

Service Manual

Air-to-Water Heatpump

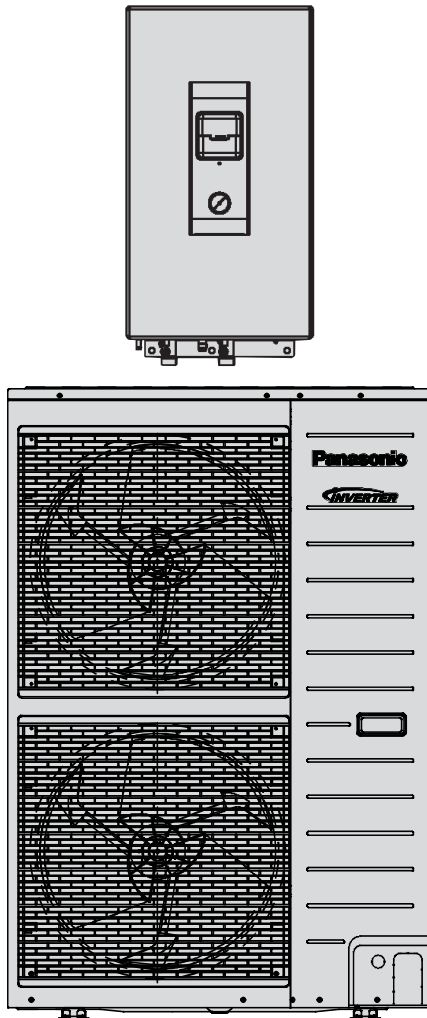
Indoor Unit

Outdoor Unit

WH-SHF12F9E8

WH-UH12FE8

Destination
Europe



⚠ 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 products dealt with in this service information by anyone else could result in serious injury or death.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by ⚠ in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

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

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

 WARNING	
1. Do not modify the machine, part or material during repairing service.	
2. If wiring unit is supplied as repairing part, do not repair or connect the wire even partial wire break. Exchange the whole wiring unit.	
3. Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4. 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.	
5. 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.	
6. Do not tie up the power supply cord into a bundle by band. Abnormal temperature rise on power supply cord may happen.	
7. Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury.	
8. Do not sit or step on the unit, you may fall down accidentally.	
9. Keep plastic bag (packaging material) away from small children, it may cling to nose and mouth and prevent breathing.	
10. Do not use pipe wrench to install refrigerant piping. It might deform the piping and cause the unit to malfunction.	
11. Do not purchase unauthorized electrical parts for installation, service, maintenance and etc.. They might cause electrical shock or fire.	
12. Do not modify the wiring of indoor/outdoor unit for installation of other components (i.e. heater, etc). Overloaded wiring or wire connection points may cause electrical shock or fire.	
13. Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.	
14. For electrical work, follow local wiring standard, regulation and this 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.	
15. For water circuit installation work, follow to relevant European and national regulations (including EN61770) and local plumbing and building regulation codes.	
16. Engage dealer or specialist for installation or servicing. If the installation or servicing done by the user is defective, it will cause water leakage, electrical shock or fire.	
17. This is a R407C 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 R407C refrigerant. Thickness of copper pipes used with R407C must be 0.8 mm or more. 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.	
18. When install or relocate Air to Water Heatpump indoor/outdoor unit, do not let any substance other than the specified refrigerant, eg. air etc mix into refrigerant cycle (piping). Mixing of air etc. will cause abnormal high pressure in refrigeration cycle and result in explosion, injury etc.	

19. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electrical shock or fire.
20. 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.
21. Do not use joint cable for indoor/outdoor connection cable. Use specified indoor/outdoor connection cable, refer to instruction CONNECT THE CABLE TO THE INDOOR UNIT and connect tightly for indoor/outdoor connection. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.
22. This equipment is strongly recommended to be installed with Residual Current Device (RCD) on-site according to the respective national wiring rules or country-specific safety measures in terms of residual current.
23. 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.
24. During pump down operation, stop the compressor before remove the refrigeration piping. Removal of refrigerant piping while compressor is operating and valves are opened will cause suck-in of air, abnormal high pressure in refrigerant cycle and result in explosion, injury etc.
25. 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.
26. After completion of installation, confirm there is no leakage of refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
27. 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.
28. Only use the supplied or specified installation or servicing parts, else, it may cause unit vibrate loose, water leakage, electrical shock or fire.
29. The unit is only for use in a closed water system. Utilization in an open water circuit may lead to excessive corrosion of water piping and risk of incubating bacteria colonies, particularly Legionella, in water.
30. If there is any doubt about the installation procedure or operation, always contact the authorized dealer for advice and information.
31. Select a location where in case of water leakage, the leakage will not cause damage to other properties.
32. When installing electrical equipment at wooden building of metal lath or wire lath, in accordance with electrical facility standard, no electrical contact between equipment and building is allowed. Insulator must be installed in between.
33. Work done to the indoor/outdoor unit after remove the front plate cover that secured by screws, must be carried out under the supervision of authorized dealer and licensed installation contractor.
34. 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 electrical shock in case equipment breakdown or insulation breakdown.

