

CHV6 AIR-CONDITIONER
「HEAT RECOVERY」

Technical Handbook

CHV6 AIR-CONDITIONER

BASIC MODELS

- CHV6-72URB
- CHV6-96URB
- CHV6-120URB
- CHV6-144URB
- CHV6-168URB
- CHV6-192URB

COMBINATION MODELS

- CHV6-216~456URB



Dear user:

Thank you for choosing and using our products. For your better understanding and use of this product, be sure to read and comply with the following related matters before use.

IMPORTANT NOTICE

Signal words (danger, warning and caution) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided below with their respective signal words:



: A hazardous situation which, if not avoided, will result in death or serious injury.



: A hazardous situation which, if not avoided, could result in death or serious injury.



: Used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTE

: Useful information for operation and/or maintenance.

- This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.
- This manual gives a common description and information for this air conditioner which you operate as well for other models. Cooper&Hunter pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- Cooper&Hunter cannot anticipate every possible circumstance that might involve a potential hazard. This air conditioner is designed for standard air conditioning only. Do not use this heat recovery air conditioner for other purposes such as drying clothes, refrigerating foods or for any other cooling or heating process. Do not install the unit in the following places. It may cause a fire, deformation, corrosion or failure.
 - * Places where oil (including machinery oil) sprays
 - * Places where inflammable gas may generate or flow
 - * Places where a lot of sulfide gas drifts such as in hot spring.
 - * Places where strong salty wind blows such as coast regions, or places with high acidity or alkalinity.
- Do not install the unit in the place where silicon gas drifts. If the silicon gas attaches to the surface of heat exchanger, the fin surface repels water. As a result, drain water splashes outside of the drain pan and splashed water runs inside of electrical box. In the end, water leakage or electrical devices failure may occur.
- Do not install the unit in the place where the breeze directly catches the animals and plants. It could adversely affect the animals and plants.
- Installation and service engineering must comply with local standards, laws and regulations.
- As the "public inaccessible appliances", the indoor units are required to be installed at a height of no lower than 2.5m.
- The installation of the air conditioner can only be carried out by dealer or professional, and self installation by user may cause water leakage, electric shock or a fire.
- If you have any questions, contact your dealer or designated service center of Cooper&Hunter.
- To prevent the environment, please do not discard the product at will, and Cooper&Hunter can provide recycling services in accordance with the relevant provisions of the country and provide replaceable parts in accordance with national standard requirements.
- This air conditioner has been designed for the following temperatures. Operate the air conditioner within this range.

Temperature

DX Indoor Unit			Maximum	Minimum
Cooling Operation	Indoor	°F DB/°F WB (°C DB/°C WB)	89/73 (32/23)	69/59 (21/15)
	Outdoor	°F DB (°C DB)	126 (52)*	14 (-10)
Heating Operation	Indoor	°F DB (°C DB)	80 (27)	59 (15)
	Outdoor	°F WB (°C WB)	62 (16.5)	-13 (-25)**

Water Module			Maximum	Minimum
Cooling Operation	Indoor	°F (°C)	77 (25)	50 (10)
	Outdoor	°F DB (°C DB)	118 (48)*	50 (10)
Heating Operation	Indoor	°F (°C)	130 (54)	50 (10)
	Outdoor		110°F DB (43°C DB)	-13°F WB (-25°C WB)

NOTES:

(*) 118°F (48°C) DB ~ 126°F (52°C) DB, Operation Control Range

(**) -4°F (-20°C) WB ~ 13°F (-25°C) WB, Operation Control Range

DB: Dry Bulb, WB: Wet Bulb

DANGER

- Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire. In case of a fire, cut off the power at the first time; do not touch the electrical parts by hand to avoid electric shock hazard.
- These products are equipped with electrical parts. Do not pour water into the indoor or outdoor unit. Otherwise, it will cause a serious electrical failures.
- Do not open the service cover of the indoor or outdoor units without turning OFF the main power supply, otherwise it may cause a serious safety accident. (In any cases, users of the equipment are not allowed to open the service cover).
- Do not touch or adjust safety devices inside the indoor unit or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- Refrigerant R410A for this unit is incombustible, non-toxic and odorless; however if the refrigerant is leaked and is contacted with fire, toxic gas will generate. Also because the R410A is heavier than air, the floor surface will be filled with it, which could cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases can cause an explosion. It is recommended that nitrogen be used for these types of tests.
- Refrigerant safety leakage standards for construction and operation systems are determined in accordance with local regulations or standards.
- Use an GLB (Ground Leakage Breaker, with an actuation time of 0.1 second or less) at or above medium induction speed, otherwise it may cause an electric shock or a fire.
- For installation, firmly connect the refrigerant pipe before the compressor starts operating.
- For maintenance, relocation and disposal, remove the refrigerant pipe after the compressor stops.
- Do not perform a short-circuit of the protection device such as a pressure switch when operating. It may cause a fire and explosion.

WARNING

- Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately 3.3ft. (1m) from the system.
- If circuit breaker is often activated, stop the system and contact your dealer or service contractor. Check that the ground wire is securely connected. If the unit is not correctly grounded, it leads electric shock. Do not connect the ground wiring to gas piping, water piping, lighting conductor or ground wiring for telephone.
- Before performing any brazing work, check to ensure that there is no flammable material around. When charging refrigerant be sure to wear leather gloves to prevent cold injuries.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and which may lead to a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.
- Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.
- Perform electrical work according to Installation Manual and all the relevant regulation and standards.
- If the instructions are not followed, an electrical failure and fire may occur due to insufficient capacity and inadequate performance. Use specified cables between units and choose the cables correctly. If not, an electrical failure or a fire may break out.
- Ensure that the outdoor unit is not covered with ice and snow before use.
- This appliance is not intended for use by persons (including children aged under 8) with reduced physical, sensory or mental capacities, or lack of experience and knowledge, unless they have been given supervision or instruction by a responsible person concerning use of the appliance and hazard involved to ensure that they can use it safely. Children shall not play with the appliance. Cleaning and maintenance shall not be made by children without supervision.
- The A-weighted emission sound pressure level at workstations does not exceed 70 dB(A).
- Cancer and reproductive harm-www.P65Warnings.ca.gov.
- Take measures to ensure that the refrigerant limitations in ASHRAE Standard 15 (Canada: 852) or other local codes, are followed. If refrigerant gas has leaked during the installation work, ventilate the room immediately.

CAUTION

- Do not step on or put any objects on the product.
- Do not put any foreign matters on the unit or inside the unit.
- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 9.8ft. (3m) from strong electromagnetic wave radiators such as medical equipment.

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Design

1. Introduction

1.1 Models Of Outdoor Unit

Basic Unit

Capacity kBtu/h(RT)	72(6RT)	96(8RT)	120(10RT)	144(12RT)	168(14RT)	192(16RT)
Model	CHV6-72URB	CHV6-96URB	CHV6-120URB	CHV6-144URB	CHV6-168URB	CHV6-192URB

Model 72 ~ 96



Model 120



Model 144 ~ 168



Model 192



Combination Module ※

Capacity kBtu/h(RT)	216(18RT)	240(20RT)	264(22RT)	288(24RT)	312(26RT)
Model	CHV6-216URB	CHV6-240URB	CHV6-264URB	CHV6-288URB	CHV6-312URB
Combination	CHV6-120URB	CHV6-120URB	CHV6-144URB	CHV6-144URB	CHV6-168URB
	CHV6-96URB	CHV6-120URB	CHV6-120URB	CHV6-144URB	CHV6-144URB

Capacity kBtu/h(RT)	366(28RT)	360(30RT)	384(32RT)
Model	CHV6-336URB	CHV6-360URB	CHV6-384URB
Combination	CHV6-168URB	CHV6-192URB	CHV6-192URB
	CHV6-168URB	CHV6-168URB	CHV6-192URB

Capacity kBtu/h(RT)	408(34RT)	432(36RT)	456(38RT)
Model	CHV6-408URB	CHV6-432URB	CHV6-456URB
Combination	CHV6-144URB	CHV6-144URB	CHV6-168URB
	CHV6-144URB	CHV6-144URB	CHV6-144URB
	CHV6-120URB	CHV6-144URB	CHV6-144URB

*Combine the specified basic units as shown in the table above. For any other types of combination, please consult technical personnel.

Model 216



Model 240



Model 264



Model 288 ~ 336



Model 360



Model 384



Model 408

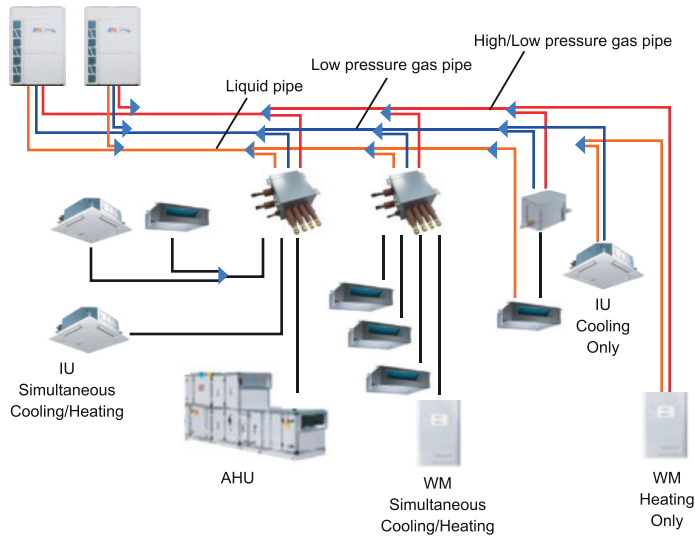


Model 432 ~ 456



1.2 Application Case

Application Case 1: Three Pipes Heat Recovery System with Switch Box



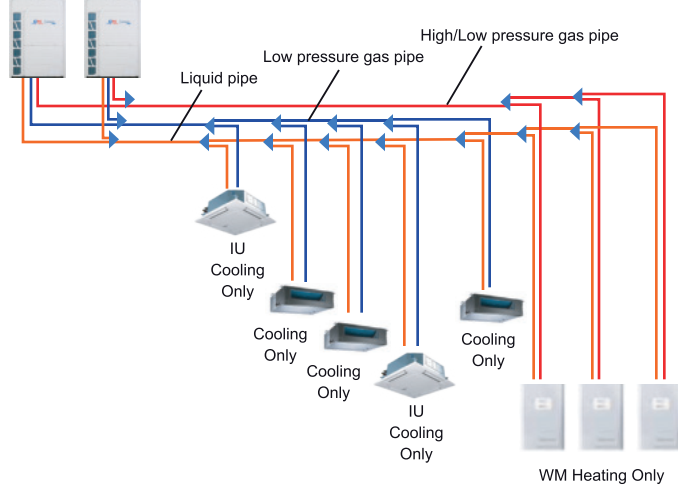
Capacity Ratio

Total Capacity Ratio		50%~150%
Indoor Unit	Total	50%~150%
	Without SW Box (Cooling Only)	0%~50%
Water Module		0%~60%

NOTE:

- (1) The function setting of "H4" must be set to 0 on the outdoor unit PCB (default setting).
- (2) The function setting of "n3" must be set to correct value equal to the quantity of water module connected on the outdoor unit PCB.
- (3) WM with Simultaneous Cooling/heating must occupy one branch of SW Box exclusively.

Application Case 2: Three Pipes Heat Recovery System without Switch Box

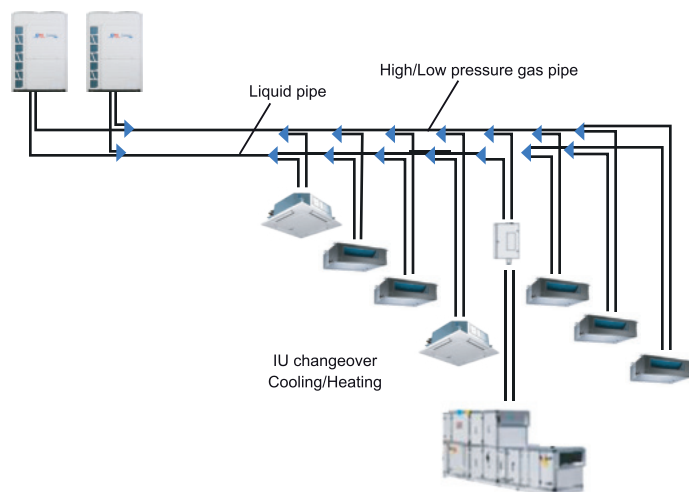


Total Capacity Ratio	100%~200%
Indoor Unit (Cooling Only)	50%~100%
Water Module (Heating Only)	50%~100%
Capacity Ratio of Indoor Unit to Water Module	80%~130%

NOTE:

- (1) The function setting of "H4" must be set to 0 on the outdoor unit PCB (default setting).
- (2) The function setting of "n3" must be set to correct value equal to the quantity of water module connected on the outdoor unit PCB.

Application Case 3: Two Pipes Heat Pump System



Outdoor Unit Model (kBtu/h)	72/144	96/192	120/140
Total Capacity Ratio	90%~150%	75%~150%	70%~150%

NOTE:

- (1) The function setting of "H4" must be set to 0 on the outdoor unit PCB.
- (2) The function setting of "n3" must be set to correct value equal to the quantity of water module connected on the outdoor unit PCB.

The following indoor units can be combined with the outdoor unit.
For operation temperature range, please refer to page i.

Table 1.1 Indoor Unit Type List

Type	Picture	Nominal Power (kBtu/h)															
		05	07	09	12	14	15	17	18	19	22	24	27	30	38	48	54
Ceiling Ducted Type (AC)			●	●	●		●			●	●	●	●	●	●	●	●
Ceiling Ducted Type (DC)			●	●	●		●			●		●		●	●	●	●
Low-Height Ceiling Ducted Type (DC)		●	●	●	●		●	●		●	●	●					
4-Way Cassette Type				●	●		●			●	●	●	●	●	●	●	●
Mini 4-Way Cassette Type		●	●	●	●		●	●		●							
Wall-Mounted Type			●	●	●		●		●			●	●				
Ceiling Floor Type									●		●	●	●	●	●	●	
1-Way Cassette Type			●	●	●	●			●			●					
MPAHU									●			●			●	●	●
Hydro Box													●				●

● : Available

- The number of connectable indoor units with the outdoor unit is as follows. Comply with the condition as follows when installing the unit.
- Total Capacity Ratio can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

1.3 Combiantion

Utilizing an inverter control, a wide range of operation capacity control is also available. A maximum total combination horsepower of 150% and a minimum total combination horsepower of 50% can be chosen by combination of the indoor units when compared with the nominal outdoor unit capacity. Therefore, the new system can meet individual air conditioning requirements in most office buildings.

Outdoor Unit Model (kBtu/h)	Min. Single-Individual Operation (kBtu/h)	Max.Number of Connectable I.U.	Recommended Number of Connectable I.U.	Max. Number of Connectable Water Modules for Application Case 1&3 (Chapter 1.2)	Max. Number of Connectable Water Modules for Application Case 2 (Chapter 1.2)
72	05	13	8	1	3
96		16	10	2	3
120		19	10	2	4
144		23	16	3	5
168		29	16	4	7
192		33	18	4	7
216		36	20	5	8
240		43	26	6	10
264		47	32	6	11
288		50	32	7	11
312		53	32	7	12
336		59	32	8	12
360		64	38	8	12
384		64	38	9	12
408		64	38	9	12
432		64	38	10	12
456		64	38	11	12

NOTE:

- (1) In a system where all indoor units operate at the same time and the same mode, total capacity of these indoor units should not be larger than combined capacity of the outdoor units, otherwise overload may occur under severe working condition or within narrow operating range.
- (2) If the system is used in the cold area (ambient temperature becomes under 50°F(-10°C)) or under the high heating load conditions, the total indoor unit capacity should be less than 100% against the outdoor unit and total piping length is less than 984ft.(300m).
- (3) 05/07 type indoor units are set with higher air flow. Determine the working environment and installation location carefully. Do not install these units in the place where the cold draft may occur during heating operation. If the unit is installed in such places, the number of connectable I.U. should be less than the recommended number on the table above.
- (4) When the connected indoor units contain Cassette Type or Wall-Mounted Type, and the nominal capacity is less than or equal to 12kBtu/h, the total indoor unit capacity should be equal to or less than 130% against the outdoor unit.
- (5) When the outdoor air temperature is more than 109.4°F (43°C) during the cooling operation, the total indoor unit capacity should be equal to or less than 100% against the outdoor unit.
- (6) If the operational capacity of indoor units at the same mode is more than 130% against the outdoor unit, the indoor units should be set to low airflow operation.

2. General Data

2.1 General Data

Capacity (RT)			6	8	10	12
Model	Outdoor Model		CHV6-72URB	CHV6-96URB	CHV6-120URB	CHV6-144URB
	Combination		CHV6-72URB	CHV6-96URB	CHV6-120URB	CHV6-144URB
Power Supply			208/230V 3PH 60Hz			
Cooling Operation*1*2	Nominal Cooling Capacity	Btu/h	69000	92000	114000	138000
		kW	20.2	27.0	33.4	40.4
	Power Consumption (Ducted/Non-ducted)	kW	5.69/4.65	7.80/6.55	9.65/8.21	12.70/11.38
	EER (Ducted/Non-ducted)	(Btu/h)/W	12.15/14.80	11.80/14.05	11.80/13.90	10.85/12.10
Heating Operation*1*2	Nominal Cooling Capacity (47°F)	Btu/h	75000	100000	126000	150000
		kW	22.0	29.3	36.9	44.0
	Power Consumption (Ducted/Non-ducted)	kW	6.27/5.30	7.96/7.15	10.19	10.19
	COP 47°F (Ducted/Non-ducted)	W/W	3.51/4.15	3.68/4.10	3.71/3.90	3.71/3.90
	Low Temperature Heating Capacity (17°F)	Btu/h	52500	70000	81000	105000
		kW	15.4	20.5	23.7	30.8
	Power Consumption (Ducted/Non-ducted)	kW	6.64/5.72	8.58/7.74	9.92/8.43	13.11/12.42
	COP 17°F (Ducted/Non-ducted)	W/W	2.32/2.69	2.39/2.65	2.39/2.81	2.35/2.48
Electrical Parameter	MCA	A	34.3	41.2	49.3	60.1
	MOP	A	45	50	60	80
Sound Pressure Level*3	Normal Mode	dB(A)	59	60	62	62
Cabinet Color*4		-	Ivory White			
Outer Dimensions	Height	in.	68-1/8	68-1/8	68-1/8	68-1/8
		mm	1730	1730	1730	1730
	Width	in.	37-13/32	37-13/32	47-5/8	53-5/32
		mm	950	950	1210	1350
Packing Dimensions	Depth	in.	29-17/32	29-17/32	29-17/32	29-17/32
		mm	750	750	750	750
	Height	in.	76-3/4	76-3/4	76-3/4	76-3/4
		mm	1950	1950	1950	1950
Weight	Width	in.	39-31/32	39-31/32	50-3/16	55-29/32
		mm	1015	1015	1275	1420
	Depth	in.	31-3/32	31-3/32	31-3/32	31-3/32
		mm	790	790	790	790
Weight	Net Weight	lbs.	534	536	637	896
		kg	242	243	289	361
	Gross Weight	lbs.	595	597	705	864
		kg	270	271	320	392
Refrigerating Installation	Compressor		-	Scroll Comp		
	Compressor Quantity		-	1	1	2
	Refrigeration Oil	Type	-	FVC68D		
		Brand	-	Idemitsu Kosan		
		Chagre (Total)	gal	1.5	1.5	2.0
			L	6.0	6.0	7.0
	Refrigerant Charge Before Shipment		lbs.	13.2	13.2	19.4
			kg	6.0	6.0	8.8
	Refrigerant Flow Control		-	Micro-computer Control Expansion Valve		
	Heat Exchanger Type		-	Multi-Way Cross-Flow Finned Tube Type		
	Heat Recovery Operation System	Low Prerssure Gas Pipe	in.	Φ3/4	Φ7/8	Φ1
			mm	Φ19.05	Φ22.20	Φ25.40
		High/Low Pressure Gas Pipe	in.	Φ5/8	Φ3/4	Φ7/8
			mm	Φ15.88	Φ19.05	Φ22.20
		Liquid Pipe	in.	Φ3/8	Φ3/8	Φ1/2
			mm	Φ9.53	Φ9.53	Φ12.70
Heat Pump Operation System	High/Low Pressure Gas Pipe	in.	Φ3/4	Φ7/8	Φ1	
		mm	Φ19.05	Φ22.20	Φ25.40	
	Liquid Pipe	in.	Φ3/8	Φ3/8	Φ1/2	
		mm	Φ9.53	Φ9.53	Φ12.70	
Fan	Condenser Fan Quantity		-	1	2	
	Air Flow Rate	CFM	6460	6460	7060	
		m³/min	183	183	200	
Hole for Power Supply Wiring		in.	Φ1-23/32	Φ1-23/32	Φ1-23/32	
		mm	Φ43.70	Φ43.70	Φ43.70	
Hole for Control Line Wiring		in.	Φ55/64	Φ55/64	Φ55/64	
		mm	Φ22.00	Φ22.00	Φ22.00	

NOTES:

*1. The above cooling and heating capacities show the capacities when the outdoor unit operating with the 100% rating of indoor units.

Cooling Operation Conditions

Indoor Air Inlet Temperature: 80°F DB (26.7°C DB)

Outdoor Air Inlet Temperature: 67°F WB (19.4°C WB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Heating Operation Conditions

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB)

Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Nominal Heating Condition

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB)

Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Low. Temp. Heating Condition

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB)

Outdoor Air Inlet Temperature: 17°F DB (-8.37°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

*2. Rated capacity and efficiency are certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

*3. The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene. Measurement point: 3.3ft. (1.0m) from the service cover surface and 4.9ft. (1.5m) from floor level.

Capacity (RT)			14	16	18	20		
Model	Outdoor Model		CHV6-168URB	CHV6-192URB	CHV6-216URB	CHV6-240URB		
	Combination		CHV6-168URB	CHV6-192URB	CHV6-120URB	CHV6-120URB		
			-	-	CHV6-120URB	CHV6-120URB		
Power Supply			208/230V 3PH 60Hz					
Cooling Operation*1*2	Nominal Cooling Capacity		Btu/h	160000	184000	206000	228000	
			kW	46.9	53.9	60.4	66.8	
	Power Consumption (Ducted/Non-ducted)		kW	14.57/13.52	16.14/15.53	17.45/14.76	19.30/16.42	
	EER (Ducted/Non-ducted)		(Btu/h)/W	11.00/11.85	11.40/11.85	11.81/13.96	11.81/13.89	
Heating Operation*1*2	Nominal Cooling Capacity (47°F)		Btu/h	170000	200000	226000	252000	
			kW	49.8	58.6	66.2	73.8	
	Power Consumption (Ducted/Non-ducted)		kW	15.51/14.27	17.87/16.7	18.41/15.73	20.90/17.16	
	COP 47°F (Ducted/Non-ducted)		W/W	3.21/3.49	3.28/3.51	3.60/4.21	3.53/4.30	
	Low Temperature Heating Capacity (17°F)		Btu/h	115000	140000	151000	161500	
			kW	33.7	41.0	44.2	47.4	
	Power Consumption (Ducted/Non-ducted)		kW	16.05/14.34	17.60/16.33	18.50/16.17	19.84/16.86	
	COP 17°F (Ducted/Non-ducted)		W/W	2.10/2.35	2.33/2.51	2.39/2.73	2.39/2.81	
Electrical Parameter	MCA		A	62.3	78.1	41.2+49.3	49.3+49.3	
	MOP		A	80	100	50+60	60+60	
Sound Pressure Level*3	Normal Mode		dB(A)	62	63	64	65	
Cabinet Color*4			Ivory White					
Outer Dimensions	Height		in.	68-1/8	68-1/8	68-1/8	68-1/8	
			mm	1730	1730	1730	1730	
	Width		in.	53-5/32	63	37-13/32 + 47-5/8	47-5/8 + 47-5/8	
			mm	1350	1600	950 + 1210	1210 + 1210	
	Depth		in.	29-17/32	29-17/32	29-17/32	29-17/32	
			mm	750	750	750	750	
Packing Dimensions	Height		in.	76-3/4	76-3/4	76-3/4	76-3/4	
			mm	1950	1950	1950	1950	
	Width		in.	55-29/32	65-9/16	39-31/32 + 50-3/16	50-3/16 + 50-3/16	
			mm	1420	1665	1015 + 1275	1275 + 1275	
	Depth		in.	31-3/32	31-3/32	31-3/32	31-3/32	
			mm	790	790	790	790	
Weight	Net Weight		lbs.	798	858	536 + 637	637 + 637	
			kg	362	389	243 + 289	289 + 289	
	Gross Weight		lbs.	866	930	597 + 705	705 + 705	
			kg	393	422	271 + 320	320 + 320	
Refrigerating Installation	Compressor		-				Scroll Comp	
	Compressor Quantity		-		2	2	1 + 1	1 + 1
	Refrigeration Oil	Type	-					
		Brand	FVC68D					
			Idemitsu Kosan					
		Chagre (Total)	gal	2.3	2.3	1.6 + 1.9		1.9 + 1.9
	L		8.4	8.6	6.0 + 7.0		7.0 + 7.0	
	Refrigerant Charge Before Shipment		lbs.	21.6	25.4	13.2 + 19.4		19.4 + 19.4
			kg	9.8	11.5	6.0 + 8.8		8.8 + 8.8
	Refrigerant Flow Control		-					
	Heat Exchanger Type		-					
	Heat Recovery Operation System	Low Prerssure Gas Pipe	in.	Φ1-1/8	Φ1-1/8	Φ1-1/8	Φ1-1/4	
			mm	Φ28.60	Φ28.60	Φ28.60	Φ31.75	
		High/Low Pressure Gas Pipe	in.	Φ7/8	Φ7/8	Φ1	Φ1	
			mm	Φ22.20	Φ22.20	Φ25.40	Φ25.40	
		Liquid Pipe	in.	Φ1/2	Φ5/8	Φ5/8	Φ3/4	
			mm	Φ12.70	Φ15.88	Φ15.88	Φ19.05	
	Heat Pump Operation System	High/Low Pressure Gas Pipe	in.	Φ1-1/8	Φ1-1/8	Φ1-1/8	Φ1-1/4	
mm			Φ28.60	Φ28.60	Φ28.60	Φ31.75		
Liquid Pipe		in.	Φ1/2	Φ5/8	Φ5/8	Φ3/4		
		mm	Φ12.70	Φ15.88	Φ15.88	Φ19.05		
Fan	Condenser Fan Quantity		-	2	2	1 + 2	2 + 2	
	Air Flow Rate		CFM	9430	12360	6460 + 7060	7060 + 7060	
			m³/min	267	350	183 + 200	200 + 200	
Hole for Power Supply Wiring			in.	Φ1-23/32	Φ1-23/32	Φ1-23/32	Φ1-23/32	
			mm	Φ43.70	Φ43.70	Φ43.70	Φ43.70	
Hole for Control Line Wiring			in.	Φ55/64	Φ55/64	Φ55/64	Φ55/64	
			mm	Φ22.00	Φ22.00	Φ22.00	Φ22.00	

NOTES:

*1. The above cooling and heating capacities show the capacities when the outdoor unit operating with the 100% rating of indoor units.

Cooling Operation Conditions

Indoor Air Inlet Temperature: 80°F DB (26.7°C DB)
67°F WB (19.4°C WB)

Outdoor Air Inlet Temperature: 95°F DB (35°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Heating Operation Conditions

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB) 70°F DB (21.1°C DB)
Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB) 17°F DB (-8.37°C DB)

43°F WB (6.1°C WB) 15°F WB (-9.4°C WB)

*2. Rated capacity and efficiency are certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

*3. The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene. Measurement point: 3.3ft. (1.0m) from the service cover surface and 4.9ft. (1.5m) from floor level.

