


BGH Silent Air

BAJA SILUETA INVERTER



R-410A 



DC SERIES

(BSBSI--CTK)

Actualización: Febrero 2014

BSBSIC60CTK*: Equipos con número de serie: D20201238612C12160001-70
D202097850213703160001-51
D202119130213925160001-51

(Referencia:
Compras a BGH
previas a Abril
2014)

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

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1. Model Lists

1.1 Indoor Units

R410A		Capacity multiplied by 1000Btu/h		
Type	Function	36	48	60
High static pressure duct	Cooling and heating	●	●	●

1.2 Outdoor Units

Universal Outdoor unit Model	Compressor type	Compressor Brand	Matched indoor units
BSBSIC36CTK	Rotary DC Inverter	MITSUBISHI	BSBSIE36CTK
BSBSIC48CTK	Rotary DC Inverter	MITSUBISHI	BSBSIE48CTK
BSBSIC60CTK*	Rotary DC Inverter	MITSUBISHI	BSBSIE60CTK
BSBSIC60CTK	Rotary DC Inverter	MITSUBISHI	BSBSIE60CTK

2. External Appearance

2.1 Indoor Units

High static pressure duct



2.2 Outdoor Units



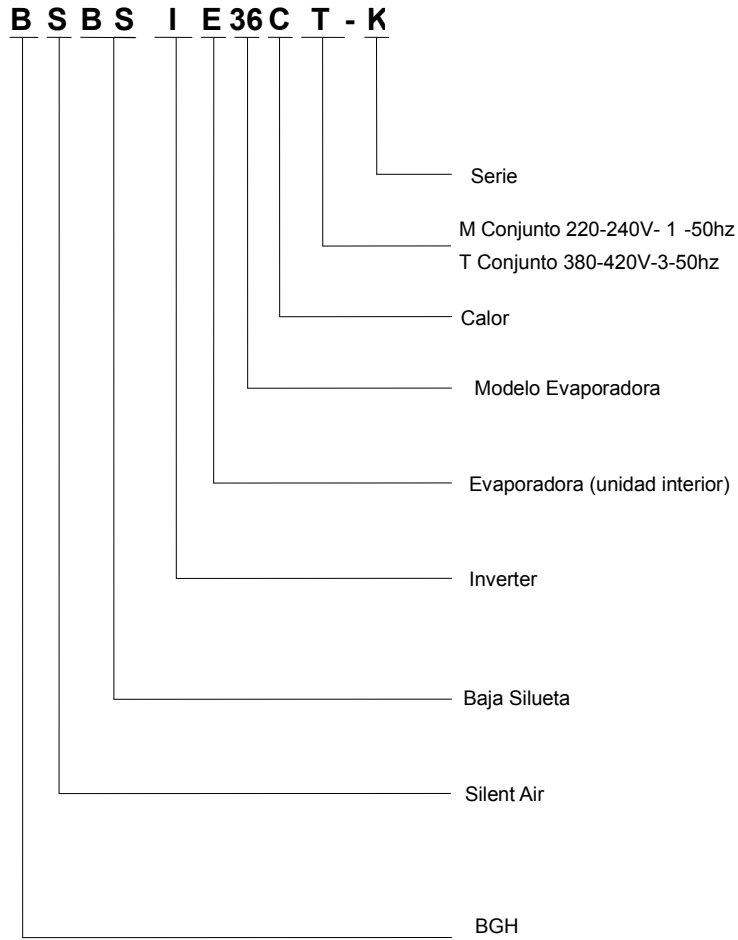
Single fan outdoor unit



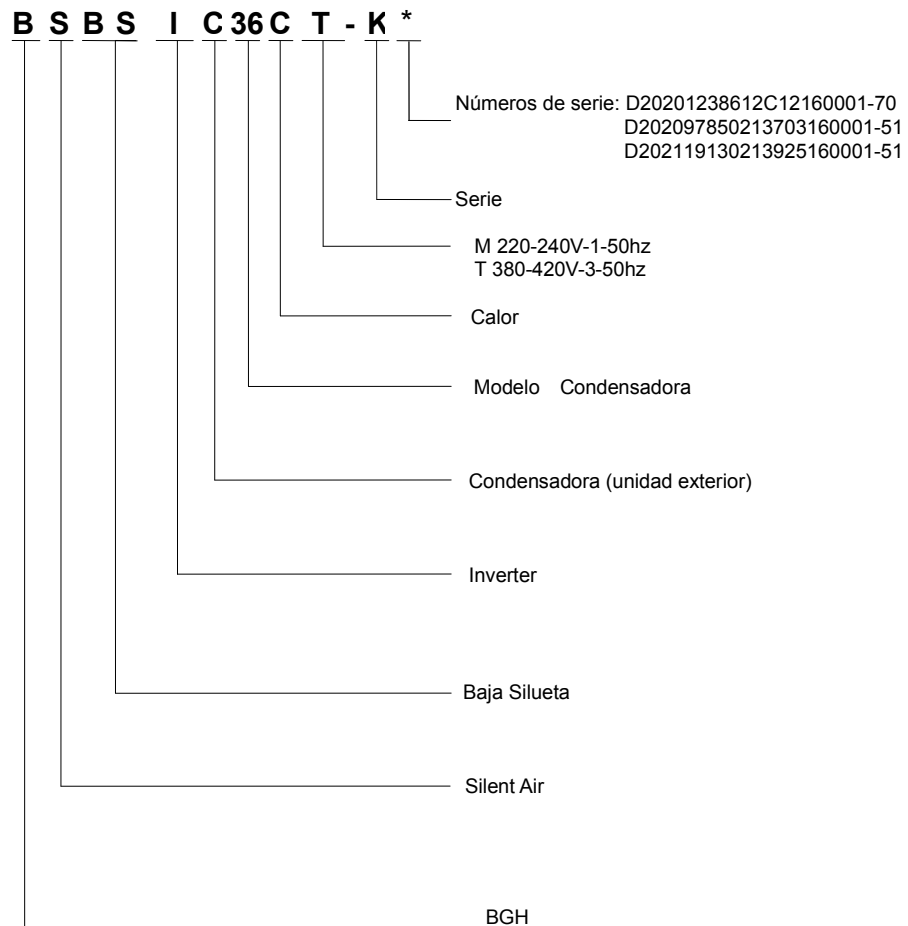
Double fan outdoor unit

3. Nomenclature

3.1 Indoor Unit



3.2 Outdoor Unit



4. Features

4.1 Universal outdoor unit design

Indoor unit with the same capacity can match with the same outdoor unit.

4.2 High efficiency and energy saving.

Thanks to the DC inverter technology and optimized piping system, the EER and COP of whole series can easily reach A-class.

4.3 Full range of products from 12K to 60K, including Med duct(A5), cassette, console, ceiling and floor, more choice for you

4.4 Low ambient kit is standard for outdoor units (except 12K)

4.5 Network control function is standard for the indoor units (except 12K)

4.6 Standard auto restart function and follow me function

4.7 Cassette, ceiling & floor, console and compact cassette with standard remote controller, wire controller and CCM for optional. Med Duct with standard wired controller, remote controller and CCM for optional.

4.8 Standard anti-cold air function

4.9 Standard auto defrosting function

4.10 Standard self-diagnose function.

4.11 Standard timer function and sleep mode function controlled by controller.

High Static Pressure Duct7

High Static Pressure Duct

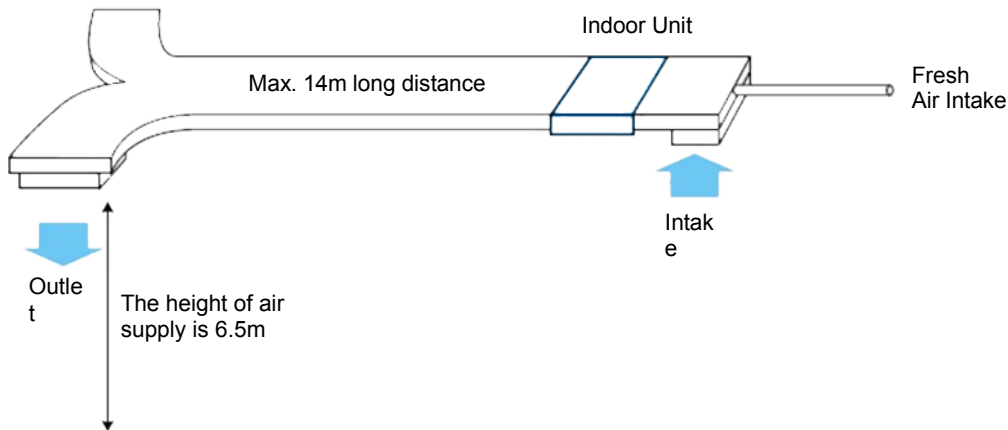
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1. Features

1.1 High static pressure design

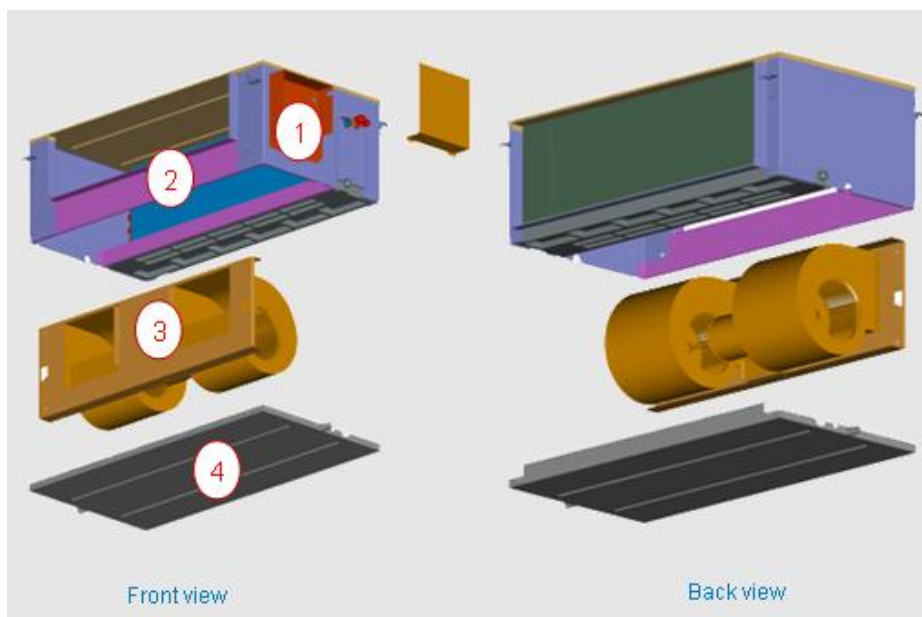
- Max static pressure of indoor unit is 160Pa.
- The longest distance of air supply is 14m, the max height of air supply is 6.5m.
- Specially recommended for spacious and large rooms like large stores and factories.

High static pressure design enables long duct.



1.2 Easy maintenance

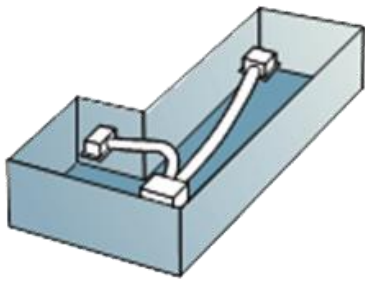
- Reduce time and cost, easily removable fan motor design.
-



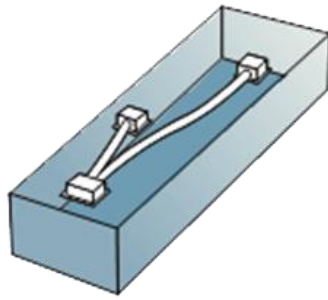
1. Control box
2. Fan casing
3. Motor assembly
4. Bottom panel

1.3 Flexible Installation

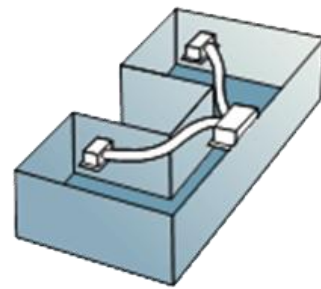
- Different solutions for any shape room by using kinds of air distribution ducts.



L-shaped



Areas far



Y-shaped

2. Specifications

Indoor Unit	Model		BSBSIE36CTK	BSBSIE48CTK	BSBSIE60CTK
	Code		220070502320	220070702100	220070802250
	Power supply	V-ph-Hz	220~240-1-50	220~240-1-50	220~240-1-50
Cooling	Capacity	Btu/h	36000	48000	55000
	Input	KW	3172	4300	4968
	EER		3.31	3.31	3.22
Heating	Capacity	Btu/h	38000	51000	58000
	Input	KW	3217	4021	4935
	COP		3.73	3.73	3.85
Indoor fan motor	Model		YSK250-4C	YSK400-4C	YSK550-4C
	Qty		1	1	1
	Input	W	588/420/360	930/660/592	1035/836/575
	Capacitor	μF	10μF/450V	15uF/370-450V	20UF/450V
	Speed(Hi/Mi/Lo)	r/min	860/705/655	1080/850/790	1170/990/790
Indoor coil	Number of rows		3	4	4
	Tube pitch(a)×row pitch(b)	mm	25.4x22	25.4x22	25.4x22
	Fin spacing	mm	1.6	1.6	1.6
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia. and type	mm	Φ9.52, inner groove tube	Φ9.52, inner groove tube	Φ9.52, inner groove tube
	Coil length × height × width	mm	996x356x66	996x356x88	996x356x88
	Number of circuits		7	7	7
Indoor air flow(Hi/Med/Lo)		m ³ /h	3177/2500/2332	3935/3325/2800	4242/3588/2920
Indoor external static pressure (Hi)		Pa	150	160	160
Indoor noise level (Hi/Med/Lo)		dB(A)	52/47/45	55/52/48	55/52/45
Throttle type			/	/	/
Indoor unit	Dimension (WxDxH)	mm	1200x808x400	1200x808x400	1200x808x400
	Packing(WxDxH)	mm	1368x877x430	1368x877x430	1368x877x430
	Net/Gross weight	kg	83/91	78/85	78/85
Design pressure		MPa	4.2/1.5	4.2/1.5	4.2/1.5
Refrigerant piping	Liquid side/ Gas side	mm	φ9.5/φ15.9	φ9.5/φ15.9	φ9.5/φ15.9
Drainage water pipe diameter		mm	ODφ32	ODφ32	ODφ32
Controller			R51/E	R51/E	R51/E
Operation temperature		°C	17-30	17-30	17-30

Notes: 1. Nominal cooling capacities are based on the following conditions:

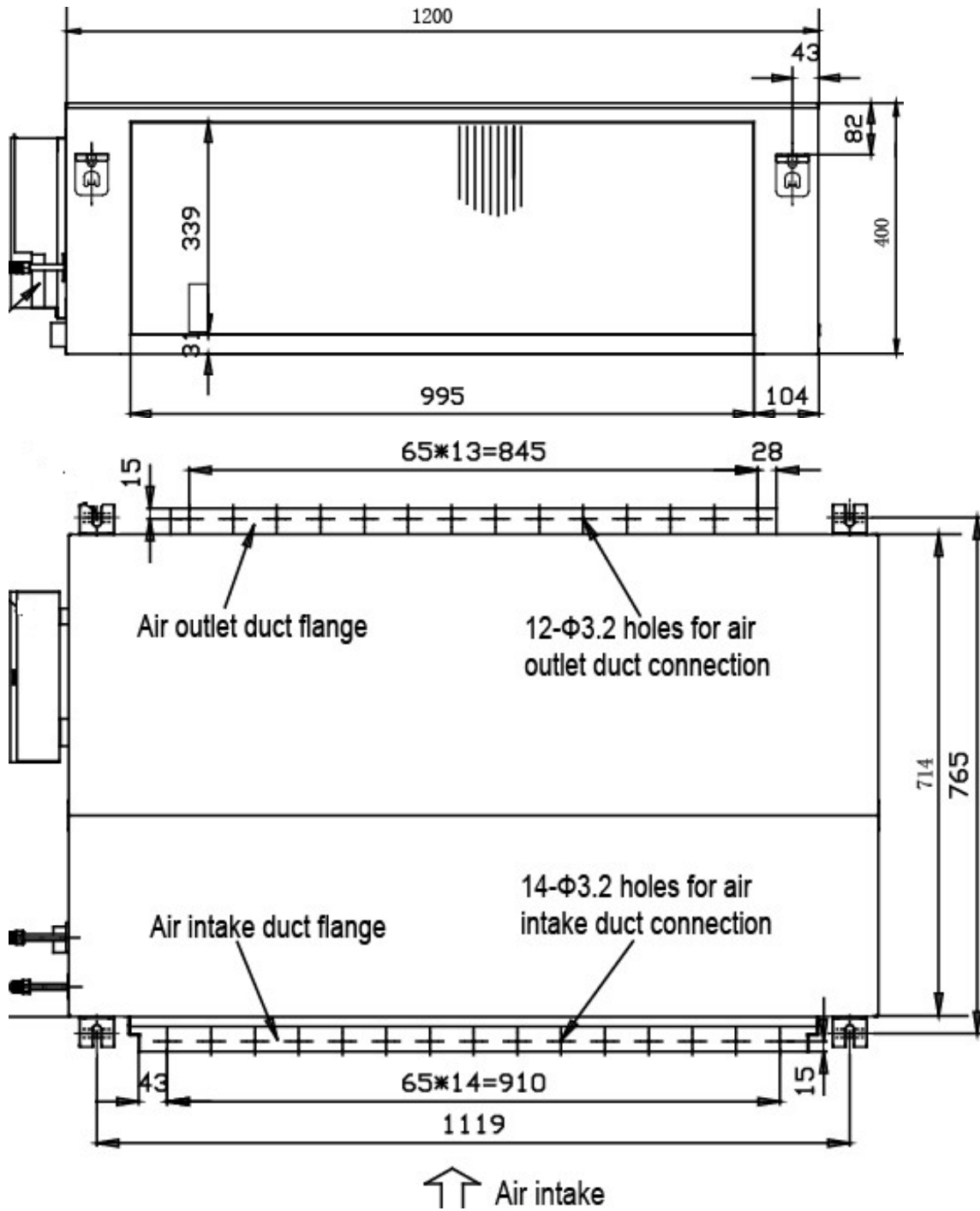
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB; Equivalent ref. piping: 7.5m (horizontal)

2. Nominal heating capacities are based on the following conditions:

Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB; Equivalent ref. piping: 7.5m (horizontal)

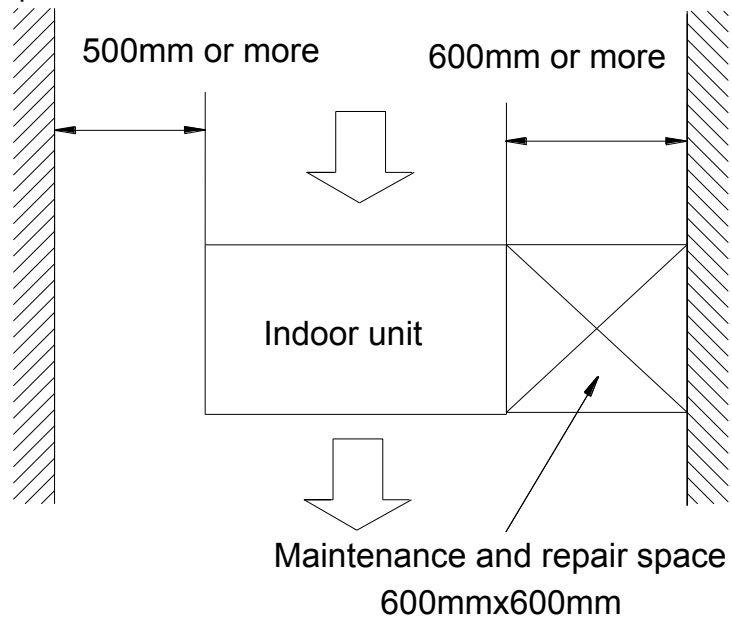
3. Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

