※The specifications, designs, and information in this book are subject to change without notice for product improvement.

Part 1
General Information

1. Model Names of Outdoor Units

Model	Refrigerant	Capacity (kW)	Power Supply (V-ph-Hz)
MGA-D10/N1	R410A	10	220-240, 1, 50
MGA-D12/N1	R410A	12	220-240, 1, 50
MGA-D14/SN1	R410A	14	380-415, 3, 50
MGA-D16/SN1	R410A	16	380-415, 3, 50

2. External Appearance

2.1 Outdoor Unit

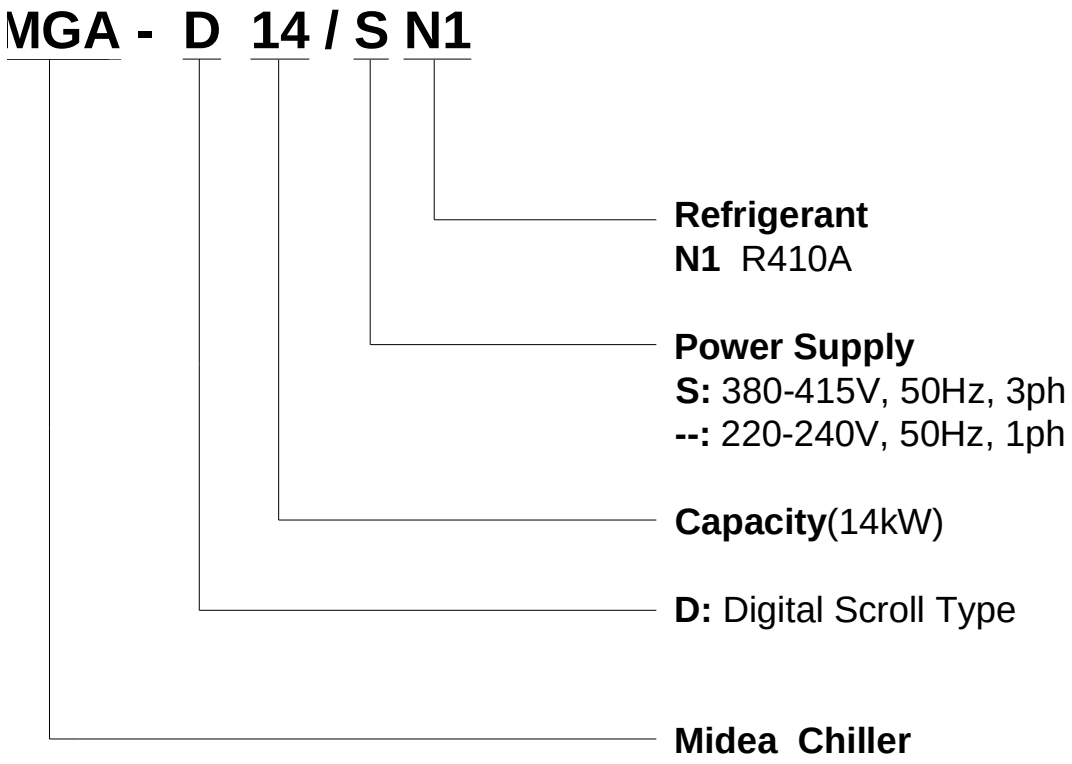
MGA-D10/N1

MGA-D12/N1 MGA-D14/SN1 MGA-D16/SN1

2.2 Water Pump Box

3. Nomenclature

Outdoor Unit：



4. Features

1. R410A environment friendly refrigerant.
2. Energy saving and reliable: Adopting Copeland digital scroll compressor, which can adjust the capacity output and satisfy the capacity demands in different working conditions.
3. With remote on-off port and malfunction alarming output port on the main board.
4. Convenient and simple installation: With international popular split design, the pump box can be installed inside the room and its outdoor unit is compact and light.
5. Flexible and convenient control: New wired controller with the Auto-restart functions of adjusting outlet water temperature and power failure memory, etc..
6. The system doesn't have EMC problem.
7. Built-in with emergency switch: Switch off the unit manually in any emergency case.
8. An AC contactor interface is added on the outdoor unit to connect with the auxiliary electric heater, which can improve the capacity output in heating mode of low temperature.
9. One chiller can connect with more than 1 wired controller, it's convenient to maintain and use.

Part 2
Outdoor Unit

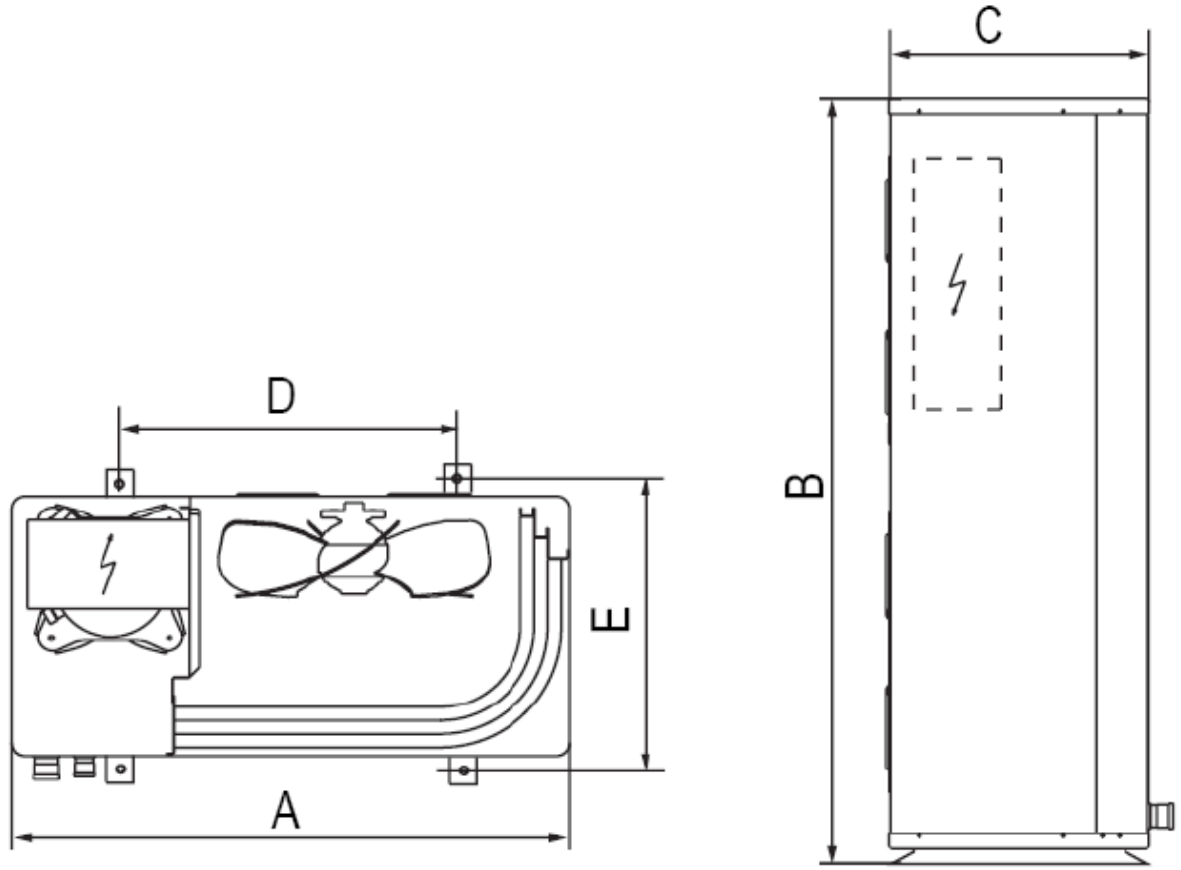
1. Specifications

Model			MGA-D10/N1	MGA-D12/N1
Code			220090400050	220090400030
Power supply		V-Ph-Hz	220-240, 1, 50	220-240, 1, 50
Cooling	Capacity	kW	10	12
	Input	W	3912	3978
Heating	Capacity	kW	13.6	14.3
	Input	W	4216	4164
Max. input consumption		W	5430	5615
Max. input current		A	27.4	28.2
Starting current		A	124	130
Compressor	Model		ZPD61KCE-PFZ-532	ZPD61KCE-PFZ-532
	Type		Digital Scroll	Digital Scroll
	Brand		Copeland	Copeland
	Rated current (RLA)	A	31.4	31.4
	Locked rotor Amp (LRA)	A	147	147
	Thermal protector		Inner	Inner
	Capacitor	uF	80uF/440V	80uF/440V
	Refrigerant oil	ml	POE OIL, 1892	POE OIL, 1892
Outdoor fan motor	Model		YDK250-6E	YDK100-6A(×2)
	Type		AC motor	AC motor
	Brand		Welling	Welling
	Input (Hi/Lo)	W	307/194	185/120(×2)
	Capacitor	uF	10uF±5% 450V	5uF/450V
	Speed (Hi/Lo)	r/min	740/530	860/610
Outdoor coil	Number of rows		2	2
	Tube pitch(a)x row pitch(b)	mm	25.4×22	25.4×22
	Fin spacing	mm	1.7	1.5
	Fin type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia. and type	mm	Φ9.53	Φ9.53
			inner grooved tube	inner grooved tube
	Coil length x height x width	mm	863×915×44	888×1220×44
	Number of circuits		4	7
Water pump	Type		LDPB2-30(S)	LDPB2-30(S)
	Input	W	420	420
	Pumping head	m	22	20
Rated water flow		m^3/h	1.80	2.06
Max. air flow		m^3/h	4500	5800
Throttle			Capillary	Capillary
Noise level (sound pressure)	Outdoor unit	dB(A)	57	60
	Water pump box	dB(A)	38.4	38.9
Minimum water flow		m^3/h	0.9	1.03
The max. and min. water inlet pressure		bar	5.0/0.5	5.0/0.5
The volume of expansion tank		L	3	3
Outdoor unit	Dimension (W×H×D)	mm	990×966×340	940×1250×340
	Packing (W×H×D)	mm	1120×1100×440	1058×1380×435
	Net/ Gross weight	kg	109/115	122/128
Water pump box	Model		CE-SBX/N1-01	CE-SBX/N1-01A
	Code		220095700030	220095700010
	Dimension (W×H×D)	mm	905×370×366	905×370×366
	Packing (W×H×D)	mm	1057×439×436	1057×439×436
	Net/ Gross weight	kg	52/57	54/59
Refrigerant	Type		R410A	R410A
	Charged volume	g	2700	3600
Refrigerant pipe diameter	Liquid side	mm	Φ9.5	Φ9.5
	Gas side	mm	Φ19	Φ19
Pipe diameter	Water inlet/outlet	mm	DN32	DN32
Control			Wired controller KJR-08B/BE	
Ambient temperature		℃	Cooling: 10℃~43℃	Cooling: 10℃~43℃
			Heating: -15℃~24℃	Heating: -15℃~24℃

Model			MGA-D14/SN1	MGA-D16/SN1
Code			220090400020	220090400040
Power supply		V-Ph-Hz	380-415, 3, 50	380-415, 3, 50
Cooling	Capacity	kW	14	16
	Input	W	4453	4904
Heating	Capacity	kW	16	17
	Input	W	4828	4943
Max. input consumption		W	6533	6573
Max. input current		A	11.7	11.5
Starting current		A	60	64
Compressor	Model		ZPD72KCE-TFD-532	ZPD72KCE-TFD-532
	Type		Digital Scroll	Digital Scroll
	Brand		Copeland	Copeland
	Rated current (RLA)	A	9.8	9.8
	Locked rotor Amp (LRA)	A	82.4	82.4
	Thermal protector		Inner	Inner
	Capacitor	uF	/	/
	Refrigerant oil	ml	3MAF POE, 1893	3MAF POE, 1893
Outdoor fan motor	Model		YDK100-6A(×2)	YDK100-6A(×2)
	Type		AC motor	AC motor
	Brand		Welling	Welling
	Input (Hi/Lo)	W	185/120(×2)	185/120(×2)
	Capacitor	uF	5uF/450V	5uF/450V
	Speed (Hi/Lo)	r/min	860/610	860/610
Outdoor coil	Number of rows		2.5	3
	Tube pitch(a)x row pitch(b)	mm	25.4×22	25.4×22
	Fin spacing	mm	1.5	1.5
	Fin type		Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia. and type	mm	Φ9.53	Φ9.53
			inner grooved tube	inner grooved tube
	Coil length x height x width	mm	775×1220×66	875×1220×66
	Number of circuits		12	8
Water pump	Type		LDPB2-30(S)	LDPB2-30(S)
	Input	W	420	420
	Pumping head	m	18	17
Rated water flow		m^3/h	2.4	2.58
Max. air flow		m^3/h	5600	5600
Throttle			Capillary	Capillary
Noise level (sound pressure)	Outdoor unit	dB(A)	60	60
	Water pump box	dB(A)	41.2	37.8
Minimum water flow		m^3/h	1.2	1.29
The max. and min. water inlet pressure		bar	5.0/0.5	5.0/0.5
The volume of expansion tank		L	3	3
Outdoor unit	Dimension (W×H×D)	mm	940×1250×340	940×1250×340
	Packing (W×H×D)	mm	1058×1380×435	1058×1380×435
	Net/ Gross weight	kg	123/130	126/133
Water pump box	Model		CE-SBX/SN1-01	CE-SBX/SN1-01A
	Code		220095700000	220095700020
	Dimension (W×H×D)	mm	905×370×366	905×370×366
	Packing (W×H×D)	mm	1057×439×436	1057×439×436
	Net/ Gross weight	kg	54/59	55/60
Refrigerant	Type		R410A	R410A
	Charged volume	g	4100	4400
Refrigerant pipe diameter	Liquid side	mm	Φ9.5	Φ9.5
	Gas side	mm	Φ19	Φ19
Pipe diameter	Water inlet/outlet	mm	DN32	DN32
Control			Wired controller KJR-08B/BE	
Ambient temperature		℃	Cooling: 10℃~43℃	Cooling: 10℃~43℃
			Heating: -15℃~24℃	Heating: -15℃~24℃

2. Dimensions

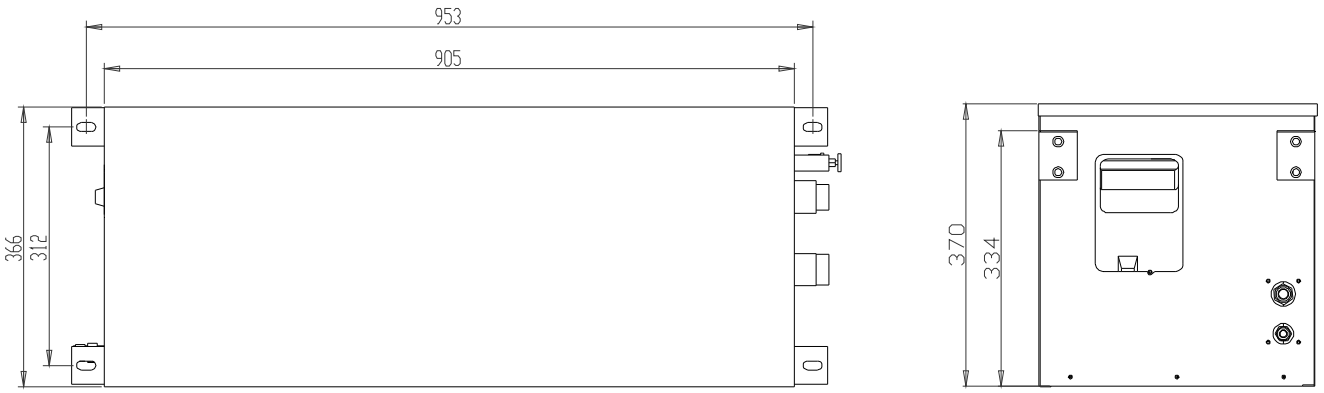
2.1 Outdoor Unit



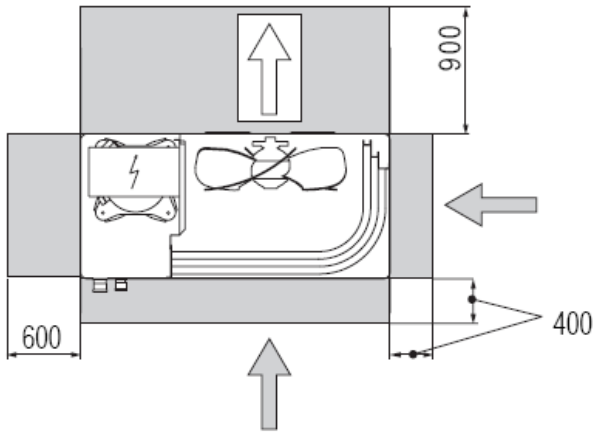
Unit: mm

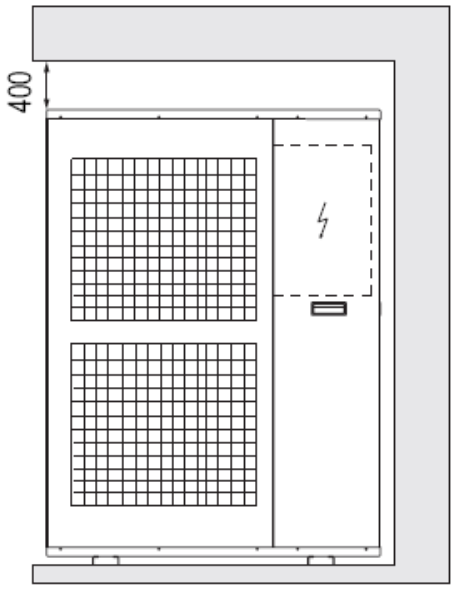
Dimensions	A	B	C	D	E
MGA-D10/N1	990	966	340	624	366
MGA-D12/N1	940	1250	340	600	376
MGA-D14/SN1	940	1250	340	600	376
MGA-D16/SN1	940	1250	340	600	376

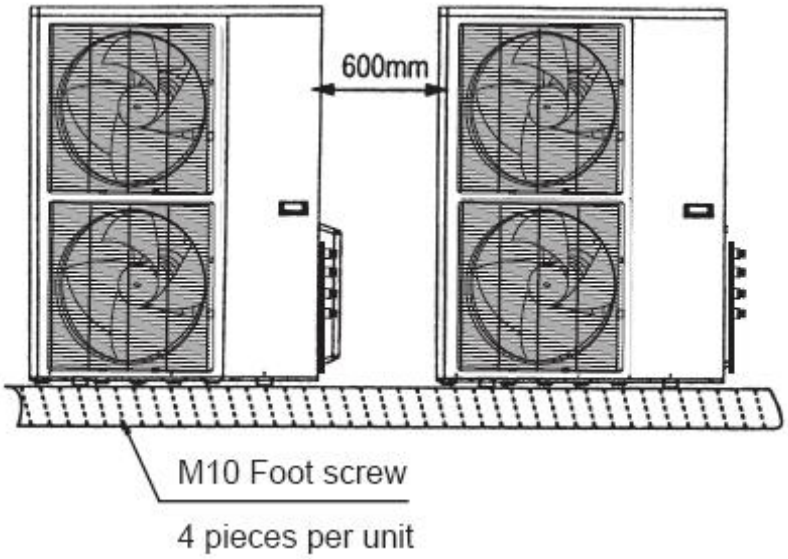
2.2 Water Pump Box



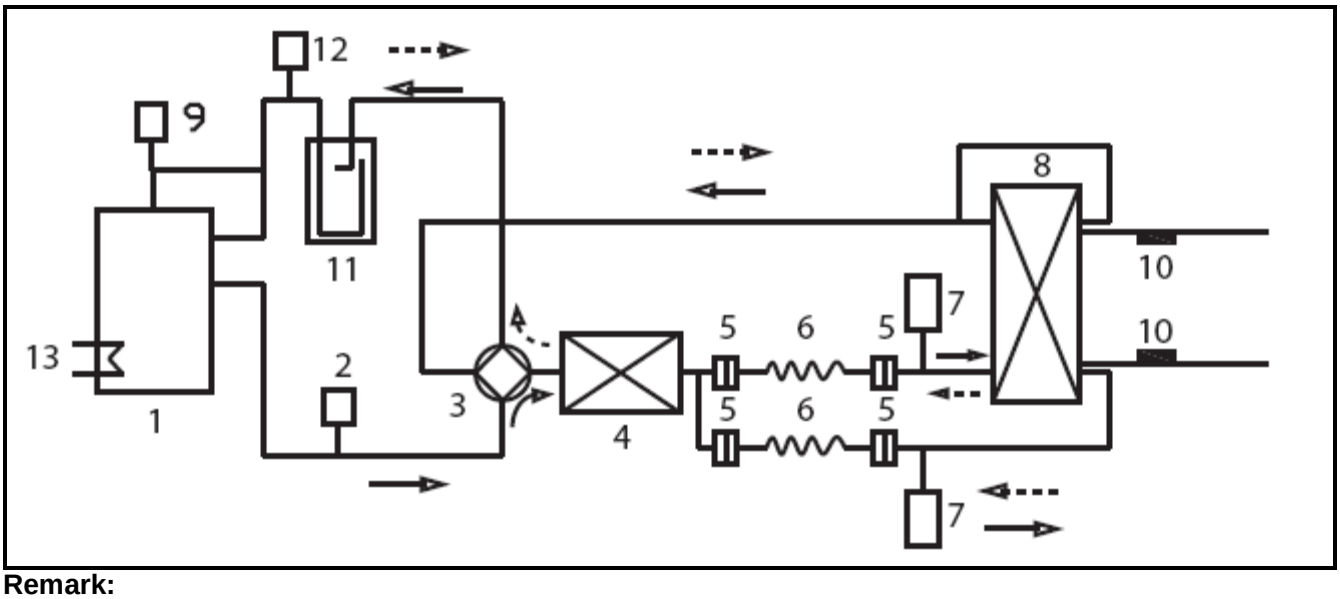
3. Service Space







4. Piping Diagram

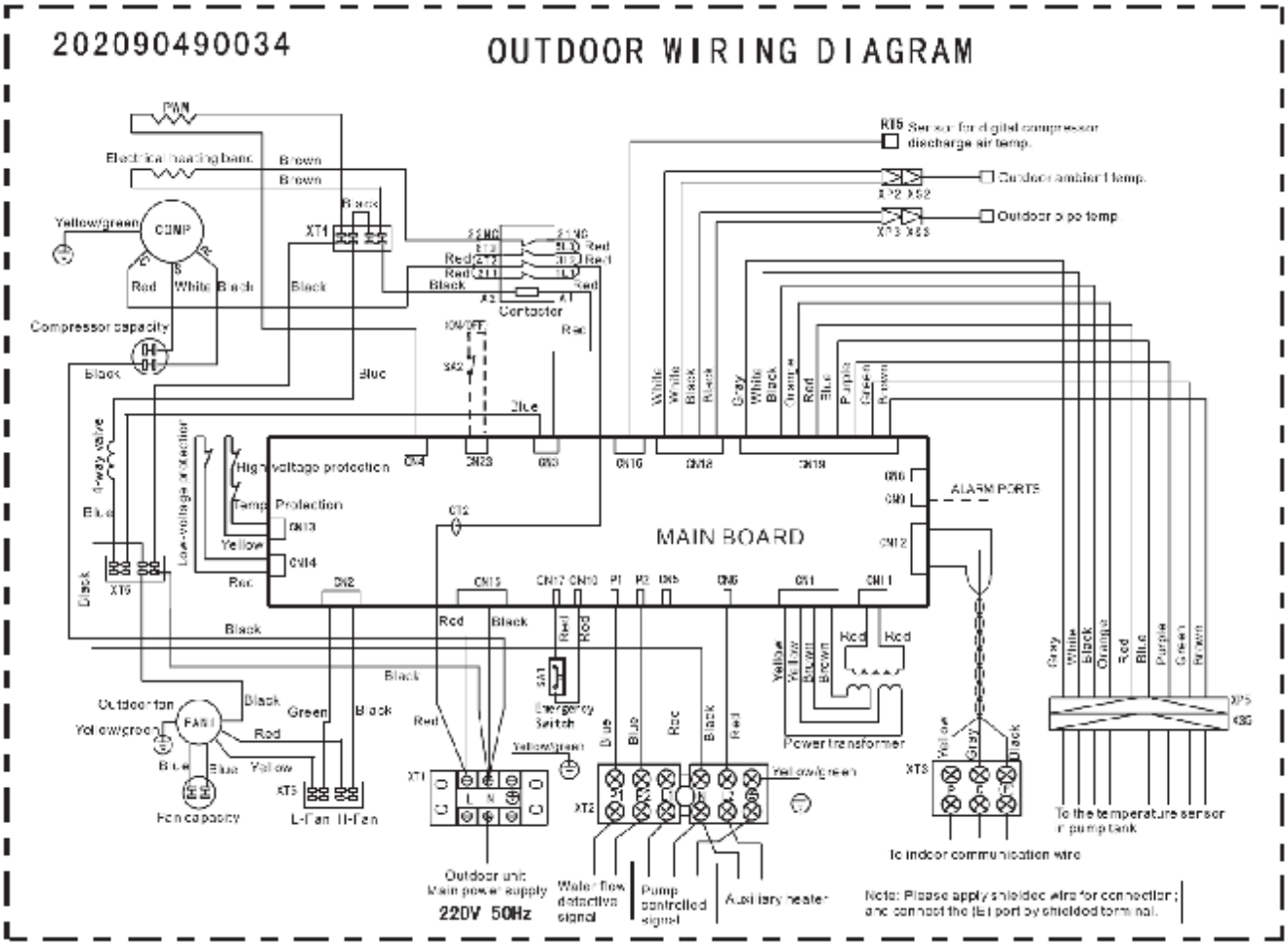


Remark:

