

Service Manual

Air-to-Water Heatpump

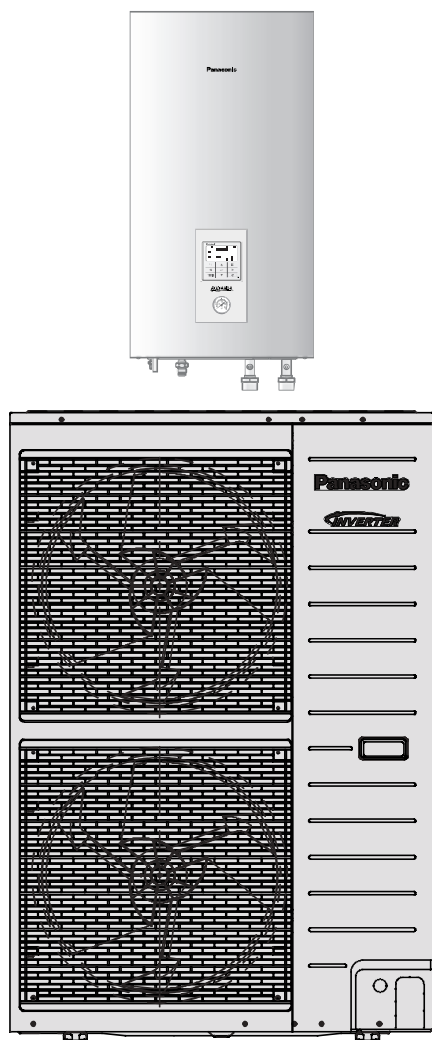
Indoor Unit

Outdoor Unit

WH-SXC12H6E5

WH-UX12HE5

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.

WH-SXC12H6E5 WH-UX12HE5

Item		Unit	Outdoor Unit		
Performance Test Condition			EN 14511		
Cooling Capacity	Condition (Ambient/Water)		A35W7		
	kW		10.00		
	BTU/h		34100		
	kcal/h		8600		
Cooling EER	W/W		2.81		
	kcal/hW		2.42		
Heating Capacity	Condition (Ambient/Water)		A7W35	A2W35	
	kW		12.00	12.00	
	BTU/h		41000	41000	
	kcal/h		10320	10320	
Heating COP	W/W		4.74	3.44	
	kcal/hW		4.08	2.96	
Heating ErP	Low Temperature Application (W35)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	12.0	12.0	14.0
	Tbivalent / TOL	°C	2 / 2	-10 / -10	-15 / -22
	SCOP / ns	(W/W) / %	5.86 / 231	4.32 / 170	4.08 / 160
	Annual Consumption	kWh	2738	5745	8460
	Class		A++	A++	A++
	Medium Temperature Application (W55)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	12.0	12.0	13.0
	Tbivalent / TOL	°C	2 / 2	-10 / -10	-15 / -22
	SCOP / ns	(W/W) / %	4.02 / 158	3.32 / 130	3.20 / 125
	Annual Consumption	kWh	3990	7466	10012
	Class		A++	A++	A++
Noise Level		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		dB (A)	Cooling: 50	Heating: 52	—
		Power Level dB	Cooling: 68	Heating: 69	—
Air Flow		m ³ /min (ft ³ /min)	Cooling: 93.3 (3290) Heating: 80.0 (2830)		
Refrigeration Control Device			Expansion Valve		
Refrigeration Oil		cm ³	FV50S (1200)		
Refrigerant (R410A)		kg (oz)	2.85 (100.6)		
F-GAS	GWP		2088		
	CO2eq (ton) (Precharged / Maximum)		5.951 / 8.039		
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)	101 (223)		
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)	50 (0.5)		
Refrigeration Charge Less		m (ft)	10 (32.8)		

Item		Unit	Outdoor Unit		
Compressor	Type		Hermetic Motor		
	Motor Type		Brushless (4-poles)		
	Rated Output	kW	3.00		
Fan	Type		Propeller Fan		
	Material		PP		
	Motor Type		DC (8-poles)		
	Input Power	W	—		
	Output Power	W	60		
	Fan Speed	rpm	Cooling: 600 (Top), 640 (Bottom) Heating: 520 (Top), 560 (Bottom)		
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		
Power Source (Phase, Voltage, Cycle)		Ø	Single		
		V	230		
		Hz	50		
Input Power		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		kW	Cooling: 3.56	Heating: 2.53	Heating: 3.49
Maximum Input Power For Heatpump System		kW	6.27		
Power Supply 1 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			1Ø / 29.0 / 6.27k		
Power Supply 2 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			1Ø / 26.0 / 6.00k		
Power Supply 3 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			— / — / —		
Starting Current		A	16.5		
Running Current		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		A	Cooling: 16.5	Heating: 11.7	Heating: 16.1
Maximum Current For Heatpump System		A	29.0		
Power Factor Power factor means total figure of compressor and outdoor fan motor.		%	Cooling: 94	Heating: 94	Heating: 94
Power Cord	Number of core		—		
	Length	m (ft)	—		
Thermostat			Electronic Control		
Protection Device			Electronic Control		

Item		Unit	Indoor Unit		
Performance Test Condition			EN 14511		
Operation Range	Outdoor Ambient	°C	Cooling: 16 ~ 43 Heating: -28 ~ 25		
	Water Outlet	°C	Cooling: 5 ~ 20 Heating: 20 ~ 55 (Below Ambient -15°C) 20 ~ 60 (Below Ambient -10°C)		
Internal Pressure Differential		kPa	Cooling: 36 Heating: 52		
Noise Level		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		dB (A)	Cooling: 33	Heating: 33	—
		Power Level dB	Cooling: 46	Heating: 46	—
Dimension	Height	mm (inch)	892 (35-1/8)		
	Width	mm (inch)	500 (19-11/16)		
	Depth	mm (inch)	340 (13-13/32)		
Net Weight		kg (lbs)	43 (95)		
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 (19/32)		
Pump	Motor Type		DC Motor		
	No. of Speed		7 (Software Selection)		
	Input Power	W	92		
Hot Water Coil	Type		Brazen Plate		
	No. of Plates		36		
	Size (W × H × L)	mm	65 × 119 × 376		
	Water Flow Rate	l/min (m ³ /h)	Cooling: 28.7 (1.7) Heating: 34.4 (2.1)		
Pressure Relief Valve Water Circuit		kPa	Open: 300, Close: 266 and below		
Flow Switch			Electronic Sensor		
Protection Device		A	Residual Current Circuit Breaker (40)		
Expansion Vessel	Volume	l	10		
	MWP	bar	3		
Capacity of Integrated Electric Heater		kW	6.00		

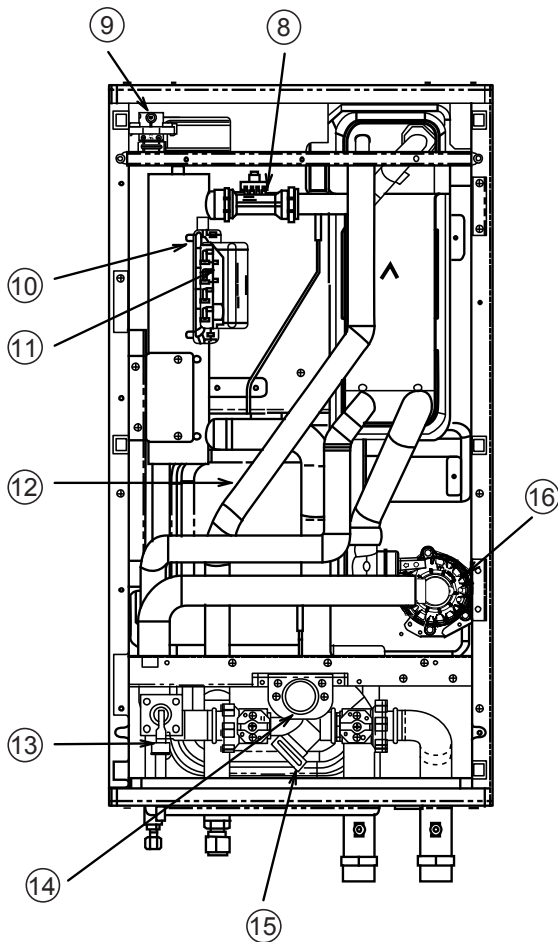
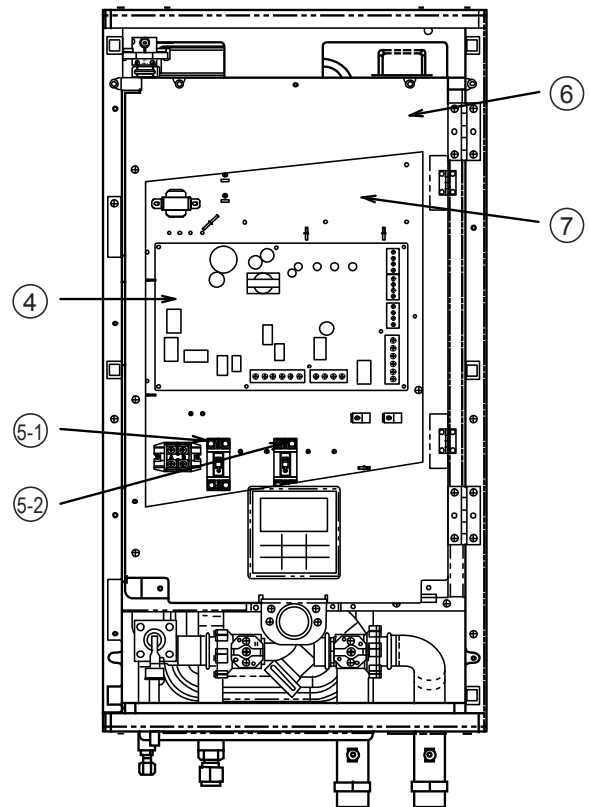
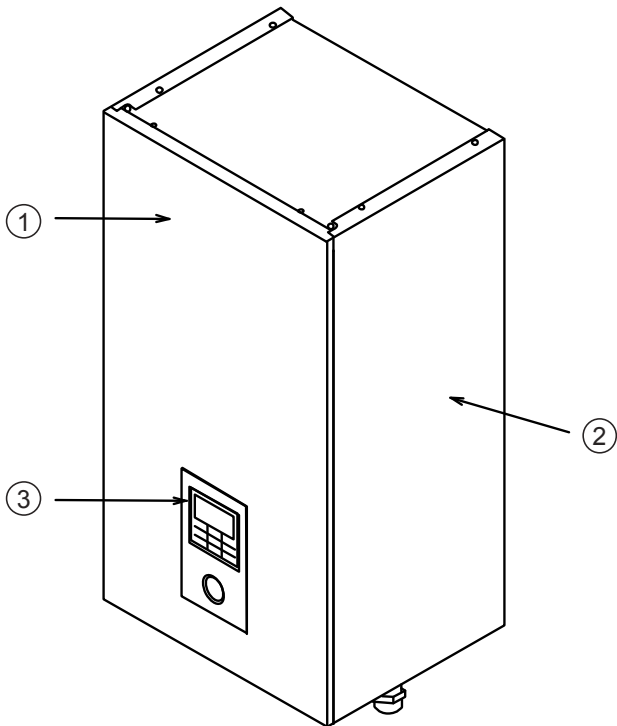
Note:

- Cooling capacities are based on outdoor air temperature of 35°C Dry Bulb with controlled indoor water inlet temperature of 12°C and water outlet temperature of 7°C.
- 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.
- Flow rate indicated are based on nominal capacity adjustment of leaving water temperature (LWT) 35°C and $\Delta T = 5^{\circ}\text{C}$.

Features

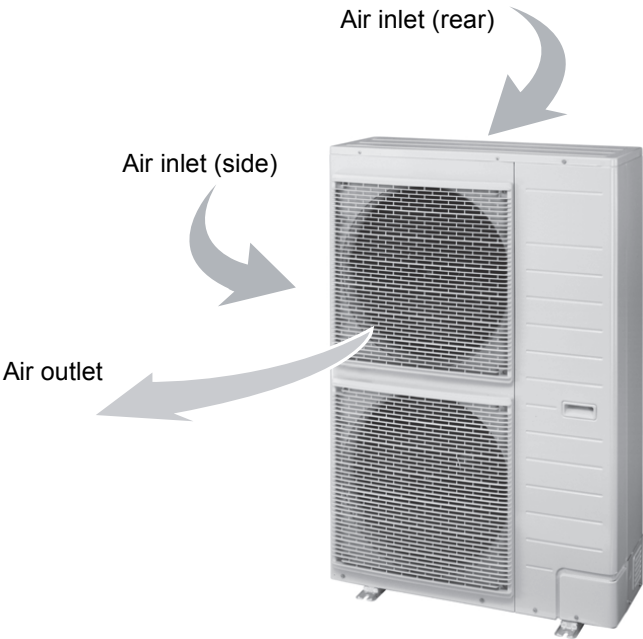
- **Inverter Technology**
 - Energy saving
- **High Efficiency**
- **Environment Protection**
 - Non-ozone depletion substances refrigerant (R410A)
- **Long Installation Piping**
 - Long piping up to 30 meter with height difference 20 meter
 - Flexible 4-way piping for outdoor unit
- **Easy to use control panel**
 - Auto mode
 - Holiday mode
 - Dry concrete function
 - Weekly timer setting
- **A-class energy efficiency pump**
 - Water pump speed can be set by selection at control panel
- **Improved deice cycle**
- **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

Main Components



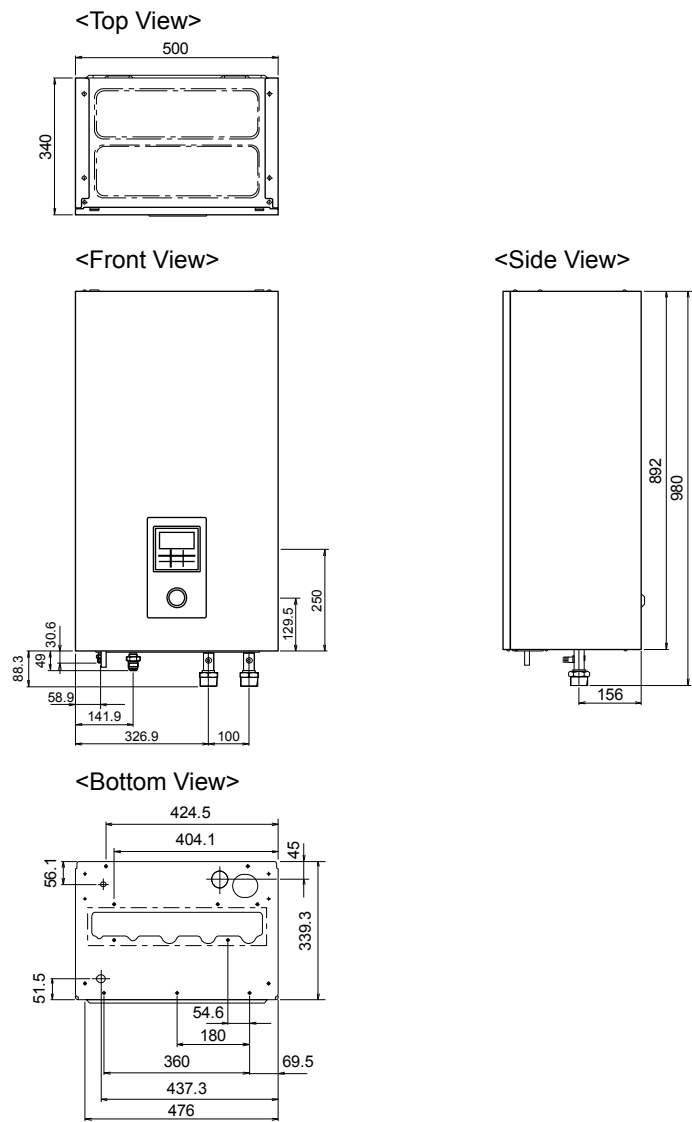
- ① Cabinet front plate
- ② Cabinet front plate (2 pieces)
- ③ Remote controller
- ④ PCB
- ⑤-1 Single Phase RCCB/ELCB (Main Power)
- ⑤-2 Single Phase RCCB/ELCB (Backup Heater)
- ⑥ Control board cover
- ⑦ Control board
- ⑧ Flow sensor
- ⑨ Air purge valve
- ⑩ Backup heater
- ⑪ Overload protector (2 pieces for SXC09*3E5 or 3 pieces for SXC12*6E5)
- ⑫ Expansion vessel
- ⑬ Pressure relief valve
- ⑭ Water pressure gauge
- ⑮ Water filter
- ⑯ Water pump