3. Dimensions 36-48-60



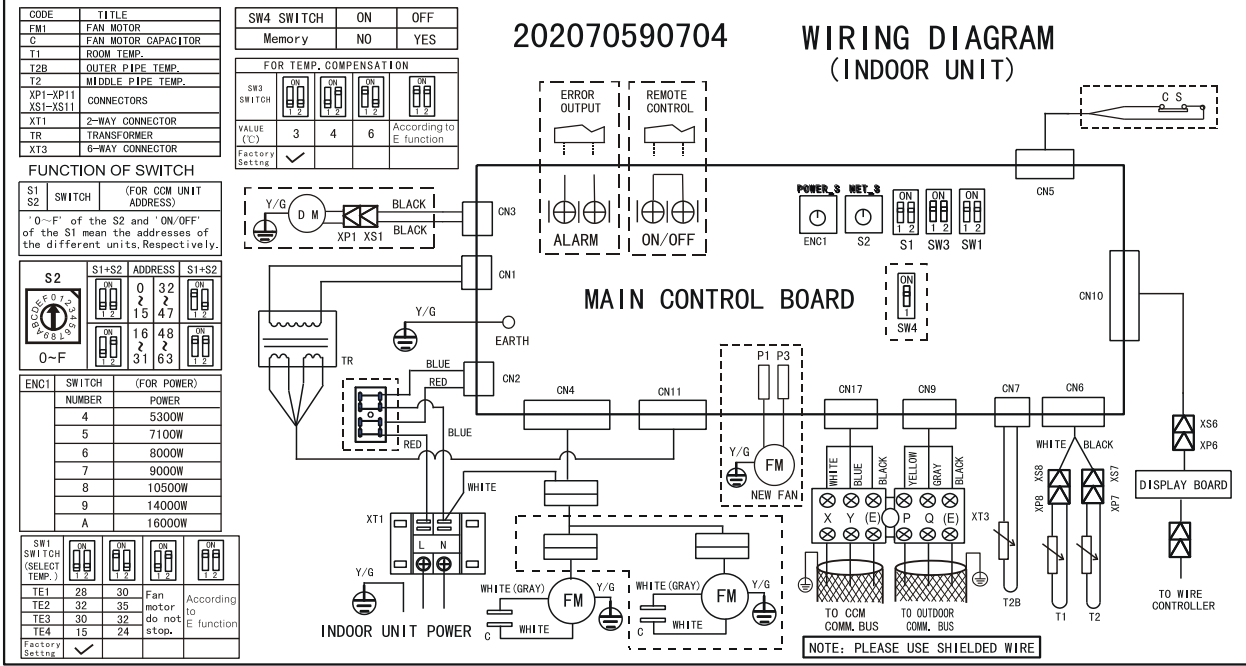
4. Service Space

Ensure enough space required for installation and maintenance

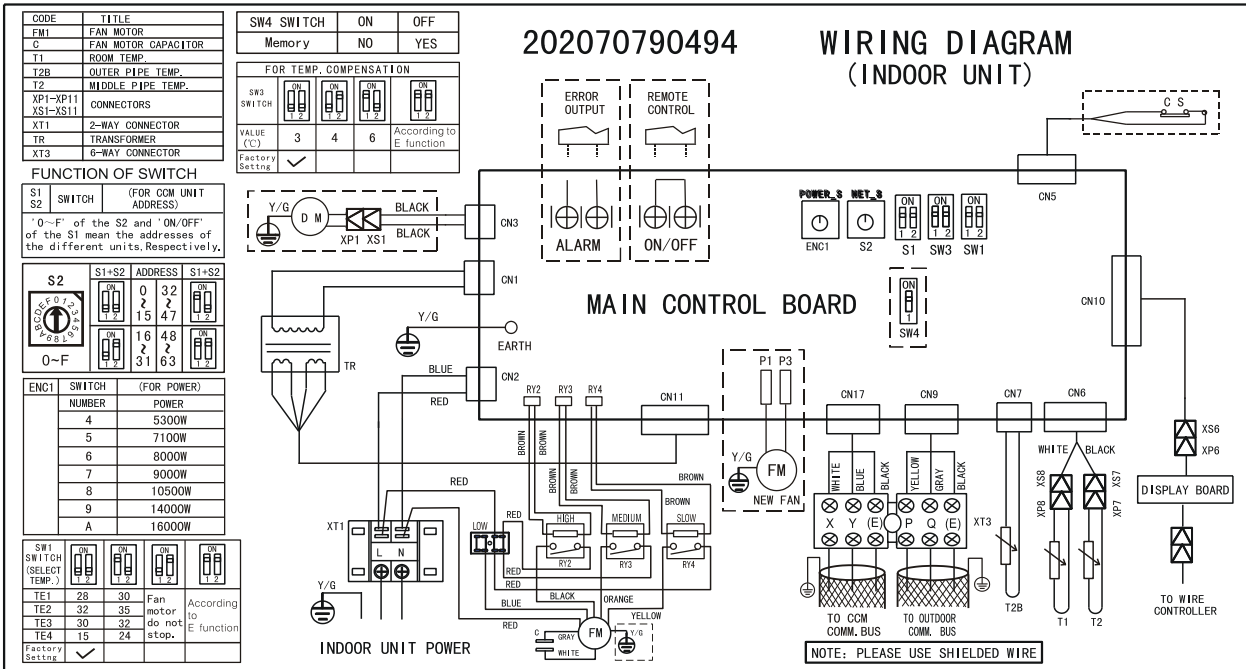


5. Wiring Diagrams

BSBSIE36CTK

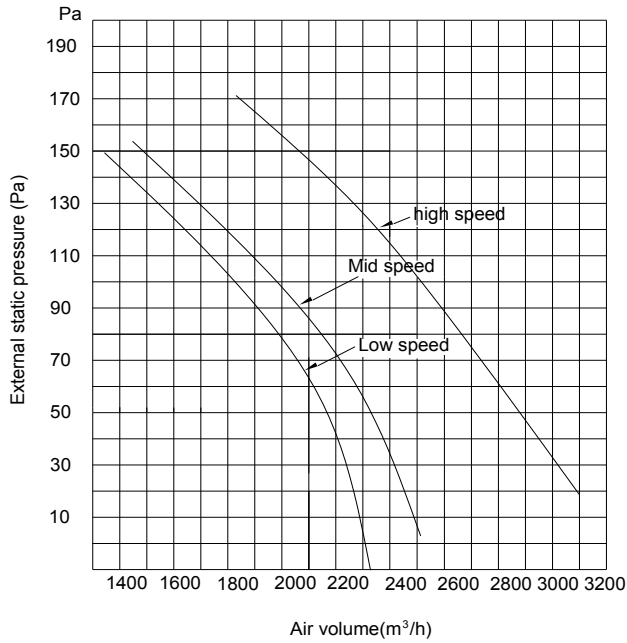


BSBSIE48CTK-BSBSIE60CTK*-BSBSIE60CTK

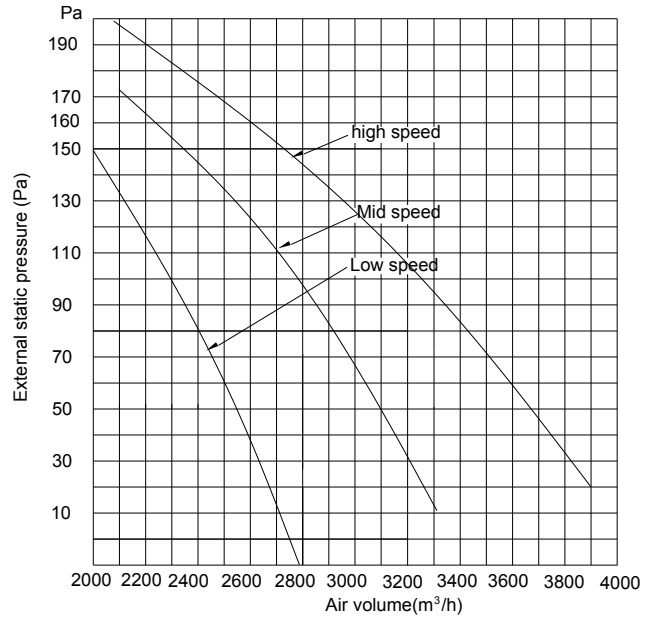


6. Fan Performances

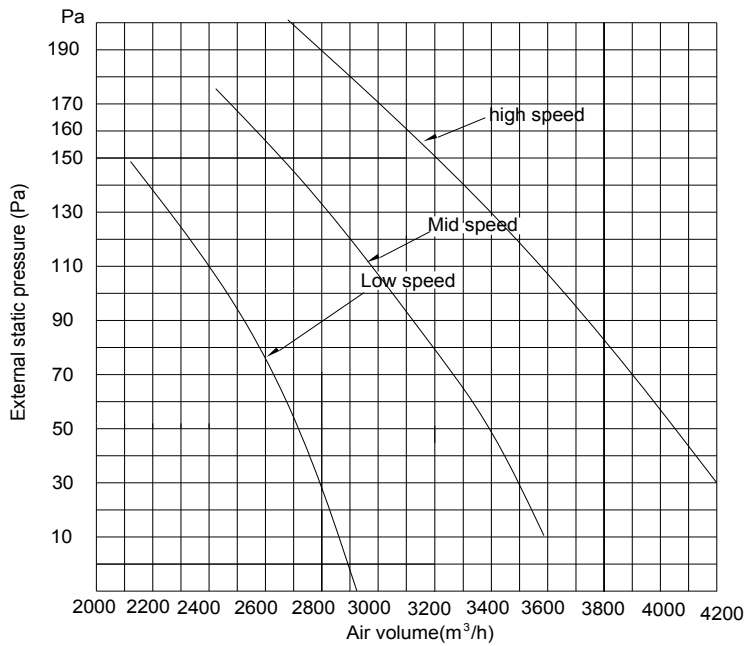
36.000 Btu/h



48.000 Btu/h



60.000 Btu/h



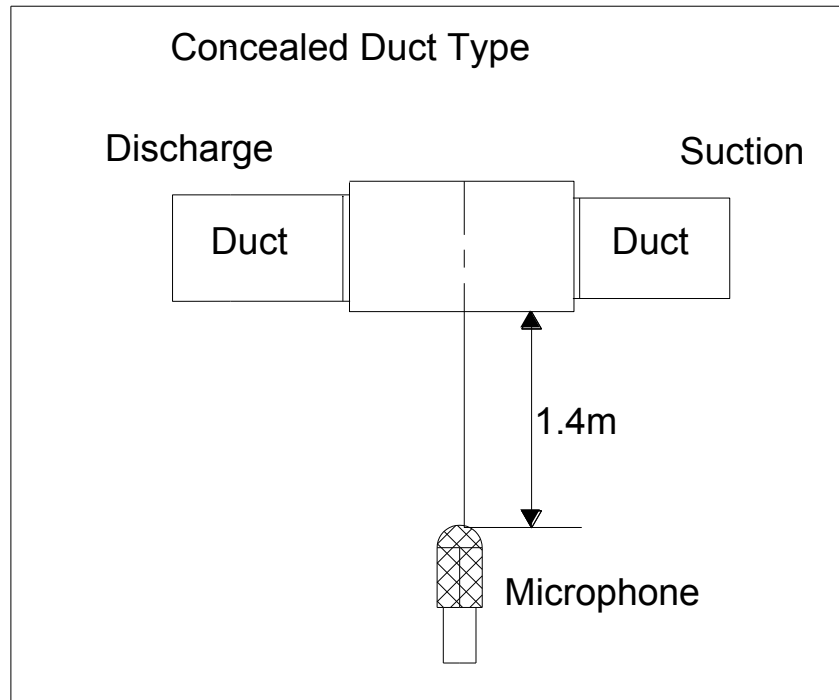
7. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
BSBSIE36TMK	50	220-240V	198V	254V	
BSBSIE48CTK	50	220-240V	198V	254V	
BSBSIE60CTK	50	220-240V	198V	254V	

Note:








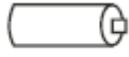

MFA: Max. Fuse Amps. (A)

8. Sound Levels



Model	Noise level dB(A)		
	H	M	L
BSBSIE36CTK	52	47	45
BSBSIE48CTK	55	52	48
BSBSIE60CTK	55	52	45

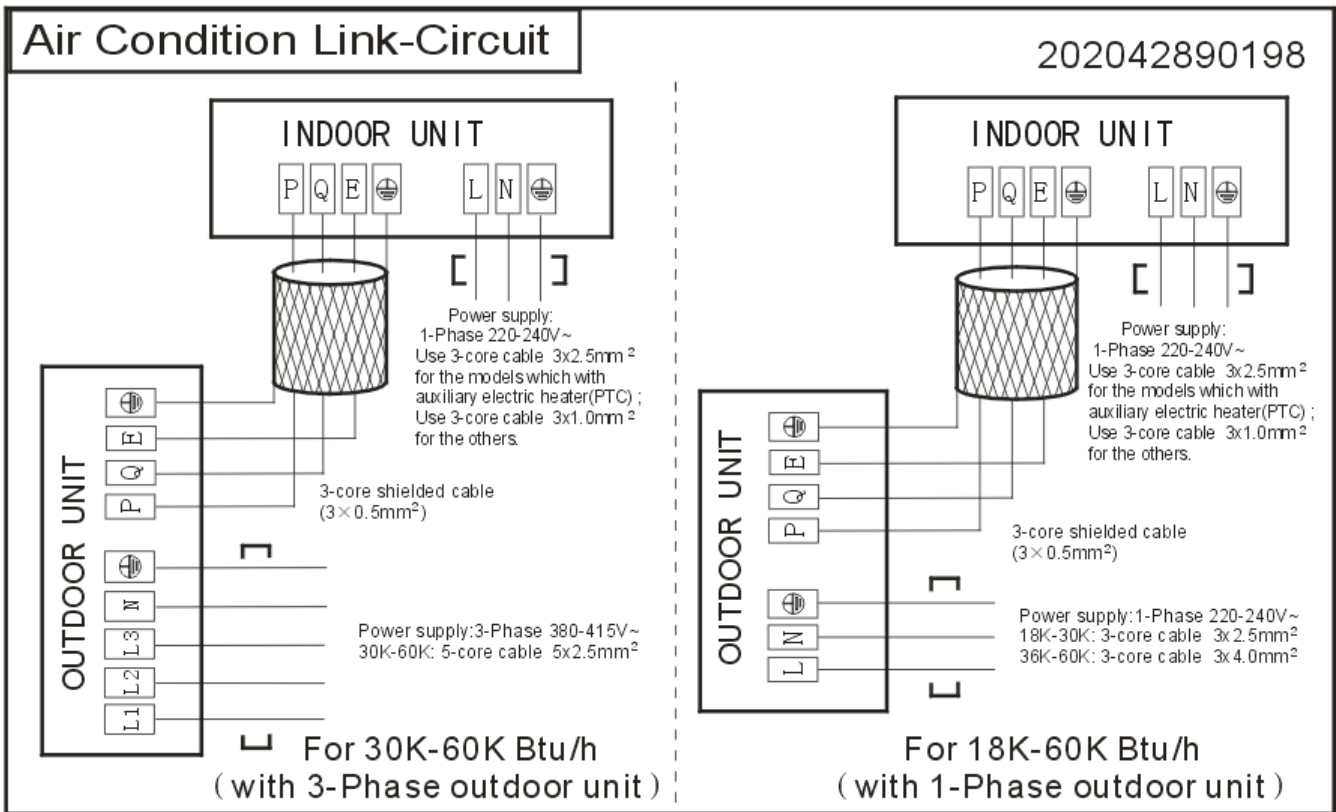
9. Accessories

	Name	Shape	Quantity
Tubing & Fittings	1. Soundproof/ insulation sheath		2
	2. Binding tape		1
Drainpipe Fittings	3. Drain joint		1
	4. Seal ring		1
Wireless Remote controller & Its Frame	5. Wireless Remote controller		1
	6. Frame		1
	7. Mounting screw(ST2.9×10-C-H)		2
	8. Alkaline dry batteries (AM4)		2
Others	9. Install spring		2
	10. Installation manual	_____	1
	11. User's manual	_____	1
	12. Wireless Remote controller manual	_____	1

10. The Specification of Power

Model		36000Btu/h	48000Btu/h	60000 Btu/h	36000Btu/h	48000-60000Btu/h
INDOOR UNIT POWER	Phase	1-phase	1-phase	1-phase	1-phase	1-phase
	Frequency and Voltage	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz
	POWER WIRING (mm ²)	3×1.0	3×1.0	3×1.0	3×1.0	3×1.0
	CIRCUIT BREAKER /FUSE (A)	15/10	15/10	15/10	15/10	15/10
OUTDOOR UNIT POWER	Phase	1-phase	1-phase	1-phase	3-phase	3-phase
	Frequency and Voltage	220-240V, 50H	220-240V, 50H	220-240V, 50H	380-415V, 50H	380-415V, 50H
	POWER WIRING (mm ²)	3×4.0	3×4.0	3×4.0	5×2.5	5×2.5
	CIRCUIT BREAKER /FUSE(A)	40/30	40/35	50/40	30/20	30/25
Indoor/Outdoor Connecting Wiring(Weak Electric Signal) (mm ²)		3×0.5	3×0.5	3×0.5	3×0.5	3×0.5
Indoor/Outdoor Connecting Wiring(Strong Electric Signal) (mm ²)		—————	—————	—————	—————	—————

11. Field Wiring



Part 3

Outdoor Units

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Specification

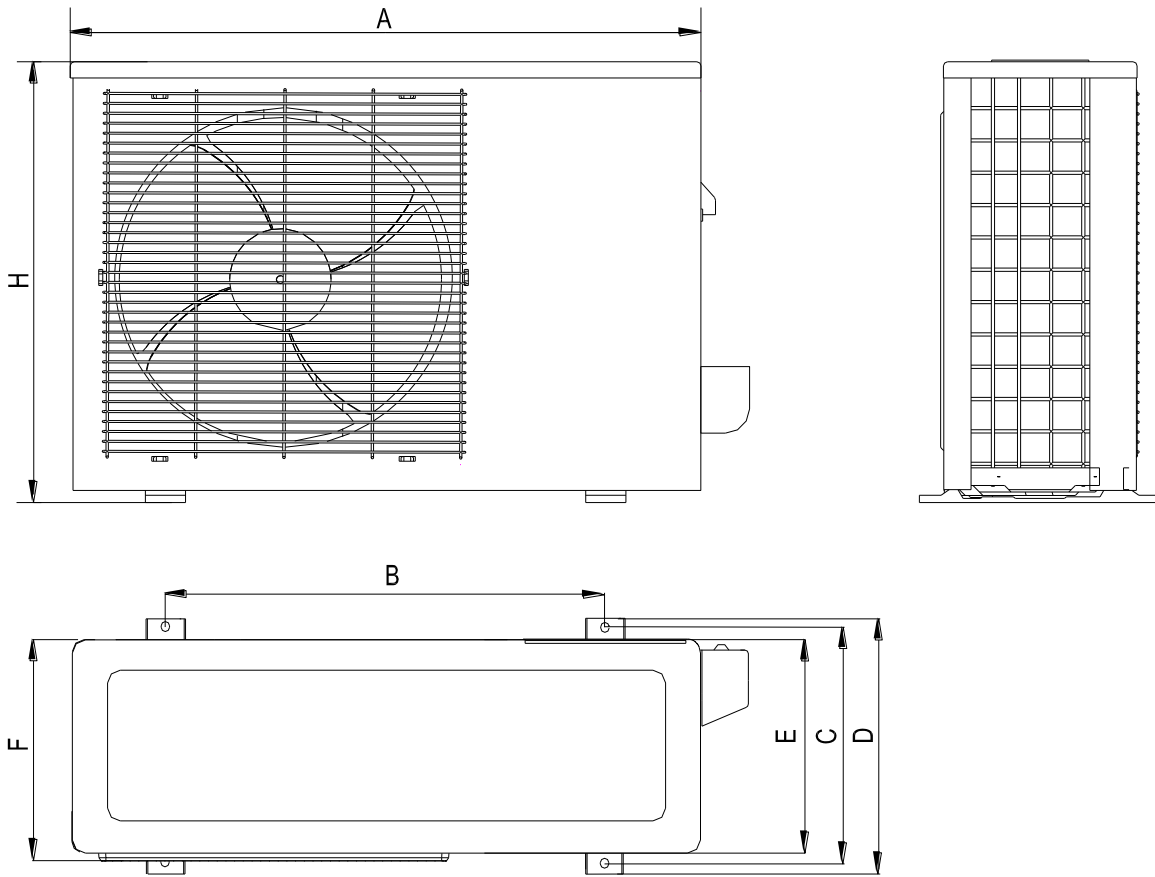
Outdoor	Model name		BSBSIC36CTK	BSBSIC48CTK
	Code		220075502220	220075702050
	Power supply		380~415V-3 Ph-50Hz	380~415V-3 Ph-50Hz
Max. input consumption		W	5000	5500
Max. current		A	14	15
Compressor	Model		TNB306FPNMC-L	TNB306FPNMC-L
	Type		Rotary	Rotary
	Brand		Mitsubishi	Mitsubishi
	Capacity	Btu/h	33711	33711
	Input	W	3010	3010
	Rated current(RLA)	A	13.5	13.5
	Locked rotor Amp(LRA)	A	/	/
	Thermal protector position		/	/
	Capacitor	μF	/	/
Refrigerant oil	ml	1070	1070	
Outdoor fan motor	Model		YDK190-6C(B)	(YDK100-6A)x2
	Qty		1	2
	Input	W	290/168	(176/133)x2
	Capacitor	uF	10UF/450V	(3.5UF/450V)x2
	Speed(Hi/Med/Lo)	r/min	850/760	810/610
Outdoor coil	Number of rows		2	3
	Tube pitch(a)x row pitch(b)	mm	22×19.05	21x13.37
	Fin spacing	mm	1.5	1.4
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia. and type	mm	Φ7.94,inner grooved tube	Φ7,inner grooved tube
	Coil length x height x width	mm	885×902×38.1	904x1218x40.11
	Number of circuits		4	12
Outdoor air flow(Hi/Low)		m ³ /h	5000/4800	6000/5800
Sound level(sound pressure)(Hi/Low)		dB(A)	63	62
Throttle type			EXV+Capillary	EXV+Capillary
Outdoor unit	Dimension(W x D x H)	mm	990x354x966	940x360x1245
	Packing (W x D x H)	mm	1120x435x1100	1058x438x1380
	Net/Gross weight	kg	79/91	99/110
Refrigerant	Type		R410A	R410A
	Charged volume	kg	2.6	4
Design pressure(Hi/Low)		MPa	4.2/1.5	4.2/1.5
Refrigerant piping	Liquid side/ Gas side	mm	Φ9.5/Φ15.9	Φ9.5/Φ15.9
	Max. refrigerant pipe length	m	30	50
	Max. difference in level	m	20	25
Ambient temp (Outdoor)		℃	Cooling: -15~50; Heating: -15~24	Cooling: -15~50; Heating: -15~24

- Notes:**
- Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;
 - Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;
 - Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

