NAVIEN Air to Water Heat Pump

Technical Manual

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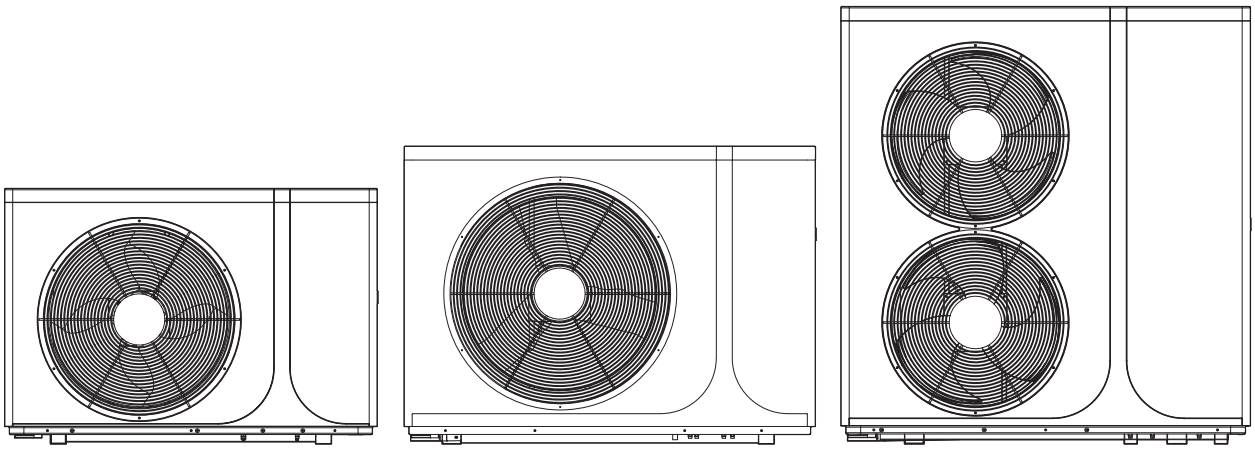
Technical Manual

Engineering Product Data Book



NAVIEN

Contents

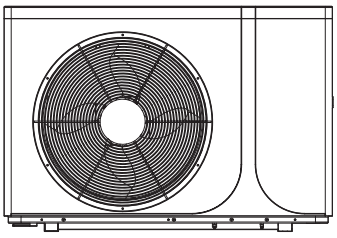
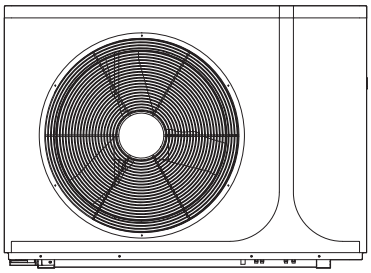
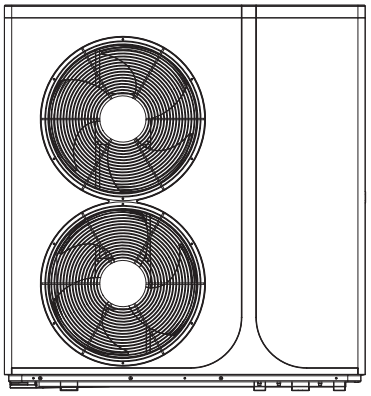
1. General Information

1.1 Model Line-up

Models

Category	Capacity (kW)	Model	Remark
1Ø, 220~240V, 50Hz	4	PEM750V004PGKC	
	6	PEM750V006PGKC	
	8	PEM750V008PGKC	
	10	PEM750V010PGKC	
	17	PEM750V017PGKC	

External View

4 / 6 / 8 kW	10kW	17kW
		

1.2 Nomenclature

Factory Model Name

Model Name	P	E	M	7	5	0	V	004	P	G	K	C
No.	1	2	3	4	5	6	7	8	9	10	11	12

No.	Signification
1	**P: ATWHP**
2	**Structure** E: Outdoor
3	**Classification** M: Monobloc
4	**Grade** 7: Premium
5	**Option** 5: Basic
6	**Version** 0: Base model
7	**Specifications** V: Inverter
8	**Heating Capacity (kW)** e.g. 4kW : 004 , 6kW: 006, 8kW: 008, 10kW: 010, 17kW: 017
9	**Refrigerant** P: R290
10	**Region** G: GB (Great Britain)
11	**Color** K: Black
12	**Electrical ratings** C: 1 Ø, 220-240 V, 50 Hz

2. Product Data

2.1 List of Functions

Water Side

Category	Functions	PEM750V004PGKC / PEM750V006PGKC / PEM750V008PGKC / PEM750V010PGKC / PEM750V017PGKC
Reliability	Self diagnosis	O
Convenience	Auto restart	O
	Child lock	O
	Timer (on /off)	O
	Timer (weekly)	O
	Two thermistor control	O
Air to Water Heat Pump Functions	Anti-condensation on floor (cooling)	O
	Digital output for external pump	O
	Current flow rate monitoring	O
	Thermostat interface (230V AC)	X
	Thermostat interface (24V AC)	X
	Solar thermal system*	X
	DHW (Domestic Hot Water) tank installation kit	O
	PHEX anti-freezing control	O
	Water pump anti-stuck function	O
	Weather compensation for heating and cooling (auto mode)	O
	Low noise operation	O
	Anti-overheating of water pipe	O
	Emergency operation	O
	Weather dependent operation with Thermostat	O
	Scheduler (DHW tank heater)	O
	Timer (domestic hot water tank heater)	O
	Quick domestic hot water tank heating	O
	Screed drying mode	X
	Sump heater	O
	Base pan heater	O
	Integrated dry contact (CN-EXT)	O
	Water flow control	O
	Water pressure monitoring	O
	Digital input for energy saving (ESS)	O
	Energy monitoring	O
	DHW recirculation	O

- O : Applied, X : Not applied
- Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
- Accessory line-ups varies by region, so check your local catalogue or local sales material.

* This function requires the 3rd party accessory, PT-1000 sensor. (field supply)

Refrigerant Side

Category	Functions	PEM750V004PGKC / PEM750V006PGKC / PEM750V008PGKC / PEM750V010PGKC / PEM750V017PGKC
Reliability	Defrost / Deicing	O
	High pressure switch	O
	Low pressure switch	O
	Phase protection	O
	Restart delay (3-minutes)	O
	Self diagnosis	O
	Soft start	O
Convenience	Test function	O
	Low noise operation	O
	Wiring error check	O
	Peak control	O
	Mode lock	O
	Forced cooling operation (outdoor unit)	O
	Base pan heater	O
Network function	Network solution	X

- O : Applied, X : Not applied
- Accessory : Ordered and purchased separately the accessory package referring to the model name provided and install at field.
- Accessory line-ups varies by region, so check your local catalogue or local sales material.

* This function requires the 3rd party accessory, PT-1000 sensor. (field supply)

Accessory Compatibility List

Category		Product	Remark	PEM750V004PGKC / PEM750V006PGKC / PEM750V008PGKC / PEM750V010PGKC / PEM750V017PGKC
Wired remote Controller	Standard			O
ETC	Remote temperature sensor			O
	Group control wire			O
	2-Remo control wire			O
	Extension wire			O
	Wi-Fi controller			O
	Meter Interface			O
Accessory kit for AWHP	DHW sensor			O
	Buffer sensor			O

- O: Possible, X: Impossible, - : Not applicable
- Some advanced functions controlled by individual controller cannot be operated.
- ACP or AC Smart is needed.
- Meter interface cannot be connected at the same time with 3rd-party controller.
- If you need more detail, please refer to the manual of product.

2.2 Specification

General Specification

The following table lists the general specifications for the AWHP.

Model		Unit	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Power Supply		V/Hz	220–240V~/50Hz				
Resistance Class			IPX4				
Overvoltage Category			I				
EN14511	Heating Capacity	A7W35 (kW)	4	6	8	10	17
	COP		4.70	4.65	4.60	4.66	4.45
	Heating Capacity	A7W55 (kW)	4.5	5.5	7.5	9.3	17.0
	COP		3.21	3.06	2.96	3.05	2.97
	Cooling Capacity	A35W18 (kW)	4	6	8	10	17
SCOP (35°C/55°C) (MCS)			4.86/3.5	4.79/3.38	4.71/3.44	4.77/3.57	4.79/3.53
ErP Rating (35°C/55°C) Heating			A+++/A++	A+++/A++	A+++/A++	A+++/A++	A+++/A++
Max. Power Input		kW	2.8	3.9	5.1	6.3	8.5
Max. Starting/Running Current		A	1.5/12.0	1.5/17.0	2.0/22.0	2.5/30.0	3.0/36.1
Refrigerant/Amounts		kg	R290/0.75	R290/0.75	R290/0.80	R290/0.98	R290/1.40
CO2 Equivalent		T	0.00225	0.00225	0.00240	0.00290	0.00420
Rated/Max. Fan Speed		RPM	350/600	400/600	460/770	400/700	500/800
Air Volume at Rated Speed		m^3/h	1500	2000	2800	4000	6000
Water Pump Input		W	60	60	60	60	180
Sound Pressure (1 m)		dB (A)	42	45	46	46	48
Sound Power Level (EN12102-1)		dB (A)	55	56	60	61	63
Connection Size		inch	1	1	1	1	1
Water Flow Volume		m^3/h	0.68	1.03	1.38	1.70	2.90
Internal Water Pressure Drop		kPa	5	15	15	20	40
Water Head		m	5.5	7.5	6.8	5.6	10.5
Weight (Net)		kg	105	105	120	145	205
Unit Dimension (W/D/H)		mm	1166 x 445 x 799.5			1287 x 500 x 932	1247 x 540 x 1332
Operating Ambient Temperature Range Space Heating/Hot Water		°C	-25–43	-25–43	-25–43	-25–43	-25–43
Operating Ambient Temperature Range Cooling		°C	10–43	10–43	10–43	10–43	10–43
Operating Flow Temperature Range Space Heating		°C	15–70	15–70	15–70	15–70	15–70
Operating Flow Temperature Range Hot Water		°C	15–75	15–75	15–75	15–75	15–75
Operating Flow Temperature Range Cooling		°C	10–28	10–28	10–28	10–28	10–28

Techincal Specification (Water Side)

Technical Specifications (Water side)				Model				
				PEM750V 004PGKC	PEM750V 006PGKC	PEM750V 008PGKC	PEM750V 010PGKC	PEM750V 017PGKC
Water Pump	Type		-	Canned type for hot water circulation				
	Model		-	UPM3 K 25-75 130 AZA / GRUNDFOS				UPMXL 25-125 130
	Motor Type		-	BLDC				
	Step of Pumping Performance		-	Variable speed 10% to 100%				
	Power input (100% Capacity)		W	50	60	60	60	180
	Water Flow Rate		m^3/h	0.68	1.03	1.38	1.7	2.9
Heat Exchanger	Type		-	Brazed Plate HEX				
	Quantity		-	1	1	1	1	1
	Dimension		mm	526 x 119 x 46.8		526 x 119 x 65	526 x 119 x 59.2	526 x 119 x 102
Water flow switch	Model			PLS-1				
	Start-up volume	Min.	LPM	0.7				
Piping Connections	Inlet		inch	1	1	1	1	1
	Outlet		inch	1	1	1	1	1

- Due to our policy of innovation some specifications may be changed without notification.
- Wiring cable size must comply with the applicable local and national codes. Refer to "2.8 Electric Characteristics" on page 28 for electrical work and design. Especially the power cable and circuit breaker should be selected in accordance with that.
- Sound power level is measured on the rated condition in accordance with ISO 9614 standard.
  Therefore, these values can be increased owing to ambient conditions during operation.
  Rated sound power level is according to the EN12102-1 under conditions of the EN14825
- Performances are in accordance with EN14511 and reflect ErP testing conditions. Above gives the declared values at rated conditions acc. ErP regulation.
  For max. capacities, refer to Performance Data.
  - Rated running current : Outdoor Temp. 7°CDB / 6°CWB, LWT 35°C
- This product contains Fluorinated greenhouse gases.

* DHW 58~80°C Operating is available only when the booster heater is operating.
** This is the power input in accordance with the 80% pump capacity setting at rated water flow rate.
When the OH SUNG pump is set as 80% capacity, it's head is similar to that of the GRUNDFOS pump at rated water flow rate.

Techincal Specification (Refrigerant Side)

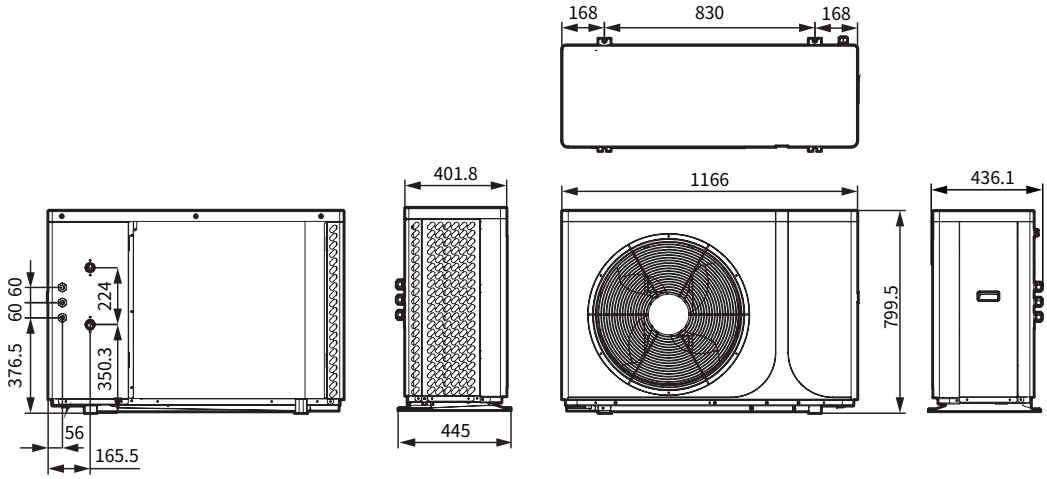
Technical Specifications (Water side)				Model				
				PEM750V 004PGKC	PEM750V 006PGKC	PEM750V 008PGKC	PEM750V 010PGKC	PEM750V 017PGKC
Compressor	Type		-	Rotary				
	Model		Model	WHP07600PSDPC9KQ (Highly)		WHP10200 PSDPC9KQ	WHP32900 VSKTQ9JK	WHP13300 PSDPC8FQ
	Motor type		-	BLDC				
	Displacement		Cm^3 / Rev	30.7		41.8	75.2	54.8
Refrigerant	Type		-	R290				
	GWP (Global Warming Potential)			3				
	Prechanged amount		g	0.75	0.75	0.8	0.98	1.4
	$t\text{-}CO_2$ eq.		-	0.00225	0.00225	0.0024	0.0029	0.0042
	Control		-	Electronic Expansion Valve				
Refrigerant Oil	Type		-	HAF68				
	Charged volume		cc x No.	840 ± 20		840 ± 20	2000 ± 20	1150 ± 20
Heat Exchanger	Type		-	Fin & Tube				
	Quantity		EA	1	1	1	1	1
	Specification		EA	800 x 240 x 725 (Ø7 x 2 x 1.6)		800 x 240 x 725 (Ø7 x 2 x 1.5)	900 x 306.7 x 850 (Ø7 x 3 x 1.8)	812 x 367 x 1250 (Ø7 x 3 x 1.8)
Fan	Type			Propeller				
	Air flow rate	Rated	m^3/h	1500	2000	2800	4000	6000
Fan Motor	Type			BLDC				
	Output		W x No.	130 x 1			170 x 1	75 x 2

- Due to our policy of innovation some specifications may be changed without notification.
- Wiring cable size must comply with the applicable local and national codes. Refer to "2.8 Electric Characteristics" on page 28 for electrical work and design. Especially the power cable and circuit breaker should be selected in accordance with that.
- Sound power level is measured on the rated condition in accordance with ISO 9614 standard.
  Therefore, these values can be increased owing to ambient conditions during operation.
  Rated sound power level is according to the EN12102-1 under conditions of the EN14825
- Performances are in accordance with EN14511 and reflect ErP testing conditions. Above gives the declared values at rated conditions acc. ErP regulation.
  For max. capacities, refer to "2.7 Performance Data" on page 25.
- Rated running current : Outdoor Temp. 7°CDB / 6°CWB, LWT 35°C
- This product contains Fluorinated greenhouse gases.

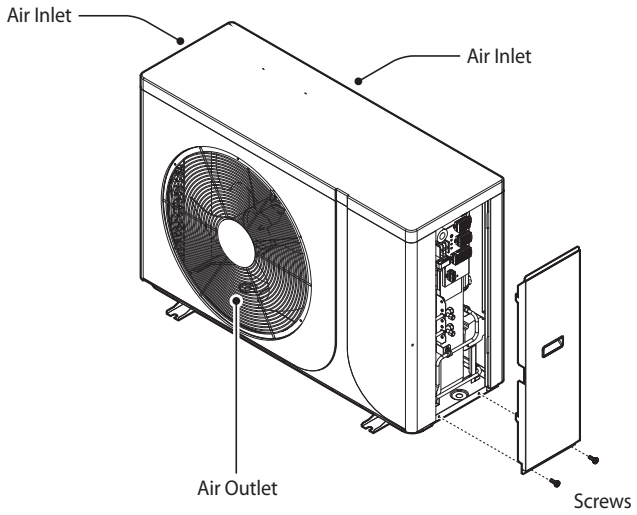
* These values are in accordance with EN14825.

2.3 Dimensions

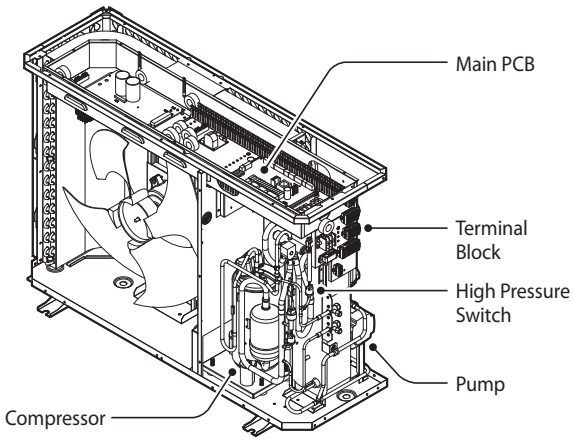
PEM750V004PGKC/PEM750V006PGKC/PEM750V008PGKC



PEM750V004PGKC/PEM750V006PGKC

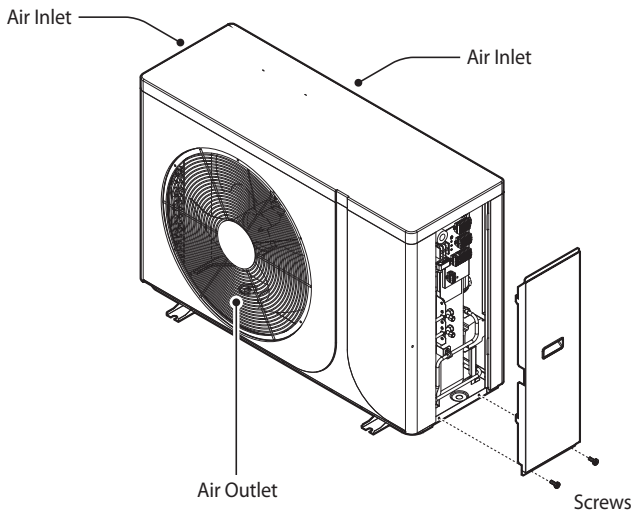


[Exterior Components]



[Internal Components]

PEM750V008PGKC



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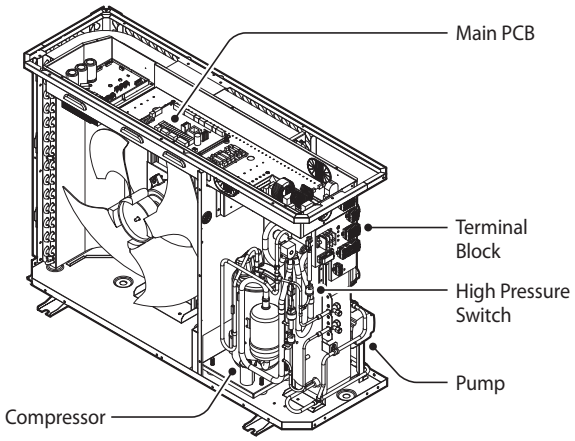
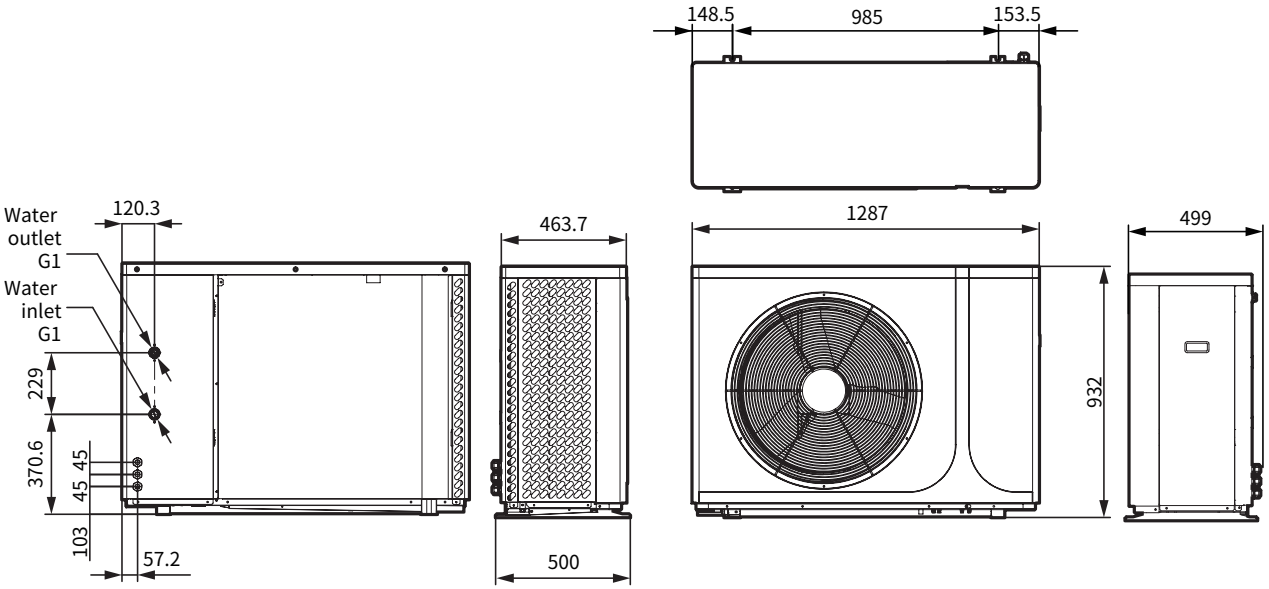


[Internal Components]