Capacity (RT)			22	24	26	
Model	Outdoor Model		CHV6-264URB	CHV6-288URB	CHV6-312URB	
	Combination		CHV6-120URB	CHV6-144URB	CHV6-144URB	
			CHV6-144URB	CHV6-144URB	CHV6-168URB	
Power Supply			208/230V 3PH 60Hz			
Cooling Operation*1*2	Nominal Cooling Capacity	Btu/h	252000	275500	298000	
		kW	73.8	80.8	87.3	
	Power Consumption (Ducted/Non-ducted)	kW	22.35/19.59	25.40/22.76	27.27/24.90	
	EER (Ducted/Non-ducted)	(Btu/h)/W	11.26/12.86	10.85/12.11	10.92/11.98	
Heating Operation*1*2	Nominal Cooling Capacity (47°F)	Btu/h	276000	300500	320000	
		kW	80.9	88.0	93.8	
	Power Consumption (Ducted/Non-ducted)	kW	23.91/20.77	26.92/24.38	28.97/26.46	
	COP 47°F (Ducted/Non-ducted)	W/W	3.38/3.90	3.27/3.61	3.24/3.54	
	Low Temperature Heating Capacity (47°F)	Btu/h	186000	210000	220000	
		kW	54.5	61.6	64.5	
	Power Consumption (Ducted/Non-ducted)	kW	23.03/20.85	26.22/24.84	29.16/26.76	
	COP 17°F (Ducted/Non-ducted)	W/W	2.37/2.61	2.35/2.48	2.21/2.41	
Electrical Parameter	MCA	A	49.3 + 60.1	60.1 + 60.1	60.1 + 62.3	
	MOP	A	60 + 80	80 + 80	80 + 80	
Sound Pressure Level*3	Normal Mode	dB(A)	65	65	65	
Cabinet Color*4		-	Ivory White			
Outer Dimensions	Height	in.	68-1/8	68-1/8	68-1/8	
		mm	1730	1730	1730	
	Width	in.	47-5/8 + 53-5/32	53-5/32 + 53-5/32	53-5/32 + 53-5/32	
		mm	1210 + 1350	1350 + 1350	1350 + 1350	
	Depth	in.	29-17/32	29-17/32	29-17/32	
		mm	750	750	750	
Packing Dimensions	Height	in.	76-3/4	76-3/4	76-3/4	
		mm	1950	1950	1950	
	Width	in.	50-3/16 + 55-29/32	55-29/32 + 55-29/32	55-29/32 + 55-29/32	
		mm	1275 + 1420	1420 + 1420	1420 + 1420	
	Depth	in.	31-3/32	31-3/32	31-3/32	
		mm	790	790	790	
Weight	Net Weight	lbs.	637 + 796	796 + 796	796 + 798	
		kg	289 + 361	361 + 361	361 + 362	
	Gross Weight	lbs.	705 + 864	864 + 864	864 + 866	
		kg	320 + 392	392 + 392	392 + 393	
Refrigerating Installation	Compressor		-	Scroll Comp		
	Compressor Quantity		-	1 + 2	2 + 2	
	Refrigeration Oil	Type	-	FVC68D		
		Brand	-	Idemitsu Kosan		
		Chagre (Total)	gal	1.9 + 2.2	2.2 + 2.2	2.2 + 2.2
			L	7.0 + 8.4	8.4 + 8.4	8.4 + 8.4
	Refrigerant Charge Before Shipment	lbs.	19.4 + 21.6	21.6 + 21.6	21.6 + 21.6	
		kg	8.8 + 9.8	9.8 + 9.8	9.8 + 9.8	
	Refrigerant Flow Control		-	Micro-computer Control Expansion Valve		
	Heat Exchanger Type		-	Multi-Way Cross-Flow Finned Tube Type		
	Heat Recovery Operation System	Low Pressure Gas Pipe	in.	Φ1-1/4	Φ1-1/4	Φ1-1/4
			mm	Φ31.75	Φ31.75	Φ31.75
		High/Low Pressure Gas Pipe	in.	Φ1-1/8	Φ1-1/8	Φ1-1/8
			mm	Φ28.60	Φ28.60	Φ28.60
		Liquid Pipe	in.	Φ3/4	Φ3/4	Φ3/4
			mm	Φ19.05	Φ19.05	Φ19.05
	Heat Pump Operation System	High/Low Pressure Gas Pipe	in.	Φ1-1/4	Φ1-1/4	Φ1-1/4
			mm	Φ31.75	Φ31.75	Φ31.75
Liquid Pipe		in.	Φ3/4	Φ3/4	Φ3/4	
		mm	Φ19.05	Φ19.05	Φ19.05	
Fan	Condenser Fan Quantity	-	2 + 2	2 + 2	2 + 2	
	Air Flow Rate	CFM	7060 + 9430	9430 + 9430	9430 + 9430	
		m³/min	200 + 267	267 + 267	267 + 267	
Hole for Power Supply Wiring		in.	Φ1-23/32	Φ1-23/32	Φ1-23/32	
		mm	Φ43.70	Φ43.70	Φ43.70	
Hole for Control Line Wiring		in.	Φ55/64	Φ55/64	Φ55/64	
		mm	Φ22.00	Φ22.00	Φ22.00	

NOTES:

*1. The above cooling and heating capacities show the capacities when the outdoor unit operating with the 100% rating of indoor units.

Cooling Operation Conditions

Indoor Air Inlet Temperature: 80°F DB (26.7°C DB)
67°F WB (19.4°C WB)

Outdoor Air Inlet Temperature: 95°F DB (35°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Heating Operation Conditions

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB)

Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB)

17°F DB (-8.37°C DB)

43°F WB (6.1°C WB)

15°F WB (-9.4°C WB)

*2. Rated capacity and efficiency are certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

*3. The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.

Measurement point: 3.3ft. (1.0m) from the service cover surface and 4.9ft. (1.5m) from floor level.

Capacity (RT)			28	30	32	
Model	Outdoor Model		CHV6-336URB	CHV6-360URB	CHV6-384URB	
	Combination		CHV6-168URB	CHV6-168URB	CHV6-192URB	
			CHV6-168URB	CHV6-192URB	CHV6-192URB	
Power Supply			208/230V 3PH 60Hz			
Cooling Operation*1*2	Nominal Cooling Capacity	Btu/h	320000	344000	368000	
		kW	93.8	100.8	107.8	
	Power Consumption (Ducted/Non-ducted)	kW	29.14/27.04	30.71/29.05	32.28/31.06	
	EER (Ducted/Non-ducted)	(Btu/h)/W	10.99/11.84	11.19/11.84	11.40/11.84	
Heating Operation*1*2	Nominal Cooling Capacity (47°F)	Btu/h	340000	370000	400000	
		kW	99.6	108.4	117.2	
	Power Consumption (Ducted/Non-ducted)	kW	31.02/28.54	33.38/30.97	35.74/33.40	
	COP 47°F (Ducted/Non-ducted)	W/W	3.21/3.49	3.25/3.50	3.28/3.51	
	Low Temperature Heating Capacity (47°F)	Btu/h	230000	255000	280000	
		kW	67.4	74.7	82.0	
	Power Consumption (Ducted/Non-ducted)	kW	32.10/28.68	33.65/30.67	35.20/32.66	
	COP 17°F (Ducted/Non-ducted)	W/W	2.10/2.35	2.22/2.44	2.33/2.51	
Electrical Parameter	MCA	A	62.3 + 62.3	62.3 + 78.1	78.1 + 78.1	
	MOP	A	80 + 80	80 + 100	100 + 100	
Sound Pressure Level*3	Normal Mode	dB(A)	65	66	66	
Cabinet Color*4		-	Ivory White			
Outer Dimensions	Height	in.	68-1/8	68-1/8	68-1/8	
		mm	1730	1730	1730	
	Width	in.	53-5/32 + 53-5/32	53-5/32 + 63	63 + 63	
		mm	1350 + 1350	1350 + 1600	1600 + 1600	
	Depth	in.	29-17/32	29-17/32	29-17/32	
		mm	750	750	750	
Packing Dimensions	Height	in.	76-3/4	76-3/4	76-3/4	
		mm	1950	1950	1950	
	Width	in.	55-29/32 + 55-29/32	55-29/32 + 65-9/16	65-9/16 + 65-9/16	
		mm	1420 + 1420	1420 + 1665	1665 + 1665	
	Depth	in.	31-3/32	31-3/32	31-3/32	
		mm	790	790	790	
Weight	Net Weight	lbs.	798 + 798	798 + 858	858 + 858	
		kg	362 + 362	362 + 389	389 + 389	
	Gross Weight	lbs.	866 + 866	862 + 930	930 + 930	
		kg	393 + 393	393 + 422	422 + 422	
Refrigerating Installation	Compressor		-	Scroll Comp		
	Compressor Quantity		-	2 + 2	2 + 2	
	Refrigeration Oil	Type	-	FVC68D		
		Brand	-	Idemitsu Kosan		
		Chagre (Total)	gal	2.2 + 2.2	2.2 + 2.3	2.3 + 2.3
			L	8.4 + 8.4	8.4 + 8.6	8.6 + 8.6
	Refrigerant Charge Before Shipment		lbs.	21.6 + 21.6	21.6 + 25.4	25.4 + 25.4
			kg	9.8 + 9.8	9.8 + 11.5	11.5 + 11.5
	Refrigerant Flow Control		-	Micro-computer Control Expansion Valve		
	Heat Exchanger Type		-	Multi-Way Cross-Flow Finned Tube Type		
	Heat Recovery Operation System	Low Pressure Gas Pipe	in.	Φ1-1/2	Φ1-1/2	Φ1-1/2
			mm	Φ38.10	Φ38.10	Φ38.10
		High/Low Pressure Gas Pipe	in.	Φ1-1/8	Φ1-1/4	Φ1-1/4
			mm	Φ28.60	Φ31.75	Φ31.75
		Liquid Pipe	in.	Φ3/4	Φ3/4	Φ3/4
			mm	Φ19.05	Φ19.05	Φ19.05
	Heat Pump Operation System	High/Low Pressure Gas Pipe	in.	Φ1-1/2	Φ1-1/2	Φ1-1/2
mm			Φ38.10	Φ38.10	Φ38.10	
Liquid Pipe		in.	Φ3/4	Φ3/4	Φ3/4	
		mm	Φ19.05	Φ19.05	Φ19.05	
Fan	Condenser Fan Quantity		-	2 + 2	2 + 2	
	Air Flow Rate		CFM	9430 + 9430	9430 + 12360	12360 + 12360
			m³/min	267 + 267	267 + 350	350 + 350
Hole for Power Supply Wiring		in.	Φ1-23/32	Φ1-23/32	Φ1-23/32	
		mm	Φ43.70	Φ43.70	Φ43.70	
Hole for Control Line Wiring		in.	Φ55/64	Φ55/64	Φ55/64	
		mm	Φ22.00	Φ22.00	Φ22.00	

NOTES:

*1. The above cooling and heating capacities show the capacities when the outdoor unit operating with the 100% rating of indoor units.

Cooling Operation Conditions

Indoor Air Inlet Temperature: 80°F DB (26.7°C DB)
67°F WB (19.4°C WB)

Outdoor Air Inlet Temperature: 95°F DB (35°C DB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

Heating Operation Conditions

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB) 70°F DB (21.1°C DB)

Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB) 17°F DB (-8.37°C DB)

43°F WB (6.1°C WB) 15°F WB (-9.4°C WB)

*2. Rated capacity and efficiency are certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

*3. The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene.

Measurement point: 3.3ft. (1.0m) from the service cover surface and 4.9ft. (1.5m) from floor level.

Capacity (RT)			34	36	38	
Model	Outdoor Model		CHV6-408URB	CHV6-432URB	CHV6-456URB	
	Combination		CHV6-120URB	CHV6-144URB	CHV6-144URB	
			CHV6-144URB	CHV6-144URB	CHV6-144URB	
			CHV6-144URB	CHV6-144URB	CHV6-168URB	
Power Supply			208/230V 3PH 60Hz			
Cooling Operation*1*2	Nominal Cooling Capacity	Btu/h	389500	413500	435500	
		kW	114.2	121.2	127.7	
	Power Consumption (Ducted/Non-ducted)	kW	35.05/30.97	38.10/34.14	39.97/36.28	
	EER (Ducted/Non-ducted)	(Btu/h)/W	11.12/12.59	10.85/12.11	10.88/12.01	
Heating Operation*1*2	Nominal Cooling Capacity (47°F)	Btu/h	426000	450500	470000	
		kW	124.9	132.0	137.8	
	Power Consumption (Ducted/Non-ducted)	kW	37.37/32.96	40.38/36.57	42.43/38.65	
	COP 47°F (Ducted/Non-ducted)	W/W	3.34/3.79	3.27/3.61	3.25/3.57	
	Low Temperature Heating Capacity (47°F)	Btu/h	291000	315500	325000	
		kW	85.3	92.4	95.3	
	Power Consumption (Ducted/Non-ducted)	kW	36.14/33.27	39.33/37.26	42.27/39.18	
	COP 17°F (Ducted/Non-ducted)	W/W	2.36/2.56	2.35/2.48	2.25/2.43	
Electrical Parameter	MCA	A	49.3 + 60.1 + 60.1	60.1 + 60.1 + 60.1	60.1 + 60.1 + 62.3	
	MOP	A	60 + 80 + 80	80 + 80 + 80	80 + 80 + 80	
Sound Pressure Level*3	Normal Mode	dB(A)	67	67	67	
Cabinet Color*4			Ivory White			
Outer Dimensions	Height	in.	68-1/8	68-1/8	68-1/8	
		mm	1730	1730	1730	
	Width	in.	47-5/8 + 53-5/32 + 53-5/32	53-5/32 + 53-5/32 + 53-5/32	53-5/32 + 53-5/32 + 53-5/32	
		mm	1210+1350 + 1350	1350 +1350 + 1350	1350 +1350 + 1350	
	Depth	in.	29-17/32	29-17/32	29-17/32	
		mm	750	750	750	
Packing Dimensions	Height	in.	76-3/4	76-3/4	76-3/4	
		mm	1950	1950	1950	
	Width	in.	50-3/16 + 55-29/32 + 55-29/32	55-29/32 + 55-29/32 + 55-29/32	55-29/32 + 55-29/32 + 55-29/32	
		mm	1275 + 1420 + 1420	1420 +1420 + 1420	1420 +1420 + 1420	
	Depth	in.	31-3/32	31-3/32	31-3/32	
		mm	790	790	790	
Weight	Net Weight	lbs.	637 + 796 + 796	796 + 796 +796	796 + 796 +798	
		kg	289 + 361 + 361	361 + 361 + 361	361 + 361 + 362	
	Gross Weight	lbs.	705 + 864 + 864	864 + 864 + 864	864 + 864 + 866	
		kg	320 + 392 + 392	392 + 392 + 392	392 + 392 + 393	
Refrigerating Installation	Compressor		Scroll Comp			
	Compressor Quantity		1 + 2 + 2		2 + 2 + 2	
	Refrigeration Oil	Type	FVC68D			
		Brand	Idemitsu Kosan			
		Chagre (Total)	gal	1.9 + 2.2 + 2.2	2.2 + 2.2 + 2.2	2.2 + 2.2 + 2.2
			L	7.0 + 8.4 + 8.4	8.4 + 8.4 + 8.4	8.4 + 8.4 + 8.4
	Refrigerant Charge Before Shipment		lbs.	19.4 + 21.6 + 21.6	21.6 + 21.6 + 21.6	
			kg	8.8 + 9.8 + 9.8	9.8 + 9.8 + 9.8	
	Refrigerant Flow Control		Micro-computer Control Expansion Valve			
	Heat Exchanger Type		Multi-Way Cross-Flow Finned Tube Type			
	Heat Recovery Operation System	Low Prerssure Gas Pipe	in.	Φ1-1/2	Φ1-1/2	Φ1-1/2
			mm	Φ38.10	Φ38.10	Φ38.10
		High/Low Pressure Gas Pipe	in.	Φ1-1/4	Φ1-1/4	Φ1-1/4
			mm	Φ31.75	Φ31.75	Φ31.75
		Liquid Pipe	in.	Φ3/4	Φ3/4	Φ3/4
			mm	Φ19.05	Φ19.05	Φ19.05
	Heat Pump Operation System	High/Low Pressure Gas Pipe	in.	Φ1-1/2	Φ1-1/2	Φ1-1/2
			mm	Φ38.10	Φ38.10	Φ38.10
		Liquid Pipe	in.	Φ3/4	Φ3/4	Φ3/4
			mm	Φ19.05	Φ19.05	Φ19.05
Fan	Condenser Fan Quantity		2 + 2 + 2		2 + 2 + 2	
	Air Flow Rate	CFM	7060 + 9430 + 9430	9430 + 9430 + 9430	9430 + 9430 + 9430	
		m³/min	200 + 267 + 267	267 + 267 + 267	267 + 267 + 267	
Hole for Power Supply Wiring		in.	Φ1-23/32	Φ1-23/32	Φ1-23/32	
		mm	Φ43.70	Φ43.70	Φ43.70	
Hole for Control Line Wiring		in.	Φ55/64	Φ55/64	Φ55/64	
		mm	Φ22.00	Φ22.00	Φ22.00	

NOTES:

*1. The above cooling and heating capacities show the capacities when the outdoor unit operating with the 100% rating of indoor units.

Cooling Operation Conditions

Indoor Air Inlet Temperature: 80°F DB (26.7°C DB)
67°F WB (19.4°C WB)
Outdoor Air Inlet Temperature: 95°F DB (35°C DB)

Heating Operation Conditions

Indoor Air Inlet Temperature: 70°F DB (21.1°C DB)
Outdoor Air Inlet Temperature: 47°F DB (8.3°C DB)
43°F WB (6.1°C WB)

Nominal Heating Condition

Low Temp. Heating Condition

70°F DB (21.1°C DB)
17°F DB (-8.37°C DB)
15°F WB (-9.4°C WB)

Piping Length: 24.6 ft. (7.5m) Piping Lift: 0ft. (0m)

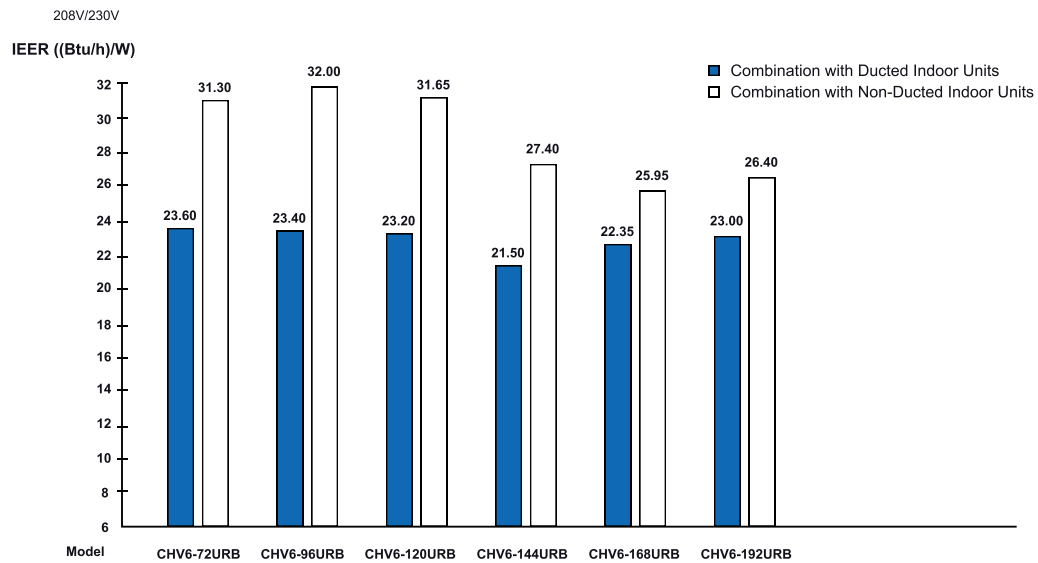
*2. Rated capacity and efficiency are certified under AHRI Standard 1230. Ratings are subject to change without notice. Current certified ratings are available at www.ahridirectory.org.

*3. The above noise values are measured in the anechoic chamber without reflected echo, therefore the impact of the reflected echo must be included at the scene. Measurement point: 3.3ft. (1.0m) from the service cover surface and 4.9ft. (1.5m) from floor level.

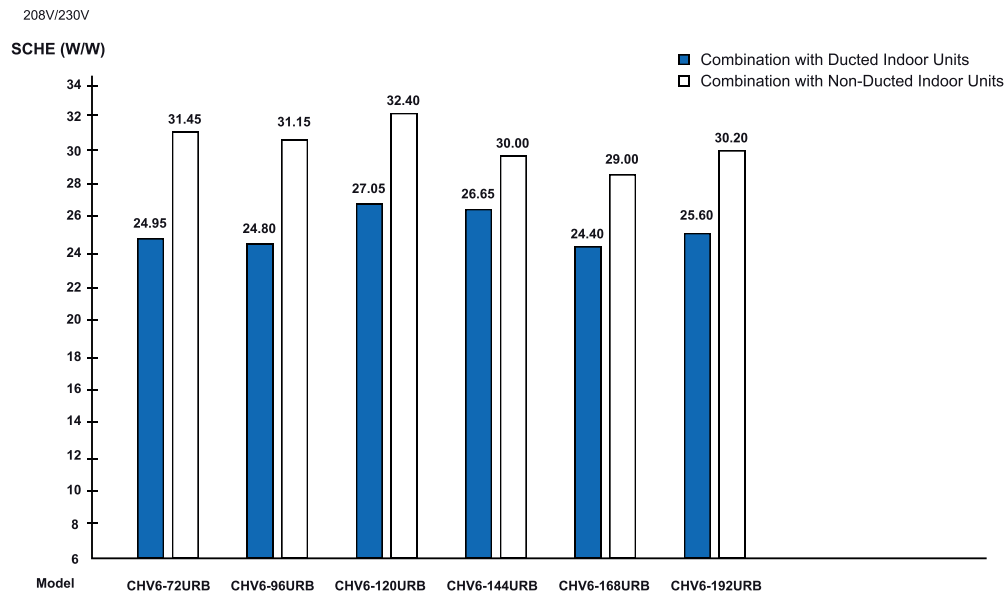
High Efficiency and Energy Saving

By improving the performance of the compressor and optimizing the refrigerant system, considerable energy savings for buildings will be achieved with the line-up of the heat pump system and the heat recovery system.

Integrated Energy Efficiency Ratio (IEER)



Simultaneous Cooling and Heating Efficiency (SCHE)



2.2 Component Data

Outdoor Heat Exchanger, Fan and Fan Motor

Model				CHV6-72*	CHV6-96*	CHV6-120*	CHV6-144*
Heat Exchanger	Heat exchanger type		-	Multi-way cross-flow finned tube type			
	Tube	Material	-	Copper			
		Outside diameter	in.(mm)	9/32 (7)			
		Rows	-	3	3	3	3
	Fin	Material	-	Aluminum			
		Pitch	in.(mm)	1/16 (1.4)	1/16 (1.4)	1/16 (1.4)	1/16 (1.4)
	Quantity		-	1	1	2	2
	Max. operating pressure		psi(MPa)	601 (4.15)			
	Max. frontal area		ft. ² (m ²)	26.15(2.43)	26.15(2.43)	35.15(3.26)	39.40(3.66)
Fan Part	Fan	Type	-	Axial-flow Fan			
		Quantity	-	1	1	2	2
		Outside diameter	in.(mm)	25-23/64 (644)	25-23/64 (644)	21-27/64 (544)	25-23/64 (644)
		Rotating speed	rpm	840	870	1185+1185	960+960
	Fan motor	Type	-	Waterproof three-phase motor			
		Start-up mode	-	Soft driving			
		Nominal output power	W	730	730	430+430	730+730
		Quantity	-	1	1	2	2
		Insulation grade	-	E	E	E	E

Model				CHV6-168*	CHV6-192*
Heat Exchanger	Heat exchanger type		-	Multi-way cross-flow finned tube type	
	Tube	Material	-	Copper	
		Outside diameter	in.(mm)	9/32 (7)	
		Rows	-	3	3
	Fin	Material	-	Aluminum	
		Pitch	in.(mm)	1/16 (1.4)	1/16 (1.4)
	Quantity		-	2	2
	Max. operating pressure		psi(MPa)	601 (4.15)	
	Max. frontal area		ft. ² (m ²)	39.40(3.66)	42.84(3.98)
Fan Part	Fan	Type	-	Axial-flow Fan	
		Quantity	-	2	2
		Outside diameter	in.(mm)	25-23/64 (644)	25-23/64 (644)
		Rotating speed	rpm	960+960	1050+1050
	Fan motor	Type	-	Waterproof three-phase motor	
		Start-up mode	-	Soft driving	
		Nominal output power	W	730+730	730+730
		Quantity	-	2	2
		Insulation grade	-	E	E

2.3 Safety and Control Device Setting

- Compressor Protection

The compressor is protected by the following devices and their combinations.

- (1) High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
- (2) Oil Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

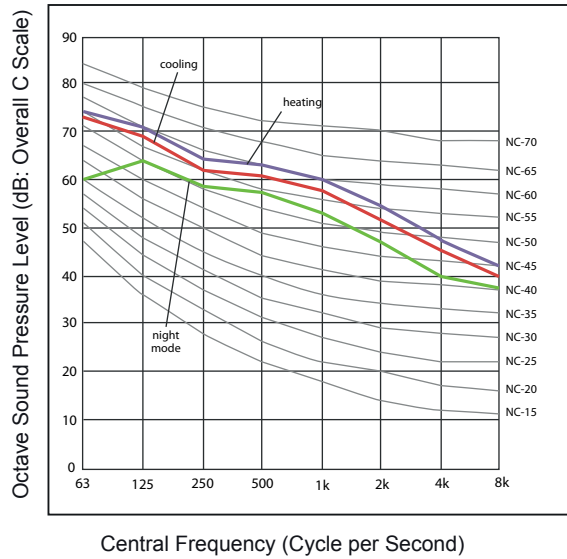
Model			72	96	120	144
Compressor			"Reset automatically and non-adjustable (one for each compressor)"			
Pressure switch						
High	Open	psi	601 -7 -22	601 -7 -22	601 -7 -22	601 -7 -22
	Close	psi	464±22	464±22	464±22	464±22
Capacity of circuit breaker		A	80x2	80x2	80x2	80x4
Oil heater capacity		W	40x2	40x2	40x2	40x4
CCP Timer setting		min.	Non-adjustable			
			3	3	3	3

Model			168	192
Compressor			"Reset automatically and non-adjustable (one for each compressor)"	
Pressure switch				
High	Open	psi	601 -7 -22	601 -7 -22
	Close	psi	464±22	464±22
Capacity of circuit breaker		A	80x4	80x4
Oil heater capacity		W	40x4	40x4
CCP Timer setting		min.	Non-adjustable	
			3	3

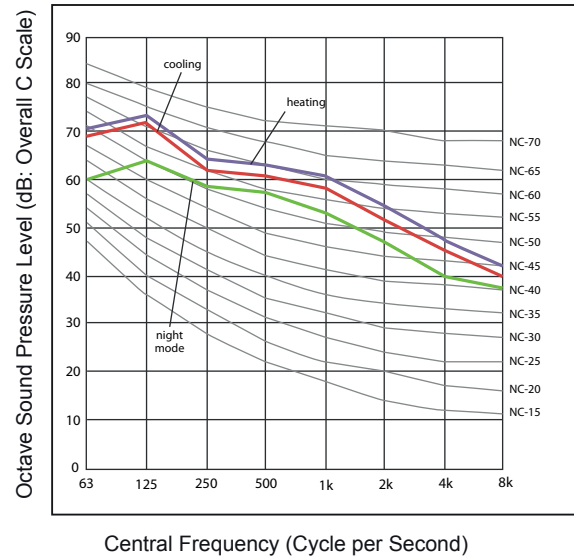
2.4 Sound Data

Measurement point: 3.3ft. (1m) from the service cover surface and 4.9ft. (1.5m) from floor level.