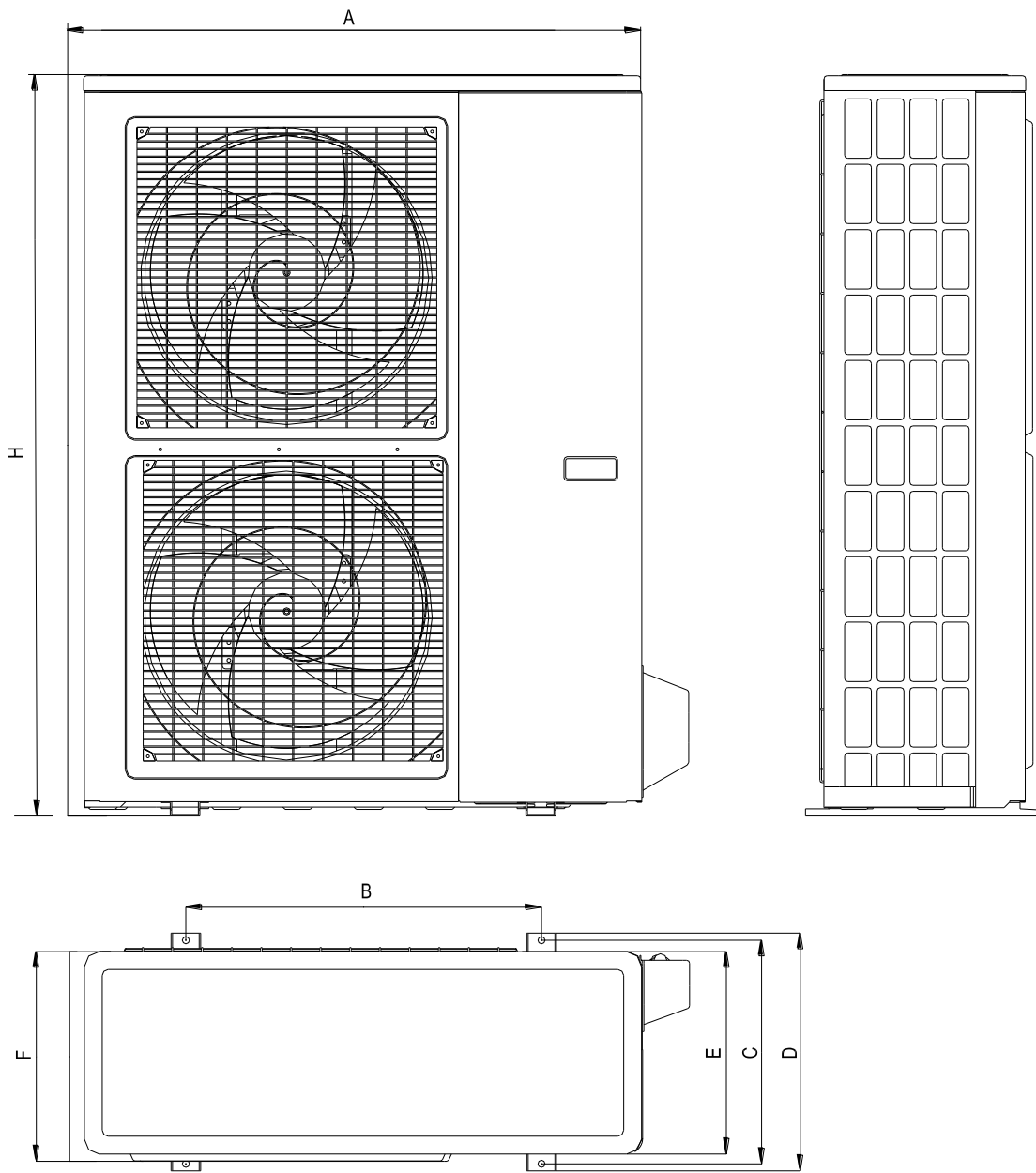
Outdoor		Model name	BSBSIC60CTK*	BSBSIC60CTK
		Code	220075802260	220075802540
		Power supply	380~415V-3 Ph-50Hz	380~420V-3 Ph-50Hz
Max. input consumption		W	8000	7500
Max. current		A	15	15
Compressor	Model		LNB42FSAMC	LNB42FSAMC
	Type		Rotary	Rotary
	Brand		Mitsubishi	Mitsubishi
	Capacity	Btu/h	47700	47700
	Input	W	4270	4270
	Rated current(RLA)	A	12	12
	Locked rotor Amp(LRA)	A	/	/
	Thermal protector position		/	/
	Capacitor	μF	/	/
	Refrigerant oil	ml	1400	1400
Outdoor fan motor	Model		YDK100-6A	YDK90-6D
	Qty		2	2
	Input	W	(176/133)×2	142/127
	Capacitor	uF	(3.5UF/450V)×2	5UF/450V
	Speed(Hi/Med/Lo)	r/min	810/610	880/810
Outdoor coil	Number of rows		3	2
	Tube pitch(a)x row pitch(b)	mm	21x13.37	5UF/450V
	Fin spacing	mm	1.4	1.5
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia. and type	mm	Φ7,inner grooved tube	Φ7.94,inner grooved tube
	Coil length x height x width	mm	904x1218x40.11	995x1320x38.1
	Number of circuits		12	10
Outdoor air flow(Hi/Low)		m ³ /h	6800	7500
Sound level(sound pressure)(Hi/Low)		dB(A)	63	64
Throttle type			EXV+Capillary	EXV+Capillary
Outdoor unit	Dimension(W x D x H)	mm	940x360x1245	938x392x1369
	Packing (W x D x H)	mm	1058x438x1380	1095x495x1505
	Net/Gross weight	kg	104/115	107/120
Refrigerant	Type		R410A	R410A
	Charged volume	kg	4.2	4.6
Design pressure(Hi/Low)		MPa	4.2/1.5	4.2/1.5
Refrigerant piping	Liquid side/ Gas side	mm	Φ9.5/Φ15.9	Φ9.5/Φ15.9
	Max. refrigerant pipe length	m	50	65
	Max. difference in level	m	25	30
Ambient temp (Outdoor)		°C	Cooling: -15~50; Heating: -15~24	Cooling: -15~50; Heating: -15~24

- Notes:**
- Nominal cooling capacities are based on the following conditions:
Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;
 - Nominal heating capacities are based on the following conditions:
Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;
 - Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

1. Dimensions

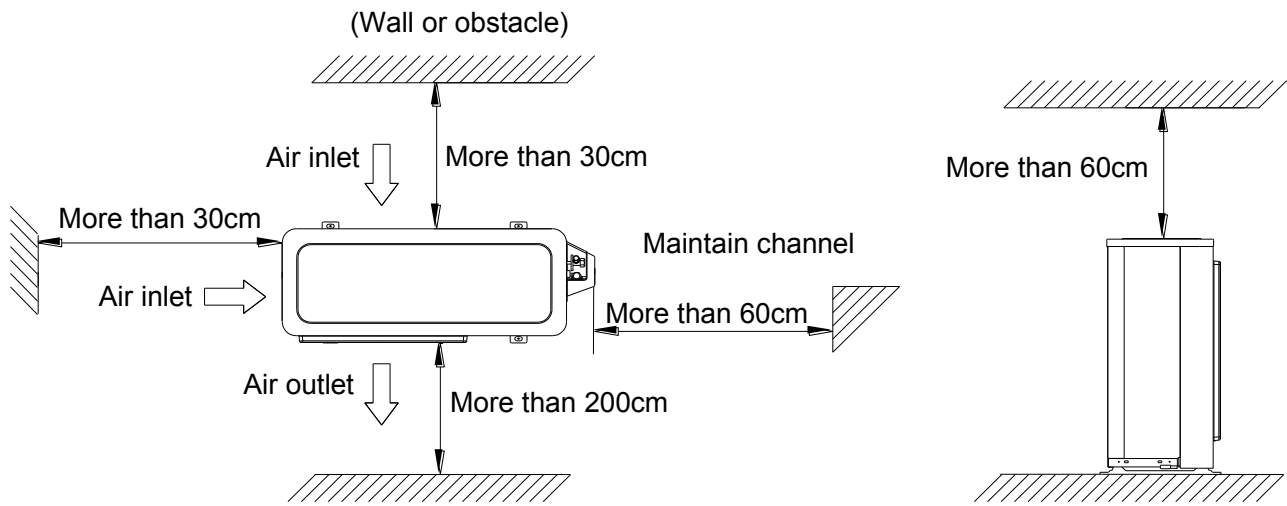


Model	Unit: mm						
	A	B	C	D	E	F	H
BSBSIC36CTK	990	624	366	396	340	354	966



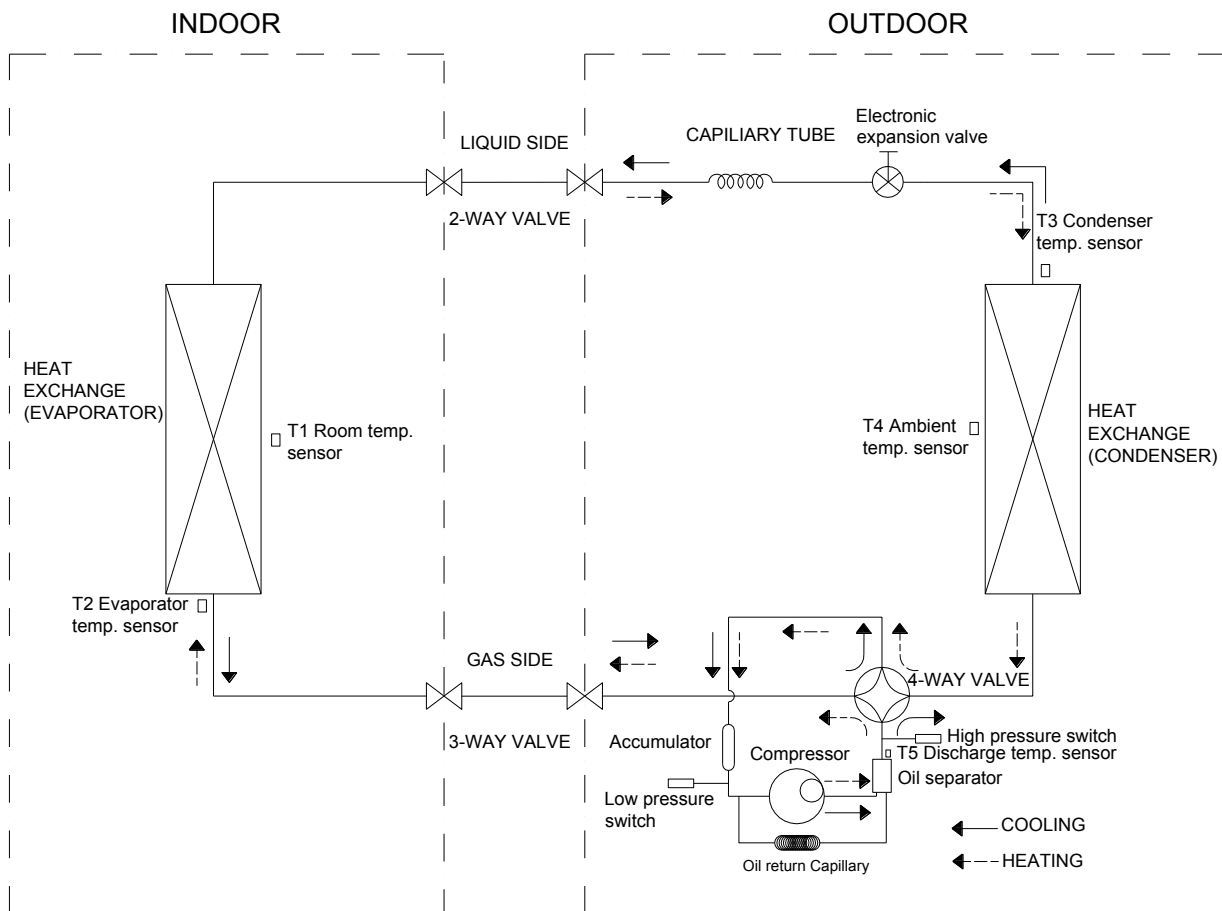
Model	Unit: mm						
	A	B	C	D	E	F	H
BSBSIC48CTK	940	600	376	400	340	360	1245
BSBSIC60CTK*							
BSBSIC60CTK	938	634	404	448	368	392	1370

2. Service Space



3. Piping Diagrams

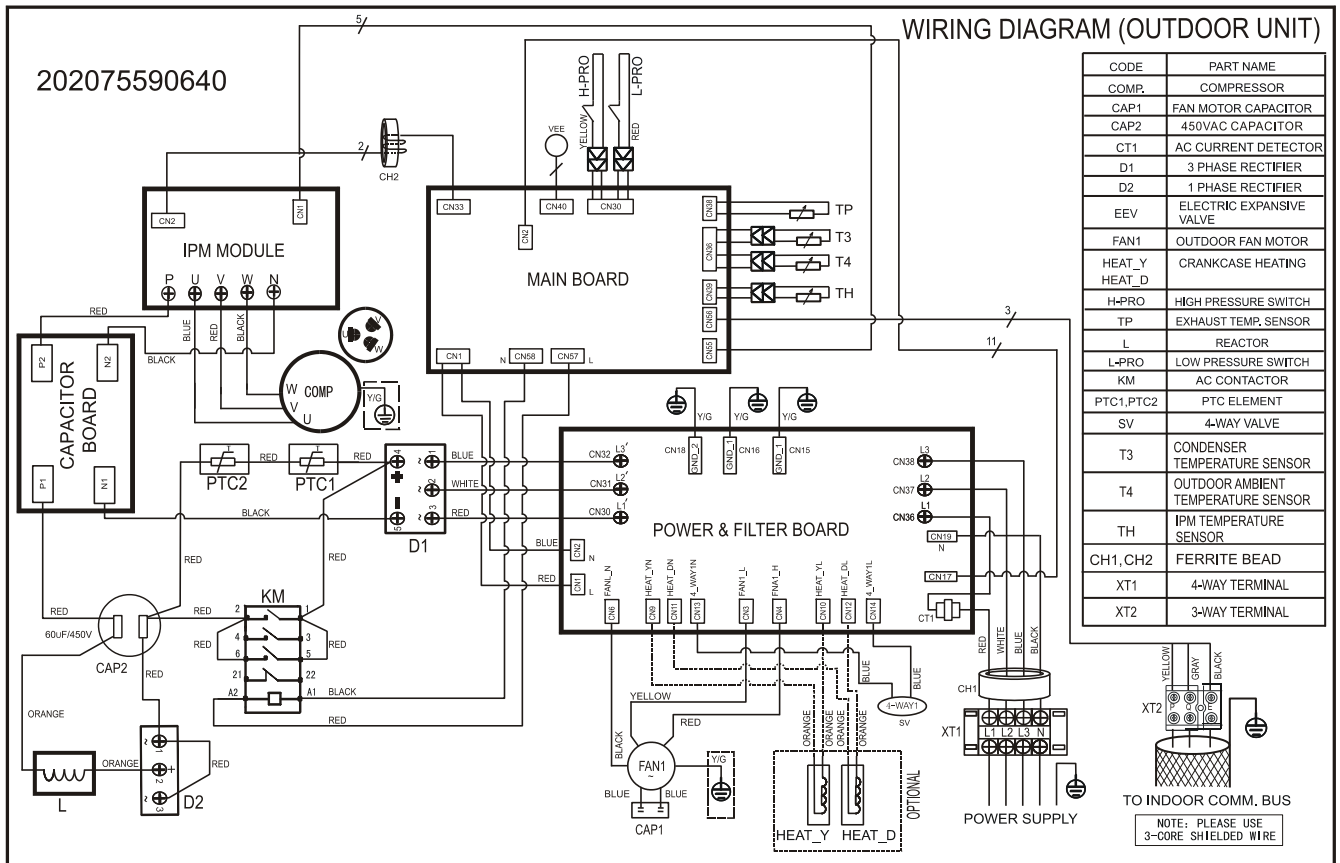
Mod: 36-48-60



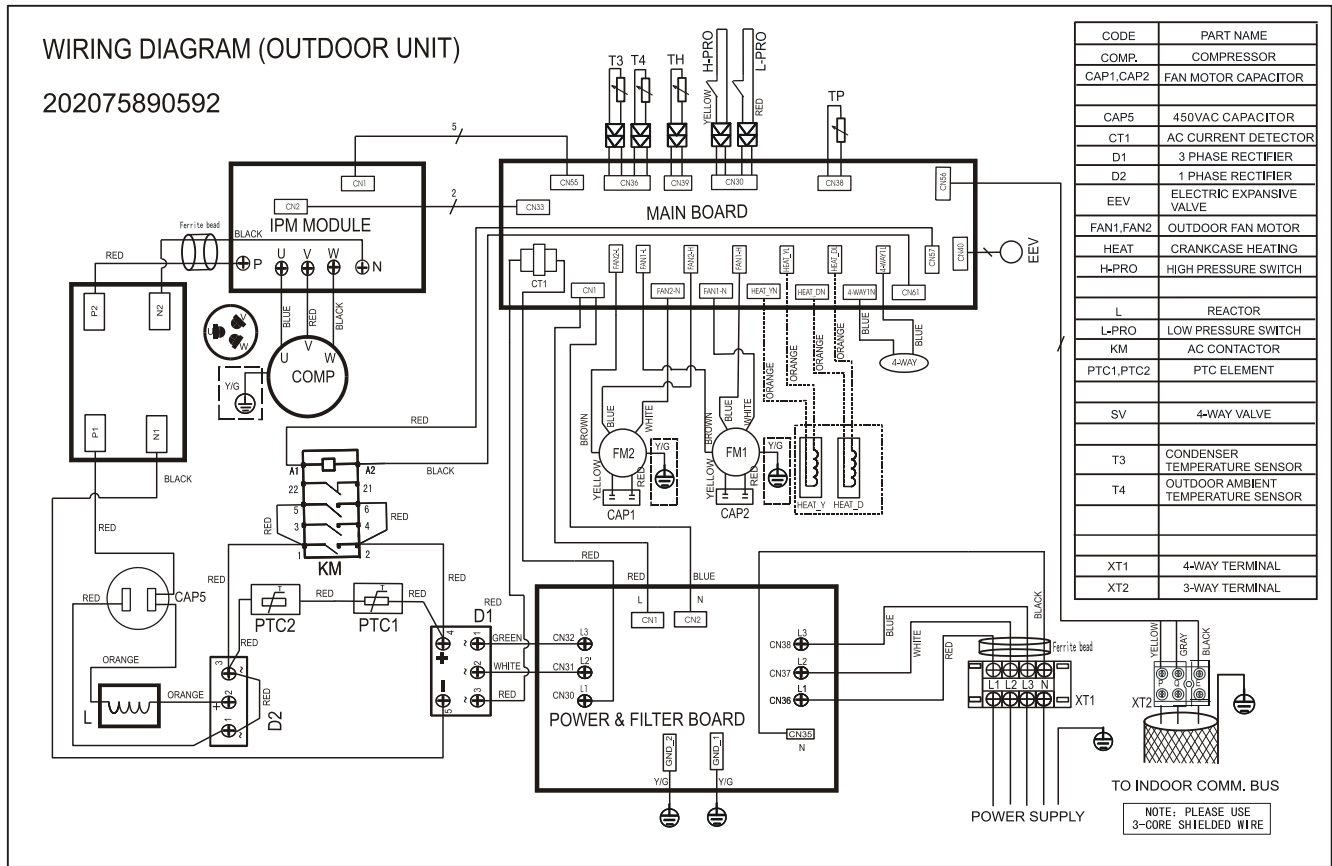
For 36-48-60 the accumulator is not included.

4. Wiring Diagrams

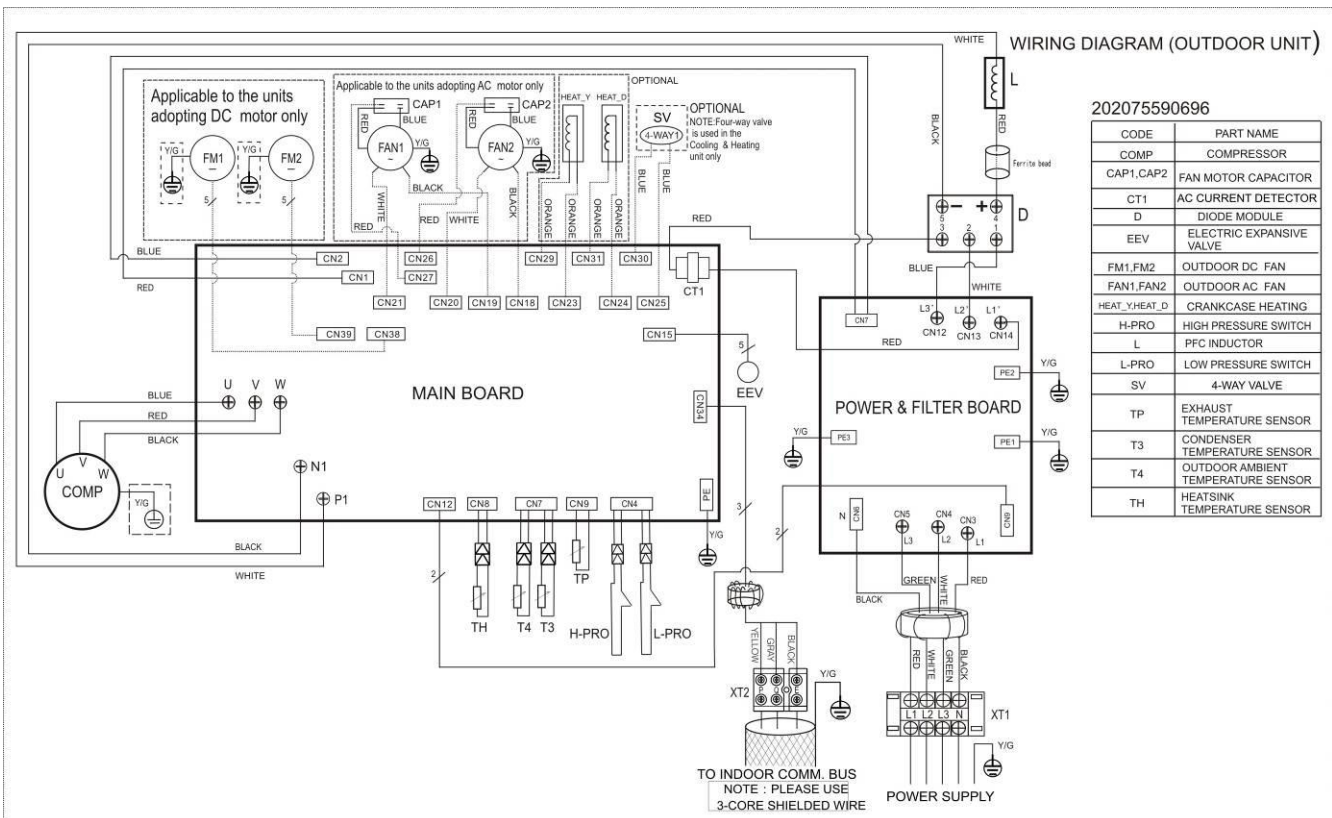
BSBSIC36CTK



BSBSIC48CTK – BSBSIC60CTK*



BSBSIC60CTK



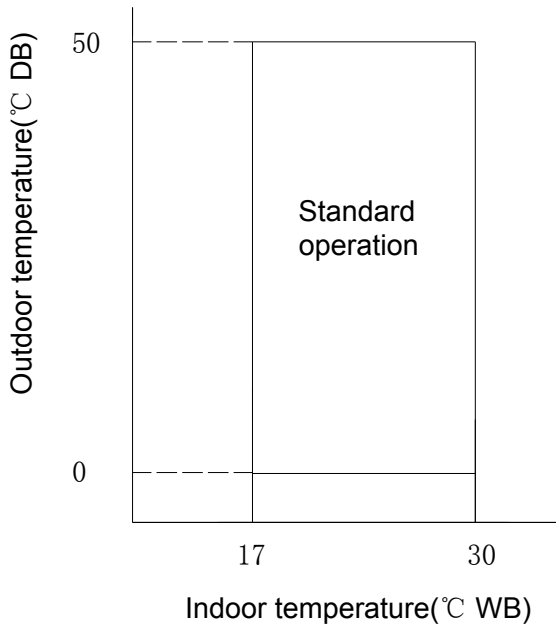
5. Electric Characteristics

Model	Outdoor Unit			
	Hz	Voltage	Min.	Max.
BSBSIC36CTK	50	380-415	342	440
BSBSIC48CTK	50	380-415	342	440
BSBSIC60CTK*	50	380-415	342	440
BSBSIC60CTK				

