

## **1 – A2W GENERAL INFORMATION**

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The first part of the paper discusses the importance of understanding the cultural context of the research. It highlights how cultural differences can influence the interpretation of data and the design of the study. The author emphasizes the need for researchers to be sensitive to these differences and to adapt their methods accordingly.

The second part of the paper focuses on the challenges of conducting research in a multicultural environment. It discusses the difficulties of finding a common ground between different cultural perspectives and the potential for bias in the research process. The author suggests that researchers should strive for transparency and openness in their work, acknowledging the limitations of their study and the influence of their own cultural background.

The third part of the paper explores the role of the researcher in the research process. It discusses the importance of the researcher's position and the impact of their choices on the results of the study. The author argues that researchers should be aware of their own biases and should strive to minimize their influence on the research.

The fourth part of the paper discusses the importance of ethical considerations in research. It highlights the need for researchers to be aware of the potential for harm to participants and to take steps to minimize this risk. The author suggests that researchers should follow established ethical guidelines and should be open to criticism and feedback.

The fifth part of the paper discusses the importance of communication in research. It highlights the need for researchers to be able to communicate their findings effectively to a wide range of audiences. The author suggests that researchers should use clear and concise language and should avoid jargon and technical terms where possible.

The sixth part of the paper discusses the importance of reflection in research. It highlights the need for researchers to reflect on their own work and to evaluate their progress. The author suggests that researchers should keep a journal and should be open to self-criticism and feedback.

The seventh part of the paper discusses the importance of collaboration in research. It highlights the need for researchers to work together and to share their knowledge and resources. The author suggests that researchers should seek out colleagues who have different perspectives and should be open to learning from them.

The eighth part of the paper discusses the importance of the research process. It highlights the need for researchers to be systematic and to follow a clear plan. The author suggests that researchers should define their research questions clearly and should use appropriate methods to answer them.

The ninth part of the paper discusses the importance of the research results. It highlights the need for researchers to be able to interpret their findings correctly and to communicate them effectively. The author suggests that researchers should be open to the possibility of unexpected results and should be able to explain them in a clear and concise way.

The tenth part of the paper discusses the importance of the research impact. It highlights the need for researchers to be able to apply their findings to real-world problems. The author suggests that researchers should be aware of the potential for their research to make a difference and should strive to do so.



## ***WARNING***

This service information is designed for experienced repair technicians only and is not designed for use by the general public.

It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.

Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

The information contained in this book is subject to change without prior notice.

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# Safety Precautions

- Read the following "SAFETY PRECAUTIONS" carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

<b>WARNING</b>	This indication shows the possibility of causing death or serious injury.
<b>CAUTION</b>	This indication shows the possibility of causing injury or damage to properties.

- The items to be followed are classified by the symbols:

	This symbol denotes item that is PROHIBITED from doing.
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- Carry out test run to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

<b>WARNING</b>	
1.	Do not modify the machine, part, material during repairing service.
2.	If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.
3.	Do not wrench the fasten terminal. Pull it out or insert it straightly.
4.	Engage dealer or specialist for installation and servicing. If installation of servicing done by the user is defective, it will cause water leakage, electrical shock or fire.
5.	Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.
6.	Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, refrigerant leakage, fire or electrical shock.
7.	Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.
8.	Do not install outdoor unit near handrail of veranda. When installing outdoor unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.
9.	For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.
10.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electric shock in case equipment breakdown or insulation breakdown.
11.	Do not use joint cable for indoor / outdoor connection cable. Use specified indoor / outdoor connection cable, refer to Installation Instructions CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor / outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.
12.	When install or relocate Air to Water Heatpump indoor / outdoor unit, do not let any substance other than the specified refrigerant, eg. air etc. mix into refrigerant cycle (piping). Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.
13.	This is a R410A model. When connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A refrigerant. Thickness of copper pipes used with R410A must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm. It is desirable that the amount of residual oil is less than 40 mg/10 m.
14.	During installation, install the refrigerant piping properly before run the compressor. Operation of compressor without fixing refrigeration piping and valves at opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.
15.	During pump down operation, stop the compressor before remove the refrigeration piping. Removal of refrigeration piping while compressor is operating and valves are opened condition will cause suck-in of air, abnormal high pressure in refrigeration cycle and result in explosion, injury etc.
16.	After completion of the installation servicing confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
17.	Ventilate the room if there is refrigerant gas leakage during operation. Extinguish all fire sources if present. It may cause toxic gas when the refrigerant contacts with fire.
18.	Only use the supplied or specified installation parts, else, it may cause unit vibrate loose, water/refrigerant leakage, electrical shock or fire.
19.	The unit is only for use in a closed portable water system. Utilization in an open water circuit or non-portable water circuit, may lead to excessive corrosion of the water piping and risk of incubating bacteria colonies, particularly Legionella, in water.
20.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.
21.	Do not dismantle refrigerant piping using pipe wrench. It might deform the piping and cause the unit to malfunction.
22.	Select a location where in case of water leakage, the leakage will not cause damage to other properties.
23.	Do not locally purchase electrical parts of the product for the purpose of installation, service, maintenance and etc. They might cause electrical shock or fire.
24.	Do not branch the power from terminal block to heater tape. Overloaded terminal block will cause electrical shock or fire.
25.	Installation or servicing work. It may need two people to carry out the installation or servicing work.
26.	Do not use unspecified cord, modified cord, joint cord or extension cord for power supply cord. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.
27.	Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.



### CAUTION

1.	Do not install the air-to-water heatpump indoor unit and outdoor unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.	
2.	Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.	
3.	It may need two persons to carry out the installation work. The weight of indoor / outdoor unit might cause injury if carried by one person.	
4.	Do not touch outdoor unit air inlet and aluminium fin. It may cause injury.	
5.	Select an installation location which is easy for maintenance.	
6.	Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F - 70°F (30°C - 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C ).	
7.	Power supply connection to the indoor unit. 1. Power supply point should be in easily accessible place for power disconnection in case of emergency. 2. In some countries, permanent connection of Air-to-Water Heatpump to the power supply is prohibited. 3. Use the power supply cord 3 x 6.0 mm <sup>2</sup> type designation 60245 IEC 57 or heavier cord. 4. Strongly recommended to make permanent connection to a circuit breaker. It must be a double pole switch with a minimum 3.0mm gap. -Use approved 30A circuit breaker for 2.5HP (SDH07C3E5/UD07CE5) and 3.0HP (SDH09C3E5/UD09CE5) -For electrical heater connection to main (either a or b) a. Used approved 15A/16A circuit breaker (internal heater only) b. Used approved 30A circuit breaker (Internal heater + Ext. Heater)	
8.	Do not release refrigerant during piping work for installation, servicing, re-installation and during repairing a refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.	
9.	Do not install this appliance in a laundry room or other high humidity location. This condition will cause rust and damage to the unit.	
10.	Make sure the insulation of power supply cord does not contact to hot part (i.e. refrigerant piping, water piping) to prevent from insulation failure (melt).	
11.	Do not sit, step or place anything on the unit, you may fall down accidentally.	
12.	Do not touch the sharp aluminium fin, sharp parts may cause injury.	
13.	After installation, check the water leakage condition in connection area during test run. If leakage occur, it will cause damage to other properties.	
14.	The unit described in this manual is designed for use in a closed water system only. Utilization in an open water circuit may lead to excessive corrosion of the water piping.	

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# ***1***

## **A2W SYSTEM – GENERAL INFORMATION**

Product Identification

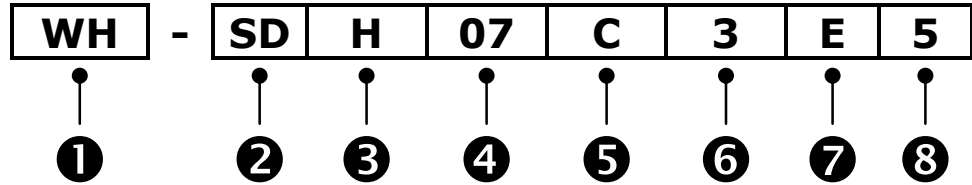
System Features

Selecting Units

Accessories

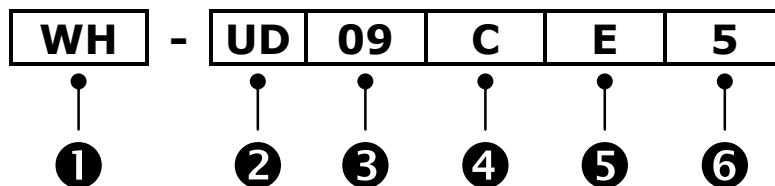
## 1.1 – Product Identification

**Indoor**



①	Model
WH	A2W heatpump
②	Type
SD	Split type indoor unit
MD	Mono block unit
③	Heating Type
C	Heating and cooling capability
F	Premium heating
H	Standard heating
④	Heating capacity in kW
07, 09, 12, 14 and 16	
⑤	System series
A, B, C, ..... Z	
⑥	Electric heater in kW
3, 6 and 9	
⑦	Market
E	Europe
⑧	Voltage
5	220V/50Hz/1ph.
8	380V/50Hz/3ph

## Outdoor



①	Model
WH	A2W heatpump
②	Type
UD	Split type outdoor unit
③	Heating capacity in kW
07, 09, 12, 14 and 16	
④	System series
A, B, C, ..... Z	
⑤	Market
E	Europe
⑥	Voltage
5	220V/50Hz/1ph.
8	380V/50Hz/3ph



## Tank



**WH**

**1**

-

**T**

**2**

**X**

**3**

**30**

**4**

**C**

**5**

**3**

**6**

**E**

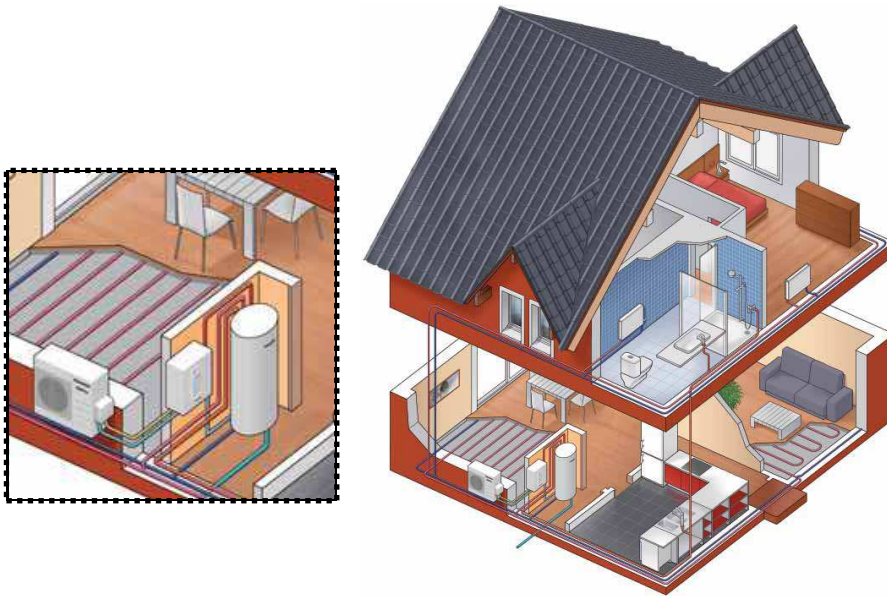
**7**

**5**

**8**

<b>1</b>	<b>Model</b>
<b>WH</b>	A2W heatpump
<b>2</b>	<b>Type</b>
<b>T</b>	Water tank
<b>3</b>	<b>Heating Type</b>
<b>D</b>	Domestic hot water storage
<b>X</b>	Closed circuit type
<b>4</b>	<b>Tank capacity in litre</b>
<b>20</b>	200 litre
<b>30</b>	300 litre
<b>5</b>	<b>System series</b>
<b>A, B, C, ..... Z</b>	
<b>6</b>	<b>Electric heater in kW</b>
<b>3, 6 and 9</b>	
<b>7</b>	<b>Market</b>
<b>E</b>	Europe
<b>8</b>	<b>Voltage</b>
<b>5</b>	220V/50Hz/1ph.
<b>8</b>	380V/50Hz/3ph

## 1.2 – System Features

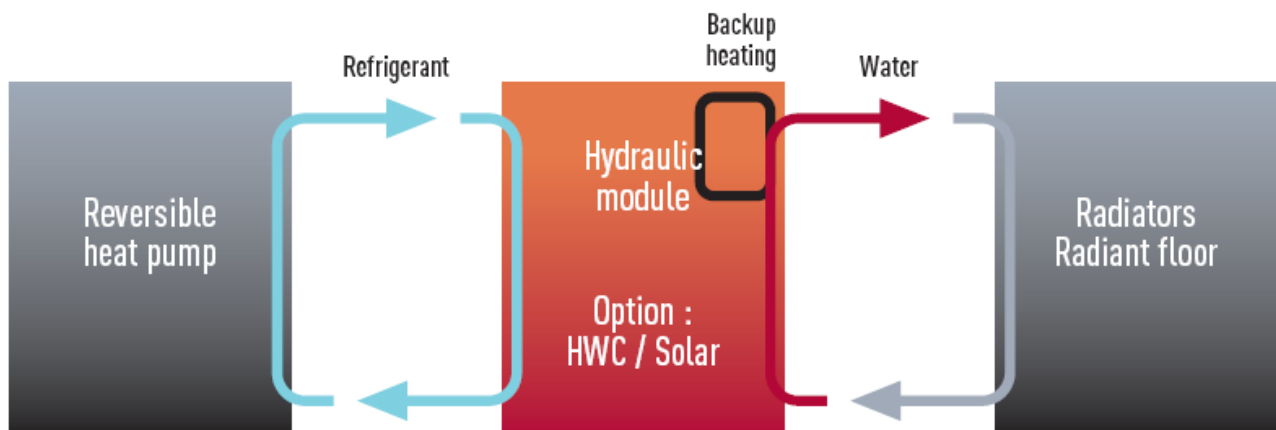


- Panasonic's new Aquarea system, based on high-efficiency heat pump technology, not only heats your home and hot water, but also cools your home in summer with incredible performances for perfect comfort whatever the weather conditions, even down to outdoor temperatures of  $-20^{\circ}\text{C}$ .

### 1.2.1 How does the Aquarea system work ?

An air to water Heat pump system uses heat energy present in the outdoor air to heat the house, cool it and also to produce hot water. The Aquarea system therefore uses free energy to heat or cool your home. It only consumes electricity to operate the compressor, the electronics, the pumps and in the event of very low temperatures, the electric elements. The result is very high efficiency and real energy savings.

Application: New or replacement boiler



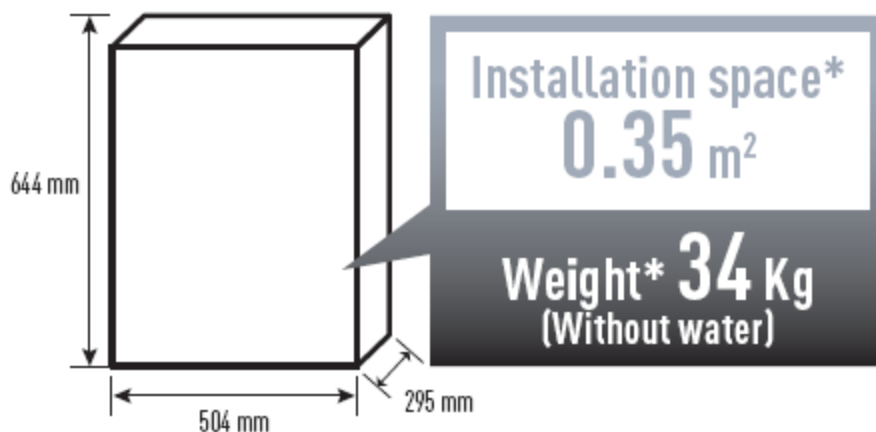
### 1.2.2 There are several types of heat pump :

- The split system : This is formed by an outdoor unit and a hydraulic module, normally located in the utility room or garage. This configuration requires refrigerant pipes between the two units but is easily integrated in the house and can be connected to an existing boiler, for example.
- The single-unit system : It only has an outdoor unit. The installation doesn't require a refrigerated connection and is only connected to the heating system. This system is therefore easier to install, but requires more outdoor space.

### 1.2.3 A compact design : Easy to install and maintain

Aquarea is a very easy heating and air conditioning system to install either in new or old buildings. Panasonic's Aquarea air to water system provides a considerable reduction on installation and maintenance costs. For new buildings, no drilling or excavation work is necessary to capture the heat, unlike geothermal installations, nor any gas connection, chimneys or fuel reservoirs. For retrofits or refurbishing, it is easy to connect to an existing heating system with low-temperature radiators or a radiant floor.

\* for the WH-SDH07C3E5 and WH-SDH09C3E5



### 1.3 – Selecting units combination

#### How to calculate the power of your house that you need ?

- To calculate the power, you will need a thermal balance report drawn up by a specialist who will analyse the house's insulation, its orientation, the openings, the minimum temperature in your area, etc.
- However, here is a quick calculation method to enable you to roughly estimate the power needed. This calculation method is given for guidance only. Consult Panasonic product specialist to give a correct assessment on the actual product recommendation.
- Panasonic will not accept responsibility under any circumstances in the event of an assessment error.

#### 1- Calculation of the house's total energy loss:

- A detached house's total energy loss can be calculated approximately using the following formula:  $D = G \times V \times \Delta T$

Where:

- D = Total loss in W
- V = Living space in m<sup>3</sup>
- $\Delta T$  = Difference between the temperature inside the house and the minimum outdoor temperature where the house is located
- G = The building's insulation coefficient in W/m<sup>3</sup>K .°C

#### 2- Estimation of coefficient G according to insulation type (G in W/m<sup>3</sup>K. °C)

- Old house without insulation G = 2
- Old house with insulation G = 1.5
- House built after 1990 G = 1.1
- House built after 2005 G = 0.8
- Very good insulation G = 0.6
- Bioclimatic G = 0.4

#### 3 - Power requirement:

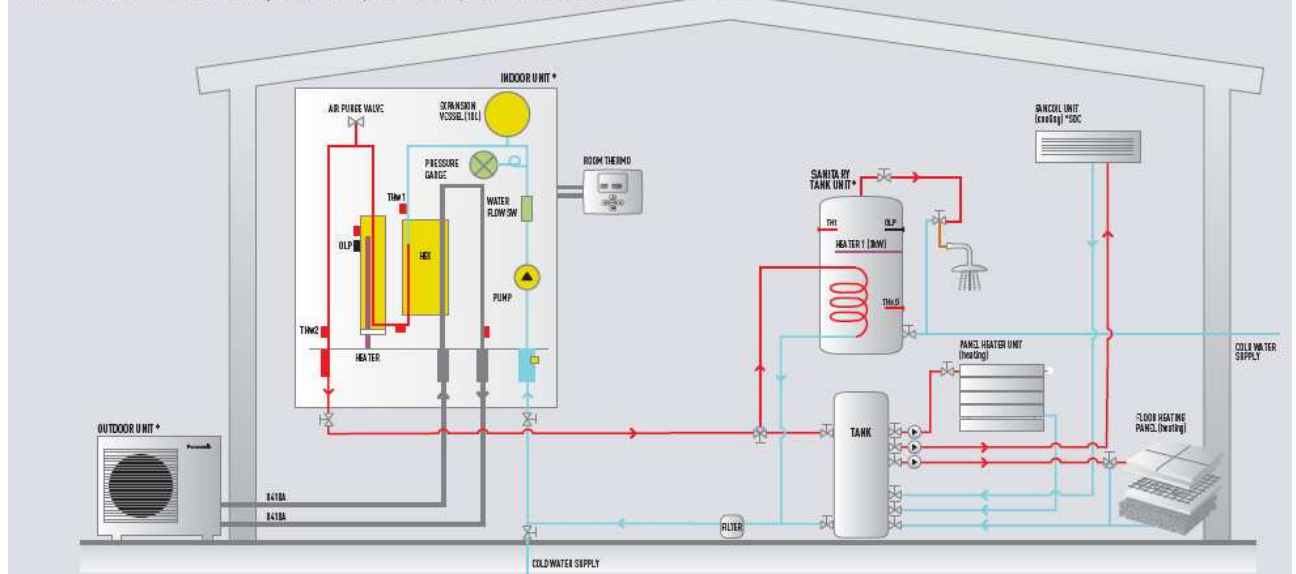
- The model selected must be capable of providing power at least equal to the estimated total energy loss value.
- Example: A 130 m<sup>2</sup> detached house with a ceiling height of 2.5 m in Seine et Marne (77), with a minimum outdoor temperature of -7 °C, built in 1995, has total energy loss:  $D = 1.1 \times [(130 \text{ m}^2 \times 2,5 \text{ m}) \times (20 \text{ °C} - (-7 \text{ °C}))] = 9652 \text{ W}$  (i.e. 9.65 kW)
- We must therefore select a Heat pump capable of producing 9.65 kW at -7°C, which leads us to a 12- kW Aquarea model.

		7 kW	9 kW	12 kW	14 kW	16 kW
Outside temperature 7°C	Power (kW)	7.00	9.00	12.00	14.00	16.00
	COP	4.40	4.10	4.67	4.50	4.23
Outside temperature -7°C	Power (kW)	5.15	5.90	10.00	10.70	11.40
	COP	2.65	2.50	2.70	2.62	2.55

Conditions : Water input temperature: 30 °C. Water output temperature: 35 °

### 1.3.1 Example of A2W connection

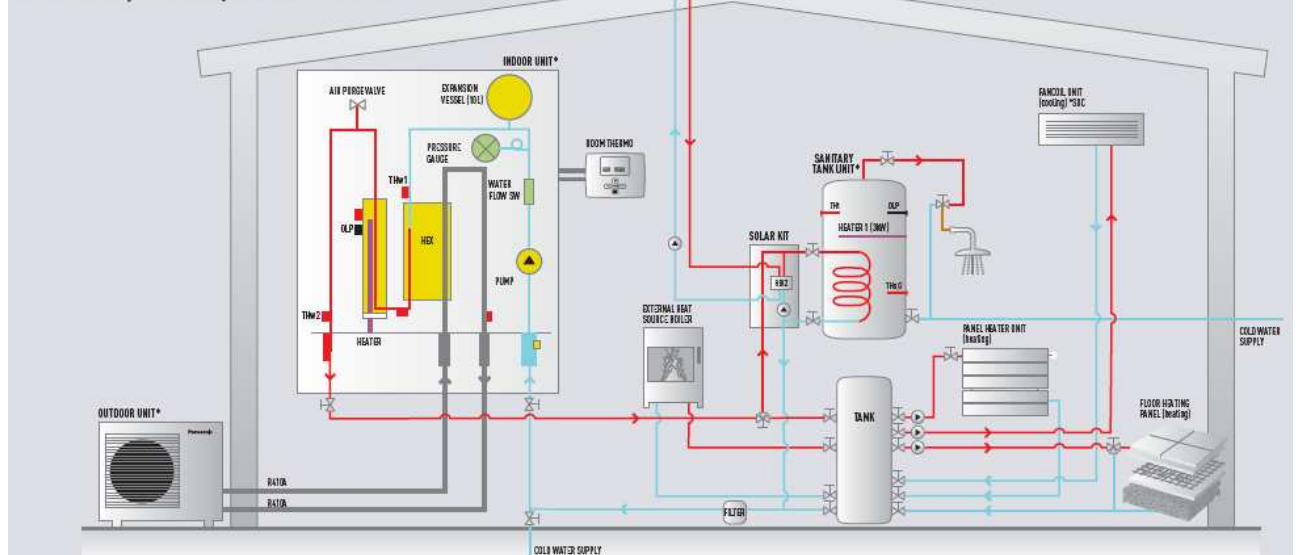
#### AQUAREA IN A RADIANT FLOOR AND HOT WATER CYLINDER APPLICATION HEAT PUMP, UD-SDH / UD-SDF / UD-SDC SERIES



\* Panasonic supplies the outdoor unit, the indoor unit, the sanitary tank and a 3-way on/off valve (included with the sanitary tank)

- Hot water production with TD series cylinder
- Heating
- Cooling (only for the UD-SDC series)
- Connection of a thermostat possible (only for the UD-SDF / UD-SDC series)

#### AQUAREA AS BOILER BACKUP AND SOLAR PANELS HEAT PUMP, UD-SDF / UD-SDC SERIES



\* Panasonic supplies the outdoor unit, the indoor unit, the sanitary tank and a 3-way on/off valve (included with the sanitary tank)

- Hot water production with TD series cylinder
- Heating with boiler backup
- Cooling (UD-SDC series only)
- Connection of solar panels possible
- Connection of a thermostat possible

## 1.4 – Accessories

### Solar Kit Brand Model No.

- RESOL FlowConS\_DeltaSol\_BS\_Plus



Oventrop Regusol X-series



### 3 way-Valve Brand Model

- Siemens CZV322 3 Port Spring return



### 2 way Valve Brand Model

- Honeywell V4043C1007 Spring return

Siemens CZV222 2 Port Spring return



### Room Thermostat Brand Model

- Siemens RAA20 Dial type



Siemens REV200 Programme



### Thermal Valve Brand Model

- Taconova RA57 NC

Danfoss AVB-NC NC



## 1.5 – Water quality

The water quality shall be in accordance with European Council Directive 98/83 EC, or revised version at the date of installation, and is not fed with water from a private supply.

Particular: Chloride content: Max. 250 mg/l

Sulphate content: Max. 250 mg/l

Combination Chloride/sulphate: Max. 300 mg/l (in total)

# 2

## ***PRODUCT SPECIFICATION***

Technical Specification  
Dimension  
Location of Control Component  
Refrigerant and Water Cycle  
Diagram  
Block Diagram  
Wiring Diagram  
Electromoc Diagram

## 2.1 – Technical Specification

### 2.1.1 – Outdoor Units: WH-SDH07C3E5 WH-UD07CE5

Item		Unit	Outdoor Unit
Performance Test Condition			EUROVENT
Heating Capacity		kW	7.00
		BTU/h	23900
		kJ/h	25200
COP		W/W	4.40
		BTU/hW	15.0
Noise Level		dB (A)	48
		Power Level dB	66
Air Flow		m <sup>3</sup> /min (ft <sup>3</sup> /min)	46.0 (1624)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm <sup>3</sup>	FV50S (900)
Refrigerant (R410A)		kg (oz)	1.45 (51.2)
Dimension	Height	mm (inch)	795 (31-5/16)
	Width	mm (inch)	900 (35-7/16)
	Depth	mm (inch)	320 (12-19/32)
Net Weight		kg (lbs)	66 (146)
Pipe Diameter	Liquid	mm (inch)	6.35 (1/4)
	Gas	mm (inch)	15.88 (5/8)
Standard Length		m (ft)	7 (23.0)
Pipe Length Range		m (ft)	3 (9.8) ~ 30 (98.4)
I/D & O/D Height Difference		m (ft)	20 (65.6)
Additional Gas Amount		g/m (oz/ft)	30 (0.3)
Refrigeration Charge Less		m (ft)	10 (32.8)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	1.70
Fan	Type		Propeller Fan
	Material		PP
	Motor Type		Transistor (8-poles)
	Input Power	W	—
	Output Power	W	60
	Fan Speed	rpm	580
Heat Exchanger	Fin material		Aluminium (Pre Coat)
	Fin Type		Corrugated Fin
	Row × Stage × FPI		2 × 30 × 17
	Size (W × H × L)	mm	38.1 × 762 × 873.8 : 903.8



Item		Unit	
Power Source (Phase, Voltage, Cycle)		ø	Single
		V	230
		Hz	50
Input Power		kW	1.59
Maximum Input Power		kW	4.59
Starting Current		A	7.30
Running Current		A	7.30
Maximum Current		A	21.0
Power Factor		%	95
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-
Thermostat			Electronic Control
Protection Device			Electronic Control

Item		Unit	Indoor
Performance Test Condition			EUROVENT
Operation Range	Outdoor Ambient	°C	-20 ~ 35
	Water Outlet	°C	25 ~ 55
Noise Level		dB (A)	30
		Power Level dB	43
Dimension	Height	mm (inch)	644 (25-11/32)
	Width	mm (inch)	504 (19-27/32)
	Depth	mm (inch)	295 (11-5/8)
Net Weight		kg (lbs)	34 (75)
Refrigerant Pipe Diameter	Liquid	mm (inch)	6.35 (1/4)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	19.05 (3/4)
	Outlet	mm (inch)	19.05 (3/4)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		Capacitor Run Induction Motor (2.5 μF)
	No. of Speed		3
	Input Power	W	100
Hot Water Coil	Type		Brazed Plate
	No. of Plates		48
	Size (W x H x L)	mm	93 x 81 x 325
	Water Flow Rate	l/min (ft3/min)	20.1 (0.71)
Water Filter	Material		Brass (Woven Wire Cloth)
	Inner Diameter	mm	22
Pressure Relief Valve Water Circuit		kPa	Open: 190, Close: 183 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker (40)
Expansion Vessel	Volume	I	10
	MWP	bar	2
Capacity of Integrated Electric Heater		kW	3.00

Note:-

- Heating capacities are based on outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb) with controlled indoor water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

### 2.1.2 – Outdoor Units: WH-SDH097C3E5 WH-UD09CE5

Item		Unit	Outdoor Unit
Performance Test Condition			EUROVENT
Heating Capacity		kW	9.00
		BTU/h	30700
		kJ/h	32400
COP		W/W	4.10
		BTU/hW	14.0
Noise Level		dB (A)	49
		Power Level dB	67
Air Flow		m <sup>3</sup> /min (ft <sup>3</sup> /min)	51.0 (1800)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm <sup>3</sup>	FV50S (900)
Refrigerant (R410A)		kg (oz)	1.45 (51.2)
Dimension	Height	mm (inch)	795 (31-5/16)
	Width	mm (inch)	900 (35-7/16)
	Depth	mm (inch)	320 (12-19/32)
Net Weight		kg (lbs)	66 (146)
Pipe Diameter	Liquid	mm (inch)	6.35 (1/4)
	Gas	mm (inch)	15.88 (5/8)
Standard Length		m (ft)	7 (23.0)
Pipe Length Range		m (ft)	3 (9.8) ~ 30 (98.4)
I/D & O/D Height Difference		m (ft)	20 (65.6)
Additional Gas Amount		g/m (oz/ft)	30 (0.3)
Refrigeration Charge Less		m (ft)	10 (32.8)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	1.70
Fan	Type		Propeller Fan
	Material		PP
	Motor Type		Transistor (8-poles)
	Input Power	W	—
	Output Power	W	60
	Fan Speed	rpm	640
Heat Exchanger	Fin material		Aluminium (Pre Coat)
	Fin Type		Corrugated Fin
	Row × Stage × FPI		2 × 30 × 17
	Size (W × H × L)	mm	38.1 × 762 × 873.8 : 903.8

Item		Unit	
Power Source (Phase, Voltage, Cycle)		ø	Single
		V	230
		Hz	50
Input Power		kW	2.20
Maximum Input Power		kW	5.01
Starting Current		A	10.10
Running Current		A	10.10
Maximum Current		A	22.9
Power Factor		%	95
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-
Thermostat			Electronic Control
Protection Device			Electronic Control

Item		Unit	Indoor Unit
Performance Test Condition			EUROVENT
Operation Range	Outdoor Ambient	°C	-20 ~ 35
	Water Outlet	°C	25 ~ 55
Noise Level		dB (A)	30
		Power Level dB	43
Dimension	Height	mm (inch)	644 (25-11/32)
	Width	mm (inch)	504 (19-27/32)
	Depth	mm (inch)	295 (11-5/8)
Net Weight		kg (lbs)	34 (75)
Refrigerant Pipe Diameter	Liquid	mm (inch)	6.35 (1/4)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	19.05 (3/4)
	Outlet	mm (inch)	19.05 (3/4)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		Capacitor Run Induction Motor (2.5 $\mu$ F)
	No. of Speed		3
	Input Power	W	100
Hot Water Coil	Type		Brazed Plate
	No. of Plates		48
	Size (W x H x L)	mm	93 x 81 x 325
	Water Flow Rate	l/min (ft <sup>3</sup> /min)	25.8 (0.91)
Water Filter	Material		Brass (Woven Wire Cloth)
	Inner Diameter	mm	22
Pressure Relief Valve Water Circuit		kPa	Open: 190, Close: 183 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker (40)
Expansion Vessel	Volume	I	10
	MWP	bar	2
Capacity of Integrated Electric Heater		kW	3.00

Note:-

- Heating capacities are based on outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb) with controlled indoor water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

### 2.1.3 – Outdoor Units: WH-SDH12C3E5 WH-UD12CE5

Item		Unit	Outdoor Unit
Performance Test Condition			EUROVENT
Heating Capacity		kW	12.00
		BTU/h	41000
		kJ/h	43200
COP		W/W	4.67
		BTU/hW	16.0
Noise Level		dB (A)	50
		Power Level dB	67
Air Flow		m <sup>3</sup> /min (ft <sup>3</sup> /min)	80.0 (2830)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm <sup>3</sup>	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.95k (104.1)
Dimension	Height	mm (inch)	1340 (52-3/4)
	Width	mm (inch)	900 (35-7/16)
	Depth	mm (inch)	320 (12-19/32)
Net Weight		kg (lbs)	106 (234)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Standard Length		m (ft)	7 (23.0)
Pipe Length Range		m (ft)	3 (9.8) ~ 40 (131.2)
I/D & O/D Height Difference		m (ft)	30 (98.4)
Additional Gas Amount		g/m (oz/ft)	50 (0.5)
Refrigeration Charge Less		m (ft)	30 (98.4)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	3.00
Fan	Type		Propeller Fan
	Material		PP
	Motor Type		Induction (8-poles)
	Input Power	W	—
	Output Power	W	60
	Fan Speed	rpm	510 (Top Fan) 550 (Bottom Fan)
Heat Exchanger	Fin material		Aluminium (Pre Coat)
	Fin Type		Corrugated Fin
	Row × Stage × FPI		2 × 51 × 18
	Size (W × H × L)	mm	881.5 × 1295.4 × 44

Item		Unit	
Power Source (Phase, Voltage, Cycle)		ø	Single
		V	230
		Hz	50
Input Power		kW	2.57
Maximum Input Power For Heat Pump System		kW	5.30
Maximum Input Power For Internal Heater (Internal Heater + Tank Heater)		kW	6.00 (9.00)
Starting Current		A	11.7
Running Current		A	11.7
Maximum Current For Heat Pump System		A	24.0
Maximum Current For Internal Heater (Internal Heater + Tank Heater)		A	26 (39)
Power Factor		%	96
Power Factor		%	96
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-
Thermostat			Electronic Control
Protection Device			Electronic Control

Item		Unit	Indoor Unit
Performance Test Condition			EUROVENT
Operation Range	Outdoor Ambient	° C	-20 ~ 35
	Water Outlet	° C	25 ~ 55
Internal Pressure Differential		Pa	17000
Noise Level		dB (A)	30
		Power Level dB	43
Dimension	Height	mm (inch)	892 (35-1/8)
	Width	mm (inch)	502 (19-3/4)
	Depth	mm (inch)	353 (13-29/32)
Net Weight		kg (lbs)	50 (110)
Refrigerant Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	28 (1-3/32)
	Outlet	mm (inch)	28 (1-3/32)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		Capacitor Run Induction Motor (5 µF)
	No. of Speed		3
	Input Power	W	190
Hot Water Coil	Type		Brazed Plate
	No. of Plates		100
	Size (H x W x L)	mm	160 x 93 x 325
	Water Flow Rate	l/min (m3/h)	34.4 (2.1)
Pressure Relief Valve Water Circuit		kPa	Open: 190, Close: 183 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker (40)
Expansion Vessel	Volum e	I	10
	MWP	bar	1
Capacity of Integrated Electric Heater		kW	6.00

Note:-

- Heating capacities are based on outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb) with controlled indoor water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.



## 2.1.4 – Outdoor Units: WH-SDH0147C3E5 WH-UD149CE5

Item		Unit	Outdoor Unit
Performance Test Condition			EUROVENT
Heating Capacity		kW	14.00
		BTU/h	47800
		kJ/h	50400
COP		W/W	4.50
		BTU/hW	15.4
Noise Level		dB (A)	51
		Power Level dB	68
Air Flow		m <sup>3</sup> /min (ft <sup>3</sup> /min)	84.0 (2970)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm <sup>3</sup>	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.95k (104.1)
Dimension	Height	mm (inch)	1340 (52-3/4)
	Width	mm (inch)	900 (35-7/16)
	Depth	mm (inch)	320 (12-19/32)
Net Weight		kg (lbs)	106 (234)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Standard Length		m (ft)	7 (23.0)
Pipe Length Range		m (ft)	3 (9.8) ~ 40 (131.2)
I/D & O/D Height Difference		m (ft)	30 (98.4)
Additional Gas Amount		g/m (oz/ft)	50 (0.5)
Refrigeration Charge Less		m (ft)	30 (98.4)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	3.00
Fan	Type		Propeller Fan
	Material		PP
	Motor Type		Induction (8-poles)
	Input Power	W	—
	Output Power	W	60
	Fan Speed	rpm	540 (Top Fan) 580 (Bottom Fan)
Heat Exchanger	Fin material		Aluminium (Pre Coat)
	Fin Type		Corrugated Fin
	Row × Stage × FPI		2 × 51 × 18
	Size (W × H × L)	mm	881.5 × 1295.4 × 44

Item		Unit	
Power Source (Phase, Voltage, Cycle)		Ø	Single
		V	230
		Hz	50
Input Power		kW	3.11
Maximum Input Power For Heat Pump System		kW	5.52
Maximum Input Power For Internal Heater (Internal Heater + Tank Heater)		kW	6.00 (9.00)
Starting Current		A	14.1
Running Current		A	14.1
Maximum Current For Heat Pump System		A	25.0
Maximum Current For Internal Heater (Internal Heater + Tank Heater)		A	26 (39)
Power Factor		%	96
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-
Thermostat			Electronic Control
Protection Device			Electronic Control

Item		Unit	Indoor Unit
Performance Test Condition			EUROVENT
Operation Range	Outdoor Ambient	° C	-20 ~ 35
	Water Outlet	° C	25 ~ 55
Internal Pressure Differential		Pa	21000
Noise Level		dB (A)	30
		Power Level dB	43
Dimension	Height	mm (inch)	892 (35-1/8)
	Width	mm (inch)	502 (19-3/4)
	Depth	mm (inch)	353 (13-29/32)
Net Weight		kg (lbs)	50 (110)
Refrigerant Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	28 (1-3/32)
	Outlet	mm (inch)	28 (1-3/32)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		Capacitor Run Induction Motor (5 µF)
	No. of Speed		3
	Input Power	W	190
Hot Water Coil	Type		Brazed Plate
	No. of Plates		100
	Size (H x W x L)	mm	160 x 93 x 325
	Water Flow Rate	l/min (m3/h)	40.1 (2.4)
Pressure Relief Valve Water Circuit		kPa	Open: 190, Close: 183 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker (40)
Expansion Vessel	Volum e	I	10
	MWP	bar	1
Capacity of Integrated Electric Heater		kW	6.00

Note:-

- Heating capacities are based on outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb) with controlled indoor water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

### 2.1.5 – Outdoor Units: WH-SDH167C3E5 WH-UD16CE5

Item		Unit	Outdoor Unit
Performance Test Condition			EUROVENT
Heating Capacity		kW	16.00
		BTU/h	54600
		kJ/h	57600
COP		W/W	4.23
		BTU/hW	14.4
Noise Level		dB (A)	53
		Power Level dB	70
Air Flow		m <sup>3</sup> /min (ft <sup>3</sup> /min)	90.0 (3180)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm <sup>3</sup>	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.95k (104.1)
Dimension	Height	mm (inch)	1340 (52-3/4)
	Width	mm (inch)	900 (35-7/16)
	Depth	mm (inch)	320 (12-19/32)
Net Weight		kg (lbs)	106 (234)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Standard Length		m (ft)	7 (23.0)
Pipe Length Range		m (ft)	3 (9.8) ~ 40 (131.2)
I/D & O/D Height Difference		m (ft)	30 (98.4)
Additional Gas Amount		g/m (oz/ft)	50 (0.5)
Refrigeration Charge Less		m (ft)	30 (98.4)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	3.00
Fan	Type		Propeller Fan
	Material		PP
	Motor Type		Induction (8-poles)
	Input Power	W	—
	Output Power	W	60
	Fan Speed	rpm	580 (Top Fan) 620 (Bottom Fan)
Heat Exchanger	Fin material		Aluminium (Pre Coat)
	Fin Type		Corrugated Fin
	Row × Stage × FPI		2 × 51 × 18
	Size (W × H × L)	mm	881.5 × 1295.4 × 44

Item		Unit	
Power Source (Phase, Voltage, Cycle)		Ø	Single
		V	230
		Hz	50
Input Power		kW	3.78
Maximum Input Power For Heat Pump System		kW	5.74
Maximum Input Power For Internal Heater (Internal Heater + Tank Heater)		kW	6.00 (9.00)
Starting Current		A	17.1
Running Current		A	17.1
Maximum Current For Heat Pump System		A	26.0
Maximum Current For Internal Heater (Internal Heater + Tank Heater)		A	26 (39)
Power Factor		%	96
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-
Thermostat			Electronic Control
Protection Device			Electronic Control

Item		Unit	Indoor Unit
Performance Test Condition			EUROVENT
Operation Range	Outdoor Ambient	° C	-20 ~ 35
	Water Outlet	° C	25 ~ 55
Internal Pressure Differential		Pa	27000
Noise Level		dB (A)	30
		Power Level dB	43
Dimension	Height	mm (inch)	892 (35-1/8)
	Width	mm (inch)	502 (19-3/4)
	Depth	mm (inch)	353 (13-29/32)
Net Weight		kg (lbs)	50 (110)
Refrigerant Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	28 (1-3/32)
	Outlet	mm (inch)	28 (1-3/32)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		Capacitor Run Induction Motor (5 µF)
	No. of Speed		3
	Input Power	W	190
Hot Water Coil	Type		Brazed Plate
	No. of Plates		100
	Size (H x W x L)	mm	160 x 93 x 325
	Water Flow Rate	l/min (m3/h)	45.9 (2.8)
Pressure Relief Valve Water Circuit		kPa	Open: 190, Close: 183 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker (40)
Expansion Vessel	Volum e	I	10
	MWP	bar	1
Capacity of Integrated Electric Heater		kW	6.00

Note:-

- Heating capacities are based on outdoor air temperature of 7°C Dry Bulb (44.6°F Dry Bulb), 6°C Wet Bulb (42.8°F Wet Bulb) with controlled indoor water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

## 2.1.6 – Outdoor Units: WH-SDH167C3E5 WH-UD16CE5

Model			WH-TD20B3E5	WH-TD30B3E5
Power Supply		Phase, Hz	Single, 50	
		V	230	
Electric Element	Connection	inch	Stainless Steel 5/4 (CW602N brass quality)	
	Material		Incoloy 825	
	Capacity	kW	3	
		Btu/h	10243	
		kJ/h	10800	
Pressure vessel	Material		Stainless Steel F18MT / AISI 444 / DIN 1.4521	
	Volume	L	198	287
Thermostat	Type		1st stage 88 (Cancel by remote control, 2nd stage (Manual cancel)	
	Safety cut off	°C	98	
Thermistor	Set Temperature	°C	40~75	
Heating coil	Material		Stainless Steel LDX 2101 / DIN 1.4162 (Lean Duplex)	
	Diameter / Thickness	mm	Ø 22 / 0.8	
	Surface area	m <sup>2</sup>	0.8	
Insulation	Material		ECO Foam - PUR	
	Thickness	mm	40	
	Heat loss		Approx. 2.1 / 24hours	
Insulation Jacket	Material		Epoxy-coated steel - 90 gloss - white	
Dimension	Diameter	mm	580	580
	Height	mm	1150	1600
Weight	Net	kg	45	59
Connection	Cold water inlet	inch	3/4 (inside baffle plate)	
	Hot water outlet	inch	3/4 (CW602N brass quality)	
	Drain	inch	3/4 (same connection as cold water inlet)	
	Flow & return	inch	2 x 3/4	
	Sensor pocket	inch	2 x 1/2	
	Anode	inch	3/4 (CW602N brass quality in connection)	
Design data	Design pressure	bar	10	
	Design temperature	°C	99	

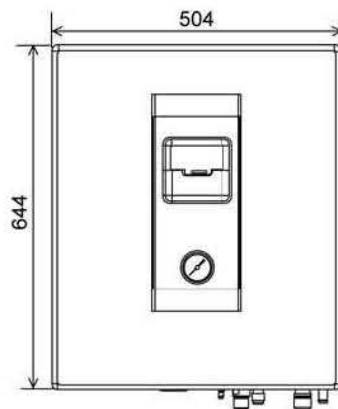
## 2.2 – Dimensions

### 2.2.1 – Indoor unit dimensions : WH-SDH07C3E5 and WH-SDH09CE5

<Top View>



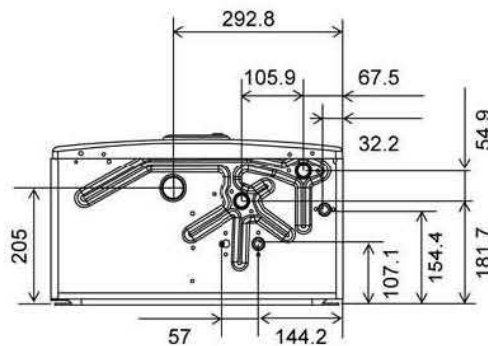
<Front View>



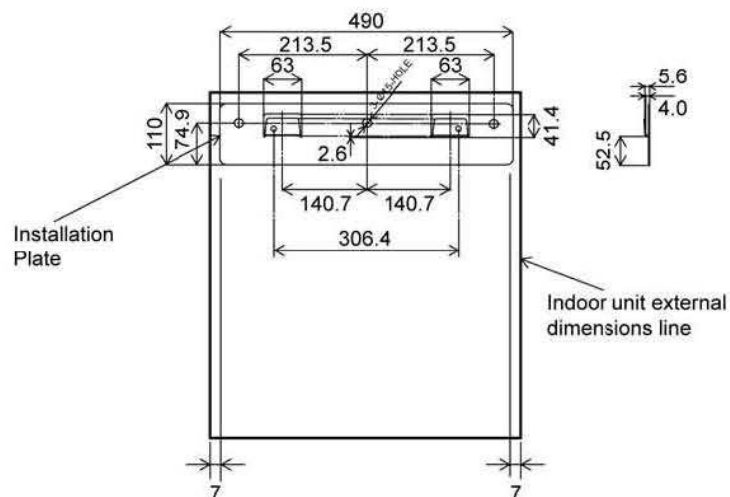
<Side View>



<Bottom View>



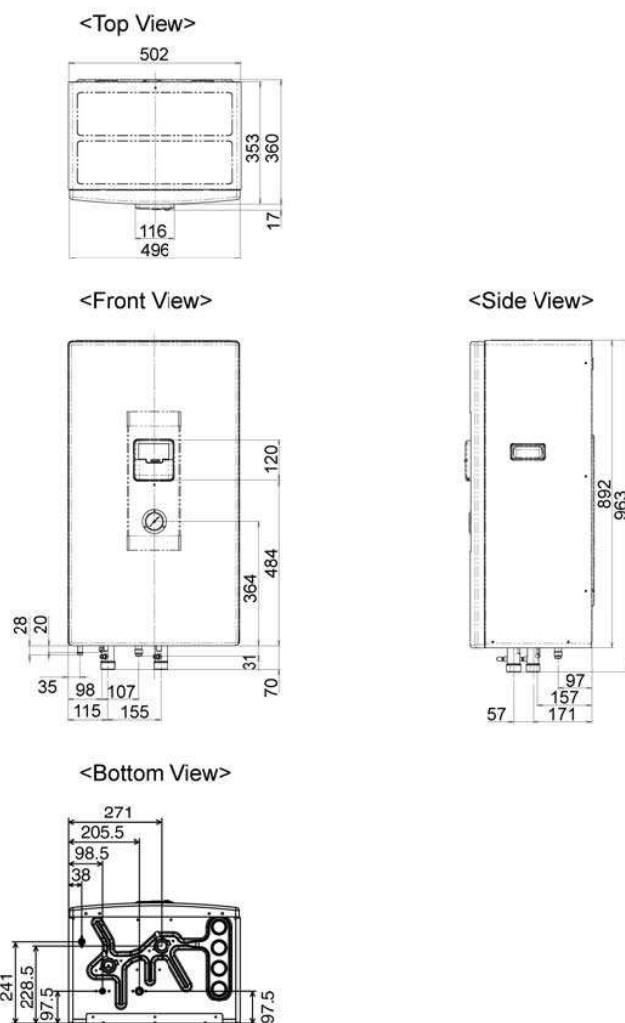
Relative position between the indoor unit and the installation plate <Front View>