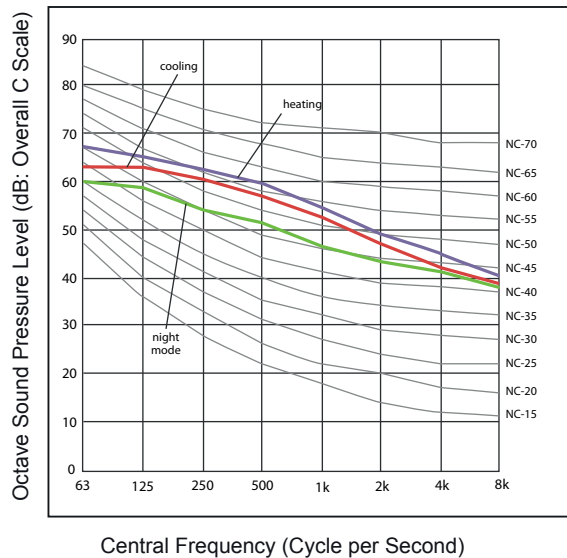
CHV6-72URB



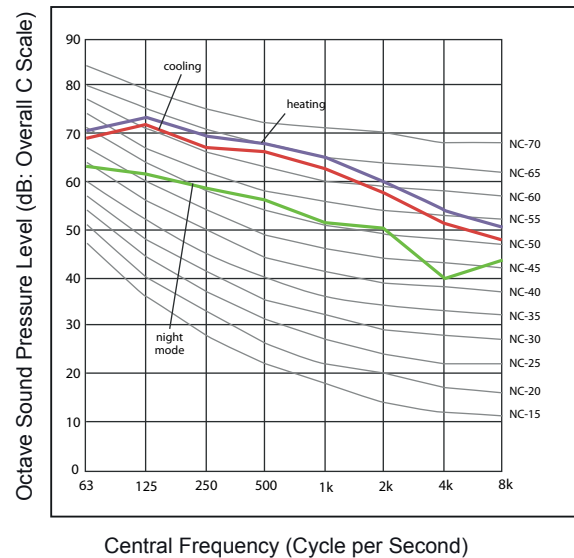
CHV6-96URB



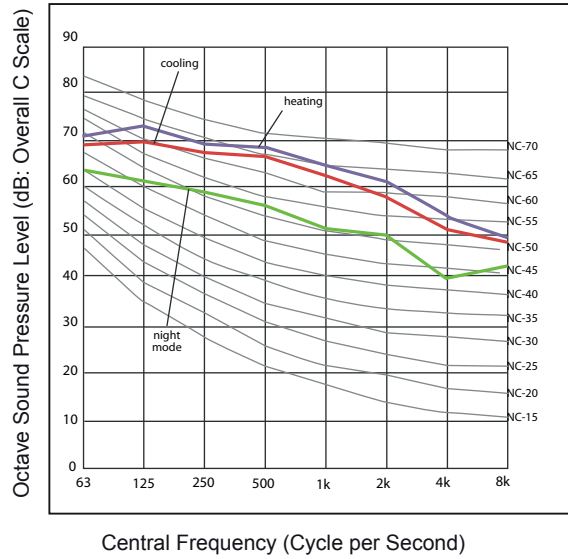
CHV6-120URB



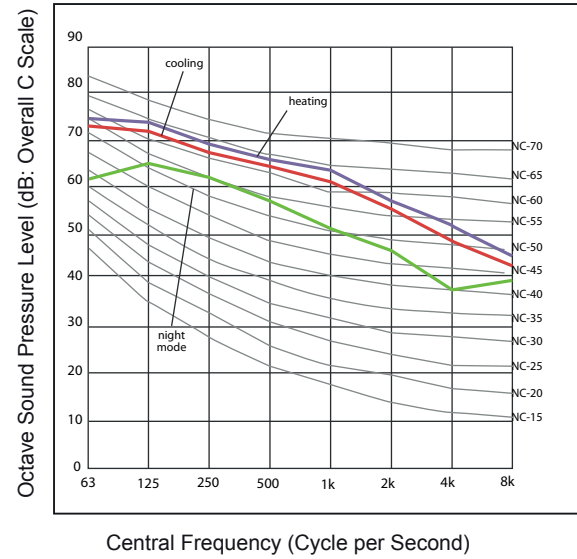
CHV6-144URB



CHV6-168URB



CHV6-192URB

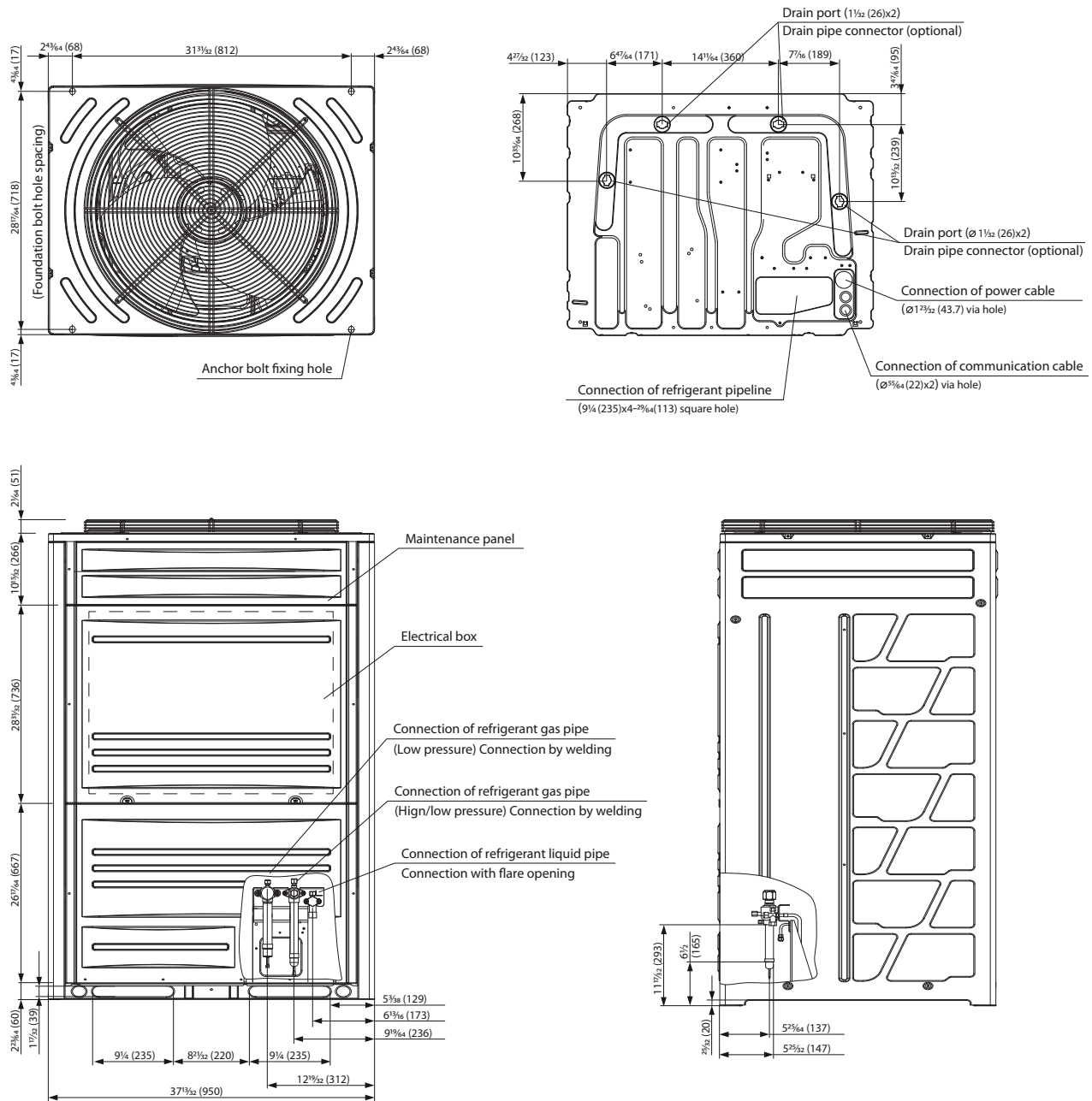


2.5 Dimension Data

■ Outdoor Unit

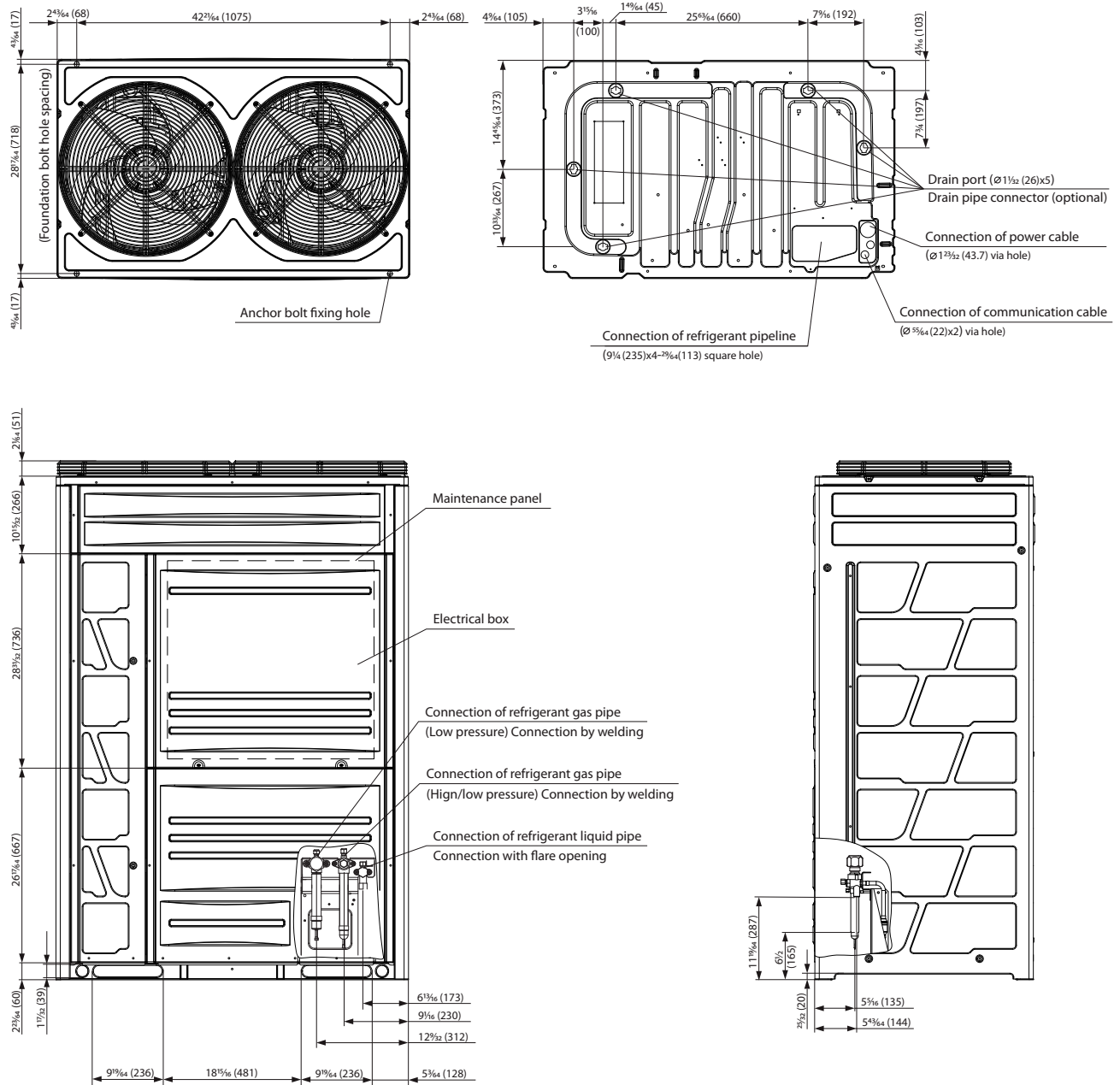
unit: in. (mm)

Model: CHV6-72URB, CHV6-96URB



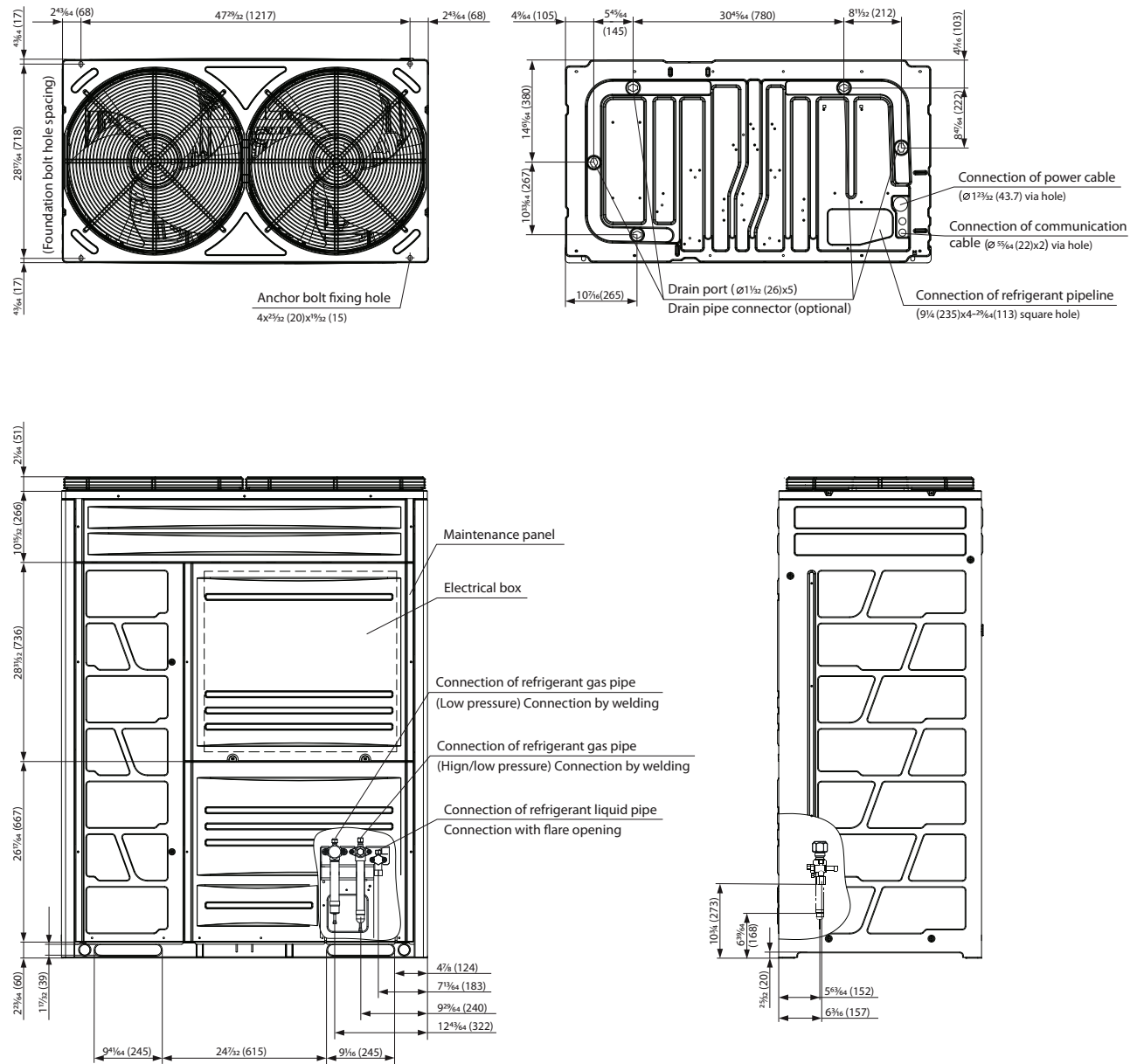
Model: CHV6-120URB

unit: in. (mm)



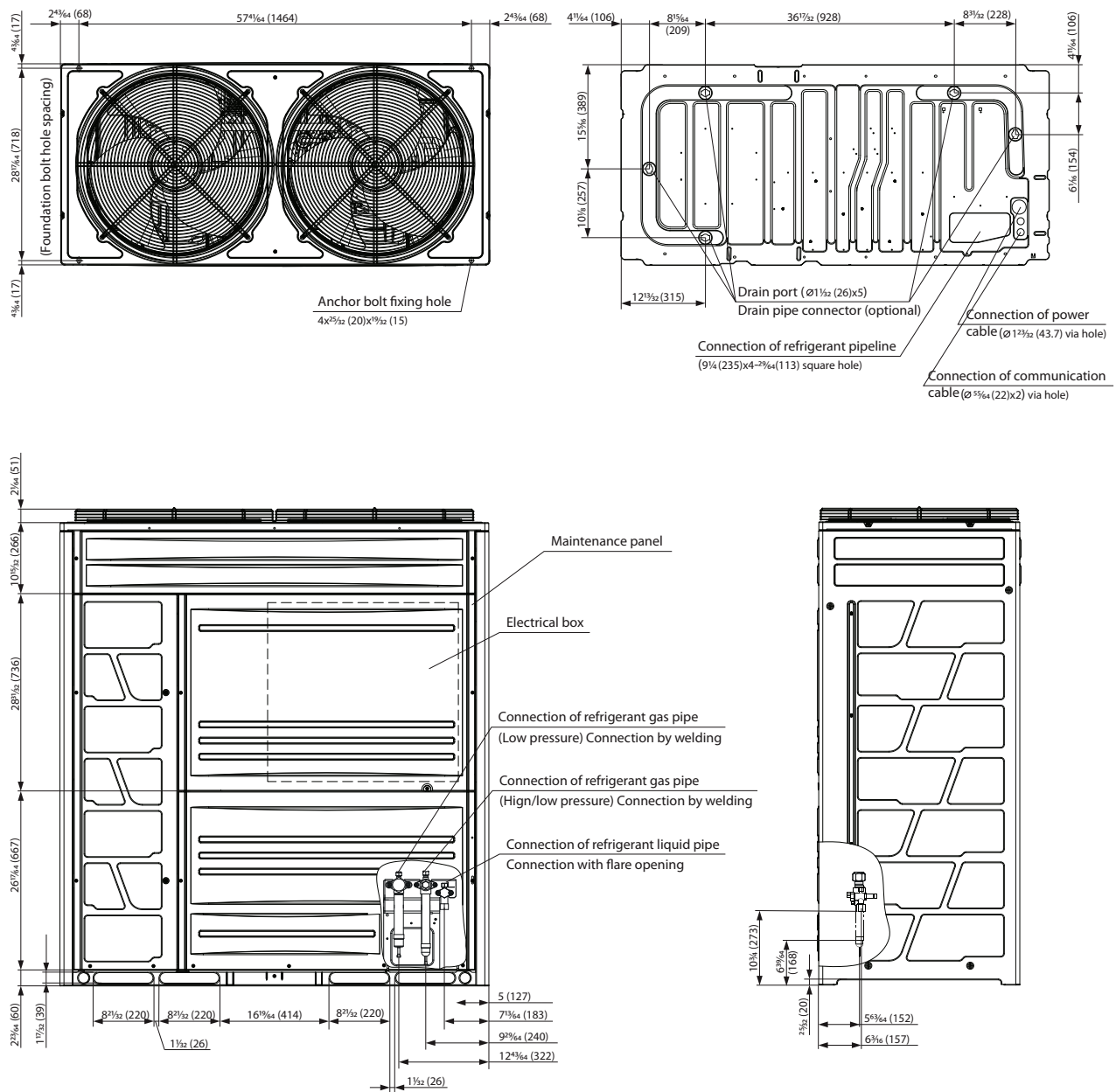
Model: CHV6-144URB, CHV6-168URB

unit: in. (mm)



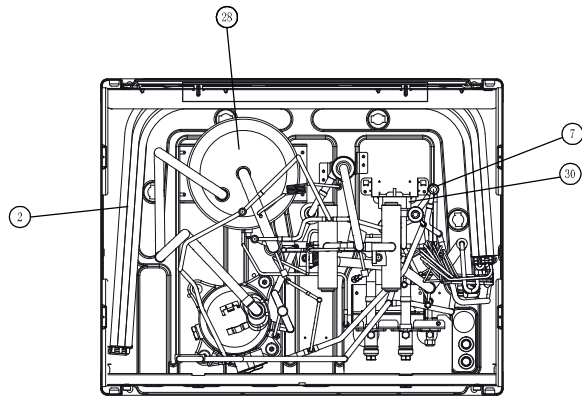
Model: CHV6-192URB

unit: in. (mm)

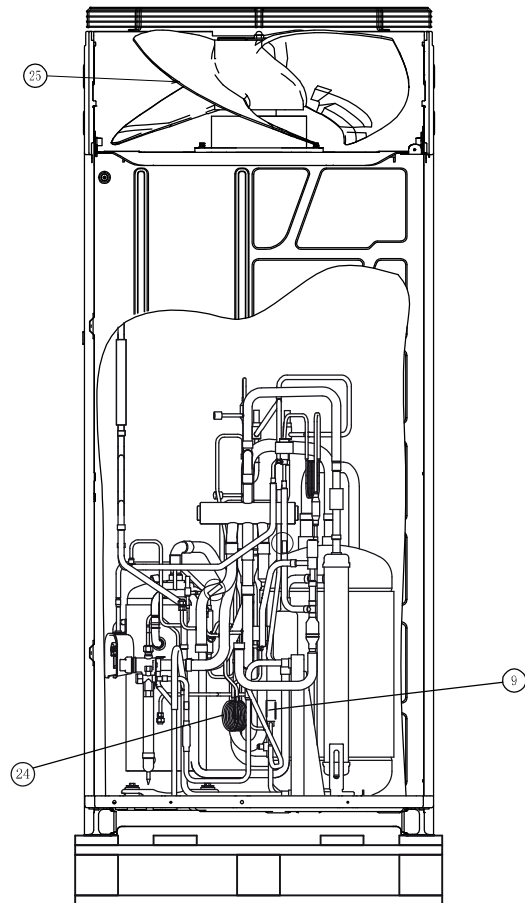
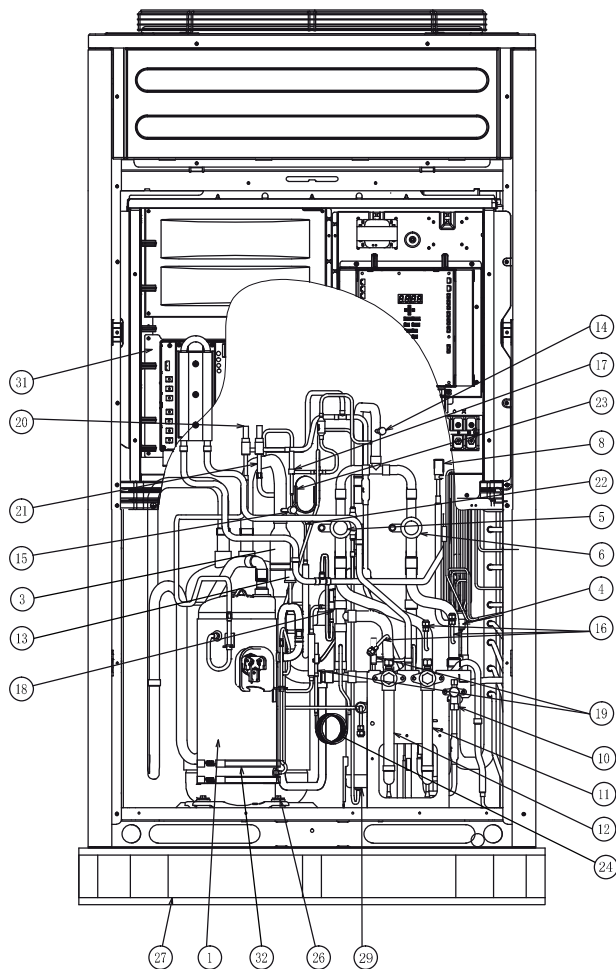


2.6 Structure

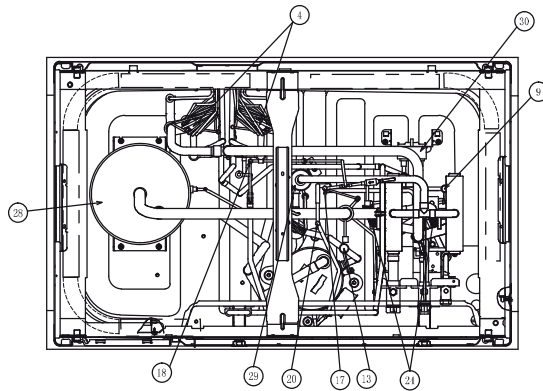
Model: CHV6-72URB, CHV6-96URB



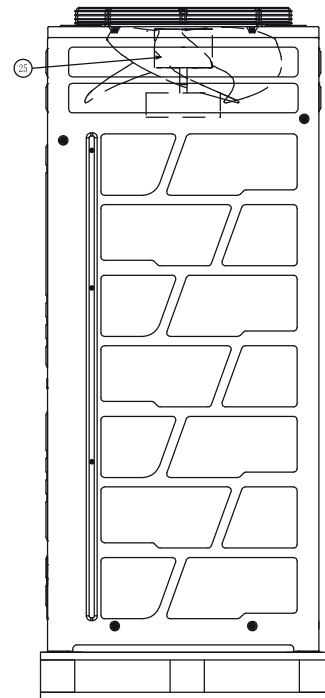
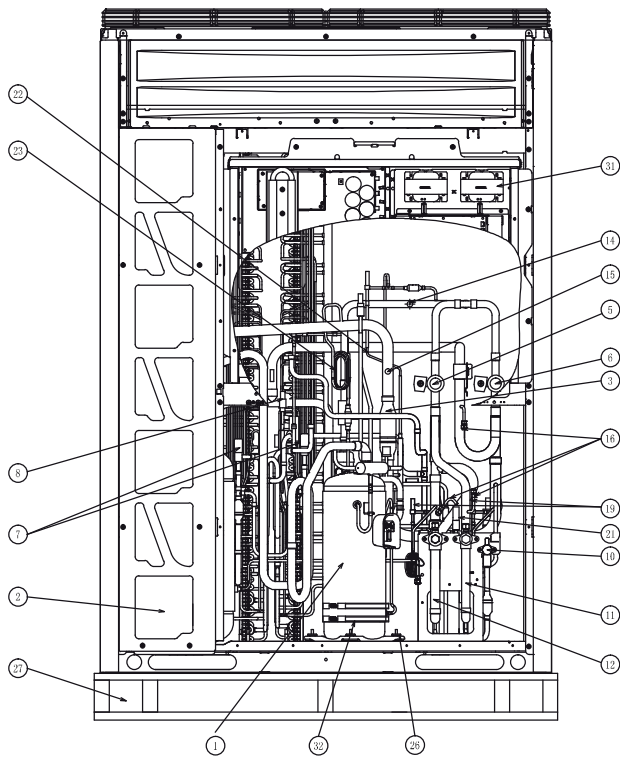
SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion valve (EVO)	23	Capillary tube (SVF)
8	Electronic expansion valve (MV5)	24	Capillary tube (SVG)
9	Electronic expansion valve (EVB)	25	Propeller fan
10	Stop valve (liquid)	26	Damping rubber pad
11	Stop valve (high/low pressure gas)	27	Wooden pallet
12	Stop valve (low pressure gas)	28	Accumulator
13	High pressure switch	29	Oil separator
14	High pressure sensor	30	Supercooler
15	Low pressure sensor	31	Electrical box
16	Check joint	32	Crankcase heater



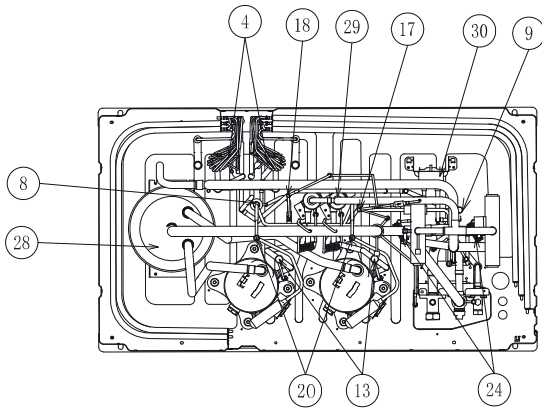
Model: CHV6-120URB



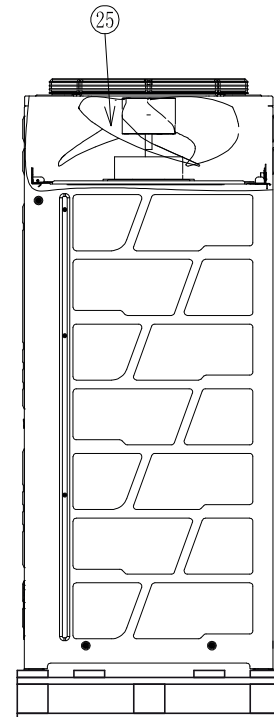
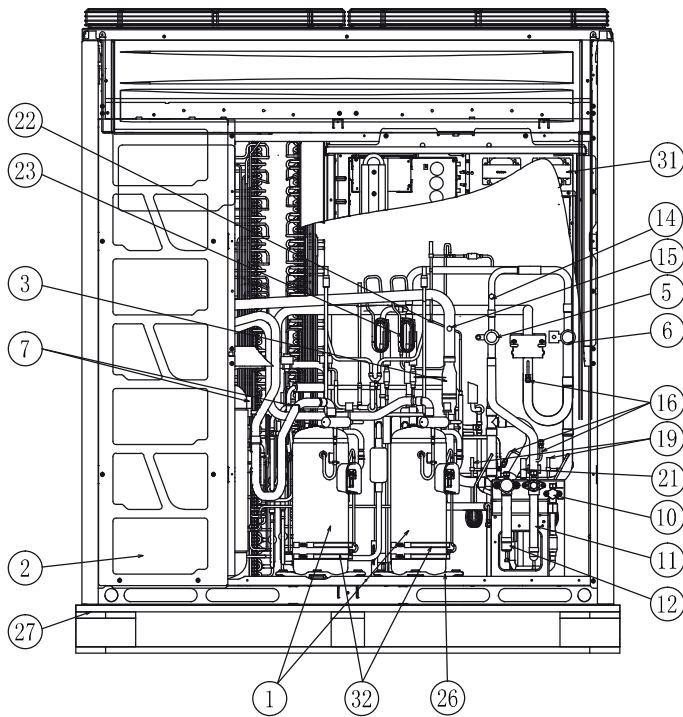
SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way valve (21-1)	21	Solenoid valve (SVS)
6	4-way valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion valve (EVO)	23	Capillary tube (SVF)
8	Electronic expansion valve (MV5)	24	Capillary tube (SVG)
9	Electronic expansion valve (EVB)	25	Propeller fan
10	Stop valve (liquid)	26	Damping rubber pad
11	Stop valve (high/low pressure gas)	27	Wooden pallet
12	Stop valve (low pressure gas)	28	Accumulator
13	High pressure switch	29	Oil separator
14	High pressure sensor	30	Supercooler
15	Low pressure sensor	31	Electrical box
16	Test connector	32	Crankcase heater



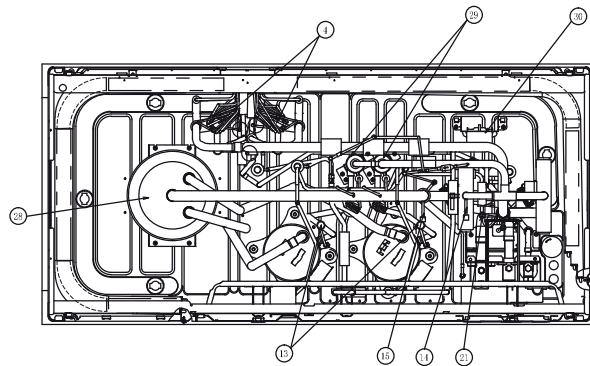
Model: CHV6-144URB, CHV6-168URB



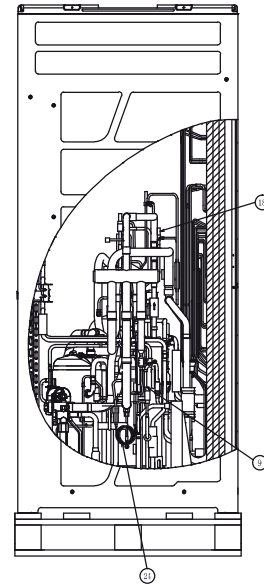
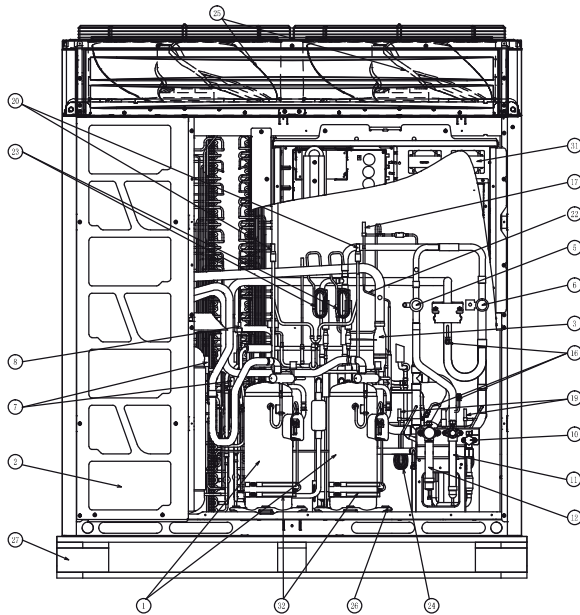
SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion valve (EVO)	23	Capillary tube (SVF)
8	Electronic expansion valve (MV5)	24	Capillary tube (SVG)
9	Electronic expansion valve (EVB)	25	Propeller fan
10	Stop valve (liquid)	26	Damping rubber pad
11	Stop valve (high/low pressure gas)	27	Wooden pallet
12	Stop valve (low pressure gas)	28	Accumulator
13	High pressure switch	29	Oil separator
14	High pressure sensor	30	Supercooler
15	Low pressure sensor	31	Electrical box
16	Test connector	32	Crankcase heater



