TECHNICAL DATA

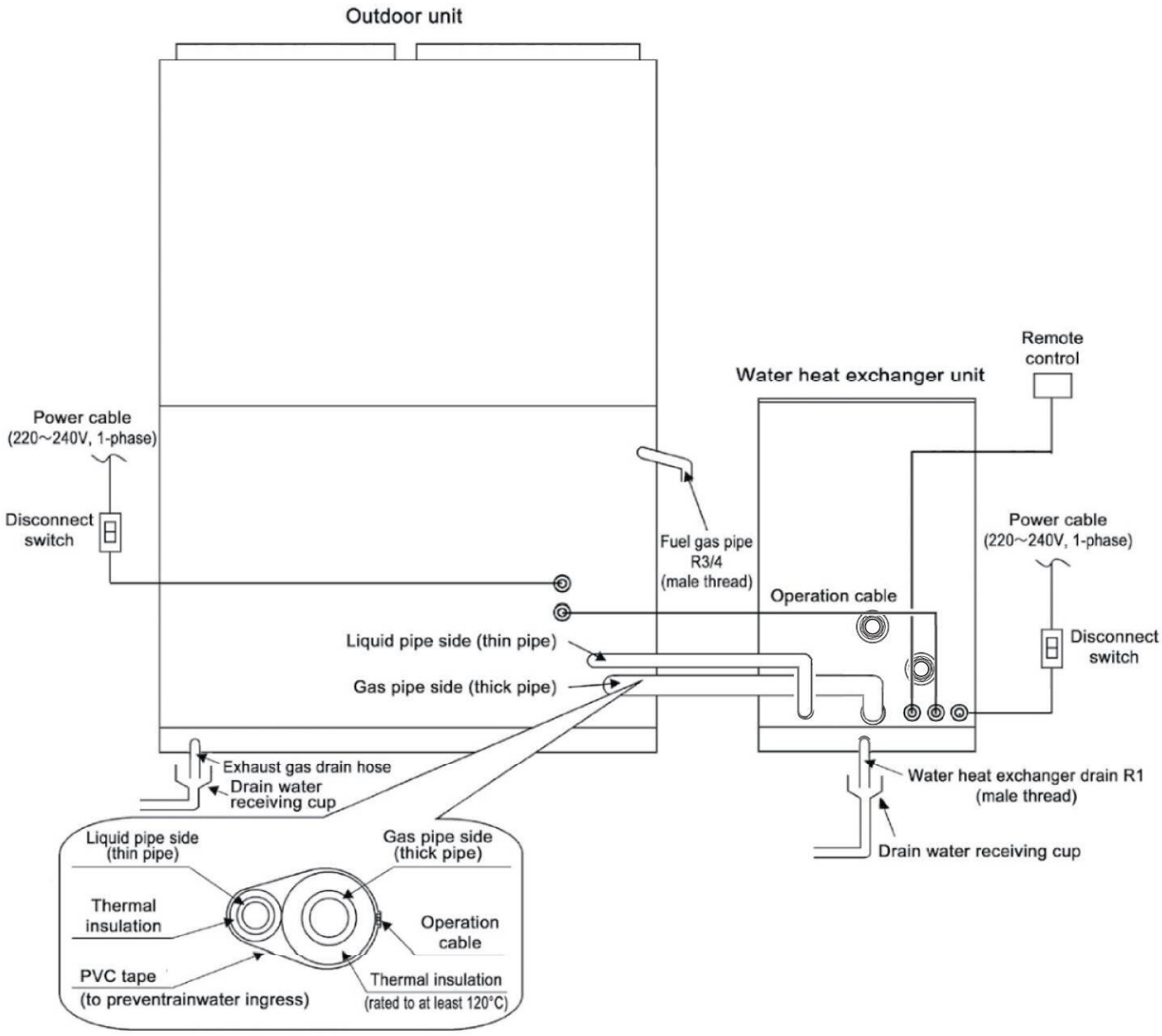
Electric Heat Pump / Gas Heat Pump Chiller Water Heat Exchanger Unit

MODEL No.	MODEL No.
PAW-250WX2E5N	PAW-250WX3E5N
PAW-500WX2E5N	PAW-500WX3E5N
PAW-710WX2E5N	PAW-710WX3E5N
PAW-250WX2E5N2	PAW-250WX3E5N2
PAW-500WX2E5N2	PAW-500WX3E5N2
PAW-710WX2E5N2	PAW-710WX3E5N2

Contents

(1) Connection points

Outdoor unit, water heat exchanger unit, remote control, power cable, operation cable



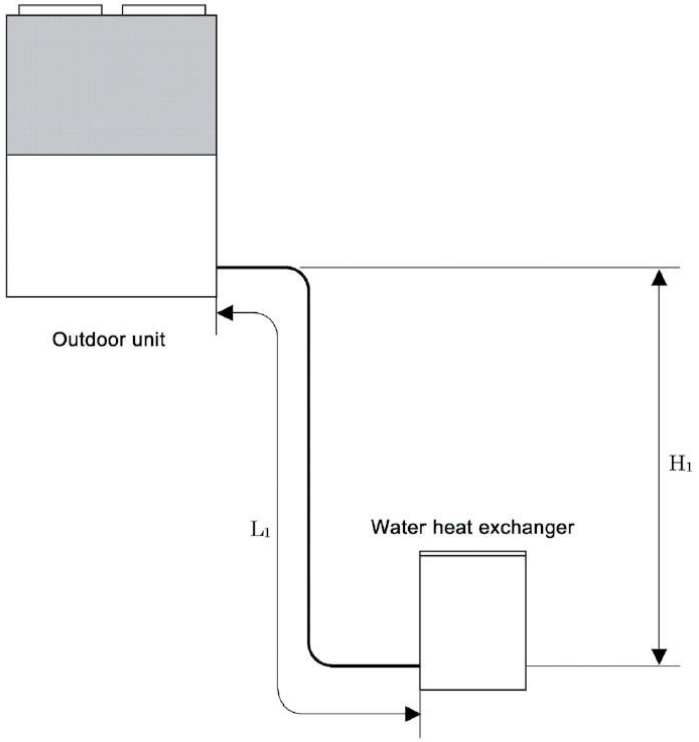
Note: Do not join the exhaust drain pipe and the water heat exchange drain pipe.
Doing so could allow exhaust gas to enter the building and foul the air.

2.1 GHP+WHE CONFIGURATION

(1) The operating ranges for both cooling and heating are the same as for Multi systems for buildings.

(2) Water heat exchanger temperature range
Cooling temperature range: 5 to 15°C (-15 to +5°C with brine specifications)
Heating temperature range: 35 to 45°C

(3) Water heat exchanger unit connection limitations



Item	Para-meter	Parameter description	Actual length (m)
Allowable pipe length	L1	Maximum allowable pipe length	≤170 (equivalent length 200)
Allowable difference in height	H1	If outdoor unit is higher	≤50
		If outdoor unit is lower	≤35*

* 30m or less when outdoor temperature is below 10ºC for cooling operations

2.2 ECOi "2way"+WHE CONFIGURATION

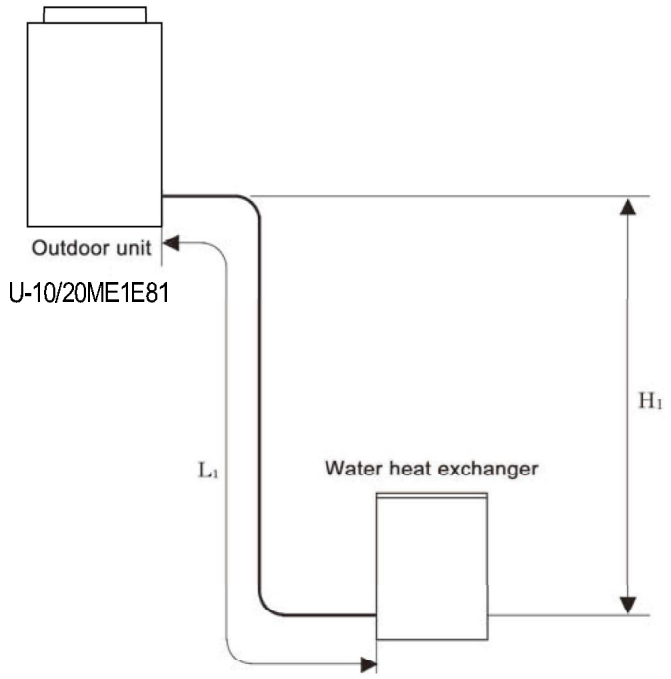
(1) Major system specifications

Water heat exchange unit	S-250WX2E5 Cooling capacity 25.0 kW Heating capacity 28.0kW	S-500WX2E5 Cooling capacity 50.0 kW Heating capacity 56.0kW
Minimum water capacity	280 liters	500 liters

(2) The operation ranges for both cooling and heating are the same as for Multi systems for buildings except for minimum outdoor temperature in heating

(3) Water heat exchanger temperature range
Cooling temperature range: 5 to 15°C (-15 to +5°C with brine specifications)
Heating temperature range: 35 to 55°C

(4) Water heat exchanger unit connection limitations

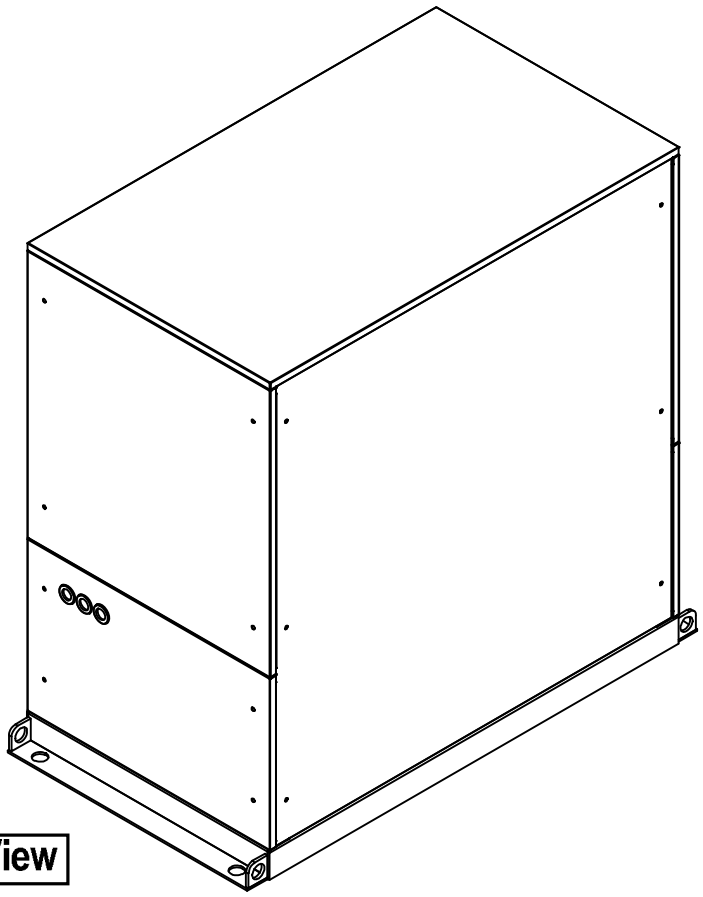


Item	Para-meter	Parameter description	Actual length (m)
Allowable pipe length	L1	Maximum allowable pipe length	≤170 (equivalent length 200)
Allowable difference in height	H1	If outdoor unit is higher	≤50
		If outdoor unit is lower	≤35*

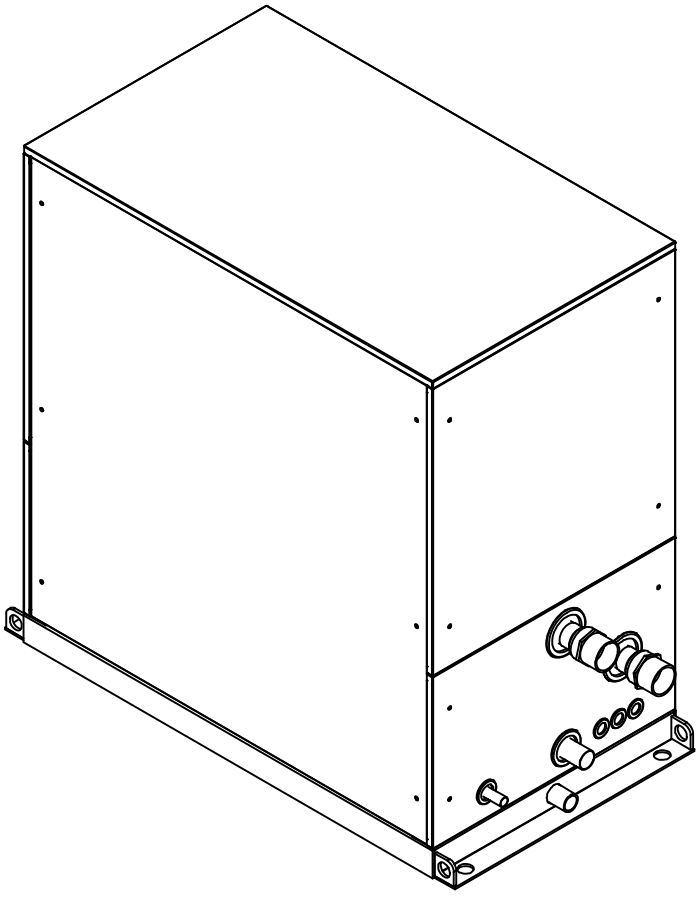
* 30m or less when outdoor temperature is below 10ºC for cooling operations

(5) Limitation

It's prohibited to connect any standard indoor unit to same refrigerant circuit that connect with chiller unit.
Only 2WAY system (ME1E81 series) can be corresponded.



Front View



Rear View

(1) Specification tables

Product Name				Water heat exchanger unit
Model No.				PAW-250WX2E5N
Performance (with GHP)	Cooling capacity		kW	25
	Heating capacity (standard)		kW	30
Performance (with ECOi)	Cooling capacity (2)		kW	25
	Heating capacity (standard) (2)		kW	28
External dimensions	Height		mm	1.010
	Width		mm	510
	Depth		mm	960
Weight			kg	120
Power source				220 to 240 V AC, 50 Hz
Electrical characteristics (N series)	Cooling	Operating current	A	0.07+(0.37/0.95 water pump)
		Power consumption	W	10 + (50/130 water pump)
	Heating	Operating current	A	0.07+(0.37/0.95 water pump)
		Power consumption	W	10 + (50/130 water pump)
Electrical characteristics (N2 series)	Cooling	Operating current	A	0.07
		Power consumption	W	10
	Heating	Operating current	A	0.07
		Power consumption	W	10
Standard hot/cold water flow rate			m^3/h	4.3
Hydraulic loss			kPa	19
Internal water reservoir capacity (1)			m^3	0.006
Minimum external water capacity			m^3	0.28
Water circuit limiting pressure			MPa	0.686
Refrigerant control method				Electronically controlled valve
Heat exchanger				Plate type
Freeze prevention device				Protective thermostat
Piping	Refrigerant	Gas pipe	mm	22 dia. (brazed)
		Liquid pipe	mm	10 dia. (brazed)
	Drain pipe			R1 male thread (25A)
	Hot/cold water outlet and inlet pipes			Rp2 female thread (50A)

Operating condition	Cooling	Heating (standard)	Heating (low temperature)
Water temperature of water heat exchanger unit	Outlet 7°C	Outlet 45°C	Outlet 45°C
Outdoor side intake air temperature	35°CDB	7°CDB, 6°CWB	2°CDB, 1°CWB
Note. "Heating (cold regions)" column values apply to operation with outdoor units specified for cold regions.			

NOTES:
(1) : Without filter in bypack
(2) : Cooling capacity and heating capacity in combination with U-10ME1E81

Product Name				Water heat exchanger unit
Model No.				PAW-500WX2E5N
Performance (with GHP)	Cooling capacity (2)		kW	50
	Heating capacity (standard)		kW	60
Performance (with ECOi)	Cooling capacity (3)		kW	50
	Heating capacity (standard) (3)		kW	56
External dimensions	Height		mm	1.010
	Width		mm	570
	Depth		mm	960
Weight			kg	145
Power source				220 to 240 V AC, 50 Hz
Electrical characteristics (N series)	Cooling	Operating current	A	0.07+(0.88/1.37 water pump)
		Power consumption	W	10 + (190/310 water pump)
	Heating	Operating current	A	0.07+(0.88/1.37 water pump)
		Power consumption	W	10 + (190/310 water pump)
Electrical characteristics (N2 series)	Cooling	Operating current	A	0.07
		Power consumption	W	10
	Heating	Operating current	A	0.07
		Power consumption	W	10
Standard hot/cold water flow rate			m^3/h	8.6
Hydraulic loss			kPa	37
Internal water reservoir capacity (1)			m^3	0.009
Minimum external water capacity			m^3	0.50
Water circuit limiting pressure			MPa	0.686
Refrigerant control method				Electronically controlled valve
Heat exchanger				Plate type
Freeze prevention device				Protective thermostat
Piping	Refrigerant	Gas pipe	mm	28 dia. (brazed)
		Liquid pipe	mm	18 dia. (brazed)
	Drain pipe			R1 male thread (25A)
	Hot/cold water outlet and inlet pipes			Rp2 female thread (50A)

Operating condition	Cooling	Heating (standard)	Heating (low temperature)
Water temperature of water heat exchanger unit	Outlet 7°C	Outlet 45°C	Outlet 45°C
Outdoor side intake air temperature	35°CDB	7°CDB, 6°CWB	2°CDB, 1°CWB

Note. "Heating (cold regions)" column values apply to operation with outdoor units specified for cold regions.

NOTES:
(1) : Without filter in bypack
(2) : Cooling capacity and heating capacity in combination with U-20GE2E5 / U-20GEP2E5
(3) : Cooling capacity and heating capacity in combination with U-20ME1E81

Product Name				Water heat exchanger unit
Model No.				PAW-710WX2E5N
Performance	Cooling capacity		kW	67
	Heating capacity (standard)		kW	80
External dimensions	Height		mm	1.010
	Width		mm	570
	Depth		mm	960
Weight			kg	180
Power source				220 to 240 V AC, 50 Hz
Electrical characteristics (N series)	Cooling	Operating current	A	0.07+(0.85/1.37 water pump)
		Power consumption	W	10 + (170/310 water pump)
	Heating	Operating current	A	0.07+(0.85/1.37 water pump)
		Power consumption	W	10 + (170/310 water pump)
Standard hot/cold water flow rate (N2 series)	Cooling	Operating current	A	0.07
		Power consumption	W	10
	Heating	Operating current	A	0.07
		Power consumption	W	10
Standard hot/cold water flow rate			m^3/h	11.6
Hydraulic loss			kPa	29
Internal water reservoir capacity			m^3	0.013
Minimum external water capacity			m^3	0.75
Water circuit limiting pressure			MPa	0.686
Refrigerant control method				Electronically controlled valve
Heat exchanger				Hot/cold water heat exchanger
Freeze prevention device				Protective thermostat
Piping	Refrigerant	Gas pipe	mm	35 dia. (brazed)
		Liquid pipe	mm	18 dia. (brazed)
	Drain pipe			R1 male thread (25A)
	Hot/cold water outlet and inlet pipes			Rp2 female thread (50A)

Operating condition	Cooling	Heating (standard)	Heating (low temperature)
Water temperature of water heat exchanger unit	Outlet 7°C	Outlet 45°C	Outlet 45°C
Outdoor side intake air temperature	35°CDB	7°CDB, 6°CWB	2°CDB, 1°CWB

Note. "Heating (cold regions)" column values apply to operation with outdoor units specified for cold regions.

