop temp. economy/normal/luxury

If tank temperature is above setting value on Menu 5.1.1, it switches to heating or cooling mode.

Default of setting value is the following table.

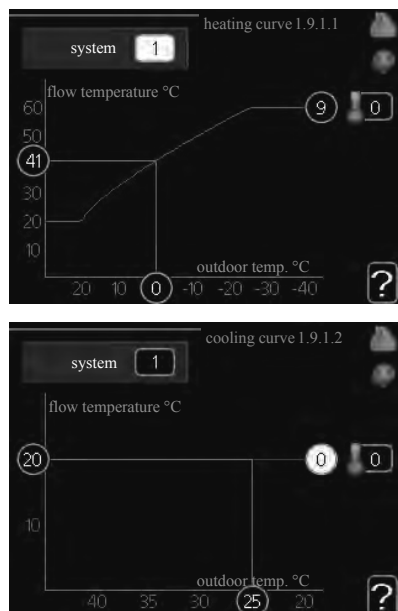
Hot operation mode	Default value
Economy	48°C
Normal	50°C
Luxury	53°C

Supply water temperature control in heating

Target supply water temperature can be seen in Menu 1.1.

Heating curve

Heating/cooling curve setting



heating curve

Setting range: 0 – 15

Default value: 9

cooling curve (accessory required)

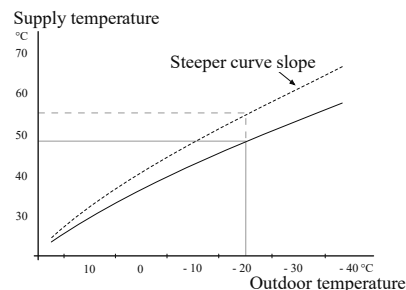
Setting range: 0 – 9

Default value: 0

The prescribed heating curve for your house can be viewed in the menu "heating curve". The task of the heating curve is to give an even indoor temperature, regardless of the outdoor temperature, and thereby energy efficient operation. From this heating curve, the control module determines the temperature of the water to the heating system, supply temperature, and therefore the indoor temperature. Select the heating curve and read off how the supply temperature changes at different outdoor temperatures here. If there is cooling function, the same settings can be made for the cooling curve.

Curve coefficient

The heating/cooling curve shows the relation between the target supply temperature and the corresponding outdoor temperature. A steep curve indicates that supply temperature becomes higher at low outdoor air temperature in heating and it becomes lower at high outdoor air temperature in cooling.



The optimum slope depends on the climate conditions in your location, the type of heating device (radiators or under floor heating) and how well insulated the house is.

The curve is set when the heating installation is installed, but may need adjusting later. Normally, the curve will not need further adjustment.

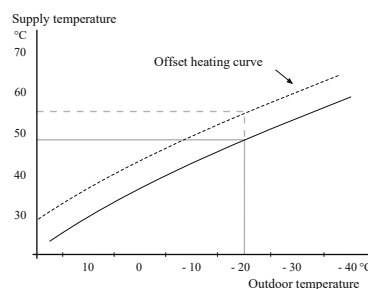
CAUTION

In the event of making fine adjustments of the indoor temperature, the curve must be offset up or down instead, this is done in menu 1.1 "temperature".

Curve offset

The target temperature can be offset in parallel over the entire outdoor temperature range by this function. This is offset by 5 °C by adjusting 2 steps.

The target temperature can be parallel offset in the entire outdoor temperature range with this function. It is offset by 5 °C by adjusting 2 steps.



Flow line temperature – maximum and minimum values

This function is used in order to limit max-min supply temperature. The heating / cooling curve becomes flat beyond max / min target temperature.

CAUTION

Underfloor heating systems are normally "max flow line temperature" set between 35 and 45°C. Take care not to cause low temperature burns in case it is set higher than 35°C.

Must be restricted with underfloor cooling min. flow line temp. to prevent condensation.

Check the max temperature for your floor with your installer/floor supplier.

TIP

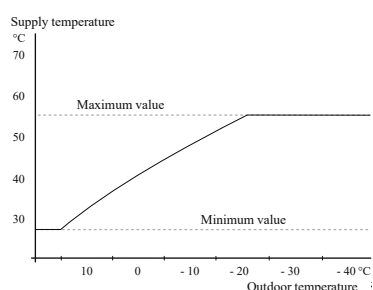
Wait 24 hours before making a new setting, so that the room temperature has time to stabilise.

If it is cold outdoors and the room temperature is too low, increase the curve slope by one increment.

If it is cold outdoors and the room temperature is too high, lower the curve slope by one increment.

If it is warm outdoors and the room temperature is too low, increase the curve offset by one increment.

If it is warm outdoors and the room temperature is too high, lower the curve offset by one increment.



The figure at the end of the curve indicates the curve number. The figure beside the thermometer icon gives the curve offset. Use the control knob to set a new value.

Confirm the new setting by pressing the OK button.

Curve 0 is an own curve created in menu 1.9.7.

To select another curve (slope):

1. Press OK button to access the setting mode
2. Select a new curve. The curves are numbered from 0 to 15, and the bigger number curve has steeper slope. Curve 0 means that "own curve" (menu 1.9.7) is used.
3. Press OK button to exit the setting.

To read off a curve:

1. Turn the control knob so that the ring on the shaft with the outdoor temperature is marked.
2. Press OK button.
3. Follow the grey line up to the curve and out to the left to read off the value for the supply temperature at the selected outdoor temperature.
4. You can now select to take read outs for different outdoor temperatures by turning the control knob to the right or left and read off the corresponding flow temperature.
5. Press OK or Back button to exit read off mode.

Water temperature control when deviated from the target

When the DM value is significantly small, supply water temperature must be controlled higher than target temperature to reduce the deficit of DM value. However, too big overshoot of the supply temperature will affect comfort.

In order to control the supply water temperature to avoid fluctuation of room temperature, overshoot limit is set in Menu 5.1.3 (Max diff flow-line temp.). When the current supply temperature deviates from the set value compared to that calculated, the heat pump is forced to stop irrespective of the degree minute value.

If the current supply temperature exceeds the calculated flow temperature plus the set value, the degree minute value is set to 0. The compressor in the heat pump stops when there is only a heating demand.

Heating thermo-ON / OFF control

The control by DM value is the basic principle to operate/stop the outdoor unit operation.

DM (Degree-Minutes) value

DM value is integrated value of the gap between the target and actual supply water temperature.

Compressor required speed and electric heater ON/OFF are controlled by the DM value.

Operation state transition according to DM value

According to the DM value, operating state is changed.

Default of DM start heating value (Menu 4.9.3) is -60.

Default of DM start add. heat value (Menu 4.9.3) is 400.

Supply water temperature control in cooling

Principle such as cooling curve, cooling curve offset and upper/lower limit is the same as heating operation.

Target supply water temperature can be checked in Menu 1.9.

Cooling curve can be chosen in Menu 1.9.1.2.

Cooling curve

Cooling curve is the basic principle to decide the target supply water temperature for cooling.

The higher the outdoor air temperature (BT1) becomes, the lower the target supply water temperature becomes, and the characteristics can be adjusted in Menu 1.9.1.2.

Upper/Lower limit of the supply water temperature

Regardless of the cooling curve setting and the outdoor air temperature, target supply water temperature can not exceed the min/max supply water temperature set in Menu 1.9.3.2 and 5.1.2.

Upper and lower limit is set after various offset correction.

Water temperature control when deviated from the target

When the DM value is significantly big, supply water temperature must be controlled lower than target temperature to reduce the surplus of DM value. However, too big overshoot of the supply temperature will affect comfort.

In order to control the supply water temperature to avoid fluctuation of room temperature, overshoot limit is set in Menu 9.6.7 (Max diff flow-line temp.). When the current supply temperature deviates from the set value compared to that calculated, the heat pump is forced to stop irrespective of the degree minute value.

If the current supply temperature exceeds the calculated flow temperature plus the set value, the degree minute value is set to 0. The compressor in the heat pump stops when there is only a heating demand.

Cooling thermo-ON / OFF control

Principle of the control such as DM value is the same as heating operation.

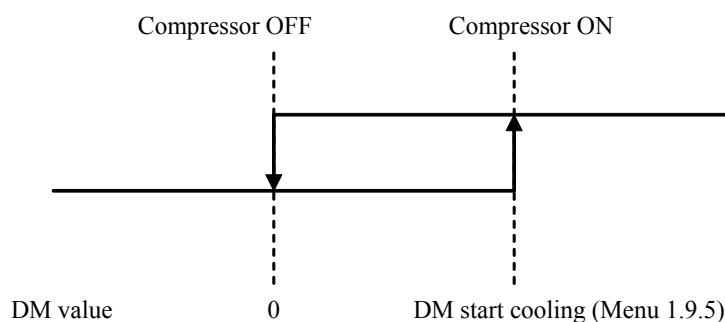
DM (Degree-Minutes) value

DM value is limited in Menu 1.9.5 and does not exceed the limit.

Operation state transition according to DM value

According to the DM value, operating state is changed.

Default of DM start cooling value (Menu 1.9.5) is +30.

**Exceptional processing of DM value**

Forced outdoor unit operation

In cooling mode, there is no exceptional DM value processing to operate the outdoor unit according to the gap between target and actual supply water temperature.

Forced outdoor unit stop

In case the actual supply water temperature is lower than the target temperature and the gap is bigger than the value set in Menu 5.1.3 when the outdoor unit is operating, the DM value is overwritten to 0, which results in stopping the outdoor unit operation immediately.

Operation control function by the indoor unit control

Hot water operation control

ON/OFF control

Regardless of the DM value, hot water operation when tank water temperature (BT6) lowers below Start temp HW in Menu 5.1.1. It finishes when the tank water temperature reaches Stop temp HW in Menu 5.1.1.

Compressor speed control

During the hot water operation, compressor speed is controlled according to the map linked with the outdoor air temperature. There are two maps. One is high cap map. The other is low cap. These map automatically changed depending on the tank temperature.

Charge method

There are two kinds of hot water storage methods. The 2 methods are dt and target temperature charging. They can be chosen in Menu 5.1.1. Dt uses high capacity curve when BT12, BT3 and BT6 allow it and finish the charging with low capacity curve. Target temperature method uses high capacity curve only.

Defrost operation

When frost accumulates on the surface of the outdoor heat exchange, defrost operation starts to remove it.
For detailed operation condition, see outdoor unit control

During defrost operation, indoor unit operates as follows in order to extract heat from the heating system:

- Reversing valve QN10 and QN12 are towards heating system.
- Circulation pump GP12 keeps operation based on general rule.

When at least one of the following conditions is fulfilled, Reversing valve QN12 switches towards hot water to extract heat from the tank.

- Water return temperature < tank defrost temperature level
- Water outlet temperature < 10°C
- Water return temperature – Water outlet temperature > Min Flow Threshold
- Operation of the climate system has been blocked

Protection control

Current protection

Maximum current limit control for the outdoor unit (by indoor unit control)

When the operation current of the outdoor unit comes close to the limit, request compressor speed is retained in order to keep the current.

Freeze protection of water heat exchanger

The freeze protection function shall avoid water to freeze inside the heat exchanger during defrost and cooling operation.

(1) In cooling mode

Compressor speed is kept when the low pressure (BP4) reaches 0.75MPa, and stopped when it reaches 0.65MPa for 20 seconds. Operation is automatically restarted when it reaches 0.83MPa and the supply water temperature becomes 14°C or higher, but it will permanently stop if the protection is activated for 10 repeated.

(2) In defrosting mode

Compressor stops when the low pressure (BP4) reaches threshold value for 10 seconds depending on water temperature.

After stopping, the system automatically restarts with heating mode.

When the above action is repeated for 10 times, the system stops and error code is displayed.

Low condenser out

Compressor stops when the supply temperature (BT12) becomes below 5°C and it automatically restarts when the supply temperature (BT12) becomes above 14°C.

High water out

Compressor stops when the supply temperature (BT12) becomes above 60°C and it automatically restarts when the supply temperature (BT12) becomes below 58°C.

High water in

Compressor stops when the return temperature (BT3) becomes above 55°C and it automatically restarts when the return temperature (BT3) becomes below 53°C.

High pressure

Compressor stops when the high pressure (BP4) reaches 4.15MPa and it automatically restarts when the high pressure (BP4) becomes below 3.15MPa.

When the above action is repeated for 5 times within an hour, the system will permanently stop.

Operation control function by the outdoor unit control

Determination of compressor speed (frequency)

- 1) Maximum and minimum frequency under normal operating conditions

(rps)

Model	FDCW60VNX-W	
Operation mode	Cooling	Heating
Maximum frequency	106	110
Minimum frequency	12	12

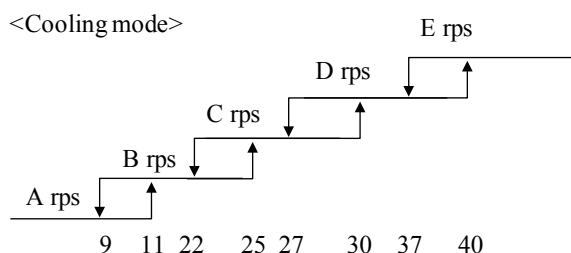
- 2) Maximum required frequency under high outdoor air temperature condition

Maximum required frequency is limited according to the outdoor air temperature (Tho-A)

(rps)

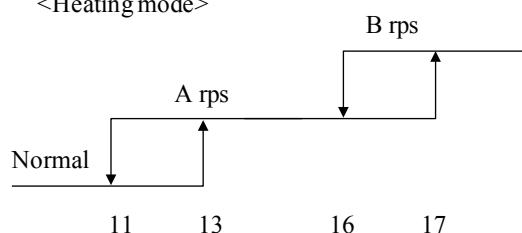
Model	FDCW60VNX-W	
Cooling mode	A rps	60
	B rps	75
	C rps	90
	D rps	Please see 3)
	E rps	95
Heating mode	A rps	90
	B rps	75

<Cooling mode>



Tho-A (°C)

<Heating mode>



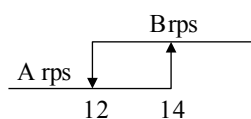
Tho-A (°C)

- 3) Maximum frequency under high condensing saturated temperature (CST or Thi-L whichever higher) in heating mode. Maximum frequency is limited according to the condensing saturated temperature.

(rps)

Model	FDCW60VNX-W	
Cooling mode	Outdoor air temperature	27°C < Tho-A ≤ 40°C
	A rps	95
	B rps	-

<Cooling mode>

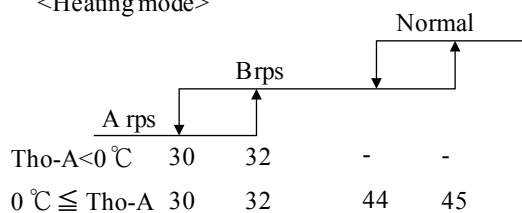


CST or Thi-L whichever higher

(rps)

Model	Outdoor air temperature	FDCW60VNX-W	
Heating mode		Tho-A < 0°C	0°C ≤ Tho-A
	A rps	95	90
	B rps	Normal	100

<Heating mode>

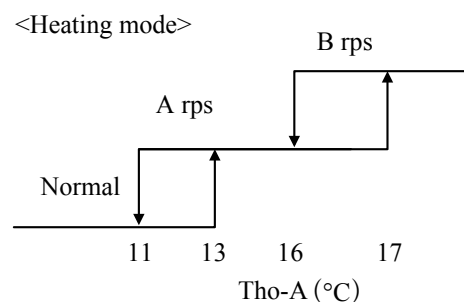
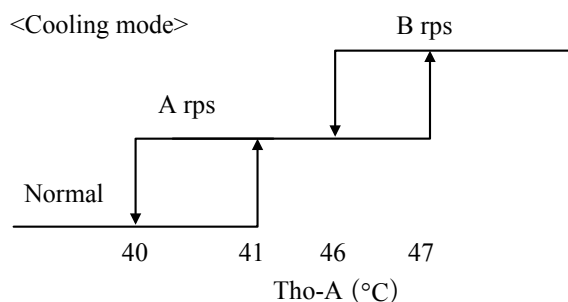


CST or Thi-L whichever higher

Operation control function by the outdoor unit control

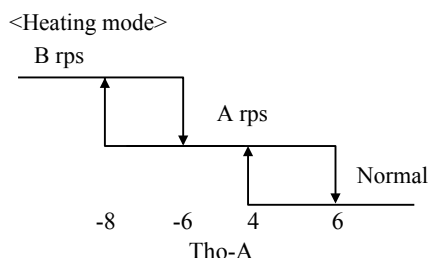
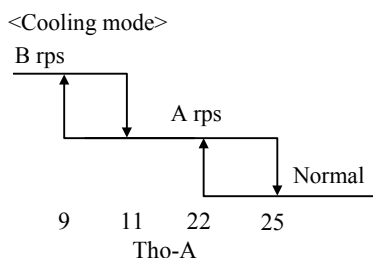
- 4) Minimum required frequency under high ambient temperature condition.
According to the outdoor air temperature (Tho-A), minimum required frequency in cooling mode is changed as per A or B in below table.

Model		FDCW60VNX-W
Cooling mode	A rps	30
	B rps	40
Heating mode	A rps	30
	B rps	40



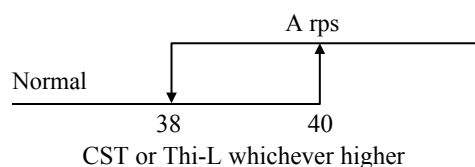
- 5) Minimum required frequency adjustment under low ambient temperature (Tho-A) condition
According to the outdoor air temperature, minimum required frequency is offset by as per below table.

Model		FDCW60VNX-W
Cooling mode	A rps	-
	B rps	45
Heating mode	A rps	35
	B rps	45



- 6) Minimum required frequency under high condensing saturated temperature (CST or Thi-L whichever higher) in heating mode.

Model		FDCW60VNX-W
Heating mode	A rps	41



- 7) When any of the controls from 1) - 6) above may duplicate, whichever the smallest value among duplicated controls is taken as the maximum required frequency, and whichever the biggest value is taken as the minimum required frequency.

Compressor start control

- Compressor starts upon receipt of the thermostat ON signal from the indoor unit
- However, at initial start-up after turning the power circuit breaker on, the compressor may enter the standby state for maximum 30 minutes in order to prevent from dry-up of oil in the compressor.

Operation control function by the outdoor unit control

Compressor soft start control

1) The pattern 1

Normally, the outdoor unit starts a compressor with this control except the condition mentioned in (2) pattern 2.

- Firstly, compressor starts at 10rps up to the target speed "30rps", and it is accelerated by 5rps/s.
- Compressor acceleration
- The compressor upper limit speed is limited at "A", "B", and "C" rps for "T minutes after compressor starts" respectively.

			Duration from the starting compressor T (min)			
			T ≤ 5min	T ≤ 7min	T ≤ 9min	T > 9min
			A rps	B rps	C rps	
FDCW60VNX-W	Cooling mode		120	120	120	-
	Heating mode	Tho-A ≥ 0℃	48	120	120	-
		Tho-A < 0℃	48	56	75	-

“When the value in this table is higher than the global highest (Nmaxo) value, it follows the global highest value.”

In case the pattern 1 condition and the pattern 3 condition are fulfilled at the same time, pattern 3 start-up will be done.

2) The pattern 2

① Control condition

Operation mode is “Heating” and all below condition a) and b) are fulfilled.

But any of 1) ~3) conditions is fulfilled, pattern 1 start-up will be done.

1) Operation mode is changed from “stop” to “Heating”

2) Restarting compressor after Defrost operation.

3) Restart from “Forced-Stop”

a) “Compressor Command” is turned from “OFF” to “ON”

b) When “Compressor command” is turned “ON”, Tho-A is less than 10 degree C.

				Duration from the starting compressor T (min)		
				T ≤ 1min	T ≤ 5min	T ≤ 5min
				A rps	B rps	C rps
FDCW60VNX-W	Heating mode	TAi < 35℃	Tho-A ≥ -5℃	40	32	-
			Tho-A < -5℃	45	32	-
		TAi > 35℃	-	48	48	-

※ TAi; Inlet water temperature

3) The pattern 3

① Control condition

In case all of the following conditions are fulfilled when the operation mode is not "Stop"

i) Inverter command changes from "STOP" to "RUN".

ii) Target compressor speed is less than A rps.

② Control contents

Compressor lower speed limit is limited at Arps for "a" minutes.

	Mode	A rps	a min
FDCW60VNX-W	Cooling	40	3
	Heating	41	3

If the operation is duplicate the pattern 2 and the pattern 3, the pattern 2 execution is priority.

Operation control function by the outdoor unit control

Outdoor fan control

1) Relations between Fan speeds and revolutions

			Fan speed (rpm)							
			1st	2nd	3rd	4th	5th	6th	7th	8th
FDCW60VNX-W	Revolutions	Cooling	150	225	485	520	570	685	740	850
		Heating	150	225	485	520	570	685	800	850

2) Control of fan motor speed

(a) Starting fanmotor speed is fixed by the fanmotor speed excepted below case (i)

(i) Operation mode is “cooling” and Tho-A < 22℃

	Fan speed	Control duration
11℃ ≤ Tho-A < 22℃	2nd	30second after “Compressor ON”
Tho-A < 11℃	1st	30second after “Compressor ON”

If Tho-A changed the condition during 30second, Fan speed does not change.

(ii) Other than case (i)

Follow the table (2).(b)

(b) Control of the fan motor speed in normal mode

		Fan speed (rpm)								
		OFF	1st	2nd	3rd	4th	5th	6th	7th	8th
Compreassor speed (rps)	Cooling	0	-	-	-	0-22	22-30	30-58	58-80	80-
	Heating	0	-	-	-	0-30	30-38	38-78	78-90	90-

※ Fan motor speed down actually delays 60 second from the time that the each change command occurs.