Outdoor Unit

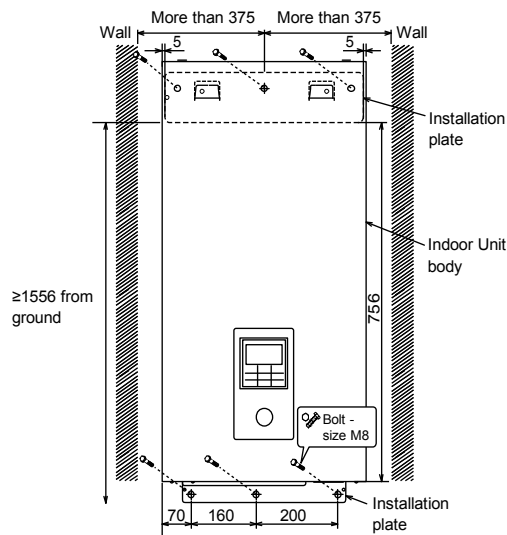


Dimensions

Indoor Unit

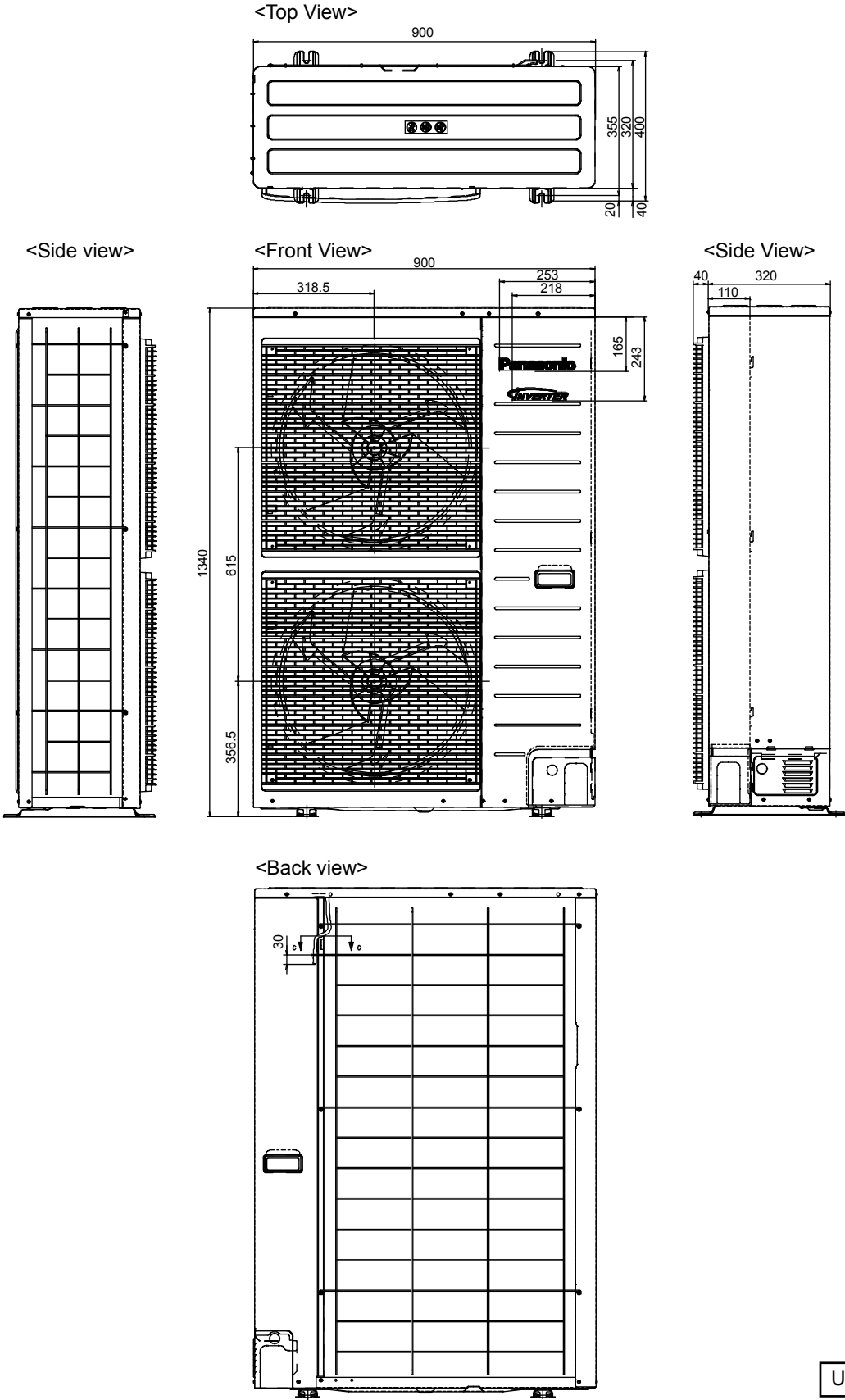


Relative position between the indoor unit and the installation plate <Front View>



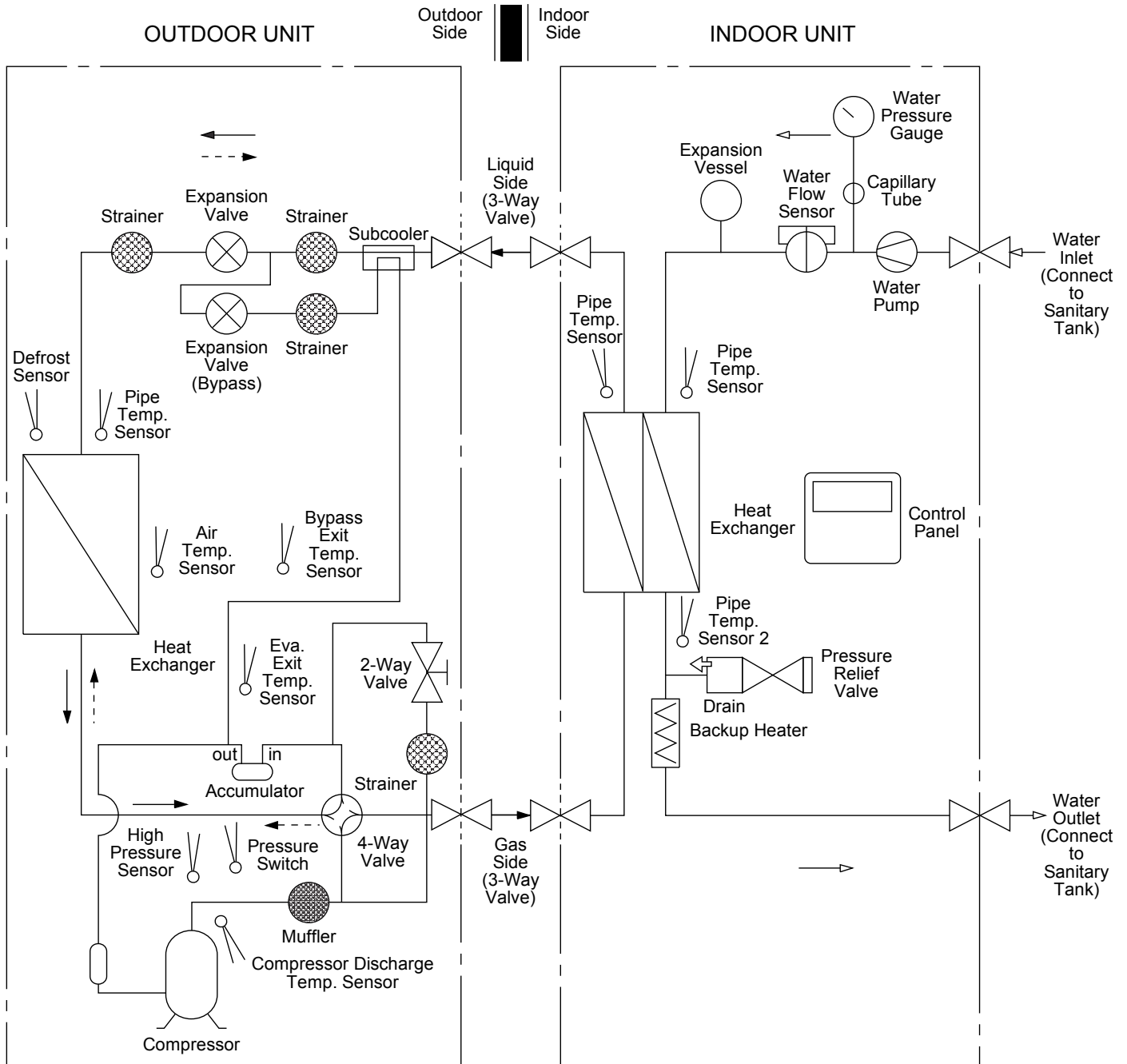
Unit: mm

Outdoor Unit



Unit: mm

Refrigeration and Water Cycle Diagram



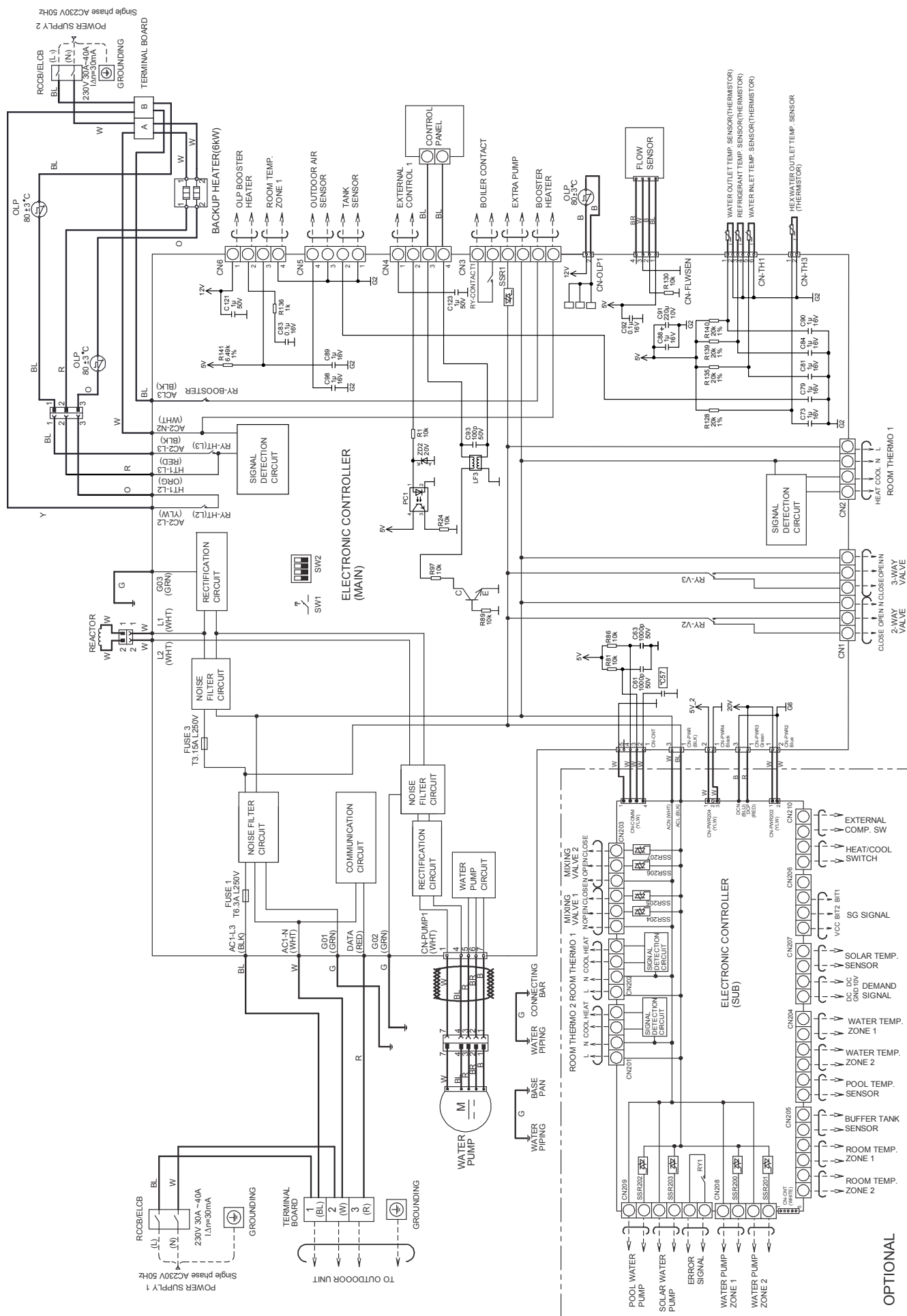
Model	Piping size		Rated Length (m)		Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid	For Heat Pump Indoor Unit	For Hydromodule + Tank				
UX09*E5*, UX12*E5*, UD12*E5*, UD16*E5*, UX09*E8*, UX12*E8*, UX16*E8*, UD09*E8*, UD12*E8*, UD16*E8*	Ø15.88 mm (5/8")	Ø9.52 mm (3/8")	7	5	20	3	30	50

Example:

