

LG

TOTAL HVAC SOLUTION PROVIDER

ENGINEERING PRODUCT DATA BOOK

Therma V

Monobloc, R290

MFL66101130



Therma V General Information

Model Line Up

1. Model Line Up

Product	Chassis	Capacity Index	Model Name
		kW	
Hydro Unit	K1	-	FHNW16606C0 [HN1616HC NK0]
			FHNW16809C0 [HN1639HC NK0]

Product	Phase	Chassis	Capacity Index	Model Name
			kW	
Monobloc	1	UN60B	12.0	FHBW126B0 [HM121HF UB60]
			14.0	FHBW146B0 [HM141HF UB60]
			16.0	FHBW166B0 [HM161HF UB60]
	3		9.0	FHBW098X0 [HM093HF UB60]
			12.0	FHBW128B0 [HM123HF UB60]
			14.0	FHBW148B0 [HM143HF UB60]
			16.0	FHBW168B0 [HM163HF UB60]

* The capacity index may differ from actual capacity values.

Product Data

Hydro Unit
Monobloc

Hydro Unit

- 1. Specifications**
- 2. List of Functions**
- 3. Accessory Compatibility List**
- 4. Dimensions**
- 5. Piping Diagrams**
- 6. Wiring Diagrams**

1. Specifications

1.1 Product

FHNW16606C0 [HN1616HC NK0]

Category		Unit	Specification
Major	Minor		
Classification	Chassis	-	K1
Operation range(Leaving Water)	Cooling(min. ~ max.)	°C(DB)	5~27
	Heating(min. ~ max.)	°C(DB)	15~75
	Domestic hot water(min. ~ max.)	°C(DB)	15 ~ 80*
Power supply	Case 1	V, Φ, Hz	220-230-240, 1, 50
Current	Current(max.)	A	0.6
Recommended circuit breaker(ELCB)	-	A	10
Connecting cable	Power supply cable(H07RN-F)	mm ² × cores	0.75 x 3C
	Communication cable(H07RN-F)	mm ² × cores	0.75 x 2C
Electric backup heater	Type	-	Sheath
	Power supply	V, Φ, Hz	220-230-240, 1, 50
	Number of heating coil	EA	2
	Capacity combination	kW	3.0 + 3.0
	Heating steps	Step	2
	Rated running current	A	26
	Power cable (H07RN-F) (included earth)	mm ² × cores	4.0 x 3C
	Recommended circuit breaker(ELCB)	A	32
Expansion tank	Volume(max.)	ℓ	8
	Water pressure(max.)	bar	3
	Water pressure(pre-charged)	bar	1
Sound power level	Heating(rated)	dB(A)	39
Water connecting pipes	Inlet	inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
	Outlet	inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
Dimensions	Net(W x H x D)	mm	490 x 850 x 315
	Shipping(W x H x D)	mm	563 x 1082 x 375
Weight	Net	kg	30
	Shipping	kg	35
Exterior	Color	-	Noble White
	RAL code	-	RAL 9016

Note

- 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. And "Electric characteristics" should be considered 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 depend on the ambient conditions and values are normally higher in actual operation.
- * DHW 65~80°C operating is available only when the booster heater is operating.

1. Specifications

FHNW16809C0 [HN1639HC NK0]

Category		Unit	Specification
Major	Minor		
Classification	Chassis	-	K1
Operation range(Leaving Water)	Cooling(min. ~ max.)	°C(DB)	5~27
	Heating(min. ~ max.)	°C(DB)	15~75
	Domestic hot water(min. ~ max.)	°C(DB)	15 ~ 80*
Power supply	Case 1	V, Φ, Hz	220-230-240, 1, 50
Current	Current(max.)	A	0.6
Recommended circuit breaker(ELCB)	-	A	10
Connecting cable	Power supply cable(H07RN-F)	mm ² × cores	0.75 x 3C
	Communication cable(H07RN-F)	mm ² × cores	0.75 x 2C
Electric backup heater	Type	-	Sheath
	Power supply	V, Φ, Hz	380-400-415, 3, 50
	Number of heating coil	EA	3
	Capacity combination	kW	3.0 + 3.0 + 3.0
	Heating steps	Step	2
	Rated running current	A	13
	Power cable (H07RN-F) (included earth)	mm ² × cores	2.5 x 4C
	Recommended circuit breaker(ELCB)	A	16
Expansion tank	Volume(max.)	ℓ	8
	Water pressure(max.)	bar	3
	Water pressure(pre-charged)	bar	1
Sound power level	Heating(rated)	dB(A)	39
Water connecting pipes	Inlet	inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
	Outlet	inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
Dimensions	Net(W x H x D)	mm	490 x 850 x 315
	Shipping(W x H x D)	mm	563 x 1082 x 375
Weight	Net	kg	31
	Shipping	kg	36
Exterior	Color	-	Noble White
	RAL code	-	RAL 9016

Note

- 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. And "Electric characteristics" should be considered 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 depend on the ambient conditions and values are normally higher in actual operation.
- * DHW 65~80°C operating is available only when the booster heater is operating.

2. List of Functions

FHNW16606C0 [HN1616HC NK0], FHNW16809C0 [HN1639HC NK0]

Category	Functions	Availability
Reliability	Self Diagnosis	O
Convenience	Auto Restart	O
	Child Lock	O
	Group Control	X
	Sleep Timer	O
	Turn On/Off Reservation	O
	Schedule	O
	Low Noise Operation	O
Installation	Electric Backup Heater	O
	Domestic Hot Water Tank heater	Accessory(3rd party)
Water Product functions	Anti-Condensation On Floor (cooling)	O
	Water Pump ON / OFF Control	X
	Water Flow Detection	O(by Flow Sensor)
	Water Flow Control	O
	Water Pressure Monitoring	O
	Thermostat Interface (230V AC)	O
	Thermostat Interface (24V AC)	X
	Digital Output For External Pump	O
	Digital inputs for energy saving (SG Ready)	O
	Communication with LG ESS by Modbus	O
	DHW(Domestic Hot Water) Tank Kit	O
	Solar thermal function	Accessory(3rd party)
	PHEX Anti-Freezing Control	O
	Water Pump Forced Operation	O
	Anti-overheating Of Water Pipe	O
	Emergency Operation	O
	Weather dependent operation with thermostat	O
	Seasonal auto mode (heating and cooling)	O
	Scheduler (DHW Tank Heater)	O
	Timer (DHW Tank Heater)	O
	Quick DHW Tank Heating	O
	Screed Drying Mode	O
	One Point Dry Contact Input (CN-EXT)	O
	Energy Monitoring	O
	DHW Recirculation	O
Special Functions	Wi-Fi Control	Accessory
	Network Solution (LGAP)	O
	Modbus connectivity (without gateway)	O
	Remote room temperature sensing	Accessory
	Outdoor Temperature sensing	Accessory
	2nd Circuit / Mixer Control	Accessory(3rd party)
	2-Remo control	Accessory

Note

■ 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.

■ Solar thermal system requires the 3rd party accessory, PT-1000 sensor. (field supply)

3. Accessory Compatibility List

FHNW16606C0 [HN1616HC NK0], FHNW16809C0 [HN1639HC NK0]

Category	Accessory Name	Model Name	Description	Compatibility
Remote Controller	Wired - RS3 (Standard III)	PREMTW101	White	O
Dry Contact	Simple	PDRYCB000	1 input port, AC 220 - 240V	O
	Communication	PDRYCB320	8 input port, For 3rd Party Thermostat (Analog Input)	O
Integration Device	Remote Temperature sensor	PQRSTA0	Room temperature sensor, NTC 10kΩ, include casing	O
	Group Control wire	PZCWRCG3	Cable Assembly for group control (Y-type cable : 0.25m, cable : 9.6m)	X
ETC	Extension wire	PZCWRC1	Extension wire for IDU-wired remote controller (9.6m)	O
	2-Remo Control wire	PZCWRC2	Y-type cable to connect additional Remote Controller as slave	O
	Wi-Fi Modem	PWFMD200	Device to use ThinQ app include connection cable	O
	Wi-Fi Extension cable	PWYREW000	USB Extension cable : 10 m	O
	Meter Interface	PENKTH000	Interface to connect 3rd-party heat and/or watt meter to indoor unit by S0 or Modbus	O
Special Kit	Solar-Thermal Interface kit with DHW Tank	PHLLA*	Limit Temperature : 96 °C	O
	Indoor Drain Pan	PHDPB	For Hydro Unit	X
		PHDPC	For Hydro Unit	O
	DHW tanks (Single coil)	OSHW-200F	200 L	O
		OSHW-300F	300 L	O
		OSHW-500F	500 L	O
	DHW tanks (Double coil)	OSHW-300FD	300 L	O
	DHW tank kit	PHLTA	For Hydro Unit (except for HN1639 NK3)	O
		PHLTC	For Hydro Unit (HN1639 NK3)	X
	DHW sensor	PHRSTA0	Included in DHW Tank kit	O
	Thermostatic Mixing valve	OSHA-MV	3/4" DN20	O
		OSHA-MV1	1" DN25	O
	3way valve	OSHA-3V	Diverging valve between space heating and DHW heating	O
	2nd Circuit Thermistor	PRSTAT5K10	NTC 5kΩ sensor needed to control mixing circuit or if 3rd-party backup heater is used.	O
	Backup Heater	HA061B E1	1Ø, 6kW (For Hydrosplit, HN1600MB NK0)	X
		HA061C E1	1Ø, 6kW (For Hydrosplit, HN1600MC NK1)	X
		HA063B E1	3Ø, 6kW (For Hydrosplit, HN1600MB NK0)	X
		HA063C E1	3Ø, 6kW (For Hydrosplit, HN1600MC NK1)	X
	Cover plate	PDC-HK10	For IWT and Hydro Unit Type indoor units	O

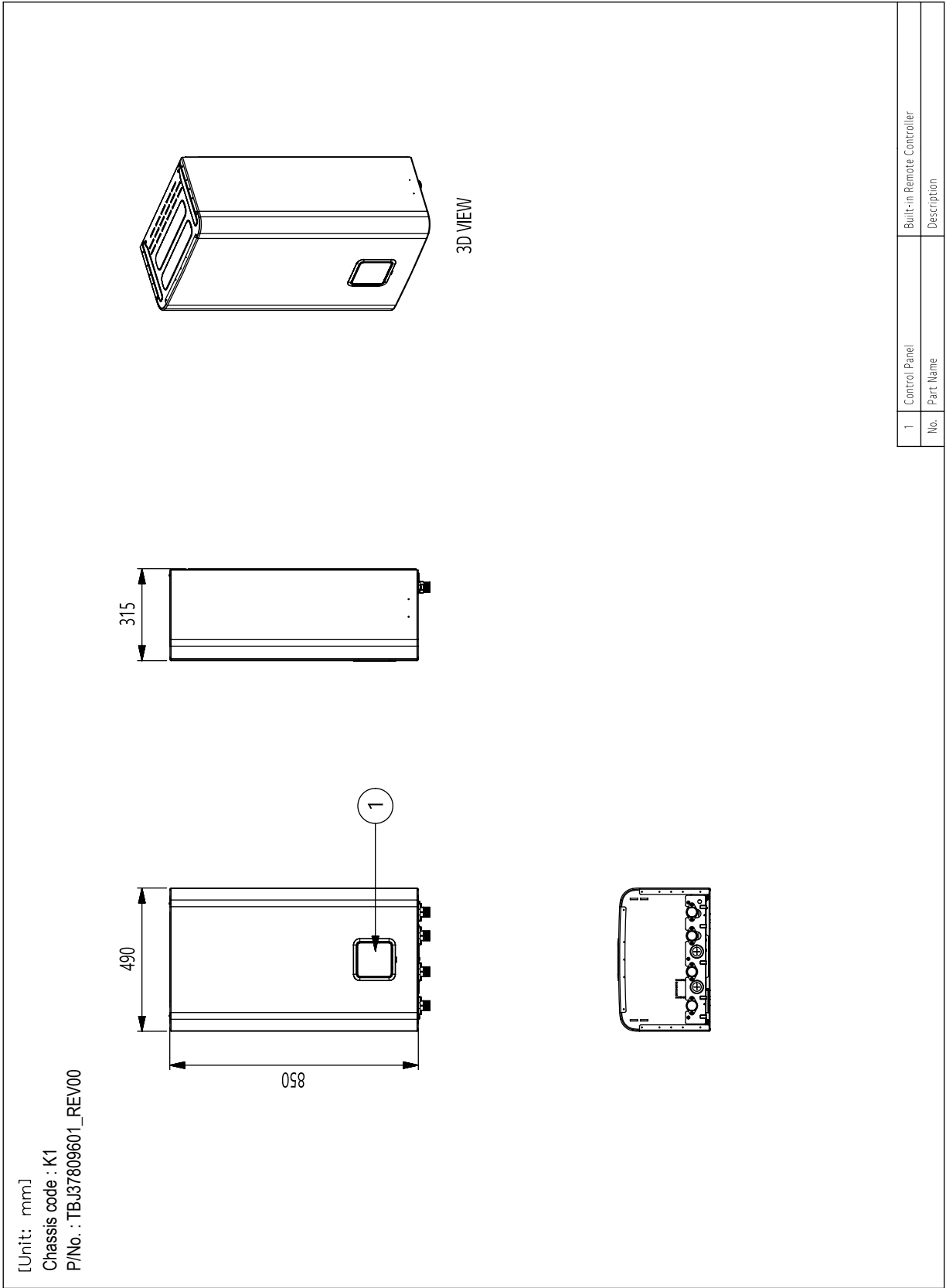
Note

- O: Possible, X: Impossible, -: Unconfirmed or irrelevant, Embedded : Included with product.
- Some advanced functions controlled by individual controller cannot be operated.
- If there is a difference in development time between the product and the remote controller, some functions cannot be operated.
- Meter Interface cannot be connected at the same time with 3rd-party controller.
- * : It includes double-sensor for solar tank. The collector sensor (PT1000) needs to be supplied locally.
- If you need more detail, please refer to the Control(BECON) PDB or the manual of product.
(<http://partner.lge.com> > Select Your Region : Home> Doc.Library> Product > Control(BECON)).