PEM750V010PGKC



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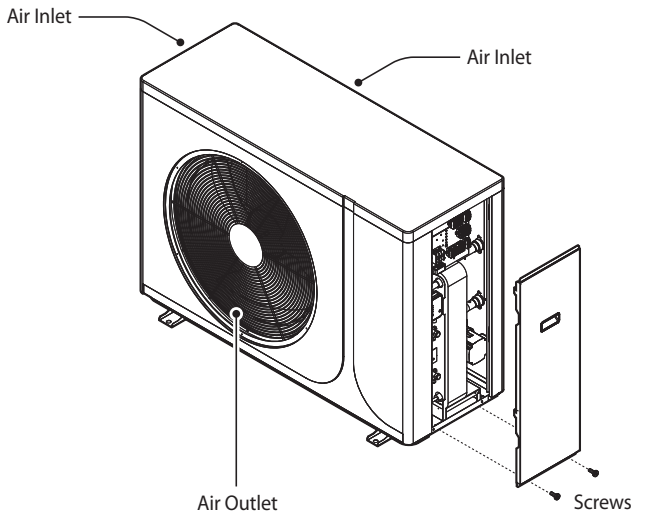

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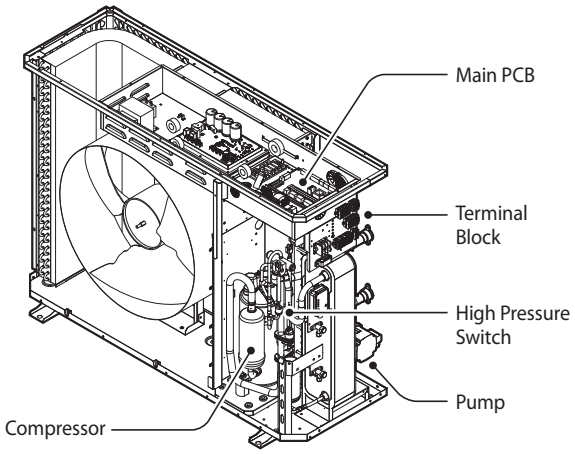
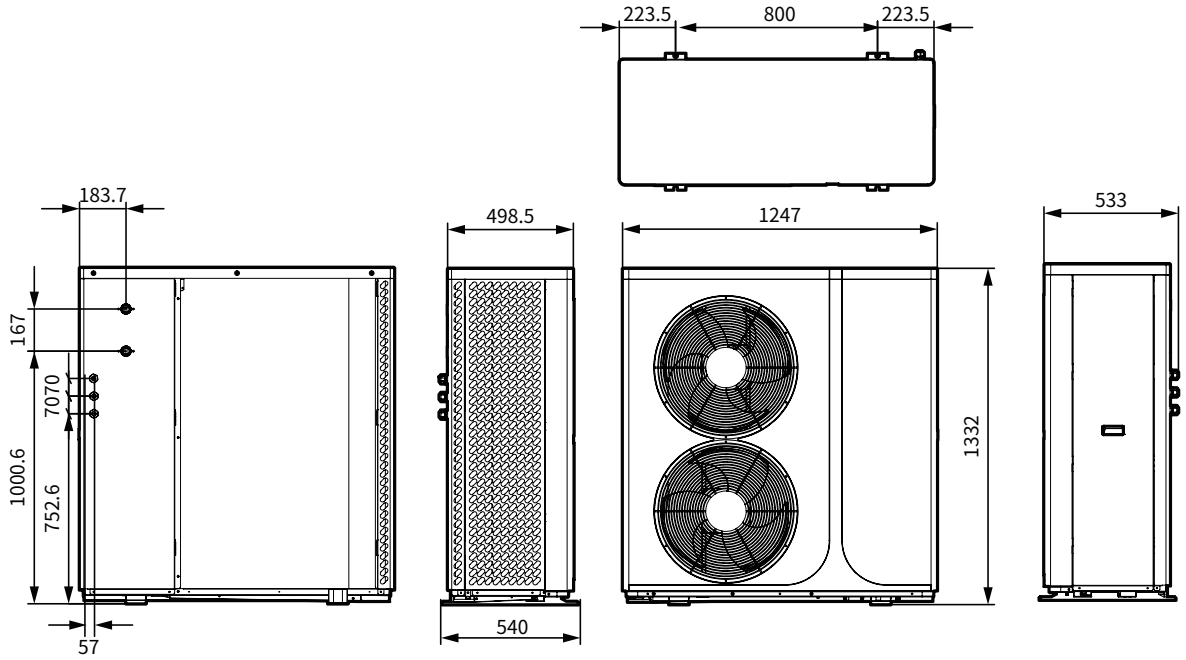
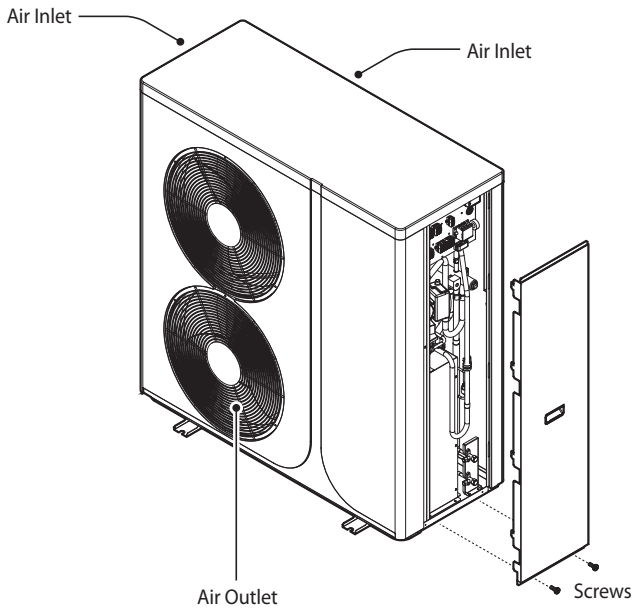


[Internal Components]

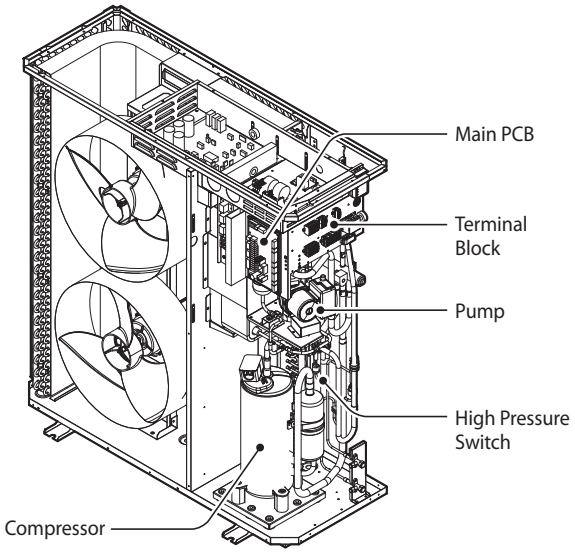
PEM750V017PGKC



PEM750V017PGKC

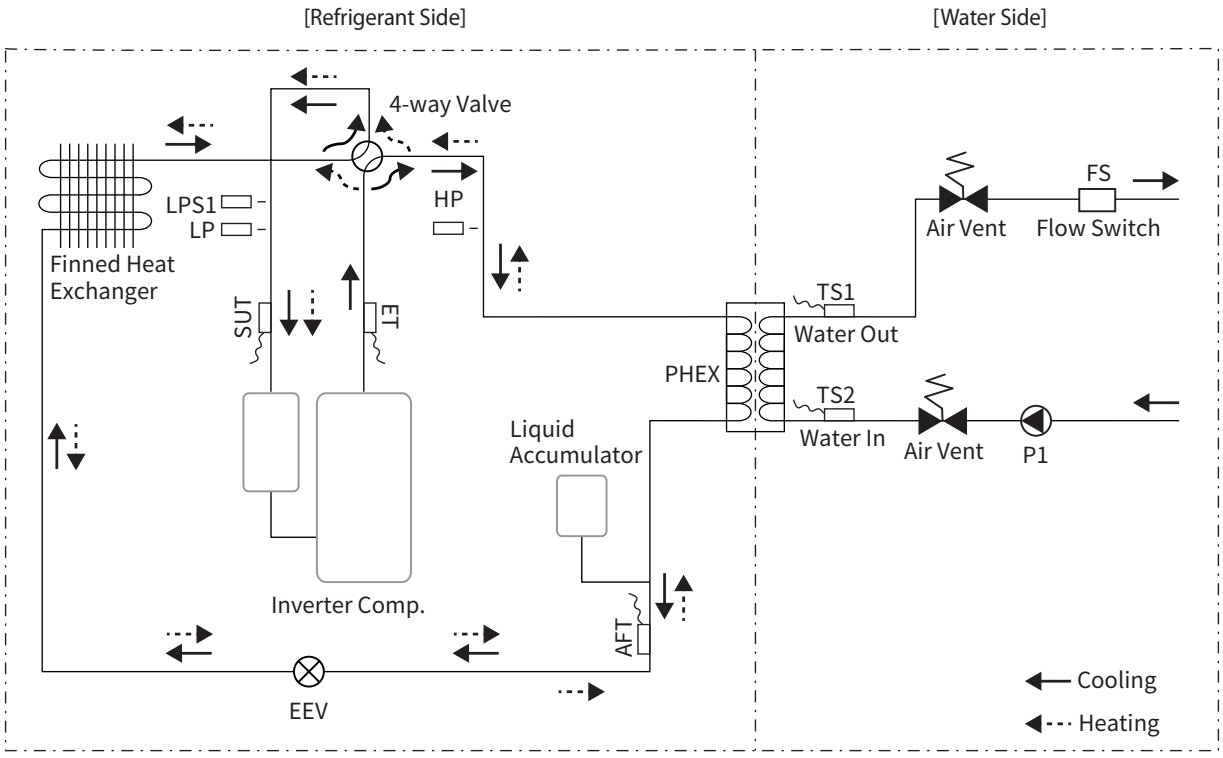


[Exterior Components]



[Internal Components]

2.4 Internal Component Schematic

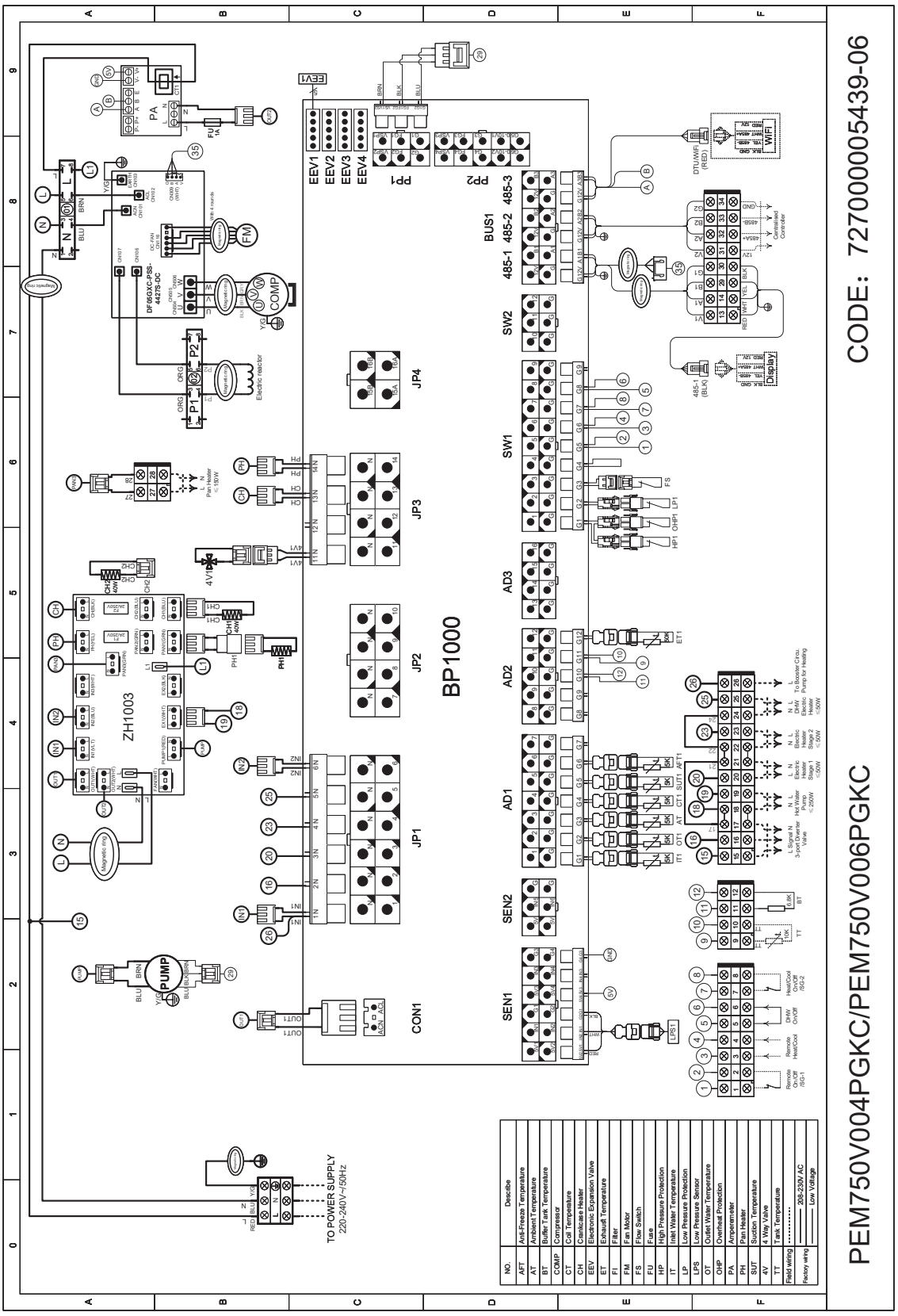


Note

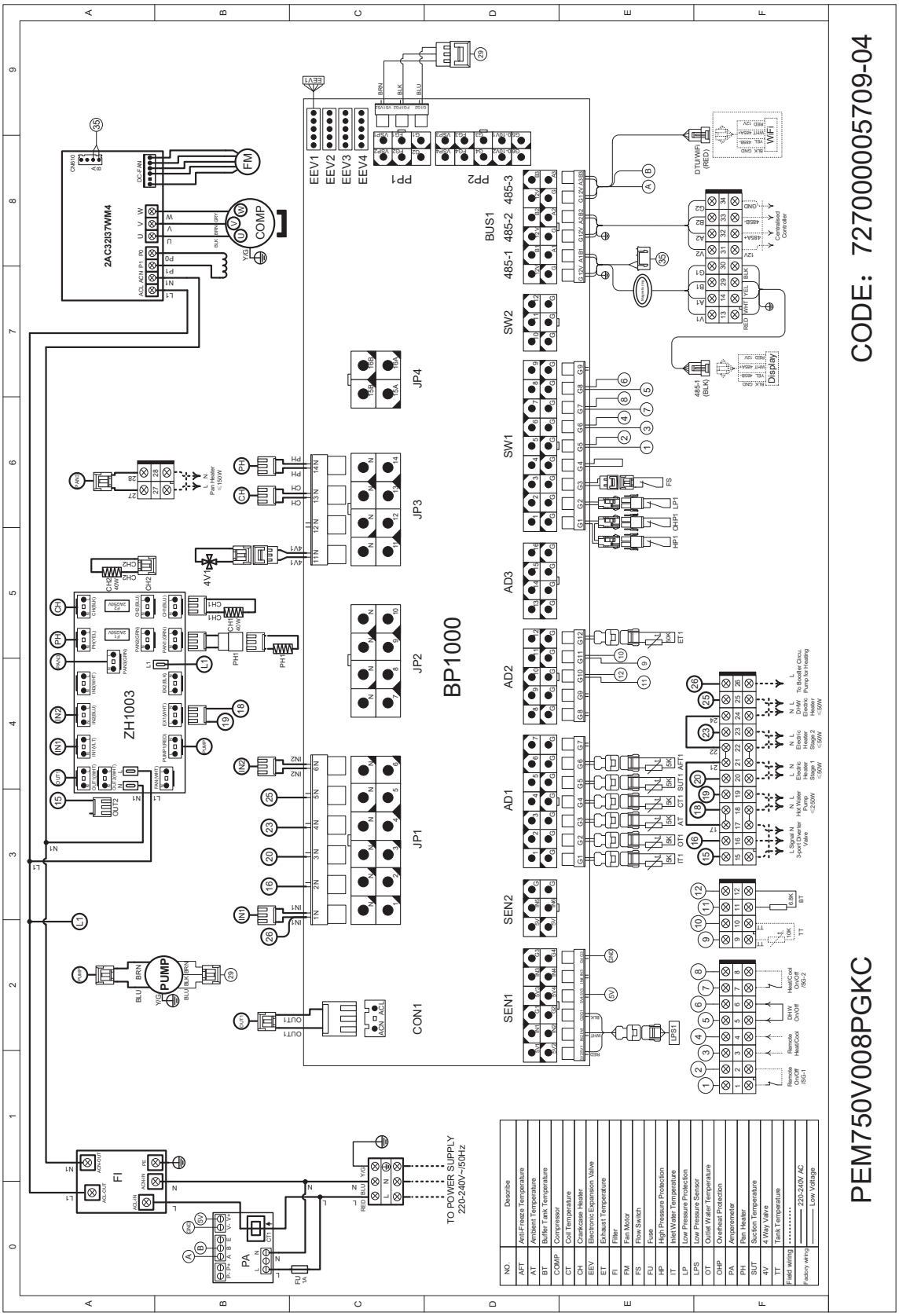
Category	Symbol	Meaning	PCB Connector
Refrigerant side	ET	Compressor discharge pipe temperature sensor	BP1000 CN_ AD2 _G12
	SUT	Compressor suction pipe temperature sensor	BP1000 CN_ AD1_G5
	EEV	Electronic expansion valve (heating & cooling)	BP1000 CN_ EEV1
	AFT	PHEX liquid temperature sensor	BP1000 CN_ AD1_G6
	LPS1	Low pressure sensor	BP1000 CN_ SEN1
	HP	High pressure switch	BP1000 CN_ SW1_G1
	LP	Low pressure switch	BP1000 CN_ SW1_G2
Water side	TS1	Outlet water temperature sensor	BP1000 CN_ AD1_G2
	TS2	Inlet water temperature sensor	BP1000 CN_ AD1_G1
	P1	Water pump	ZH1003 CN_ PUMP(RED)
	FS	Flow switch	BP1000 CN_ SW1_G3

