Hisense

Qingdao Hisense Hitachi Air-conditioning Systems Co.,Ltd.

Add.: No. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, China

http://www.hisensehvac.com E-mail: hhexport@hisense.com

Specifications in this catalogue are subject to change without notice, in order that Hisense may bring the latest innovations to their customers.

TCY12019005L

Hisense

VRF AIR-CONDITIONER (HEAT RECOVERY)

TCY12019005L

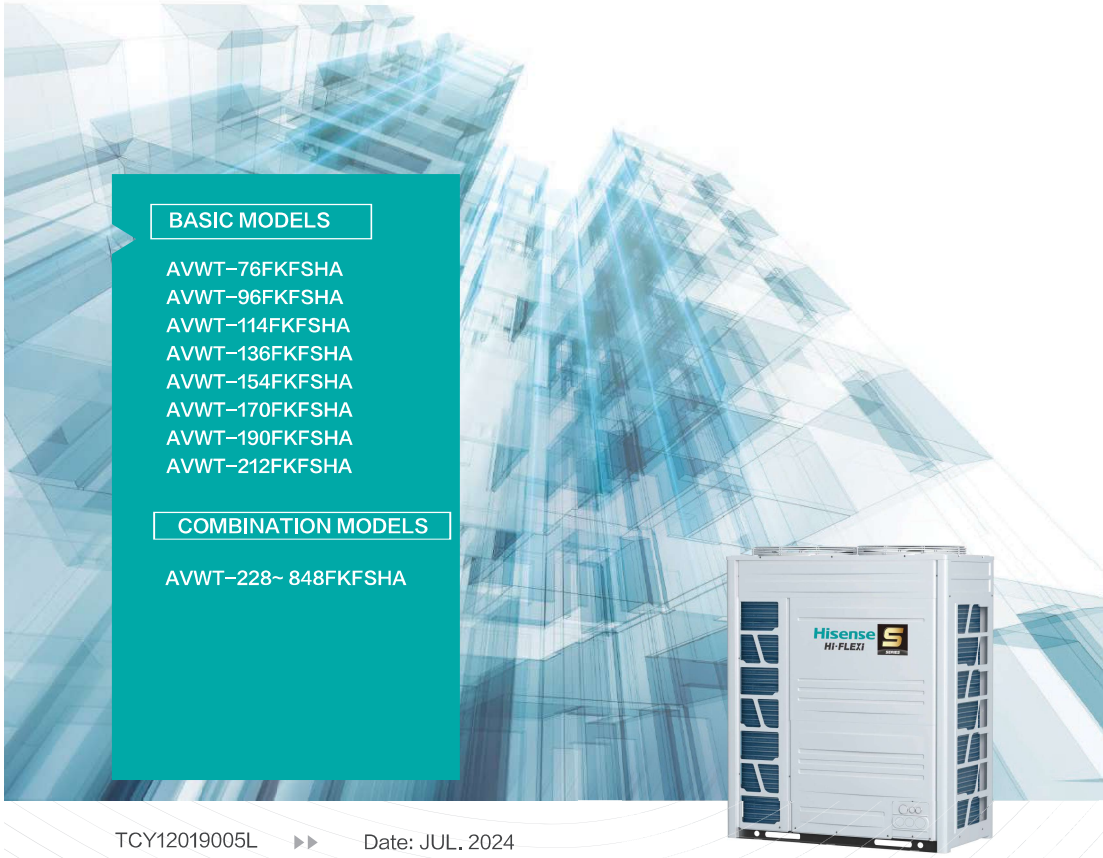
Hisense

VRF AIR-CONDITIONER

「HEAT RECOVERY」

Technical, Installation and Service Handbook

Hi-FLEXi S SERIES



TCY12019005L ▶▶ Date: JUL. 2024

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 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:

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

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

CAUTION : 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.
- HISENSE pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- HISENSE 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 purpose 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 a hot spring.
  * Places where strong salty wind blows such as coast regions , or places with an atmosphere of 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 fire.
- If you have any questions, contact your dealer or designated service center of HISENSE.
- To protect the environment, please do not discard the product at will, and HISENSE 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.

Indoor Unit-Cooling (℃)

	Maximum	Minimum
Indoor	32 DB/23 WB	21 DB/15 WB
Outdoor	52 DB *	-10 DB

Indoor Unit-Heating

	Maximum	Minimum
Indoor	27 DB	15 DB
Outdoor	16.5 WB	-25 WB**

Water Module Cooling

	Maximum	Minimum
Inlet water	25	10
Outdoor	48 DB	10 DB

Water Module Heating (Floor Heating)

	Maximum	Minimum
Inlet water	54	10
Outdoor	16.5 WB	-25 WB**

Water Module Heating (DHW)

	Maximum	Minimum
Inlet water	54	10
Outdoor	43 WB	-25 WB**

DB: Dry Bulb, WB: Wet Bulb

(*) 48℃ DB ~ 52℃ DB, Operation Control Range

(**) -20℃ WB ~ -25℃ WB, Operation Control Range

⚠ 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 fire, cut off the power immediately; do not touch the electrical parts by hand to avoid electric shock hazard.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical failure.
- 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.
- 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 refrigeration cycle when performing a leakage test or an air-tightness 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 ELB (Earth 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 one (1) meter 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 wire to gas pipe, water pipe, lighting conductor or ground wire for telephone.
- Before performing any brazing work, check to ensure that there is no flammable material around. When filling 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 a 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 fire may occur.
- Ensure that the outdoor unit is not covered with ice and snow before use.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. 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).

⚠ CAUTION

- Do not step on the product.
- Do not put any foreign matters on or inside the unit.
- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
- Starting the unit after longtime idleness requires the compressor temperature to meet the starting requirements or reach a certain heating time.

NOTE:

- It is recommended that the room will be ventilated every 3 to 4 hours.
- In some cases, the heat pump air conditioner may not operate properly in the following cases.
  * In case the power supplied by the power transformer is less than or equal to the electric power of the air conditioner.
  * In case the large power-consuming equipment is too close to the power supply wiring for the air conditioner, so that large surge voltage may be inducted in the power supply wiring of the air conditioner.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, auxiliary heating equipment is recommended on the job site when the unit is installed in a low temperature region.
- The repair and maintenance of this air conditioner can only be carried out by professional .

IMPORTANT NOTICE



Correct Disposal of this product

This mark indicates that this product should not be disposed with other household wastes. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact your retailer. They can take this product for environmentally safe recycling.

CHECKING PRODUCT RECEIVED

- Upon receiving this product, inspect it for any shipping damage.
  Claims for damage in a written form, either apparent or concealed, should be filled immediately with the shipping company.
- Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct. The standard utilization of the unit shall be explained in these instructions. Please contact your local agent, as the occasion arises.

  HISENSE's liability shall not cover defects arising from the alteration performed by a customer without HISENSE's consent in a written form.

-CONTENTS-

DESIGN

1. Introduction....1
   1.1 Models of Outdoor Unit....1
   1.2 Application Case....6
   1.3 Combination (High Efficiency Type)....8
2. General Data....10
   2.1 General Data....10
   2.2 Component Data....21
   2.3 Safety and Control Device Setting....23
   2.4 Sound Data....24
   2.5 Dimensional Data....26
   2.6 Structure....30
3. Piping System....34
   3.1 Connection of Refrigerant Pipes for 3 Pipes Heat Recovery System....34
   3.2 Connection of Refrigerant Pipes for 2 Pipes Heat Pump System....41
   3.3 Pipe Connection Design Guidance for 3 Pipes Heat Recovery System....47
   3.4 Pipe Connection Design Guidance for 2 Pipes Heat Pump System....50
   3.5 Calculation of Additional Refrigerant....53
   3.6 Piping Connection Kit Dimensions (optional)....55
4. Capacities and Selection Data....61
   4.1 Procedure for Selection of the System....61
   4.2 Capacity Correction Based on Refrigerant Piping Length....66
   4.3 Correction Factor According to Defrosting Operation....68
5. Control System....69
   5.1 Refrigerant Cycle....69
   5.2 Control Logic....72
   5.3 Standard Operation Procedure Chart....74

INSTALLATION

1. Structure....86
   1.1 Outdoor Unit & Refrigeration Cycle....86
   1.2 Necessary Tools and Instrument List for Installation....86
2. Transportation and Handling....88
   2.1 Transportation....88
   2.2 Hanging Method....89
3. Outdoor Unit Installation....90
   3.1 Service Space....90
   3.2 Factory-Supplied Accessories....92
   3.3 Installation....92
   3.4 Foundation....93
   3.5 Drain Water Treatment....94
4. Refrigerant Piping Work....96
   4.1 Piping Materials....96
   4.2 Flaring and Joint....97
   4.3 Caution about Outdoor Unit Installation....98
   4.4 Piping Connection....100
5. Electrical Wiring....104
   5.1 General Check....104
   5.2 Electrical Data....105
   5.3 Electrical Wiring Connection....106
   5.4 DIP Switch Setting of Outdoor Unit....109
6. Additional Refrigerant Charge....112
   6.1 Air-Tightness Test....112
   6.2 Vacuuming....113
   6.3 Charging Operation....114
7. Test Run....116
   7.1 Before Test Run....116
   7.2 Test Run....117

SERVICE

1. Troubleshooting 119
1.1 Initial Troubleshooting 119
1.1.1 Checking of Electrical Wiring and Power Supply 119
1.1.2 Checking of Rotary Switch and Dip Switch Setting 119
1.1.3 Checking by 7-Segment Display 121
1.1.4 Checking of Alarm Code History 122
1.1.5 Emergency Operation 125
1.1.6 Failure of Power Supply to Indoor Unit and Remote Control Switch 130
1.1.7 Abnormal Transmission between Remote Control Switch and Indoor Unit 131
1.1.8 Abnormalities of Devices 132
1.2 Troubleshooting Procedure 140
1.2.1 Alarm Code Table 140
1.2.2 Troubleshooting by Alarm Code 143
1.2.3 Troubleshooting in Check Mode by Remote Control Switch 202
1.2.3.1 Check mode 202
1.2.3.2 Alarm History Display 209
1.2.4 Troubleshooting by 7-Segment Display 210
1.2.5 Function of RSW, DSWs and LEDs 218

2. Servicing 228
2.1 Removing Front Service Cover 228
2.2 Attaching Front Service Cover 229
2.3 Removing Top Cover 230
2.4 Removing Shroud 231
2.5 Removing Electrical Box Cover 232
2.6 Removing Electrical Box 233
2.7 Removing E-Box Stay 234
2.8 Removing Air Grille 235
2.9 Removing Outdoor Fan 236
2.10 Removing Compressor 238
2.11 Replacing Refrigerant Oil 248
2.11.1 Replacing Refrigerant Oil (No Clogging in Return Oil Circuit) 248
2.11.2 Replacing Refrigerant Oil (Clogging in Return Oil Circuit) and Replacing Return Oil Circuit 249
2.12 Removing Coils 252
2.12.1 Removing Expansion Valve Coil (MV5, EVB, EVO1, EVO2) 254
2.12.2 Removing Solenoid Valve Coil (SVA, SVC, SVG, SVJ, SVS) 255
2.12.3 Removing Solenoid Valve (SVA ,SVC,SVG,SVJ and SVS) 256
2.12.4 Removing Reversing Valve Coil (RVR1, RVR2) 257
2.12.5 Removing Reversing Valve 258
2.13 Removing Stop Valve 260
2.14 Removing High Pressure Switch, High Pressure Sensor, Low Pressure Sensor and Thermistor 259
2.14.1 Removing High Pressure Switch (PSH1 and PSH2) 263
2.15 Removing Thermistor for Liquid Pipe 264
2.16 Removing Thermistor for Ambient Temperature 265
2.17 Removing Other Electrical Components 266
2.17.1 Removing Outdoor Unit PCB and Electrical Components for Electrical Box 267
2.17.2 Removing Inverter PCB 270
2.17.3 Mount the electrical box in the reverse procedure 271
2.18 Removing Components for SW BOX 272
2.18.1 Removing Service Cover for Electrical Box and Electronic Expansion Valve 272
2.18.2 Removing Electrical Components 274
2.18.3 Removing Electronic Expansion Valve Coil 277

3. Main Parts 280
3.1 Inverter 280
3.1.1 Specification of Inverter 280
3.1.2 Arrangement of Inverter Power Unit 281
3.1.3 Protective Function 282
3.1.4 Overload Protection Control 283
3.2 Electronic Expansion Valve 284
3.3 Pressure Sensor 285
3.4 Noise Filter (NF1, NF2) 286
3.5 Reactor (DCL1, DCL2) 288
4. Optional Function 290
4.1 Setting Method 290
4.2 External Input and Output Setting 291
4.2.1 Input Fixing Heating Operation Mode (Control Function No.1),
Input Fixing Cooling Operation Mode (Control Function No.2) 293
4.2.2 Input Demand Stoppage (Control Function No.3) 293
4.2.3 Input Outdoor Fan Motor Start/Stop (Control Function No.4) 294
4.2.4 Input Forced Stoppage (Control Function No.5) 295
4.2.5 Input Demand Current Control 40, 60, 70, 80, 100% (Control Function No.6 to 10) 295
4.2.6 Input Low Noise Setting 1, 2, 3 (Control Function No.11 to 13) 296
4.2.7 Output Operation Signal (Control Function No.1) 298
4.2.8 Output Alarm Signal (Control Function No.2) 298
4.2.9 Output Compressor ON Signal (Control Function No.3) 299
4.2.10 Output Defrosting Signal (Control Function No.4) 299
4.3 Function Setting 300
4.3.1 Circulator Function at Heating Thermo-OFF (Control Function FA) 302
4.3.2 Night-Shift (Low Noise) 303
4.3.3 Cancellation of Outdoor Ambient Temperature Limit 304
4.3.4 Defrost for Cold Area (Change of Defrost Condition) 304
4.3.5 SLo Defrost Setting 305
4.3.6 Capacity-Focused Mode Setting 305
4.3.7 Low Noise Setting 305
4.3.8 Demand Function Setting 306
4.3.9 Wave Function Setting 307
4.3.10 Cold Draft Protection 307
4.3.11 Adjustment of Fan Rotation 307
4.3.12 Outdoor Fan Motor Intermitted Operation Setting 308
4.3.13 Function Setting 309
5. Field Work Instruction 311
5.1 Caution for Refrigerant Leakage 311
5.2 Maintenance Work 313
5.3 Service and Maintenance Record by 7-Segment Display 314
5.4 Service and Maintenance Record by Remote Control Switch 315
5.5 Service & Maintenance Record 316
5.6 Saturation Curve for Refrigerant 317
5.7 Mollier Chart for R410A 318
6. Test Run 319
6.1 Test Run by Remote Control Switch 320
6.2 Test Run from Outdoor Unit Side 322
6.3 Checking at Test Run 324
6.4 Checking List for Refrigerant Cycle 325

DESIGN

1. Introduction

1.1 Models of Outdoor Unit

【Basic Unit】

Capacity (kBtu/h(HP))	76(8HP)	96(10HP)	114(12HP)	136(14HP)	154(16HP)
Model	AVWT-76FKFSHA	AVWT-96FKFSHA	AVWT-114FKFSHA	AVWT-136FKFSHA	AVWT-154FKFSHA

Capacity (kBtu/h(HP))	170(18HP)	190(20HP)	212(22HP)
Model	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA

Model 76~96



Model 114~136



Model 154~170



Model 190~212



【Combination Module】※

Capacity kBtu/h(HP)	228(24HP)	250(26HP)	272(28HP)	290(30HP)	308(32HP)
Model	AVWT-228FKFSHA	AVWT-250FKFSHA	AVWT-272FKFSHA	AVWT-290FKFSHA	AVWT-308FKFSHA
Combination	AVWT-114FKFSHA	AVWT-136FKFSHA	AVWT-136FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA
	AVWT-114FKFSHA	AVWT-114FKFSHA	AVWT-136FKFSHA	AVWT-136FKFSHA	AVWT-154FKFSHA

Capacity kBtu/h(HP)	324(34HP)	340(36HP)	360(38HP)	380(40HP)	402(42HP)
Model	AVWT-324FKFSHA	AVWT-340FKFSHA	AVWT-360FKFSHA	AVWT-380FKFSHA	AVWT-402FKFSHA
Combination	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA

Capacity kBtu/h(HP)	424(44HP)	444(46HP)	462(48HP)	478(50HP)	494(52HP)
Model	AVWT-424FKFSHA	AVWT-444FKFSHA	AVWT-462FKFSHA	AVWT-478FKFSHA	AVWT-494FKFSHA
Combination	AVWT-212FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
	AVWT-212FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA
	-	AVWT-136FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA

Capacity kBtu/h(HP)	510(54HP)	530(56HP)	550(58HP)	570(60HP)	592(62HP)
Model	AVWT-510FKFSHA	AVWT-530FKFSHA	AVWT-550FKFSHA	AVWT-570FKFSHA	AVWT-592FKFSHA
Combination	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA

Capacity kBtu/h(HP)	614(64HP)	636(66HP)	648(68HP)	664(70HP)	680(72HP)
Model	AVWT-614FKFSHA	AVWT-636FKFSHA	AVWT-648FKFSHA	AVWT-664FKFSHA	AVWT-680FKFSHA
Combination	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
			AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA

Capacity kBtu/h(HP)	700(74HP)	720(76HP)	740(78HP)	760(80HP)	782(82HP)
Model	AVWT-700FKFSHA	AVWT-720FKFSHA	AVWT-740FKFSHA	AVWT-760FKFSHA	AVWT-782FKFSHA
Combination	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA

Capacity kBtu/h(HP)	804(84HP)	826(86HP)	848(88HP)
Model	AVWT-804FKFSHA	AVWT-826FKFSHA	AVWT-848FKFSHA
Combination	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA
	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA
	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA
	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA

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

Model 228~272



Model 290



Model 308~340



Model 360



Model 380~424



Model 444



Model 462~510



Model 530



Model 550



Model 570~636



Model 648~680



Model 700



Model 720



Model 740

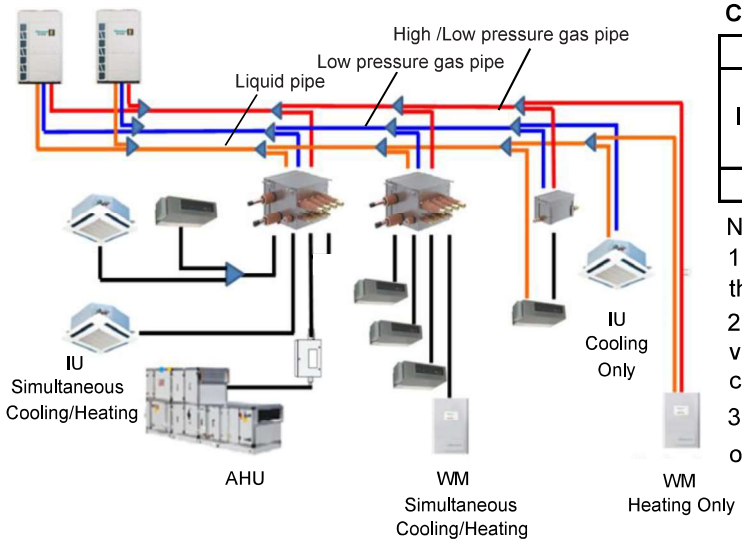


Model 760~848



1.2 Application Case

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



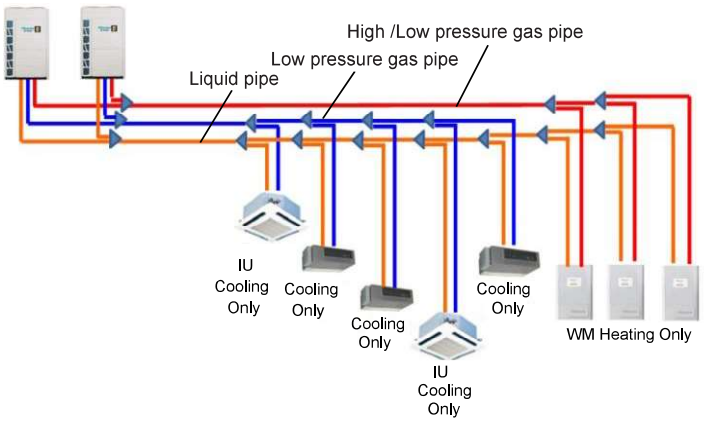
Capacity Ratio

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



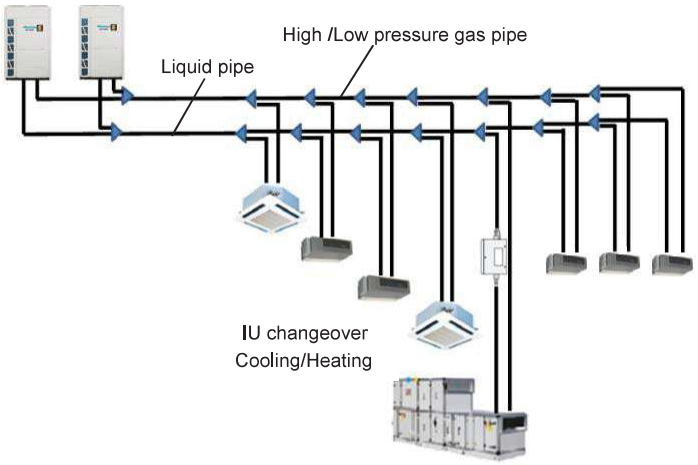
Capacity Ratio

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



Total Capacity Ratio	50%~150%

For operation temperature range, please refer to page i.

The following indoor units and water modules can be combined with the outdoor unit.

Table 1.1 Indoor Unit Type List

Type	Nominal Power (kBtu/h)																	
	05	07	09	12	14	15	17	18	19	22	24	27	28	30	38	48	54	76	96
Ceiling Ducted Type (Low Static Pressure)		●	●	●		●			●	●	●	●		●	●	●	●	●	●
Ceiling Ducted Type (High Static Pressure)		●	●	●		●			●	●	●	●		●	●	●	●	●	●
Low-Height Ceiling Ducted Type	●	●	●	●		●	●		●	●	●								
Low-Height Ceiling Ducted Type (DC)	●	●	●	●		●	●		●	●	●								
1-Way Cassette Type		●	●	●	●			●			●								
2-Way Cassette Type		●	●	●	●			●			●	●		●	●	●	●		
4-Way Cassette Type			●	●		●			●	●	●	●		●	●	●	●		
Mini 4-Way Cassette Type	●	●	●	●		●	●		●										
Wall-Mounted Type	●	●	●	●		●		●			●		●						
Ceiling and Floor Type							●	●		●	●	●		●	●	●			
Floor-Concealed Type			●		●			●			●								
Console Type	●	●	●	●		●	●												

● : available

Table 1.2 Water Module Type List

Water Module Type	Nominal Power(100W)	
	80	160
Wall-Mounted Type	○	○

○ Available

- The number of connectable indoor units with the outdoor unit is as follows. Comply with the condition as follows when installing the unit.
- A maximum total capacity of 150% and a minimum total capacity of 50% can be obtained by combination of the indoor units when compared with the nominal outdoor unit capacity.

1.3 Combination (High Efficiency Type)

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 (Chapter 1.2)	Max. Number of Connectable Water Modules for Application Case 2 (Chapter 1.2)
76 (8HP)	05	15	8	1	3
96 (10HP)		19	10	2	3
114 (12HP)		22	10	2	4
136 (14HP)		27	16	3	5
154 (16HP)		30	16	3	6
170 (18HP)		34	16	4	7
190 (20HP)		38	18	4	7
212 (22HP)		41	20	5	8
228 (24HP)		45	26	5	9
250 (26HP)		50	26	6	10
272 (28HP)		54	32	6	11
290 (30HP)		57	32	7	11
308 (32HP)		61	32	7	12
324 (34HP)		64	32	7	12
340 (36HP)		64	32	8	12
360 (38HP)		64	38	8	12
380 (40HP)		64	38	9	12
402 (42HP)		64	38	9	12
424 (44HP)		64	38	10	12
444 (46HP)		64	38	10	12
462 (48HP)		64	38	11	12
478 (50HP)		64	38	11	12
494 (52HP)		64	38	12	12
510 (54HP)		64	38	12	12
530 (56HP)		64	38	12	12
550 (58HP)		64	38	12	12
570 (60HP)		64	38	12	12

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 (Chapter 1.2)	Max. Number of Connectable Water Modules for Application Case 2 (Chapter 1.2)
592 (62HP)	05	64	38	12	12
614 (64HP)		64	38	12	12
636 (66HP)		64	38	12	12
648 (68HP)		64	38	12	12
664 (70HP)		64	38	12	12
680 (72HP)		64	38	12	12
700 (74HP)		64	38	12	12
720 (76HP)		64	38	12	12
740 (78HP)		64	38	12	12
760 (80HP)		64	38	12	12
782 (82HP)		64	38	12	12
804 (84HP)		64	38	12	12
826 (86HP)		64	38	12	12
848 (88HP)		64	38	12	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 -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 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 43℃ 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（kBtu/h）				76	96	114	136
Model			Outdoor Model	AVWT-76FKFSHA	AVWT-96FKFSHA	AVWT-114FKFSHA	AVWT-136FKFSHA
			Combination	AVWT-76FKFSHA	AVWT-96FKFSHA	AVWT-114FKFSHA	AVWT-136FKFSHA
				/	/	/	/
				/	/	/	/
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	22.4	28.0	33.5	40.0
			Btu/h	76400	95500	114300	136500
	Power Consumption		kW	4.77	6.67	7.25	8.70
	EER		W/W	4.70	4.20	4.62	4.60
	SEER		W/W	8.67	7.87	8.56	8.36
Heating Operation	Capacity (Max)		kW	25.0	31.5	37.5	45.0
			Btu/h	85300	107500	128000	153500
	Power Consumption (Max)		kW	4.88	6.29	7.50	10.47
	COP (Max)		W/W	5.12	5.01	5.00	4.30
	Capacity (Nom)		kW	22.4	28.0	33.5	40.0
			Btu/h	76400	95500	114300	136500
	Power Consumption (Nom)		kW	4.06	5.18	6.20	8.70
	COP (Nom)		W/W	5.52	5.41	5.40	4.60
	SCOP		W/W	4.11	4.21	4.24	3.88
Sound Pressure Level/Silent mode ※1			dB(A)	59/49	60/49	62/51	62/53
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×950×750	1730×950×750	1730×1210×750	1730×1210×750
Packing Dimensions (H×W×D)			mm	1950×1015×790	1950×1015×790	1950×1275×790	1950×1275×790
Net Weight / Gross Weight			kg	246/276	247/277	290/322	353/385
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	1	1	1	2
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	2.3/6	2.3/6	2.3/7	4.6/7.9
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	6.00	6.00	8.80	9.20
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	1	1	2	2
	Air Flow Rate		m^3/min	183	183	200	200
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ19.05	Φ22.20	Φ25.40	Φ25.40
	High/Low Pressure Gas Line		mm	Φ15.88	Φ19.05	Φ22.2	Φ22.2
	Liquid Line		mm	Φ9.53	Φ9.53	Φ12.70	Φ12.70
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ19.05	Φ22.20	Φ25.40	Φ25.40
	Liquid Line		mm	Φ9.53	Φ9.53	Φ12.70	Φ12.70
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions

Indoor Air Inlet Temperature: 27°C DB (80°F DB)
19°C WB (66.2°F WB)