NOTES:
(1) : Without filter in bypack
(2) : Cooling capacity and heating capacity in combination with U-30GE2E5

Outdoor model name U-10ME1E81
Indoor model name PAW-250WX2E5

Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output(*) Same with design load for heating	Prated (Pdesign)	18.90	kW	Seasonal space heating energy efficiency	η	146	%
Declared capacity for heating for part load at indoor temperature 20°C and outdoor temperature Tj				Declared COP or PER for part load at indoor temperature 20°C and outdoor temperature Tj			
Tj = -7°C	Pdh	16.64	kW	Tj = -7°C	COPd or PERd	2.58	- or %
Tj = +2°C	Pdh	10.21	kW	Tj = +2°C	COPd or PERd	3.63	- or %
Tj = +7°C	Pdh	6.62	kW	Tj = +7°C	COPd or PERd	3.88	- or %
Tj = +12°C	Pdh	2.84	kW	Tj = +12°C	COPd or PERd	6.95	- or %
Tj = bivalent temperature	Pdh	18.90	kW	Tj = bivalent temperature	COPd or PERd	2.15	- or %
Tj = operation limit temperature	Pdh	16.83	kW	Tj = operation limit temperature	COPd or PERd	2.00	- or %
Tj = -15°C (if TOL is < -20 °C)	Pdh	-	kW	Tj = -15°C (if TOL is < -20 °C)	COPd or PERd	-	- or %
Bivalent temperature	Tbiv	-10	°C	Operation Limit temperature	TOL	-20	°C
Degradation co-efficient	Cdh		-	-			
Power consumption in modes other than active mode				-			
Off mode	P_{OFF}	0.043	kW				
Thermostat off mode	P_{TO}	0.043	kW				
Standby mode	P_{SB}	0.043	kW				
Crankcase heater mode	P_{CK}	0.043	kW				
Other Items				Other Items			
Sound power level (outdoor)	L_{WA}	74	dB	Rated air flow rate, outdoors	-	9180	m^3/h
Emission of Nox	Nox	-	mg/kWh				

Outdoor model name U-20ME1E81
Indoor model name PAW-500WX2E5

Item	Symbol	Value	Unit
Rated heat output(*) Same with design load for heating	Prated (Pdesign)	36.36	kW
Declared capacity for heating for part load at indoor temperature 20°C and outdoor temperature Tj			
Tj = -7°C	Pdh	32.00	kW
Tj = +2°C	Pdh	19.64	kW
Tj = +7°C	Pdh	12.73	kW
Tj = +12°C	Pdh	5.46	kW
Tj = bivalent temperature	Pdh	36.36	kW
Tj = operation limit temperature	Pdh	32.36	kW
Tj = -15°C (if TOL is < -20 °C)	Pdh	-	kW
Bivalent temperature	Tbiv	-10	°C
Degradation co-efficient	Cdh		-
Power consumption in modes other than active mode			
Off mode	P_{OFF}	0.107	kW
Thermostat off mode	P_{TO}	0.107	kW
Standby mode	P_{SB}	0.107	kW
Crankcase heater mode	P_{CK}	0.107	kW
Other Items			
Sound power level (outdoor)	L_{WA}	78	dB
Emission of Nox	Nox	-	mg/kWh

Item	Symbol	Value	Unit
Seasonal space heating energy efficiency	η	156	%
Declared COP or PER for part load at indoor temperature 20°C and outdoor temperature Tj			
Tj = -7°C	COPd or PERd	2.35	- or %
Tj = +2°C	COPd or PERd	4.25	- or %
Tj = +7°C	COPd or PERd	4.20	- or %
Tj = +12°C	COPd or PERd	6.48	- or %
Tj = bivalent temperature	COPd or PERd	1.68	- or %
Tj = operation limit temperature	COPd or PERd	1.56	- or %
Tj = -15°C (if TOL is < -20 °C)	COPd or PERd	-	- or %
Operation Limit temperature	TOL	-20	°C
-			
-			
Other Items			
Rated air flow rate, outdoors	-	16980	m^3/h

Outdoor model name U-20GE2E5
Indoor model name PAW-500WX2E5

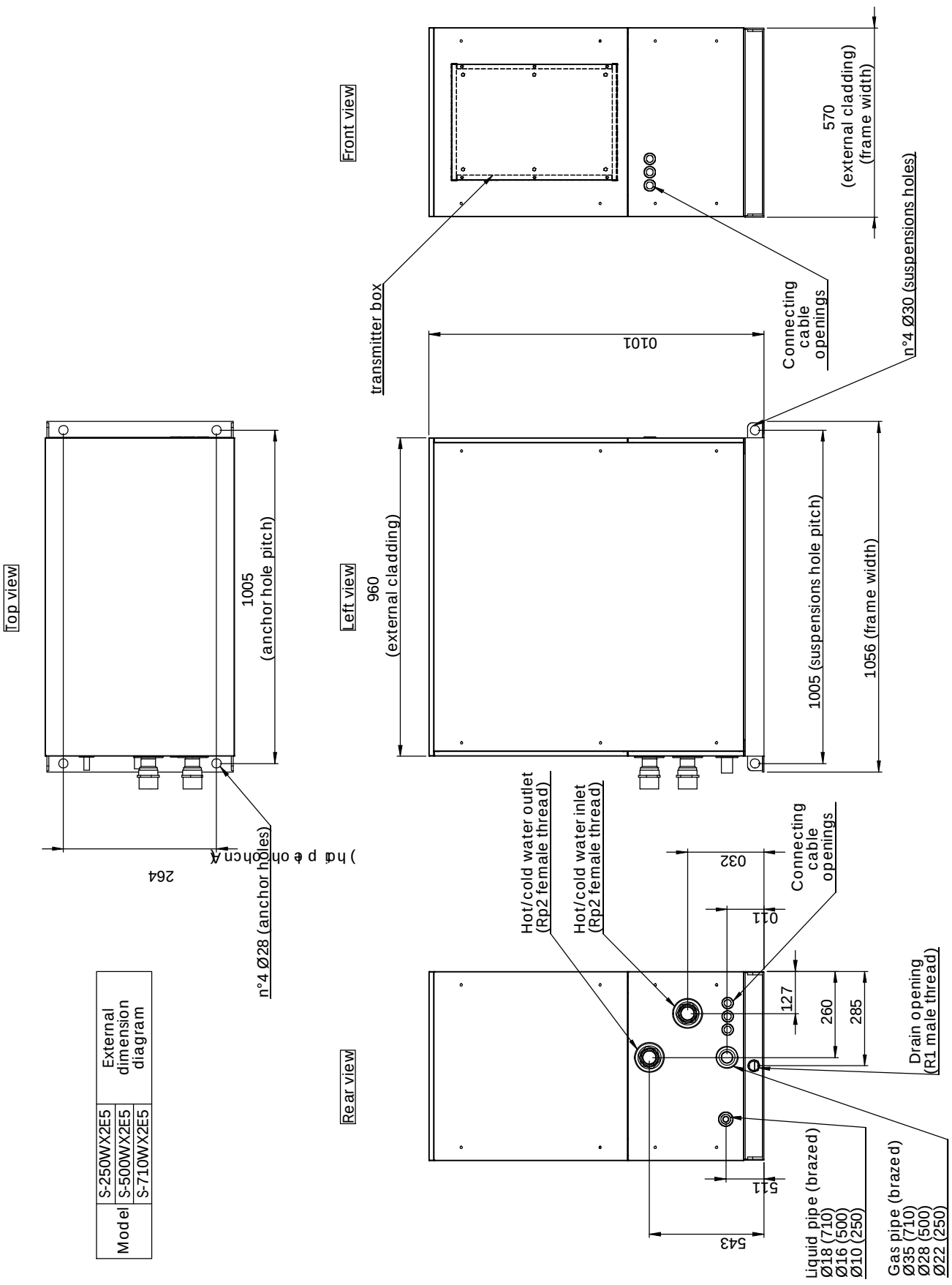
Item	Symbol	Value	Unit	Item	Symbol	Value	Unit
Rated heat output(*) Same with design load for heating	Prated (Pdesign)	60	kW	Seasonal space heating energy efficiency	η	118	%
Declared capacity for heating for part load at indoor temperature 20℃ and outdoor temperature Tj				Declared COP or PER for part load at indoor temperature 20℃ and outdoor temperature Tj			
Tj = -7℃	Pdh	52.8	kW	Tj = -7℃	PERd	80	%
Tj = +2℃	Pdh	32.4	kW	Tj = +2℃	PERd	128	%
Tj = +7℃	Pdh	21.0	kW	Tj = +7℃	PERd	141	%
Tj = +12℃	Pdh	9.0	kW	Tj = +12℃	PERd	95	%
Tj = bivalent temperature	Pdh	60.0	kW	Tj = bivalent temperature	PERd	82	%
Tj = operation limit temperature	Pdh	60.0	kW	Tj = operation limit temperature	PERd	80	%
Tj = -15℃ (if TOL is < -20 ℃)	Pdh	-	kW	Tj = -15℃ (if TOL is < -20 ℃)	PERd	-	%
Bivalent temperature	Tbiv	-10	℃	Operation Limit temperature	TOL	-20	℃
Degradation co-efficient	Cdh	0.25	-	-			
Power consumption in modes other than active mode				-			
Off mode	P_{OFF}	0	kW				
Thermostat off mode	P_{TO}	0.027	kW				
Standby mode	P_{SB}	0.027	kW				
Crankcase heater mode	P_{CK}	0.058	kW				
Other Items				Other Items			
Sound power level (outdoor)	L_{WA}	85	dB	Rated air flow rate, outdoors	-	22800	m^3/h
Emission of Nox	Nox	136	mg/kWh				

Outdoor model name U-30GE2E5
Indoor model name PAW-710WX2E5

Item	Symbol	Value	Unit
Rated heat output(*) Same with design load for heating	Prated (Pdesign)	80	kW
Declared capacity for heating for part load at indoor temperature 20°C and outdoor temperature Tj			
Tj = -7°C	Pdh	70.4	kW
Tj = +2°C	Pdh	43.2	kW
Tj = +7°C	Pdh	28.0	kW
Tj = +12°C	Pdh	12.0	kW
Tj = bivalent temperature	Pdh	80.0	kW
Tj = operation limit temperature	Pdh	80.0	kW
Tj = -15°C (if TOL is < -20 °C)	Pdh	-	kW
Bivalent temperature	Tbiv	-10	°C
Degradation co-efficient	Cdh	0.25	-
Power consumption in modes other than active mode			
Off mode	P_{OFF}	0	kW
Thermostat off mode	P_{TO}	0.027	kW
Standby mode	P_{SB}	0.027	kW
Crankcase heater mode	P_{CK}	0.058	kW
Other Items			
Sound power level (outdoor)	L_{WA}	86	dB
Emission of Nox	Nox	212	mg/kWh

Item	Symbol	Value	Unit
Seasonal space heating energy efficiency	η	118	%
Declared COP or PER for part load at indoor temperature 20°C and outdoor temperature Tj			
Tj = -7°C	PERd	85	%
Tj = +2°C	PERd	128	%
Tj = +7°C	PERd	134	%
Tj = +12°C	PERd	101	%
Tj = bivalent temperature	PERd	85	%
Tj = operation limit temperature	PERd	84	%
Tj = -15°C (if TOL is < -20 °C)	PERd	-	%
Operation Limit temperature	TOL	-20	°C
-			
-			
Other Items			
Rated air flow rate, outdoors	-	26400	m^3/h

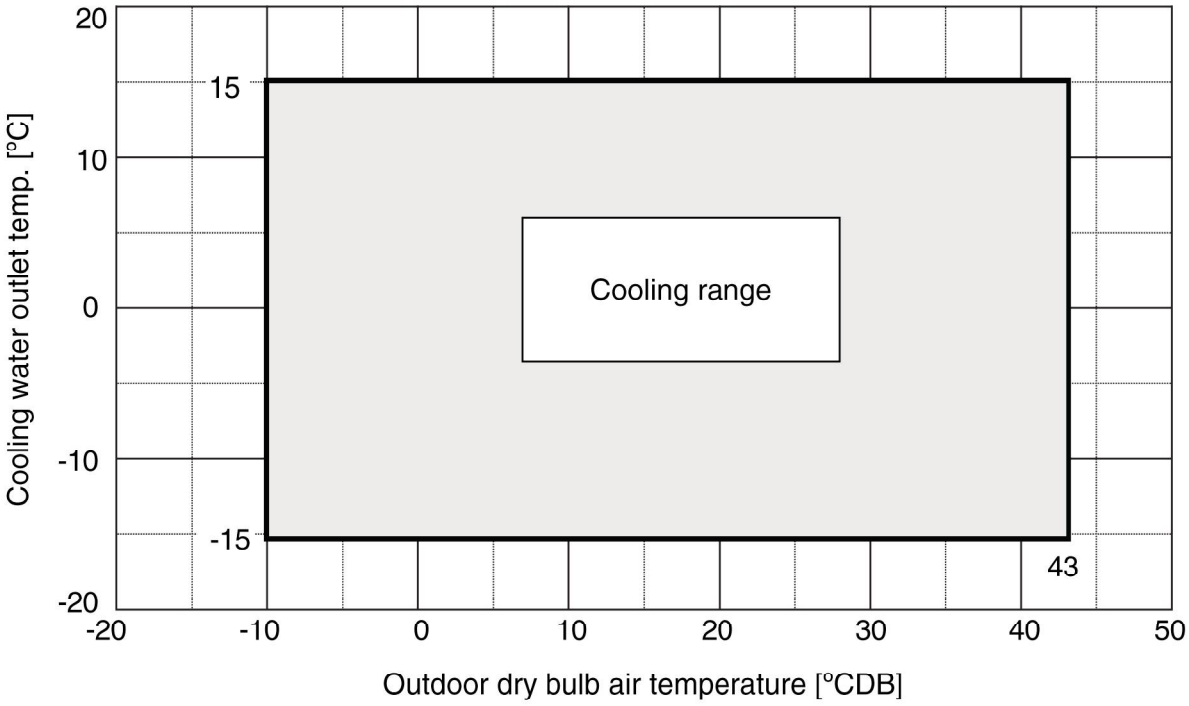
(2) External dimension diagram



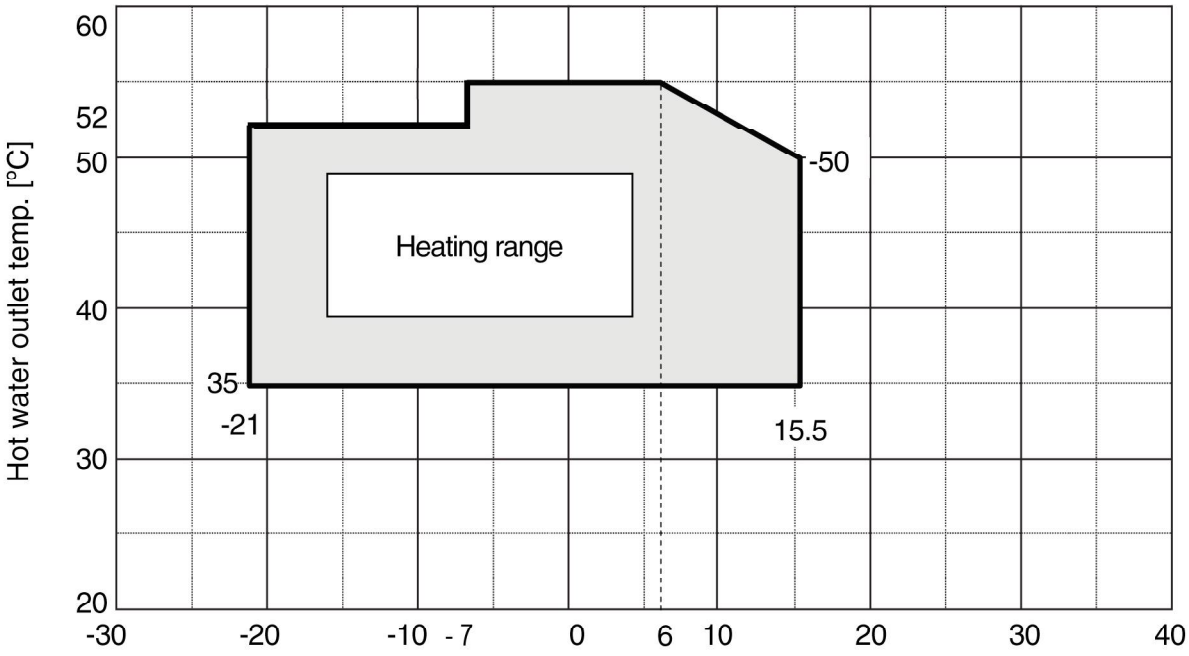
Model	External dimension diagram
S-250WX2E5	
S-500WX2E5	
S-710WX2E5	