Model: CHV6-192URB

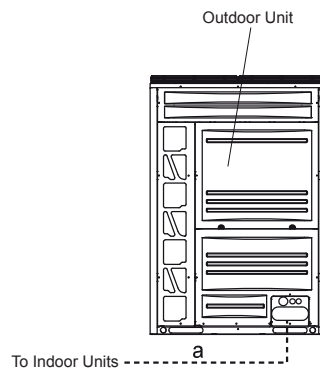


SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion valve (EVO)	23	Capillary tube (SVF)
8	Electronic expansion valve (MV5)	24	Capillary tube (SVG)
9	Electronic expansion valve (EVB)	25	Propeller fan
10	Stop valve (liquid)	26	Damping rubber pad
11	Stop valve (high/low pressure gas)	27	Wooden pallet
12	Stop valve (low pressure gas)	28	Accumulator
13	High pressure switch	29	Oil separator
14	High pressure sensor	30	Supercooler
15	Low pressure sensor	31	Electrical box
16	Test connector	32	Crankcase heater



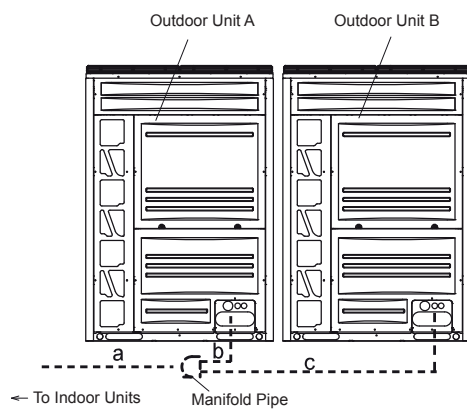
3. Piping System

3.1 Connection of Refrigerant Pipes for 3 Pipes Heat Recovery System

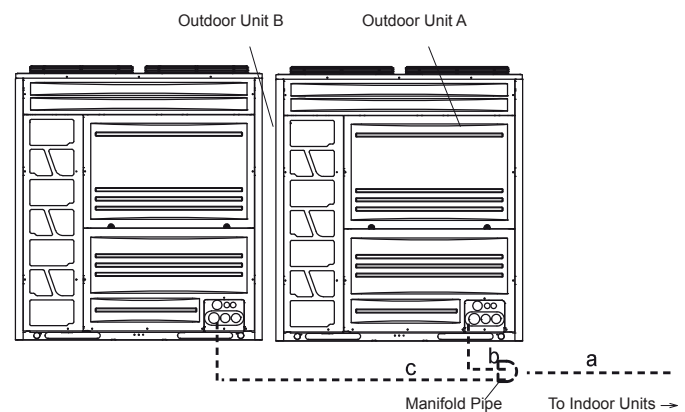


Model (kBtu/h)			72 (6RT)	96 (8RT)	120 (10RT)	144 (12RT)	168 (14RT)	192 (16RT)
Piping Size Φ in.(mm)	a	Low Pressure Gas	3/4 (19.05)	7/8 (22.2)	1 (25.4)	1 (25.4)	1-1/8 (28.6)	1-1/8 (28.6)
		High/Low Pressure Gas	5/8 (15.88)	3/4 (19.05)	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)
		Liquid	3/8 (9.53)	3/8 (9.53)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	5/8 (15.88)

Indoor unit on the left side



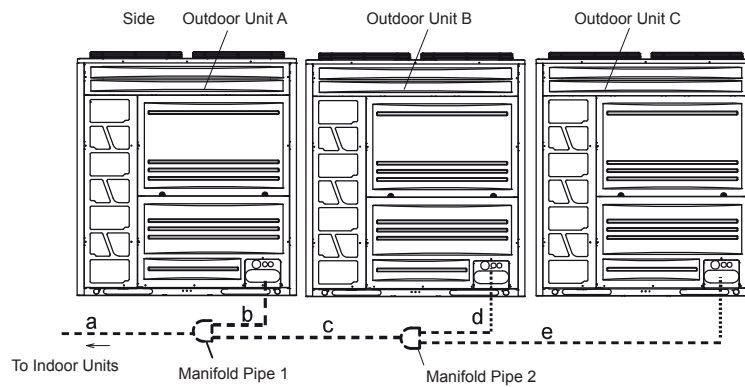
Indoor unit on the right side



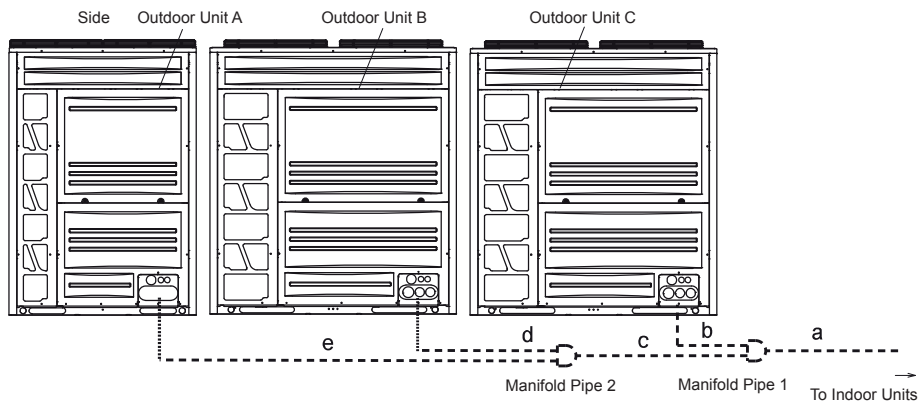
Model (kBtu/h)		216 (18RT)	240 (20RT)	264 (22RT)	288 (24RT)	312 (26RT)
Combination of Basic Unit	Outdoor Unit A	120 (10RT)	120 (10RT)	144 (12RT)	144 (12RT)	168 (14RT)
	Outdoor Unit B	96 (8RT)	120 (10RT)	120 (10RT)	144 (12RT)	144 (12RT)
Manifold Pipe		SPBPK-M202HR	SPBPK-M212HR			
Piping Size Φ in.(mm)	a	Low Pressure Gas	1-1/8 (28.6)	1-1/4 (31.75)	1-1/4 (31.75)	1-1/4 (31.75)
		High/Low Pressure Gas	1 (25.4)	1 (25.4)	1-1/8 (28.6)	1-1/8 (28.6)
		Liquid	5/8 (15.88)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)
	b	Low Pressure Gas	1 (25.4)	1 (25.4)	1 (25.4)	1-1/8 (28.6)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	c	Low Pressure Gas	7/8 (22.2)	1 (25.4)	1 (25.4)	1 (25.4)
		High/Low Pressure Gas	3/4 (19.05))	7/8 (22.2)	7/8 (22.2)	7/8 (22.2)
		Liquid	3/8 (9.53)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)

Model (kBtu/h)		336 (28RT)	360 (30RT)	384 (32RT)
Combination of Basic Unit	Outdoor Unit A	168 (14RT)	192 (16RT)	192 (16RT)
	Outdoor Unit B	168 (14RT)	168 (14RT)	192 (16RT)
Manifold Pipe		SPBPK-M212HR	SPBPK-M302HR	
Piping Size Φ in.(mm)	a	Low Pressure Gas	1-1/2 (38.1)	1-1/2 (38.1)
		High/Low Pressure Gas	1-1/8 (28.6)	1-1/4 (31.75)
		Liquid	3/4 (19.05)	3/4 (19.05)
	b	Low Pressure Gas	1-1/8 (28.6)	1-1/8 (28.6)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	5/8 (15.88)
	c	Low Pressure Gas	1-1/8 (28.6)	1-1/8 (28.6)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	5/8 (15.88)

Indoor unit on the left side

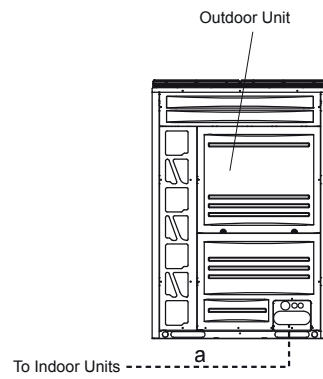


Indoor unit on the right side



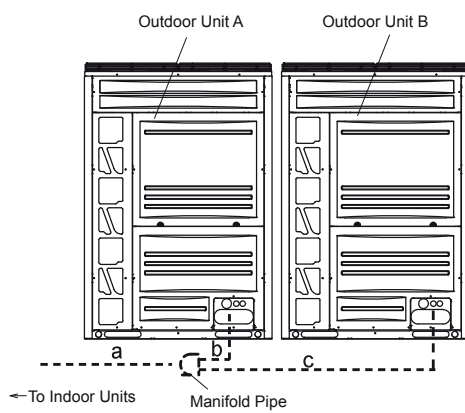
Model (kBtu/h)		408 (34RT)	432 (36RT)	456 (38RT)
Combination of Basic Unit	Outdoor Unit A	144 (12RT)	144 (12RT)	168 (14RT)
	Outdoor Unit B	144 (12RT)	144 (12RT)	144 (12RT)
	Outdoor Unit C	120 (10RT)	144 (12RT)	144 (12RT)
Manifold Pipe 1		SPBPK-M302HR		
Manifold Pipe 2		SPBPK-M212HR		
Piping Size Φ in.(mm)	a	Low Pressure Gas	1-1/2 (38.1)	1-1/2 (38.1)
		High/Low Pressure Gas	1-1/4 (31.75)	1-1/4 (31.75)
		Liquid	3/4 (19.05)	3/4 (19.05)
	b	Low Pressure Gas	1 (25.4)	1-1/8 (28.6)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	1/2 (12.7)
	c	Low Pressure Gas	1-1/4 (31.75)	1-1/4 (31.75)
		High/Low Pressure Gas	1-1/8 (28.6)	1-1/8 (28.6)
		Liquid	3/4 (19.05)	3/4 (19.05)
	d	Low Pressure Gas	1 (25.4)	1 (25.4)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	1/2 (12.7)
	e	Low Pressure Gas	1 (25.4)	1 (25.4)
		High/Low Pressure Gas	7/8 (22.2)	7/8 (22.2)
		Liquid	1/2 (12.7)	1/2 (12.7)

3.2 Connection of Refrigerant Pipes for 2 Pipes Heat Pump System

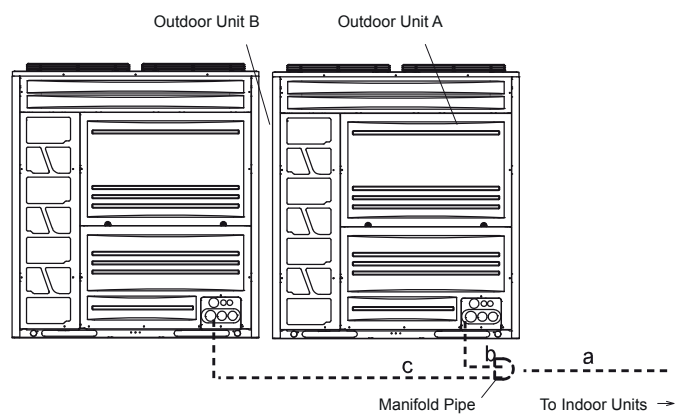


Model (kBtu/h)		72 (6RT)	96 (8RT)	120 (10RT)	144 (12RT)	168 (14RT)	192 (16RT)
Piping Size Φ in.(mm)	a	High/Low Pressure Gas	3/4 (19.05)	7/8 (22.20)	1 (25.4)	1 (25.4)	1-1/8 (28.6)
		Liquid	3/8 (9.53)	3/8 (9.53)	1/2 (12.7)	1/2 (12.7)	5/8 (15.88)

Indoor unit on the left side



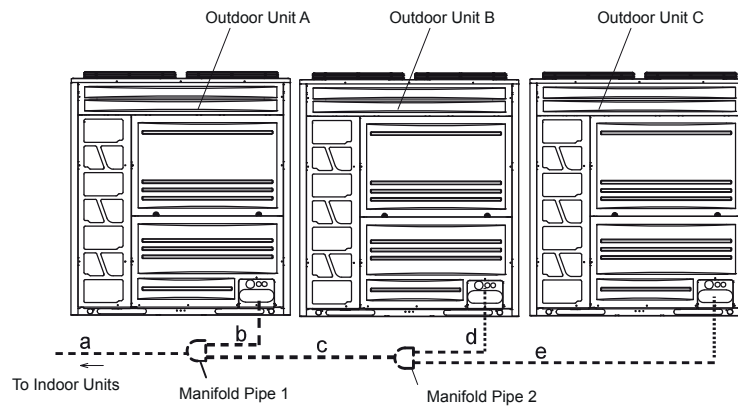
Indoor unit on the right side



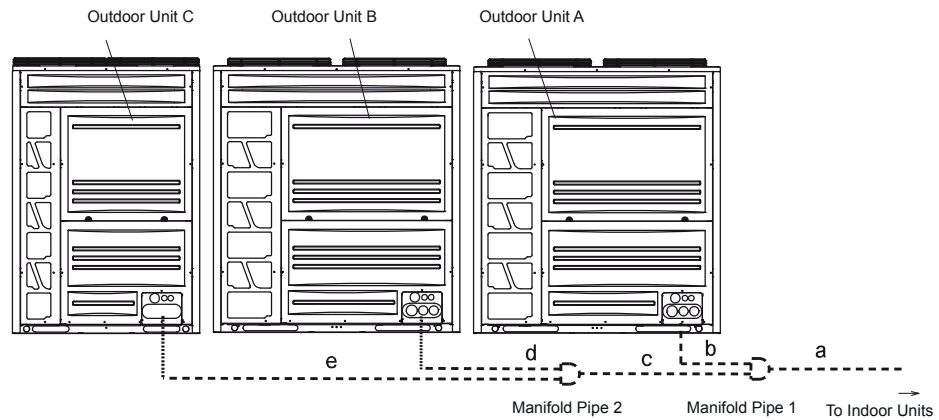
Model (kBtu/h)		216 (18RT)	240 (20RT)	264 (22RT)	288 (24RT)	312 (26RT)
Combination of Basic Unit	Outdoor Unit A	120 (10RT)	120 (10RT)	144 (12RT)	144 (12RT)	168 (14RT)
	Outdoor Unit B	96 (8RT)	120 (10RT)	120 (10RT)	144 (12RT)	144 (12RT)
Manifold Pipe		SPBPK-M32HP				
Piping Size Φ in.(mm)	a	High/Low Pressure Gas	1-1/8 (28.6)	1-1/4 (31.75)	1-1/4 (31.75)	1-1/4 (31.75)
		Liquid	5/8 (15.88)	3/4 (19.05)	3/4 (19.05)	3/4 (19.05)
	b	High/Low Pressure Gas	1 (25.4)	1 (25.4)	1 (25.4)	1-1/8 (28.6)
		Liquid	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	c	High/Low Pressure Gas	7/8 (22.2)	1 (25.4)	1 (25.4)	1 (25.4)
		Liquid	3/8 (9.53)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)

Model (kBtu/h)		336 (28RT)	360 (30RT)	384 (32RT)
Combination of Basic Unit	Outdoor Unit A	168 (14RT)	192 (16RT)	192 (16RT)
	Outdoor Unit B	168 (14RT)	168 (14RT)	192 (16RT)
Manifold Pipe		SPBPK-M32HP		
Piping Size Φ in.(mm)	a	High/Low Pressure Gas	1-1/2 (38.1)	1-1/2 (38.1)
		Liquid	3/4 (19.05)	3/4 (19.05)
	b	High/Low Pressure Gas	1-1/8 (28.6)	1-1/8 (28.6)
		Liquid	1/2 (12.7)	5/8 (15.88)
	c	High/Low Pressure Gas	1-1/8 (28.6)	1-1/8 (28.6)
		Liquid	1/2 (12.7)	5/8 (15.88)

Indoor unit on the left side

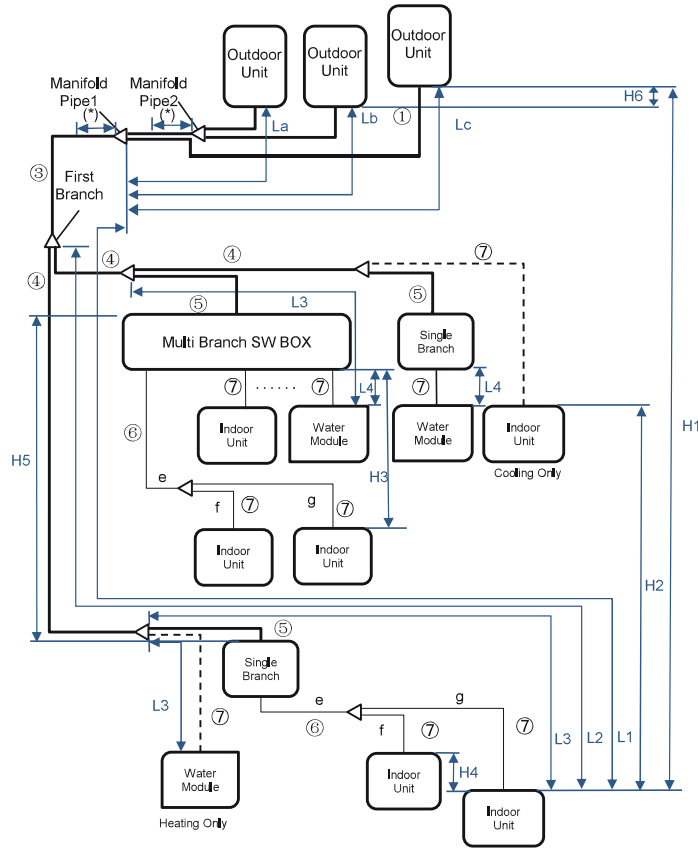


Indoor unit on the right side



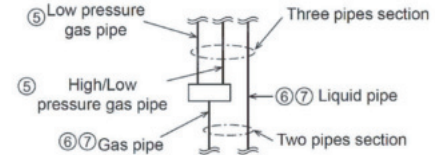
Model (kBtu/h)		408 (34RT)	432 (36RT)	456 (38RT)
Combination of Basic Unit	Outdoor Unit A	144 (12RT)	144 (12RT)	168 (14RT)
	Outdoor Unit B	144 (12RT)	144 (12RT)	144 (12RT)
	Outdoor Unit C	120 (10RT)	144 (12RT)	144 (12RT)
Manifold Pipe 1		SPBPK-M32HR		
Manifold Pipe 2		SPBPK-M32HP		
Piping Size Φ in.(mm)	a	High/Low Pressure Gas	1-1/2 (38.1)	1-1/2 (38.1)
		Liquid	3/4 (19.05)	3/4 (19.05)
	b	High/Low Pressure Gas	1 (25.4)	1-1/8 (28.6)
		Liquid	1/2 (12.7)	1/2 (12.7)
	c	High/Low Pressure Gas	1-1/4 (31.75)	1-1/4 (31.75)
		Liquid	3/4 (19.05)	3/4 (19.05)
	d	High/Low Pressure Gas	1 (25.4)	1 (25.4)
		Liquid	1/2 (12.7)	1/2 (12.7)
	e	High/Low Pressure Gas	1 (25.4)	1 (25.4)
		Liquid	1/2 (12.7)	1/2 (12.7)

3.3 Pipe Connection Design Guidance for 3 Pipes Heat Recovery System



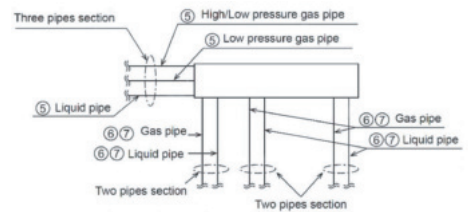
(*) Keep the straight line distance of 19-11/16 in. (500mm) or more after the manifold pipe

For single branch SW BOX:



Liquid pipe is not connected to SW BOX

For multi branch SW BOX:



— : High/Low Pressure Gas Pipe, Low Pressure Gas Pipe, Liquid Pipe
 — : Gas Pipe, Liquid Pipe
 - - - : Low Pressure Gas Pipe, Liquid Pipe (For Cooling Only Indoor Unit)
 - - - : High/Low Pressure Gas Pipe, Liquid Pipe (For Heating Only Indoor Water Module)

Pipe Length and Height Difference

Item	Mark	Permitted Value	
		< Recommended Connectable Number of Indoor Unit and Water Module	≥ Recommended Connectable Number of Indoor Unit and Water Module
Total Piping Length	Total Liquid Piping Actual Length	≤3280.8ft.(1000m)	≤984.3ft.(300m)
Piping Length between Manifold Pipe 1 and Each Outdoor Unit	L _a , L _b , L _c	≤32.8ft.(10m)	
Maximum Piping Length	Actual Length	≤541.3ft.(165m)	
	Equivalent Length	≤623.4ft.(190m)	
Maximum Piping Length between First Branch and Each Indoor Unit	L ₂	≤295.3ft.(90m)	≤131.2ft.(40m)
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit	L ₃	≤131.2ft.(40m)	≤98.4ft.(30m)
Total Piping Length between Switch Box and Each Indoor Unit	L ₄ e+f+g	≤131.2ft.(40m)	
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	≤164ft.(50m)	
	O.U. is Lower	≤131.2ft.(40m)	
Height Difference between Indoor Units	H ₂	≤98.4ft.(30m)	
Height Difference between Switch Box and Indoor Units	H ₃	≤49.2ft.(15m)	
Height Difference between Indoor Units using the Same Branch of Switch Box	H ₄	≤13.1ft.(4m)	
Height Difference between Switch Box	H ₅	≤49.2ft.(15m)	
Height Difference between Outdoor Units	H ₆	≤0.3ft.(0.1m)	

NOTE:

- (1) Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
- (2) Piping length between outdoor units should be $L_a \leq L_b \leq L_c \leq 32.8\text{ft.}(10\text{m})$.
- (3) If the piping length between branch and indoor unit (L_3) is considerably longer than others, refrigerant may not flow well and also performance may be deteriorated compared to other models. (Recommended: $L_3 \leq 49.2\text{ft.}(15\text{m})$).
- (4) When the liquid piping length is longer than 49.2ft. (15m), use $\Phi 3/8\text{in.}$ (9.53mm) pipe and reducer (field-supplied).
- (5) Allowable total piping length may become shorter than 3280.Bft.(1,000m) due to the limitation of maximum additional refrigerant amount.
- (6) Function setting of C_i is required ($C_i=2$), in case of height difference between indoor units: $49.2\text{ft.}(15\text{m}) < H_2 \leq 98.4\text{ft.}(30\text{m})$.
- (7) In case of the height difference between outdoor units and indoor units: $164\text{ft.}(131.2\text{ft.}) < H_1 \leq 295.3\text{ft.}$, contact technical department of the manufacture.

- ①② Piping between outdoor unit Refer to section 3.1.
③ Main Pipe (Basic Unit or Manifold Pipe 1 to First Branch)

Outdoor Unit Capacity (kBtu/h)	Low Pressure Gas Φ in.(mm)	High/Low Pressure Gas Φ in.(mm)	"Liquid Φ in.(mm)"	First Branch Model
72	3/4 (19.05)	5/8 (15.88)	3/8 (9.53)	SPBPK-M282HR
96	7/8 (22.2)	3/4 (19.05)	3/8 (9.53)	
120~144	1 (25.4)	7/8 (22.2)	1/2 (12.7)	SPBPK-M452HR
168	1-1/8 (28.6)	7/8 (22.2)	1/2 (12.7)	
192	1-1/8 (28.6)	7/8 (22.2)	5/8 (15.88)	SPBPK-M562HR
216	1-1/8 (28.6)	1 (25.4)	5/8 (15.88)	
240	1-1/4 (31.75)	1 (25.4)	3/4 (19.05)	SPBPK-M692HR
264~312	1-1/4 (31.75)	1-1/8 (28.6)	3/4 (19.05)	
336	1-1/2 (38.1)	1-1/8 (28.6)	3/4 (19.05)	
360~456	1-1/2 (38.1)	1-1/8 (28.6)	3/4 (19.05)	SPBPK-M902HR

NOTE:

When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 328ft. (100m), the pipe size of low pressure gas, high/low pressure gas and liquid line from base unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied), but for 240 model, the pipe size can not be increased.

- ④ Pipe after first branch (3 pipes portion)

Total Indoor Unit Capacity (kBtu/h)	Low Pressure Gas Φ in.(mm)	High/Low Pressure Gas Φ in.(mm)	"Liquid Φ in.(mm)"	First Branch Model
$Q < 54$	5/8 (15.88)	1/2 (12.7)	3/8 (9.53)	SPBPK-M142HR
$54 \leq Q < 86$	3/4 (19.05)	5/8 (15.88)	3/8 (9.53)	SPBPK-M282HR
$86 \leq Q < 114$	7/8 (22.2)	3/4 (19.05)	3/8 (9.53)	
$114 \leq Q < 154$	1-1/8 (28.6)	7/8 (22.2)	1/2 (12.7)	SPBPK-M452HR
$154 \leq Q < 170$	1-1/8 (28.6)	7/8 (22.2)	1/2 (12.7)	SPBPK-M562HR
$170 \leq Q < 212$	1-1/8 (28.6)	7/8 (22.2)	5/8 (15.88)	
$212 \leq Q < 250$	1-1/8 (28.6)	1 (25.4)	5/8 (15.88)	SPBPK-M692HR
$250 \leq Q < 344$	1-1/4 (31.75)	1-1/8 (28.6)	3/4 (19.05)	
$344 \leq Q < 544$	1-1/2 (38.1)	1-1/4 (31.75)	3/4 (19.05)	SPBPK-M902HR

NOTE:

Even if the equivalent refrigerant piping length (L1) is more than 328ft.(100m), no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as the one before the branch.

- ⑤ Pipe Diameter between Switch Box to Branch Pipe (3 pipes or 2 pipes portion)

Type	SW BOX Model	Number of Branch	Number of Connectable Indoor Unit per Branch	Maximum Combination of Indoor Unit Capacity (kBtu/h)		Low Pressure Gas	High/Low Pressure Gas	Liquid
				per SW BOX	per Branch			
Single	SPSBD-16	1	1-8"¹	54	38	5/8(15.88)	1/2(12.7)	3/8(9.53)²²
					54	3/4(19.05)	5/8(15.88)	3/8(9.53)²²
	SPSBD-28	1	1-8"¹	96	76	5/8(15.88)	1/2(12.7)	3/8(9.53)²²
					96	3/4(19.05)	5/8(15.88)	3/8(9.53)²²
Multi	SPMBD-4/45	4	1-8"¹	154	38	Refer to ④		
	SPMBD-8/85	8	1-8"¹	290	54			
	SPMBD-12/85	12	1-6"¹	290	54			
	SPMBD-16/85	16	1-6"¹	290	54			

NOTE:

- (1) When multiple indoor units are connected to the same branch, they are controlled with the same operation mode.
(2) The liquid pipe is not required to connect to the single SW BOX.
(3) In case that the number of connectable indoor units exceeds four, the high/low pressure gas pipe, low pressure gas pipe and liquid pipe need to increase one size respectively.

⑥ Pipe after first branch (2 pipes portion)

Total Indoor Unit (kBtu/h)	Gas Φ in.(mm)	Liquid Φ in.(mm)	Branch Pipe Model
$Q < 54$	5/8 (15.88)	3/8 (9.53)	SPBPK-102HP
$54 \leq Q < 86$	3/4 (19.05)	3/8 (9.53)	
$86 \leq Q < 114$	7/8 (22.2)	3/8 (9.53)	
$114 \leq Q < 154$	1 (25.4)	1/2 (12.7)	SPBPK-162HP
$154 \leq Q < 170$	1-1/8 (28.6)	1/2 (12.7)	
$170 \leq Q < 250$	1-1/8 (28.6)	5/8 (15.88)	SPBPK-242HP
$250 \leq Q < 344$	1-1/4 (31.75)	3/4 (19.05)	SPBPK-302HP
$344 \leq Q < 544$	1-1/2 (38.1)	3/4 (19.05)	
$544 \leq Q < 552$	1-5/8 (41.3)	7/8 (22.2)	SPBPK-462HP
$552 \leq Q < 654$	1-3/4 (44.5)	7/8 (22.2)	

⑦ Pipe between last branch and indoor unit (2-pipe portion)

4-Way Cassette Type and mini 4-Way Cassette Type

Indoor Unit (kBtu/h)	Air pipe Φ in.(mm)	Liquid pipe Φ in.(mm)
05~19	1/2 (12.7)	1/4 (6.35)
22~54	5/8 (15.88)	3/8 (9/53)

Others

Indoor Unit (kBtu/h)	Air pipe Φ in.(mm)	Liquid pipe Φ in.(mm)
05~17	1/2 (12.7)	1/4 (6.35)
18	5/8 (15.88)	3/8 (9/53)
19	5/8 (15.88)	1/4 (6.35)
22~54	5/8 (15.88)	3/8 (9/53)

NOTE:

- The pipe diameter should be the same as the indoor unit piping connection size, details refer to the technical catalog of indoor unit.
- When the liquid piping length is longer than 49.2ft.(15m), use $\Phi 3/8$ in.(9.53mm) pipe and reducer (field-supplied) instead of $\Phi 1/4$ in.(6.35mm)pipe.