4. Dimensions

4.1 Dimensional Drawing (External)

FHNW16606C0 [HN1616HC NK0], FHNW16809C0 [HN1639HC NK0]



4. Dimensions

FHNW16606C0 [HN1616HC NK0], FHNW16809C0 [HN1639HC NK0]



9	Thermal switch	Cut-off power input to backup heater at 90 °C (manual return at 55 °C)
8	Backup heater	
7	Air Vent	
6	Expansion Tank	
5	Control Box	Capacity : 10 KW, 30-90W
4	Entering Water Pipe(ODU)	Air purging when charging water
3	Leaving Water Pipe(ODU)	Absorbing Volume change of heated water
2	Entering Water Pipe(Heat load)	PCB and terminal blocks
1	Leaving Water Pipe(Heat load)	Male PT 1 inch
	Part Name	Male PT 1 inch
	Description	Male PT 1 inch

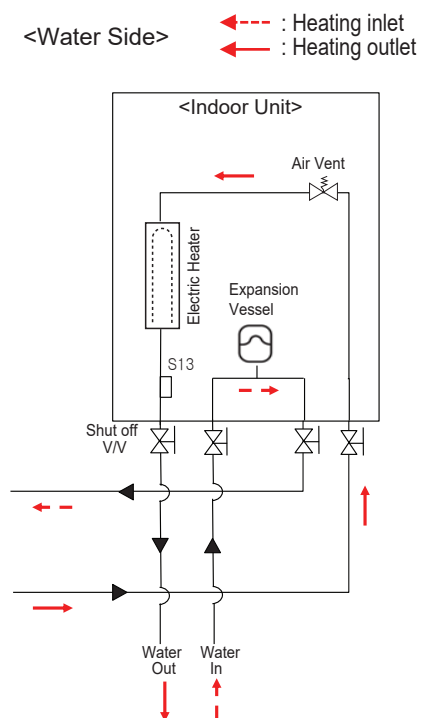
[Unit: mm]

Chassis code : K1

P/No.: TBJ37809602_REV00

5. Piping Diagrams

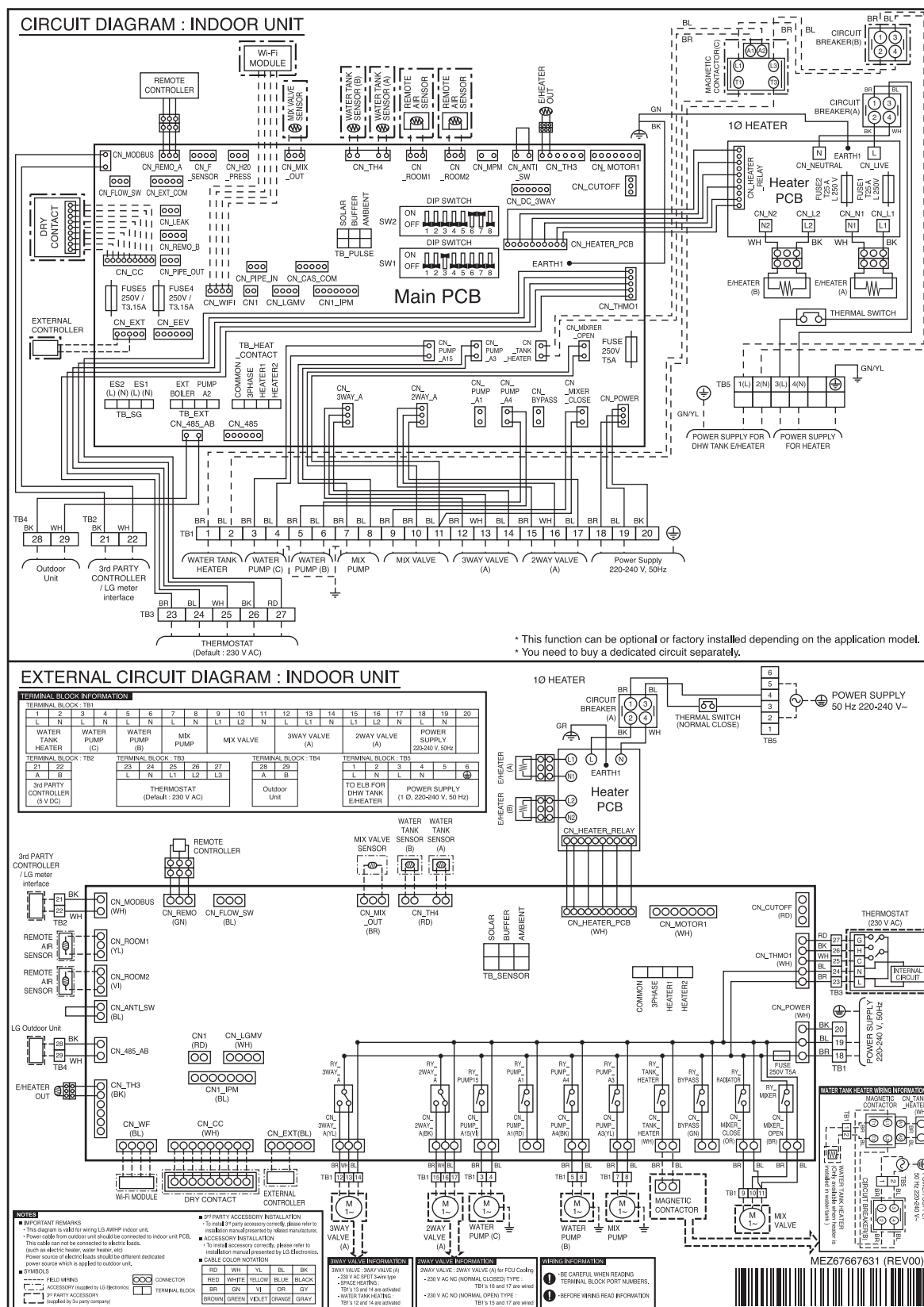
FHNW16606C0 [HN1616HC NK0], FHNW16809C0 [HN1639HC NK0]



* S13 : Electric backup heater outlet temp. sensor

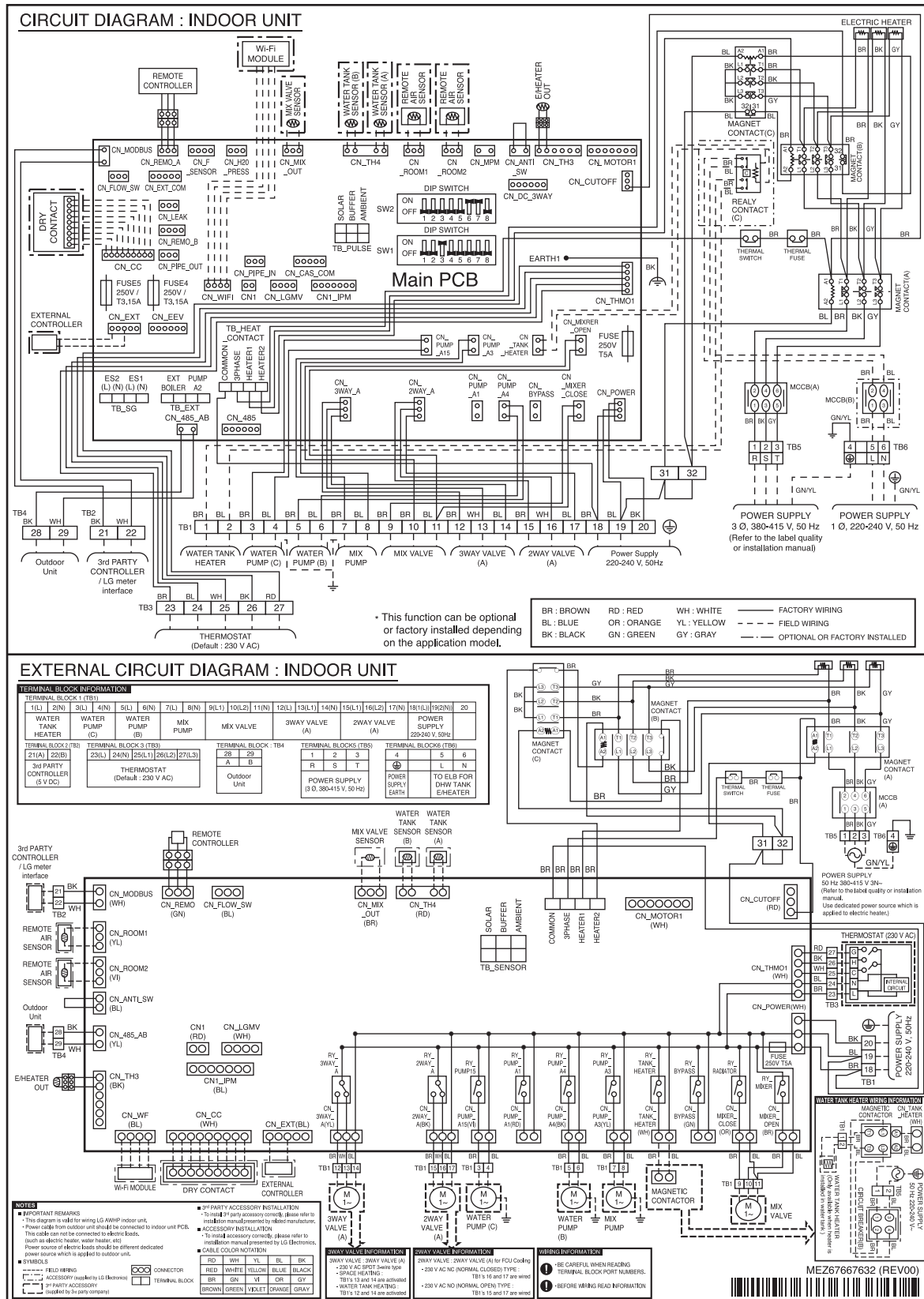
6.1 Product

FHNW16606C0 [HN1616HC NK0]



6. Wiring Diagrams

FHNW16809C0 [HN1639HC NK0]



Monobloc

- 1. Specifications**
- 2. List of Functions**
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- 7. Performance Data**
- 8. Operation Range**
- 9. Sound levels**
- 10. Hydraulic Performance**

1. Specifications

■ Combination with Hydro Unit type (1Φ)

Performance specifications					FHBW126B0 [HM121HF UB60]	FHBW146B0 [HM141HF UB60]
-	-	Outdoor temp. (°CDB)	Leaving water temp. (°C)	-		
Capacity	Heating	7	35	kW	12.0	14.0
			55	kW	10.0	11.0
		2	35	kW	12.0	14.0
			55	kW	11.8	13.0
	Cooling	-7	35	kW	9.3	10.3
			55	kW	11.5	12.0
35		18	kW	10.5	12.0	
		7	kW			
Power input	Heating	7	35	kW	2.55	3.11
			55	kW	3.23	3.38
		2	35	kW	3.23	3.88
			55	kW	3.61	4.05
		Cooling	-7	35	kW	4.01
	55			kW		
	35		18	kW	3.04	3.24
		7	kW	3.37	4.01	
COP	Heating	7	35	W/W	4.70	4.50
			55	W/W	3.10	3.25
		2	35	W/W	3.72	3.61
			55	W/W	3.27	3.21
		-7	35	W/W	2.32	2.28
			55	W/W	2.32	2.28
EER	Cooling	35 / 24	18	W/W	3.78	3.70
			7	W/W	3.12	2.99
Seasonal space heating eff. class			35	-	A+++	A+++
			55	-	A+++	A+++
Seasonal space heating efficiency (η _s)			35	-	215	212
			55	-	156	155
SCOP(average climate)			35	W/W	5.45	5.38
			55	W/W	3.97	3.96
Water flow rate		Rated(at ΔT 5°C)		ℓ /min	34.5	40.3
Operation range (outdoor temperature)		Cooling	Min.~Max.	°C(DB)	5~48	5~48
		Heating	Min.~Max.	°C(DB)	-28 ~ 35	-28 ~ 35

Electrical specifications			FHBW126B0 [HM121HF UB60]	FHBW146B0 [HM141HF UB60]
Power supply	Case 1	V, Ø, Hz	220-240, 1, 50	220-240, 1, 50
	Limit range of voltage	V	187 ~ 276	187 ~ 276
Running current	Heating(Rated)	A	11.10	13.53
	Cooling(Rated)	A	12.66	13.38
Peak control running current	Heating	A	20	20
	Cooling	A	20	20
Recommended circuit breaker(ELCB)		A	25	25
Standby power consumption		W	10	10
Connecting cable	Power supply cable (included Earth, H07RN-F)	mm ² x cores	2.5 x 3C	2.5 x 3C
	Communication cable (H07RN-F)	mm ² x cores	0.75 x 2C	0.75 x 2C

Technical specifications			FHBW126B0 [HM121HF UB60]	FHBW146B0 [HM141HF UB60]
Refrigerant	Type	-	R290	R290
	Precharged amount	kg	1.2	1.2
	GWP	-	3	3
	t-CO ₂ eq.	-	0.0036	0.0036
	Control type	-	Electronic expansion valve	Electronic expansion valve
Compressor	Type	-	Hermetic motor compressor	Hermetic motor compressor
	Model x No.	-	PJQC062MAA x 1	PJQC062MAA x 1
	Piston displacement	cm ³ /rev	61.5	61.5
	Motor type	-	BLDC	BLDC
Refrigerant oil	Type	-	PZ68S	PZ68S
	Charged volume	cc x No.	1200	1200
Fan	Type	-	Propeller	Propeller
	Air flow rate (rated)	m ³ /min	110 x 1	110 x 1
Fan motor	Type	-	BLDC	BLDC
	Output	W x No.	250 x 1	250 x 1
Heat exchanger	Rows x columns x FPI	-	46 x 3 x 18	46 x 3 x 18
	No.	EA	1	1
	Fin type	-	Corrugate	Corrugate

1. Specifications

Technical specifications				FHBW126B0 [HM121HF UB60]	FHBW146B0 [HM141HF UB60]
Water pump***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	GRUNDFOS, UPML GEO 20-105 CHBL	GRUNDFOS, UPML GEO 20-105 CHBL
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17~152	17~152
		Rated	W	145	145
	Max. head		m	11	11
Water pump 2***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	OH SUNG, ODM-061P	OH SUNG, ODM-061P
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17 ~ 152	17 ~ 152
		Rated	W	145	145
	Max. head		m	11	11
Heat exchanger (refrigerant to water)	Type		-	Brazed plate HEX	Brazed plate HEX
	No.		-	1	1
	Number of plate		EA	76	76
	Water volume		ℓ	1	1
Water strainer	Supply type		-	Loose supply (externally installed)	Loose supply (externally installed)
	Mesh size		mesh	30	30
	Max. particle size		mm	0.6	0.6
	Material		-	Stainless steel	Stainless steel
Safety valve (water cycle)	Pressure limit	Upper limit	bar	3.0	3.0
Flow sensor	Type		-	Vortex	Vortex
	Model(maker,name)		-	SIKA VVXC9SNBUC00252P	SIKA VVXC9SNBUC00252P
	Measuring range	Min. ~ Max.	ℓ /min	5 ~ 80	5 ~ 80
	Trigger point		ℓ /min	10	10
Water pressure sensor	Model (maker, name)		-	Sensata OFM(2HMP)	Sensata OFM(2HMP)
	Measuring range	Min. ~ Max.	bar	0 ~ 20	0 ~ 20
Sound pressure level	Heating(rated, @5m)		dB(A)	27	29
Sound power level	Heating	Low noise	dB(A)	48	50
		Rated	dB(A)	49	51
		Daytime max.	dB(A)	59	60
Water connecting pipes	Inlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	Male PT 1" according to ISO 7-1 (tapered pipe threads)
	Outlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	Male PT 1" according to ISO 7-1 (tapered pipe threads)
Dimensions	Net(W x H x D)		mm	1,560 x 1,019 x 520	1,560 x 1,019 x 520
	Shipping(W x H x D)		mm	1,620 x 1,180 x 625	1,620 x 1,180 x 625
Weight	Net		kg	181.0	181.0
	Shipping		kg	199.0	199.0
Exterior	Color of front grille		-	Dark dawn gray	Dark dawn gray
	RAL Code of front grille		-	RAL 7012	RAL 7012

Note

- 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. And "Electric characteristics" chapter should be considered for electrical work and design. Especially the power cable and circuit breaker should be selected in accordance with that.
- Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.
- Performances are accordance with EN14511 and reflect ErP testing conditions. The values indicated above are the declared values at rated conditions acc. ErP regulation. For max. capacities, please refer to Performance Data.
- This product contains Fluorinated greenhouse gases.
- SCOP is in accordance with EN14825.
- Rated running currents are based on the declared values under the following conditions.
 - Cooling : Outdoor Temp. 7°CDB / 6°CWB, Leaving Water Temp. 35°C
 - Heating : Outdoor Temp. 35°C(DB) / 24°C(WB), Leaving Water Temp. 18°C
- All installation sites must be equipped with an earth leakage circuit breaker (ELCB).
 - * DHW 65~80°C Operating is available only when the booster heater is operating.
 - ** This is the power input i 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.
 - *** In the case of integrated water pump, either water pump or water pump 2 will be applied.

