

Hisense

Hi-AquaSmart Series High-efficiency Air to Water Heat Pump

Outdoor Units

AHW-070UCSDP
AHW-090UCSDP
AHW-120UCSDP
AHW-140UCSEP
AHW-160UCSEP

Water Module

AHM-070UXCSAPA3
AHM-160UXCSAPA3

Technical and Service Handbook

- Technical Data -
- Installation and Operation -
- Service and Maintenance -

Hisense

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

Add: Hisense Information Industry Park 218,Qianwangang Road,
Qingdao Economic Development Zone,China
Tel:+86-532-80879968 **Fax:**+86-532-80875929
Http: //www.hisensehitachi.com
E-mail: export@hisensehitachi.com

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



Important Items

- Hisense Our company is committed to continuously improving the product, so the information may change without notice.
- Hisense is not responsible for any accidental damage to the air conditioner operating in a particular environment.
- This air conditioner can only be used as an ordinary air conditioner.
- Please do not use this heat pump type air conditioner for drying clothes, freezing food, cooling or heating or other purposes.
- Any part of this manual shall not be copied without permission.
- Bold texts (danger, warning and attention) are used to indicate the degree of danger. Below is the definition of bold texts and the degree of danger.



DANGER : It will cause serious personal injury and even have direct risk of leading to the death.



Warning : It may cause serious personal injury, and even have the risk or unsafe condition of leading to the death.



Attention : It may cause minor personal injury, and have the risk or unsafe condition of products and property damage.

Notes : These are tips and instructions on the operation, maintenance and repairs.

- If any doubt, please contact the dealer or Hisense service center.
- Please install air conditioner in accordance with local standards.
- Designed temperature range of this heat pump type air conditioner is shown in the figure below. Please use it within this range.

Temperature		(°C)	
Condition		Min.	Max.
Outdoor Unit	Cooling Operation	10 DB	43 DB
	Heating Operation	-20WB	35 DB
	Domestic Hot Water	-20WB	43 DB
Water Module (Water Supply)	Cooling Operation	5	25
	Heating Operation	15	55
	Domestic Hot Water	15	55

DB: Dry Bulb, WB: Wet Bulb

This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.

ATTENTION :



This product shall not be mixed with general household waste at the end of its life and it shall be retired according to the appropriated local or national regulations in an environmentally correct way. Due to refrigerant, oil and other components contained in the Air Conditioner, its dismantling must be done by a professional installer accordingly to the applicable regulations.

Contact the Hisense Customer Care for more information.

Outdoor unit design section

1. System Composition	1
1.1 Outdoor Unit Series	1
1.2 System Diagram.....	1
2. Specification.	2
3. Electrical Parameters.....	4
4. Capacity table	5
4.1 Water tank heat-up time	7
5. Piping diagram	9
5.1 Piping System	9
5.2 Connection between water module and Outdoor Unit..	9
5.3 Piping Conection	10
5.4 Refrigerant Piping Work.....	11
6. Dimensional and Structure.	12
6.1 Dimensional.....	12
6.2 Structure	14
7 Control system.	17
8. Electrical Wiring Diagram	19
9. Sound Data.	21
10. Operation Range.....	23
11. Outdoor Unit Installation	24
11.1 Select the best location	24
11.2 Transportation and Handling	33
11.3 Factory–Supplied Accessories.	33
11.4 Initial Check.....	34
11.5 Installation Work.	35
11.6 Refrigerant Piping Work	38
11.7 Pipe Connection.....	39
11.8 Air tight Test	41
11.9 Vacuuming and Charging Refrigerant	43
11.10 Pressure Measurement at Detection Connectors	45
11.11 Collecting Refrigerant	46

Indoor unit design section

1. System Composition	47
2. Specification.	47
3. Electrical Parameters.....	48
4. Capacity table	48
5. Piping diagram	49
5.1 Refrigerant Pipeline and Tubing.....	50
5.2 Connect Refrigerant Pipeline	50
5.3 Connect Water Pipeline.	50
6. Dimensional and Structure.	51
6.1 Dimensional.....	51
6.2 Structure	52
7. Electrical Wiring Diagram.	53
8. Sound Data	54
9. OperationRange.....	55
10. External Connection Diagrams	55
10.1 Wiring.....	56
11. Hydraulic Performance.	61
12. Water Module Accessories	62

Installation and Maintenance Section

1. Safety Precautions	63
2. Specification.	66
3. Features.....	66
4. Location of controls and components	66
5. Dimensional and Structure	66
6. Control system.	66
7 Block diagram	67
8. .Wiring connection diagram.....	68
9. Electronic circuit diagram	68
10. Printed circuit board.....	69
10.1 Outdoor unit	69
10.2 Indoor unit	70
11. Installation Instruction.	71
11.1 Installation tools.	71
11.2 Select the best location	72
11.3 Indoor unit installation diagram	73
11.4 Water pipe work.....	75
12. Operation and control	78
12.1 Operating Steps..	79
12.2 Stop Operation	88
12.3 Other Symbols	88
12.4 Check	90
13. Automatic Protection Function.....	93
13.1 Standard Operating Procedure	93
13.2 Alarm Code.	96
14. Test Run	96
14.1 DIP Switch Settings of Outdoor Unit	96
14.2 Check Befor Test Run.....	98
14.3 Commissioning.	98
14.4 Proper pump down procedure	100
14.5 Expansion vessel prepressure checking.....	101
15. Maintenance & Troubleshooting	103
15.1 Troubleshooting.....	103
15.2 Alarm Code.	104
15.3 Check Mode.....	109
15.4 Cleaning Plate Heat Exchanger.....	115

Outdoor unit design section

1. System Composition

1.1 Outdoor Units Series

Capacity (HP)	70 (3)	90 (4)	120(4.5)	140 (5)	160 (6)
Model	AHW-070UCSDP	AHW-090UCSDP	AHW-120UCSDP	AHW-140UCSEP	AHW-160UCSEP



1.2 System Diagram



Water module: Integrates heat exchanger, water pump, water system regulator equipment, expansion tank, pressure gauge and other components. The cold flow (heat) in the refrigerant is transferred to the water system through the heat exchanger.

2. Specification

Outdoor unit Model			AHW-070UCSDP	AHW-090UCSDP	AHW-120UCSDP		
Indoor unit Model			AHM-070UXCSAPA3	AHM-160UXCSAPA3	AHM-160UXCSAPA3		
Power supply			1PH,220~240V/50Hz	1PH,220~240V/50Hz	1PH,220~240V/50Hz		
Heating(AW35) without axillary heater	Rated Capacity (A 7°C/W 35°C)		kW	7	9	12	
	Rated Power (A 7°C/W 35°C)		kW	1.56	1.95	2.93	
	COP (A 7°C/W 35°C)		kW/kW	4.50	4.62	4.10	
	Heating Capacity (A2°C/W 35°C)		kW	6.9	8.1	11.1	
	COP (A2°C/W 35°C)		kW/kW	3.54	3.23	2.94	
	Heating Capacity (A-7°C/W 35°C)		kW	6.35	7.2	9.95	
	COP (A-7°C/W 35°C)		kW/kW	2.13	2.42	2.15	
Heating(AW35) with axillary heater	Rated Capacity (A 7°C/W 35°C)		kW	7(+3)	9(+3)	12(+3)	
	Rated Power (A 7°C/W 35°C)		kW	1.56(+3)	1.95(+3)	2.93(+3)	
	Heating Capacity (A2°C/W 35°C)		kW	6.9(+3)	8.1(+3)	11.1(+3)	
	Heating Capacity (A-7°C/W 35°C)		kW	6.35(+3)	7.2(+3)	9.95(+3)	
Heating A7/6°C LWC45°C (DT=5°C)	Heating Capacity		kW	6.2	8.12	10.95	
	COP		kW/kW	3.52	3.78	3.50	
CoolingA35°C LWE18°C (DT=5 °C)	Rated Capacity		kW	6.5	8	10.5	
	EER		kW/kW	3.00	2.90	2.80	
Energy Efficiency Grade	Heating (35°C)			A+	A++	A++	
Dimensions	H*W*D		mm	800×950×370	800×950×370	800×950×370	
Packing dimensions	H*W*D		mm	930×1025×460	930×1025×460	930×1025×460	
Operation Ambient Range	Heating		°C	-20~35	-20~35	-20~35	
	Domestic Hot Water		°C	-20~43	-20~43	-20~43	
	Cooling		°C	10~43	10~43	10~43	
Heating	Sound Pressure		dB(A)	51	52	54	
	Sound Power		dB(A)	64	65	67	
Cooling	Sound Pressure		dB(A)	50	51	53	
	Sound Power		dB(A)	63	64	66	
Refrigerent	Type		-	R410A	R410A	R410A	
	charge		kg	2.3	3.05	3.05	
Heat Exchanger	Form		-	Multi-channel Cross Flow Finned Tube			
	Piping	Material	-	Brass			
		Outer Diameter	φ mm	7	7	7	
		Number of Rows	-	2	2.5	2.5	
	Fin	Material	-	Aluminum			
		Pitch	mm	1.4	1.4	1.4	
	Maximum Operation Pressure		MPa	4.15	4.15	4.15	
	Maximum Windward Area		m²	1.5	1.96	1.96	
	Qty.		-	1	1	1	
	Form		-	Axial fan			
	Qty.		-	1	1	1	
	Outer Diameter		φ mm	544	544	544	
	Rotating Speed		rpm	664	780	780	
	Fan Motor		Nominal Air Volume	m³/min	64	69	69
			Form	-	Fully Enclosed Waterproof Motor		
			Start Mode	-	DC start		
			Nominal Output Power	W	138	138	138
Qty.			-	1	1	1	
Insulation Class			-	E	E	E	
Compressor	Leakage Pressure	Exhaust Pressure	MPa	4.15	4.15	4.15	
		Suction Pressure	MPa	2.21	2.21	2.21	
	Compressor Motor	Start Mode	-	Variable frequency			
		Number of Poles	-	4	4	4	
		Insulation Class	-	E	E	E	
	Refrigeration Oil	Grade	-	HAF68D1C	α68HES-H	α68HES-H	
Injection Volume		L	0.88	1.65	1.65		

Notes : Test conditon of heat pump with electrically driven compressor for space heating and cooling based on the EN 14511-2-2011.

Outdoor unit Model			AHW-140UCSEP	AHW-160UCSEP
Indoor unit Model			AHM-160UXCSAPA3	AHM-160UXCSAPA3
Power supply			1PH,220~240V/50Hz	1PH,220~240V/50Hz
Heating(AW35) without axillary heater	Rated Capacity (A 7°C/W 35°C)	kW	14	16
	Rated Power (A 7°C/W 35°C)	kW	2.89	3.38
	COP (A 7°C/W 35°C)	kW/kW	4.84	4.74
	Heating Capacity (A2°C/W 35°C)	kW	14	16
	COP (A2°C/W 35°C)	kW/kW	4.11	4.64
	Heating Capacity (A-7°C/W 35°C)	kW	14	16
	COP (A-7°C/W 35°C)	kW/kW	3.07	2.81
Heating(AW35) with axillary heater	Rated Capacity (A 7°C/W 35°C)	kW	14(+3)	16(+3)
	Rated Power (A 7°C/W 35°C)	kW	2.89(+3)	3.38(+3)
	Heating Capacity (A2°C/W 35°C)	kW	14(+3)	14(+3)
	Heating Capacity (A-7°C/W 35°C)	kW	14(+3)	14(+3)
Heating A7/6°C LWC45°C (DT=5°C)	Heating Capacity	kW	14	16
	COP	kW/kW	4.70	4.43
CoolingA35°C LWE18°C (DT=5°C)	Rated Capacity	kW	12	13.5
	EER	kW/kW	2.77	2.53
Energy Efficiency Grade	Heating (35°C)		A++	A++
Dimensions	H*W*D	mm	1380×950×370	1380×950×370
Packing dimensions	H*W*D	mm	1477×1025×600	1477×1025×600
Operation Ambient Range	Heating	°C	-20~35	-20~35
	Domestic Hot Water	°C	-20~43	-20~43
	Cooling	°C	10~43	10~43
Heating	Sound Pressure	dB(A)	51	52
	Sound Power	dB(A)	65	66
Cooling	Sound Pressure	dB(A)	50	51
	Sound Power	dB(A)	64	65
Refrigerent	Type	-	R410A	R410A
	charge	kg	4.9	4.9
Heat Exchanger	Form		-	Fully Enclosed Waterproof Motor
	Piping	Material	-	Brass
		Outer Diameter	φ mm	7
		Number of Rows	-	2
	Fin	Material	-	Aluminum
		Pitch	mm	1.4
	Maximum Operation Pressure		MPa	4.15
	Maximum Windward Area		m ²	1.35
	Qty.		-	2
	Form		-	Axial fan
	Qty.		-	2
	Outer Diameter		φ mm	544
	Rotating Speed		rpm	560+464
	Fan Motor	Nominal Air Volume	m ³ /min	90
		Form	-	Fully Enclosed Waterproof Motor
		Start Mode	-	DC start
		Nominal Output Power	W	51+51
		Qty.	-	2
		Insulation Class	-	E
Compressor	Leakage Pressure	Exhaust Pressure	MPa	4.15
		Suction Pressure	MPa	2.21
	Compressor Motor	Start Mode	-	Variable frequency
		Number of Poles	-	6
		Insulation Class	-	B
		Grade	-	POE 32-3MAF
	Refrigeration Oil	Injection Volume	L	1.18

3.Electrical Parameters

Outdoor Unit Electrical Parameters

Model	Main power supply			Operating voltage range/V		Rate power/KW		Rated current/A		Maximum current/A	
	VOL	PH	Hz	Max.	Min.	Cooling	Heating	Cooling	Heating	Cooling	Heating
AHW-070UCSDP	220 ~240	1	50	264	198	2.17	1.56	10.5	7.5	27.5	27.5
AHW-090UCSDP						2.76	1.95	13.3	9.4	28.0	28.0
AHW-120UCSDP						3.75	2.93	18.1	14.2	28.0	28.0
AHW-140UCSEP						4.33	2.89	20.9	14.0	27.5	27.5
AHW-160UCSEP						5.34	3.38	25.8	16.3	27.5	27.5

VOL: Rated supply voltage (V) RLA: Rated load current (A) RNC: Operating current (A) Hz: Frequency (HZ)

PH: Phase (ø) IPT: Rated input power (kW) STC: Start current (A) MRC: Maximum running current (A)

Note:

1. Above compressor parameters are tested under 100% indoor and outdoor configuration.
2. Above characteristic parameters are tested when equivalent pipe length is 7.5m and pipe height difference is 0m.
3. See the table below for site wiring:

Model	Power supply	Max. running current A	Power cord size mm ²	Comm. cable spec. mm ²	ELB		Fuse A
					Standand current A	Current sensitivity mA	
AHW-070UCSDP	220-240V ~ 50Hz	27.5	6.0	0.75	32	30	32
AHW-090UCSDP	220-240V ~ 50Hz	28.0	6.0	0.75	32	30	32
AHW-120UCSDP							
AHW-140UCSEP	220-240V ~ 50Hz	27.5	6.0	0.75	32	30	32
AHW-160UCSEP							

4.Capacity table

Unit:KW

Cooling capacity tables

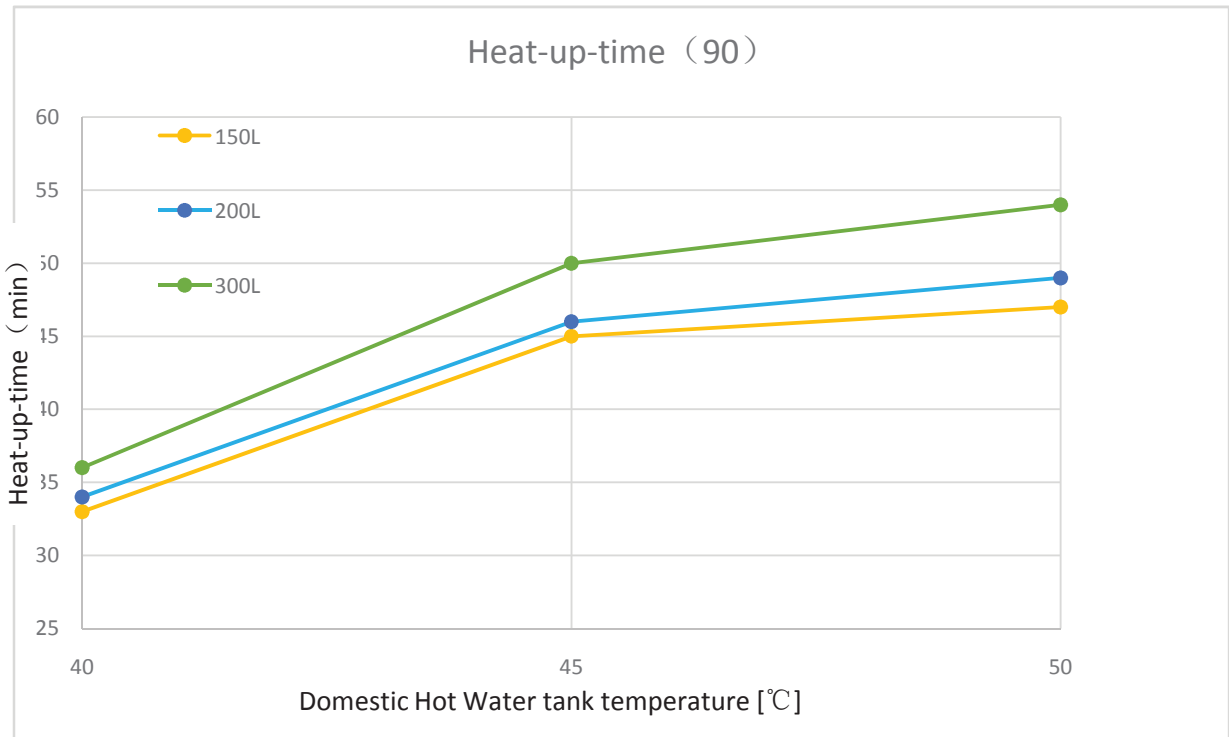
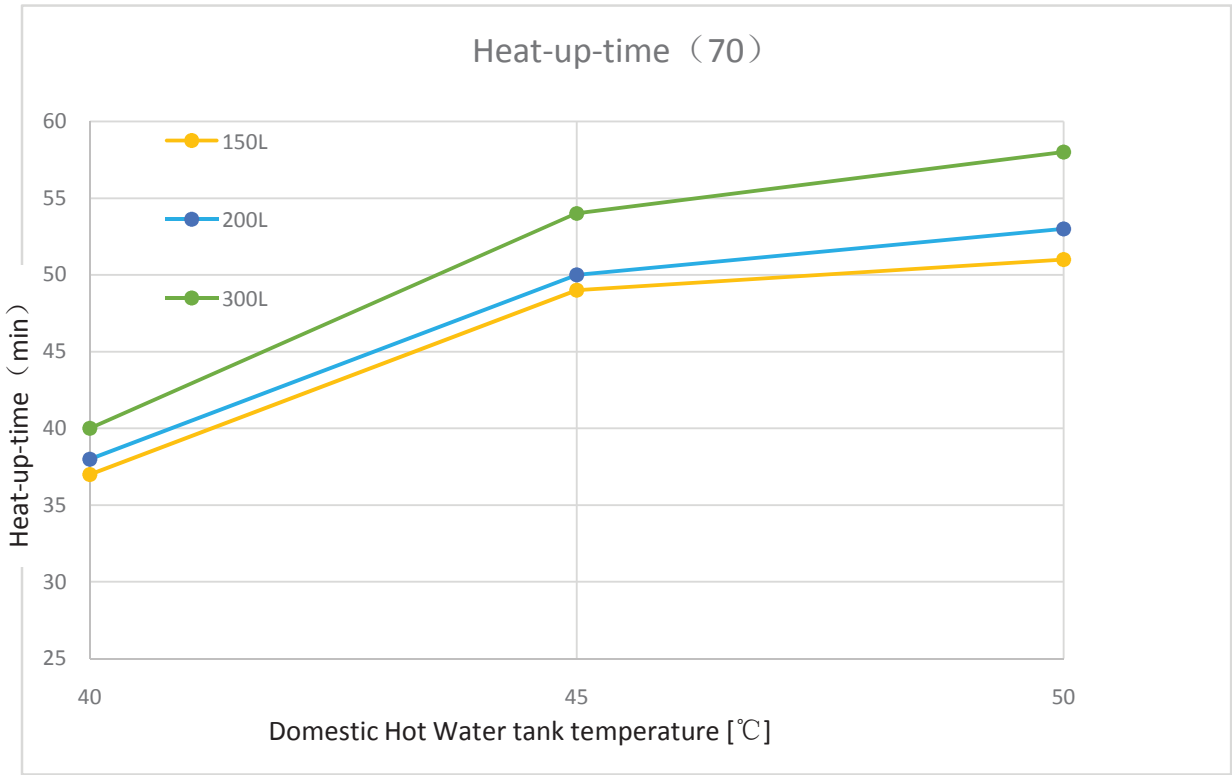
Model	Tarb °C	20℃		25℃		30℃		35℃		40℃		45℃	
	LWC	CC(KW)	PI(KW)	CC(KW)	PI(KW)	CC(KW)	PI(KW)	CC(KW)	PI(KW)	CC(KW)	PI(KW)	CC(KW)	PI(KW)
16KW	5	13.75	4.70	13.58	4.90	13.42	5.10	13.25	5.30	13.08	5.50	12.91	5.70
	7	14.01	4.74	13.84	4.94	13.67	5.14	13.50	5.34	13.33	5.54	13.16	5.74
	10	14.09	4.84	13.92	5.04	13.75	5.24	13.58	5.44	13.42	5.64	13.25	5.84
	13	14.13	4.90	13.96	5.10	13.80	5.30	13.63	5.50	13.46	5.70	13.29	5.90
	15	14.18	4.75	14.01	5.05	13.84	5.35	13.67	5.55	13.50	5.75	13.33	5.95
	18	14.22	4.81	14.05	5.11	13.88	5.41	13.71	5.61	13.54	5.81	13.37	6.01
	22	14.93	4.82	14.77	5.22	14.60	5.72	14.43	5.92	14.26	6.12	14.09	6.32
14KW	5	12.25	3.61	12.10	3.81	11.95	4.01	11.80	4.21	11.65	4.41	11.50	4.61
	7	12.47	3.73	12.32	3.93	12.17	4.13	12.00	4.33	11.87	4.53	11.72	4.73
	10	12.55	3.90	12.40	4.10	12.25	4.30	12.10	4.50	11.95	4.70	11.80	4.90
	13	12.59	4.10	12.44	4.30	12.29	4.50	12.14	4.70	11.99	4.90	11.84	5.10
	15	12.62	4.15	12.47	4.35	12.32	4.55	12.17	4.75	12.02	4.95	11.87	5.15
	18	12.66	4.21	12.51	4.41	12.36	4.61	12.21	4.81	12.06	5.01	11.91	5.21
	22	13.30	4.52	13.15	4.72	13.00	4.92	12.85	5.12	12.70	5.32	12.55	5.52
12KW	5	10.75	3.35	10.62	3.55	10.49	3.75	10.36	3.95	10.22	4.15	10.09	4.35
	7	10.95	3.15	10.82	3.35	10.68	3.55	10.50	3.75	10.42	3.95	10.29	4.15
	10	11.01	3.30	10.88	3.50	10.75	3.70	10.62	3.90	10.49	4.10	10.36	4.30
	13	11.04	3.50	10.91	3.70	10.78	3.90	10.65	4.10	10.52	4.30	10.39	4.50
	15	11.08	3.55	10.95	3.75	10.82	3.95	10.68	4.15	10.55	4.35	10.42	4.55
	18	11.11	3.61	10.98	3.81	10.85	4.01	10.72	4.21	10.59	4.41	10.45	4.61
	22	11.67	3.92	11.54	4.12	11.41	4.32	11.27	4.52	11.14	4.72	11.01	4.92
9KW	5	8.45	1.96	8.25	2.16	8.05	2.36	7.85	2.56	7.65	2.76	7.45	2.96
	7	8.60	2.16	8.40	2.36	8.20	2.56	8.00	2.76	7.80	2.96	7.60	3.16
	10	9.50	2.50	9.30	2.70	9.10	2.90	8.90	3.10	8.70	3.30	8.50	3.50
	13	10.12	2.70	9.92	2.90	9.72	3.10	9.52	3.30	9.32	3.50	9.12	3.70
	15	10.32	2.75	10.12	2.95	9.92	3.15	9.72	3.35	9.52	3.55	9.32	3.75
	18	11.35	2.81	11.15	3.01	10.95	3.21	10.75	3.41	10.55	3.61	10.35	3.81
	22	12.20	3.12	12.00	3.32	11.80	3.52	11.60	3.72	11.40	3.92	11.20	4.12
7KW	5	6.80	1.80	6.60	2.00	6.40	2.20	6.20	2.40	6.00	2.60	5.80	2.80
	7	7.10	1.57	6.90	1.77	6.70	1.97	6.50	2.17	6.30	2.37	6.10	2.57
	10	7.50	1.90	7.30	2.10	7.10	2.30	6.90	2.50	6.70	2.70	6.50	2.90
	13	8.12	2.10	7.92	2.30	7.72	2.50	7.52	2.70	7.32	2.90	7.12	3.10
	15	8.32	2.15	8.12	2.35	7.92	2.55	7.72	2.75	7.52	2.95	7.32	3.15
	18	9.35	2.21	9.15	2.41	8.95	2.61	8.75	2.81	8.55	3.01	8.35	3.21
	22	10.20	2.52	10.00	2.72	9.80	2.92	9.60	3.12	9.40	3.32	9.20	3.52
5KW	5	4.73	1.62	4.59	1.80	4.45	1.98	4.31	2.16	4.18	2.34	4.04	2.52
	7	4.94	1.41	4.80	1.59	4.66	1.77	4.50	1.95	4.38	2.13	4.25	2.31
	10	5.21	1.71	5.08	1.89	4.94	2.07	4.80	2.25	4.66	2.43	4.52	2.61
	13	5.64	1.89	5.51	2.07	5.37	2.25	5.23	2.43	5.09	2.61	4.95	2.79
	15	5.78	1.93	5.64	2.11	5.51	2.29	5.37	2.47	5.23	2.65	5.09	2.83
	18	6.50	1.99	6.36	2.17	6.22	2.35	6.08	2.53	5.94	2.70	5.80	2.88
	22	7.08	2.26	6.95	2.44	6.81	2.62	6.67	2.80	6.53	2.98	6.39	3.16
	25	7.36	2.35	7.22	2.53	7.08	2.71	6.95	2.89	6.81	3.07	6.67	3.25

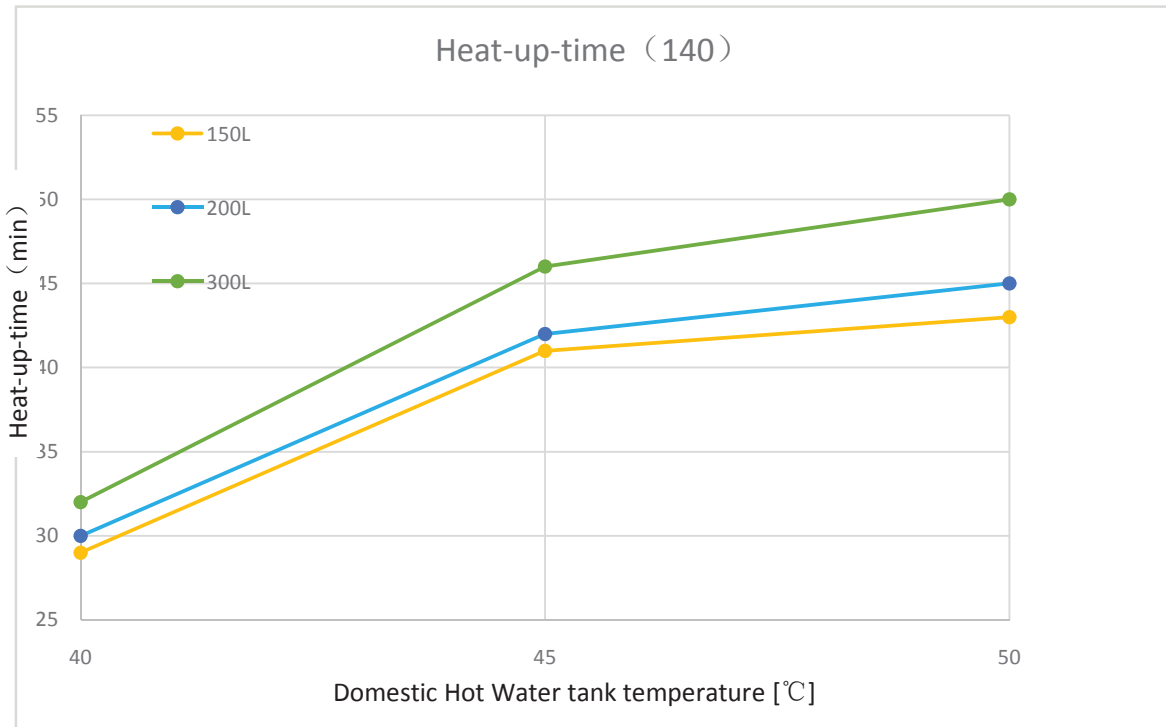
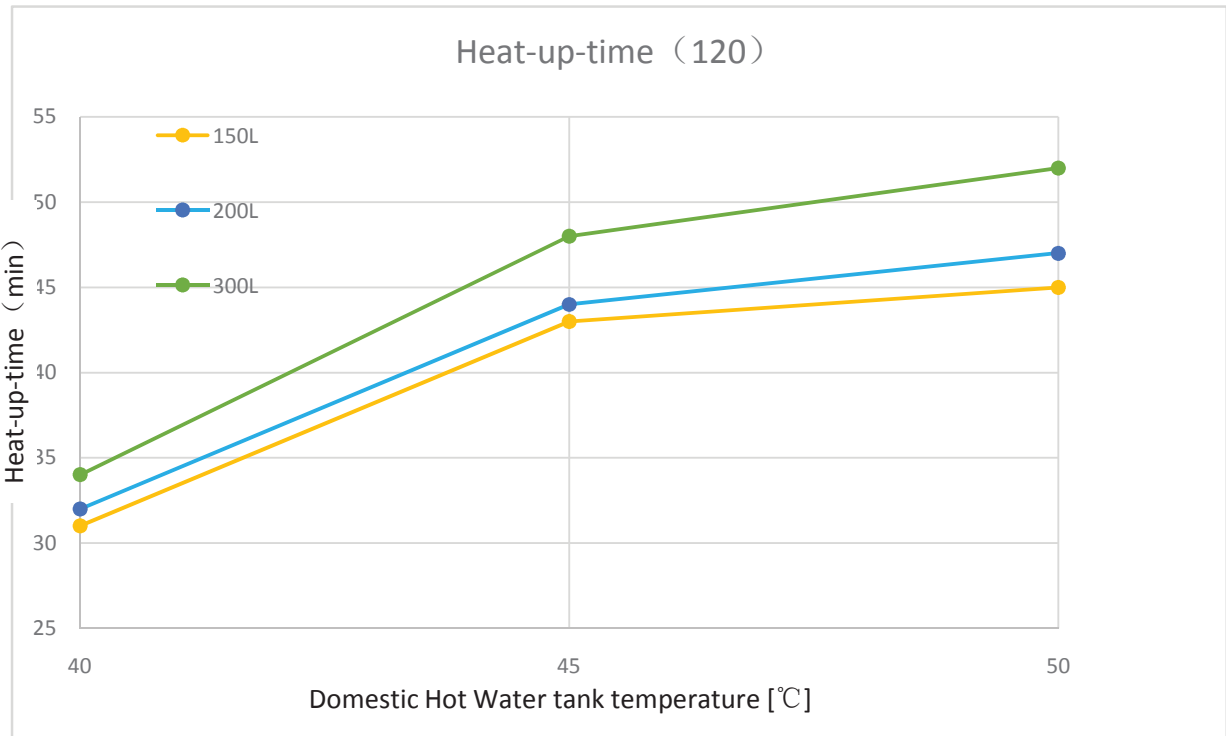
Unit:KW

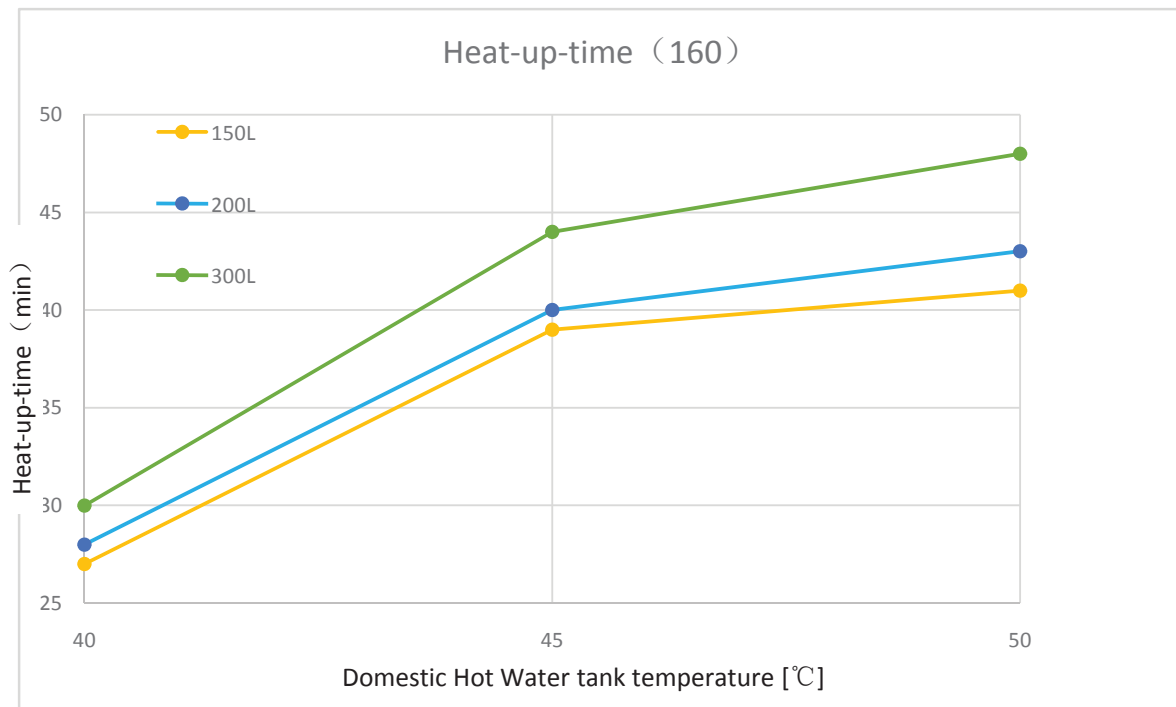
Heating capacity tables

Model	LWC	30°C		35°C		40°C		45°C		50°C		55°C	
	Tarb °C	HC (KW)	PI(KW)	HC(KW)	PI(KW)	HC(KW)	PI(KW)	HC(KW)	PI(KW)	HC(KW)	PI(KW)	HC(KW)	PI(KW)
16KW	-20	11.50	4.98	11.25	4.38	11.05	4.63						
	-15	14.14	4.72	14.04	4.92	14.00	5.17	13.92	5.42	13.82	5.67		
	-10	16.00	5.62	16.00	5.82	15.99	6.07	15.96	6.32	15.93	6.57	15.90	6.82
	-7	16.00	5.50	16.00	5.70	16.00	5.95	15.98	6.20	15.95	6.45	15.92	6.70
	-5	16.00	4.92	16.00	5.12	16.00	5.37	16.00	5.62	15.97	5.87	15.94	6.12
	-2	16.00	4.31	16.00	4.51	16.00	4.76	16.00	5.01	15.99	5.26	15.96	5.51
	0	16.00	3.71	16.00	3.91	16.00	4.16	16.00	4.41	16.00	4.66	15.98	4.91
	2	16.00	3.25	16.00	3.45	16.00	3.70	16.00	3.95	16.00	4.20	16.00	4.45
	5	16.00	2.92	16.00	3.40	16.00	3.51	16.00	3.62	16.00	3.87	16.00	4.12
	7	16.00	2.93	16.00	3.38	16.00	3.48	16.00	3.61	16.00	3.86	16.00	4.11
	10	17.07	2.92	17.05	3.12	17.04	3.37	17.01	3.62	16.98	3.87	16.95	4.12
	12	18.12	2.96	18.10	3.16	18.09	3.41	18.06	3.66	18.03	3.91	18.00	4.16
	15	20.00	2.98	19.50	3.18	19.00	3.43	18.40	3.68	18.20	3.93	18.30	4.18
	20	22.50	2.99	22.00	3.19	21.40	3.44	20.80	3.69	20.30	3.94	19.80	4.19
14KW	-20	11.00	4.80	10.95	4.25	10.55	4.46						
	-15	14.00	4.58	14.00	4.78	13.93	4.99	13.86	5.21	13.79	5.43		
	-10	14.00	4.45	14.00	4.65	13.95	4.86	13.88	5.08	13.81	5.30	13.74	5.52
	-7	14.00	4.36	14.00	4.56	13.97	4.77	13.90	4.99	13.83	5.21	13.76	5.43
	-5	14.00	3.92	14.00	4.12	13.99	4.33	13.92	4.55	13.85	4.77	13.78	4.99
	-2	14.00	3.66	14.00	3.86	14.00	4.07	13.94	4.29	13.87	4.51	13.80	4.73
	0	14.00	3.55	14.00	3.75	14.00	3.96	14.00	4.18	13.97	4.40	13.90	4.62
	2	14.00	3.30	14.00	3.41	14.00	3.52	14.00	3.74	14.00	4.16	13.95	4.28
	5	14.00	3.02	14.00	3.22	14.00	3.43	14.00	3.65	14.00	3.87	14.00	4.09
	7	14.00	2.16	14.00	2.89	14.00	2.92	14.00	2.98	14.00	3.32	14.00	3.74
	10	15.52	2.17	15.02	2.37	14.57	2.58	14.27	2.80	14.20	3.02	14.20	3.24
	12	16.64	2.18	16.04	2.38	15.54	2.59	15.04	2.81	14.54	3.03	14.24	3.25
	15	18.02	2.19	17.42	2.39	16.92	2.60	16.32	2.82	15.92	3.04	15.52	3.26
	20	20.01	2.38	19.41	2.40	18.81	2.61	18.21	2.83	17.71	3.05	17.21	3.27
12KW	-20	9.42	4.44	8.92	4.45	8.42	4.55						
	-15	9.62	4.47	9.12	4.48	8.62	4.58						
	-10	10.01	4.67	9.51	4.68	9.01	4.78	8.51	4.88				
	-7	10.45	4.61	9.95	4.62	9.45	4.72	8.95	4.82				
	-5	10.80	4.22	10.30	4.23	9.80	4.33	9.30	4.43				
	-2	11.20	3.81	10.70	3.82	10.20	3.92	9.70	4.02	9.20	4.12		
	0	11.55	3.79	11.05	3.81	10.55	3.91	10.05	4.01	9.55	4.11		
	2	11.60	3.77	11.10	3.78	10.60	3.88	10.10	3.98	9.60	4.08	9.10	4.18
	5	12.35	3.27	11.85	3.28	11.35	3.38	10.85	3.48	10.35	3.58	9.85	3.68
	7	12.50	2.92	12.00	2.93	11.50	3.03	10.95	3.13	10.95	3.23	10.95	3.33
	10	13.15	2.87	12.65	2.88	12.15	2.98	11.65	3.08	11.15	3.18	10.65	3.28
	12	13.50	2.82	13.00	2.83	12.50	2.93	12.00	3.03	11.50	3.13	11.00	3.23
	15	15.00	2.77	14.50	2.78	14.00	2.88	13.50	2.98	13.00	3.08	12.50	3.18
	20	14.80	2.72	14.30	2.73	13.80	2.83	13.30	2.93	12.80	3.03	12.30	3.13
9KW	-20	6.40	2.93	5.90	2.94	5.40	3.04						
	-15	6.80	3.13	6.30	3.14	5.80	3.24						
	-10	7.25	3.01	6.75	3.02	6.25	3.12	5.75	3.22				
	-7	7.70	2.97	7.20	2.98	6.70	3.08	6.20	3.18				
	-5	8.15	2.72	7.65	2.73	7.15	2.83	6.65	2.93				
	-2	8.60	2.52	8.10	2.53	7.60	2.63	7.10	2.73	6.60	2.83		
	0	8.65	2.54	8.15	2.55	7.65	2.65	7.15	2.75	6.65	2.85		
	2	8.60	2.50	8.10	2.51	7.60	2.61	7.10	2.71	6.60	2.81	6.10	2.91
	5	9.50	2.19	9.00	2.20	8.50	2.30	8.00	2.40	7.50	2.50	7.00	2.60
	7	9.50	1.94	9.00	1.95	8.50	2.05	8.12	2.15	8.12	2.25	8.12	2.35
	10	10.15	1.89	9.65	1.90	9.15	2.00	8.65	2.10	8.15	2.20	7.65	2.30
	12	10.50	1.84	10.00	1.85	9.50	1.95	9.00	2.05	8.50	2.15	8.00	2.25
	15	12.00	1.79	11.50	1.80	11.00	1.90	10.50	2.00	10.00	2.10	9.50	2.20
	20	12.05	1.79	11.55	1.80	11.05	1.90	10.55	2.00	10.05	2.10	9.55	2.20
7KW	-20	6.40	2.88	5.90	2.89	5.40	2.99						
	-15	6.80	3.11	6.30	3.12	5.80	3.22						
	-10	6.82	3.01	6.32	3.02	5.82	3.12	5.32	3.22				
	-7	6.85	2.97	6.35	2.98	5.85	3.08	5.35	3.18				
	-5	6.90	2.31	6.40	2.32	5.90	2.42	5.40	2.52				
	-2	7.00	2.31	6.50	2.32	6.00	2.42	5.50	2.52	5.00	2.62		
	0	7.10	1.94	6.60	1.95	6.10	2.05	5.60	2.15	5.10	2.25		
	2	7.40	1.94	6.90	1.95	6.40	2.05	5.90	2.15	5.40	2.25	4.90	2.35
	5	7.55	1.76	7.05	1.77	6.55	1.87	6.05	1.97	5.55	2.07	5.05	2.17
	7	7.50	1.55	7.00	1.56	6.50	1.66	6.20	1.76	6.20	1.86	6.20	1.96
	10	9.15	1.45	8.65	1.46	8.15	1.56	7.65	1.66	7.15	1.76	6.65	1.86
	12	9.50	1.49	9.00	1.50	8.50	1.60	8.00	1.70	7.50	1.80	7.00	1.90
	15	10.00	1.49	9.50	1.50	9.00	1.60	8.50	1.70	8.00	1.80	7.50	1.90
	20	10.50	1.49	10.00	1.50	9.50	1.60	9.00	1.70	8.50	1.80	8.00	1.90
5KW	-20	4.50	2.25	4.08	2.26	3.67	2.37						
	-15	4.83	2.26	4.42	2.27	4.00	2.38						
	-10	4.85	2.28	4.43	2.29	4.02	2.40	3.60	2.50				
	-7	4.88	2.29	4.46	2.30	4.04	2.41	3.63	2.51				
	-5	4.92	2.38	4.50	2.39	4.08	2.49	3.67	2.59				
	-2	5.00	2.39	4.58	2.40	4.17	2.50	3.75	2.60	3.33	2.70		
	0	5.08	2.44	4.67	2.45	4.25	2.55	3.83	2.65	3.42	2.76		
	2	5.50	2.23	5.08	2.24	4.67	2.34	4.25	2.45	3.83	2.55	3.42	2.65
	5	5.46	2.04	5.04	2.05	4.63	2.15	4.21	2.25	3.79	2.35	3.38	2.46
	7	5.42	1.44	5.00	1.45	4.58	1.55	4.17	1.66	3.75	1.76	3.33	1.86
	10	6.79	1.45	6.38	1.46	5.96	1.56	5.54	1.67	5.13	1.77	4.71	1.87
	12	7.08	1.47	6.67	1.48	6.25	1.58	5.83	1.69	5.42	1.79	5.00	1.89
	15	7.50	1.53	7.08	1.54	6.67	1.65	6.25	1.75	5.83	1.85	5.42	1.95
	20	7.92	1.53	7.50	1.54	7.08	1.65	6.67	1.75	6.25	1.85	5.83	1.95

4.1 Water tank heat-up time







5 Piping diagram

5.1 Piping System

Select the refrigeration pipes according to the following requirements.

Piping specification of outdoor unit Unit: mm

Model \ Length (m)	Outer diameter (mm)	
	Gas pipe	Liquid pipe
AHW - 70~120UCSDP	ø 15.88 (5/8)	ø 9.53 (3/8)
AHW - 140/160UCSEP		

5.2 Connection between water module and Outdoor Unit

(1) Length of refrigerant piping

Model \ Project	Pipe length	
	Actual length	Equivalent length
AHW-070/090/120UCSDP	≤ 30m	≤ 33m
AHW-140/160UCSEP	25m	35m

(2) Permissible height difference between outdoor unit and water module

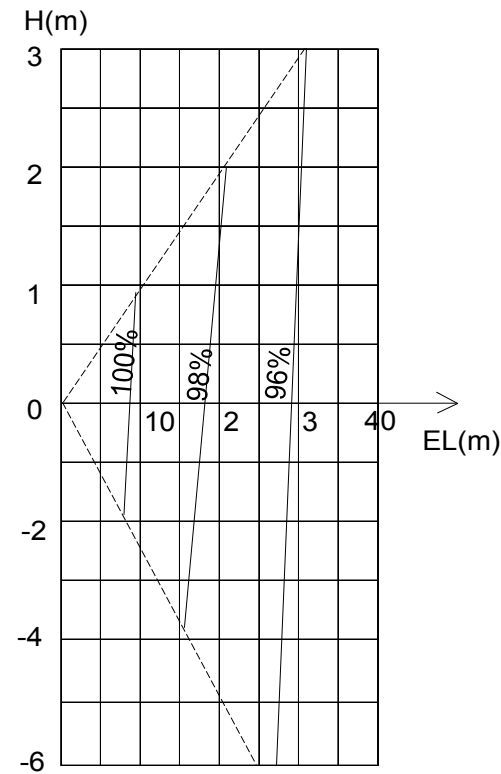
Position of outdoor unit	Max. height difference
At the bottom	6m
At the top	3m

Note: The maximum piping length from three-way valve to the water module is 5m.