(3.1) Heating and cooling temperature ranges for GHP+WHE configuration

Cooling



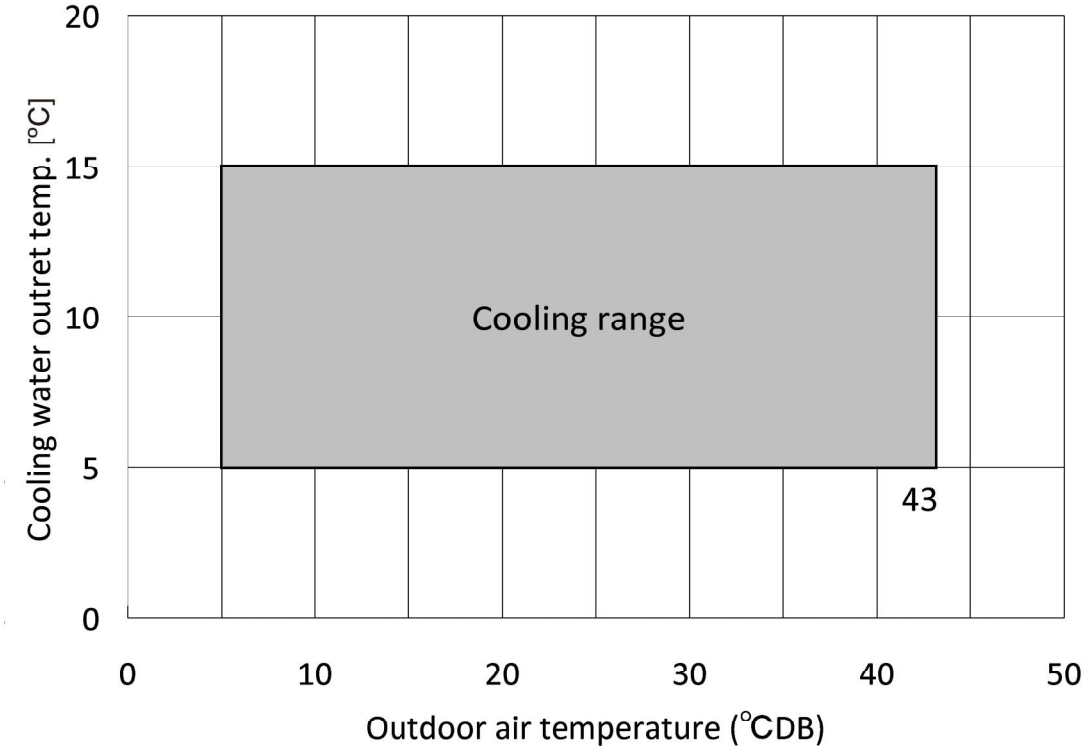
Heating



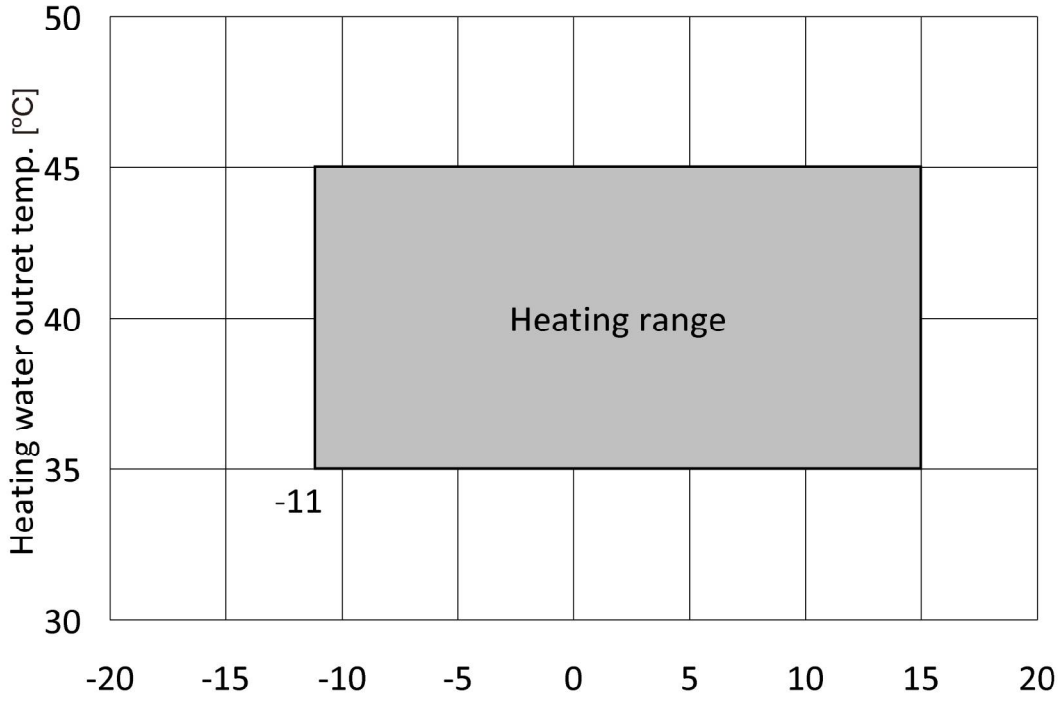
Notes
When starting cooling, the system can operate even if the cold water outlet temperature is somewhat above 15°C.
When starting heating, the system can operate even if the hot water outlet temperature is lower than 35°C.

(3.2) Heating and cooling temperature ranges for ECOi+WHE configuration

Cooling



Heating



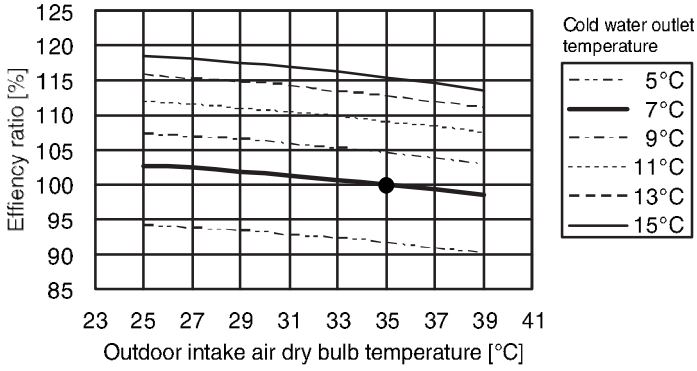
Notes

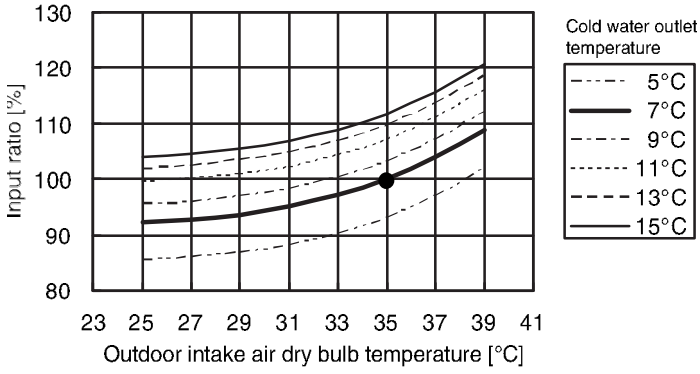
When starting cooling, the system can operate even if the cold water outlet temperature is somewhat above 15°C.
When starting heating, the system can operate even if the hot water outlet temperature is lower than 35°C.

(4.1) Power characteristics for GHP+WHE configuration

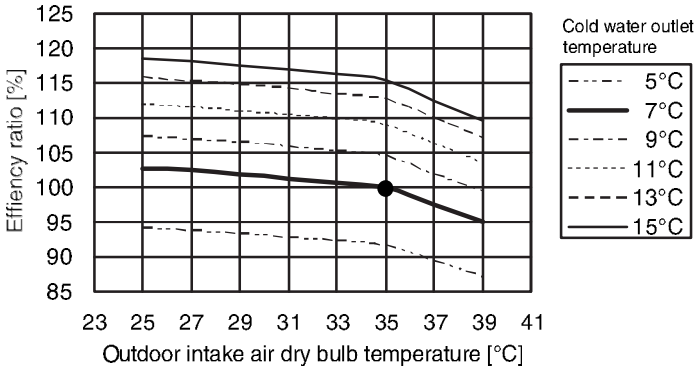
(4.1.1) Water heat exchanger unite performance, gas consumption (during cooling)

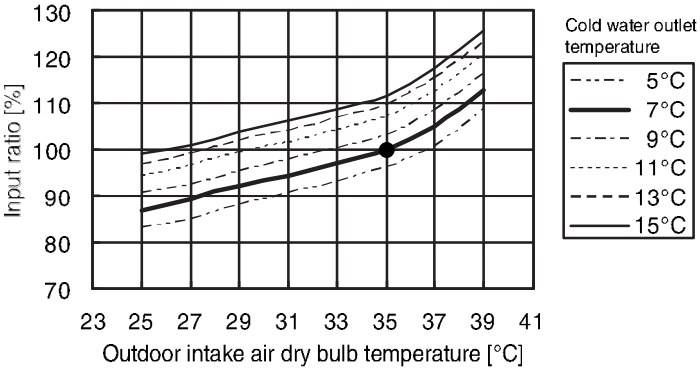
U-20GE2E5+PAW-500WX2E5N





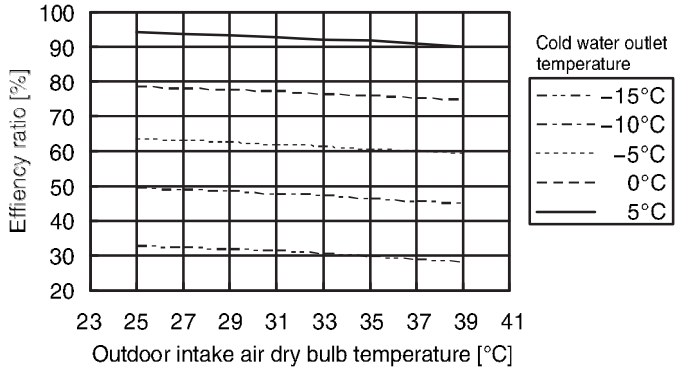
U-30GE2E5+PAW-710WX2E5N

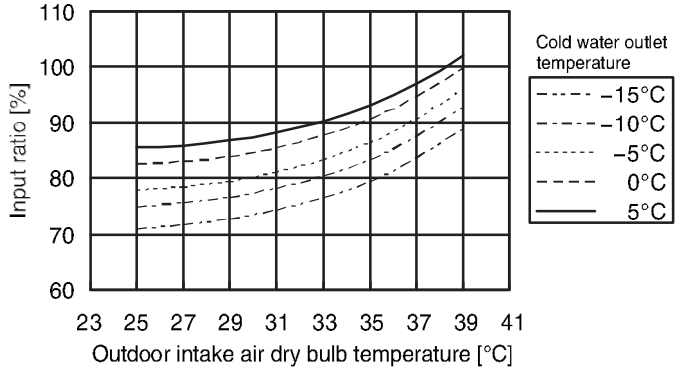




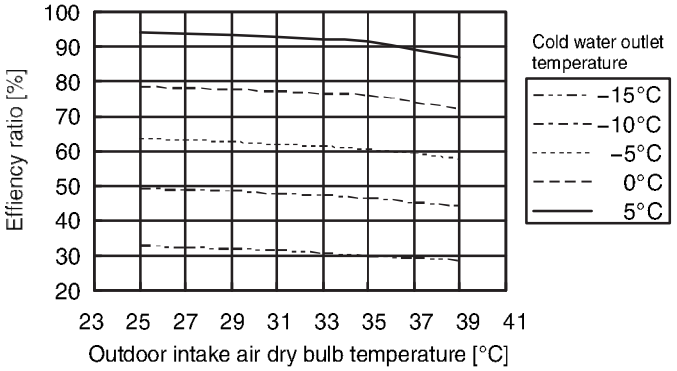
(4.1.2) Water heat exchanger (brine specification)unite performance, gas consumption (during cooling)

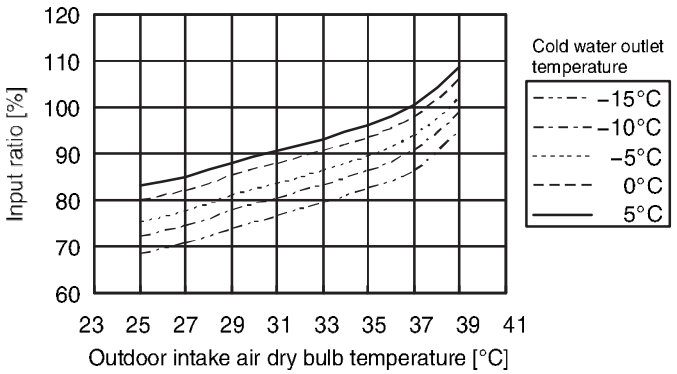
U-20GE2E5+PAW-500WX2E5N





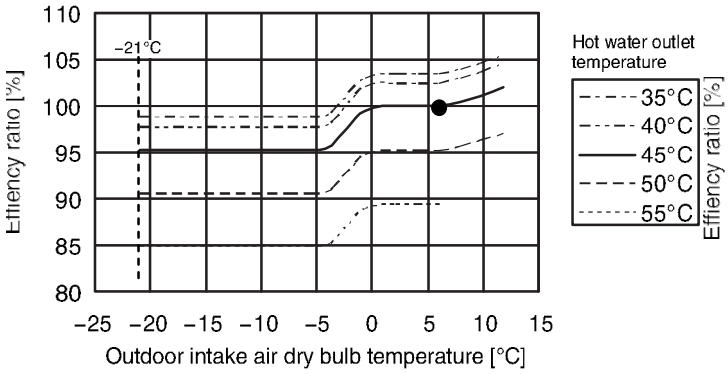
U-30GE2E5+PAW-710WX2E5N

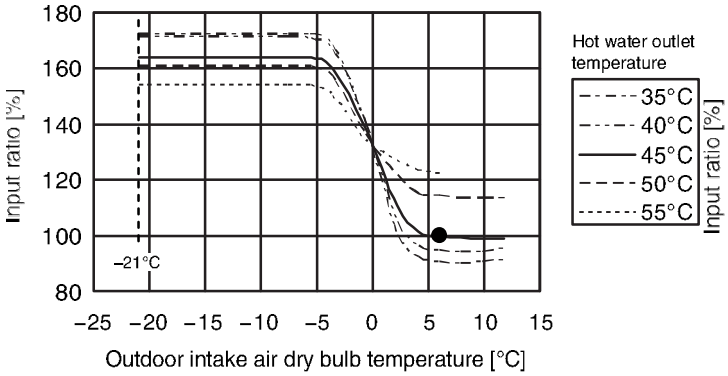




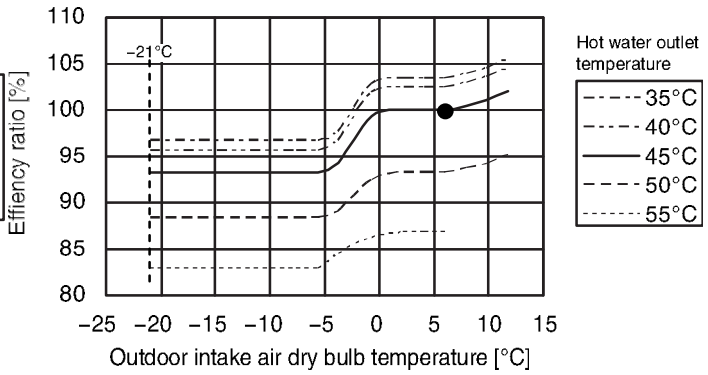
(4.1.3) Water heat exchanger unite performance, gas consumption (during heating)

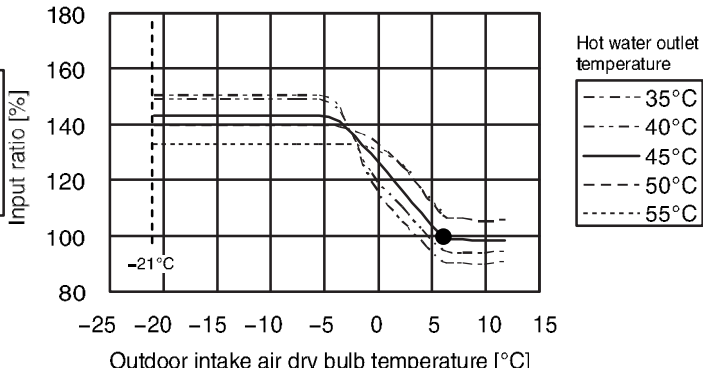
U-20GE2E5+PAW-500WX2E5N





U-30GE2E5+PAW-710WX2E5N

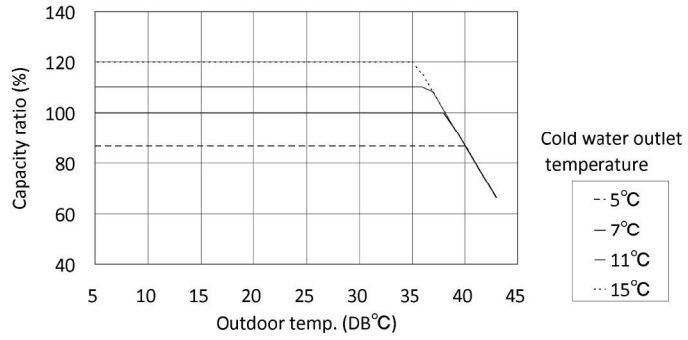


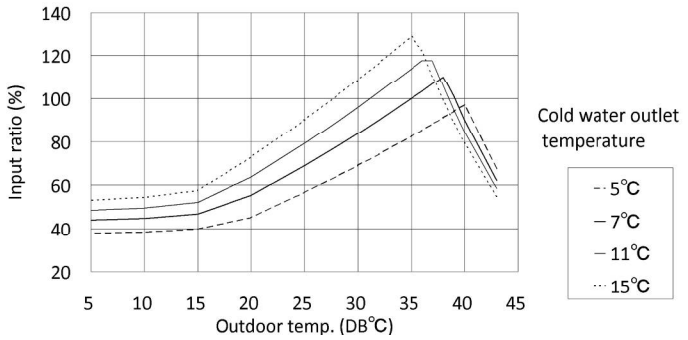


(4.2) Power characteristics for ECOi+WHE configuration

(4.2.1) Water heat exchanger unite performance, power consumption (during cooling)