1. Specifications

Performance specifications					FHBW166B0 [HM161HF UB60]
-	-	Outdoor temp. (°CDB)	Leaving water temp. (°C)	-	
Capacity	Heating	7	35	kW	16.0
			55	kW	12.0
		2	35	kW	14.5
			55	kW	13.8
	-7	35	kW	10.9	
		55	kW	12.5	
Cooling	35	18	kW	12.5	
		7	kW	12.5	
Power input	Heating	7	35	kW	3.72
			55	kW	3.63
		2	35	kW	4.15
			55	kW	4.35
	-7	35	kW	4.82	
		55	kW	4.82	
Cooling	35	18	kW	3.38	
		7	kW	4.24	
COP	Heating	7	35	W/W	4.30
			55	W/W	3.30
		2	35	W/W	3.49
			55	W/W	3.17
	-7	35	W/W	3.17	
		55	W/W	2.26	
EER	Cooling	35 / 24	18	W/W	3.70
			7	W/W	2.95
Seasonal space heating eff. class			35	-	A+++
			55	-	A+++
Seasonal space heating efficiency (ηs)			35	-	201
			55	-	154
SCOP(average climate)			35	W/W	5.11
			55	W/W	3.92
Water flow rate		Rated(at ΔT 5°C)		ℓ /min	46.0
Operation range		Cooling	Min.~Max.	°C(DB)	5~48
(outdoor temperature)		Heating	Min.~Max.	°C(DB)	-28 ~ 35

Electrical specifications			FHBW166B0 [HM161HF UB60]
Power supply	Case 1	V, Ø, Hz	220-240, 1, 50
	Limit range of voltage	V	187 ~ 276
Running current	Heating(Rated)	A	16.18
	Cooling(Rated)	A	14.30
Peak control running current	Heating	A	20
	Cooling	A	20
Recommended circuit breaker(ELCB)		A	25
Standby power consumption		W	10
Connecting cable	Power supply cable (included Earth, H07RN-F)	mm ² x cores	2.5 x 3C
	Communication cable (H07RN-F)	mm ² x cores	0.75 x 2C

Technical specifications			FHBW166B0 [HM161HF UB60]
Refrigerant	Type	-	R290
	Precharged amount	kg	1.2
	GWP	-	3
	t-CO ₂ eq.	-	0.0036
Compressor	Control type	-	Electronic expansion valve
	Type	-	Hermetic motor compressor
	Model x No.	-	PJQC062MAA x 1
	Piston displacement	cm ³ /rev	61.5
Refrigerant oil	Motor type	-	BLDC
	Type	-	PZ68S
Fan	Charged volume	cc x No.	1200
	Type	-	Propeller
Fan motor	Air flow rate (rated)	m ³ /min	110 x 1
	Type	-	BLDC
Heat exchanger	Output	W x No.	250 x 1
	Rows x columns x FPI	-	46 x 3 x 18
	No.	EA	1
Fin type		-	Corrugate

1. Specifications

Technical specifications				FHBW166B0 [HM161HF UB60]
Water pump***	Type		-	Canned type for hot water circulation
	Model (maker, name)		-	GRUNDFOS, UPML GEO 20-105 CHBL
	Motor type		-	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17~152
		Rated	W	145
Max. head		m	11	
Water pump 2***	Type		-	Canned type for hot water circulation
	Model (maker, name)		-	OH SUNG, ODM-061P
	Motor type		-	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17 ~ 152
		Rated	W	145
Max. head		m	11	
Heat exchanger (refrigerant to water)	Type		-	Brazed plate HEX
	No.		-	1
	Number of plate		EA	76
	Water volume		ℓ	1
Water strainer	Supply type		-	Loose supply (externally installed)
	Mesh size		mesh	30
	Max. particle size		mm	0.6
	Material		-	Stainless steel
Safety valve (water cycle)	Pressure limit	Upper limit	bar	3.0
Flow sensor	Type		-	Vortex
	Model(maker,name)		-	SIKA VVXC9SNBUC00252P
	Measuring range	Min. ~ Max.	ℓ /min	5 ~ 80
	Trigger point		ℓ /min	10
Water pressure sensor	Model (maker, name)		-	Sensata OFM(2HMP)
	Measuring range	Min. ~ Max.	bar	0 ~ 20
Sound pressure level	Heating(rated, @5m)		dB(A)	30
Sound power level	Heating	Low noise	dB(A)	51
		Rated	dB(A)	52
		Daytime max.	dB(A)	61
Water connecting pipes	Inlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
	Outlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)
Dimensions	Net(W x H x D)		mm	1,560 x 1,019 x 520
	Shipping(W x H x D)		mm	1,620 x 1,180 x 625
Weight	Net		kg	181.0
	Shipping		kg	199.0
Exterior	Color of front grille		-	Dark dawn gray
	RAL Code of front grille		-	RAL 7012

Note

- 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. And "Electric characteristics" chapter should be considered for electrical work and design. Especially the power cable and circuit breaker should be selected in accordance with that.
- Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.
- Performances are accordance with EN14511 and reflect ErP testing conditions. The values indicated above are the declared values at rated conditions acc. ErP regulation. For max. capacities, please refer to Performance Data.
- This product contains Fluorinated greenhouse gases.
- SCOP is in accordance with EN14825.
- Rated running currents are based on the declared values under the following conditions.
 - Cooling : Outdoor Temp. 7°CDB / 6°CWB, Leaving Water Temp. 35°C
 - Heating : Outdoor Temp. 35°C(DB) / 24°C(WB), Leaving Water Temp. 18°C
- All installation sites must be equipped with an earth leakage circuit breaker (ELCB).
 - * DHW 65~80°C Operating is available only when the booster heater is operating.
 - ** This is the power input i 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.
 - *** In the case of integrated water pump, either water pump or water pump 2 will be applied.

1. Specifications

■ Combination with Hydro Unit type (3Φ)

Performance specifications					FHBW098X0 HM093HFX UB60	FHBW128B0 [HM123HF UB60]
-	-	Outdoor temp. (°CDB)	Leaving water temp. (°C)	-		
Capacity	Heating	7	35	kW	9.0	12.0
			55	kW	9.0	10.0
		2	35	kW	9.0	12.0
			-7	35	kW	8.9
	Cooling	35	55	kW	7.0	9.3
			18	kW	9.0	11.5
Power input	Heating	7	7	kW	9.0	10.5
			35	kW	1.84	2.55
		2	55	kW	2.81	3.23
			-7	35	kW	2.32
	Cooling	35	55	kW	2.59	3.61
			18	kW	2.88	4.01
COP	Heating	7	7	kW	2.31	3.04
			35	kW	2.78	3.37
		2	55	W/W	4.90	4.70
			-7	35	W/W	3.20
	Cooling	35	55	W/W	3.88	3.72
			18	W/W	3.44	3.27
EER	Cooling	35 / 24	55	W/W	2.43	2.32
			18	W/W	2.90	3.78
Seasonal space heating eff. class			7	W/W	3.24	3.12
			35	-	A+++	A+++
Seasonal space heating efficiency (η _s)			55	-	A++	A+++
			35	-	206	215
SCOP(average climate)			55	-	147	156
			35	W/W	5.23	5.45
Water flow rate			55	W/W	3.75	3.97
			55	W/W	3.75	3.97
Operation range		Rated(at ΔT 5°C)		ℓ /min	25.9	34.5
(outdoor temperature)		Cooling	Min.~Max.	°C(DB)	5~48	5~48
		Heating	Min.~Max.	°C(DB)	-28 ~ 35	-28 ~ 35

Electrical specifications			FHBW098X0 HM093HFX UB60	FHBW128B0 [HM123HF UB60]
Power supply	Case 1	V, Ø, Hz	380-415, 3, 50	380-415, 3, 50
	Limit range of voltage	V	342~457	342~457
Running current	Heating(Rated)	A	2.65	3.69
	Cooling(Rated)	A	3.21	4.20
Peak control running current	Heating	A	8	8
	Cooling	A	8	8
Recommended circuit breaker(ELCB)		A	16	16
Standby power consumption		W	10	10
Connecting cable	Power supply cable (included Earth, H07RN-F)	mm ² x cores	2.5 x 5C	2.5 x 5C
	Communication cable (H07RN-F)	mm ² x cores	0.75 x 2C	0.75 x 2C

Technical specifications			FHBW098X0 HM093HFX UB60	FHBW128B0 [HM123HF UB60]
Refrigerant	Type	-	R290	R290
	Precharged amount	kg	1.2	1.2
	GWP	-	3	3
	t-CO ₂ eq.	-	0.0036	0.0036
	Control type	-	Electronic expansion valve	Electronic expansion valve
Compressor	Type	-	Hermetic motor compressor	Hermetic motor compressor
	Model x No.	-	PJQC062MAA x 1	PJQC062MAA x 1
	Piston displacement	cm ³ /rev	61.5	61.5
	Motor type	-	BLDC	BLDC
Refrigerant oil	Type	-	PZ68S	PZ68S
	Charged volume	cc x No.	1200	1200
Fan	Type	-	Propeller	Propeller
	Air flow rate (rated)	m ³ /min	110 x 1	110 x 1
Fan motor	Type	-	BLDC	BLDC
	Output	W x No.	250 x 1	250 x 1
Heat exchanger	Rows x columns x FPI	-	46 x 3 x 18	46 x 3 x 18
	No.	EA	1	1
	Fin type	-	Corrugate	Corrugate

1. Specifications

Technical specifications				FHBW098X0 HM093HFX UB60	FHBW128B0 [HM123HF UB60]
Water pump***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	GRUNDFOS, UPML GEO 20-105 CHBL	GRUNDFOS, UPML GEO 20-105 CHBL
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17~152	17~152
		Rated	W	145	145
Max. head			m	11	11
Water pump 2***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	OH SUNG, ODM-061P	OH SUNG, ODM-061P
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17 ~ 152	17 ~ 152
		Rated	W	145	145
Max. head			m	11	11
Heat exchanger (refrigerant to water)	Type		-	Brazed plate HEX	Brazed plate HEX
	No.		-	1	1
	Number of plate		EA	76	76
	Water volume		ℓ	1	1
Water strainer	Supply type		-	Loose supply (externally installed)	Loose supply (externally installed)
	Mesh size		mesh	30	30
	Max. particle size		mm	0.6	0.6
	Material		-	Stainless steel	Stainless steel
Safety valve (water cycle)	Pressure limit	Upper limit	bar	3.0	3.0
Flow sensor	Type		-	Vortex	Vortex
	Model(maker,name)		-	SIKA VVXC9SNBUC00252P	SIKA VVXC9SNBUC00252P
	Measuring range	Min. ~ Max.	ℓ /min	5 ~ 80	5 ~ 80
	Trigger point		ℓ /min	10	10
Water pressure sensor	Model (maker, name)		-	Sensata OFM(2HMP)	Sensata OFM(2HMP)
	Measuring range	Min. ~ Max.	bar	0 ~ 20	0 ~ 20
Sound pressure level	Heating(rated, @5m)		dB(A)	27	27
Sound power level	Heating	Low noise	dB(A)	48	48
		Rated	dB(A)	49	49
		Daytime max.	dB(A)	59	59
Water connecting pipes	Inlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	
	Outlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	
Dimensions	Net(W x H x D)		mm	1,560 x 1,019 x 520	1,560 x 1,019 x 520
	Shipping(W x H x D)		mm	1,620 x 1,180 x 625	1,620 x 1,180 x 625
Weight	Net		kg	181.0	181.0
	Shipping		kg	199.0	199.0
Exterior	Color of front grille		-	Dark dawn gray	Dark dawn gray
	RAL Code of front grille		-	RAL 7012	RAL 7012

Note

- 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. And "Electric characteristics" chapter should be considered for electrical work and design. Especially the power cable and circuit breaker should be selected in accordance with that.
- Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.
- Performances are accordance with EN14511 and reflect ErP testing conditions. The values indicated above are the declared values at rated conditions acc. ErP regulation. For max. capacities, please refer to Performance Data.
- This product contains Fluorinated greenhouse gases.
- SCOP is in accordance with EN14825.
- Rated running currents are based on the declared values under the following conditions.
 - Cooling : Outdoor Temp. 7°CDB / 6°CWB, Leaving Water Temp. 35°C
 - Heating : Outdoor Temp. 35°C(DB) / 24°C(WB), Leaving Water Temp. 18°C
- All installation sites must be equipped with an earth leakage circuit breaker (ELCB).
 - * DHW 65~80°C Operating is available only when the booster heater is operating.
 - ** This is the power input i 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.
 - *** In the case of integrated water pump, either water pump or water pump 2 will be applied.

1. Specifications

Performance specifications					FHBW148B0 [HM143HF UB60]	FHBW168B0 [HM163HF UB60]
-	-	Outdoor temp. (°CDB)	Leaving water temp. (°C)	-		
Capacity	Heating	7	35	kW	14.0	16.0
			55	kW	11.0	12.0
		2	35	kW	14.0	14.5
			55	kW	13.0	13.8
	-7	55	kW	10.3	10.9	
		18	kW	12.0	12.5	
Power input	Heating	35	7	kW	12.0	12.5
			35	kW	3.11	3.72
		2	55	kW	3.38	3.63
			35	kW	3.88	4.15
	-7	35	kW	4.05	4.35	
		55	kW	4.52	4.82	
COP	Heating	35	18	kW	3.24	3.38
			7	kW	4.01	4.24
		2	35	W/W	4.50	4.30
			55	W/W	3.25	3.30
	-7	35	W/W	3.61	3.49	
		55	W/W	3.21	3.17	
EER	Cooling	35 / 24	55	W/W	2.28	2.26
			18	W/W	3.70	3.70
Seasonal space heating eff. class			7	W/W	2.99	2.95
			35	-	A+++	A+++
Seasonal space heating efficiency (η _s)			55	-	A+++	A+++
			35	-	212	201
SCOP(average climate)			55	-	155	154
			35	W/W	5.38	5.11
Water flow rate			55	W/W	3.96	3.92
Operation range		Rated(at ΔT 5°C)		ℓ /min	40.3	46.0
(outdoor temperature)		Cooling	Min.~Max.	°C(DB)	5~48	5~48
		Heating	Min.~Max.	°C(DB)	-28 ~ 35	-28 ~ 35

Electrical specifications			FHBW148B0 [HM143HF UB60]	FHBW168B0 [HM163HF UB60]
Power supply	Case 1	V, Ø, Hz		
Limit range of voltage		V	380-415, 3, 50	380-415, 3, 50
Running current	Heating(Rated)	A	342~457	342~457
Peak control running current	Cooling(Rated)	A	4.49	5.37
Recommended circuit breaker(ELCB)	Heating	A	4.44	4.75
Standby power consumption	Cooling	A	9	10
Connecting cable	Power supply cable (included Earth, H07RN-F)	mm ² x cores	9	10
	Communication cable (H07RN-F)	mm ² x cores	16	16
			10	10
			2.5 x 5C	2.5 x 5C
			0.75 x 2C	0.75 x 2C

Technical specifications			FHBW148B0 [HM143HF UB60]	FHBW168B0 [HM163HF UB60]
Refrigerant	Type	-		
Precharged amount		kg	R290	R290
GWP		-	1.2	1.2
t-CO ₂ eq.		-	3	3
Control type		-	0.0036	0.0036
Compressor	Type	-	Electronic expansion valve	Electronic expansion valve
Model x No.		-	Hermetic motor compressor	Hermetic motor compressor
Piston displacement		-	PJQC062MAA x 1	PJQC062MAA x 1
Motor type		-	61.5	61.5
Refrigerant oil	Type	-	BLDC	BLDC
Charged volume		-	PZ68S	PZ68S
Fan	Type	-	1200	1200
Air flow rate (rated)		-	Propeller	Propeller
Fan motor	Type	-	110 x 1	110 x 1
Output		-	BLDC	BLDC
Heat exchanger	Rows x columns x FPI	-	250 x 1	250 x 1
No.		-	46 x 3 x 18	46 x 3 x 18
Fin type		-	1	1
		-	Corrugate	Corrugate