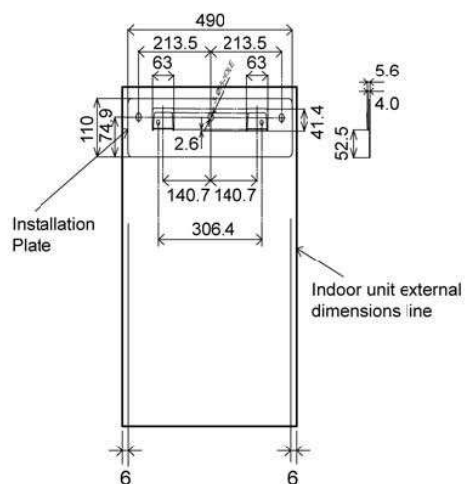
Unit: mm



## 2.2.2 – Indoor unit dimensions : WH-SDH12C3E5, WH-SDH14CE5 nd WH-SDH14CE5

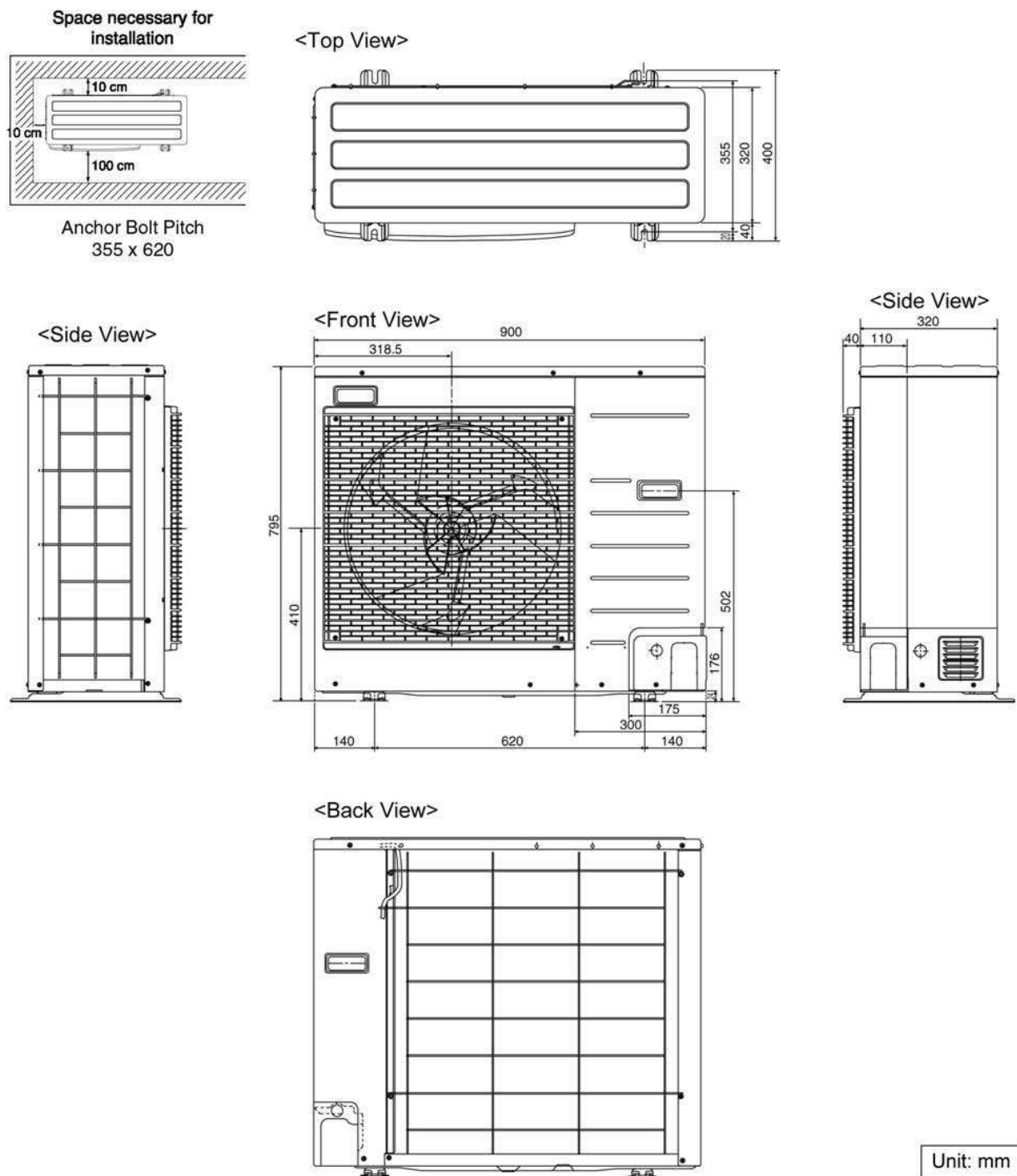


Relative position between the indoor unit and the installation plate <Front View>

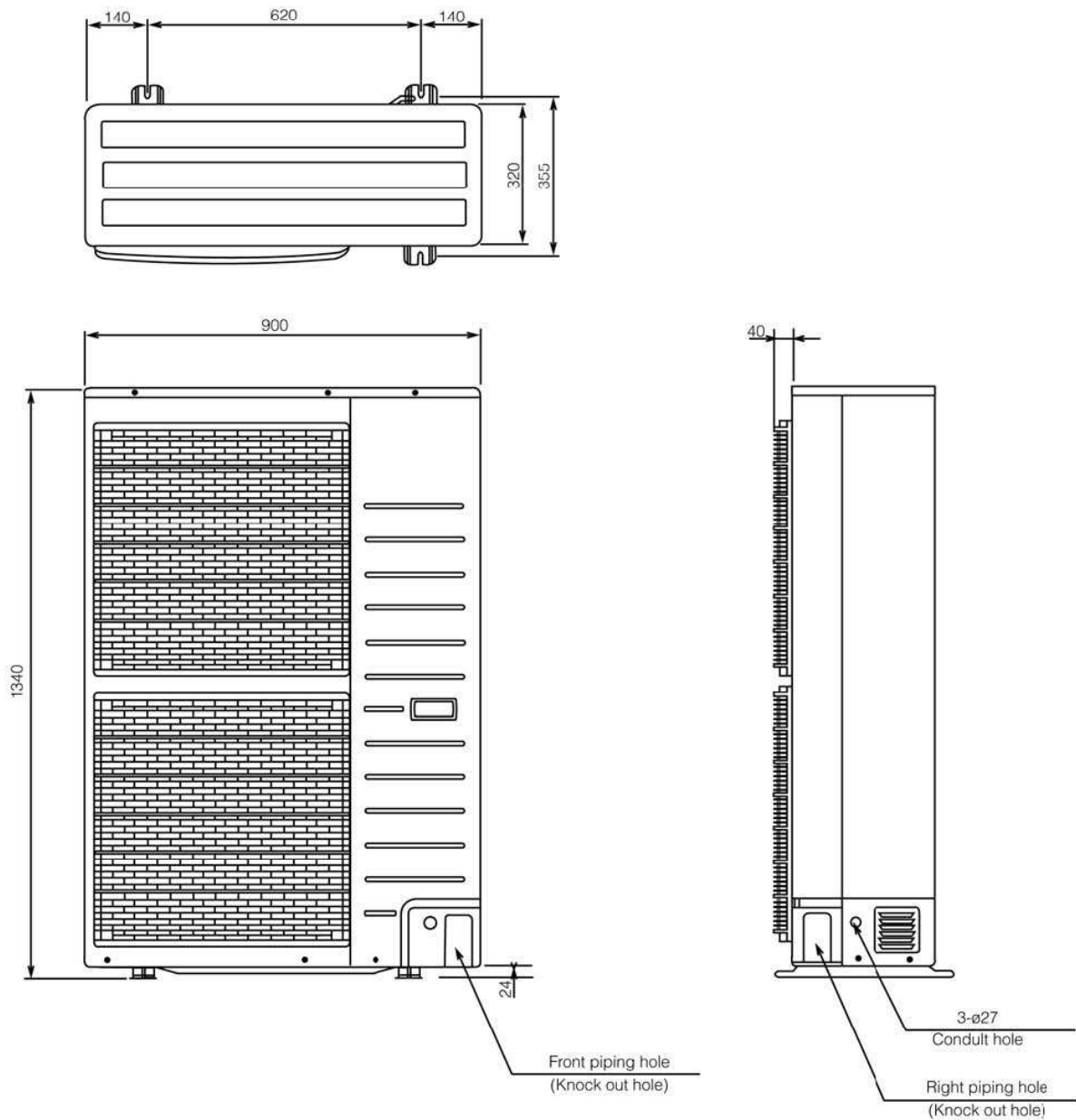


Unit: mm

### 2.2.3 – Outdoor unit dimensions : WH-UD07CE5 and WH-UD097CE5

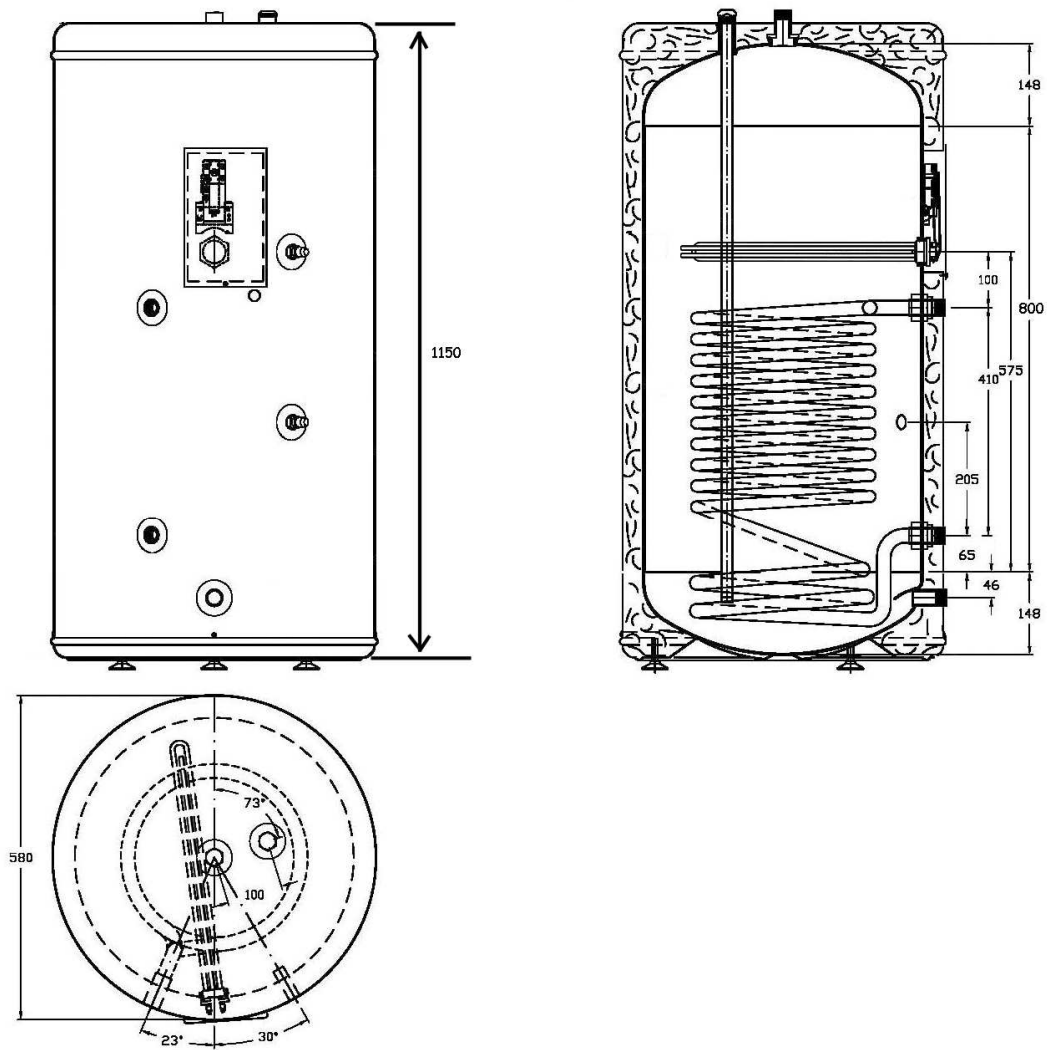


## 2.2.4 – Outdoor unit dimensions : WH-UD12CE5, WH-UD14CE5 and WH-UD014CE5

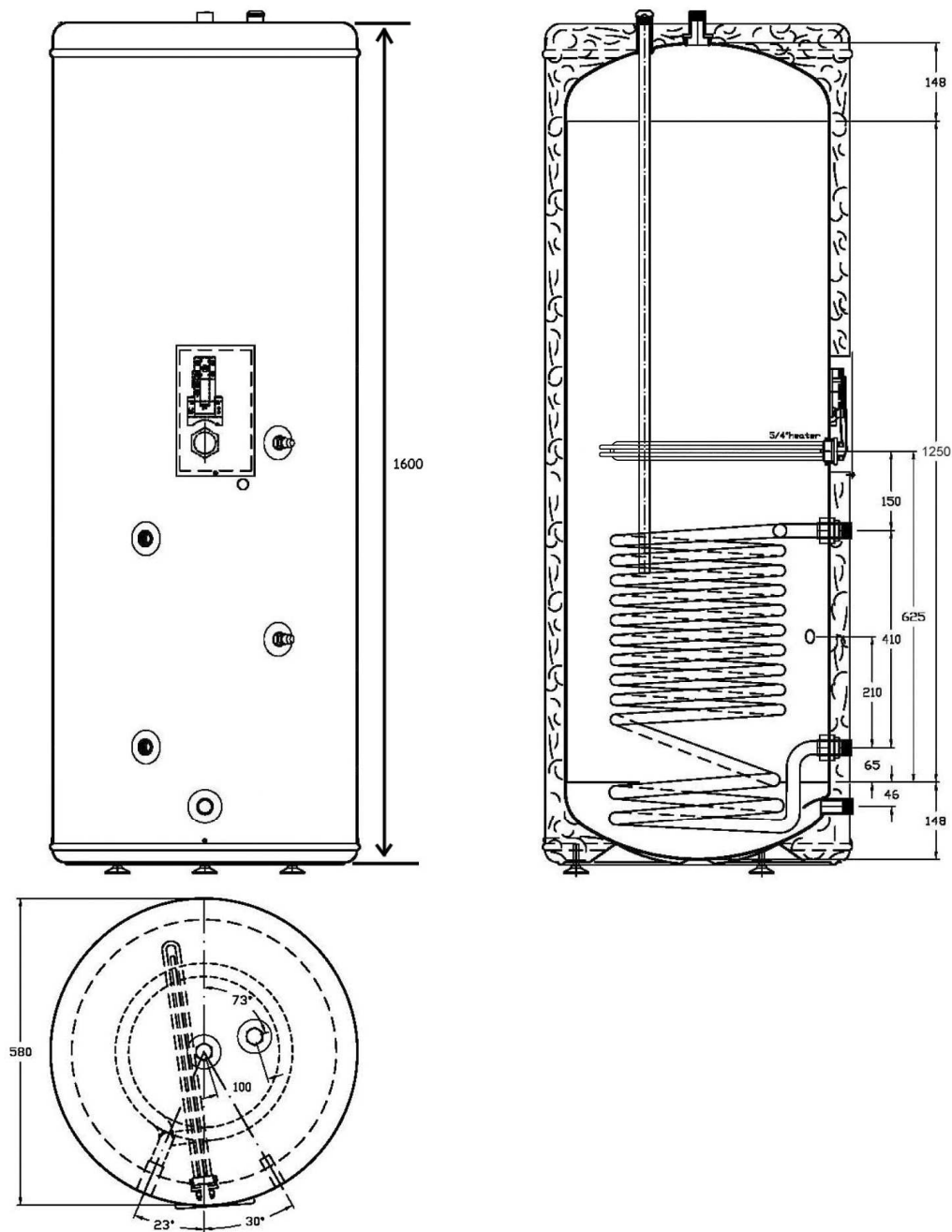


Unit : mm

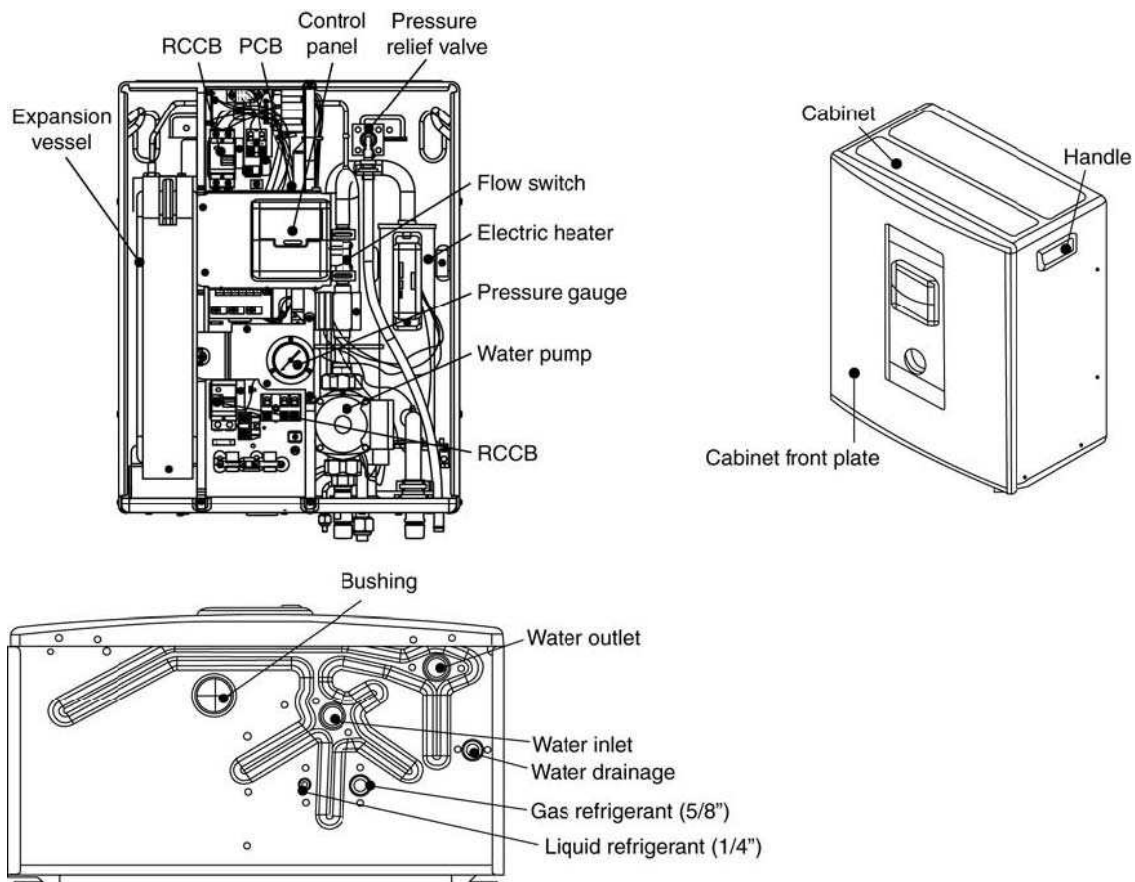
### 2.2.5 – Water unit dimesion : WH-TD20B3E5



## 2.2.6 – Water unit dimesion : WH-TD30B3E5

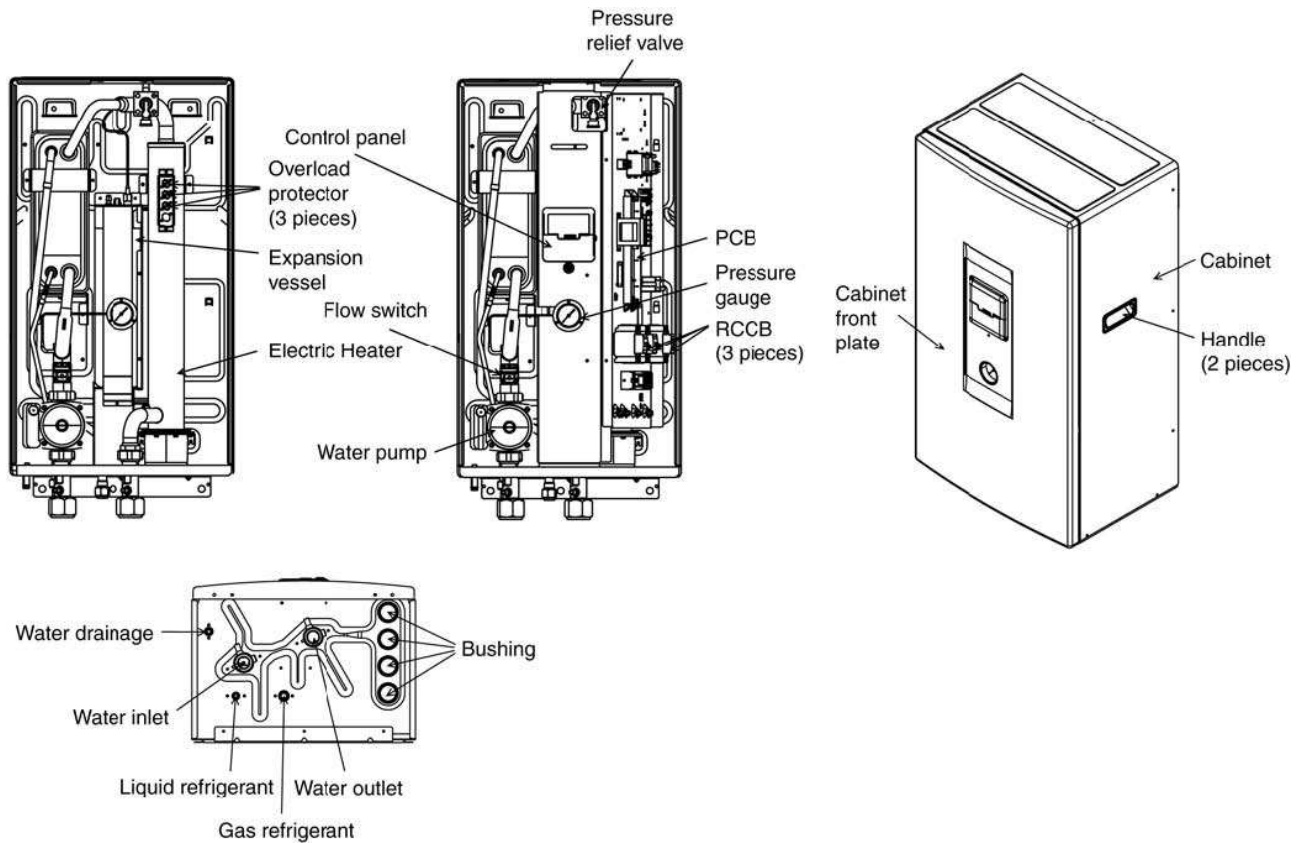


## 2.2.7 – Indoor internal structure : WH-SDH07C3E5 WH-UD07CE5



Water pump:	The pump circulates the water in the water circuit.
Pressure gauge:	The manometer allows read out of the water pressure in the water circuit.
Flow switch:	The flow switch checks the flow in the water circuit and protects the heat exchanger against high pressure built-up and the pump against damage.
Pressure relief valve:	The pressure relief valve prevents excessive water pressure in the water circuit (> 190kPa).
Control panel:	The user interface allows the installer and user to setup, use and maintain the unit.
Electric Heater:	Additional heating capacity to the system when water and ambient temp is low.
Expansion Vessel:	Storage for excessive water.

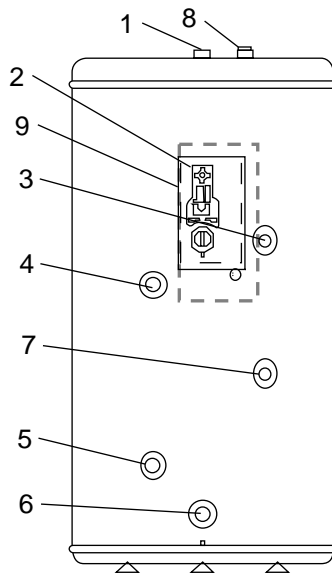
## 2.2.8 – Indoor internal : WH-SDH12C3E5, WH-SDH14CE5 nd WH-SDH14CE5



Water pump:	The pump circulates the water in the water circuit.
Pressure gauge:	The manometer allows read out of the water pressure in the water circuit.
Flow switch:	The flow switch checks the flow in the water circuit and protects the heat exchanger against high pressure built-up and the pump against damage.
Pressure relief valve:	The pressure relief valve prevents excessive water pressure in the water circuit (> 190kPa).
Control panel:	The user interface allows the installer and user to setup, use and maintain the unit.
Electric Heater:	Additional heating capacity to the system when water and ambient temp is low.
Expansion Vessel:	Storage for excessive water.

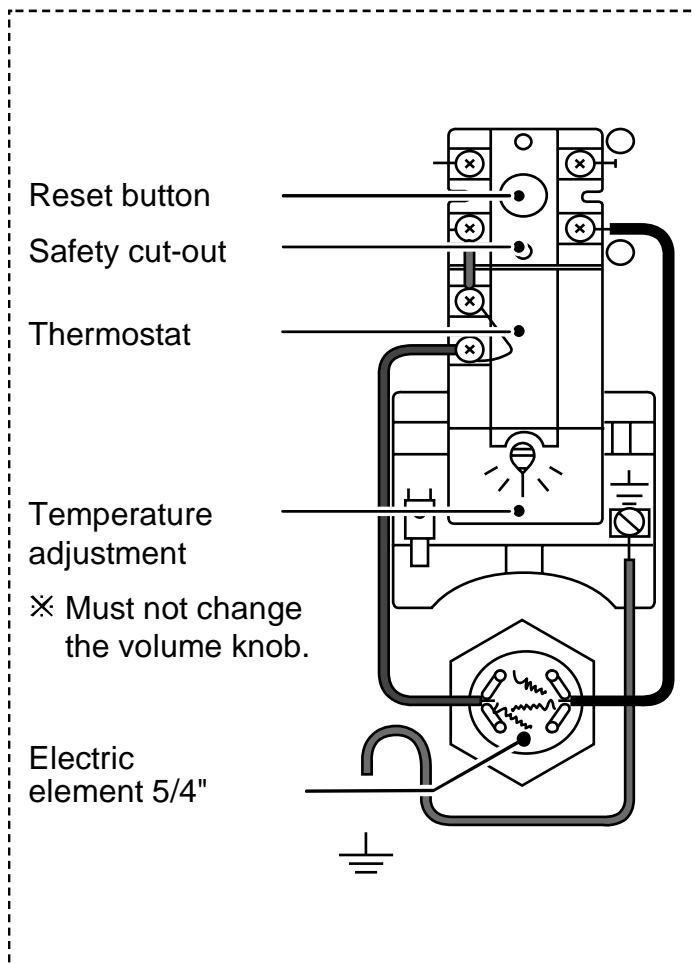


## 2.2.9 – Water tank structure



### Main components

1. Hot water outlet (3/4" BSP)
2. Electrical box
3. Sensor pocket (1/2" BSP)
4. Flow inlet (3/4" BSP)
5. Return outlet (3/4" BSP)
6. Cold water inlet (3/4" BSP)
7. Threaded Sensor hole for solar station connection (1/2" BSP)
8. Anode connector (3/4" BSP)

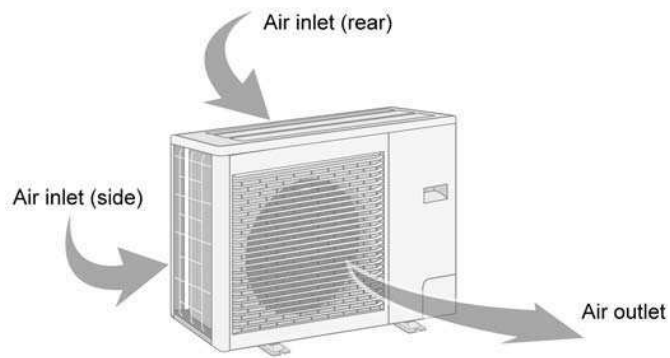


### Accessory parts

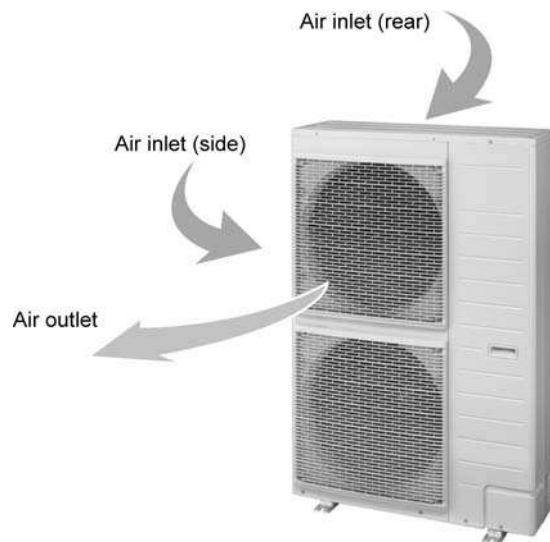
- A. 3-way valve
- B. Sensor
- C. Installation manual
- D. Safety valve
- E. Adjustable legs X 3
- F. Anode bar



**2.2.10 – Outdoor unit air circulation : WH-UD12CE5, WH-UD14CE5 and WH-UD014CE5**

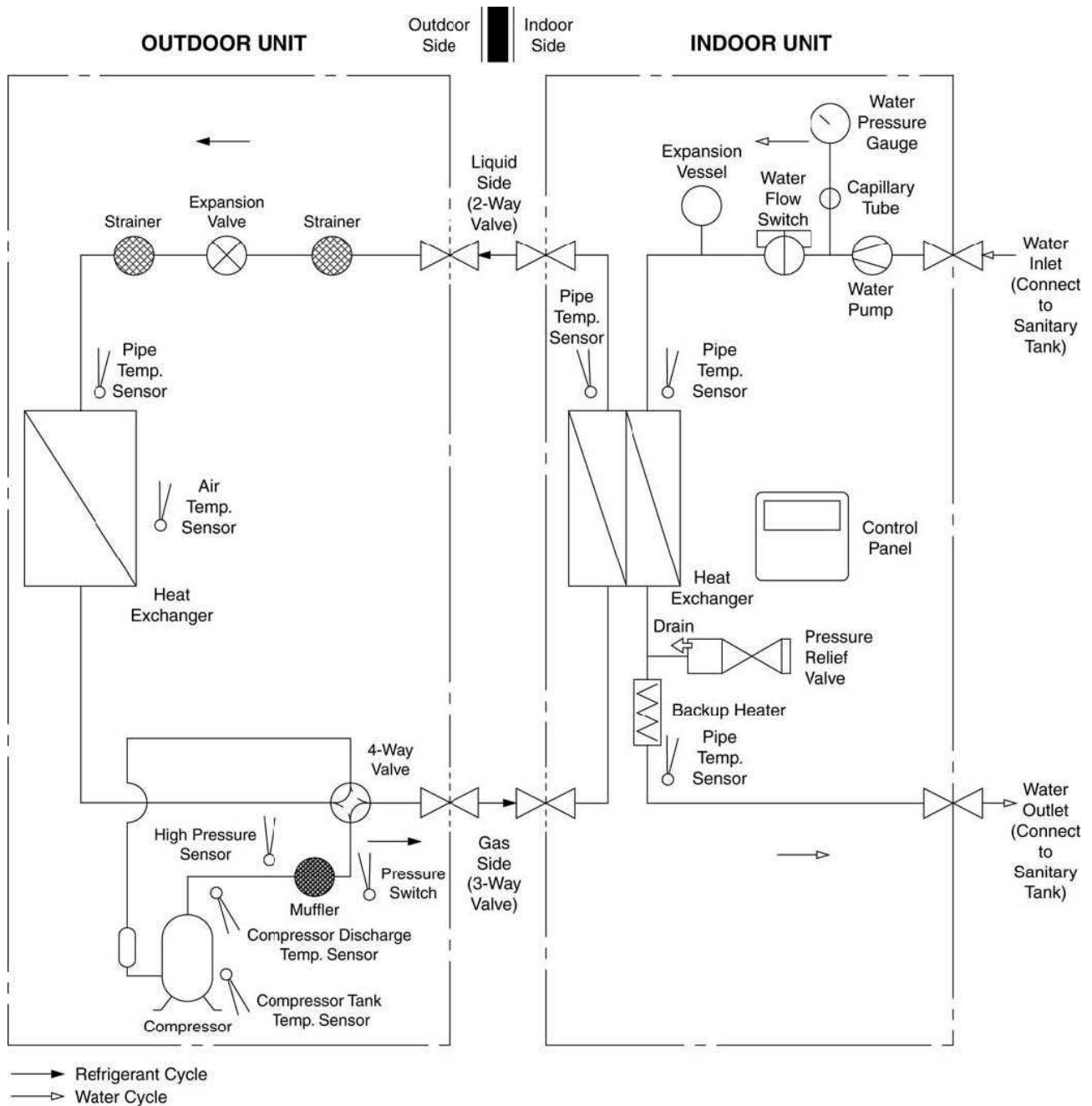


**2.2.11 – Outdoor unit air circulation : WH-UD12CE5, WH-UD14CE5 and WH-UD014CE5**



## 2.3 – Refrigeration Cycle Diagram

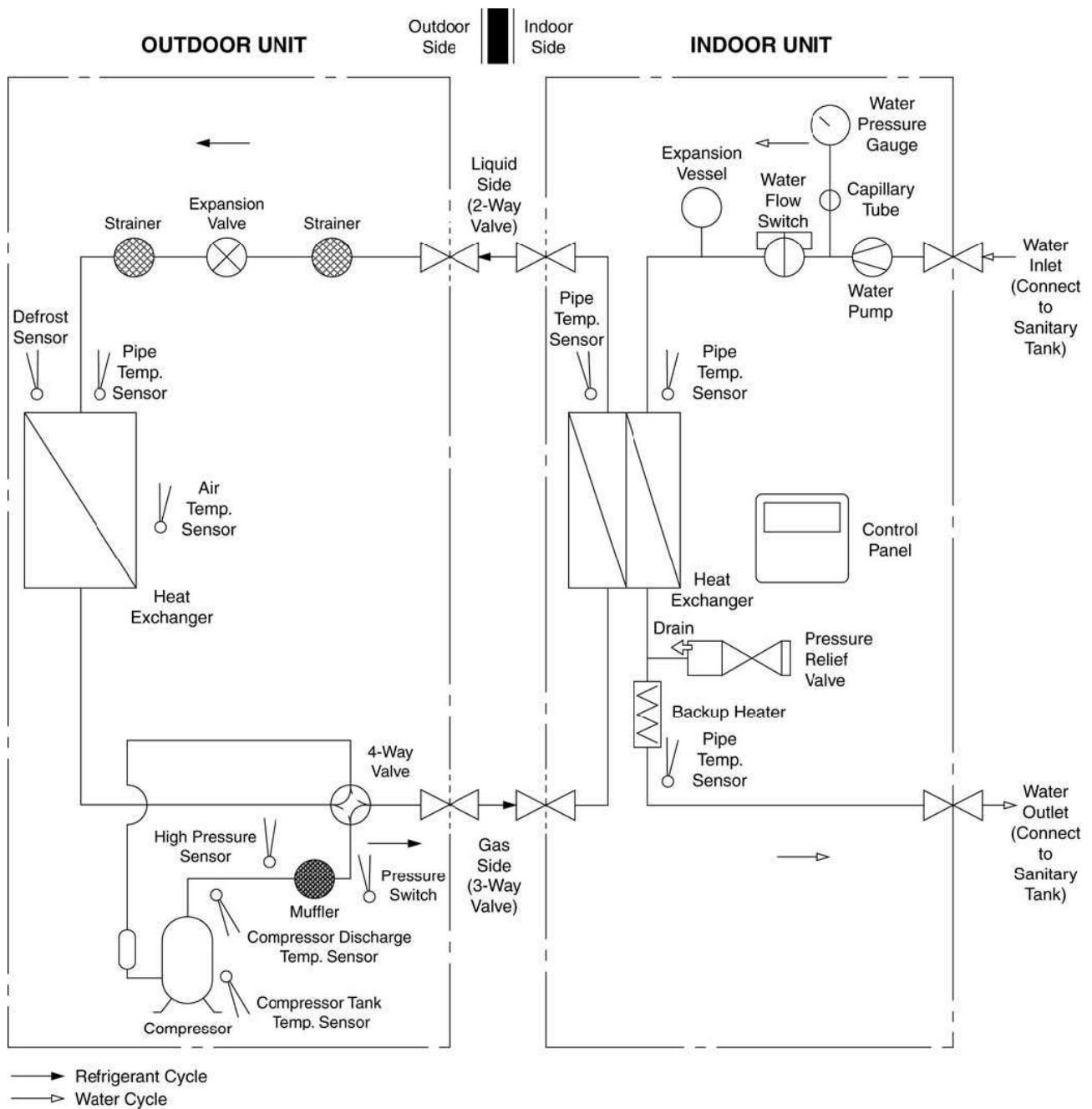
### 2.3.1 – WH-SDH07C3E5 and WH-SDH09CE5



Model	Piping size		Rated Length (m)	Common Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid						
UD07CE5	5/8"	1/4"	7	10	20	3	30	30
UD09CE5	5/8"	1/4"	7	10	20	3	30	30

\* If piping length is over common length, additional refrigerant should be added as shown in the table.

### 2.3.2 – WH-SDH12C3E5 WH-SDH14C3E5 and WH-SDH16CE5

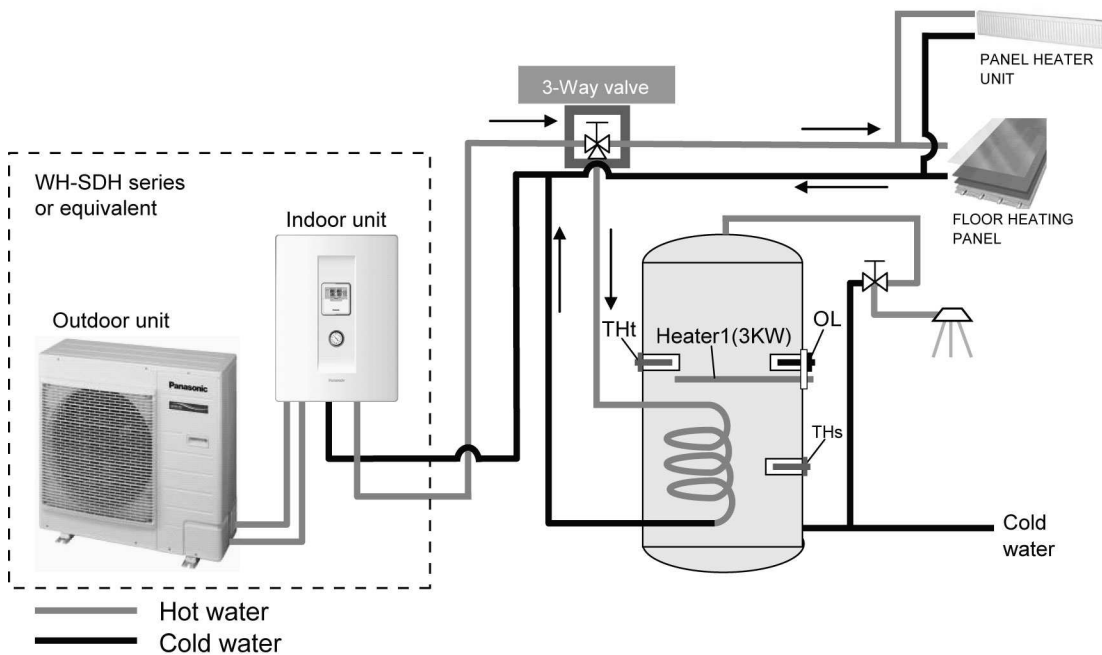


Model	Piping size		Rated Length (m)	Common Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid						
UD12CE5	5/8"	3/8"	7	30	30	3	40	50
UD14CE5	5/8"	3/8"	7	30	30	3	40	50
UD16CE5	5/8"	3/8"	7	30	30	3	40	50

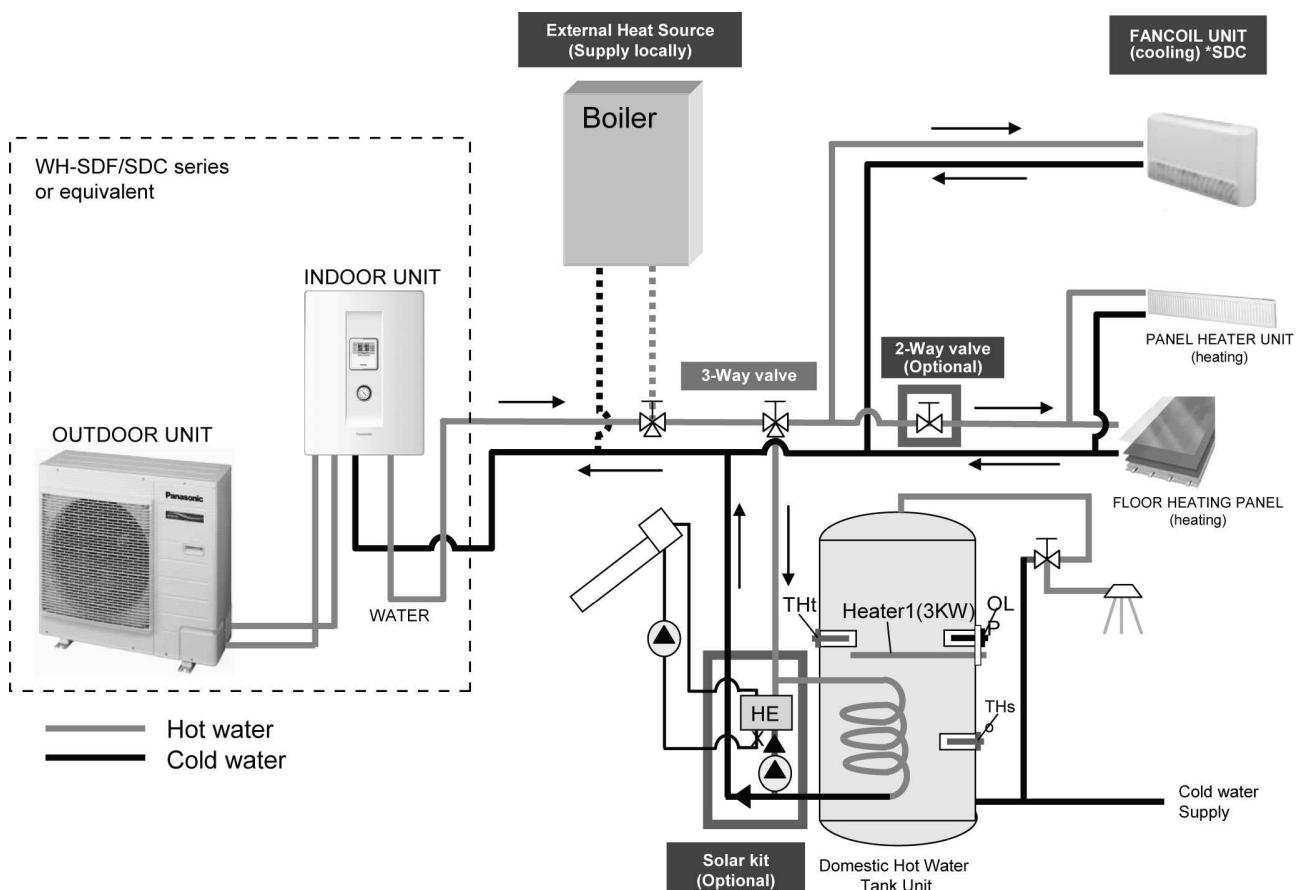
\* If piping length is over common length, additional refrigerant should be added as shown in the table.

