

# Console Type

<b>1. Features</b> .....	
<b>2. Specifications</b> .....	
<b>3. Dimensions</b> .....	
<b>4. Service Space</b> .....	
<b>5. Wiring Diagrams</b> .....	
<b>6. Air Velocity and Temperature Distributions</b> .....	
<b>7. Capacity Tables</b> .....	
<b>8. Electric Characteristics</b> .....	
<b>9. Sound Levels</b> .....	
<b>10. Exploded View</b> .....	
<b>11. Accessories</b> .....	

# 1. Features

## 1. Consumes up to 30% less energy than non-inverter units

- DC inverter compressor
- indoor fan motor adopts DC motor

## 2. Achieves set temperature more quickly

- air supplying from top and bottom or from top only
- air inlet from four directions



## 3. Compact unit body, space saving

- this unit body is very thin and harmonious with room. It is beautiful, elegant and space saving.
- lightweight and compact.

## 4. Flexible installation.

- can be used for floor standing or lower wall applications
- as a floor standing floor model, it can be semi or fully recessed without loss of capacity.

## 5. High efficiency filter

- built in Formaldehyde nemesis filter
- active-carbon and biological anti-virus filter is optional.

## 6. Comfort

- flexible air blow: vertical auto swing and wide angle louvers ensure that warm air reaches the furthest corners of the room and increase the air flow coverage
- Low noise operation, lowest to 23Db
- Low starting power and precise room temperature adjustment

## 7. Powerful mode can be selected for rapid cooling or heating.

## 8. Easy cleaning grille and maintenance

## 9. Indoor unit adopts DC motor, it has five level fan speed meet different requirements.

## 2. Specifications

<b>Model</b>	Indoor	Model name	<b>MFA-12HRDN1-Q</b>	<b>MFA-18HRDN1-Q</b>
		Power supply	220~240V-1Ph-50Hz	220~240V-1Ph-50Hz
	Outdoor	Model name	<b>MOU-12HRDN1-Q</b>	<b>MOU-18HRDN1-Q</b>
		Power supply	220~240V-1Ph-50Hz	220~240V-1Ph-50Hz
Cooling	Capacity	KW	4.0-3.5-1.4	5.65-5.27-1.7
	Input	KW	1.4-1.1-0.35	2.4-1.6-0.55
	Current	A	12-4.3-2.0	12.3-6.9-2.45
	EER		3.2	3.3
Heating	Capacity	KW	4.75-4.0-1.4	6.2-5.86-1.45
	Input	KW	1.88-1.2-0.38	2.6-1.7-0.72
	Rated current	A	12-6.6-2.0	12.3-6.53-3.13
	COP		3.3	3.33
Max. input consumption		W	2550	2550
Max. current		A	12	12.3
Compressor	Model		DA108X1C-20FZ3	JU1015D4
	Type		DC Inverter Rotary	DC Inverter Rotary
	Brand		TOSHIBA	HITACHI
	Capacity	Btu/h	10921	15017
	Input	W	855	1585
	Rated current(RLA)	A	5.3	8.8
	Thermal protector		Internal	Internal
	Capacitor	μF	/	/
	Refrigerant oil	ml	ESTER OIL VG74 480ml	HAF68D1 580ml
Indoor fan motor	Model		RD-280-20-8A	RD-280-20-8A
	Type		DC MOTOR	DC MOTOR
	Input	w	18	28
	Capacitor	μF	/	/
	Speed(hi/mi/lo)	r/min	420/460/560/610/680	530/680/780/840/890
Indoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	21*13.37	21*13.37
	c.Fin spacing	mm	1.3	1.3
	d.Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum
	e.Tube outside dia.and type	mm	Φ7 Inner groove tube	Φ7 Inner groove tube
	f.Coil length x height x width	mm	512*318*26.74	512*318*26.74
	g.Number of circuits		2	2
Indoor air flow		m <sup>3</sup> /h	350/380/460/490/550	440/560/640/700/740
Sound level (sound pressure)		dB(A)	23/27/31/33/35	29/31/33/35/38
Indoor unit	Dimension (W x H x D)	mm	700*600*210	700*600*210
	Packing (W x H x D)	mm	810*710*365	810*710*430
	Net/Gross weight	kg	20/25	20/25
Outdoor fan motor	Model		YDK24-6G	YDK53-6Y
	Type		AC MOTOR	AC MOTOR
	Input	W	59/47	129/86
	Capacitor	μF	2.5	3

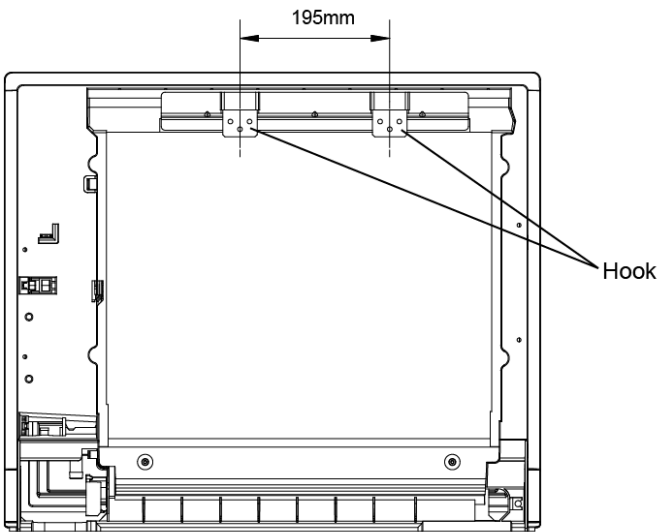
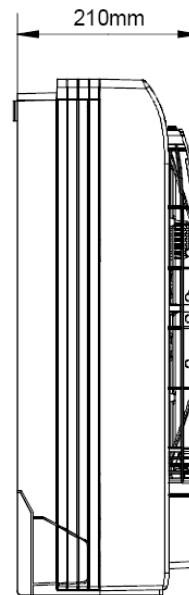
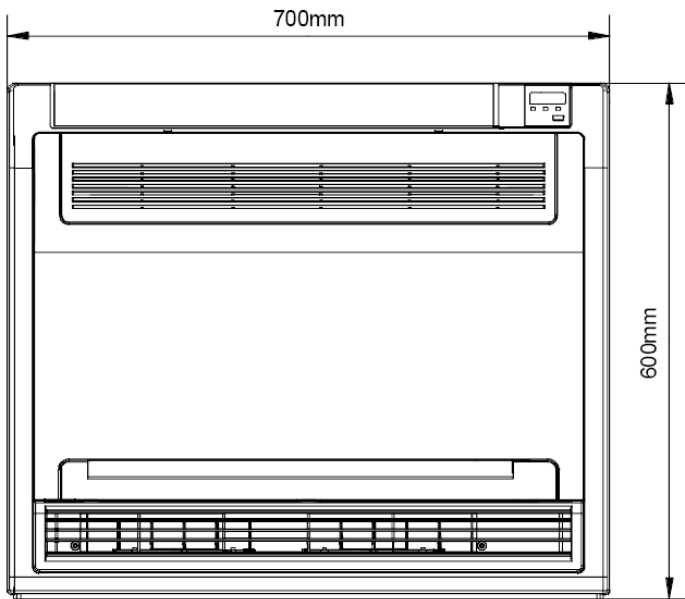
	Speed	r/min	800/550	770/560
Outdoor coil	Number of rows		2	2
	Tube pitch(a)x row pitch(b)	mm	25.4*22	25.4*22
	Fin spacing	mm	1.4	1.7
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminum
	Tube outside dia.and type	mm	Φ9.5 innergroove tube	9.5 Innergroove tube
	Coil length x height x width	mm	637*558*44	748*660*44
	Number of circuits		2	2
Outdoor air flow		m <sup>3</sup> /h	2500/1600	2400/1680
Sound level (sound pressure)		dB(A)	48/44	52/47
Outdoor unit	Dimension(WxDxH)	mm	761×593×279	842×695×324
	Packing (WxDxH)	mm	887×655×355	965×770×395
	Net/Gross weight	kg	42/45	62/66
Refrigerant	Type		R410A	R410A
	Charged volume	g	1400	1700
Throttle type			Capillary	EXV
Design pressure		MPa	4.2/2.0	4.2/2.0
Refrigerant piping	Liquid side/ Gas side	mm	φ6.4/12.7	φ6.4/12.7
	Max. refrigerant pipe length	m	4	6
	Max. difference in level(Outdoor is up)	m	4	6
	Max. difference in level (Outdoor is down)	m	4	6
Connection wiring	Power wiring	mm <sup>2</sup>	3 core x 1.5	3 core×2.5
	Signal wiring	mm <sup>2</sup>	4-core shielded wire×1.5	4-core shielded wire x1.5
Wireless remote controller (Indoor)			R51D/E	
Operation temp (Indoor)		°C	17~30	
Ambient temp (Outdoor)		°C	-5~43	Cooling: -15~43; Heating: -15~21

<b>Model</b>	Indoor	Model name	<b>MFA-12HRDN1</b>	<b>MFA-18HRDN1</b>
		Power supply	220~240V-1P-50Hz	220~240V-1P-50Hz
	Outdoor	Model name	<b>MOU-12HRDN1</b>	<b>MOU-18HRDN1</b>
		Power supply	220~240V-1P-50Hz	220~240V-1P-50Hz
Cooling	Capacity	KW	4.1-3.5-1.4	5.7-5.27-1.7
	Input	KW	1.4-1.05-0.35	2.5-1.57-0.55
	Current	A	12-4.3-2.0	12.3-6.7-2.45
	EER		3.3	3.35
Heating	Capacity	KW	4.9-4.0-1.4	6.2-5.86-1.45
	Input	KW	1.88-1.17-0.38	2.6-1.67-0.72
	Rated current	A	12-6.6-2.0	12.3-6.53-3.13
	COP		3.4	3.5
Max. input consumption		W	2550	2600
Max. current		A	12	12.3
Compressor	Model		DA108X1C-20FZ3	JU1015D4
	Type		DC Inverter Rotary	DC Inverter Rotary
	Brand		TOSHIBA	HITACHI
	Capacity	Btu/h	10921	15017
	Input	W	855	1585
	Rated current(RLA)	A	5.3	8.8
	Thermal protector		Internal	Internal
	Capacitor	μF	/	/
Refrigerant oil	ml	ESTER OIL VG74 480ml	HAF68D1 580ml	
Indoor fan motor	Model		RD-280-20-8A	RD-280-20-8A
	Type		DC MOTOR	DC MOTOR
	Input	w	18	28
	Capacitor	μF	/	/
	Speed(hi/mi/lo)	r/min	420/460/560/610/680	530/680/780/840/890
Indoor coil	a.Number of rows		2	2
	b.Tube pitch(a)x row pitch(b)	mm	21*13.37	21*13.37
	c.Fin spacing	mm	1.3	1.3
	d.Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum
	e.Tube outside dia.and type	mm	Φ7 Inner groove tube	Φ7 Inner groove tube
	f.Coil length x height x width	mm	512*318*26.74	512*318*26.74
	g.Number of circuits		2	2
Indoor air flow		m <sup>3</sup> /h	350/380/460/490/550	440/560/640/700/740
Sound level (sound pressure)		dB(A)	23/27/31/33/35	29/31/33/35/38
Indoor unit	Dimension (W x H x D)	mm	700*600*210	700*600*210
	Packing (W x H x D)	mm	810*710*370	810*710*435
	Net/Gross weight	kg	20/25	20/25
Outdoor fan motor	Model		YDK24-6G	YDK53-6Y
	Type		AC MOTOR	AC MOTOR
	Input	W	59/47	129/86
	Capacitor	μF	2.5	3
	Speed	r/min	800/550	770/560
Outdoor coil	Number of rows		2	2