1. Specifications

Technical specifications				FHBW148B0 [HM143HF UB60]	FHBW168B0 [HM163HF UB60]
Water pump***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	GRUNDFOS, UPML GEO 20-105 CHBL	GRUNDFOS, UPML GEO 20-105 CHBL
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17~152	17~152
		Rated	W	145	145
	Max. head		m	11	11
Water pump 2***	Type		-	Canned type for hot water circulation	Canned type for hot water circulation
	Model (maker, name)		-	OH SUNG, ODM-061P	OH SUNG, ODM-061P
	Motor type		-	BLDC	BLDC
	Steps of pumping performance		-	Variable speed 10% to 100%	Variable speed 10% to 100%
	Power input	Min.~Max.	W	17 ~ 152	17 ~ 152
		Rated	W	145	145
	Max. head		m	11	11
Heat exchanger (refrigerant to water)	Type		-	Brazed plate HEX	Brazed plate HEX
	No.		-	1	1
	Number of plate		EA	76	76
	Water volume		ℓ	1	1
Water strainer	Supply type		-	Loose supply (externally installed)	Loose supply (externally installed)
	Mesh size		mesh	30	30
	Max. particle size		mm	0.6	0.6
	Material		-	Stainless steel	Stainless steel
Safety valve (water cycle)	Pressure limit	Upper limit	bar	3.0	3.0
Flow sensor	Type		-	Vortex	Vortex
	Model(maker,name)		-	SIKA VVXC9SNBUC00252P	SIKA VVXC9SNBUC00252P
	Measuring range	Min. ~ Max.	ℓ /min	5 ~ 80	5 ~ 80
	Trigger point		ℓ /min	10	10
Water pressure sensor	Model (maker, name)		-	Sensata OFM(2HMP)	Sensata OFM(2HMP)
	Measuring range	Min. ~ Max.	bar	0 ~ 20	0 ~ 20
Sound pressure level	Heating(rated, @5m)		dB(A)	29	30
Sound power level	Heating	Low noise	dB(A)	50	51
		Rated	dB(A)	51	52
		Daytime max.	dB(A)	60	61
Water connecting pipes	Inlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	Male PT 1" according to ISO 7-1 (tapered pipe threads)
	Outlet		inch	Male PT 1" according to ISO 7-1 (tapered pipe threads)	Male PT 1" according to ISO 7-1 (tapered pipe threads)
Dimensions	Net(W x H x D)		mm	1,560 x 1,019 x 520	1,560 x 1,019 x 520
	Shipping(W x H x D)		mm	1,620 x 1,180 x 625	1,620 x 1,180 x 625
Weight	Net		kg	181.0	181.0
	Shipping		kg	199.0	199.0
Exterior	Color of front grille		-	Dark dawn gray	Dark dawn gray
	RAL Code of front grille		-	RAL 7012	RAL 7012

Note

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- Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.
- Performances are accordance with EN14511 and reflect ErP testing conditions. The values indicated above are the declared values at rated conditions acc. ErP regulation. For max. capacities, please refer to Performance Data.
- This product contains Fluorinated greenhouse gases.
- SCOP is in accordance with EN14825.
- Rated running currents are based on the declared values under the following conditions.
 - Cooling : Outdoor Temp. 7°CDB / 6°CWB, Leaving Water Temp. 35°C
 - Heating : Outdoor Temp. 35°C(DB) / 24°C(WB), Leaving Water Temp. 18°C
- All installation sites must be equipped with an earth leakage circuit breaker (ELCB).
 - * DHW 65~80°C Operating is available only when the booster heater is operating.
 - ** This is the power input i 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.
 - *** In the case of integrated water pump, either water pump or water pump 2 will be applied.

2. List of functions

Category	Functions	FHBW126B0 [HM121HF UB60] FHBW146B0 [HM141HF UB60] FHBW166B0 [HM161HF UB60]	FHBW098X0 [HM093HFX UB60] FHBW128B0 [HM123HF UB60] FHBW148B0 [HM143HF UB60] FHBW168B0 [HM163HF UB60]
Reliability	Defrost / Deicing	O	O
	High pressure switch	O	O
	Low pressure switch	X	X
	Phase protection	X	O
	Restart delay (3-minutes)	O	O
	Self diagnosis	O	O
	Soft start	X	X
Convenience	Test function	X	X
	Low Noise Operation	O	O
	Wiring Error Check	X	X
	Peak Control	O	O
	Mode Lock	O	O
	Forced Cooling Operation (Outdoor Unit)	X	X
	Base Pan Heater	O	O
	SLC(Smart Load Control)	X	X
Network function	Network solution(LGAP)	O	O

Note

1. O : Applied, X : Not applied

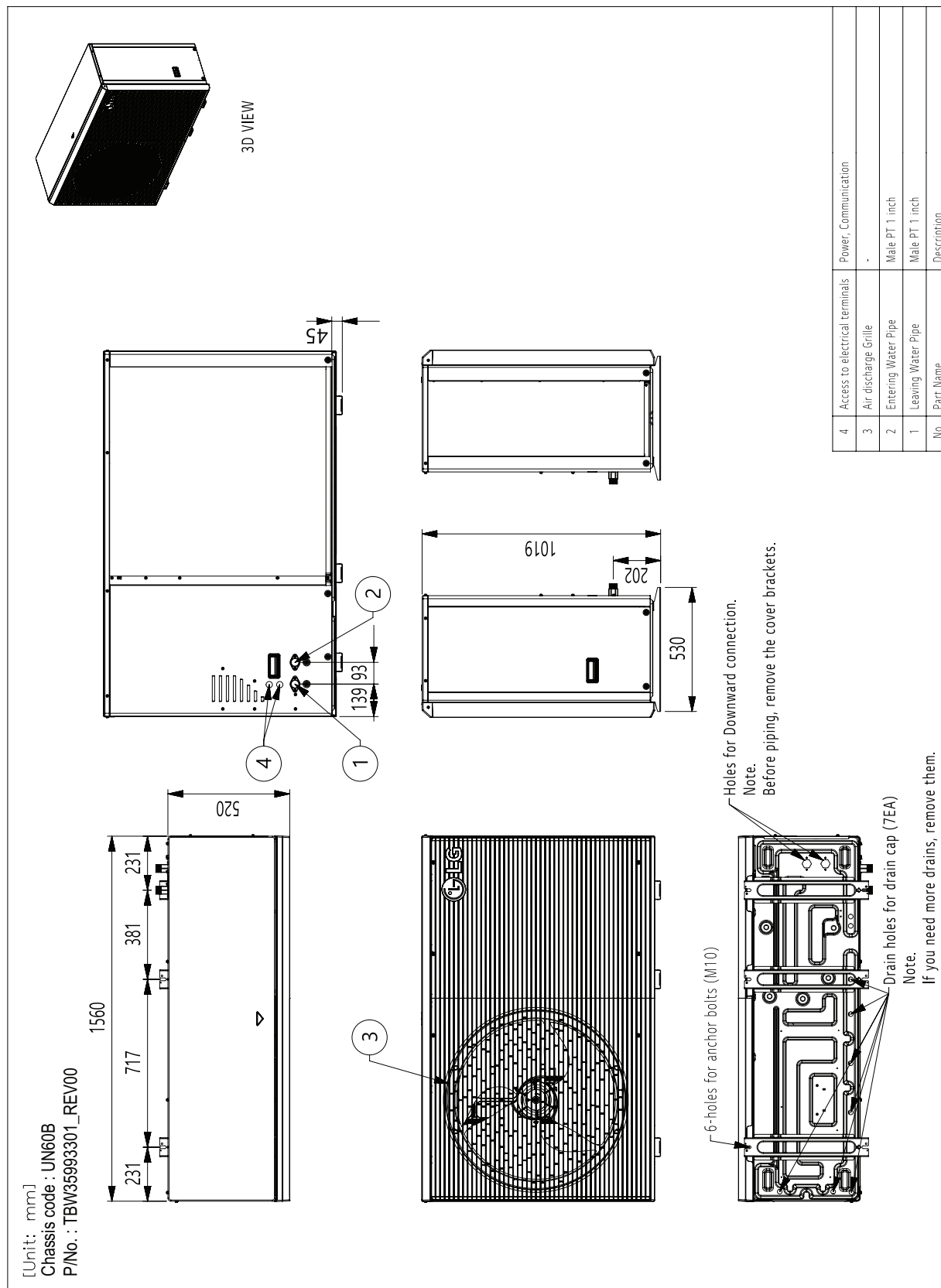
3. Accessory Compatibility List

Category		Product	Remark	FHBW126B0 [HM121HF UB60] FHBW146B0 [HM141HF UB60] FHBW166B0 [HM161HF UB60] FHBW098X0 [HM093HFX UB60] FHBW128B0 [HM123HF UB60] FHBW148B0 [HM143HF UB60] FHBW168B0 [HM163HF UB60]
Central Controller	AC EZ	PQCSZ250S0	AC EZ	X
	AC Ez Touch	PACEZA000	AC Ez Touch	X
	AC Smart	PACSSA000	AC Smart 5	X
	ACP	PACP5A000	ACP 5	X
	AC Manager **	PACM5A000	AC Manager 5	X
Gateway	IDU PI485	PHNFP14A0	Without case	X
		PSNFP14A0	With case	X
	ODU PI485	PP485A00T	PI 485 Gateway	X
		PMNFP14A1	PI 485 Gateway (Produced before 1st of Sep. of 2021)	X
	BACnet	PQNFB17C0	ACP BACnet	O
	Lonworks	PLNWKB000	ACP Lonworks	O
	Modbus	PMBUSB00A	-	O
ETC	PDI	PPWRDB000	PDI Standard	O
		PQNUD1S40	PDI Premium	O
	ACS IO Module	PEXPMB000	-	X

Note

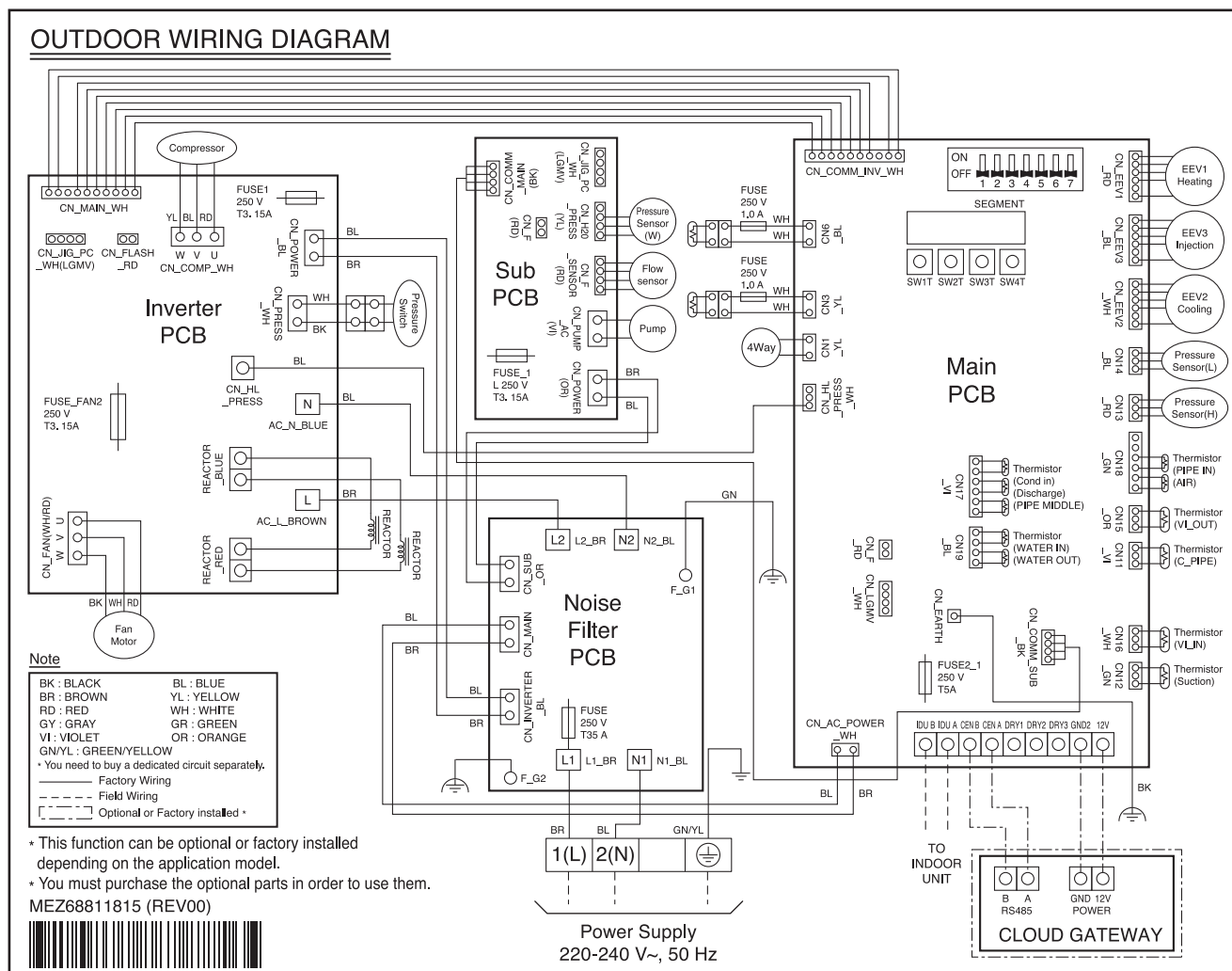
1. O: Possible, X: Impossible, - : Not applicable
2. **: ACP or AC Smart is needed.
3. If you need more detail, please refer to the manual of product.
(<http://partner.lge.com> > Select Your Region : Home> Doc.Library> Product > Control(BECON))

THERMA V Monobloc



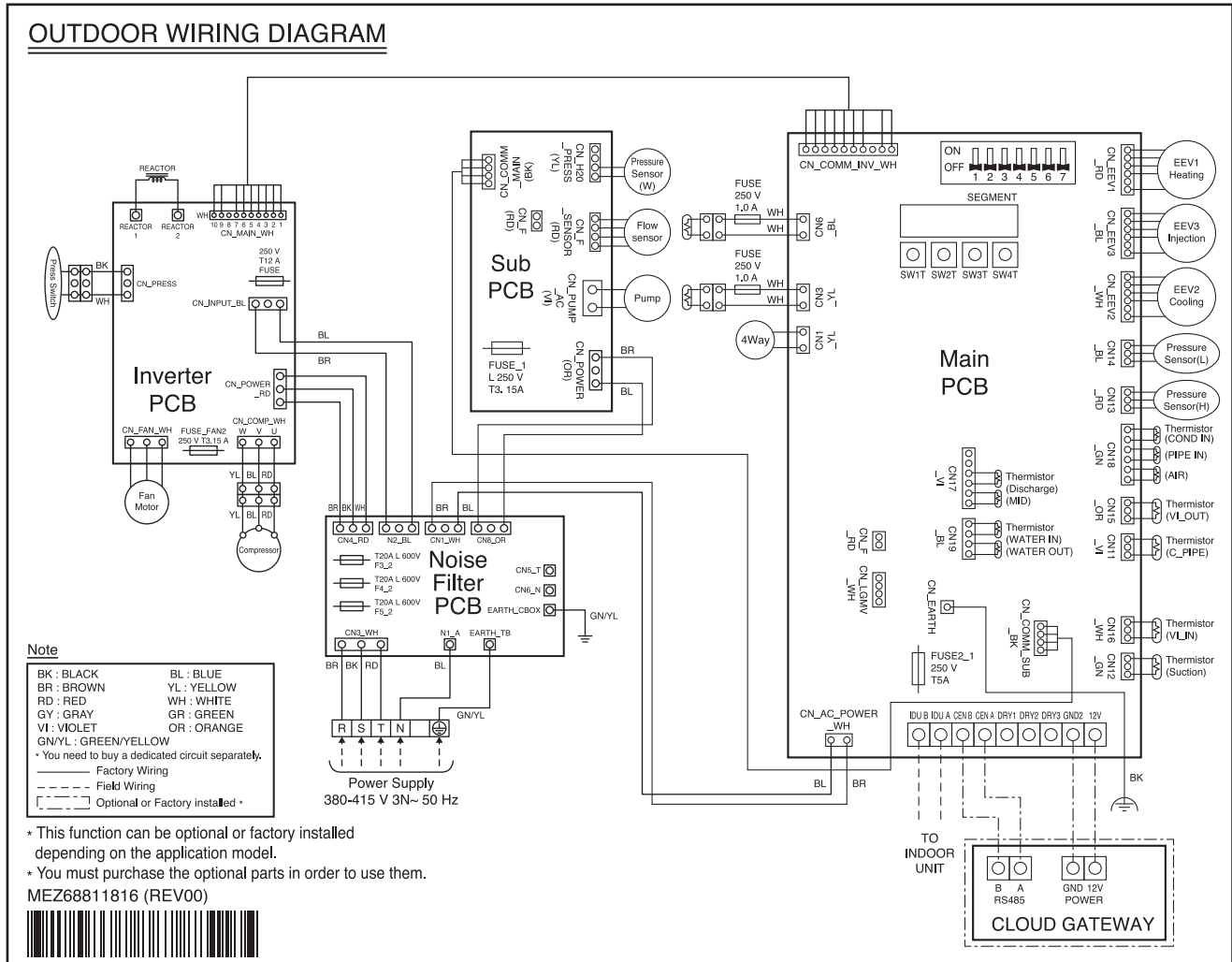
5. Wiring Diagram

Internal Diagrams (1Φ)