## 2.4 – Water Cycle Connection

### 2.4.1 – Connection for WH-SDH series or equivalent

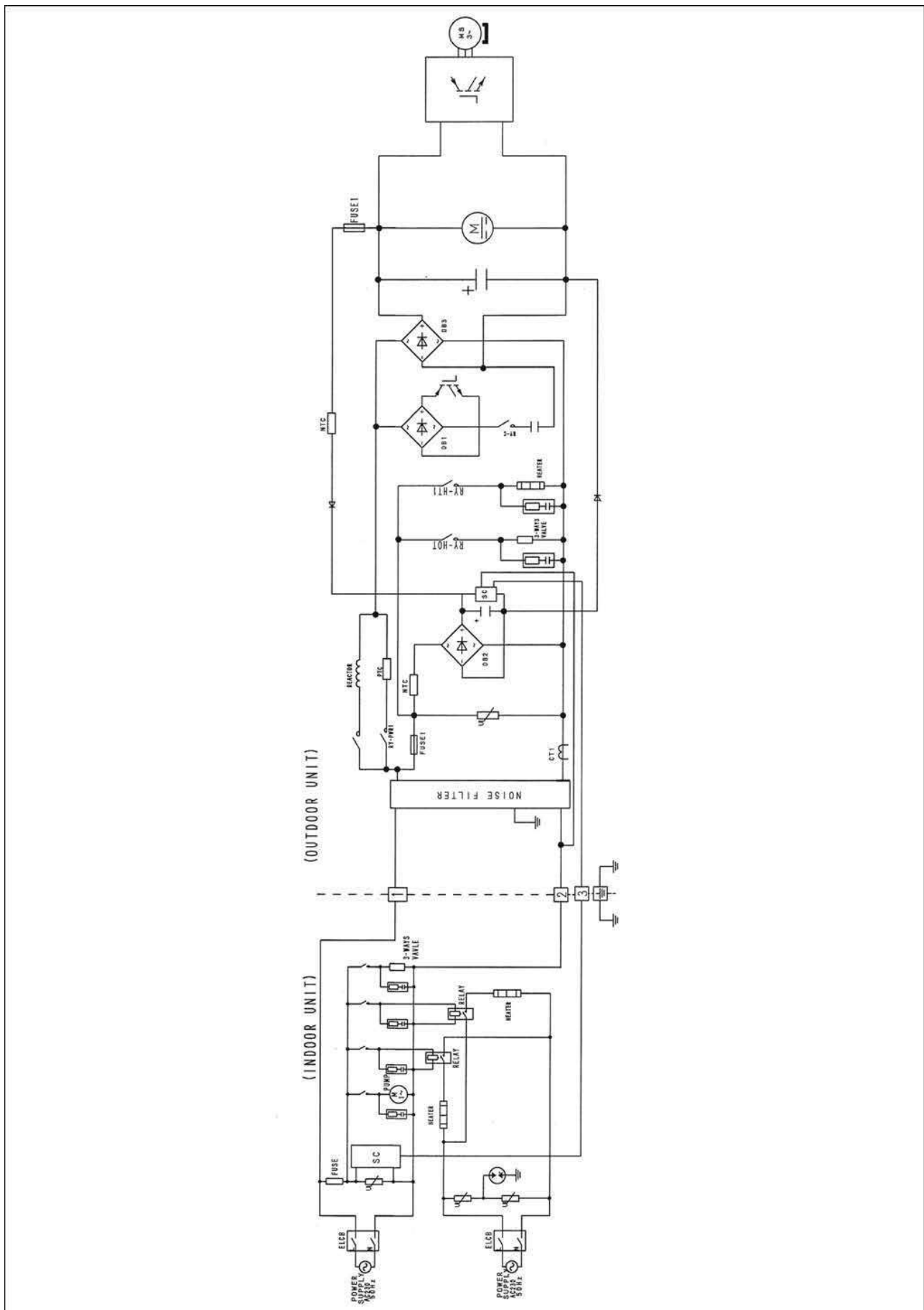


### 2.4.2 – Connection for Connection for WH-SDF / SDC series or equivalent

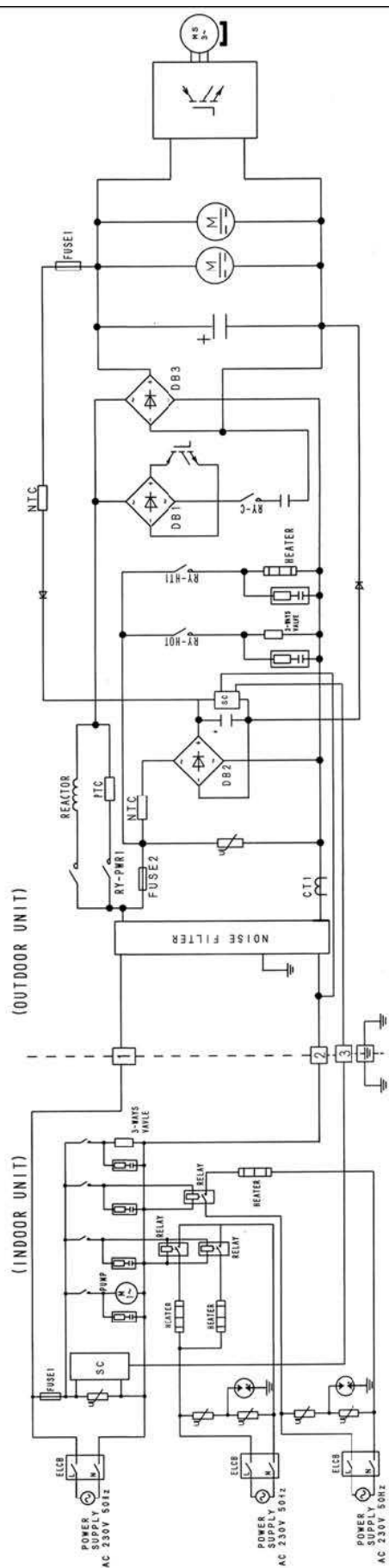


## 2.5 – Block diagram

### 2.5.1 – WH-SDH07C3E5 and WH-SDH09CE5



### 2.5.2 – WH-SDH12C3E5 WH-SDH14C3E5 and WH-SDH16CE5

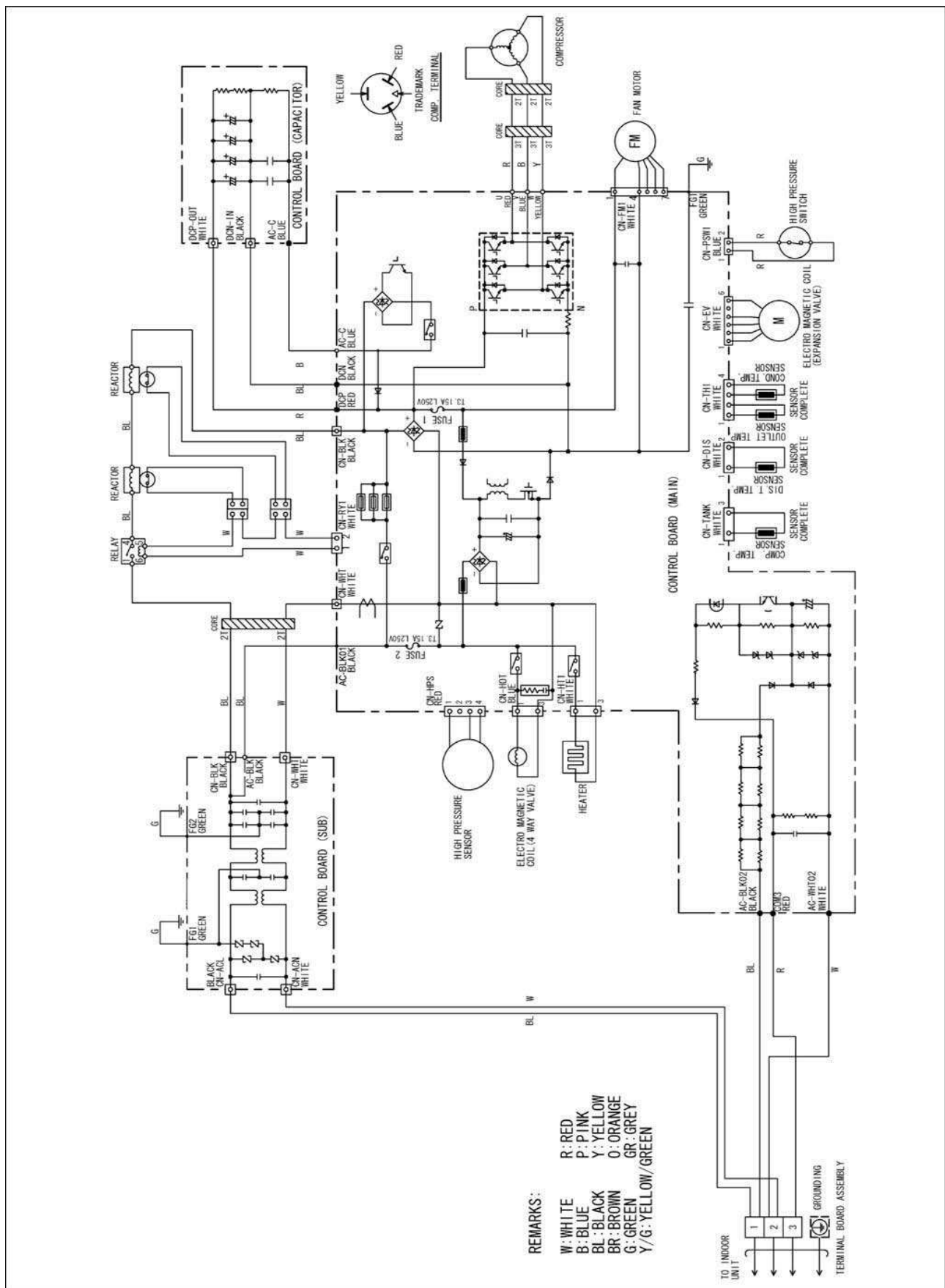


### 2.6.1 – Indoor : WH-SDH07C3E5 and WH-SDH09CE5



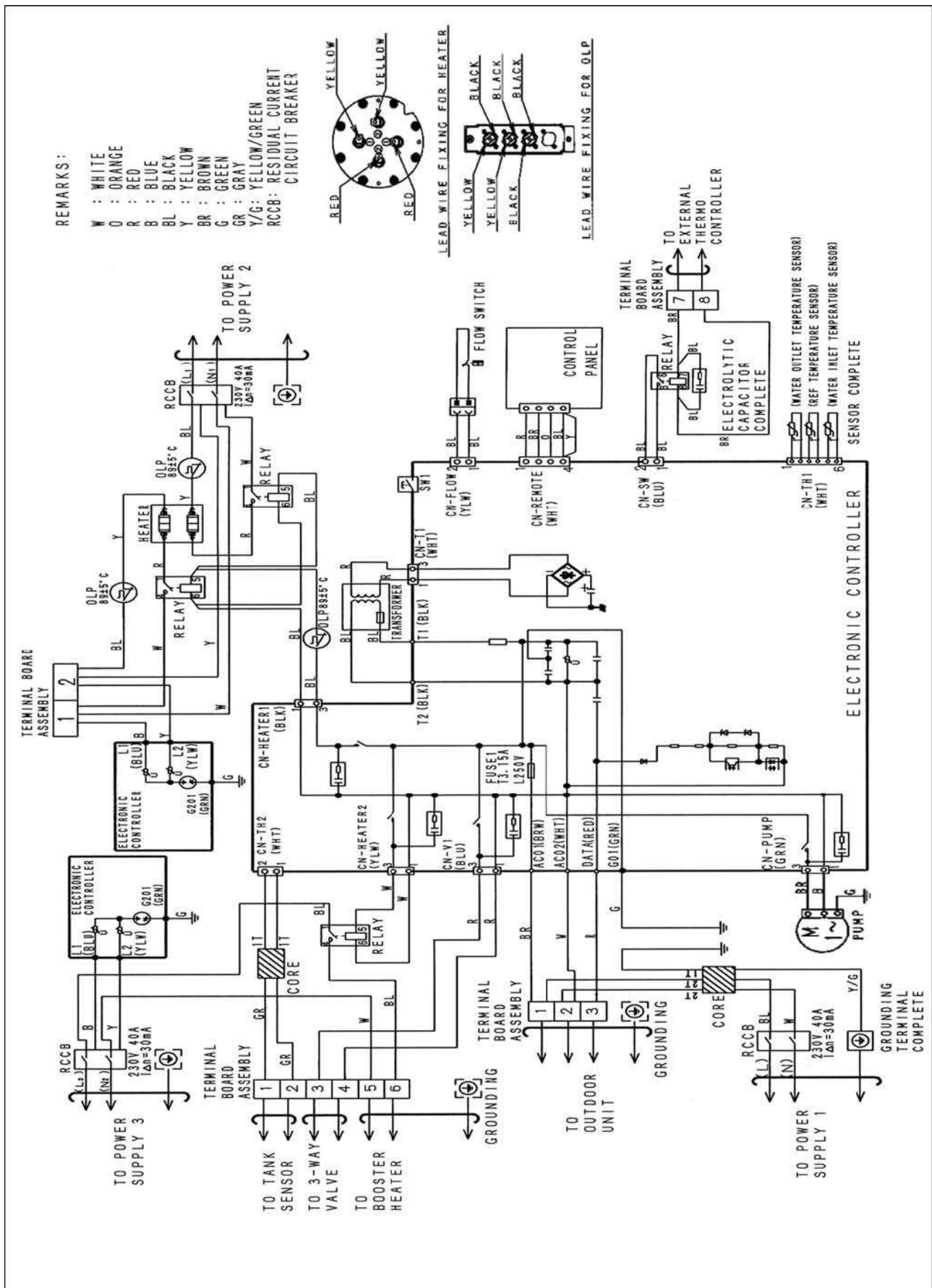


## 2.6.2 – Outdoor : WH-UD07CE5 and WH-UD097CE5

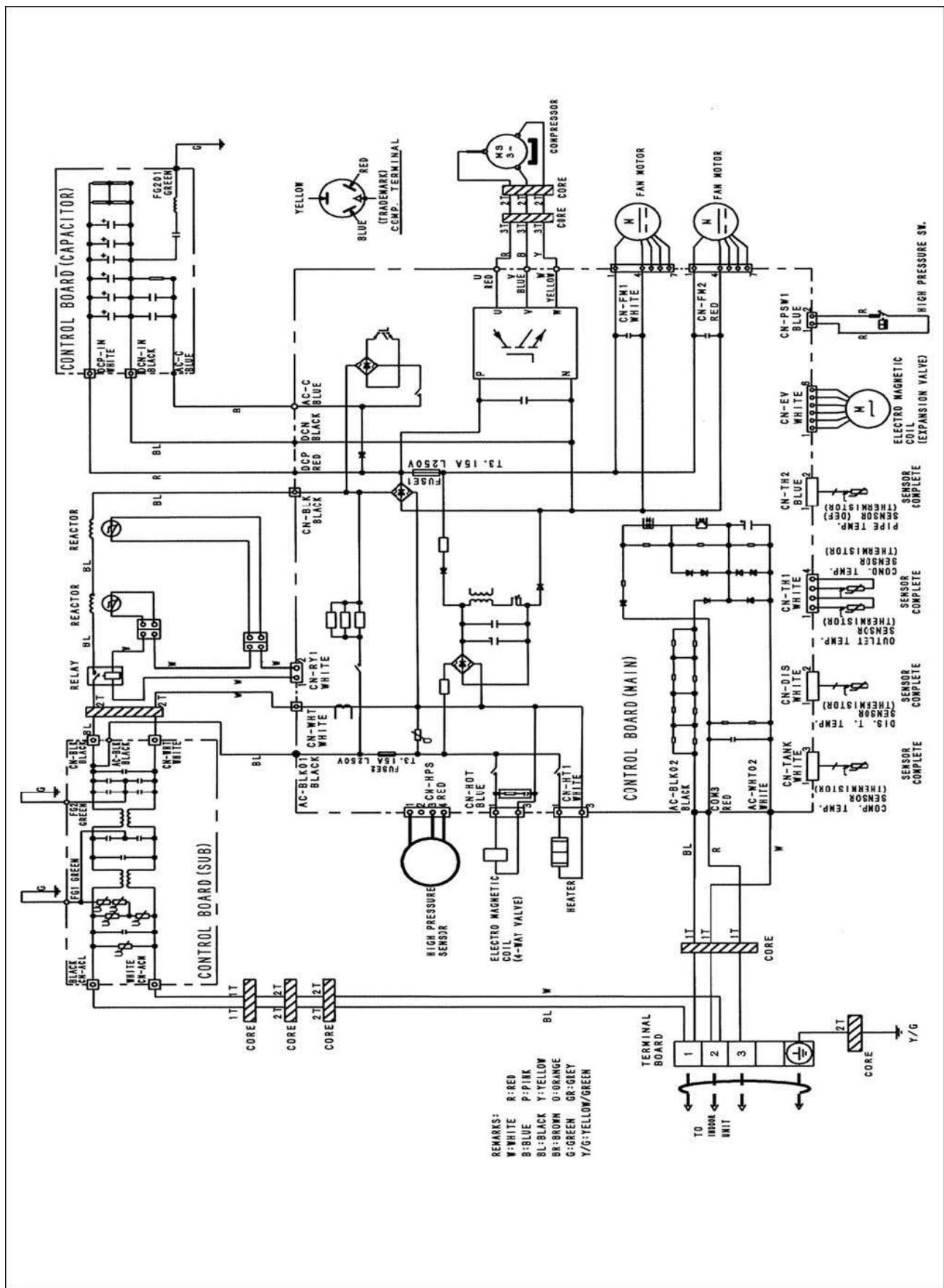




### 2.6.3 – Indoor : WH-SDH12C3E5 WH-SDH14C3E5 and WH-SDH16CE5

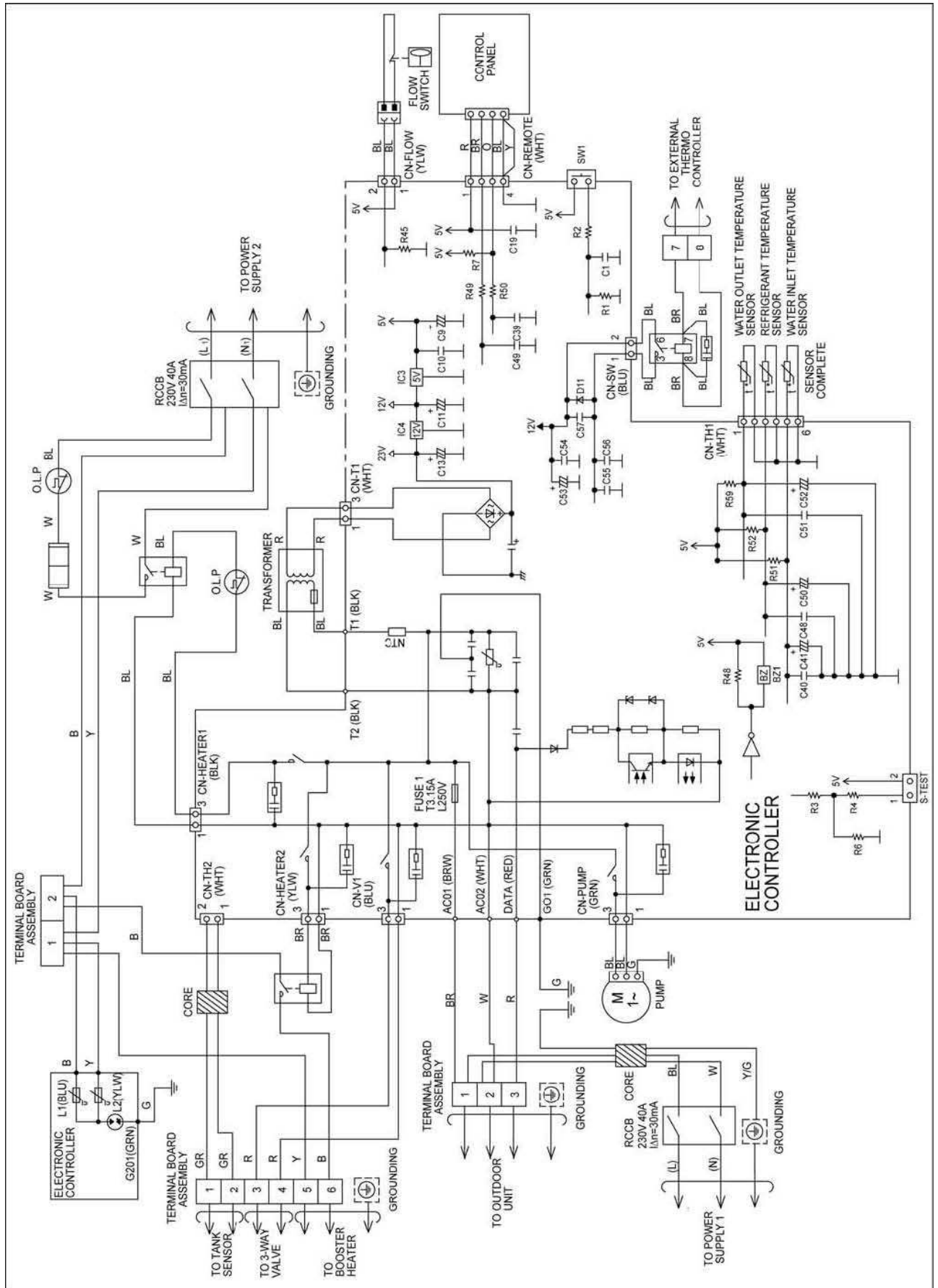


## 2.6.4 – Outdoor : WH-UD12CE5, WH-UD14CE5 and WH-UD014CE5

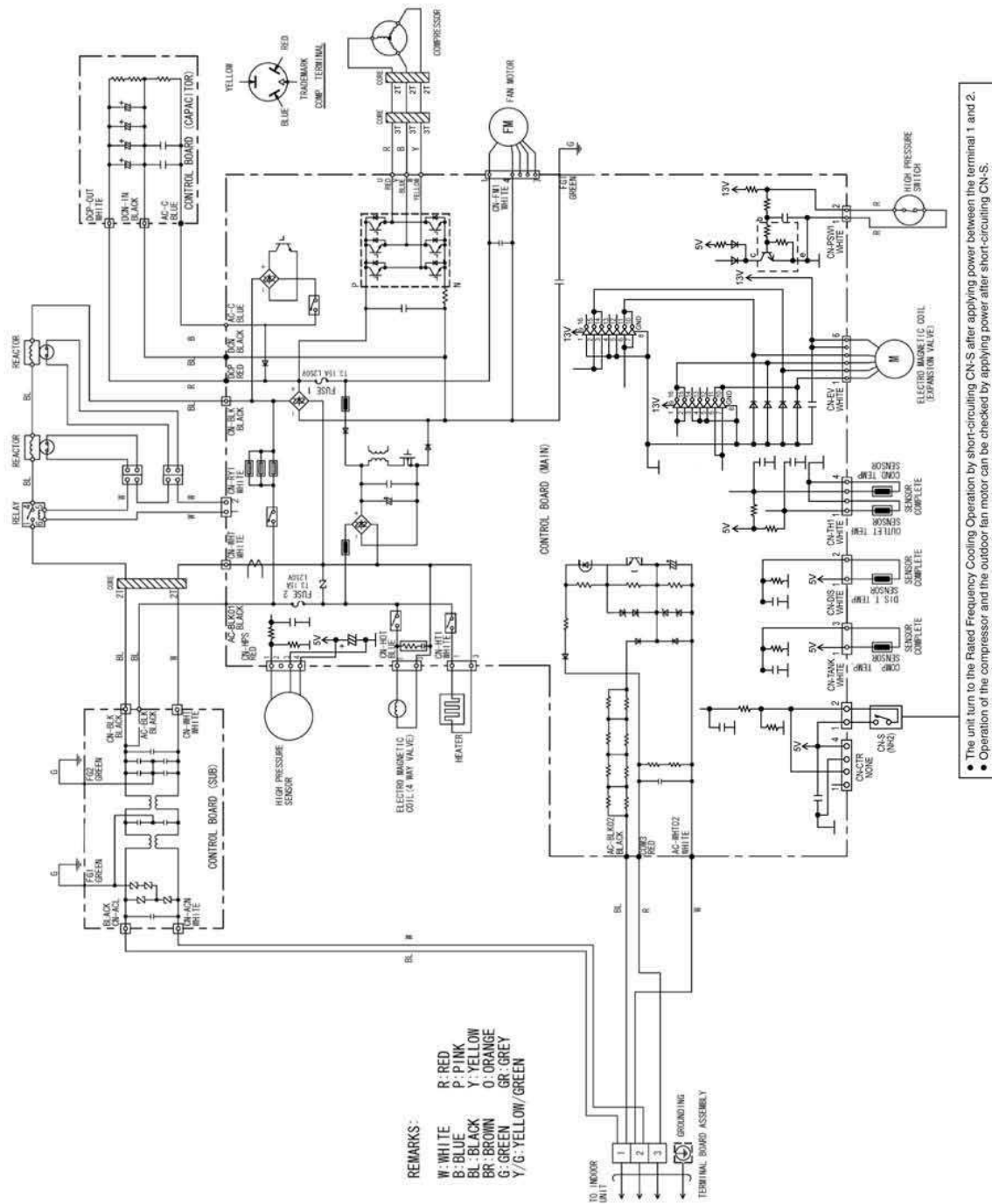


## 2.7 – Electronic Diagrams

### 2.7.1 – Indoor : WH-SDH07C3E5 and WH-SDH09CE5

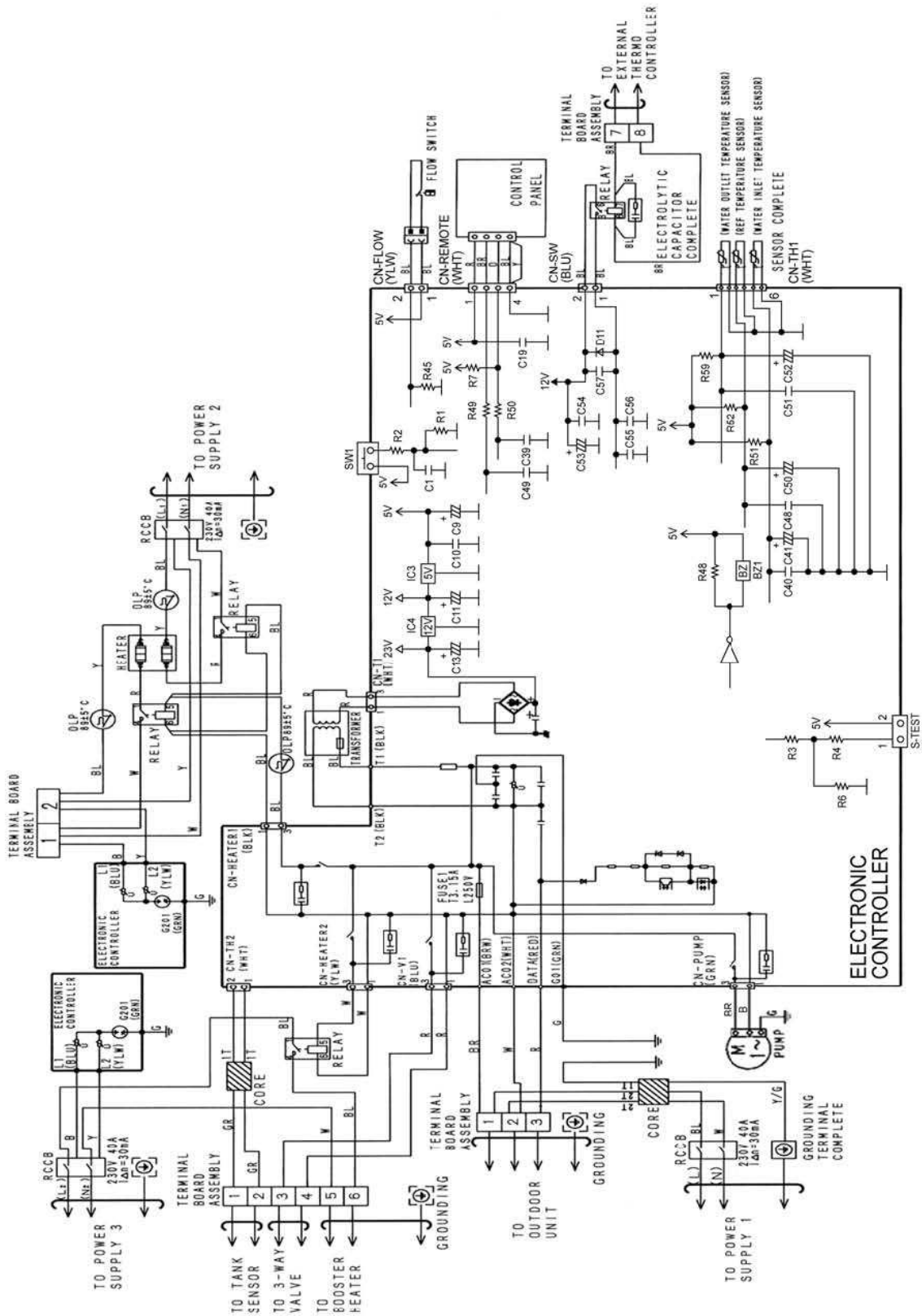


### 2.7.2 – Outdoor : WH-UD07CE5 and WH-UD097CE5

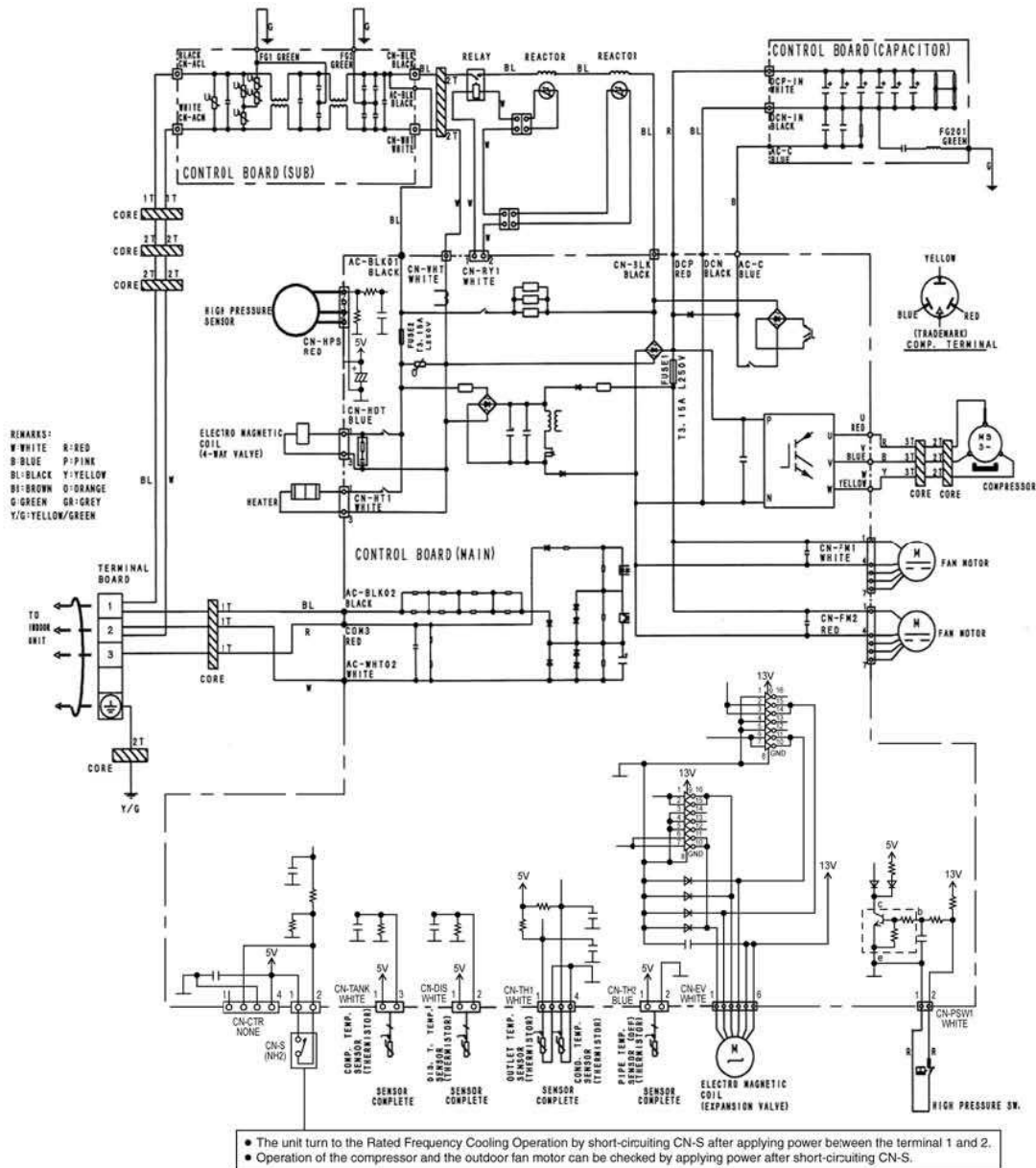




### 2.7.3 – Indoor : WH-SDH12C3E5 WH-SDH14C3E5 and WH-SDH16CE5



#### **2.7.4 – Outdoor : WH-UD12CE5, WH-UD14CE5 and WH-UD014CE5**



# 3

## **A2W – UNITS OVERVIEW**

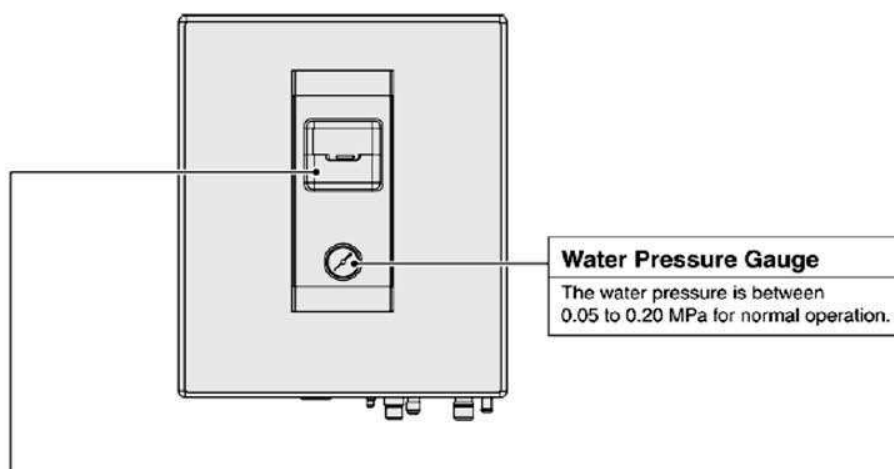
Indoor Remote Control

Timer Control

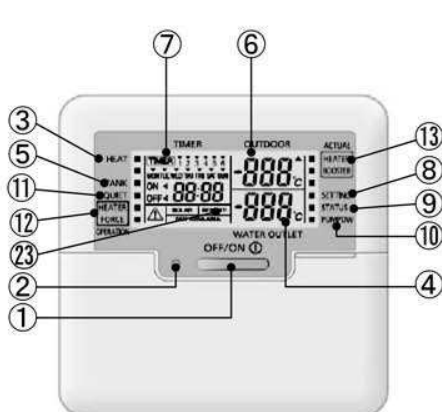
Special Function

### 3.1 Indoor Unit Remote Control

#### 3.1.1 Indoor : WH-SDH07C3E5 and WH-SDH09CE5

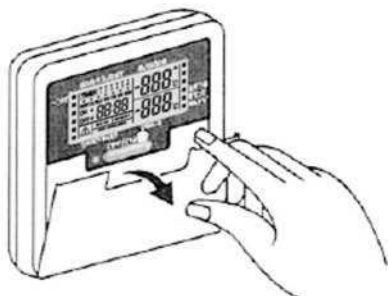


#### Control Panel

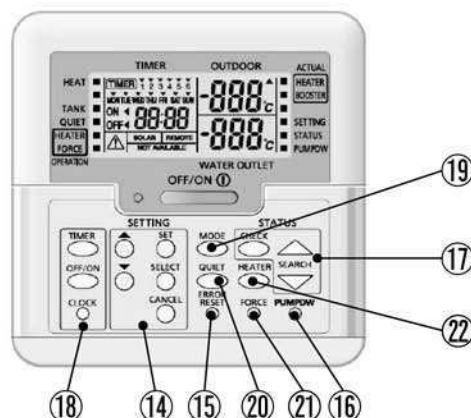


- ① **OFF/ON Button**  
This button starts or stops the mode operation function of the unit.
- ② **Operation LED**  
This LED indicates the unit is in operation.
- ③ **Heat Mode Indicator**  
This icon indicates heating mode operation.
- ④ **Water Outlet Temperature Display**  
This LCD show the water outlet temperature.
- ⑤ **Tank Mode Indicator**  
This icon indicates tank mode operation.
- ⑥ **Outdoor Ambient Temperature Display**  
This LCD show the outdoor ambient temperature.
- ⑦ **Timer/Clock Setting display**  
This LCD show the weekly schedule timer setting and clock display.
- ⑧ **System Setting Indicator**  
This icon indicates the system setting mode request OFF/ON display.
- ⑨ **System Status Indicator**  
This icon indicates the status check mode request OFF/ON display.
- ⑩ **System Pumpdown Indicator**  
This icon indicates the system pump down OFF/ON display.
- ⑪ **Quiet Mode Indicator**  
This icon indicates quiet mode operation.
- ⑫ **HEATER/FORCE Indicator**  
This icon indicates backup heater/force heater mode operation.
- ⑬ **HEATER/BOOSTER indicator**  
This icon indicates backup heater/booster heater actual operation.
- ⑳ **Remote Display**  
This LCD show the external thermo controller display.





Open cover for buttons selections.



#### ⑭ System Setting Button

These setting button can change the temperature range of setup setting mode selection.

Perform the steps below to set preferred temperature range.

STEP 1: Press SET button for 5 seconds to enter setting mode.

STEP 2: Press upward or downward button to choose the 7 of the parameter as below for change the temperature range.

- 1) Outdoor ambient set temperature for heat mode at low water outlet temperature (Selection range:  $-15^{\circ}\text{C} \sim 15^{\circ}\text{C}$ ).
- 2) Outdoor ambient set temperature for heat mode at high water outlet temperature (Selection range:  $-15^{\circ}\text{C} \sim 15^{\circ}\text{C}$ ).
- 3) Water outlet set temperature for heat mode at low outdoor ambient temperature (Selection range:  $25^{\circ}\text{C} \sim 55^{\circ}\text{C}$ ).
- 4) Water outlet set temperature for heat mode at high outdoor ambient temperature (Selection range:  $25^{\circ}\text{C} \sim 55^{\circ}\text{C}$ ).
- 5) Set temperature for turning OFF heating operation (Selection range:  $5^{\circ}\text{C} \sim 35^{\circ}\text{C}$ ).
- 6) Outdoor ambient set temperature for turning ON heater operation (Selection range:  $-15^{\circ}\text{C} \sim 20^{\circ}\text{C}$ ).
- 7) Sanitary tank set temperature (Selection range:  $40^{\circ}\text{C} \sim 75^{\circ}\text{C}$ ).

STEP 3: Press SELECT button to enter selected parameter.

STEP 4: Press upward or downward button to set desired temperature.

STEP 5: Press SET button again to confirm the setting.

Note: Repeat steps 2 to 5 to set other parameters.

STEP 6: Press CANCEL button or wait 30 seconds to exit setting mode.

#### Water Temperature Thermo Shift Setting

Perform the steps below to set the desired shift temperature.

STEP 1: Press SET button within 5 seconds.

STEP 2: Press SELECT button to enter the setting temperature.

STEP 3: Press upward or downward button to set desired temperature (Selection range:  $-5^{\circ}\text{C} \sim 5^{\circ}\text{C}$ ).

STEP 4: Press SET button again to confirm the setting.

STEP 5: Press CANCEL button or wait 30 seconds to exit setting.

**⑮ Error Reset Button**

This button is to reset the control panel and system error code.

**⑯ System Pumpdown Button**

This button is to select the pump down operation (Press 5 seconds)

Press OFF/ON button to stop the pump down operation.

**⑰ System Status Check Button**

This button is to check the various mode status.

Perform the steps below to check the selection status.

STEP 1: Press CHECK button for 5 seconds to enter status mode.

STEP 2: Press SEARCH Upward or Downward buttons for checking below value.

1.Compressor running frequency

2.Error history

3.Water inlet tempetarure

4.Tank Temperature

STEP 3: Press CANCEL button at setting mode or wait 30 seconds to exit status check.

**⑱ Timer Button**

This button is to set weekly timer and clock-time combine with setting button.

Perform the steps below to setting the current day and time.

STEP 1: Press CLOCK button.

STEP 2: Press SETTING Upward or Downward buttons to set current day.

STEP 3: Press SET button to confirm.

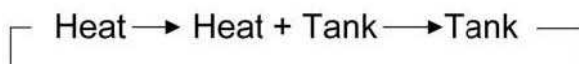
STEP 4: Repeat STEP 2 and 3 to set the current time.

Note: The current time that has been set will be the standard time for all the Timer Operations.

**⑲ Mode Button**

This button is to set operation mode.

The mode does the following transition by button operation.



**⑳ Quiet Button**

This button is to enjoy quiet environment by reduces outdoor unit noise.

**㉑ Force Button**

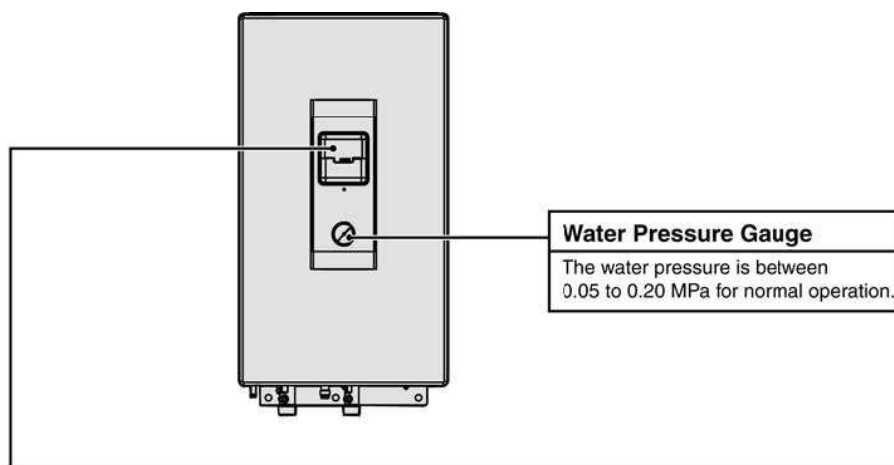
This button is to select force heater mode operation.

Press OFF/ON button to stop the force heater mode operation.

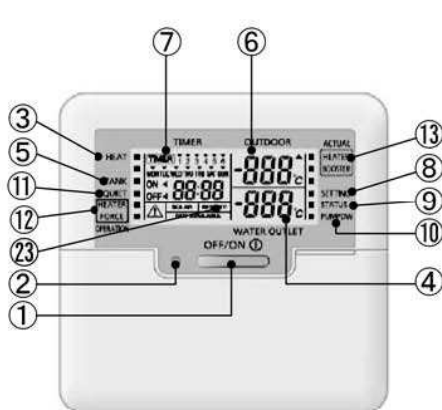
**㉒ Heater Button**

This button is to select backup heater mode operation.

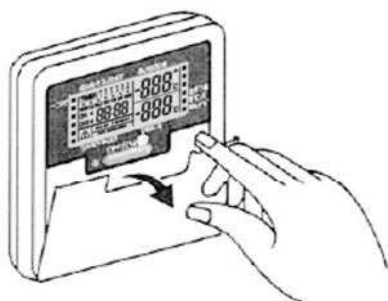
### 3.1.2 Indoor : WH-SDH12C3E5 WH-SDH14C3E5 and WH-SDH16CE5



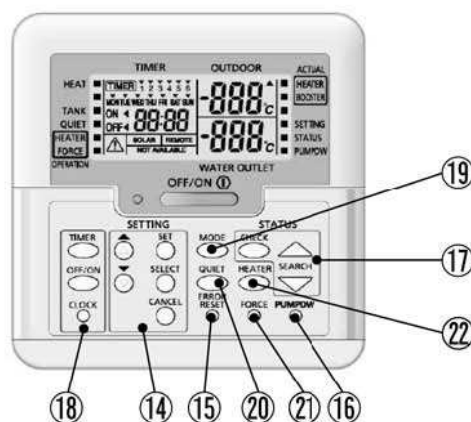
#### Control Panel



- ① **OFF/ON Button**  
This button starts or stops the mode operation function of the unit.
- ② **Operation LED**  
This LED indicates the unit is in operation.
- ③ **Heat Mode Indicator**  
This icon indicates heating mode operation.
- ④ **Water Outlet Temperature Display**  
This LCD show the water outlet temperature.
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This icon indicates tank mode operation.
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This LCD show the weekly schedule timer setting and clock display.
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- ⑩ **System Pumpdown Indicator**  
This icon indicates the system pump down OFF/ON display.
- ⑪ **Quiet Mode Indicator**  
This icon indicates quiet mode operation.
- ⑫ **HEATER/FORCE Indicator**  
This icon indicates backup heater/force heater mode operation.
- ⑬ **HEATER/BOOSTER indicator**  
This icon indicates backup heater/booster heater actual operation.
- ⑳ **Remote Display**  
This LCD show the external thermo controller display.



Open cover for buttons selections.



#### ⑭ System Setting Button

These setting button can change the temperature range of setup setting mode selection. Perform the steps below to set preferred temperature range.

STEP 1: Press SET button for 5 seconds to enter setting mode.

STEP 2: Press upward or downward button to choose the 7 of the parameter as below for change the temperature range.

- 1) Outdoor ambient set temperature for heat mode at low water outlet temperature (Selection range:  $-15^{\circ}\text{C} \sim 15^{\circ}\text{C}$ ).
- 2) Outdoor ambient set temperature for heat mode at high water outlet temperature (Selection range:  $-15^{\circ}\text{C} \sim 15^{\circ}\text{C}$ ).
- 3) Water outlet set temperature for heat mode at low outdoor ambient temperature (Selection range:  $25^{\circ}\text{C} \sim 55^{\circ}\text{C}$ ).
- 4) Water outlet set temperature for heat mode at high outdoor ambient temperature (Selection range:  $25^{\circ}\text{C} \sim 55^{\circ}\text{C}$ ).
- 5) Set temperature for turning OFF heating operation (Selection range:  $5^{\circ}\text{C} \sim 35^{\circ}\text{C}$ ).
- 6) Outdoor ambient set temperature for turning ON heater operation (Selection range:  $-15^{\circ}\text{C} \sim 20^{\circ}\text{C}$ ).
- 7) Sanitary tank set temperature (Selection range:  $40^{\circ}\text{C} \sim 75^{\circ}\text{C}$ ).

STEP 3: Press SELECT button to enter selected parameter.

STEP 4: Press upward or downward button to set desired temperature.

STEP 5: Press SET button again to confirm the setting.

Note: Repeat steps 2 to 5 to set other parameters.

STEP 6: Press CANCEL button or wait 30 seconds to exit setting mode.

#### Water Temperature Thermo Shift Setting

Perform the steps below to set the desired shift temperature.

STEP 1: Press SET button within 5 seconds.

STEP 2: Press SELECT button to enter the setting temperature.

STEP 3: Press upward or downward button to set desired temperature (Selection range:  $-5^{\circ}\text{C} \sim 5^{\circ}\text{C}$ ).

STEP 4: Press SET button again to confirm the setting.

STEP 5: Press CANCEL button or wait 30 seconds to exit setting.



**⑮ Error Reset Button**

This button is to reset the control panel and system error code.

**⑯ System Pumpdown Button**

This button is to select the pump down operation (Press 5 seconds)

Press OFF/ON button to stop the pump down operation.

**⑰ System Status Check Button**

This button is to check the various mode status.

Perform the steps below to check the selection status.

STEP 1: Press CHECK button for 5 seconds to enter status mode.

STEP 2: Press SEARCH Upward or Downward buttons for checking below value.

1.Compressor running frequency

2.Error history

3.Water inlet temperature

4.Tank Temperature

STEP 3: Press CANCEL button at setting mode or wait 30 seconds to exit status check.

**⑱ Timer Button**

This button is to set weekly timer and clock-time combine with setting button.

Perform the steps below to setting the current day and time.

STEP 1: Press CLOCK button.

STEP 2: Press SETTING Upward or Downward buttons to set current day.

STEP 3: Press SET button to confirm.

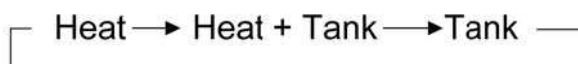
STEP 4: Repeat STEP 2 and 3 to set the current time.

Note: The current time that has been set will be the standard time for all the Timer Operations.

**⑲ Mode Button**

This button is to set operation mode.

The mode does the following transition by button operation.



**⑳ Quiet Button**

This button is to enjoy quiet environment by reduces outdoor unit noise.

**㉑ Force Button**

This button is to select force heater mode operation.

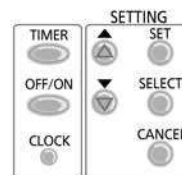
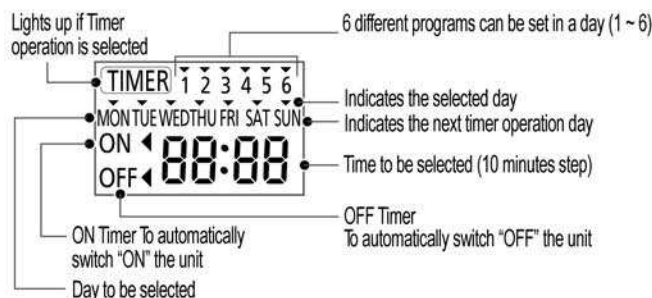
Press OFF/ON button to stop the force heater mode operation.

**㉒ Heater Button**

This button is to select backup heater mode operation.

## 3.2 Weekly Timer Control

### Timer Display



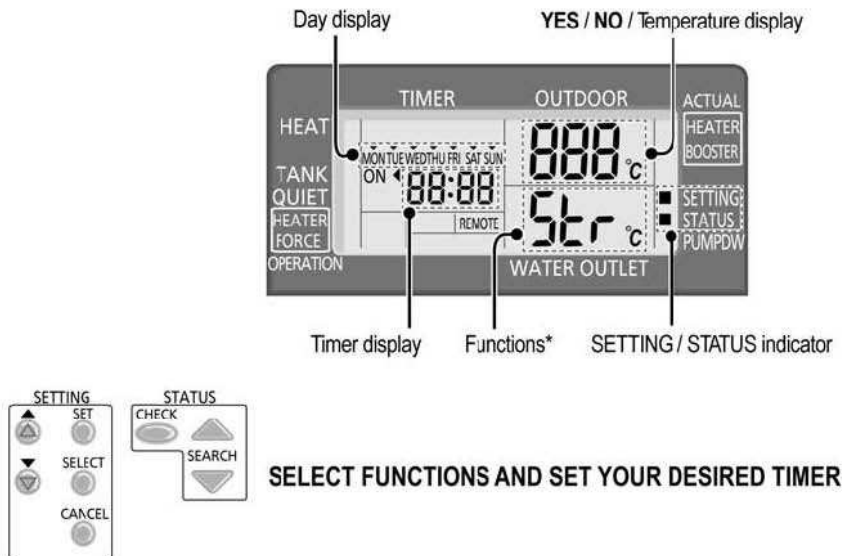
Function	Step
Enter timer mode	Press
Set day & time	<ol style="list-style-type: none"> <li>Press  or  to select your desired day.</li> <li>Press  to confirm.</li> <li>"1" will be blinking, press  to set program 1.</li> <li>Press  to select ON or OFF timer.</li> <li>Press  or  to select your desired time. If you want to set the timer together with other operations, press  and .</li> <li>Press  to confirm program 1. The selected day will be highlighted with ▼. • After 2 seconds, the display will move to the next program.</li> <li>Repeat steps 4 to 7 to set programs 2 to 6. • During timer setup, if no button is pressed within 30 seconds, or if the  button is pressed the setting at that moment is confirmed and timer setup is ended.</li> </ol>
Add/Modify timer	Repeat the steps above.
Disable timer	Press , then press .
Enable timer	Press , then press .
Check timer	<ol style="list-style-type: none"> <li>Press .</li> <li>Press  or  until your desired day is shown, press  to confirm your selection.</li> <li>Press  or  to check the set programs.</li> </ol>
Cancel timer	<ol style="list-style-type: none"> <li>Press .</li> <li>Press  or  until your desired day is shown.</li> <li>Press  to enter program setting.</li> <li>Press  or  until your desired program is shown.</li> <li>Press  to cancel the program.</li> </ol>

### Notes:

- You can set the Timer for each day of the week (Monday to Sunday) with 6 programs per day.
- ON Timer can be set together with your desired temperature and this temperature will be used continuously.
- Same timer program cannot be set in the same day.
- You may also select collective days with same timer setting.
- Promotes energy saving by allowing you to set up to 6 programs in any given day.

### 3.3 Setting Up Special Function

- After initial installation, you can manually adjust the settings. The initial setting remains active until the user changes it.
- The control panel can be used for multiple installations. Some functions may not be applicable to your unit.

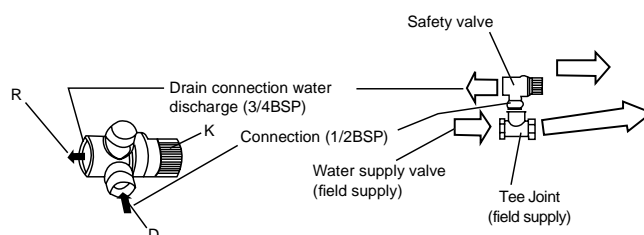


1. Press **SET** and **CHECK** simultaneously for 5 seconds to enter special setting mode. "SETTING" and "STATUS" indicator is ON.  
(Make sure the OFF/ON control panel LED is OFF no operation)
2. Press **▲** or **▼** to browse functions.
3. Press **SELECT** to enter the function.
4. Press **▲** or **▼** to enable **YES** or disable **NO** function, or set your desired day and time.
5. Press **SET** to confirm.

Set	Display	Function *
Set 1	con	External Thermo Controller (YES / NO) To set external thermo controller connection.
Set 2	con	Tank Connection (YES / NO) To set tank connection. Note: If select "Tank connection" is "NO", Set 3~10 are skipped.
Set 3	Pr-y	Heating Priority (YES / NO) To choose to heat up the heat pump and tank units. Note: If select "Heating priority" is "YES", Set 4~6 are skipped.
Set 4	int	Heating Heat-up Interval Set To set timer during heating for HEAT + TANK mode (0.5hour ~ 10hours).
Set 5	int	Tank Heat-up Interval Set To set timer during tank for HEAT + TANK mode (5minutes ~ 1hour 35minutes).
Set 6	dLy	Booster Heater Delay Time Set To set delay timer for booster heater to ON if tank temperature is not reached (20minutes ~ 1hour 35minutes).
Set 7	Fun	Sterilization (YES / NO) To set sterilization, if required. Note: If select "Sterilization" is "NO", Set 8~10 are skipped.
Set 8	Str	Sterilization Day & Time Set To set timer for sterilization (only once a week).
Set 9	bo i	Sterilization Temperature Set To set temperature for sterilization function (40°C ~ 75°C).
Set 10	aPr	Sterilization Continue Time To set timer to maintain heating temperature in order to complete the sterilization function (5minutes ~ 1hour).

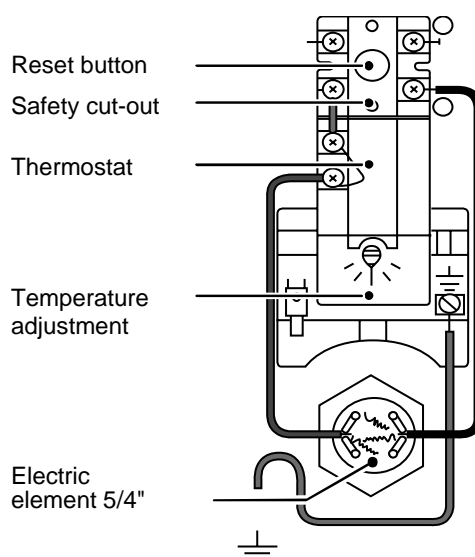
### **3.4 Water tank – safety valve control**

- Use commercial T-joint to joint connection (D) of safety valve. Please install between water supply inlet and water supply tube at below of front side of main unit.
- Please connect discharge drain at connector (R). During boiling, when pressure is above 9bar, expanded water will come out and it is not abnormality.
- Close the water supply main tap, open faucet and turn the safety valve knob K to clockwise direction until stopped at open position, and hot water from tank can be discharged.
- When safety valve is not installed, tank may be damage. It must be installed



### **3.5 Water tank – thermostat control**

- 1<sup>st</sup> stage Set 88°C (Can be cancelled by remote control) Must not change the volume knob.
- 2<sup>nd</sup> stage Set 95°C (Can be cancelled by thermostat reset button).
- Reset button located on upper part of the thermostat, this button will release and cut all power to the heating element if the internal temperature in the water heater rises above 98°C. If this occurs, the function of the thermostat must be checked by authorized personnel before the reset button is pressed.