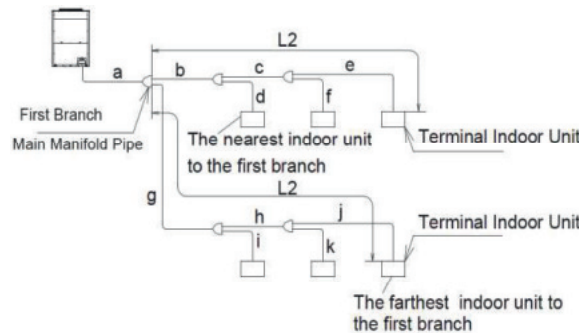
Piping Branch Restrictions

In the case that the piping length from the first branch to the farthest indoor unit (L2) is over 131.2ft.(40m), follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

In the case that piping length from the first branch to the terminal Indoor Units is within 131.2ft.(40m) - 295.3ft.(90m).

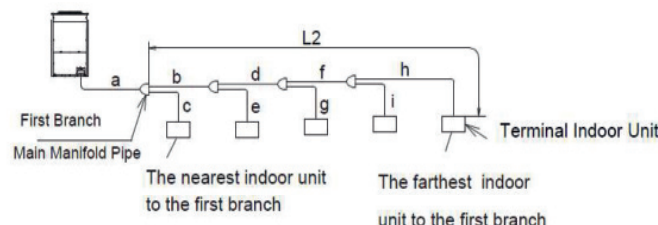
- If the piping length L2 is over 131.2ft.(40m), the diameter of gas and liquid lines "b and c" or "g and h" should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b), but for 240 model, if the (a) is smaller than (b), the size of (a) and (b) can not be increased.
- The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 131.2ft.(40m).



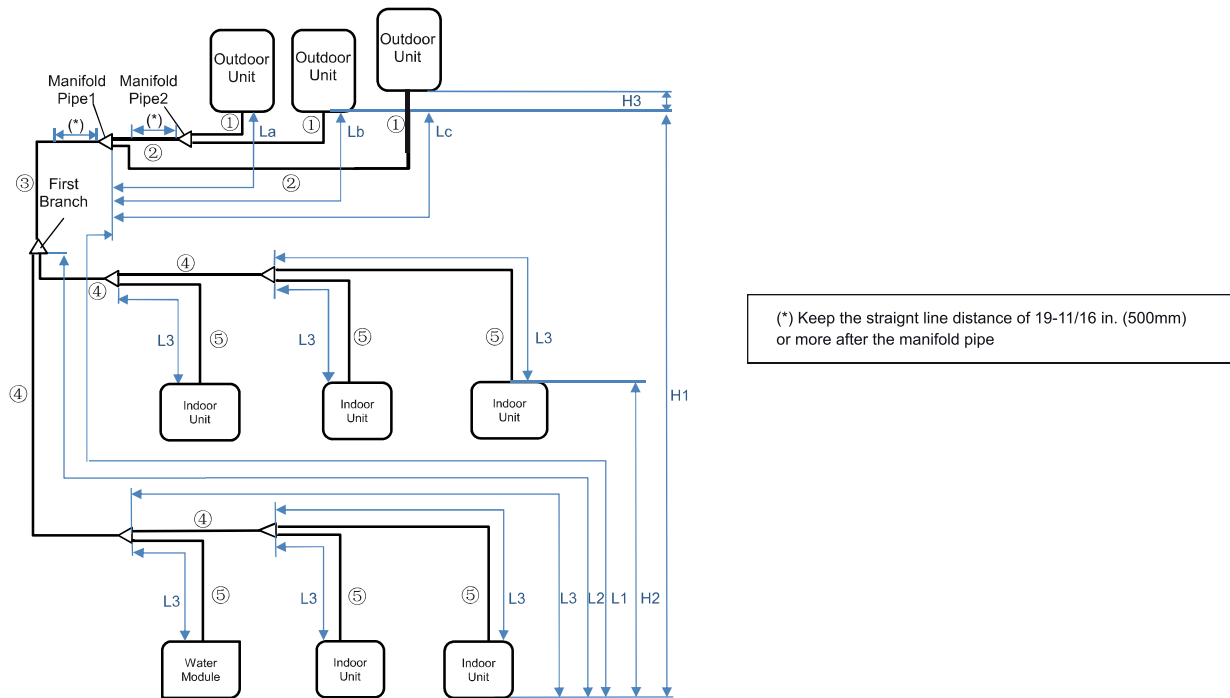
Example 2: Installation without Main Piping Branch

In the case that piping length from the first branch to the terminal Indoor Units is within 131.2ft.(40m) - 295.3ft.(90m).

- If the piping length L2 is over 131.2ft.(40m), the diameter size of gas and liquid lines "b, d and f" should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b), but for 240 model, if the (a) is smaller than (b), the size of (a) and (b) can not be increased.
- The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 131.2ft.(40m).



3.4 Pipe Connection Design Guidance for 2 Pipes Heat Pump System



Item	Mark	Permitted Value	
		< Recommended Connectable Number of Indoor Unit and Water Module	≥ Recommended Connectable Number of Indoor Unit and Water Module
Total Piping Length	Total Liquid Piping Actual Length	≤3280.8ft.(1000m)	≤984.3ft.(300m)
Piping Length between Manifold Pipe 1 and Each Outdoor Unit	La, Lb, Lc	≤32.8ft.(10m)	
Maximum Piping Length	Actual Length	≤541.3ft.(165m)	
	Equivalent Length	≤623.4ft.(190m)	
Maximum Piping Length between First Branch and Each Indoor Unit	L2	≤295.3ft.(90m)	≤131.2ft.(40m)
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit	L3	≤131.2ft.(40m)	≤98.4ft.(30m)
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	≤164ft.(50m)	
	O.U. is Lower	≤131.2ft.(40m)	
Height Difference between Indoor Units	H2	≤98.4ft.(30m)	
Height Difference between Outdoor Units	H6	≤0.3ft.(0.1m)	

NOTE:

- (1) Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
- (2) Piping length between outdoor units should be $L_a \leq L_b \leq L_c \leq 32.8\text{ft.}(10\text{m})$.
- (3) If the piping length between branch and indoor unit (L3) is considerably longer than others, refrigerant may not flow well and also performance may be deteriorated compared to other models. (Recommended: $L_3 \leq 49.2\text{ft.}(15\text{m})$).
- (4) When the liquid piping length is longer than 49.2ft. (15m), use $\Phi 3/8\text{in.}(9.53\text{mm})$ pipe and reducer (field-supplied).
- (5) Allowable total piping length may become shorter than 3280.Bft.(1,000m) due to the limitation of maximum additional refrigerant amount.
- (6) Function setting of Ci is required ($C_i=2$), in case of height difference between indoor units: $49.2\text{ft.}(15\text{m}) < H_2 \leq 98.4\text{ft.}(30\text{m})$.
- (7) In case of the height difference between outdoor units and indoor units: $164\text{ft.}(131.2\text{ft.}) < H_1 \leq 295.3\text{ft.}$, contact technical department of the manufacture.

①② Piping between outdoor unit Refer to section 3.2.

③ Main Pipe (Basic Unit or Manifold Pipe 1 to First Branch)

Outdoor Unit Capacity (kBtu/h)	Gas Φ in.(mm)	Liquid Φ in.(mm)	Branch Pipe Model
72	3/4 (19.05)	3/8 (9.53)	SPBPK-102HP
96	7/8 (22.2)	3/8 (9.53)	
120~140	1 (25.4)	1/2 (12.7)	SPBPK-162HP
168	1-1/8 (28.6)	1/2 (12.7)	
192	1-1/8 (28.6)	5/8 (15.88)	SPBPK-242HP
216	1-1/8 (28.6)	5/8 (15.88)	
240	1-1/4 (31.75)	3/4 (19.05)	SPBPK-302HP
264~312	1-1/4 (31.75)	3/4 (19.05)	
336	1-1/2 (38.1)	3/4 (19.05)	
360~456	1-1/2 (38.1)	3/4 (19.05)	SPBPK-462HP

NOTE:

When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe 1 to the indoor unit is over 328ft. (100m), the pipe size of high/low pressure gas and liquid line from base unit/manifold pipe 1 to first branch should be increased one size with the reducer (field-supplied).

④ Pipe after first branch (2 pipes portion)

Total Indoor Unit(kBtu/h)	Gas Φ in.(mm)	Liquid Φ in.(mm)	Branch Pipe Model
Q < 54	5/8 (15.88)	3/8 (9.53)	SPBPK-102HP
54 ≤ Q < 86	3/4 (19.05)	3/8 (9.53)	
86 ≤ Q < 114	7/8 (22.2)	3/8 (9.53)	
114 ≤ Q < 154	1 (25.4)	1/2 (12.7)	SPBPK-162HP
154 ≤ Q < 170	1-1/8 (28.6)	1/2 (12.7)	
170 ≤ Q < 250	1-1/8 (28.6)	5/8 (15.88)	SPBPK-242HP
250 ≤ Q < 344	1-1/4 (31.74)	3/4 (19.05)	SPBPK-302HP
344 ≤ Q < 544	1-1/2 (38.1)	3/4 (19.05)	
544 ≤ Q < 552	1-5/8 (41.3)	7/8 (22.2)	SPBPK-462HP
552 ≤ Q < 654	1-3/4 (44.5)	7/8 (22.2)	

NOTE:

Even if the equivalent refrigerant piping length (L1) is more than 328ft. (100m), no need to increase the pipe size after first branch. If the branch pipe size is larger than the first branch, adjust the branch pipe size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as the one before the branch.

⑤ Pipe between last branch and indoor unit

4-Way Cassette Type and mini 4-Way Casette Type

Indoor Unit (kBtu/h)	Air pipe Φ in.(mm)	Liquid pipe Φ in.(mm)
05~19	1/2 (12.7)	1/4 (6.35)
22~54	5/8 (15.88)	3/8 (9.53)

Others

Indoor Unit (kBtu/h)	Air pipe Φ in.(mm)	Liquid pipe Φ in.(mm)
05~17	1/2 (12.7)	1/4 (6.35)
18	5/8 (15.88)	3/8 (9.53)
19	5/8 (15.88)	1/4 (6.35)
22~54	5/8 (15.88)	3/8 (9.53)

NOTE:

- When the liquid piping length is longer than 49.2ft.(15m), use Φ 3/8in.(9.53mm) pipe and reducer (field-supplied) instead of Φ 1/4in.(6.35mm) pipe.
- The pipe diameter should be the same as the indoor unit piping connection size.

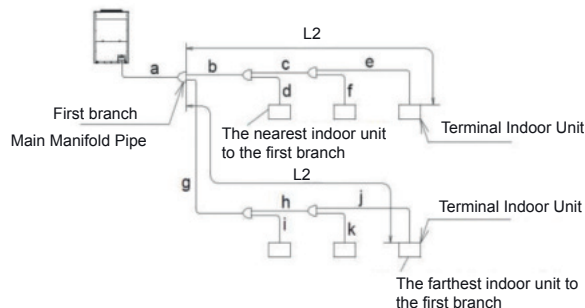
Piping Branch Restrictions

In the case that the piping length from the first branch to the farthest indoor unit (L2) is over 131.2ft.(40m), follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

In the case that piping length from the first branch to the terminal Indoor Units is within 131.2ft.(40m) - 295.3ft.(90m).

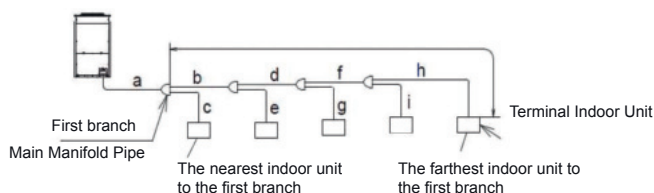
- (1) If the piping length L2 is over 131.2ft.(40m), the diameter of gas and liquid lines "b and c" or "g and h" should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).
- (2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 131.2ft.(40m).



Example 2: Installation without Main Piping Branch

In the case that piping length from the first branch to the terminal Indoor Units is within 131.2ft.(40m) - 295.3ft.(90m).

- (1) If the piping length L2 is over 131.2ft.(40m), the diameter size of gas and liquid lines "b, d and f" should be increased by one size with reducers (field-supplied). If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).
- (2) The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the nearest indoor unit must be within 131.2ft.(40m).



3.5 Calculation of Additional Refrigerant

Table 3.1 Additional Refrigerant Charge Calculation

Although refrigerant has been charged into this unit, additional refrigerant charge is required. Determine the additional refrigerant quantity according to the following procedure, and charge it into the system. Record the additional refrigerant quantity to facilitate maintenance and servicing activities thereafter.

1. Calculating Method of Additional Refrigerant Charge (W lbs)

(1) Additional refrigerant charge calculation for liquid piping (W1)

Pipe Diameter	Total Piping Length (ft.)	Refrigerant Amount for 1 ft Pipe (lbs/ft)	Additional Charge (lbs)
1-1/8 (28.6)	ft.	x 0.45 =	
1 (25.4)	ft.	x 0.35 =	
7/8 (22.2)	ft.	x 0.24 =	
3/4 (19.05)	ft.	x 0.175 =	
5/8 (15.88)	ft.	x 0.114 =	
1/2 (12.7)	ft.	x 0.074 =	
3/8 (9.53)	ft.	x 0.038 =	
1/4 (6.35)	ft.	x 0.016 =	
Total Additional Charge for Liquid Piping =			

(2) Additional refrigerant charge calculation for indoor unit and water module (W2)

Total Capacity of Indoor Unit Used in Heat Recovery System and NOT Connected to SW BOX (Cooling Only Indoor Unit) (kBtu/h)	Refrigerant Charge (lbs/kBTu/h)	Additional Charge (lbs)
	x 0.0231 =	
Total Other Indoor Unit and Water Module Capacity (kBtu/h)	Refrigerant Charge (lbs/kBTu/h)	Additional Charge (lbs)
	x 0.0516 =	
Additional Charge for Indoor Unit and Water Module =		

(3) Additional refrigerant charge calculation for switch box (W3)

SW BOX Model	Number of SW BOX Connected	Refrigerant Charge (lbs/unit)	Additional Charge (lbs)
SPMBD-4/45		x 0.22 =	
SPMBD-8/85		x 0.44 =	
SPMBD-12/85		x 0.66 =	
SPMBD-16/85		x 0.88 =	
Total Additional Charge for SW BOX =			

(4) Additional refrigerant charge calculation for connection ratio (W4)

Connection Ratio (Total Capacity of Indoor Unit and Water Module / Outdoor Unit Capacity)	Refrigerant Charge (lbs)
≤ 100%	0.0lbs
101% ~ 115%	1.1lbs
116% ~ 130%	2.2lbs
131% ~ 150%	3.3lbs

Total additional refrigerant charge can be calculated as follows: $W=W1 +W2+W3+W4=$ lbs

Maximum Additional Refrigerant Charge

Total additional charge must not exceed the maximum additional refrigerant charge indicated in the following table. Accordingly, allowable total piping length may become shorter than maximum value due to the limitation of maximum additional refrigerant amount.

Capacity (kBtu/h)	72	96	120	144~168	192~240	264	288~336	360~384	408~456
Max. Additional Refrigerant Charge (lbs(kg))	62.8 (28.5)	67.2 (30.5)	69.4 (31.5)	76.1 (34.5)	90.4 (41.0)	100.3 (45.5)	112.4 (51.0)	126.8 (57.5)	144.4 (65.5)

Ref. Charge of O.U. Before Shipment (W0) lbs

Outdoor Unit (kBtu/h)	W0 Outdoor Unit Ref. Charge (lbs(kg))
72	13.2 (6.0)
96	13.2 (6.0)
120	19.4 (8.8)
144	21.6 (9.8)
168	21.6 (9.8)
192	25.4 (11.5)

NOTE:

- W0 is outdoor unit ref. charge before shipment.
- In case of the combination of the basic unit, calculate the total ref. charge before shipment of the outdoor units to be combined.

2. Charging Work

Charge refrigerant (R410A) into the system according to Section 6.3. in INSTALLATION chapter.

3. Record of Additional Charge

Total refrigerant charge of this system is calculated in the following formula.

$$\begin{aligned} \text{Total Ref. Charge} &= W + W_0 \\ \text{This System} &= \boxed{} + \boxed{} = \boxed{} \text{ lbs} \end{aligned}$$

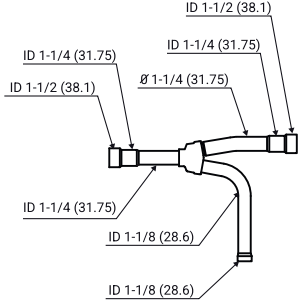
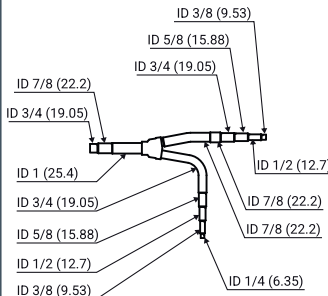
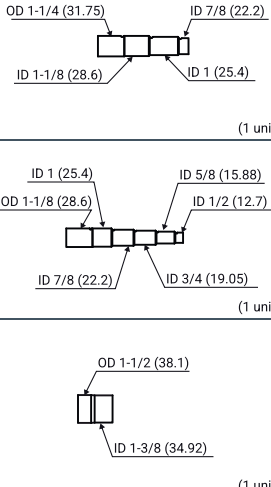
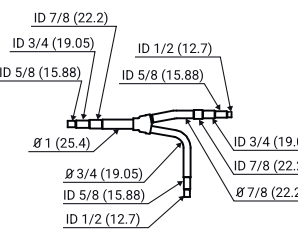
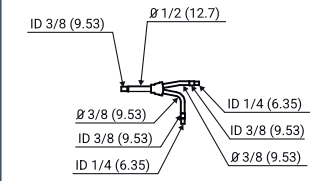
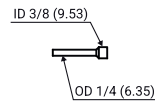
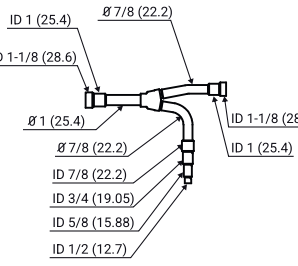
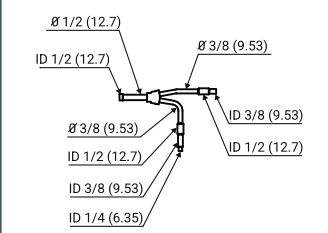
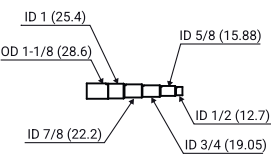
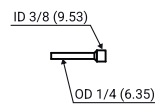
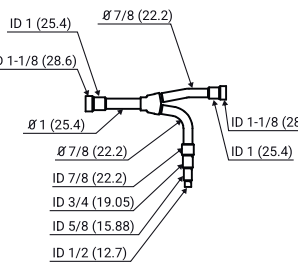
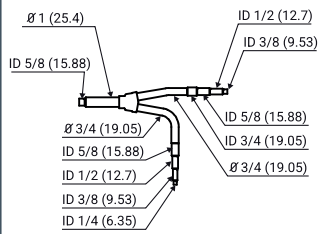
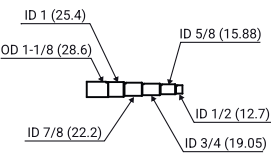
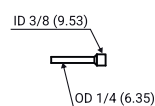
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Total Ref. Charge: lbs

Date of Ref. / /

Charge Work:

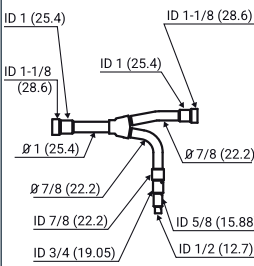
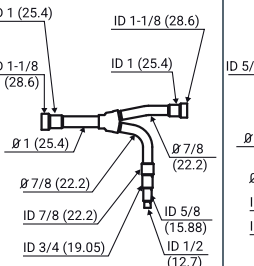
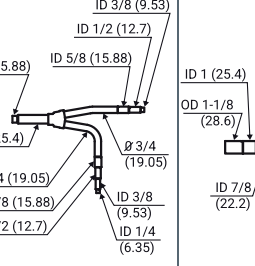
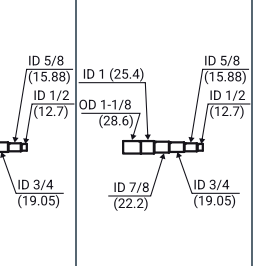
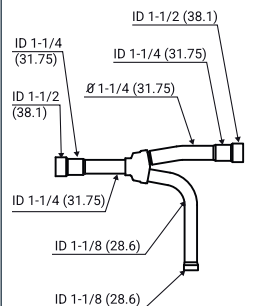
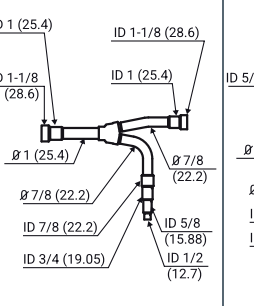
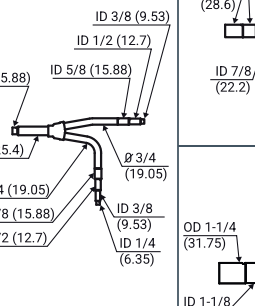
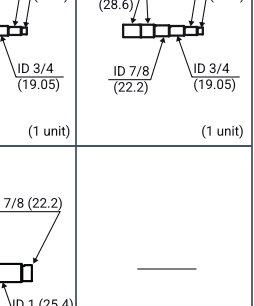
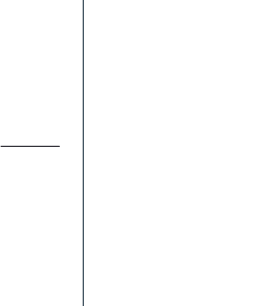
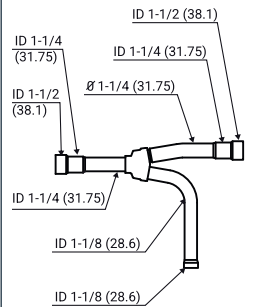
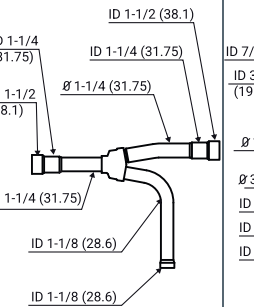
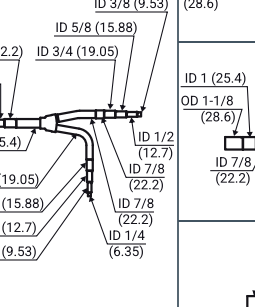
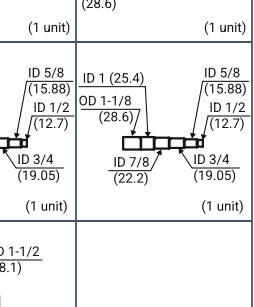
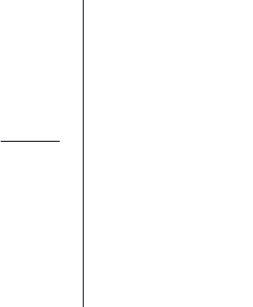
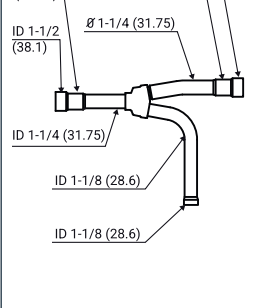
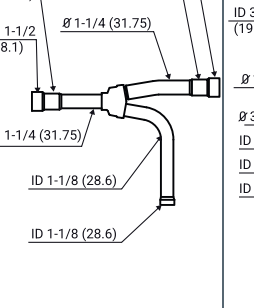
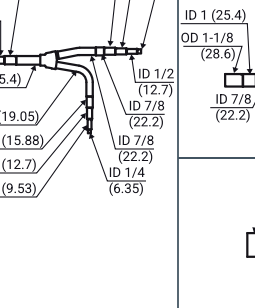
3.6 Piping Connection Kit Dimensions (optional)

Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
SPBPK-M32HP			 (1 unit)	
SPBPK-102HP				 (2 unit)
SPBPK-162HP			 (1 unit)	 (1 unit)
SPBPK-242HP			 (1 unit)	 (1 unit)

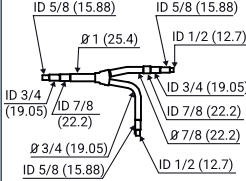
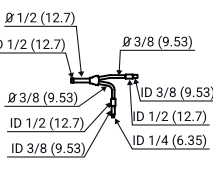
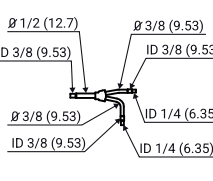
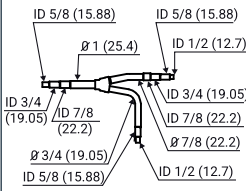
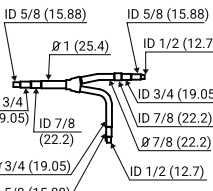
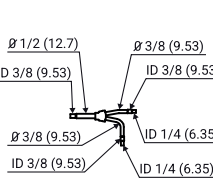
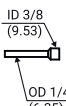
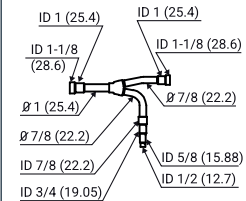
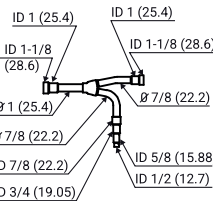
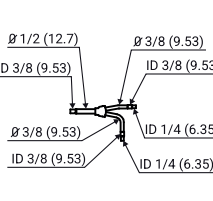
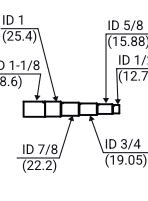
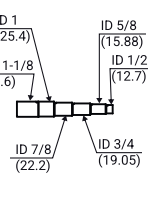
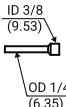
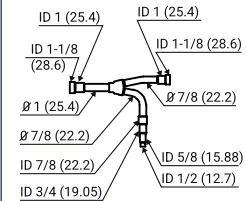
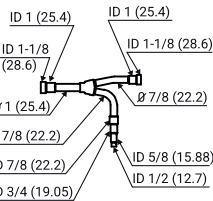
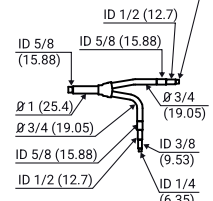
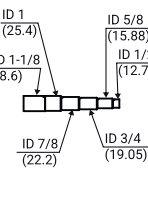
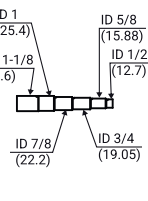
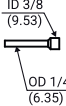
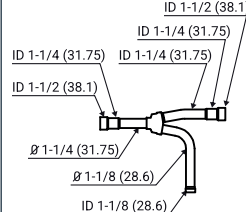
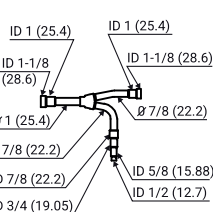
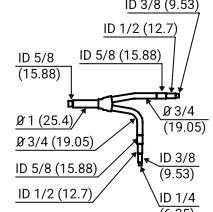
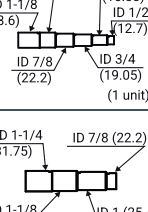
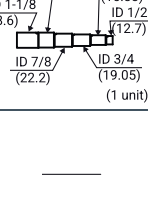
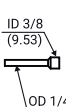
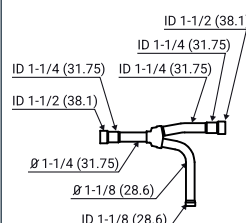
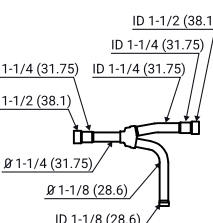
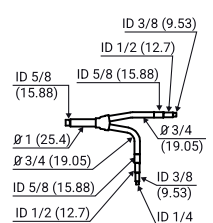
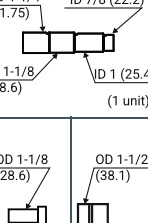
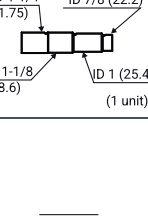
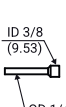
unit: in.(mm), ID: Inner Diameter, OD: Outer Diameter

Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
SPBPK302HP			(1 unit)	(1 unit)
			(1 unit)	
			(1 unit)	
SPBPK-M462HP			(1 unit)	(1 unit)
			(1 unit)	

unit: in.(mm), ID: Inner Diameter, OD: Outer Diameter

Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
SPBPK-M202HR				 (1 unit)	 (2 unit)	—
SPBPK-M212				 (1 unit)	 (1 unit)	—
SPBPK-M302HR				 (1 unit)	 (1 unit)	—
	 (1 unit)	 (1 unit)	 (1 unit)			

unit: in.(mm), ID: Inner Diameter, OD: Outer Diameter

Model	Low Pressure Gas Line	High Pressure Gas Line	Liquid Line	Reducer for Low Pressure Gas Line	Reducer for High Pressure Gas Line	Reducer for Liquid Line
SPBPK-M142HR				—	—	 (2 unit)
SPBPK-M282HR				—	—	 (1 unit)
SPBPK-M452HR				 (1 unit)	 (2 unit)	 (1 unit)
SPBPK-M562HR				 (1 unit)	 (2 unit)	 (1 unit)
SPBPK-M692HR				 (1 unit)	 (1 unit)	 (1 unit)
SPBPK-M902HR				 (1 unit)	 (1 unit)	 (1 unit)

unit: in.(mm), ID: Inner Diameter, OD: Outer Diameter

4. Capacities and Selection Data

4.1 Procedure for Selection of the System

This section explains the procedure to select the most suitable outdoor unit, with the values to be taken into account and the necessary steps to be carried out.