2.5 Wiring Diagram

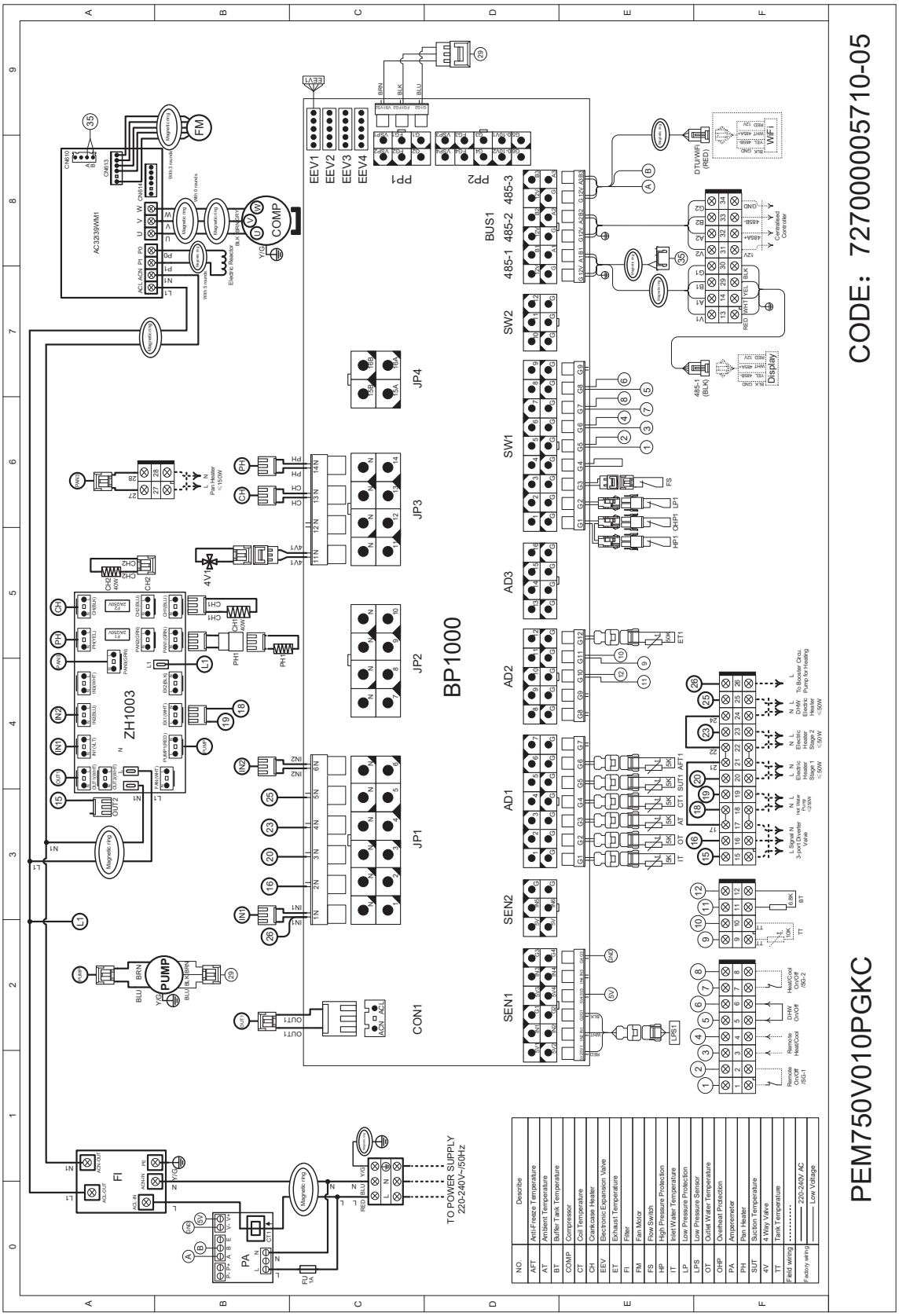
2.5.1 PEM750V004PGKC / PEM750V006PGKC



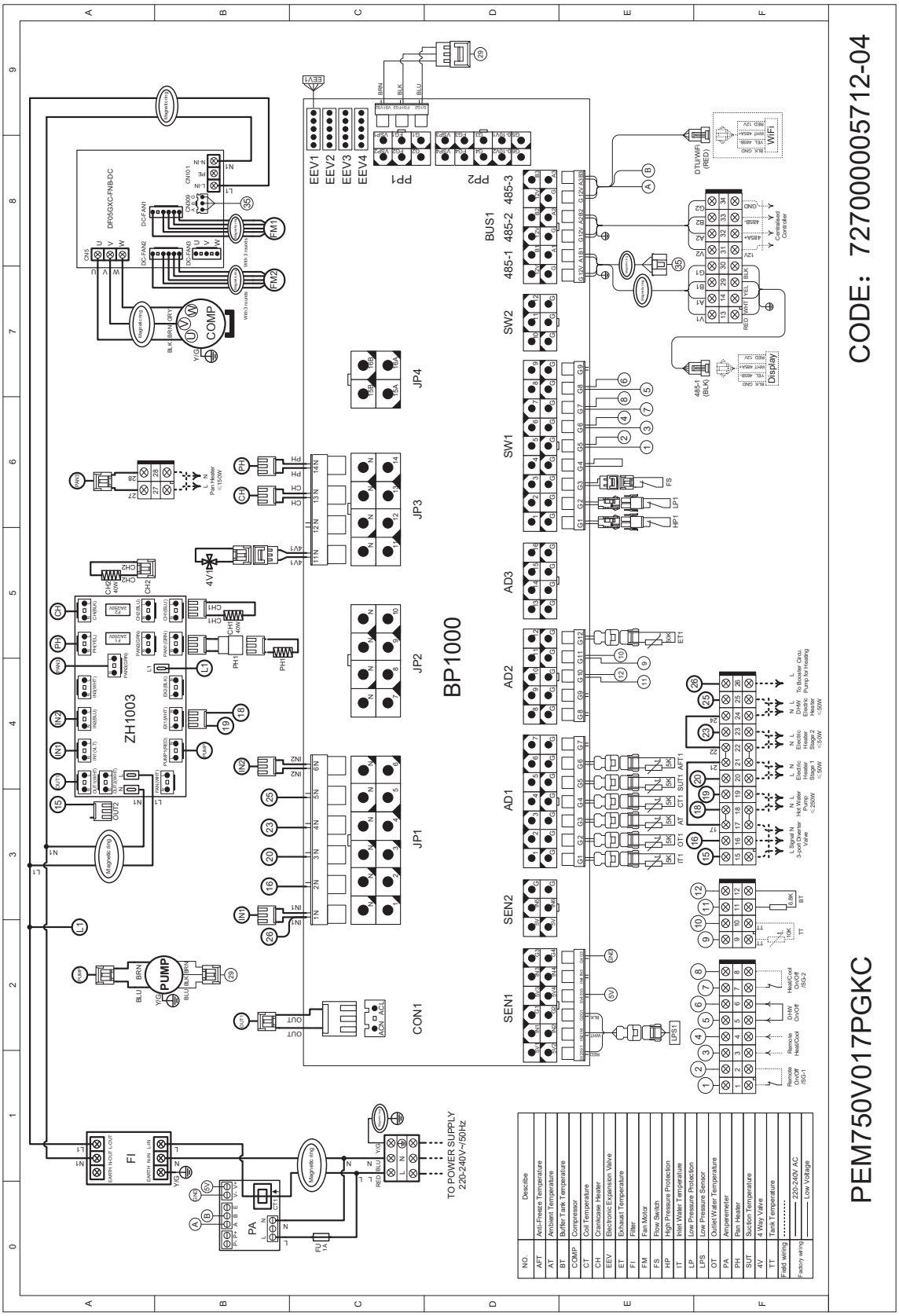
2.5.2 PEM750V008PGKC



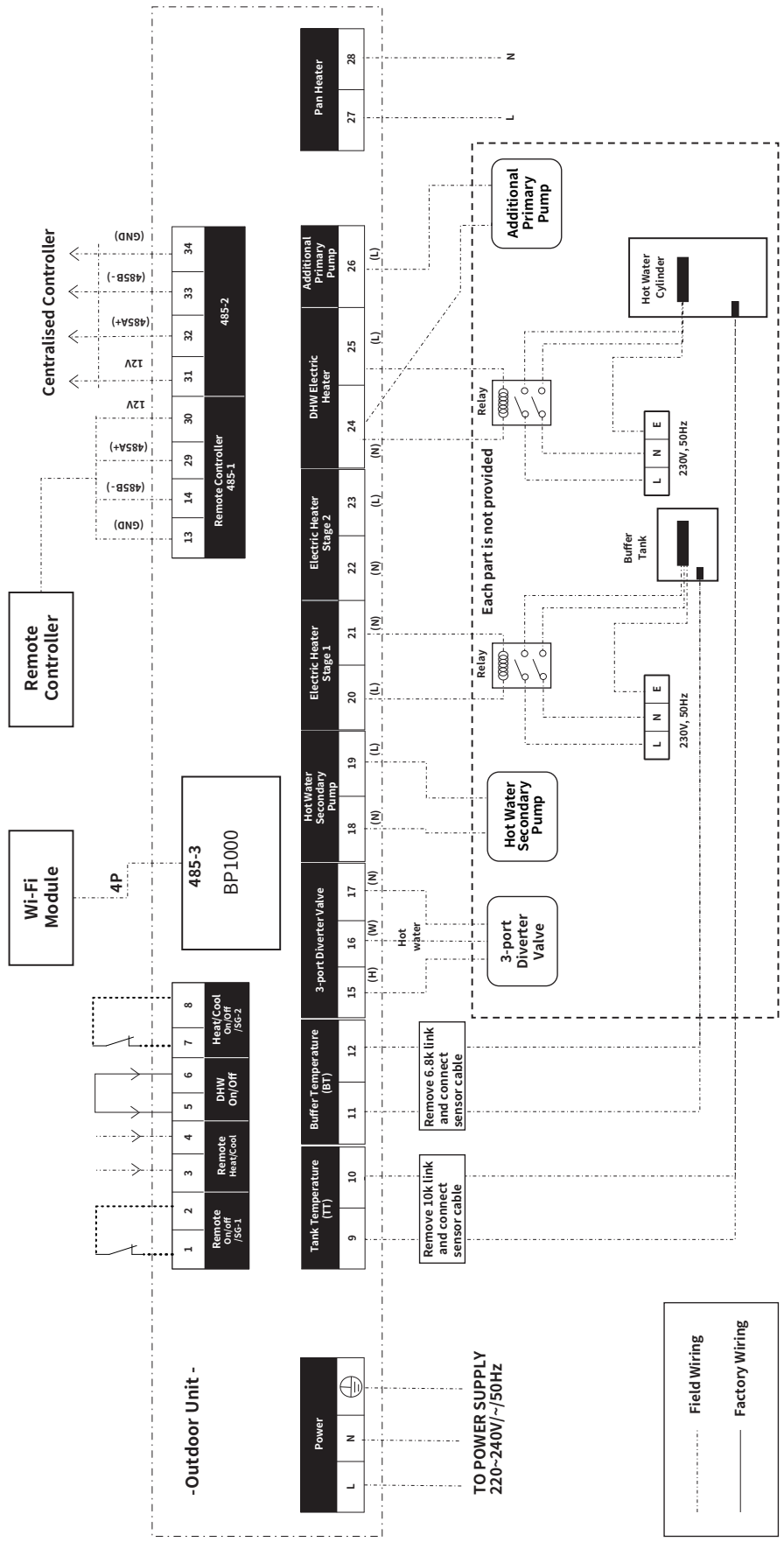
2.5.3 PEM750V010PGKC



2.5.4 PEM750V017PGKC



2.5.5 Field Wiring Diagram



Inputs/Outputs Information

- 3-port Diverter Valve : Hot water valve (230 VAC)
  15 = Heating
  16 = Hot Water
  17= neutral
  15 to show live out 16 switch and 17 neutral for external controls and power source
- Hot Water Secondary pump: Hot water Recirculation pump (230 VAC, Max. 250W)
- Additional Primary pump: Boost pump (230 VAC, Max. 250W)
- Buffer Tank sensor: Buffer tank temperature
- Hot Water Sensor: Hot Water temperature
- Remote Controller product controller (12V)
  13 = GND
  14 = 485B-
  15 = 485A+
  16 = 12V
- Relay_EXT: signal (230 VAC) to the relay _Buffer Tank heater
  The heater requires a separate power supply.
- Relay_EXT: signal (230 VAC) to the relay _Hot water Tank heater
  The heater requires a separate power.
- TB_Pan heater: Supply power to the Pan heater.

Terminal Block Information

1	2	3	4	5	6	7	8
A	B	A	B	A	B	A	B
BL	BL	-	-	BL	BL	BL	BL
Remote On/off/SG-1		Remote Heat/Cool		DHW On/Off		Heat/Cool On/Off/ SG-2	

9	10	11	12
A	B	A	B
BK	BK	BK	BK
Tank Temperature (TT)		Buffer Temperature (RT)	

13	14	29	30	31	32	33	34
V1 (12V)	A1 (485A+)	B1 (485B-)	G1 (GND)	V2 (12V)	A2 (485A+)	B2 (485B-)	G2 (GND)
RD	WH	YL	BK	RD	WH	YL	BK
Remote Controller (485-1)				485-2			

15	16	17	18	19	20	21	22	23	24	25	26
L(H)	Signal (W)	N	N	L	L	N	N	L	N	L	L
OR	BR	BL	BK	WH	WH	BK	BK	WH	BK	WH	WH
3-port Diverter Valve			Hot Water Pump		Electric Heater Stage 1		Electric Heater Stage 2		DHW Electric Heater		Additional Primary Pump

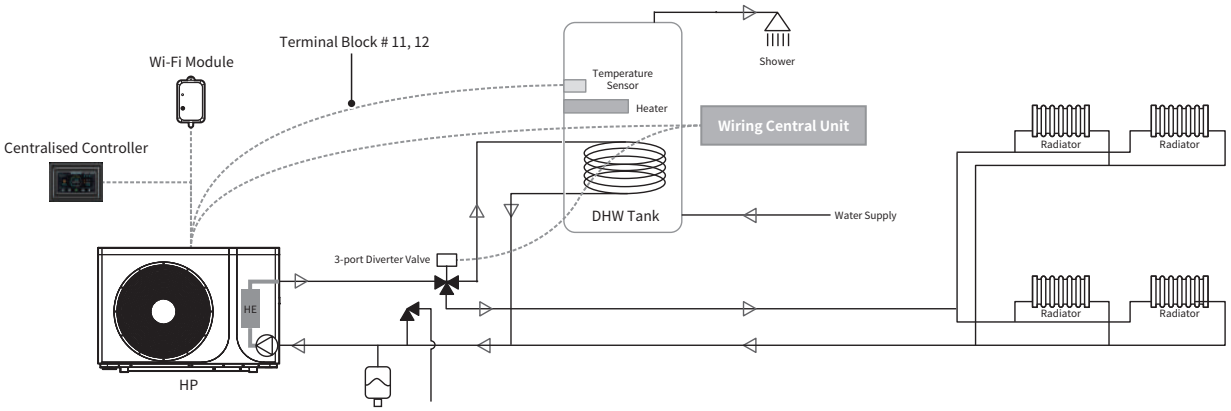
27	28
L	N
WH	BK
Pan Heater (230 VAC)	

Note

KEY	
BK	BLACK
BL	BLUE
OR	ORANGE
GN	GREEN
RD	RED
WH	WHITE
GY	GRAY
VI	VIOLET
YI	YELLOW
GNYL	GREEN/YELLOW

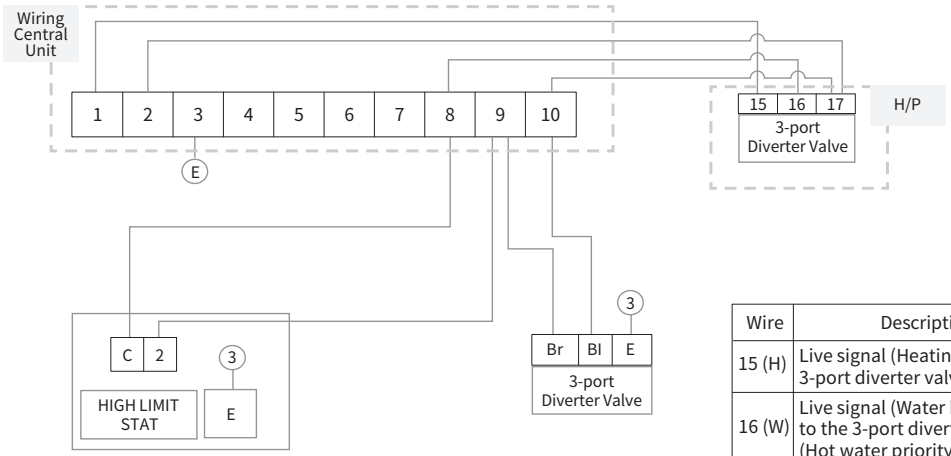
2.5.6 Field Wiring Case

Open Loop Heating Wiring Diagram



KEY	
Br	BROWN
O	ORANGE
Bl	BLUE
G	GRAY

1	L	Live
2	N	Neutral
3	E	



Wire	Descriptions
15 (H)	Live signal (Heating) from the PCB to the 3-port diverter valve (Heating priority)
16 (W)	Live signal (Water heating) from the PCB to the 3-port diverter valve (Hot water priority) (Default)
17 (N)	Neutral signal from the PCB to the 3-port diverter valve

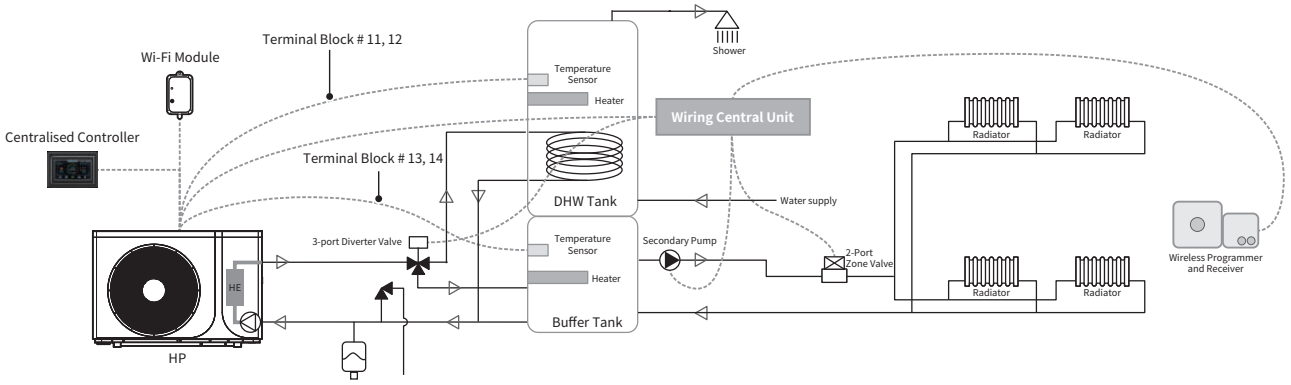
* Navien hold no responsibility for the wiring diagram above. The wiring diagram is for guideline only.

Note

- Terminal 16 supplies 230V in valve hot water mode, 3-port valve is normally open to the heating circuit, and opens to hot water when brown is supplied with power.
- Terminal block 15 of HP is permanent power supply.
- Power supply is up to 200W.
- When the heat pump is turned off, the secondary pump is also not supplied with power, making it safe to repair.
- Set the Hot Water Mode and Heating Mode as needed. For detailed information on parameters, refer to the Installation & Operation manual.

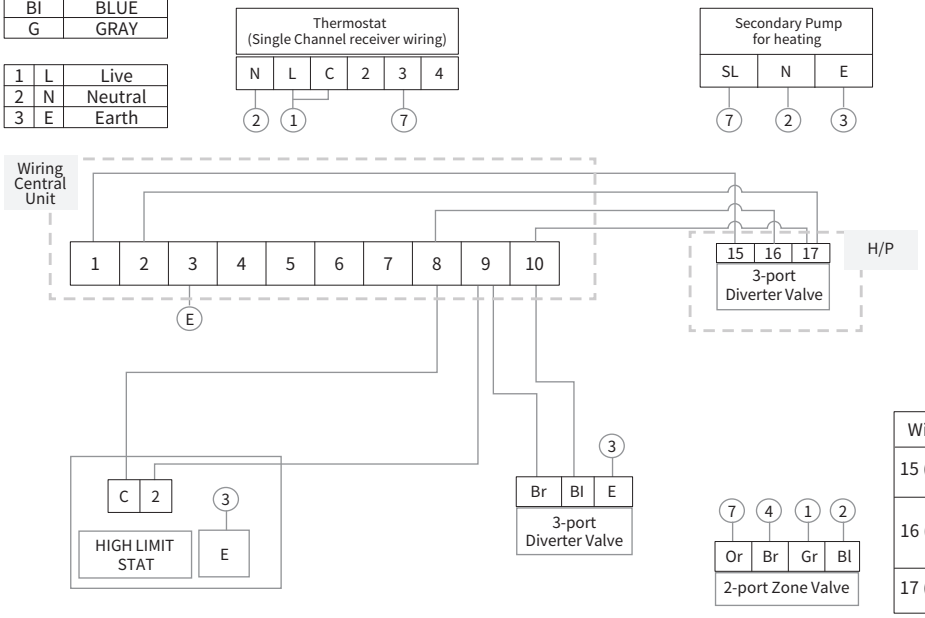
Item		Hot Water Mode	Heating Mode
System Status	OFF	Water tank temp ≥ R01 + R17	Outlet water temp ≥ R02 + R05
	ON	Water tank temp ≤ R01 – R16	Outlet water temp ≤ R02 – R04
Parameter	Target Temperature	R01: DHW Target Temp. (default 60°C)	R02: Heating target temp. (default 45°C)
	Power-On Threshold	R16: Temp. Difference for Power-on in DHW (default 5°C)	R04: Temp. Difference for Power-on in Heating (default 5°C)
	Standby Threshold	R17: Temp. Difference for Standby in DHW (default 2°C)	R05: Temp. Difference for Standby in Heating (default 1°C)

1-Heating Zone Wiring Diagram with Wireless Programmer



KEY	
Br	BROWN
O	ORANGE
Bl	BLUE
G	GRAY

1	L	Live
2	N	Neutral
3	E	Earth



Wire	Descriptions
15 (H)	Live signal (Heating) from the PCB to the 3-port diverter valve (Heating priority)
16 (W)	Live signal (Water heating) from the PCB to the 3-port diverter valve (Hot water priority) (Default)
17 (N)	Neutral signal from the PCB to the 3-port diverter valve

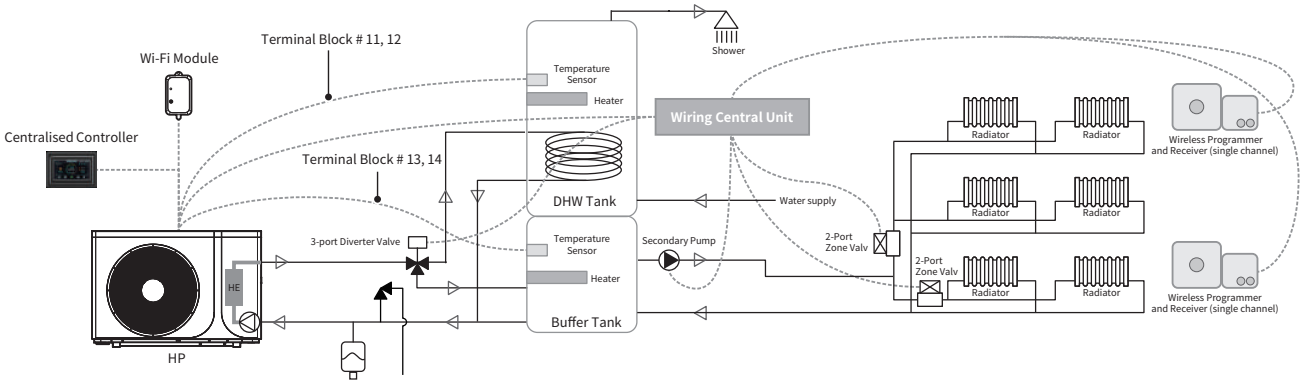
* Navien hold no responsibility for the wiring diagram above. The wiring diagram is for guideline only.

Note

- Terminal 16 supplies 230V in valve hot water mode, 3-port diverter valve is normally open to the heating circuit, and opens to hot water when brown is supplied with power.
- Terminal block 15 of HP is permanent power supply.
- Power supply is up to 200W.
- When the heat pump is turned off, the secondary pump is also not supplied with power, making it safe to repair.
- Set the Hot Water Mode and Heating Mode as needed. For detailed information on parameters, refer to the Installation & Operation manual.

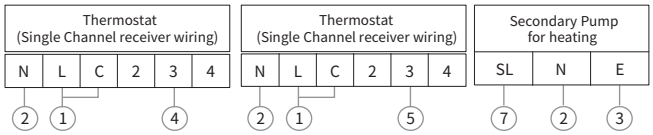
Item		Hot Water Mode	Heating Mode
System Status	OFF	Water tank temp ≥ R01 + R17	Outlet water temp ≥ R02 + R05
	ON	Water tank temp ≤ R01 – R16	Outlet water temp ≤ R02 – R04
Parameter	Target Temperature	R01: DHW Target Temp. (default 60°C)	R02: Heating target temp. (default 45°C)
	Power-On Threshold	R16: Temp. Difference for Power-on in DHW (default 5°C)	R04: Temp. Difference for Power-on in Heating (default 5°C)
	Standby Threshold	R17: Temp. Difference for Standby in DHW (default 2°C)	R05: Temp. Difference for Standby in Heating (default 1°C)

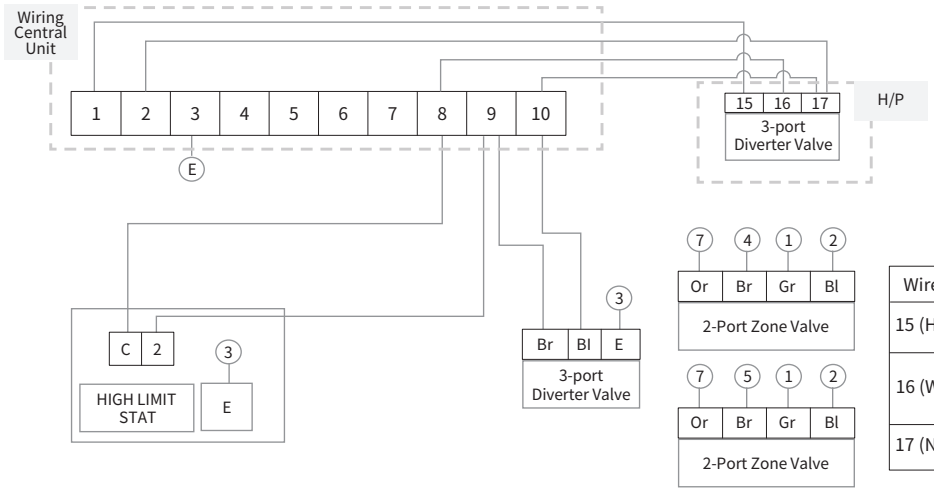
2-Heating Zone Wiring Diagram with Wireless Programmer



KEY	
Br	BROWN
O	ORANGE
Bl	BLUE
G	GRAY

1	L	Live
2	N	Neutral
3	E	Earth





Wire	Descriptions
15 (H)	Live signal (Heating) from the PCB to the 3-port diverter valve (Heating priority)
16 (W)	Live signal (Water heating) from the PCB to the 3-port diverter valve (Hot water priority) (Default)
17 (N)	Neutral signal from the PCB to the 3-port diverter valve

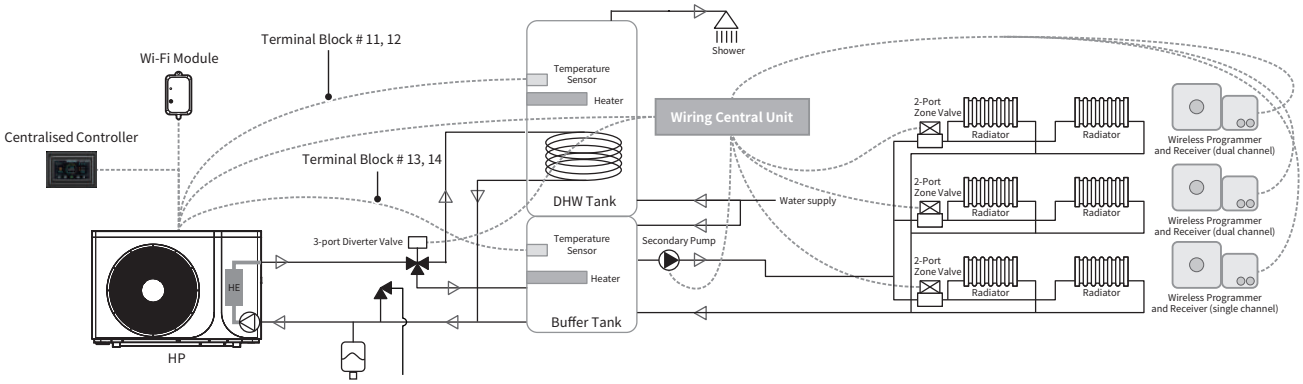
* Navien hold no responsibility for the wiring diagram above. The wiring diagram is for guideline only.