### **3.1 – 3.6 Water tank – 3-way valve control**

- The purpose of 3-way valve is to change the hot water flow to heating panel or to water tank.
- Control content
  - During 3-way valve OFF, the hot water will supply to heating panel.
  - During 3-way valve ON, the hot water will supply to water tank.
  - During OFF condition, the 3-way valve will be switch to OFF posotion

# 4

## ***INSTALLATION***

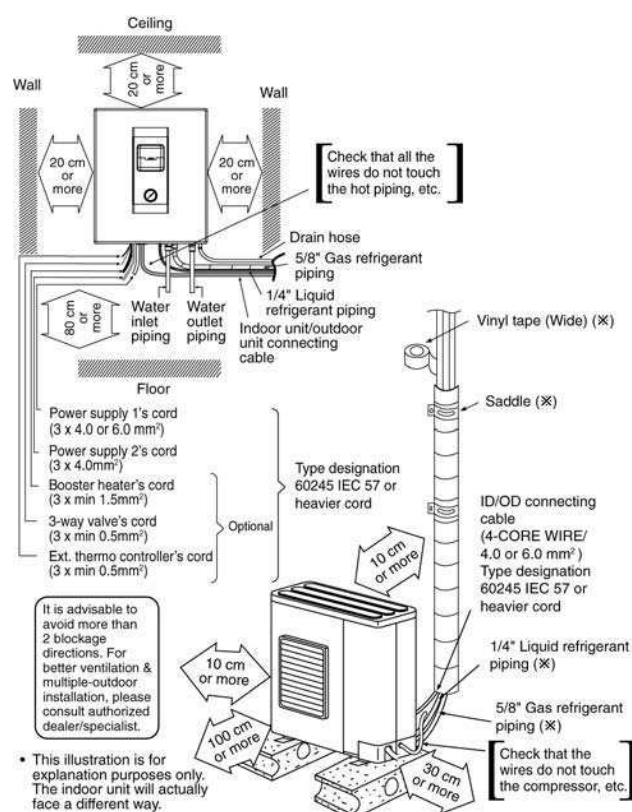
Pipe Length Limitations

Branch Pipe Connection

Capacity Correction

Wiring Installation

## 4.1 – Installation Diagram



## 4.2 – Select best location for indoor and outdoor

### Indoor unit location

- There should not be any heat source or steam near the unit.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 80 cm.
- Must install on a vertical wall.
- When install electrical equipment at wooden building of metal lath or wire lath, according to electrical facility technical standard, no electrical contact between equipment and building is allowed. Insulator must be installed in between.
- Do not install the unit at outdoor. This is designed for indoor installation only.

## Outdoor unit location

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- Avoid location where ambient temperature is below -20° C.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If outdoor unit installed near sea, region with high content of sulphur or oily location (e.g. machinery oil, etc), its lifespan may be shortened.
- If piping length is over 30 m, additional refrigerant should be added as shown in the table.
- When installing the product in a place where it will be affected by typhoon or strong wind such as wind blowing between buildings, including the rooftop of a building and a place where there is no building in surroundings, fix the product with an overturn prevention wire, etc. (Overturn prevention fitting model number: K-KYZP15C)



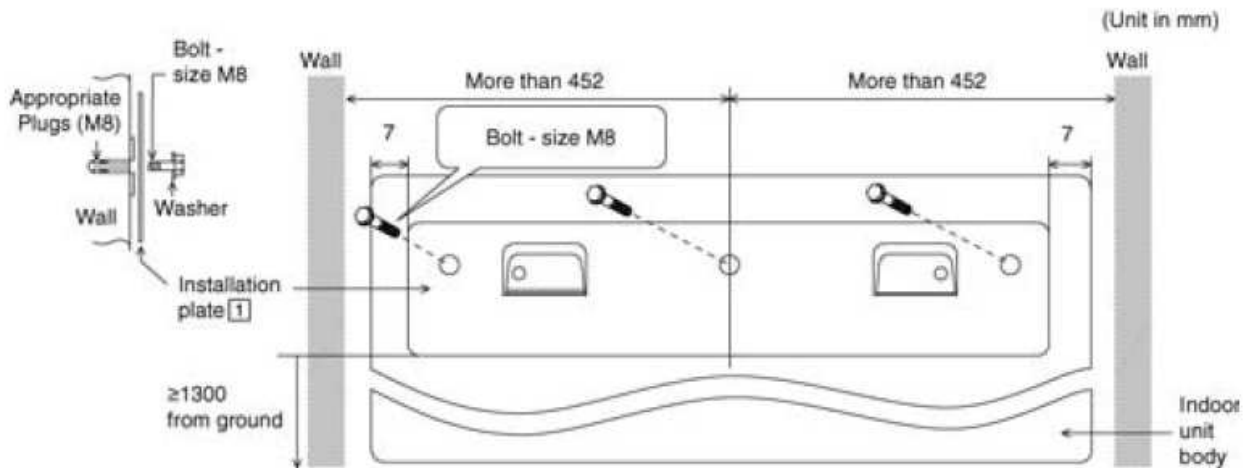
Model	Piping size		Rated Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
SDH07C3E5/UD07CE5	5/8"	1/4"	5 ~ 7.5	20	3	30	30
SDH09C3E5/UD09CE5	5/8"	1/4"	5 ~ 7.5	20	3	30	30

Model	Piping size		Rated Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
SDH12C6E5/UD12CE5	5/8"	3/8"	7	30	3	40	50
SDH14C6E5/UD14CE5	5/8"	3/8"	7	30	3	40	50
SDH16C6E5/UD16CE5	5/8"	3/8"	7	30	3	40	50

Example : For SDH12C6E5/UD12CE5

If the unit is installed at a 40 m distance, the quantity of additional refrigerant should be 500 g .....  $(40 - 30) \text{ m} \times 50 \text{ g/m} = 500 \text{ g}$ .

### 4.3 – How to fix installation plate



The mounting wall is strong and solid enough to prevent it from the vibration.

The centre of installation plate should be at more than 452 mm at right and left of the wall. The distance from installation plate edge to ground should more than 1300 mm.

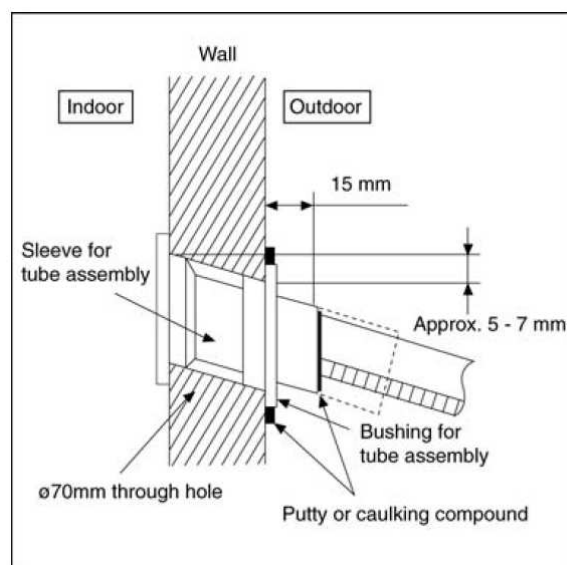
- Always mount the installation plate horizontally by aligning the marking thread and using a level gauge.
- Mount the installation plate on the wall with 3 sets of plug, bolt and washer (all non-supply) with size M8.

### 4.4 – Drill a hole in the wall and install sleeve of piping

1. Insert the piping sleeve to the hole.
2. Fix the bushing to the sleeve.
3. Cut the sleeve until it extrudes about 15 mm from the wall
4. Finish by sealing the sleeve with putty or caulking compound at the final stage.

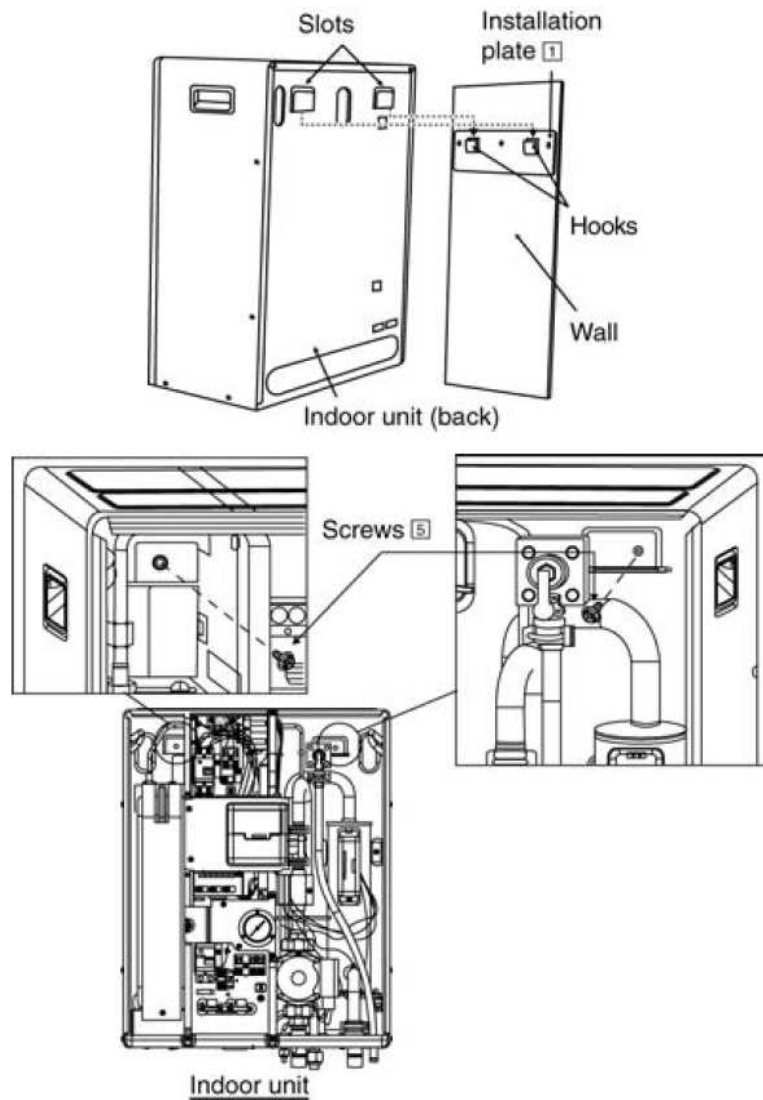


When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connecting cable.



#### 4.5 – Install the indoor unit

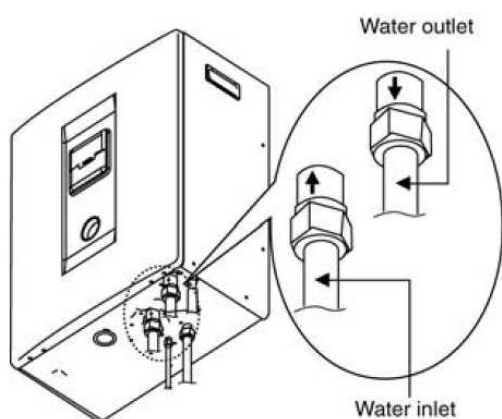
1. Engage the slots on the indoor unit to the hooks of installation plate. Ensure the hooks are properly seated on the installation plate by moving it left and right.
2. Fix the screws (5) to the holes on the hooks of installation plate, as illustrated below.





## 4.6 – Water piping installation

Water inlet and water outlet on indoor unit are used for connection to water circuit. Please request a licensed technician to install this water circuit.

- This water circuit must comply with all relevant European and national regulations, i.e. IEC/EN 61770.
- Be careful not to deform the piping with excessive force when doing piping connection job.
- Do not install any valve between indoor unit and water piping to avoid accidental closure of water supply to the indoor unit.
- Use 1 1/4" nut for both water inlet and outlet connection and clean all tubes with tap water before install.
- Cover the pipe end to prevent dirt and dust when inserting it through a wall.
- Choose proper sealer which can withstand the pressures and temperatures of the system.
- Connect water inlet connector of indoor unit (indicate with "IN") to boiler tank outlet. Then, connect water outlet connector of indoor unit (indicate with "OUT") to boiler tank inlet. Fail to connect the tube appropriately might causing the indoor unit malfunction.
- Be sure to use two spanners to tighten the connection. Further tighten the nuts with torque wrench in specified torque as stated in the table.
- If non-brass metallic piping is used for installation, make sure to insulate the pipes to prevent galvanic corrosion.
- Make sure to insulate the water circuit pipes to prevent reduction of heating capacity.
- After installation, check the water leakage condition in connection area during test run. When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connecting cable.





Model	Nut size (Torque)
	Water
SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5	3/4" [58.8 N•m]
<div> <b>CAUTION</b></div> <p>Do not over tighten, over tightening cause water leakage.</p>	

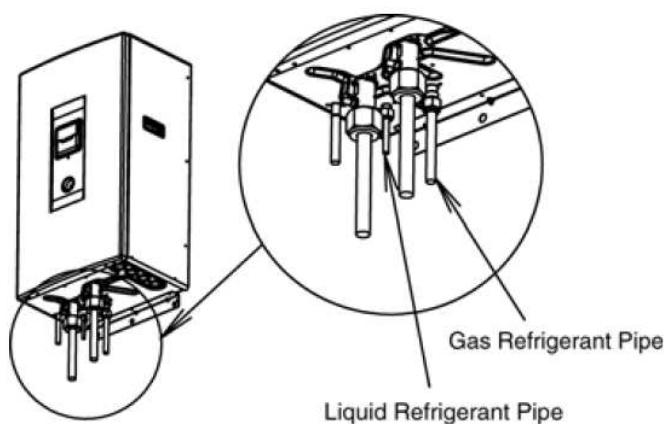
Model	Nut size (Torque)
	Water
SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5	1 1/4" [117.6 N•m]
<div> <b>CAUTION</b></div> <p>Do not over tighten, over tightening cause water leakage.</p>	

#### 4.7 – Indoor unit refrigerant piping installation

1. Please make flare after inserting flare nut (located at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)
2. Do not use pipe wrench to open refrigerant piping. Flare nut may be broken and cause leakage. Use proper spanner or ring wrench.
3. Connect the piping:
  - Align the center of piping and sufficiently tighten the flare nut with fingers.
  - Further tighten the flare nut with torque wrench in specified torque as stated in the table.

Model	Piping size (Torque)	
	Gas	Liquid
SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5	5/8" [65 N•m]	1/4" [18 N•m]
<div> <b>CAUTION</b></div> <p>Do not over tighten, over tightening cause gas leakage.</p>		
Model	Piping size (Torque)	
	Gas	Liquid
SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5	5/8" [65 N•m]	3/8" [42 N•m]
<div> <b>CAUTION</b></div> <p>Do not over tighten, over tightening cause gas leakage.</p>		

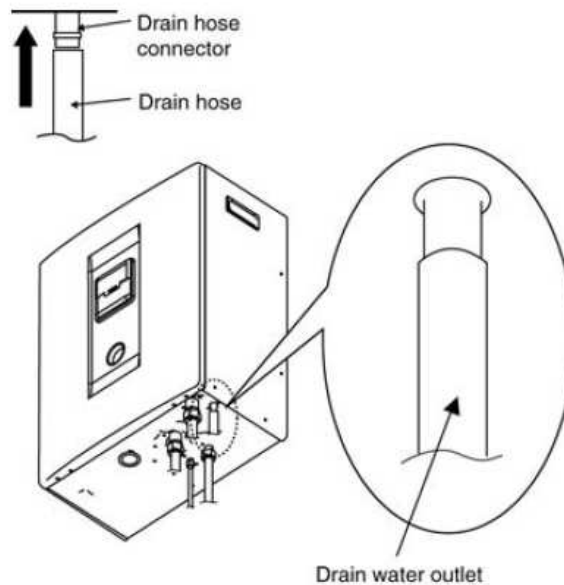
- In case of using long piping, please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe.





#### 4.8 – Drain hose installation

- Use inner diameter 15 mm drain hose in the market.
- This hose must to be installed in a continuously downward direction and in a frost-free environment.
- Guides this hose's outlet to outdoor only.
- Do not insert this hose into sewage hose or cleaning hose that may generate ammonia gas, sulfuric gas etc.
- If necessary, use hose clamp to further tighten the hose at drain hose connector to prevent it leakage.
- The water may drip from drain hose. Therefore must ensure the outlet of the hose is always not closed or blocked



#### 4.9 – Connect the wiring cable to the indoor unit

1. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 4.0 or 6.0 mm<sup>2</sup> flexible cord, type designation 60245 IEC 57 or heavier cord.

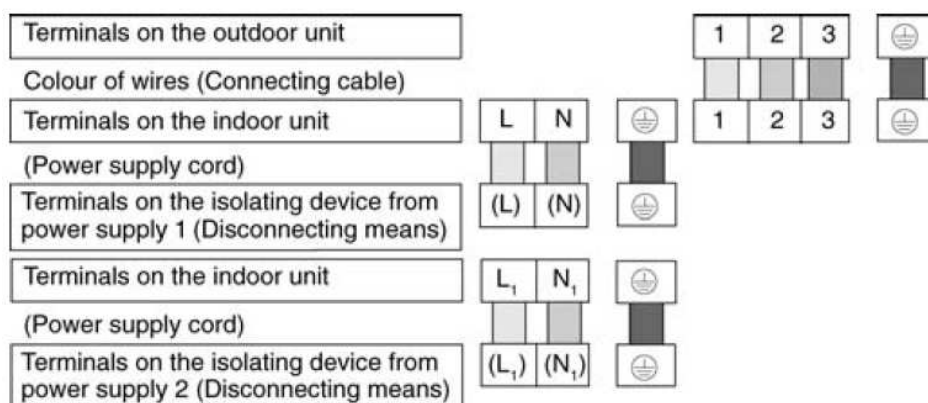
- Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor unit's respectively.
- Earth lead wire shall be longer than the other lead wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

2. Cable connection to the power supply through isolating device (Disconnecting means).

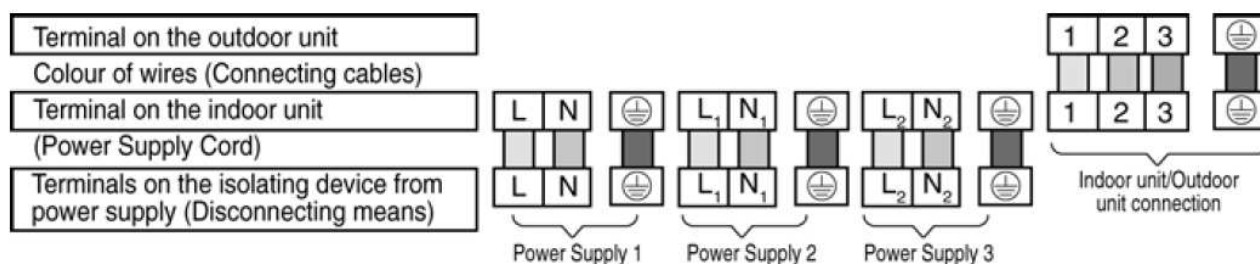
- Isolating device (Disconnecting means) should have minimum 3.0 mm contact gap.
- Connect the approved polychloroprene sheathed power supply 1 cable (3 x 4.0 or 6.0 mm<sup>2</sup>) and power supply 2 cable (3 x 4.0 mm<sup>2</sup>) and power supply 3 cable (3 x 1.5 mm<sup>2</sup>), type designation 60245 IEC 57 or heavier cord to the terminal board, and to the other end of the cable to isolating device (Disconnecting means).

3. To avoid cable harmed by sharp edge, cables must go through bushing (located at the bottom of indoor unit) before carry out electrical connection. The bushing must be used and must not take off.

SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5:



SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5:



#### 4.10 – Connecting the external water tank unit (optional)

1. All connections should follow to the local national wiring standard.
2. Maximum output power of booster heater should be  $\leq 3\text{kW}$ .
3. Sensor should be resistance type, please refer to Graph 5.1 for the characteristic and details of sensor.

\* note:

- sensor's cable should be (2 x min 0.3 mm<sup>2</sup>) double insulation sheathed type with insulation strength of min 30V.

4. 3-Way Valve should be of spring type (refer to diagram 5.2). Valve's cord or cable must be (2 x min 0.5 mm<sup>2</sup>), of type designation 60245 IEC 57 or heavier cord, or similarly double insulation sheathed.

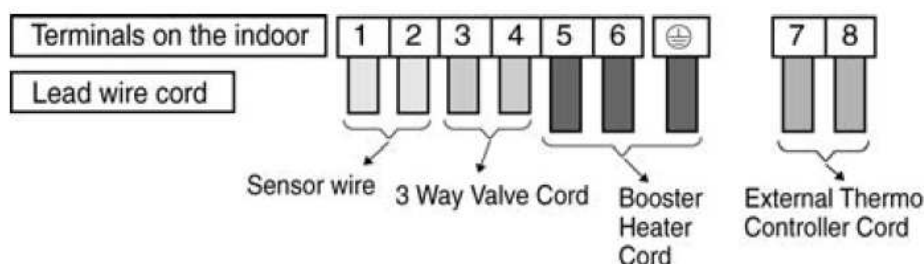
\* note:

- should be CE compliance component. - it should be directed to heating mode when it is OFF.
- maximum load for the valve is 3VA.

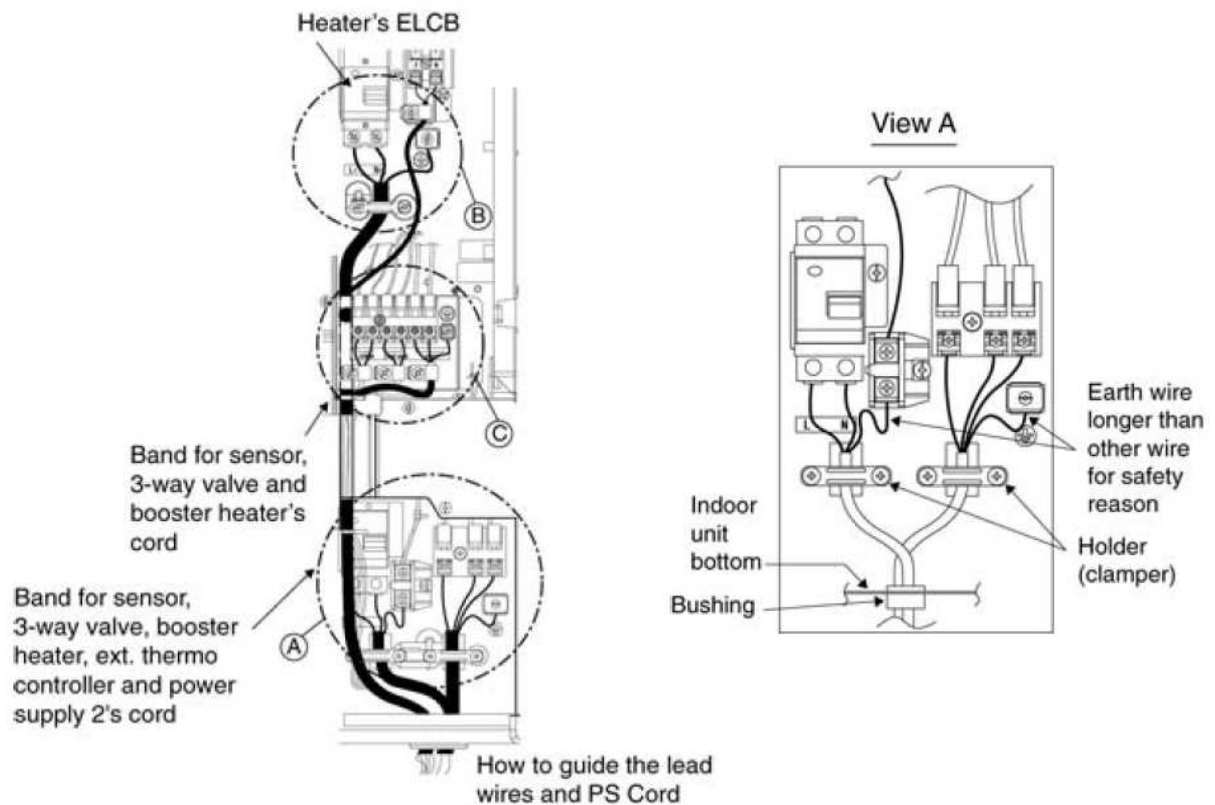
5. Ext thermal controller should be of bimetal type. (connection refer to diagram 5.3) Its cord or cable must be (2 x min 0.5 mm<sup>2</sup>), of type designation 60245 IEC 57 or heavier cord, or similarly double insulation sheathed.

\* note:

- should be CE compliance component.
- maximum operating current should be less than 3A rms.

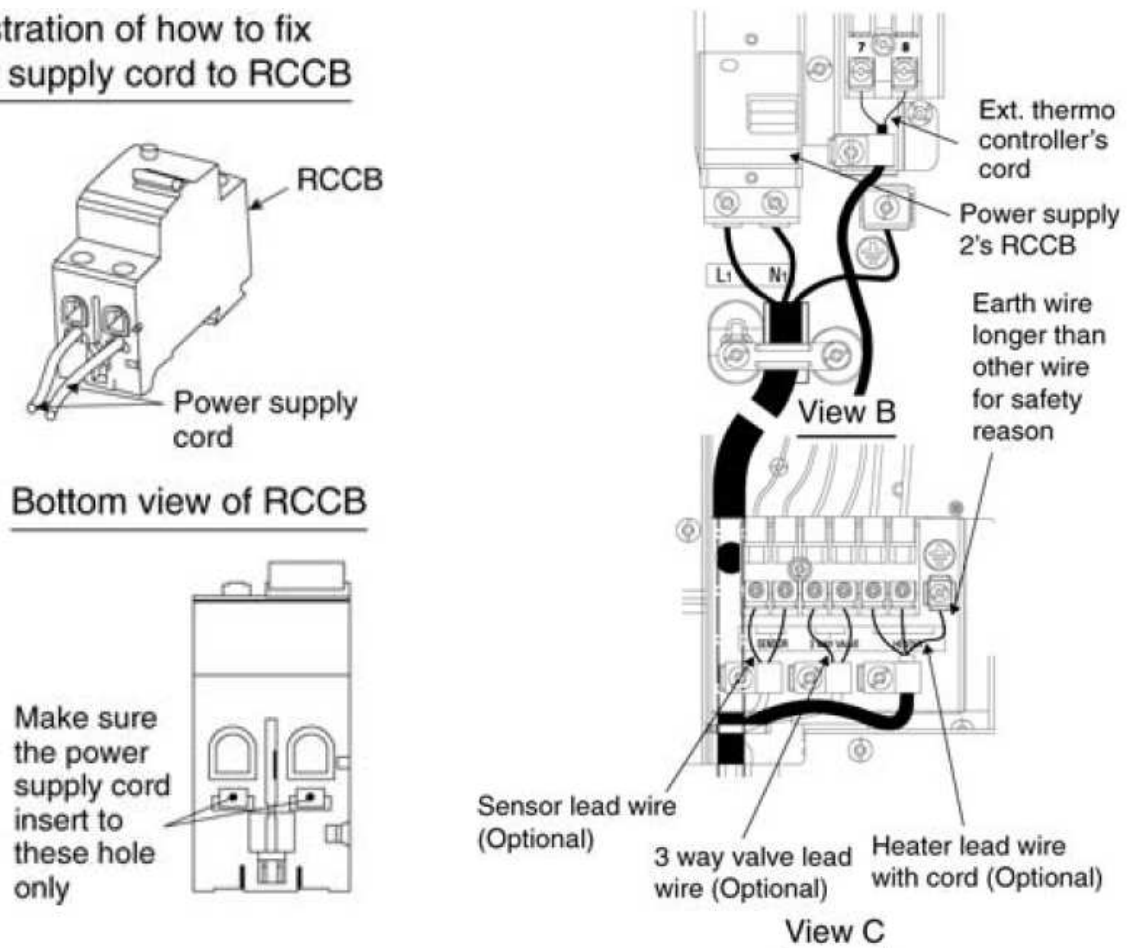


#### 4.10.1 : SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5:

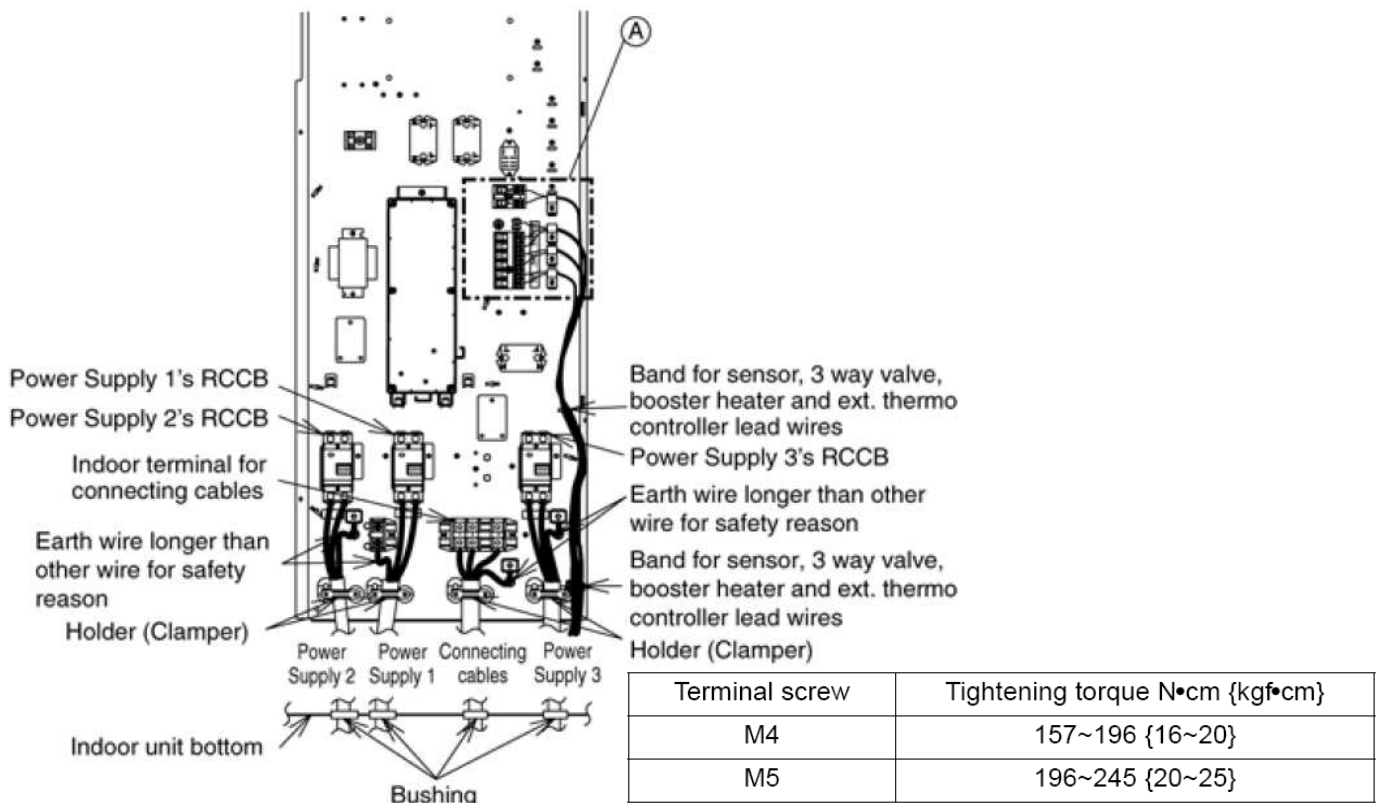


Terminal screw	Tightening torque N•cm {kgf•cm}
M4	157~196 {16~20}
M5	196~245 {20~25}

#### Illustration of how to fix power supply cord to RCCB

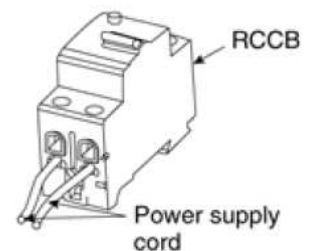
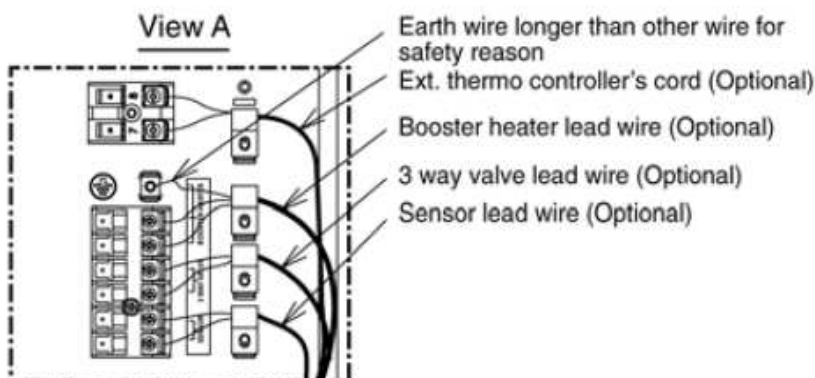


#### 4.10.2 : SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5:

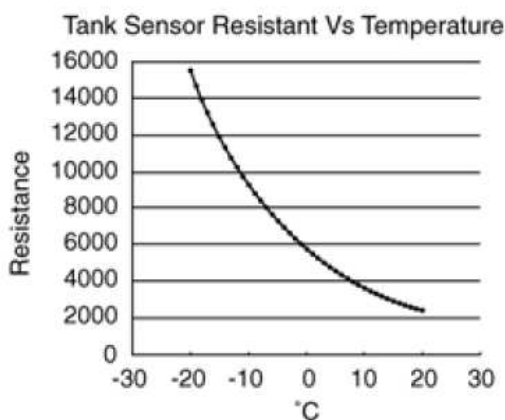


How to guide the lead wires and PS Cord  
(view without internal wiring)

Illustration of how to fix  
power supply cord to RCCB



Bottom view of RCCB



Graph 5.1: Tank sensor characteristic

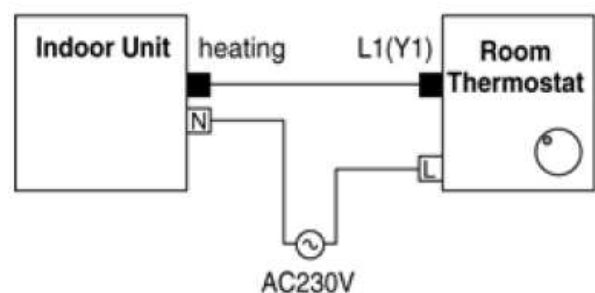
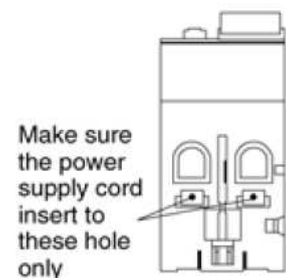
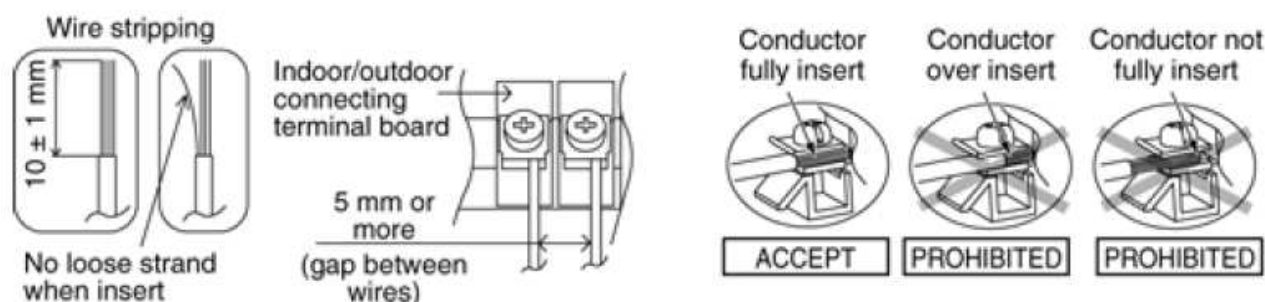


Diagram 5.2: External thermo controller connecting diagram



#### 4.1.1 – Stripping wire and connecting requirement



##### **Connecting Requirement SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5 :**

- The equipment's power supply 1 complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 885.92kW (for SDH07C3E5/UD07CE5 & SDH09C3E5/UD09CE5) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power  $S_{sc}$  greater than or equal to 885.92kW.
- The equipment's power supply 1 shall be connected to a suitable supply network, having service current capacity  $\geq 100A$  per phase. Please liaise with supply authority to ensure that the service current capacity at the interface point is sufficient for the installation of the equipment.
- As for the equipment's power supply 2, it also need to comply with EN 61000-3-12.
- This equipment's power supply 2 shall be connected to a suitable supply network, with the following maximum permissible system impedance  $Z_{max}$  at the interface of point for models:  
WH-SDH07C3E5/WH-UD07CE5 & WH-SDH09C3E5/WH-UD09CE5: 0.355 ohm.

Please liaise with supply authority to ensure that the power supply 2 is connected only

##### **Connecting Requirement SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5**

- The equipment's power supply 1 complies with IEC 61000-3-12 provided that the short-circuit power  $S_{sc}$  is greater than or equal to 929.08kW (for SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5 and SDH16C6E5/UD16CE5) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power  $S_{sc}$  greater than or equal to 929.08kW.
- The equipment's power supply 1 shall be connected to a suitable supply network, having service current capacity  $\geq 100A$  per phase. Please liaise with supply authority to ensure that the service current capacity at the interface point is sufficient for the installation of the equipment.
- The equipment's power supply 2 complies with IEC/EN 61000-3-12.
- This equipment's power supply 2 shall be connected to a suitable supply network, with the following maximum permissible system impedance  $Z_{max}$  at the interface of point for models:

WH-SDH12C6E5/WH-UD12CE5, WH-SDH14C6E5/WH-UD14CE5 and WH-SDH16C6E5/WH-UD16CE5: 0.234 ohm.

Please liaise with supply authority to ensure that the power supply 2 is connected only to a supply of that impedance or less.

- This equipment's power supply 3 complies with IEC/EN 61000-3-12.
- This equipment's power supply 3 shall be connected to a suitable supply network, with the following maximum permissible system impedance  $Z_{max}$  at the interface of point for models:

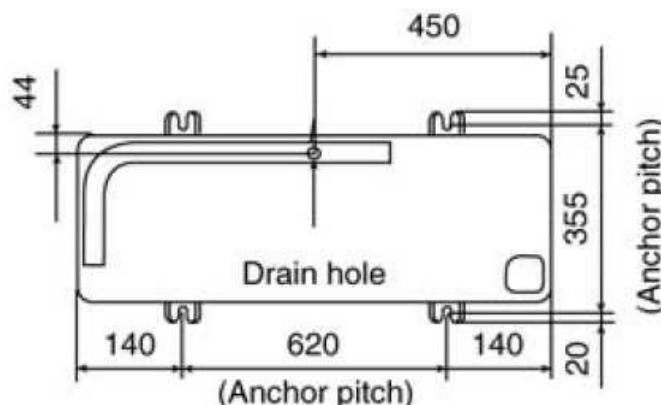
WH-SDH12C6E5/WH-UD12CE5, WH-SDH14C6E5/WH-UD14CE5 and WH-SDH16C6E5/WH-UD16CE5: 0.444 ohm

Please liaise with supply authority to ensure that the power supply 3 is connected only to a supply of that impedance or less.

## 4.12 – Outdoor Installation

After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.

1. Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut ( $\varnothing 10$  mm).
2. When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.



### 4.11.1 Connecting The Piping To Outdoor Unit

Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (locate at valve) onto the copper pipe. Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table. Local pipes can project in any of four directions.

- Make holes in the pipe panels for the pipes to pass through.
- Be sure to install the pipe panels to prevent rain from getting inside the outdoor unit.

[Removing the service panel].

(1) Remove the two mounting screws.

(2) Slide the service panel downward to release the pawls. After this, pull the service panel toward you to remove it.

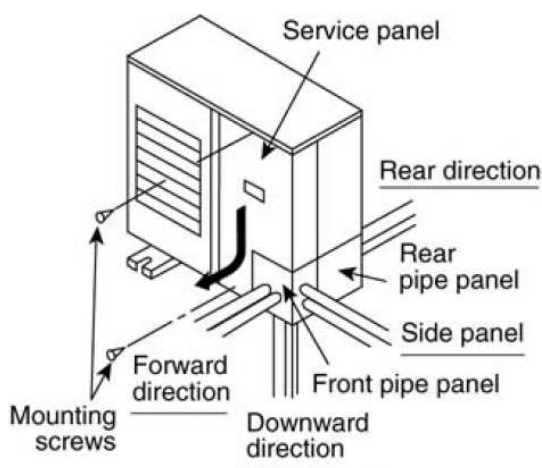
Model	Piping size (Torque)	
	Gas	Liquid
SDH07C3E5/UD07CE5, SDH09C3E5/UD09CE5	5/8" [65 N•m]	1/4" [18 N•m]

Model	Piping size (Torque)	
	Gas	Liquid
SDH12C6E5/UD12CE5, SDH14C6E5/UD14CE5, SDH16C6E5/UD16CE5	5/8" [65 N•m]	3/8" [42 N•m]

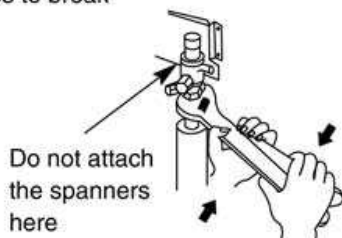


### CAUTION

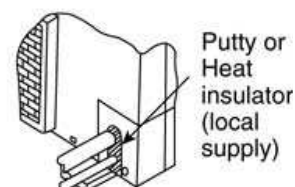
Do not over tighten, over tightening cause gas leakage.



Be sure to use two spanners to tighten.  
(If the nuts are overtightened, it may cause the flares to break or leak.)



Close the tube joining area with putty heat insulator (local supply) without any gap as shown in right figure. (To prevent insects or small animal entering.)

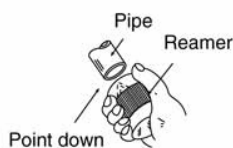


#### 4.11.2 CUTTING AND FLARING THE PIPING

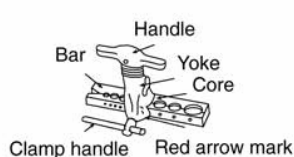
1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
3. Please make flare after inserting the flare nut onto the copper pipes.



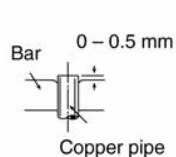
1. To cut



2. To remove burrs



3. To flare



#### Improper flaring

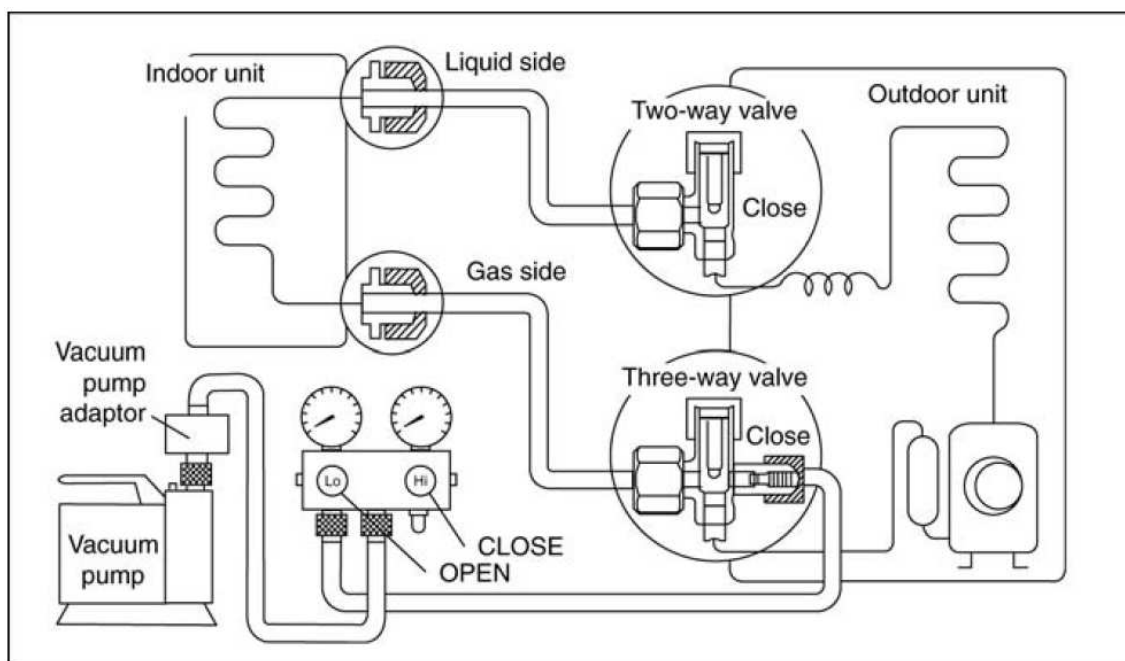


When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.



### 4.11.3 EVACUATION OF THE EQUIPMENT

WHEN INSTALLING AN AIR-TO-WATER HEATPUMP, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.



1. Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
  - Be sure to connect the end of the charging hose with the push pin to the service port.
2. Connect the center hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.
3. Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa). Then evacuate the air approximately ten minutes.
4. Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.

Note: BE SURE TO FOLLOW THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
5. Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
6. Tighten the service port caps of the 3-way valve at a torque of 18 N.m with a torque wrench.
7. Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "OPEN" using a hexagonal wrench (4 mm).
8. Mount valve caps onto the 2-way valve and the 3-way valve.
  - Be sure to check for gas leakage.

### CAUTION







If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step 3 above take the following measure:

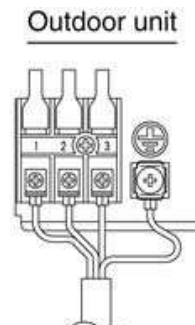
- If the leak stops when the piping connections are tightened further, continue working from step 3 .
- If the leak does not stop when the connections are retightened, repair the location of leak.
- Do not release refrigerant during piping work for installation and reinstallation. Take care of the liquid refrigerant, it may cause frostbite.

#### 4.13 – Connect the cable to the outdoor unit

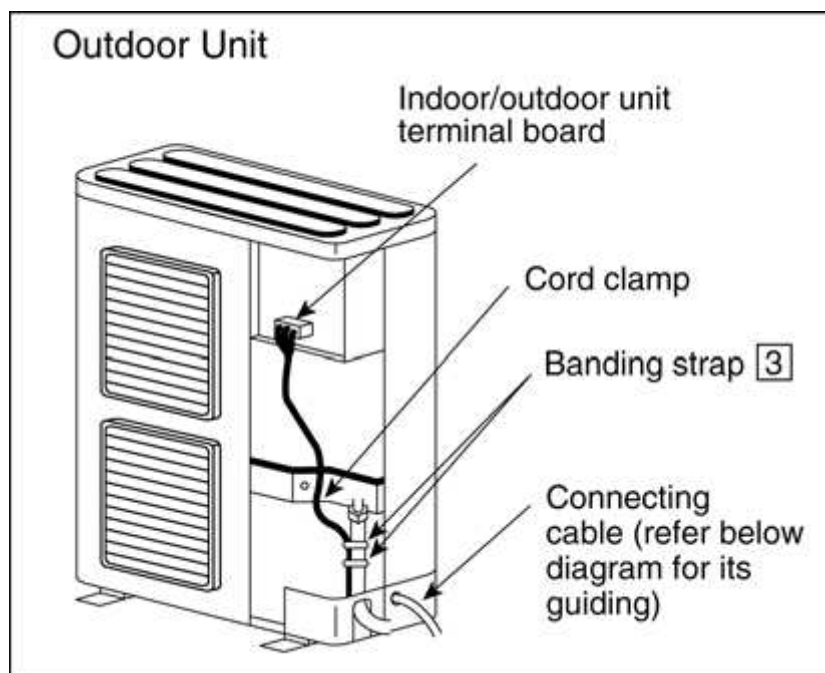
(FOR DETAIL REFER TO WIRING DIAGRAM AT UNIT)

1. Remove the control board cover from the unit by loosening the screw.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 × (4.0 or 6.0 mm<sup>2</sup>) flexible cord, type designation 60245 IEC 57 or heavier cord.

Terminals on the indoor unit	1	2	3	
Colour of wires				
Terminals on the outdoor unit	1	2	3	

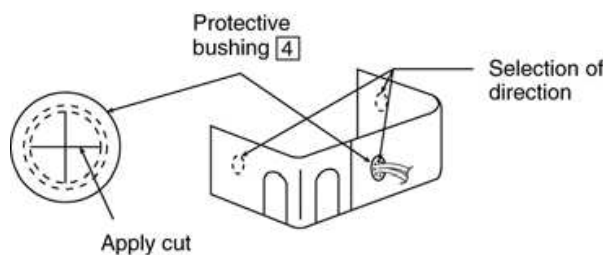


3. Secure the cable onto the control board with the holder (clammer).
4. Select required direction and apply protective bushing provided in accessories to protect cables from sharp edges.
5. Once all wiring work has been completed, tie the wires and cord together with the binding strap so that they do not touch other parts such as the compressor and bare copper pipes.
6. Install back the control board cover.