Once the increase command is active even if it is within the above 60 seconds, the fan speed is increased promptly.

※※ When fan motor speed command “OFF” is active, fan motor speed is controlled 0 rpm promptly without delay.

3) Stop fanspeed control.

Fan stop control shows as follows.

① Fan motor stops after fan 6th speed is operated T minutes.

	T (minutes)
Cooling	1min
Heating	1min

4) Fan speed control during cooling operation

a) Ambient air temperature (Tho-A) is below 25℃ .

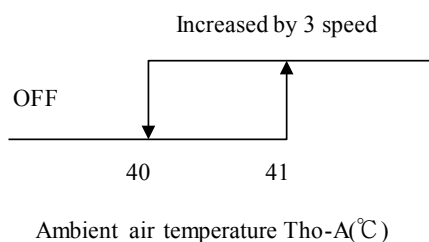
Fan motor speed operates the Up-Down control according to heat exchanger temperature (Tho-R).

Tho-R	Fan speed
Tho-R ≤ 21℃	Decreased by 1 speed
21℃ < Tho-R ≤ 38℃	Retained
38℃ < Tho-R	Increased by 1 speed

Operation control function by the outdoor unit control

- b) Ambient air temperature (Tho-A) is above 41℃ .

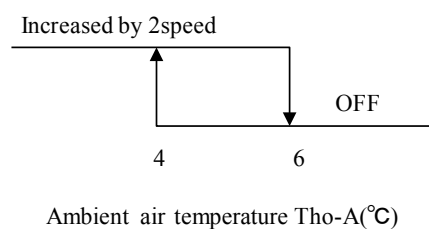
Fan motor speed operates the Up control according to ambient air temperature (Tho-A).



- 5) Fan speed control during normal heating operation

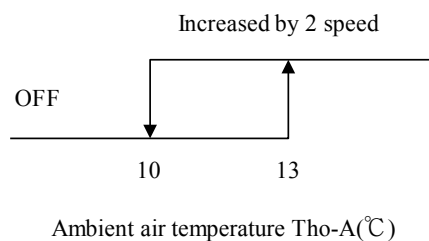
- a) Ambient air temperature (Tho-A) is below 4℃ .

Fan motor speed operates the Up control according to ambient air temperature (Tho-A).



- b) Heat exchanger temperature (Tho-R) is above 13℃ .

Fan motor speed operates the Down control according to heat exchanger temperature (Tho-R).



Silent mode

When outdoor unit receives silent mode signal from indoor unit, silent mode operation starts.

[Control contents]

- a) Fan speed upper limits are restricted according to the following table.

Model	Operation mode	Max speed (rpm)
FDCW60VNX-W	Heating / Cooling	570

* Compressor speed limits are also restricted by indoor unit control command.

* In case of some conditions which enter protection control, the restriction of silent mode is cancelled.

Defrost operation

1) Defrost starting conditions

Defrost operation can be started only when all of the following condition are satisfied.

a) After start of heat operation

When it elapsed 35 minutes.(Accumulated compressor operating time)

b) After end of defrost operation

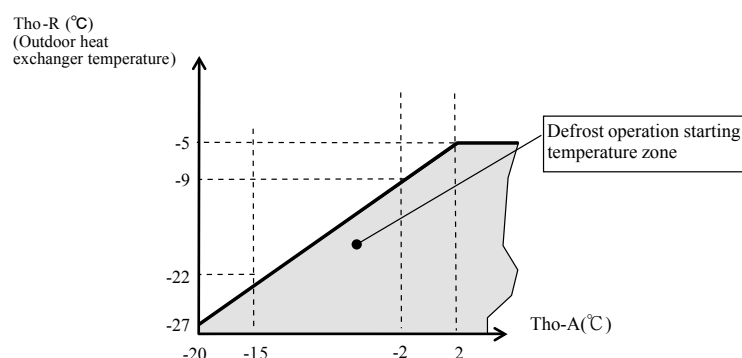
When it elapsed 35 minutes.(Accumulated compressor operation time)

c) Outdoor heat exchanger sensor (Tho-R) temperature

When the temperature has been below -5°C for 3 minutes continuously.

d) The difference between the outdoor air temperature sensor and the outdoor heat exchanger temperature sensor (Tho-A - Tho-R) fulfils the following condition.

- $\text{Tho-A} - \text{Tho-R} \geq 7^{\circ}\text{C}$

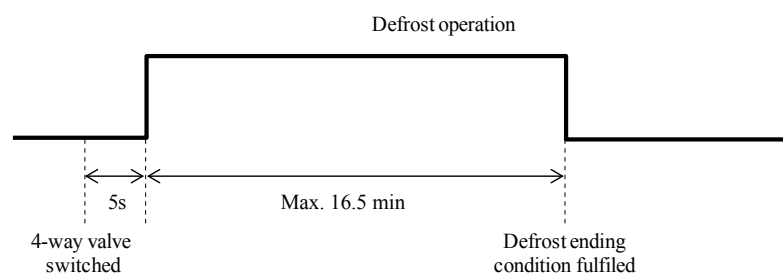


2) Defrost ending conditions

Defrost ending condition is fulfilled when either one of the following is satisfied.

a) Outdoor heat exchanger temperature sensor (Tho-R): 10°C or higher

b) Control operation time of defrost operation → When 16 minutes 35 seconds has passed since 4-way valve is switched.



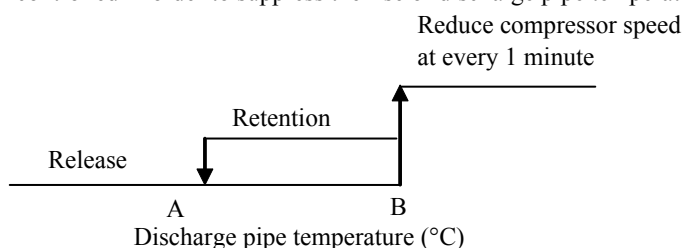
Operation control function by the outdoor unit control

Protective control/ anomalous stop control by compressor speed (frequency)

1) Compressor discharge pipe temperature protection

a) Protective control

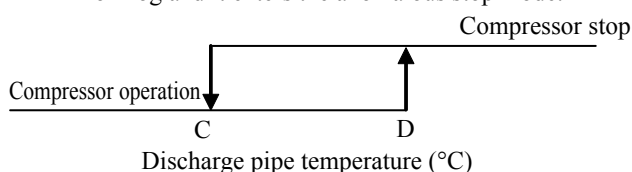
If the discharge pipe temperature (detected with Tho-D) exceed the setting value, the compressor speed (frequency) is controlled in order to suppress the rise of discharge pipe temperature.



Model	A°C	B°C
FDCW60VNX-W	95	105

b) Anomalous stop control

- If the discharge pipe temperature (detected with Tho-D) exceed the setting value, the compressor stops.
- When the discharge pipe temperature anomaly is detected 2 times within 60 minutes or 60 minutes continuously including the time of compressor stopping, discharge pipe temperature error is displayed and E36 is recorded in Error Log and it enters the anomalous stop mode.



Model	C°C	D°C
FDCW60VNX-W	95	115

c) Reset of anomalous stop mode

When the discharge pipe temperature drops to the reset value of E°C or lower for F minutes continuously, it becomes possible to restart from control.

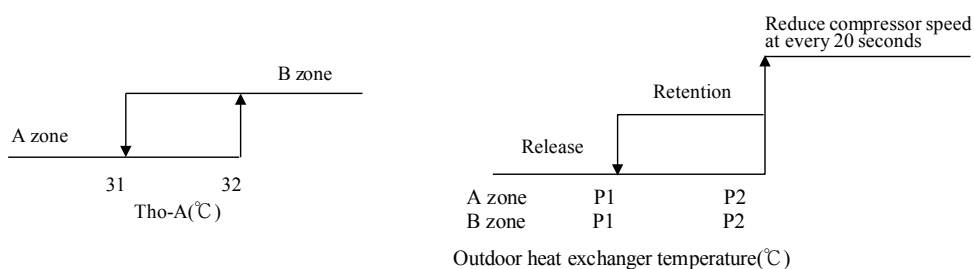
Model	FDCW60VNX-W
E °C	95
F minutes	Immediately

2) Cooling high pressure protection

a) Protective control

- When the outdoor heat exchanger temperature (Tho-R) exceeds setting value that be changed by outdoor air temperature, the compressor speed (frequency) is controlled in order to suppress the rise of high pressure.

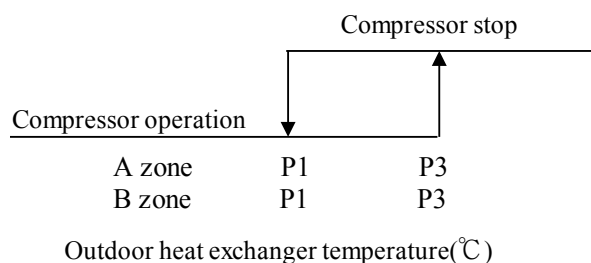
Model		FDCW60VNX-W	
		A zone	B zone
Cooling mode	P1	51	53
	P2	53	58
	P3	56	63



Operation control function by the outdoor unit control

b) Anomalous stop control

- i) If the outdoor heat exchanger temperature (Tho-R) exceeds the setting value, the compressor stop.
- ii) When the outdoor heat exchanger temperature anomaly is detected 5 times within 60 minutes, or 60 minutes continuously including the time of compressor stopping, coolinf overload error is displayed and E35 is recorded in the Error Log and it enters the anomalous stop mode.



c) Reset of anomalous stop mode

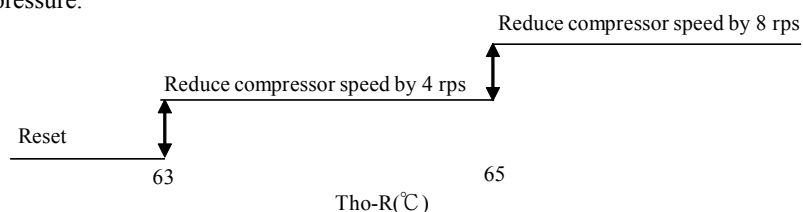
When the outdoor heat exchanger temperature drops to the reset value P3 °C or lower, it becomes possible to restart from the control.

3) Heating high pressure protection

a) Protective control

If the liquid line temperature of water heat exchanger (BT15=Thi-L) or the condensing saturated temperature (CST), whichever the higher.

Exceeds the setting value, the compressor speed (frequency) is controlled at every 10 seconds to suppress the rise of high pressure.



Operation control function by the outdoor unit control

4) Overcurrent protection

When the inverter primary current (CT current) reaches following value, the compressor speed is reduced until it gets to the cancellation value.

Operation mode	Current (A)
Cooling	11.5
Heating	13.5

5) Anomalous power transistor current

- a) If the current value of power transistor exceeds the setting value, the compressor stops in order to prevent from overcurrent of inverter.

6) Anti-freeze control by the compressor frequency control

It depends on the command from indoor unit.

7) Broken wire detection on temperature sensor and low pressure sensor

- a) Outdoor heat exchanger temperature sensor, outdoor air temperature sensor

If the following is detected for 5 seconds continuously within 2 minutes to 2 minutes 20 seconds after the compressor ON, the compressor stops. After a delay of 3 minutes, the compressor restarts but if the same anomaly is detected repeatedly 3 times within 40 minutes, the compressor stops with the anomalous stop mode.

- Outdoor heat exchanger temperature sensor (Tho-R): -50°C or lower
- Outdoor air temperature sensor (Tho-A): -30°C or lower

Note : During defrost operation and for 3 minutes after the end of defrost operation, this control is not performed.

- b) Discharge pipe temperature sensor

If the following is detected for 5 seconds continuously within 10 minutes to 10 minutes 20 seconds after the compressor ON, the compressor stops. After a delay of 3 minutes, the compressor restarts but if the same anomaly is detected repeatedly 3 times within 40 minutes, the compressor stops with the anomalous stop mode.

- Discharge pipe temperature sensor (Tho-D): -10°C or lower

Note : During defrost operation and for 3 minutes after the end of defrost operation, this control is not performed.

8) Fan motor error

- a) If the outdoor fan speed is detected A rpm or lower for 30 seconds continuously under the outdoor fan control mode, the compressor stops.
- b) When the outdoor fan speed drops to A rpm or lower 3 times and the compressor stops, Fan alarm is displayed and E48 is recorded in the Error Log.

Model	FDCW60VNX-W
A rpm	75

9) Anomalous stop by the compressor start/stop

- a) When it fails to shift to the rotor position detection operation of compressor DC motor during 5 seconds after establishing the compressor start condition, the compressor stops temporarily and restarts 3 minutes later.

Operation control function by the outdoor unit control

Pump-down control

It is possible to recover the refrigerant on the piping into the outdoor unit by this function.

Pump down operation can only be started when operation mode is set to addition heat only on menu 4.2. When this operating mode is activated pump down is available on service menu 5.11.

Menu number	Setting	Alternatives	Default	Other
5.11.X.1	Pump down	Yes/No	No	Menu only displayed in “Addition heat only” mode
5.11.X.2	Start pump down	Yes/No	No	Activates compressor operation. Above menu has to set “Yes” to display this menu.

Once the function has been activated:

- Compressor starts cooling operation with 2 minutes delay time.
- Target compressor speed will be 56 rps.
- Circulation pump runs at 100% when compressor starts.

Pump down stops automatically when one of the following conditions is fulfilled:

- Pressure at BP4 gets lower more than 0.087MPa for more than 5 seconds.
- More than 5 minutes have passed.
- An alarm stops the compressor operation.

When pump down is stopped:

- Circulation pump runs at it normal operation.
- Pump down changes to “No”.
- Start pump down changes to “No”.

Alarm list

Alarm No.	Alarm text on the display	Description	May be due to
157	Low lp cooling	Protection against freezing in water HX during cooling operation	<ul style="list-style-type: none"> ■ Low/no water flow
162	High condenser out temperature	Too high temperature out from the condenser. Self-resetting.	<ul style="list-style-type: none"> ■ Low flow during heating operation ■ Too high set temperatures
163	High condenser in temperature	Too high temperature into the condenser. Self-resetting.	<ul style="list-style-type: none"> ■ Temperature generated by another heat source
183	Defrosting in progress	Not an alarm, but an operating status.	<ul style="list-style-type: none"> ■ Set when the heat pump runs the defrosting procedure
220	High pressure alarm	BP4 has been above 4,15MPa 5 times within 60 minutes.	<ul style="list-style-type: none"> ■ Insufficient air circulation or blocked heat exchanger ■ Expansion valve not correctly connected ■ Service valve closed ■ Defective control board in FDCW ■ Low or no flow during heating operation ■ Defective circulation pump ■ Defective fuse, F(4A)
224	Fan alarm from heat pump	Deviations in the fan speed in FDCW.	<ul style="list-style-type: none"> ■ The fan cannot rotate freely ■ Defective control board in FDCW ■ Defective fan motor ■ Control board in FDCW dirty ■ Fuse (F2) blown
228	Failed defrosting	10 aborted defrost due to alarm: 418,419 or 343	<ul style="list-style-type: none"> ■ Too low water flow ■ Too low return temperatur
230	Hot gas alarm	Temperature deviation on the hot gas sensor (Tho-D) twice within 60 minutes or for 60 minutes continuously.	<ul style="list-style-type: none"> ■ Sensor does not work (see section "Ambient temperature sensor") ■ Insufficient air circulation or heat exchanger ■ Blocked ■ If the fault persists during cooling, there may be an insufficient amount of refrigerant. ■ Defective control board in FDCW
261	High HWX temp	Temperature deviation on the heat exchanger sensor (Tho-R1/R2) five times within 60 minutes or for 60 minutes continuously.	<ul style="list-style-type: none"> ■ Sensor does not work (see section "Disturbances in comfort") ■ Insufficient air circulation or blocked heat exchanger ■ Defective control board in FDCW ■ Too much refrigerant
262	Inv. err.	When IPM (Intelligent power module) displays FO-signal (Fault Output) five times during a 60-minute period.	Can occur when 15V power supply to the inverter PCB is unstable.

Alarm No.	Alarm text on the display	Description	May be due to
263	Inv. err.	Voltage from the inverter outside the parameters four times within 30 minutes.	<ul style="list-style-type: none"> ■ Incoming power source interference ■ Service valve closed ■ Insufficient amount of refrigerant ■ Compressor fault ■ Defective circuit board in FDCW
265	Inv. err.	Continuous deviation on power transistor for 15 minutes.	<ul style="list-style-type: none"> ■ Defective fan motor ■ Defective circuit board in FDCW
267	Inv. err.	Failed start for compressor	<ul style="list-style-type: none"> ■ Defective circuit board in FDCW ■ Defective control board in FDCW ■ Compressor fault
268	Inv. err.	Overcurrent, Inverter A/F module	<ul style="list-style-type: none"> ■ Sudden power failure
271	Lw otd tmp	Temperature of BT28 below the value that permits operation	<ul style="list-style-type: none"> ■ Cold weather conditions ■ Sensor fault
272	High otd tmp	Temperature of BT28 above the value that permits operation	<ul style="list-style-type: none"> ■ Warm weather conditions ■ Sensor fault
277	Sensor fault from heat pump	Sensor fault, heat exchanger in FDCW(Tho-R).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board in FDCW
278	Sensor fault from heat pump	Sensor fault, outdoor temperature sensor in FDCW (Tho-A).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board in FDCW
279	Sensor fault from heat pump	Sensor fault, hot gas in FDCW (Tho-D).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board in FDCW
294	Incompatible heat pump	Heat pump and indoor module do not work properly together due to technical parameters.	<ul style="list-style-type: none"> ■ Outdoor module and indoor module are not compatible.
343	Low temp water out	Low water out temperature during cooling or tank defrost operation	<ul style="list-style-type: none"> ■ Too low water flow ■ Too low return temperatur
347	Temp high press	Temporary high pressure alarm	<ul style="list-style-type: none"> ■ No/low water flow ■ Air in water system
403	Sensor fault from PCA 154	Sensor fault, Sensor incoming water in indoor unit (BT3).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board AA23 in indoor unit.

Alarm No.	Alarm text on the display	Description	May be due to
404	Sensor fault from PCA 154	Sensor fault, Sensor high pressure heating/low pressure cooling in indoor unit (BP4).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board AA23 in indoor unit.
412	Sensor fault from PCA 154	Sensor fault, Sensor outgoing water in indoor unit (BT12).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board AA23 in indoor unit.
415	Sensor fault from PCA 154	Sensor fault, Sensor fluid pipe in indoor unit (BT15).	<ul style="list-style-type: none"> ■ Open circuit or short circuit on sensor input ■ Sensor does not work (see section "Disturbances in comfort") ■ Defective control board AA23 in indoor unit.
418	Low temp water out	Anti-freeze protection water heat exchanger during defrost operation.	<ul style="list-style-type: none"> ■ Too low water flow
419	Freeze prot. exch. defr.	Anti-freeze protection water heat exchanger during defrost operation.	<ul style="list-style-type: none"> ■ Too low water return temperature