This procedure allows to select the unit with the best characteristics to provide the greatest level of efficiency and comfort, considering the building layout, the specifications of the indoor units to be installed and the distribution of air and refrigerant flows.

The ease of access for installation and maintenance work must be taken into account when selecting the location for installation of the outdoor unit.

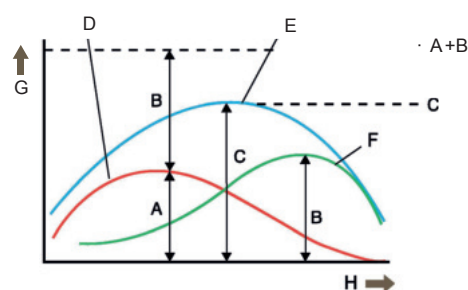
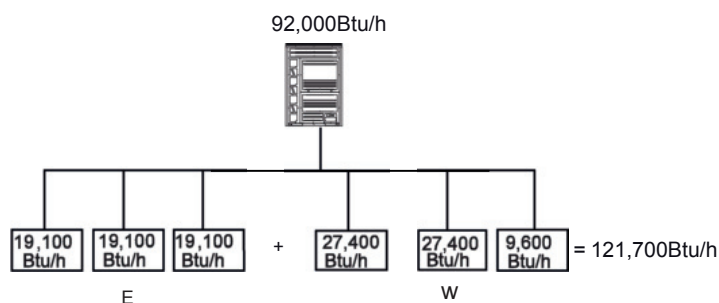
4.1.1 Unique features of the system

The system boasts some unique features that must be taken into account before selecting the outdoor unit.

Possibility of installing a reduced total unit capacity

The system allows the connection of a total combined indoor capacity as low as 50% and as high as 150%, of the nominal capacity of the outdoor unit. In comparison with other air conditioning systems requiring the indoor and outdoor nominal capacities to be equal, the system allows the installation of an outdoor unit with a nominal capacity up to 50% smaller than the total combined indoor capacity. This possibility is explained in the following example:

The diagram shows a typical building with a morning peak heat load on the east zone equivalent to a 57,300 Btu/h unit. In the afternoon, a peak equivalent to a 64,400 Btu/h unit occurs on the west zone.



Indoor unit capacity
E: East zone (57,300 Btu/h)
W: West zone (64,400 Btu/h)

A: morning peak heat load in the eastern area
B: evening peak heat load in the western area
C: maximum simultaneous load for the entire building
D: eastern area load

E: total load
F: western area load
G: load
H: time

In this case, a conventional system would require the installation of a 121,700 Btu/h outdoor unit, matching the total installed indoor capacity (57,300 Btu/h + 64,400 Btu/h). However, the maximum simultaneous load in the whole building occurs at noon, and is equal to 92,000 Btu/h of unit capacity. Therefore, a 92,000 Btu/h outdoor unit could be selected, directing its capacity to either the east or the west zone as dictated by the system controls.

NOTE:

- The maximum required loads of east and west zone must not be simultaneous.
- In systems in which all the indoor units are operated simultaneously, the total indoor capacity must not exceed the nominal capacity of the outdoor unit. Otherwise, poor performance or a narrowing of the operation range in overload conditions may occur.

The ratio of total combined capacity is calculated with the following formula:

$$\text{Ratio of total combined capacity} = (\text{Total capacity of the indoor units} / \text{Capacity of the outdoor unit}) \times 100\% = (121,700 \text{ Btu/h} / 92,000 \text{ Btu/h}) \times 100\% \approx 132\%$$

4.1.2 Selection Parameters

To select the outdoor units, it will be necessary to consult and/or use a series of parameters shown in tables and graphics presented in the different chapters of this handbook. A summarized list is shown below:

For cooling and heating capacities: manual of "Engineering Data".

For cooling correction factor depending on the piping length: 4.2 "Capacity Correction Based on Refrigerant Piping Length".

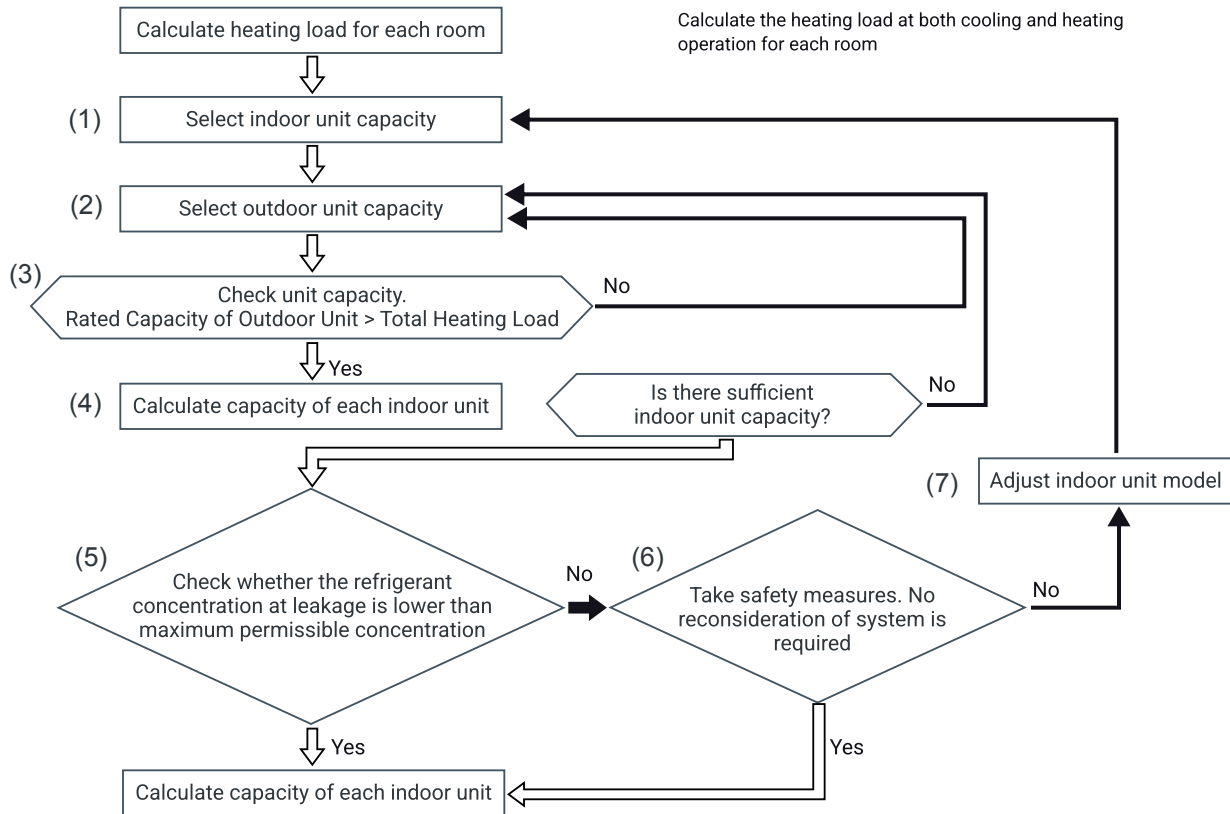
For heating correction factor depending on the piping length: 4.2 "Capacity Correction Based on Refrigerant Piping Length".

For sensible heat factor: CHV Indoor Units Technical Catalog.

In case of an installation with ducts the fan performance for duct calculations should be considered. The CHV units are designed with difference static pressure ranges in order to fulfill all installation necessities.

4.1.3 Check points for system installation

For selecting the unit capacity, perform the system selection with checking the refrigerant concentration at leakage in order not to exceed the maximum permissible concentration.



(1) Selecting indoor unit capacity.

Set temporarily the indoor unit model and capacity in each room as following:

Heating Load for each room < Capacity of Indoor Unit

At this time, consider the correction factor according to room temperature.

Then, sum up each indoor unit capacity (The calculation is required for cooling and heating operation).

Indoor unit capacity = Rated capacity x correction Factor (room temperature)

Correction factor according to room temperature: When the estimated load for each room differs from the rated capacity (cooling: 80.0°F (26.7°C)DB / 67.0°F (19.4 °C)WB; heating: 70.0°F (21.1°C)DB, select the outdoor unit capacity at the estimated load from the manual of Engineering Data.

Correction Factor (room temperature) = Outdoor unit capacity at estimated load / Rated outdoor unit capacity

(2) Selecting outdoor unit capacity

Set temporarily the outdoor unit capacity according to the total connectable indoor unit capacity at the item (1). Then, calculate maximum outdoor unit capacity with considering the correction factors according to temperature condition, piping length and lift, and defrosting correction factor (for heating operation).

The calculation is required for cooling and heating operation

Outdoor unit capacity = Outdoor unit capacity at estimated load x
Correction factors (total indoor unit capacity, piping length, defrosting correction factor (for heating operation))

Outdoor unit capacity at estimated load: When calculating heating load for outdoor unit, check the ambient temperature. If the ambient temperature differs from the temperature indicated in the rated capacity (cooling: 95.0°F (35°C) DB; heating: 47.0°F (8.3°C)DB / 43.0°F (6.1°C)WB), select the outdoor unit capacity at the estimated load from the manual of Engineering Data.

Correction factor according to total indoor unit capacity:

- Select the correction factor according to manual of Engineering Data.
- Correction factor according to piping length:
Select the correction factor according to 4.2 "Capacity Correction Based on Refrigerant Piping Length".
- Correction factor according to defrosting condition (for heating operation):
Select the correction factor according to 4.3 "Correction Factor According to Defrosting Operation".

(3) Checking unit capacity.

Compare the outdoor unit capacity calculated in the item (2) with the total heating load.

(4) Calculating each indoor unit capacity.

Recalculate the indoor unit capacity as follows. (The calculation is required for cooling and heating operation.)

$$\text{Unit capacity for each room} = \text{Outdoor Unit Capacity (value at item 2)} \\ \times (\text{indoor unit capacity in concerned room (model)} / \text{Total indoor unit capacity (model)})$$

If the outdoor unit capacity is insufficient against the necessary heating load for each room, recalculate it from the item (2) after the outdoor unit capacity is increased.

(5) Checking Refrigerant Concentration at Refrigerant Leakage < Permissible Refrigerant Concentration .

(6) Taking Safety Measure (Reconsideration of system is not required).

(7) Correction of outdoor unit model if the condition of both (5) and (6) are negative.

NOTE:

- Refer to 6.3 Charge Operation in Installation Chapter for items from (5) through (7).
- When the temperature is set, consider that the ambient temperature increases by short circuit. Especially, if multiple outdoor units are installed or there is obstacle around the outdoor unit, pay attention to increase the ambient temperature.
- For the setting temperature at the heating operation in the ducted and cassette indoor unit type, consider the temperature irregularity between the floor and the ceiling surface. The temperature around the ceiling surface normally becomes 2°C higher than the floor surface during the heating operation.
- For selecting indoor unit capacity, if the sensible heating load is considered, consider the sensible heat factor together.
- In the case that the total indoor unit capacity exceeds the outdoor unit capacity, the temperature is low or the piping length is long, if the indoor units operate simultaneously, the air outlet temperature decreases so that may be felt uncomfortably. Therefore, the facility should be designed that the cooling/heating capacity for indoor unit calculated from the cooling/heating capacity for system is more than the heating load.

4.1.4 Selection procedure example

Given conditions

Once considered the system possibilities, it's the moment to start with the selection procedure. In order to do this, it has been assumed an installation consisting of several rooms with different required cooling loads and temperature conditions.

Total load required for each room

Concept	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
Estimated cooling load (Btu/h)	13,470	17,250	17,250	20,700	27,930	30,750	30,760
Estimated cooling load (Btu/h)	14,590	18,620	18,620	22,410	29,440	32,050	32,050

Temperature condition

unit: °F °(C)

Operating conditions		Estimated cooling load (Btu/h)	Estimated cooling load (Btu/h)
Indoor air inlet temperature	DB	80 (27.0)	68 (20.0)
	WB	66 (19.0)	-
Outdoor air inlet temperature	DB	86 (30.0)	34 (1.0)
	WB	-	32 (0.0)

DB: dry bulb; WB: wet bulb.

In this example, the maximum required loads will not be simultaneous.

Piping dimensions:

- Equivalent pipe length between outdoor unit and indoor units: 196.85 ft. (60 m).
- Pipe height: 82.02 ft. (25 m).
- Cooling capacity correction factor depending on the pipe length =0.90.
- Heating capacity correction factor depending on the pipe length =0.95.
- Heat recovery system (3 pipes).

Appropriate selection of indoor units and nominal capacity

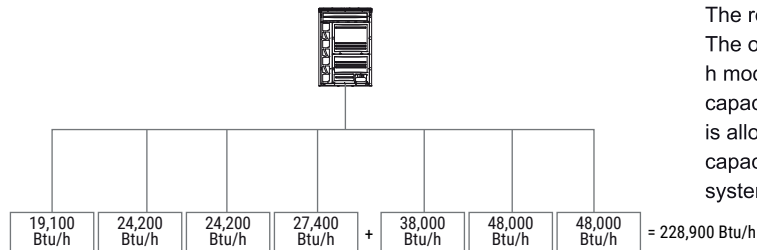
Example: selection of SDHSP ducted indoor units.

The pre-selected capacity of the different indoor units has not been the immediately higher in all the units, in order to apply a safety factor considering the different correction factors existing, which will reduce the capacity.

Concept	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
Model selected	CHV-19*	CHV-24*	CHV-24*	CHV-27*	CHV-38*	CHV-48*	CHV-48*
Nominal cooling load (Btu/h)	19,100	24,200	24,200	27,400	38,000	48,000	48,000
Nominal cooling load (Btu/h)	21,600	27,400	27,400	30,800	42,500	54,500	54,500

Then, it's shown a diagram of the installation resulting:

184,000Btu/h



The resulting total indoor unit capacity is 228,900 Btu/h. The outdoor unit with the exact capacity is the 228,900 Btu/h model, but the possibility "Reduced total outdoor unit capacity" allows the 184,000 Btu/h model selection. Thus, it is allowed at the outdoor unit to be up to 24% smaller capacity when compared with other air conditioning systems.

$$\text{Total combination capacity} = (\text{Total indoor unit capacity} / \text{Outdoor unit capacity}) \times 100\% = (228,900 \text{ Btu/h} / 184,000 \text{ Btu/h}) \times 100\% \approx 124\%$$

NOTE:

The maximum simultaneous load on the installation must not be higher than 184,000 Btu/h for this example. To determine the outdoor unit pre-selected nominal cooling and heating capacity, it's necessary refer to manual of Engineering Data, in which the total capacity combination (124%) and the temperature condition have been taken into consideration.

Concept	Room 1+2+3+4+5+6+7 (228,900 Btu/h)	Outdoor unit pre-selected (184,000 Btu/h ~ 124%)
Total nominal cooling loads (Btu/h)	228,900	196,348
Total nominal heating loads (Btu/h)	258,700	208,480

NOTE:

- If the air inlet temperature for the indoor unit or outdoor unit is not contained in the capacity tables, an interpolation should be carried out using the values above and below those of the air inlet temperature.
- If the total combination capacity is not shown in the capacity tables (for example, 124%), an interpolation should be carried out using the values above and below (120% and 130%) those of the total combination

Next step will be the capacity correction using the different correction factors shown in this chapter.

Defrost factor

Due to frost build-up during heating, defrosting is needed so capacity is reduced. Defrost time is affecting overall capacity so capacity correction is necessary.

In consideration of the frost or the defrosting operation, the heating capacity is corrected by the equation below.

Corrected Heating Capacity = Correction Factor x Heating Capacity

Outdoor Inlet Air Temp. (°F)(°C)DB) (Humidity=85% RH)	20 (-7)	23 (-5)	26 (-3)	32 (0)	38 (3)	41 (5)	44 (7)
Correction Factor	0.95	0.93	0.88	0.85	0.87	0.90	1.0

Outdoor inlet air temp.(°C DB)=1, then Defrost correction factor = 0.857.

Actual capacity of the outdoor unit

Actual maximum capacity of the outdoor unit = (nominal capacity of the outdoor unit) x
(correction factor according to pipe length and height) x (correction factor according to temperature)

See manual of Engineering Data for the nominal capacity at the total capacity of combined indoor units.

See "Capacity Correction Based on Refrigerant Piping Length " for the correction factor according to the pipe length.

Cooling: (196,348 Btu/h) x (0.90) = 176,713 Btu/h.

Heating: (208,480 Btu/h) x (0.95) x (0.857) = 169,734 Btu/h.

Actual capacity of each indoor unit

Actual capacity of each indoor unit = (actual capacity of the outdoor unit) x
(power value of each range of indoor units / sum of the power of each indoor unit)

Example:

CHV-19*

Cooling: $176,713 \times (19,100 / (19,100 + 24,200 + 24,200 + 27,400 + 38,000 + 48,000 + 48,000)) = 14,745 \text{ Btu/h}$

Cooling: $169,734 \times (21,600 / (21,600 + 27,400 + 27,400 + 30,800 + 42,500 + 54,500 + 54,500)) = 14,172 \text{ Btu/h}$

CHV-24*

Cooling: $176,713 \times (24,200 / (19,100 + 24,200 + 24,200 + 27,400 + 38,000 + 48,000 + 48,000)) = 18,683 \text{ Btu/h}$

Cooling: $169,734 \times (27,400 / (21,600 + 27,400 + 27,400 + 30,800 + 42,500 + 54,500 + 54,500)) = 17,977 \text{ Btu/h}$

CHV-27*

Cooling: $176,713 \times (27,400 / (19,100 + 24,200 + 24,200 + 27,400 + 38,000 + 48,000 + 48,000)) = 21,153 \text{ Btu/h}$

Cooling: $169,734 \times (30,800 / (21,600 + 27,400 + 27,400 + 30,800 + 42,500 + 54,500 + 54,500)) = 20,208 \text{ Btu/h}$

CHV-38*

Cooling: $176,713 \times (38,000 / (19,100 + 24,200 + 24,200 + 27,400 + 38,000 + 48,000 + 48,000)) = 29,336 \text{ Btu/h}$

Cooling: $169,734 \times (42,500 / (21,600 + 27,400 + 27,400 + 30,800 + 42,500 + 54,500 + 54,500)) = 27,884 \text{ Btu/h}$

CHV-48*

Cooling: $176,713 \times (48,000 / (19,100 + 24,200 + 24,200 + 27,400 + 38,000 + 48,000 + 48,000)) = 37,056 \text{ Btu/h}$

Cooling: $169,734 \times (54,500 / (21,600 + 27,400 + 27,400 + 30,800 + 42,500 + 54,500 + 54,500)) = 35,758 \text{ Btu/h}$

Results

Concept	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
Model selected	CHV-19*	CHV-24*	CHV-24*	CHV-27*	CHV-38*	CHV-48*	CHV-48*
Actual cooling capacity (Btu/h)	14,745	18,683	18,683	21,153	29,336	37,056	37,056
Actual heating capacity (Btu/h)	14,172	17,997	17,997	20,208	27,884	35,758	35,758
Estimated cooling load (Btu/h)	13,470	17,250	17,250	20,700	27,930	30,760	30,760
Estimated heating load (Btu/h)	14,590	18,620	18,620	22,410	29,440	32,050	32,050

Concept	Room 1+2+3+4+5+6+7
Actual total cooling capacity (Btu/h)	176,713
Actual total heating capacity (Btu/h)	169,734
Estimated total cooling load (Btu/h)	158,120
Estimated total heating load (Btu/h)	167,780

As can be seen, the actual total cooling and heating capacity are higher than the estimated total cooling and heating load. Therefore, it can be said that the CHV6-192U(S)RBHH unit meets the minimum cooling and heating requirements set for the system.

NOTE:

If the actual total cooling or heating capacity calculated is lower than the estimated total cooling or heating load, the calculation must be done again with the unit immediately.

4.2 Capacity Correction Based on Refrigerant Piping Length

< Cooling Capacity >

Correction factor for cooling capacity according to piping length.

The cooling capacity should be corrected according to the following formula:

$$CCA = CC \times F$$

CCA: actual corrected cooling capacity

CC: cooling capacity in the performance table

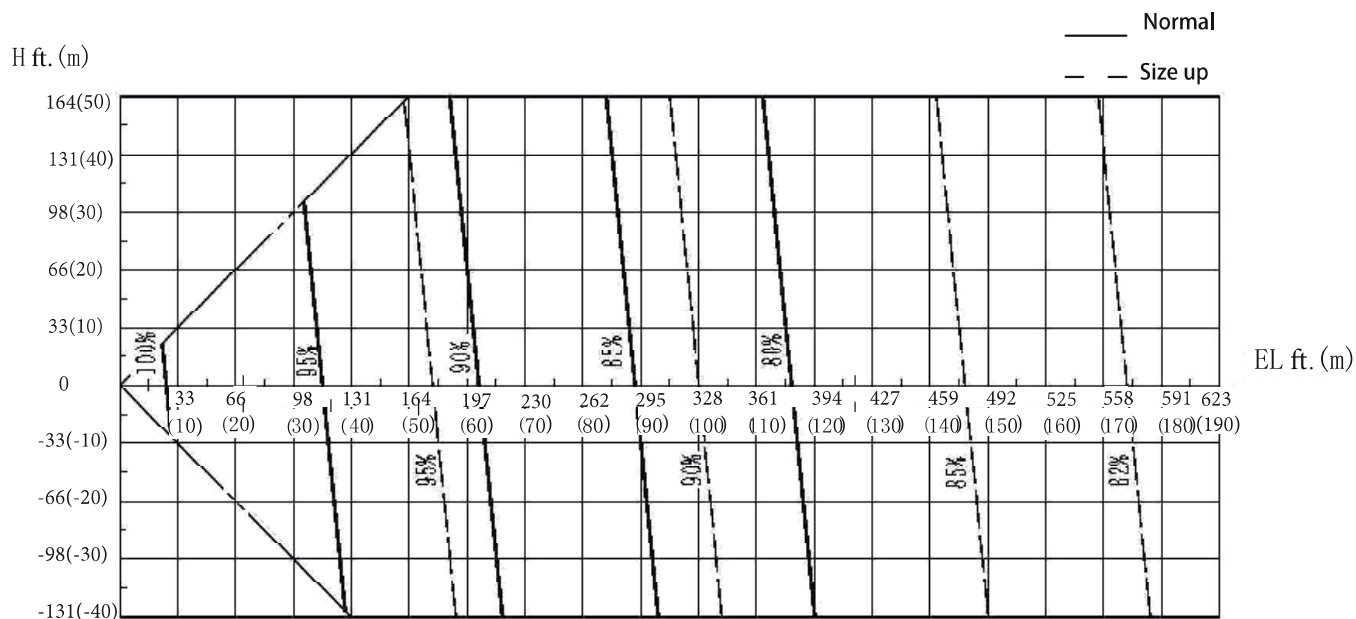
F: correction factor based on the equivalent piping length

The correction factors are shown in the following figure.

Equivalent piping length for

- one 90° elbow is 1.6ft. (0.5m).
- one 180° bend is 4.9ft. (1.5m).
- one branch pipe is 1.6ft. (0.5m).

CHV6-72* ~ 456*



< Heating Capacity >

Correction factor for cooling capacity according to piping length.

The heating capacity should be corrected according to the following formula:

$$HCA = HC \times F$$

HCA: actual corrected cooling capacity

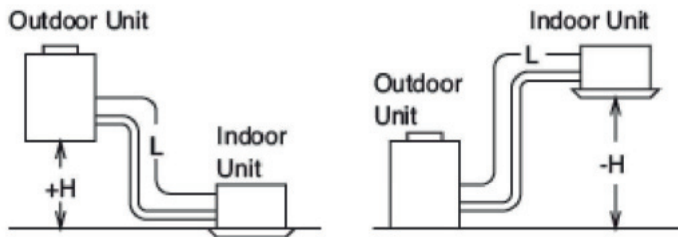
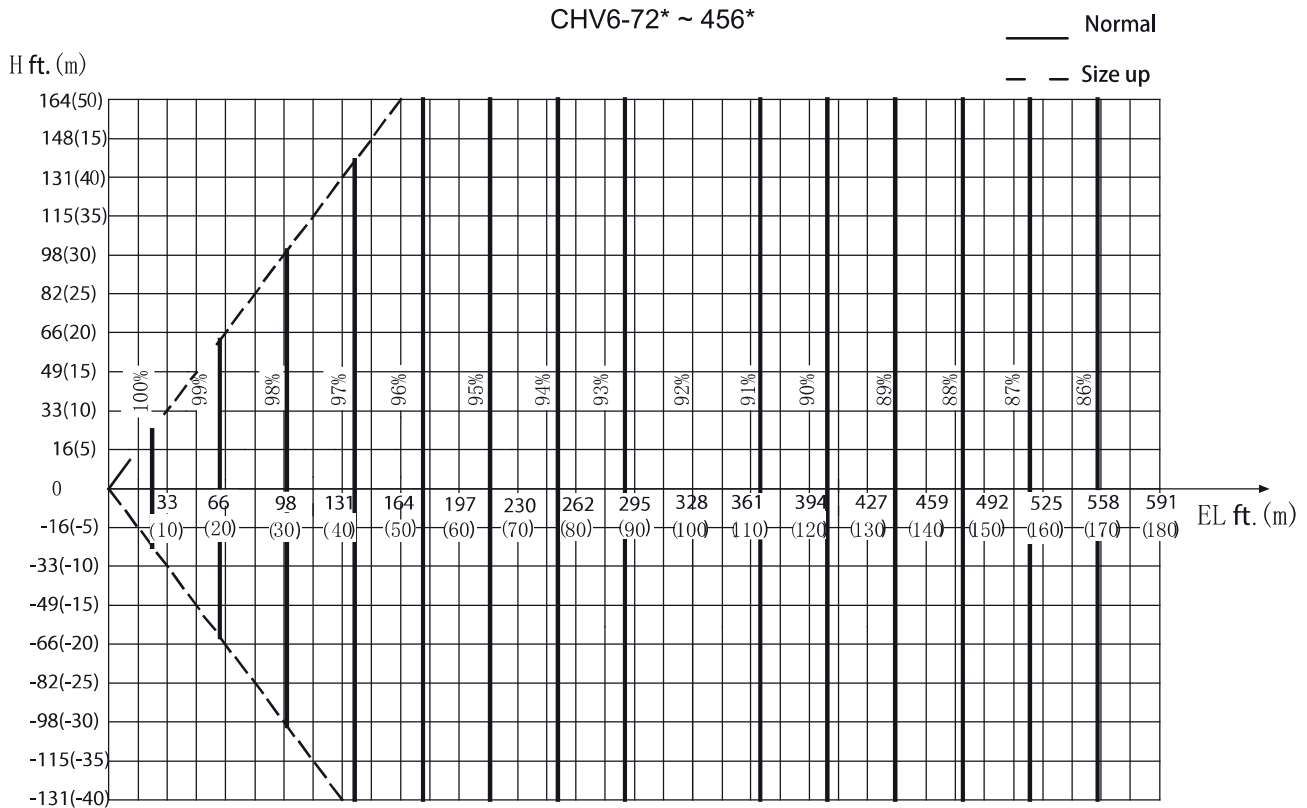
HC: cooling capacity in the performance table

F: correction factor based on the equivalent piping length

The correction factors are shown in the following figure.

Equivalent piping length for

- one 90° elbow is 1.6ft. (0.5m).
- one 180° bend is 4.9ft. (1.5m).
- one branch pipe is 1.6ft. (0.5m).



H: vertical distance between indoor unit and outdoor unit

EL: equivalent total distance between indoor unit and outdoor unit
(equivalent one-way piping length)

H>0: position of outdoor unit higher than position of indoor unit

L: actual one-way piping length between indoor unit and outdoor unit.

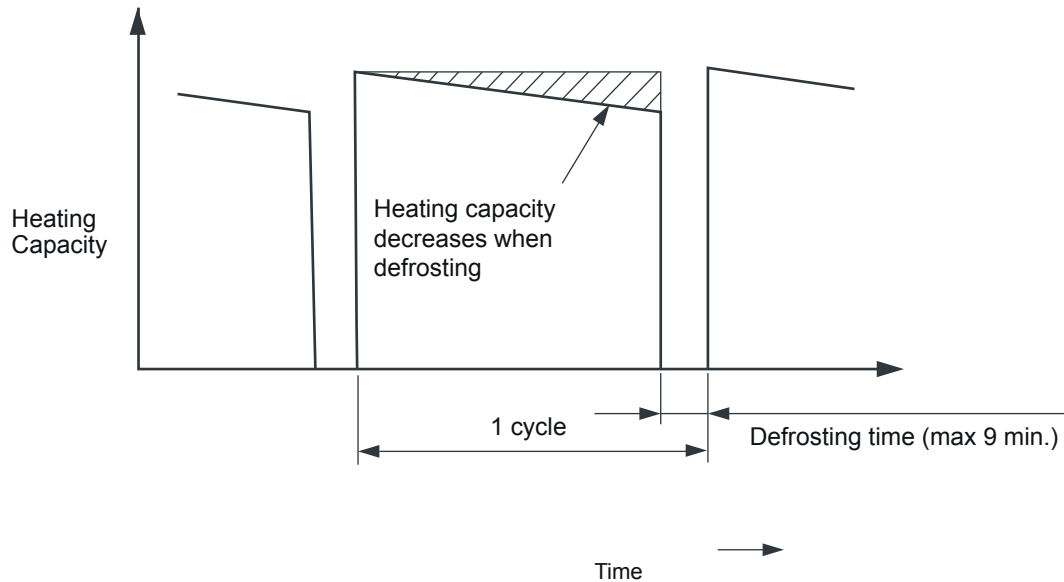
4.3 Correction Factor According to Defrosting Operation

The heating capacity in the preceding paragraph excludes the condition of the frost or the defrosting operation period.