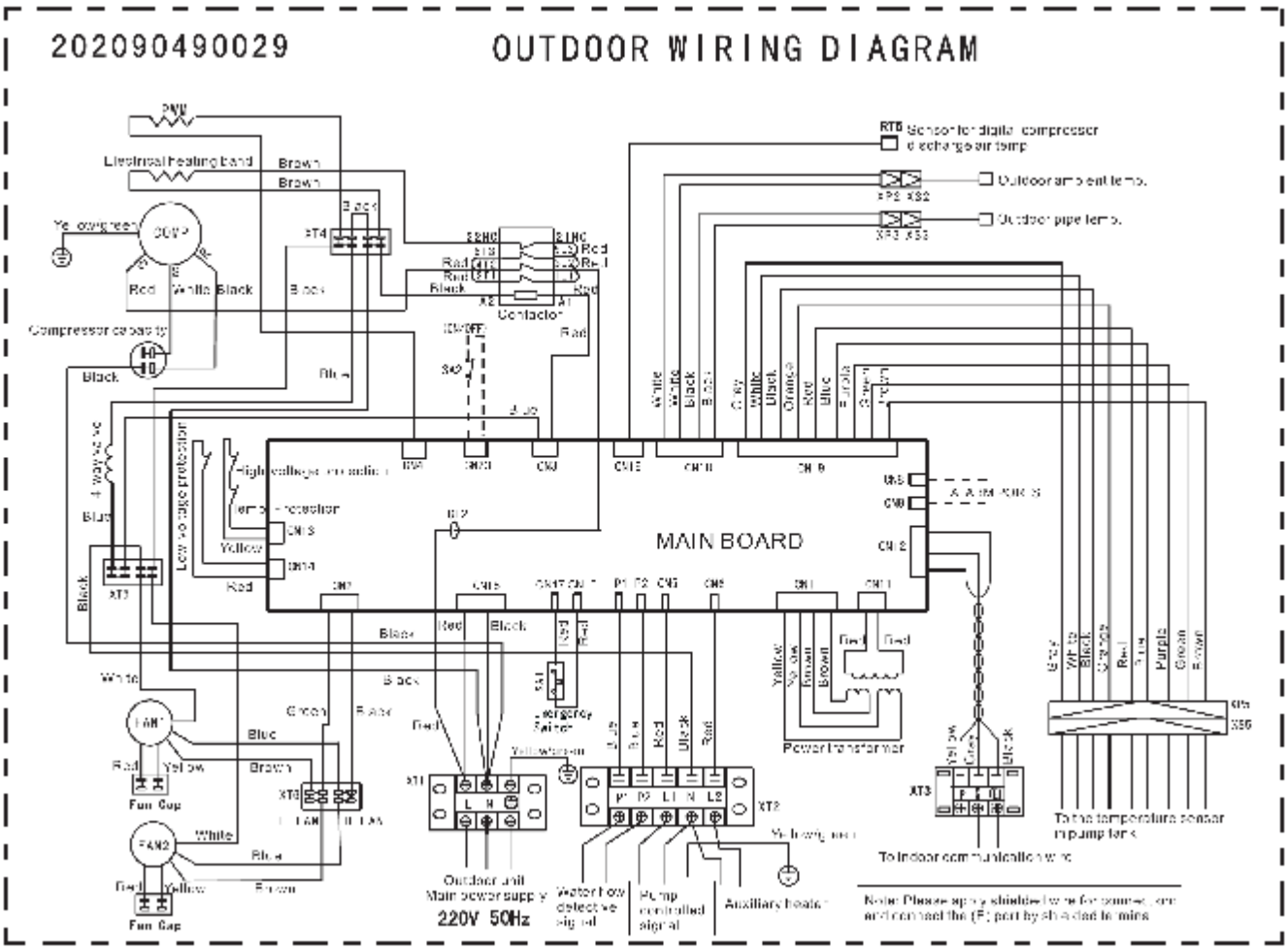
No	Name	No	Name	No	Name
1	Compressor	6	Capillary	11	Liquid receiver
2	High pressure switch	7	Liquid receiver	12	Low pressure switch
3	4 -way valve	8	Plate heat exchanger	13	Crank heater
4	Condenser	9	PWM valve		
5	Filter	10	Water temperature sensor		

5. Wiring Diagrams

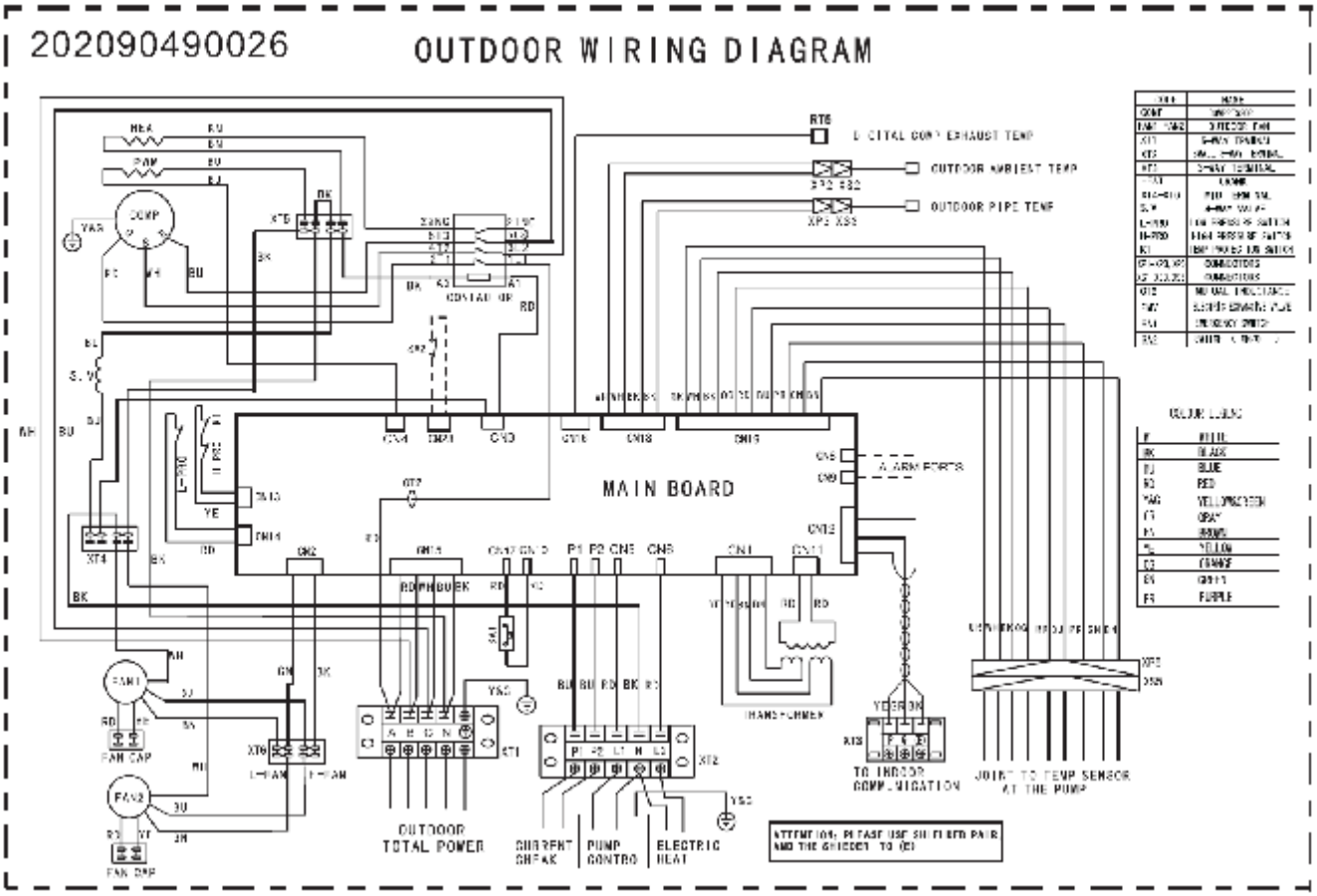
5.1 MGA-D10/N1



5.2 MGA-D12/N1



5.3 MGA-D14/SN1 MGA-D16/SN1



6. Electric Characteristics

Mod. kW	Electrical Power supply (V-ph-Hz)	Rated values											Fuses
		Compressors			Fan/fans		Pump		Total		Max. values(2)		Glass 5×20mm 250V
		F.L.I.	F.L.A.	L.R.A.	F.L.I.	F.L.A.	F.L.I.	F.L.A.	F.L.I.	F.L.A.	F.L.I.	F.L.A.	Fuse 1
		(kW)	(A)	(A)	(kW)	(A)	(kW)	(A)	(kW)	(A)	(kW)	(A)	
10	220-240-1-50	5.0	23.2	147	0.3	1.4	0.5	2.2	5.8	26.8	7.54	34.8	45A
12	220-240-1-50	5.0	23.2	147	0.37	1.6	0.5	2.2	5.8	27	7.63	35.1	45A
14	380-415-3-50	5.75	9.8	82.4	0.37	1.6	0.5	2.2	6.62	13.6	8.6	17.7	25A
16	380-415-3-50	5.75	9.8	82.4	0.37	1.6	0.5	2.2	6.62	13.6	8.6	17.7	25A

Remark:

F.L.I. Power input

F.L.A. Current input

L.R.A. Compressor start-up current

(1) Outside air temperature 35℃-Water temperature at evaporator 12/7℃

(2) Values refer to the lower rated voltage(50Hz). These values are used to judge the protection switch size and the thickness of the power supply cable.

7. Capacity Tables

7.1 Cooling capacity

Model		MGA-D10/N1					
Ta. (°C)	Tw (°C)	5	6	7	8	9	10
25	Pf (kW)	10.9	11.2	11.5	11.8	12.1	12.4
	Pa (kW)	3.3	3.3	3.4	3.4	3.4	3.5
	Pat (kW)	4.1	4.1	4.2	4.2	4.2	4.3
	Qev (m^3/h)	1.9	1.9	2.0	2.0	2.1	2.2
	△Pev (kPa)	47.3	47.6	50.0	50.3	54.0	57.0
30	Pf (kW)	10.4	10.8	11.1	11.5	11.8	12.1
	Pa (kW)	2.9	2.9	3.0	3.1	3.1	3.1
	Pat (kW)	3.4	3.4	3.5	3.6	3.6	3.6
	Qev (m^3/h)	1.8	1.8	1.9	2.0	2.0	2.0
	△Pev (kPa)	44.7	45.6	47.7	49.8	50.4	50.9
35	Pf (kW)	9.9	10.2	10.5	10.7	11.0	11.3
	Pa (kW)	3.3	3.3	3.4	3.4	3.5	3.5
	Pat (kW)	3.8	3.8	3.9	3.9	4.0	4.0
	Qev (m^3/h)	1.7	1.7	1.8	1.9	1.9	2.0
	△Pev (kPa)	40.5	41.3	45.0	48.0	48.6	51.0
40	Pf (kW)	9.4	9.7	10.0	10.3	10.6	11.0
	Pa (kW)	3.6	3.6	3.7	3.7	3.8	3.8
	Pat (kW)	4.1	4.1	4.2	4.2	4.3	4.3
	Qev (m^3/h)	1.6	1.6	1.7	1.7	1.8	1.8
	△Pev (kPa)	36.0	36.6	40.8	41.4	45.5	45.8
43	Pf (kW)	9.0	9.3	9.5	9.8	10.0	10.3
	Pa (kW)	3.8	3.8	3.9	3.9	4.0	4.0
	Pat (kW)	4.3	4.3	4.4	4.4	4.5	4.5
	Qev (m^3/h)	1.5	1.6	1.6	1.7	1.7	1.8
	△Pev (kPa)	31.5	35.7	36.6	40.5	41.3	46.5

Remark:

Ta: outside air temperature (°C)

Tw : evaporator water outlet temperature (°C)

Pf: cooling capacity (kW)

Pa: compressor power input (kW)

Pat: total power input (kW)

Qev: evaporator water flow (m^3/h)

△Pev: evaporator pressure drop (kPa)

Model		MGA-D12/N1					
Ta. (°C)	Tw (°C)	5	6	7	8	9	10
25	Pf (kW)	12.4	12.7	13.0	13.3	13.6	13.9
	Pa (kW)	3.5	3.5	3.5	3.6	3.6	3.6
	Pat (kW)	4.1	4.1	4.1	4.2	4.2	4.2
	Qev (m^3/h)	2.2	2.2	2.3	2.3	2.3	2.4
	△Pev (kPa)	46.6	47.8	49.6	51.8	54.6	60.0
30	Pf (kW)	11.9	12.2	12.5	12.8	13.1	13.4
	Pa (kW)	3.8	3.8	3.8	3.9	3.9	3.9
	Pat (kW)	4.4	4.4	4.4	4.5	4.5	4.5
	Qev (m^3/h)	2.0	2.1	2.1	2.2	2.2	2.3
	△Pev (kPa)	37.0	37.1	40.6	43.2	46.1	48.0
35	Pf (kW)	11.4	11.7	12.0	12.3	12.6	12.9
	Pa (kW)	4.2	4.2	4.2	4.3	4.3	4.3
	Pat (kW)	4.8	4.8	4.8	4.9	4.9	4.9
	Qev (m^3/h)	2.0	2.0	2.1	2.1	2.2	2.2
	△Pev (kPa)	33.8	37.1	40.6	43.2	46.1	48.0
40	Pf (kW)	10.9	11.2	11.5	11.8	12.1	12.4
	Pa (kW)	4.5	4.5	4.5	4.6	4.6	4.6
	Pat (kW)	5.1	5.1	5.1	5.2	5.2	5.2
	Qev (m^3/h)	1.9	2.0	2.0	2.0	2.1	2.1
	△Pev (kPa)	32.3	35.0	36.3	38.4	41.0	45.1
43	Pf (kW)	10.5	10.8	11.1	11.4	11.7	12.0
	Pa (kW)	4.7	4.7	4.7	4.8	4.8	4.8
	Pat (kW)	5.3	5.3	5.3	5.4	5.4	5.4
	Qev (m^3/h)	1.8	1.9	1.9	2.0	2.0	2.0
	△Pev (kPa)	28.0	30.1	33.8	37.4	38.6	40.5

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
△Pev: evaporator pressure drop (kPa)

Model		MGA-D14/SN1					
Ta. (°C)	Tw (°C)	5	6	7	8	9	10
25	Pf (kW)	14.8	15.1	15.4	15.7	16.1	16.4
	Pa (kW)	3.6	3.6	3.6	3.7	3.7	3.7
	Pat (kW)	4.1	4.1	4.1	4.2	4.2	4.2
	Qev (m^3/h)	2.6	2.6	2.7	2.7	2.8	2.8
	△Pev (kPa)	49.3	50.0	51.7	53.0	56.1	57.8
30	Pf (kW)	14.1	14.4	14.7	15.0	15.3	15.6
	Pa (kW)	4.1	4.1	4.1	4.2	4.2	4.2
	Pat (kW)	4.6	4.6	4.7	4.7	4.7	4.7
	Qev (m^3/h)	2.4	2.5	2.5	2.6	2.6	2.7
	△Pev (kPa)	43.9	47.9	48.3	49.1	50.2	52.7
35	Pf (kW)	13.4	13.7	14.0	14.3	14.6	14.9
	Pa (kW)	4.6	4.6	4.6	4.7	4.7	4.7
	Pat (kW)	5.1	5.1	5.1	5.2	5.2	5.2
	Qev (m^3/h)	2.3	2.4	2.4	2.5	2.5	2.5
	△Pev (kPa)	40.8	43.5	44.2	46.9	47.8	48.3
40	Pf (kW)	12.5	12.8	13.1	13.4	13.7	14.0
	Pa (kW)	5.1	5.1	5.1	5.2	5.2	5.2
	Pat (kW)	5.6	5.6	5.6	5.7	5.7	5.7
	Qev (m^3/h)	2.2	2.2	2.3	2.3	2.4	2.4
	△Pev (kPa)	33.3	34.5	36.7	39.8	43.7	44.9
43	Pf (kW)	12.0	12.3	12.6	12.9	13.2	13.5
	Pa (kW)	5.5	5.5	5.5	5.6	5.6	5.6
	Pat (kW)	6.0	6.0	6.0	6.1	6.1	6.1
	Qev (m^3/h)	2.1	2.1	2.2	2.2	2.3	2.3
	△Pev (kPa)	30.6	32.5	35.2	36.2	39.1	40.5

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
△Pev: evaporator pressure drop (kPa)

Model		MGA-D16/SN1					
Ta. (°C)	Tw (°C)	5	6	7	8	9	10
25	Pf (kW)	15.5	15.7	16.0	16.3	16.5	16.8
	Pa (kW)	3.9	3.9	3.9	4.0	4.0	4.0
	Pat (kW)	4.7	4.7	4.7	4.8	4.8	4.8
	Qev (m^3/h)	2.7	2.7	2.8	2.8	2.9	2.9
	△Pev (kPa)	54.9	57.6	59.4	62.1	65.2	67.7
30	Pf (kW)	14.9	15.2	15.5	15.8	16.1	16.4
	Pa (kW)	4.4	4.4	4.4	4.5	4.5	4.5
	Pat (kW)	5.2	5.2	5.2	5.4	5.4	5.4
	Qev (m^3/h)	2.6	2.6	2.7	2.7	2.8	2.8
	△Pev (kPa)	51.0	52.9	50.9	54.7	59.9	63.0
35	Pf (kW)	14.4	14.7	15.0	15.3	15.6	15.9
	Pa (kW)	4.9	4.9	4.9	5.0	5.0	5.0
	Pat (kW)	5.7	5.7	5.7	5.8	5.8	5.8
	Qev (m^3/h)	2.6	2.6	2.7	2.7	2.8	2.8
	△Pev (kPa)	50.8	53.1	55.8	58.1	61.2	63.2
40	Pf (kW)	13.9	14.2	14.5	14.8	15.1	15.2
	Pa (kW)	5.3	5.3	5.3	5.4	5.4	5.4
	Pat (kW)	6.1	6.1	6.1	6.2	6.2	6.2
	Qev (m^3/h)	2.5	2.5	2.6	2.6	2.7	2.7
	△Pev (kPa)	46.8	49.1	51.5	53.1	55.8	59.4
43	Pf (kW)	13.5	13.8	14.1	14.4	14.7	14.8
	Pa (kW)	5.7	5.7	5.7	5.8	5.8	5.8
	Pat (kW)	6.5	6.5	6.5	6.6	6.6	6.6
	Qev (m^3/h)	2.4	2.4	2.5	2.5	2.6	2.6
	△Pev (kPa)	41.4	44.3	47.0	49.1	51.5	59.4

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pf: cooling capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qev: evaporator water flow (m^3/h)
△Pev: evaporator pressure drop (kPa)

7.2 Heating capacity

Model		MGA-D10/N1			
Ta. U.R.87% (°C)	Tw (°C)	35	40	45	50
-5	Pt (kW)	8.3	8.3	8.3	—
	Pa (kW)	3.6	3.9	4.2	—
	Pat (kW)	4.4	4.7	5.0	—
	Qc (m^3/h)	1.5	1.5	1.5	—
	△Pc (kPa)	29.4	28.4	27.0	—
0	Pt (kW)	9.4	9.4	9.4	9.2
	Pa (kW)	3.7	4.0	4.3	4.5
	Pat (kW)	4.5	4.8	5.1	5.3
	Qc (m^3/h)	1.8	1.8	1.8	1.8
	△Pc (kPa)	27.5	25.6	24.8	23.2
7	Pt (kW)	13.2	13.1	13.0	12.9
	Pa (kW)	3.8	4.1	4.4	4.7
	Pat (kW)	4.6	4.9	5.2	5.5
	Qc (m^3/h)	2.2	2.2	2.2	2.2
	△Pc (kPa)	37.2	35.8	34.5	33.1
10	Pt (kW)	12.3	12.2	12.1	12.0
	Pa (kW)	3.9	4.2	4.5	4.8
	Pat (kW)	4.7	5.0	5.3	5.1
	Qc (m^3/h)	2.3	2.3	2.3	2.3
	△Pc (kPa)	40.5	40.0	39.2	38.8
15	Pt (kW)	13.8	13.7	13.6	13.5
	Pa (kW)	4.0	4.3	4.6	4.9
	Pat (kW)	4.8	5.1	5.4	5.7
	Qc (m^3/h)	2.4	2.4	2.3	2.3
	△Pc (kPa)	45.8	45.1	43.6	42.9

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pt: heating capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qc: condenser water flow (m^3/h)
ΔPc: evaporator pressure drop (kPa)
— : conditions outside of operating limits

Model		MGA-D12/N1			
Ta. U.R.87% (°C)	Tw (°C)	35	40	45	50
-5	Pt (kW)	11.0	10.9	10.8	—
	Pa (kW)	3.7	4.0	4.3	—
	Pat (kW)	4.5	4.8	5.1	—
	Qc (m^3/h)	1.7	1.7	1.7	—
	△Pc (kPa)	41.6	41.0	40.3	—
0	Pt (kW)	12.2	12.1	12.0	11.9
	Pa (kW)	3.8	4.1	4.4	4.6
	Pat (kW)	4.6	4.9	5.2	5.4
	Qc (m^3/h)	2.0	2.0	2.0	2.0
	△Pc (kPa)	33.0	32.6	32.1	31.8
7	Pt (kW)	14.2	14.1	14.0	13.9
	Pa (kW)	3.9	4.2	4.5	4.8
	Pat (kW)	4.7	5.0	5.3	5.6
	Qc (m^3/h)	2.4	2.4	2.4	2.4
	△Pc (kPa)	44.0	43.6	43.1	42.8
10	Pt (kW)	15.2	15.1	15.0	14.9
	Pa (kW)	4.0	4.3	4.6	4.9
	Pat (kW)	4.8	5.1	5.4	5.7
	Qc (m^3/h)	2.5	2.5	2.5	2.5
	△Pc (kPa)	38.0	37.6	37.2	37.0
15	Pt (kW)	16.7	16.6	16.5	16.4
	Pa (kW)	4.1	4.4	4.7	5.0
	Pat (kW)	4.9	5.2	5.5	5.8
	Qc (m^3/h)	2.8	2.8	2.8	2.8
	△Pc (kPa)	45.0	44.8	44.6	44.2

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pt: heating capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qc: condenser water flow (m^3/h)
ΔPc: evaporator pressure drop (kPa)
— : conditions outside of operating limits

Model		MGA-D14/SN1			
Ta. U.R.87% (°C)	Tw (°C)	35	40	45	50
-5	Pt (kW)	10.4	10.5	10.6	—
	Pa (kW)	4.0	4.4	4.9	—
	Pat (kW)	4.8	5.2	5.7	—
	Qc (m^3/h)	1.9	1.9	1.9	—
	△Pc (kPa)	25.8	27.2	27.0	—
0	Pt (kW)	13.1	13.0	13.0	12.9
	Pa (kW)	4.0	4.4	4.9	5.4
	Pat (kW)	4.8	5.2	5.7	6.1
	Qc (m^3/h)	2.3	2.3	2.3	2.3
	△Pc (kPa)	21.1	21.1	21.0	21.0
7	Pt (kW)	16.2	16.1	16.0	15.9
	Pa (kW)	4.1	4.5	5.0	5.5
	Pat (kW)	4.9	5.3	5.8	6.3
	Qc (m^3/h)	2.8	2.8	2.8	2.8
	△Pc (kPa)	31.2	31.1	31.0	31.0
10	Pt (kW)	17.6	17.5	17.4	17.4
	Pa (kW)	4.2	4.6	5.1	5.6
	Pat (kW)	5.0	5.4	5.9	6.4
	Qc (m^3/h)	3.1	3.1	3.1	3.1
	△Pc (kPa)	36.4	36.2	36.0	35.9
15	Pt (kW)	19.8	19.7	19.6	19.4
	Pa (kW)	4.3	4.7	5.2	5.7
	Pat (kW)	5.1	5.5	6.0	6.5
	Qc (m^3/h)	3.5	3.5	3.5	3.5
	△Pc (kPa)	45.4	45.2	45.0	44.9

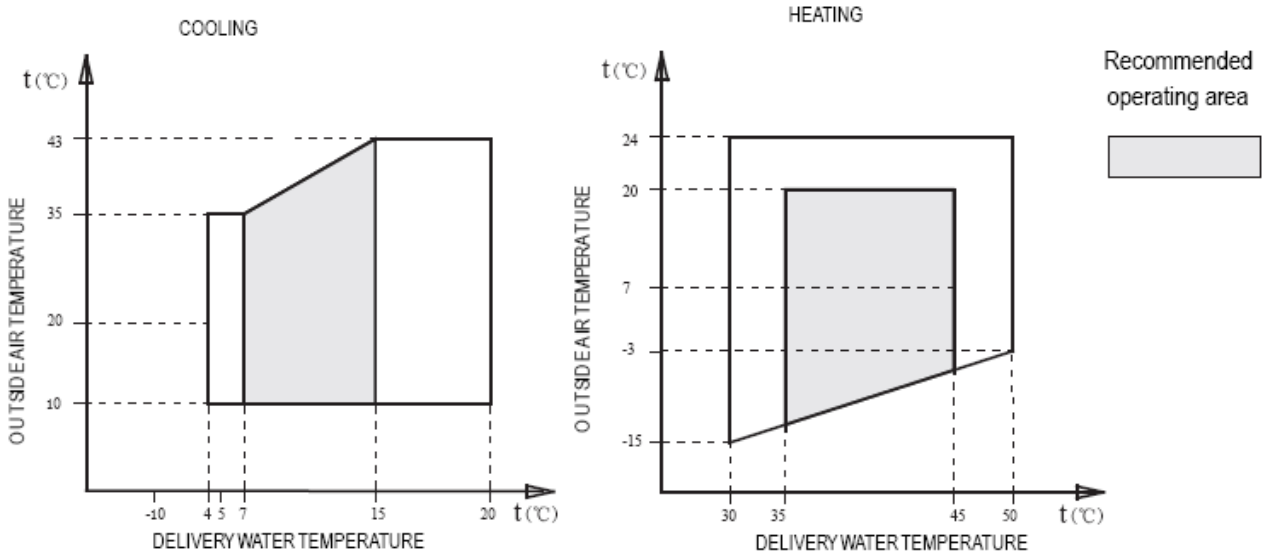
Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pt: heating capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qc: condenser water flow (m^3/h)
ΔPc: evaporator pressure drop (kPa)
— : conditions outside of operating limits

Model		MGA-D16/SN1			
Ta. U.R.87% (°C)	Tw (°C)	35	40	45	50
-5	Pt (kW)	11.5	11.4	11.3	—
	Pa (kW)	4.1	4.5	5.0	—
	Pat (kW)	4.9	5.3	5.8	—
	Qc (m^3/h)	2.0	2.0	2.0	—
	△Pc (kPa)	25.0	25.0	24.8	—
0	Pt (kW)	14.2	14.1	14.0	13.9
	Pa (kW)	4.2	4.6	5.1	5.6
	Pat (kW)	5.0	5.4	5.1	5.6
	Qc (m^3/h)	5.0	5.4	5.9	6.4
	△Pc (kPa)	20.2	20.1	20.0	19.9
7	Pt (kW)	17.2	17.1	17.0	16.9
	Pa (kW)	4.3	4.7	5.2	5.7
	Pat (kW)	5.1	5.5	6.0	6.5
	Qc (m^3/h)	2.9	2.9	2.9	2.9
	△Pc (kPa)	30.2	30.1	30.0	30.0
10	Pt (kW)	18.7	18.6	18.5	18.4
	Pa (kW)	4.4	4.8	5.3	5.8
	Pat (kW)	5.2	5.6	6.1	6.6
	Qc (m^3/h)	3.2	3.2	3.2	3.2
	△Pc (kPa)	35.4	35.2	35.0	34.8
15	Pt (kW)	21.0	20.9	20.8	20.7
	Pa (kW)	4.5	4.9	5.4	5.9
	Pat (kW)	5.3	5.7	6.2	6.7
	Qc (m^3/h)	3.6	3.6	3.6	3.6
	△Pc (kPa)	46.2	45.6	45.0	44.4

Remark:
Ta: outside air temperature (°C)
Tw : evaporator water outlet temperature (°C)
Pt: heating capacity (kW)
Pa: compressor power input (kW)
Pat: total power input (kW)
Qc: condenser water flow (m^3/h)
ΔPc: evaporator pressure drop (kPa)
— : conditions outside of operating limits

8. Operation Limits

Cooling operation	Outdoor temperature: 10℃～43℃
	Water temperature: 4℃-20℃
Heating operation	Outdoor temperature: 4℃～24℃ (-15℃～24℃, when charge enough antifreeze)
	Water temperature: 30℃-50℃



8.1 Ethylene Glycol Solutions

Water and ethylene glycol solutions used as a thermal vector in the place of water reduce the performance of the unit. Multiply the performance figures by the values given in the following table.