CAUTION

1. Do not install the air-to-water heatpump indoor unit and outdoor unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.	⊘
2. Do not release refrigerant. Do not release refrigerant during piping work for installation, re-installation and during repairing a refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.	⊘
3. Do not install this appliance in a laundry room or other high humidity location. This condition will cause rust and damage to the unit.	⊘
4. Make sure the insulation of power supply cord does not contact hot part (i.e. refrigerant piping, water piping) to prevent from insulation failure (melt).	⊘
5. Do not touch the sharp aluminium fin, sharp parts may cause injury.	⊘
6. Do not apply excessive force to water pipes that may damage the pipes. If water leakage occurs, it will cause flooding and damage to other properties.	⊘
7. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.	
8. Select an installation location which is easy for maintenance.	
9. Power supply connection to indoor 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. - Power Supply 1: Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0mm. - Power Supply 2: Use approved 15/16A 2-poles circuit breaker with a minimum contact gap of 3.0mm. (Only applicable for WH-SHF09F3E8) or Use approved 20A 4-poles circuit breaker with a minimum contact gap of 3.0mm. (Only applicable for WH-SHF12F9E8)	
10. Ensure the correct polarity is maintained throughout all wiring. Otherwise, it will cause electrical shock or fire.	
11. After installation, check the water leakage condition in connection area during test run. If leakage occur, it will cause damage to other properties	
12. Installation work. It may need two or more people to carry out the installation work. The weight of indoor/outdoor unit might cause injury if carried by one person.	

2.2 WH-SHF12F9E8 WH-UH12FE8

Item		Unit	Outdoor Unit	
Performance Test Condition			EN14511	
Heating Capacity	Condition (Ambient/Water)		A7W35	A2W35
	kW		12.00	12.00
	BTU/h		41000	41000
	kcal/h		10320	10320
COP	W/W		4.46	3.26
	kcal/hW		3.84	2.80
Noise Level	dB (A)		50	-
	Power Level dB		67	-
Air Flow		m ³ /min (ft ³ /min)	80.0 (2830)	
Refrigeration Control Device			Expansion Valve	
Refrigeration Oil		cm ³	FV50S (1600)	
Refrigerant (R407C)		kg (oz)	2.90 (102.3)	
Dimension	Height	mm (inch)	1340 (52-3/4)	
	Width	mm (inch)	900 (35-7/16)	
	Depth	mm (inch)	320 (12-19/32)	
Net Weight		kg (lbs)	110 (243)	
Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)	
	Gas	mm (inch)	15.88 (5/8)	
Standard Length		m (ft)	7 (23.0)	
Pipe Length Range		m (ft)	3 (9.8) ~ 30 (98.4)	
I/D & O/D Height Difference		m (ft)	20 (65.6)	
Additional Gas Amount		g/m (oz/ft)	70 (0.8)	
Refrigeration Charge Less		m (ft)	10 (32.8)	
Compressor	Type		Hermetic Motor (Rotary)	
	Motor Type		Brushless (4-poles)	
	Rated Output	kW	3.40	
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	903.7 × 1295.4 × 38.1	

Item		Unit		
Power Source (Phase, Voltage, Cycle)		ø	Three	
		V	400	
		Hz	50	
Power Supply 1: Phase / Max. Current / Max. Input Power		ø / A / W	Three / 10.8 / 7.07k	
Power Supply 2: Phase / Max. Current / Max. Input Power		ø / A / W	Three / 13.0 / 9.00k	
Input Power		kW	2.69	3.68
Maximum Input Power For Heat Pump System		kW	7.07	
Starting Current		A	4.2	

Item		Unit		
Running Current		A	4.2	5.6
Maximum Current For Heat Pump System		A	10.8	
Power Factor		%	94	95
Power factor means total figure of compressor and outdoor fan motor.				
Power Cord	Number of core		-	
	Length	m (ft)	-	
Thermostat			Electronic Control	
Protection Device			Electronic Control	

Item		Unit	Indoor Unit
Performance Test Condition			EN14511
Operation Range	Outdoor Ambient	°C	-20 ~ 35
	Water Outlet	°C	25 ~ 65
Internal Pressure Differential		kPa	39.8
Noise Level		dB (A)	33
		Power Level dB	46
Dimension	Height	mm (inch)	892 (35-1/8)
	Width	mm (inch)	502 (19-3/4)
	Depth	mm (inch)	353 (13-29/32)
Net Weight		kg (lbs)	48 (106)
Refrigerant Pipe Diameter	Liquid	mm (inch)	9.52 (3/8)
	Gas	mm (inch)	15.88 (5/8)
Water Pipe Diameter	Inlet	mm (inch)	28 (1-3/32)
	Outlet	mm (inch)	28 (1-3/32)
Water Drain Hose Inner Diameter		mm (inch)	15.00 (19/32)
Pump	Motor Type		DC Motor
	No. of Speed		7 (Software Selection)
	Input Power	W	60
Hot Water Coil	Type		Brazed Plate
	No. of Plates		80
	Size (H × W × L)	mm	130 × 93 × 325
	Water Flow Rate	l/min (m ³ /h)	34.4 (2.1)
Pressure Relief Valve Water Circuit		kPa	Open: 300, Close: 265 and below
Flow Switch			Magnetic Lead Switch
Protection Device		A	Residual Current Circuit Breaker / Earth Leakage Circuit Breaker (25)
Expansion Vessel	Volume	l	10
	MWP	bar	3
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.