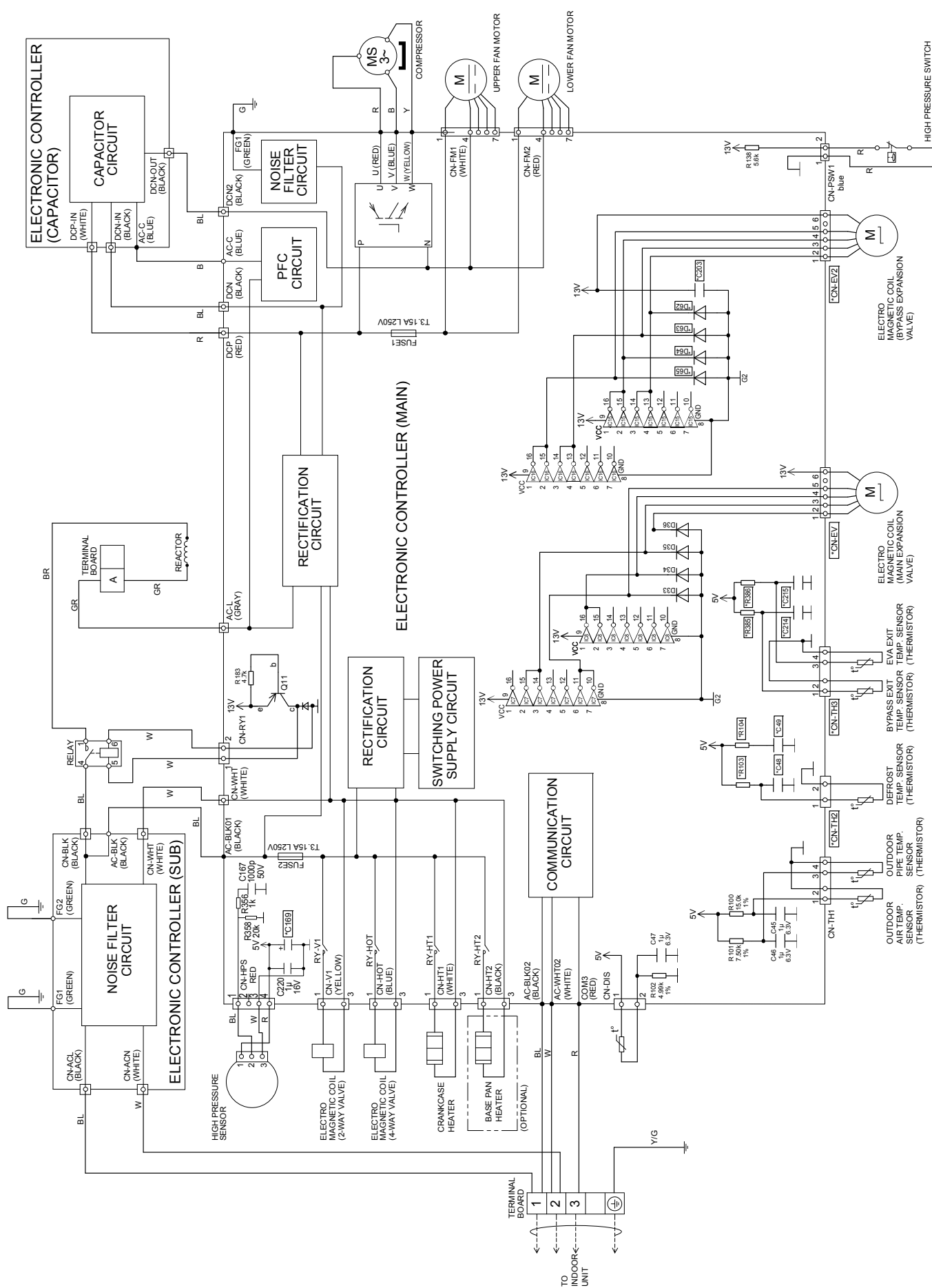
If piping length is 30m, the quantity of additional refrigerant should be 1000g. $[(30-10)m \times 50 \text{ g/m} = 1000\text{g}]$

GWP (R410A) = 2088

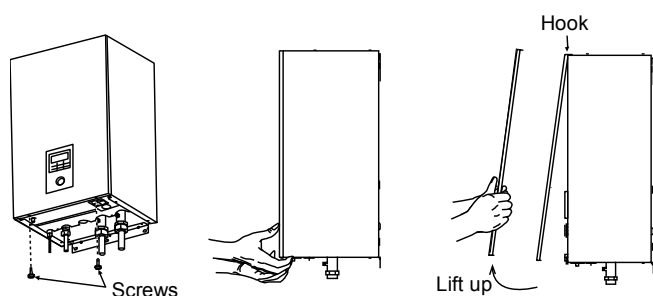
WH-SXC12H6E8



Outdoor Unit

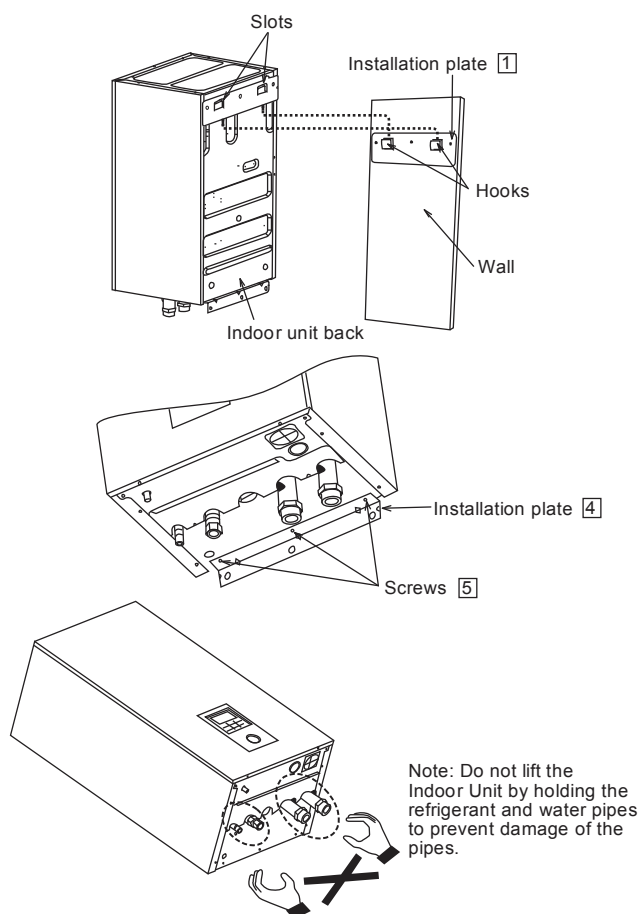


2. Gently pull the lower section of the front plate towards you to remove the front plate from left and right hooks.
3. Hold the left edge and right edge of front plate to lift up front plate from hooks.



Install the indoor unit

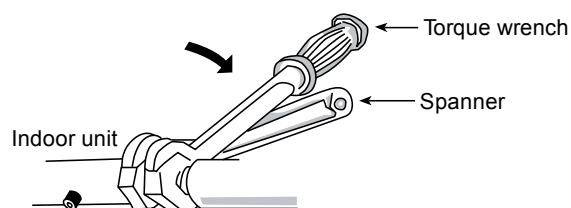
1. Engage the slots on the indoor unit to the hooks of installation plate ①. Ensure the hooks are properly seated on the installation plate by moving it left and right.
2. Fix the screws ⑤ to the holes on the hooks of installation plate ④, as illustrated below.



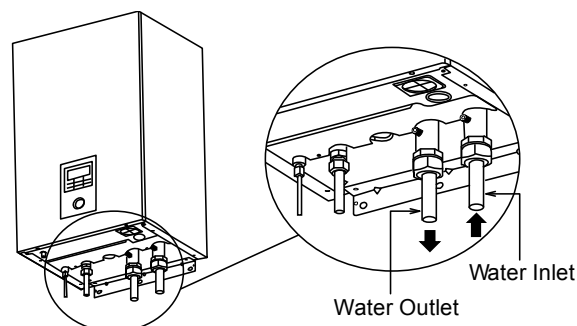
Water Piping Installation

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

- This water circuit must comply with all relevant European and national regulations, i.e. IEC/EN 61770.
- Be careful not to deform the piping to excessive force when doing piping connection job.
- Use Rp 1 ¼" nut for both water inlet and outlet connection and clean all pipings with tap water before connecting to the indoor unit.
- Cover the pipe end to prevent dirt and dust when inserting it through a wall.
- Choose proper sealer which can withstand the pressures and temperatures of the system.
- If an existing tank is to be connected to this indoor unit, ensure the pipes are clean before water pipe installation is carried out.
- Be sure to use two spanners to tighten the connection. Tighten the nuts with torque wrench: 117.6N•m.



- If non-brass metallic piping is used for installation, make sure to insulate the pipes to prevent galvanic corrosion.
- Make sure to insulate the water circuit pipes to prevent reduction of heating capacity.
- After installation, check the water leakage condition in connection area during test run.

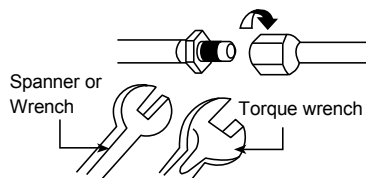


CAUTION

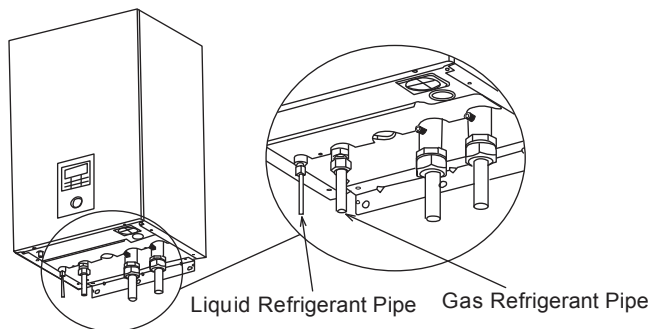
Do not over tighten, over tightening cause water leakage.

Refrigerant Pipe Installation

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



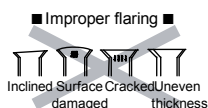
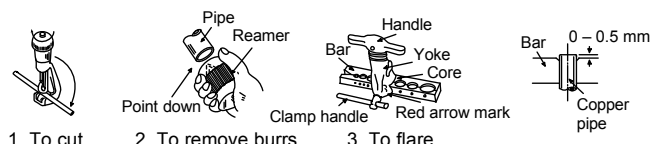
Piping size (Torque)	
Gas	Liquid
ø15.88 mm (5/8") [65 N•m]	Ø9.52 mm (3/8") [42 N•m]



⚠ CAUTION
Do not over tighten, over tightening cause water leakage.
⚠ CAUTION
Please take extra precaution when open the control board cover ⑥ and control board ⑦ for indoor unit installation and servicing. Failure to do so may cause injury.

CUTTING AND FLARING THE PIPING

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

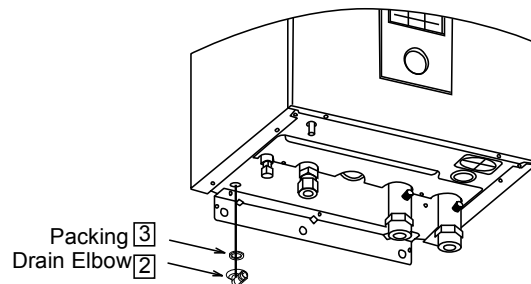


When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

Drain Elbow and Hose Installation

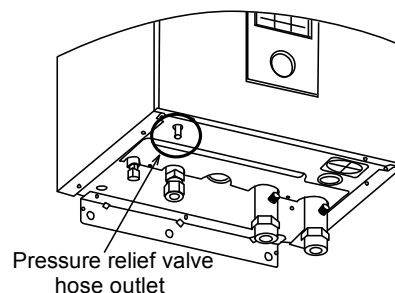
- Fix the drain elbow ② and packing ③ to the bottom of indoor unit, as shown in below illustration.
- Use inner diameter 17 mm drain hose in the market.
- This hose must be installed in a continuously downward direction and in a frost-free environment.
- Guides this hose's outlet to outdoor only.
- Do not insert this hose into sewage or drain pipe that may generate ammonia gas, sulfuric gas, etc.

- If necessary, use hose clamp to further tighten the hose at drain hose connector to prevent leakage.
- Water will drip from this hose, therefore the outlet of this hose must be installed in an area where the outlet cannot become blocked.



Pressure Relief Valve Drainage Pipework

- Connect a drain hose to the pressure relief valve hose outlet.
- This hose must be installed in a continuously downward direction and in a frost-free environment.
- Guides this hose's outlet to outdoor only.
- Do not insert this hose into sewage hose or cleaning hose that may generate ammonia gas, sulfuric gas, etc.
- If necessary, use hose clamp to further tighten the hose at drain hose connector to prevent leakage.
- Water will drip from this hose, therefore the outlet of this hose must be installed in an area where the outlet cannot become blocked.



Connect The Cable To The Indoor Unit

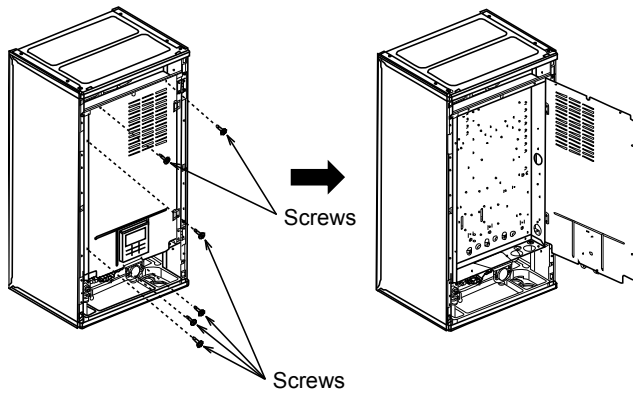
⚠ WARNING
This section is for authorised and licensed electrician only. Work behind the Control Board Cover ⑥ secured by screws must only be carried out under supervision of qualified contractor, installation engineer or service person.

Open the Control Board Cover

⑥

Please follow the steps below to open control board cover. Before opening the control board cover of indoor unit, always switch off all power supply (i.e. indoor unit power supply, heater power supply and Tank Unit power supply).

1. Remove the 6 mounting screws at the control board cover.
2. Swing the control board cover to the right hand side.

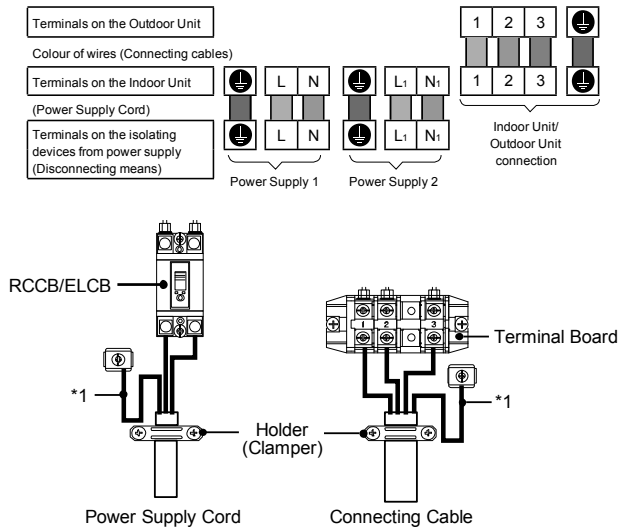


Fixing of Power Supply Cord and Connecting Cable

- Connecting cable between Indoor Unit and Outdoor Unit shall be approved polychloroprene sheathed $4 \times \min 4.0 \text{ mm}^2$ flexible cord, type designation 60245 IEC 57 or heavier cord.
 - Ensure the colour of wires of Outdoor Unit and the terminal no. are the same to the Indoor Unit respectively.
 - Earth wire shall be longer than other wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the Holder (Clamper).
- An isolating device must be connected to the power supply cable.
 - Isolating device (disconnecting means) should have minimum 3.0 mm contact gap.
 - Connect the approved polychloroprene sheathed power supply 1 cord and power supply 2 cord and type designation 60245 IEC 57 or heavier cord to the terminal board, and to the other end of the cord to isolating device (Disconnecting means). See below table for cable size requirement.

Power Supply Cord	Cable Size	Isolating Devices	Recommended RCD
1	$3 \times \min 4.0 \text{ mm}^2$	30A	30mA, 2P, type A
2	$3 \times \min 4.0 \text{ mm}^2$	30A	30mA, 2P, type A

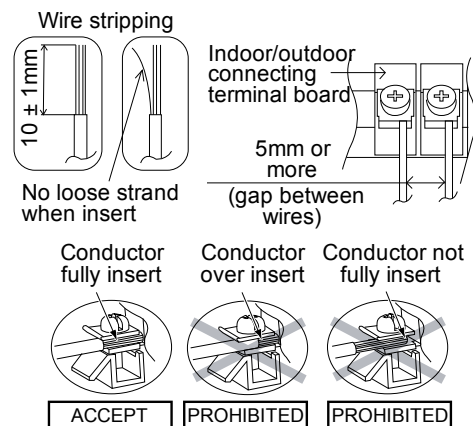
- To avoid the cable and cord being damaged by sharp edges, the cable and cord must be passed through a bushing (located at the bottom of Control Board) before terminal board. The bushing must be used and must not be removed.