Freezing point (°C)						
	0	-5	-10	-15	-20	-25
Percentage of ethylene glycol in weight						
	0	12%	20%	28%	35%	40%
cPf	1	0.98	0.97	0.965	0.96	0.955
cQ	1	1.02	1.04	1.075	1.11	1.14
cdp	1	1.07	1.11	1.18	1.22	1.24

cPf: correction factor refrigerating capacity
cQ: correction factor flow rate
cdp: correction factor pressure drop

Note:

1. During winter leaving the unit unused, please drain water out completely from unit if no antifreeze were charged into pipeline, or keep power on (at standby or off status) and ensure that water is contained inside of unit.
2. When ambient temperature is lower than 5℃, running cooling mode must be charged antifreeze. Refer to upper parameters for the charged volume.

8.2 Fouling Factors

The performance data given refer to conditions with clean evaporator plates (fouling factor=1). For different fouling factors, multiply the figures in the performance tables by the coefficient given in the following table.

Fouling factors	Evaporator		
(m^2°C/W)	f1	fk1	fx1
4.4×10^{-5}	-	-	-
0.86×10^{-4}	0.96	0.99	0.99
1.72×10^{-4}	0.93	0.98	0.98

f1 capacity correction factor
fk1 compressor power input correction factor
fx1 total power input correction factor

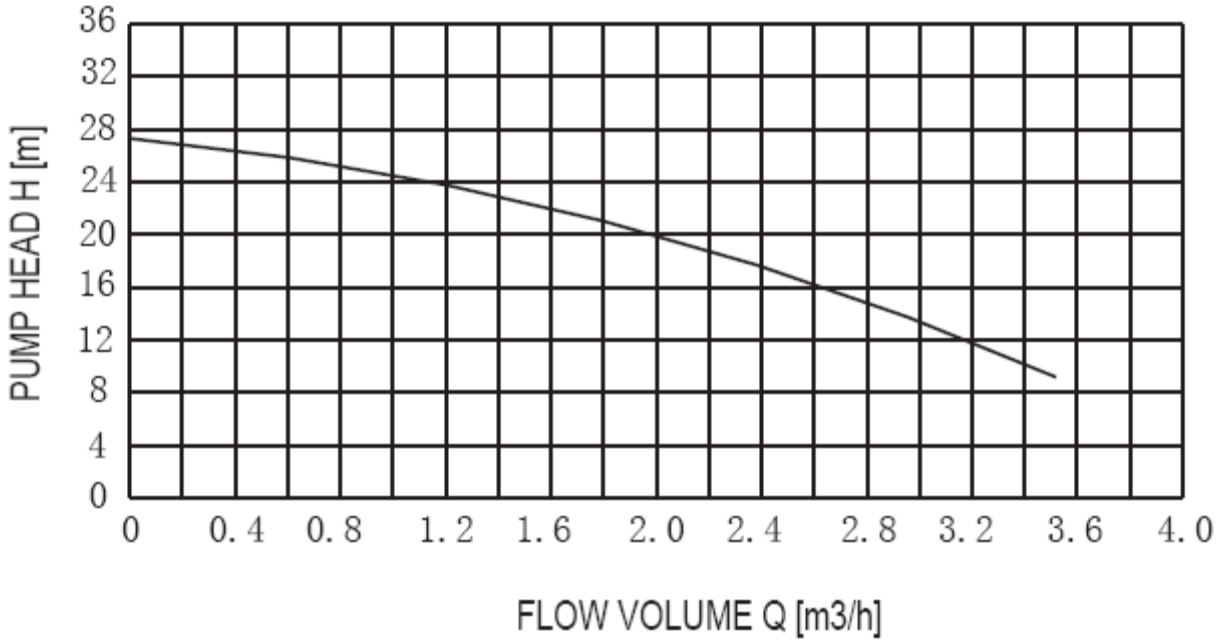
8.3 Quantity of Water in Installation

Model	MGA-D10/N1	MGA-D12/N1	MGA-D14/SN1	MGA-D16/SN1
Minimum water volume (L)	43	50	60	68

If the total water volume in the system is less than the value in the table above, the additional water tank is necessary in order to avoid the compressor On/Off frequency.
The minimum size of the water tank is calculated as:
Size of additional water tank(L)=Minimum water volume (L) –Actual water volume(L)

9. Hydraulic Performance

9.1 Pump head curves(*)



Note:
(*) To obtain the useful head of the installation, subtract the pressure drop of the plate heat exchanger.

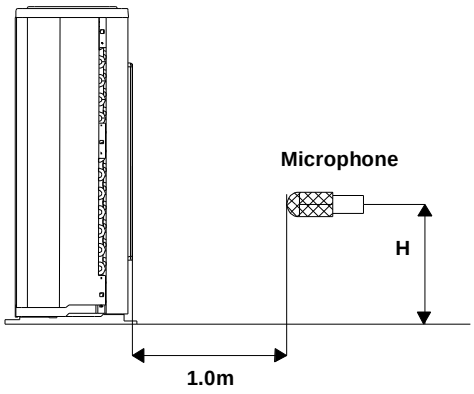
9.2 Heat exchanger pressure drop (water side)

Model	Water flow	m^3/h	0.8	1.0	1.2	1.4	1.6	1.8	2.0	
10kW		l/sec	0.222	0.278	0.333	0.389	0.444	0.500	0.556	
	Pressure drop	kPa	26	29	33	37	42	46	50	

Model	Water flow	m^3/h	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.6
		l/sec	0.333	0.389	0.444	0.500	0.556	0.611	0.667	0.722
12 kW	Pressure drop	kPa	35	39	44	47	50	53	58	
14 kW		kPa	28	31	36	40	43	46	50	54
16 kW		kPa	26	29	32	37	41	45	49	52

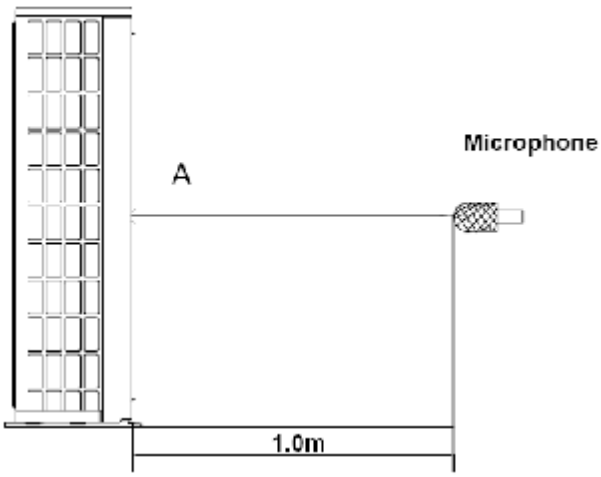
10. Sound Levels

10kW



Note: H= 0.5 × height of outdoor unit

12/14/16kW

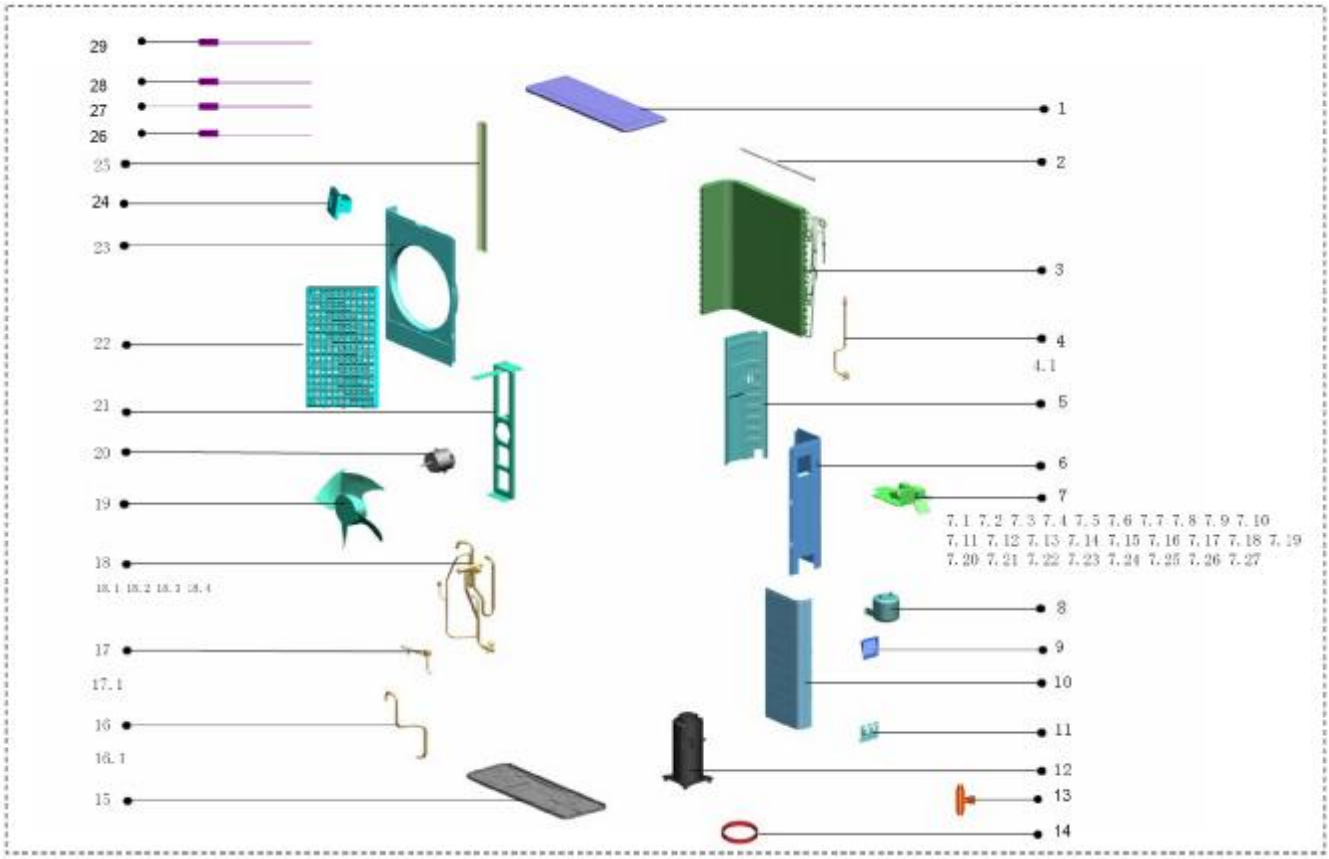


Note: The point A is in the middle of the whole outdoor panel.

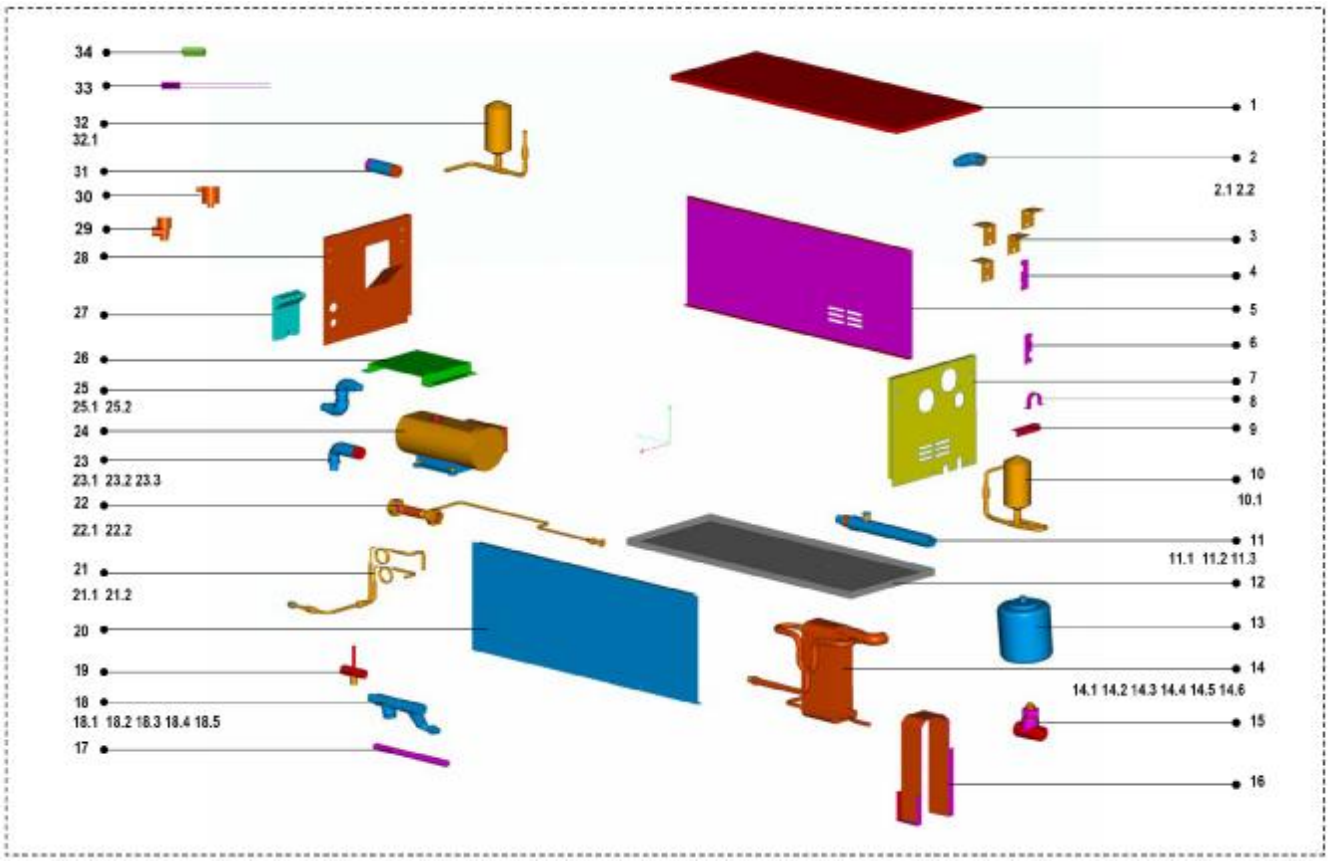
Model	Noise level dB(A)
MGA-D10/N1	57
MGA-D12/N1	60
MGA-D14/SN1	60
MGA-D16/SN1	60

11. Exploded View

11.1 MGA-D10/N1

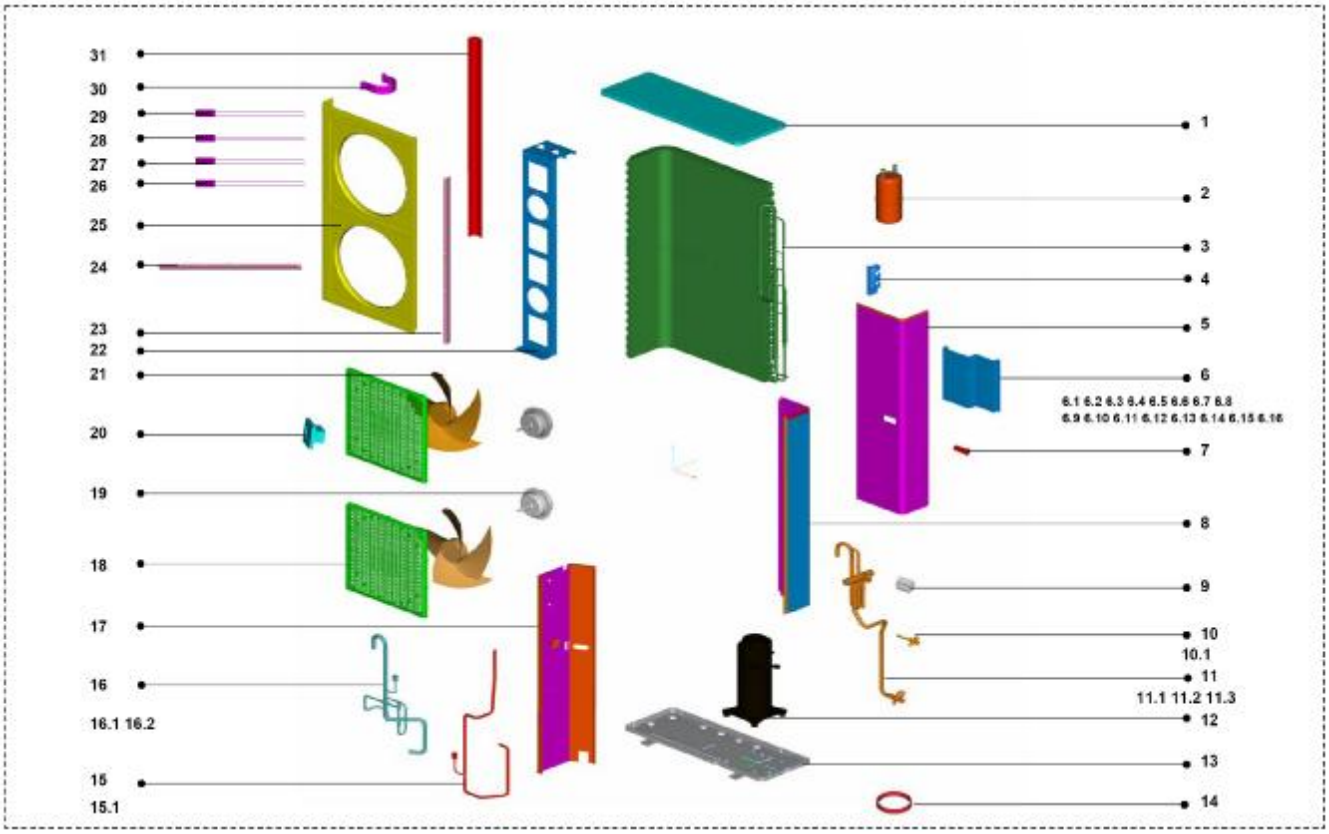


Matched water pump box- CE-SBX/N1-01

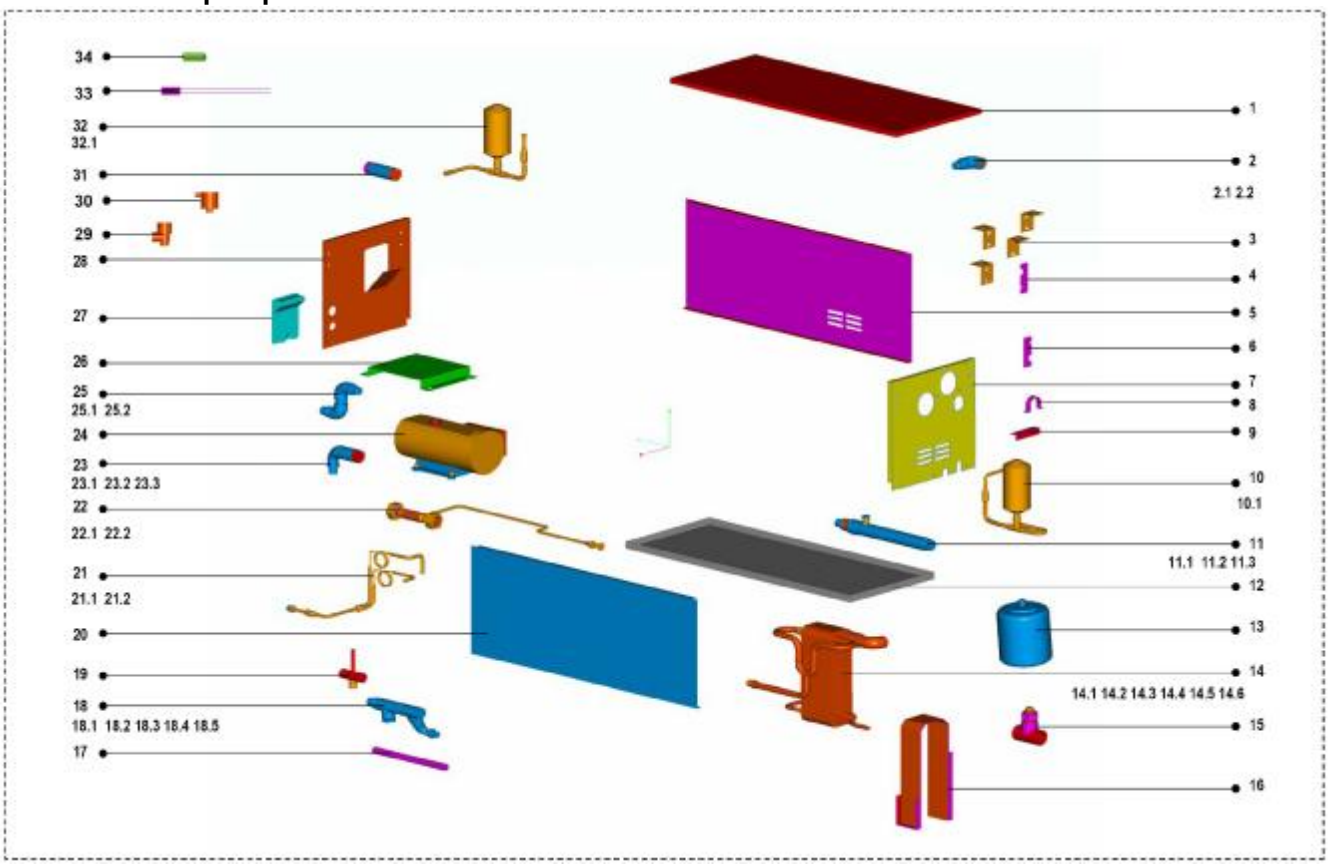


MGA-D10/N1					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Top cover ass'y	1	7.25	Wire joint	1
2	Rear Supporter	1	7.26	Compressor capacitor	1
3	Condenser ass'y	1	7.27	Wire clamp	1
4	High pressure valve ass'y	1	8	Separator	1
4.1	Low pressure valve	1	9	Big handle	1
5	Partition board ass'y	1	10	Front right clapboard ass'y	1
6	Rear right clapboard ass'y	1	11	Valve plate	1
7	E-part box ass'y	1	12	Compressor	1
7.1	485 communication wire	1	13	Branch pipe ass'y	1
7.2	Transformer	1	14	Compressor electric heater	1
7.3	Cable	1	15	Base ass'y	1
7.4	Damp	1	16	Suction pipe ass'y	1
7.5	Electric installation board	1	16.1	Pressure controller	1
7.6	Capacitor	1	17	Solenoid valve ass'y	1
7.7	Capacitor installation board	1	17.1	Pressure-relief-valve	1
7.8	Capacitor clamp	1	18	4-way valve ass'y	1
7.9	Capacitor clamp	1	18.1	Solenoid	1
7.10	Wire clamp	1	18.2	4-way valve	1
7.11	Terminal board	1	18.3	Low pressure valve	1
7.12	Urgency switch	1	18.4	Pressure controller	1
7.13	AC contactor	1	19	Axial flow fan	1
7.14	Wire joint ass'y	1	20	Motor	1
7.15	Wire joint	1	21	Motor bracket ass'y	1
7.16	Wire joint	1	22	Grille	1
7.17	Wire joint	3	23	Front panel	1
7.18	Wire joint	1	24	Wire controller	1
7.19	Wire joint	1	25	Left holder	1
7.20	Surge suppresser	1	26	Temp sensor	1
7.21	Caution label	1	27	Pipe temp sensor ass'y	1
7.22	Power supply wire	1	28	Discharge temp sensor ass'y	1
7.23	Main control board ass'y	1	29	Discharge temp sensor	1
7.24	Outdoor communication cable	1			
Water pump box CE-SBX/N1-01					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Up covering plate	1	18.2	Branch pipe	2
2	Water-inlet pipe ass'y	1	18.3	Screw	1
2.1	Pipe joint	1	18.4	Elbow pipe	1
2.2	Elbow pipe	1	18.5	Inner joint	1
3	Hook	4	19	Water charge valve	1
4	Pipe clamp I	1	20	Rear clapboard	2
5	Front clapboard	1	21	Input pipe ass'y	1
6	Pipe clamp II	1	21.1	Pipe joint	1
7	Right cover ass'y	1	21.2	Copper nut	1
8	Capacitor clamp	1	22	Water-outlet pipe ass'y	1
9	Water-inlet pipe supporter	2	22.1	Water-outlet pipe ass'y I	1
10	Input pipe ass'y	1	22.2	Drain pipe adapter	1
10.1	Accumulator tank	1	23	Water-outlet pipe ass'y II	1
11	Water-inlet pipe ass'y	1	23.1	Elbow pipe	1
11.1	outer joint	1	23.2	Water-outlet pipe II	1
11.2	Pipe joint	1	23.3	Pipe joint	1
11.3	Water-inlet pipe ass'y I	1	24	Pump	1
12	Base	1	25	Water-outlet pipe ass'y I	1
13	Expansion vessel	1	25.1	Pipe joint	3
14	Heat-exchanger plate ass'y	1	25.2	Elbow pipe	2
14.1	Plate Heat-exchanger	1	26	Installation bracket	1
14.2	Elbow pipe	1	27	Big handle	1
14.3	Pipe joint	1	28	Left clapboard ass'y	1
14.4	Pipe hoop	1	29	Safety valve	1
14.5	Pipe joint	1	30	Discharge valve	1
14.6	Copper nut	1	31	Water-outlet pipe III	1
15	Target flow-volume controller	1	32	Input pipe ass'y	1
16	Clamp	1	32.1	Accumulator tank	1
17	Water charge pipe	1	33	Temp. sensor ass'y	1
18	Water-inlet pipe ass'y II	1	34	Wire joint, 5p	1
18.1	Pipe joint	3			

