



CONFIDENTIAL

# ***THERMA V***<sup>TM</sup>

## **AIR-TO-WATER HEAT PUMP**

### **SERVICE MANUAL**

### **(Exploded View)**

#### **CAUTION**

Before Servicing the unit, read the safety precautions in General SVC manual.  
Only for authorized service personnel.

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# 1. Model Information

With advanced inverter technology, **THERMA V™** is suitable for applications like under floor heating, under floor cooling, and hot water generation. By Interfacing to various accessories user can customize the range of the application.

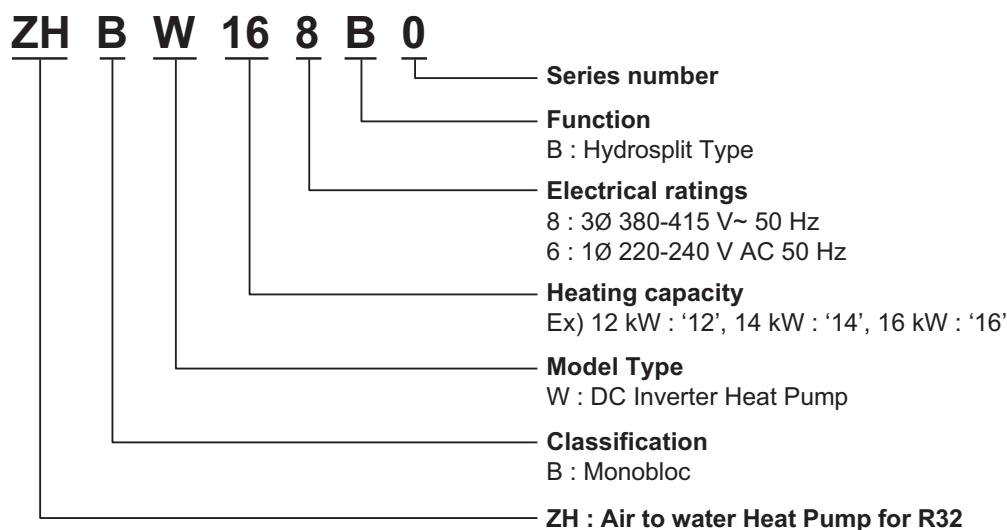
In this chapter, general information of **THERMA V™** is presented to identify the installation procedure. Before beginning installation, read this chapter carefully and find helpful information on installation.

## 1. Model Information

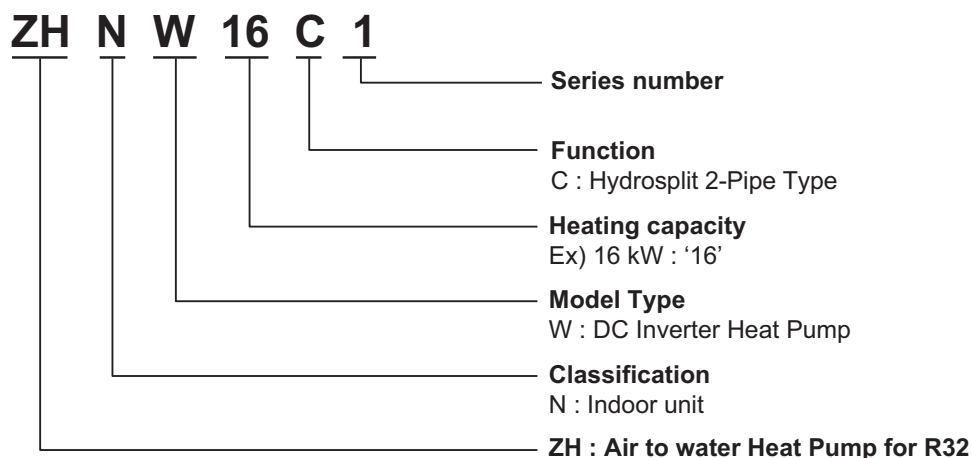
### Model number nomenclature

#### Factory Model Name

##### Outdoor Unit



##### Indoor Unit



- Additional Information : Serial number is refer to the barcode on the product.
- Max allowable pressure High side / Low side : 4.32 MPa / 2.4 MPa
- Refrigerant : R32

## Buyer Model Name

### Outdoor Unit

**H U 16 3 M R B U 3 0**

Series number

Platform (Chassis code)

3 : U60A Chassis

Classification

U : Outdoor unit

**B : Hydrosplit Type**

Refrigerant

R : R32

**M : Middle Temperature**

Electrical ratings

3 : 3Ø, 380-415 V AC 50 Hz

1 : 1Ø, 220-240 V AC 50 Hz

Heating capacity

Ex) 12 kW → '12', 14 kW → '14', 16 kW → '16'

Classification

U : Outdoor unit

**H : Air to water Heat Pump**

### Indoor Unit

**H N 16 0 0 M C N K 1**

Series number

Platform (Chassis code)

K : K1 Chassis

Classification

N : Indoor unit

**C : Hydrosplit 2-Pipe Type**

**M : Middle Temperature**

Heater capacity

0 : 0 kW Heater

Heater electrical ratings

0 : For both 1Ø, 220-240 V, 50 Hz and 3Ø, 380-415 V, 50 Hz

Heating capacity

Ex) 16 kW → '16'

Classification

N : Indoor unit

**H : Air to water Heat Pump**

- Additional Information : Serial number is refer to the barcode on the product.
- Max allowable pressure High side / Low side : 4.32 MPa / 2.4 MPa
- Refrigerant : R32



## Model name and related information

Model Name		Capacity		Power Source (Unit)
Phase	Capacity	Heating(kW)*1	Cooling(kW)*2	
1Ø	12 kW	12	12	220~240 V~ 50 Hz
	14 kW	14	14	
	16 kW	16	16	
3Ø	12 kW	12	12	380-415 V~ 50 Hz
	14 kW	14	14	
	16 kW	16	16	

\*1 : tested under EN 14511 Heating condition

(water out temperature 35°C at outdoor ambient temperature 7°C / 6°C)

\*2 : tested under EN 14511 Cooling condition

(water out temperature 18°C at outdoor ambient temperature 35°C / 24°C)

※ All appliances were tested at atmospheric pressure (1atm).

## 2. Specification

### Indoor

Indoor Unit				ZHNW16C1 [HN1600MC NK1]	
Operation Range (Leaving Water Temp.)	Cooling	Min. ~ Max.	°C DB	5 ~ 27	
	Heating	Min. ~ Max.	°C DB	15 ~ 65	
	DHW	Min. ~ Max.	°C DB	15 ~ 80	
Water Pump	Type		-	Canned type for hot water circulation	
	Model		-	GRUNDFOS UPML 20-105 CHBL	
	Motor Type		-	BLDC	
	Steps of Pumping Performance		-	Variable capacity 10% to 100%	
	Power input	Min. ~ Max.	W	3.5 ~ 140	
Flow Sensor	Type		-	Vortex	
	Model		-	SIKA VVX20	
	Measuring Range		Min. ~ Max.	5 ~ 80	
	Flow(Trigger point)		Min. ~ Max.	15	
Water Pressure Sensor	Model		-	Sensata OFM(2HMP)	
	Measuring Range	Min. ~ Max.	MPa(G)	0 ~ 2	
Expansion Vessel	Volume	Max.	~	8	
	Water pressure	Max.	bar	3	
		Pre-charged	bar	1	
Relief Valve	Pressure Limit	Upper Limit	bar	3.0	
Devices for Water Circuit			-	Relief valve / Flow sensor	
			-	Drain hose	
			-	Pressure sensor / Air vent valve	
Piping Connections	Water Circuit	Inlet	mm(inch)	Male PT 25.4(1)	
		Outlet	mm(inch)	Male PT 25.4(1)	
Wiring Connections		Communication Cable (H07RN-F) (included Earth)	mm² × cores	0.75 x 4	
Sound Power Level		Heating	Rated	dB(A)	44
Dimensions		Net	W × H × D	mm	490 × 850 × 315
		Shipping	W × H × D	mm	563 ×1082 × 375
Weight		Net		kg	30.5
		Shipping		kg	34.5

#### 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 Level Values are measured at Noise Measuring chamber accordance with standard. Therefore, these values depend on the ambient conditions and values are normally higher in actual operation.
- Performances are based on the following conditions :
  - Cooling : Inlet/Outlet Water Temp. 23°C/18°C, Outdoor Air Temp. 35°CDB / 24°CWB
  - Heating : Inlet/Outlet Water Temp. 30°C/35°C, Outdoor Air Temp. 7°CDB / 6°CWB
  - Interconnected Pipe Length is standard length and difference of Elevation (Outdoor ~ Indoor Unit) is Zero.
- This product contains Fluorinated greenhouse gases.
- Sound Performances are based on the following conditions.
  - Sound Power Level : Measured according to EN14825.
  - Sound Pressure Level : Calculated value according to distance of sound power.