3. Features

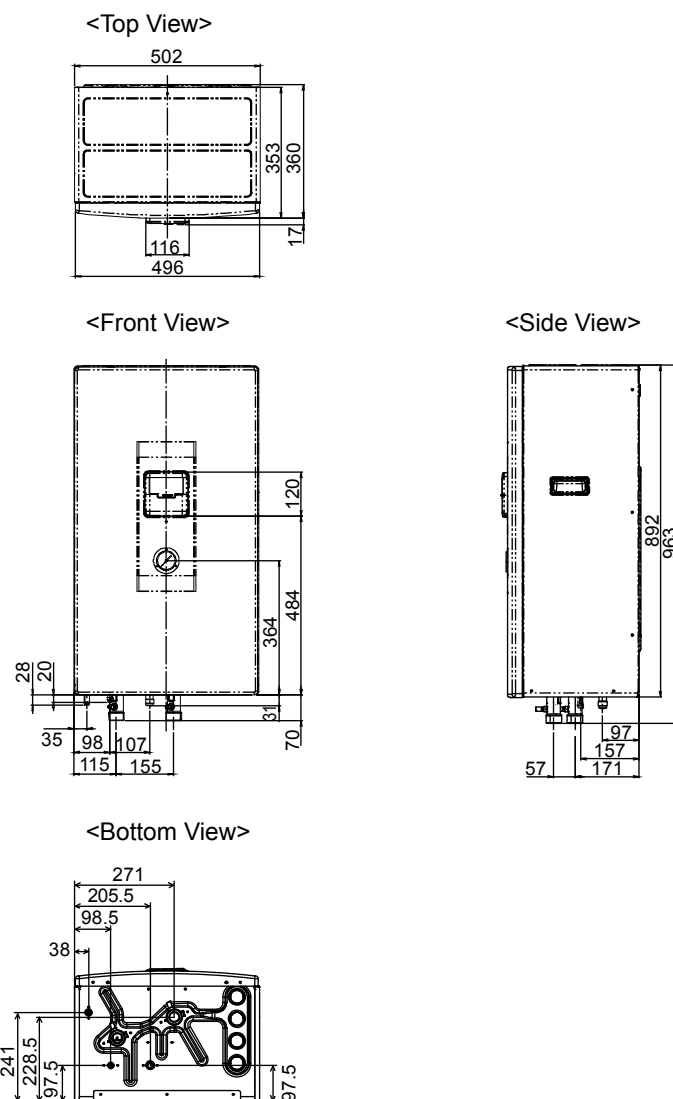
- **Inverter Technology**
 - Energy saving
- **High Efficiency**
- **Compact Design**
- **Environment Protection**
 - Non-ozone depletion substances refrigerant (R407C)
- **Long Installation Piping**
 - Long piping up to 30 meter with height difference 20 meter
 - Flexible 4-way piping for outdoor unit
- **Easy to use control panel**
 - Holiday mode
 - Dry concrete function
 - Weekly timer setting
- **A-class energy efficiency pump**
 - Water pump speed can be set by selection at control panel
- **Weekly Timer setting**
- **Protection Feature**
 - Random auto restart after power failure for safety restart operation
 - Gas leakage protection
 - Prevent compressor reverse cycle
 - Inner protector to protect compressor
- **Serviceability Feature**
 - Breakdown Self Diagnosis function
 - System Status Check Buttons for servicing purpose
 - System Pumpdown Button for servicing purpose
 - Front maintenance design for outdoor unit
- **Operation Condition**

		Indoor	Outdoor
		Water outlet temperature (°C)	Ambient temperature (°C)
HEATING	Maximum	65	35
	Minimum	25	-20

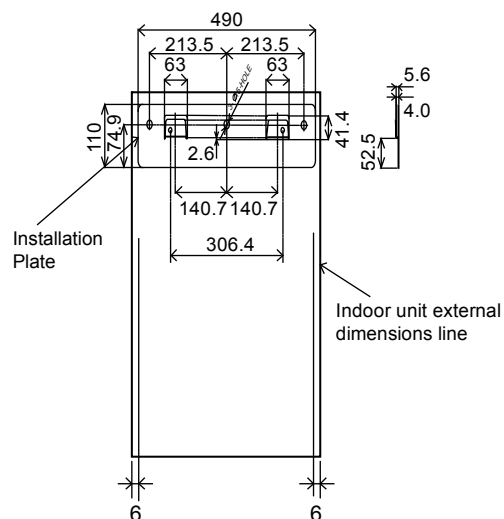
NOTICE : When the outdoor temperature is out of the above temperature range, the heating capacity will drop significantly and outdoor unit might stop for protection control.