Heating Operation Conditions

Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				154	170	190	212
Model			Outdoor Model	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
			Combination	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
				/	/	/	/
				/	/	/	/
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	45.0	50.0	56.0	61.5
			Btu/h	153500	170600	191100	209800
	Power Consumption		kW	11.22	12.69	14.36	18.41
	EER		W/W	4.01	3.94	3.90	3.34
	SEER		W/W	7.98	8.03	7.72	7.53
Heating Operation	Capacity (Max)		kW	50.0	56.0	63.0	69.0
			Btu/h	170600	191100	215000	235400
	Power Consumption (Max)		kW	11.88	13.97	15.75	20.18
	COP (Max)		W/W	4.21	4.01	4.00	3.42
	Capacity (Nom)		kW	45.0	50.0	56.0	61.5
			Btu/h	153500	170600	191100	209800
	Power Consumption (Nom)		kW	10.23	11.88	13.40	16.49
	COP (Nom)		W/W	4.40	4.21	4.18	3.73
	SCOP		W/W	3.85	4.10	4.08	4.03
Sound Pressure Level/Silent mode ※1			dB(A)	62/54	62/55	63/52	64/52
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×1350×750	1730×1350×750	1730×1600×750	1730×1600×750
Packing Dimensions (H×W×D)			mm	1950×1420×790	1950×1420×790	1950×1665×790	1950×1665×790
Net Weight / Gross Weight			kg	373/408	378/413	401/439	402/440
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	2	2	2	2
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	4.6/8	4.6/8	4.6/9	4.6/9
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	9.80	10.60	11.50	11.50
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	2	2	2	2
	Air Flow Rate		m^3/min	267	298	350	350
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ28.60	Φ28.60	Φ28.60	Φ28.60
	High/Low Pressure Gas Line		mm	Φ22.2	Φ22.2	Φ22.2	Φ25.4
	Liquid Line		mm	Φ12.70	Φ15.88	Φ15.88	Φ15.88
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ28.60	Φ28.60	Φ28.60	Φ28.60
	Liquid Line		mm	Φ12.70	Φ15.88	Φ15.88	Φ15.88
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				228	250	272	290
Model			Outdoor Model	AVWT-228FKFSHA	AVWT-250FKFSHA	AVWT-272FKFSHA	AVWT-290FKFSHA
			Combination	AVWT-114FKFSHA	AVWT-136FKFSHA	AVWT-136FKFSHA	AVWT-154FKFSHA
				AVWT-114FKFSHA	AVWT-114FKFSHA	AVWT-136FKFSHA	AVWT-136FKFSHA
				/	/	/	/
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	67.0	73.5	80.0	85.0
			Btu/h	228600	250800	273000	290000
	Power Consumption		kW	14.50	15.95	17.40	19.92
	EER		W/W	4.62	4.61	4.60	4.27
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	75.0	82.5	90.0	95.0
			Btu/h	255900	281500	307100	324100
	Power Consumption (Max)		kW	15.00	17.97	20.94	22.35
	COP (Max)		W/W	5.00	4.59	4.30	4.25
	Capacity (Nom)		kW	67.0	73.5	80.0	85.0
			Btu/h	228600	250800	273000	290000
	Power Consumption (Nom)		kW	12.40	14.90	17.40	18.93
	COP (Nom)		W/W	5.40	4.93	4.60	4.49
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	65/54	65/55	65/56	65/57
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×2420×750	1730×2420×750	1730×2420×750	1730×2560×750
Packing Dimensions (H×W×D)			mm	1950×2550×790	1950×2550×790	1950×2550×790	1950×2695×790
Net Weight / Gross Weight			kg	580/644	643/707	706/770	726/793
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	2	3	4	4
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	4.6/14	6.9/14.9	9.2/15.8	9.2/15.9
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	17.60	18.00	18.40	19.00
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	4	4	4	4
	Air Flow Rate		m^3/min	400	400	400	467
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ28.60	Φ31.75	Φ31.75	Φ31.75
	High/Low Pressure Gas Line		mm	Φ25.4	Φ25.4	Φ28.6	Φ28.6
	Liquid Line		mm	Φ15.88	Φ19.05	Φ19.05	Φ19.05
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ28.60	Φ31.75	Φ31.75	Φ31.75
	Liquid Line		mm	Φ15.88	Φ19.05	Φ19.05	Φ19.05
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				308	324	340	360
Model			Outdoor Model	AVWT-308FKFSHA	AVWT-324FKFSHA	AVWT-340FKFSHA	AVWT-360FKFSHA
			Combination	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA
				AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
				/	/	/	/
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	90.0	95.0	100.0	106.0
			Btu/h	307100	324100	341200	361700
	Power Consumption		kW	22.44	23.91	25.38	27.05
	EER		W/W	4.01	3.97	3.94	3.92
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	100.0	106.0	112.0	119.0
			Btu/h	341200	361700	382100	406000
	Power Consumption (Max)		kW	23.76	25.85	27.94	29.72
	COP (Max)		W/W	4.21	4.10	4.01	4.00
	Capacity (Nom)		kW	90.0	95.0	100.0	106.0
			Btu/h	307100	324100	341200	361700
	Power Consumption (Nom)		kW	20.46	22.11	23.76	25.28
	COP (Nom)		W/W	4.40	4.30	4.21	4.19
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	65/57	65/58	65/58	66/57
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×2700×750	1730×2700×750	1730×2700×750	1730×2950×750
Packing Dimensions (H×W×D)			mm	1950×2840×790	1950×2840×790	1950×2840×790	1950×3085×790
Net Weight / Gross Weight			kg	746/816	751/821	756/826	779/852
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	4	4	4	4
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	9.2/16	9.2/16	9.2/16	9.2/17
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	19.60	20.40	21.20	22.10
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	4	4	4	4
	Air Flow Rate		m^3/min	534	565	596	648
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ31.75	Φ31.75	Φ38.1	Φ38.1
	High/Low Pressure Gas Line		mm	Φ28.6	Φ28.6	Φ28.6	Φ31.75
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ31.75	Φ31.75	Φ38.1	Φ38.1
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				380	402	424	444
Model			Outdoor Model	AVWT-380FKFSHA	AVWT-402FKFSHA	AVWT-424FKFSHA	AVWT-444FKFSHA
			Combination	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-154FKFSHA
				AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-154FKFSHA
				/	/	/	AVWT-136FKFSHA
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	112.0	117.5	123.0	130.0
			Btu/h	382100	400900	419700	443600
	Power Consumption		kW	28.72	32.77	36.82	31.14
	EER		W/W	3.90	3.59	3.34	4.17
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	126.0	132.0	138.0	145.0
			Btu/h	429900	450400	470900	494700
	Power Consumption (Max)		kW	31.50	35.93	40.36	34.23
	COP (Max)		W/W	4.00	3.67	3.42	4.24
	Capacity (Nom)		kW	112.0	117.5	123.0	130.0
			Btu/h	382100	400900	419700	443600
	Power Consumption (Nom)		kW	26.80	29.89	32.98	29.16
	COP (Nom)		W/W	4.18	3.93	3.73	4.46
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	66/55	67/55	67/55	67/58
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×3200×750	1730×3200×750	1730×3200×750	1730×3910×750
Packing Dimensions (H×W×D)			mm	1950×3330×790	1950×3330×790	1950×3330×790	1950×4115×790
Net Weight / Gross Weight			kg	802/878	803/879	804/880	1099/1201
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	4	4	4	6
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	9.2/18	9.2/18	9.2/18	13.8/23.9
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	23.00	23.00	23.00	28.80
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	4	4	4	6
	Air Flow Rate		m^3/min	700	700	700	734
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
	High/Low Pressure Gas Line		mm	Φ31.75	Φ31.75	Φ31.75	Φ31.75
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				462	478	494	510
Model			Outdoor Model	AVWT-462FKFSHA	AVWT-478FKFSHA	AVWT-494FKFSHA	AVWT-510FKFSHA
			Combination	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
				AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
				AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	135.0	140.0	145.0	150.0
			Btu/h	460600	477700	494700	511800
	Power Consumption		kW	33.66	35.13	36.60	38.07
	EER		W/W	4.01	3.99	3.96	3.94
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	150.0	156.0	162.0	168.0
			Btu/h	511800	532300	552700	573200
	Power Consumption (Max)		kW	35.64	37.73	39.82	41.91
	COP (Max)		W/W	4.21	4.13	4.07	4.01
	Capacity (Nom)		kW	135.0	140.0	145.0	150.0
			Btu/h	460600	477700	494700	511800
	Power Consumption (Nom)		kW	30.69	32.34	33.99	35.64
	COP (Nom)		W/W	4.40	4.33	4.27	4.21
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	67/59	67/59	67/59	67/60
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×4050×750	1730×4050×750	1730×4050×750	1730×4050×750
Packing Dimensions (H×W×D)			mm	1950×4260×790	1950×4260×790	1950×4260×790	1950×4260×790
Net Weight / Gross Weight			kg	1119/1224	1124/1229	1129/1234	1134/1239
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	6	6	6	6
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	13.8/24	13.8/24	13.8/24	13.8/24
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	29.40	30.20	31.00	31.80
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	6	6	6	6
	Air Flow Rate		m^3/min	801	832	863	894
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
	High/Low Pressure Gas Line		mm	Φ31.75	Φ31.75	Φ31.75	Φ31.75
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ38.1	Φ38.1	Φ38.1	Φ38.1
	Liquid Line		mm	Φ19.05	Φ19.05	Φ19.05	Φ19.05
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				530	550	570	592
Model			Outdoor Model	AVWT-530FKFSHA	AVWT-550FKFSHA	AVWT-570FKFSHA	AVWT-592FKFSHA
			Combination	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
				AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
				AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
				/	/	/	/
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	156.0	162.0	168.0	173.5
			Btu/h	532300	552700	573200	592000
	Power Consumption		kW	39.74	41.41	43.08	47.13
	EER		W/W	3.93	3.91	3.90	3.68
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	175.0	182.0	189.0	195.0
			Btu/h	597100	621000	644900	665300
	Power Consumption (Max)		kW	43.69	45.47	47.25	51.68
	COP (Max)		W/W	4.01	4.00	4.00	3.77
	Capacity (Nom)		kW	156.0	162.0	168.0	173.5
			Btu/h	532300	552700	573200	592000
	Power Consumption (Nom)		kW	37.16	38.68	40.20	43.29
	COP (Nom)		W/W	4.20	4.19	4.18	4.01
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	67/59	67/58	68/57	68/57
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×4300×750	1730×4550×750	1730×4800×750	1730×4800×750
Packing Dimensions (H×W×D)			mm	1950×4505×790	1950×4750×790	1950×4995×790	1950×4995×790
Net Weight / Gross Weight			kg	1157/1265	1180/1291	1203/1317	1204/1318
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	6	6	6	6
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	13.8/25	13.8/26	13.8/27	13.8/27
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	32.70	33.60	34.50	34.50
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	6	6	6	6
	Air Flow Rate		m^3/min	946	998	1050	1050
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ41.3	Φ44.5	Φ44.5	Φ44.5
	High/Low Pressure Gas Line		mm	Φ38.1	Φ41.3	Φ41.3	Φ41.3
	Liquid Line		mm	Φ22.2	Φ22.2	Φ22.2	Φ22.2
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ41.3	Φ44.5	Φ44.5	Φ44.5
	Liquid Line		mm	Φ22.2	Φ22.2	Φ22.2	Φ22.2
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				614	636	648	664
Model			Outdoor Model	AVWT-614FKFSHA	AVWT-636FKFSHA	AVWT-648FKFSHA	AVWT-664FKFSHA
			Combination	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
				AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
				AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-154FKFSHA	AVWT-170FKFSHA
				/	/	AVWT-154FKFSHA	AVWT-154FKFSHA
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	179.0	184.5	190.0	195.0
			Btu/h	610700	629500	648300	665300
	Power Consumption		kW	51.18	55.23	47.82	49.29
	EER		W/W	3.50	3.34	3.97	3.96
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	201.0	207.0	212.0	218.0
			Btu/h	685800	706300	723300	743800
	Power Consumption (Max)		kW	56.11	60.54	51.70	53.79
	COP (Max)		W/W	3.58	3.42	4.10	4.05
	Capacity (Nom)		kW	179.0	184.5	190.0	195.0
			Btu/h	610700	629500	648300	665300
	Power Consumption (Nom)		kW	46.38	49.47	44.22	45.87
	COP (Nom)		W/W	3.86	3.73	4.30	4.25
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	68/57	69/57	68/61	68/61
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×4800×750	1730×4800×750	1730×5400×750	1730×5400×750
Packing Dimensions (H×W×D)			mm	1950×4995×790	1950×4995×790	1950×5680×790	1950×5680×790
Net Weight / Gross Weight			kg	1205/1319	1206/1320	1502/1642	1507/1647
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	6	6	8	8
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	13.8/27	13.8/27	18.4/32	18.4/32
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	34.50	34.50	40.80	41.60
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	6	6	8	8
	Air Flow Rate		m^3/min	1050	1050	1130	1161
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ44.5	Φ44.5	Φ50.8	Φ50.8
	High/Low Pressure Gas Line		mm	Φ41.3	Φ41.3	Φ44.5	Φ44.5
	Liquid Line		mm	Φ22.2	Φ22.2	Φ25.4	Φ25.4
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ44.5	Φ44.5	Φ50.8	Φ50.8
	Liquid Line		mm	Φ22.2	Φ22.2	Φ25.4	Φ25.4
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				680	700	720	740
Model			Outdoor Model	AVWT-680FKFSHA	AVWT-700FKFSHA	AVWT-720FKFSHA	AVWT-740FKFSHA
			Combination	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
				AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
				AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-190FKFSHA
				AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA	AVWT-170FKFSHA
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	200.0	206.0	212.0	218.0
			Btu/h	682400	702900	723300	743800
	Power Consumption		kW	50.76	52.43	54.10	55.77
	EER		W/W	3.94	3.93	3.92	3.91
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	224.0	231.0	238.0	245.0
			Btu/h	764300	788200	812100	835900
	Power Consumption (Max)		kW	55.88	57.66	59.44	61.22
	COP (Max)		W/W	4.01	4.01	4.00	4.00
	Capacity (Nom)		kW	200.0	206.0	212.0	218.0
			Btu/h	682400	702900	723300	743800
	Power Consumption (Nom)		kW	47.52	49.04	50.56	52.08
	COP (Nom)		W/W	4.21	4.20	4.19	4.19
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	68/61	68/60	69/60	69/59
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×5400×750	1730×5650×750	1730×5900×750	1730×6150×750
Packing Dimensions (H×W×D)			mm	1950×5680×790	1950×5925×790	1950×6170×790	1950×6415×790
Net Weight / Gross Weight			kg	1512/1652	1535/1678	1558/1704	1581/1730
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	8	8	8	8
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	18.4/32	18.4/33	18.4/34	18.4/35
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	42.40	43.30	44.20	45.10
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	8	8	8	8
	Air Flow Rate		m^3/min	1192	1244	1296	1348
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
	High/Low Pressure Gas Line		mm	Φ44.5	Φ44.5	Φ44.5	Φ44.5
	Liquid Line		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
	Liquid Line		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				760	782	804	826
Model			Outdoor Model	AVWT-760FKFSHA	AVWT-782FKFSHA	AVWT-804FKFSHA	AVWT-826FKFSHA
			Combination	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA
				AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA	AVWT-212FKFSHA
				AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-212FKFSHA
				AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA	AVWT-190FKFSHA
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz			
Cooling Operation	Nominal Capacity		kW	224.0	229.5	235.0	240.5
			Btu/h	764300	783100	801800	820600
	Power Consumption		kW	57.44	61.49	65.54	69.59
	EER		W/W	3.90	3.73	3.59	3.46
	SEER		W/W	-	-	-	-
Heating Operation	Capacity (Max)		kW	252.0	258.0	264.0	270.0
			Btu/h	859800	880300	900800	921200
	Power Consumption (Max)		kW	63.00	67.43	71.86	76.29
	COP (Max)		W/W	4.00	3.83	3.67	3.54
	Capacity (Nom)		kW	224.0	229.5	235.0	240.5
			Btu/h	764300	783100	801800	820600
	Power Consumption (Nom)		kW	53.60	56.69	59.78	62.87
	COP (Nom)		W/W	4.18	4.05	3.93	3.83
	SCOP		W/W	-	-	-	-
Sound Pressure Level/Silent mode ※1			dB(A)	69/58	69/58	70/58	70/58
Cabinet Color			—	Grayish White			
Outer Dimensions (H×W×D)			mm	1730×6400×750	1730×6400×750	1730×6400×750	1730×6400×750
Packing Dimensions (H×W×D)			mm	1950×6660×790	1950×6660×790	1950×6660×790	1950×6660×790
Net Weight / Gross Weight			kg	1604/1756	1605/1757	1606/1758	1607/1759
Refrigerating Installation	Compressor Type		—	Scroll Comp			
	Compressor Quantity		—	8	8	8	8
	Refrigeration Oil	Type	—	FVC68D			
		Brand	—	Idemitsu Kosan			
		Charge (Comp./Total)	L	18.4/36	18.4/36	18.4/36	18.4/36
	Refrigerant	Type	—	R410A			
		Charge Quantity	kg	46.00	46.00	46.00	46.00
	Chargeless Length		m	0			
	Max.Piping Length		m	1000			
	Connections Refrigerant Piping		—	Brazing			
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve			
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube			
Pressure(High/Low Pressure)			MPa	4.15/2.21	4.15/2.21	4.15/2.21	4.15/2.21
Fan	Condenser Fan Quantity		—	8	8	8	8
	Air Flow Rate		m^3/min	1400	1400	1400	1400
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
	High/Low Pressure Gas Line		mm	Φ44.5	Φ44.5	Φ44.5	Φ44.5
	Liquid Line		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ50.8	Φ50.8	Φ50.8	Φ50.8
	Liquid Line		mm	Φ25.4	Φ25.4	Φ25.4	Φ25.4
Hole for Power Supply Wiring			mm	46	46	46	46
Hole for Control Line Wiring			mm	20	20	20	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

Capacity（kBtu/h）				848
Model			Outdoor Model	AVWT-848FKFSHA
			Combination	AVWT-212FKFSHA
				AVWT-212FKFSHA
				AVWT-212FKFSHA
				AVWT-212FKFSHA
Power Supply			—	AC 3Φ 380~415V/50Hz/60Hz
Cooling Operation	Nominal Capacity		kW	246.0
			Btu/h	839400
	Power Consumption		kW	73.64
	EER		W/W	3.34
	SEER		W/W	-
Heating Operation	Capacity (Max)		kW	276.0
			Btu/h	941700
	Power Consumption (Max)		kW	80.72
	COP (Max)		W/W	3.42
	Capacity (Nom)		kW	246.0
			Btu/h	839400
	Power Consumption (Nom)		kW	65.96
	COP (Nom)		W/W	3.73
	SCOP		W/W	-
Sound Pressure Level/Silent mode ※1			dB(A)	70/58
Cabinet Color			—	Grayish White
Outer Dimensions (H×W×D)			mm	1730×6400×750
Packing Dimensions (H×W×D)			mm	1950×6660×790
Net Weight / Gross Weight			kg	1608/1760
Refrigerating Installation	Compressor Type		—	Scroll Comp
	Compressor Quantity		—	8
	Refrigeration Oil	Type	—	FVC68D
		Brand	—	Idemitsu Kosan
		Charge (Comp./Total)	L	18.4/36
	Refrigerant	Type	—	R410A
		Charge Quantity	kg	46.00
	Chargeless Length		m	0
	Max.Piping Length		m	1000
	Connections Refrigerant Piping		—	Brazing
	Refrigerant Flow Control		—	Micro-computer Control Expansion Valve
	Heat Exchanger Type			Multi-Pass Cross-Finned Tube
Pressure(High/Low Pressure)			MPa	4.15/2.21
Fan	Condenser Fan Quantity		—	8
	Air Flow Rate		m^3/min	1400
Heat Recovery Operation System	Low Pressure Gas Line		mm	Φ50.8
	High/Low Pressure Gas Line		mm	Φ44.5
	Liquid Line		mm	Φ25.4
Heat Pump Operation System	High/Low Pressure Gas Line		mm	Φ50.8
	Liquid Line		mm	Φ25.4
Hole for Power Supply Wiring			mm	46
Hole for Control Line Wiring			mm	20

The above cooling and heating capacities show the capacities when the outdoor unit is operated with the 100% rating of indoor units,

Cooling Operation Conditions
Indoor Air Inlet Temperature: 27℃ DB (80°F DB)
19℃ WB (66.2°F WB)

Heating Operation Conditions
Indoor Air Inlet Temperature: 20°C DB (68°F DB)
Outdoor Air Inlet Temperature: 7°C DB (45°F DB)
6°C WB (43°F WB)

Outdoor Air Inlet Temperature: 35°C DB (95°F DB)
Piping Length: 7.5 meters, Piping Lift: 0 meter

※ 1: The sound pressure is tested according to the appendix B of EN14511. The above parameters were measured in an anechoic chamber with no echo, so the echo should be considered in the field. When return air grille is on bottom plate of the duct or external static pressure is higher, the sound pressure will increase according to the installation method and building structure.

2.2 Component Data

Outdoor Heat Exchanger, Fan and Fan Motor

Model				AVWT-76*	AVWT-96*	AVAWT-114*	AVWT-136*
Heat Exchanger	Heat exchanger type		-	Multi-way cross-flow finned tube type			
	Tube	Material	-	Copper			
		Outside diameter	mm	7			
		Rows	-	3	3	3	3
	Fin	Material	-	Aluminum			
		Pitch	mm	1.7	1.7	1.7	1.7
	Quantity		-	1	1	2	2
	Max. operating pressure		MPa	4.15			
	Max. frontal area		m^2	2.43	2.43	3.26	3.26
Fan Part	Fan	Type	-	Axial-flow Fan			
		Quantity	-	1	1	2	2
		Outside diameter	mm	644	644	544	544
		Rotating speed	rpm	870	870	1185	1185
	Fan motor	Type	-	Waterproof three-phase motor			
		Start-up mode	-	Soft driving			
		Nominal output power	W	660	660	430+430	460+460
		Quantity	-	1	1	1	2
		Insulation grade	-	E	E	E	E

Model				AVWT-154*	AVWT-170*	AVAWT-190*	AVWT-212*
Heat Exchanger	Heat exchanger type		-	Multi-way Cross-flow Finned Tube Type			
	Tube	Material	-	Copper			
		Outside diameter	mm	7			
		Rows	-	3	3	3	3
	Fin	Material	-	Aluminum			
		Pitch	mm	1.7	1.7	1.7	1.7
	Quantity		-	2	2	2	2
	Max. operating pressure		MPa	4.15			
	Max. frontal area		m^2	3.66	3.66	3.98	3.98
Fan Part	Fan	Type	-	Axial-flow Fan			
		Quantity	-	2	2	2	2
		Outside diameter	mm	644	644	644	644
		Rotating speed	rpm	960	960	960	960
	Fan motor	Type	-	Waterproof three-phase motor			
		Start-up mode	-	Soft driving			
		Nominal output power	W	660+660	730+730	800+800	820+820
		Quantity	-	2	2	2	2
		Insulation grade	-	E	E	E	E

Parameters of Compressor

Compressor Model			ANB52FZFMT	ANB66FZCMT	ANB78FZCMT
Design Pressure	High Side	MPa	4.15		
	Low Side	MPa	2.21		
Compressor Motor	Model	-	Three-phase sync motor		
	Start-up mode	-	VFD		
	Polarities	-	6		
	Insulation grade		E		
Refrigerator oil	Brand	-	FVC68D		
	Quantity volume	L	2.3		

Model	Compressor Model	Compressor Quantity
AVWT-76*	ANB66FZCMT	1
AVWT-96*	ANB78FZCMT	1
AVWT-114*	ANB78FZCMT	1
AVWT-136*	ANB52FZFMT	2
AVWT-154*	ANB52FZFMT	2
AVWT-170*	ANB66FZCMT	2
AVWT-190*	ANB78FZCMT	2
AVWT-212*	ANB78FZCMT	2

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.

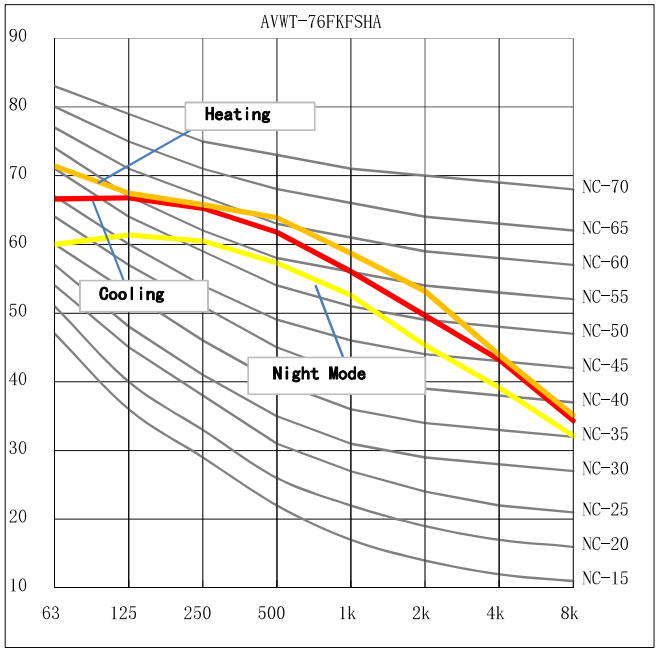
(2) Oil Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

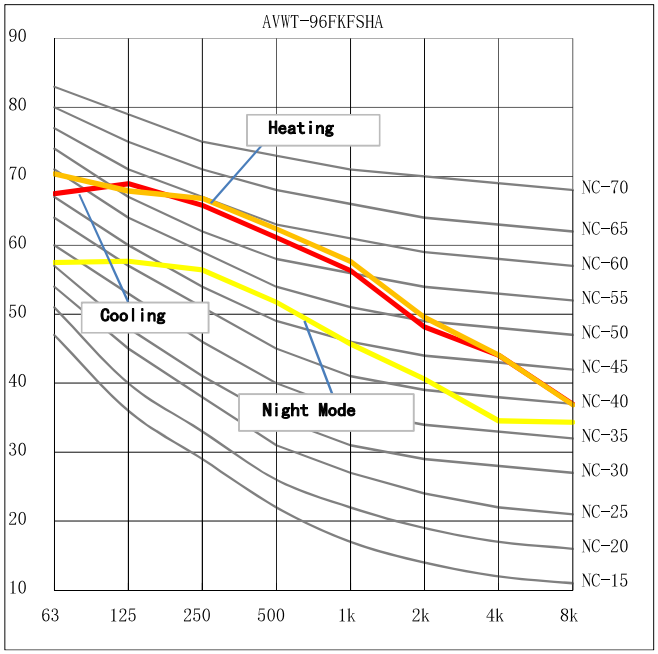
Model			76	96	114	136	154
Compressor			Reset automatically and non-adjustable (one for each compressor)				
Pressure switch							
High	Open	MPa	4.15	4.15	4.15	4.15	4.15
	Close	MPa	3.20	3.20	3.20	3.20	3.20
Capacity of circuit breaker		A	63X2	63X2	63X2	63X4	63X4
Oil heater capacity		W	40X2	40X2	40X2	40X4	40X4
CCP timer Time setting		min.	Non-adjustable				
			3	3	3	3	3

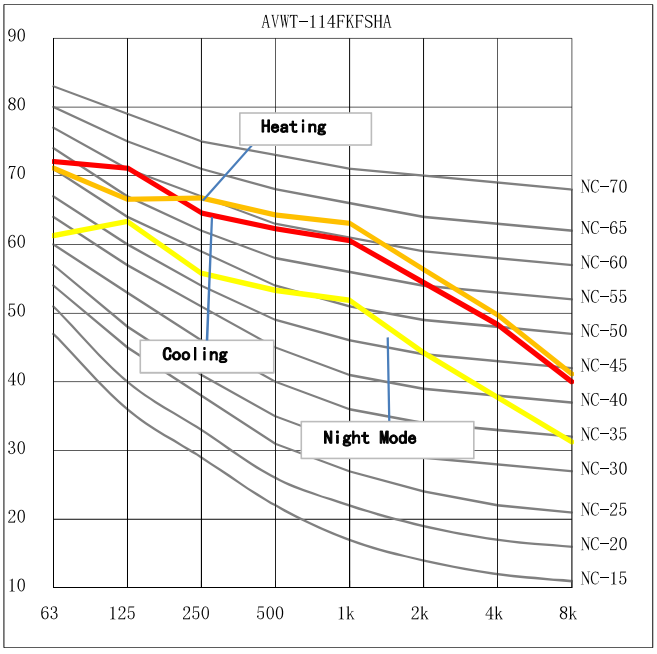
Model			170	190	212
Compressor			Reset automatically and non-adjustable (one for each compressor)		
Pressure switch					
High	Open	MPa	4.15	4.15	4.15
	Close	MPa	3.20	3.20	3.20
Capacity of circuit breaker		A	63X4	63X4	63X4
Oil heater capacity		W	40X4	40X4	40X4
CCP timer Time setting		min.	Non-adjustable		
			3	3	3

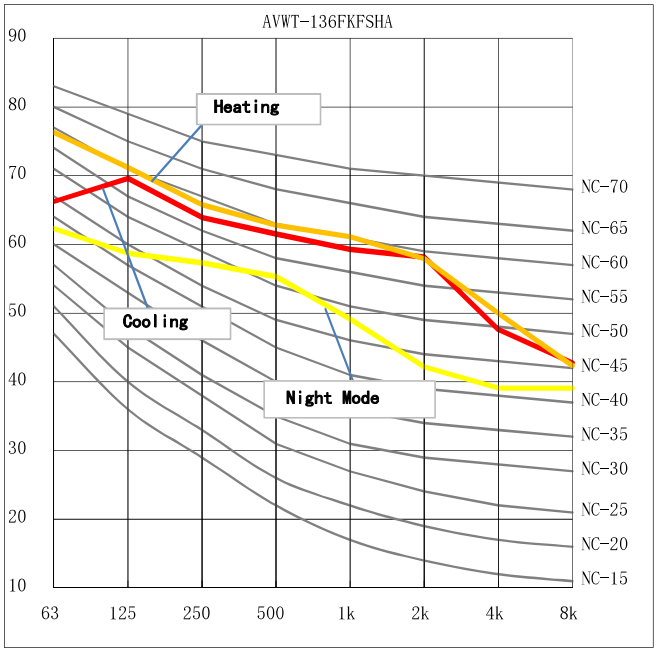
2.4 Sound Data

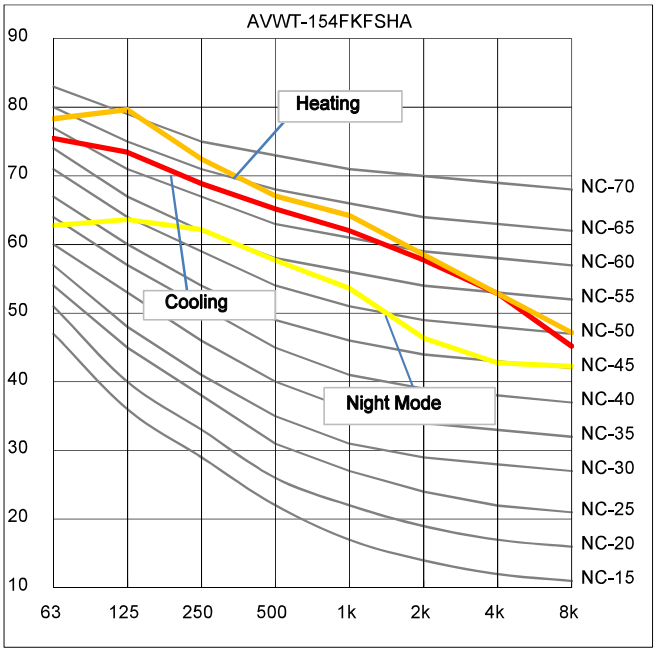
Measurement point: 1 meter from the service cover surface and 1.5 meters from floor level.