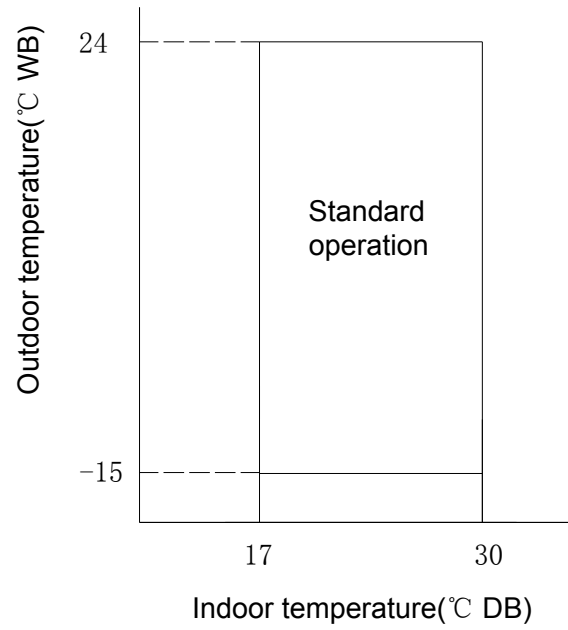
6. Operation Limits

12k

Cooling

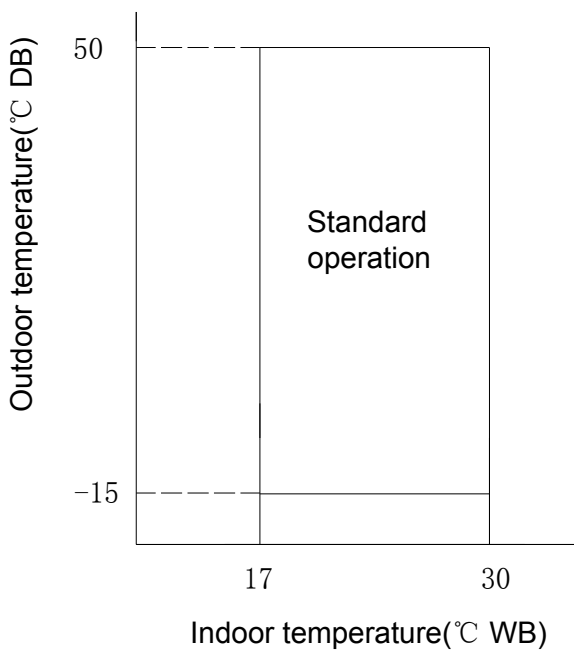


Heating

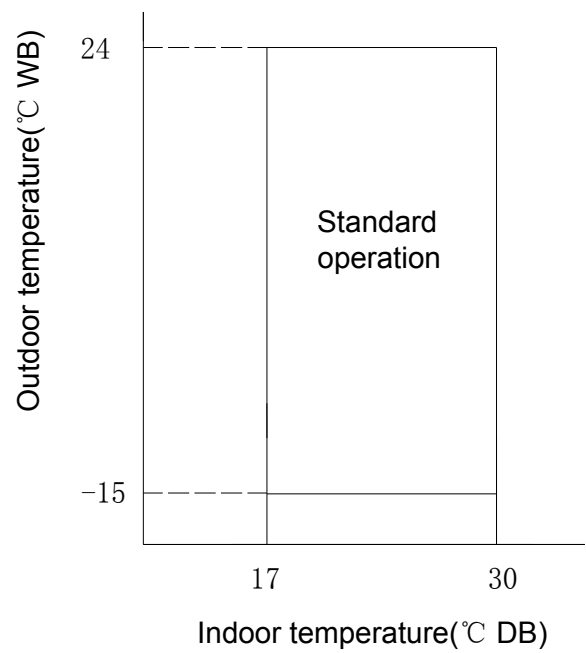


18-60k

Cooling



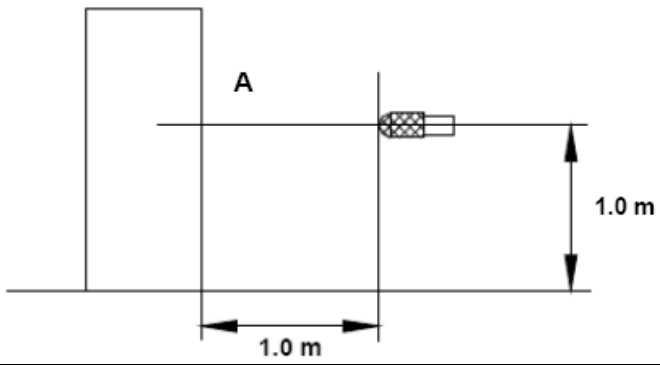
Heating



7. Sound Levels

Outdoor unit

Microphone



Model	Noise level dB(A)
BSBSIC36CTK	63
BSBSIC48CTK	62
BSBSIC60CTK*	63
BSBSIC60CTK	62

8. Point Check Function

There is a check switch in outdoor PCB.

Push the switch SW1 to check the states of unit when the unit is running. The digital display tube will display the follow procedure when push SW1 each time.

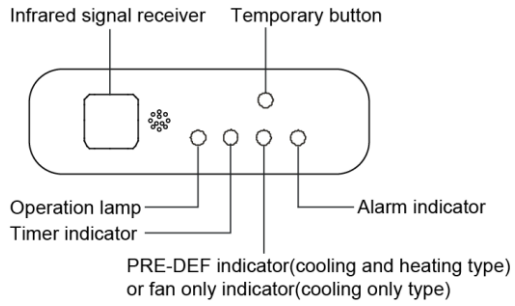
	Display	Remark		
00	Normal display	Display running frequency, running state or malfunction code		
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "5.0",it means the capacity demand is 15. the digital display tube show "60",it means the capacity demand is 6.0)		
02	Amendatory capacity demand code			
03	The frequency after the capacity requirement transfer			
04	The frequency after the frequency limit			
05	The frequency of sending to 341			
06	Indoor unit evaporator outlet temp.(T2)	If the temp. is lower than 0 degree, the digital display tube will show "0".If the temp. is higher than 70 degree, the digital display tube will show "70".		
07	Condenser pipe temp.(T3)	If the temp. is lower than -9 degree, the digital display tube will show "-9".If the temp. is higher than 70 degree, the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show: " — — "		
08	Outdoor ambient temp.(T4)			
09	Compressor discharge temp.(Tp)	The display value is between 30~120 degree. If the temp. is lower than 30 degree, the digital display tube will show "30".If the temp. is higher than 99 degree, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "0.5",it means the compressor discharge temp. is 105 degree. the digital display tube show "1.6",it means the compressor discharge temp. is 116 degree)		
10	AD value of current	The display value is hex number.		
11	AD value of voltage			
12	Indoor unit running mode code	Off:0, Fan only 1, Cooling:2, Heating:3, Forced cooling:4		
13	Outdoor unit running mode code			
14	EXV open angle	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example ,the digital display tube show "2.0",it means the EXV open angle is $120 \times 4 = 480p.$)		
15	Frequency limit symbol	Bit7	0	The display value is hex number. For example, the digital display tube show 2A,then Bit5=1, Bit3=1, Bit1=1. It means frequency limit caused by T4,T3 and current.
		Bit6	0	
		Bit5	Frequency limit caused by T4.	
		Bit4	Frequency limit caused by T2.	
		Bit3	Frequency limit caused by T3.	
		Bit2	Frequency limit caused by Tp.	
		Bit1	Frequency limit caused by current	
		Bit0	Frequency limit caused by voltage	

9. Troubleshooting

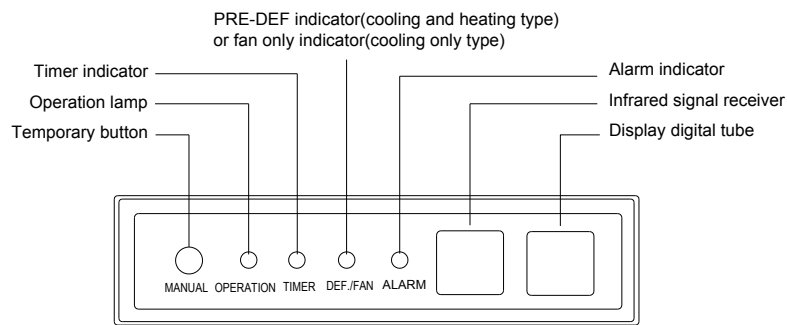
10.1 Indoor unit malfunction

10.1.1 Display board

High pressure static duct



Duct



10.1.2 Troubleshooting

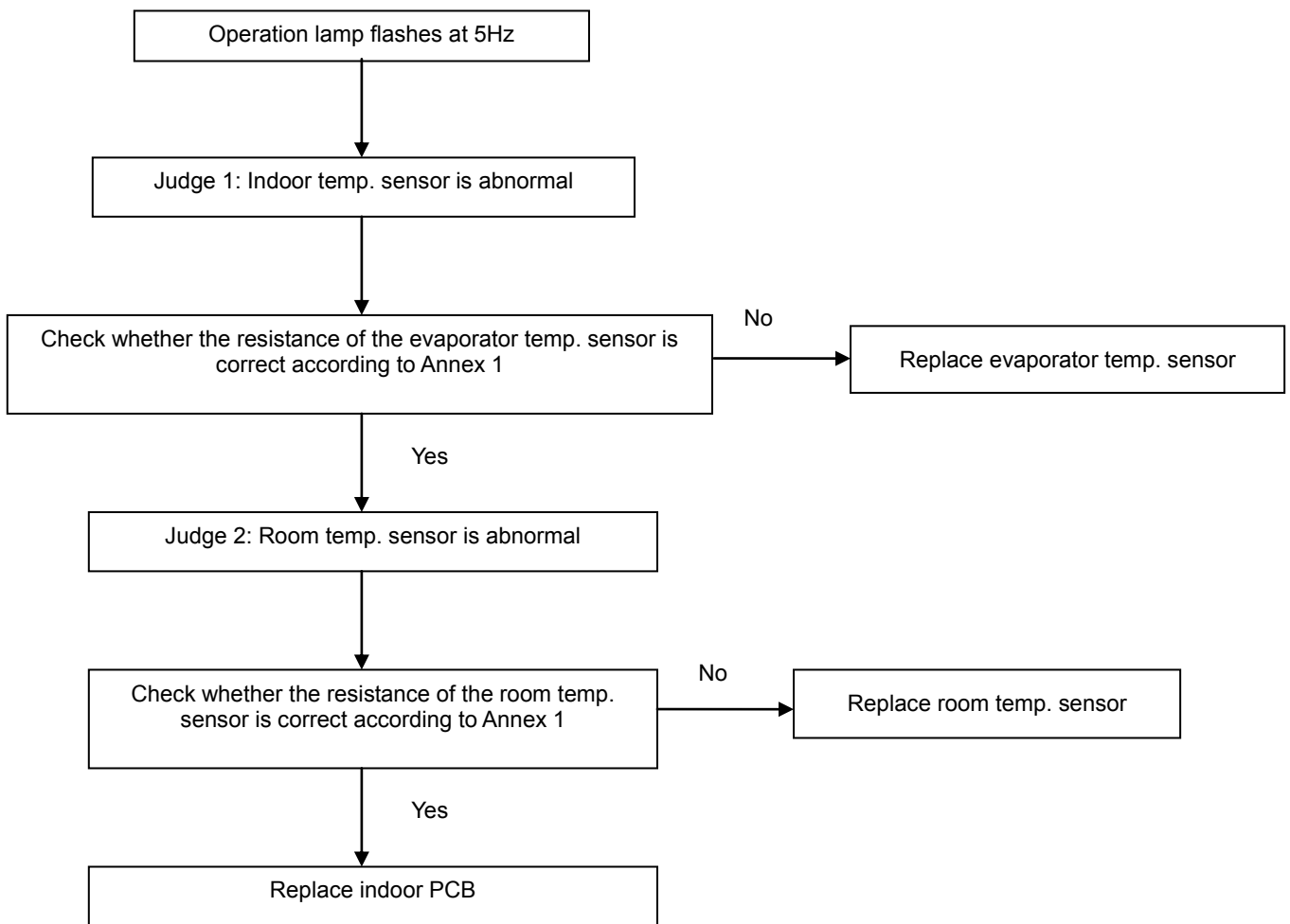
For High pressure static duct

NO.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp	Display(nixie tube)
1	Communication malfunction between indoor and outdoor units.	X	☆	X	X	E1
2	Open or short circuit of T1 temperature sensor	☆	X	X	X	E2
3	Open or short circuit of T2 temperature sensor	☆	X	X	X	E3
4	Open or short circuit of T2B temperature sensor	☆	X	X	X	E4
5	Full-water malfunction	X	X	X	☆	EE
6	EEPROM malfunction	X	X	☆	X	E7
8	Outdoor unit malfunction	X	X	X	◎	Ed
X(off) ☆(flash at 5Hz) ◎(flash at 0.5Hz)						

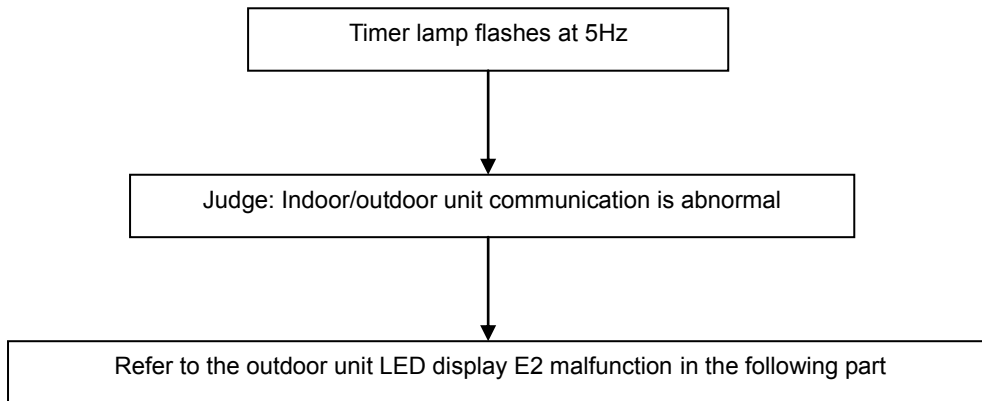
For model 18-60

NO.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp	Display(nixie tube)
1	Collision model malfunction	X	X	☆	X	E0
2	Communication malfunction between indoor and outdoor units.	X	☆	X	X	E1
3	Open or short circuit of T1 temperature sensor	☆	X	X	X	E2
4	Open or short circuit of T2 temperature sensor	☆	X	☆	X	E3
5	Open or short circuit of T2B temperature sensor	☆	X	☆	X	E4
6	EEPROM malfunction	◎	X	X	X	E7
7	Full-water malfunction	X	X	X	☆	EE
8	Outdoor unit malfunction	X	X	X	◎	Ed
X(off) ☆(flash at 5Hz) ◎(flash at 1Hz)						

