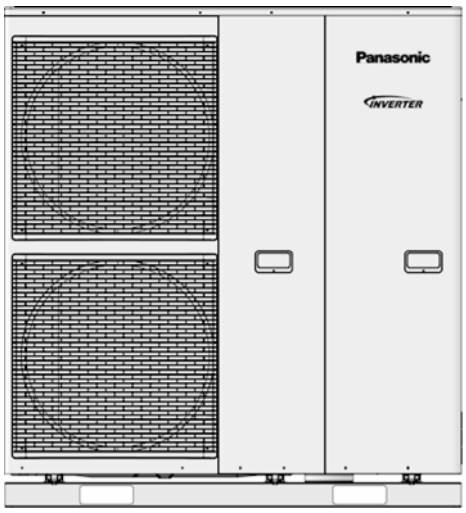
Order No. PHAAM1010087C2

Service Manual

Monobloc Air-to-Water Heatpump System



Monobloc Unit
WH-MDF09C3E8
WH-MDF12C9E8
WH-MDF14C9E8
WH-MDF16C9E8

⚠ 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.

⚠ PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

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1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before perform any servicing.
- Electrical work and water installation work must be installed or serviced by a licensed electrician and licensed water system installer respectively. 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.

⚠ **WARNING**	This indication shows the possibility of causing death or serious injury.
⚠ **CAUTION**	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.

- 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.

⚠ **WARNING**
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 monobloc unit connection cable. Use specified monobloc unit connection cable, refer to Installation Instructions CONNECT THE CABLE TO THE MONOBLOC UNIT and connect tightly for monobloc unit 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 monobloc 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.

⚠ WARNING
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 four or more 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 monobloc unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the monobloc 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 four or more persons to carry out the installation work. The weight of monobloc unit might cause injury if carried by less than four person.
4. Do not touch monobloc unit air inlet and aluminum 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 Monobloc unit. • Power supply point should be in easily accessible place for power disconnection in case of emergency. • Must follow local national wiring standard, regulation and this installation instruction. • Strongly recommended to make permanent connection to a circuit breaker. For WH-MDF09C3E8: - Power 1: Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0mm. - Power 2: Use approved 15/16A 2-poles circuit breaker with a minimum contact gap of 3.0mm. For WH-MDF12C9E8,WH-MDF14C9E8,WH-MDF16C9E8: - Power 1: Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0mm. - Power 2: Use approved 15/16A 2-poles circuit breaker with a minimum contact gap of 3.0mm. - Power 3: Use approved 15/16A 4-poles circuit breaker with a minimum contact gap of 3.0mm.
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 aluminum fins or edges of metal parts. If you are required to handle sharp parts during installation or servicing, please wear hand glove. 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.

2. Specifications

2.1 WH-MDF09C3E8

Item		Unit	Refrigerant System
Performance Test Condition			EUROVENT
Heating Capacity		kW	9.00
		BTU/h	30700
		kcal/h	7740
COP		W/W	4.74
		kcal/hW	4.07
Air Flow		m^3/min (ft^3/min)	76.8 (2710)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm^3	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.30 (81.2)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
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	490 (Top Fan) 530 (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	Monobloc Unit
Dimension	Height	mm (inch)	1410 (55.5)
	Width	mm (inch)	1283 (50.5)
	Depth	mm (inch)	320 (12.6)
Net Weight		kg (lbs)	157 (346)
Noise Level		dB-A	49
		Power Level dB	66
Power Source (Phase, Voltage, Cycle)		ø	Three
		V	400
		Hz	50
Input Power		kW	1.90
Starting Current		A	2.9
Running Current		A	2.9
Max. Current/Max. Input Power Heatpump unit (Heatpump unit + Back-up Heater)		A/kW	7.5 (11.8) / 4.94 (7.94)
Back-up Heater: Max. Current/Max. Input Power		A/kW	Common ELCB to Heatpump
Tank Heater [1 Phase, 230V]: Max. Current/ Max. Input Power		A/kW	13.0 / 3.00
Power Factor		%	95
Power factor means total figure of compressor and outdoor fan motor.			
Power Cord	Number of core		-
	Length	m (ft)	-

Item	Unit	Monobloc Unit
Thermostat		Electronic Control
Protection Device		Electronic Control

Item			Unit	Water System
Performance Test Condition				EUROVENT
Operation Range	Outdoor Ambient		°C	-20 ~ 35
	Water Outlet		°C	25 ~ 55
Internal Pressure Differential			kPa	15.0
Refrigerant Pipe Diameter	Liquid		mm (inch)	9.52 (3/8)
	Gas		mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet		mm (inch)	30 (1-3/16)
	Outlet		mm (inch)	30 (1-3/16)
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	180
Hot Water Coil	Type			Brazed Plate
	No. of Plates			60
	Size (W x H x L)		mm	93 × 100 × 325
	Water Flow Rate		l/min (m^3/h)	25.8 (1.6)
Pressure Relief Valve Water Circuit			kPa	Open: 190, Close: 186 and below
Flow Switch				Magnetic Lead Switch
Protection Device			A	Residual Current Circuit Breaker (40)
Expansion Vessel		Volume	l	10
		MWP	bar	1
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.

2.2 WH-MDF12C9E8

Item		Unit	Refrigerant System
Performance Test Condition			EUROVENT
Heating Capacity		kW	12.00
		BTU/h	40900
		kcal/h	10320
COP		W/W	4.67
		kcal/hW	4.02
Air Flow		m^3/min (ft^3/min)	80.0 (2830)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm^3	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.30 (81.2)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	4.30
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	Monobloc Unit
Dimension	Height	mm (inch)	1410 (55.5)
	Width	mm (inch)	1283 (50.5)
	Depth	mm (inch)	320 (12.6)
Net Weight		kg (lbs)	157 (346)
Noise Level		dB-A	50
		Power Level dB	67
Power Source (Phase, Voltage, Cycle)		ø	Three
		V	400
		Hz	50
Input Power		kW	2.57
Starting Current		A	3.9
Running Current		A	3.9
Max. Current/Max. Input Power Heatpump unit (Heatpump unit + Back-up Heater)		A/kW	8.8 / 5.85 (Separate ELCB)
Back-up Heater: Max. Current/Max. Input Power		A/kW	13.0 / 9.00
Tank Heater [1 Phase, 230V]: Max. Current/ Max. Input Power		A/kW	13.0 / 3.00
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	Water System
Performance Test Condition				EUROVENT
Operation Range	Outdoor Ambient		°C	-20 ~ 35
	Water Outlet		°C	25 ~ 55
Internal Pressure Differential			kPa	27.5
Refrigerant Pipe Diameter	Liquid		mm (inch)	9.52 (3/8)
	Gas		mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet		mm (inch)	30 (1-3/16)
	Outlet		mm (inch)	30 (1-3/16)
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	180
Hot Water Coil	Type			Brazed Plate
	No. of Plates			60
	Size (W x H x L)		mm	93 × 100 × 325
	Water Flow Rate		l/min (m^3/h)	34.4 (2.1)
Pressure Relief Valve Water Circuit			kPa	Open: 190, Close: 186 and below
Flow Switch				Magnetic Lead Switch
Protection Device			A	Residual Current Circuit Breaker (40)
Expansion Vessel		Volume	l	10
		MWP	bar	1
Capacity of Integrated Electric Heater			kW	9.00

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 water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

2.3 WH-MDF14C9E8

Item		Unit	Refrigerant System
Performance Test Condition			EUROVENT
Heating Capacity		kW	14.00
		BTU/h	47800
		kcal/h	12040
COP		W/W	4.50
		kcal/hW	3.87
Air Flow		m^3/min (ft^3/min)	84.0 (2970)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm^3	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.30 (81.2)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	4.30
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	Monobloc Unit
Dimension	Height	mm (inch)	1410 (55.5)
	Width	mm (inch)	1283 (50.5)
	Depth	mm (inch)	320 (12.6)
Net Weight		kg (lbs)	157 (346)
Noise Level		dB-A	51
		Power Level dB	68
Power Source (Phase, Voltage, Cycle)		ø	Three
		V	400
		Hz	50
Input Power		kW	3.11
Starting Current		A	4.7
Running Current		A	4.7
Max. Current/Max. Input Power Heatpump unit (Heatpump unit + Back-up Heater)		A/kW	9.4 / 6.25 (Separate ELCB)
Back-up Heater: Max. Current/Max. Input Power		A/kW	13.0 / 9.00
Tank Heater [1 Phase, 230V]: Max. Current/ Max. Input Power		A/kW	13.0 / 3.00
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	Water System
Performance Test Condition				EUROVENT
Operation Range	Outdoor Ambient		°C	-20 ~ 35
	Water Outlet		°C	25 ~ 55
Internal Pressure Differential			kPa	36.0
Refrigerant Pipe Diameter	Liquid		mm (inch)	9.52 (3/8)
	Gas		mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet		mm (inch)	30 (1-3/16)
	Outlet		mm (inch)	30 (1-3/16)
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	180
Hot Water Coil	Type			Brazed Plate
	No. of Plates			60
	Size (W x H x L)		mm	93 × 100 × 325
	Water Flow Rate		l/min (m^3/h)	40.1 (2.4)
Pressure Relief Valve Water Circuit			kPa	Open: 190, Close: 186 and below
Flow Switch				Magnetic Lead Switch
Protection Device			A	Residual Current Circuit Breaker (40)
Expansion Vessel		Volume	l	10
		MWP	bar	1
Capacity of Integrated Electric Heater			kW	9.00

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.

2.4 WH-MDF16C9E8

Item		Unit	Refrigerant System
Performance Test Condition			EUROVENT
Heating Capacity		kW	16.00
		BTU/h	54600
		kcal/h	13760
COP		W/W	4.23
		kcal/hW	3.64
Air Flow		m^3/min (ft^3/min)	90.0 (3180)
Refrigeration Control Device			Expansion Valve
Refrigeration Oil		cm^3	FV50S (1200)
Refrigerant (R410A)		kg (oz)	2.30 (81.2)
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Compressor	Type		Hermetic Motor
	Motor Type		Brushless (4-poles)
	Rated Output	kW	4.30
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	Monobloc Unit
Dimension	Height	mm (inch)	1410 (55.5)
	Width	mm (inch)	1283 (50.5)
	Depth	mm (inch)	320 (12.6)
Net Weight		kg (lbs)	157 (346)
Noise Level		dB-A	53
		Power Level dB	70
Power Source (Phase, Voltage, Cycle)		ø	Three
		V	400
		Hz	50
Input Power		kW	3.78
Starting Current		A	5.7
Running Current		A	5.7
Max. Current/Max. Input Power Heatpump unit (Heatpump unit + Back-up Heater)		A/kW	9.9 / 6.59 (Separate ELCB)
Back-up Heater: Max. Current/Max. Input Power		A/kW	13.0 / 9.00
Tank Heater [1 Phase, 230V]: Max. Current/ Max. Input Power		A/kW	13.0 / 3.00
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	Water System
Performance Test Condition				EUROVENT
Operation Range	Outdoor Ambient		°C	-20 ~ 35
	Water Outlet		°C	25 ~ 55
Internal Pressure Differential			kPa	47.5
Refrigerant Pipe Diameter	Liquid		mm (inch)	9.52 (3/8)
	Gas		mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet		mm (inch)	30 (1-3/16)
	Outlet		mm (inch)	30 (1-3/16)
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	180
Hot Water Coil	Type			Brazed Plate
	No. of Plates			60
	Size (W x H x L)		mm	93 × 100 × 325
	Water Flow Rate		l/min (m^3/h)	45.9 (2.8)
Pressure Relief Valve Water Circuit			kPa	Open: 190, Close: 186 and below
Flow Switch				Magnetic Lead Switch
Protection Device			A	Residual Current Circuit Breaker (40)
Expansion Vessel		Volume	l	10
		MWP	bar	1
Capacity of Integrated Electric Heater			kW	9.00

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 water inlet temperature of 30°C and water outlet temperature of 35°C.
- Specification are subjected to change without prior notice for further improvement.

3. Features

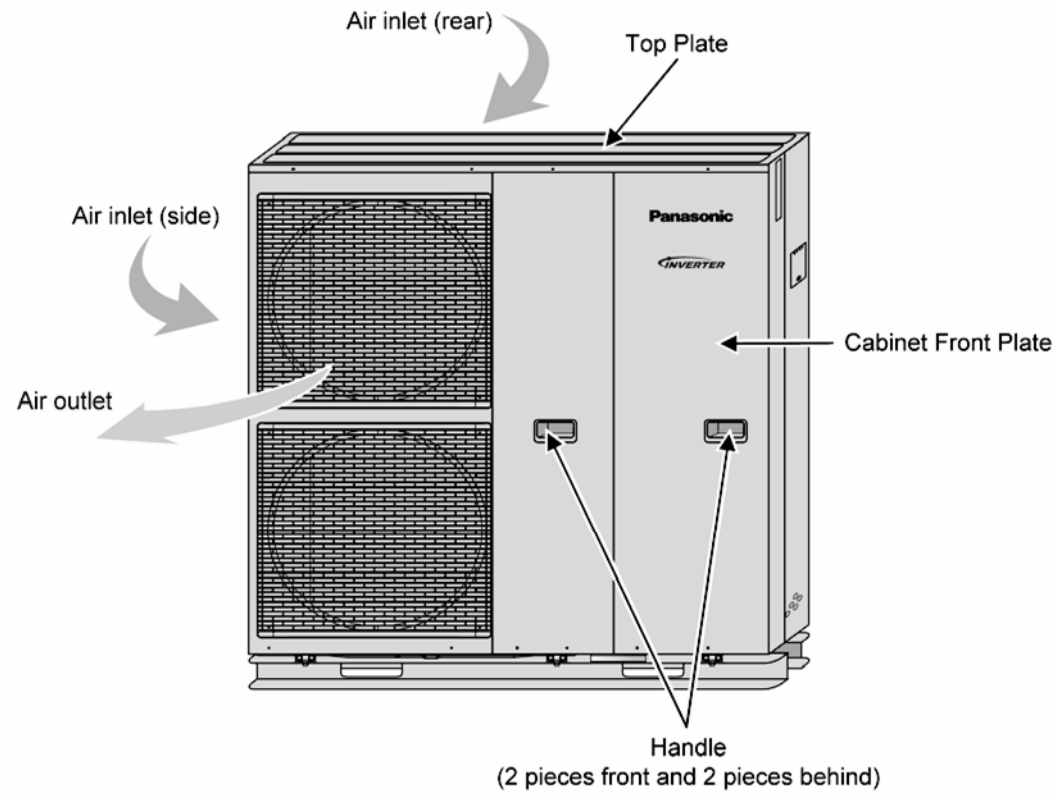
- **Inverter Technology**
  - Energy saving
- **High Efficiency**
- **Compact Design**
- **Environment Protection**
  - Non-ozone depletion substances refrigerant (R410A)
- **Easy to use remote control**
- **Weekly Timer setting**
- **Quality Improvement**
  - Random auto restart after power failure for safety restart operation
  - Gas leakage protection
  - Prevent compressor reverse cycle
  - Inner protector to protect compressor
- **Serviceability Improvement**
  - Breakdown Self Diagnosis function
  - System Status Check Buttons for servicing purpose
  - System Pumpdown Button for servicing purpose
  - Front maintenance design for monobloc unit
- **Operation Condition**

		Water outlet temperature (°C)	Ambient temperature (°C)
HEATING	Maximum	55	35
	Minimum	25	-20

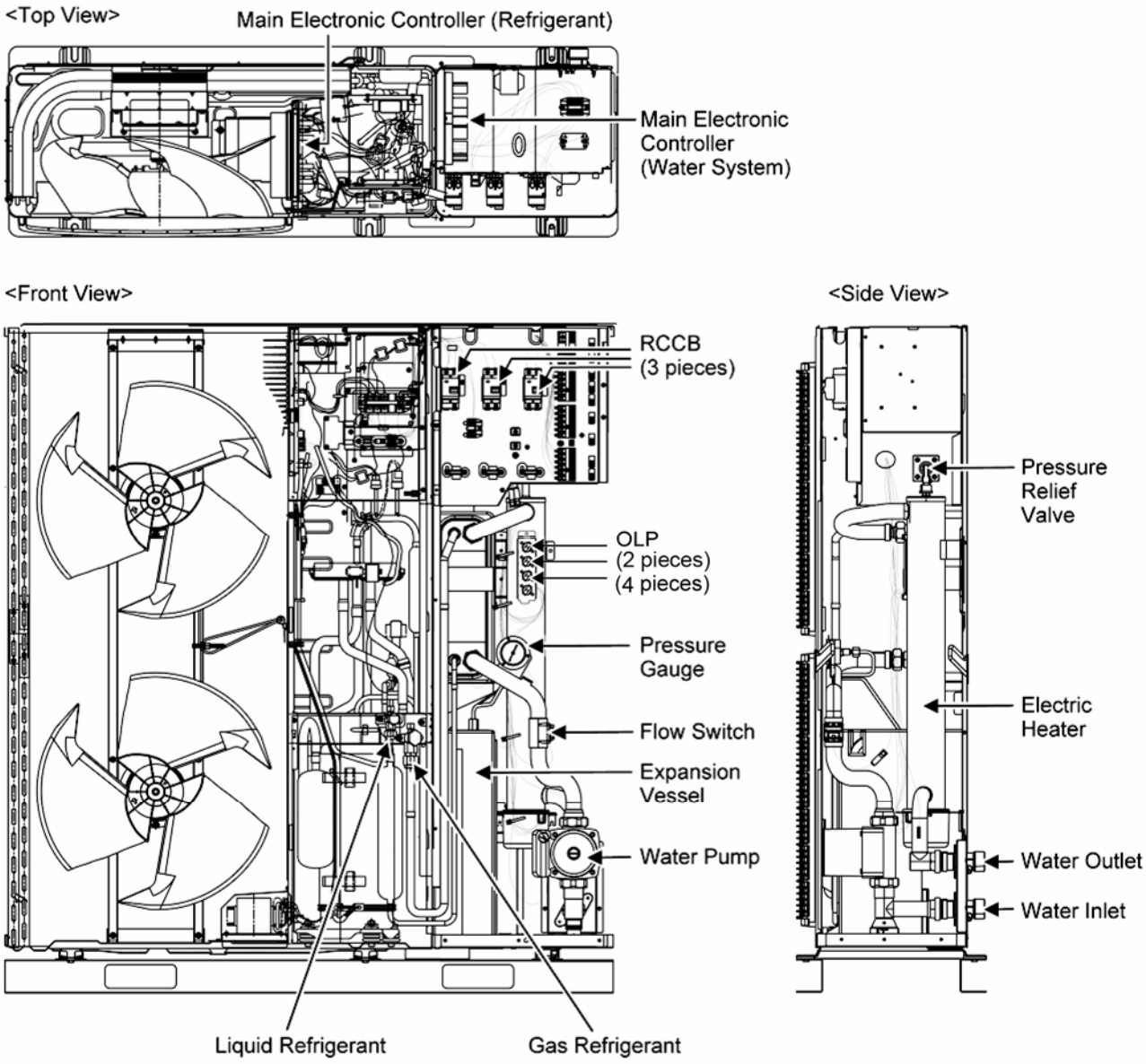
NOTICE : When the outdoor temperature is out of the above temperature range, the heating capacity will drop significantly and monobloc unit might stop for protection control.

4. Location of Controls and Components

4.1 Monobloc Unit



4.1.1 Main Components

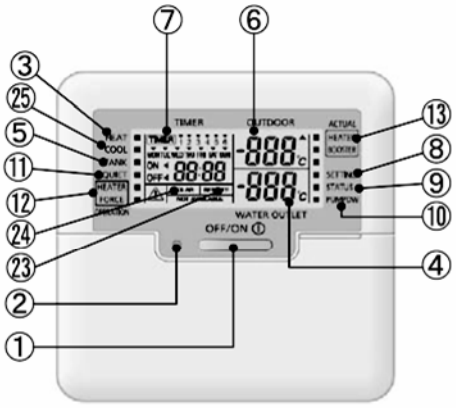


Water pump:	The pump circulates the water in the water circuit.
Pressure gauge:	The manometer allows read out of the water pressure in the water circuit.
Flow switch:	The flow switch checks the flow in the water circuit and protects the heat exchanger against high pressure built-up and the pump against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

4.1.2 Location of Control

4.1.2.1 Remote Control

The user interface allows the installer and user to setup, use and maintain the unit.



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.

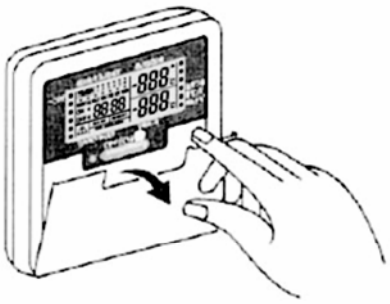
⑫ **HEATER/FORCE Indicator**
This icon indicates backup heater/force heater mode operation.

⑬ **HEATER/BOOSTER indicator**
This icon indicates backup heater/booster heater actual operation.

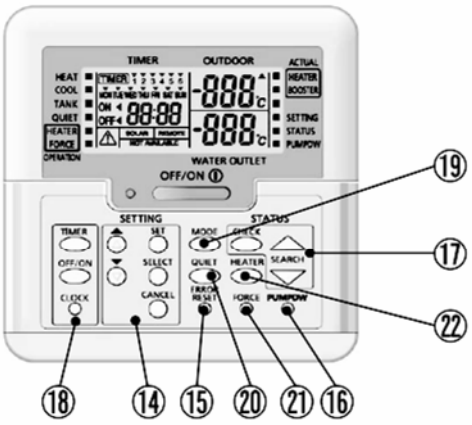
㉓ **Remote Display**
This LCD show the external thermo controller display.

㉔ **Solar Display**
This LCD show the solar display.

㉕ **Cool Mode Indicator**
This icon indicates cooling mode operation.



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 8 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°C ~ 15°C).
2) Outdoor ambient set temperature for heat mode at high water outlet temperature (Selection range: -15°C ~ 15°C).
3) Water outlet set temperature for heat mode at low outdoor ambient temperature (Selection range: 25°C ~ 55°C).
4) Water outlet set temperature for heat mode at high outdoor ambient temperature (Selection range: 25°C ~ 55°C).
5) Set temperature for turning OFF heating operation (Selection range: 5°C ~ 35°C).
6) Outdoor ambient set temperature for turning ON heater operation (Selection range: -15°C ~ 20°C).
7) Water set temperature during cool mode (5°C ~ 20°C).
8) Sanitary tank set temperature (Selection range: 40°C ~ 75°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°C ~ 5°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 remote control 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.

Heat → Heat + Tank → Tank

⑳ **Quiet Button**

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

㉑ **Force Button**

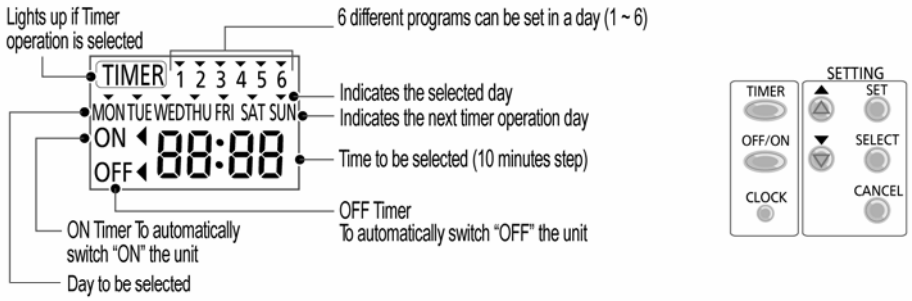
This button is to select force heater mode operation.
Press OFF/ON button to stop the force heater mode operation.

㉒ **Heater Button**

This button is to select backup heater mode operation.

4.1.3 Weekly Timer Setting

Timer Display



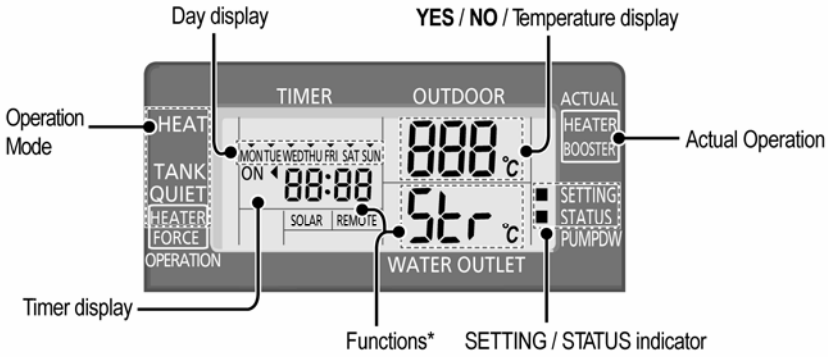
Function	Step
Enter timer mode	Press TIMER.
Set day & time	1. Press ▲ or ▼ to select your desired day. 2. Press SELECT to confirm. 3. "1" will be blinking, press SELECT to set program 1. 4. Press OFF/ON to select ON or OFF timer. 5. Press ▲ or ▼ to select your desired time. If you want to set the timer together with other operations, press MODE and QUIET. 6. Press SET to confirm program 1. The selected day will be highlighted with ▼. • After 2 seconds, the display will move to the next program. 7. 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 SET button is pressed the setting at that moment is confirmed and timer setup is ended.
Add/Modify timer	Repeat the steps above.
Disable timer	Press TIMER, then press CANCEL.
Enable timer	Press TIMER, then press SET.
Check timer	1. Press TIMER. 2. Press ▲ or ▼ until your desired day is shown, press SELECT to confirm your selection. 3. Press ▲ or ▼ to check the set programs.
Cancel timer	1. Press TIMER. 2. Press ▲ or ▼ until your desired day is shown. 3. Press SELECT to enter program setting. 4. Press ▲ or ▼ until your desired program is shown. 5. Press CANCEL to cancel the program.

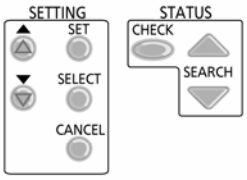
Notes:

- 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.

4.1.4 Setting Up The Special Functions

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





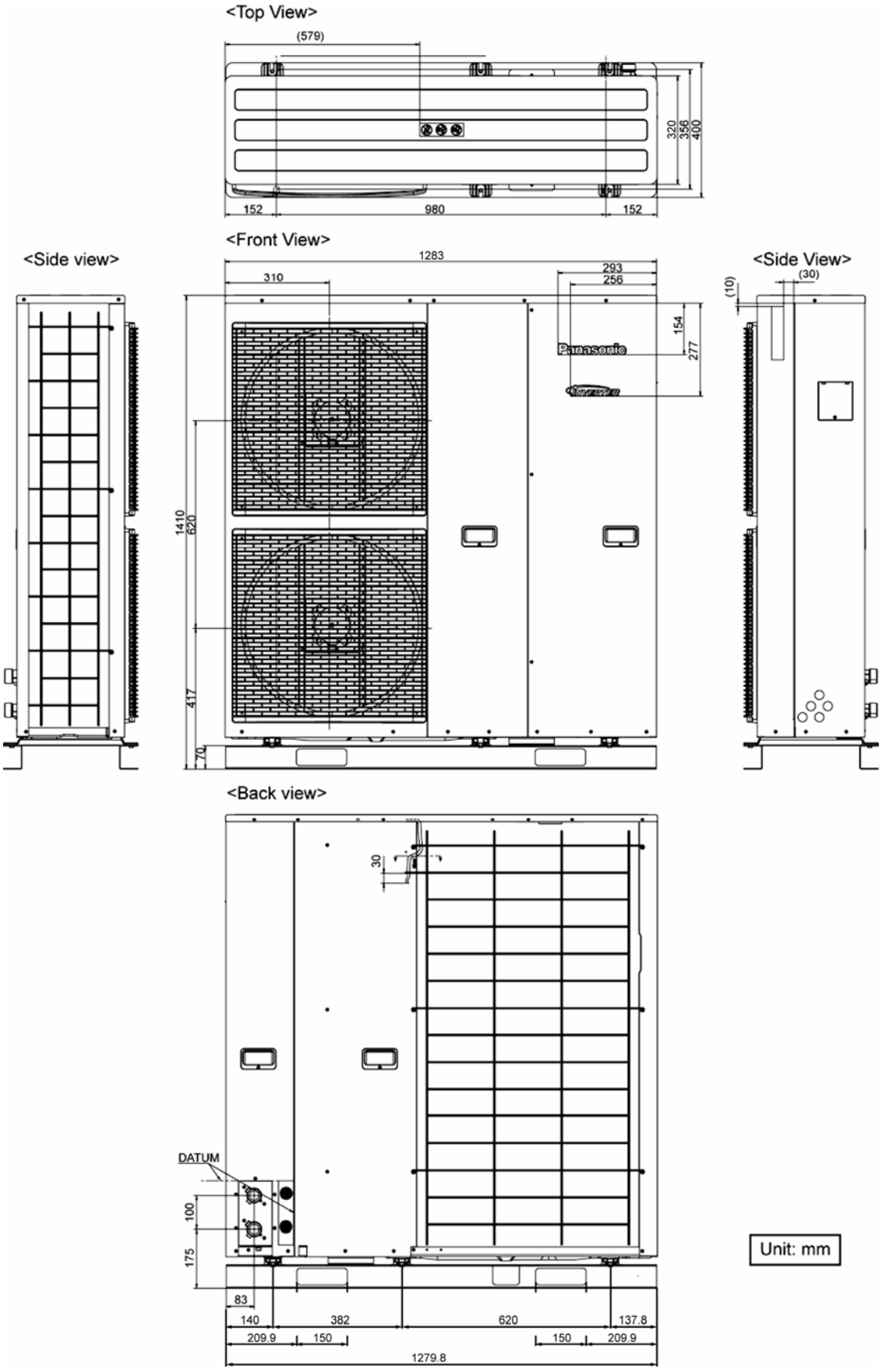
SELECT FUNCTIONS AND SET YOUR DESIRED TIMER

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 remote control 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.

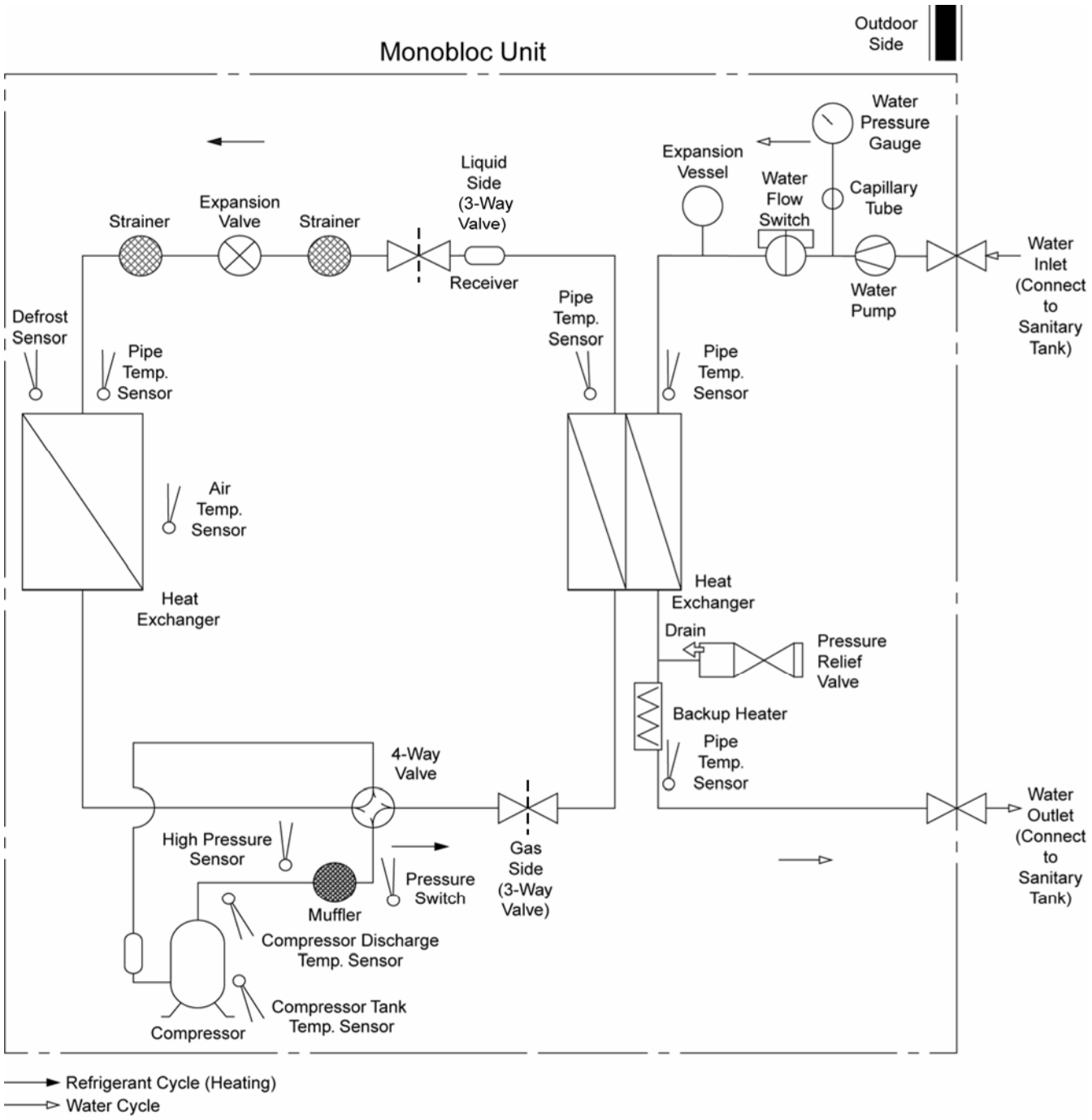
Set	Function*	Operation Mode/ Actual Operation	Description
Set 1	con	roon	External Thermo Controller (YES / NO) To set external thermo controller connection.
Set 2	con	TANK	Tank Connection (YES / NO) To set tank connection. Note: If select "Tank connection" is "NO", Set 3~11 are skipped.
Set 3	Pry	SOLAR	Solar Priority (YES / NO) To choose the solar use for water tank heat up.
Set 4	Pry	HEAT	Heating Priority (YES / NO) To choose the heat pump only use for Heating side during HEAT + TANK mode. Note: If select "Heating priority" is "YES", Set 5~7 are skipped.
Set 5	int	HEAT	Heating Heat-up Interval Set To set timer for Heating during HEAT + TANK mode (0.5hour ~ 10hours).
Set 6	int	TANK	Tank Heat-up Interval Set To set timer for Tank during HEAT + TANK mode (5minutes ~ 1hour 35minutes).
Set 7	dLy	BOOSTER	Booster Heater Delay Time Set To set delay timer for booster heater to ON if tank temperature is not reached (20minutes ~ 1hour 35minutes).
Set 8	Fun	StrL	Sterilization (YES / NO) To set sterilization, if required. Note: If select "Sterilization" is "NO", Set 9~11 are skipped.
Set 9	Str		Sterilization Day & Time Set To set timer for sterilization (only once a week).
Set 10	boi	StrL	Sterilization Temperature Set To set temperature for sterilization function (40°C ~ 75°C).
Set 11	oPr	Str	Sterilization Continue Time To set timer to maintain heating temperature in order to complete the sterilization function (5minutes ~ 1hour).

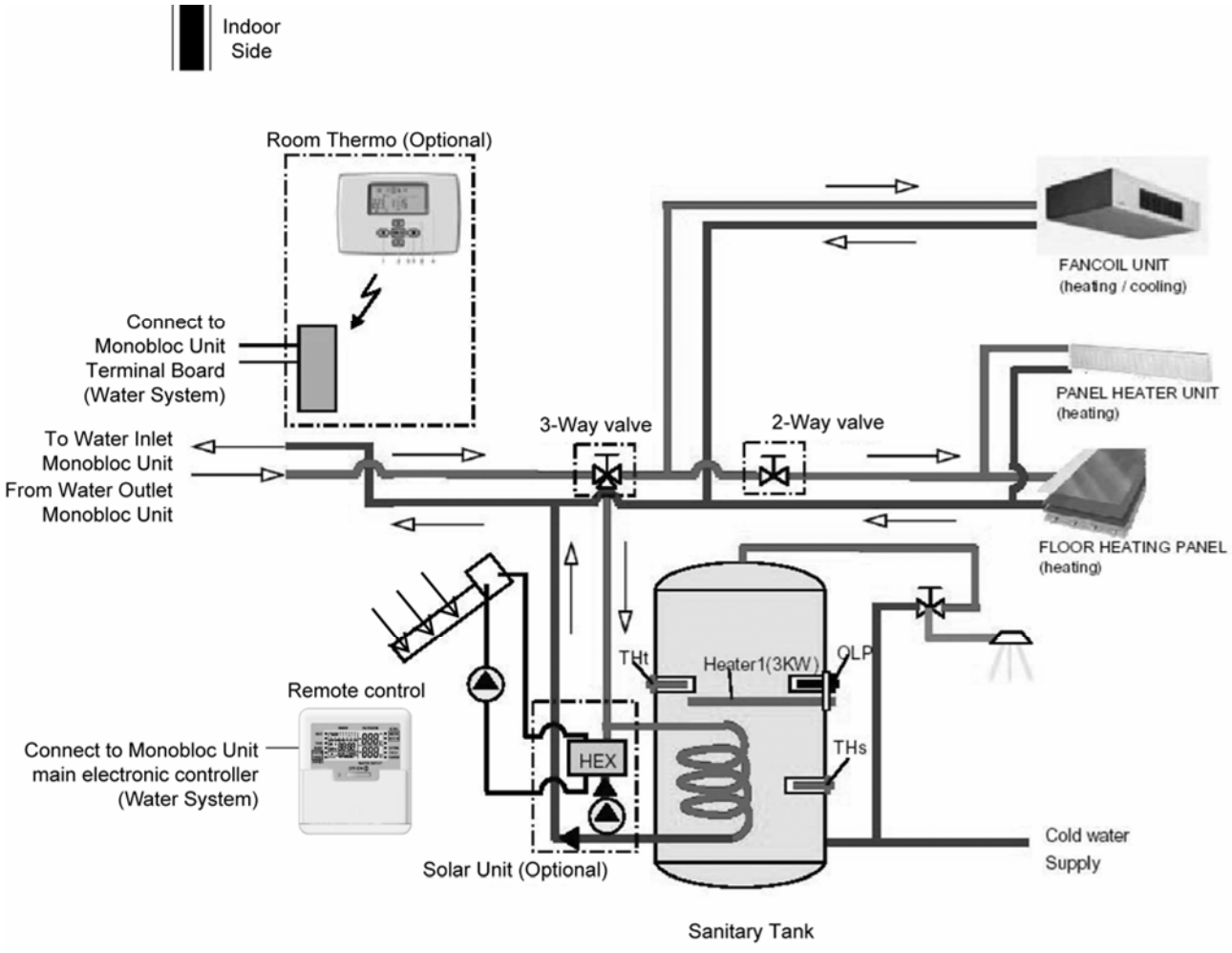
5. Dimensions

5.1 Monobloc Unit



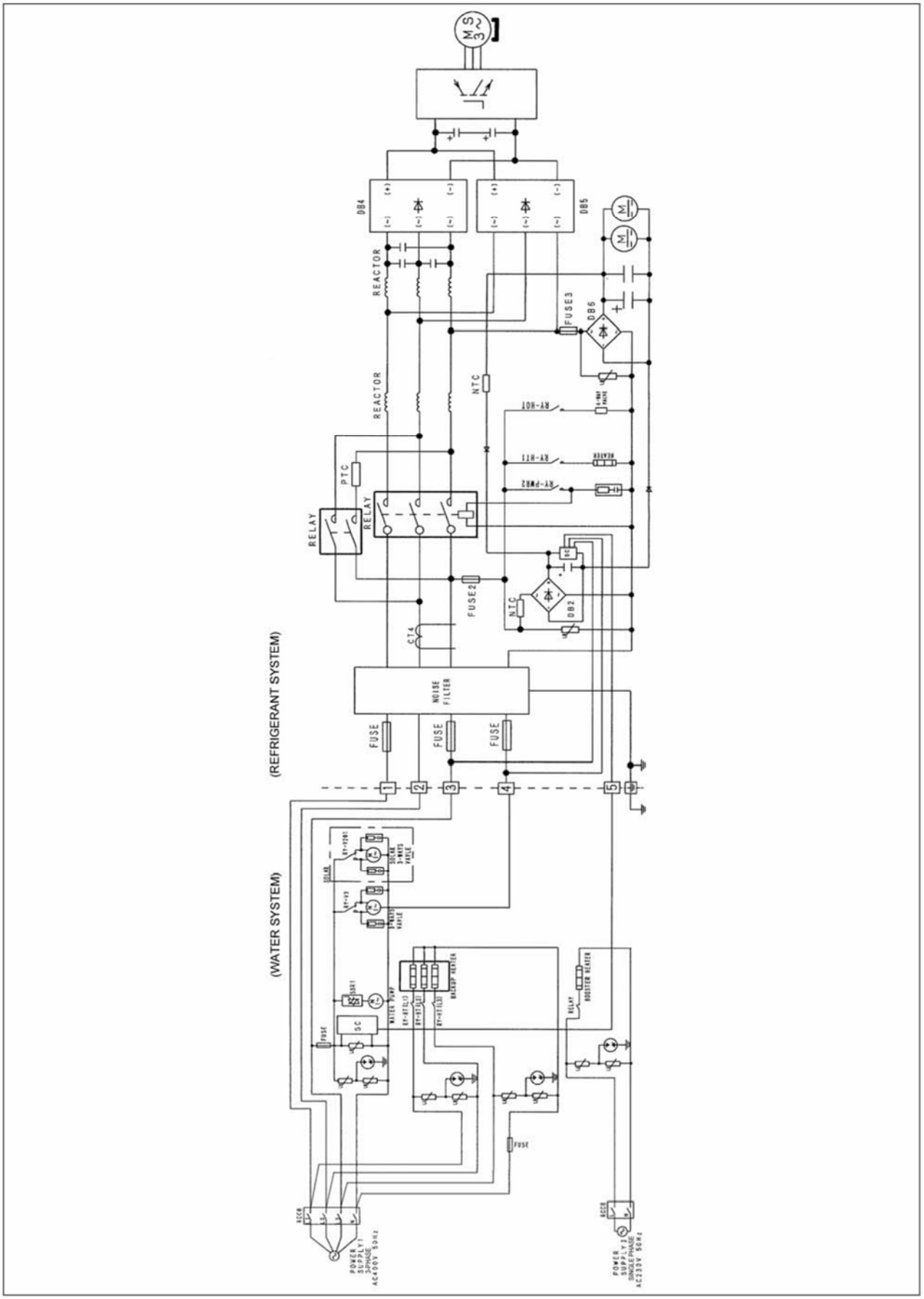
6. Refrigeration And Water Cycle Diagram



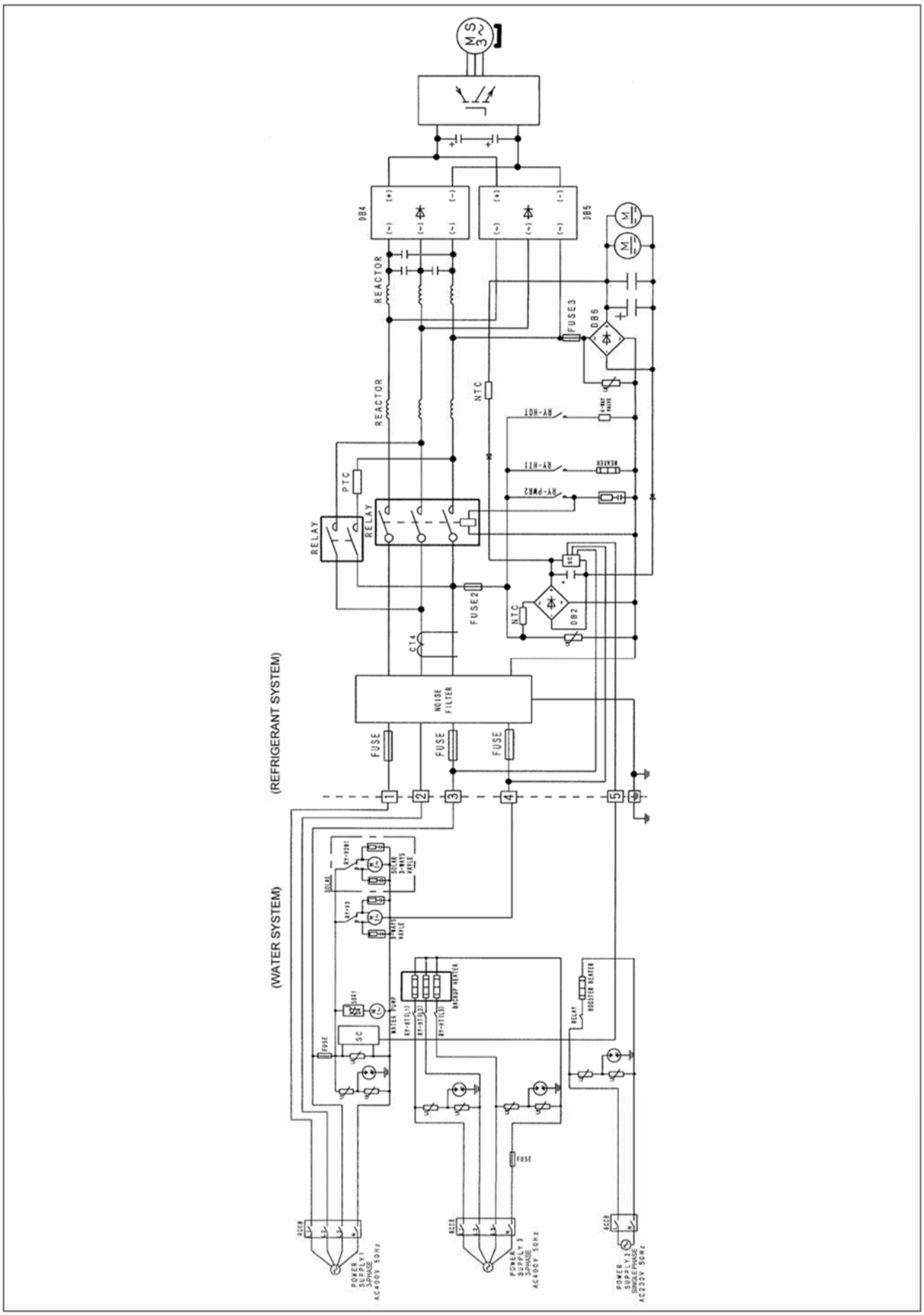

Indoor
Side
Room Thermo (Optional)
Connect to
Monobloc Unit
Terminal Board
(Water System)
To Water Inlet
Monobloc Unit
From Water Outlet
Monobloc Unit
3-Way valve
2-Way valve
FANCOIL UNIT
(heating / cooling)
PANEL HEATER UNIT
(heating)
FLOOR HEATING PANEL
(heating)
THt
Heater1(3KW)
OLP
THs
HEX
Remote control
Connect to Monobloc Unit
main electronic controller
(Water System)
Solar Unit (Optional)
Cold water
Supply
Sanitary Tank