#### 4.14 – Wire stripping and connecting requirement

- Same as indoor requirement. For details please refer the diagram on AIR-TO-WATER HEATPUMP INDOOR UNIT, section 4.10 (CONNECT THE CABLE TO THE INDOOR UNIT)



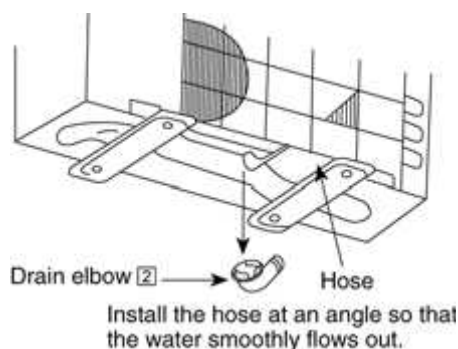
DETAIL OF CONNECTING CABLE GUIDING

#### 4.15 – Pipe insulation

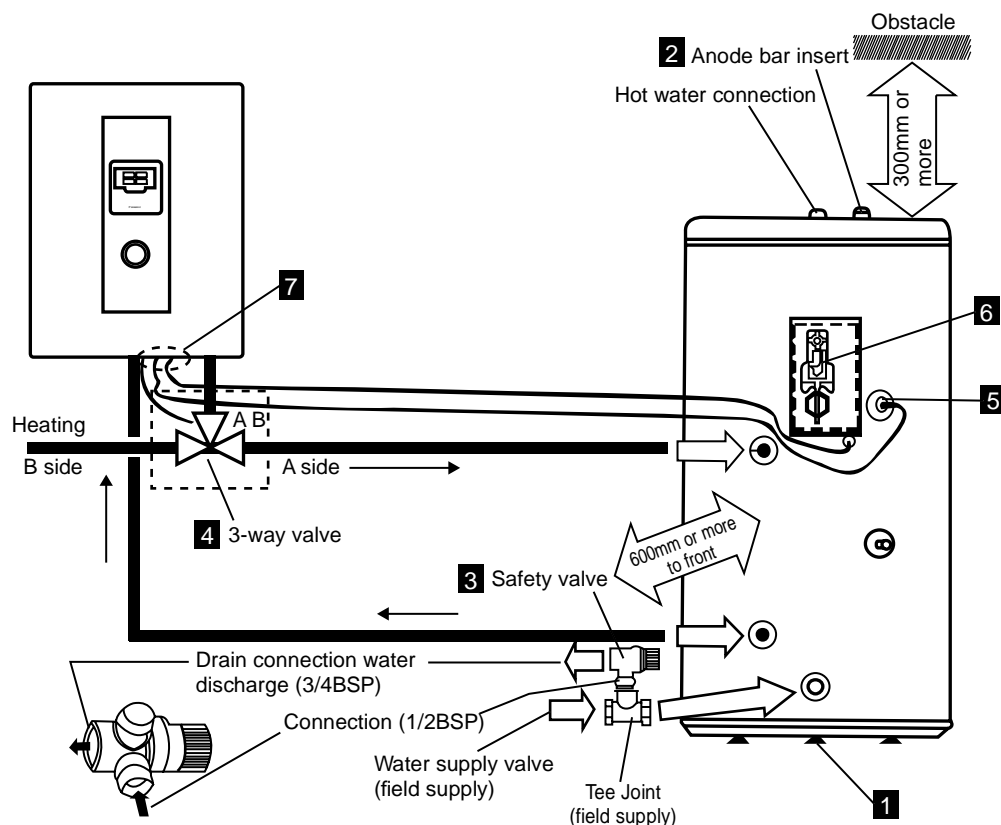
- Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.
- If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.

#### 4.16 – Disposal of outdoor unit drain water

- If a drain elbow is used, the unit should be placed on a stand which is taller than 5 cm.
- If the unit is used in an area where temperature falls below 0° C for 2 or 3 days in succession, it is recommended not to use a drain elbow, for the drain water freezes and the fan will not rotate.



## 4.17 – Water tank piping and wiring installation



### WARNING

This section is for authorized and licensed electrician / water system installer only.

Be sure to switch off all power supply (Tank Unit power supply, indoor unit power supply, heater power supply etc.) before performing installation.

- 1** Install adjustable legs at bottom of tank (3 locations) then adjust the height until the unit stable.
- 2** Fix the anode bar into socket.
- 3** Install safety valve at water supply inlet, install drain appropriately.
- 4** Install 3-way valve at outlet tube of indoor unit, connect heating tube connection with tank pipe.

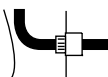


### WARNING


Be careful on 3-way valve connecting direction.

- "Default" condition is at Heating Side
- "On" condition is at Tank Unit

- 4** Insert sensor until it touches securely end of socket, tighten the cap of socket so that it is not shifted. (Refer bottom diagram)



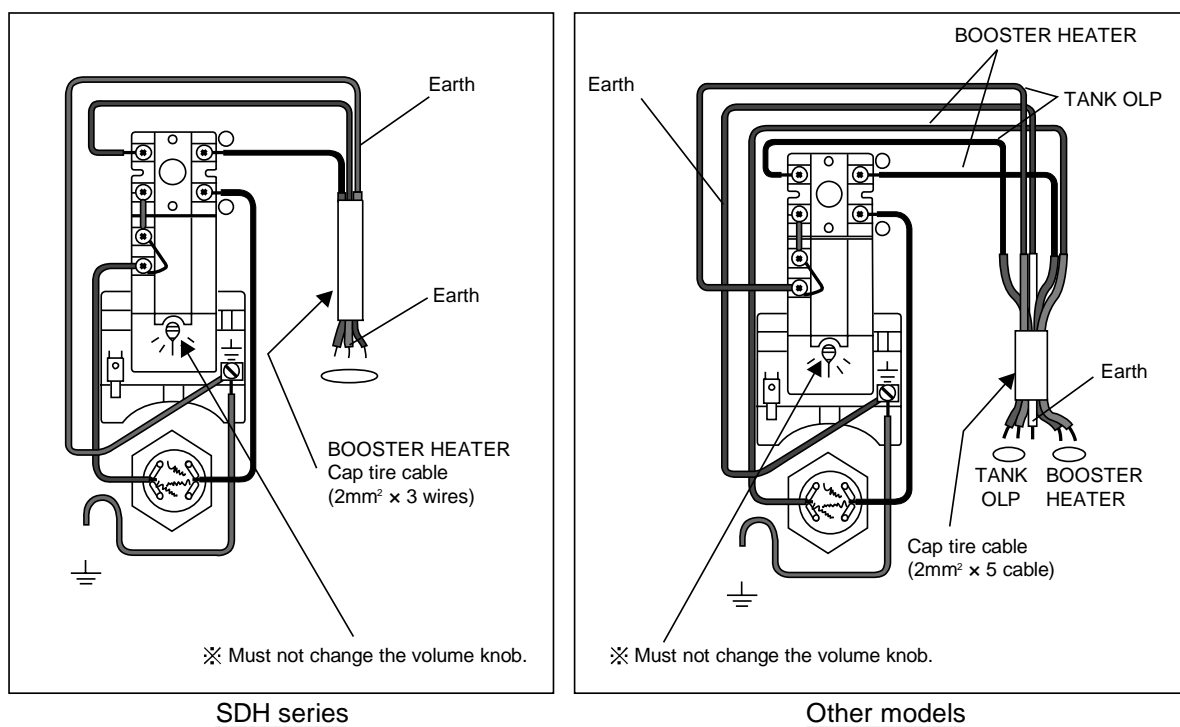
- 6** Connect the cable between heater and OLP, which located inside electrical box as shown at below section. (Wiring at Tank Unit – (Electrical Box) and Wiring at Indoor Unit)

 <b>WARNING</b>
Use cap tire cable (2 mm <sup>2</sup> ) for wiring. For SDH series, 3 cables are needed. While, for other models, 5 cables is needed.
Fix the cables to the cord protector mountings with cable ties to ensure strain relief closely.

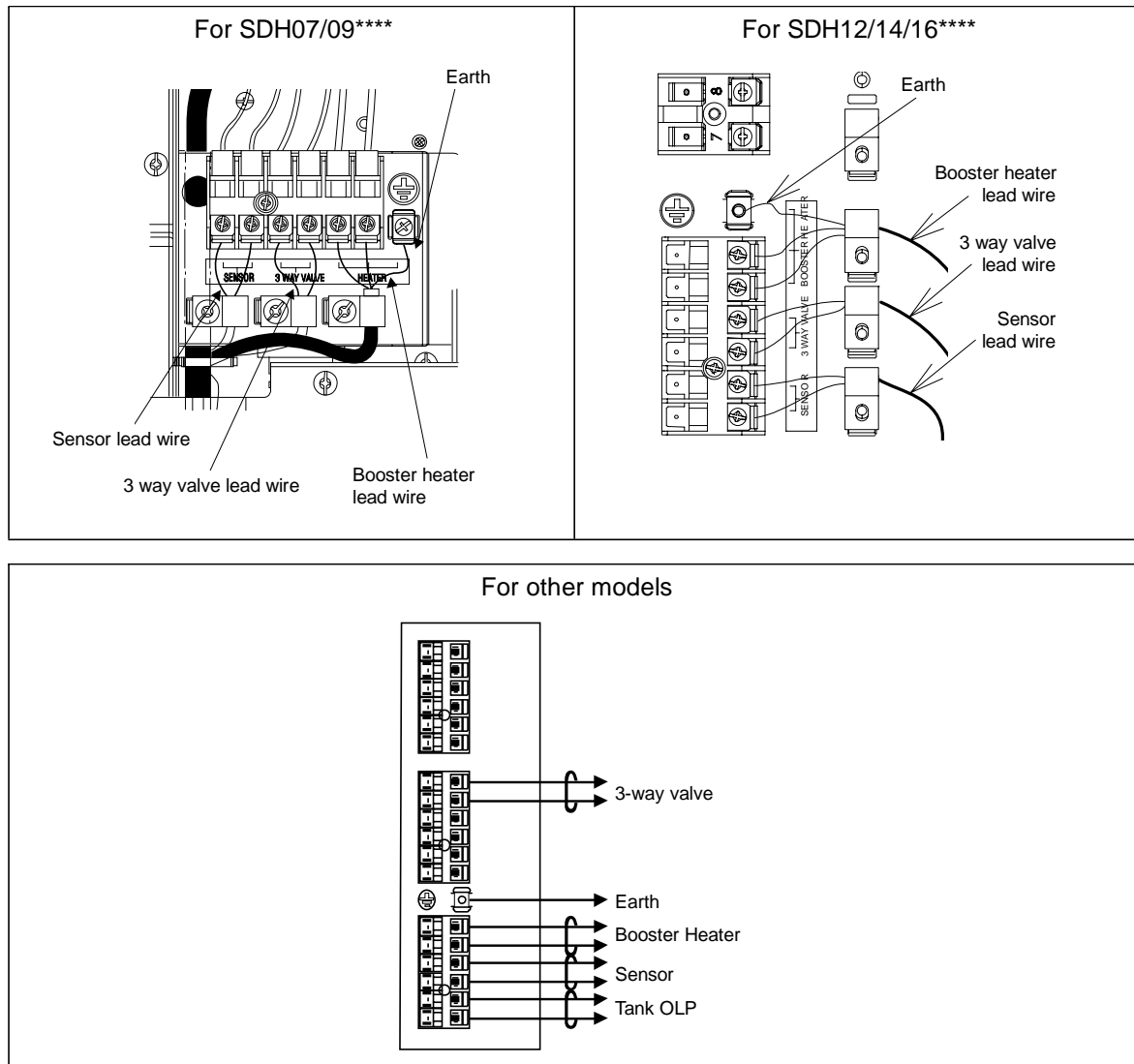
- 7** Insert the cables of 3-way valve, sensor & heater from bushing at the bottom of indoor unit. Guide the wire inside the indoor unit with refer to the installation instruction of indoor unit.

※ Please keep the space for maintenance purpose (Top: above 300mm / Front: above 600mm)

#### 4.18 – Wiring at tank unit (electrical box)



## 4.19 – Wiring Installation



## 4.20 – Water tank : Charge water

### **⚠ WARNING**

Make sure Tank Unit filled up with water before switch on the power.

- 1) Make sure all the piping installations are properly done.
- 2) Set the water supply valve "OPEN" and all hot water tap "OPEN".
- 3) Start filling water to the Tank Unit. After 20~40min, water should flow out from hot water tap.  
Else, please contact your local authorized dealer.
- 4) Switch ON the power supply of the Indoor unit. Then set the indoor control panel to "Tank Connection" to "Yes". After that, change operation mode to "Tank Mode".  
Make sure water pump running.  
Else, please contact your local authorized dealer.
- 5) Check and make sure no water leaking at the tube connecting points.

#### **4.21 – Examine the anode (once a year)**

To protect the pressure vessel an anode is placed inside the tank. The anode will, depending on the water quality, corrode. When diameter is approx. 8mm the anode must be replaced.

It is easy to check and replace the anode

- 1) Turn off power supply.
- 2) Close water supply valve.
- 3) Manually open the safety valve and drain approx. 2ltrs..
- 4) Unscrew the anode, check and if necessary replace.

#### **4.22 – Discharge the water**

- 1) Turn off power supply.
- 2) Close water supply valve.
- 3) Open safety valve, by turning knob counter-clockwise until it stays open.
- 4) After discharge, close valve continue turning counter-clockwise until the valve snaps shut.

#### **4.23 – Precuation of usage**

- When using hot water, it must be mixed with water.  
Please check the hot water's temperature before using it.  
(Hot water may cause scalding.)
- The water quality shall be in accordance with European Council Directive 98/83 EC, or revised version at the date of installation, and is not fed with water from a private supply.  
Particular: Chloride content: Max. 250 mg/l  
Sulphate content: Max. 250 mg/l  
Combination Chloride/sulphate: Max. 300 mg/l (in total)

# 5

## **SETTING AND SERVICING**

Units Configuration: Address  
Setting

Emergency Operation

Local Setting Mode

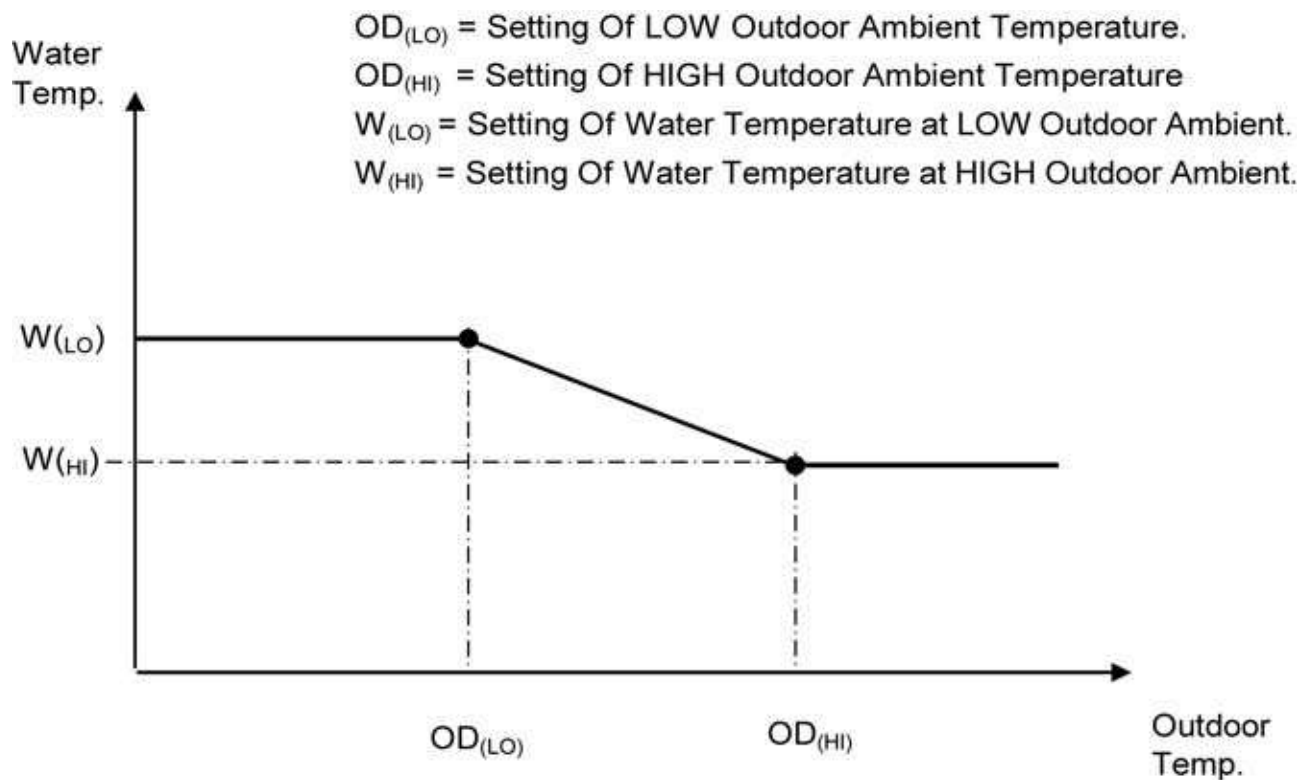
Other Servicing Operations on  
Indoor Unit

Other Servicing Operations on  
Outdoor Unit



### Setting Water Outlet Temperature For Heat Mode

- The set temperature define the parameters for the outdoor ambient temperature dependent operation of the unit. Where by the internal water setting temperature is determined automatically depending on the outdoor temperature. The colder outdoor temperatures will result in warmer water and vice versa. The user has the possibility to shift up or down the target water temperature by control panel setting

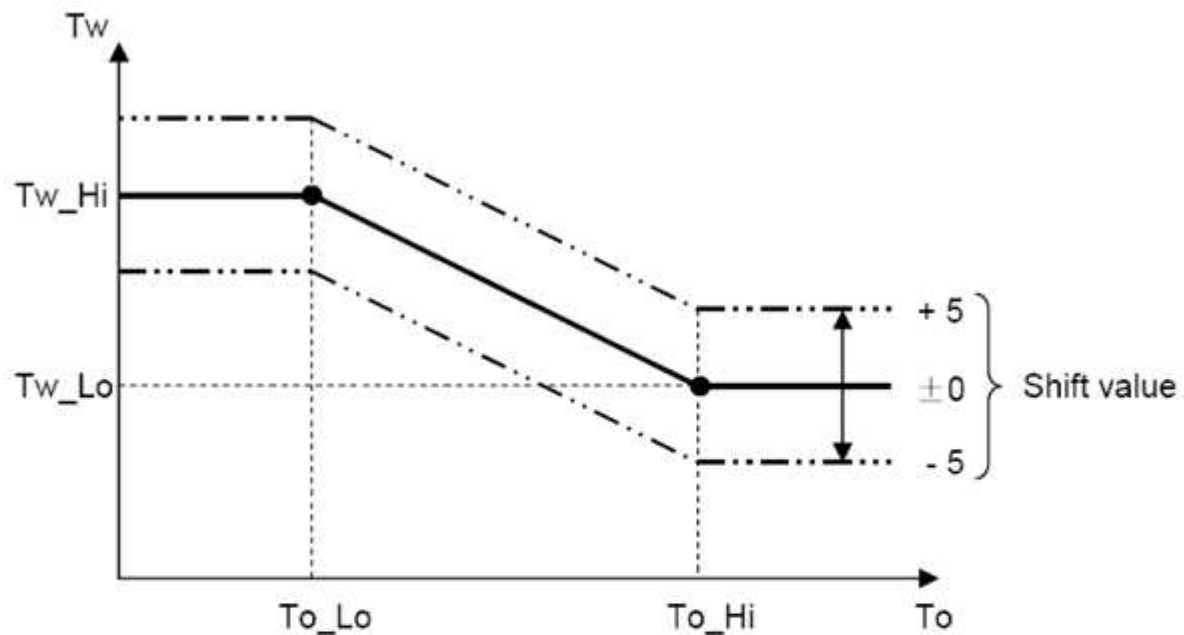


- Outdoor temperature is updated every 30 minutes when operation ON.

### Water Temperature Thermo Shift Setting

- Switchs are ignored during "PUMPDW" = ON.
- Switchs are ignored during "STATUS" = ON.
- " ", " ", "SELECT" switch are ignored if "SETTING" = OFF.
- "CANCEL" switch is ignored if "SETTING" = OFF & "STATUS" = OFF.
- If "SET" Switch pressed for lesss than 5secs, immediately enter water temperature shift setting mode.
- Once enter this setting mode, "SETTING" display is ON.

This setting mode is used to easily shift the target water outlet temperature.



$T_w$  : Setting water temperature

$T_o$  : Outdoor temperature

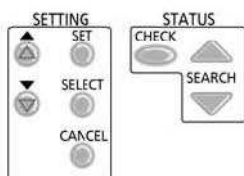
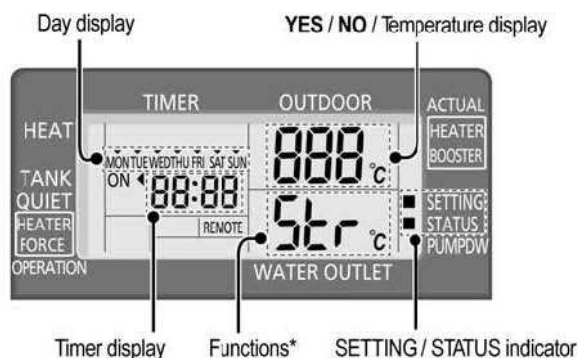
Shift value : Setting water temperature thermo shift

$T_{w\_Hi}$  : Setting water temperature at low outdoor temperature ( $T_{o\_Lo}$ ).

$T_{w\_Lo}$  : Setting water temperature at high outdoor temperature ( $T_{o\_Hi}$ ).

## Special Function Setting

- After initial installation, you can manually adjust the settings. The initial setting remains active until the user changes it.
- The control panel can be used for multiple installations. Some functions may not be applicable to your unit.



### SELECT FUNCTIONS AND SET YOUR DESIRED TIMER

1. Press **SET** and **CHECK** simultaneously for 5 seconds to enter special setting mode. "SETTING" and "STATUS" indicator is ON.  
(Make sure the OFF/ON control panel LED is OFF no operation)
2. Press **▲** or **▼** to browse functions.
3. Press **SELECT** to enter the function.
4. Press **▲** or **▼** to enable **YES** or disable **NO** function, or set your desired day and time.
5. Press **SET** to confirm.

Set	Display	Function *
Set 1	con	External Thermo Controller (YES / NO) To set external thermo controller connection.
Set 2	con	Tank Connection (YES / NO) To set tank connection. Note: If select "Tank connection" is "NO", Set 3~10 are skipped.
Set 3	PrY	Heating Priority (YES / NO) To choose to heat up the heat pump and tank units. Note: If select "Heating priority" is "YES", Set 4~6 are skipped.
Set 4	int	Heating Heat-up Interval Set To set timer during heating for HEAT + TANK mode (0.5hour ~ 10hours).
Set 5	int	Tank Heat-up Interval Set To set timer during tank for HEAT + TANK mode (5minutes ~ 1hour 35minutes).
Set 6	dLY	Booster Heater Delay Time Set To set delay timer for booster heater to ON if tank temperature is not reached (20minutes ~ 1hour 35minutes).
Set 7	Fun	Sterilization (YES / NO) To set sterilization, if required. Note: If select "Sterilization" is "NO", Set 8~10 are skipped.
Set 8	Str	Sterilization Day & Time Set To set timer for sterilization (only once a week).
Set 9	bo i	Sterilization Temperature Set To set temperature for sterilization function (40°C ~ 75°C).
Set 10	aPr	Sterilization Continue Time To set timer to maintain heating temperature in order to complete the sterilization function (5minutes ~ 1hour).

# 6

## ***TESTING AND COMMISSIONING***

Check Before Test Run

Test Run Procedure

Test Operation Check Sheets

## 6.1 – Check before Test Run

Before starting up the system for the first time check the following points on outdoor and indoor units, installation pipes and electrical connections.

Any defective check point has to be solved before start the system.

<b>Check Point</b>	<b>Content Check</b>
Power Supply	Check that the power supply level on outdoor and all indoor units is between 220 Volts AC and 240 Volts AC.
Power Supply cable	Are the wires set up and connected as described in the installation instructions?
	On three-phase models check for any phase sequence.
	Are the wire connection screws loose?
	Is the power supply cable's thickness and length appropriately measured as described in the instructions?
	Check that the power supply cables have the size and lengths as indicated in the installation instructions.
Indoor / Outdoor connection	Is it earthed (grounded)?.
	Check that the insulation resistant value is more than 1 MΩ. Use the 500 V mega-testers to measure the insulation. Do not use the mega-testers for any other circuit except for voltage of 220V to 240V.
Earth wire	Are the wire connections for the indoor/outdoor units connected as described in the instructions?
	Are the wire connections for the water tank units connected as described in the instructions?
Refrigerant pipe	Is the piping installed as described in the instructions?
	Are the pipes sizes appropriate?
	Does the pipe's length adhere to the specifications?
	Is the branch pipe slant being appropriately done as described in the instructions?. It is forbidden to have an output higher. Both has to be on same level.
	Was vacuum removal sufficiently carried out?
	Was the leak tightness test carried out with nitrogen gas? Use the testing pressure of 4.15 MPa.

<b>Check Point</b>	<b>Content Check</b>
Refrigerant pipe	Is the piping insulation material appropriately installed? Insulation material is necessary for both gas and liquid piping
	Is the 3-way valve for the liquid side and gas side open? ?
Filling additional refrigerant	Fill a proper amount of refrigerant if the piping exceed the standard piping length.
	Water tank is filled with water before turning the electricity supply on to the heater elements
	Check the water tank with enough water and remove air trip inside the system.
	Check the water tank safety valve and indoor pressure relief valve upon filling the water.
Other	
	Check that the refrigerant piping and the related wiring is connected to the same refrigerant system

Once all check points are confirmed before the first start-up of the system make sure to do the following:

- Switch the power supply ON to the outdoor unit at least 12 hours before starting the test run.
- Use test run mode for first operation. See chapter 6.2 for test run procedure.
- Make sure to perform the cooling mode test run first for at least 20 minutes before changing to heating mode test run. This will avoid any problem caused by accumulated liquid refrigerant in the outdoor unit heat exchanger during transportation or storage.

For maintenance and periodical inspections it will be necessary to measure the main parameters of the system during test run. These measurements can help engineers during commissioning work. Some of this parameters could be:

- Installed units: indoor / outdoor models, serial numbers, remote controllers list ....
- Additional accessories: Cool/Heat selector, centralized controllers, Urban Controller Software/Adapter, DIOs, ...
- Data of: user, installer, dealer, Official Service Company.
- Operating running parameters (cooling and heating), for example:
  - Suction and discharge pressure
  - Compressor / units current consumption
  - Suction and discharge compressor pipe temperatures

- Liquid and gas pipe temperature
- Intake and discharge indoor unit temperatures.
- Address setting numbers outdoor and indoor units.

When the test run is finished request the customer to review the instruction manual, explain the operating method for the product and inform him of any necessary periodical maintenance.

If any error happens during the test run, see chapter number 8 - Self Diagnosis Function in this document.

## Servicing Mode

### Test Run

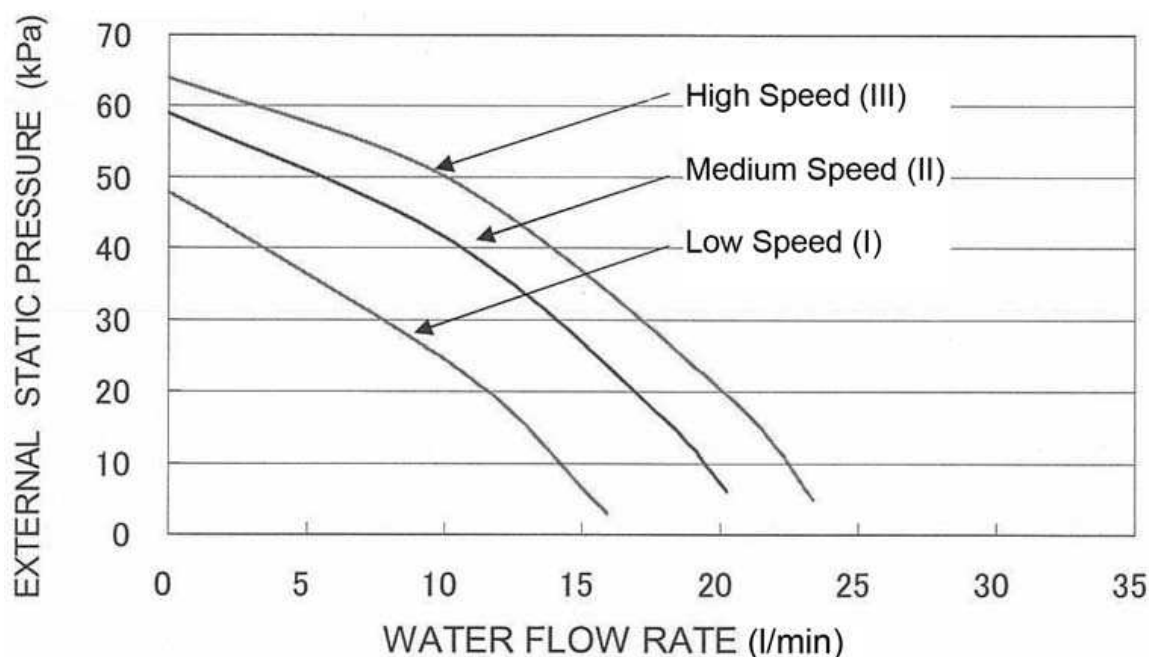
1. Fill up the boiler tank with water. For details refer to boiler tanks installation instruction and operation instruction.
2. Set ON to the indoor unit and RCCB. Then, for control panel's operation please refers to air-to-water heatpump's operation instruction.
3. For normal operation, pressure gauge reading should be in between 0.05 MPa and 0.2 MPa. If necessary, adjust the water pump speed accordingly to obtain normal water pressure operating range. If adjust water pump speed cannot solve the problem, contact your local authorized dealer.

### Proper Pump Down Procedure

1. Make sure the OFF/ON control panel LED is OFF (no operation).
2. Press the "PUMPDW" switch on control panel to begin PUMP DOWN mode. Operate the system in PUMP DOWN mode for 10 ~ 15 minutes.
3. After 10-15 minutes, (after 1 or 2 minutes in case very low ambient temperatures ( $< 10^{\circ}\text{C}$ )), fully close 2 way valve.
4. After 3 minutes, fully close 3 way valve.
5. Press the "OFF/ON" switch on control panel to stop PUMP DOWN mode.
6. Remove the refrigerant piping.

### How To Adjust Water Flow Rate

- The water flow rate can be adjusted with select the water pump speed on the water pump. The default setting is high speed (III). Adjust it to moderate speed (II) and slow speed (I) if necessary (e.g. reduce the noise of running water). Below graph shown the external static pressure (kPa) versus water flow rate (l/min).•



- Flow rate characteristic of indoor unit is as per above mentioned.



## Expansion Vessel Pre Pressure Checking

- Expansion Vessel with 10L air capacity and initial pressure of 1 bar is installed in this indoor unit.
- Total amount of water in system should be below 200L.  
(Note: This amount of water is not include the tank unit volume)
- If total amount of water is over 200L, please add expansion vessel.
- Please keep the installation height difference of system water circuit within 7m.  
(Inner volume of same indoor unit is about 5L)

## Maintenance Guide

In order to ensure optimal performance of the unit, checks and inspections on the unit and the field wiring must be carried out regularly. Please request a licensed technician for carry out maintenance job.

Before carried out any maintenance or repair work, and removing the front plate of heat exchanger unit, always switch off all power supply (i.e. indoor unit power supply, heater power supply and sanitary tank power supply).

Below checks must be carried out at least once a year.

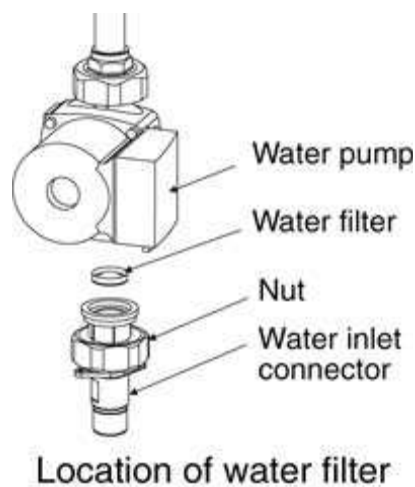
### 1. Water pressure

Water pressure should not lower than 0.05 MPa (with inspects the pressure gauge). If necessary add tap water into boiler tank. Refer to boiler tank installation instruction for details on how to add water.

### 2. Water filter

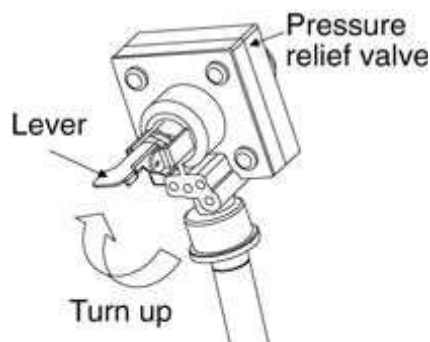
Clean the water filter in regularly basic.

- Water filter is located inside the tube connector which is below water pump.  
(Refer to figure below)
- Use spanner to detach the water pump's bottom nut.
- Take out the filter carefully so that not deforms it shape.
- Use tap water only to wash the residue on the filter. If necessary, gently use soft brush only to clean the hard dirt.
- After clean, put it back to the original location and tighten the nut connection with torque wrench.



### 3. Pressure relief valve

- Check for correction operation of pressure relief valve by turn up the lever to become horizontal. (Refer to figure below)
- If you do not hear a clacking sound (due to water drainage), contact your local authorized dealer.
- Turn down the lever after checking finish.
- In case the water keeps drained out from the unit, switch off the system, and then contact your local authorized dealer.



How to check  
pressure relief valve

### 4. Indoor unit control board area

Thorough visual inspection of the control board and look for defects, i.e. loose connection, melting of wire insulator and etc.

### 5. RCCB

Ensure the RCCB set to "ON" condition before check RCCB.

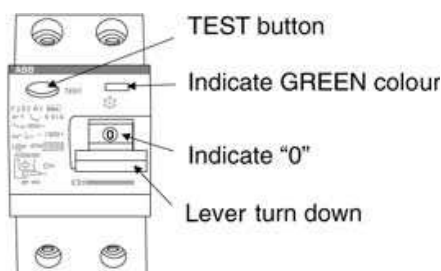
Turn on the power supply to the indoor unit.

This testing could only be done when power is supplied to the indoor unit.

#### WARNING

Be careful not to touch parts other than RCCB test button when the power is supplied to Indoor Unit. Else, electrical shock may happen.

- Push the "TEST" button on the RCCB. The lever would turn down and indicate "0" and indicate green colour if it functions normal.
- Contact authorized dealer if the RCCB malfunction.
- Turn off the power supply to the indoor unit.
- If RCCB functions normal, set the lever to "ON" again after testing finish.



Condition of RCCB - function normal  
(after press "TEST" button)

6. How to release the trapped air in water circuit

- Turn up the lever to become horizontal. (Refer to figure "Pressure relief valve"). The trapped air will be drained out together with water. After few seconds, turn down the lever to stop the water drainage.
- Repeat it until the bubbling sound disappear.

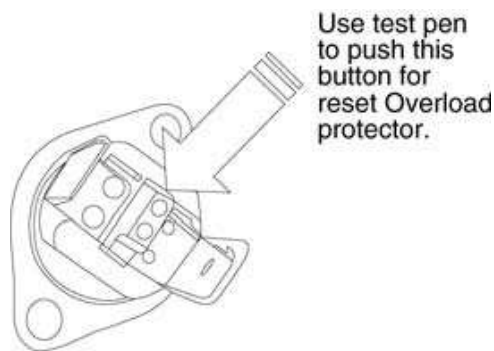
7. Reset overload protector

Overload Protector serves the safety purpose to prevent the water over heating. When the Overload Protector trip at high water temperature, take below steps to reset it.

a. Take out OLP Cover.

b. Use a test pen to push the centre button gently in order to reset the Overload protector.

c. After finish, install back the Overload protector following the reverse order of step a & b.



How to reset Overload protector

## Test Operation Check Sheets

### Test Operation Check Sheet A)

Customer	Name		Customer approval	Phone no.
	Address			

Dealer	Company name		Phone no.
	Address		
Installation company (agent)			Phone no.
Company name			Phone no.
Business address			Phone no.

Test operator	Name:	Date:	Company name:		
System name			Outdoor unit	Model name	
				Serial no.	
Unit no.					
Indoor unit	Model name		Water tank unit	Model name	
	Serial no.			Serial no.	

#### Important:

- Turn the power on 6 hours before carrying out test operation to supply power to the compressor crankcase heater to stop valve damage due to compression errors when operation starts.
- Always carry out test operation in cooling mode first for 20 minutes, even if installing during the warm season.
- Switch on power supply for Urban Net bus (SW5 to ON, only one outdoor unit on the bus line).

#### Checks before operation:

- |  | Yes                      | No                       |
|--|--------------------------|--------------------------|
| • Are power supply wiring specifications such as leakage current breakers, wire thicknesses, cable lengths and tightening torques correct? | <input type="checkbox"/> | <input type="checkbox"/> |
| • Is the electrical insulation resistance value 1 mΩ or higher?  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does the grounding work correspond to the pertinent standards?   | <input type="checkbox"/> | <input type="checkbox"/> |
| • Does the drain pipe run downward, have all welded connections and internal pipes been insulated, and is the pipe free of leaks?          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Has the separate refrigerant pipe insulation been provided for gas and liquid pipes, and are the pipes free of leaks?                    | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are the air conditioners and panels attached securely, and have any water leaks due to cool air leaking been prevented?                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are the indoor and outdoor units set up in stable locations, and are the installation bolts securely tightened?                          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Are the refrigerant pipe connections free of leaks?  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Have all printed circuit board settings been completed?  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Any further checked items, if required:  |                          |                          |

.....

.....

**The test operation was performed for:** ☐ cooling operation ☐ heating operation

#### Important:

- Measure and record the test operation characteristics and keep the measurement data in a safe place.
- The measurement items are listed on sheet 2 below.

#### Test evaluation:

- |  | Good                     | No good                  |
|--|--------------------------|--------------------------|
| • Power supply voltage, operating voltage and operating current measurements | <input type="checkbox"/> | <input type="checkbox"/> |
| • Temperature measurements at various locations                              | <input type="checkbox"/> | <input type="checkbox"/> |
| • Pressure measurements at outdoor unit                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| • Pressure measurements at indoor (water side)                               | <input type="checkbox"/> | <input type="checkbox"/> |
| • Pressure measurements at water tank unit                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| • Water pump is operate for indoor unit                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| • Water heater is operate for indoor and water tank unit                     | <input type="checkbox"/> | <input type="checkbox"/> |
| • Water is fill into the tank  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Remove air trap in the water tank system and water piping                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • Fan speed and air flow volume measurements (mainly for duct type)          | <input type="checkbox"/> | <input type="checkbox"/> |
| • Abnormal vibration check   | <input type="checkbox"/> | <input type="checkbox"/> |
| • Abnormal noise check   | <input type="checkbox"/> | <input type="checkbox"/> |

#### Comments:

--

## Test Operation Check Sheet B)

Indoor remote control information			
Parameter	Condition	Remote setting	Remark
Outdoor ambient temperature (-15°C ~ 15°C)	Hi		`C
	Lo		`C
Water outlet set temperature (25°C ~ 55°C)	Hi		`C
	Lo		`C
OFF temperature for heating operation	5°C ~ 35°C		`C
Outdoor ambient temperature to ON heating operation	-15°C ~ 20°C		`C
Sanitary tank temperature	40°C ~ 75°C		`C
Mode button	Heat		Yes / No
	Heat + tank		Yes / No
	Tank		Yes / No
Timer operation	Weekly setting		Yes / No

**7**

***SELF  
DIAGNOSIS  
FUNCTION***

Self Diagnosis

Error Code List

## 7.1 – Self Diagnosis

### Self Diagnosis Function (Three Digits Alphanumeric Code)

- When abnormality occur during operation, the system will stop operation, and OFF/ON control panel LED will blink and error code will display on the control panel Timer display LCD.
- Even error code is reset by turning OFF power supply or by pressing ERROR RESET button, if the system abnormality is still unrepaired, system will again stop operation, and OFF/ON control panel LED will again blink.
- The error code will store in IC memory.

#### • To check the error code

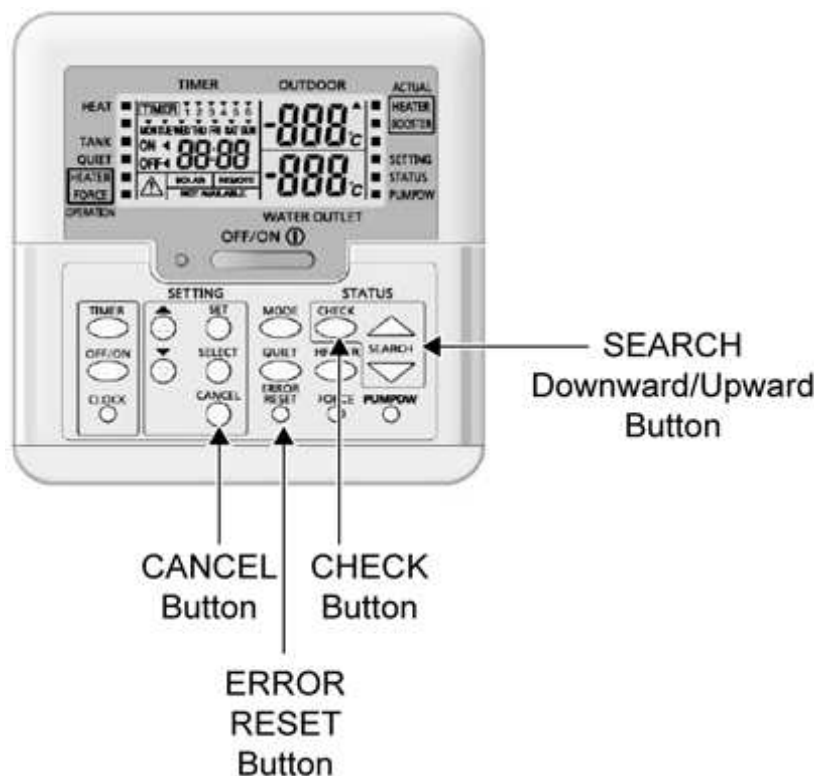
1. When an abnormality occurs, system will stop operation and OFF/ON control panel LED will blink.
2. Error code of the abnormality will display on the control panel Timer display LCD.
3. To determine the abnormality description, the Error Code Table needs to be referred.

#### • To display past/last error code

1. Turn ON power supply.
2. Press and hold the CHECK button for more than 5 seconds to enter status mode.
3. Press the SEARCH DOWN/UP button to retrieve past/last error code.
4. Press the CANCEL button or wait 30 seconds to exit status mode.

#### • To permanently delete error code from IC memory

1. Turn ON power supply.
2. Press and hold the ERROR RESET button for more than 8 seconds till a beep sound is heard.



## 7.2 – Water tank troubleshooting guide

Type of failure	Possible cause	Diagnostic and what to do
No hot water	No power supply to the water Heater.	Check if there is any power on the power supply terminal on the thermostat.
	The fuse or safety cut-off to operate.	Press the reset button.
No heating	Heating element or internal electrical wiring out of order.	Check if there is any power on the power supply on the connector of the heating element. If this OK, press the reset button on the fuse/safety cut-off.
Water not warm enough	Heating element or the internal electrical wiring partially out of order.	Adjust the thermostat up using a std. screwdriver.
		Check the resistance of the heating element on the connector of the heater bundle, and the condition of the internal wiring.
Safety valve (SV) is dripping	Water expands when heated. If there is no consumption of hot water over a period of time pressure builds up, causing the safety valve to open.	If drip from the SV is severe it might need to be replaced. Some dripping is normal. Alternatively an expansion vessel can be fitted.
Leak warning outlet is dripping	The heating element may not be properly tightened, or there may be a leak.	Check the heating element o-ring seal and all connections.



### 7.3 – Error Code List

Diagnosis display	Abnormality / Protection control	Abnormality Judgement	Primary location to verify
H00	No abnormality detected	—	—
H12	Indoor/Outdoor capacity unmatched	90s after power supply	<ul style="list-style-type: none"> <li>Indoor/outdoor connection wire</li> <li>Indoor/outdoor PCB</li> <li>Specification and combination table in catalogue</li> </ul>
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>Compressor temperature sensor (defective or disconnected)</li> </ul>
H23	Indoor refrigerant liquid temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>Refrigerant liquid temperature sensor (defective or disconnected)</li> </ul>
H38	Indoor/Outdoor mismatch	—	<ul style="list-style-type: none"> <li>Indoor/Outdoor PCB</li> </ul>
H42	Compressor low pressure abnormality	—	<ul style="list-style-type: none"> <li>Outdoor pipe temperature sensor</li> <li>Clogged expansion valve or strainer</li> <li>Insufficient refrigerant</li> <li>Outdoor PCB</li> <li>Compressor</li> </ul>
H62	Water flow switch abnormality	Continue for 1 min.	<ul style="list-style-type: none"> <li>Water flow switch</li> </ul>
H64	Refrigerant high pressure abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>Outdoor high pressure sensor (defective or disconnected)</li> </ul>
H72	Tank sensor abnormal	Continue for 5 sec.	<ul style="list-style-type: none"> <li>Tank sensor</li> </ul>
H76	Indoor - control panel communication abnormality	—	<ul style="list-style-type: none"> <li>Indoor - control panel (defective or disconnected)</li> </ul>
H90	Indoor / outdoor abnormal communication	> 1 min after starting operation	<ul style="list-style-type: none"> <li>Internal / external cable connections</li> <li>Indoor / Outdoor PCB</li> </ul>
H95	Indoor/Outdoor wrong connection	—	<ul style="list-style-type: none"> <li>Indoor/Outdoor supply voltage</li> </ul>
H98	Outdoor high pressure overload protection	—	<ul style="list-style-type: none"> <li>Outdoor high pressure sensor</li> <li>Water pump or water leakage</li> <li>Clogged expansion valve or strainer</li> <li>Excess refrigerant</li> <li>Outdoor PCB</li> </ul>
F12	Pressure switch activate	4 times occurrence within 20 minutes	<ul style="list-style-type: none"> <li>Pressure switch</li> </ul>
F14	Outdoor compressor abnormal revolution	4 times occurrence within 20 minutes	<ul style="list-style-type: none"> <li>Outdoor compressor</li> </ul>
F15	Outdoor fan motor lock abnormality	2 times occurrence within 30 minutes	<ul style="list-style-type: none"> <li>Outdoor PCB</li> <li>Outdoor fan motor</li> </ul>
F16	Total running current protection	3 times occurrence within 20 minutes	<ul style="list-style-type: none"> <li>Excess refrigerant</li> <li>Outdoor PCB</li> </ul>

<b>Diagnosis display</b>	<b>Abnormality / Protection control</b>	<b>Abnormality Judgement</b>	<b>Primary location to verify</b>
F20	Outdoor compressor overheating protection	4 times occurrence within 30 minutes	<ul style="list-style-type: none"> <li>• Compressor tank temperature sensor</li> <li>• Clogged expansion valve or strainer</li> <li>• Insufficient refrigerant</li> <li>• Outdoor PCB</li> <li>• Compressor</li> </ul>
F23	Outdoor Direct Current (DC) peak detection	7 times occurrence continuously	<ul style="list-style-type: none"> <li>• Outdoor PCB</li> <li>• Compressor</li> </ul>
F27	Pressure switch abnormality	Continue for 1 min.	<ul style="list-style-type: none"> <li>• Pressure switch</li> </ul>
F36	Outdoor air temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>• Outdoor air temperature sensor (defective or disconnected)</li> </ul>
F37	Indoor water inlet temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>• Water inlet temperature sensor (defective or disconnected)</li> </ul>
F40	Outdoor discharge pipe temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>• Outdoor discharge pipe temperature sensor (defective or disconnected)</li> </ul>
F41	PFC control	4 times occurrence within 10 minutes	<ul style="list-style-type: none"> <li>• Voltage at PFC</li> </ul>
F42	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	<ul style="list-style-type: none"> <li>• Outdoor heat exchanger temperature sensor (defective or disconnected)</li> </ul>

### 7.2.1 Compressor Tank Temperature Sensor Abnormality (H15)

#### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the compressor tank temperature sensor are used to determine sensor error.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

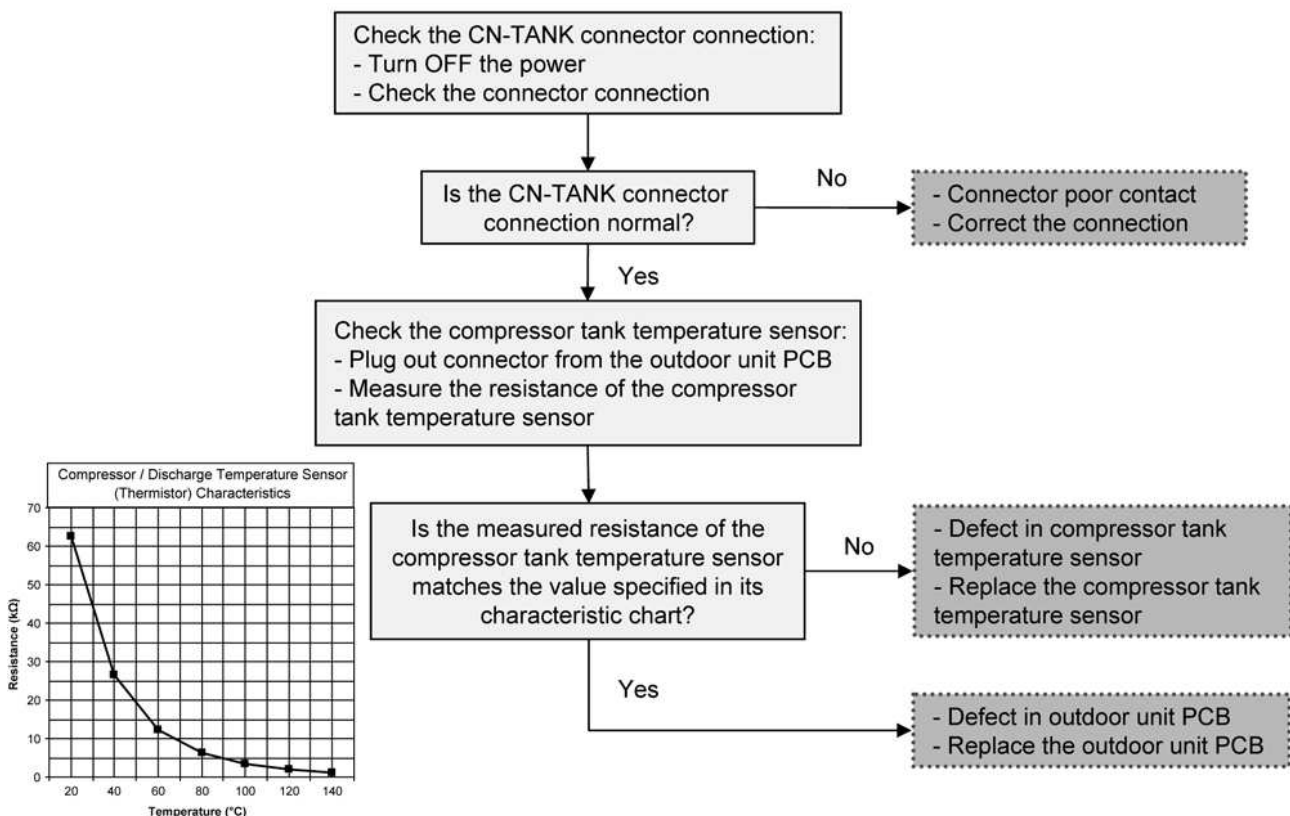
Continue for 5 seconds.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.2 Indoor Refrigerant Liquid Temperature Sensor Abnormality (H23)

#### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the indoor refrigerant liquid temperature sensor are used to determine sensor error.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty indoor unit PCB.