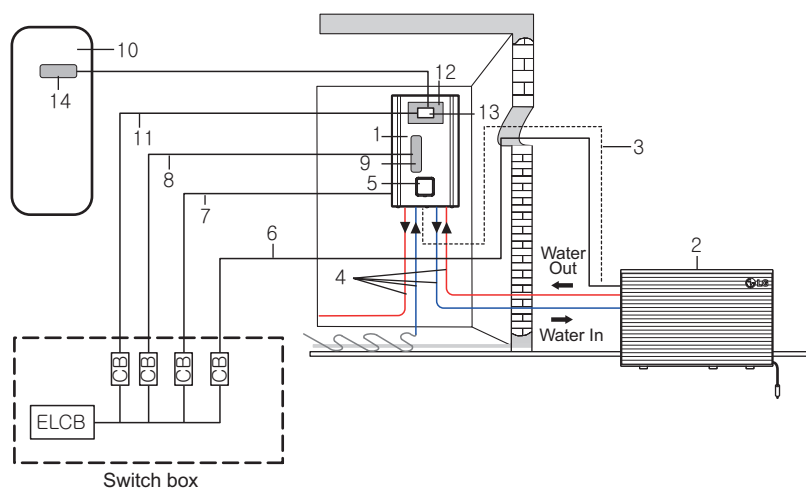
5. Wiring Diagram

■ Internal Diagrams (3Φ)



■ Field Wiring

◆ For Hydro Unit type

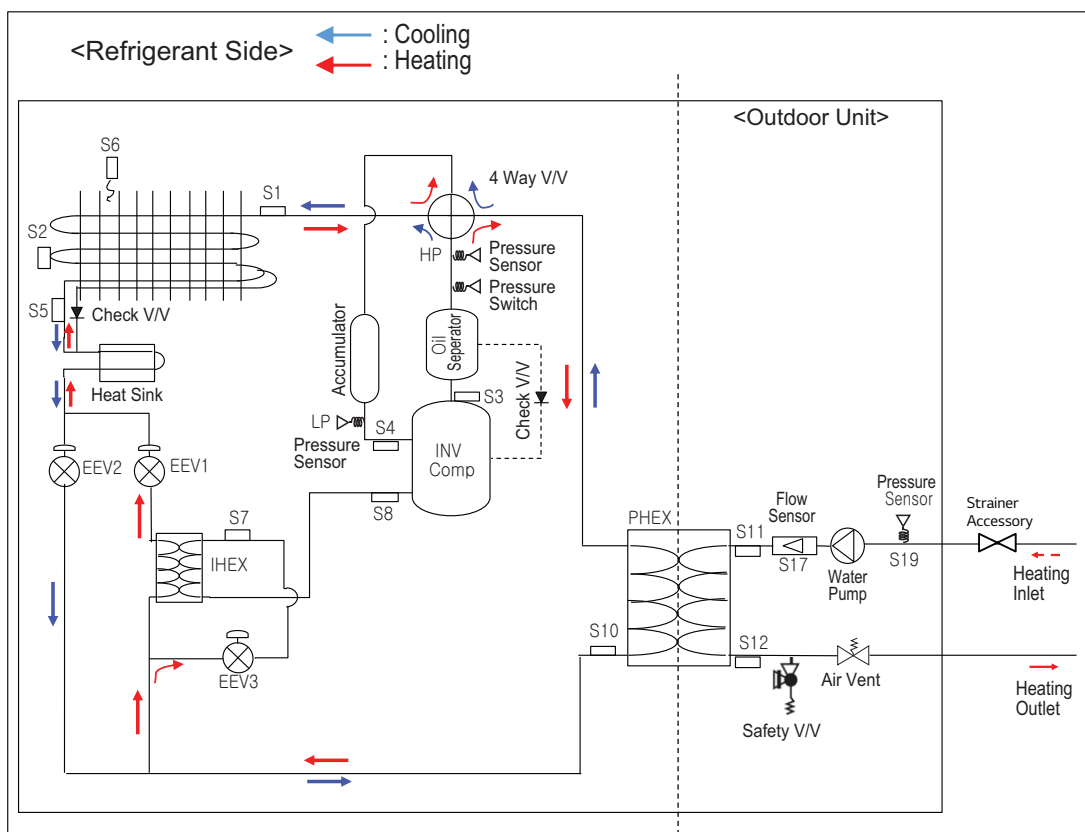


No.	Name	No.	Name
1	Hydro unit	10	DHW tank *
2	Outdoor unit	11	Power supply DHW boost heater *
3	Communication cable	12	DHW tank kit *
4	Heating water pipes	13	Circuit breaker for DHW boost heater *
5	Remote controller	14	DHW boost heater *
6	Power supply outdoor unit	* Optional ELCB : Earth-leakage circuit breaker CB : Circuit breaker	
7	Power supply indoor unit		
8	Power supply backup heater *		
9	Backup heater *		

Note

1. Voltage supplied to the unit terminals should be within the minimum and maximum range.
2. Maximum allowable voltage unbalance between phase is 2%.
3. All installation sites must be equipped with an earth leakage circuit breaker (ELCB).

6. Piping Diagram



Category	Symbol	Meaning
Refrigerant side	S1	Outdoor-HEX gas temp. sensor
	S2	Outdoor-HEX middle temp. sensor
	S3	Compressor discharge temp. sensor
	S4	Compressor suction pipe temp. sensor
	S5	Outdoor-HEX temp. sensor
	S6	Outdoor air temp. sensor
	S7	Compressor-injection pipe IN temp. sensor
	S8	Compressor-injection pipe OUT temp. sensor
Water side	S10	PHEX liquid temp. sensor
	S11	Inlet water temp. sensor
	S12	Outlet water temp. sensor
	S17	Flow sensor
	S19	Water pressure sensor
	LP	Low pressure sensor
	HP	High pressure sensor

7. Capacity Tables

7.1 Heating Operation

■ Maximum Capacity (Include defrost effect)

◆ FHBW098X0 [HM093HFX UB60]

Outdoor Temp. [°C DB]	Water flow rate 25.9 LPM								Water flow rate 16.2 LPM				Water flow rate 12.9 LPM							
	LWT 30 °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	TC	COP
-25	7.84	2.45	7.56	2.25	7.30	2.04	7.07	1.84	6.86	1.62	6.37	1.33								
-20	9.00	2.79	8.80	2.56	8.63	2.36	8.52	2.15	8.51	1.94	8.27	1.70	6.77	1.42						
-15	9.00	3.17	9.00	2.95	9.00	2.72	9.00	2.50	9.00	2.33	9.00	2.21	8.71	1.78	7.17	1.49				
-7	9.00	3.78	9.00	3.44	9.00	3.22	9.00	3.02	9.00	2.80	9.00	2.60	9.00	2.29	9.00	2.01	8.99	1.78		
-4	9.00	4.00	9.00	3.64	9.00	3.43	9.00	3.19	9.00	2.98	9.00	2.74	9.00	2.47	9.00	2.21	9.00	1.94	8.91	1.77
-2	9.00	4.16	9.00	3.79	9.00	3.56	9.00	3.33	9.00	3.08	9.00	2.84	9.00	2.58	9.00	2.33	9.00	2.07	9.00	1.85
2	9.00	4.82	9.00	3.88	9.00	3.94	9.00	3.67	9.00	3.40	9.00	3.09	9.00	2.72	8.08	1.68	6.84	1.44	6.36	1.34
7	9.00	5.56	9.00	4.90	9.00	4.47	9.00	4.15	9.00	3.80	9.00	3.52	9.00	2.99	9.00	2.13	8.03	1.74	7.67	1.60
10	9.00	6.00	9.00	5.19	9.00	4.81	9.00	4.44	9.00	4.05	9.00	3.64	9.00	3.13	9.00	2.35	9.00	2.05	8.95	1.82
15	9.00	6.59	9.00	5.90	9.00	5.39	9.00	4.92	9.00	4.46	9.00	3.98	9.00	3.51	9.00	2.67	9.00	2.49	9.00	2.25
18	9.00	6.94	9.00	6.28	9.00	5.73	9.00	5.22	9.00	4.71	9.00	4.15	9.00	3.74	9.00	2.90	9.00	2.66	9.00	2.37
20	9.00	7.17	9.00	6.54	9.00	5.95	9.00	5.42	9.00	4.89	9.00	4.36	9.00	3.88	9.00	3.05	9.00	2.78	9.00	2.46
35					9.00	7.66	9.00	6.71	9.00	6.11	9.00	5.51	9.00	4.92	9.00	4.32	9.00	3.63	9.00	3.06

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ /min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW126B0 [HM121HF UB60], FHBW128B0 [HM123HF UB60]

Outdoor Temp. [°C DB]	Water flow rate 34.5 LPM								Water flow rate 21.6 LPM				Water flow rate 17.3 LPM							
	LWT 30 °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	TC	COP
-25	8.36	2.42	8.07	2.23	7.79	2.02	7.54	1.82	7.32	1.60	6.37	1.33								
-20	9.60	2.76	9.39	2.53	9.20	2.33	9.09	2.13	9.08	1.92	8.27	1.70	6.77	1.42						
-15	10.84	3.09	10.69	2.88	10.55	2.66	10.55	2.44	10.84	2.27	10.76	2.14	8.71	1.78	7.17	1.49				
-7	12.00	3.62	12.00	3.30	12.00	3.08	12.00	2.88	12.00	2.66	12.00	2.48	11.27	2.19	10.00	1.97	8.99	1.78		
-4	12.00	3.84	12.00	3.49	12.00	3.29	12.00	3.05	12.00	2.84	12.00	2.60	12.00	2.35	10.88	2.13	9.65	1.91	8.91	1.77
-2	12.00	3.98	12.00	3.63	12.00	3.41	12.00	3.19	12.00	2.95	12.00	2.70	12.00	2.45	11.45	2.22	10.29	2.01	9.32	1.84
2	12.00	4.62	12.00	3.72	12.00	3.78	12.00	3.52	12.00	3.26	12.00	2.95	12.00	2.59	8.08	1.68	6.84	1.44	6.36	1.34
7	12.00	5.32	12.00	4.70	12.00	4.28	12.00	3.97	12.00	3.64	12.00	3.37	12.00	2.86	10.28	2.08	8.34	1.73	7.67	1.60
10	12.00	5.74	12.00	4.97	12.00	4.61	12.00	4.25	12.00	3.88	12.00	3.48	12.00	3.00	11.20	2.28	9.90	2.02	8.95	1.82
15	12.00	6.31	12.00	5.65	12.00	5.16	12.00	4.72	12.00	4.27	12.00	3.81	12.00	3.36	12.00	2.55	12.00	2.37	11.09	2.17
18	12.00	6.65	12.00	6.02	12.00	5.48	12.00	5.00	12.00	4.51	12.00	3.97	12.00	3.58	12.00	2.78	12.00	2.54	11.69	2.26
20	12.00	6.87	12.00	6.26	12.00	5.70	12.00	5.19	12.00	4.68	12.00	4.17	12.00	3.72	12.00	2.93	12.00	2.65	12.00	2.32
35					12.00	7.33	12.00	6.42	12.00	5.85	12.00	5.28	12.00	4.71	12.00	4.14	12.00	3.46	12.00	2.90

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ/min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW146B0 [HM141HF UB60], FHBW148B0 [HM143HF UB60]

Outdoor Temp. [°C DB]	Water flow rate 40.3 LPM								Water flow rate 25.2 LPM				Water flow rate 20.1 LPM							
	LWT 30 °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	TC	COP
-25	8.88	2.40	8.57	2.20	8.28	2.00	8.01	1.80	7.78	1.59	6.37	1.33								
-20	10.20	2.73	9.97	2.50	9.78	2.31	9.66	2.11	9.48	1.91	8.27	1.70	6.77	1.42						
-15	12.06	3.03	11.99	2.82	11.79	2.60	11.59	2.40	11.29	2.25	10.76	2.14	8.71	1.78	7.17	1.49				
-7	14.00	3.51	14.00	3.19	13.82	2.99	13.63	2.80	13.45	2.60	12.58	2.45	11.27	2.19	10.00	1.97	8.99	1.78		
-4	14.00	3.72	14.00	3.39	13.90	3.20	13.83	2.96	13.83	2.76	13.23	2.55	12.06	2.34	10.88	2.13	9.65	1.91	8.91	1.77
-2	14.00	3.86	14.00	3.52	13.96	3.31	13.95	3.10	14.00	2.85	13.71	2.62	12.59	2.42	11.45	2.22	10.29	2.01	9.32	1.84
2	14.00	4.48	14.00	3.61	14.00	3.67	14.00	3.41	14.00	3.16	14.00	2.86	13.16	2.54	8.08	1.68	6.84	1.44	6.36	1.34
7	14.00	5.16	14.00	4.50	14.00	4.16	14.00	3.85	14.00	3.54	14.00	3.27	14.00	2.78	10.28	2.08	8.34	1.73	7.67	1.60
10	14.00	5.57	14.00	4.82	14.00	4.48	14.00	4.12	14.00	3.76	14.00	3.38	14.00	2.91	11.20	2.28	9.90	2.02	8.95	1.82
15	14.00	6.12	14.00	5.48	14.00	5.01	14.00	4.58	14.00	4.14	14.00	3.70	14.00	3.26	12.72	2.53	12.02	2.37	11.09	2.17
18	14.00	6.45	14.00	5.84	14.00	5.32	14.00	4.85	14.00	4.38	14.00	3.86	14.00	3.47	13.82	2.70	12.89	2.50	11.69	2.26
20	14.00	6.67	14.00	6.08	14.00	5.53	14.00	5.04	14.00	4.54	14.00	4.05	14.00	3.61	14.00	2.84	13.47	2.59	12.09	2.32
35					14.00	7.12	14.00	6.23	14.00	5.68	14.00	5.12	14.00	4.57	14.00	4.01	14.00	3.34	12.80	2.85

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ/min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW166B0 [HM161HF UB60], FHBW168B0 [HM163HF UB60]

Outdoor Temp. [°C DB]	Water flow rate 46.0 LPM								Water flow rate 28.8 LPM				Water flow rate 23.0 LPM							
	LWT 30 °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	TC	COP
-25	9.41	2.37	9.08	2.18	8.76	1.98	8.48	1.78	7.81	1.59	6.37	1.33								
-20	10.80	2.70	10.56	2.48	10.35	2.28	10.23	2.09	9.48	1.91	8.27	1.70	6.77	1.42						
-15	13.36	2.96	13.28	2.75	12.74	2.56	12.15	2.38	11.29	2.25	10.76	2.14	8.71	1.78	7.17	1.49				
-7	16.00	3.39	16.00	3.09	15.17	2.92	14.35	2.77	13.52	2.59	12.58	2.45	11.27	2.19	10.00	1.97	8.99	1.78		
-4	16.00	3.61	16.00	3.28	15.43	3.12	14.85	2.91	14.29	2.74	13.23	2.55	12.06	2.34	10.88	2.13	9.65	1.91	8.91	1.77
-2	16.00	3.75	16.00	3.41	15.69	3.22	15.34	3.03	14.81	2.82	13.71	2.62	12.59	2.42	11.45	2.22	10.29	2.01	9.32	1.84
2	16.00	4.34	16.00	3.50	16.00	3.55	16.00	3.31	16.00	3.06	14.84	2.82	13.16	2.54	8.08	1.68	6.84	1.44	6.36	1.34
7	16.00	5.01	16.00	4.30	16.00	4.03	16.00	3.74	16.00	3.43	16.00	3.17	14.25	2.77	10.28	2.08	8.34	1.73	7.67	1.60
10	16.00	5.41	16.00	4.68	16.00	4.34	16.00	4.00	16.00	3.65	16.00	3.28	14.92	2.87	11.20	2.28	9.90	2.02	8.95	1.82
15	16.00	5.94	16.00	5.32	16.00	4.86	16.00	4.44	16.00	4.02	16.00	3.58	16.00	3.16	12.72	2.53	12.02	2.37	11.09	2.17
18	16.00	6.25	16.00	5.66	16.00	5.16	16.00	4.71	16.00	4.25	16.00	3.74	16.00	3.37	13.82	2.70	12.89	2.50	11.69	2.26
20	16.00	6.47	16.00	5.90	16.00	5.37	16.00	4.88	16.00	4.40	16.00	3.93	16.00	3.50	14.56	2.81	13.47	2.59	12.09	2.32
35					16.00	6.90	16.00	6.05	16.00	5.51	16.00	4.97	16.00	4.43	16.00	3.89	14.40	3.32	12.80	2.85