7. Block Diagram

7.1 WH-MDF09C3E8

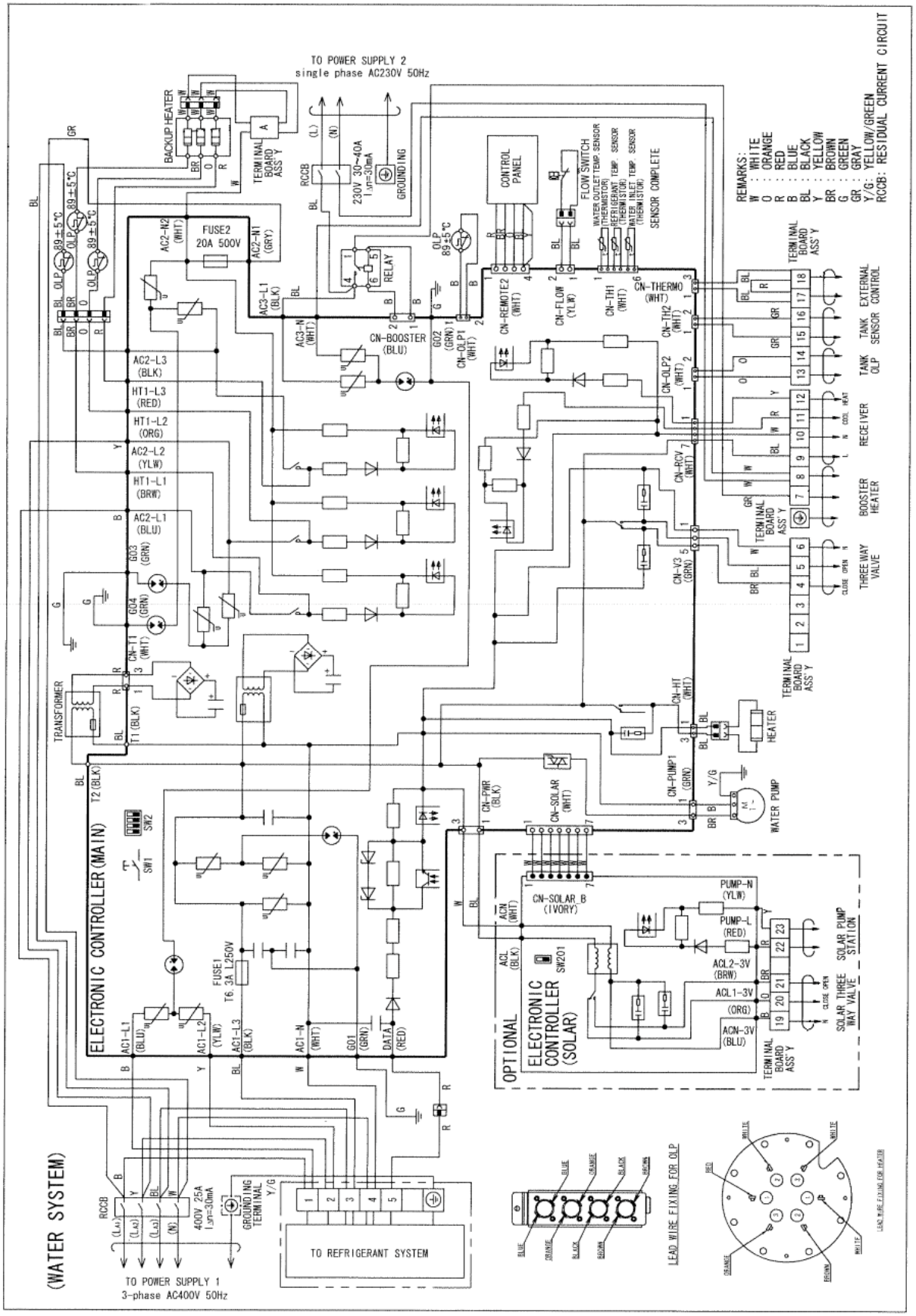


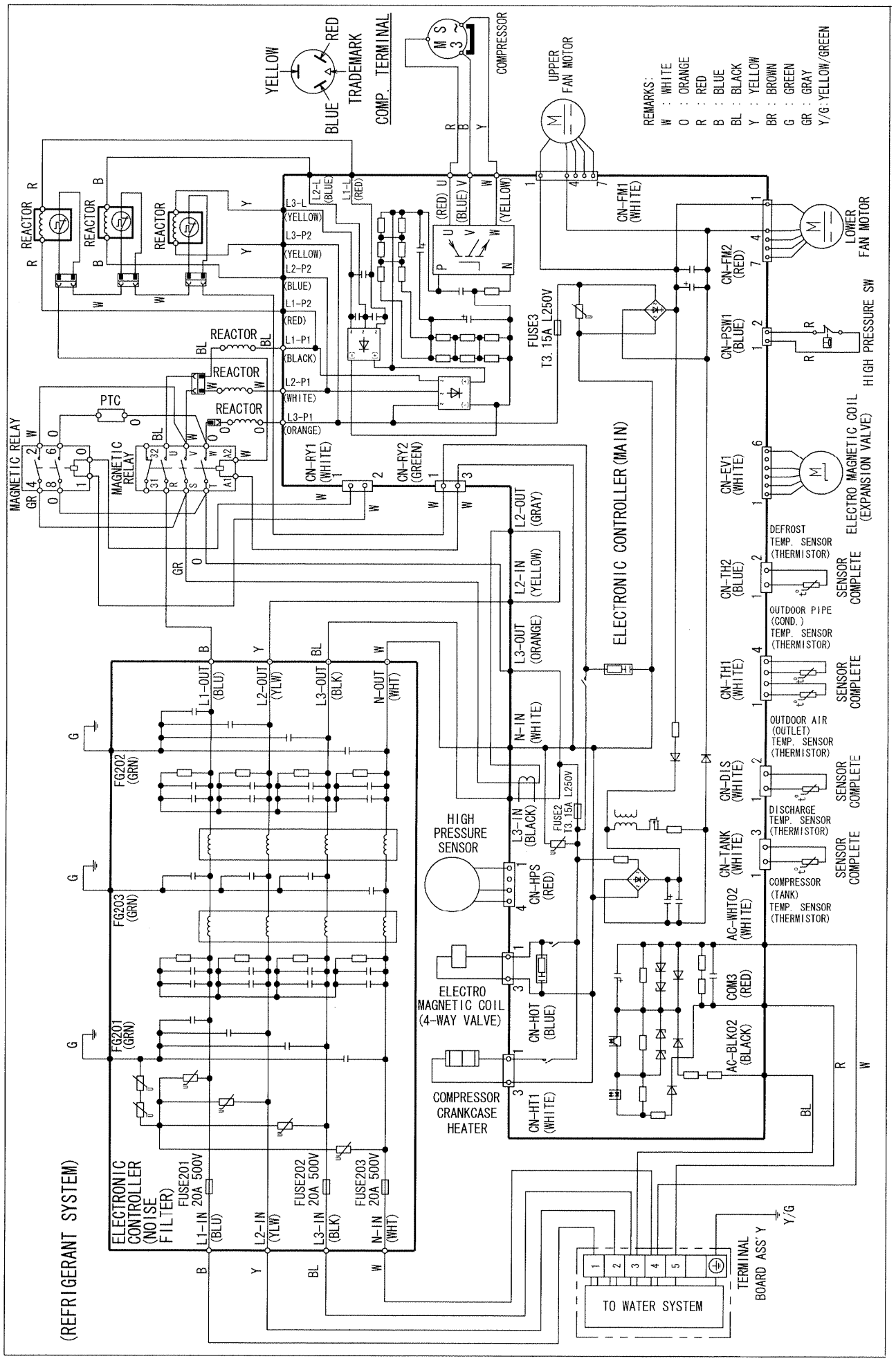
7.2 WH-MDF12C9E8 WH-MDF14C9E8 WH-MDF16C9E8



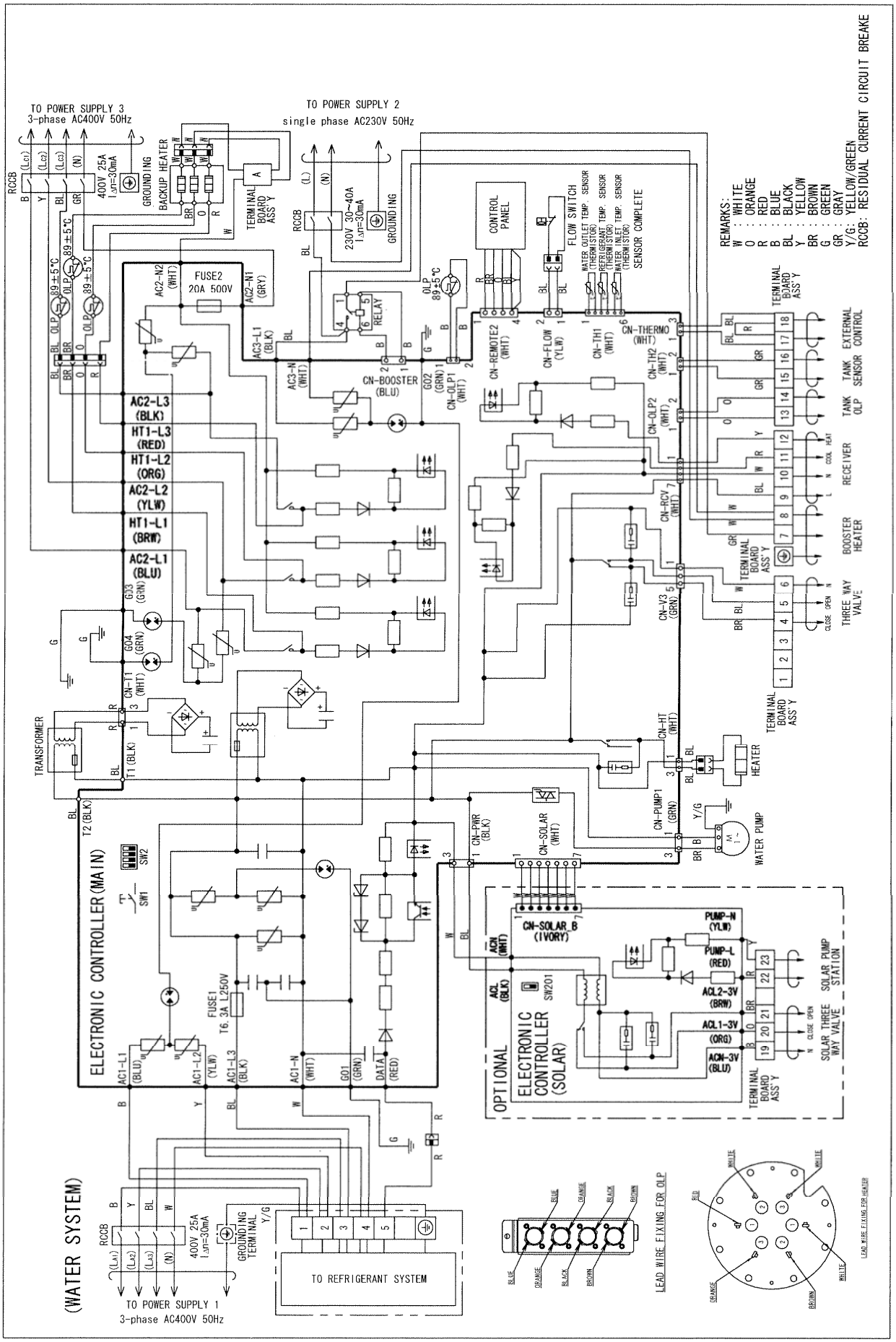
8. Wiring Connection Diagram

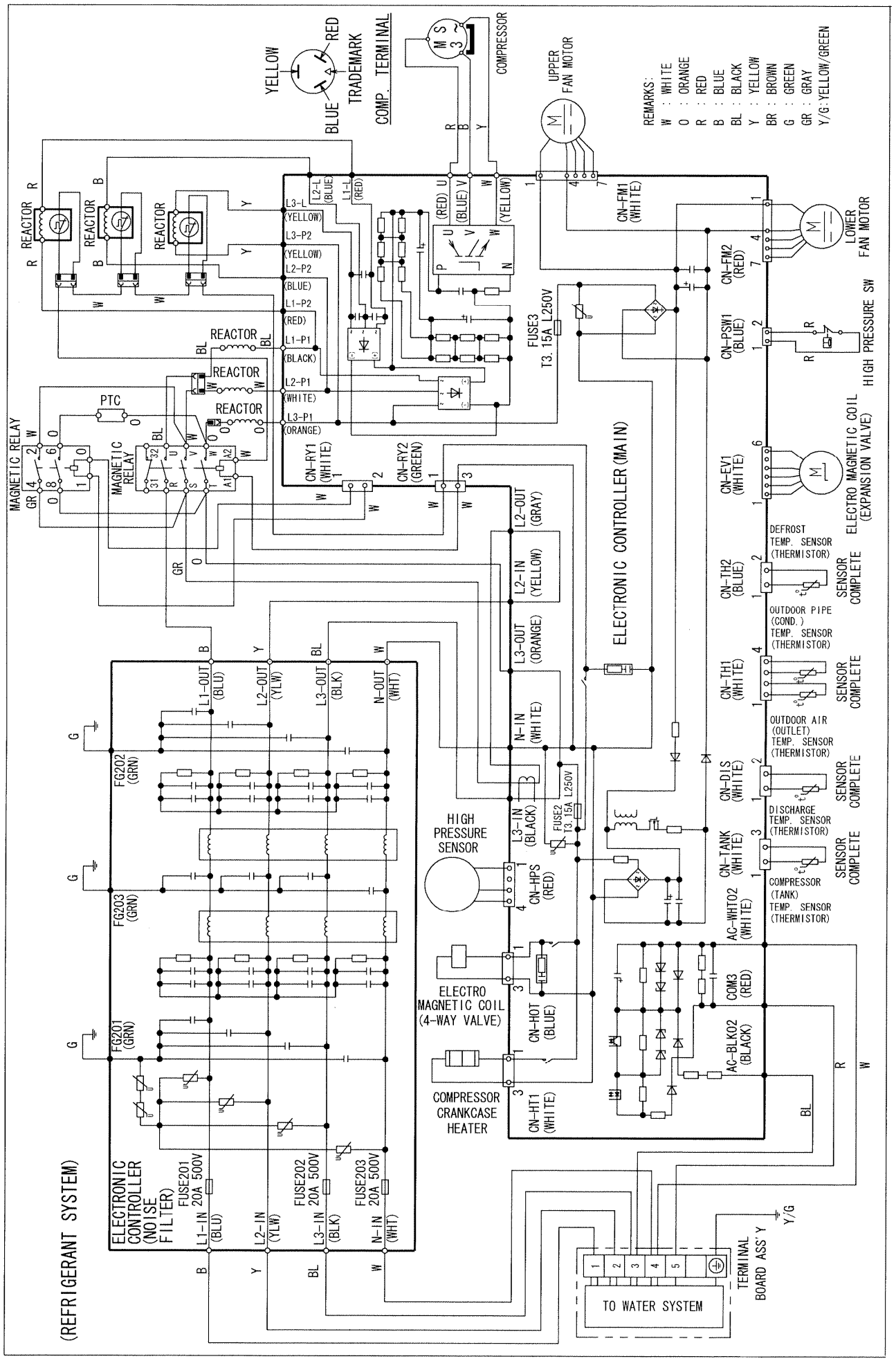
8.1 WH-MDF09C3E8




(REFRIGERANT SYSTEM)
ELECTRONIC CONTROLLER (NOISE FILTER)
FUSE201 20A 500V
FUSE202 20A 500V
FUSE203 20A 500V
L1-IN (BLU)
L2-IN (YLW)
L3-IN (BLK)
N-IN (WHT)
FG201 (GRN)
FG202 (GRN)
FG203 (GRN)
TO WATER SYSTEM
TERMINAL BOARD ASS'Y
Y/G
ELECTRONIC CONTROLLER (MAIN)
MAGNETIC RELAY
MAGNETIC RELAY
REACTOR
PTC
CN-RY1 (WHITE)
CN-RY2 (GREEN)
FUSE3 T3.15A L250V
FUSE2 T3.15A L250V
HIGH PRESSURE SENSOR
CN-HPS (RED)
ELECTRO MAGNETIC COIL (4-WAY VALVE)
CN-HOT (BLUE)
COMPRESSOR CRANKCASE HEATER
CN-HT1 (WHITE)
L1-OUT (BLU)
L2-OUT (YLW)
L3-OUT (BLK)
N-OUT (WHT)
L2-OUT (GRAY)
L2-IN (YELLOW)
L3-OUT (ORANGE)
N-IN (WHITE)
L3-IN (BLACK)
COMPRESSOR
YELLOW
RED
BLUE
TRADEMARK
COMP. TERMINAL
UPPER FAN MOTOR
LOWER FAN MOTOR
CN-FM1 (WHITE)
CN-FM2 (RED)
CN-PSW1 (BLUE)
HIGH PRESSURE SW
CN-EV1 (WHITE)
ELECTRO MAGNETIC COIL (EXPANSION VALVE)
CN-TH2 (BLUE)
DEFROST TEMP. SENSOR (THERMISTOR)
CN-TH1 (WHITE)
OUTDOOR PIPE (COND.) TEMP. SENSOR (THERMISTOR)
CN-DIS (WHITE)
OUTDOOR AIR (OUTLET) TEMP. SENSOR (THERMISTOR)
CN-TANK (WHITE)
DISCHARGE TEMP. SENSOR (THERMISTOR)
AC-WHT02 (WHITE)
COMPRESSOR (TANK) TEMP. SENSOR (THERMISTOR)
SENSOR COMPLETE
COM3 (RED)
AC-BLK02 (BLACK)
REMARKS:
W : WHITE
O : ORANGE
R : RED
B : BLUE
BL : BLACK
Y : YELLOW
BR : BROWN
G : GREEN
GR : GRAY
Y/G:YELLOW/GREEN

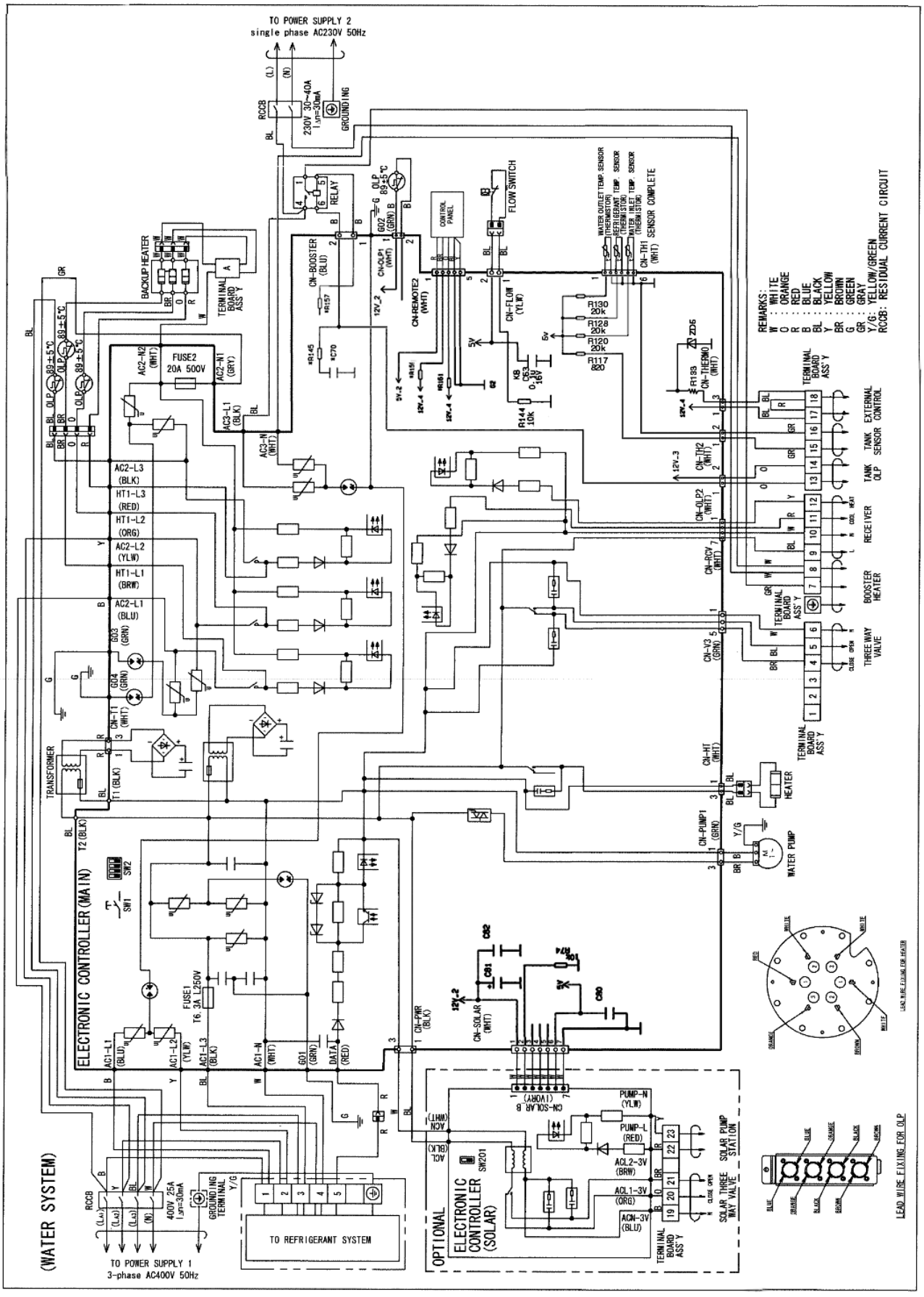
8.2 WH-MDF12C9E8 WH-MDF14C9E8 WH-MDF16C9E8

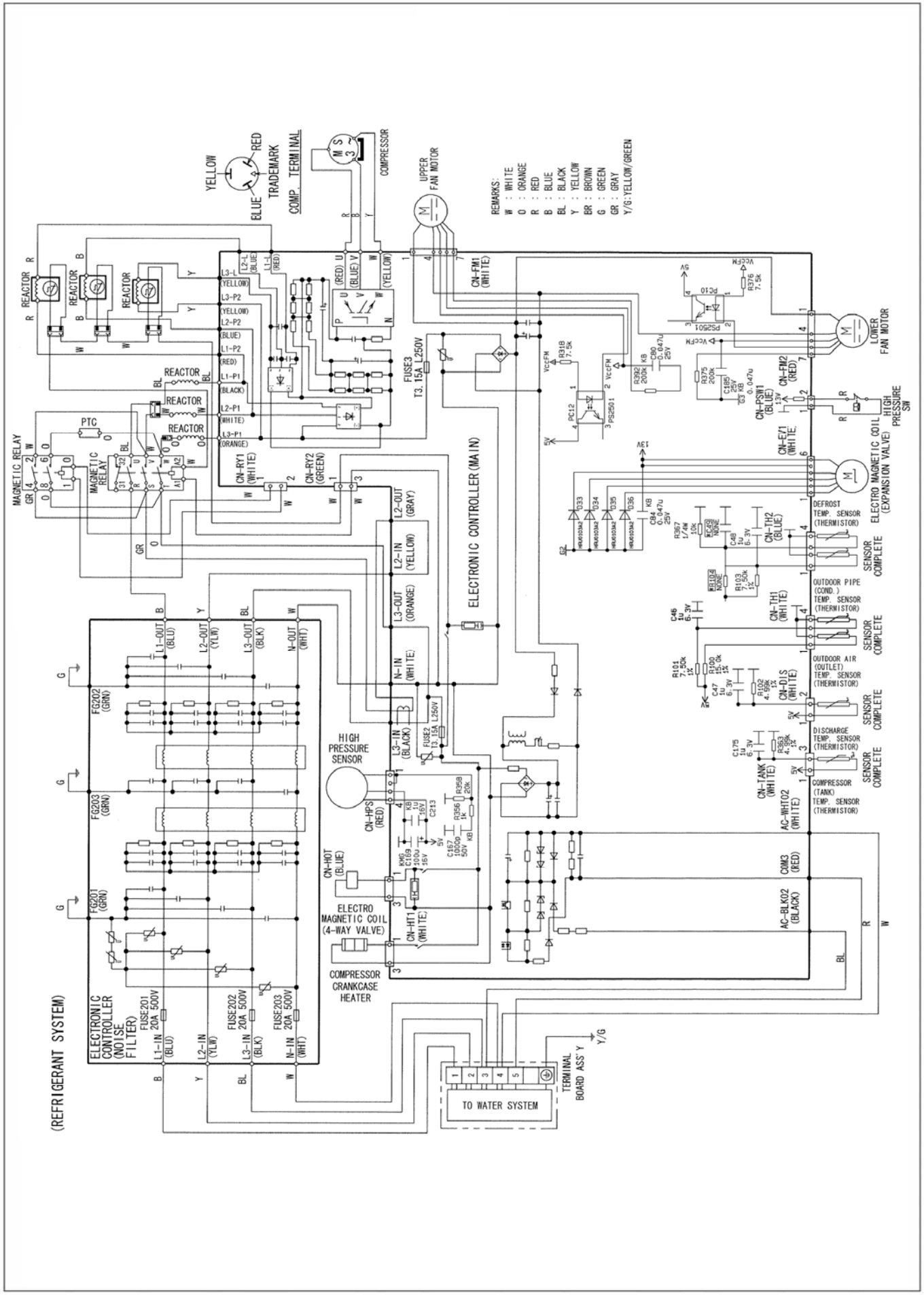



(REFRIGERANT SYSTEM)
ELECTRONIC CONTROLLER (NOISE FILTER)
FUSE201 20A 500V
FUSE202 20A 500V
FUSE203 20A 500V
L1-IN (BLU)
L2-IN (YLW)
L3-IN (BLK)
N-IN (WHT)
FG201 (GRN)
FG202 (GRN)
FG203 (GRN)
L1-OUT (BLU)
L2-OUT (YLW)
L3-OUT (BLK)
N-OUT (WHT)
MAGNETIC RELAY
MAGNETIC RELAY
REACTOR
REACTOR
REACTOR
REACTOR
REACTOR
PTC
CN-RY1 (WHITE)
CN-RY2 (GREEN)
ELECTRONIC CONTROLLER (MAIN)
L3-L (YELLOW)
L3-P2 (YELLOW)
L2-P2 (BLUE)
L1-P2 (RED)
L1-P1 (BLACK)
L2-P1 (WHITE)
L3-P1 (ORANGE)
L2-L (BLUE)
L1-L (RED)
L2-OUT (GRAY)
L2-IN (YELLOW)
L3-OUT (ORANGE)
N-IN (WHITE)
L3-IN (BLACK)
FUSE2 T3.15A L250V
FUSE3 T3.15A L250V
CN-HPS (RED)
HIGH PRESSURE SENSOR
CN-HOT (BLUE)
ELECTRO MAGNETIC COIL (4-WAY VALVE)
CN-HT1 (WHITE)
COMPRESSOR CRANKCASE HEATER
COMPRESSOR
COMP. TERMINAL
YELLOW
BLUE
RED
TRADEMARK
UPPER FAN MOTOR
CN-FM1 (WHITE)
LOWER FAN MOTOR
CN-FM2 (RED)
CN-PSW1 (BLUE)
HIGH PRESSURE SW
CN-EV1 (WHITE)
ELECTRO MAGNETIC COIL (EXPANSION VALVE)
CN-TH2 (BLUE)
DEFROST TEMP. SENSOR (THERMISTOR)
CN-TH1 (WHITE)
OUTDOOR PIPE (COND.) TEMP. SENSOR (THERMISTOR)
CN-DIS (WHITE)
OUTDOOR AIR (OUTLET) TEMP. SENSOR (THERMISTOR)
CN-TANK (WHITE)
DISCHARGE TEMP. SENSOR (THERMISTOR)
AC-WHT02 (WHITE)
COMPRESSOR (TANK) TEMP. SENSOR (THERMISTOR)
SENSOR COMPLETE
COM3 (RED)
AC-BLK02 (BLACK)
TERMINAL BOARD ASS'Y
TO WATER SYSTEM
REMARKS:
W : WHITE
O : ORANGE
R : RED
B : BLUE
BL : BLACK
Y : YELLOW
BR : BROWN
G : GREEN
GR : GRAY
Y/G:YELLOW/GREEN

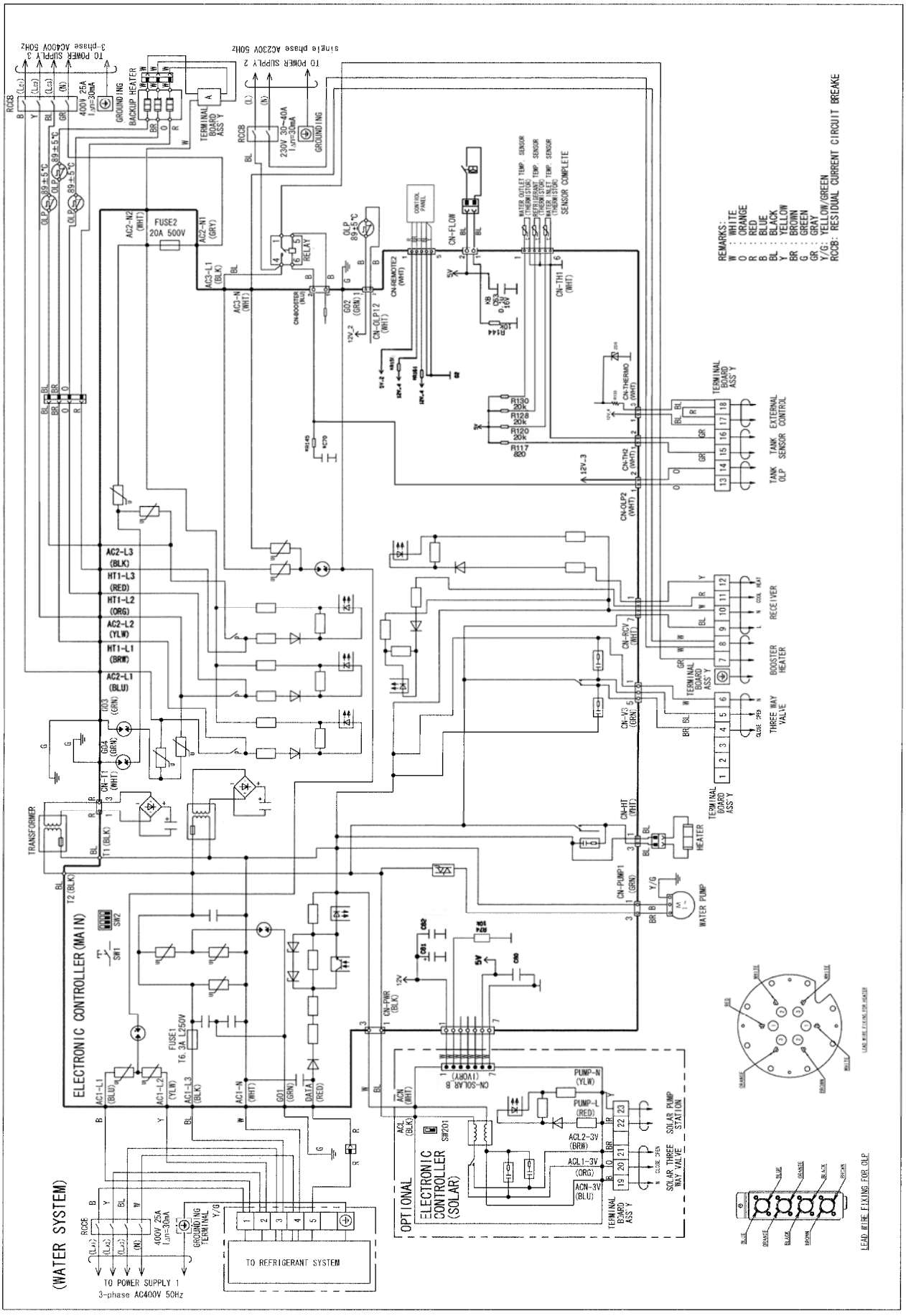
9. Electronic Circuit Diagram

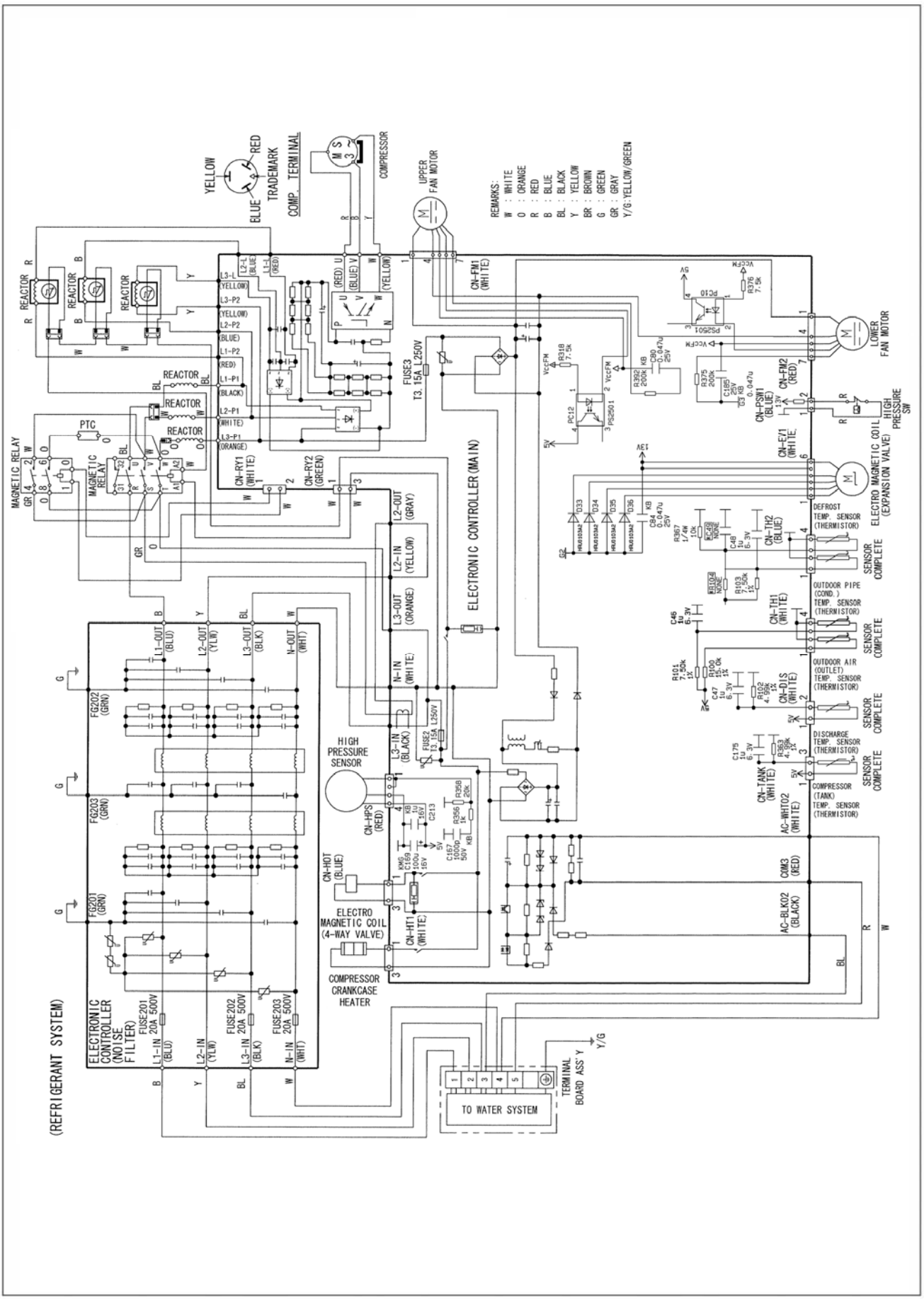
9.1 WH-MDF09C3E8




(REFRIGERANT SYSTEM)
ELECTRONIC CONTROLLER (NOISE FILTER)
FUSE201 20A 500V
FUSE202 20A 500V
FUSE203 20A 500V
L1-IN (BLU)
L2-IN (YLW)
L3-IN (BLK)
N-IN (WHT)
L1-OUT (BLU)
L2-OUT (YLW)
L3-OUT (BLK)
N-OUT (WHT)
FG202 (GRN)
FG203 (GRN)
FG201 (GRN)
TERMINAL BOARD ASS'Y
TO WATER SYSTEM
COMPRESSOR CRANKCASE HEATER
ELECTRO MAGNETIC COIL (4-WAY VALVE)
CN-HT1 (WHITE)
CN-HOT (BLUE)
HIGH PRESSURE SENSOR
CN-HPS (RED)
FUSE2 T3.15A L250V
ELECTRONIC CONTROLLER (MAIN)
CN-RY1 (WHITE)
CN-RY2 (GREEN)
MAGNETIC RELAY
PTC
REACTOR
FUSE3 T3.15A L250V
CN-FM1 (WHITE)
UPPER FAN MOTOR
COMPRESSOR
YELLOW
RED
BLUE
TRADEMARK
COMP. TERMINAL
REMARKS:
W : WHITE
O : ORANGE
R : RED
B : BLUE
BL : BLACK
Y : YELLOW
BR : BROWN
G : GREEN
GR : GRAY
Y/G:YELLOW/GREEN
LOWER FAN MOTOR
CN-FM2 (RED)
CN-PSW1 (BLUE)
HIGH PRESSURE SW
CN-EV1 (WHITE)
ELECTRO MAGNETIC COIL (EXPANSION VALVE)
DEFROST TEMP. SENSOR (THERMISTOR)
CN-TH2 (BLUE)
OUTDOOR PIPE (COND.) TEMP. SENSOR (THERMISTOR)
CN-TH1 (WHITE)
OUTDOOR AIR (OUTLET) TEMP. SENSOR (THERMISTOR)
CN-DIS (WHITE)
DISCHARGE TEMP. SENSOR (THERMISTOR)
COMPRESSOR (TANK) TEMP. SENSOR (THERMISTOR)
CN-TANK (WHITE)
AC-WHT02 (WHITE)
AC-BLK02 (BLACK)
COM3 (RED)
SENSOR COMPLETE

9.2 WH-MDF12C9E8 WH-MDF14C9E8 WH-MDF16C9E8

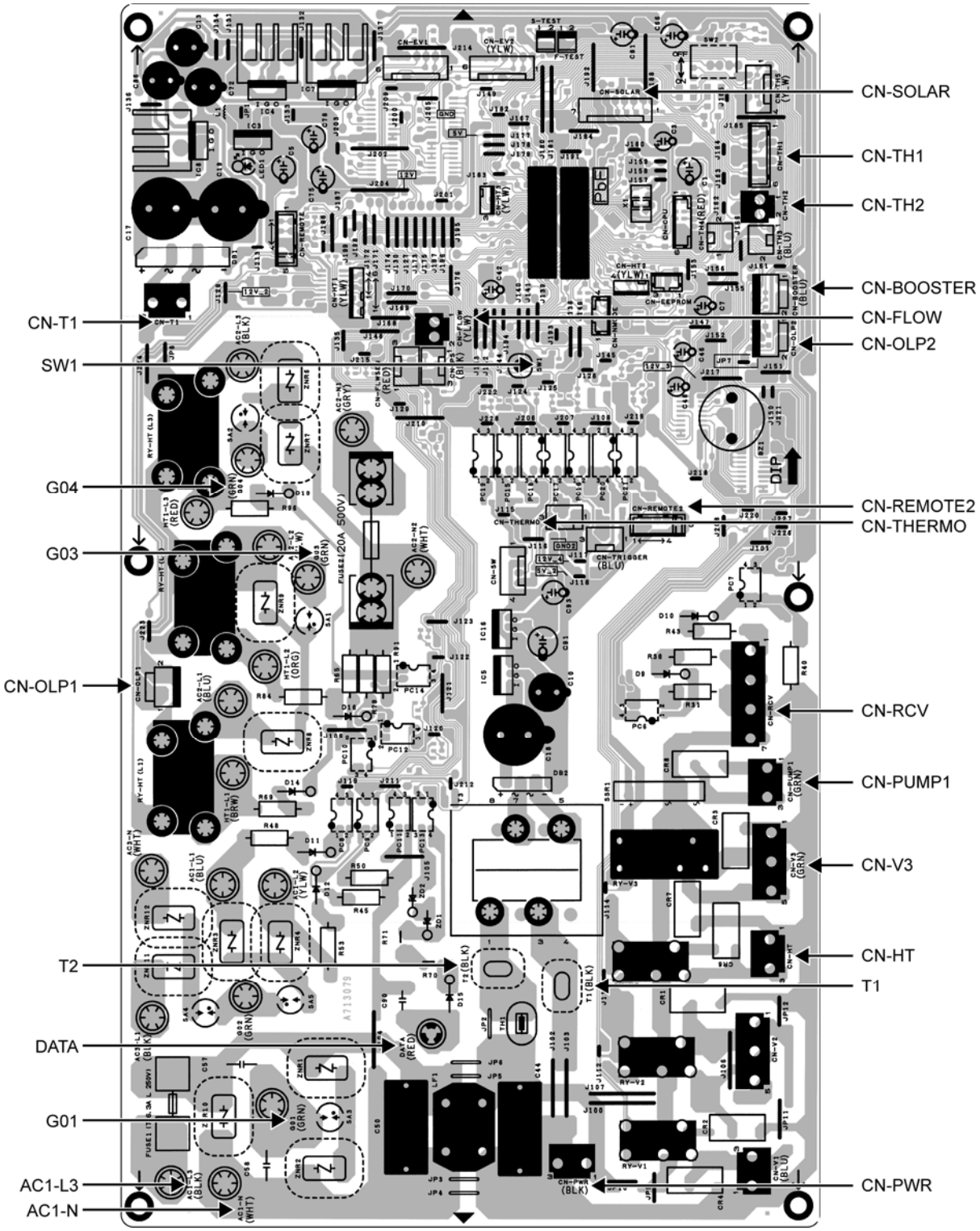



(REFRIGERANT SYSTEM)
ELECTRONIC CONTROLLER (NOISE FILTER)
ELECTRONIC CONTROLLER (MAIN)
TO WATER SYSTEM
TERMINAL BOARD ASS'Y
COMPRESSOR
UPPER FAN MOTOR
LOWER FAN MOTOR
REACTOR
PTC
MAGNETIC RELAY
HIGH PRESSURE SENSOR
ELECTRO MAGNETIC COIL (4-WAY VALVE)
COMPRESSOR CRANKCASE HEATER
ELECTRO MAGNETIC COIL (EXPANSION VALVE)
HIGH PRESSURE SW
DEFROST TEMP. SENSOR (THERMISTOR)
OUTDOOR PIPE (COND.) TEMP. SENSOR (THERMISTOR)
OUTDOOR AIR (OUTLET) TEMP. SENSOR (THERMISTOR)
DISCHARGE TEMP. SENSOR (THERMISTOR)
COMPRESSOR (TANK) TEMP. SENSOR (THERMISTOR)
SENSOR COMPLETE
FUSE201 20A 500V
FUSE202 20A 500V
FUSE203 20A 500V
FUSE3 T3.15A L250V
FUSE2 T3.15A L250V
REMARKS:
W : WHITE
O : ORANGE
R : RED
B : BLUE
BL : BLACK
Y : YELLOW
BR : BROWN
G : GREEN
GR : GRAY
Y/G:YELLOW/GREEN

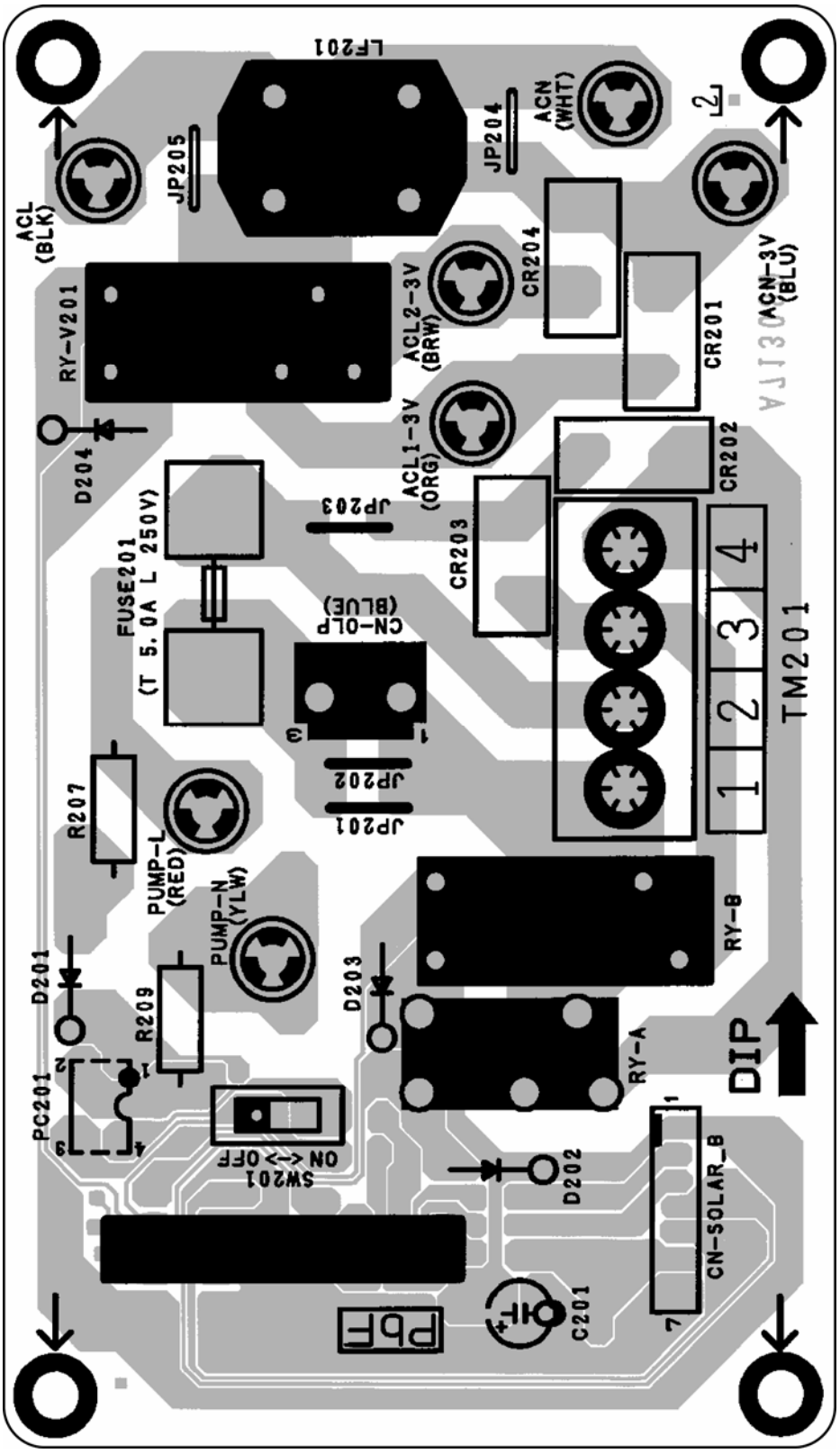
10. Printed Circuit Board

10.1 Water System

10.1.1 Main Printed Circuit Board

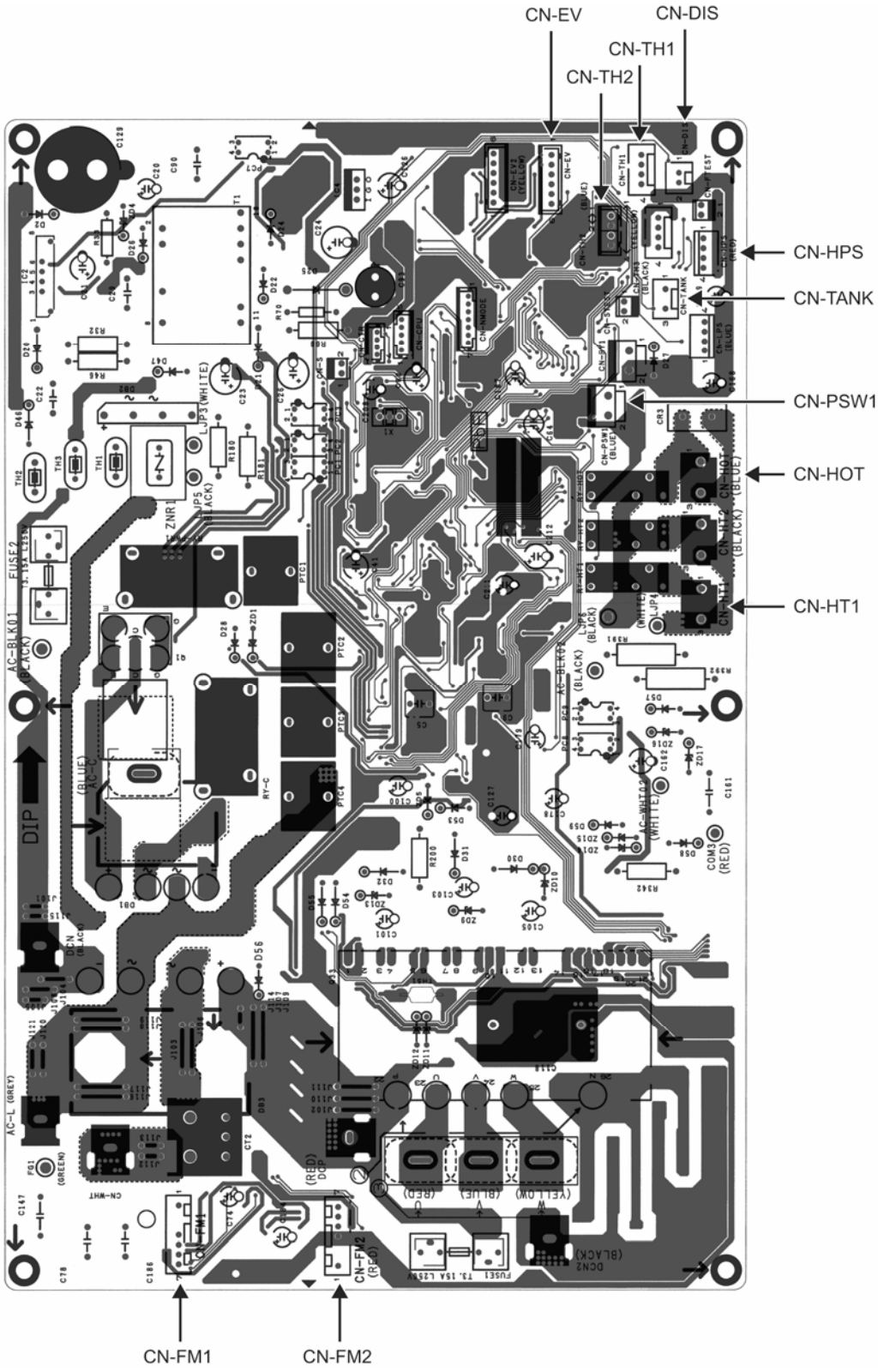


10.1.2 Solar Printed Circuit Board (Optional)

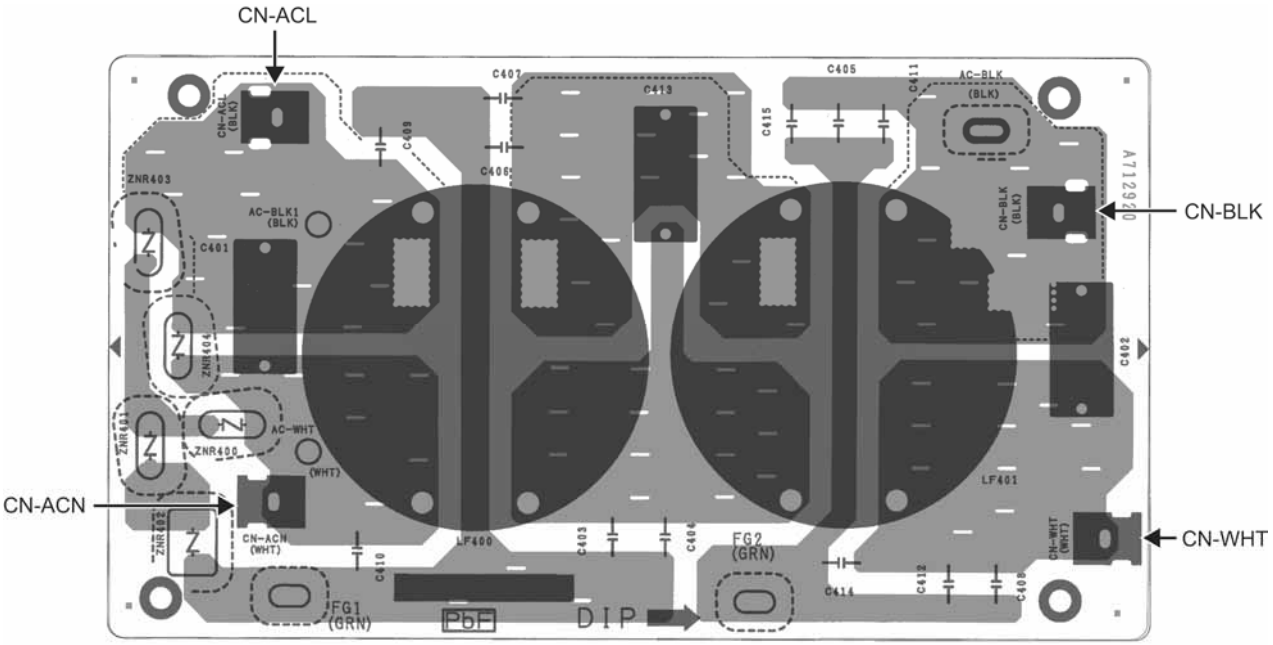


10.2 Refrigerant System

10.2.1 Main Printed Circuit Board



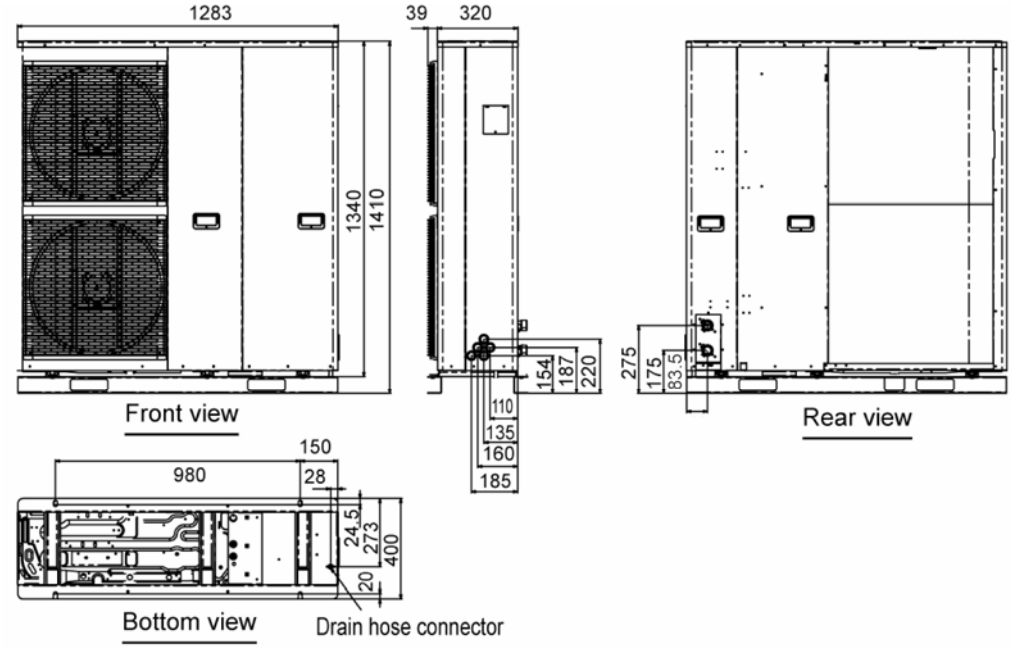
10.2.1.1 Noise Filter Printed Circuit Board