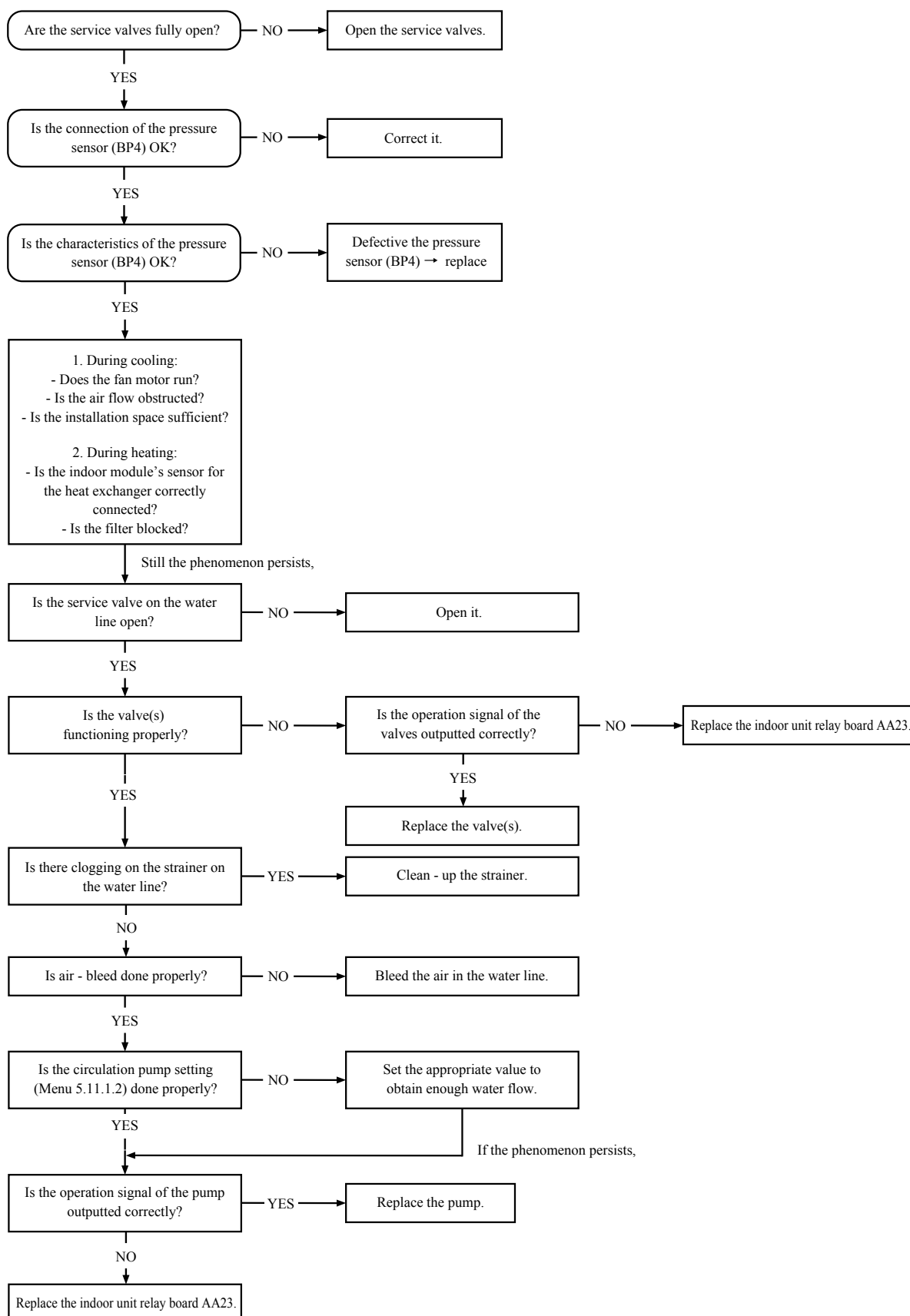
Outdoor unit alarm

Alarm No.	Alarm text on the display	Description	May be due to
E5	Com. flt from the heat pump	Communication between the control board and the communication board is interrupted. There must be 22 Volt direct current (DC) at the switch CNW2 on the control board (PCB1).	<ul style="list-style-type: none"> - Any circuit breakers for FDCW off - Incorrect cable routing
E35	High HWX temp	Temperature deviation on the heat exchanger sensor (Tho-R1/R2) five times within 60 minutes or for 60 minutes continuously.	<ul style="list-style-type: none"> - Sensor does not work (see section "Disturbances in comfort") - Insufficient air circulation or blocked heat exchanger - Defective control board in FDCW - Too much refrigerant
E36	Hot gas alarm	Temperature deviation on the discharge pipe temperature sensor (Tho-D) twice within 60 minutes or for 60 minutes continuously.	<ul style="list-style-type: none"> - Sensor does not work (see section "Ambient temperature sensor") - Insufficient air circulation or heat exchanger - Blocked - If the fault persists during cooling, there may be an insufficient amount of refrigerant. - Defective control board in FDCW
E37	Sensor fault from heat pump	Sensor fault, heat exchanger in FDCW(Tho-R).	<ul style="list-style-type: none"> - Open circuit or short circuit on sensor input - Sensor does not work (see section "Disturbances in comfort") - Defective control board in FDCW
E38	Sensor fault from heat pump	Sensor fault, outdoor air temperature sensor in FDCW (Tho-A).	<ul style="list-style-type: none"> - Open circuit or short circuit on sensor input - Sensor does not work (see section "Disturbances in comfort") - Defective control board in FDCW
E39	Sensor fault from heat pump	Sensor fault, hot gas in FDCW (Tho-D).	<ul style="list-style-type: none"> - Open circuit or short circuit on sensor input - Sensor does not work (see section "Disturbances in comfort") - Defective control board in FDCW
E40	High pressure alarm	BP4 has been above 4.15MPa 5 times within 60 minutes.	<ul style="list-style-type: none"> - Insufficient air circulation or blocked heat exchanger - Expansion valve not correctly connected - Service valve closed - Defective control board in FDCW - Low or no flow during heating operation - Defective circulation pump - Defective fuse, F(4A)
E42	Current cut	When IPM(Intelligent power module) detects abnormally high current.	<ul style="list-style-type: none"> - Incoming power supply interference - Service valve closed - Insufficient amount of refrigerant - Compressor fault - Defective circuit board for inverter in FDCW

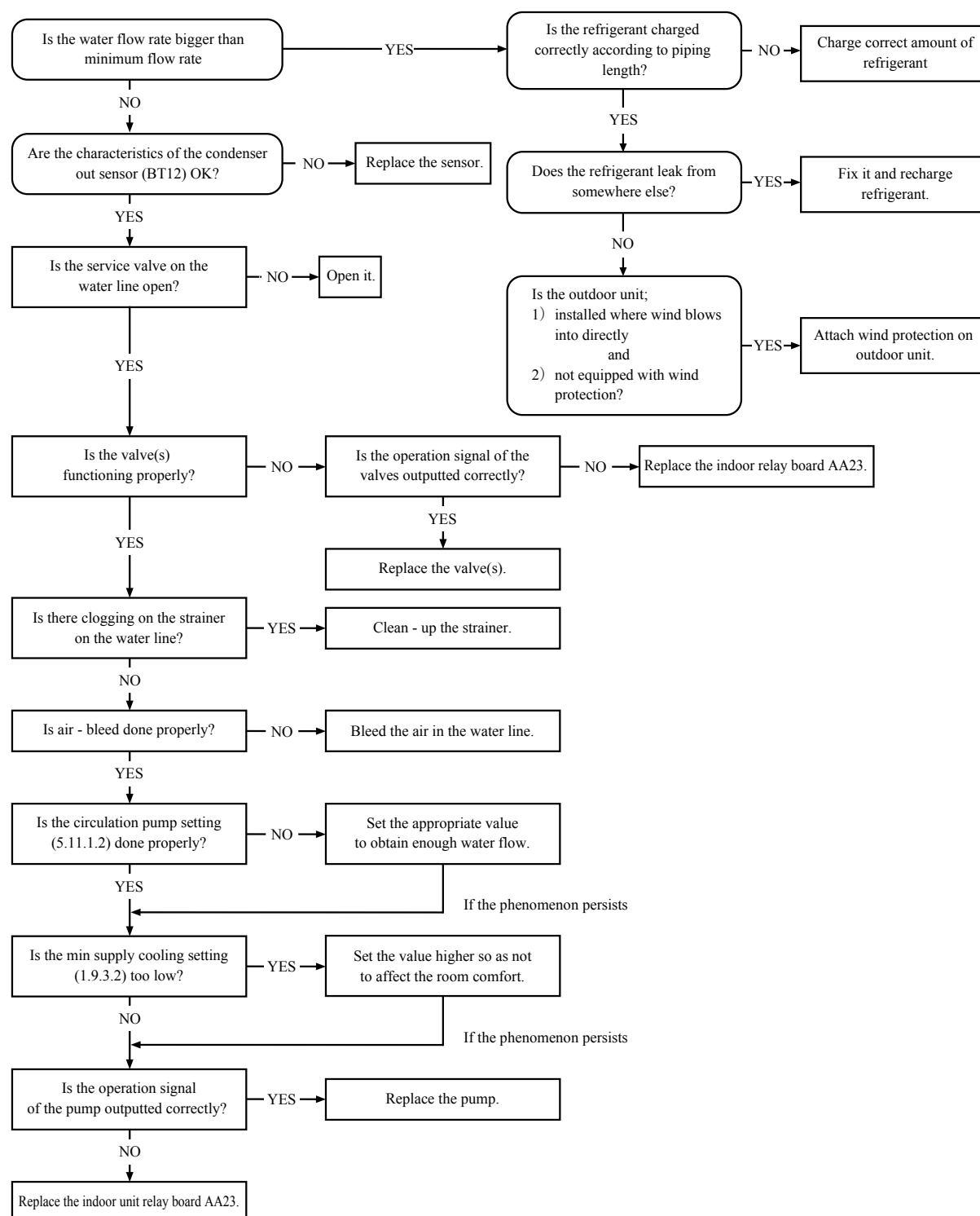
Alarm No.	Alarm text on the display	Description	May be due to
E47	Inv. err.	Overcurrent, Inverter A/F module	- Sudden power failure
E48	Fan alarm from heat pump	Deviations in the fan speed in FDCW	<ul style="list-style-type: none"> - The fan cannot rotate freely - Defective control board in FDCW - Defective fan motor - Control board in FDCW dirty - Fuse (F2) blown
E51	Inv. err.	Continuous deviation on power transistor.	<ul style="list-style-type: none"> - Defective fan motor - Defective circuit board for inverter in FDCW
E59	Inv. err.	Failed start for compressor	<ul style="list-style-type: none"> - Defective circuit board for inverter in FDCW - Defective control board in FDCW - Compressor fault
E60	Rotor lock	If the compressor motor's magnetic pole positions cannot be correctly detected when the compressor starts	<ul style="list-style-type: none"> - Open phase compressor - Defective PCB in FDCW - Compressor fault

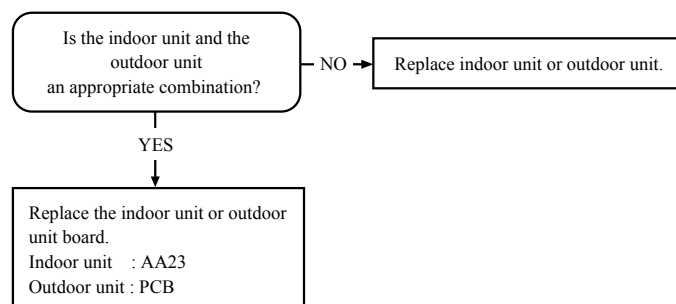
Troubleshooting guide

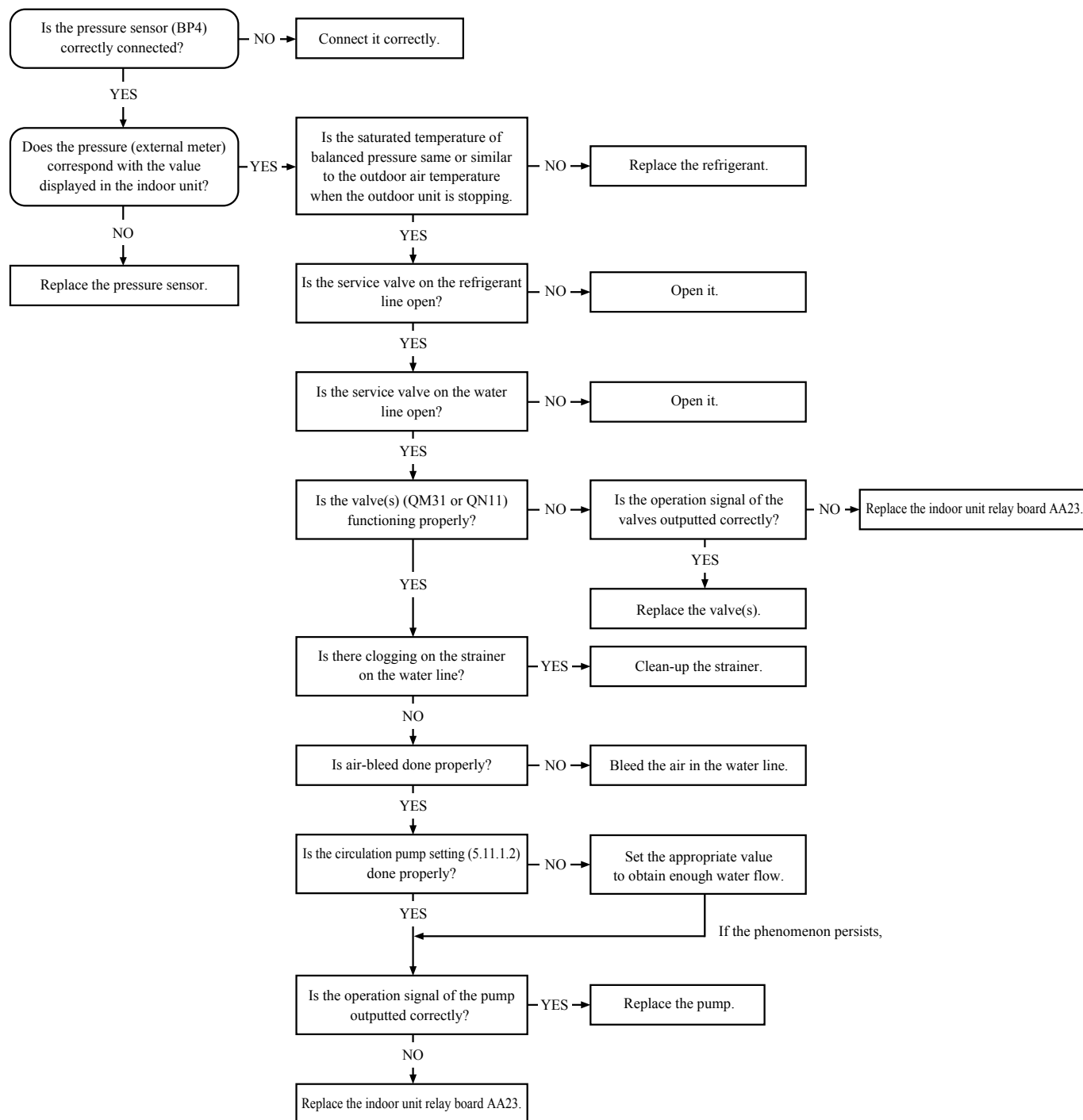
220 - High pressure alarm

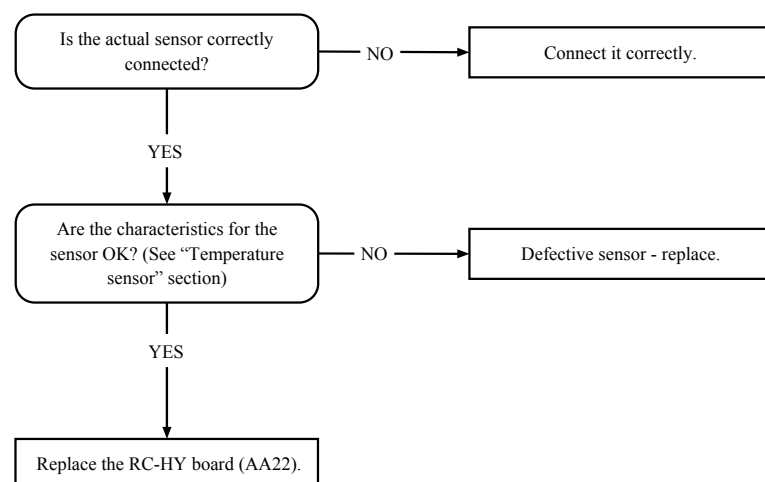


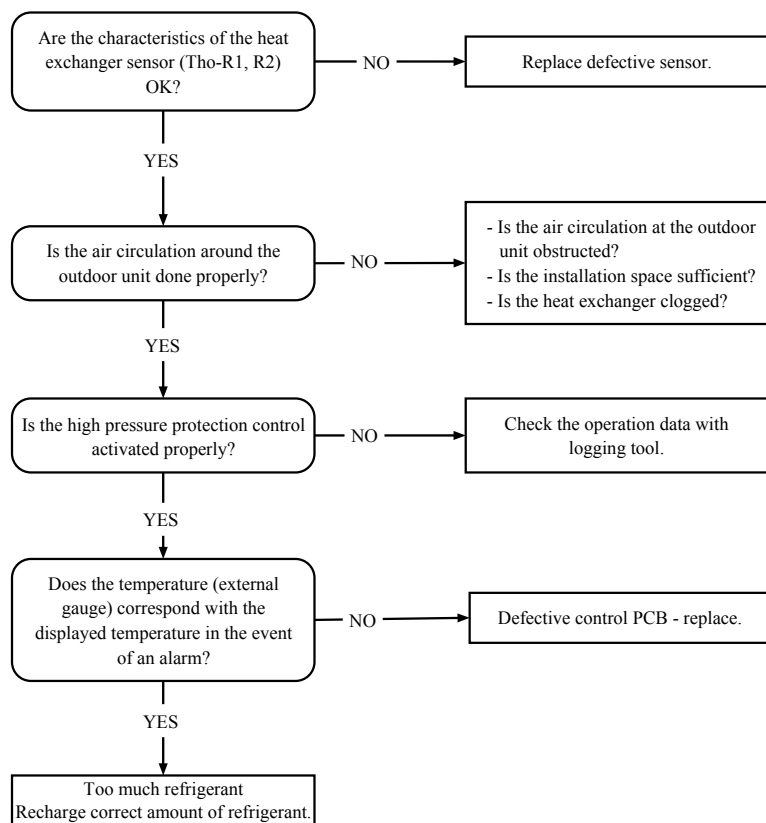
228 - Failed defrost operation

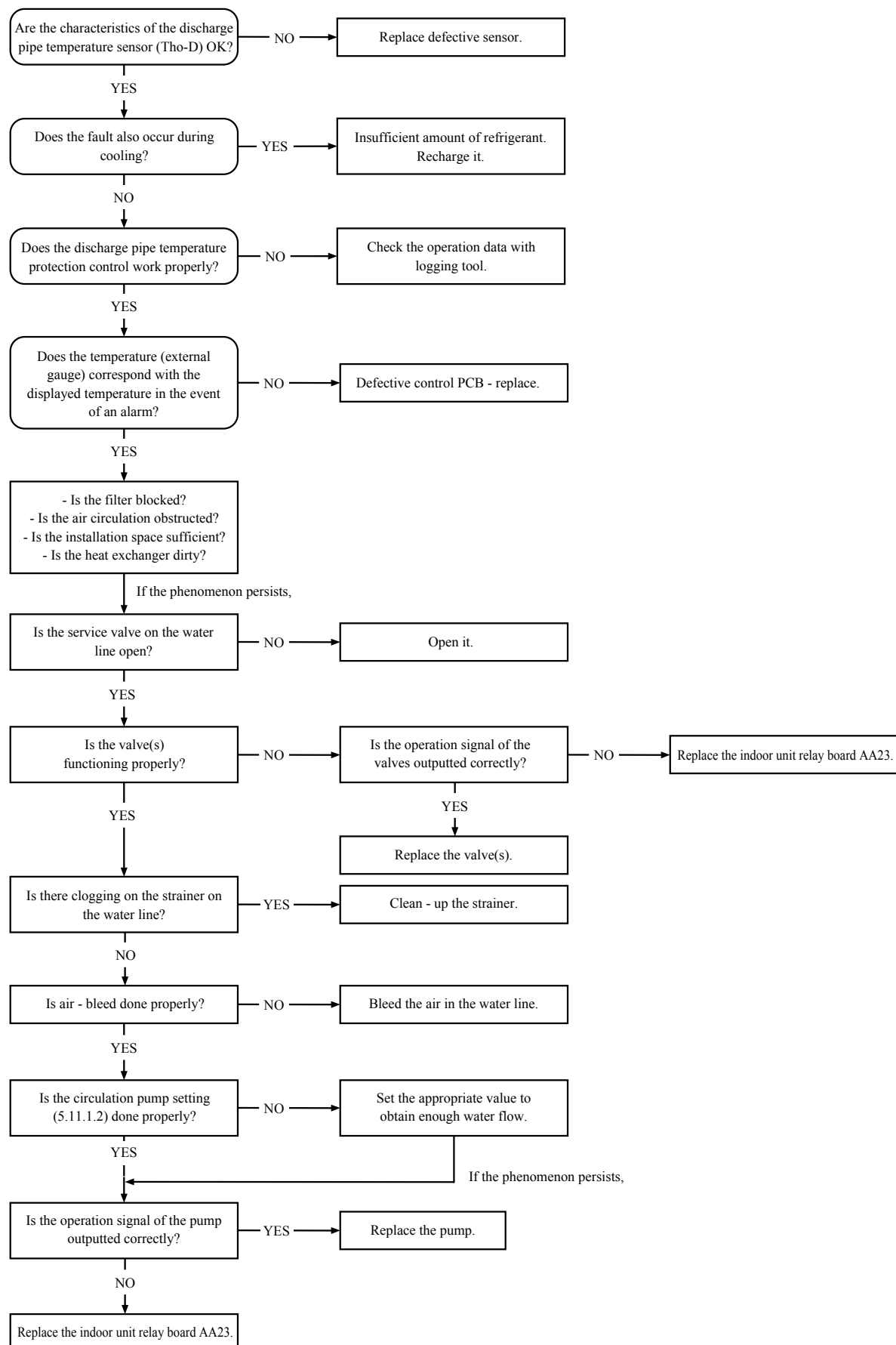


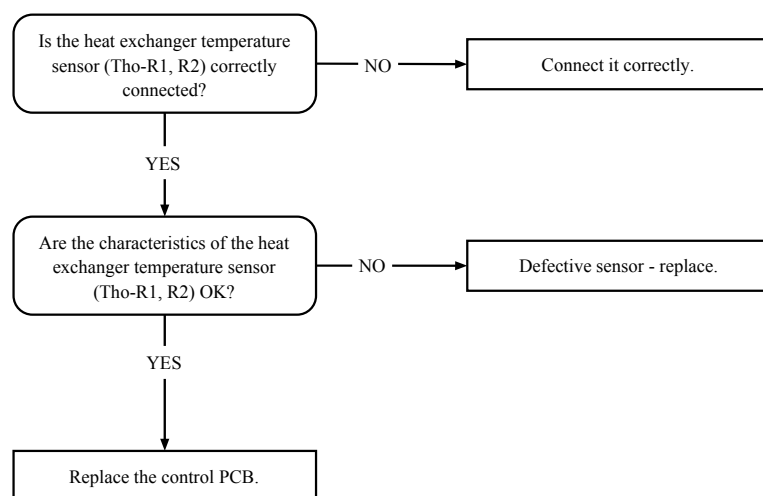
294 - Incompatible heat pump

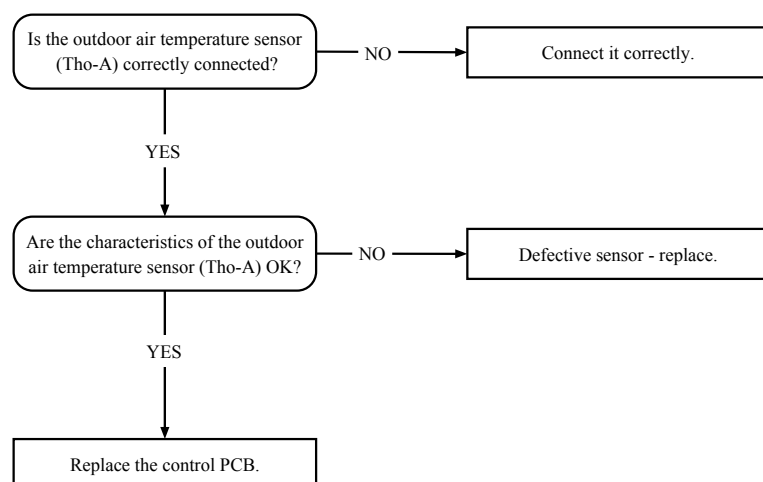
404 - S. fault HP

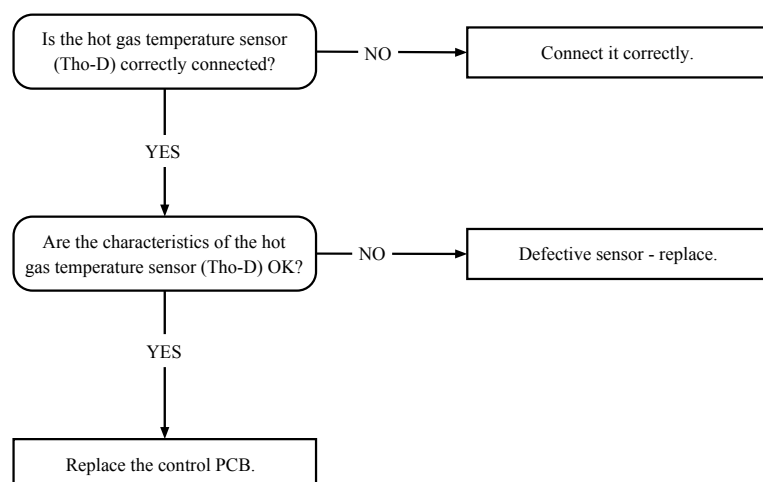
403, 412, 415, - Sensor fault from PCA154