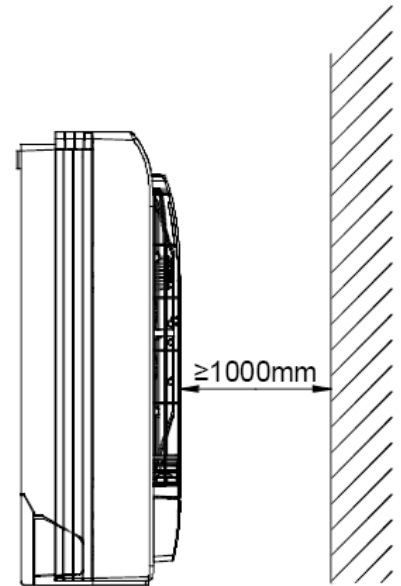
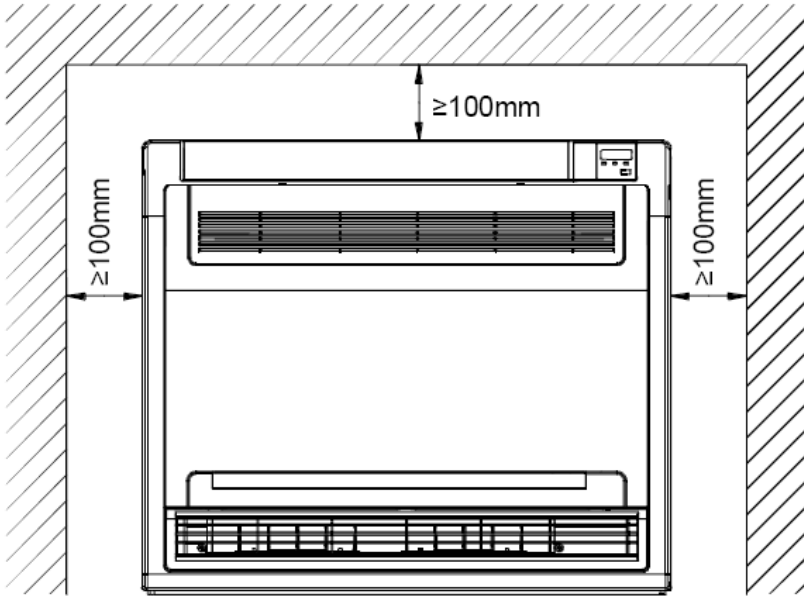
	Tube pitch(a)x row pitch(b)	mm	25.4*22	25.4*22
	Fin spacing	mm	1.4	1.7
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminum
	Tube outside dia.and type	mm	Φ9.5 innergroove tube	Φ9.5 Innergroove tube
	Coil length x height x width	mm	637*558*44	748*660*44
	Number of circuits		2	2
Outdoor air flow		m <sup>3</sup> /h	2500/1600	2400/1680
Sound level (sound pressure)		dB(A)	48/44	52/47
Outdoor unit	Dimension(WxDxH)	mm	761×593×279	842×695×324
	Packing (WxDxH)	mm	887×655×355	965×770×395
	Net/Gross weight	kg	42/45	62/66
Refrigerant	Type		R410A	R410A
	Charged volume	g	1400	1700
Throttle type			Capillary	EXV
Design pressure (Hi/Lo)		MPa	4.2/2.0	4.2/2.0
Refrigerant piping	Liquid side/ Gas side	mm	φ6.4/12.7	φ6.4/12.7
	Max. refrigerant pipe length	m	10	20
	Max. difference in level(Outdoor is up)	m	5	10
	Max. difference in level (Outdoor is down)	m	5	10
Connection wiring	Power wiring (Indoor)	mm <sup>2</sup>	3 core x 1.5	—
	Power wiring (Outdoor)	mm <sup>2</sup>	—	3 core×2.5
	Signal wiring	mm <sup>2</sup>	4-core shielded wire×1.5	3-core shielded wire x0.5
Wireless remote controller (Indoor)			R51D/E	
Operation temp (Indoor)		℃	17~30	
Ambient temp (Outdoor)		℃	-5~43	Cooling: -15~43; Heating: -15~21

### 3. Dimensions

MFA-12HRDN1(-Q)/ MFA-18HRDN1(-Q)



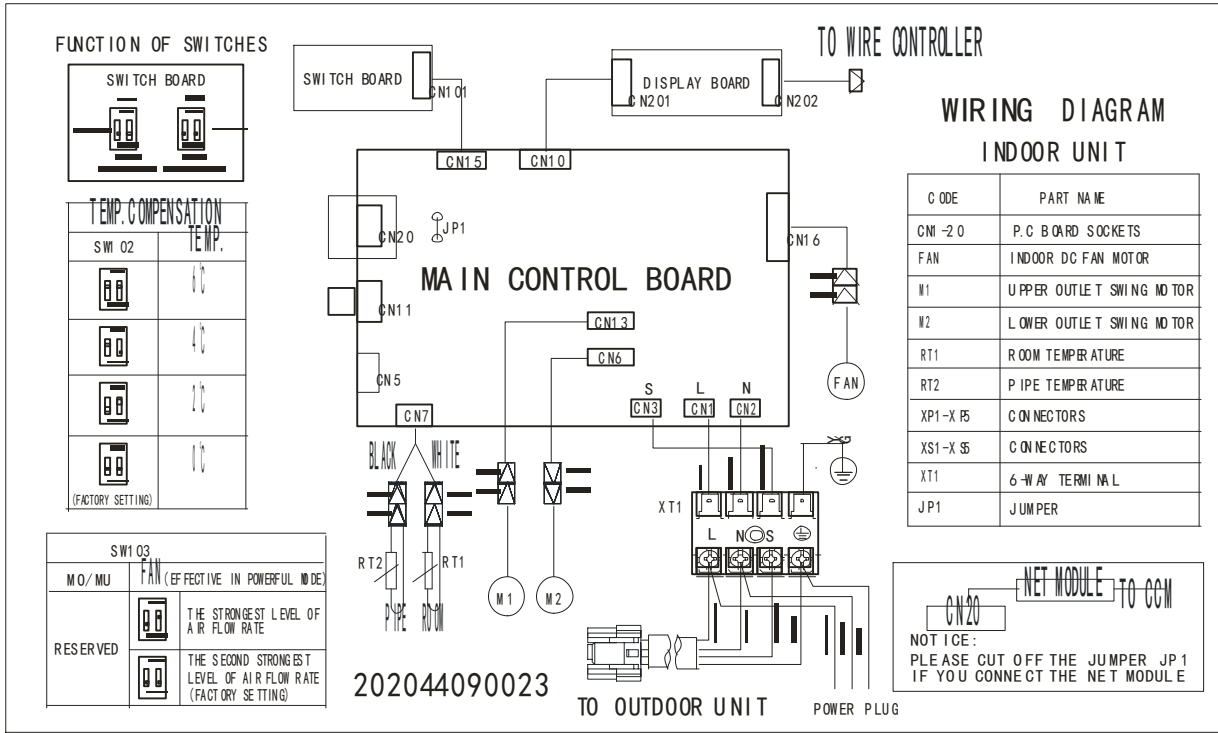
## 4. Service Space



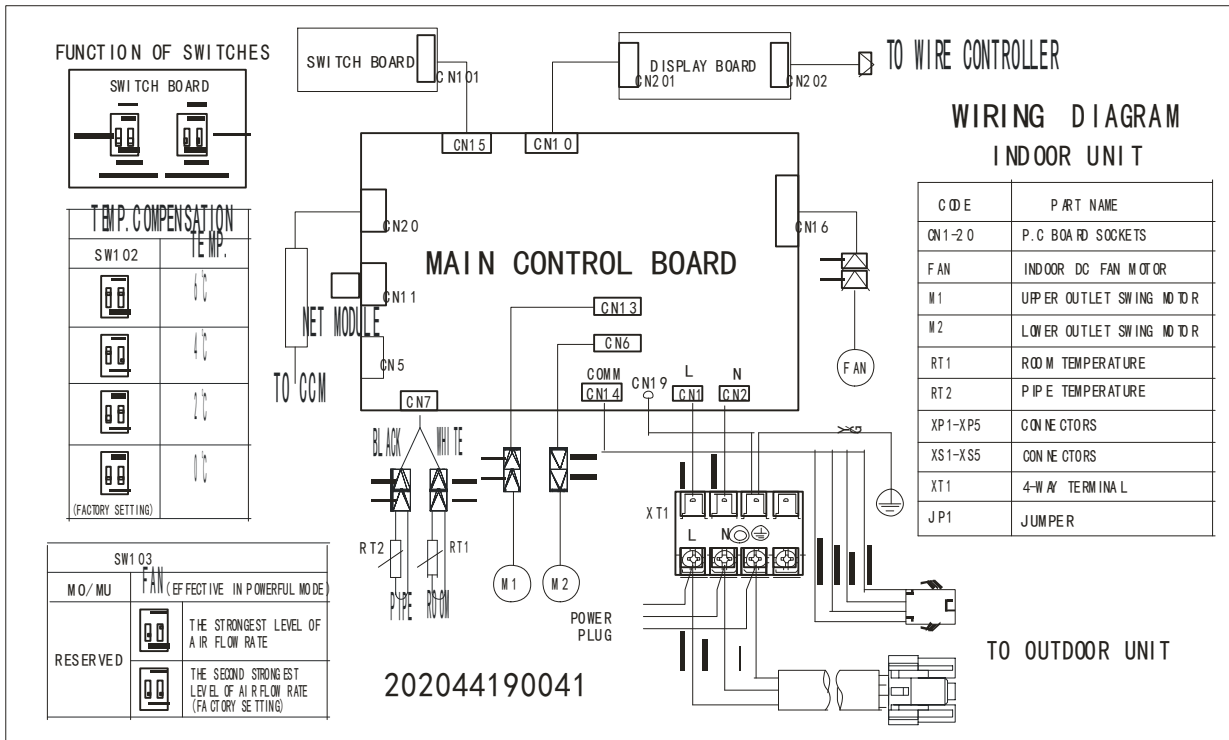


# 5. Wiring Diagrams

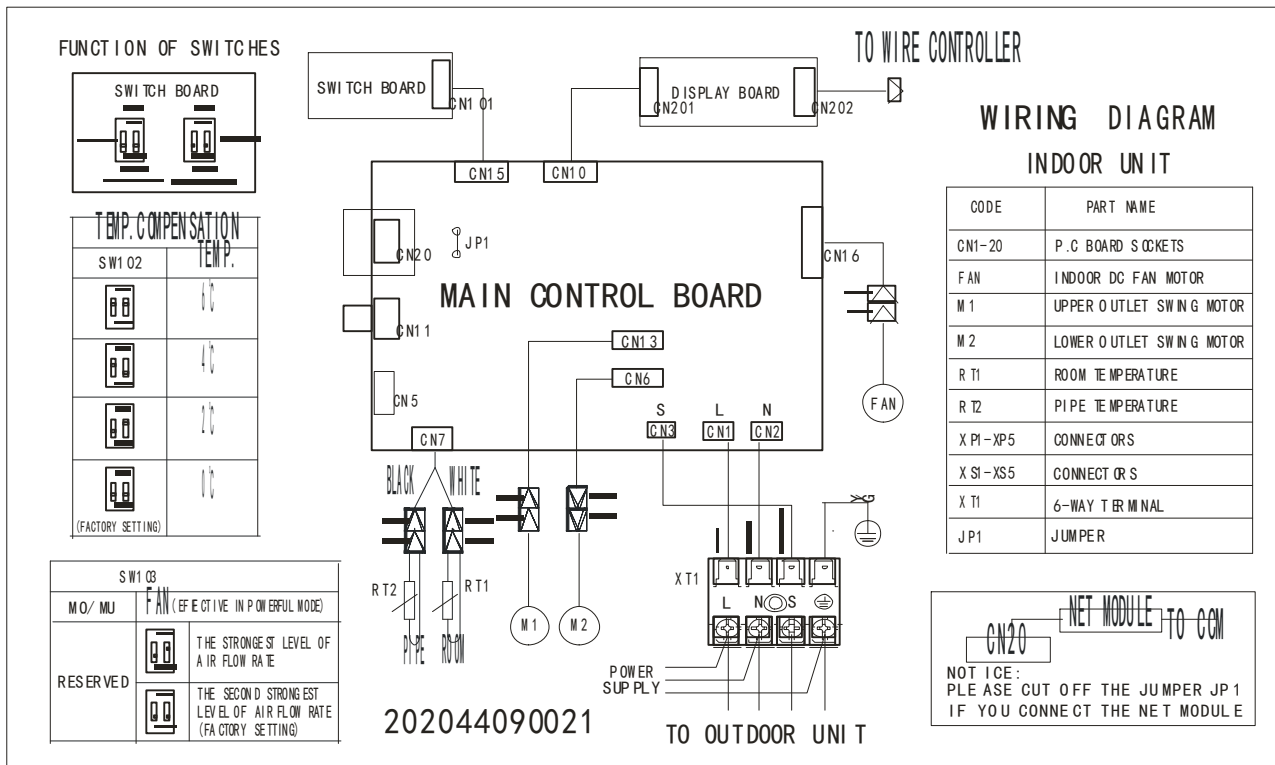
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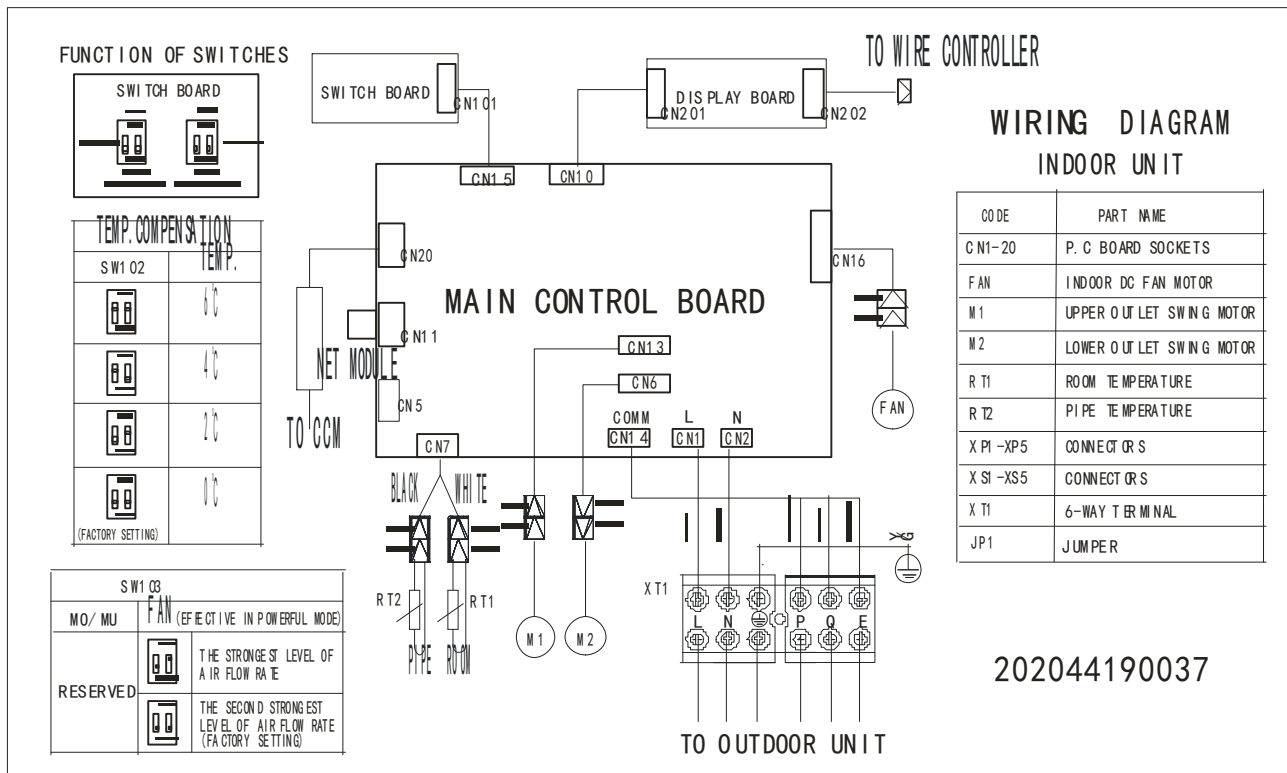
## MFA-18HRDN1-Q