Note

- Terminal 16 supplies 230V in valve hot water mode, 3-port diverter valve is normally open to the heating circuit, and opens to hot water when brown is supplied with power.
- Terminal block 15 of HP is permanent power supply.
- Power supply is up to 200W.
- When the heat pump is turned off, the secondary pump is also not supplied with power, making it safe to repair.
- Set the Hot Water Mode and Heating Mode as needed. For detailed information on parameters, refer to the Installation & Operation manual.

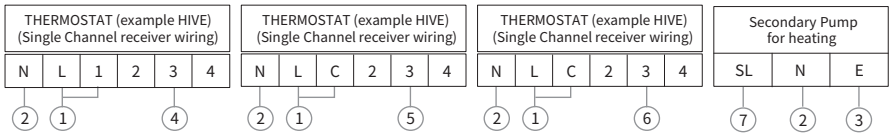
Item		Hot Water Mode	Heating Mode
System Status	OFF	Water tank temp ≥ R01 + R17	Outlet water temp ≥ R02 + R05
	ON	Water tank temp ≤ R01 – R16	Outlet water temp ≤ R02 – R04
Parameter	Target Temperature	R01: DHW Target Temp. (default 60°C)	R02: Heating target temp. (default 45°C)
	Power-On Threshold	R16: Temp. Difference for Power-on in DHW (default 5°C)	R04: Temp. Difference for Power-on in Heating (default 5°C)
	Standby Threshold	R17: Temp. Difference for Standby in DHW (default 2°C)	R05: Temp. Difference for Standby in Heating (default 1°C)

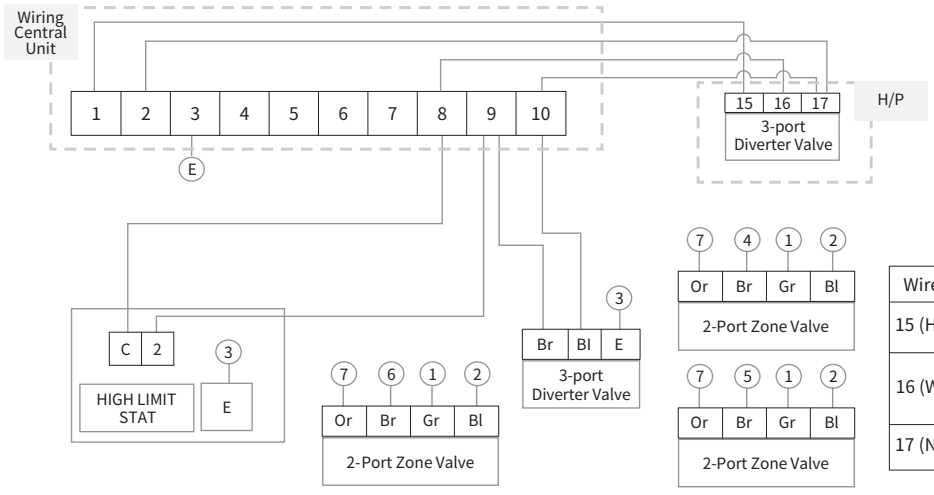
3-Heating Zone Wiring Diagram with Wireless Programmer



KEY	
Br	BROWN
O	ORANGE
Bl	BLUE
G	GRAY

1	L	Live
2	N	Neutral
3	E	Earth





Wire	Descriptions
15 (H)	Live signal (Heating) from the PCB to the 3-port diverter valve (Heating priority)
16 (W)	Live signal (Water heating) from the PCB to the 3-port diverter valve (Hot water priority) (Default)
17 (N)	Neutral signal from the PCB to the 3-port diverter valve

* Navien hold no responsibility for the wiring diagram above. The wiring diagram is for guideline only.

Note

- Terminal 16 supplies 230V in valve hot water mode, 3-port diverter valve is normally open to the heating circuit, and opens to hot water when brown is supplied with power.
- Terminal block 15 of HP is permanent power supply.
- Power supply is up to 200W.
- When the heat pump is turned off, the secondary pump is also not supplied with power, making it safe to repair.
- Set the Hot Water Mode and Heating Mode as needed. For detailed information on parameters, refer to the Installation & Operation manual.

Item		Hot Water Mode	Heating Mode
System Status	OFF	Water tank temp ≥ R01 + R17	Outlet water temp ≥ R02 + R05
	ON	Water tank temp ≤ R01 – R16	Outlet water temp ≤ R02 – R04
Parameter	Target Temperature	R01: DHW Target Temp. (default 60°C)	R02: Heating target temp. (default 45°C)
	Power-On Threshold	R16: Temp. Difference for Power-on in DHW (default 5°C)	R04: Temp. Difference for Power-on in Heating (default 5°C)
	Standby Threshold	R17: Temp. Difference for Standby in DHW (default 2°C)	R05: Temp. Difference for Standby in Heating (default 1°C)

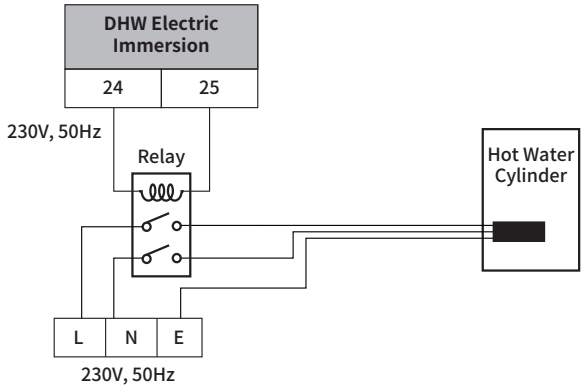
2.6 Electric Heaters

For all systems that want to use immersion heaters they wire in the same way as below.

2.6.1 Connecting the Electric Heater to Cylinder

1. Remove the side cover of the heat pump.
2. Connect the wires to the **DHW Electric Immersion** terminal block with a relay as shown in the following diagram.

Note The relay is not included with the product.



Note
- To set the electric heater's stage, change the **H18** parameter.

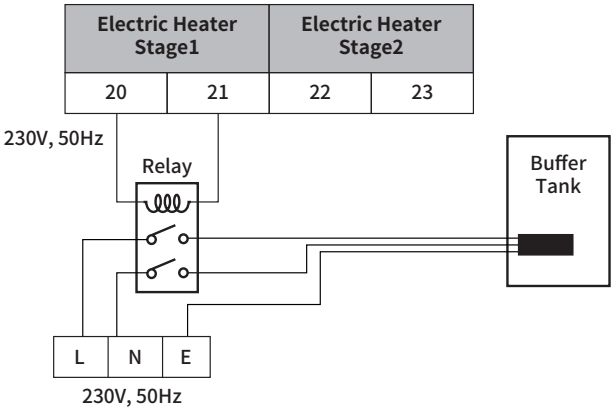
Parameter	Value	Description
H18	1	Only turns on stage 1.
H18	2	Once the value is set, Stage 1 will be turned off after 30 minutes, and then Stage 2 will be turned on.
H18	3	Depending on the current set stage, the stage will be changed as: • Once the value is set, Stage 1 will be turned off after 30 minutes, and then Stage 2 will be turned on. • Once the value is set, Stage 2 will be turned off after 30 minutes, and then Stage 1 will be turned on.

- To disable the electric heating function, set the **R35** parameter to 0.

2.6.2 Connecting the Electric Heater to Buffer Tank

1. Remove the side cover of the heat pump.
2. Set the **R35** parameter to 3 (buffer tank).
3. Connect the wires to the **DHW Electric Heater** terminal block with a relay as shown in the following diagram.

Note The relay is not included with the product.

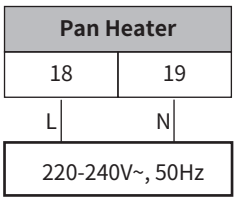


2.6.3 Connecting the Pan Heater

WARNING

Disconnect the main electrical supply before beginning any work and make sure all the necessary safety precautions are taken into account.

1. Remove the side cover of the heat pump.
2. Connect the wires to the **Pan Heater** terminal block described in the following diagram.



Note
- The cables and circuit breakers should meet EN Standards.
- When the cable is long enough, ensure that the cable specification meets BS 7671 (IET Wiring Regulations).

2.7 Performance Data

Maximum Heating Capacity (4kW)

Outdoor Temperature (°C)	LWT 35°C		LWT 40°C		LWT 45°C		LWT 50°C		LWT 55°C		LWT 60°C		LWT 65°C		LWT 70°C		LWT 75°C	
	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP
-25	3	1.83	2.91	1.70	2.8	1.55	2.72	1.45	2.5	1.24	2.1	1.07						
-20	3.6	2.57	3.66	1.64	3.34	1.94	3.4	1.69	3.23	1.52	3	1.33	2.45	1.02				
-15	4.25	2.97	4.12	1.67	4.09	2.29	4.26	2.04	4.05	1.82	3.9	1.66	3.42	1.35	3.3	1.15		
-10	5	3.45	5.09	1.67	4.65	2.64	4.73	2.2	4.6	2.05	4.47	1.85	4.18	1.6	3.8	1.3		
-7	5.4	3.7	5.27	1.61	5.19	2.92	5.45	2.46	5.3	2.22	4.96	2.01	4.54	1.72	4.15	1.41	3.4	1.03
-5	5.65	3.72	5.57	1.71	5.44	3.04	5.65	2.51	5.46	2.29	5.22	2.08	4.78	1.8	4.4	1.48	3.65	1.1
2	6.3	3.99	6.17	1.66	5.99	3.33	5.87	3.1	5.6	2.78	5.5	2.59	5.3	2.31	4.75	1.88	4.2	1.49
7	6.7	4.5	6.62	1.6	6.52	3.85	6.34	3.49	6	3.03	5.74	2.8	5.44	2.46	5.18	2.18	4.92	1.9
10	7.3	4.87	7.10	1.61	6.91	4.02	6.72	3.65	6.36	3.18	6.08	2.93	5.77	2.57	5.49	2.26	5.22	1.99
15	6.94	5.93	6.88	1.23	6.52	4.72	6.83	4.05	6.59	3.64	6.26	3.3	6	2.96	5.67	2.62	5.27	2.3
20	7.3	6.19	7.72	1.24	6.85	4.89	7.24	4.24	6.98	3.81	6.67	3.46	6.42	3.11	6.08	2.77	5.67	2.44
25	6.69	7.74	6.52	1.10	6.08	5.41	6.48	4.55	6.16	3.93	5.82	3.39	5.58	2.96	5.2	2.44	4.9	2.15
30	7.11	7.83	6.89	1.14	6.5	5.57	6.94	4.72	6.63	4.1	6.29	3.56	6.01	3.13	5.5	2.52	5.2	2.24
35	6.94	8.23	6.55	0.90	6.32	6.73	5.96	5.62	5.61	4.48	5.34	3.86	5.08	3.38	4.89	2.88		
43	7.65	8.54	7.31	0.95	7.03	7.15	6.72	6.23	6.41	5.04	6.23	4.42	6.01	3.9				

Maximum Heating Capacity (6kW)

Outdoor Temperature (°C)	LWT 35°C		LWT 40°C		LWT 45°C		LWT 50°C		LWT 55°C		LWT 60°C		LWT 65°C		LWT 70°C		LWT 75°C	
	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP
-25	3.31	1.81	3.18	1.95	3.00	1.48	2.88	1.28	2.60	1.07	2.25	0.95						
-20	4.21	2.26	3.94	1.99	3.85	1.78	3.60	1.56	3.48	1.36	3.30	1.22	2.56	0.96				
-15	5.10	2.70	4.88	1.92	4.70	2.14	4.50	1.32	4.35	1.64	4.20	1.49	3.60	1.28	3.30	1.15		
-10	5.90	3.09	5.73	2.08	5.51	2.40	5.35	2.14	5.20	1.92	5.05	1.74	4.40	1.52	3.80	1.30		
-7	6.35	3.26	6.25	2.09	6.05	2.54	5.95	2.33	5.70	2.04	5.60	1.89	4.78	1.63	4.15	1.41	3.40	1.03
-5	6.55	3.32	6.50	2.19	6.40	2.61	6.25	2.40	6.05	2.14	5.90	1.97	5.03	1.71	4.40	1.48	3.65	1.10
2	7.35	3.62	7.19	2.23	7.05	2.82	6.90	2.63	6.80	2.36	6.70	2.19	5.65	1.85	5.00	1.62	4.40	1.28
7	9.75	4.69	9.39	2.26	9.20	3.59	8.86	3.19	8.54	2.76	8.23	2.53	7.20	2.25	6.10	1.90	5.60	1.60
10	10.45	4.91	10.06	2.29	9.80	3.82	9.44	3.41	9.10	2.94	8.76	2.70	7.67	2.38	6.55	2.02	6.00	1.71
15	11.12	4.94	10.71	2.38	10.51	3.97	10.12	3.61	9.76	3.12	8.82	2.90	7.95	2.56	7.00	2.27	6.50	1.99
20	11.82	5.09	11.38	2.42	11.22	4.09	10.81	3.79	10.42	3.29	9.40	3.04	8.50	2.70	7.50	2.41	7.00	2.11
25	10.80	7.65	10.29	1.61	9.60	5.23	9.14	4.37	8.70	3.76	8.22	3.23	7.30	2.90	5.20	2.47	4.90	2.17
30	11.40	7.57	10.89	1.73	10.26	5.30	9.80	4.42	9.36	3.82	8.88	3.29	7.80	3.01	5.50	2.55	5.20	2.26
35	9.60	7.80	9.06	1.25	8.52	6.68	8.04	5.51	7.56	4.42	7.20	3.70	6.85	3.20	6.59	2.73		
43	10.20	8.03	9.75	1.33	9.48	7.04	9.06	5.96	8.64	4.81	8.40	4.18	8.10	3.48				

Maximum Heating Capacity (8kW)

Outdoor Temperature (°C)	LWT 35°C		LWT 40°C		LWT 45°C		LWT 50°C		LWT 55°C		LWT 60°C		LWT 65°C		LWT 70°C		LWT 75°C	
	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP
-25	4.90	1.85	4.68	2.72	4.50	1.61	4.30	1.44	4.05	1.28	3.80	1.13						
-20	5.70	2.05	5.54	2.89	5.40	1.81	5.25	1.69	5.00	1.51	4.75	1.34	4.50	1.20				
-15	6.55	2.32	6.38	2.96	6.28	2.03	6.12	1.88	5.90	1.68	5.65	1.49	5.40	1.33	4.70	1.15		
-10	7.75	2.73	7.54	3.02	7.40	2.31	7.20	2.12	7.00	1.94	6.78	1.76	6.55	1.59	5.90	1.42		
-7	8.15	2.84	8.05	3.05	7.90	2.42	7.80	2.25	7.70	2.08	7.50	1.90	7.18	1.70	6.45	1.52	4.95	1.09
-5	8.45	2.91	8.34	3.09	8.23	2.46	8.12	2.28	8.00	2.11	7.80	1.93	7.60	1.78	6.71	1.58	5.28	1.15
2	9.55	3.20	9.34	3.20	9.20	2.71	9.00	2.47	8.75	2.26	8.40	2.04	8.10	1.86	7.20	1.66	6.10	1.40
7	12.30	3.97	11.99	3.29	11.80	3.30	11.50	3.03	11.20	2.76	10.70	2.46	10.00	2.17	8.75	1.91	7.55	1.64
10	13.00	4.17	12.58	3.32	12.50	3.46	12.10	3.15	11.80	2.88	11.25	2.55	10.50	2.23	9.20	1.97	7.95	1.69
15	13.90	4.43	13.54	3.36	13.40	3.68	13.05	3.35	12.70	3.01	12.10	2.68	10.77	2.41	9.80	2.21	8.30	1.77
20	15.01	4.75	14.65	3.39	14.40	3.91	14.05	3.56	13.60	3.19	12.90	2.81	11.53	2.52	10.60	2.36	9.20	1.95
25	15.00	5.45	14.60	2.96	13.98	4.33	13.62	3.91	13.16	3.52	12.70	3.16	12.30	2.67	11.45	2.54	10.30	2.19
30	16.19	5.85	15.78	2.99	14.63	4.48	14.26	4.05	13.80	3.65	13.43	3.32	13.25	2.86	12.20	2.68	11.10	2.36
35	16.01	6.81	15.43	2.50	14.63	5.58	14.10	4.52	12.60	4.13	11.40	3.80	10.00	3.41	7.90	2.86	7.10	2.49
43	17.02	7.03	16.43	2.66	15.64	5.78	15.10	4.72	13.70	4.39	12.30	3.98	11.06	3.69	8.80	3.12		

Maximum Heating Capacity (10kW)

Outdoor Temperature (°C)	LWT 35°C		LWT 40°C		LWT 45°C		LWT 50°C		LWT 55°C		LWT 60°C		LWT 65°C		LWT 70°C		LWT 75°C	
	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP
-25	6.87	2.10	6.60	3.27	6.53	1.83	5.78	1.66	5.43	1.53	5.10	1.35	4.75	1.14				
-20	8.08	2.30	8.04	3.48	7.71	1.97	7.06	1.83	6.74	1.70	6.58	1.57	6.43	1.40	5.53	1.11		
-15	9.30	2.51	9.09	3.61	9.03	2.19	8.25	2.04	8.05	1.89	7.84	1.73	7.63	1.57	6.17	1.22		
-10	10.92	2.83	10.05	3.70	10.15	2.40	9.31	2.24	9.15	2.08	8.98	1.92	8.82	1.76	6.82	1.34		
-7	11.44	2.91	11.07	3.79	10.83	2.49	9.95	2.31	9.81	2.14	9.67	1.98	9.53	1.83	7.52	1.40	5.48	0.99
-5	11.70	2.94	11.25	3.96	11.28	2.54	10.38	2.35	10.24	2.16	10.12	2.02	10.00	1.88	7.86	1.45	5.61	0.99
2	11.31	3.06	11.09	3.71	10.81	2.43	10.61	2.14	10.40	1.98	10.20	1.89	10.10	1.84	9.14	1.62	6.86	1.14
7	14.59	3.79	14.03	4.06	13.89	3.11	13.37	2.69	13.04	2.45	12.52	2.28	12.21	2.15	9.85	1.72	7.05	1.19
10	16.09	3.97	15.72	4.12	15.74	3.45	15.33	3.07	15.02	2.76	14.03	2.50	12.73	2.17	10.25	1.78	7.45	1.25
15	17.58	4.22	17.00	4.17	16.44	3.54	16.33	3.25	15.91	2.89	15.48	2.67	11.29	2.20	9.75	1.90	8.13	1.34
20	18.39	4.30	17.56	4.14	16.94	3.62	16.59	3.29	16.17	2.92	15.84	2.68	12.54	2.26	10.02	1.98		
25	17.53	5.64	16.64	3.16	16.17	4.17	15.99	3.72	14.96	3.36	14.03	2.64	11.96	2.29	7.86	2.14		
30	18.68	5.87	17.98	3.29	17.35	4.39	16.87	3.86	15.66	3.45	14.95	2.81	13.12	2.47	8.63	2.21		
35	16.95	6.62	16.17	2.65	15.74	5.04	15.20	4.59	14.68	3.99	13.95	3.36	12.50	2.91				
43	18.89	7.26	18.38	2.73	18.08	5.72	17.68	5.19	17.27	4.16	16.87	3.72	15.01	3.27				

Maximum Heating Capacity (17kW)

Outdoor Temperature (°C)	LWT 35°C		LWT 40°C		LWT 45°C		LWT 50°C		LWT 55°C		LWT 60°C		LWT 65°C		LWT 70°C		LWT 75°C	
	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP	TC	COP
-25	11.24	2.14	11.02	5.65	10.74	1.78	10.53	1.68	10.34	1.60	9.50	1.38						
-20	12.78	2.40	12.47	5.77	12.20	1.97	11.90	1.81	11.63	1.68	10.68	1.50	10.46	1.36				
-15	14.56	2.65	14.07	5.98	13.48	2.14	13.21	1.93	13.00	1.77	11.96	1.61	11.45	1.44	8.46	1.10		
-10	16.00	2.82	15.69	6.15	15.40	2.35	15.01	2.11	14.30	1.85	13.23	1.69	12.40	1.51	9.57	1.20		
-7	16.30	2.83	16.09	6.12	16.00	2.40	15.70	2.14	15.00	1.89	14.00	1.76	12.87	1.53	10.15	1.26	8.87	1.07
-5	16.70	2.88	16.49	6.20	16.30	2.43	15.80	2.14	15.30	1.90	14.31	1.80	13.30	1.56	10.63	1.30	9.06	1.09
2	18.00	3.11	17.76	6.22	17.52	2.54	17.19	2.32	16.75	2.24	16.55	2.08	16.35	2.03	12.88	1.79	9.72	1.27
7	22.30	4.05	22.11	6.05	22.00	3.35	21.81	2.93	21.67	2.75	20.68	2.68	18.97	2.37	14.10	1.93	12.66	1.61
10	23.91	4.34	23.70	6.16	23.40	3.53	23.19	3.08	23.05	2.76	21.25	2.71	20.17	2.51	15.30	2.08	13.10	1.65
15	26.38	4.69	26.04	6.23	25.73	3.79	25.50	3.35	25.29	2.99	22.49	2.85	21.38	2.64	12.10	2.14	11.20	1.86
20	28.90	4.99	28.41	6.30	28.03	4.10	27.26	3.49	26.59	3.12	23.63	2.97	22.49	2.75	12.70	2.22	11.80	1.94
25	26.88	6.40	26.47	4.97	26.00	4.63	25.61	4.02	25.29	3.53	24.76	3.11	21.63	2.93	12.53	2.16	12.00	1.96
30	29.54	6.65	28.90	5.11	28.51	4.77	27.90	4.06	27.16	3.63	26.34	3.20	23.63	3.01	13.26	2.26		
35	23.49	7.31	22.81	3.43	22.24	5.90	21.60	5.36	21.14	4.70	20.50	3.98	19.49	3.50				
43	25.98	7.68	25.59	3.50	25.19	6.35	24.53	5.97	23.89	5.3	22.99	4.44	21.93	3.80				

- DB : Dry bulb temperature (°C), LWT : Leaving water temperature (°C)
- TC : Total capacity(kW), COP : Coefficient of performance (kW/kW)
- Direct interpolation is permissible. Do not extrapolate.
- Measuring procedure follows EN14511.
- Rated values are based on standard conditions, and it can be found on specifications.
- Above table values may not be matched according to installation condition. Except for rated value, the performance is not guaranteed.
- In accordance with the test standard(or nations), the results may vary.
- The shaded areas are not guaranteed continuous operation.