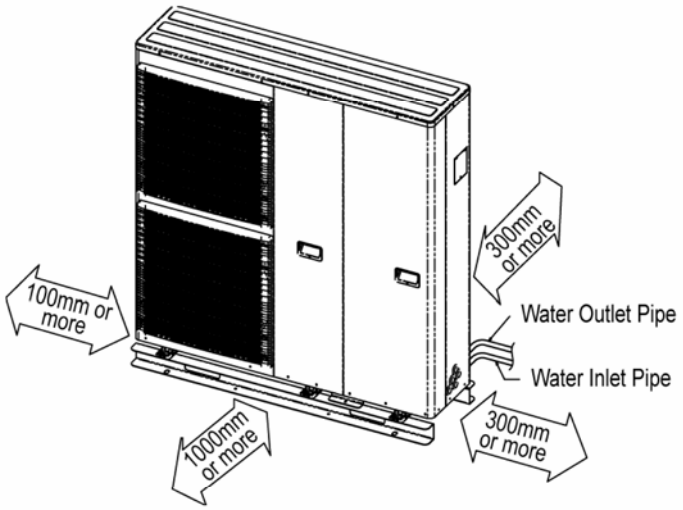


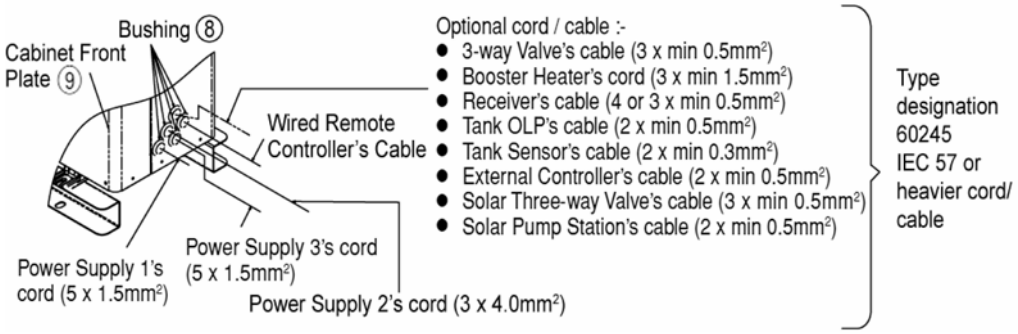
11. Installation Instruction

Monobloc Unit

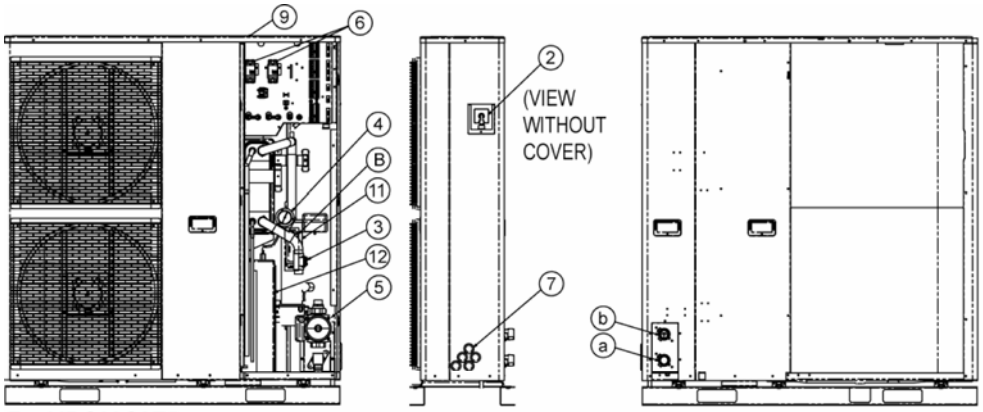
Dimension Diagram



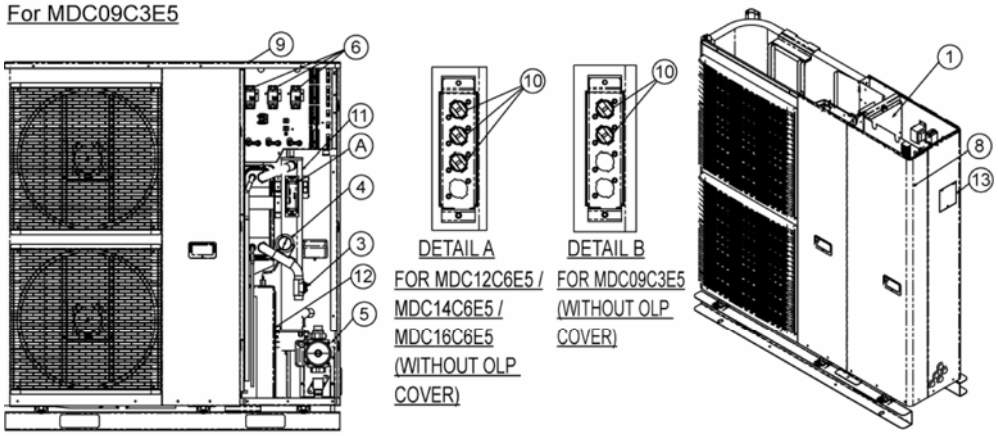




Main Components



For MDC09C3E5



For MDC12C6E5/MDC14C6E5/MDC16C6E5

View without cabinet top plate

Component name

① PCB
② Pressure relief valve
③ Flow switch
④ Pressure gauge
⑤ Water pump
⑥ RCCB
⑦ Bushing
⑧ Cabinet front plate
⑨ Cabinet top plate
⑩ Overload protector
⑪ Heater assembly
⑫ Expansion vessel
⑬ Cover

Connector name

ⓐ Water inlet
ⓑ Water outlet

11.1 Select the Best Location

- Install Monobloc unit at outdoor only.
- Avoid location where ambient temperature is below -20°C.
- Must install on a flat horizontal and solid hard surface.
- A place where should not be any heat source or steam near the Monobloc unit.
- A place where air circulation is good.
- A place where drainage can be easily done.
- A place where Monobloc unit's operation noise will not cause discomfort to the user.
- A place where accessible for maintenance.
- Ensure to keep minimum distance of spaces as illustrated below from wall, ceiling, or other obstacles.
- A place where flammable gas leaking might not occur.
- A place where the Monobloc unit's piping and wiring lengths come within reasonable ranges.
- 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.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- Avoid install the Monobloc unit at a location where suction side may be exposed directly to wind.
- If Monobloc unit installed near sea, region with high content of sulphur or oily location (e.g. machinery oil, etc.), it lifespan maybe shorten.
- 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)

- When connecting solar pump station cable between Monobloc unit and solar pump station, the distance between both apparatuses shall be 2 ~ 8 meters and the length of the said cable must be shorter than 10 meters.
  Fail to do so may lead to abnormal operation to the system.

11.2 Monobloc Unit Installation

Monobloc unit will become heavy when filled with water.
Therefore, please install the Monobloc unit on strong concrete floor, by considering weight of unit and water.

- Fix Mono bloc unit on the concrete floor with M12 anchor bolt at 4 locations.
- Pull-out strength of these anchor bolts must be above 15000N.

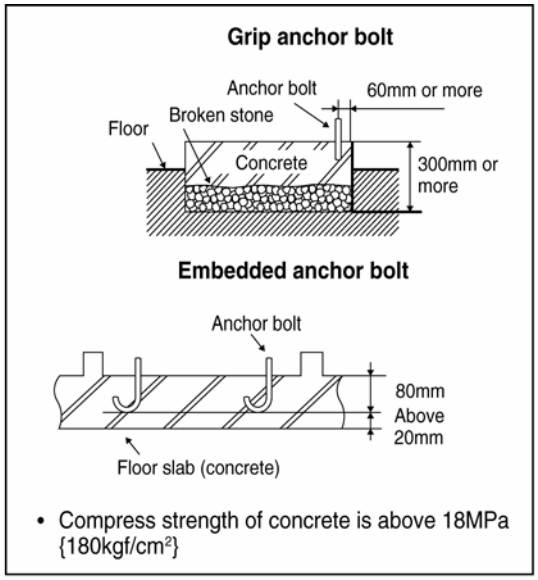


Illustration of grip type and embedded type anchor bolt

11.3 Piping Installation

⚠ WARNING
This section is for authorized and licensed electrician / water system installer only. Work behind the front plate secured by screws must only be carried out under supervision of qualified contractor, installation engineer or service person.

Please engage a licensed water circuit installer to install this water circuit.

- The minimum requirement of water in the system is 50 litres.If this value could not be achieved, please install additional buffer tank (field supply).
- This water circuit must comply with relevant European and national regulations (including EN61770), and local building regulation codes.
- Ensure the components installed in the water circuit could withstand water pressure during operation.
- Do not apply excessive force to piping that may damage the pipes.
- Do not install any valve between Monobloc unit and water piping to avoid accidental closure of water supply to the Monobloc unit.
- Use Rp 1 ¼" nut for both water inlet and water outlet connection and clean all piping with tap water before install.
- If old heat pump terminal / tank is utilized, please clean the dust properly before installation.
- Refer Diagram 3.1 for installation of 3-way Valve Kit.
- Must install an external filter (30 mesh or more, field supply) before water inlet connector of Monobloc unit (indicate with "WATER IN").
- Connect the external of Monobloc unit (indicate with "WATER OUT") to boiler tank inlet. Fail to connect the tube appropriately might causing the Monobloc unit malfunction.
- Choose proper sealer which can withstand the pressures and temperatures of the system.
- Make sure to use two spanners to tighten the connection. Further tighten the nuts with torque wrench in specified torque as stated in the table.

Model	Nut size (Torque)
	Water
WH-MDF09C3E5	Rp 1 1/4" [117.6 N•m]
WH-MDF12C6E5	
WH-MDF14C6E5	
WH-MDF16C6E5	

- If non-brass metallic piping is used for installation, make sure to insulate the piping to prevent galvanic corrosion.
- Do not use worn out piping.
- Make sure to insulate the water circuit piping (insulator thickness : 20mm or more) to prevent reduction of heating capacity, as well as avoid freezing of the outdoor water circuit piping during winter season.
- After installation, check the water leakage condition in connection area during test run.

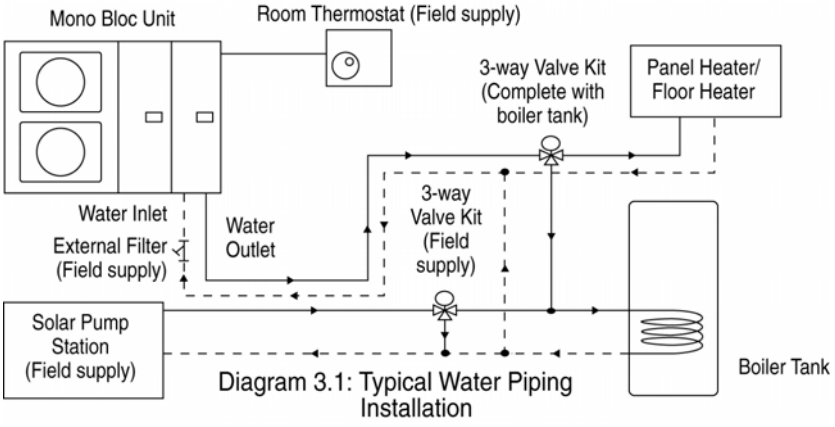
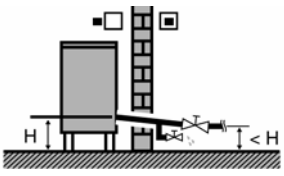


Diagram 3.1: Typical Water Piping Installation

- In case of a power supply failure or pump operating failure, drain the system (as suggested in the figure below)



When water is idle inside the system, freezing up is very likely to happen which could damage the system

Drainage piping installation

- Use a drain hose with inner diameter of 15 mm.
- The hose must be installed in a continuously downward direction and left open to the frost-free atmosphere.
- If drain hose is long, use a metal support fixture along the way to eliminate the wavy pattern of drain tube.
- The water may drip from this discharge hose. Therefore must guide the hose without close or block the outlet of the hose.
- Do not insert this hose into sewage hose or cleaning hose that may generate ammonia gas, sulfuric gas, etc.
- If necessary, use a hose clamp to tighten the hose at drain hose connector to prevent it from leaking.

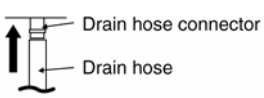
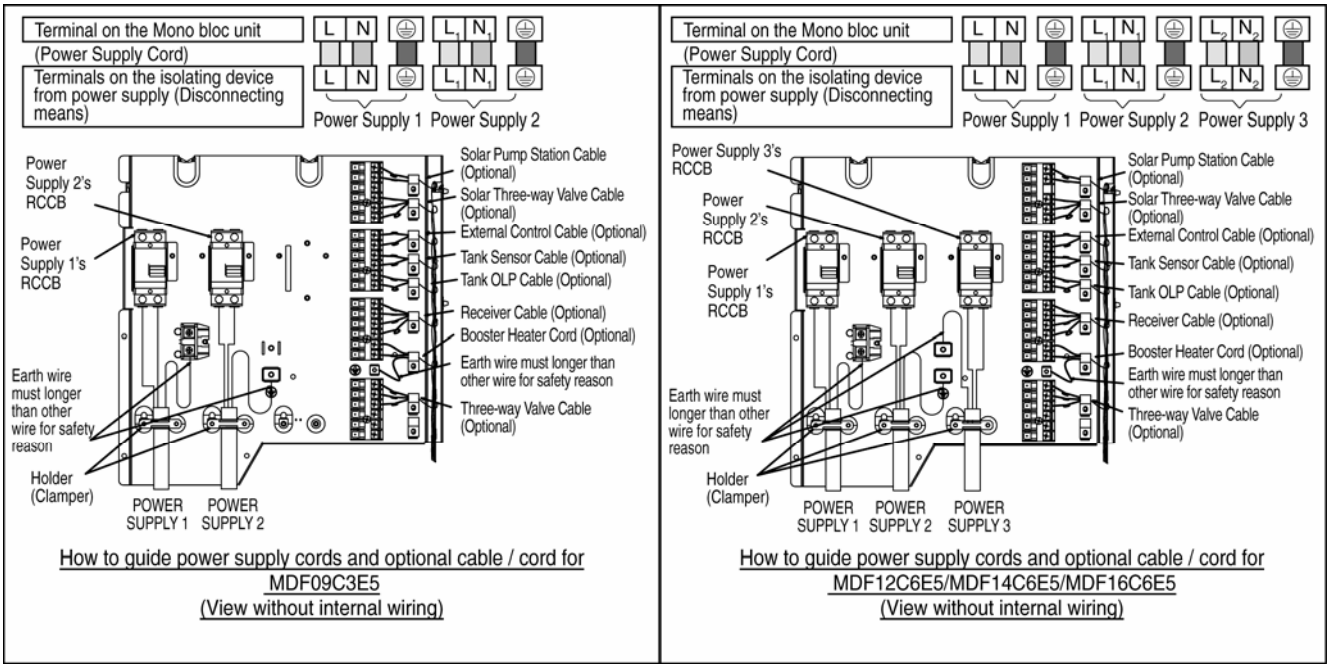


Illustration of how to fix drain hose to Mono bloc unit

11.4 Connect The Cord And Cable To Monobloc Unit

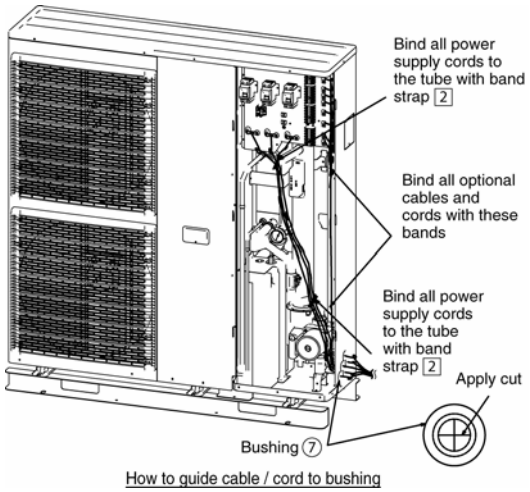
(REFER TO WIRING DIAGRAM AT UNIT FOR DETAIL)

1. 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 cord (3 x 4.0 or 6.0 mm^2) and power supply 2 cord (3 x 4.0 mm^2) and power supply 3 cord (3 x 1.5 mm^2), type designation 60245 IEC 57 or heavier cord to the RCCB, and to the other end of the cord to isolating device (Disconnecting means).
2. To avoid cable and cord harmed by sharp edge, cable and cord must go through bushing (located at the right side of Monobloc unit) before carry out electrical connection. The bushing must be used and must not take off.
3. Secure the cable onto the control board with the holder (clamper).



How to guide power supply cords and optional cable / cord for MDF09C3E5
(View without internal wiring)

How to guide power supply cords and optional cable / cord for MDF12C6E5/MDF14C6E5/MDF16C6E5
(View without internal wiring)



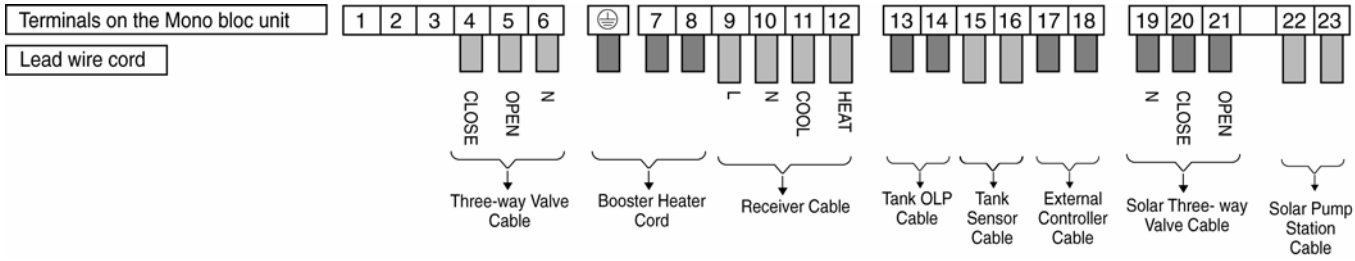
How to guide cable / cord to bushing

Connecting with external device (optional)

1. All connections shall follow to the local national wiring standard.
2. It is strongly recommended to use manufacturer-recommended parts and accessories for installation.
3. Maximum output power of booster heater shall be ≤ 3 kW. Booster Heater's cord must be (3 x min 1.5 mm^2), of type designation 60245 IEC 57 or heavier.
4. Three-way Valve shall be spring and electronic type. Valve's cable shall be (3 x min 0.5 mm^2), of type designation 60245 IEC 57 or heavier, or similarly double insulation sheathed cable.

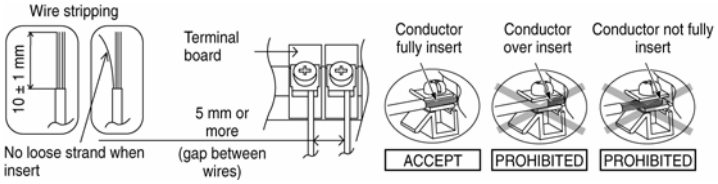
   * note: - Shall be CE marking compliance component.
   - It shall be directed to heating mode when it is OFF.
   - Maximum load for the valve is 3VA.

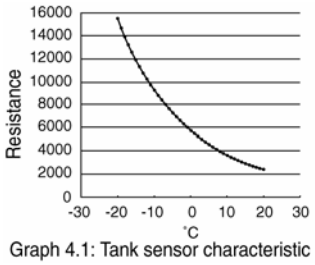
5. Receiver shall be connected to “Room Thermostat”, refer to “Field Supply Accessories” table for details. Receiver’s cable must be (4 or 3 x min 0.5 mm^2), double insulation layer of PVC-sheathed or polychloroprene sheathed cable. (connection refer to Diagram 4.2).
6. Tank OLP’s cable must be (2 x min 0.5 mm^2), double insulation layer of PVCsheathed or polychloroprene sheathed cable.
   * note: if such connection deemed NO necessary for tank OLP, please connect jumper between terminal no #13 and #14.
7. Tank Sensor shall be resistance type, please refer to Graph 4.1 for the characteristic and details of sensor. Its cable shall be (2 x min 0.3 mm^2), double insulation layer (with insulation strength of min 30V) of PVC-sheathed or polychloroprene sheathed cable.
8. External Controller shall be connected to 1-pole switch with min 3.0mm contact gap. (connection refer to Diagram 4.3). Its cable must be (2 x min 0.5 mm^2), double insulation layer of PVC-sheathed or polychloroprene sheathed cable.
   * note: - When making such connection, kindly remove the jumper between terminal no #17 and #18.
   - Switch used shall be CE compliance component.
   - Maximum operating current shall be less than $3A_{rms}$.
9. Solar Three-way Valve’s cable shall be (3 x min 0.5 mm^2), double insulation layer PVC-sheathed or polychloroprene sheathed cable.
10. Must install Solar Connection PCB [5] to Monobloc unit when Solar Pump Station is utilized. Refer Solar Connection PCB’s installation instruction for detail of installation.
11. Solar Pump Station’s cable shall be (2 x min 0.5 mm^2), of double insulation PVC-sheathed or polychloroprene sheathed cable. Strongly recommended install with maximum length of 10 meter only.



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

11.4.1 Wire Stripping And Connecting Requirement





Graph 4.1: Tank sensor characteristic

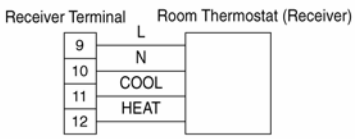


Diagram 4.2: Room Thermostat (Receiver) connecting diagram

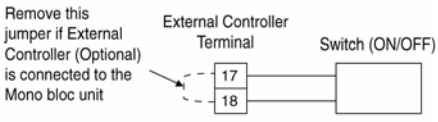


Diagram 4.3: External Controller connecting diagram

11.4.2 Connecting Requirement

For WH-MDF09C3E5:

- The equipment’s power supply 1 complies with IEC/EN 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 858kW (for WH-MDF09C3E5) 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 858kW.

- The equipment's power supply 1 shall be connected to a suitable supply network, having service current capacity ≥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.
- The 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 for models:
  WH-MDF09C3E5 : 0.236Ω
  Please liaise with supply authority to ensure that the power supply 2 is connected only to a supply of that impedance or less.

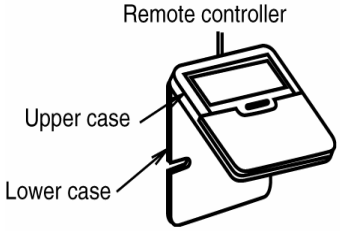
For WH-MDF12C6E5, WH-MDF14C6E5, WH-MDF16C6E5:
- The equipment's power supply 1 complies with IEC/EN 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 858kW (for WH-MDF12C6E5, WH-MDF14C6E5, WH-MDF16C6E5) at the interface point between the user's supply and the public 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 858kW.
- The equipment's power supply 1 shall be connected to a suitable supply network, having service current capacity ≥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.
- The 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 for models:
  WH-MDF12C6E5, WH-MDF14C6E5, WH-MDF16C6E5 : 0.236 Ω
  Please liaise with supply authority to ensure that the power supply 2 is connected only to a supply of that impedance or less.
- The equipment's power supply 3 complies with IEC/EN 61000-3-12.
- The 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 for models:
  WH-MDF12C6E5, WH-MDF14C6E5, WH-MDF16C6E5 : 0.464 Ω
  Please liaise with supply authority to ensure that the power supply 3 is connected only to a supply of that impedance or less.

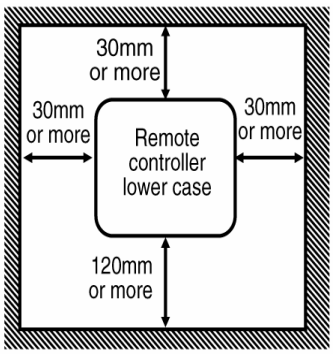
11.4.3 Wired Remote Controller Installation

⚠ WARNING	
❗	1) Be sure to turn off the main power before installing and connecting the remote controller. Otherwise, it will cause the electrical shock.
❗	2) Use the attached accessories parts and specified parts for installation. Otherwise, it will cause the set to fall, fire or electrical shock.
❗	3) Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed properly, it will cause fire or electrical shock.
⃠	4) Do not modify the length of the remote controller cable. Otherwise, it will cause fire or electrical shock.
❗	5) If passing the remote controller cable through a wall, be sure to install a water trap above the cable. Otherwise, it will cause the electrical shock.
⚠ CAUTION	
❗	1) Install in a flat surface to avoid warping of remote controller, else damage to the LCD case or operation problems may result.
❗	2) Avoid installing the remote controller cable near refrigerant pipes or water pipes, else will cause electrical shock or fire.
❗	3) Install the remote controller cable at least 5cm away from electric wires of other appliances to avoid miss operation (electromagnetic noise).
❗	4) Be sure to use only the accessory screws to avoid damage of remote controller PCB.

11.4.3.1 Selecting The Installation Location

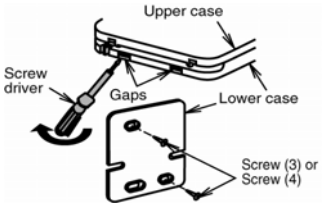
- Allow sufficient space around the remote controller (1) as shown in the illustration above.
- Install in a place which is away from direct sunlight and high humidity.
- Install in a flat surface to avoid warping of the remote controller. If installed to a wall with an uneven surface, damage to the LCD case or operation problems may result.
- Install in a place where the LCD can be easily seen for operation. (Standard height from the floor is 1.2 to 1.5 meters.)
- Avoid installing the remote controller cable near refrigerant pipes or drain pipes, else it will cause electrical shock or fire.





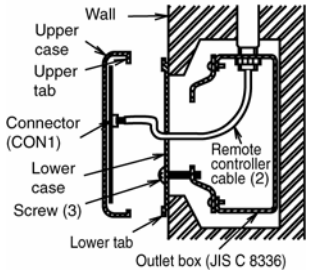
11.4.3.2 Installing The Remote Controller Unit To The Wall

1. Remove the remote controller (1) lower case.
   (Insert a flat-tipped screw driver or similar tool 2 to 3 mm into one of the gaps at the bottom of the case, and twist to open. Refer to the illustration at right.)
   Be careful not to damage the lower case.
2. Do not remove the protective tape which is affixed to the upper case circuit board when remove the remote controller lower case.
3. Secure the lower case to an outlet box or wall. Refer to (A) or (B) instructions below depending on your choice of cable installation.
4. Be sure to use only the screws provided.
5. Do not over tighten the screws, as it may result in damage to the lower case.

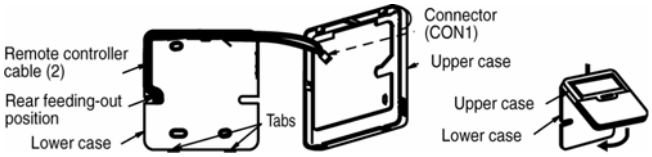


A. If Remote Controller Cable Is Embedded

1. Embed an outlet box (JIS C 8336) into the wall. Outlet box may be purchased separately.
   Medium-sized square outlet box (obtain locally) Part No. DS3744 (Panasonic Co., Ltd.) or equivalent.
2. Secure the remote controller lower case to the outlet box with the two accessory screws (3).
   Make sure that the lower case is flat against the wall at this time, with no bending.
3. Pass the remote controller cable (2) into the box.
4. Route the remote controller cable (2) inside the lower case through rear feeding-out direction.
5. Insert firmly the connector of remote controller cable (2) to connector (CON1) in the upper case circuit board. [Refer to the illustration at below.]
6. Secure the remote controller upper case to the lower case with the tabs provided.

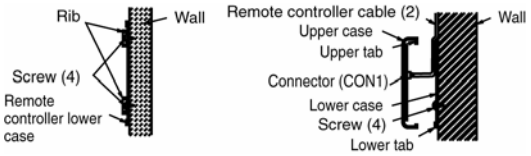


⚠ CAUTION
When the wall is hollow, please be sure to use the sleeve for remote controller cable to prevent dangers caused by mice biting the cable.

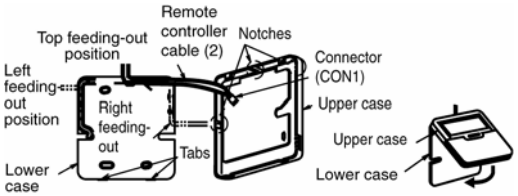


B. If Remote Controller Cable Is Exposed

1. Install the remote controller lower case to the wall with the two accessory screws (4).
2. Fasten the screws properly until screw head is lower than the rib and reach the base of remote controller lower case to ensure they do not damage the PCB inside the remote controller (1).



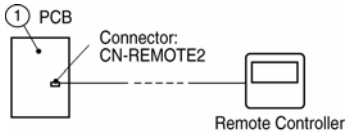
3. The feeding-out direction for the remote controller cable can be either via top, left or right side.
4. Use nipper to cut a notch at the upper case. (Select the intended feeding-out position)
5. Route the remote controller cable (2) inside the lower case in accordance with the intended feeding-out direction. (Refer to the illustration at below)
6. Insert firmly the connector of remote controller cable (2) to connector (CON1) in the upper case circuit board (Refer to the illustration at below)
7. Secure the remote controller upper case to the lower case with the tabs provided.

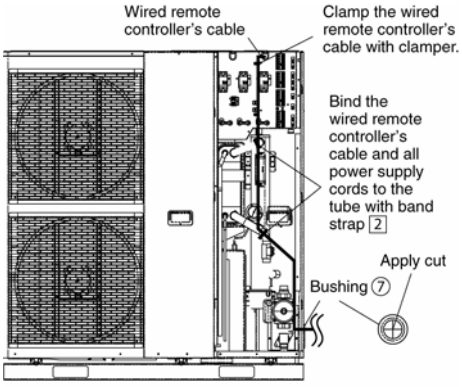


11.4.3.3 Connecting The Remote Controller Cable To Monobloc Unit

⚠ CAUTION
Be sure to turn off the main power before installing and connecting the remote controller. Otherwise, it will cause the electrical shock.

1. Remove the cabinet front plate and cabinet top plate.
2. Connect the remote controller's connector to PCB ① - CN-REMOTE2 as shown in below illustration. (Refer wiring diagram for detail.)
3. Guide the remote controller cable through the clamper and Bushing ⑦.
   (Refer illustration "How to connect Remote Controller to PCB" for detail.)
4. Reinstall the cabinet front plate and cabinet top plate after connection complete.

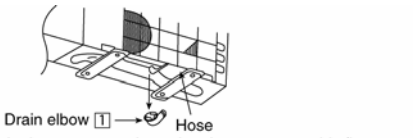




How to connect Remote Controller to PCB

11.4.3.4 Disposal of Monobloc Unit Drain Water

- 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.



Install the hose at an angle so that the water smoothly flows out.

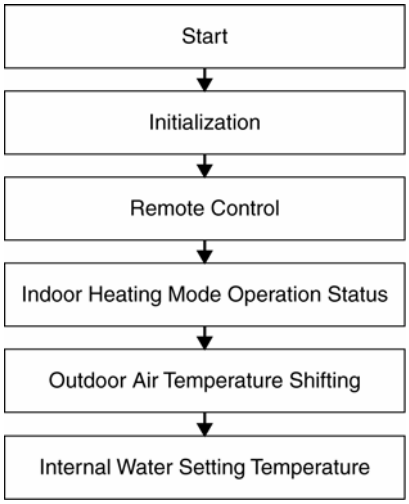
12. Operation and Control

12.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at monobloc unit is operating following the frequency instructed by the microcomputer at monobloc unit that judging the condition according to internal water setting temperature and water outlet temperature.

12.1.1 Internal Water Setting Temperature

Once the operation starts, control panel setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the monobloc unit settings and the operation environment. The final shifted value will be used as internal water setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



12.1.2 Heating Operation

12.1.2.1 Thermostat control

- Compressor is OFF when Water Outlet Temperature - Internal Water Setting Temperature > 2°C for continuously 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Water Outlet Temperature - Water Inlet Temperature (temperature at thermostat OFF is triggered) < -3°C.

12.1.3 Tank Mode Operation

Control contents:

- 3 ways valve direction
  - 3 ways valve switch and fix to tank side.

- Heatpump Thermostat characteristic
  - Water set temperature = Tank set temperature or **[55°C]** whichever lower.
  - Heatpump Water Outlet set temperature is set to Maximum (55°C) at tank mode

i. Case 1

- THERMO OFF TEMP:
  1 THERMO OFF TEMP = Water set temperature + **[+2°C]**.
  2 Tank temperature > THERMO OFF TEMP for continuous 3 minutes, heatpump OFF and water pump OFF.

- THERMO ON TEMP:
  1 THERMO ON TEMP = Water set temperature + **[-3°C]**.
  2 When detect tank temperature < THERMO ON TEMP, water pump ON for 3 minute then heatpump ON.
  - Pump ON when Tank temperature is less than tank temperature when Heatpump Thermo Off - **[-3°C]**.

ii. Case 2
- Heatpump THERMO OFF TEMP:
  1 Heatpump THERMO OFF TEMP = 55°C + **[+2°C]**.
  2 Water outlet temperature > Heatpump THERMO OFF TEMP for continuous 3 minutes, heatpump OFF but water pump ON.

- Heatpump THERMO ON TEMP:
  1 Heatpump THERMO ON TEMP = Water inlet during thermo off time + **[-3°C]**.
  2 Heatpump ON back when water outlet temperature < Heatpump THERMO ON TEMP.

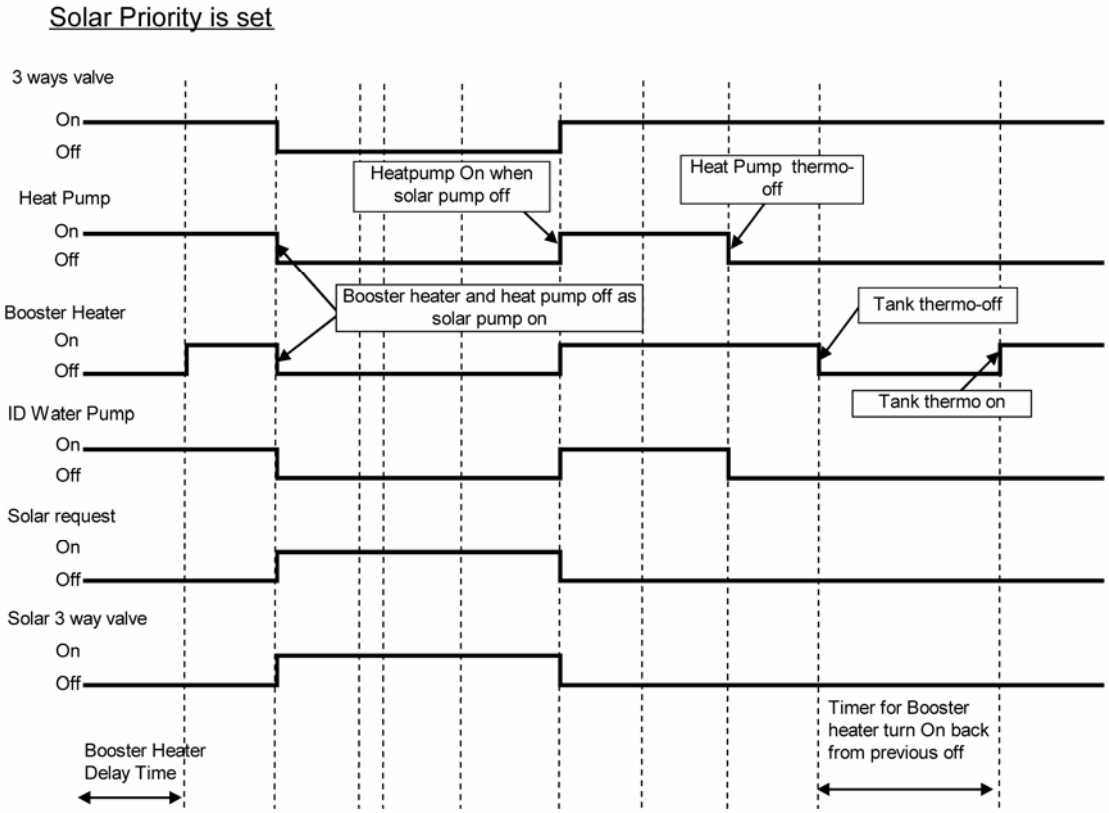
iii. Case 3
- Heatpump THERMO OFF TEMP:
  1 Water inlet temperature > 52°C for continuous 60 seconds, heatpump OFF and water pump OFF.

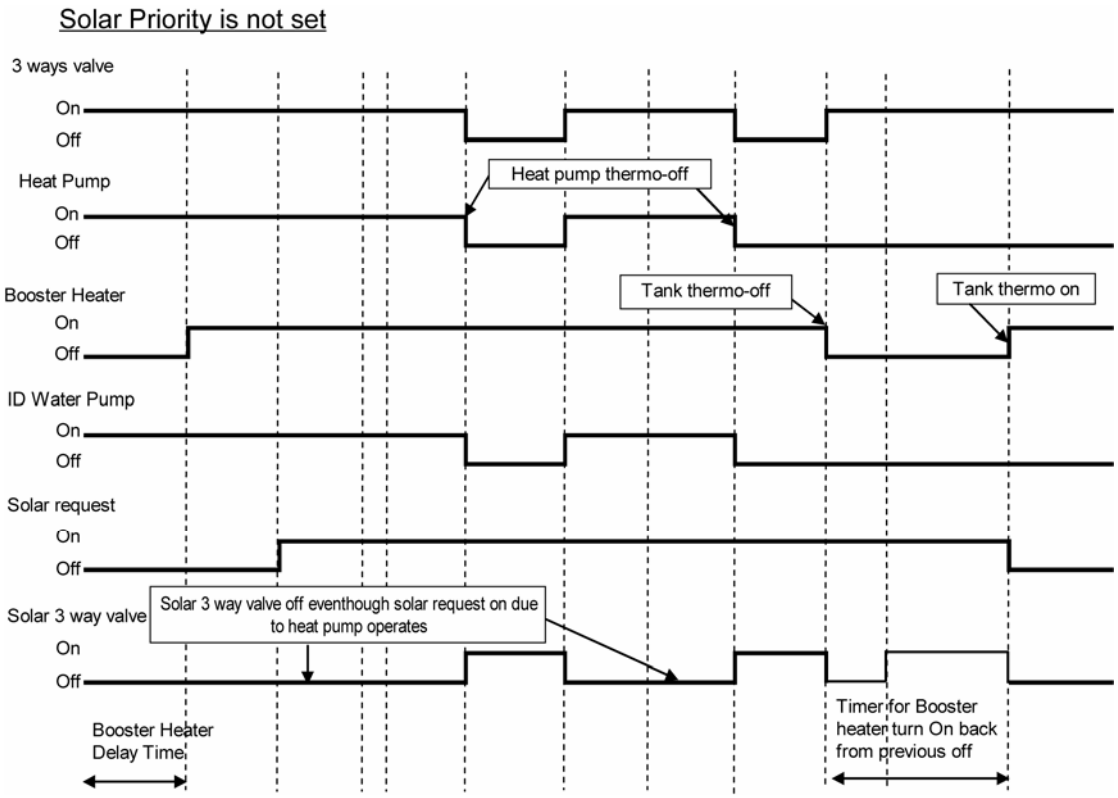
- Heatpump THERMO ON TEMP:
  1 Heatpump THERMO ON TEMP = Water inlet during thermo off time + **[-3°C]**.
  2 Water pump ON back when tank temp. < Tank temp. when heatpump thermo off + **[-3°C]**.
  3 Heatpump only ON back after water outlet temperature < Heatpump THERMO ON TEMP & water pump ON for 3 minutes.

- Booster heater control
  - Booster heater turn On and Off follow normal operation.
  - Booster heater turn ON condition:
    1 During startup time (initialization), Booster heater turn ON after DELAY TIMER.
    2 When tank temperature lower than HEATER ON TEMP
    3 20 minutes from previous heater off.
  - Booster heater turn OFF condition:
    1 When tank temperature higher than tank set temperature for continous 15 sec.

- Solar 3 way valve
  - Solar pump operates follow solar operation specification.

- Others
  - Indoor backup heater cannot be ON during tank mode only.





12.1.4 Heat + Tank Mode Operation

Setting 1: When Heating priority is set by control panel:

1 3 ways valve control:
   - 3 ways valve switch and fix to room side.

2 Heatpump operation control:
   - Heatpump operate follow normal operation.

3 Backup Heater control:
   - Backup heater operate follow normal operation.

4 Booster heater control:
   - Booster heater On/Off follow normal operation.

5 Solar 3 way valve:
   - Solar 3 way valve operates follow solar operation specification.

   * Under solar priority is set condition, when solar 3 way valve is ON, booster heater turn OFF.

Setting 2: When heating priority is not set by control panel:
When Solar Priority is set/not set by control panel:

1 3 ways valve control:
   - 3 ways valve switch to room side during heating heat-up interval, and switch to tank side during tank heat-up interval. Both mode will switch alternatively.

2 Heatpump operation control:
   - During heating heat-up interval
     - Follow normal heating operation.
       Under solar priority set condition:
       - Always detect the tank temperature after heating heat-up interval. Switch only to tank heat-up interval and start counting tank heat-up timer when tank temperature < THERMO ON TEMP AND solar 3WV OFF
       Under solar priority not set condition:
       - Always detect the tank temperature after heating heat-up interval. Switch only to tank heat-up interval and start counting tank heat-up timer when tank temperature < THERMO ON TEMP
       * THERMO ON TEMP is defined form following Case1 to Case4.
   - During tank heat-up interval
     - Heatpump tank target temperature = Tank set temperature or **[55°C]** whichever lower
     - Heatpump Water Outlet set temperature is set to Maximum **[55°C]** during tank interval

i. Case 1
- THERMO OFF TEMP:
1. THERMO OFF TEMP = Heatpump tank target temperature + **[+2°C]**.
2. Tank temperature > THERMO OFF TEMP for continuous 3 minutes, switch 3 ways valve to room side. End Tank heat-up interval and start count heating heat-up interval.

- THERMO ON TEMP:
1. THERMO ON TEMP = Heatpump tank target temperature + **[-3°C]**.
2. After Heating heat-up interval, always detect tank temperature. Switch to next tank heat-up interval when tank temperature < THERMO ON TEMP

ii. Case 2
- Heatpump THERMO OFF TEMP:
1. Heatpump THERMO OFF TEMP = 55°C + **[+2°C]**.
2. Water outlet temperature > Heatpump THERMO OFF TEMP for continuous 90 seconds, switch 3 ways valve to room side. End Tank heat-up interval and start count heating heat-up interval.

- THERMO ON TEMP:
1. THERMO ON TEMP = Tank temp. when heatpump thermo off + **[-3°C]**.
2. After Heating heat-up interval, always detect tank temperature. Switch to next tank heat-up interval when tank temperature < THERMO ON TEMP

iii. Case 3
- Heatpump THERMO OFF TEMP:
1. Water inlet temperature > 52°C for continuous 60 seconds, switch 3 ways valve to room side. End tank heat-up interval and start count heating heat-up interval.

- THERMO ON TEMP:
1. THERMO ON TEMP = Tank temp. when heatpump thermo off + **[-3°C]**.
2. After Heating heat-up interval, always detect tank temperature. Switch to next tank heat-up interval when tank temperature < THERMO ON TEMP

iv. Case 4 (Only during solar priority is set condition)
When solar pump ON, tank heat-up interval end early and 3 ways valve switch to room side.

- THERMO ON TEMP:
1. THERMO ON TEMP = Heatpump tank target temperature + **[-3°C]**.
2. After Heating heat-up interval, always detect tank temperature. Switch to next tank heat-up interval when tank temperature < THERMO ON TEMP and solar 3 way valve OFF.

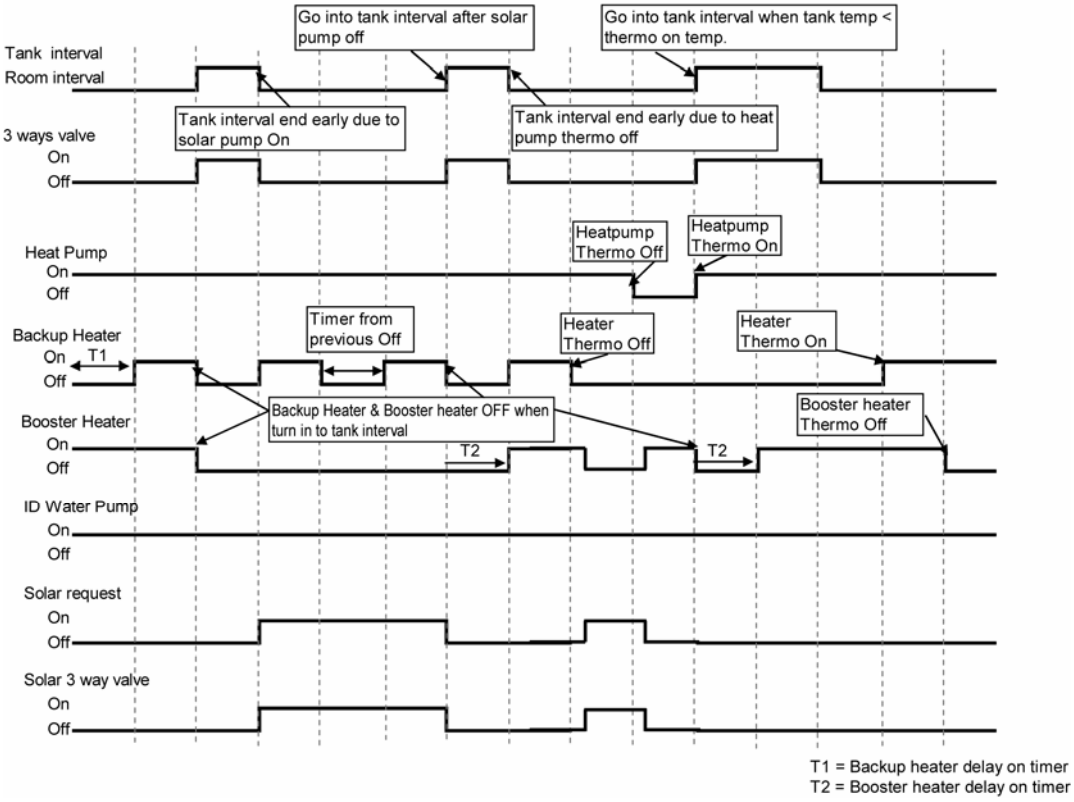
3 Backup heater control:
- During heating heat up interval.
  - Follow normal backup heater control operation.
- During tank heat-up interval.
  - Backup heater OFF during this interval.