# MFA-12HRDN1



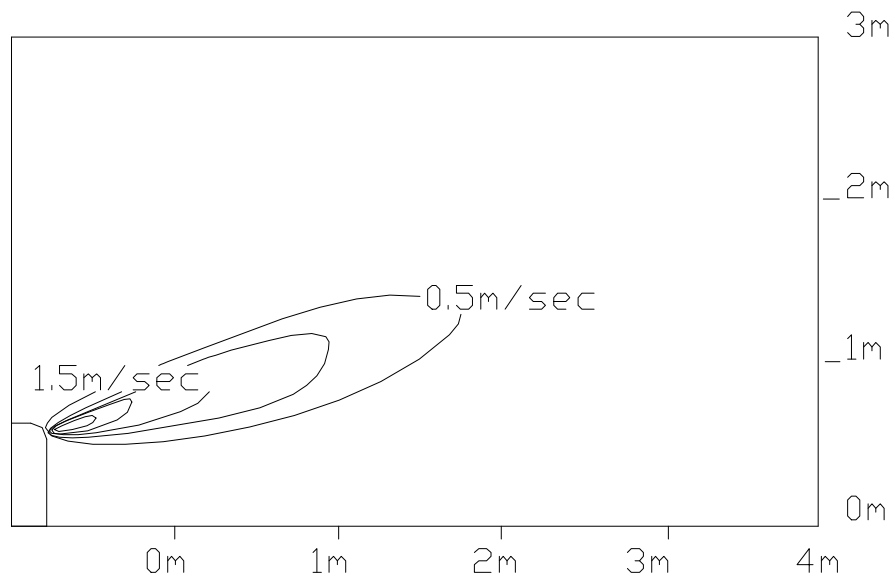
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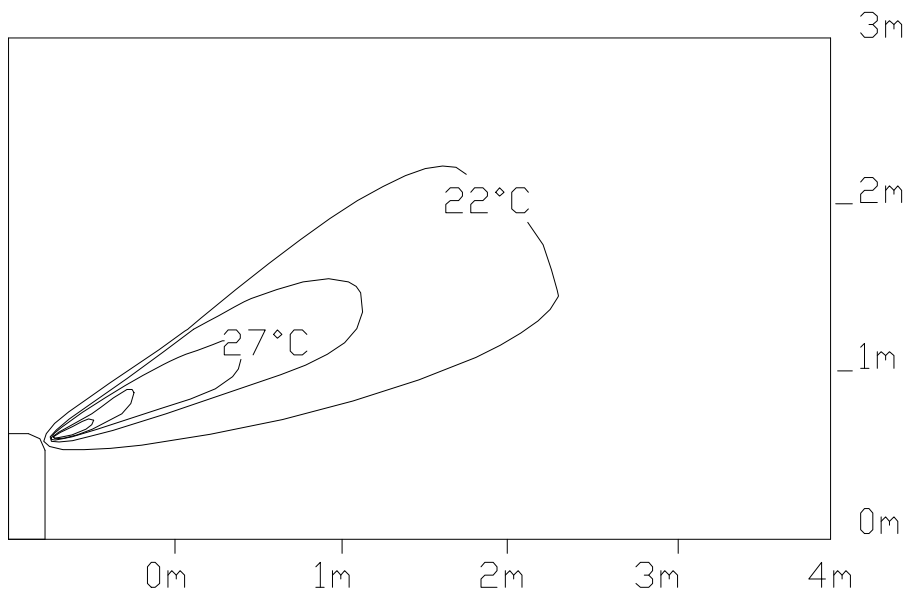
## 6. Air Velocity and Temperature Distributions

Discharge angle 60

Airflow velocity



Temperature



## 7. Capacity Tables

### MFA-12HRDN1-Q

#### Cooling

Outdoor temperature(°C DB)		Indoor temperature(°C WB)													
		14.00		16.00		18.00		19.00		20.00		22.00		24.00	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
10.00		2.42	0.37	2.86	0.46	3.30	0.55	3.50	0.59	3.70	0.64	3.78	0.64	3.86	0.65
12.00		2.42	0.37	2.86	0.47	3.30	0.56	3.50	0.61	3.70	0.65	3.78	0.65	3.86	0.66
14.00		2.42	0.38	2.86	0.47	3.30	0.57	3.50	0.62	3.70	0.66	3.78	0.67	3.86	0.67
16.00		2.42	0.39	2.86	0.48	3.30	0.58	3.50	0.63	3.70	0.68	3.78	0.68	3.86	0.68
18.00		2.42	0.39	2.86	0.49	3.30	0.59	3.50	0.64	3.70	0.69	3.78	0.69	3.86	0.70
19.00		2.42	0.40	2.86	0.50	3.30	0.60	3.50	0.65	3.70	0.70	3.78	0.70	3.86	0.71
21.00		2.42	0.43	2.86	0.54	3.30	0.64	3.50	0.70	3.70	0.75	3.78	0.75	3.86	0.76
23.00		2.42	0.46	2.86	0.57	3.30	0.69	3.50	0.75	3.70	0.80	3.78	0.81	3.86	0.81
25.00		2.42	0.49	2.86	0.61	3.30	0.74	3.50	0.80	3.70	0.86	3.78	0.86	3.86	0.87
27.00		2.42	0.53	2.86	0.66	3.30	0.79	3.50	0.85	3.70	0.92	3.78	0.92	3.86	0.93
29.00		2.42	0.56	2.86	0.70	3.30	0.84	3.50	0.91	3.70	0.98	3.78	0.98	3.86	0.99
31.00		2.42	0.60	2.86	0.75	3.30	0.90	3.50	0.97	3.70	1.05	3.78	1.05	3.86	1.06
33.00		2.42	0.64	2.86	0.80	3.30	0.95	3.50	1.03	3.70	1.11	3.78	1.12	3.86	1.13
35.00		2.42	0.68	2.86	0.85	3.30	1.01	3.50	1.10	3.70	1.19	3.78	1.19	3.86	1.20
37.00		2.42	0.72	2.86	0.90	3.30	1.08	3.50	1.17	3.70	1.26	3.78	1.27	3.86	1.28
39.00		2.42	0.73	2.86	0.90	3.30	1.08	3.50	1.18	3.70	1.27	3.78	1.27	3.86	1.28
41.00		2.42	0.73	2.86	0.91	3.30	1.09	3.50	1.18	3.70	1.27	3.78	1.28	3.86	1.29
43.00		2.42	0.73	2.86	0.91	3.30	1.09	3.50	1.19	3.70	1.28	3.78	1.28	3.86	1.29

#### Heating

Outdoor air temp.		Indoor temperature(°C DB)											
		16		18		20		21		22		24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
°C DB	°C WB	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.7	-15	2.54	0.98	2.54	1.00	2.54	1.03	2.44	0.98	2.34	0.94	2.14	0.85
-12.6	-13	2.68	1.00	2.68	1.02	2.68	1.04	2.57	1.00	2.47	0.95	2.26	0.86
-10.5	-11	2.82	1.02	2.82	1.04	2.82	1.06	2.71	1.01	2.60	0.97	2.37	0.87
-9.5	-10	2.89	1.02	2.89	1.05	2.89	1.07	2.77	1.02	2.66	0.97	2.43	0.88
-8.5	-9.1	2.96	1.03	2.96	1.05	2.96	1.08	2.84	1.03	2.72	0.98	2.49	0.89
-7	-7.6	3.06	1.04	3.06	1.06	3.06	1.09	2.94	1.04	2.82	0.99	2.57	0.90
-5	-5.6	3.19	1.06	3.19	1.08	3.19	1.10	3.07	1.05	2.94	1.01	2.69	0.91
-3	-3.7	3.33	1.07	3.33	1.10	3.33	1.12	3.20	1.07	3.06	1.02	2.80	0.92
0	-0.7	3.53	1.10	3.53	1.12	3.53	1.14	3.39	1.09	3.25	1.04	2.97	0.94
3	2.2	3.73	1.12	3.73	1.14	3.73	1.17	3.58	1.12	3.43	1.07	3.14	0.96
5	4.1	3.87	1.14	3.87	1.16	3.87	1.18	3.71	1.13	3.56	1.08	3.25	0.98
7	6	4.00	1.15	4.00	1.18	4.00	1.20	3.84	1.15	3.68	1.09	3.37	0.99
9	7.9	4.00	1.11	4.00	1.14	4.00	1.16	3.84	1.11	3.68	1.06	3.37	0.96
11	9.8	4.00	1.07	4.00	1.10	4.00	1.12	3.84	1.07	3.68	1.02	3.37	0.92
13	11.8	4.00	1.03	4.00	1.06	4.00	1.08	3.84	1.03	3.68	0.98	3.37	0.89
15	13.7	4.00	1.00	4.00	1.02	4.00	1.04	3.84	0.99	3.68	0.95	3.37	0.86