2.8 Electric Characteristics

CAUTION

The installation must be in line with MCS standards and system design.

WARNING

Improperly connecting the electrical supply can result in electrical shock and electrocution. All electrical connections must be carried out in line with the British standards and governing regulations and by a competent, qualified electrician.

DANGER

- You must ensure that the heat pump is disconnected from the electrical supply before carrying out any servicing inside the heat pump and, particularly, on the electric terminal strips.
- If the electrical supply is connected, contact with electricity could cause component damage or serious injury.

CAUTION

- Label all wires before disconnecting them when you are working on the controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing is complete.
- Be sure to properly ground the unit. Do not connect the ground line to any gas pipe, liquid pipe, lightning rod, or telephone ground line. If the grounding is incomplete, it may cause electric shock.

2.8.1 Accessing the Terminal Strips

All the wiring connections are made to the terminal PCB and terminal block inside the heat pump. To access these connections, remove the wiring cover at the right end of the heat pump.

2.8.2 Connecting the Power Supply Cables

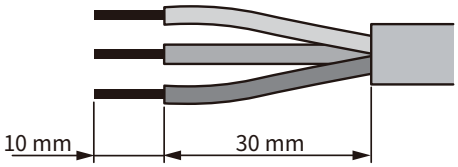
WARNING

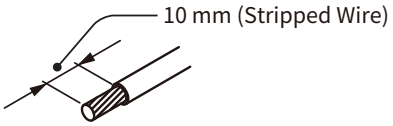
Disconnect the main electrical supply before beginning any work and make sure all the necessary safety precautions are taken into account.

Note

- The cables and circuit breakers should meet EN Standards.
- When the cable is long enough, ensure that the cable specification meets BS 7671 (IET Wiring Regulations).

1. Strip the end of the connecting cables to expose 10 mm of core wires, and then twist the core wires.





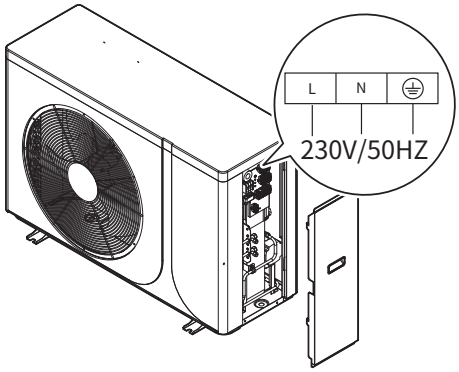
Note

- Crimp terminals with insulating sleeves can be used for connecting the wires to the terminal block.

- Do not solder the stranded conductors.
- Use a circuit breaker with a 3 mm gap between the contacts.

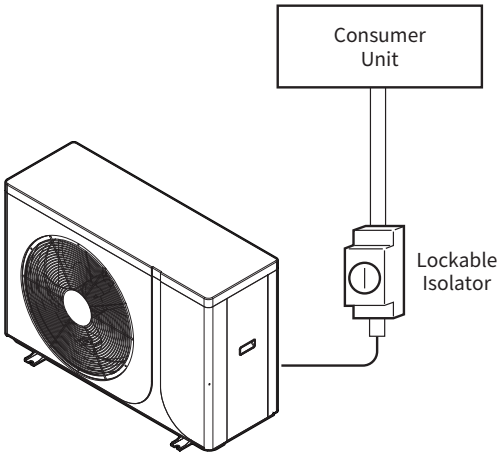
2. Fasten each terminal screw securely.

3. After wiring the cables, check if the connections are secure by pulling the cable slightly. The heat pump must be connected to the supply terminals via the cable.



Note

- Use a dedicated power supply with a circuit breaker of the proper size to supply power to the heat pump. The final power supply connection must be made from a weatherproof lockable isolator located outside the building. The cable should be either armoured or shielded with a flexible conduit.



- Refer to the following table for the heat pump's power supply cable and breaker capacity for each model of the heat pump.

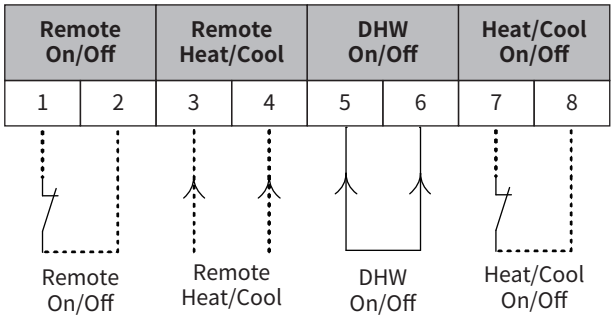
Model	Power Supply Cable (mm^2)	Breaker Capacity
PEM750V004PGKC	2.5	16A
PEM750V006PGKC	4.0	25A
PEM750V008PGKC	4.0	32A
PEM750V010PGKC	6.0	40A
PEM750V017PGKC	10.0	50A

2.8.3 Setting the Remote Control Functions

To control the remote controller manually, set the **H07** parameter to 1.

Turning the Heat Pump On/Off

Close the Remote On/Off switch to turn on the heat pump. To turn off the heat pump, open the Remote On/Off switch.



Setting the Mode

To configure the mode settings, close or open the switches. Refer to the following table for detailed settings for each mode.

Mode	Remote Heat/Cool	DHW On/Off	Heat/Cool On/Off
Heat	Close	Open	Close
Cool	Open	Open	Close
Hot water	-	Close	Open
Hot water + Heat	Close	Close	Close
Hot water + Cool	Open	Close	Close

2.8.4 Connecting the Heating System Controls

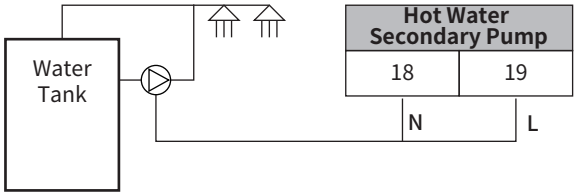
For information about connecting the heating system controls, refer to "2.5.5 Field Wiring Diagram" on page 18.

2.8.5 Connecting the Warm Water Secondary Circulation Pump

You can use hot water at any time when using a warm water secondary circulation pump.

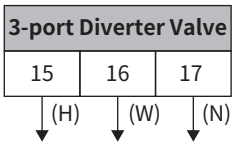
Note To change the warm water circulation pump's operation method, set up the **H40** parameter.

1. Remove the side cover of the heat pump.
2. Connect the wires to the **Hot Water Pump** terminal block as shown in the following diagram.



2.8.6 Connecting the 3-port Diverter Valve

1. Remove the side cover of the heat pump.
2. Connect the wires to the **3-port Diverter Valve** terminal block as shown in the following diagram.



Each terminal of the 3-port diverter valve is explained in the following table.

Wire	Descriptions
15 (H)	Live signal (Heating) from the PCB to the 3-port diverter valve (Heating priority)
16 (W)	Live signal (Water heating) from the PCB to 3-port diverter valve (Hot water priority) (Default)
17 (N)	Neutral signal from the PCB to 3-port diverter valve

Note Depending on the type of heating, the 3-port diverter valve should be set as follows.

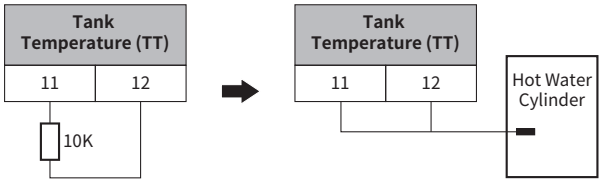
- When electric power is supplied to the 16 **(W)** and 17 **(N)** terminal, the 3-port diverter valve should be used for water heating (Priority Hot water) (Default).
- When electric power is supplied to the 15 **(H)** and 17 **(N)** terminal, the 3-port diverter valve should be used for under floor heating (Heating Priority).

2.8.7 Connecting the Temperature Sensor

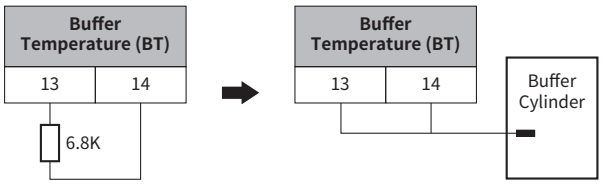
CAUTION

- Before installing the temperature sensor, remove the resistor (6.8k or 10k).
- Insert the sensor into the sensor pocket firmly.

1. Remove the side cover of the heat pump.
2. Connect the wires to the **Tank Temperature (TT)** terminal block as shown in the following diagram.



[When 10K-Temperature Sensor is Used]

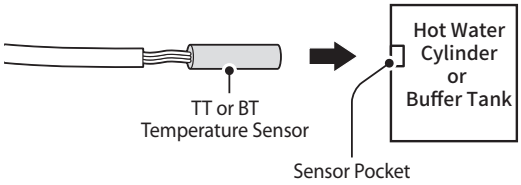


[When 6.8K-Temperature Sensor is Used]

Note To change the type of temperature sensor, change the **H25** parameter to the required temperature sensor.

Parameter	Value	Description
H25	0	Outlet Water Temperature
	1	Room Temperature
	2	Buffer Tank Temperature
	3	Inlet Water Temperature

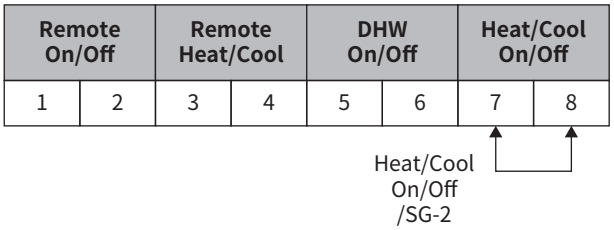
3. Connect the sensor to the hot water cylinder or buffer tank as shown in the following diagram. Make sure it is firmly connected so that it does not fall off.



Note If there is no sensor pocket in the buffer tank, set the **H25** parameter to 0.

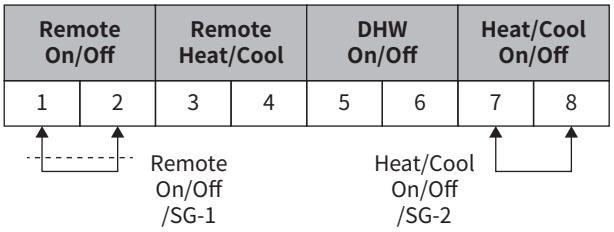
2.8.8 Configuring the Smart Grid (SG) Ready

1. Remove the side cover of the heat pump.
2. Connect the wires to the **Heat/Cool On/Off** terminal block as shown in the following diagram.



[When the Inverter Only Supports One SG Output Signal]

SG-2 Status	Mode	Description
Open	Normal mode	SG Ready is not active
Close	Solar High mode	The heat pump runs at full capacity and the warm water temperature is raised (the electric heater can be selected to be on or off).



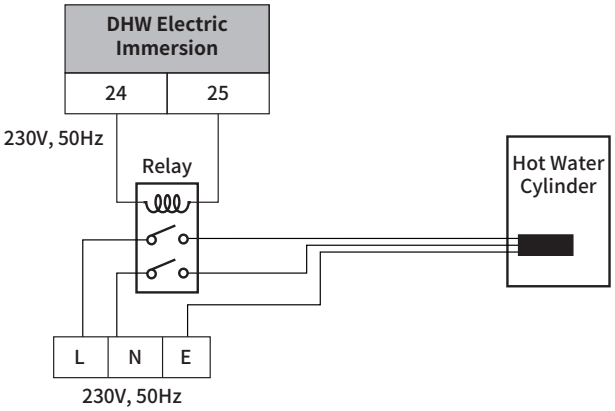
[When the Inverter Supports SG Output and Input Signal]

SG-1 Status	SG-2 Status	Mode	Description
Open	Open	Sleep mode	The heat pump and electric heater are blocked in this mode.
Open	Open	Solar Low mode	The operating power is limited.
Open	Close	Solar Medium mode	The operating power is limited.
Close	Close	Solar High mode	The heat pump runs at full capacity and the warm water temperature is raised. (The electric heater can be selected to be on or off.)
After exiting Sleep mode		Normal mode	SG Ready is not active.

2.8.9 Connecting the Electric Heater

1. Remove the side cover of the heat pump.
2. Connect the wires to the **DHW Electric Immersion** terminal block with a relay as shown in the following diagram.

Note The relay is not included with the product.



Note
- To set the electric heater's stage, change the **H18** parameter.

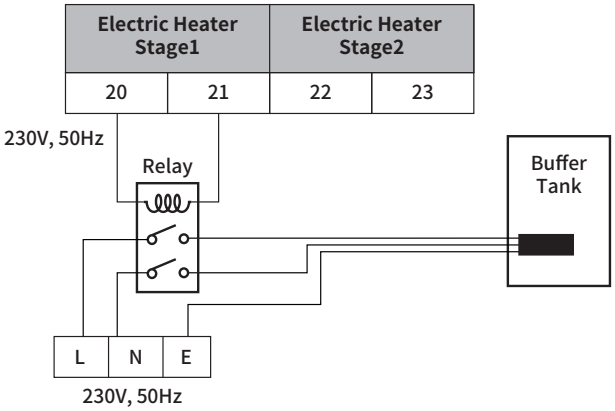
Parameter	Value	Description
H18	1	Only turns on stage 1.
H18	2	Once the value is set, Stage 1 will be turned off after 30 minutes, and then Stage 2 will be turned on.
H18	3	Depending on the current set stage, the stage will be changed as: • Once the value is set, Stage 1 will be turned off after 30 minutes, and then Stage 2 will be turned on. • Once the value is set, Stage 2 will be turned off after 30 minutes, and then Stage 1 will be turned on.

- To disable the electric heating function, set the **R35** parameter to 0.

2.8.10 Connecting the Buffer Tank

1. Remove the side cover of the heat pump.
2. Set the **R35** parameter to 3 (buffer tank).
3. Connect the wires to the **DHW Electric Heater** terminal block with a relay as shown in the following diagram.

Note The relay is not included with the product.

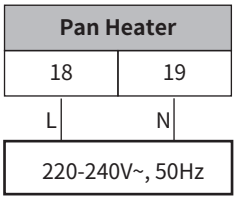


2.8.11 Connecting the Pan Heater

WARNING

Disconnect the main electrical supply before beginning any work and make sure all the necessary safety precautions are taken into account.

1. Remove the side cover of the heat pump.
2. Connect the wires to the **Pan Heater** terminal block described in the following diagram.

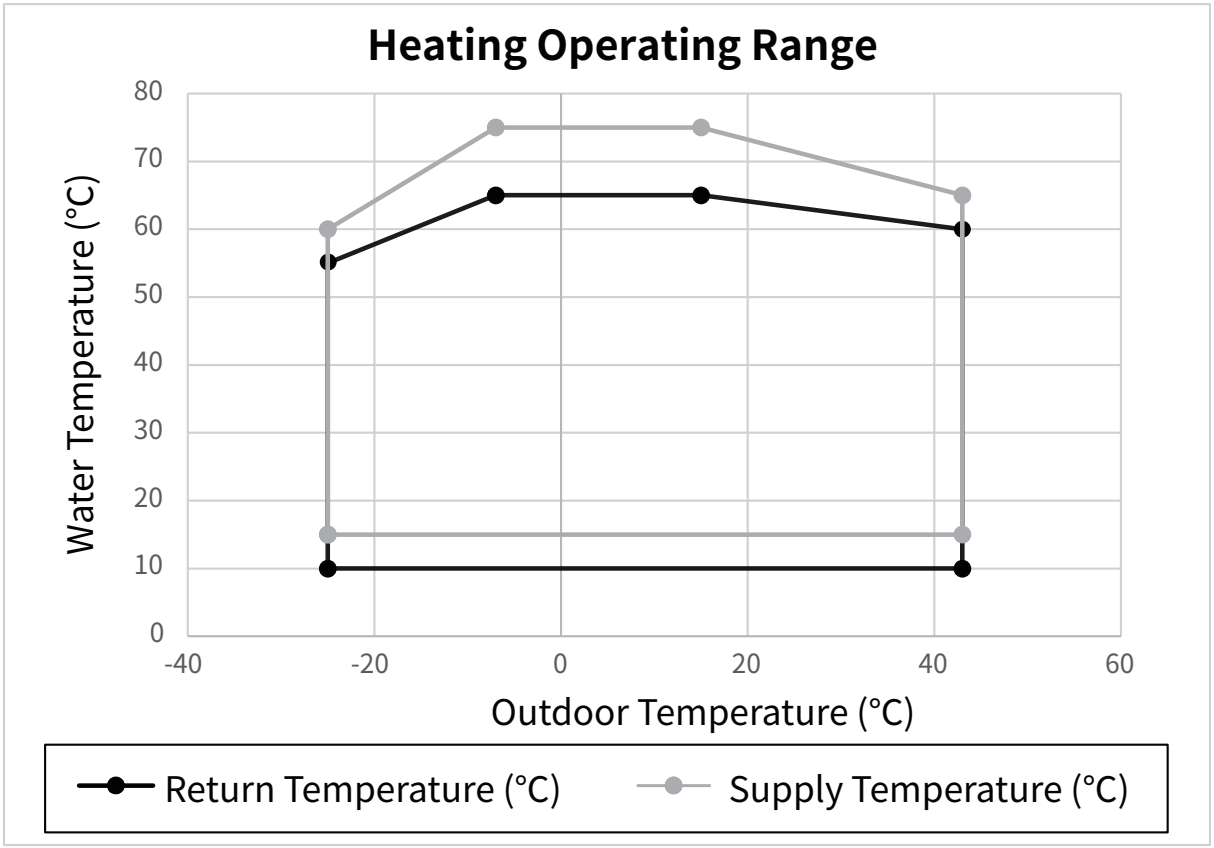


Note
- The cables and circuit breakers should meet EN Standards.
- When the cable is long enough, ensure that the cable specification meets BS 7671 (IET Wiring Regulations).

2.9 Operation Range

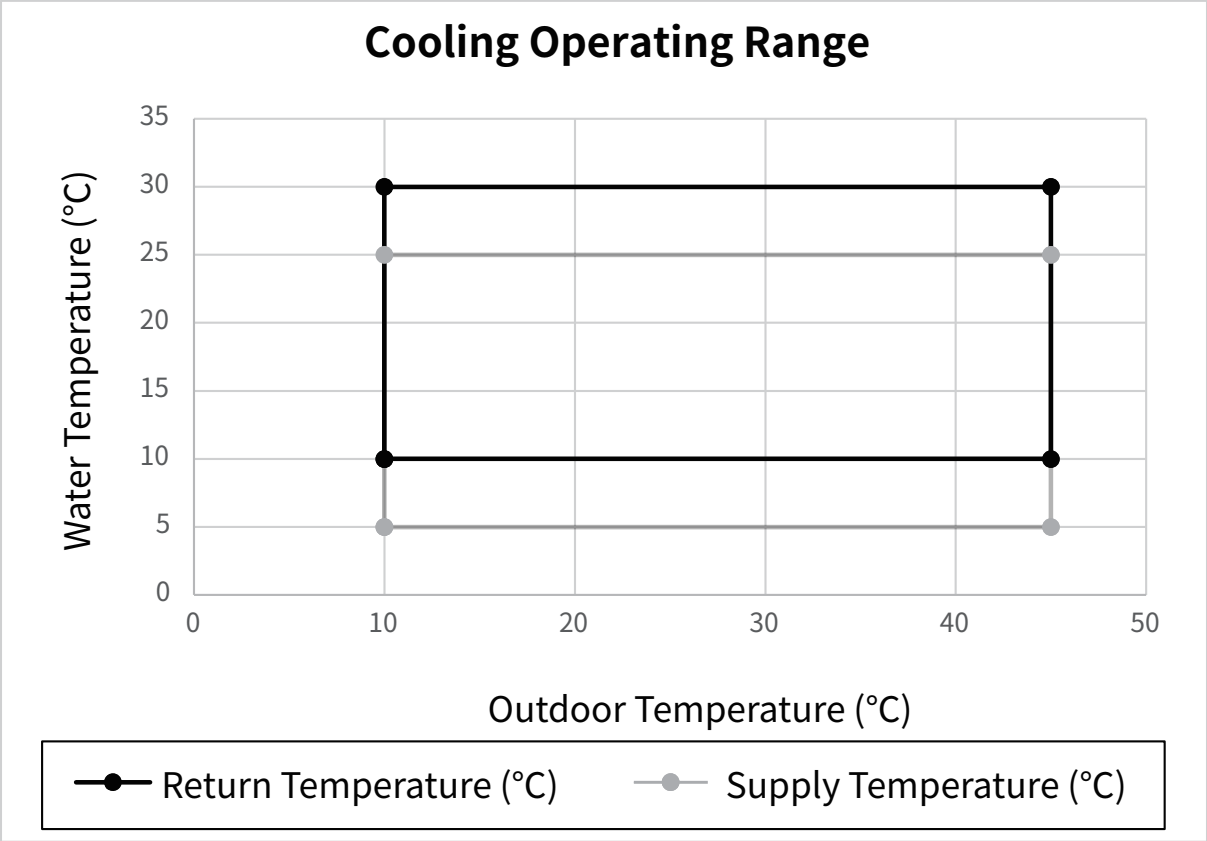
Heating

Heating operation range		
Outdoor temperature (°C)	Return temperature (°C)	Supply temperature (°C)
-25	10	15
-25	55	60
-7	65	75
15	65	75
43	60	65
43	10	15
-25	10	15



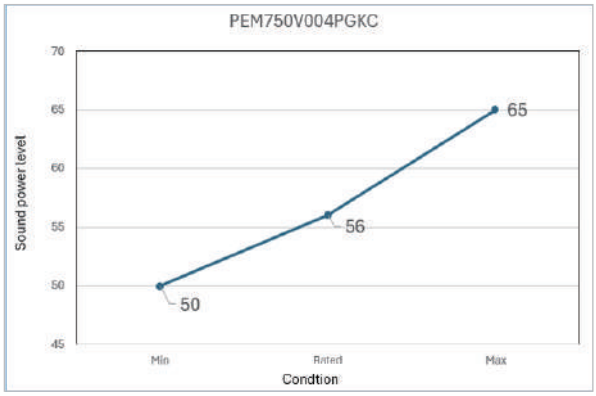
Cooling

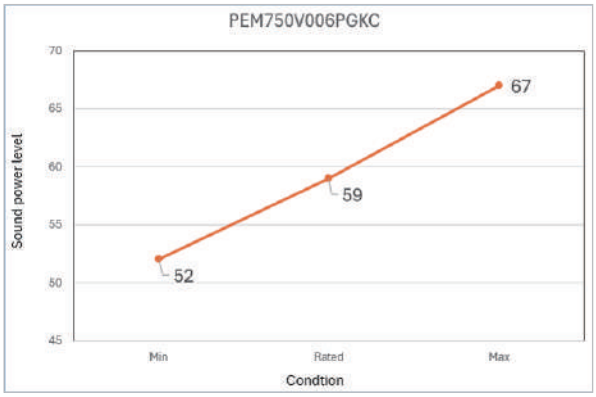
Cooling operation range		
Outdoor temperature (°C)	Return temperature (°C)	Supply temperature (°C)
10	10	5
10	30	25
45	30	25
45	10	5
10	10	5

