LG

TOTAL HVAC SOLUTION PROVIDER

ENGINEERING PRODUCT DATA BOOK

MULTI V™

Hydro Kit

R410A/R32(50Hz/60Hz)

0CVG5-03A(Replaces 0CVG5-02A)

LG Life's Good

P/No. : MFL61741646

MULTI V™

Hydro Kit

General information

Wall Mounted (Medium Temperature)

Floor Standing (Mediun Temperature)

MULTI V™

Hydro Kit

General information

1. Model Names & External Appearance
2. Nomenclature
3. Indoor Unit Capacity Index & Combination Ratio

1. Model Names & External Appearance

■ Model Names

◆ Wall Mounted

Category	Operating Temperature	Chassis Name	18 kBtu/h	24 kBtu/h	30 kBtu/h
Wall Mounted	Medium	K1	ARNH18GK1B4	ARNH24GK1B4	ARNH30GK1B4

◆ Floor Standing

Category	Operating Temperature	Chassis Name	4 HP	10 HP	16 HP
Floor standing	Medium	K2	ARNH04GK2B4	ARNH10GK2B4	ARNH16GK2B4

■ External Appearance

Category	Operating Temperature	Chassis Name	Model Name	Refrigerant	Model
Wall Mounted	Medium	K1	ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4	R410A / R32	
Floor standing	Medium	K2	ARNH04GK2B4 ARNH10GK2B4 ARNH16GK2B4	R410A / R32	

2. Nomenclature

Model Name	ARN	H	18	G	K1	B	4
No.	1	2	3	4	5	6	7

No.	Signification
1	**Indoor Unit for Multi V System using R410A / R32**
2	**Type of indoor unit** H : Hydro Kit
3	**Capacity** Wall Mounted : kBtu/h Ex) Wall Mounted 18 kBtu/h → '18', Floor Standing : HP Ex) Floor Standing 8 HP→ ‘08’
4	**Electrical Ratings** G: 1Ø, 220-240V, 50Hz / 1Ø, 220V, 60Hz
5	**Chassis Name** K1 : Wall Mounted (Medium temp.) K2 : Floor Standing (Medium temp.)
6	**Combinations of functions** A : Basic function B : AWHP function
7	**Serial Number**

3. Indoor Unit Capacity Index & Combination Ratio

■ Indoor Unit Capacity Index

◆ Wall Mounted

Model	ARNH18GK1B4	ARNH24GK1B4	ARNH30GK1B4
Capacity Index	5.6	7.1	9.0

◆ Floor Standing

Model	ARNH04GK2B4	ARNH10GK2B4	ARNH16GK2B4
Capacity Index	12.3	28.0	46.4

Note

- Capacity Index is based on cooling capacity(kW).

■ ODU-IDU Compatibility

O : Compatible, X : Not Compatible

Line up	Outdoor Unit Type	Normal Indoor Units	Special Indoor Units[1]						
			Hydro Kit[2]			Fresh Air Intake Unit(FAU)	ERV DX	AHU. Comm. Kit & EEV Kit	
			Floor standing		Wall Mounted			Return (Room) air	Discharge (Supply) air
			Med. Temp	High Temp					
Multi V i	Heat Pump & Heat Recovery	O	O	O	O	O	O	O	O (HP* only)
Multi V 5	Heat Pump & Heat Recovery	O	O	O	O	O	O	O	O (HP* only)
Multi V S	R410A Heat Pump	O	O	O	O	O	O	O	O
	R410A Heat Recovery	O	O	O	O	X	O	O	X
	R32 Heat Pump	O	O	O	O	X	X	O	O
Multi V Water IV	Heat Pump	O	O	O	X	O	O	O	O
	Heat Recovery	O	O	O	X	X	O	O	X
Multi V Water 5	Heat Pump & Heat Recovery	O	O	O	O	O (HP* only)	O	O	O (HP* only)
Multi V M	MULTI V M[3]	O	X	X	X	X	X	X	X

■ Combination Ratio for System with Special Indoor Units

Type		Hydro Kit[2]	ERV DX	Fresh Air Intake Unit (FAU)	AHU Comm. Kit & EEV Kit[4]	
					in Heat Recovery AHU	in Fresh Air AHU
1 ODU : 1 IDU		50 ~ 105%				
One ODU with normal IDUs and Special IDUs	Total (Normal IDUs + Special IDUs)	Refer to 'Combination Ratio for System with Normal Indoor Units' in outdoor unit PDB	50 ~ 130%	50 ~105%	50 ~ 130 %	50 ~ 105%
	Max. Special IDUs	~105%	~50%	~ 30% (Max 4 Units)	~ 50% (~100% : With cooling only ODU)	~ 50%
One ODU with Multiple Special IDUs only (no normal IDUs)		50 ~105%	50 ~ 130 %	50 ~ 105%	50 ~ 130 %	50 ~ 105%

Note

1. Special Indoor Unit : Hydro Kit, FAU, ERV DX, AHU Comm. Kit & EEV kit, Water. Comm. Module & EEV Kit.
   If more than 2 types of special IDUs are connected, total combination ratio follows the small one.
2. Hydro Kit cannot be combined with Multi V quadruple frame (4 units) system.
3. Special Indoor Units cannot be combined with Multi V M.
4. The combination ratio for systems with AHU Comm. Kit& EEV kit is determined by: (heat exchanger capacity + indoor unit nominal capacity index) / outdoor unit nominal cooling capacity. The on-coil temperature (i,e. coil inlet temperature) of Heat Recovery AHU should be within the operation range of the indoor units.
   For more detail about AHU comm. Kit application, please refer to AHU Comm. Kit PDB.
5. * : Heat Pump

MULTI V™

Hydro Kit

Wall Mounted (Medium Temperature)

1. List of functions

■ Basic functions of Unit

Category	Functions	ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4
Installation	Drain pump	X
	E.S.P. control	X
	Electric heater (operation)	O
	High ceiling operation	X
	Domestic Hot Water Tank heater	Accessory
Reliability	Hot start	X
	Self diagnosis	O
	Soft dry operation	X
Convenience	Auto changeover	X
	Auto cleaning	X
	Auto operation (artificial intelligence)	X
	Auto restart operation	O
	Child lock	O
	Forced operation	X
	Group control	O
	Sleep Timer	O
	Turn On/Off Reservation	O
	Schedule	O
	Low Noise Operation	O
	Two thermistot control	X
Individual control	Standard wired remote controller	O
	Premium wired remote controller	X
	Simple wired remote controller	X
	Simple Wired remote controller(for hotel use)	X
	Wireless remote controller(simple)	X
Network function	General central controller (Non LGAP)	X
	Network Solution (LGAP)	O
Hydro Kit Functions	Anti-Condensation on floor (cooling)	O
	Water Pump ON / OFF Control	O
	Water Flow Control	O
	Water Pressure Monitoring	O
	Communication with LG ESS by Modbus	O
	Solar Thermal function	Accessory
	Water Flow detection	O
	Thermostat Interface (230V AC)	O
	Thermostat Interface (24V AC)	X
	DHW(Domestic Hot Water) tank kit	Accessory
	PHEX Anti-Freezing Control	O
	Water Pump Forced Operation	O
	Autosetting according to Ambient Temperature	X
	Anti-overheating of Water Pipe	O
	Emergency Operation	O
	Weather Dependent Operation with Thermostat	O
	Seasonal auto mode (heating and cooling)	O
	Scheduler (Domestic Hot Water Tank Heater)	O
	Timer (Domestic Hot Water Tank Heater)	O
	Quick Domestic Hot Water Tank Heating	O
	Electric Backup Heater Capacity Control	O
	Screed Drying Mode	O
	Sump Heater	X
	One Point Dry Contact Input (CN-EXT)	O
	Energy Monitoring	O
	DHW Recirculation	O
	Tank Disinfection(Optional, need to booster heater)	O
	Pump Capacity Control	O
	SG Ready(Energy State Storage)	O
	ODU Cycle Priority (Heating Priority)	O
Special Functions	Wi-Fi Control	Accessory
	Modbus Connectivity (without gateway)	O
	Remote Room temperature Sensing	Accessory
	2nd Circuit/Mixer Control	Accessory

Note

1. 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.

1. List of functions

■ Accessory Compatibility List

Category		Product	ETC	ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4
Central Controller	Simple	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	BACnet	PQNFB17C0	ACP BACnet	O
	Lonworks	PLNWKB000	ACP Lonworks	O
	Modbus	PMBUSB00A	Modbus Gateway	O
Dry contact	Simple Contact	PDRYCB000 PDRYCB100	Simple Dry Contact	O
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	X
		PDRYCB300	Dry Contact For 3rd Party Thermostat	O
		PDRYCB320	Dry Contact For 3rd Party Thermostat (Analog Input)	O
		PDRYCB500	Dry Contact For Modbus	X
ETC	Remote temperature sensor	PQRSTA0	-	O
	Zone controller	ABZCA	-	X
	Group control wire	PZCWRCG3	0.25m	O
	Wi-Fi Controller*	PWFMDD200	-	O
	Multi-Tenant Power Module	PINPMB001	-	X
	Refrigerant Leakage Detector	PRLDNVS0	For R410A	O
		PLDRNV1S	For R32	O
	PDI	PPWRDB000	PDI Standard	O
		PQNUD1S40	PDI Premium	O
Special Kit for Hydrokit	Solar-Thermal Interface kit with DHW Tank	PHLLA	Limit Temperature : 96℃	O
	DHW Tank Kit	PHLTA : 1Ø	-	O
	DHW Tank (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
	Thermistor for DHW Tank	PHRSTA0	-	O
	Extension Wire	PZCWRC1	-	O
	Cover Plate	PDC-HK10	-	O
	Indoor Drain Pan	PHDPC	-	O
	2nd Circuit Thermistor	PRSTAT5K10	NTC 5kΩ sensor needed to control mixing circuit	O

Note

1. O : Applied, X : Not applied
   Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separated package.
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. If you need more detail, please refer to the BECON PDB or the manual of product.
   (http://partner.lge.com> Select Your Region : Home> Doc.Library> Product > Control(BECON))

2. Specifications

Model			Unit	ARNH18GK1B4	ARNH24GK1B4	ARNH30GK1B4
Power Supply		-	V, Ø, Hz	220-230-240, 1, 50/60		
Capacity (Rated)		Cooling	kW	5.6	7.1	9.0
			kcal/h	4,800	6,100	7,700
			Btu/h	19,100	24,200	30,700
		Heating	kW	5.6	7.1	9.0
			kcal/h	4,800	6,100	7,700
			Btu/h	19,100	24,200	30,700
Input (Rated)		Cooling	W	75	75	75
		Heating	W	75	75	75
Running Current (220 - 230 - 240V)		Cooling / Heating	A	0.70 - 0.67 - 0.64	0.70 - 0.67 - 0.64	0.70 - 0.67 - 0.64
Casing		Material	-	Painted Steel Plate	Painted Steel Plate	Painted Steel Plate
		RAL (Classic)	-	RAL 9016		
Dimensions	Net(W x H x D)		mm	490 × 850 × 315		
	Shipping(W x H x D)		mm	1,082 x 563 x 375		
Weight	Net		kg	39.2		
	Shipping		kg	43.7		
Heat Exchanger	Refrigerant to Water	Type	-	Brazed Plate HEX	Brazed Plate HEX	Brazed Plate HEX
		Quantity	EA	1		
		Number of Plate	EA	52		
		Water Volume	ℓ	0.7		
		Rated Water Flow	ℓ/min	15.8	20.1	25.9
Head Loss			m	0.49	0.76	1.19
Water Pump	Type		-	Canned type for hot water circulation		
	Model		-	GRUNDFOS UPM3K 20-75 CHBL		
	Motor Type		-	BLDC		
	Steps of Pump Performance		-	Variable capacity 10% to 100%		
	Power input	Min. ~ Max.	W	3 ~ 60		
Expansion Vessel	Volume	Max.	ℓ	8.0		
	Water pressure	Max.	bar	3.0		
	Water pressure	Pre-charged	bar	1.0		
Strainer	Mesh size		-	30 mesh		
	Material		-	Stainless Steel		
Relief valve	Pressure Limit	Upper Limit	bar	3.0		
Backup Heater	Type		-	Sheath		
	Number of Heating Coil		EA	2		
	Capacity Combination		kW	3.0 + 3.0		
	Operation		-	Automatic		
	Heating Steps		Step	2		
	Power Supply		V, Ø, Hz	220-240, 1, 50		
	FLA		A	31.0		
	Power Cable (H07RN-F) (Included Earth)		mm^2x cores	4.0 x 3C		
Flow Sensor	Type		-	Vortex		
	Model		-	SIKA VVX20		
	Mesasuring Range	Min. ~ Max.	ℓ/min	5 ~ 80		
	Flow (Trigger Point)	Min.	ℓ/min	7.0		
Temperature Control			-	Microprocessor, Thermostat for cooling and heating		

Note

1. Due to our policy of innovation some specifications may be changed without notification.
2. 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.
3. 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 0m.
4. This product contains Fluorinated greenhouse gases.
5. Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard
   Sound power level is measured on the rated condition in the reverberation rooms by ISO 3741 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.

2. Specifications

Model			Unit	ARNH18GK1B4	ARNH24GK1B4	ARNH30GK1B4
Water Tank Temperature Sensor		Type(Sensor Holder)	-	Male PT 1/2 inch		
		Length	m	12		
Sound Absorbing Thermal Insulation Material			-	Expanded Polypropylene		
Safety Device			-	Fuse		
Piping Connections	Water Side	Inlet	-	Male PT 1 inch		
		Outlet	-	Male PT 1 inch		
	Refrigerant Side	Liquid	mm(inch)	Ø 9.52(3/8)		
		Gas	mm(inch)	Ø 15.88(5/8)		
Power Cable Supply Calbe(H07RN-F)			mm² x cores	2.5 x 3C	2.5 x 3C	2.5 x 3C
Communication Cable(VCTF-SB)			mm² x cores	1.0~1.5 × 2C	1.0~1.5 × 2C	1.0~1.5 × 2C
Refrigerant	Refrigerant to Water	Type	-	R410A / R32		
		Precharged Amount	kg (lbs)	-	-	-
		Additional Charging Amount	kg (each)	0.52 / 0.43	0.52 / 0.43	0.52 / 0.43
		Control	-	EEV		
Sound Pressure Level	Cooling / Heating	Rated	dB(A)	35		
Sound Power Level	Cooling / Heating	Rated	dB(A)	44		

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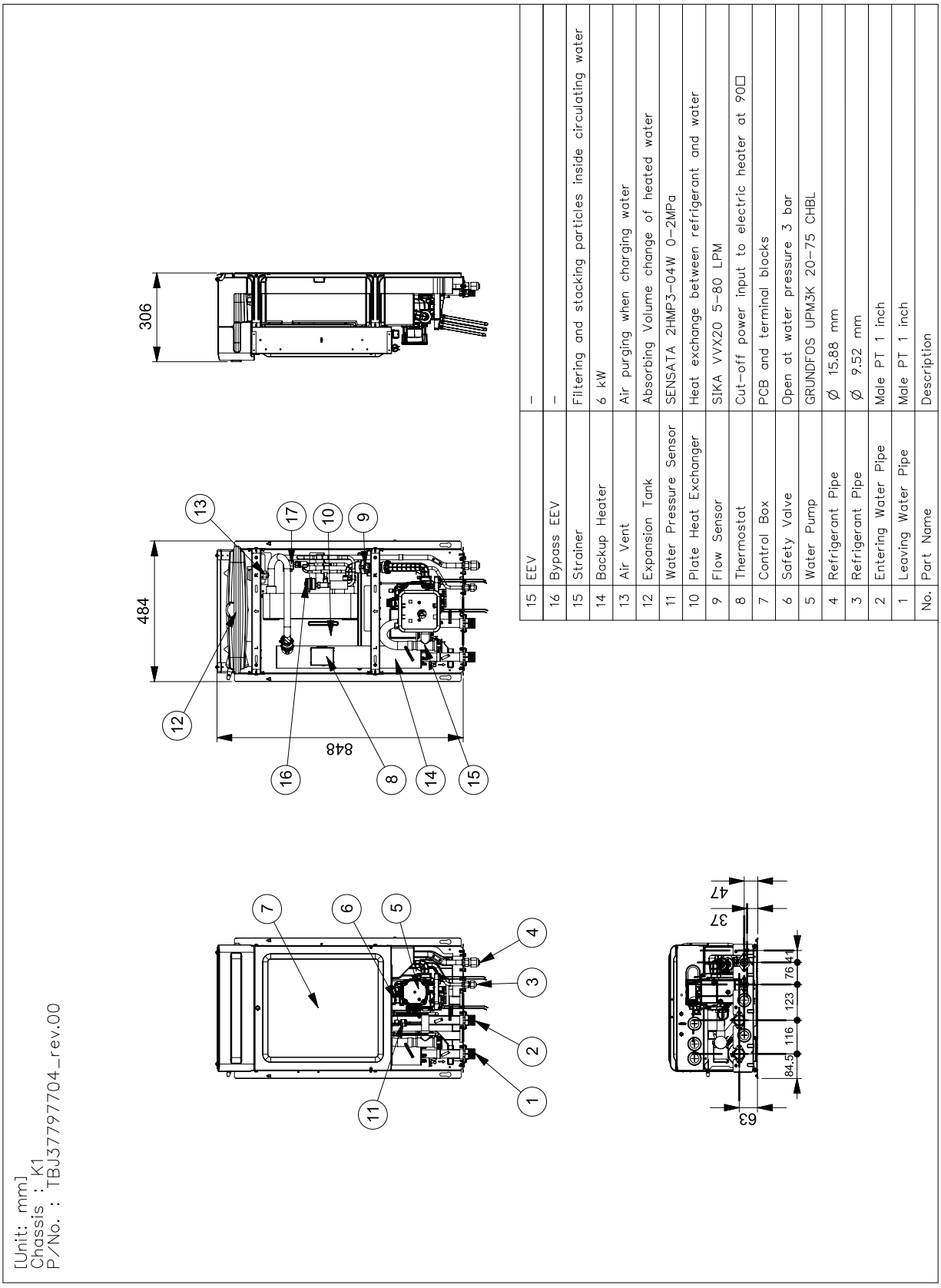
3. Dimensions

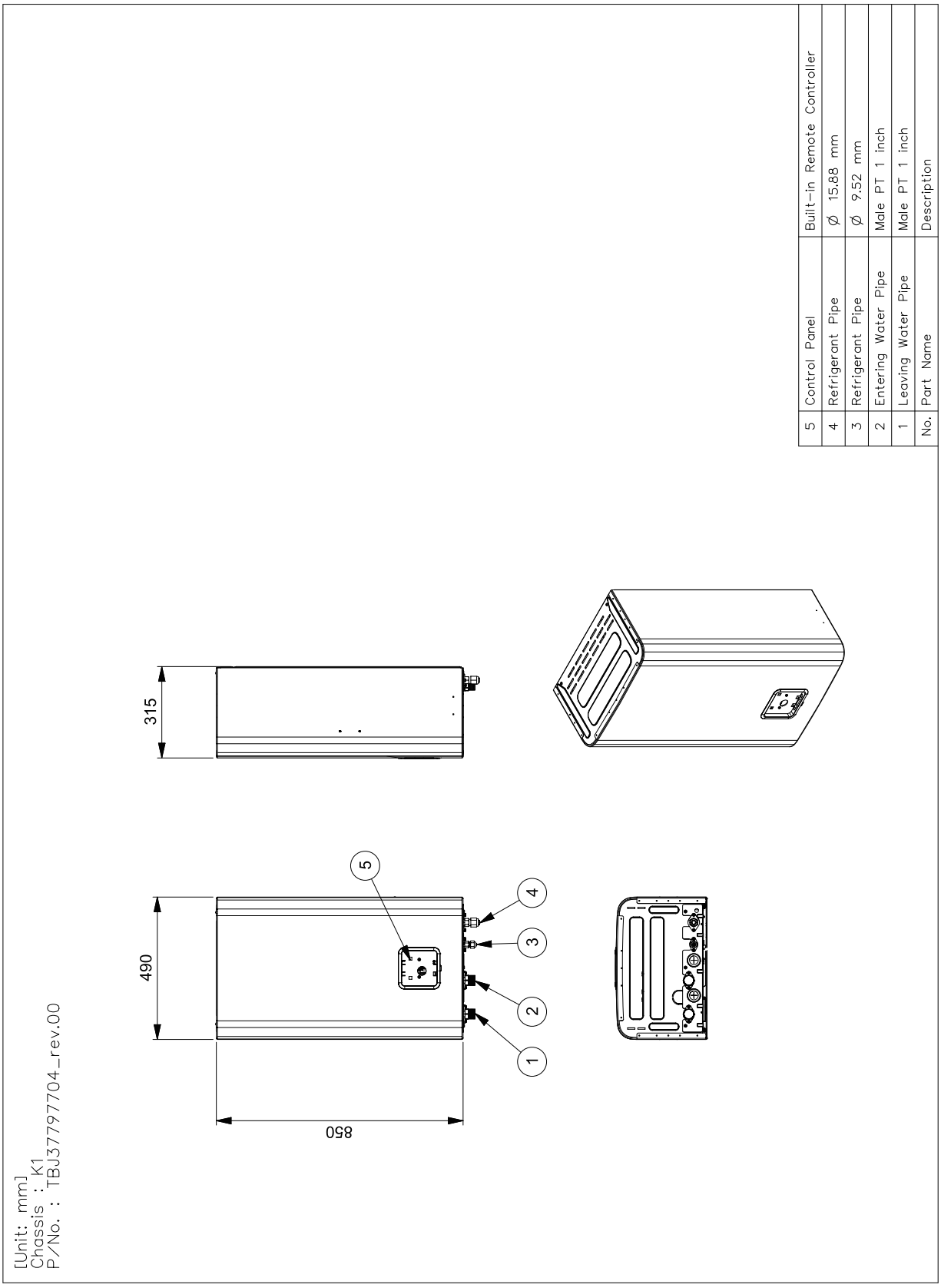
3.1 Internal Layout



No.	Part Name	Description
1	Leaving Water Pipe	Male PT 1 inch
2	Entering Water Pipe	Male PT 1 inch
3	Refrigerant Pipe	ø 9.52 mm
4	Refrigerant Pipe	ø 15.88 mm
5	Water Pump	GRUNDFOS UPM3K 20-75 CHBL
6	Safety Valve	Open at water pressure 3 bar
7	Control Box	PCB and terminal blocks
8	Thermostat	Cut-off power input to electric heater at 90□
9	Flow Sensor	SIKA VVX20 5-80 LPM
10	Plate Heat Exchanger	Heat exchange between refrigerant and water
11	Water Pressure Sensor	SENSATA 2HMP3-04W 0-2MPa
12	Expansion Tank	Absorbing Volume change of heated water
13	Air Vent	Air purging when charging water
14	Backup Heater	6 kW
15	Strainer	Filtering and stacking particles inside circulating water
16	Bypass EEV	-
15	EEV	-

3. Dimensions

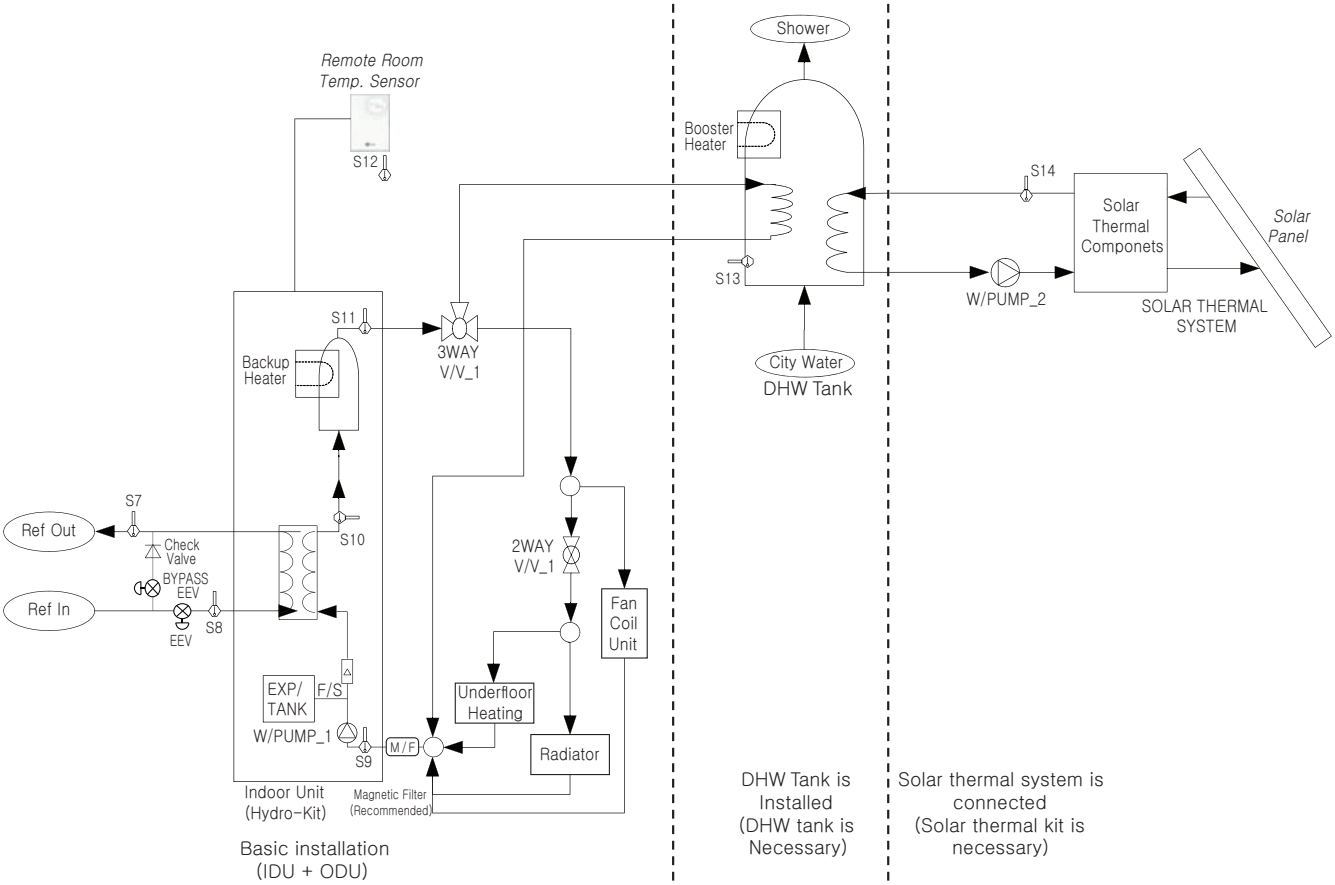
3.2 External Layout



No.	Part Name	Description
5	Control Panel	Built-in Remote Controller
4	Refrigerant Pipe	Ø 15.88 mm
3	Refrigerant Pipe	Ø 9.52 mm
2	Entering Water Pipe	Male PT 1 inch
1	Leaving Water Pipe	Male PT 1 inch