E35 - High HX temp

E36 - Hot gas alarm

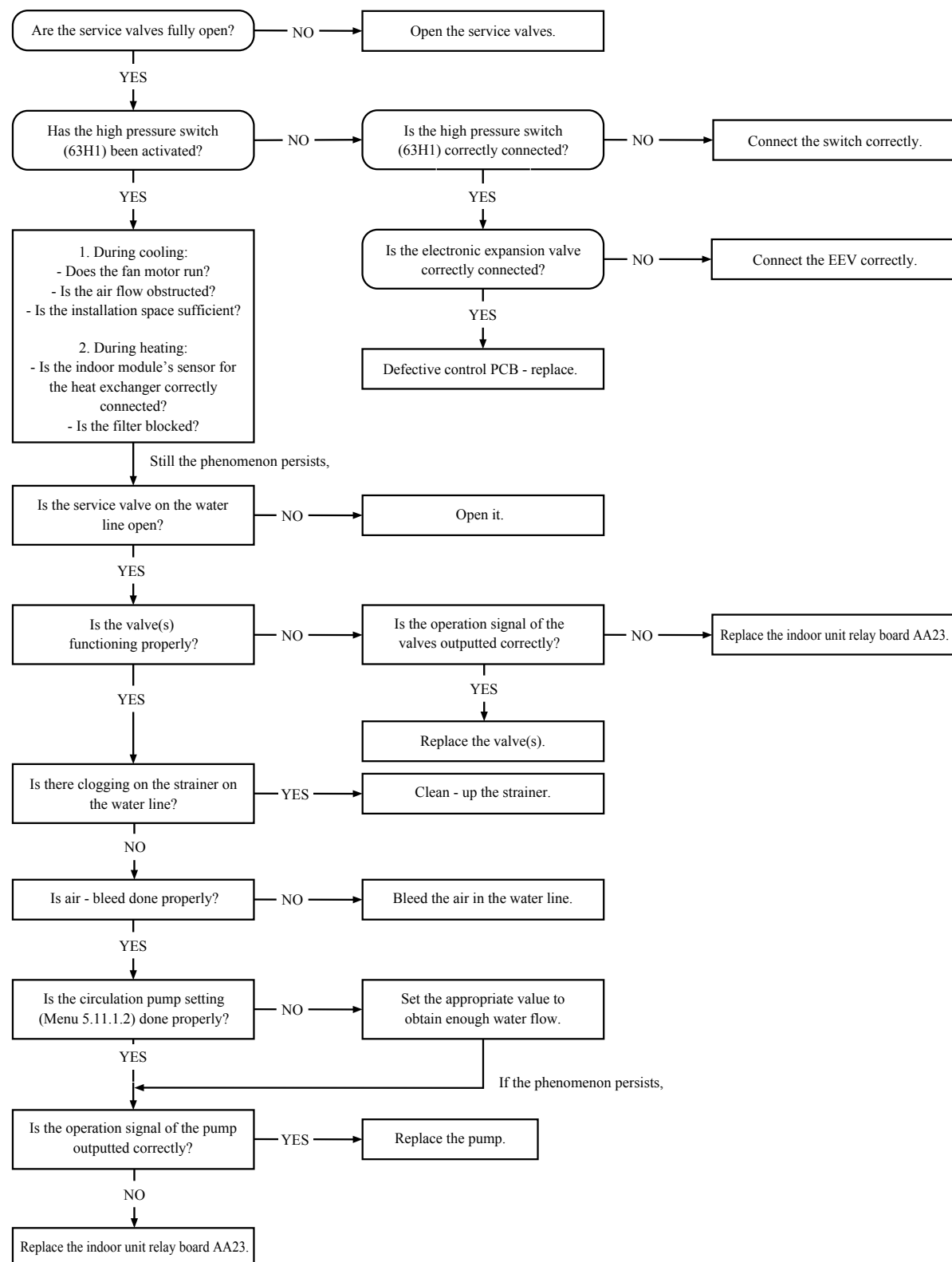
E37 - S. fault Tho-R

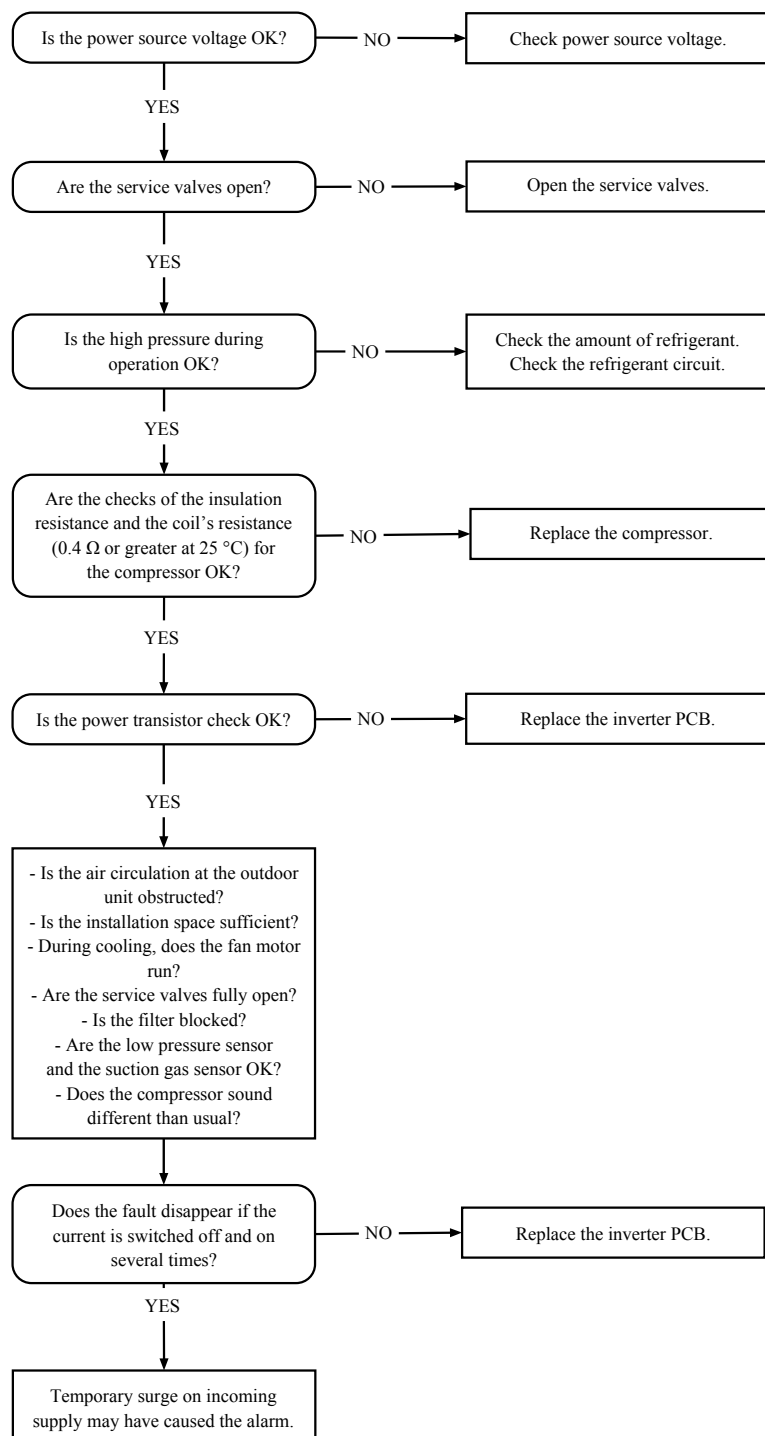
E38 - S. fault Tho-A

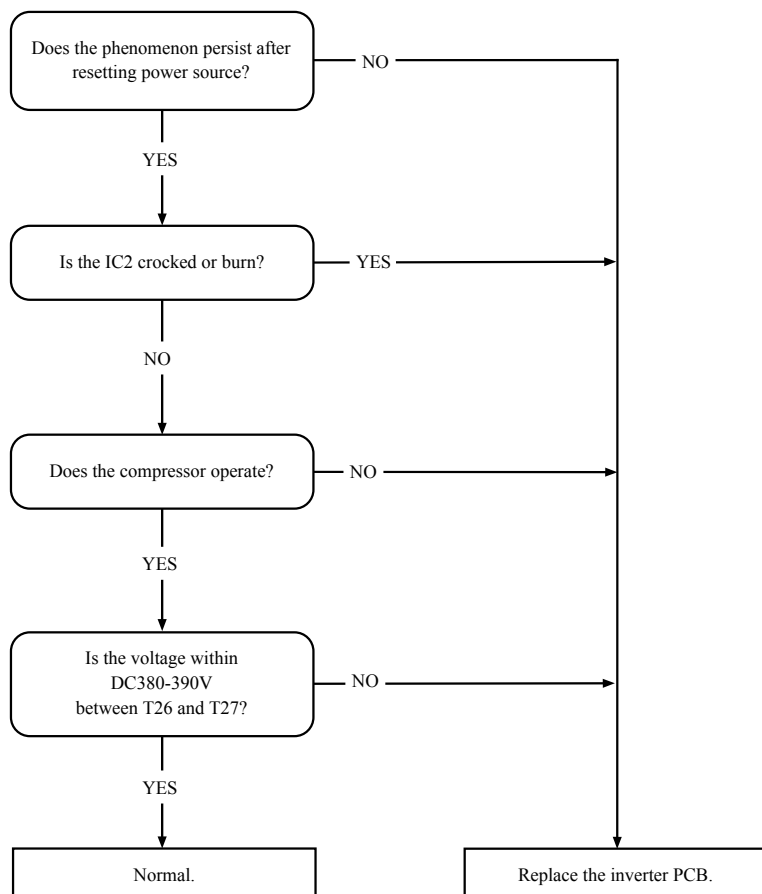
E39 - S. fault Tho-D

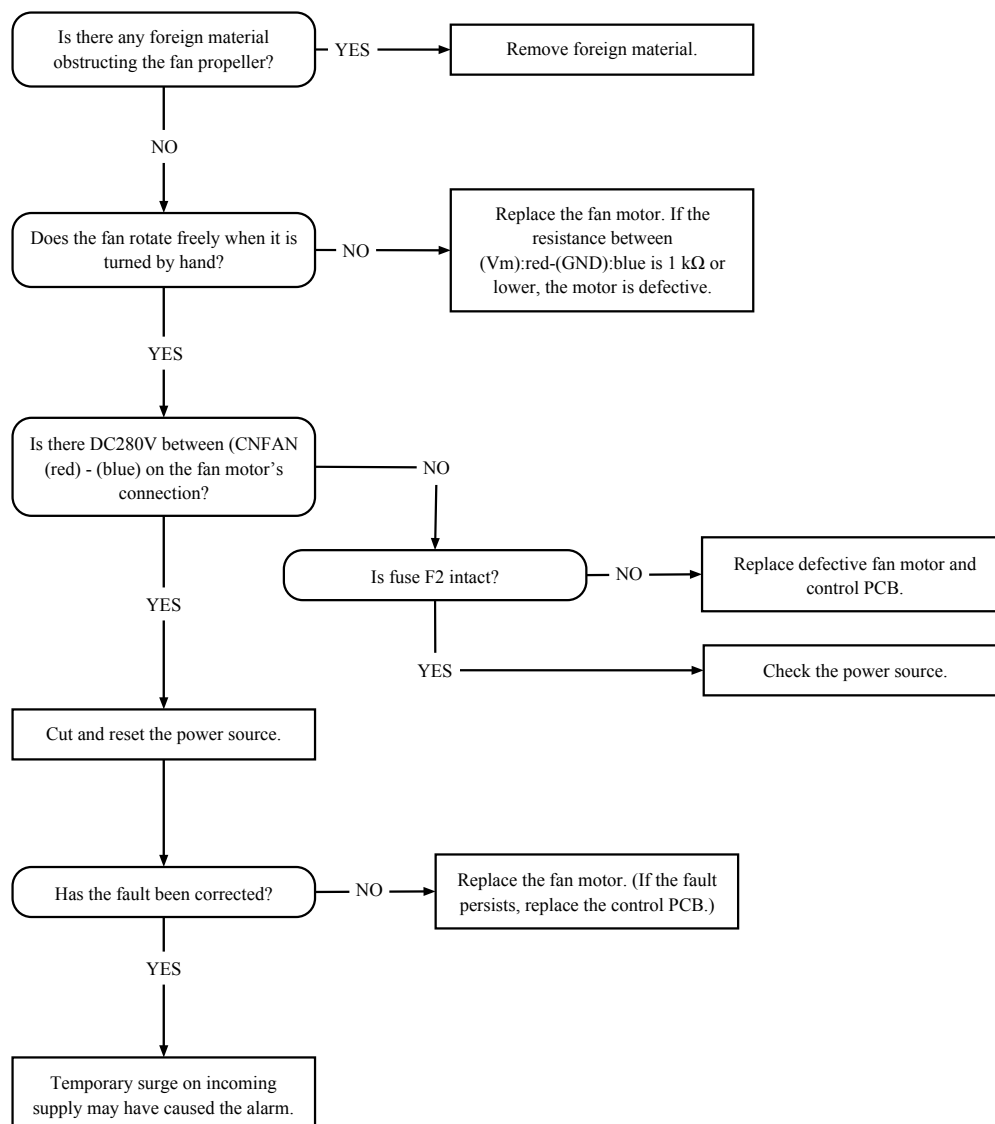
E40 - High pressure alarm

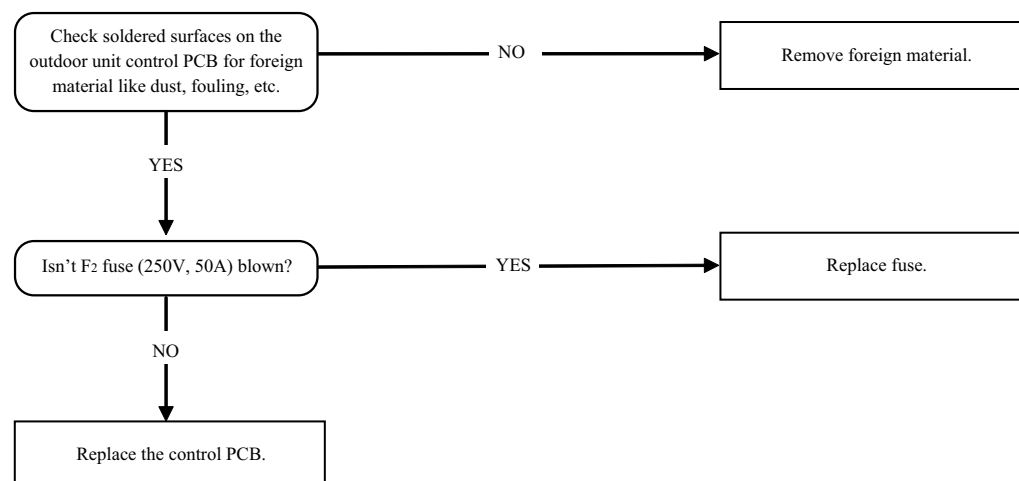
If the power source voltage to the outdoor unit is switched off and on too quickly, E40 may be displayed. This is normal.

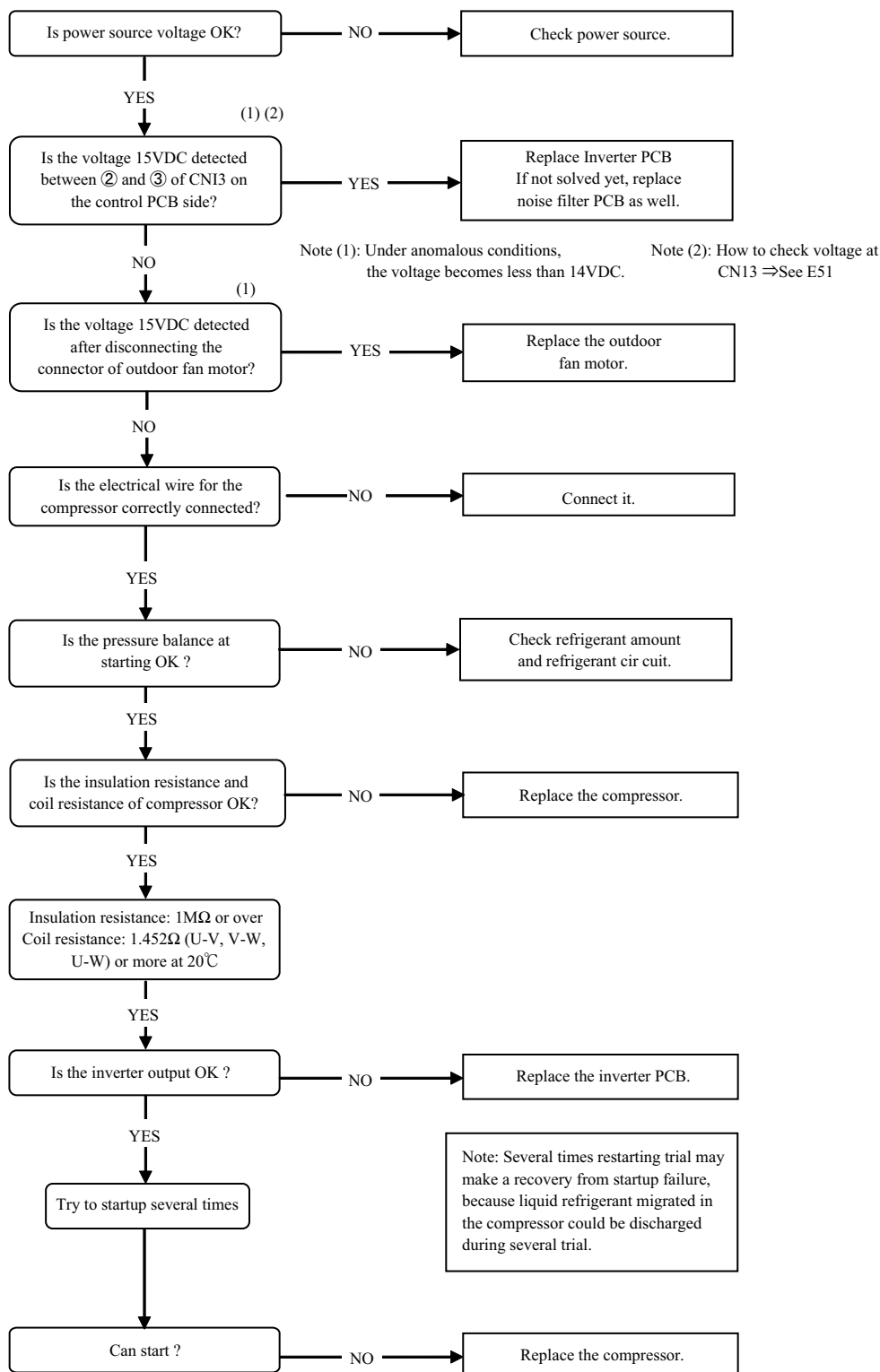


E42 - Current cut

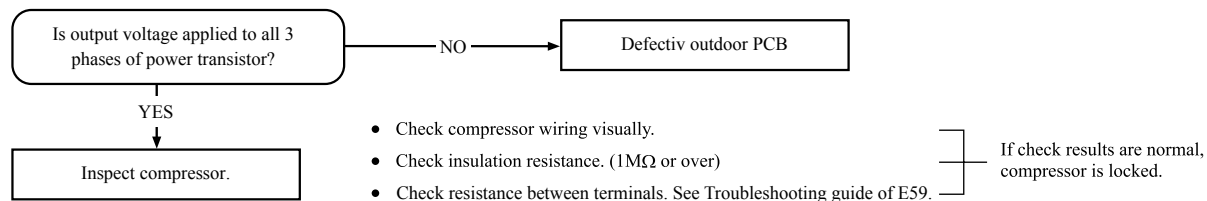
E47 - Inverter A/F module over current

E48 - Fan alarm

E51 - Inverter and fan motor error

E59 - Inverter error

E60 - Rotor lock



Model FDCW60VNX-W

◆Check point of outdoor unit

⚠ CAUTION – HIGH VOLTAGE

High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

Color symbol

Mark	Color
BK	Black
BL	Blue
RD	Red
WH	White
YE	Yellow
Y/G	Yellow/Green

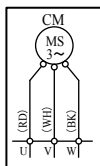
◆Voltage check in PCB

The normal range is as follows.