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

*1 - Earth wire must be longer than other cables for safety reasons

Wire Stripping and Connecting Requirement



Connecting Requirement

For SXC09*3E5/SXC12*6E5

- 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 1700kW at the interface point between the user's supply and the public system. It is the responsible 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 short circuit power S_{SC} greater than or equal to 1700kW.
- The equipment's power supply 1 complies with IEC/EN 61000-3-11 and shall be connected to a suitable supply net work, having service current capacity $\geq 100A$ per phase. Please liaise with supply authority 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 complies with IEC/EN 61000-3-11 and shall be connected to suitable supply network, with the following maximum permissible system impedance $Z_{max} = 0.271\Omega$ at the interface. Please liaise with supply authority to ensure that the power supply 2 is connected only to a supply of that impedance or less.

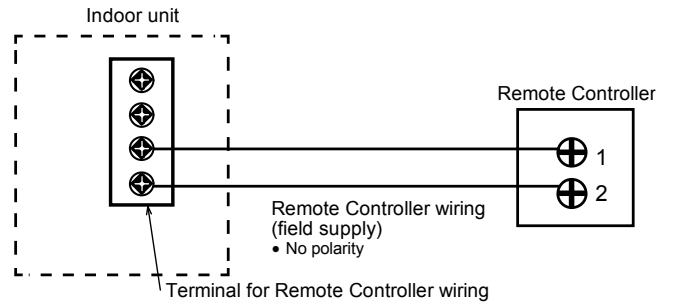
Installation Of Remote Controller As Room Thermostat

- Remote Controller ③ mounted to the Indoor Unit can be moved to the room and serve as Room Thermostat.

Installation Location

- Install at the height of 1 to 1.5 m from the floor (Location where average room temperature can be detected).
- Install vertically against the wall.
- Avoid the following locations for installation.
 1. By the window, etc. exposed to direct sunlight or direct air.
 2. In the shadow or backside of objects deviated from the room airflow.
 3. Location where condensation occurs (The Remote Controller is not moisture proof or drip proof.)
 4. Location near heat source.
 5. Uneven surface.
- Keep distance of 1 m or more from the TV, radio and PC. (Cause of fuzzy image or noise)

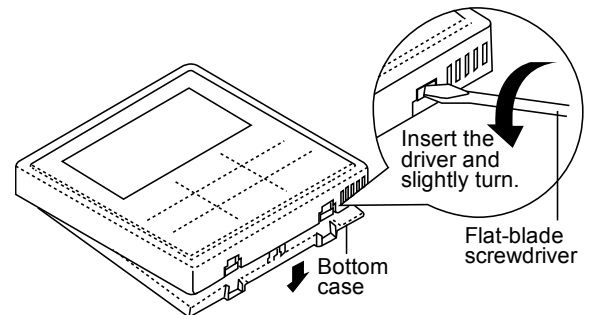
Remote Controller Wiring



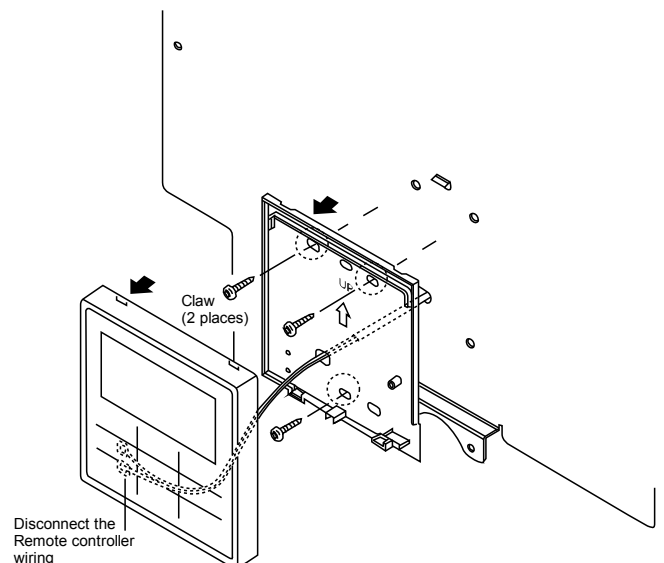
- Remote Controller cable shall be $(2 \times \min 0.3 \text{ mm}^2)$, of double insulation PVC-sheathed or rubber sheathed cable. Total cable length shall be 50 m or less.
- Be careful not to connect cables to other terminals of Indoor Unit (e.g. power source wiring terminal). Malfunction may occur.
- Do not bundle together with the power source wiring or store in the same metal tube. Operation error may occur.

Remove The Remote Controller From Indoor Unit

1. Remove the top case from the bottom case.



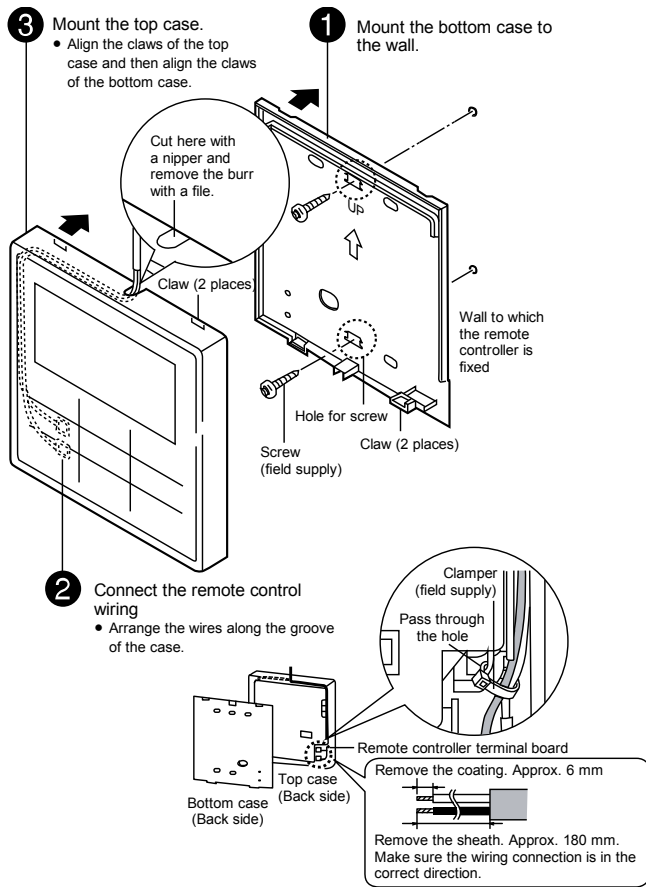
2. Remove the wiring between Remote controller and Indoor Unit terminal. Remove the bottom case from the Control board cover by loosening the screws. (3 pieces)



Mounting The Remote Controller

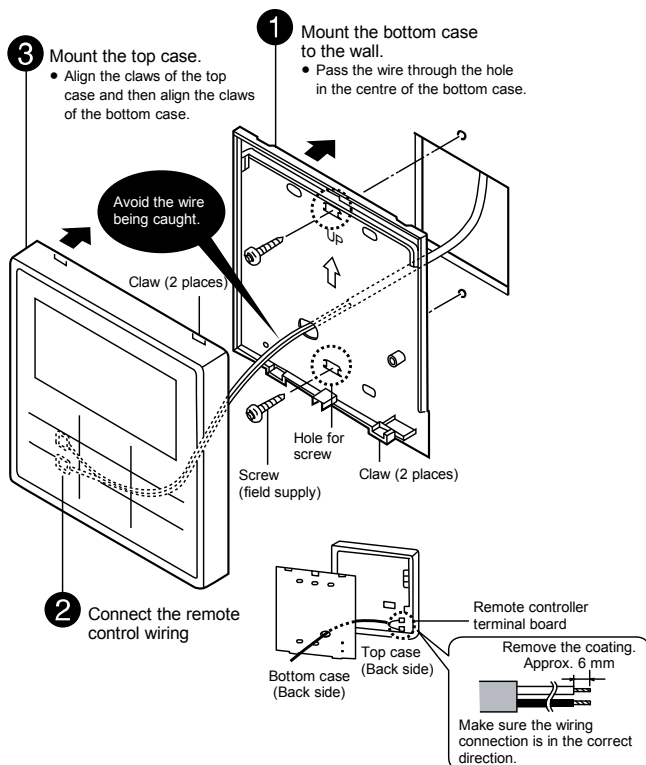
For exposed type

Preparation: Make 2 holes for screws using a driver.



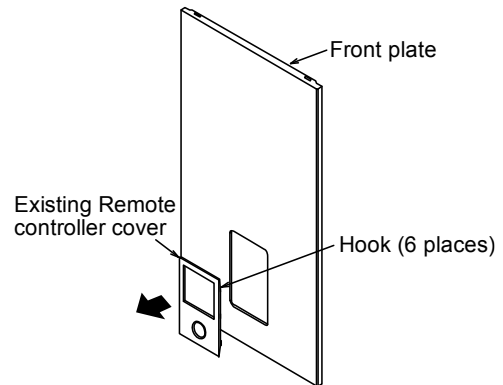
For embedded type

Preparation: Make 2 holes for screws using a driver.

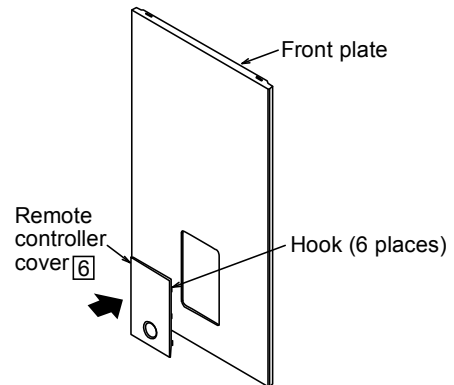


Replace The Remote Controller Cover

- Replace the existing Remote controller cover with Remote controller cover ⑥ to close the hole left after remove the Remote controller.
- Release the Remote controller cover's hooks from behind the front plate.

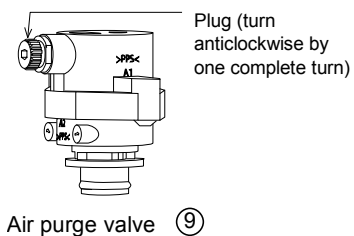


- Press from front to fix the Remote controller cover ⑥ on the front plate.

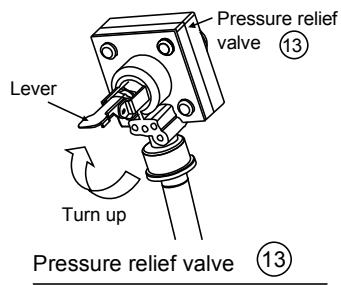


Charging The Water

- Make sure all the piping installations are properly done before carry out below steps.
- Turn the plug on the Air Purge Valve ⑨ outlet anticlockwise by one complete turn from fully closed position.



2. Set the Pressure Relief Valve ⑬ level "DOWN".

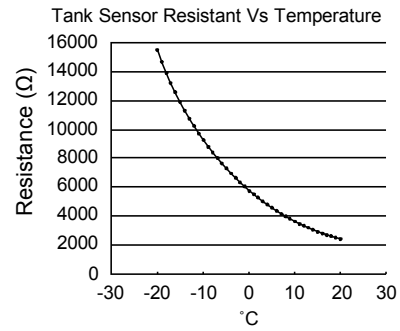


3. Start filling water (with pressure more than 0.1 MPa (1 bar)) to the Indoor Unit via water inlet. Stop filling water if the free water flow through Pressure Relief Valve drain hose.
4. Turn ON the power supply and make sure Water Pump ⑯ is running.
5. Check and make sure no water leaking at the tube connecting points.

How To Fix Cable

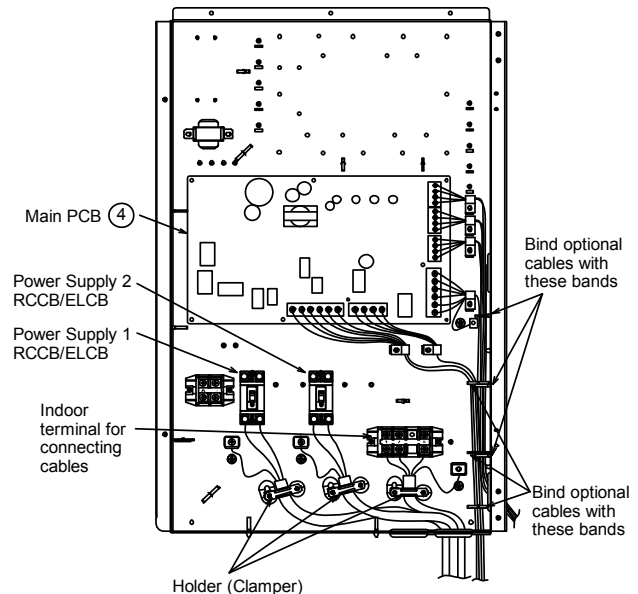
Connecting with external device (optional)

- All connections shall follow to the local national wiring standard.
 - It is strongly recommended to use manufacturer-recommended parts and accessories for installation.
 - For connection to main PCB ④.
1. Two-way valve shall be spring and electronic type, refer to "Field Supply Accessories" table for details. Valve cable shall be $(3 \times \min 1.5 \text{ mm}^2)$, of type designation 60245 IEC 57 or heavier, or similarly double insulation sheathed cable.
* note: - Two-way Valve shall be CE marking compliance component.
- Maximum load for the valve is 9.8VA.
 2. Three-way valve shall be spring and electronic type. Valve cable shall be $(3 \times \min 1.5 \text{ mm}^2)$, 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 9.8VA.
 3. Room thermostat cable must be $(4 \text{ or } 3 \times \min 0.5 \text{ mm}^2)$, of type designation 60245 IEC 57 or heavier cord, or similarly double insulation sheathed cable.
 4. Maximum output power of booster heater shall be $\leq 3 \text{ kW}$. Booster heater cable must be $(3 \times \min 1.5 \text{ mm}^2)$, of type designation 60245 IEC 57 or heavier.
 5. Extra pump cable shall be $(2 \times \min 1.5 \text{ mm}^2)$, of type designation 60245 IEC 57 or heavier.
 6. Boiler contact cable shall be $(2 \times \min 0.5 \text{ mm}^2)$, of type designation 60245 IEC 57 or heavier.
 7. External control shall be connected to 1-pole switch with min 3.0 mm contact gap. Its cable must be $(2 \times \min 0.5 \text{ mm}^2)$, double insulation layer of PVC-sheathed or rubber-sheathed cable.
* note: - Switch used shall be CE compliance component.
- Maximum operating current shall be less than $3A_{\text{rms}}$.
 8. Tank sensor shall be resistance type, please refer to Graph 7.1 for the characteristic and details of sensor. Its cable shall be $(2 \times \min 0.3 \text{ mm}^2)$, double insulation layer (with insulation strength of min 30V) of PVC-sheathed or rubber-sheathed cable.