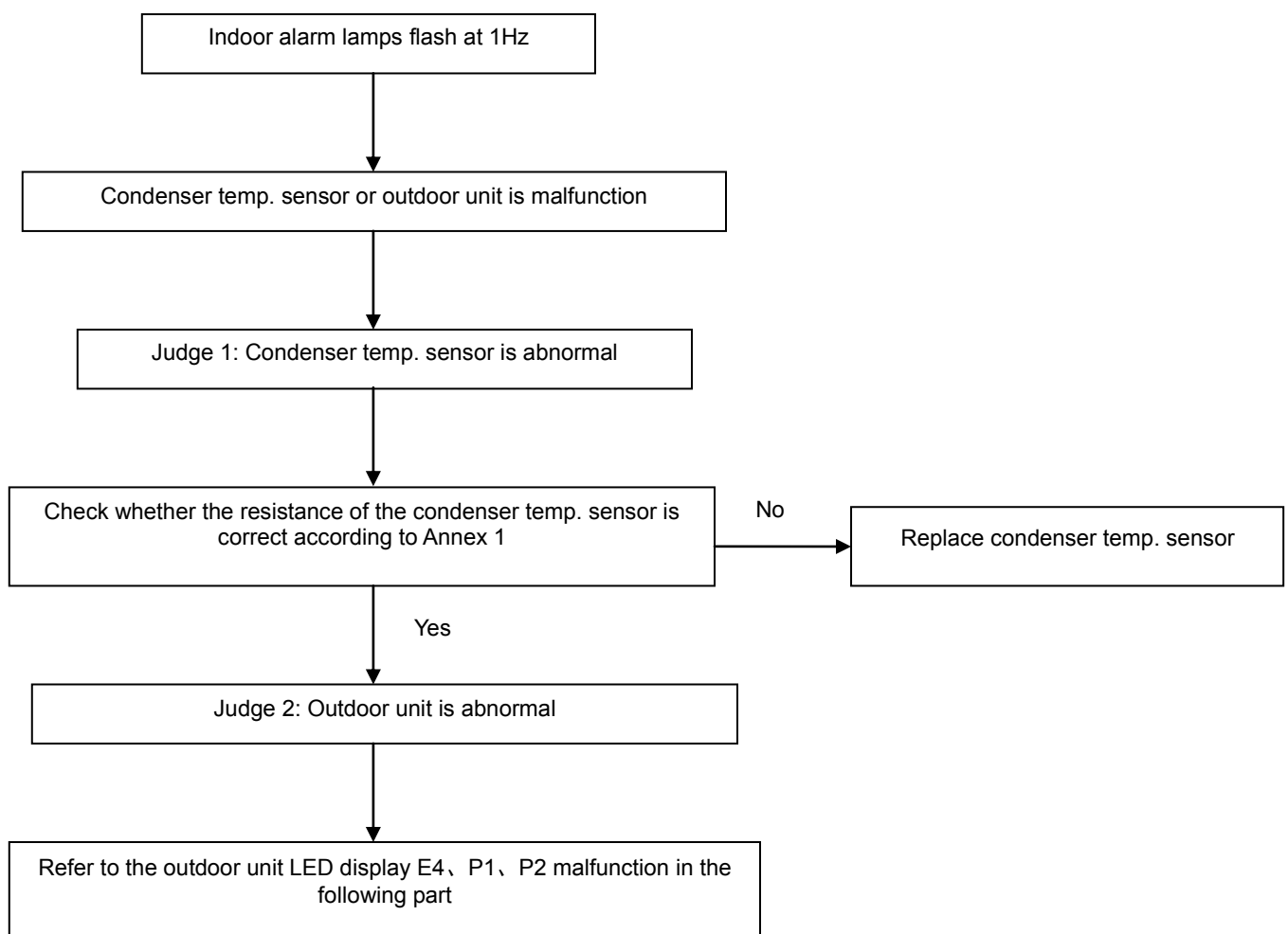
1. Operation lamp flashes



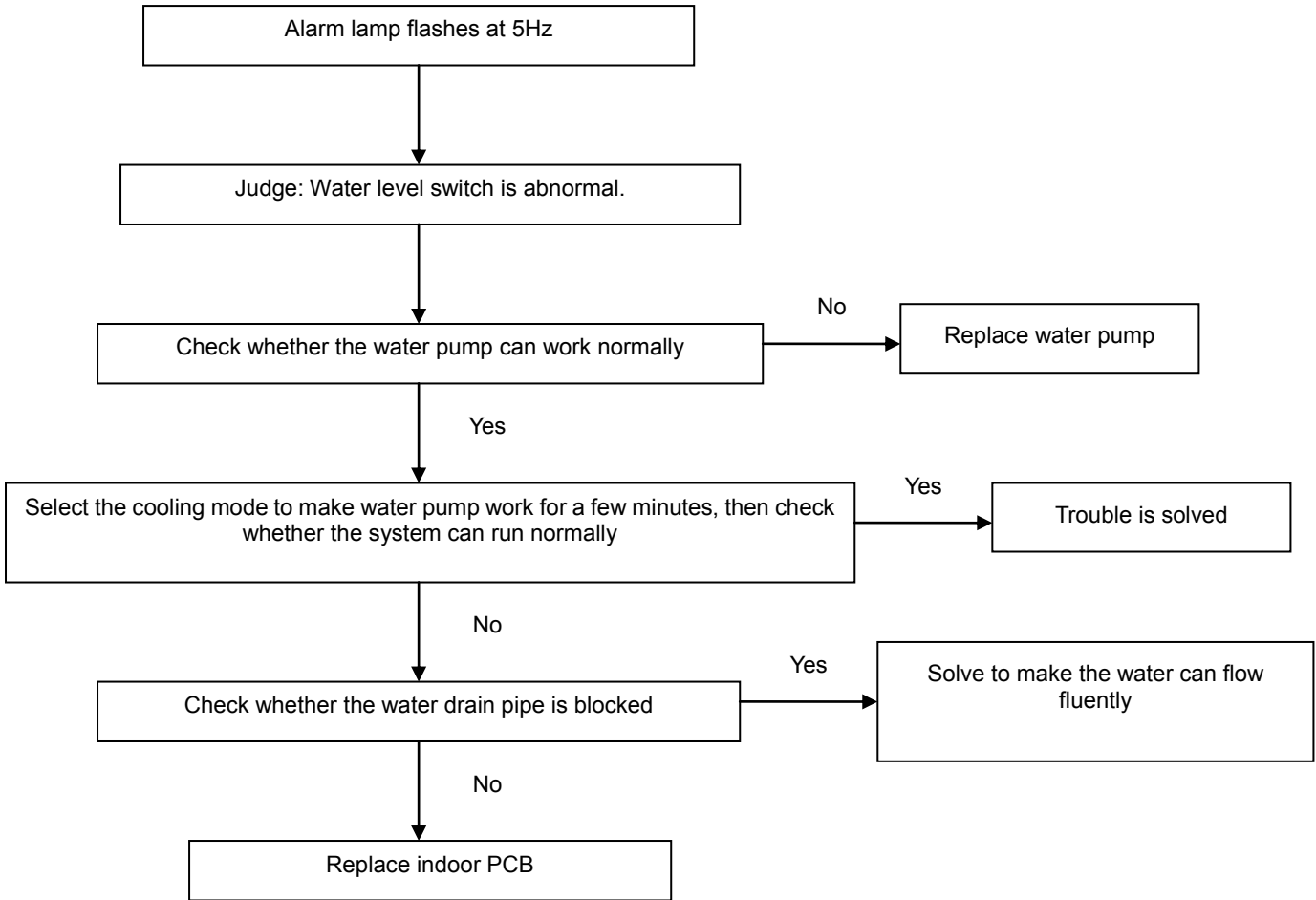
2. Timer lamp flashes



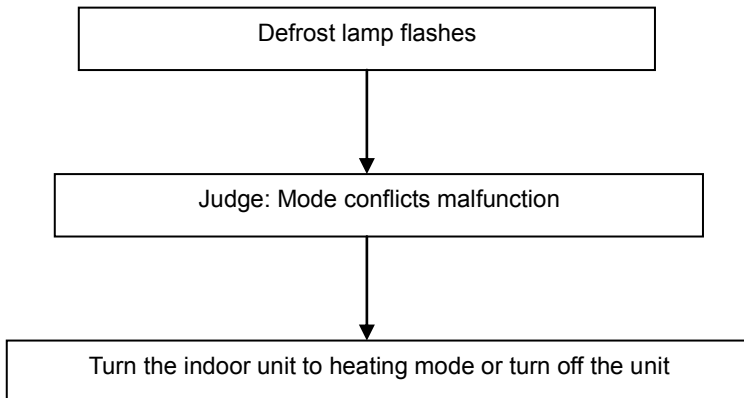
3. Alarm lamp slow-flash



4. Alarm lamp quick-flash



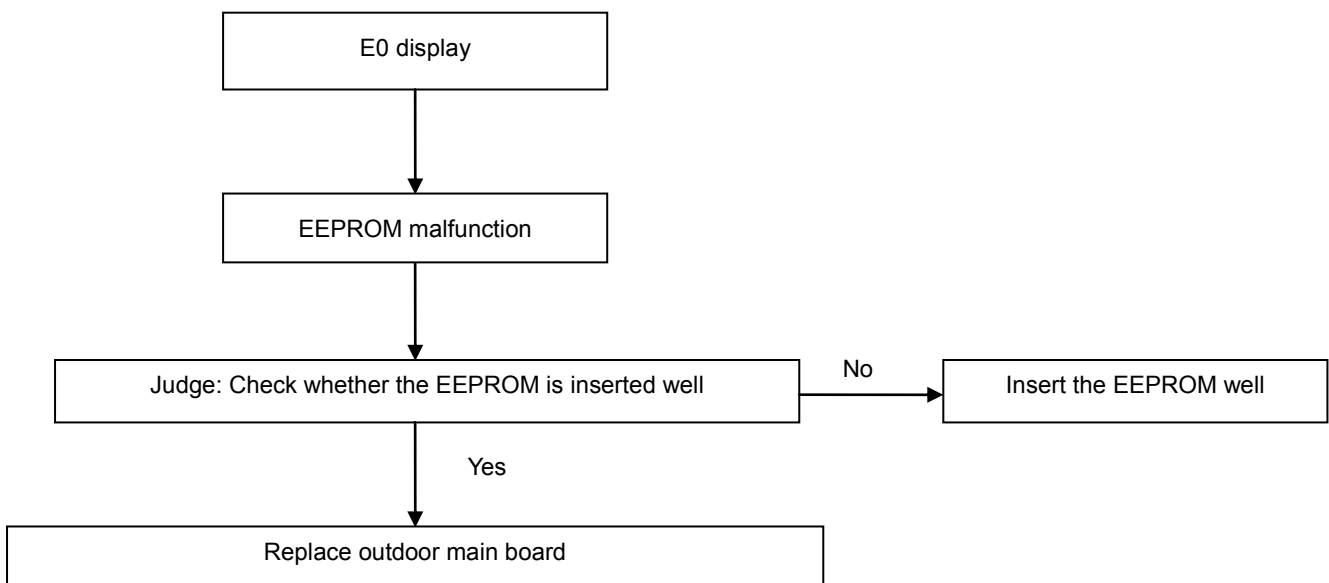
5. Defrost lamp flashes



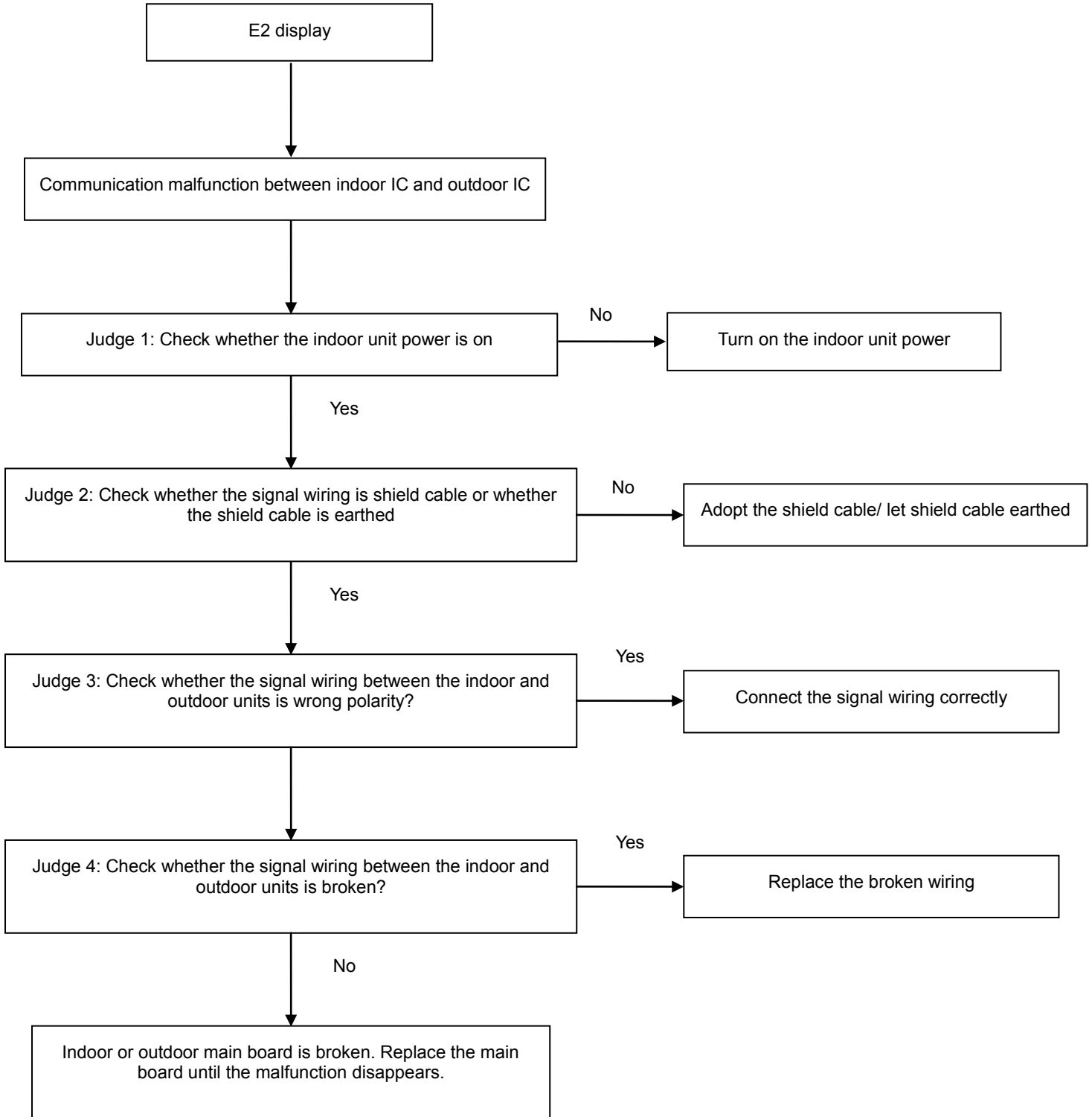
10.2 Outdoor unit malfunction

Display	Malfunction or Protection
E0	EEPROM malfunction
E2	Communication malfunction between indoor IC and outdoor IC
E3	Communication malfunction in outdoor IC and DSP
E4	Open or short circuit of T3 temperature sensor
E5	Voltage protection of compressor
E6	PFC module protection (Only for 30K, 36K with 1 phase)
P0	Top temperature protection of compressor
P1	High pressure protection
P2	Low pressure protection
P3	Current protection of compressor
P4	Discharge temperature protection of compressor
P5	High temperature protection of condenser
P6	Module protection
P7	High temperature protection of evaporator

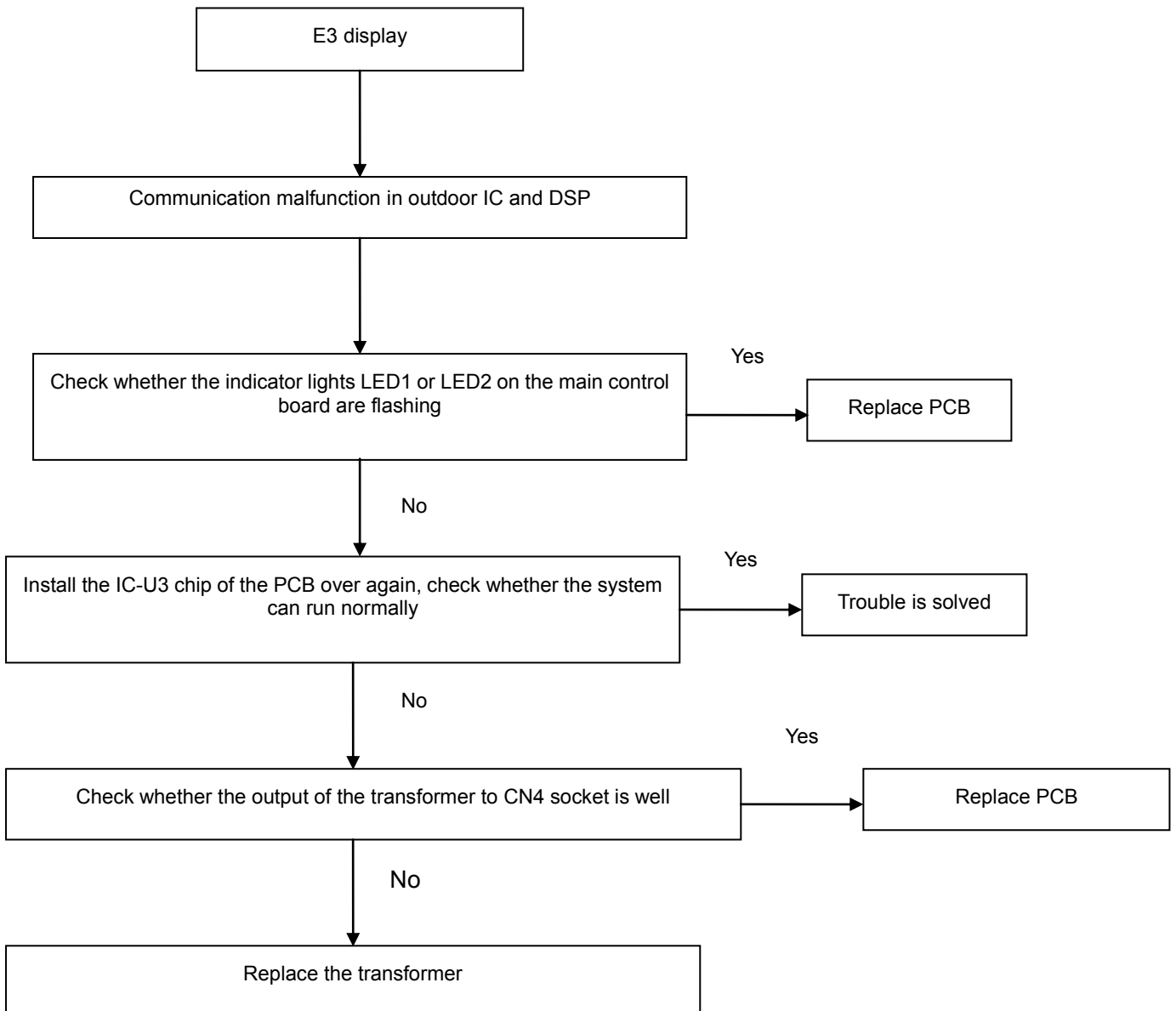
1. E0 malfunction



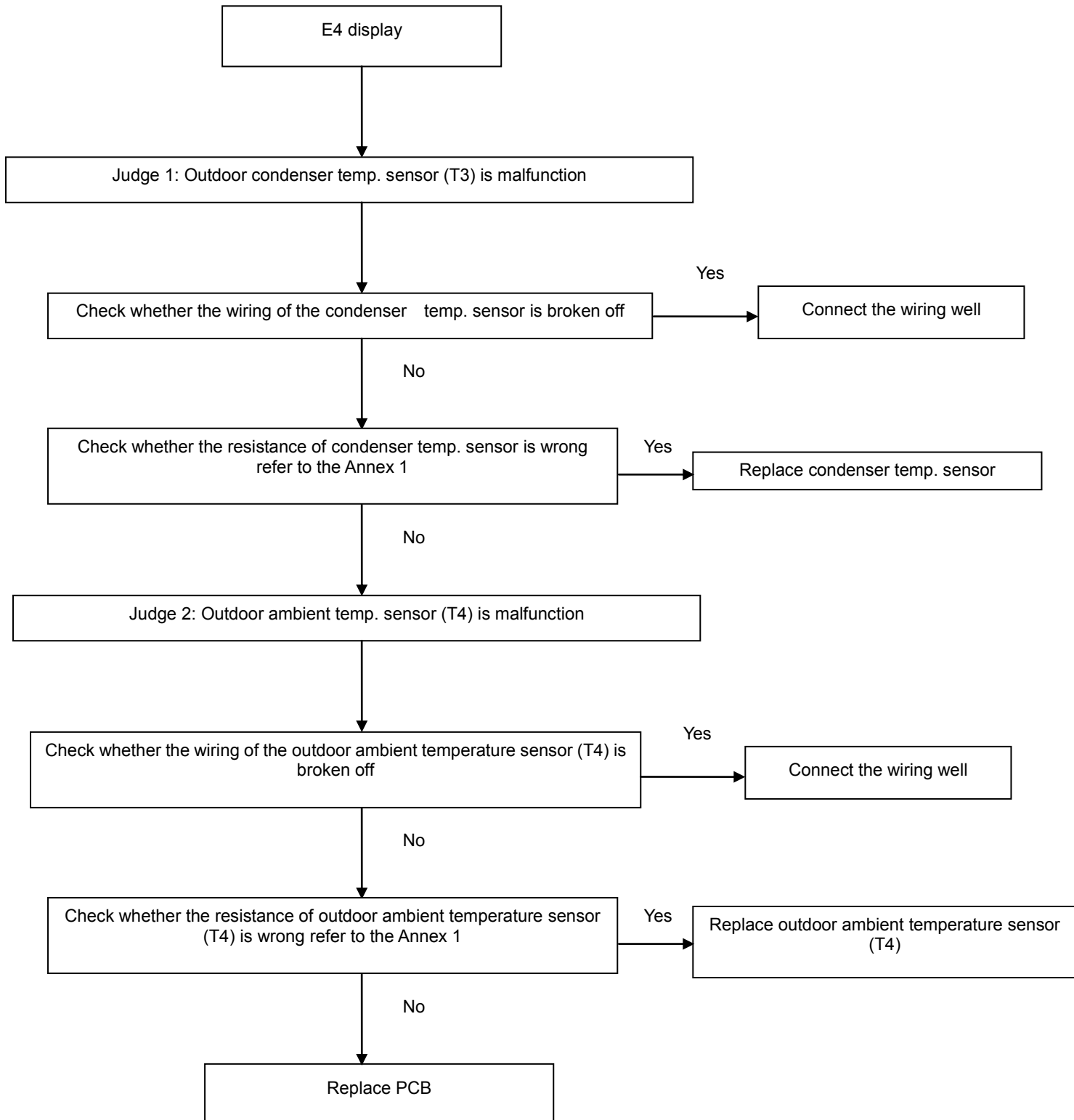
2. E2 malfunction



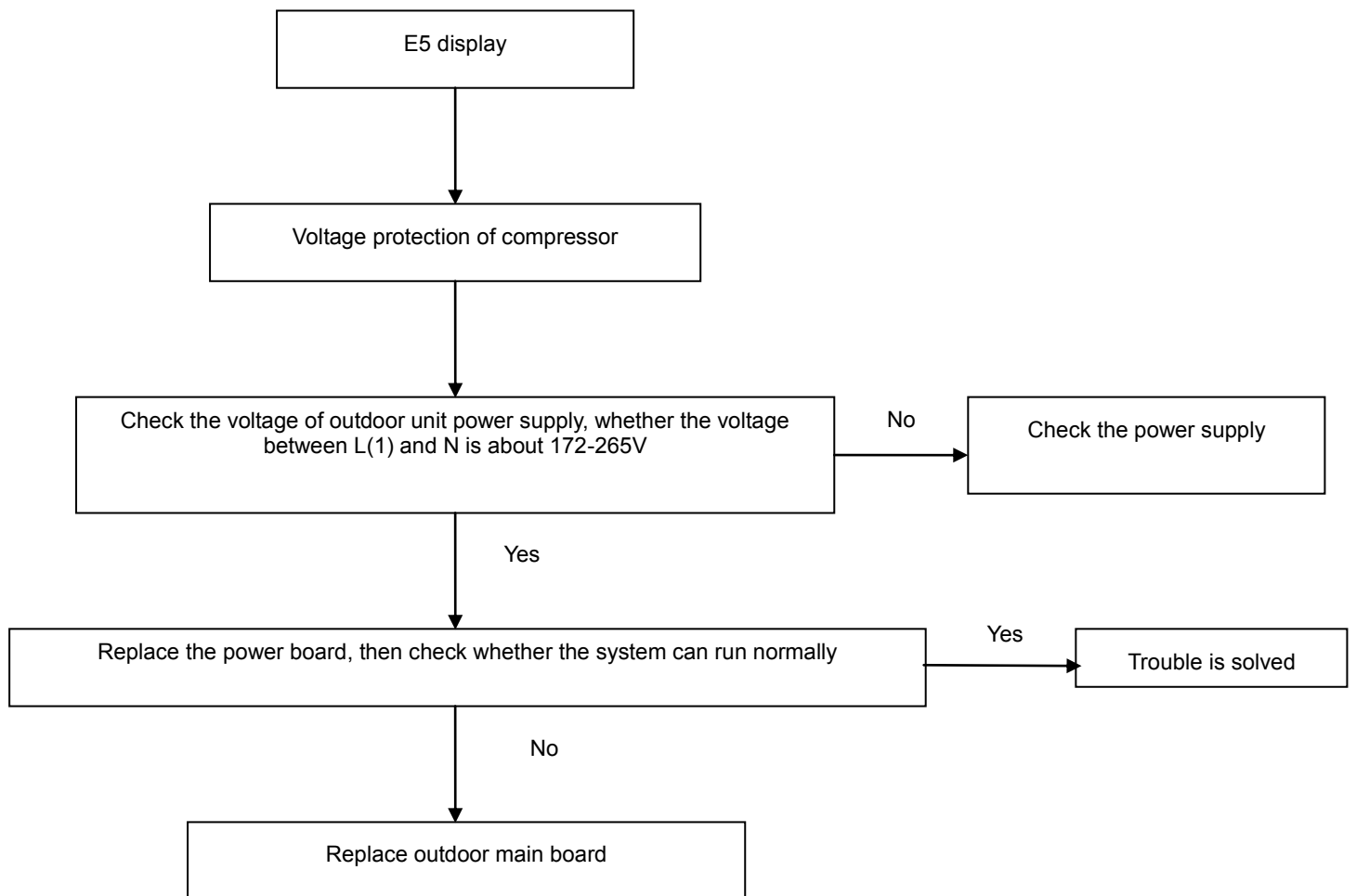
3. E3 malfunction (For 36K & 48K & 60K)