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ/min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

7.2 Cooling Operation

■ Maximum Capacity

◆ FHBW098X0 [HM093HFX UB60]

Outdoor Temperature [°C DB]	Water flow rate 25.9 LPM													
	LWT 7 °C		LWT 10 °C		LWT 13 °C		LWT 15 °C		LWT 18 °C		LWT 20 °C		LWT 22 °C	
	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER
20	9.00	4.30	9.00	4.65	9.00	5.01	9.00	5.26	9.00	5.63	9.00	5.88	9.00	6.14
30	9.00	3.59	9.00	4.00	9.00	4.30	9.00	4.55	9.00	4.80	9.00	4.96	9.00	4.96
35	9.00	3.24	9.00	3.44	9.00	3.65	9.00	3.85	9.00	3.90	9.00	4.21	9.00	4.37
40	8.01	2.84	8.64	3.01	9.00	3.17	9.00	3.32	9.00	3.49	9.00	3.64	9.00	3.78
45	7.02	2.41	7.63	2.57	8.23	2.71	8.63	2.80	9.00	2.95	9.00	3.07	9.00	3.19

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ /min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW126B0 [HM121HF UB60], FHBW128B0 [HM123HF UB60]

Outdoor Temperature [°C DB]	Water flow rate 33.1 LPM													
	LWT 7 °C		LWT 10 °C		LWT 13 °C		LWT 15 °C		LWT 18 °C		LWT 20 °C		LWT 22 °C	
	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER
20	11.50	4.02	11.50	4.35	11.50	4.69	11.50	4.92	11.50	5.27	11.50	5.50	11.50	5.74
30	10.97	3.41	11.50	3.79	11.50	4.09	11.50	4.33	11.50	4.56	11.50	4.68	11.50	4.64
35	10.50	3.12	11.28	3.33	11.50	3.53	11.50	3.74	11.50	3.78	11.50	4.02	11.50	4.09
40	9.35	2.74	10.08	2.91	10.80	3.07	11.27	3.22	11.50	3.36	11.50	3.45	11.50	3.54
45	8.19	2.34	8.90	2.49	9.61	2.62	10.07	2.70	10.77	2.82	11.23	2.90	11.50	2.99

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ /min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW146B0 [HM141HF UB60], FHBW148B0 [HM143F UB60]

Outdoor Temperature [°C DB]	Water flow rate 34.5 LPM													
	LWT 7 °C		LWT 10 °C		LWT 13 °C		LWT 15 °C		LWT 18 °C		LWT 20 °C		LWT 22 °C	
	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER
20	12.00	3.97	12.00	4.30	12.00	4.63	12.00	4.85	12.00	5.20	12.00	5.43	12.00	5.66
30	12.00	3.32	12.00	3.71	12.00	4.01	12.00	4.26	12.00	4.49	12.00	4.62	12.00	4.58
35	12.00	2.99	12.00	3.22	12.00	3.45	12.00	3.67	12.00	3.70	12.00	3.97	12.00	4.03
40	10.68	2.64	11.52	2.81	12.00	2.98	12.00	3.14	12.00	3.29	12.00	3.40	12.00	3.49
45	9.36	2.27	10.17	2.41	10.98	2.52	11.51	2.60	12.00	2.73	12.00	2.84	12.00	2.95

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ /min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

7. Capacity Tables

◆ FHBW166B0 [HM161HF UB60], FHBW168B0 [HM163HF UB60]

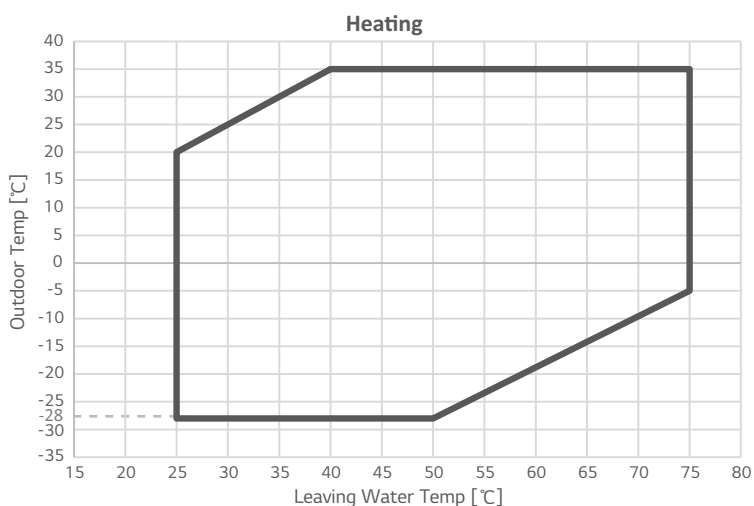
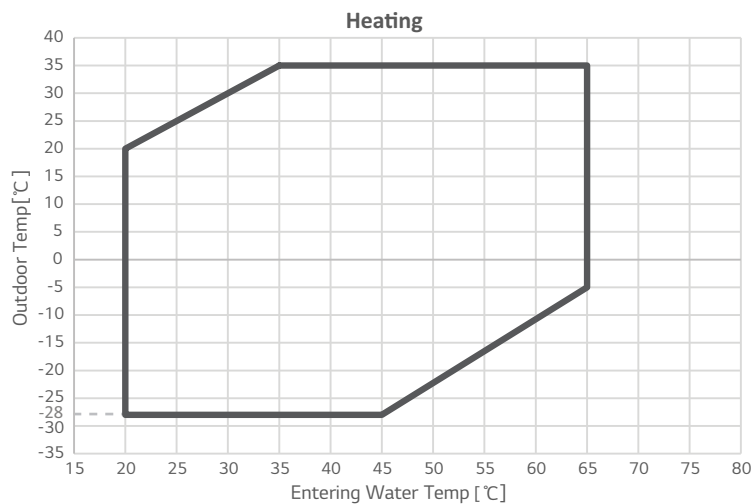
Outdoor Temperature [°C DB]	Water flow rate 35.9 LPM													
	LWT 7 °C		LWT 10 °C		LWT 13 °C		LWT 15 °C		LWT 18 °C		LWT 20 °C		LWT 22 °C	
	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER	TC	EER
20	12.50	3.91	12.50	4.24	12.50	4.56	12.50	4.78	12.50	5.12	12.50	5.35	12.50	5.58
30	12.50	3.27	12.50	3.64	12.50	3.92	12.50	4.15	12.50	4.37	12.50	4.52	12.50	4.51
35	12.50	2.95	12.50	3.14	12.50	3.33	12.50	3.51	12.50	3.70	12.50	3.84	12.50	3.98
40	12.02	2.55	12.50	2.74	12.50	2.90	12.50	3.04	12.50	3.18	12.50	3.32	12.50	3.44
45	10.03	2.23	10.78	2.37	11.54	2.49	12.05	2.56	12.50	2.69	12.50	2.80	12.50	2.91

Note

1. DB : Dry bulb temperature(°C), LWT : Leaving water temperature(°C), LPM : Liter per minute (ℓ /min)
2. TC : Total capacity(kW), EER: Energy efficiency ratio(kW/kW), COP : Coefficient of performance (kW/kW)
3. Direct interpolation is permissible. Do not extrapolate.
4. 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.
5. The Shaded areas are not guaranteed continuous operation.

8. Operation Limits

8.1 Heating

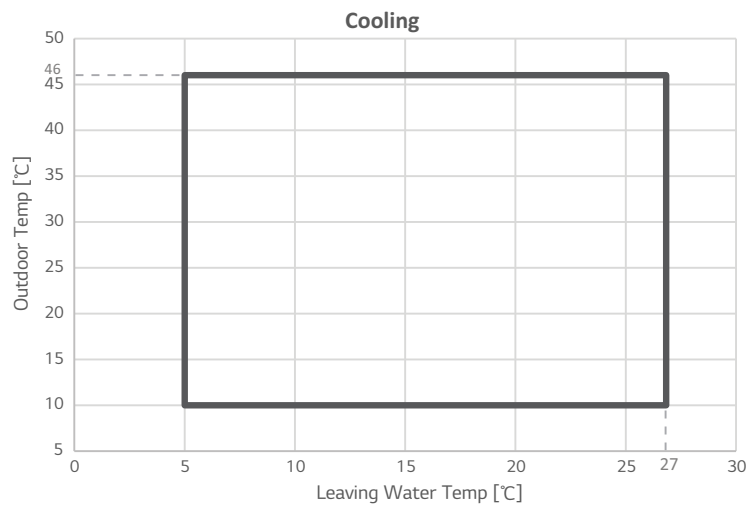
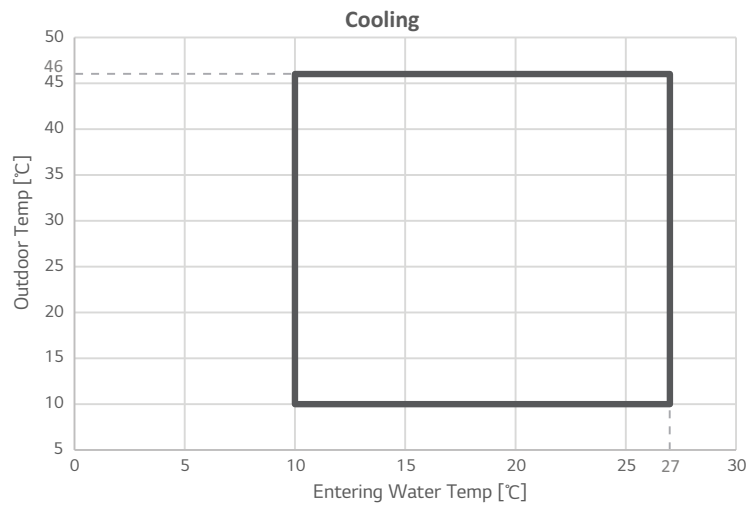


Note

- DHW operation without electric heater : max. 65 °C
- DHW operation with electric heater : max. 80 °C

8. Operation Limits

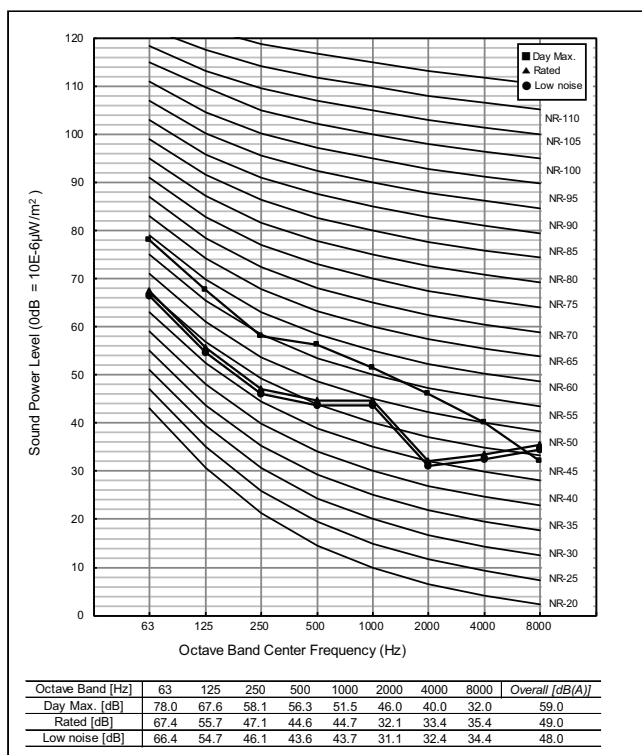
8.2 Cooling



9. Sound levels

9.1 Sound Power Level

FHBW098X0 [HM093HFX UB60]



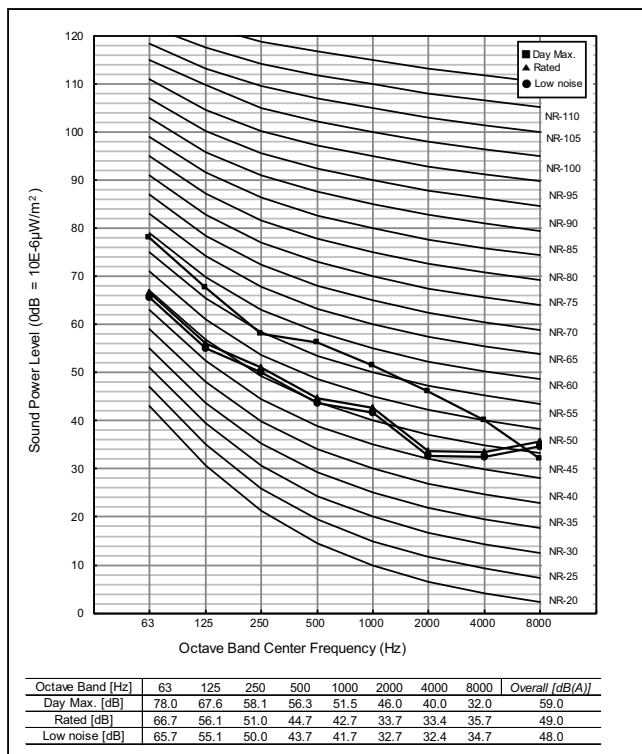
Model		Heating [dB(A)]		
Outdoor Unit	Indoor Unit	Rated	Low Noise	Daytime Max
FHBW098X0 [HM093HFX UB60]	FHNW16809C0 [HN1639HC NK0]	49.0	48.0	59.0

Note

1. Data is valid at diffuse field condition.
2. Reference acoustic intensity 0dB = 10E-6μW/m²
3. Sound power level is measured on the rated condition in the reverberation rooms. Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
4. Sound levels can be increased in accordance with installation and operating conditions.
5. 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 is installed.
6. Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.

9. Sound levels

FHBW126B0 [HM121HF UB60], FHBW128B0 [HM123HF UB60]



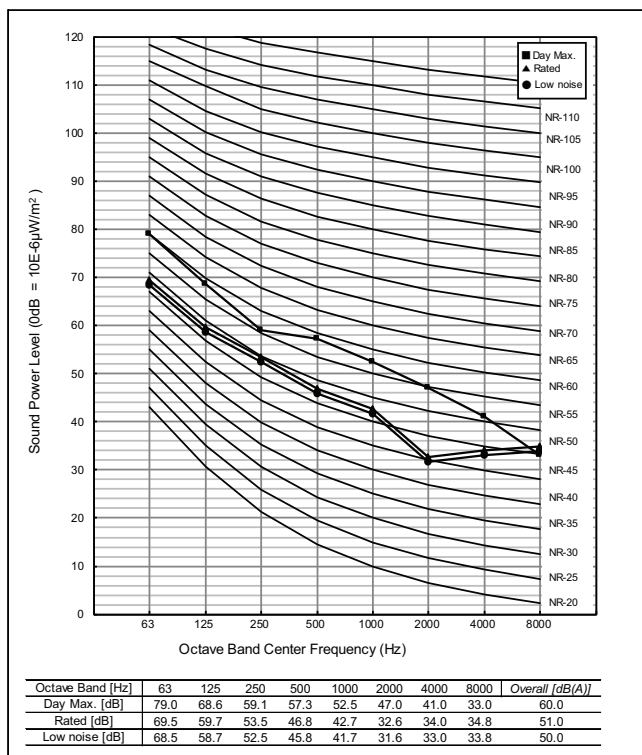
Model		Heating [dB(A)]		
Outdoor Unit	Indoor Unit	Rated	Low Noise	Daytime Max
FHBW126B0 [HM121HF UB60]	FHNW16606C0 [HN1616HC NK0]	49.0	48.0	59.0
FHBW128B0 [HM123HF UB60]	FHNW16809C0 [HN1639HC NK0]	49.0	48.0	59.0

Note

1. Data is valid at diffuse field condition.
2. Reference acoustic intensity $0\text{dB} = 10\text{E-}6\mu\text{W/m}^2$
3. Sound power level is measured on the rated condition in the reverberation rooms. Refer to the Model Specifications for nominal conditions (Power source and Ambient temperature, etc)
4. Sound levels can be increased in accordance with installation and operating conditions.
5. 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 is installed.
6. Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.