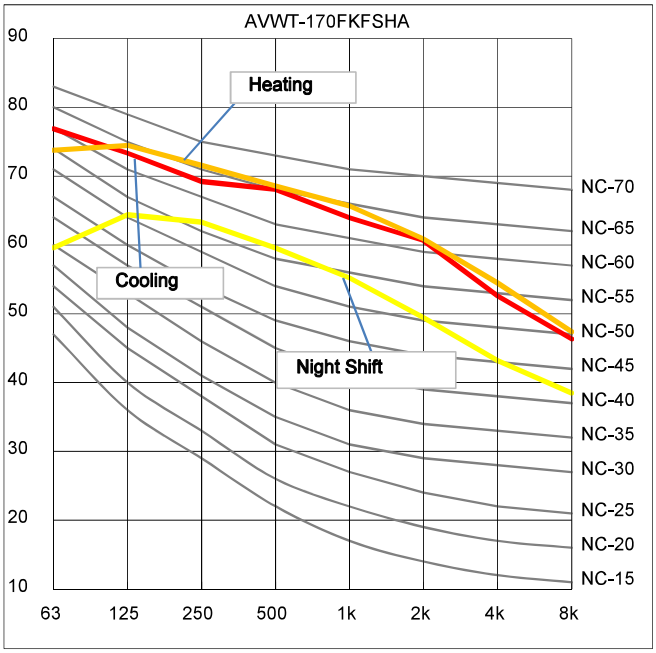


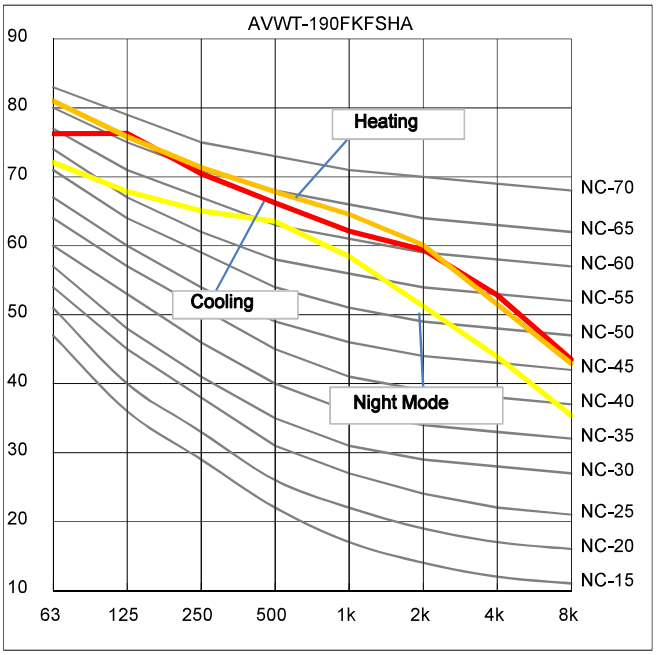


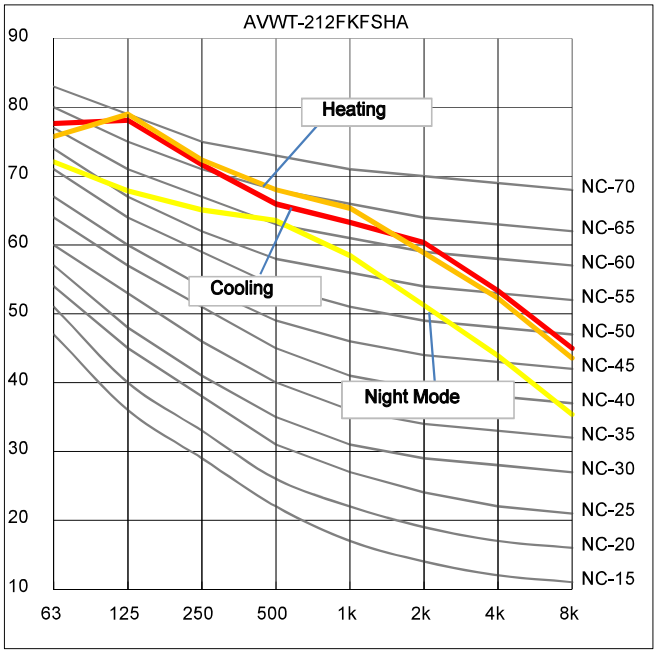





AVWT-154FKFSHA
Heating
Cooling
Night Mode
NC-70
NC-65
NC-60
NC-55
NC-50
NC-45
NC-40
NC-35
NC-30
NC-25
NC-20
NC-15
90
80
70
60
50
40
30
20
10
63
125
250
500
1k
2k
4k
8k


AVWT-170FKFSHA
Heating
Cooling
Night Shift
NC-70
NC-65
NC-60
NC-55
NC-50
NC-45
NC-40
NC-35
NC-30
NC-25
NC-20
NC-15
90
80
70
60
50
40
30
20
10
63
125
250
500
1k
2k
4k
8k


AVWT-190FKFSHA
Heating
Cooling
Night Mode
NC-70
NC-65
NC-60
NC-55
NC-50
NC-45
NC-40
NC-35
NC-30
NC-25
NC-20
NC-15
90
80
70
60
50
40
30
20
10
63
125
250
500
1k
2k
4k
8k

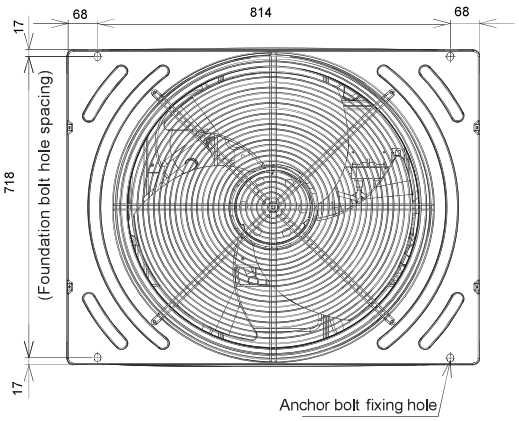

AVWT-212FKFSHA
Heating
Cooling
Night Mode
NC-70
NC-65
NC-60
NC-55
NC-50
NC-45
NC-40
NC-35
NC-30
NC-25
NC-20
NC-15
90
80
70
60
50
40
30
20
10
63
125
250
500
1k
2k
4k
8k

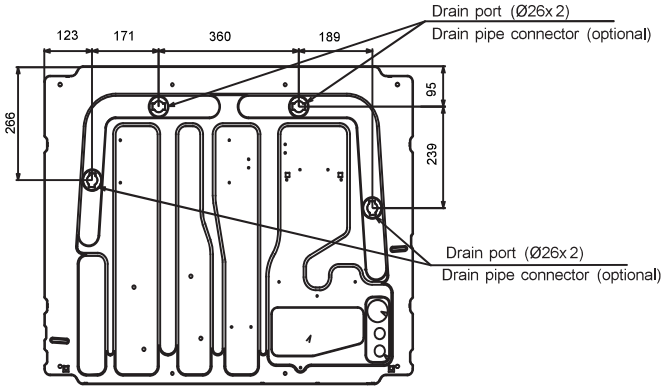
2.5 Dimensional Data

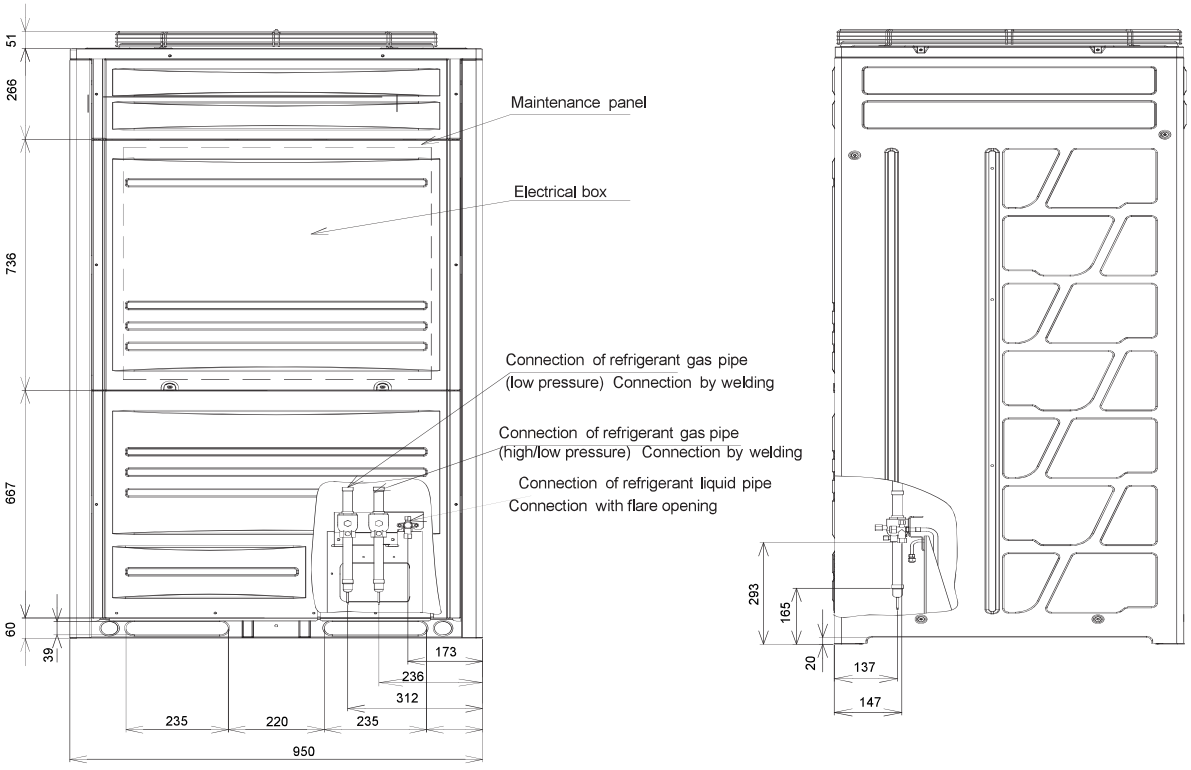
unit: mm

■ Outdoor Unit

Model: AVWT-76*, AVWT-96*

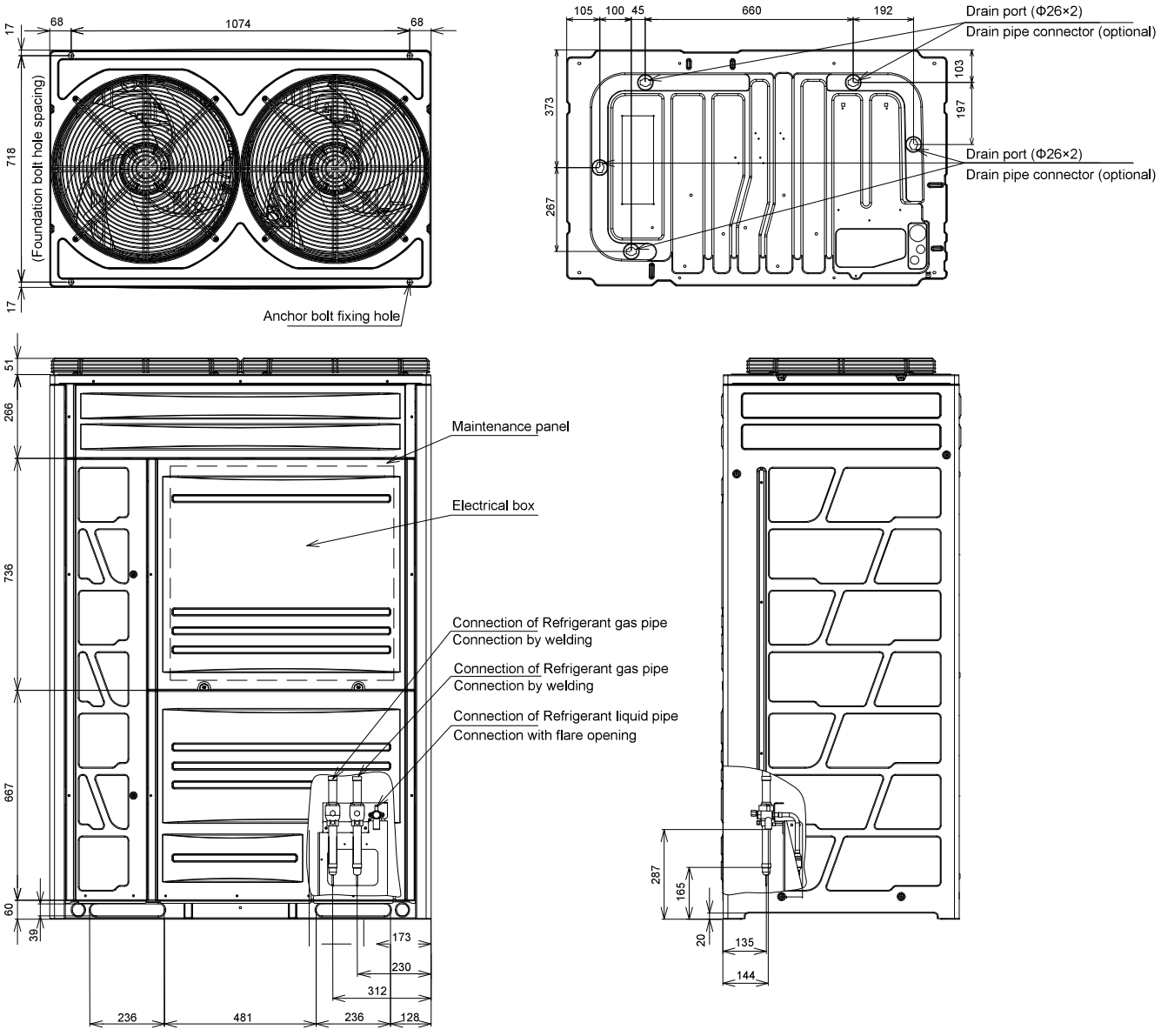






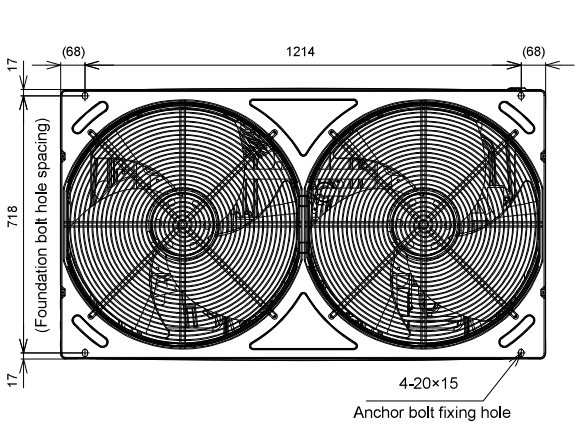
Model: AVWT-114*, AVWT-136*

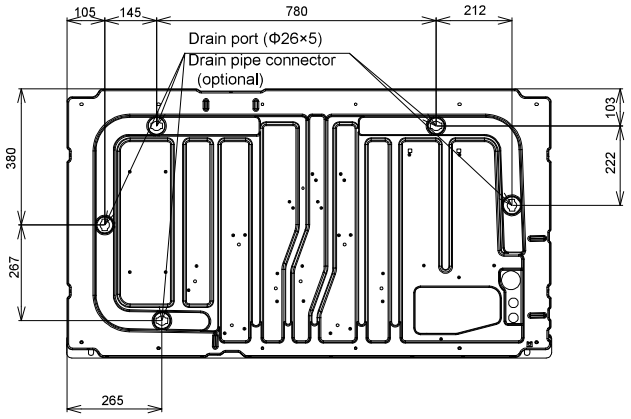
unit: mm

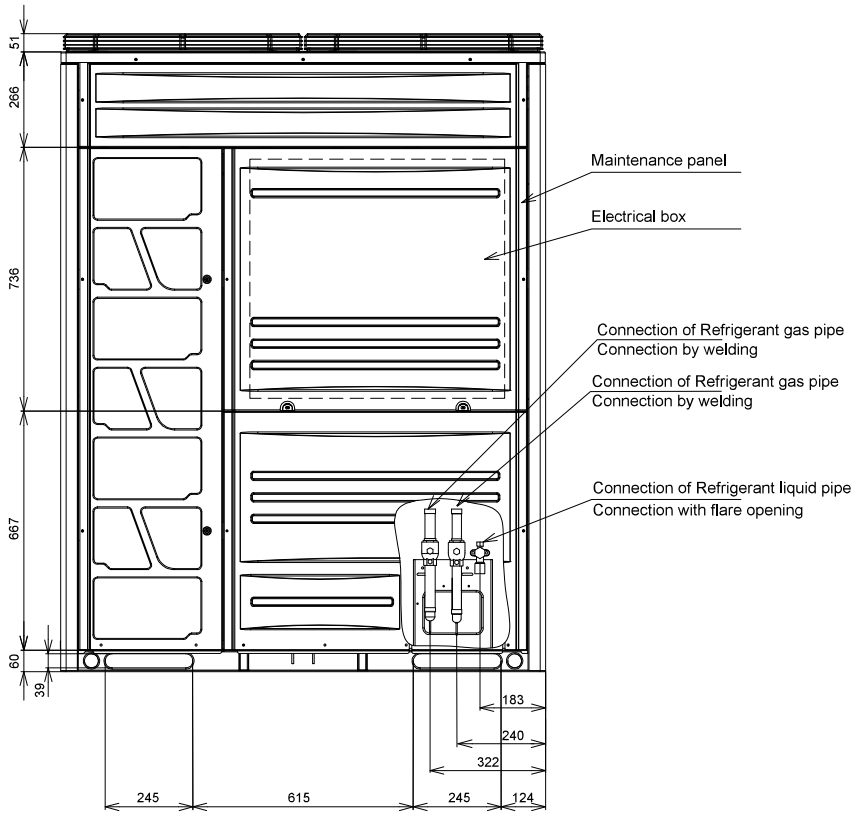


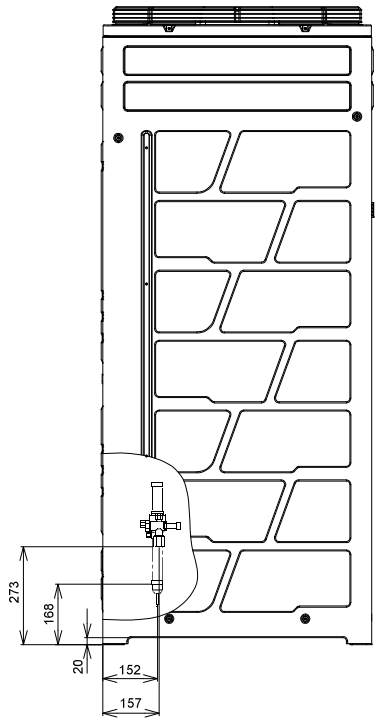
Model: AVWT-154*, AVWT-170*

unit: mm



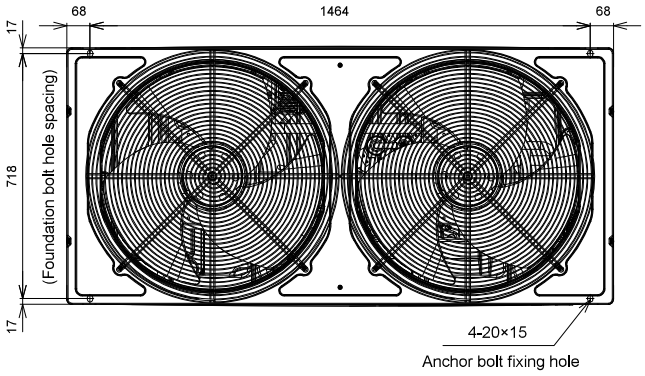


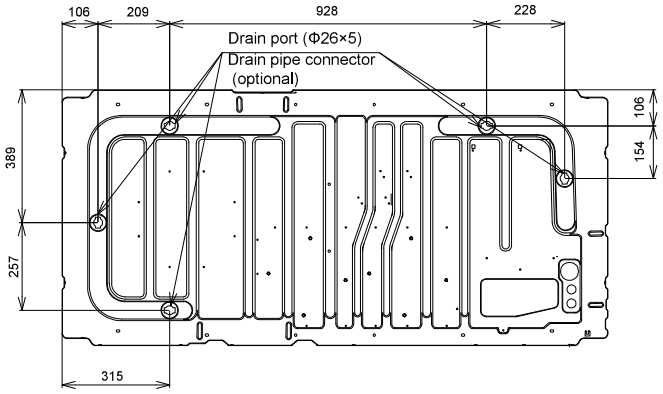


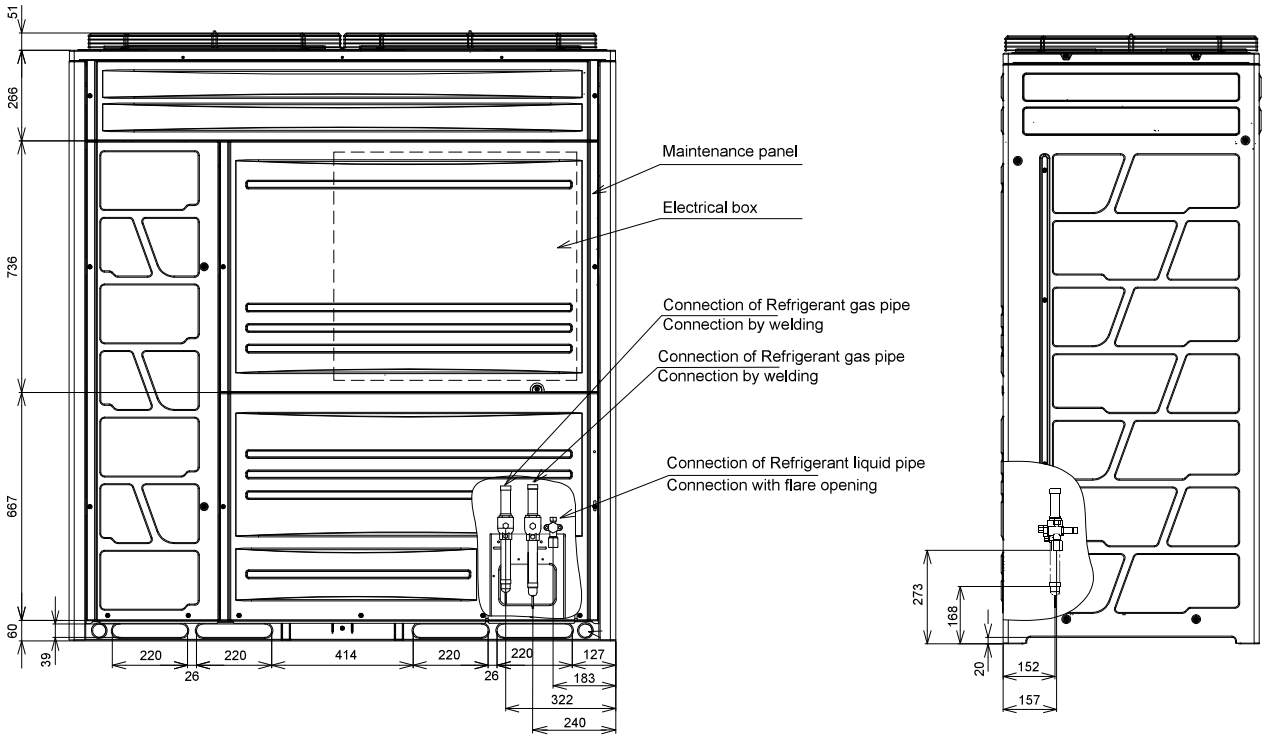


Model: AVWT-190*, AVWT-212*

unit: mm

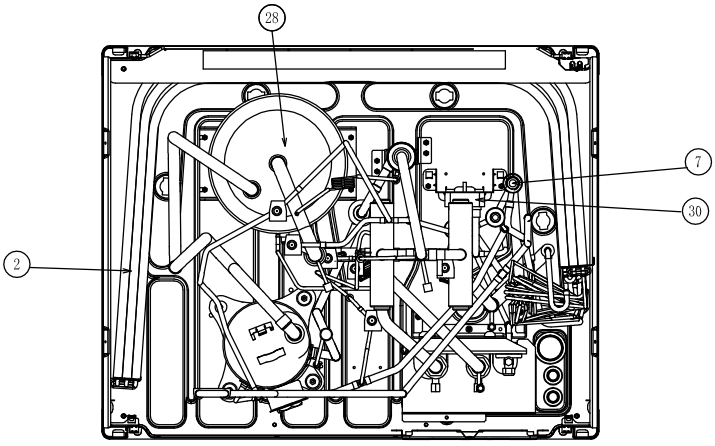




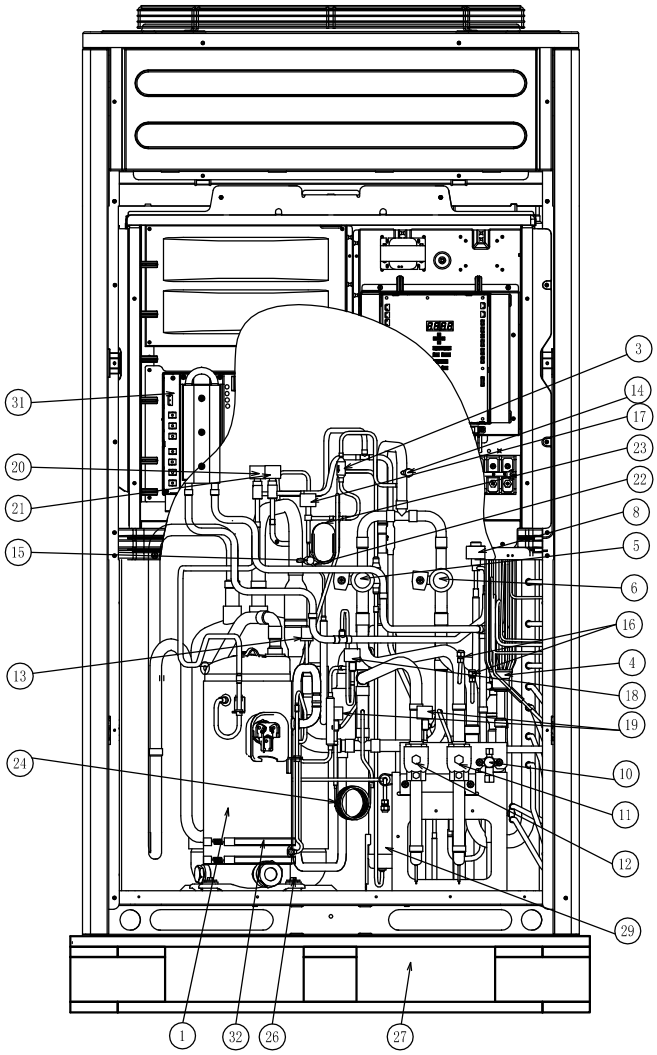


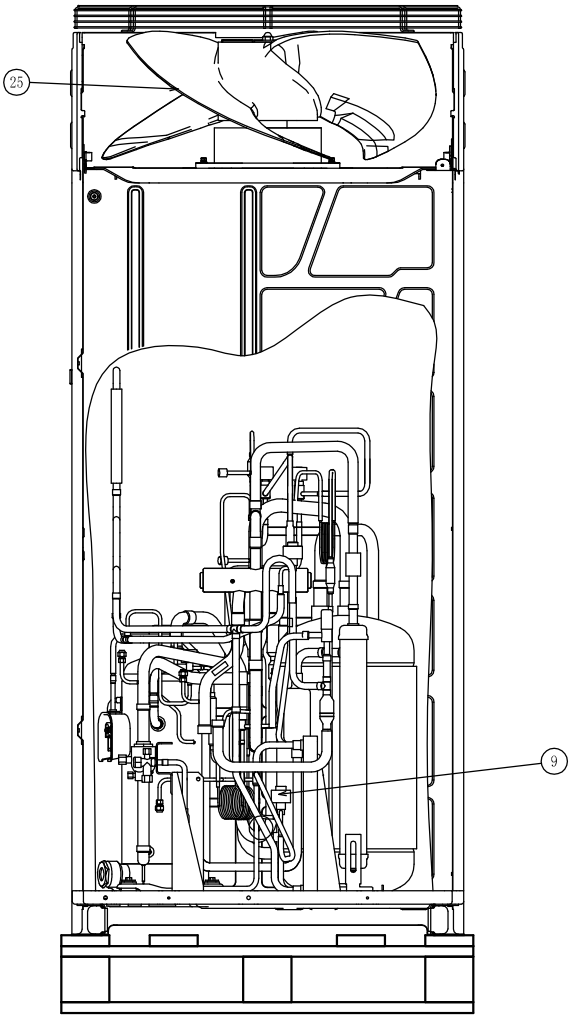
2.6 Structure

AVWT-76, AVWT-96*

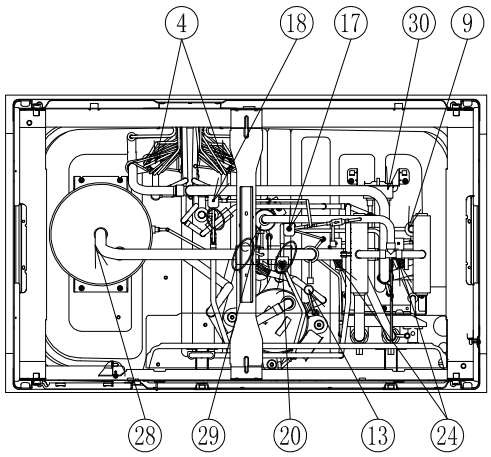


SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion 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	Subcooler
15	Low pressure sensor	31	Electrical box
16	Check joint	32	Crankcase heater

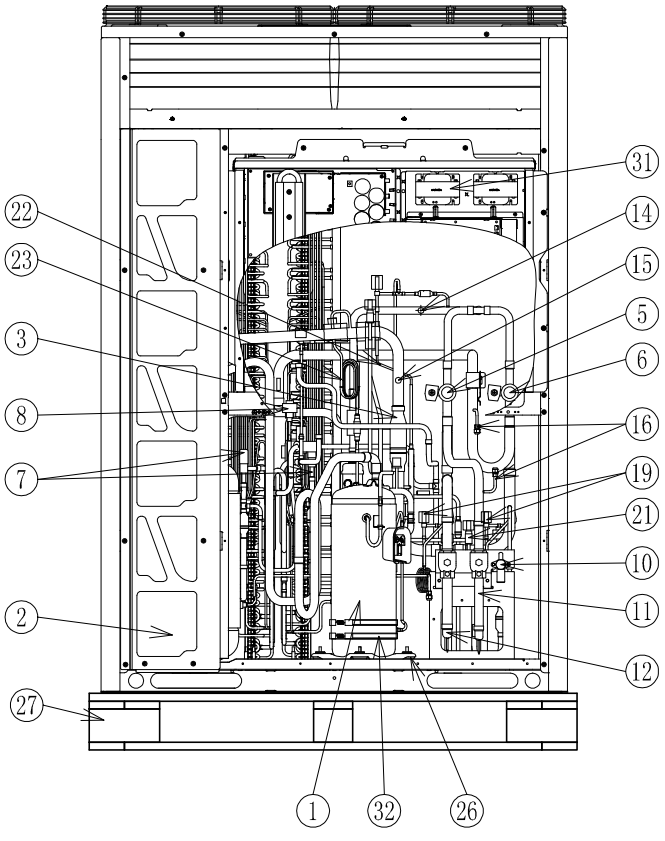


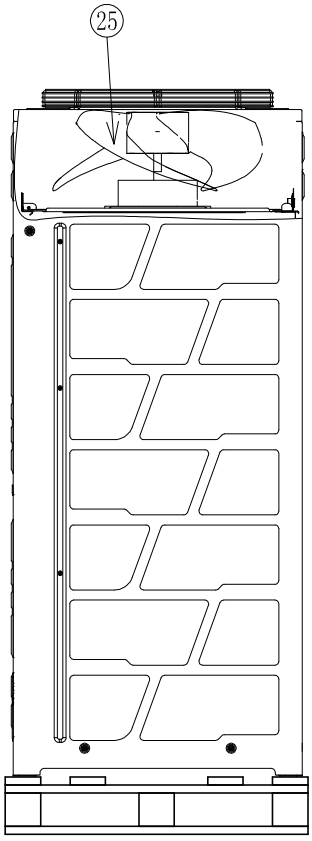


Model: AVWT-114*

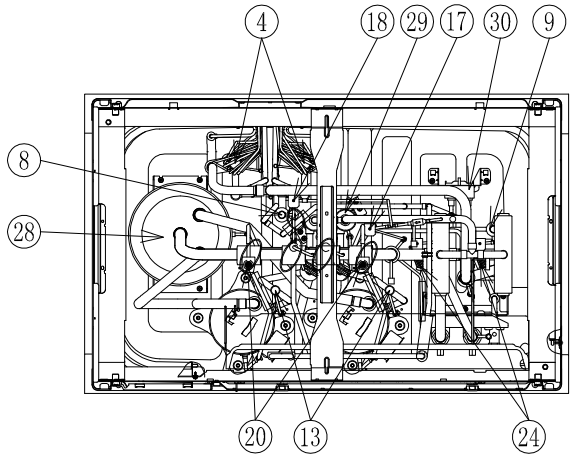


SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion 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	Subcooler
15	Low pressure sensor	31	Electrical box
16	Check joint	32	Crankcase heater

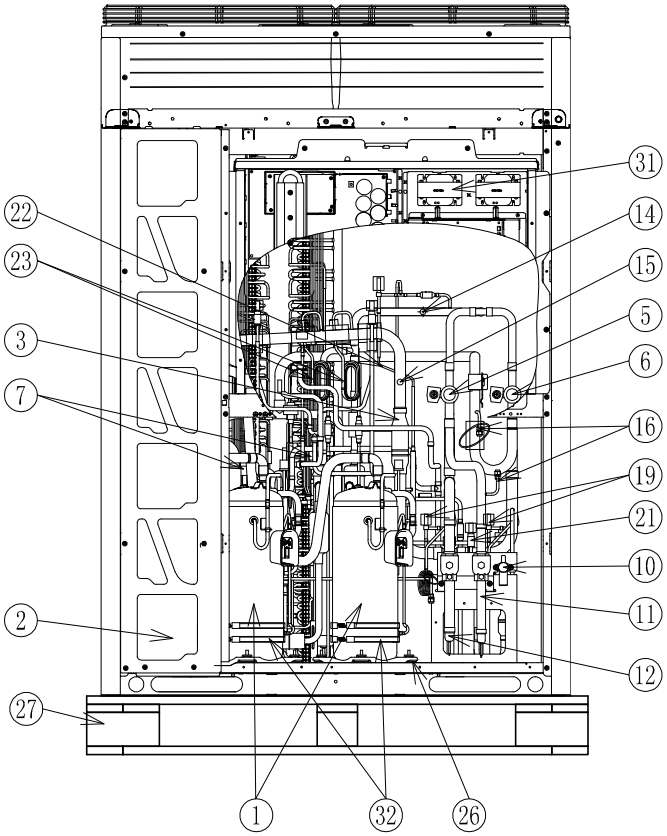


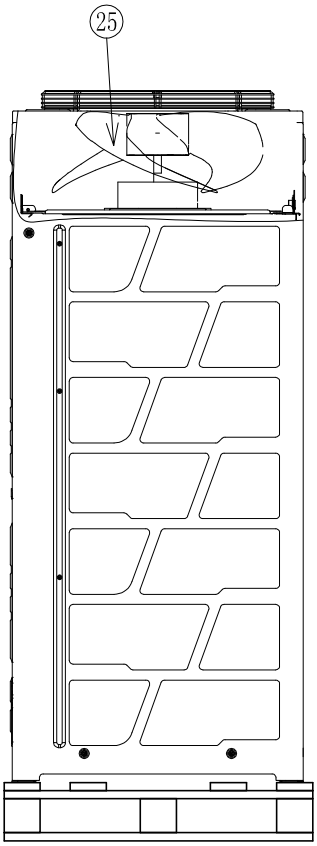


Model: AVWT-136*

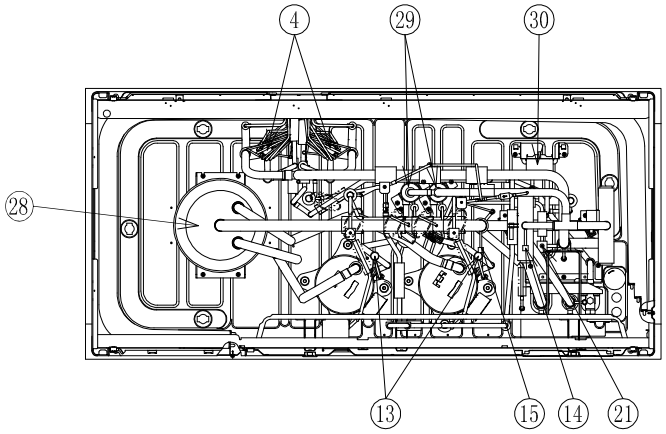


SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion 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	Subcooler
15	Low pressure sensor	31	Electrical box
16	Check joint	32	Crankcase heater