5. Dimensions

5.1 Indoor Unit

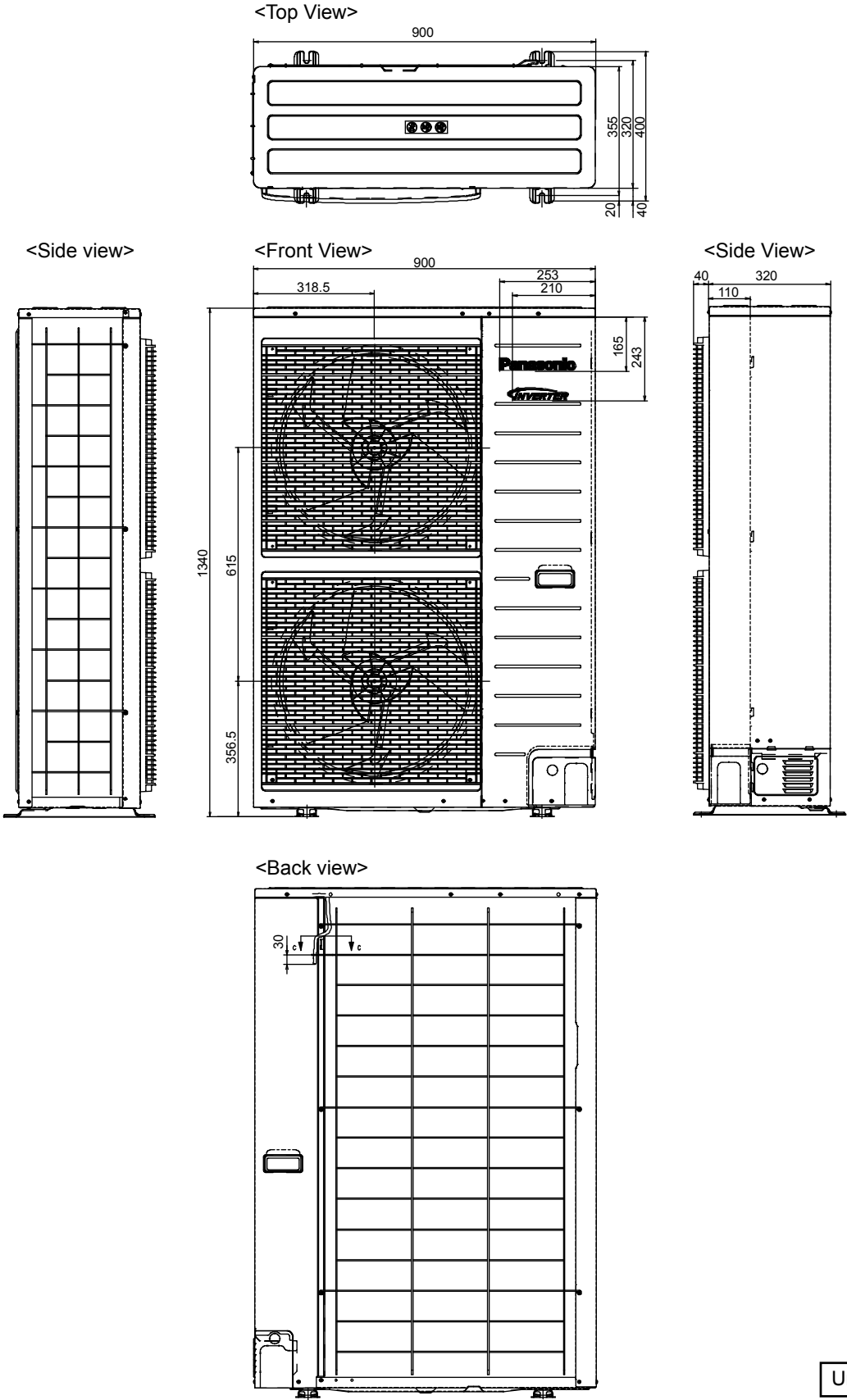


Relative position between the indoor unit and the installation plate <Front View>