#### Abnormality Judgment:

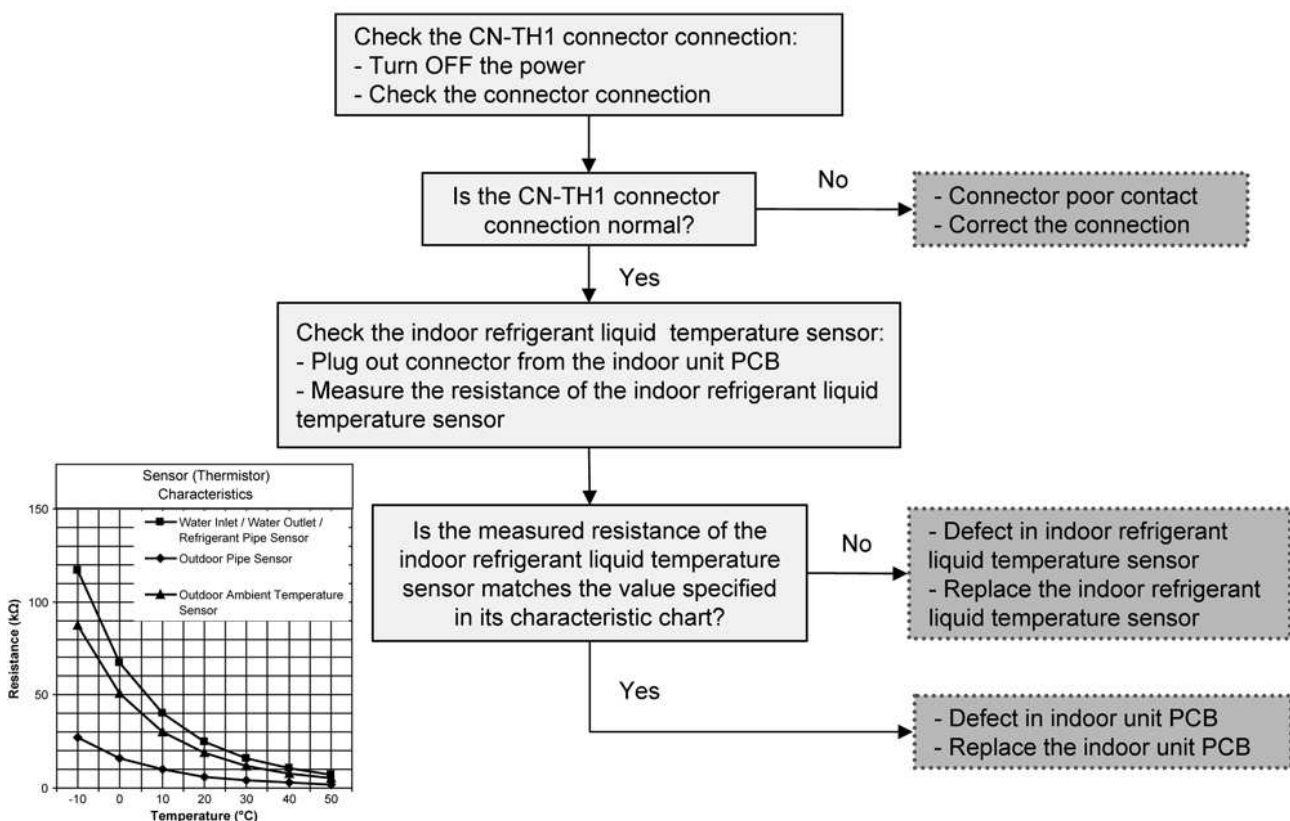
Continue for 5 seconds.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.3 Compressor Low Pressure Protection (H42)

Error code will not display (no OFF/ON Control Panel LED blinking) but store in EEPROM

#### Malfunction Decision Conditions:

During operation of heating and after 5 minutes compressor ON, when outdoor pipe temperature below  $-29^{\circ}\text{C}$  or above  $26^{\circ}\text{C}$  is detected by the outdoor pipe temperature sensor.

#### Malfunction Caused:

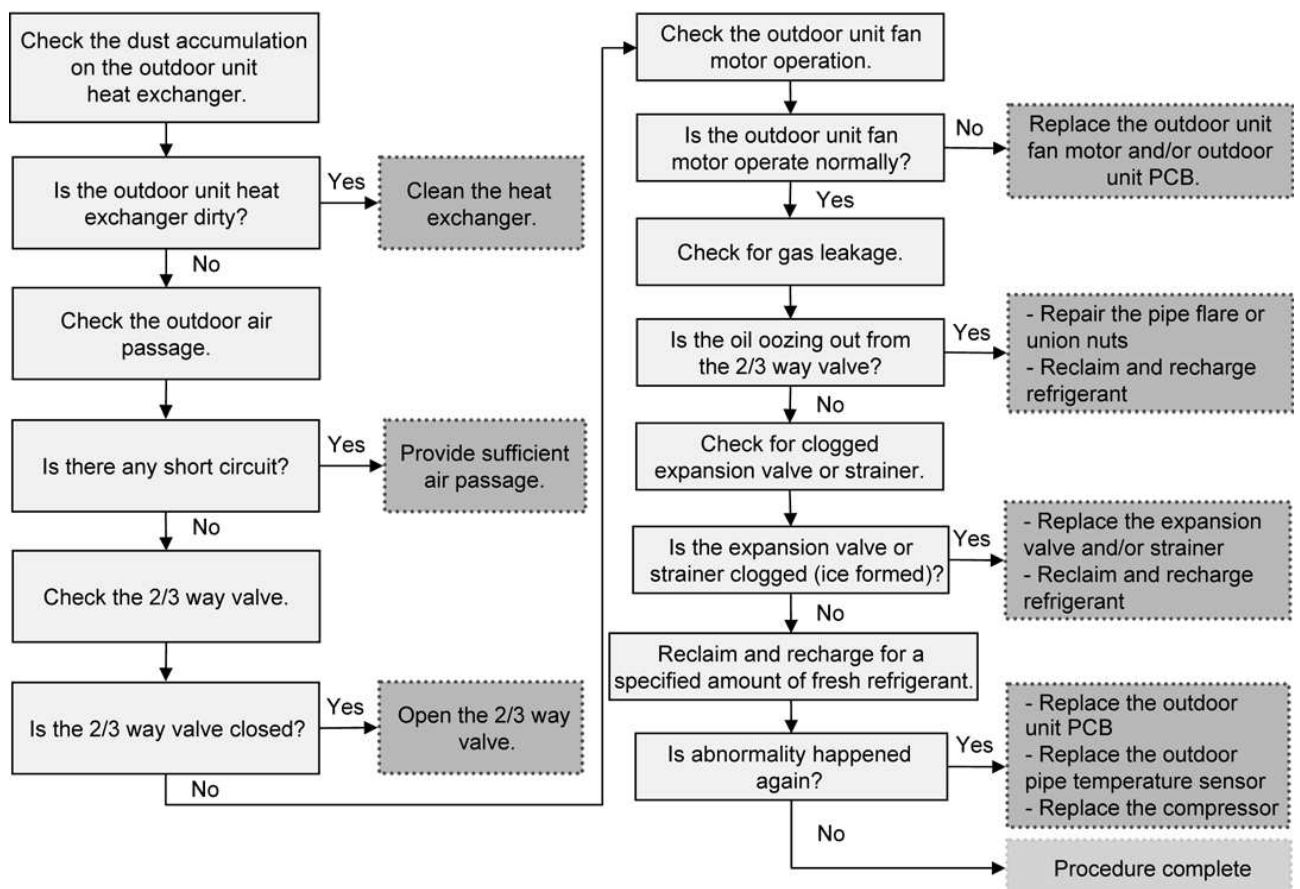
1. Dust accumulation on the outdoor unit heat exchanger.
2. Air short circuit at outdoor unit.
3. 2/3 way valve closed.
4. Faulty outdoor unit fan motor.
5. Refrigerant shortage (refrigerant leakage).
6. Clogged expansion valve or strainer.
7. Faulty outdoor pipe temperature

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



## 7.2.4 Water Flow Switch Abnormality (H62)

### Malfunction Decision Conditions:

During operation of heating, the water flow detected by the indoor water flow switch is used to determine water flow error.

### Malfunction Caused:

1. Faulty water pump.
2. Water leak in system.
3. Faulty connector connection.
4. Faulty water flow switch.
5. Faulty indoor unit PCB.

### Abnormality Judgment:

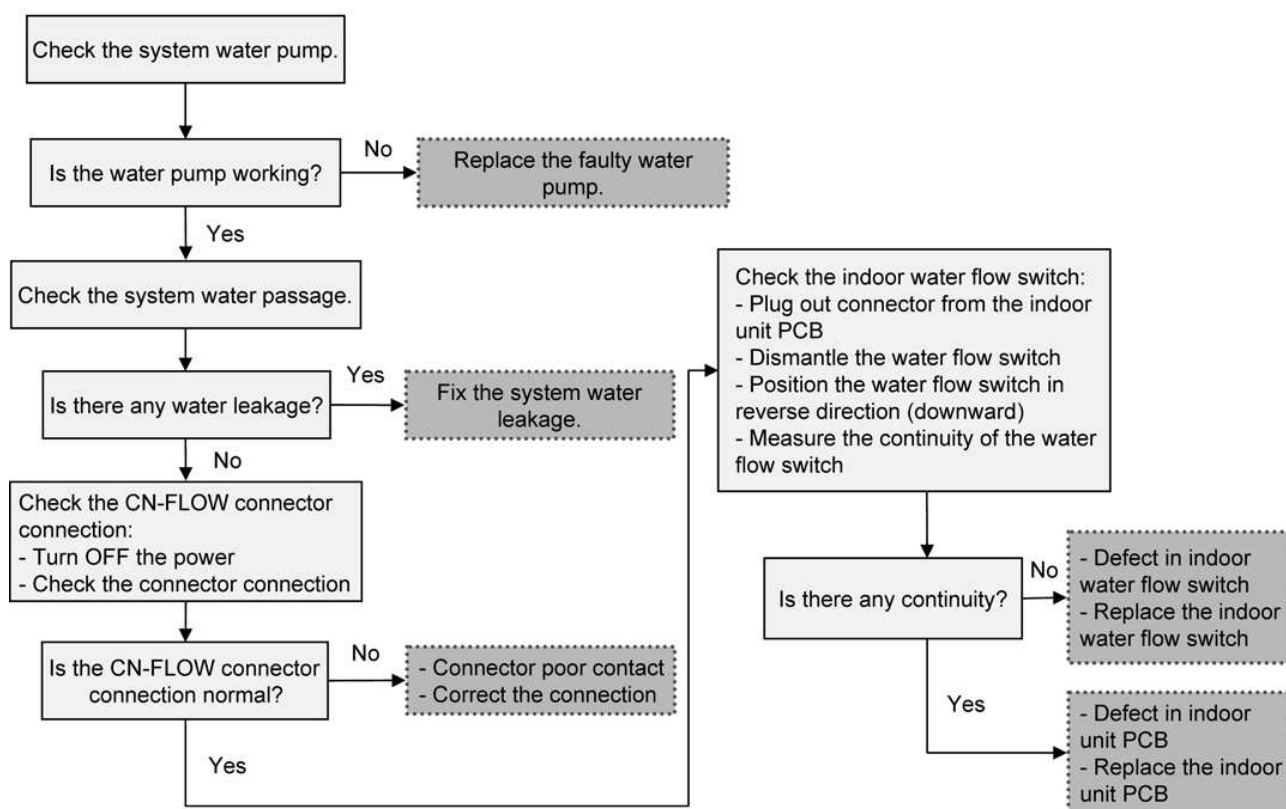
Continue for 1 minute (but no judgment for 9 minutes after compressor startup/restart).

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





### 7.2.5 Outdoor High Pressure Abnormality (H64)

#### Malfunction Decision Conditions:

During operation of heating, when the outdoor high pressure sensor output signal is 0Vdc or 5Vdc.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

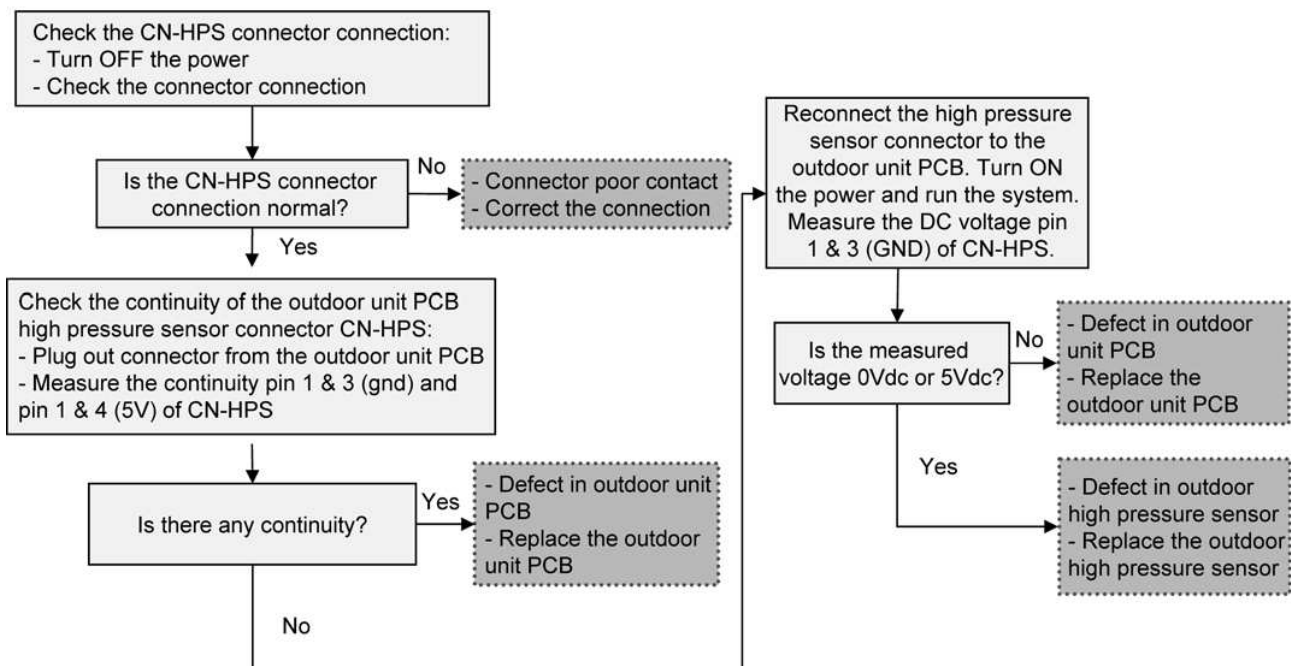
Continue for 5 seconds (but no judgment for 5 minutes after compressor startup/restart).

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



## 7.2.6 Indoor-Control Panel Communication Abnormality (H76)

### Malfunction Decision Conditions:

During standby and operation of heating, indoor-control panel error occur.

### Malfunction Caused:

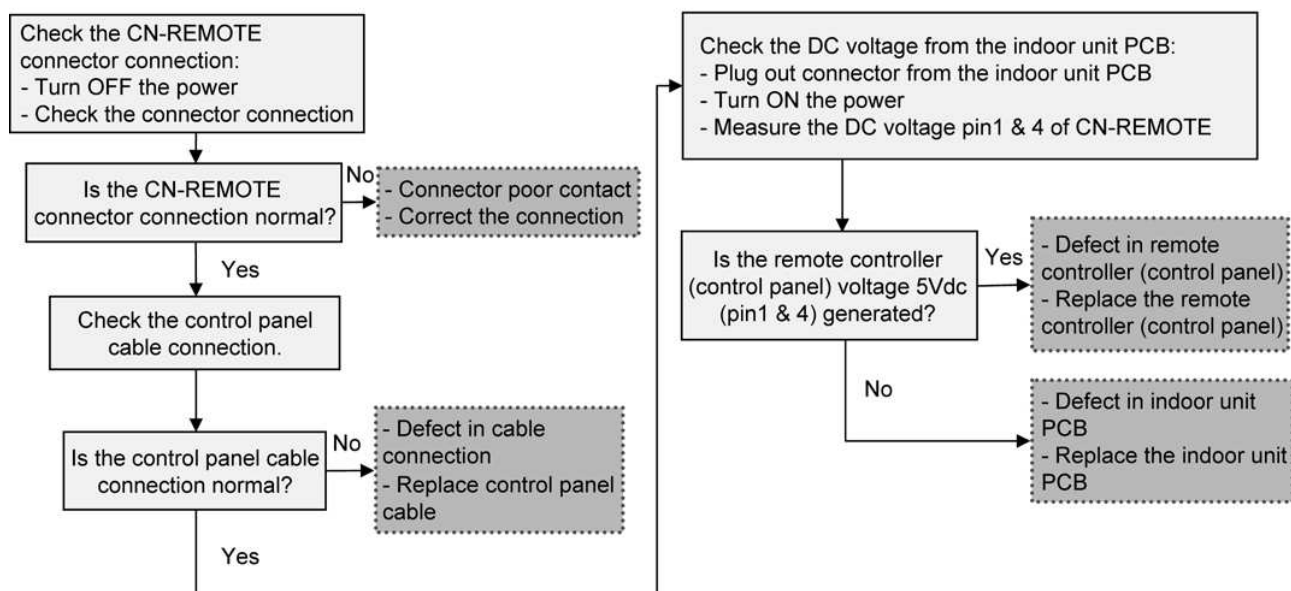
1. Faulty connector connection.
2. Faulty control panel.
3. Faulty indoor unit PCB.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





### 7.2.7 Indoor/Outdoor Abnormal Communication (H90)

#### Malfunction Decision Conditions:

During standby and operation of heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

#### Malfunction Caused:

1. Faulty outdoor unit PCB.
2. Faulty indoor unit PCB.
3. Indoor-outdoor signal transmission error due to wrong wiring.
4. Indoor-outdoor signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.
5. Indoor-outdoor signal transmission error due to disturbed power supply waveform.

#### Abnormality Judgment:

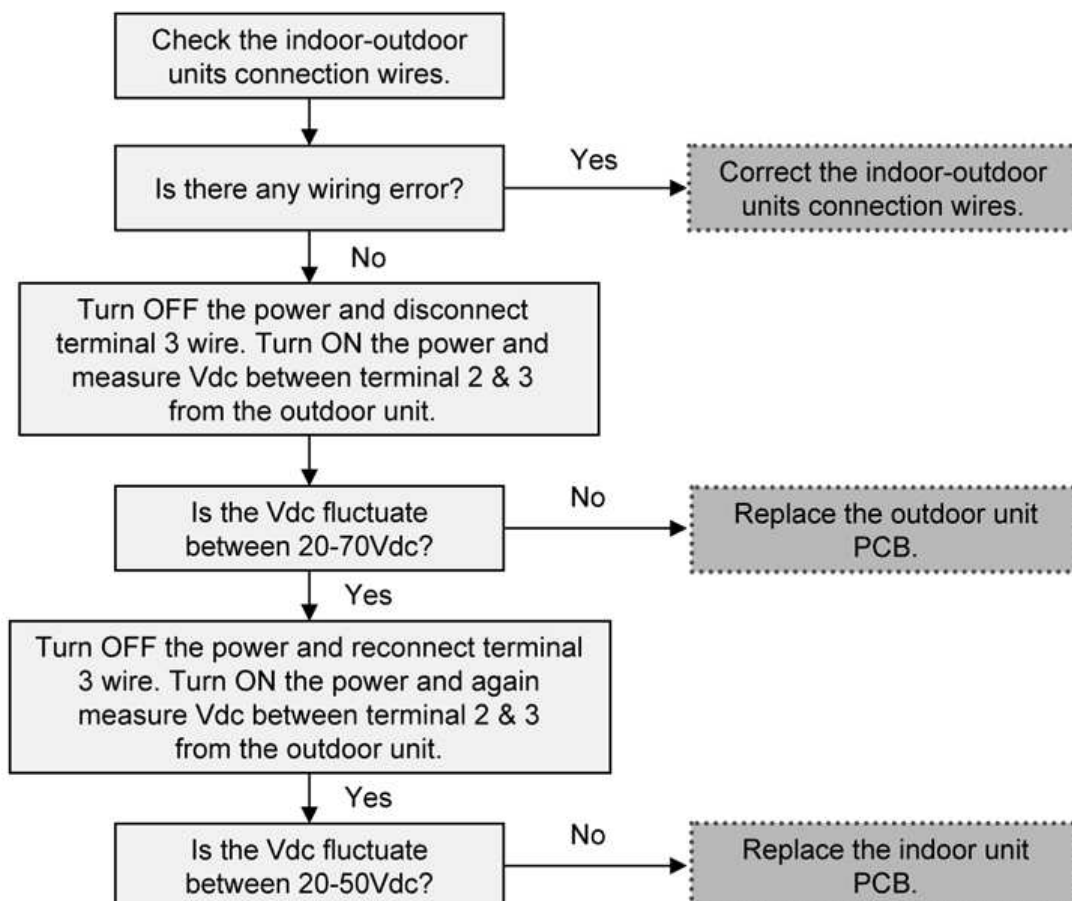
Continue for 1 minute after operation.

#### Troubleshooting:

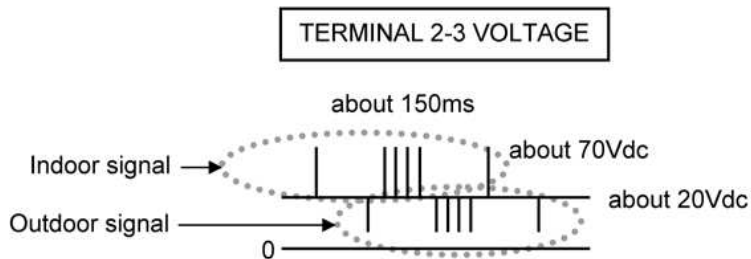


Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.7.1 Communication voltage measurement:



To determine if outdoor unit PCB or indoor unit PCB is faulty:

1. Start with outdoor terminal.
2. Remove terminal 3 wire.
3. Measure with a multimeter (voltage in DC range).
4. If it is never constant, and outdoor PCB is good fluctuating in between 20-70Vdc, outdoor PCB is in good condition.

## 7.2.8 Unspecified Voltage between Indoor and Outdoor (H95)

### Malfunction Decision Conditions:

The supply power is detected for its requirement by the indoor/outdoor transmission.

### Malfunction Caused:

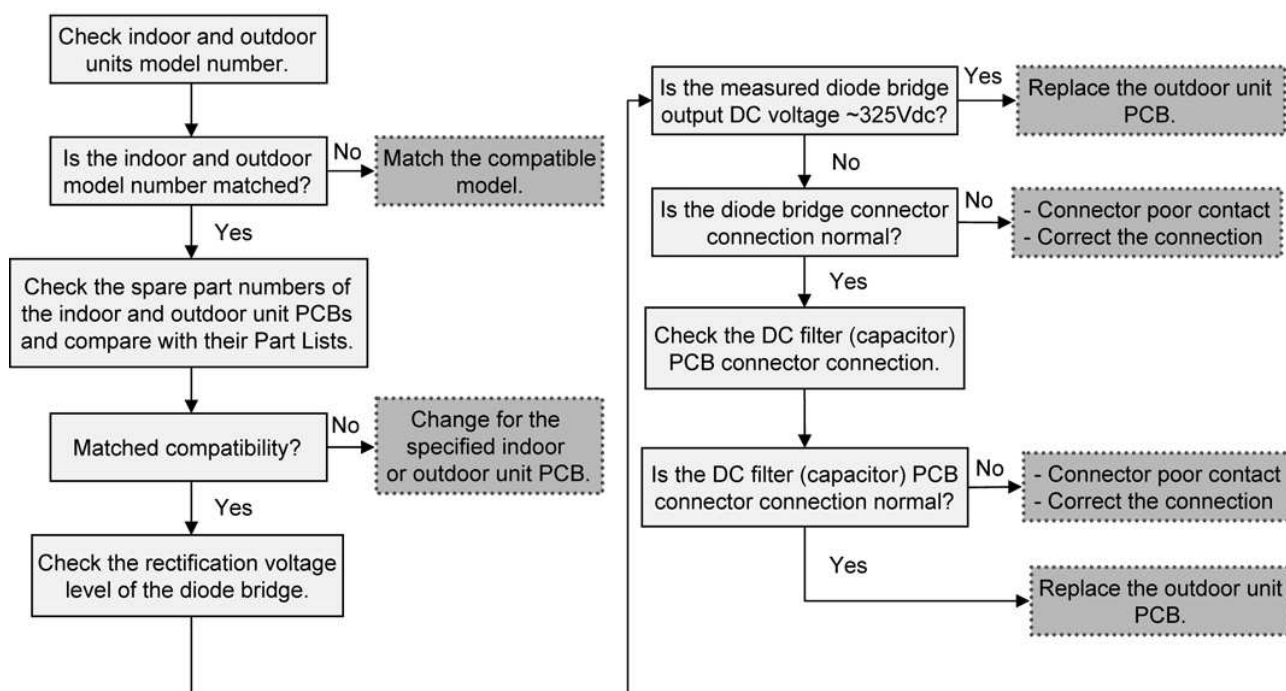
1. Wrong models interconnected.
2. Wrong indoor unit or outdoor unit PCB used.
3. Faulty indoor unit or outdoor unit PCB.

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.9 Outdoor High Pressure Protection (H98)

Error code will not display (no OFF/ON Control Panel LED blinking) but store in EEPROM

#### Malfunction Decision Conditions:

During operation of heating, when pressure 4.0 MPa and above is detected by outdoor high pressure sensor.

#### Malfunction Caused:

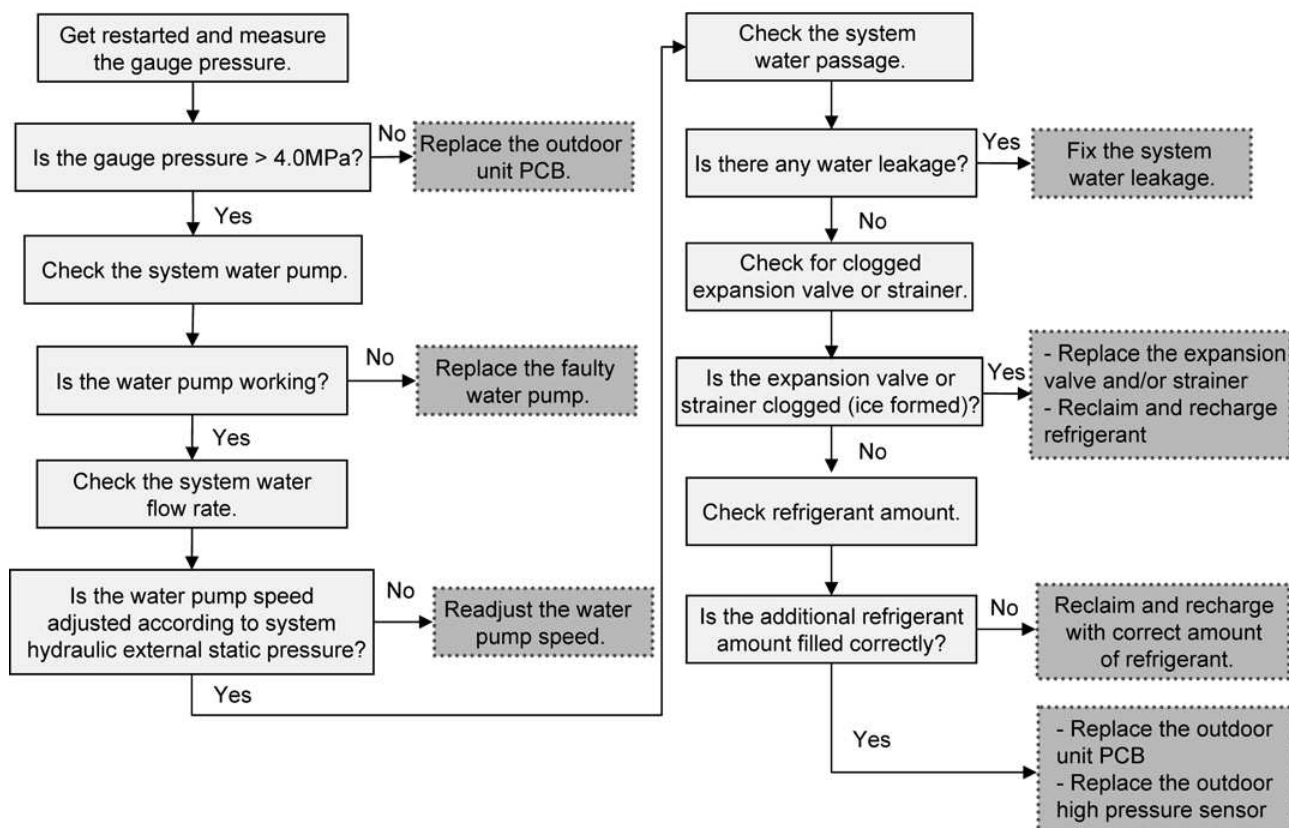
1. Faulty water pump.
2. Insufficient water flow rate in system.
3. Water leak in system.
4. Clogged expansion valve or strainer.
5. Excessive refrigerant.
6. Faulty outdoor high pressure sensor.
7. Faulty outdoor unit PCB.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.10 Outdoor High Pressure Switch Activate (F12)

#### Malfunction Decision Conditions:

During operation of heating, when pressure 4.5 MPa and above is detected by outdoor high pressure switch.

#### Malfunction Caused:

1. Faulty water pump.
2. Insufficient water flow rate in system.
3. Water leak in system.
4. Clogged expansion valve or strainer.
5. Excessive refrigerant.
6. Faulty outdoor high pressure sensor and switch.
7. Faulty outdoor unit PCB.

#### Abnormality Judgment:

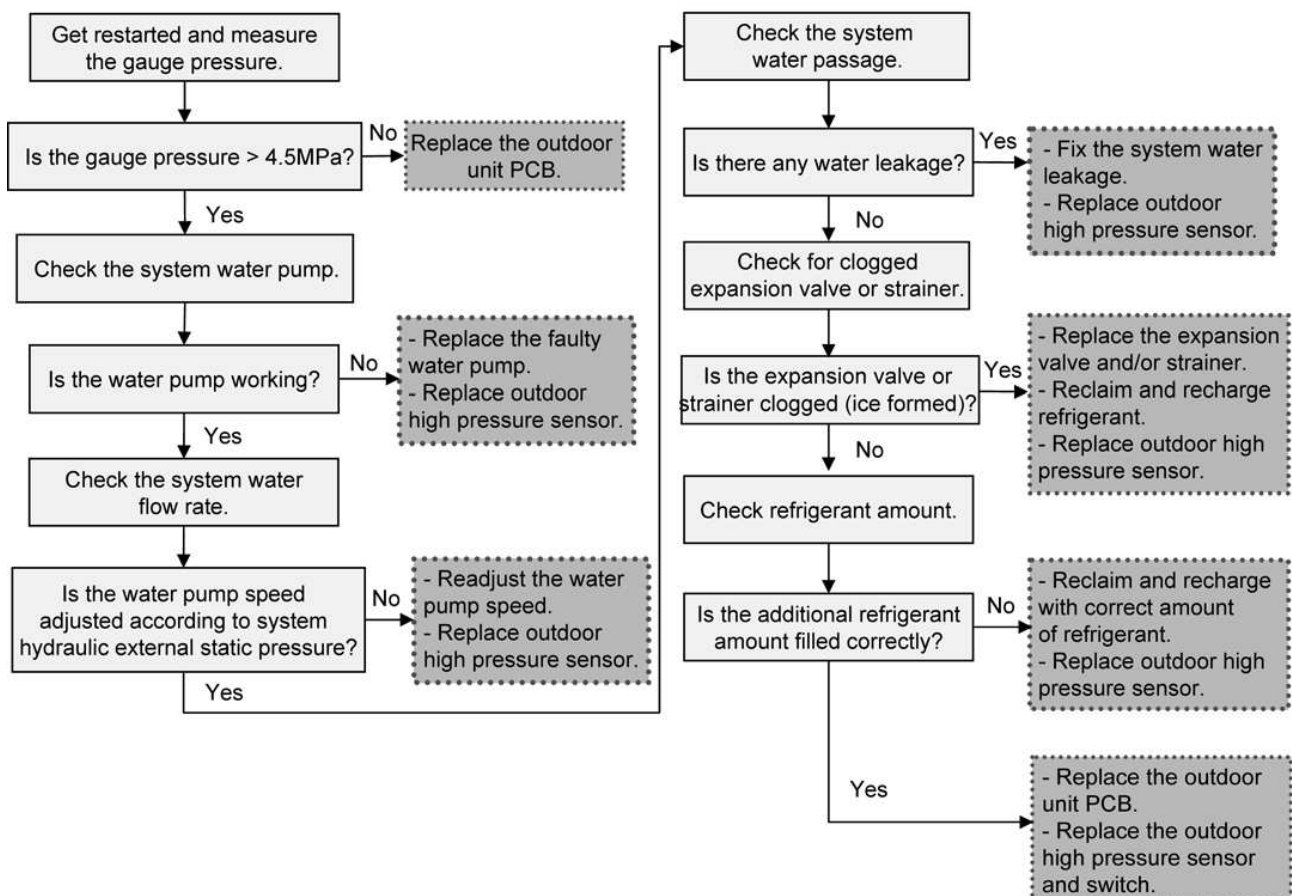
Continue 4 times in 20 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





### 7.2.11 Compressor Rotation Failure (F14)

#### Malfunction Decision Conditions:

A compressor rotation failure is detected by checking the compressor running condition through the position detection circuit.

#### Malfunction Caused:

1. Compressor terminal disconnect.
2. Faulty outdoor unit PCB.
3. Faulty compressor.

#### Abnormality Judgment:

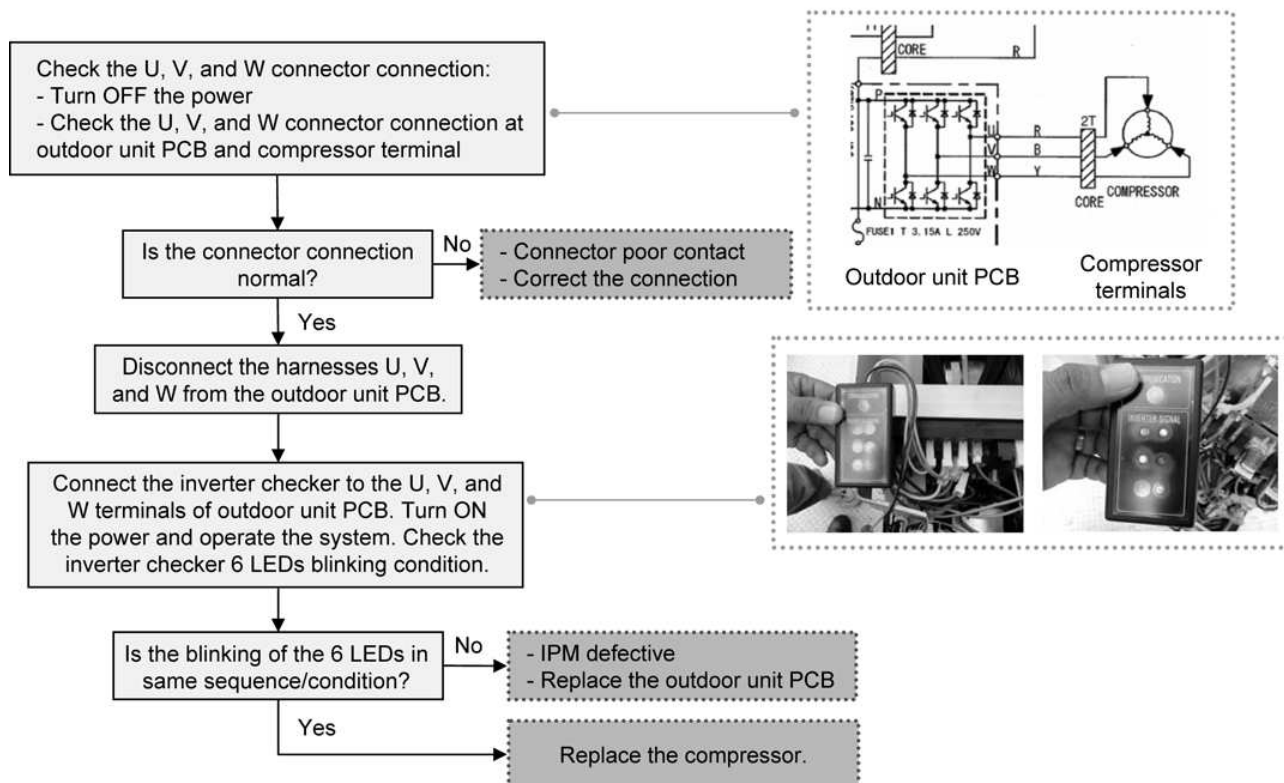
Continue 4 times in 20 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.12 Outdoor Fan Motor (DC Motor) Mechanism Locked (F15)

#### Malfunction Decision Conditions:

The rotation speed detected by the Hall IC of the fan motor during fan motor operation is used to determine abnormal fan motor (feedback of rotation > 2550rpm or < 50rpm).

#### Malfunction Caused:

1. Operation stop due to short circuit inside the fan motor winding.
2. Operation stop due to breaking of wire inside the fan motor.
3. Operation stop due to breaking of fan motor lead wires.
4. Operation stop due to fan motor Hall IC malfunction.
5. Operation error due to faulty outdoor unit PCB.

#### Abnormality Judgment:

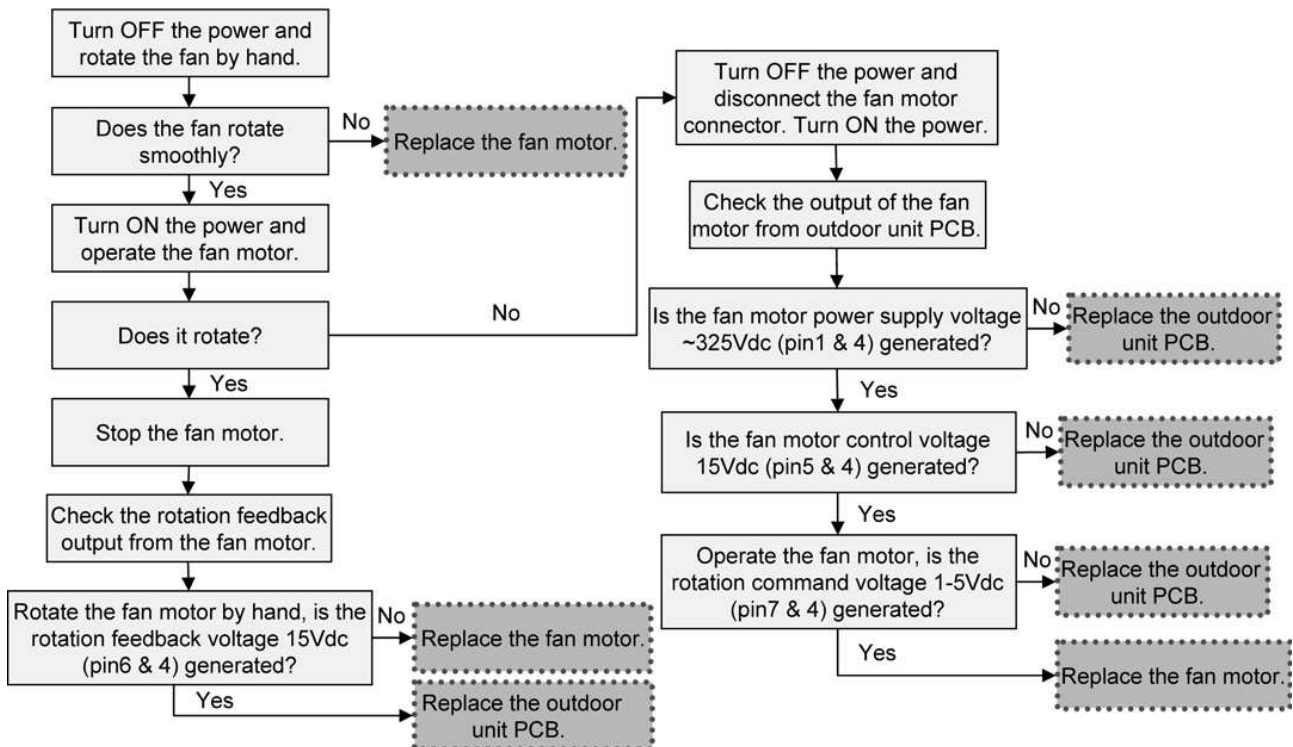
Continue 2 times in 30 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.13 Input Over Current Detection (F16)

#### Malfunction Decision Conditions:

During operation of heating, when outdoor current above 28.0A is detected by the current transformer (CT) in the outdoor unit PCB.

#### Malfunction Caused:

1. Excessive refrigerant.
2. Faulty outdoor unit capacitor PCB.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

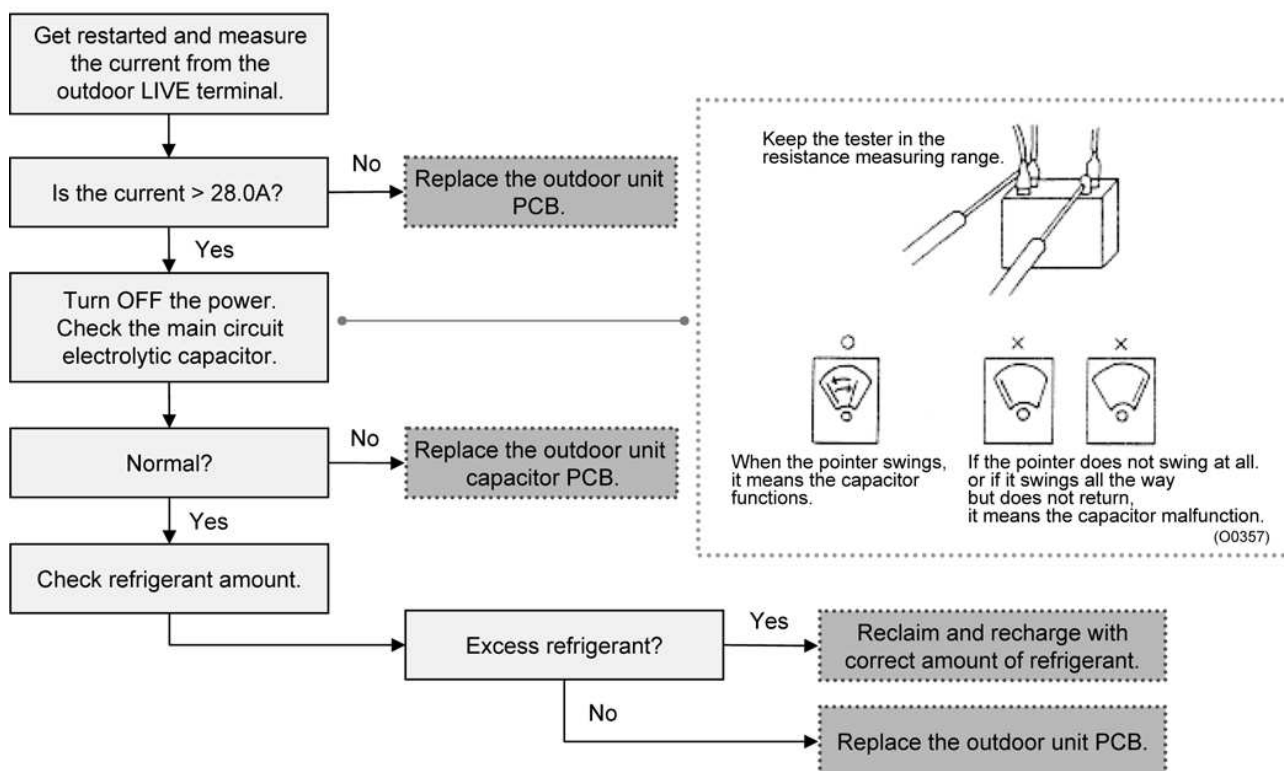
Continue 3 times in 20 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





### 7.2.14 Compressor Overheating (F20)

#### Malfunction Decision Conditions:

During operation of heating, when temperature above 112°C is detected by the compressor tank temperature sensor.

#### Malfunction Caused:

1. Faulty compressor tank temperature sensor.
2. 2/3 way valve closed.
3. Refrigerant shortage (refrigerant leakage).
4. Clogged expansion valve or strainer.
5. Faulty outdoor unit PCB.
6. Faulty compressor.

#### Abnormality Judgment:

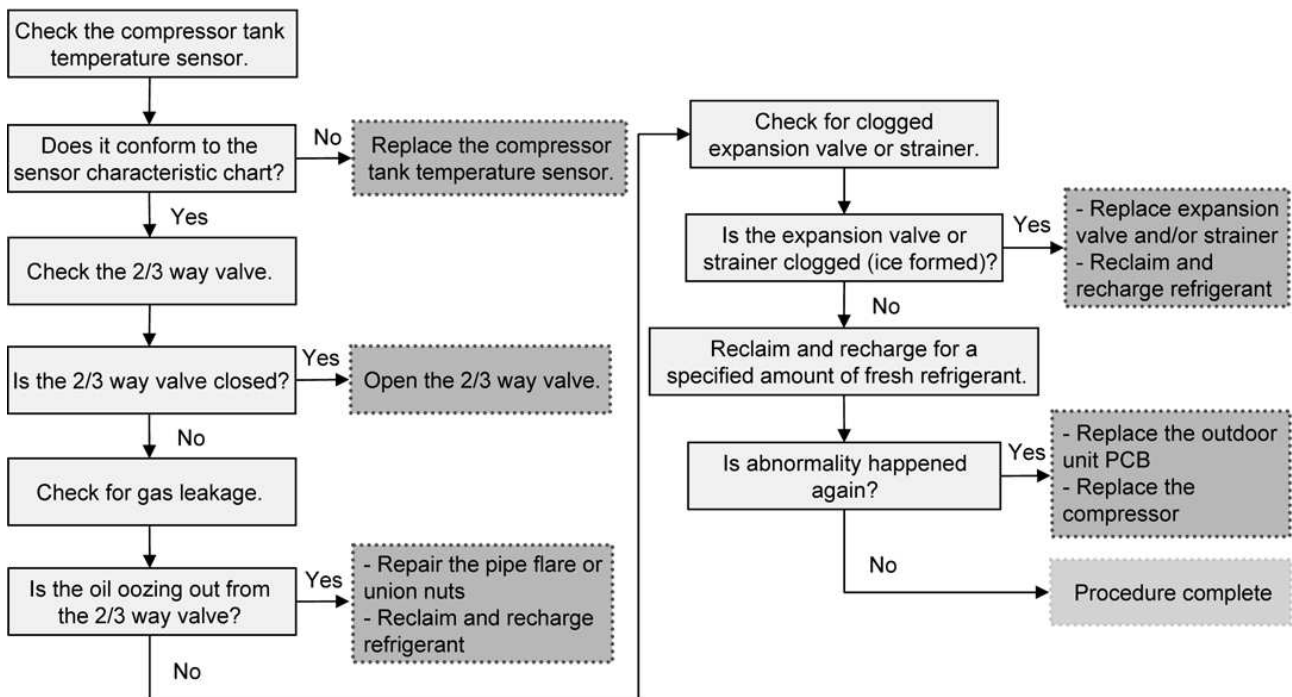
Continue 4 times in 30 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.15 IPM Overheating (F22)

#### Malfunction Decision Conditions:

During operation of heating, when temperature 95° C is detected by the outdoor IPM temperature sensor.

#### Malfunction Caused:

1. Faulty outdoor unit fan motor.
2. Faulty outdoor unit PCB.

#### Abnormality Judgment:

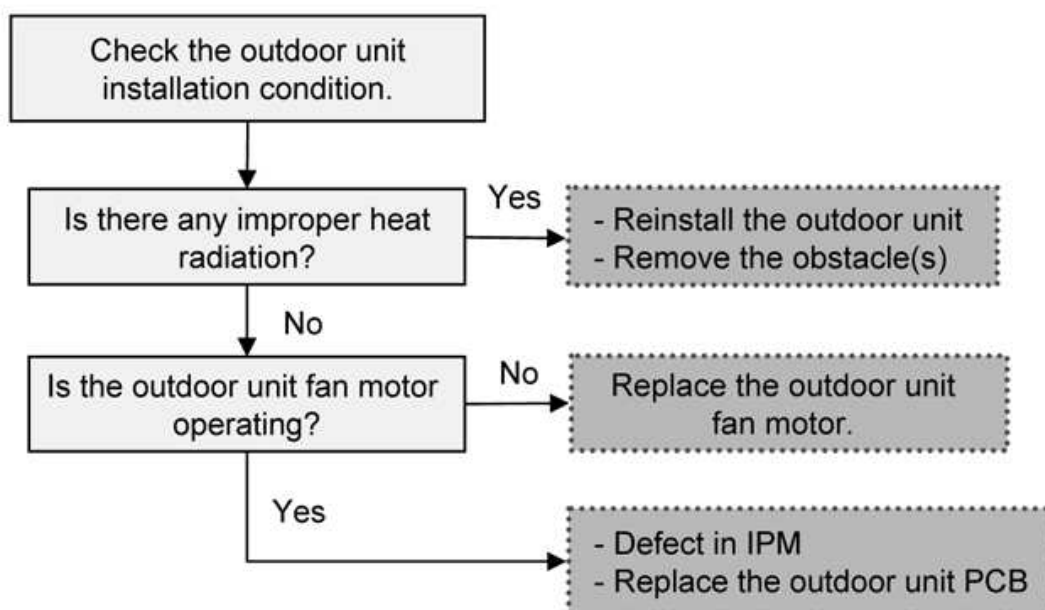
Continue 3 times in 30 minutes.

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



## 7.2.16 Output Over Current Detection (F23)

### Malfunction Decision Conditions:

During operation of heating, when DC current above  $30.0 \pm 5.0\text{A}$  is detected by the IPM DC Peak sensing circuitry in the outdoor unit PCB.