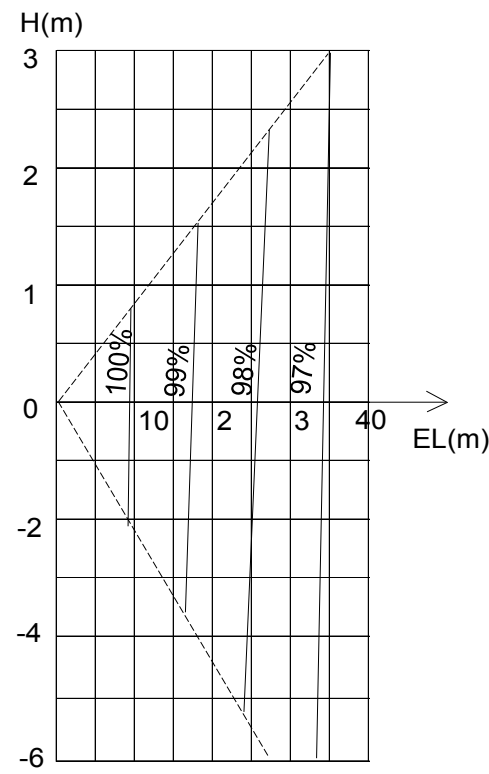
5.3 Piping Conection

Heating

AHW-070~120UCSDP

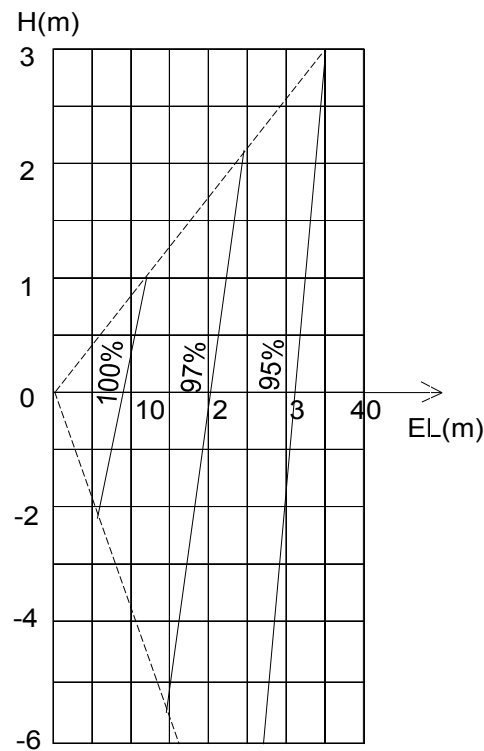


AHW-140UCSEP AHW-160UCSEP

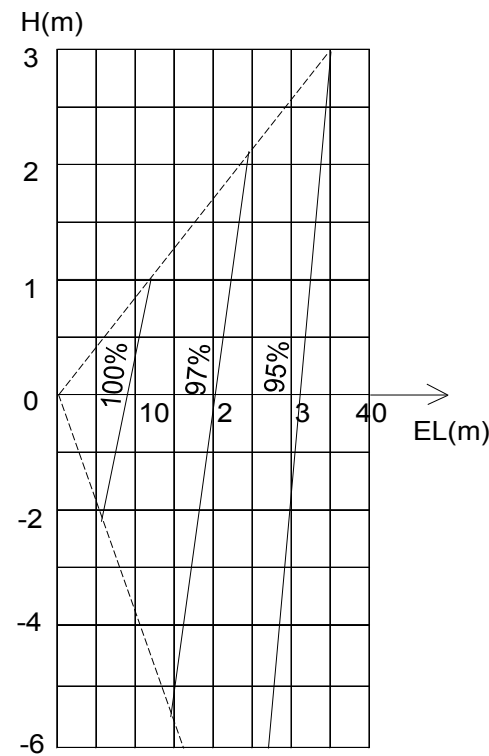


Cooling

AHW-070~120UCSDP



AHW-140UCSEP AHW-160UCSEP

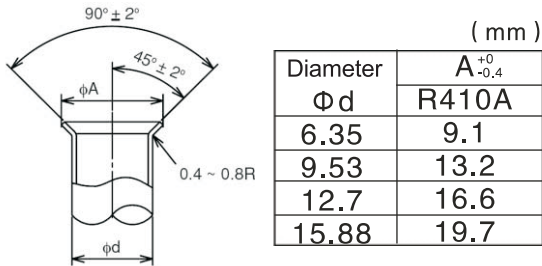


5.4 Refrigerant Piping Work

5.4.1 Piping Materials

● Flaring Dimension

Perform the flaring work as shown below.



● Piping Thickness and Material

Use the pipe as below.

Diameter	R410A	
	Thickness	Material
φ 6.35	0.8	0
φ 9.53	0.8	0
φ 12.7	0.8	0
φ 15.88	1.0	0

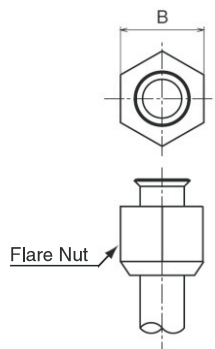
Material is based on a JIS standard (JIS B8607).

● Flare Nut Dimension

Use the flare nut as below.

<Flare Nut Dimension B (mm)

Diameter	R410A
φ 6.35	17
φ 9.53	22
φ 12.7	26
φ 15.88	29



Dimension is based on a JIS standard (JIS B8607).

5.4.2 Refrigerant Piping Work

- (1) Ensure that the directions for refrigerant piping work according to the tables.

Table Limitation of Outdoor Unit

Diameter Model	Outer Diameter of Pipe (mm)	
	Gas	Liquid
AHW-070/090/120 UCSDP	φ 15.88	φ 9.53
AHW-140/160 UCSEP		

- (2) Additional Refrigerant Charge R410A

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

Table W₀ Outdoor Unit Ref.charge before shipment

Outdoor Unit Model	W ₀ (kg)
AHW-070UCSDP	2.30
AHW-090/120UCSDP	3.05
AHW-140/160UCSEP	4.90

- Calculate charge refrigerant quantity by liquid pipe length, charge it to refrigerant cycle.

AHW-070/090/120UCSDP

W₁ (kg): (φ 9.53 liquid length-5 m) × 0.05

W = W₀ + W₁

AHW-140/160UCSEP

W₁ (kg): (φ 9.53 liquid length m) × 0.03

W = W₀ + W₁

- Inform local service the quantity of charging refrigerant after finish charging.

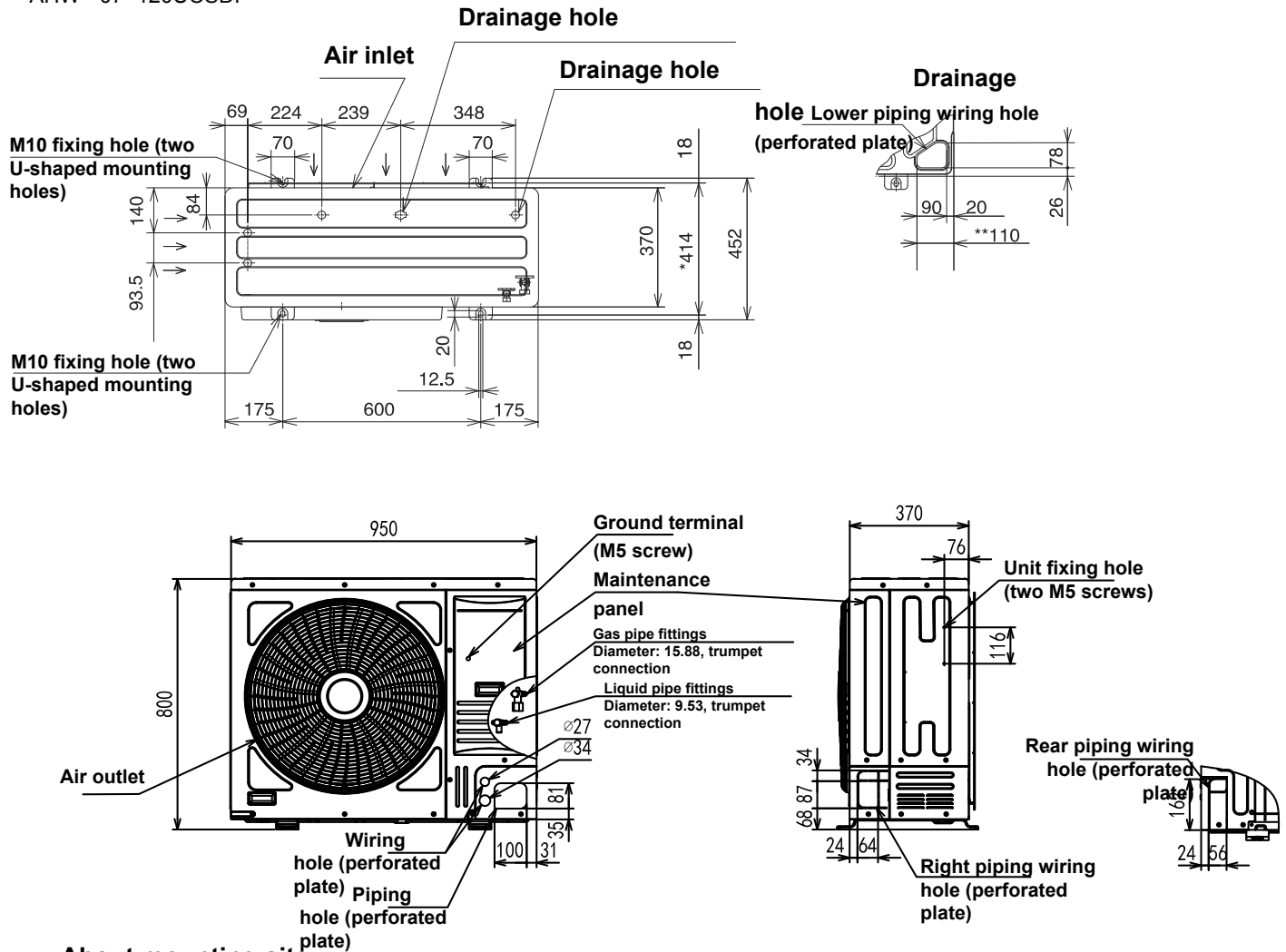
6. Dimensional and Structure

6.1 Dimensional

unit:mm

Outdoor unit

AHW - 07~120UCSDP



About mounting site

Please mount it in the position insusceptible to head wind (blowing to the fan directly) in order to prevent blowing snow into the unit.

- 1) Select the position with high strength and good stability for basic construction; be sure to fix
- 2) firmly. The air outlet of the unit shouldn't face strong wind.

Note

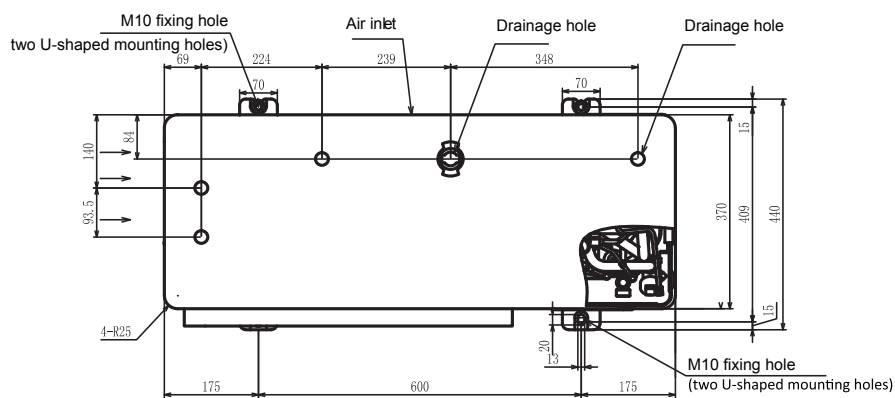
1. Refrigerant had been filled into the outdoor unit in the factory; refrigerant replenishing amount is 0.05kg/m; no filling is required in 5m.
2. The unit is equipped with a Stop valve, and the refrigerant pipe on site is connected to the shut off valve through a trumpet.

Note:

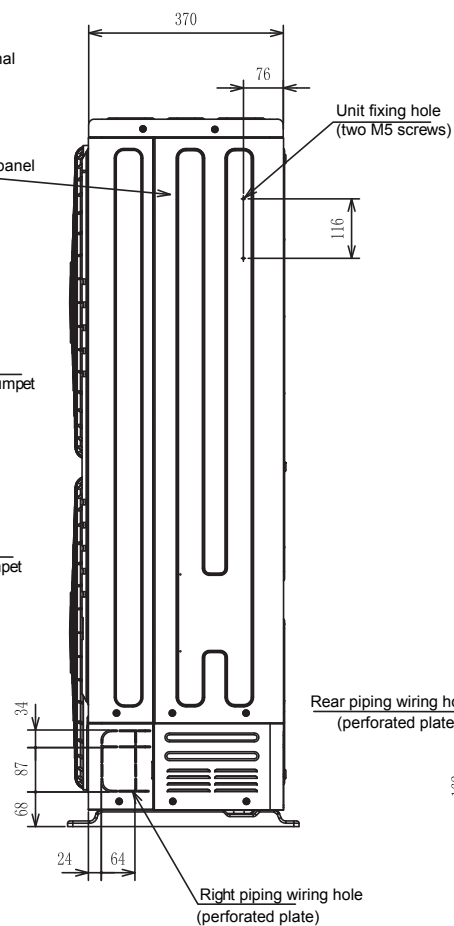
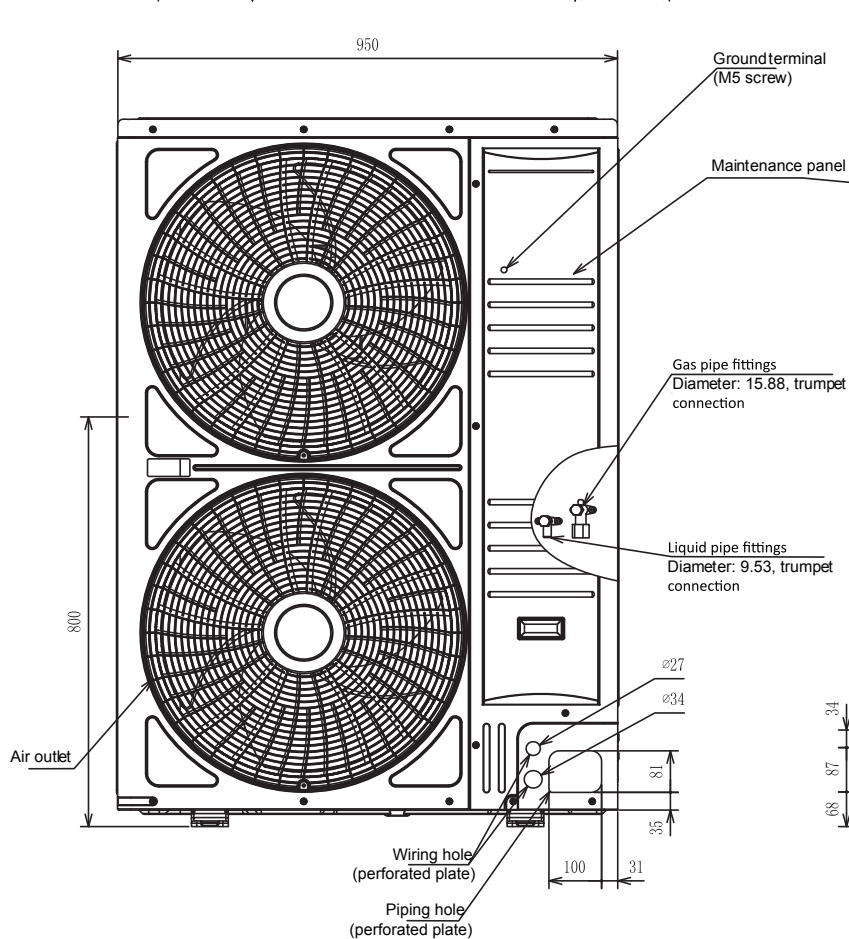
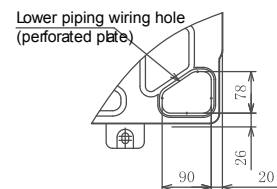
If drainage problem occurs during defrosting

- 1) Mount the unit in the position with smooth drainage and provide drainage channels.
- 2) The outdoor unit should be mounted stably and firmly in order to facilitate the discharge of frost water. When the weather is cold, the condensate water will freeze, so avoid drainage to places where people often walk on, in order to prevent slipping.

Model: AHW - 140~160UCSEP

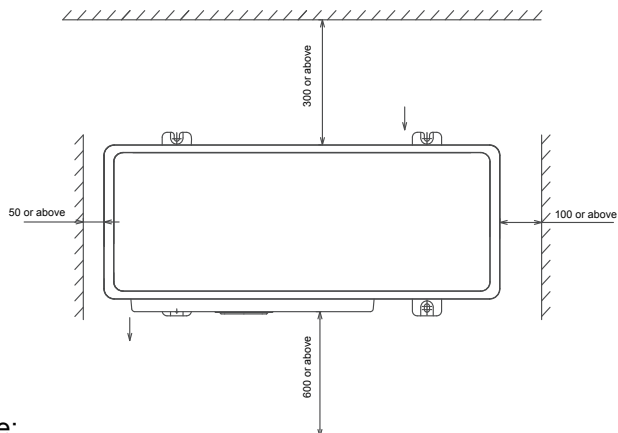


Unit: mm

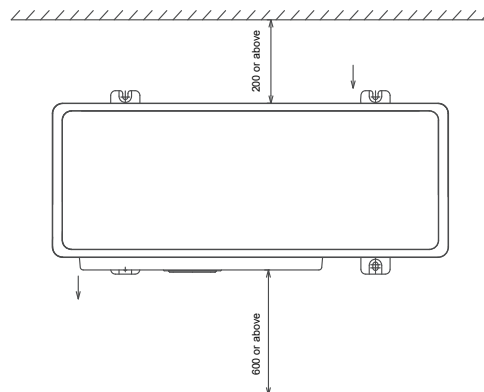


Service space

Obstacles on both sides,
no obstacle on top



No obstacle on top or both sides

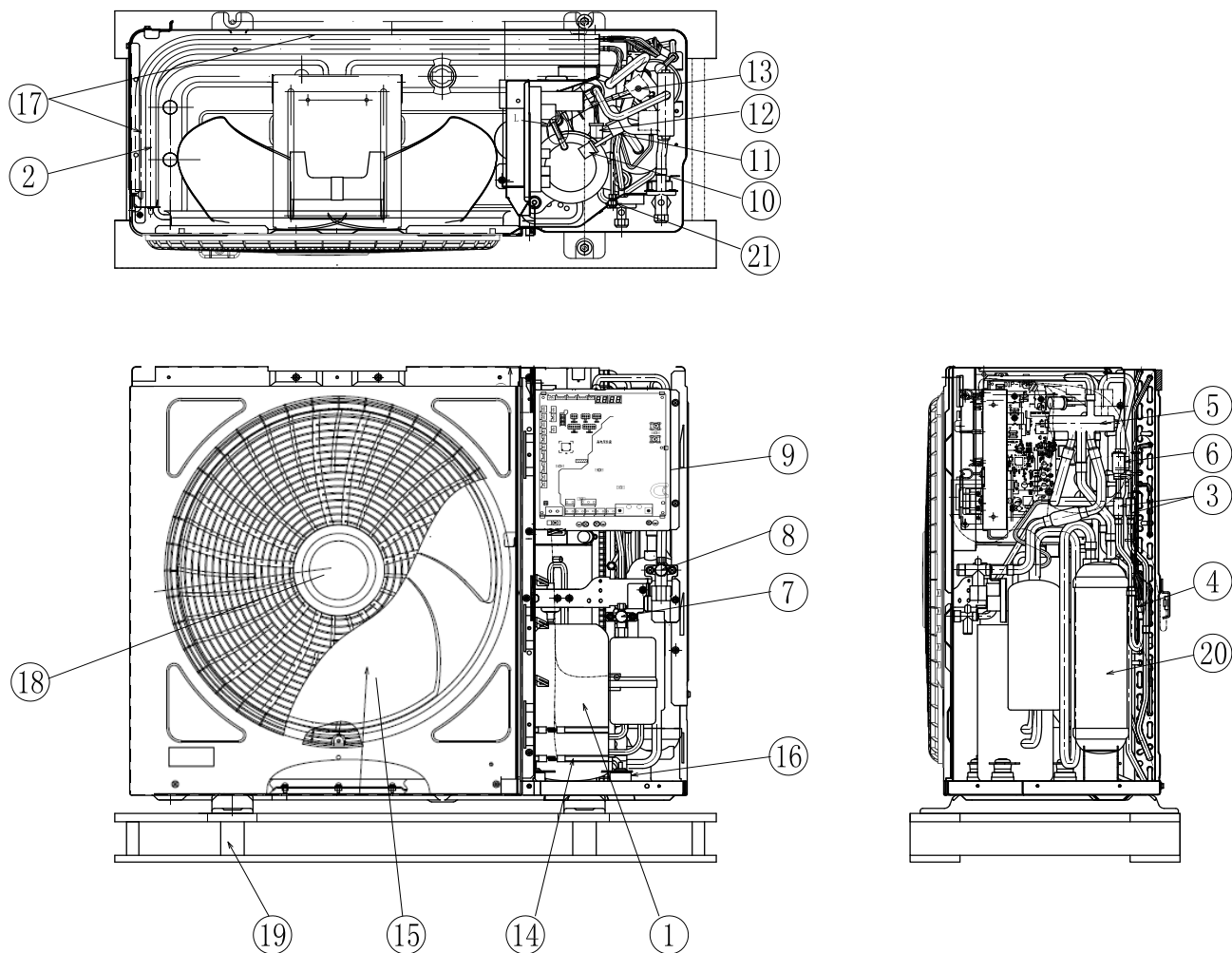


Note:

1. Stop valve is mounted in the shell
2. The mounting spacing of fixing bolts is 600x410.

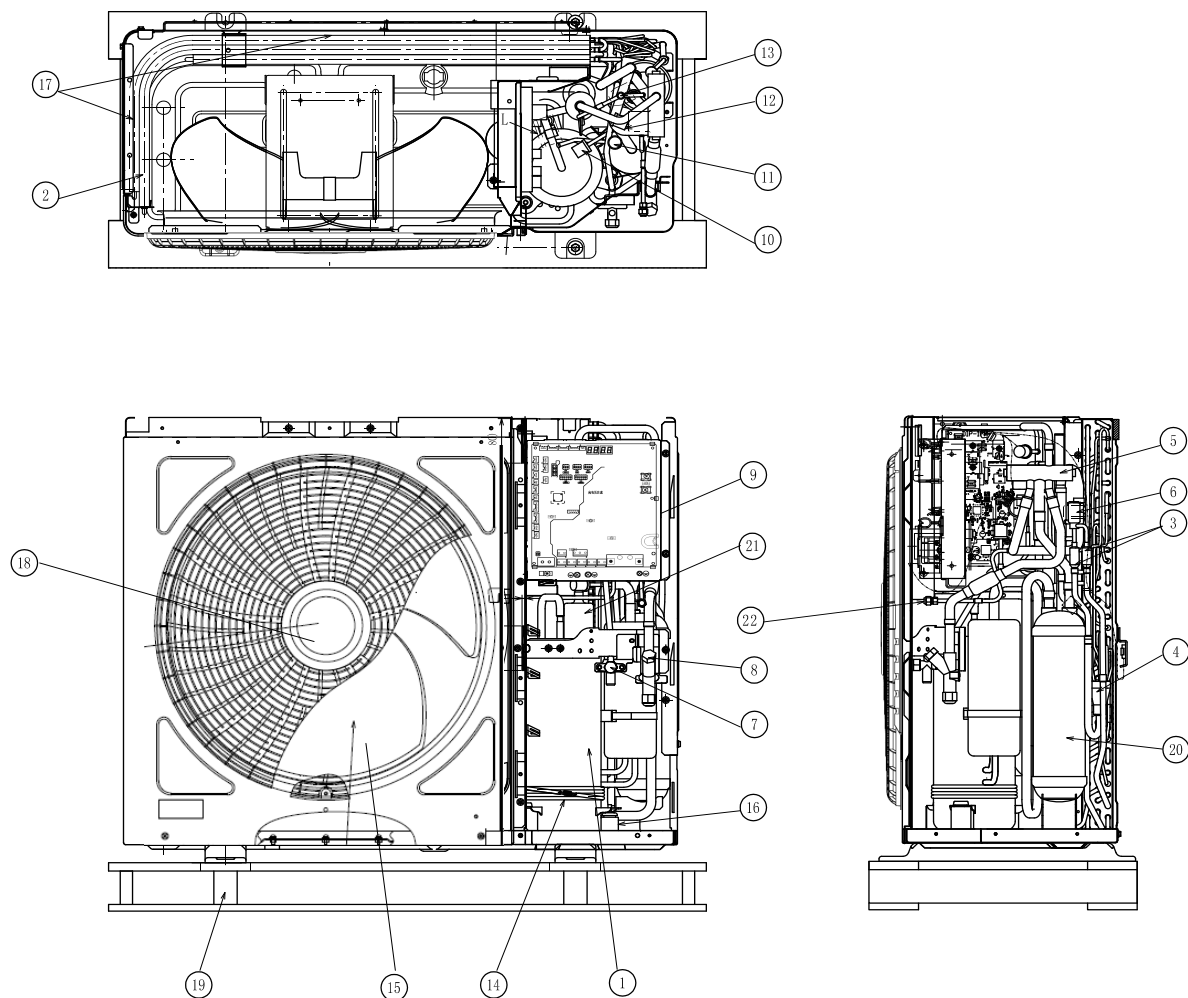
6.2 Structure

<Capacity (10²W): 70 outdoor unit>



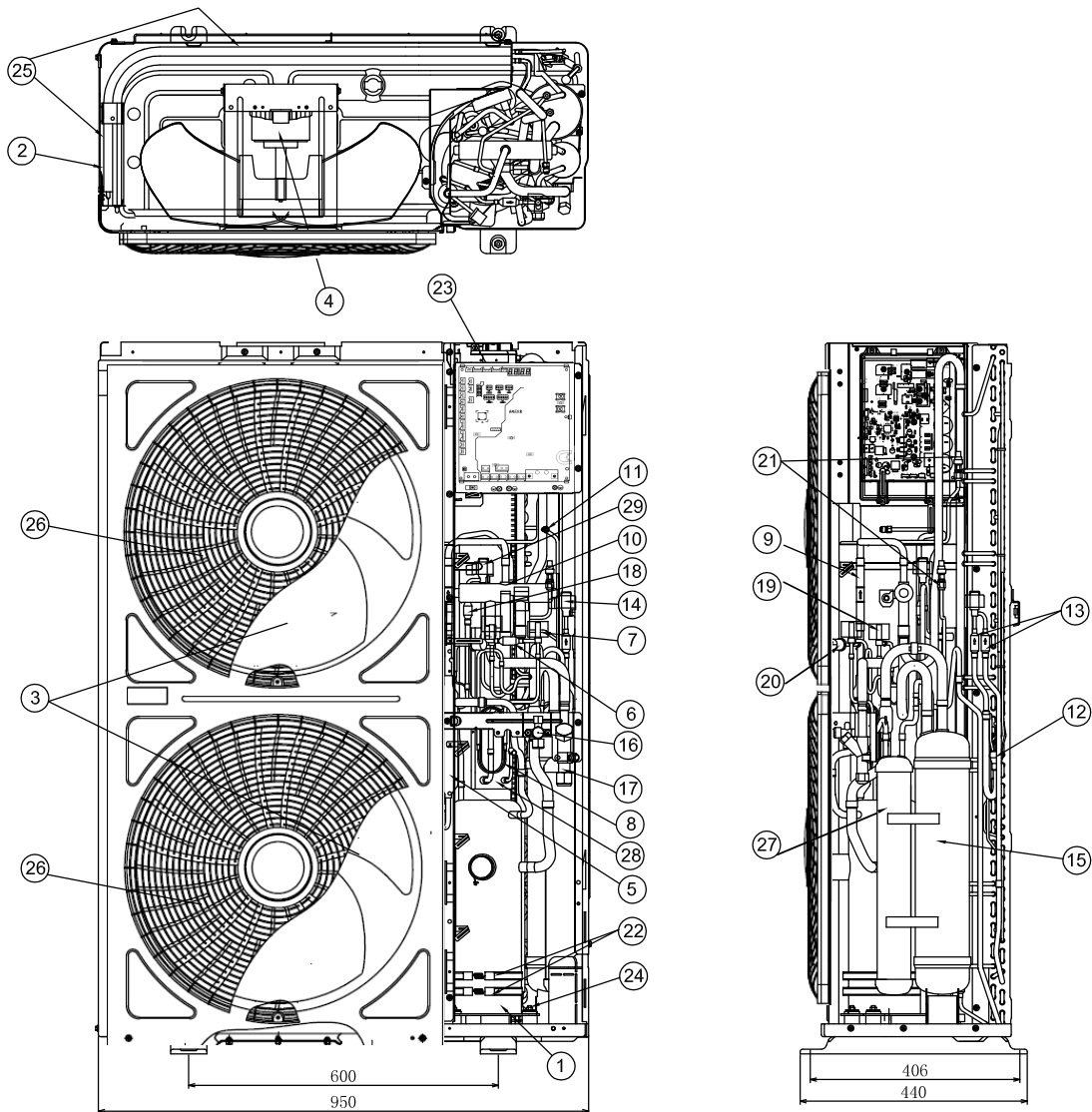
NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Compressor	9	Electrical Box	17	Air Inlet
2	Heat Exchanger	10	Low Pressure Sensor	18	Air Outlet
3	Strainer	11	High Pressure Switch	19	Wood backing
4	Flow Divider	12	High Pressure Sensor	20	Gas-liquid Separator
5	Four-way Solenoid Valve	13	Solenoid Valve	21	Check Joint
6	Electronic Expansion Valve	14	Crankcase HeaterBand		
7	Liquid-side StopValve	15	Fan Motor		
8	Gas-side Stop Valve	16	Damper Rubber		

<Capacity (10²W): 90/120 outdoor unit>



NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Compressor	9	Electrical Box	17	Air Inlet
2	Heat Exchanger	10	Low Pressure Sensor	18	Air Outlet
3	Strainer	11	High Pressure Switch	19	Wood backing
4	Flow Divider	12	High Pressure Sensor	20	Gas-liquid Separator
5	Four-way Solenoid Valve	13	Solenoid Valve	21	Silencer
6	Electronic Expansion Valve	14	Crankcase HeaterBand	22	Check Joint
7	Liquid-side StopValve	15	Fan Motor		
8	Gas-side Stop Valve	16	Damper Rubber		

<Capacity (10²W): 140/160 outdoor unit>

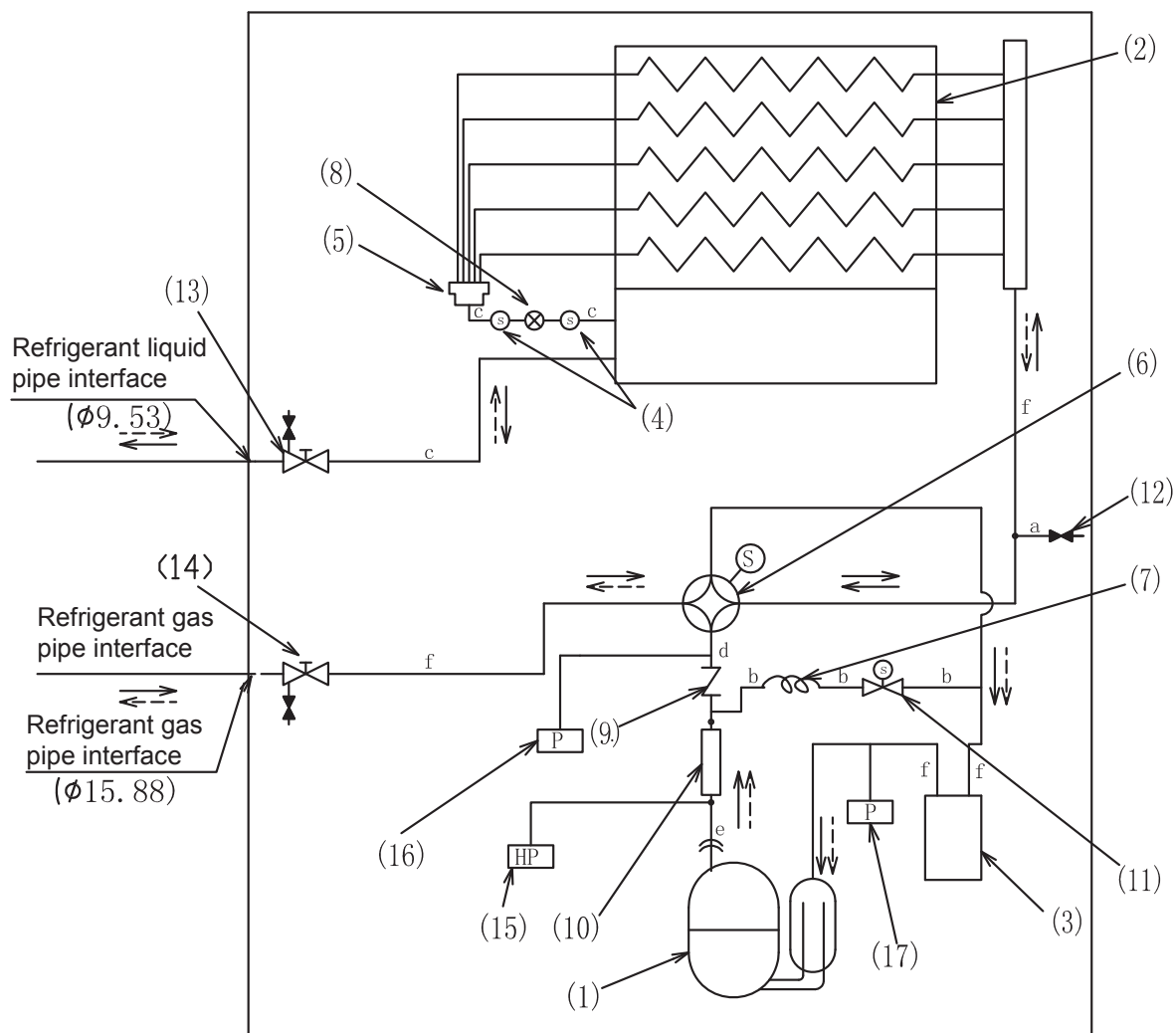


NO.	Part Name	NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Compressor	9	One-way Valve	16	Liquid-side Stop Valve	24	Damper Rubber
2	Heat Exchanger	10	Four-way Solenoid Valve	17	Gas-side Stop Valve	25	Air Inlet
3	Axial Flow Fan	11	High/ Low Pressure Check Joint	18	Strainer	26	Air Outlet
4	Fan Motor		(cooling / heating)	19	By-pass Solenoid Valve	27	Liquid Tank
5	Oil Separator	12	Flow Divider	20	High Pressure Switch	28	Plate Heat Exchanger
6	Strainer	13	Strainer	21	Pressure Sensor	29	Electronic Expansion Valve
7	Oil Return Solenoid Valve	14	Electronic Expansion Valve	22	Crankcase Heater Band		
8	Oil Return Capillary Tube	15	Gas-liquid Separator	23	Electrical Box		

7 . Control system

Refrigeration Cycle System

Outdoor unit AHW-070~120UCSDP

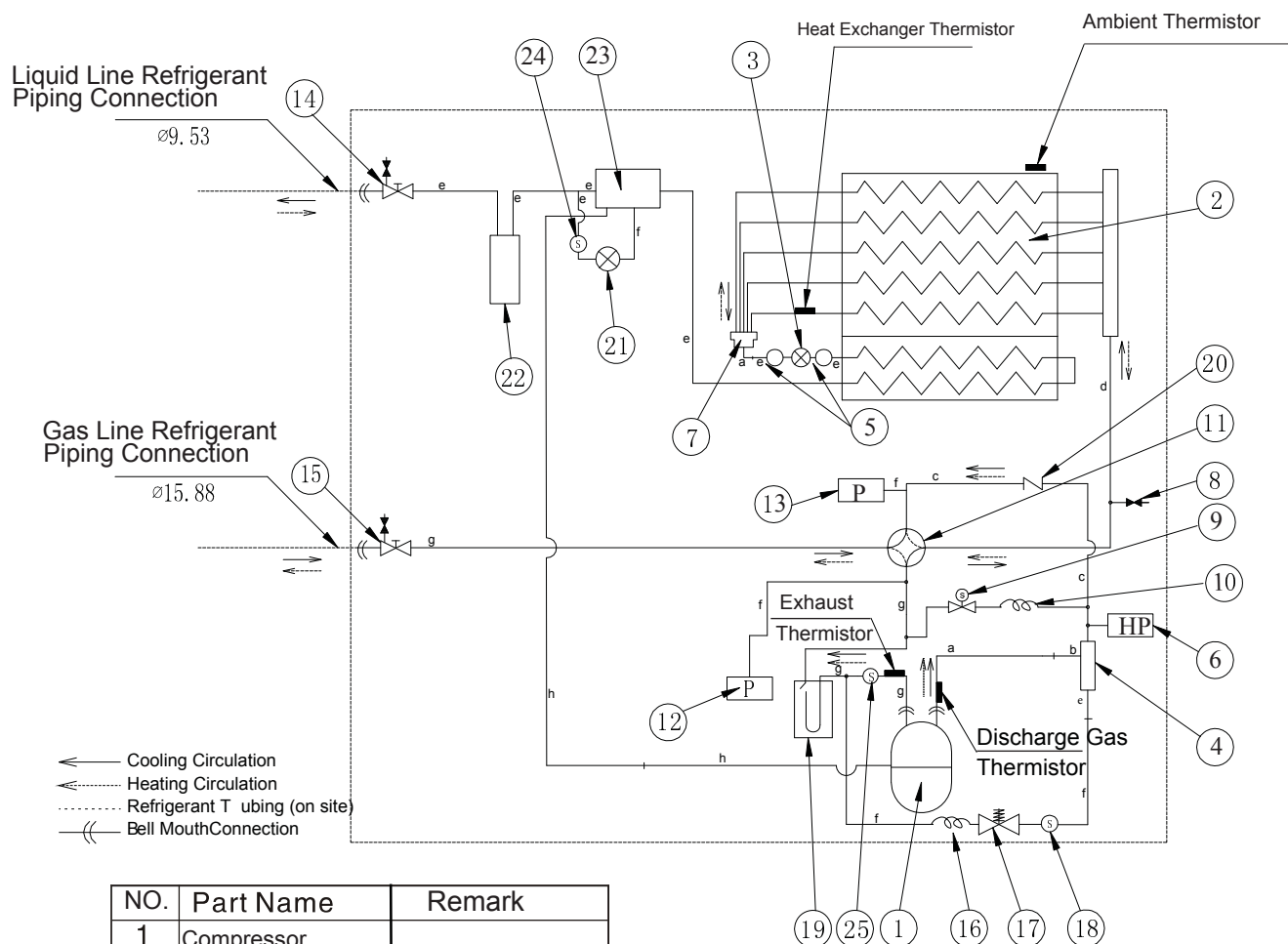


————→ Cooling
 - - - - -> Heating

No.	Name
(1)	Compressor
(2)	Heat exchanger
(3)	Gas-liquid separator
(4)	Filter
(5)	Shunt
(6)	Four-way valve
(7)	Capillary tube
(8)	Electronic expansion valve
(9)	Check valve
(10)	Silencer
(11)	Electromagnetic valve
(12)	Detection joint
(13)	Liquid side stop valve
(14)	Gas side stop valve
(15)	Pressure switch
(16)	Pressure sensor
(17)	Pressure sensor

Mark	O.D.×T	Material
a	Φ 6.35× 0.7t	TP2M
b	Φ 6.35× 1.07t	
c	Φ 9.53× 0.8 t	
d	Φ 12.7× 1.0 t	
e	Φ 12.7× 1.2 t	
f	Φ 15.88× 1.2 t	

Outdoor unit AHW-140-160UCSEP



NO.	Part Name	Remark
1	Compressor	
2	Heat Exchanger	
3	Expansion Valve	EV0
4	Oil Separator	
5	Strainer	
6	Pressure Switch	high pressure
7	Flow Divider	
8	Check Joint	
9	SVA1Solenoid Valve	
10	Capillary Tube	
11	Four-way Valve	
12	Pressure Sensor	low pressure
13	Pressure Sensor	high pressure
14	Liquid-side Stop Valve	
15	Gas-side Stop Valve	
16	Capillary Tube	For oil return
17	Solenoid Valve	For oil return
18	Strainer	
19	Accumulator	
20	One-way Valve	
21	Expansion Valve	EVB
22	L tank	
23	Plate heat exchanger	

NO.	Part Name	Remark
24	Strainer	
25	Strainer	

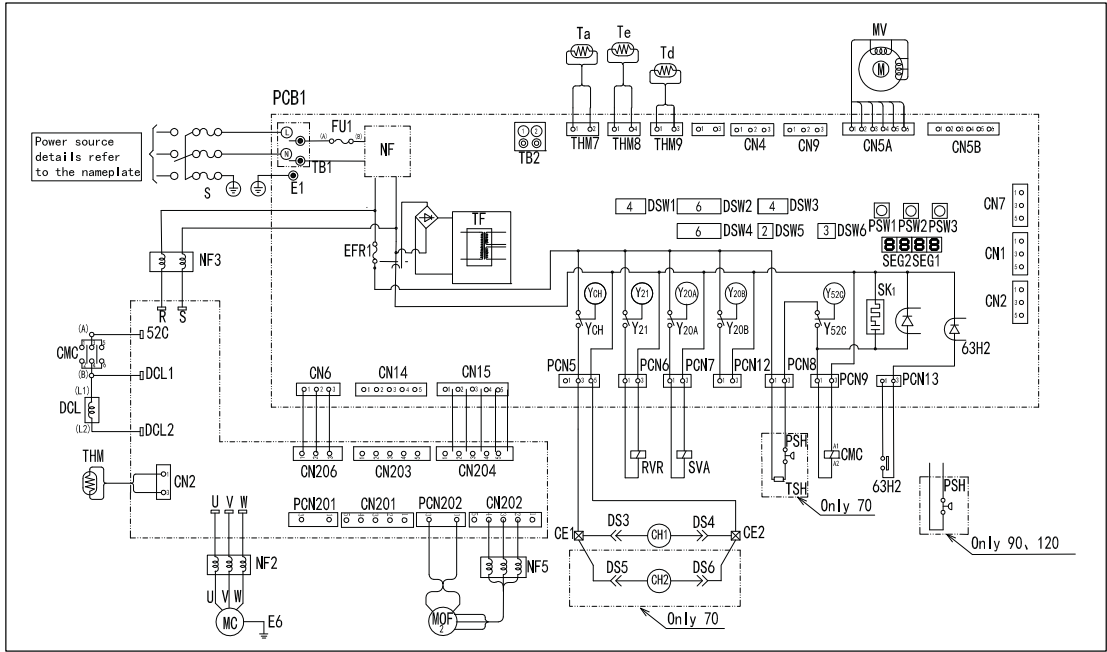
NO.	O.D. × T	Material
a	Φ12.7 × 1.0 t	C1220T-0
b	Φ15.88 × 1.65 t	
c	Φ12.7 × 1.2 t	
d	Φ15.88 × 1.0 t	
e	Φ9.53 × 0.8 t	
f	Φ6.35 × 1.07 t	
g	Φ19.05 × 1.2 t	
h	Φ9.53 × 1.0 t	

ELECTRICAL WIRING DIAGRAM

8. Electrical Wiring Diagram

(AHW - 70~120UCSDP)

Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 1 minute before electrical wiring work or a periodical check is performed.



Mark	Name
MC	Motor for Compressor
MOF2	Motor for Out Fan
FU1	Fuse
CMC	Contactor for Compressor Motor
RVR	Reversing Valve Relay
MV	Micro-Computer Control Expansion Valve
SVA	Solenoid Valve for Hot Gas Bypass
PSH	High Pressure Switch For Protection
TSH	High Temperature Switch For Protection
63H2	High Pressure Switch For Control
TB1,2	Terminal Board
TF	Transformer
PCB1	Printed Circuit Board
EFR1	Fuse
Y20C	Relay (CMC)
Y21	Relay (RVR)
Y20	Relay (CH)
Y20A	Relay (SVA)
THM7	Thermistor
THM8	Thermistor
THM9	Thermistor
DCL	Reactor
IPM	Inverter System Power Podule
NF1~5	Noise Filter
PSW1	Push Switch on PCB1
PSW2	Push Switch on PCB1
PSW3	Push Switch on PCB1
DSW1	Dip Switch on PCB1
DSW2	Dip Switch on PCB1
DSW3	Dip Switch on PCB1
DSW4	Dip Switch on PCB1
DSW5	Dip Switch on PCB1
DSW6	Dip Switch on PCB1
CH1~2	Crankcase Heater
E1, 6	Ground Wire

Code	Content of Abnormality	Loading Cause
01	Activation of Protection Device	Activation of Float Switch, High Water Level in Drain Pan
02	Activation of Protection Device	Activation of PSH, Pipe Clogging, Excessive Ref., Inert Gas Mixing
03	Anomaly between L.U. and O.U./O.L. and O.L.	Incorrect Wiring, Loose Terminals, Disconnected Wire, Tripping of Fuse
04	Anomaly between Inverter PCB and O.U. PCB	Transmission Failure (Loose Connector)
06	Abnormal Inverter Voltage	O.U. Voltage Drop, Insufficient Power Capacity
07	Decrease of Discharge Gas Superheat	Excessive Ref. Charge, Failure of Thermistor, Incorrect Wiring
08	Increase of Discharge Gas Temperature	Insufficient Ref. Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring
11	Inlet Air Thermistor	Incorrect Wiring , Disconnected Wiring
12	Outlet Air Thermistor	
13	Freeze Protection Thermistor	
14	Gas Piping Thermistor	
16	Remote Control Thermistor	Fan Motor Overheat, Locking
17	Remote Control Switch Thermistor	
19	Activation of Protection Device for Indoor Unit Fan	Incorrect Wiring , Disconnected Wiring
22	Outdoor Air Thermistor	
23	Discharge Gas Thermistor	Incorrect Setting of Capacity Combination
24	Evaporating Piping Thermistor	
31	Incorrect Capacity of O.U. and L.U.	Duplication of Indoor Unit No. Refrigerant of Indoor Unit No.
35	Incorrect Setting of L.U. No.	
36	Incorrect Combination of L.U. No.	Failure of Protection Detecting Circuit
38	Anomaly of Protective Circuit in O.U.	
47	Activation of Low-Pressure Decrease Protection Device (Vacuum Operation)	Insufficient Ref., Ref. Pipe Clogging Locking (Loose Connector)
48	Activation of Inverter Overcurrent Protection Device	Overload Operation, Comp. Failure
51	Abnormal Current Sensor	Current Sensor Failure
53	Inverter Error Signal Detection	Driver IC Error Signal Detection, (Protection for Overcurrent, Low Voltage, Short-Circuit)
54	Increase of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Abnormal Fan
55	Inverter Failure	Inverter PCB Failure
57	Fan Motor Abnormality	Disconnected Wiring/Incorrect Wiring between Control PCB (PCB1) and Fan Relay PCB (PCB3, PCB5), Fan Motor Failure
EE	Compressor Protection Alarm	Failure of Compressor

Table1

DSW1 (Test Operation)		DSW2(Optional Function Setting)		DSW3(Capacity Setting)					
ON  OFF 		70, 90, 120 ON  OFF 		70 ON  OFF 		90 ON  OFF 		120 ON  OFF 	
DSW4(Ref. Cycle No. Setting)		DSW5		DSW6 (Other Function Setting)					
ON  OFF 		ON  OFF 		ON  OFF 					
Ref. Cycle No. Setting 0~63									

Service Operation Service Operation on the talbe below can be performed through the Setting of DSW1 and PSW1. Setting of DSW should be according to the Table 1. Take care of the remarks on the right during operation.

- Do not touch any other electrical parts when operating switches on the PCB.
- Do not attach or detach service cover when the power source for the outdoor unit is ON and the outdoor unit is operated.
- Turn all the dip switches of DSW1 OFF when the test run operation is completed.