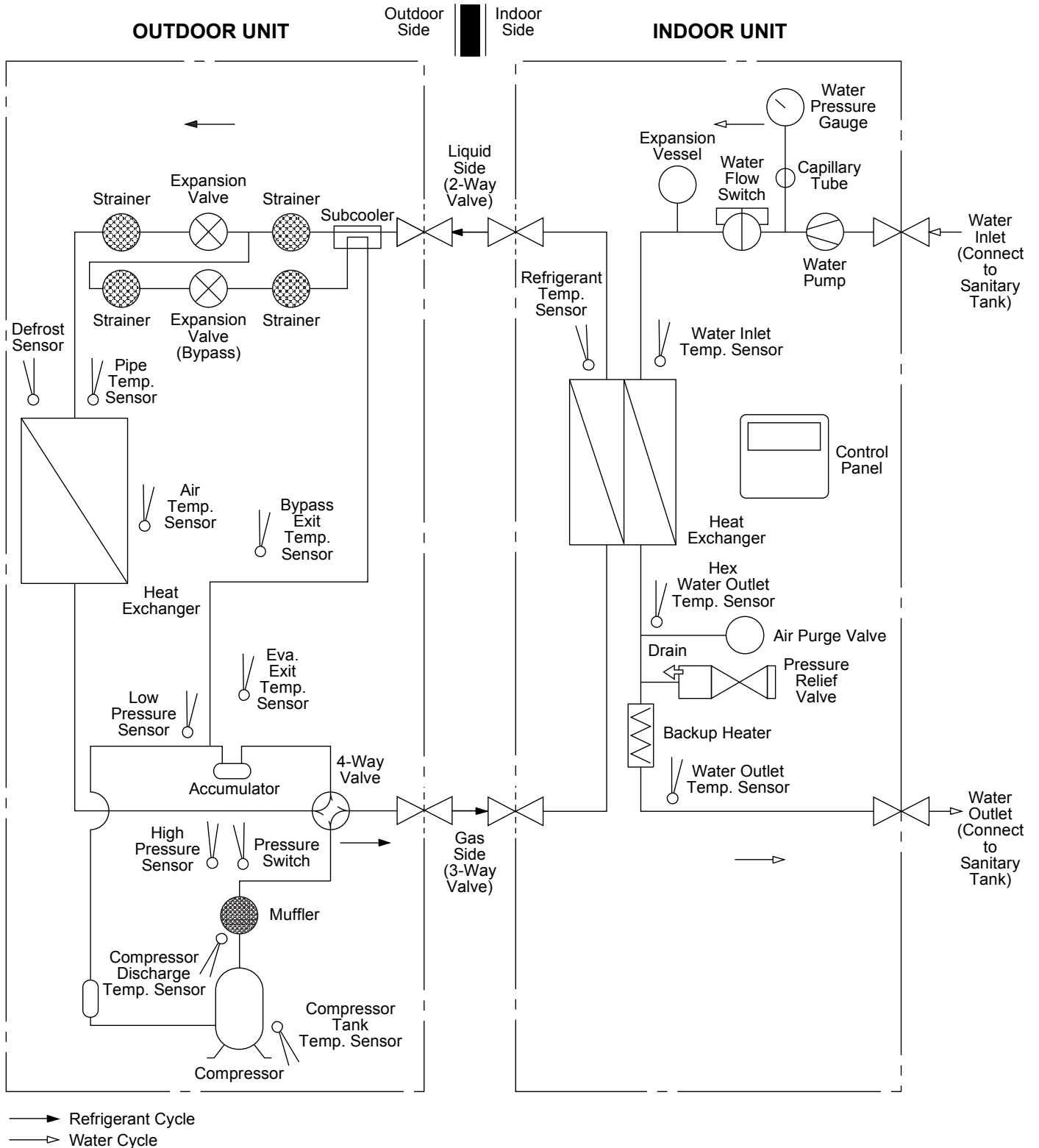
Unit: mm

5.2 Outdoor Unit



Unit: mm

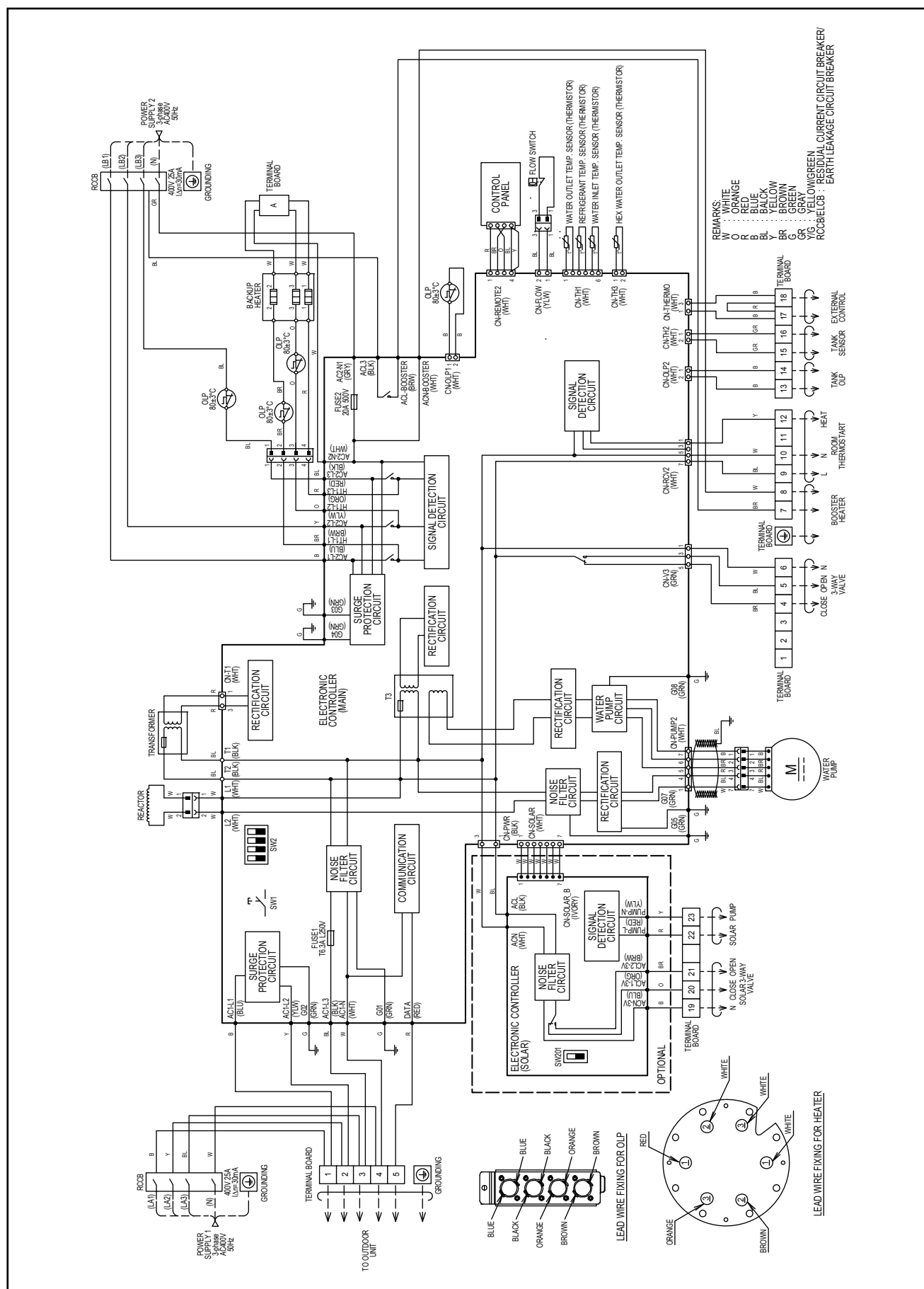
6. Refrigeration and Water Cycle Diagram