4. Piping Diagram

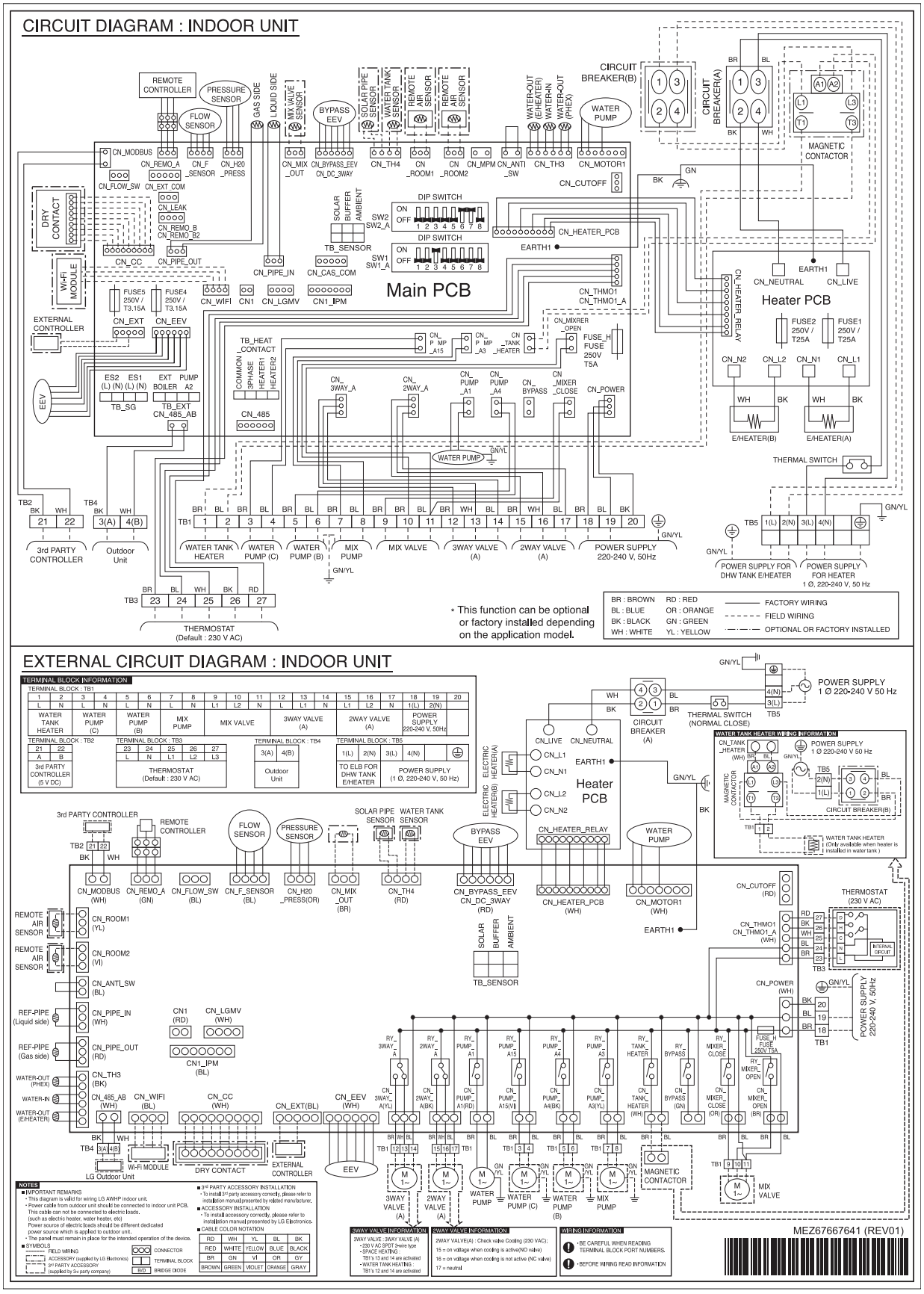
■ ARNH18GK1B4, ARNH24GK1B4, ARNH30GK1B4



4. Piping Diagram

Category	Symbol	Meaning	PCB Connector	Remarks
Indoor Unit	S7	Refrigerant temperature sensor (Gas side)	CN_PIPE_OUT	- Meaning is expressed based on Cooling mode.
	S8	Refrigerant temperature sensor (Liquid side)	CN_PIPE_IN	
	S9	Entering Water temperature sensor	CN_TH3 (WATER IN) (PHEX OUT) (WATER OUT)	- S9, S10 and S11 are connected at 6 pin type connector CN_TH3.
	S10	Leaving Water temperature sensor		
	S11	Backup heater outlet temperature sensor		
	F/S	Flow Sensor	CN_F_SENSOR	- To monitor water flow rate in the system.
	E/HT	Backup Heater	E/Heat(A) : CN_L1, CN_N1 E/Heat(B) : CN_L2, CN_N2 on Heater PCB	- Heating capacity is divided into two level : partial capacity by E/HEAT(A) and full capacity by E_HEAT_A + E_HEAT_B. - Operating power(230 V AC 50 Hz) of E_HEAT_A and E_HEAT_B are supplied by external power source via relay connector and ELB.
	W_PUMP_1	Internal Water Pump	CN_MOTOR1 CN_PUMP_A1	- Water Pump is connected at CN_MOTOR1 and CN_PUMP_A1
	EXP/TANK	Expansion Tank	(no connector)	- Absorb volume change of heated water,
	S12	Remote Air sensor (Room 1/Direct circuit)	CN_ROOM1	- Optional accessory (sold separately)
	CTR/PNL	Control Panel (or 'Remote Controller')	CN_REMO_A	- Pre built-in at indoor unit
	2WAY V/V_1	To block underfloor heating from cooling water	CN_2WAY_A	- 3rd party accessory and Field installation (sold separately) - 2 wire NO or NC type 2way valve is supported.
	M / F	Magnetic Filter	(no connector)	- 3rd party accessory and Field installation (sold separately)
DHW Heating	W/TANK	DHW Tank	(no connector)	- Accessory and Field installation (sold separately) - Generating and storing DHW by Hydro kit or built-in backup heater
	B/HT	Booster Heater	CN_TANK_HEATER	- 3rd party accessory and Field installation (usually) built-in at W/TANK) - Supplying additional water heating capacity.
	3WAY V/V_1	- Flow control for water which is leaving from indoor unit. - Flow direction switching between underfloor and water tank	CN_3WAY_A	- 3rd party accessory and Field installation (sold separately) - SPDT type 3way valve is supported.
	Cold WATER	Water to be heated by Indoor unit and Booster Heater of W/TANK	(no connector)	- Field installation
	SHOWER	Water supplied to end-user	(no connector)	- Field installation
	S13	W/TANK water temperature sensor	CN_TH4	- S13 and S15 are connected at 4 pin type connector CN_TH4. - S13 is a part of DHW tank kit. - S14 is a part of solar thermal kit
Solar Heating	S14	Solar-heated water temperature sensor		
	3WAY V/V_2	- 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	- 3rd party accessory and Field installation (sold separately) - SPDT type 3way valve is supported.
	W_PUMP/2	External Water Pump	CN_PUMP_A4	- 3rd 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, Sensors, Thermostats, Interim heat exchanger, Water pump, etc. - To utilized hot water heated by SOLAR THERMAL SYSTEM, end-user must install Solar-Kit accessory provided by LG.	(no connector)	- 3rd party accessory and Field installation (sold separately)

5. Wiring Diagram



6. Capacity Tables

6.1 Capacity correction factor by temperature

■ Capacity/Power Input Calculation method

Total Capacity = Hydro Kit Capacity + Indoor Unit Capacity

Hydro Kit Capacity = Q_{HK} x F_{TC,T_HK} x F_{TC,W_HK}x F_{TC,P_ODU} x F_{TC,D_ODU}

Q_{HK} =	Hydro Kit capacity at rated condition. (kW)	..... Refer to *Specification of this PDB*
F_{TC,T_HK} =	Capacity correction factor by Outdoor and water inlet temperature.	..... Refer to *following Graph of this PDB*
F_{TC,W_HK} =	Capacity correction factor by Water flow rate.	..... Refer to *following Graph of this PDB*
F_{TC,P_ODU} =	Capacity correction factor by Refrigerant Piping length.	..... Refer to *correction factors of outdoor unit PDB*
F_{TC,D_ODU} =	Capacity correction factor by Defrosting operation.	..... Refer to *correction factors of outdoor unit PDB*

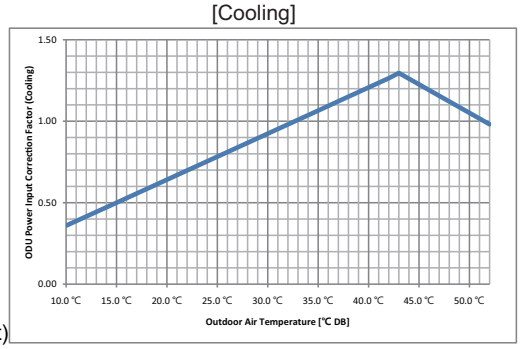
Total Power Input = Hydro Kit Power Input + Indoor Unit Power Input

Hydro Kit Power Input = PI_{ODU} x (I_{HK} / I_{TOTAL}) x F_{PI,T_HK} x F_{PI,W_HK}

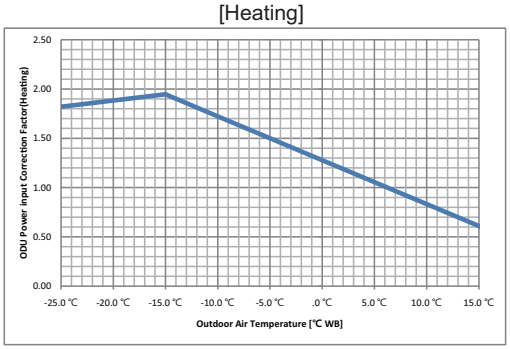
PI_{ODU}= Outdoor Unit Power Input by outdoor air (outside inlet water) temp. and capacity ratio at standard indoor temp. ..... Refer to *Capacity tables of outdoor unit PDB*

* Standard indoor temperature is 27/19℃ DB/WB on cooling mode, 20℃ DB on heating mode.
** PI ODU pattern by outdoor air temp.(It is reference data.This data would be different depending on outdoor Unit)

[Cooling]



[Heating]



F_{PI,T_HK} =	Power Input correction factor [Outdoor Unit] by Outdoor and water inlet temperature.	.... Refer to *following Graph of this PDB*
F_{PI,W_HK} =	Power Input correction factor [Outdoor Unit] by Water flow rate	..... Refer to *following Graph of this PDB*
I_{HK} =	Capacity index for Hydro Kit	..... Refer to *index table of this PDB*
I_{TOTAL} =	Sum of Capacity index for combined indoor units and Hydro kit	..... Refer to *index table of outdoor unit PDB*

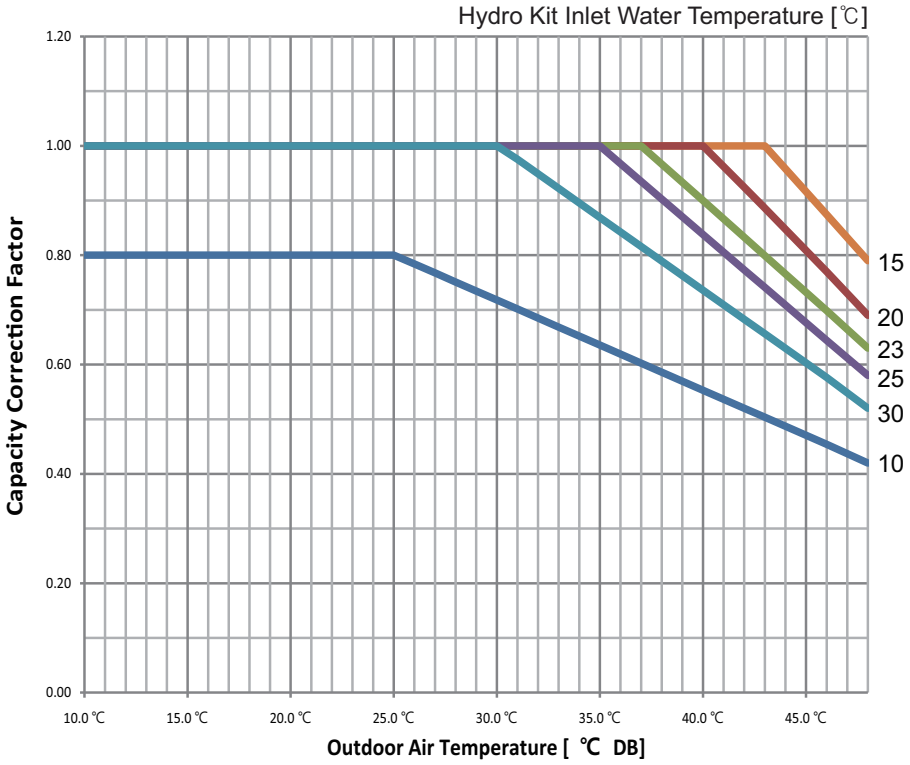
Note

1. When calculating at upper or lower temperature than the range of Outdoor unit capacity table, use the same value with the boundary value of that. For example, when calculating Heating PI with capacity table of Outdoor unit at upper temperature than 15℃DB, use the same value of PI at 15℃ DB.

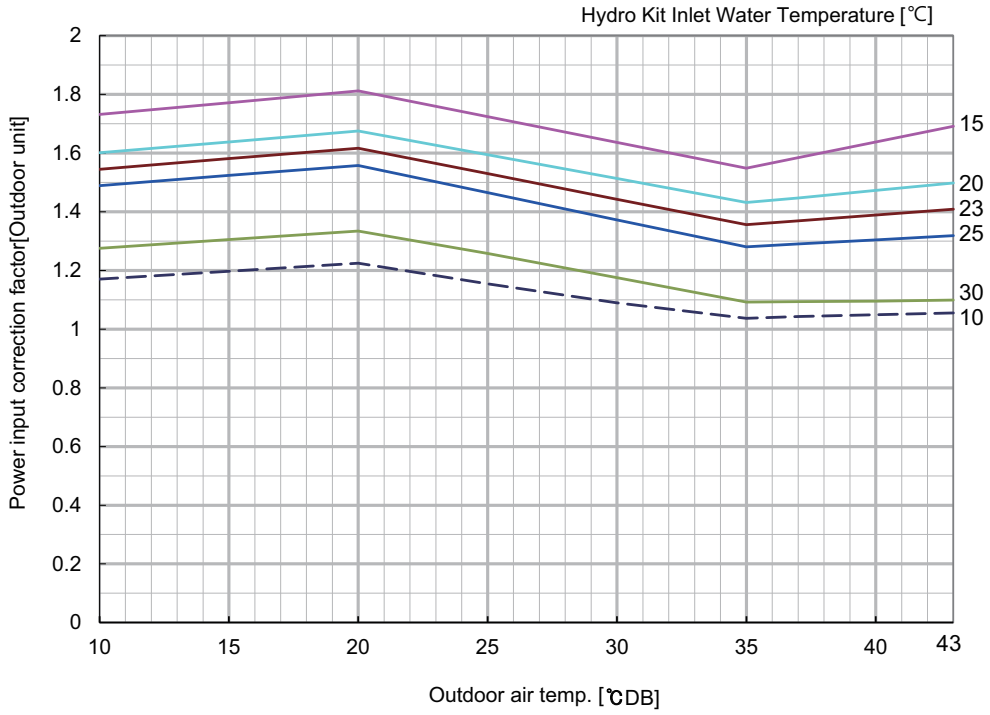
6. Capacity Tables

■ Cooling

◆ Capacity



◆ Power Input

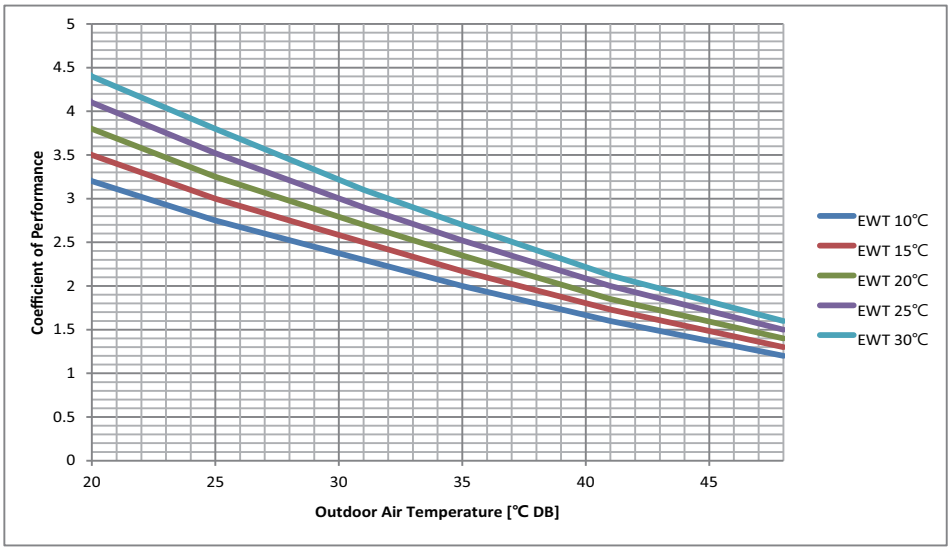


Note

- Correction factor follows the outdoor unit operation range and cannot operate outside the operating range.
- In cooling mode, Leaving water temperature changes per pipe length of the system.
  Please check 'Minimum Leaving Water Temperature by Pipe Length' table in this PDB

6. Capacity Tables

◆ COP Pattern by outdoor air temp.(Reference Data)



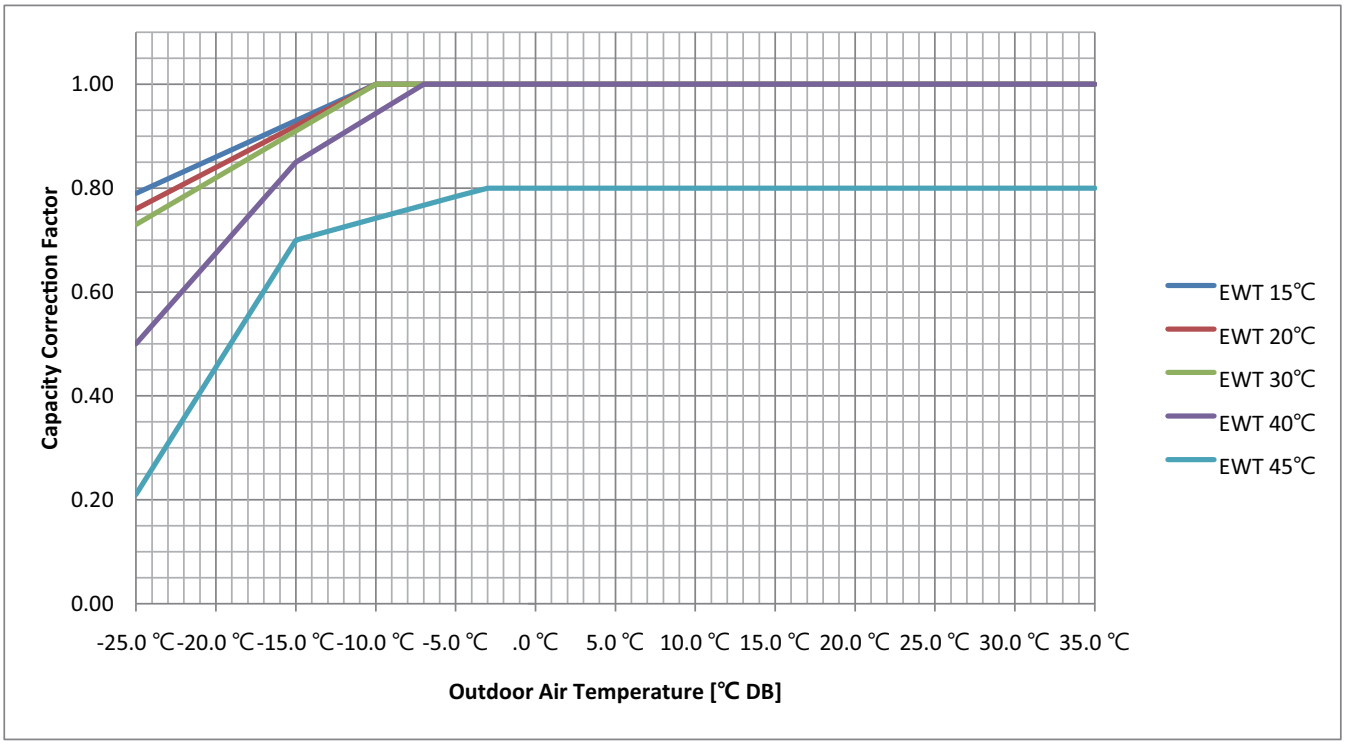
Note

COP Pattern by outdoor air temp. is a reference graph assuming a design with 10HP Multi V i Product.
If you would like to know the COP in a real project, Please contact to LG engineers.

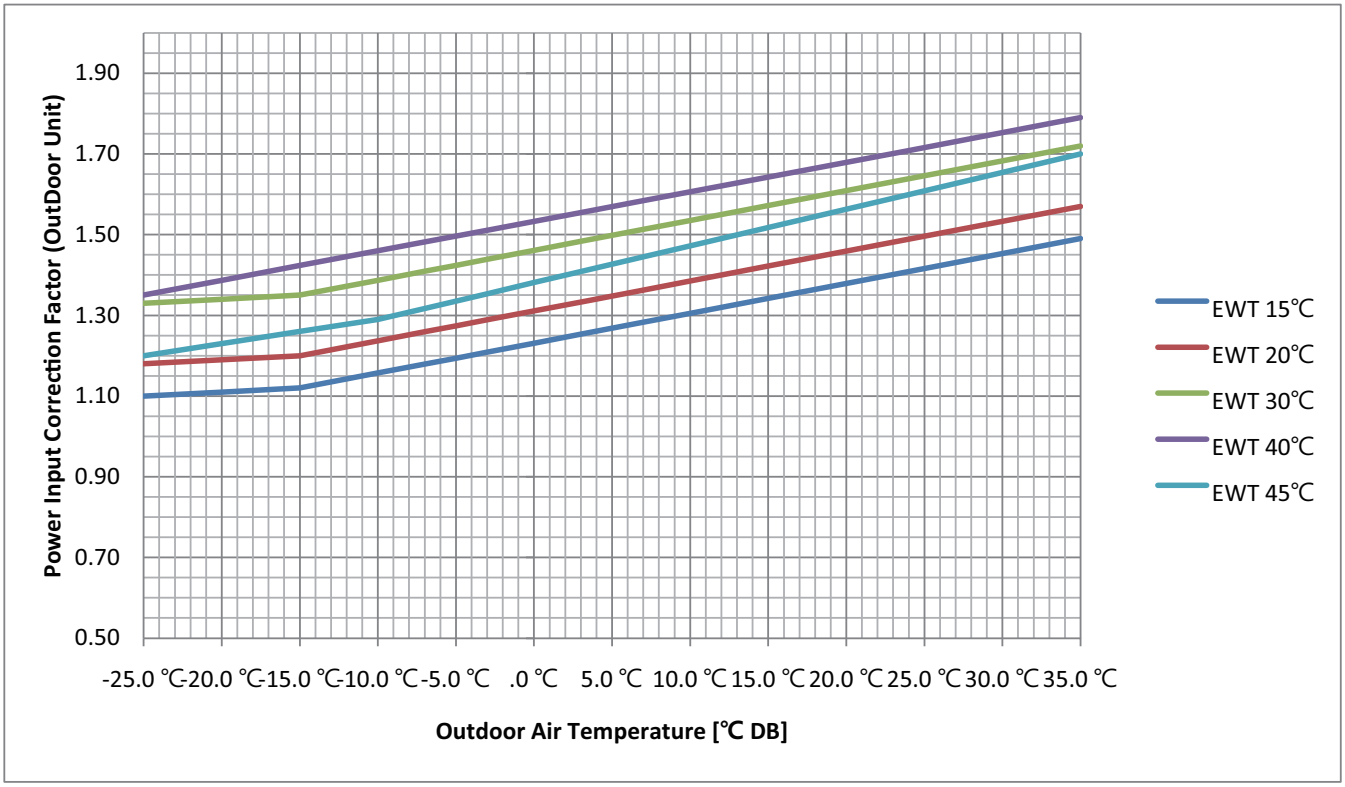
6. Capacity Tables

■ Heating

◆ Capacity



◆ Power Input

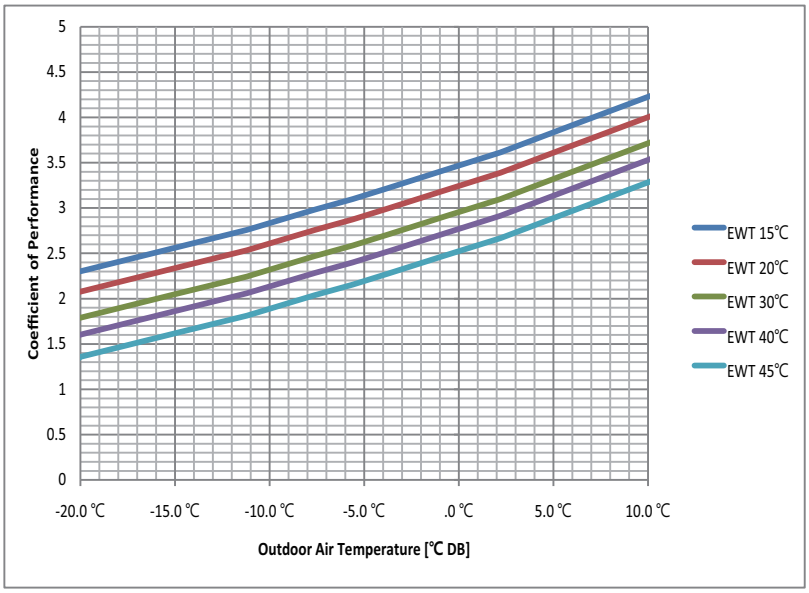


Note

Correction factor follows the outdoor unit operation range and cannot operate outside the operating range.

6. Capacity Tables

◆ COP Pattern by outdoor air temp.(Reference Data)



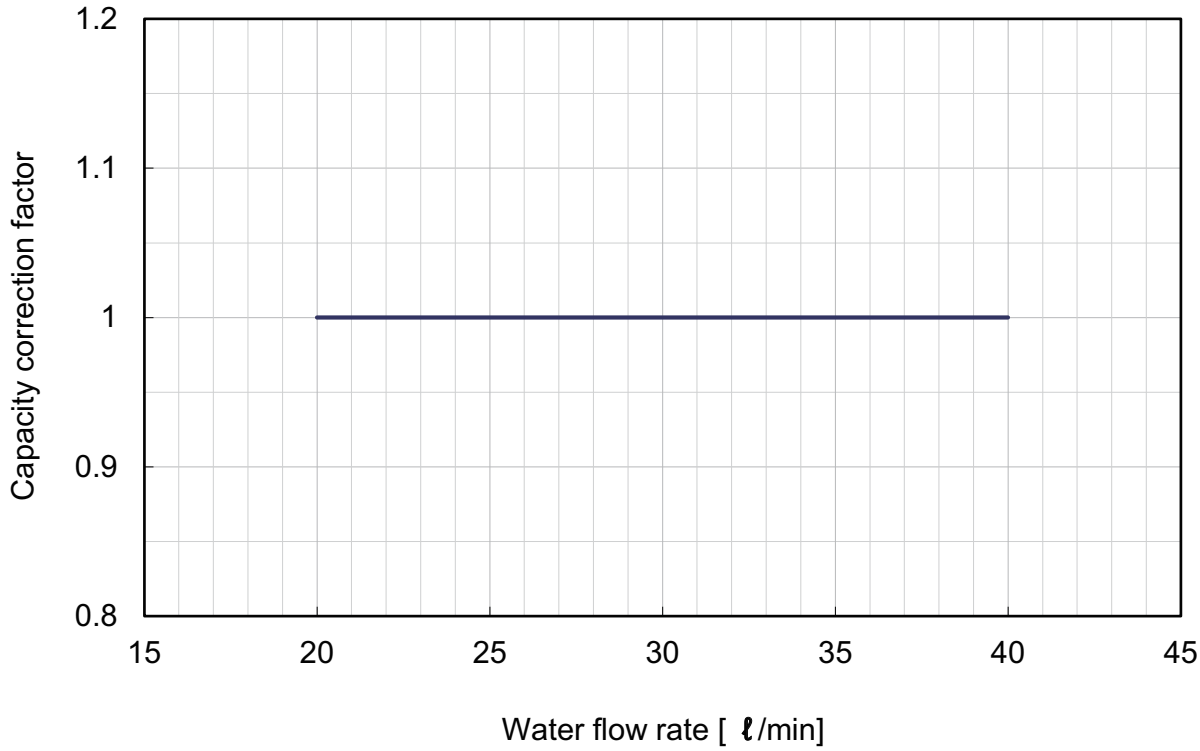
Note

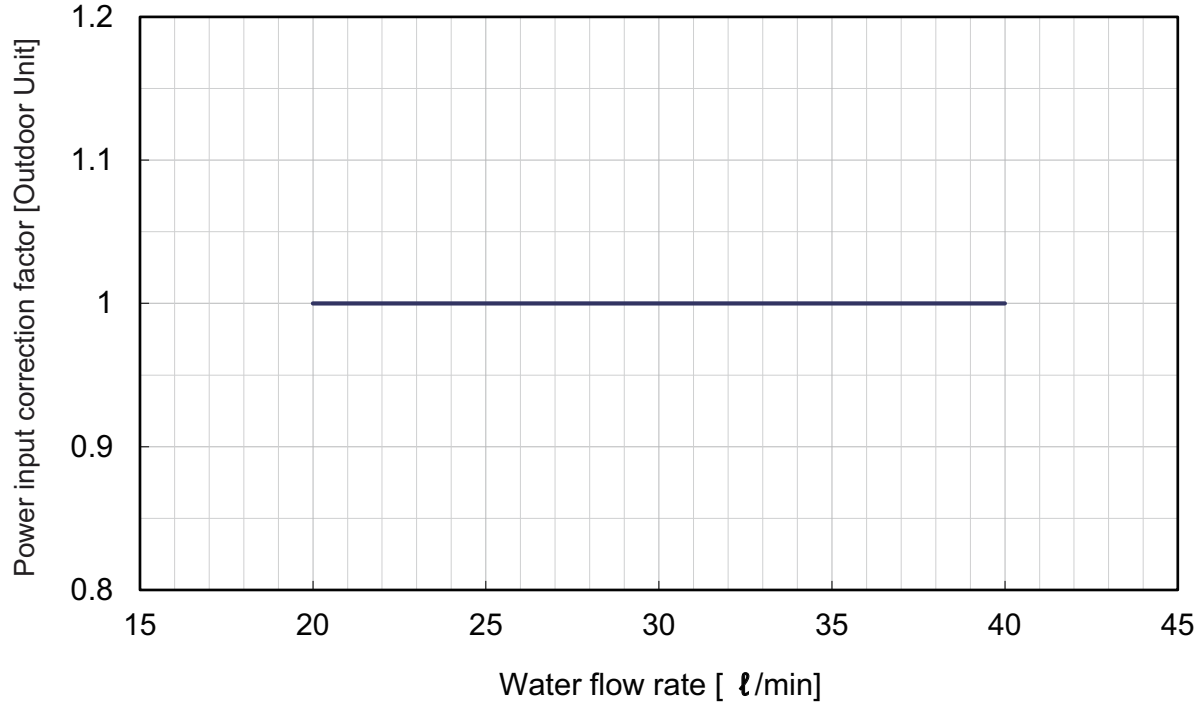
COP Pattern by outdoor air temp. is a reference graph assuming a design with 10HP Multi V i Product.
If you would like to know the COP in a real project, Please contact to LG engineers.