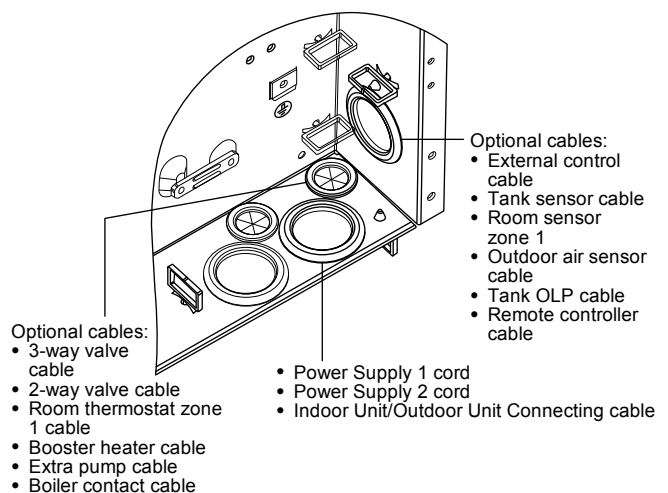


Tank sensor characteristic

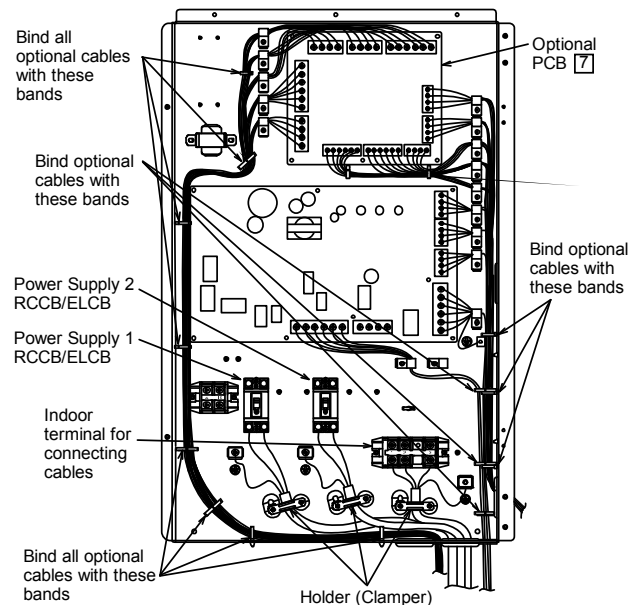
9. Room sensor zone 1 cable shall be $(2 \times \min 0.3 \text{ mm}^2)$ double insulation layer of PVC-sheathed or rubber-sheathed.
10. Outdoor air sensor cable shall be $(2 \times \min 0.3 \text{ mm}^2)$ double insulation layer of PVC-sheathed or rubber-sheathed.
11. Tank OLP cable must be $(2 \times \min 0.5 \text{ mm}^2)$, double insulation layer of PVC-sheathed or rubber-sheathed cable.



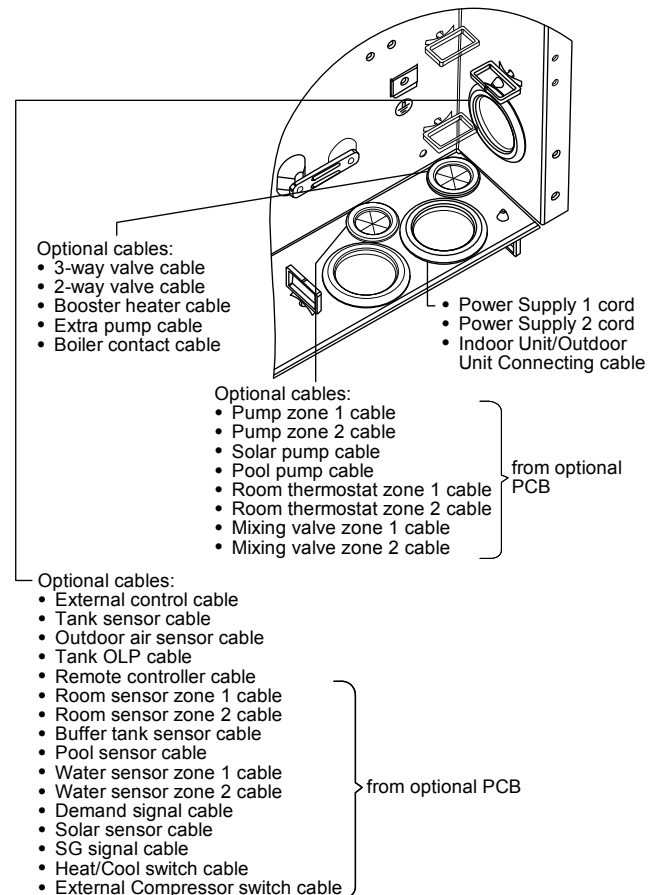
How to guide the optional cables and power supply cord
(view without internal wiring)



- For connection to optional PCB 7
- By connecting optional PCB, 2 Zone temperature control can be achieved. Please connect mixing valves, water pumps and thermistors in zone 1 and zone 2 to each terminals in optional PCB. Temperature of each zone can be controlled independently by remote controller.
 - Pump zone 1 and zone 2 cable shall be ($2 \times \min 1.5 \text{ mm}^2$), of type designation 60245 IEC 57 or heavier.
 - Solar pump cable shall be ($2 \times \min 1.5 \text{ mm}^2$), of type designation 60245 IEC 57 or heavier.
 - Pool pump cable shall be ($2 \times \min 1.5 \text{ mm}^2$), of type designation 60245 IEC 57 or heavier.
 - Room thermostat zone 1 and zone 2 cable shall be ($4 \times \min 0.5 \text{ mm}^2$), of type designation 60245 IEC 57 or heavier.
 - Mixing valve zone 1 and zone 2 cable shall be ($3 \times \min 1.5 \text{ mm}^2$), of type designation 60245 IEC 57 or heavier.
 - Room sensor zone 1 and zone 2 cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer (with insulation strength of minimum 30V) of PVC-sheathed or rubber-sheathed cable.
 - Buffer tank sensor, pool water sensor and solar sensor cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer (with insulation strength of minimum 30V) of PVC-sheathed or rubber-sheathed cable.
 - Water sensor zone 1 and zone 2 cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer of PVC-sheathed or rubber-sheathed cable.
 - Demand signal cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer of PVC-sheathed or rubber-sheathed cable.
 - SG signal cable shall be ($3 \times \min 0.3 \text{ mm}^2$), double insulation layer of PVC-sheathed or rubber-sheathed cable.
 - Heat/Cool switch cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer of PVC-sheathed or rubber-sheathed cable.
 - External compressor switch cable shall be ($2 \times \min 0.3 \text{ mm}^2$), double insulation layer of PVC-sheathed or rubber-sheathed cable.



How to guide the optional cables and power supply cord
(view without internal wiring)



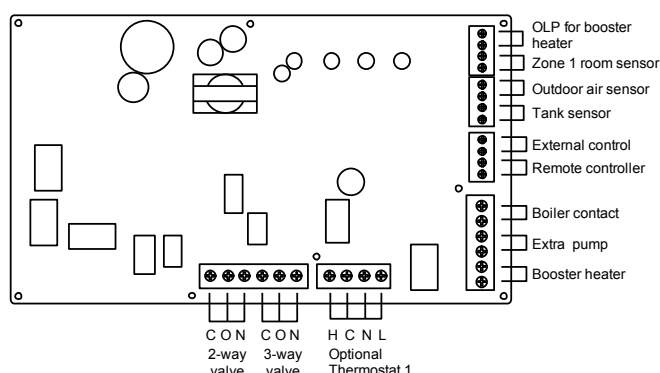
Terminal screw on PCB	Maximum tightening torque cN•m {kgf•cm}
M3	50 {5.1}
M4	120 {12.24}

Connecting Cables Length

When connecting cables between Indoor Unit and external devices, the length of the said cables must not exceed the maximum length as shown in the table.

External device	Maximum cables length (m)
Two-way valve	50
Three-way valve	50
Mixing valve	50
Room thermostat	50
Booster heater	50
Extra pump	50
Solar pump	50
Pool pump	50
Pump	50
Boiler contact	50
External control	50
Tank sensor	30
Room sensor	30
Outdoor air sensor	30
Tank OLP	30
Buffer tank sensor	30
Pool water sensor	30
Solar sensor	30
Water sensor	30
Demand signal	50
SG signal	50
Heat/Cool switch	50
External compressor switch	50

Connection of the main PCB



Signal inputs

Optional Thermostat	L N =AC230V, Heat, Cool=Thermostat heat, Cool terminal * It does not function when using the optional PCB
OLP for booster heater	Dry contact Vcc-Bit1, Vcc-Bit2 open/short (System setup necessary) It is connected to the safety device (OLP) of DHW tank.
External control	Dry contact Open=not operate, Short=operate (System setup necessary) Able to turn ON/OFF the operation by external switch
Remote controller	Connected (Please use 2 cores wire for relocation and extension. Total cable length shall be 50m or less.)

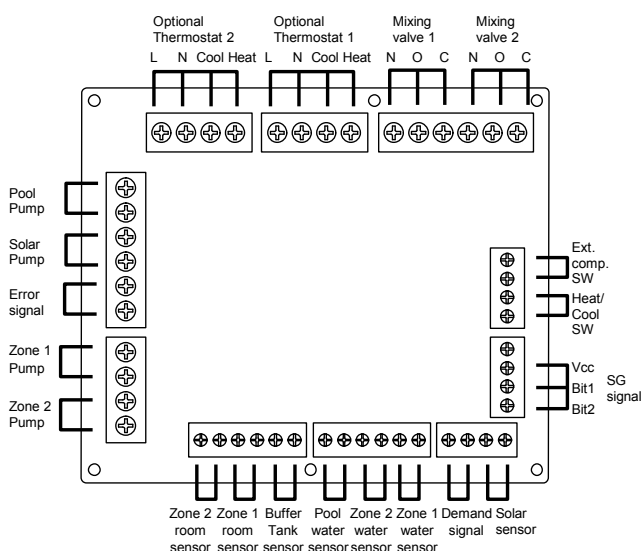
Outputs

3-way valve	AC230V N=Neutral Open, Close=direction (For circuit switching when connected to DHW tank)
2-way valve	AC230V N=Neutral Open, Close (Prevent water circuit pass through during cooling mode)
Extra pump	AC230V (Used when indoor unit pump capacity is insufficient)
Booster heater	AC230V (Used when using booster heater in DHW tank)
Boiler contact	Dry contact (System setup necessary)

Thermistor inputs

Zone 1 room sensor	PAW-A2W-TSRT * It does not work when using the optional PCB
Outdoor air sensor	AW-A2W-TSOD (Total cable length shall be 30m or less)
Tank sensor	Please use Panasonic specified part

Connection of Optional PCB (CZ-NS4P)



Signal inputs

Optional Thermostat	L N =AC230V, Heat, Cool=Thermostat heat, Cool terminal
SG signal	Dry contact Vcc-Bit1, Vcc-Bit2 open/short (System setup necessary) Switching SW (Please connect to the 2 contacts controller)
Heat/Cool SW	Dry contact Open=Heat, Short=Cool (System setup necessary)
External comp. SW	Dry contact Open=Comp.ON, Short=Comp.OFF (System setup necessary)
Demand signal	DC 0~10V (System setup necessary) Please connect to the DC 0~10V controller.

■ Outputs

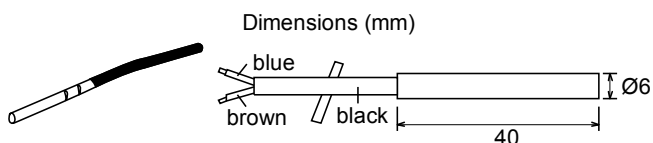
Mixing valve	AC230V N=Neutral Open, Close=mixture direction Operating time: 30s~120s
Pool pump	AC230V
Solar pump	AC230V
Zone pump	AC230V

■ Thermistor inputs

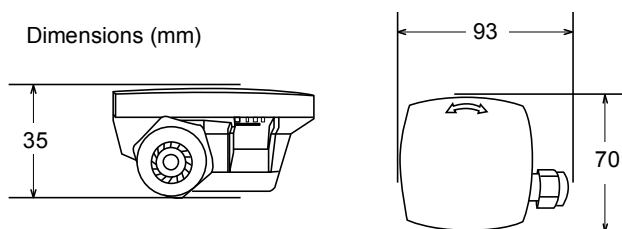
Zone room sensor	PAW-A2W-TSRT
Buffer tank sensor	PAW-A2W-TSBU
Pool water sensor	PAW-A2W-TSHC
Zone water sensor	PAW-A2W-TSHC
Solar sensor	PAW-A2W-TSSO

Recommended External Device Specification

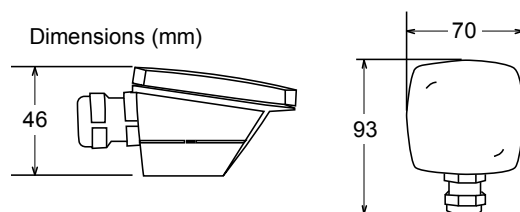
- This section explains about the external devices (optional) recommended by Panasonic. Please always ensure to use the correct external device during system installation.
 - For optional sensor.
1. Buffer tank sensor: PAW-A2W-TSBU
Use for measurement of the buffer tank temperature.
Insert the sensor into the sensor pocket and paste it on the buffer tank surface.



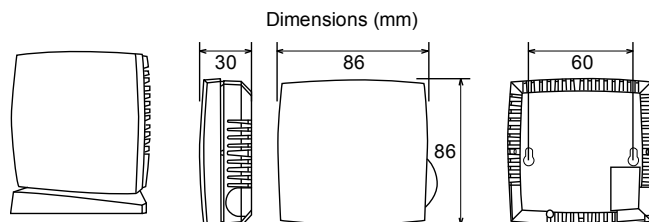
2. Zone water sensor: PAW-A2W-TSHC
Use to detect the water temperature of the control zone.
Mount it on the water piping by using the stainless steel metal strap and contact paste (both are included).



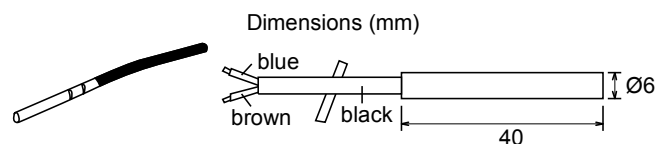
3. Outdoor sensor: PAW-A2W-TSOD
If the installation location of the outdoor unit is exposed to direct sunlight, the outdoor air temperature sensor will be unable to measure the actual outdoor ambient temperature correctly. In this case, optional outdoor temperature sensor can be fixed at a suitable location to more accurately measure ambient temperature.



4. Room sensor: PAW-A2W-TSRT
Install the room temperature sensor to the room which requires room temperature control.



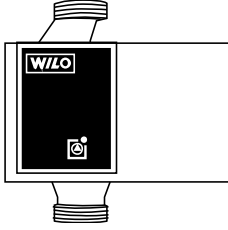
5. Solar sensor: PAW-A2W-TSSO
Use for measurement of the solar panel temperature.
Insert the sensor into the sensor pocket and paste it on the solar panel surface.



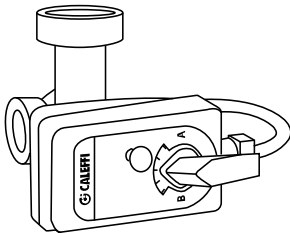
6. Please refer to the table below for sensor characteristic of the sensors mentioned above.