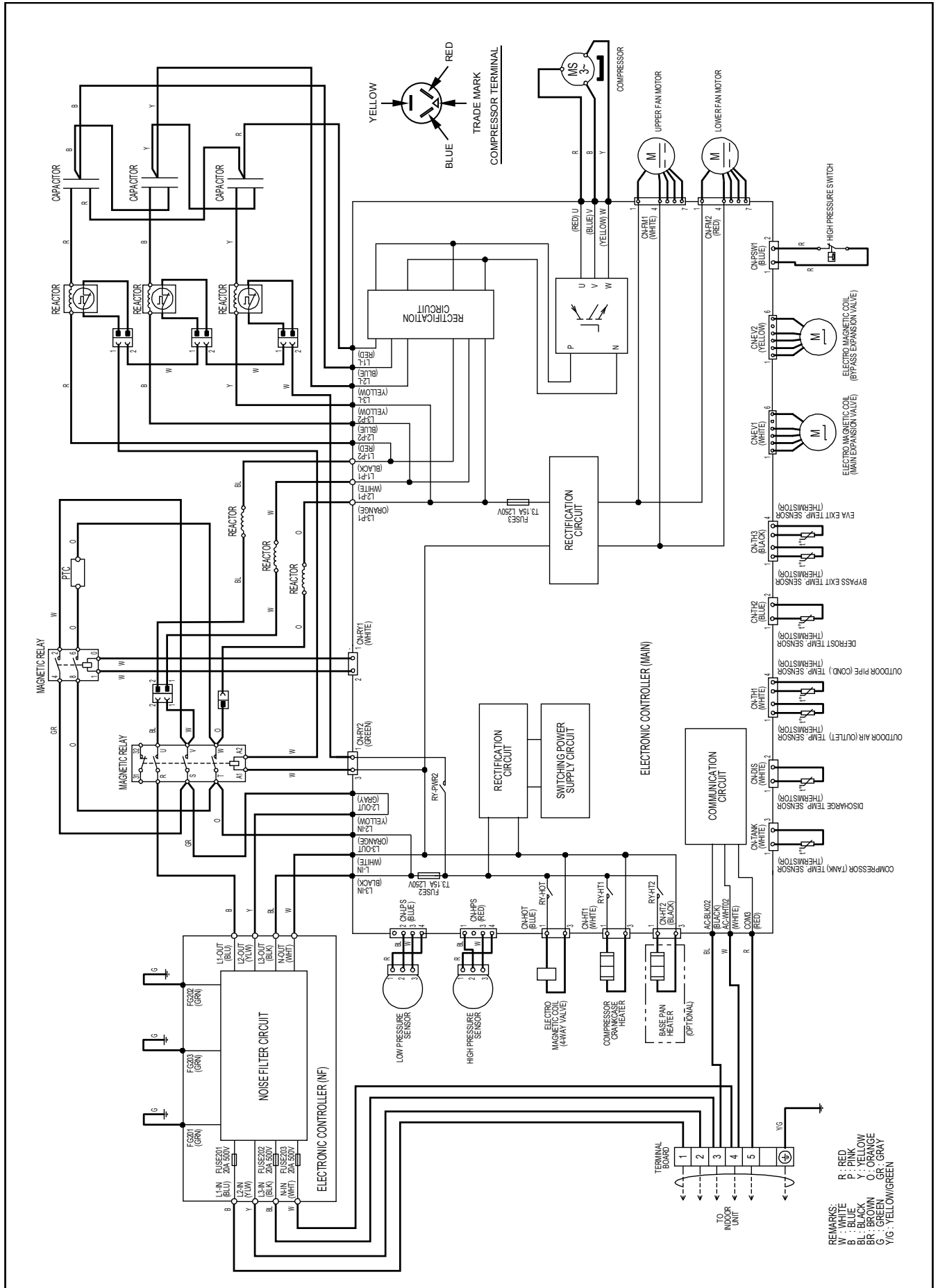
Model	Piping size		Rated Length (m)	Max. Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
WH-SHF09F3E8 WH-UH09FE8	Ø15.88 mm (5/8")	Ø9.52 mm (3/8")	5~7.5	20	3	30	70
WH-SHF12F9E8 WH-UH12FE8							

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

8.1.2 WH-SHF12F9E8



8.2 Outdoor Unit



How to Adjust Water Flow Rate [SERVICE MODE: 02]