4 Booster heater control:
- During heating heat-up interval.
  - Booster heater ON/OFF according to booster heater operation control.
- During tank heat-up interval.
  - Once switch from heating heat-up interval to tank heat-up interval, turn off the booster heater and start counting the BOOSTER HEATER DELAY TIMER.
  - Booster heater turn ON after BOOSTER HEATER DELAY TIMER fufil and tank temperature lower than tank set temperature.
  - BOOSTER HEATER DELAY TIMER is clear when switch to heating heat-up interval.

5 Solar 3 way valve:
- Solar 3WV operates follow solar operation specification.

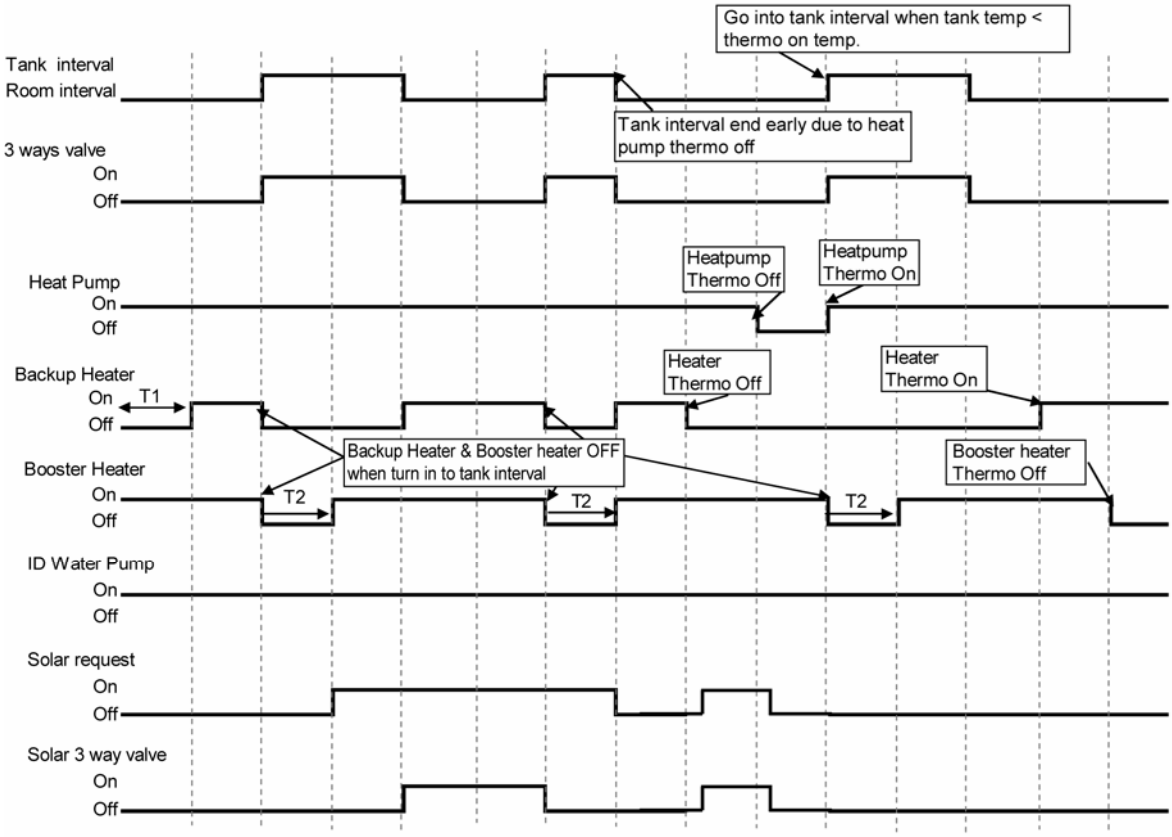
* Under solar priority is set condition, when solar 3WV is ON, booster heater turn OFF.
* Under solar priority is not set condition, solar 3WV only can ON during heating heat-up interval.

Heat+Tank (heating no priority)
(Solar priority Set)



T1 = Backup heater delay on timer
T2 = Booster heater delay on timer

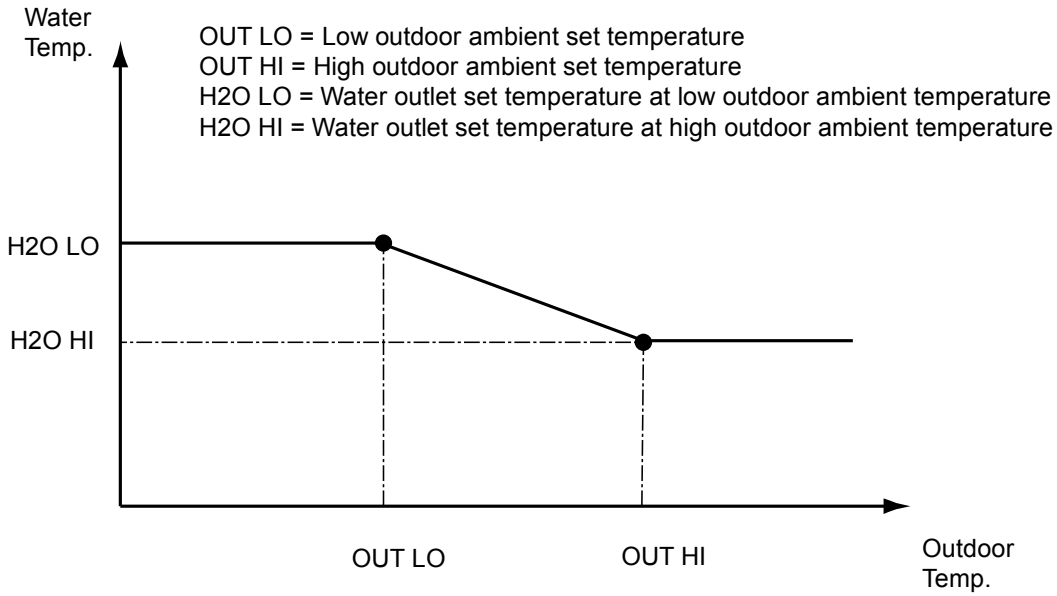
Heat+Tank (heating no priority)
(Solar priority not set)



T1 = Backup heater delay on timer
T2 = Booster heater delay on timer

12.1.5 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 remote control setting.

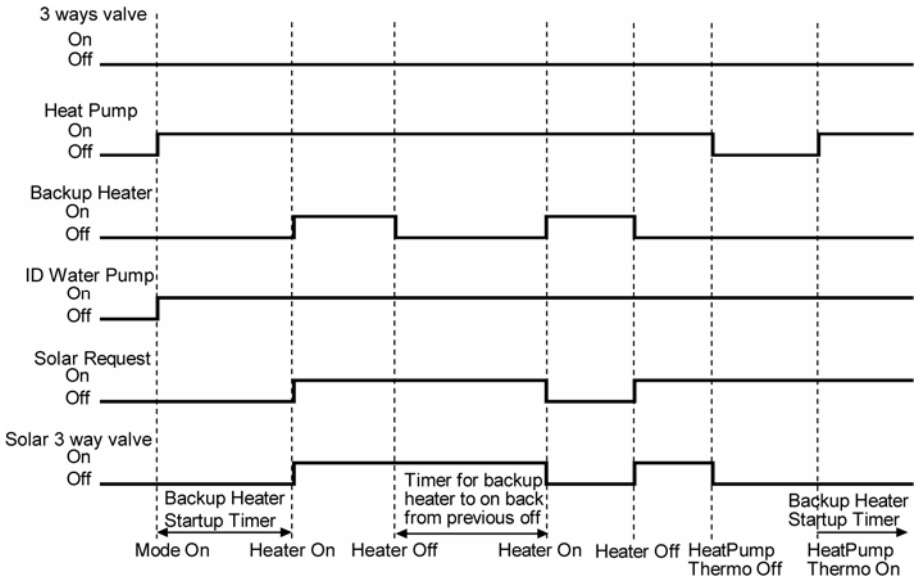


• Change in setting water outlet temperature is updated every 30 minutes

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

12.1.5.1 Heating Mode Operation Time Chart

Example

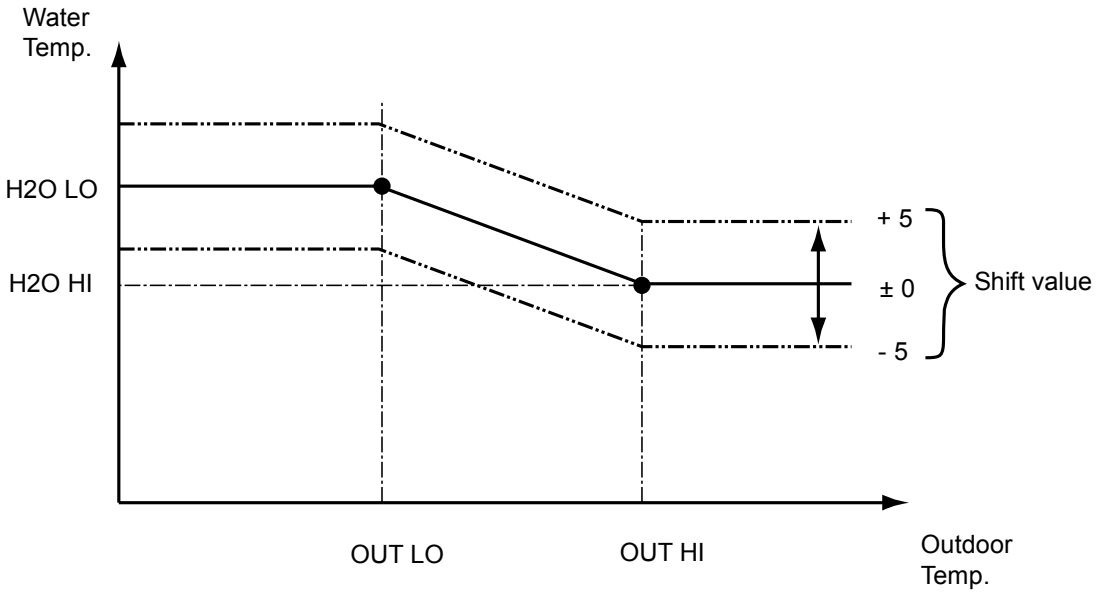


1 3 ways valve control:
   - 3 ways valve switch and fix to heating side.
2 Heatpump operate follow normal heating operation.
3 Backup heater operate follow normal operation.
4 Solar 3 way valve operates follow solar operation specification.

12.1.6 Water Temperature Thermo Shift Setting

- Switchs are ignored during “PUMPDW” = ON.
- Switchs are ignored during “STATUS” = ON.

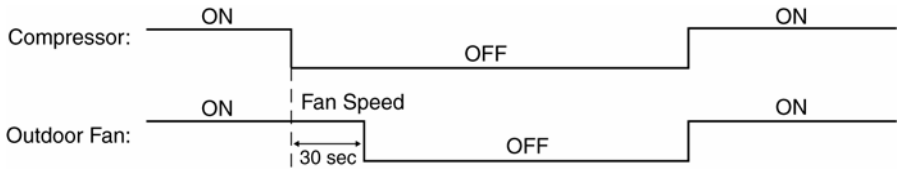
- "▲", "▼", "SELECT" switch are ignored if "SETTING" = OFF.
- "CANCEL" switch is ignored if "SETTING" = OFF & "STATUS" = OFF.
- If "SET" Switch pressed for less than 5secs, immediately enter water temperature shift setting mode.
- Once enter this setting mode, "SETTING" display is ON.
  This setting mode is used to easily shift the target water outlet temperature.



OUT LO = Low outdoor ambient set temperature
OUT HI = High outdoor ambient set temperature
H2O LO = Water outlet set temperature at low outdoor ambient temperature
H2O HI = Water outlet set temperature at high outdoor ambient temperature
Shift Value = Setting water temperature thermo shift

12.1.7 Fan Motor Operation

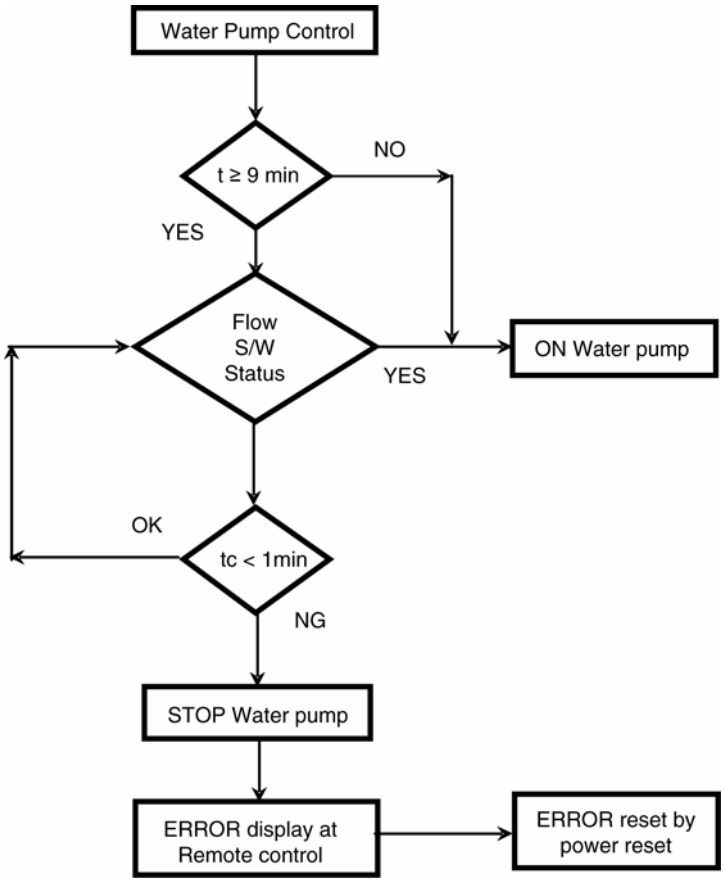
Fan motor is adjusted according to operation condition. It starts when compressor starts operation and it stops 30 seconds after compressor stops operation.



12.2 Water Pump

12.2.1 Water Pump Control

1 Once the monobloc unit is ON, the water pump will be ON immediately and no error judgement for 9 minutes. However, during this 9 minutes operation, if there is any abnormality cause at monobloc unit or malfunction, the compressor should be OFF immediately and restart delay after 3 minutes.
2 The system will start checking on the water flow level after operation start for 9 minutes. If water flow level is detected low continuously for 1 minute, the water pump and compressor will be OFF permanently and OFF/ON remote control LED will blink (H62 error occurs)
3 The water pump will remain ON when compressor OFF due to thermostat OFF.



12.3 Pump Down Operation

Purpose

Ensure the pump down operation when relocating or disposing of the unit. The pump down operation will extract all refrigerant from the piping into the outdoor unit.

1 Make sure the OFF/ON control panel LED is OFF (no operation).
2 Press the Pump Down button to start the pump down operation.
3 No low pressure protection error during pump down operation and 3-way valve will be shift to heating side.
4 Press OFF/ON button to stop the pump down operation.

12.4 Flow Switch

12.4.1 Flow Switch Control

1 The water flow switch serve as an overload protector that shuts down the unit when the water level is detected to be low.
2 Detection is Lo (0V) when there is no water flow, and detection is Hi (5V) when there is water flow.

12.5 Force Heater Mode Operation

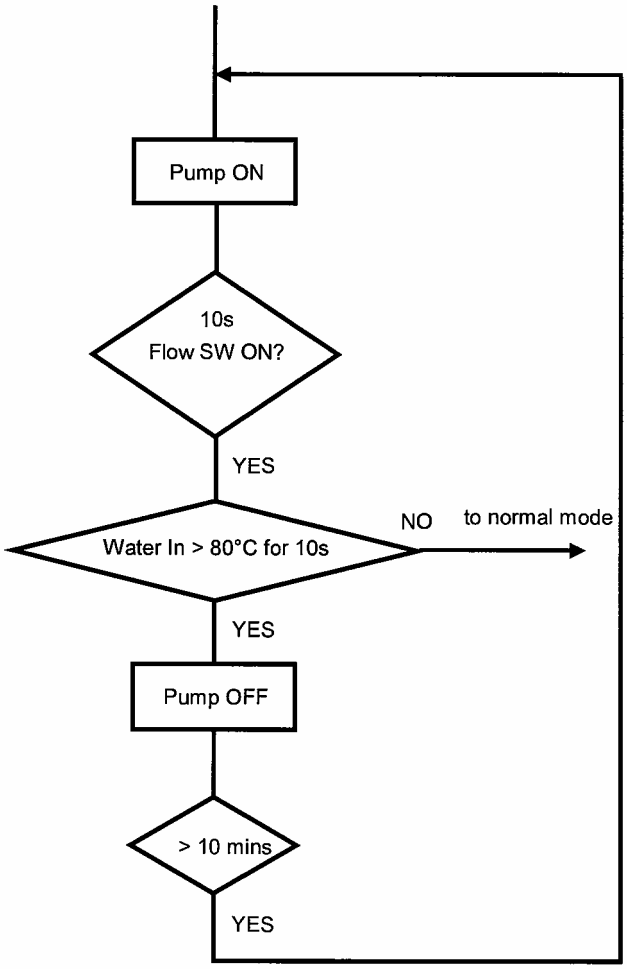
The backup heater also serves as backup in case of malfunctioning of the outdoor unit.

1 Make sure the OFF/ON control panel LED is OFF (no operation).
2 Press the Force button to start the force heater mode operation.
3 During force heater mode, all other operations are not allowed.
4 Press OFF/ON button to stop the force heater mode operation.

12.6 Monobloc Unit Safety

12.6.1 Monobloc Unit Safety Control

1 When water pump is ON, the system will start checking flow switch status (ON/OFF).
2 If the flow switch ON for 10 seconds, the system will check on the water inlet temperature for 10 seconds.
If the water inlet temperature not exceeds 80°C, the water pump shall be continuously running with normal mode.
If the water inlet temperature exceeds 80°C for continuously 10 seconds, the water pump will be OFF immediately.
3 After water pump OFF for more than 10 minutes, it will be ON back and the monobloc unit safety control checking is restarted.



12.7 Auto Restart Control

1 When the power supply is cut off during the operation of Monobloc unit, the compressor will re-operate after power supply resumes.

12.8 Indication Panel

LED	Operation
Color	Green
Light ON	Operation ON
Light OFF	Operation OFF

Note:

- If Operation LED is blinking, there is an abnormality operation occurs.

12.9 Back-Up Heater Control

12.9.1 Electric Heater Control

1 Normal Heating Mode
   - Heater On condition:
     a. Heater switch is ON
     b. After Heatpump thermo ON for **[30]** mins
     c. After water pump operate **[9]** mins
     d. Outdoor air temperature < Outdoor set temperature for heater
     e. When water outlet temperature < Water set temperature + **[-8°C]**
     f. **[20]** minutes since previous Backup heater Off
        * When heatpump cannot operate due to error happens during normal operation, heater will go into force mode automatic
        * Heater need to operate during deice operation

   - Heater Stop Condition:
     a. When outdoor set temperature > outdoor set temperature + **[+2°C]** for continuous 15 secs OR
     b. When water out temp> water set temperature + **[-2°C]** for continuous 15 secs OR
     c. Heater switch is Off OR
     d. Heatpump thermo-off or OFF condition

2 Force Heater Mode
   - Heater On Condition:
     a. After water pump operate **[9]** mins
     b. When water outlet temperature < water set temperature + **[-8°C]**
     c. **[20]** minutes since previous Backup heater Off

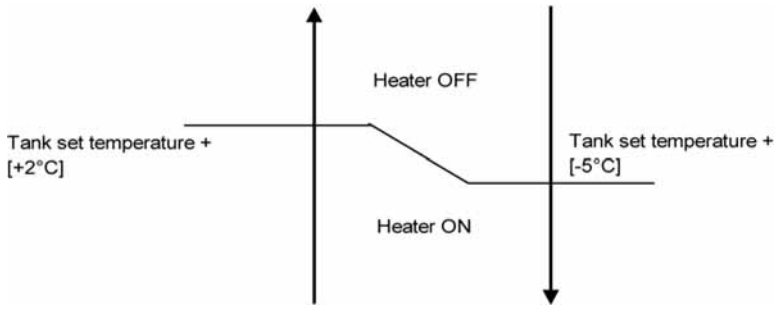
   - Heater Stop condition
     a. Force mode off **OR**
     b. When water outlet temperature > water set temperature + **[-2°C]** for continuous 15 secs

* Do not operate heater at the following situation
1 Water outlet temperature sensor, and water inlet sensor abnormal
2 Flow switch abnormal
3 Circulation pump stop condition
4 During Heatpump switch to tank side

12.10 Tank Booster Heater Control

12.10.1 Tank booster heater control

Heating operation condition:



1 Booster heater Turn On condition:
   - After BOOSTER HEATER DELAY TIMER fulfil during heatpump startup time in tank mode, or during switching from heating heat-up interval to tank heat-up interval in heat+tank mode (heating priority not set).
   - Tank temperature < tank set temperature + **[-5°C]**,
   - 20 minutes since previous heater off.

   * BOOSTER HEATER DELAY TIMER is clear when tank heat-up interval end.

2 Booster heater Turn Off condition:
   - Tank temperature > Tank set temperature + **[+2°C]** for continuous 15 sec
   - When BOOSTER HEATER DELAY TIMER start count after switch from heating heat-up interval to tank heat-up interval

   * DELAY TIMER can be set by control panel.

12.11 Three Way Valve Control

- Purpose:
  - 3 ways valve is used to change flow direction of hot water from heatpump between heating side and tank side
- Control contents:
  1 3 ways valve switch Off:
     - During 3 ways valve switch Off time, the hot water will provide heat capacity to heating side.
  2 3 ways valve switch On:
     - During 3 ways valve switch On time, the hot water will provide heat capacity to tank side.
  3 Stop condition:
     - During stop mode, 3 ways valve will be in switch off position

12.12 Sterillization Mode

1 During sterillization mode, Tank will be heat up to the sterillize Set temperature for a certain period of time, also set by controller.
2 The function can only be set on timer to operate once in a week.
3 It will be cancelled even when the temperature is not reached after 4 hours.
4 When tank mode is OFF or disabled, sterillization is cancelled.

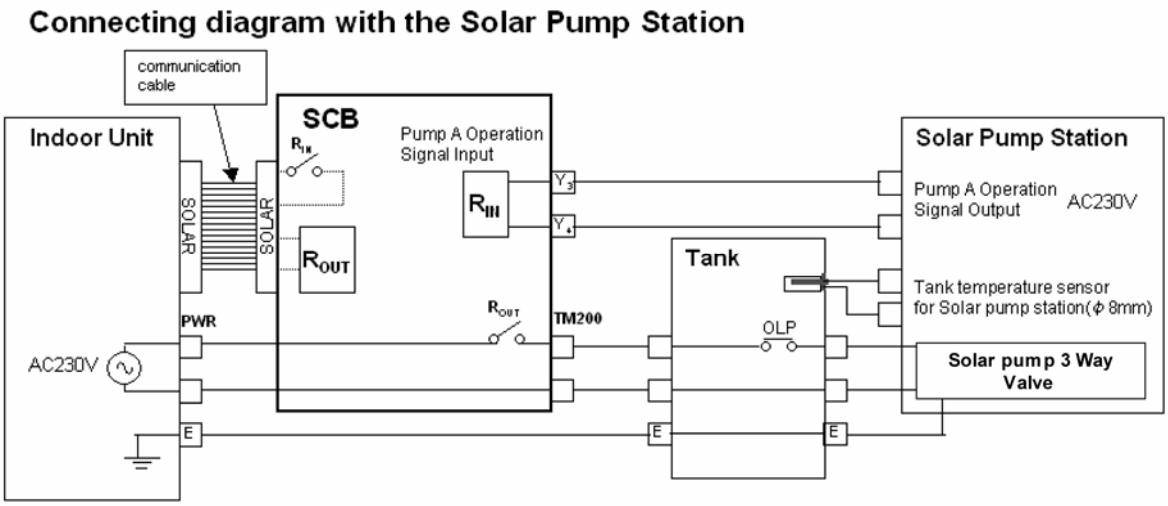
12.13 Quiet Operation

- Purpose:
  - To provide quiet operation compare to normal operation by reduces outdoor unit noise.
- Starting condition:
  1 When quiet button is presses.
  2 When quiet request ON time by weekly timer (Refer to remote control.)
- When any of above mentioned condition is achieved, this control is activated.
  New target FM speed = Present target FM speed - 80rpm
  Minimum target FM speed = 200rpm
- Cancellation condition:
  1 Cancel by press quiet button
  2 Stop by OFF/ON button
  3 When quiet request OFF time by weekly timer
  When any of above mentioned condition is achieved, this control is cancelled.

12.14 Solar Operation (Optional)

12.14.1 Solar Operation

1 Control according to preset whether solar priority is set or not.
2 When tank connection is NOT set at SETTING mode, Solar operation is disabled.
3 When Pump A (from Solar pump station) is detected On through connection Y3 and Y4, then the Solar pump 3 Way Valve is requested ON (Refer to figure below).



12.14.2 Solar Operation Control

When solar priority is SET

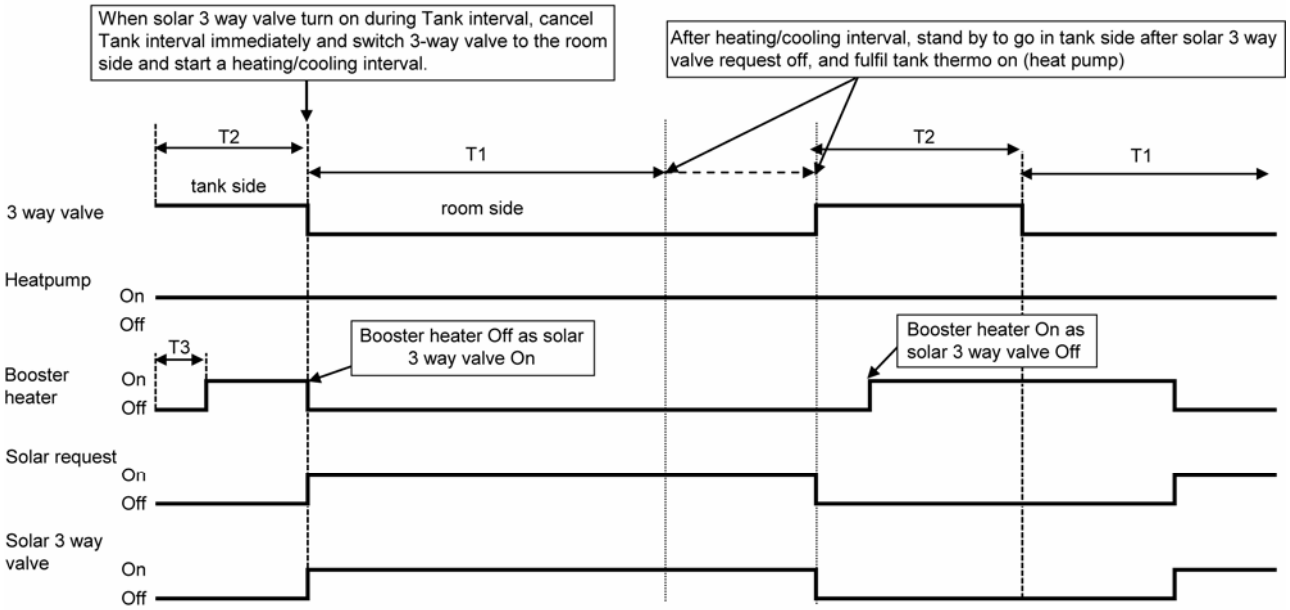
1 Operation condition:
  a Solar pump operates if all of the following conditions are fulfilled:-
    - Power On. (regardless operation ON or OFF)
    - There is operation request from Solar pump station.
    - Tank hot water temp is below solar on upper limit temp [EEPROM 1 : 70]°C.
2 Stop condition:
  a Solar pump stops operating when:-
    - No power supply to unit **OR**
    - There is **NO** operation request from solar pump station **OR**
    - Tank hot water temp is above solar off upper limit temp [EEPROM 2 : 77]°C.

    * heatpump OFF OR operate to room side when solar pump operate during solar priority set.
    * booster heater OFF when solar pump operate during solar priority set.

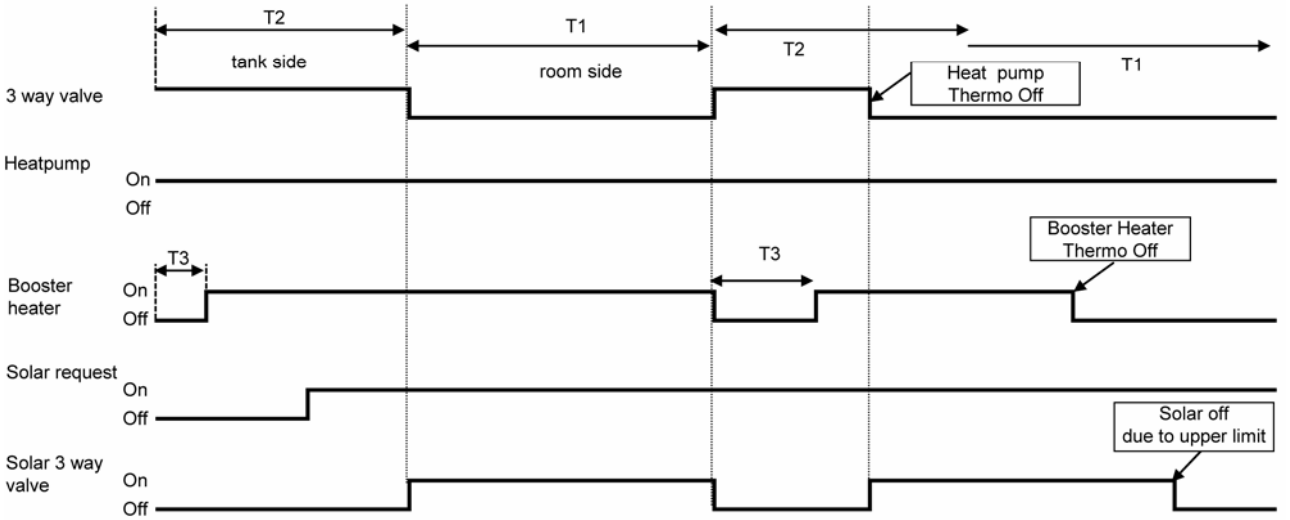
When solar priority is NOT SET

1 Operation condition:
  a Solar pump operates if all of the following conditions are fulfilled:-
    - Power On. (regardless operation ON or OFF).
    - There is operation request from Solar pump station.
    - Tank hot water temp is below solar on upper limit temp [EEPROM 1 : 70]°C.
    - Heatpump thermo OFF in tank mode OR Heatpump operate to room side (During Operation ON and tank mode selected).
2 Stop condition:
  a Solar pump stops operating when:-
    - No power supply to unit **OR**
    - There is **NO** operation request from solar pump station **OR**
    - Tank hot water temp is above solar off upper limit temp [EEPROM 2 : 77]°C.
    - Heatpump thermo ON and operate to tank side. (During Operation ON and tank mode selected).

Heat + Tank Mode (Heating priority not set)
(Solar Priority Set)

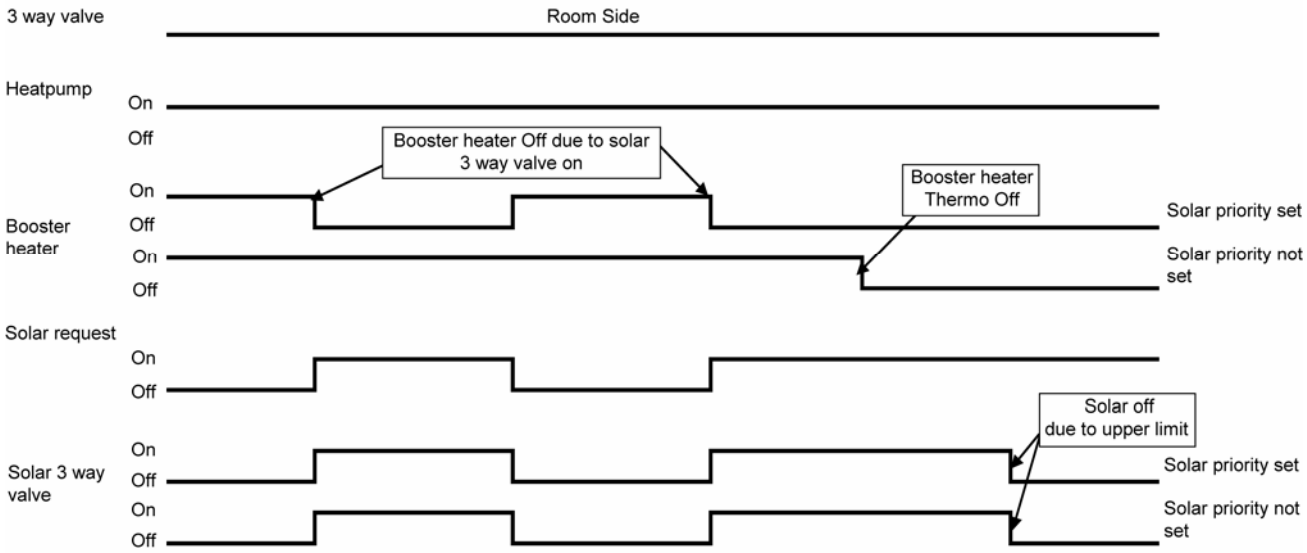


(Solar Priority Not Set)

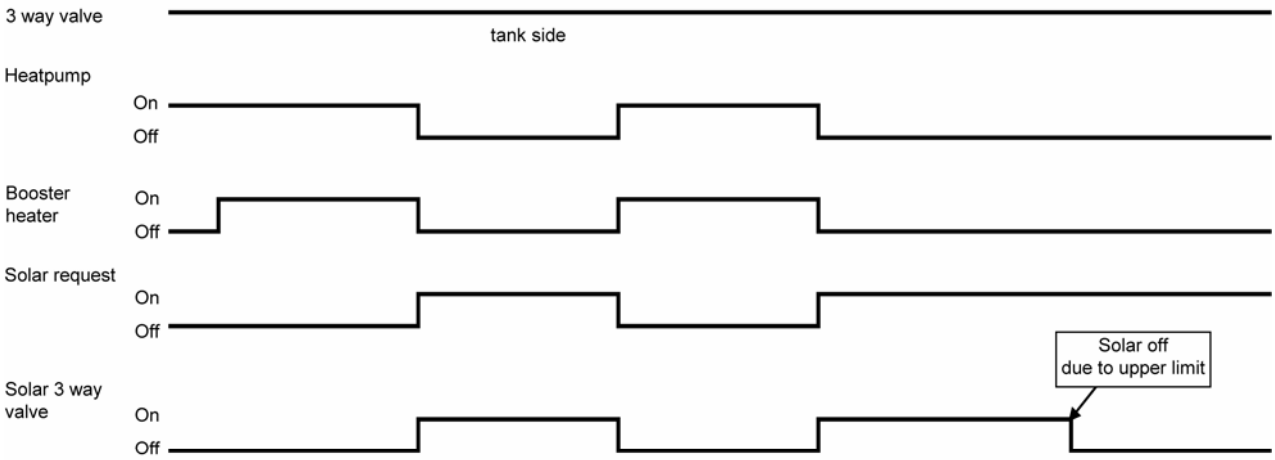


T1 - Heating
T2 - Tank interval
T3 - Booster heater delay timer

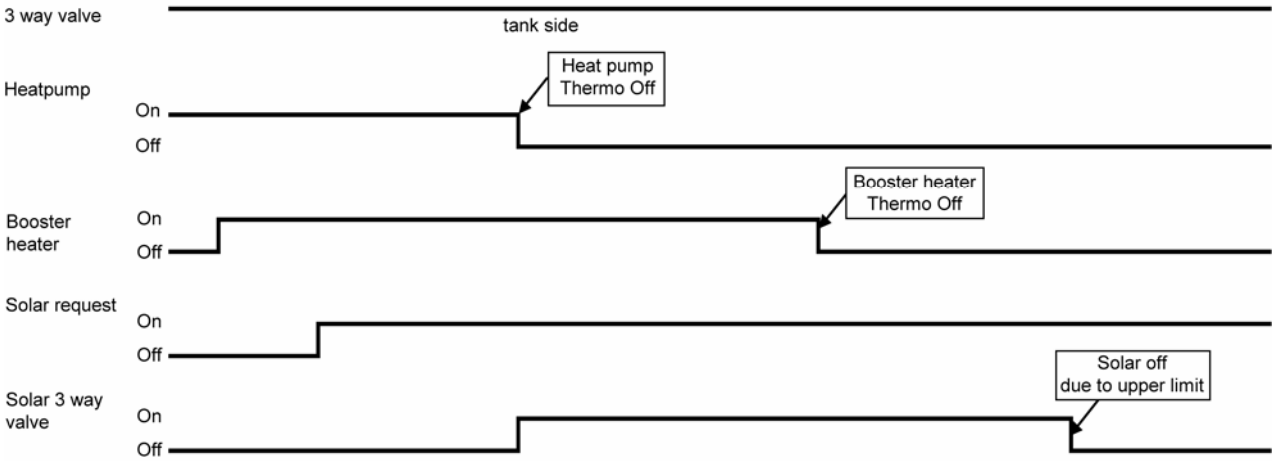
Heat + Tank Mode (Heating Priority Set)



Tank Mode (Solar Priority Set)



(Solar Priority Not Set)



12.15 External Room Thermostat Control (Optional)

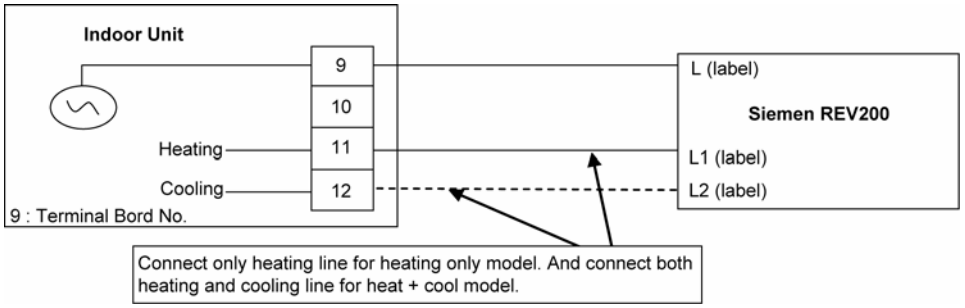
Purpose:

1 Better room temperature control to fulfill different temperature request by external room thermostat.
Recommended external room thermostat:

Maker	Characteristic
Siemen (REV200)	Touch panel
Siemen (RAA20)	Analog

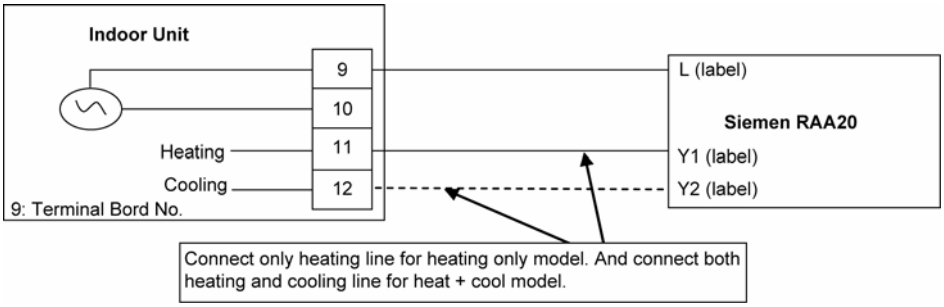
Connection external room thermostat:
Wire Connection and thermo characteristic of Siemen REV200:

Setting	L/L1 (H)	Heat Thermo	L/L2 (C)	Cool Thermo
Set Temp < Actual Temp	Open Circuit	OFF	Short Circuit	ON
Set Temp > Actual Temp	Short Circuit	ON	Open Circuit	OFF



Wire Connection and thermo characteristic of Siemen RAA20:

Setting	L/Y1 (H)	Heat Thermo	L/Y2 (C)	Cool Thermo
Set Temp < Actual Temp	Open Circuit	OFF	Short Circuit	ON
Set Temp > Actual Temp	Short Circuit	ON	Open Circuit	OFF



Control Content:

- External room thermostat control activate only when remote thermostat connection select YES by Indoor remote control.
- When indoor running heat mode, refer thermo On/Off from heating line feedback. And when indoor running cool mode, refer thermo On/Off from cooling line feedback.
- Heatpump Off immediately when receive thermo off feedback.

13. Protection Control

13.1 Protection Control for All Operations

13.1.1 Time Delay Safety Control

1 The compressor will not start for three minutes after stop of operation.

13.1.2 30 Seconds Forced Operation

1 Once the compressor starts operation, it will not stop its operation for 30 seconds.
2 However, it can be stopped using remote control.

13.1.3 Total Running Current Control

1 When the monobloc unit running current exceeds X value, the compressor frequency will decrease.
2 If the monobloc unit running current does not exceed X value, the compressor frequency will return to normal operating frequency.
3 If the monobloc unit running current continue to increase till exceed Y value, compressor will stop, and if this occurs 3 times within 20 minutes, system will stop operation and OFF/ON remote control LED will blink (F16 error occurs).

	09C		12C		14C		16C	
Operation Mode	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)
Heating	6.2	10.6	7.4	10.6	8.0	10.6	8.5	10.6

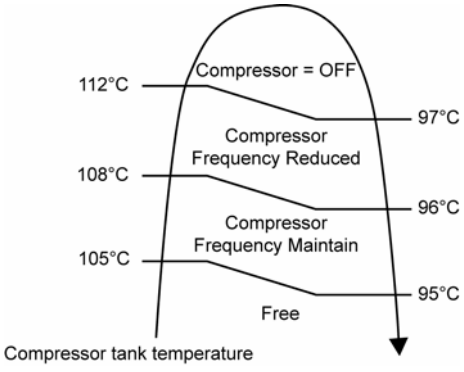
13.1.4 IPM (Power Transistor) Prevention Control

A. Overheating Prevention Control
1 When the IPM temperature rises to 95°C, compressor will stop immediately.
2 Compressor will restart delay 3 minutes when the IPM temperature decreases to 90°C.
If this condition repeats continuously 3 times within 30 minutes, system will stop operation and OFF/ON remote control LED will blink (F22 error occurs).

B. DC Peak Current Control
1 When the current to IPM exceeds set value of 40.1 ± 5.0 A (MDF09C), 44.7 ± 5.0 A (MDF12C, MDF14C, MDF16C), compressor will stop. Compressor will restart after three minutes.
2 If the set value exceeds again for more than 30 seconds after the compressor restarts, operation will restart after two minutes.
3 If the set value exceeds again for within 30 seconds after the compressor restarts, operation will restart after one minute. If this condition repeats continuously for seven times, system will stop operation and OFF/ON remote control LED will blink (F23 error occurs).

13.1.5 Compressor Overheating Prevention Control

- The compressor operating frequency is regulated in accordance to compressor tank temperature as shown in below figures. When the compressor tank temperature exceeds 112°C, compressor will stop, and if this occurs 4 times within 30 minutes, system will stop operation and OFF/ON remote control LED will blink (F20 error occurs).



13.1.6 Low Frequency Protection Control 1

- When the compressor continuously operates at frequency lower than 25 Hz for 240 minutes, the operation frequency will change to 24 Hz for 2 minutes.

13.1.7 Low Frequency Protection Control 2

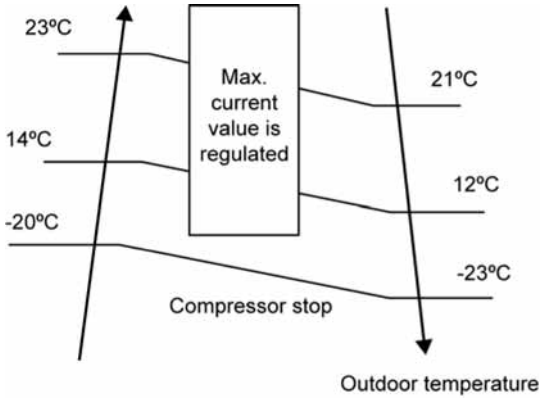
- When all the below conditions comply, the compressor frequency will change to lower frequency.

Temperature, T, for:	Heating
Outlet water (°C)	T < 14 or T ⩾ 48
Outdoor air (°C)	T < 4 or T ⩾ 24
Indoor heat exchanger (°C)	T ⩾ 0

13.1.8 High Pressure Sensor Control

- Purpose:
  - To protect the system operation.
- Detection period:
  - After compressor on for 5 minutes.
- Detection conditions:
  - When abnormal high voltage detection, 5V or when open circuit detection 0V for 5 seconds continuously.
- After detection:
  - When abnormality is detected continue 5 seconds, unit stop operation.
  - OFF/ON control panel LED will blink (H64 error occurs).

13.1.9 Outside Temperature Current Control



13.1.10 Crank Case Heater Control

- Purpose:
  - For compressor protection during low outdoor ambient operation (during heating low temperature operation).
- Control content:
  a. Trigger heater START condition
     - when the outdoor air temperature is 4°C or below, and discharge temperature is 11.6°C or below.
  b. Resetting heater STOP condition
     1. when the outdoor air temperature exceeds entry condition (6°C)
     2. when the discharge temperature exceeds entry condition (18.8°C)

13.2 Protection Control for Heating Operation

13.2.1 Outdoor Air Temperature Control

The maximum current value is regulated when the outdoor air temperature rises above 14°C in order to avoid compressor overloading.

13.2.2 Deice Operation

When Monobloc unit (Refrigerant system) pipe temperature and outdoor air temperature is low, deice operation start where monobloc unit fan motor stop.

14. Servicing Mode

14.1 Test Run

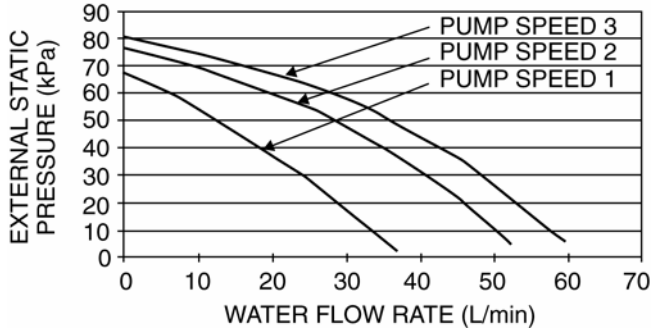
1 Fill up the boiler tank with water. For details refer to boiler tanks installation instruction and operation instruction.
2 Set ON to the monobloc unit and RCCB. Then, for remote control operation please refers to monobloc unit operation instruction.
3 For normal operation, pressure gauge reading should 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.

14.2 Proper Pump Down Procedure

1 Make sure the OFF/ON remote control LED is OFF (no operation).
2 Press the “PUMPDW” switch on remote control 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°C)), fully close 3 way valve (Liquid side).
4 After 3 minutes, fully close 3 way valve (Gas Side).
5 Press the “OFF/ON” switch on remote control to stop PUMP DOWN mode.
6 Remove the refrigerant piping.

14.3 How to Adjust Water Flow Rate

- Before adjust the water flow rate, make sure that the total water volume in the installation is 30 litres minimum (09C3) and 50 litres minimum (12C6, 14C6 & 16C6).
- The water flow rate can be adjusted with select the water pump speed on the water pump. The default setting is moderate speed (II). Adjust it to high speed (III) 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.

14.4 Expansion Vessel Pre Pressure Checking

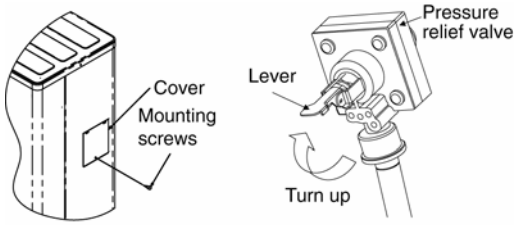
- Expansion Vessel with 10L air capacity and initial pressure of 1 bar is installed in this monobloc unit.
- Total amount of water in system should be below 200L.
  (Note: This amount of water is not include the tank unit volume)
- If total amount of water is over 200L, please add expansion vessel.
-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

15. 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. monobloc 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 Pressure relief valve
- Take out the cover with remove the mounting screw for access to the 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.
- Reinstall the cover with tighten the mounting screws properly, if the pressure relief valve is functioning normal.