### Malfunction Caused:

1. Faulty outdoor unit PCB.
2. Faulty compressor.

### Abnormality Judgment:

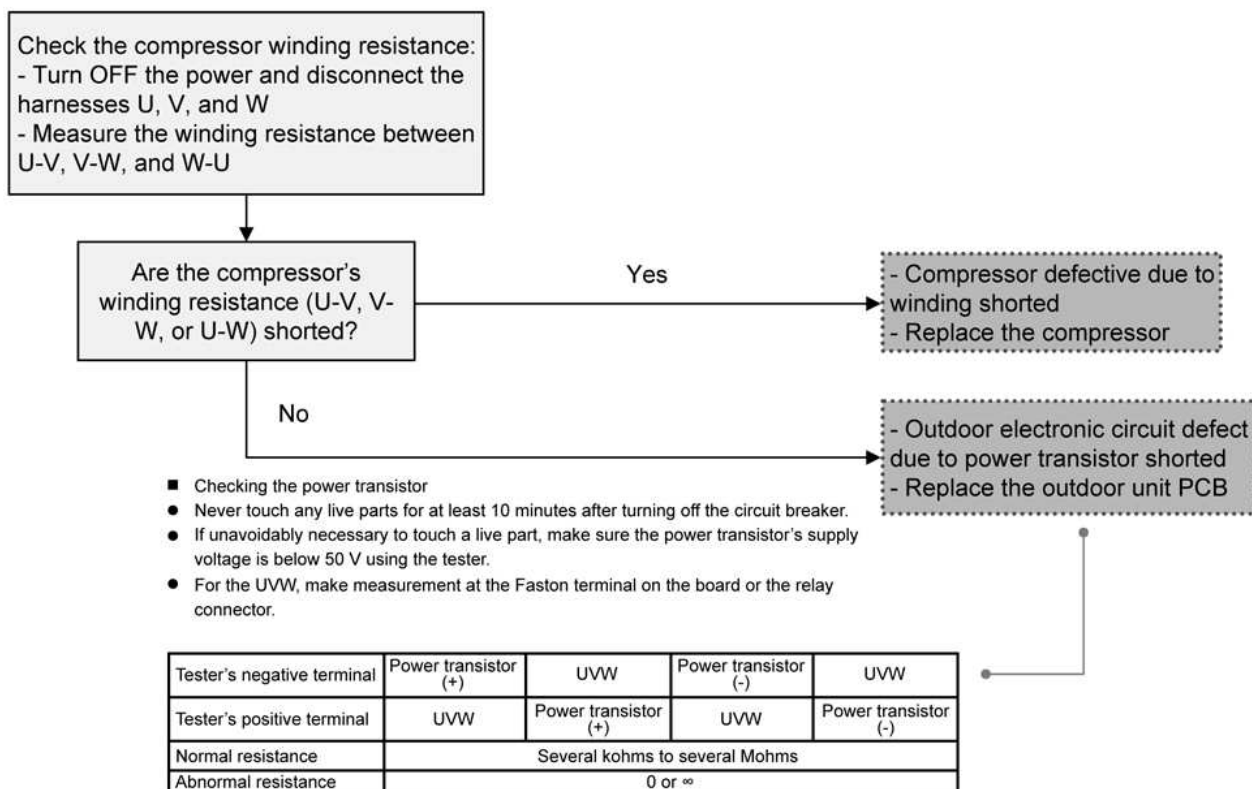
Continue for 7 times.

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.17 Refrigeration Cycle Abnormality (F24)

#### Malfunction Decision Conditions:

1. During operation of heating, compressor frequency > Fhrated.
2. During operation of heating, running current:  $0.65A < I < 1.65A$ .
3. During operation of heating, indoor pipe temperature — water inlet temperature < 5° C.

#### Malfunction Caused:

1. Faulty indoor water inlet or indoor pipe temperature sensors.
2. 2/3 way valve closed.
3. Refrigerant shortage (refrigerant leakage).
4. Clogged expansion valve or strainer.
5. Faulty outdoor unit PCB.
6. Poor compression of compressor.

#### Abnormality Judgment:

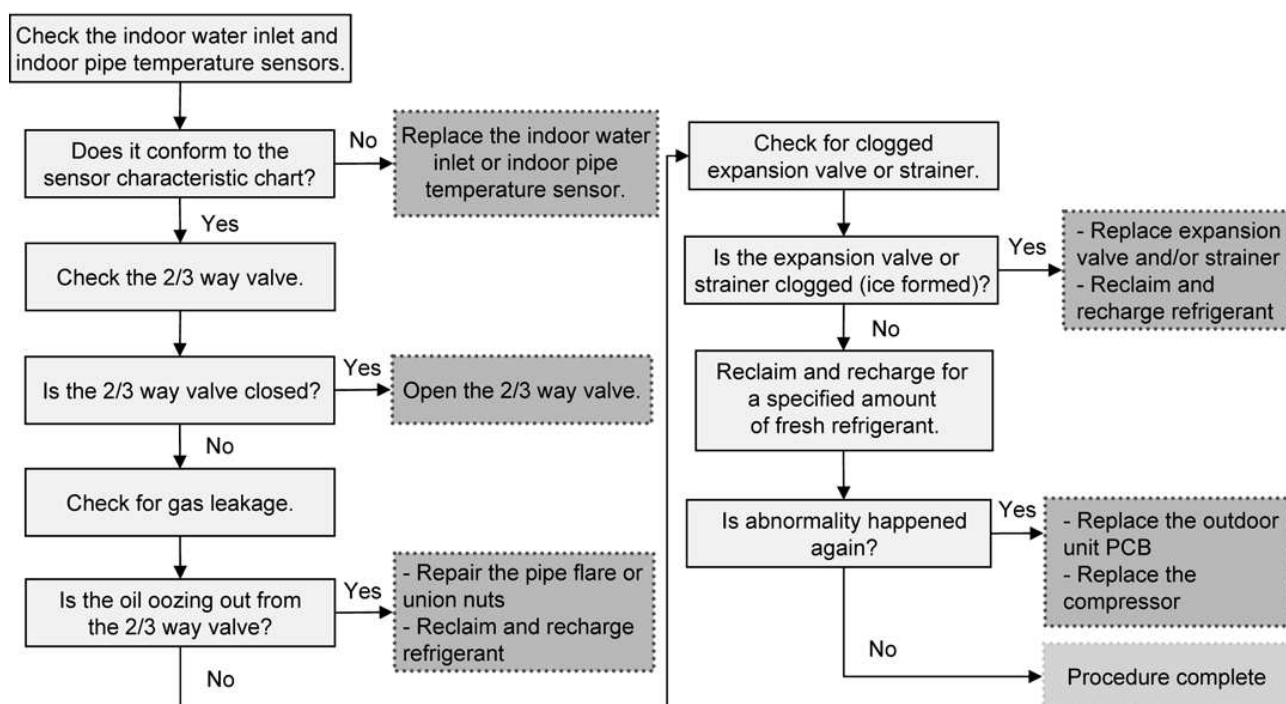
Continue 2 times in 20 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.18 Four Way Valve Abnormality (F25)

#### Malfunction Decision Conditions:

During operation of heating, when temperature below 0° C is detected by indoor pipe temperature sensor.

#### Malfunction Caused:

1. Faulty sensor.
2. Faulty connector connection.
3. Faulty outdoor unit PCB.
4. Faulty four way valve.

#### Abnormality Judgment:

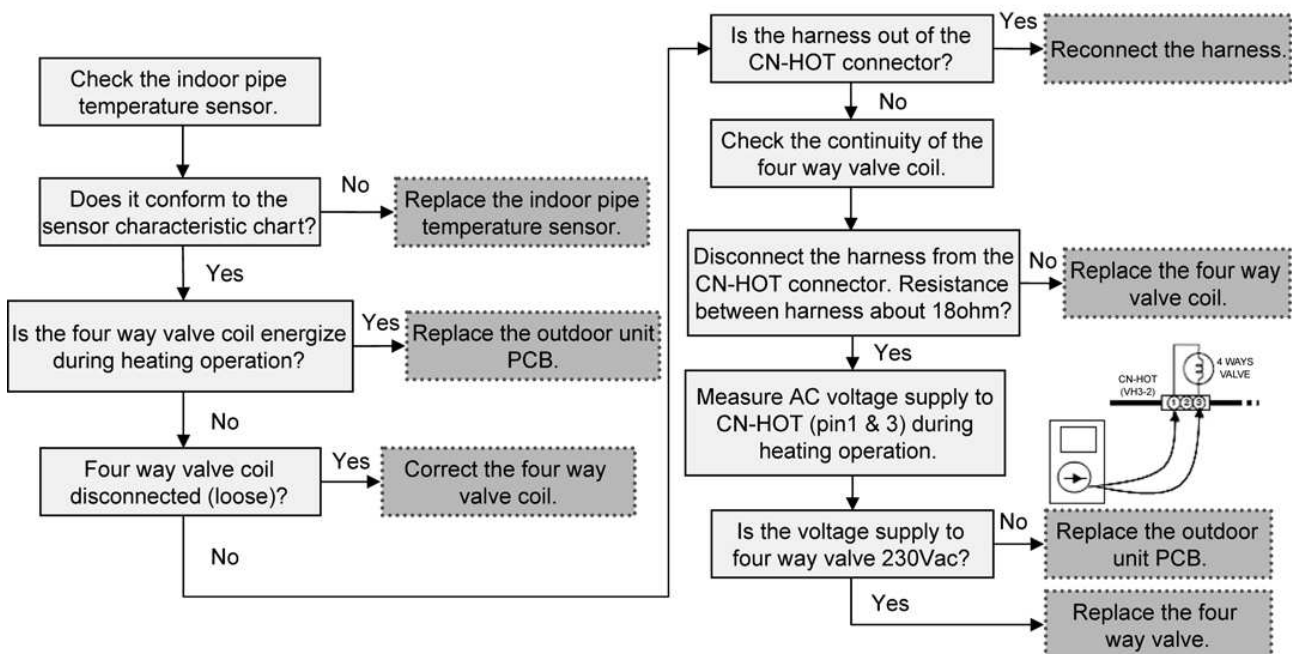
Continue 4 times in 30 minutes

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.19 Outdoor High Pressure Switch Abnormal (F27)

#### Malfunction Decision Conditions:

During compressor stop, and outdoor high pressure switch is remain opened.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty switch.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

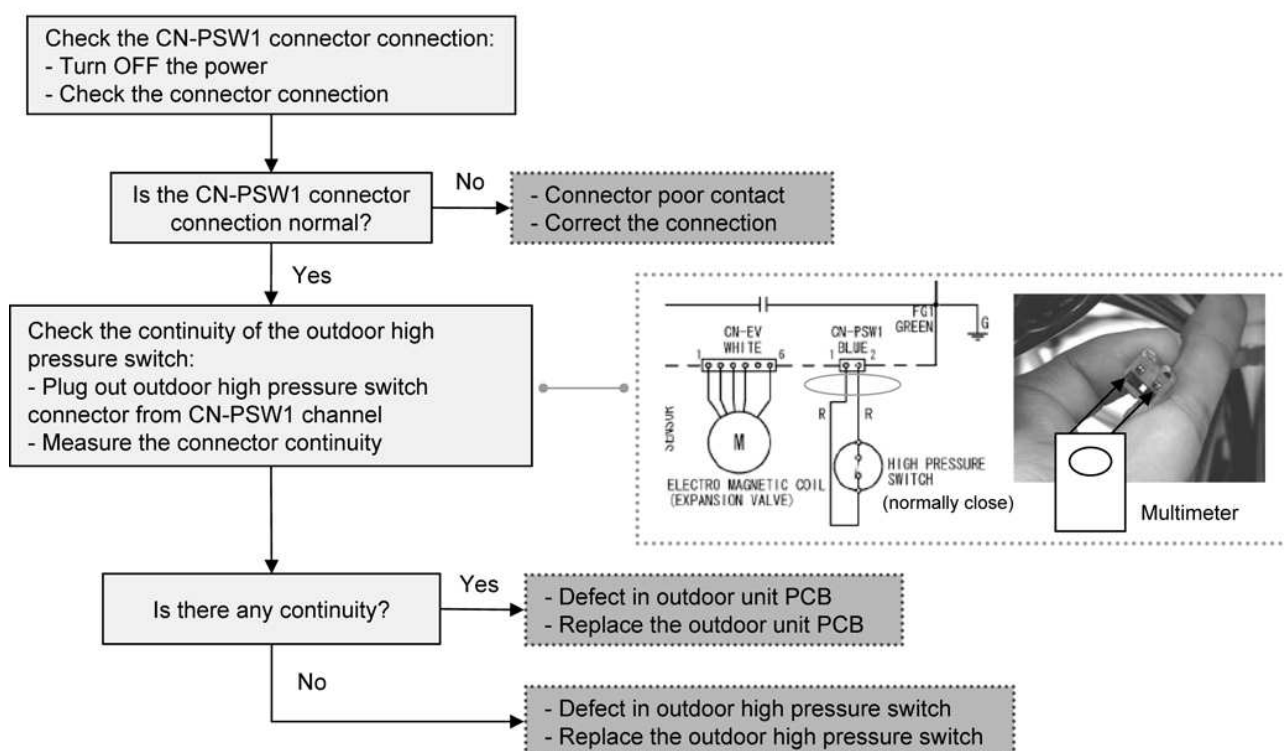
Continue for 1 minute.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





## 7.2.20 Outdoor Air Temperature Sensor Abnormality (F36)

### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor error.

### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty outdoor unit PCB.

### Abnormality Judgment:

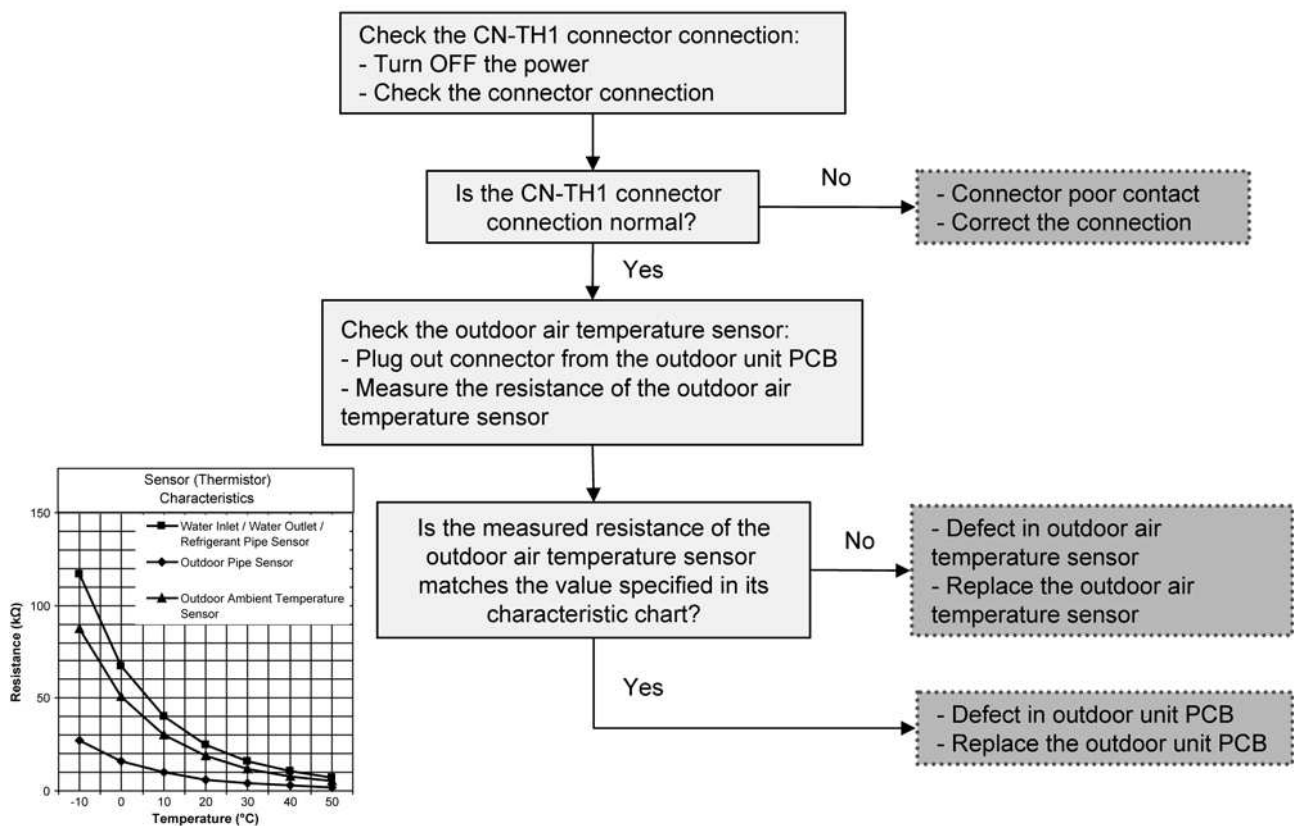
Continue for 5 seconds.

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.21 Indoor Water Inlet Temperature Sensor Abnormality (F37)

#### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the indoor water inlet temperature sensor are used to determine sensor error.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty indoor unit PCB.

#### Abnormality Judgment:

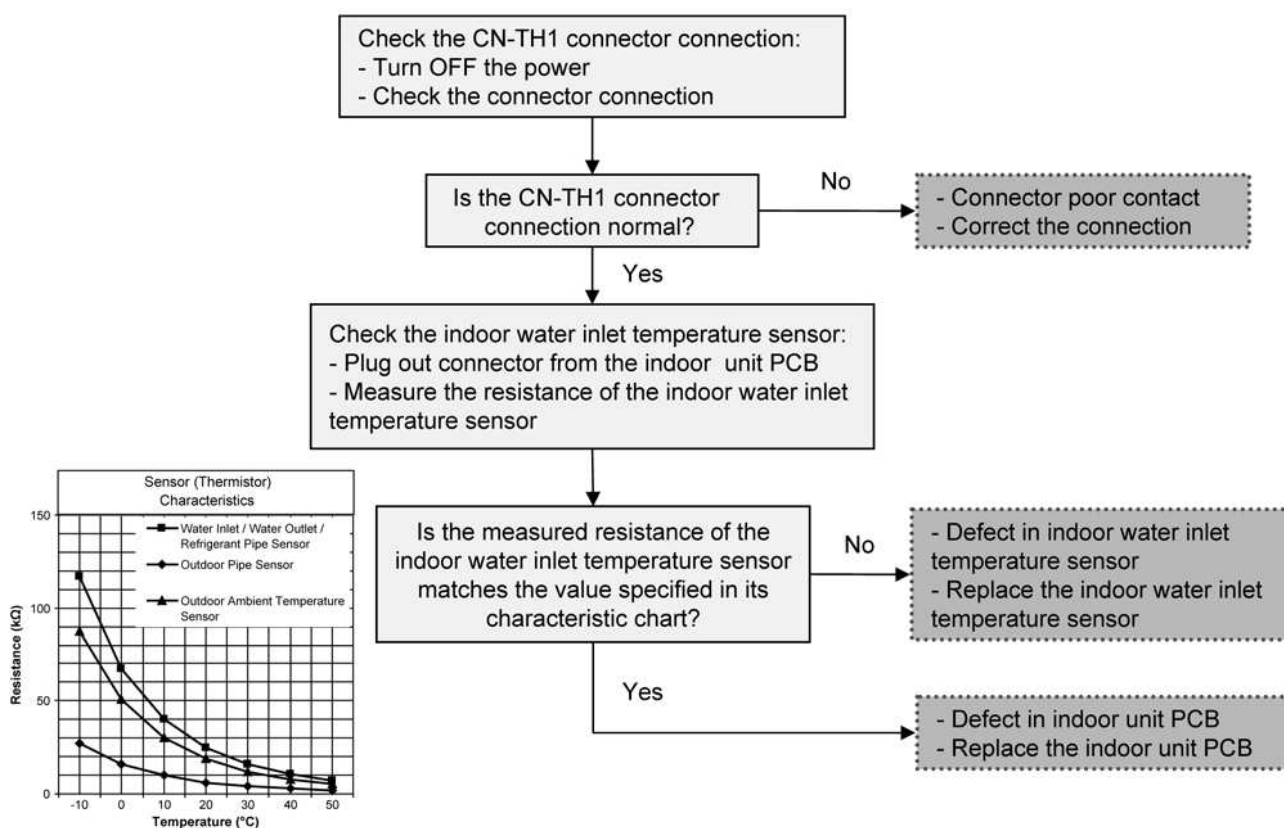
Continue for 5 seconds.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.





## 7.2.22 Outdoor Discharge Pipe Temperature Sensor Abnormality (F40)

### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor error.

### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty outdoor unit PCB.

### Abnormality Judgment:

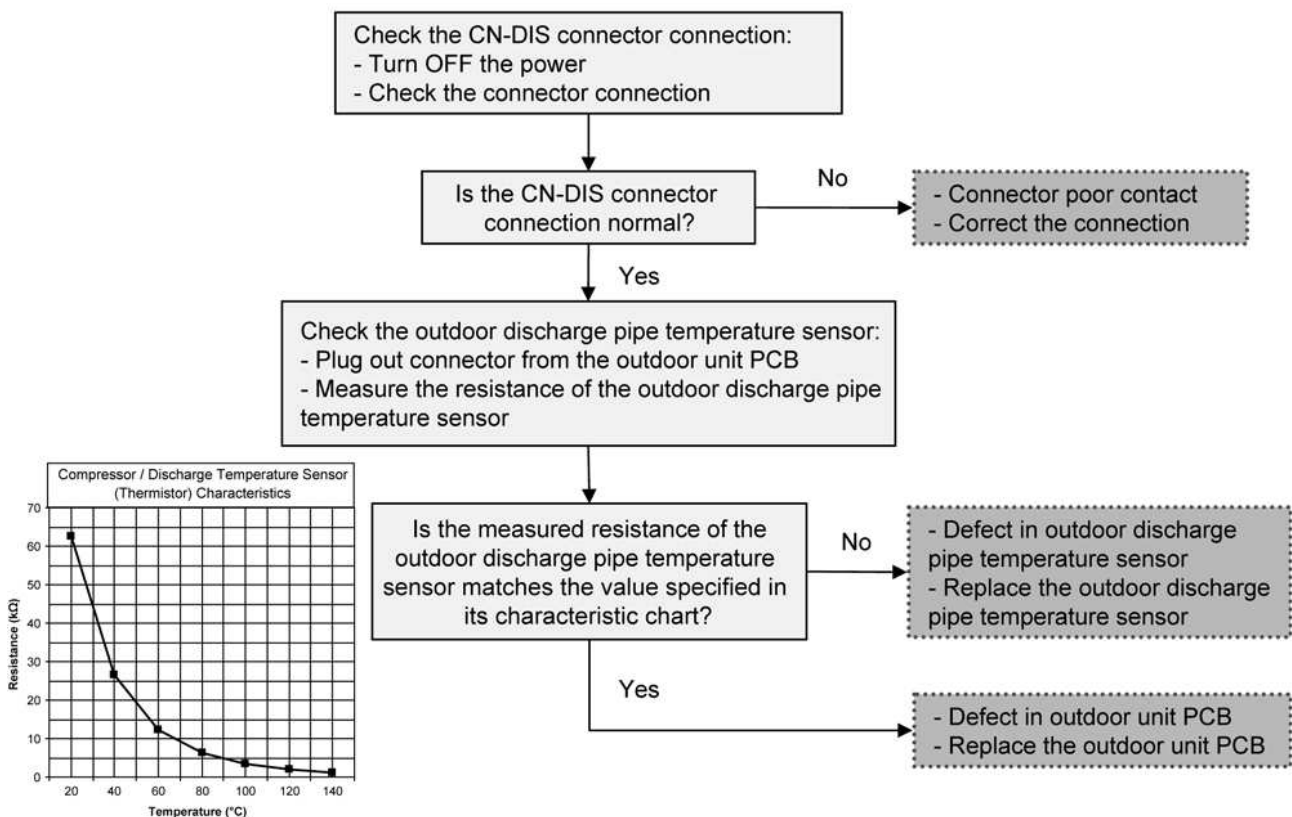
Continue for 5 seconds

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.23 Power Factor Correction (PFC) Abnormality (F41)

#### Malfunction Decision Conditions:

During operation of heating, when the PFC protection circuitry in the outdoor unit main PCB senses abnormal high DC voltage level.

#### Malfunction Caused:

1. Power supply surge.
2. Compressor windings not uniform.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

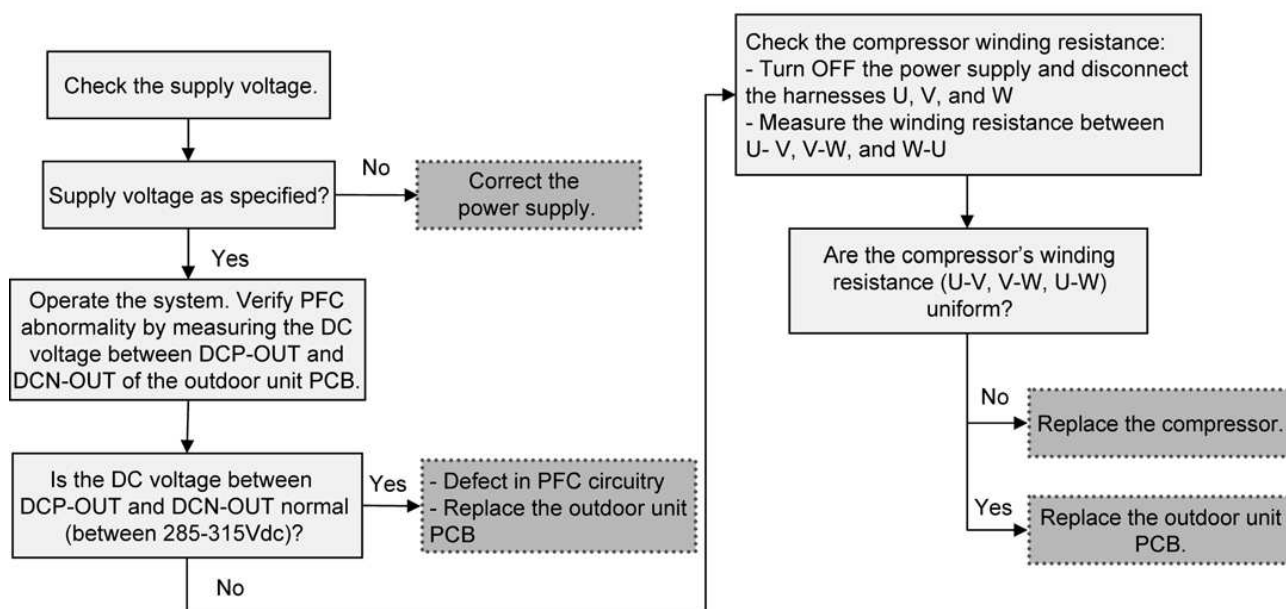
Continue 4 times in 10 minutes.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.24 Outdoor Pipe Temperature Sensor Abnormality (F42)

#### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor error.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty outdoor unit PCB.

#### Abnormality Judgment:

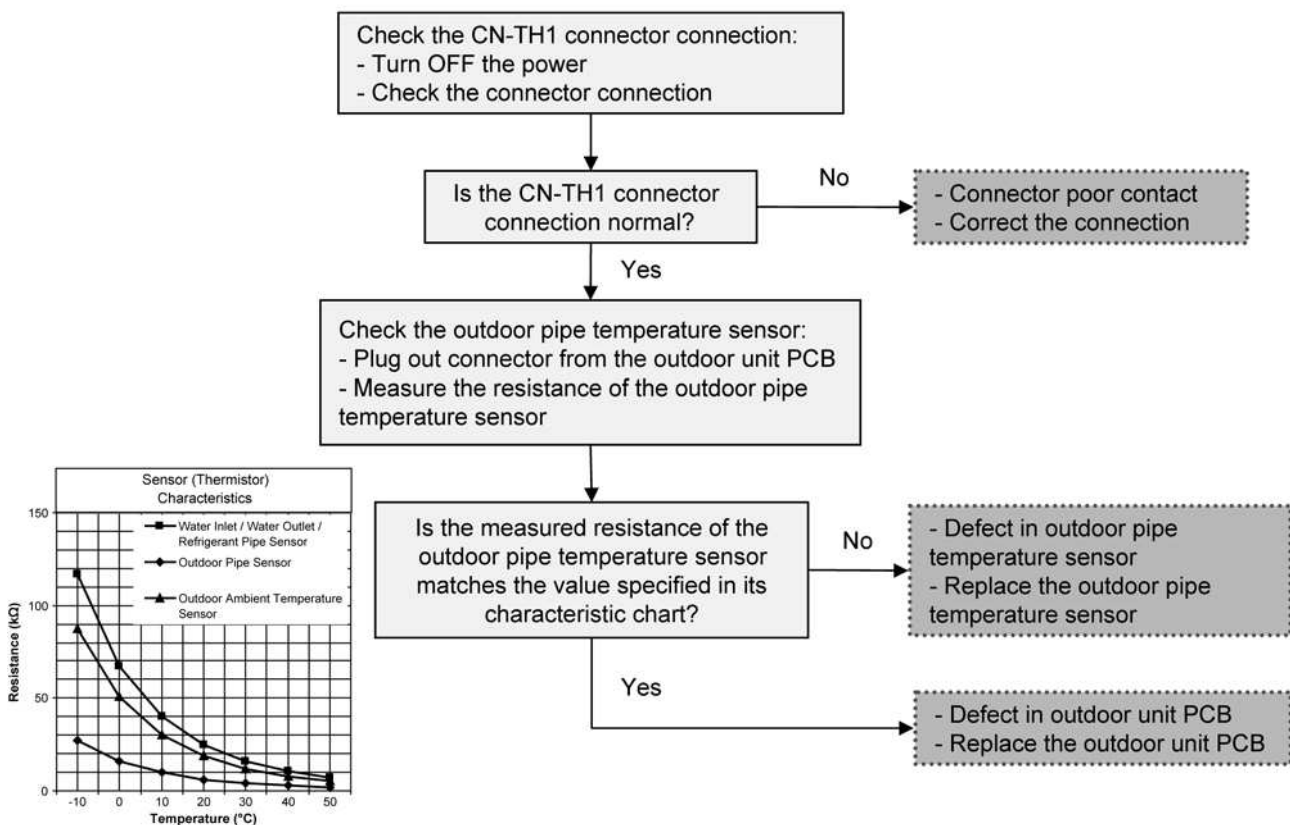
Continue for 5 seconds.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



### 7.2.25 Indoor Water Outlet Temperature Sensor Abnormality (F45)

#### Malfunction Decision Conditions:

During startup and operation of heating, the temperatures detected by the indoor water outlet temperature sensor are used to determine sensor error.

#### Malfunction Caused:

1. Faulty connector connection.
2. Faulty sensor.
3. Faulty indoor unit PCB.

#### Abnormality Judgment:

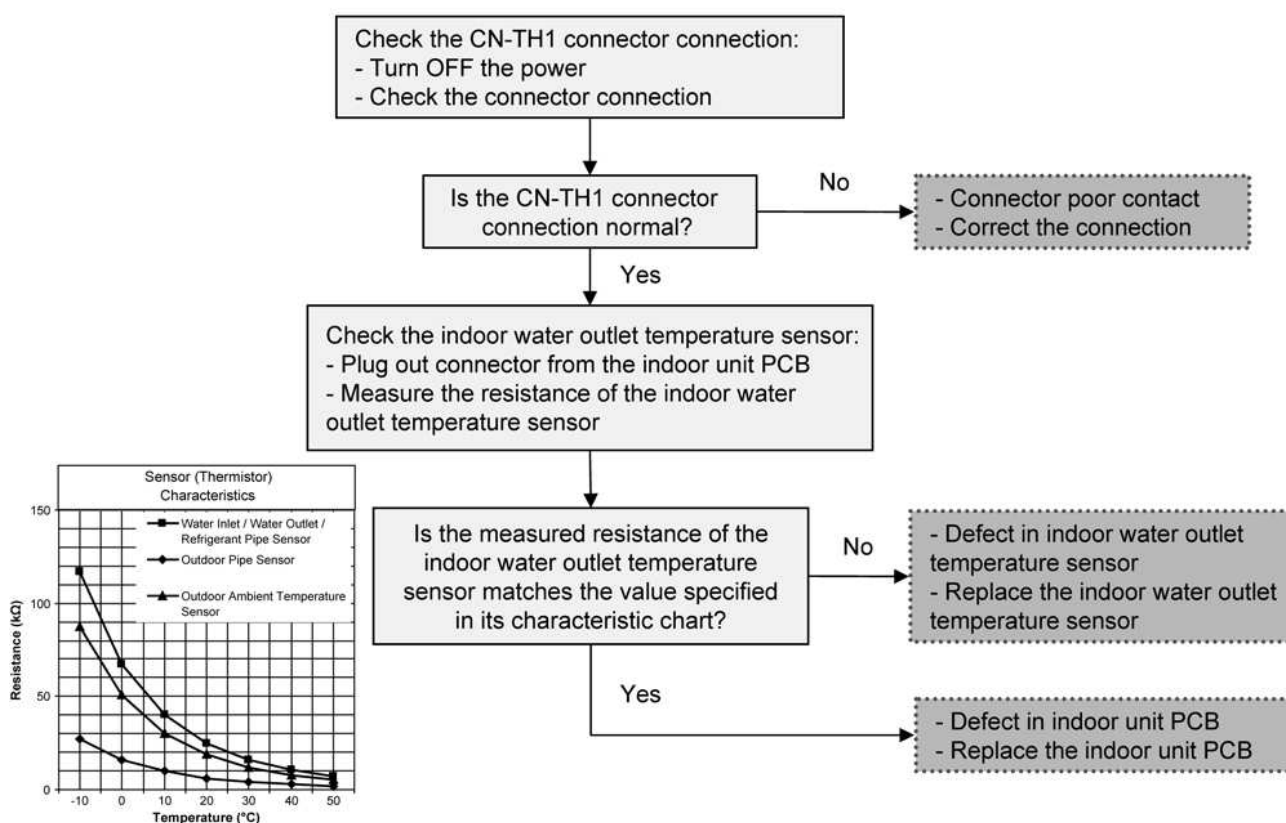
Continue for 5 seconds.

#### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



## 7.2 26 Outdoor Current Transformer Open Circuit (F46)

### Malfunction Decision Conditions:

A current transformer (CT) open circuit is detected by checking the compressor running frequency (rated frequency) and CT detected input current ( $< 0.65\text{A}$ ) for continuously 20 seconds.

### Malfunction Caused:

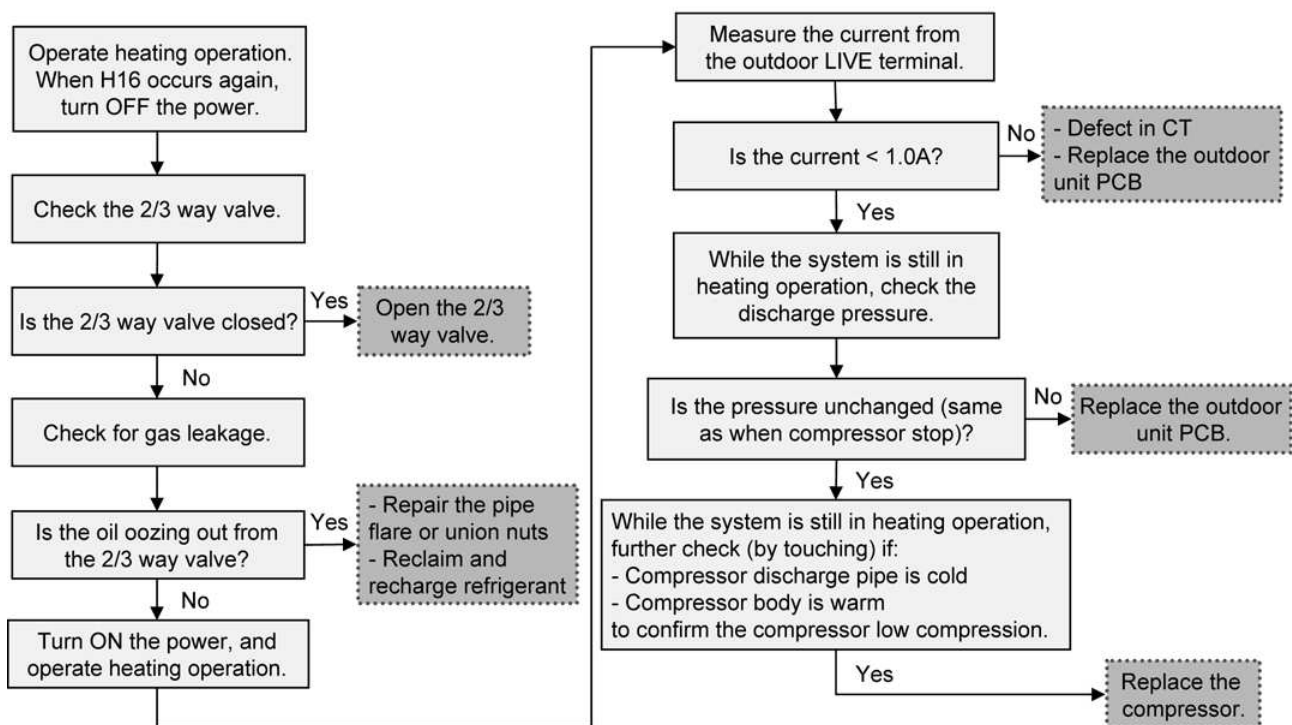
1. CT defective.
2. Faulty outdoor unit PCB.
3. Compressor defective (low compression).

### Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



# 8

## ***TECHNICAL DATA***

Operation Characteristics

Capacity and Power Input Data

Indoor Unit Capacity  
Calculation

Air Flow Volume

Sound Data

Operation Range

## 8.1 – Operation Characteristics

### WH-SDH07C3E5 WH-UD07CE5

#### Heating Characteristics at Different Outdoor Air Temperature

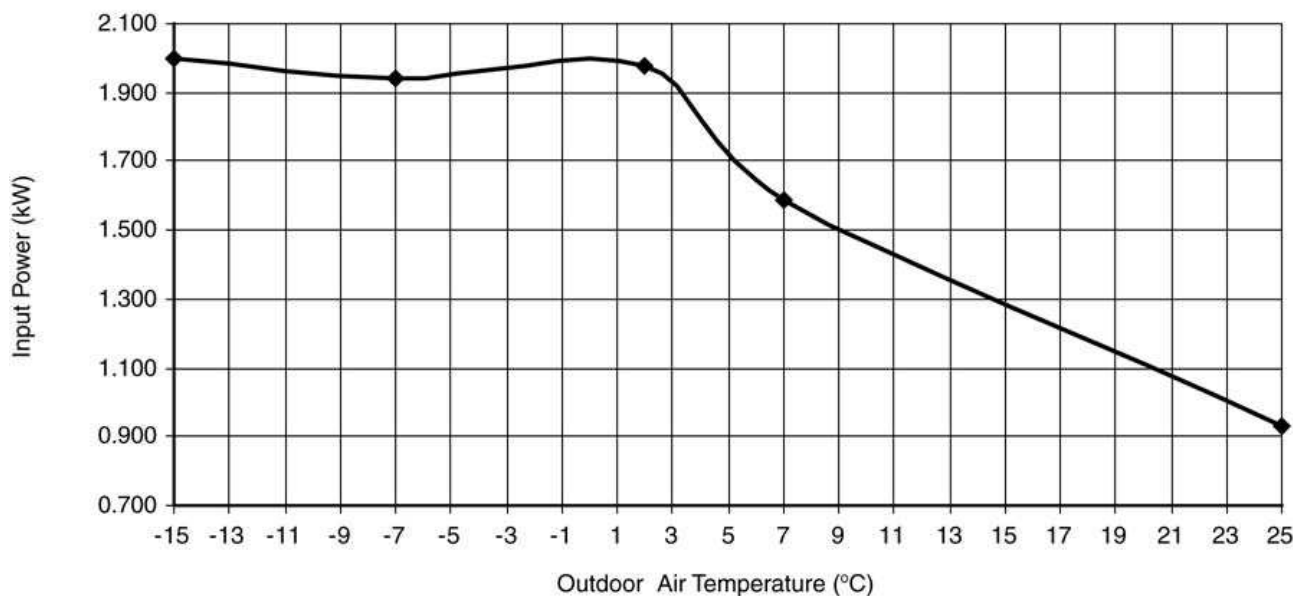
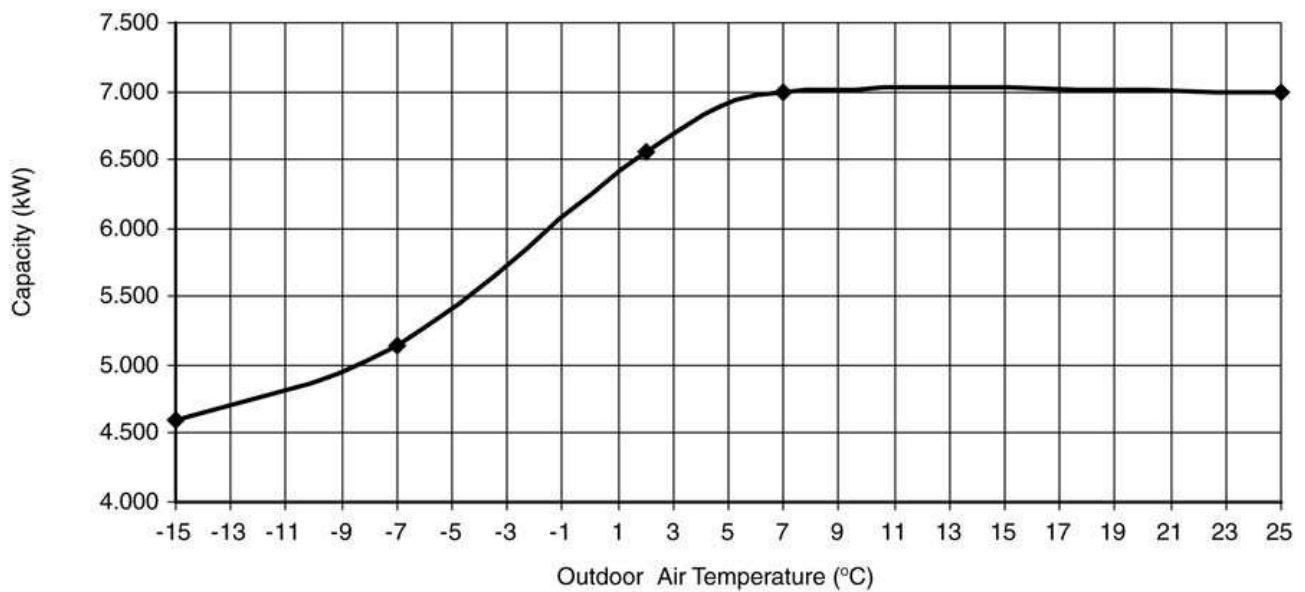
Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



#### Heating Characteristics at Different Piping Length



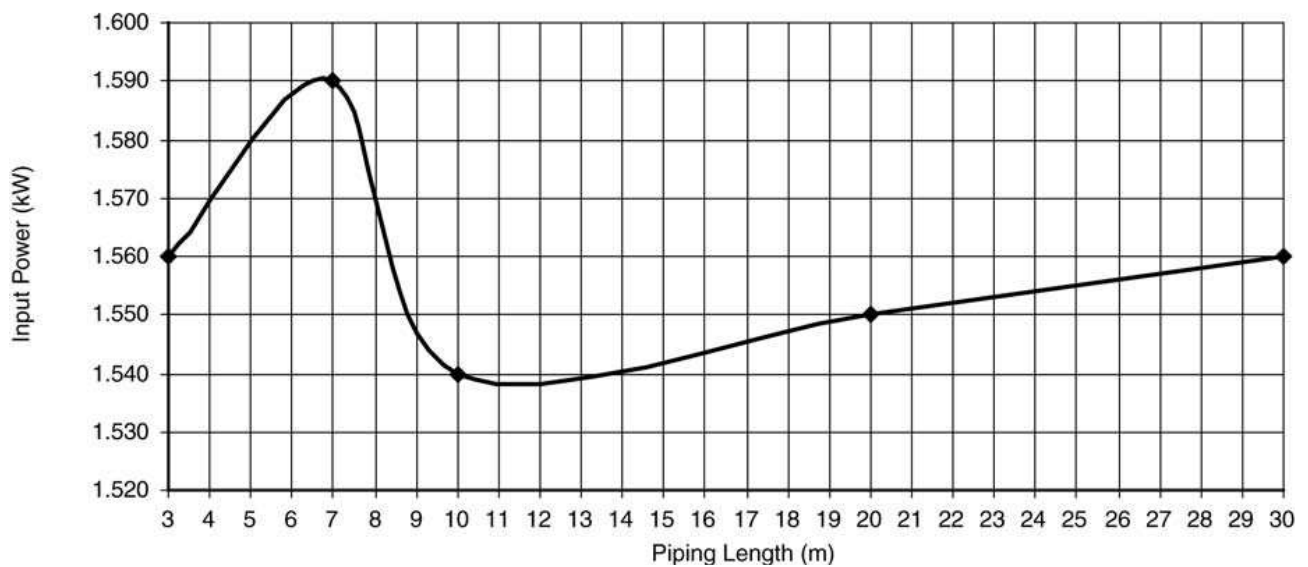
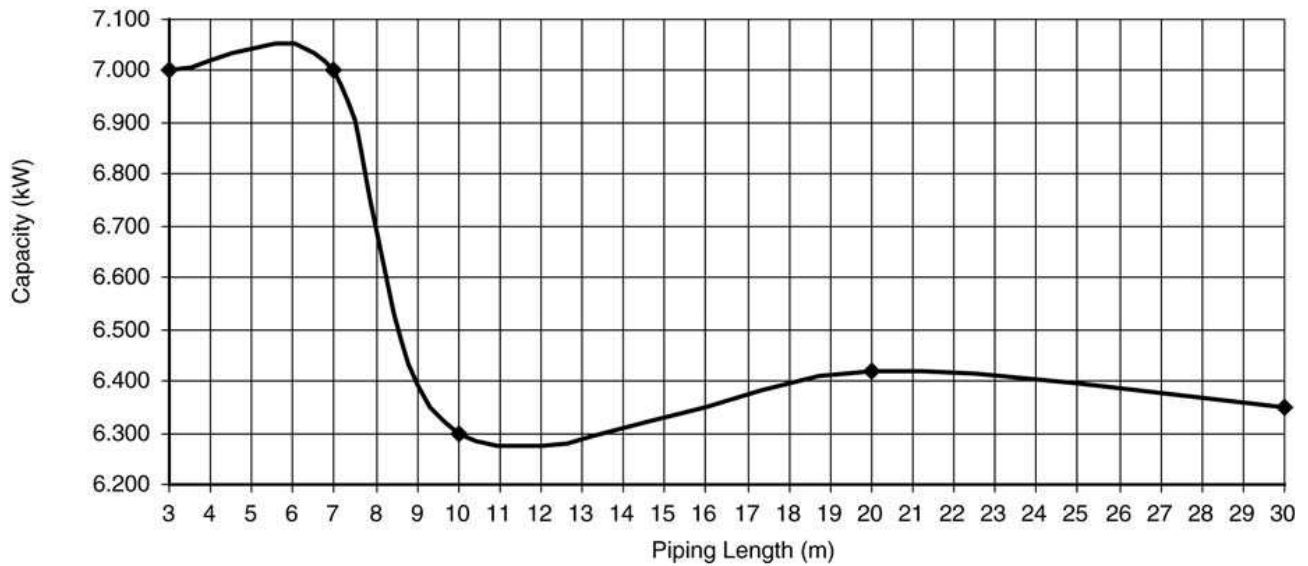
### Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m