## Outdoor (1Ø)

Nominal Capacity and Nominal Input					ZHBW126B0 [HU121MRB U30]	ZHBW146B0 [HU141MRB U30]	ZHBW166B0 [HU161MRB U30]
-	-	Outdoor Temp. (°C) DB / WB	Leaving Water Temp. (°C)	-			
Capacity	Cooling	35 / 24	18	kW	12.00	14.00	16.00
			7	kW	12.00	14.00	16.00
	Heating	7 / 6	35	kW	12.00	14.00	16.00
			55	kW	11.00	11.50	12.00
		2 / 1	35	kW	11.00	12.00	13.80
Power Input	Cooling	35 / 24	18	kW	2.53	3.26	4.00
			7	kW	4.44	5.38	6.40
	Heating	7 / 6	35	kW	2.38	2.86	3.33
			55	kW	3.79	4.04	4.29
		2 / 1	35	kW	3.01	3.31	3.83
EER	Cooling	35 / 24	18	W/W	4.75	4.30	4.00
			7	W/W	2.70	2.60	2.50
COP	Heating	7 / 6	35	W/W	5.04	4.89	4.80
			55	W/W	2.90	2.85	2.80
		2 / 1	35	W/W	3.65	3.63	3.60
SCOP (Low temp. Average Climate)					4.60	4.57	4.55
SCOP (High temp. Average Climate)					3.50	3.47	3.45
Rated Water Flow Rate (at LWT 35 °C)				LPM	34.5	40.3	46.0

Electrical Specifications			ZHBW126B0 [HU121MRB U30]	ZHBW146B0 [HU141MRB U30]	ZHBW166B0 [HU161MRB U30]
Power Supply		V, Ø, Hz	220-240, 1, 50	220-240, 1, 50	220-240, 1, 50
Peak Control Running Current	Cooling	A	23.0	24.0	25.0
	Heating	A	23.0	24.0	25.0
Rated Running Current	Cooling	A	11.2	14.4	17.8
	Heating	A	10.6	12.7	14.8
Circuit Breaker		A	40.0	40.0	40.0
Wiring Connections	Power Supply Cable (included Earth, H07RN-F)	mm <sup>2</sup> × cores	6.0 × 3	6.0 × 3	6.0 × 3

Technical Specifications				ZHBW126B0 [HU121MRB U30]	ZHBW146B0 [HU141MRB U30]	ZHBW166B0 [HU161MRB U30]
Sound Power Level	Heating	Max.	dB(A)	67	68	69
		Rated	dB(A)	61	62	63
		Silent	dB(A)	60	60	60
Dimensions	Net	W × H × D	mm	950 × 1,380 × 330	950 × 1,380 × 330	950 × 1,380 × 330
	Shipping	W × H × D	mm	1,140 × 1,462 × 461	1,140 × 1,462 × 461	1,140 × 1,462 × 461
Weight	Net		kg	91.7	91.7	91.7
	Shipping		kg	104.7	104.7	104.7

Outdoor Units				ZHBW126B0 [HU121MRB U30]	ZHBW146B0 [HU141MRB U30]	ZHBW166B0 [HU161MRB U30]
Operation Range (Outdoor Temp.)	Cooling	Min. ~ Max.	°C DB	5 ~ 48	5 ~ 48	5 ~ 48
	Heating	Min. ~ Max.	°C DB	-25 ~ 35	-25 ~ 35	-25 ~ 35
Compressor	Type		-	Hermetic Sealed Scroll	Hermetic Sealed Scroll	Hermetic Sealed Scroll
	Model		Model × No.	RJB036MAA × 1	RJB036MAA × 1	RJB036MAA × 1
	Motor Type		-	BLDC	BLDC	BLDC
	Displacement		cm <sup>3</sup> /Rev.	31.6	31.6	31.6
Refrigerant	Type		-	R32	R32	R32
	GWP (Global Warming Potential)		-	675.0	675.0	675.0
	Precharged Amount		g	2,100	2,100	2,100
	t-CO2 eq.		-	1.418	1.418	1.418
	Control		-	Electronic Expansion Valve	Electronic Expansion Valve	Electronic Expansion Valve
Refrigerant Oil	Type		-	FW68D	FW68D	FW68D
	Charged Volume		cc × No.	1,100	1,100	1,100
Heat Exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube
	Quantity		-	2	2	2
	Specification	Row	EA	2	2	2
		Column	EA	32	32	32
		FPI	EA	14	14	14
Plate Heat Exchanger	Type		-	Brazed Plate HEX	Brazed Plate HEX	Brazed Plate HEX
	Quantity		-	1	1	1
	Number of Plate		EA	76	76	76
Strainer	Mesh size		-	30 mesh	30 mesh	30 mesh
	Material		-	Stainless Steel	Stainless Steel	Stainless Steel
Fan	Type		-	Propeller	Propeller	Propeller
	Air Flow Rate	Rated	m <sup>3</sup> /min × No.	76.3 × 2	76.3 × 2	76.3 × 2
Fan Motor	Type		-	BLDC	BLDC	BLDC
	Output		W × No.	124 × 2	124 × 2	124 × 2

**Note :**

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3. Sound Level Values are measured at Noise Measuring chamber accordance with standard. Therefore, these values depend on the ambient conditions and values are normally higher in actual operation.
4. Performances are based on the following conditions :
  - Cooling : Inlet/Outlet Water Temp. 23°C/18°C, Outdoor Air Temp. 35°CDB / 24°CWB
  - Heating : Inlet/Outlet Water Temp. 30°C/35°C, Outdoor Air Temp. 7°CDB / 6°CWB
  - Interconnected Pipe Length is standard length and difference of Elevation (Outdoor ~ Indoor Unit) is Zero.
5. This product contains Fluorinated greenhouse gases.
6. Sound Performances are based on the following conditions.
  - Sound Power Level : Measured according to EN14825.
  - Sound Pressure Level : Calculated value according to distance of sound power.

## Outdoor (3Ø)

Nominal Capacity and Nominal Input					ZHBW128B0 [HU123MRB U30]	ZHBW148B0 [HU143MRB U30]	ZHBW168B0 [HU163MRB U30]
-	-	Outdoor Temp. (°C) DB / WB	Leaving Water Temp. (°C)	-			
Capacity	Cooling	35 / 24	18	kW	12.00	14.00	16.00
			7	kW	12.00	14.00	16.00
	Heating	7 / 6	35	kW	12.00	14.00	16.00
			55	kW	11.00	11.50	12.00
		2 / 1	35	kW	11.00	12.00	13.80
Power Input	Cooling	35 / 24	18	kW	2.53	3.26	4.00
			7	kW	4.44	5.38	6.40
	Heating	7 / 6	35	kW	2.38	2.86	3.33
			55	kW	3.79	4.04	4.29
		2 / 1	35	kW	3.01	3.31	3.83
EER	Cooling	35 / 24	18	W/W	4.75	4.30	4.00
			7	W/W	2.70	2.60	2.50
COP	Heating	7 / 6	35	W/W	5.04	4.89	4.80
			55	W/W	2.90	2.85	2.80
		2 / 1	35	W/W	3.65	3.63	3.60
SCOP (Low temp. Average Climate)					4.60	4.57	4.55
SCOP (High temp. Average Climate)					3.50	3.47	3.45
Rated Water Flow Rate (at LWT 35 °C)				LPM	34.5	40.3	46.0

Electrical Specifications			ZHBW128B0 [HU123MRB U30]	ZHBW148B0 [HU143MRB U30]	ZHBW168B0 [HU163MRB U30]
Power Supply		V, Ø, Hz	380-415, 3, 50	380-415, 3, 50	380-415, 3, 50
Peak Control Running Current	Cooling	A	8.0	9.0	10.0
	Heating	A	8.0	9.0	10.0
Rated Running Current	Cooling	A	3.7	4.8	5.9
	Heating	A	3.5	4.2	4.9
Circuit Breaker		A	16.0	16.0	16.0
Wiring Connections	Power Supply Cable (included Earth, H07RN-F)	mm <sup>2</sup> × cores	2.5 × 5	2.5 × 5	2.5 × 5

Technical Specifications				ZHBW128B0 [HU123MRB U30]	ZHBW148B0 [HU143MRB U30]	ZHBW168B0 [HU163MRB U30]
Sound Power Level	Heating	Max.	dB(A)	67	68	69
		Rated	dB(A)	61	62	63
		Silent	dB(A)	60	60	60
Dimensions	Net	W × H × D	mm	950 × 1,380 × 330	950 × 1,380 × 330	950 × 1,380 × 330
	Shipping	W × H × D	mm	1,140 × 1,462 × 461	1,140 × 1,462 × 461	1,140 × 1,462 × 461
Weight	Net		kg	91.7	91.7	91.7
	Shipping		kg	104.7	104.7	104.7

## Specification

Outdoor Units				ZHBW128B0 [HU123MRB U30]	ZHBW148B0 [HU143MRB U30]	ZHBW168B0 [HU163MRB U30]
Operation Range (Outdoor Temp.)	Cooling	Min. ~ Max.	°C DB	5 ~ 48	5 ~ 48	5 ~ 48
	Heating	Min. ~ Max.	°C DB	-25 ~ 35	-25 ~ 35	-25 ~ 35
Compressor	Type		-	Hermetic Sealed Scroll	Hermetic Sealed Scroll	Hermetic Sealed Scroll
	Model		Model × No.	RJB036MAA × 1	RJB036MAA × 1	RJB036MAA × 1
	Motor Type		-	BLDC	BLDC	BLDC
	Displacement		cm <sup>3</sup> /Rev.	31.6	31.6	31.6
Refrigerant	Type		-	R32	R32	R32
	GWP (Global Warming Potential)		-	675.0	675.0	675.0
	Precharged Amount		g	2,100	2,100	2,100
	t-CO <sub>2</sub> eq.		-	1.418	1.418	1.418
	Control		-	Electronic Expansion Valve	Electronic Expansion Valve	Electronic Expansion Valve
Refrigerant Oil	Type		-	FW68D	FW68D	FW68D
	Charged Volume		cc × No.	1,100	1,100	1,100
Heat Exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube
	Quantity		-	2	2	2
	Specification	Row	EA	2	2	2
		Column	EA	32	32	32
		FPI	EA	14	14	14
Plate Heat Exchanger	Type		-	Brazed Plate HEX	Brazed Plate HEX	Brazed Plate HEX
	Quantity		-	1	1	1
	Number of Plate		EA	76	76	76
Strainer	Mesh size		-	30 mesh	30 mesh	30 mesh
	Material		-	Stainless Steel	Stainless Steel	Stainless Steel
Fan	Type		-	Propeller	Propeller	Propeller
	Air Flow Rate	Rated	m <sup>3</sup> /min × No.	76.3 × 2	76.3 × 2	76.3 × 2
Fan Motor	Type		-	BLDC	BLDC	BLDC
	Output		W × No.	124 × 2	124 × 2	124 × 2

### Note :

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  - Heating : Inlet/Outlet Water Temp. 30°C/35°C, Outdoor Air Temp. 7°CDB / 6°CWB
  - Interconnected Pipe Length is standard length and difference of Elevation (Outdoor ~ Indoor Unit) is Zero.
5. This product contains Fluorinated greenhouse gases.
6. Sound Performances are based on the following conditions.
  - Sound Power Level : Measured according to EN14825.
  - Sound Pressure Level : Calculated value according to distance of sound power.

## 3. Functions

### Basic functions of Unit

#### Note

1. O : Applied, X : Not applied

Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separate package.