U-10ME1E81+PAW-250WX2E5N





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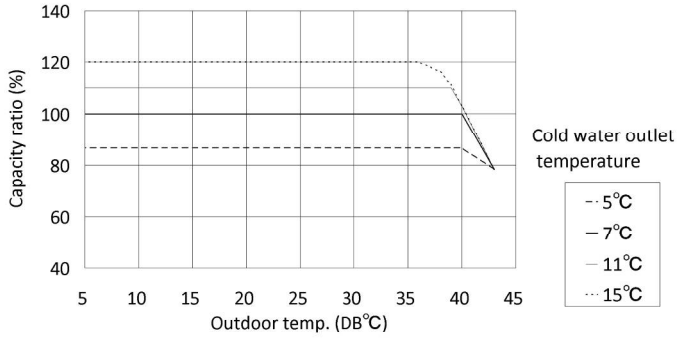
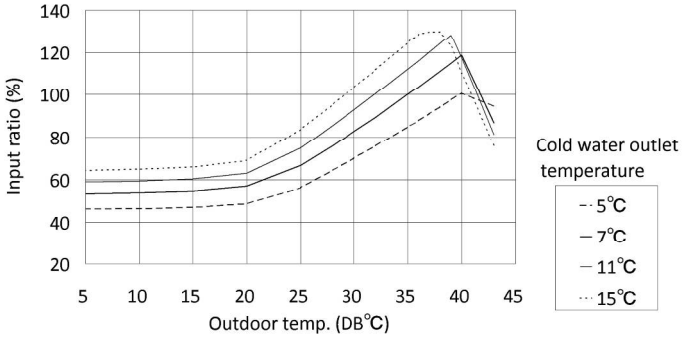
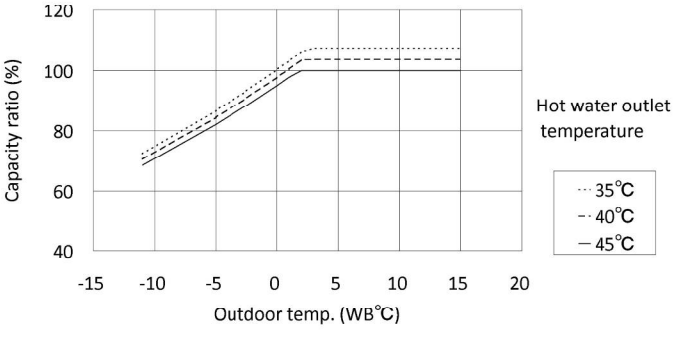
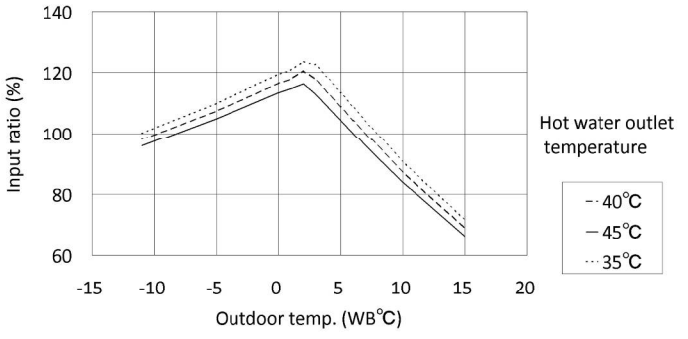




(4.2.2) Water heat exchanger unite performance, power consumption (during heating)

U-10ME1E81+PAW-250WX2E5N





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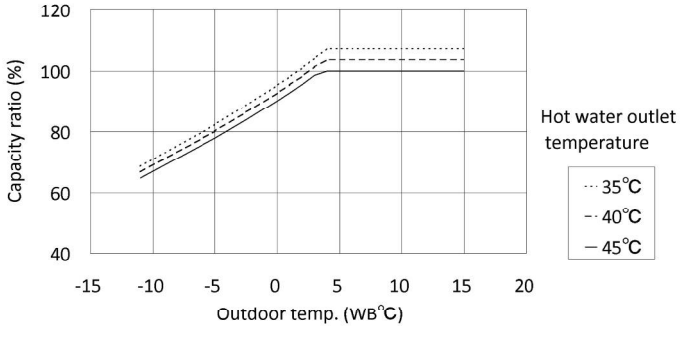
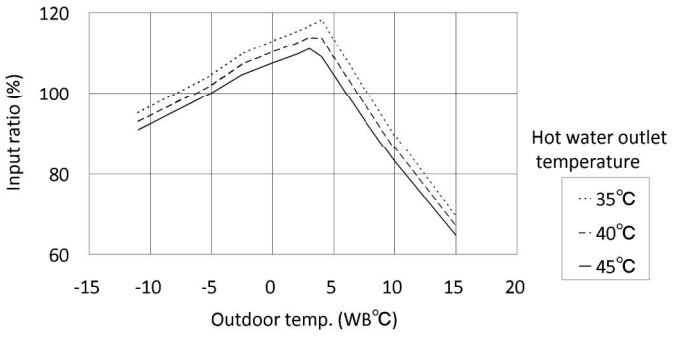
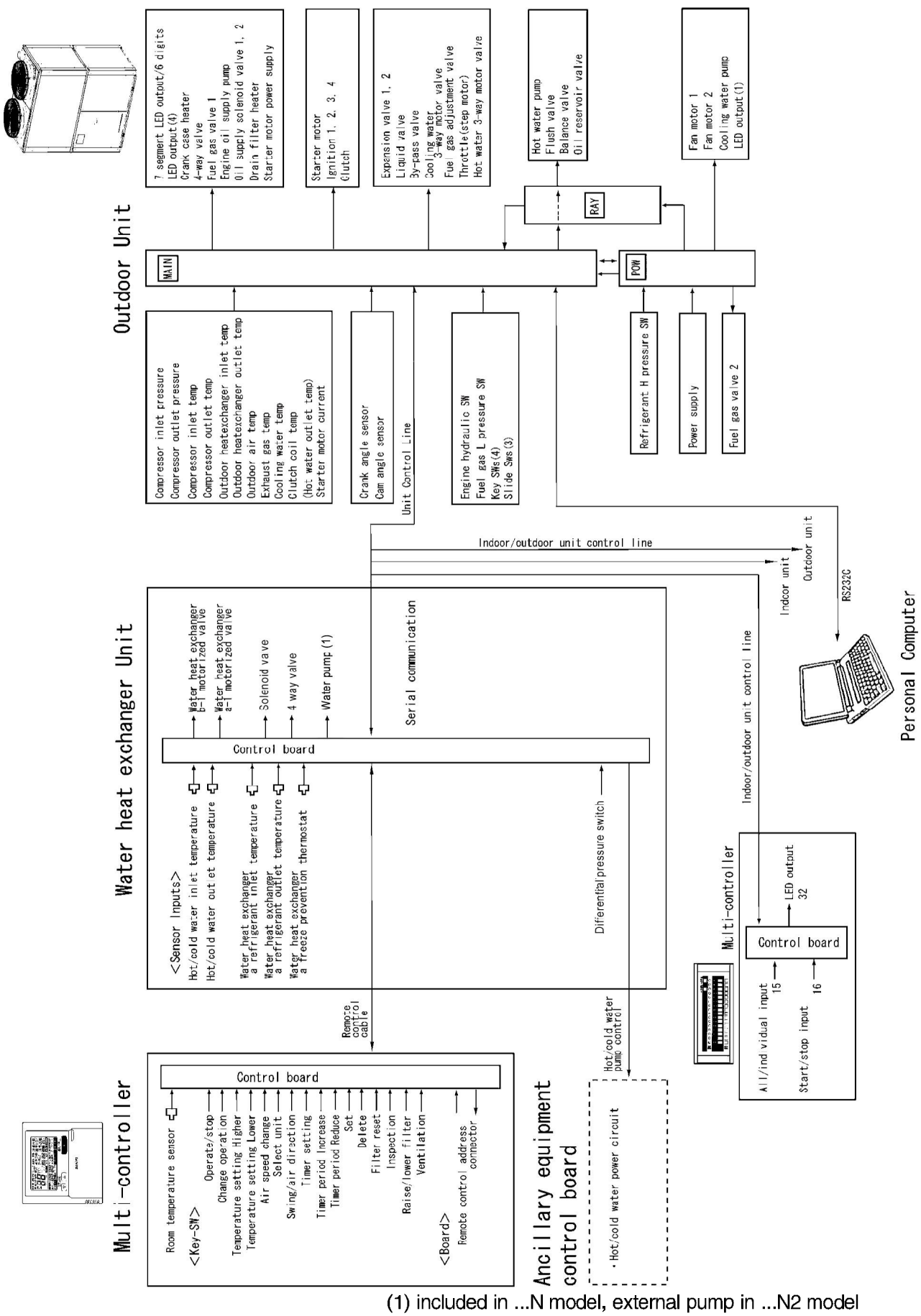




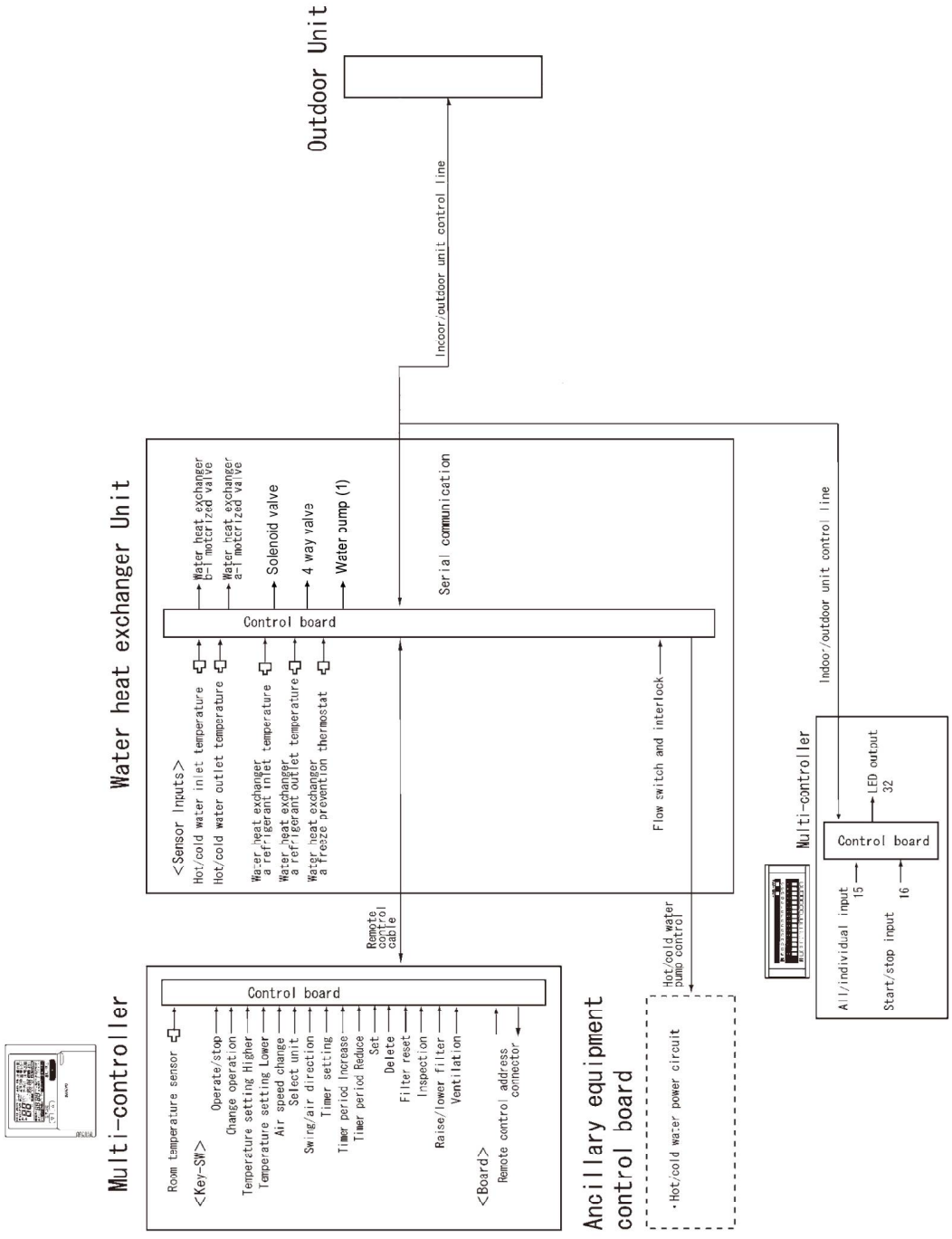
(1) System block diagram

(1.1) GHP+WHE Configuration



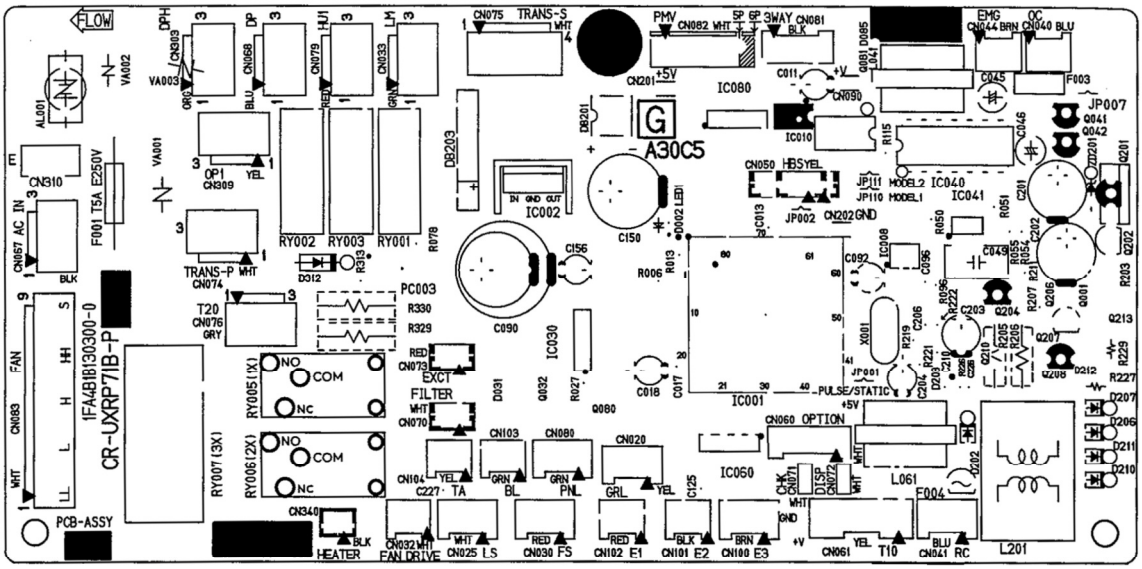
(1) included in ...N model, external pump in ...N2 model

(1.2) (ECOi+WHE Configuration)

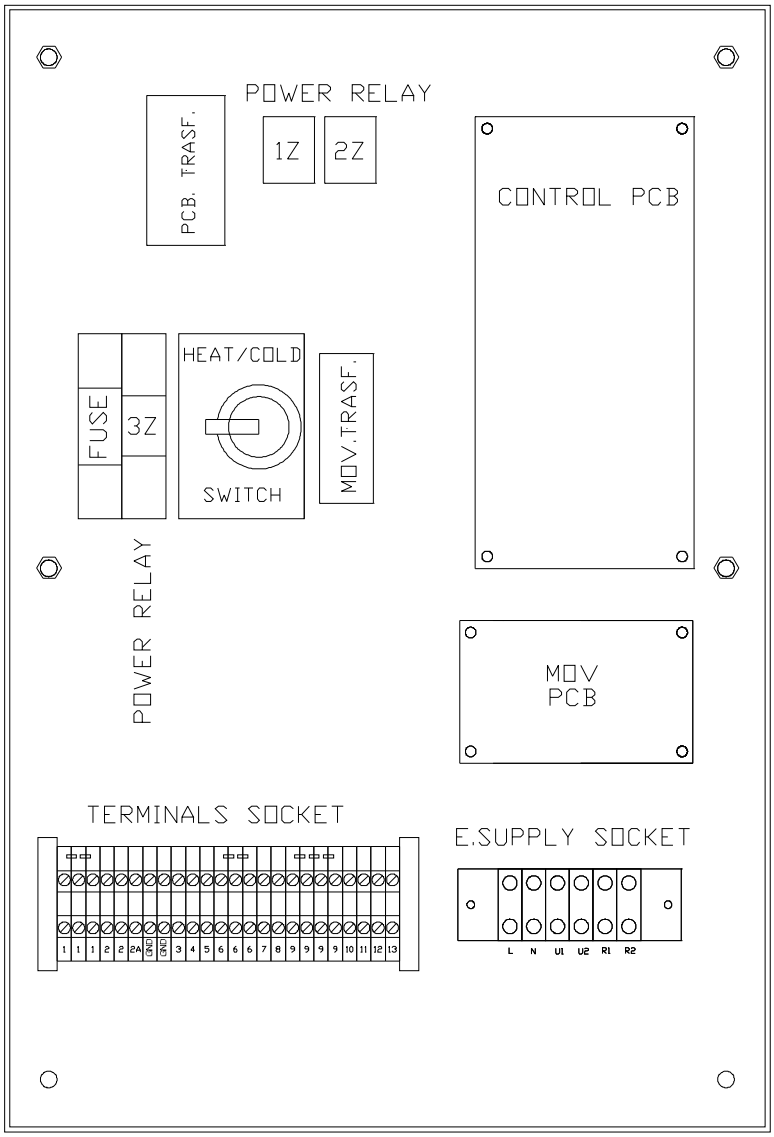


(1) included in ...N model, external pump in ...N2 model

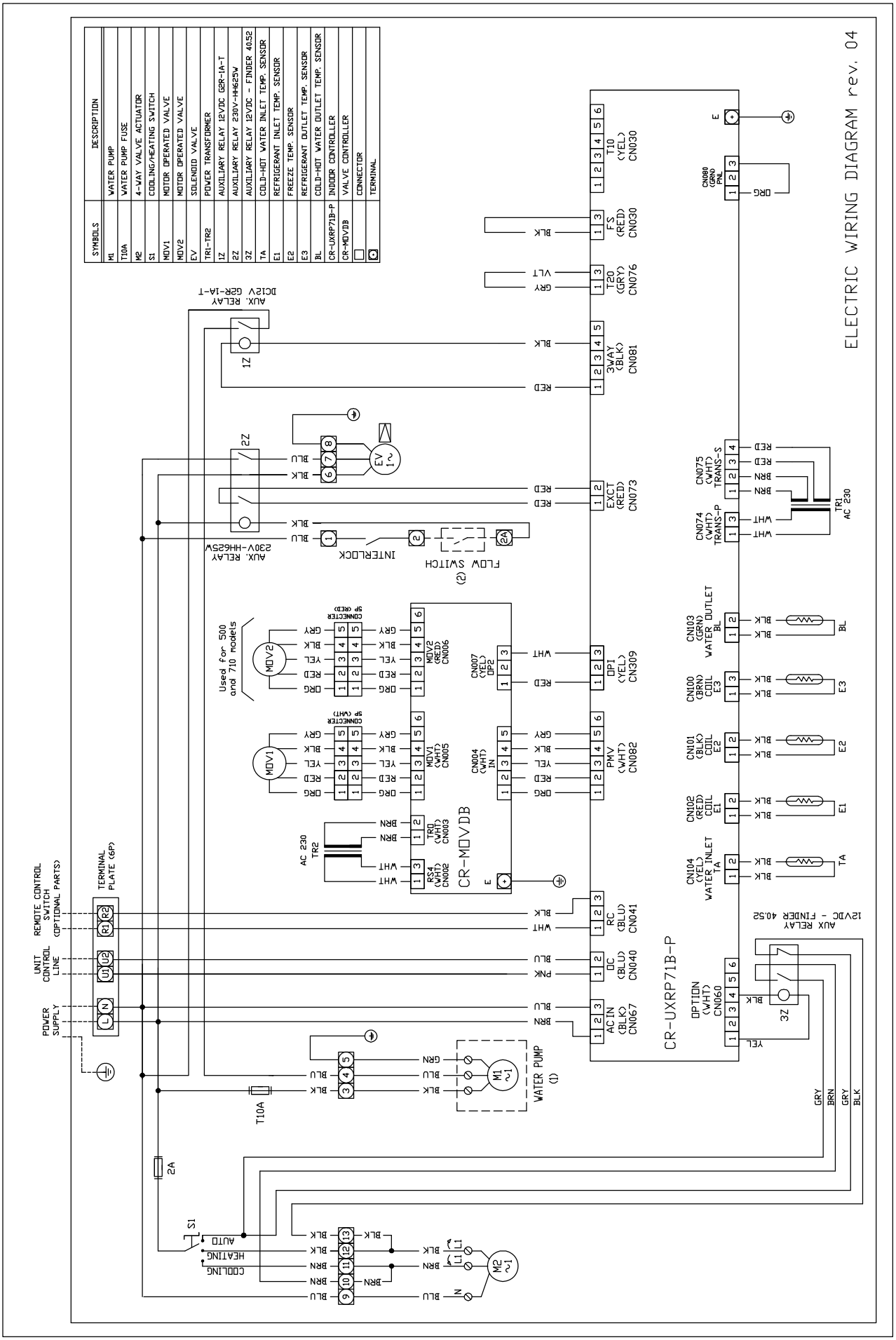
(2) Cicrcuit board controls and connettors



(3) Electrical box layout



(4) Electrical wiring diagram



(1) Only for PAW-250/500/710WX2E5N - PAW-250/500/710WX3E5N

(2) For 2/2N series the flow switch to be added supplied.