9. Sound levels

FHBW146B0 [HM141HF UB60], FHBW148B0 [HM143HF UB60]



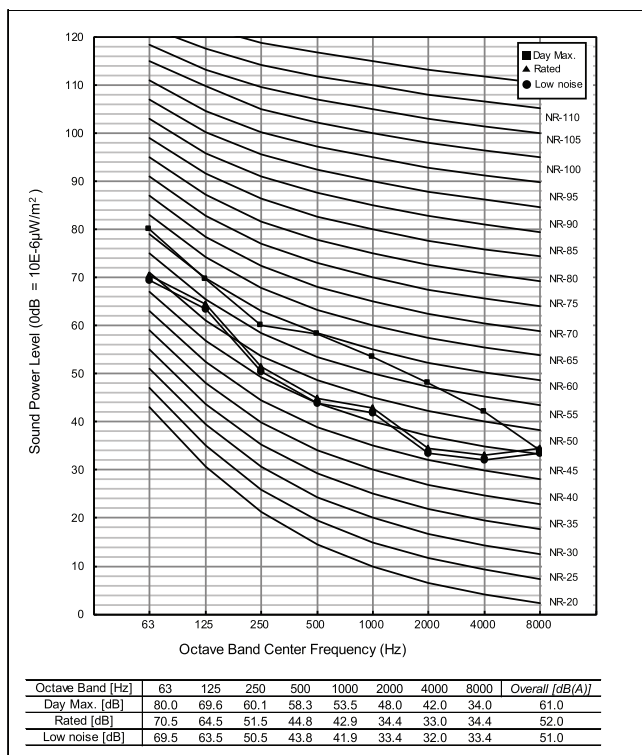
Model		Heating [dB(A)]		
Outdoor Unit	Indoor Unit	Rated	Low Noise	Daytime Max
FHBW146B0 [HM141HF UB60]	FHNW16606C0 [HN1616HC NK0]	51.0	50.0	60.0
FHBW148B0 [HM143HF UB60]	FHNW16809C0 [HN1639HC NK0]	51.0	50.0	60.0

Note

1. Data is valid at diffuse field condition.
2. Reference acoustic intensity 0dB = 10E-6μW/m²
3. Sound power level is measured on the rated condition in the reverberation rooms. Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
4. Sound levels can be increased in accordance with installation and operating conditions.
5. 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 is installed.
6. Sound power level is measured in accordance with EN 12102-1 and ISO 9614.
 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.

9. Sound levels

FHBW166B0 [HM161HF UB60], FHBW168B0 [HM163HF UB60]



Model		Heating [dB(A)]		
Outdoor Unit	Indoor Unit	Rated	Low Noise	Daytime Max
FHBW166B0 [HM161HF UB60]	FHNW16606C0 [HN1616HC NK0]	52.0	51.0	61.0
FHBW168B0 [HM163HF UB60]	FHNW16809C0 [HN1639HC NK0]	52.0	51.0	61.0

Note

1. Data is valid at diffuse field condition.
2. Reference acoustic intensity 0dB = 10E-6μW/m²
3. Sound power level is measured on the rated condition in the reverberation rooms. Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
4. Sound levels can be increased in accordance with installation and operating conditions.
5. 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 is installed.
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 - Rated : This mode is measured on the rated condition in the semi-anechoic rooms. Therefore, these values may vary depending on operation conditions.
 - Daytime max : This mode is measured based on max. fan RPM and max. compressor Hz. that can be reached under outdoor air temperature 2°C.
 - Low noise : This mode lowers noise by limiting the compressor Hz. and fan RPM, and thus the performance may be limited.

10. Hydraulic Performance

The water pump is variable type which is capable to change 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.

■ Pressure Drop

◆ For GRUNDFOS Water Pump

Capacity [kW]	Rated flow-rate [LPM]	Pump Head [m] (at rated flow- rate)	Product pressure drop [m] (Plate heat exchanger)	Serviceable Head [m]	Min. flow-rate [LPM] (Recommend)
9	25.9	10.0	0.4	9.6	20
12	34.5	9.8	0.8	9.0	
14	40.3	9.3	1.1	8.2	
16	46.0	9.0	1.4	7.6	

◆ For OH SUNG Water Pump

Capacity [kW]	Rated flow-rate [LPM]	Pump Head [m] (at rated flow- rate)	Product pressure drop [m] (Plate heat exchanger)	Serviceable Head [m]	Min. flow-rate [LPM] (Recommend)
9	25.9	6.1	0.4	5.7	20
12	34.5	9.7	0.8	8.9	
14	40.3	9.1	1.1	8.0	
16	46.0	8.3	1.4	6.9	

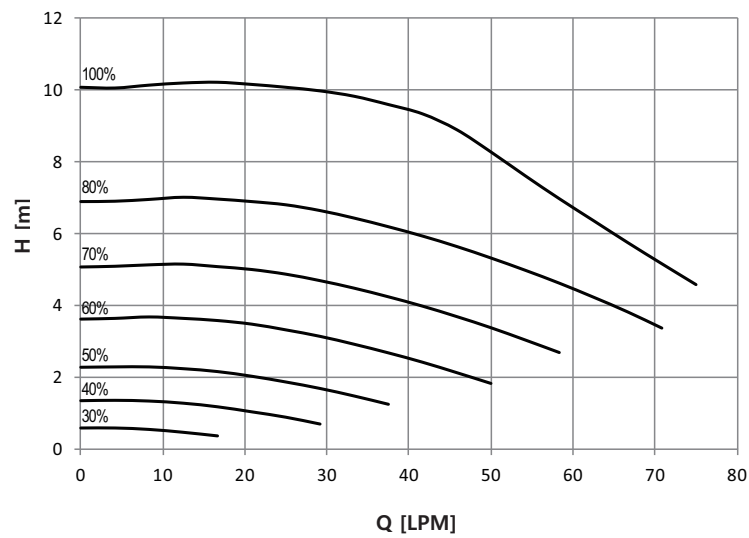
Note

- To secure enough water flow rate, do not set water pump capacity as Minimum.
It can lead unexpected flow rate error CH14.
- When installing the product, install additional pump in consideration of the pressure loss and pump performance.
- If flow-rate is low, overloading of product can occur.

10. Hydraulic Performance

■ GRUNDFOS Water Pump (UPML 20 - 105 CHBL)

Q-H Chart

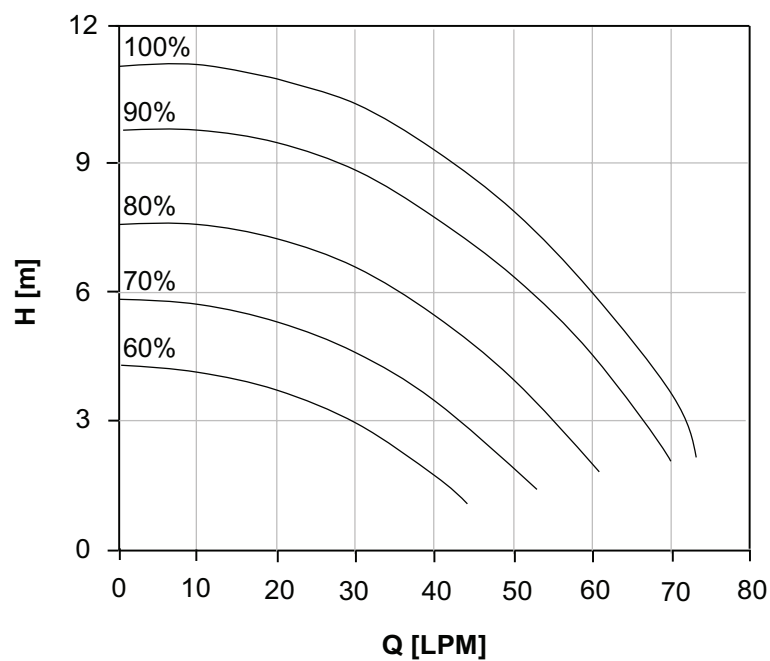


Note

Performance test based on standard ISO 9906 with pre-pressure 2.0 bar and liquid temperature 20°C.

■ OH SUNG Water Pump (ODM - 061P)

Q-H Chart



Note

Performance test based on standard ISO 9906 with pre-pressure 2.0 bar and liquid temperature 20°C.

Installation

Installation of Outdoor Unit

1. Information for Refrigerant

■ Refrigerant _ R290

- The refrigerant R290 has a lower GWP(Global Warming Potential)value than R32.
The Ozone Depletion Potential (ODP) of R290 is 0, and Global Warming Potential(GWP) is 3.
- Refrigerant piping consists of copper/steel pipes, joints, and other fittings. All components must be selected and installed in conformity with the standards pertaining to the Refrigeration Safety Regulation.
- Same piping as for R32 can be used.

< ! > WARNING

- This product contains flammable gases (Refrigerant type : R290).
DO NOT emit refrigerant gases into the atmosphere.
- The refrigerant R290 has Higher Flammability than R32. But It does not leak normally. If the refrigerant leaks in the installed place and contact with burning energy, it may cause fire, or a harmful gas.
- If there is some leak, turn off any combustion devices, ventilate the installed place, and contact the dealer from which you purchased the unit. Do not use the unit until the refrigerant leaked is repaired.
- Only use R290 as refrigerant. Other substances may cause explosions and accidents.

< ! > CAUTIONS

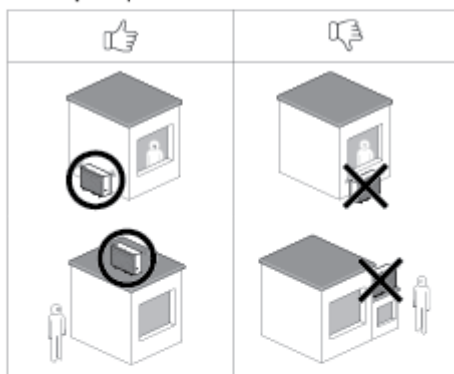
- The wall thickness of the piping should comply with the relevant local and national regulations for the designed pressure.
- Any unapproved pipe must not be used.
- Do not heat pipes more than necessary to prevent them from softening.

2. Selection of the best Location

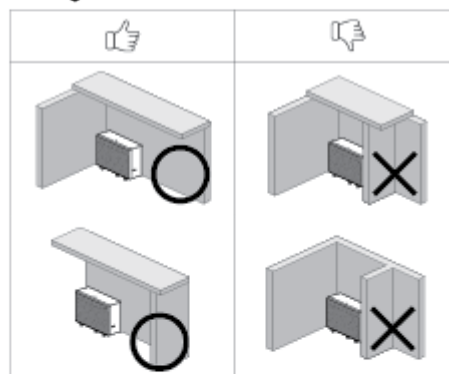
2.1 Best location

- The outdoor unit is installed outside to exchange heat with ambient air.
- Therefore, it is important to secure proper space around the outdoor unit and care for specific external conditions. This chapter presents a guide to install the outdoor unit, make a route to connect with the indoor, and what to do when installed around seaside.

- For quiet place



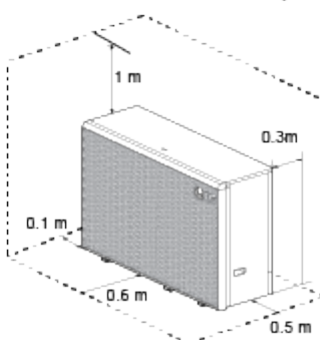
- For good ventilation



※ Do not block the slits in the exterior panels.

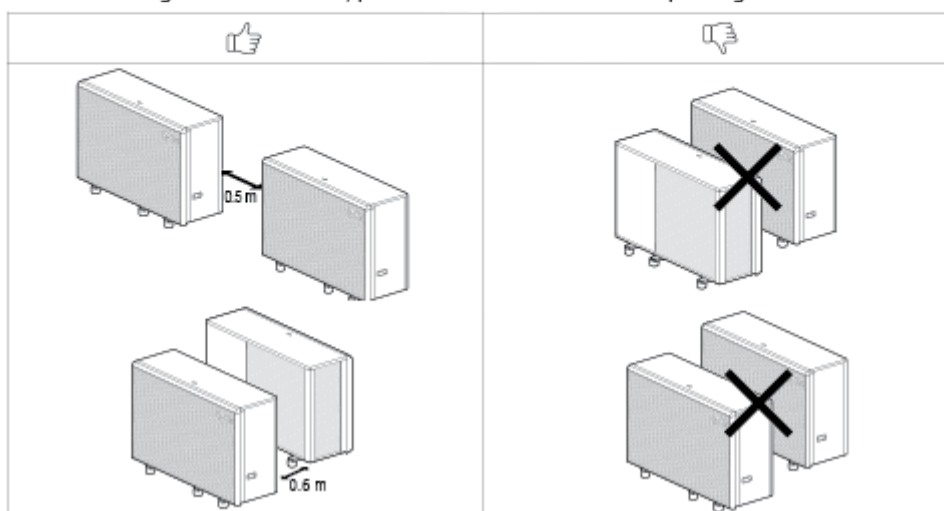
- Minimum operation space

Following distances around the outdoor unit must be respected under any condition:



- Multiple installation

When installing two or more units, please observe the installation spaces given below.

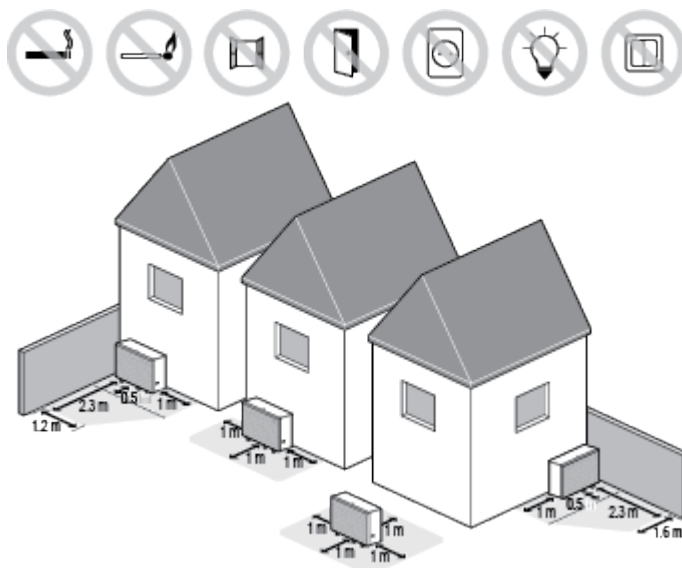


2. Selection of the best Location

2.2 Safety zone

Since the outdoor unit contains flammable refrigerant, a separate safety zone must be defined near the outdoor unit.

- Special safety precautions must be taken within the areas marked below.
 - These areas must be free of potential ignition sources, such as electrical switches or lamps.
- Open flames are strongly prohibited!