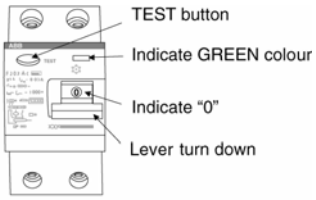
How to check pressure relief valve

3 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.

4 RCCB
Ensure the RCCB set to “ON” condition before check RCCB.
Turn on the power supply to the monobloc unit.
This testing could only be done when power is supplied to the monobloc unit.

⚠ **WARNING**
Be careful not to touch parts other than RCCB test button when the power is supplied to Monobloc 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 monobloc unit.
- If RCCB functions normal, set the lever to “ON” again after testing finish.



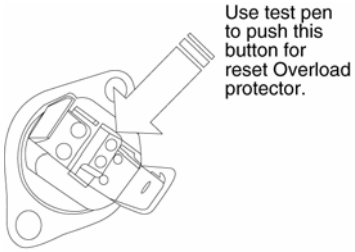
Condition of RCCB - function normal (after press “TEST” button)

5 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.

6 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.

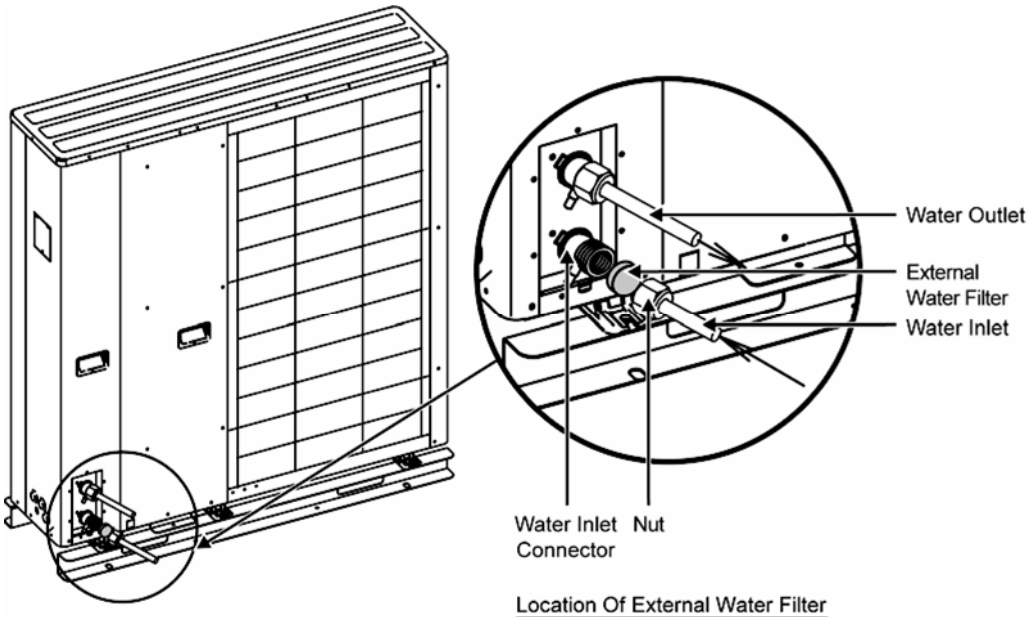


How to reset Overload protector

7 External water filter (field supply)

Clean the external water filter in regularly basic.

- External water filter is located inside the tube connector which is before water inlet connector of monobloc unit (indicated with “WATER IN”). (Refer to figure below)
- Use spanner to detach the tube connector 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.



Location Of External Water Filter

16. Troubleshooting Guide

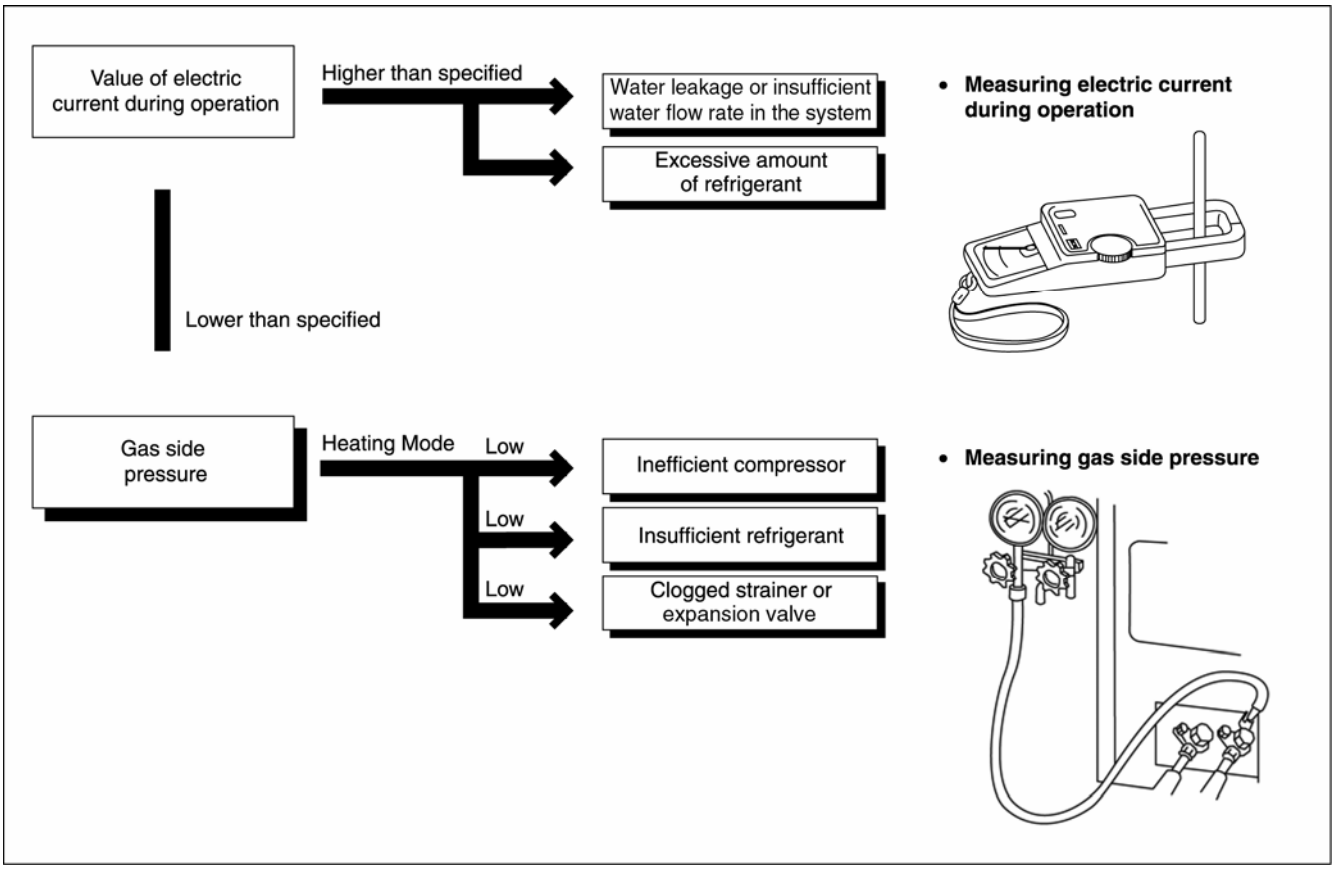
16.1 Refrigeration Cycle System

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan.
The normal pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table on the right.

Normal Pressure (Standard)

	Gas pressure MPa (kg/cm²G)
Heating Mode	2.3 ~ 2.9 (23 ~ 29)

★ Condition: • Outdoor temperature 7°C at heating mode.
• Compressor operates at rated frequency.



16.2 Relationship Between The Condition Of The Monobloc Unit And Pressure And Electric Current

Condition of the Monobloc Unit	Heating Mode		
	Low Pressure	High Pressure	Electric current during operation
Water leakage or insufficient water flow rate in the system			
Excessive amount of refrigerant			
Inefficient compression			
Insufficient refrigerant (gas leakage)			
Monobloc unit (refrigerant system) heat exchange deficiency			
Clogged expansion valve or Strainer			

- Carry out the measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

16.3 Breakdown Self Diagnosis Function

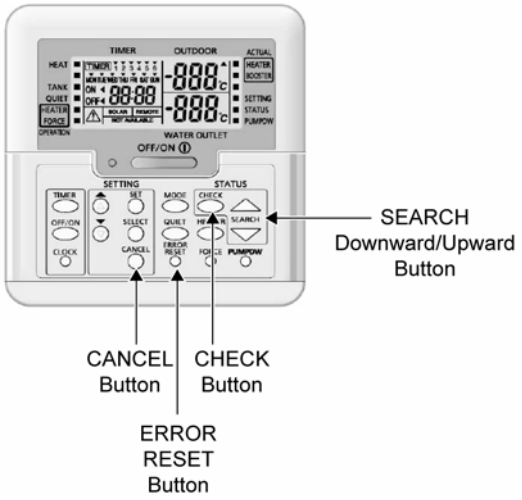
16.3.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

- When abnormality occur during operation, the system will stop operation, and OFF/ON remote control LED will blink and error code will display on the remote control 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 un-repaired, system will again stop operation, and OFF/ON remote control 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 remote control LED will blink.
  2 Error code of the abnormality will display on the remote control 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.



16.4 Error Codes Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgement	Primary location to verify
H00	No abnormality detected	—	—
H12	Indoor/Outdoor capacity unmatched	90s after power supply	• Indoor/outdoor connection wire • Indoor/outdoor PCB • Specification and combination table in catalogue
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	• Compressor temperature sensor (defective or disconnected)
H23	Indoor refrigerant liquid temperature sensor abnormality	Continue for 5 sec.	• Refrigerant liquid temperature sensor (defective or disconnected)
H42	Compressor low pressure abnormality	—	• Outdoor pipe temperature sensor • Clogged expansion valve or strainer • Insufficient refrigerant • Outdoor PCB • Compressor
H62	Water flow switch abnormality	Continue for 1 min.	• Water flow switch
H64	Refrigerant high pressure abnormality	Continue for 5 sec.	• Outdoor high pressure sensor (defective or disconnected)
H70	Back-up heater OLP abnormality	Continue for 60 sec.	• Back-up heater OLP (Disconnection or activated)
H72	Tank sensor abnormal	Continue for 5 sec.	• Tank sensor
H76	Indoor – remote control communication abnormality	—	• Indoor - control panel (defective or disconnected)
H90	Indoor/outdoor abnormal communication	> 1 min after starting operation	• Internal/external cable connections • Indoor/Outdoor PCB
H91	Tank heater OLP abnormality	Continue for 60 sec.	• Tank heater OLP (Disconnection or activated)
H95	Indoor/Outdoor wrong connection	—	• Indoor/Outdoor supply voltage
H98	Outdoor high pressure overload protection	—	• Outdoor high pressure sensor • Water pump or water leakage • Clogged expansion valve or strainer • Excess refrigerant • Outdoor PCB
H99	Indoor heat exchanger freeze prevention	—	• Indoor heat exchanger • Refrigerant shortage
F12	Pressure switch activate	4 times occurrence within 20 minutes	• Pressure switch
F14	Outdoor compressor abnormal revolution	4 times occurrence within 20 minutes	• Outdoor compressor
F15	Outdoor fan motor lock abnormality	2 times occurrence within 30 minutes	• Outdoor PCB • Outdoor fan motor
F16	Total running current protection	3 times occurrence within 20 minutes	• Excess refrigerant • Outdoor PCB
F20	Outdoor compressor overheating protection	4 times occurrence within 30 minutes	• Compressor tank temperature sensor • Clogged expansion valve or strainer • Insufficient refrigerant • Outdoor PCB • Compressor
F22	IPM (power transistor) overheating protection	3 times occurrence within 30 minutes	• Improper heat exchange • IPM (Power transistor)
F23	Outdoor Direct Current (DC) peak detection	7 times occurrence continuously	• Outdoor PCB • Compressor
F24	Refrigeration cycle abnormality	2 times occurrence within 20 minutes	• Insufficient refrigerant • Outdoor PCB • Compressor low compression
F25	Cooling/Heating cycle changeover abnormality	4 times occurrence within 30 minutes	• 4-way valve • V-coil
F27	Pressure switch abnormality	Continue for 1 min.	• Pressure switch
F36	Outdoor air temperature sensor abnormality	Continue for 5 sec.	• Outdoor air temperature sensor (defective or disconnected)
F37	Indoor water inlet temperature sensor abnormality	Continue for 5 sec.	• Water inlet temperature sensor (defective or disconnected)
F40	Outdoor discharge pipe temperature sensor abnormality	Continue for 5 sec.	• Outdoor discharge pipe temperature sensor (defective or disconnected)

Diagnosis display	Abnormality/Protection control	Abnormality Judgement	Primary location to verify
F41	PFC control	4 times occurrence within 10 minutes	• Voltage at PFC
F42	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	• Outdoor heat exchanger temperature sensor (defective or disconnected)
F43	Outdoor defrost sensor abnormality	Continue for 5 sec.	• Outdoor defrost sensor (defective or disconnected)
F45	Indoor water outlet temperature sensor abnormality	Continue for 5 sec.	• Water outlet temperature sensor (defective or disconnected)
F46	Outdoor Current Transformer open circuit	—	• Insufficient refrigerant • Outdoor PCB • Compressor low
F95	Cooling high pressure overload protection	—	• Outdoor high pressure sensor • Water pump or water leakage • Clogged expansion valve or strainer • Excess refrigerant • Outdoor PCB

16.5 Self-diagnosis Method

16.5.1 Connection Capability Rank Abnormality (H12)

Malfunction Decision Conditions:

During startup operation of cooling and heating, the capability rank of indoor checked by the outdoor is used to determine connection capability rank abnormality.

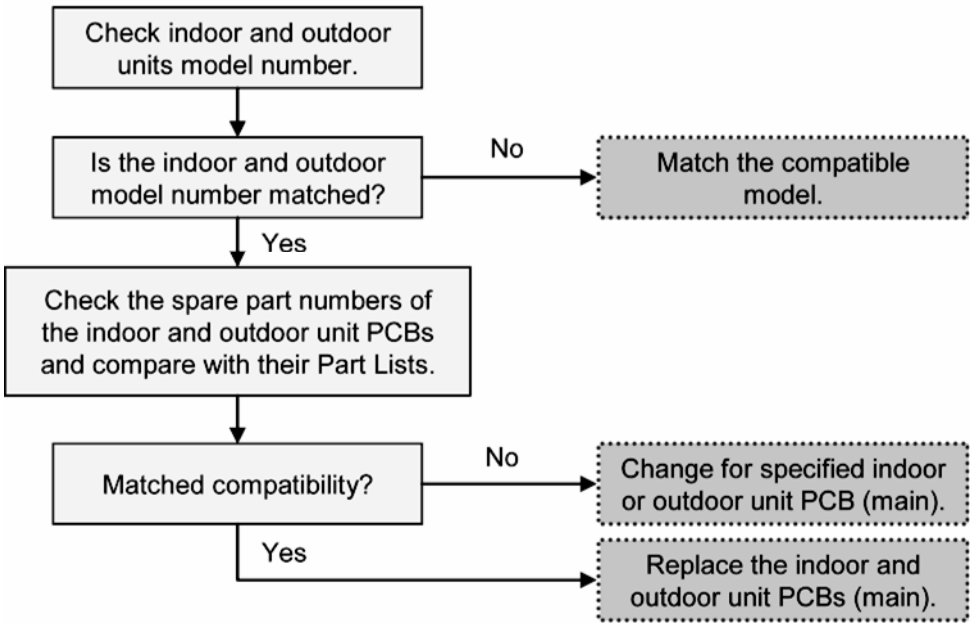
Malfunction Caused:

1 Wrong model interconnected.
2 Wrong indoor unit or outdoor unit PCB (main) used.
3 Faulty indoor unit or outdoor unit PCB (main).

Abnormality Judgment:

Continue for 90 seconds.

Troubleshooting:



16.5.2 Compressor Tank Temperature Sensor Abnormality (H15)

Malfunction Decision Conditions:

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

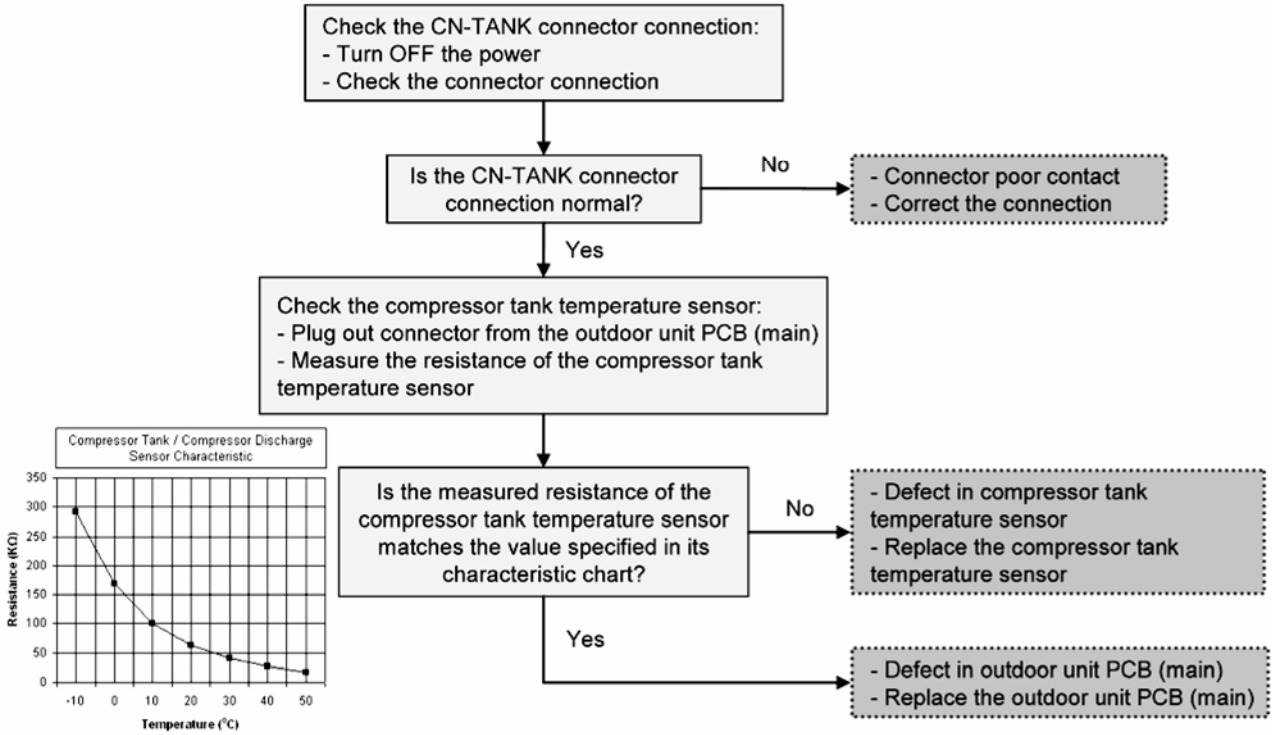
Malfunction Caused:

1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

Continue for 5 seconds.

Troubleshooting:



16.5.3 Indoor Refrigerant Liquid Temperature Sensor Abnormality (H23)

Malfunction Decision Conditions:

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

Malfunction Caused:

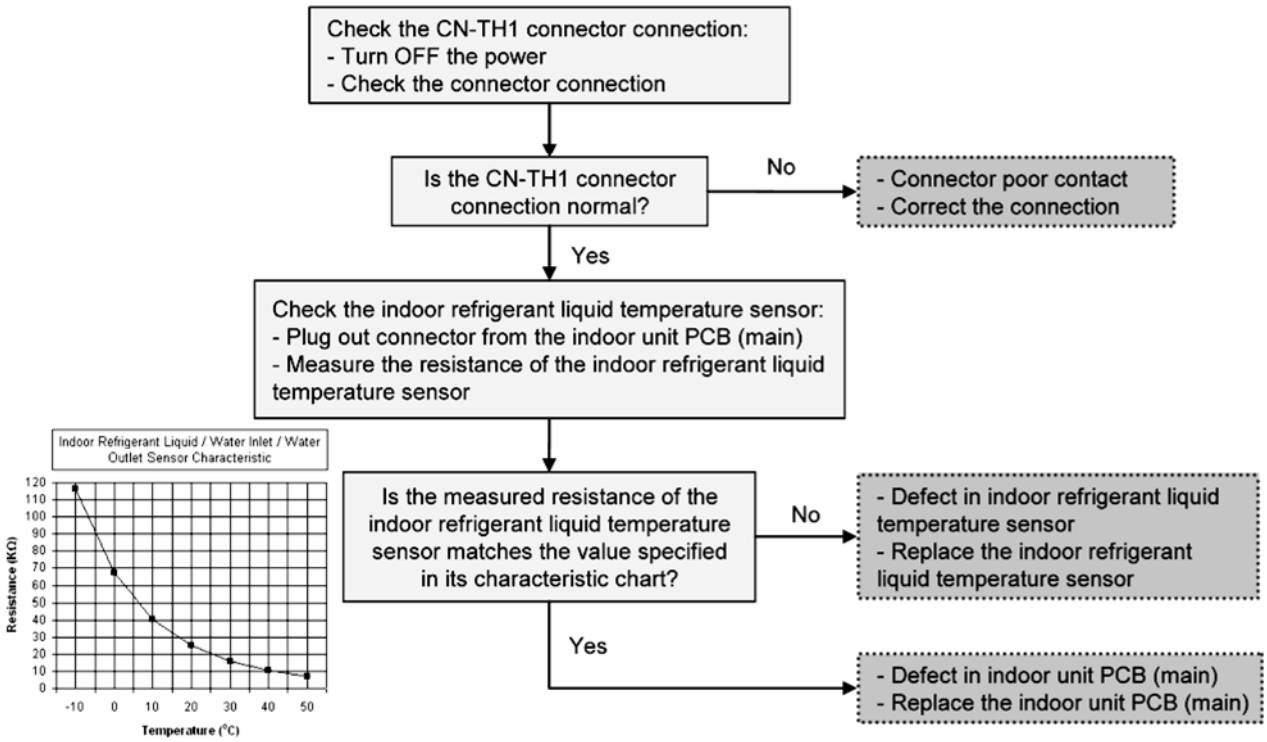
1 Faulty connector connection.
2 Faulty sensor.
3 Faulty indoor unit PCB (main).

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.



16.5.4 Compressor Low Pressure Protection (H42)

Malfunction Decision Conditions:

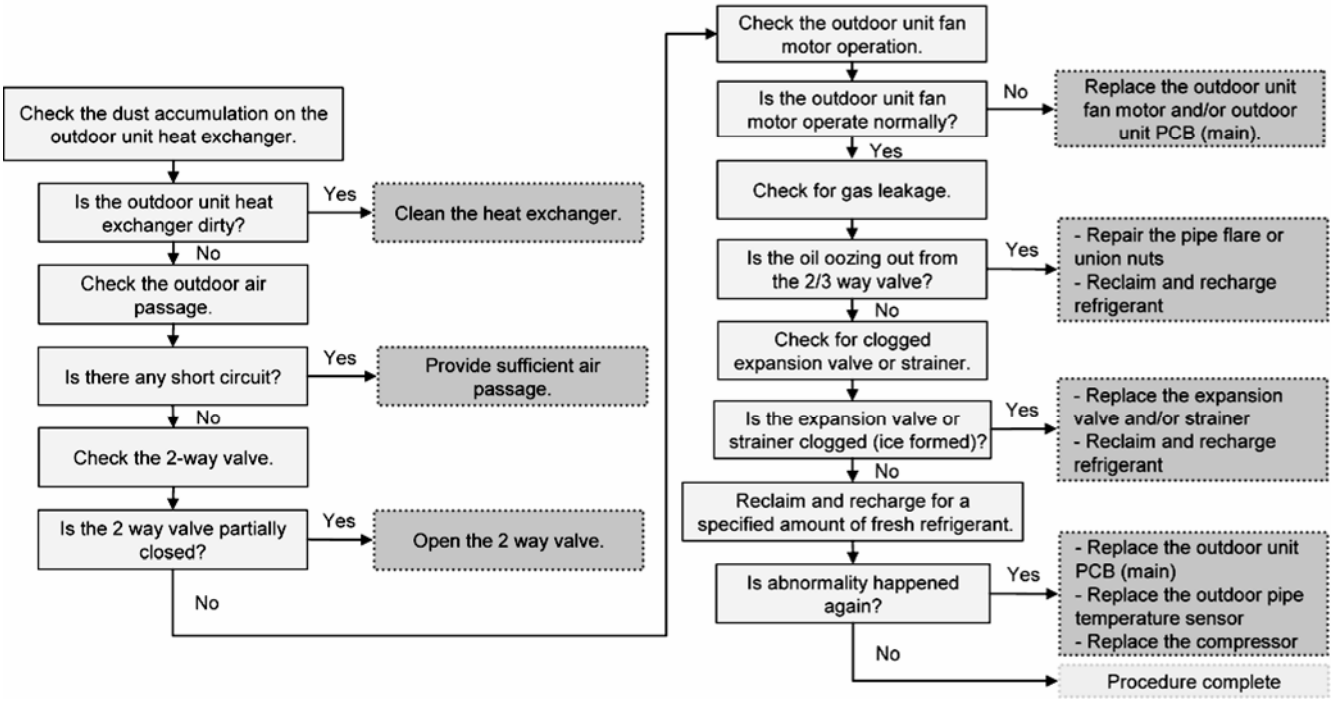
During operation of heating and after 5 minutes compressor ON, when outdoor pipe temperature below -29°C or above 26°C is detected by the outdoor pipe temperature sensor.

Malfunction Caused:

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

Troubleshooting:

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



16.5.5 Water Flow Switch Abnormality (H62)

Malfunction Decision Conditions:

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

Malfunction Caused:

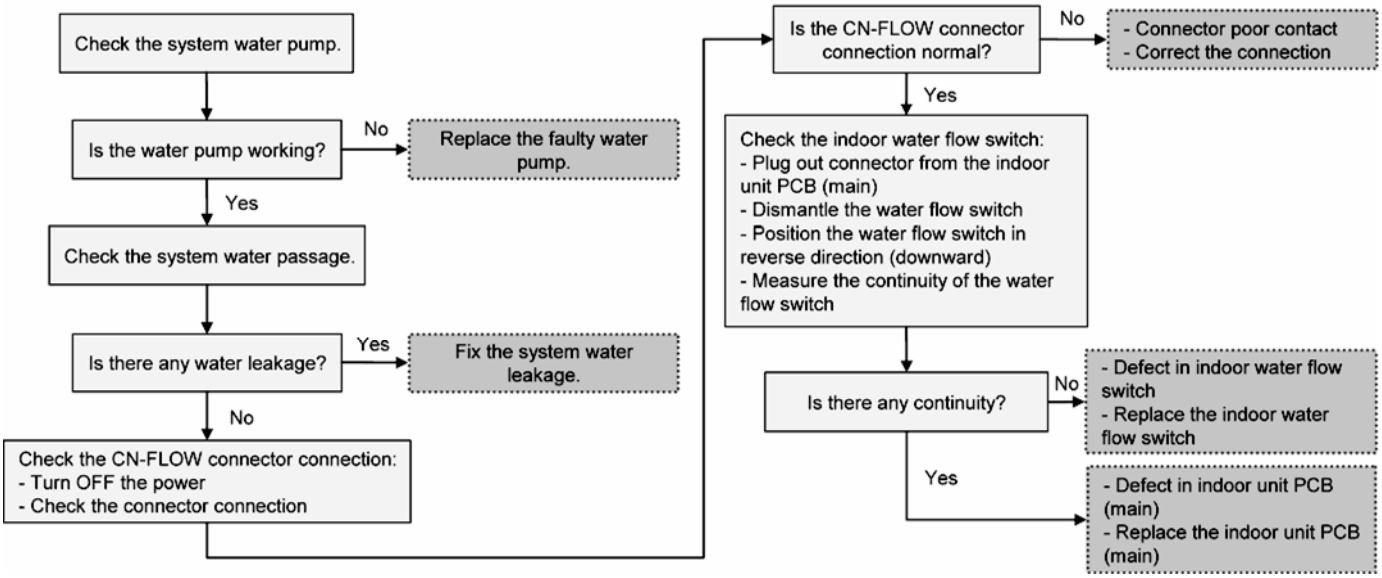
1 Faulty water pump.
2 Water leak in system.
3 Faulty connector connection.
4 Faulty water flow switch.
5 Faulty indoor unit PCB (main).

Abnormality Judgment:

Continue for 10 seconds (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.



16.5.6 Outdoor High Pressure Abnormality (H64)

Malfunction Decision Conditions:

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

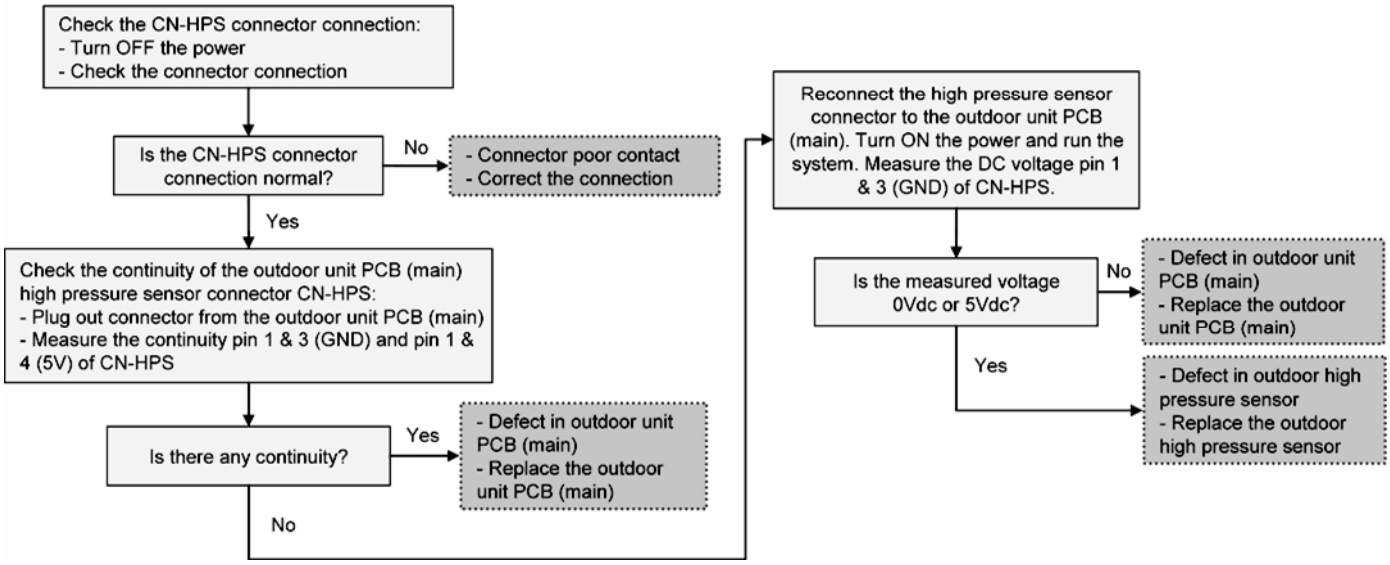
Malfunction Caused:

1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

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.



16.5.7 Indoor Backup Heater OLP Abnormality (H70)

Malfunction Decision Conditions:

During operation of indoor backup heater, when no power supplies to indoor backup heater or OLP open circuit.

Malfunction Caused:

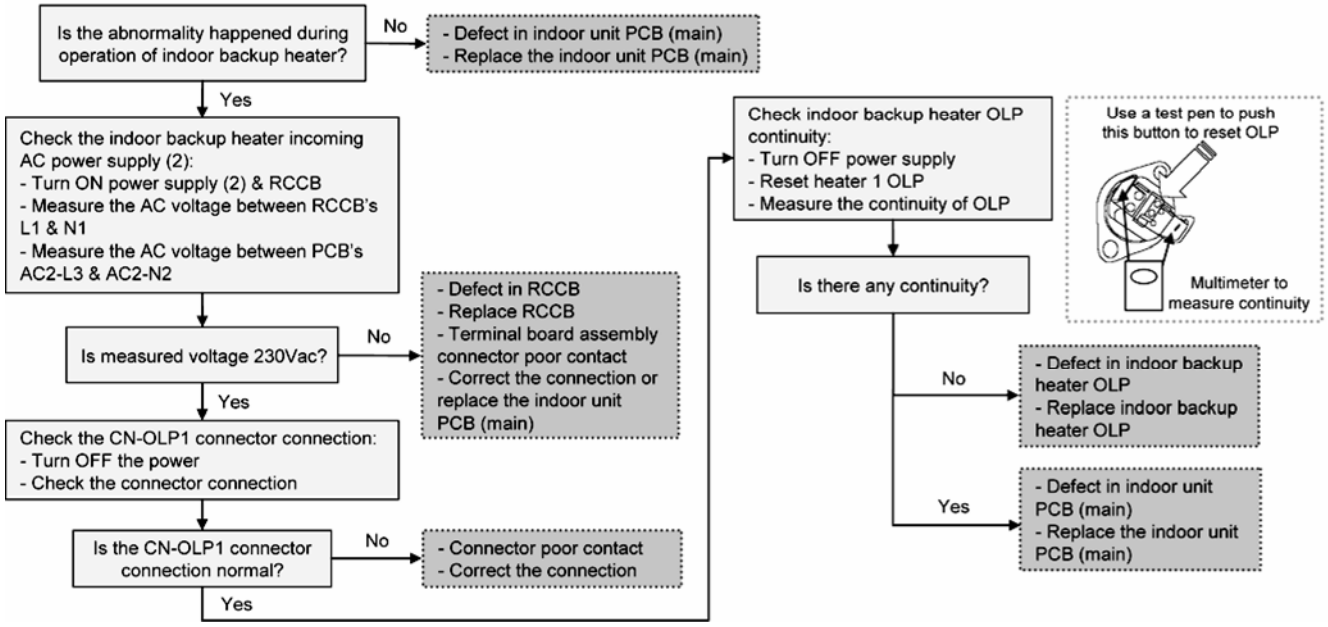
1 Faulty power supply connector connection.
2 Faulty connector connection.
3 Faulty indoor backup heater overload protector (OLP).
4 Faulty indoor unit PCB (main).

Abnormality Judgment:

Continue for 60 seconds.

Troubleshooting:

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



16.5.8 Tank Temperature Sensor Abnormality (H72)

Malfunction Decision Conditions:

When tank connection is set to ON, the temperatures detected by the tank temperature sensor are used to determine sensor error.

Malfunction Caused:

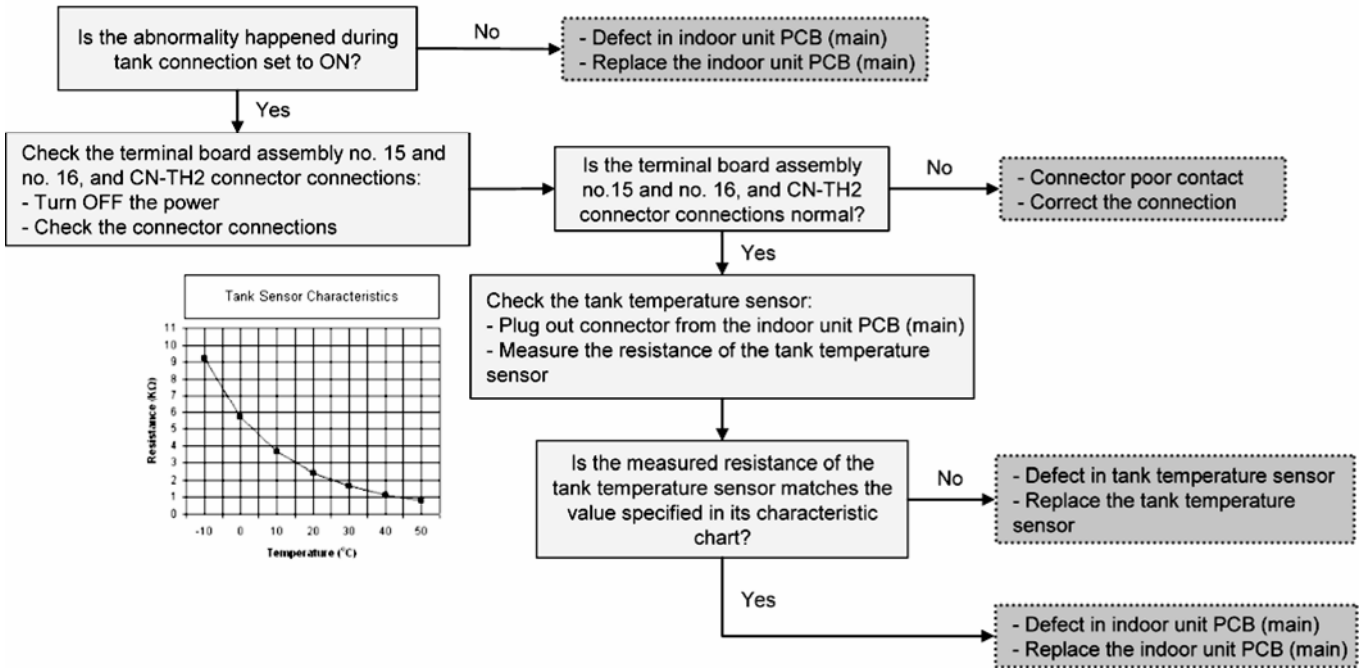
1 Faulty connector connection.
2 Faulty sensor.
3 Faulty indoor unit PCB (main).

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.



16.5.9 Indoor-Control Panel Communication Abnormality (H76)

Malfunction Decision Conditions:

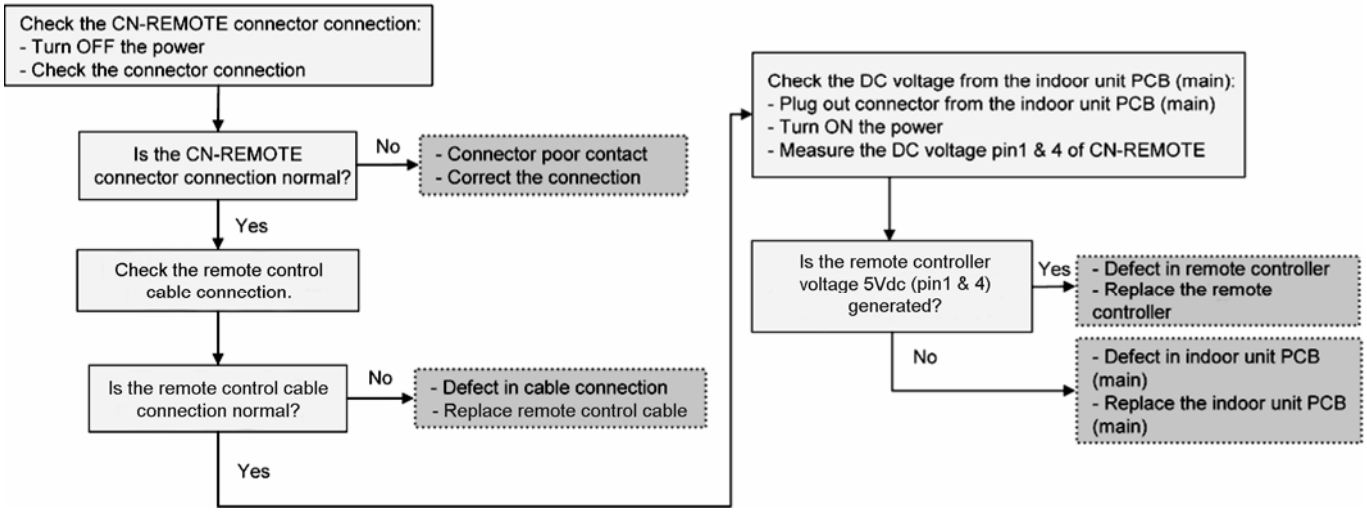
During standby and operation of cooling and heating, indoor-remote control error occur.

Malfunction Caused:

1 Faulty connector connection.
2 Faulty remote contro.
3 Faulty indoor unit PCB (main).

Troubleshooting:

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



16.5.10 Indoor/Outdoor Abnormal Communication (H90)

Malfunction Decision Conditions:

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

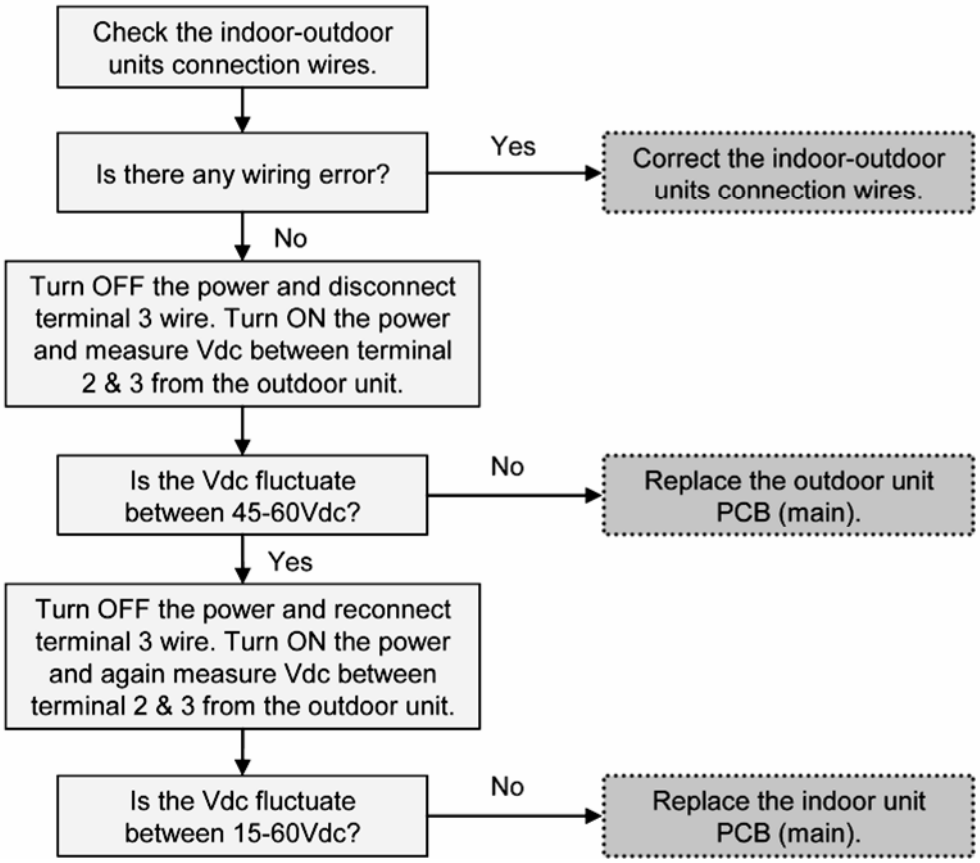
Malfunction Caused:

1 Faulty outdoor unit PCB (main).
2 Faulty indoor unit PCB (main).
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.



16.5.11 Tank Booster Heater OLP Abnormality (H91)

Malfunction Decision Conditions:

During operation of tank booster heater, and tank booster heater OLP open circuit.

Malfunction Caused:

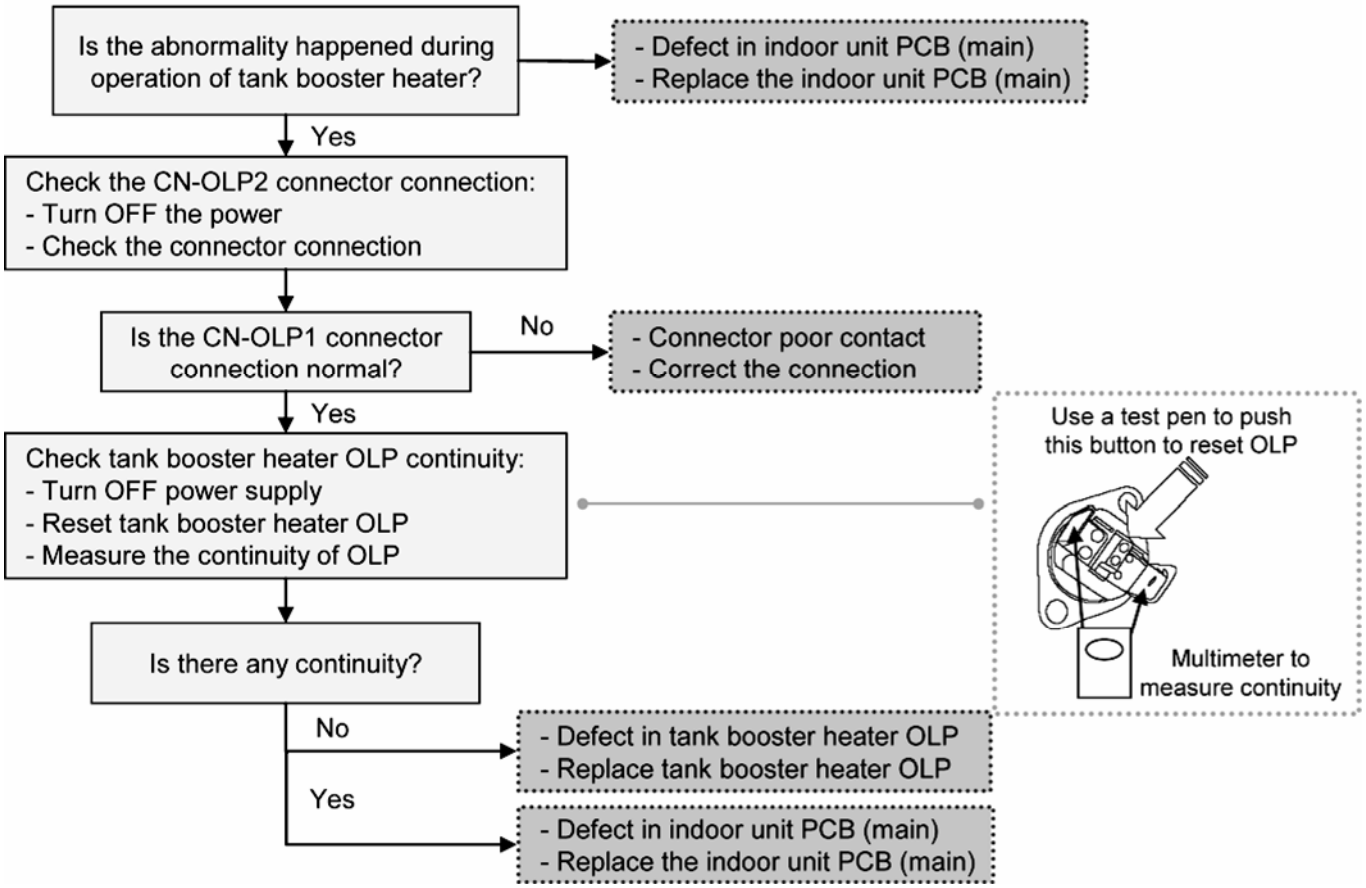
1 Faulty connector connection.
2 Faulty tank booster heater overload protector (OLP).
3 Faulty indoor unit PCB (main).

Abnormality Judgment:

Continue for 60 seconds.

Troubleshooting:

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



16.5.12 Unspecified Voltage between Indoor and Outdoor (H95)

Malfunction Decision Conditions:

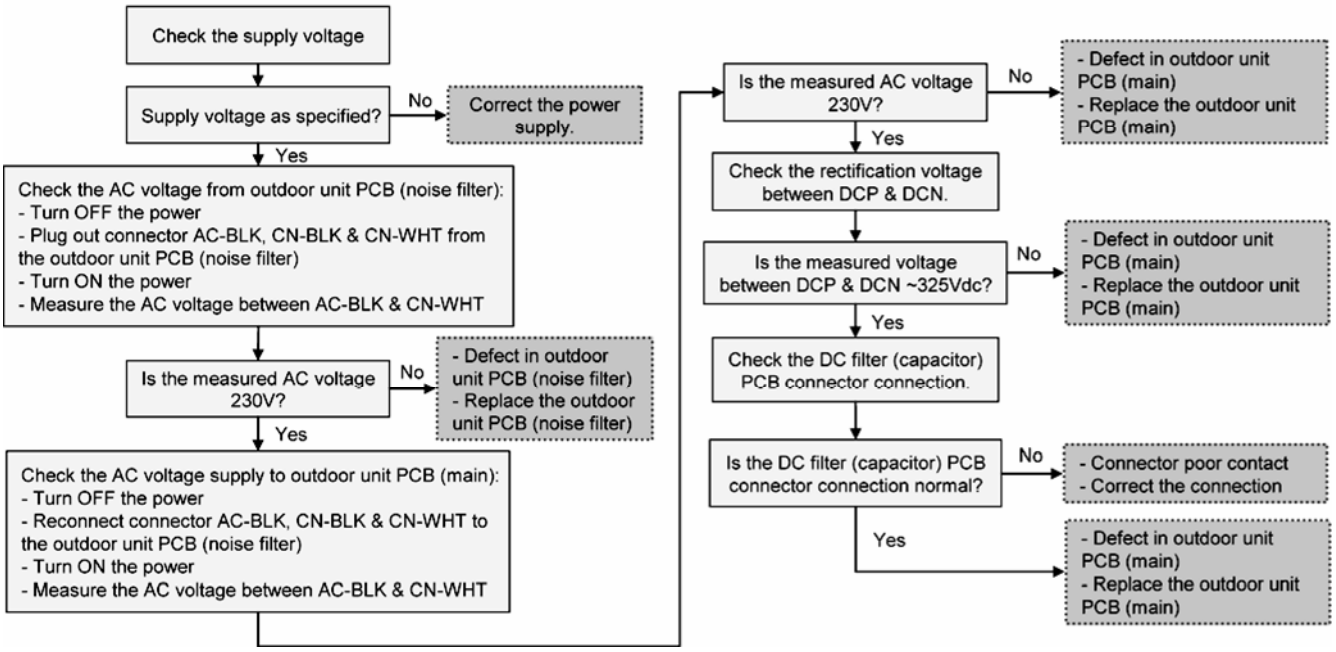
The supply power is detected for its requirement by the indoor/outdoor transmission.