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
30	5.326	150	0.147
25	6.523	140	0.186
20	8.044	130	0.236
15	9.980	120	0.302
10	12.443	110	0.390
5	15.604	100	0.511
0	19.70	90	0.686
-5	25.05	80	0.932
-10	32.10	70	1.279
-15	41.45	65	1.504
-20	53.92	60	1.777
-25	70.53	55	2.106
-30	93.05	50	2.508
-35	124.24	45	3.003
-40	167.82	40	3.615
		35	4.375

- For optional pump.
Power supply: AC230V/50Hz, <500W
Recommended part: Yonos 25/6: made by Wilo



- For optional mixing valve.
Power supply: AC230V/50Hz (input open/output close)
Operating time: 30s~120s
Recommended part: 167032: made by Caleffi



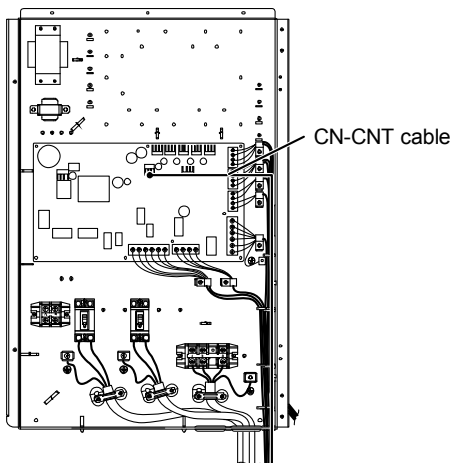
WARNING

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.

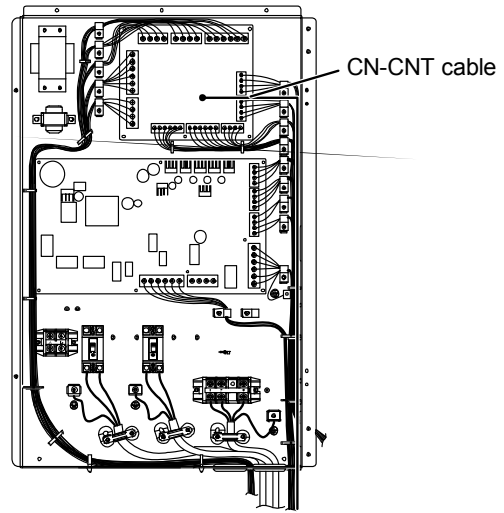
Network Adaptor 8 Installation (Optional)

- Open the Control Board Cover ⑥, then connect the cable included with this adaptor to the CN-CNT connector on the printed circuit board.
- Pull the cable out of the Indoor Unit so that there is no pinching.
- If an optional PCB has been install in the Indoor Unit, connect the CN-CNT connector to Optional PCB ⑦.

Connection examples : H series

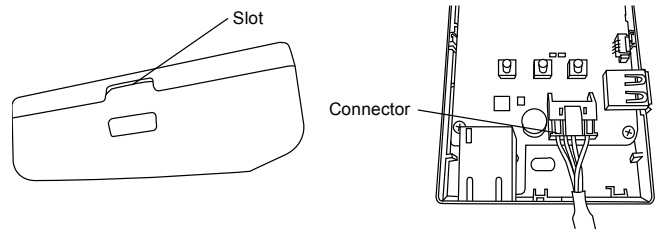


Without Optional PCB

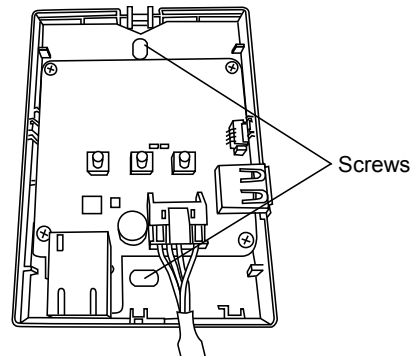


With Optional PCB

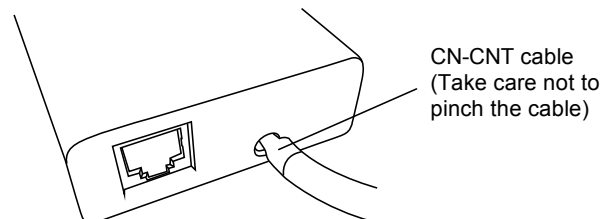
- Insert a flat head screwdriver into the slot on the top of the adaptor and remove the cover. Connect the other end of the CN-CNT cable connector to the connector inside the adaptor.



- On the wall near the Indoor Unit, attach the adaptor by screwing screws through the holes in the back cover.



- Pull the CN-CNT cable through the hole in the bottom of the adaptor and re-attach the front cover to the back cover.

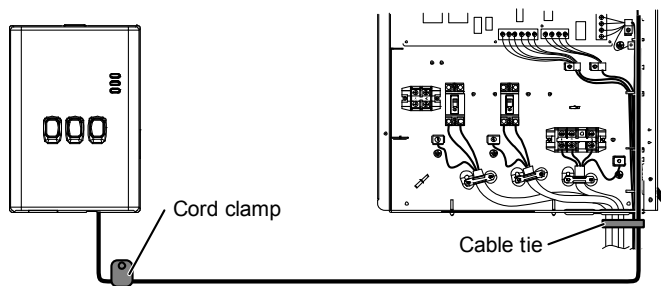


CN-CNT cable
(Take care not to pinch the cable)

5. **Use the included cord clamp to fix the CN-CNT cable to the wall.**

Pull the cable around as shown in the diagram so that external forces cannot act on the connector in the adaptor.

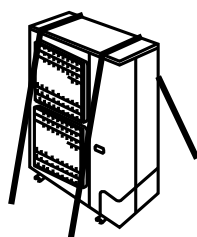
Furthermore, on the Indoor Unit end, use the included cable tie to fix the cables together.



Outdoor Unit

Select the Best Location

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- Avoid installations in areas where the ambient temperature may drop below -20°C for UD models and -28°C for UX models.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If outdoor unit installed near sea, region with high content of sulphur or oily location (e.g. machinery oil, etc), its lifespan may be shortened.
- 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)



- If piping length is over 10 m, additional refrigerant should be added as shown in the table.

Model	Piping size		Rated Length (m)		Max. Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid	For Heat Pump Indoor Unit	For Hydromodule + Tank				
UX09*E5*, UX12*E5*, UD12*E5*, UD16*E5*, UX09*E8*, UX12*E8*, UX16*E8*, UD09*E8*, UD12*E8*, UD16*E8*	ø15.88 mm (5/8")	ø9.52 mm (3/8")	7	5	20	3	30	50

Example:

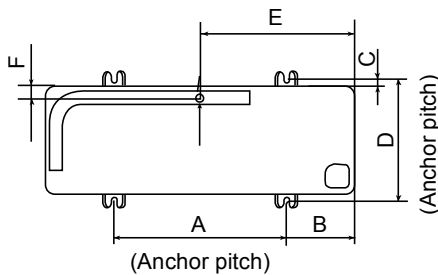
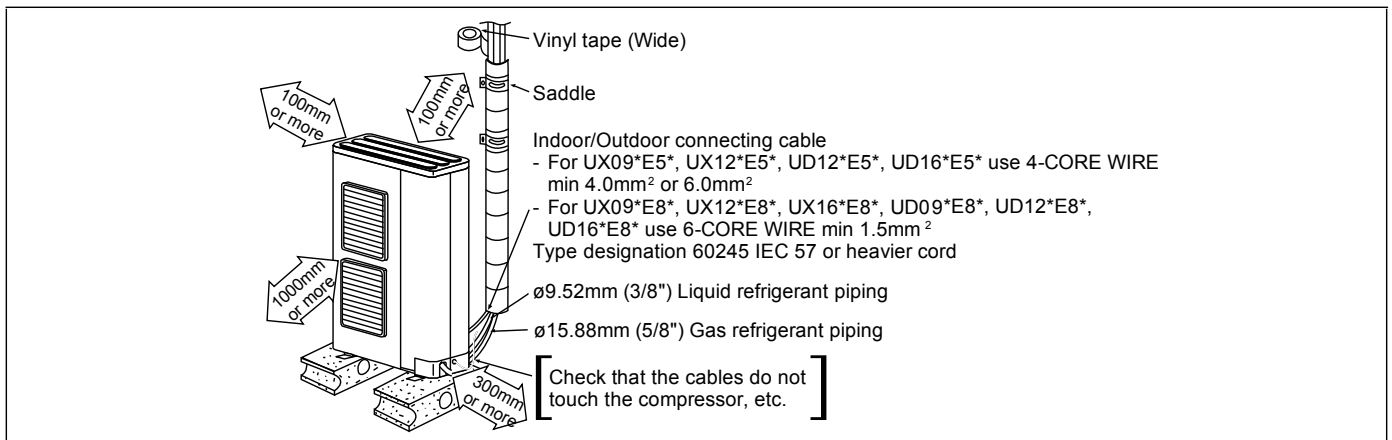
If piping length is 30 m, the quantity of additional refrigerant should be 1000g. [(30-10)m × 50 g/m = 1000g]

GWP (R410A) = 2088

Install The Outdoor Unit

Installation Diagram

- It is advisable to avoid more than 2 blockage directions. For better ventilation & multiple-outdoor installation, please consult authorized dealer/specialist.
- This illustration is for explanation purposes only.



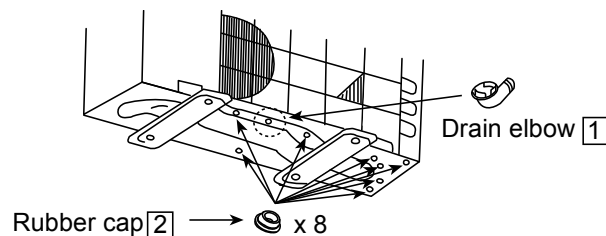
Model	A	B	C	D	E	F
UX09*E5*, UX12*E5*, UD12*E5*, UD16*E5*, UX09*E8*, UX12*E8*, UX16*E8*, UD09*E8*, UD12*E8*, UD16*E8*	620	140	15	355	450	44

(Unit : mm)

- After selecting the best location, start installation according to Installation Diagram.
- Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø10 mm).
 - When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.

Disposal of Outdoor Unit Drain Water

- When a Drain elbow [1] is used, please ensure to follow below:
 - the unit should be placed on a stand which is taller than 50 mm.
 - cover the ø20 mm holes with Rubber cap [2] (refer to illustration below).
 - use a tray (field supply) when necessary to dispose the outdoor unit drain water.
- If the unit is used in an area where temperature falls below 0°C for 2 or 3 consecutive days, it is recommended not to use the Drain elbow [1] and Rubber cap [2], for the drain water freezes and the fan will not rotate.



Connecting The Piping

 CAUTION
Do not over tighten, over tightening cause gas leakage.

Model	Piping size (Torque)	
	Gas	Liquid
UX09*E5*, UX12*E5*, UD12*E5*, UD16*E5*, UX09*E8*, UX12*E8*, UX16*E8*, UD09*E8*, UD12*E8*, UD16*E8*	ø15.88 mm (5/8") [65 N•m]	ø9.52 mm (3/8") [42 N•m]

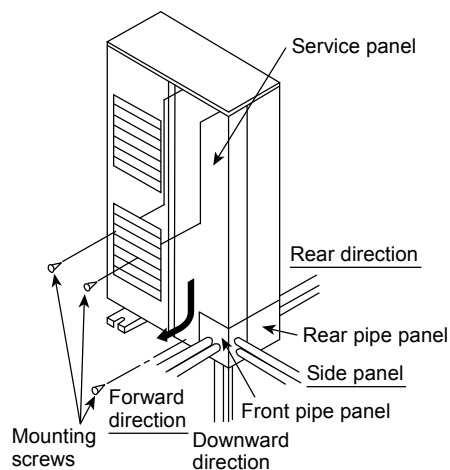
Connecting the Piping to Outdoor Unit

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

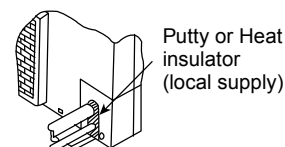
Local pipes can project in any of four directions.

- Make holes in the pipe panels for the pipes to pass through.
- Be sure to install the pipe panels to prevent rain from getting inside the outdoor unit.
[Removing the service panel].
 1. Remove the three mounting screws.
 2. Slide the service panel downward to release the pawls.

After this, pull the service panel toward you to remove it.

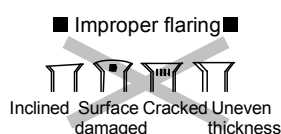
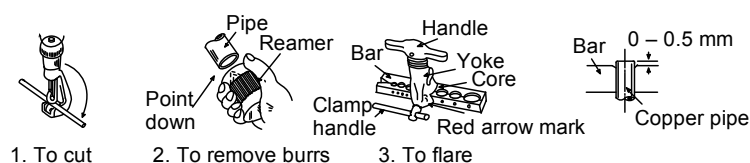


Close the tube joining area with putty heat insulator (local supply) without any gap as shown in right figure. (To prevent insects or small animal entering.)



CUTTING AND FLARING THE PIPING

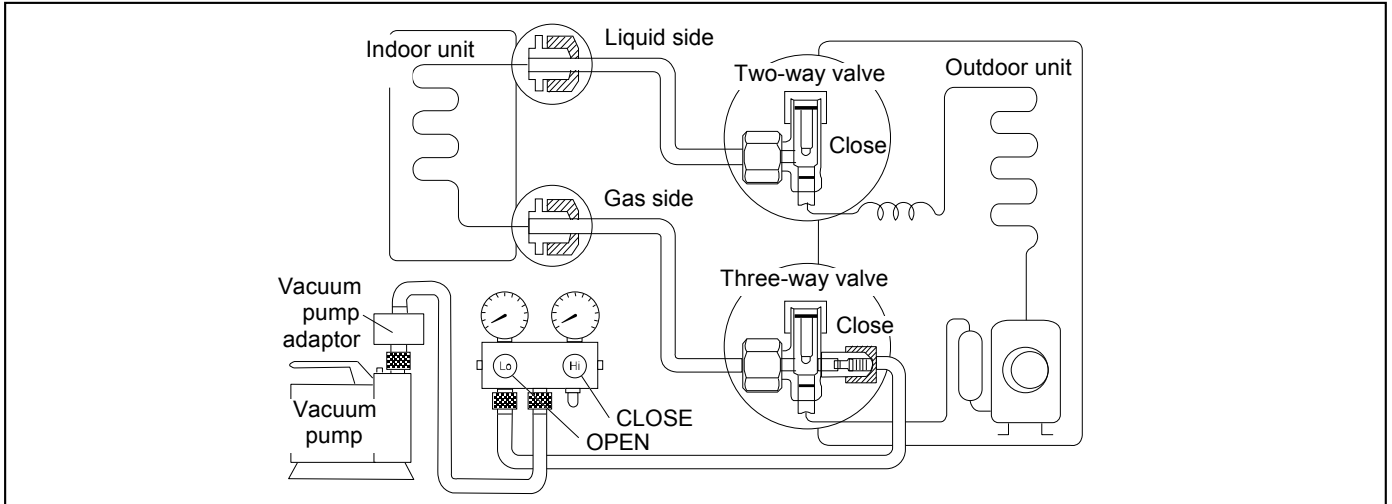
1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.
Turn the piping end down to avoid the metal powder entering the pipe.
3. Please make flare after inserting the flare nut onto the copper pipes.



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

Evacuation Of The Equipment

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



- 1 Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
 - Be sure to connect the end of the charging hose with the push pin to the service port.
- 2 Connect the center hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.
- 3 Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa). Then evacuate the air approximately ten minutes.
- 4 Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.
Note: BE SURE TO FOLLOW THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
- 5 Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
- 6 Tighten the service port caps of the 3-way valve at a torque of 18 N•m with a torque wrench.
- 7 Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "OPEN" using a hexagonal wrench (4 mm).
- 8 Mount valve caps onto the 2-way valve and the 3-way valve.
 - Be sure to check for gas leakage.