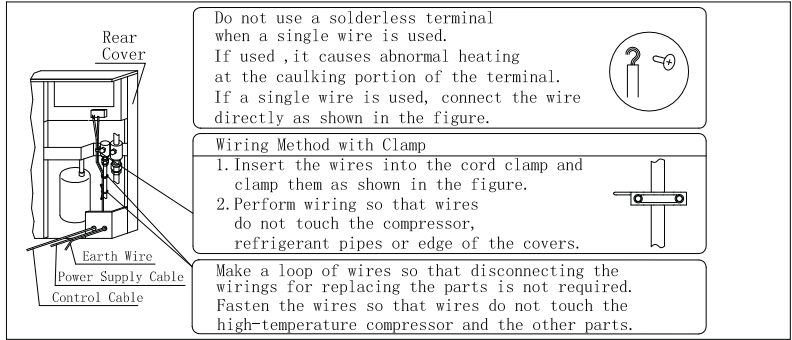
Table2, Setting of DSW1 (IPM)

DSW1 (IPM)
Inspection of Current is not available when setting 1 ON. So reset it after assembly.

	Dip Switch Setting	Operation	Remarks
1 Test Run	● Setting of Operation Mode Cooling: Set DSW1-2 OFF. Heating: Set DSW1-2 ON. ● Starting Test Run Set DSW1-1 ON and the operation is started after a few 20 seconds.	● The indoor unit automatically start to operate when the test run of the outdoor unit is set. ● The ON/OFF operation can be performed from the remote control switch of DSW1-1 of the outdoor unit. ● Continuous operation during 2 hours is performed without Thermo-OFF.	● Take care that the indoor units operate in accordance with the test run operation of the outdoor unit. ● In case that the plural indoor units are connected with one remote control switch, all the units start test run operation at the same time, therefore, turn the power source OFF for the indoor units not to operate test run. ● The setting of DSW1 is not required for the test run from the remote control switch.
2 Manual OFF of Compressor	● Setting Compressor Manual OFF: Set DSW1-4 ON Compressor ON: Set DSW1-4 OFF	● When DSW1-4 is ON during compressor operation, the compressor stops to operate immediately and the indoor unit is under the condition of Thermo-OFF. ● When DSW1-4 is OFF, the compressor starts to operate after the cancellation of 3-minutes guard.	● Do not repeat compressor ON/OFF frequently.
3 Manual Defrost	● Manual Defrost Operation Starts Press PSW1 for more than 3 seconds during heating operation. ● Manual Defrost Operation Ends Press PSW1 for more than 3 seconds during Defrost operation. OR is automatically ended.	● Defrost operation is available regardless of frosting condition and total time of heating operation. ● Defrost operation is not performed when the temperature of outdoor heat exchanger is higher than 10°C, high pressure is higher or Thermo-OFF.	● Do not repeat defrost operation frequently.

Electrical Wiring Between Indoor Unit and Outdoor Unit

Do not connect the power source line to the terminals 1 and 2. These terminals are for the control line. If connected, the printed circuit board will be damaged.



(Refrigerant Charging Quantity)

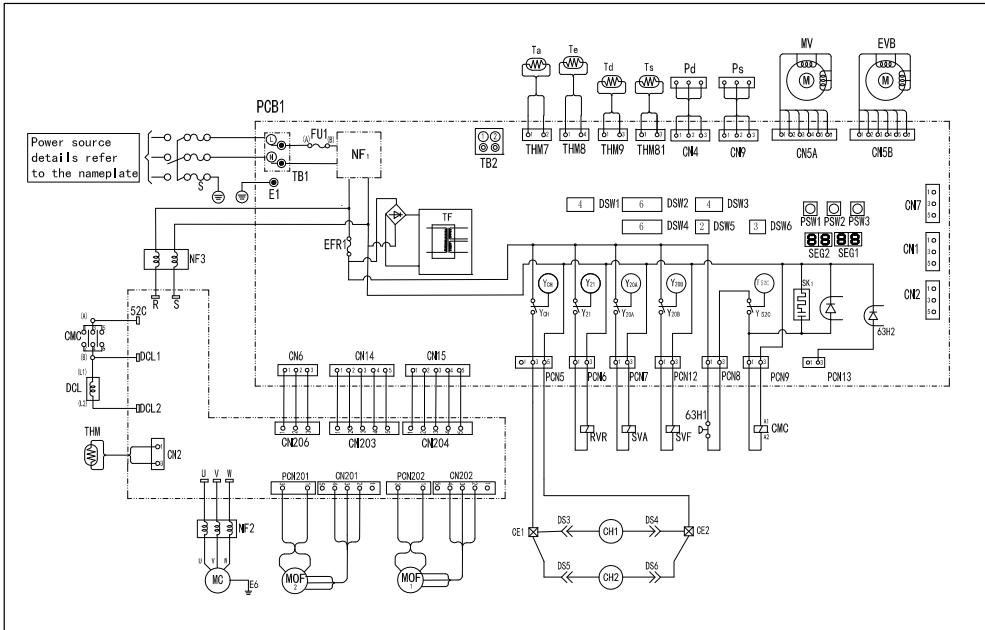
- If liquid piping length is more than 5m, it is necessary additional refrigerant charge as follows.

Total Additional Charge W1(kg)
$$= (\text{Total Liquid Piping Length(m)} - 5\text{m}) \times 0.05\text{kg/m}$$

ELECTRICAL WIRING DIAGRAM

(AHW - 140/160UCSEP)

Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 1 minute before electrical wiring work or a periodical check is performed.



MARK	NAME
MC	Motor for Compressor
MOF1	Motor for Out Fan
MOF2	Motor for Out Fan
FU1	Fuse
CMC	Contactor for Compressor Motor
RVR	Reversing Valve Relay
MV, EVB	Micro-Computer Control Expansion Valve
SVA	Solenoid Valve for Hot Gas Bypass
SVF	Solenoid Valve for Backing Of Oil
63H1	High Pressure Switch for Protection
Pa	Sensor for Refrigerant Pressure
Ps	Sensor for Refrigerant Pressure
TB1, 2	Terminal Board
TF	Transformer
PCB1	Printed Circuit Board
EFR1	Fuse
Y1sc	Relay (CMC)
Y1a	Relay (RVR)
Y1c	Relay (CH)
Y1ma	Relay (SVA)
Y1ob	Relay (SVF)
THM7	Thermistor
THM8	Thermistor
THM9	Thermistor
THM81	Thermistor
DCL	Reactor
IPM	Inverter System Power Podule
NF1-4	Noise Filter
PSW1	Push Switch on PCB1
PSW2	Push Switch on PCB1
PSW3	Push Switch on PCB1
DSW1	Dip Switch on PCB1
DSW2	Dip Switch on PCB1
DSW3	Dip Switch on PCB1
DSW4	Dip Switch on PCB1
DSW5	Dip Switch on PCB1
DSW6	Dip Switch on PCB1
CH1-2	Crankcase Heater
E1, 6	Ground Wire

Code	Content of Abnormality	Leading Cause
01	Activation of Protection Device	Activation of Float Switch, High Water Level in Drain Pan
02	Activation of Protection Device	Activation of PSU, Pipe Clogging, Excessive Ref., Inert Gas Mixing
03	Abnormality between I.U. and O.U. (O.U. and O.U.)	Incorrect Wiring, Loose Terminals, Disconnected Wire, Tripping of Fuse
04	Abnormality between Inverter PCB and O.U. PCB	Transmission Failure (Loose Connector)
06	Abnormal Inverter Voltage	O.U. Voltage Drop Insufficient Power Capacity
07	Decrease of Discharge Gas Superheat	Excessive Ref. Charge, Failure of Thermistor, Incorrect Wiring
08	Increase of Discharge Gas Temperature	Insufficient Ref. Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring
11	Inlet Air Thermistor	
12	Outlet Air Thermistor	
13	Freeze Protection Thermistor	Incorrect Wiring ,
14	Gas Piping Thermistor	Disconnected Wiring
16	Remote Control Thermistor	
17	Remote Control Switch Thermistor	
19	Activation of Protection Device for Indoor Unit Fan	Fan Motor Overheat, Locking
22	Outdoor Air Thermistor	
23	Discharge Gas Thermistor	Incorrect Wiring,
24	Evaporating Piping Thermistor	Disconnected Wiring
31	Incorrect Capacity of O.U. and I.U.	Incorrect Setting of Capacity Combination
35	Incorrect Setting of I.U. No.	Duplication of Indoor Unit No.
36	Incorrect Combination of I.U. No.	Refrigerant of Indoor Unit No.
38	Abnormality of Protective Circuit in O.U.	Failure of Protection Detecting Circuit
47	Activation of Low-Pressure Decrease Protection Device (Vacuum Operation)	Insufficient Ref., Ref. Pipe Clogging Locking (Loose Connector)
48	Activation of Inverter Overcurrent Protection Device	Overload Operation, Comp. Failure
51	Abnormal Current Sensor	Current Sensor Failure
53	Inverter Error Signal Detection	Driver IC Error Signal Detection, (Protection for Overcurrent, Low Voltage, Short-Circuit)
54	Increase of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Abnormal Fan
55	Inverter Failure	Inverter PCB Failure
57	Fan Motor Abnormality	Disconnected Wiring/Incorrect Wiring between Control PCB (PCB1) and Fan Relay PCB (PCB3, PCB5), Fan Motor Failure
EE	Compressor Protection Alarm	Failure of Compressor

Table1

DSW1 (Test Operation)	DSW2(Optional Function Setting)	DSW3(Capacity Setting)	
ON OFF	ON OFF	140 ON OFF	160 ON OFF
DSW4(Ref. Cycle No. Setting)		DSW5 DSW6 (Other Function Setting)	
ON OFF Ref. Cycle No. Setting 0~63		ON OFF	ON OFF

Service Operation
Service Operation on the table below can be performed through the Setting of DSW1 and PSW1. Setting of DSW should be according to the Table 1. Take care of the remarks on the right during operation.

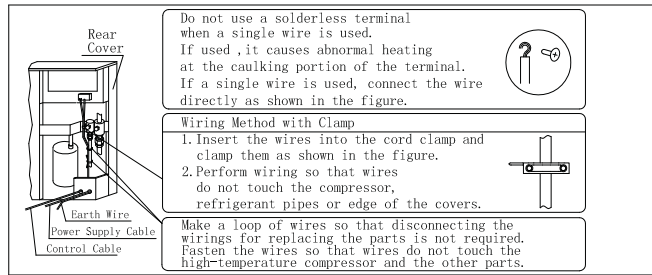
- Do not touch any other electrical parts when operating switches on the PCB.
- Do not attach or detach service cover when the power source for the outdoor unit is ON and the outdoor unit is operated.
- Turn all the dip switches of DSW1 OFF when the test run operation is completed.

	Dip Switch Setting	Operation	Remarks
1 Test Run	Setting of Operation Mode Cooling: Set DSW1-2 OFF. Heating: Set DSW1-2 ON. Starting Test Run Set DSW1-1 ON and the operation is started after a few 20 seconds.	The indoor unit automatically start to operate when the test run of the outdoor unit is set. The ON/OFF operation can be performed from the remote control switch of DSW1-1 of the outdoor unit. Continuous operation during 2 hours is performed without Thermo-Off.	Take care that the indoor units operate in accordance with the test run operation of the outdoor unit. In case that the plural indoor units are connected with one remote control switch, all the units start test run operation at the same time, therefore, turn the power source OFF for the indoor units not to operate test run. The setting of DSW1 is not required for the test run from the remote control switch.
2 Manual Defrost	Manual Defrost Operation Starts Press PSW1 for more than 3 seconds during heating operation. Manual Defrost Operation Ends Press PSW1 for more than 3 seconds during defrost operation. OR is automatically ended.	Defrost operation is available regardless of frosting condition and total time of heating operation. Defrost operation is not performed when the temperature of outdoor heat exchanger is higher than 30°C, high pressure is higher or Thermo-Off.	Do not repeat defrost operation frequently.

Manual Defrost on the above table is performed only for heat pump.

Electrical Wiring Between Indoor Unit and Outdoor Unit

Do not connect the power source line to the terminals 1 and 2. These terminals are for the control line. If connected, the printed circuit board will be damaged.



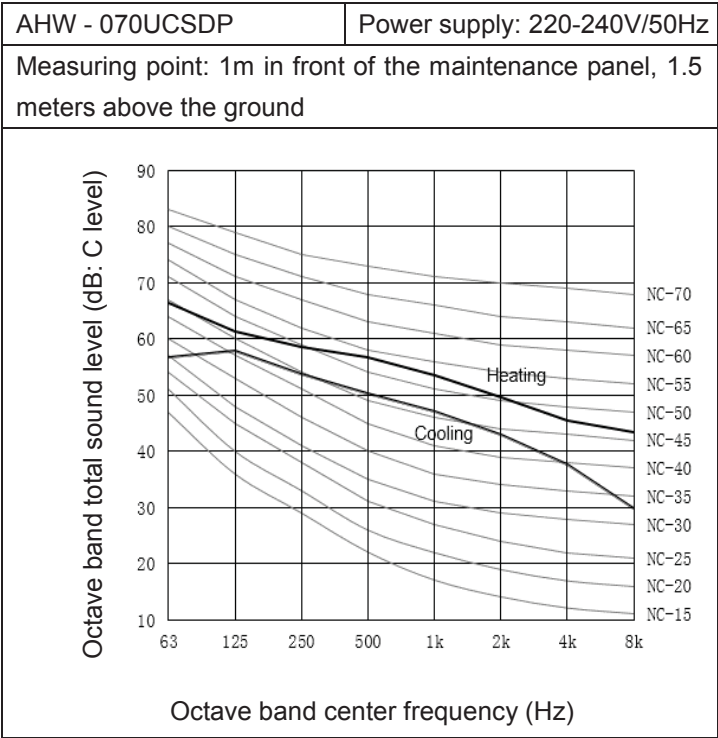
(Refrigerant Charging Quantity)

Additional Refrigerant Charge Calculation for Liquid Piping (W: kg)
W (Additional Refrigerant Charging Quantity for Ø9.53 Liquid Piping)
= 0.03kg/m × m
= kg

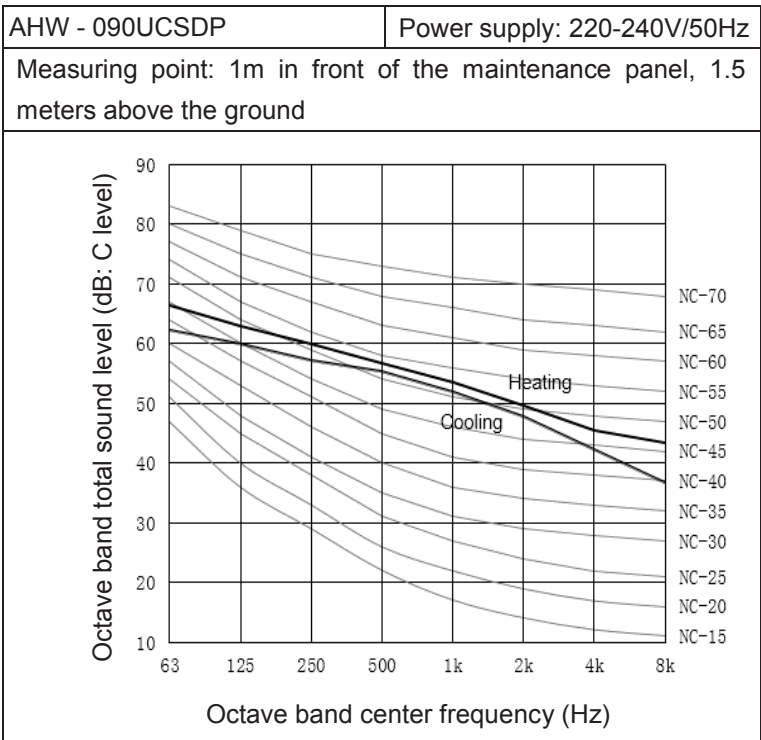
Table2, Setting of DSW1 (IPM)

DSW1 (IPM)
Inspection of Current is not available when setting 1 ON. So reset it after assembly.

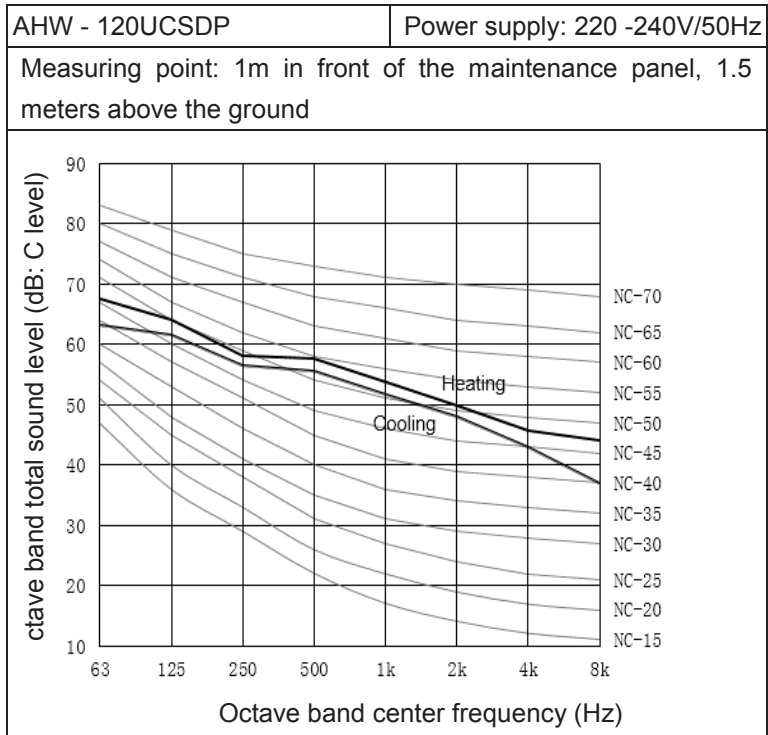
9. Sound Data



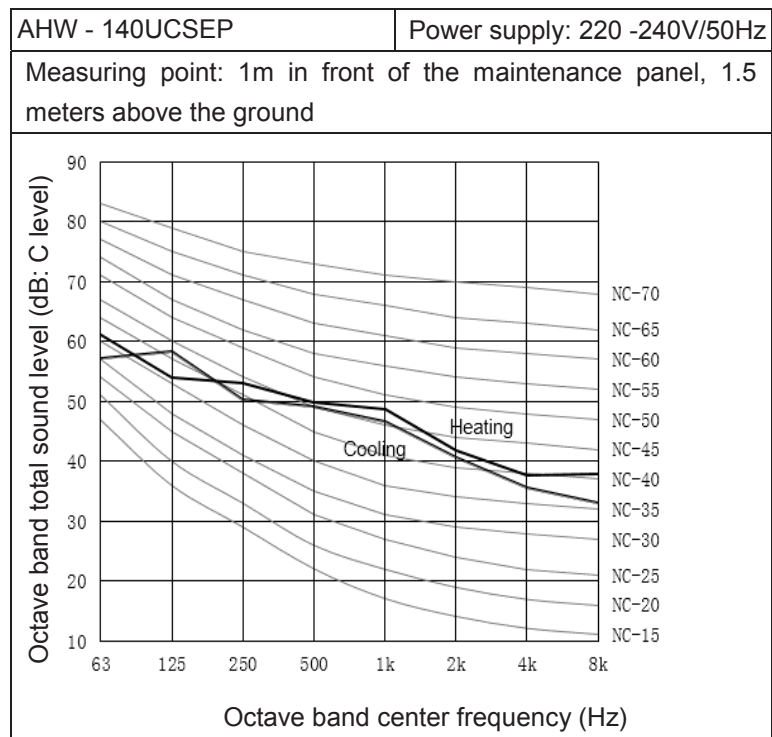
Variable Frequency Floor Heater 3HP Outdoor Unit Standard Cooling/Heating NC Curve



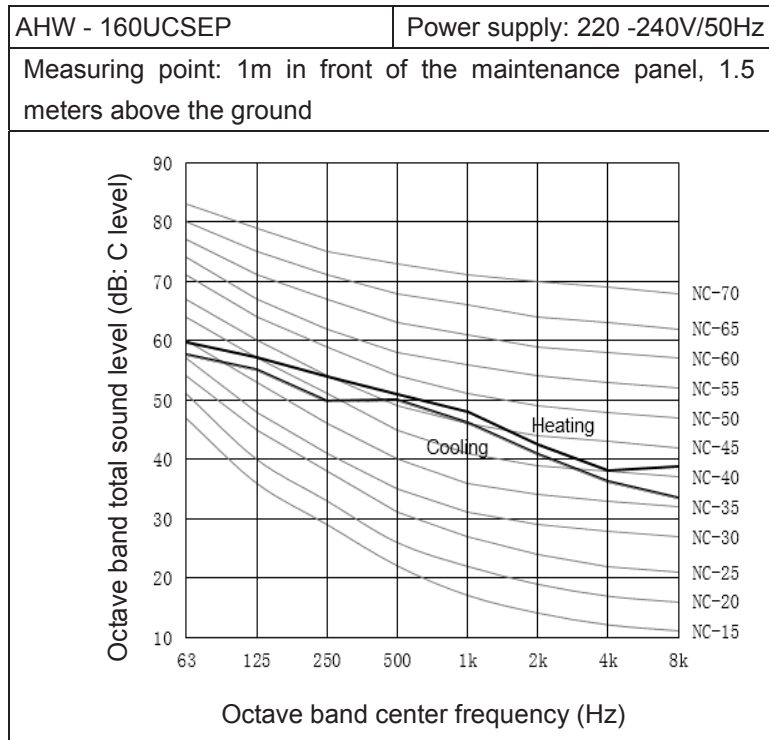
Variable Frequency Floor Heater 4HP Outdoor Unit Standard Cooling/Heating NC Curve



Variable Frequency Floor Heater 4.5HP Outdoor Unit Standard Cooling/Heating NC Curve



Variable Frequency Floor Heater 5HP Outdoor Unit Standard Cooling/Heating NC Curve



10. Operation Range

Power supply

Operating voltage: 90%~110% of rated voltage.

Unbalanced phase: The voltage deviation of each phase measured on the main power cord of the outdoor unit must be in 3%.

Starting voltage: should be higher than 85% of the rated voltage.

Temperature range in operating environment.

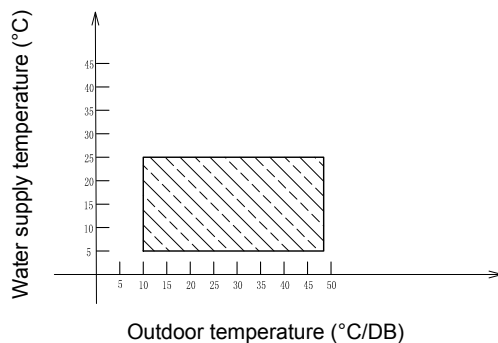
Please refer to the following table for the operating temperature range.

Temperature		(°C)	
Condition		Min.	Max.
Outdoor Unit	Cooling Operation	10 DB	43 DB
	Heating Operation	-20WB	35 DB
	Domestic Hot Water	-20WB	43 DB

DB: Dry Bulb, WB: Wet Bulb

AHW-70~120UCSDP AHW -140/160UCSEP

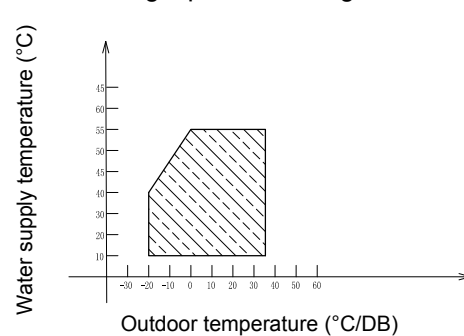
Cooling Operation Range



Continuous operation area of heat pump unit

AHW-70~120UCSDP AHW-140/160UCSEP

Heating Operation Range



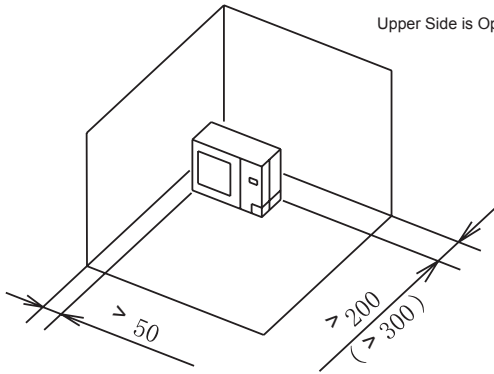
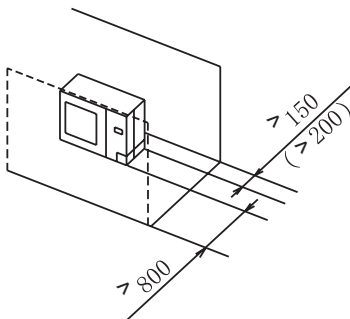
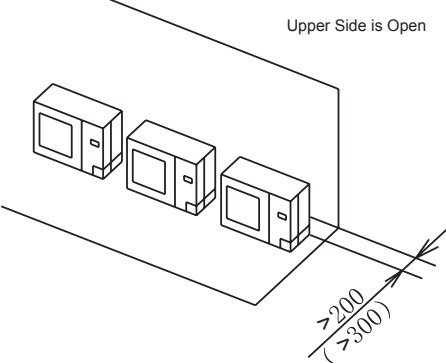
Continuous operation area of heat pump unit

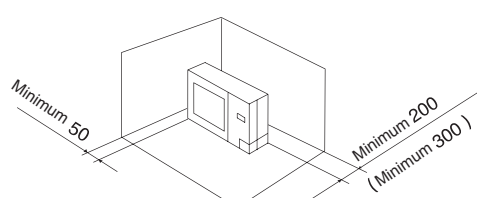
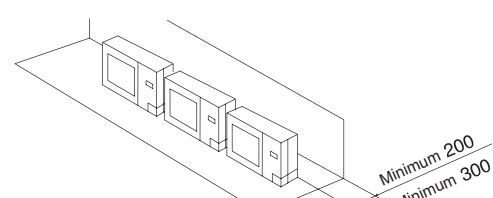
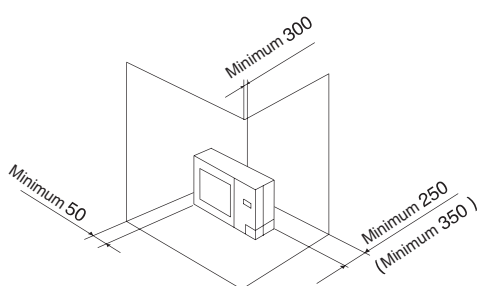
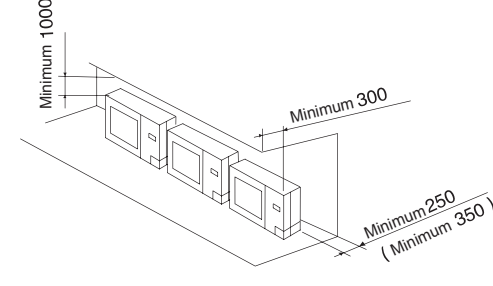
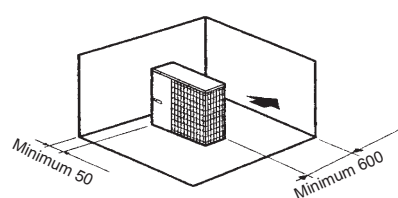
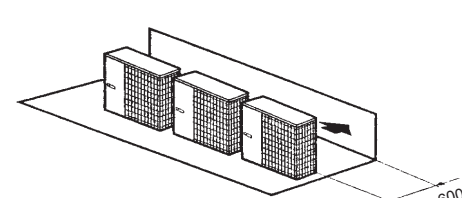
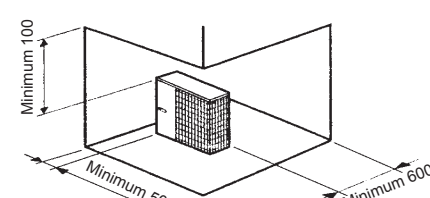
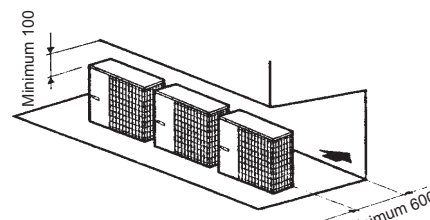
11. Outdoor Unit Installation

11.1 Select the best location

AHW-070UCSDP AHW-090UCSDP AHW-120UCSDP

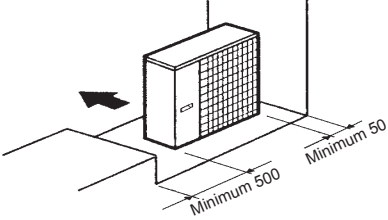
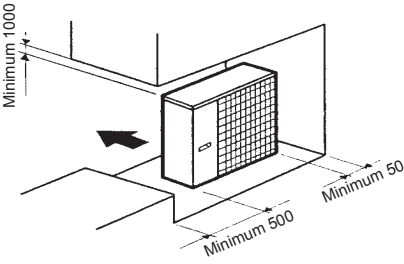
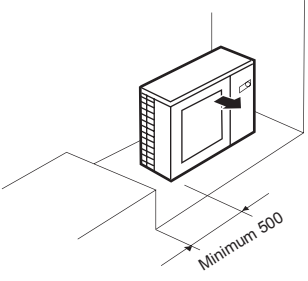
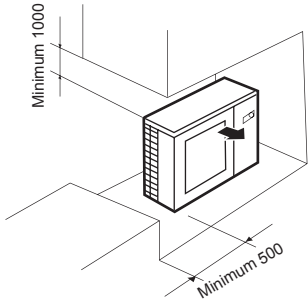
(mm)

Single Installation	 Upper Side is Open Keep a distance of 100mm between service cover and wall. The dimension in "()" is for the model 70 and 120.
Single Installation	 Keep a distance of 100mm between service cover and wall. The dimension in "()" is for the model 70 and 120. The dimension in "()" is for the model of 70 and 120.
Multiple Installation	 Upper Side is Open Keep a distance of more than 100mm between other units. The dimension in "()" is for the model of 70 and 120.

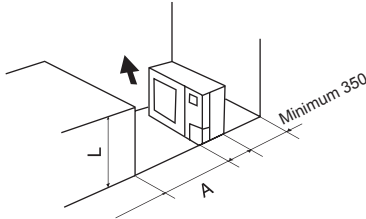
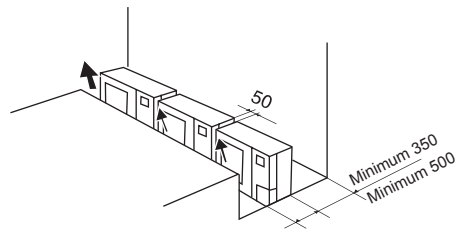
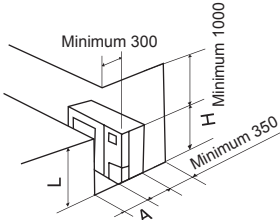
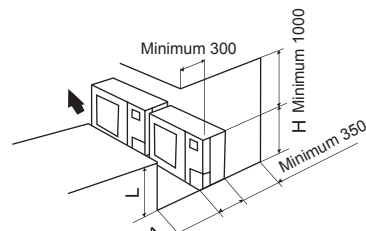
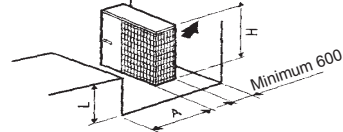
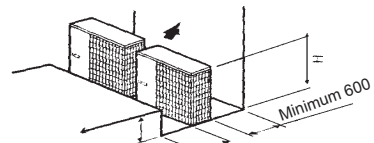
In case of obstacles on inlet and outlet side			
In case of no obstacles on suction side	No obstacles in above	Single Installation	Multiple Installation
		 The space of service panel is greater than 15mm, at least 200mm of space is required at the rear side if the left and right side of the outdoor unit are open.	 Keep a distance of more than 100mm between other units, and there are no obstacles on the left and right sides of the outdoor unit.
	Obstacles in above	Single Installation	Multiple Installation
		 At least 50mm on each side	 Keep a distance of more than 100mm between other units, and there are no obstacles on the left and right sides of the outdoor unit.
In case of no obstacles on outlet side	No obstacles in above	 At least 50mm on each side	 Keep a distance of more than 100mm between other units, and there are no obstacles on the left and right sides of the outdoor unit.
	Obstacles in above	 At least 50mm on each side	 Keep a distance of more than 100mm between other units, and there are no obstacles on the left and right sides of the outdoor unit.

Note: The dimension in "()" is for the model of 70 and 120.

Installation Space (1)

Obstacles on left and right sides	
No Obstacles in above	When installing one outdoor unit
	
Obstacles in above	 Install Wind Guard on outlet side
No Obstacles in above	
Obstacles in above	

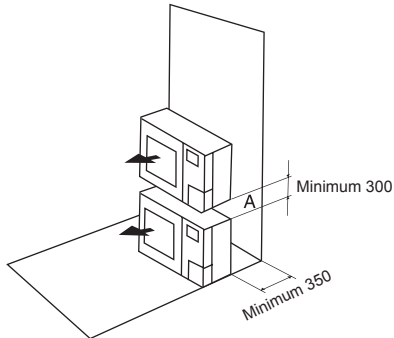
Installation Space (2)

Multiple Installation													
Type A Wall Front Wall	No Obstacles in Above	Single Installation	Installation multiple										
		 There shall not be any obstacle at the left and right sides of the outdoor unit. Check and make sure the use of air deflector.	 Ensure a distance of 100mm between outdoor units, and there are no obstacles at the left and right sides. Keep a distance of 500mm between the unit and the wall (at the rear of unit where sunlight can straightly shine at), check and make sure the use of air deflector.										
Obstacles in Above Wall	Obstacles in Above	 There shall not be any obstacle at the left and right sides of the outdoor unit. Check and make sure the use of air deflector.	 Ensure a distance of 50mm between outdoor units, and there are no obstacles at the left and right sides of the outdoor unit. Check and ensure the use of the air deflector.										
		Size Table of Model A <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>Minimum 600</td></tr><tr><td>$1/2H < L \leq H$</td><td>Minimum 1200</td></tr></table> If $L > H$, block up the unit and make $L < H$		L	A	$0 < L \leq 1/2H$	Minimum 600	$1/2H < L \leq H$	Minimum 1200				
L	A												
$0 < L \leq 1/2H$	Minimum 600												
$1/2H < L \leq H$	Minimum 1200												
Type B Wall Front Wall	No Obstacles in Above	 There shall not be any obstacle at the left and right sides of the outdoor unit. Check and make sure the use of air deflector.	 Ensure a distance of 100mm between outdoor units; Do not install 3 or more than 3 units at the left and right sides of the outdoor unit; And there shall not be any obstacles at the left and right side; Check and ensure the use of air deflector.										
		Size Table of Model A <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>Minimum 200</td></tr><tr><td>$1/2H < L \leq H$</td><td>Minimum 300</td></tr></table> If $L > H$, block up the unit and make $L < H$ <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>Minimum 200</td></tr><tr><td>$1/2H < L \leq H$</td><td>Minimum 350</td></tr></table> If $L > H$, block up the unit and make $L < H$		L	A	$0 < L \leq 1/2H$	Minimum 200	$1/2H < L \leq H$	Minimum 300	L	A	$0 < L \leq 1/2H$	Minimum 200
L	A												
$0 < L \leq 1/2H$	Minimum 200												
$1/2H < L \leq H$	Minimum 300												
L	A												
$0 < L \leq 1/2H$	Minimum 200												
$1/2H < L \leq H$	Minimum 350												

Installation Space (3)

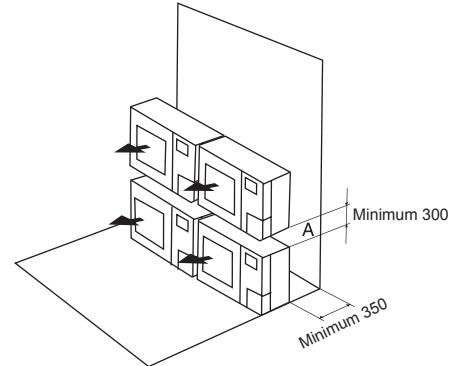
Install in the vertical direction (Maximum 2 Groups)

Single Vertical Installation

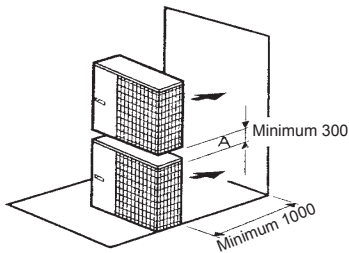


Fill space "A" to avoid intake and exhaust short circuit; do not make condensed water drip from the above unit.

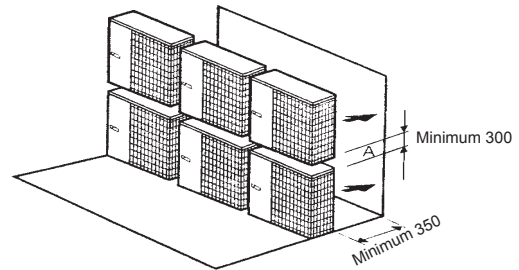
Multiple Vertical Installation



With a distance of more than 50mm between the units, do not install more than three outdoor units. There shall not be any obstacles at both sides of the unit; fill space "A" to avoid intake and exhaust short circuit; do not make condensed water drip from the above outdoor unit.



Fill space "A" to avoid intake and exhaust short circuit; do not make condensed water drip from the above unit.

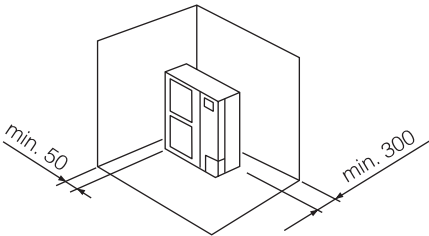
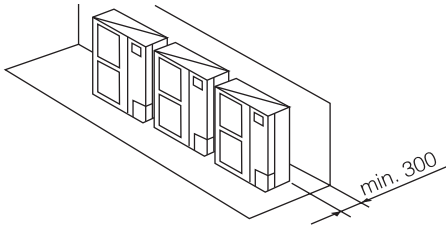
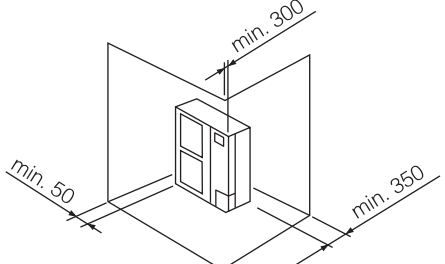
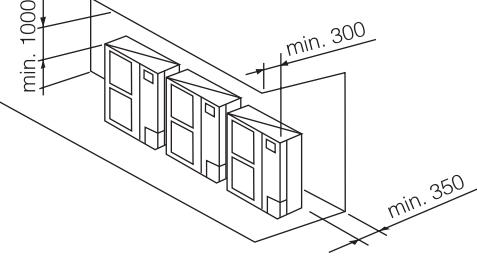
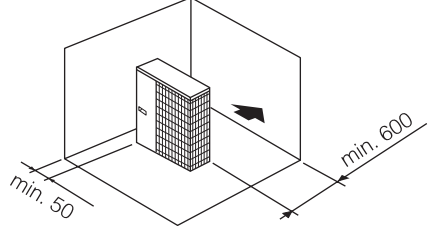
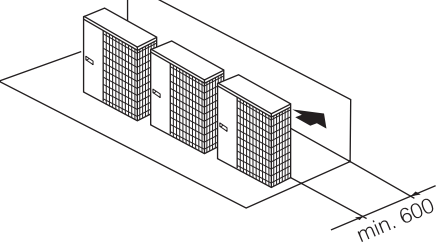
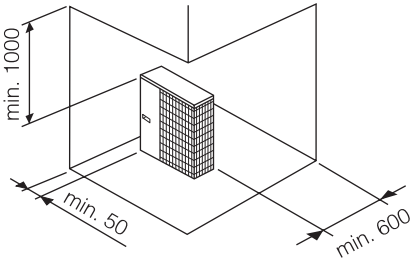
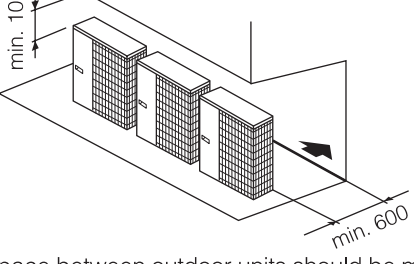


With a distance of more than 50mm between the units, do not install more than three outdoor units. There shall not be any obstacles at both sides of the unit; fill space "A" to avoid intake and exhaust short circuit; do not make condensed water drip from the above outdoor unit.

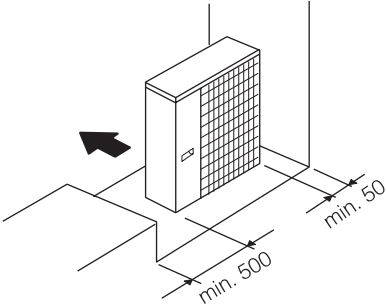
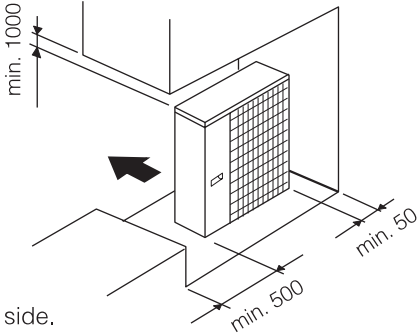
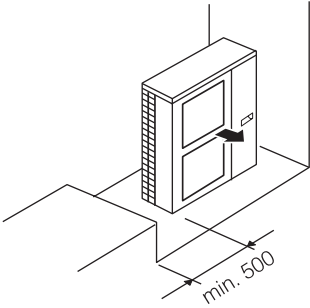
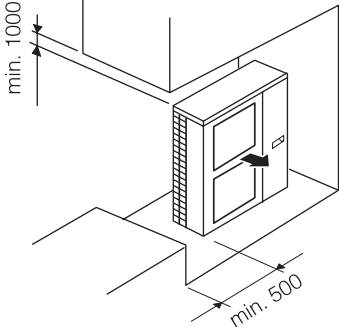
Installation Space (4)

There should be sufficient maintenance and service space for the installation of outdoor unit

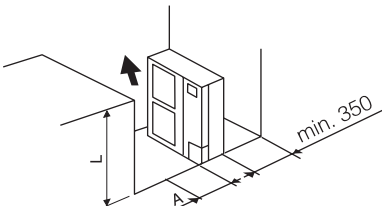
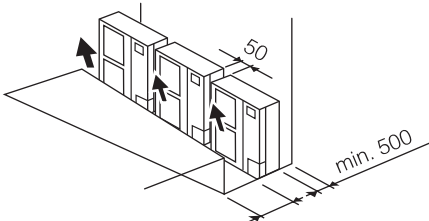
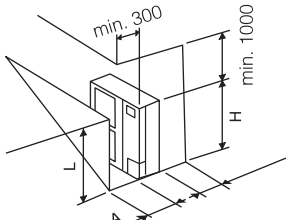
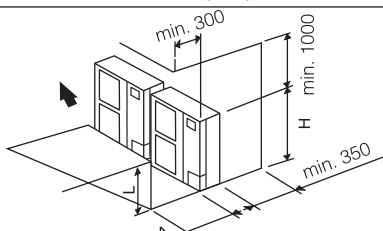
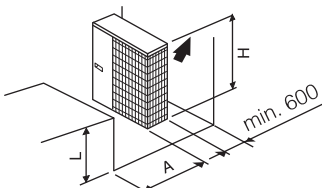
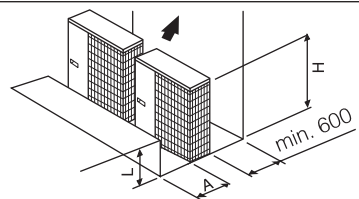
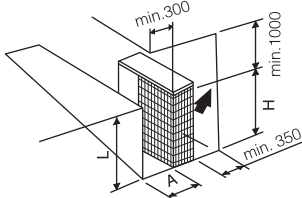
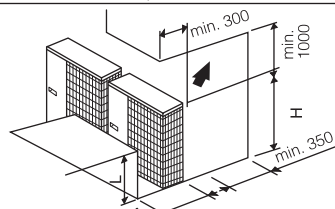
(mm)

Situation when there are barriers at air inlet and outlet sides			
Under the situation that there is no barrier at the air inlet side	There is no barrier at the upper part	One set is installed  The space from the maintenance panel should be more than 50mm. If the left and right sides of outdoor unit are open, the space of more than 300mm should be needed at back side.	Several sets are installed  The space between outdoor units should be more than 50mm. There should be no barrier at left and right sides of outdoor unit.
		 More than 50mm from each side.	 The space between outdoor units should be more than 50mm. There should be no barrier at left and right sides of outdoor unit.
	There is no barrier at the air outlet side	 More than 50mm from each side.	 The space between outdoor units should be more than 50mm. There should be no barrier at left and right sides of outdoor unit.
		 More than 50mm from each side.	 The space between outdoor units should be more than 50mm. There should be no barrier at left and right sides of outdoor unit.

Installation space (1)

In case of barriers at left and right sides	
If there is no barrier at the upper part	If one outdoor unit is installed
	
If there is barrier at the upper part	 Put air fluid director at air outlet side.
If there is no barrier at the upper part	
If there is barrier at the upper part	

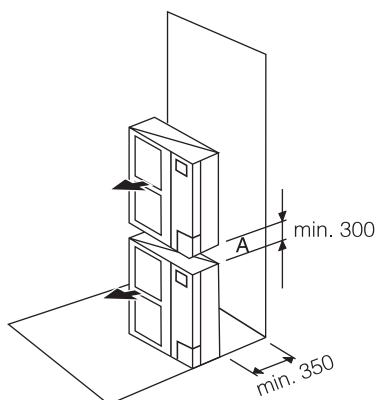
Installation space (2)

Several units are installed														
AType Wall Forward Wall	If there is no barrier at the upper part	In case of only one unit installed  There should be no barriers at left and right sides of outdoor unit. Check and confirm that the air fluid director is used.	Several units are installed  The distance of 50mm between the outdoor units should be ensured; there should be no barriers at left and right sides of outdoor; the distance from unit to wall is 500mm (the rear of unit can be directly exposed under sunshine)											
		If there is barrier at the upper part  There should be no barriers at left and right sides of outdoor unit. Check and confirm that the air fluid director is used.	 The distance of 50mm between the outdoor units should be ensured. There should be no barriers at left and right sides of outdoor unit. Check and confirm that the air fluid director is used.											
	A dimension table <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>min. 600</td></tr><tr><td>$1/2H < L \leq H$</td><td>min. 1200</td></tr></table>		L	A	$0 < L \leq 1/2H$	min. 600	$1/2H < L \leq H$	min. 1200	If $L > H$, the unit should be padded to make $L < H$.					
	L	A												
$0 < L \leq 1/2H$	min. 600													
$1/2H < L \leq H$	min. 1200													
BType Wall Forward Wall	If there is no barrier at the upper part	 There should be no barriers at left and right sides of outdoor unit. Check and confirm that the air fluid director is used.	 The distance of 50mm between the outdoor units should be ensured. Three or more units can not be installed at left and right sides of outdoor unit and there should be no barrier at left and right sides of unit. Check and confirm that the air fluid director is used.											
		A dimension table <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>min. 200</td></tr><tr><td>$1/2H < L \leq H$</td><td>min. 300</td></tr></table>	L	A	$0 < L \leq 1/2H$	min. 200	$1/2H < L \leq H$	min. 300	A dimension table <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>min. 200</td></tr><tr><td>$1/2H < L \leq H$</td><td>min. 350</td></tr></table>	L	A	$0 < L \leq 1/2H$	min. 200	$1/2H < L \leq H$
	L	A												
	$0 < L \leq 1/2H$	min. 200												
$1/2H < L \leq H$	min. 300													
L	A													
$0 < L \leq 1/2H$	min. 200													
$1/2H < L \leq H$	min. 350													
If $L > H$, the unit should be padded to make $L < H$.		If $L > H$, the unit should be padded to make $L < H$.												
If there is barrier at the upper part	 There should be no barriers at left and right sides of outdoor unit. Check and confirm that the air fluid director is used.	 The distance of 50mm between the outdoor units should be ensured. Three or more units can not be installed at left and right sides of outdoor unit and there should be no barrier at left and right sides of unit. Check and confirm that the air fluid director is used.												
	A dimension table <table><tr><th>L</th><th>A</th></tr><tr><td>$0 < L \leq 1/2H$</td><td>min. 600</td></tr><tr><td>$1/2H < L \leq H$</td><td>min. 1200</td></tr></table>	L	A	$0 < L \leq 1/2H$	min. 600	$1/2H < L \leq H$	min. 1200	If $L > H$, the unit should be padded to make $L < H$.						
L	A													
$0 < L \leq 1/2H$	min. 600													
$1/2H < L \leq H$	min. 1200													

Installation space (3)

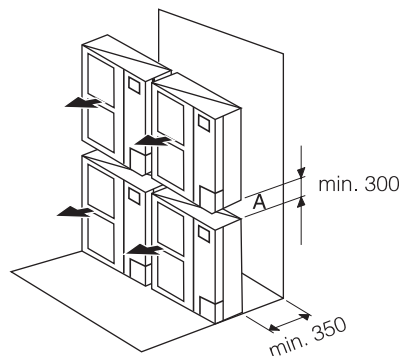
Installation at vertical direction (two sets in maximum)

One is vertically installed

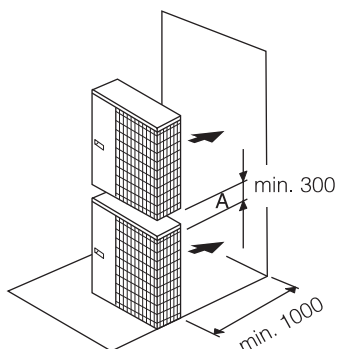


Padding the "A" space to avoid the air inlet and outlet short-circuit, do not make the condensation water drop from upper outdoor unit.