#### Indoor Unit

Category	Functions	ZHNW16C1 [HN1600MC NK1]
Installation	Backup heater (Operation)	O (Accessory)
Reliability	Self diagnosis	O
	Auto Restart	O
	Child lock	O
Convenience	Sleep mode	O
	Timer (on/off)	O
	Timer (weekly)	O
	Two thermistor control	X
Network function	Network solution(LGAP)	O
	Modbus connectivity (without gateway)	O
	Anti-condensation on floor (cooling)	O
	Digital output for external pump	O
	Flow sensor	O
	Thermostat interface (230V AC)	O
	Thermostat interface (24V AC)	X
	DHW(Domestic Hot Water) tank kit	O (Accessory)
	Therma V solar kit	O (3rd party Accessory)
	PHEX anti-freezing control	O
	Water pump anti-stuck function	O
	Weather compensation for heating and cooling (Auto mode)	O
	Low noise operation	O
Air to Water Heat Pump Functions	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	O
	Integrated Dry Contact (CN-EXT)	O
	Water flow control	O
	Water pressure sensor	O
	Energy Monitoring	O
	DHW Recirculation	O

#### Outdoor Unit

Category	Functions	ZHBW126B0 [HU121MRB U30] ZHBW146B0 [HU141MRB U30] ZHBW166B0 [HU161MRB U30]	ZHBW128B0 [HU123MRB U30] ZHBW148B0 [HU143MRB U30] ZHBW168B0 [HU163MRB U30]
	Defrost / Deicing	O	O
	High pressure switch	O	O
	Low pressure switch	X	X
Reliability	Phase protection	X	O
	Restart delay (3-minutes)	O	O
	Self diagnosis	O	O
	Soft start	O	O
	Test function	X	X
	Wiring Error Check	X	X
Convenience	Peak Control	O	O
	Mode Lock	O	O
	Low noise operation	O	O
	Forced Cooling Operation (Outdoor Unit)	X	X
	Base Pan Heater	O	O
Network function	Network solution(LGAP)	O (Accessory)	O (Accessory)

## Accessory Compatibility List

### Indoor unit

Category		Product	Remark	ZHNW16C1 [HN1600MC NK1]
Wired Remote Controller	Standard	PREMTW101	New standard (White)	O
Dry Contact	Simple Contact	PDRYCB000	Simple Dry Contact	O
	Communication Type	PDRYCB400	2 Points Dry Contact (For Setback)	X
		PDRYCB300	For 3rd party Thermostat	O
		PDRYCB500	Dry Contact for Modbus	X
ETC	Remote temperature sensor	PQRSTA0	-	O
	Group control wire	PZCWRCG3	0.25 m	X
	2-Zone Control Wire	PZCWRC2	0.25 m	O
	Extension wire	PZCWRC1	10 m	O
	Wi-Fi controller *	PWFMDD200	USB Cable : 0.6 m Extension cable : 0.5 m	O
	Meter Interface Module	PENKTH000	Interface between IDU and Meter	O
	2 Zone Valve Controller	PZNVVB200	-	O
	Cover plate	PDC-HK10	For K1 Chassis only	O
Accessory Kit for AWHP	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 Split	O
		PHLTB	For Monobloc	X
	DHW sensor	PHRSTA0	included in PHLTA kit	O
	Mixing Valve	OSHA-MV	3/4" DN20	O
		OSHA-MV1	1" DN20	O
	Backup heater	AHEH066C [HA061C E1]	220~240 V, 1Ø	O
		AHEH068C [HA063C E1]	380~415 V, 3Ø	O
	3way valve	OSHA-3V	-	O
	Solar thermal kit	PHLLA	-	O
	Thermistor for 2nd Circuit or E/Heater	PRSTAT5K10	-	O
	Drain pan	PHDPB	-	X
		PHDPC	-	O

#### Note :

1. O: Possible, X: Impossible, -: Not applicable
2. \*: Some advanced functions controlled by individual controller cannot be operated.
3. \*\*: ACP, AC Smart, ACP BACnet or ACP Lonworks is needed.
4. If you need more detail, please refer to the manual of product. (<http://partner.lge.com/global> : Home> Doc.Library> Product > Control(BECON))  
\*\*\* Meter interface cannot be connected at the same time with 3rd-party controller.

### Outdoor unit

Category		Product	Remark	ZHBW126B0 [HU121MRB U30] ZHBW146B0 [HU141MRB U30] ZHBW166B0 [HU161MRB U30] ZHBW128B0 [HU123MRB U30] ZHBW148B0 [HU143MRB U30] ZHBW168B0 [HU163MRB U30]
Central Controller	AC EZ	PQCSZ250S0	AC EZ	X
	AC Ez Touch	PACEZA000	AC Ez Touch	O
	AC Smart	PACS4B000	AC Smart IV	O
		PACS5A000	AC Smart 5	O
	ACP	PACP4B000	ACP IV	O
		PACP5A000	ACP 5	O
	AC Manager **	PACM4B000	AC Manager IV	O
		PACM5A000	AC Manager 5	O
Gateway	Cloud Gateway	PWFMDB200	Cloud Gateway	O
	IDU PI485	PHNFP14A0	Without case	X
		PSNFP14A0	With case	X
	ODU PI485	PP485A00T	PI 485 Gateway	O
	BACnet	PQNFB17C0	ACP BACnet	O
	Lonworks	PLNWKB000	ACP Lonworks	O
	Modbus	PMBUSB00A	-	O

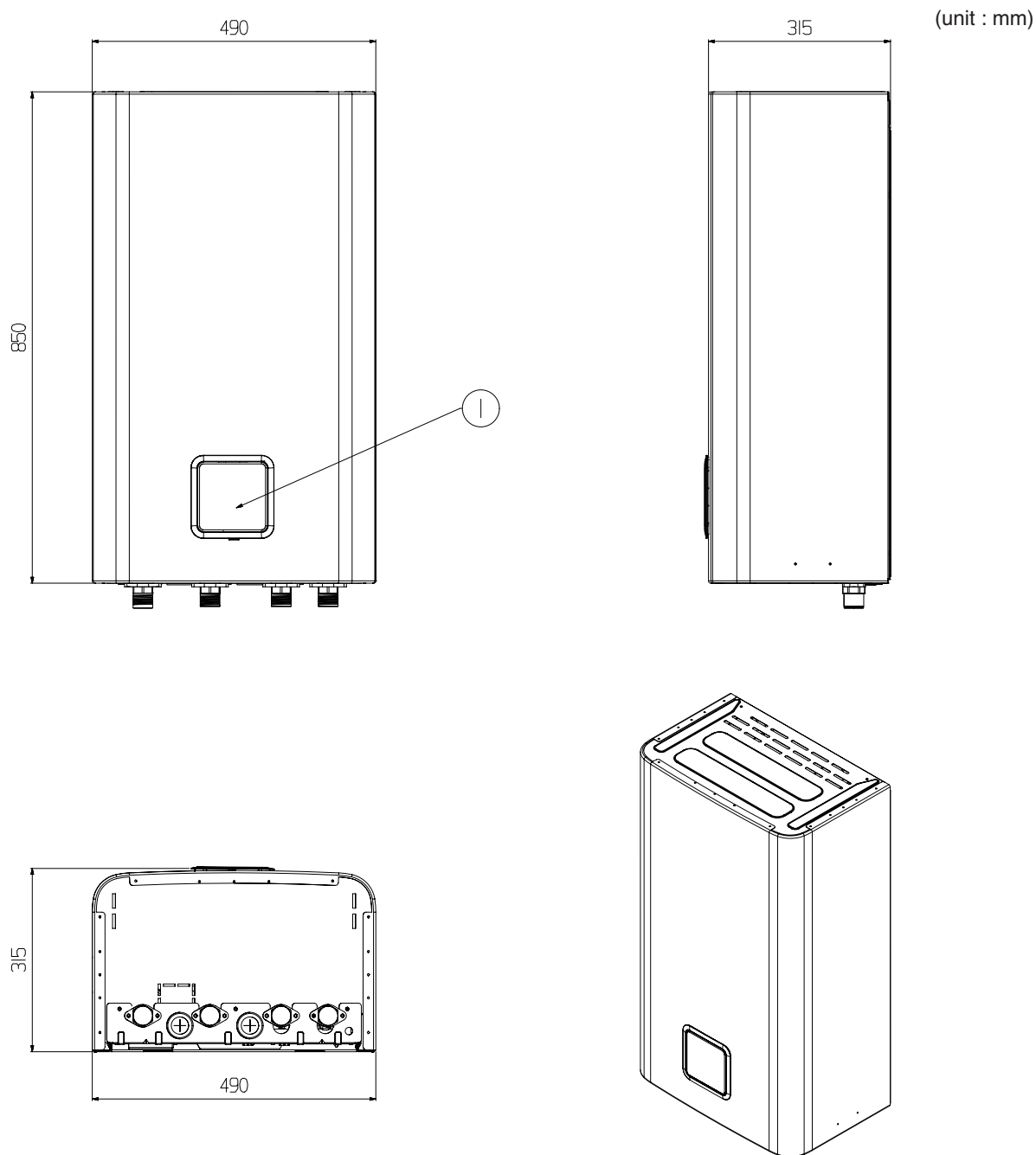
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## 4. Components