CAUTION

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

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

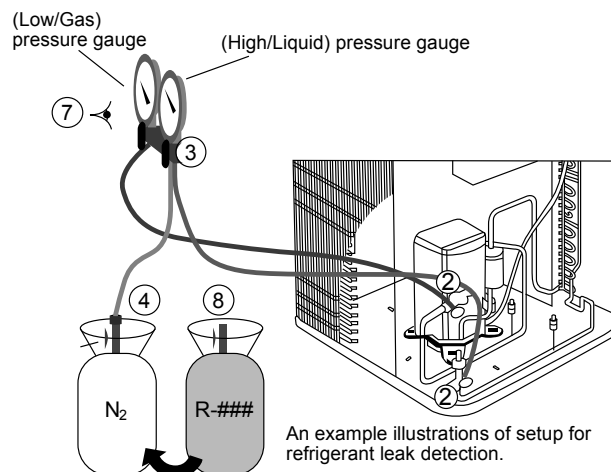
Air-Tightness Test on the Refrigerating System

Before system charged with refrigerant and before the refrigerating system in put into operation, below site test procedure and acceptance criteria shall be verified by the certified technicians, and/or the installer:-

Step 1: Pressure test for refrigerant leak detection:

1. Steps for pressure test, in accordance to ISO 5149.
2. Evacuate the system from refrigerant before the leak test, attach the gauge manifold set correctly and tightly. Charging hose of Low side connect to Gas side. (Charging hose of High side connect to Liquid side if applicable.)
3. Adjust the knob on the service valves, and regulator on the gauge set, so that test gas can be inserted through the centre manifold of the gauge set.
4. Insert Nitrogen gas into the system through the centre manifold and wait until the pressure within the system to reach about 1MPa (10 BarG) wait for a few hours and monitor the pressure reading on the gauges.
5. Please note that the system's pressure may rise slightly if the test is carried out on mid day, due to temperature rise. The inverse may happen when there is temperature drop at night. However, this variation will be minimal.
6. Waiting time depends on the size of the system. Larger systems may require 12 hours of waiting time. Leak detection within smaller system can be achieved in 4 hours.
7. Check if there is a constant pressure drop. Move to next step "Step 2: Refrigerant leak detection..." if there is any pressure drop. Otherwise, release the Nitrogen gas and, move to "Step 3: Vacuum test".

8. Next, insert a small amount of same refrigerant into the system through the centre hose, until the pressure reaches about 1MPa (10 BarG).



Step 2: Refrigerant leak detection through Electronic halogen leak detector and/or ultrasonic leak detector:

1. Use any one of below detector to check leaking.

- Electronic halogen leak detector.
 - Switch on the unit.
 - Cover the test area from direct draft.
 - Pass the detection probe near test area and wait for audible and visible signals.
- Ultrasonic Leak Detector
 - Make sure the area is quiet.
 - Switch on the ultrasonic leak detector.
 - Move the probe along your air conditioning system to test for leaks, and mark for repair.

2. Any leak detected at this level shall be repaired and retested, starting from “Step 1: Pressure test”.

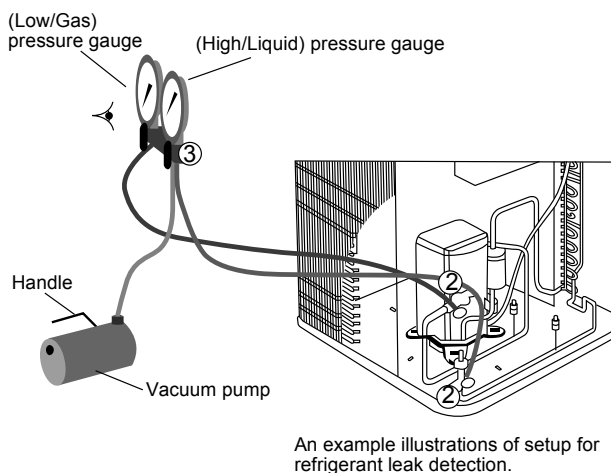
NOTE:

- Always recover the refrigerant and Nitrogen gas into recovery cylinder after completion of a test.
- You must use the detection equipment with Detectable Leak Rate of 10^{-6} Pa.m₃/s or better.
- Do not use refrigerant as test medium for system with total refrigerant charge more than 5kg.
- Test shall be performed with dry Nitrogen or another non-flammable, non-reactive, dried gas. Oxygen, air or mixtures containing them shall not be used.

Step 3: Vacuum test:

1. Perform Vacuum test to check leak / moisture if present.
2. Refer to section “EVACUATION OF THE EQUIPMENT” to vacuum gas out of the air conditioning system.
3. Wait for a few hours, depending on the size of the refrigerating system and monitor the pressure rise.
 - If the pressure rises until 1 bar absolute, then there is leak.
 - If the pressure rises, but it is lower than 1 bar absolute, then moisture is present.

Next, remove the moisture, or repair, and redo the refrigerant leak testing, starting from “Step 1: Pressure test”.



Connect The Cable To The Outdoor Unit

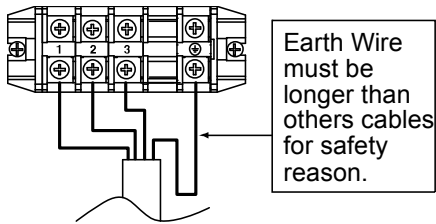
(FOR DETAIL REFER TO WIRING DIAGRAM AT UNIT)

1. Remove the control board cover from the unit by loosening the screw.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed flexible cable (see below table), type designation 60245 IEC 57 or heavier cable.
3. Secure the cable onto the control board with the holder (clammer).
4. Attach the control board cover back to the original position with screw.

⚠ WARNING	
⚡ This equipment must be properly earthed.	

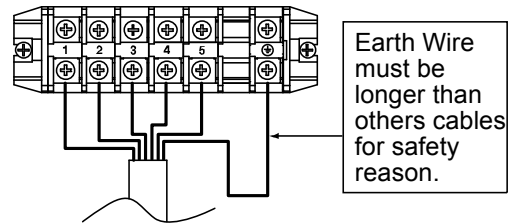
Models	Flexible cable specification
UX09*E5*, UX12*E5*, UD12*E5*, UD16*E5*	4 × min 4.0 mm ² or 6.0 mm ²

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



Models	Flexible cable specification
UX09*E8*, UX12*E8*, UX16*E8*, UD09*E8*, UD12*E8*, UD16*E8*	6 × min 1.5 mm ²

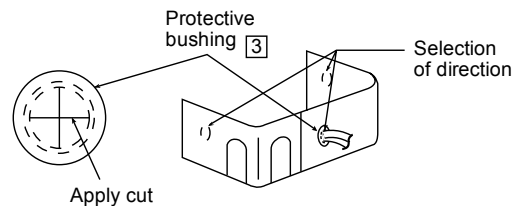
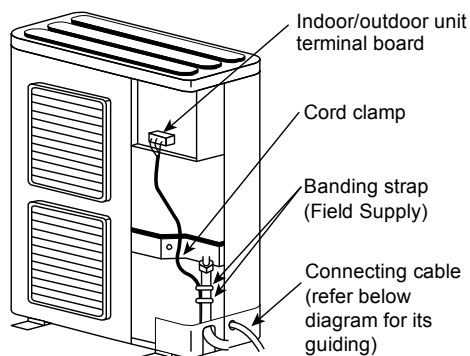
Terminals on the indoor unit	1	2	3	4	5	⚡
Colour of wires						
Terminals on the outdoor unit	1	2	3	4	5	⚡



⚠ CAUTION	
• For three phase model never operate the unit by pressing the electromagnetic switch. • Never correct the phase by switching over any of the wires inside the unit.	

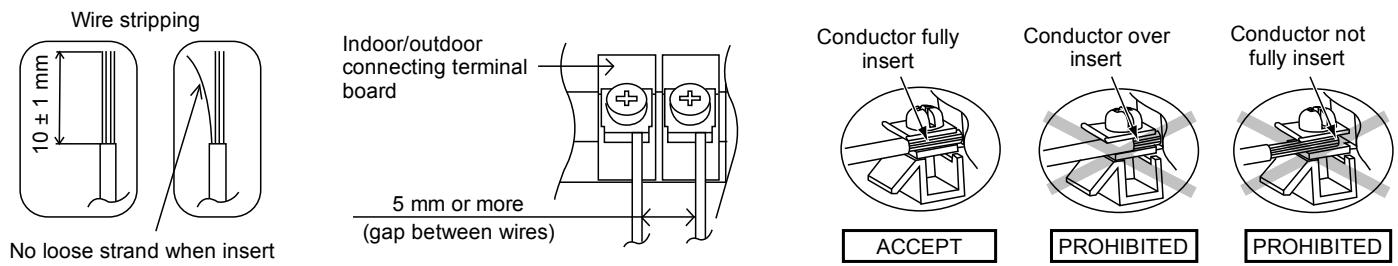
- Select required direction and apply protective bushing provided in accessories to protect cables from sharp edges.
- Once all wiring work has been completed, tie the cable and cord together with the binding strap so that they do not touch other parts such as the compressor and bare copper pipes.

Outdoor Unit



DETAIL OF CONNECTING CABLE GUIDING

WIRE STRIPPING AND CONNECTING REQUIREMENT



Pipe Insulation

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

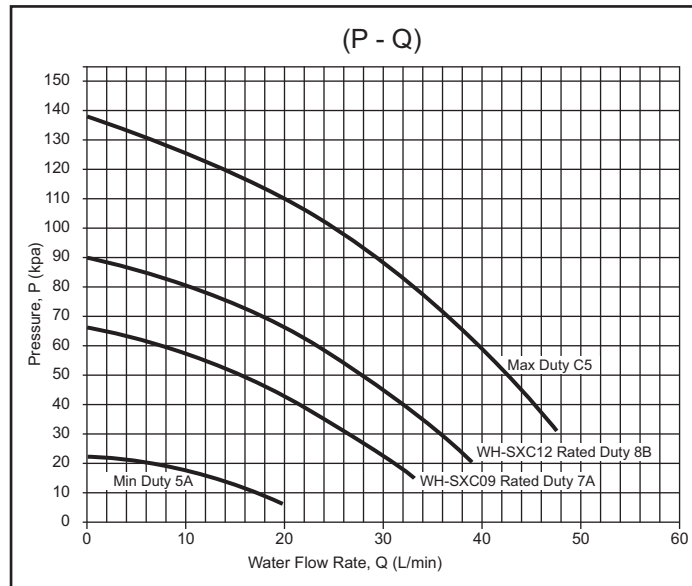
Maximum pump speed setting on remote control

- Standard pump speed is automatically controlled to get the designed water temperature different between water inlet and outlet (ΔT). Instead of setting the standard pump speed, maximum pump speed is manually adjusted by the installer according to water circuit pressure drop.

However, the following sequences do not follow maximum pump duty setting by remote control.

- Pump down mode
- Air purge mode
- Normal deice

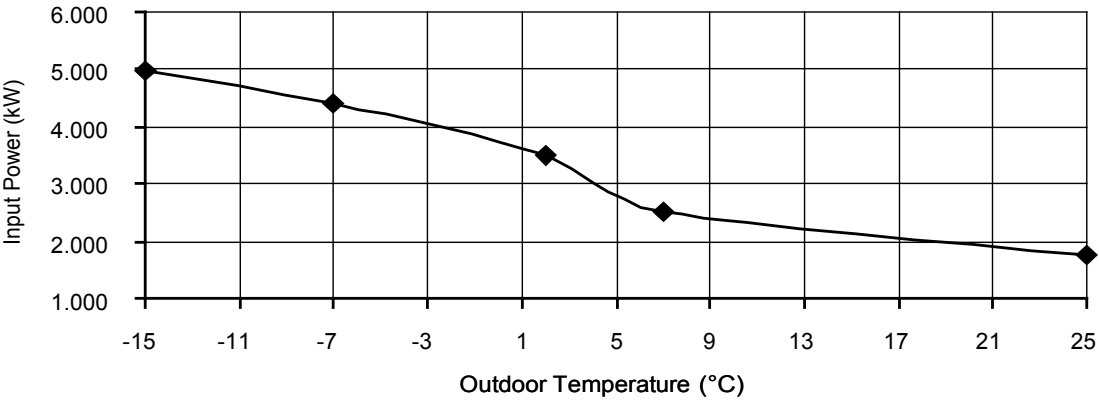
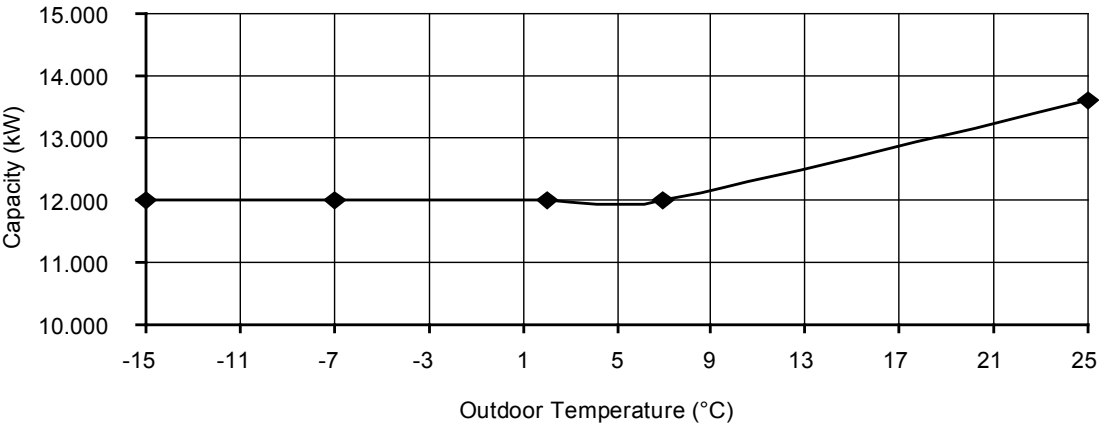
1) P-Q graph for different pump HEX duty