6. Capacity Tables

6.2 Capacity correction factor by water flow rate

■ Cooling



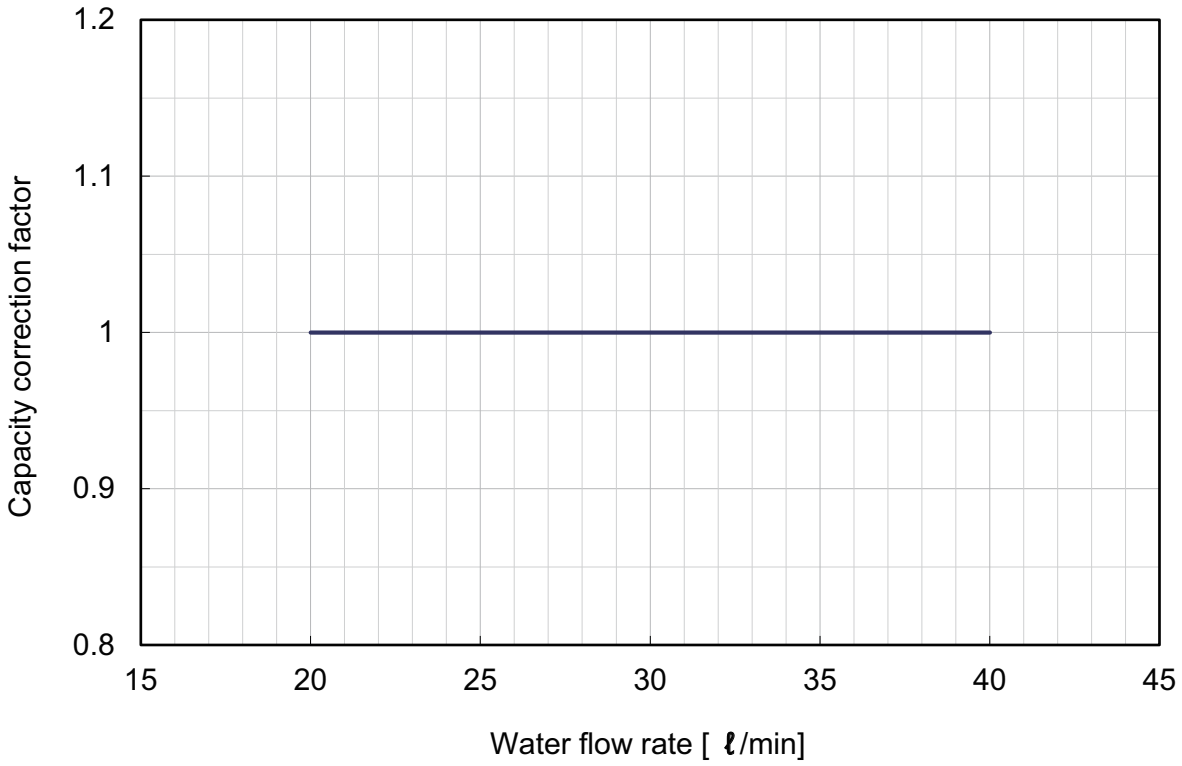


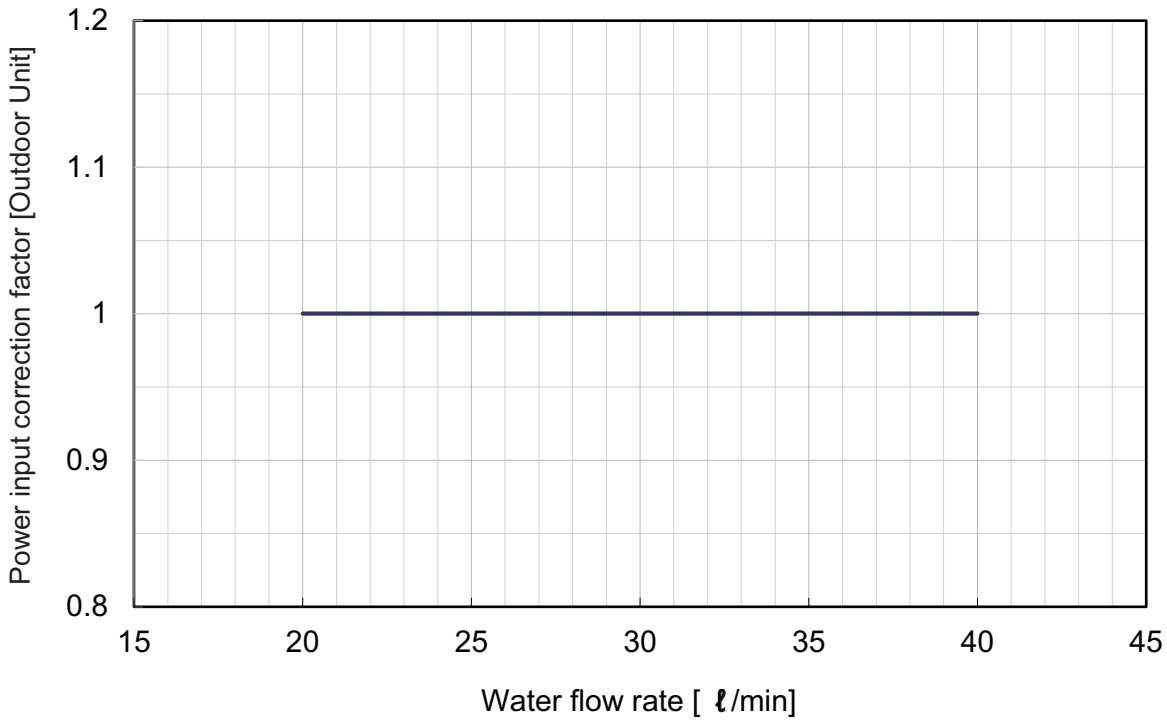
⚠ WARNING

Water Flow Rate Range (recommended) : 15 ~ 40 (ℓ/min)

6. Capacity Tables

■ Heating





⚠ WARNING

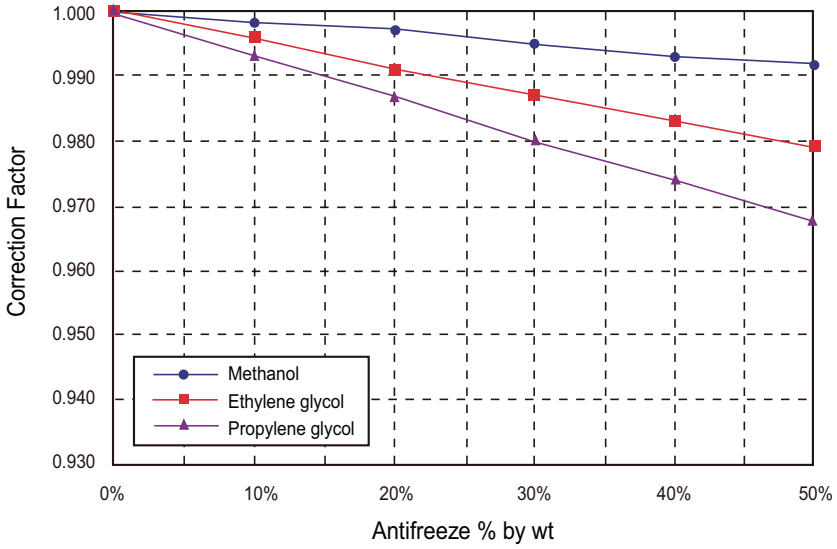
Water Flow Rate Range (recommended) : 15 ~ 40 (ℓ/min)

6. Capacity Tables

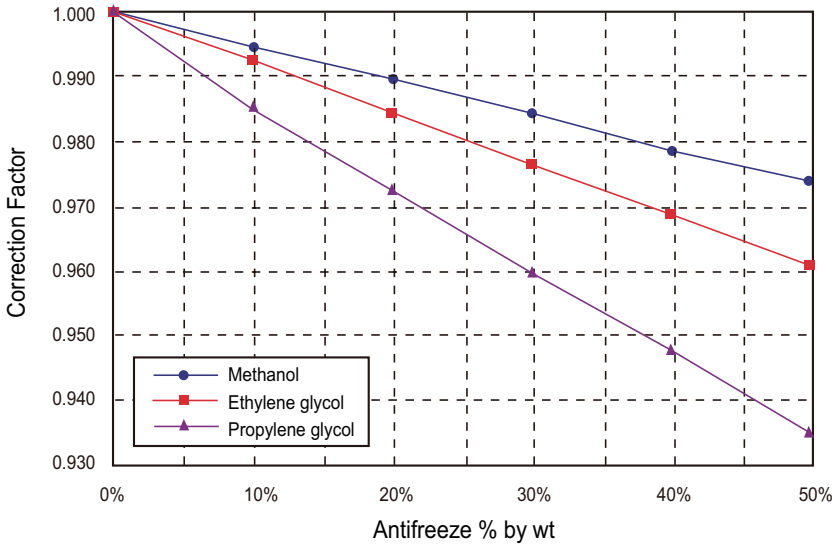
6.3 Capacity correction factor by antifreeze

Antifreeze Type	Item	Antifreeze % by wt				
		10%	20%	30%	40%	50%
Methanol	Cooling	0.998	0.997	0.995	0.993	0.992
	Heating	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	0.996	0.991	0.987	0.983	0.979
	Heating	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	0.993	0.987	0.980	0.974	0.968
	Heating	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**



CAUTION

Please apply antifreeze according to local regulation.

6. Capacity Tables

6.4 Minimum Leaving Temperature by Piping Length

◆ For Cooling Operation

HU (m)	110	-	-	-	-	-	-	-	-	-	-	-	12.9	13.1	13.4	13.6	13.8	14.1	14.3	14.6	14.8	15.1	15.3	15.5	15.7
	100	-	-	-	-	-	-	-	-	-	-	12.5	12.8	13.1	13.3	13.5	13.8	14.0	14.3	14.5	14.8	15.0	15.3	15.5	15.6
	90	-	-	-	-	-	-	-	-	-	12.0	12.5	12.8	13.0	13.3	13.5	13.8	14.0	14.3	14.5	14.8	15.0	15.2	15.5	15.6
	80	-	-	-	-	-	-	-	-	11.4	11.9	12.4	12.7	13.0	13.2	13.5	13.7	14.0	14.2	14.5	14.7	15.0	15.2	15.5	15.6
	70	-	-	-	-	-	-	-	10.9	11.4	11.9	12.4	12.7	12.9	13.2	13.4	13.7	13.9	14.2	14.4	14.7	14.9	15.2	15.4	15.6
	60	-	-	-	-	-	-	10.3	10.8	11.3	11.8	12.3	12.6	12.8	13.1	13.4	13.6	13.9	14.1	14.4	14.7	14.9	15.2	15.4	15.5
	50	-	-	-	-	-	9.7	10.2	10.7	11.2	11.7	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.1	14.4	14.6	14.9	15.1	15.4	15.5
	40	-	-	-	-	9.1	9.7	10.2	10.7	11.2	11.7	12.2	12.5	12.7	13.0	13.3	13.5	13.8	14.1	14.3	14.6	14.9	15.1	15.4	15.5
	30	-	-	-	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.4	12.7	13.0	13.2	13.5	13.8	14.0	14.3	14.6	14.8	15.1	15.3	15.5
	20	-	-	8.0	8.5	9.0	9.5	10.0	10.6	11.1	11.6	12.1	12.4	12.6	12.9	13.2	13.5	13.7	14.0	14.3	14.5	14.8	15.1	15.3	15.4
	10	-	7.4	7.9	8.4	8.9	9.5	10.0	10.5	11.0	11.5	12.0	12.3	12.6	12.9	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.0	15.3	15.4
	7.5	7.0	7.3	7.9	8.4	8.9	9.5	10.0	10.5	11.0	11.5	12.0	12.3	12.6	12.9	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.0	15.3	15.4
	0	7.0	7.3	7.8	8.4	8.9	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.4	13.7	13.9	14.2	14.5	14.7	15.0	15.3	15.4
Equvalent Length (m)		7.5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	225
HL(m)	0	7.0	7.3	7.8	8.4	8.9	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.4	13.7	13.9	14.2	14.5	14.7	15.0	15.3	15.4
	7.5	7.0	7.3	7.8	8.3	8.8	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.2	14.4	14.7	15.0	15.2	15.4
	10	-	7.3	7.8	8.3	8.8	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.2	14.4	14.7	15.0	15.2	15.4
	20	-	-	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.8	12.1	12.4	12.7	13.0	13.3	13.6	13.9	14.1	14.4	14.7	14.9	15.2	15.3
	30	-	-	-	8.2	8.7	9.2	9.8	10.3	10.8	11.3	11.8	12.1	12.4	12.7	13.0	13.3	13.5	13.8	14.1	14.4	14.6	14.9	15.2	15.3
	40	-	-	-	-	8.7	9.2	9.7	10.2	10.7	11.2	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.3	14.6	14.9	15.1	15.3
	50	-	-	-	-	-	9.1	9.7	10.2	10.7	11.2	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.7	14.0	14.3	14.6	14.9	15.1	15.3
	60	-	-	-	-	-	-	9.6	10.1	10.6	11.1	11.6	11.9	12.2	12.5	12.8	13.1	13.4	13.7	14.0	14.3	14.6	14.8	15.1	15.2
	70	-	-	-	-	-	-	-	10.0	10.6	11.1	11.6	11.8	12.1	12.5	12.8	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.1	15.2
	80	-	-	-	-	-	-	-	-	10.5	11.0	11.5	11.8	12.1	12.4	12.7	13.0	13.3	13.6	13.9	14.2	14.5	14.8	15.0	15.2
	90	-	-	-	-	-	-	-	-	-	10.9	11.4	11.7	12.0	12.4	12.7	13.0	13.3	13.6	13.9	14.2	14.5	14.7	15.0	15.1
	100	-	-	-	-	-	-	-	-	-	-	11.4	11.7	12.0	12.3	12.6	13.0	13.3	13.6	13.9	14.1	14.4	14.7	15.0	15.1
	110	-	-	-	-	-	-	-	-	-	-	-	11.6	11.9	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.4	14.7	15.0	15.1

Note

Maximum height and pipe length may vary per outdoor unit.

For each piping limit, please check 'Refrigerant Piping System' section from the outdoor unit PDB.

7. Water Pressure Drop

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

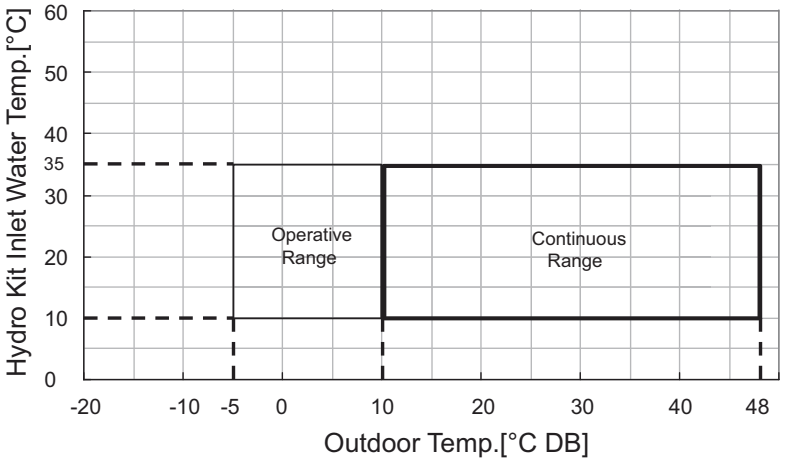
Capacity [kW]	Rated flow-rate [LPM]	Pump Head [m] (at rated flow-rate)	Product pressure drop [m]	Serviceable Head [m]	Min.flow-rate [LPM] (Recommend)
5	15.8	7.5	0.2	7.3	15
7	20.1	7.3	0.3	7.0	
9	25.9	6.1	0.4	5.7	

Note

- To secure enough water flow rate, do not set water pump capacity as Minimum.
  It can lead unexpected flow rate error CH14(Error CH14 occurs if the flow rate is lower than 7 LPM.).
- 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.

8. Operation limits

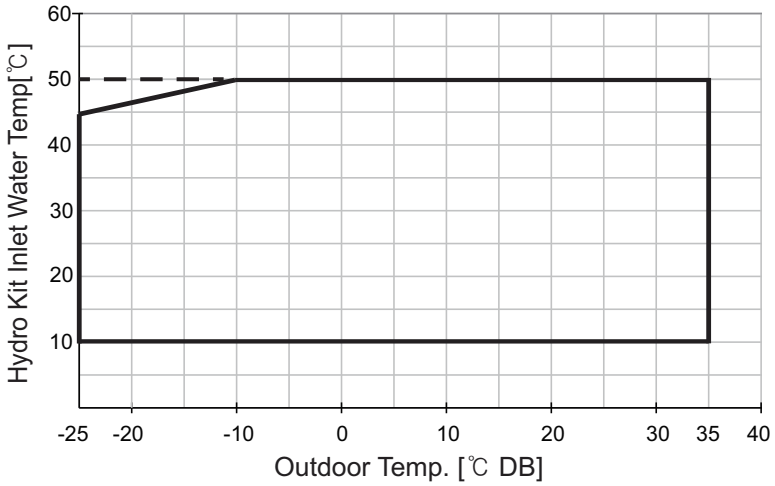
◆ Cooling



Note

1. To protect PHEX freezing, cooling operation below 10℃ might be limited.
   To activate operation, set “Antifreeze mode” by switching the option switch 3-2 and also antifreeze liquid should be added.

◆ Heating



Note

1. For only Hydro Kit combination, maximum operation limits is outdoor temp. 35 ℃ DB / 24℃ WB.
2. Operation limit follows the outdoor unit operation range and cannot operate outside the operating range.

9. Electric characteristics

■ Wiring of Main Power Supply and Equipment Capacity

1. The power supply work is needed only to the outdoor unit. The power supply to the indoor unit or the BD unit is conducted through the transmission wiring. Therefore, the power supply work can be carried out at just one place of the outdoor unit. It will contribute to simplify the work procedure and to save cost.
2. Bear in mind ambient conditions (ambient temperature,direct sunlight, rain liquid,etc.) when proceeding with the wiring and connections
3. The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker taking into account the line voltage drops. Make sure the power-supply voltage does not drop more than 10%.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for outdoor use should not be lighter than polychloroprene sheathed flexible cord.
6. Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.

⚠ WARNING

- **Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.**
- **Make sure to use specified wires for connections so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.**
- **Make sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.**

⚠ CAUTION

- **All installation site must require attachment of an earth leakage breaker. If no earth leakage breaker is installed, it may cause an electric shock.**
- **Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.**

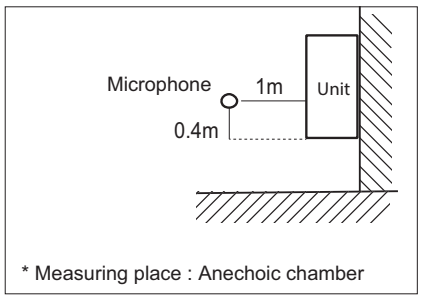
Model	Type	Hz	Volts	Voltage Range	Power Supply			Input(W)	
					MCA(A)	MFA(A)	FLA(A)	Cooling(W)	Heating(W)
ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4	K1	50	220-240	Max:264 Min:198	0.06	15	0.05	75	75
	K1	60	220	Max:242 Min:198	0.06	15	0.05	75	75
	Heater	50	220-240	Max:264 Min:198	38.75	50	31	-	-
	Heater	60	220	Max:242 Min:198	38.75	50	31	-	-

Symbols
MCA : Minimum Circuit Amperes (A)
MFA : Maximum Fuse Amperes (A)
W : Rated input (W)
FLA : Full Load Amperes (A)

Note
1. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above the listed range limits.
2. Maximum allowable voltage unbalance between phases is 2%.
3. MCA/MFA
   MCA=1.25 x FLA
   MFA = 1.1 x MCA, MFA≤ 4 x FLA
   (If MFA is smaller than minimum standard value, Use minimum standard value in region for selecting circuit breaker.)
4. Select wire size based on the MCA
5. Instead of fuse, use Circuit Breaker.

10. Sound levels

■ Sound Pressure Level

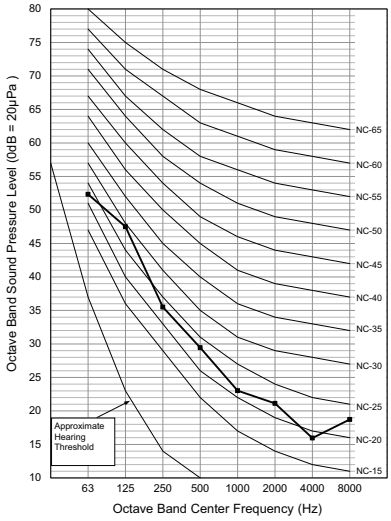


Note

1. Sound measured at some distance away from the center of the unit.
2. Data is valid at free field condition.
3. Reference accoustic pressure 0dB = 20μPa.
4. Data is valid at nominal operation condition.
   Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
5. Sound level will vary depending on a range of factors such as the construction(acoustic absorption coefficient) of particular room in which the equipment in installed.
6. Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.

Model	Sound Level (dB(A))
ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4	35

ARNH18GK1B4 / ARNH24GK1B4 / ARNH30GK1B4



10. Sound levels

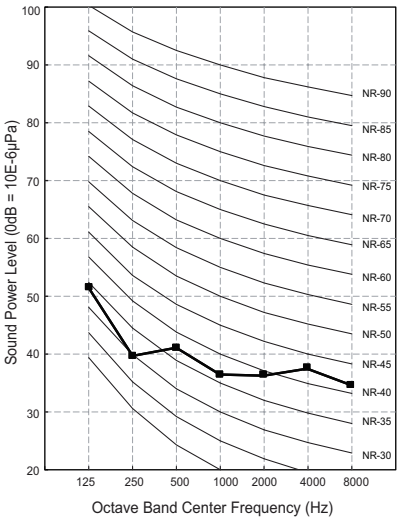
■ Sound Power Level

Note

1. Data is valid at diffuse field condition.
2. Data is valid at nominal operation condition.
   Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
3. Sound level can be increased in static pressure mode or used air guide.
4. Sound level will vary depending on a range of factors such as the construction (acoustic absorption coefficient).
5. Reference acoustic intensity 0dB = 10E-6μW/m^2
6. Sound power level is measured on the rated condition in the reverberation rooms by ISO 3741 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.

Model	Sound Power Level [dB(A)]
ARNH18GK1B4 ARNH24GK1B4 ARNH30GK1B4	44

ARNH18GK1B4 / ARNH24GK1B4 / ARNH30GK1B4



11. Installation

11.1 Installation Information

11.1.1 Alternative Refrigerant R32

The refrigerant R32 has higher efficiency and is more environmental friendly comparing to R410A. It has a lower GWP (Global Warming Potential) value, and higher efficiency than R410A. The Ozone Depletion Potential (ODP) of R32 is 0, and Global Warming Potential(GWP) is 675.

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 R410A can be used.

⚠ WARNING

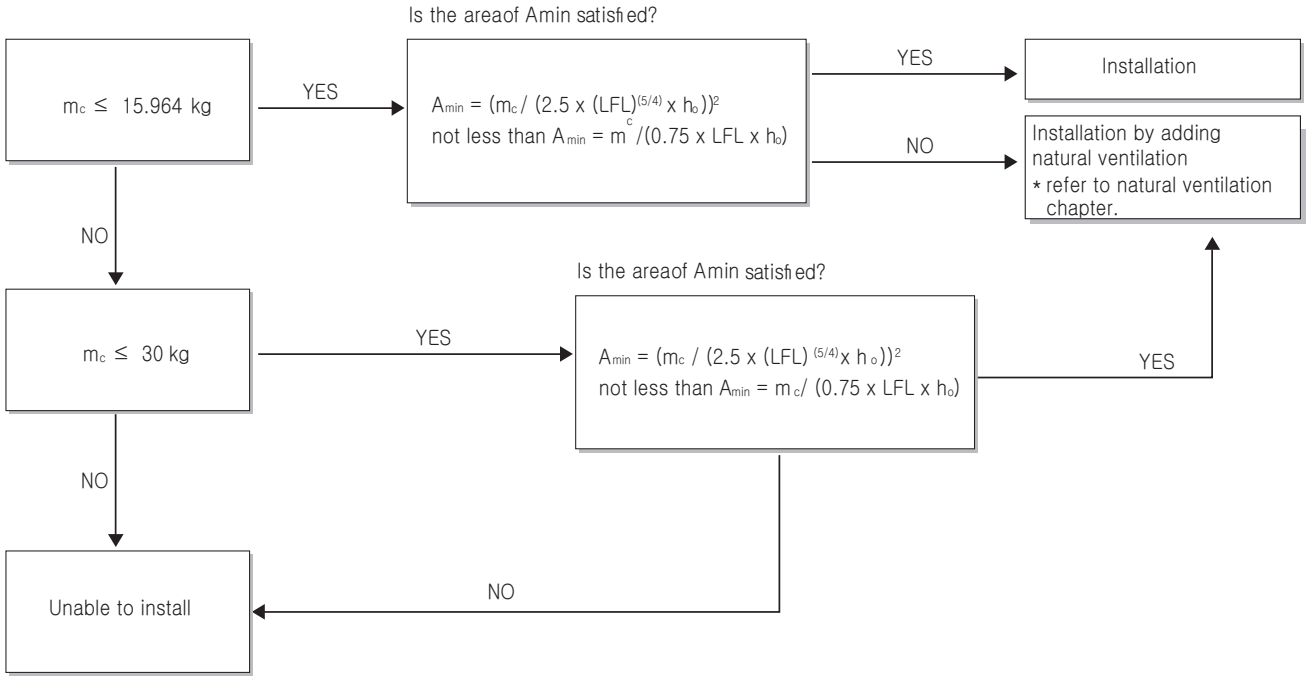
- This product contains fluorinated greenhouse gases (Refrigerant type : R32). Do NOT leak refrigerant gases into the atmosphere.
- The refrigerant R32 is a slightly flammable gas. Normally, it does not leak. If the refrigerant leaks in the installed place and is in contact with a flaming source, it may cause fire, or a harmful gas.
- If there is some leak, turn off any combustion devices, ventilate the installation location and contact the dealer from whom you purchased the unit. Do not use the unit until the refrigerant leak is repaired.
- Only use R32 as refrigerant. Other substances may cause explosions and accidents.

⚠ CAUTION

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

11. Installation

■ Installation Flow Chart



A_{min} = Minimum installation required area

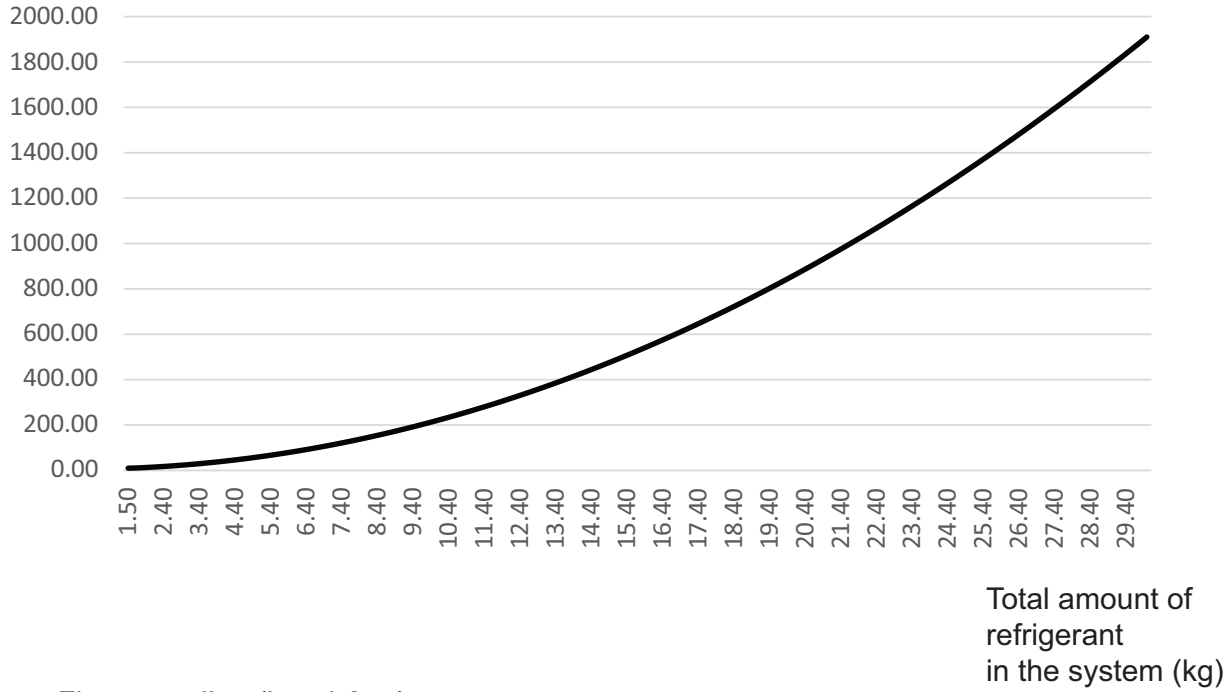
m_c = Total amount of refrigerant in the system (kg)

LFL(Lower Flammability Limit)(kg/m³) = 0.307 kg/m³

h_o: The Vertical Distance from the floor to the point of Release (m)

11. Installation

■ Minimum Floor Area for Installation : accordance with IEC06



11. Installation

Total amount of refrigerant in the system (kg)	Minimum installation required area (m²)	Total amount of refrigerant in the system (kg)	Minimum installation required area (m²)
	Floor standing (h0: 1.3 m)		Floor standing (h0 :1.3 m)
1.50	4.79	16.00	544.69
1.60	5.45	16.20	558.40
1.80	6.89	16.40	572.27
2.00	8.51	16.60	586.31
2.20	10.30	16.80	600.52
2.40	12.26	17.00	614.91
2.60	14.38	17.20	629.46
2.80	16.68	17.40	644.18
3.00	19.15	17.60	659.08
3.20	21.79	17.80	674.14
3.40	24.60	18.00	689.38
3.60	27.58	18.20	704.78
3.80	30.72	18.40	720.36
4.00	34.04	18.60	736.10
4.20	37.53	18.80	752.02
4.40	41.19	19.00	768.10
4.60	45.02	19.20	784.36
4.80	49.02	19.40	800.78
5.00	53.19	19.60	817.38
5.20	57.53	19.80	834.15
5.40	62.04	20.00	851.08
5.60	66.72	20.20	868.19
5.80	71.58	20.40	885.47
6.00	76.60	20.60	902.91
6.20	81.79	20.80	920.53
6.40	87.15	21.00	938.32
6.60	92.68	21.20	956.28
6.80	98.39	21.40	974.40
7.00	104.26	21.60	992.70
7.20	110.30	21.80	1011.17
7.40	116.51	22.00	1029.81
7.60	122.90	22.20	1048.62
7.80	129.45	22.40	1067.60
8.00	136.17	22.60	1086.75
8.20	143.07	22.80	1106.07
8.40	150.13	23.00	1125.56
8.60	157.37	23.20	1145.22
8.80	164.77	23.40	1165.05
9.00	172.34	23.60	1185.05
9.20	180.09	23.80	1205.22
9.40	188.00	24.00	1225.56
9.60	196.09	24.20	1246.07
9.80	204.34	24.40	1266.75
10.00	212.77	24.60	1287.60
10.20	221.37	24.80	1308.62
10.40	230.13	25.00	1329.82
10.60	239.07	25.20	1351.18
10.80	248.18	25.40	1372.71
11.00	257.45	25.60	1394.41
11.20	266.90	25.80	1416.29
11.40	276.52	26.00	1438.33
11.60	286.30	26.20	1460.54
11.80	296.26	26.40	1482.93
12.00	306.39	26.60	1505.48
12.20	316.69	26.80	1528.20
12.40	327.16	27.00	1551.10
12.60	337.79	27.20	1574.16
12.80	348.60	27.40	1597.40