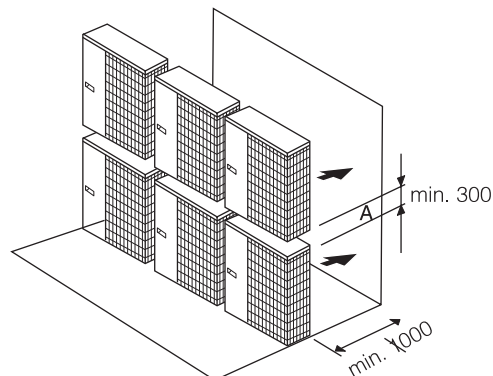
Several sets are vertically installed



If the space between outdoor units is more than 50mm, the number of outdoor unit can not exceed three. There should be no barrier at both sides of machine unit. Padding the "A" space to avoid the air inlet and outlet short-circuit; do not make the condensation water drop from upper outdoor unit.



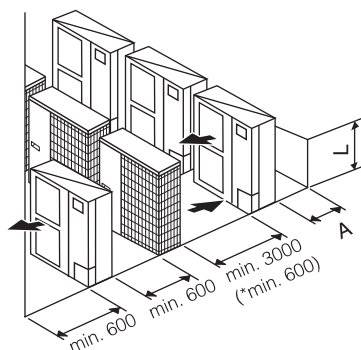
Padding the "A" space to avoid the air inlet and outlet short-circuit, do not make the condensation water drop from upper outdoor unit.



In case of that the space between outdoor units is more than 50mm, the number of outdoor unit can not exceed three. There should be no barrier at both sides of machine unit. Padding the "A" space to avoid the air inlet and outlet short-circuit; do not make the condensation water drop from upper outdoor unit.

Installation space (4)

Several units are installed simultaneously



The side distance of machine should be more than 50mm

Dimensions are as follows:

L	A
$0 < L \leq 1/2H$	min. 200
$1/2H < L \leq H$	min. 300

If $L > H$, the unit should be padded to make $L < H$.

Ensure the converter is used if the dimension is marked with "x"

11.2 Transportation and Handling

Transport the product as close to the installation location as practical before unpacking.



Do not put any material on the product.
Apply two lifting wires onto the outdoor unit when lifting it by crane.

● Lifting method

When lifting the unit, ensure a balance of the unit, check safety and lift it up smoothly.

- (1) Do not remove any packing materials.
- (2) Lift the unit under packing condition with two (2) ropes, as shown in Fig. below

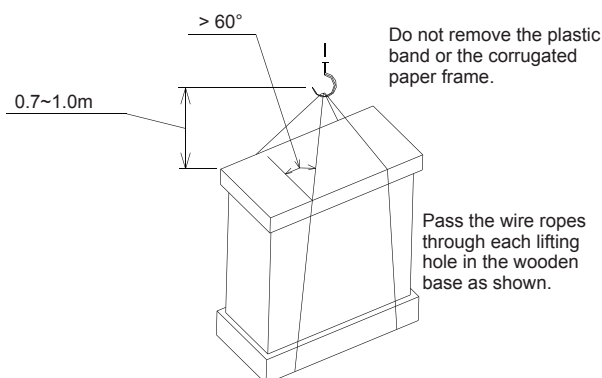


Fig. Lifting Work for Transportation



- **Lift the outdoor unit in its factory packaging with 2 wire ropes.**
- **For safety reasons ensure that the outdoor unit is lifted smoothly and does not lean.**
- **Do not attach lifting equipment to the plastic band or the corrugated paper frame.**
- **Ensure the exterior of the unit is adequately protected with cloth or paper.**



Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

- **When Using Handles**
 When manually lifting the unit using the handles, pay attention to the following points.

- (1) Do not remove the wooden base from outdoor unit.
- (2) To prevent the unit from overturning, pay attention to the center of gravity as shown in the below figure.
- (3) Two or more personnel should be used to move the unit.

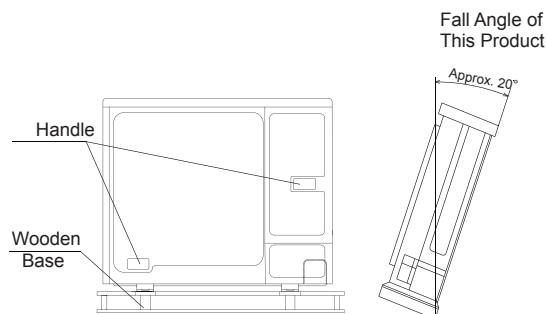


Fig. Handling of Outdoor unit

Model(KBtu/h)	Unit Gross weight (kg)
AHW-070UCSDP	82
AHW-090UCSDP	88.5
AHW-120UCSDP	88.5
AHW-140/160UCSEP	123

11.3 Factory-Supplied Accessories

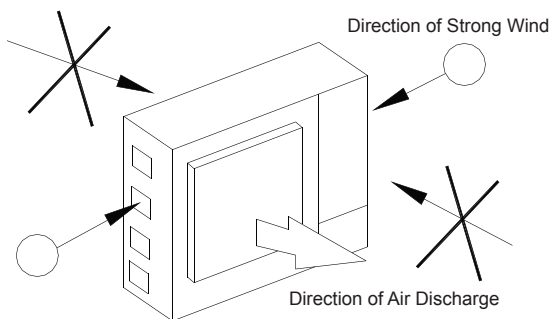
Accessory	Q'ty	Recommend
Shim	4	
Magnetic Ring	1	
Screw	2	
Tier	1	
Clamp	1	

NOTE

If any of these accessories are not packed with the unit, please contact your contractor.

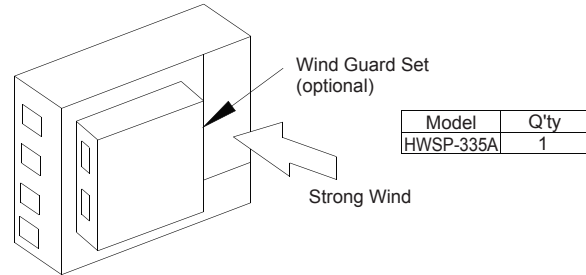
11.4 Initial Check

- Install the outdoor unit where good ventilation is available, and where it is dry.
- Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding vegetation.
The operating sound at the rear or right/left sides is higher than the value in the catalog at the front side.
- Check to ensure that the foundation is flat, level and sufficiently strong.
- Do not install the outdoor unit where there is a high level of oil mist, salty air or harmful gases such as sulphur.
- Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
- Install the outdoor unit as far as practical, being at least 3 meters from the electromagnetic wave radiator.
- When installing the outdoor unit in snowcovered areas, mount the field-supplied hoods at the discharge side of the outdoor unit and the inlet side of the heat exchanger.
- Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
- Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
- Install the outdoor unit in a space with limited access to general public.
- Do not install the outdoor unit in a space where a seasonal wind directly blows to the outdoor heat exchanger or a wind from a building space directly blows to the outdoor fan.

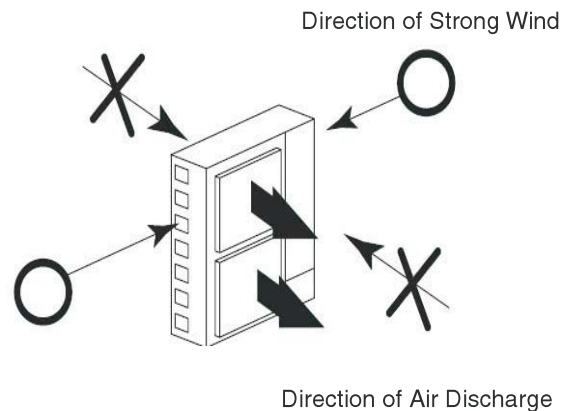
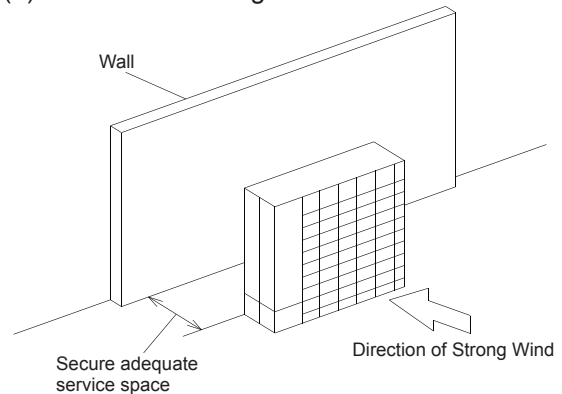


- In case of installation in the open spaces unavoidably where there is no buildings or surrounding structures, adopt the wind guard set or install near the wall to avoid facing the wind directly. Ensure that the service space should be secured.

(1) Using Wind Guard

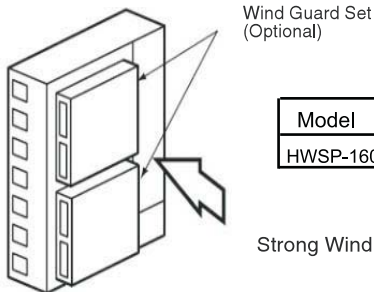


(2) A Wall to Guard Against Wind



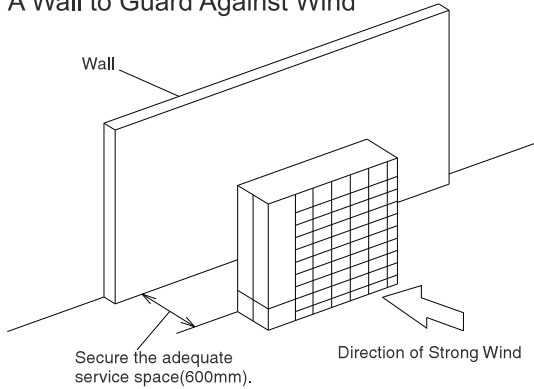
- In case of installation in the open spaces unavoidably where there is no buildings or surrounding structures, adopt the wind guard set or install near the wall to avoid facing the wind directly. Ensure that the service space should be secured.

(3) Using Wind Guard



Model	Quantity
HWSP-160A	1

(4) A Wall to Guard Against Wind



NOTE:

If the extreme strong wind blows directly against the air discharge portion, the fan may rotate reversely and be damaged.



CAUTION

Aluminum fins have very sharp edges. Pay attention to the fins to avoid any injury.

NOTE

Install the outdoor unit on a roof or in an area where people except service engineers can not touch the outdoor unit.

11.5 Installation Work

AHW - 70~120UCSDP

(1) Secure the outdoor unit with the anchor bolts.

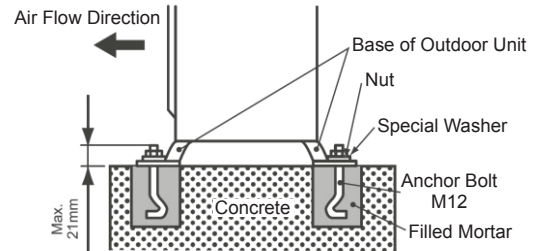


Fig. Installation of Anchor Bolts

Fix the outdoor unit to the anchor bolts by special washer of factory-supplied accessories.

(2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. below regarding the location of fixing holes.

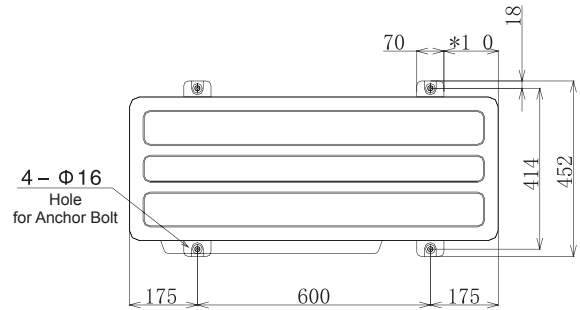


Fig. Position of Anchor Bolts

NOTE:

When the mark * dimension is secured, piping work from bottom side is easy without interference of foundation.

(3) Example of fixing outdoor unit by anchor bolts.

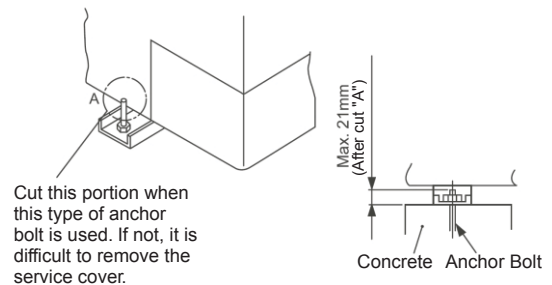


Fig.Fixing Example

- (4) Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.

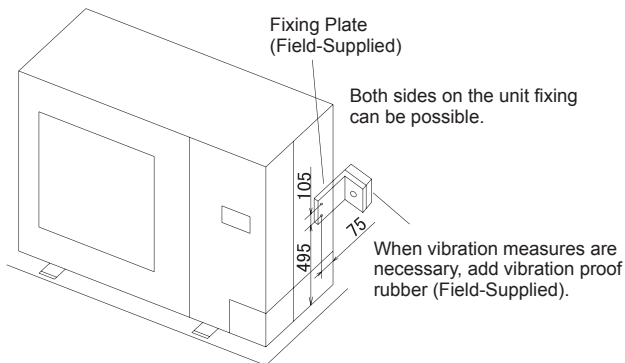
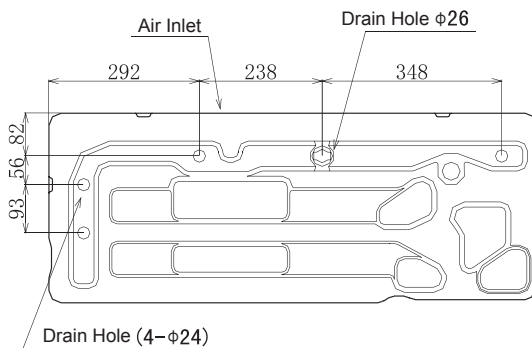


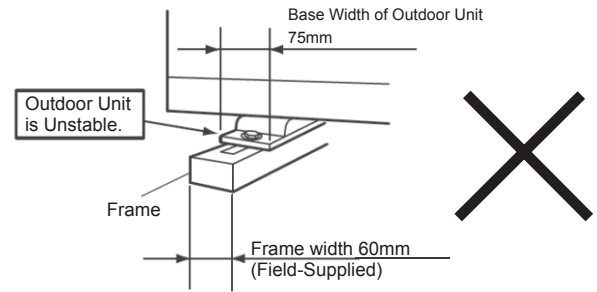
Fig. Additional Fixing Arrangement

- (5) When installing the unit on a roof or a veranda, drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery.
- (6) In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DC-01Q:Optional Parts)

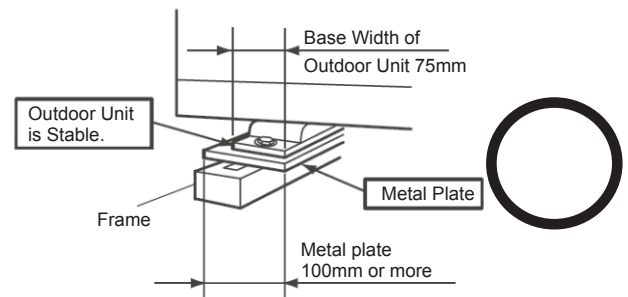


- (7) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way.
- When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown in Fig. below.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)

Plate Thickness: 4.5T



Fig. Frame and Base Installation

AHW - 140~160UCSEP

- (1) Secure the outdoor unit with the anchor bolts.

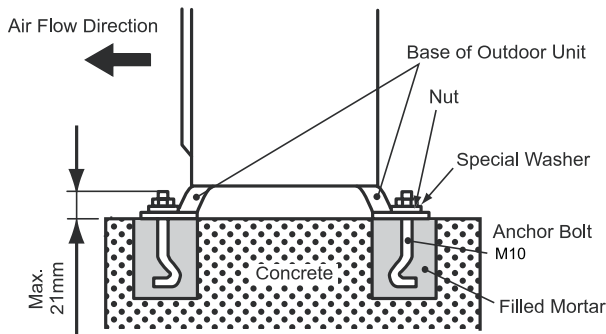


Fig. Installation of Anchor Bolts

Fix the outdoor unit to the anchor bolts by special washer of factory-supplied accessory.

- (2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig below

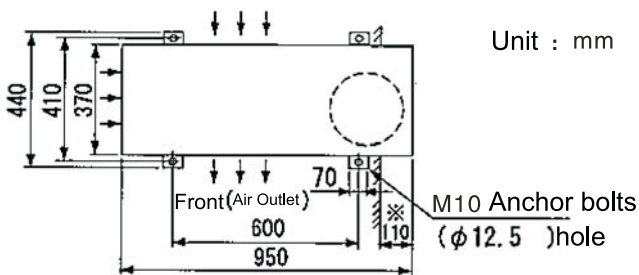
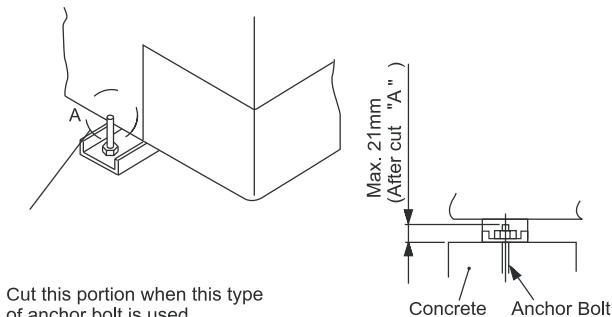


Fig. Position of Anchor Bolts

NOTE:

When the mark * dimension is secured, piping work from bottom side is easy without interference of foundation.

- (3) Example of fixing outdoor unit by anchor bolts.



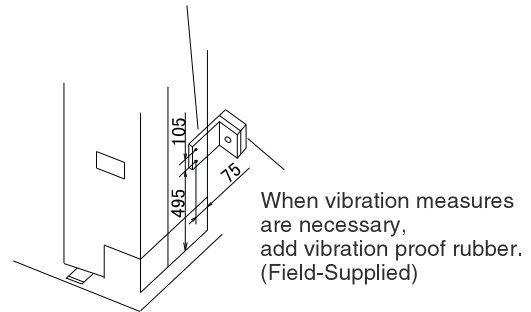
Cut this portion when this type of anchor bolt is used. If not, it is difficult to remove the service cover.

Fig. Fixing Example

- (4) Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.

Fixing Plate
(Field-Supplied)

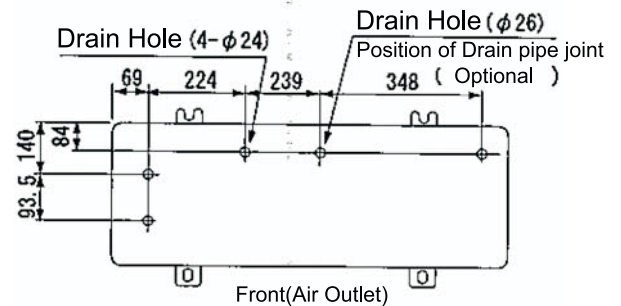
Both sides on the unit fixing can be possible.



Additional Fixing Arrangement

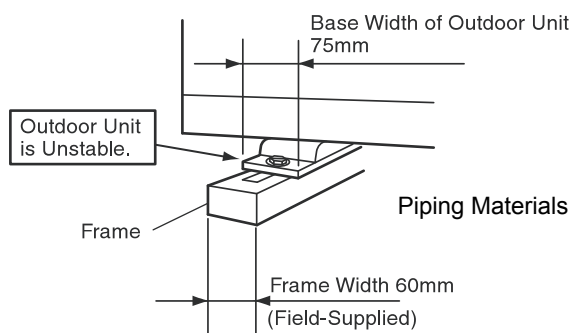
- (5) When installing the unit on a roof or a veranda, drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery.

- (6) In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DC-01Q :Optional Parts) .

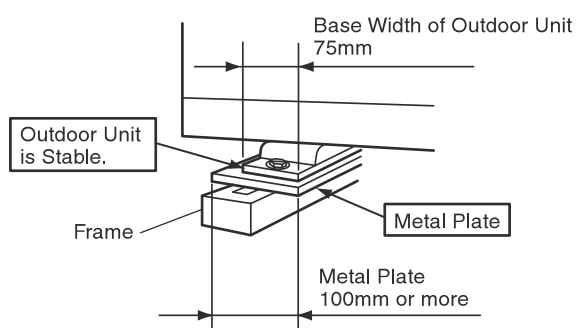


- (7) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way. When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown below.

Incorrect

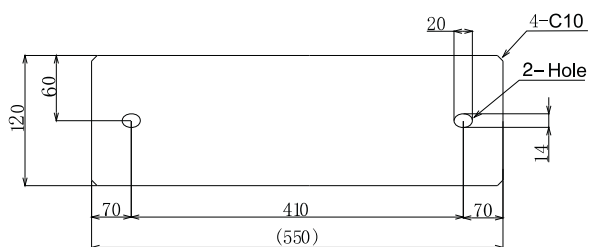


Correct



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)
Plate Thickness: 4.5T



Frame and Base Installation

CAUTION

- Cap the end of the pipe when the pipe is to be inserted through a hole.
- Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.

11.6 Refrigerant Piping Work

- (1) Ensure that the directions for refrigerant piping work according to the tables.

Table Limitation of Outdoor Unit

Diameter Model	Outer Diameter of Pipe (mm)	
	Gas	Liquid
AHW-070/090/120 UCSDP	φ 15.88	φ 9.53
AHW-140/160 UCSEP		

Table Indoor Unit Pipe Model

Model	Gas Pipe	Liquid Pipe
AHM-070/160UXCSAPA3	φ 15.88	φ 9.53

(2) Additional Refrigerant Charge R410A

Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

Table W₀ Outdoor Unit Ref.charge before shipment

Outdoor Unit Model	W ₀ (kg)
AHW-070UCSDP	2.30
AHW-090/120UCSDP	3.05
AHW-140/160UCSEP	4.90

- Calculate charge refrigerant quantity by liquid pipe length, charge it to refrigerant cycle.

AHW-070/090/120 UCSDP

W₁ (kg): (φ 9.53 liquid length-5 m) × 0.05

W = W₀ + W₁

AHW-140/160UCSEP

W₁ (kg): (φ 9.53 liquid length m) × 0.03

W = W₀ + W₁

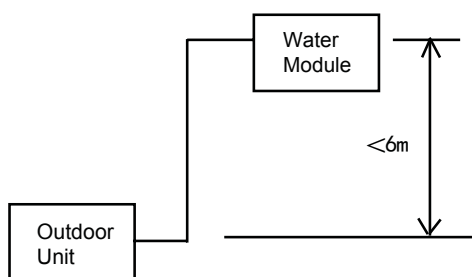
- Inform local service the quantity of charging refrigerant after finish charging.

(3) Pipes running the length and height difference Table below the length of the refrigerant pipe running

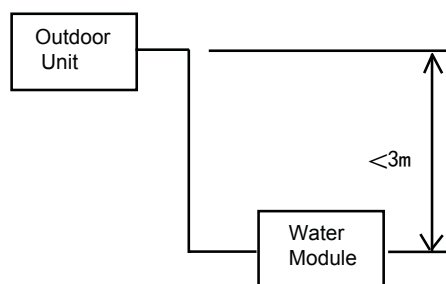
Model \ Project	Pipe length	
	Actual length	Equivalent length
AHW-070/090/120 UCSDP	$\leq 30\text{m}$	$\leq 33\text{m}$
AHW-140/160UCSEP	$\leq 25\text{m}$	$\leq 35\text{m}$

Table outdoor unit and water module allows the height difference

Outdoor unit location	Maximum height difference
Outdoor unit is lower than indoor unit	6m
Outdoor unit is higher than indoor unit	3m



Outdoor unit is lower than indoor unit



Outdoor unit is higher than indoor unit

11.7 Pipe Connection

The pipes have four connection directions.

- (1) Make sure that the stop valve has been closed.
- (2) Prepare elbows and piping on site, and connect through braze welding according to the operation requirements.
- (3) For pipe connection at stop valve, tighten the nut cap with two wrenches.

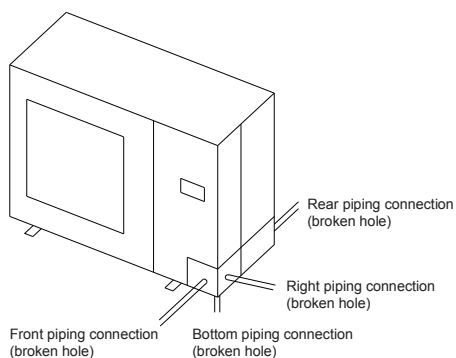


Fig. Piping Connection

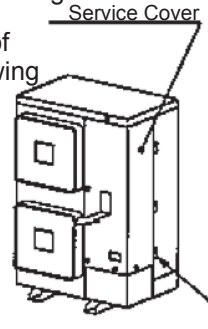
Note Item for Removing Service Cover

Main Points for Removing Service Cover

① Remove the bolts of service cover following right Fig.

– Note –

Press the service cover when remove the bolts. It is possible for service cover to slide down.



② Press the service cover at front, then remove it down slowly.

Fig. Remove Service Cover

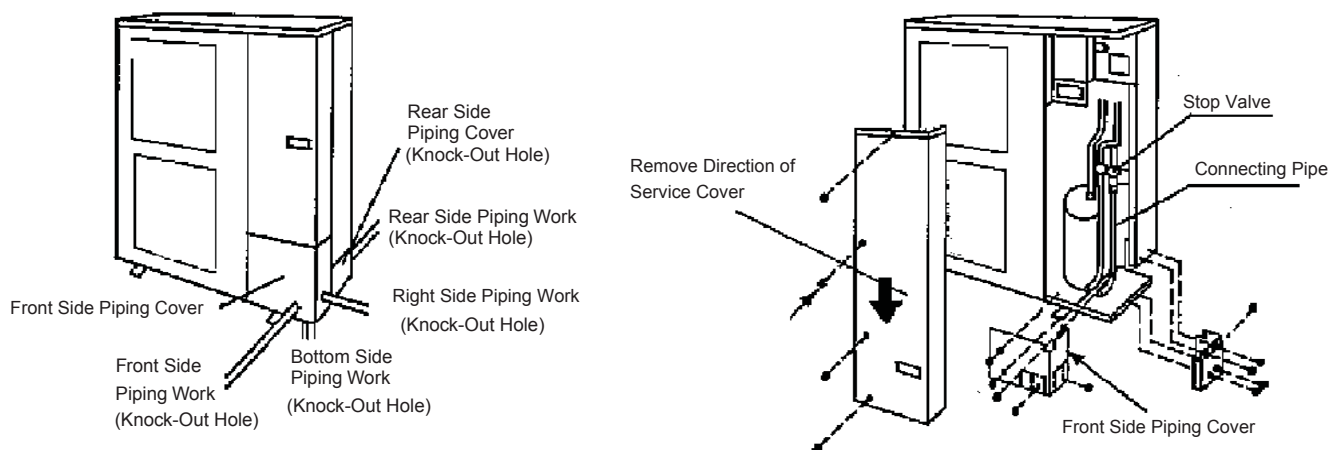
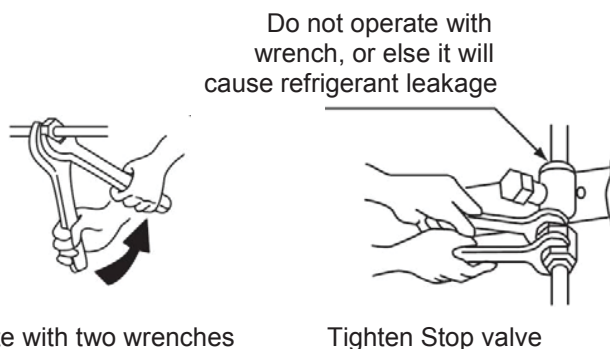


Fig. Piping Direction

Table Nut Cap Tightening Torque

Piping diameter	Tightening torque
Φ 6.35 (1/4)	20 N·m (2kgf·m)
Φ 9.53 (3/8)	40 N·m (4kgf·m)
Φ 12.7 (1/2)	60 N·m (6kgf·m)
Φ 15.88 (5/8)	80 N·m (8kgf·m)



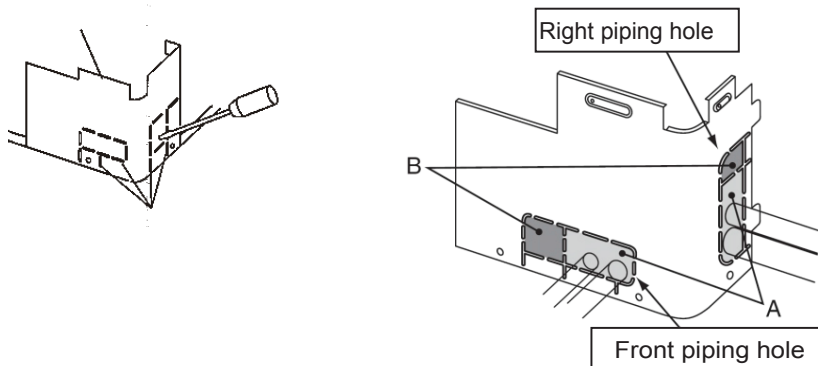
Operate with two wrenches

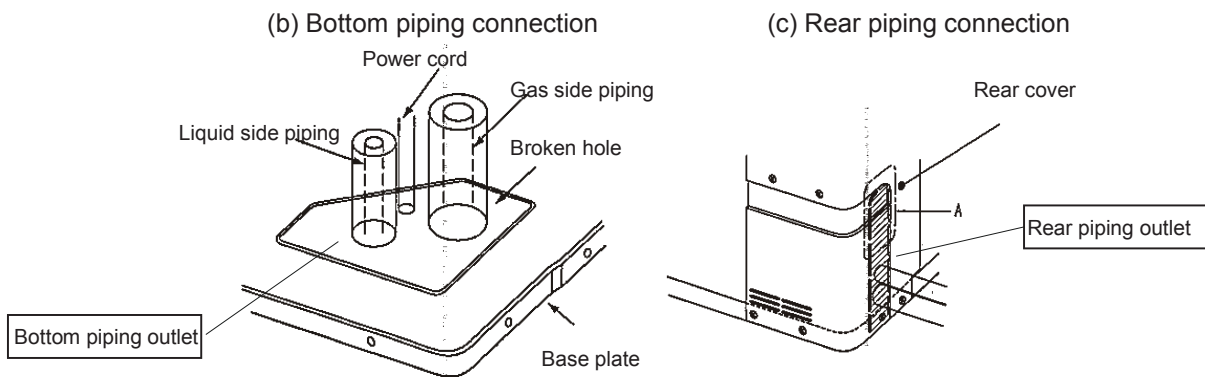
Tighten Stop valve

(4) As shown in Fig. the piping can be connected in four directions through the broken holes in front/rear piping cover or the bottom plate. Remove the piping cover from the outdoor unit, knock off the holes along the slotting line with screwdriver and hammer, then trim the edge, and mount insulation sleeve (site available) to protect the piping and wiring.

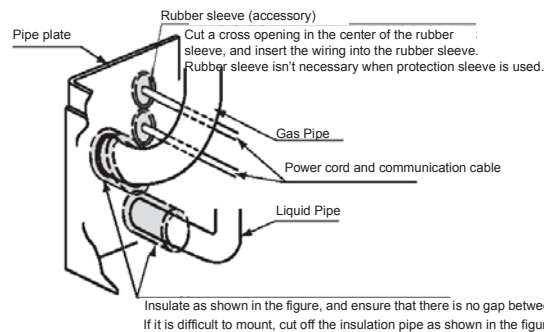
Front piping cover

(a) Front and right piping connection





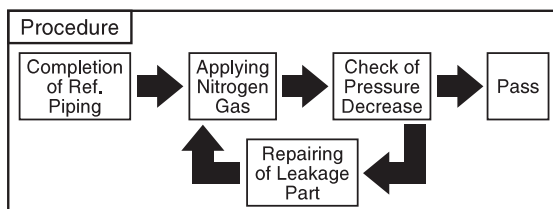
(5) To prevent water entering the unit and damaging the electrical components, mount rubber sleeve (site available) and seal completely (front piping is shown below) when mounting the piping cover.



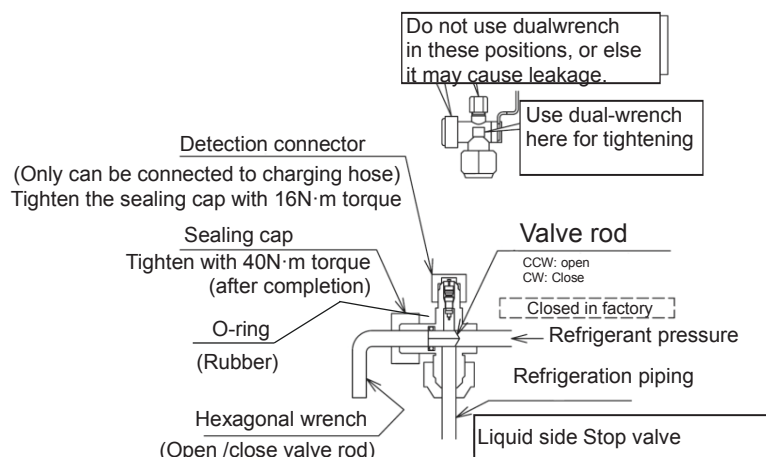
Example of Unit Interior for Front Piping Connection

11.8 Air Tight Test

- (1) The stop valve had been closed in the factory; confirm that before mounting.
- (2) Connect the refrigerant pipes (prepared on site) of indoor unit and outdoor unit. Set up a support every certain length to avoid refrigerant pipes contacting the wall or ceiling (if in contact, it will make noise due to pipe vibration; also pay special attention to short piping).
- (3) Before tightening nut cap and piping, apply small amount of refrigeration oil. Use two wrenches to tighten the nutcap. Refrigeration oil is available on site. refrigeration oil model refer to section 2.



(4) Stop valve



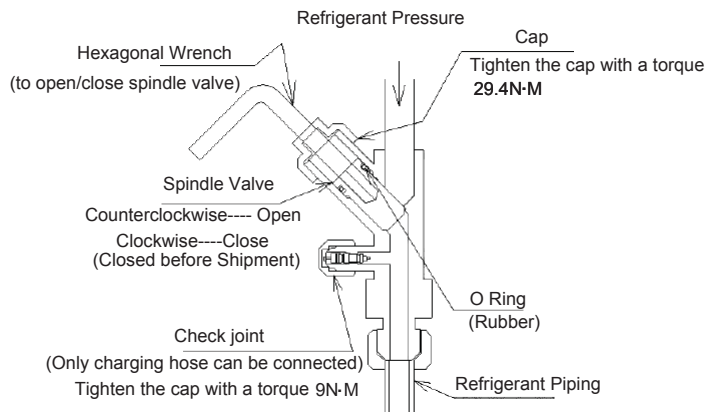
Valve rod opening torque (N·m)

Gas side	Liquid side
9~11	7~9

Hexagonal wrench size (mm)

Gas side	Liquid side
5	4

<Gas Valve>



Hexagonal Wrench Size (mm)

Gas	Liquid
8	4

Spindle Valve Torque (N·m)

Gas	Liquid
11~14	7~9



Note

- When the valve is nearly fully open, do not apply too much force (< 5 N·m), as the stop valve doesn't have rear seat structure.
 - Do not release the retaining ring, or else the valve rod will eject, which is very dangerous.
- (5) Connect the regulating valve and vacuum pump or nitrogen tank to the detection connectors of gas valve and liquid valve of outdoor unit with charging conduit; carry out airtight test; do not open the stop valve; nitrogen pressure for the test is 4.15MPa
- (6) Check if the nut cap and braze welding position leak with leakage detecting instrument or foam
- (7) Release the nitrogen after airtight test.

Note

- After connect the piping and nut cap and before carrying out airtight test, open the sealing cap of the valve rod of stop valve and confirm that the valve has been closed tightly (CW).
- Tighten the nut cap with the above-mentioned torque; excessive torque may cause refrigerant leakage from the valve rod of stop valve.
- Close the valve rod before airtight test.

Note:

Detection connectors are used to connect charging hose rather than the nut cap. However, it doesn't matter if there is slight leakage sound when the sealing caps of detection connector and valve rod are open, and it has no impact on unit performance.

Piping diameter	Tightening torque
Φ 6.35 (1/4)	14~18 N·m
Φ 9.53 (3/8)	34~42 N·m
Φ 12.7 (1/2)	49~61 N·m
Φ 15.88 (5/8)	68~82 N·m

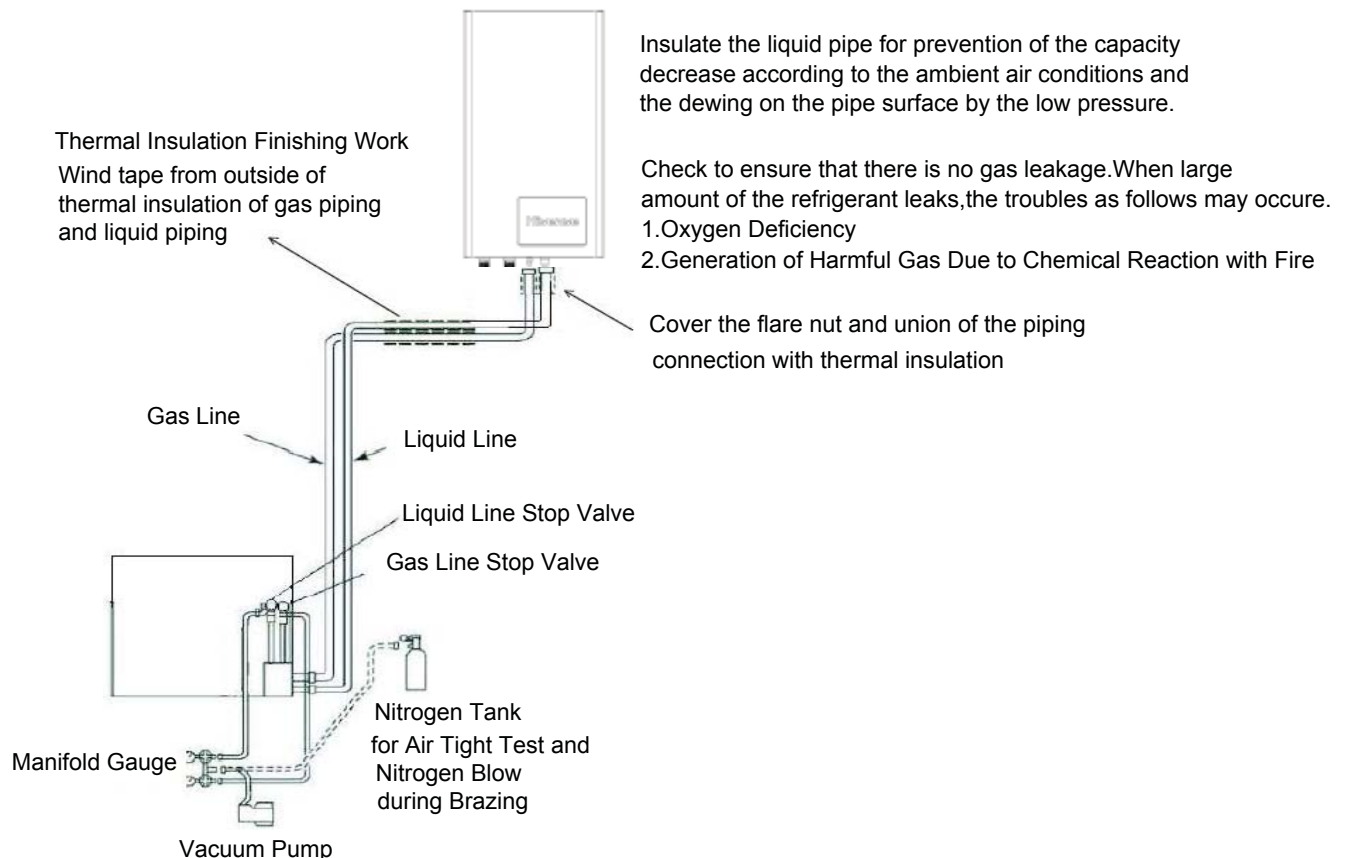
11.9 Vacuuming and Charging Refrigerant

(1) Connect the regulating valve to detection connector. Vacuum for 1~2 hours until the vacuum degree reaches at least 756mmHg.

After vacuuming, close the regulating valve, stop vacuuming and maintain 1 hour. Make sure that the pressure of the regulating valve doesn't rise.

Note:

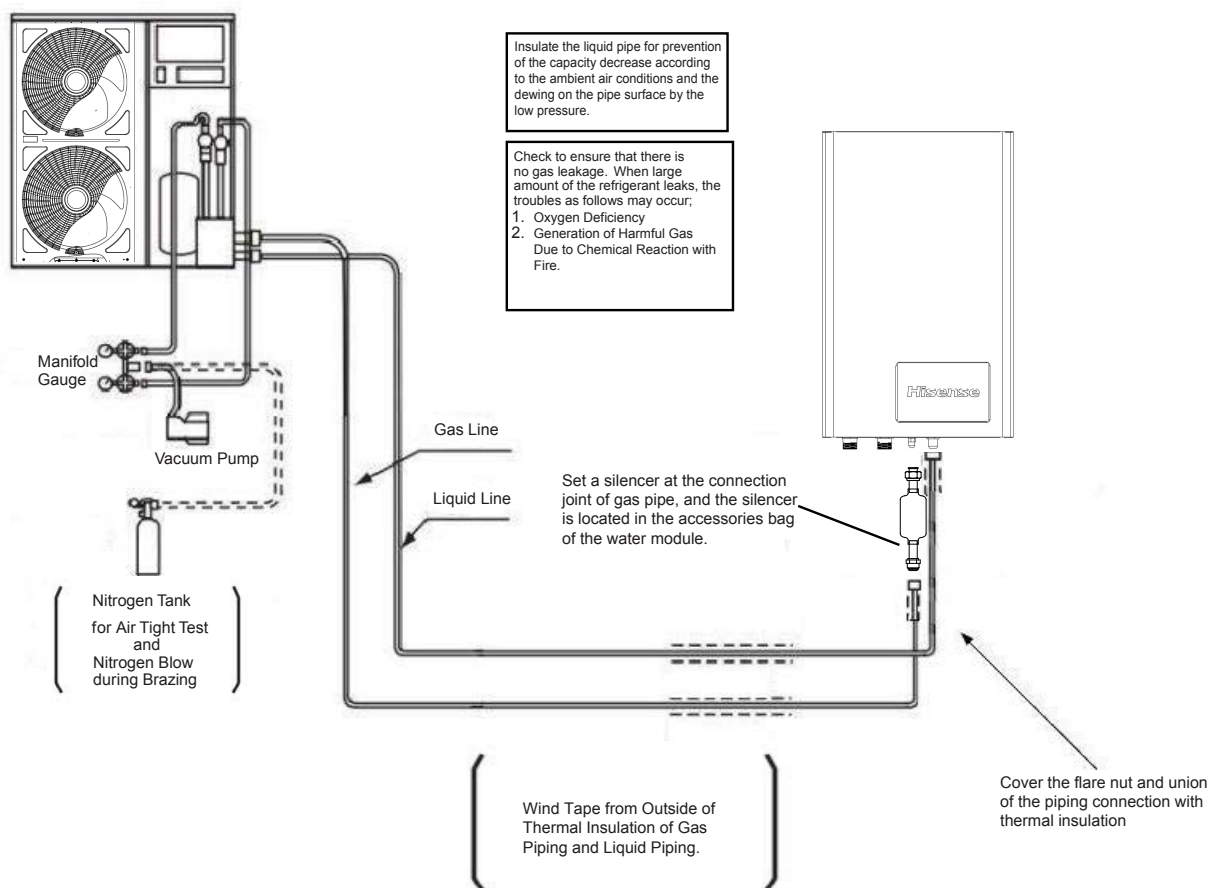
1. Use tools and instruments dedicated for new refrigerant (R410A) in places that contact refrigerant directly.
2. If the vacuum degree can't reach 756mmHg, there may be leakage. Check for air leakage again. If no leakage is found, then vacuum for 1~2 hours again.
- (2) Connect the regulating valve and liquid charging tank to the detection connector of liquid valve.
- (3) After fully opening the gas valve and exhaust valve, slightly open the liquid valve.
- (4) Open the regulating valve and charge refrigerant (in liquid state).
- (5) Run in refrigeration state, and charge refrigerant for specified quantity.
- (6) Confirm the refrigerant charging quantity with weight graph. Excessive or insufficient refrigerant will cause serious damage to the units.
- (7) Fully open the liquid valve after charging the refrigerant.



⚠ CAUTION

- At the test run, fully open the spindle. If not fully opened, the devices will be damaged.
- An excess or a shortage of refrigerant is the main cause of trouble to the units.
Charge the correct refrigerant quantity according to the description of label at the inside of service cover.
- Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.

Never use the refrigerant charged in the outdoor unit for air purging.
Insufficient refrigerant will lead to failure.



Note

- The valve should be fully open for commissioning, or else it may damage the device
- Excessive and insufficient refrigerant is a main cause of unit failure. Please strictly follow the requirement on standard charging quantity of refrigerant.
- Check for refrigerant leakage carefully. Large leakage of refrigerant will cause dyspnea, and will produce harmful gases if there is open flame in the room.

1. Maximum permissible concentration of HFC gas R410A

R410A refrigerant is incombustible nontoxic gas. However, if there is leakage and refrigerant enters the room, it may cause asphyxia. According to air-conditioning device standard (KHKS 0010) (High Pressure Gas Safety Institute of Japan), the maximum permissible concentration of R410A in air is 0.3kg/m^3 . If there is any leakage, it is required to take effective measures to keep R410A concentration in air lower than 0.3kg/m^3 .