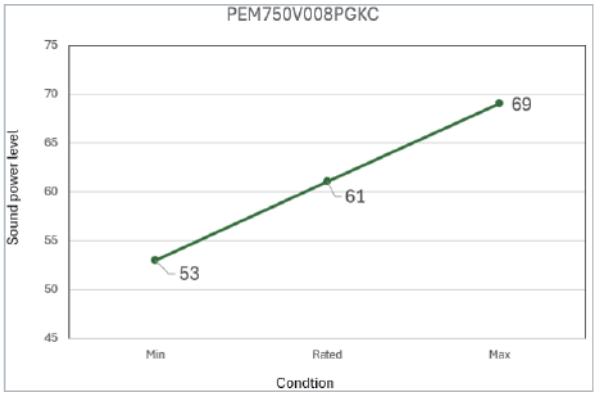


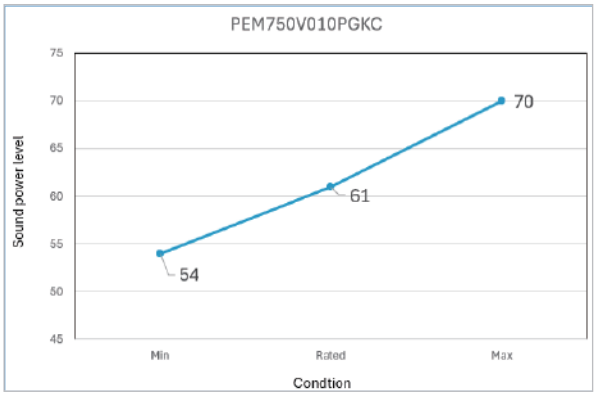
2.10 Sound Levels

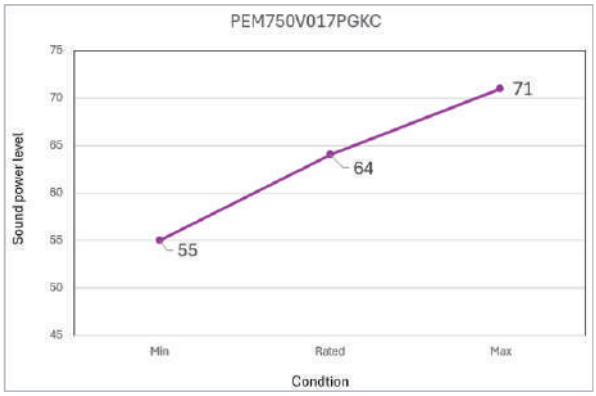
Model	Heating [dB(A)]		
	Min	Rated	Max
PEM750V004PGKC	50	56	65
PEM750V006PGKC	52	59	67
PEM750V008PGKC	53	61	69
PEM750V010PGKC	54	61	70
PEM750V017PGKC	55	64	71
* According to Rating Condition (A7W35)			











Note

- Sound levels can be increased in accordance with installation and operating conditions.
- Sound level will vary depending on a range of factors such as the construction (acoustic absorption coefficient) of particular installed place in which the equipment in installed.
- Sound power level is measured on the rated condition in accordance with ISO 9614 standard. Therefore, these values can be increased owing to ambient conditions during operation.

2.11 Hydraulic Performance

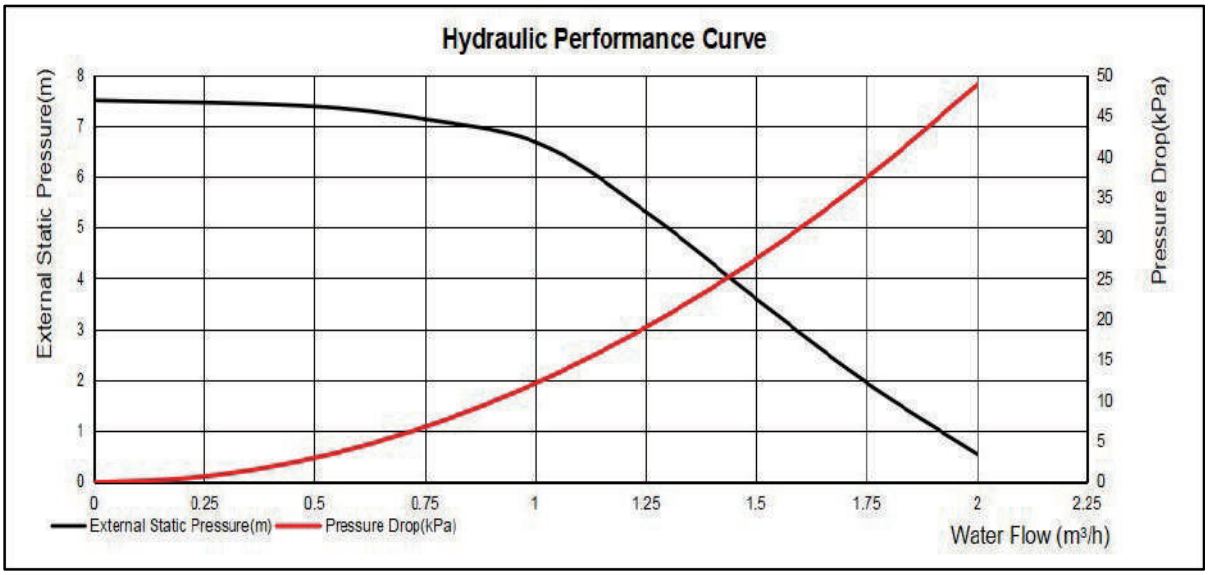
The water pump is variable type which is capable of changing flow rate, so it may be required to change default water pump capacity in case of noise by water flow. In most case, however, it is strongly recommended to set capacity as Maximum.

Product Pressure Drop Overview (for GRUNDFOS Water Pump)

Capacity (kW)	Rated flow-rate (m^3/h)	Pump head (m)	Product pressure drop (m)	Serviceable head(m)	Min. flow-rate (m^3/h)
4	0.68	7.5	0.5	7	0.68
6	1.03	7.5	2.1	5.3	
8	1.38	7.5	4	3.5	
10	1.7	7.5	3.8	3.7	0.75
17	2.9	12.5	5.5	7	1.5

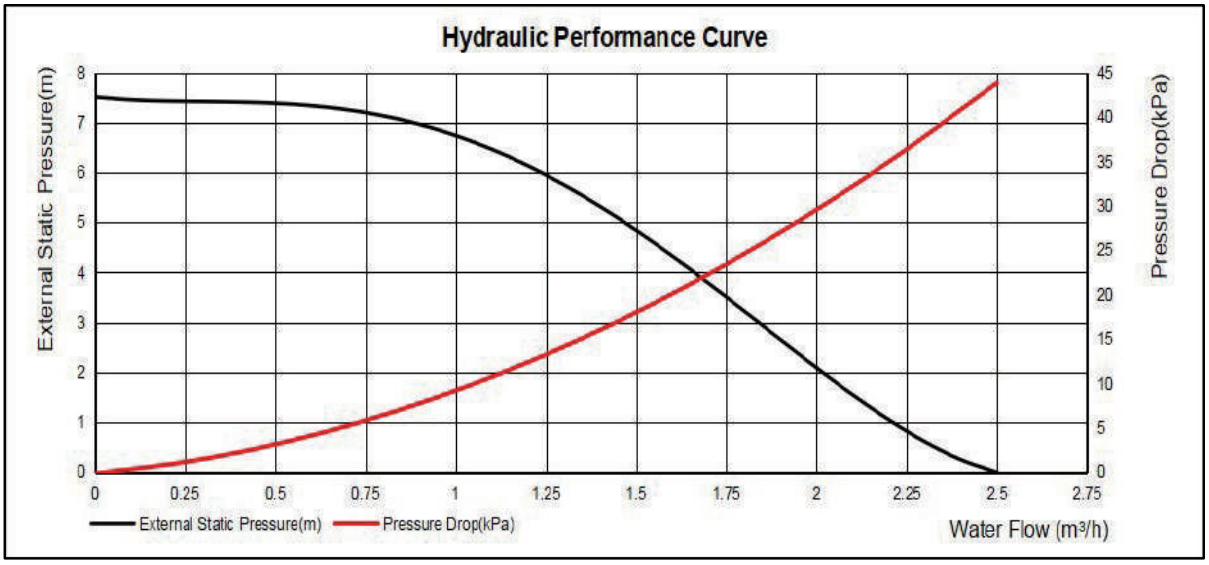
PEM750V004PGKC(4kW) /PEM750V006PGKC(6kW) / PEM750V008PGKC(8kW)

- Circulation Pump: UPM3K 25-75



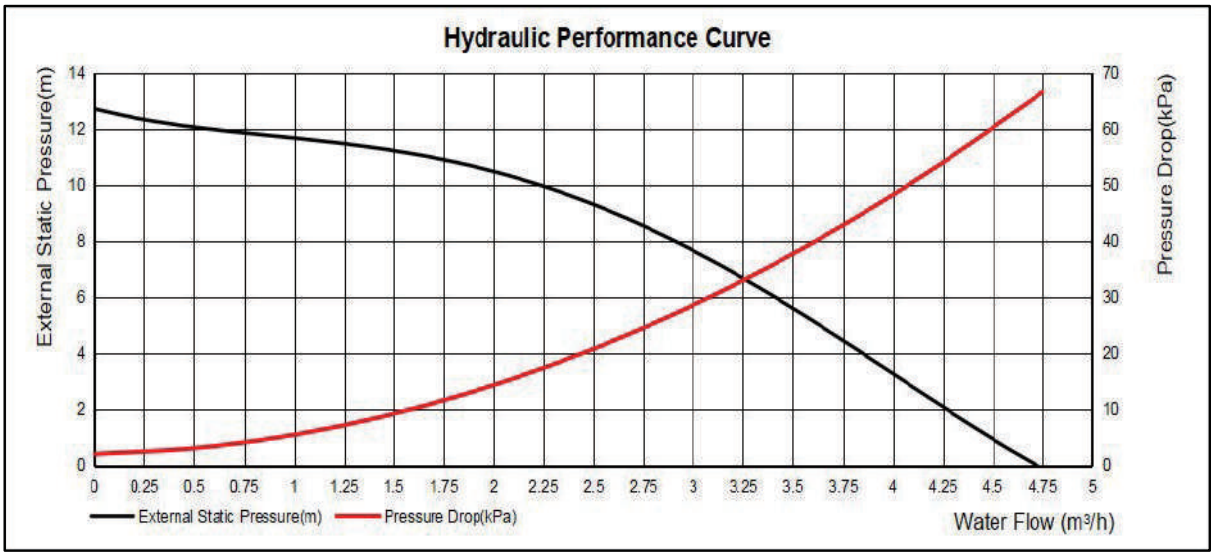
PEM750V010PGKC(10kW)

- Circulation Pump: UPM3K 25-75



PEM750V017PGKC(17kW)

- Circulation Pump: UPMXL 25-125



2.12 Minimum Flow Rate During the Defrost Cycle

Classification	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Minimum Recommended Flow Rate During Defrost Cycle	1.03 * 0.7 [m^3/h]	1.03 * 0.7 [m^3/h]	1.38 * 0.7 [m^3/h]	1.7 * 0.7 [m^3/h]	2.9 * 0.7 [m^3/h]

* If the rated water flow is 2 m^3/h, the minimum defrost flow rate can be set to 1.4 m^3/h (i.e., 2 × 0.7). Actual values may vary based on site conditions.

2.13 Parameter Settings

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	A03	Shutdown Ambient Temp.	-40.0~10.0℃	-25℃	-25℃	-25℃	-25℃	-25℃
Not allowed to change	A04	Antifreeze Temp.	A22~10℃	8℃	8℃	4℃	8℃	8℃
Not allowed to change	A05	Antifreeze Temp. Difference	1.0~50.0℃	7℃	7℃	3℃	7℃	7℃
Not allowed to change	A06	Max. Exhaust Temp.	60.0~130.0℃	115℃	115℃	115℃	115℃	115℃
Not allowed to change	A11	Enable Low Pressure Sensor	0-[NO]/1-[YES]	1	1	1	1	1
Not allowed to change	A21	Ambient/ Suction/ Coil Sensor Type	0-5K/1-2K	0	0	0	0	0
Not allowed to change	A22	Min. Antifreeze Temp.	-20.0~10.0℃	3℃	3℃	4℃	4℃	4℃
Not allowed to change	A23	Min. Outlet Water Temp. Protect	-30~20℃	5℃	5℃	5℃	5℃	5℃
Not allowed to change	A24	Excess Temp. Diff. Between Inlet and Outlet Temp.	0~30℃	15℃	15℃	15℃	15℃	15℃
Not allowed to change	A25	Minimum Evaporation Temp. of Cooling	-50℃~30℃	-5℃	-5℃	-5℃	-5.5℃	-5.5℃
Not allowed to change	A26	Refrigerant Type	0-R32/1-R290	1	1	1	1	1
Not allowed to change	A27	Temp. Diff. of Limiting Frequency	-20~95℃	7℃	7℃	7℃	7℃	7℃
Not allowed to change	A28	Temp. Diff. Between Outlet and DHW Temp.	-20~95℃	7℃	7℃	7℃	7℃	7℃
Not allowed to change	A29	Enable High Pressure Sensor	0-[NO]/1-[YES]	0	0	0	0	0
Not allowed to change	A30	Min. AT for Cooling	-30~60℃	10℃	10℃	10℃	10℃	10℃

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
	A31	Electric Heater On AT	-30~60℃	-7	-7	-7	-7	-7
	A32	Electric Heater Delays Comp. On Time	10~999min	60	60	60	60	30
	A33	Electric Heater Opening Temp. Diff	0~20℃	2	2	2	2	2
	A34	Crank Preheating Time	0~360min	0	0	0	0	0
	A35	Electric Heater Off Temp. Diff	0-30℃	0	0	0	0	0
Not allowed to change	A38	Low Pressure of Limiting Frequency	0.0~20.0bar	0.7	0.7	0.7	0.5	0.7
Not allowed to change	A39	Max. Current Value	0.0~50.0A	12	0	0	0	0
Not allowed to change	A40*	Rated Water Flow	0.00~9.99m^3/h	1.03	1.03	1.38	1.7	2.9
	H01	Enable Power-off Memory	0-[NO]/1-[YES]	1	1	1	1	1
	H05	Enable Cooling Function	0-[NO]/1-[YES]	1	1	1	1	1
	H07	Control Mode	0-[Display 1-[Dry Contact]	0	0	0	0	0
	H10	Unit Address	1~32	1	1	1	1	1
	H18	Electric Heater Stage	1-[Stage1]/ 2-[Stage2]/ 3-[Stage3]	3	3	3	3	3
	H20	3-port Diverter Valve Polarity	0-[Hot Water-ON]/ 1-[Hot Water-OFF]	0	0	0	0	0
	H21	Temperature Unit	0-[℃]/1-[℉]	0	0	0	0	0
	H22	Enable Silent Mode	0-[No]/1-[Yes]	1	1	1	1	1
	H25	Temp. Control Selection	0-[Outlet Water Temp.] 1-[Room Temp.] 2-[Buffer Tank Temp.] 3-[Inlet Water Temp.]	0	0	0	0	0
Not allowed to change	H27	Enable EVI	0- [No EVI]/ 1-[EVI for Cooling]/ 2-[EVI for Heating]/ 3-[All EVI]	0	0	0	0	0
	H28	Heating/Cooling and Hot Water Function Enabled	0-[NO]/1-[YES]/ 2-[Only DHW]	1	1	1	1	1
Not allowed to change	H29	Operation Code	0-20	0	0	0	0	0

* If using a Grundfos pump, set the value according to the table. If using a SHIMGE pump, set the value to 0.

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	H30	Enable Hydraulic Module	0-[NO]/1-[YES]	0	0	0	0	0
Not allowed to change	H31	Circulation Pump Type	0-[No Flow Detection] 1-[Grundfos(25~75)] 2-[Grundfos(25~105)] 3-[Grundfos(25~125)] 4-[APM25-9-130] 5-[APF25-12-130]	1	1	1	1	3
	H32	Force Switch Mode Time	1~300min	120min	120min	120min	120min	120min
Not allowed to change	H33	Fan Motor Driver and Comp. Driver Integrated	0-[NO]/1-[YES]	1	1	1	1	1
	H36	Enable Positive Weather Compensation	0-[No]/1-[Yes]	0	0	0	0	0
	H37	DHW Temp. Sourcing	0-[DHW Tank Sensor] 1-[External from Modbus]	0	0	0	0	0
	H38	Language	0-[English] 1-[Polish] 2-[German] 3-[Dutch] 4-Danish 5-Español 6-Greek 7-Français 8-Ukrainian 9-Portuguese 10-Czech 11-Bulgarian 12-Swedish 13-Slovenian 14-Italian	0	0	0	0	0
	H40	External Pump Selection	0-Hot Water Pump 1-Warm Water Cir. Pump 2-Off signal when defrosting	0	0	0	0	0
	H41	Password for Unmodified Parameters	66-999 (Invalid when set to 855)	66	66	66	66	66
	H42	AT for Bottom Plate Heater Turned On	-20°C~20°C	1	1	1	1	1
	H43	Normal/Eco	0-Normal/1-Eco	0	0	0	0	0
Not allowed to change	F01	Fan Motor Type	3-[DC]/4-[DC with External Driver]	3	3	3	3	3
Not allowed to change	F02	Coil Temp. for Max. Fan Speed in Cooling	-15.0~60.0°C	35°C	35°C	35°C	30°C	40°C

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	F03	Coil Temp. for Min. Fan Speed in Cooling	-15.0~60.0°C	15°C	15°C	15°C	10°C	15°C
Not allowed to change	F05	Coil Temp. for Max. Fan Speed in Heating	-15.0~60.0°C	10°C	10°C	10°C	10°C	10
Not allowed to change	F06	Coil Temp. for Min. Fan Speed in Heating	-15.0~60.0°C	18°C	18°C	18°C	20°C	20°C
Not allowed to change	F10	Fan Quantity	0-[One fan]/ 1-[Two fans]	0	0	0	0	1
Not allowed to change	F18	Min. Fan Speed in Cooling	10~1300r	250r	250r	300r	200r	300r
Not allowed to change	F19	Min. Fan Speed in Heating	10~1300r	250r	250r	300r	400r	500
Not allowed to change	F22	Enable Manual-Control Fan Speed	0-[NO]/1-[YES]	0	0	0	0	0
Not allowed to change	F23	Rated DC Fan Motor Speed	10~1300r	600r	600r	700r	600r	600r
Not allowed to change	F25	Max. Fan Speed in Cooling	10~1300r	600r	700r	770r	700r	750r
Not allowed to change	F26	Max. Fan Speed in Heating	10~1300r	600r	600r	700r	600r	800
Not allowed to change	F27	Fan Motor Power Curve	0~100	0	0	0	0	0
Not allowed to change	F28	CT to Reduce Two Fans to One in Cooling	-30~60°C	10°C	10°C	10°C	10°C	8
Not allowed to change	F29	CT to Stop Single Fan in Cooling	-30~60°C	8°C	8°C	8°C	6°C	6
Not allowed to change	E01	EEV Adjust Mode	0-[Manual]/ 1-[Auto] /2-[Smart]	1	1	1	1	1
Not allowed to change	E02	Target Superheat for Heating	-20.0~20.0°C	0°C	0°C	0°C	0	0°C
Not allowed to change	E03	EEV Initial Steps for Heating	0~500N	0	0	0	0	0
Not allowed to change	E07	EEV Min. Steps	0~500N	80	80	80	80	70
Not allowed to change	E08	EEV Initial Steps for Cooling	0~500N	400	400	400	350	400
Not allowed to change	E09	EVI EEV: Adjustment Mode	0-[Manual]/1-[Auto]	1	1	1	1	1
Not allowed to change	E10	EVI EEV: Initial Steps	0~500N	350N	350N	350N	350N	350N

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	E13	EVI EEV Target Superheat Degree	-20.0~20.0℃	3℃	3℃	3℃	3℃	3℃
Not allowed to change	E14	EVI EEV Min. Steps	0~500N	100N	100N	100N	100N	100N
Not allowed to change	E17	Defrosting EEV Steps	10~500N	480	480	480	480	350
Not allowed to change	E18	Target Superheat for Cooling	-10.0~10.0℃	5℃	5℃	5℃	3℃	5℃
Not allowed to change	E19	EEV Adjustment Range In Smart Mode	0%--300%	20	20	20	20	20
Not allowed to change	E03-1	Segment 1 of EEV Initial Steps for Heating	0~500N	240	240	250	400	400
Not allowed to change	E03-2	Segment 2 of EEV Initial Steps for Heating	0~500N	220	220	220	350	350
Not allowed to change	E03-3	Segment 3 of EEV Initial Steps for Heating	0~500N	200	200	200	250	300
Not allowed to change	E03-4	Segment 4 of EEV Initial Steps for Heating	0~500N	180	180	180	200	270
Not allowed to change	E03-5	Segment 5 of EEV Initial Steps for Heating	0~500N	160	160	160	180	230
Not allowed to change	E07-1	Segment 1 of EEV Min.Steps	0~500N	120	120	100	120	120
Not allowed to change	E07-2	Segment 2 of EEV Min.Steps	0~500N	200	200	150	110	180
Not allowed to change	E07-3	Segment 3 of EEV Min.Steps	0~500N	150	150	150	100	150
Not allowed to change	E07-4	Segment 4 of EEV Min.Steps	0~500N	100	100	100	90	100
Not allowed to change	E07-5	Segment 5 of EEV Min.Steps	0~500N	80	80	80	80	90
Not allowed to change	D01	Ambient Temp. of Starting Defrosting	-37~45℃	45℃	45℃	45℃	45℃	45℃
Not allowed to change	D02	Heating Operation Time Before Defrosting	0~120min	15 min	15 min	15min	15 min	15min
Not allowed to change	D03	Interval Time Between Defrosting Cycles	10~90min	45 min	45 min	45 min	45 min	45 min
Not allowed to change	D04	Exhaust Temp. Correction for Defrosting Cycle	0~150℃	105℃	105℃	105℃	105℃	105℃