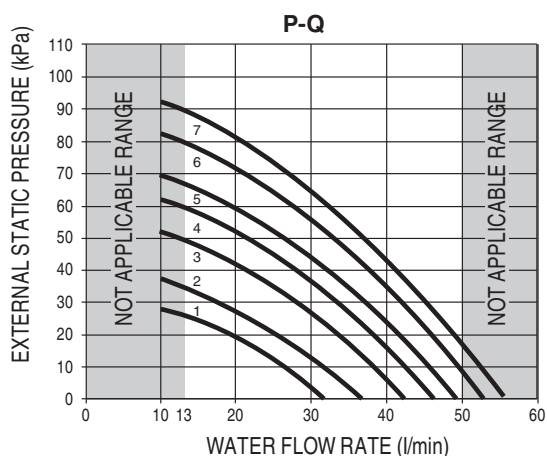
Before adjust the water flow rate, make sure that the total water volume in the installation is 50 litres minimum for heating side. The default setting is SPEED 5. Please ensure the minimum flow rate is not less than 13 l/min and not more than 50 l/min.

The available external static pressure (kPa) in function of the water flow rate (l/min) is shown in the P-Q graph. Depend on the hydraulic system pressure loss and type, the water flow rate can be adjusted by control panel.

1. Press SERVICE button for 5 seconds.
2. Press ▲/▼ button to select menu S02 (PUMP SPEED ADJUST MODE) and press SET button to confirm the menu.
3. Press SELECT button then press ▲/▼ button to change SPEED and press SET to confirm.
4. Press OFF/ON button to exit PUMP SPEED ADJUST MODE.

During PUMP SPEED ADJUST MODE, we can select AIR PURGE function by pressing FORCE button.

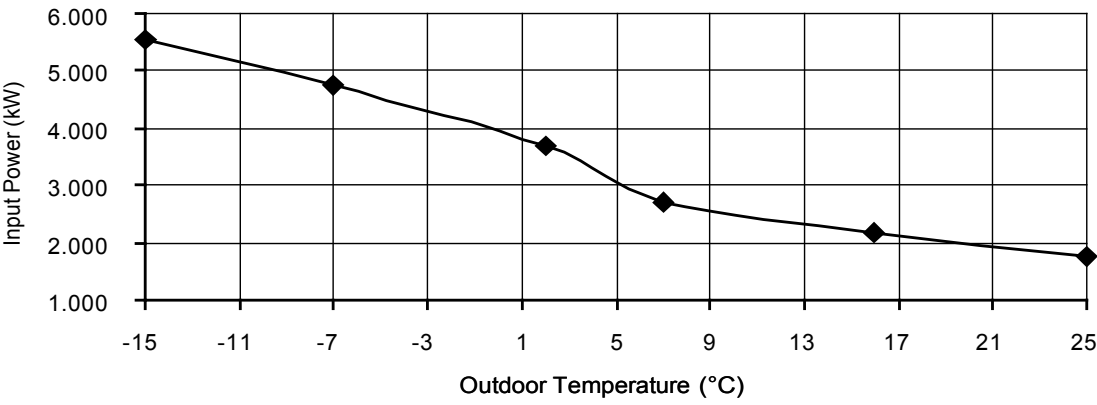
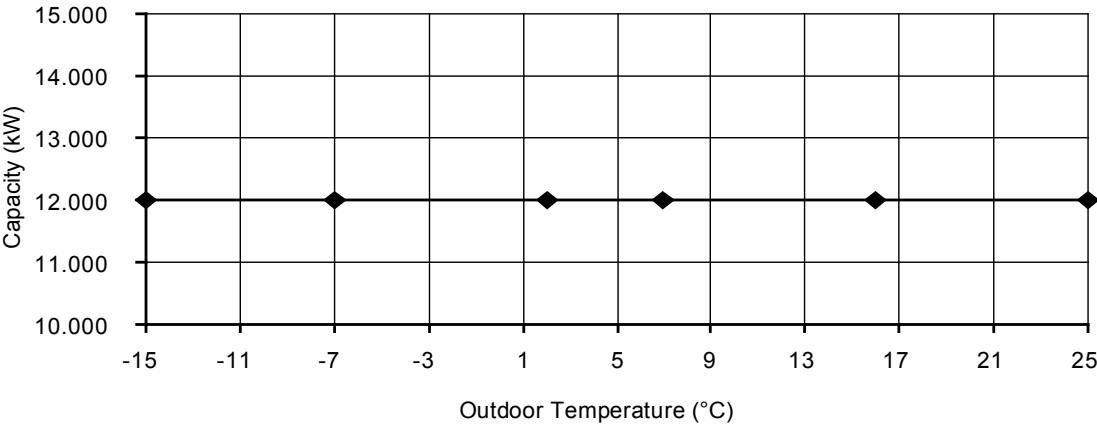
In AIR PURGE function, the pump will operate ON and OFF for 10 minutes to purge the air in the hydraulic system. Press again the FORCE button to exit AIR PURGE function. PUMP SPEED ADJUST MODE will stop operation.