2. Calculation of refrigerant concentration

- (1) Calculate the total quantity of refrigerant (kg) (including the charging quantity of all connected indoor units)
- (2) Calculate the volume V (m^3) of each relevant room
- (3) Calculate the refrigerant concentration C (kg/m^3) in the room with the following formula

R: Total quantity of refrigerant (kg)

V: Room volume (m^3)

C: Refrigerant concentration ≤ 0.3 (kg/m^3)

If there are any special regulations, follow local requirements.

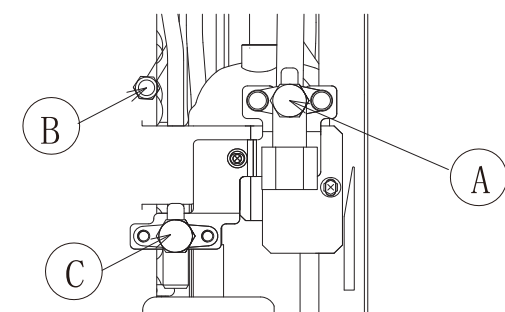
11.10 Pressure Measurement at Detection Connectors

As shown below, the pressure is measured at the detection connector (A) of gas side Stop valve and the detection connector (C) of liquid side Stop valve. Meanwhile, as the running modes are different, the high pressure side and low pressure side will change; the pressure gauge should be connected according to the table below.

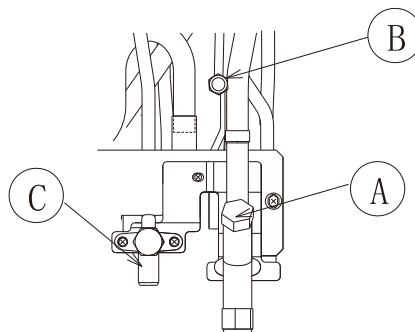
	Cooling	Heating
Gas side Stop valve detection connector "A"	Low pressure	High pressure
Piping detection connector "B"	High pressure	Low pressure
Liquid side Stop valve detection connector "C"	For vacuum pump connection and refrigerant charging	

Note:

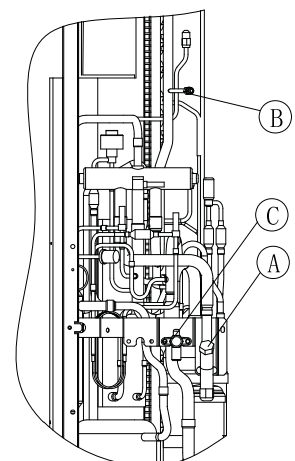
When removing the charging hose, do not spill refrigerant or refrigerator oil on electrical components.



<Outdoor unit - AHW -70UCSDP>



<Outdoor unit - AHW -90~120UCSDP>



<Outdoor unit - AHW-- 160UCSEP>

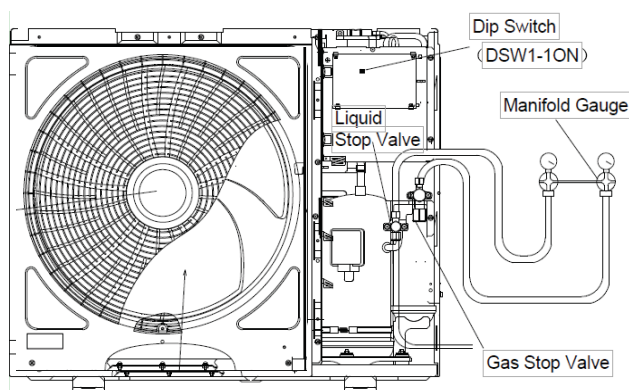
Figure: Positions of Detection Connectors

11.11 Collecting Refrigerant

AHW-070/090/120UCSDP

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows.

- (1) Attach the manifold gauge to the gas stop valve and the liquid stop valve.
- (2) Turn ON the power source.
- (3) Set the DSW1-1 pin of the outdoor unit PCB at the "ON" side for cooling operation. Close the liquid stop valve and collect the refrigerant.
- (4) When the pressure at lower pressure side (gas stop valve) indicates -0.01MPa (684mmHg), perform the following procedures immediately.
 - * Close the gas stop valve.
 - * Set the DSW1-1 pin at the "OFF" side. (To stop the unit operation.)
- (5) Turn OFF the power source.



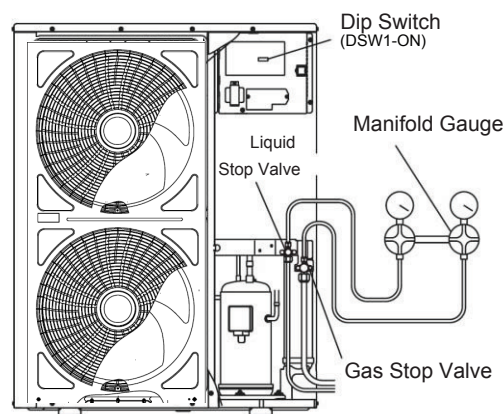
CAUTION

Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01MPa. If the pressure is lower than -0.01MPa, the compressor may be faulty.

AHW-140/160UCSEP

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows.

- (1) Attach the manifold gauge to the gas stop valve and the liquid stop valve.
- (2) Turn ON the power source.
- (3) Set the DSW1-1 pin of the outdoor unit PCB at the "ON" side for cooling operation. Close the liquid stop valve and collect the refrigerant.
- (4) When the pressure at lower pressure side (gas stop valve) indicates -0.01MPa (684mmHg), perform the following procedures immediately.
 - * Close the gas stop valve.
 - * Set the DSW1-1 pin at the "OFF" side. (To stop the unit operation.)
- (5) Turn OFF the power source.



CAUTION

Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01MPa. If the pressure is lower than -0.01MPa, the compressor may be faulty.

Indoor unit (Water Module)design section

1. System Composition

Indoor Units Series

AHM-070UXCSAPA3

AHM-160UXCSAPA3



2. Specification

Water module model			AHM-070UXCSAPA3	AHM-160UXCSAPA3
Power supply			1PH , 220 ~ 240V/50Hz	
Heating capacity		kW	7	16
Hot water capacity		kW	7	16
Power input		kW	0.285(3.285)	0.285(3.285)
Dimensions	H*W*D	mm	890×520×320	890×520×320
Packing dimensions	H*W*D	mm	1120×595×462	1120×595×462
Weight	Net	kg	55	58
	Gross	kg	72	75
Heat Exchanger		—	plate heat exchanger	
Heat Exchanger insulation material		—	Elastomeric Foam	
Hot water temperature	Heating	°C	15 to 55	15 to 55
	DHW	°C	25 to 75	25 to 75
	Cooling	°C	5 to 25	5 to 25
Sound pressure		dB(A)	33	33
Sound power		dB(A)	46	46
Piping connections	Gas	mm	Φ9.53	Φ9.53
	Liquid	mm	Φ15.88	Φ15.88
Water pump	Type	—	DC motor	
	Speed	—	Inverter Control	
	Power input	w	100	160
Booster heating		kW	3	3
Water filter	Diameter perforations	mm	0.85	0.85
	Material	—	Hpb59-1	Hpb59-1
Water circuit	Piping connections diameter	mm	G1-1/4"	G1-1/4"
	Shut off valve	—	Yes	Yes
	Drain valve	—	Yes	Yes
	Safety valve	Bar	3	3
	Air purge valve	—	Yes	Yes
Expansion vessel	Volume	L	8	8
	Max. water pressure	Bar	3	3

3. Electrical Parameters

Model	Main power supply			Operating voltage range/V		Rate power/KW		Rated current/A		Maximum current/A	
	VOL	PH	Hz	Max.	Min.	Cooling	Heating	Cooling	Heating	Cooling	Heating
AHM-070UXCSAPA3	220	1	50	242	198	0.285	0.285/3.285	1.36	1.36/15.7	1.47	16.9
AHM-160UXCSAPA3	~240										

See the table below for site wiring:

Water module model	Power supply	Max. current	Power cord size	Comm. cable spec.
AHM-070UXCSAPA3	220~240V	16.9A	4 mm ²	0.75 mm ²
AHM-160UXCSAPA3	50Hz			

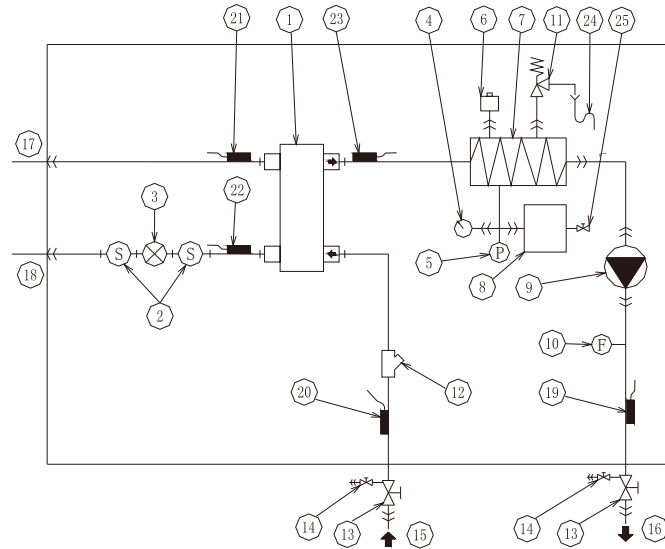
4.Capacity table

Refer Outdoor unit section 4 .

5. Control system

It is prohibited to use the water module unit of floor heater pump in other heat sources (e.g. gas furnace). If you do not comply with this rule, HHIsense will not be liable for any damage resulting there from.

● Water Module Circulation Diagram



- | | |
|-------------------------------|---|
| 1. Plate heat exchanger | 14. Replenishing port |
| 2. Filter | 15. Water inlet |
| 3. Electronic expansion valve | 16. Water outlet |
| 4. Pressure gauge | 17. Refrigerant gas pipe |
| 5. Water pressure switch | 18. Refrigerant liquid pipe |
| 6. Auto exhaust valve | 19. Outlet water temperature |
| 7. Electric heating | 20. Inlet water temperature |
| 8. Expansion tank | 21. Gas pipe temperature |
| 9. Water pump | 22. Liquid pipe temperature |
| 10. Water flow switch | 23. Plate heat exchanger outlet water temperature |
| 11. Safety valve | 24. Drain pipe |
| 12. Water filter | 25. Expansion tank inflation port |
| 13. Ball valve | |

⚠ DANGER

R410A refrigerant is adopted. When leakage and air tight test are made, do not mix with oxygen, acetylene, inflammable gas and poisonous gas. They are very dangerous and may cause explosion. Recommend using compressed air, nitrogen or refrigerant.

5.1 Refrigerant Pipeline and Tubing

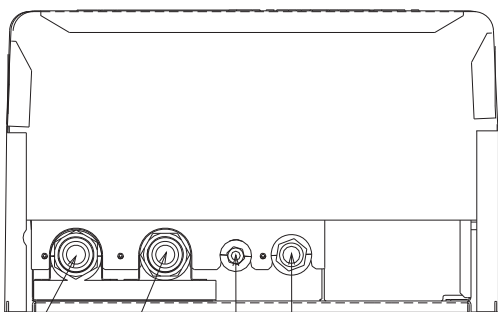
- (1) Copper tube are prepared on site.
- (2) Pipe dimension are selected as follows.
Unit (mm)

Type	Gas tube	Liquid tube
AHM-070UXCSAPA3	Φ 15.88	Φ 9.53
AHM-160UXCSAPA3		

- (3) Select copper tube without dust and moisture.
Blow dust and impurity in pipeline with nitrogen or dry air before pipeline is mounted.

5.2 Connect Refrigerant Pipeline

- (1) Confirm stop valve is closed. Gas and liquid tube are located as shown in Fig.5.1:



Water Inlet Water Outlet Gas Tube Liquid Tube

Fig.Location of Gas Tube and Liquid Tube

- (2) As shown in Fig., screw up nut cap. Refer to the torque required below:

Pipe Diameter	Torque(N•m)
φ 9.53	40
φ 15.88	80
φ 19.05	100

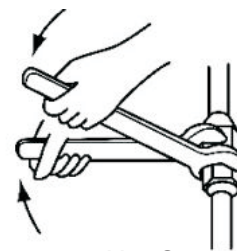


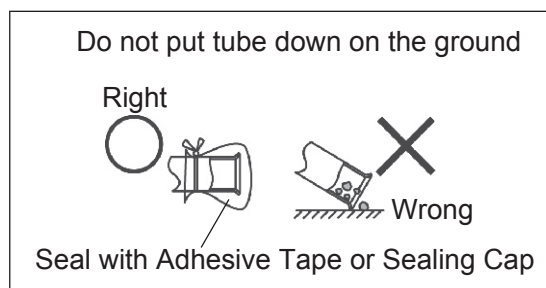
Fig. Screw up Nut Cap

- (3) Heat preservation of refrigerant tube
After tube is connected, heat preservation material on site should be used to keep gas tube, liquid tube and connecting nut warm, and wrap the tube with adhesive tape, avoiding heat dissipation condensation on surface of pipeline.

- (4) Charging and discharging of refrigerant
Operate according to installation and maintenance manual of outdoor unit.

⚠ CAUTION

- When the tube passes through holes, tube head should be sealed by sealing cap.
- Seal the tube end with sealing cap or adhesive tape. Do not directly put tube down on the ground.



5.3 Connect Water Pipeline

- (1) The connecting location of water pipeline is seen in Fig.

- (2) Notes for connecting water tube

- A small amount of water may exist in water module. Note that when sealing cap is opened.
 - Pay attention to connection location of tube. Do not connect water inlet and water outlet tube inversely.
 - Use water tube conforming to specification. Dimension of water tube is equal to or above interface dimension in machine (G1/1/4"). For main connecting pipeline, recommend using DN40 water tube to reduce pressure loss in pipeline.
 - Properly keep water tube thermal insulated and avoid pipeline freezing.
 - Regularly clean water filter.
- (3) Basic requirements for operating water tube:
 - Let the end of tube face downward when deburring, avoiding foreign matter invading into tube.

- Thoroughly flush all water pipelines before installation, ensure no foreign matter before use. Note that do not flush any foreign material into plate heat exchanger.
 - Apply good sealant to seal joint and the joint must bear pressure and temperature of system.
 - If water tubes of different material are used, ensure they are isolated, preventing electrical conduction and corrosion.
 - Galvanized parts that may cause corrosion in water system are prohibited.
 - Water tube and tube joint must be supported independently on water module.
 - Tube and tube joint in water module should be easy to remove and convenient to operate and clean.
 - Flexible joint should be used between water module interface and on-site pipeline, avoiding vibration propagation and pipeline breakage.
 - Arrange drainage interface at low positions in water system, make water in water module and pipeline smoothly drained out. Arrange air exhaust device at high positions. Do not treat air exhaust valve and drainage interface thermally for repair convenience.
- (4) Water treatment and water quality control
- Confirm with water treatment company that antifreezing solution, scale inhibitor, corrosion remover that are used in water treatment do not corrode stainless steel and copper products before use. When system links with water tank, to avoid domestic hot water contaminated by coil leakage, antifreezing solution, scale inhibitor, corrosion remover are not allowed to use.
 - Water quality control methods and reference refer to water quality requirements issued by Japan Refrigeration and Air Conditioning Industry Association (JRA-GL-02-1994). Medium and low water temperature reference values of water module unit are seen in table 6.1.

6. Dimensional and Structure

Unit:mm

6.1 Dimensional

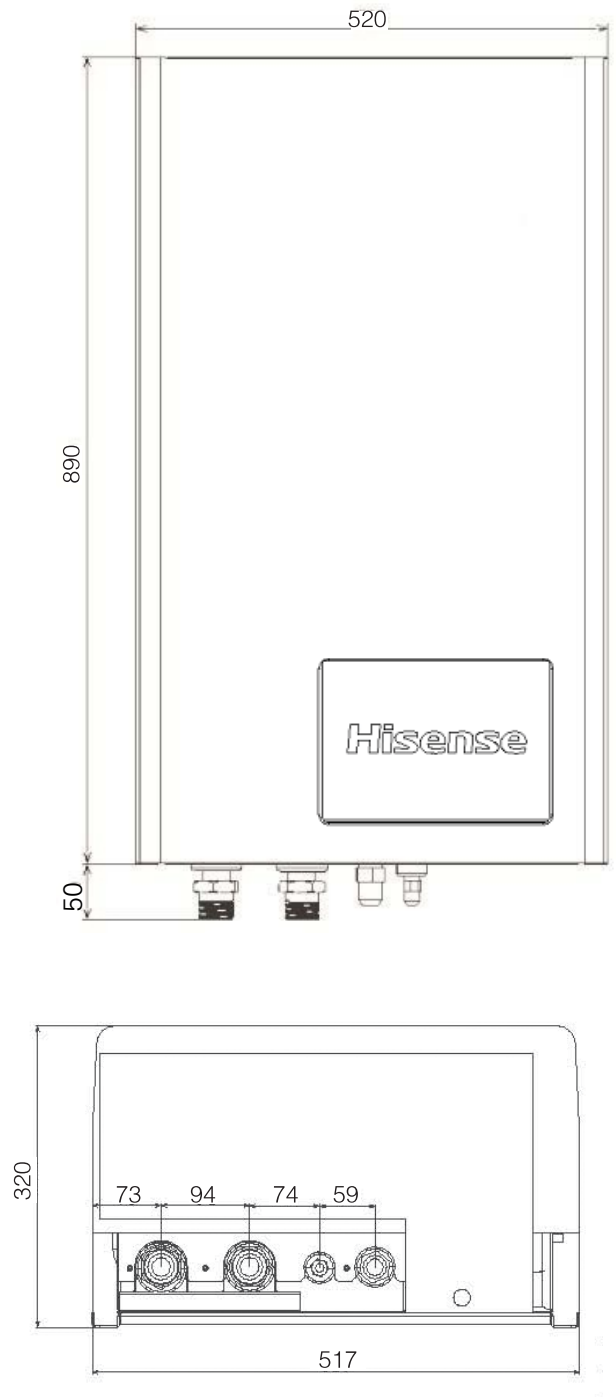
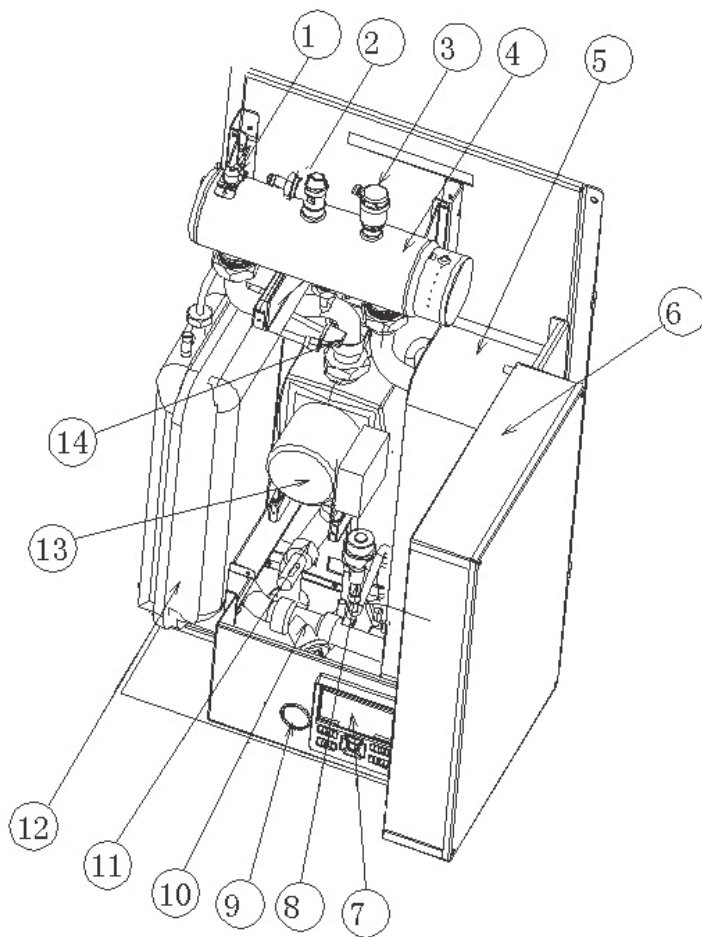


Figure: Water Module Size

6.2 Structure



① Electric Heating Temperature Switch in Water Module

② Safety Valve

Safety Valve guarantees hydraulic pressure is below 3bar to prevent from too high hydraulic pressure in water cycle. When the hydraulic pressure is too high, drain some water.

③ Automatic Vent Valve

Remove residual air in water system through automatic vent valve.

④ Electrical Heater

⑤ Plate Heat Exchanger

⑥ Electrical Box

⑦ Wire Controller

⑧ Electronic Expansion Valve

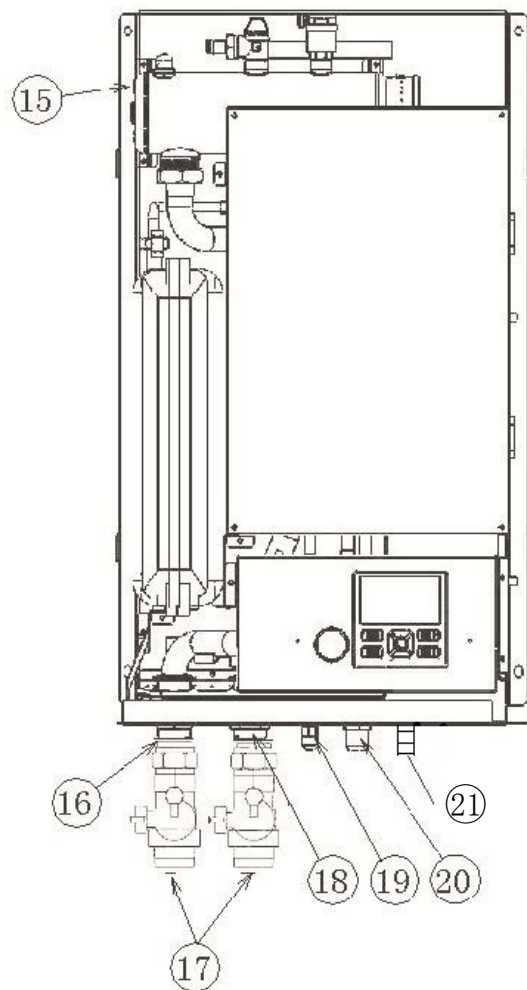
⑨ Pressure Gage

Read pressure in water circulating system.

⑩ Filter

⑪ Water Flow Switch

Water Flow Switch disconnects and the unit stops when water flow is too low.



⑫ Expansion Tank

Volume change caused by temperature change in absorbed water circulating system.

⑬ Water Pump

Feed power to water circulating system.

⑭ Low Water Pressure Switch

It trips and the unit stops when pressure in water circulating system is too low.

⑮ Temperature Fuse in Water Module Heater

Temperature fuse disconnects and electrical heater cuts off at too high temperature. It can not automatically restore.

⑯ Water Inlet

⑰ Ball Valve

Isolate water circulation after ball valves in water inlet and outlet are closed. Water make-up inlet in ball valve supplements water to water circulating system.

⑱ Water Outlet

⑲ Refrigerant Liquid Tube Joint

⑳ Refrigerant Air Tube Joint

㉑ Outlet of drainage

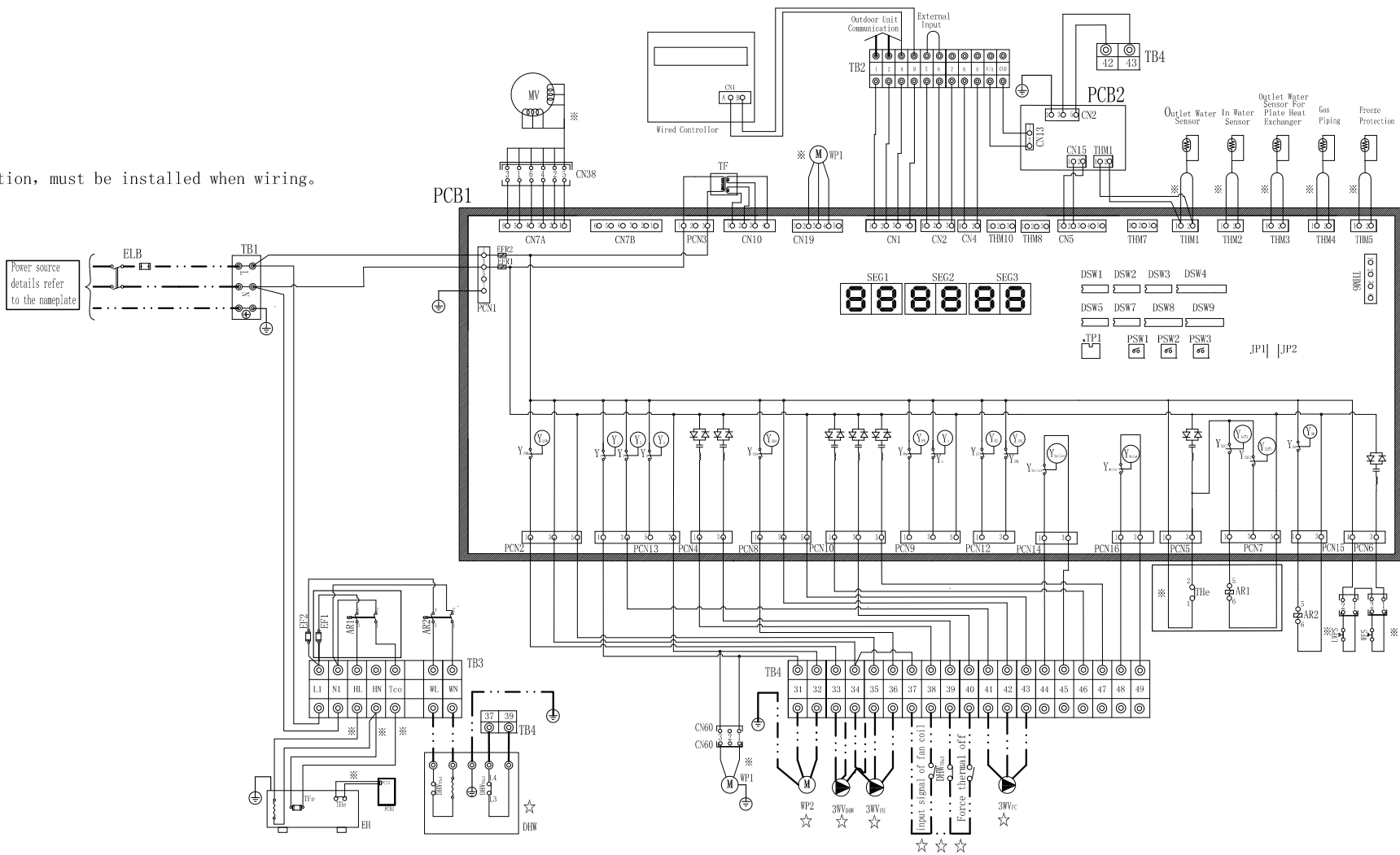
ELECTRICAL WIRING DIAGRAM

7. Electrical Wiring Diagram

(AHM-070UXCSAPA3 AHM-160UXCSAPA3)

HEAT PUMP

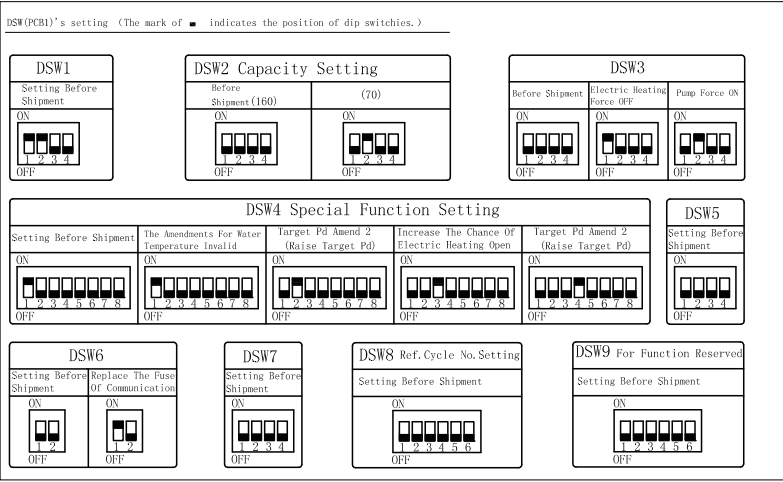
- : Factory Wiring
—— : Earth Wiring
- - - - : Field Wiring
ELB : Leakage Protection, must be installed when wiring.
☆ : Optional Parts



**WARNING**

When checking the electrical components, set the operation switch to OFF, meanwhile turn off the main switch.

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

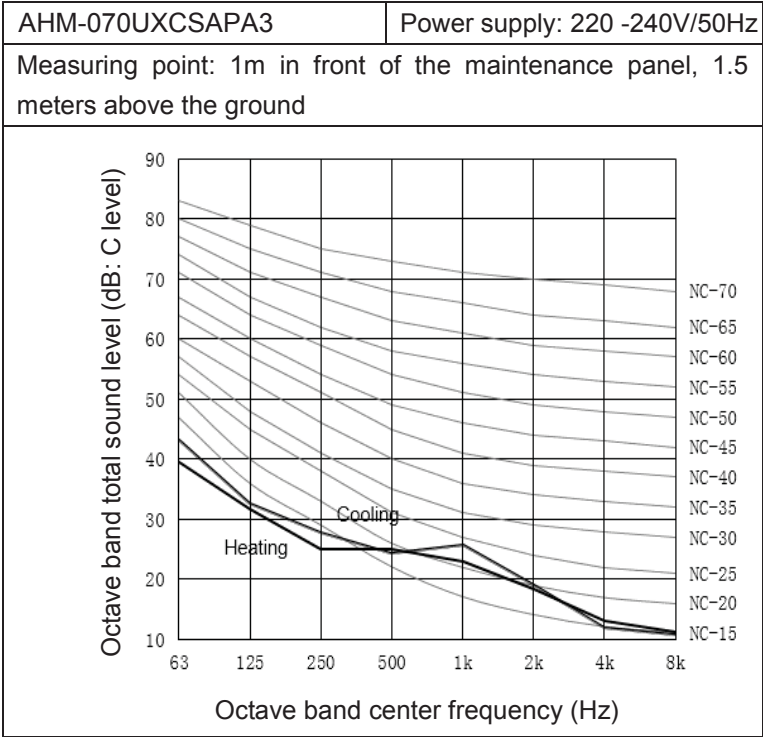


Code	Content of Abnormality
AR1, AR2	Relay
CMC	AC Contactor
CN1~10	Connector
CN60	Connector
3WVFC	Three-way Valve For Fan coil
DHW	Tank
DHWthe1, DHWthe2	Tank Thermostat
DSW1~5, 7~9	Dip Switch for Setting
EF1, EFR2	Fuse (on PCB)
EF1, EF2	Fuse
EH	Electric Heating For Water Module
LWPS	Low Water Pressure Switch
MV	Micro-Computer Control Expansion Valve
PCB1	Printed Circuit Board
PCB2	Printed Circuit Board

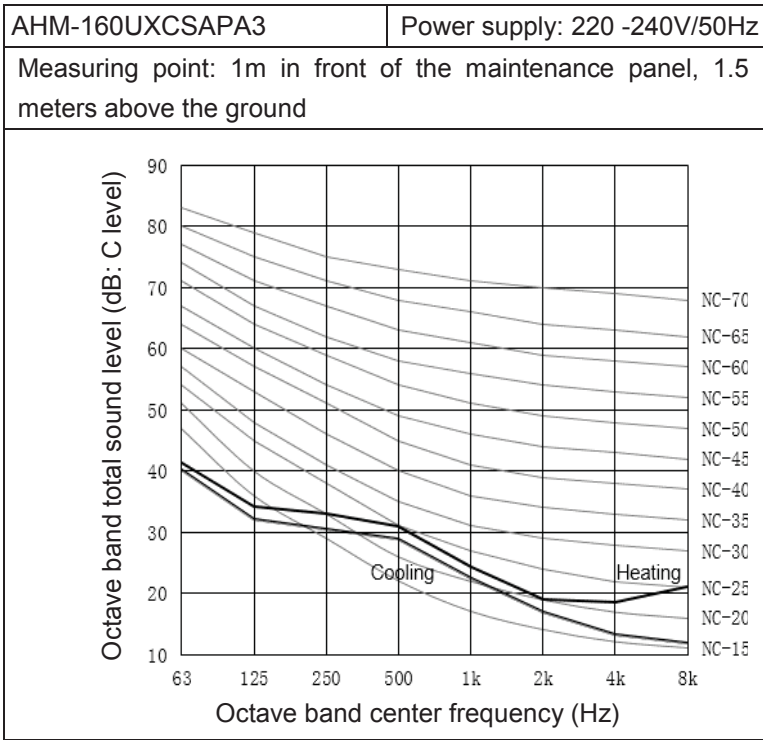
Code	Content of Abnormality
PCN1~16	Connector on PCB
TB1, 2, 3, 4	Terminal Block
TF	Transformer
TFe	Fuse Of Electric Heating
THE	Thermostat Of Electric Heating
WFS	Flow Switch
WP1	The Built Pump in Water Module
WP2	External Pump(Live Matching)
Y1~Y4, Y204, Y208	Relay on PCB
Yboiler, Ysolar, Y52C1, Y52C2, Y10	Relay on PCB
Y4, YFR, Y12, Y20	Relay on PCB
3WVWH	Three-way Valve For Tank
3WVH	Three-way Valve For Floor Heating

8.Sound Data

Octave band center frequency (Hz)



Variable Frequency Floor Heater Standard Cooling//Heating NC Curve



Variable Frequency Floor Heater Standard Cooling//Heating NC Curve

9. Operation range

Outlet Temperature		(°C)	
Condition		Min.	Max.
Water Module	Cooling Operation	5	25
	Heating Operation	15	55
	Domestic Hot Water	15	55

10. External connection diagrams

- (1) Ensure all electrical apparatus used on site (power switch, cut-out switch, lead, conduit and terminal block) are selected according to technical manual I and national electrician standard. Wiring must be made according to national specification.
- (2) Check voltage is within rated voltage $\pm 6\%$. If too low, system will not start. If too high, electrical parts will be burnt out.
- (3) Check cable capacity. See specification of power line connected on site in table below.
- (4) Confirm ground wire is connected.

Electrical Parameters of Water Module and Electric Wire Specification

Model	Power	Rated current	Power source cable size	transmitting cable size
AHM-070UXCSAPA3 AHM-160UXCSAPA3	220~240V 50Hz	16.9A	4mm ²	0.75mm ²
Total current (A)		Cable (mm ²)		*2: In the case that current exceeds 63A do not connect cables in series.
I≤3		1.0~2.5		
3 < I≤6		1.0~2.5		
6 < I≤10		1.0~2.5		
10 < I≤16		1.5~4.0		
16 < I≤25		2.5~6.0		
25 < I≤32		4.0~10.0		
32 < I≤50		6.0~16.0		
50 < I≤63		10.0~25.0		
I > 63		*2		

NOTES:

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with *1 in the above table are selected at the rated current of the unit according to the European Standard, EN60335-1. Use the wires which are not lighter than the ordinary polyvinyl chloride sheathed flexible cord (code designation H05VV-F).
- 3) Use a shielded cable for the transmitting circuit and connect it to ground.
- 4) In the case that power cables are connected in series, add each unit maximum current and select wires below.

10.1 Wiring

(1) See holes linking electric wire in water module in Fig.below.

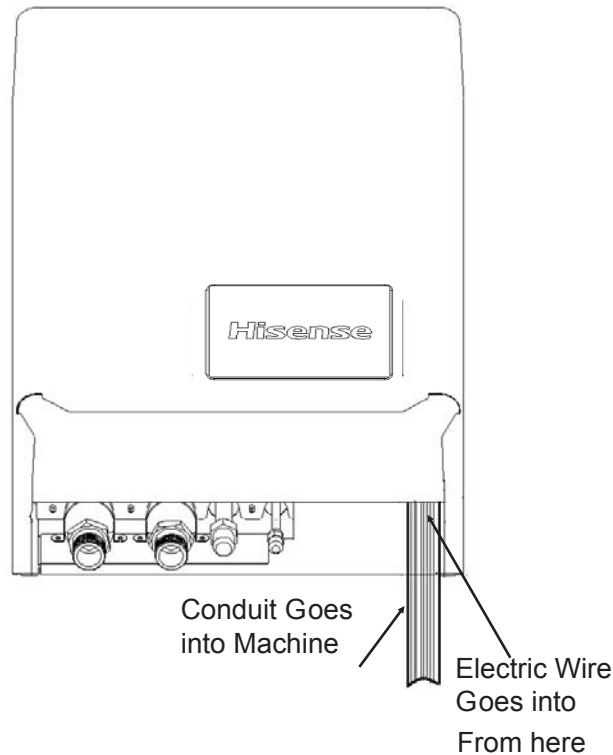


Fig. Electric Wiring Location Diagram

CAUTION

Indoor and outdoor unit must adopt fixed wiring. Conduit must be hard and goes into machine. Tighten electric wire and communication cable with wire holder shown in Fig.

(2) Inner wiring diagram of water module below.

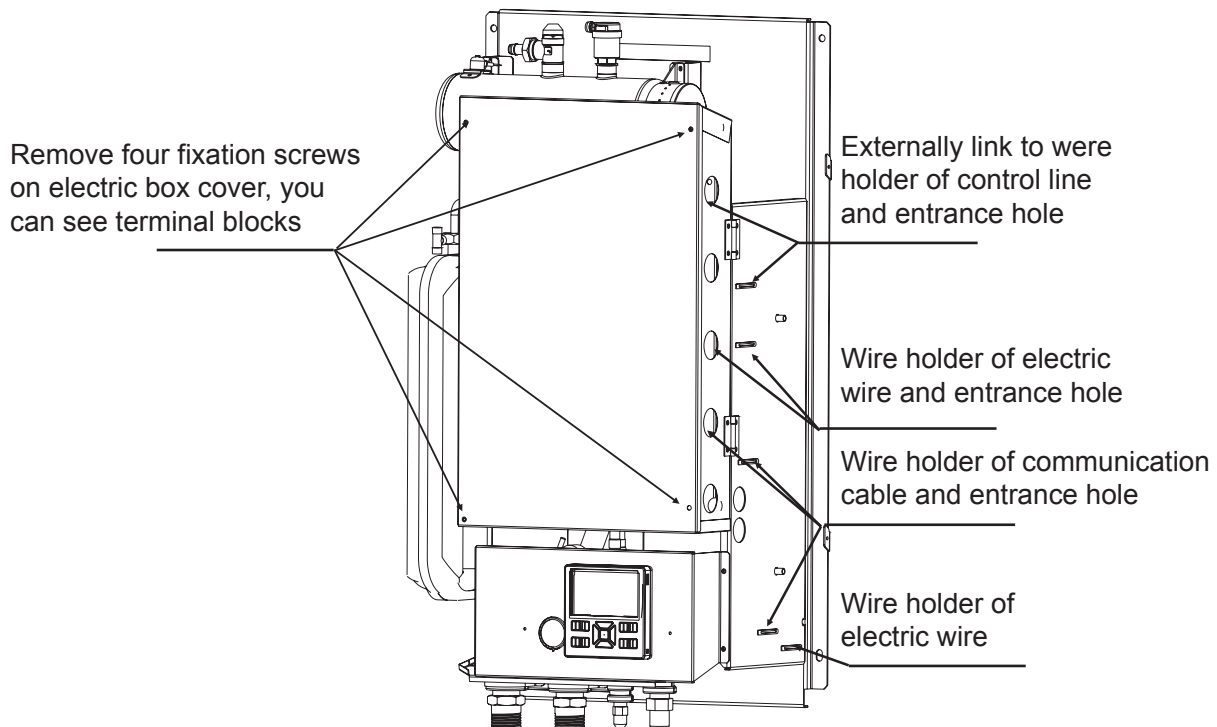
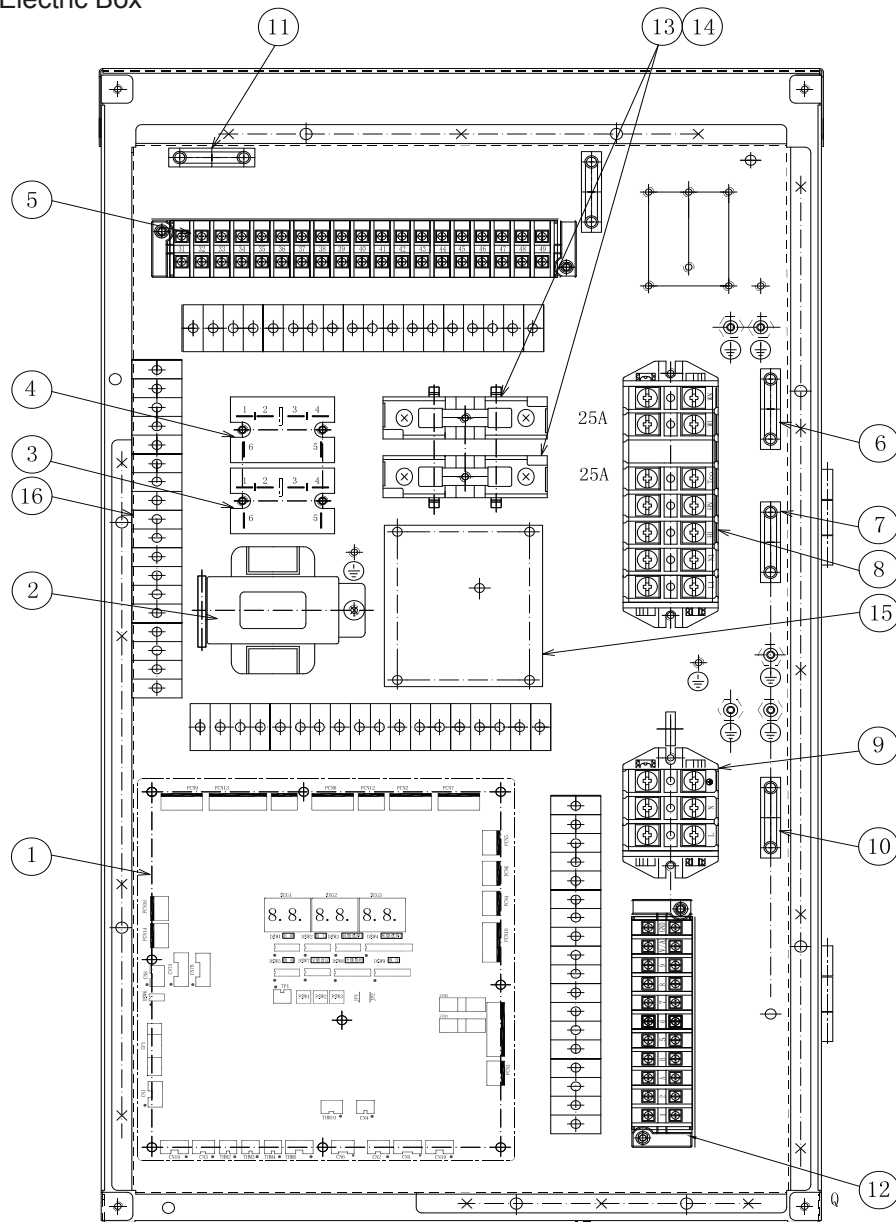
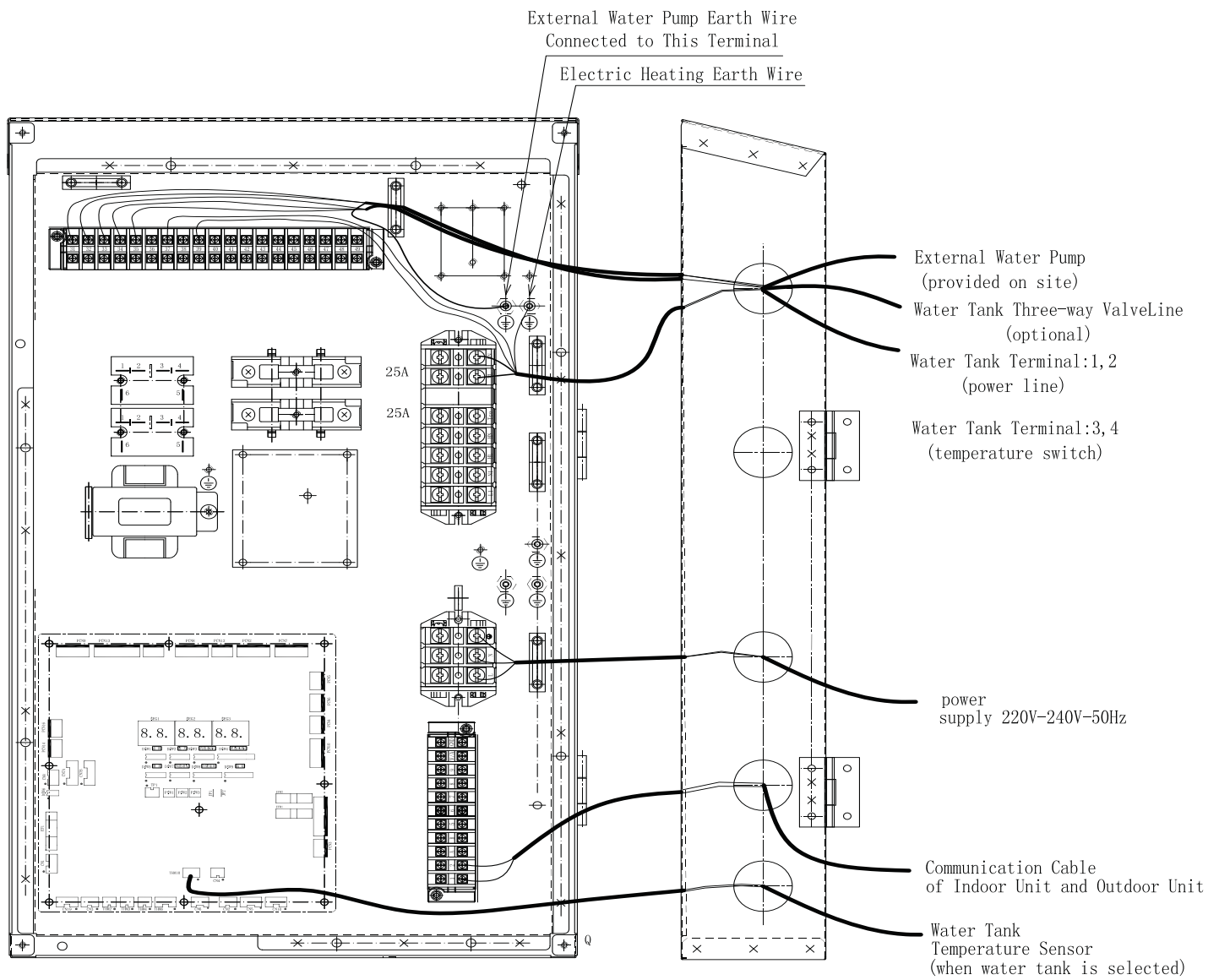


Fig. Inner Wiring Diagram

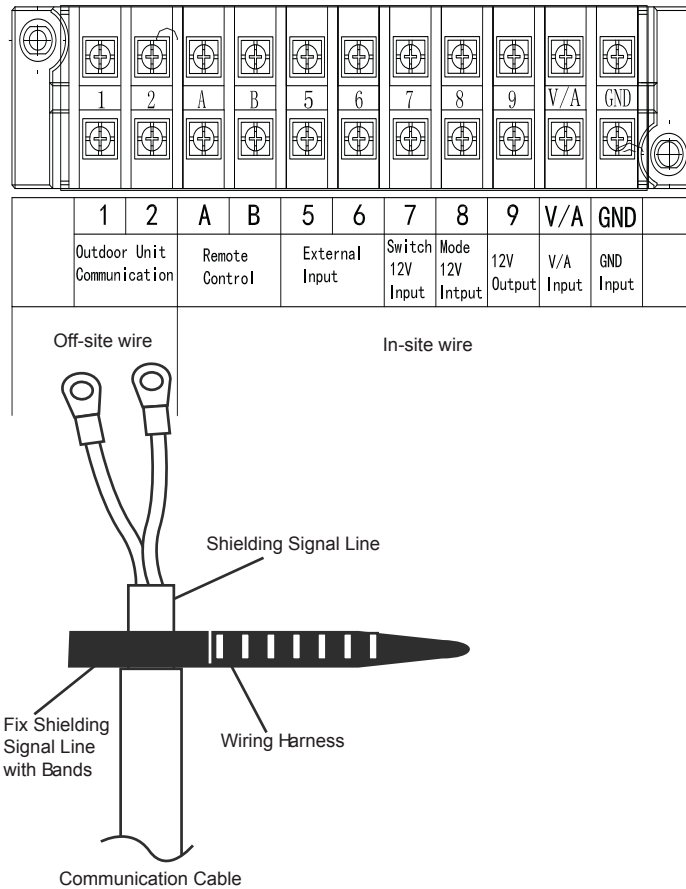
Main Parts of Electric Box



- | | |
|--|--|
| <p>① PCB1</p> <p>② Transformer</p> <p>③ Relay</p> <ul style="list-style-type: none"> • Used for electric heating in water module <p>④ Relay</p> <ul style="list-style-type: none"> • Used in electrical heater in refrigerator <p>⑤ Terminal Block TB4</p> <ul style="list-style-type: none"> • Used for small power control and adopt signal <p>⑥ Wire Holder</p> <ul style="list-style-type: none"> • Fix external input power of TB4 terminal block <p>⑦ Wire Holder</p> <ul style="list-style-type: none"> • Fix external input power of TB4 terminal block <p>⑧ Terminal Block TB3</p> <ul style="list-style-type: none"> • Used for electric heating of water module and electric heating of water tank externally connected | <p>⑨ Terminal Block TB1</p> <ul style="list-style-type: none"> • Used for introducing 220V power cable externally connected <p>⑩ Wire Holder</p> <ul style="list-style-type: none"> • Used for fixing 220V power cable externally connected <p>⑪ Wire Holder</p> <ul style="list-style-type: none"> • Used for fixing communication cable of indoor and outdoor unit <p>⑫ Terminal Block</p> <ul style="list-style-type: none"> • Connect Communication cable and externally connected cable <p>⑬ Fuse</p> <ul style="list-style-type: none"> • Used for electric heating in water module, 25A <p>⑭ Fuse</p> <ul style="list-style-type: none"> • Used for electric heating in water tank, 25A <p>⑮ PCB2</p> <p>⑯ Trunking</p> |
|--|--|



Connect Communication Cable



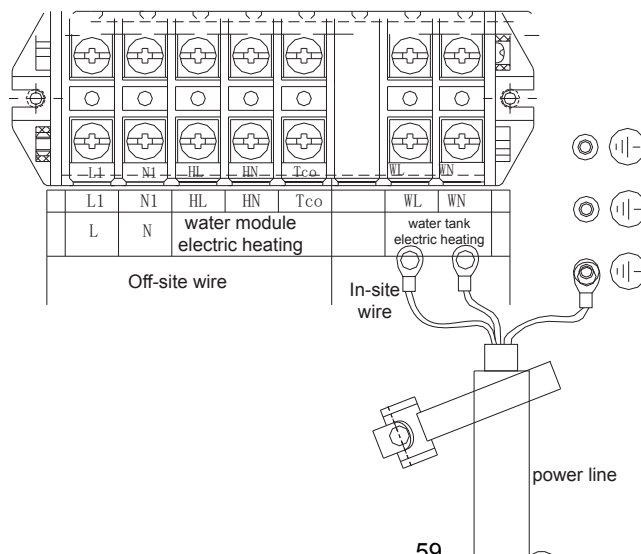
CAUTION

between outdoor unit and water module is fixed with wiring harness.