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	D05-1	Defrosting Suction Pressure 1	0~45bar	1.2bar	1.2bar	1.2bar	1.1bar	1.2bar
Not allowed to change	D05-2	Defrosting Suction Pressure 2	0~45bar	0.5bar	0.5bar	0.5bar	0.5bar	0.5bar
Not allowed to change	D06	Defrosting Cycle Time Correction	0~120min	10min	10min	10min	10 min	15min
Not allowed to change	D07	Ambient Temp. of Start Sliding Defrosting	-37~45°C	8°C	8°C	8°C	8°C	8°C
Not allowed to change	D08	Suction Temp. of Start Sliding Defrosting	-37~45°C	-4°C	-4°C	-4°C	-3.5°C	-5°C
Not allowed to change	D09	Ambient Temp. of Stop Sliding Defrosting	-37~45°C	-25°C	-25°C	-25°C	-25°C	-25°C
Not allowed to change	D10	Suction Temp. of Stop Sliding Defrosting	-37~45°C	-30°C	-30°C	-30°C	-30°C	-30°C
Not allowed to change	D11	Min. Inlet Water Temp. of Defrosting	4~65°C	23°C	23°C	23°C	23°C	23°C
Not allowed to change	D12	Suction Pressure of Forced Defrosting	0~45bar	3.3bar	3.3bar	3.5bar	3.4bar	3.4bar
Not allowed to change	D13	Heating Operation Time Before Forced Defrosting	0~360min	180 min	180 min	180 min	180 min	180 min
Not allowed to change	D14	Fan Motor Power Ratio to Extend Defrosting Cycle	0 - 5.00	1.3	1.3	1.3	1.3	1.3
Not allowed to change	D15	Fan Motor Power Ratio to Enter Forced Defrosting	0 - 5.00	1.5	1.5	1.5	1.5	1.5
Not allowed to change	D16	Max. Fan Motor Power to Enter Forced Defrosting	50 - 1000W	200W	200W	200W	200W	200W
Not allowed to change	D17	Coil Temp. of Exit Defrosting	-37~45°C	25°C	25°C	25°C	25°C	25°C
Not allowed to change	D18	Distributor Tube Temp. of Exit Defrosting	-37~45°C	70°C	70°C	70°C	70°C	70°C

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	D19	Max. Defrosting Time	0~20min	8 min	8 min	8 min	8 min	8 min
Not allowed to change	D20	Defrosting Frequency	30~90Hz	70Hz	70Hz	70Hz	60Hz	70Hz
Not allowed to change	D21	Enable Electric Heater During Defrosting	0-NO/1-YES	1	1	1	1	1
Not allowed to change	D22	Water Flow of Defrosting	0-50.00m^3/h	0	0	0	1	1.2
Not allowed to change	D23	Max. Defrosting Cycle by Fan Motor Power	0~240min	120min	120min	120min	120min	120min
	D24	Defrosting Heating Source in Heating / DHW Mode	0-[Stay Current Circuit] 1-[DHW Circuit] 2-[Heating Circuit]	2	2	2	2	2
Not allowed to change	D25	Max. Water Temp. Decrease during Defrosting	2~65°C	7°C	7°C	7°C	7°C	7°C
	D26	Enable Defrosting Communication in Cascade	0-NO/1-YES	0	0	0	0	0
	D30	Bottom Heater Delays Off Time after Defrost	0~60min	45	45	45	45	45
	R01	DHW Target Temp.	R36~R37	55°C	55°C	55°C	55°C	55°C
	R02	Heating Target Temp.	R10~R11°C	65°C	65°C	65°C	65°C	65°C
	R03	Cooling Target Temp.	R08~R09°C	7°C	7°C	7°C	7°C	7°C
	R04	Temp. Diff. for Power-on in Heating	0~10°C	3°C	3°C	3°C	5°C	5°C
	R05	Temp. Diff. for Standby in Heating	0~10°C	2°C	2°C	2°C	2°C	2°C
	R06	Temp. Diff. for Power-on in Cooling	0~10°C	3°C	3°C	3°C	5°C	5°C
	R07	Temp. Diff. for Standby in Cooling	0~10°C	2°C	2°C	2°C	1°C	2°C
Not allowed to change	R08	Min. Cooling Target Temp.	-30.0~R09°C	5°C	5°C	5°C	7°C	5°C
Not allowed to change	R09	Max. Cooling Target Temp.	R08~80.0°C	28°C	28°C	28°C	28°C	28°C

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	R10	Min. Heating Target Temp.	-30.0~R11℃	15℃	15℃	15℃	15℃	15℃
Not allowed to change	R11	Max. Heating Target Temp.	R10~99℃	75℃	75℃	75℃	75℃	75℃
Not allowed to change	R15	Temp. Diff. of Exiting Overhigh Outlet Temp.	0~15℃	2℃	2℃	2℃	2℃	2℃
	R16	Temp. Diff. for Power-on in DHW	0~10℃	5℃	5℃	5℃	5℃	5℃
	R17	Temp. Diff. for Standby in DHW	0~10℃	2℃	2℃	0℃	2℃	0℃
Not allowed to change	R29	Low AT for Water Temp. Limit On	R30~4℃	-5℃	-5℃	-5℃	-5℃	-7℃
Not allowed to change	R30	Low AT for Water Temp. Limit Off	-35~R29℃	-25℃	-25℃	-25℃	-23℃	-25℃
Not allowed to change	R31	Max. Limit Outlet Water Temp. at Low AT	20~85℃	62℃	60℃	62℃	55℃	62℃
Not allowed to change	R32	High AT for Water Temp. Limit On	10~R33℃	30℃	30℃	30℃	15℃	25℃
Not allowed to change	R33	High AT for Water Temp. Limit Off	R32~60℃	40℃	40℃	40℃	35℃	43℃
Not allowed to change	R34	Max. Limit Outlet Water Temp. at High AT	20~85℃	70℃	70℃	70℃	67℃	67℃
	R35	Location of Electric Heater	0-[Not Available]/ 1-[Main Water Circuit]/ 2-[DHW Tank]/ 3-[Buffer Tank]	0	0	0	0	0
Not allowed to change	R36	Min. DHW Target Temp.	0~R37℃	15℃	15℃	15℃	15℃	15℃
Not allowed to change	R37	Max. DHW Target Temp.	R36~85℃	70℃	70℃	70℃	70℃	75℃
Not allowed to change	R39	AT for Auto-start Heating Mode	5~20℃	10℃	10℃	10℃	10℃	10℃
Not allowed to change	R42	Max. Outlet Water Temp. in Heating	20~ 85℃	75℃	75℃	75℃	75℃	75℃
Not allowed to change	R43	Max. Limit Target Water Temp. at Low AT in Heating	20~85℃	60℃	60℃	60℃	60℃	60℃

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	R44	Max. Limit Target Water Temp. at High AT in Heating	20~85℃	70℃	70℃	70℃	65℃	65℃
Not allowed to change	R45	AT to Start Electric Heater Without Delay	-50~20℃	-7℃	-7℃	-7℃	-10℃	-10℃
Not allowed to change	R46	Temp. Diff. between Max. DHW Target Temp. & Max. Outlet Temp.	0~25℃	7℃	7℃	7℃	7℃	7℃
Not allowed to change	R60	AT to Start Frequency Limit in Cooling	0~60℃	35℃	35℃	35℃	31℃	29℃
Not allowed to change	R61	AT to Stop Frequency Limit in Cooling	0~60℃	42℃	42℃	42℃	43℃	43℃
Not allowed to change	R62	Max. Heat Pump Outlet Water Temp.	40~95℃	77℃	77℃	77℃	77℃	77℃
	R70	Target Room Temp.	5~27℃	20℃	20℃	20℃	20℃	20℃
	R71	Room Temp. Diff. for Power-on in Heating	0.1~3℃	0.5℃	0.5℃	0.5℃	0.5℃	0.5℃
	R72	Room Temp. Diff. for Standby in Heating	0.1~3℃	0.5℃	0.5℃	0.5℃	0.5℃	0.5℃
	R73	Room Temp. Diff. for Power-on in Cooling	0.1~3℃	0.5℃	0.5℃	0.5℃	0.5℃	0.5℃
	R74	Room Temp. Diff. for Standby in Cooling	0.1~3℃	0.5℃	0.5℃	0.5℃	0.5℃	0.5℃
	P01	Main Circulation Pump Operation Mode	0-[Always On]/ 1-[Saving]/ 2-[Interval]	2	2	2	2	2
	P02	Interval Time	1~120min	30 Min	30 Min	30 Min	30 Min	30 Min
	P03	Operation Duration Time	1~30min	3 Min	3 Min	3 Min	3 Min	3 Min
	P05	DHW Pump Operation Mode	0-[Always On]/ 1-[Saving]/ 2-[Interval]	2	2	2	2	2
	P06	Main Circulation Pump Manual Control	0-[NO]/1-[YES]	0	0	0	0	0

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	P08	Main Circulation Pump Rated Power	0-2000W	0	0	0	0	0
	P09	Circulation Pump Protection Period	0-30 days	0	0	0	0	0
Not allowed to change	P10	Speed of Circulation Pump	0-100%	0	0	0	0	0
	P11	Target Temp. Diff. for Pump Speed Control	0~20°C	5	5	5	5	5
	P12	Pump Speed Adjust Range for Each Period	0~10N	4	4	4	4	4
	P13	Refill Valve Start Cycle (for IDU)	0~200days	30	30	30	30	30
	P14	Refill Valve Working Duration (for IDU)	0~6000s	30	30	30	30	30
	P15	Target Water Pressure (for IDU)	0.0~20.0bar	1	1	1	1	1
	P16	Stop Refilling Pressure Diff. (for IDU)	0.0~5.0bar	0.5	0.5	0.5	0.5	0.5
	G01	Disinfection Water Temp.	60~70°C	63°C	63°C	63°C	63°C	63°C
	G02	Time Duration of Disinfection	0~60min	0min	0min	0min	0min	0min
	G03	Disinfection Starting Time	0~23h	0:00	0:00	0:00	1:00	0:00
	G04	Interval Period of Disinfection	1~30days	30	30	30	30	30
	G05	Enable Disinfection	0-[NO]/1-[YES]	1	1	1	1	1
Not allowed to change	C01	Manual Comp. Frequency	0~120Hz	0	0	0	0	0
Not allowed to change	C02	Min. Comp. Frequency	20~60Hz	20	20	20	25	20
Not allowed to change	C03	Max. Comp. Frequency	30~120Hz	84	96	96	96	96
Not allowed to change	C04	Model Selection	0~99	13	13	73	0	1
Not allowed to change	C05	Min. Comp. Frequency in Cooling at Low Ambient Temp.	0~60Hz	54	54	54	40	54
Not allowed to change	C07	Resonance Point 1	0~120HZ	0	0	0	35	0
Not allowed to change	C08	Resonance Point 2	0~120HZ	0	0	0	36	0

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
Not allowed to change	C09	Resonance Point 3	0~120HZ	0	0	0	0	0
Not allowed to change	C10	Min. Comp. Frequency in Heating at Low Ambient Temp.	0~120HZ	60	60	60	42	48
Not allowed to change	C11	Max. Comp. Frequency in Cooling at High Ambient Temp.	0~120HZ	66	66	72	60	54
	C12	Max. Comp. Frequency in DHW mode	30-C03Hz	84	90	90	90	90
	Z01	Enable Multi-Zone Control	0-None 1-Zone 1-S 2-Zone 2-S 3-Zone 1&2-S 4-Zone 1-T 5-Zone 2-T 6-Zone 1&2-T 7-Zone 1-P 8-Zone 2-P 9-Zone 1&2-P	0	0	0	0	0
	Z02	Zone 1 Target RT	10-35°C	20°C	20°C	20°C	20°C	20°C
	Z03	Zone 1 RT Diff. to Start	0-10°C	2°C	2°C	2°C	2°C	2°C
	Z04	Zone 2 Target RT	10-35°C	20°C	20°C	20°C	20°C	20°C
	Z05	Zone 2 RT Diff. to Start	0-10°C	2°C	2°C	2°C	2°C	2°C
	Z06	Zone 1 Heating Target Outlet WT	R10-R11°C	45°C	45°C	45°C	45°C	45°C
	Z07	Zone 2 Mixing Target Outlet WT	R10-Z15°C	35°C	35°C	35°C	35°C	35°C
	Z08	Mixing Valve Manual Adjustment Ratio (0% for Auto Control)	0-100%	0	0	0	0	0
	Z09	Mixing Valve Opening Time	0-2000s	150s	150s	150s	150s	150s
	Z10	Mixing Valve Closing Time	0-2000s	150s	150s	150s	150s	150s
	Z11	Mixing Valve Adjustment P(PID)	0-10.0	2	2	2	2	2
	Z12	Mixing Valve Adjustment I(PID)	0-10.0	0.2	0.2	0.2	0.2	0.2
	Z13	Mixing Valve PID Period	1-20 min	2min	2min	2min	2min	2min

Type	Parameter Number	Parameters	Range value (℃)	PEM750V004PGKC	PEM750V006PGKC	PEM750V008PGKC	PEM750V010PGKC	PEM750V017PGKC
	Z14	Steps of Mixing Valve in Cooling	0-100%	0	0	0	0	0
	Z15	Zone 2 Max. Water Target Temp.	R10-99℃	40℃	40℃	40℃	40℃	40℃
	Z16	Enable AT Compensation Curve Zone 1	0-[NO]/1-[YES]	0	0	0	0	0
	Z17	Enable AT Compensation Curve Zone 2	0-[NO]/1-[YES]	0	0	0	0	0
	Z19	Diff. of No Pump On at Low Water Temp.	0℃~25℃	2℃	2℃	2℃	2℃	2℃
	Z20	Enable Zone 1 Water Pump in Cooling	0-[NO]/1-[YES]	0	0	0	0	0
	SG01	SG Ready Application	0-Disabled 1-One Dry Contact 2-Two Dry Contact	0	0	0	0	0
	SG02	Block Time of Mode 1	0-120min	120	120	120	120	120
	SG03	Limited Power in Solar Low Mode 2	0-99.9kW	0	0	0	0	0
	SG04	Limited Power in Solar Medium Mode 3	0-99.9kW	0	0	0	0	0
	SG05	Additional Hot Water Temp. in Mode 4	0-25℃	0	0	0	0	0
	SG06	Additional Heating Water Temp. in Mode 4	0-25℃	0	0	0	0	0
	SG07	Additional Cooling Water Temp. in Mode 4	0-25℃	0	0	0	0	0
	SG08	Turn On the Electric Heater Immediately in Mode 4	0-[NO]/1-[YES]	0	0	0	0	0

3. Design and Installation

3.1 Refrigerant R290

The natural refrigerant R290 has an Ozone Depletion Potential (ODP) of 0 and a Global Warming Potential (GWP) of 3, making it more environmentally friendly than R32 (GWP below 750).

DANGER

- **The product contains the combustible refrigerant R290. If there is a leak, escaping refrigerant may mix with air and form a flammable atmosphere which can explode and catch fire, causing severe burns.**
  - Do not use or place any ignition sources, such as plug sockets, light switches, lamps, electrical switches, or other ignition sources, in the protective zone.
  - Keep all flammable sources away from the product.
  - Do not place it near any devices with an extremely hot surface.
  - Before opening the cover and working on the product, use a gas leak detector to make sure there is no leak.
  - If there is a leak, close the front cover and inform the end user and contact the Technical Helpdesk at 0344 332 2323.
  - Ensure that the product installation site can be ventilated and aerated properly.
  - Do not allow any unauthorised personnel to access or work on the product installation site.
  - Keep any required ventilation openings clear of obstruction.
- **When removing, transporting, or filling the refrigerant:**
  - Only licensed personnel may handle the refrigerant.
  - Wear suitable personal protective equipment and bring a fire extinguisher with you.
  - Use permitted tools or units in proper working condition.
  - Do not allow air to get into the refrigerant circuit, refrigerant-carrying tools (or units), or refrigerant cylinder.
  - Do not allow R290 refrigerant to be introduced into the sewage system.
  - Do not use the compressor to pump the refrigerant into the outdoor unit (no pump down).
  - Do not tilt the product more than 30°. Doing so may lead to creating problems in the refrigerant circuit during operation.

CAUTION

Use R290 refrigerant that has been used before or that is at least 99.5% pure with minimal levels of critical impurities, including moisture and unsaturated hydrocarbons.

- Using improper or contaminated R290 refrigerant may damage the product.

3.2 Select the Best Location

Select space for installing unit, which will meet the following conditions:

- No direct thermal radiation from other heat sources
- No possibility of annoying neighbors by noise from unit
- No exposition to strong wind
- With strength which bears weight of unit
- With space for air passage and service work shown next
- Because of the possibility of fire, do not install unit to the space where generation, inflow, stagnation, and leakage of combustible gas is expected.
- Avoid unit installation in a place where acidic solution and spray (sulfur) are often used.
- Do not use unit under any special environment where oil, steam and sulfuric gas exist.
- It is recommended to fence round the unit in order to prevent any person or animal from accessing the unit.
- If installation site is area of heavy snowfall, then the following directions should be observed.
  - Make the foundation as high as possible.
  - Fit a snow protection hood.
- Select installation location considering following conditions to avoid bad condition when additionally performing defrost operation.
  1. Install the unit at a place well ventilated and having a lot of sunshine in case of installing the product at a place with a high humidity in winter (near beach, coast, lake, etc).
  2. Performance of heating will be reduced and pre-heat time of the unit may be lengthened in case of installing the unit in winter at following location:

  1) Shade position with a narrow space

  2) Location with much humidity around.

  3) Location where liquid gathers since the floor is not even.
- When installing the unit in a place that is constantly exposed to a strong wind like a coast or on a high story of a building, secure a normal fan operation by using a duct or a wind shield.
  1. Install the unit so that its discharge port faces to the wall of the building. Keep a distance 300 mm or more between the unit and the wall surface.
  2. Supposing the wind direction during the operation season of the unit, install the unit so that the discharge port is set at right angle to the wind direction.

3.3 Installation

CAUTION

The installation must be in line with MCS standards and system design.

3.3.1 Moving the Heat Pump

WARNING

The surface of the heat exchanger is sharp. Do not touch the heat exchanger of the heat pump with your fingers or other objects while moving and installing the heat pump.

To move the heat pump safely, follow these guidelines:

- Consider the weight distribution during transport. The product is significantly heavier on the right side than the left.
- Select the movement route in advance, and ensure that the route can bear the weight of the heat pump.
- Do not tilt the heat pump more than 30˚ when carrying it. (Do not lay the product down sideways.)
- When the unit needs to be hung during installation, a cable (8 m) is needed, and you should put a soft material between the cable and the unit to prevent damage to the heat pump.
- The heat pump should not be stored at temperatures below -30°C or above 60°C.

3.3.2 Choosing an Installation Location

Installation Location Conditions

When choosing an installation location, select a location that meets the following conditions:

- The noise and air discharged should not affect or disturb neighbours.
- The location should be protected from the wind.
- The location should support the minimum recommended space.
- The heat pump should not obstruct access to doors or paths.
- The surfaces of the floor must be strong enough to support the weight of the heat pump, and they should minimise noise and vibration.
- Preventive measures should be taken so that children cannot reach the heat pump.
- The installation location should be level (not inclined more than 5°).
- There should be no dust or strong wind around the location.
- The location should withstand vibrations and the weight of the heat pump.
- The location should allow for proper airflow.
- There should be no potential sources of ignition, such as heat, steam, or flammable gases around the location.
- During heat pump operation, condensate water flows from the heat pump. Therefore, the heat pump should be installed in a place where the condensate water flow will not be obstructed.
- The location should be in a place where people do not pass frequently.
- The location should be as free from adverse weather conditions as possible.

Noise Level

All heat pumps make noise. Discuss the potential nuisance factor with the end user when considering the final installation location. Take opening windows and doors into account. It is not essential for the heat pump to be positioned against a wall of the house. Installing the heat pump behind an outbuilding may be more suitable, so discuss the options with the end user.

Orientation

The north face of the building will usually have the coolest ambient temperature. To ensure maximum efficiency, position the heat pump on another side. In order of preference, install the heat pump on the south face, followed by either southeast or southwest, then by east or west. Only install the heat pump on the north face if there is no alternative.

Base

The heat pump should be installed on a firm, flat, level surface capable of supporting the heat pump's weight and that minimises the transmission of noise and vibration. For example:

- A flat trowelled concrete base 150 mm thick
- Paving slabs on compacted, hard core of a sufficient depth for the ground condition

This surface should extend at least 150 mm beyond the heat pump on three sides.

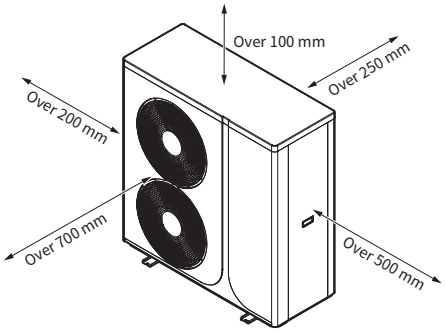
The heat pump should not be installed on loose or uneven surfaces, such as grass, soil, shingle, or gravel. The heat pump must be raised up from the surface of the base by approximately 80 mm on suitable anti-vibration mounts or blocks.

Install the heat pump near a drain or where embankment work has been done.

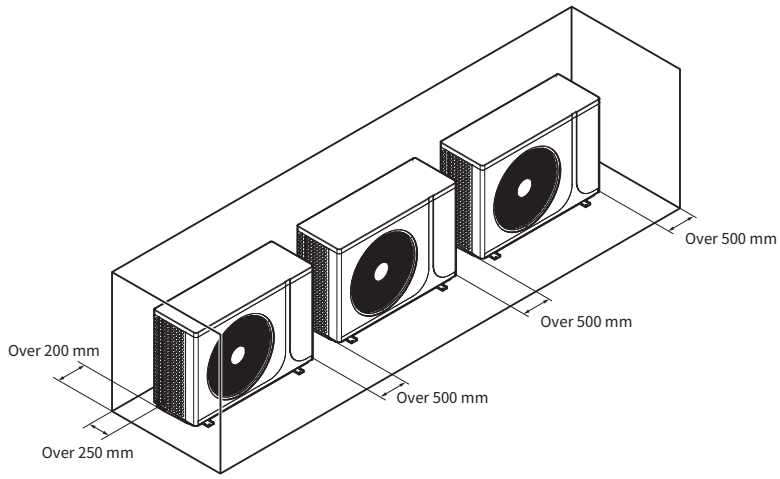
Adequate Installation Clearances

Install the heat pump in an area that allows for service, maintenance, and adequate airflow in and out of the heat pump. Based on the installation location, ensure that the following clearances are maintained:

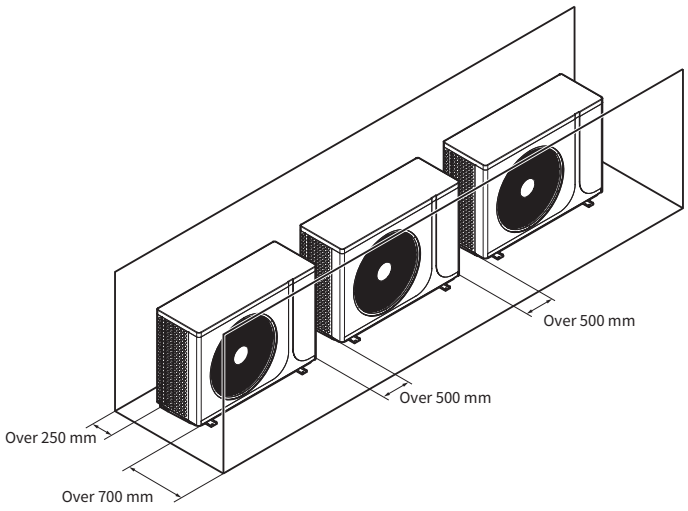
- When installing one heat pump



- When installing more than one heat pump



[3-Sides Suction Obstruction]



[Suction/Discharge Obstruction]

3.3.3 Installation in Coastal Areas in the Vicinity of Sea

CAUTION

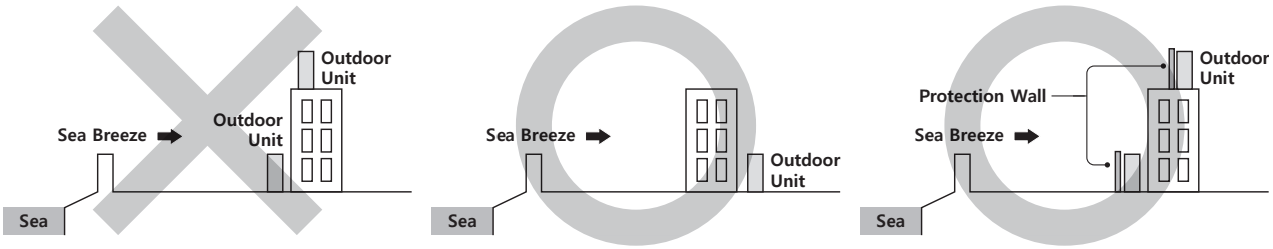
- Do not install the heat pump in areas where it may be exposed to corrosive gases, including acidic or alkaline environments, to prevent material degradation.
- Avoid direct exposure of the heat pump to sea wind, as the salty air can lead to corrosion, particularly damaging the condenser and evaporator fins. This corrosion could result in malfunction or reduced efficiency.
- If the heat pump must be installed near the seaside, ensure it is shielded from direct sea wind. If exposure is unavoidable, apply additional anti-corrosion treatments to the heat exchanger to extend its lifespan and maintain efficiency.