11. Installation

13.00	359.58	27.60	1620.80
13.20	370.73	27.80	1644.38
13.40	382.05	28.00	1668.12
13.60	393.54	28.20	1692.04
13.80	405.20	28.40	1716.12
14.00	417.03	28.60	1740.38
14.20	429.03	28.80	1764.80
14.40	441.20	29.00	1789.40
14.60	453.54	29.20	1814.17
14.80	466.05	29.40	1839.10
15.00	478.73	29.60	1864.21
15.20	491.59	29.80	1889.49
15.40	504.61	30.00	1914.94
15.60	517.80		
15.80	531.16		
15.964 *	542.24		

Note
* If M_c > 15.964, must add natural ventilation

11. Installation

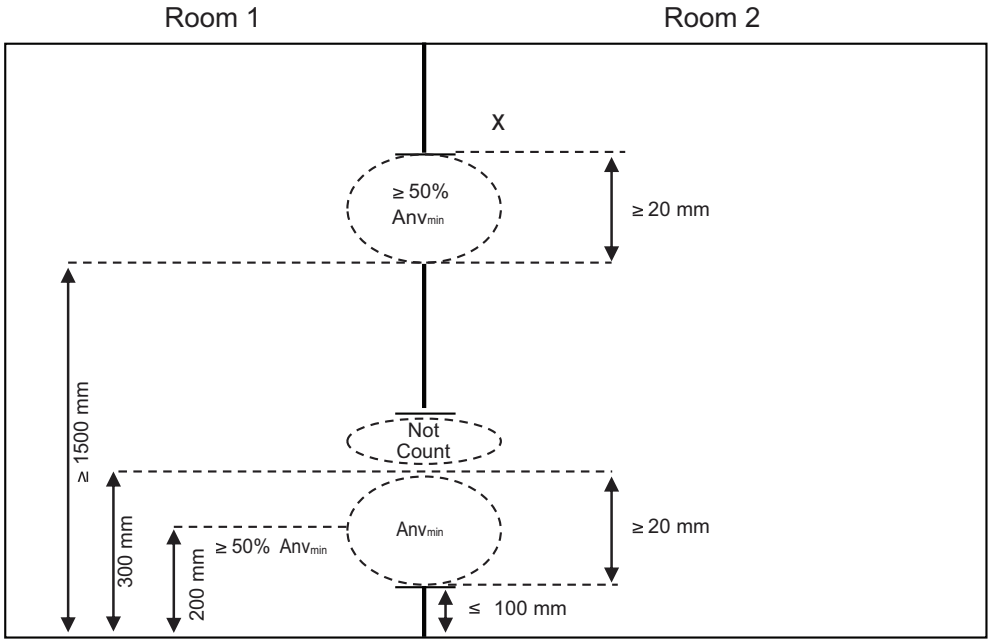
■ Natural Ventilation

For the lower opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥ Anvmin
- The area of any openings above 300 mm from the floor does not count when determining Anvmin
- At least 50% of Anvmin is less than 200 mm above the floor
- The bottom of the lower opening is ≤ 100 mm from the floor
- The height of the opening is ≥ 20 mm

For the upper opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥ 50% of Anvmin
- The bottom of the upper opening must be ≥ 1 500 mm above the floor
- The height of the opening is ≥ 20 mm



Minimum opening area (*Anv*)

$$Anv_{min} = \frac{m_c - m_{max}}{LFL \times 104} \times \sqrt{\frac{A}{g \times m_{max}} \cdot \frac{M}{M - 29}}$$

Anv	is the minimum opening for natural ventilation in m^2.
m_c	is the actual refrigerant charge of refrigerant in the system in kg;
m_{max}	is the allowable maxinum refrigerant charge in the system in kg, calculated according to Equation GG.8 or m^2, whichever is lower,
LFL	is the lower flammability limit in kg/m^3 ;
A	is the room area in m^2;
M	is the molar mass of the refrigerant in kg/kmol;
g	is the gravity acceleration of 9,81 m/s^2;
29	is the average molar mass of air in kg/kmol.

11. Installation

11.1.2 Installation of Indoor Unit

The indoor unit of Hydro Kit is installed inside where terminal of under floor water pipe cycle and refrigerant pipe from the outdoor unit are accessible at the same time. In this chapter conditions for installation place is described. In addition, considerations when installing accessories or 3rd party accessories are described, too.

■ Conditions where Indoor Unit is Installed

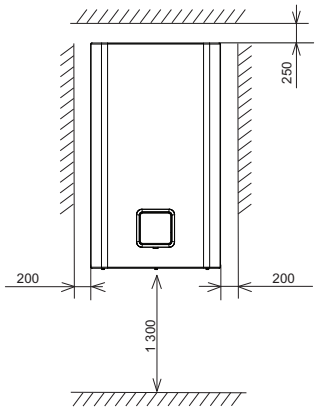
Specific conditions are required for installation place such as service space, wall mounting, water pipe length and height, total volume of water, adjusting expansion vessel, and water quality.

- General Considerations
  Followings should be considered before installation of the indoor unit.
  - The installation place should be free from outdoor weather conditions such as rain, snow, wind, frost, etc.
  - Choose the place which is water-resistant or has good drainage.
  - Service space should be secured.
  - No flammable materials around the indoor unit.
  - Keep the indoor unit free or any animal like rodents, etc.
  - Do not place anything in front of the indoor unit to ensure air circulation around the indoor unit.
  - Do not plasce anything under the indoor unit to be free from unexpected water out. In order to prevent things getting wet from unexceed water drips.
  - In case water pressure rises over 3.0 bar, water will be drained by safety valve, thus, water drainage shall be applied.

■ Service Space

- Ensure that the spaces indicated by arrows around bottom, side, and top side.
- Wider spaces are preferred for easy maintenance and piping.
- If minimum service space is not secured, air circulation can be troubled and internal parts of the indoor unit can be damaged by overheating.

(unit : mm)



Minimum service space

Note

The default setting of the product is for heating only. To enable the cooling system , DIP S / W 4 should be turned ON and additional drain pan accessory should be installed.

11.1.3 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.
- Never connect electric power while proceeding water charging.

■ Water Piping and Water Circuit Connection

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 may happened when the internal pressure is over 3.0 bar and water inside the indoor unit will be discharged to drain hose.

While connecting water pipes, followings should be considered.

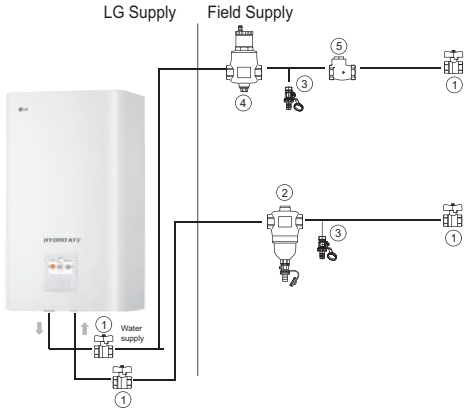
- Pipe fittings (e.g. L-shape elbow, T-shape tee, diameter reducer, etc) should be tightened strongly to be free from water leakage.
- To avoid leakage from water piping connections, tefron tape, rubber bushing, sealant solution, etc, should be applied.
- Appropriate tools and tooling methods should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

11. Installation

■ Water Cycle minimum requirements

1. For selecting the components of the hydraulic system, be sure they are above the design waterpressure.
2. For the water pipe, diffusely tight water pipes are recommended instead of steel pipes.
3. For the drain pipe size, use the same diameter as the product connected or larger. Always install a natural drainage so that the drained water does not flows back
4. Install insulated material across the total hydraulic piping to prevent condensation and to prevent low cooling or heating . If the ambient temperature is higher than 30 °C and the humidity is higher than RH 80 % the insulation material must be minimum 20 mm thick to prevent condensation.
5. Install the shut-off valve (1) to block the water by closing the valve when replacing the component or cleaning.
6. Install an additional expansion tank if required expansion tank size is more then 8 liter.
7. Install the drain valve (3) that can be used for draining the water inside when replacing the component or providing service.
8. Install a magnetic dirt separator.
9. Install an addtional circulaton pump if the hydraulic system doesn't meet required water flow rate due to excessive pressure drop.
10. Install an automatic air separator(4) in the outlet water pipe. If the air separator is not installed or bubbles inside the hydraulic system may occur. Flow error will be showed first on remote controller, however, as result, a plate heat exchanger may burst during combined circumstances.
11. Install a pressure meter (5) at the outlet water pipe.
12. In case of cascade hydraulic systems or bivalent systems, install a flow-check valve (6) at each outlet water pipe.
13. Install a buffer tank of at least 10L/kW heating capacity in order to have a correct defrost cycle, if there is no knowledge about the type and size of the heating system. If there is no buffer tank installed, the product can be damaged during normal operation or defrost operation.
14. In case of new installation, clean the water filter after 2 weeks of product operation.
In the beginning of operation small particular dirt from installing process can block the filter which can lead to damage of the product.
15. Water quality should be complied with EN 98/83 EC directives.

11. Installation



1	Shut-Off valve	2	Magnetic filter
3	Service port(Drain valve)	4	Automatic air separator
5	Check valve		

Notice

- Install the closed loop type water pipe system.

11.1.4 Water Control

■ Frost Protection

- In areas of the country where entering water temperatures drop below 15℃(59˚F), the water pipe must be protected by using an approved antifreeze solution. Consult your Hydro Kit unit supplier for locally approved solutions in your area. Calculate the approximate volume of water in the system. (Except the Hydro Kit unit.) And add appropriate amount of antifreeze liquid considering the total volume of water in the system.

Type of Antifreeze	Minimum Temperature for Freeze Pretection				
	15℃(59˚F) ~ -5℃(23˚F)	-10℃(14˚F)	-15℃(5˚F)	-20℃(-4˚F)	-25℃(-13˚F)
Ethylene glycol	12%	20%	30%	-	-
Propylene glycol	17%	25%	33%	-	-
Methanol	6%	12%	16%	24%	30%

⚠ CAUTION

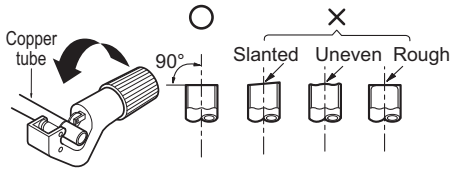
- Use only one of the above antifreeze.
- If antifreeze is used, pressure drop and capability degradation of the system can occur.
- Once of antifreezes is used, corrosion may occur. Please add corrosion inhibitor in order to prevent corrosion.
- Please periodically check and keep the same concentration of the antifreeze in the system.
- When the antifreeze is used (for installation or operation), be sure not to get in contact with it.
- Please, abide rules and regulations of your country regarding antifreeze usage.

11. Installation

11.1.5 Refrigerant Piping

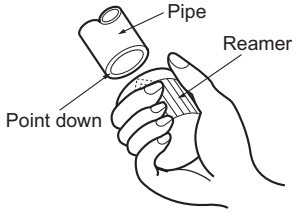
◆ Cut the pipes and the cable

- Use the accessory piping kit or the pipes purchased locally.
- Measure the distance between the indoor and the outdoor unit.
- Cut the pipes a little longer than measured distance.
- Cut the cable 1.5m longer than the pipe length.



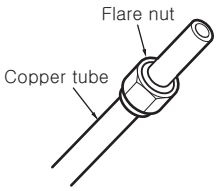
◆ Burrs removal

- Completely remove all burrs from the cut cross section of pipe/tube.
- Put the end of the copper tube/pipe to downward direction as you remove burrs in order to avoid to let burrs drop in the tubing.



◆ Putting nut on

- Remove flare nuts attached to indoor and outdoor units, than put them on pipe/tube having completed burr removal. (Not possible to put them on after flaring work)

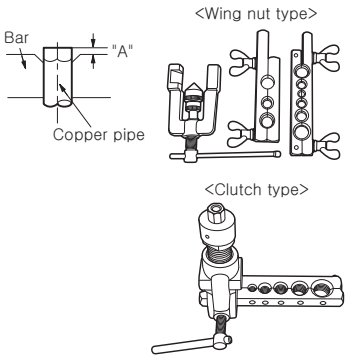


◆ Flaring work

- Carry out flaring work using dedicated flaring tool for R-410A refrigerant as shown below.

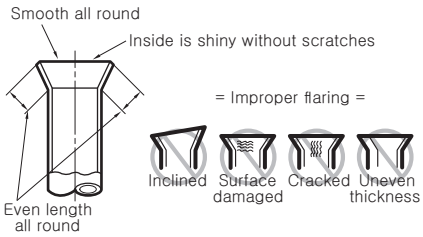
Pipe diameter [inch(mm)]	A inch (mm)	
	Wing nut type	Clutch type
1/4 (6.35)	0.04~0.05(1.1~1.3)	0~0.02 (0~0.5)
3/8 (9.52)	0.06~0.07(1.5~1.7)	
1/2 (12.7)	0.06~0.07(1.6~1.8)	
5/8 (15.88)	0.06~0.07(1.6~1.8)	
3/4 (19.05)	0.07~0.08(1.9~2.1)	

- Firmly hold copper tube in a bar(or die) as indicated dimension in the table above.



◆ Check

- Compare the flared work with right figure.
- If flare is seemed to be defective, cut off the flared section and do flaring work again.
- Insert the insulation material within the product as deep as possible.



11.1.6 Electrical Wirings

■ General Consideration

Followings are should be considered before beginning indoor unit wiring.

- Field-supplied electrical components such as power switches, circuit breakers, wires, terminal boxes, etc should be properly chosen with compliance with national electrical legislation or regulation.
- Make it sure that supplied electricity is enough to operate the product including outdoor unit, electric heater, water tank heater, etc. The capacity of fuse also selected according to the power consumption.
- The main electricity supply should be dedicated line. Sharing main electricity supply with other devices such as washing machine or vacuum cleaner is not permitted.

Note

- Before starting wiring job, the main electricity supply should be turned off until wiring is completed.
- When adjusting or changing wiring, the main electricity supply should be turned off and ground wire should be connected securely.
- Installation place should be free from the attack of wild animal. For example, mice's wire attacking or frog's entering into the indoor unit may cause critical electrical accident.
- All power connections should be protected from dew condensation by thermal insulation.
- All electrical wiring should comply with national or local electrical legislation or regulation.
- The ground should be connected exactly. Do not earth the product to the copper pipe,steel fence at the veranda, city water outlet pipe, or any other conductivity materials.
- Fix all cable using cord clamp tightly. (When cable is not fixed with cord clamp, use additionally supplied cable ties.)

MULTI V™

Hydro Kit

Floor Standing (Medium Temperature)

1. List of functions

■ Basic functions of Unit

Category	Functions	ARNH04GK2B4 / ARNH10GK2B4 ARNH16GK2B4
Installation	Drain pump	X
	E.S.P. control	X
	Electric heater (operation)	X
	High ceiling operation	X
Reliability	Hot start	X
	Self diagnosis	O
	Soft dry operation	X
Convenience	Auto changeover	X
	Auto cleaning	X
	Auto operation (artificial intelligence)	X
	Auto restart operation	O
	Child lock	O
	Forced operation	X
	Group control	O
	Sleep mode	X
	Timer (on/off)	O
	Timer (weekly)	O
	Two thermistor control	X
Individual control	Standard wired remote controller	O
	Premium wired remote controller	X
	Simple wired remote controller	X
	Simple Wired remote controller(for hotel use)	X
	Wireless remote controller(simple)	X
Network function	General central controller (Non LGAP)	X
	Network Solution (LGAP)	O
Hydro Kit Functions	Anti-Condensation on floor (cooling)	O
	Water Pump ON / OFF Control	O
	Water Flow Detection	O
	Thermostat Interface (230V AC)	O
	Thermostat Interface (24V AC)	X
	DHW(Domestic Hot Water) tank kit	O
	PHEX Anti-Freezing Control	O
	Water Pump Forced Operation	O
	Autosetting according to Ambient Temperature (for heating operation)	O
	Silent Operation	O
	Anti-overheating of Water Pipe	O
	Emergency Operation	O
	Weather Dependent Operation with Thermostat	X
	Scheduler (Domestic Hot Water Tank Heater)	O
	Timer (Domestic Hot Water Tank Heater)	X
	Quick Domestic Hot Water Tank Heating	O
	Electric Heater Capacity Control	X
	Screed Drying Mode	O
	Sump Heater	X
	One Point Dry Contact Input(CN-EXT)	O
	Tank Disinfection(Optional, need to booster heater)	O
	Pump Frequency	O
	SG Ready(Energy State Storage)	O
	ODU Cycle Priority (Heating Priority)	O

Note

1. 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.

1. List of functions

■ Accessory Compatibility List

Category		Product	ETC	ARNH04GK2B4 ARNH10GK2B4 ARNH16GK2B4
Central Controller	Simple	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	BACnet	PQNFB17C0	ACP BACnet	O
	Lonworks	PLNWKB000	ACP Lonworks	O
	Modbus	PMBUSB00A	Modbus Gateway	O
Dry contact	Simple Contact	PDRYCB000 PDRYCB100	Simple Dry Contact	O
	Communication type	PDRYCB400	2 Points Dry Contact (For Setback)	X
		PDRYCB300	Dry Contact For 3rd Party Thermostat	O
		PDRYCB500	Dry Contact For Modbus	X
ETC	Remote temperature sensor	PQRSTA0	-	O
	Zone controller	ABZCA	-	X
	Group control wire	PZCWRCG3	0.25m	O
	Wi-Fi Controller	PWFMDD200	-	O
	Multi-Tenant Power Module	PINPMB001	-	O
	Refrigerant Leakage Detector	PRLDNVS0	For R410A	O
		PLDRNV1S	For R32	O
	PDI	PPWRDB000	PDI Standard	O
		PQNUD1S40	PDI Premium	O
Special Kit for Hydrokit	Solar-Thermal Interface kit with DHW Tank	PHLLA	Limit Temperature : 96℃	O
	Indoor Drain Pan	PHDPB	-	X

Note

1. O : Applied, X : Not applied
   Accessory model name : Installed at field, ordered and purchased separately by the corresponding model name, supplied with separated package.
2. * : Some advanced functions controlled by individual controller cannot be operated.
3. If you need more detail, please refer to the BECON PDB or the manual of product.
   (http://partner.lge.com> Select Your Region : Home> Doc.Library> Product > Control(BECON))

2. Specifications

Model			Unit	ARNH04GK2B4	ARNH10GK2B4
Capacity (Rated)		Cooling	kW	12.3	28.0
			kcal/h	10,580	24,100
			Btu/h	42,000	95,900
		Heating	kW	13.8	31.5
			kcal/h	11,870	27,100
			Btu/h	47,000	107,500
Input (Rated)		Cooling	kW	0.01	0.01
		Heating	kW	0.01	0.01
Casing		Material	-	Painted Steel Plate	Painted Steel Plate
		Color (RAL code)	-	RAL 7038	
Dimensions	Net	Body (W x H x D)	mm	520 x 631 x 330	520 x 631 x 330
			inch	20-15/32 x 24-27/32 x 13	20-15/32 x 24-27/32 x 13
Weight	Net	Body	kg (lbs)	32.3(71.2)	37.3(82.2)
Heat Exchanger	Refrigerant to Water	Type	-	Brazed Plate HEX	Brazed Plate HEX
		Quantity	EA	1	1
		Number of Plate	EA	26	48
		Rated Water Flow	ℓ / min	39.6	92.0
		Head Loss	kPa	41.0	69.0
Temperature Control			-	Microprocessor, Thermostat for cooling and heating	
Water Tank Temperature Sensor		Type(Sensor Holder)	inch	Male PT 1/2	
		Length	m	12	
Sound Absorbing Thermal Insulation Material			-	Foamed polystrene	Foamed polystrene
Safety Device			-	Fuse	Fuse
Piping Connections	Water Side	Inlet	inch	Male PT 1	Male PT 1
		Outlet	inch	Male PT 1	Male PT 1
	Refrigerant Side	Liquid	mm(inch)	Ø 9.52(3/8)	Ø 9.52(3/8)
		Gas	mm(inch)	Ø 15.88(5/8)	Ø 22.2(7/8)
Drain Piping Connection			inch	Male PT 1	Male PT 1
Sound Pressure Level		Cooling	dB(A)	26	26
		Heating	dB(A)	26	26
Transmission Cable			mm²	1.0~1.5 × 2C	1.0~1.5 × 2C
Refrigerant	Refrigerant to Water	Refrigerant name	-	R410A / R32	R410A / R32
		Precharged Amount	kg (lbs)	-	-
		Additional Refrigerant Charge Amount	kg (lbs)	0.80(1.76) / 0.66(1.46)	1.60(3.53) / 1.32(2.91)
		GWP (Global Warming Potential)	-	2,087.5	2,087.5
		t-CO2 eq	-	-	-
		Control	-	Electronic Expansion Valve	Electronic Expansion Valve
Power Supply			V, Ø, Hz	220-230-240, 1, 50/60	220-230-240, 1, 50/60
Running Current		Cooling / Heating	A	0.13 - 0.13 - 0.13	0.13 - 0.13 - 0.13

Note

1. Capacities are based on the following conditions:
   - Cooling Temperature : Outdoor 35°C(95°F) DB / 24°C(75.2°F) WB, Water Inlet 23℃(73.4˚F) / Outlet18℃(64.4˚F)
   - Heating Temperature : Outdoor 7°C(44.6°F) DB / 6°C(42.8°F) WB, Water Inlet 30℃(86˚F) / Outlet 35℃(95˚F)
   - Difference Limit of Elevation (Outdoor ~ Indoor Unit) is 0m.
   - Piping Length : Interconnected Pipe Length = 7.5m
2. Wiring cable size must comply with the applicable local and national code
3. Due to our policy of innovation, some specifications may be changed without notification.
4. Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.
5. This product contains Fluorinated greenhouse gases.(R410A,GWP(Global warming potential) = 2087.5)

2. Specifications

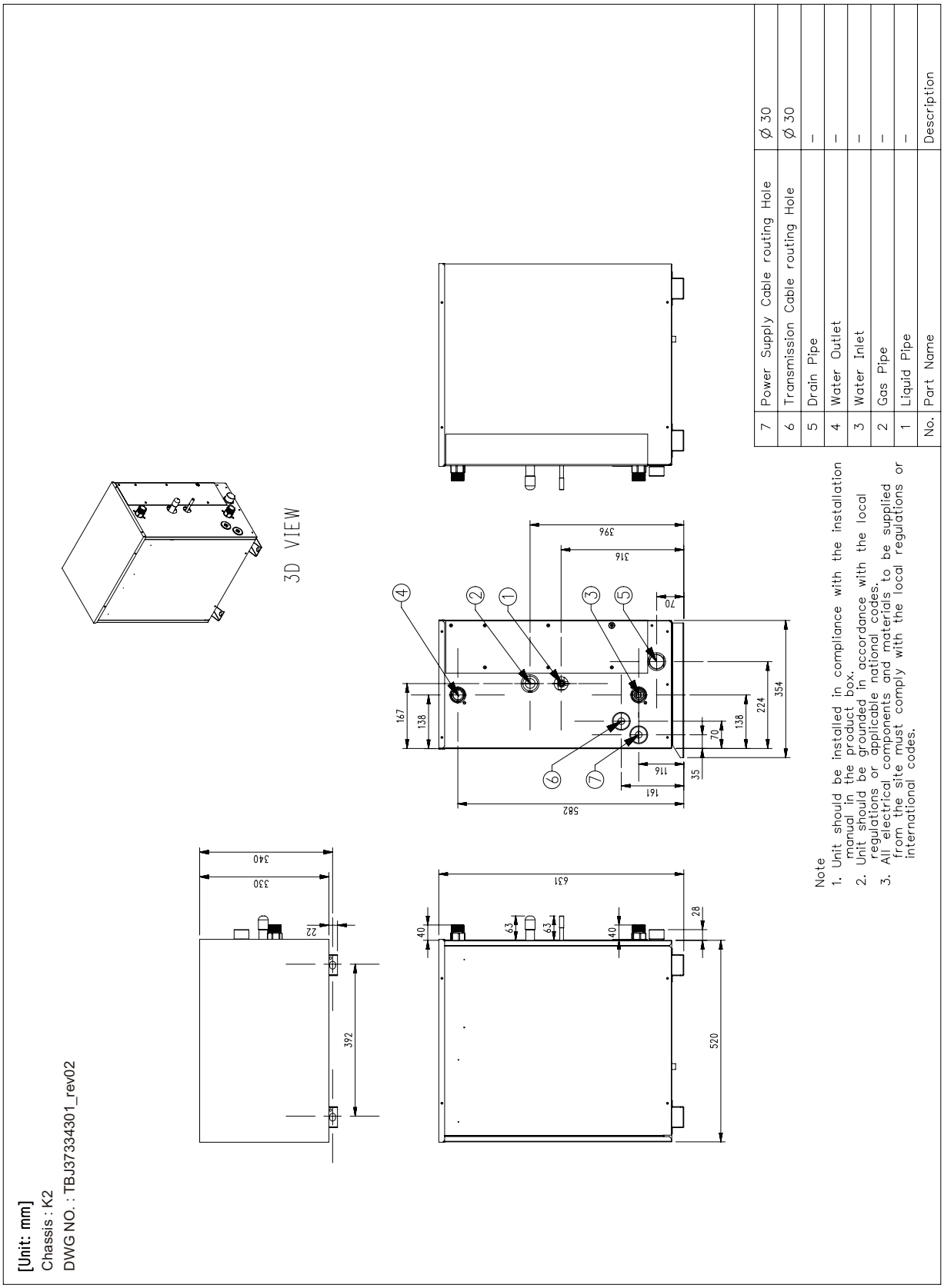
Model			Unit	ARNH16GK2B4
Capacity (Rated)		Cooling	kW	46.4
			kcal/h	39,900
			Btu/h	158,300
		Heating	kW	52.0
			kcal/h	44,700
			Btu/h	177,400
Input (Rated)		Cooling	kW	0.01
		Heating	kW	0.01
Casing		Material	-	Painted Steel Plate
		Color (RAL code)	-	RAL 7038
Dimensions	Net	Body (W x H x D)	mm	520 x 631 x 330
			inch	20-15/32 x 24-27/32 x 13
Weight	Net	Body	kg (lbs)	47.3(104.3)
Heat Exchanger	Refrigerant to Water	Type	-	Brazed Plate HEX
		Quantity	EA	1
		Number of Plate	EA	96
		Rated Water Flow	ℓ / min	150
		Head Loss	kPa	-
Temperature Control			-	Microprocessor, Thermostat for cooling and heating
Water Tank Temperature Sensor		Type(Sensor Holder)	inch	Male PT 1/2
		Length	m	12
Sound Absorbing Thermal Insulation Material			-	Foamed polystrene
Safety Device			-	Fuse
Piping Connections	Water Side	Inlet	inch	Male PT 1-1/4
		Outlet	inch	Male PT 1-1/4
	Refrigerant Side	Liquid	mm(inch)	Ø 12.7(1/2)
		Gas	mm(inch)	Ø 28.58(1-1/8)
Drain Piping Connection			inch	Male PT 1
Sound Pressure Level		Cooling	dB(A)	30
		Heating	dB(A)	30
Transmission Cable			mm²	1.0~1.5 × 2C
Refrigerant	Refrigerant to Water	Refrigerant name	-	R410A / R32
		Precharged Amount	kg (lbs)	-
		Additional Refrigerant Charge Amount	kg (lbs)	2.40(5.29) / 1.98(4.37)
		GWP (Global Warming Potential)	-	2,087.5
		t-CO2 eq	-	-
		Control	-	Electronic Expansion Valve
Power Supply			V, Ø, Hz	220-230-240, 1, 50/60
Running Current		Cooling / Heating	A	0.13 - 0.13 - 0.13

Note

1. Capacities are based on the following conditions:
   - Cooling Temperature : Outdoor 35°C(95°F) DB / 24°C(75.2°F) WB, Water Inlet 23℃(73.4˚F) / Outlet18℃(64.4˚F)
   - Heating Temperature : Outdoor 7°C(44.6°F) DB / 6°C(42.8°F) WB, Water Inlet 30℃(86˚F) / Outlet 35℃(95˚F)
   - Difference Limit of Elevation (Outdoor ~ Indoor Unit) is 0m.
   - Piping Length : Interconnected Pipe Length = 7.5m
2. Wiring cable size must comply with the applicable local and national code
3. Due to our policy of innovation, some specifications may be changed without notification.
4. Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.
5. This product contains Fluorinated greenhouse gases.(R410A,GWP(Global warming potential) = 2087.5)

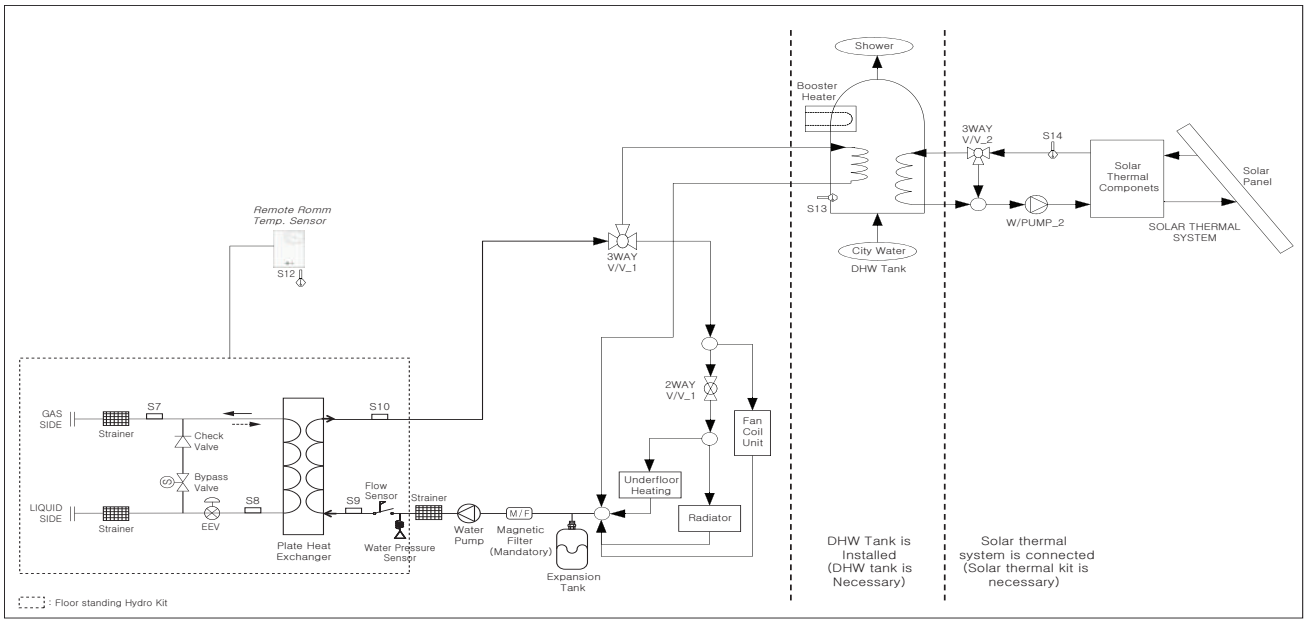
3. Dimensions

■ ARNH04GK2B4 / ARNH10GK2B4 / ARNH16GK2B4



4. Piping diagrams

■ ARNH04GK2B4 / ARNH10GK2B4 / ARNH16GK2B4



Note

The schematic diagram above is given for reference only.