### Indoor unit : External

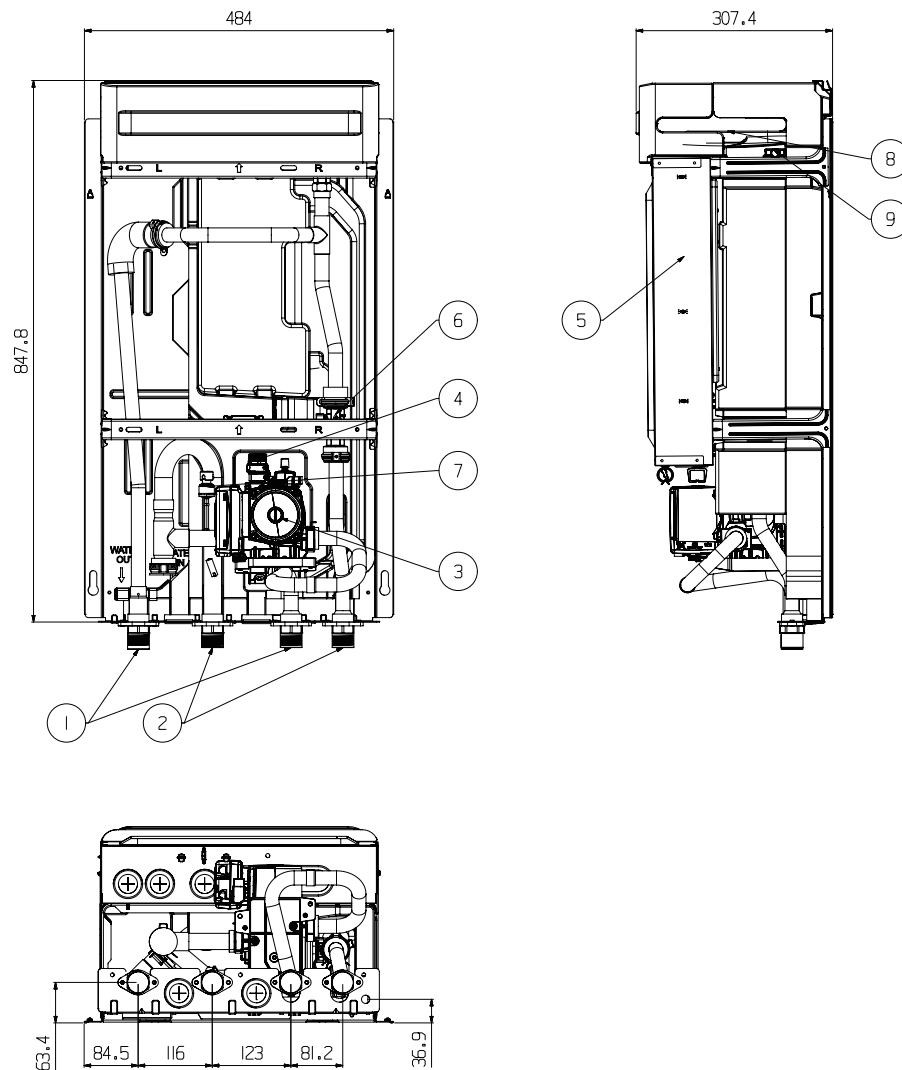


### Description

No	Name	Remark
1	Control Panel	Built-in Remote Controller

## Indoor unit : Internal

(unit : mm)

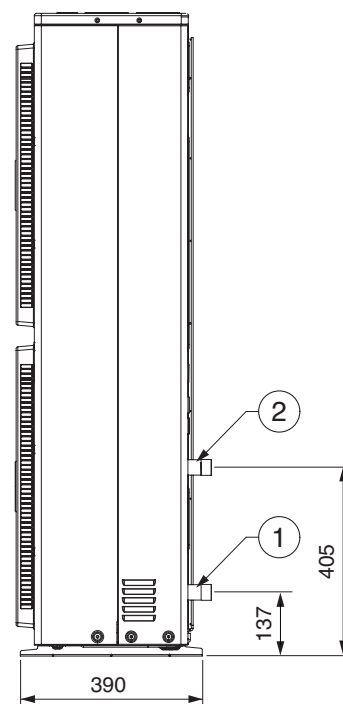
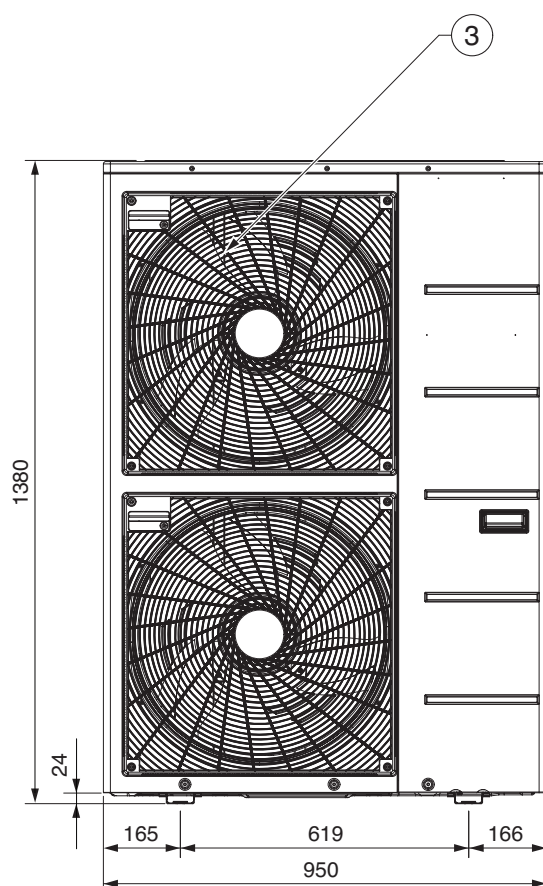
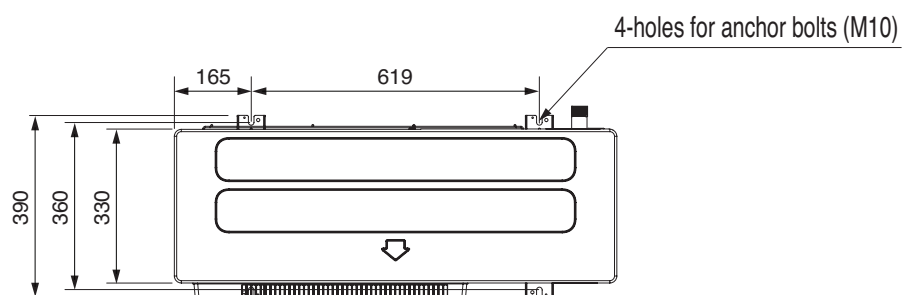


### Description

No	Name	Remark
1	Leaving Water Pipe	Male PT 1 inch
2	Entering Water Pipe	Male PT 1 inch
3	Water Pump	Circulating the water
4	Safety Valve	Open at water pressure 3 bar
5	Control Box	PCB and terminal blocks
6	Flow Sensor	Range : 5 ~ 80 L/min
7	Pressure Sensor	Indicates circulating water pressure
8	Expansion Tank	Absorbing Volume change of heated water
9	Air Vent	Air Pumping when Charging water

## Outdoor unit : External

(unit : mm)

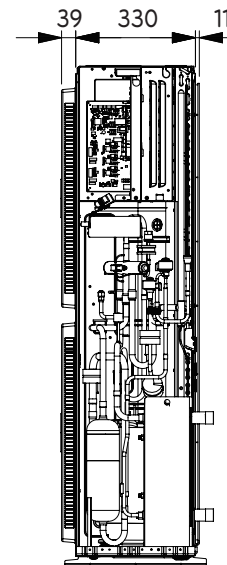
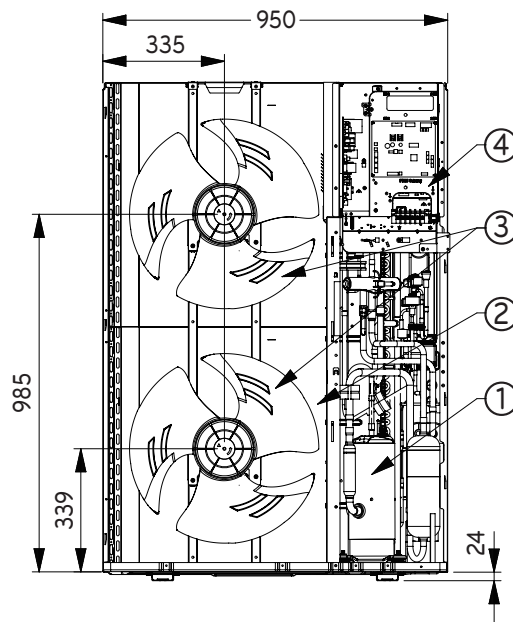
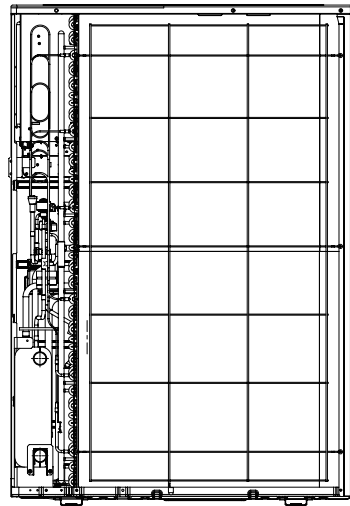