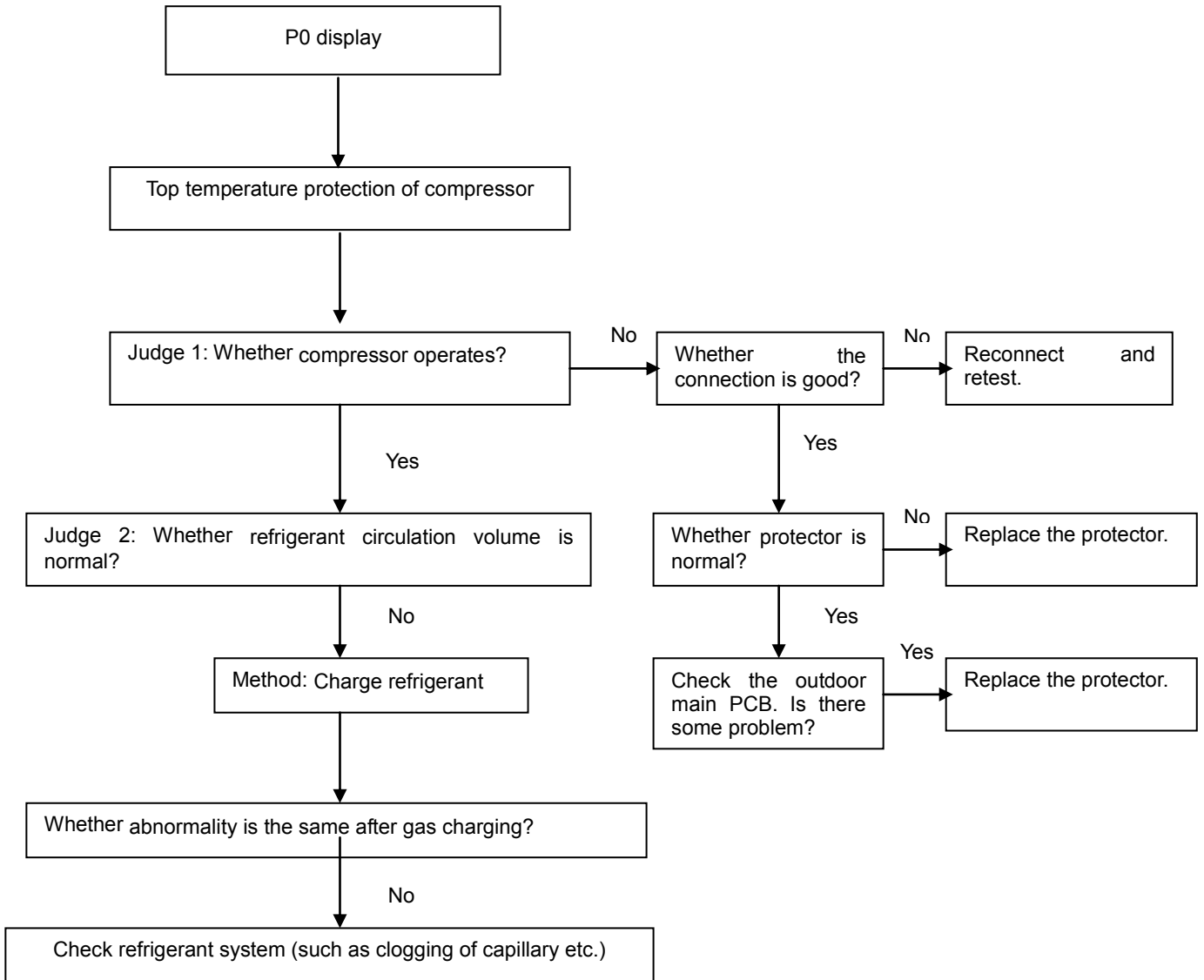
5. E4 malfunction



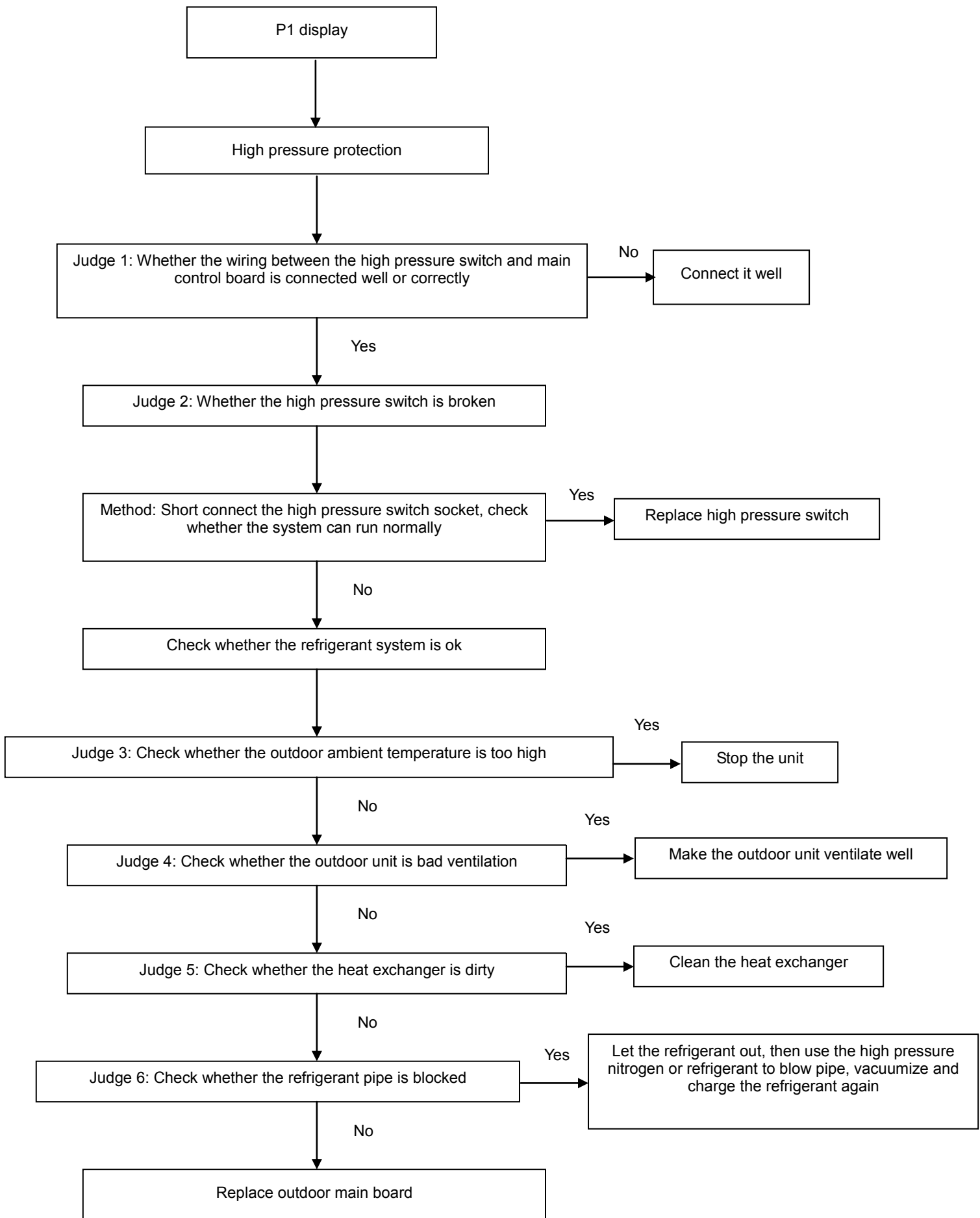
6. E5 malfunction



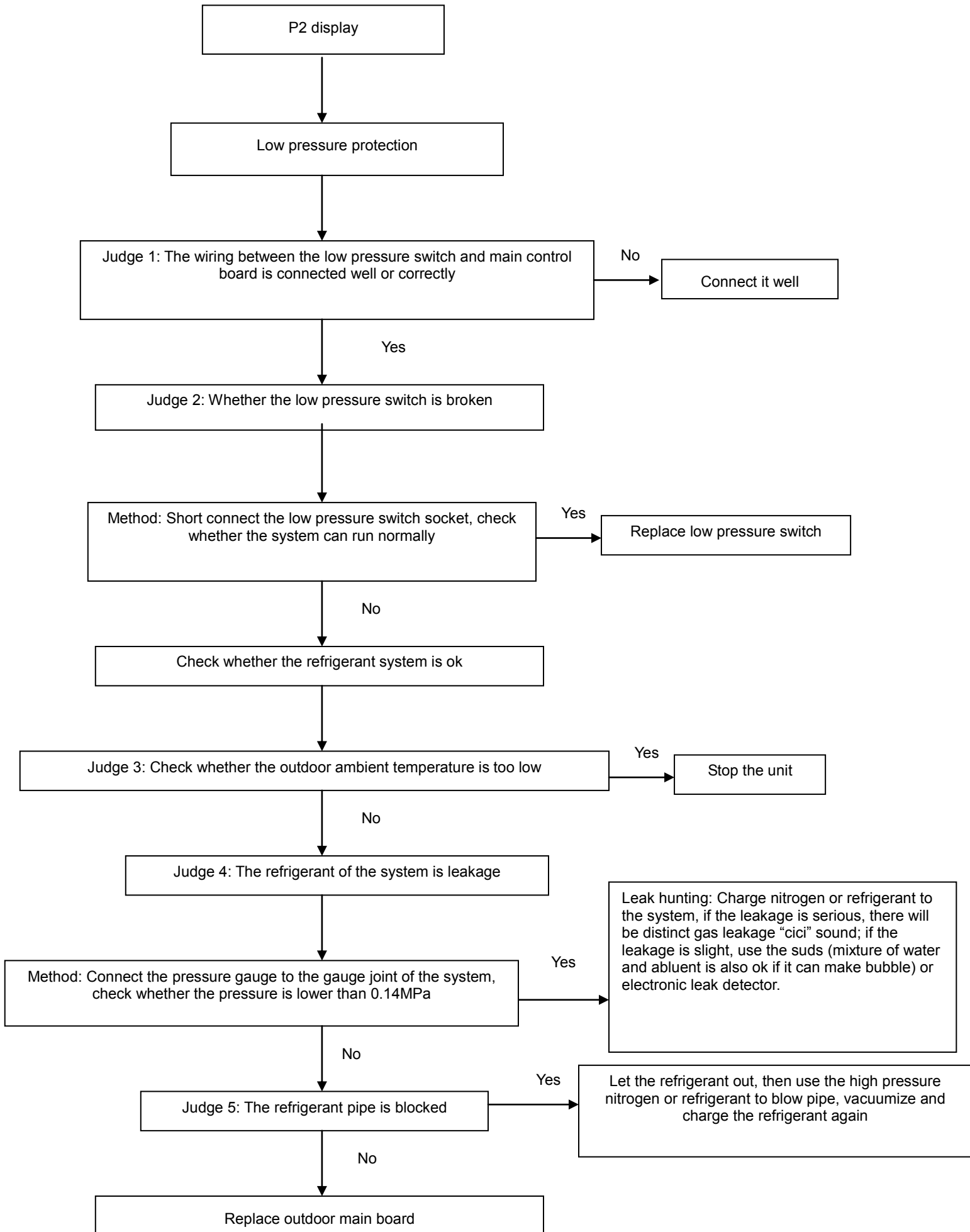
8. P0 malfunction



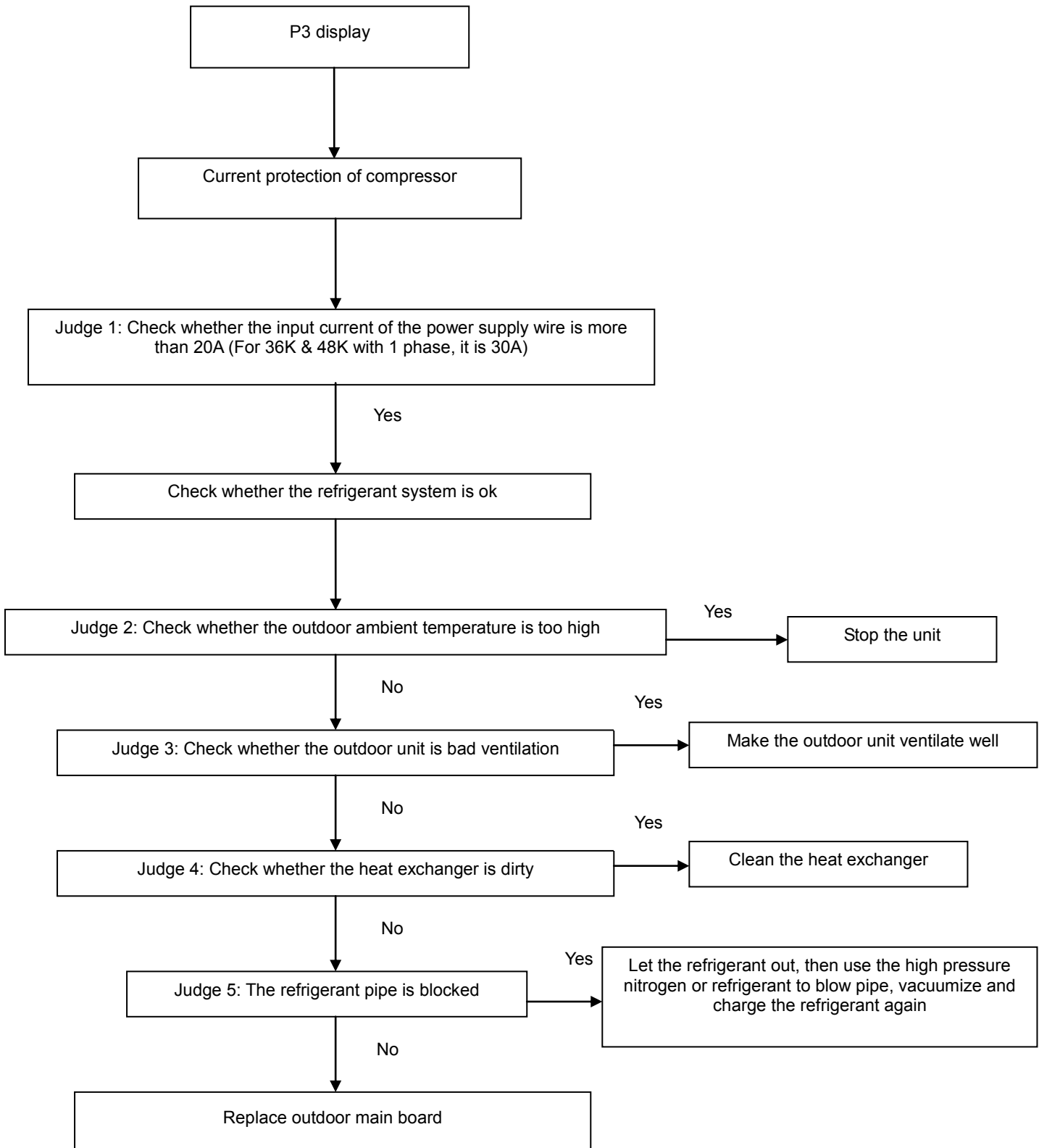
9. P1 malfunction



10. P2 malfunction

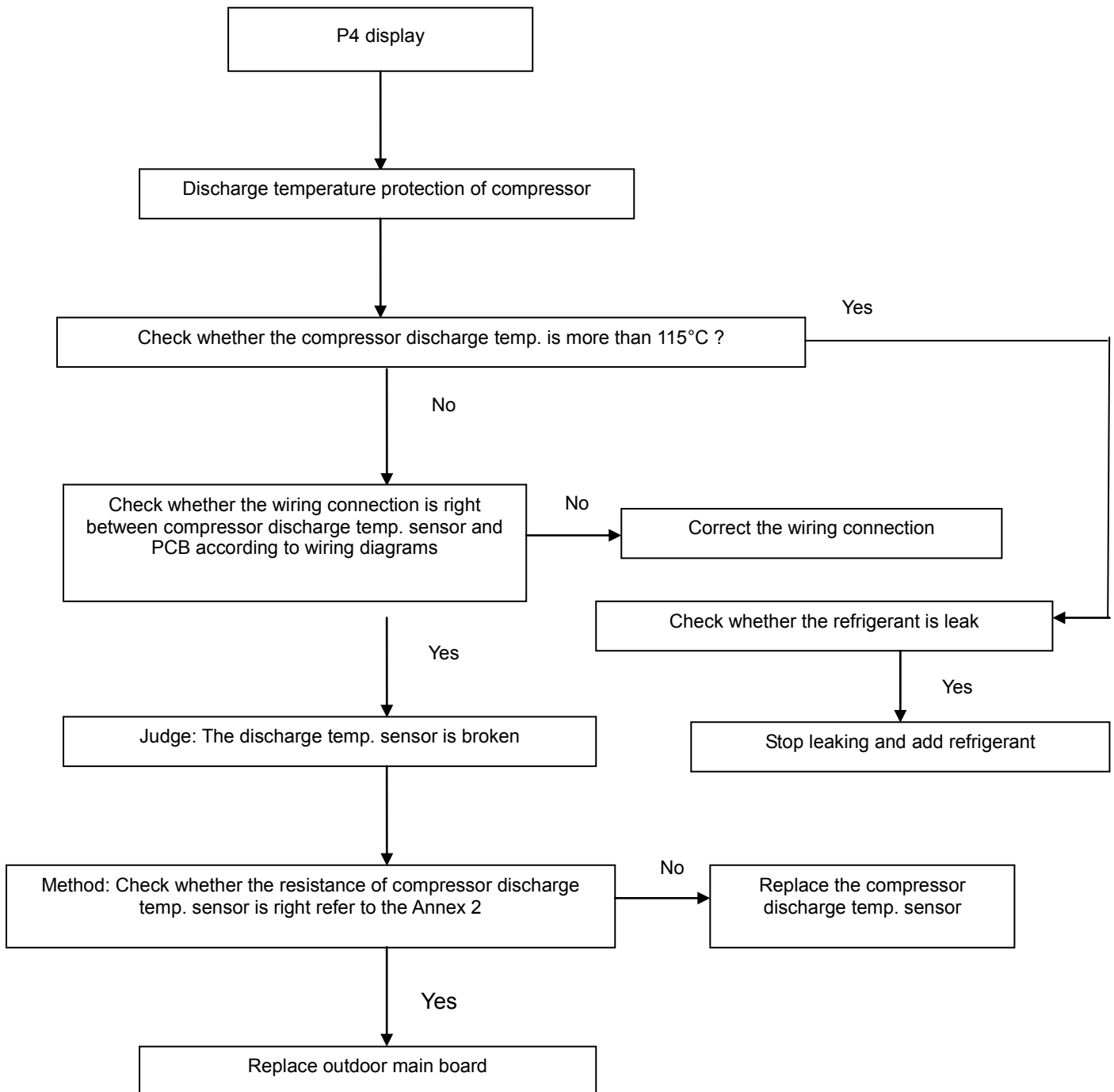


11. P3 malfunction



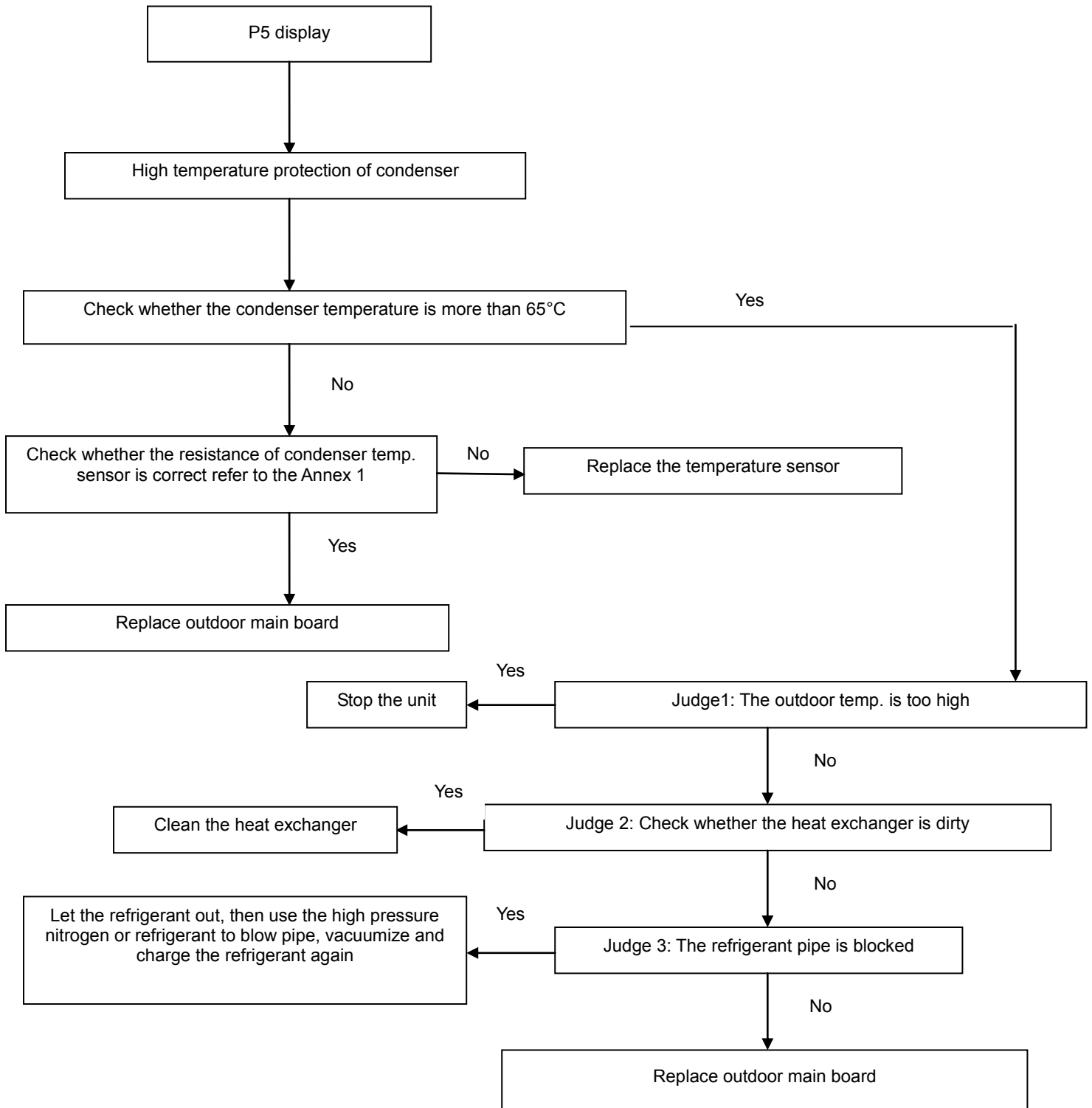
12. P4 malfunction

When compressor discharge temperature is higher than 115°C, the unit will stop, and unit runs again when compressor discharge temperature is lower than 90°C.