# MFA-18HRDN1-Q

## Cooling

Outdoor temperature(°C DB)		Indoor temperature(°C WB)													
		14.00		16.00		18.00		19.00		20.00		22.00		24.00	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
10.00		3.65	0.53	4.31	0.67	4.97	0.80	5.27	0.86	5.57	0.93	5.69	0.93	5.82	0.94
12.00		3.65	0.54	4.31	0.68	4.97	0.81	5.27	0.88	5.57	0.95	5.69	0.95	5.82	0.96
14.00		3.65	0.55	4.31	0.69	4.97	0.83	5.27	0.90	5.57	0.97	5.69	0.97	5.82	0.98
16.00		3.65	0.56	4.31	0.70	4.97	0.84	5.27	0.91	5.57	0.98	5.69	0.99	5.82	1.00
18.00		3.65	0.57	4.31	0.71	4.97	0.86	5.27	0.93	5.57	1.00	5.69	1.00	5.82	1.01
19.00		3.65	0.58	4.31	0.73	4.97	0.87	5.27	0.94	5.57	1.02	5.69	1.02	5.82	1.03
21.00		3.65	0.63	4.31	0.78	4.97	0.93	5.27	1.01	5.57	1.09	5.69	1.09	5.82	1.10
23.00		3.65	0.67	4.31	0.83	4.97	1.00	5.27	1.08	5.57	1.17	5.69	1.17	5.82	1.18
25.00		3.65	0.72	4.31	0.89	4.97	1.07	5.27	1.16	5.57	1.25	5.69	1.25	5.82	1.27
27.00		3.65	0.77	4.31	0.95	4.97	1.14	5.27	1.24	5.57	1.34	5.69	1.34	5.82	1.35
29.00		3.65	0.82	4.31	1.02	4.97	1.22	5.27	1.32	5.57	1.43	5.69	1.43	5.82	1.45
31.00		3.65	0.87	4.31	1.09	4.97	1.30	5.27	1.41	5.57	1.52	5.69	1.53	5.82	1.54
33.00		3.65	0.93	4.31	1.16	4.97	1.39	5.27	1.50	5.57	1.62	5.69	1.63	5.82	1.64
35.00		3.65	0.99	4.31	1.23	4.97	1.48	5.27	1.60	5.57	1.72	5.69	1.73	5.82	1.75
37.00		3.65	1.05	4.31	1.31	4.97	1.57	5.27	1.70	5.57	1.83	5.69	1.84	5.82	1.86
39.00		3.65	1.06	4.31	1.32	4.97	1.58	5.27	1.71	5.57	1.84	5.69	1.85	5.82	1.87
41.00		3.65	1.06	4.31	1.32	4.97	1.58	5.27	1.72	5.57	1.85	5.69	1.86	5.82	1.87
43.00		3.65	1.07	4.31	1.33	4.97	1.59	5.27	1.72	5.57	1.86	5.69	1.87	5.82	1.88

## Heating

Outdoor air temp.		Indoor temperature(°C DB)											
		16		18		20		21		22		24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
°C DB	°C WB	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.7	-15	3.72	1.39	3.72	1.42	3.72	1.45	3.57	1.39	3.43	1.32	3.13	1.20
-12.6	-13	3.93	1.42	3.93	1.45	3.93	1.48	3.77	1.41	3.62	1.35	3.30	1.22
-10.5	-11	4.13	1.44	4.13	1.47	4.13	1.50	3.97	1.43	3.81	1.37	3.48	1.24
-9.5	-10	4.23	1.45	4.23	1.48	4.23	1.51	4.07	1.45	3.90	1.38	3.56	1.25
-8.5	-9.1	4.33	1.46	4.33	1.49	4.33	1.52	4.16	1.46	3.99	1.39	3.64	1.26
-7	-7.6	4.48	1.48	4.48	1.51	4.48	1.54	4.30	1.47	4.12	1.41	3.77	1.27
-5	-5.6	4.68	1.50	4.68	1.53	4.68	1.56	4.49	1.49	4.31	1.43	3.93	1.29
-3	-3.7	4.87	1.52	4.87	1.55	4.87	1.59	4.68	1.52	4.49	1.45	4.10	1.31
0	-0.7	5.17	1.55	5.17	1.59	5.17	1.62	4.96	1.55	4.76	1.48	4.35	1.34
3	2.2	5.47	1.59	5.47	1.62	5.47	1.65	5.25	1.58	5.03	1.51	4.60	1.36
5	4.1	5.66	1.61	5.66	1.64	5.66	1.68	5.44	1.60	5.21	1.53	4.76	1.38
7	6	5.86	1.63	5.86	1.67	5.86	1.70	5.63	1.63	5.39	1.55	4.93	1.40
9	7.9	5.86	1.58	5.86	1.61	5.86	1.64	5.63	1.57	5.39	1.50	4.93	1.36
11	9.8	5.86	1.52	5.86	1.55	5.86	1.59	5.63	1.52	5.39	1.45	4.93	1.31
13	11.8	5.86	1.47	5.86	1.50	5.86	1.53	5.63	1.46	5.39	1.39	4.93	1.26
15	13.7	5.86	1.41	5.86	1.44	5.86	1.47	5.63	1.41	5.39	1.34	4.93	1.21

# MFA-12HRDN1

## Cooling

Outdoor temperature(°C DB)		Indoor temperature(°C WB)													
		14.00		16.00		18.00		19.00		20.00		22.00		24.00	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
10.00		2.42	0.35	2.86	0.44	3.30	0.52	3.50	0.57	3.70	0.61	3.78	0.61	3.86	0.62
12.00		2.42	0.36	2.86	0.44	3.30	0.53	3.50	0.58	3.70	0.62	3.78	0.62	3.86	0.63
14.00		2.42	0.36	2.86	0.45	3.30	0.54	3.50	0.59	3.70	0.63	3.78	0.64	3.86	0.64
16.00		2.42	0.37	2.86	0.46	3.30	0.55	3.50	0.60	3.70	0.65	3.78	0.65	3.86	0.65
18.00		2.42	0.38	2.86	0.47	3.30	0.56	3.50	0.61	3.70	0.66	3.78	0.66	3.86	0.66
19.00		2.42	0.38	2.86	0.48	3.30	0.57	3.50	0.62	3.70	0.67	3.78	0.67	3.86	0.68
21.00		2.42	0.41	2.86	0.51	3.30	0.61	3.50	0.66	3.70	0.72	3.78	0.72	3.86	0.73
23.00		2.42	0.44	2.86	0.55	3.30	0.66	3.50	0.71	3.70	0.77	3.78	0.77	3.86	0.78
25.00		2.42	0.47	2.86	0.59	3.30	0.70	3.50	0.76	3.70	0.82	3.78	0.82	3.86	0.83
27.00		2.42	0.50	2.86	0.63	3.30	0.75	3.50	0.81	3.70	0.88	3.78	0.88	3.86	0.89
29.00		2.42	0.54	2.86	0.67	3.30	0.80	3.50	0.87	3.70	0.94	3.78	0.94	3.86	0.95
31.00		2.42	0.57	2.86	0.71	3.30	0.85	3.50	0.93	3.70	1.00	3.78	1.00	3.86	1.01
33.00		2.42	0.61	2.86	0.76	3.30	0.91	3.50	0.99	3.70	1.06	3.78	1.07	3.86	1.08
35.00		2.42	0.65	2.86	0.81	3.30	0.97	3.50	1.05	3.70	1.13	3.78	1.14	3.86	1.15
37.00		2.42	0.69	2.86	0.86	3.30	1.03	3.50	1.12	3.70	1.20	3.78	1.21	3.86	1.22
39.00		2.42	0.69	2.86	0.86	3.30	1.03	3.50	1.12	3.70	1.21	3.78	1.21	3.86	1.22
41.00		2.42	0.70	2.86	0.87	3.30	1.04	3.50	1.13	3.70	1.21	3.78	1.22	3.86	1.23
43.00		2.42	0.70	2.86	0.87	3.30	1.04	3.50	1.13	3.70	1.22	3.78	1.22	3.86	1.24

## Heating

Outdoor air temp.		Indoor temperature(°C DB)											
		16		18		20		21		22		24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
°C DB	°C WB	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.7	-15	2.54	0.96	2.54	0.98	2.54	1.00	2.44	0.96	2.34	0.91	2.14	0.82
-12.6	-13	2.68	0.97	2.68	1.00	2.68	1.02	2.57	0.97	2.47	0.93	2.26	0.84
-10.5	-11	2.82	0.99	2.82	1.01	2.82	1.03	2.71	0.99	2.60	0.94	2.37	0.85
-9.5	-10	2.89	1.00	2.89	1.02	2.89	1.04	2.77	0.99	2.66	0.95	2.43	0.86
-8.5	-9.1	2.96	1.01	2.96	1.03	2.96	1.05	2.84	1.00	2.72	0.96	2.49	0.86
-7	-7.6	3.06	1.02	3.06	1.04	3.06	1.06	2.94	1.01	2.82	0.97	2.57	0.87
-5	-5.6	3.19	1.03	3.19	1.05	3.19	1.08	3.07	1.03	2.94	0.98	2.69	0.89
-3	-3.7	3.33	1.05	3.33	1.07	3.33	1.09	3.20	1.04	3.06	1.00	2.80	0.90
0	-0.7	3.53	1.07	3.53	1.09	3.53	1.11	3.39	1.07	3.25	1.02	2.97	0.92
3	2.2	3.73	1.09	3.73	1.12	3.73	1.14	3.58	1.09	3.43	1.04	3.14	0.94
5	4.1	3.87	1.11	3.87	1.13	3.87	1.15	3.71	1.10	3.56	1.05	3.25	0.95
7	6	4.00	1.12	4.00	1.15	4.00	1.17	3.84	1.12	3.68	1.07	3.37	0.96
9	7.9	4.00	1.08	4.00	1.11	4.00	1.13	3.84	1.08	3.68	1.03	3.37	0.93
11	9.8	4.00	1.05	4.00	1.07	4.00	1.09	3.84	1.04	3.68	1.00	3.37	0.90
13	11.8	4.00	1.01	4.00	1.03	4.00	1.05	3.84	1.01	3.68	0.96	3.37	0.87
15	13.7	4.00	0.97	4.00	0.99	4.00	1.01	3.84	0.97	3.68	0.92	3.37	0.84

# MFA-18HRDN1

## Cooling

Outdoor temperature(°C DB)		Indoor temperature(°C WB)													
		14.00		16.00		18.00		19.00		20.00		22.00		24.00	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
10.00		3.65	0.52	4.31	0.65	4.97	0.78	5.27	0.85	5.57	0.91	5.69	0.92	5.82	0.93
12.00		3.65	0.53	4.31	0.66	4.97	0.80	5.27	0.86	5.57	0.93	5.69	0.93	5.82	0.94
14.00		3.65	0.54	4.31	0.68	4.97	0.81	5.27	0.88	5.57	0.95	5.69	0.95	5.82	0.96
16.00		3.65	0.55	4.31	0.69	4.97	0.83	5.27	0.89	5.57	0.96	5.69	0.97	5.82	0.98
18.00		3.65	0.56	4.31	0.70	4.97	0.84	5.27	0.91	5.57	0.98	5.69	0.98	5.82	0.99
19.00		3.65	0.57	4.31	0.71	4.97	0.85	5.27	0.93	5.57	1.00	5.69	1.00	5.82	1.01
21.00		3.65	0.61	4.31	0.76	4.97	0.92	5.27	0.99	5.57	1.07	5.69	1.07	5.82	1.08
23.00		3.65	0.66	4.31	0.82	4.97	0.98	5.27	1.06	5.57	1.15	5.69	1.15	5.82	1.16
25.00		3.65	0.70	4.31	0.88	4.97	1.05	5.27	1.14	5.57	1.23	5.69	1.23	5.82	1.24
27.00		3.65	0.75	4.31	0.94	4.97	1.12	5.27	1.22	5.57	1.31	5.69	1.32	5.82	1.33
29.00		3.65	0.80	4.31	1.00	4.97	1.20	5.27	1.30	5.57	1.40	5.69	1.40	5.82	1.42
31.00		3.65	0.86	4.31	1.07	4.97	1.28	5.27	1.39	5.57	1.49	5.69	1.50	5.82	1.51
33.00		3.65	0.91	4.31	1.14	4.97	1.36	5.27	1.48	5.57	1.59	5.69	1.60	5.82	1.61
35.00		3.65	0.97	4.31	1.21	4.97	1.45	5.27	1.57	5.57	1.69	5.69	1.70	5.82	1.71
37.00		3.65	1.03	4.31	1.29	4.97	1.54	5.27	1.67	5.57	1.80	5.69	1.81	5.82	1.82
39.00		3.65	1.04	4.31	1.29	4.97	1.55	5.27	1.68	5.57	1.81	5.69	1.81	5.82	1.83
41.00		3.65	1.04	4.31	1.30	4.97	1.55	5.27	1.68	5.57	1.82	5.69	1.82	5.82	1.84
43.00		3.65	1.05	4.31	1.30	4.97	1.56	5.27	1.69	5.57	1.82	5.69	1.83	5.82	1.85