(5) Fault indicators and codes

Reset method [common for 1. to 3.]: After correcting the fault, allow for automatic recovery or press the reset button.

1. Sensor faults (related to the water heat exchanger unit)
   1) Faulty water heat exchanger refrigerant inlet temperature sensor (primary or secondary) [F01]
      • Detection method: Open (-20°Ct) or short circuit (130°C≤t)
   2) Faulty water heat exchanger freeze prevention sensor (primary or secondary) [F02]
      • Detection method: Open (-20°Ct) or short circuit (130°C≤t)
   3) Faulty water heat exchanger refrigerant outlet temperature sensor (primary or secondary) [F03]
      • Detection method: Open (-20°Ct) or short circuit (130°C≤t)
   4) Faulty hot/cold water inlet temperature sensor [F10]
      • Detection method: Open (-30°Ct) or short circuit (100°C≤t)
   5) Faulty hot/cold water outlet temperature sensor [F11]
      • Detection method: Open (-30°Ct) or short circuit (100°C≤t)

2. Serial communication faults or faulty settings (related to remote control of the water heat exchanger unit)
   1) Faulty remote control reception [E01]
      • Detection method: There has been no communications addressed to the device for 3 minutes
   2) Remote control transmission fault [E02]
      • Detection method: The device cannot read it's own transmissions for 3 minutes
   3) Faulty reception from the remote control by the water heat exchanger unit [E03]
      • Detection method: There has been no communications addressed to the device for 3 minutes
   4) Faulty reception from the outdoor side by the water heat exchanger unit [E04]
      • Detection method: There has been no communications addressed to the device for 3 minutes
   5) Faulty transmission by the water heat exchanger unit to the outdoor unit [E05]
      • Detection method: The device cannot read it's own transmissions for 3 minutes
   6) Duplication of indoor unit address [E08]
      • Detection method: Another unit has the same indoor unit address as the device
   7) Faulty transmission by the water heat exchanger unit to the remote control [E13]
      • Detection method: The device cannot read it's own transmissions for 3 minutes

3. Other warnings (determined by the water heat exchanger unit)
   1) Water heat exchanger unit anti-icing warning [P11]
      • Detection method: While the outdoor unit is operating, freezing temperature is detected by either the anti-icing sensor, the hot/cold water inlet and outlet sensor, or the refrigerant outlet temperature sensor.
   2) Interlock warning (ancillary equipment) [P23]
      • Detection method: Within 30 seconds after a hot/cold water pump start command, the interlock does not turn ON, or the interlock turns OFF during a hot/cold water pump start command.
   3) Non-volatile memory (EEPROM) fault [F29]
      • Detection method: Inability to write normally

⚠ Safety precautions

Carefully read the following "Safety Precautions" before beginning installation and wiring work.

The precautions in this document consist of specific ⚠ Warnings and ⚠ Cautions.
All concern safety-related issues that require careful attention.
Their meanings are as described below.

⚠ Warnings: Indicates a potentially hazardous situation in which incorrect handling may result in the death or serious injury of personnel.

⚠ Cautions: Indicates a potentially hazardous situation in which incorrect handling may result in the injury of personnel or damage to property.

⚠ Warning

Equipment installation and electrical work should be entrusted to the dealer where the product is purchased, or to a specialist contractor. Incorrect installation performed with inadequate experience can result in water leakage, electric shock or fire.

Installation and electrical work should be carried out in accordance with the "Procedures and Technical Points for System Installation" and "Procedures and Technical Points for Electrical Wiring Work". Defective installation can result in refrigerant or water leakage, electric shock, or fire.

The electrical work should be carried out by a properly qualifi ed electrician in accordance with "Technical Criteria for Electrical Equipment," "Electrical Wiring Regulations," "Procedures and Technical Points for System Installation," "Procedures and Technical Points for Electrical Wiring Work". Be certain that the power source specifi cations for gas heat pump air conditioners are satisfi ed, and to provide a dedicated power circuit.

If the power circuit has insuffi cient capacity, or if there is a defect in the electrical construction, electric shock or fi re could result.

Use a dedicated branch circuit for the electrical cables, and do not share it with other equipment. Otherwise, secondary damages may occur as a result of breaker tripping.

Cables should be securely connected using the specifi ed cable type and thickness, with strain-relieved terminations that protect them from external force on the cables. Improper or insecure connections may cause overheating and fire.

If the water heat exchanger unit is installed in an equipment room or similar, the system design must ensure that a refrigerant leak would not cause the density limit of 0.3 kg/m3 to be exceeded, in accordance with the installation criteria for cooling and air conditioning equipment (S0010) published by the High Pressure Gas Safety Institute of Japan.

If this limit is exceeded, either provide an opening to an adjoining room, or provide a ventilation system linked to a gas leak warning device. If the density limit was to be exceeded in the event of a gas leak in a small room, suffocation of inhabitants could result.

Ensure that the installation location is strong enough to support the weight of the water heat exchanger unit (and be certain to secure it with anchor bolts). Inadequate strength of the equipment mounting structure could result in accidents from falling equipment.

Take the appropriate specifi ed measures during installation to protect against strong winds, hurricanes and earthquakes. A defective installation could result in accidents from falling equipment.

If a refrigerant leak should occur during installation operations, ventilate the area.

If refrigerant gas comes in contact with fl ames from a welding torch, then this could generate poisonous gas.

After installation of the refrigerant piping is complete, conduct a nitrogen leak test to ensure that there are no leaks. If refrigerant gas leaks into a room and comes into contact with fan heaters, stoves, etc., poisonous gas could be generated.

Do not use the same drain pipe for both the water heat exchanger unit and the indoor units. This could cause poisoning due to backfl ow of exhaust gas to the indoors.

Do not connect the water heat exchanger unit drain pipe to a gutter in which sulfurous or other toxic gases may be generated. The toxic gases could leak indoors and cause poisoning.

⚠ Caution

When handling refrigerant gas, do not directly touch the gas. This can cause burns due to freezing.
Do not install the water heat exchanger unit where flammable gas could flow, accumulate or be produced, or where volatile or flammable substances are handled. Fire could occur from ignition of combustible substances or flammable gas.
Connect the drain pipes in accordance with "Procedures and Technical Points for System Installation," and provide sufficient insulation to prevent the formation of condensation. A defect in the piping could cause water leaks into the surrounding property.
Thoroughly insulate refrigerant piping with insulation material in accordance with "Procedures and Technical Points for System Installation." Uninsulated pipes can result in water leaks or burns.
(Insulation on the thick pipe must be able to withstand 120°C or greater.)
Provide a proper dedicated earth ground. Do not connect grounding lines to gas or water pipes, lightning rod wires, or telephone grounding lines. Electric shocks may occur if the earth ground is inadequate.

Affix an overload circuit breaker with the correct load capacity to each unit.
Installing an incorrect breaker can result in fire due to overheating or short circuits.

(1) Accessories

Accessories
- Thermometer
- Filter

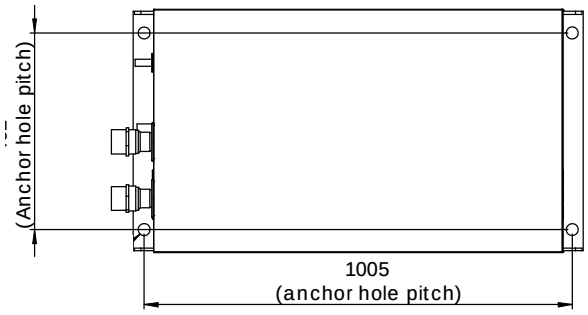
Supplemental documentation
- Procedures and Technical Points for System Installation
- Procedures and Technical Points for Electrical Wiring Work
- Procedures and Technical Points for Test Run
- Instruction Manual

Use M10 or larger diameter anchor bolts.
Obtain anchor bolts locally.

(2) Installation location

⚠ Caution

1. Provide the required space for inspection and maintenance (see Figure 2).
Insufficient space at the installation location could result in accidents from falling equipment.
2. If the water heat exchanger unit is installed on a roof or other high location, provide a permanent ladder or hand grips for safe access, and provide railings or hand grips around the water heat exchanger unit to prevent falls.
3. Ensure that the installation location has adequate water drainage.
A defect in the piping could cause water leaks into the surrounding property.
• Drain pipes that pass indoors should be as short as possible.
• Drain pipes that pass indoors must be insulated.
• Make sure that drain water cannot cause trouble for surrounding properties.
4. Use a leveling tool to ensure that the unit is truly horizontal.
Water leaks can result if the unit is not horizontally true.



Use M10 or larger diameter anchor bolts.

Figure 1. Anchor Bolt Positioning

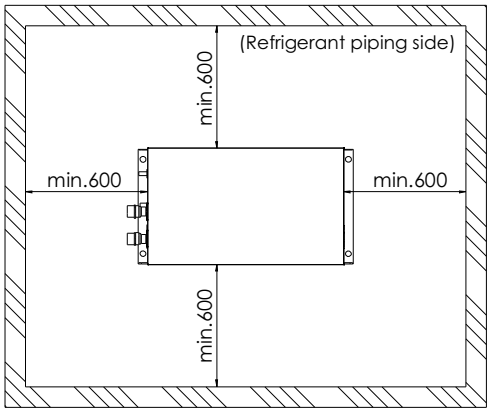


Figure 2

1. Avoid locations near equipment that emits high frequency radiation.
2. When lifting the water heat exchanger unit by suspension:
   Suspend the unit by attaching ropes to the four suspension rings on the base.
   When attaching lifting ropes, protect the external finish from scratches by, for example, using timber battens.
   When lifting by crane, make sure that the crane hook is at least 1 m from the unit.

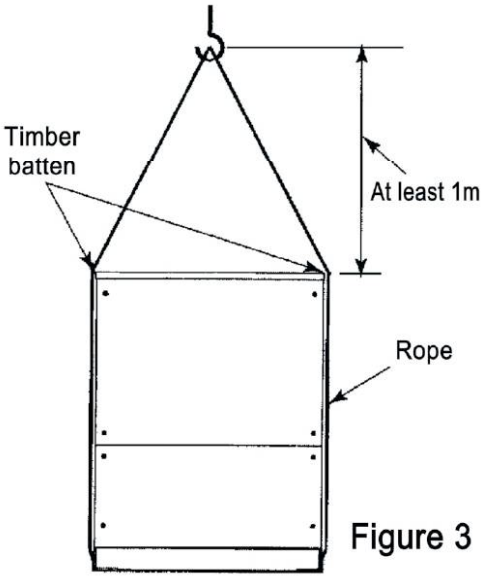


Figure 3

⚠ Caution

Do not lay the heat exchanger unit on its side during transportation.
Internal damage could result in malfunction.

(3.1) Installing refrigerant piping and charging with refrigerant (GHP+WHE Configuration)

> ⚠ Caution
> Always replace the refrigerant with nitrogen before brazing refrigerant piping.
> Loose oxide scales can cause motorized valves to seize and clog strainers, which can result in operation failure.

1. Be sure to heed the caution labels on the water heat exchanger unit.
2. Pipe routes should be designed to use the shortest possible length of piping and for the minimum possible difference between high and low points. When bending pipes, be careful to avoid kinking or flattening.
3. Table 1 shows the limitations on refrigerant pipe length between the water heat exchanger unit and the outdoor unit, and on the difference in height between the high and low points. Also add the unit additional charge amount in Table 2 according to the outdoor unit type.
4. For each WHE unit, regardless of size another 3,5 kg of refrigerant needs to be added.

Type	Allowable pipe length	Allowable Height difference		Amount of additional refrigerant	Refrigerant piping (copper pipe C1220T, external diameter × wall thickness in mm)**	
		Outdoor unit is higher	Outdoor unit is lower	For the length of refrigerant piping	Liquid side (O material)	Gas side (1/2H, H material)
Type 710	170 (equivalent length 200 m)	50m	*35m	259g/m (366g/m)	Ø19.05×1.0 (Ø22.22×1.0)	Ø31.75×1.1 (Ø38.1×1.35)
Type 500				185g/m (259g/m)	Ø15.88×1.0 (Ø19.05×1.0)	Ø28.58×1.0 (Ø31.75×1.1)
Type 250				56g/m (128g/m)	Ø9.52×0.8 (Ø12.7×0.8)	Ø22.22×1.0 (Ø25.4×1.0)

* For cooling operation where the outdoor air temperature is 10°C or less, this value should be 30m.
**These piping dimensions need to be used even if connected to a smaller outdoor unit than the 30 HP GHP.
• If the pipe length is 90m or more, use one size bigger one provided in parentheses.

Table 2 Unit additional charge amount

Outdoor unit type	45.0 kW	56.0 kW	71.0 kW	85.0 kW
Unit additional charge amount	–	0.5 kg	2.5 kg	10.0 kg

5. Do not allow dust, dirt, or moisture to become trapped inside the piping.
6. After connecting the piping, perform gas leakage testing by means of an air purge (Figure 4).
Leakage testing may be legally required in accordance with local regulations such as the High Pressure Gas Safety Law (in Japan). After connecting the pipes, perform testing in accordance with the points below (or those for the installation locale), to confi rm that there are no leaks from the joints.

Cautions

1) Gas pressure in the gas leakage test: 4.15 MPa
2) After the gas leakage test, evacuate the system to 667 Pa (-755 mmHg, 5 Torr).
3) Do not open outdoor unit valves until the gas leakage and vacuum tests are complete.
4) Do not allow the equipment to sit idle for long after completing vacuum testing.
6. Apply thermal insulation to the piping.
Apply the thermal insulation after completing the leak check on the pipe joints.
Apply thermal insulation to both the thick pipes and thin pipes.
7. A gas heat pump air conditioning system must be installed in accordance with the European Parliament and the Council Directive 97/23/EC on pressure equipment (PED) and the required rules of the actual valid EN 378. Furthermore it must be installed in accordance with the Regulation (EU) No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases and all the necessary reporting procedures must be carried out.

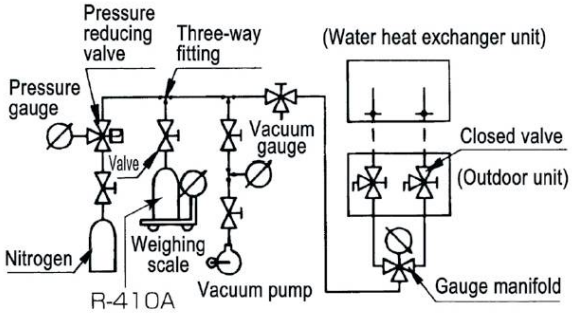


Figure 4

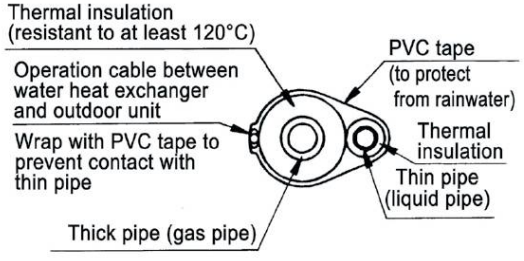


Figure 5

(3.2) Installing refrigerant piping and charging with refrigerant (ECOi+WHE configuration)

> ⚠ Caution
> Always replace the refrigerant with nitrogen before brazing refrigerant piping.
> Loose oxide scales can cause motorized valves to seize and clog strainers, which can result in operation failure.

1. Be sure to heed the caution labels on the water heat exchanger unit.
2. Pipe routes should be designed to use the shortest possible length of piping and for the minimum possible difference between high and low points. When bending pipes, be careful to avoid kinking or flattening.
3. Table 1 shows the limitations on refrigerant pipe length between the water heat exchanger unit and the outdoor unit, and on the difference in height between the high and low points. Also add the unit additional charge amount in Table 2 according to the outdoor unit type.
4. For each WHE unit, regardless of size another 3,5 kg of refrigerant needs to be added.

Type	Allowable pipe length	Allowable Height difference		Amount of additional refrigerant	Refrigerant piping (copper pipe C1220T, external diameter × wall thickness in mm)**	
		Outdoor unit is higher	Outdoor unit is lower	For the length of refrigerant piping	Liquid side (O material)	Gas side (1/2H, H material)
Type 500	170 (equivalent length 200 m)	50m	*35m	185g/m (259g/m)	Ø15.88×1.0 (Ø19.05×1.0)	Ø28.58×1.0 (Ø31.75×1.1)
Type 250				56g/m (128g/m)	Ø9.52×0.8 (Ø12.7×0.8)	Ø22.22×1.0 (Ø25.4×1.0)

* For cooling operation where the outdoor air temperature is 10°C or less, this value should be 30m.

Table 2 Unit additional charge amount

Outdoor unit type	U-10ME1E81	U-20ME1E81
Unit additional charge amount	6.6 kg	8.5 kg

5. Do not allow dust, dirt, or moisture to become trapped inside the piping.
6. After connecting the piping, perform gas leakage testing by means of an air purge (Figure 4).
   Leakage testing may be legally required in accordance with local regulations such as the High Pressure Gas Safety Law (in Japan). After connecting the pipes, perform testing in accordance with the points below (or those for the installation locale), to confi rm that there are no leaks from the joints.