11.2 MGA-D12/N1

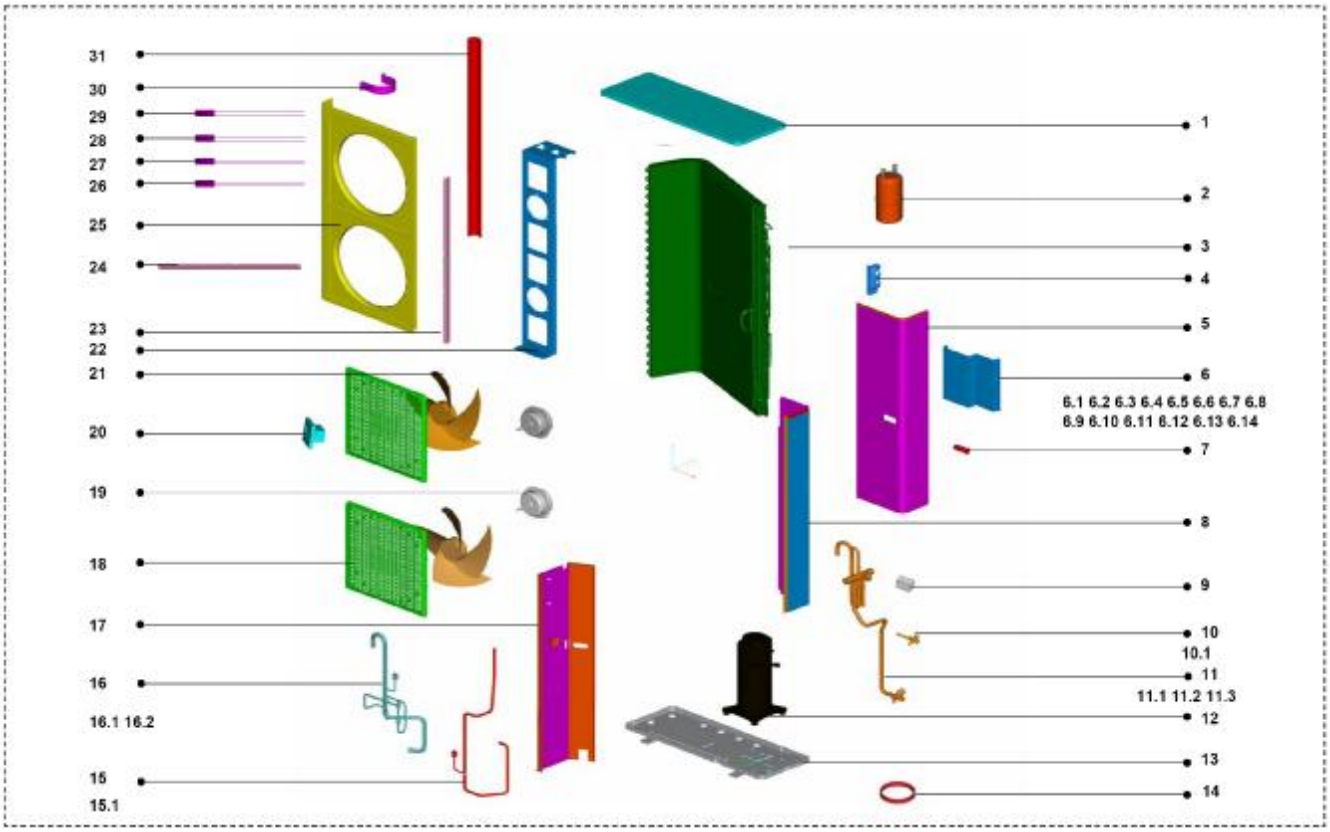


Matched water pump box- CE-SBX/N1-01A

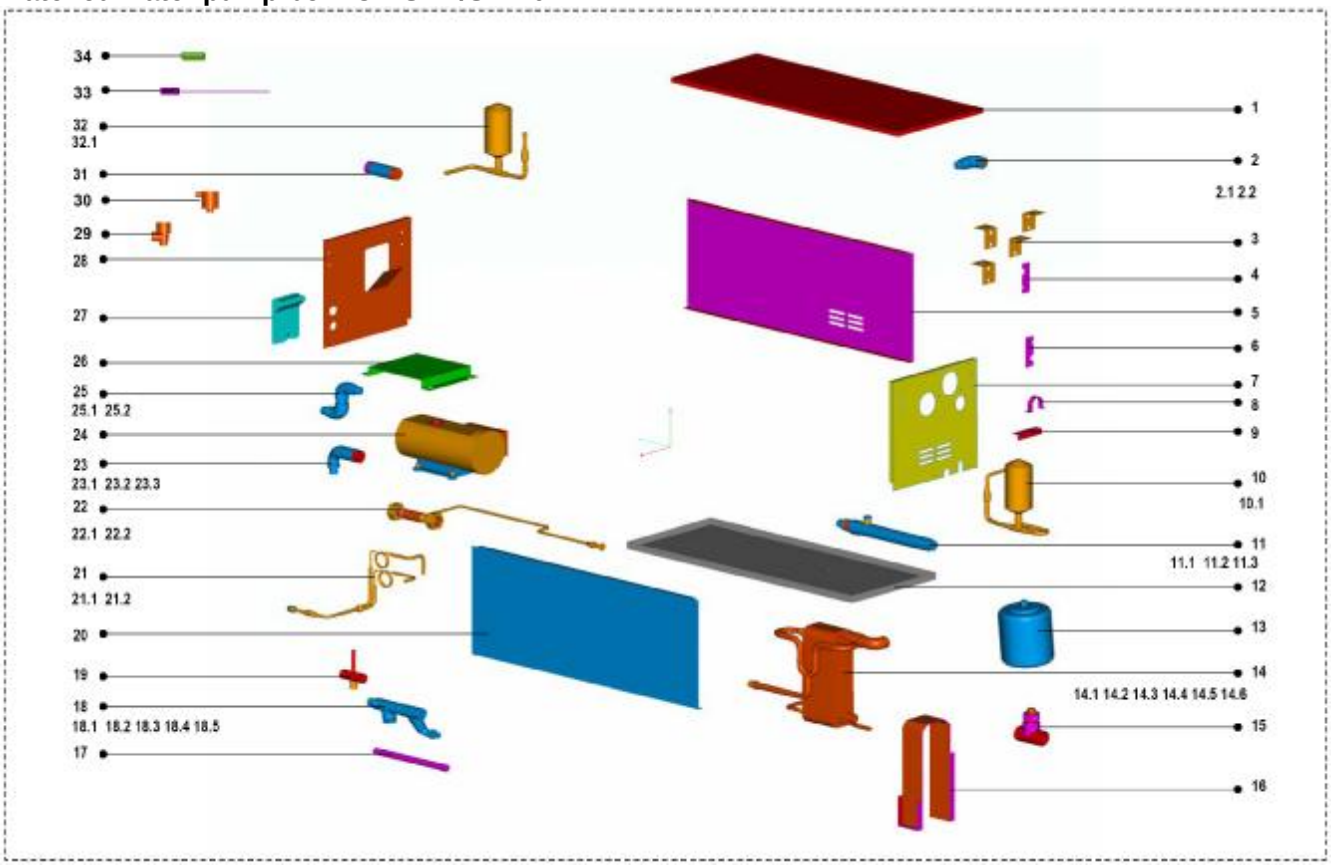


MGA-D12/N1					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Top cover ass'y	1	11	4-way valve ass'y	1
2	Accumulator cylinder	1	11.1	4-way valve	1
3	Condenser ass'y	1	11.2	4-Ways valve solenoid	1
4	Valve plate	1	11.3	Low pressure valve	1
5	Front clapboard ass'y	1	12	Compressor	1
6	E-part box ass'y	1	13	Base	1
6.1	AC contactor	1	14	Compressor electric heater	1
6.2	Surge suppresser	1	15	Discharge pipe ass'y	1
6.3	Capacitor clamp	1	15.1	Pressure controller	1
6.4	Compressor capacitor	1	16	Suction pipe ass'y	1
6.5	Main control board ass'y	1	16.1	Pressure controller	1
6.6	Transformer	1	16.2	Pressure-relief-valve	1
6.7	Wire joint	1	17	Partition board ass'y	1
6.8	Motor capacitor	2	18	Grille	2
6.9	Wire joint, 3p	1	19	Motor	2
6.10	Wire joint	1	20	Wire controller	1
6.11	Electric installation board ass'y	1	21	Axial flow fan	2
6.12	Cable	1	22	Motor bracket ass'y	1
6.13	Power supply wire	1	23	Rear support board I	1
6.14	Wire joint	3	24	Rear net clip	1
6.15	Wire joint	1	25	Front panel	1
6.16	Wire joint	1	26	Discharge temp sensor ass'y	1
7	Urgency switch	1	27	Temp sensor ass'y	1
8	Rear clapboard ass'y	1	28	Room temp sensor ass'y	1
9	Handle	2	29	Discharge temp sensor	1
10	High pressure valve ass'y	1	30	Fixing ring	1
10.1	Low pressure valve	1	31	Rear support board II	1
Water pump box CE-SBX/N1-01A					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Up covering plate	1	18.2	Branch pipe	2
2	Water-inlet pipe ass'y	1	18.3	Screw	1
2.1	Pipe joint	1	18.4	Elbow pipe	1
2.2	Elbow pipe	1	18.5	Inner joint	1
3	Hook	4	19	Water charge valve	1
4	Pipe clamp I	1	20	Rear clapboard	2
5	Front clapboard	1	21	Input pipe ass'y	1
6	Pipe clamp II	1	21.1	Pipe joint	1
7	Right cover ass'y	1	21.2	Copper nut	1
8	Capacitor clamp	1	22	Water-outlet pipe ass'y	1
9	Water-inlet pipe supporter	2	22.1	Water-outlet pipe ass'y I	1
10	Input pipe ass'y	1	22.2	Drain pipe adapter	1
10.1	Accumulator tank	1	23	Water-outlet pipe ass'y II	1
11	Water-inlet pipe ass'y	1	23.1	Elbow pipe	1
11.1	outer joint	1	23.2	Water-outlet pipe II	1
11.2	Pipe joint	1	23.3	Pipe joint	1
11.3	Water-inlet pipe ass'y I	1	24	Pump	1
12	Base	1	25	Water-outlet pipe ass'y I	1
13	Expansion vessel	1	25.1	Pipe joint	3
14	Heat-exchanger plate ass'y	1	25.2	Elbow pipe	2
14.1	Plate Heat-exchanger	1	26	Installation bracket	1
14.2	Elbow pipe	1	27	Big handle	1
14.3	Pipe joint	1	28	Left clapboard ass'y	1
14.4	Pipe hoop	1	29	Safety valve	1
14.5	Pipe joint	1	30	Discharge valve	1
14.6	Copper nut	1	31	Water-outlet pipe III	1
15	Target flow-volume controller	1	32	Input pipe ass'y	1
16	Clamp	1	32.1	Accumulator tank	1
17	Water charge pipe	1	33	Temp. sensor ass'y	1
18	Water-inlet pipe ass'y II	1	34	Wire joint, 5p	1
18.1	Pipe joint	3			

11.3 MGA-D14/SN1

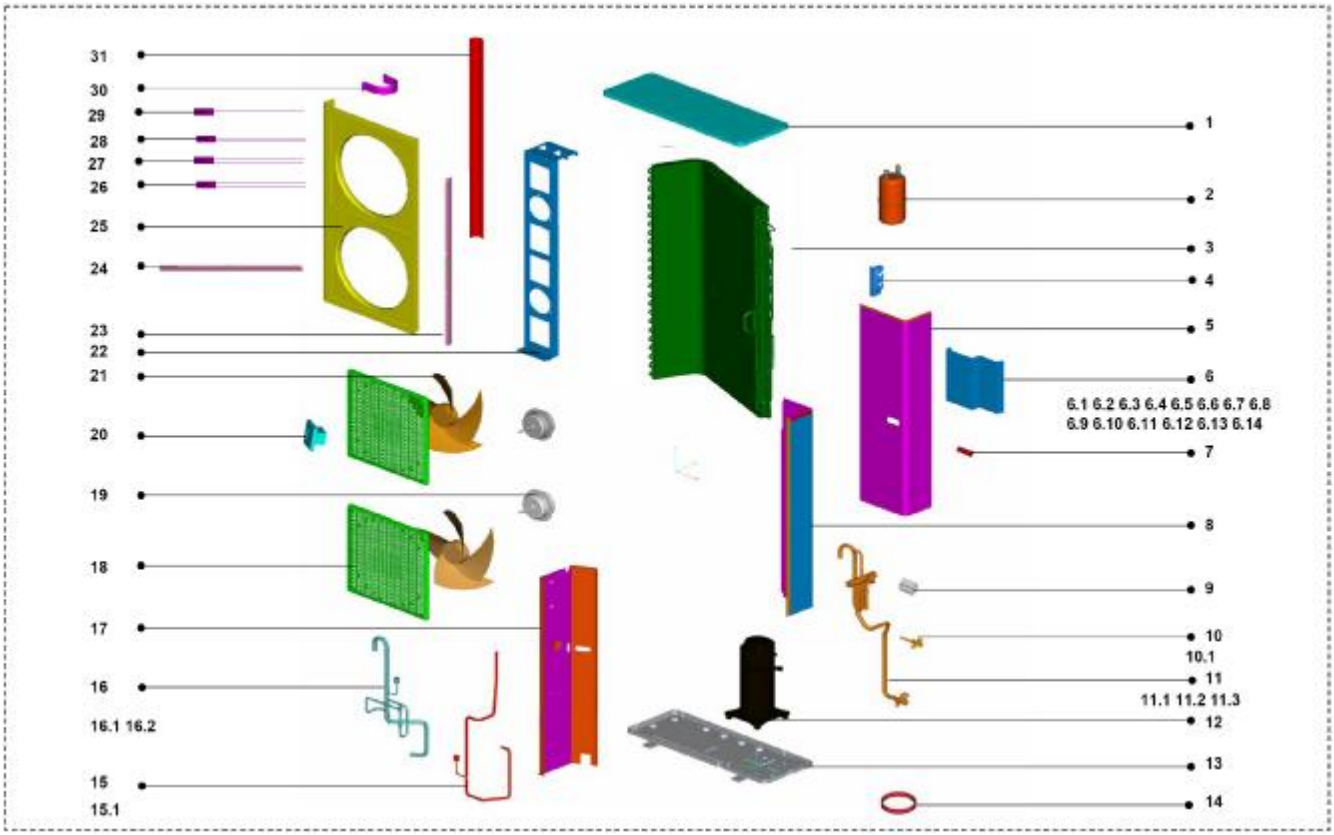


Matched water pump box- CE-SBX/SN1-01

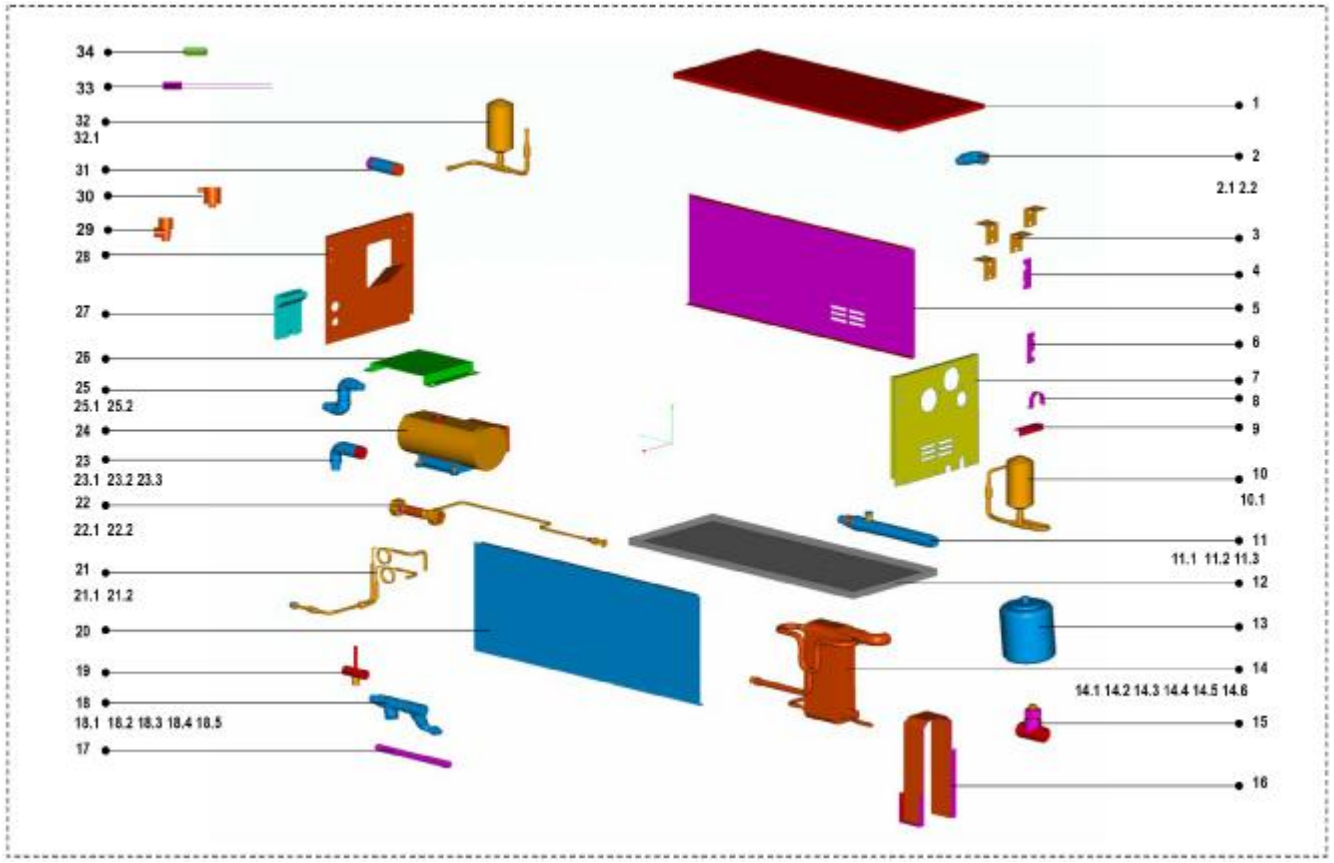


MGA-D14/SN1					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Top cover ass'y	1	11.1	4-way valve	1
2	Accumulator cylinder	1	11.2	4-Ways valve solenoid	1
3	Condenser ass'y	1	11.3	Low pressure valve	1
4	Valve plate	1	12	Compressor	1
5	Front clapboard ass'y	1	13	Base	1
6	E-part box ass'y	1	14	Compressor electric heater	1
6.1	AC contactor	1	15	Discharge pipe ass'y	1
6.2	Surge suppresser	1	15.1	Pressure controller	1
6.3	Main control board ass'y	1	16	Suction pipe ass'y	1
6.4	Transformer	1	16.1	Pressure controller	1
6.5	Wire joint	1	16.2	Pressure-relief-valve	1
6.6	Motor capacitor	2	17	Motor bracket ass'y	1
6.7	Wire joint, 3p	1	18	Grille	2
6.8	Wire joint	1	19	Motor	2
6.9	Electric installation board ass'y	1	20	Wire controller	1
6.10	Cable	1	21	Axial flow fan	2
6.11	Outdoor communication cable	1	22	Motor bracket ass'y	1
6.12	Wire joint	3	23	Rear support board I	1
6.13	Wire joint	1	24	Rear net clip	1
6.14	Wire joint, 5p	1	25	Front panel	1
7	Urgency switch	1	26	Discharge temp sensor ass'y	1
8	Rear clapboard ass'y	1	27	Temp sensor ass'y	1
9	Handle	2	28	Discharge temp sensor	1
10	High pressure valve ass'y	1	29	Room temp sensor ass'y	1
10.1	Low pressure valve	1	30	Fixing ring	1
11	4-way valve ass'y	1	31	Rear support board II	1
Water pump box CE-SBX/SN1-01					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Up covering plate	1	18.2	Branch pipe	2
2	Water-inlet pipe ass'y	1	18.3	Screw	1
2.1	Pipe joint	1	18.4	Elbow pipe	1
2.2	Elbow pipe	1	18.5	Inner joint	1
3	Hook	4	19	Water charge valve	1
4	Pipe clamp I	1	20	Rear clapboard	2
5	Front clapboard	1	21	Input pipe ass'y	1
6	Pipe clamp II	1	21.1	Pipe joint	1
7	Right cover ass'y	1	21.2	Copper nut	1
8	Capacitor clamp	1	22	Water-outlet pipe ass'y	1
9	Water-inlet pipe supporter	2	22.1	Water-outlet pipe ass'y I	1
10	Input pipe ass'y	1	22.2	Drain pipe adapter	1
10.1	Accumulator tank	1	23	Water-outlet pipe ass'y II	1
11	Water-inlet pipe ass'y	1	23.1	Elbow pipe	1
11.1	outer joint	1	23.2	Water-outlet pipe II	1
11.2	Pipe joint	1	23.3	Pipe joint	1
11.3	Water-inlet pipe ass'y I	1	24	Pump	1
12	Base	1	25	Water-outlet pipe ass'y I	1
13	Expansion vessel	1	25.1	Pipe joint	3
14	Heat-exchanger plate ass'y	1	25.2	Elbow pipe	2
14.1	Plate Heat-exchanger	1	26	Installation bracket	1
14.2	Elbow pipe	1	27	Big handle	1
14.3	Pipe joint	1	28	Left clapboard ass'y	1
14.4	Pipe hoop	1	29	Safety valve	1
14.5	Pipe joint	1	30	Discharge valve	1
14.6	Copper nut	1	31	Water-outlet pipe III	1
15	Target flow-volume controller	1	32	Input pipe ass'y	1
16	Clamp	1	32.1	Accumulator tank	1
17	Water charge pipe	1	33	Temp. sensor ass'y	1
18	Water-inlet pipe ass'y II	1	34	Wire joint, 5p	1
18.1	Pipe joint	3			

11.4 MGA-D16/SN1



Matched water pump box- CE-SBX/SN1-01A



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Top cover ass'y	1	11.1	4-way valve	1
2	Accumulator cylinder	1	11.2	4-Ways valve solenoid	1
3	Condenser ass'y	1	11.3	Low pressure valve	1
4	Valve plate	1	12	Compressor	1
5	Front clapboard ass'y	1	13	Base	1
6	E-part box ass'y	1	14	Compressor electric heater	1
6.1	AC contactor	1	15	Discharge pipe ass'y	1
6.2	Surge suppresser	1	15.1	Pressure controller	1
6.3	Main control board ass'y	1	16	Suction pipe ass'y	1
6.4	Transformer	1	16.1	Pressure controller	1
6.5	Wire joint	1	16.2	Pressure-relief-valve	1
6.6	Motor capacitor	2	17	Motor bracket ass'y	1
6.7	Wire joint, 3p	1	18	Grille	2
6.8	Wire joint	1	19	Motor	2
6.9	Electric installation board ass'y	1	20	Wire controller	1
6.10	Cable	1	21	Axial flow fan	2
6.11	Outdoor communication cable	1	22	Motor bracket ass'y	1
6.12	Wire joint	3	23	Rear support board I	1
6.13	Wire joint	1	24	Rear net clip	1
6.14	Wire joint, 5p	1	25	Front panel	1
7	Urgency switch	1	26	Discharge temp sensor ass'y	1
8	Rear clapboard ass'y	1	27	Temp sensor ass'y	1
9	Handle	2	28	Discharge temp sensor	1
10	High pressure valve ass'y	1	29	Room temp sensor ass'y	1
10.1	Low pressure valve	1	30	Fixing ring	1
11	4-way valve ass'y	1	31	Rear support board II	1
Water pump box CE-SBX/SN1-01A					
No.	**Part Name**	**Quantity**	**No.**	**Part Name**	**Quantity**
1	Up covering plate	1	18.2	Branch pipe	2
2	Water-inlet pipe ass'y	1	18.3	Screw	1
2.1	Pipe joint	1	18.4	Elbow pipe	1
2.2	Elbow pipe	1	18.5	Inner joint	1
3	Hook	4	19	Water charge valve	1
4	Pipe clamp I	1	20	Rear clapboard	2
5	Front clapboard	1	21	Input pipe ass'y	1
6	Pipe clamp II	1	21.1	Pipe joint	1
7	Right cover ass'y	1	21.2	Copper nut	1
8	Capacitor clamp	1	22	Water-outlet pipe ass'y	1
9	Water-inlet pipe supporter	2	22.1	Water-outlet pipe ass'y I	1
10	Input pipe ass'y	1	22.2	Drain pipe adapter	1
10.1	Accumulator tank	1	23	Water-outlet pipe ass'y II	1
11	Water-inlet pipe ass'y	1	23.1	Elbow pipe	1
11.1	outer joint	1	23.2	Water-outlet pipe II	1
11.2	Pipe joint	1	23.3	Pipe joint	1
11.3	Water-inlet pipe ass'y I	1	24	Pump	1
12	Base	1	25	Water-outlet pipe ass'y I	1
13	Expansion vessel	1	25.1	Pipe joint	3
14	Heat-exchanger plate ass'y	1	25.2	Elbow pipe	2
14.1	Plate Heat-exchanger	1	26	Installation bracket	1
14.2	Elbow pipe	1	27	Big handle	1
14.3	Pipe joint	1	28	Left clapboard ass'y	1
14.4	Pipe hoop	1	29	Safety valve	1
14.5	Pipe joint	1	30	Discharge valve	1
14.6	Copper nut	1	31	Water-outlet pipe III	1
15	Target flow-volume controller	1	32	Input pipe ass'y	1
16	Clamp	1	32.1	Accumulator tank	1
17	Water charge pipe	1	33	Temp. sensor ass'y	1
18	Water-inlet pipe ass'y II	1	34	Wire joint, 5p	1
18.1	Pipe joint	3			