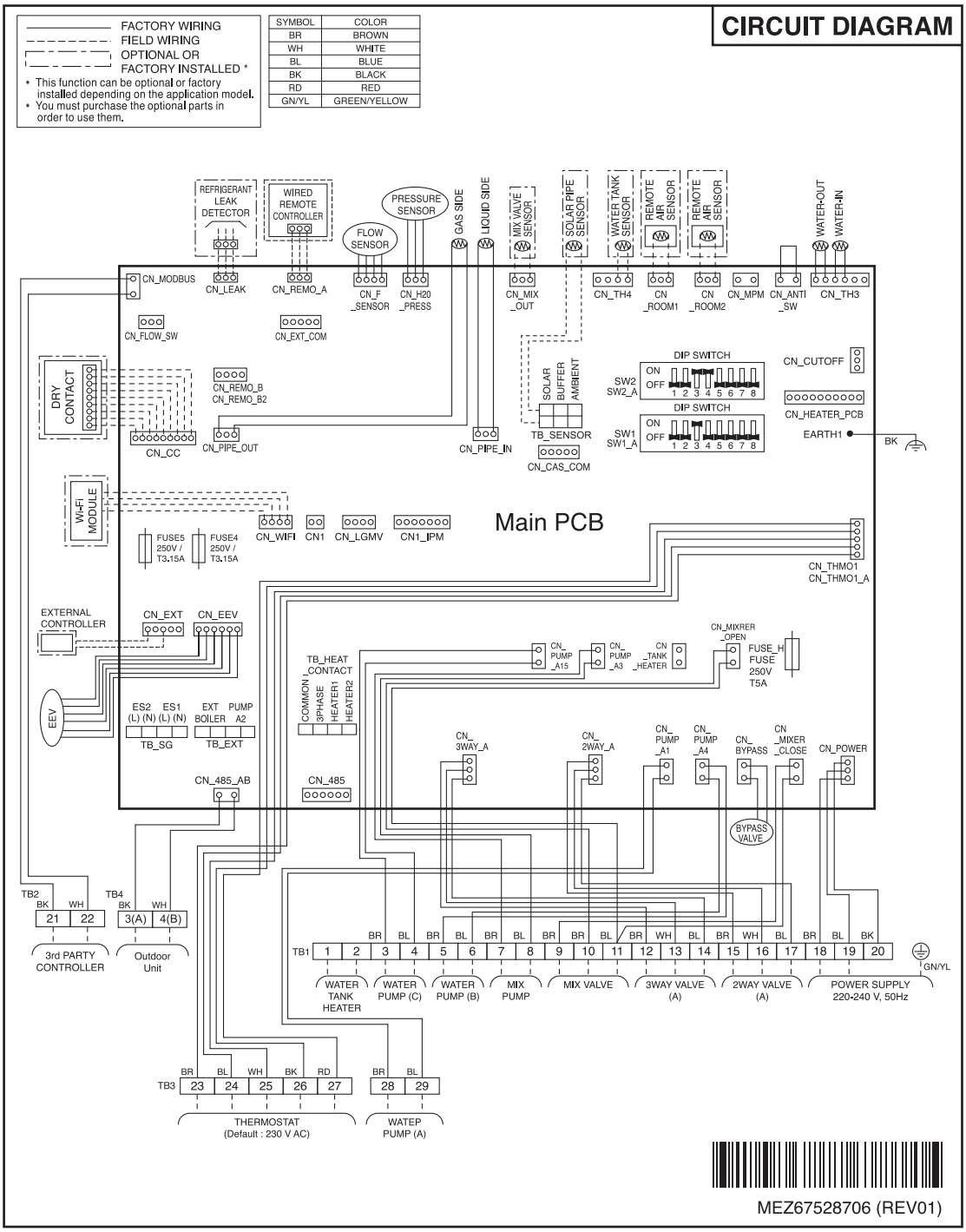
Actual schematic diagram may be different depending on the project requirement.

4. Piping diagrams

Category	Symbol	Meaning	PCB Connector	Remarks
Indoor Unit	S7	Refrigerant temperature sensor (Gas side)	CN_PIPE/OUT	- Meaning is expressed based on Cooling mode.
	S8	Refrigerant temperature sensor (Liquid side)	CN_PIPE/IN	
	S9	Entering Water temperature sensor	CN_TH3 (WATER IN) (PHEX OUT) (WATER OUT)	- S9, S10 are connected at 6 pin type connector CN_TH3.
	S10	Leaving Water temperature sensor		
	F/S	Flow Sensor	CN_FLOW1	- To monitor water flow in the system.
	S12	Remote Air sensor (Room 1/Direct circuit)	CN_ROOM	- Optional accessory (sold separately)
	CTR/PNL	Control Panel (or 'Remote Controller')	CN_REMO	- Pre built-in at indoor unit
Space Heating/ Cooling	2WAYV/V_1	To block underfloor heating from cooling water	CN_2WAY_A	- 3rd party accessory and Field installation (sold separately) -2wire NO or NC type 2way valve is supported.
DHWHeating	DHW TANK	Water TANK	(no connector)	- Accessory and Field installation (sold separately)- Generating and storing DHW by Hydro kit or built-in backup heater
	Cold WATER	Water to be heated by Indoor unit and Booster Heater of W/TANK	(no connector)	- Field installation
	SHOWER	Water supplied to end-user	(no connector)	- Field installation
	S13	W/TANK water temperature sensor	CN_TH4	- S13 and S15 are connected at 4 pin type connector CN_TH4.- S13 is a part of DHW tank kit.- S14 is a part of solar thermal kit
Solar Heating	S14	Solar-heated water temperature sensor		
	3WAYV/V_2	- 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	- 3rd party accessory and Field installation (sold separately)- SPDT type 3way valve is supported.
	W_PUMP/2	External Water Pump	CN_W/PUMP_B	- 3rd 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, Sensors, Thermostats, Interim heat exchanger, Water pump, etc.- To utilized hot water heated by SOLAR THERMAL SYSTEM, end-user must install Solar-Kit accessory provided by LG.	(no connector)	- 3rd party accessory and Field installation (sold separately)
Common	Expansion Tank	Expansion Tank	(no connector)	- Absorb volume change of heated water,
	M / F	Magnetic Filter	(no connector)	- 3rd party accessory and Field installation (sold separately)
	3WAYV/V_1	- Flow control for water which is leaving from indoor unit.- Flow direction switching between underfloor and water tank	CN_3WAY_A	- 3rd party accessory and Field installation (sold separately)- SPDT type 3way valve is supported.
	Water Pump	Water Pump	Pump(A)	-Sold separately
	Strainer	Strainer	(no connector)	-Included in the product package

5. Wiring diagrams

■ ARNH04GK2B4 / ARNH10GK2B4 / ARNH16GK2B4



6. Capacity Correction Factor

6.1 Capacity Correction Factor by Temperature

■ Capacity/Power Input Calculation method

Total Capacity = Hydro Kit Capacity + Indoor Unit Capacity

Hydro Kit Capacity = Q_{HK} x F_{TC,T_HK} x F_{TC,W_HK}x F_{TC,P_ODU} x F_{TC,D_ODU}

Q_{HK} =	Hydro Kit capacity at rated condition. (kW)	..... Refer to *Specification of this PDB*
F_{TC,T_HK} =	Capacity correction factor by Outdoor and water inlet temperature.	..... Refer to *following Graph of this PDB*
F_{TC,W_HK} =	Capacity correction factor by Water flow rate.	..... Refer to *following Graph of this PDB*
F_{TC,P_ODU} =	Capacity correction factor by Refrigerant Piping length.	..... Refer to *correction factors of outdoor unit PDB*
F_{TC,D_ODU} =	Capacity correction factor by Defrosting operation.	..... Refer to *correction factors of outdoor unit PDB*

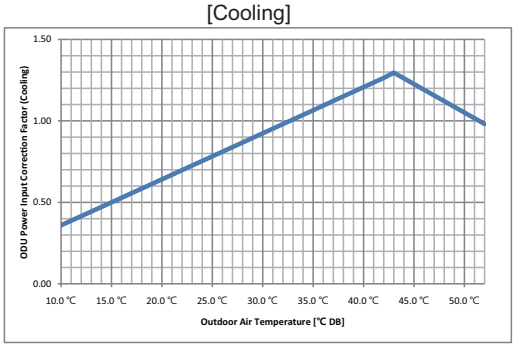
Total Power Input = Hydro Kit Power Input + Indoor Unit Power Input

Hydro Kit Power Input = PI_{ODU} x (I_{HK} / I_{TOTAL}) x F_{PI,T_HK} x F_{PI,W_HK}

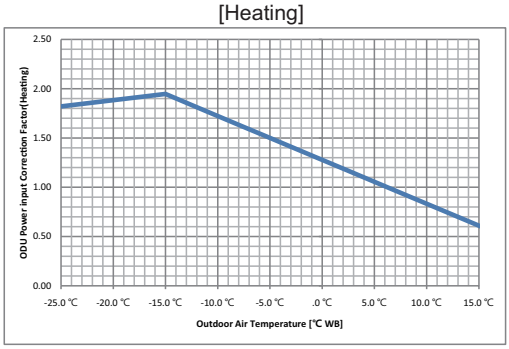
PI_{ODU}= Outdoor Unit Power Input by outdoor air (outside inlet water) temp. and capacity ratio at standard indoor temp. ..... Refer to *Capacity tables of outdoor unit PDB*

* Standard indoor temperature is 27/19℃ DB/WB on cooling mode, 20℃ DB on heating mode.
** PI ODU pattern by outdoor air temp.(It is reference data.This data would be different depending on outdoor Unit)

[Cooling]



[Heating]



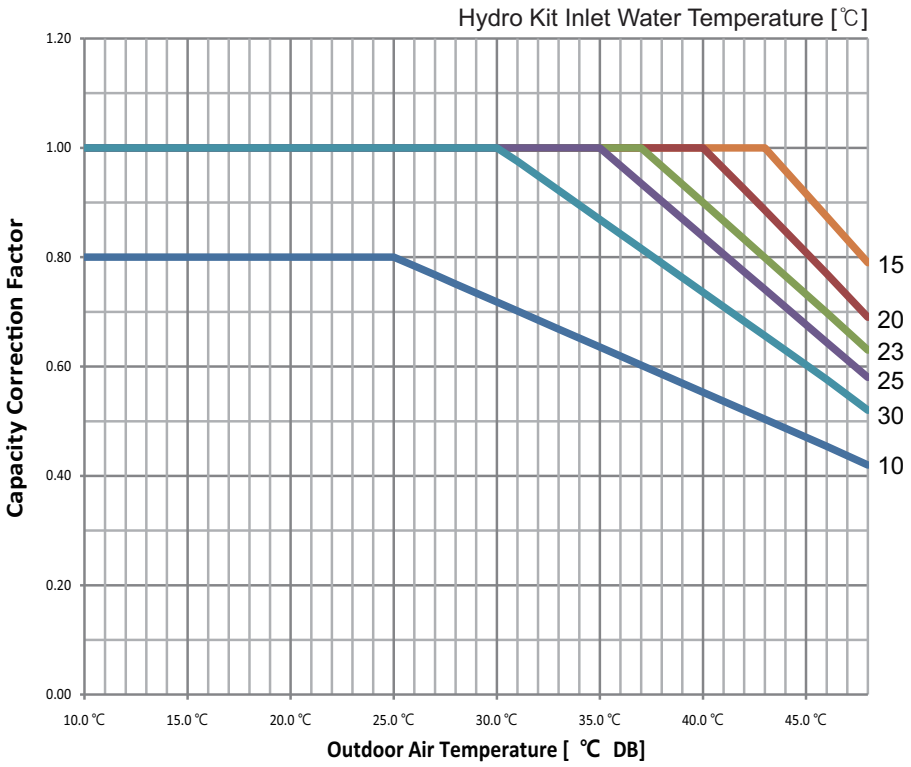
F_{PI,T_HK} =	Power Input correction factor [Outdoor Unit] by Outdoor and water inlet temperature.	.... Refer to *following Graph of this PDB*
F_{PI,W_HK} =	Power Input correction factor [Outdoor Unit] by Water flow rate	..... Refer to *following Graph of this PDB*
I_{HK} =	Capacity index for Hydro Kit	..... Refer to *index table of this PDB*
I_{TOTAL} =	Sum of Capacity index for combined indoor units and Hydro kit	..... Refer to *index table of outdoor unit PDB*

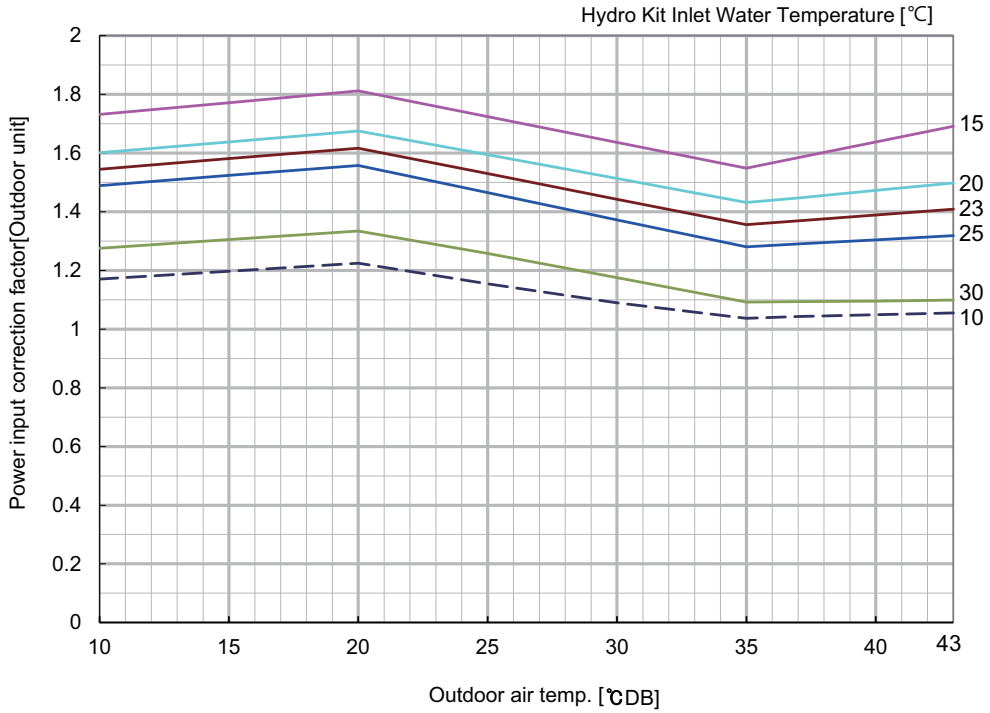
Note

1. When calculating at upper or lower temperature than the range of Outdoor unit capacity table, use the same value with the boundary value of that. For example, when calculating Heating PI with capacity table of Outdoor unit at upper temperature than 15℃DB, use the same value of PI at 15℃ DB.

6. Capacity Correction Factor

■ ARNH04GK2B4 / ARNH10GK2B4 / ARNH16GK2B4(Cooling)



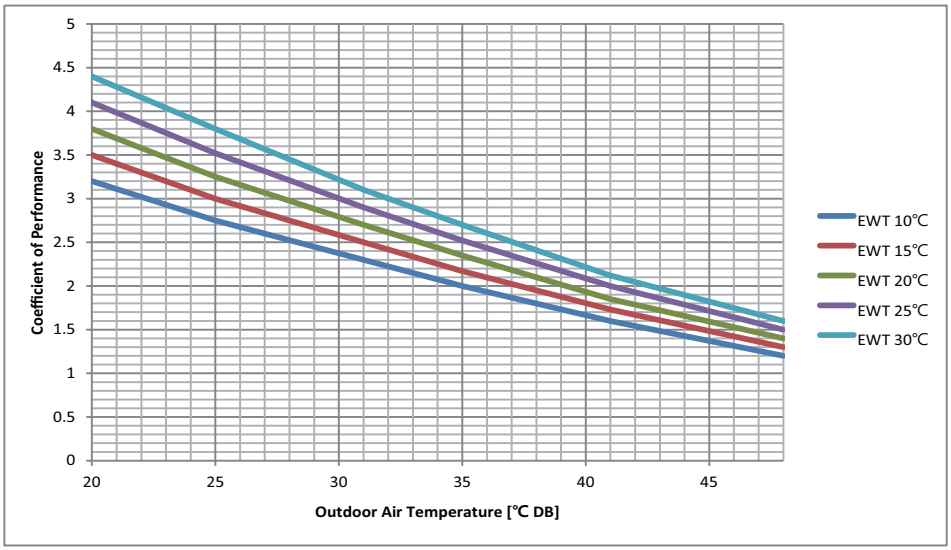


Note

- Correction factor follows the outdoor unit operation range and cannot operate outside the operating range.
- Leaving water temperature changes per pipe length of the system.
  Please check 'Minimum Leaving Water Temperature by Pipe Length' table in this PDB

6. Capacity Correction Factor

◆ COP Pattern by outdoor air temp.(Reference Data)

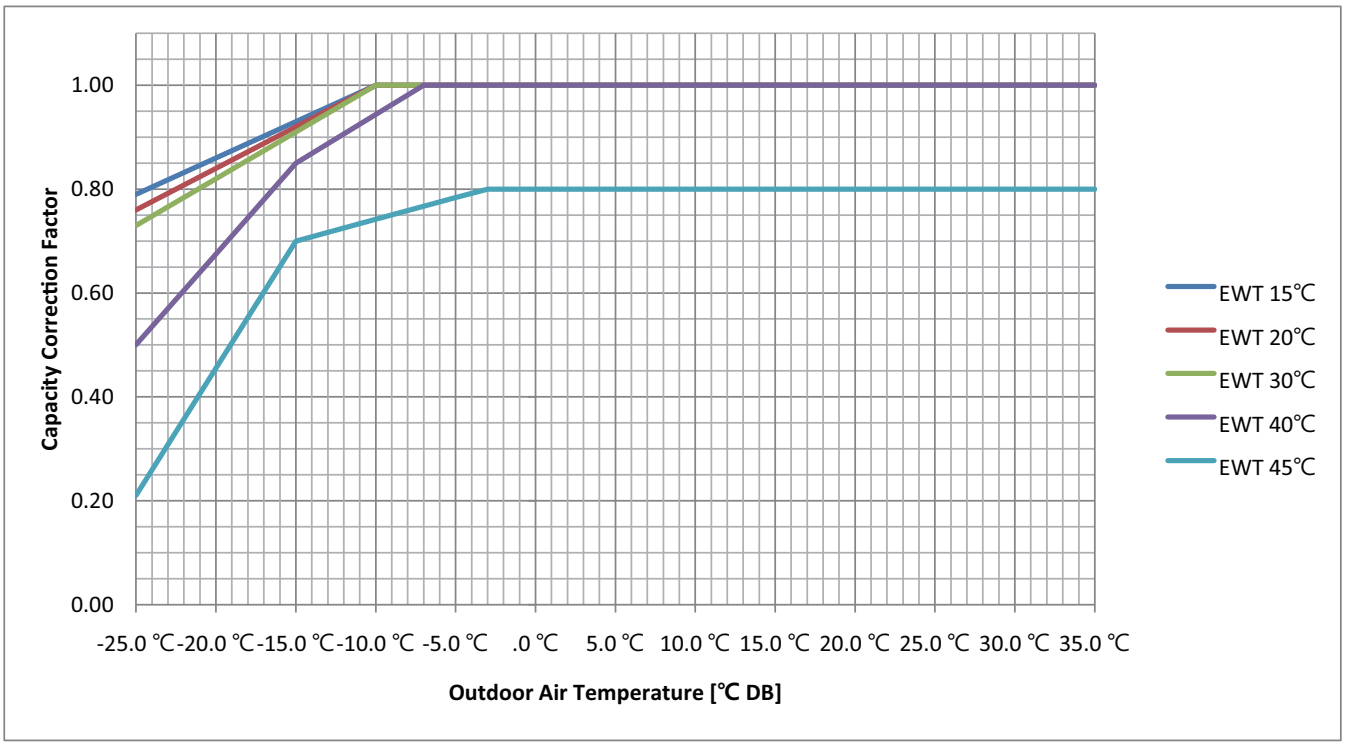


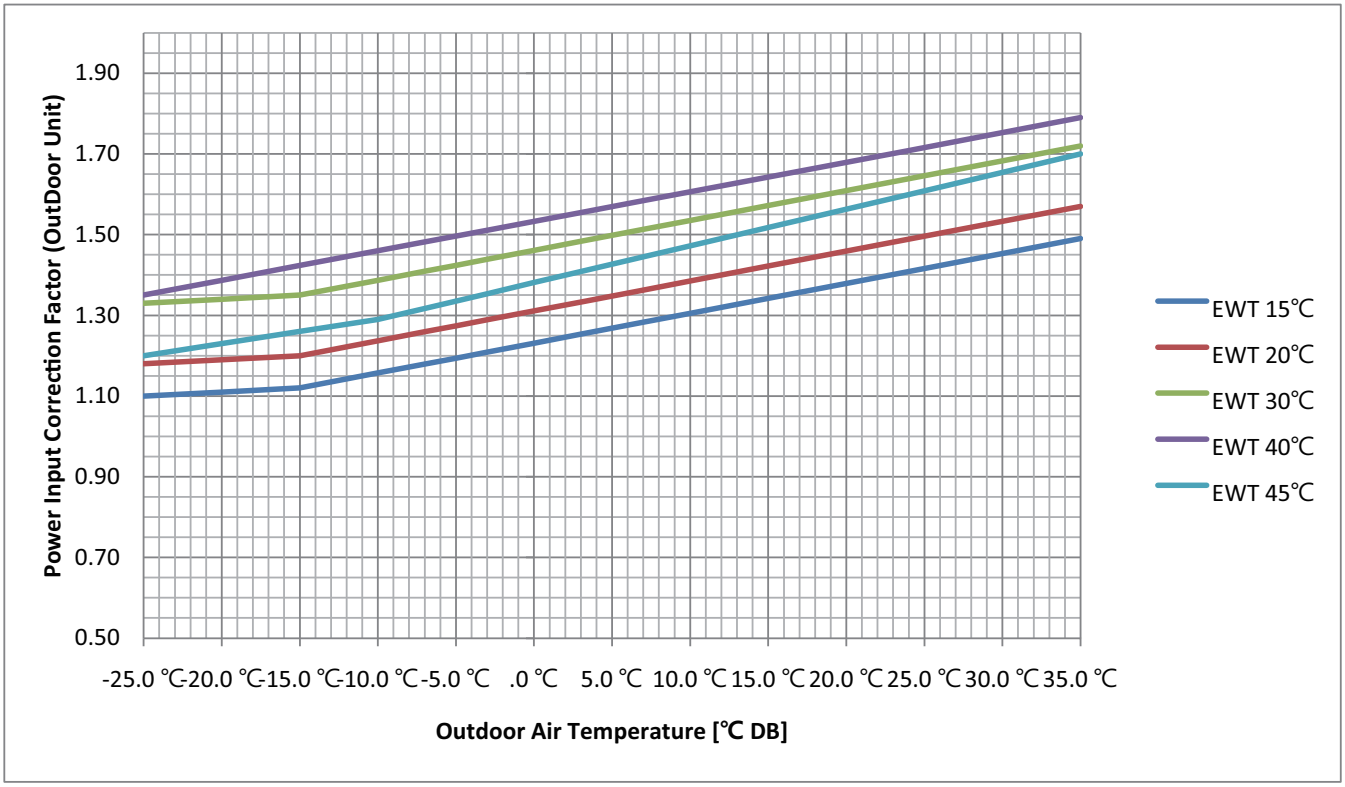
Note

COP Pattern by outdoor air temp. is a reference graph assuming a design with 10HP Multi V i Product.
If you would like to know the COP in a real project, Please contact to LG engineers.

6. Capacity Correction Factor

■ ARNH04GK2B4 / ARNH10GK2B4 / ARNH16GK2B4(Heating)



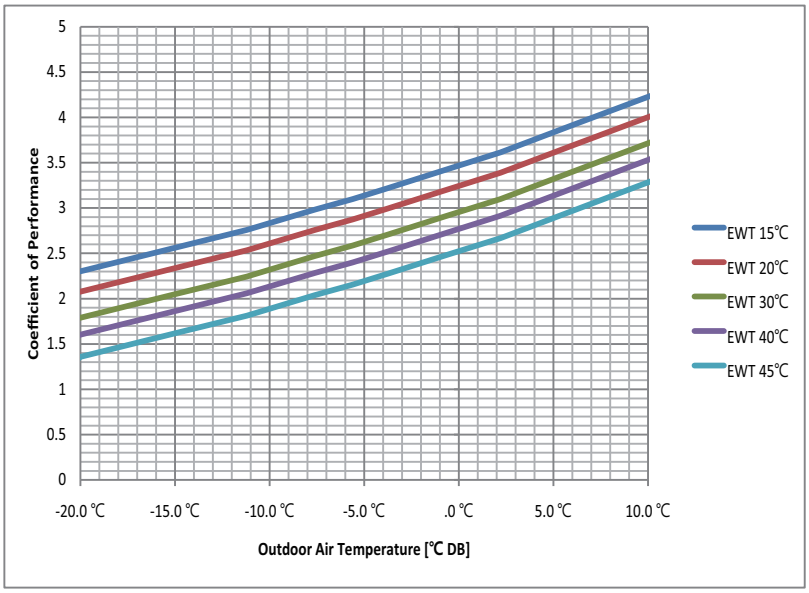


Note

Correction factor follows the outdoor unit operation range and cannot operate outside the operating range.