## Heating

Outdoor air temp.		Indoor temperature(°C DB)											
		16		18		20		21		22		24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
°C DB	°C WB	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
-14.7	-15	3.72	1.37	3.72	1.40	3.72	1.43	3.57	1.36	3.43	1.30	3.13	1.18
-12.6	-13	3.93	1.39	3.93	1.42	3.93	1.45	3.77	1.39	3.62	1.32	3.30	1.20
-10.5	-11	4.13	1.41	4.13	1.44	4.13	1.47	3.97	1.41	3.81	1.34	3.48	1.22
-9.5	-10	4.23	1.42	4.23	1.45	4.23	1.48	4.07	1.42	3.90	1.35	3.56	1.22
-8.5	-9.1	4.33	1.43	4.33	1.47	4.33	1.50	4.16	1.43	3.99	1.36	3.64	1.23
-7	-7.6	4.48	1.45	4.48	1.48	4.48	1.51	4.30	1.45	4.12	1.38	3.77	1.25
-5	-5.6	4.68	1.47	4.68	1.50	4.68	1.54	4.49	1.47	4.31	1.40	3.93	1.27
-3	-3.7	4.87	1.49	4.87	1.53	4.87	1.56	4.68	1.49	4.49	1.42	4.10	1.28
0	-0.7	5.17	1.53	5.17	1.56	5.17	1.59	4.96	1.52	4.76	1.45	4.35	1.31
3	2.2	5.47	1.56	5.47	1.59	5.47	1.63	5.25	1.55	5.03	1.48	4.60	1.34
5	4.1	5.66	1.58	5.66	1.61	5.66	1.65	5.44	1.58	5.21	1.50	4.76	1.36
7	6	5.86	1.60	5.86	1.64	5.86	1.67	5.63	1.60	5.39	1.52	4.93	1.38
9	7.9	5.86	1.55	5.86	1.58	5.86	1.61	5.63	1.54	5.39	1.47	4.93	1.33
11	9.8	5.86	1.49	5.86	1.53	5.86	1.56	5.63	1.49	5.39	1.42	4.93	1.28
13	11.8	5.86	1.44	5.86	1.47	5.86	1.50	5.63	1.44	5.39	1.37	4.93	1.24
15	13.7	5.86	1.39	5.86	1.42	5.86	1.45	5.63	1.38	5.39	1.32	4.93	1.19

## 8. Electric Characteristics

Model	Indoor Unit				Power Supply	IFM	
	Hz	Voltage	Min	Max	MFA	kW	FLA
MFA-12HRDN1(-Q)	50	220~240V	198V	254V	16	0.02	0.018
MFA-18HRDN1(-Q)	50	220~240V	198V	254V	16	0.02	0.028

**Remark:**

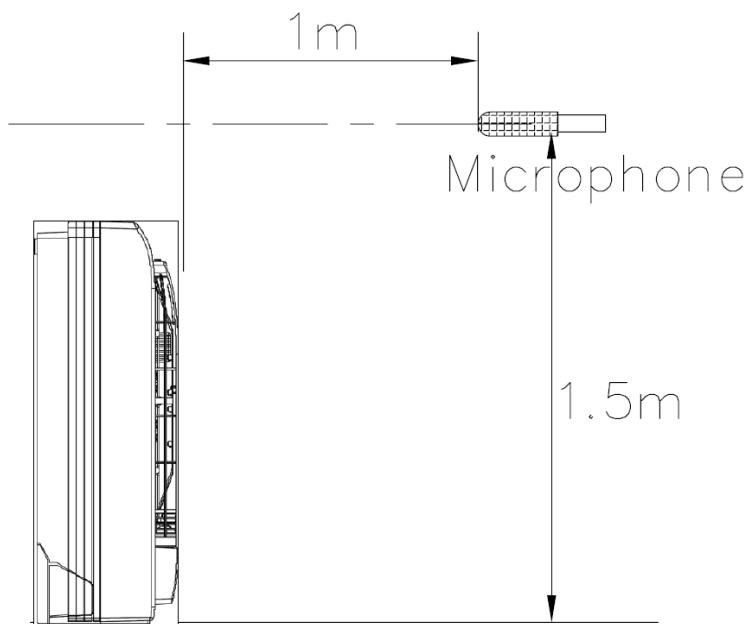
MFA: Max. Fuse Amps. (A)

KW: Fan Motor Rated Output (KW)

FLA: Full Load Amps. (A)

IFM: Indoor Fan Motor

## 9. Sound Levels










Model	Noise level dB(A)				
	Highest	Higher	H	M	L
MFA-12HRDN1-Q/ MFA-12HRDN1	35	33	31	27	23
MFA-18HRDN1-Q/ MFA-18HRDN1	38	35	33	31	29








## 10. Accessories

### MFA-12HRDN1-Q/ MFA-18HRDN1-Q

	Name	Shape	Quantity
<b>Installation fittings</b>	Hook		2
<b>Remote controller &amp; Its Frame</b>	Remote controller		1
	Frame		1
	Mounting screw(ST2.9×10-C-H)		2
	Alkaline dry batteries (AM4)		2
<b>Others</b>	Installation & Owner's manual	/	1
	Holding sponge		2
	Wrapping tape		1

### MFA-12HRDN1/ MFA-18HRDN1

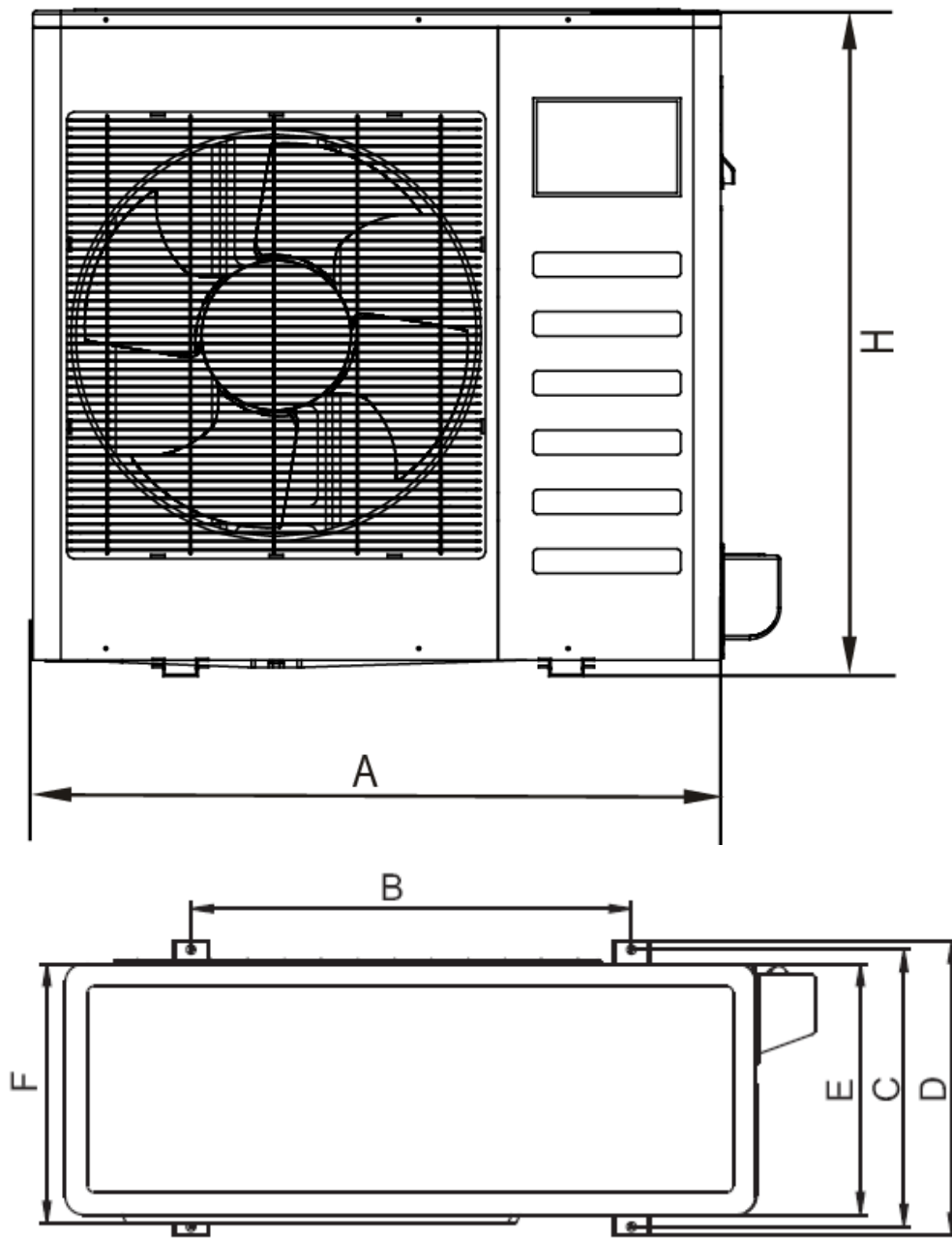
	Name	Shape	Quantity
<b>Installation fittings</b>	Hook		2
<b>Remote controller &amp; Its Frame</b>	Remote controller		1
	Frame		1
	Mounting screw(ST2.9×10-C-H)		2
	Alkaline dry batteries (AM4)		2
<b>Others</b>	Installation manual	/	1
	Owner's manual	/	1

# Part 3

## Outdoor Units

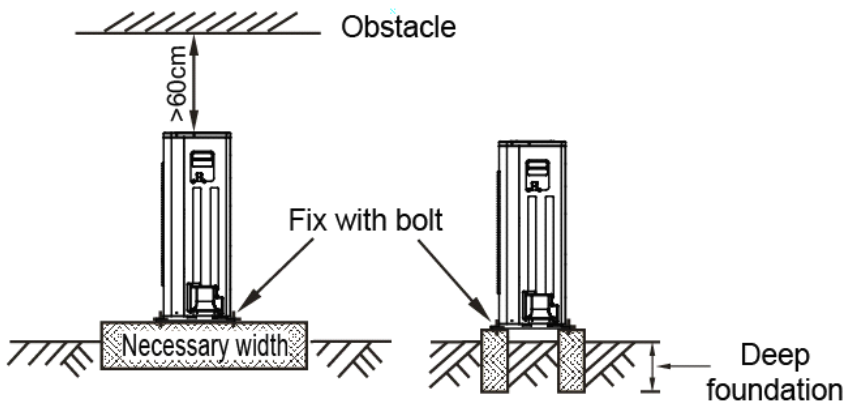
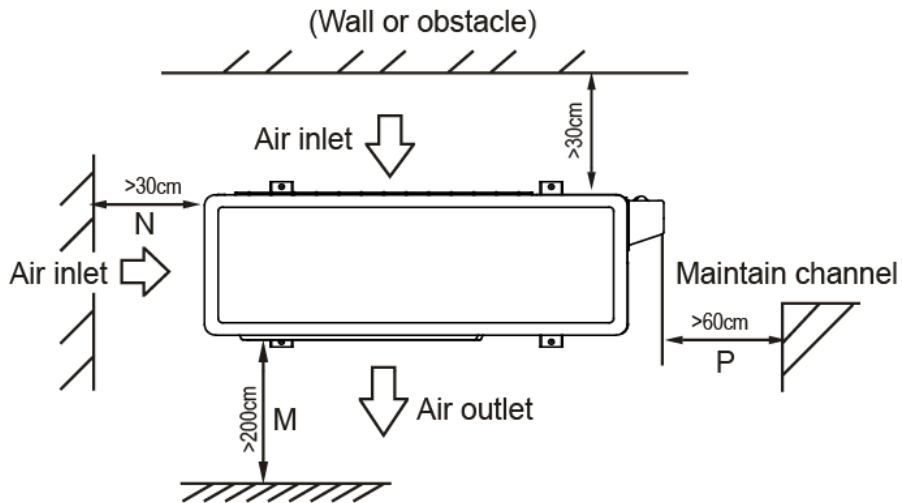
1. Dimensions.....
2. Service Space.....
3. Piping Diagrams.....
4. Wiring Diagrams.....
5. Electric Characteristics.....
6. Sound Levels.....
7. Exploded View.....
8. Operation Limits.....
9. Troubleshooting.....