## Description

No	Name
1	Entering Water Pipe
2	Leaving Water Pipe
3	Air discharge Grille

## Outdoor unit : Internal

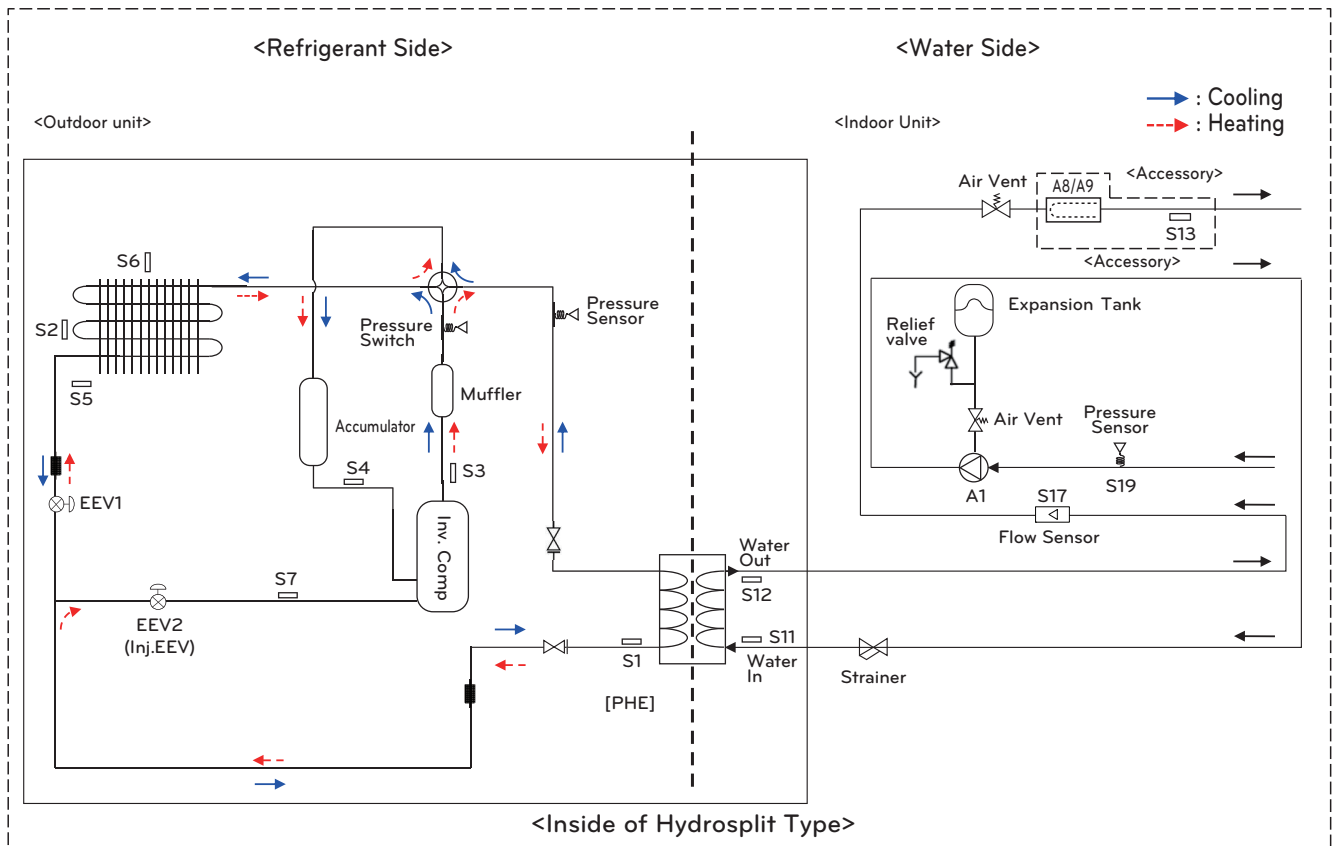
(unit : mm)



### Description

No	Name	Remark
1	Compressor	Increase pressure of the refrigerant.
2	Fin tube Heat Exchanger	Heat exchange between refrigerant and air.
3	Fan	Circulating the air.
4	Control Box	PCB and terminal blocks.

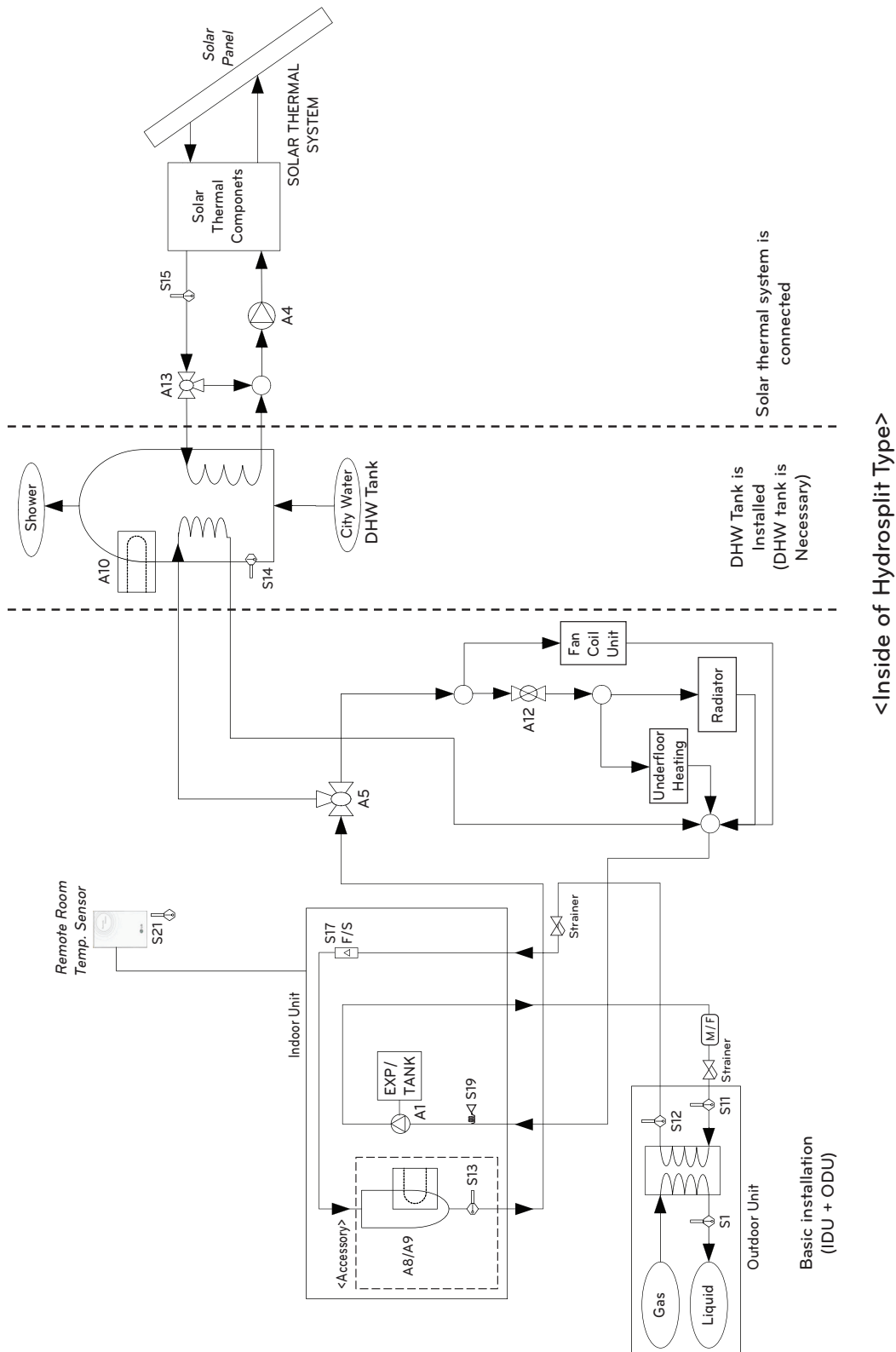
## 5. Cycle Diagrams



### Description

Category	Symbol	Meaning	PCB Connector
Refrigerant side	S1	PHEX liquid temperature sensor	CN_PIPE_IN
	S2	Outdoor-HEX middle temperature sensor	CN_MID
	S3	Compressor-discharge pipe temperature sensor	CN_DISCHARGE
	S4	Compressor-suction pipe temperature sensor	CN_SUCTION
	S5	Outdoor-HEX temperature sensor	CN_C_PIPE
	S6	Outdoor air temperature sensor	CN_AIR
	S7	Compressor-injection pipe temperature sensor	CN_VI_IN
	EEV1	Electronic Expansion Valve (Heating/Cooling)	CN_EEV1
	EEV2	Electronic Expansion Valve (Injection)	CN_EEV_MAIN
Water Side	S12	Outlet water temperature sensor	CN_WATER_OUT
	S11	Inlet water temperature sensor	CN_WATER_IN
	S13	Backup heater outlet sensor	CN_TH3
	S17	Flow sensor	CN_F_SENSOR
	S19	Water pressure sensor	CN_H2O_PRESS
	A1	Main Water Pump	CN_PUMP_A1 CN_MOTOR1
	A8	Electric backup heater (1Ø, Optional accessory)	CN_HEATER_PCB
	A9	Electric backup heater (3Ø, Optional accessory)	HEATER1