Connect Power Line

- (1) Connect power line and earth wire to the terminal of electric box and fix with wiring harness, seen below.
- (2) Check and ensure live line and null line of

terminal blocks in power supply are correctly linked. If connected inversely, some parts may be damaged.



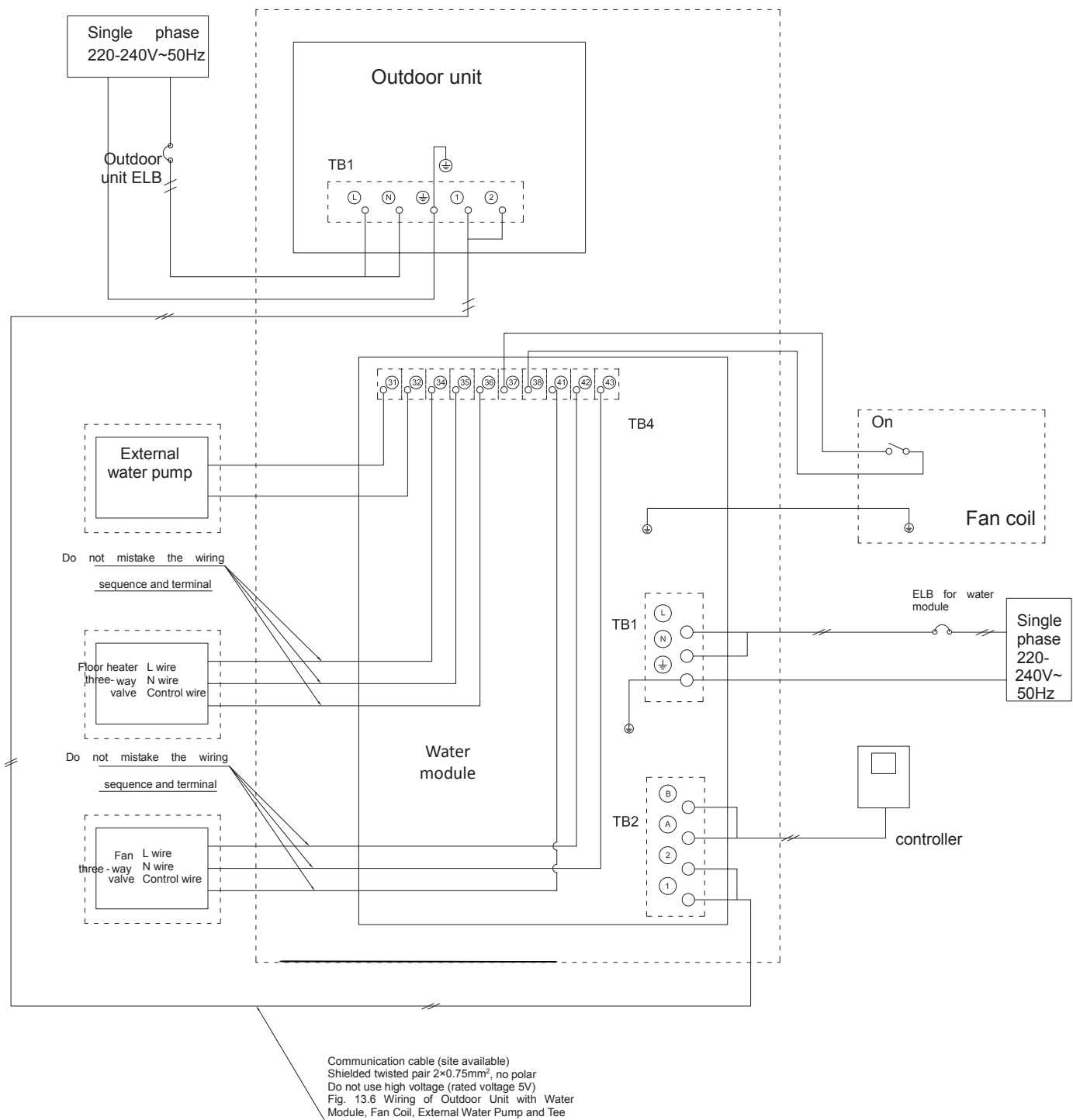
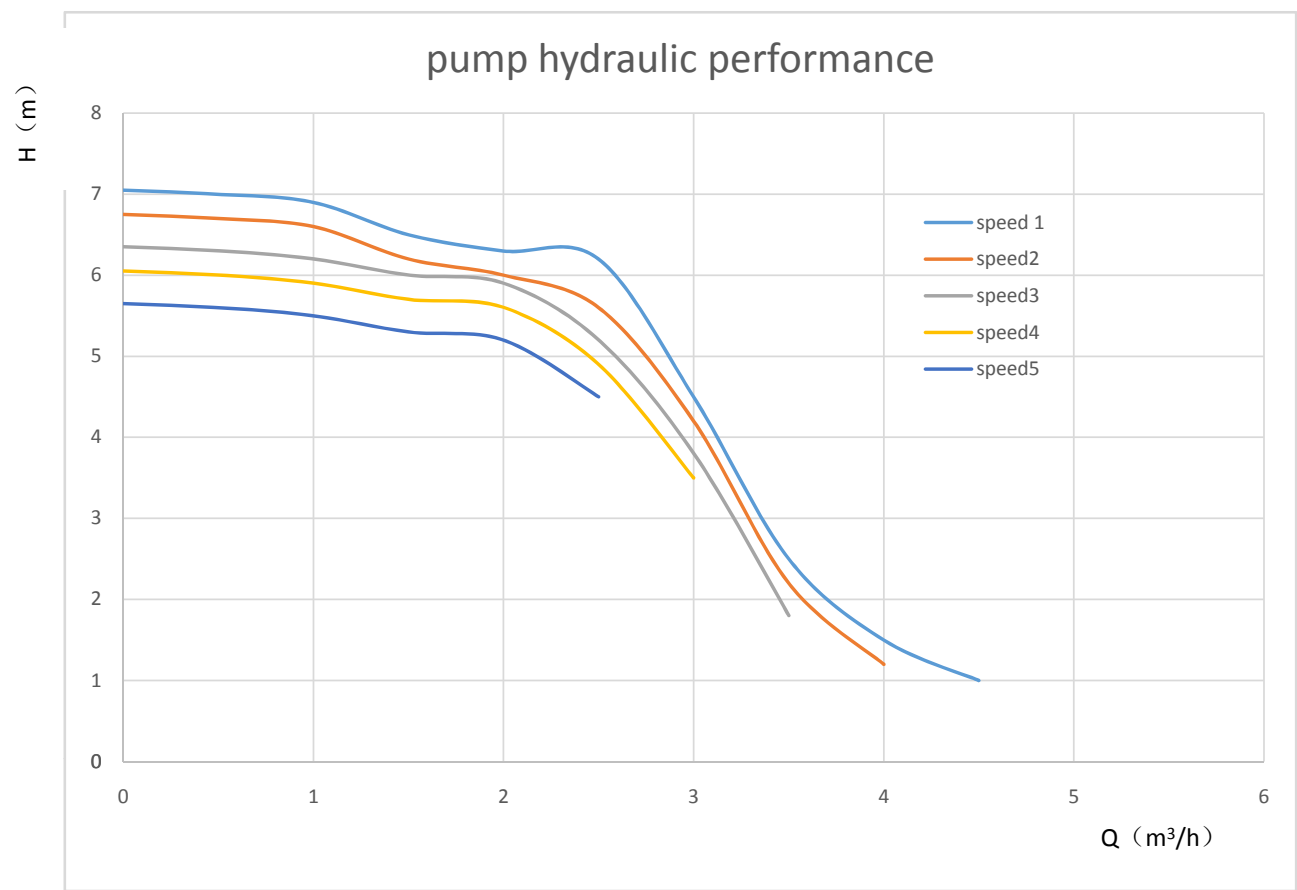
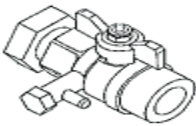


Fig Connection between the outdoor unit and the water module, fan coil, external water pump, three-way valve

11. Hydraulic performance



12. Water Module Accessories

No.	Name	Quantity	Picture	Remarks
1	Wall Hanging Board	1		Temporarily fix water module on the wall; for actual fixing, the expansion bolts must be used to securely fix water module on the wall.
2	Instruction Manual	1		
3	Ball Valve	2		Connect at the water inlet/outlet of water module, for connecting/disconnecting water pipe, drain and filling.
4	Rubber Gasket	2		Used for sealing the connections between water module and ball valves.
5	Strap	3		
6	Stainless Steel Screw	4		
7	Clamp	1		
8	Clamp	1		
9	Drain Pipe	1		Used for drain hose connection.

Installation and Maintenance Section

1. Safety Precautions

DANGER

- Please don't perform refrigerant piping connection, water pipe connection, wiring connection and other installations without reading installation manual. Any violation will lead to leakage of the system, electrical failure or fire.
- This system uses refrigerant R410A. During leak detection and air tight test, please do not fill in oxygen, acetylene or inflammable and poisonous gases. These gases are quite dangerous and may lead to explosion. It is recommended to do this test with dry nitrogen.
- Please do not splash water into water module and outdoor unit. This machine is electrical product, so ingress of water will lead to serious electrical fault.
- Without disconnecting main power supply, please do not open outdoor unit, maintenance cover of water module and circuit boards, otherwise it may lead to serious security incident.
- It is strictly prohibited to touch or alter security devices inside the outdoor unit and water module without permission. If these devices are touched or altered, it may lead to serious security incident.
- Refrigerant leak may cause difficulty in breathing due to hypoxia. If a refrigerant leak occurs, please immediately turn off main switch, put out any open flame and then contact service dealer.
- Make sure that air tightness test is carried out. Refrigerant (carbon-oxygen compound) used in this machine is non-flammable, non-toxic and without odor. If a refrigerant leak occurs, exposure to open flame will produce toxic gases, and because the specific gravity of refrigerant gas is greater than that of air, suffocation may happen when the space near ground is filled with refrigerant gas.
- Use ELB above medium-speed induction (earth leakage breaker, action time of 0.1 second or less). Electric shock or fire may occur without it.
- For installation, refrigerant pipe must be firmly connected before the compressor starts running. For maintenance, refrigerant pipe must not be moved, disposed and removed before the compressor stops running.
- In operation, please do not make the protection device shorted, otherwise it may cause serious accidents including fire.

Warning

- Please do not use following sprays within 1m of the machine: Pesticides, paints, hair gel or other flammable gases.
- If the circuit breaker or fuse functions frequently, please stop running the system and then contact local dealer or customer service.
- Make sure that ground wire is firmly connected. If the machine is not properly grounded, it may lead to electrical failure. Please do not connect the ground wire to gas pipe, water pipe, lightning rod or telephone wire.
- Select a fuse based on specified capacity.
- In the process of soldering, make sure that there's no flammable materials around; While using refrigerant, please wear leather gloves to avoid frostbite.
- Prevent mice or other small animals from damaging wirings and electrical components. If the unprotected part is bitten, it may cause a fire.
- Please install the water module indoors on someplace solid enough to bear the weight. If the installation is not solid enough, it will lead to the fall of the water module, resulting in personal injury and machine damage.
- Please make sure to use the specified accessories and components for installation. Otherwise it may cause water leakage, electric shock, fire or failed operation of the water module.
- Please do not install the machine where there's a large amount of oil, vapour, organic solvents and corrosive gases (ammonia, sulfide and acid, etc.). Because the corrosion may lead to refrigerant leak, electrical failure, performance degradation and machine damage.

- Please carry out electrical construction in accordance with the installation manual and all the relevant requirements and standards, otherwise it will lead to electrical failure or fire due to inadequate capacity or inconformity with specifications.
- Please use specified wires on the machines and select correct ones, otherwise it will lead to electrical failure or fire.
- Make sure that the connection is tightened to the prescribed torque, otherwise a fire or electrical failure will be initiated at the terminal.



Attention

- Please do not trample the machine or place other materials on the machine.
- Please do not place additional materials inside the machine.
- Provide a sturdy and suitable basis so that:
 - A. The water module will not tilt.
 - B. There'll be no abnormal sound.
- Please use tap water and ensure that it's not hard water. Use of hard water will shorten the lifetime of plate type heat exchanger, auxiliary electrical heater, all the valves and others. Please do not use it to heat up water of high hardness such as underground water, spring water and well water; otherwise we cannot guarantee service life of this product.
- Please do not use galvanized parts in the water cycle, otherwise these parts lead to corrosion.
- When the product is not running in the winter, please do not disconnect power supply for the water module. The unit will automatically enter into antifreezing operation under certain conditions during off mode.
- When the product is not in use for a long time, please be sure to pump circulating water out of the system. If the circulating water is not pumped out before turning off the power, it will cause damage to the system due to freezing.
- If the interval time between debugging and use is over 1 month, please release circulating water out of the system.
- Please do not install indoor unit, outdoor unit, water module, remote controller and cable within 3 meters of strong electromagnetic radiation source (such as medical equipment), .
- The unit must be connected to the WM, otherwise it will not work properly.
- Address code of water module must be greater than those of indoor units. Before delivery, address code of water module has been set to 63, so the setting of indoor units should be below 63.
- When installing and debugging the water module, please open the automatic exhaust valve and ensure that air in the water system is evacuated.
- If the water module is not at the highest point of the water system, it is necessary to add an exhaust valve in the water system. When air in the water system is not fully evacuated, failure of electrical heater and water pump can happen more easily.
- If water tank and floor heating system are both installed, it is necessary to install the electric actuated three-way valve. For installation details, please refer to the relevant instructions below.
- If the system is only installed with water tank or floor heating system, it is not mandatory to install the electric actuated three-way valve.
- When installing water module, it is necessary to adjust the initial pressure of the expansion tank in accordance with the height of the water module and the water capacity of the system, especially when the water volume in the system is large, the initial pressure of the expansion tank must be adjusted. For adjustment methods, please refer to the relevant instructions below.
- When selecting water pipe of the water system, it is better to use $\Phi 40$ PPR pipe, which will reduce the resistance of water.
- When installing inlet and outlet ball valve in the water module, please make sure that rubber washer is installed, otherwise it will lead to water leak.
- While designing the floor heating system, please make sure that pressure loss is below 30KPa, otherwise the low level of water flow in the system will affect the heating.
- The water module is equipped with a water flow switch. When water flow is below 0.84m³/h, the system will give an alarm. General requirement for the water flow is over 1.0m³/h.
- It is recommended to install a one-way valve on the tap water inlet pipe to avoid backflow.
- When the on-site floor heating pipe and the water module are to be added with water for test together, open the exhaust valve in the water module manually to evacuate air in the system before adding water. When the pressure gauge in the water module is up to 2bar, inlet and outlet ball valve in the water module must be closed and the pressure should never become 0.6MPa as the same with the water pipe system.

- When the outdoor environment temperature is very low or the space load is very high, the backup heater of system will start running automatically to generate additional heat.
- When a failure occurs to an outdoor unit, the emergency mode can be set up through the wired remote controller; during the floor heating mode, it can provide heat through the separate operation of a backup heater. During the domestic hot water mode, the heating is provided by the electric heating of individual water tank.
- Due to the high thermal inertia of water, room temperature may not rise quickly after the operation of the floor heating due to different conditions of on-site installations.
- When the unit is in cooling operation, if the heat recovery setup on the wired remote controller is effective, the system will automatically enter into the heat recovery operation mode (where the optional accessories of water tank is installed). But when the number of air conditioners in cooling operation is relatively few, the volume of heat recovery will also be less. In this case, water tank heating capacity may be insufficient if the heating of water tank is set up manually. Heating capacity of the water tank can be enhanced through increasing the number of indoor cooling units, or closing out all of the indoor air-conditioning units.
- While operating air conditioning heating and floor heating at the same time, or air conditioning heating and water tank heating at the same time, the system will automatically prioritize air conditioning heating operation. When the operation capacity of water tank heating or floor heating is insufficient, it'll automatically start auxiliary electric heating or backup electric heating to produce additional heat, but it may result in the increase of energy consumption. At this point, energy consumption can be reduced by turning off all indoor air conditioning units. Water module under the following conditions may not function normally.
- Water module under the following conditions may not function normally:
 - *Electric power of power transformer is the same as that of water module.
 - *Power supply of high-power electrical equipment is too close to the power line of the water module.

Equipment: (for example) elevator, container crane, electric railway rectifier, inverter power supply device, electric arc furnace, electric furnace, large induction motor and large-scale relay and other equipment of high power consumption.

Under the above mentioned conditions, power line of the water module will produce a large inductive voltage surge due to sharp changes of power consumption in the power equipment and switching action. So in order to protect the power supply of the water module, please check carefully the on-site installation specifications and standards before electrical construction.

Arrival inspection

- After receiving the product, please check if there is any delivery damage.
If any damage is found on the surface or inside, please notify immediately to the transport company in written form.
- Check product model, electrical parameters (power, voltage, frequency) and accessories to determine if they are in compliance with the requirements.
- It is not recommended to use the machine without conforming to the conditions described in this manual.
- When any problem occurs, please contact the local agent.
- Hisense Hitachi Company will not be responsible for any change of equipment without its written consent.

2.Specification

2.1 Refer to Outdoor unit Section 2.

2.2 Refer to Indoor unit Section 2.

3 .Features

Refer to Outdoor unit section 1.2 .

4. Location of controls and components

Refer to Outdoor unit section 6.2 .

Refer to Indoor unit section 6.

5. Dimensional and Structure Refer to

Outdoor unit section 6.1.

Refer to Indoor unit section 6.

6 . Control system

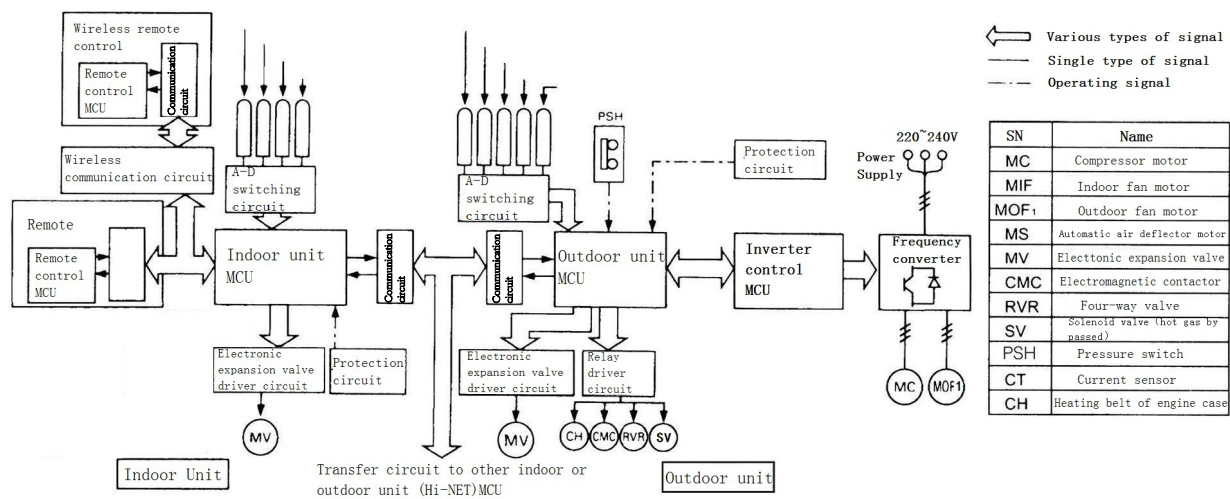
Refer to Outdoor unit section 7.

Refer to Indoor unit section 5.

7 Block diagram

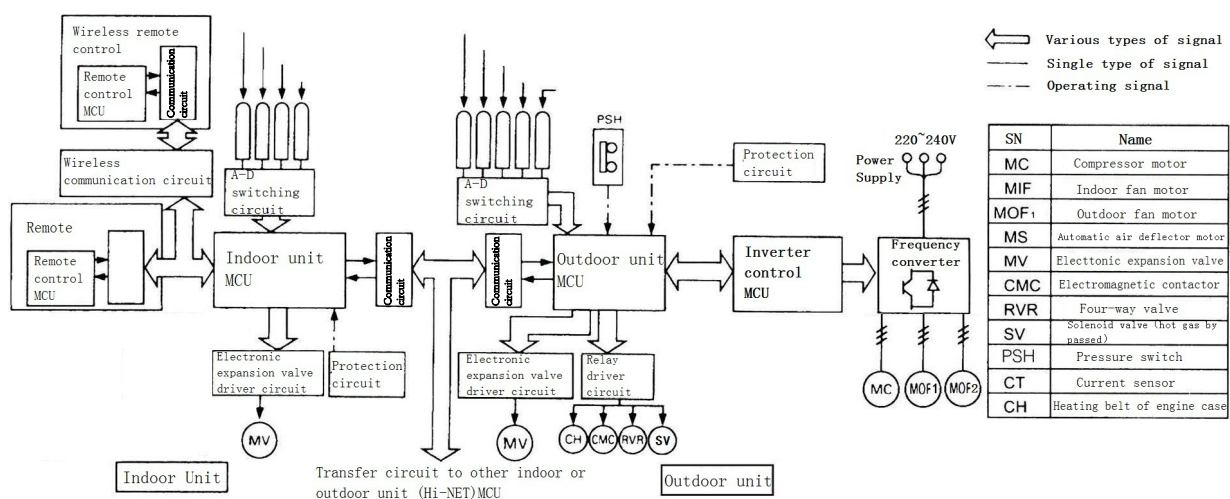
AHW-070UCSDP AHW-090UCSDP AHW-120UCSDP

Block Diagram of control System



AHW-140UCSEP AHW-160UCSEP

Block Diagram of control System



8. Wiring connection diagram

Refer to Indoor unit section 10.1 .

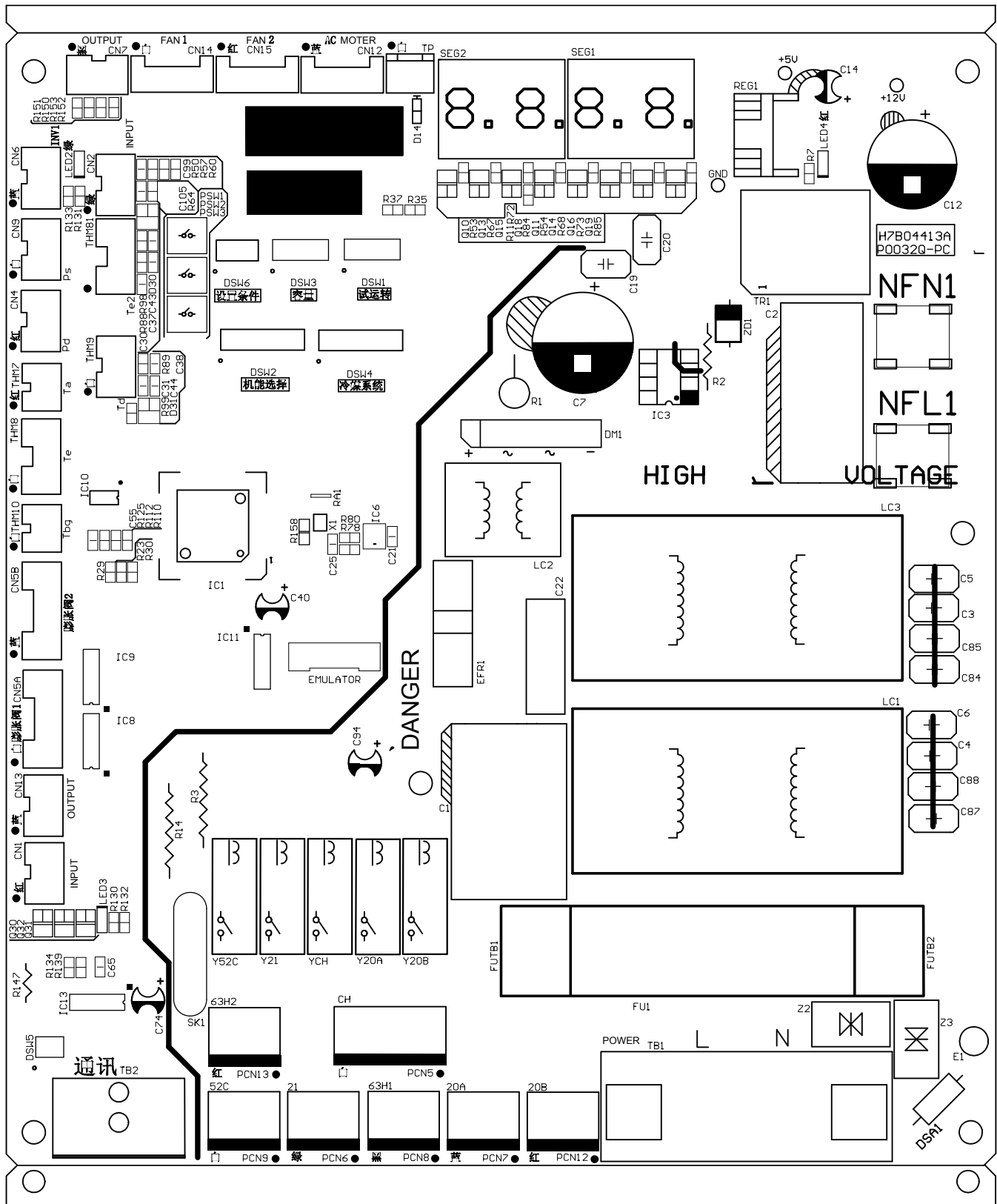
9. Electronic circuit diagram

Refer to Outdoor unit section 8*

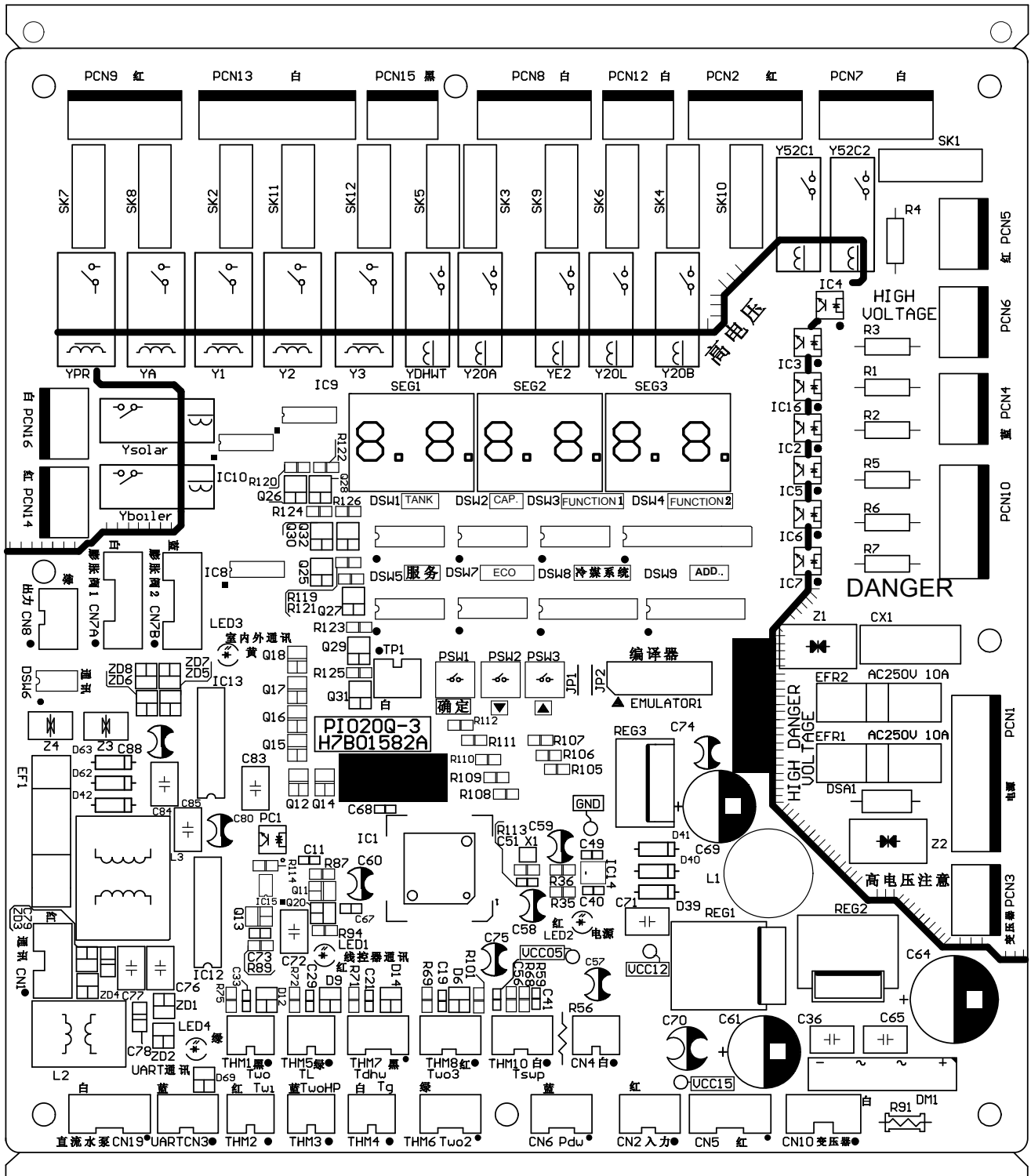
Refer to Indoor unit section 7.

10. Printed circuit board

10.1 Outdoor unit



10.2 Indoor unit



11 Installation Instruction

11.1 Installation tools

No.	Tool	No.	Tool	No.	Tool	No.	Tool
1	Handsaw	6	Pipe bending	11	Wrench	16	Gradienter
2	Screw driver	7	Manual water pump	12	Liquid storage tank	17	Wire occlusion device
3	Vacuum pump	8	Pipe cutting machine	13	Control valve	18	Lift (for indoor unit)
4	Charging pipe	9	Brazing tool	14	Wire cutter	19	Galvanometer
5	Megger	10	Hexagon wrench	15	Leak detector	20	Voltmeter

While contacting the refrigerant directly, please use installation tools and instruments specified for the new refrigerant.

◇ : Interchangeable with tools for refrigerant R22

● : Refrigerant R410A only (not interchangeable with R22)

× : Prohibited

◆ : Refrigerant R407C only (not interchangeable with R22)

Installation tools and measurement instruments		Interchangeable with refrigerant R22		Reasons for N/A and notes (★ : strict requirements)	Function
		R410A	R407C		
Refrigerant pipeline	Angle cutter	◇	◇	—	Pipe cutting Burring
	Flaring machine	※●	◇	★ Flaring machine of R407C is applicable to R22.	Pipe flaring processing
	Hole gauge	●	—	★ If flared pipe is used, its nozzle size is bigger than R410A. ★ If the material hardness is 1/2H, flaring is not applicable.	Caliber control after pipe flaring
	Pipe bending machine	◇	◇	★ If the material hardness is 1/2H, pipe bending is not applicable. Use elbow for bending and welding.	Pipe bending
	Pipe expander	◇	◇	★ If the material hardness is 1/2H, pipe expanding is not applicable. Connect the pipe with the connector.	Pipe expanding
	Torque wrench	◇	◇	★ For Φ6. 35, Φ9. 53, Φ12. 7, Φ15.88, select the corresponding wrench size.	Flare nut tightening Flare nut connection
	Brazing equipment	◇	◇	★ Ensure correct brazing.	Pipe brazing
	Nitrogen	◇	◇	★ Prevent invasion of foreign materials (blow nitrogen while brazing).	Avoid oxidation during brazing
	Lubricating oil (spread on the flared surface)	●	◆	★ Use the same lubricating oil as that of cooling system. ★ Lubricating oil has good water absorption.	Lubricate the flared surface
Vacuum Drying and Refrigerant Charging	Liquid storage tank	●	◆	★ Confirm the color of the liquid storage tank. ★ Ensure that non-azeotropic mixed refrigerant is charged in liquid state.	Refrigerant charging
	Vacuum pump	◇	◇	★ The available vacuum pump is acceptable, but it should be installed with a connector to prevent backflow of mineral oil when it stops.	Vacuum pumping
	Vacuum pump connector	※●	◆		
	Control valve	●	◆	★ Due to a higher level of pressure standard than that of R22, it is not interchangeable.	Vacuum pumping and maintaining, refrigerant charging and pressure check
	Charging pipe	●	◆	★ Please do not use previous components. Otherwise, the attached mineral oil will enter and deposit in the system, which may cause the circuit obstruction and compressor failure. ★ Their connection diameters are not the same. :R410A:UNF1/2; R407C:UNF7/1	
	Liquid storage	×	×	Use the gravimeter.	
	Gravimeter	◇	◇	—	Measurement of refrigerant charge
	Leak detector	※●	◆	★ The available leak detector (R22) is not interchangeable due to different detection methods.	Leak detection

※ : Interchangeable with refrigerant R407C

11.2 Select the best location

11.2.1 Outdoor unit refer to section 11.1.

11.2.2 Indoor Unit

Installing indoor unit should secure adequate service space as figure.

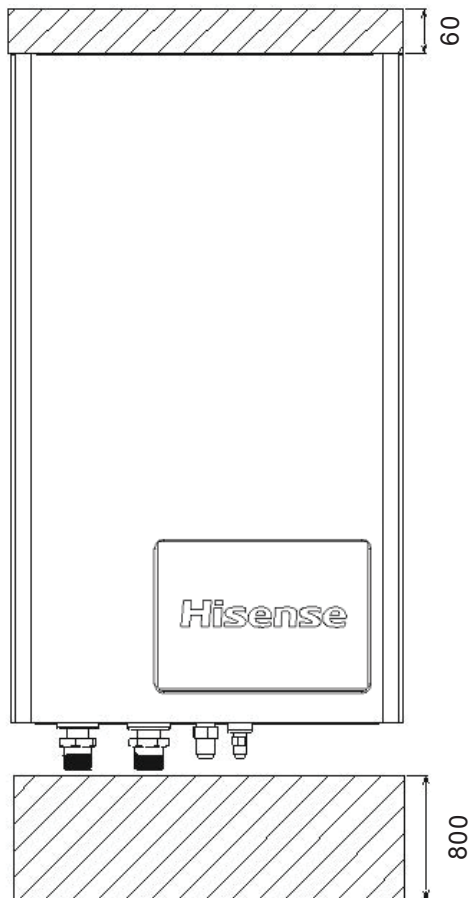


Fig Installation and Maintenance Space

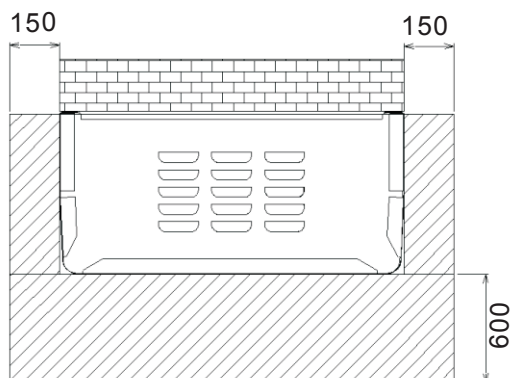


Fig Installation and Maintenance Space

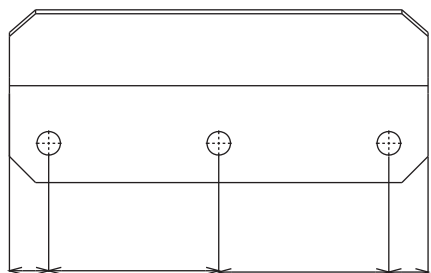
▨ Means maintenance space.

Selection of installation location:

- Indoor installation is made in selected special machine room, closed balcony, basement, corridor, equipment room or other indoor area with sufficient space.
- Installation surface must be flat, vertical and nonflammable wall and bear running weight of unit .
- Installation location is free from freezing.
- Water module should be installed in the shade to avoid direct sunlight or the direct radiation of high temperature heat source.
- Environmental temperature of the unit should range between 10~35℃, and the relative humidity should not exceed 80%.
- Water module should be installed in a place that is free from acid, alkaline or other corrosive gases.
- Please do not install the water module in a place that has a lot of oil, fibre, dust, volatile flammable gas (such as gasoline and paint solvents), etc.
- Please do not install the unit in a place where the electric box is exposed to the direct radiation of electromagnetic wave.
- Please keep the unit at least 3m away from the electromagnetic radiation.
- The noise of the water module should not disturb people's living, working, etc.
- In order to remove front panel and replace water pump, expansion tank and others, there should be a reserved space of over 600mm in the front.
- In order to facilitate the removal of the housing and electric box and free rotation of the electric box, there should be a reserved space of over 150mm on both right and left sides.
- In order to facilitate the connection of the lower pipe and water pipe, there should be a reserved space of over 800mm under the unit.
- In order to facilitate the installation and removal of the unit, there should be a reserved space of over 60mm over the unit.

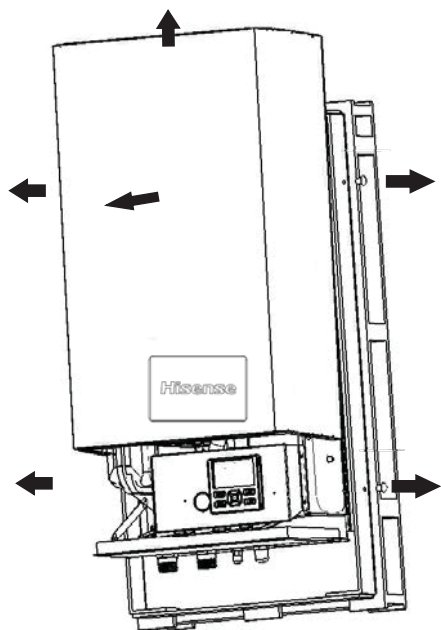
11.3 Indoor unit installation diagram

- Take out the add-on “wall-mounted plate” from the package. The size of the wall-mounted plate is shown below: (Unit: mm)

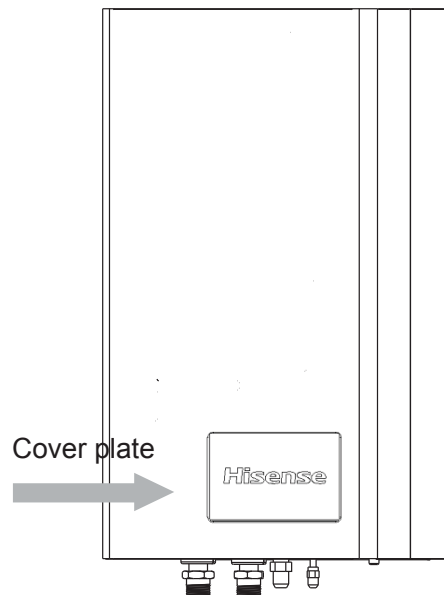


- Fix the mounting plate on the wall with three expansion bolts of size M8. Please ensure that the mounting plate is horizontally installed.

- As shown below, after unpacking the water module, remove four screws on the both sides and lift the front panel to take it off. Parts inside the unit may be hot, so please be careful.

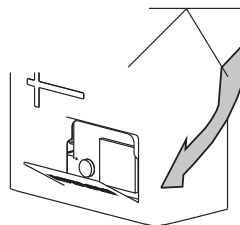


- After removing the cover on the lower side of the front panel of the water module, you can find the pressure gauge and wired remote controller. The cover is fixed by the magnet.

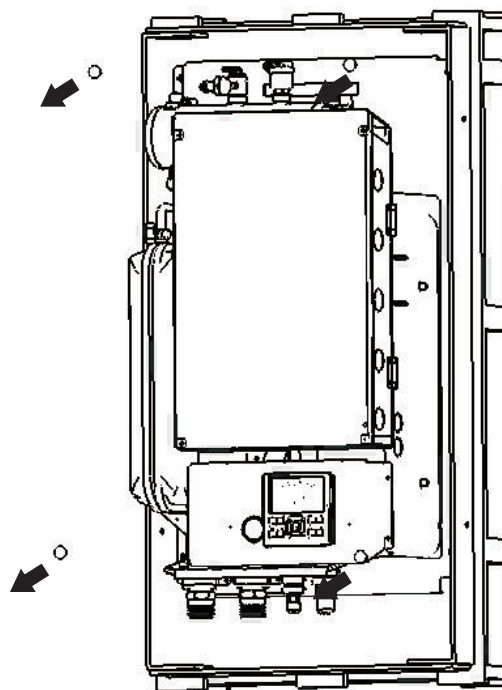


① Flip over the cover

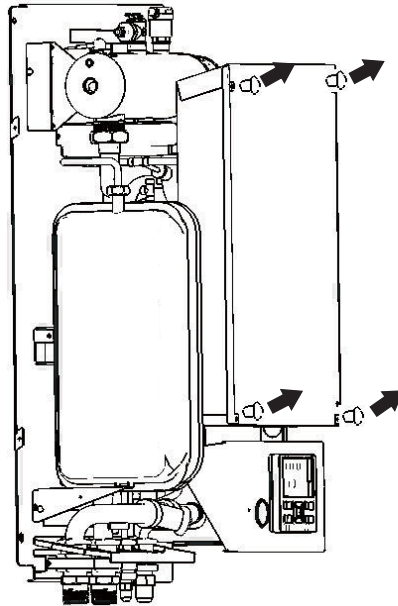
② Remove two fixing bolts



- As shown in the figure below, after removing four screws on the wood pallet, the packaging bottom and wood pallet can be taken away.

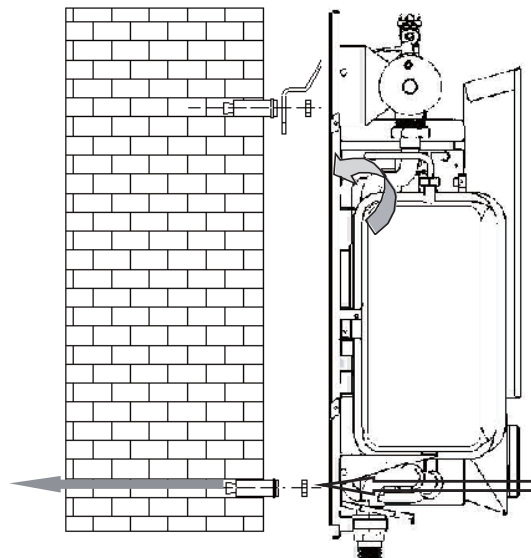


- Before opening the electric box, please make sure that all the powers are switched off (power of outdoor unit, water module, backup heater and water tank). As shown below, after removing four screws on the electric box, you can take off the cover and find internal components such as wires, terminals, etc.



- Please install the water module as follows:

- ① Install wall support plate with three expansion bolts horizontally on the wall.
- ② Put the water module on the wall support plate.
- ③ Two holes on the outer edge of the bottom frame can be used to fix the water module. Please use two expansion bolts of size M8 to fix the bottom of the water module.



- Please make sure that the installation wall can bear the operating weight (76kg) of the water module;
 - a. Water module will not tilt to all sides;
 - b. Water module will not have abnormal vibration or noise in operation;
- Please install the water module onto the wall support plate;

11.4 Water pipe work

	Project	Medium-low temperature water		Tendency	
		Cycle water: 20℃<T<60℃	Supplemental water	Corrosion	Scale
	PH(25℃)	7.0~8.0	7.0~8.0	V	V
Standard project	Electrical conductivity (mS/m)(25℃)	<30	<30	V	V
	Chloridion(mgCl ⁻ /L)	<50	<50	V	
	Sulfion(mgSO ₄ ²⁻ /L)	<50	<50	V	
	Acidconsumption ² (PH4.8)(mgCaCO ₃ /L)	<50	<50		V
	Totalhardness (mgCaCO ₃ /L)	<70	<70		V
	Calcium hardness(mgCaCO ₃ /L)	<50	<50		V
	Ionizedsilicon (mgCaSiO ₃ /L)	<30	<30		V
Reference project	Fe (mgFe/L)	<1.0	<0.3	V	V
	Cu (mgCu/L)	<1.0	<0.1	V	
	Sulfion (mgS ²⁻ /L)	Unmeasurable	Unmeasurable	V	
	Ammonium ion (mgNH ₄ ⁺ /L)	<0.3	<0.1	V	
	Chlorine residue (mgCl/L)	<0.25	<0.3	V	
	Free carbon dioxide (mgCO ₂ /L)	<0.4	<4.0	V	
	Stability Index	-	-	V	V

▲ Danger

The refrigeration circuit is filled with refrigerant R410A. Do not mix oxygen, acetylene and flammable or toxic gases in the leakage test and air tightness test, as these gases are quite dangerous and may cause an explosion. It is advisable to do these tests with nitrogen.