# 1. Dimensions



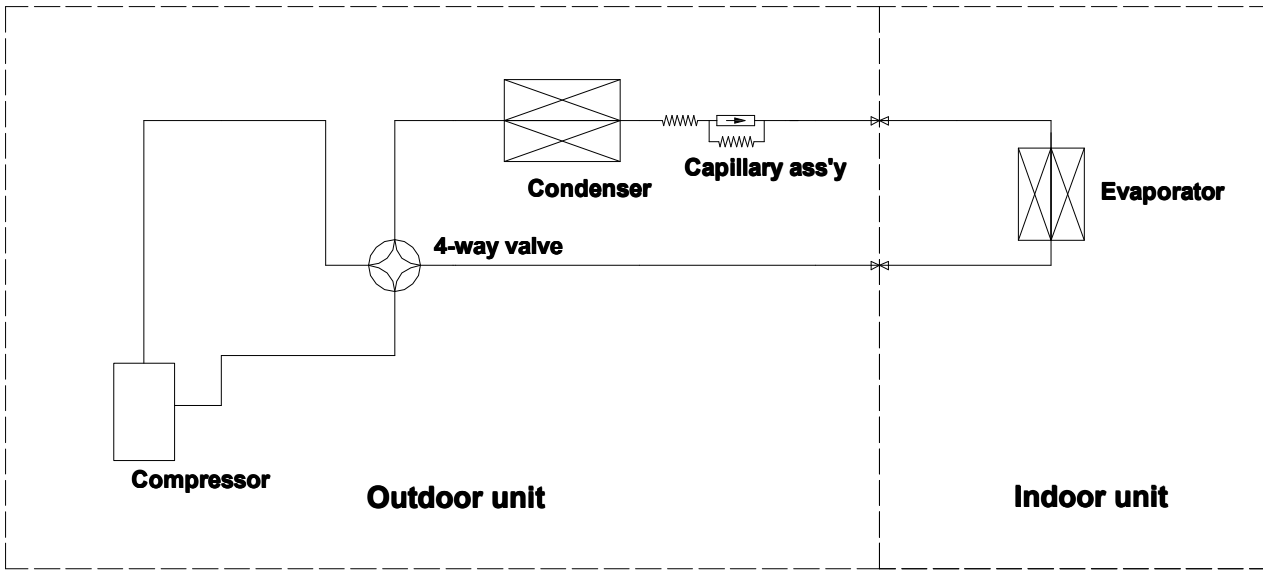
Model	A	B	C	D	E	F	H
MOU-12HDN1- (Q)	761	530	290	315	270	279	593
MOU-18HDN1- (Q)	842	560	335	360	312	324	695