12. Troubleshooting

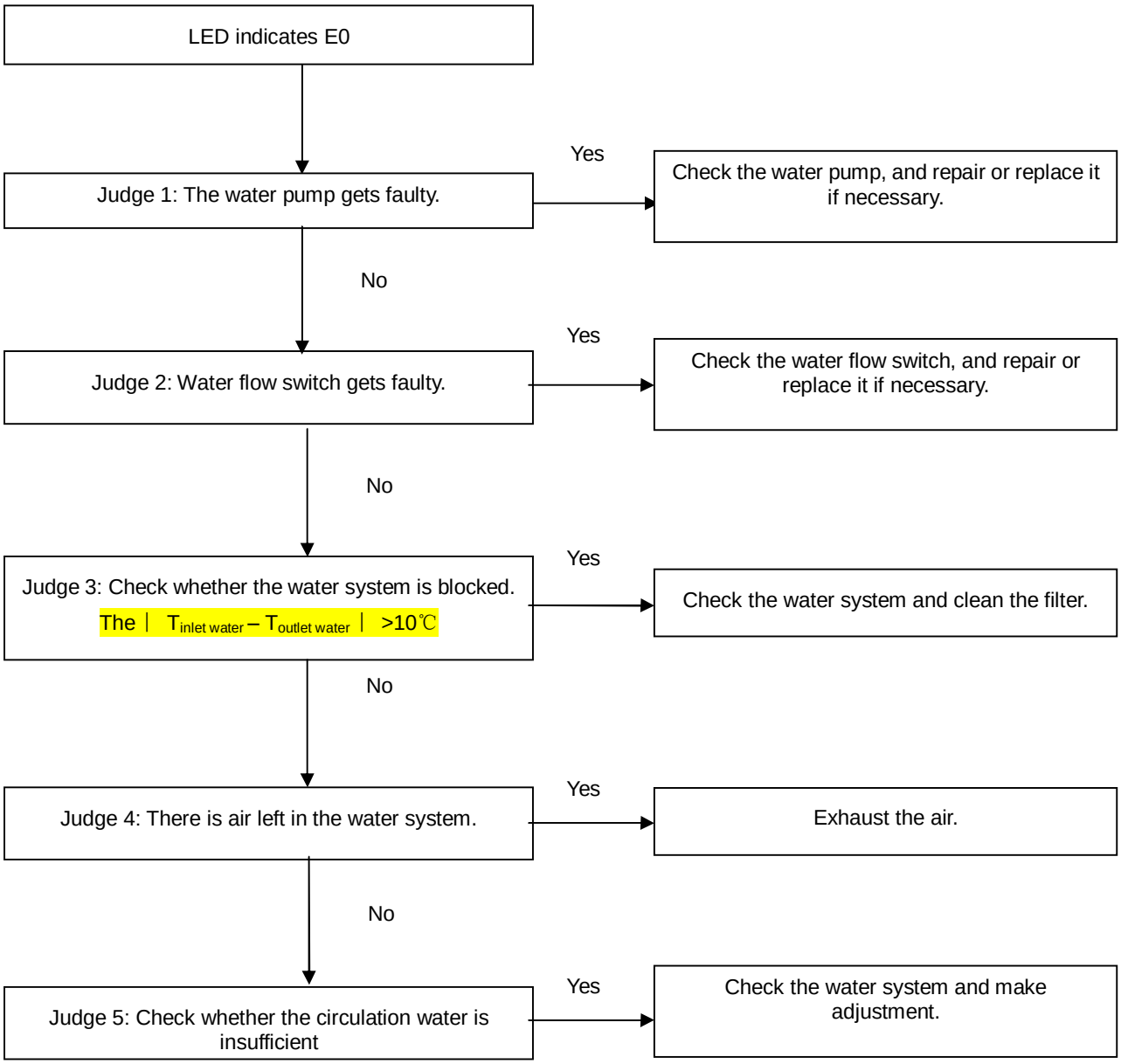
12.1 Troubles Cause and Solution

Troubles	Causes	Solution
Water pump doesn't work	1. Voltage is out of operation range.	Check wiring and circuit
	2. Water flow in the water pump box is abnormal	Check whether the water system is blocked with sundries. Clean the filter and refill water.
Water pump works while compressor not	1. Open-circuit of compressor connector	Check the cable connection.
	2. Open-circuit of compressor wiring	Check the cable connection.
Temp. of chilled or hot water abnormal	1. Improper adjustment to water valve	Adjust the water valve.
	2. Overload	Change to a bigger capacity chiller.
Compressor can't run automatically after stop	1. Heating in summer	Change the mode into cooling mode.
	2. Cooling in winter	Change the mode into heating mode.

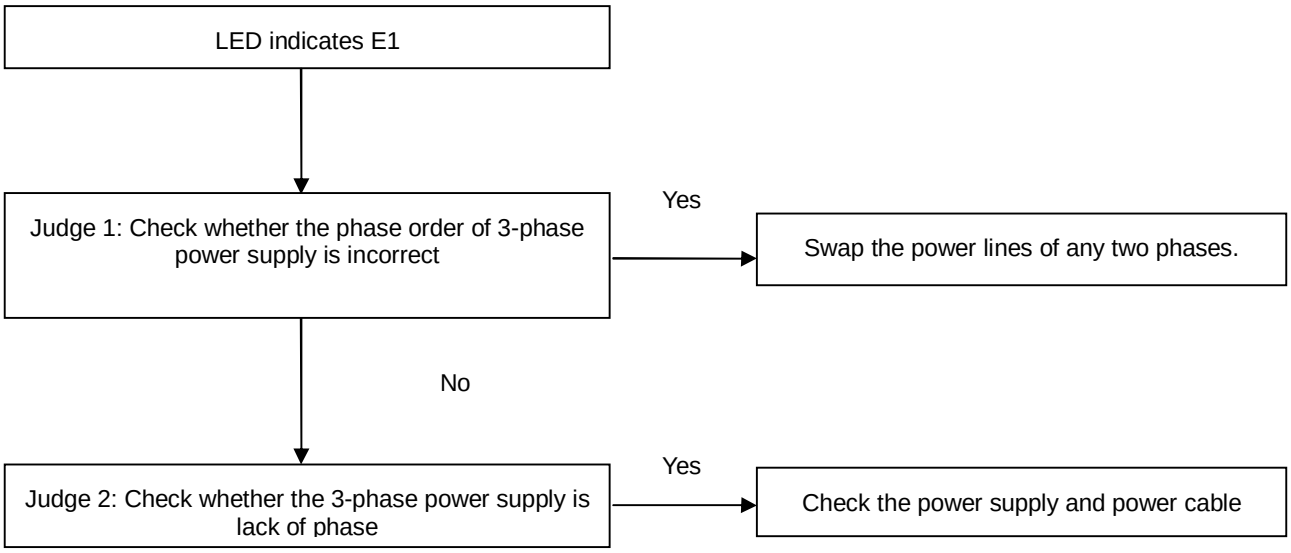
12.2 Malfunction Code

Code	Malfunction	Code	Malfunction
E0	Water flow test malfunction	**P0**	Current protection
E1	Phase sequence malfunction	**P1**	High pressure protection
E2	In-outdoor unit communication checking channel is abnormal	**P2**	Low pressure protection
E3	Backwater temperature sensor checking channel is abnormal	**P3**	Discharge air temperature protection
E4	Outdoor environment temperature sensor checking channel is abnormal	**P4**	Inlet–outlet water temperature difference protection
E5	Outlet water temperature sensor checking channel is abnormal	**P5**	Condenser high temperature protection
E6	Condenser temperature sensor checking channel is abnormal	**P6**	Plate heat exchanger low temperature protection
E7	Plate heat exchanger temperature sensor 1 checking channel is abnormal	**Pb**	System anti-frozen protection
E8	Plate heat exchanger temperature sensor 2 checking channel is abnormal	**P8**	Inlet temperature protection (three times in one hour and system should be powered on again) At this time, the wired controller displays P4
E9	Digital scroll compressor discharge temperature sensor is abnormal (thermostat display E4)		

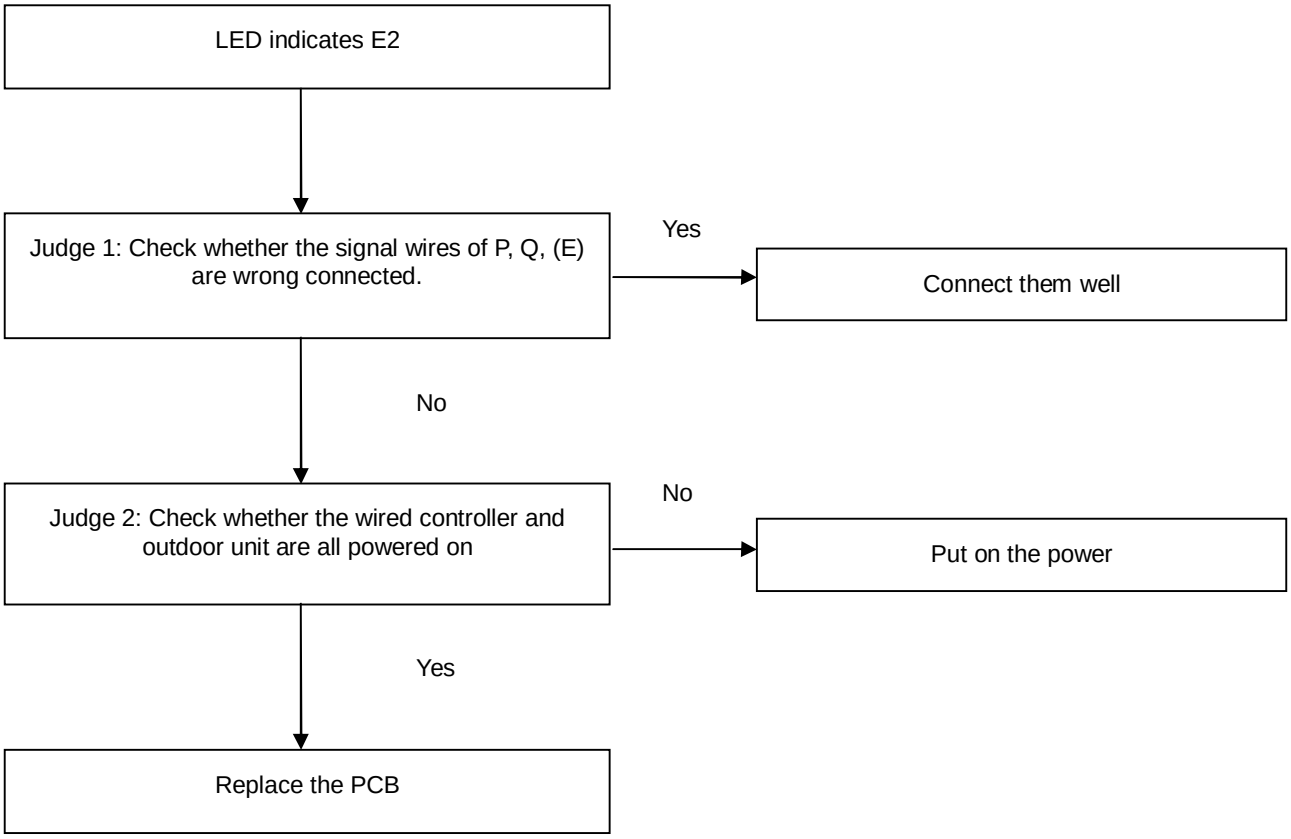
E0: Water flow test malfunction



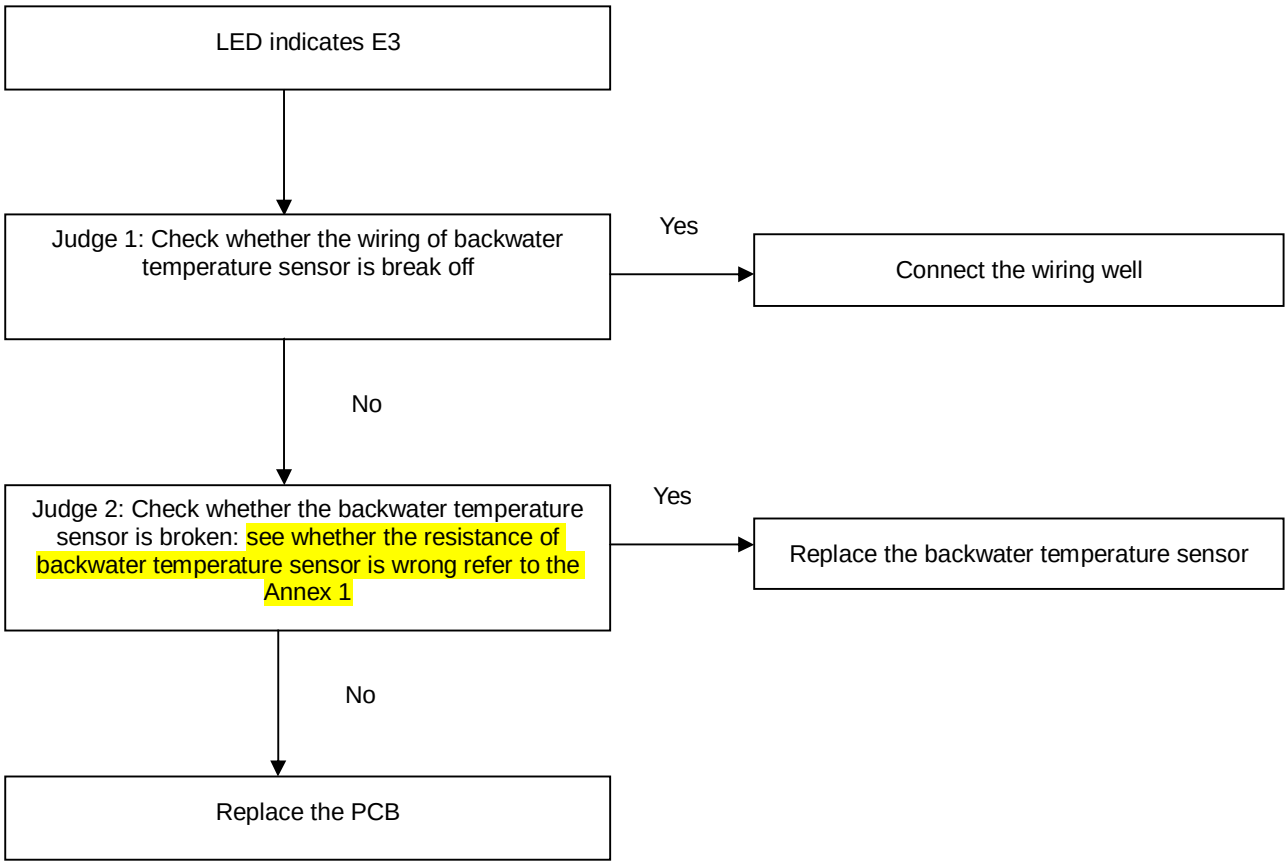
E1: Phase sequence malfunction



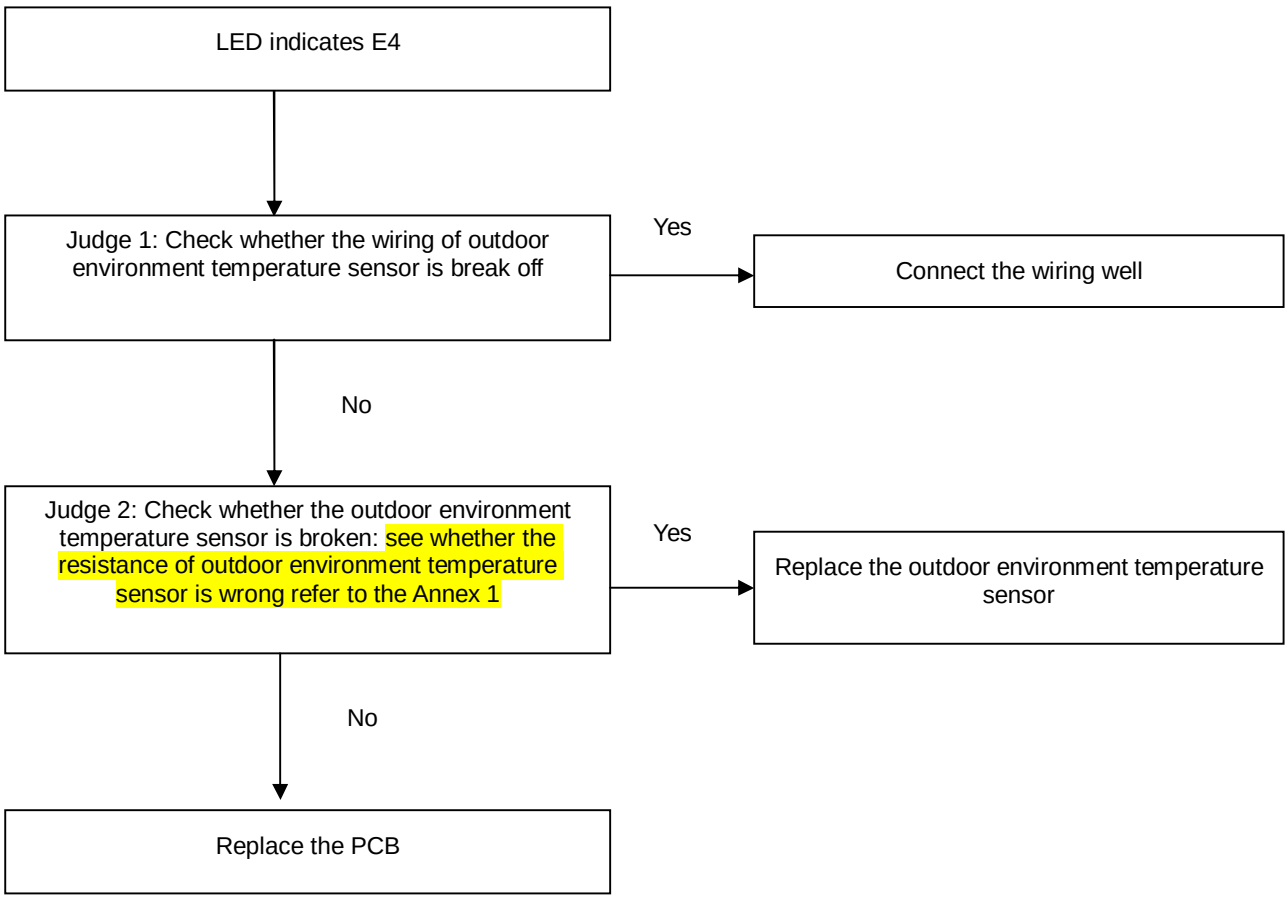
E2: In-outdoor unit communication checking channel is abnormal



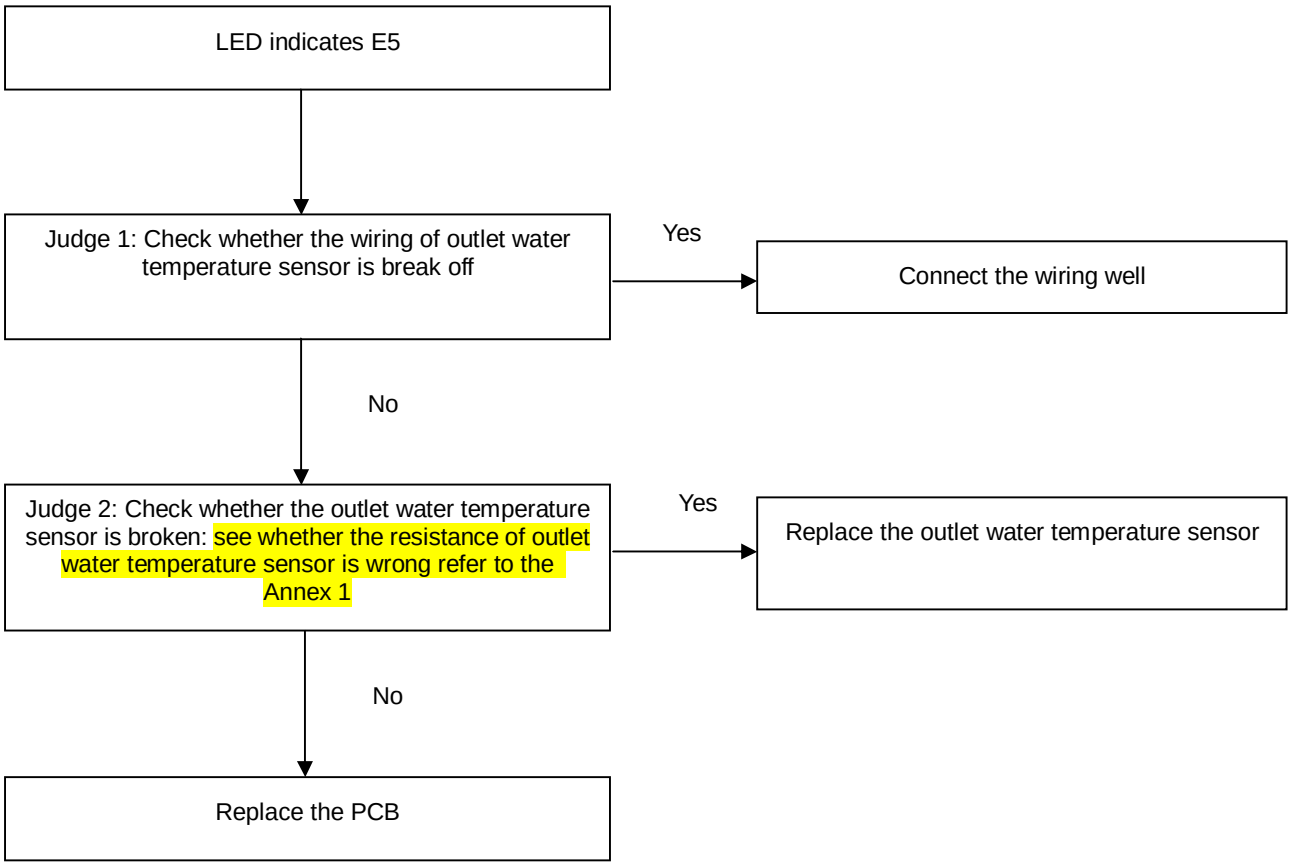
E3: Backwater temperature sensor checking channel is abnormal



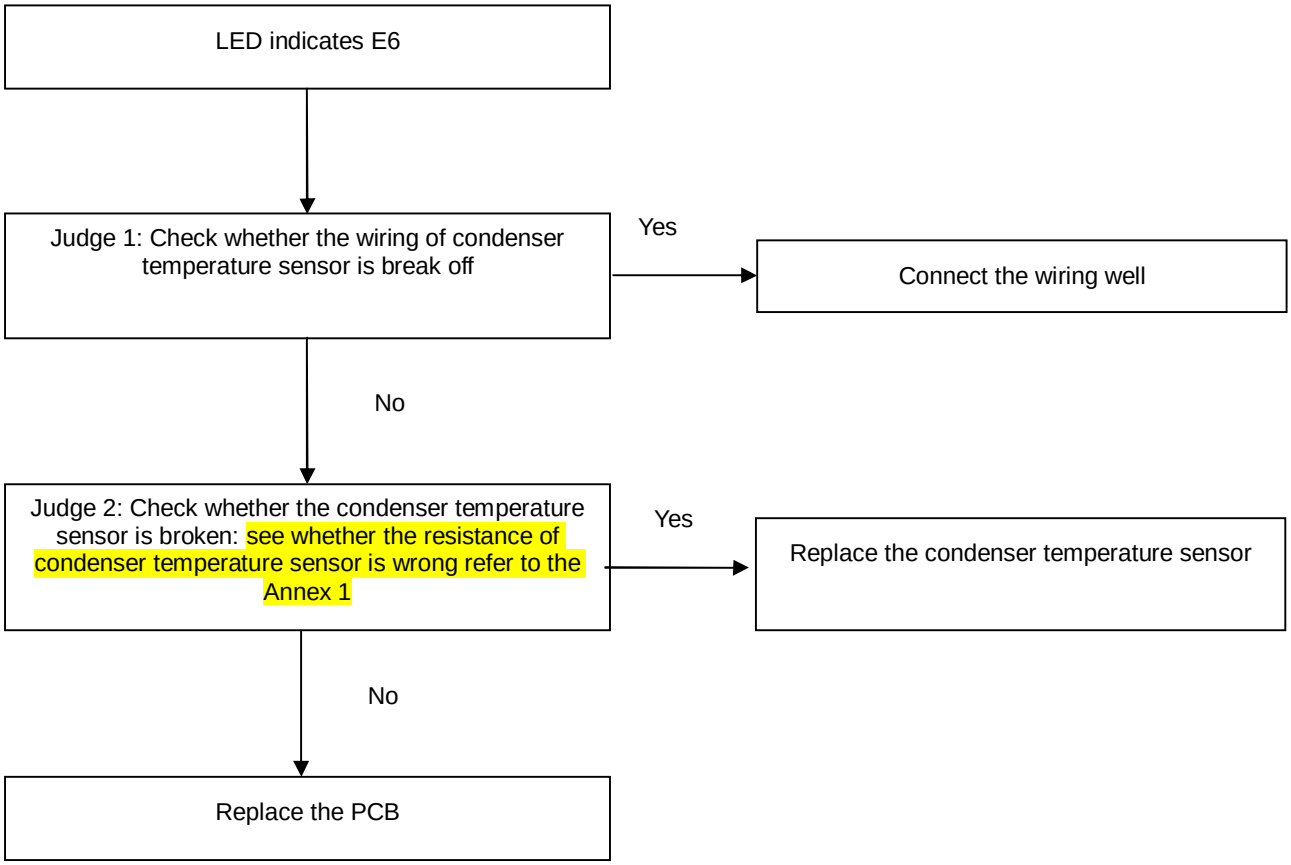
E4: Outdoor environment temperature sensor checking channel is abnormal