11.4.1 Material of refrigerant pipes

- (1) Copper pipes are prepared in the field
- (2) Select the pipe size according to the table below

Unit	(mm)	
Model	Gas pipe	Liquid pipe
AHM-070UXCSAPA3	15.88	9.53
AHM-160UXCSAPA3		

- (3) Select clean and moisture-free brass pipes. Before mounting, blow off the dust and impurities in the pipe with nitrogen or dry air.

11.4.2 Connection of refrigerant pipes

- (1) Make sure that the stop valve is closed;
- (2) Braze elbow and pipes prepared on site;
- (3) As shown in Fig. below, tighten the nut cap with two wrenches; refer to the torque requirements in the following table:

Piping diameter	Tightening torque (N·m)
Φ 9.53	40
Φ 15.88	80
Φ 19.05	100

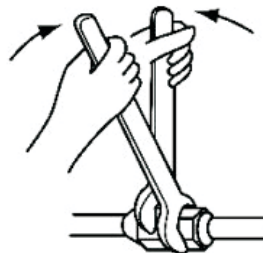


Fig. Tightening Nut Cap

(4) Insulation of the refrigerant pipe

After connecting the pipes, protect the gas pipe, liquid pipe, detection connectors and connector nuts with the insulation materials on site, and wrap with adhesive tapes to prevent heat dissipation and condensation on pipe surface.

(5) Refrigerant charging and discharging

Operate according to the mounting and maintenance manual of the outdoor unit.

11.4.3 Connection of water pipes

(1) Water pipe connection position is shown below

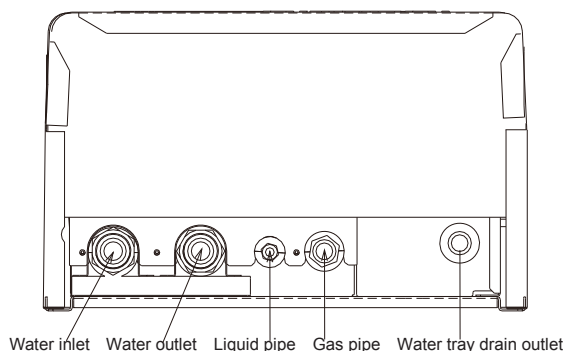


Fig. 12.4 Water Pipe Connection Position

(2) Precautions for water pipe connection

- Please pay attention to the connection position, and do not reverse inlet and outlet pipes.
- Use water pipes that comply with local or national regulations, and the size should be equal to or greater than the machine interface (G1-1/4").
- Inlet and outlet pipes should be properly insulated to prevent condensation or pipe freezing.
- Clean the water filters regularly according to the degree of clogging.
- After prolonged downtime in the winter, it is recommended to discharge all the water in the water module and the water pipes to prevent freezing.
- For any initial start-up after prolonged downtime, please thoroughly check and clean the unit and other equipment of the piping system.

(3) Basic requirements on water pipe operation:

- Rinse all water pipes thoroughly before mounting so that they do not have any foreign matters before they can be put into operation. Be careful not to rinse any foreign matters into the shell heat exchanger.
- Piping and fittings must be supported independently of the water module.
- The adapters and fittings of water module should be easily removed for easy operation and cleaning.
- A gate valve must be mounted on the water inlet and outlet piping of the water circulation system so that the water module channel can be cut off during maintenance.
- Flexible joints should be used between the water module interface and the field pipe to reduce the spread of vibration and prevent pipe rupture.
- For easy maintenance, thermometer or pressure gauge should be mounted in the inlet and outlet pipes. The pressure gauge and thermometer should be purchased by the user.
- All low points of the water system should have drainage interfaces so that the water in the water module and pipes can be discharged smoothly; all high points should have exhaust devices to remove air from the pipe. For easy maintenance, exhaust valve and water outlet do not need insulation treatment.
- All water pipes in the system that may be frozen should be insulated to prevent freezing and rupture of the pipes in low temperature environments.
- Connect the water tray outlet and the drainage pipe with the water pipe joint provided in the accessories, and fix the water pipe joint with the drainage pipe and the water tray outlet together respectively with clamps to prevent the condensate outflow.

(4) Water treatment and water quality management

- Before using any scale inhibitor or preservative for water treatment, please check with water treatment company that these solutions have no corrosion effect on stainless steel and copper products.

12 . Operation and control



Figure **Wired remote control switch (HYXE-F12H)**

- | | |
|---------------------------------------|--|
| A Operation buttons | (18) "TIMER"(timing run) display |
| (1) "STER"button | (19) Alarm icon display |
| (2) Domestic hot water button | (20) "NO FUNCTION" display |
| (3) "TEMP."button | (21) "CENTRAL" display |
| (4) "CHECK"button | (22) "CHECK" display |
| (5) "RESET"button | (23) "STER" display |
| (6) FUNC(Function Selection) | (24) "RUN CTRL" display |
| (7) "MODE" button | (25) Defrosting to anti-freeze icon display |
| (8) "RUN/ STOP" button (LED light) | (26) COOL / HEAT run mode display |
| (9) "SCHEDULE"button | (27) "AUTO" |
| (10) "Timer"button | (28) 7 -day timing mode display |
| (11) "TIME"button | (29) Temperature code display |
| B LCD Display | (30) "SET TEMP."display |
| (12) Date display | (31) Floor heating / Domestic hot water Pool water / Fan coil function display |
| (13) "ON/OFF"display | (32) Boiler Solar energy function display |
| (14) Clock icon display | (33) Water pump run Energy saving - icon display |
| (15) "TIME"display | (34) Locked icon display |
| (16) "SERVICE" display | (35) Test run icon display |
| (17) Service code display | (36) Electrical heater icon display |



Note

Only press the buttons with fingers to avoid damaging the buttons. Do not touch the CHECK button, which is only intended for service personnel. If you press it by mistake, press it again to reset.

- Temperature setting

Every time the “Temp. Control” button is pressed, the set outlet water temperature increases or drops by 1°C. In heating mode, the minimum set temperature is 20°C, and the maximum set temperature is 55°C; in Cooling mode, the minimum set temperature is 5°C, and the maximum set temperature is 20°C.

- Temperature and actual indoor temperature

The set outlet water temperature is the temperature on the sensor of the water module. Due to the sensor error, the measured temperature may be different from the actual temperature.

- Contact buttons

All the buttons on the wired remote control are contact type, and you just need to press lightly. The operating status can be confirmed on the LCD.

- LCD symbols disappear

If all symbols disappear in system running process, it is caused by communication signal distortion due to electromagnetic interference. In this case, please cut off the power and turn on again, and the communication error will be eliminated.

- External mounting of wired controller

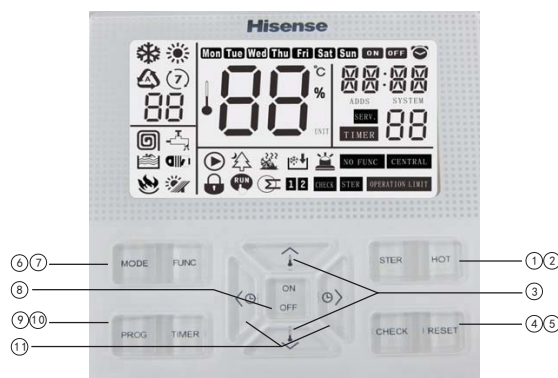
Water module controller is mounted by leading the shielded twisted pair. Pay attention to avoid communication cable short circuit or open circuit during wiring. The maximum length of the wire is 500m.



Note

- Although LCD display includes swimming pool water, boiler and solar energy symbols, this water module doesn't have these functions.
- If the unit hasn't been used for a long time, turn on the power for 12 hours before starting the unit. Do not start the unit immediately after turning on the power, or else the compressor may be damaged because the lubricant isn't warmed up.
- Check if the outdoor unit is covered by ice and snow; if yes, remove with warm water. Do not use water exceeding 50°C, or else it will damage the plastic parts.
- Do not cut off the power of the water module even it isn't used. If it won't be used for a long time, please drain the circulating water in the system, or else the system may be damaged due to freezing.
- Before running floor heating function every season, start “floor drying operation” function first, or else the floor may be damaged because the temperature rises too fast.

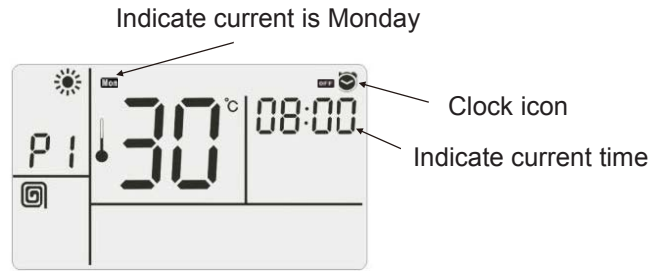
12.1 Operating Steps



12.1.1 Setting Standard Time

Step 1

Turn on the power, and four straight lines and default status of the controller appear on the LCD (last function also may appear)



Step 2

Press and hold the timer button ⑩ for three seconds to enter standard time setting, and current week and time flash; press the temperature control ③ button to adjust the week, and press the right button or left button of time setting ○ to adjust the time; press the button once to increase or decrease the minute by 1, or press and hold it to increase or decrease the minute by 10; press the schedule button ⑨ to exit standard time setting, or the system exits automatically if there is no operation in 15 seconds.

Note:

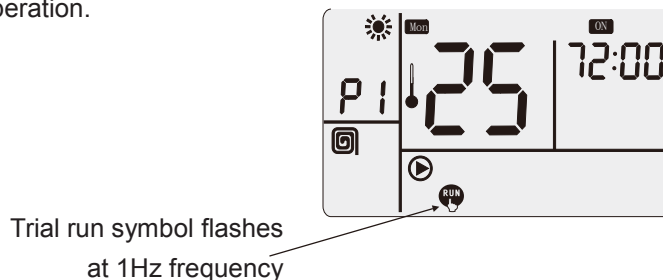
Time setting must be done in standby state.

12.1.2 Heating Operation

12.1.2.1 Floor Drying Operation

Step 1

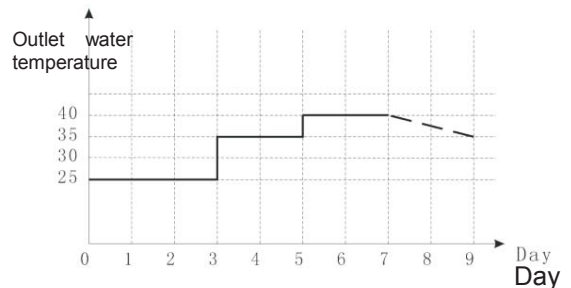
In standby state, press and hold the reset button ⑤ and hot water button ② simultaneously for three seconds to enter floor drying operation.



Step 2

Heat for seven days in this mode, and set the outlet water temperature as shown in the figure below:

- Set the outlet water temperature to 25°C and run for 72 hours
- Set the outlet water temperature to 35°C and run for 48 hours
- Set the outlet water temperature to 40°C and run for 48 hours



Step 3

After floor drying operation for seven days, the outlet water temperature of water module returns to the set value; if no outlet water temperature is set, it will resume default value.



Note

- Before running floor heating function every season, this function must be run to avoid damaging the floor because the temperature rises too fast.
- Before running floor heating function, replenish water to the system (make sure that the exhaust valve is open), and make sure that the water pressure is in normal range.
- In floor drying mode, the controller only responds to on/off operation, while other modes, functions and temperature control are unavailable.

- The 7-day floor drying is accumulated time; if the unit is turned off midway, floor drying resumes when it is turned on next time. Trial run symbol flashes at 1Hz frequency.
- If instantaneous power failure occurs during running, floor drying resumes when the power is connected. If the power has been cut off for a long time, the floor drying will be turned off when the power is connected. You need to press Start/Stop button ⑧ to restart floor drying (running time is 7 days accumulated)



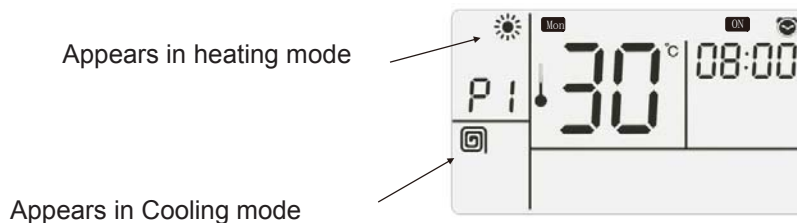
Warning

You can terminate floor drying in advance by pressing and holding the reset button ⑤ and hot water button ② simultaneously for three seconds. Please note that stopping floor drying in advance may damage the floor.

12.1.2.2 Heating Operation

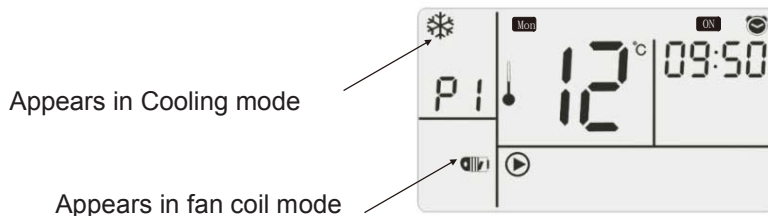
Step 1

Turn on the power, and four straight lines and default status of the controller appear on the LCD (last function also may appear). Press the Mode button ⑦ to show the heating mode symbol on the LCD.



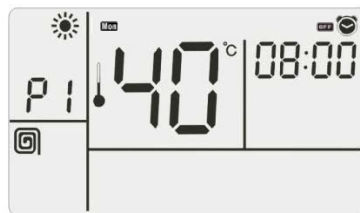
Step 2

According to the actually mounted terminals, press the Function button ⑥ to show floor heater on the LCD; press the Function button ⑥ repeatedly and the symbol will switch between floor heater and fan coil.



Step 3

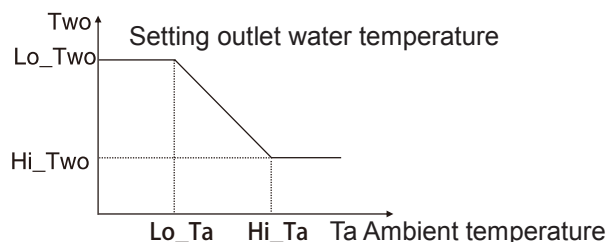
To increase the outlet water temperature setting, press the ^ button of temperature control ③. To reduce the outlet water temperature setting, press the v button of temperature control ③. The maximum outlet water temperature set in heating mode is 55°C, and the minimum temperature is 20°C.



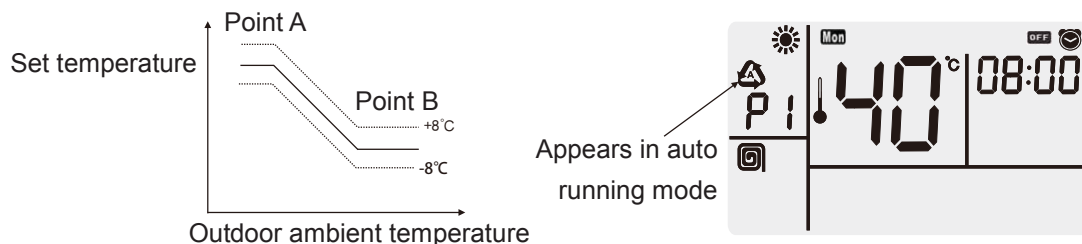
Note

- You can also set automatic control of outlet water temperature in site settings of wired remote control. After setting, the outlet water temperature of the unit adjusts automatically according to the changes of outdoor ambient temperature (OTC); see “ 16.2.7 Site Settings” for the specific setting method. The settings include auto control on/off (b9), start time and end time every day (C1, C2), minimum and maximum ambient temperature (C3, C4) and water temperature corresponding to minimum and maximum ambient temperature (C5, C6)
- OTC: outlet water temperature automatic control function. In this function, the outlet water temperature of the system adjusts automatically between Lo-Ta and Hi-Ta according to the ambient temperature. The specific temperature control is shown below:

Lo_Two Low ambient temperature setting (C5)
 Hi_Two High ambient temperature setting (C6)
 Lo-Ta Low ambient temperature (C3)
 Hi-Ta High ambient temperature (C4)
 Two Setting outlet water temperature
 Ta Outdoor ambient temperature



When the unit is in outlet water temperature auto-control state, the set outlet water temperature is calculated by the wired controller automatically; you can adjust the calculation result by 8°C, but shouldn't exceed the upper limit and lower limit of the temperature setting.



When OTC starts, auto-run icon appears, indicating that it enters OTC function; after the set time, the auto-run icon disappears.

Step 3

Press the Start/Stop button ⑧, the running LED turns on and the unit starts running.



12.1.3 Cooling Operation

Cooling mode is available only when fan coil is valid.

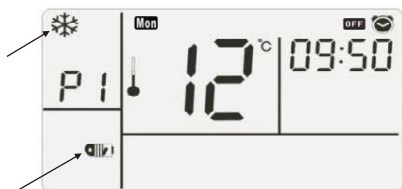
When the main power is turned on and unit is restarted, the last set function will appear on the LCD.

Step 1

Turn on the power, and four straight lines and default status of the controller appear on the LCD (last function also may appear). Press the Mode button ⑦ to show the cooling mode symbol on the LCD (cooling terminal only has fan coil).

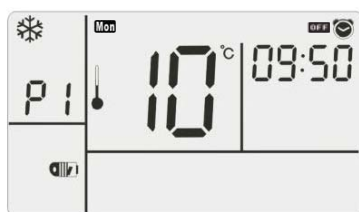
Appears in cooling mode

Appears in fan coil mode



Step 2

To increase the outlet water temperature setting, press the ^ button of temperature control ③. To reduce the outlet water temperature setting, press the v button of temperature control ③. The maximum outlet water temperature set in cooling mode is 20°C, and the minimum temperature is 5°C.



Step 3

Press the Start/Stop button ⑧, the running LED (12) turns on, “ON” appears and the unit starts running.



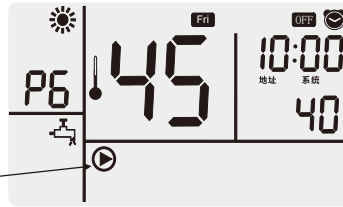
12.1.4 Other Operations

12.1.4.1 Water Pump Anti-rusting

- If the unit hasn't been used for a long time, it will start the water pump operation regularly to prevent rusting of the water pump and other circulation parts.

- Start condition:

This operation starts automatically when the machine is in standby state. You can disable this function, but it isn't recommended (5.1.6 site setting “G1”)



Water pump operation

- The default time to enter anti-rusting automatically: Starts at 0:00 (5.1.6 site setting “G2”) every Saturday (5.1.6 site setting “G3”), lasts for one minutes, and then exits automatically to stop state.

- When the anti-rusting has been started, it exits under the following three conditions

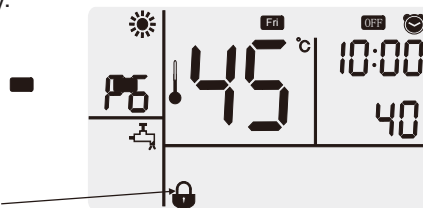
- ① Running time reaches one minute
- ② Timer function starts
- ③ Intervened by manual operation

12.1.4.2 Quick Lock

- When the system enters quick lock state, all functions that relate to time and can enable unit automatic start are disabled, including 7-day timer, timer, sterilize, auto water storage and maintaining minimum water temperature.
- If you will go out for a long time, you can enable quick lock to avoid timer function starting.

Step 1

Press and hold the Reset button ⑤ for three seconds to enter quick lock, the water module directly turns off, and the lock icon flashes at 1Hz frequency.



Lock icon flashes

Step 2

In lock state, press and hold the Reset button ⑤ for three seconds to exit, and the water module runs in off state. All timer functions before locking are canceled, and you need to press the Schedule button ⑨ or Timer button ⑩ to start desired timer functions.



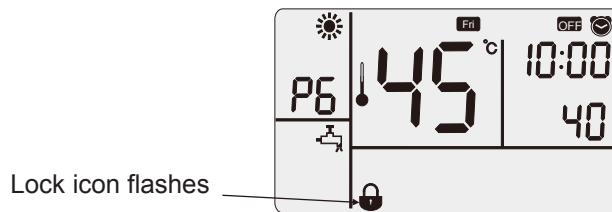
Note

Please note that the quick lock function will cancel all schedules and timers that have been set.

12.1.4.3 Controller Keypad Lock

Step 1

When the controller power has been turned on, press and hold the < button and > button of time setting ⑪ simultaneously for three seconds to enter controller keypad lock.



Step 2

You also need to press and hold the < button and > button simultaneously for three seconds to exit.

Note

- When the controller is in keypad lock state, it doesn't respond to any key pressing in order to prevent disoperation by children.
- Keypad lock doesn't affect the operation of the unit.

12.1.5 Timer Operation

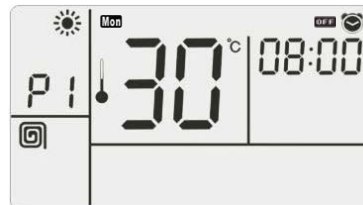
Note

- In timer operation state, the system will run or stop at set time.
- When the timer has been set, the setting will resume after instantaneous power failure; however, the timer will be canceled after long time power failure.

12.1.5.1 Setting Floor Heater Timer

Step 1

Turn on the power, and four straight lines appear on the LCD (last function also may appear).

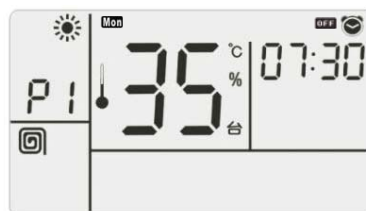


Step 2

Press the function selection button ⑥ to show the floor heater symbol on the LCD.

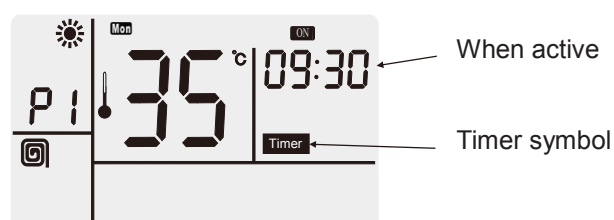
Step 3

To increase the outlet water temperature setting, press the ^ button of temperature control ③. To reduce the outlet water temperature setting, press the v button of temperature control ③. The maximum outlet water temperature set for floor heating is 55°C, and the minimum temperature is 20°C.



Step 4

If you press the Timer button ⑩ in stop state, the "ON" symbol will appear, so does the "Timer" symbol. If you press the Timer button ⑩ in the running process, the "OFF" symbol will appear, so does the "Timer" symbol.



Press the > button of time setting (11) to increase the time; press the < button to decrease the time. The set time can be adjusted between 30 minutes and 24 hours by 30 minutes. In timer state, the system will run or stop at specified time. For example, if the set time is “09:30”, the system will run or stop after 9.5 hours.

12.1.5.2 Cancel Timer

press the Timer button (10), the timer symbol disappears and the timer function is canceled.



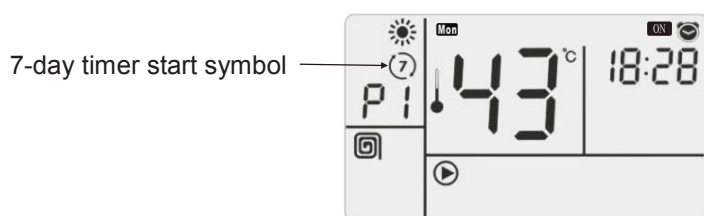
12.1.6 7-day Timer Operation

12.1.6.1 7-day Timer Operation

Press the Schedule button (9) to enter or exit 7-day timer operation. In 7-day timer mode, the unit starts and stops according to previously set procedure. You can still turn on/off the unit, adjust water temperature, change operation function or start timer through manual operation in this mode. In case of instantaneous or long time power failure in 7-day timer mode, the system resumes 7-day timer operation when the power is connected. If different settings appear at the same time point, follow the latter setting. In 7-day timer operation, start/stop time points don't need to appear in pair.

Note

After long time power failure, please check if the date and time are correct when the power is connected.

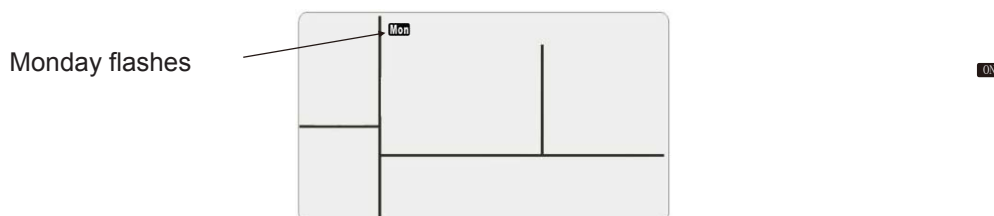


12.1.6.2 Schedule Setting

In power off state (unavailable in power on state), press and hold the Schedule button (9) for three seconds to turn on/off the schedule setting function. In this mode, you can set timer for eight periods every day by OK (Schedule button (9)), >/< of time setting (11), ^/v of temperature control (3), Cancel (Sterilize button (1)), operation mode selection (7) and function selection (6), and set the functions and outlet water temperature of each period.

Step 1

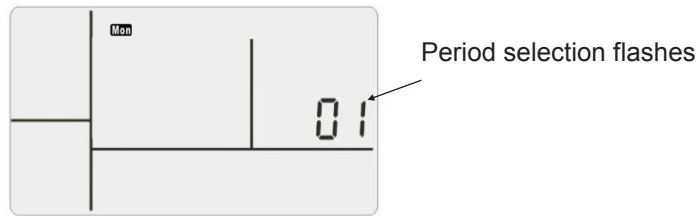
Press and hold the Schedule button (9) for three seconds to enter week setting, and “Mon.” flashes. Press the ^/v button of temperature control (3) to select desired week.



Step 2

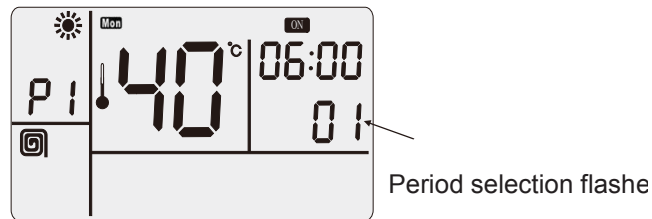
Press OK (Schedule button (9)) to enter period setting, and period [01] flashes at 1Hz frequency; press the >/< button of time setting (11) to select desired period from 1 to 8.

If the period hasn't been set, only the period number flashes, as shown above.



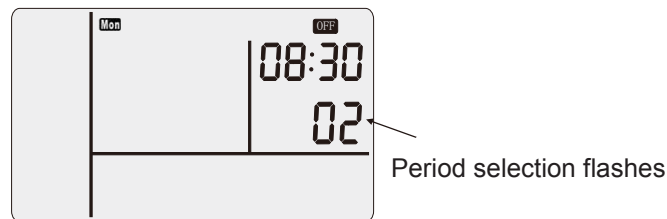
Note

- If the period has been set, it has two display states.
- First: Schedule power on



The figure above shows that the set period is 01, the machine starts at 6:00 a.m. on Monday for floor heating, the outlet water temperature of control target is 40°C, and floor heating symbol is P1.

- Second: Schedule power off



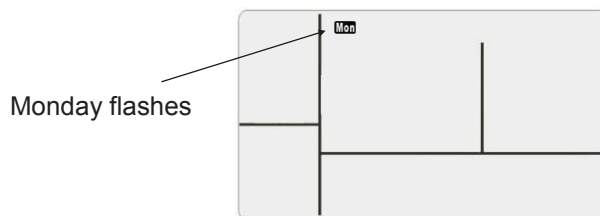
The figure above shows that the set period is 02, and the machine shuts down at 8:30 a.m. on Monday.

Step 3

Press OK (Schedule button ⑨) and then press the >/< button of time setting (11) to select timers on ("ON" flashes at 1Hz frequency), timer off ("OFF" flashes at 1Hz frequency) or cancel timer (both "ON" and "OFF" flash at 1Hz frequency)

Step 4

When "Tue." flashes at 1Hz frequency, press and hold the hot water button ② for three seconds to copy the setting of previous day (Monday) to current day (Tuesday), "Tue." Changes to "Wed." and flashes at 1Hz frequency. If you press and hold the hot water button ② for three seconds again, the setting of Tuesday will be copied to Wednesday. This function allows copying the period setting of previous day, and thus 7-day timer can be set quickly.



Step 5

After setting, repeat step 4 to exit schedule setting. After setting the 7-day timer, please fill out the details in "7-day Timer Operation Schedule" for future reference.

12.1.7 Site Setting (Wired Controller Function)

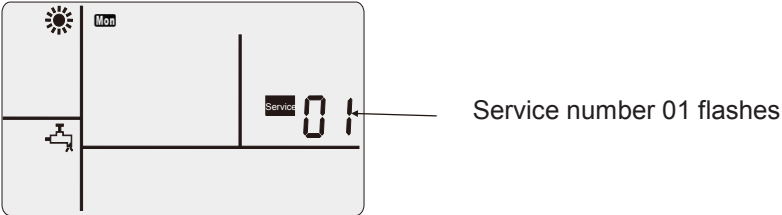
Through wired controller, you can enable/disable different terminals in site settings according to the terminal mounting. When switching functions with wired controller, the function can be selected only when it is valid. See Step 4 for specific setting. You can select to enable/disable floor heater water temperature auto control (OTC) and fan coil according to actual use.

Note:

- Wired controller site setting is unavailable in power on state.
- To select setting mode, press ^/v of temperature control ③ to select the number and address of the refrigeration system to be set; this model does not need to select system and address (use system default).
- In site setting state, the wired controller returns to normal state automatically if there is no operation in two hours.
- In site setting state, the wired controller can return to normal state when the power is connected after instantaneous or long time power failure.

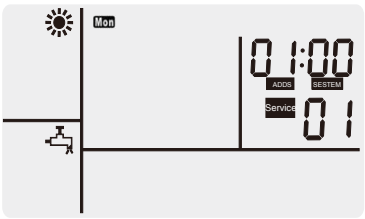
Step 1

In power off state, press and hold the Check button ④ and Reset button ⑤ simultaneously for three seconds to enter site setting state, the service number flashes at 1Hz frequency, and the wired controller displays as follows.



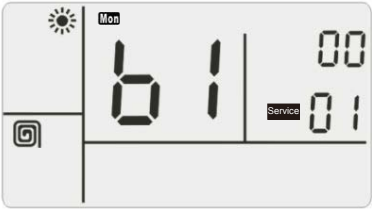
Step 2

Press the Check button ④ in above interface to enter site setting mode.



Step 3

Continue to press the Check button ④ to enter site function setting state.



Step 4

Press the >/< button of time setting (11) to change the items to be set; press the Sterilize button ① and Check button ④ to change the value; the floor heating and fan coil of wired remote control should be set according to relevant options set on site (floor heating is default which has been set in the factory), and can be selected only when the function is valid. The specific options are shown below:

Function	Corresponding site setting
Fan coil	d2
Floor heating	d4

Step 5

Press the >/< button of time setting (11) to view the setting code and content of common items used on site; refer to the table below for details:

No.	Code	Setting	Default	Range	Min. adj. unit	Unit	Function	Remark
1	b9	Auto temperature control	Invalid	Invalid/valid	/	/	OTC function invalid/ valid	00:Invalid, 01: Valid
2	C1	Start time of auto temperature control	23:00	0:00~23:00	1	h	OTC start time	The value indicates one day (24 hours)
3	C2	End time of auto temperature control	5:00	0:00~23:00	1	h	OTC end time	The value indicates one day (24 hours)
4	C3	Low ambient temperature	-20	-20~5	1	°C	Confirm OTC temperature curve	The value indicates temperature range
5	C4	High ambient temperature	20	6~25	1	°C		The value indicates temperature range
6	C5	Set water temperature in low ambient temperature	44	20~55	1	°C		The value indicates temperature range
7	C6	Set water temperature in high ambient temperature	25	25~55	1	°C		The value indicates temperature range
8	G1	Water pump anti-rusting	Valid	Invalid/ valid	/	/	If it hasn't been run for a long time, start the water pump and run a short period to prevent rusting and corrosion of water system	00: Invalid, 01: Valid
9	G2	Operating time of water pump anti-rusting	0:00	0:00~23:00	1	h	Start time of water pump anti-rusting	The value indicates one day (24 hours)
10	G3	Operating cycle of water pump anti-rusting	06	01~07	1	Day	Default operating time is every Saturday	The value indicates one week (7 days)

Step 6

You may set certain unnecessary items improperly in site setting. Below are required default values, and improper settings may lead to operation failure of the water module.

No.	Code	Default	Remark
1	b4	Invalid	00: Invalid, 01: Valid
2	b6	Invalid	00: Invalid, 01: Valid
3	b7	Invalid	00: Invalid, 01: Valid
4	E1	Invalid	00: Invalid, 01: Valid
5	E7	Invalid	00: Invalid, 01~03: Valid
6	F3	Invalid	00: Invalid, 01~24: Valid
7	F9	Invalid	00: Invalid, 01: Valid
8	H2	Invalid	00: Invalid, 01: Valid
9	H9	Invalid	00: Invalid, 01: Valid
10	J4	Invalid	00: Invalid, 01: Valid
11	J5	Invalid	00: Invalid, 01: Valid

Step 7

Press the Reset button (5) to exit site setting.

Note

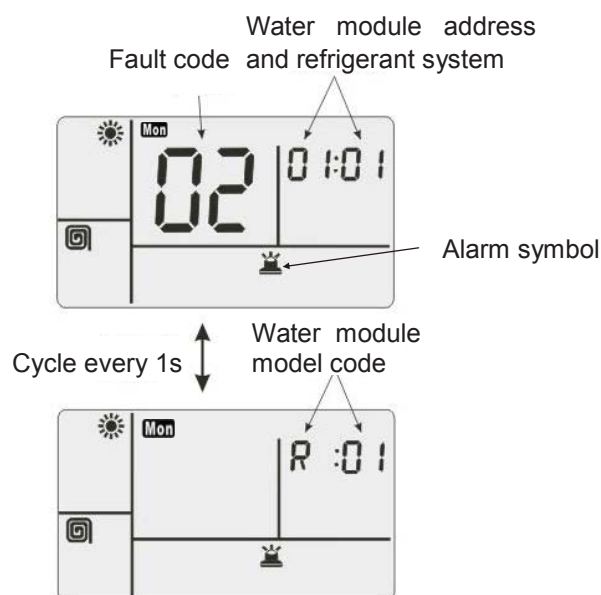
- This table doesn't include all setting functions of the wired controller; for the setting of other function, please consult local dealer.

12.2 Stop Operation

Press the Start/Stop button (8) to stop the system, and the LED turns off.

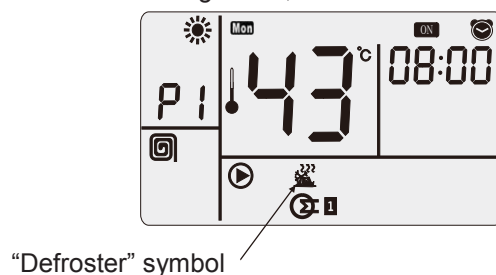
12.3 Other Symbols

- Exception "alarm" symbol (appears when operation is abnormal): When any exception such as protection device problem and "Start/Stop" indicator flashing occurs, the LCD shows "alarm" symbol. In this case, please check the cause and adjust accordingly. To restart the system, press the "Start/Stop" button twice or press the "Reset" button once. When "Alarm" appears on the LCD, the cause and the number of abnormal machine also appear in the temperature display area of the LCD. In this case, please contact our agent.



● “Defroster” symbol

When the heating operation enters defrosting mode, the LCD shows “Defroster” symbol.



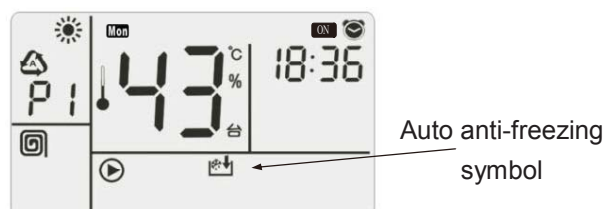
● “NA” symbol

As the wired remote control is universal part, the LCD shows “NA” symbol and flashes five times if the operating function is not available on the water module.



● Auto anti-freezing symbol

The unit has auto anti-freezing function, and the LCD shows auto anti-freezing symbol when this function is activated.



Note:

If all symbols disappear in system running process, it is caused by communication signal distortion due to electromagnetic interference. In this case, please restart the system.

12.4 Check

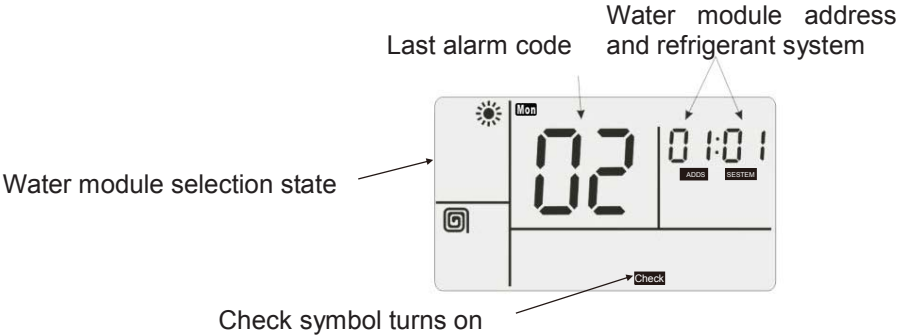
Check modes include [Check mode 1] and [Check mode 2], which have the following difference:

- Check mode 1: Display sensor and other data that should be updated every 30 seconds.
- Check mode 2: Display the data of the moment before alarm occurs as the data are saved in EEPROM.

12.4.1 Check Mode 1

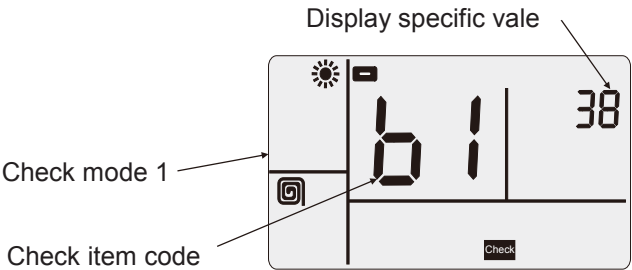
Step 1

Press and hold the Check button ④ for three seconds to enter water module selection state in check mode



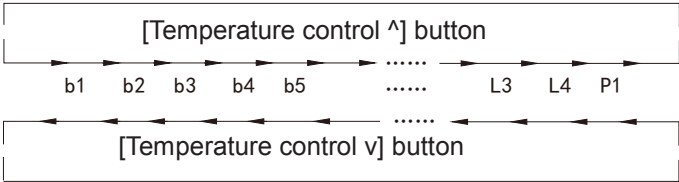
Step 2

Press the Check button ④ or wait for seven seconds to enter communication of [Check 1 data format]and show the data of check 1.



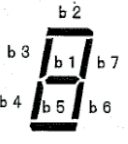
Step 3

Press ^/v of temperature control button ③ to cycle the check items (as shown on the right). The temperature display area will show the check item code.



Note:

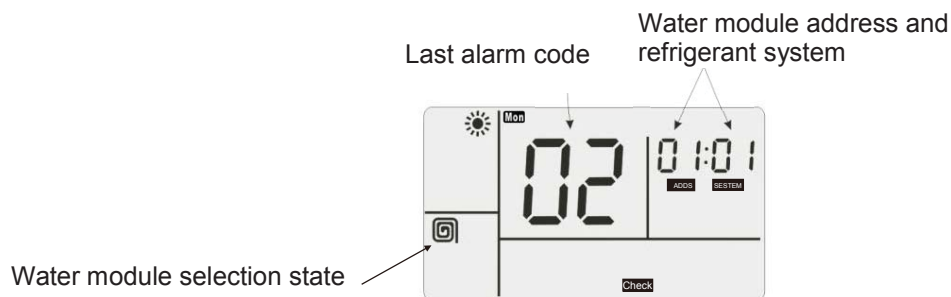
Refer to the following table for the display of “Check mode 1” data:

No.	Check item	Symbol	Unit	Example	Parameter description
1	Target water temperature	b1	°C	45	Temperature set by wired remote control
2	Inlet water temperature of water module	b2	°C	30	Measured temperature
3	Outlet water temperature of water module	b3	°C	35	Measured temperature
4	Liquid pipe temperature of water module	b4	°C	34	Measured temperature
5	Outlet water temperature of heat exchanger	b5	°C	40	Measured temperature
6	Ambient temperature	b6	°C	25	Measured temperature
7	Gas pipe temperature of water module	b7	°C	60	Measured temperature
8	Water temperature of domestic water tank	b8	°C	53	Temperature for water tank test
9	Evaporation temperature of outdoor unit	b9	°C	6	Measured temperature
10	Top exhaust temperature of compressor	bA	°C	70	Measured temperature
11	Wired controller thermistor temperature	bb	°C	30	Reserved (measured temperature of the room)
12	Set water temperature of domestic water tank	bC	°C	55	-
13	Reserved	bd	°C	30	-
14	Reserved	bE	°C	30	-
15	Ambient temperature (average)	bF	°C	25	Average ambient temperature
16	Water module I/O state	C1	-	8	b1: thermostat boot input state b2: forced thermostat stop input state b3: water module pump operation status b4: water module electric heating state b5: domestic water tank electric heating state 
17	Downtime cause	d1	-	10	Show the cause of last downtime (see Technical Data II for details)
18	Times of exception	E1	Time	5	-
19	Instantaneous power failure times of indoor unit	E2	Time	6	-
20	Times of communication error between wired controller and water module	E3	Time	7	-
21	Times of inverter exception	E4	Time	8	-
22	Exhaust pressure	H1	MPa	29	Outdoor unit pressure (×10)
23	Suction pressure	H2	MPa	6	Outdoor unit pressure (×10)
24	Target exhaust pressure	H3	MPa	23	Outdoor unit pressure (×10)
25	Compressor operating frequency	H4	Hz	80	-
26	Water module capacity	J1	-	140	Recognize automatically according to model
27	Outdoor unit number	J2	-	WP01	-
28	Refrigerant system number	J3	-	1	-
29	Refrigerant system number	J4	-	0	-
30	Operating state	J5	-	0	OFF:0 Floor heater thermostat ON: 1 Floor heater thermostat OFF: 2 Fan coil thermostat ON: 3 Fan coil thermostat OFF: 4 Water tank thermostat ON: 5 Water tank thermostat OFF: 6
31	Water module wired controller ROM number	J6	-	V11	-
32	Water module expansion valve opening	L1	%	30	Percentage of maximum opening
33	Outdoor unit expansion valve opening	L2	%	20	Percentage of maximum opening
34	Outdoor unit expansion valve opening	L3	%	20	Percentage of maximum opening
35	Outdoor unit expansion valve opening	L4	%	20	Percentage of maximum opening
36	Compressor operating current	P1	A	12	-

12.4.2 Check Mode 2

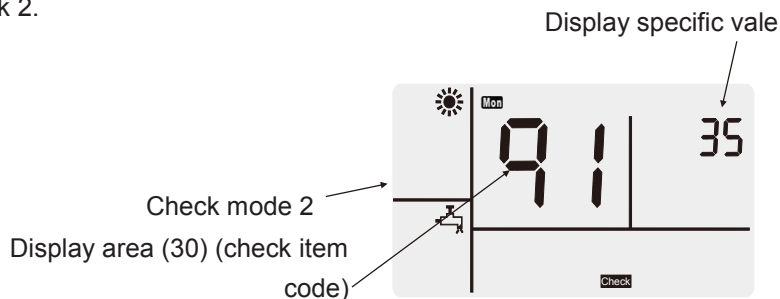
Step 1

You need to enter check mode 1 before entering check mode 2. In check mode 1, press and hold the Check button ④ for three seconds to enter water module selection state.



Step 2

Press the Check button ④ or wait for seven seconds to enter communication of [Check 2 data format] and show the data of check 2.

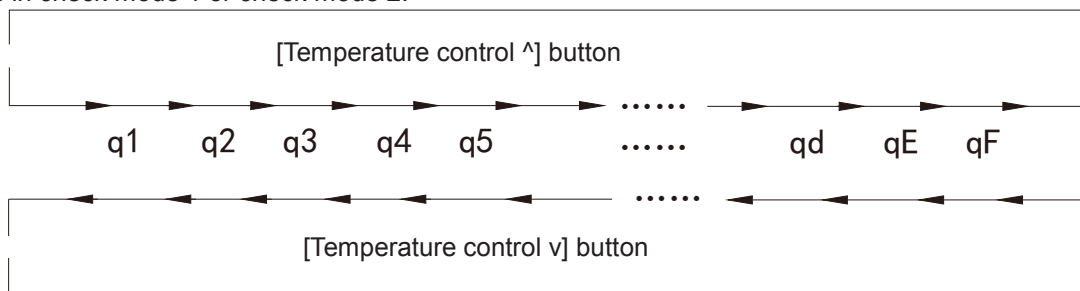


Step 3

In check data display state, press ^/v of temperature control button ③ to cycle the check items. The temperature display area (30) will show the check item code.

Step 4

In check mode 2, press the Check button ④ to exit. The system also exits automatically if there is no operation in two hours in check mode 1 or check mode 2.



Note:

- Refer to the following table for the display of “Check mode 2” data.
- Note for tables of “Check mode 1&2”: Please note that there are more “symbols” during checking, which are not used by this model and not described here.

No.	Check item	Symbol	Unit	Example	Parameter description
1	Inlet water temperature of water module	q1	°C	30	Measured temperature
2	Outlet water temperature of water module	q2	°C	35	Measured temperature
3	Liquid pipe temperature	q3	°C	45	Measured temperature
4	Outdoor ambient temperature	q4	°C	25	Measured temperature
5	Gas pipe temperature	q5	°C	40	Measured temperature
6	Evaporation temperature of outdoor unit	q6	°C	8	Measured temperature
7	Outlet water temperature of heat exchanger	q7	°C	8	Measured temperature
8	Top exhaust temperature of compressor	q8	°C	60	Measured temperature
9	Exhaust pressure	q9	MPa	23	Outdoor unit pressure (×10)
10	Suction pressure	qA	MPa	6	Outdoor unit pressure (×10)
11	Targetfrequency of water module	qb	Hz	135	-
12	Compressor operating frequency	qC	Hz	55	-
13	Water module expansion valve opening	qd	%	5	Percentage of maximum opening
14	Outdoor unit expansion valve opening	qE	%	10	Percentage of maximum opening
15	Compressor operating current	qF	A	5	-

13 Automatic Protection Function

- 3-minute stop protection

In order to protect the compressor, it can't be operated in three minutes after stopped.

- 3-minute operating protection

Make sure that the compressor has run at least three minutes. If not, the compressor won't stop before it has run three minutes even if the outlet water temperature of the water module has reached the set temperature.

- Auto-defrosting

Press the "Start/Stop" button to stop heating, the outdoor unit will detect the frosting automatically and still can defrost for up to ten minutes.