In consideration of the frost or the defrosting operation, the heating capacity is corrected by the equation below.

Corrected Heating Capacity = Correction Factor x Heating Capacity.

Outdoor Inlet Air Temp. (°F DB) (Humidity=85% RH)	19.4	23.0	26.6	32	37.4	41.0	44.6
Correction Factor	0.95	0.93	0.88	0.85	0.87	0.90	1.0



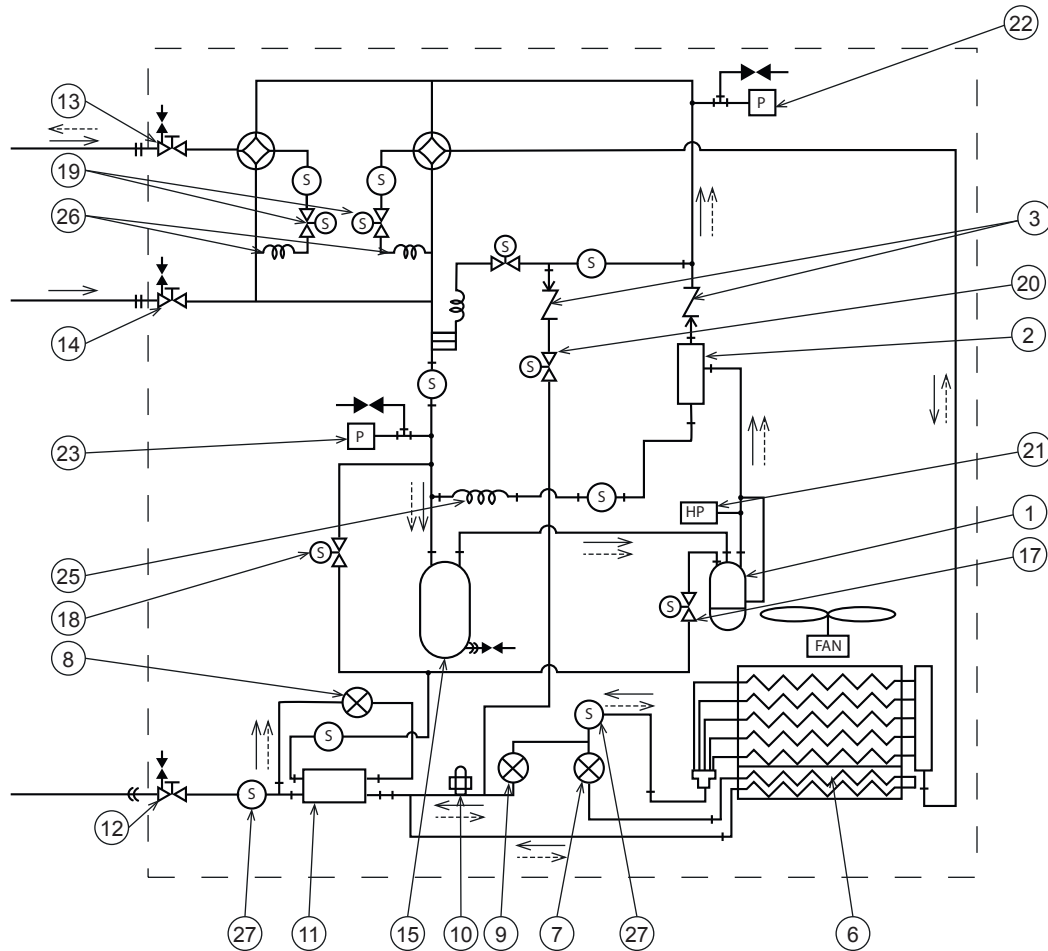
NOTE:

The correction factor is not available for the special condition like a snowfall or an operation in a transitional period.

5. Control System

5.1 Refrigerant Cycle

CHV6-72*~96*



← Refrigerant flow direction (Cooling)

←····· Refrigerant flow direction (Heating)

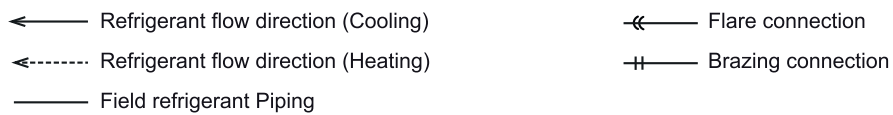
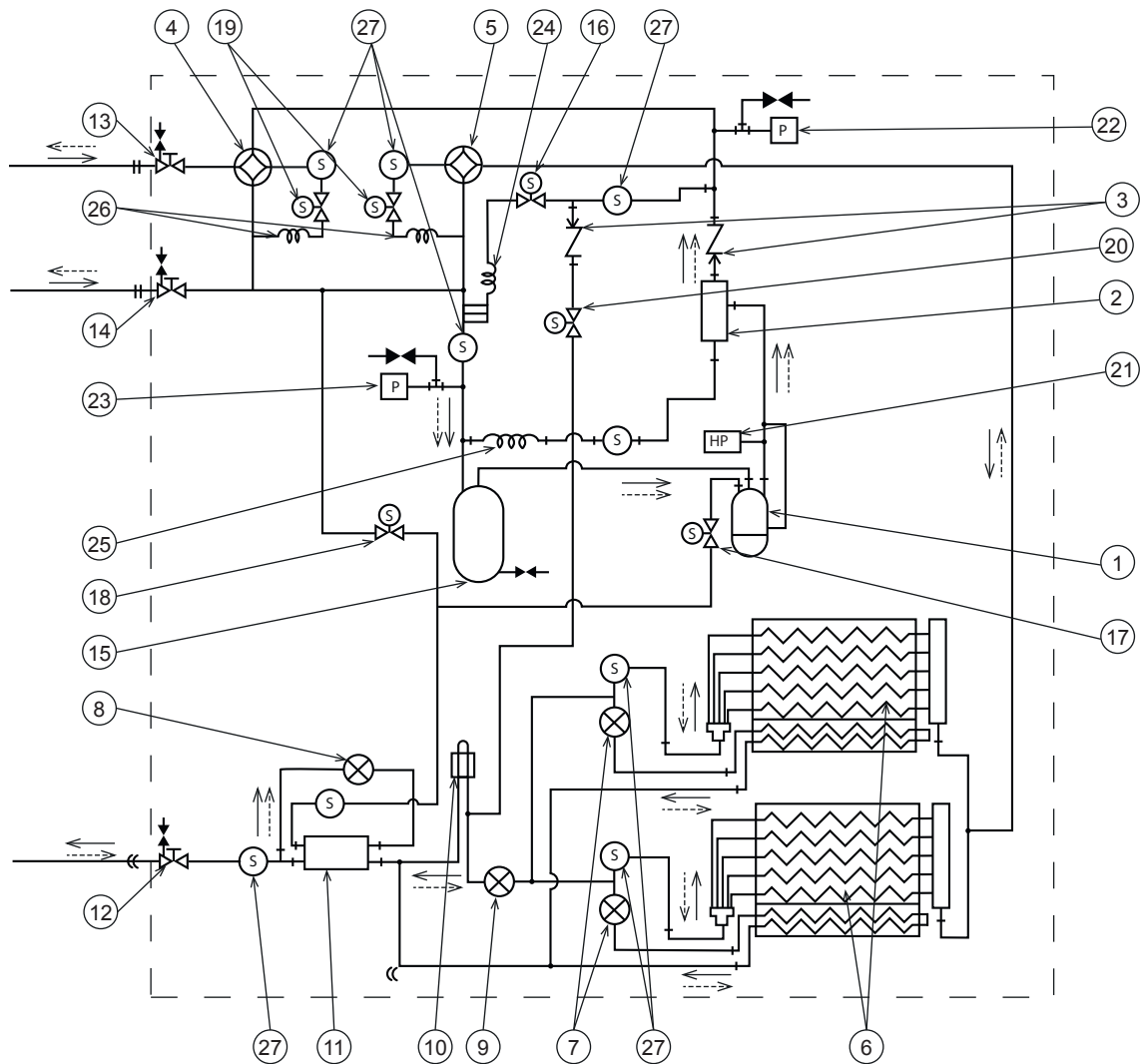
— Field refrigerant Piping

≡ Flare connection

≡ Brazing connection

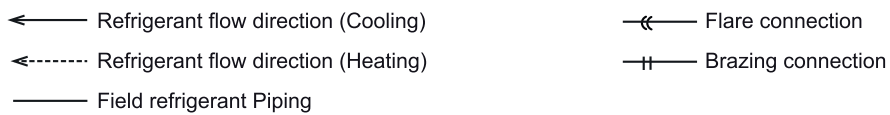
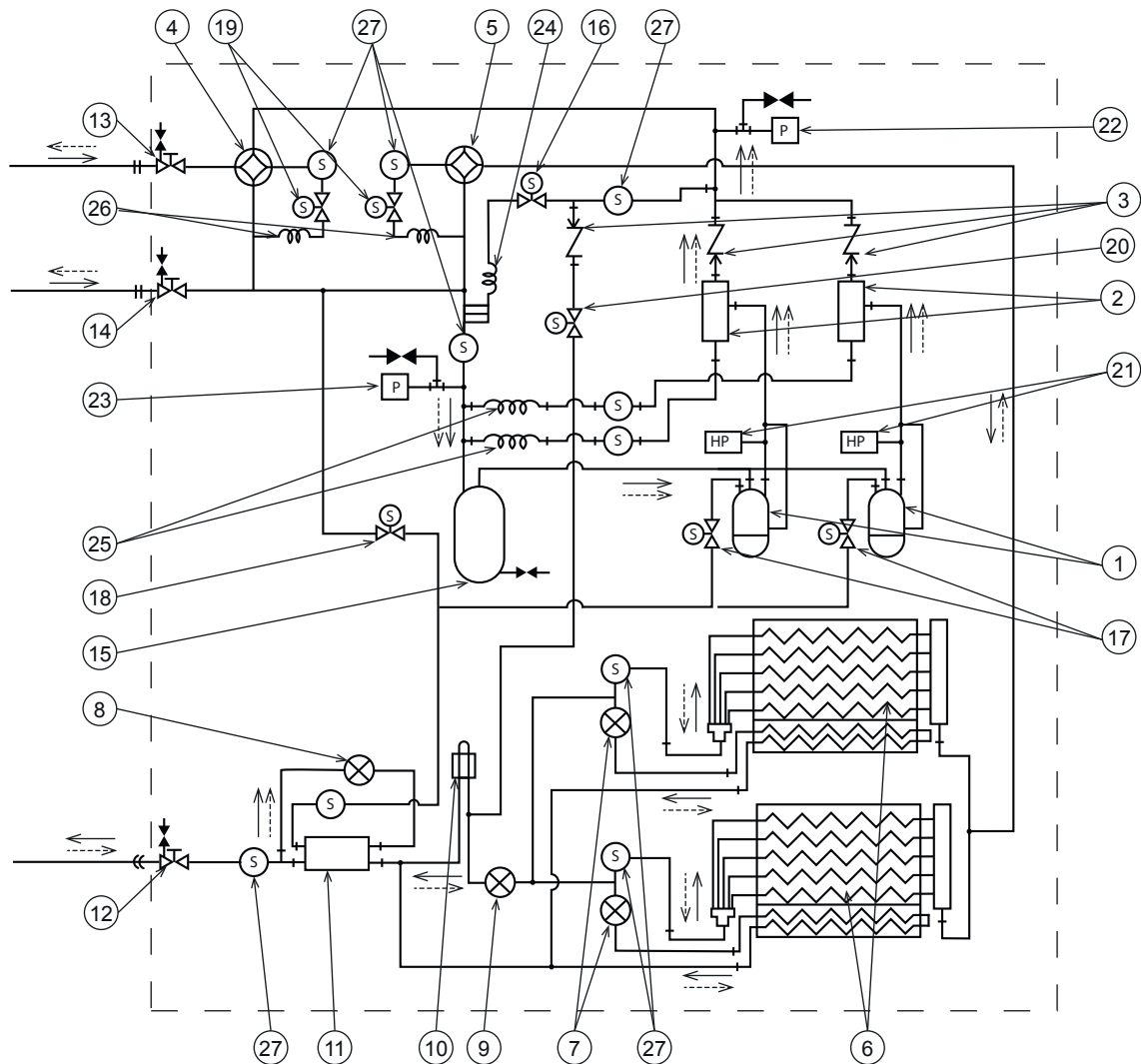
No.	Name	No.	Name	No.	Name
1	Compressor	10	Refrigerant cooler	19	Solenoid valve
2	Oil separator	11	Supercooler	20	SVG
3	Check valve	12		21	SVC
4	4-way reversing valve	13	Stop valve	22	High pressure switch
5		14		23	Pressure sensor
6	Heat exchanger	15	Accumulator	24	HP
7		16		25	LP
8	Expansion valve	17	Solenoid valve	26	SVA
9		18		27	SVF
					SVG
					Strainer

CHV6-120*



No.	Name		No.	Name		No.	Name	
1	Compressor		10	Refrigerant cooler		19	Solenoid valve	SVG
2	Oil separator		11	Supercooler		20	Solenoid valve	SVC
3	Check valve		12	Stop valve	Liquid	21	High pressure switch	
4	4-way reversing valve	21-1	13		High/Low pressure Gas	22	Presser sensor	HP
5		21-2	14		Low pressure Gas	23		LP
6	Heat exchanger		15	Accumulator		24	Capillary tube	SVA
7	Expansion valve	EVO	16	Solenoid valve	SVA	25		SVF
8		EVB	17		SVJ	26		SVG
9		MV5	18		SVS	27	Strainer	

CHV6-144~192*



No.	Name		No.	Name		No.	Name	
1	Compressor		10	Refrigerant cooler		19	Solenoid valve	SVG
2	Oil separator		11	Supercooler		20	Solenoid valve	SVC
3	Check valve		12	Stop valve	Liquid	21	High pressure switch	
4	4-way reversing valve	21-1	13		High/Low pressure Gas	22	Presser sensor	HP
5		21-2	14		Low pressure Gas	23		LP
6	Heat exchanger		15	Accumulator		24	Capillary tube	SVA
7	Expansion valve	EVO	16	Solenoid valve	SVA	25		SVF
8		EVB	17		SVJ	26		SVG
9		MV5	18		SVS	27	Strainer	

5.2 Control Logic

(1) Cycle Control

Control Device		Summary of Control					
		Cooling Operation*		Heating Operation		Simultaneous Operation	
		Purpose of Control	Contents of Control	Purpose of Control	Contents of Control	Purpose of Control	Contents of Control
MC	Inverter Frequency of Compressor	Cooling Capacity Control	Inverter Frequency control is carried out to bring the I.U. air inlet temperature to temperature setpoint by evaporation temperature control	Heating Capacity Control	Inverter Frequency control is carried out to bring the I.U. air inlet temperature to temperature setpoint by condensation temperature control	Mainly Cooling: Cooling Capacity Control	Inverter Frequency Control is carried out to bring the Cooling I.U. air inlet temperature to temperature setpoint.
						Mainly Cooling: Heating Capacity Control	Inverter Frequency Control is carried out to bring the Heating I.U. air inlet temperature to temperature setpoint.
EVO	Electronic Expansion Valve for HEX	HEX SC Control	EVO opening is adjusted to achieve the target value of HEX SC	HEX SH Control	EVO opening is adjusted to achieve the target value of HEX SH	Mainly Cooling: SC-Pd Control	EVO opening is adjusted to achieve the target value of SC-Pd
						Mainly Cooling: HEX SH Control	EVO opening is adjusted to achieve the target value of HEX SH
MV5	Electronic Expansion Valve for Inverter Radiation	Inverter Temperature Control	MV5 opening is adjusted to suppress Inverter Temperature Increase	Inverter Temperature Control	MV5 opening is adjusted to suppress Inverter Temperature Increase	Inverter Temperature Control	MV5 opening is adjusted to suppress Inverter Temperature Increase
EVb	Electronic Expansion Valve for plate Type HEX	Compressor discharge temperature and SC of liquid refrigerant	EVb opening is adjusted to achieve the target value of compressor discharge temperature and SC of liquid refrigerant	Compressor discharge temperature and SC of liquid refrigerant	EVb opening is adjusted to achieve the target value of compressor discharge temperature and SC of liquid refrigerant	Compressor discharge temperature and SC of liquid refrigerant	EVb opening is adjusted to achieve the target value of compressor discharge temperature and SC of liquid refrigerant
EVI	Electronic Expansion Valve for Indoor Unit	I.U. HEX SH Control	EVI opening is adjusted to achieve the target value of I.U. HEX SH	I.U. HEX SC Control	EVI opening is adjusted to achieve the target value of I.U. HEX SC	Cooling Operation I.U.: I.U. HEX SH Control	EVI opening is adjusted to achieve the target value of I.U. HEX SH
						Cooling Operation I.U.: I.U. HEX SC Control	EVI opening is adjusted to achieve the target value of I.U. HEX SC
SVA	Solenoid Valve to Bypass High/Low Pressure	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd<522 psi (3.6MPa) Open 2. Ps<29psi (0.2MPa) Open	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd>522 psi (3.6MPa) Open 2. Ps<29psi (0.2MPa) Open	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd>522 psi (3.6MPa) Open 2. Ps<29psi (0.2MPa) Open
SVC	Solenoid Valve to Bypass Inverter Radiation Piping	1. Inverter Condensation Protection 2. Pd Decrease Protection	1. Tf<ambient Temperature Open 2. Pd<232psi (1.6MPa) Open	1. Pd Decrease Protection	1. Pd<232psi (1.6MPa) Open	1. Inverter Condensation Protection 2. Pd Decrease Protection	1. Tf<ambient Temperature Open 2. Pd<232psi (1.6MPa) Open
SVG	Solenoid Valve to Blocking High/Low Pressure	Blocking High/Low Pressure Gas Bypass during Stoppage	During Operation: Open During Stoppage: Close	Blocking High/Low Pressure Gas Bypass during Stoppage	During Operation: Open During Stoppage: Close	Blocking High/Low Pressure Gas Bypass during Stoppage	During Operation: Open During Stoppage: Close

(*): Dry operation is included in the cooling operation

Pd: Discharge Pressure

Ps: Suction Pressure

SH: Superheat

SC: Subcool

Tf: Inverter Temperature

I.U.: Indoor Unit

HEX: Heat Exchanger

(2) Heat Exchanger Mode Control

In accordance with the connectable indoor unit operation mode, the outdoor unit heat exchanger is switched as shown in the table below.

Heat Exchanger Mode at Cooling: Condenser **COND**

Heat Exchanger Mode at Heating: Evaporator **EVAP**

The Number of Outdoor Unit: 1 (one)

Heat Exchanger Mode		Cooling Mode	Mainly Cooling Mode		Mainly Heating Mode	Heating Mode
		COND	D1	D1-1	D4	EVAP
Heat Exchanger Condition		COND	COND	cond	EVAP	EVAP
Reversing Valve	RVR 2	OFF	OFF	OFF	ON	ON
	RVR 1	ON	OFF	OFF	OFF	OFF
Expansion Valve	EVO	HEX SC	HEX SC-Pd	HEX SC-Pd	HEX SH	HEX SH
	MV5	Tf	Tf	Tf	Tf	Tf
	EVB	Td-SC	Td-SC	Td-SC	Td-SC	Td-SC

NOTE:

(1) Heat Exchanger Condition

COND: Use as Condenser

cond: Avoid the use of Heat Exchanger (under a high pressure condition)

EVAP: Use as Evaporator

(2) Control Method of Expansion Valve

HEX SC: To adjust to achieve the target value of heat exchanger SC

HEX SH: To adjust to achieve the target value of heat exchanger SH

Pd: To adjust to achieve the target value of Discharge Pressure

Tf: To adjusted to suppress Inverter Temperature increase

Td-SC: To adjusted to achieve the target value of compressor discharge temperature and SC of liquid refrigerant.

(3) COND, D1, D1-1, D4 and EVAP are the reference numbers.

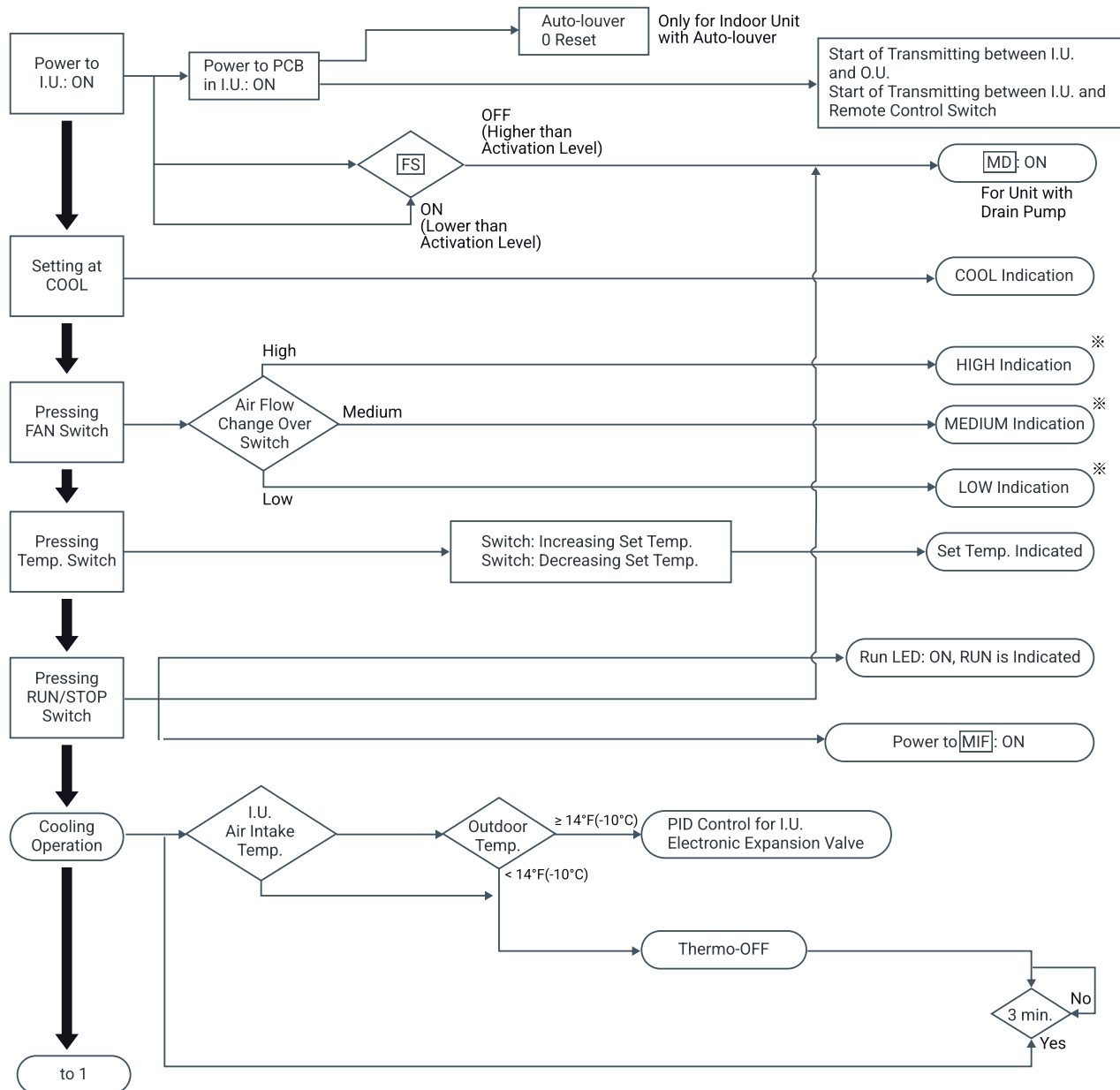
5.3 Standard Operation Procedure Chart

CHV6-72* ~ 192*

Cooling operation

I.U.: Indoor Unit

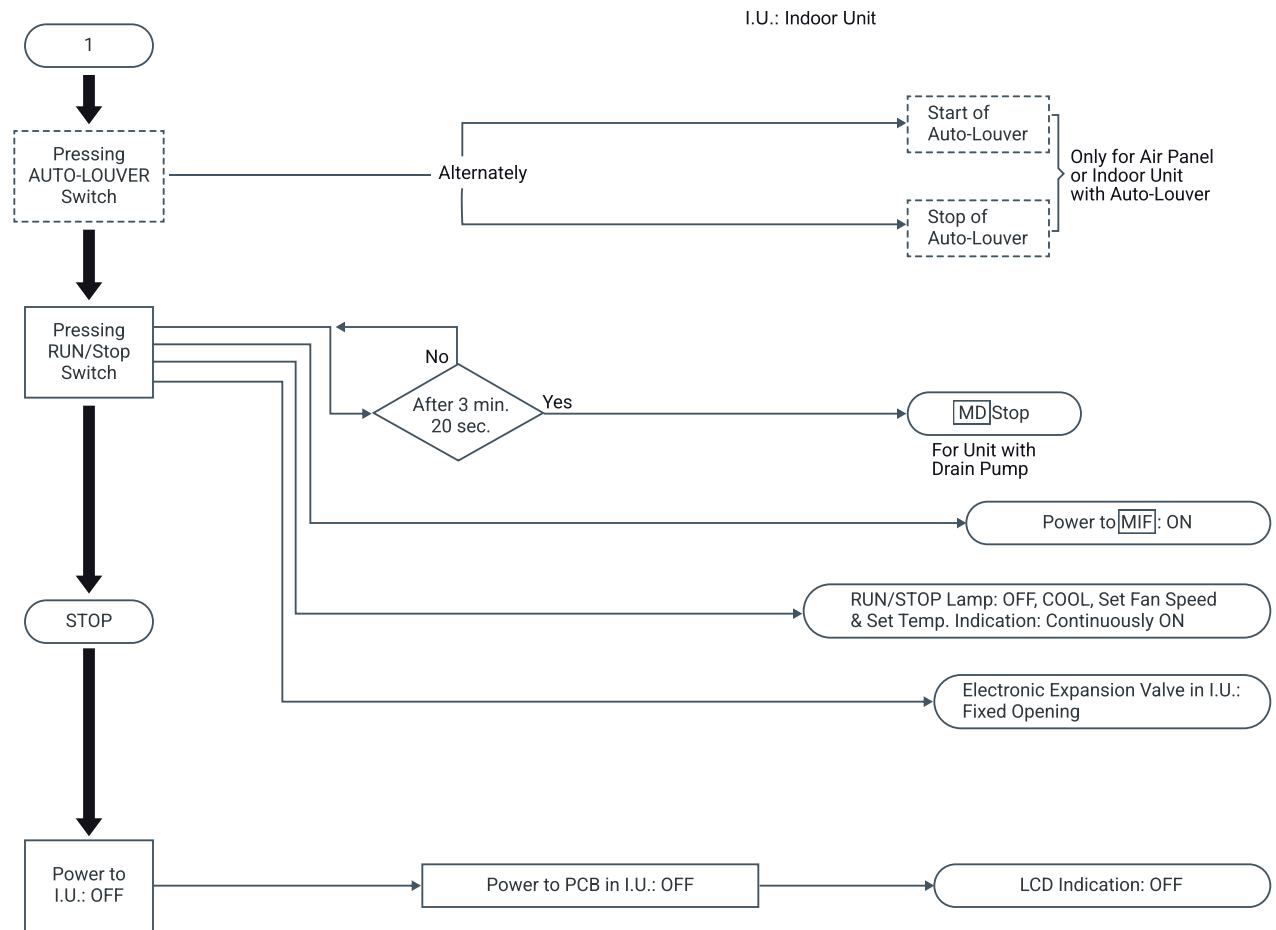
O.U.: Outdoor Unit



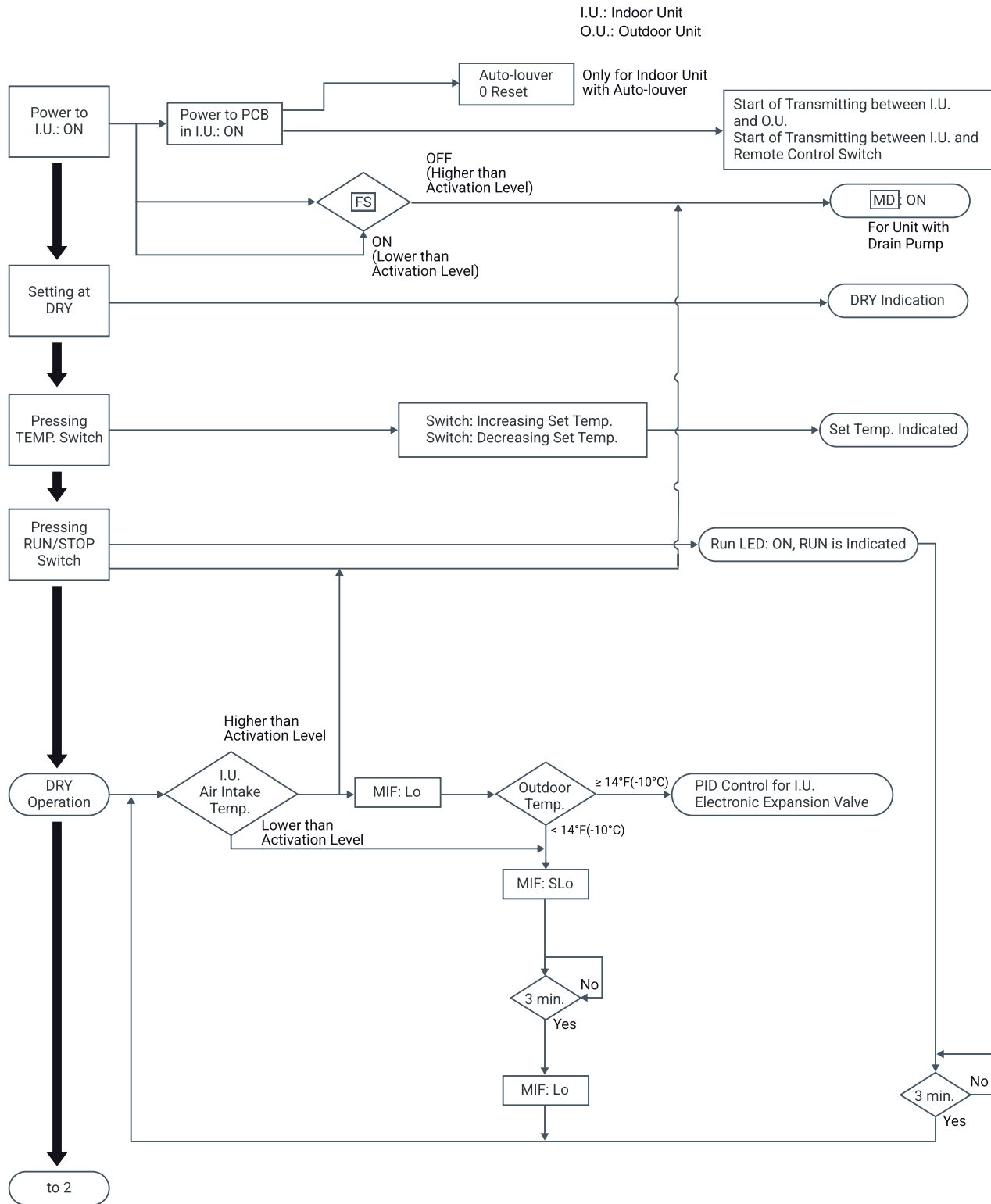
NOTE:

- ※ By pressing the FAN SPEED SWITCH of Remote Control Switch, indication of LCD changes as Hi→Me→Lo, but actual fan speed is “High” only.