Malfunction Caused:

1 Insufficient power supply.
2 Faulty outdoor unit PCB (noise filter/main).

Troubleshooting:

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



16.5.13 Outdoor High Pressure Protection (H98)

Malfunction Decision Conditions:

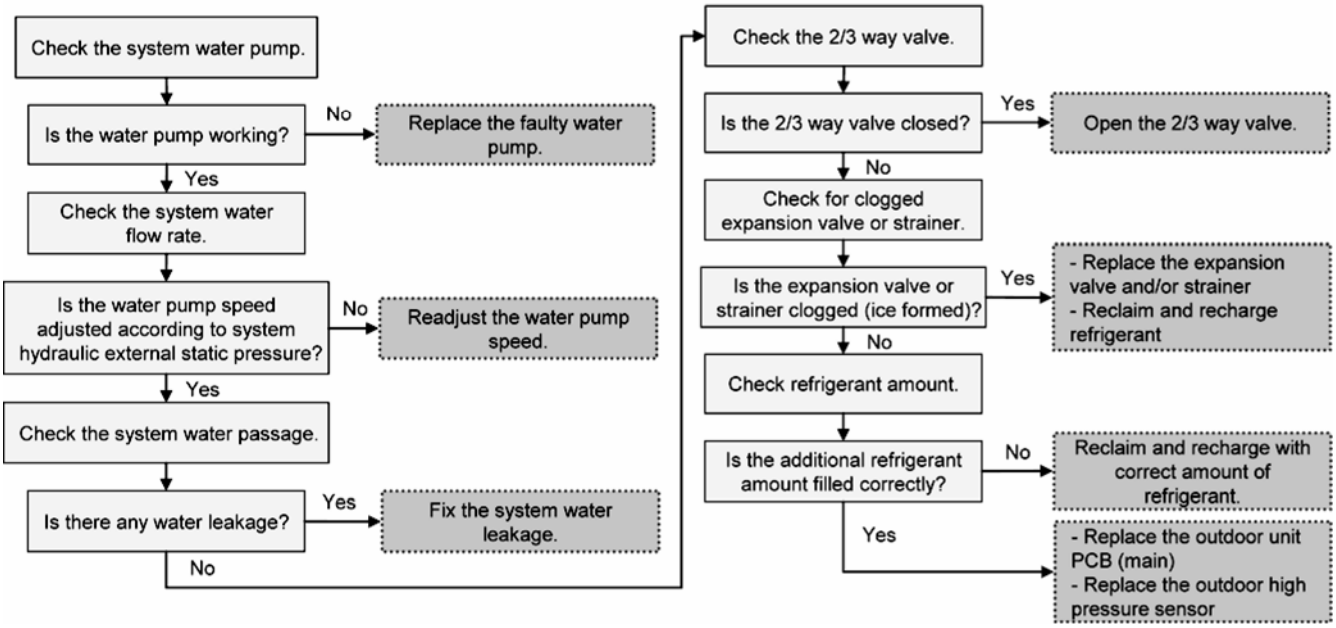
During operation of heating, when pressure 4.0 MPa and above is detected by outdoor high pressure sensor.

Malfunction Caused:

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

Troubleshooting:

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



16.5.14 Indoor Freeze-up Protection (H99)

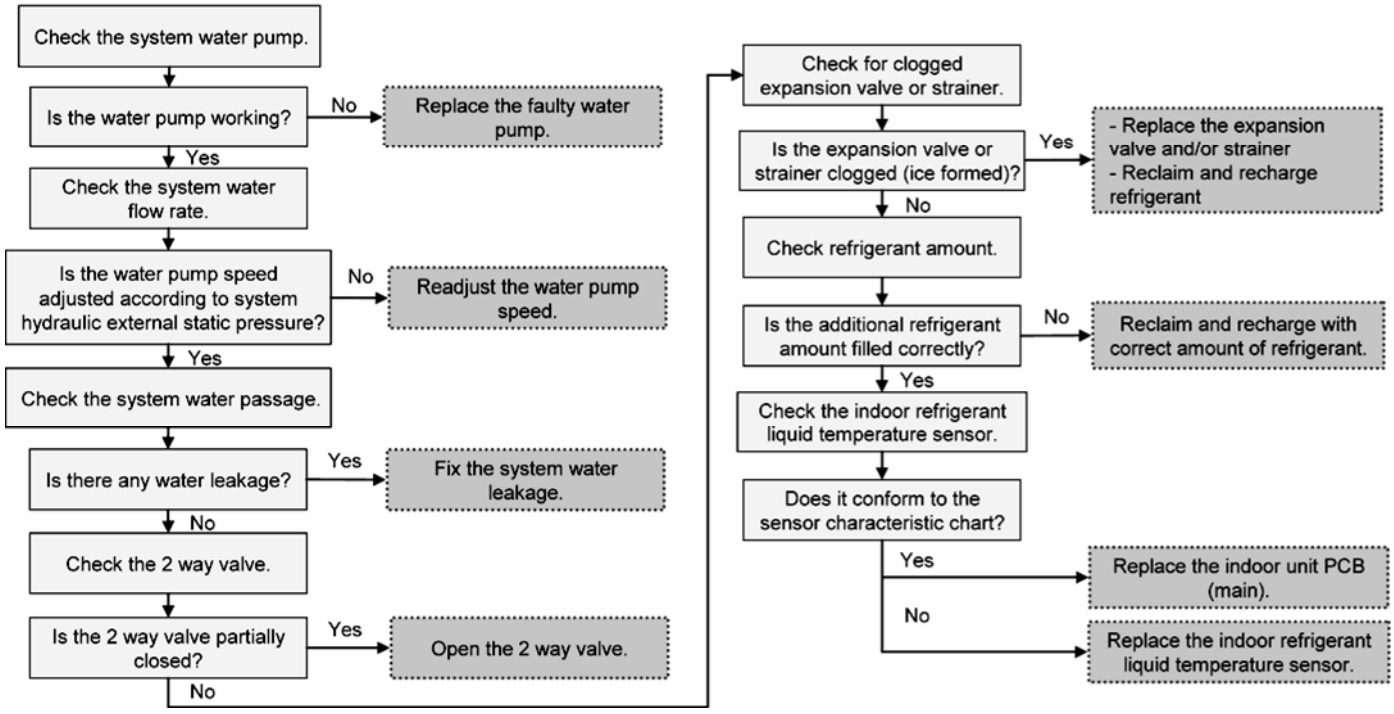
Malfunction Decision Conditions:

During anti-freezing control in cooling operation, when the indoor refrigerant liquid temperature < 0°C.

Malfunction Caused:

1 Faulty water pump.
2 Insufficient water flow rate in system.
3 Water leak in system.
4 2 way valve partially closed.
5 Clogged expansion valve or strainer.
6 Refrigerant shortage (refrigerant leakage).
7 Faulty indoor refrigerant liquid temperature sensor.
8 Faulty indoor unit PCB (main).

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



16.5.15 Outdoor High Pressure Switch Activate (F12)

Malfunction Decision Conditions:

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

Malfunction Caused:

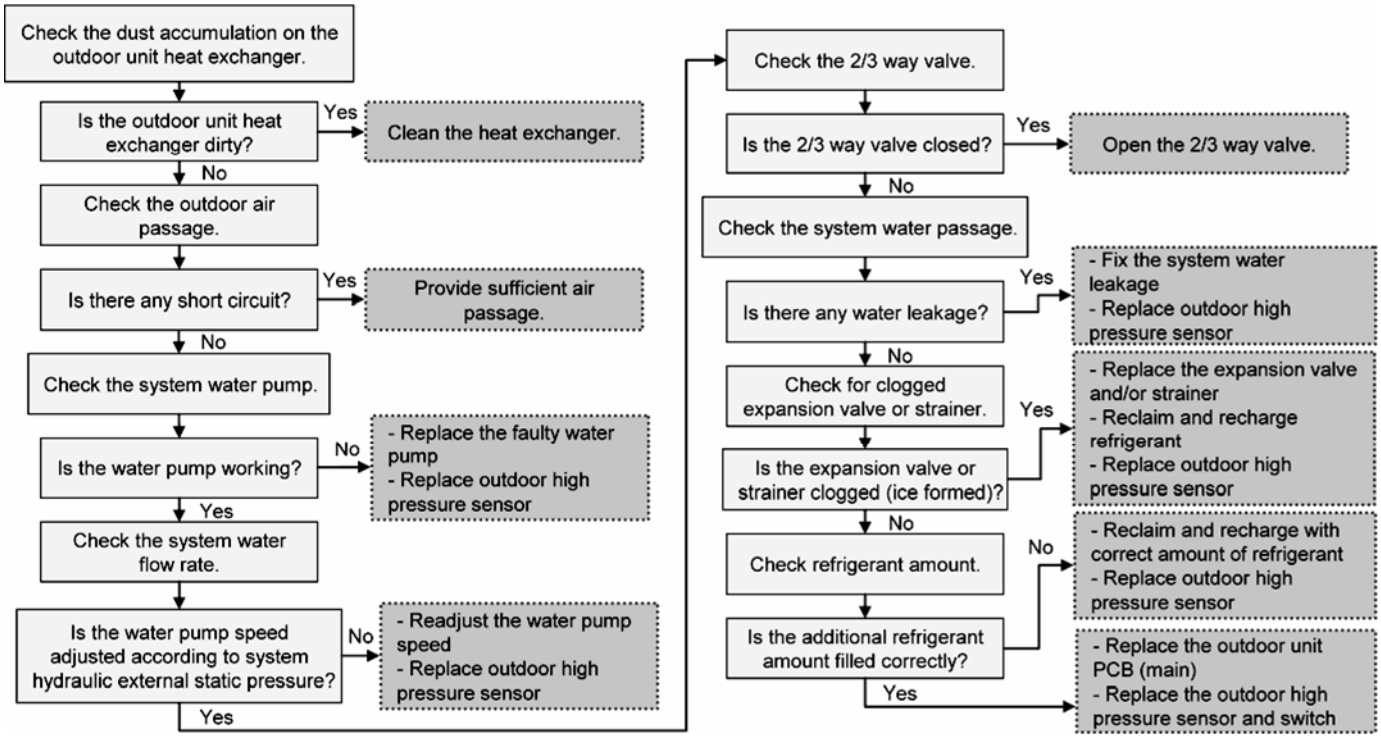
1 Dust accumulation on the outdoor unit heat exchanger.
2 Air short circuit at outdoor unit.
3 Faulty water pump.
4 Insufficient water flow rate in system.
5 Water leak in system.
6 2/3 way valve closed.
7 Clogged expansion valve or strainer.
8 Excessive refrigerant.
9 Faulty outdoor high pressure sensor and switch.
10 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.



16.5.16 Compressor Rotation Failure (F14)

Malfunction Decision Conditions:

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

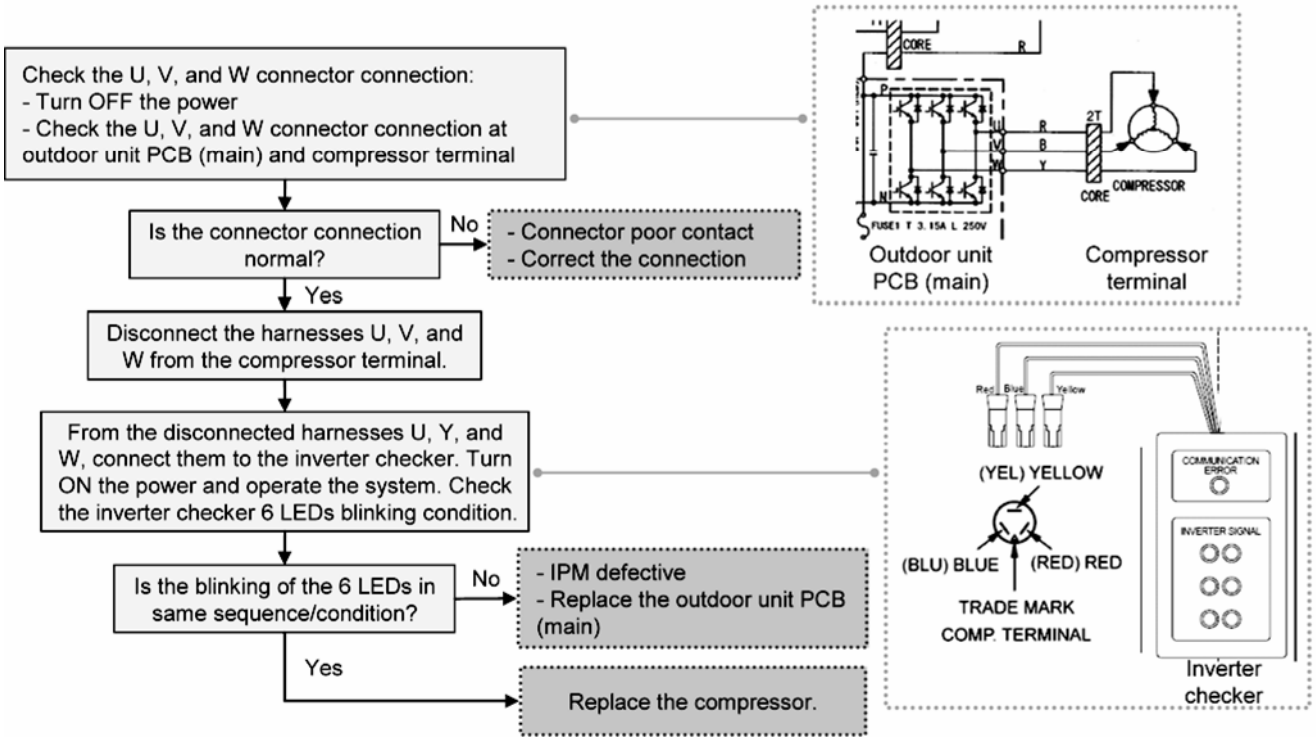
Malfunction Caused:

1 Compressor terminal disconnect.
2 Faulty outdoor unit PCB (main).
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.



16.5.17 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:

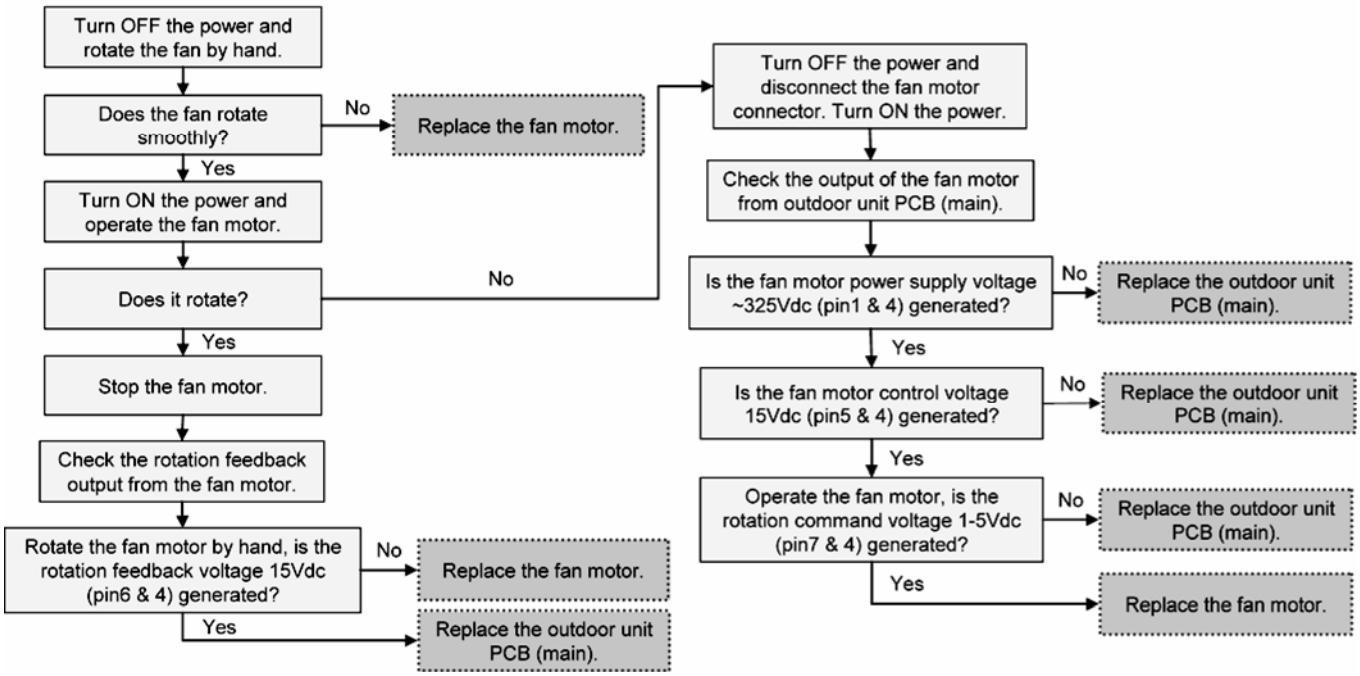
1 Operation stop due to short circuit inside the fan motor winding.
2 Operation stop due to breaking of wire inside the fan motor.
3 Operation stop due to breaking of fan motor lead wires.
4 Operation stop due to fan motor Hall IC malfunction.
5 Operation error due to faulty outdoor unit PCB.

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.



16.5.18 Input Over Current Detection (F16)

Malfunction Decision Conditions:

During operation of cooling and heating, when outdoor current above 10.6A is detected by the current transformer (CT) in the outdoor unit PCB.

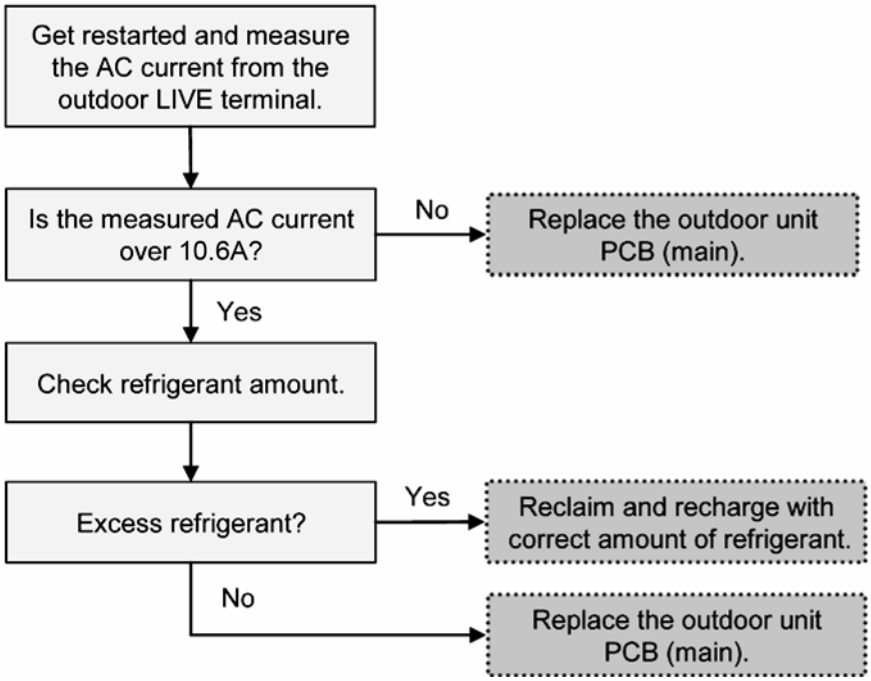
Malfunction Caused:

1 Excessive refrigerant.
2 Faulty outdoor unit PCB (main).

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.



16.5.19 Compressor Overheating (F20)

Malfunction Decision Conditions:

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

Malfunction Caused:

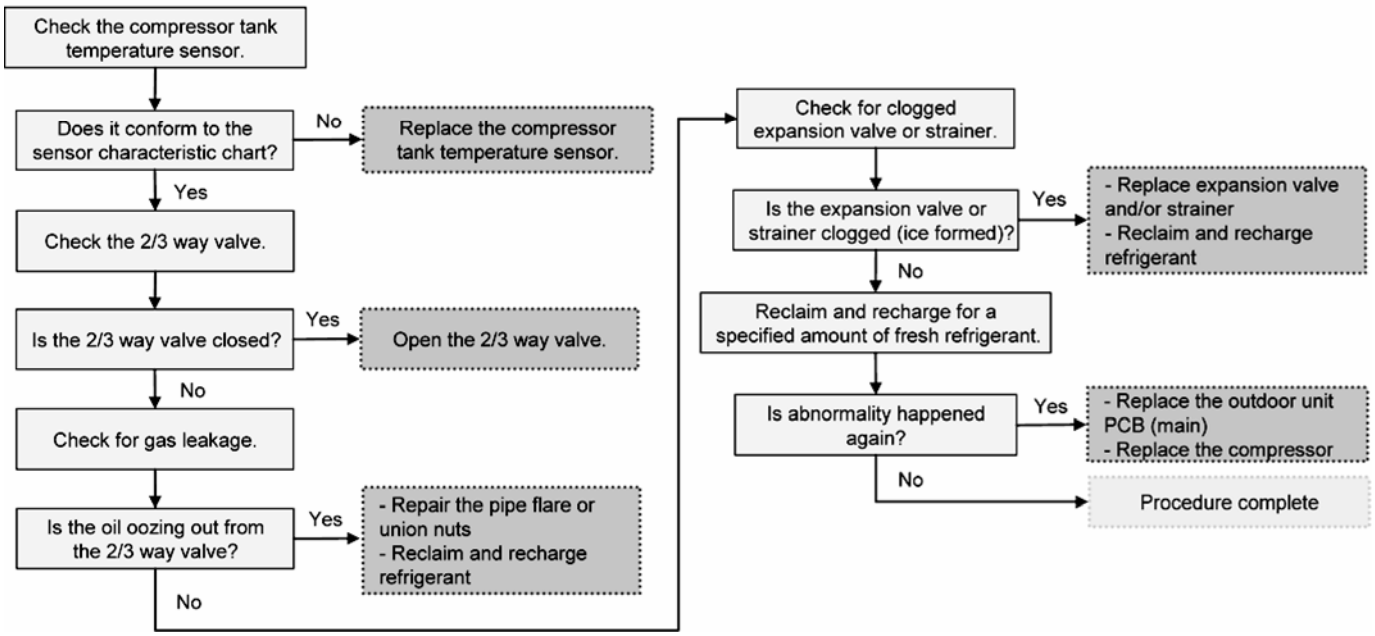
1 Faulty compressor tank temperature sensor.
2 2/3 way valve closed.
3 Refrigerant shortage (refrigerant leakage).
4 Clogged expansion valve or strainer.
5 Faulty outdoor unit PCB (main).
6 Faulty compressor.

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.



16.5.20 IPM Overheating (F22)

Malfunction Decision Conditions:

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

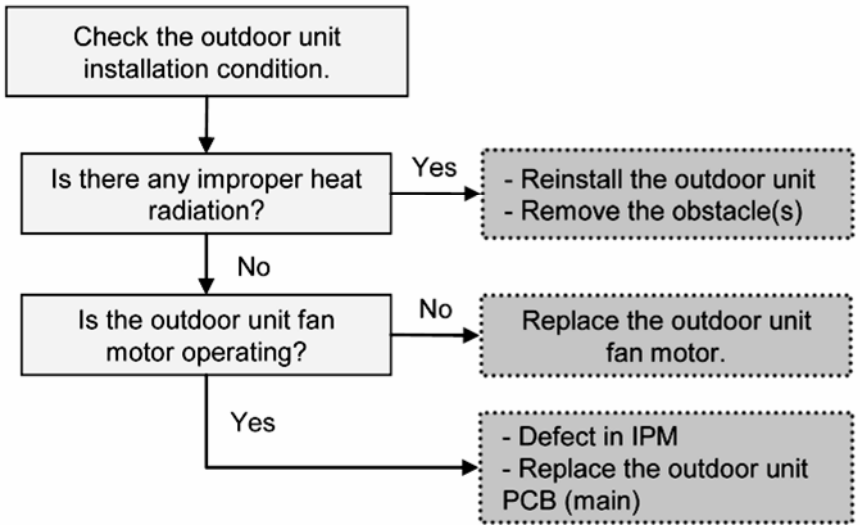
Malfunction Caused:

1 Faulty outdoor unit fan motor.
2 Faulty outdoor unit PCB (main).

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.



16.5.21 Output Over Current Detection (F23)

Malfunction Decision Conditions:

During operation of cooling and heating, when outdoor DC current is above 40.1 ± 5.0A (for: UD07~09CE) OR 44.7 ± 5.0A (for:UD12~16CE) is detected by the IPM DC Peak sensing circuitry in the outdoor unit PCB (main).

Malfunction Caused:

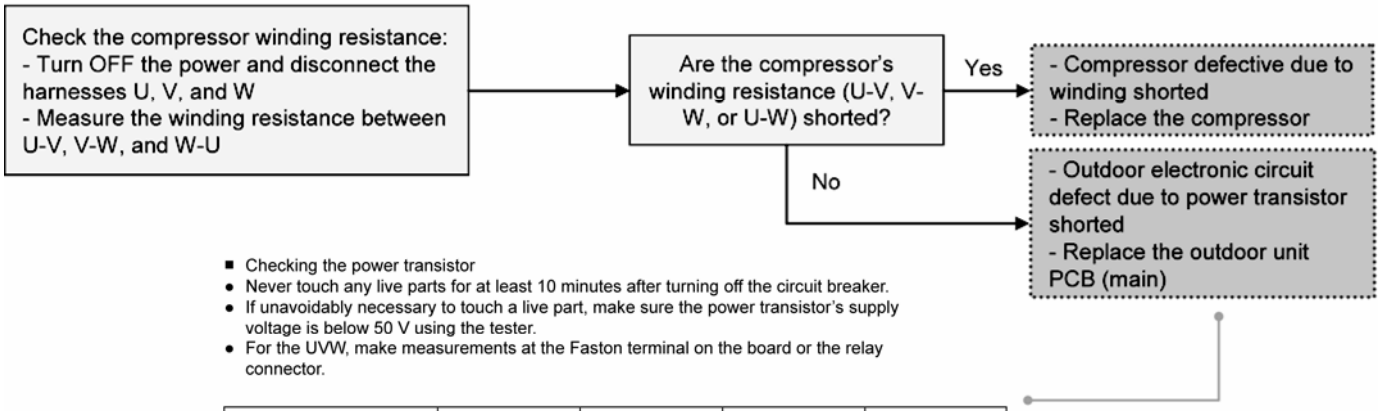
1 Faulty outdoor unit PCB (main).
2 Faulty compressor.

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.



- Checking the power transistor
- Never touch any live parts for at least 10 minutes after turning off the circuit breaker.
- If unavoidably necessary to touch a live part, make sure the power transistor's supply voltage is below 50 V using the tester.
- For the UVW, make measurements at the Faston terminal on the board or the relay connector.

Tester's negative terminal	Power transistor (+)	UVW	Power transistor (–)	UVW
Tester's positive terminal	UVW	Power transistor (+)	UVW	Power transistor (–)
Normal resistance	Several kohms to several Mohms			
Abnormal resistance	0 or ∞			

16.5.22 Refrigeration Cycle Abnormality (F24)

Malfunction Decision Conditions:

1 During operation of cooling and heating, compressor frequency > Frated.
2 During operation of cooling and heating, running current: 0.65A < I < 1.65A.
3 During operation of cooling, water inlet temperature - indoor refrigerant liquid temperature < 5°C.
4 During operation of heating, indoor refrigerant liquid temperature - water inlet temperature < 5°C.

Malfunction Caused:

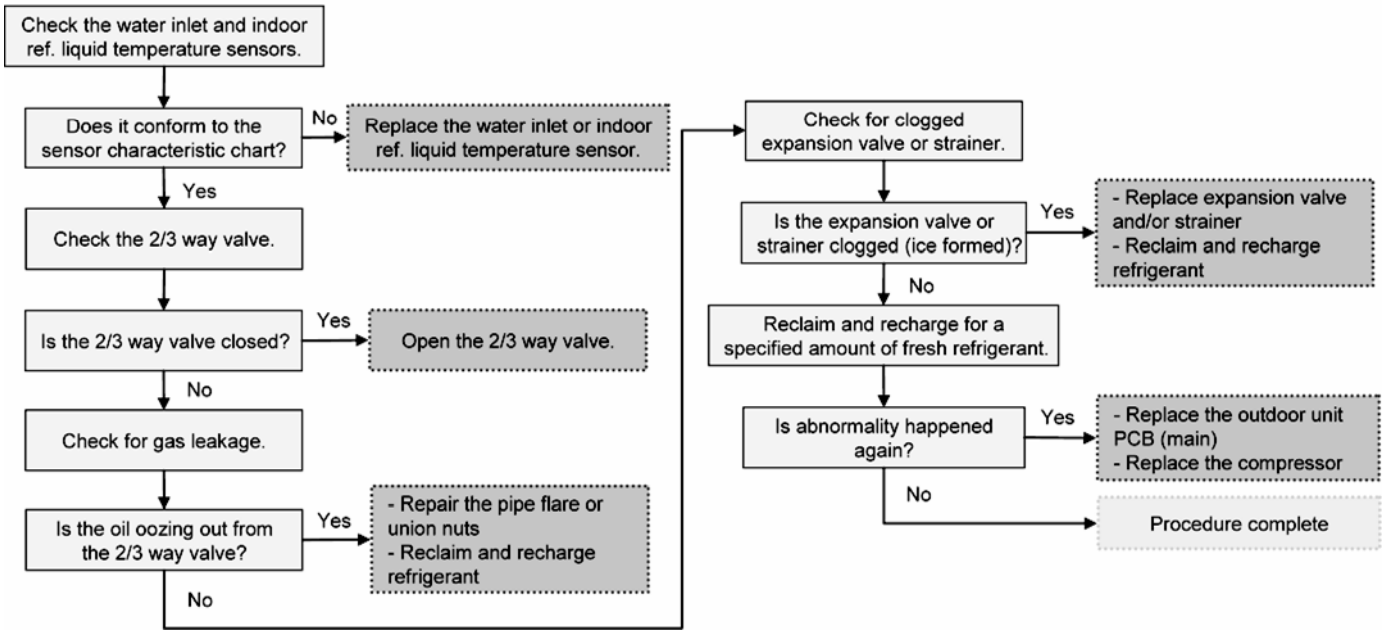
1 Faulty water inlet or indoor refrigerant liquid temperature sensors.
2 2/3 way valve closed.
3 Refrigerant shortage (refrigerant leakage).
4 Clogged expansion valve or strainer.
5 Faulty outdoor unit PCB (main).
6 Poor compression of compressor.

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.



16.5.23 Four Way Valve Abnormality (F25)

Malfunction Decision Conditions:

1 During heating operation, when the indoor pipe temperature of thermostat ON indoor unit < 0°C.
2 During cooling operation, when the indoor pipe temperature of thermostat ON indoor unit > 45°C.

Malfunction Caused:

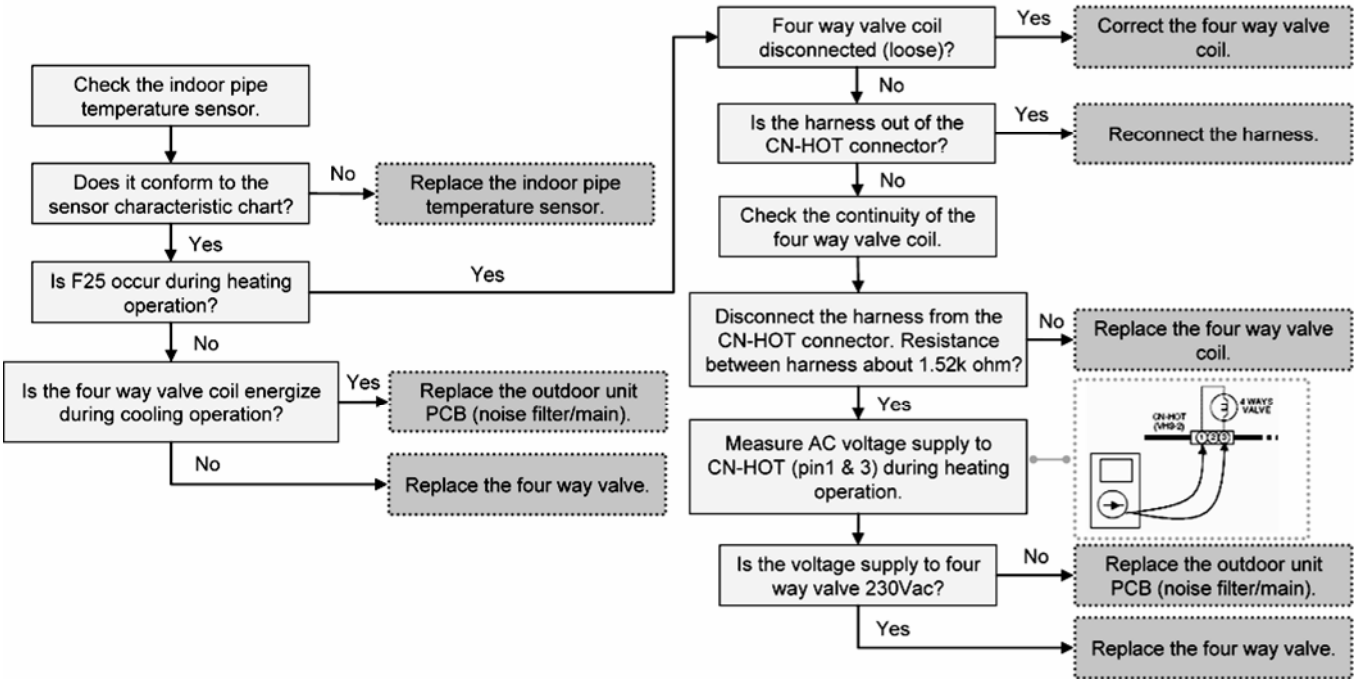
1 Faulty sensor.
2 Faulty connector connection.
3 Faulty outdoor unit PCB (noise filter/main).
4 Faulty four way valve.

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.



16.5.24 Outdoor High Pressure Switch Abnormal (F27)

Malfunction Decision Conditions:

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

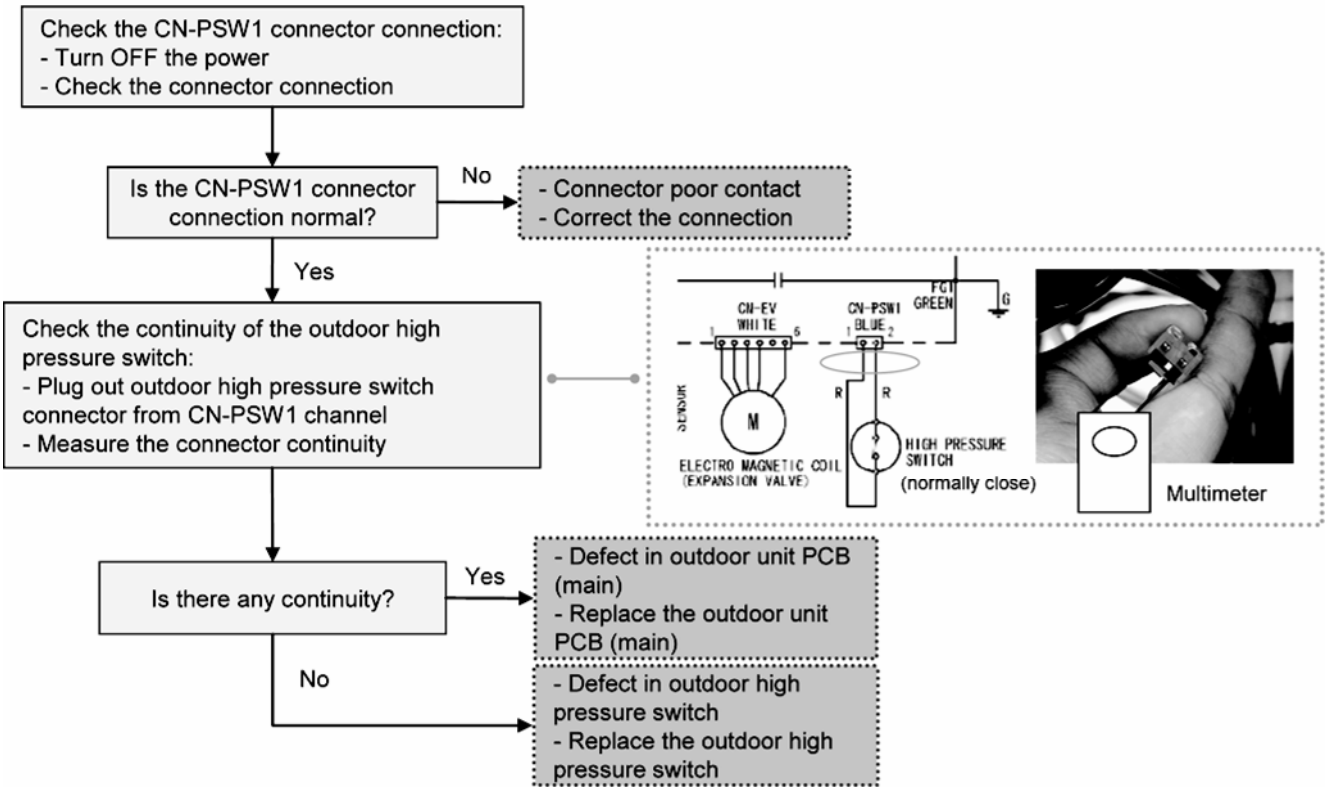
Malfunction Caused:

1 Faulty connector connection.
2 Faulty switch.
3 Faulty outdoor unit PCB (main).

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.



16.5.25 Outdoor Air Temperature Sensor Abnormality (F36)

Malfunction Decision Conditions:

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

Malfunction Caused:

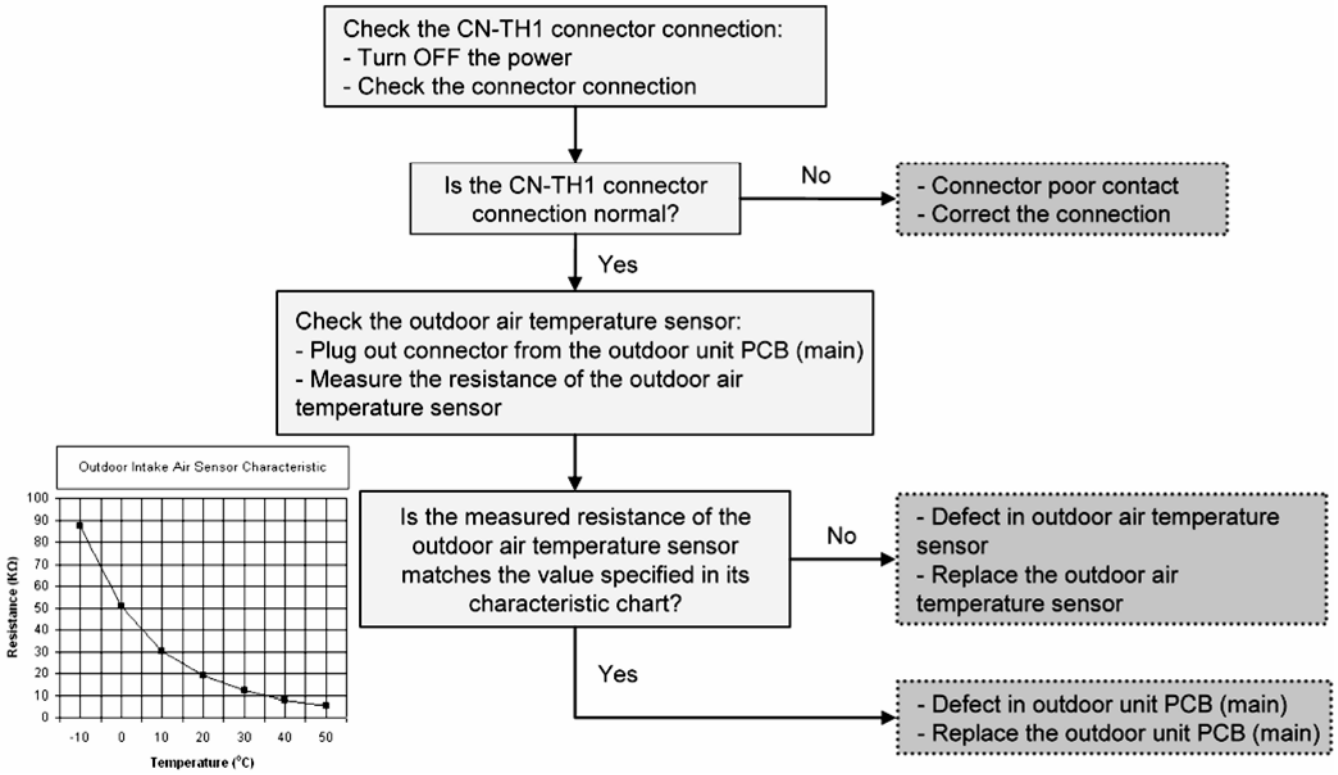
1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

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.



16.5.26 Indoor Water Inlet Temperature Sensor Abnormality (F37)

Malfunction Decision Conditions:

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

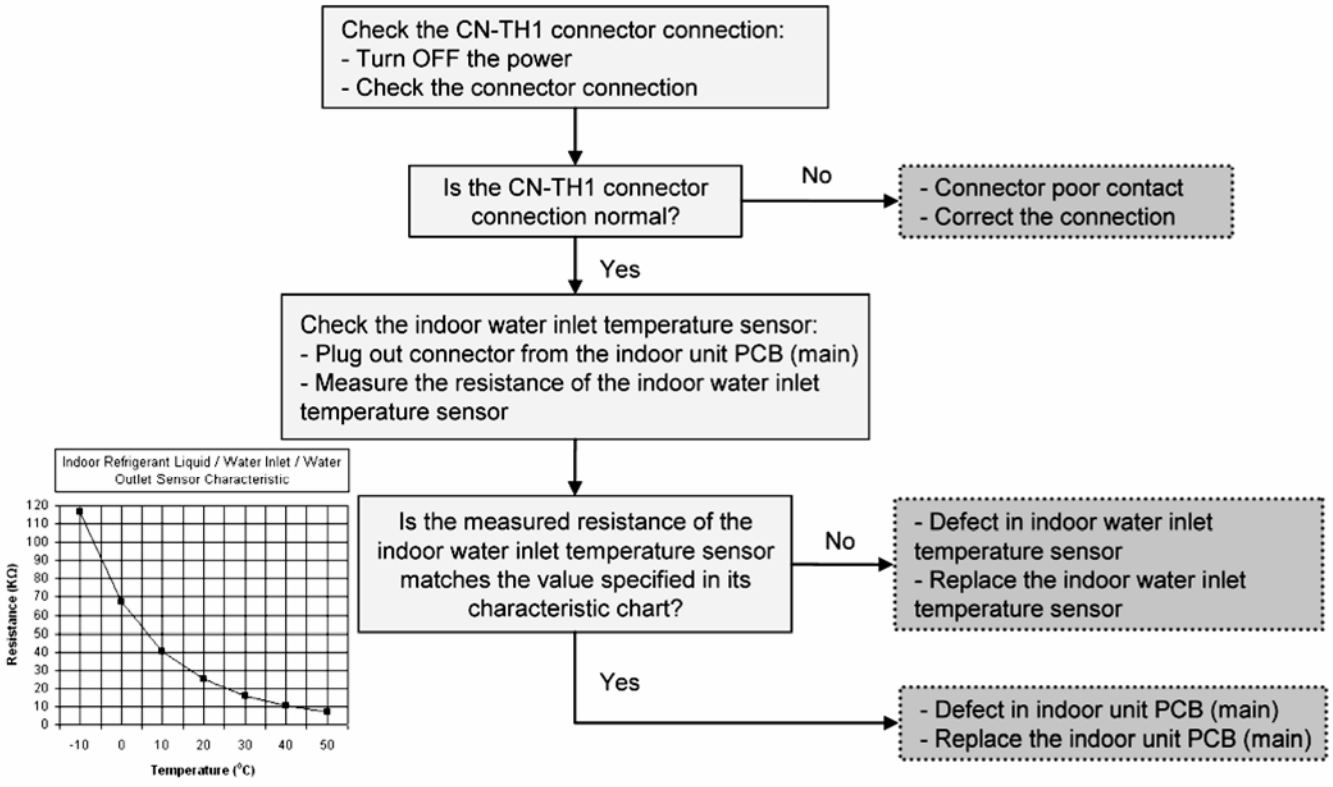
Malfunction Caused:

1 Faulty connector connection.
2 Faulty sensor.
3 Faulty indoor unit PCB (main).

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.



16.5.27 Outdoor Discharge Pipe Temperature Sensor Abnormality (F40)

Malfunction Decision Conditions:

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

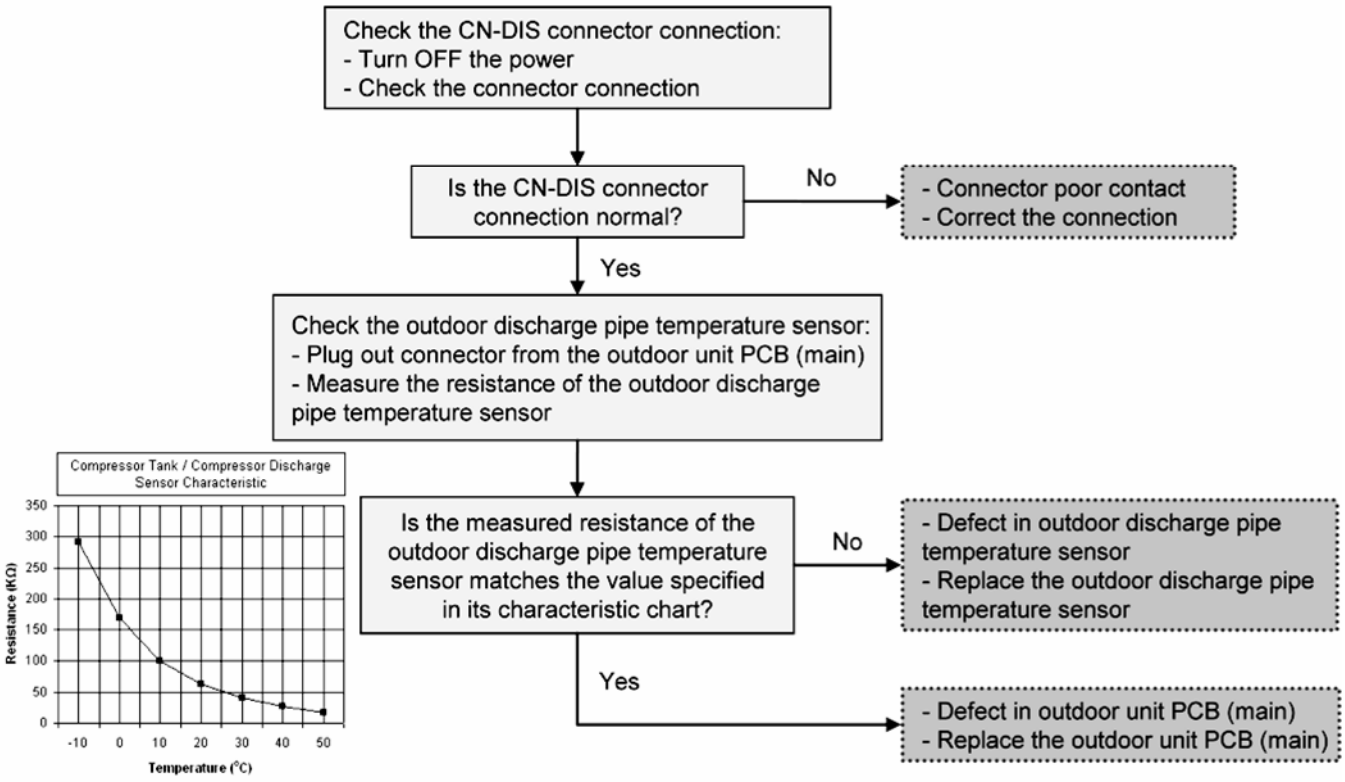
Malfunction Caused:

1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

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.