## WH-SDH09C3E5 WH-UD09CE5

### Heating Characteristics at Different Outdoor Air Temperature

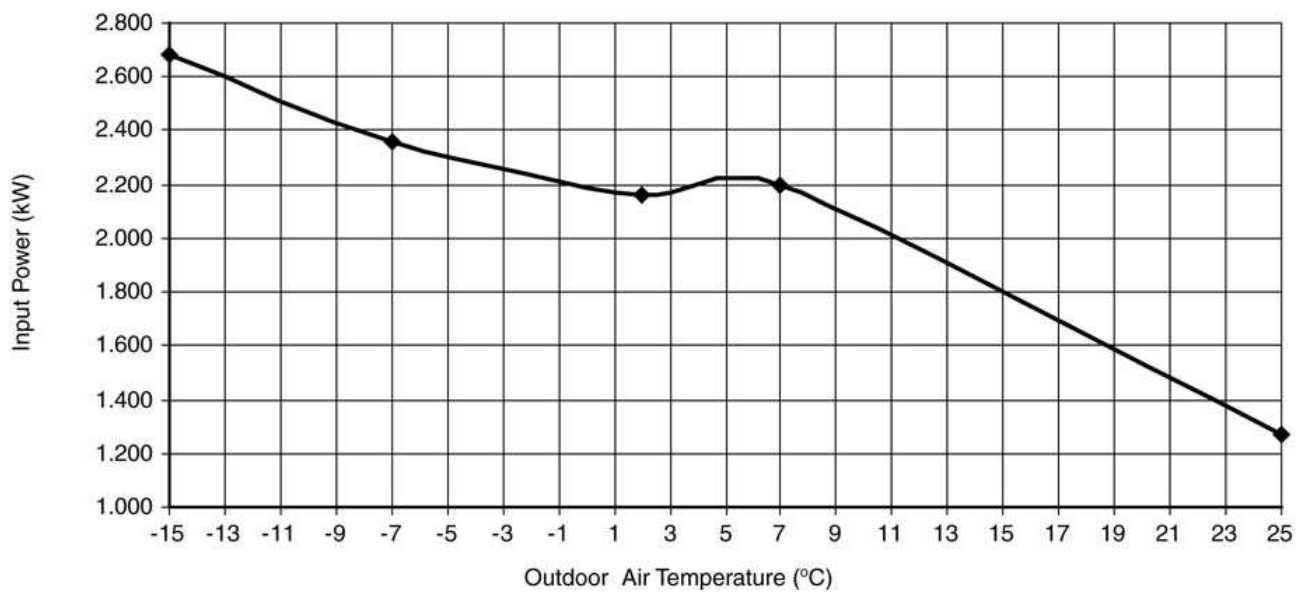
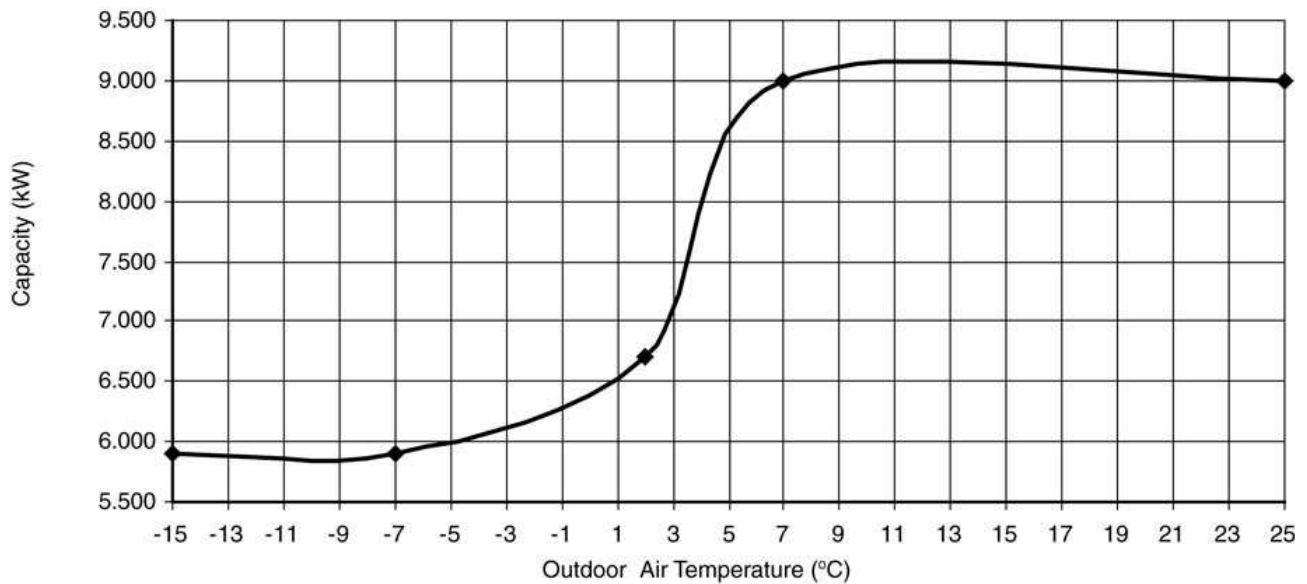
Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



## Heating Characteristics at Different Piping Length

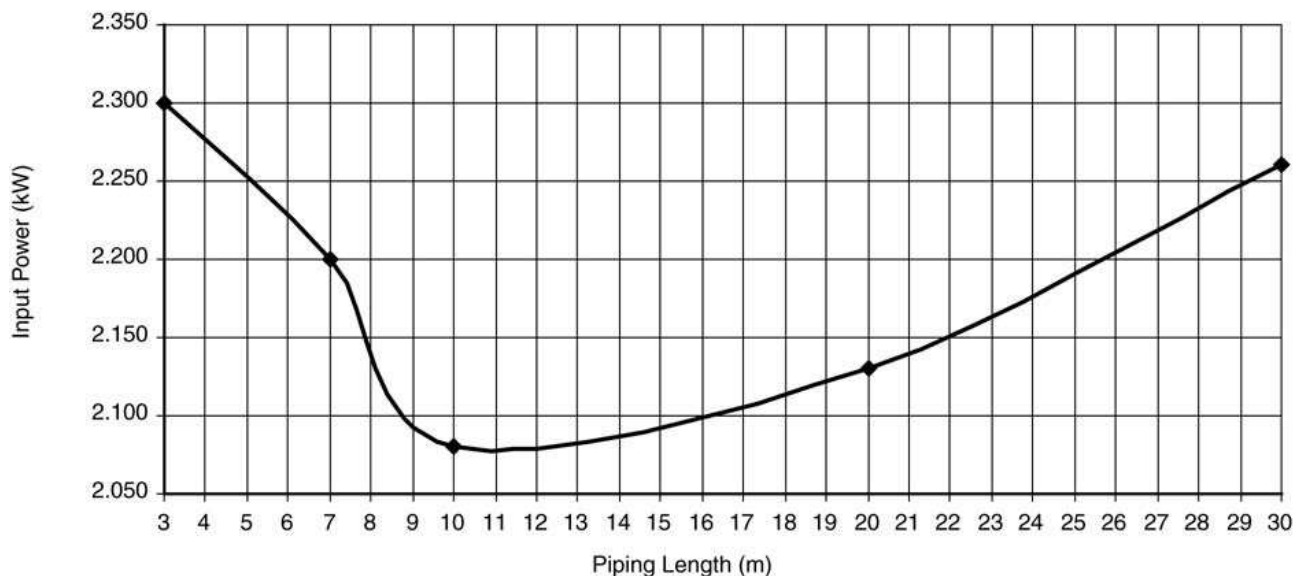
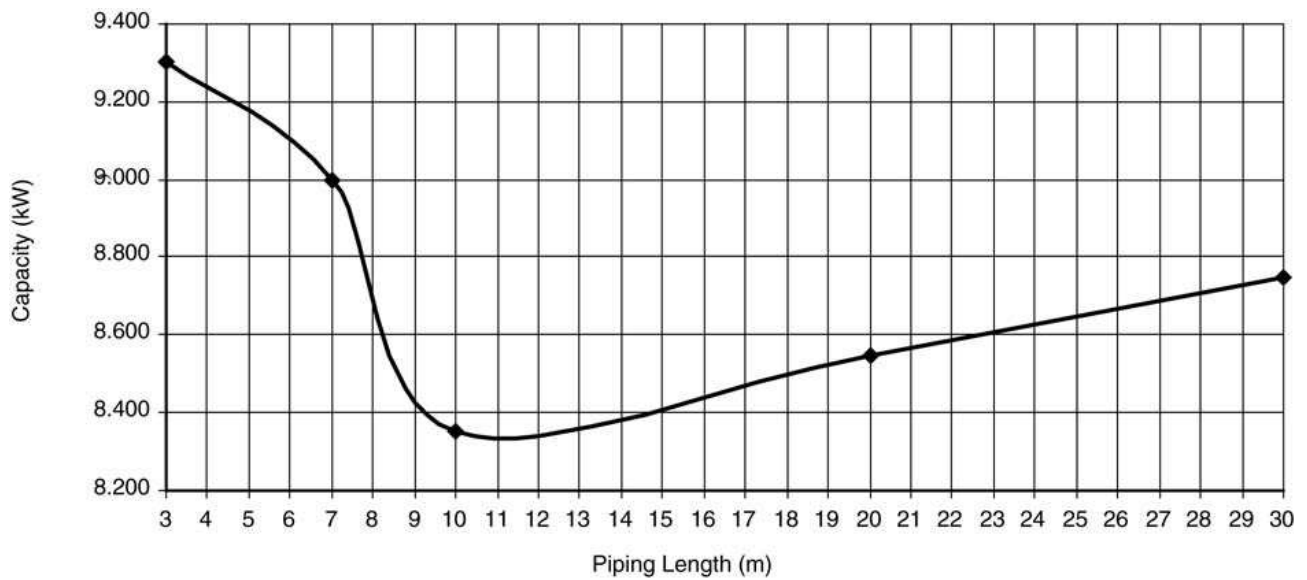
Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



## WH-SDH12C6E5 WH-UD12CE5

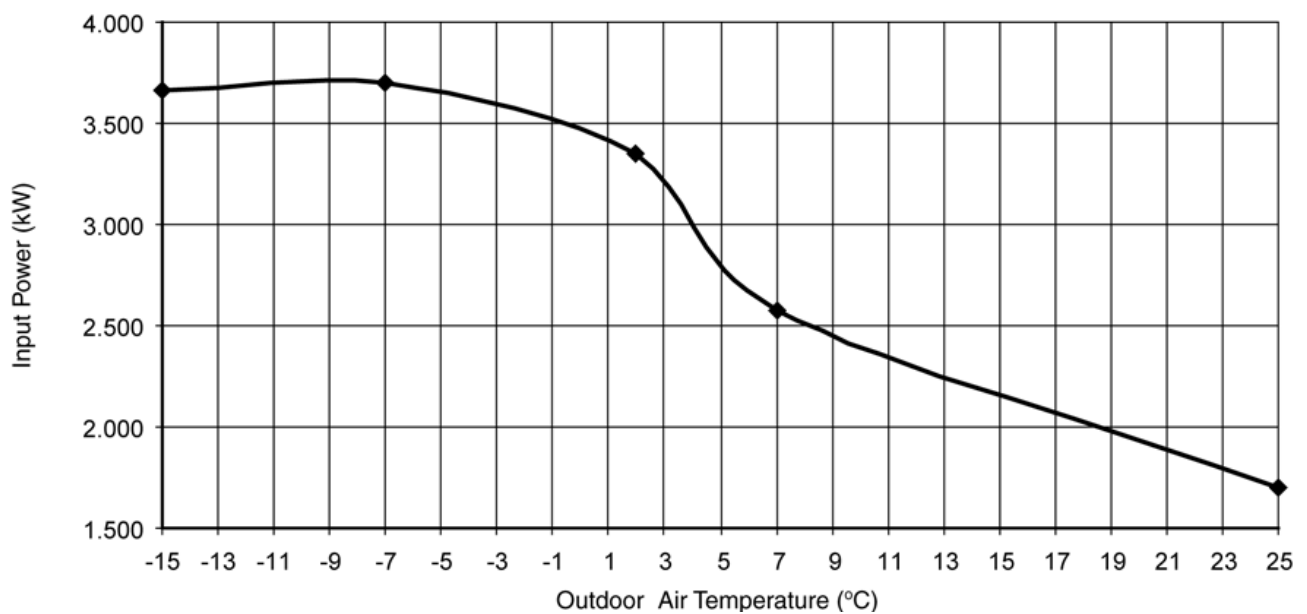
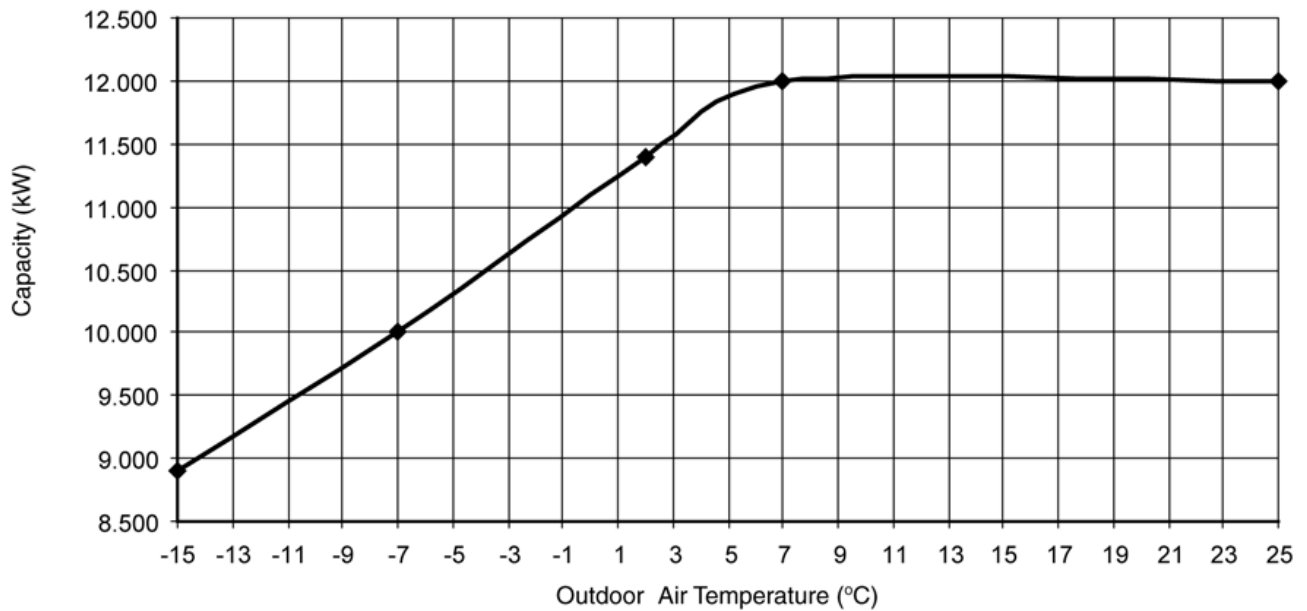
### Heating Characteristics at Different Outdoor Air Temperature

Condition

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



## Heating Characteristics at Different Piping Length

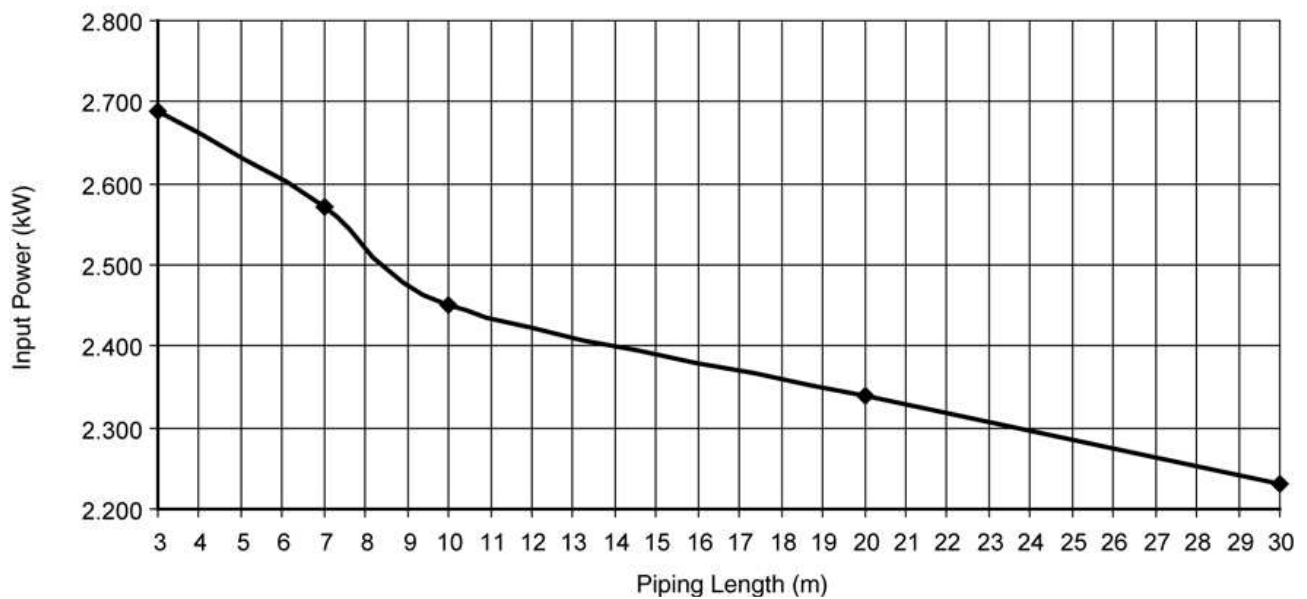
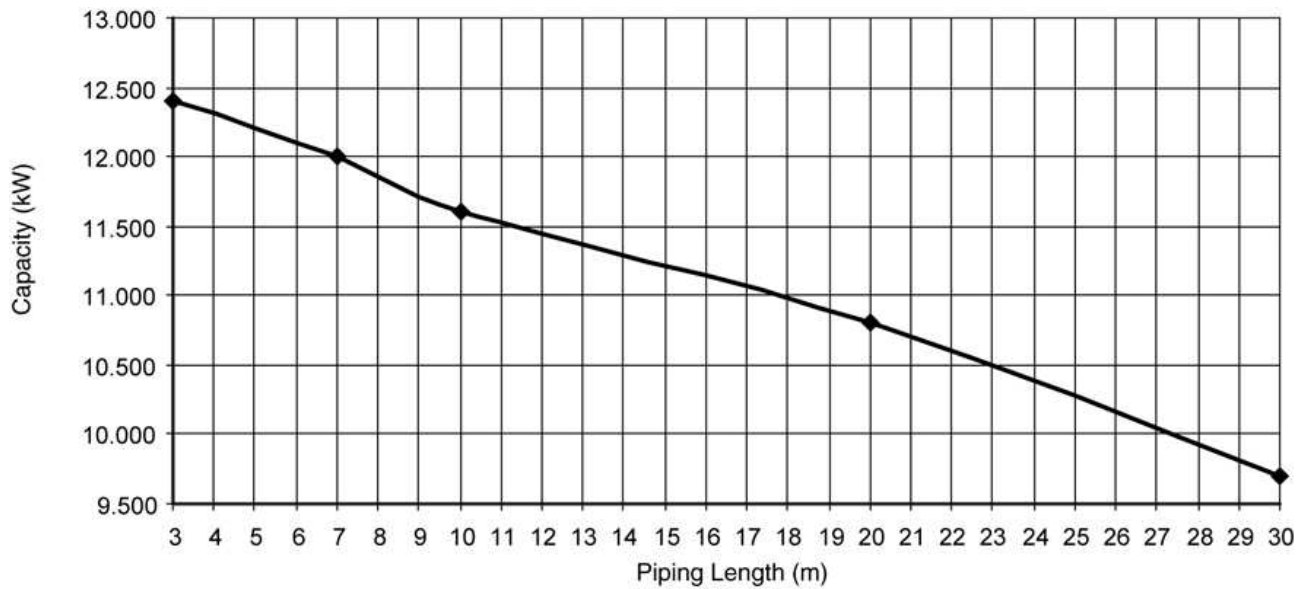
Condition

Outdoor air temperature : 7° C (DBT), 6° C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



## WH-SDH14C6E5 WH-UD14CE5

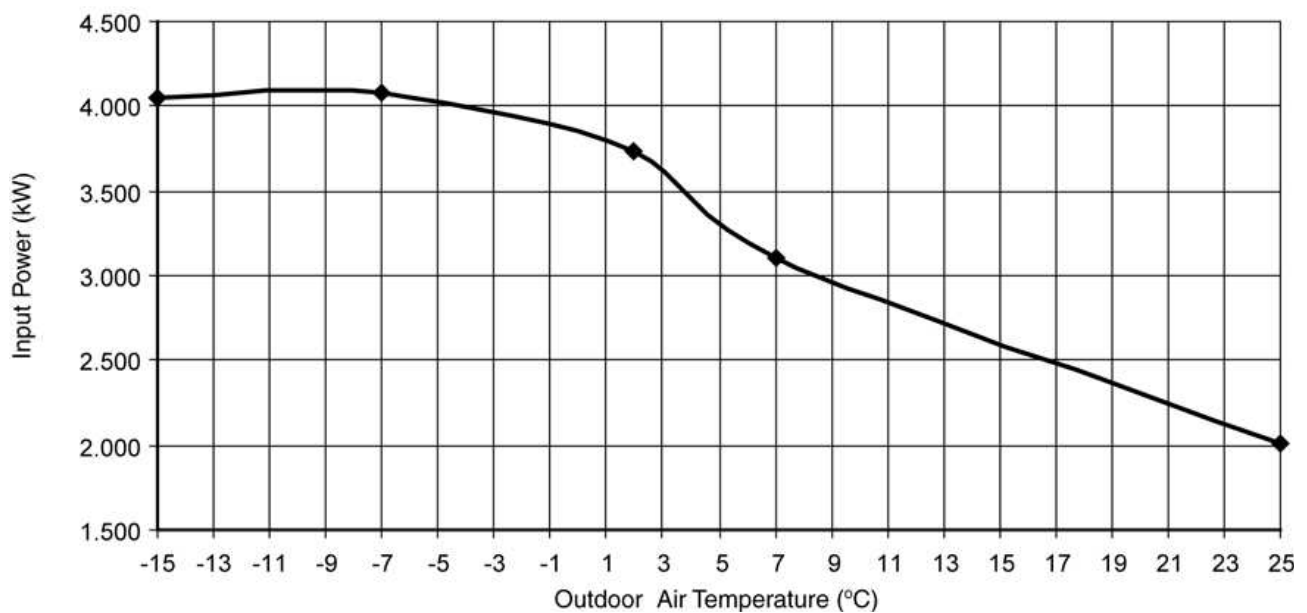
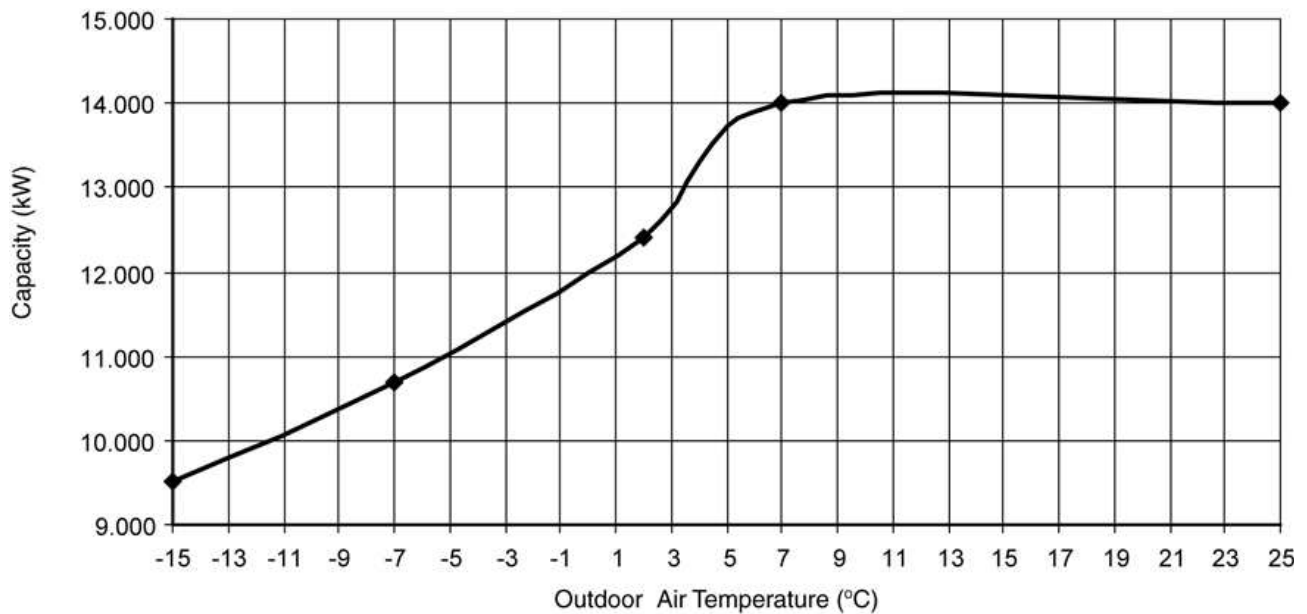
### Heating Characteristics at Different Outdoor Air Temperature

Condition

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



### Heating Characteristics at Different Piping Length

## Heating Characteristics at Different Piping Length

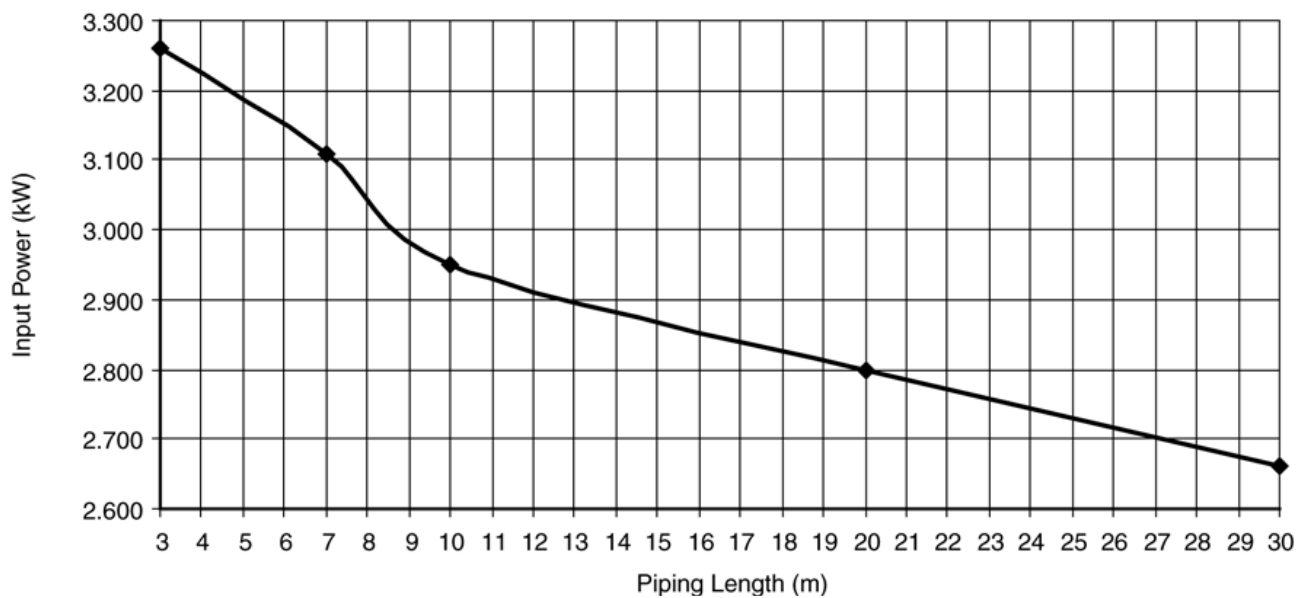
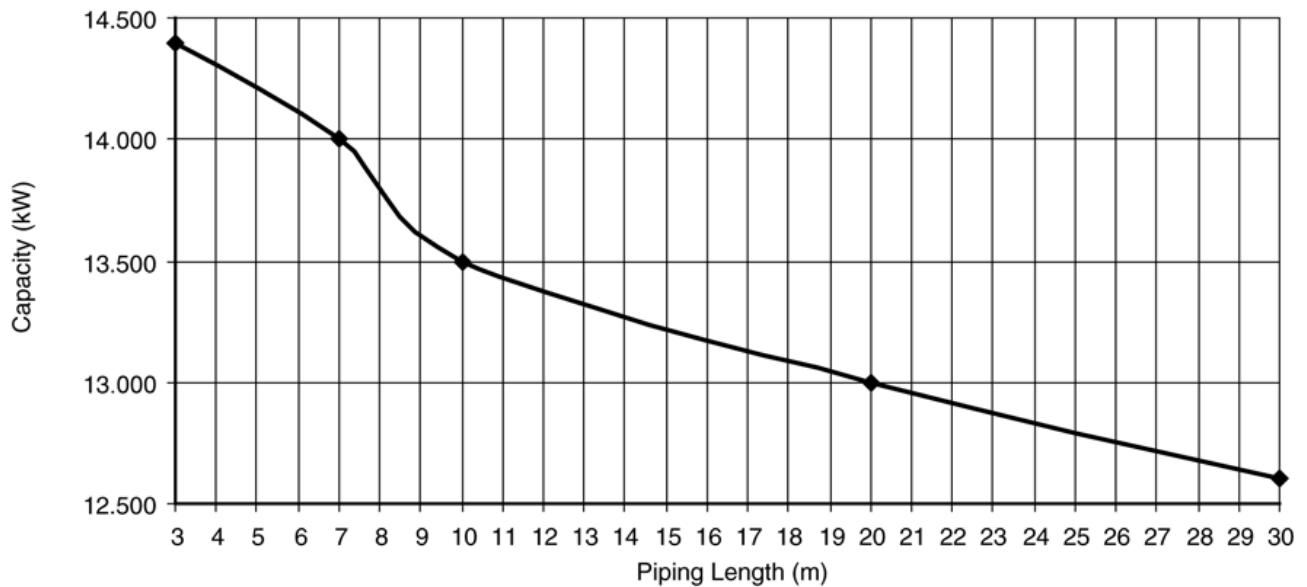
Condition

Outdoor air temperature : 7° C (DBT), 6° C (WBT)

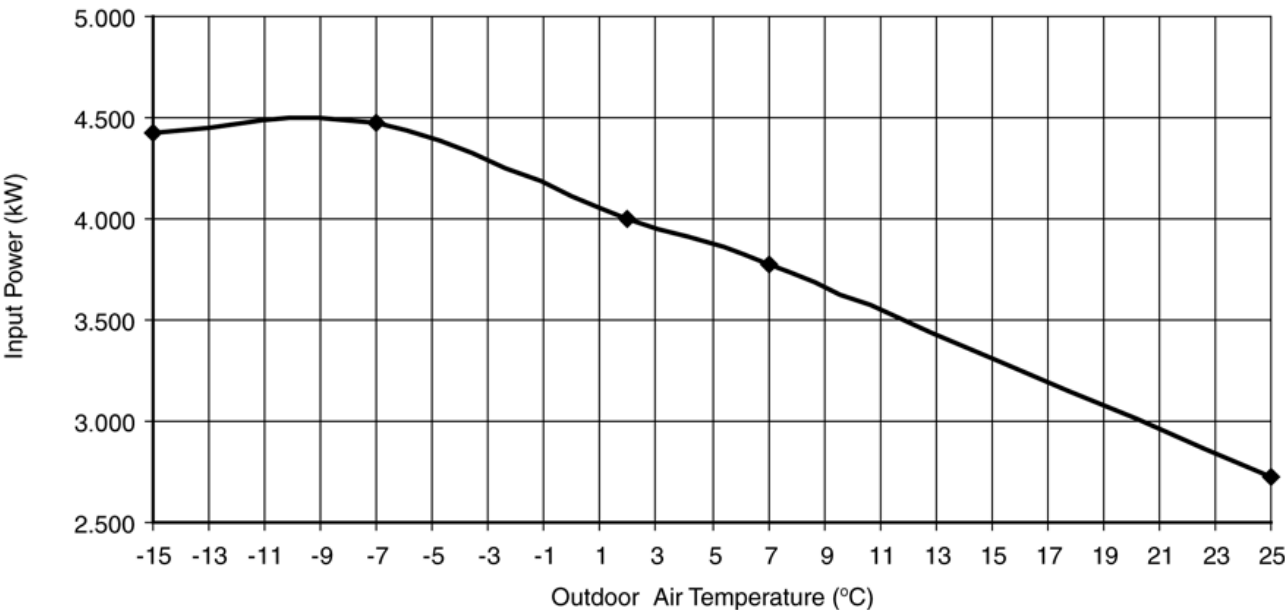
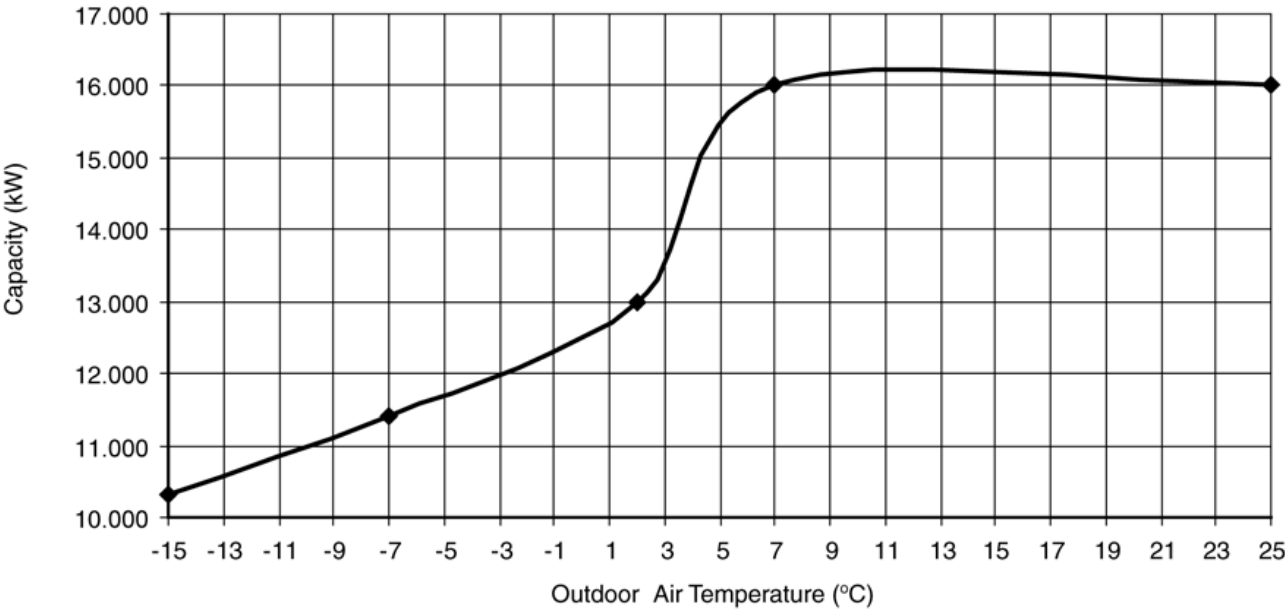
Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



**WH-SDH16C6E5 WH-UD16CE5**  
**Heating Characteristics at Different Outdoor Air Temperature**  
Condition  
Indoor water inlet temperature : 30°C  
Indoor water outlet temperature : 35°C  
Piping length : 7m



Heating Characteristics at Different Piping Length



## Heating Characteristics at Different Piping Length

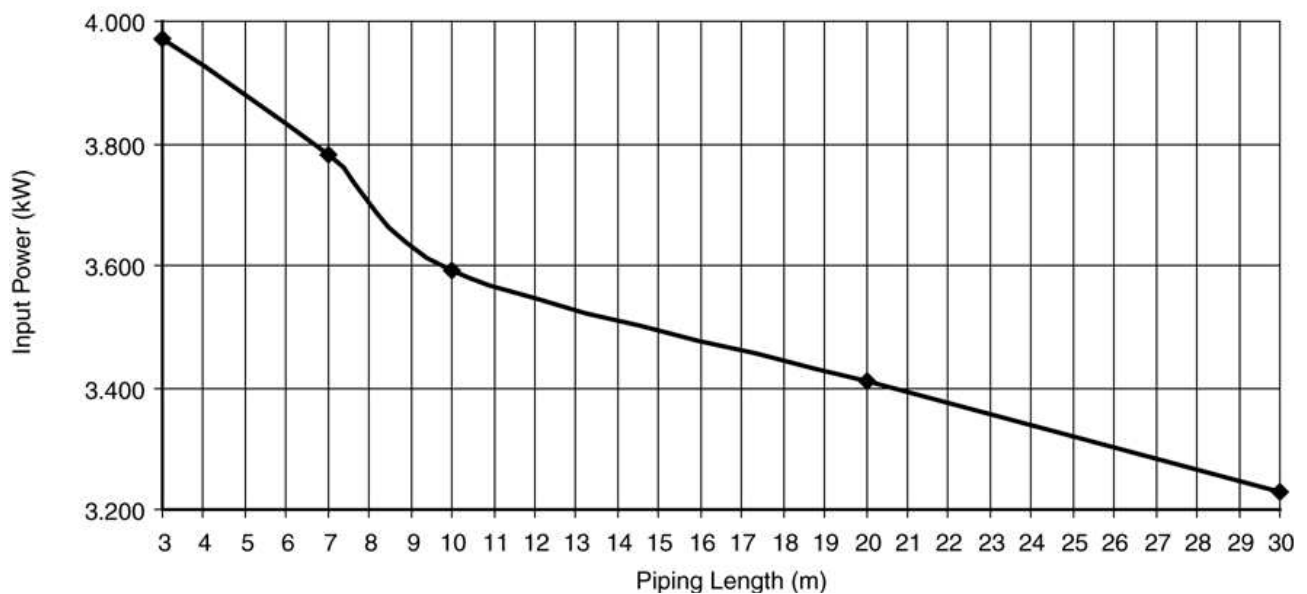
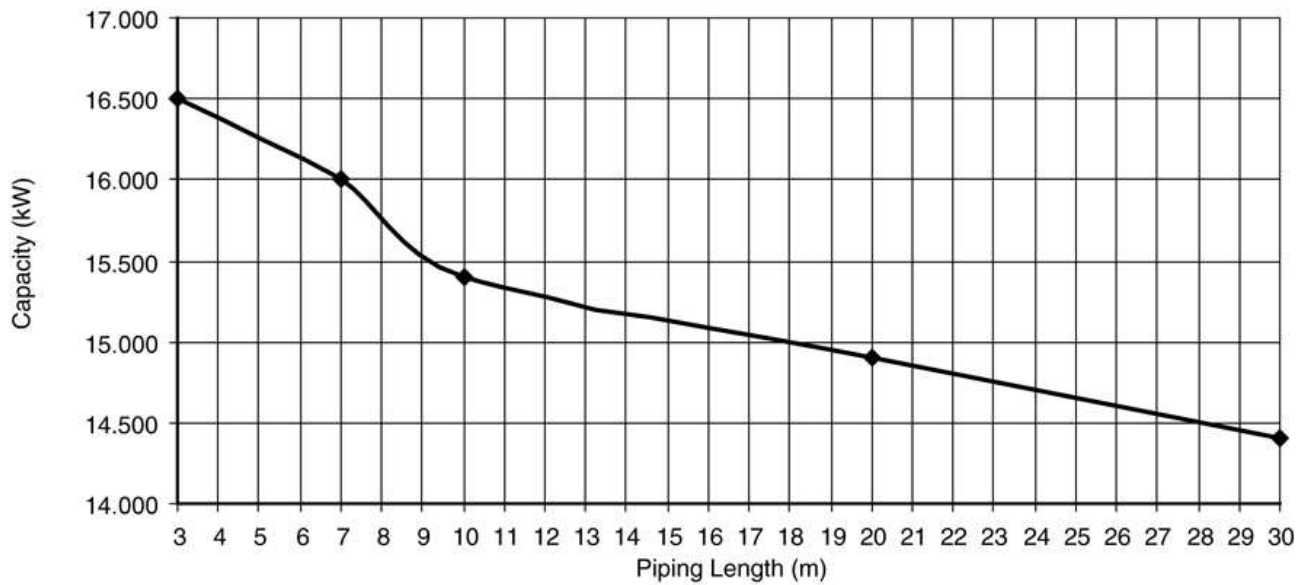
Condition

Outdoor air temperature : 7° C (DBT), 6° C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m



## Heating Capacity Table

### WH-SDH07C3E5 WH-UD07CE5

LWC	30		35		40		45		50		55	
Tamb	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP
-15	4.60	1.87	4.60	2.00	4.60	2.19	4.60	2.42	4.55	2.68	4.50	3.00
-7	5.15	1.80	5.15	1.94	5.08	2.14	5.00	2.38	4.90	2.47	4.80	2.67
2	6.70	1.83	6.55	1.98	6.58	2.29	6.60	2.64	6.30	2.90	6.00	3.16
7	7.00	1.43	7.00	1.59	7.00	1.77	7.00	2.12	6.90	2.30	6.80	2.72
25	7.00	0.79	7.00	0.93	6.40	1.03	6.10	1.17	5.90	1.33	5.70	1.49

HC: Heating Capacity (kW)

IP: Power Input (kW)

LWC: Leaving Water Condenser Temperature (°C)

Tamb: Ambient Temperature (°C)

### WH-SDH09C3E5 WH-UD09CE5

LWC	30		35		40		45		50		55	
Tamb	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP
-15	6.00	2.55	5.90	2.68	5.50	2.82	5.40	3.00	5.20	3.14	5.00	3.33
-7	6.10	2.16	5.90	2.36	5.85	2.63	5.80	2.90	5.80	3.06	5.80	3.22
2	6.80	1.87	6.70	2.16	6.70	2.38	6.60	2.64	6.30	2.90	6.00	3.16
7	9.00	1.93	9.00	2.20	9.00	2.45	9.00	2.81	8.95	3.23	8.90	3.87
25	9.00	1.07	9.00	1.27	8.40	1.40	8.00	1.59	7.80	1.81	7.50	2.03

HC: Heating Capacity (kW)

IP: Power Input (kW)

LWC: Leaving Water Condenser Temperature (°C)

Tamb: Ambient Temperature (°C)

### WH-SDH12C6E5 WH-UD12CE5

LWC	30		35		40		45		50		55	
Tamb	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP
-15	9.30	3.50	8.90	3.66	8.50	3.83	8.10	3.99	7.50	4.09	7.00	4.20
-7	10.40	3.41	10.00	3.70	9.60	3.99	9.20	4.28	8.70	4.30	8.20	4.31
2	11.80	3.14	11.40	3.35	11.00	3.57	10.60	3.78	9.80	3.98	9.10	4.18
7	12.00	2.14	12.00	2.57	12.00	3.00	12.00	3.43	12.00	3.82	12.00	4.20

HC: Heating Capacity (kW)

IP: Power Input (kW)

LWC: Leaving Water Condenser Temperature (°C)

Tamb: Ambient Temperature (°C)

## WH-SDH14C6E5 WH-UD14CE5

LWC	30		35		40		45		50		55	
Tamb	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP
-15	9.90	3.91	9.50	4.05	9.00	4.19	8.60	4.33	7.90	4.45	7.30	4.56
-7	11.1 0	3.73	10.7 0	4.08	10.2 0	4.43	9.80	4.78	9.10	4.76	8.50	4.74
2	12.9 0	3.51	12.4 0	3.73	11.9 0	3.95	11.4 0	4.17	10.4 0	4.29	9.50	4.40
7	14.0 0	2.60	14.0 0	3.11	14.0 0	3.63	14.0 0	4.14	13.6 0	4.61	13.3 0	5.08

HC: Heating Capacity (kW)

IP: Power Input (kW)

LWC: Leaving Water Condenser Temperature (°C)

Tamb: Ambient Temperature (°C)

## WH-SDH16C6E5 WH-UD16CE5

LWC	30		35		40		45		50		55	
Tamb	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP	HC	IP
-15	10.6 0	4.13	10.3 0	4.42	10.0 0	4.71	9.70	5.00	8.80	4.98	7.90	4.95
-7	11.9 0	4.07	11.4 0	4.47	10.8 0	4.87	10.3 0	5.26	9.60	5.13	9.00	4.99
2	13.5 0	3.78	13.0 0	4.00	12.4 0	4.22	11.9 0	4.44	10.8 0	4.50	9.80	4.55
7	16.0 0	3.25	16.0 0	3.78	16.0 0	4.31	16.0 0	4.84	15.2 0	5.15	14.5 0	5.45

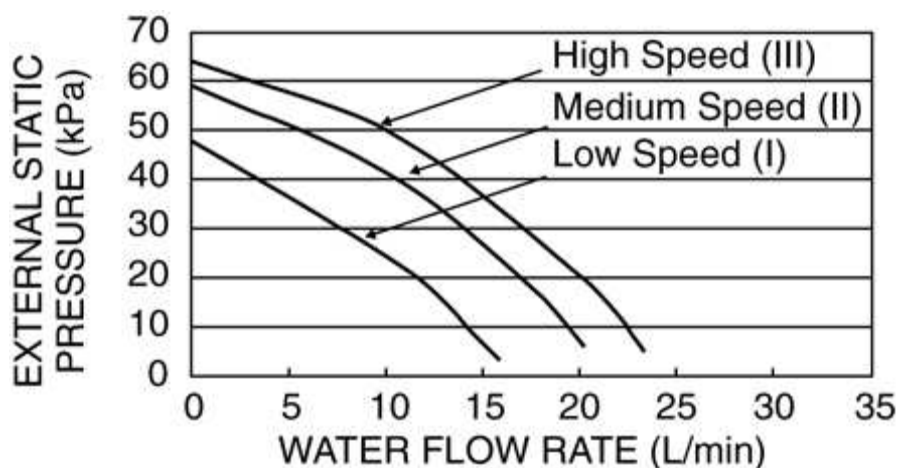
HC: Heating Capacity (kW)

IP: Power Input (kW)

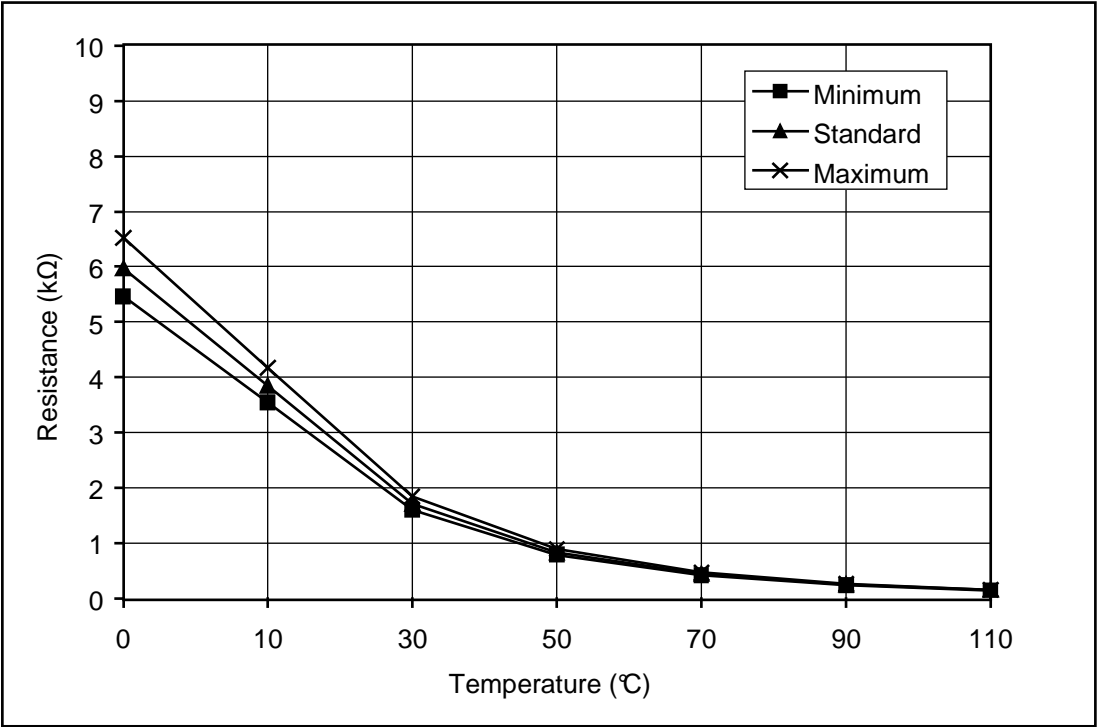
LWC: Leaving Water Condenser Temperature (°C)

Tamb: Ambient Temperature (°C)

## 8.2 – Hydraulic Pump Performance

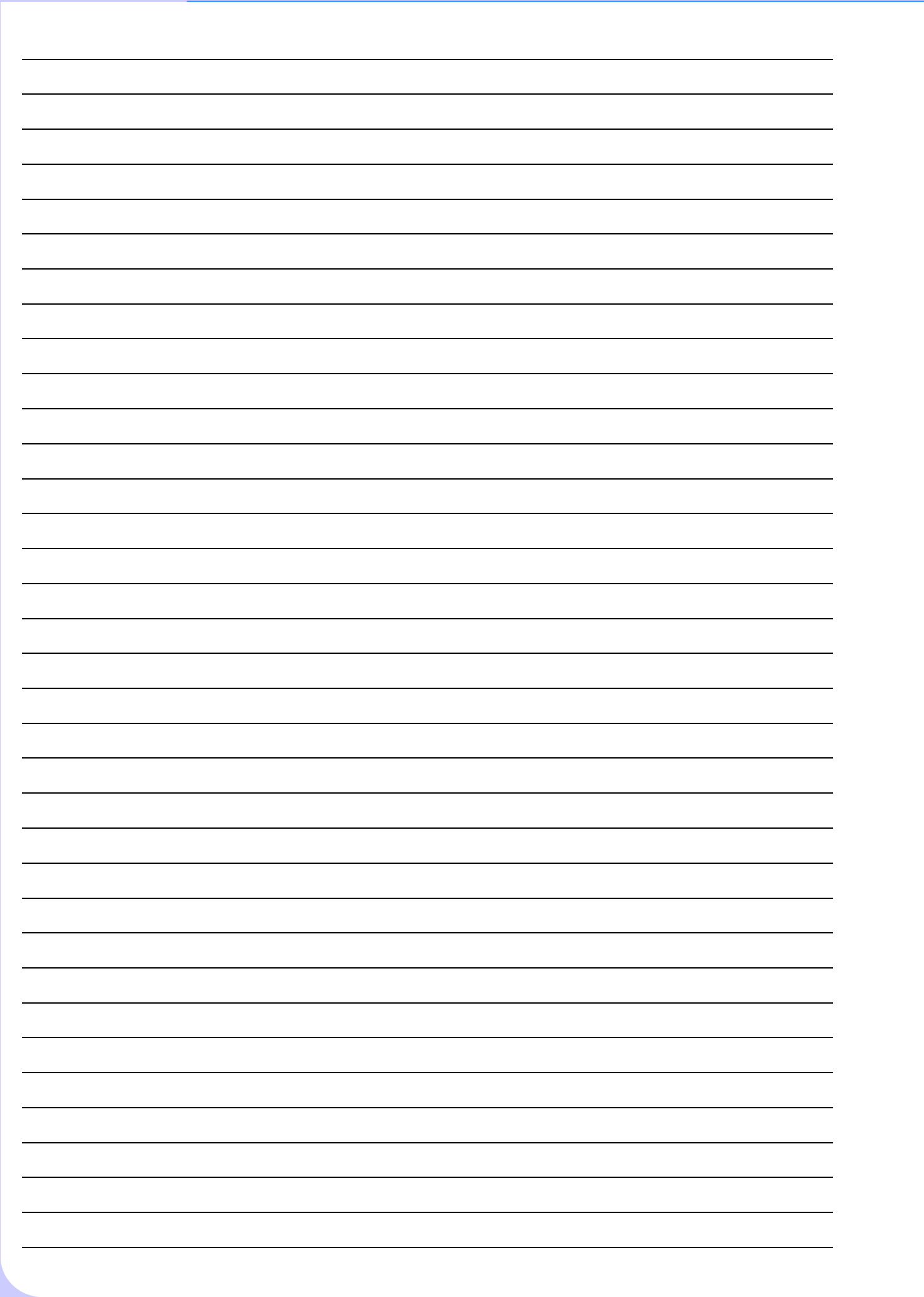


8.3 – Tank Thermistor











[illegible]