WH-SXC12H6E5 WH-UX12HE5

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



Cooling Characteristics at Different Outdoor Air Temperature

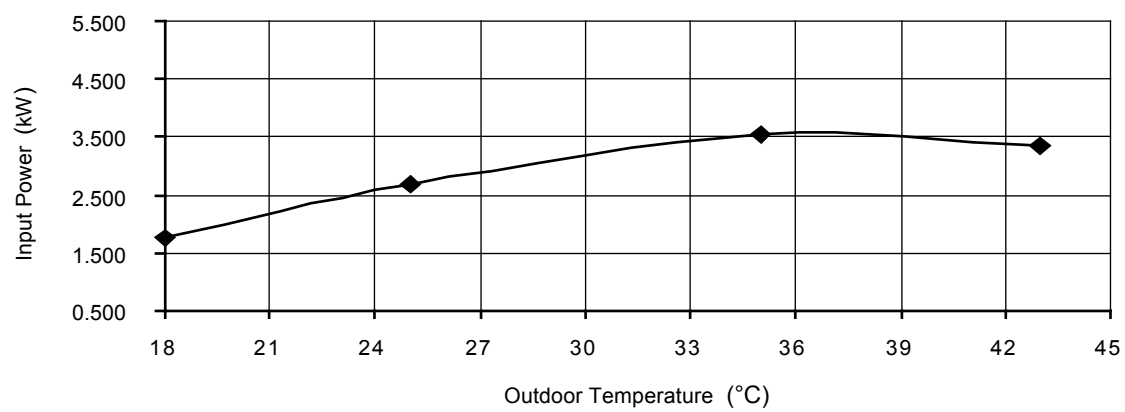
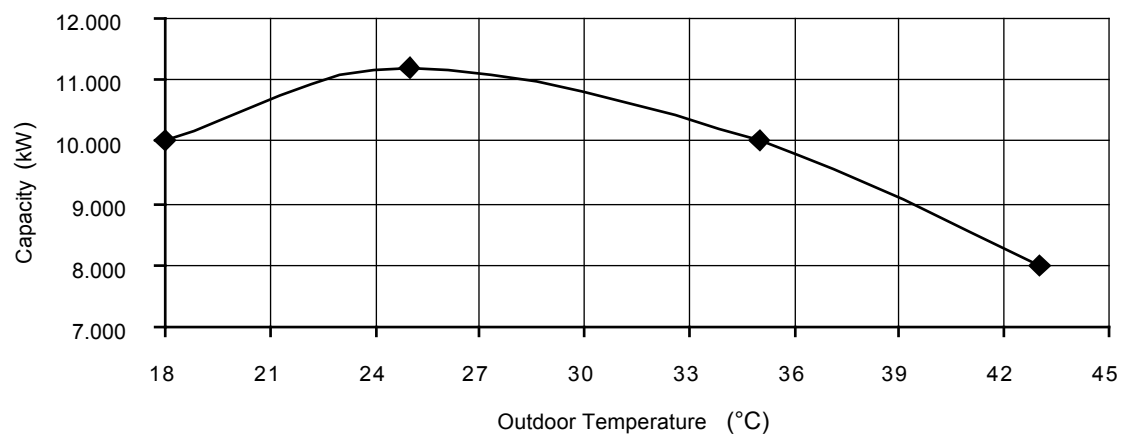
Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 12°C

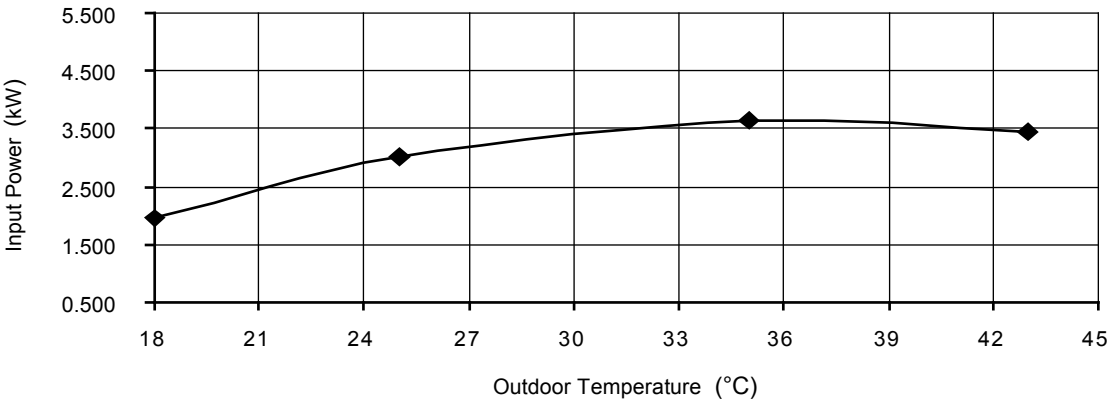
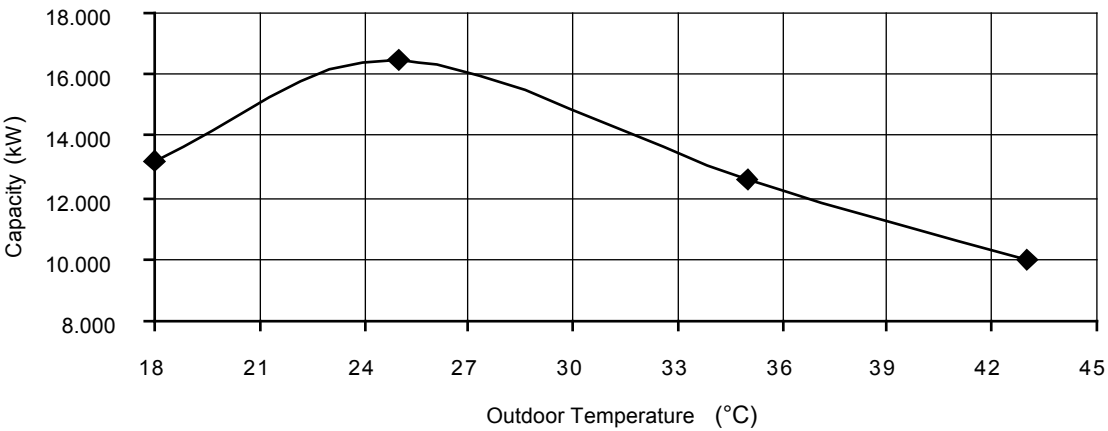
Indoor water outlet temperature : 7°C

Piping length : 7 m



Cooling Characteristics at Different Outdoor Air Temperature

Condition
Outdoor air temperature : 35°C (DBT), -°C (WBT)
Indoor water inlet temperature : 19°C
Indoor water outlet temperature : 14°C
Piping length : 7 m



Cooling Characteristics at Different Outdoor Air Temperature

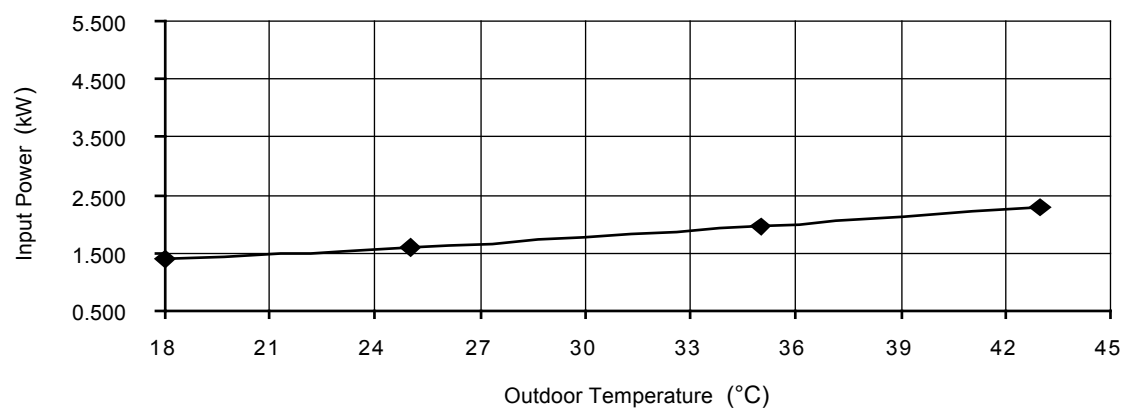
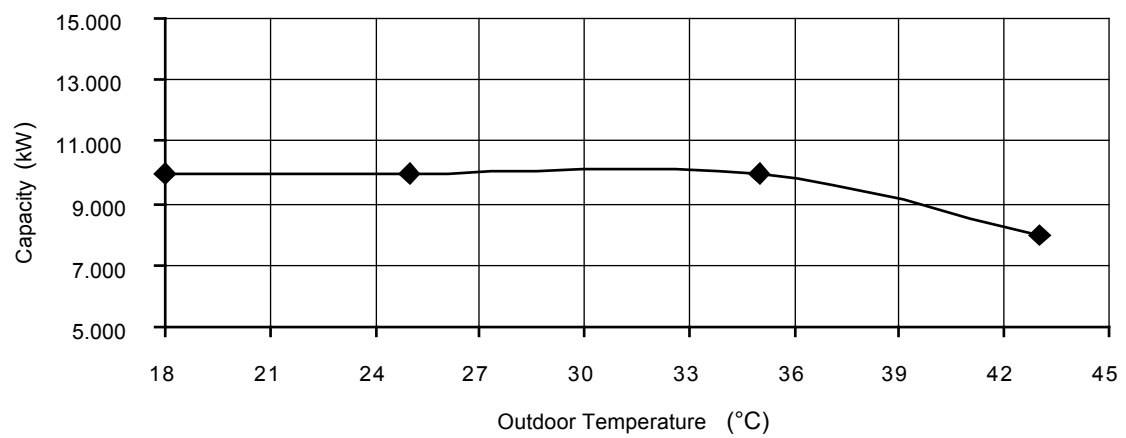
Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 23°C

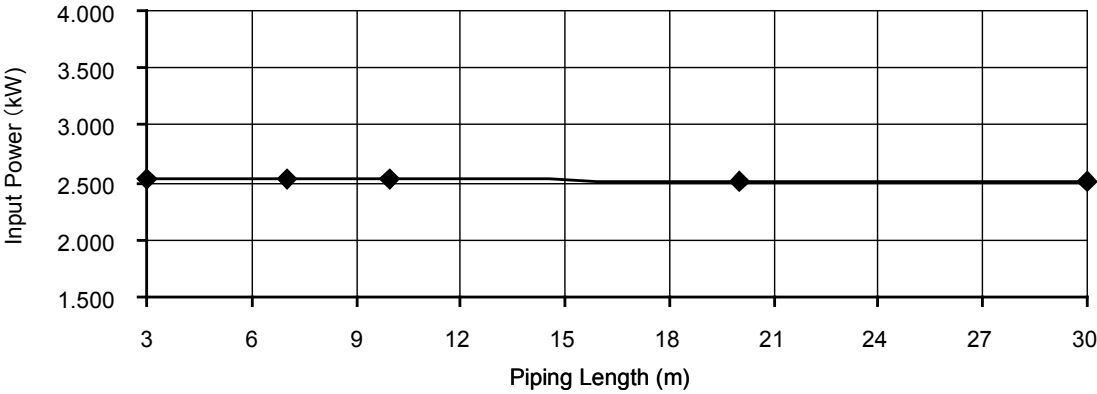
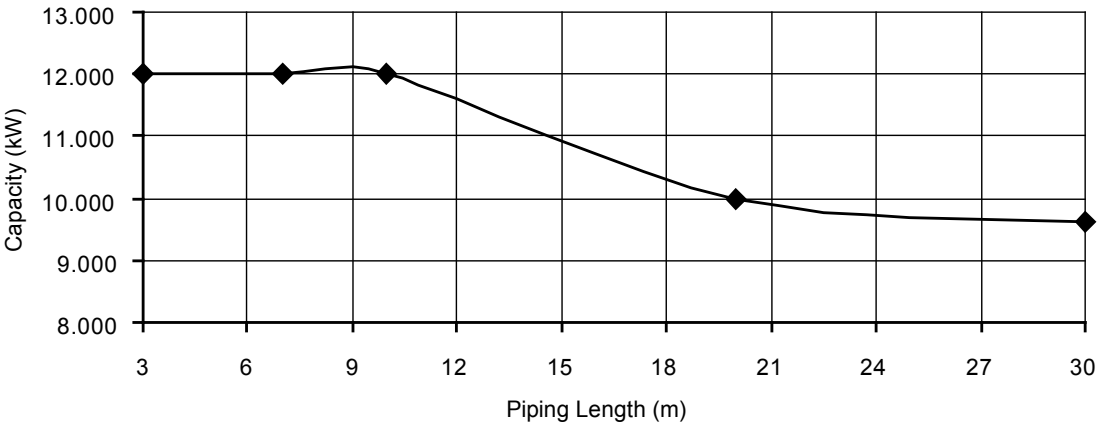
Indoor water outlet temperature : 18°C

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



Cooling Characteristics at Different Piping Length

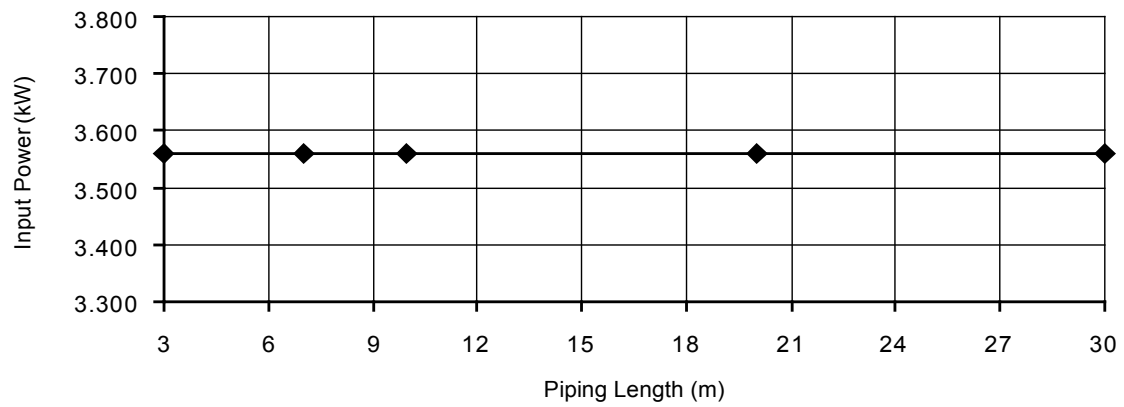
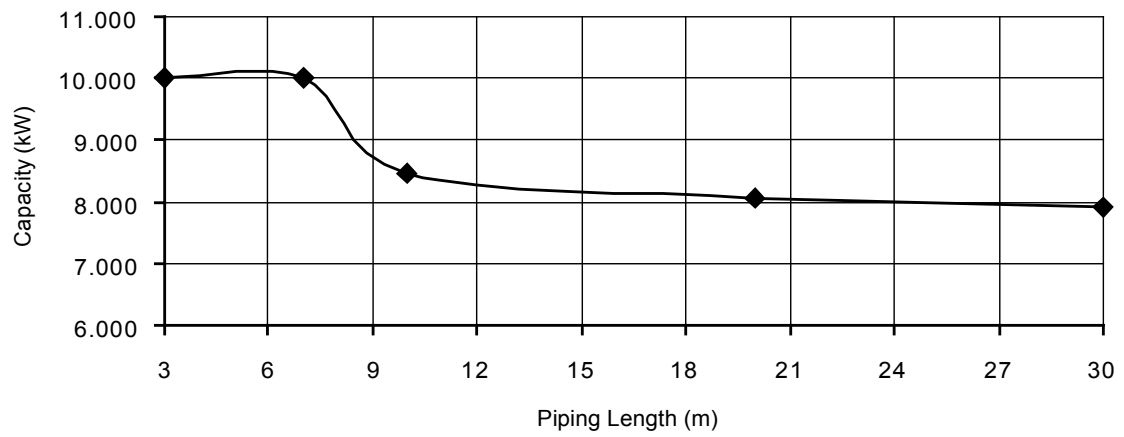
Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 12°C

Indoor water outlet temperature : 7°C

Piping length : 7 m



Heating Capacity Table

WH-UX12HE5

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	4750	12000	4960	12000	5410	11000	5380	10800	5820	10500	6260
-7	12000	3850	12000	4410	12000	4980	12000	5540	12000	5900	12000	6260
2	12000	3190	12000	3490	12000	3870	12000	4250	12000	4860	12000	5470
7	12000	2180	12000	2530	12000	2960	12000	3390	12000	3780	12000	4160
25	13600	1550	13600	1760	13400	2100	13200	2430	12600	2660	12000	2890

Cooling Capacity Table

WH-SXC12H6E5 WH-UX12HE5

Water In (°C)	12		19		23	
Water Out (°C)	7		14		18	
Outdoor Air (°C)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)	Capacity (W)	Input Power (W)
18	10000	1750	13200	1960	10000	1400
25	11200	2670	16500	3010	10000	1600
35	10000	3560	12550	3630	10000	1950
43	8000	3350	10000	3460	8000	2300