16.5.28 Power Factor Correction (PFC) Abnormality (F41)

Malfunction Decision Conditions:

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

Malfunction Caused:

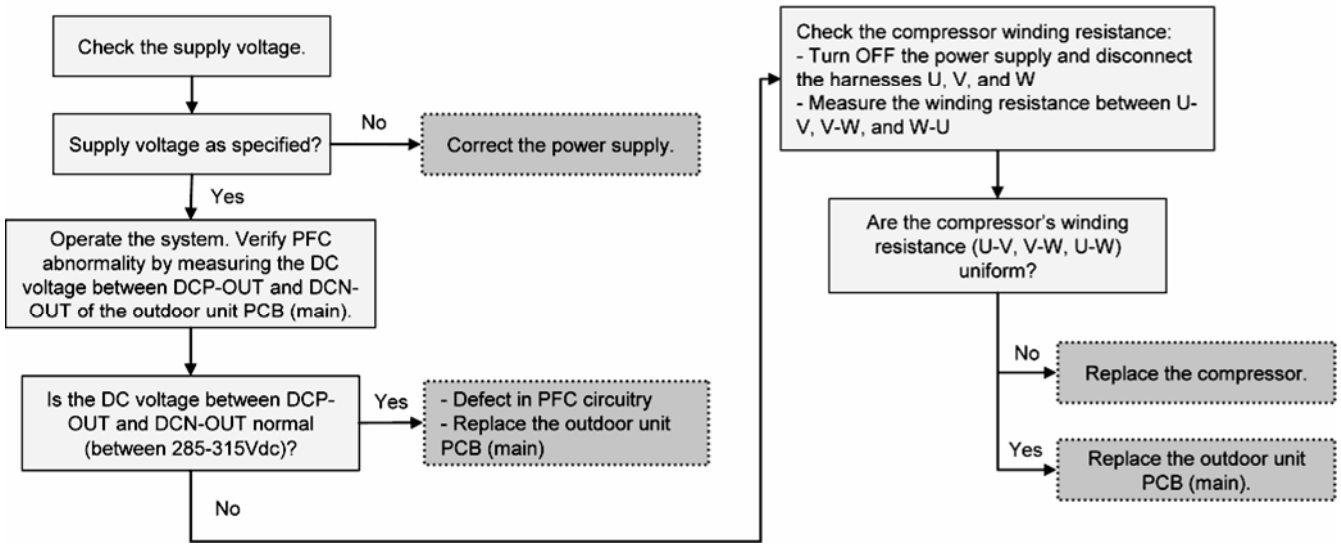
1 Power supply surge.
2 Compressor windings not uniform.
3 Faulty outdoor unit PCB (main).

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.



16.5.29 Outdoor Pipe Temperature Sensor Abnormality (F42)

Malfunction Decision Conditions:

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

Malfunction Caused:

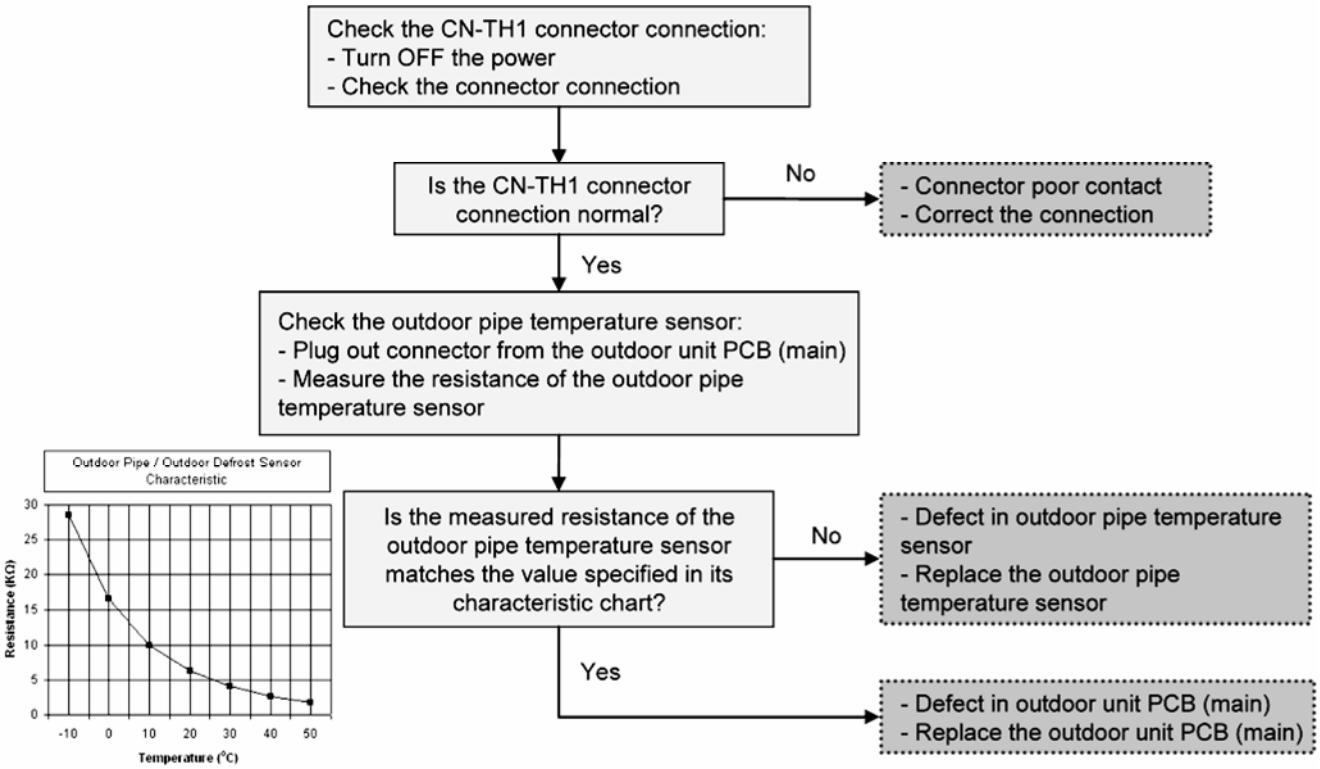
1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

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.



16.5.30 Outdoor Defrost Temperature Sensor Abnormality (F43)

Malfunction Decision Conditions:

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

Malfunction Caused:

1 Faulty connector connection.
2 Faulty sensor.
3 Faulty outdoor unit PCB (main).

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.

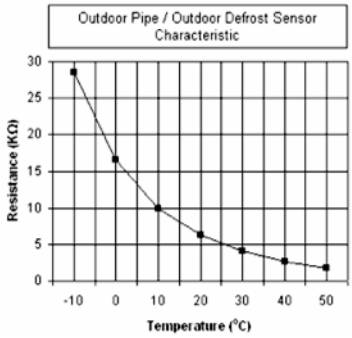
Check the CN-TH2 connector connection:
- Turn OFF the power
- Check the connector connection

Is the CN-TH2 connector connection normal?

No → - Connector poor contact
- Correct the connection

Yes

Check the outdoor defrost temperature sensor:
- Plug out connector from the outdoor unit PCB (main)
- Measure the resistance of the outdoor defrost temperature sensor



Is the measured resistance of the outdoor defrost temperature sensor matches the value specified in its characteristic chart?

No → - Defect in outdoor defrost temperature sensor
- Replace the outdoor defrost temperature sensor

Yes → - Defect in outdoor unit PCB (main)
- Replace the outdoor unit PCB (main)

16.5.31 Indoor Water Outlet Temperature Sensor Abnormality (F45)

Malfunction Decision Conditions:

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

Malfunction Caused:

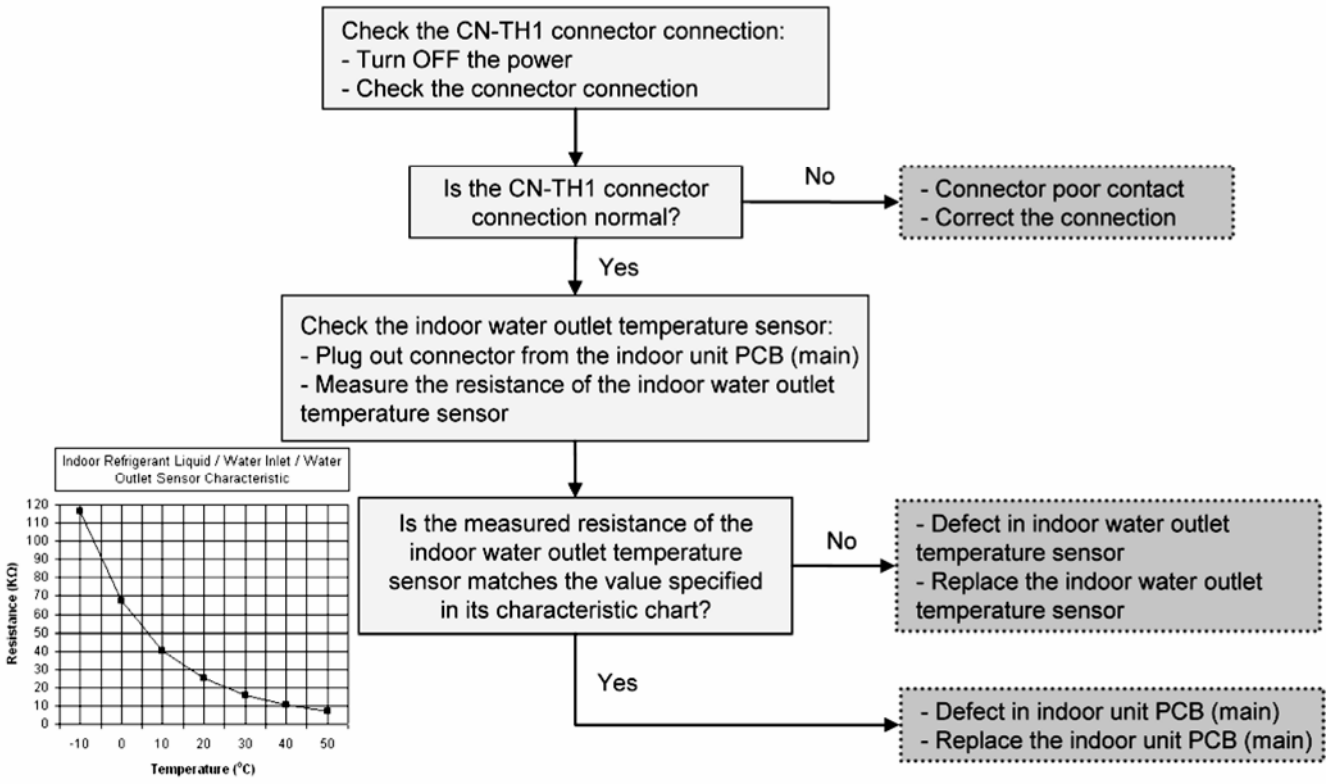
1 Faulty connector connection.
2 Faulty sensor.
3 Faulty indoor unit PCB (main).

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.



16.5.32 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 (< 0.65A) for continuously 20 seconds.

Malfunction Caused:

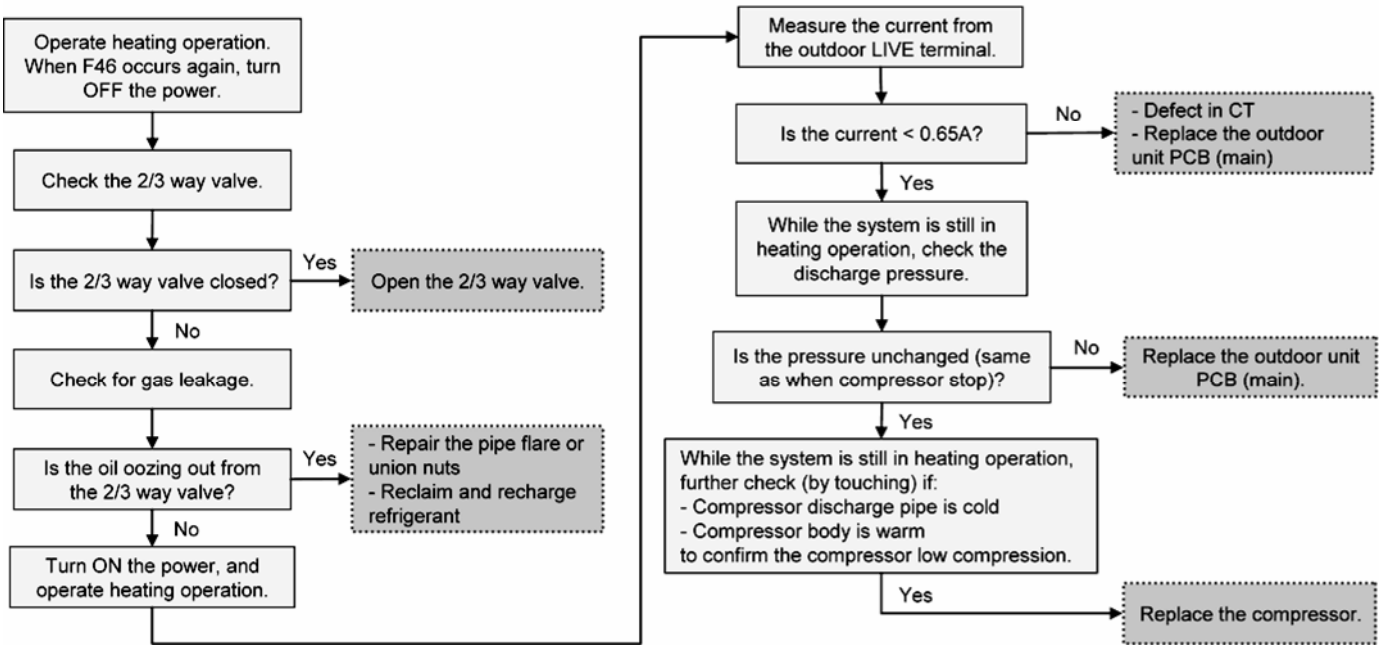
1 CT defective.
2 Faulty outdoor unit PCB.
3 Compressor defective (low compression).

Abnormality Judgment:

Continue 3 times in 20 seconds.

Troubleshooting:

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



16.5.33 Cooling High Pressure Overload Protection (F95)

Malfunction Decision Conditions:

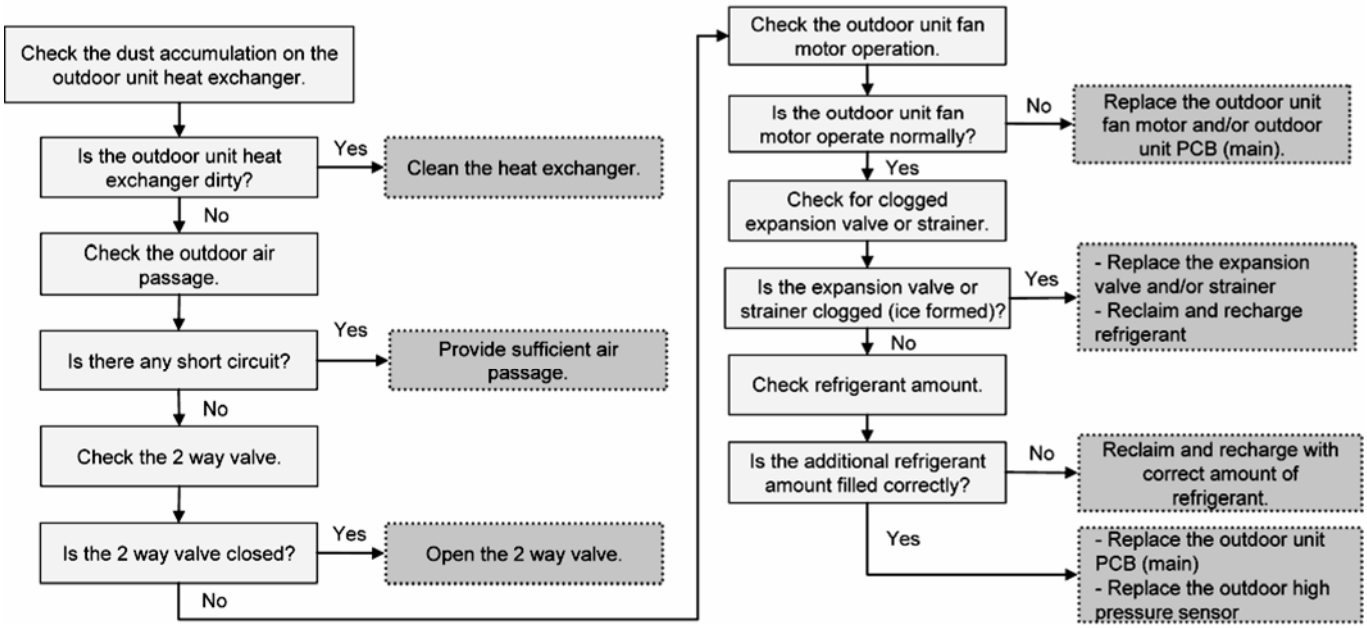
During operation of cooling, when pressure 4.0MPa and above is detected by outdoor high pressure sensor.

Malfunction Caused:

1 Dust accumulation in the outdoor unit heat exchanger.
2 Air short circuit at outdoor unit.
3 2 way valve closed.
4 Faulty outdoor unit fan motor.
5 Clogged expansion valve or strainer.
6 Excessive refrigerant.
7 Faulty outdoor high pressure sensor.
8 Faulty outdoor unit PCB (main).

Troubleshooting:

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



17. Disassembly and Assembly Instructions

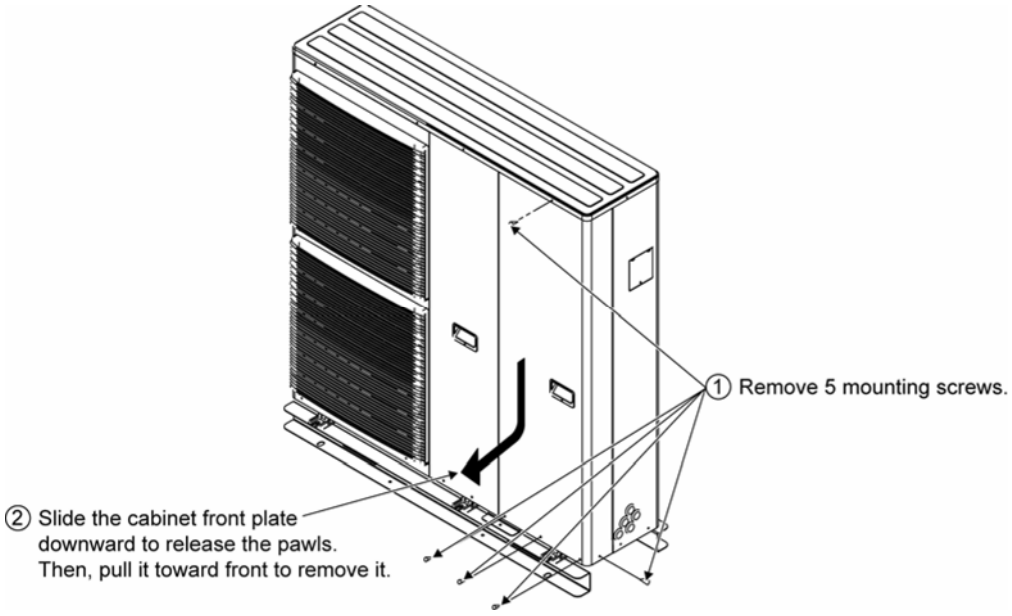
WARNING

High Voltage are generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

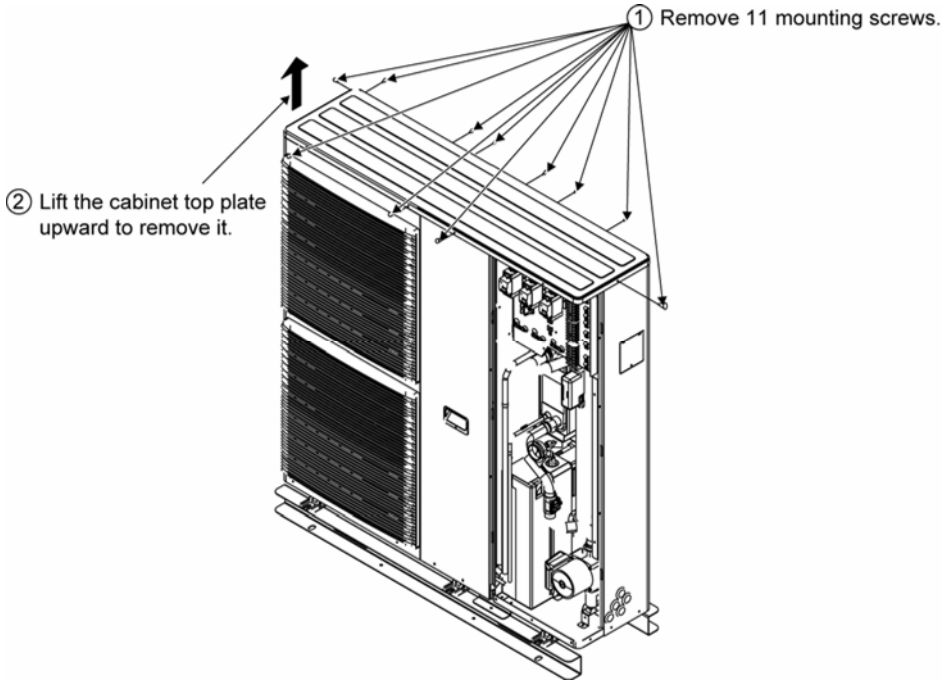
WARNING

Be sure to switch off all the power supply before performing each of the below action.

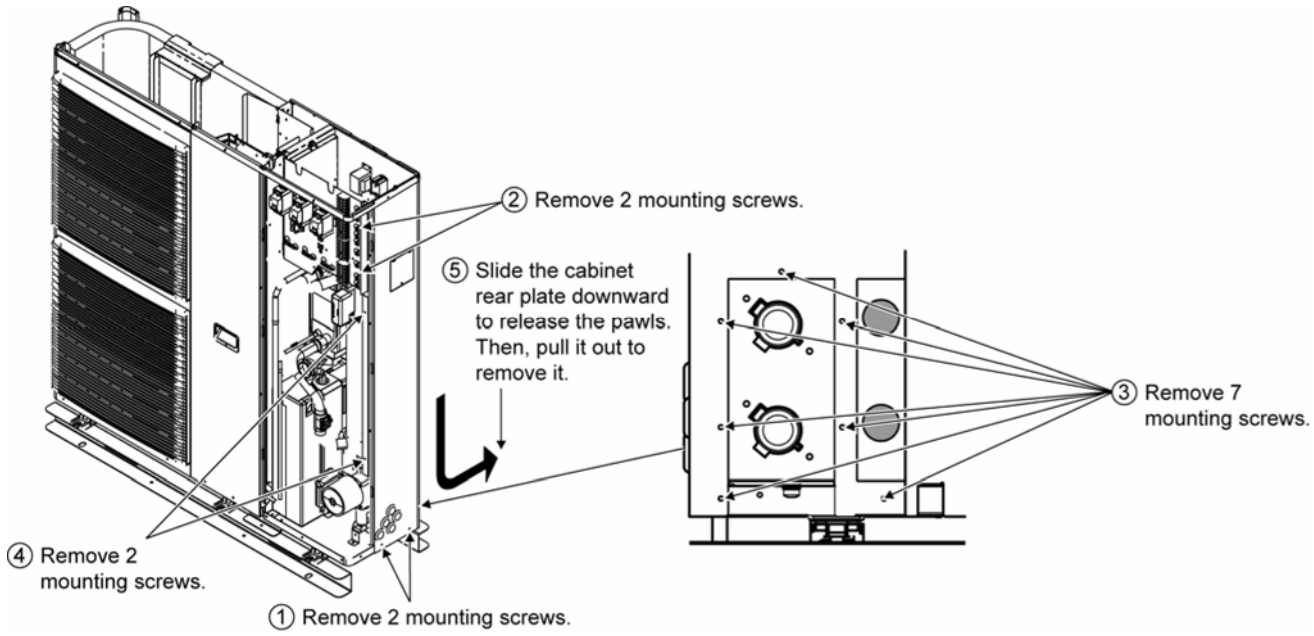
17.1 To Remove The Cabinet Front Plate



17.2 To Remove The Cabinet Top Plate



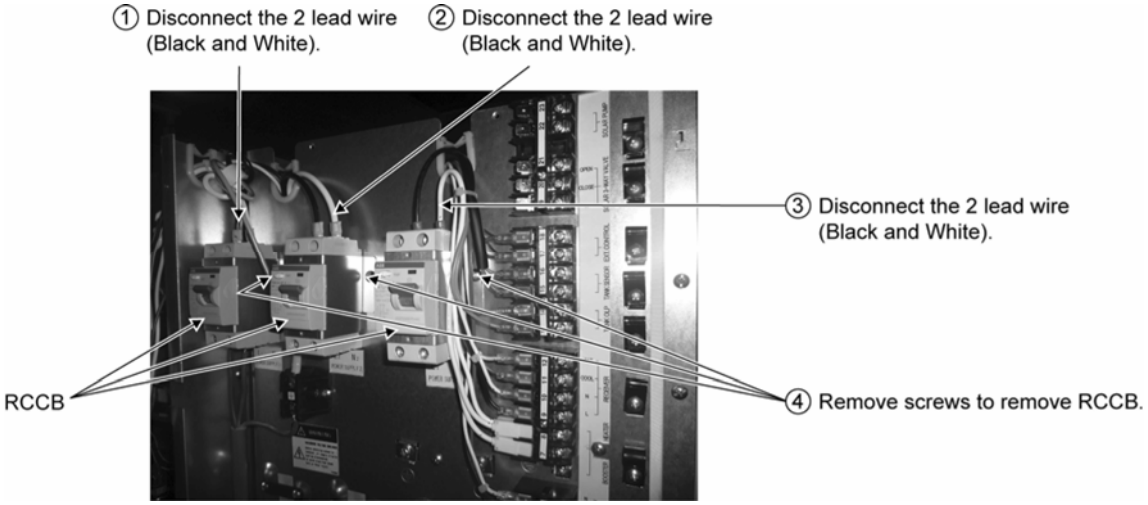
17.3 To Remove The Cabinet Rear Plate



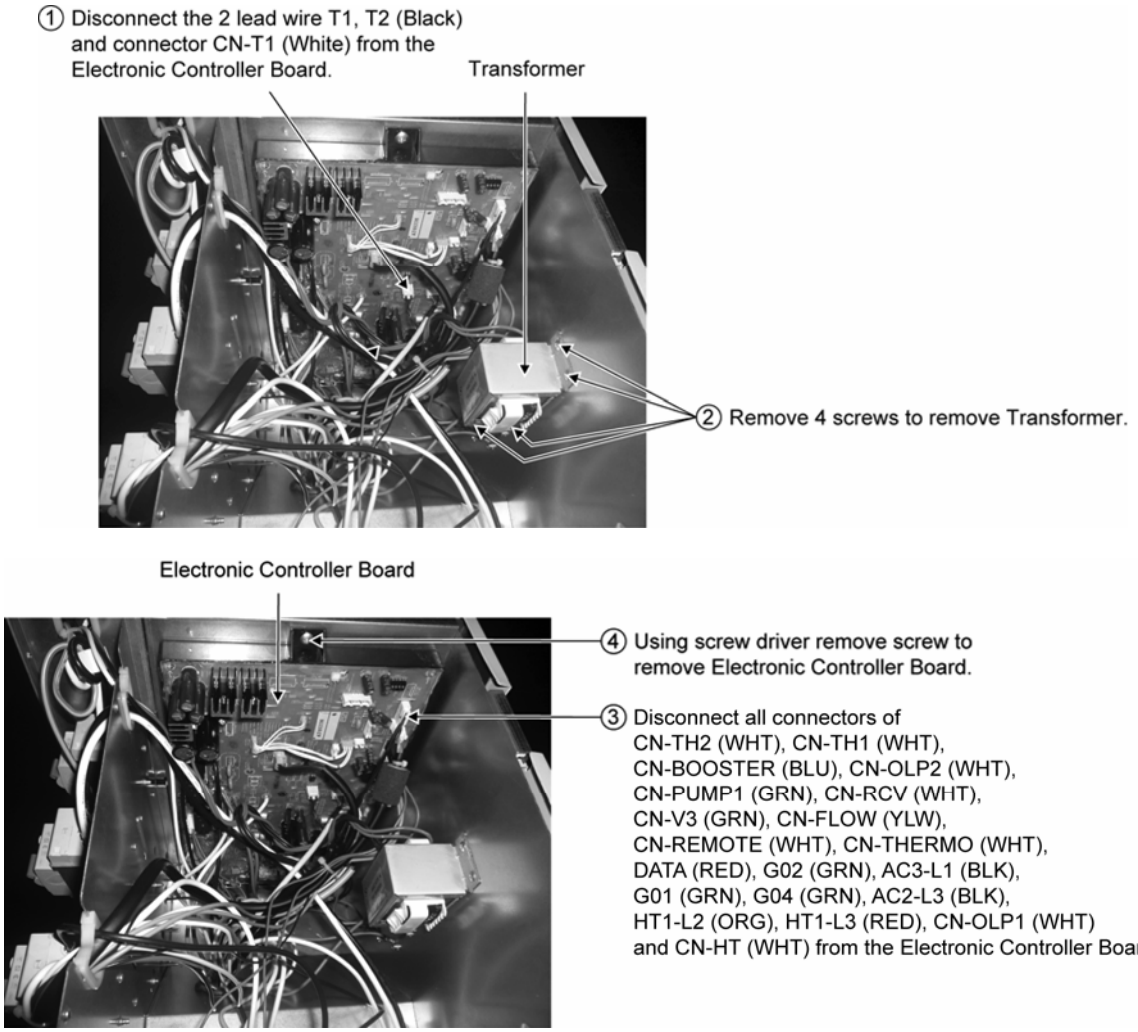
17.4 To Remove Pressure Gauge

To Remove RCCB

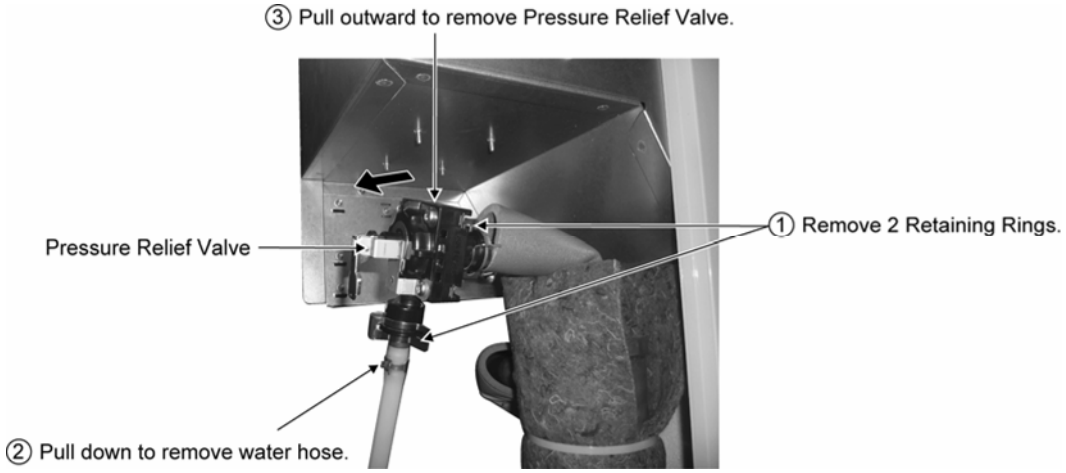
17.5 To Remove RCCB



17.6 To Remove Transformer and Electronic Controller Board

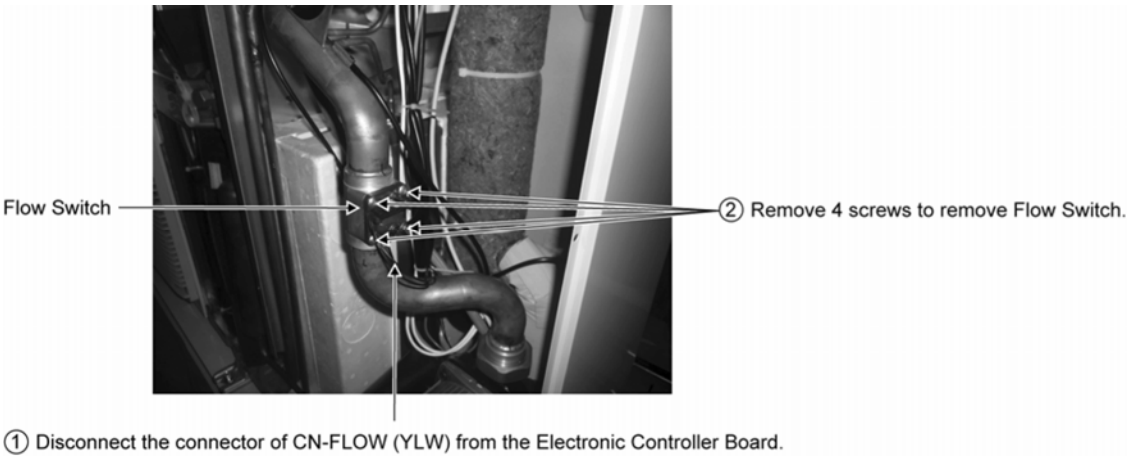


17.7 To Remove Pressure Relief Valve



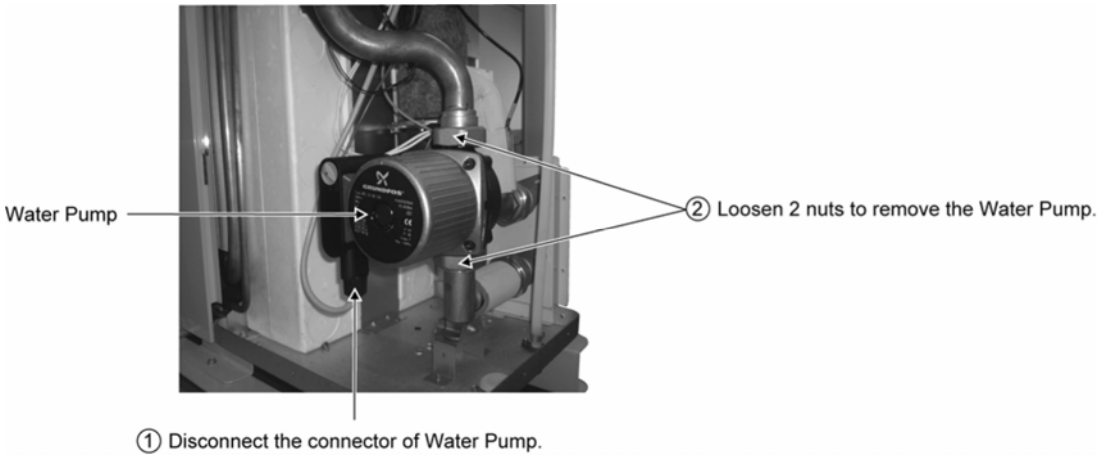
⚠ When reinstall the water pipe, use grease or water at the joining.

17.8 To Remove Flow Switch



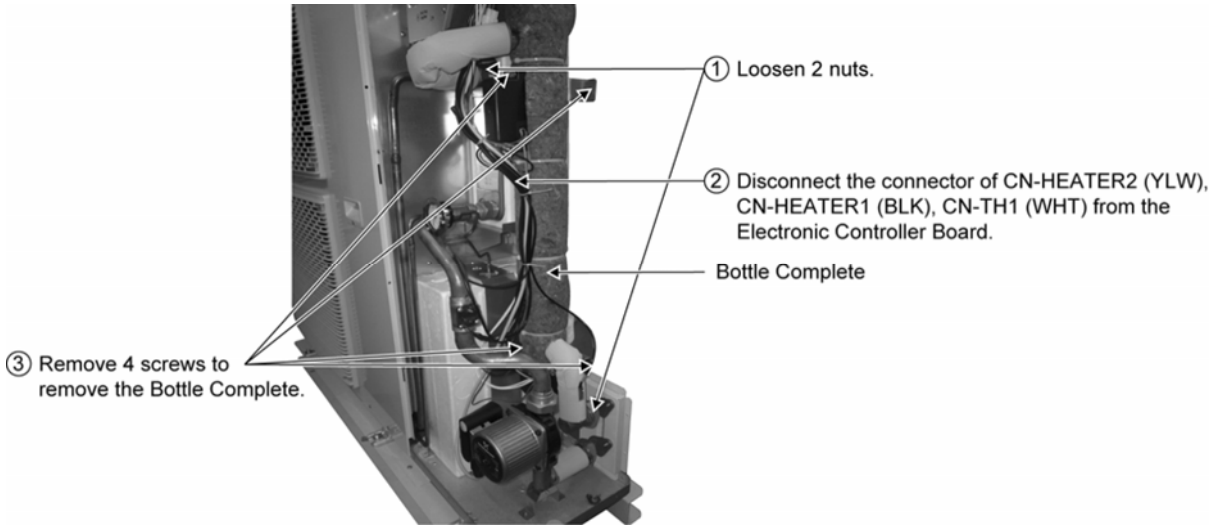
⚠ When reinstall the water pipe, use grease or water at the joining.

17.9 To Remove Water Pump



⚠ When reinstall the water pipe, use grease or water at the joining.

17.10 To Remove Bottle Complete



⚠ When reinstall the water pipe, use grease or water at the joining

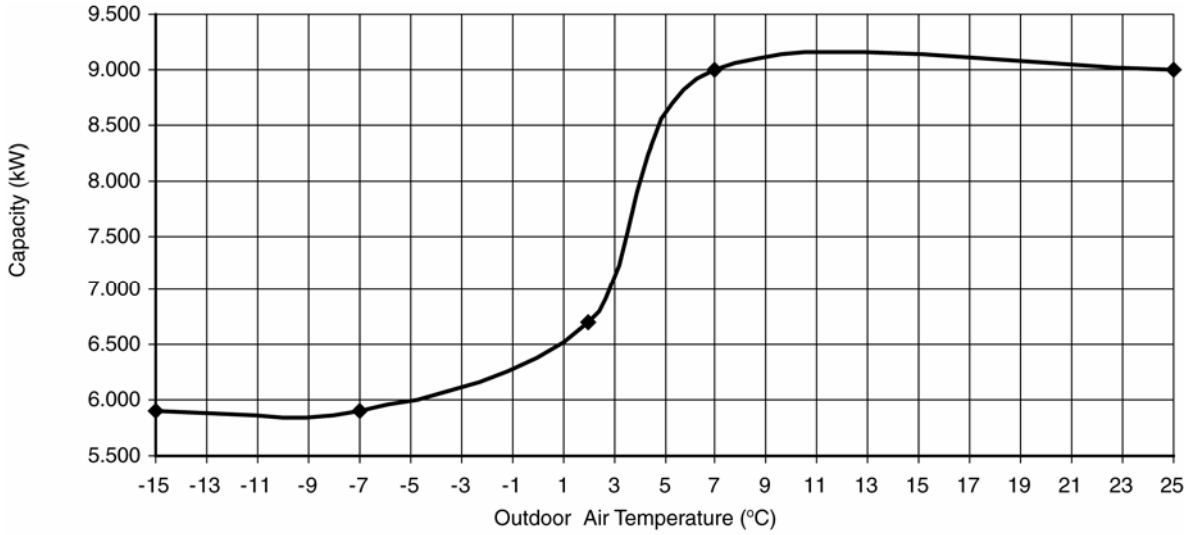
18. Technical Data

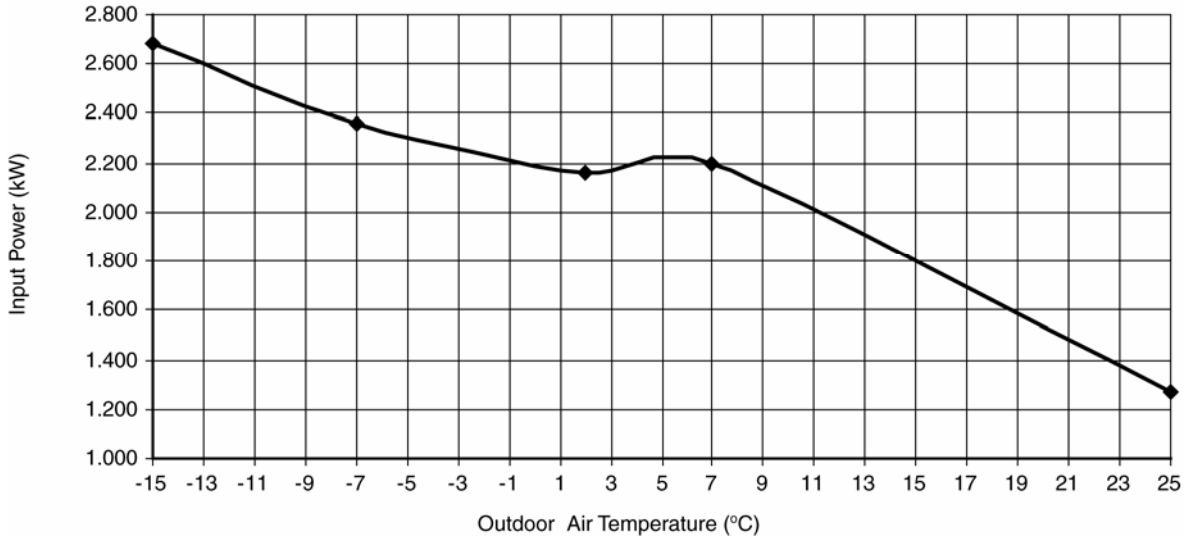
18.1 Operation Characteristics

18.1.1 WH-MDF09C3E8

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

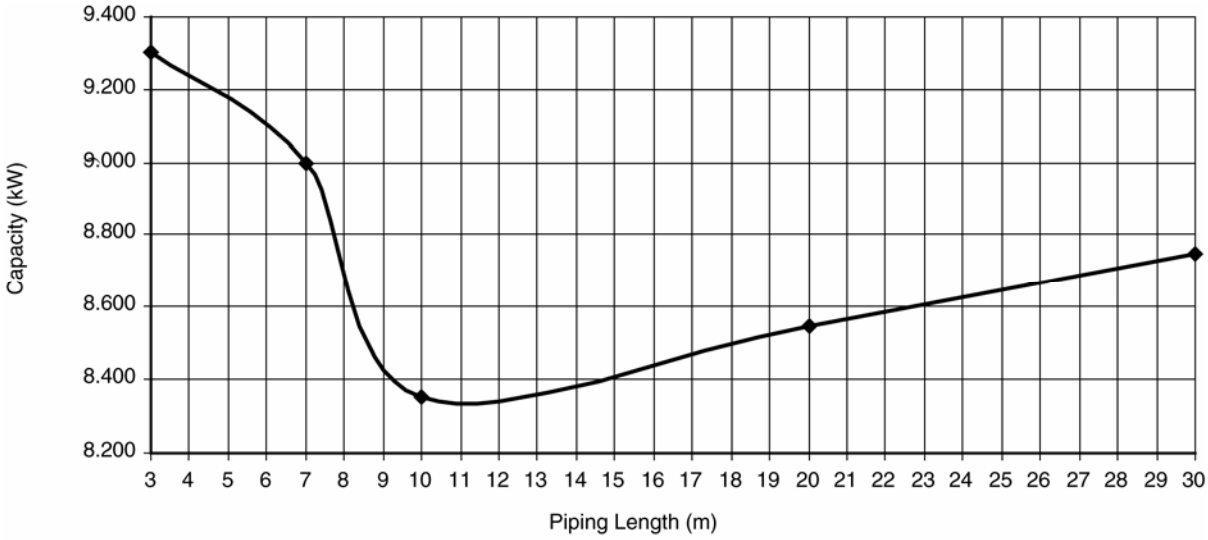
Condition

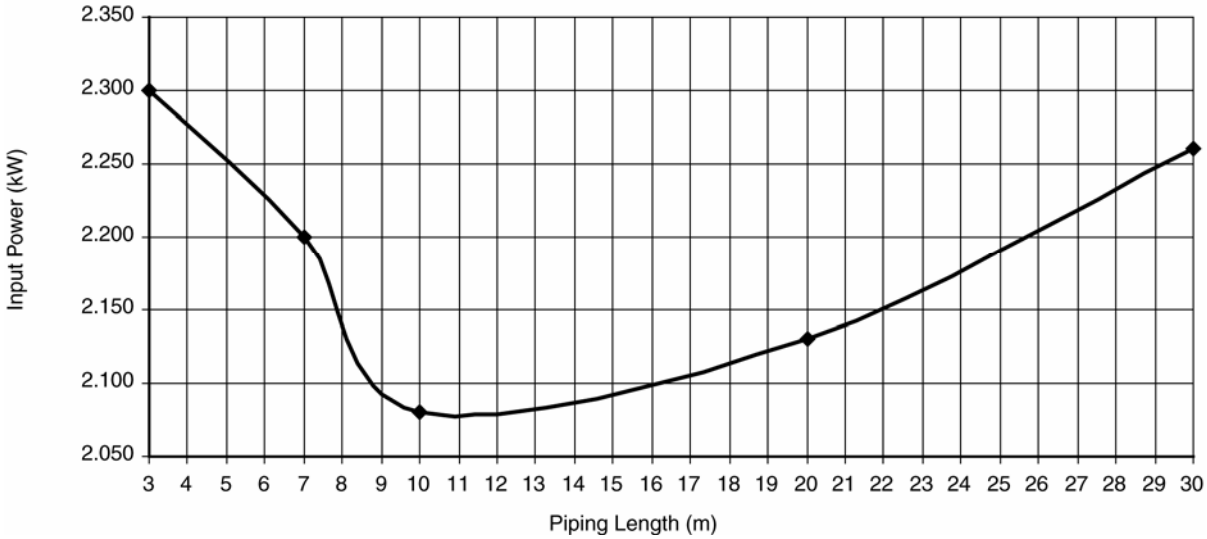
Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m

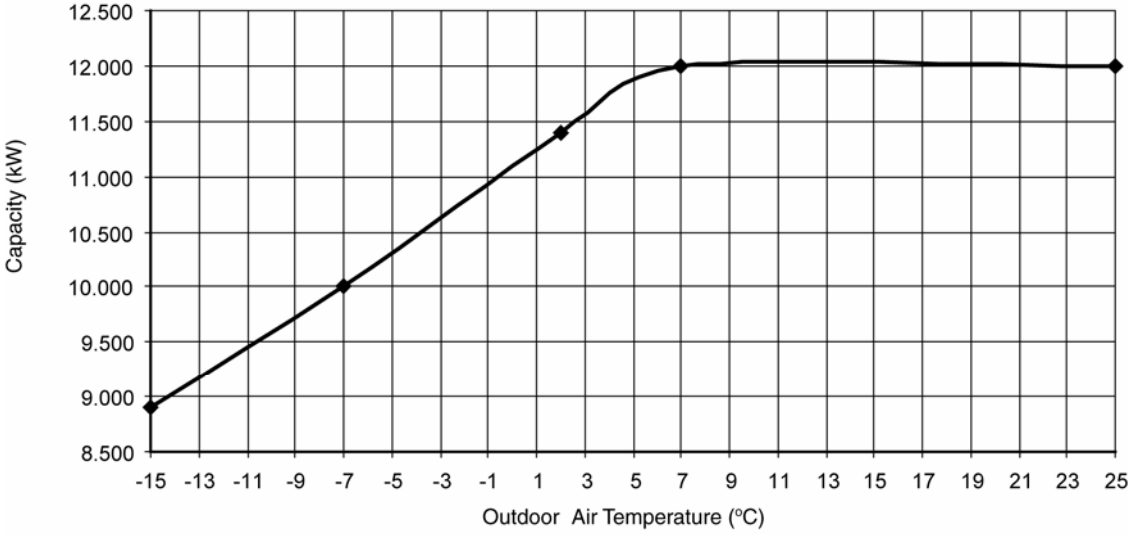


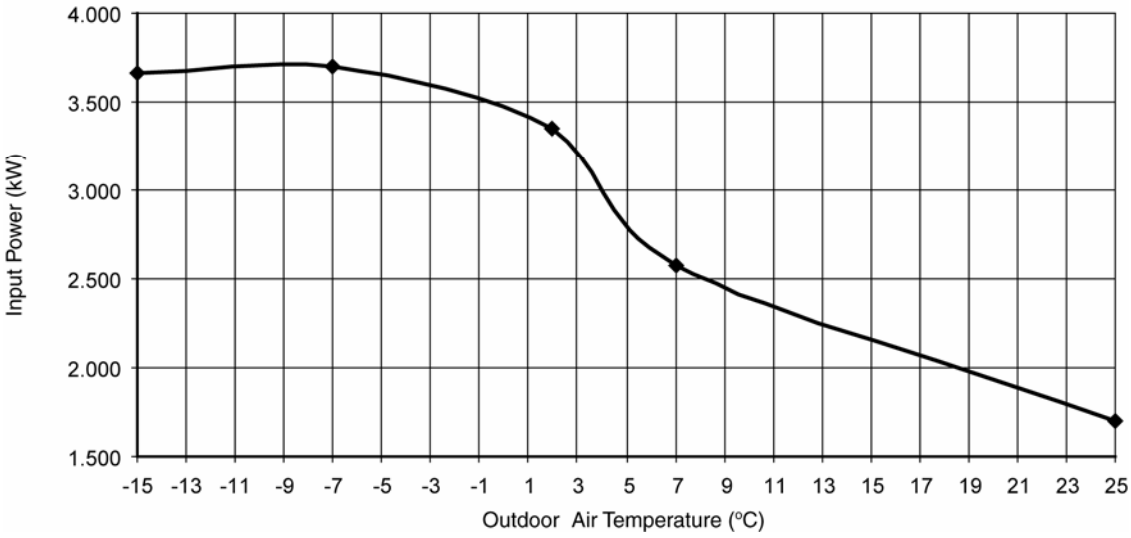


18.1.2 WH-MDF12C9E8

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

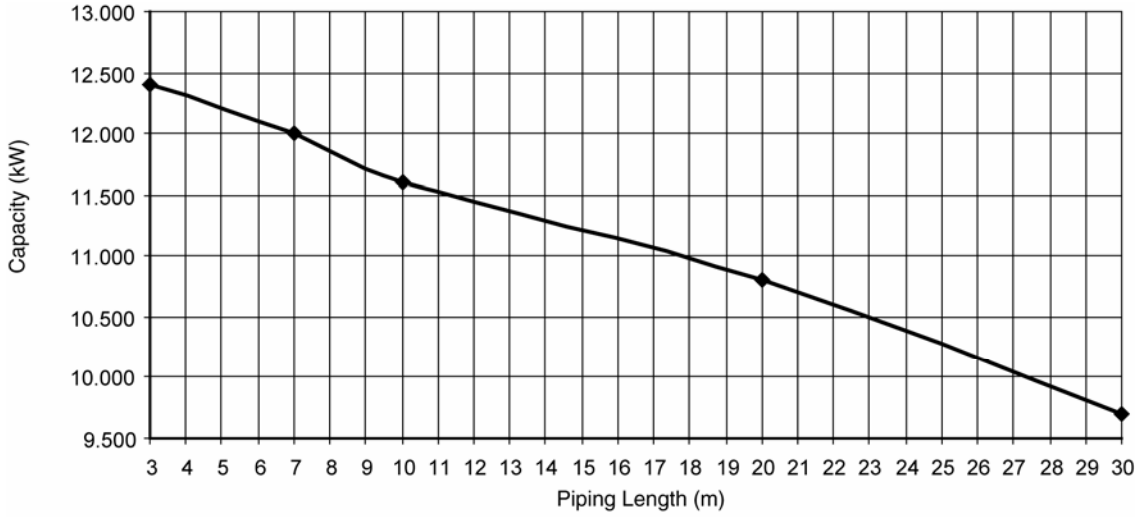
Condition

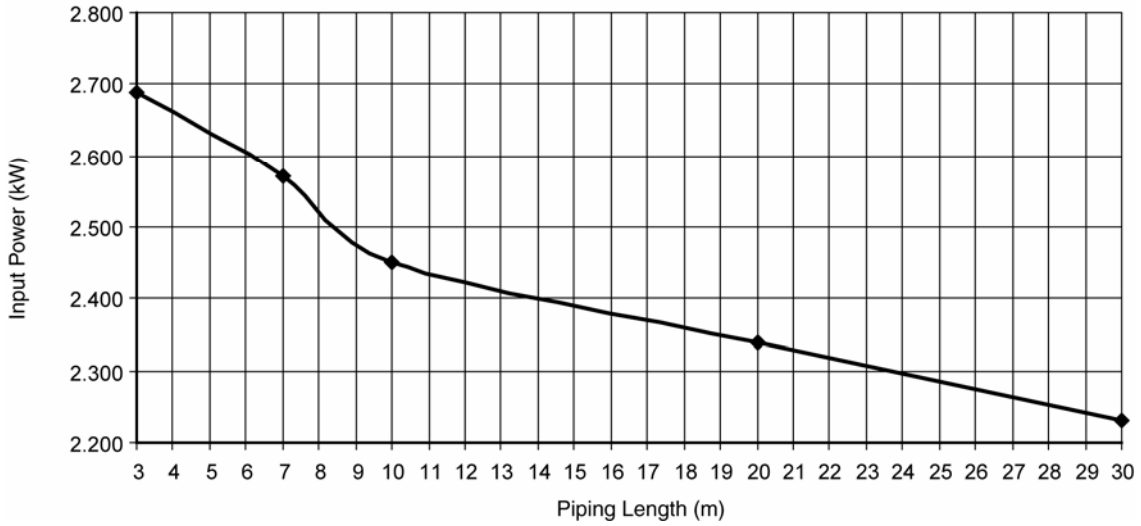
Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m