- Auto anti-freezing

To prevent water pipe and pump cracking in winter, the system will automatically start water pump or outdoor unit to prevent freezing of water system if the water temperature is too low in power off state

13.1 Standard Operating Procedure

(1) Cooling (normal operating)

The temperature range of cooling operation is refer to outdoor unit section 10.

- a. In heating mode, the setting and control range of hot water temperature is 20~55°C (default: 12°C)
- b. In normal heating operation, the target outlet water temperature Ttwo:

$$T_{two} = TF1 + Ts \beta \quad (5 \leq T_{two} \leq 22)$$

Ttwo: Target water temperature during refrigeration

TF1: Value set by wired controller

Ts β: Correction value of target water temperature

The operating frequency of compressor relates to the following factors:

- 1) Horsepower of running indoor units;
- 2) Capacity correction factor when the selected capacity is corrected;
- 3) Exhaust pressure correction;
- 4) Exhaust pressure too low prevention correction;
- 5) Return oil correction;
- 6) Water module inlet/outlet water temperature difference;
- 7) Outlet water temperature too low prevention correction;

(2) Heating (normal operating)

The temperature range of heating operation is refer outdoor unit section 10 .

- a. In heating mode, the setting and control range of hot water temperature is 20~55°C (default: 12°C)
- b. In normal heating operation, the target outlet water temperature Ttwo:

$$T_{two} = TF1 \quad (20 \leq T_{two} \leq T_{max} \text{ (shown above)})$$

Ttwo: Target water temperature during heating

TF1: Value set by wired controller

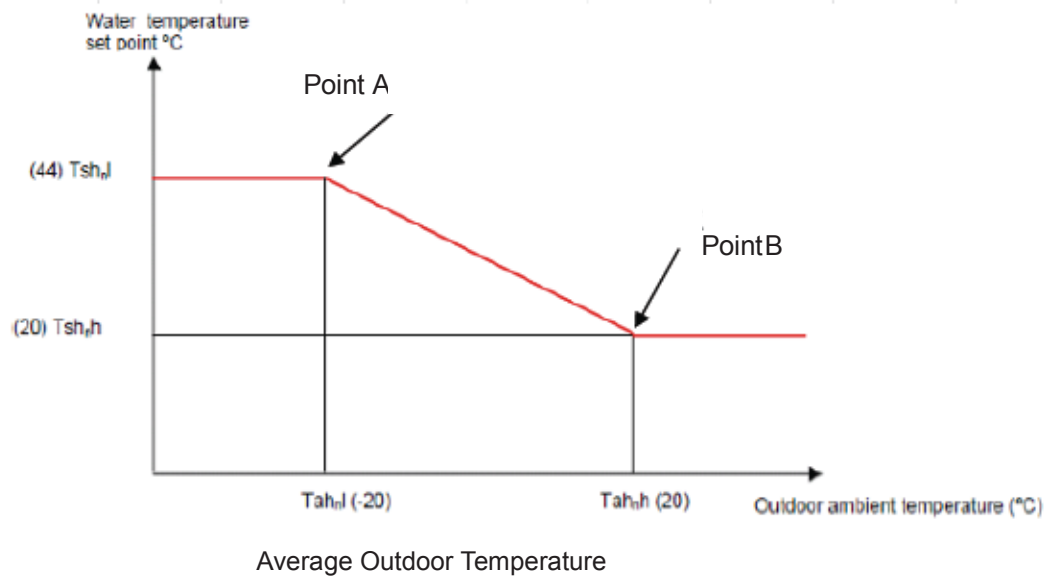
- c. In heating OTCpoint mode, the target outlet water temperature Ttwo:

$$T_{two} = \text{Calculated target water temperature} + T_{sd} \quad (20 \leq T_{two} \leq T_{max} \text{ (shown above)})$$

Ttwo: Target water temperature during heating

Tsd: Correction value of target water temperature (shown below)

The calculation of target water temperature bases on the following characteristic lines



Symbol	Content	Initial value	Range	Interval	Unit
Tah1L	Outdoor temperature of point A	-20	-20~5	1	°C
Tah1h	Outdoor temperature of point B	20	6~25	1	°C
Tsh1L	Target water temperature of point A	44	20~55	1	°C
Tsh1h	Target water temperature of point B	25	25~55	1	°C

(3) Auto anti-freezing

To prevent water pipe, floor heater pipe and water pump cracking in winter, the unit will enter anti-freezing operation under the following conditions in power off state:

- Operating power of the units hasn't been cut off;
- Water pump anti-freezing: When water temperature $T_{wi} < 5^{\circ}\text{C}$, water pump starts;
When water temperature $T_{wi} > 7^{\circ}\text{C}$, water pump stops;
- Anti-freezing of auxiliary electric heating: When water temperature $T_{wi} < 3^{\circ}\text{C}$, electric heating stops;
When water temperature $T_{wi} > 7^{\circ}\text{C}$, electric heating stops.

(4) Water pump control

- In power off state, set the mode and outlet water temperature properly, press the ON button and the water pump starts operating immediately;
- In power on state, press the OFF button, the water pump continues operating and turns off after three minutes;
- In power on state, if water flow switch protection alarm or other faults that can't be reset occur, the water pump turns off after three minutes;
- In power on state, if the water module should be stopped due to failure of outdoor unit, the water pump turns off after three minutes;
- In power off state, set the manual button to control water pump running independently (used for commissioning, water system exhaust);
- In the defrosting process, the water pump maintains operating; if you press the OFF button in this process, the water pump will wait for three minutes after receiving defrosting complete signal from outdoor unit before turning off;

Note: 1. Faults that can't be reset refer to those that can be released only when the unit is turned off;

2. In power on state, if faults that can be reset (e.g. sensor failure) occur, the water pump turns off after three minutes; when the faults are eliminated (alarm message released), the water pump should start operating immediately.

(5) Fan coil linkage function

In power off state, if the fan coil linkage switch is closed, the system turns on immediately; if all fan coil switches are closed, the system returns to power off state (if the system is controlled by wired controller, the system doesn't respond to the fan coil linkage switch).

● Trial run

The indoor controller starts trial run when receives trial run signal or receives trial run signal sent by outdoor unit.

- Cooling: Send refrigeration trial run signal to outdoor unit; the indoor water module is always Thermo ON regardless of the value of $(T_{ow}-T_s)$; others are same as normal operating;
- Heating: Send heating trial run signal to outdoor unit; the indoor water module is always Thermo ON regardless of the value of $(T_{ow}-T_s)$; others are same as normal operating;

Note: 1. 3-minute stop protection of compressor is invalid

- Trial run is prohibited during operating

● Floor heater trial run

Before trial run, the air in the water system must be thoroughly drained. The water pump can be run separately by pressing and holding the PSW1 button on the water module base plate for more than 3 seconds. To stop the pump, press and hold the PSW1 button for more than 3 seconds again.

In power off state, press and hold the Reset + Hot water button simultaneously for more than 3 seconds to start floor heater trial run. The temperature of trial run automatically sets according to the running time; the set temperature and the left time of the period are shown in the operation process.

1. Set Tow to 25°C and run for 72 hours; set Tow to 35°C and run for 48 hours; set Tow to 40°C and run for 48 hours;
2. After heating trial run for seven days, the outlet water temperature returns to the set value; if no outlet water temperature is set, it will resume default value (i.e.35°C);
3. You can turn on/off the unit in the heating trial run process, but can't adjust mode and function or changeoutlet water temperature;
4. The time of heating trial run is accumulated; if the unit is turned off midway, the heating trial run resumes when it is turned on next time.

13.2 Alarm Code

(1) Alarm detection

If the following cases occur in the running process, the unit turns off (SW OFF) and alarms. However, it doesn't detect in power off state.

- a. Indoor/outdoor unit communication failure
- b. Indoor water module temperature sensor failure
- c. Indoor water module water flow switch activates
- d. Indoor water module protection switch failure
- e. Indoor water module water pressure switch activates

(2) Alarm treatment

- a. Send alarm
- b. Update alarm count, record cause of compressor downtime, d1 = 02

(3) Alarm reset

- a. After receiving SW OFF signal
- b. After receiving alarm reset signal
- c. After temperature sensor and communication failure automatically restore

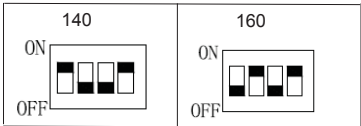
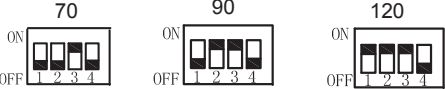
(4) Exception avoidance

* See Chapter 15.2 for the details of alarm codes.

14. Test Run

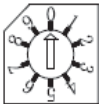
14.1 DIP Switch Settings of Outdoor Unit

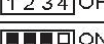
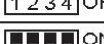
Turn off all power switches before setting, or else the DIP switch can't work normally and the setting will be invalid. Please set the DIP switch according to the requirements in the following table, in which the “■” symbols indicate the positions of the contacts of DIP switch.

DSW1	DSW2	DSW4	DSW5
 1 ON: 1、2 ON: Test run(Heat) 4 ON:	ALL OFF:Shipment Set 5 ON: Optional Function Setting 6 ON: Output Setting 	Ref. Cycle No. Setting 	Communication Setting 
	DSW3	DSW6	
	Capacity Setting  	Pipe length Setting Shipment  I.U.is located higher than O.U.(>20m)  O.U.is located higher than I.U.(>25m) 	

- Communication Setting
It is necessary to set Ref. cycle system No. and terminal resistor connect to Hi-NET system.
- Setting Ref.cycle system No.
Setting Ref.cycle (DSW4&RSW1)

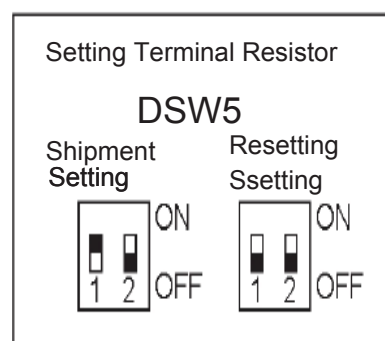
DSW4
Tens Digit Setting


RSW1
Single Digit Setting


Unit number	Set	Unit number	Set
0		8	
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7		15	

- Settings of terminal resistance

At factory, the number 1 button of DSW5 is set to "ON" position. When Hi-NET is connected to one outdoor unit only, it doesn't need resetting. When one Hi-NET is connected to several outdoor units, turn the number 1 button of DSW5 to "OFF" position from the second unit.



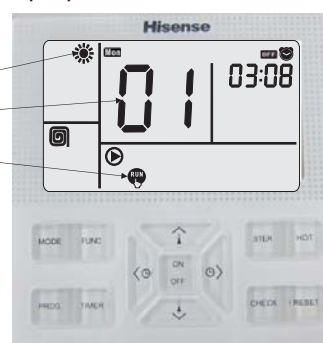
14.2 Check before Test Run

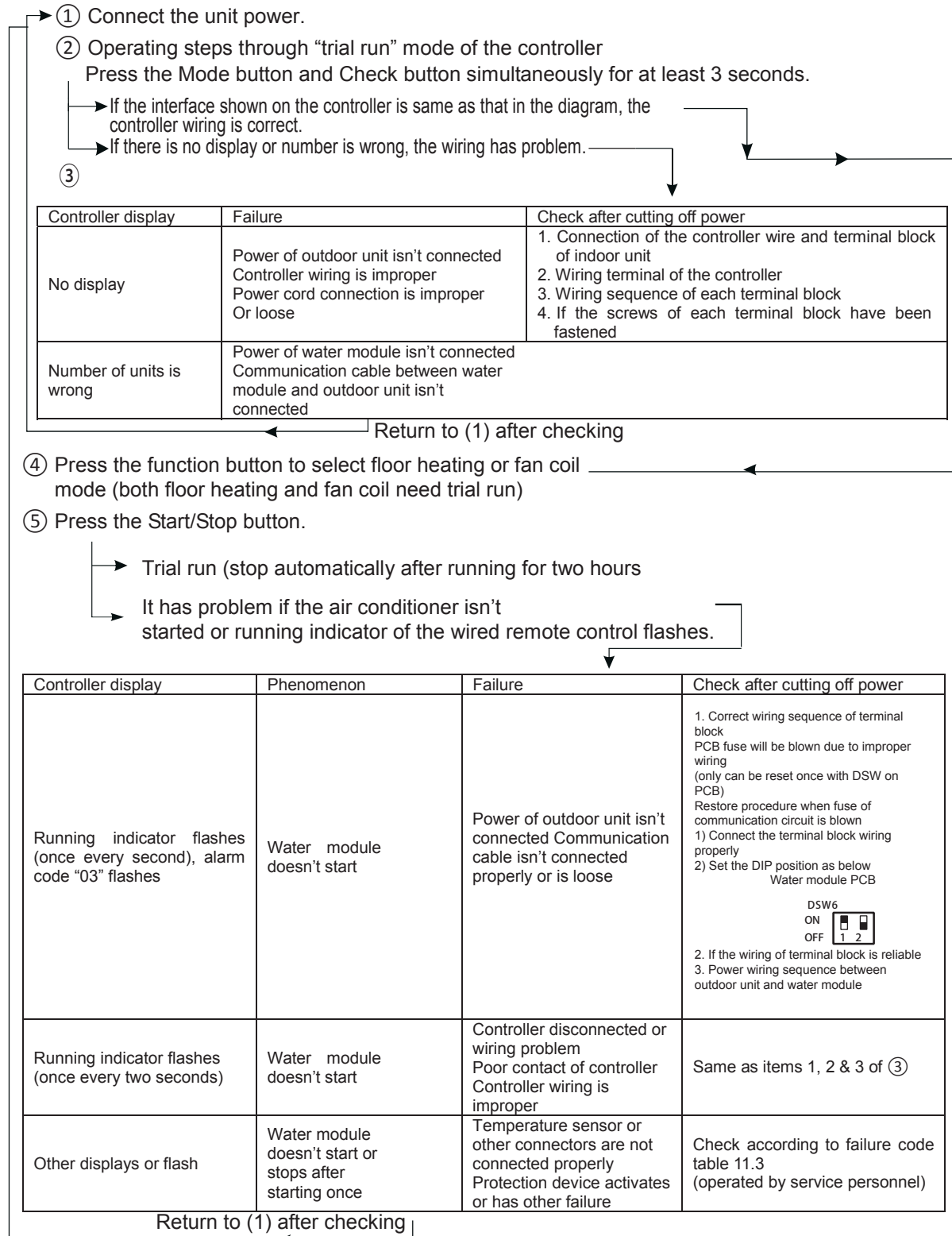
- Start the machine only when all points have been checked clearly.
 - (1) Check and ensure that the resistance of terminals to ground is higher than 1MΩ, or else the system can't be started until the cause of current leakage is found and repaired.
 - (2) Check and ensure that the Stop valve of outdoor unit has been fully open.
 - (3) Make sure that the power has been connected at least 12 hours to ensure that the compressor oil has been heated.
- Pay attention to the following when the system is running.
 - (1) Do not touch any components of the exhaust end, as the compressor and pipes have been heated to 90°C or higher at the exhaust end.
 - (2) Do not press the AC contactor button, or else it will cause serious accidents.
- Do not touch any electrical components in 3 minutes after turning off the main power supply.
- Site wiring: Check if the power cords and communication cables meet the specifications, and ensure that the resistance of terminals to ground is higher than 1MΩ, or else it will cause exception and serious accidents.
- Fixation: Check and ensure that the equipment and pipes are fixed reliably and meet the mounting requirements.
- Supply voltage: Stable in permissible range, warm up main unit at least 12 hours.
- Make sure that the Stop valve of outdoor unit has been fully open, or else it will cause serious accidents.
- Exhaust valve: Make sure that the exhaust valve is open.
- Safety valve: Check if the system has been filled up water when the safety valve is working, and it is water instead of air that is discharged.
- Filter and auto water supply valve have been mounted and set properly.
- Check if the Stop valve and the valves in water separator, collector and other systems are mounted properly and opened as required.
- Make sure that the filter is clean.

14.3 Commissioning

Table: Test run and check if the wiring is proper.

Note	
Every independent refrigerant system needs trial run.	Heating mode Number of water modules Icon of trial run
Operating steps through “test run” mode of the controller	





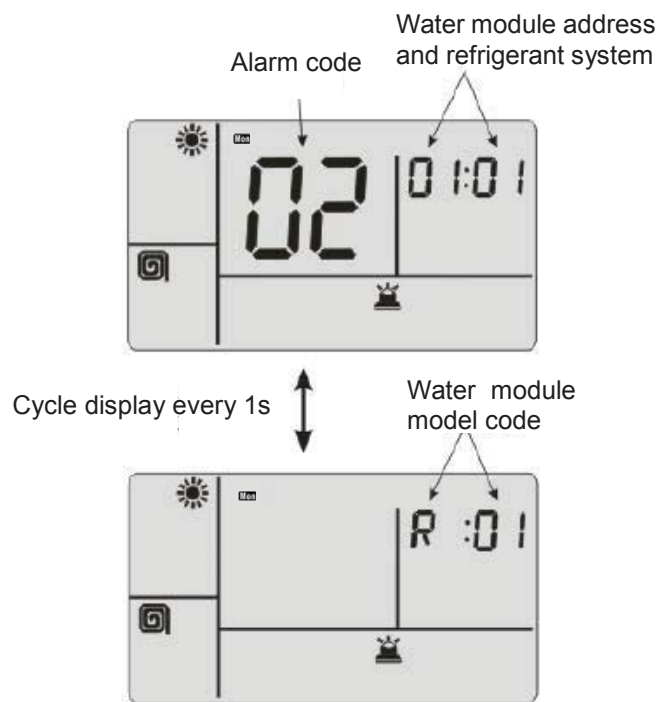
(2) Operating steps through DIP switch mode of outdoor unit

DSW1		Test run setting	
Set when trial run is needed			
Factory state		Cooling trial run	Heating trial run
ON ☐ ☐ ☐ ☐ OFF ☐ ☐ ☐ ☐ 1 2 3 4		ON ☐ ☐ ☐ ☐ OFF ☐ ☐ ☐ ☐ 1 2 3 4	ON ☐ ☐ ☐ ☐ OFF ☐ ☐ ☐ ☐ 1 3 4 2

Note: After trial run through DIP switch mode of outdoor unit, remember to turn the DIP switch to the default state.

Note

- If the protection device activates or there is any other failure in the process of trial run, the running indicator on the wired remote control will flash, display [Alarm] icon, and show the alarm code in the position to set temperature display.



14.4 Proper pump down procedure

External water pump selection technical requirements:

Number	Specifications	Unit	Parameter value
1	Rated voltage	V	220~240
2	Max input power	W	≤280
3	Max current	A	≤2
4	Max pump head	m	≥6
5	Rated flow	m ³ /h	≥1.25
6	Caliber	mm	25
7	Noise	dB	≤40

Recommended Models of External Water Pumps

No.	Manufacturer	Model
1	Shimge Pump Industry Group Co., Ltd.	XPS25-12-180
2	GRUNDFOS Pump	UPS-25-125
3	WILO Pump	RS25/8

Note: For water pumps with rated power over 400W, external AC contactor is required to control the water pumps, or else it will burn the main base plate.

14.5 Expansion vessel prepressure checking

(1) The unit has an expansion tank of 8L, and its initial pressure is 1.0 bar.

(2) To ensure the proper functioning of the unit, please adjust the initial pressure of the expansion tank and determine the maximum and minimum capacity of water.

- Check if the minimum total water capacity of the installation system is 16L. The minimum capacity value is applicable to most situations, but it may need additional water in the demanding process or when the room heat load is very high.
- Use water capacity checklist 5.3 and determine if the initial pressure of the expansion tank needs adjustment.
- Use water capacity checklist, and determine if the total water capacity of the installation system is below the acceptable maximum water capacity.
- Installation height difference: This value is the height difference between the highest point of the water cycle and the water module. If the water module is installed at the highest point of the water cycle, above all the other waterpipes, the installation height difference is zero.

(3) Expansion tank initial pressure calculation

According to the maximum installation height difference (H), the initial pressure should be calculated as follows:

$$P_g = H/10 + 0.3$$

Unit : H (m) , P_g (bar)

Note: 0.3 is the minimum initial pressure of the expansion tank

(4) Determine the acceptable maximum water capacity

Calculate the acceptable maximum water capacity in the whole cycle as follows:

- ① Calculate the maximum water capacity corresponding to the initial pressure P_g according to the maximum water capacity graph figure 8.1, 8.2.
- ② Confirm if the total maximum water capacity of this water cycle is less than this value. If not, expansion tank in the water muddle is too small for this system.

Attention

- When the initial pressure of the expansion tank is set to the minimum value 0.3bar and cycle water needed by this system is greater than the limit value, the expansion tank may need to be replaced.
- If the expansion tank of large capacity does not match with water module structure, please use safety valve of higher popping pressure while keeping the capacity of the expansion tank unchanged. The advisable safety valve is of operating value 5bar.

Water capacity checklist

	Installation height difference (a)	Water capacity	
		≤220L	>220L
Safety valve (3bar)	≤7m	No need to adjust the initial pressure of the expansion tank	Need to do: Decrease the initial pressure according to the "Expansion tank initial pressure calculation". Check if the water capacity is lower than the acceptable maximum water capacity. (Refer to the graph below)
	>7m	Need to do: Increase the initial pressure according to the "Expansion tank initial pressure calculation". Check if the water capacity is lower than the acceptable maximum water capacity. (Refer to the graph below)	Expansion tank of the unit is too small for the installation. (It requires proper expansion tank or safety valve of higher popping pressure provided in the site)
	Installation height difference (a)	Water capacity	
		≤330L	>330L
Safety valve(5bar)	≤7m	No need to adjust the initial pressure of the expansion tank	Need to do: Decrease the initial pressure according to the "Expansion tank initial pressure calculation". Check if the water capacity is lower than the acceptable maximum water capacity. (Refer to the graph below)
	>7m	Need to do: Increase the initial pressure according to the "Expansion tank initial pressure calculation". Check if the water capacity is lower than the acceptable maximum water capacity. (Refer to the graph next page).	Expansion tank of the unit is too small for the installation. (It requires proper expansion tank provided in the site)

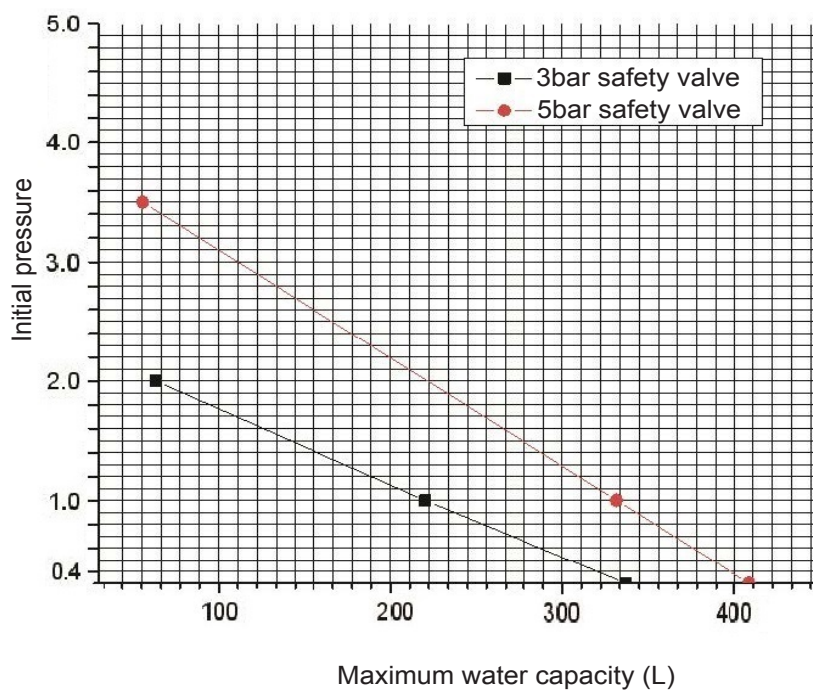


Fig. Maximum water capacity curve

15. Maintenance & Troubleshooting

- Regular system maintenance is needed to ensure normal running of the unit.
 - Turn off the unit power before maintenance
 - Maintenance and checking items
- (1) Water pressure: Check if the water pressure is normal.
 - (2) Safety valve
 - (3) Filter: Clean water filter and check if the filter is damaged
 - (4) Check and make sure that the water pump doesn't leak and has no problem
 - (5) Check and make sure that the pipes and fittings don't leak
 - (6) Electrical box is clean and dry, wiring terminal doesn't loose, and contactor contacts reliably
 - (7) Electrical insulation meets the requirements

15.1 Troubleshooting

Failure	Cause	Solution
Compressor doesn't run when controller is started	Power isn't turned on	Check and connect the power
	Safety protection device trips	Repair and reset
	Fuse blown, cable loose	Check for short circuit, poor contact and cable loose, and connect the power when the problem has been eliminated
	Compressor failure	Replace the compressor
Cooling or heating is poor	Heat exchanger is dirty	Clean
	Air outlet or return port is blocked, poor air distribution	Clear the air port
	Insufficient refrigerant	Replenish refrigerant appropriately
	Water flow inappropriate	Adjust and check
	Water filter dirty or clogging	Clean the filter
	Temperature setting improper	Re-set
Safety valve opens	Water pressure is too high	Check and adjust
	Spring defect	Replace
	Safety valve failure	Repair and replace
Water pump doesn't run	Motor failure	Replace
	Water flow switch failure	Repair and replace
	Dirty, clogging or mechanical stuck	Eliminate

15.2 Alarm Code

AHM-070UXCSAPA3 AHM-160UXCSAPA3

Alarm code	Alarm content	Remark
03	Outdoor communication problem	Outdoor - WM communication problem
11	Inlet water temperature (Twi) thermistor problem	Thermistor problem
12	Outlet water temperature (Two) thermistor problem	Thermistor problem
13	Liquid pipe temperature (TL) thermistor problem	Thermistor problem
14	Gas pipe temperature (Tg) thermistor problem	Thermistor problem
17	Plate heat exchanger outlet water temperature (TWOHP) thermistor problem	Thermistor problem
70	Water exception alarm (low pressure · water flow)	Water pressure in the circuit is low (leak) Water pump problem
73	Water flow switch stops to prevent short connection control (water pump stops, water flow switch closes)	Water flow alarm
76	Freezing prevention (liquid pipe) alarm	Freezing prevention during defrosting
79	Outdoor unit combination problem	Outdoor unit model doesn't match
7A	W module problem (although outdoor unit alarms, the cause is W module)	Alarm 70 or 76 in water module is alarm 7A of the outdoor unit
80	Controller communication problem	W module base plate - controller communication problem

Note: For the alarms caused by outdoor unit, follow the outdoor unit control specifications.

Causes for compressor stop

Code of stop cause	Main reason	52C1 treatment
03	Outlet water temperature too low and retry	ON
05	Outdoor unit instantaneous stop detection, outdoor base plate stops due to main chip reset	ON
07	Stop due to outdoor temperature too low during cooling	ON
	Stop due to outdoor temperature and indoor temperature during heating (overload)	ON
	Stop due to outdoor temperature too low during heating (low temperature)	ON

10	Stop due to demand (external input demand or normal demand)	ON
	Stop due to emergency stop (DSW1-4 ON or forced stop input)	OFF
11	Retry stop due to pressure ratio drops	ON
12	Retry stop due to low pressure rises	OFF
13	Retry stop due to high pressure rises	OFF
15	Retry stop due to compressor top temperature (Td) rises	ON
	Retry stop due to low pressure drops	OFF
16	Retry stop due to TdSH drops	ON
17	Retry due to inverter trip (instantaneous over current, electronic overheating activates, current sensor exception)	OFF
18	Retry due to inverter trip (inverter under voltage, overvoltage, transmission exception, main chip reset)	OFF
19	Stop due to expansion valve opening dislocation prevention control	ON
21	Thermo OFF stop due to oil return control	ON
22	Stop due to outdoor unit hot start control	OFF
26	Retry stop due to high pressure drops	ON
28	Stop due to cooling air outlet temperature control	ON
37	Stop due to communication failure between outdoor unit and indoor unit	ON

Details of abnormal inspection control

Inlet water temperature (Twi) thermistor problem (alarm code: 11)

Name of protection control	Inlet water temperature (Twi) thermistor problem
Condition of alarm	Alarm when the exception inspection condition lasts for several minutes Alarm is reported only when running signal is ON
Alarm code	11

Outlet water temperature (Two) thermistor problem (alarm code: 12)

Name of protection control	Outlet water temperature (Two) thermistor problem
Condition of alarm	Alarm when the exception inspection condition lasts for several minutes Alarm is reported only when running signal is ON
Alarm code	12

Indoor unit liquid pipe temperature (TL) thermistor problem (alarm code: 13)

Name of protection control	Indoor unit liquid pipe temperature (TL) thermistor problem
Condition of alarm	Alarm when the exception inspection condition lasts for several minutes Alarm is reported only when running signal is ON
Alarm code	13

Indoor unit gas pipe temperature (Tg) thermistor problem (alarm code: 14)

Name of protection control	Inlet water temperature (Tg) thermistor problem
Condition of alarm	Alarm when the exception inspection condition lasts for several minutes Alarm is reported only when running signal is ON
Alarm code	14

Plate heat exchanger water temperature (TwoHP) thermistor problem (alarm code: 17)

Name of protection control	Plate heat exchanger water temperature (TwoHP) thermistor problem
Condition of alarm	Alarm when the exception inspection condition lasts for several minutes Alarm is reported only when running signal is ON
Alarm code	17

Water exception (alarm code: 70)

Name of protection control	Water exception alarm (low pressure • water flow)
Condition of alarm	Alarm when can't resume normal even after retrying
Alarm code	70

Freezing prevention (liquid pipe) alarm (alarm code: 76)

Name of protection control	Freezing prevention (liquid pipe)
Condition of alarm	Liquid pipe is too low when the compressor is running
Alarm code	76

Controller communication problem (alarm code: 80)

Name of protection control	Controller communication problem (W module controller)
Condition of alarm	Lasts for several minutes
Alarm code	80

Outdoor communication problem (alarm code: 03)

Name of protection control	Outdoor communication problem
Condition of alarm	Communication error lasts for several minutes The main chip will reset when the communication error lasts for several minutes if the transmission with outdoor unit is normal at least once
Alarm code	03

Water flow switch stop control

Name of protection control	Water flow switch stop control problem
Condition of exception	Water flow switch is in ON position when the water pump has stopped for tens of seconds
Alarm code	73

Llarm Code

Alarm code	Downtime retry code	Exception	Main cause
(01)	-	Indoor protection device activates	Float switch activates (level of water tray is too high)
02	-	Outdoor protection device activates	High pressure (compressor temperature) protection device activates
03	05	Communication error between indoor units	Outdoor fuse blown, indoor/outdoor communication cable (broken, wrong wiring, etc.)
04	05	Inverter communication error	Control base plate - inverter base plate communication cable (broken, wrong wiring, etc.)
05	-	Power phase exception	Reverse phase or phase loss of three-phase power supply
06	18	Under voltage, overvoltage	Outdoor base plate exception, inverter base plate exception, DM, CB exception
07	16	TdSH low	Excessive refrigerant, expansion valve action problem
08	15	Compressor top (Td) temperature abnormal	Insufficient refrigerant, leakage, piping dirty or clogging, expansion valve clogging
(11)	-	Return air temperature sensor exception	Sensor wiring error, open circuit, short circuit
(12)	-	Outlet air temperature sensor exception	Sensor wiring error, open circuit, short circuit
(13)	-	Freezing prevention temperature sensor exception	Sensor wiring error, open circuit, short circuit
(14)	-	Indoor gas pipe temperature sensor exception	Sensor wiring error, open circuit, short circuit
(16)	-	Remote control temperature sensor exception	Sensor wiring error, open circuit, short circuit
(17)	-	Wired remote control built-in temperature sensor exception	Sensor wiring error, open circuit, short circuit
(19)	-	Indoor fan motor exception	Indoor fan motor overheating, stall
21	-	High pressure sensor exception	Pd sensor wiring error, open circuit, short circuit
22	-	Outdoor air temperature sensor exception	Ta sensor wiring error, open circuit, short circuit
23	-	Compressor top temperature sensor exception	Td1 sensor wiring error, open circuit, short circuit
24	-	Outdoor heat exchanger liquid pipe temperature sensor exception	Sensor wiring error, open circuit, short circuit
27	-	Suction temperature sensor exception	Ts sensor wiring error, open circuit, short circuit
29	-	Low pressure sensor exception	Ps sensor wiring error, open circuit, short circuit
31	-	Indoor/outdoor unit combination setting exception	Indoor/outdoor unit capacity setting error, total capacity of indoor units is too large or too small
35	-	Indoor/outdoor unit number setting error	Indoor unit of same number exists in the same refrigerant piping system
36	-	Indoor unit combination error	Indoor units of different series exist in the same refrigerant piping system
38	-	Outdoor protection detection circuit exception	Outdoor unit base plate problem, outdoor base plate wiring error
43	11	Pressure ratio low	Poor compression (compressor or inverter failure)
44	12	Low pressure rises	Indoor overload during cooling, or outdoor high temperature during heating
45	13	High pressure rises	Running overload (heat exchanger dirty or clogging), non-condensable gas mixed
-	26	High-pressure too low	Insufficient refrigerant
47	15	Low pressure too low prevention activates	Insufficient refrigerant, leakage, piping dirty or clogging, expansion valve closed
48	17	Protection device activates when running overload	Circulation error, inverter base plate exception, DM exception, heat exchanger dirty or clogging
51	17	Inverter current sensor exception	CT wiring error, outdoor base plate exception, inverter base plate exception
53	17	Inverter module error	Compressor, IPSM (SIPM) exception, heat exchanger dirty or clogging
54	17	Inverter radiator fin temperature abnormal	Fin sensor exception, heat exchanger dirty or clogging, fan motor exception
55	18	Inverter doesn't run	Inverter failure
57	-	Fan motor exception	Control base plate - inverter base plate - fan motor wiring (broken, error)
77	31	Outdoor PS anti-freezing exception	Insufficient refrigerant, leakage, piping dirty or clogging, expansion valve closed
(b1)	-	Refrigerant system address setting error	Refrigerant system address setting exceeds 64
b5	-	Number error of connected indoor units	Connected indoor units corresponding to non-H-Link II exceed 17
EE	-	Alarm due to compressor problem	Alarm causing harm to compressor appears three times in six hours

Stop Code

The compressor sends stop code (d1) to indoor units when it stops for the following reasons.

Downtime cause code	Downtime cause
(00)	SW OFF
(01)	Thermo OFF, AC contactor activates
(02)	Stop due to alarm
(03)	Retry due to outlet water temperature too low
05	Outdoor unit instantaneous power failure is detected, stop due to outdoor base plate chip reset
(06)	Indoor unit instantaneous power failure is detected, stop due to indoor base plate chip reset
07	Stop when outdoor air temperature hasn't reached -5°C during cooling
	Stop due to the limit of outdoor air temperature and indoor suction temperature during heating (overload)
	Stop when outdoor air temperature hasn't reached -20°C during heating
10	Stop due to demand (external input)
	Stop due to emergency stop (DSW1-4 ON or forced stop input)
11	Stop due to pressure ratio too low
12	Stop due to low pressure rises
13	Stop due to high pressure rises
15	Stop due to compressor top temperature (Td) rises
	Stop due to low pressure too low
16	Stop due to TdSH too low
17	Stop due to inverter trip (instantaneous over current, built-in temperature sensor activates, current sensor exception)
18	Stop due to inverter trip (inverter under voltage, overvoltage, communication error, chip reset)
19	Stop to prevent expansion valve opening dislocation
21	Thermo OFF stop due to oil return control
22	Stop due to outdoor unit hot start control
26	Stop due to high pressure too low
28	Stop due to cooling air outlet temperature control
31	Outdoor PS anti-freezing exception

15.3 Check Mode

AHW - 70~120UCSDP ,AHW - 140/160UCSEP

Start and end of check mode (1) Start of check mode

Press and hold [PSW2] at least three seconds in normal mode to enter the check mode.

Press PSW2 [▼] to forward, and press PSW3 [▲] to return. Operations

in check mode (base plate digital tube)

The list of items that can be confirmed in check mode is shown below.

No.	Item	Digital tube display (assumed)	Unit	Example	Remark
1	Target water temperature	Too	°C	45	Target water temperature calculated in warm water 1 mode (OTC Points0 calculated from outdoor temperature) Include the adjusted part of the controller's target water temperature
2	Inlet water temperature	In	°C	30	Thermistor value
3	Discharged water temperature	o1	°C	35	Thermistor value
4	Heat exchanger outlet water temperature	OHP	°C	34	Thermistor value
5	Liquid pipe temperature	TL	°C	40	Thermistor value
6	Gas pipe temperature	TG	°C	60	Thermistor value
7	Outdoor temperature	TA	°C	8	Thermistor value
8	Outdoor temperature (average)	TAA	°C	8	Calculated from No.7 outdoor temperature (water module)
9	Evaporation temperature	Te	°C	6	Thermistor value
10	Compressor top temperature	Td	°C	70	Thermistor value
11	Target Pd	TPd	MPa	3.3	
12	Pd	Pd	MPa	2.9	
13	Ps	Ps	MPa	0.6	
14	W module expansion valve opening degree	Ev	%	30	Opening degree indication from outdoor unit
15	Water tank temperature	OH	°C	53	Thermistor value in water tank
16	Set water temperature in water tank	Oho	°C	55	Water temperature set in warm water 2 mode
17	Thermostat	THS	-	ON	CN2 1-2 situation. Short circuit when thermostat isn't used (usually ON)
18	Mandatory Thermo OFF	THF	-	ON	PCN3 10 information (Tariff)
19	Water pump 1 operating status	Pu1	-	ON	Operating status of water pump in water module
20	Electric heater operating status	EH1	-	ON	Operating status of water pump in water module
21	Water tank electric heater operating status	EH2	-	ON	Operating status of water tank heater
22	Stop code	d1	-	10	
23	Operating frequency	H1	Hz	80	
24	A1 current value	A1	A	12	
25	Outdoor expansion valve opening	Eo	%	20	
26	Outdoor unit capacity	Co	-	140	
27	W module capacity	Vo	-	140	
28	Rom number (W module)	No	-	1234	ROM number of W module
29	Refrigerant system	Ou	-	1	
30	3-way valve for water tank	-1	-	ON	
31	3-way valve for floor heater	-2	-	ON	
32	3-way valve for fan coil	-3	-	ON	

See Chapter 15.3 for the check items of controller

AHW - 70~120UCSDP ,AHW - 140/160UCSEP

Outdoor Base Plate Operations and Expressing Summary

No.	Mode	Mode changing method (summary)	Expressing (summary)
1	Normal	None	Alarm code
			Protection control code
			Downtime retry code
2	Manual defrosting	Press and hold PSW1	The time from display to defrosting start
3	Spot check	Press and hold PSW2	Spot check data
4	External I/O selection	6 th digit of DSW2 ON	Setting of external I/O
5	Function selection setting	5 th digit of DSW2 ON	Setting items and content of function selection
6	RAM display	Press and hold PSW1, 2&3	RAM content

check mode

Start of check mode

Press and hold PSW2 at least three seconds in normal mode to enter the check mode. End

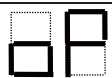
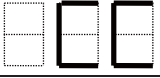
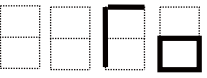
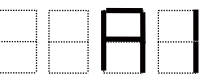
of check mode

Press and hold PSW at least three seconds in check mode to end the check mode and return to normal mode.

Relationship between operation and display

The data of each check item in check mode displays alternately. The list of check items is shown on next page. In check mode, press PSW2 to move to next item, and press PSW3 to move to previous item.

Display in spot check mode

Spot check item	Display	Data range
Outdoor unit chip output state		Refer to *1
Total capacity of running indoor units		0~9999 (show sum of indoor unit capacity code)
Inverter frequency (command value)		0~115 (Hz)
Number of running compressors		0~1 (set)
Air volume level of outdoor fans		0~15
Opening of outdoor expansion valve EVO		0~100 (%)
Opening of outdoor expansion valve EVB		0~255
High pressure value		-0.55~5.52 (MPa) When Pd sensor open circuit: 5.62 Short circuit: -0.62
Low pressure value		-0.22~2.21 (MPa) When Ps sensor open circuit: 2.25 Short circuit: -0.25
Opening of outdoor expansion valve EVB		1~142 (°C) When sensor open circuit: 0 Short circuit: 255
Evaporation temperature during heating		-46~80 (°C) When sensor open circuit: -127 Short circuit: 127
Ambient temperature Ta		-46~80 (°C) When sensor open circuit: -127 Short circuit: 127
Suction temperature Ts		-46~80 (°C) When sensor open circuit: -127 Short circuit: 127
Compressor current (indoor unit) (inverter primary current)		0~255 (A)

Spot check item	Display	Data range	Remark
Indoor expansion valve opening (0# unit) └┘ (63# unit)		0~100 (%)	Display the connected indoor units SEG1 shows indoor unit number 2. When setting refrigerant system, use the comma shown below to indicate the difference between the refrigerant systems. For example, indoor expansion valve opening (16# indoor unit) SEG2 SEG1 [Set refrigerant system +1] expressed by comma
		0~100 (%)	
Indoor unit heat exchanger liquid pipe temperature (0# unit) └┘ (63# unit)		-62~127 (°C)	
		-62~127 (°C)	
Indoor unit heat exchanger gas pipe temperature (0# unit) └┘ (63# unit)		-62~127 (°C)	
		-62~127 (°C)	
Indoor unit return air temperature (0# unit) └┘ (63# unit)		-62~127 (°C)	
		-62~127 (°C)	
Water tank temperature (0# unit) └┘ (63# unit)		-62~127 (°C)	
		-62~127 (°C)	

Spot check item	Display	Data range	Remark
Indoor unit outlet air temperature (0# unit) └┘ (63# unit)		-62~127 (°C)	Display the connected indoor units. Below iE is same. * 2. When setting refrigerant system, use the comma shown below to indicate the difference between the refrigerant systems. For example, indoor expansion valve opening (16# indoor unit) SEG2 SEG1 [Set refrigerant system +1] expressed by comma
	└┘		
		-62~127 (°C)	
Indoor unit capacity (0# unit) └┘ (63# unit)		6~160 (indoor capacity code display)	
	└┘		
		6~160 (indoor capacity code display)	
Indoor unit downtime cause code (0# unit) └┘ (63# unit)		0~99	
	└┘		
		0~99	

Spot check item	Display	Data range
Back control for pressure ratio too low prevention		0: Back control inactive 1: Back control active
Back control for high pressure too high prevention		0: Back control inactive 1: Back control active
Back control for inverter radiator temperature rise prevention		0: Back control inactive 1: Back control active
Back control for exhaust temperature too high prevention		0: Back control inactive 1: Back control active
Back control for TdSH too low prevention		0: Back control inactive 1: Back control active
Back control for over current prevention		0: Back control inactive 1: Back control active
Accumulated operating time of compressor 1		0~9999 (×10 hours) Start counting from 0 when exceeds 9999
Accumulated operating time of compressor 1 (reset)		0~9999 (×10 hours)

Spot check item	Display	Data range
Outdoor and heat storage alarm code		0~99
Inverter downtime cause code (*2)		0~16
One alarm history		Records of alarm history holding function
15 alarm history		Records of alarm history holding function
Total capacity of connected indoor units		0~9999 (show sum of indoor unit capacity code)
Number of connected indoor units		0~64 (sets)
Refrigerant system address		0~63

15.4 Cleaning Plate Heat Exchanger



Note

Plate heat exchanger must be cleaned by qualified personnel. Please commission experienced chemical company or contact your dealer or agent.

● Cleaning method

- (1) Select appropriate cleaning agents according to the dirt accumulated on the plate heat exchanger.
- (2) The plate heat exchanger is made of stainless steel, which mustn't be cleaned with agents containing choric acid or fluoride, or else it will damage the heat exchanger and lead to refrigerant leakage.
- (3) After using the cleaning agents, wash the water pipes and heat exchanger with clean water to prevent water system being corroded or scale adsorption.
- (4) If cleaning agents are used, adjust the concentration, cleaning time and temperature according to the dirt accumulated.
- (5) After cleaning with acid solution, neutralize the waste solution. Contact treatment company to process the waste solution.
- (6) Cleaning agents and neutralization agents are corrosive and irritant to eyes, skin and nasal mucosa. Please use protective devices (such as goggles, gloves, protective shoes, mask and protective cloth) while cleaning to prevent inhaling or contacting such agents.

Type of Clogging and Cleaning Solution (Reference)

Type of clogging	Cleaning solution
Scaling	Citric acid, acetic acid or phosphoric acid
Silt	
Rust	
Dust and sand particles	Detergent/soap, household detergent and hot water
Grease	
Plastic	
Fiber material	

● Cleaning method

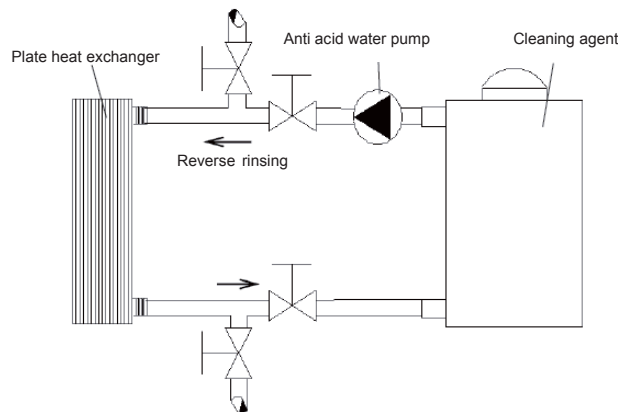
- (1) Mounting cleaning circuit
 - ① Stop water module unit
 - ② Stop circulation water pump of unit system
 - ③ Disconnect the gate valve of the water inlet/outlet pipes of the unit, and mount an anti-acid water pump to form circulation loop
- (2) Check the cleaned circulation loop

Add pure water to the clean water pump and start anti-acid water pump

 - ① Check and ensure that there is no water leakage
 - ② Check and ensure that the water pipes have been mounted firmly
 - ③ Check and ensure that even if the cleaning agents are spilled onto or stuck to the devices near the unit, it won't damage the devices.
 - ④ Check and ensure that the environment is properly ventilated
 - ⑤ Check and ensure that there is no abnormal sound during running

(3) Cleaning

- ① Discharge the water in the water module
- ② Rinse the cleaning solution into the clean water tank reversely to the outlet of plate heat exchanger, i.e. outlet of water module, with anti-acid water pump (reverse to normal flow direction)



- ③ Circulate the cleaning solution for appropriate time (depending on the cleaning agent type, concentration and dirt thickness)

(4) Waste solution

- ① Stop the anti-acid water pump
- ② Pour the waste solution into the waste solution tank
- ③ Discharge the water into the cleaning water tank, start the water pump and wash with water
- ④ Discharge the used water into the waste solution tank
- ⑤ Test the PH value with test paper, add neutralization agent gradually to neutralize the waste solution
- ⑥ After neutralizing, contact treatment company to process the waste solution

(5) Neutralization of water pipes

- ① Add water to the cleaning water tank
- ② Start the anti-acid water pump
- ③ Test the PH value with test paper, add neutralization agent gradually until $\text{PH} = 7$
- ④ Start the anti-acid water pump for a period to finish the neutralization
- ⑤ Discharge the used water
- ⑥ Start the circulation pump, and wash the circulation system with water until there is no scale liquid

(6) Restart the unit

- ① Connect the water pipes of the unit as it is, and the water unit runs normally
- ② After cleaning, perform water treatment (precaution) to prevent water path corrosion