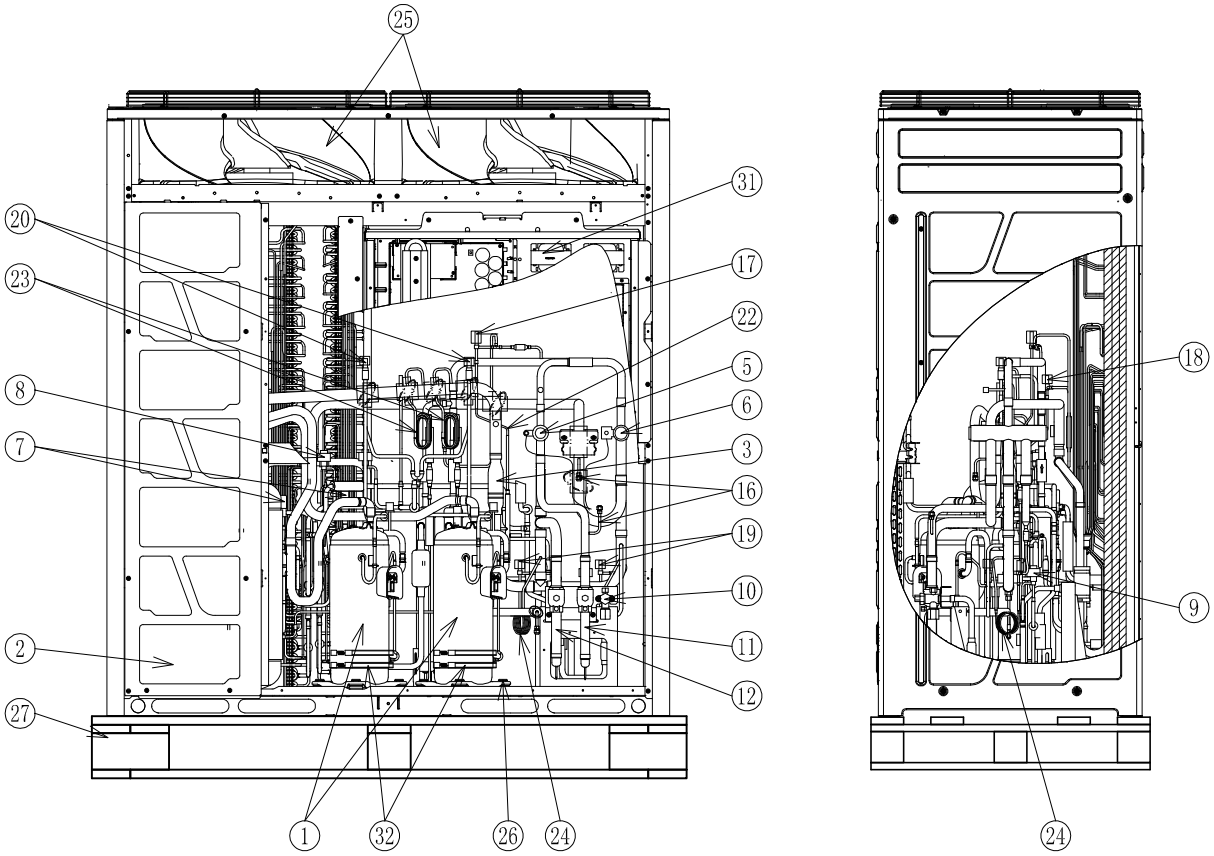




Model: AVWT-154*,AVWT-170*,AVWT-190*,AVWT-212*

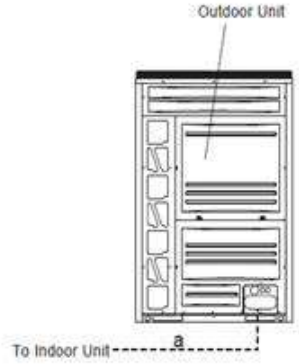


SN	Part Name	SN	Part Name
1	Compressor	17	Solenoid valve (SVA)
2	Heat exchanger	18	Solenoid valve (SVC)
3	Strainer	19	Solenoid valve (SVG)
4	Splitter	20	Solenoid valve (SVJ)
5	4-way reversing valve (21-1)	21	Solenoid valve (SVS)
6	4-way reversing valve (21-2)	22	Capillary tube (SVA)
7	Electronic expansion 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	Subcooler
15	Low pressure sensor	31	Electrical box
16	Check joint	32	Crankcase heater



3. Piping System

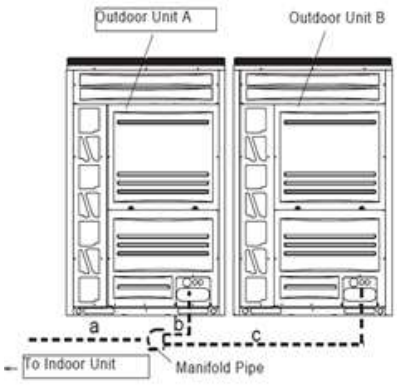
3.1 Connection of Refrigerant Pipes for 3 Pipes Heat Recovery System



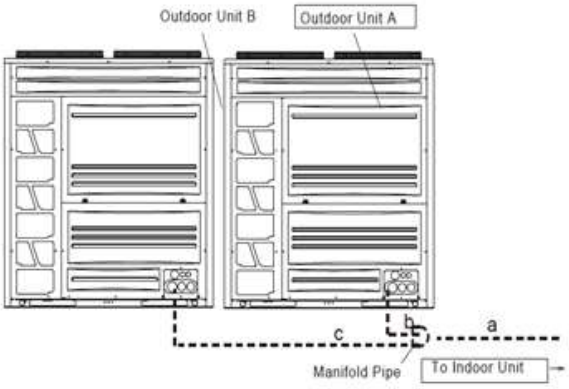
Model (kBtu/h)			76 (8HP)	96 (10HP)	114 (12HP)	136 (14HP)	154 (16HP)
Piping Size Φ (mm)	a	Low Pressure Gas	19.05	22.2	25.4	25.4	28.6
		High/Low Pressure Gas	15.88	19.05	22.2	22.2	22.2
		Liquid	9.53	9.53	12.7	12.7	12.7

Model (kBtu/h)			170 (18HP)	190 (20HP)	212 (22HP)
Piping Size Φ (mm)	a	Low Pressure Gas	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	25.4
		Liquid	15.88	15.88	15.88

(Indoor Unit on left side)



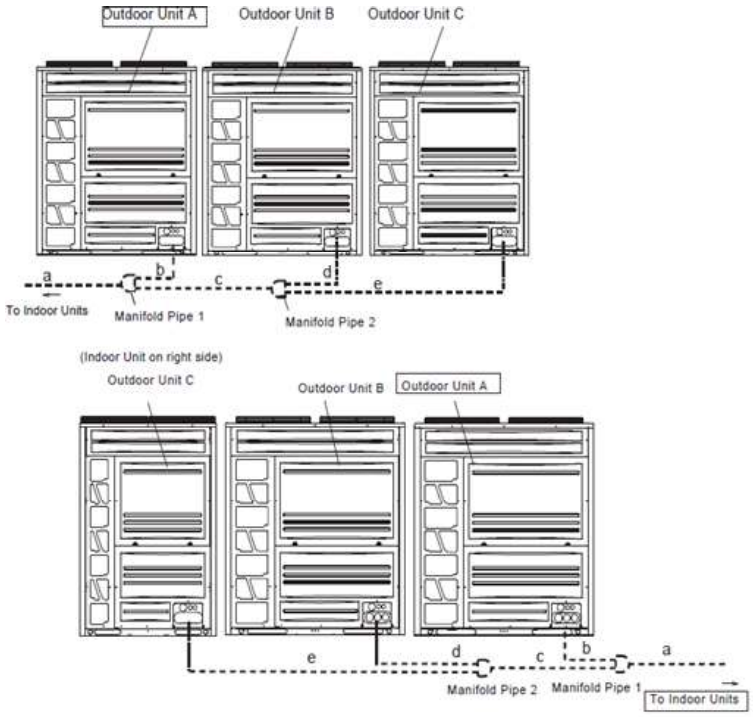
Indoor Unit on right side)



Model (kBtu/h)			228 (24HP)	250 (26HP)	272 (28HP)	290 (30HP)	308 (32HP)
Combination of Basic Unit	Outdoor Unit A		114 (12HP)	136 (14HP)	136 (14HP)	154 (16HP)	154 (16HP)
	Outdoor Unit B		114 (12HP)	114 (12HP)	136 (14HP)	136 (14HP)	154 (16HP)
Manifold Pipe			HFQ-M202F	HFQ-M212F			
Piping Size Φ (mm)	a	Low Pressure Gas	28.6	31.75	31.75	31.75	31.75
		High/Low Pressure Gas	25.4	25.4	28.6	28.6	28.6
		Liquid	15.88	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	25.4	25.4	25.4	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7
	c	Low Pressure Gas	25.4	25.4	25.4	25.4	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	12.7

Model (kBtu/h)			324 (34HP)	340 (36HP)	360 (38HP)	380 (40HP)	402 (42HP)
Combination of Basic Unit	Outdoor Unit A		170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit B		154 (16HP)	170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)
Manifold Pipe			HFQ-M212F		HFQ-M302F		
Piping Size Φ (mm)	a	Low Pressure Gas	31.75	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	28.6	28.6	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	15.88	15.88	15.88	15.88

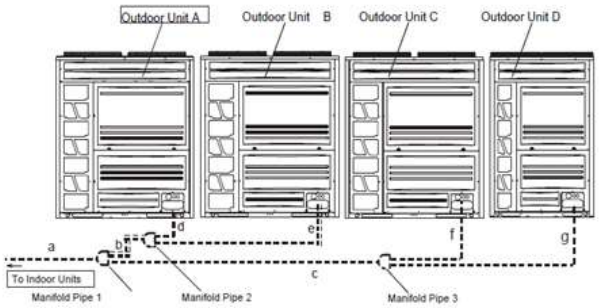
Model (kBtu/h)			424 (44HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
Manifold Pipe			HFQ-M302F
Piping Size Φ (mm)	a	Low Pressure Gas	38.1
		High/Low Pressure Gas	31.75
		Liquid	19.05
	b	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	c	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88



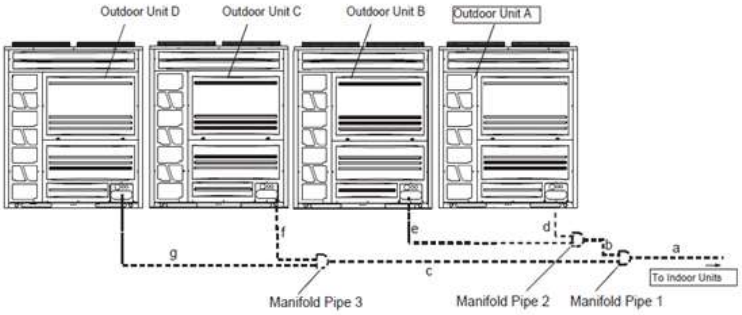
Model (kBtu/h)			444 (46HP)	462 (48HP)	478 (50HP)	494 (52HP)	510 (54HP)
Combination of Basic Unit	Outdoor Unit A		154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)
	Outdoor Unit B		154 (16HP)	154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)
	Outdoor Unit C		136 (14HP)	154 (16HP)	154 (16HP)	154 (16HP)	170 (18HP)
Manifold Pipe1			HFQ-M302F				
Manifold Pipe2			HFQ-M212F				
Piping Size Φ (mm)	a	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	b	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	15.88	15.88	15.88
	c	Low Pressure Gas	31.75	31.75	31.75	31.75	38.1
		High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	15.88	15.88
	e	Low Pressure Gas	25.4	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	12.7	12.7	15.88

Model (kBtu/h)			530 (56HP)	550 (58HP)	570 (60HP)	592 (62HP)	614 (64HP)
Combination of Basic Unit	Outdoor Unit A		190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)
	Outdoor Unit B		170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit C		170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)
Manifold Pipe1			HFQ-M462XF				
Manifold Pipe2			HFQ-M212F	HFQ-M302F			
Piping Size Φ (mm)	a	Low Pressure Gas	41.3	44.5	44.5	44.5	44.5
		High/Low Pressure Gas	38.1	41.3	41.3	41.3	41.3
		Liquid	22.2	22.2	22.2	22.2	22.2
	b	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	c	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	28.6	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88

Model (kBtu/h)			636 (66HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
	Outdoor Unit C		212 (22HP)
Manifold Pipe1			HFQ-M462XF
Manifold Pipe2			HFQ-M302F
Piping Size Φ (mm)	a	Low Pressure Gas	44.5
		High/Low Pressure Gas	41.3
		Liquid	22.2
	b	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	c	Low Pressure Gas	38.1
		High/Low Pressure Gas	31.75
		Liquid	19.05
	d	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	e	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88



(Indoor unit at the right side)

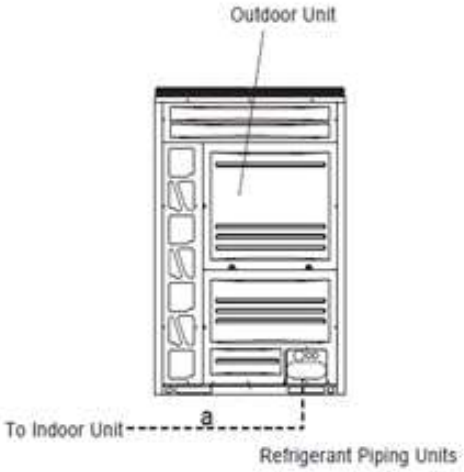


Model (kBtu/h)			648 (68HP)	664 (70HP)	680 (72HP)	700 (74HP)	720 (76HP)
Combination of Basic Unit	Outdoor Unit A		170 (18HP)	170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)
	Outdoor Unit B		170 (18HP)	170 (18HP)	170 (18HP)	170 (18HP)	190 (20HP)
	Outdoor Unit C		154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)	170 (18HP)
	Outdoor Unit D		154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)
Manifold Pipe1			HFQ-M682XF				
Manifold Pipe2			HFQ-M212F			HFQ-M302F	
Manifold Pipe3			HFQ-M212F				
Piping Size Φ (mm)	a	Low Pressure Gas	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5
		Liquid	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	28.6	28.6	28.6	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas	31.75	31.75	38.1	38.1	38.1
		High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	15.88	15.88	15.88	15.88
	g	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	12.7	12.7	15.88	15.88	15.88

Model (kBtu/h)			740 (78HP)	760 (80HP)	782 (82HP)	804 (84HP)	826 (86HP)
Combination of Basic Unit	Outdoor Unit A		190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)	212 (22HP)
	Outdoor Unit B		190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)
	Outdoor Unit C		190 (20HP)	190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit D		170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)	190 (20HP)
Manifold Pipe1			HFQ-M682XF				
Manifold Pipe2			HFQ-M302F				
Manifold Pipe3			HFQ-M302F				
Piping Size Φ (mm)	a	Low Pressure Gas	50.8	50.8	50.8	50.8	50.8
		High/Low Pressure Gas	44.5	44.5	44.5	44.5	44.5
		Liquid	25.4	25.4	25.4	25.4	25.4
	b	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	c	Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		High/Low Pressure Gas	31.75	31.75	31.75	31.75	31.75
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	25.4	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	25.4	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	f	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	25.4
		Liquid	15.88	15.88	15.88	15.88	15.88
	g	Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		High/Low Pressure Gas	22.2	22.2	22.2	22.2	22.2
		Liquid	15.88	15.88	15.88	15.88	15.88

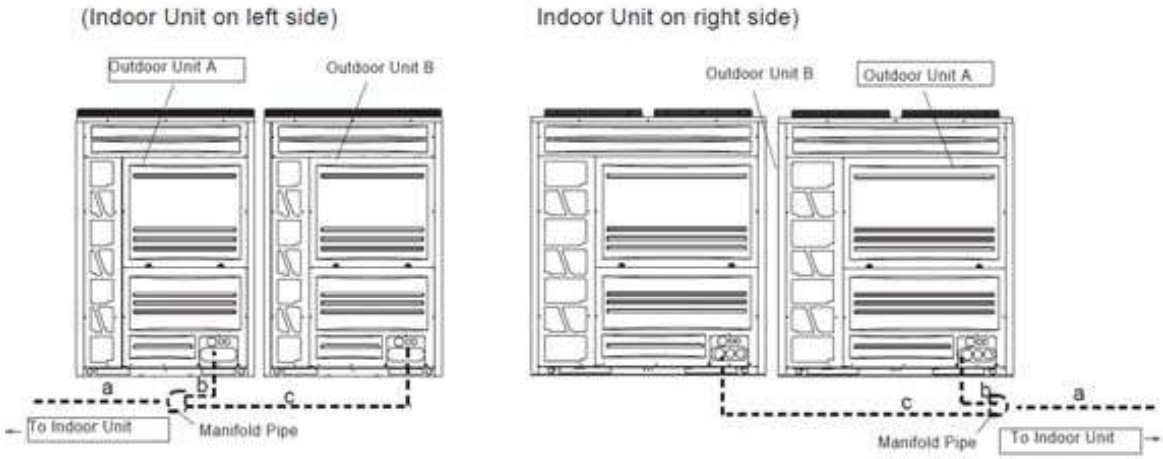
Model (kBtu/h)			848 (88HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
	Outdoor Unit C		212 (22HP)
	Outdoor Unit D		212 (22HP)
Manifold Pipe1			HFQ-M682XF
Manifold Pipe2			HFQ-M302F
Manifold Pipe3			HFQ-M302F
Piping Size Φ (mm)	a	Low Pressure Gas	50.8
		High/Low Pressure Gas	44.5
		Liquid	25.4
	b	Low Pressure Gas	38.1
		High/Low Pressure Gas	31.75
		Liquid	19.05
	c	Low Pressure Gas	38.1
		High/Low Pressure Gas	31.75
		Liquid	19.05
	d	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	e	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	f	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88
	g	Low Pressure Gas	28.6
		High/Low Pressure Gas	25.4
		Liquid	15.88

3.2 Connection of Refrigerant Pipes for 2 Pipes Heat Pump System



Model (kBtu/h)			76 (8HP)	96 (10HP)	114 (12HP)	136 (14HP)	154 (16HP)
Piping Size Φ (mm)	a	High/Low Pressure Gas	19.05	22.2	25.4	25.4	28.6
		Liquid	9.53	9.53	12.7	12.7	12.7

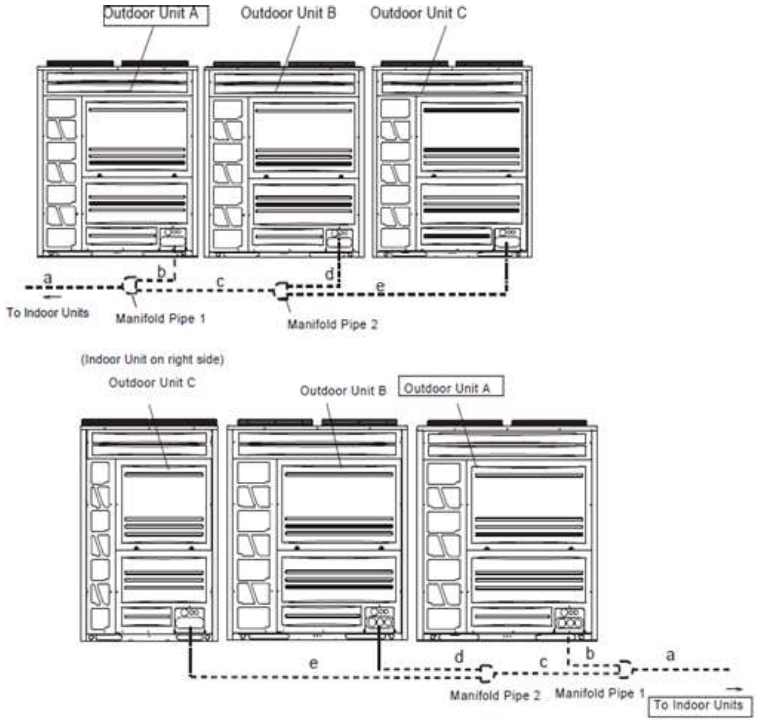
Model (kBtu/h)			170 (18HP)	190 (20HP)	212 (22HP)
Piping Size Φ (mm)	a	High/Low Pressure Gas	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88



Model (kBtu/h)			228 (24HP)	250 (26HP)	272 (28HP)	290 (30HP)	308 (32HP)
Combination of Basic Unit	Outdoor Unit A		114 (12HP)	136 (14HP)	136 (14HP)	154 (16HP)	154 (16HP)
	Outdoor Unit B		114 (12HP)	114 (12HP)	136 (14HP)	136 (14HP)	154 (16HP)
Manifold Pipe			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	28.6	31.75	31.75	31.75	31.75
		Liquid	15.88	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	25.4	25.4	25.4	28.6	28.6
		Liquid	12.7	12.7	12.7	12.7	12.7
	c	High/Low Pressure Gas	25.4	25.4	25.4	25.4	28.6
		Liquid	12.7	12.7	12.7	12.7	12.7

Model (kBtu/h)			324 (34HP)	340 (36HP)	360 (38HP)	380 (40HP)	402 (42HP)
Combination of Basic Unit	Outdoor Unit A		170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit B		154 (16HP)	170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)
Manifold Pipe			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	31.75	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	15.88	15.88	15.88	15.88

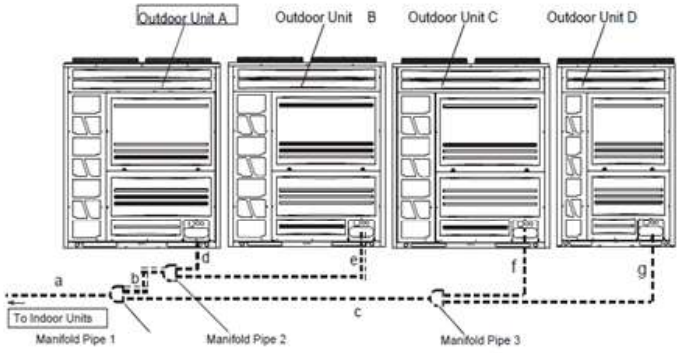
Model (kBtu/h)			424 (44HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
Manifold Pipe			HFQ-M32F
Piping Size Φ (mm)	a	High/Low Pressure Gas	38.1
		Liquid	19.05
	b	High/Low Pressure Gas	28.6
		Liquid	15.88
	c	High/Low Pressure Gas	28.6
		Liquid	15.88



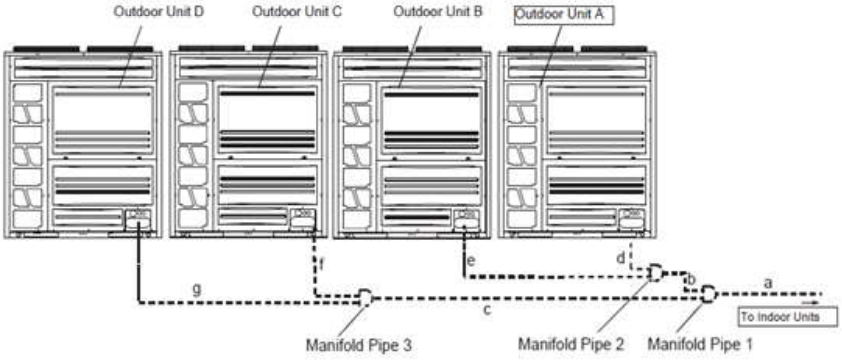
Model (kBtu/h)			444 (46HP)	462 (48HP)	478 (50HP)	494 (52HP)	510 (54HP)
Combination of Basic Unit	Outdoor Unit A		154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)
	Outdoor Unit B		154 (16HP)	154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)
	Outdoor Unit C		136 (14HP)	154 (16HP)	154 (16HP)	154 (16HP)	170 (18HP)
Manifold Pipe1			HFQ-M32F				
Manifold Pipe2			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	b	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	15.88	15.88	15.88
	c	High/Low Pressure Gas	31.75	31.75	31.75	31.75	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	12.7	15.88	15.88
	e	High/Low Pressure Gas	25.4	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	12.7	12.7	15.88

Model (kBtu/h)			530 (56HP)	550 (58HP)	570 (60HP)	592 (62HP)	614 (64HP)
Combination of Basic Unit	Outdoor Unit A		190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)
	Outdoor Unit B		170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit C		170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)
Manifold Pipe1			HFQ-M462F				
Manifold Pipe2			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	41.3	44.5	44.5	44.5	44.5
		Liquid	22.2	22.2	22.2	22.2	22.2
	b	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88

Model (kBtu/h)			636 (66HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
	Outdoor Unit C		212 (22HP)
Manifold Pipe1			HFQ-M462F
Manifold Pipe2			HFQ-M32F
Piping Size Φ (mm)	a	High/Low Pressure Gas	44.5
		Liquid	22.2
	b	High/Low Pressure Gas	28.6
		Liquid	15.88
	c	High/Low Pressure Gas	38.1
		Liquid	19.05
	d	High/Low Pressure Gas	28.6
		Liquid	15.88
	e	High/Low Pressure Gas	28.6
		Liquid	15.88



(Indoor unit at the right side)

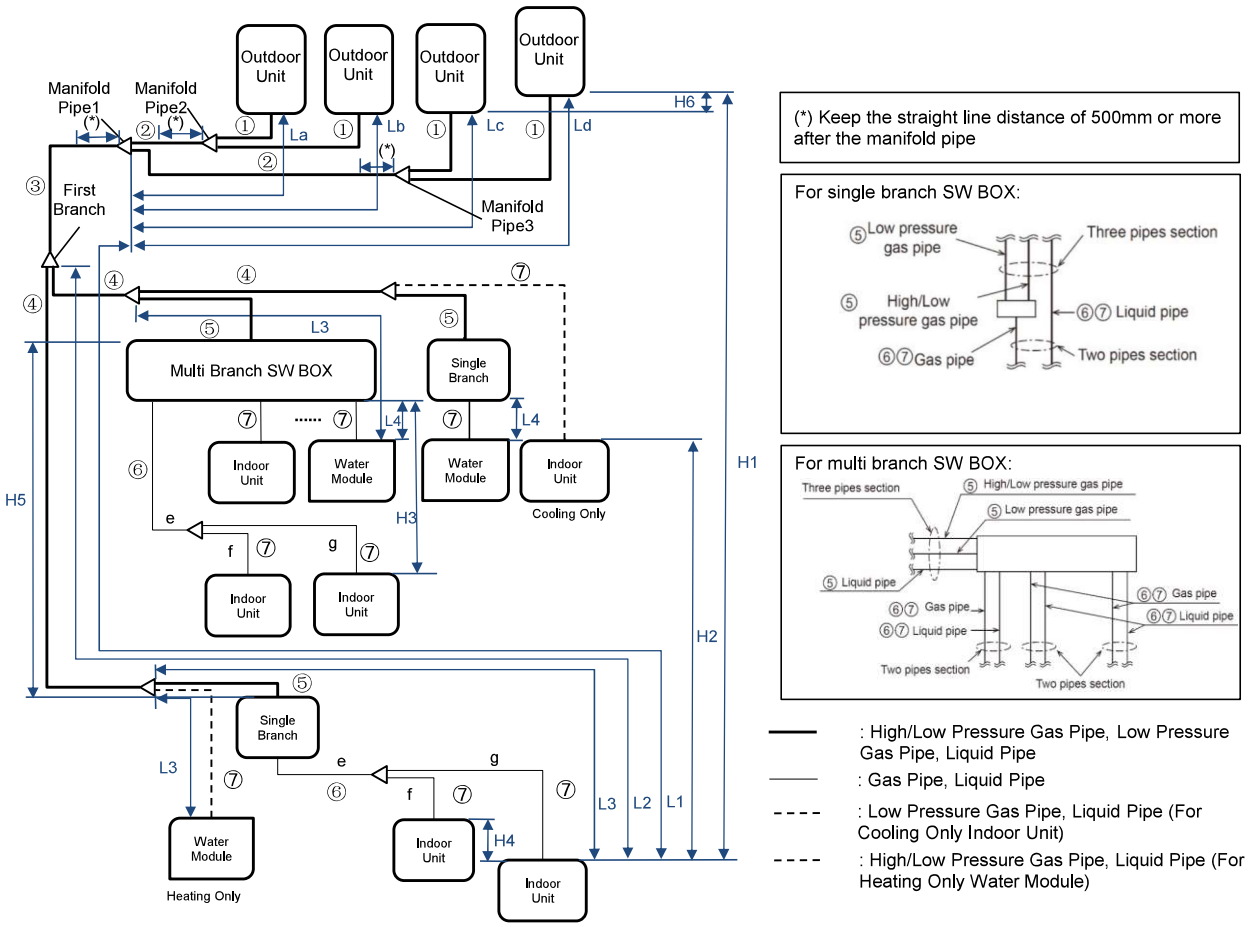


Model (kBtu/h)			648 (68HP)	664 (70HP)	680 (72HP)	700 (74HP)	720 (76HP)
Combination of Basic Unit	Outdoor Unit A		170 (18HP)	170 (18HP)	170 (18HP)	190 (20HP)	190 (20HP)
	Outdoor Unit B		170 (18HP)	170 (18HP)	170 (18HP)	170 (18HP)	190 (20HP)
	Outdoor Unit C		154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)	170 (18HP)
	Outdoor Unit D		154 (16HP)	154 (16HP)	170 (18HP)	170 (18HP)	170 (18HP)
Manifold Pipe1			HFQ-M682F				
Manifold Pipe2			HFQ-M32F				
Manifold Pipe3			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8
		Liquid	25.4	25.4	25.4	25.4	25.4
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	31.75	31.75	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	15.88	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	12.7	12.7	15.88	15.88	15.88

Model (kBtu/h)			740 (78HP)	760 (80HP)	782 (82HP)	804 (84HP)	826 (86HP)
Combination of Basic Unit	Outdoor Unit A		190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)	212 (22HP)
	Outdoor Unit B		190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)	212 (22HP)
	Outdoor Unit C		190 (20HP)	190 (20HP)	190 (20HP)	190 (20HP)	212 (22HP)
	Outdoor Unit D		170 (18HP)	190 (20HP)	190 (20HP)	190 (20HP)	190 (20HP)
Manifold Pipe1			HFQ-M682F				
Manifold Pipe2			HFQ-M32F				
Manifold Pipe3			HFQ-M32F				
Piping Size Φ (mm)	a	High/Low Pressure Gas	50.8	50.8	50.8	50.8	50.8
		Liquid	25.4	25.4	25.4	25.4	25.4
	b	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	c	High/Low Pressure Gas	38.1	38.1	38.1	38.1	38.1
		Liquid	19.05	19.05	19.05	19.05	19.05
	d	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	e	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	f	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88
	g	High/Low Pressure Gas	28.6	28.6	28.6	28.6	28.6
		Liquid	15.88	15.88	15.88	15.88	15.88

Model (kBtu/h)			848 (88HP)
Combination of Basic Unit	Outdoor Unit A		212 (22HP)
	Outdoor Unit B		212 (22HP)
	Outdoor Unit C		212 (22HP)
	Outdoor Unit D		212 (22HP)
Manifold Pipe1			HFQ-M682F
Manifold Pipe2			HFQ-M32F
Manifold Pipe3			HFQ-M32F
Piping Size Φ (mm)	a	High/Low Pressure Gas	50.8
		Liquid	25.4
	b	High/Low Pressure Gas	38.1
		Liquid	19.05
	c	High/Low Pressure Gas	38.1
		Liquid	19.05
	d	High/Low Pressure Gas	28.6
		Liquid	15.88
	e	High/Low Pressure Gas	28.6
		Liquid	15.88
	f	High/Low Pressure Gas	28.6
		Liquid	15.88
	g	High/Low Pressure Gas	28.6
		Liquid	15.88

3.3 Pipe Connection Design Guidance for 3 Pipes Heat Recovery System



Pipe Length and Height Difference

Item		Mark	Permitted Value	
			< Recommended Connectable Number of Indoor Unit and Water Module	⩾ Recommended Connectable Number of Indoor Unit or Water Module
Total Piping Length		Total Liquid Piping Actual Length	⩽1000m	⩽300m
Piping Length between Manifold Pipe 1 and Each Outdoor Unit		La, Lb, Lc, Ld	⩽10m	
Maximum Piping Length	Actual Length	L1	⩽165m	
	Equivalent Length		⩽190m	
Maximum Piping Length between First Branch and Each Indoor Unit		L2	⩽90m	⩽40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit		L3	⩽40m	⩽30m
Total Piping Length between Switch Box and Each Indoor Unit		L4 e+f+g	⩽40m	
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1	⩽50m	
	O.U. is Lower		⩽40m	
Height Difference between Indoor Units		H2	⩽30m	
Height Difference between Switch Box and Indoor Units		H3	⩽15m	
Height Difference between Indoor Units using the Same Branch of Switch Box		H4	⩽4m	
Height Difference between Switch Boxes		H5	⩽15m	
Height Difference between Outdoor Units		H6	⩽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 La⩽Lb⩽Lc⩽Ld⩽10m.