6. Capacity Correction Factor

◆ **COP Pattern by outdoor air temp.(Reference Data)**



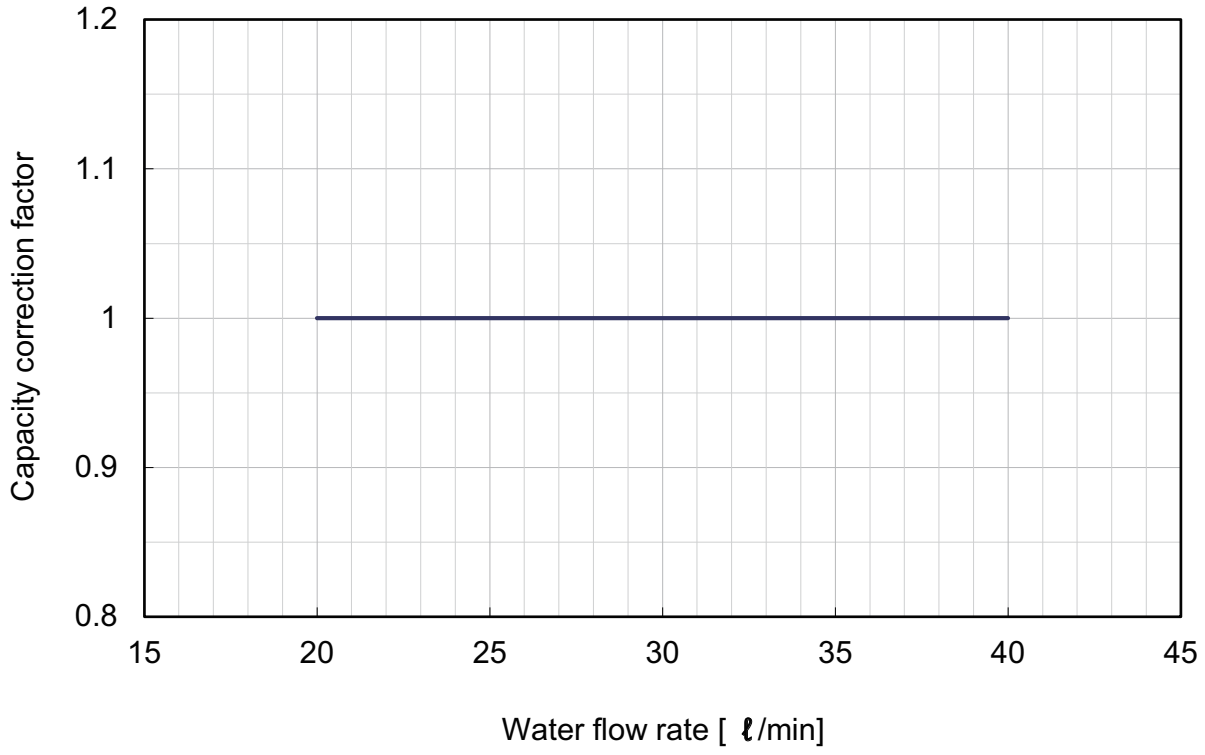
Note

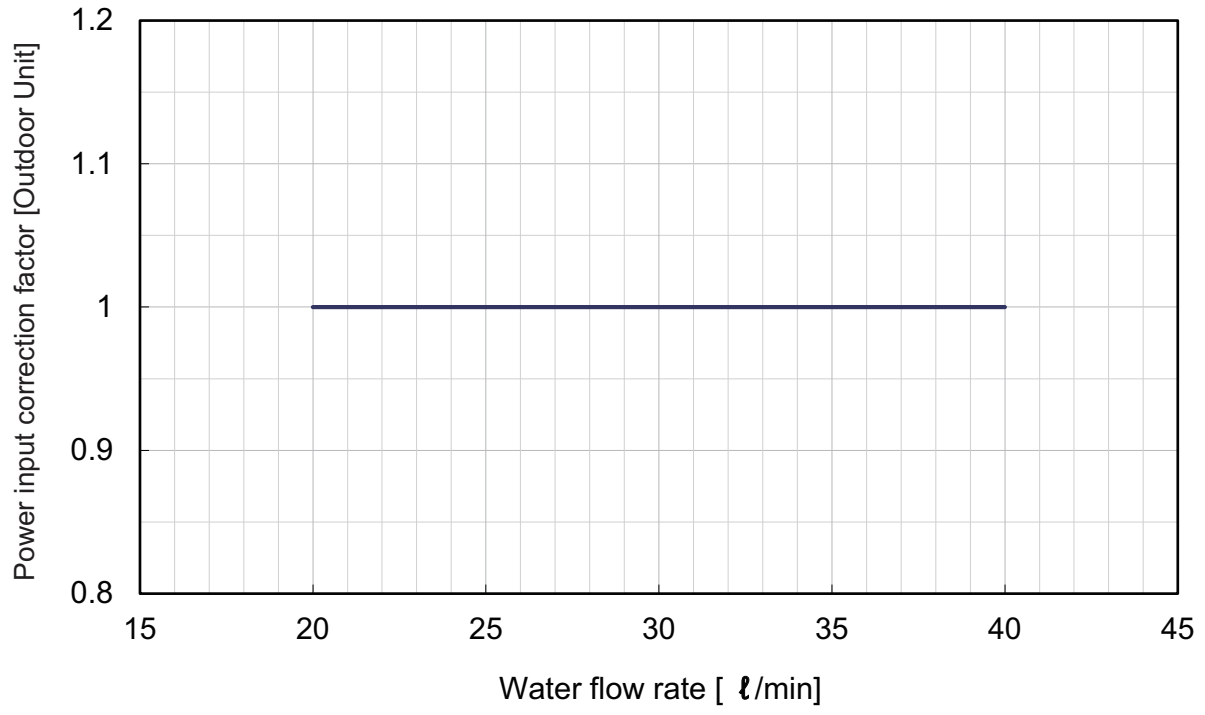
COP Pattern by outdoor air temp. is a reference graph assuming a design with 10HP Multi V i Product.
If you would like to know the COP in a real project, Please contact to LG engineers.

6. Capacity Correction Factor

6.2 Capacity Correction Factor by Water Flow Rate

■ ARNH04GK2B4 (Cooling)



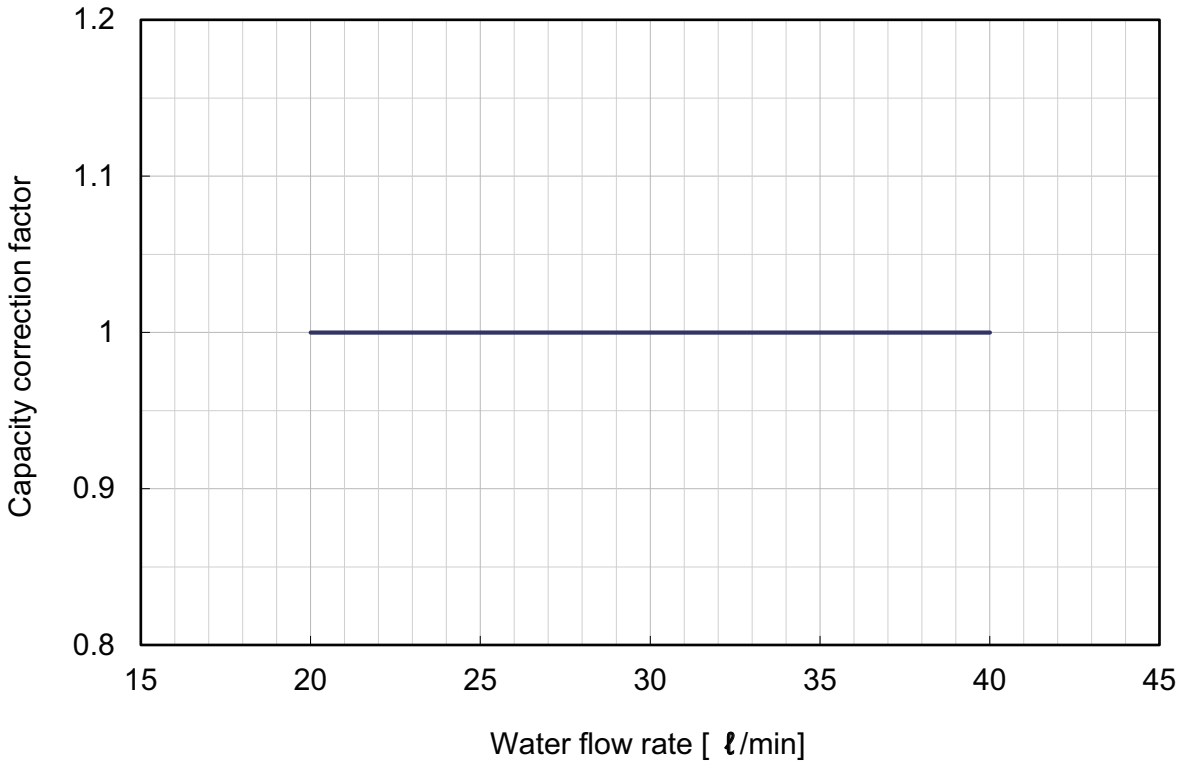


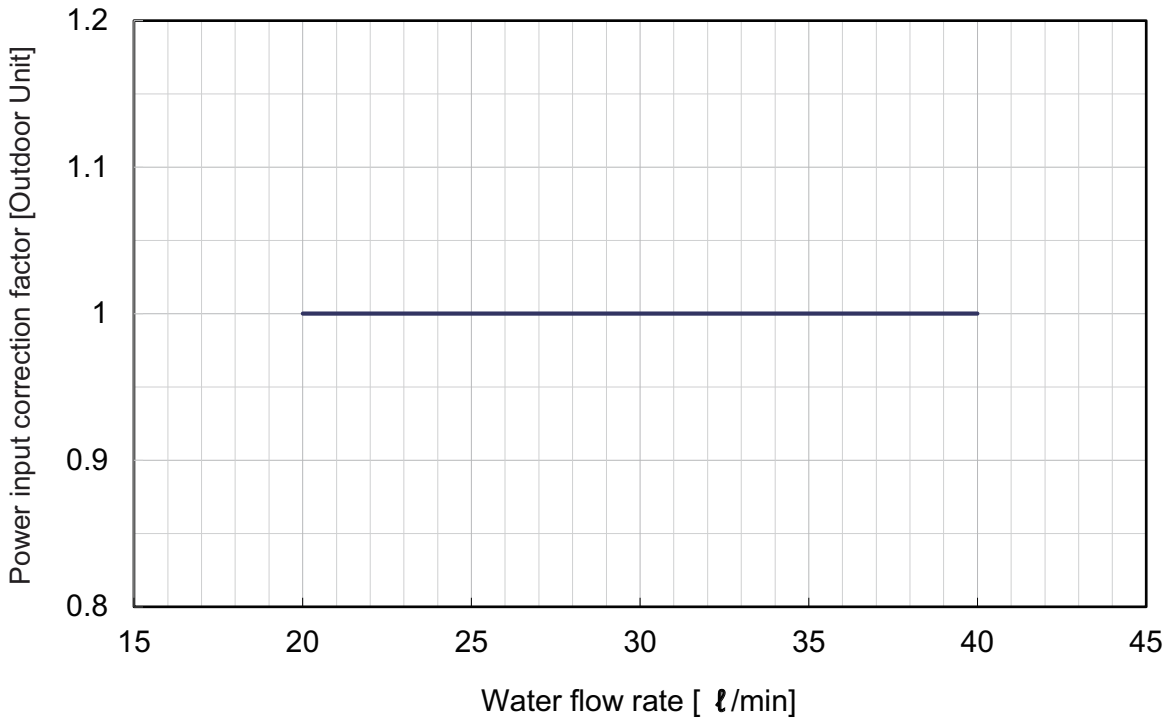
⚠ WARNING

Water Flow Rate Range (recommended) : ARNH04GK2B4 20 ~ 40 (ℓ/min)

6. Capacity Correction Factor

■ ARNH04GK2B4 (Heating)



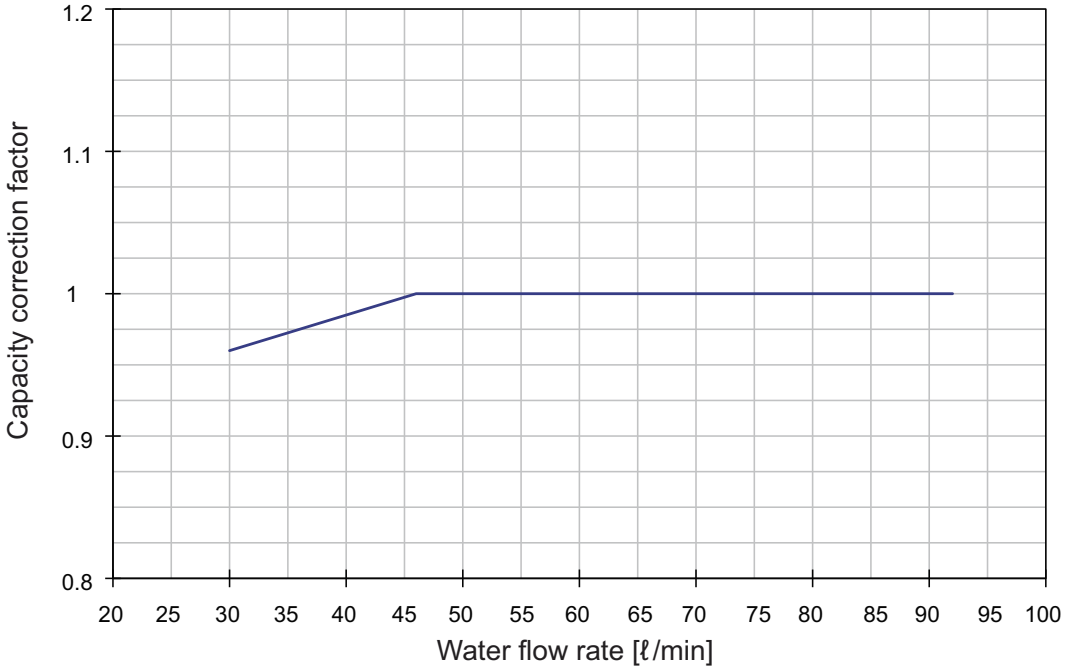


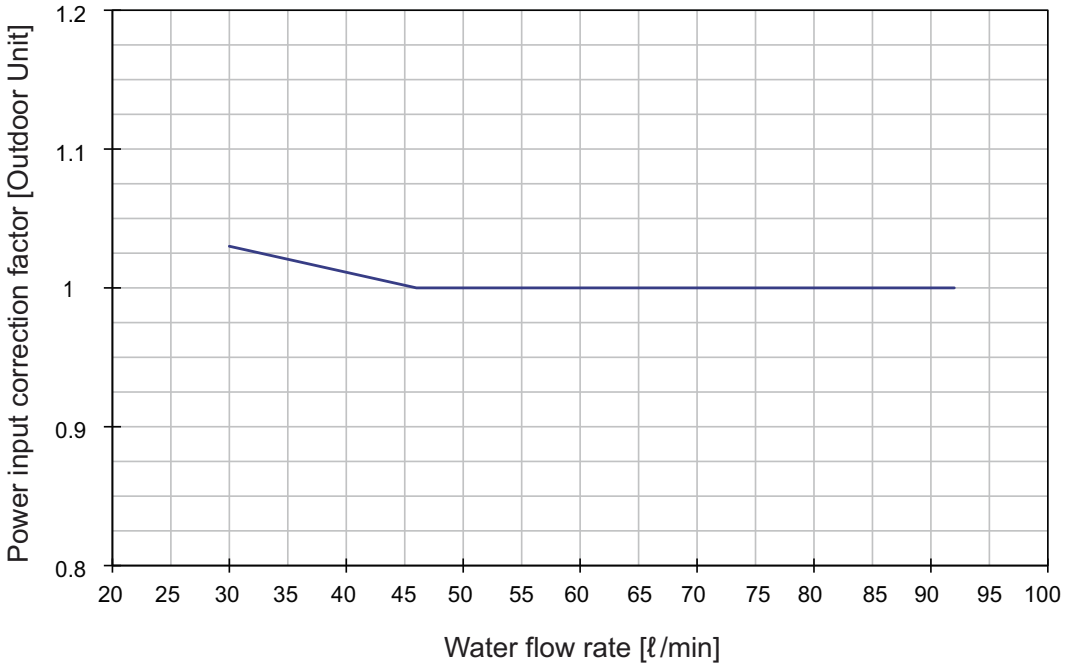
⚠ WARNING

Water Flow Rate Range (recommended) : ARNH04GK2B4 20 ~ 40 (ℓ/min)

6. Capacity Correction Factor

■ ARNH10GK2B4 (Cooling)



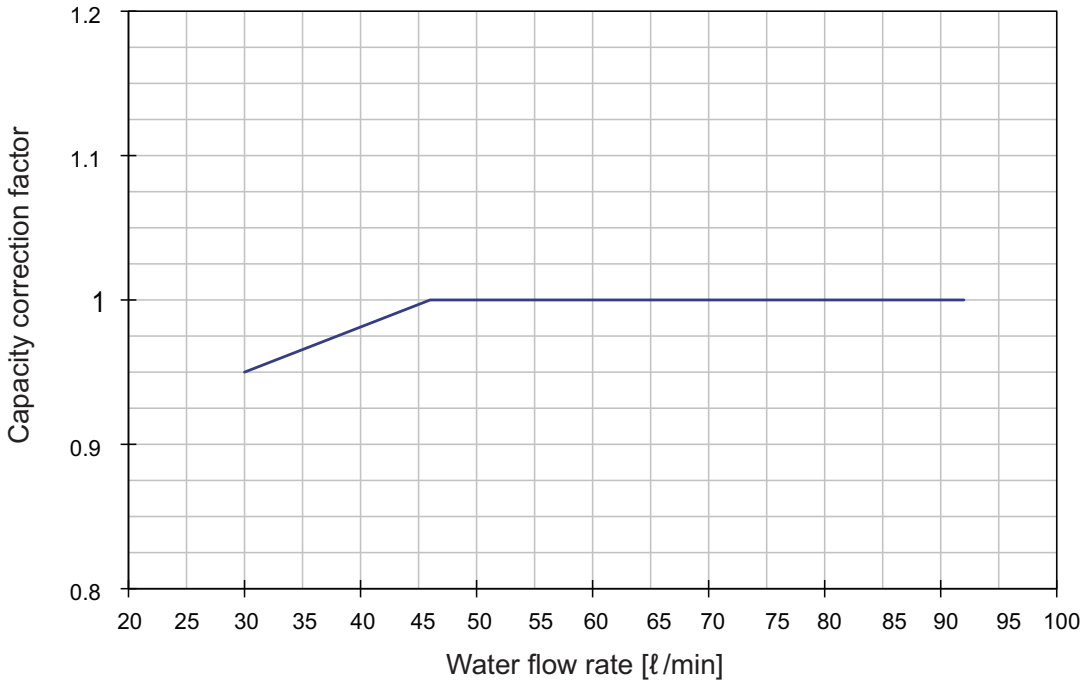


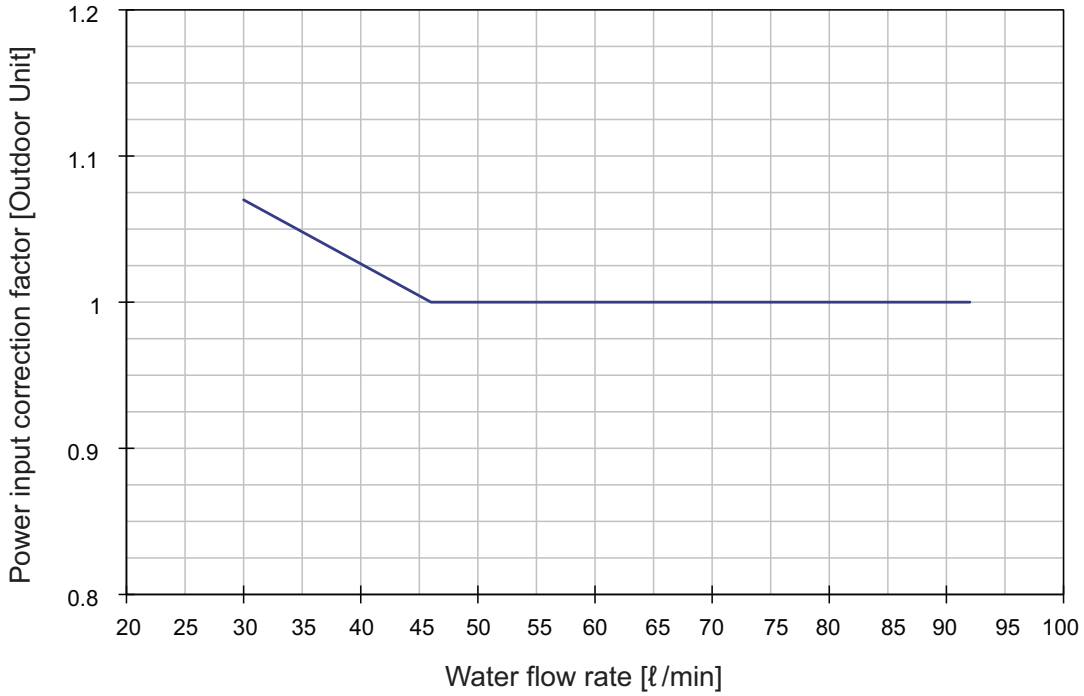
⚠ WARNING

Water Flow Rate Range (recommended) : ARNH10GK2B4 45 ~ 92 (ℓ/min)

6. Capacity Correction Factor

■ ARNH10GK2B4 (Heating)



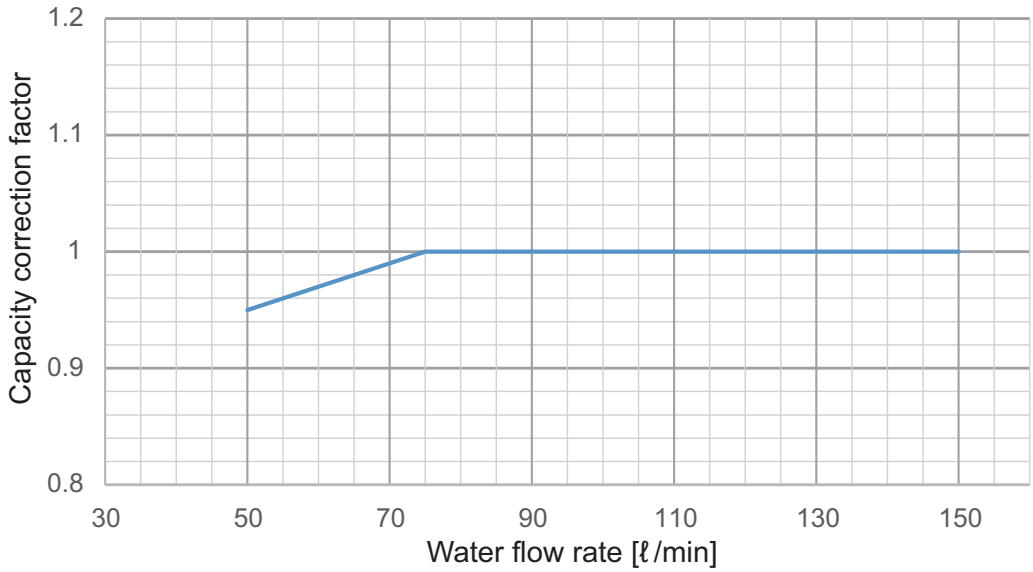


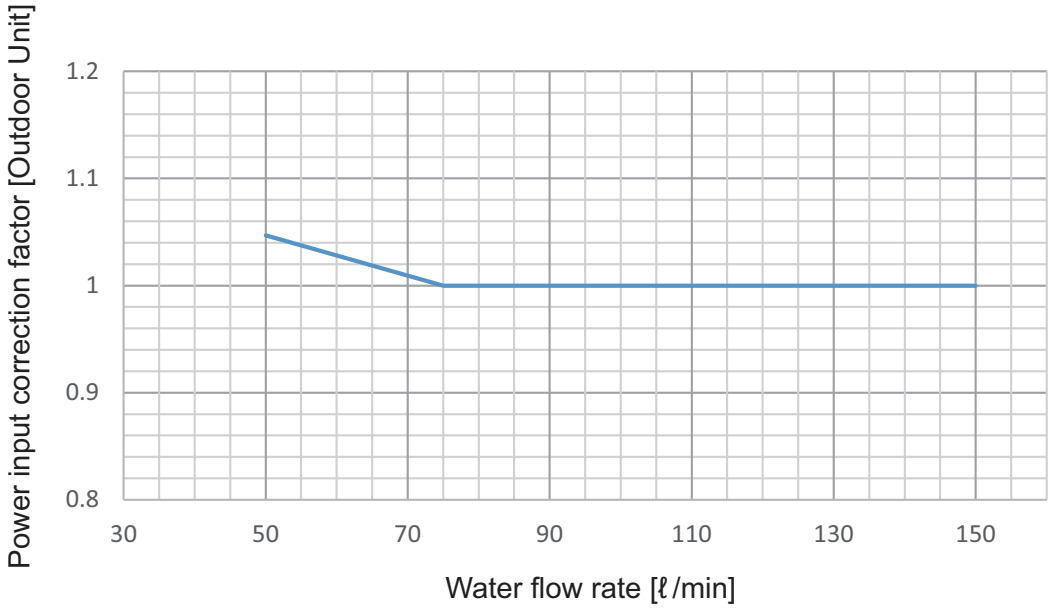
⚠ WARNING

Water Flow Rate Range (recommended) : ARNH10GK2B4 45 ~ 92 (ℓ/min)

6. Capacity Correction Factor

■ ARNH16GK2B4 (Cooling)



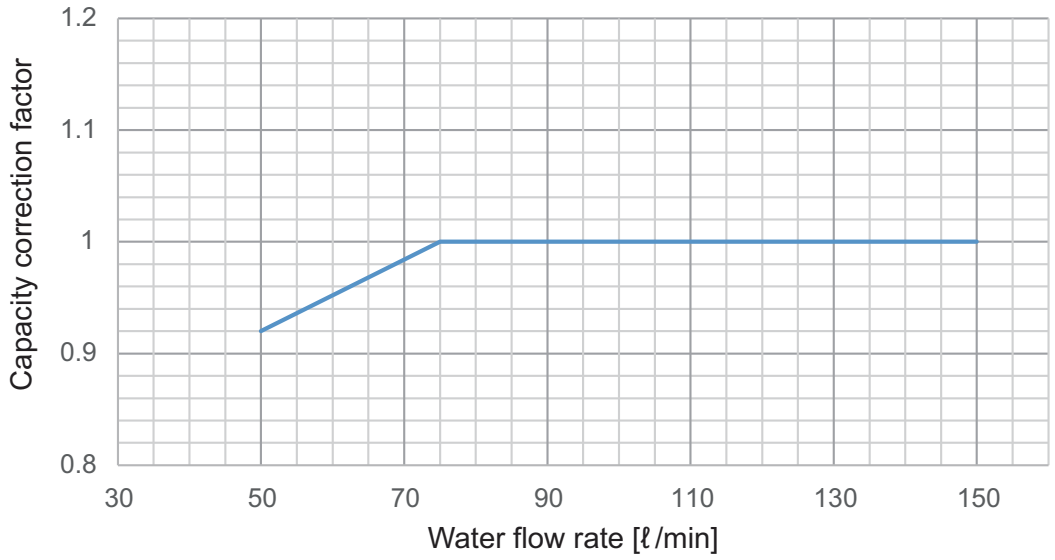


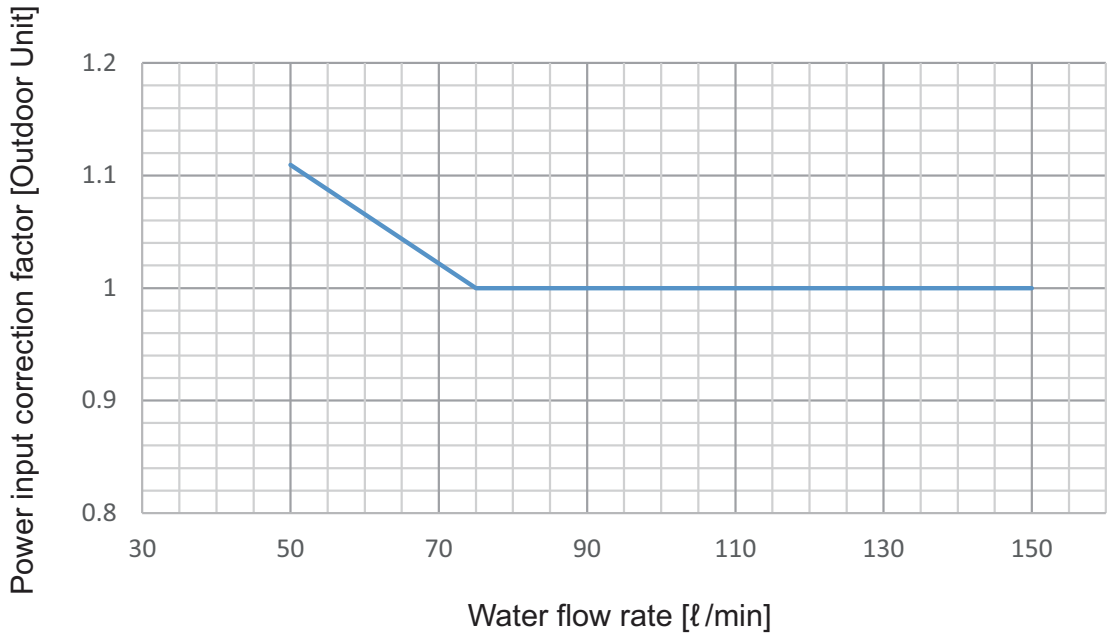
⚠ WARNING

Water Flow Rate Range (recommended) : ARNH10GK2B4 50~ 150(ℓ/min)

6. Capacity Correction Factor

■ ARNH16GK2B4 (Heating)





⚠ WARNING

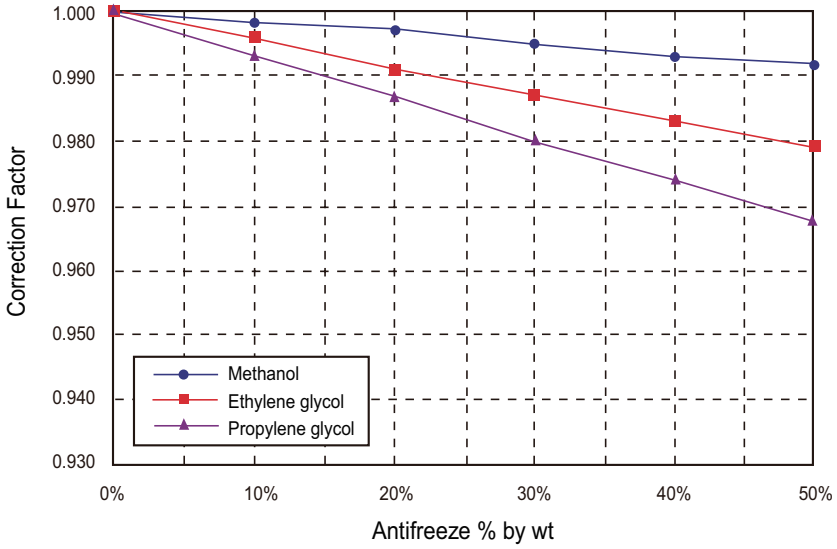
Water Flow Rate Range (recommended) : ARNH10GK2B4 50~ 150(ℓ/min)

6. Capacity Correction Factor

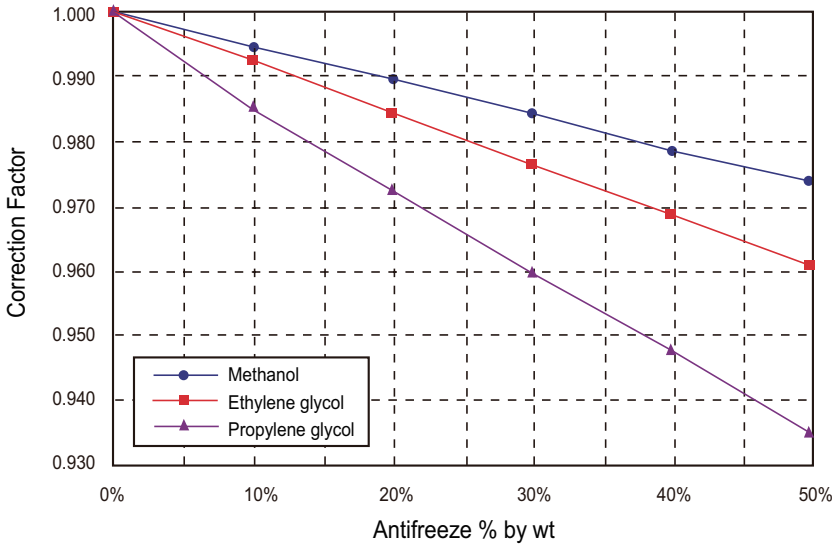
6.3 Capacity Correction Factor by Antifreeze

Antifreeze Type	Item	Antifreeze % by wt				
		10%	20%	30%	40%	50%
Methanol	Cooling	0.998	0.997	0.995	0.993	0.992
	Heating	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	0.996	0.991	0.987	0.983	0.979
	Heating	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	0.993	0.987	0.980	0.974	0.968
	Heating	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**



CAUTION

Please apply antifreeze according to local regulation.