Cautions

1) Gas pressure in the gas leakage test: 3.80 MPa
2) After the gas leakage test, evacuate the system to 667 Pa (-755 mmHg, 5 Torr).
3) Do not open outdoor unit valves until the gas leakage and vacuum tests are complete.
4) Do not allow the equipment to sit idle for long after completing vacuum testing.
6. Apply thermal insulation to the piping.
   Apply the thermal insulation after completing the leak check on the pipe joints.
   Apply thermal insulation to both the thick pipes and thin pipes.
7. An electric heat pump air conditioning system must be installed in accordance with the European Parliament and the Council Directive 97/23/EC on pressure equipment (PED) and the required rules of the actual valid EN 378. Furthermore it must be installed in accordance with the Regulation (EU) No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases and all the necessary reporting procedures must be carried out.

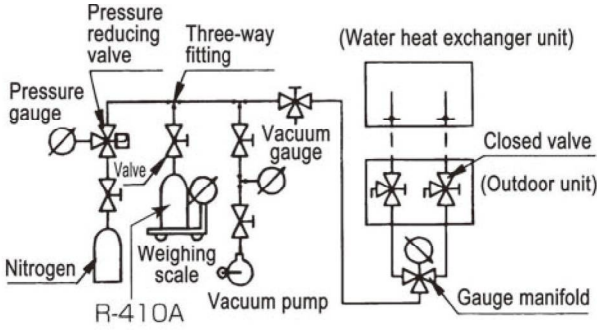


Figure 4

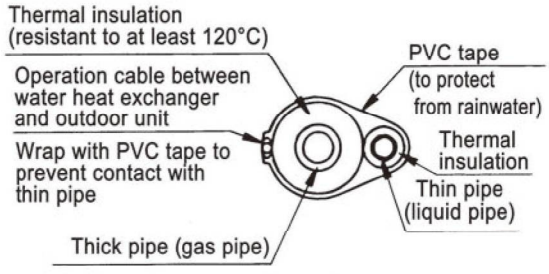


Figure 5

(4) Water piping construction

⚠ Warning
Use only water as the heat-transfer medium for the hot/cold water circuits and the coolant circuits.
Use of other fluids could result in fire or explosion.

⚠ Caution
Use hot/cold water and coolants that complies with refrigeration and air-conditioning equipment water quality guidelines (JRA-GL 02-1994)*.
Poor quality water can cause breakdown or water leaks.
Dispose of brine and cleaning fluid in accordance with applicable local regulations.
Disposing of these items improperly may not only result in legal penalties, but may also degrade the environment and public health.

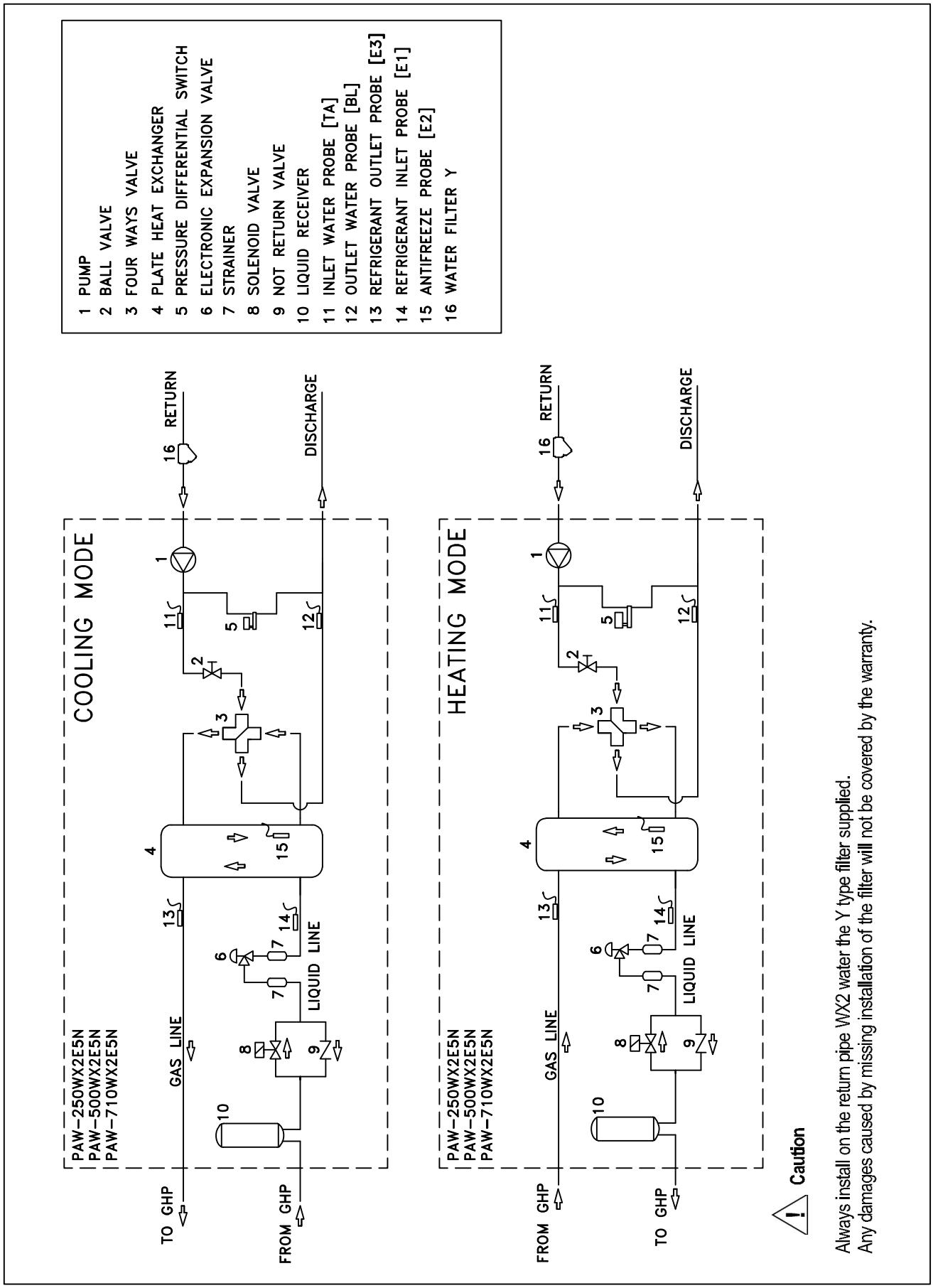
* Refer to the reference materials for details.

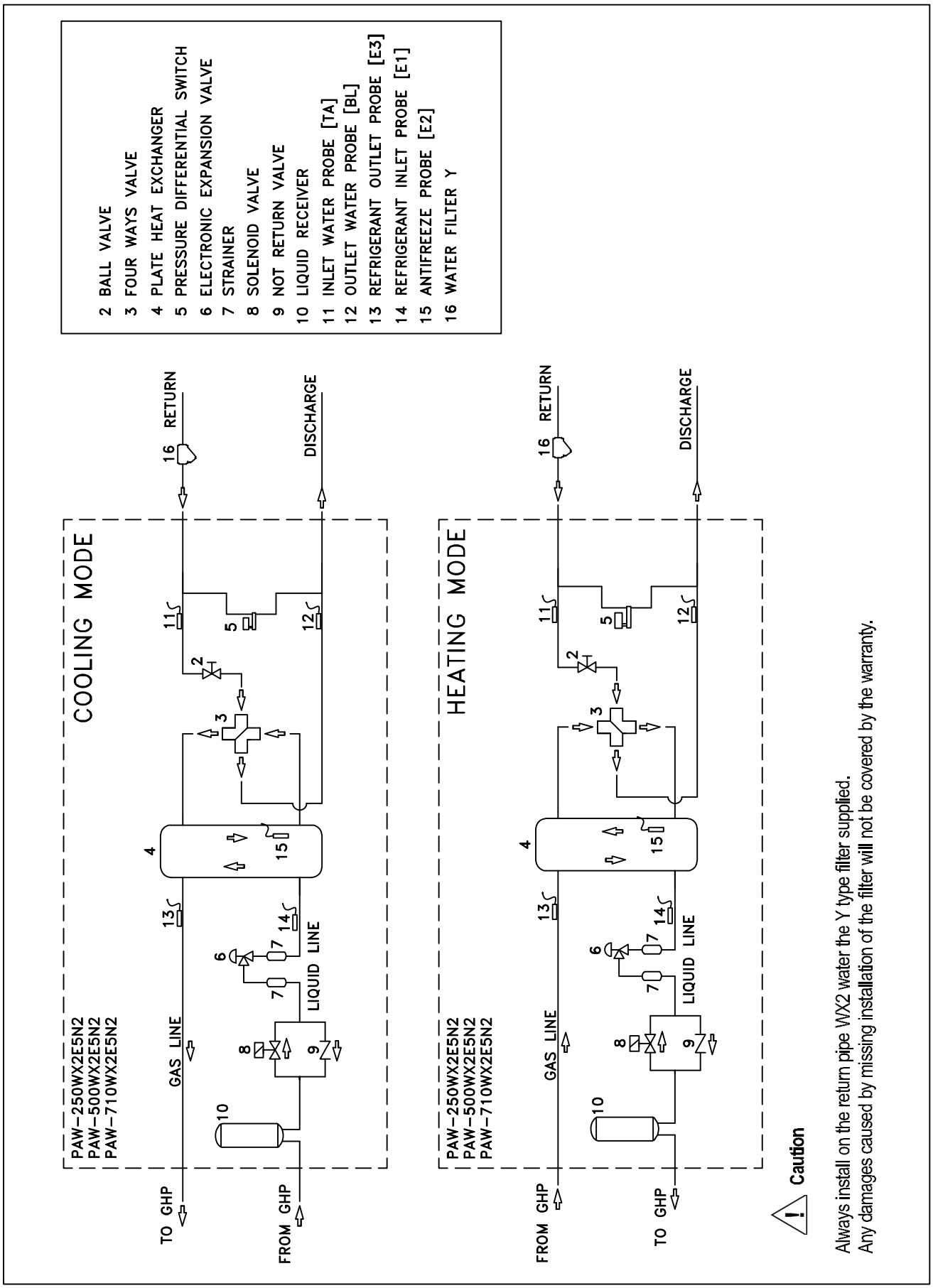
1. The inside diameter of the water pipe should be larger than that of the connectors (50A), with as few bends as possible in order to minimize flow resistance. Also, install unions or flanges near the unit so that it can be easily removed.
2. Install appropriate valves to enable removal of water and air from the water pipes. Noise, corrosion, and reduced performance are likely to occur if air becomes mixed with the liquid in the pipes.
3. Make sure that the system always contains at least the minimum quantity of water (if necessary, provide a storage tank or similar). Insufficient water in the unit will cause the system to stop frequently or to break down.
4. Provide a flow rate adjustment valve, so that the hot/cold water flow rate can be adjusted while watching the water temperature during testing. Do not touch the adjustment valve after adjusting.
5. Adjust the water pressure so that the pressure in the water heat exchanger does not exceed 0.7 MPa.
7. Include an expansion tank in the water pipe system installation.
6. The hot/cold water flow rate should be within the range shown in Figure 6. Operating outside this range could cause breakdown due to corrosion or freezing of the water heat exchanger unit.
7. Provide sufficient insulation on the water pipes. Heat loss due to insufficient insulation can result in damage from frozen pipes during severe cold periods.
8. The water heat exchanger unit includes a circuit to automatically start the hot/cold water circulation pump when the external air temperature and the temperature of the water within the unit fall, to prevent freezing within the water heat exchanger unit. However, an improper installation location or insufficient water pipe insulation may result in the water in the pump and hot/cold water pipes freezing before the temperature of the water inside the unit falls sufficiently to start the circulation pump. In this situation, provide a circuit to detect the outdoor air temperature at the location within the overall water circulation system where the water temperature falls fastest, so that the hot/cold water circulation pump startsautomatically at the proper time.
9. Provide suitable suspension hardware for the pipes, so that no unreasonable load is applied to the water heat exchanger unit.

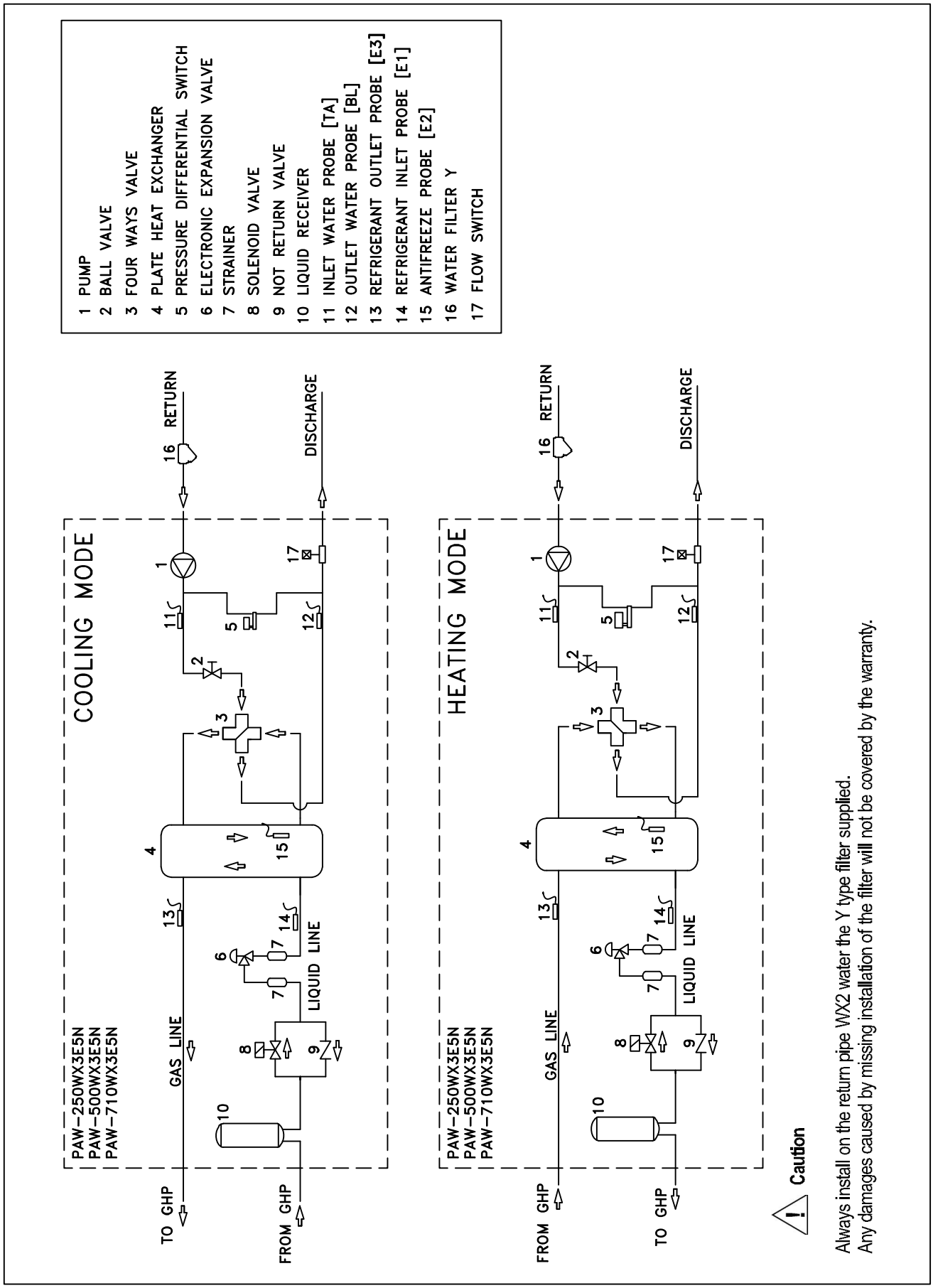
⚠ **Caution**

ALWAYS INSTALL ON THE RETURN PIPE WX2 WATER THE Y TYPE FILTER SUPPLIED.
ANY DAMAGES CAUSED BY MISSING INSTALLATION OF THE FILTER WILL NOT BE COVERED BY THE WARRANTY.