(3) If the piping length between some 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: L3⩽15m)

(4) When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied).

(5) Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount.

(6) Fuction setting of Ci is required (Ci=2), in case of height difference between indoor units: 15m < H2 ⩽30m.

(7) In case of the height difference between outdoor units and indoor units: 50 m(40m) < H1 ⩽90m, contact technical department of the manufacture.

①② Piping between outdoor unit Refer to 3.1.

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

Outdoor Unit Capacity (kBtu/h)	Low Pressure Gas Φ (mm)	High/Low Pressure Gas Φ (mm)	Liquid Φ (mm)	First Branch Model
76 (8HP)	19.05	15.88	9.53	HFQ-M282F
96 (10HP)	22.2	19.05	9.53	
114~136 (12~14HP)	25.4	22.2	12.7	HFQ-M452F
154 (16HP)	28.6	22.2	12.7	
170~190 (18~20HP)	28.6	22.2	15.88	HFQ-M562F
212~232 (22~24HP)	28.6	25.4	15.88	
250 (26HP)	31.75	25.4	19.05	HFQ-M692F
272~324 (28~34HP)	31.75	28.6	19.05	
344 (36HP)	38.1	28.6	19.05	
360~522 (38~54HP)	38.1	31.75	19.05	HFQ-M902F
544 (56HP)	41.3	38.1	22.2	HFQ-462XF
552~634 (56~66HP)	44.5	41.3	22.2	
654~1088 (68~112HP)	50.8	44.5	25.4	HFQ-682XF

NOTE:
When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 100m, the pipe size of low pressure gas, high/low pressure gas and liquid line from basic unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied).

④ Pipe after first branch (3 pipes portion)

Total Indoor Unit Capacity (kBtu/h)	Low Pressure Gas Φ (mm)	High/Low Pressure Gas Φ (mm)	Liquid Φ (mm)	Branch Pipe Model
Q < 54 (6HP)	15.88	12.7	9.53	HFQ-M142F
54 (6HP) ≤ Q < 86 (9HP)	19.05	15.88	9.53	HFQ-M282F
86 (9HP) ≤ Q < 114 (12HP)	22.2	19.05	9.53	
114 (12HP) ≤ Q < 154 (16HP)	25.4	22.2	12.7	HFQ-M452F
154 (16HP) ≤ Q < 170 (18HP)	28.6	22.2	12.7	HFQ-M562F
170 (18HP) ≤ Q < 212 (22HP)	28.6	22.2	15.88	
212 (22HP) ≤ Q < 250 (26HP)	28.6	25.4	15.88	HFQ-M692F
250 (26HP) ≤ Q < 344 (36HP)	31.75	28.6	19.05	
344 (36HP) ≤ Q <544 (56HP)	38.1	31.75	19.05	HFQ-M902F
544 (56HP) ≤ Q < 552 (58HP)	41.3	38.1	22.2	HFQ-462XF
552 (58HP) ≤ Q < 654 (68HP)	44.5	41.3	22.2	
654 (68HP) ≤ Q	50.8	44.5	25.4	HFQ-682XF

NOTE:
Even if the equivalent refrigerant piping length (L1) is more than 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	HCHS-N06X	1	1-7*1	54 (6HP)	48 (4HP)	15.88	12.7	9.53*2
					54 (6HP)	19.05	15.88	9.53*2
	HCHS-N10X	1	1-8*1	96 (10HP)	76 (8HP)	19.05	15.88	9.53*2
					96 (10HP)	22.2	19.05	9.53*2
Multi	HCHM-N04X	4	1-6*1	152 (14HP)	54 (6HP)	Refer to ④		
	HCHM-N08X	8	1-6*1	290 (30HP)	54 (6HP)			
	HCHM-N12X	12	1-6*1	290 (30HP)	54 (6HP)			
	HCHM-N16X	16	1-6*1	290 (30HP)	54 (6HP)			

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 Capacity (kBtu/h)	Gas Φ (mm)	Liquid Φ (mm)	Branch Pipe Model
Q < 54 (6HP)	15.88	9.53	HFQ-102F
54 (6HP) ≤ Q < 86 (9HP)	19.05	9.53	
86 (9HP) ≤ Q < 114(12HP)	22.2	9.53	
114 (12HP) ≤ Q < 154 (16HP)	25.4	12.7	HFQ-162F
154 (16HP) ≤ Q < 170 (18HP)	28.6	12.7	
170 (18HP) ≤ Q < 250 (26HP)	28.6	15.88	HFQ-242F
250 (26HP) ≤ Q < 344 (36HP)	31.75	19.05	HFQ-302F
344 (36HP) ≤ Q < 544 (56HP)	38.1	19.05	
544 (56HP) ≤ Q < 552 (58HP)	41.3	22.2	HFQ-462F
552 (58HP) ≤ Q < 654 (68HP)	44.5	22.2	
654 (68HP) ≤ Q	50.8	25.4	HFQ-682F

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

1. The pipe diameter should be the same as the indoor unit piping connection size, details refer to the technical catalog of indoor unit.
2. When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied) instead of Φ6.35 pipe.

Piping Branch Restrictions

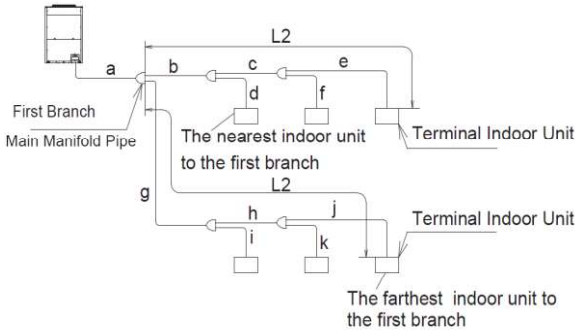
In the case that the piping length from the first branch to the farthest indoor unit (L2) is over 40m, follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

In the case that piping length from the first branch to the terminal indoor units is within 40-90m.

(1) If the piping length L2 is over 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).

(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 40m.

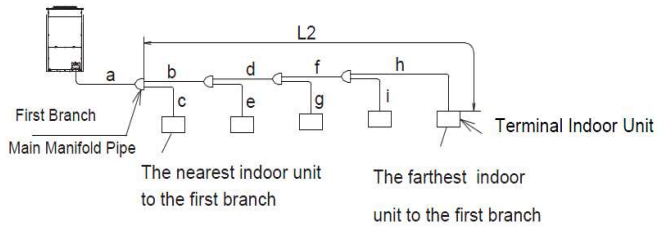


Example 2: Installation without Main Piping Branch

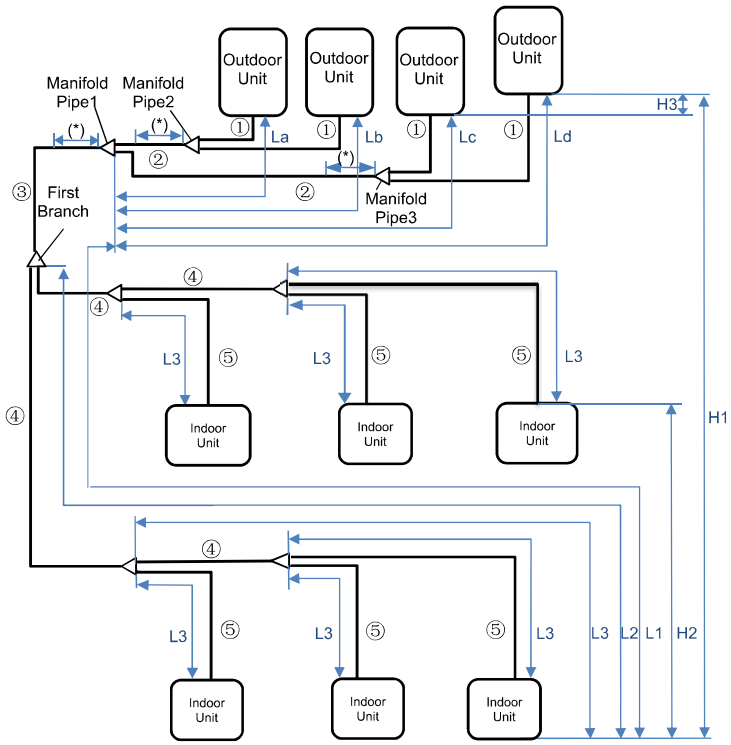
In the case that piping length from the first branch to the terminal Indoor Units is within 40-90m,

(1) If the piping length L2 is over 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 40m.



3.4 Pipe Connection Design Guidance for 2 Pipes Heat Pump System



(*) Keep the straight line distance of 500mm or more after the manifold pipe.

Pipe Length and Height Difference

Item		Mark	Permitted Value	
			< Recommended Connectable Number of Indoor Unit	⩾ Recommended Connectable Number of Indoor Unit
Total Piping Length		Total Liquid Piping Actual Length	⩽1000m	⩽300m
Piping Length between Manifold Pipe 1 and Each Outdoor Unit		La, Lb, Lc, Ld	⩽10m	
Maximum Piping Length	Actual Length	L1	⩽165m	
	Equivalent Length		⩽190m	
Maximum Piping Length between First Branch and Each Indoor Unit		L2	⩽90m	⩽40m
Maximum Piping Length between Each Branch Pipe and Each Indoor Unit		L3	⩽40m	⩽30m
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1	⩽50m	
	O.U. is Lower		⩽40m	
Height Difference between Indoor Units		H2	⩽30m	
Height Difference between Outdoor Units		H3	⩽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 La⩽Lb⩽Lc⩽Ld⩽10m.

(3) If the piping length between some 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: L3⩽15m)

(4) When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied).

(5) Allowable total piping length may become shorter than 1,000m due to the limitation of maximum additional refrigerant amount.

(6) Fuction setting of Ci is required (Ci=2), in case of height difference between indoor units: 15m ＜ H2 ⩽30m.

(7) In case of the height difference between outdoor units and indoor units: 50 m(40m) ＜ H1 ⩽90m, contact technical department of the manufacture.

①② Piping between outdoor unit Refer to the 3.2.

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

Outdoor Unit Capacity (kBtu/h)	High/Low Pressure Gas Φ (mm)	Liquid Φ (mm)	First Branch Model
76 (8HP)	19.05	9.53	HFQ-102F
96 (10HP)	22.2	9.53	
114~136 (12~14HP)	25.4	12.7	HFQ-162F
154 (16HP)	28.6	12.7	
170~232 (18~24HP)	28.6	15.88	HFQ-242F
250~324 (26~34HP)	31.75	19.05	HFQ-302F
344~522 (36~54HP)	38.1	19.05	
544 (56HP)	41.3	22.2	HFQ-462F
552~634 (58~66HP)	44.5	22.2	
654~1088 (68~112HP)	50.8	25.4	HFQ-682F

NOTE:
When maximum length of the equivalent refrigerant pipe (L1) from the outdoor unit/manifold pipe1 to the indoor unit is over 100m, the pipe size of high/low pressure gas and liquid line from basic unit/manifold pipe1 to first branch should be increased one size with the reducer (field-supplied).

④ Pipe after first branch (2 pipes portion)

Total Indoor Unit Capacity (kBtu/h)	Gas Φ (mm)	Liquid Φ (mm)	Branch Pipe Model
Q < 54 (6HP)	15.88	9.53	HFQ-102F
54 (6HP) ≤ Q < 86 (9HP)	19.05	9.53	
86 (9HP) ≤ Q < 114 (12HP)	22.2	9.53	
114 (12HP) ≤ Q < 154 (16HP)	25.4	12.7	HFQ-162F
154 (16HP) ≤ Q < 170 (18HP)	28.6	12.7	
170 (18HP) ≤ Q < 250 (26HP)	28.6	15.88	HFQ-242F
250 (26HP) ≤ Q < 344 (36HP)	31.75	19.05	HFQ-302F
344 (36HP) ≤ Q <544 (56HP)	38.1	19.05	
544 (56HP) ≤ Q < 552 (58HP)	41.3	22.2	HFQ-462F
552 (58HP) ≤ Q < 654 (68HP)	44.5	22.2	
654 (68HP) ≤ Q	50.8	25.4	HFQ-682F

NOTE:
Even if the equivalent refrigerant piping length (L1) is more than 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.

⑤Pipe between last branch and indoor unit

1. The pipe diameter should be the same as the indoor unit piping connection size, details refer to the technical catalog of indoor unit.
2. When the liquid piping length is longer than 15m, use Φ9.53 pipe and reducer (field-supplied) instead of Φ6.35 pipe.

Piping Branch Restrictions

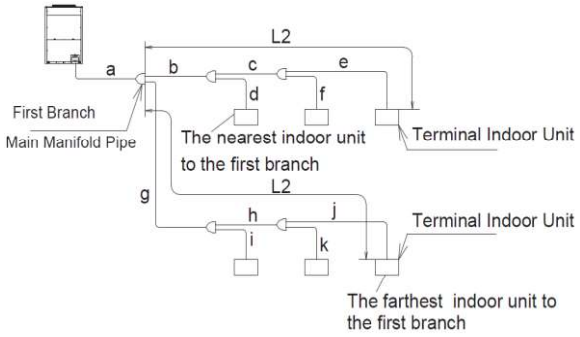
In the case that the piping length from the first branch to the farthest indoor unit (L2) is over 40m, follow the instructions below when performing the field-supplied piping work.

Example 1: Installation with Main Piping Branch

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

(1) If the piping length L2 is over 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).

(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 40m.

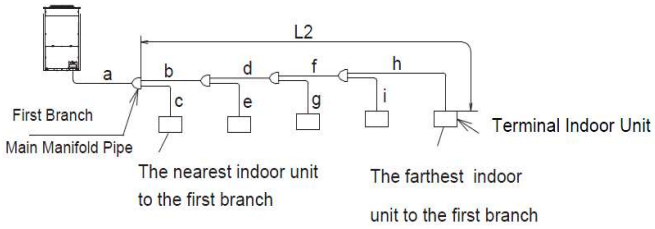


Example 2: Installation without Main Piping Branch

In the case that piping length from the first branch to the terminal indoor units is within 40-90m,

(1) If the piping length L2 is over 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 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 kg)

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

Pipe Diameter Φ (mm)	Total Piping Length (m)	Refrigerant Amount for 1m Pipe (kg/m)	Additional Charge (kg)
28.6	m	× 0.67=	
25.4	m	× 0.52=	
22.2	m	× 0.36=	
19.05	m	× 0.26=	
15.88	m	× 0.17=	
12.7	m	× 0.11=	
9.53	m	× 0.056=	
6.35	m	× 0.024=	
		Total Additional Charge For Liquid Piping =	

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

Total Capcity of Indoor Unit Used in Heat Recovery System and NOT Connected to SW BOX (Cooling Only Indoor Unit) (kBtu/h)	Refrigerant Charge (kg/kBtu/h)	Additional Charge (kg)
	× 0.0105=	
Total Other Indoor Unit and Water Module Capcity (kBtu/h)	Refrigerant Charge (kg/kBtu/h)	Additional Charge (kg)
	× 0.0234=	
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 (kg/unit)	Additional Charge (kg)
HCHM-N04X		× 0.1=	
HCHM-N08X		× 0.2=	
HCHM-N12X		× 0.3=	
HCHM-N16X		× 0.4=	
		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 (kg)
⩽ 100%	0.0kg
(101% ~ 115%)	0.5kg
(116% ~ 130%)	1.0kg
(131% ~ 150%)	1.5kg

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

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)	76	96	114	136~154	170~228	250~272	290~340	360~424	444~530	550~648	664~804	826~848
Max. Additional Refrigerant Charge (kg)	28.5	30.5	31.5	34.5	41.0	44.5	51.0	57.5	65.5	74.5	85.5	100.0

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

Outdoor Unit (kBtu/h) (FKFSHA)	W_0 Outdoor Unit Ref. Charge (Kg)
76	6. 0
96	6. 0
114	8. 8
136	9. 2
154	9. 8
170	10. 6
190	11. 5
212	11. 5

NOTE:

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

2. Charging Work

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

3. Record of Additional Charge

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

Total Ref. Charge = W + Wo

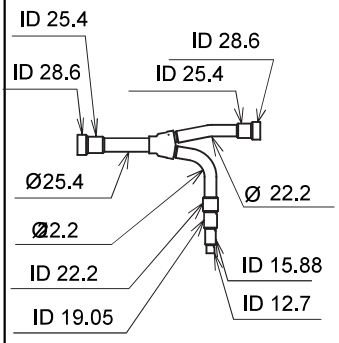
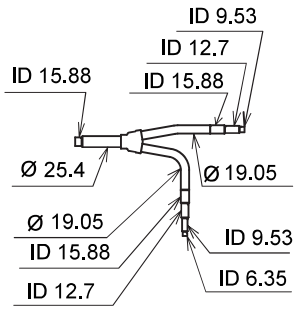
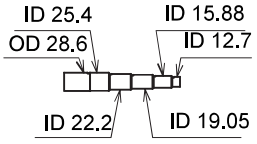
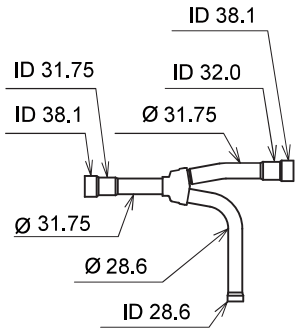
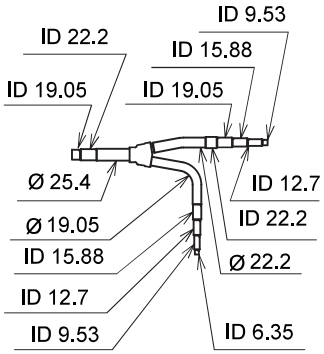
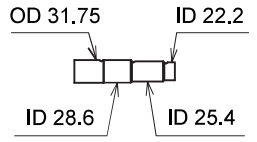
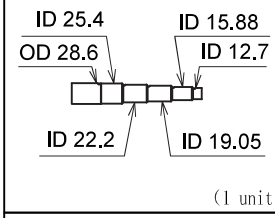
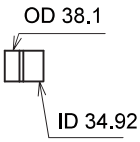
This System = ☐ + ☐ = ☐ kg

Total Additional Charge: W ☐ kg

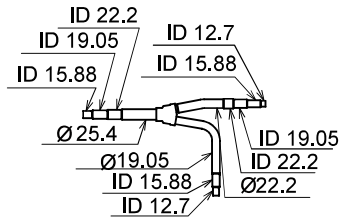
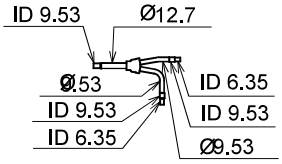
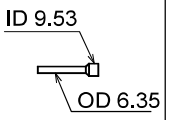
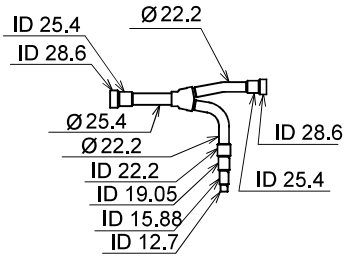
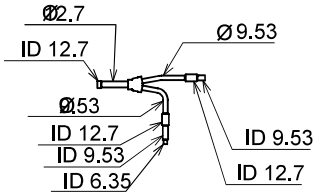
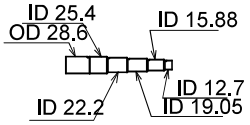
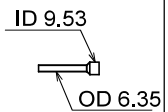
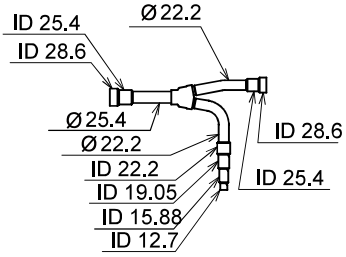
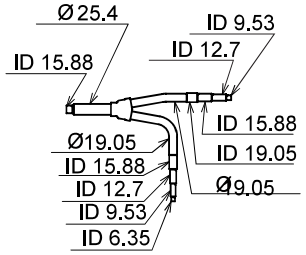
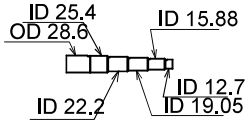
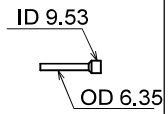
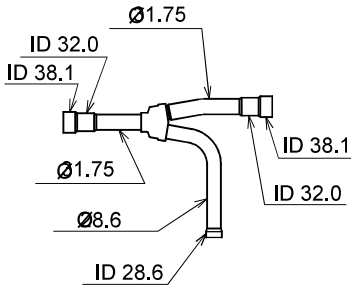
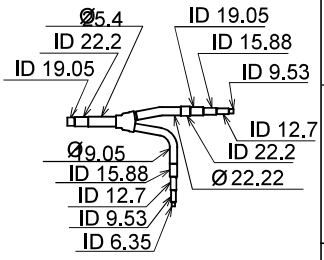
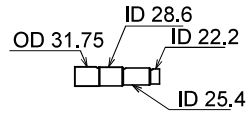
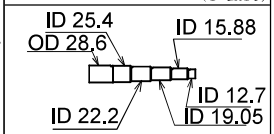
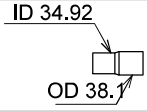
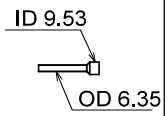
Total Ref. Charge: ☐ kg

Date of Charging: ☐ / ☐ / ☐

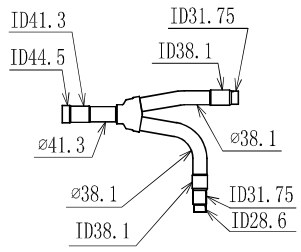
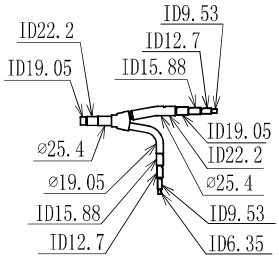
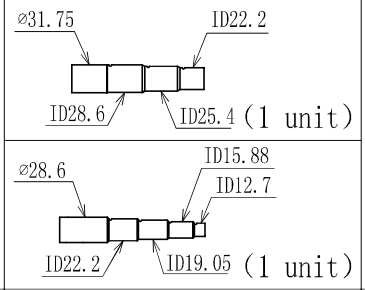
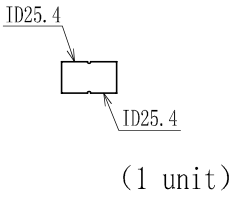
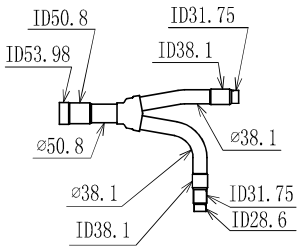
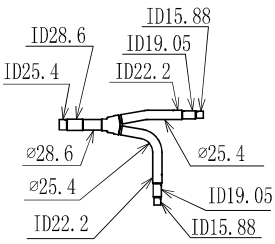
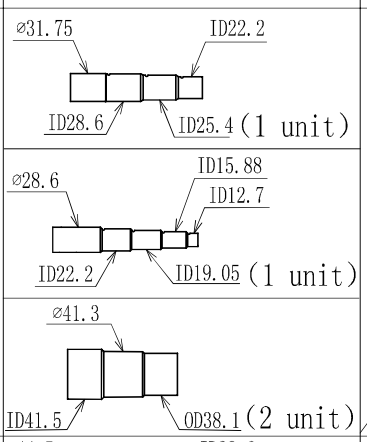
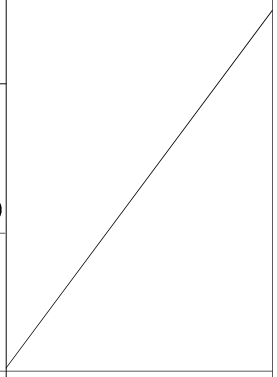
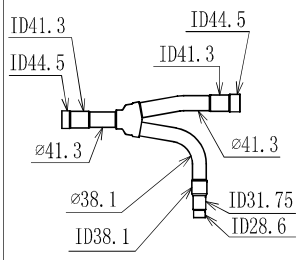
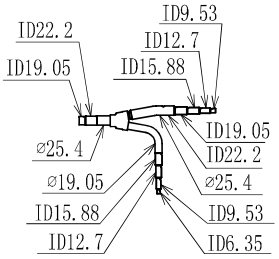
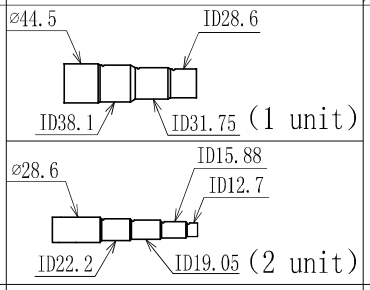
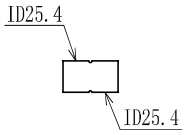
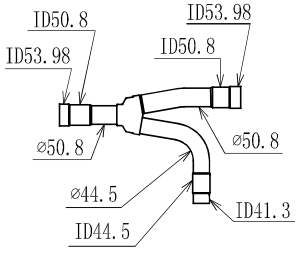
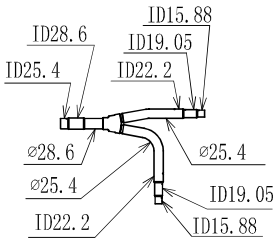
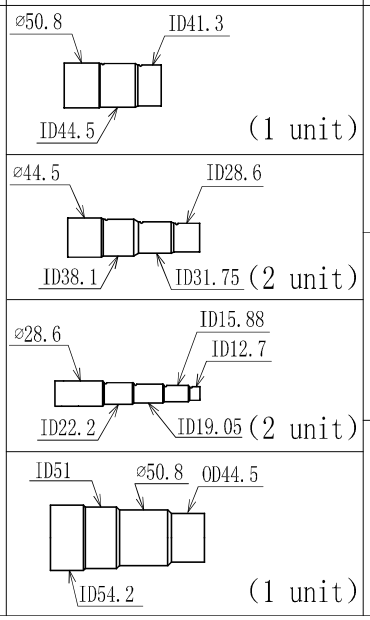
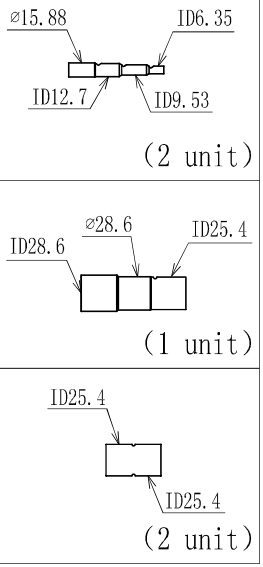
3.6 Piping Connection Kit Dimensions (optional)

Model	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
HFQ-M22F			 (2 unit)	—
HFQ-M32F			 (1 unit)  (1 unit)  (1 unit)	—

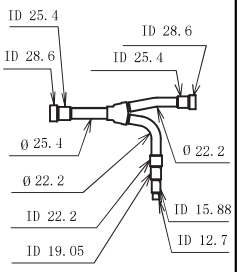
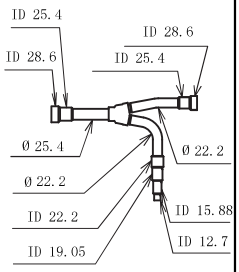
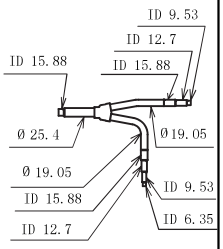
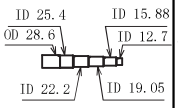
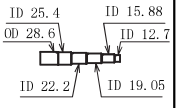
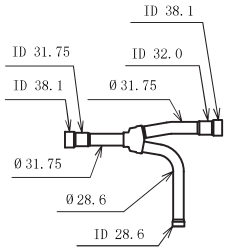
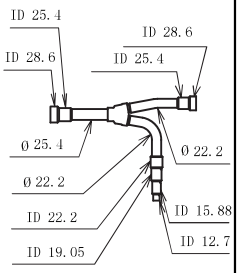
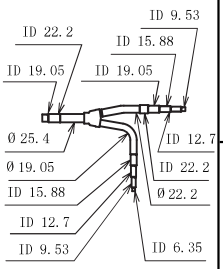
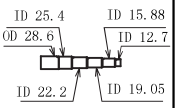
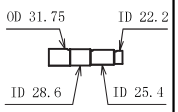
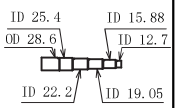
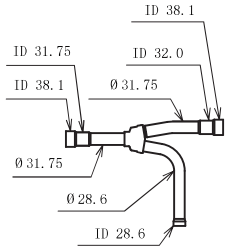
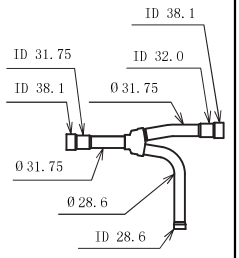
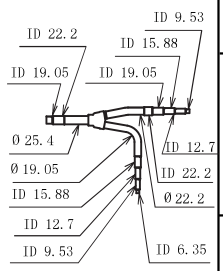
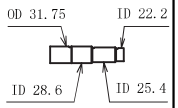
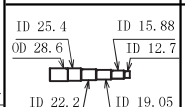
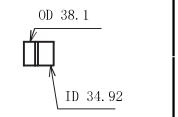
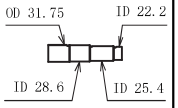
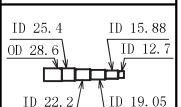
Unit: mm, ID: Inner Diameter, OD: Outer Diameter

Models	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
HFQ-102F			—	 (2 unit)
HFQ-162F			 (1 unit)	 (1 unit)
HFQ-242F			 (1 unit)	 (1 unit)
HFQ-302F			 (1 unit)  (1 unit)  (1 unit)	 (1 unit)