To install the heat pump near the seashore, follow these guidelines:

Installation Location Conditions

Install the product away from direct exposure to salt water and sea breezes. If installation near the seashore is unavoidable:

- Position it behind a building (or protective structure) to shield it from sea breezes.
- Construct a solid wall to protect the product from direct exposure to sea breezes, ensuring the wall is 1.5 times the height and width of the outdoor unit. Maintain at least 700 mm of space between the wall and the unit for adequate air circulation.



Drainage Optimisation

- Choose a location that promotes efficient water drainage, particularly ensuring the base has effective drainage capabilities.
- Keep the surrounding ground level to prevent rainwater from pooling and ensure the drain hole remains unblocked by debris.

Inspections and Maintenance

- Regularly wash the heat pump to remove salinity, especially if installed within 500 meters of the coast.
- Conduct thorough inspections every three months, applying anti-corrosion treatments like commercially available water repellent greases or waxes based on the product's condition.
- Apply additional anti-corrosion treatments as necessary when the product is installed close to the sea.
- Cover the heat pump during prolonged periods of non-use to protect it from environmental factors.

Corrosion Prevention

- Ensure proper sloping at the installation site to facilitate drainage and prevent water accumulation at the base of the outdoor unit, which can accelerate corrosion.
- Address any damages incurred during installation or maintenance promptly to avoid further deterioration.

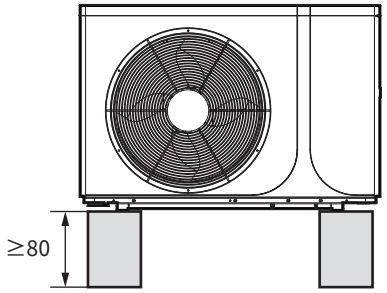
Cleaning the Heat Pump

1. Disconnect the main power supply from the heat pump.
2. Remove foreign substances and dust from the heat pump and clean major parts with a soft cloth and neutral detergent.

3.3.4 Installation in Areas with Heavy Snowfall

When using the heat pump in Heating mode, ice may accumulate. During de-icing (defrost operation), the condensed water must be drained off safely. To install the heat pump in an area with heavy snowfall, follow these guidelines:

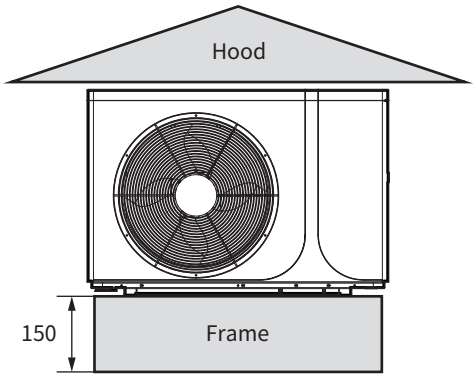
- Make sure that there is enough separation distance more than 80 mm between the bottom of the outdoor unit and the ground.



- When installing the product, make sure that the rack is not placed under the drain hole.
- Ensure that the drained water runs off properly and safely.

CAUTION

- In areas with heavy snowfall, snow may block the air intake. To avoid this, install a frame that is higher than the estimated snowfall. Also, install a snow-proof hood to avoid snow from accumulating around the outdoor unit.
- If ice accumulates around the base, it may cause critical damage to the product. (e.g., a lakeside in a cold area, the coastal, an alpine region, etc.)
- In areas with heavy snowfall, do not install the drain plug and drain cap into the outdoor unit. Doing so may result in frozen ground.
- Install the outdoor unit with a space of at least 150 mm between the floor and the ground. The product exceeds the maximum expected eye level. Make sure they are at least 150 mm above each other.



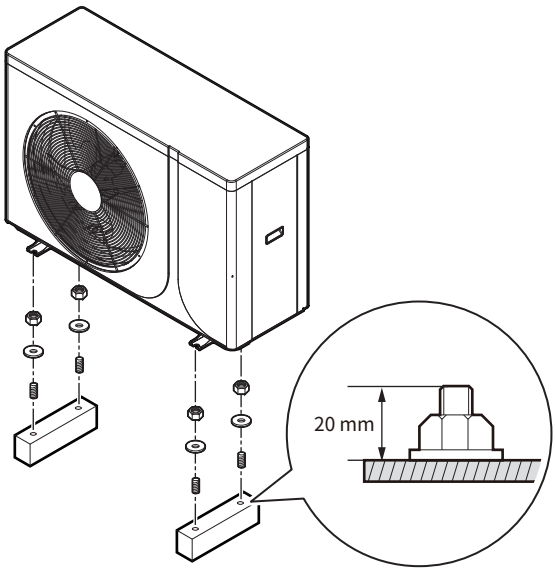
3.3.5 Conditions for the Installation Types

The heat pump is suitable for ground installation, wall installation and flat-roof installation.

Note The pitched-roof installation is not permitted.

3.3.5.1 Fixing the Heat Pump to the Ground

The heat pump must be installed on a rigid, stable base to avoid any increase in the noise level and vibration, if the outdoor unit is to be installed in a location exposed to strong winds or at a height, the unit must be fixed to an appropriate support via anchor bolts.



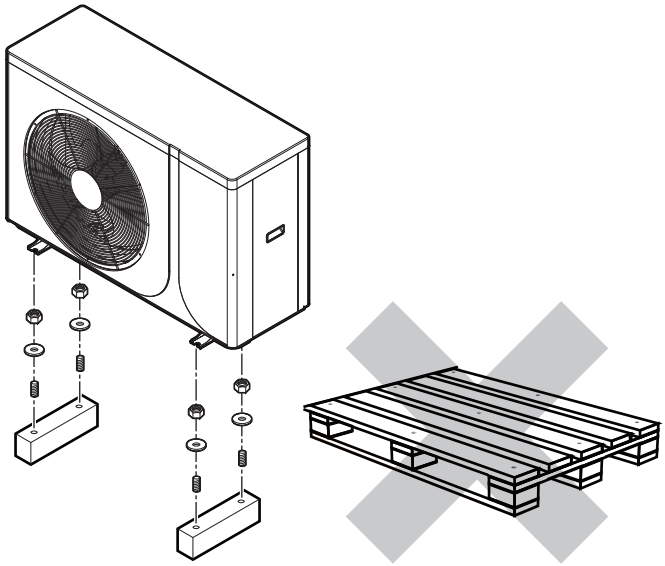
Note The anchor bolts must be 20 mm or higher from the base's surface.

CAUTION

- When tightening the anchor bolts, tighten the rubber washers to prevent the heat pump's bolt connector from corroding.
- Make a drain outlet around the base for outdoor unit drainage.
- If the heat pump is installed on the roof, check the waterproofing of the heat pump and ensure the ceiling can support the heat pump's weight.

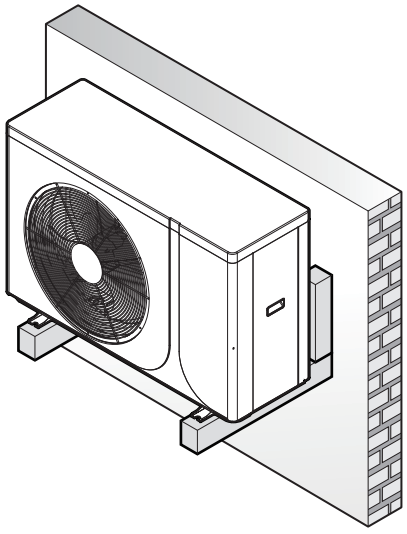
WARNING

Be sure to remove the pallet(wood support) of the bottom side of the outdoor unit base pan before fixing the bolt. It may cause the unstable state of the outdoor settlement, and may cause freezing of the heat exchanger resulting in abnormal operations.



3.3.5.2 Fixing the Heat Pump to a Wall

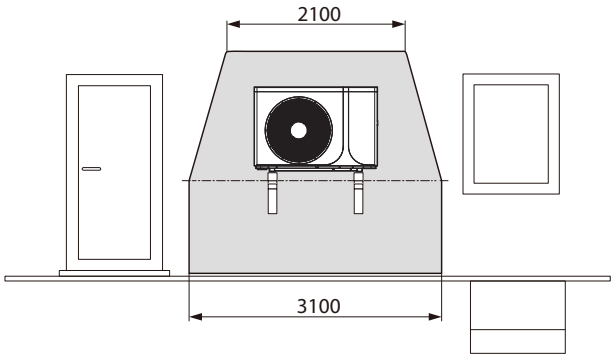
Depending on the ground conditions, you can also fix the heat pump to a wall via support brackets. The wall must be able to support the weight of the heat pump.



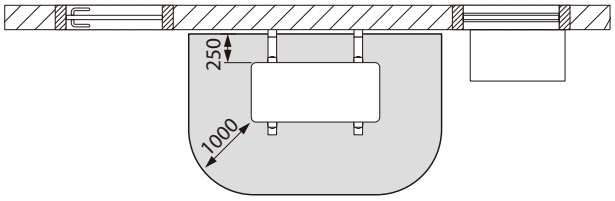
Protective Zone for Wall Installation in Front of a Building Wall or in a Building Corner

The protective zone below the product extends as far as the floor.

Wall

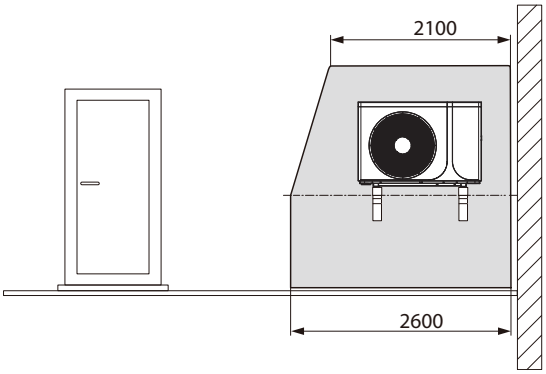


[Front View]

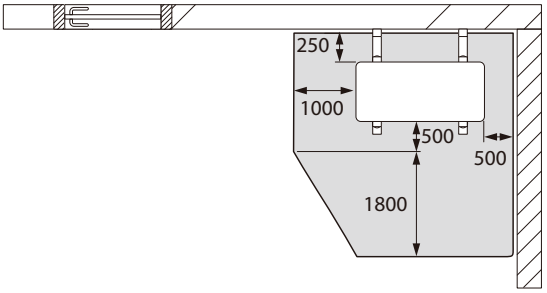


[Top View]

Corner



[Front View]



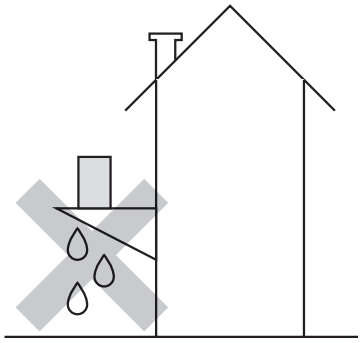
[Top View]

Note

- Install the support brackets close to the column as much as possible.
- Install proper anti vibration washers in order to reduce noise and residual vibration transferred by the outdoor unit towards the wall.
- To cut off vibration from the support brackets to the wall, install a soft rubber washer (optional).

CAUTION

If you install the outdoor unit on a wall support bracket, install drainage pipework. To avoid the drain water from dripping on the floor potentially creating a slippery surface or an ice layer under freezing conditions, securely mount the outdoor unit before connecting the water piping.



3.4 Water Control

3.4.1 Water Quality

Water quality should comply with EN 98/83 EC Directives. Refer to the following table for the requirements for resolved chemical ingredients. Detailed water quality conditions can be found in EN 98/83 EC Directives.

Parameter	Value
Acrylamide	0.10 µg/l
Antimony	5.0 µg/l
Arsenic	5.0 µg/l
Benzene	1.0 µg/l
Benzo(a)pyrene	0.010 µg/l
Boron	1.0 mg/l
Bromate	10 µg/l
Cadmium	5.0 µg/l
Chromium	50 µg/l
Copper	2.0 mg/l
Cyanide	5.0 µg/l
1.2-dichloroethane	3.0 µg/l
Epichlorohydrin	0.10 µg/l
Fluoride	1.5 mg/l
Lead	10 µg/l
Mercury	1.0 µg/l
Nickel	20 µg/l
Nitrate	50 mg/l
Nitrite	0.50 mg/l
Pesticides	0.10 µg/l
Pesticides - Total	0.50 µg/l
Polycyclic aromatic hydrocarbons	0.10 µg/l
Selenium	10 µg/l
Tetrachloroethene and Trichloroethene	10 µg/l
Trihalomethanes - Total	100 µg/l
Vinyl chloride	0.50 µg/l

CAUTION

- If the product is installed in an existing hydraulic water loop, you must clean hydraulic pipes to remove sludge and limescale.
- To prevent performance degradation, install a sludge strainer in the water loop.
- Chemical treatment to prevent rust should be performed by an authorised technician or licensed professional.

3.4.2 Freeze Protection

To prevent the hydraulic components from freezing, the heat pump has a freezing protection function that includes activation of the pump at low temperatures.

Note In case of a power failure, these functions cannot guarantee protection.

To protect water circuit from freezing, any of the following should be performed.

Freeze Protection via Glycol

Add glycol to water. Glycol lowers the freezing point of water. Freeze protection solutions must use propylene glycol with a toxicity rating of Class 1, as listed in Clinical Toxicology of Commercial Products, 5th Edition.

WARNING

- Ethylene glycol is toxic and must not be used in the primary water circuit to prevent cross contamination in the potable circuit.
- If an antifreeze is used, pressure drops and degradation of system capability may occur.

CAUTION

- Due to the presence of glycol, corrosion of the system is possible. Uninhibited glycol will turn acidic due to oxygen. Acidic, uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system.
- Glycol with corrosion inhibitors should be selected to counteract acids formed by oxidation.
- No automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates that can contaminate or clog the system.
- Galvanised pipes are NOT used in glycol systems since their presence may lead to the precipitation of certain components in the glycol's corrosion inhibitor.

To prevent the system from freezing, more glycol is required. Add glycol according to the table below.

Freezing Points of Propylene Glycol-Water Mixtures		
Percent Propylene Glycol [wt. %]	**Freezing Point [wt. °F]**	**Freezing Point [wt. °C]**
0	32	0
10	26	-3
20	20	-7
30	10	-12
36	0	-18
40	-5	-20
43	-10	-23
48	-20	-29

Antifreeze Valves

WARNING

If you add glycol to the water, do not install an antifreeze valve. Glycol will leak out of the antifreeze valve.

CAUTION

If the unit is used for Cooling mode in summer, install an antifreeze protection valve with an ambient air sensor. This prevents the valves from opening due to low water temperatures. Set the minimum cooling point to 7°C or higher to avoid triggering the freeze protection valves during cooling operations.

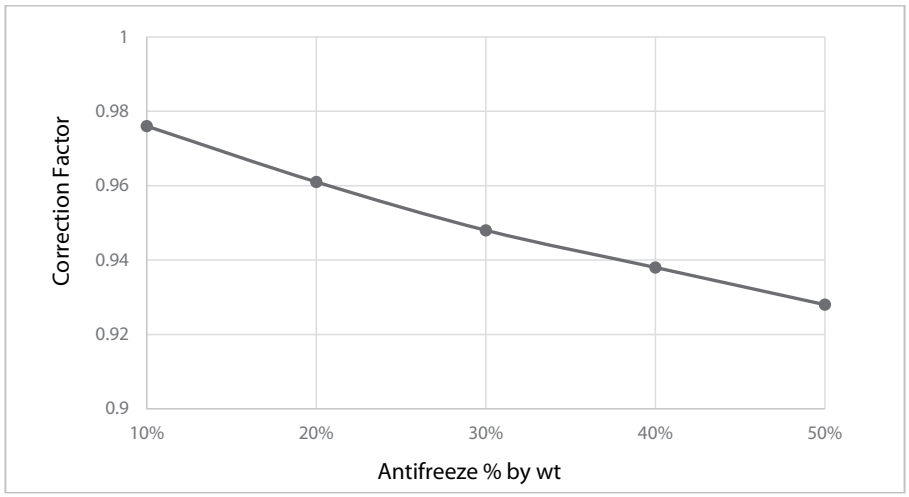
Install an antifreeze valve. The antifreeze valve will discharge water from the system before it freezes.

To prevent system water from freezing inside the pipes during sub-zero ambient conditions after sudden power outages, installing an antifreeze valve is recommended if glycol is not a suitable solution. An antifreeze valve opens when the medium (water) is below a certain temperature value. When using the heat pump for cooling in the summer, an antifreeze valve with an ambient sensor is required to avoid unwanted opening due to low water temperatures.

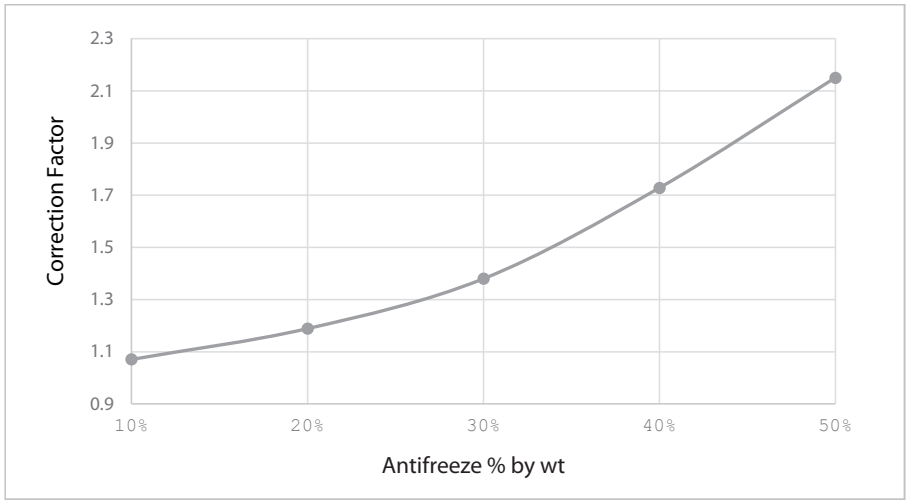
Capacity Correction Factor by Antifreeze

Antifreeze Type	Item	Antifreeze % by wt				
		10%	20%	30%	40%	50%
Propylene Glycol	Cooling	0.976	0.961	0.948	0.938	0.928
	Pressure Drop	1.071	1.189	1.380	1.728	2.15

- Correction of Cooling Capacity



- Correction of Pressure Drop



3.5 Connecting Water Pipes

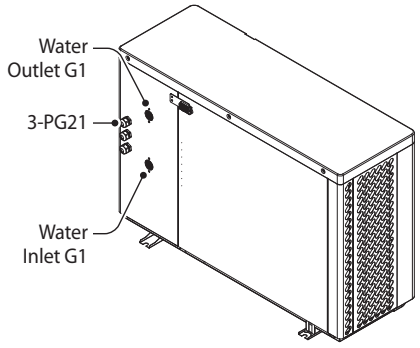
CAUTION

- Do not turn on the heat pump while installing a shut-off valve.
- Do not use excessive force when connecting the piping to prevent deformation. Deformed piping may damage the outdoor unit and cause it to malfunction.
- Always use two spanners when tightening or loosening the water connections to ensure balanced pressure and prevent damage. Tighten all connections using a spanner to avoid damaging the connections and parts, which could lead to leaks.
- The product is designed for use exclusively in a closed water system. Operating the product in an open water circuit is not recommended as it may lead to contamination of the heat exchangers, corrosion, and leaks.

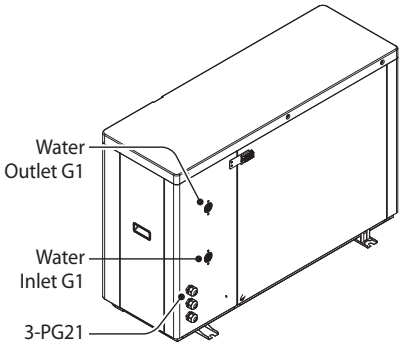
To ensure a proper water circuit connection for the outdoor unit, a shut-off valve must be connected to the outdoor unit. To install a shut-off valve properly, follow these guidelines.

1. Disconnect the main power supply from the heat pump.
2. Connect the shut-off valve (with integrated filter) to the outdoor unit's water inlet using thread sealant.

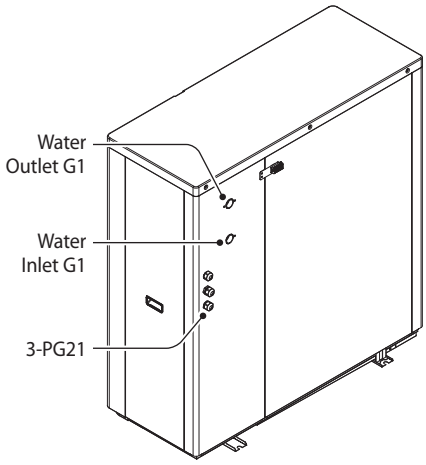
Note Use a reliable thread sealant that can withstand system pressures and temperatures.



PEM750V004PGKC
PEM750V006PGKC
PEM750V008PGKC



PEM750V010PGKC



PEM750V017PGKC

3. To prevent vibration and noise caused by the operation of the outdoor unit, a flexible hose should be connected.
4. Attach the field piping to the shut-off valve.

Note After installing the shut-off valve, follow the instructions below.

- Clean the water pipes and connections thoroughly.
- Remove burrs while holding the pipe with the end facing downwards.
- Cover the pipe end when inserting it through a wall to prevent dust and dirt from entering.
- Insulate non-brass metallic piping to prevent galvanic corrosion.
- A magnetic filter must be installed in the pipe line to remove iron dust or foreign substances inside the pipe.
- An inline Y strainer must be fitted to the primary return.