(5) Refrigerant and Hydraulic circuit diagram

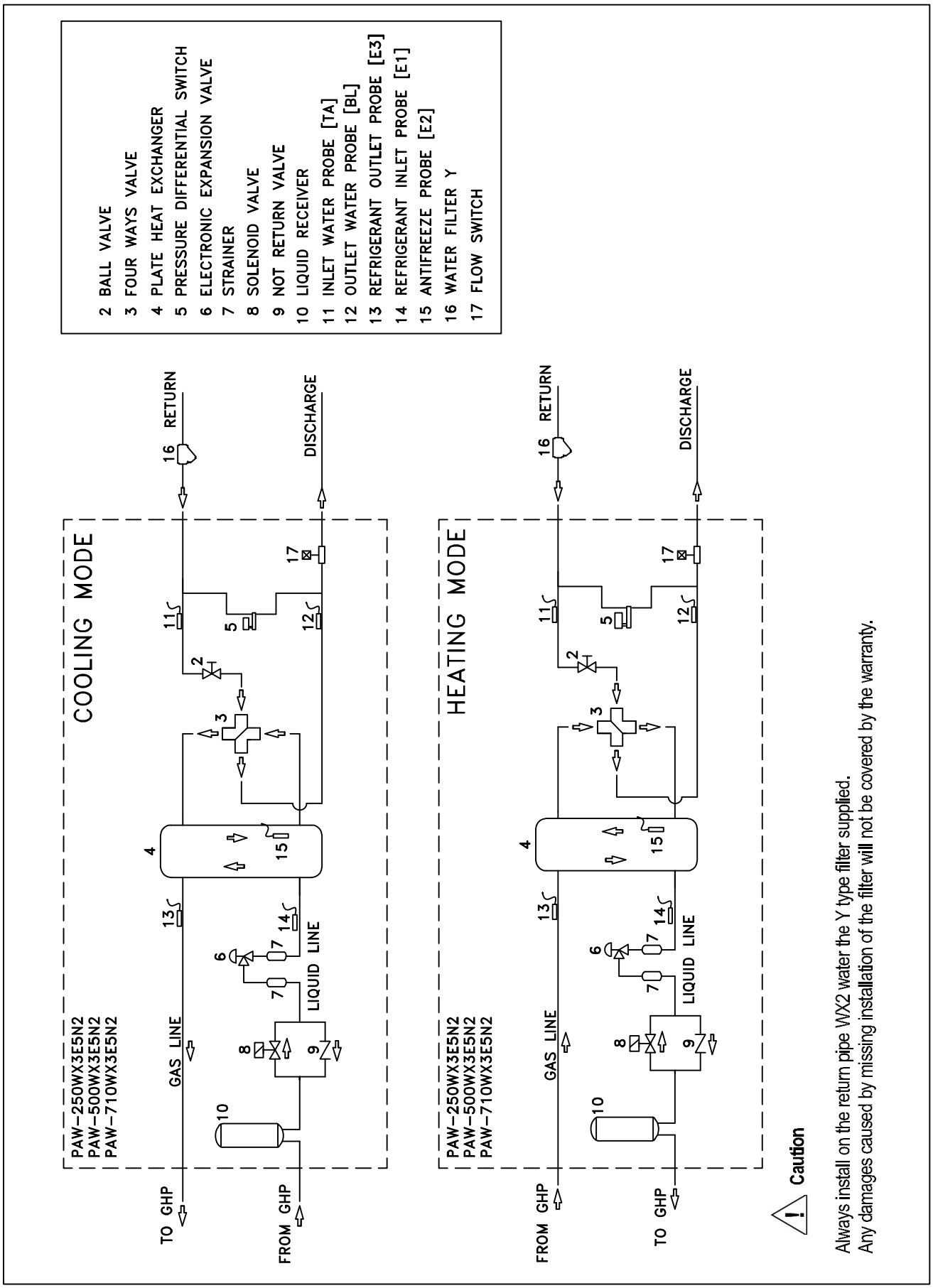



2 BALL VALVE
3 FOUR WAYS VALVE
4 PLATE HEAT EXCHANGER
5 PRESSURE DIFFERENTIAL SWITCH
6 ELECTRONIC EXPANSION VALVE
7 STRAINER
8 SOLENOID VALVE
9 NOT RETURN VALVE
10 LIQUID RECEIVER
11 INLET WATER PROBE [TA]
12 OUTLET WATER PROBE [BL]
13 REFRIGERANT OUTLET PROBE [E3]
14 REFRIGERANT INLET PROBE [E1]
15 ANTIFREEZE PROBE [E2]
16 WATER FILTER Y
COOLING MODE
PAW-250WX2E5N2
PAW-500WX2E5N2
PAW-710WX2E5N2
16 RETURN
DISCHARGE
GAS LINE
LIQUID LINE
TO GHP
FROM GHP
HEATING MODE
PAW-250WX2E5N2
PAW-500WX2E5N2
PAW-710WX2E5N2
16 RETURN
DISCHARGE
GAS LINE
LIQUID LINE
FROM GHP
TO GHP
Caution
Always install on the return pipe WX2 water the Y type filter supplied.
Any damages caused by missing installation of the filter will not be covered by the warranty.



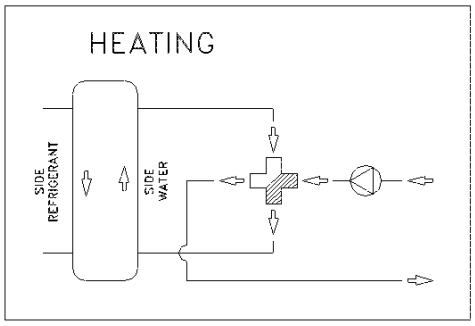
Caution

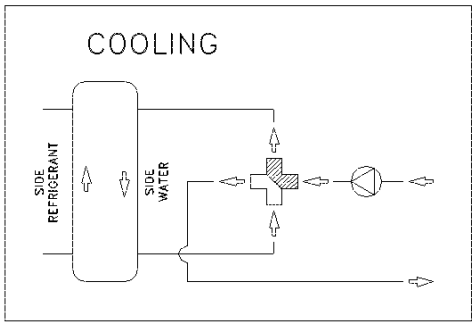
Always install on the return pipe WX2 water the Y type filter supplied.
Any damages caused by missing installation of the filter will not be covered by the warranty.


2 BALL VALVE
3 FOUR WAYS VALVE
4 PLATE HEAT EXCHANGER
5 PRESSURE DIFFERENTIAL SWITCH
6 ELECTRONIC EXPANSION VALVE
7 STRAINER
8 SOLENOID VALVE
9 NOT RETURN VALVE
10 LIQUID RECEIVER
11 INLET WATER PROBE [TA]
12 OUTLET WATER PROBE [BL]
13 REFRIGERANT OUTLET PROBE [E3]
14 REFRIGERANT INLET PROBE [E1]
15 ANTIFREEZE PROBE [E2]
16 WATER FILTER Y
17 FLOW SWITCH
COOLING MODE
PAW-250WX3E5N2
PAW-500WX3E5N2
PAW-710WX3E5N2
16 RETURN
DISCHARGE
GAS LINE
LIQUID LINE
TO GHP
FROM GHP
HEATING MODE
PAW-250WX3E5N2
PAW-500WX3E5N2
PAW-710WX3E5N2
16 RETURN
DISCHARGE
GAS LINE
LIQUID LINE
FROM GHP
TO GHP
Caution
Always install on the return pipe WX2 water the Y type filter supplied.
Any damages caused by missing installation of the filter will not be covered by the warranty.

6) 4-ways valve operations

On the water inlet pipe of plate heat exchanger there is a servo-controlled 4 ways valve that allows countercurrent exchange in Cooling and Heating mode.





The actuator is controlled by three-position switch (S1):

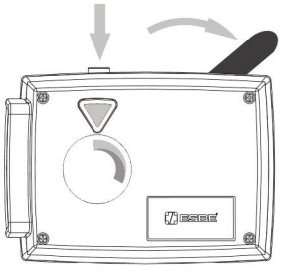
- **Heating:** the valve is maintained in the heating mode, so that the direction flow is from bottom to top. In Heating the triangular red indicator is located at the red band.

- **Cooling :** the valve is maintained in the cooling mode, so that the direction flow is from top to button. In Cooling the triangular red indicator is located at the blue band.

- **Auto:** The valve automatically switches to Heating or Cooling mode by a changeover contact activated from CN060 connector. Switching is performed with 90° rotation in 120 seconds .

It's also possible to operate the valve manually, according to the scheme shown below:

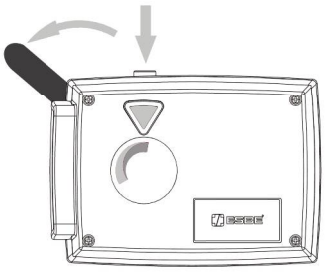
- To operate the valve in manual mode, press the button and use the lever to choose the required position. The power supply is disconnected automatically until the button is in down position.



Heating

Caution:

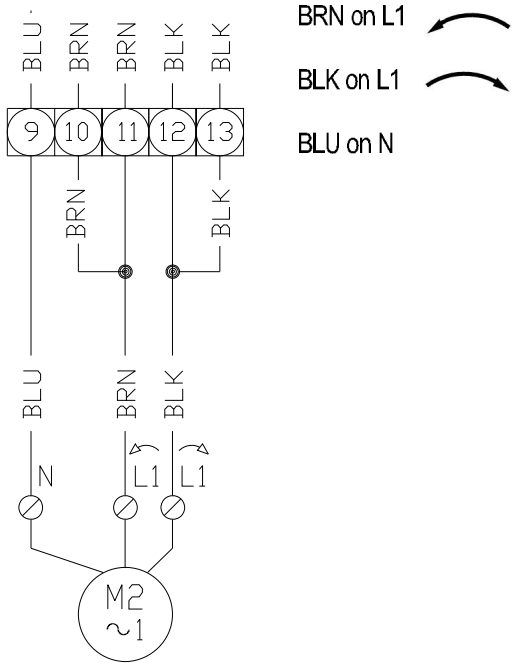
- To return to Auto mode, return the lever in block position. In this mode the button returns in up position and the power supply is connected again.



Cooling

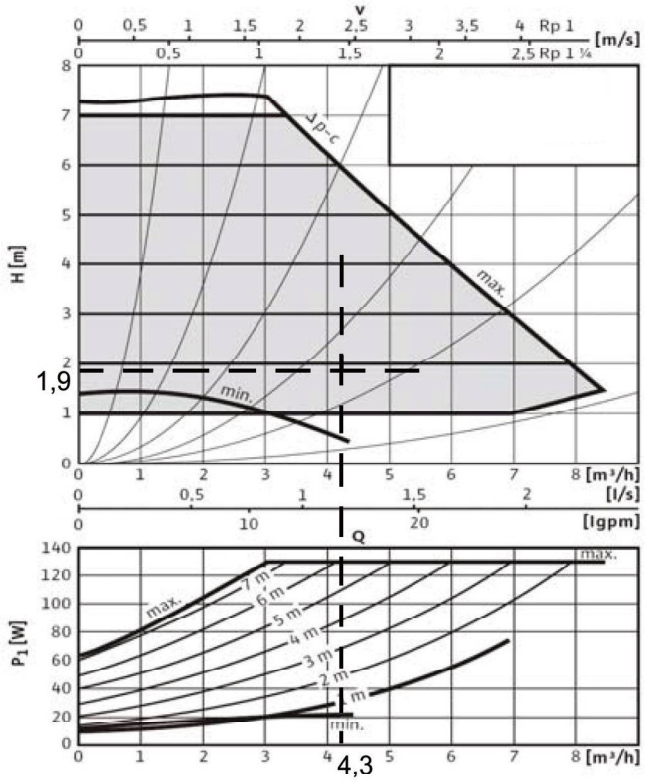
Electrical connection

For the correct operation check the electrical connections:

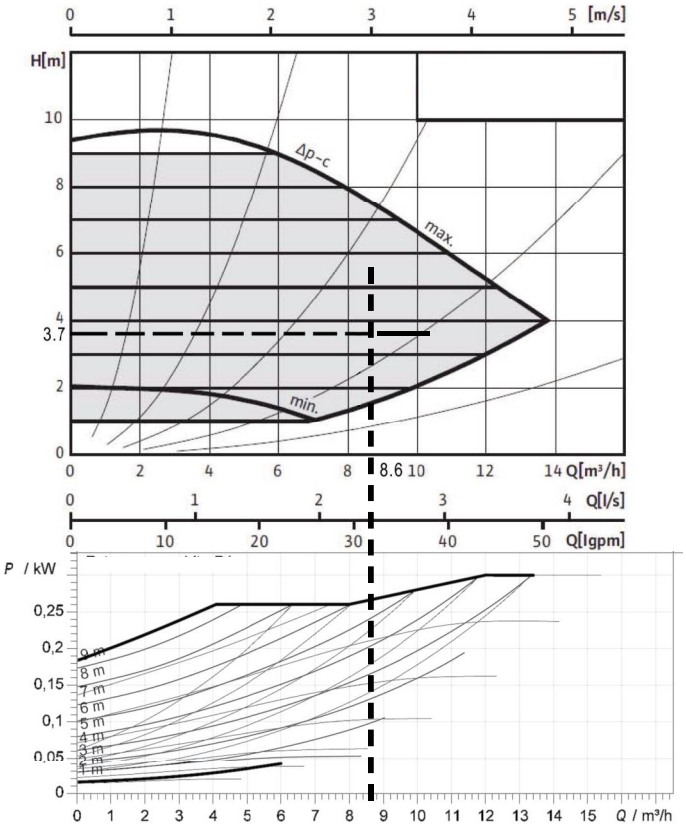


(7) Hydraulic loss characteristics

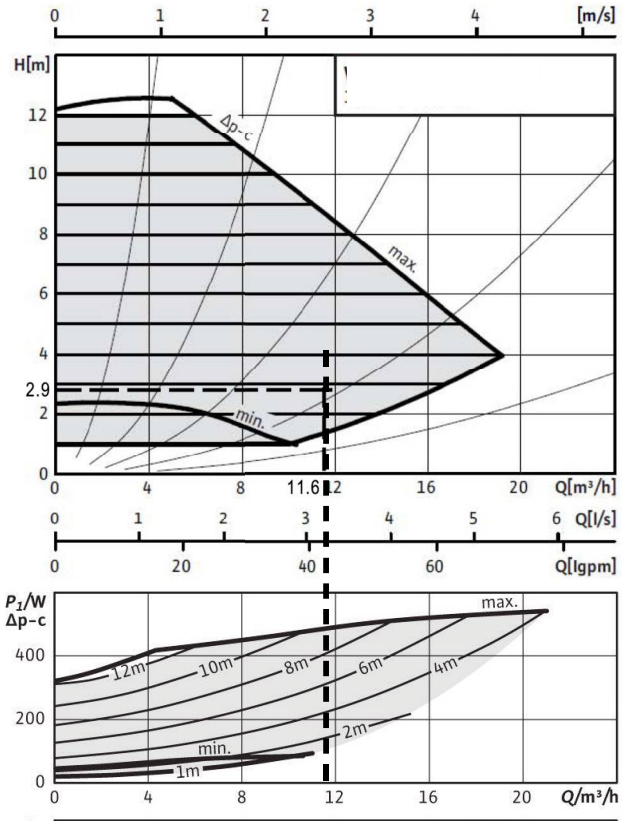
PAW-250WX2E5N



PAW-500WX2E5N



PAW-710WX2E5N



The high efficiency pump with ECM technology (Electronic Commutated Motor) is equipped with an electronic device that allows the automatic adjustment of pump performance at different load conditions of the system.
The device is located on the motor housing and enables the automatic adjustment, using the integrated control of the differential pressure.
The device has several control modes. In the present case, the control of the differential pressure must be set as **Dp-c**
(see attached manual pump), so as to maintain the pressure difference, created by the pump, constantly to the nominal value of the predetermined pressure differential, depending on the required nominal flow rate.

The pressure value to be set, must be equal to the sum of the hydrostatic loss of the unit and hydrostatic loss of the system.

The diagram shows the operating point with reference to the ydrostatic loss of the unit (hydraulic pression loss without the supplied Y-filter).

Minimum / maximum flow rates:

PAW-250WX2E5N / PAW-250WX3E5N: 3.6 / 6.5 m³/h
PAW-250WX2E5N2 / PAW-250WX3E5N2: 3.6 / 6.5 m³/h

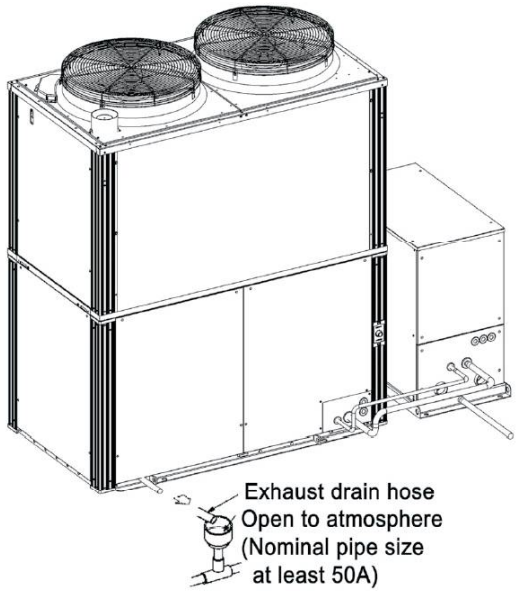
PAW-500WX2E5N / PAW-500WX3E5N : 6.3 / 12.0 m³/h
PAW-500WX2E5N2 / PAW-500WX3E5N2: 6.3 / 12.0 m³/h

PAW-710WX2E5N / PAW-710WX3E5N: 9.5 / 15.0 m³/h
PAW-710WX2E5N2 / PAW-710WX3E5N2: 9.5 / 15.0 m³/h

(8) Drain piping construction

⚠ Caution

The drain should allow water to run out naturally, so provide a downward slope of at least 1:100.
An upward slope could cause leakage from drainage water backflow.
When the piping is completed, check the drains to ensure that there are no leaks, and apply insulation to any part of the drain system located indoors to prevent water leaks and condensation.
Do not use the same drain pipe for both outdoor and indoor units, as this could cause poisoning due to backflow of exhaust gas to indoors.



(9) Indoor Installation

⚠ Caution

1.A water heat exchanger unit characteristically exhibits a cold internal temperature, particularly during cooling operation, which can result in condensation on the outside of the unit and elsewhere, leading to dripping that can cause indoor furnishings to become wet. When installing a water heat exchanger unit indoors, always include a drain pan beneath the unit to catch condensation runoff. Also, as necessary, provide thermal insulation for the drain pan.

(10) Using Anti-Vibration Mounts

Rooftop installations should include anti-vibration mounts in cases where noise or vibration may cause problems for residential and meeting rooms beneath. When using anti-vibration mounts, consider installing anti-vibration fittings on the refrigerant and other pipes.
Also consider the following during installation.

• When only the outdoor unit is installed on anti-vibration mounts, the actual length of refrigerant piping between the outdoor unit and the water heat exchanger should be at least 3m, and include bends in at least two places (Fig. 8).
Also, refrigerant piping should be secured with support fi xtures at least 1.5m from the indoor unit.
• To install anti-vibration mounts, follow the instructions provided by its manufacturer.