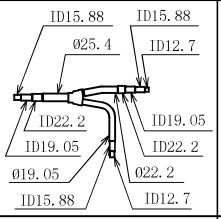
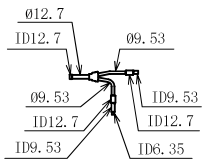
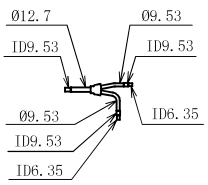
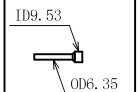
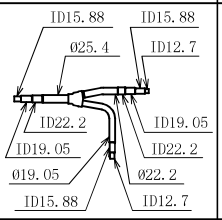
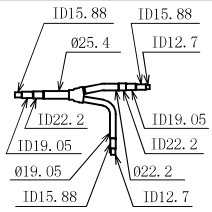
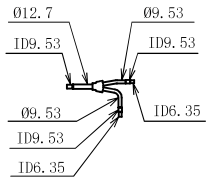
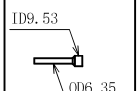
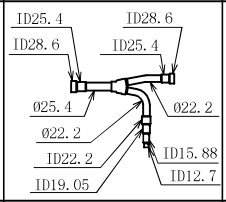
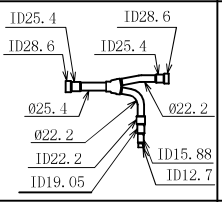
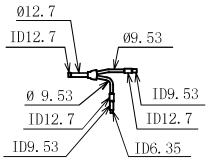
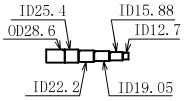
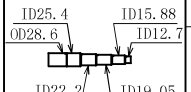
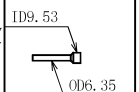
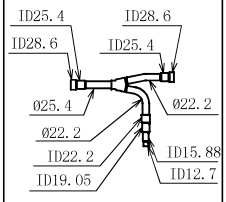
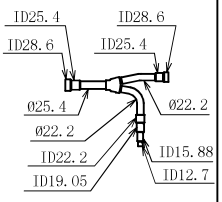
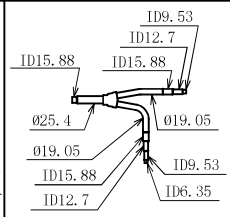
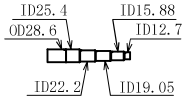
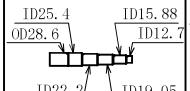
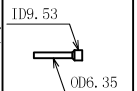
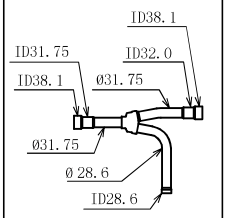
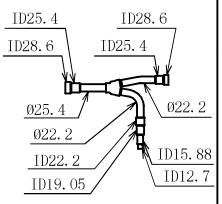
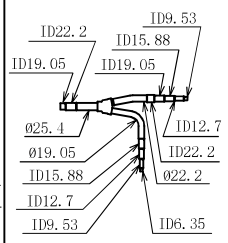
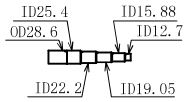
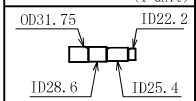
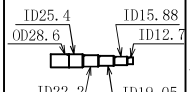
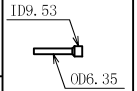
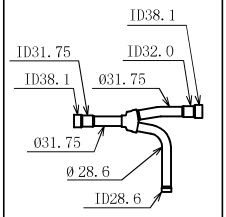
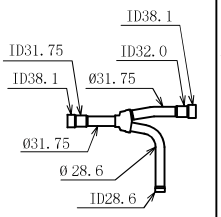
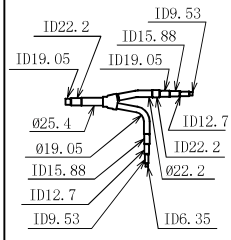
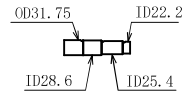
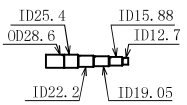
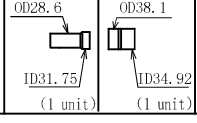
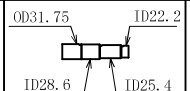
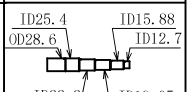
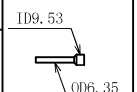
Unit: mm, ID: Inner Diameter, OD: Outer Diameter

Models	Gas Line	Liquid Line	Reducer for Gas Line	Reducer for Liquid Line
HFQ-M462F				
HFQ-M682F				
HFQ-462F				
HFQ-682F				

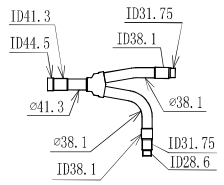
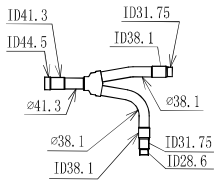
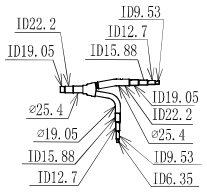
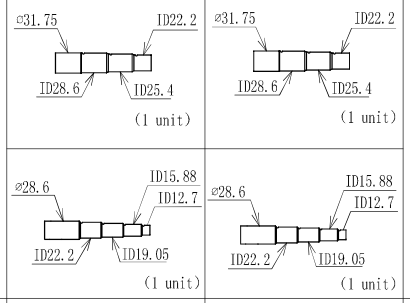
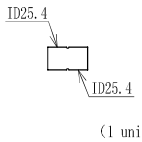
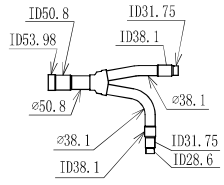
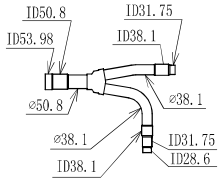
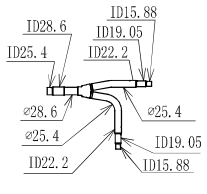
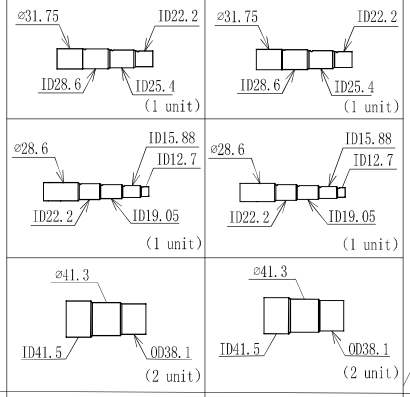
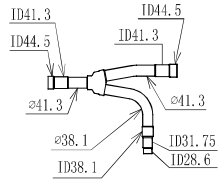
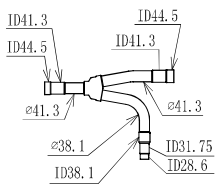
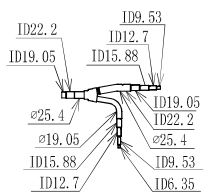
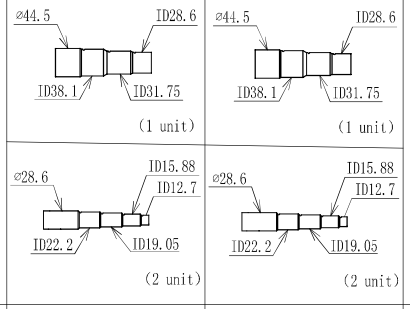
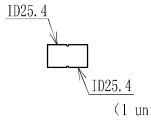
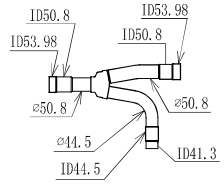
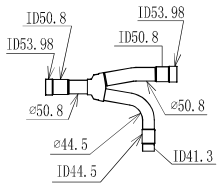
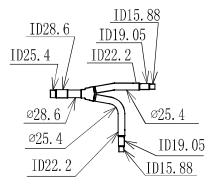
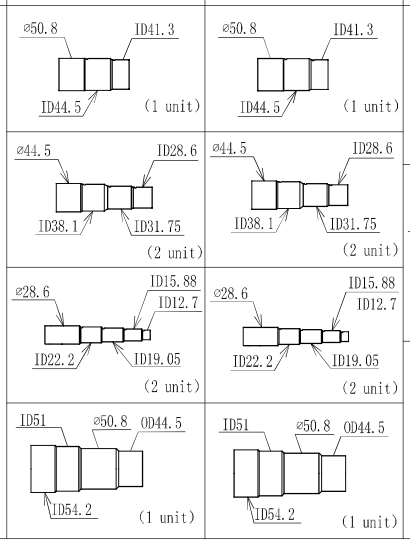
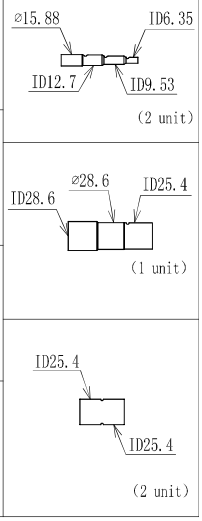
Unit: mm, ID: Inner Diameter, OD: Outer Diameter

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
HFQ-M202F				 (1 unit)	 (2 unit)	—
HFQ-M212F				 (1 unit)  (1 unit)	 (1 unit) —	—
HFQ-M302F				 (1 unit)  (1 unit)  (1 unit)	 (1 unit)  (1 unit) —	—

Unit: 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
HFQ-M142F				—	—	 (2 unit)
HFQ-M282F				—	—	 (2 unit)
HFQ-M452F				 (1 unit)	 (2 unit)	 (1 unit)
HFQ-M562F				 (1 unit)	 (2 unit)	 (1 unit)
HFQ-M692F				 (1 unit)  (1 unit)	 (1 unit)	 (1 unit)
HFQ-M902F				 (1 unit)  (1 unit)  (1 unit) (1 unit)	 (1 unit)  (1 unit)	 (1 unit)

Unit: 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
HFQ-M462XF						
HFQ-M682XF						
HFQ-462XF						
HFQ-682XF						

Unit: mm, ID: Inner Diameter, OD: Outer Diameter

4. Capacities and Selection Data

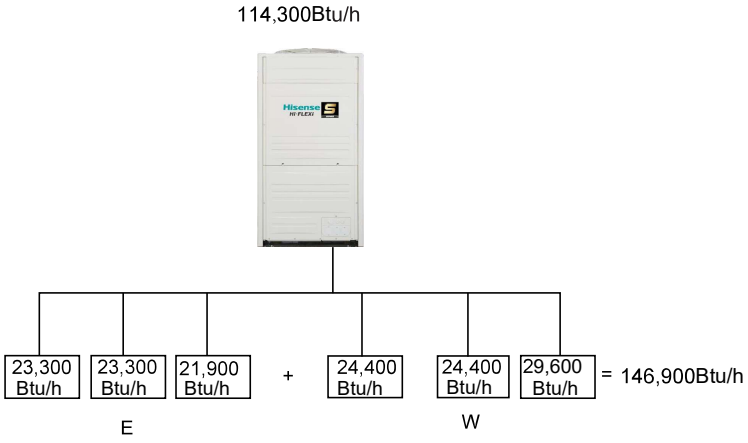
4.1 Procedure for Selection of the System

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.

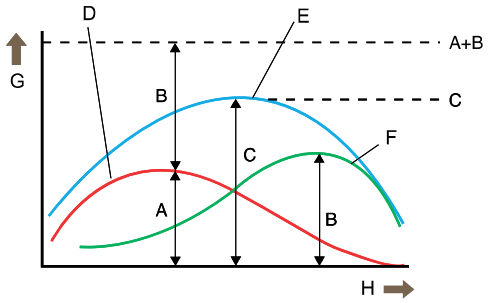
4.1.1 Unique features of the system

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 68,500 Btu/h unit. In the afternoon, a peak equivalent to a 78,400 Btu/h unit occurs on the west zone.



Indoor unit capacity
E: East zone (68,500Btu/h)
W: West zone (78,400Btu/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 146,900 Btu/h outdoor unit, matching the total installed indoor capacity (68,500 Btu/h + 78,400 Btu/h). However, the maximum simultaneous load in the whole building occurs at noon, and is equal to 114,300 Btu/h of unit capacity. Therefore, a 114,300 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 horsepower is calculated with the following formula:

Ratio of total combined horsepower= (Total capacity of the indoor units / Capacity of the outdoor unit) x 100%
= (146,900 Btu/h / 114,300 Btu/h) x 100% ≈126%

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: refer to manual of Engineering Data.

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

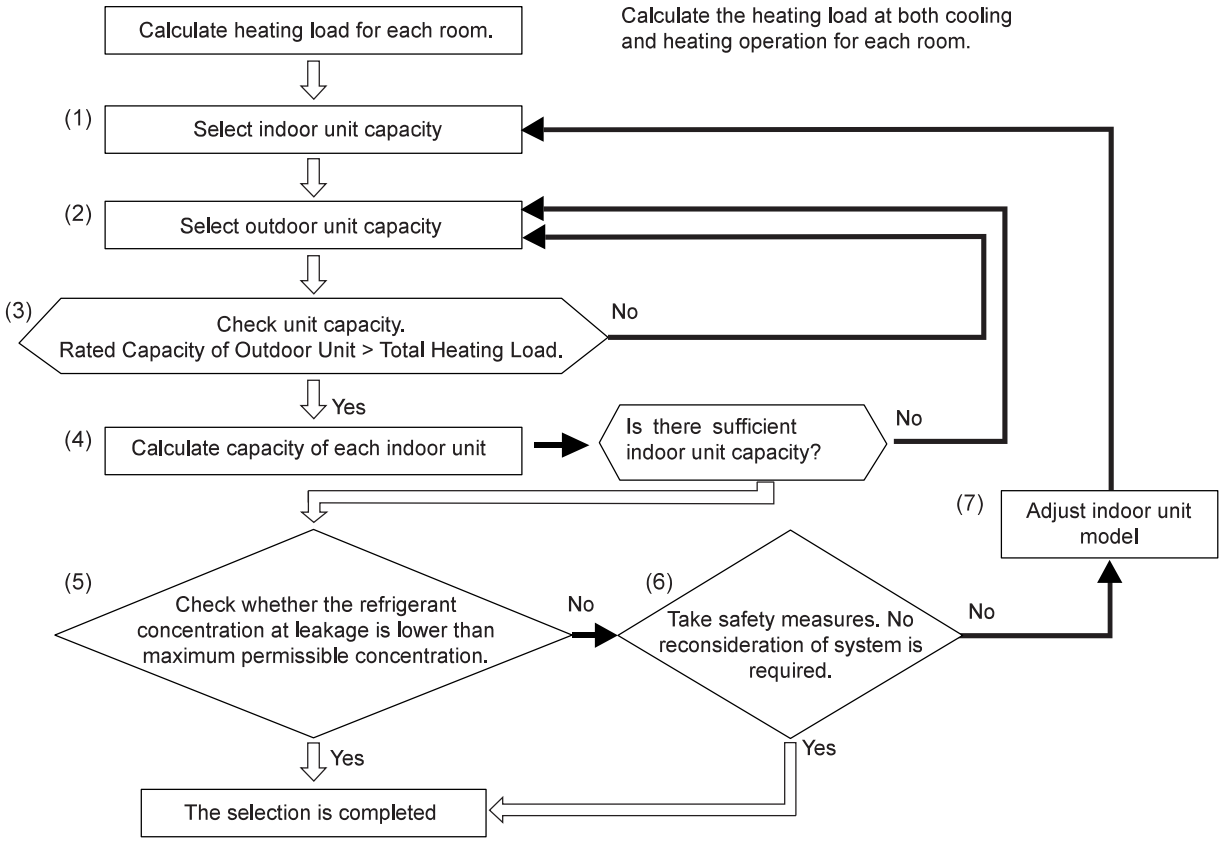
For heating correction factor depending on the piping length: 4.2 “Capacity Correction Based on Refrigerant Piping Length”.

For sensible heat factor: VRF Indoor Units Technical Catalog.

In case of an installation with ducts (outdoor unit with AVD indoor unit) the fan performance for duct calculations should be considered. The AVD 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).

Capacity of Indoor Unit = Norminal capacity of Indoor Unit x correction Factor (room temperature)

Correction factor according to room temperature: When the estimated load for each room differs from the rated capacity (cooling: 27.0 ºC DB/19 ºC WB; heating: 20ºC 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, 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

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: 35ºC DB; heating: 7ºC DB / 6ºC 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.)

Unit capacity for each room = Outdoor Unit Capacity (value at item 2) x (Indoor unit capacity in concerned room / Total indoor unit capacity)

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 Section 6.3 in Installation Chapter for items from (5) through (7).
- When select the temperature, 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 selecting 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 2ºC 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	30,760	30,760
Estimated heating load (Btu/h)	14,590	18,620	18,620	22,410	29,440	32,050	32,050

Temperature conditions:

Operating conditions		Cooling	Heating
Indoor air inlet temperature	DB(°C)	27.0	20
	WB(°C)	19.0	—
Outdoor air inlet temperature	DB(°C)	30.0	1.0
	WB(°C)	—	0.0

DB: dry bulb; WB: wet bulb.

Piping connection conditions:

- Equivalent pipe length between outdoor unit and indoor units: 60 m.
- Pipe height: 25 m.
- Heat recovery system (3 pipes).

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

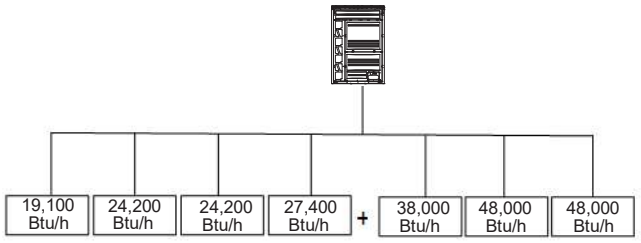
Appropriate selection of indoor units and nominal capacity

Example: selection of AVD 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 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	AVD-19*	AVD-24*	AVD-24*	AVD-27*	AVD-38*	AVD-48*	AVD-48*
Nominal cooling load (Btu/h)	19,100	24,200	24,200	27,400	38,000	48,000	48,000
Nominal heating 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: 191,100Btu/h



The resulting total indoor unit capacity is 228,900 Btu/h. The outdoor unit with the exact capacity is the 228,900 Btu/model, but the possibility "Reduced total outdoor unit capacity" allows the AVWT-190* model (nominal capacity:191,100Btu/h) to be selected. Thus, it is allowed that the outdoor unit to be up to 20% smaller capacity when compared with other air conditioning systems.

Total combination horsepower = (Total indoor unit capacity / Outdoor unit capacity) x 100%
= (228,900Btu/h / 191,100Btu/h) x100% ≈ 120%

NOTE:

The maximum simultaneous load on the installation must not be higher than 191,100 Btu/h for this example.

To determine the outdoor unit pre-selected nominal cooling and heating capacity, it's necessary refer to Engineering Data, in which the total capacity combination (120%) and the temperature condition have been taken into consideration.

Concept	Room 1+2+3+4+5+6+7	Outdoor unit pre-selected capacity(AVWT-190*~120%)
Total nominal cooling load (Btu/h)	228,900	204,105
Total nominal heating load (Btu/h)	258,700	222,462

NOTES:

- 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 the air inlet temperature.
- If the total combination capacity is not shown in the capacity tables (for example, 115%), an interpolation should be carried out using the values above and below (110% and 120%) the total combination.

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

Correction factor according to piping length:

According to 4.2 “Capacity Correction Based on Refrigerant Piping Length”.

- Cooling capacity correction factor depending on the pipe length =0.890.
- Heating capacity correction factor depending on the pipe length =0.954.

Correction factor according to defrosting condition (for heating operation):

According to 4.3 “Correction Factor According to Defrosting Operation”.

- Outdoor inlet air temp.(ºC 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)

Cooling: (204,105 Btu/h) x (0.890)x (1.0) = 181,653 Btu/h.
Heating: (222,462 Btu/h) x (0.954) x (0.857) = 181,880 Btu/h.

Actual capacity of each indoor unit.

Actual capacity of each indoor unit = (Actual capacity of the outdoor unit) x (Nominal capacity of each indoor units / Total nominal capacity of each indoor unit)

Example:

AVD-19*
Cooling: 181,653 × (19,100 / (19,100 + 24,200 + 24,200 + 27,400 +38,000 + 48,000 + 48,000)) = 15,158 Btu/h.
Heating: 181,880 × (21,600 / (21,600 + 27,400 +27,400 +30,800 + 42,500+ 54,500 + 54,500)) = 15,186 Btu/h.

AVD-24*
Cooling: 181,653 × (24,200 / (19,100 + 24,200 + 24,200 + 27,400 +38,000 + 48,000 + 48,000)) = 19,208 Btu/h.
Heating: 181,880 × (27,400 / (21,600 + 27,400 +27,400 +30,800 + 42,500+ 54,500 + 54,500)) = 19,264 Btu/h.

AVD-27*
Cooling: 181,653 × (27,400 / (19,100 + 24,200 + 24,200 + 27,400 +38,000 + 48,000 + 48,000)) = 21,744 Btu/h.
Heating: 181,880 × (30,800 / (21,600 + 27,400 +27,400 +30,800 + 42,500+ 54,500 + 54,500)) = 21,654 Btu/h.

AVD-38*
Cooling: 181,653 × (38,000/ (19,100 + 24,200 + 24,200 + 27,400 +38,000 + 48,000 + 48,000)) = 30,156 Btu/h.
Heating: 181,880 × (42,500 / (21,600 + 27,400 +27,400 +30,800 + 42,500+ 54,500 + 54,500)) = 29,880 Btu/h.

AVD-48*
Cooling: 181,653 × (48,000 / (19,100 + 24,200 + 24,200 + 27,400 +38,000 + 48,000 + 48,000)) = 38,092 Btu/h.
Heating: 181,880 × (54,500/ (21,600 + 27,400 +27,400 +30,800 + 42,500+ 54,500 + 54,500)) = 38,316 Btu/h.

Results:

Concept	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
Model selected	AVD-19*	AVD-24*	AVD-24*	AVD-27*	AVD-38*	AVD-48*	AVD-48*
Actual cooling capacity (Btu/h)	15,158	19,208	19,208	21,744	30,156	38,092	38,092
Actual heating capacity (Btu/h)	15,186	19,264	19,264	21,654	29,880	38,316	38,316
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)	181,653
Actual total heating capacity (Btu/h)	181,880
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 AVWT-190* unit meets the minimum cooling and heating requirements set for the system.

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

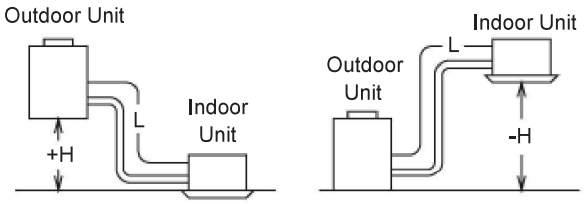
4.2 Capacity Correction Based on Refrigerant Piping Length

< Cooling Capacity >
Correction factor for cooling capacity according to piping length.

The cooling capacity should be corrected according to the following formula:
CCA=CC×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 0.5m.
- one 180° bend is 1.5m.
- one branch pipe is 0.5m.



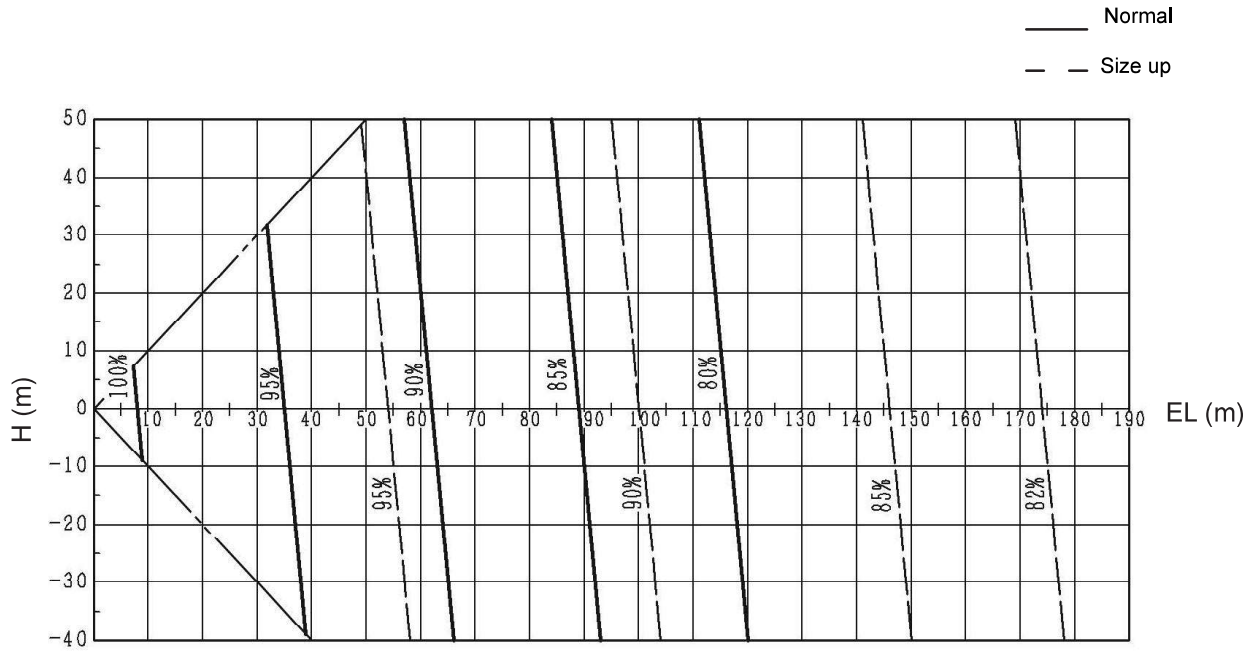
H: Vertical Distance Between Indoor Unit and Outdoor Unit

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

* H and EL please refer to INSTALLATION Chapter Section 4 Refrigerant Piping Work

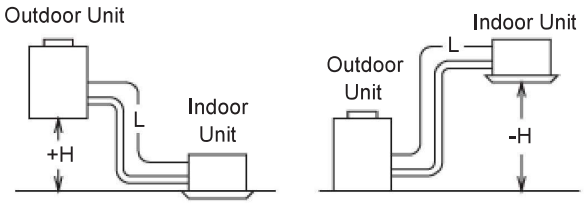


<Heating Capacity >
Correction factor for heating capacity according to piping length.

The heating capacity should be corrected according to the following formula:
HCA=HC×F
HCA: actual corrected heating capacity
HC: heating 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 0.5m.
- one 180° bend is 1.5m.
- one branch pipe is 0.5m.



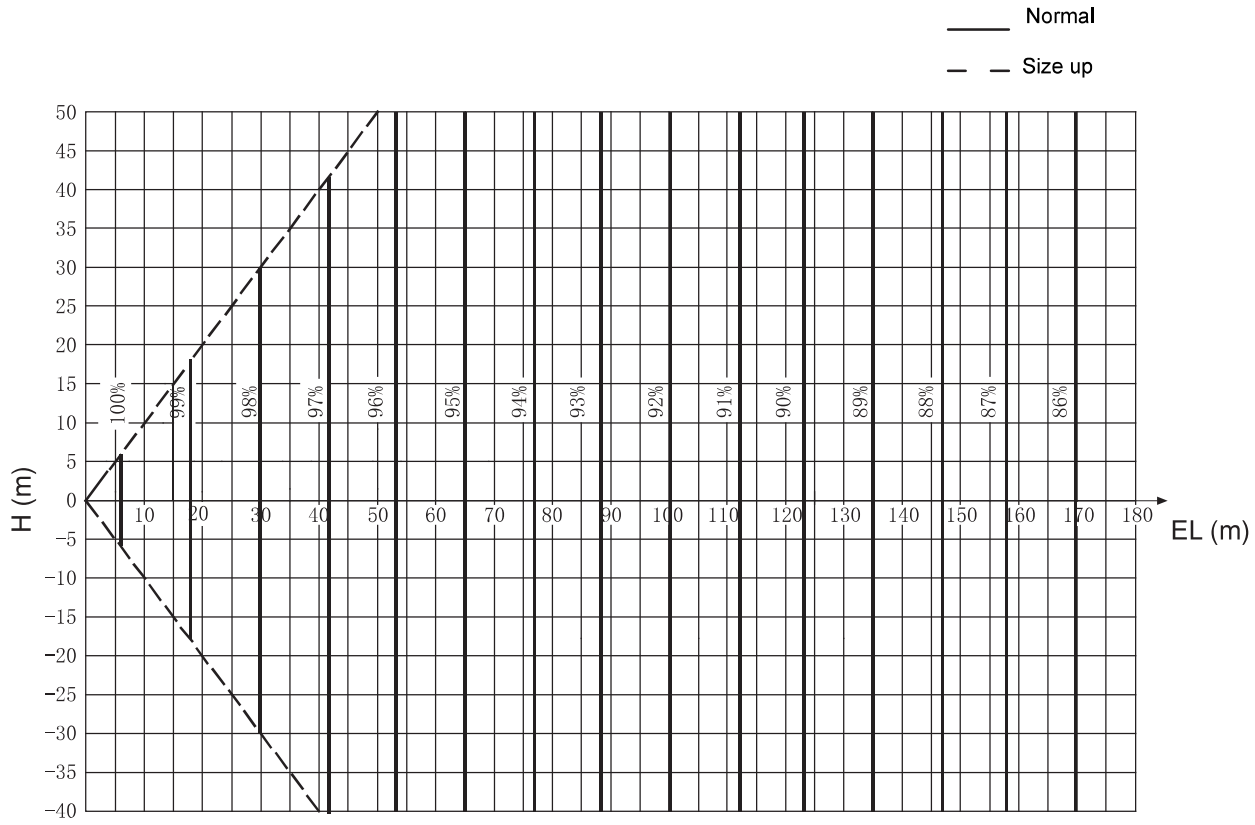
H: Vertical Distance Between Indoor Unit and Outdoor Unit

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

* H and EL please refer to INSTALLATION Chapter Section 4 Refrigerant Piping Work

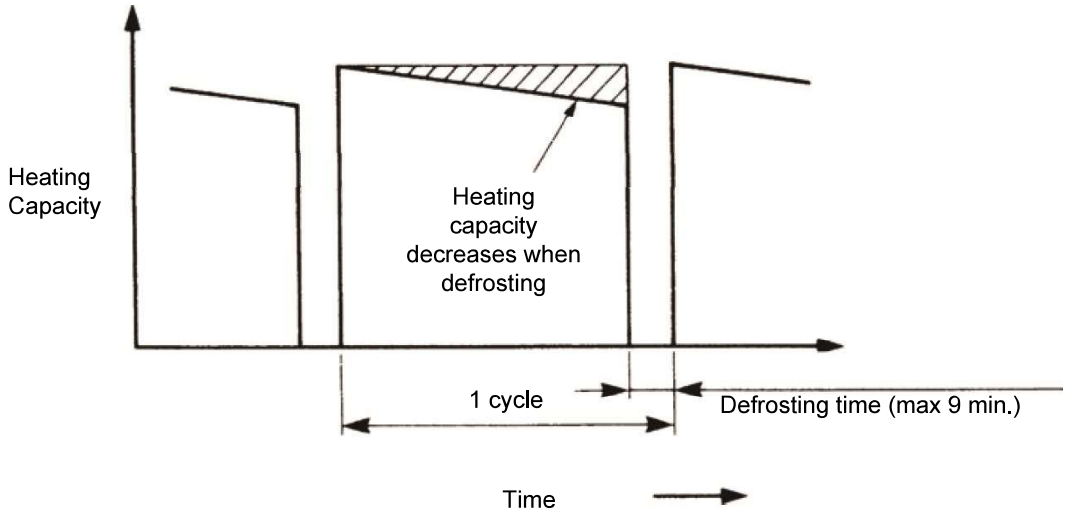


4.3 Correction Factor According to Defrosting Operation

The heating capacity in the preceding paragraph does not include defrost operation periods. Therefore, capacity should be corrected as follows:

Corrected Heating Capacity = Correction Factor x Heating Capacity

Outdoor Inlet Air Temp. (°C DB) (Humidity=85% RH)	-7	-5	-3	0	3	5	7
Correction Factor	0.95	0.93	0.88	0.85	0.87	0.90	1.00



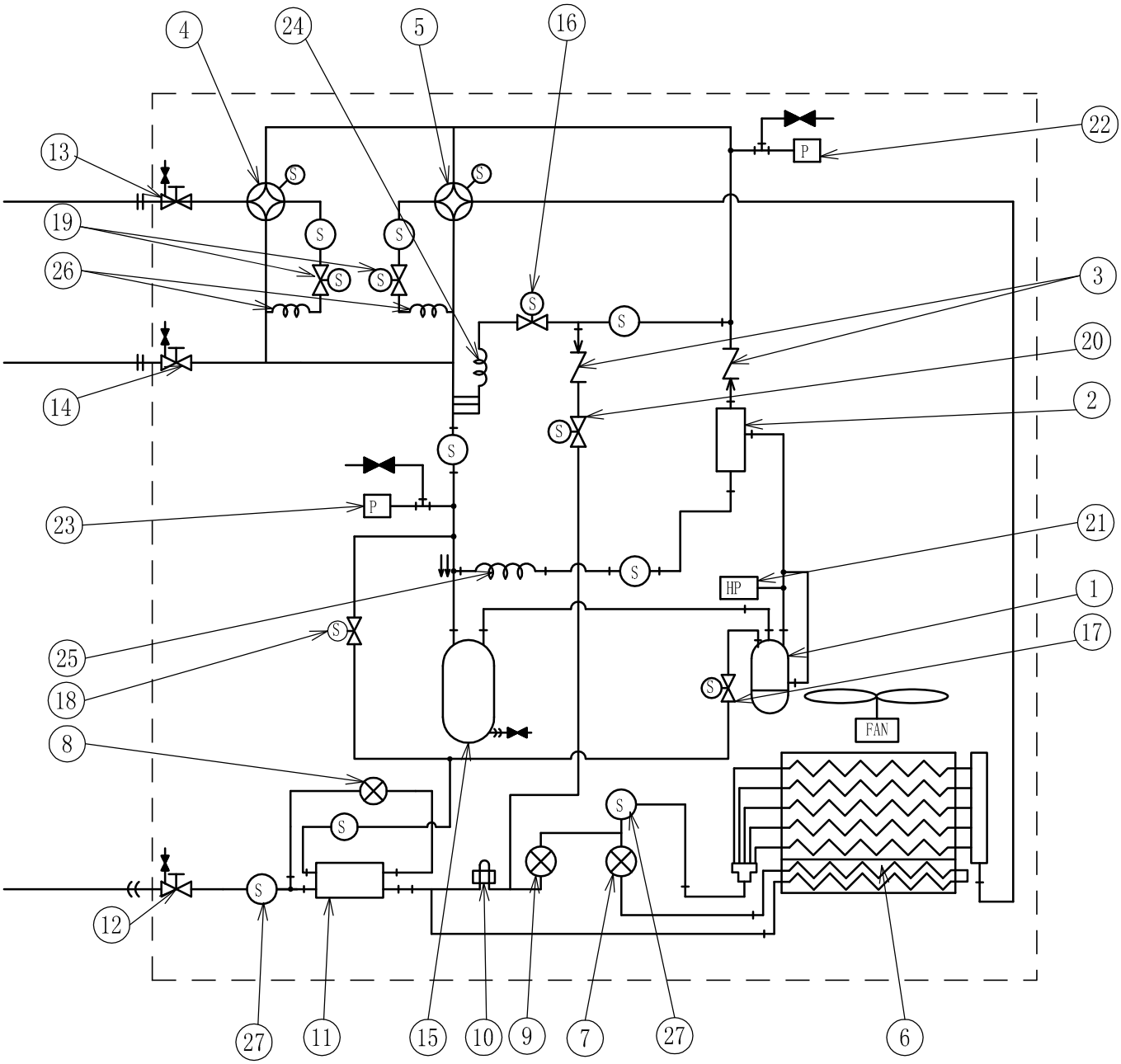
NOTES:

- The correction factor is not available for special conditions like snowfall or operation in a transitional period.
- When the outdoor inlet air temperature is higher than 7 °C, this correction coefficient is 1.0. And when the outdoor inlet air temperature is lower than -7 °C, this correction coefficient is 0.95.
- If the outdoor inlet air temperature is not shown in the above table (for example, 1 °C), an interpolation should be carried out using the values before and after (0 °C and 3 °C) the outdoor inlet air temperature.