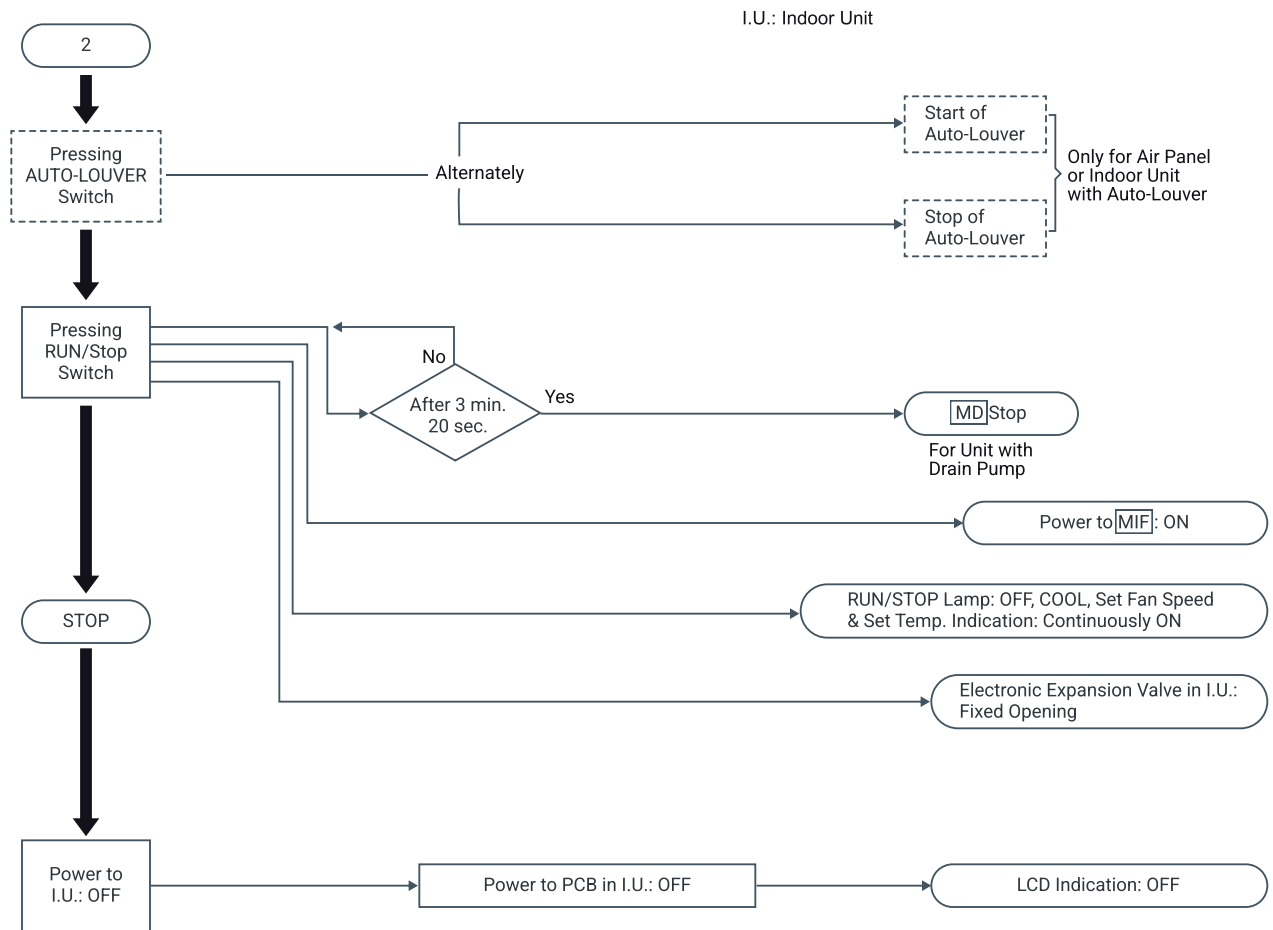
Cooling operation



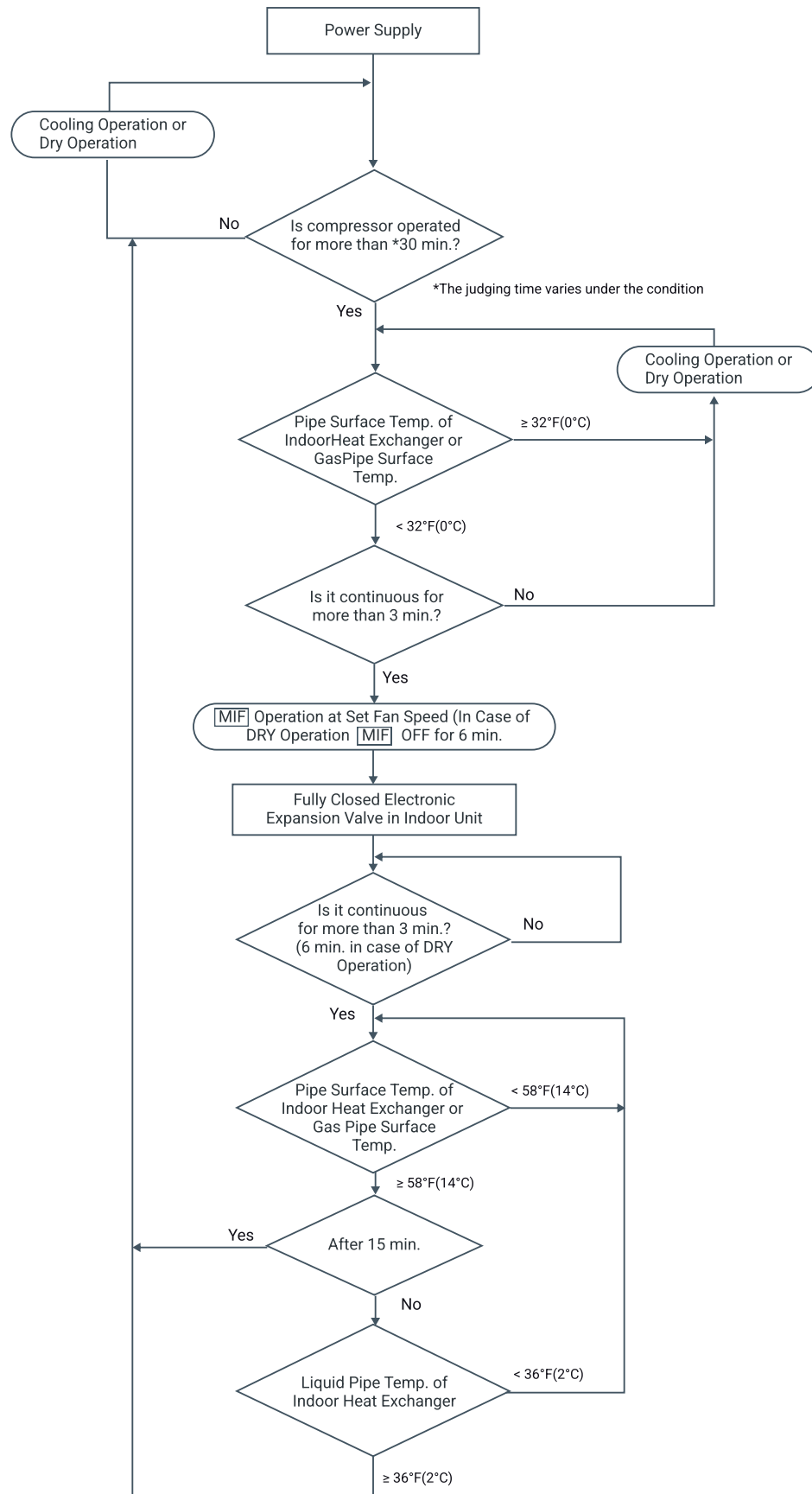
Dry run



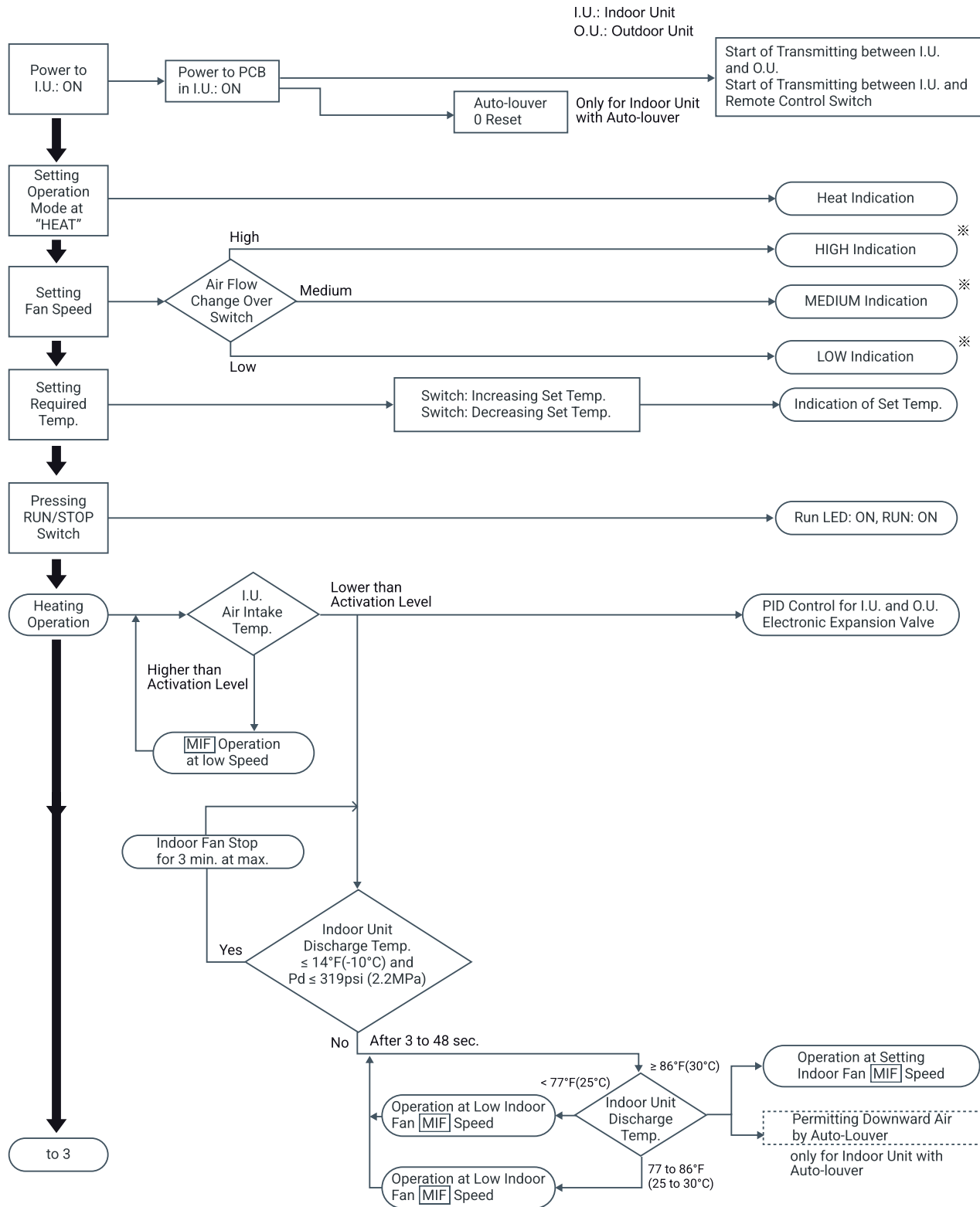
Dry run



Freeze protection control during the cool run



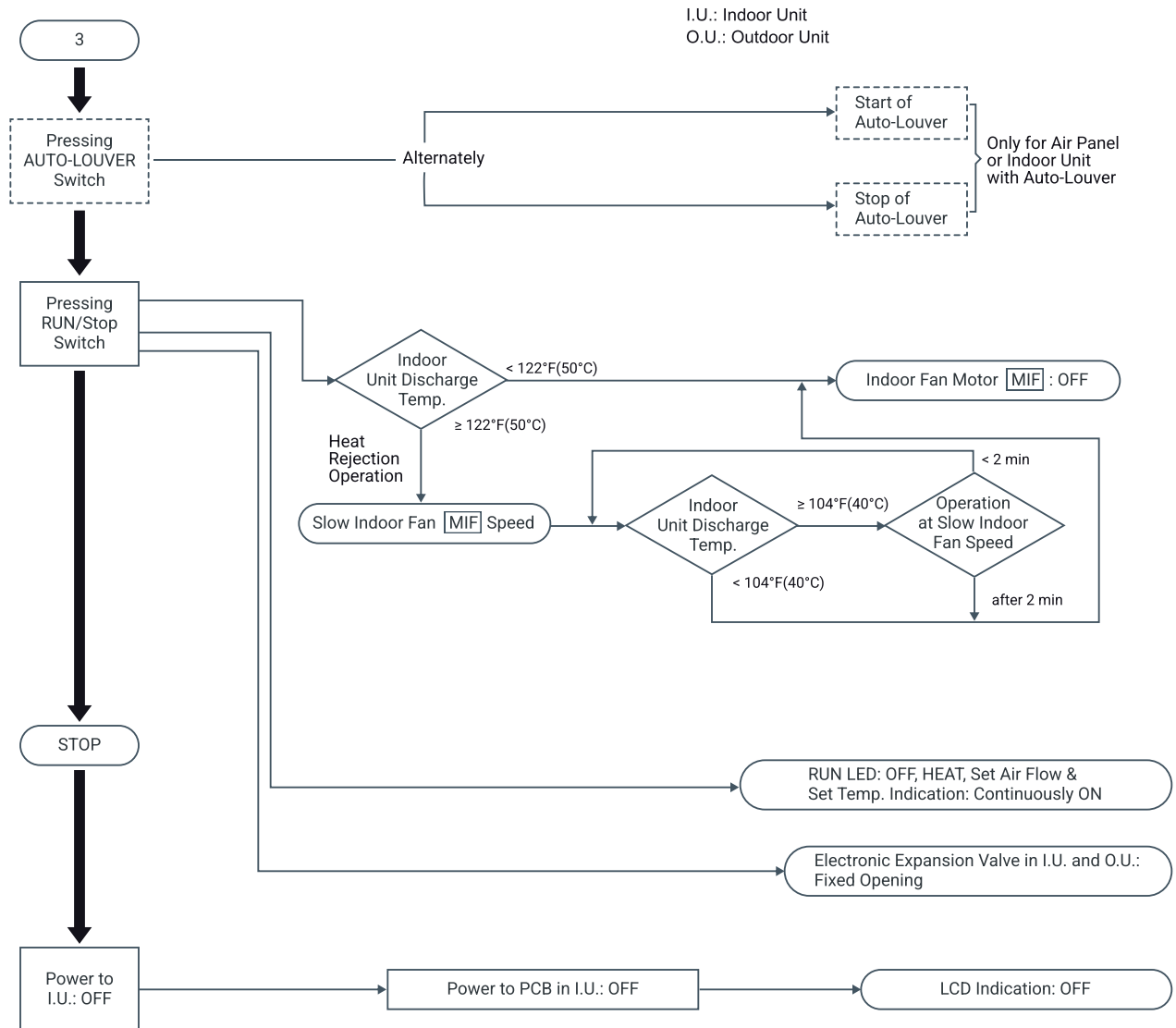
Heating operation



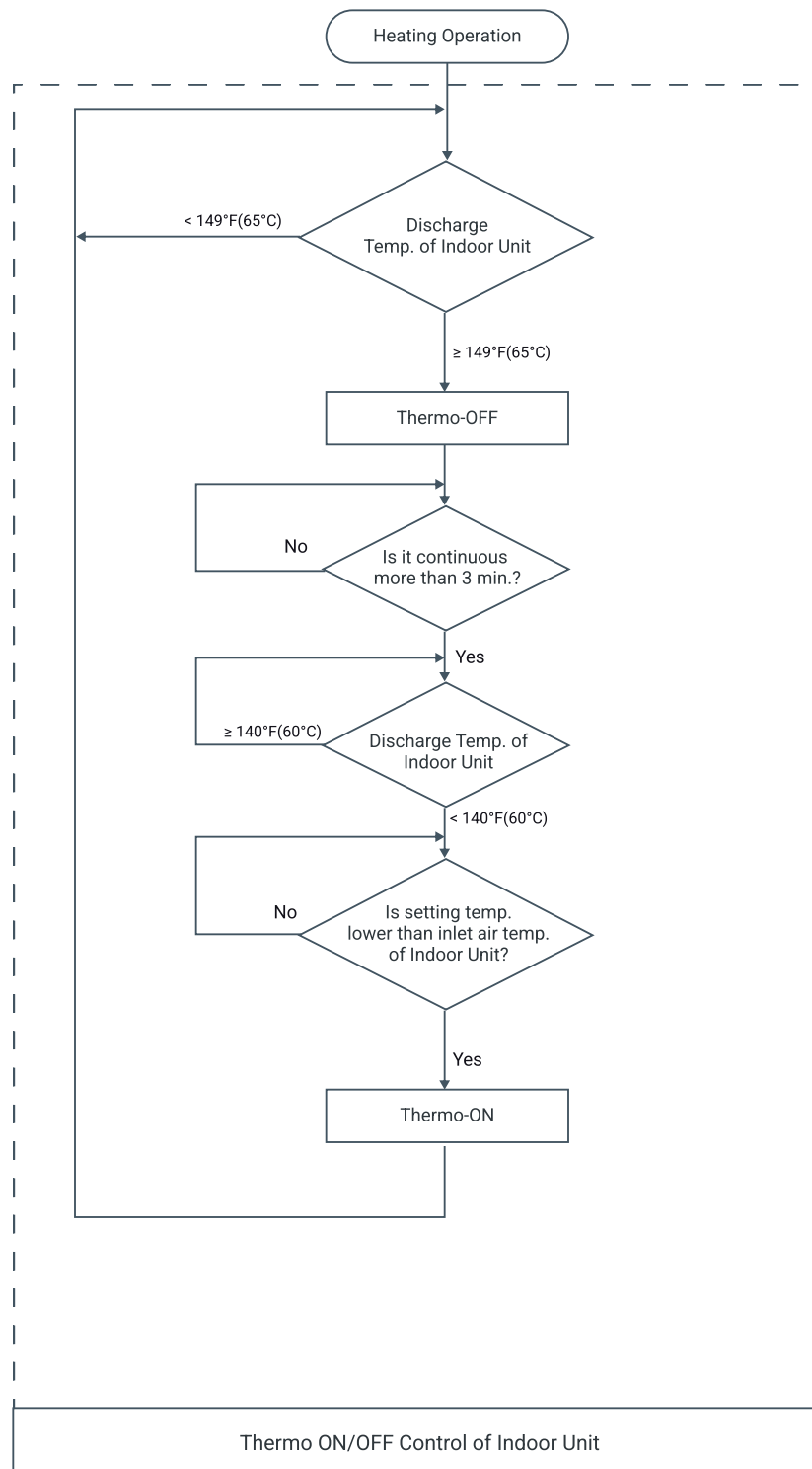
NOTE:

- ※ In case of CHV6-76 and 96, Fan Speed is "High" only.
By pressing the FAN SPEED SWITCH of Remote Control Switch, indication of LCD changes as Hi→Me→Lo, but actual fan speed is "High" only.

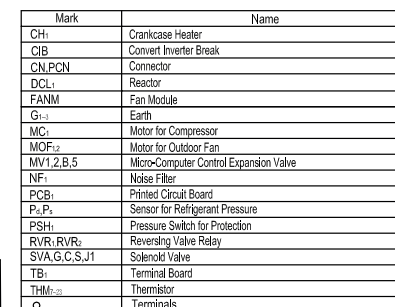
Heating operation



Supply air temperature overheat protection

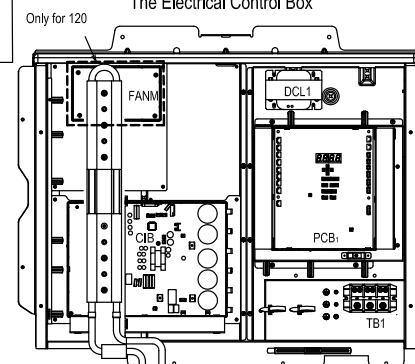


CHV6-72*~120*



Electrical Control Box of Outdoor Unit

The Electrical Control Box

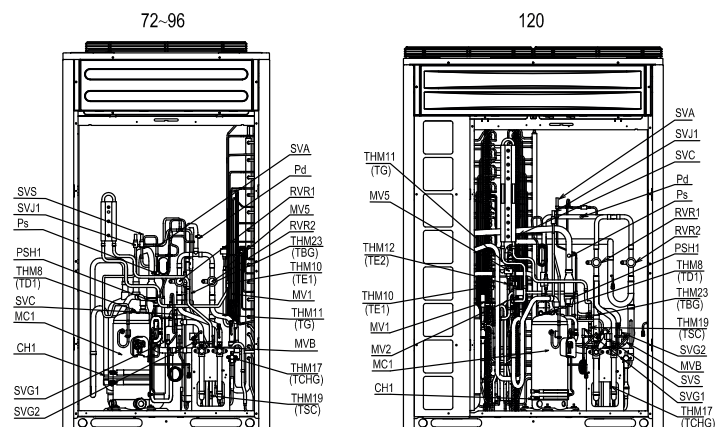


(1) Refrigerant and Oil Charge before Shipment

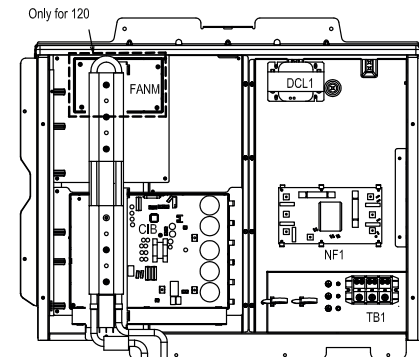
Outdoor Unit	W. Outdoor Unit Ref. Charge (lb/oz/g)	V Total Oil. Charge (gal/L)	V-Compressor Oil. Charge (gal/L)
72	13.2 (6.0)	1.6 (6.0)	0.6 (2.3)
96	13.2 (6.0)	1.6 (6.0)	0.6 (2.3)
120	19.4 (8.8)	1.9 (7.0)	0.6 (2.3)
144	21.6 (9.8)	2.2 (8.4)	1.2 (4.6)
168	21.6 (9.8)	2.2 (8.4)	1.2 (4.6)
192	25.4 (11.5)	2.3 (8.6)	1.2 (4.6)

1. All the field wiring and equipment must comply with local codes.

Location of Main Parts



Only for 120



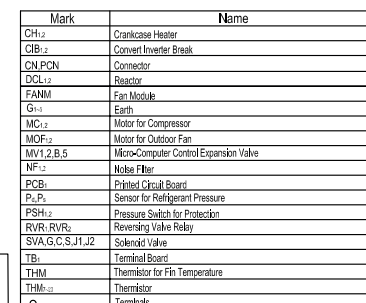
- (2) Additional Refrigerant Charge
- ① Additional Refrigerant Charge Calculation refers to the Technical Catalog
- ② Max. Additional Refrigerant Charge as the Table below

Outdoor Unit	Max Additional Charge(lbs/kg)
72	62.8(28.5)
96	67.2(30.5)
120	69.4(31.5)
144~168	76.1(34.5)
192~240	90.4(41.0)
264	100.3(45.5)
288~336	112.4(51.0)
360~384	126.8(57.5)
408~456	144.4(65.5)

- ### (3) Record of Refrigerant Charge

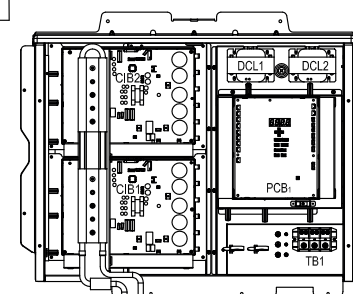
Total Additional Charge lbs(kg)
Total Ref. Charge of This System lbs(kg)
Date of Ref. Charge Work
Year Month Day

CHV6-144*~192*



Electrical Control Box of Outdoor Unit

The Electrical Control Box



Refrigerant Charge

(1) Refrigerant and Oil Charge before Shipment

Outdoor Unit	W. Outdoor Unit Ref. Charge [lb (kg)]	V Total Oil, Charge [gal (L)]	V. Compressor Oil, Charge [gal (L)]
72	13.2 (6.0)	1.6 (6.0)	0.6 (2.3)
96	13.2 (6.0)	1.6 (6.0)	0.6 (2.3)
120	19.4 (8.8)	1.9 (7.0)	0.6 (2.3)
144	21.6 (9.8)	2.2 (8.4)	1.2 (4.6)
168	21.6 (9.8)	2.2 (8.4)	1.2 (4.6)
192	25.4 (11.5)	2.3 (8.6)	1.2 (4.6)

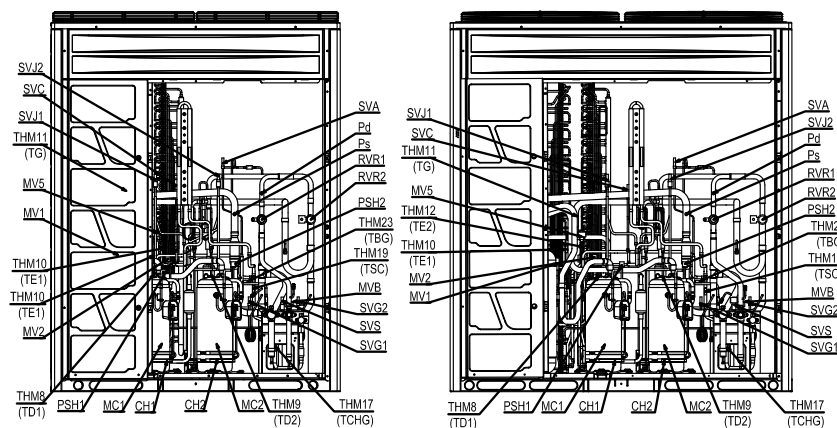
Note:

1. All the field wiring and equipment must comply with local codes.

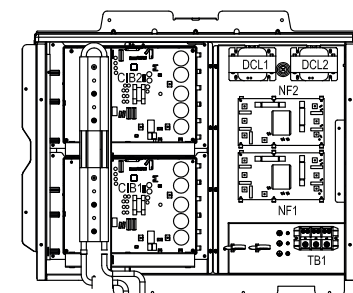
Location of Main Parts

144~168

192



The Electrical Control Box (opened the P separator)



(2) Additional Refrigerant Charge

- ① Additional Refrigerant Charge Calculation refers to the Technical Catalog
② Max. Additional Refrigerant Charge as the Table below

Outdoor Unit	Max Additional Charge(lbs/kg)
72	62.8(28.5)
96	67.2(30.5)
120	69.4(31.5)
144~168	76.1(34.5)
192~240	90.4(41.0)
264	100.3(45.5)
288~336	112.4(51.0)
360~384	126.8(57.5)
408~456	144.4(65.5)

(3) Record of Refrigerant Charge

Total Additional Charge lbs(kg)
Total Ref. Charge of This System lbs(kg)
Date of Ref. Charge Work
Year Month Day