6. Capacity Correction Factor

6.4 Minimum Leaving Temperature by Piping Length

◆ For Cooling Operation

HU (m)	110	-	-	-	-	-	-	-	-	-	-	-	12.9	13.1	13.4	13.6	13.8	14.1	14.3	14.6	14.8	15.1	15.3	15.5	15.7
	100	-	-	-	-	-	-	-	-	-	-	12.5	12.8	13.1	13.3	13.5	13.8	14.0	14.3	14.5	14.8	15.0	15.3	15.5	15.6
	90	-	-	-	-	-	-	-	-	-	12.0	12.5	12.8	13.0	13.3	13.5	13.8	14.0	14.3	14.5	14.8	15.0	15.2	15.5	15.6
	80	-	-	-	-	-	-	-	-	11.4	11.9	12.4	12.7	13.0	13.2	13.5	13.7	14.0	14.2	14.5	14.7	15.0	15.2	15.5	15.6
	70	-	-	-	-	-	-	-	10.9	11.4	11.9	12.4	12.7	12.9	13.2	13.4	13.7	13.9	14.2	14.4	14.7	14.9	15.2	15.4	15.6
	60	-	-	-	-	-	-	10.3	10.8	11.3	11.8	12.3	12.6	12.8	13.1	13.4	13.6	13.9	14.1	14.4	14.7	14.9	15.2	15.4	15.5
	50	-	-	-	-	-	9.7	10.2	10.7	11.2	11.7	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.1	14.4	14.6	14.9	15.1	15.4	15.5
	40	-	-	-	-	9.1	9.7	10.2	10.7	11.2	11.7	12.2	12.5	12.7	13.0	13.3	13.5	13.8	14.1	14.3	14.6	14.9	15.1	15.4	15.5
	30	-	-	-	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.4	12.7	13.0	13.2	13.5	13.8	14.0	14.3	14.6	14.8	15.1	15.3	15.5
	20	-	-	8.0	8.5	9.0	9.5	10.0	10.6	11.1	11.6	12.1	12.4	12.6	12.9	13.2	13.5	13.7	14.0	14.3	14.5	14.8	15.1	15.3	15.4
	10	-	7.4	7.9	8.4	8.9	9.5	10.0	10.5	11.0	11.5	12.0	12.3	12.6	12.9	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.0	15.3	15.4
	7.5	7.0	7.3	7.9	8.4	8.9	9.5	10.0	10.5	11.0	11.5	12.0	12.3	12.6	12.9	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.0	15.3	15.4
	0	7.0	7.3	7.8	8.4	8.9	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.4	13.7	13.9	14.2	14.5	14.7	15.0	15.3	15.4
Equvalent Length (m)		7.5	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	225
HL(m)	0	7.0	7.3	7.8	8.4	8.9	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.4	13.7	13.9	14.2	14.5	14.7	15.0	15.3	15.4
	7.5	7.0	7.3	7.8	8.3	8.8	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.2	14.4	14.7	15.0	15.2	15.4
	10	-	7.3	7.8	8.3	8.8	9.4	9.9	10.4	10.9	11.4	11.9	12.2	12.5	12.8	13.1	13.3	13.6	13.9	14.2	14.4	14.7	15.0	15.2	15.4
	20	-	-	7.8	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.8	12.1	12.4	12.7	13.0	13.3	13.6	13.9	14.1	14.4	14.7	14.9	15.2	15.3
	30	-	-	-	8.2	8.7	9.2	9.8	10.3	10.8	11.3	11.8	12.1	12.4	12.7	13.0	13.3	13.5	13.8	14.1	14.4	14.6	14.9	15.2	15.3
	40	-	-	-	-	8.7	9.2	9.7	10.2	10.7	11.2	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.3	14.6	14.9	15.1	15.3
	50	-	-	-	-	-	9.1	9.7	10.2	10.7	11.2	11.7	12.0	12.3	12.6	12.9	13.2	13.5	13.7	14.0	14.3	14.6	14.9	15.1	15.3
	60	-	-	-	-	-	-	9.6	10.1	10.6	11.1	11.6	11.9	12.2	12.5	12.8	13.1	13.4	13.7	14.0	14.3	14.6	14.8	15.1	15.2
	70	-	-	-	-	-	-	-	10.0	10.6	11.1	11.6	11.8	12.1	12.5	12.8	13.1	13.4	13.7	14.0	14.2	14.5	14.8	15.1	15.2
	80	-	-	-	-	-	-	-	-	10.5	11.0	11.5	11.8	12.1	12.4	12.7	13.0	13.3	13.6	13.9	14.2	14.5	14.8	15.0	15.2
	90	-	-	-	-	-	-	-	-	-	10.9	11.4	11.7	12.0	12.4	12.7	13.0	13.3	13.6	13.9	14.2	14.5	14.7	15.0	15.1
	100	-	-	-	-	-	-	-	-	-	-	11.4	11.7	12.0	12.3	12.6	13.0	13.3	13.6	13.9	14.1	14.4	14.7	15.0	15.1
	110	-	-	-	-	-	-	-	-	-	-	-	11.6	11.9	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.4	14.7	15.0	15.1

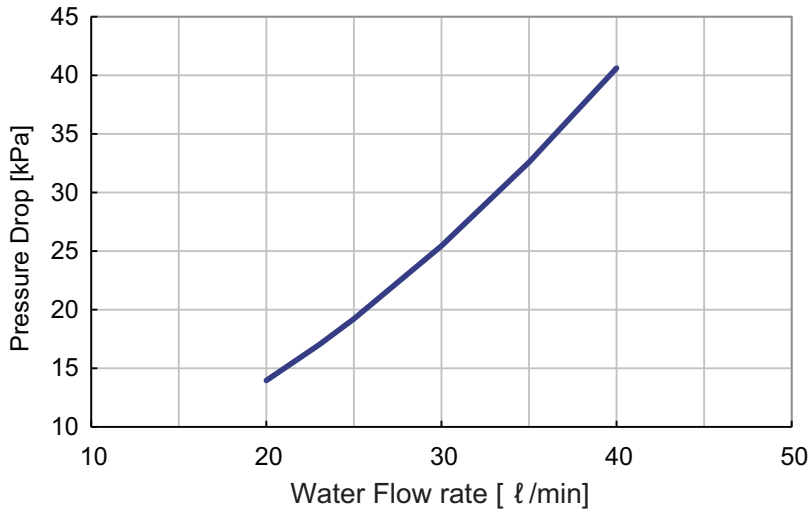
Note

Maximum height and pipe length may vary per outdoor unit.

For each piping limit, please check 'Refrigerant Piping System' section from the outdoor unit PDB.

7. Water pressure drop

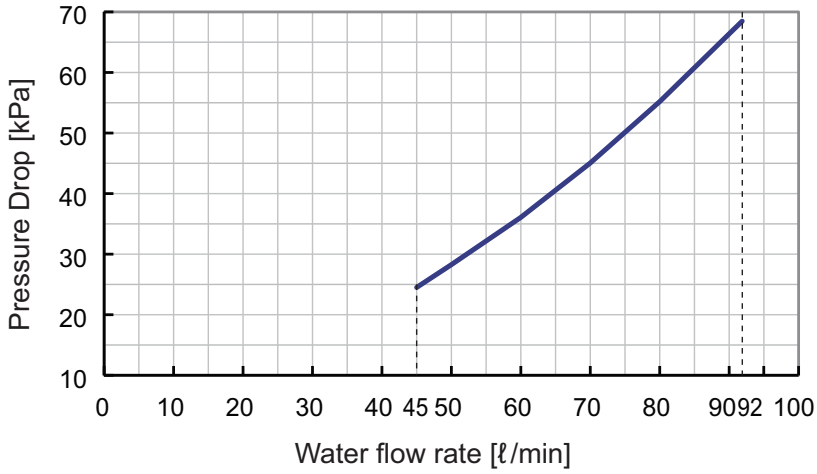
■ ARNH04GK2B4



⚠ CAUTION

Water Flow Rate Range (recommended) : ARNH04GK2B4 20 ~ 40 (ℓ/min)

■ ARNH10GK2B4



⚠ CAUTION

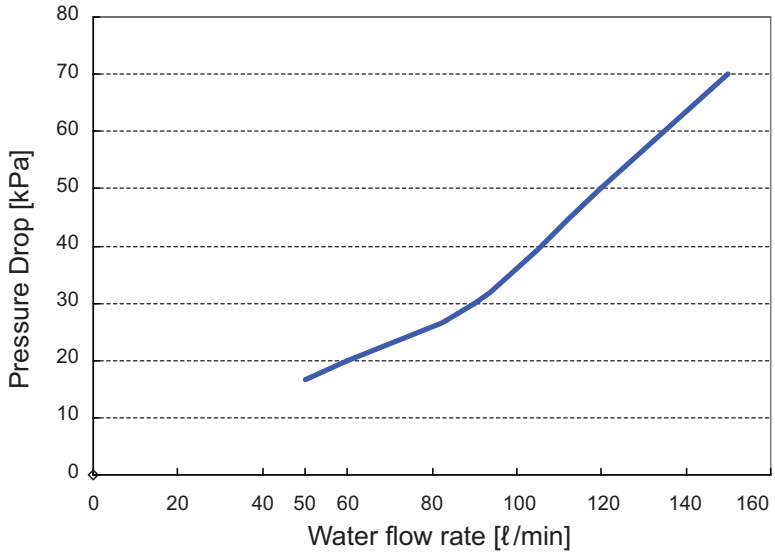
Water Flow Rate Range (recommended) : ARNH10GK2B4 45 ~ 92 (ℓ/min)

Note

- The Flow Factor (Kv) is used for water devices without integrated pumps.
- Flow Factor is calculated using metric units : Kv = Q x (SG / ΔP) ^ (1/2)
  - Q : Rated Water Flow (m^3/hr)
  - ΔP : Head loss (bar)
  - SG is the specific gravity of the fluid (for water = 1)

7. Water pressure drop

■ ARNH16GK2B4



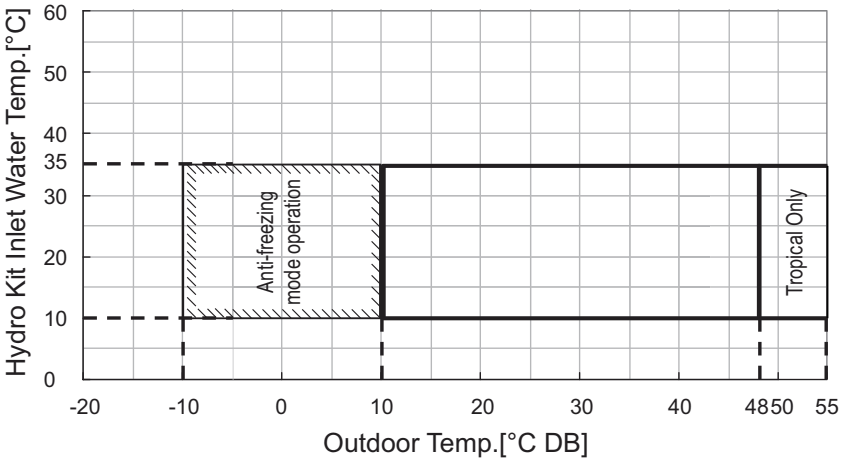
CAUTION

Water Flow Rate Range (recommended) : ARNH16GK2B4 50~ 150(ℓ/min)

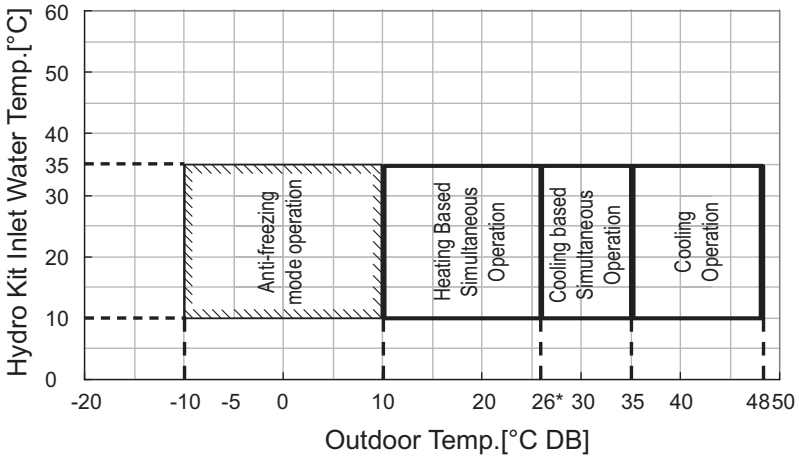
8. Operation limits

■ Cooling

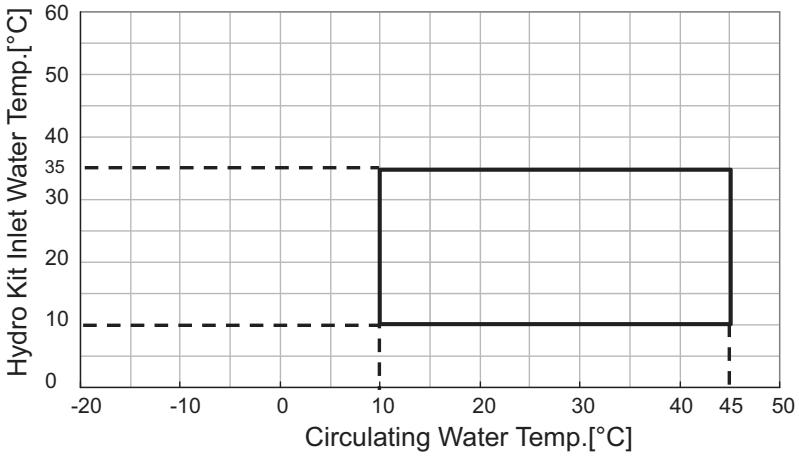
◆ -RUM------5,6(Heat Pump), ARUN------5, ARUN------0



◆ -RUM------5,6 (Heat Recovery), ARUB------0(Heat Recovery)



◆ ARWN-series, ARWB-series



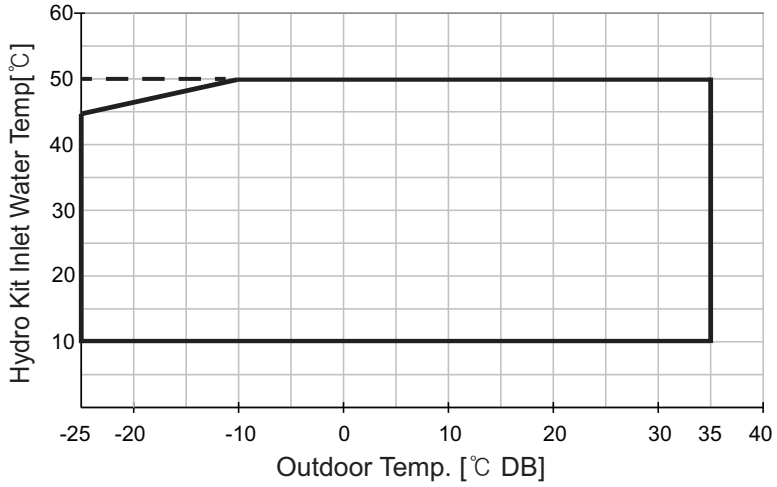
Note

1. Operation limit follows the outdoor unit operation range and cannot operate outside the operating range.
   Also operation limit depends on product type and target region.
2. 'Simultaneous Operation' means other Indoor units are operating on heating mode.
3. * : 26℃ DB corresponds to the 16℃ WB .

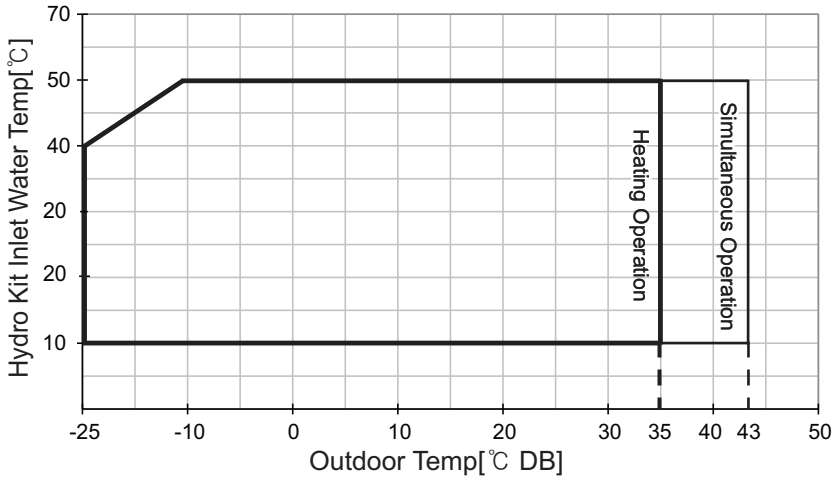
8. Operation limits

■ Heating

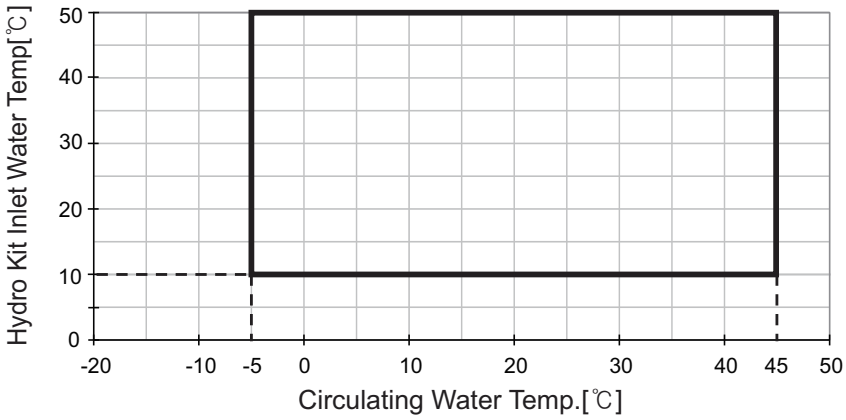
◆ -RUM------5,6(Heat Pump), ARUN------5, ARUN------0



◆ -RUM------5,6 (Heat Recovery), ARUB------0(Heat Recovery)



◆ ARWB- series, ARWN-series



Note

1. For only Hydro Kit combination, Maximum operation limit in heating is outdoor temperature 35℃ DB / 24℃ WB.
2. Operation limit follows the outdoor unit operation range and cannot operate outside the operating range.
   Also operation limit depends on product type and target region.
3. 'Simultaneous Operation' means other Indoor units are operating on cooling mode.

9. Electric characteristics

■ Wiring of Main Power Supply and Equipment Capacity

1. The power supply work is needed only to the outdoor unit. The power supply to the indoor unit or the BD unit is conducted through the transmission wiring. Therefore, the power supply work can be carried out at just one place of the outdoor unit. It will contribute to simplify the work procedure and to save cost.
2. Bear in mind ambient conditions (ambient temperature,direct sunlight, rain liquid,etc.) when proceeding with the wiring and connections
3. The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker taking into account the line voltage drops. Make sure the power-supply voltage does not drop more than 10%.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for outdoor use should not be lighter than polychloroprene sheathed flexible cord.
6. Don't install an individual switch or electrical outlet to disconnect each of indoor unit separately from the power supply.

⚠ WARNING

- **Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.**
- **Make sure to use specified wires for connections so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.**
- **Make sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.**

⚠ CAUTION

- **All installation site must require attachment of an earth leakage breaker. If no earth leakage breaker is installed, it may cause an electric shock.**
- **Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.**

Model	Type	Hz	Volts	Voltage Range	Power Supply			Input(W)	
					MCA(A)	MFA(A)	FLA(A)	Cooling(W)	Heating(W)
ARNH04GK2B4 ARNH10GK2B4 ARNH16GK2B4	K2	50	220-240	Max:264 Min:198	0.06	15	0.05	10	10
	K2	60	220	Max:242 Min:198	0.06	15	0.05	10	10

Symbols

MCA : Minimum Circuit Amperes (A)

MFA : Maximum Fuse Amperes (A)

W : Rated input (W)

FLA : Full Load Amperes (A)

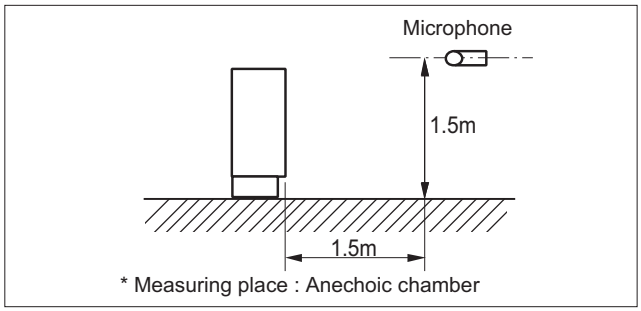
Note

1. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above the listed range limits.
2. Maximum allowable voltage unbalance between phases is 2%.
3. MCA/MFA
   MCA=1.25 x FLA
   MFA = 1.1 x MCA, MFA≤ 4 x FLA
   (If MFA is smaller than minimum standard value, Use minimum standard value in region for selecting circuit breaker.)
4. Select wire size based on the MCA
5. Instead of fuse, use Circuit Breaker.

10. Sound levels

10.1 Sound pressure level

■ Overall

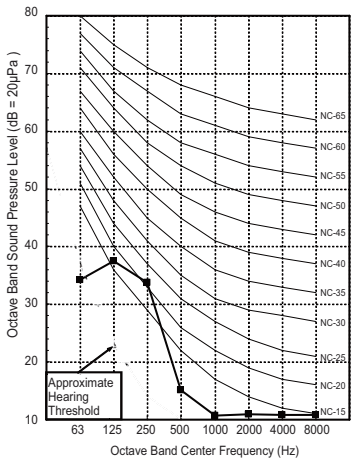


Note

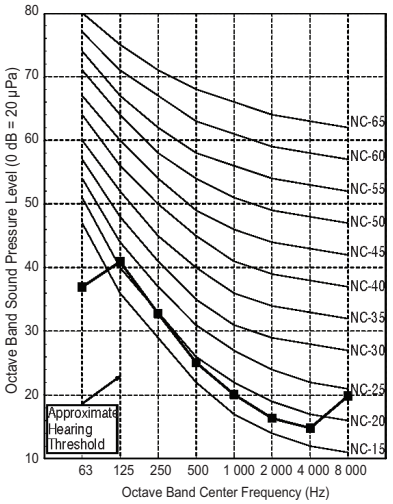
1. Sound measured at some distance away from the center of the unit.
2. Data is valid at free field condition.
3. Reference accoustic pressure 0dB = 20μPa.
4. Data is valid at nominal operation condition.
   Refer to the Model Specifications for nominal conditions(Power source and Ambient temperature, etc)
5. Sound level will vary depending on a range of factors such as the construction(acoustic absorption coefficient) of particular room in which the equipment in installed.
6. Sound pressure level is measured on the rated condition in the anechoic rooms by ISO 3745 standard.
   Therefore, these values can be increased owing to ambient conditions during operation.

Model	Sound Level (dB(A))
ARNH04GK2B4	26
ARNH10GK2B4	
ARNH16GK2B4	30

ARNH04GK2B4 / ARNH10GK2B4



ARNH16GK2B4



11. Installation

11.1 Installation Information

11.1.1 Alternative Refrigerant R32

The refrigerant R32 has higher efficiency and is more environmental friendly comparing to R410A. It has a lower GWP (Global Warming Potential) value, and higher efficiency than R410A. The Ozone Depletion Potential (ODP) of R32 is 0, and Global Warming Potential(GWP) is 675.

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 R410A can be used.

⚠ WARNING

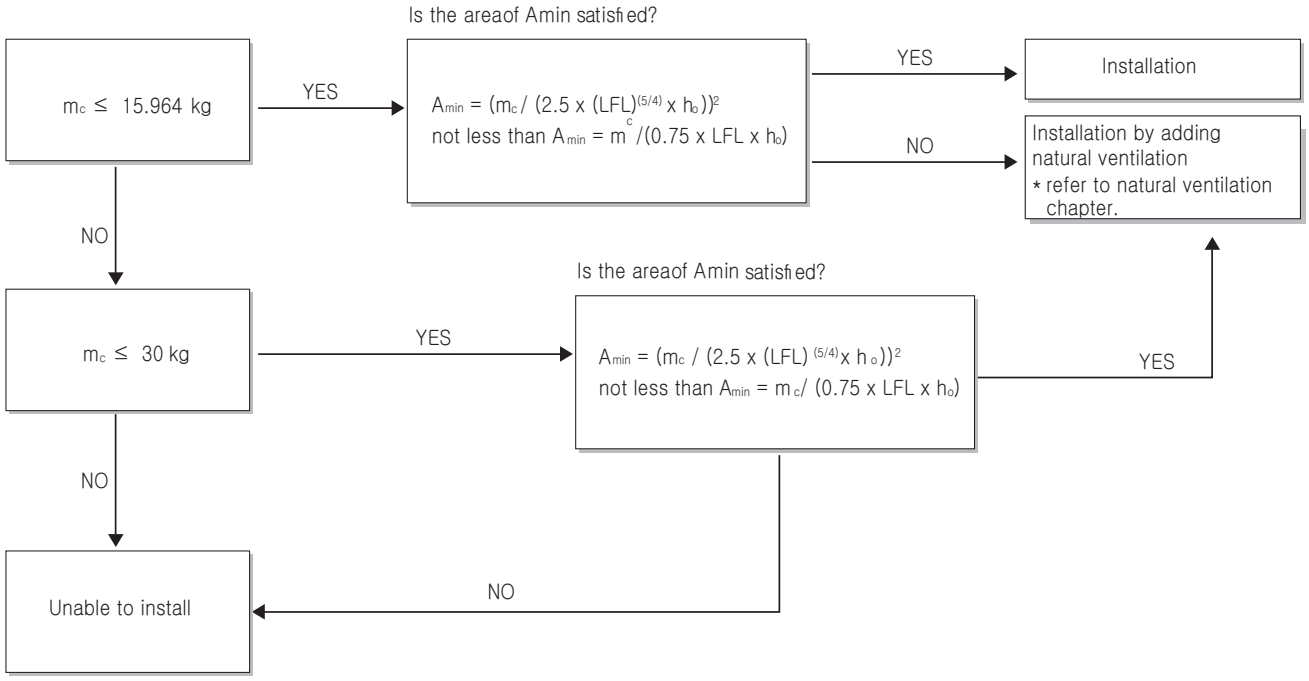
- This product contains fluorinated greenhouse gases (Refrigerant type : R32). Do NOT leak refrigerant gases into the atmosphere.
- The refrigerant R32 is a slightly flammable gas. Normally, it does not leak. If the refrigerant leaks in the installed place and is in contact with a flaming source, it may cause fire, or a harmful gas.
- If there is some leak, turn off any combustion devices, ventilate the installation location and contact the dealer from whom you purchased the unit. Do not use the unit until the refrigerant leak is repaired.
- Only use R32 as refrigerant. Other substances may cause explosions and accidents.