5. Control System

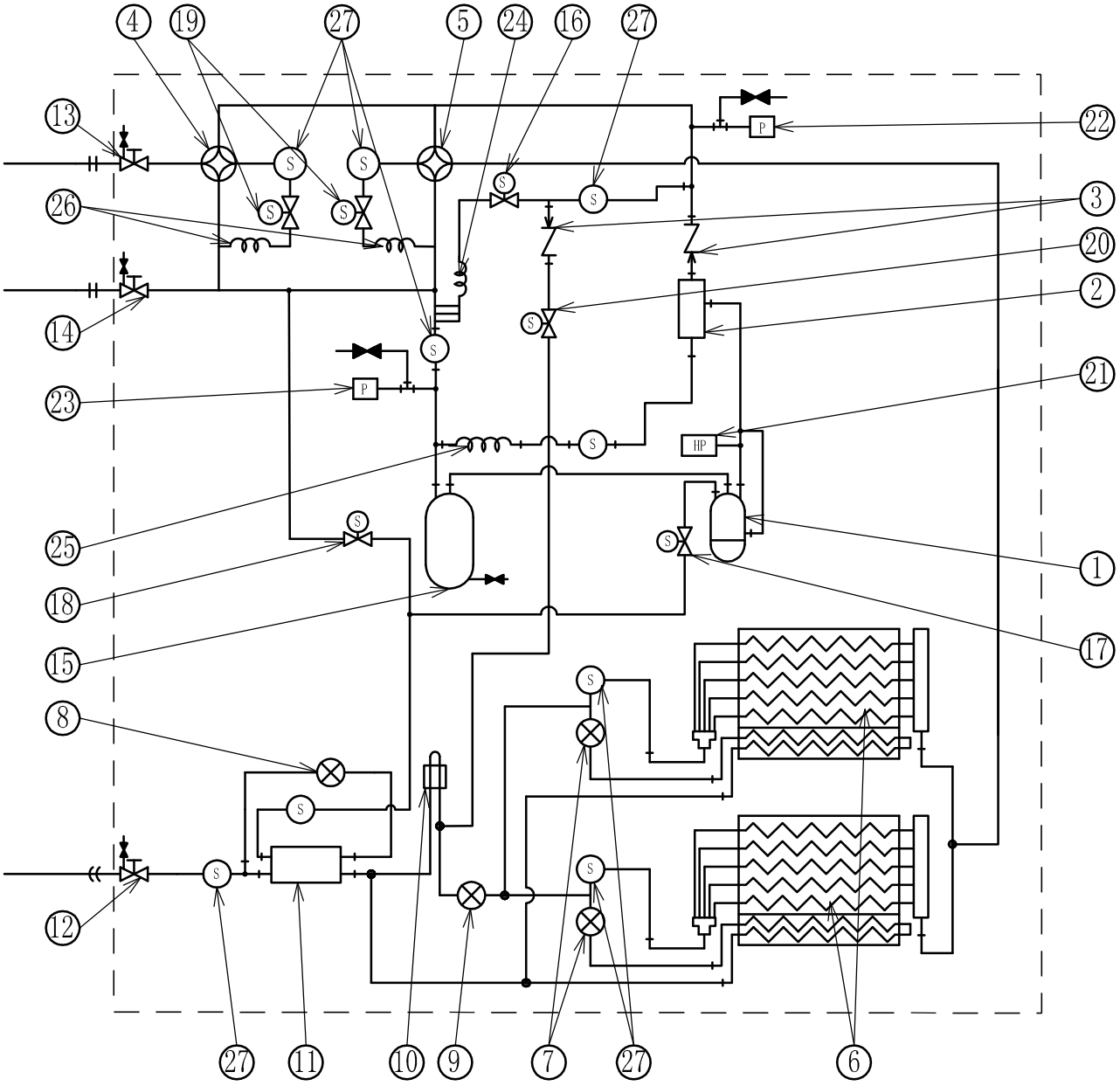
5.1 Refrigeration Cycle

AVWT–76*~96*



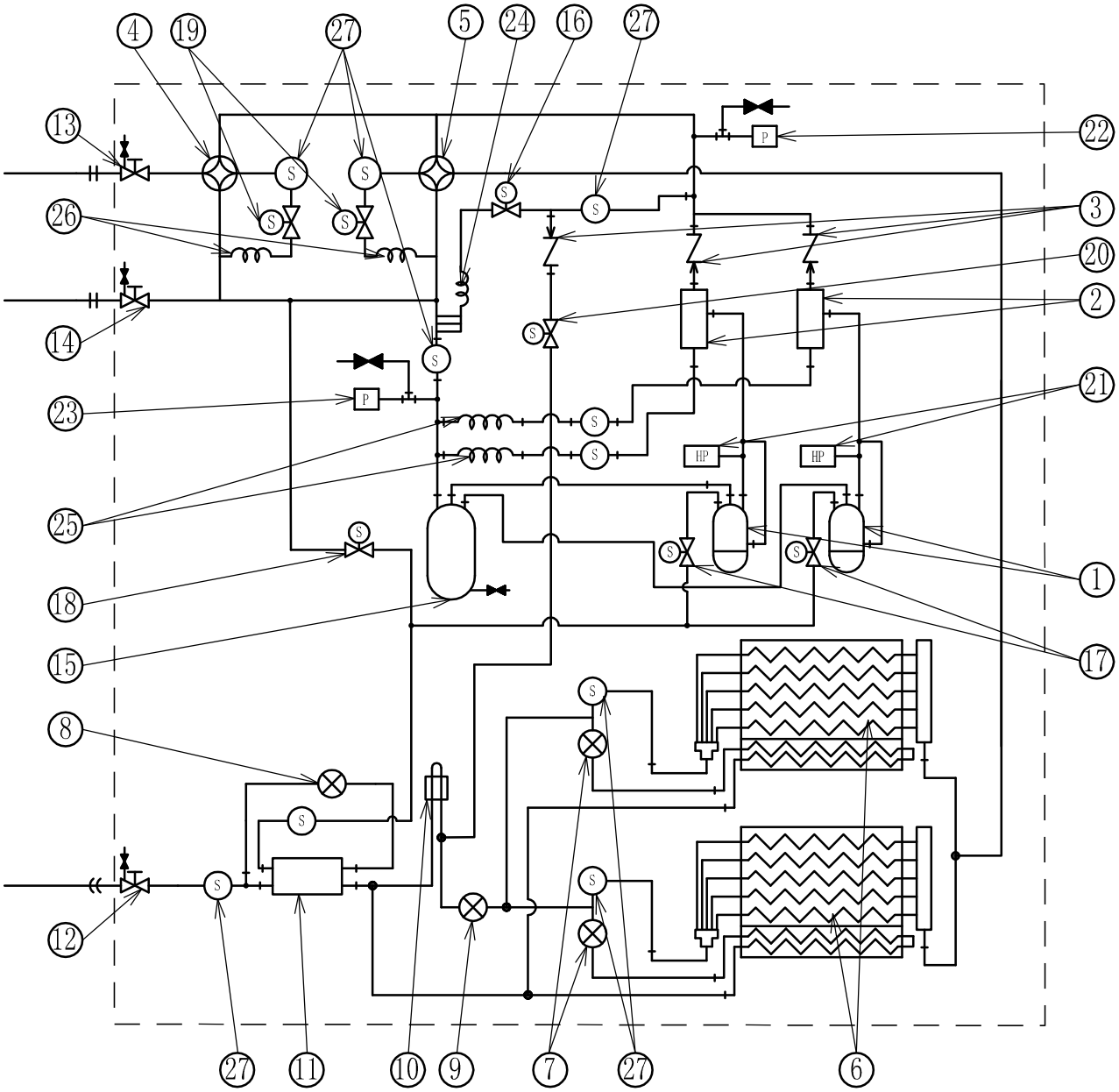
NO.	Name		NO.	Name		NO.	Name	
1	Compressor		10	Refrigerant cooler		19	Solenoid valve	SVG
2	Oil separator		11	Subcooler		20		SVC
3	Check valve		12	Stop valve	Liquid	21	High pressure switch	
4	4-way reversing valve	21-1	13		High/Low pressure Gas	22	Presser sensor	HP
5		21-2	14		Low pressure Gas	23		LP
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	

AVWT-114*~136*



NO.	Name		NO.	Name		NO.	Name	
1	Compressor		10	Refrigerant cooler		19	Solenoid valve	SVG
2	Oil separator		11	Subcooler		20		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	

AVWT–154~212*



NO.	Name		NO.	Name		NO.	Name	
1	Compressor		10	Refrigerant cooler		19	Solenoid valve	SVG
2	Oil separator		11	Subcooler		20		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 Heating: 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 Heating: 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.
						Heating 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≥ 3.6MPa: Open 2. Ps≤ 0.2MPa: Open	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd≥ 3.6MPa: Open 2. Ps≤ 0.2MPa: Open	1. Pd Increase Protection 2. Ps Decrease Protection	1. Pd≥ 3.6MPa: Open 2. Ps≤ 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≤ 1.6MPa: Open	1. Pd Decrease Protection	1. Pd≤ 1.6MPa: Open	1. Inverter Condensation Protection 2. Pd Decrease Protection	1. Tf≤ambient Temperature : Open 2. Pd≤ 1.6MPa: Open
SVG	Solenoid Valve for 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	RVR2	OFF	OFF	OFF	ON	ON
	RVR1	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:

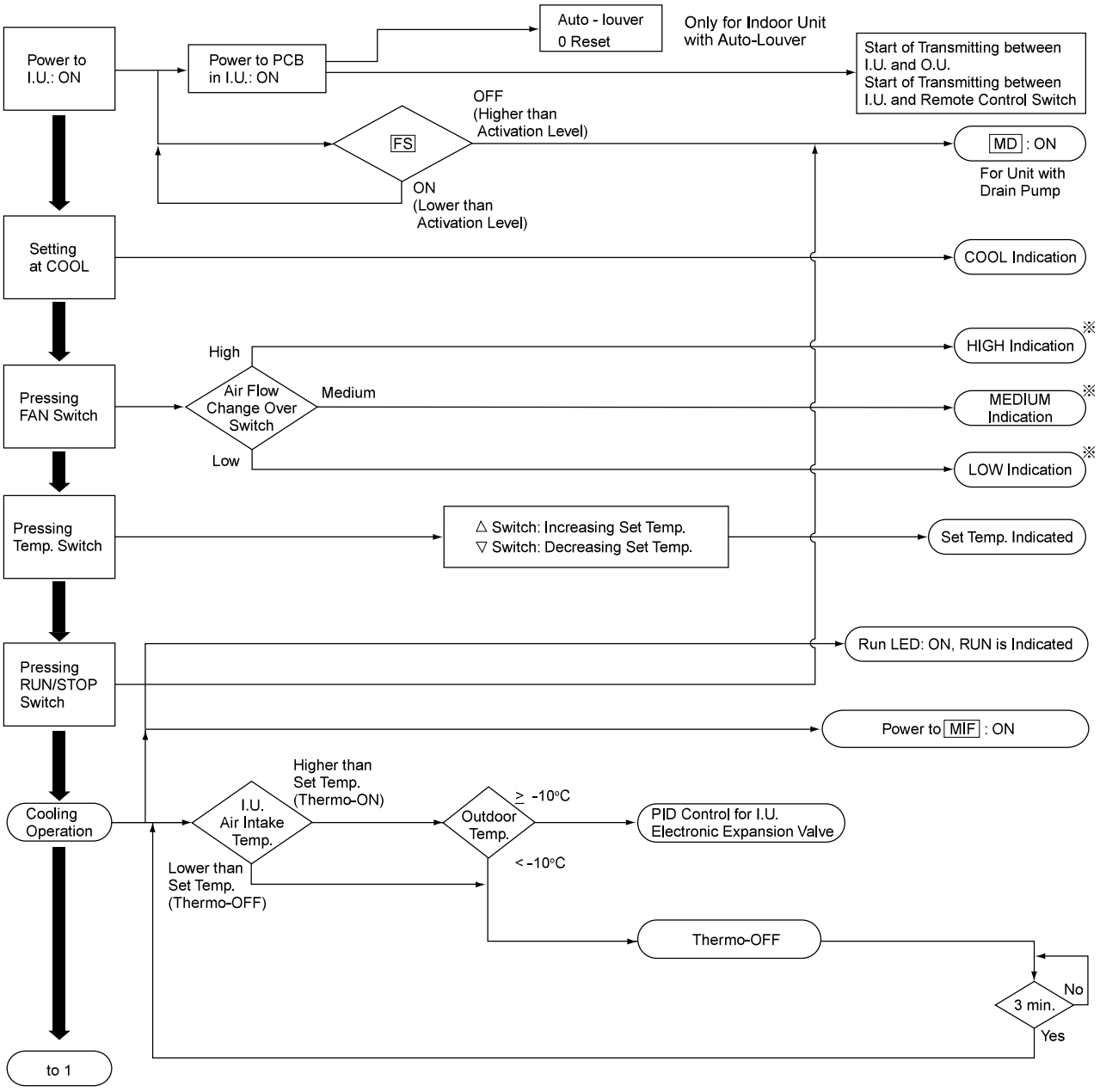
1. Heat Exchanger Condition
   COND : Use as Condenser
   cond : Avoid the use of Heat Exchanger (under a high pressure condition)
   EVAP : Use as Evaporator
2. Control Method of Expansion Valve
   HEX SC: To adjust to achieve the target value of heat exchanger SC
   HEX SH: To adjust to achieve the 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 Operating Procedure Chart

AVWT–76*~212*

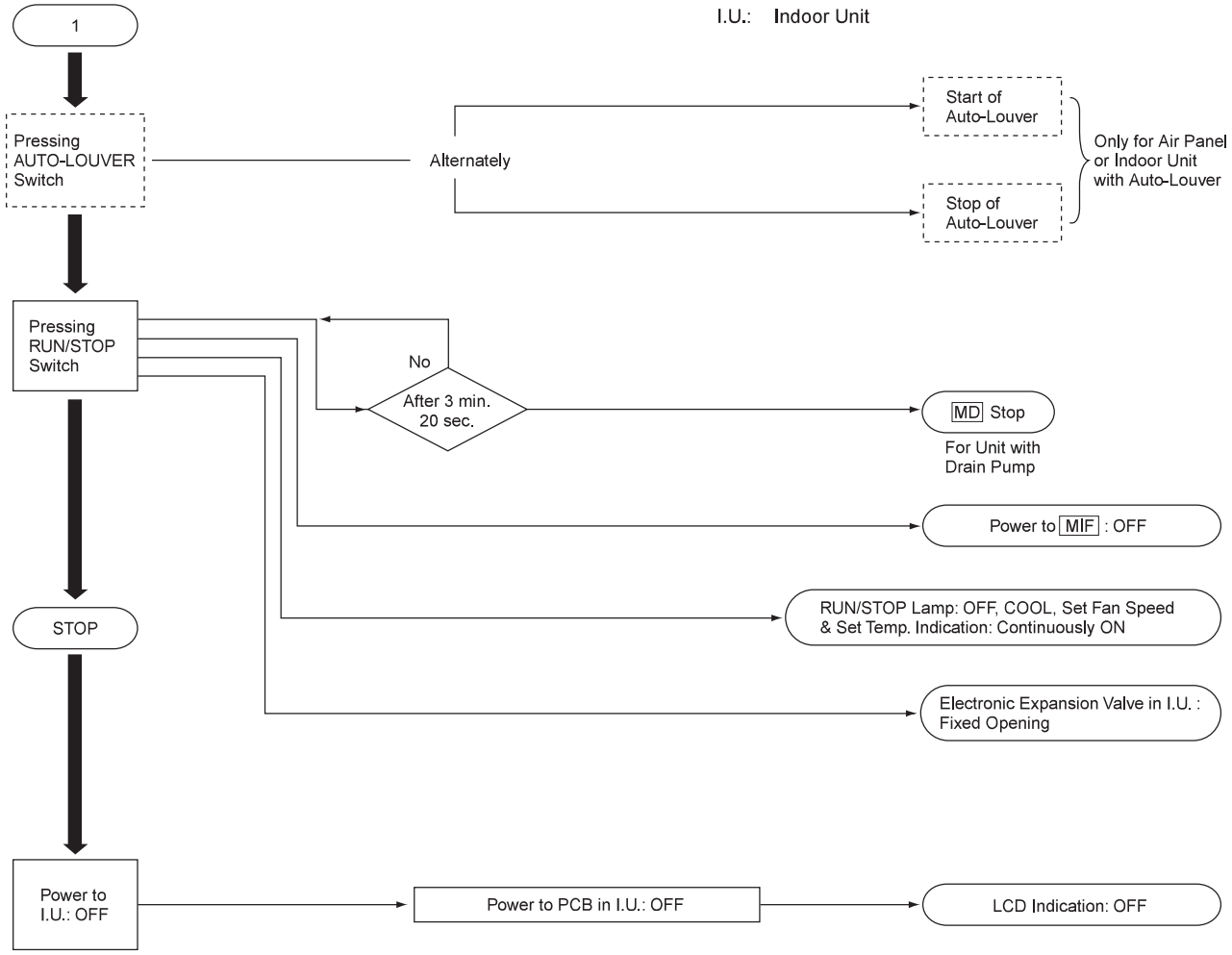
Cooling operation

I.U.: Indoor Unit
O.U.: Outdoor Unit

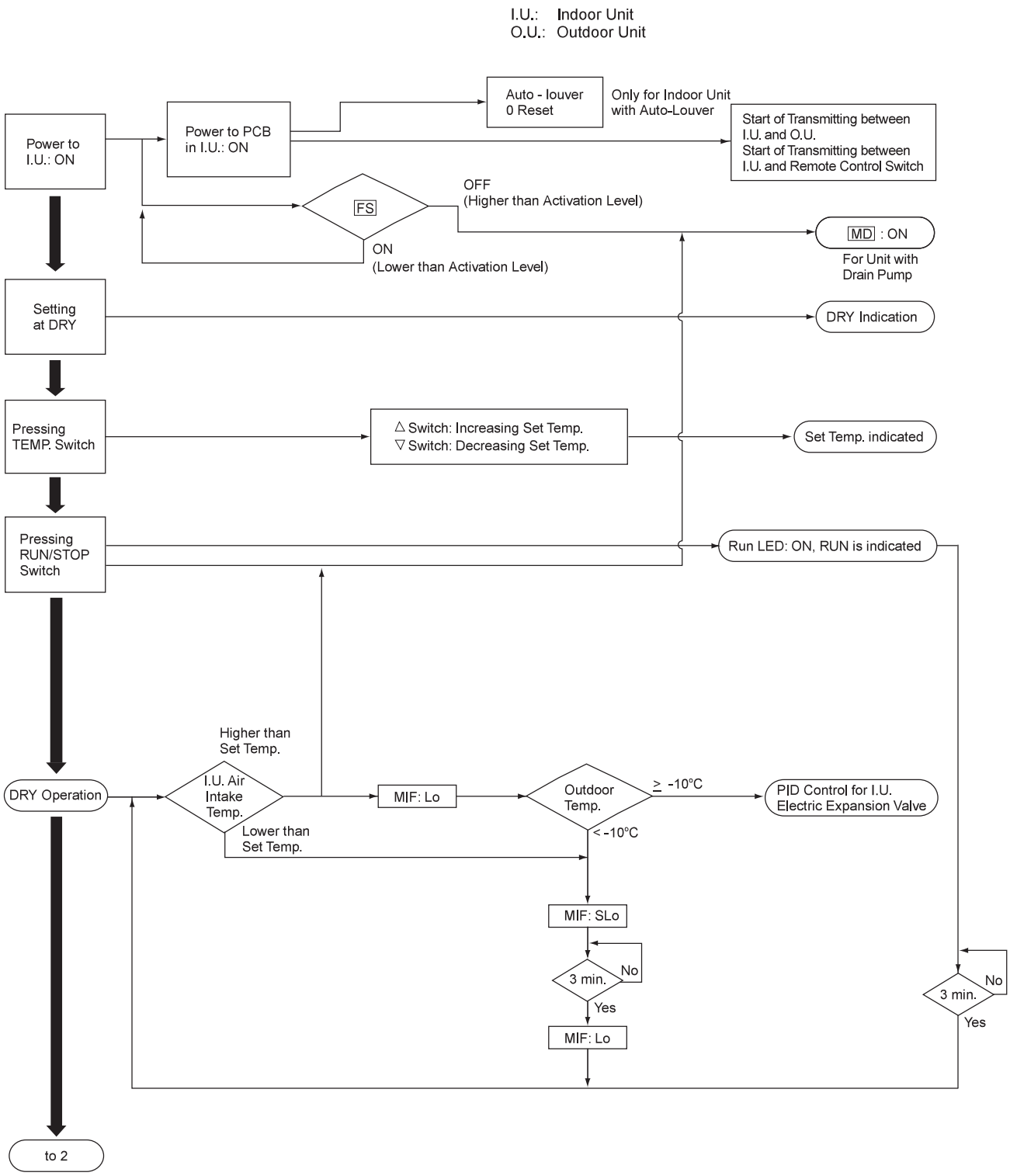


NOTE:
※: In case of AVD-76 and 96, Fan Speed is "High"only .
By pressing the FAN SPEED SWITCH of Remote Control Switch, indication of LCD changes as →Hi→Me→Lo→, but actual fan speed is "High" only.

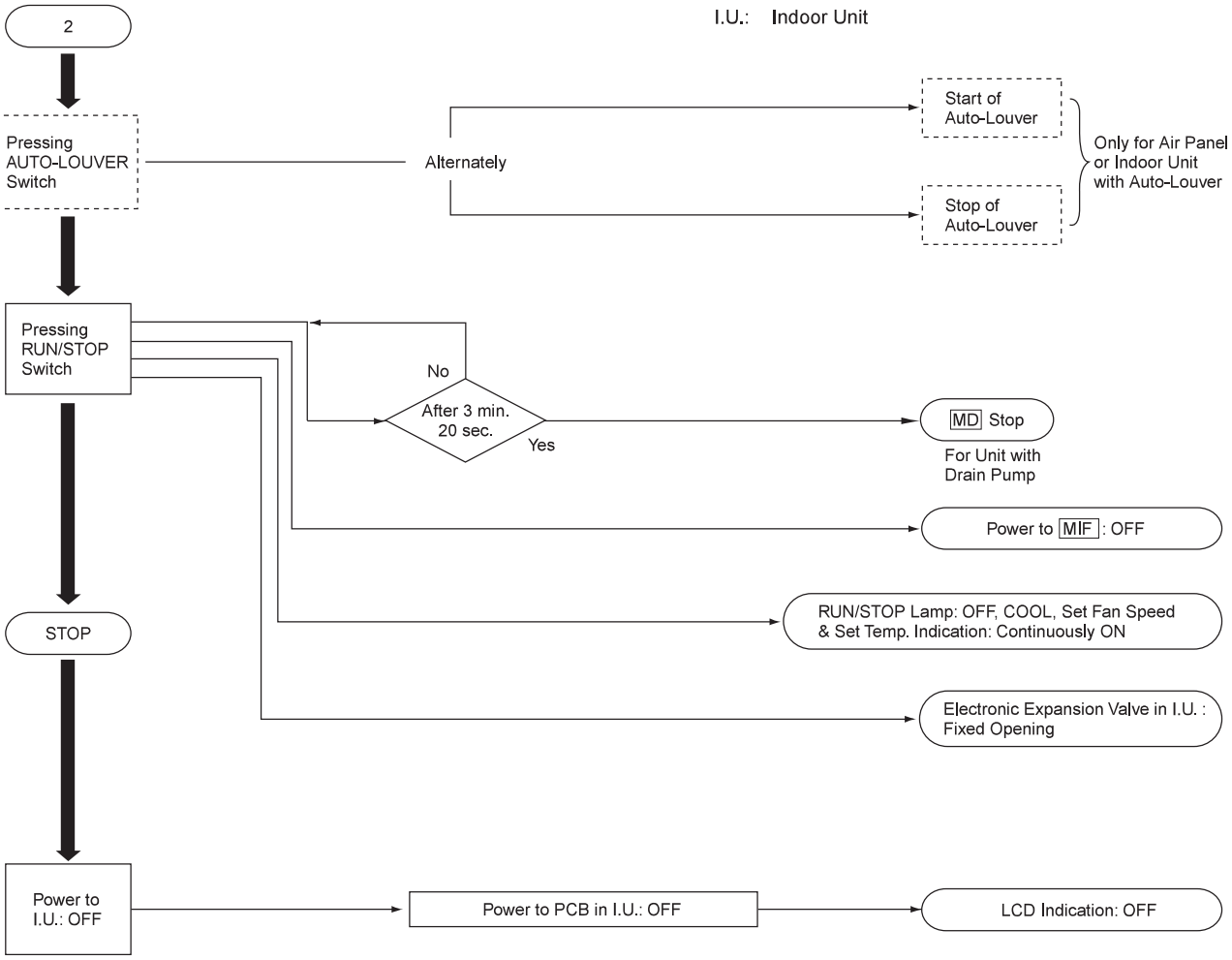
Cooling operation



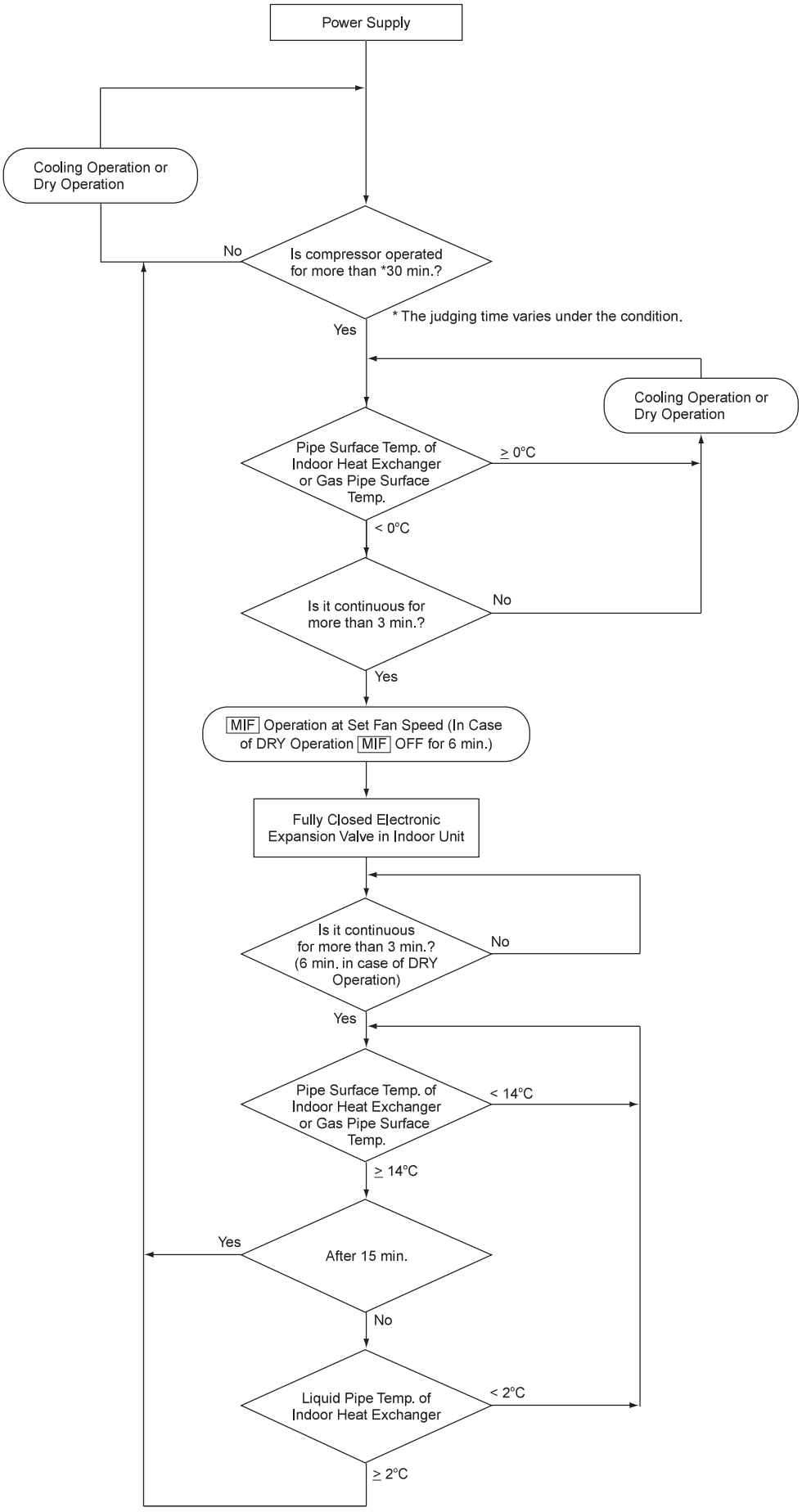
Dry run


I.U.: Indoor Unit
O.U.: Outdoor Unit
Power to I.U.: ON
Power to PCB in I.U.: ON
Auto - louver 0 Reset
Only for Indoor Unit with Auto-Louver
Start of Transmitting between I.U. and O.U.
Start of Transmitting between I.U. and Remote Control Switch
FS
OFF
(Higher than Activation Level)
ON
(Lower than Activation Level)
MD : ON
For Unit with Drain Pump
Setting at DRY
DRY Indication
Pressing TEMP. Switch
△ Switch: Increasing Set Temp.
▽ Switch: Decreasing Set Temp.
Set Temp. indicated
Pressing RUN/STOP Switch
Run LED: ON, RUN is indicated
DRY Operation
Higher than Set Temp.
I.U. Air Intake Temp.
Lower than Set Temp.
MIF: Lo
Outdoor Temp.
≥ -10°C
< -10°C
PID Control for I.U. Electric Expansion Valve
MIF: SLo
3 min.
No
Yes
MIF: Lo
3 min.
No
Yes
to 2