## 6. Piping Diagrams

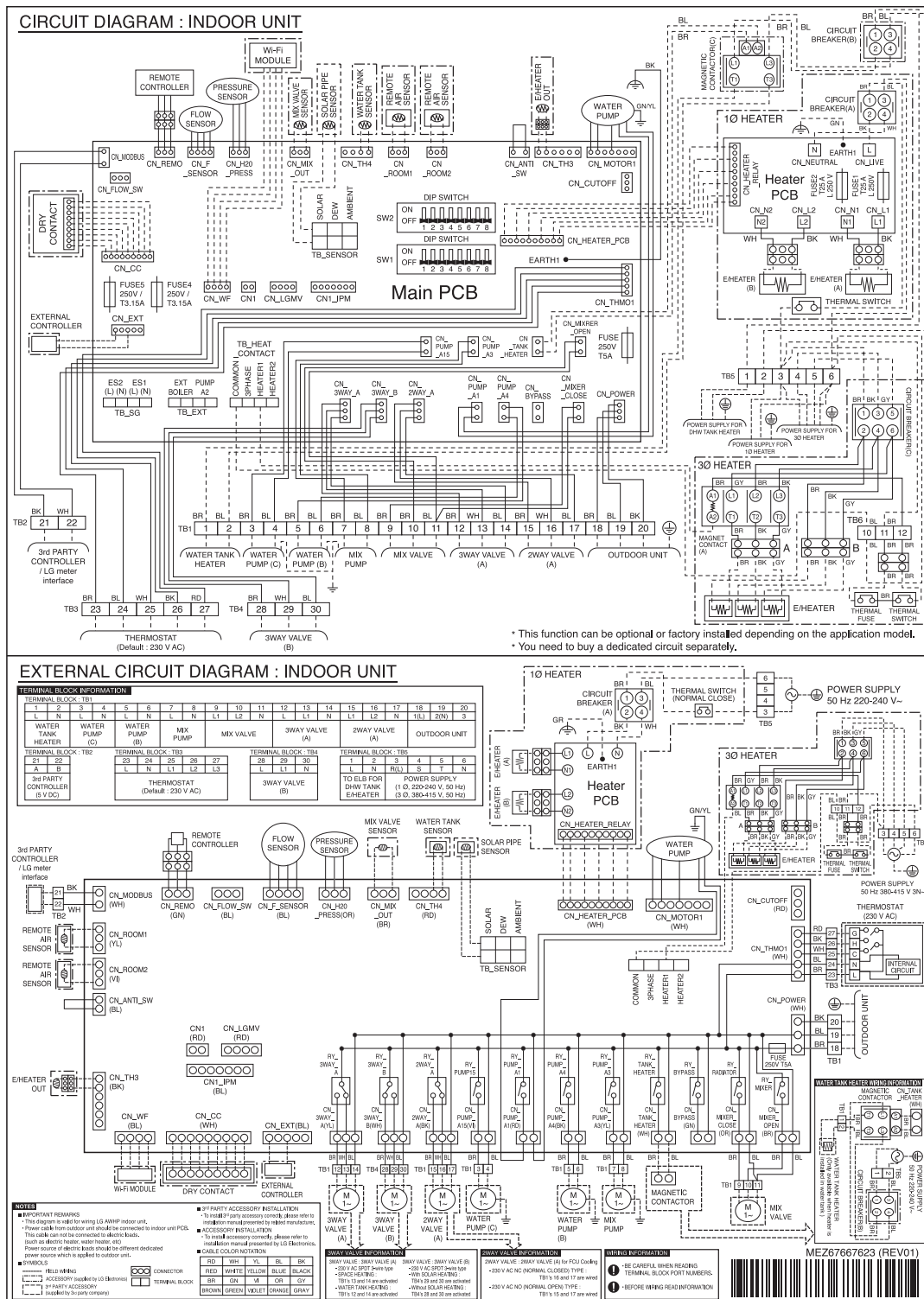


**Description**

Category	Symbol	Meaning	PCB Connector	Remarks
Outdoor Unit	S1	Refrigerant temperature sensor (Liquid side)	CN_PIPE_IN	Meaning is expressed based on Cooling mode.
	S12	Outlet water temperature sensor	CN_WATER_OUT	Leaving water temperature sensor
	S11	Inlet water temperature sensor	CN_WATER_IN	Entering water temperature sensor
	M/F	Magnetic Filter	(No connector)	- 3rd party accessory and Field installation (sold separately) - It is strongly recommended to install an additional filter on the heating water circuit
Indoor Unit	S19	Entering Water Pressure sensor	CN_H2O_PRESS	
	A8 / A9	Backup heater	(No connector)	- Optional accessory (sold separately) - HA061B E1 : 1Ø, HA063B E1 : 3Ø
	S13	Outlet sensor of backup heater	CN_TH3	- Accessory supplied with Backup heater
	A1	Internal Water Pump	CN_MOTOR1 CN_PUMP_A1	- Water Pump is connected at CN_MOTOR1 and CN_PUMP_A1
	A2	External Pump	TB_EXT(PUMP A2)	- voltage-free contact - External water pump if head of internal pump is not sufficient or if parallel buffer tank is used
	EXP/TANK	Expansion Tank	(No connector)	- Absorb volume change of heated water.
	S17	Flow sensor	CN_F_SENSOR	- To monitor water flow rate in the system
	S21	Remoted Air temperature sensor	CN_ROOM2	- Optional accessory (sold separately) - PQRSTA0
	CTR/PNL	Control Panel (or 'Remote Controller')	CN_REMO	- Pre built-in at indoor unit
	A12	To control water flow for Fan Coil Unit	CN_2WAY_A	- 3 <sup>rd</sup> party accessory and Field installation (sold separately) - 2 wire NO and NC type 2way valve is supported
Water Heating	W/TANK	DHW Tank	(No connector)	- 3 <sup>rd</sup> party accessory and Field installation (sold separately) - Generating and storing DHW by AWHF or built-in electric heater
	A10	Booster Heater	CN_TANK_HEATER	- 3 <sup>rd</sup> party accessory and Field installation (usually built-in at W/TANK) - Supplying additional water heating capacity
	A5	- Flow control for water which is leaving from indoor unit. - Flow direction switching between underfloor and water tank.	CN_3WAY_A	- 3 <sup>rd</sup> party accessory and Field installation (sold separately)
	CITY WATER	Water to be heated by indoor unit and B/HT of W/TANK	(No connector)	- Field installation
	SHOWER	Water supplied to end-user	(No connector)	- Field installation
	S14	W/TANK water temperature sensor	CN_TH4	- S14 are connected at 4 pin type connector CN_TH4 - S14 is a part of DHW tank kit (Model : PHLTA)
Solar Heating	S15	Solar-heated water temperature sensor	TB_SENSOR SOLAR	- 3rd party accessory and Field installation (sold separately) - PT1000
	A13	- Flow control for water which is heated and circulated by SOLAR THERMAL SYSTEM. - Flow direction switching between SOLAR THERMAL SYSTEM and W/TANK	CN_3WAY_B	- 3 <sup>rd</sup> party accessory and Field installation (sold separately) - SPDT type 3way valve is supported
	A4	Solar collector pump	CN_PUMP_A4	- 3 <sup>rd</sup> party accessory and Field installation (sold separately) - If water pump of SOLAR THERMAL SYSTEM is incapable of circulation, external water pump can be used.
	SOLAR THERMAL SYSTEM	- This system can include following components : Solar panel, Sensor, Thermostats, Interim heat exchanger, Water pump, etc.	(No connector)	- 3 <sup>rd</sup> party accessory and Field installation (sold separately)