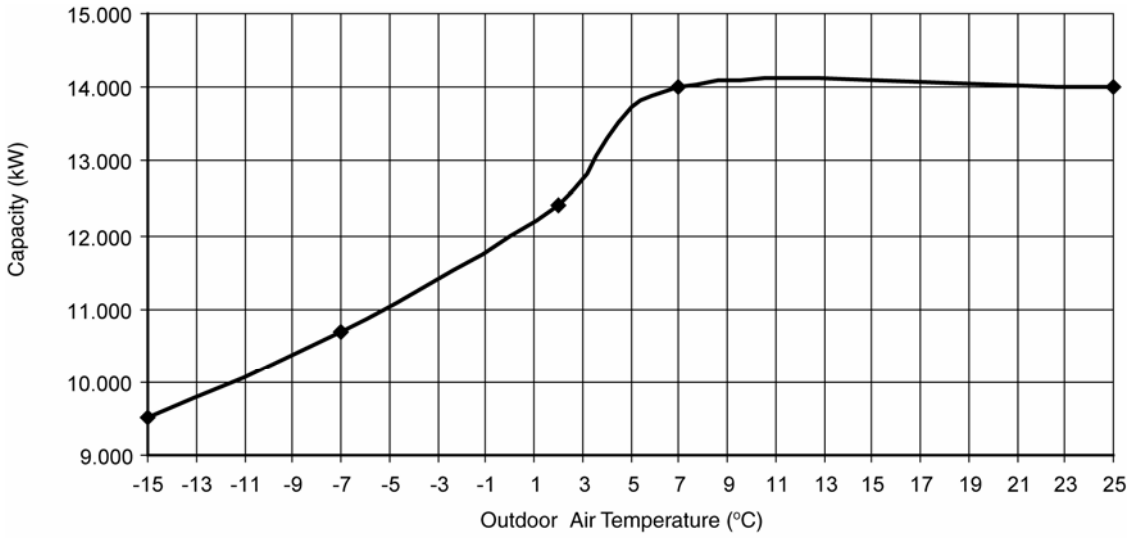


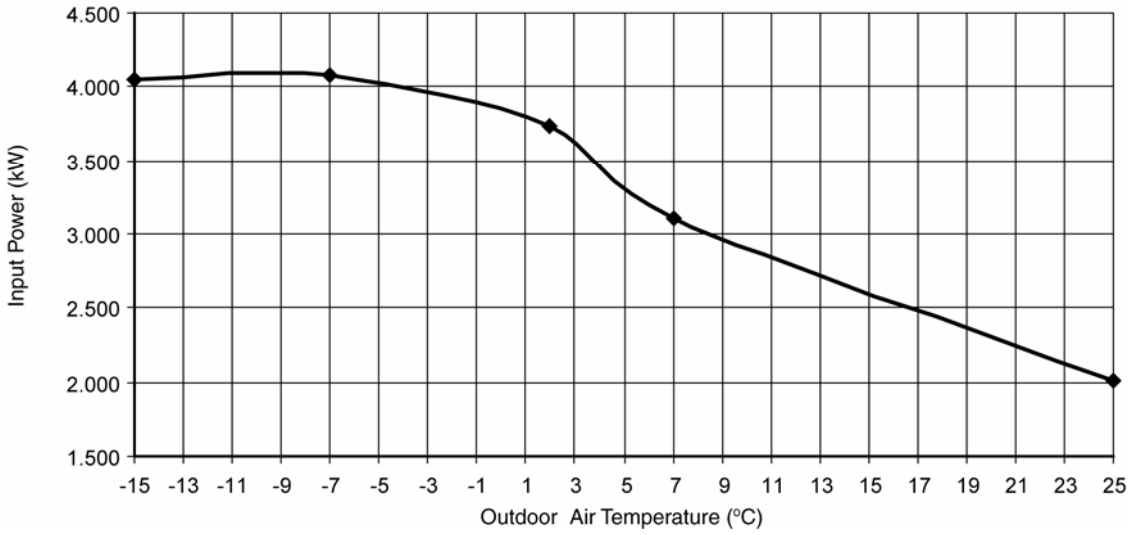


18.1.3 WH-MDF14C9E8

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

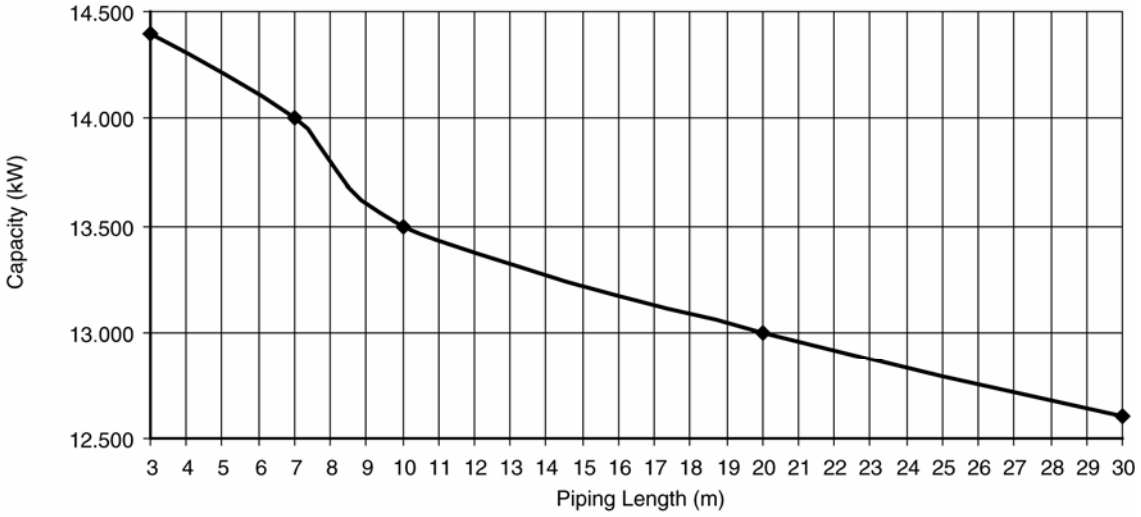
Condition

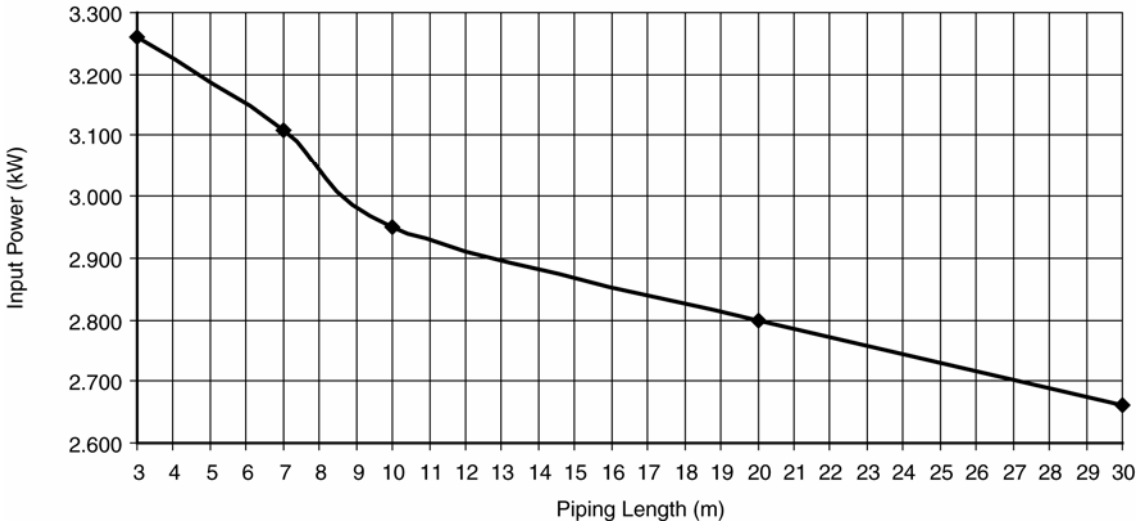
Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m

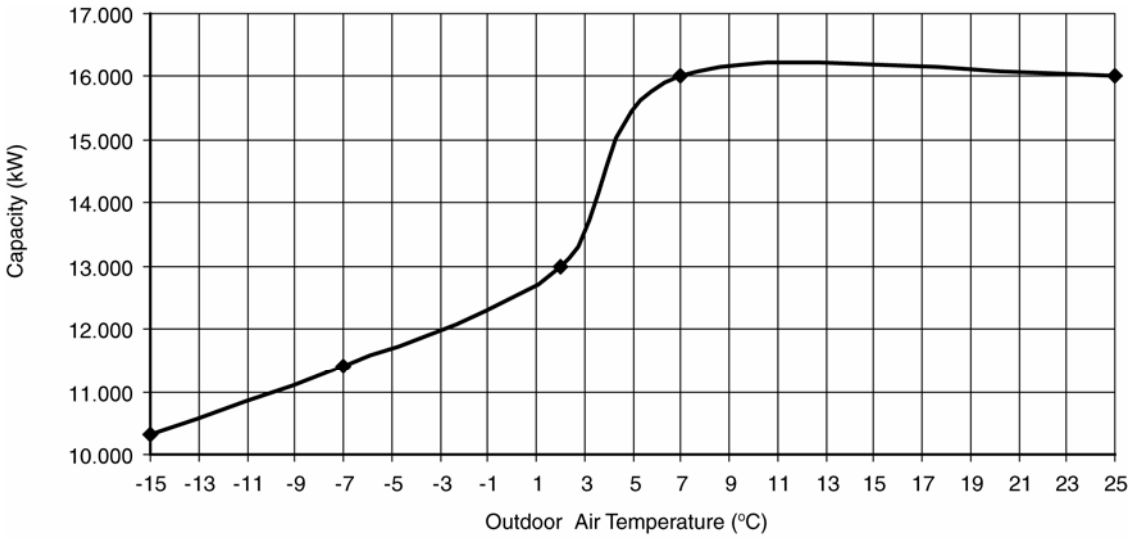


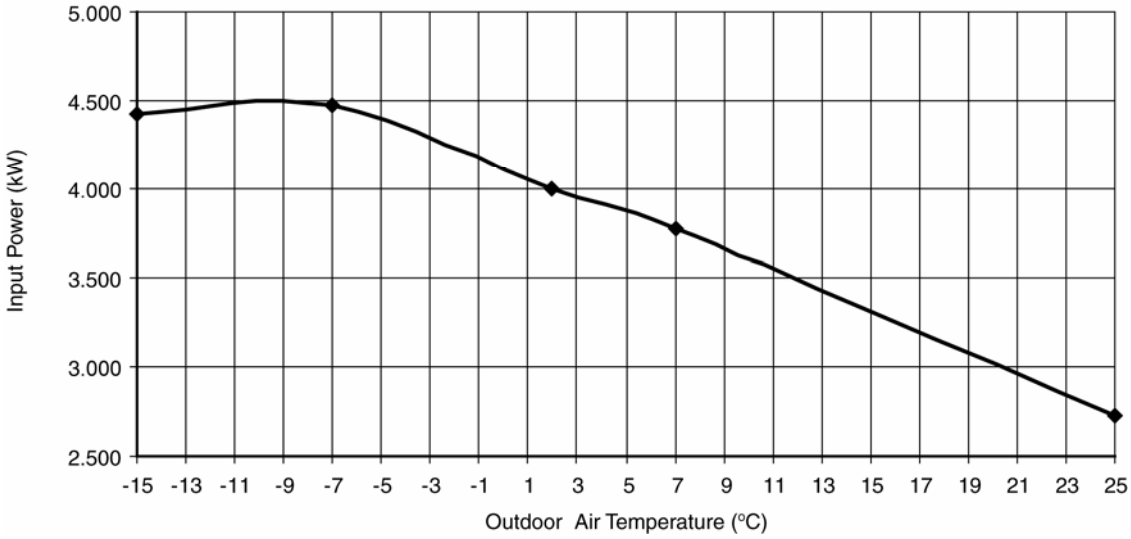


18.1.4 WH-MDF16C9E8

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

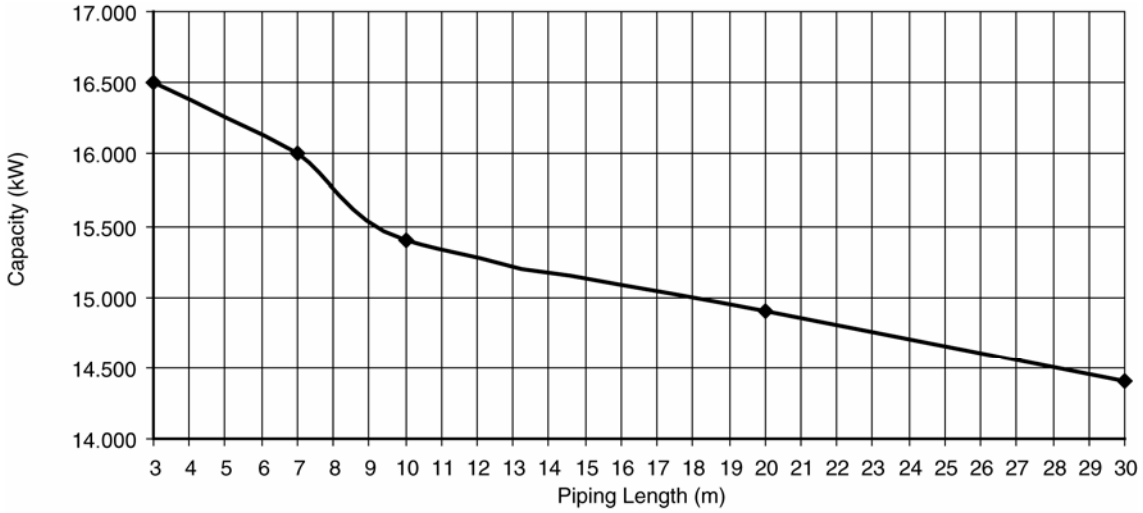
Condition

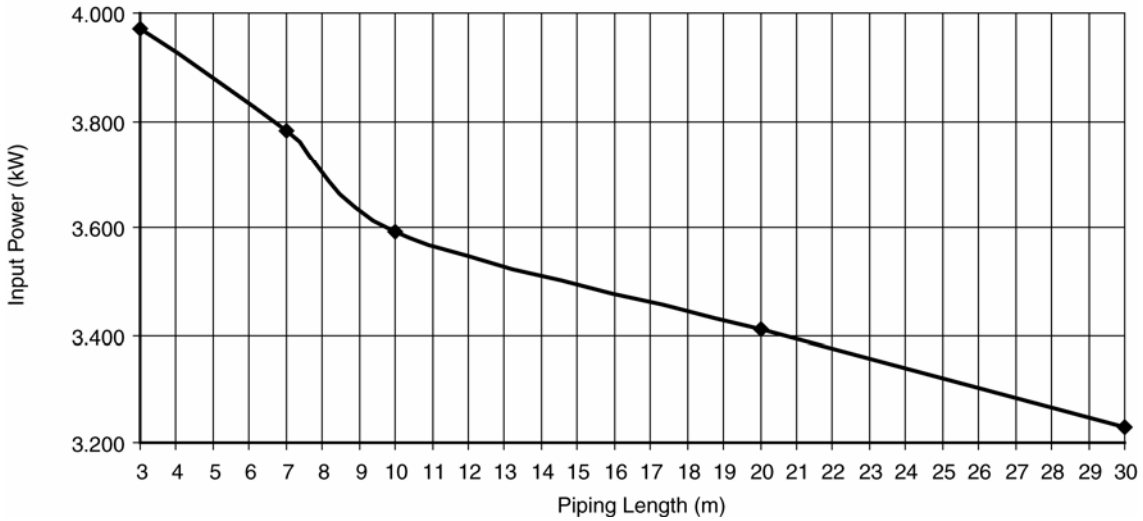
Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7m





18.2 Heating Capacity Table

18.2.1 WH-MDF09C3E8

Water Out	30		35		40		45		50		55	
Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power
-15	8650	3100	8300	3250	7950	3450	7600	3650	7150	3750	6700	3850
-7	9350	2950	9000	3200	8850	3500	8700	3800	8300	3850	7900	3900
2	9310	2390	9000	2550	9000	2820	9000	3090	8900	3530	8800	3980
7	9000	1580	9000	1900	9000	2200	9000	2500	9000	2800	9000	3100
25	9000	1090	9000	1280	8730	1480	8460	1680	8280	1860	8100	2040

18.2.2 WH-MDF12C9E8

Water Out	30		35		40		45		50		55	
Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity
-15	9300	3500	8900	3660	8500	3830	8100	3990	7500	4090	7000	4200
-7	10400	3410	10000	3700	9600	3900	9200	4100	8700	4200	8200	4310
2	11800	3140	11400	3340	11000	3570	10600	3780	9800	3980	9100	4180
7	12000	2140	12000	2570	12000	3000	12000	3430	12000	3820	12000	4200
25	12000	1420	12000	1700	11800	1980	11700	2270	11500	2530	11400	2780

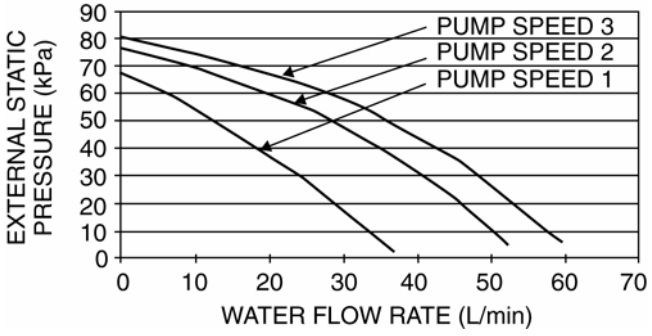
18.2.3 WH-MDF14C9E8

Water Out	30		35		40		45		50		55	
Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity
-15	9900	3910	9500	4050	9000	4190	8600	4330	7900	4450	7300	4560
-7	11100	3730	10700	4000	10200	4200	9800	4400	9100	4570	8500	4740
2	12900	3510	12400	3730	11900	3950	11400	4170	10400	4290	9500	4400
7	14000	2600	14000	3110	14000	3630	14000	4140	13600	4610	13300	5080
25	14000	1750	14000	2100	14000	2450	14000	2800	14000	3050	14000	3440

18.2.4 WH-MDF16C9E8

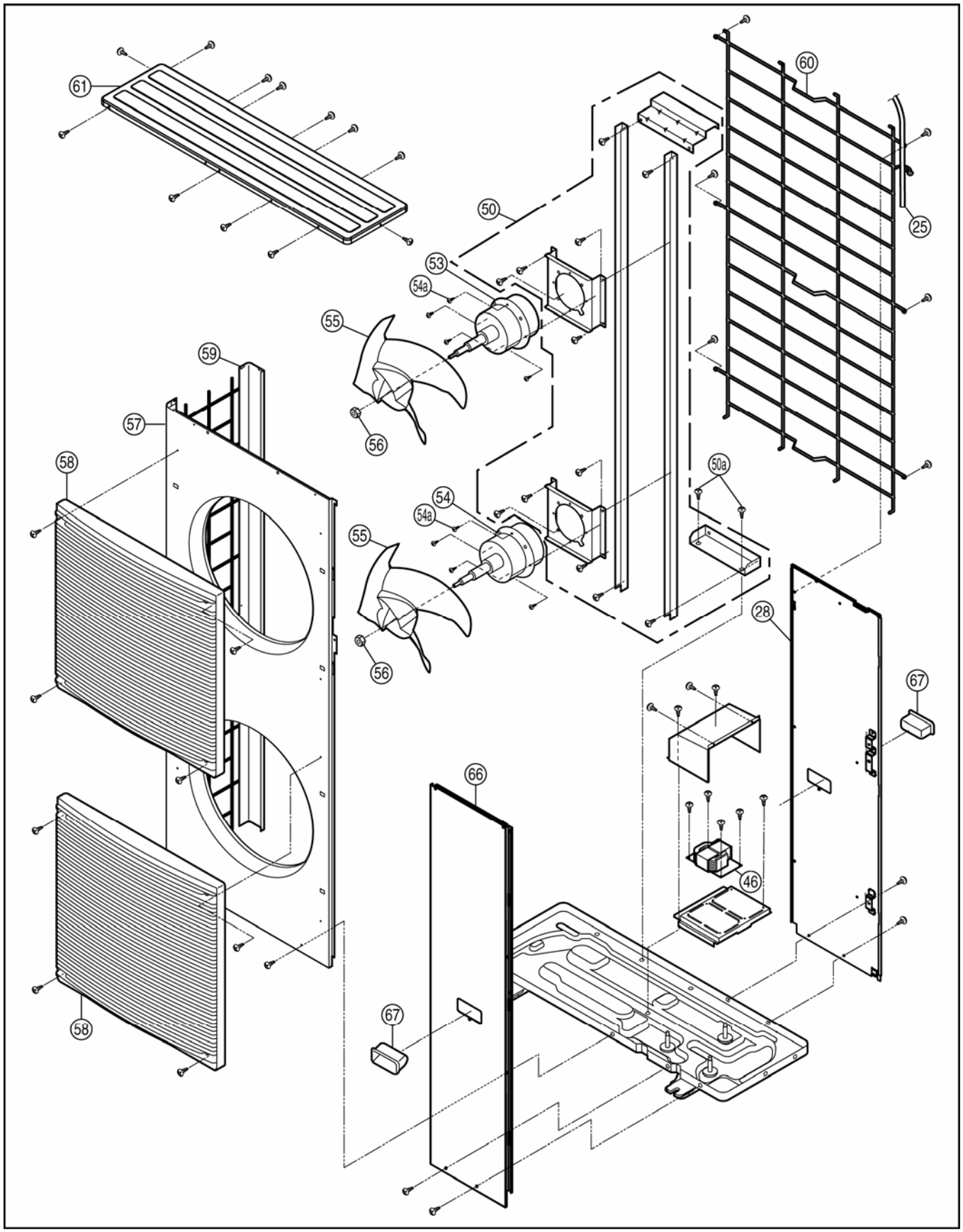
Water Out	30		35		40		45		50		55	
Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity	Input Power	Outdoor Air	Capacity	Input Power	Capacity	Input Power	Capacity
-15	10600	4130	10300	4420	10000	4710	9700	5000	8800	4980	7900	4950
-7	11900	4070	11400	4300	10800	4500	10300	4700	9600	4850	9000	4990
2	13500	3780	13000	4000	12400	4220	11900	4440	10800	4500	9800	4550
7	16000	3250	16000	3780	16000	4310	16000	4840	15200	5150	14500	5450
25	16000	2350	16000	2730	16000	3110	16000	3490	16000	3710	15900	3930

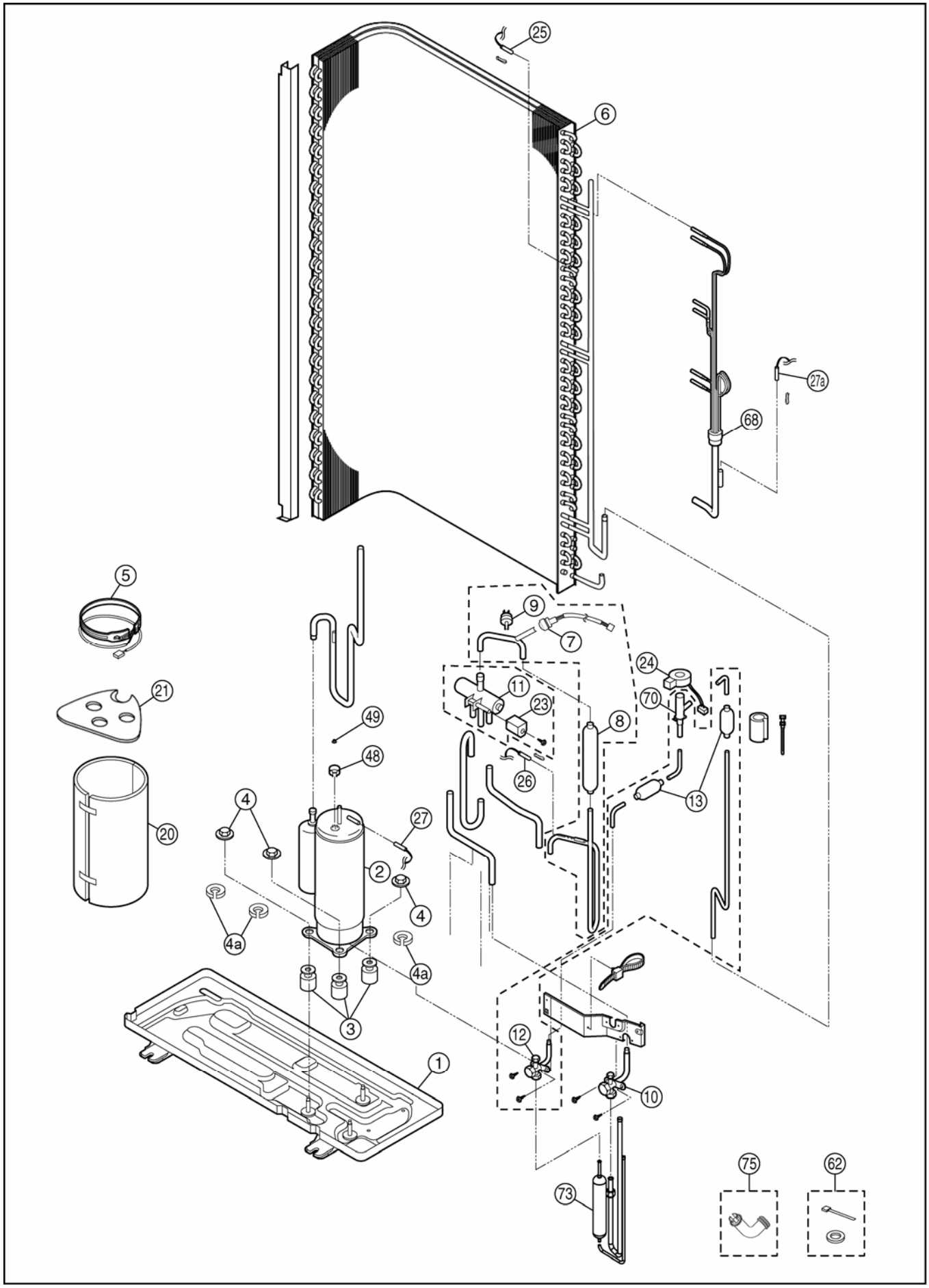
18.3 Hydraulic Pump Performance



19. Exploded View and Replacement Parts List

19.1 WH-MDF09C3E5 WH-MDF12C6E5 WH-MDF14C6E5 WH-MDF16C6E5 (Refrigerant System)




25
6
27a
68
5
21
49
48
20
4
27
2
4
4a
4a
3
1
9
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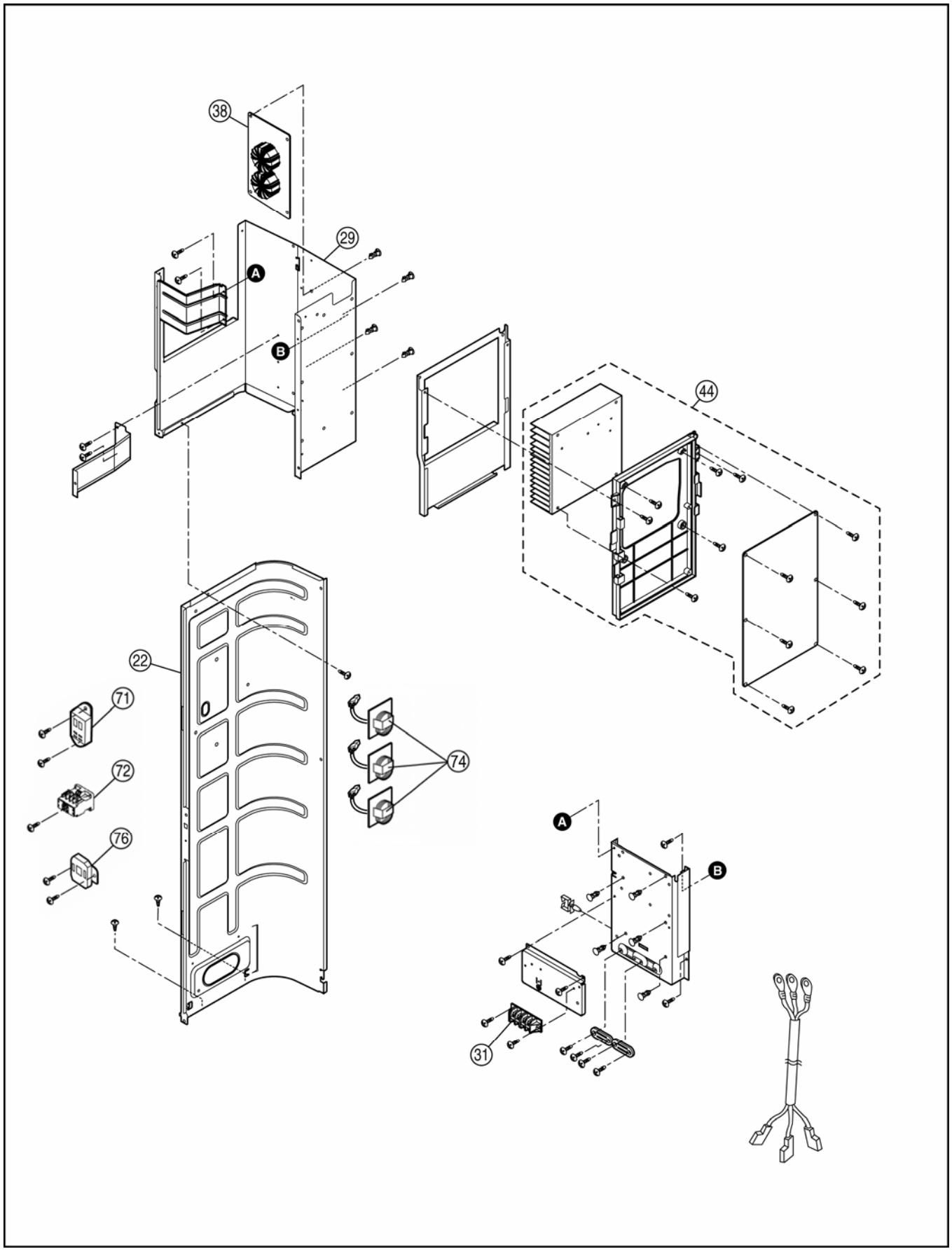
23
70
8
26
13
12
10
73
75
62



Note:
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

<Model: Refrigerant System>

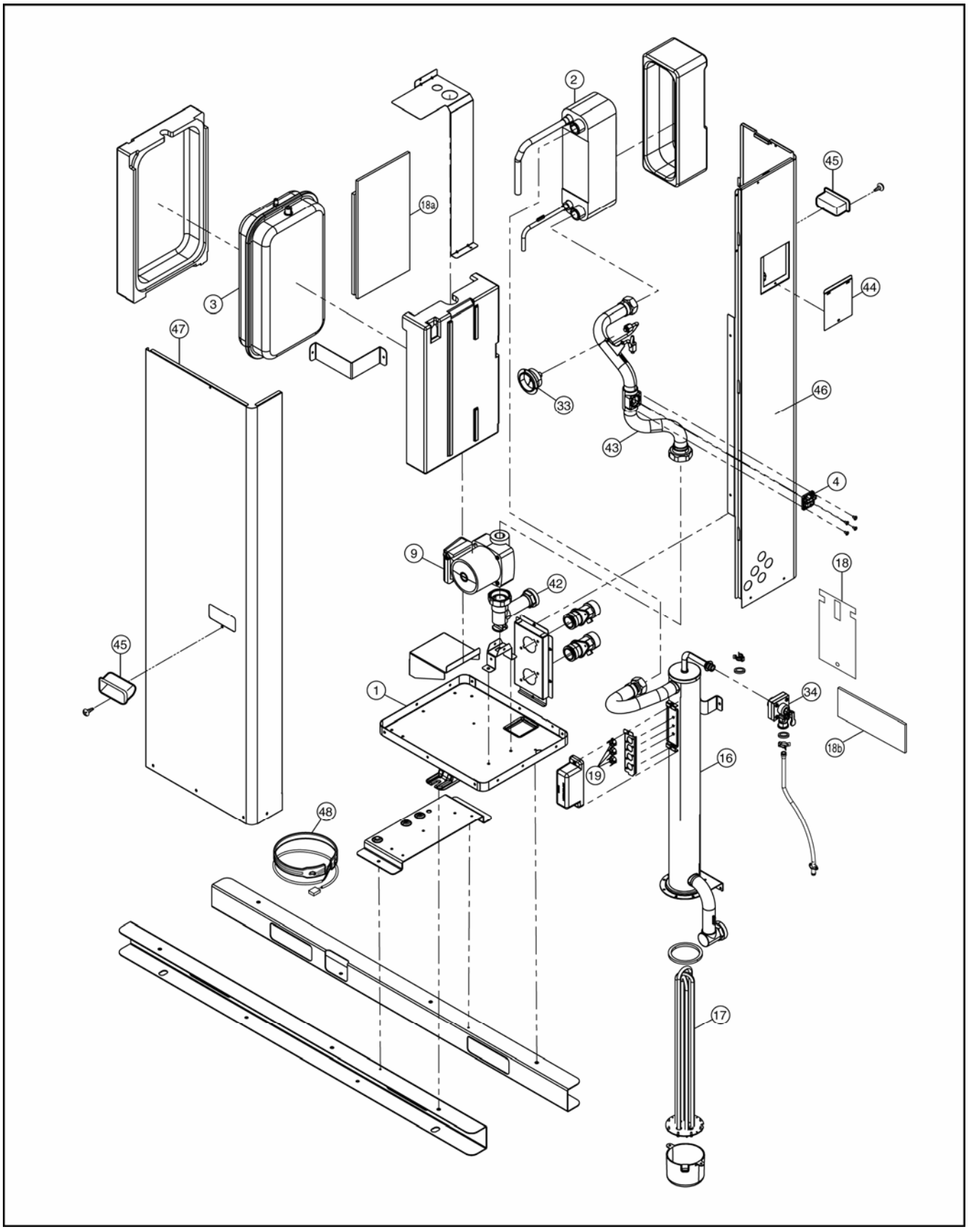
REF. NO.	DESCRIPTION & NAME	QTY.	WH-MDF09C3E8	WH-MDF12C9E8	WH-MDF14C9E8	WH-MDF16C9E8	REMARKS
1	BASE PAN ASS'Y	1	CWD52K1251	←	←	←	
2	COMPRESSOR	1	5JD420XBA22	←	←	←	O
3	BUSHING - COMPRESSOR MOUNT	3	CWH50055	←	←	←	
4	NUT-COMPRESSOR MOUNT	3	CWH561049	←	←	←	
4a	GASKET FOR TERMINAL COVER	3	CWB811017	←	←	←	
5	CRANKCASE HEATER	1	CWA341053	←	←	←	
6	CONDENSER COMPLETE	1	CWB32C3035	←	←	←	
7	HIGH PRESSURE SENSOR	1	CWA50C2570	←	←	←	
8	DISCHARGE MUFFLER	1	CWB121014	←	←	←	
9	PRESSURE SWITCH	1	CWA101013	←	←	←	
10	3-WAYS VALVE (GAS)	1	CWB011251	←	←	←	
11	4-WAYS VALVE	1	CWB001046	←	←	←	
12	3-WAYS VALVE(LIQUID)	1	CWB011292	←	←	←	
13	STRAINER	1	CWB111032	←	←	←	
20	SOUND PROOF MATERIAL	1	CWG302265	←	←	←	
21	SOUND PROOF MATERIAL	1	CWG302266	←	←	←	
22	SOUND PROOF BOARD	1	CWH15K1031	←	←	←	
23	V-COIL COMPLETE - 4-WAY VALVE	1	CWA43C2169J	←	←	←	O
24	V-COIL COMPLETE - EXP.VALVE	1	CWA43C2385	←	←	←	O
25	SENSOR-OD TEMP/ COIL	1	CWA50C2730	←	←	←	
26	SENSOR-COMP.DISCHARGE	1	CWA50C2576	←	←	←	
27	SENSOR-COMP. TOP	1	CWA50C2629	←	←	←	
27a	SENSOR-COMP.DEF	1	CWA50C2577	←	←	←	
28	CABINET REAR PLATE-COMPLETE	1	CWE02K1019A	←	←	←	
29	CONTROL BOARD CASING	1	CWH10K1133	←	←	←	
31	TERMINAL BOARD ASS'Y	1	CWA28K1214	←	←	←	
38	ELECTRONIC CONTROLLER (NOISE FILTER)	1	CWA745822	←	←	←	O
44	ELECTRONIC CONTROLLER (MAIN)	1	CWA73C5078R	CWA73C5079R	CWA73C5080R	CWA73C5081R	O
46	REACTOR	1	G0C293J00001	←	←	←	
48	TERMINAL COVER	1	CWH171039A	←	←	←	
49	NUT-TERMINAL COVER	1	CWH7080300J	←	←	←	
50	FAN MOTOR BRACKET	1	CWD54K1024	←	←	←	
50a	SCREW-FAN MOTOR BRACKET	8	CWH551040J	←	←	←	
53	FAN MOTOR (UPPER)	1	EHDS80AAC	←	←	←	O
54	FAN MOTOR (BOTTOM)	1	EHDS80BAC	←	←	←	O
54a	SCREW-FAN MOTOR MOUNT	8	CWH551016J	←	←	←	
55	PROPELLER FAN ASSY	2	CWH00K1006	←	←	←	
56	NUT-PROPELLER FAN	2	CWH561051	←	←	←	
57	CABINET FRONT PLATE	1	CWE061098A	←	←	←	
58	DISCHARGE GRILLE	2	CWE201073	←	←	←	
59	CABINET SIDE PLATE ASSY	1	CWE04K1023A	←	←	←	
60	WIRE NET	1	CWD041103A	←	←	←	
61	CABINET TOP PLATE	1	CWE03C1105	←	←	←	
62	ACCESSORY-COMPLETE	1	CWH82C1535	←	←	←	
66	CABINET FRONT PLATE	1	CWE061274A	←	←	←	
67	HANDLE	2	CWE161014	←	←	←	
68	TUBE ASSY (CAP.TUBE)	1	CWT07K1541	←	←	←	
70	EXPANSION VALVE	1	CWB051028	←	←	←	
71	ELECTRO MAGNETIC SWITCH	1	K6C2AGA00002	←	←	←	
72	ELECTRO MAGNETIC SWITCH	1	K6C4E8A00001	←	←	←	
73	RECEIVER	1	CWB141055	←	←	←	
74	REACTOR	3	G0C153J00009	←	←	←	

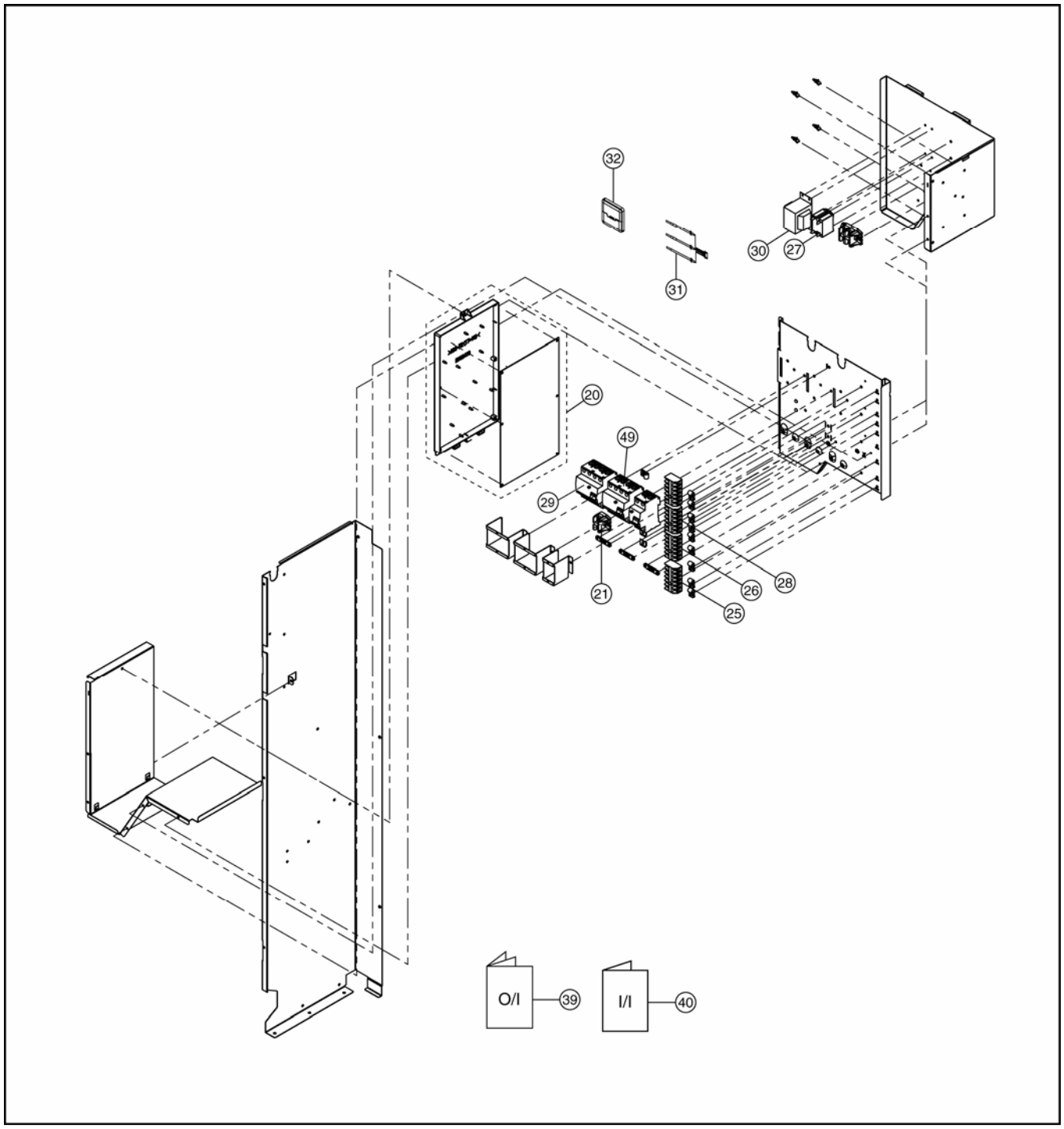
REF. NO.	DESCRIPTION & NAME	QTY.	WH-MDF09C3E8	WH-MDF12C9E8	WH-MDF14C9E8	WH-MDF16C9E8	REMARKS
75	ACCESSORY CO.(DRAIN ELBOW)	1	CWG87C2030	←	←	←	
76	PTC THERMISTOR	1	DADDG101001	←	←	←	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- “O” marked parts are recommended to be kept in stock.

19.2 WH-MDF09C3E5 WH-MDF12C6E5 WH-MDF14C6E5 WH-MDF16C6E5 (Water System)





Note:
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

<Model: Water System>

REF. NO.	DESCRIPTION & NAME	QTY.	WH-MDF09C3E8	WH-MDF12C9E8	WH-MDF14C9E8	WH-MDF16C9E8	REMARKS
1	BASE PAN ASS'Y	1	CWD52K1242	←	←	←	
2	HOT WATER COIL-COMPLETE	1	CWB90C1046	←	←	←	O
3	RECEIVER	1	CWB141039	←	←	←	
4	FLOAT (FLOW SWITCH)	1	CWB601008	←	←	←	O
9	PUMP	1	CWB532096	←	←	←	O
16	BOTTLE COMP.	1	CWH90C0013	←	←	←	
17	HEATER ASS'Y	1	CWA34K1029	CWA34K1030	←	←	O
18	SOUND PROOF MATERIAL	1	CWG302592	←	←	←	
18a	SOUND PROOF MATERIAL	1	CWG302594	←	←	←	
18b	SOUND PROOF MATERIAL	1	CWG302599	←	←	←	
19	THERMOSTAT	4	CWA151065	←	←	←	O
20	ELECTRONIC CONTROLLER (MAIN)	1	CWA73C5088R	CWA73C5089R	CWA73C5090R	CWA73C5091R	O
21	TERMINAL BOARD ASS'Y	1	CWA28K1200	←	←	←	
25	TERMINAL BOARD ASS'Y	1	CWA28K1211	←	←	←	
26	TERMINAL BOARD ASS'Y	1	CWA28K1221	←	←	←	
27	ELECTRO MAGNETIC SWITCH	1	K6C1AYY00004	←	←	←	
28	TERMINAL BOARD ASS'Y	1	CWA28K1222	←	←	←	
29	CIRCUIT BREAKER	1	CWA181005	←	←	←	O
30	TRANSFORMER-COMPLETE	1	CWA40C1075	←	←	←	O
31	SENSOR-COMPLETE	1	CWA50C2749	←	←	←	O
32	REMOTE CONTROL COMPLETE	1	CWA75C3687	←	←	←	O
33	PRESSURE GAUGE	1	CWB070001	←	←	←	O
34	PRESSURE RELIEF VALVE	1	CWB621011	←	←	←	O
39	OPERATING INSTRUCTION	1	CWF567865	←	←	←	
40	INSTALLATION INSTRUCTION	1	CWF614632	←	←	←	
42	TUBE CONNECTOR-COMPLETE	1	CWT29C1050	←	←	←	
43	TUBE CONNECTOR-COMPLETE	1	CWT29C1055	←	←	←	
44	CONTROL BOARD COVER	1	CWH131420A	←	←	←	
45	HANDLE	2	CWE161014	←	←	←	
46	CABINET SIDE PLATE ASS'Y	1	CWE04K1060A	←	←	←	
47	CABINET FRONT PLATE	1	CWE061275A	←	←	←	
48	CRANKCASE HEATER	1	CWA341071	←	←	←	
49	CIRCUIT BREAKER	1	CWA181008	←	←	←	

Note:

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

[PHAAM] Printed in Malaysia
SYBZ1010-00