Display	Voltage range
①DC280V DC230V -DC310V	
②DC 20V DC 18V -DC 22V	
③DC 13V DC 12V -DC 14V	
④DC 15V DC 14V -DC 16V	
⑤DC 5V DC 4V -DC 6V	
⑥DC 2.5V DC 2.3V -DC 2.5V	

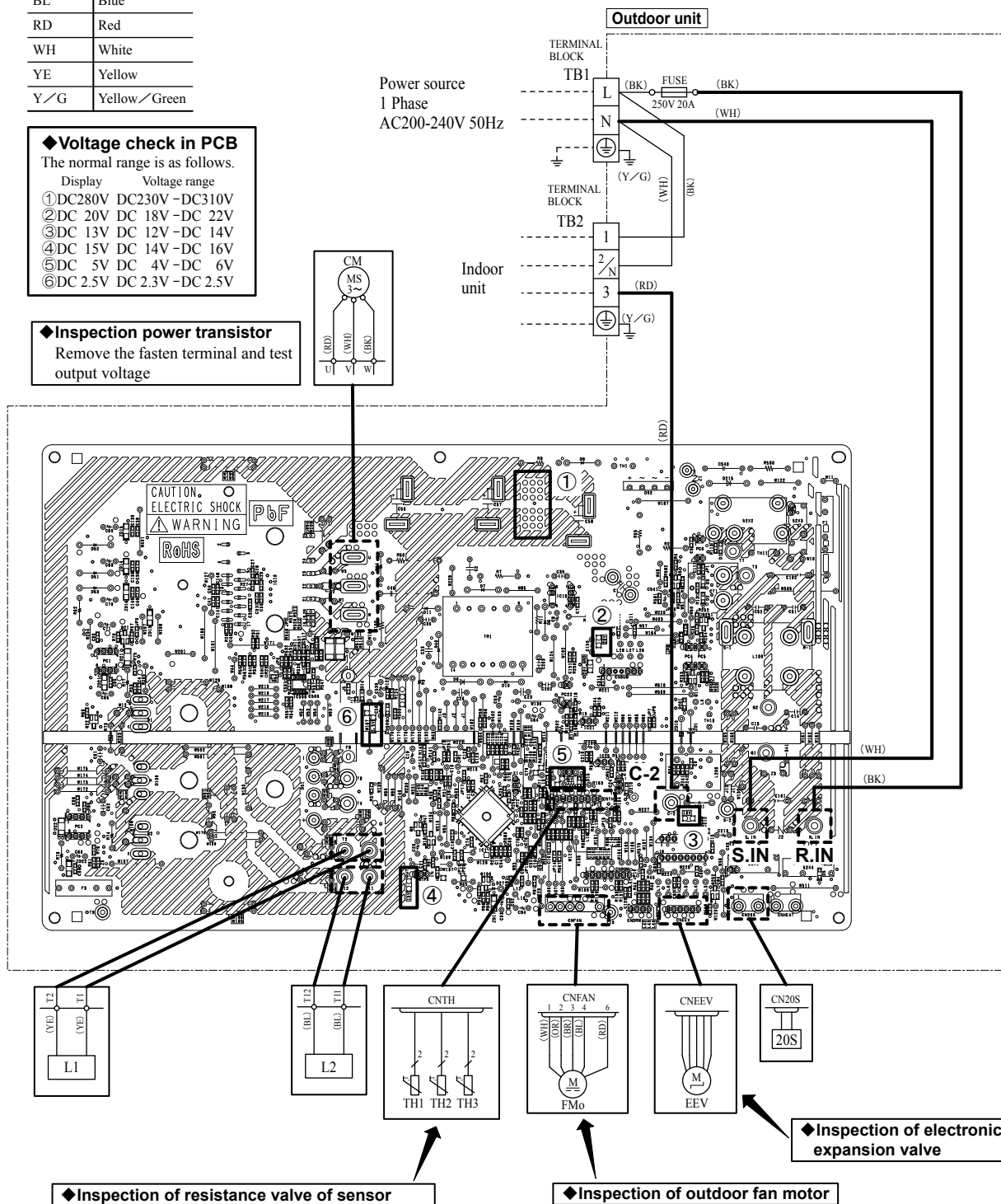
◆Inspection power transistor

Remove the fasten terminal and test output voltage



◆Power source and serial signal inspection

- ① to ② : AC220/230/240V
- ① to ②/N : AC220/230/240V
- ②/N to ③ : Normal if the voltage oscillates between DC0 and approx. 20V

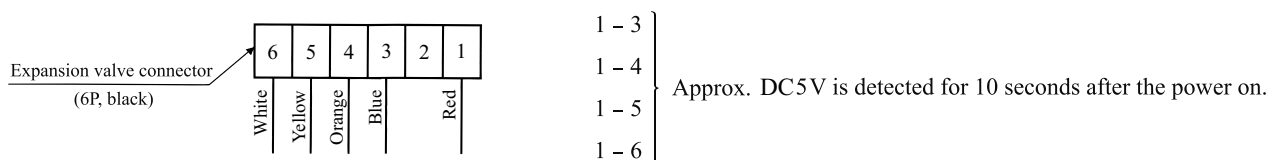


(a) Inspection of electronic expansion valve

Electronic expansion valve operates for approx. 10 seconds after the power on, in order to determine its aperture. Check the operating sound and voltage during the period of time. (Voltage cannot be checked during operation in which only the aperture change occurs.)

(i) If it is heard the sound of operating electronic expansion valve, it is almost normal.

(ii) If the operating sound is not heard, check the output voltage.



(iii) If voltage is detected, the outdoor PCB is normal.

(iv) If the expansion valve does not operate (no operating sound) while voltage is detected, the expansion valve is defective.

• Inspection of electronic expansion valve as a separate unit

Measure the resistance between terminals with an analog tester.

Measuring point	Resistance when normal
1-6	46 ± 4Ω (at 20°C)
1-5	
1-4	
1-3	

(b) Outdoor unit fan motor check procedure

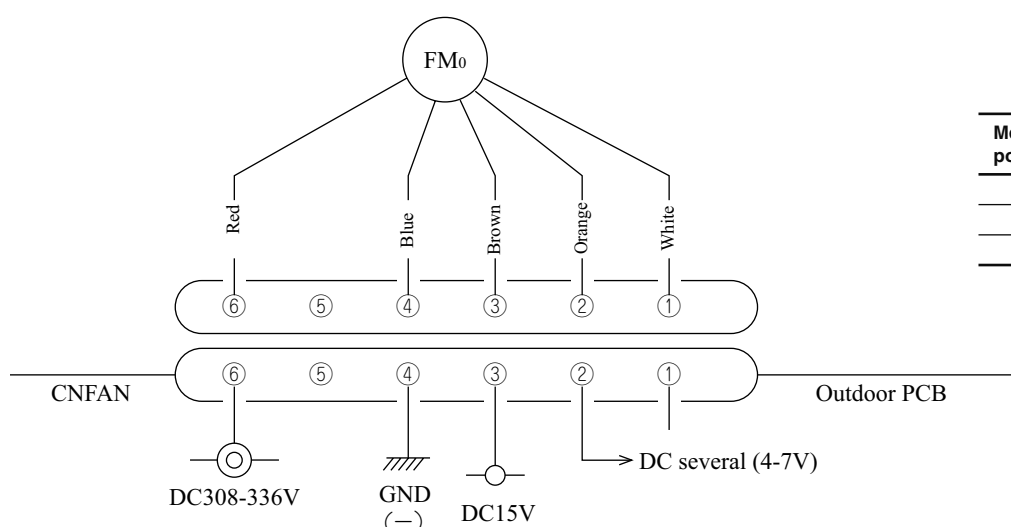
- When the outdoor unit fan motor error is detected, diagnose which of the outdoor unit fan motor or outdoor PCB is defective.
- Diagnose this only after confirming that the indoor unit is normal.

(i) Outdoor PCB output check

- 1) Turn off the power.
- 2) Disconnect the outdoor unit fan motor connector CNFAN.
- 3) When the indoor unit is operated by inserting the power source plug and pressing (ON) the backup switch for more than 5 seconds, if the voltage of pin No. ② in the following figure is output for 30 seconds at 20 seconds after turning "ON" the backup switch, the outdoor PCB is normal but the fan motor is defective.

If the voltage is not detected, the outdoor PCB is defective but the fan motor is normal.

Note (1) The voltage is output 3 times repeatedly. If it is not detected, the indoor unit displays the error message.



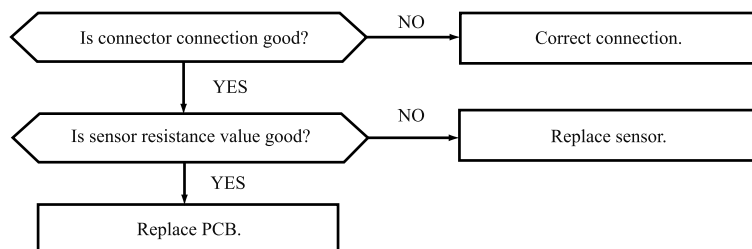
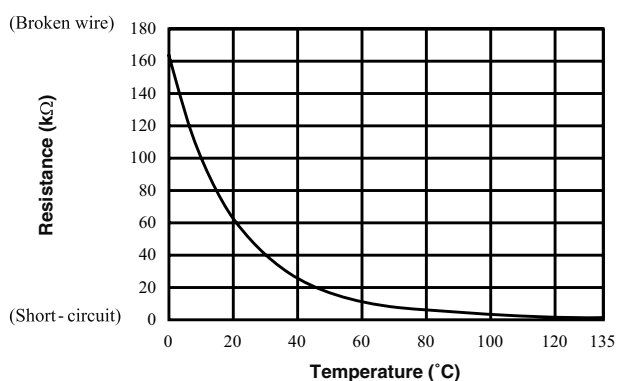
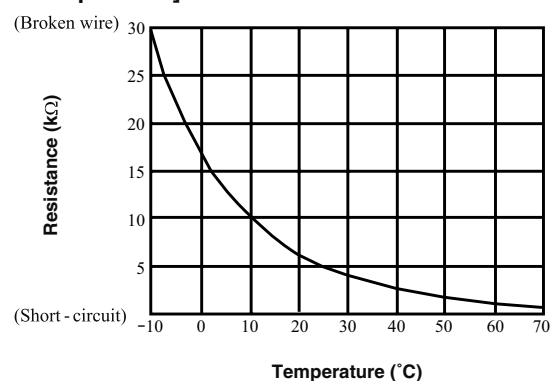
Measuring point	Voltage range when normal
⑥ - ④	DC308-336V
③ - ④	DC15V
② - ④	DC several V (4-7V)

(ii) Fan motor resistance check

Measuring point	Resistance when normal
⑥ - ④ (Red - Blue)	20 MΩ or higher
③ - ④ (Brown - Blue)	20 kΩ or higher

Notes (1) Remove the fan motor and measure it without power connected to it.

(2) If the measured value is below the value when the motor is normal, it means that the fan motor is faulty.

(c) Inspection of resistance valve of temperature sensor**◆ Discharge pipe temperature sensor characteristics****◆ Temperature sensor characteristics [Outdoor heat exchanger temperature, outdoor air temperature]**

Component replacement

Indoor units

HSB60-W

Open HSB unit

1. Remove 2 screws from the bottom part of the unit



Screws are located here (bottom)



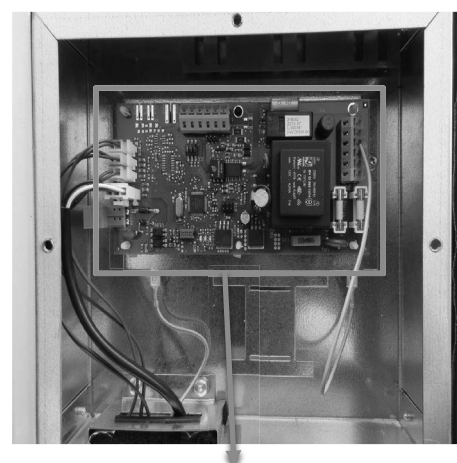
Screws

2. Remove the lid by pulling it and pushing it up



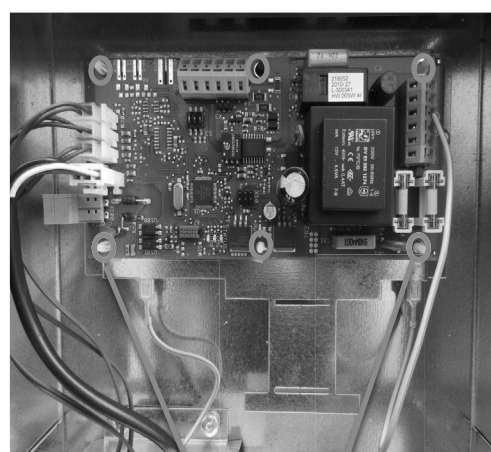
**Replace AA23 communication card**

1. Disconnect all wiring and remove AA23 card by unlocking plastic PCB holders



AA23 communication card

2. Place the new AA23 communication card, lock in on plastic holders, connect all cabling and close unit



Plastic holders

Replace pressure sensor BP4

Before removing pressure the pressure sensor make sure that you pump down the unit and that outdoor unit valves are closed!

1. Unscrew BP4 pressure sensor, remove cabling from AA23 communication card.



BP4 connector

Pressure sensor (BP4)

2. Install the new pressure sensor, connect all the cables, pressure test the circuit for leak check and then open the outdoor unit valves.

Replace temperature sensor BT15

1. Cut the insulation material in the square box that is on the bottom right part of the HSB unit.



BT15 connector

Insulation
BT15 is in the
back.

2. Remove the damaged sensor and its cabling.
3. Install the new sensor and guide the sensor cable to AA23 communication card.

Replace temperature sensor BT12 and BT3

As temperature sensors BT12 (heating medium flow) and BT3 (heating medium return) are installed on the water pipes (back of the unit) and covered with insulation there is limitation to access, so it is not possible to remove damaged sensors. Solution is leave the sensors on the unit and install the new ones in a different position.

1. Install the new sensor (BT12 or BT3) on the external water pipes from the unit. Make sure that there is contact between the sensor and the pipe and that the sensor is insulated along the pipe.



BT12

BT3

2. Guide the new sensor cable to AA23 communication board using one of the available cable glands



Cable glands

3. Remove cabling from the damaged temperature sensor and connect the new one.



BT12/BT3 connector

PT300

Tank of PT300

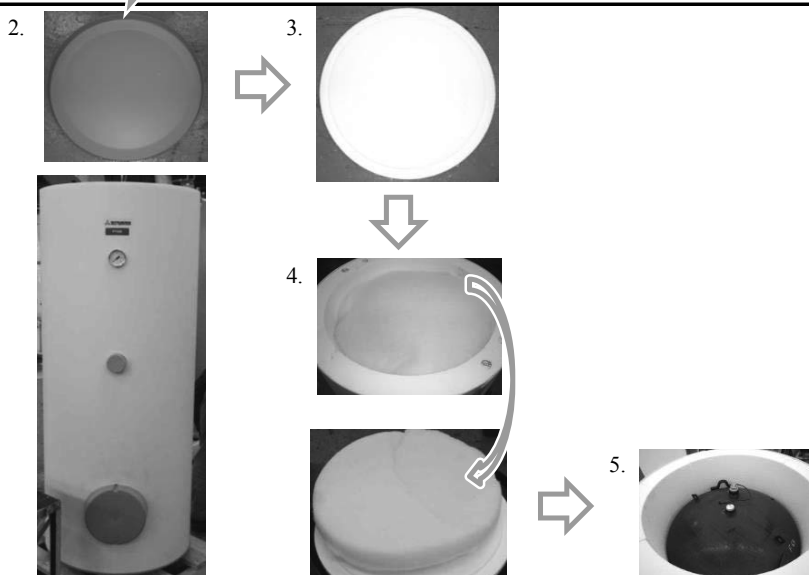
1. Remove the top panel of the tank.



Tank: PT300

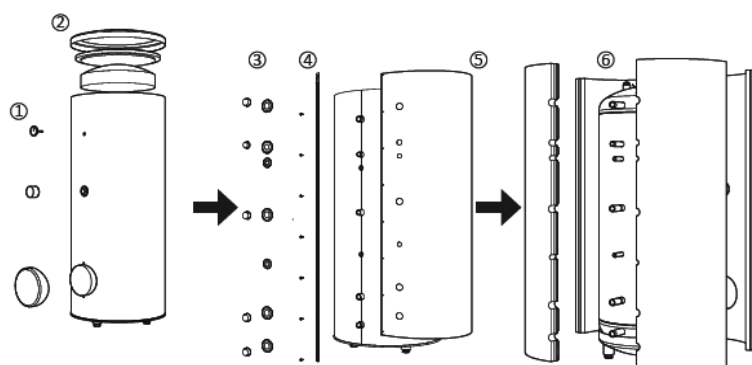
2. Remove the styrofoam.

3. See the tank.



4. (Details)

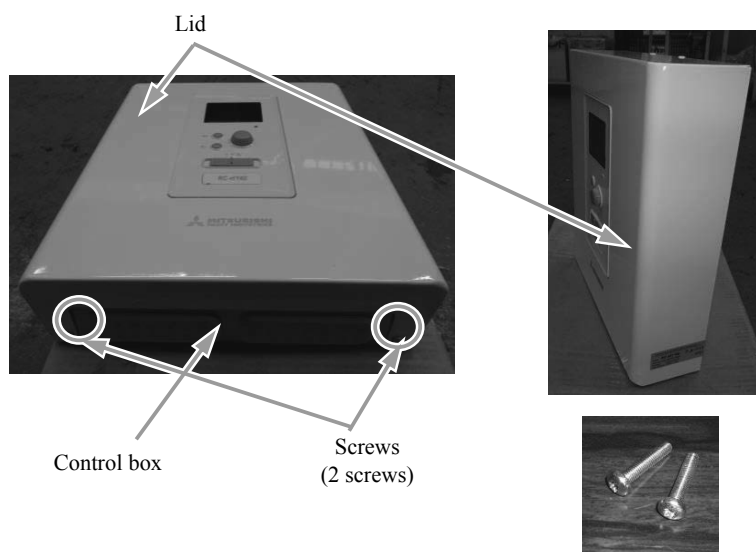
- (1) Remove the temperature gauge, plug of the heating element connector pipe and blanking plate of the inspection opening.
- (2) Remove the upper cover of the housing together with thermal insulation.
- (3) Remove the plugs from the connector pipes and black bushings.
- (4) Remove the fixing screws and the strip connecting the housing jacket.
- (5) Remove the jacket surrounding the tank (housing jacket).
- (6) Remove the four-piece thermal insulation.



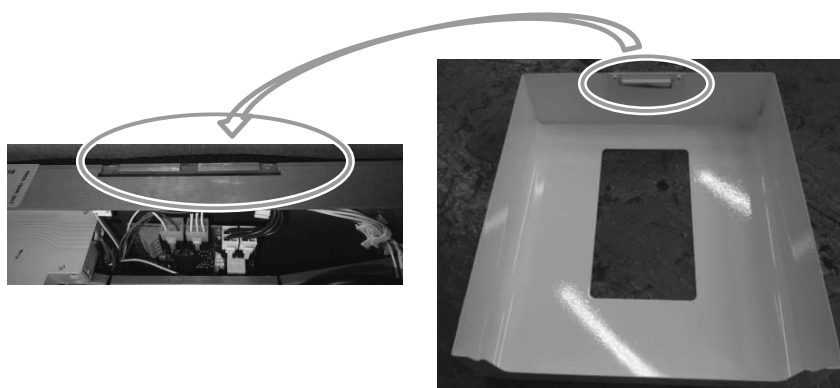
RC-HY20/40-W

Controller

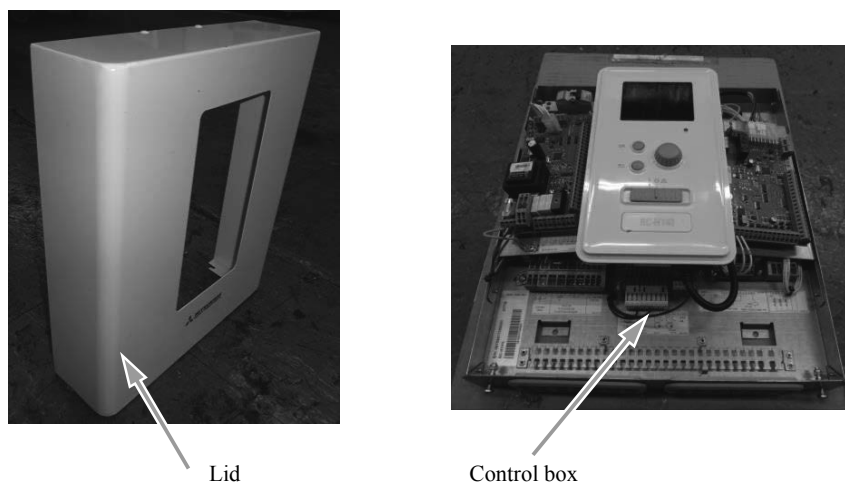
1. Loosen the screw and remove the lid and control box first.
2. Loosen 2 screws and remove the lid of control box.