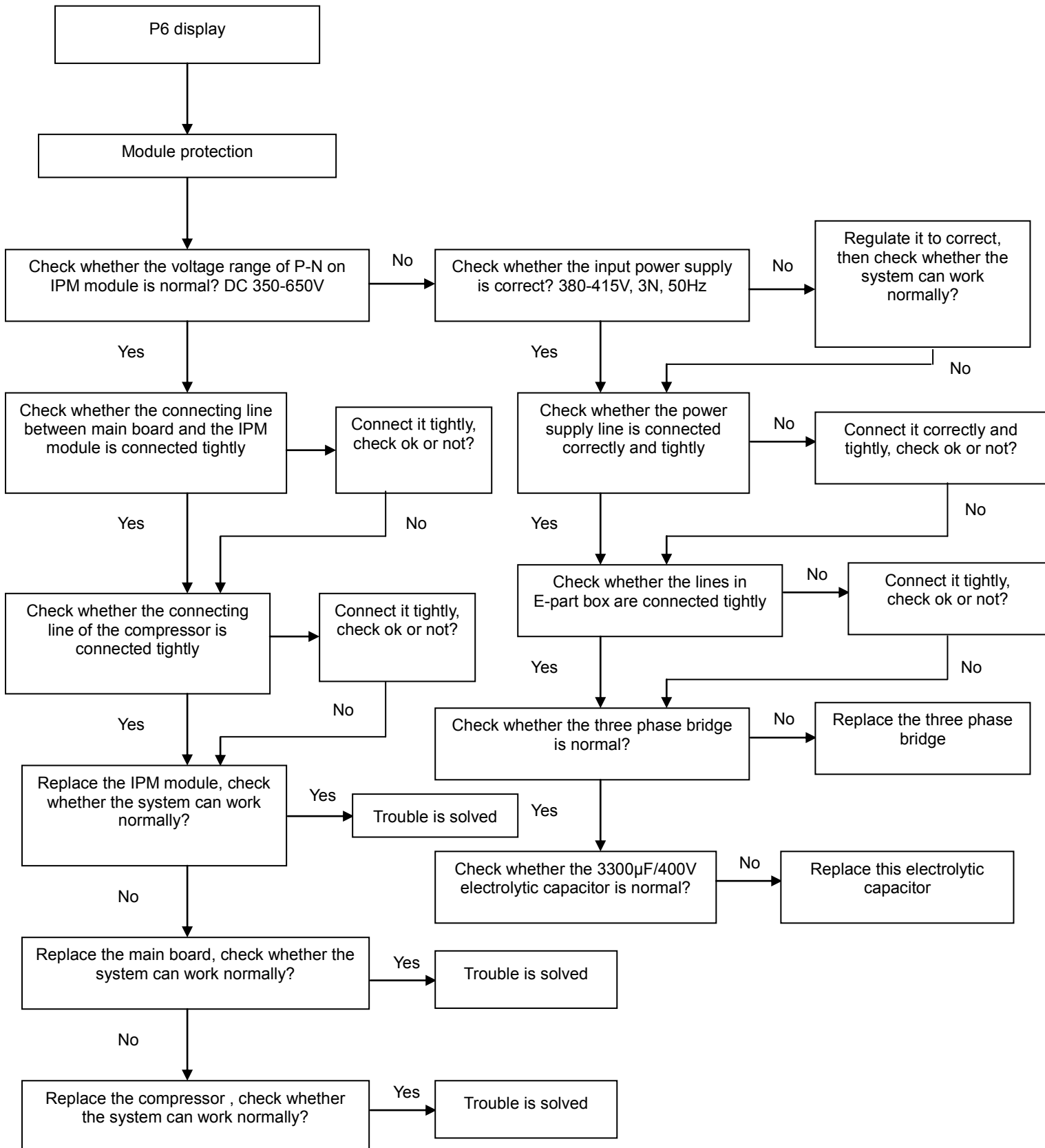


13. P5 malfunction

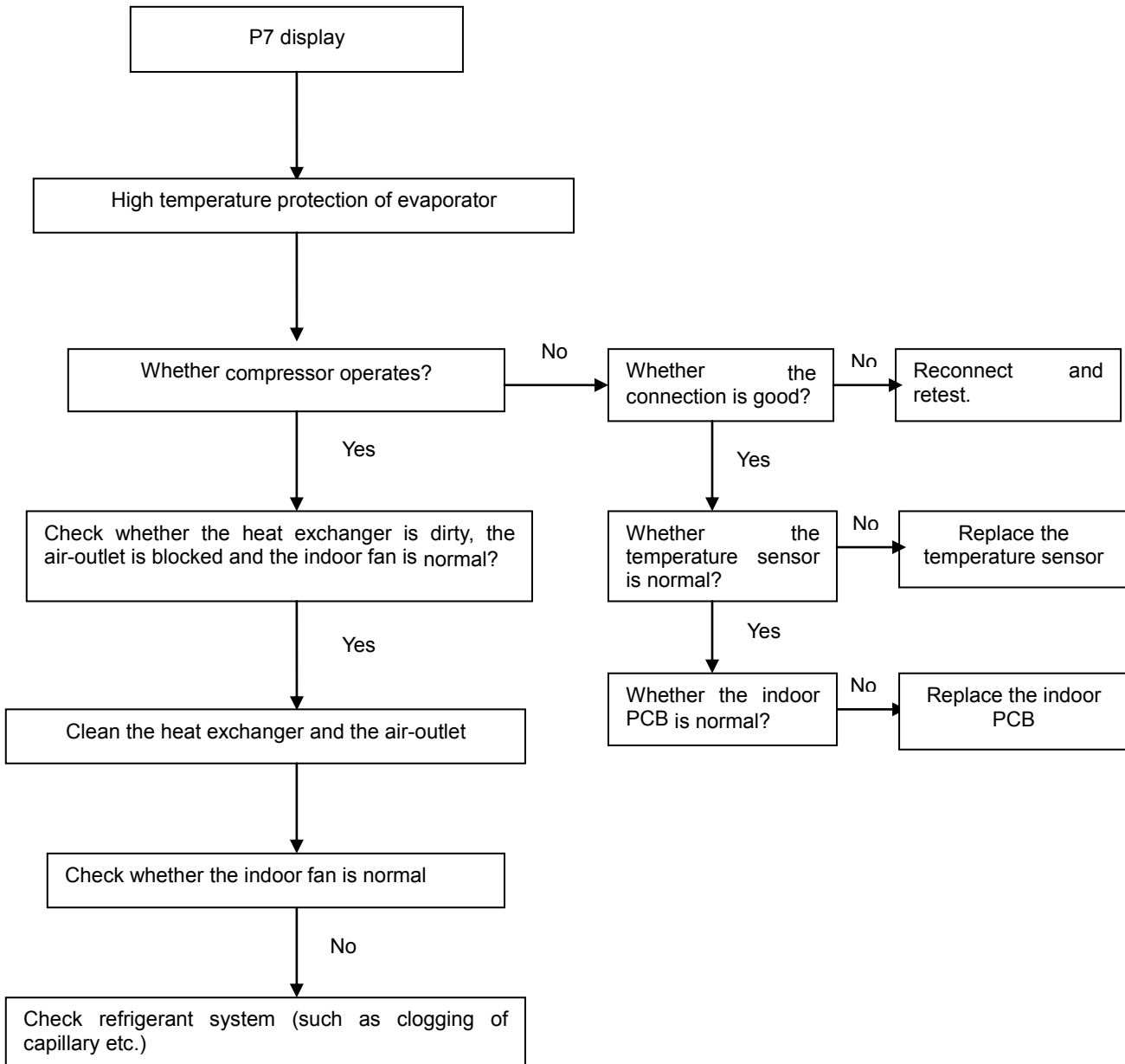
When condenser high temp. is more than 65°C, the unit will stop, and unit runs again when outdoor pipe temp. less than 52°C.



14. P6 malfunction (For three phases units)



16. P7 malfunction



Appendix Indoor Temp. and Pipe Temp. Sensor Resistance Value Table (°C--K)

°C	K Ohm	°C	K Ohm	°C	K Ohm	°C	K Ohm
-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	11.5000	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	84.2190	25	10.0000	65	1.96532	105	0.54448
-14	79.3110	26	9.55074	66	1.89627	106	0.52912
-13	74.5360	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	0.48600
-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	44.0000	36	6.13059	76	1.34105	116	0.40060
-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	1.21330	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	4.57050	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.32390
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	0.87950	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.27770
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	13.9180	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Part 4
Installation

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7.Test Operation.....59

1. Precaution on Installation

1). Measure the necessary length of the connecting pipe, and make it by the following way.

a. Connect the indoor unit at first, then the outdoor unit.

Bend the tubing in proper way. Do not harm them.

Specially Notice the pipe length/height/dimension of each capacity.

Maximum pipe length

Model	Max. Length	Max. Elevation
12,000Btu/h	10m	5m
18,000Btu/h ~24,000Btu/h	25m	12m
30,000Btu/h	25m	15m
36,000Btu/h	30m	20m
48,000Btu/h ~60,000Btu/h	50m	25m

Piping sizes

Model	Liquid(mm)	Gas(mm)
12,000Btu/h~18,000Btu/h	6.4	12.7
24,000Btu/h~60,000Btu/h	9.5	15.9

CAUTIONS

- Daub the surfaces of the flare pipe and the joint nuts with frozen oil, and wrench it for 3~4 rounds
- With hands before fasten the flare nuts.
- Be sure to use two wrenches simultaneously when you connect or disconnect the pipes.

Pipe gauge	Tightening torque	Flare dimension A		Flare shape
		Min (mm)	Max	
Φ6.4	14.2~17.2N.m (144~176 kgf.cm)	8.3	8.7	
Φ9.5	32.7~39.9N.m (333~407kgf.cm)	12.0	12.4	
Φ12.7	49.5~60.3N.m (504~616kgf.cm)	15.4	15.8	
Φ15.9	61.8~75.4N.m (630~770 kgf.cm)	18.6	19.1	
Φ19	97.2~118.6N.m (990~1210kgf.cm)	22.9	23.3	

b. The stop value of the outdoor unit should be closed absolutely (as original state). Every time you connect it, first loosen the nuts at the part of stop value, then connect the flare pipe immediately (in 5 minutes). If the nuts have been loosened for a long time, dusts and other impurities may enter the pipe system and may cause malfunction later. So please expel the air out of the pipe with refrigerant before connection.

c. Expel the air after connecting the refrigerant pipe with the indoor unit and the outdoor unit. Then fasten the nuts at the repair-points.

2) Locate The Pipe

a. Drill a hole in the wall (suitable just for the size of the wall conduit), then set on the fittings such as the wall conduit and its cover.

b. Bind the connecting pipe and the cables together tightly with binding tapes. Do not let air in, which will cause water leakage by condensation.

c. Pass the bound connecting pipe through the wall conduit from outside. Be careful of the pipe allocation to do no damage to the tubing.

3) Connect the pipes.

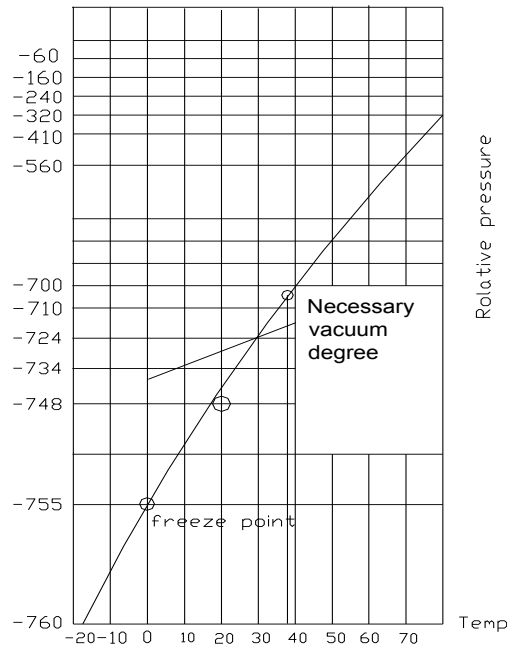
4) Then, open the stem of stop values of the outdoor unit to make the refrigerant pipe connecting the indoor unit with the outdoor unit in fluent flow.

5) Be sure of no leakage by checking it with leak detector or soap water.

6) Cover the joint of the connecting pipe to the indoor unit with the soundproof / insulating sheath (fittings), and bind it well with the tapes to prevent leakage.

2. Vacuum Dry and Leakage Checking

- 1) Vacuum Dry: use vacuum pump to change the moisture (liquid) into steam (gas) in the pipe and discharge it out of the pipe to make the pipe dry. Under one atmospheric pressure, the boiling point of water(steam temperature) is 100°C. Use vacuum pump to make the pressure in the pipe near vacuum state, the boiling point of water falls relatively. When it falls under outdoor temperature, the moisture in the pipe will be vaporized.

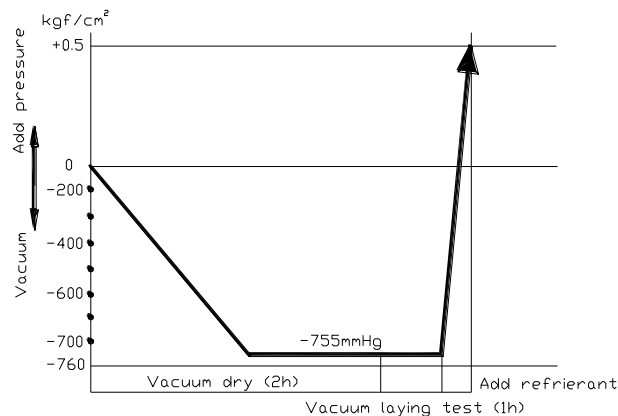


2) Vacuum dry procedure

There are two methods of vacuum dry due to different construction environment: common vacuum dry, special vacuum dry.

① Common vacuum dry procedure

- Vacuum dry (for the first time)---connect the all-purpose detector to the inlet of liquid pipe and gas pipe, and run the vacuum pump more than two hours (the vacuum pump should be below -755mmHg)
- If the pump can't achieve below -755mmHg after pumping 2 hours, moisture or leakage point will still exist in the pipe. At this time, it should be pumped 1 hour more.
- If the pump can't achieve -755mmHg after pumping 3 hours, please check if there are some leakage points.
- Vacuum placement test: place 1 hour when it achieves -755mmHg, pass if the vacuum watch shows no rising. If it rises, it shows there's moisture or leakage point.
- Vacuuming from liquid pipe and gas pipe at the same time.
- Sketch map of common vacuum dry procedure.



② Special vacuum dry procedure

- This vacuum dry method is used in the following conditions:
- There's moisture when flushing the refrigerant pipe.
- Rainwater may enter into the pipe.
- Vacuum dry for the first time 2h pumping

③ Vacuum destroy for the second time Fill nitrogen to 0.5Kgf/cm²

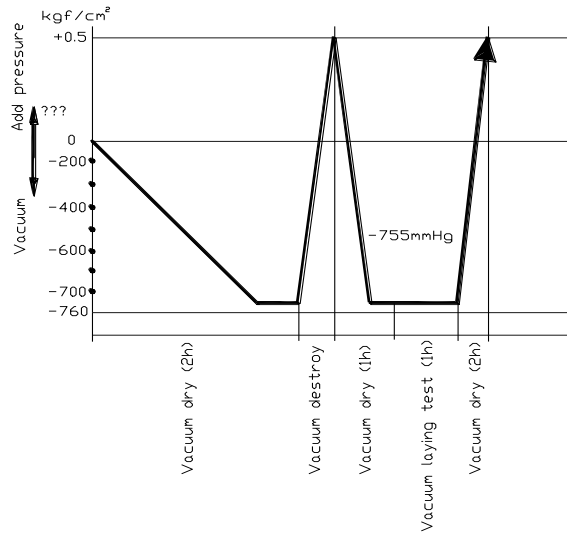
Because nitrogen is for drying gas, it has vacuum drying effect during vacuum destroy. But if the moisture is too much, this method can't dry thoroughly. So, please pay more attention to prevent water entering and forming condensation water.

④ Vacuum dry for the second time 1h pumping

Determinant: Pass if achieving below -755mmHg. If -755mmHg can't be achieved in 2h, repeat procedure ③ and ④

⑤ Vacuum placing test 1h

⑥ Sketch map of special vacuum dry procedure



3. Additional Refrigerant Charge

Caution

- a) Refrigerant cannot be charged until field wiring has been completed.
- b) Refrigerant may only be charged after performing the leak test and the vacuum pumping.
- c) When charging a system, care shall be taken that its maximum permissible charge is never exceeded, in view of the danger of liquid hammer.
- d) Charging with an unsuitable substance may cause explosions and accidents, so always ensure that the appropriate refrigerant is charged.
- e) Refrigerant containers shall be opened slowly.
- f) Always use protective gloves and protect your eyes when charging refrigerant.

The outdoor unit is factory charged with refrigerant. Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor unit/indoor unit.

R(g) \ D(mm)	φ6.4	φ9.5	φ12.7
L(m)			
Less than 5m (One-way)	—	—	—
Added Refrigerant When Over 5m(One-way)	11g/m×(L-5)	30g/m×(L-5)	60g/m×(L-5)

Remark:

R (g): Additional refrigerant to be charged

L (m): The length of the refrigerant pipe (one-way)

D (mm): Liquid side piping diameter

4. Water Drainage

4.1 Gradient and Supporting

- 1). Keep the drainpipe sloping downwards at a gradient of at least 1/50. Keep the drainpipe as short as possible and eliminate the air bubble.
- 2). The horizontal drainpipe should be short. When the pipe is too long, a prop stand must be installed to keep the gradient of 1/50 and prevent bending. Refer to the following table for the specification of the prop stand.

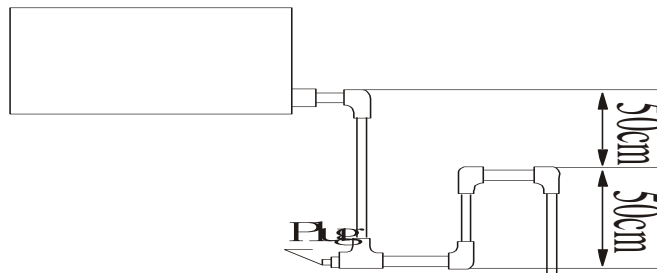
	Diameter	Distance between the prop stands
Hard PVC pipe	25~40mm	1.5~2m

3). Precautions

- ①The diameter of drainpipe should meet the drainage requirement at least.
- ②the drainpipe should be heat-insulated to prevent atomization.
- ③Drainpipe should be installed before installing indoor unit. After powering on, there is some water in water-receiver plate. Please check if the drain pump can operate correctly.
- ④All connection should be firm.
- ⑤Wipe color on PVC pipe to note connection.
- ⑥Climbing, horizontal and bending conditions are prohibited.
- ⑦The dimension of drainpipe can't less than the connecting dimension of indoor drainpipe.
- ⑧Heat-insulation should be done well to prevent condensation.
- ⑨Indoor units with different drainage type can't share one convergent drainpipe.

4.2 Drainpipe Trap

- 1). If the pressure at the connection of the drainpipe is negative, it needs to design drainpipe trap.
- 2). Every indoor unit needs one drainpipe trap.
- 3). A plug should be designed to do cleaning.



5. Insulation Work

5.1 Insulation material and thickness

1). Insulation material

Insulation material should adopt the material which is able to endure the pipe's temperature: no less than 70°C in the high-pressure side, no less than 120°C in the low-pressure side (For the cooling type machine, no requirements at the low-pressure side.)

Example: Heat pump type----Heat-resistant Polyethylene foam (withstand above 120°C)

Cooling only type---- Polyethylene foam (withstand above 100°C)

2). Thickness choice for insulation material

Insulation material thickness is as follows:

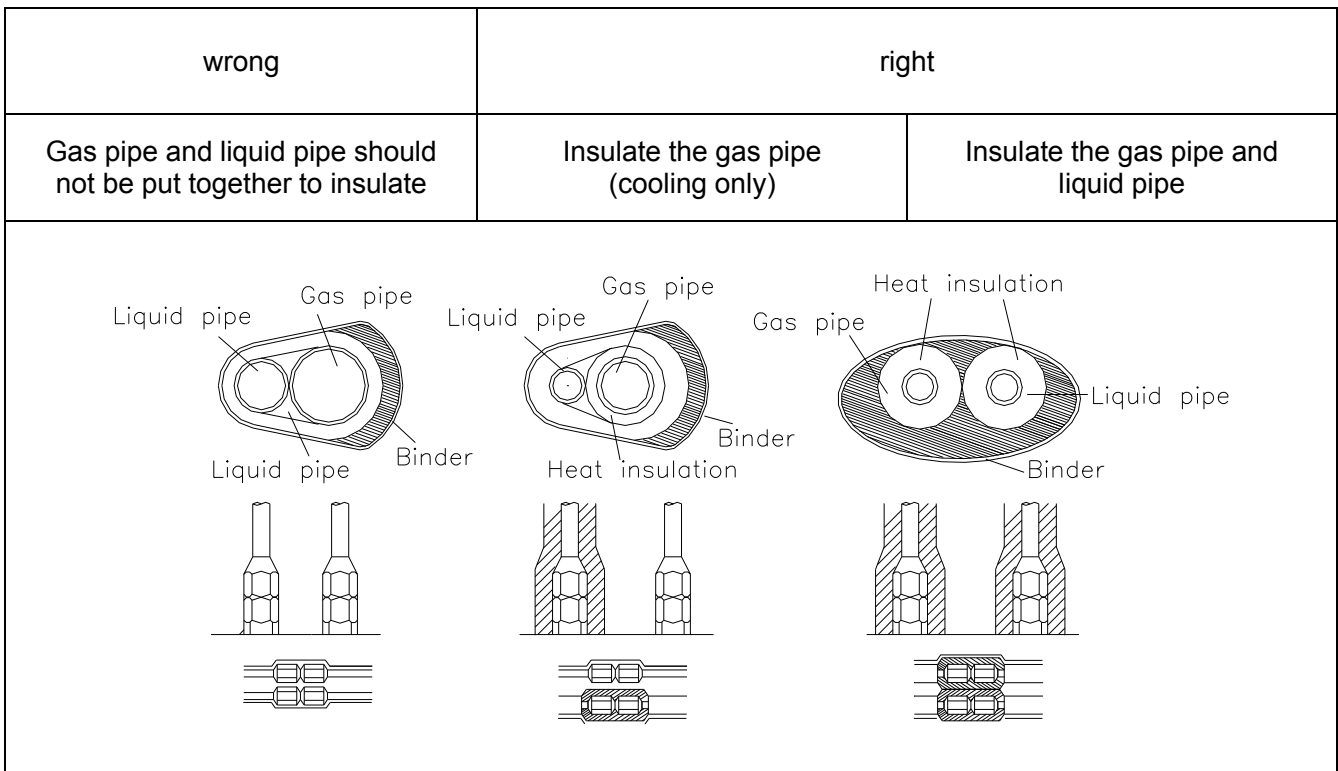
	Pipe diameter (mm)	Adiabatic material thickness
Refrigerant pipe	Φ6.4—Φ25.4	10mm
	Φ28.6—Φ38.1	15mm
Drainage pipe	Inner diameterΦ20—Φ32	6mm

5.2 Refrigerant pipe insulation

1). Work Procedure

- ① Before laying the pipes, the non-jointing parts and non-connection parts should be heat insulated.
- ② When the gas proof test is eligible, the jointing area, expanding area and the flange area should be heat insulated

2). Insulation for non-jointing parts and non-connection parts

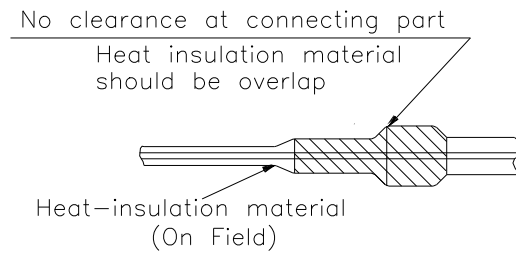


For construction convenience, before laying pipes, use insulation material to insulate the pipes to be deal with, at the same time, at two ends of the pipe, remain some length not to be insulated, in order to be welded and check the leakage after laying the pipes.

3). Insulate for the jointing area, expanding area and the flange area

① Insulate for the jointing area, expanding area and the flange area should be done after checking leakage of the pipes

② Make sure there's no clearance in the joining part of the accessorial insulation material and local preparative insulation material.



5.3 Drainage pipe insulation

1) The connection part should be insulated, or else water will be condensing at the non-insulation part.

5.4 Note

1) The jointing area, expanding area and the flange area should be heat insulated after passing the pressure test

2) The gas and liquid pipe should be heat insulated individually, the connecting part should be heat insulated individually.

3) Use the attached heat-insulation material to insulate the pipe connections (pipes' tie-in ,expand nut) of the indoor unit.

6. Wiring

Please refer to the Wiring Diagram.

7. Test Operation

(1) The test operation must be carried out after the entire installation has been completed.

(2) Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Tubing and wiring are correctly completed.
- The refrigerant pipe system is leakage-checked.
- The drainage is unimpeded.
- The ground wiring is connected correctly.
- The length of the tubing and the added stow capacity of the refrigerant have been recorded.
- The power voltage fits the rated voltage of the air conditioner.
- There is no obstacle at the outlet and inlet of the outdoor and indoor units.
- The gas-side and liquid-side stop valves are both opened.
- The air conditioner is pre-heated by turning on the power.

(3) According to the user's requirement, install the remote controller when the remote controller's signal can reach the indoor unit smoothly.

(4) Test operation

Set the air conditioner under the mode of "COOLING" with the remote controller, and check the following points.

Indoor unit

- Whether the switch on the remote controller works well.
- Whether the buttons on the remote controller works well.
- Whether the air flow louver moves normally.
- Whether the room temperature is adjusted well.
- Whether the indicator lights normally.
- Whether the temporary buttons works well.
- Whether the drainage is normal.
- Whether there is vibration or abnormal noise during operation.