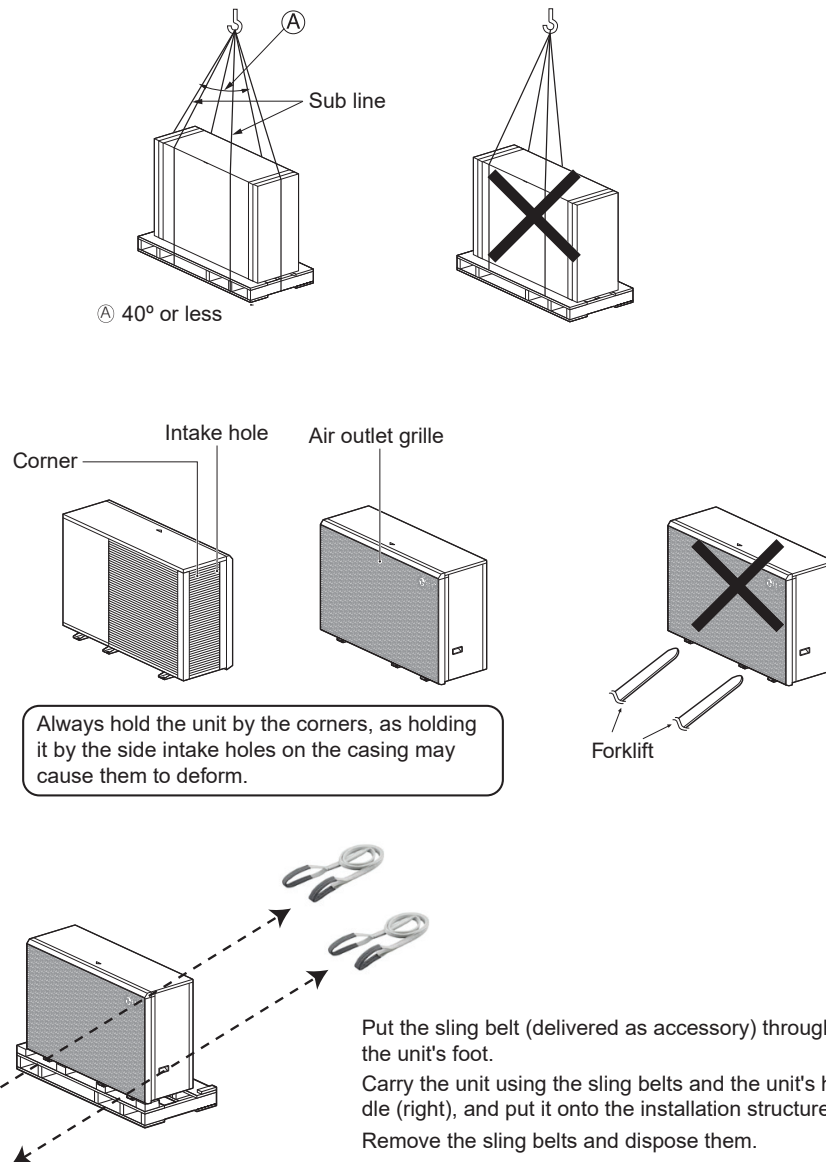


< ! > CAUTIONS

- There must be no building openings. (windows, doors, roof windows, etc.)
- There must be no external and outlet air openings. (e.g. intakes of central ventilation system)
- There should be no building boundaries, adjacent buildings, passageways, or roads.
- Drainage system inlets, pump shafts, downspouts, and bath lakes should not be present.
- Other grooves, bottoms and shafts must not be present.
- There should be no Roof avalanches.
- Ignition sources must not be used.
- No parts should have a surface temperature higher than 360 °C.

2. Selection of the best Location

2.3 Lifting method

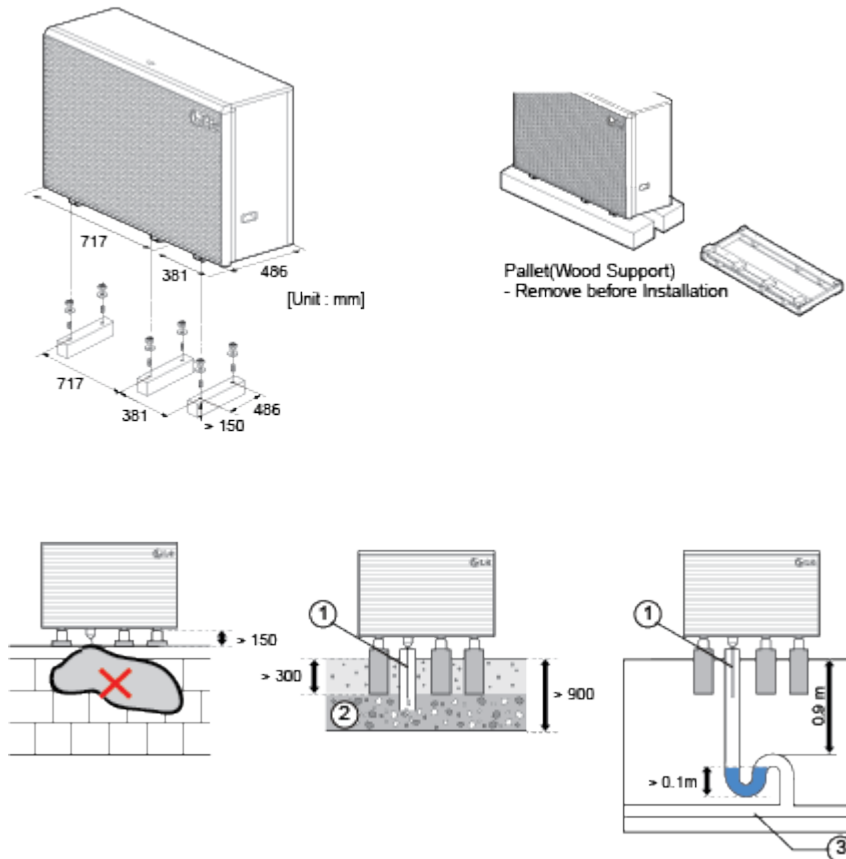


< ! > CAUTION

- Be very careful while carrying the product.
- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut in your hands.
- Tear plastic packaging bag and scrap it so that children cannot play with it.
Otherwise plastic packaging bag may suffocate children to death.
- When carrying in Outdoor Unit, be sure to support it at four points.
Carrying in and lifting with 3-point support may make Outdoor Unit unstable, resulting in a fall.
- Use 2 belts of at least 8m(26.2ft) long.
- Place extra cloth or boards in the locations where the casing comes in contact with the sling to prevent damage.
- Hoist the unit making sure it is being lifted at its center of gravity.

3. Foundation for Installation

- Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise after installation.
- Fix the unit securely by means of the foundation bolts. Prepare 6sets of M12 foundation bolts, nuts and washers available on the market.
- It is best to screw in the foundation bolts until their length are 20 mm from the foundation surface.
- When installing the unit on the ground, install a separate pedestal with enough height to install the drain nipple and higher than the average snowfall in your area.



- 1 Section of condensate drain pipe exposed to open air must be insulated.
- 2 If condensate is drained into a gravel-bed, the pipe must be directed into frost-free area. The gravel must be able to absorb up to 100 ℓ of condensate per day.
- 3 If condensate water is drained into a rainwater sewer or other drainage pipe, note the slope of the pipe and make sure the pipe is frost-free. Alternatively, route the condensate back into the building and connect directly to the building's sewage system using a syphon.

< ! > WARNING

- Be sure that condensate does not discharge onto road to avoid accumulated freezing of condensate.

4. Water Control

4.1 Water quality

Water quality should be complied with EN 98/83 EC Directives.

<I> IMPORTANT

- If the product is installed at existing hydraulic water loop, it is important to clean hydraulic pipes to remove sludge and scale.
- Installing sludge strainer in the water loop is very important to prevent performance degrade.
- Chemical treatment to prevent rust should be performed by installer.
- It is strongly recommended to install an additional filter on the heating water circuit. Especially to remove metallic particles from the heating piping, it is advised to use a magnetic or cyclone filter, which can remove small particles. Small particles may damage the unit and will NOT be removed by the standard filter of the heat pump system.
- Water quality check should be implemented before completing the installation of system. Detailed guide can be found in the table as below.

Water Contents	Value		
pH	7.5 ~ 9.0		
Conductivity	10 ~ 500 μ S/cm		
TDS (Total dissolved solids)	8 ~ 400 ppm		
Alkalinity (HCO_3^-)	60 ~ 300 (mg/L)		
Total hardness	4 ~ 8.5 °dH		
	71.4 ~ 151.7 (mg/L)		
Iron (Fe)	≤ 0.2 (mg/L)		
Sulphate (SO_4^{2-})	≤ 100 (mg/L)		
Nitrite (NO_3^-)	≤ 100 (mg/L)		
Free chlorine (Cl_2)	≤ 1 (mg/L)		
Chlorides (Cl^-)	ppm		
	pH7	15°C	STS316
		40°C	STS304
		60°C	
		80°C	
	pH9	15°C	3,000
		40°C	500
		60°C	200
		80°C	125
	pH9	15°C	18,000
		40°C	2,600
		60°C	1,000
		80°C	550
			700
			250
			170
			130

4. Water Control

4.2 Frost protection

■ Freezing Protection

- In areas of the country where entering water temperatures drop below specified temperature, the water pipe must be protected by using an approved antifreeze solution.
 - For Medium Temperature : below 15°C (59°F)
 - For High Temperature : below 0°C (32°F)
- Consult your AWHP unit or Hydro Kit unit supplier for locally approved solutions in your area.
- Calculate the approximate volume of water in the system. (Except the AWHP or Hydro Kit unit.) And add antifreeze solution to the total volume to allow for the water contained in AWHP unit or Hydro Kit unit.
- Circulate the water with the pump before dropping the temperature.

Anti freeze type	Minimum temperature for anti freezing(°C)					
	Med. Temp. : 15°C High Temp. : 0°C	-5	-10	-15	-20	-25
Methanol (%)	0	6	12	16	24	30
Ethylene glycol (%)	0	12	20	30	-	-
Propylene glycol (%)	0	17	25	33	-	-

<I> CAUTIONS

- Use only one of the above antifreeze.
- If a antifreeze is used, pressure drop and capability degradation of the system can occur.
- If one of antifreezes is used, corrosion can occur. So please add corrosion inhibitor.
- Please check the concentration of the antifreeze periodically to keep same concentration.
- When the antifreeze is used (for installation or operation), take care to ensure that antifreeze must not betouched.
- Ensure to respect all laws and norms of your country about Anti-freeze usage.
- When hydro kit is applied for cooling, the antifreeze must be added in the water circuit to prevent freezing.
- Set the DIP S/W and short key to Anti Freeze mode only after the addition of brine(Anti-freeze). Or else theproduct may get damage due to freezing and bursting.
- Do not add brine(Anti-freeze) to the water circuit when it is used for hot water.

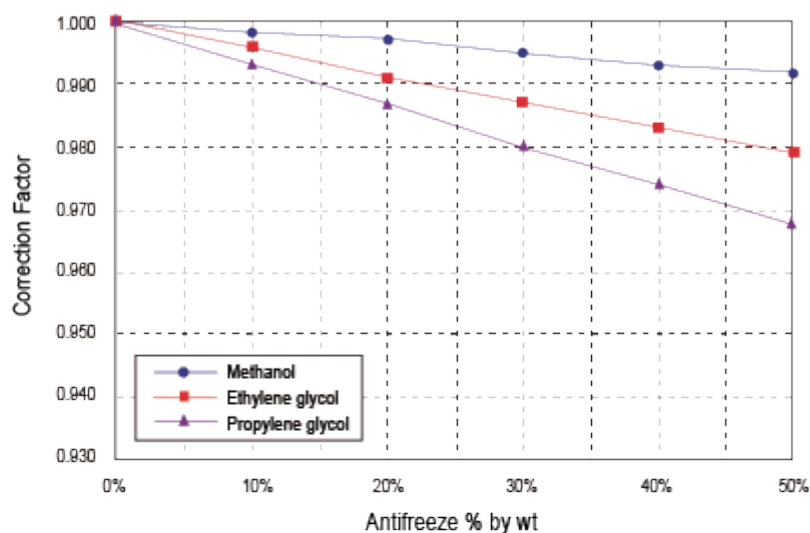
4. Water Control

4.3 Capacity correction factor by antifreeze

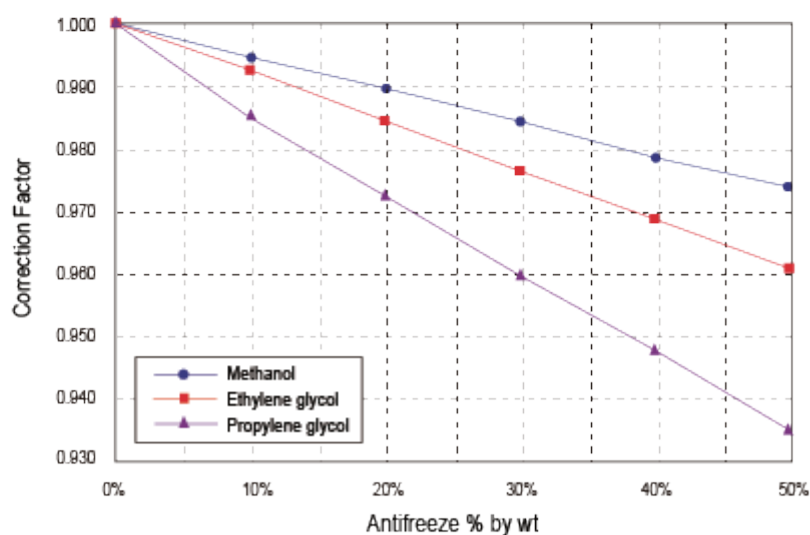
If a antifreeze is used, pressure drop and capability degradation of the system can be occurred. Refer to the next table.

Antifreeze Type	Correction Factor Item	Antifreeze % by wt				
		10%	20%	30%	40%	50%
Methanol	Cooling Capacity	0.998	0.997	0.995	0.993	0.992
	Heating Capacity	0.995	0.990	0.985	0.979	0.974
	Pressure Drop	1.023	1.057	1.091	1.122	1.160
Ethylene glycol	Cooling Capacity	0.996	0.991	0.987	0.983	0.979
	Heating Capacity	0.993	0.985	0.977	0.969	0.961
	Pressure Drop	1.024	1.068	1.124	1.188	1.263
Propylene glycol	Cooling Capacity	0.993	0.987	0.980	0.974	0.968
	Heating Capacity	0.966	0.973	0.960	0.948	0.935
	Pressure Drop	1.040	1.098	1.174	1.273	1.405

◆ Correction factor of cooling capacity



◆ Correction factor of heating capacity



5. Water Piping System

5.1 Water piping and water circuit connection

■ General Considerations

Followings should be considered before beginning water circuit connection

- Service space should be secured.
- Water pipes and connections should be cleaned using water.
- Space for installing external water pump should be provided if internal water pump capacity is not enough for installation field.
- Never connect electric power while proceeding water charging.

■ Water Piping and Water Circuit Connection

1. Definition of terms are as follow :

- Water piping : Installing pipes where water is flowing inside the pipe.
- Water circuit connecting : Making connection between the unit and water pipes or between pipes and pipes. Connecting valves or elbows are, for example, in this category.
- A buffer tank should be installed to reduce sudden load fluctuations.(Please refer to the product installation manual guide)

2. While installing water pipes, followings should be considered :

- While inserting or putting water pipes, close the end of the pipe with pipe cap to avoid dust entering.
- When cutting or welding the pipe, always be careful that inner section of the pipe should not be defective. For example, no weldments or no burrs are found inside the pipe.
- Drain piping should be provided in case of water discharge by the operation of the safety valve. This situation can be happened when the internal pressure is over 3.0 bar and water inside the unit will be discharged to drain hose.

3. While connecting water pipes, followings should be considered :

- Pipe fittings (e.g. L-shape elbow, T-shape tee, diameter reducer, etc) should be tightened strongly to be free from water leakage.
- Connected sections should be leakage-proof treatment by applying teflon tape, rubber bushing, sealant solution, etc.
- Appropriate tools and tooling methods should be applied to prevent mechanical breakage of the connections.
- Operation time of flow control valve(e.g. 3way valve or 2way valve) should be less than 90 seconds.
- Drain hose should be connected with drain piping.

■ Water condensation on the floor

If underfloor cooling is performed, it is very important to keep leaving water temperature higher than 16 °C. Otherwise, dew condensation can occur on the floor.If floor is in humid environment, do not set leaving water temperature below 18 °C.

■ Water condensation on the radiator

While cooling operation, cold water may not flow to the radiator. If cold water enters to the radiator, dew generation on the surface of the radiator can be occurred. Use 2way-valve to block circuits from cooling operation.

■ Water condensation on the floor

While cooling operation, condensed dew can drop down to the bottom of the unit. The condensing water must be sufficiently drained from the unit and dissipated frost-free.



Air Solution

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