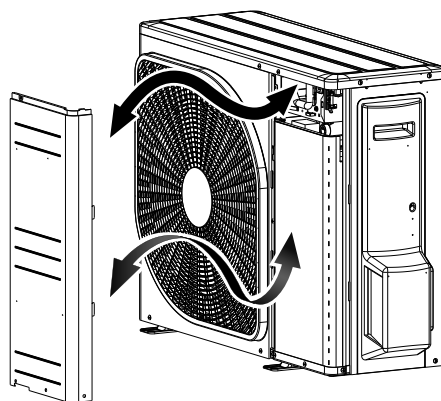
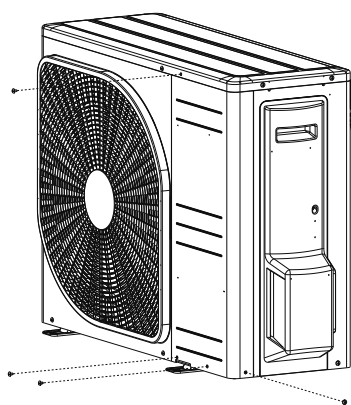
3. Remove the bracket of the lid from hole of the control box.



4. Remove the lid.
5. Check the inside of the control box.

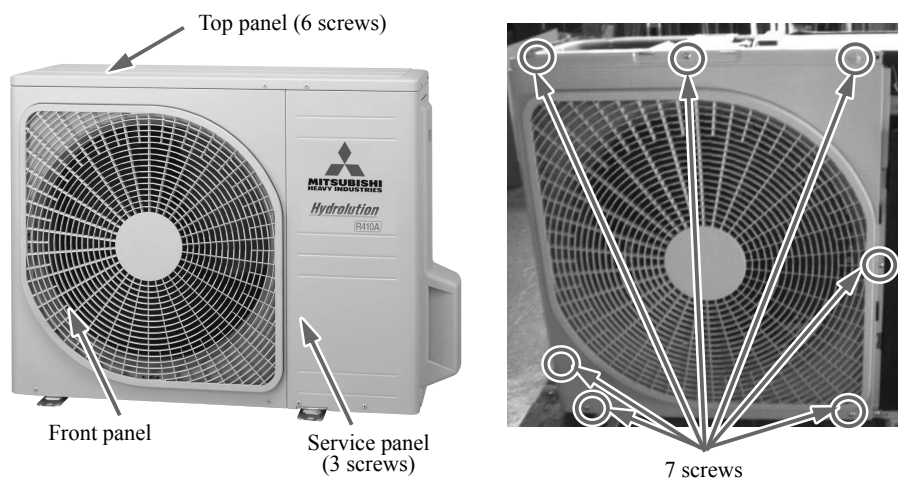


Outdoor unit
FDCW60VNX-W

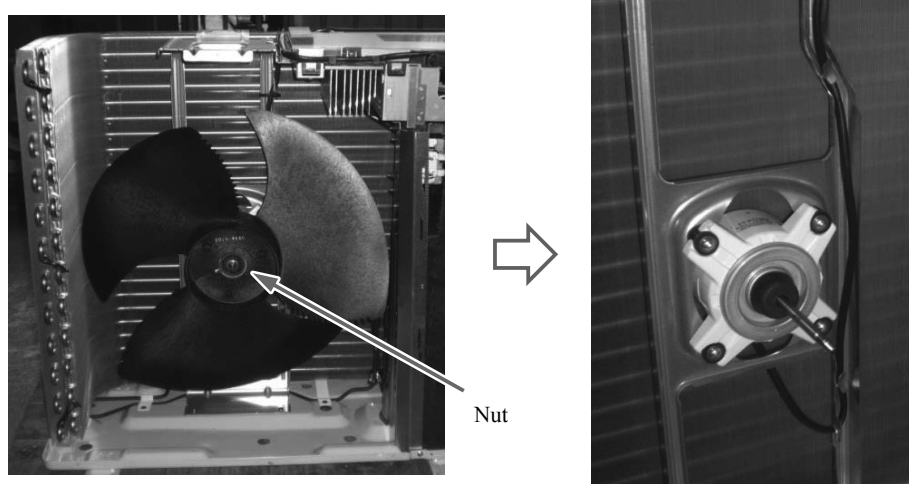


FDCW60VNX-W**Fan and fan motor (FMo1)**

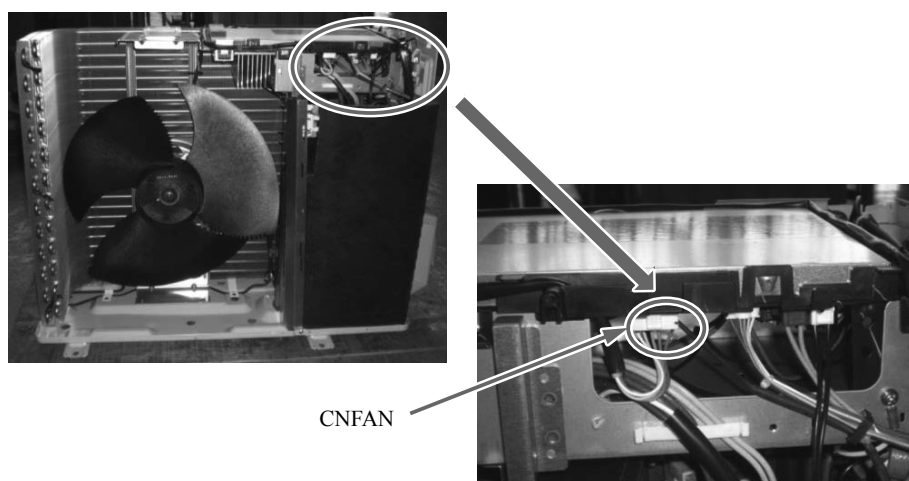
1. Loosen the screw and remove the top panel and service panel first.
2. Loosen 7 screws and remove the panel including fan grills.



3. Loosen the nut and remove the fan propeller.

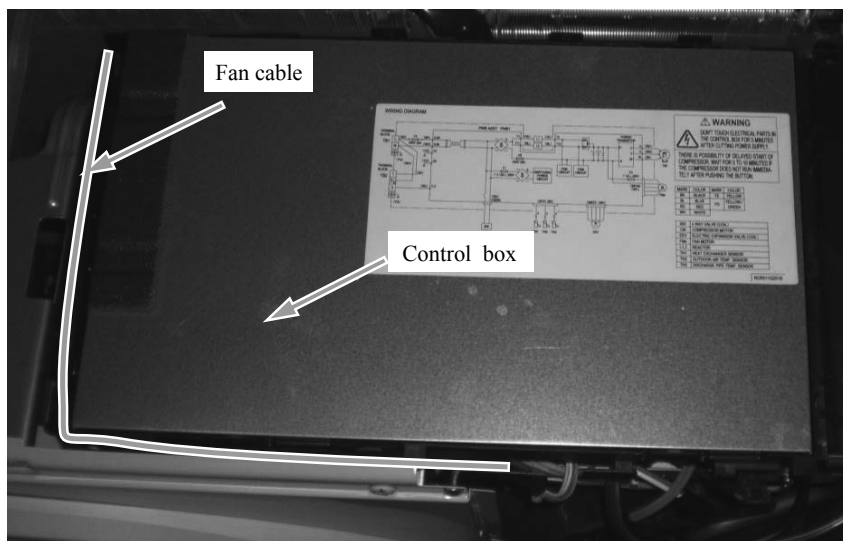


4. Disconnect the connector of CNFAN.



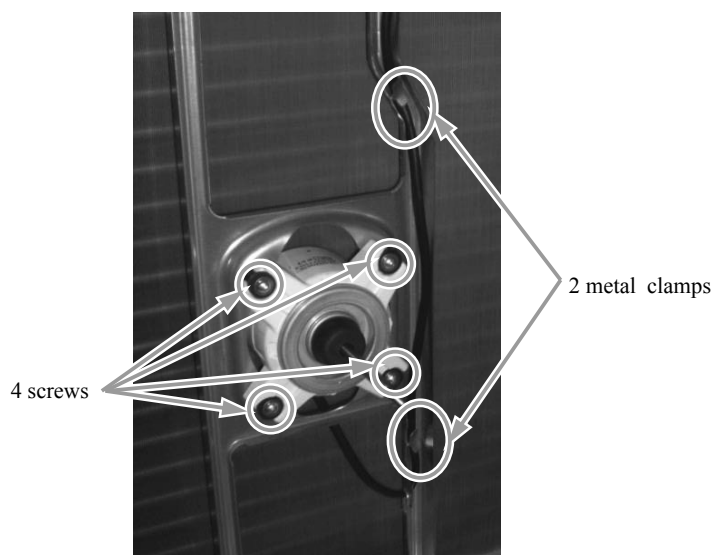
Fan and fan motor (FMo1)

5. Remove band and fan cable.



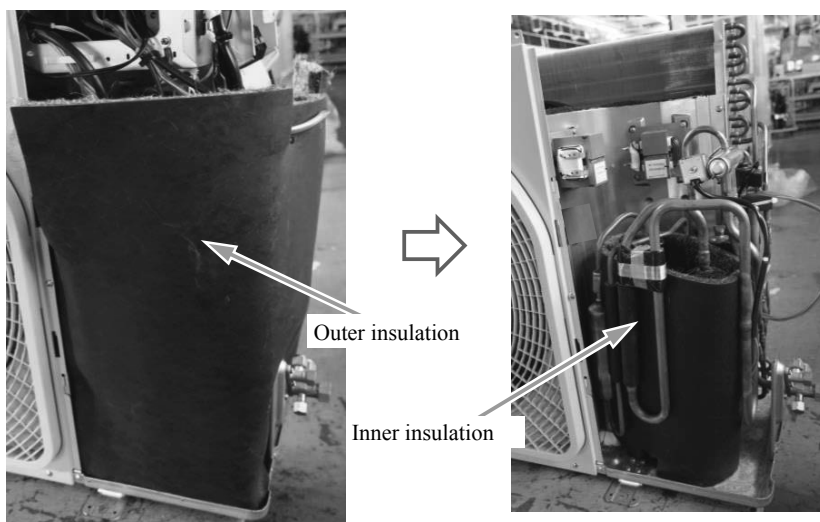
6. Release 2 metal clamps.

7. Loosen 4 screws and remove fan motor.



Compressor (CM)

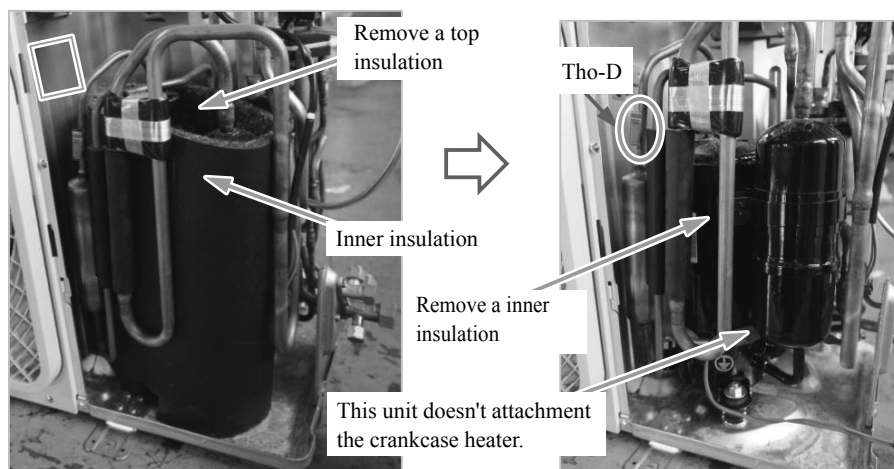
1. Unit the strings and remove the outer insulation.



Compressor (CM)

2. Remove the top and inner insulations.

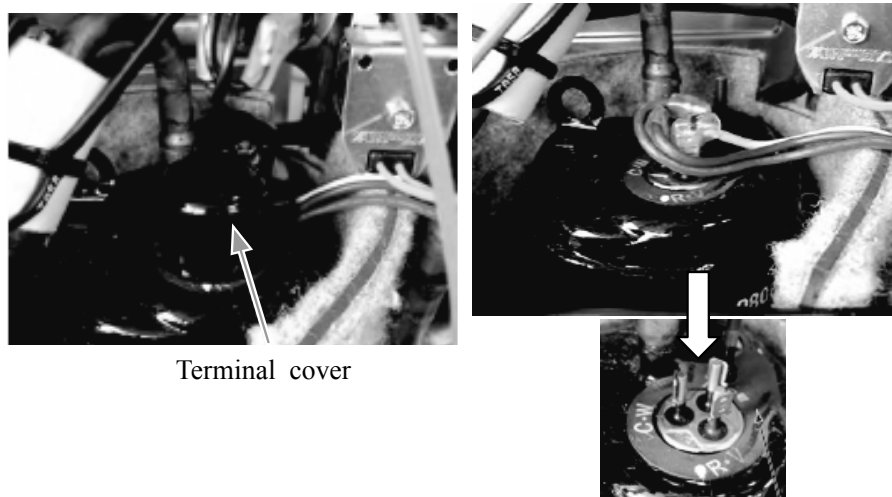
3. Take off sprig leaf and pull out sensor (Tho-D).



4. Remove the terminal cover.

5. Disconnect the faston terminal connectors from compressor.

U : Red cable
V : White cable
W : Blue cable



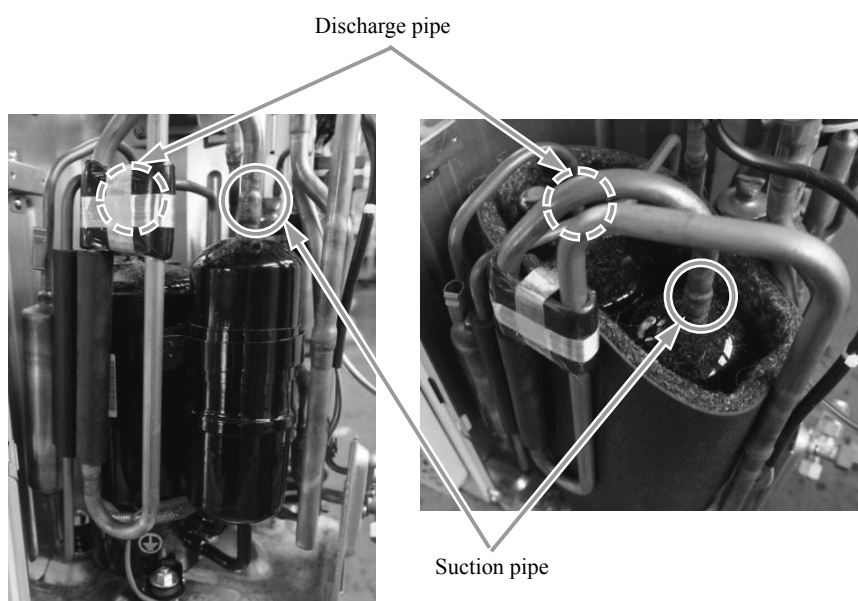
6. Loosen 3 units of compressor fixing bolts.



Compressor (CM)

7. Disconnect the pipes for suction and discharge.

8. Remove the compressor.

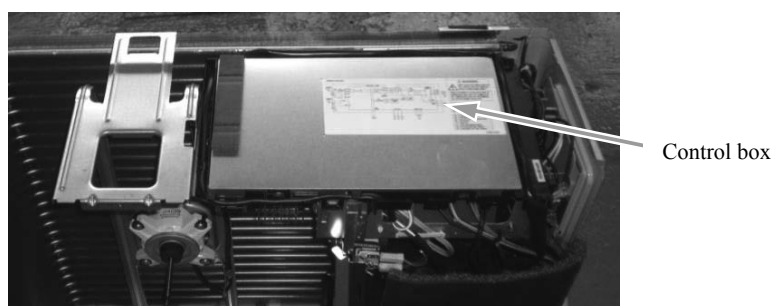
**Control PCB(PWB)**

1. Open the top panel.

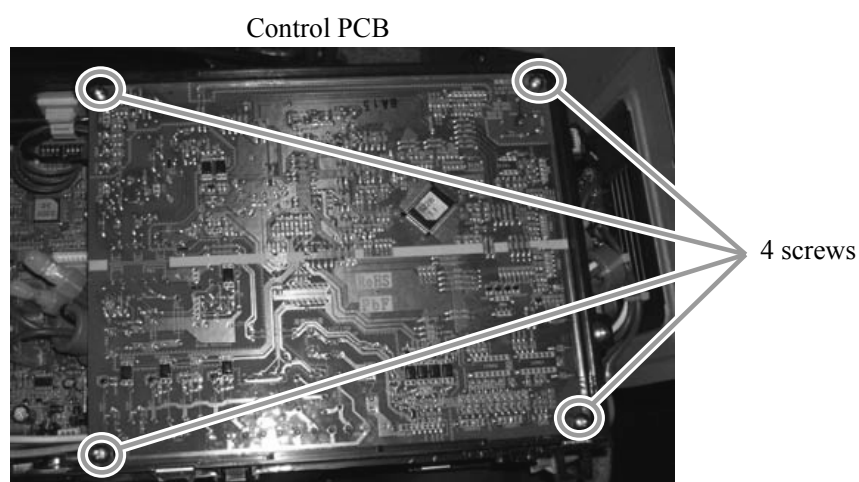
2. Open the control box cover.

Note: Be sure to do this work after elapsing 3 minutes from OFF.

3. Loosen 4 screws.



Open the control box cover.

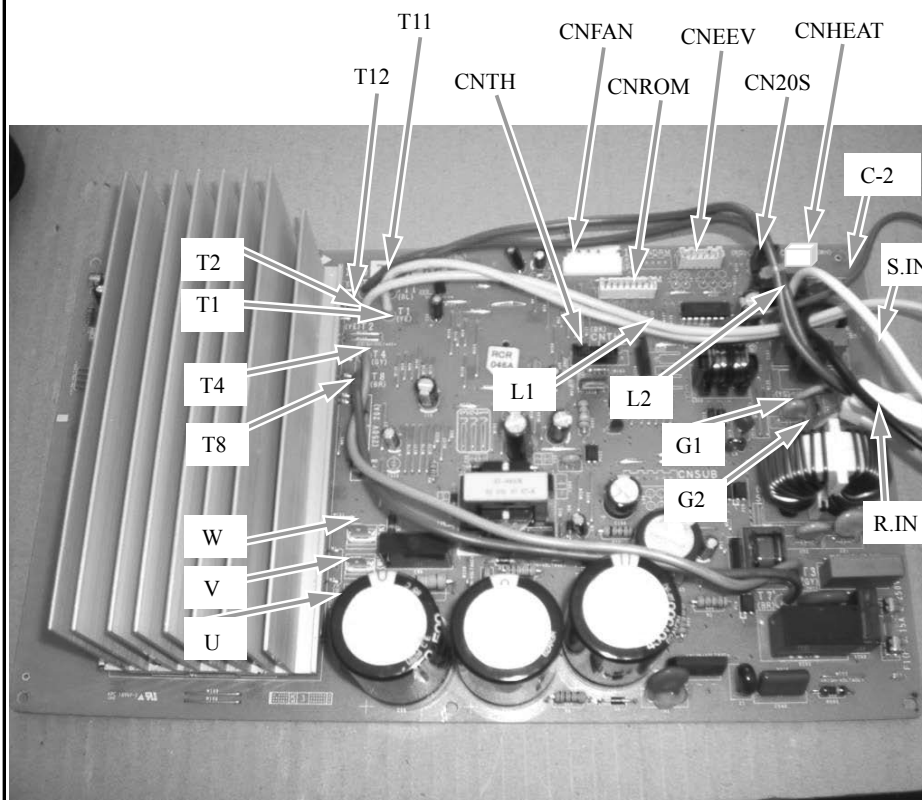


Control PCB (PWB)

- 1.** Disconnect all connectors and remove the control PCB.

(Connector)

CNHEAT
CN20S
CNEEV
CNROM
CNFAN
CNTH
L1
L2



- 2.** Disconnect all terminals on the terminal block.