## 2. Service Space

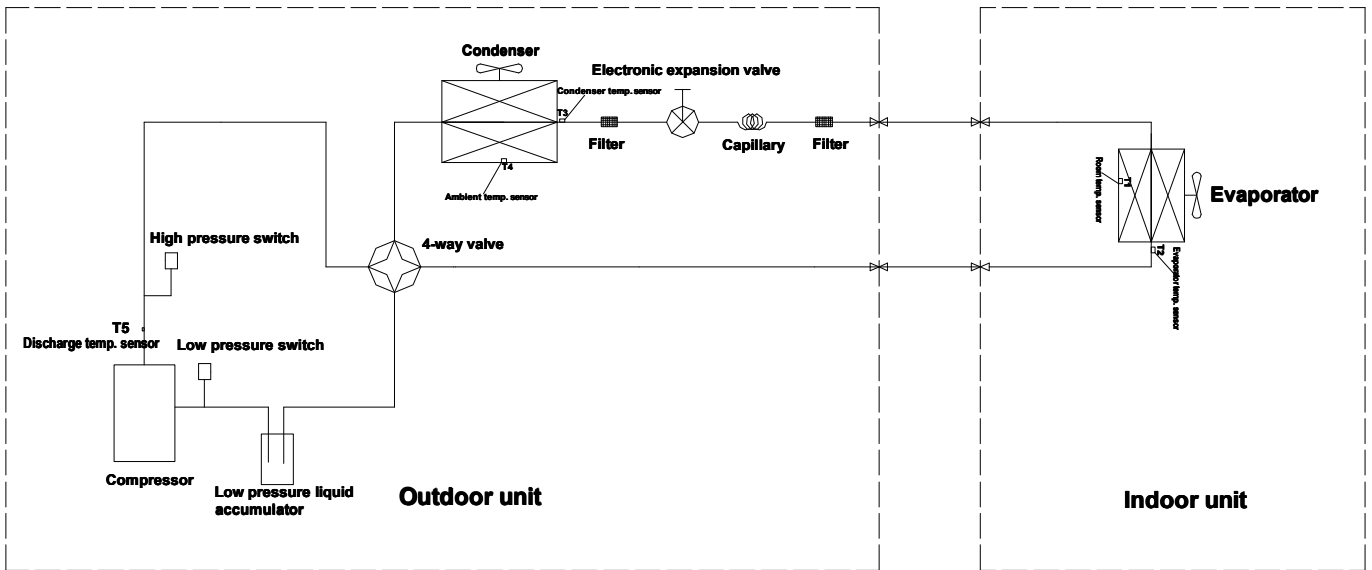


### 3. Piping Diagrams

#### MOU-12HDN1 (-Q)

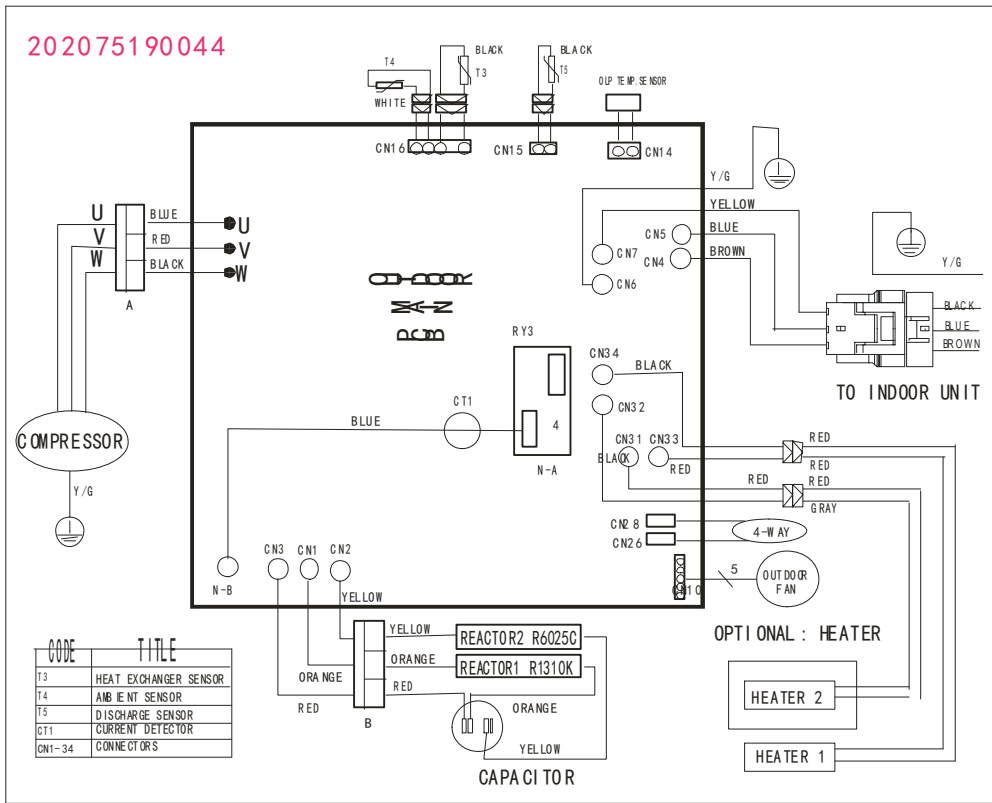


#### MOU-18HDN1 (-Q)

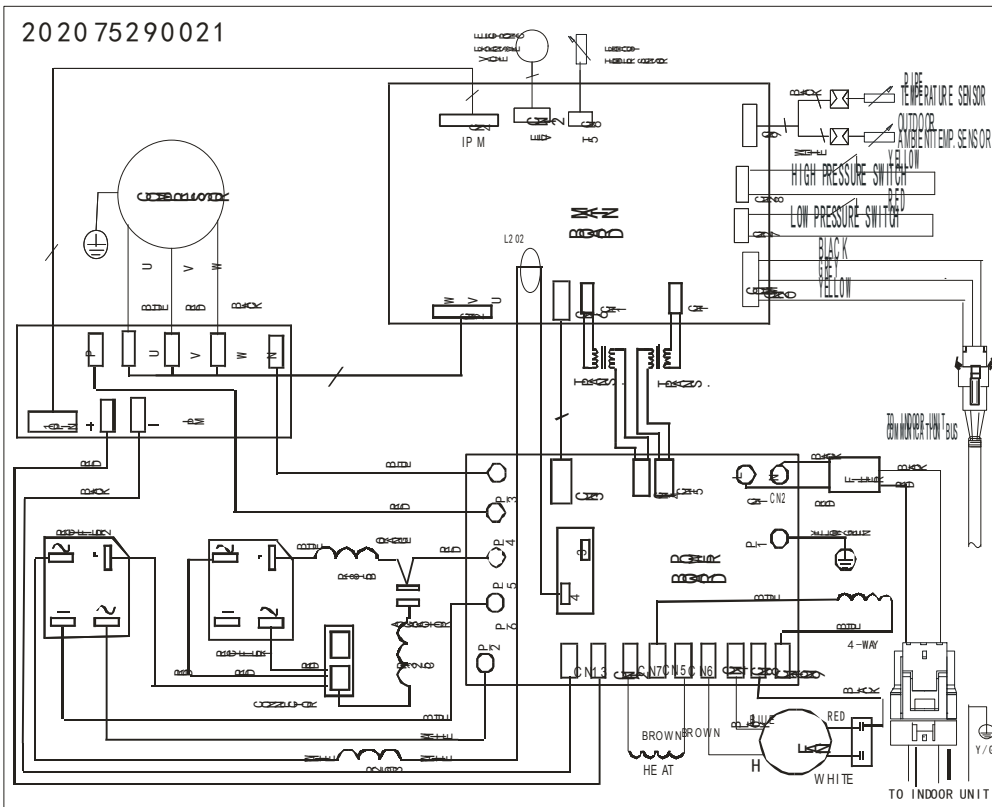


# 4. Wiring Diagrams

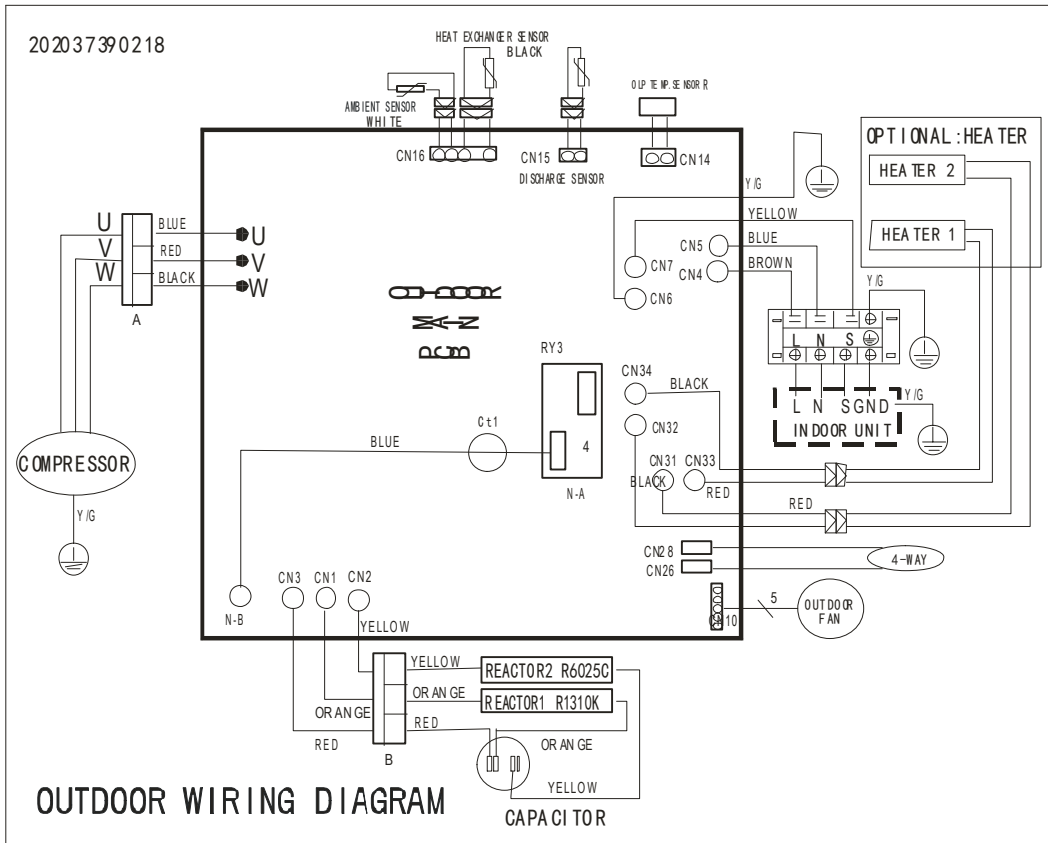
## MOU-12HDN1-Q



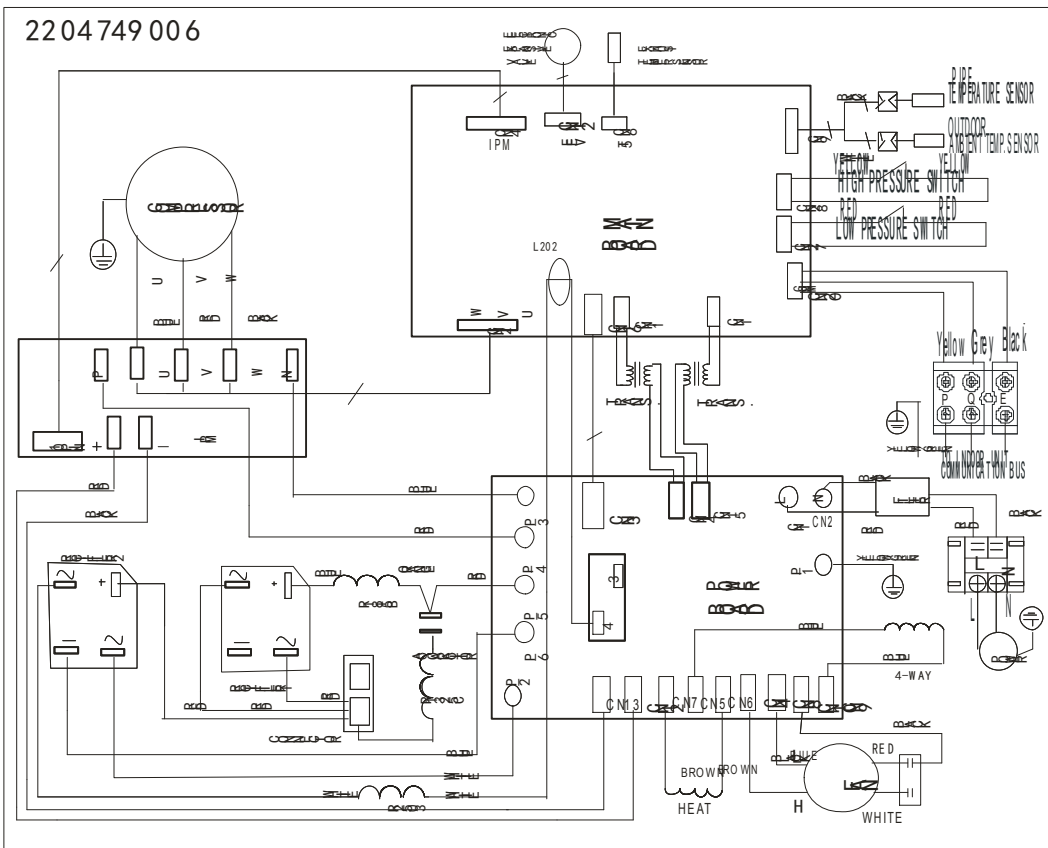
## MOU-18HDN1-Q



# MOU-12HDN1



# MOU-18HDN1



## 5. Electric Characteristics

Model	Outdoor Unit				Power Supply		Compressor	OFM	
	Hz	Voltage	Min.	Max.	TOCA	MFA	RLA	kW	FLA
MOU-12HDN1-Q	50	220~240V	198V	254V	20	16	5.3	0.024	0.27
MOU-18HDN1-Q	50	220~240V	198V	254V	20	16	8.8	0.053	0.59
MOU-12HDN1	50	220~240V	198V	254V	20	16	5.3	0.024	0.27
MOU-18HDN1	50	220~240V	198V	254V	20	16	8.8	0.053	0.59

### Remark:

TOCA: Total Over-current Amps. (A)

MFA: Max. Fuse Amps. (A)

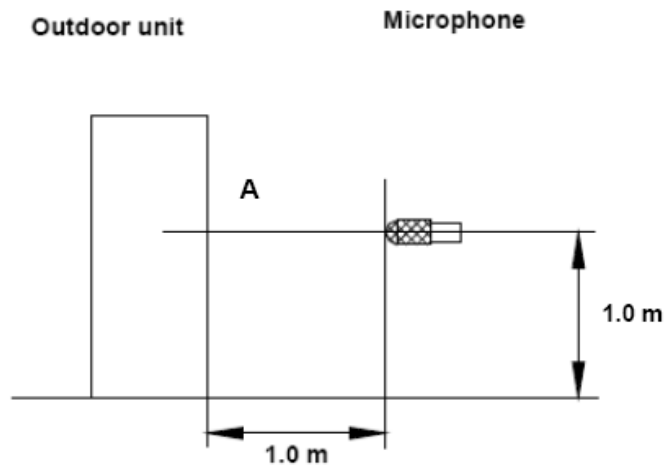
RLA: Rated Locked Amps. (A)

OFM: Outdoor Fan Motor.

FLA: Full Load Amps. (A)

KW: Rated Motor Output (KW)

## 6. Sound Levels

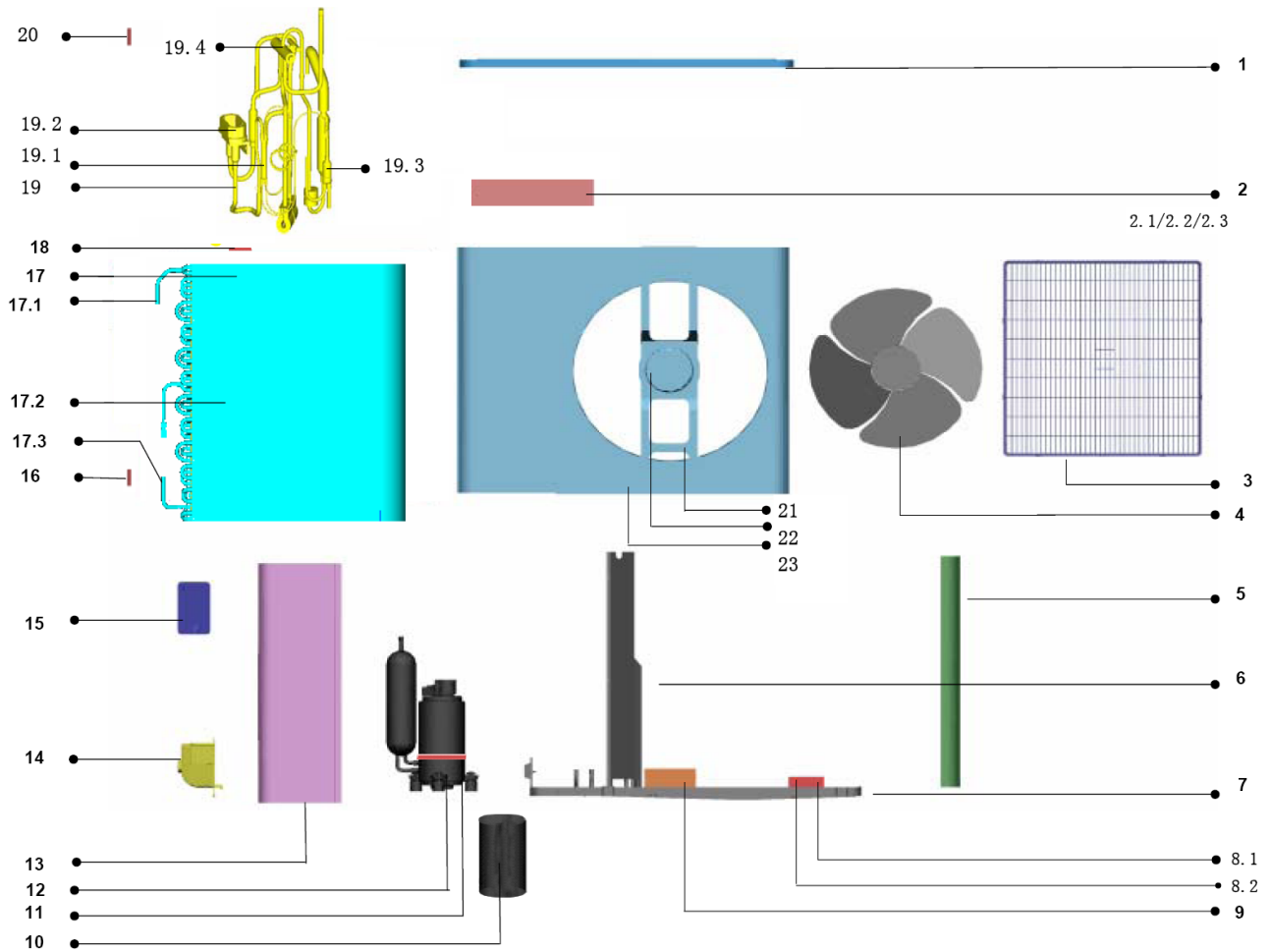


Model	Noise level dB(A)	
	Hi	Lo
MOU-12HDN1(-Q)	48	44
MOU-18HDN1(-Q)	52	47



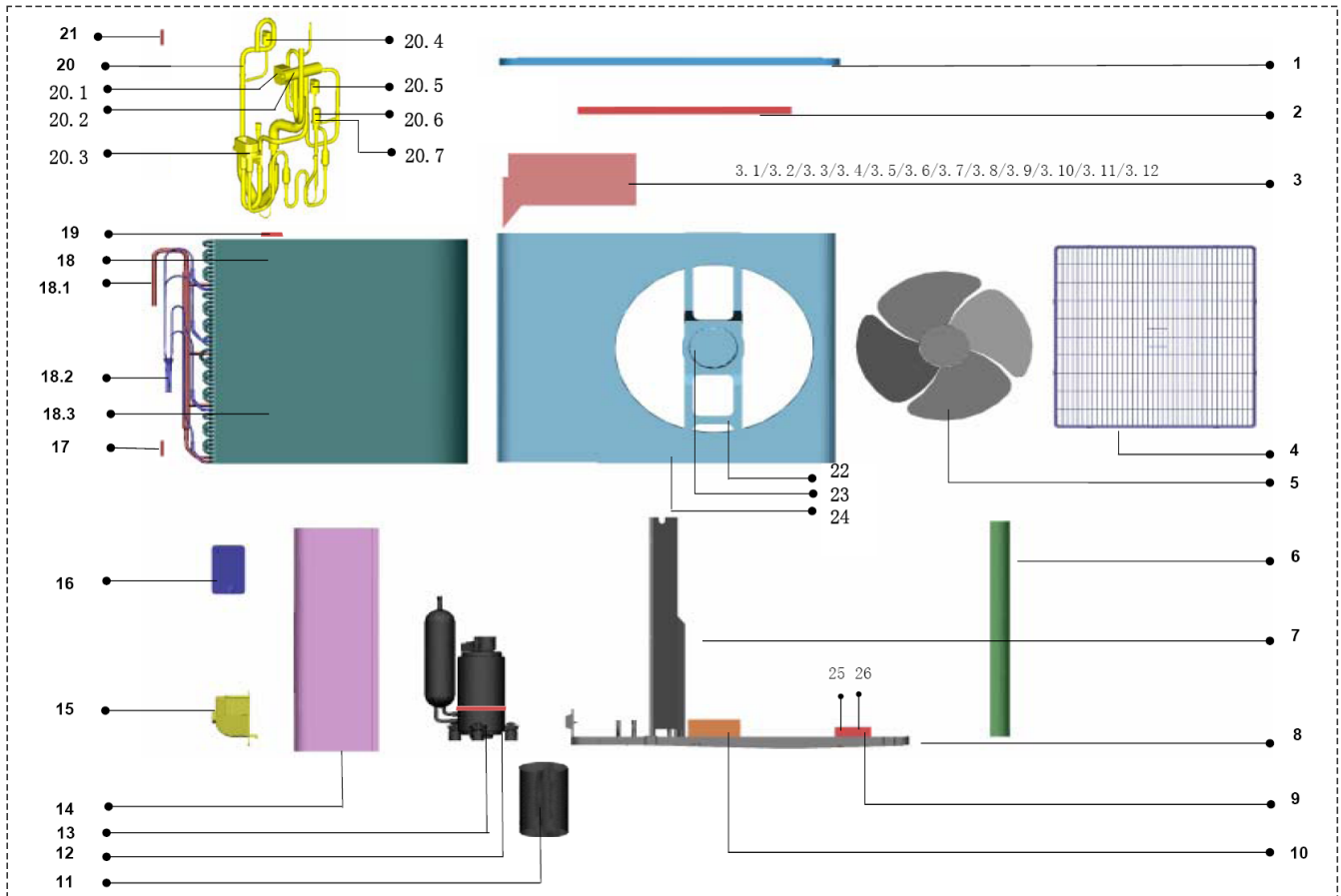
# 7. Exploded View

## MOU-12HDN1-Q



No.	Part name	Quantity	No.	Part name	Quantity
1	Top cover	1	14	Drainage pan	1
2	E-part box ass'y	1	15	Big handle	1
2.1	Main controller ass'y	1	16	Discharge temp sensor ass'y	1
2.2	Compressor capacitor	1	17	Condenser ass'y	1
2.3	Radiator	1	17.1	Condenser inlet pipe ass'y	1
3	Grille	1	17.2	Condenser	1
4	Axial flow fan	1	17.3	Condenser outlet pipe	1
5	Left holder	1	18	Room temp sensor ass'y	1
6	Partition board ass'y	1	19	Connect couplings ass'y	1
7	Base ass'y	1	19.1	One way valve	1
8.1	Reactance	1	19.2	Connect couplings	1
8.2	Reactance	1	19.3	Strainer ass'y	1
9	Electric inductance cover ass'y	1	19.4	Four-way electro-magnetic reversing valve	1
10	Sponge	1	20	Temp. sensor ass'y	1
11	Compressor electric heater	1	21	Motor bracket	1
12	Compressor	1	22	Motor	1
13	Right cover	1	23	Front panel	1