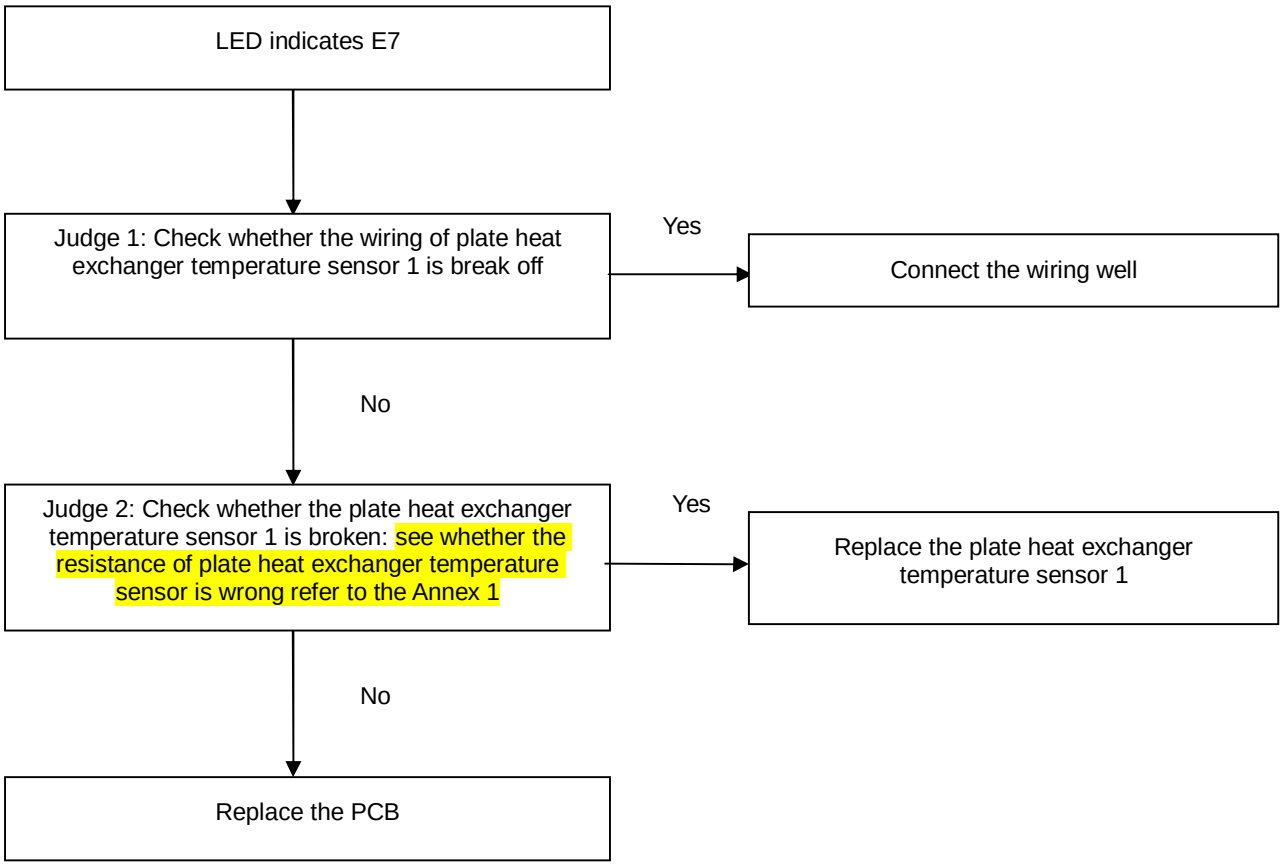
E5: Outlet water temperature sensor checking channel is abnormal



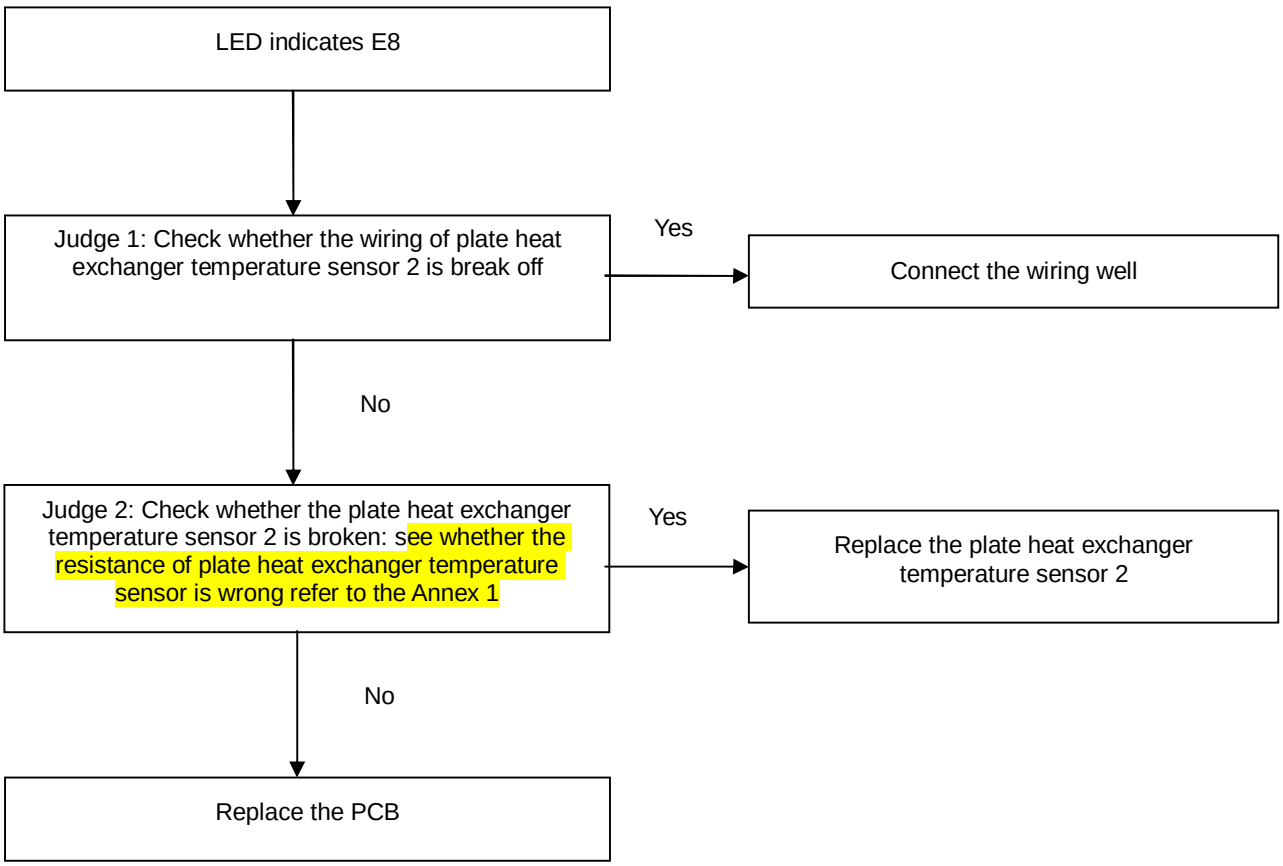
E6: Condenser temperature sensor checking channel is abnormal



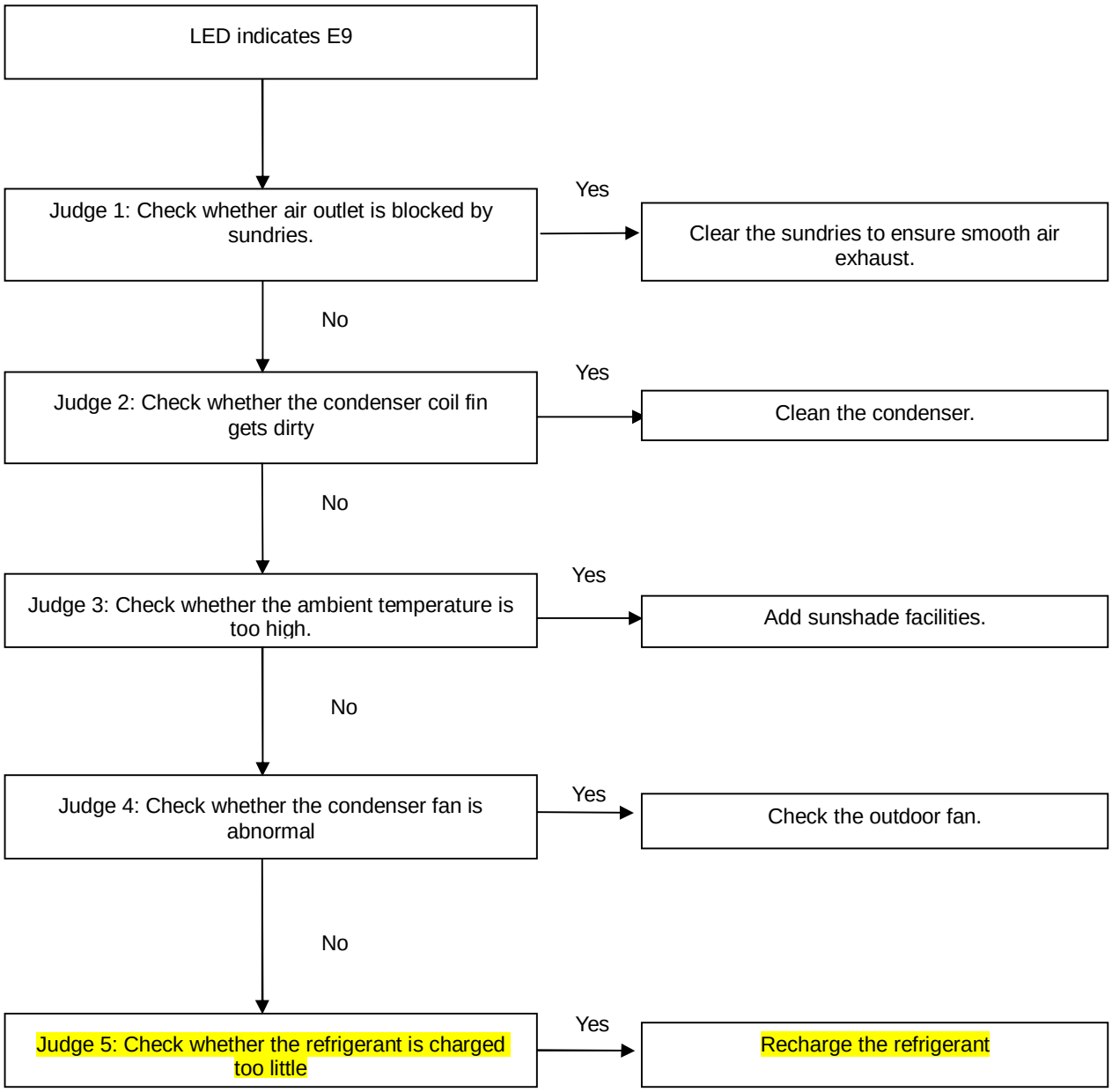
E7: Plate heat exchanger temperature sensor 1 checking channel is abnormal



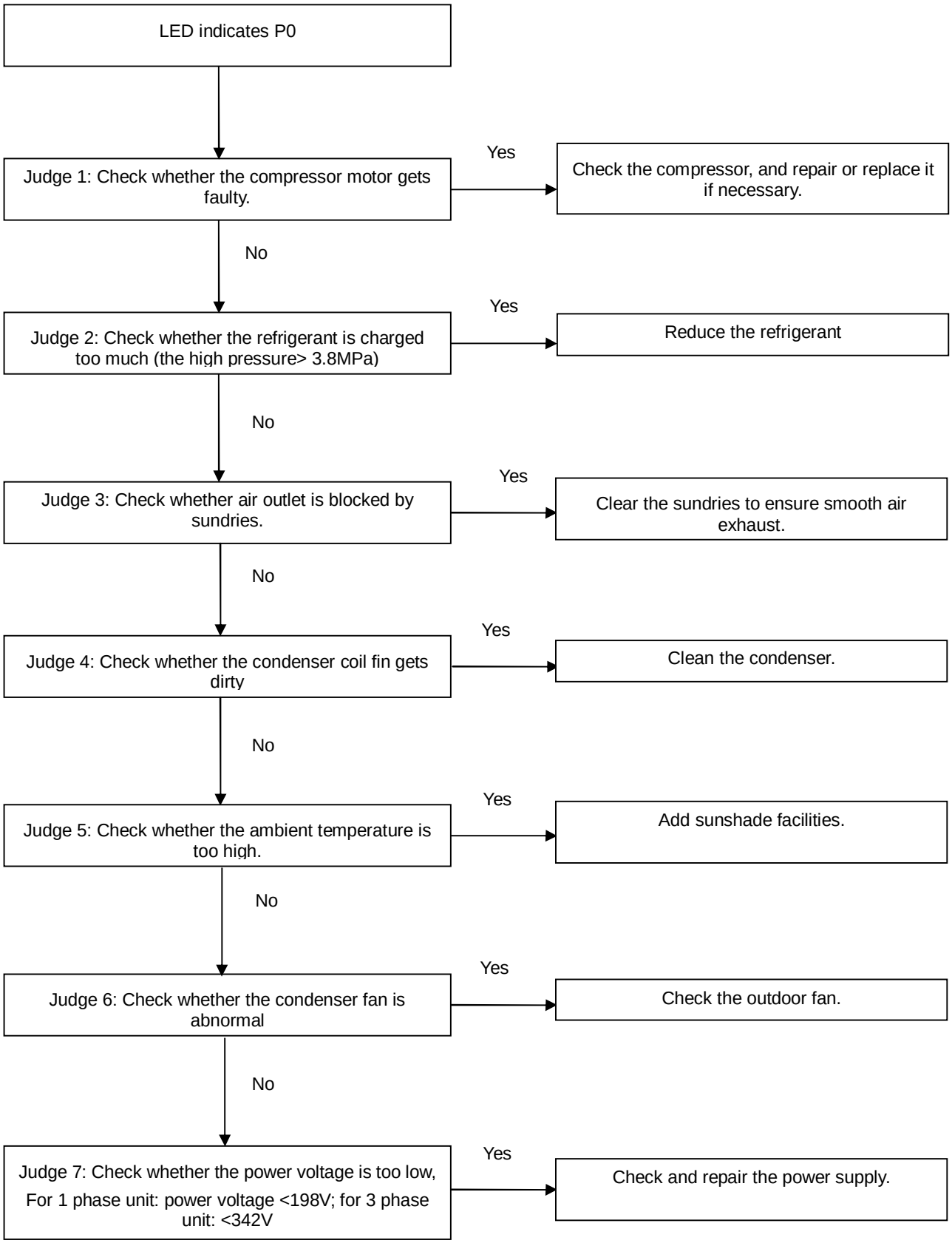
E8: Plate heat exchanger temperature sensor 2 checking channel is abnormal



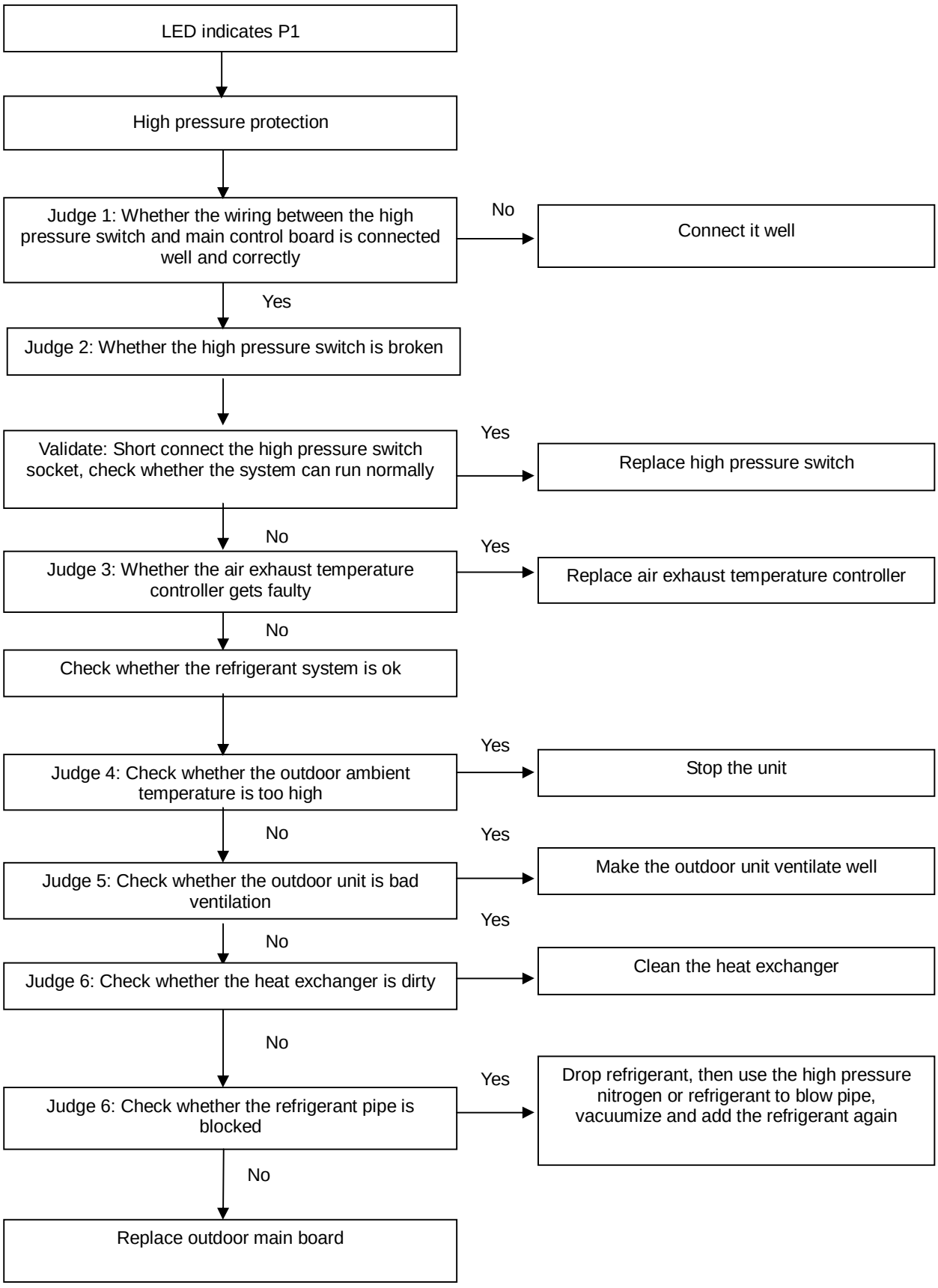
E9: Digital scroll compressor discharge temperature sensor is abnormal (thermostat display E4)