(Terminal block)

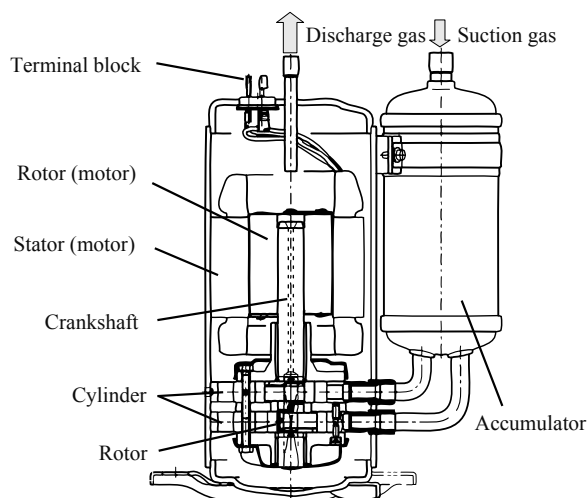
C-2(Harness color:RED)
S.IN(Harness color:WHITE)
R.IN(Harness color:BLACK)
G1 (Harness color:YELLOW/GREEN)
G2 (Harness color:YELLOW/GREEN)



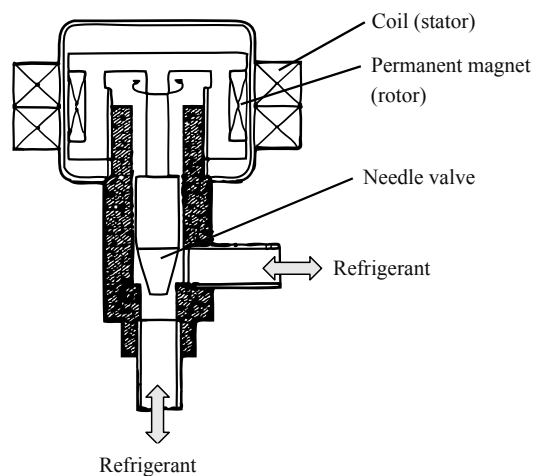
Components

Outdoor unit

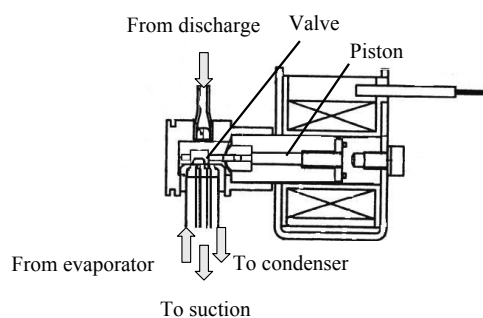
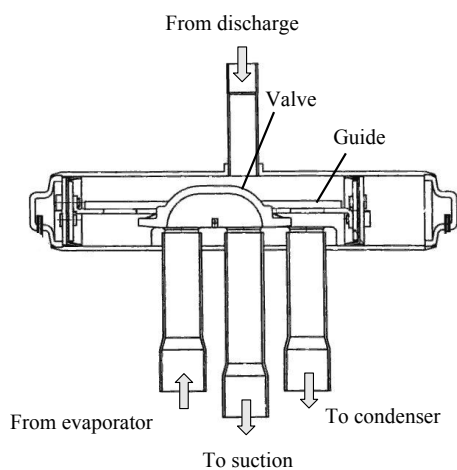
Compressor



Expansion valve

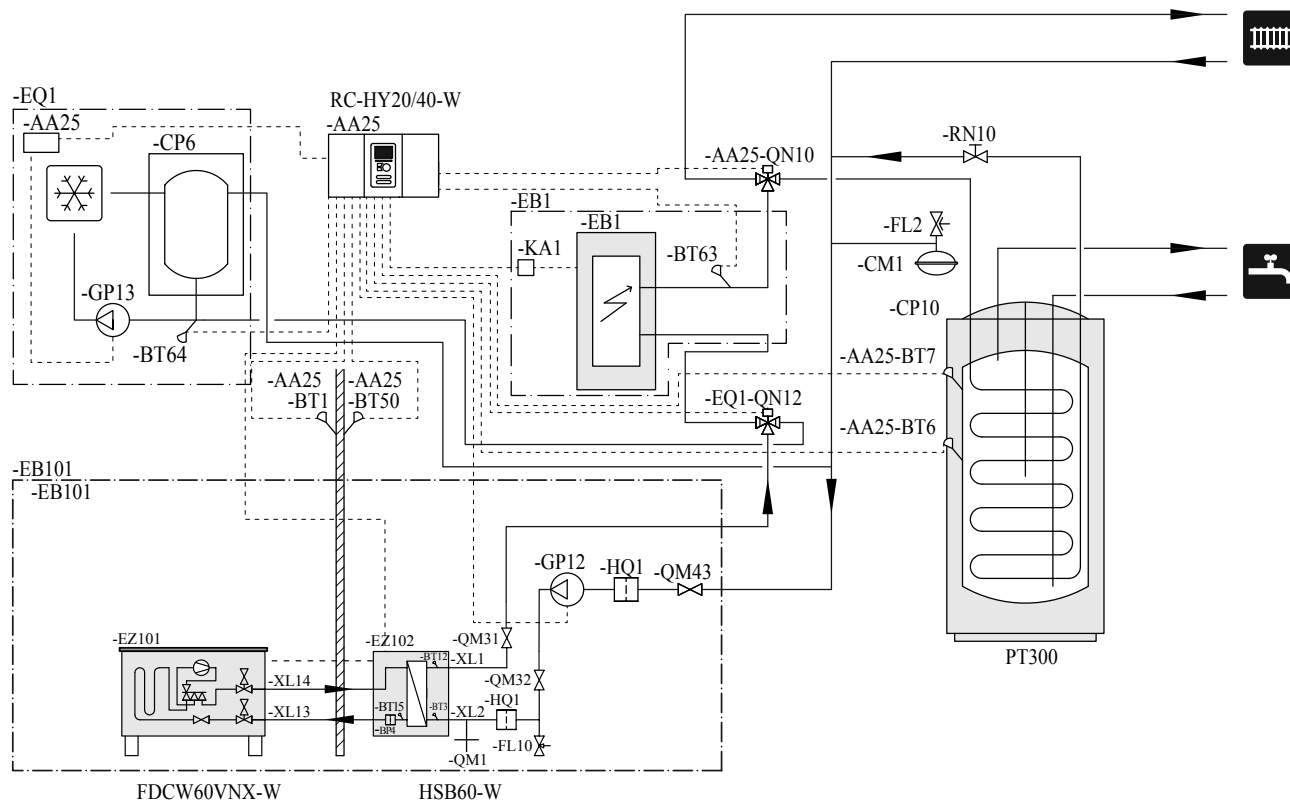


4-way valve



HSB60-W

Installation with indoor unit HSB60-W, tank PT300, controller RC-HY20/40-W with step controlled additional heat before reversing valve for hot water and cooling function (4-pipe system)

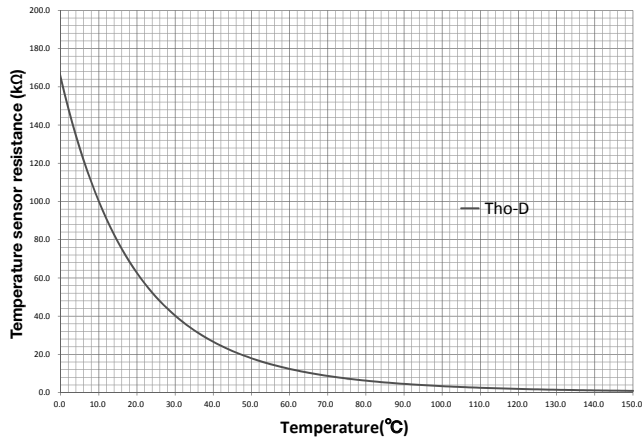
**Explanation****AA25 Controller**

BT1	Outdoor sensor ¹⁾
BT6	Temperature sensor, hotwater charging ¹⁾
BT7	Temperature sensor, hot water top ¹⁾
BT25	Temperature sensor, external supply line ¹⁾
BT63	Temperature sensor, external supply line after electric heater
BT71	Temperature sensor, external return line ¹⁾
Tho-A	Temperature sensor, Outdoor air
Tho-D	Temperature sensor, hot gas
Tho-R	Temperature sensor, heat exchanger out

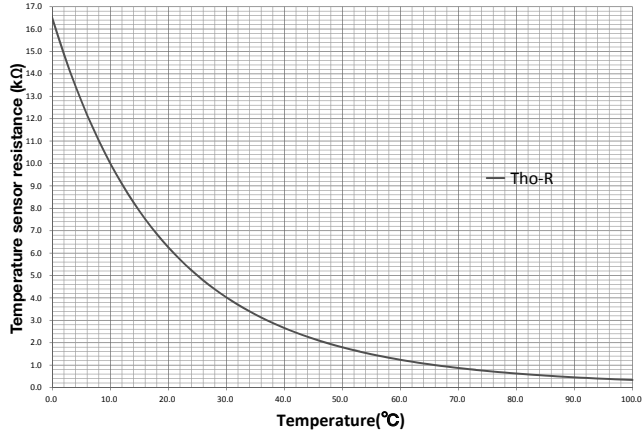
Temperature sensor

Data for sensor in outdoor unit

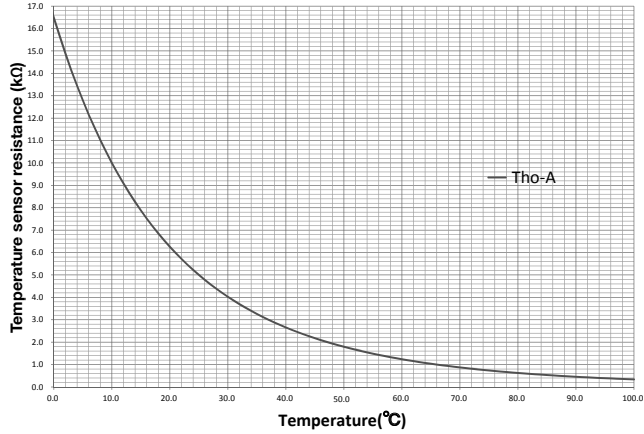
Tho-D



Tho-R



Tho-A



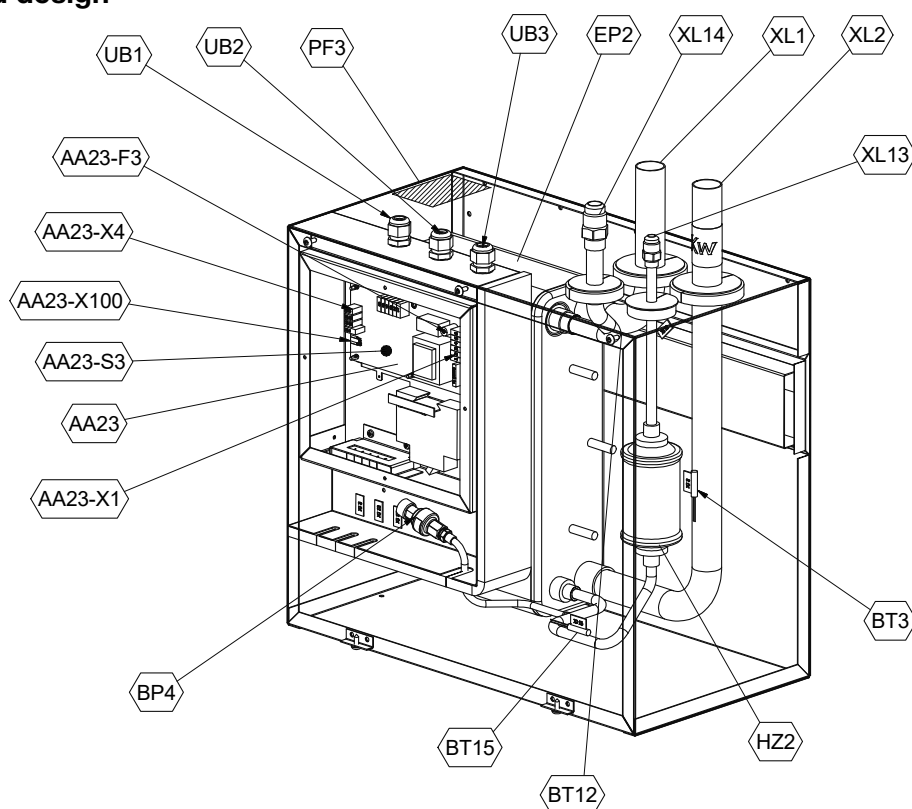
Temperature (°C)	Resistance (kΩ)	Voltage (VDC)
-40	351.0	3.256
-35	251.6	3.240
-30	182.5	3.218
-25	133.8	3.189
-20	99.22	3.150
-15	74.32	3.105
-10	56.20	3.047
-5	42.89	2.976
0	33.02	2.889
5	25.61	2.789
10	20.02	2.673
15	15.77	2.541
20	12.51	2.399
25	10.00	2.245
30	8.045	2.083
35	6.514	1.916
40	5.306	1.752
45	4.348	1.587
50	3.583	1.426
55	2.968	1.278
60	2.467	1.136
65	2.068	1.007
70	1.739	0.891
75	1.469	0.785
80	1.246	0.691
85	1.061	0.607
90	0.908	0.533
95	0.779	0.469
100	0.672	0.414

Component positions

Indoor units

Over view and design

HSB60-W



Symbol	Pipe connection
XL1 (Red mark)	Climate system supply $\phi 22$ mm
XL2 (Blue mark)	Climate system return $\phi 22$ mm
XL53	Refrigerant connection, liquid line, $\frac{1}{4}$ "
XL52	Refrigerant connection, gas line, $\frac{1}{2}$ "

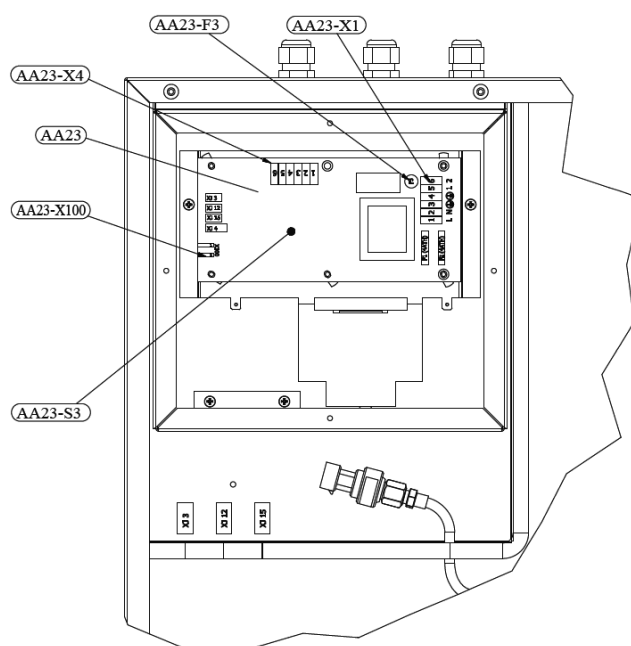
Symbol	Sensor, thermostats
BP4	Pressure sensor, high pressure
BT3	Temperature sensor, heating medium, return
BT12	Temperature sensor, condenser, supply
BT15	Temperature sensor, fluid pipe

Symbol	Valves etc.
EP2	Heat exchanger
HQ1	Particle filter (supplied)
HZ2	Drying filter

Symbol	Miscellaneous
UB1	Cable gland
UB2	Cable gland
UB3	Cable gland

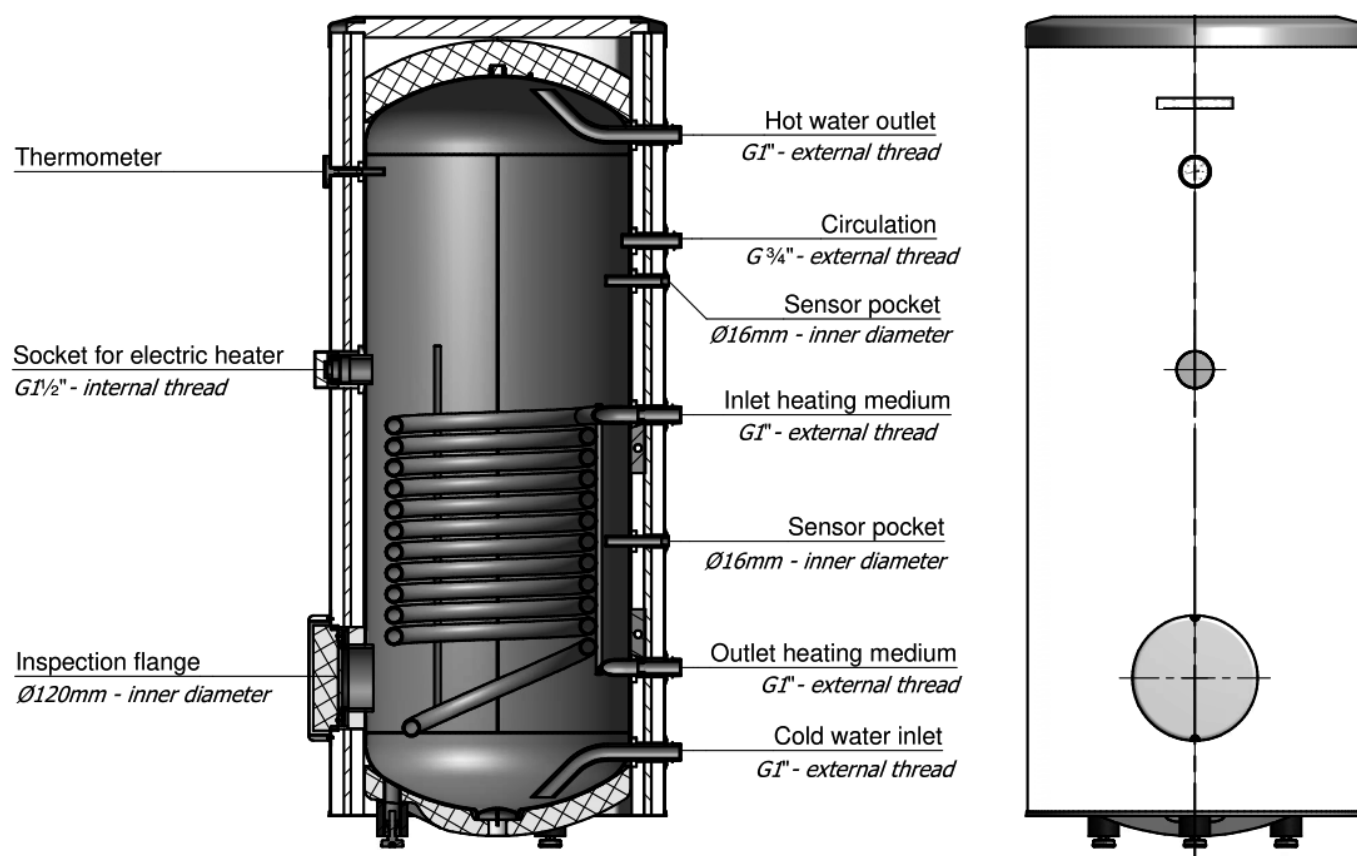
Symbol	Electrical components
AA23	Communication board
AA23-F3	Fuse for external heating cable
AA23-S3	DIP switch, addressing of outdoor unit
AA23-X1	Terminal block, incoming supply, connection of KVR
AA23-X4	Terminal block, communication with indoor module / control module
AA23-X100	Terminal block, communication outdoor module
X1	Terminal block, incoming component

HSB60-W

**Explanation**

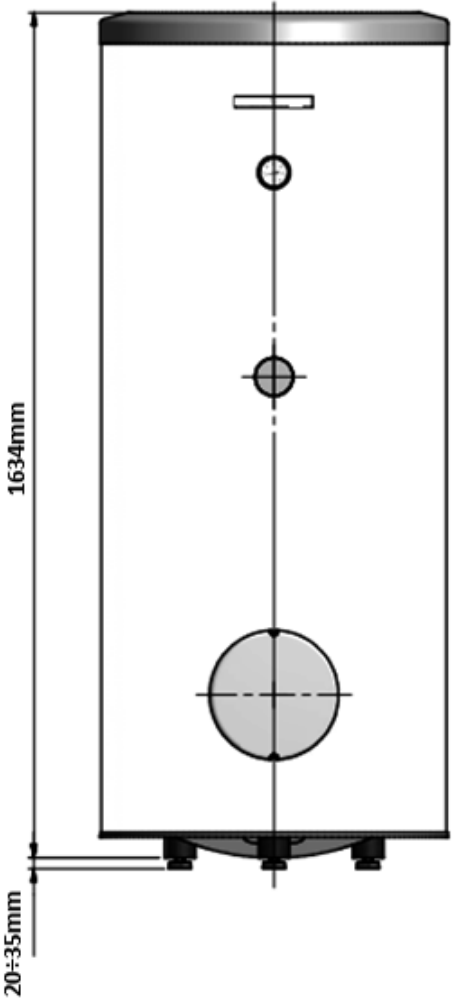
AA23	Communication board
AA23-F3	Fuse for external heating cable
AA23-S3	DIP switch, addressing of outdoor unit
AA23-X1	Terminal block, incoming supply, connection of KVR
AA23-X4	Terminal block, communication with indoor module / control module
AA23-X100	Terminal block, communication outdoor module FDCW