18.1.2 WH-SHF12F9E8 WH-UH12FE8

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 : 7 m



Heating Characteristics at Different Piping Length

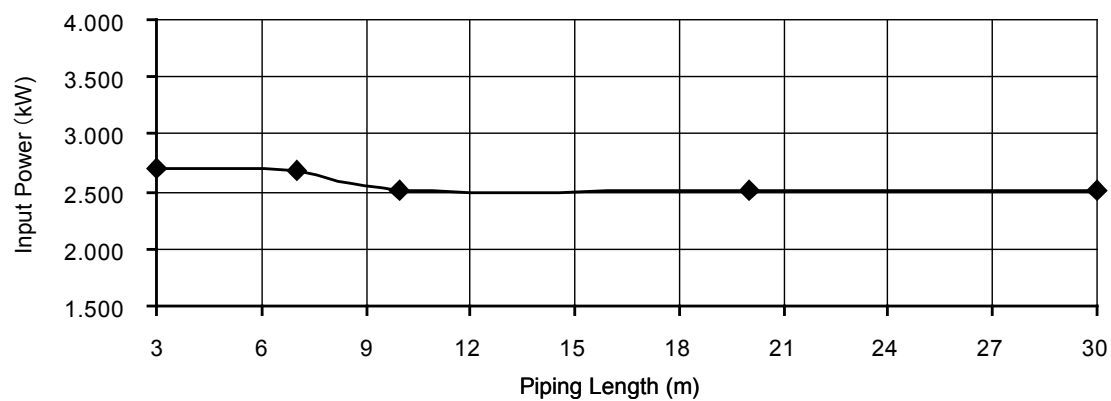
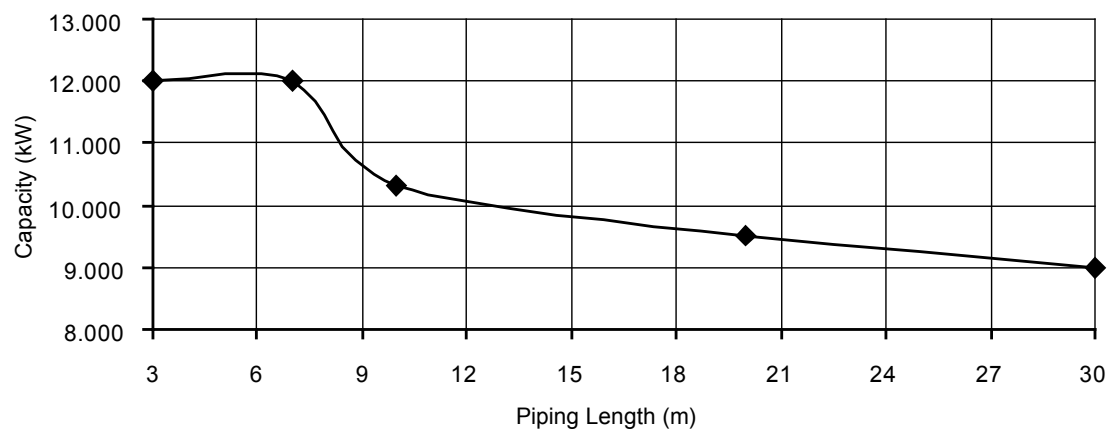
Condition

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

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C

Piping length : 7 m



18.2 Heating Capacity Table

18.2.1 WH-UH09FE8

Water Out (°C)	30		35		40		45		50		55	
Outdoor Air (°C)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
-15	9000	3460	9000	3710	9000	4010	8800	4260	8600	4610	8500	4910
-7	9000	3060	9000	3290	9000	3560	8900	3830	8900	4110	8900	4460
2	9000	2430	9000	2610	9000	2910	9000	3210	9000	3550	9000	3880
7	9000	1820	9000	1940	9000	2210	9000	2460	9000	2760	9000	3060
16	9000	1460	9000	1560	9000	1810	8900	2020	8800	2310	8600	2520
25	12000	1660	12000	1760	12000	2010	10800	2140	10600	2460	10200	2660

Water Out (°C)	60		65	
Outdoor Air (°C)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
-15	8000	5060	7800	5860
-7	8900	4960	8900	5460
2	9000	4350	9000	4760
7	9000	3460	9000	3960
16	8200	2770	8200	3180
25	9800	2890	9600	3310

18.2.2 WH-UH12FE8

Water Out (°C)	30		35		40		45		50		55	
Outdoor Air (°C)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
-15	12000	5160	12000	5530	11000	5510	10600	5530	10300	5630	9700	5760
-7	12000	4430	12000	4760	11500	4910	11200	5060	10800	5160	10100	5280
2	12000	3420	12000	3680	11500	3860	11300	4140	11000	4510	10800	4860
7	12000	2520	12000	2690	12000	3060	12000	3440	12000	3810	12000	4280
16	12000	2030	12000	2170	12000	2520	12000	2860	11500	3190	11500	3480
25	12000	1660	12000	1760	12000	2010	11800	2410	11200	2640	10800	2860

Water Out (°C)	60		65	
Outdoor Air (°C)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
-15	9000	6010	8000	6110
-7	10000	5660	9600	5910
2	10650	5310	10300	5590
7	12000	4760	12000	5410
16	11000	3820	11000	4370
25	10500	3110	10300	3620

18.3 Heating Capacity Table

Outdoor Air (°C)	WH-SHF09		WH-SHF12	
	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
3	9000	1950	12000	2710
7	9000	1940	12000	2690
10	8000	1840	10300	2510
20	7400	1840	9500	2510
30	7000	1840	9000	2510

18.4 Usage Limitation