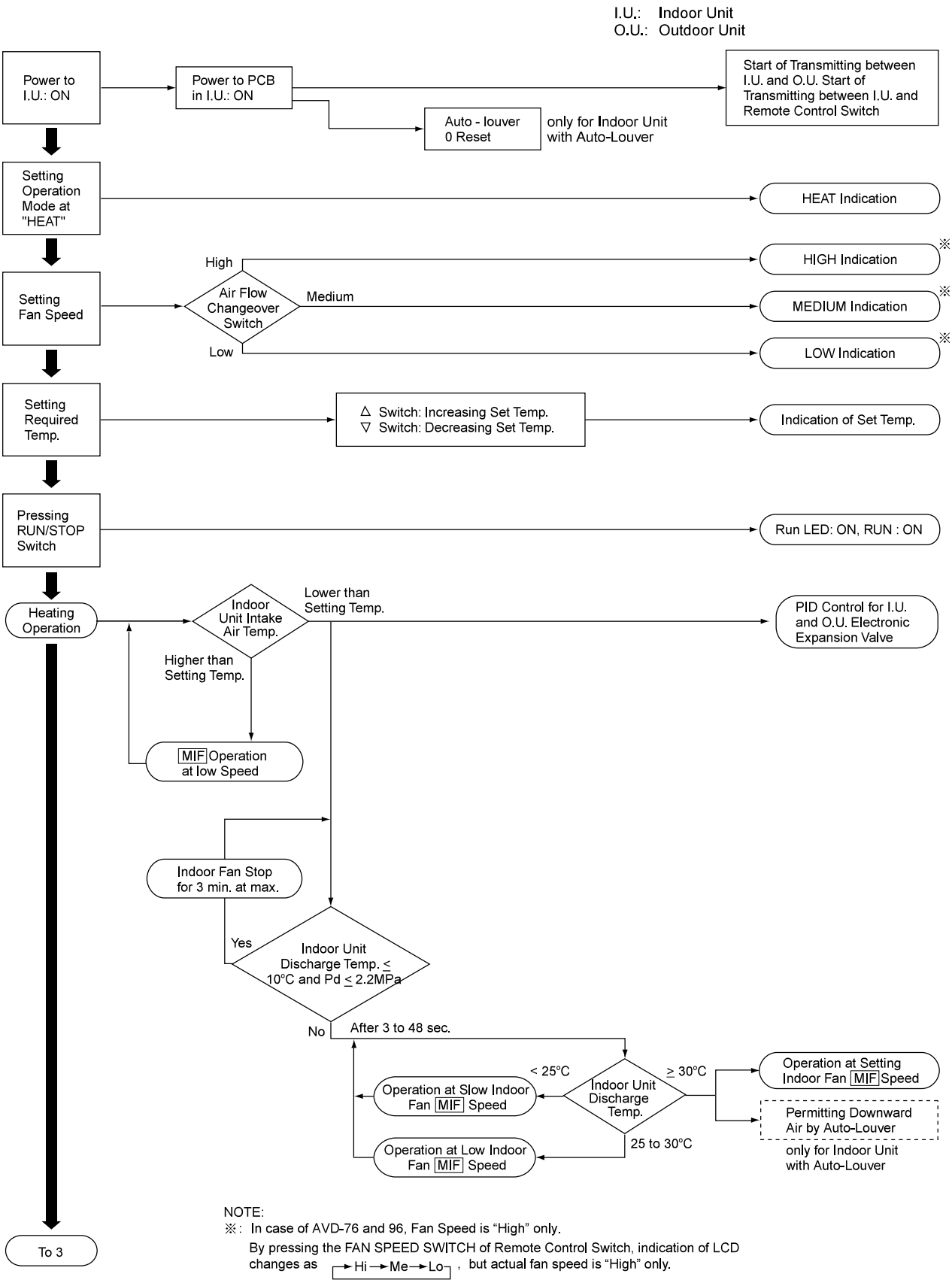
Dry run


I.U.: Indoor Unit
2
Pressing AUTO-LOUVER Switch
Alternately
Start of Auto-Louver
Stop of Auto-Louver
Only for Air Panel or Indoor Unit with Auto-Louver
Pressing RUN/STOP Switch
No
After 3 min. 20 sec.
Yes
MD Stop
For Unit with Drain Pump
Power to MIF : OFF
STOP
RUN/STOP Lamp: OFF, COOL, Set Fan Speed & Set Temp. Indication: Continuously ON
Electronic Expansion Valve in I.U. : Fixed Opening
Power to I.U.: OFF
Power to PCB in I.U.: OFF
LCD Indication: OFF

Freeze protection control during the cool or dry run

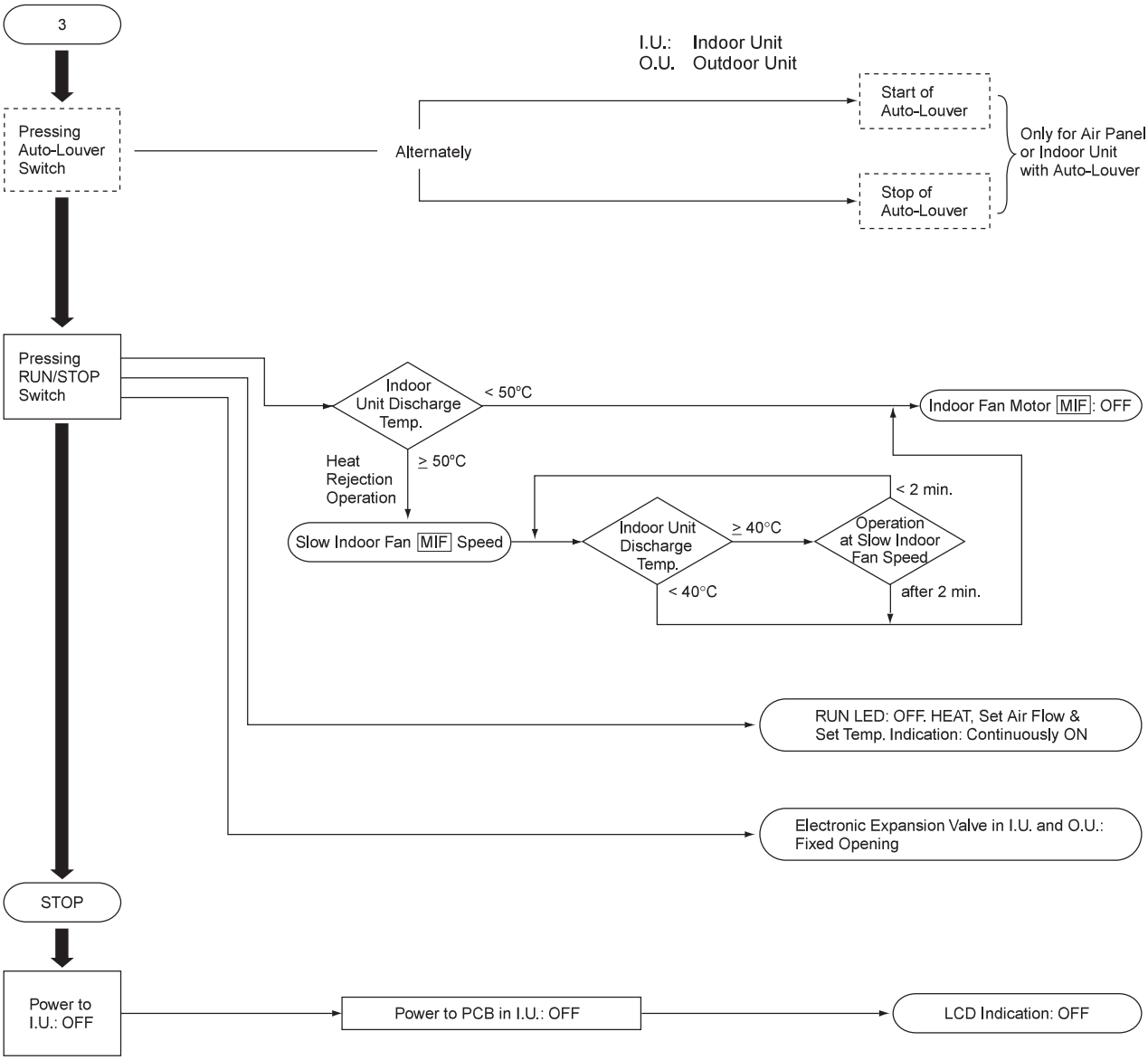


Heating operation

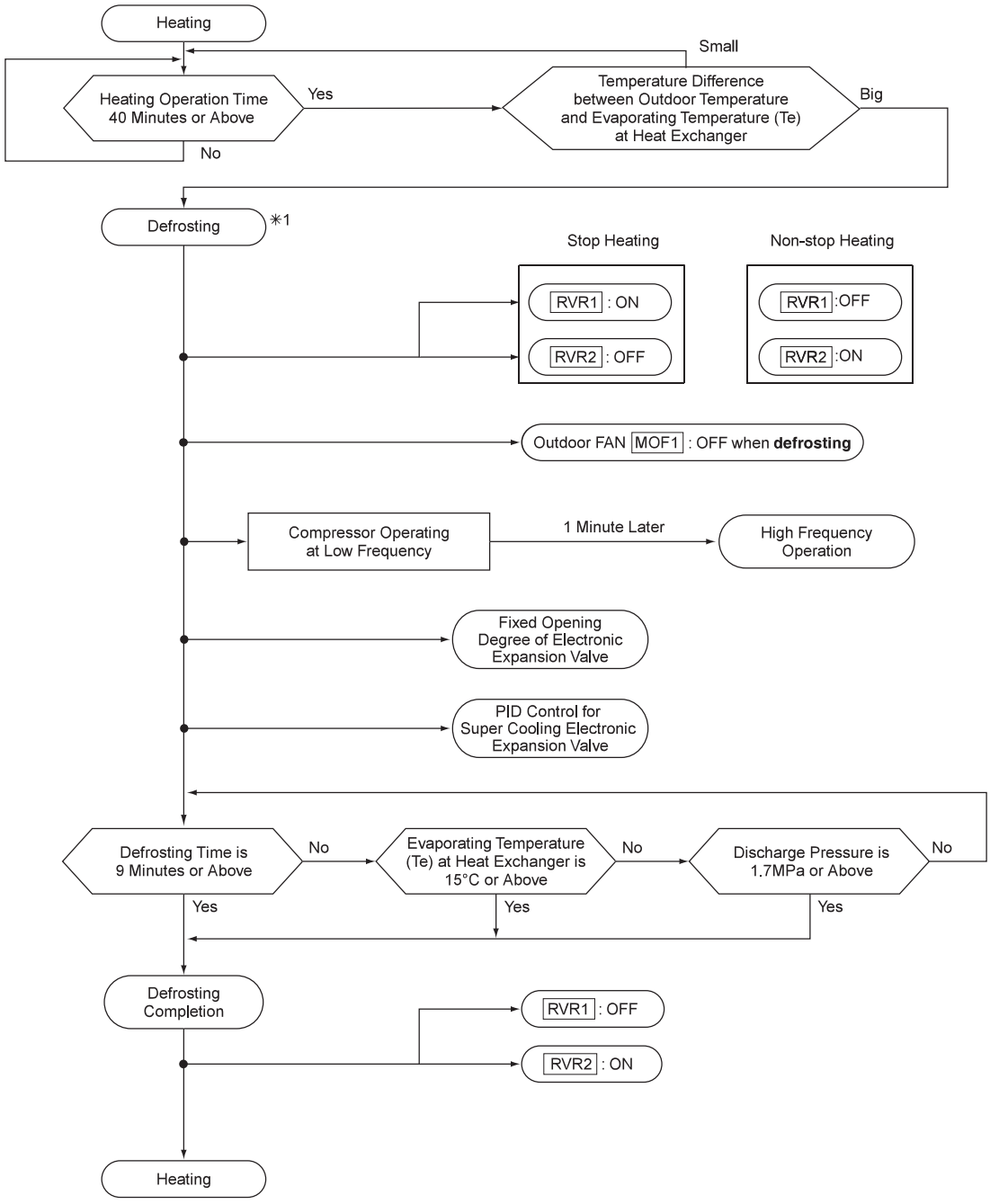


NOTE:
※: In case of AVD-76 and 96, Fan Speed is "High" only.
By pressing the FAN SPEED SWITCH of Remote Control Switch, indication of LCD changes as ┌→Hi→Me→Lo┐, but actual fan speed is "High" only.

Heating operation

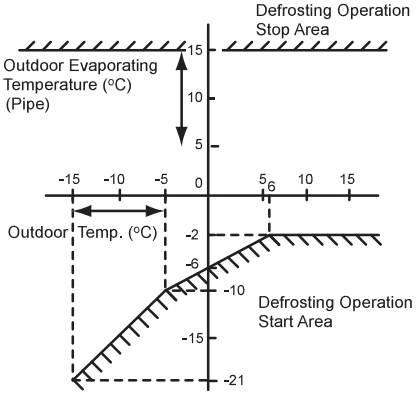


Defrosting operation

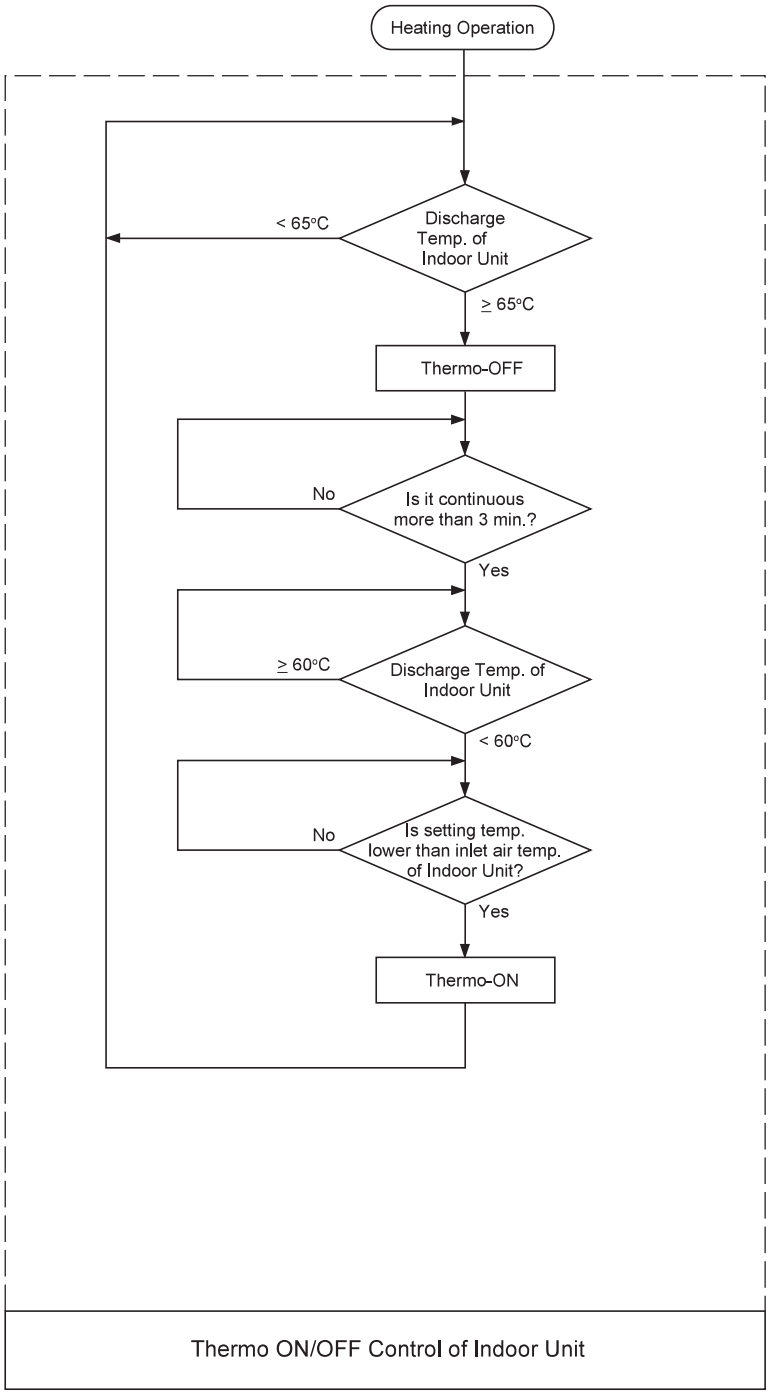


*1: Defrost operation signal is transmitted to the indoor unit during the defrost operation. After the signal is received, “DEFROST” will be indicated on LCD of remote control switch and the indoor fan will be stopped.

Temperature Conditions in Defrosting Operation

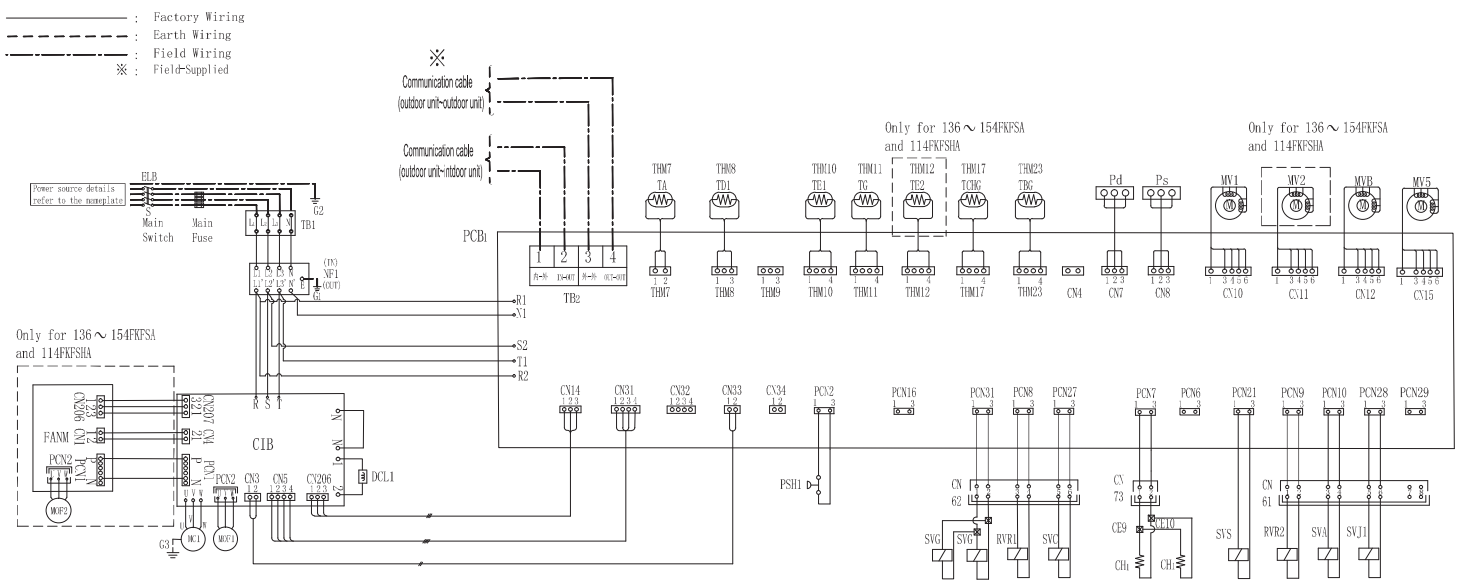


Supply air temperature overheat protection



ELECTRICAL WIRING DIAGRAM

AVWT-76*~114*



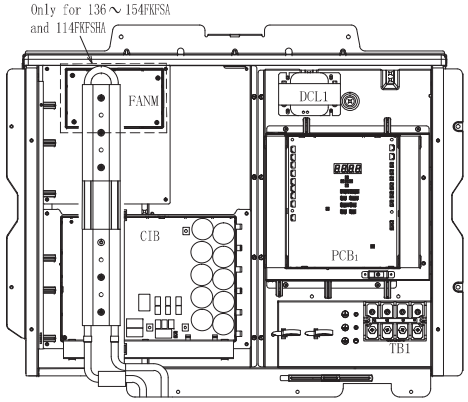
Mark	Name
CH_1	Crankcase Heater
CIB	Convert Inverter Break
CN, PCN	Connector
DCL_1	Reactor
FANM	Fan Module
G_{1-3}	Earth
MC_1	Motor for Compressor
$MOF_{1,2}$	Motor for Outdoor Fan
MV1, 2, B, 5	Micro-Computer Control Expansion Valve
NF_1	Noise Filter
PCB_1	Printed Circuit Board
P_d, P_s	Sensor for Refrigerant Pressure
PSH_1	Pressure Switch for Protection
RVR_1, RVR_2	Reversing Valve Relay
SVA, G, C, S, J1, J2	Solenoid Valve
TB_1	Terminal Board
THM_{1-23}	Thermistor
○	Terminals

Expansion Valve	Expansion Valve Coil
EVO1	MV1
EVO2	MV2
EVB	MVB

Note:

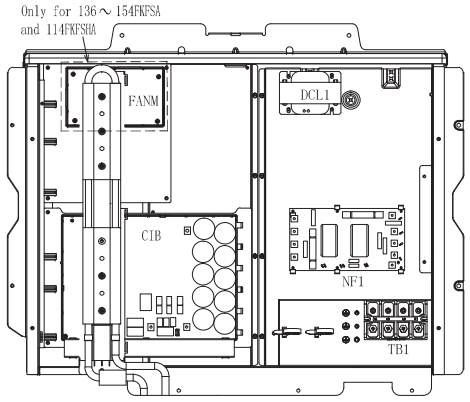
1. All the field wiring and equipment must comply with local codes.

The Electrical Control Box



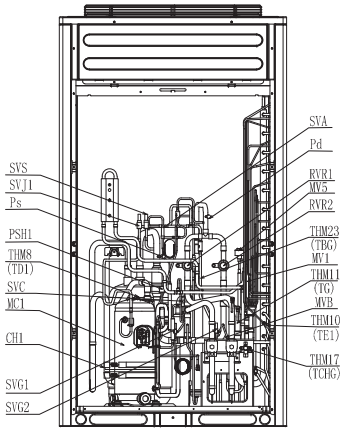
Electrical Control Box of Outdoor Unit

The Electrical Control Box (opened the P separator)

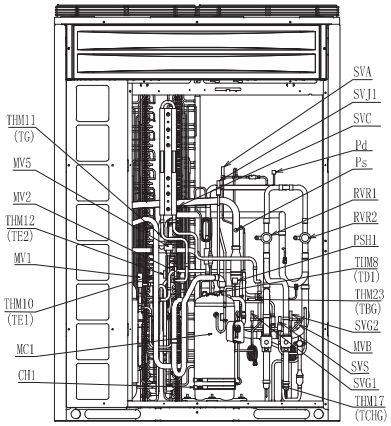


Location of Main Parts

AVWT-76~114FKFSA
AVWT-76~96FKFSHA



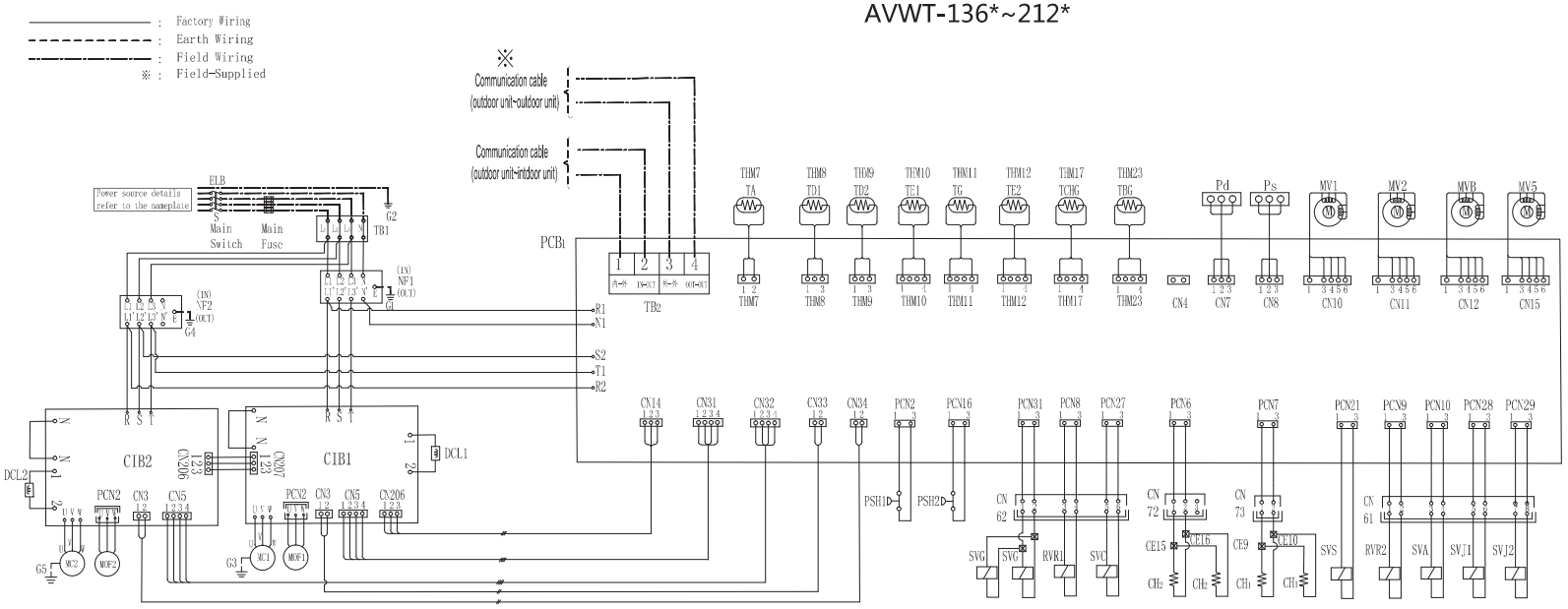
AVWT-136~154FKFSA
AVWT-114FKFSHA



Hisense

ELECTRICAL WIRING DIAGRAM

AVWT-136*~212*



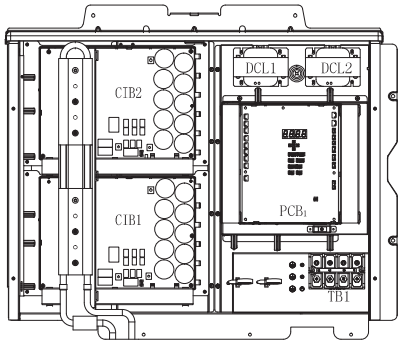
Mark	Name
$CH_{1,2}$	Crankcase Heater
$CIB_{1,2}$	Convert Inverter Break
CN, PCN	Connector
$DCL_{1,2}$	Reactor
FANM	Fan Module
$G_{1\text{-}5}$	Earth
$MC_{1,2}$	Motor for Compressor
$MOF_{1,2}$	Motor for Outdoor Fan
MV1, 2, B, 5	Wicro-Computer Control Expansion Valve
$NF_{1,2}$	Noise Filter
PCB_1	Printed Circuit Board
P_d, P_s	Sensor for Refrigerant Pressure
$PSH_{1,2}$	Pressure Switch for Protection
RVR_1, RVR_2	Reversing Valve Relay
SVA, G, C, S, J1, J2	Solenoid Valve
TB_1	Terminal Board
THM	Thermistor for Fin Temperature
$THM_{6\text{-}23}$	Thermistor
○	Terminals

Expansion Valve	Expansion Valve Coil
EVO1	MV1
EVO2	MV2
EVB	MVB

Note:

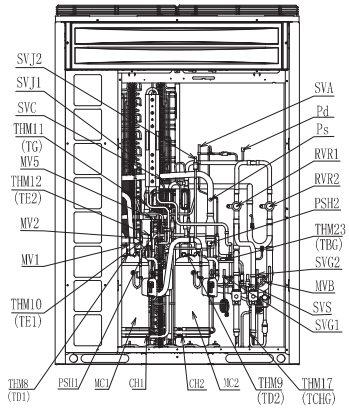
1. All the field wiring and equipment must comply with local codes.

The Electrical Control Box

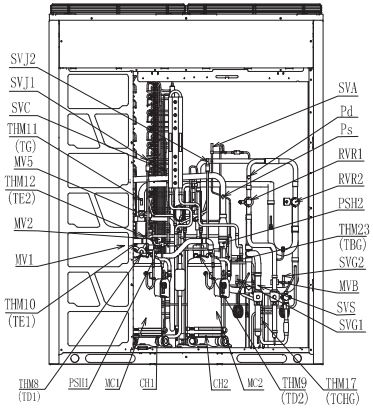


Location of Main Parts

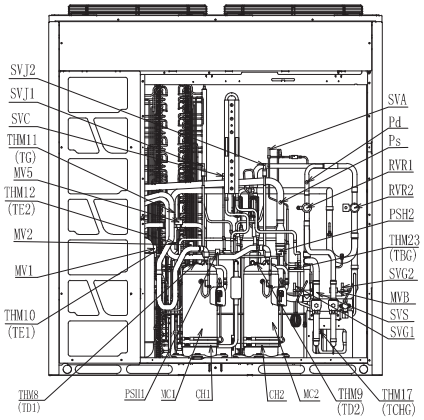
AVWT-170FKFSA
AVWT-136FKFSHA



AVWT-190~232FKFSA
AVWT-154~170FKFSHA



AVWT-250~272FKFSA
AVWT-190~212FKFSHA



Electrical Control Box of Outdoor Unit

The Electrical Control Box (opened the P separator)