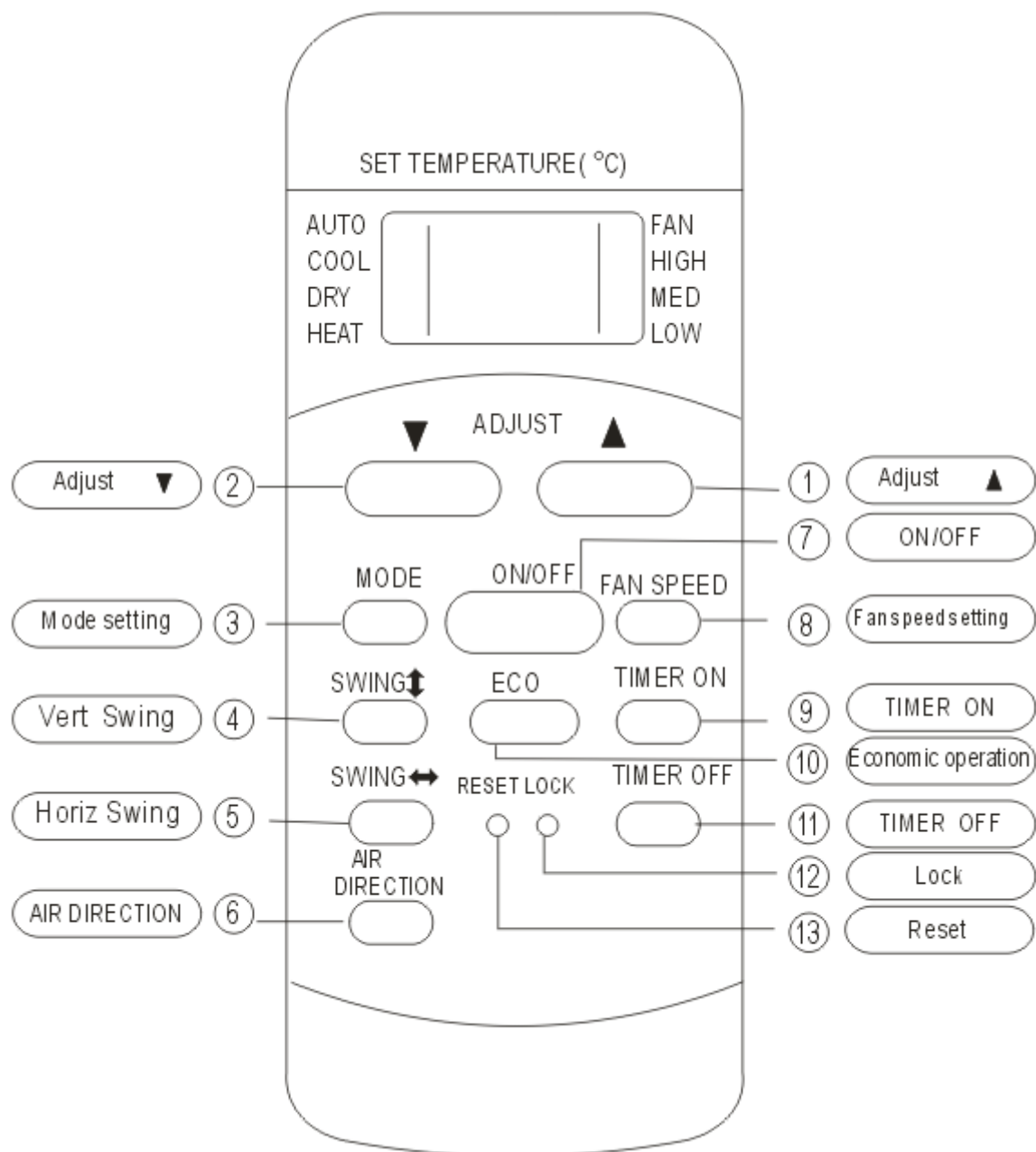
Outdoor unit

- Whether there is vibration or abnormal noise during operation.
- Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- Whether any of the refrigerant is leaked.

1. Controller61

1. Controller

1.1 RG51Q1/BG(C)E



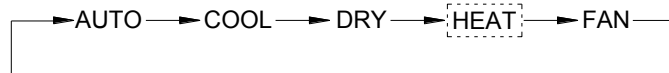
General Function for wireless remote controller:

Model and Specification

Model	RG51Q1/BG(C)E
Rated voltage	3.0V(Dry batteries R03/LR03×2)
Min voltage for sending signal of CPU	2.0V
Effective receiving distance	8m(when using 3.0 voltage, it Gets 11m)
Operation condition	-5~60℃

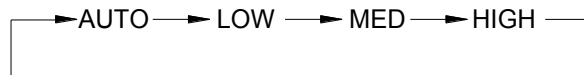
Buttons and functions

- 1. **Adjust ▼** : Decrease the set temp. Keeping pressing will decrease the temp with 1°C per 0.5s.
- 2. **Adjust ▲** : Increase the set temp. Keeping pressing will increase the temp with 1°C per 0.5s.
- 3. **MODE**: Once pressing, running mode will be selected in the following sequence:



NOTE: No heating mode for cool only type unit.

- 4. **VERT SWING**: Used to stop or start horizontal louver movement or set the desired up/down air flow direction. The louver changes 6 degree in angle for each press. If keep pushing more than 2 seconds, the louver will swing up and down automatically.
- 5. **HORIZ SWING**: Used to stop or start vertical louver movement.
- 6. **AIR DIRECTION**: Used to set the desired up/down air flow direction. The louver changes 6 degree in angle for each press.
- 7. **ON/OFF**: For turning on or turning off the air conditioner.
- 8. **FAN SPEED**: Fan speed will be selected in following sequence once pressing this button:



- 9. **TIME ON**: For time ON setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjusting the figure to 0.00 will cancel time ON setting.
- 10. **ECO**: Activate or turn off economic operation mode. It is suggested to turn on this function when sleeping. (Only available when remote controller is used with corresponding unit.)
- 11. **TIME OFF**: For time OFF setting. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour.

Adjust the figure to 0.00 will cancel time ON setting.

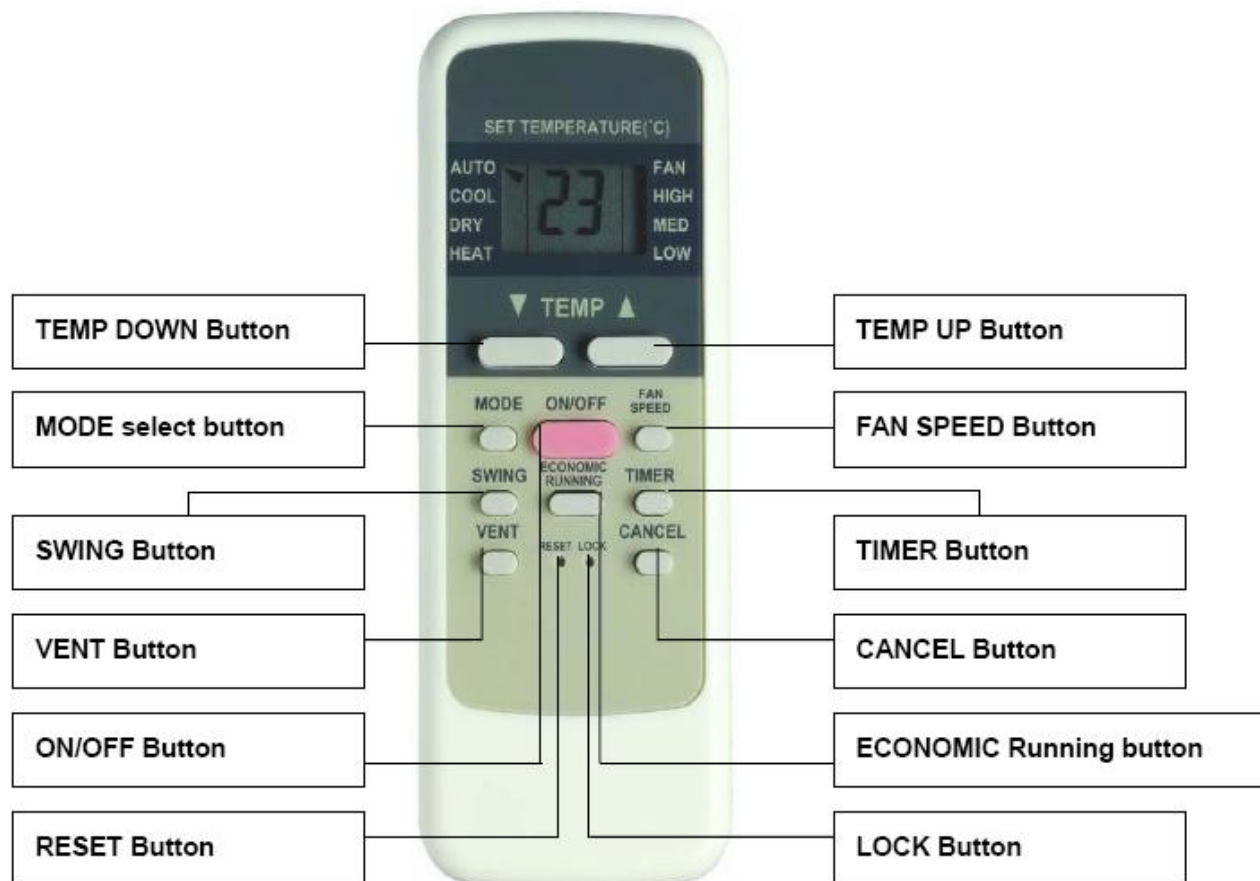
- 12. **LOCK** (inner located): Press this button with a needle of 1mm to lock or unlock the current setting.
- 13. **RESET** (inner located): Press this button with a needle of 1mm to cancel the current setting and reset remote controller.

1.2 R51/E

Remote Controller Specifications

Model	R51/E
Rated Voltage	3.0V
Lowest Voltage of CPU Emitting Signal	2.0V
Reaching Distance	8m (when using 3.0 voltage, it can get 11m)
Environment Temperature Range	-5°C~60°C

Introduction of Function Buttons on the Remote Controller



1. TEMP DOWN Button: Push the TEMP DOWN button to decrease the indoor temperature setting or to adjust the timer in a counter-clockwise direction.

2. MODLE SELECT Button: Each time you push the button, a mode is selected in a sequence that goes from AUTO, COOL, DRY, HEAT and FAN as the following figure indicates:



▲ NOTE: HEAT only for Heat Pump

3. SWING Button: Push this switch button to change the louver angle.

4. RESET Button: When the RESET button is pushed, all of the current settings are cancelled and the control will return to the initial settings.

5. ECONOMIC RUNNING Button: Push this button to go into the Energy-Saving operation mode.

6. LOCK Button: Push this button to lock in all the current settings. To release settings, push again.

7. CANCEL Button: Push this button to cancel the TIMER settings.

8. TIMER Button: This button is used to preset the time ON (start to operate) and the time OFF (turn off the operation)

9. ON/OFF Button: Push this button to start the unit operation. Push the button again to stop the unit operation.

10. FAN SPEED Button: This button is used for setting fan speed in the sequence that goes from AUTO, LOW, MED to HIGH, and then back to Auto.

11. TEMP UP Button: Push this button to increase the indoor temperature setting or to adjust the timer in a counter-clockwise direction.

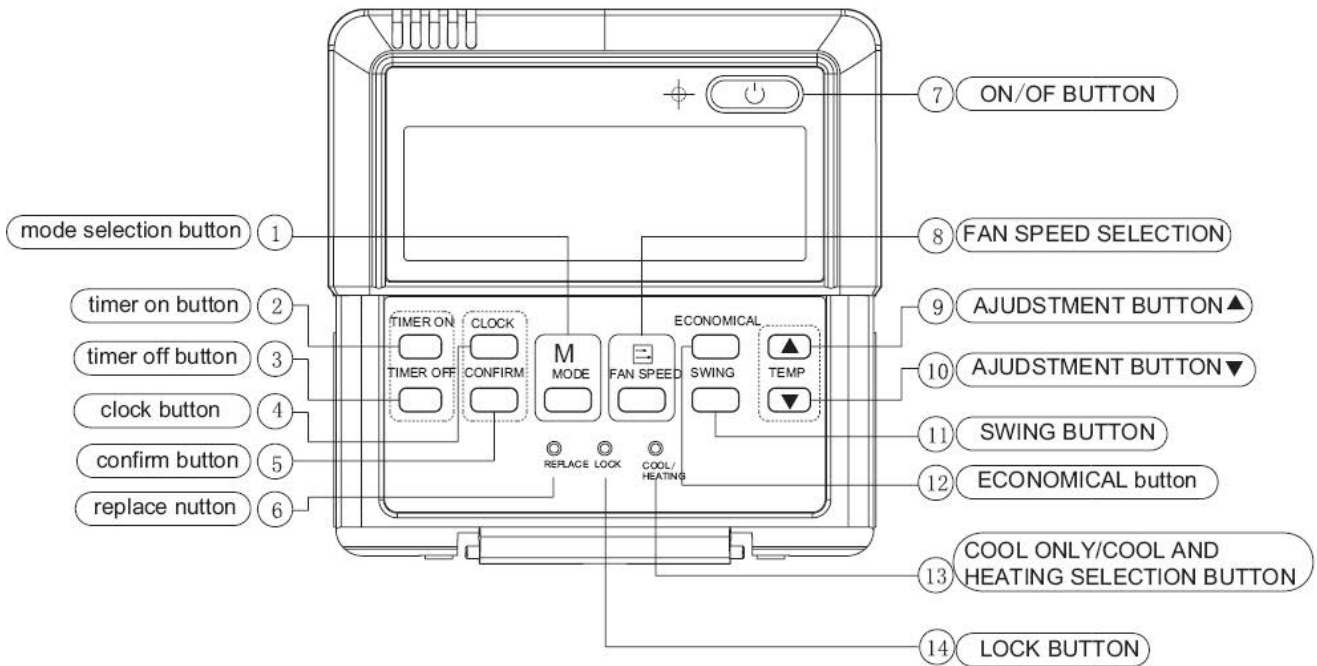
12. VENT Button: Push this button to set the ventilating mode. The ventilating mode will operate in the following sequence:



Ventilation Function is available for the Fresh Star Series.

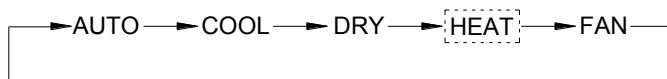
1.3 KJR-10B (OPTIONAL)

Name and functions of buttons on the wire controller



1 mode selection button:

It is used to select mode, push the button one time, then the operation modes will change In turn as follows:



Remark: no heating mode if wire controller is set as the cool only.

2 Timer on button:

Push the button to set TIMER ON, each time you push the button the time moves forward by 0.5 hours. When the set time is over 10 hours, each time you push the button the time moves forward by 1 hour. If want to cancel the TIMER ON, then adjust the time of TIMER ON as 0.0

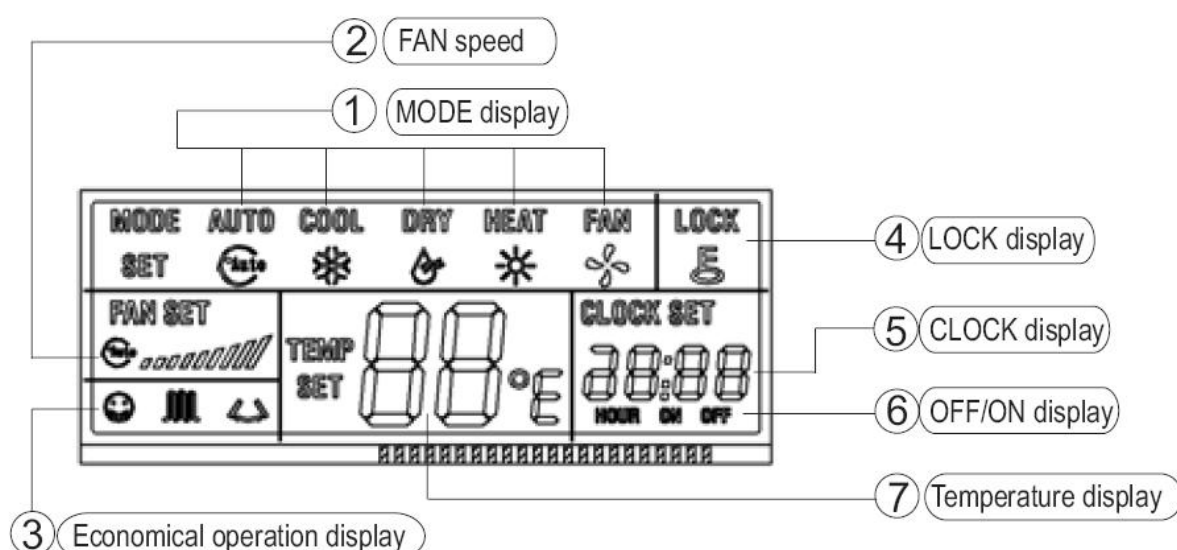
3 Timer off button:

Push the button to set TIMER OFF, each time you push the button the time moves forward by 0.5 hours. When the set time is over 10 hours, each time you push the button the time moves forward by 1 hour. If want to cancel the TIMER OFF, then adjust the time of TIMER OFF as 0.0

4 CLOCK button:

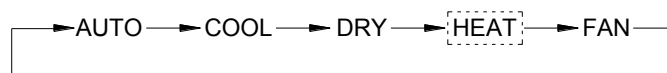
Normally display the clock set currently (display 12:00 for the first electrifying or resetting). When push the button for 4 seconds, the hour part on the clock display flashes every 0.5 seconds, then push button and to adjust hour; push the button CLOCK again, the minute part flashes every 0.5 seconds, then push and button to adjust minute. When set clock or alter clock setting, must push the confirm button to complete the setting

Name and function of LCD on the wire controller



1 Mode select button (MODE):

Press MODE button to select "COOL", "DRY", "HEAT", or "FAN ONLY" mode. (HEAT is invalid for COOL ONLY wire controller.)



2 Fan speed button (FAN SPEED)

Press FAN SPEED to select fan speed from "AUTO", "LOW", "MED", and "HIGH". NOTE: some air conditioners have no MED fan speed, and then the MED is regarded as HIGH.

3 Economical operation displays:

Press ECONOMICAL to display economical operation, if press ECONOMICAL again then the display disappears

4 Lock display

Press LOCK to display the icon of LOCK. Press the button again then the icon of LOCK disappears. In the mode of LOCK, all the buttons are invalid except for LOCK button.

5 CLOCK display.

Usually display the clock set currently. Press the button CLOCK for 4 seconds, the HOUR part will flash, press button ▲ and ▼ to adjust HOUR. Press the button CLOCK again, the minute part flash, press button ▲ or ▼ to adjust MINUTE. After clock set or clock operation, it must press CONFIRM to complete the set.

6 TIMER ON/OFF display:

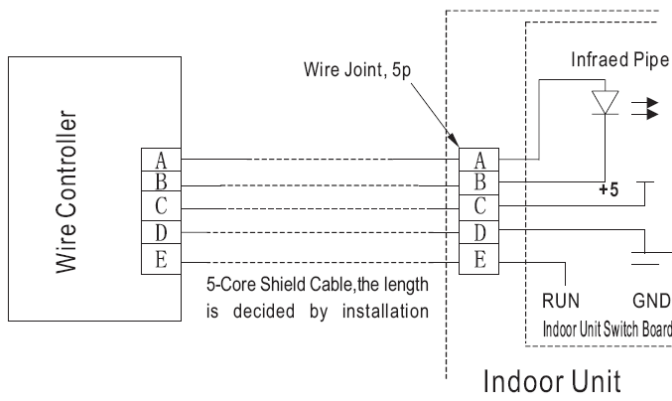
Display ON at the state of TIMER ON adjustment or after only set the TIMER ON; Display OFF at the state of TIMER OFF adjustment or after only set the TIMER OFF; Display ON/OFF if simultaneously set the mode of TIMER ON and TIMER OFF.

7 Temperature display area:

Usually display the set temperature. Press the buttons of and to set temperature, at the mode of FAN, there is no figure display in the area.

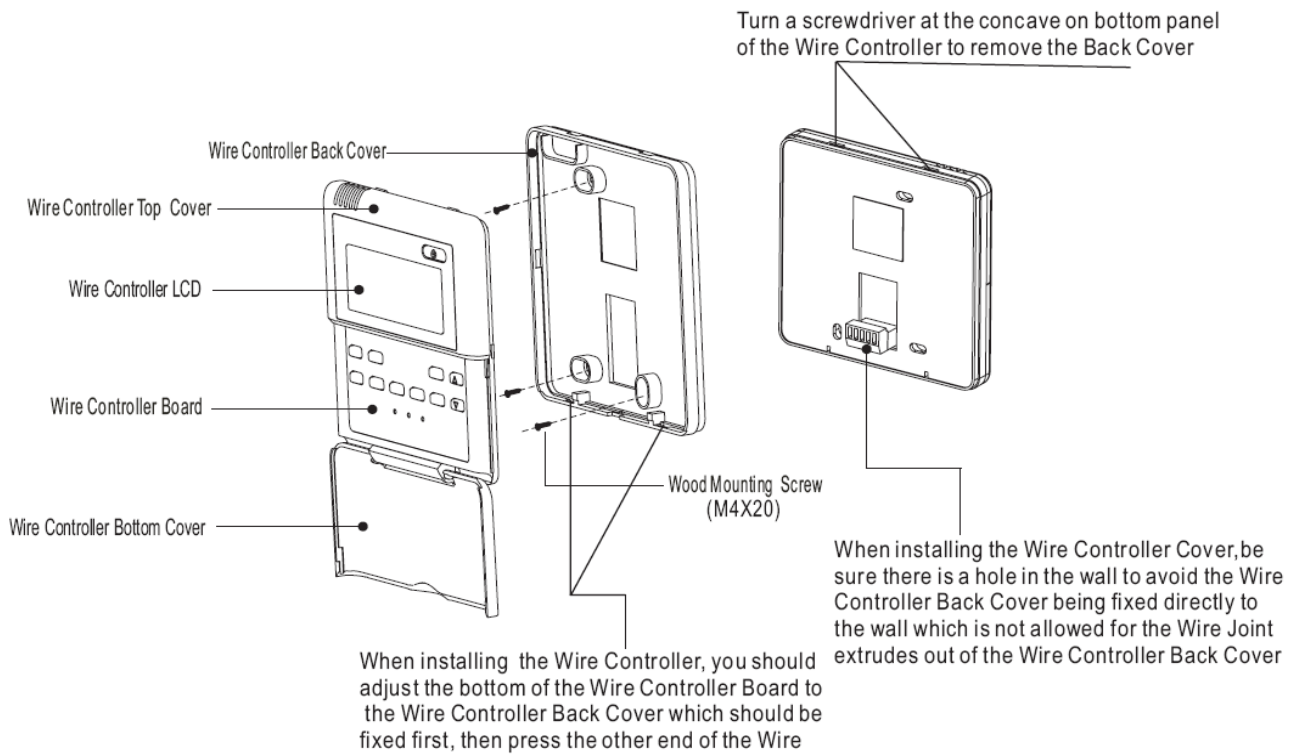
Installation

Wiring Principle Sketch:



Installation Notice:

When the air conditioner needs the constant frequency wire Controller, be sure adding a Wire Joint with 5 terminal named A, B, C, D, E in indoor unit, and fixing a infrared emitter whose anode and cathode connecting with A and B near the receiver in the Indoor Unit Switch Board, then connecting the terminal +5v, GND, Run in the Switch Board to C,D,E respectively.

**NOTE**

Never turn screws too tightly, or else the cover would be dented or the Liquid Crystal breaks.
Please leave enough long cable for maintenance of the Wire Controller Board.