PT300

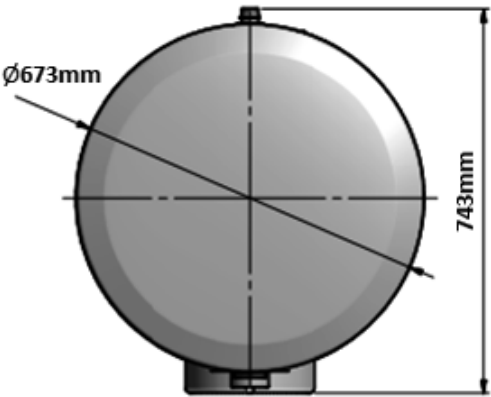


Component positions

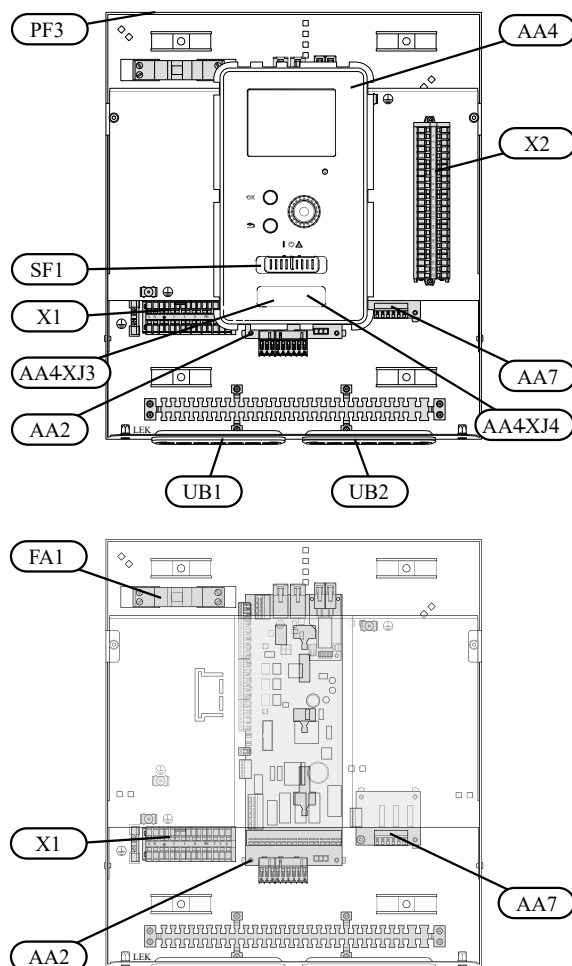
PT300



	PT300
A(mm)	1634
B(mm)	743
ØC(mm)	673

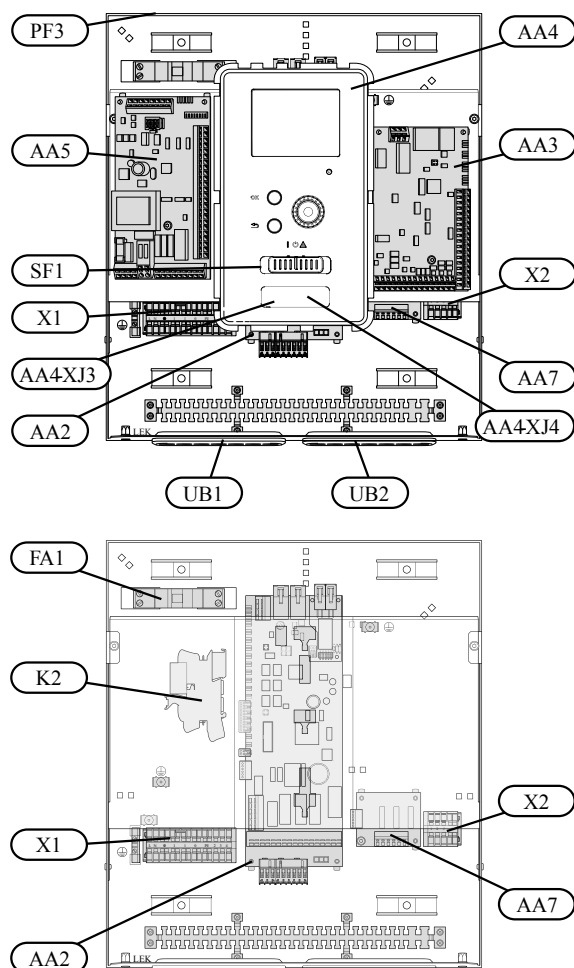


RC-HY20-W



Explanation

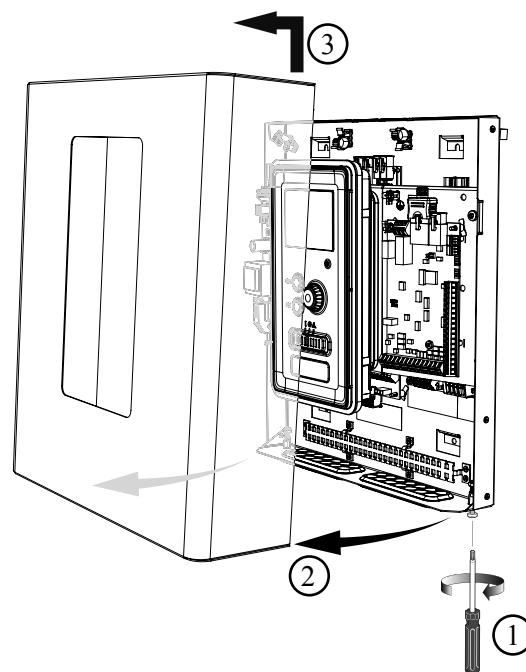
AA2	Base card
AA4	Display unit
AA4-XJ3	AA4-XJ3 USB socket
AA4-XJ4	Service outlet (No function)
AA7	Extra relay circuit board
FA1	Miniature circuit-breaker
X1	Terminal block, incoming electrical supply
X2	Terminal block, control signal circulation pump, sensors AUX inputs and heat pump
SF1	Switch
PF3	Serial number plate
UB1	Cable grommet, incoming supply electricity, power for accessories
UB2	Cable grommet, signal

RC-HY40-W**Explanation**

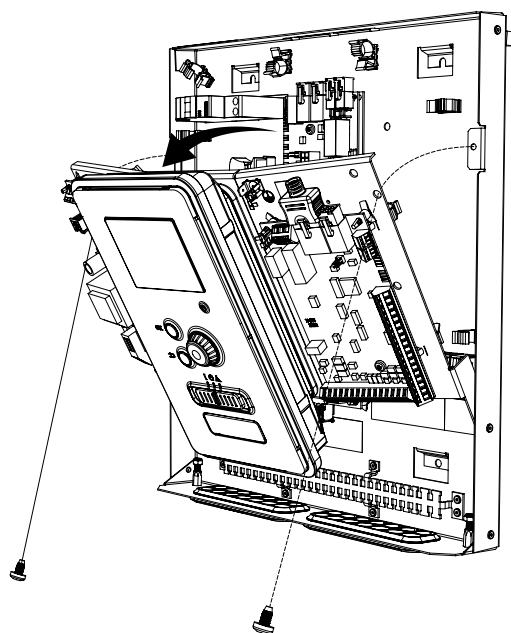
AA2	Base card
AA3	Input circuit board
AA4	Display unit
AA4-XJ3	USB socket
AA4-XJ4	Service outlet (No function)
AA5	Accessory card
AA7	Extra relay circuit board
FA1	Miniature circuit-breaker
K2	Emergency mode relay
X1	Terminal block, incoming electrical supply
X2	Terminal block, AUX4 - AUX6
SF1	Switch
PF3	Serial number plate
UB1	Cable grommet, incoming supply electricity, power for accessories
UB2	Cable grommet, signal

Accessibility, electrical connection for controller

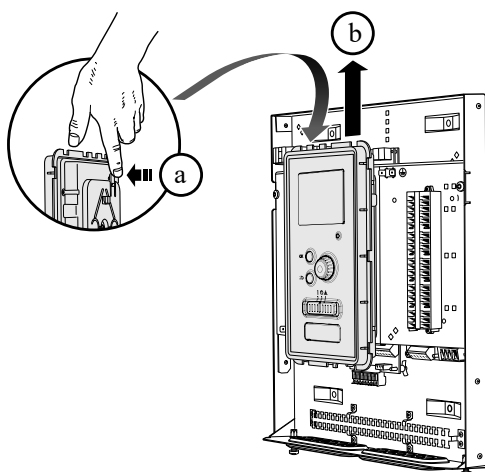
The cover of the control module is opened using a Torx 25 screwdriver. Assembly takes place in the reverse order.

**NOTE**

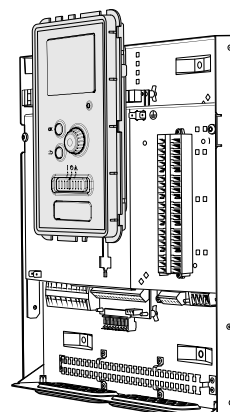
The cover to access the base board is opened using a Torx 25 screwdriver



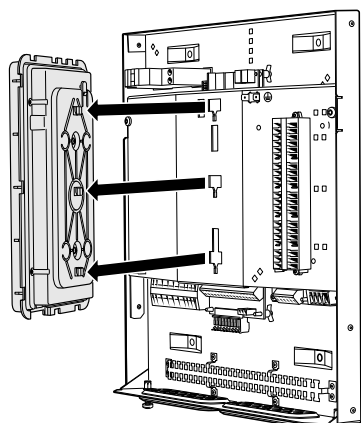
The display may need to be moved for easier access when connecting electrics. This is easily done by following these steps.



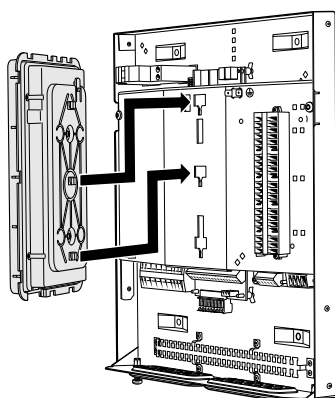
1. Press in the catch on the upper rear side of the display unit towards you (a) and move the display unit upwards (b) so that the mountings unhook from the panel.



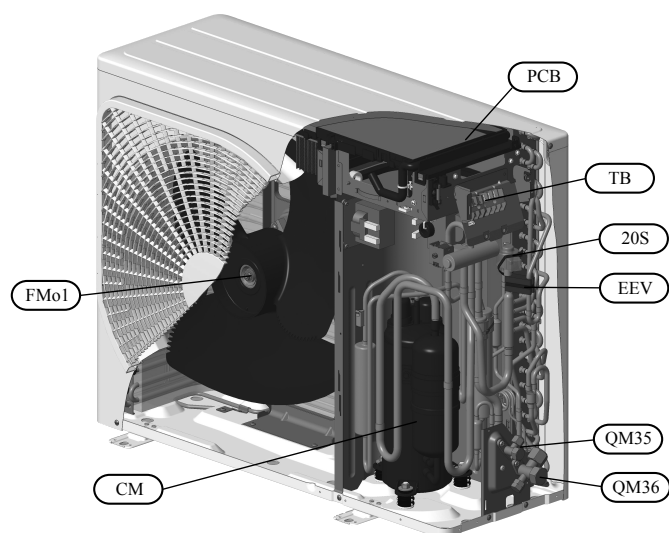
4. Secure the display on the panel.
5. When the electrical connection is ready the display must be reinstalled with three mounting points again, otherwise the front cover cannot be installed.



2. Lift the display unit from its mountings.

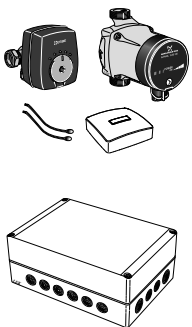
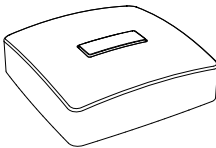
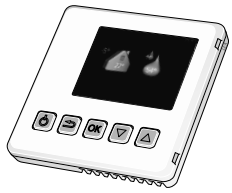
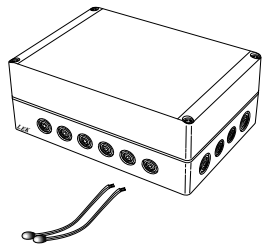
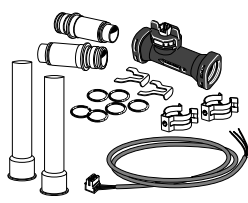


3. Align the two lower mountings on the reverse of the display unit with the two upper holes in the panel as illustrated.

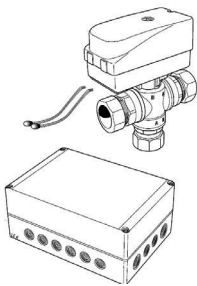
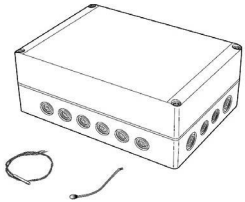
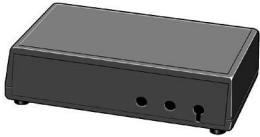
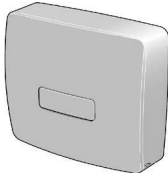
Outdoor unit**Component image****FDCW60VNX-W**

Accessories

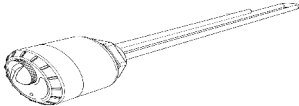
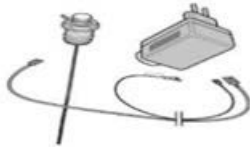

Accessory parts

Model name	Designation	RC-HY20-W Connection	RC-HY40-W Connection	Part No.
ECS-40M ECS-41M	 <p>Extra climate system</p>	—	✓	MCD291A008/ MCD291A009
RTS40M	 <p>Room sensor</p>	✓	✓ (Included)	MCD291A010
RMU40M	 <p>Room unit</p>	—	✓	MCD291A011
AXC30M	 <p>Accessories</p>	—	✓	MCD291A012
EMK300M	 <p>Energy meter kit</p>	—	✓	MCD291A013
EMK500M		—	✓	MCD291A014

Model name	Designation		RC-HY20-W Connection	RC-HY40-W Connection	Part No.
ELK9M		Immersion heater 9kW	✓	✓	MCD291A015
CPD11-25M/65		Charging pump	✓	✓	MCD291A016
CPD11-25M/75			✓	✓	MCD291A017
VST05M		Hot water control	✓	✓	MCD291A018
VST11M			✓	✓	MCD291A019
VST20M			✓	✓	MCD291A020
VCC05M		Shuttle valve	✓	✓	MCD291A021
VCC11M			✓	✓	MCD291A022

Model name	Designation		RC-HY20-W Connection	RC-HY40-W Connection	Part No.
POOL40M		Pool heating	—	✓	MCD291A030
SOLAR42M		Solar heating	—	✓	MCD291A033
MODBUS40M		Modbus communication module	—	✓	MCD291A031
EME20M		Solar electricity	✓	✓	MCD291A032

Option parts (for PT tank)

Model name	Designation		Part No.
ME1030M		Electrical module	MCD291A029
AnodeT300		Titanium anode	MCD291A024
AnodeT500			MCD291A025
HR10M		Auxiliary relay	MCD291A028

Model name	Designation		Part No.
Anode M300		Magnesium anode	MCD291A026
Anode M500			MCD291A027

Wind protection (prepared on site)

At the site where the following conditions are satisfied, wind protection for outdoor unit is required to avoid capacity drop or abnormal stop for protection.

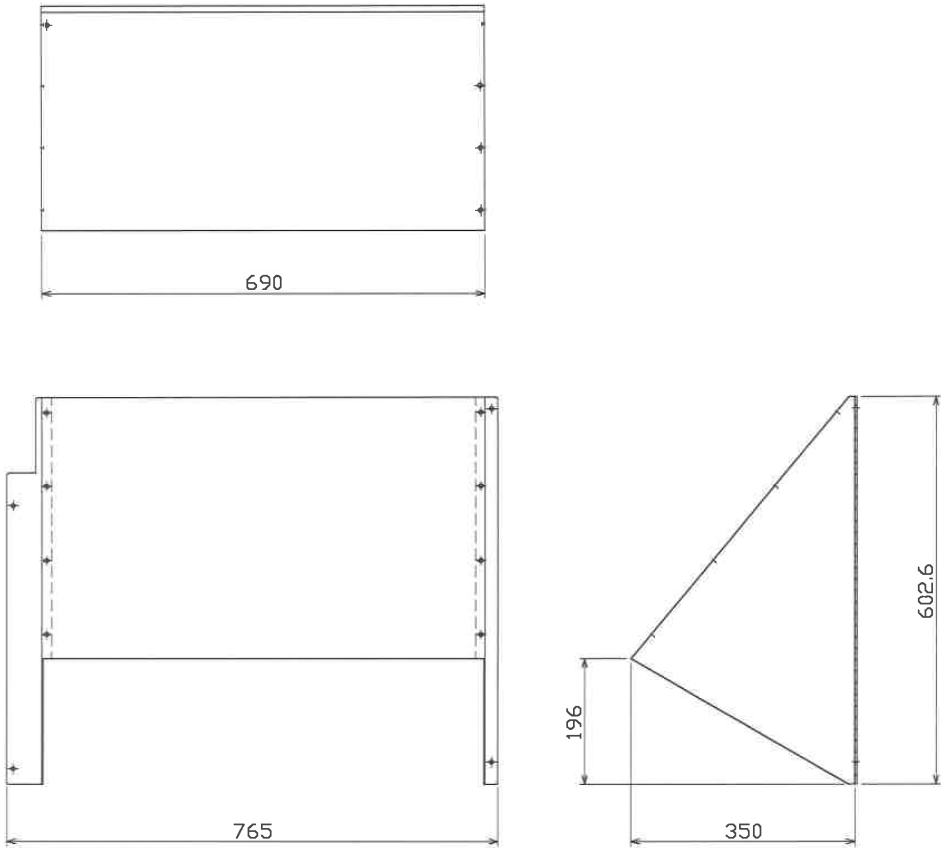
- Natural wind directly blows into outdoor unit.
- Relation between wind speed and outdoor air temperature is in the hatched area at the coldest day.

< FDCW60VNX-W >

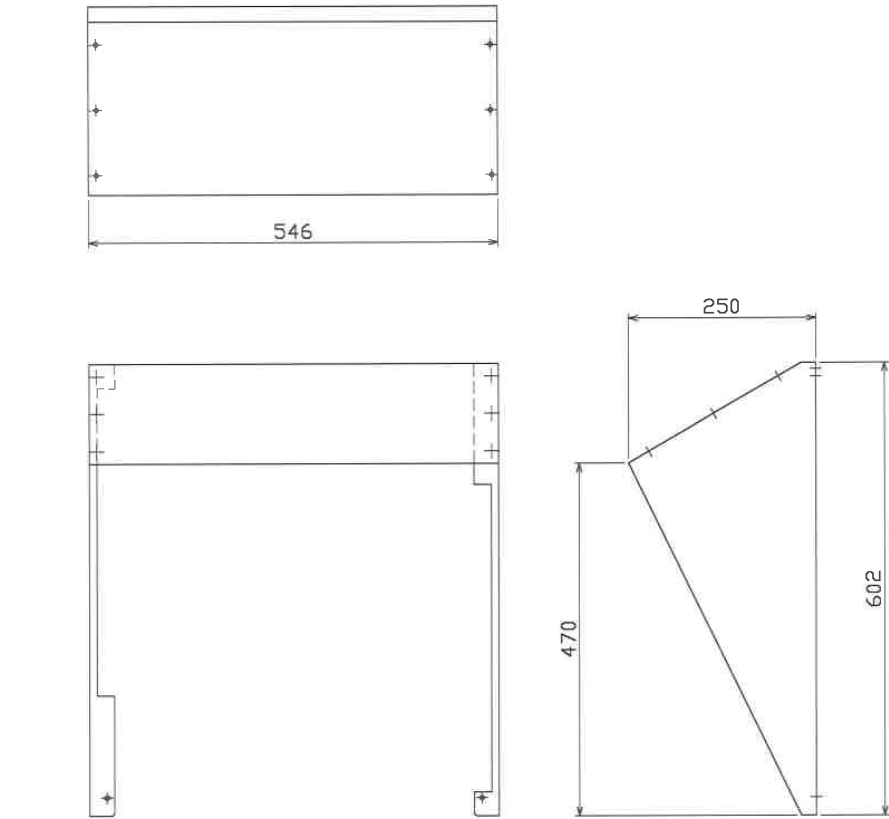
- Use wind guard in case outdoor unit is installed where ambient temperature drops below -10°C and natural wind blows into outdoor unit directly.

<For FDCW60VNX-W>

Front wind guard



Rear wind guard

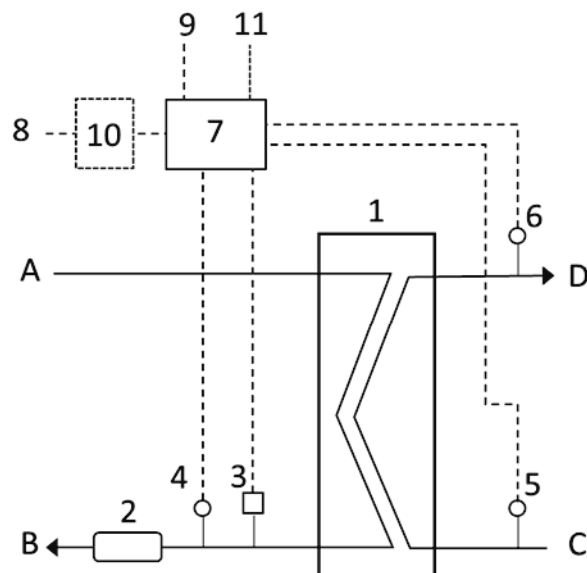


Piping system

Indoor unit

Split box

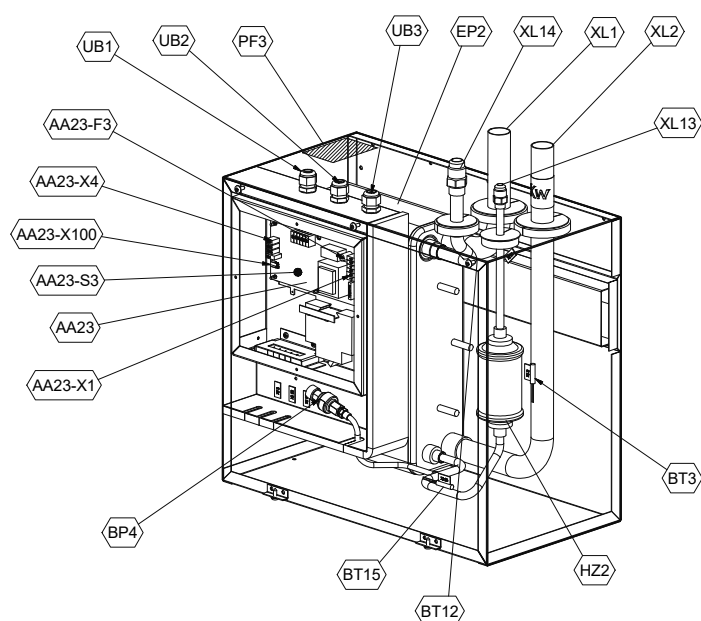
HSB60-W



A: Refrigerant flow
B: Refrigerant return
C: Space heating return
D: Space heating flow

1: Condenser
2: Filter
3: Pressure sensor
4: Temperature sensor, refrigerant return
5: Temperature sensor, space heating return
6: Temperature sensor, space heating flow
7: Print control board
8: Power source
9: Signal cable to outdoor heat pump
10: Residual current device (RCD)
(option)
11: Cable for heat tracing (option)

(Components location)



(Parts name)

EP2 Heat exchanger

HZ2 Drying filter

Electrical components

AA23 Communication board
AA23-F3 Fuse for external heating cable
AA23-S3 DIP switch, addressing of outdoor unit
AA23-X1 Terminal block, incoming supply
AA23-X4 Terminal block, communication with indoor module / control module
AA23-X100 Terminal block, communication outdoor module

Sensor, thermostats

BP4 Pressure sensor, high pressure
BT3 Temperature sensor, heating medium, return
BT12 Temperature sensor, condenser, supply
BT15 Temperature sensor, fluid pipe

Pipe connections

XL1 Connection, heating medium supply
XL2 Connection, heating medium return
XL53 Connection, liquid cooling medium
XL52 Connection, gas cooling medium

Miscellaneous

UB1 Cable gland
UB2 Cable gland
UB3 Cable gland
PF3 Nameplate with serial number

Outside unit

FDCW60VNX-W