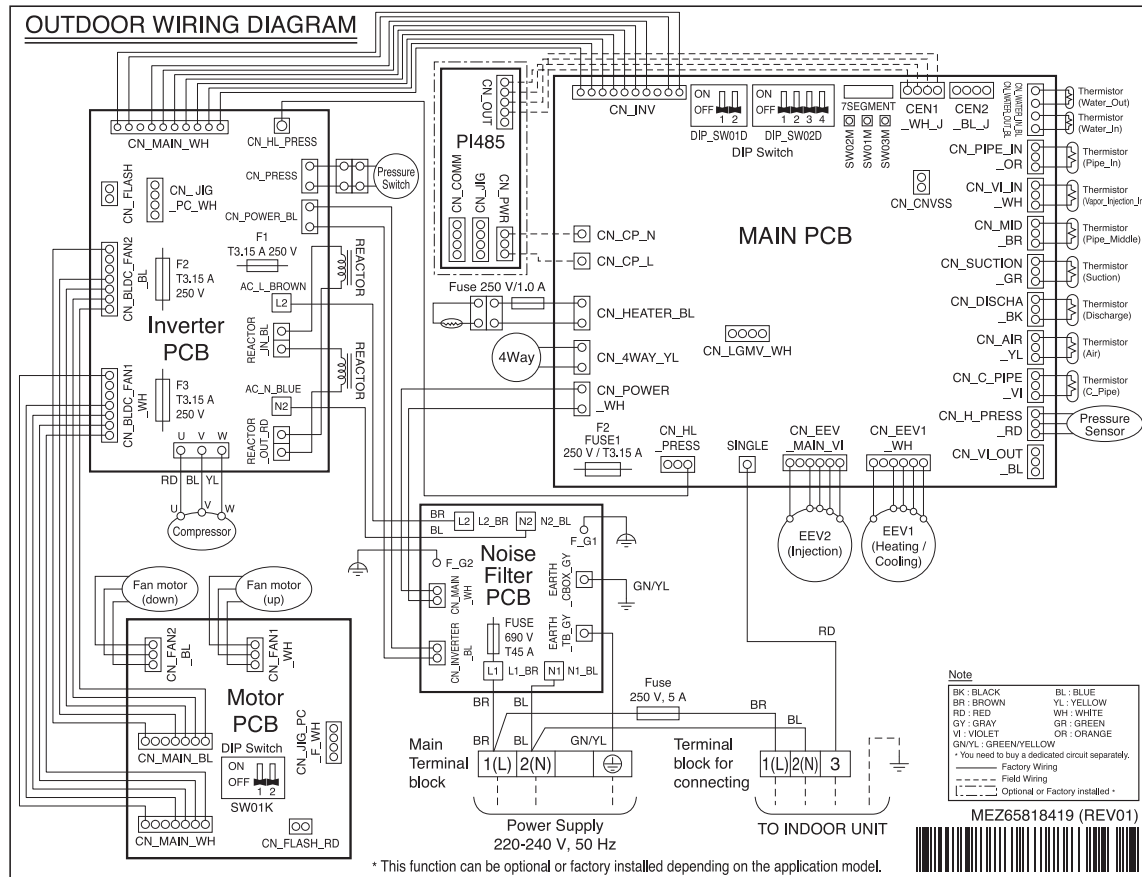
# 7. Wiring Diagrams

## Indoor Unit(Including field wiring) : K1 Chassis, 1Ø, 3Ø

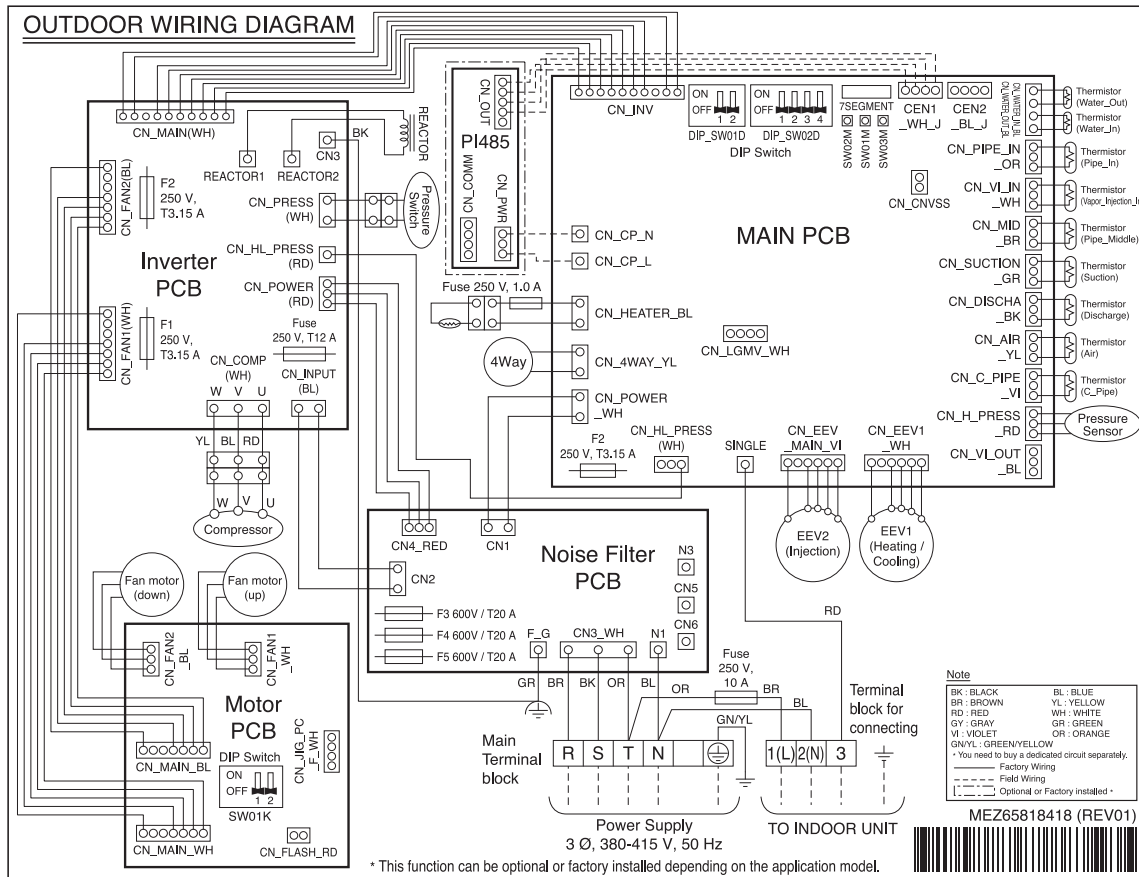




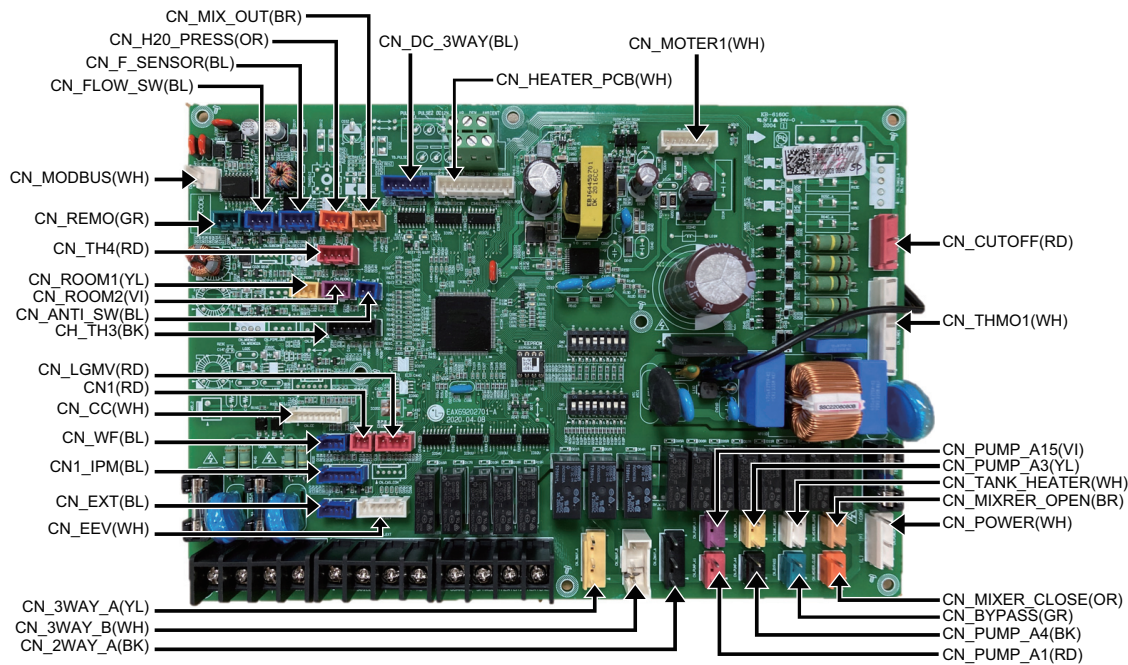
**Outdoor Unit(Including field wiring) : U60A Chassis, 1Ø**



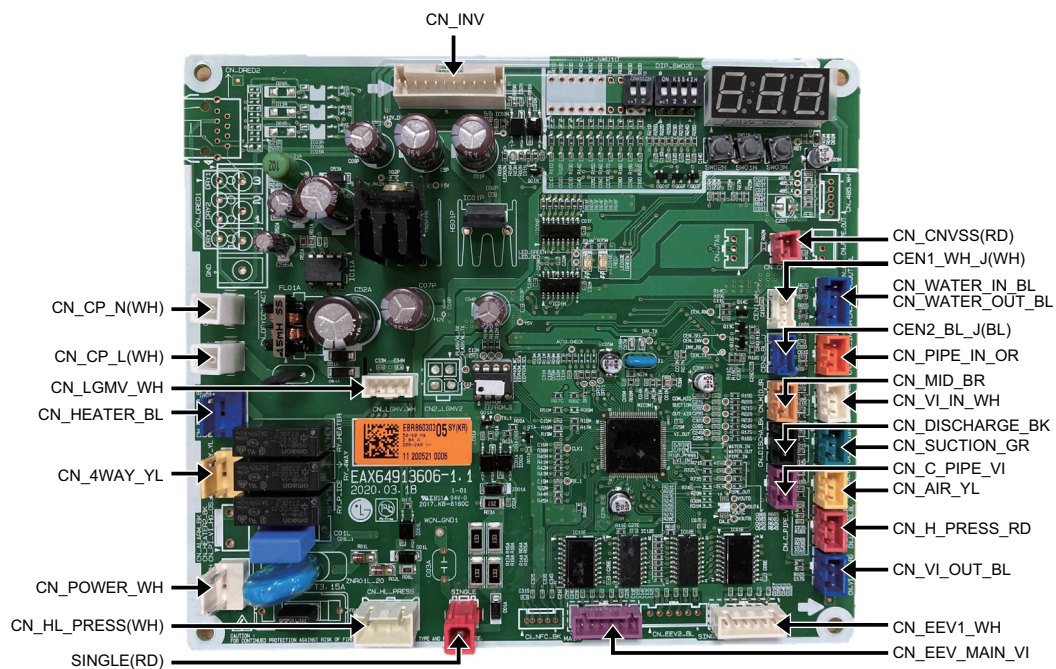
# Outdoor Unit(Including field wiring) : U60A Chassis, 3Ø