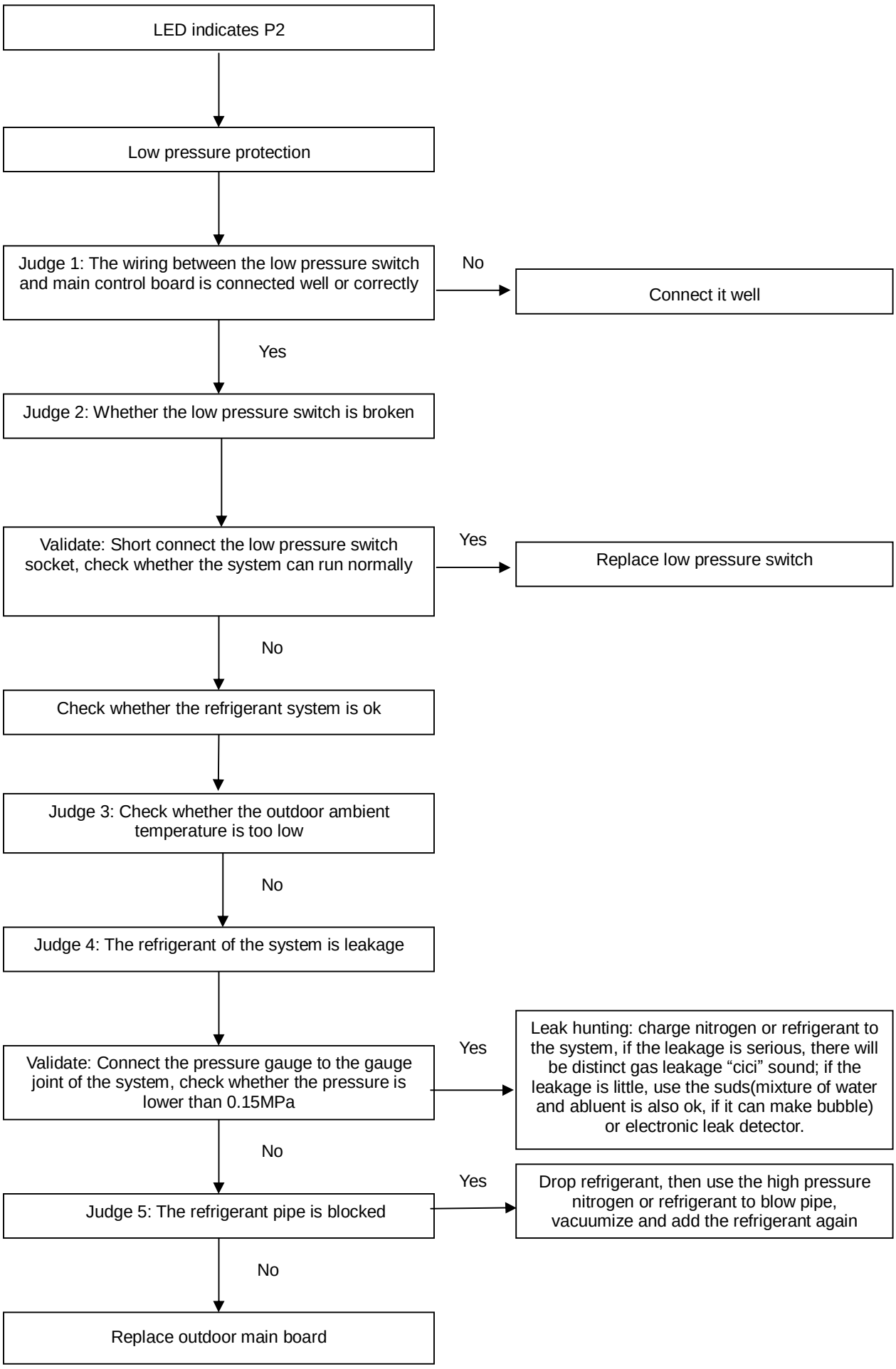
P0: Current protection



P1: High pressure protection

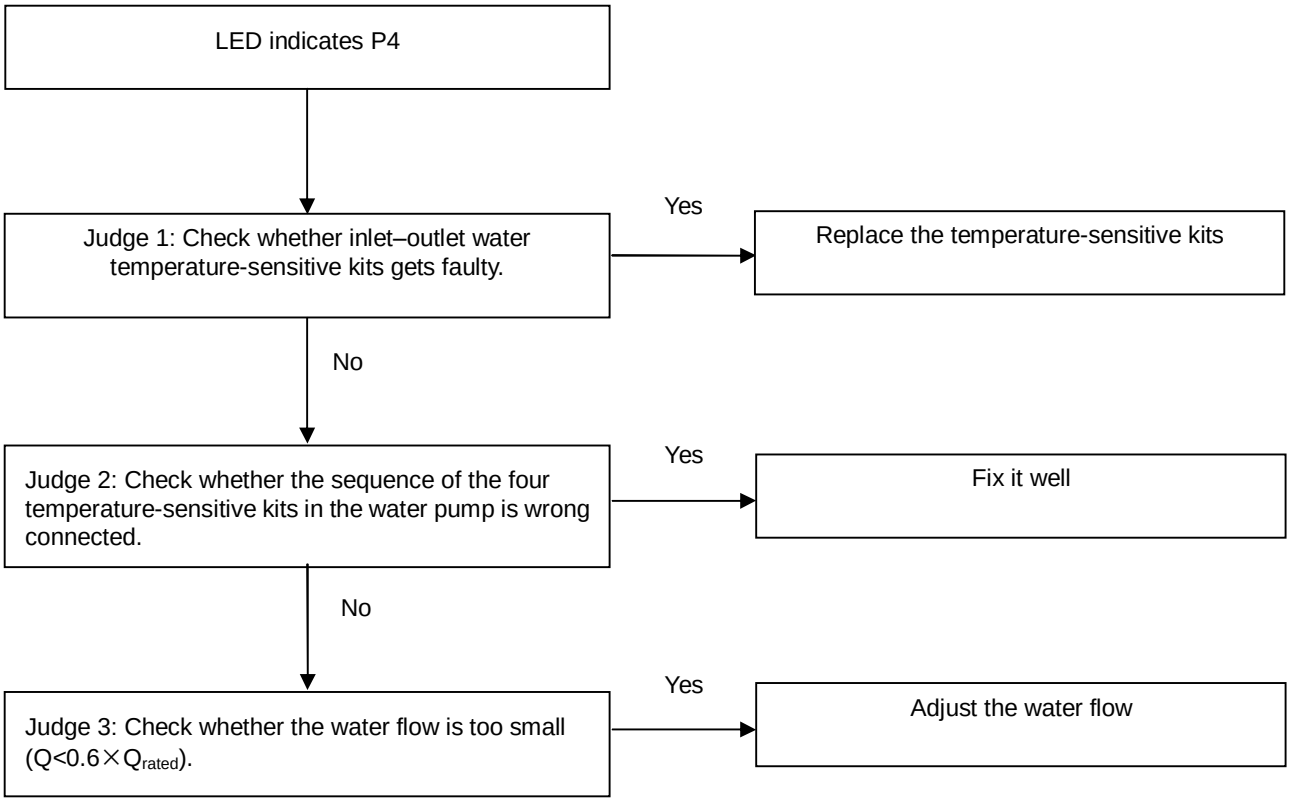


P2: Low pressure protection

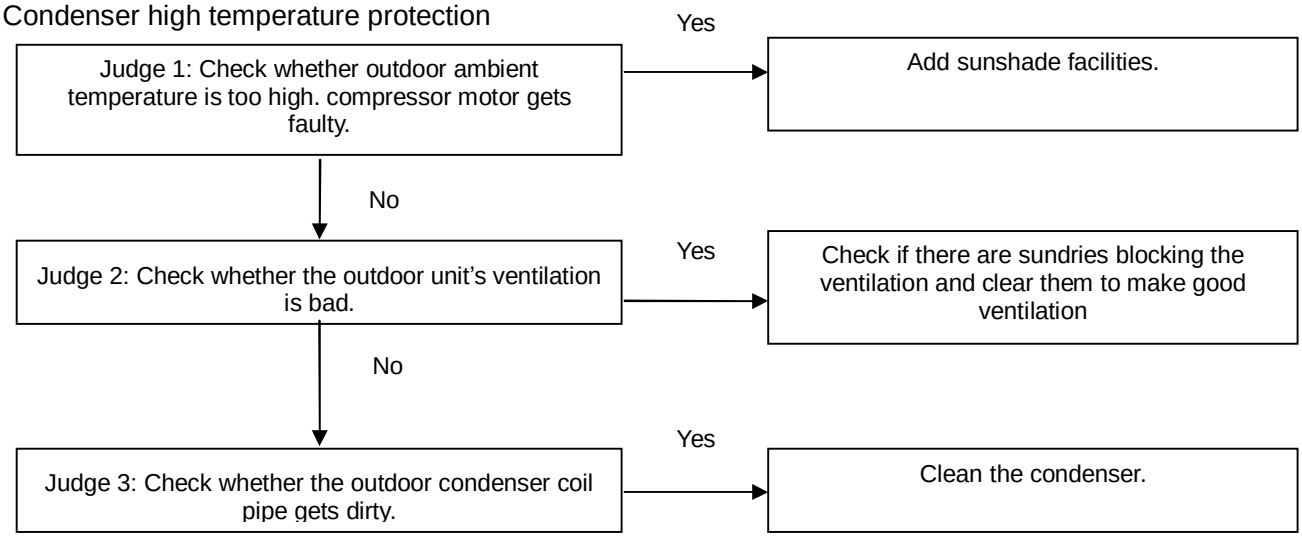


P3: Discharge air temperature protection
Refer to the E9 to solve the problem

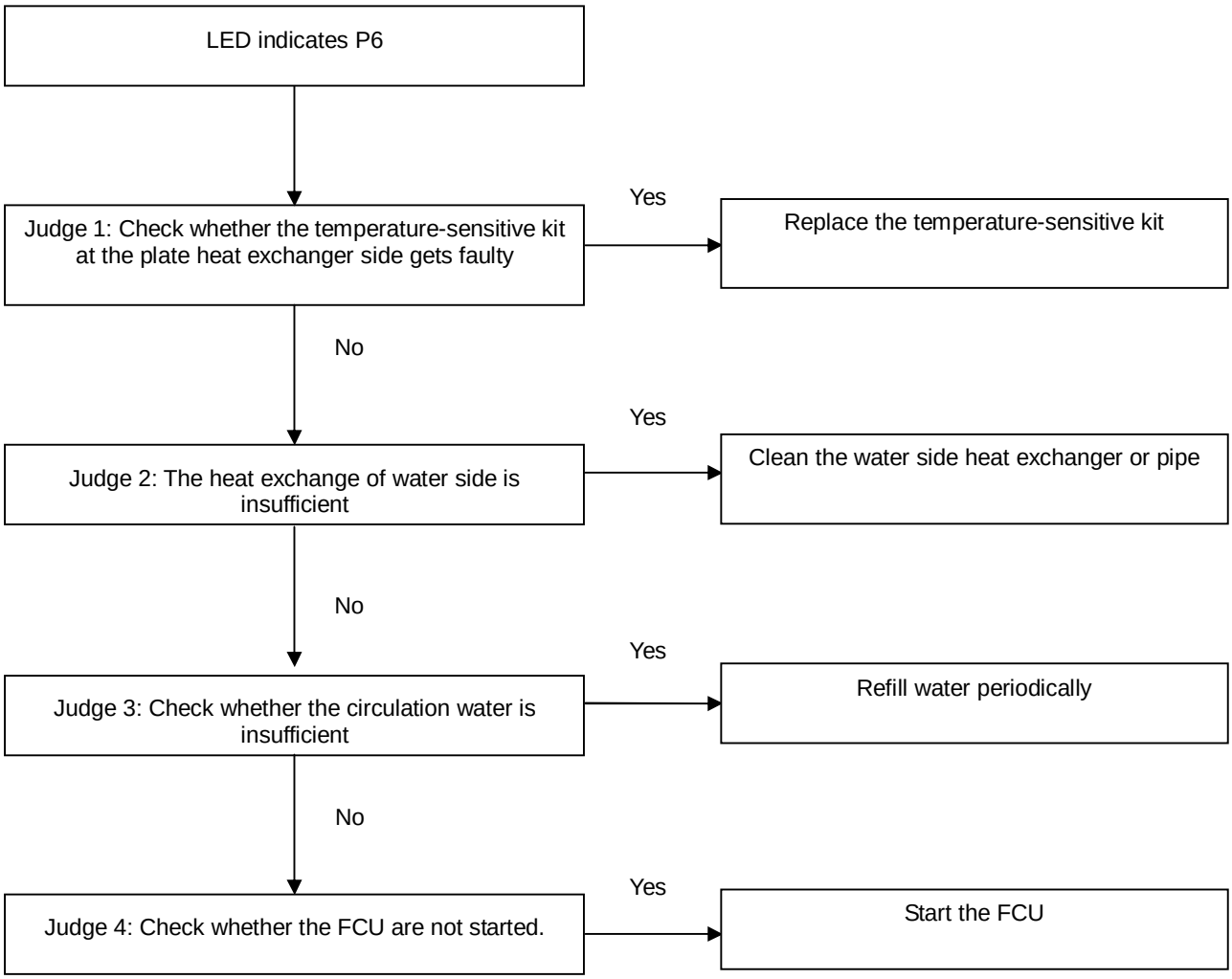
P4: Inlet–outlet water temperature difference protection



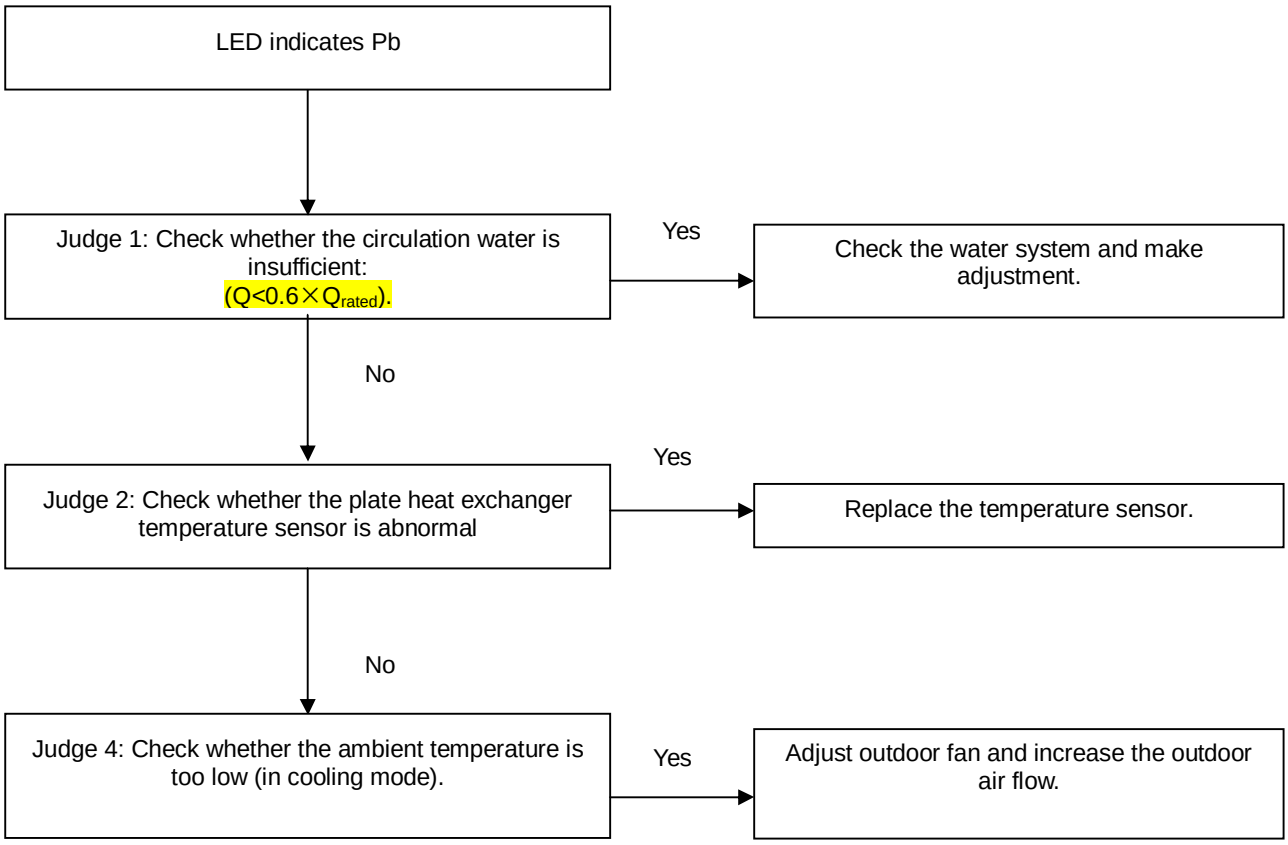
P5: Condenser high temperature protection



P6: Plate heat exchanger low temperature protection



Pb: System anti-frozen protection



P8: Inlet temperature protection (three times in one hour and system should be powered on again) At this time, the wired controller displays P4
-----Refer to the P4 to solve the problem

Annex 1

Unit： ℃--K		Room temperature sensor \Pipe temperature sensor Table					
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.219	25	10	65	1.96532	105	0.54448
-14	79.311	26	9.55074	66	1.89627	106	0.52912
-13	74.536	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.486
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44	36	6.13059	76	1.34105	116	0.4006
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.2133	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.5705	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.3239
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.8795	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.2777
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.918	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Part 3
Installation

1. General Information

General warning

1. These units have been designed to chill and heat water and must be used in applications compatible with their performance characteristics; these appliances are designed for residential or similar applications.
2. Incorrect installation, regulation and maintenance or improper use absolves the manufacturer from all liability, whether contractual or otherwise, for damage to people, animals or things. Only those applications specifically indicated in this list are permitted.
3. Read this manual carefully. All work must be carried out by qualified personnel in conformity with legislation in force in the country concerned.
4. The guarantee is invalidated if the above instructions are not respected and if the unit is started up for the first time without the presence of personnel authorized by the Company (where specified in the supply contract) who should draw up a “start-up” report.
5. The documentation supplied with the unit must be consigned to the owner who should keep it carefully for future consultation in the event of maintenance or service.
6. All repair or maintenance work must be carried out by the Company’s Technical Service or qualified personnel following the instructions in this manual. The air-conditioner must under no circumstances be modified or tampered with as this may create situations of risk. Failure to observe this condition absolves the manufacturer of all liability for resulting damage.

Fundamental safety rules

Prohibition

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Do not touch the unit with bare feet or with wet or damp parts of the body.

Do not carry out cleaning operations without first disconnecting the system from the electricity supply.

Do not modify safety or regulation devices without authorization and instructions from the manufacture.

Do not pull, detach or twist the electrical cables coming from the unit , even when disconnected from the mains electricity supply.

Do not open doors or panels providing access to the internal parts of the unit without first ensuring that the mains switch is in the off position.

Do not introduce pointed objects through the air intake and outlet grills.

Do not dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent a hazard.

Important

1. The chiller appliances are supplied without the main switch. The power supply to the unit must be disconnected using a suitable main switch that must be supplied and installed by the installer.
2. Respect safety distances between the unit and other equipment or structures. Guarantee adequate space for access to the unit for maintenance and/or service operations;

Power supply: the cross section of the electrical cables must be adequate for the power of the unit and the power supply voltage must correspond with the value indicated on the respective units. All units must be earthed in conformity with legislation in force in the country concerned.

3. Hydraulic connections should be carried out as indicated in the instructions to guarantee correct operation of the unit. Empty the water circuit or add glycol if the unit is not used during the winter. Handle the unit with the utmost care to avoid damage.

2. Description of Standard Unit

These air cooled reverse-cycle chillers with axial-flow fans operate with refrigerant fluid and are suitable for outdoor installation. They are factory tested and on site installation is limited to water and electrical connections.

Structure:

Panels and base are made from galvanized steel plate painted with epoxy powder to ensure total resistance to atmospheric agents. Condensate collection pan as standard.

Compressors:

Digital scroll compressor with crankcase heater and thermal cut-out.

Evaporator:

AISI 316 stainless steel plate type evaporator complete with electric heater and differential pressure switch. Casing lined with anti-condensate closed cell neoprene cladding.

Pump:

The units feature a pump with the moving parts in contact with the water made from corrosion resistant materials, extra wear ring on the impeller, built-in capacitor for high starting torque and automatic venting of impeller chamber.

Pump assembly:

Pump assembly with expansion tank, auto water replenishing assembly, pump.

Condensing coil:

Made from copper tubes and high surface area aluminum fins. Condensing coil protection grills as standard.

Fans:

Axial-flow fans. Six-pole electric motor with built-in thermal cut-out. Housed in aerodynamic tubes with accident prevention grill. Device for operation with low outside air temperatures: continuous fan rotation speed control via condensing temperatures transducer.

Power and control electrical panel:

Power and control electrical panel constructed in accordance with IEC 204-1/EN60335-2-40, complete with compressor contactor. Control via “HSW7” control panel.

Emergency stop pushbuttons:

In case system crisis is occur (e.g: Compressor out of control), press the emergency stop pushbuttons at once, and turn it clockwise, until crisis is removed.

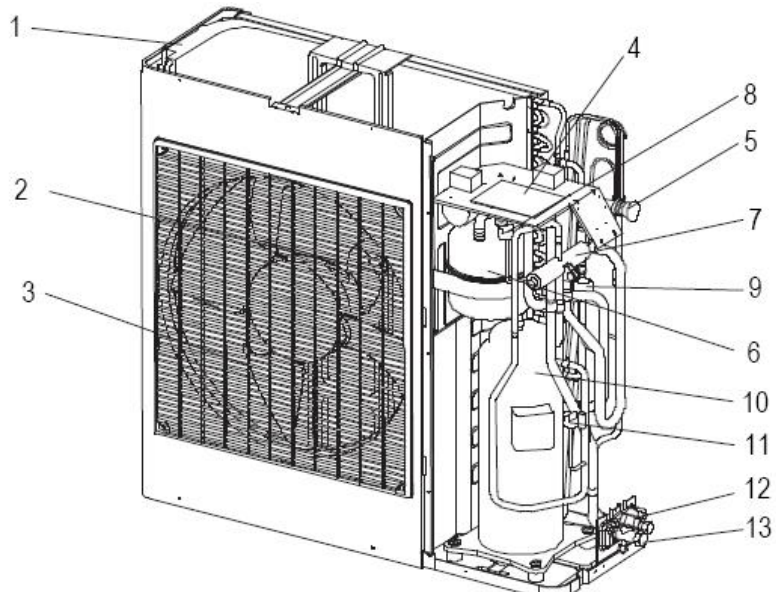
Optional accessories:

- Removable metal mesh filter.
- Remote keyboard kit.

The above accessories are optional. Consult the relative documentation for assembly instructions and technical data.

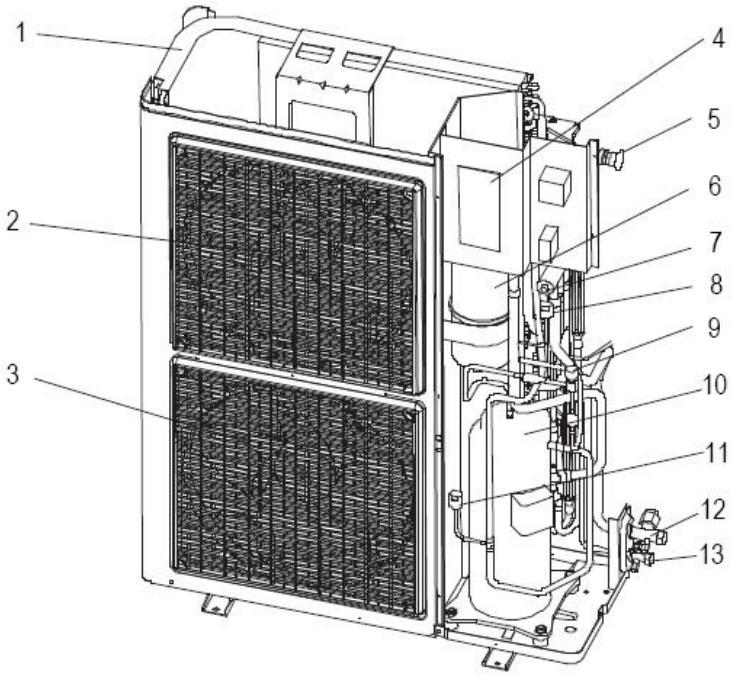
Outdoor Unit

10kW



1 Condenser
2 Motor
3 Axial-flow fan
4 Electrical panel
5 Emergency Stop Pushbuttons
6 Accumulater
7 4-way valve
8 Low pressure switch
9 Solenoid valve
10 Compressor
11 High pressure switch
12 Liquid side
13 Gas side

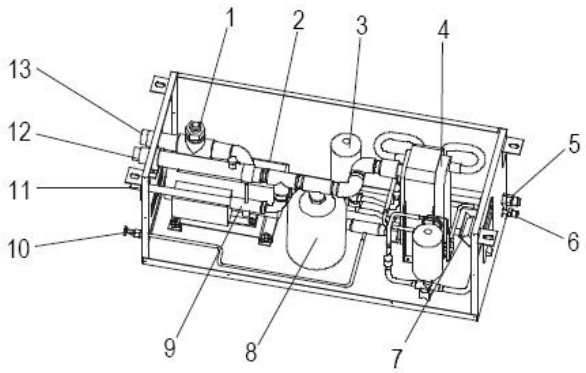
12 14 16kW



1 Condenser
2 Motor
3 Axial-flow fan
4 Electrical panel
5 Emergency Stop Pushbuttons
6 Liquid receiver
7 4-way valve
8 Low pressure switch
9 Solenoid valve
10 Compressor
11 High pressure switch
12 Gas side
13 Liquid side

Water pump box

tainer



1 Flow switch
2 Pump
3 Accumulater
4 Plate heat exchanger
5 Gas side
6 Liquid side
7 Electrical panel
8 Expansion tank
9 Auto-water replenishing
10 Water discharge
11 Auto-water pipe
12 Water intlet
13 Water outlet

3. Installation

3.1 Choice of installation site

Before installing the unit, agree with the customer the site where it will be installed, taking the following points into consideration:

- check that the fixing points are adequate to support the weight of the unit;
- pay scrupulous respect to safety distances between the unit and other equipment or structures to ensure that air entering the unit and discharged by the fans is free to circulate.

3.2 Positioning

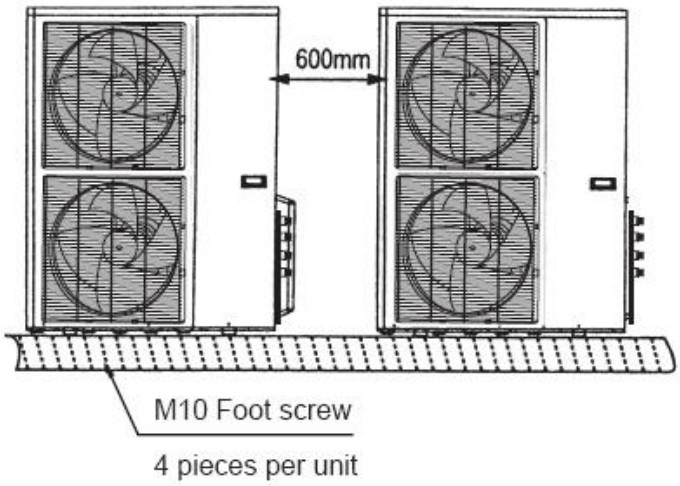
Before handling the unit, check the capacity of the lifting equipment used, respecting the instructions on the packaging. To move the unit in the horizontal, make appropriate use of a lift truck or similar, bearing in mind the weight distribution of the unit. To lift the unit, insert tubes long enough to allow positioning of the lifting slings and safety pins in the feet on the unit.

To avoid the slings damaging the unit, place protection between the slings and the unit. Position the unit in the site indicated by the customer. Place either a layer of rubber (min. thickness 10 mm) or vibration damper feet (optional) between the base and support surface. Fix the unit, making sure it is level and that there is easy access to hydraulic and electrical components. If the site of installation is exposed to strong winds, fix the unit adequately to the support surface using tie rods if necessary. If a heat pump unit is being installed, make sure the condensate is drained using the drain hose supplied as standard. Prevent leaves, branches or snow from accumulating around the unit. These could reduce the efficiency of the unit.

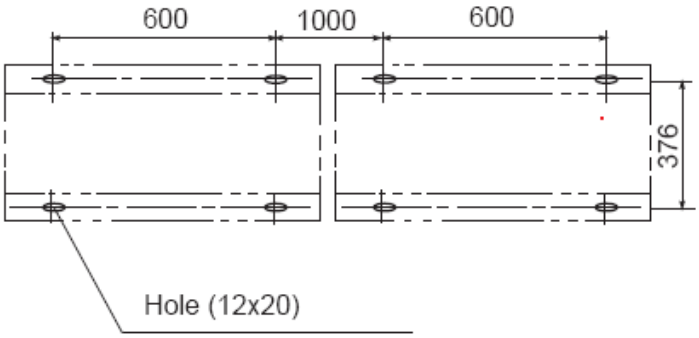
3.3 Installation of outdoor unit

3.3.1 Installation space

1) At least 600mm distance should be left between outdoor units:



2) Distance between foot screws is shown below:



3.3.2 Refrigerant Piping

Note:

1. Refrigerant piping connection is on the right side of outdoor unit.
2. The piping connects to refrigerant piping connection.
3. Install the refrigerant piping towards left, right or back.
4. Refer to system identifiers in valve installation board for corresponding connections of indoor units.
   a. Choose the sizes of refrigerant piping: φ9.5+φ19
   b. Connection: refer to connection of refrigerant piping
   c. Length and height drop permitted of refrigerant piping

Maximum length of piping (L)		10m
Maximum height drop (Height drop between water pump box and outdoor unit H)	Outdoor unit (up)	5m
	Outdoor unit (down)	5m

   d. Remove dirt or water in the piping
      ● Make sure there is no any dirt or water in the piping before connecting it to the outdoor unit.
      ● Please clean the piping with high-pressure nitrogen rather than refrigerant of outdoor unit.
   e. Vacuuming with vacuum pump
      ● Please vacuum with vacuum pump.
      ● Vacuuming should be done from the gas side.
   f. Open all valves
   g. Refrigerant volume to be added

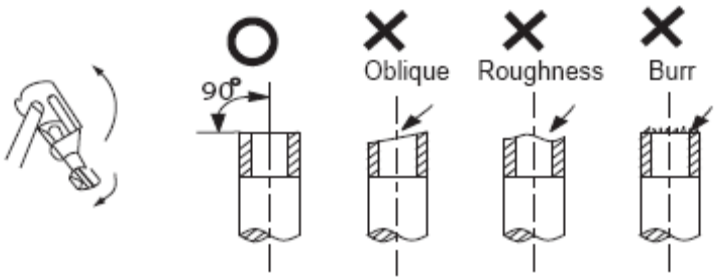
Calculate the volume according to the diameter and the length of the liquid side piping between outdoor unit and water pump box. The refrigerant volume to be added is based on the following table:

Piping on liquid side	Method	Refrigerant volume to be added
<5m	Use refrigerant in outdoor unit	—
≥5m	Use vacuum pump or refrigerant box	60g/m× (length of piping -5m)

Expel the air

1. Flaring

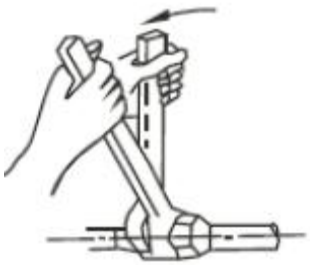
Cut a pipe with a pipe cutter.



Insert a flare nut into a pipe and flare the pipe.