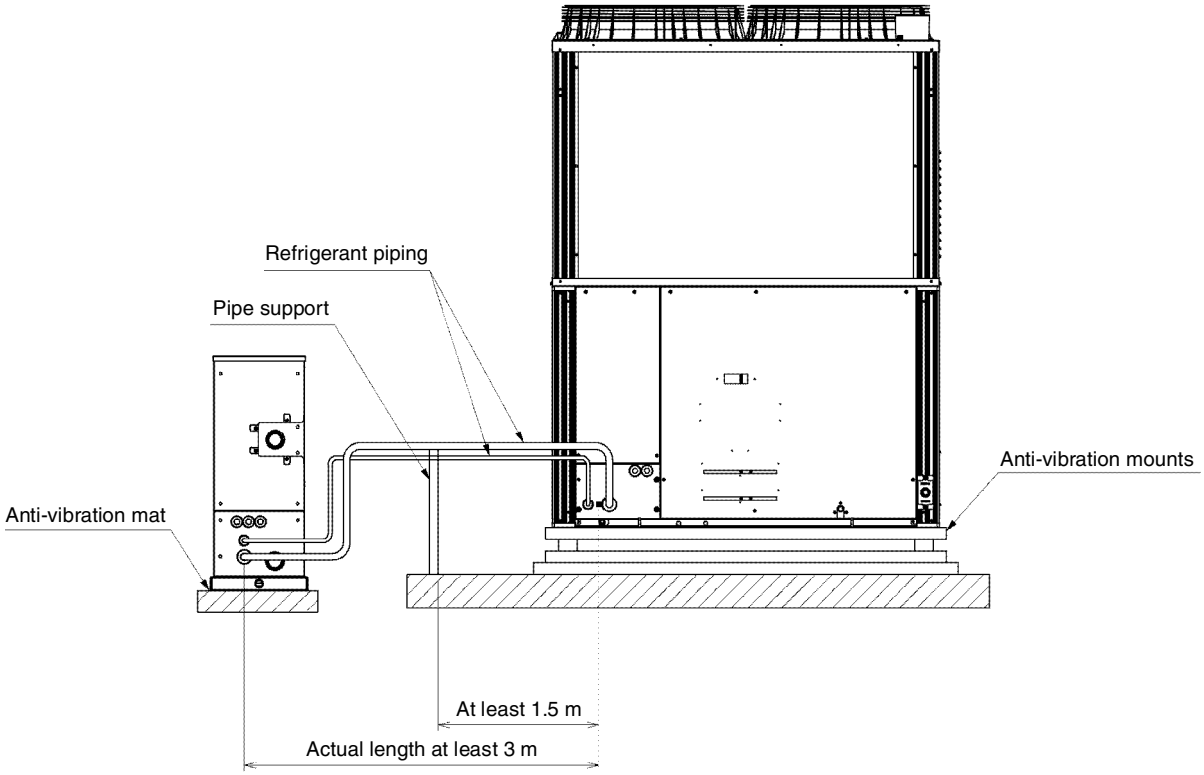


Figure 8

Reference: Water quality standard guidelines for A/C and refrigeration equipment (JRA-GL 02-1994)

	Item[1][6]	Cold water systems		Hot water systems[3]				Tendency[2]	
				Lower temp. hot water systems		High temp. hot water systems			
		Circulating 20ºC or less	Supply	Circulating 20 to 60ºC	Supply	Circulating 60 to 90ºC	Supply	Corrosion	Scaling buildup
Standard Items	pH (@25ºC)	6.8 – 8.0	6.8 – 8.0	7.0 – 8.0	7.0 – 8.0	7.0 – 8.0	7.0 – 8.0	○	○
	Elect. conductivity (mS/m) (@25ºC) { S/cm} (@25ºC)[1]	40 or less {400 or less}	30 or less {300 or less}	30 or less {300 or less}	30 or less {300 or less}	30 or less {300 or less}	30 or less {300 or less}	○	○
	Chloride ions (mg/l Cl^-)	50 or less	50 or less	50 or less	50 or less	30 or less	30 or less	○	
	Sulphate ions (mg/l SO_4^{2-})	50 or less	50 or less	50 or less	50 or less	30 or less	30 or less	○	
	Acid consumption (pH 4.8, mg/l $CaCO_3$)	50 or less	50 or less	50 or less	50 or less	50 or less	50 or less		○
	Total hardness (mg/l $CaCO_3$)	70 or less	70 or less	70 or less	70 or less	70 or less	70 or less		○
	Calcium hardness (mg/l $CaCO_3$)	50 or less	50 or less	50 or less	50 or less	50 or less	50 or less		○
	Silica ions (mg/l SiO_2)	30 or less	30 or less	30 or less	30 or less	30 or less	30 or less		○
Reference	Iron (mg/l Fe)	1.0 or less	0.3 or less	1.0 or less	0.3 or less	1.0 or less	0.3 or less	○	○
	Copper (mg/l Cu)	1.0 or less	0.1 or less	1.0 or less	0.1 or less	1.0 or less	0.1 or less	○	
	Sulfide ions (mg/l S^{2-})	Undetectable	Undetectable	Undetectable	Undetectable	Undetectable	Undetectable	○	
	Ammonium ions (mg/l NH^{4+})	1.0 or less	0.1 or less	0.3 or less	0.1 or less	0.1 or less	0.1 or less	○	
	Residual chloride (mg/l Cl)	0.3 or less	0.3 or less	0.25 or less	0.3 or less	0.1 or less	0.3 or less	○	
	Free carbonate (mg/l CO_2)	4.0 or less	4.0 or less	0.4 or less	4.0 or less	0.4 or less	4.0 or less	○	
	Ryznar stability index	-	-	-	-	-	-	○	○

	Item[1][6]	Coolant systems[4]			Tendency[2]	
		Circulating systems		Flow-thru systems		
		Circulating	Supply	Flow-thru water	Corrosion	Scaling buildup
Standard Items	pH (@25ºC)	6.5 – 8.2	6.0 – 8.0	6.0 – 8.0	○	○
	Elect. conductivity (mS/m) (@25ºC) { S/cm} (@25ºC)[1]	80 or less {800 or less}	30 or less {300 or less}	40 or less {400 or less}	○	○
	Chloride ions (mg/l Cl^-)	200 or less	50 or less	50 or less	○	
	Sulphate ions (mg/l SO_4^{2-})	200 or less	50 or less	50 or less	○	
	Acid consumption (pH 4.8, mg/l $CaCO_3$)	100 or less	50 or less	50 or less		○
	Total hardness (mg/l $CaCO_3$)	200 or less	70 or less	70 or less		○
	Calcium hardness (mg/l $CaCO_3$)	150 or less	50 or less	50 or less		○
	Silica ions (mg/l SiO_2)	50 or less	30 or less	30 or less	○	○
Reference	Iron (mg/l Fe)	1.0 or less	0.3 or less	1.0 or less	○	
	Copper (mg/l Cu)	0.3 or less	0.1 or less	1.0 or less	○	
	Sulfide ions (mg/l S^{2-})	Undetectable	Undetectable	Undetectable	○	
	Ammonium ions (mg/l NH^{4+})	1.0 or less	0.1 or less	1.0 or less	○	
	Residual chloride (mg/l Cl)	0.3 or less	0.3 or less	0.3 or less	○	
	Free carbonate (mg/l CO_2)	4.0 or less	4.0 or less	4.0 or less	○	
	Ryznar stability index	6.0 – 7.0	-	-	○	○

Notes

(1) Item names, term definitions and units are based on the JIS K 0101 standard. However, units and values in brackets { } are common units included for reference.

(2) The '○' symbol indicates whether an item primarily affects corrosion or scale buildup.

(3) Higher temperatures (40ºC+) accelerate corrosion, so that uncoated ferrous materials must be protected by countermeasures such as an anti-corroding agent or anti-oxidizing treatment.

(4) In coolant systems with a closed-loop cooling tower, circulating water and its replenishment supply, and evaporator water and its replenishment supply, depend on their respective water quality standards.

(5) The source of water and replenishment supply may be tap water, industrial water, artesian water and pure water. Recycled waste water and softening-processed water are excepted.

(6) The fifteen items in the above tables are typical factors affecting corrosion and scaling buildup.

(1) Cable capacity

Cable capacity (Use 600 V, CAT IV vinyl-insulated power cable, obtained locally)

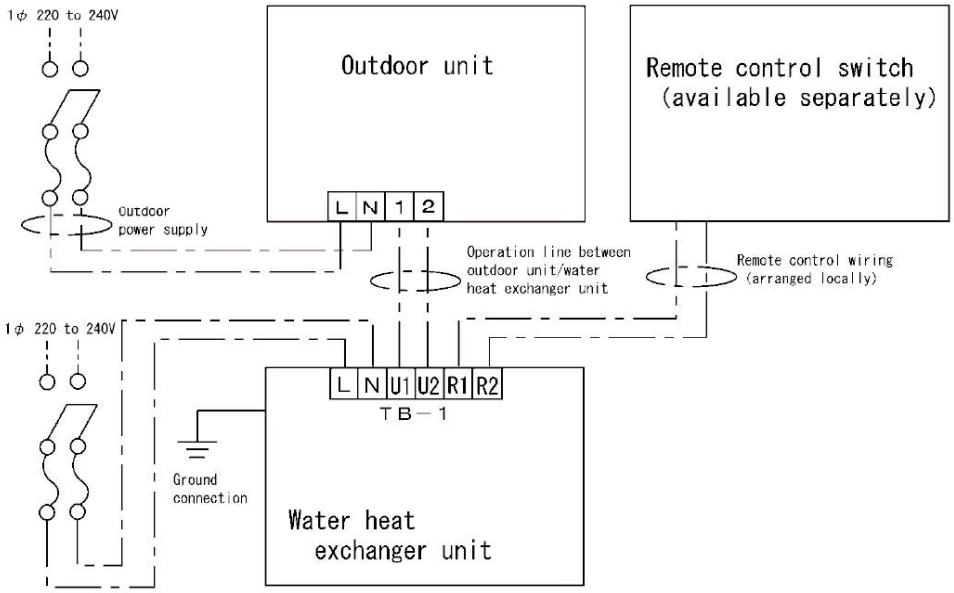
Applicable Unit		Water Heat Exchanger Model
Model type		PAW-250WX2E5N /N2
Switch capacity (A)		30
Fuse capacity (A)		15
Power cable (metal or PVC pipe) with 2% voltage drop standard	Minimum cable size	2 mm^2
	Up to 25 m	2 mm^2
	Up to 50 m	2 mm^2
	Up to 75 m	2 mm^2
	Up to 100 m	2 mm^2
Grounding cable size		2 mm^2
Inter-unit operation cable size		0.5 mm^2 to 2 mm^2 (Up to 1000 m total)
Remote control cable size		0.5 mm^2 to 1.25 mm^2 (Up to 300 m total)

Applicable Unit		Water Heat Exchanger Model
Model type		PAW-500WX2E5N /N2
Switch capacity (A)		30
Fuse capacity (A)		15
Power cable (metal or PVC pipe) with 2% voltage drop standard	Minimum cable size	2 mm^2
	Up to 25 m	2 mm^2
	Up to 50 m	2 mm^2
	Up to 75 m	2 mm^2
	Up to 100 m	2 mm^2
Grounding cable size		2 mm^2
Inter-unit operation cable size		0.5 mm^2 to 2 mm^2 (Up to 1000 m total)
Remote control cable size		0.5 mm^2 to 1.25 mm^2 (Up to 300 m total)

Applicable Unit		Water Heat Exchanger Model
Model type		PAW-710WX2E5N /N2
Switch capacity (A)		30
Fuse capacity (A)		15
Power cable (metal or PVC pipe) with 2% voltage drop standard	Minimum cable size	2 mm^2
	Up to 25 m	2 mm^2
	Up to 50 m	2 mm^2
	Up to 75 m	2 mm^2
	Up to 100 m	2 mm^2
Grounding cable size		2 mm^2
Inter-unit operation cable size		0.5 mm^2 to 2 mm^2 (Up to 1000 m total)
Remote control cable size		0.5 mm^2 to 1.25 mm^2 (Up to 300 m total)

Values within parentheses () are the maximum length in meters for the minimum cable size.

(2) Electrical connection diagram



Caution.
Always connect the flow switch in parallel with the pump operating signal to protect against freezing.

(3) Precautions regarding electrical work

Read these important precautions regarding safety carefully, and be sure to observe them.

The precautions shown here are classified into " ⚠ Warning" and " ⚠ Caution." However, they are all important items regarding safety, and must be observed.
The following shows the symbols used and their meanings.

Warning: ⚠ Indicates a potentially hazardous situation in which incorrect handling may result in the death or serious injury of personnel.

Caution: ⚠ Indicates a potentially hazardous situation in which incorrect handling may result in the injury of personnel or damage to property.

(1) Safety precautions

⚠ Warning

Electrical work should be entrusted to the dealer where this product was purchased, or a professional contractor.
Problems due to incorrectly carrying out the work yourself may result in leaking refrigerant, electric shock, fire, etc.
The electrical work should be carried out by a properly qualified electrician in accordance with "Technical Criteria for Electrical Equipment," "Electrical Wiring Regulations (chiller)," and "Procedures and Technical Points for Electrical Wiring Work." Incorrect wiring work may result in an electric shock or fire.

(2) Electrical wiring work precautions

⚠ Warning

Use a dedicated branch circuit for the electrical cables, and do not share it with other equipment. Otherwise, secondary damage may occur as a result of the circuit breaker tripping.
When carrying out wiring work, use the designated cables (type and thickness) and connect them securely. Fix the cables properly in place to ensure that external force from the cables does not transmit to the connection terminals. Not connecting the cables securely or not fixing them in place properly may result in the generation of heat, fire, etc.

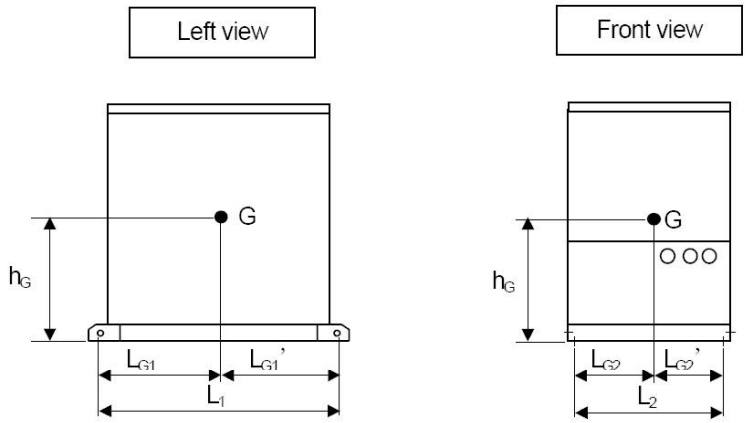
⚠ Warning

Attach an overcurrent circuit breaker of the set capacity to each unit. Installing an inappropriate overcurrent circuit breaker may result in a fire due to heat generation, short circuit, etc.
Attach an earth leakage breaker of the set capacity to each unit. Not installing an earth leakage breaker (earth leakage breaker rating of 30 mA within 0.1 sec) may result in an electric shock or fire.
For the ground connection, install a D type connection in accordance with the Technical Criteria for Electrical Equipment (formerly type 3 ground connection).
Do not connect the ground cable to a gas pipe, water pipe, lightning conductor, or telephone ground cable.
Inadequate grounding may result in an electric shock.

An inverter is used in the unit, so use an earth leakage breaker that is compliant with the inverter. Use the clamper for cables in the outdoor unit to fix the power supply cable and the operation cable for the outdoor and water heat exchanger units to ensure they do not come into contact with parts such as the following. Refrigerant pipe, thin pipe for pressure outlet, or any other part of the refrigerant circuit.
Sharp edges of attachments and other objects. For the operation cables (remote control cable, operation cable for the indoor, outdoor and water heat exchanger units), use signal cables that are easy to differentiate from the power supply cable (AC200-240V). Also, do not run the power cable with the operation cables.
Keep the power supply cable and operation cables of the unit 3 m or more away from the chiller, antenna cable, operation cable, power supply cable, and other parts of equipment such as a TV, radio, stereo, interphone, personal computer, word processor, and telephone. Noise from such equipment may have adverse effects.

(1) Installation and center of gravity

1) Position of center of gravity



Outdoor unit type	Position of mounting points		Position of center of gravity					Product weight (kg)
	L_1	L_2	L_{G1}	L_{G1}'	L_{G2}	L_{G2}'	h_G	
PAW-250WX2E5N	1005	462	354	651	282	180	608	120
PAW-500WX2E5N	1005	462	354	651	294	168	638	145
PAW-710WX2E5N	1005	462	374	631	288	174	628	160

* For earthquake-resistant design, use the smallest value of L_{G1}, L_{G1}', L_{G2}, or L_{G2}'.

(4) Example anchor bolt calculation

Example of evaluation using calculations

(1) Anchor bolt conditions

1) Total no. of bolts (N)	N = 4	current models have four bolts
2) Bolt diameter (D)	D = 12 mm	for M12 bolts
3) Bolt cross-sectional area (A)	$A = \pi D^2 / 4 = 113\ mm^2$	
4) Bolts on one side (end-on direction, n_1)	$n_1 = 2$	current models have two bolts
(broadside direction, n_2)	$n_2 = 2$	current models have two bolts

5) The installation method is for "embedded J or JA type bolts," on a 15-cm-thick slab
Anchor bolt allowable short-term tensile load (Ta) Ta = 11,760 N
(The installation method may also be selected after completing calculations.)

(2) Calculation

1) Design horizontal seismic magnitude (K_H)	$K_H = 1.0$	Installation location:KH	roof : 1.0 ground : 0.4
2) Operating load (W) (= operating mass × 9.8)	W = 1,568 N		
3) Horizontal earthquake force (F_H)	$F_H = KH \cdot W = 1{,}568$ N		
4)Height of center-of-gravity (h_G)	$h_G = 512$ mm		
5) Vertical earthquake force (F_V)	$F_V = F_H / 2 = 784$ N		

6) Distance from center-of-gravity to bolt

End-on direction (L_{G1})	$L_{G1} = 531$ mm
Broadside direction (L_{G2})	$L_{G2} = 230$ mm

7) Bolt span

End-on direction (L_1)	$L_1 = 1{,}014$ mm
Broadside direction (L_2)	$L_2 = 462$ mm

8) Actual strength of anchor bolts

Short-term allowable tensile stress (f_t) $f_t = 176$ N/mm² for SS400, $f_t = 176$

Short-term allowable shear stress (f_s) $f_s = 99$ N/mm² for SS400, $f_s = 132 \times 0.75$

9) Pull-out load on one bolt

End-on direction (Rb_1) $Rb_1 = (F_H \cdot h_G - (W - F_V) L_{G1}) / L_1 \cdot n_1 = 191$ N

Broadside direction (Rb_2) $Rb_2 = (F_H \cdot h_G - (W - F_V) L_{G2}) / L_2 \cdot n_2 = 674$ N

10) Anchor bolt shear stress ( ) $\tau = F_H / N \cdot A = 3.5$ N/mm²

11) Mounting bolt tensile stress

End-on direction (δ_1) $\delta_1 = R_{b1} / A = 1.7$ N/mm²

Broadside direction (δ_2) $\delta_2 = Rb_2 / A = 6$ N/mm²

12) Allowable tensile stress on a bolt subject to both tensile and shear stresses (f_{ts})

$f_{ts} = 1.4 \cdot f_t - 1.6 \tau = 240.9$ N/mm²

(3) Judgment

1) Tensile load

End-on direction, if $Rb_1 < T_a$ OK $Rb_1 = 191 < T_a = 11{,}760$

Broadside direction, if $Rb_2 < T_a$ OK $Rb_2 = 674 < T_a = 11{,}760$

2) Shear stress

if $\tau < f_s$, OK $\tau = 3.5 < f_s = 99$

3) Tensile stress

End-on direction: if $\delta_1 < f_t$ $< f_t = 176.0$

OK $\delta_1 = 1.7$

$\delta_1 < f_{ts}$ $< f_{ts} = 240.9$

Broadside direction: if $\delta 2 < f_t$ $< f_t = 176.0$

OK $\delta_2 = 6$

$\delta_2 < f_{ts}$ $< f_{ts} = 240.9$