## Indoor PCB

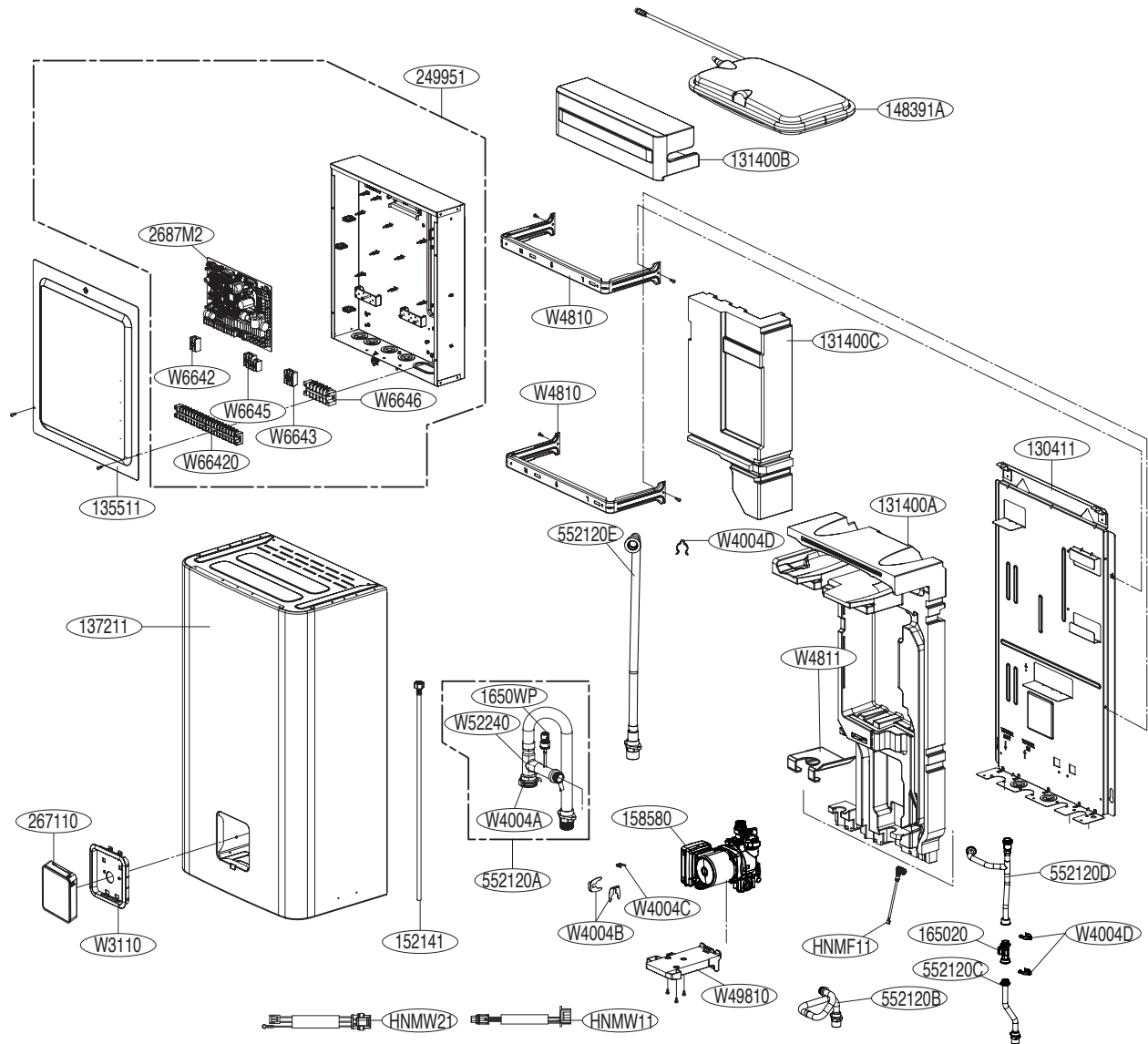


## Outdoor PCB



## 8. Exploded View

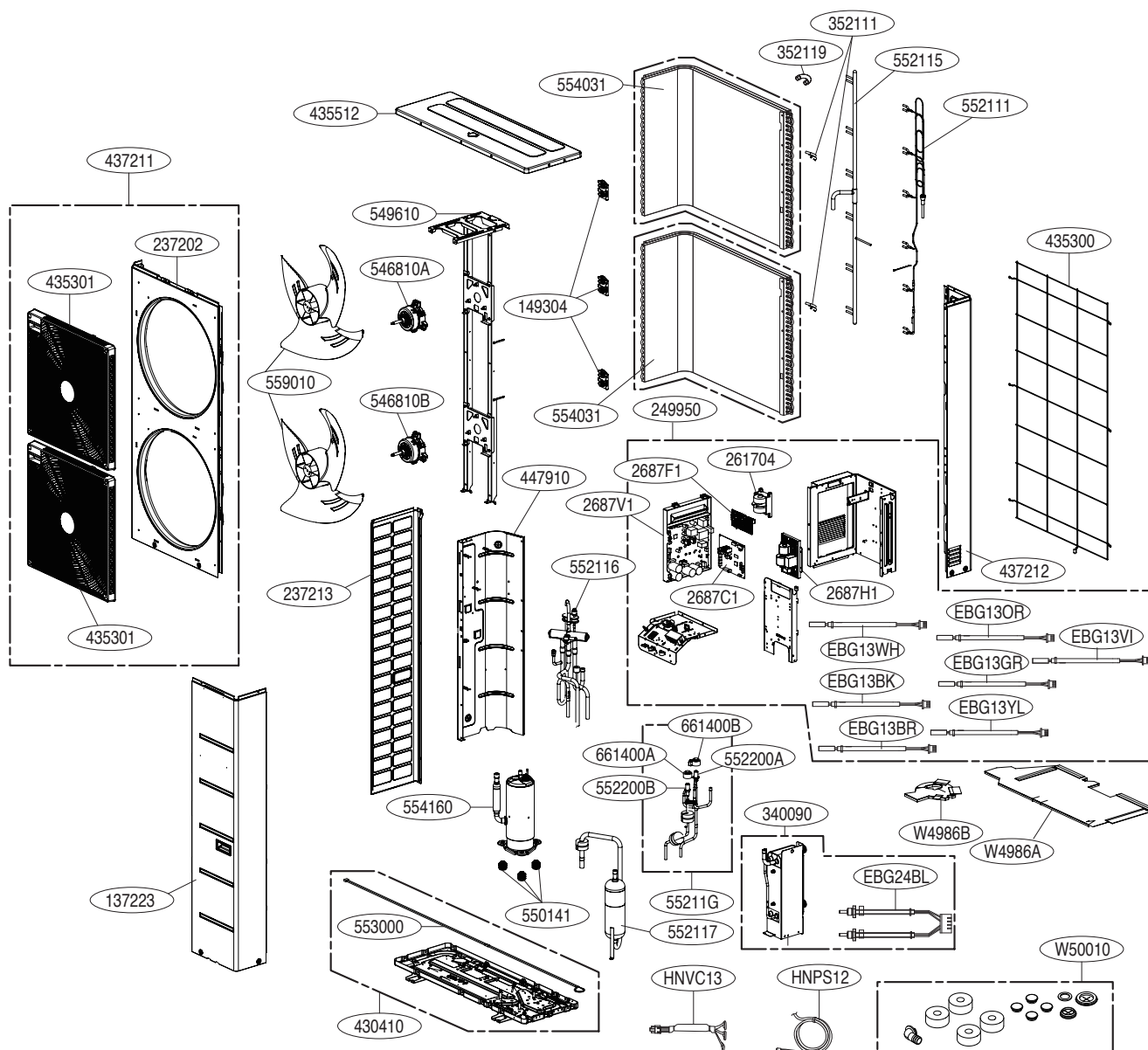
### Indoor Unit



Location No.	Description	Description	Housing color
HNMW21	Harness, single (CN_W_PUMP_A)	Pump AC Wire	White
HNMW11	Harenss, multi (CN_MOTOR1)	Pump DC Wire	Red
HNMF11	Harness, single (CN_EXT)	For external controller	Blue

Location No.	Description	Remark
W4004A	Clip	For assemble flow sensor or pipe
W4004B	Clip	For assemble pump and pipe
W4004C	Clip	For assemble pump and expansion tank hose

# Outdoor Unit (1Ø : 12, 14, 16 kW)

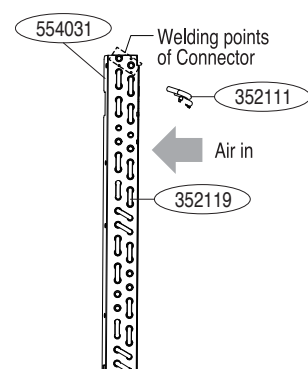


## Thermistor Assembly,NTC

Location No.	Thermistor Description	Housing Color
EBG24BL	Water In/Water Out	Blue
EBG13WH	VI_IN	White
EBG13OR	Pipe In	Orange
EBG13GR	SUCTION	Green
EBG13BK	DISCHA	Black
EBG13YL	AIR	Yellow
EBG13BR	MID-PIPE	Brown
EBG13VI	CONDENSER_PIPE	Violet

## Condenser Assembly

you need to buy these parts when repair condenser assembly.

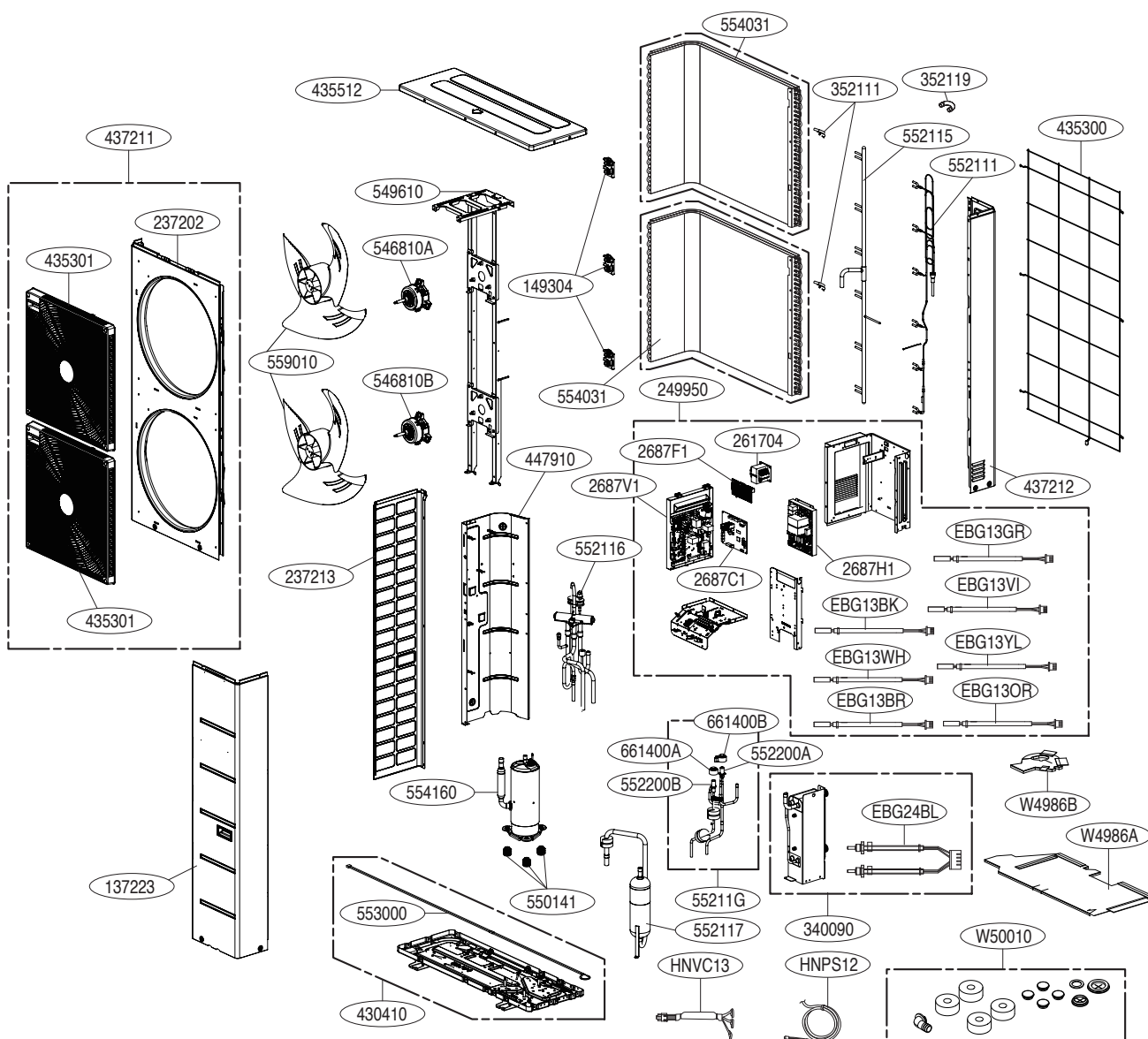


## Condenser Assembly Repaired parts

Description	Location No.	Quantity
Condenser Assembly,Bending	554031	2
Tube Assembly,Connector	352111	2
Tube Assembly,Return Bending	352119	25



# Outdoor Unit (3Ø : 12, 14, 16 kW)



## Thermistor Assembly,NTC

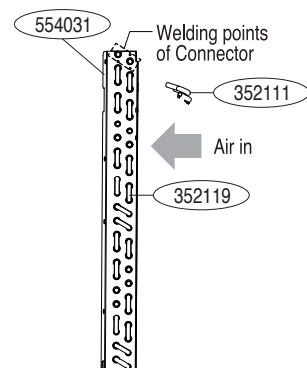
Location No.	Thermistor Description	Housing Color
EBG24BL	Water In/Water Out	Blue
EBG13WH	VI_IN	White
EBG13OR	Pipe In	Orange
EBG13GR	SUCTION	Green
EBG13BK	DISCHA	Black
EBG13YL	AIR	Yellow
EBG13BR	MID-PIPE	Brown
EBG13VI	CONDENSER_PIPE	Violet

## Condenser Assembly Repaired parts

Description	Location No.	Quantity
Condenser Assembly,Bending	554031	2
Tube Assembly,Connector	352111	2
Tube Assembly,Return Bending	352119	25

## Condenser Assembly

you need to buy these parts when repair condenser assembly.





P/NO : MFL68681922