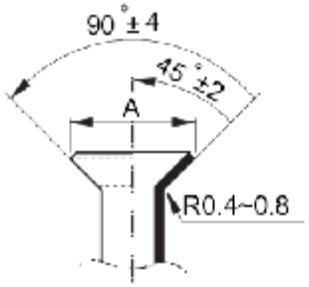
2. Fasten the nuts

Put the connecting tubing at the proper position, wrench the nuts with hands then fasten it with a wrench.



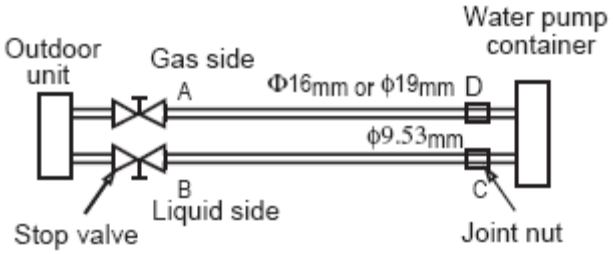
Caution

Too large torque will harm the bell-mouth and too small will cause leakage. Please determine the torque according to the table below:

Pipe gauge	Tightening torque	Flare dimension A Min (mm)	Max	Flare shape
Φ6.4	15～16N.m (153～163kgf.cm)	8.3	8.7	
Φ9.5	25～26N.m (255～265kgf.cm)	12.0	12.4	
Φ12.7	35～36N.m (357～367kgf.cm)	15.4	15.8	
Φ15.9	45～47N.m (459～480kgf.cm)	18.6	19.0	
Φ19.1	65～67N.m (663～684kgf.cm)	22.9	23.3	

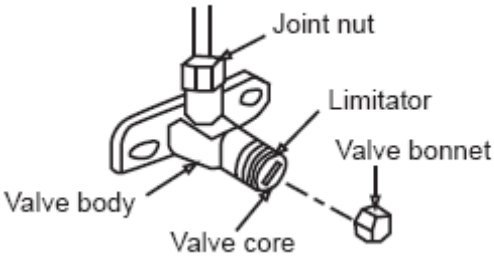
3. How to expel the air

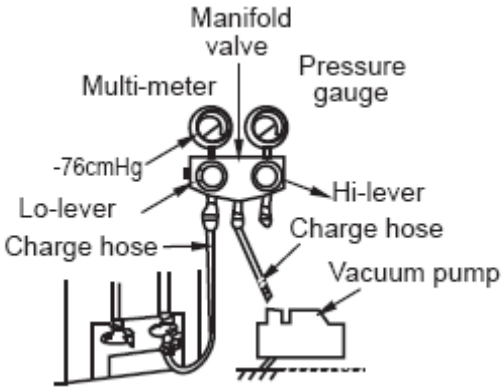
A. Expel the air with refrigerant in outdoor unit: connect the wiring between water pump box and outdoor unit, refer to the example below:



1. Totally fasten the joint nut of stop valve B and nut C and D.
2. Loosen the joint nut of stop valve A a little.
3. For 3~5m s piping, turn the valve rod of B anticlockwise to 45°for about 6~7seconds. After the air is expelled from A, fasten the joint nut of stop valve A. (Refer to former page for the torque)
4. Totally open the valve rods of stop valve A and B.
5. Totally fasten the valve bonnet.

B. Expel the air with vacuum pump (following procedures are for all the Lo-stop valve)





1. Connect the charging hose of the manifold valve with the charging inlet of the Lo-stop valve. (All the Hi-stop valves should be closed)
2. Connect the connection of charge hose with vacuum pump.
3. Totally open the Lo-lever of the manifold valve.
4. Turn on the vacuum pump. First loosen the joint nut of Lo-stop valve a little to check whether the air comes in (the noise of vacuum pump changes and the indicator of multi-meter turns to be above 0). Then fasten the joint nut.

5. After vacuuming, close the Lo-lever of manifold valve and turn off vacuum pump. When doing vacuuming for more than 15 minutes, please confirm that the indicator of multi-meter points to-1.0X105Pa(-76cmHg)
6. Totally open the Hi-stop valve and Lo-stop valve.
7. Remove the charge hose from the charging inlet of Lo-stop valve.
8. Fasten the valve bonnets on Hi-stop valve, Lo-stop valve and on the charging inlet of Lo-stop valve.

C. Expel air with refrigerant container

1. Connect the charge hose of refrigerant container with charging inlet of Lo-stop valve.
2. Fasten the joint nuts C, D and the joint nut of stop valve A.
3. Loosen the joint nut of stop valve B a little.
4. Open the valve of refrigerant container, after the refrigerant air is expelled from joint nut on Hi-stop valve side for 10~15 seconds, fasten the joint nut of stop valve B.
5. Remove the charge hose from the connection of Lo-stop valve and push the air valve core with a screw driver to discharge the refrigerant from piping until there is no noise. Then put back the air valve core at once in case the air goes into the system.
6. Remove the valve bonnet and totally open the stop valve B on high-pressure side and the valve rod on low-pressure side of the outdoor unit, then fasten the valve bonnet.
7. Make sure to fasten the valve bonnets of both Hi-stop valve and Lo-stop valve.

3.4 Installation of water pump box

3.4.1 Installation location

Please keep away from the following places:

- Such places where the temperature is high, water pump box can be installed outdoors. In other places, please install it indoors, such as washroom and the places that prevents it from water.
- There is combustible gas leakage.
- There is much salty ingredients.
- There is caustic gas such sulfide in the air. (The copper tubes and welding parts will be rusted and damaged, causing refrigerant to leak.)
- There is mineral oil, cooking oil or gasoline. (This may cause damage to plastic parts, looseness of components and leakage.
- A place that is too weak to bear the weight of water pump box.
- There is equipment that produces electromagnetic wave. (It will disturb the controlling system of air conditioner.)

3.4.2 Install the refrigerant piping

Check whether the height drop between water pump container and outdoor unit, the length of refrigerant piping, and the quantity of the bends meet the following requirements:

The Max. Height drop 5m (if longer than 5m, outdoor unit should be above the water pump container.); The length of refrigerant piping shorter than 10m;

The quantity of bends fewer than 15.

- Do not let air, dust, moisture or other impurities fall in the piping system during installation.
- Fix the outdoor unit and water pump box before installing the refrigerant piping.
- The refrigerant piping should not be installed until you check that the H-stop valve and Lo-stop valve or outdoor unit have been closed.

3.4.3 The procedures for connecting pipe

1) Connect the water inlets and water outlets of water pump box and indoor unit with soft connection and charge water into the pipe to check whether there is leakage. Then connect the outdoor unit piping. Bend the piping carefully and do not damage them.
2) The stop valve of the outdoor unit should be closed absolutely (as original state). Every time you connect it, remove the nut of stop valve then connect the flaring pipe immediately (with 5 minutes). Before connecting, use refrigerant to expel the air in the pipe.
3) Connect the Hi-stop valve and Lo-stop valve of A and B system in outdoor unit to water pump box with piping. Make sure that the connection of both outdoor unit and water pump box should be corresponding.
4) The flexible pipe should be used on water pump side. (The bending angle should not exceed 90°. The bending part is preferably in the middle of the pipe, the bigger the bending radius, the better it is. Do not bend the pipe more than 3 times.)
5) Bending the connecting pipe of thin wall.

● Cut out a desired concave at the bending part of the insulating pipe.

● To avoid distortion or damage, please bend the pipe at its biggest radius.

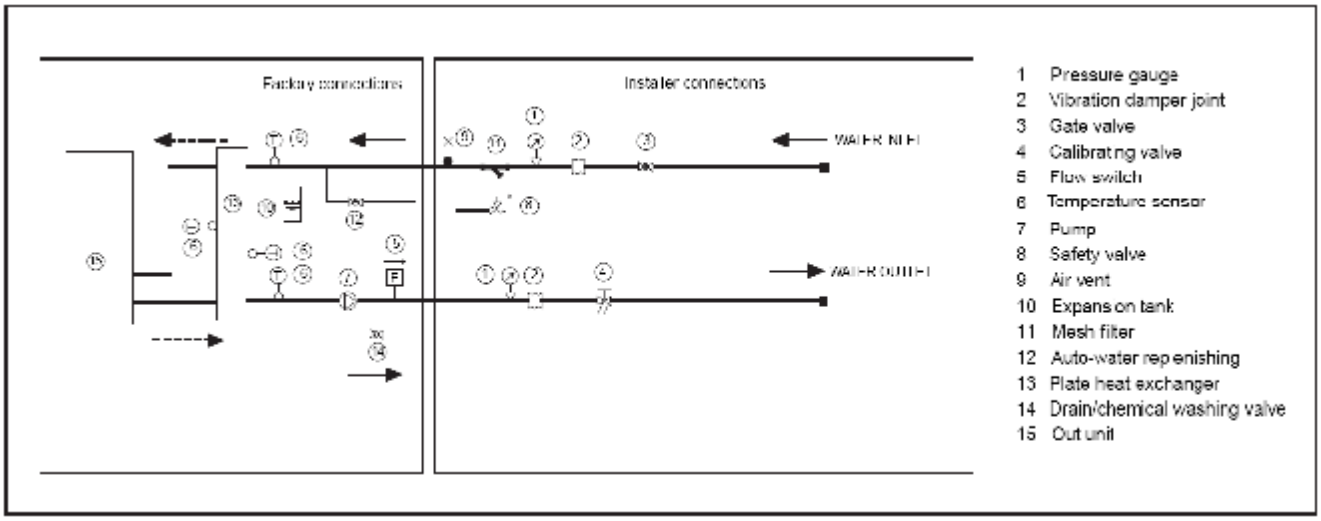
● Use bender to get a pipe with small radius.

Note: Make sure to use insulation material for the copper tube which you purchase by yourself.

4. Hydraulic Connection

The choice and installation of components is the responsibility of the installer who should follow good working practice and current legislation. Before connecting the pipes, make sure they do not contain stones, sand, rust, dross or other foreign bodies which might damage the unit. Construction of a bypass is recommended to enable the pipes to be washed through without having to disconnect the unit (see drain valves). The connection piping should be supported in such a way as to avoid it weighing on the unit. It is recommended that the following devices are installed in the water circuit of the evaporator: A hydraulic safety valve shall be mounted in water system, which should open constantly.

1. Two pressure gauges with a suitable scale (inlet and outlet).
2. Two vibration damper joints (inlet and outlet).
3. Two gate valves (normal inlet and calibrating in outlet)
4. A flow switch (inlet) or a differential pressure switch (inlet-outlet).
5. Two thermometers (inlet and outlet).
6. An inlet filter as close as possible to the evaporator and positioned to allow easy access for routine maintenance.
7. An energy-saving water tank.
8. Additional pump.



⚠ Important

1) The chillers must be provided with a filling/top-up system connected to the return line and a drain cock in the lowest part of the installation. Installations containing anti-freeze or covered by specific legislation must be fitted with hydraulic disconnections.
2) The manufacturer is not liable for obstruction, breakage or noise resulting from the failure to install filters or vibration dampers. Particular types of water used for filling or topping up must be treated with appropriate treatment systems. For reference values, see the table.

P H	6-8
Electrical conductivity	less than 200 mV/cm (25°C)
Chlorine ions	less than 50 ppm
Sulphuric acid ions	less than 50 ppm
Total iron	less than 0.3 ppm
Alkalinity M	less than 50 ppm
Total hardness	less than 50 ppm
Sulphur ions	none
Ammonia ions	none
Silicon ions	less than 30ppm

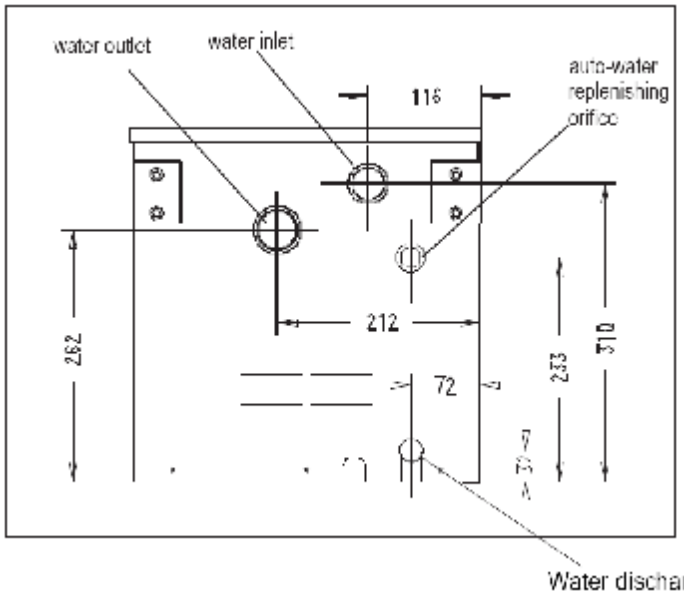
Filling the installation

- Before filling, check that the installation drain cock is closed.
- Open all installation and terminal air vents.
- Open the gate valves.
- Begin filling, slowly opening the water filling cock outside the unit
- When water begins to leak out of the terminal air vent valves, close them and continue filling until the pressure gauge indicates a pressure of 1.5 bars.

Emptying the installation

- Before emptying, place the mains switch in the “off” position
- Make sure the installation fill/top-up water cock is closed
- Open the drain cock outside the unit and all the installation and terminal air vent valves.

Size and position of connections



Model	MGA-D10/N1	MGA-D12/N1	MGA-D14/SN1	MGA-D16/SN1
Water inlet/outlet (Ø)	R5/4”	R5/4”	R5/4”	R5/4”
Auto-water replenishing(Ø)	R1/2”	R1/2”	R1/2”	R1/2”
Security discharge(Ø)	G1/2”	G1/2”	G1/2”	G1/2”
Mesh filter (Ø)	R5/4”	R5/4”	R5/4”	R5/4”
Air vent (Ø)	G3/8”	G3/8”	G3/8”	G3/8”

a) The installation must be filled to a pressure of between 1 and 2 bars.

b) It is recommended that this operation be repeated after the unit has been operating for a number of hours. The pressure of the installation should be checked regularly and if it drops below 1 bar, the water content should be topped-up.

c) Check the hydraulic tightness of joints.

d) If the fluid in the circuit contains anti-freeze, it should not be allowed to drain freely as it is pollutant. It should be collected for possible reuse. When draining after heat pump operation, take care as the water may be hot (up to 50℃).

5. Electrical Connection

5.1 Notice

The split mini chillers leave the factory already wired, and require the installation of an omnipolar thermal overload switch, a lockable mains disconnecting switch for the connection to the mains power supply , and the connection of the flow switch to the corresponding terminals. All the above operations must be carried out by qualified personnel in compliance with the legislation in force.

For all electrical work, refer to the electrical wiring diagrams in this manual. You are also recommended to check that the characteristics of the mains electricity supply are adequate for the absorptions indicated in the electrical characteristics table below, also bearing in mind the possible use of other equipment at the same time.

⚠ **Important**

☆ Power to the unit must be turned on only after installation work (hydraulic and electrical) has been completed.

☆ All electrical connections must be carried out by qualified personnel in accordance with legislation in force in the country concerned.

☆ Respect instructions for connecting phase, neutral and earth conductors.

☆ The power line should be fitted upstream with a suitable device to protect against short-circuits and leakage to earth, isolating the installation from other equipment.

☆ Voltage must be within a tolerance of ±10% of the rated power supply voltage for the unit (for three phase units, the unbalance between the phases must not exceed 3%). If these parameters are not respected, contact the electricity supply company.

☆ For electrical connections, use double insulation cable in conformity with current legislation in the country concerned.

☆ An omnipolar thermal overload switch and a lockable mains disconnecting switch, in compliance with the CEI-EN standards (contact opening of at least 3mm), with adequate switching and residual current protection capacity based on the electrical data table shown below, must be installed as near as possible to the appliance.

☆ The appliance shall be installed in accordance with national wiring regulations.

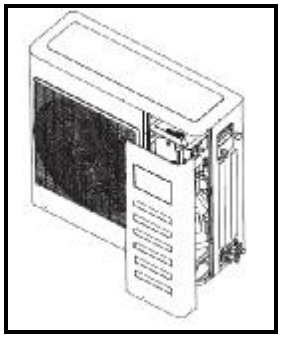
☆ The power cord technical data type and connection diagram should be list in the user manual. The power cord type designation is H07RN-F.

☆ An all-pole disconnection device which has at least 3mm separation distance in all pole and a residual current device(RCD)with the rating of above 10mA shall be incorporated in the fixed wiring according to the national rule.

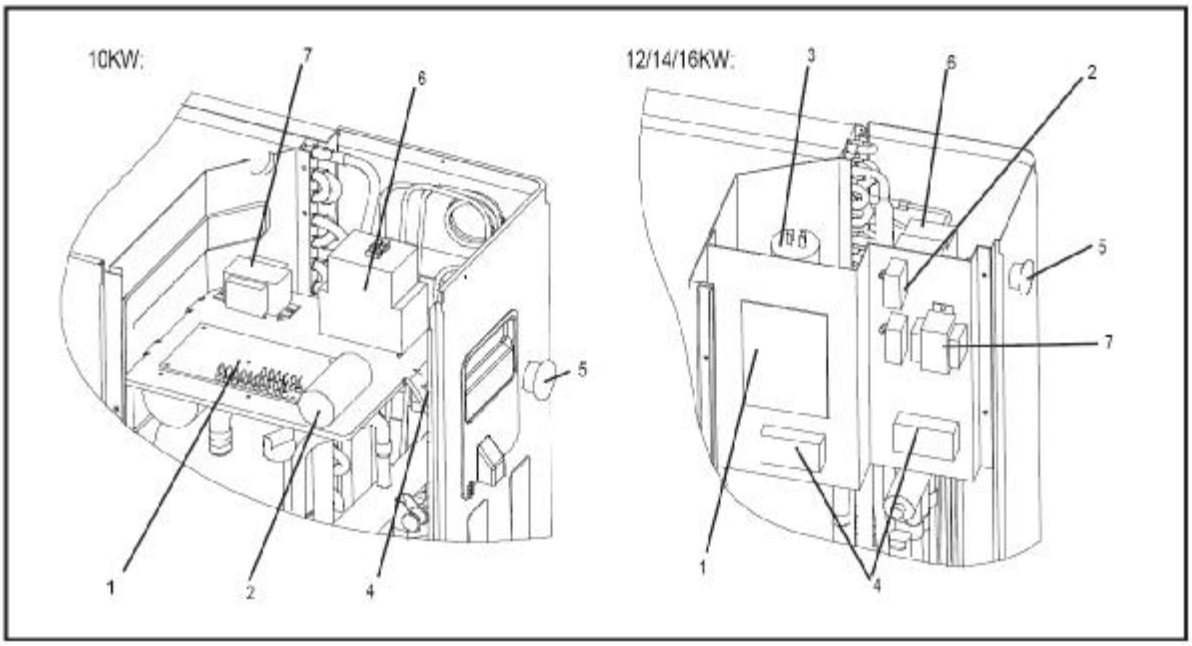
☆ Do not use water pipes to earth the unit.

5.2 Electrical Panel

The electrical panel is located inside the unit at the top of the technical compartment where the variouscomponents of the refrigerant circuit are also to be found. To access the electrical panel, remove the front panel of the unit by undoing the screws.



Electrical Panel Layout

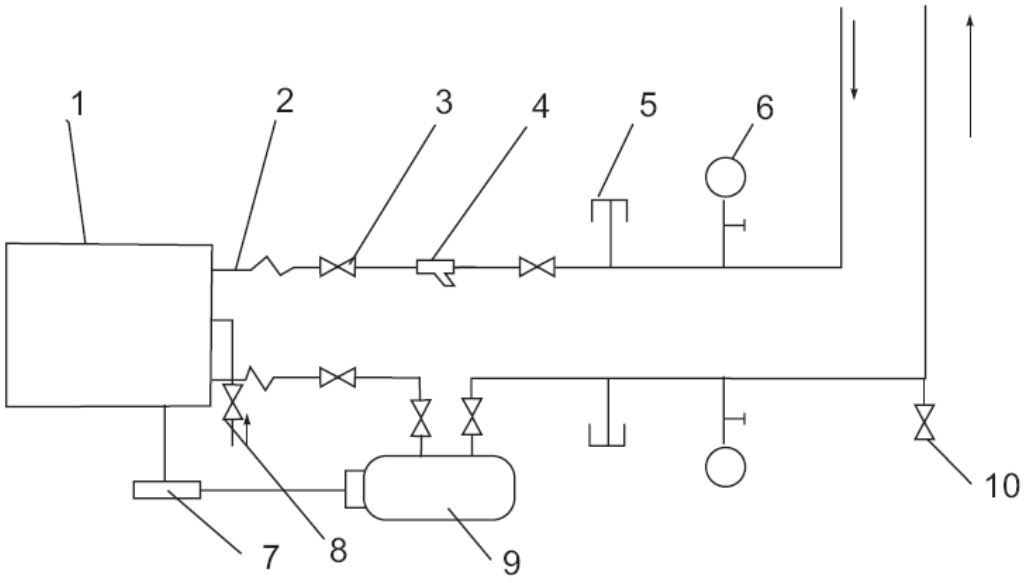


No	Name	No	Name	No	Name
1	Power control board	4	Terminal board	7	Transformer
2	Fan capacitor	5	Emergency switch		
3	Compressor capacitor	6	Compressor contactor		

5.3 Outdoor unit wiring specifications

Model	Name	Quantity	Specifications (for reference)	Notes (purchased by customers)
10/12kW	Overall power cord	1	RVV-300/500 3×6.0mm^2	For outdoor unit
14/16kW	Overall power cord	1	RVV-450/750 5×4.0 mm^2	For outdoor unit
10/12/14/16kW	Water-flow controlling wire	1	AWG24(7-core shielded wire)	Between outdoor unit and water pump box
	Temp. Sensor signal wire (shielded wire)	1	RVV-300/500 3×1.0 mm^2	Between outdoor unit and auxiliary heater
	Water pump power cord	1	RVV-300/500 3×1.0 mm^2	Between outdoor unit and water pump box
	Auxiliary heater controlling wire	1	RVV-300/500 3×1.0 mm^2	Between outdoor unit and auxiliary heater
	Controlling wire for Central & wire controller	1	RVVP-300/300 2×0.5 mm^2 (2-core shielded wire)	Between outdoor unit and central& wire controller shorter than 120m.

6. Auxiliary Electric Heater Installation



1.Water pump container 2.Soft connection 3.Stop valve
4. Y shape filter 5.Thermometer (0~100℃) 6.Pressure gauge(0~0.6MPa)
7.Heater power 8.Charging valve 9.Auxiliary electric heater
10.Drain valve

7. Maintenance

7.1 Shut down for long periods

If it is previewed not to use the machine for long periods, after deactivating the chiller:

- Make sure the remote switch SA1 is in the "OFF" position, or alternatively disconnect the unit from the power supply.
- Make sure the remote keyboard (if present) is set to “OFF”.
- Position QF and QS on OFF
- Deactivate the indoor terminal units by placing the switch of each unit in the “OFF” position.
- Close the water valves.

Note:
If there is a possibility that the outside temperature may drop below zero, there is the risk of freezing. The water circuit must be emptied and shut off power(when draining after heat pump operation take care as the water may be hot) or antifreeze must be added in the proportion recommended by the manufacture.

7.2 Routine maintenance

Never perform any cleaning operations before having disconnected the unit from the mains power supply. If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.

Regular maintenance is fundamental to maintain the efficiency of the unit both in terms of operation and energy consumption. The Technical Assistance Service maintenance plan must be observed, with an annual service which includes the following operations and checks:

- Filling of the water circuit.
- Presence of air bubbles in the water circuit.
- Efficiency of safety devices.
- Power supply voltage.
- Power input.
- Tightness of electrical and hydraulic connections.
- Condition of the compressor contactor.
- Efficiency of the plate heat exchanger heater.
- Checking of operating pressure, superheating and subcooling.
- Efficiency of compressor heater.
- Cleaning of finned coil (*).
- Cleaning of fan grills.
- Cleaning of condensate drain pan (if installed).

(*) for “Heat pump” appliances, the checks are to be performed quarterly.

- For units installed near the sea, the intervals between maintenance should be halved.

7.3 Extraordinary maintenance

Never perform any cleaning operations before having disconnected the unit from the mains power supply.

7.3.1 Chemical washing

You are recommended to chemically wash the plate heat exchanger after every 3 years of operation.

7.3.2 Refrigerant gas content

The chillers are filled R410A refrigerant gas and tested in the factory. In normal conditions, there should be no need for the Technical Assistance Service to intervene to check the refrigerant gas. However, over time, small leaks may develop at the joints leading to loss of refrigerant and draining of the circuit, causing the unit to function poorly. In this case, the leaks of refrigerant circuit refilled. Proceed as follows:

- Empty and dry the entire refrigerant circuit using a vacuum pump connected to the low and high pressure tap until the vacuometer reads about 10Pa. Wait a couple of minutes and check that this value does not rise to more than 200Pa.

- Connect the refrigerant gas cylinder or a filling cylinder to the low pressure line pressure gauge connection.
- Fill with the quantity of refrigerant gas indicated on the rating plate of the unit.
- Always check the superheating and subcooling values. In the nominal operating conditions for the appliance, these should be between 5 and 10°C and between 4 and 8°C respectively.
- After a couple of hours of operation, check that the liquid indicator indicates circuit dry (dry-green)

Note:

1) In the event of partial leaks, the circuit must be completely emptied before being refilled

The R410A refrigerant must only be filled in the liquid state.

Operating conditions other than nominal conditions may produce considerably different values, Seal testing or identification of leaks must only be carried out using R410A refrigerant gas, checking with a suitable leak detector.

2) The use of a different refrigerant or oils may cause serious damage to the compressor.

Oxygen, acetylene or other inflammable or poisonous gas must never be used in the refrigerant circuit as they may cause explosion or poisoning.

7.3.3 Disposal

Do not dispose this product as unsorted municipal waste. Collection of such waste separately for special treatment is necessary. Do not dispose of electrical appliances as unsorted municipal waste, use separate collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging your health and well-being,