⚠ CAUTION

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

11. Installation

■ Installation Flow Chart



A_{min} = Minimum installation required area

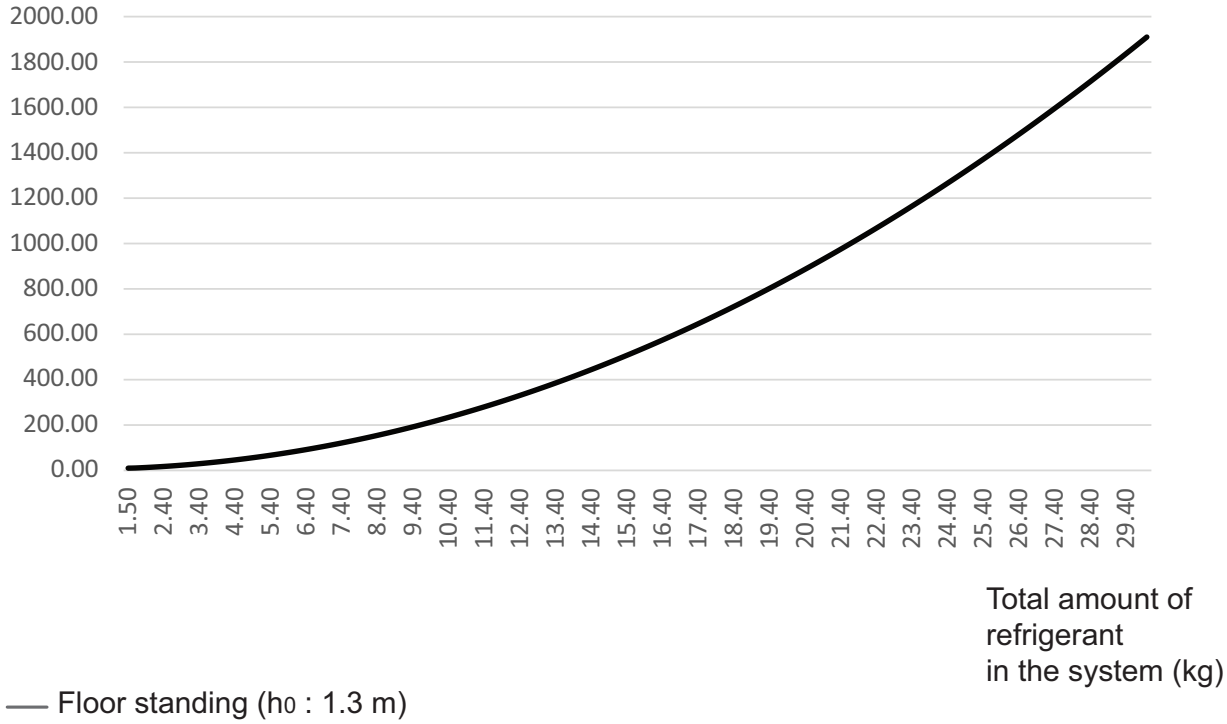
m_c = Total amount of refrigerant in the system (kg)

LFL(Lower Flammability Limit)(kg/m³) = 0.307 kg/m³

h_o: The Vertical Distance from the floor to the point of Release (m)

11. Installation

■ Minimum Floor Area for Installation : accordance with IEC06



11. Installation

Total amount of refrigerant in the system (kg)	Minimum installation required area (m²)	Total amount of refrigerant in the system (kg)	Minimum installation required area (m²)
	Floor standing (h0: 1.3 m)		Floor standing (h0 :1.3 m)
1.50	4.79	16.00	544.69
1.60	5.45	16.20	558.40
1.80	6.89	16.40	572.27
2.00	8.51	16.60	586.31
2.20	10.30	16.80	600.52
2.40	12.26	17.00	614.91
2.60	14.38	17.20	629.46
2.80	16.68	17.40	644.18
3.00	19.15	17.60	659.08
3.20	21.79	17.80	674.14
3.40	24.60	18.00	689.38
3.60	27.58	18.20	704.78
3.80	30.72	18.40	720.36
4.00	34.04	18.60	736.10
4.20	37.53	18.80	752.02
4.40	41.19	19.00	768.10
4.60	45.02	19.20	784.36
4.80	49.02	19.40	800.78
5.00	53.19	19.60	817.38
5.20	57.53	19.80	834.15
5.40	62.04	20.00	851.08
5.60	66.72	20.20	868.19
5.80	71.58	20.40	885.47
6.00	76.60	20.60	902.91
6.20	81.79	20.80	920.53
6.40	87.15	21.00	938.32
6.60	92.68	21.20	956.28
6.80	98.39	21.40	974.40
7.00	104.26	21.60	992.70
7.20	110.30	21.80	1011.17
7.40	116.51	22.00	1029.81
7.60	122.90	22.20	1048.62
7.80	129.45	22.40	1067.60
8.00	136.17	22.60	1086.75
8.20	143.07	22.80	1106.07
8.40	150.13	23.00	1125.56
8.60	157.37	23.20	1145.22
8.80	164.77	23.40	1165.05
9.00	172.34	23.60	1185.05
9.20	180.09	23.80	1205.22
9.40	188.00	24.00	1225.56
9.60	196.09	24.20	1246.07
9.80	204.34	24.40	1266.75
10.00	212.77	24.60	1287.60
10.20	221.37	24.80	1308.62
10.40	230.13	25.00	1329.82
10.60	239.07	25.20	1351.18
10.80	248.18	25.40	1372.71
11.00	257.45	25.60	1394.41
11.20	266.90	25.80	1416.29
11.40	276.52	26.00	1438.33
11.60	286.30	26.20	1460.54
11.80	296.26	26.40	1482.93
12.00	306.39	26.60	1505.48
12.20	316.69	26.80	1528.20
12.40	327.16	27.00	1551.10
12.60	337.79	27.20	1574.16
12.80	348.60	27.40	1597.40

11. Installation

13.00	359.58	27.60	1620.80
13.20	370.73	27.80	1644.38
13.40	382.05	28.00	1668.12
13.60	393.54	28.20	1692.04
13.80	405.20	28.40	1716.12
14.00	417.03	28.60	1740.38
14.20	429.03	28.80	1764.80
14.40	441.20	29.00	1789.40
14.60	453.54	29.20	1814.17
14.80	466.05	29.40	1839.10
15.00	478.73	29.60	1864.21
15.20	491.59	29.80	1889.49
15.40	504.61	30.00	1914.94
15.60	517.80		
15.80	531.16		
15.964 *	542.24		

Note
* If M_c > 15.964, must add natural ventilation

11. Installation

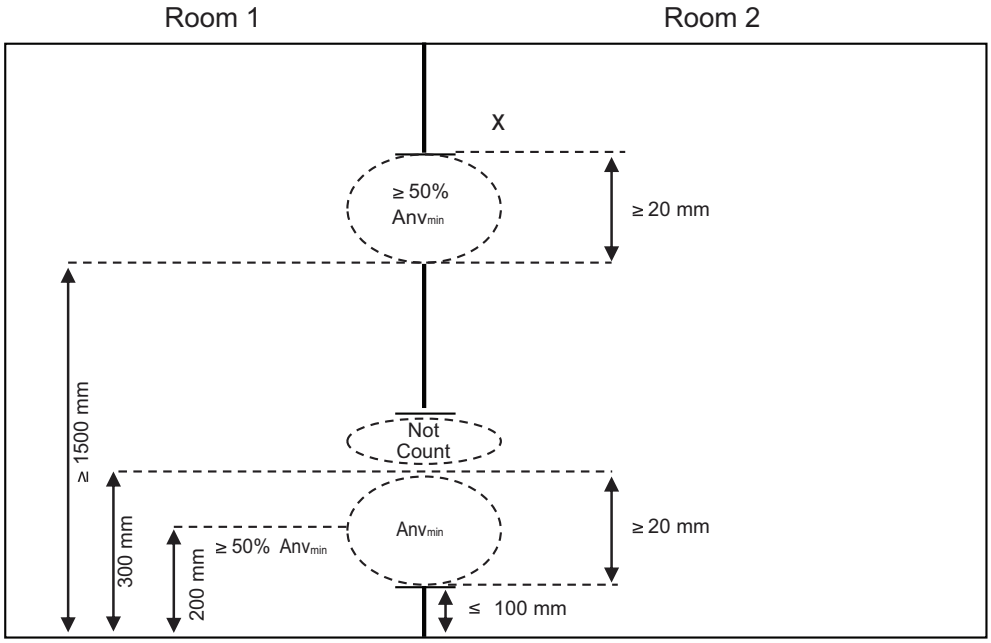
■ Natural Ventilation

For the lower opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥ Anvmin
- The area of any openings above 300 mm from the floor does not count when determining Anvmin
- At least 50% of Anvmin is less than 200 mm above the floor
- The bottom of the lower opening is ≤ 100 mm from the floor
- The height of the opening is ≥ 20 mm

For the upper opening:

- It is not an opening to the outside
- The opening cannot be closed
- The opening must be ≥ 50% of Anvmin
- The bottom of the upper opening must be ≥ 1 500 mm above the floor
- The height of the opening is ≥ 20 mm



Minimum opening area (*Anv*)

$$Anv_{min} = \frac{m_c - m_{max}}{LFL \times 104} \times \sqrt{\frac{A}{g \times m_{max}} \cdot \frac{M}{M - 29}}$$

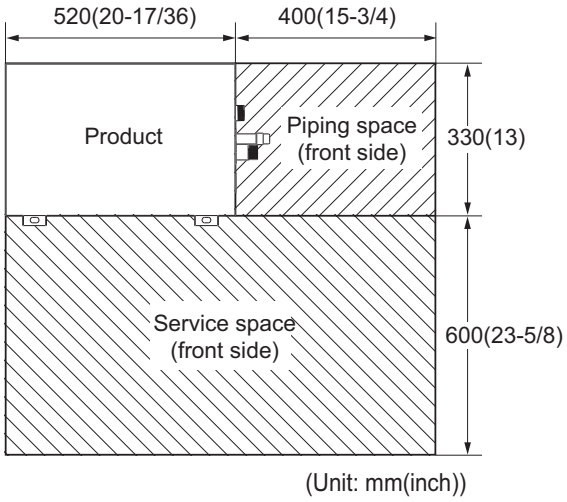
Anv	is the minimum opening for natural ventilation in m^2.
m_c	is the actual refrigerant charge of refrigerant in the system in kg;
m_{max}	is the allowable maxinum refrigerant charge in the system in kg, calculated according to Equation GG.8 or m^2, whichever is lower,
LFL	is the lower flammability limit in kg/m^3 ;
A	is the room area in m^2;
M	is the molar mass of the refrigerant in kg/kmol;
g	is the gravity acceleration of 9,81 m/s^2;
29	is the average molar mass of air in kg/kmol.

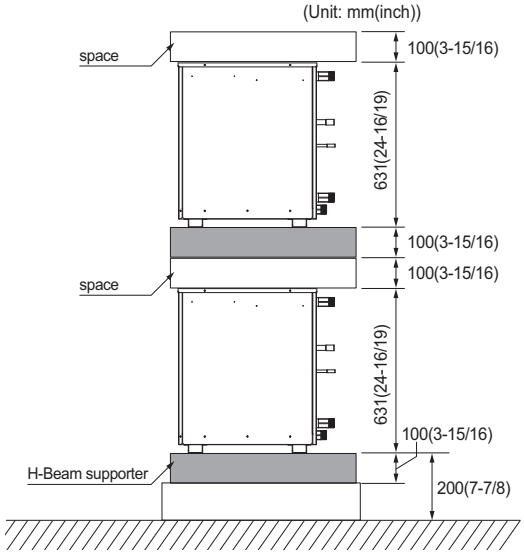
11. Installation

11.1.2 Selection of the best location

■ Installation Space

- The following values are the least space for installation. If any service area is needed for service according to field circumstance, obtain enough service space.





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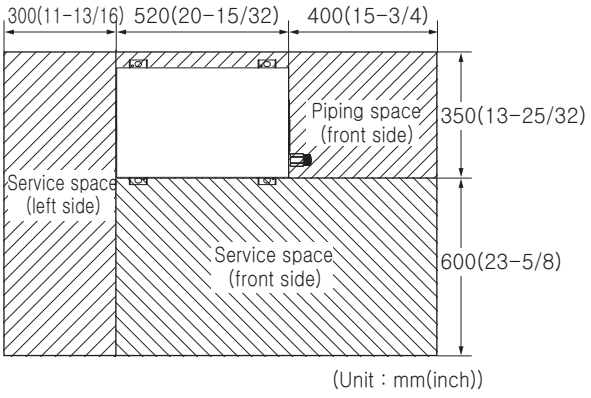
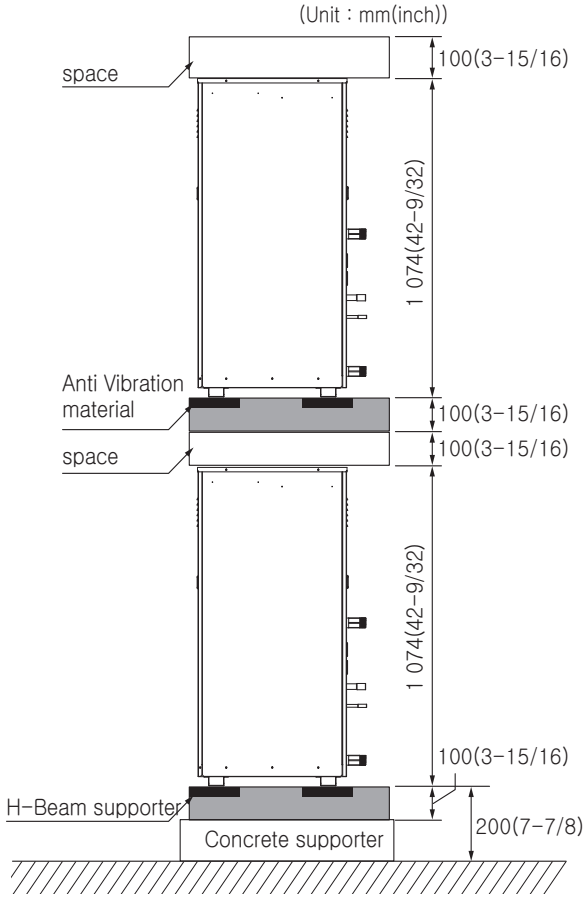


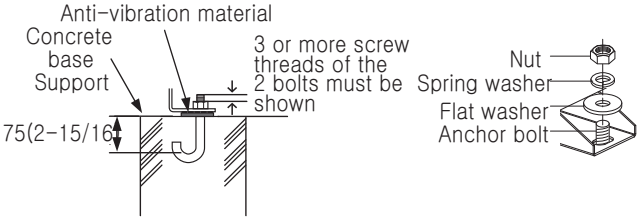


< High Temperature >

11. Installation

■ Foundation for Installation (Floor standing type)

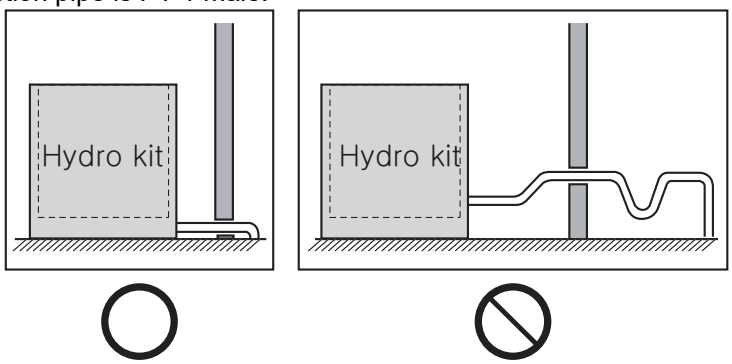
- Fix the unit tightly with bolts as shown below so that the unit will not fall down due to earthquake.
- Noise and vibration may occur from the floor or wall since vibration is transferred through the installation part depending on installation status. Thus, use anti-vibration materials (cushion pad) fully.
  (The base pad shall be more than 200 mm (7-7/8inch).)



11. Installation

■ Drain pipe connection

- Hydro Kit does not use the drain pump.
- Do not install in upward direction.
- Install the drain pipe in downward direction (1/50-1/100).
- Hydro Kit drain connection pipe is PT 1 male.



■ Selection of best location

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

- The place shall easily bear a load exceeding four times of the unit weight.
- The place where the unit shall be leveled.
- The place shall allow easy water drainage.
- The place where the unit shall be connected to the outdoor unit.
- The place where the unit is not affected by an electrical noise.
- The place where there should not be any heat source or steam near the unit.

Important

- The place is where the unit shall be installed only inside and protected from outdoor weather events.

11.1.3 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.
- Never connect electric power while proceeding water charging.

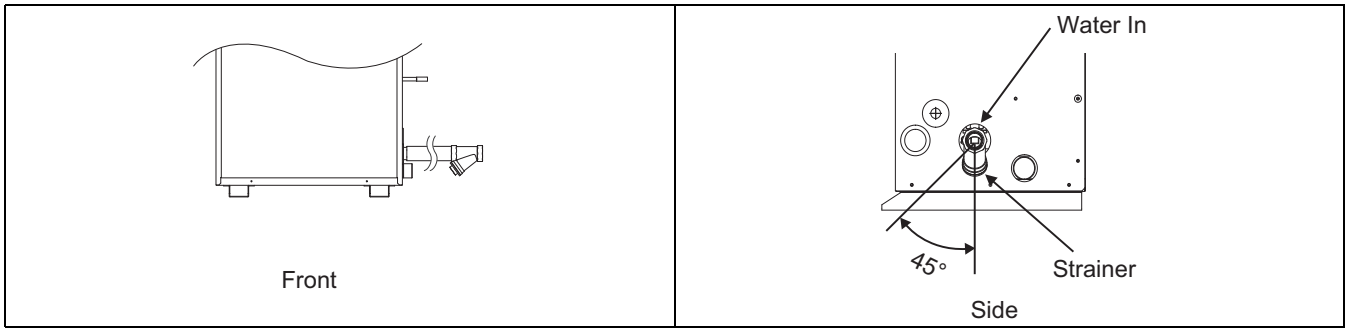
■ Water Piping and Water Circuit Connection

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.
- 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 tefron 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 valve(e.g. 3way valve or 2way valve) should be less than 90 seconds.
- Pipe is insulated to prevent heat loss to external environment.

■ Strainer (Floor standing type)

- Use the 30 mesh strainer. (Exclude scale diameter of 0.8mm or less and other net)
- Check the strainer direction and assemble on the inlet hole (Refer to picture)
- Wrap the Teflon tape on the screw thread of the water pipe for more than 15 times for assembly.
- Install the service port facing downward. (Within left/right 45 degrees)
- Check if there is any leakage on the connecting part.
- Clean the strainer periodically. (Once a year or more frequent)



Note

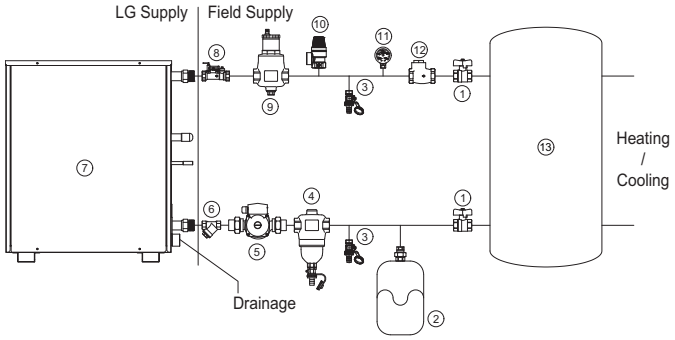
- The strainer included with product has a 28-mesh filter.

11. Installation

■ Water Cycle minimum requirements

1. For selecting the components of the hydraulic system, be sure they are above the design waterpressure.
2. For the water pipe, diffusely tight water pipes are recommended instead of steel pipes.
3. For the drain pipe size, use the same diameter as the product connected or larger. Always install a natural drainage so that the drained water does not flows back
4. Install insulated material across the total hydraulic piping to prevent condensation and to prevent low cooling or heating capacity during heat transfer losses. If the temperature is higher than 30 °C and the humidity is higher than 80 % the insulation material must be minimum 20 mm thick to prevent condensation.
5. Install the shut-off valve (1) to block the water by closing the valve when replacing the component or cleaning.
6. Install an expansion tank (2) based on the water volume of the hydraulic system.
7. Install the drain valve (3) that can be used for draining the water inside when replacing the component or providing service.
8. Install a magnetic dirt separator (4) at the inlet water pipe If the air separator is not installed there can be formed air bubbles inside the hydraulic system. Flow error will be showed first on remote controller, however finally a plate heat exchanger may burst during combined circumstances.
9. Install a circulation pump (5) which meets the water flow specifications mentioned inside product data book.
10. Install the strainer (6) at the inlet water pipe connection to protect the PHE. Do not charge water into the water pipe directly during Hydro Kit operation. If the strainer is not installed, component malfunction of Hydro Kit may occur.
- For the strainer, use one with 30 mesh or above with measurement diameter of 0.8 mm or less.
- Always install the strainer on the horizontal pipe.
11. Install a balancing valve (with flow meter) (8)
12. Install an automatic air separator in the outlet water pipe (9)
13. Install pressure safety relief valve (10) in vertical upright position that meets the design water pressure to prevent unit or water pipe damage during pressure increase inside the water pipe system.
14. Install a pressure meter (11) in the outlet water pipe.
15. Install in case of cascade hydraulic systems or bivalent systems a flow-check valve (12) at each outlet water pipe.
16. Install a buffer tank (13) of at least 10L/kW heating capacity in order to have a correct defrost cycle, if there is no knowledge about the type and dimensions of the heating system. If there is no buffer tank installed, the product can be damaged during normal operation or defrost operation.
17. After product operation for 2 weeks in case of new installation, clean the water filter. In the beginning of operation small particular dirt from installing process can block the filter which can lead to damage of the product.

11. Installation



1	Shut-Off valve	8	Balancing valve with flow meter
2	Expansion tank	9	Automatic air separator
3	Service port(Drain valve)	10	Pressure safety relief valve
4	Magnetic filter(Recommended)	11	Pressure meter
5	Water Pump	12	Check valve
6	Strainer	13	Buffer tank / DHW[1)] (Sanitary Water) Tank
7	Flow switch (included in product)		

Notice

- Install the closed loop type water pipe system.
- Balancing valve with flow meter is recommended to ensure 100% of the nominal flow.
- 1) DHW : Domestic Hot Water.

11.1.4 Water Control

■ Freezing Protection

- For Medium Temperature

  In areas of the country where entering water temperatures drop below 15℃(59˚F), the water pipe must be protected by using an approved antifreeze solution. Consult your Hydro Kit unit supplier for locally approved solutions in your area. Calculate the approximate volume of water in the system. (Except the Hydro Kit unit.) And add antifreeze solution to the total volume to allow for the water contained in Hydro Kit unit.

Type of Antifreeze	Minimum Temperature for Freeze Pretection				
	15℃(59˚F) ~ -5°C(23°F)	-10℃(14˚F)	-15℃(5˚F)	-20℃(-4˚F)	-25℃(-13˚F)
Ethylene glycol	12%	20%	30%	-	-
Propylene glycol	17%	25%	33%	-	-
Methanol	6%	12%	16%	24%	30%

- For High Temperature

  In areas of the country where entering water temperatures drop below 0℃(32˚F), the water pipe must be protected by using an approved antifreeze solution. Consult your Hydro Kit unit supplier for locally approved solutions in your area. Calculate the approximate volume of water in the system. (Except the Hydro Kit unit.) And add antifreeze solution to the total volume to allow for the water contained in Hydro Kit unit.

Type of Antifreeze	Minimum Temperature for Freeze Protection					
	0 ℃(32 ˚F)	-5 ℃(23 ˚F)	-10 ℃(14 ˚F)	-15 ℃(5 ˚F)	-20 ℃(-4 ˚F)	-25 ℃(-13 ˚F)
Ethylene glycol	0 %	12 %	20 %	30 %	-	-
Propylene glycol	0 %	17 %	25 %	33 %	-	-
Methanol	0 %	6 %	12 %	16 %	24 %	30 %

⚠ CAUTION

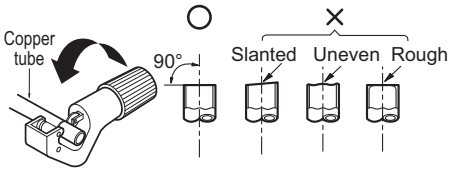
- Use only one of the above antifreeze.
- If a antifreeze is used, pressure drop and capability degradation of the system can occur.
- If one of antifreezes is used, corrosion can occur. So please add corrosion inhibitor.
- Please check the concentration of the antifreeze periodically to keep same concentration.
- When the antifreeze is used (for installation or operation), take care to ensure that antifreeze must not be touched.
- 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 the product 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.

11. Installation

11.1.5 Refrigerant Piping

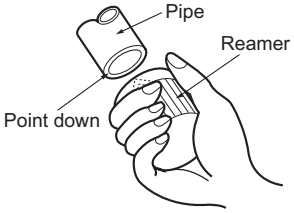
◆ Cut the pipes and the cable

- Use the accessory piping kit or the pipes purchased locally.
- Measure the distance between the indoor and the outdoor unit.
- Cut the pipes a little longer than measured distance.
- Cut the cable 1.5m longer than the pipe length.



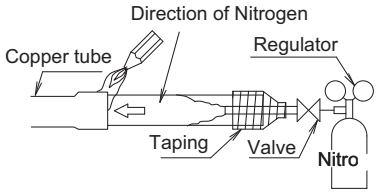
◆ Burrs removal

- Completely remove all burrs from the cut cross section of pipe/tube.
- Put the end of the copper tube/pipe to downward direction as you remove burrs in order to avoid to let burrs drop in the tubing.



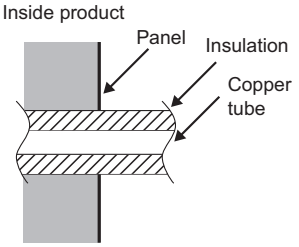
◆ Pipe welding

- Insert and weld the pipe.
- Always make sure to flow Nitrogen at 0.2kgf/cm2 within the pipe when welding.
- If the welding is done without flowing Nitrogen, it can generate a thick oxidized coating within the pipe to interfere with normal operation of valve and compressor etc.



◆ Insulation

- Use rubber foamed insulation material (EPDM, NBR) with high thermal resistance.
- When installed in humid environment, use thicker insulation material than usual.
- Insert the insulation material within the product as deep as possible.



Classification	Thickness
Liquid pipe	t9 or above
Gas pipe	t19 or above

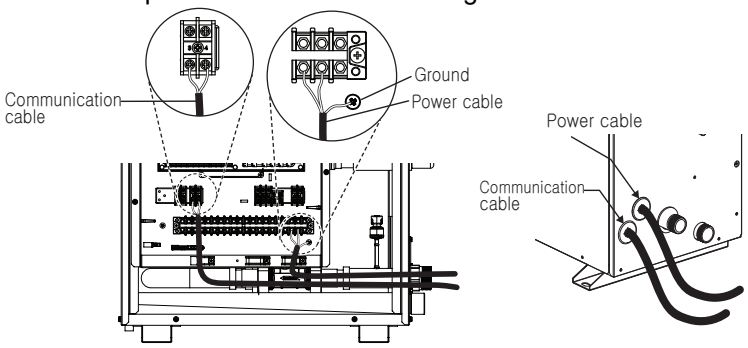
* The thickness of the above insulation material is based on thermal conduction rate of 0.036W/m °C. When installing independent power module, refrigerant piping should be installed in accordance with the manual of independent power module.

11. Installation

11.1.6 Electrical Wirings

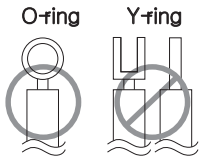
■ How to connect wirings

- Remove the box cover of electric parts and connect the wiring.



⚠ CAUTION

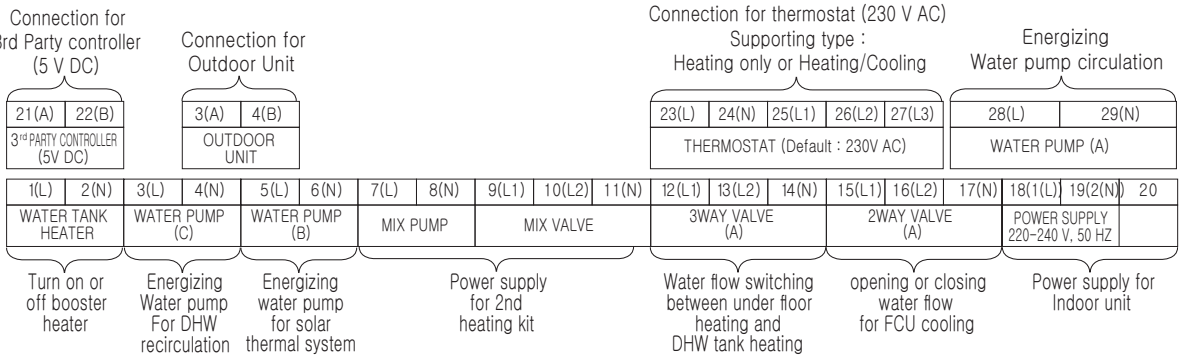
When connecting the power and communication cable, always use the terminal connector.
Make sure to tighten so that the screw of the terminal does not get loose.



■ Wiring Connection

Connect the wires to the terminals on the control board individually according to the outdoor unit connection.

- Ensure that the wire color of the outdoor unit and terminal No. are same as those of the indoor unit respectively.



⚠ CAUTION

- Make sure that the screws of the terminal are free from looseness.
- Be sure to test the power line and communication line for incorrect wiring before power is applied.
  1) If the power line and communication line are swapped over, the product will be damaged.
  2) Incorrect wiring confirmation test method
     : Measure the resistance across the power terminals (L,N) using a multi meter.
     - Resistance value of a normal connection: 1MΩ or more
     - Incorrect wiring resistance value: 500MΩ or less

11. Installation

⚠ CAUTION

After the confirmation of the above conditions, prepare the wiring as follows:

1. Use a separate power source only for the air conditioner.
   For the method of wiring, follow the circuit diagram on the inner side of control box cover.
2. Install a circuit breaker between power source and the unit.
3. Make sure that wiring screws are fastened. Screw could be loose by vibration during transportation.
   (If screws are loose, wires could be burnt-out.)
4. Check the specification of power source.
5. Make sure that electrical capacity is sufficient.
6. Starting voltage should be maintained above 90 percent of the rated voltage marked on the name plate.
7. Make sure the cable thickness matches the power sources specification.
   (Please note the relation between cable length and thickness.)
8. Do not install the earth leakage breaker in a place which is wet or moist.
   Water or moist may cause short circuit.
9. The following troubles could be caused by voltage drop-down.
   - Vibration of a magnetic switch, damage on the contact point there of, (fuse breaking), disturbance to the normal function of an overload protection device.
   - Proper starting power is not given to the compressor.
10. Before supplying power to the indoor unit, please check the wiring of the power and communication lines.
11. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazrd.

■ Connecting Cables

Classification	types	Cable cross section
Power cable(CV)	mm^2x cores	4.0 x 3
Communication cable(VCTF-SB)	mm^2x cores	1.0~1.5 x 2

The distance between communication cable and power cable

- If the power cable and communication cable are tied together, system malfunction may occur with electrostatic, electromagnetic combination effect causing the interference signal. If communication cable is connected along with power cable, secure at least 50mm distance between indoor unit power cable and communication cable.
- It is the value with the assumption of the length of the parallel cable as 100 m. If it is longer than 100m, it shall be calculated again with proportional to the added length.
  If the distortion in the waveform of the power still occurs despite securing the distance, increase the distance.
  * When several power cables are inserted into the transmission line, or tied together, make sure to consider the following issues.
  - Power cables and communication cable shall not be in the same transmission line.
  - Power cables and communication cable shall not be tied together.

⚠ WARNING

- Are all of the indoor units and outdoor units grounded?
- If grounding is not properly done, there is a risk of electric shock. Grounding must be done by a qualified technician.
- Consider the surrounding conditions(surrounding temperature, direct sunlight, rain water, etc.) when wiring the cable.
- The thickness of the power cable is the minimum thickness of metal conductor cable. Use thicker cable considering the voltage drop.

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The air conditioners manufactured by LG have received ISO9001 certificate for quality assurance and ISO14001 certificate for environmental management system.
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