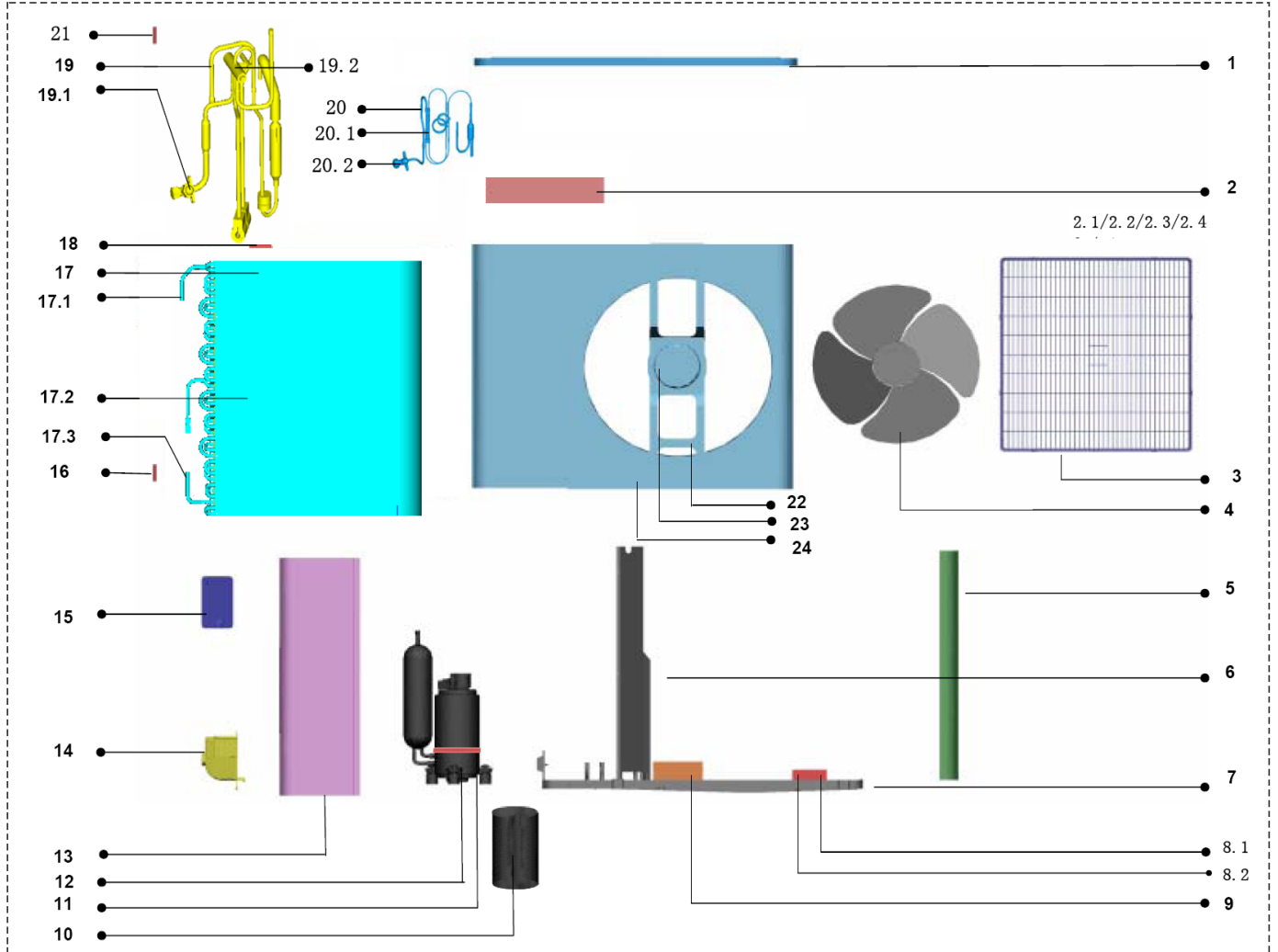
# MOU-18HDN1-Q



No.	Part name	Quantity	No.	Part name	Quantity
1	Top cover ass'y	1	13	Compressor	1
2	Rear net frame	1	14	Rear right clapboard ass'y	1
3	E-part box ass'y	1	15	Drainage cover	1
3.1	Inverter radiator	1	16	Big handle	1
3.2	Transformer	1	17	Discharge temp sensor ass'y	1
3.3	Transformer	1	18	Condenser ass'y	1
3.4	Main controller ass'y	1	18.1	Output pipe ass'y	1
3.5	Inverter control Module	1	18.2	Input pipe ass'y	1
3.6	Rectifier	2	18.3	Condenser	1
3.7	Compressor capacitor	1	19	Temp sensor	1
3.8	Power board ass'y	1	20	Connect coupling ass'y	1
3.9	Main controller ass'y	1	20.1	Solenoid	1
3.10	EMC filter	1	20.2	4-way valve	1
3.11	Motor capacitor	1	20.3	Connect coupling	1
3.12	Wire joint	1	20.4	Pressure controller	1
4	Grille	1	20.5	Pressure controller	1
5	Axial flow fan	1	20.6	Electronic expansion valve	1
6	Left holder	1	20.7	EEV solenoid	1
7	Partition board ass'y	1	21	Temp. sensor ass'y	1
8	Base ass'y	1	22	Motor bracket ass'y	1

9	Reactance	1	23	Motor	1
10	Electrical inductance box	1	24	Front panel	1
11	Sponge	1	25	Reactance	1
12	Compressor electric heater	1	26	Reactance	1

## MOU-12HR



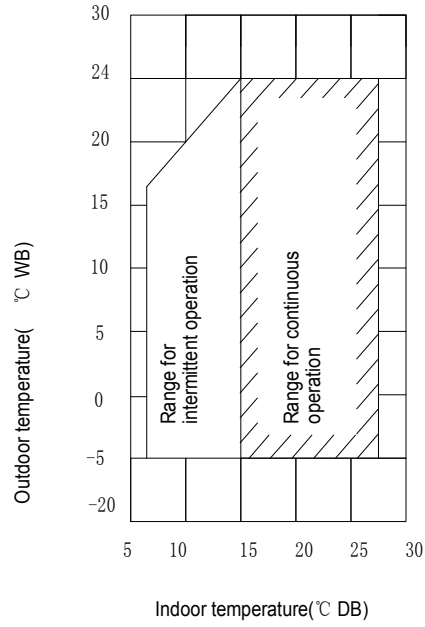
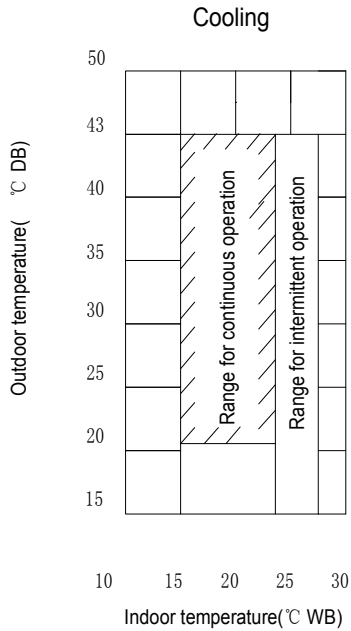
No.	Part Name	No.	Part Name
1	Top cover	14	Drainage pan
2	E-part box ass'y	15	Big handle
2.1	Main controller ass'y	16	Discharge temp sensor ass'y
2.2	Compressor capacitor	17	Condenser ass'y
2.3	Radiator	17.1	Condenser inlet pipe ass'y
3	Grille	17.2	Condenser
4	Axial flow fan	17.3	Condenser outlet pipe
5	Left holder	18	Room temp sensor ass'y
6	Partition board ass'y	19	Connect couplings ass'y
7	Base ass'y	19.1	One way valve
8.1	Reactance	19.2	Connect couplings

8.2	Reactance	19.3	Strainer ass'y
9	Electric inductance cover ass'y	19.4	Four-way electro-magnetic reversing valve
10	Sponge	20	Temp.sensor ass'y
11	Compressor electric heater	21	Motor bracket
12	Compressor	22	Motor
13	Right cover	23	Front panel

## 8. Operation Limits

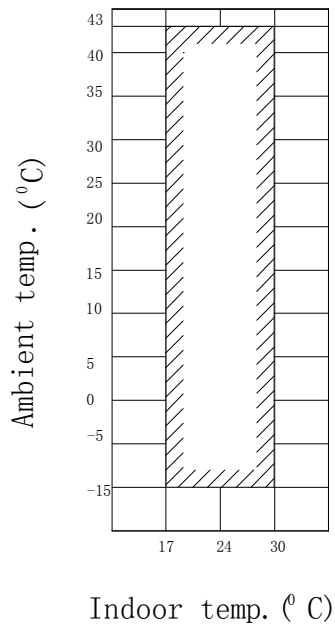
Item / Model	Cooling mode		Heating mode	
	Outdoor	Indoor	Outdoor	Indoor
<b>MOU-12HDN1 (-Q)</b>	21°C~43°C	17°C~30°C	-5°C~24°C	17°C~30°C

Heating

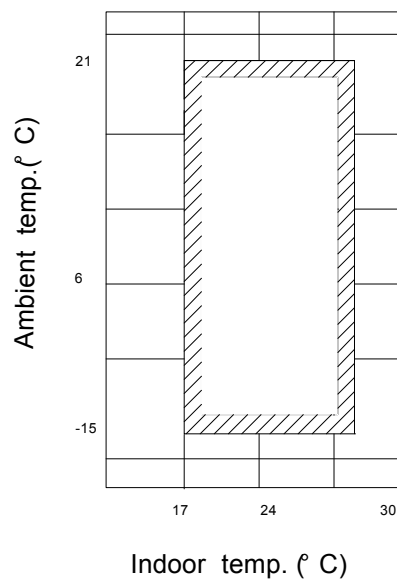


Item / Model	Cooling mode		Heating mode	
	Outdoor	Indoor	Outdoor	Indoor
<b>MOU-18HDN1 (-Q)</b>	-15°C~43°C	17°C~30°C	-15°C~21°C	17°C~30°C

cooling

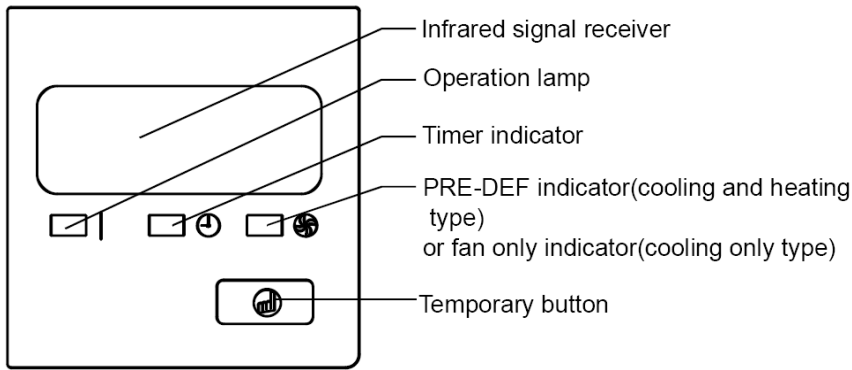


Heating



## 9. Troubleshooting

## 9.1 Indoor unit malfunction



### ◆ LED Indication (MFA-12HRDN1 (-Q))

No	Running lamp	Timer lamp	Defrosting lamp	Malfunction
1	☆	×	×	Room temperature sensor checking channel is abnormal
2	×	×	☆	Evaporator sensor checking channel is abnormal
3	×	☆	×	In-outdoor unit communication checking channel is abnormal
4	☆	☆	×	EEPROM malfunction
5	☆	×	☆	Module protection
6	☆	☆	☆	Outdoor temperature sensors malfunction
7	☆	☆	●	Outdoor unit voltage protection
8	☆	●	×	Compressor discharge over-temperature protection
9	☆	●	●	Outdoor unit current protection

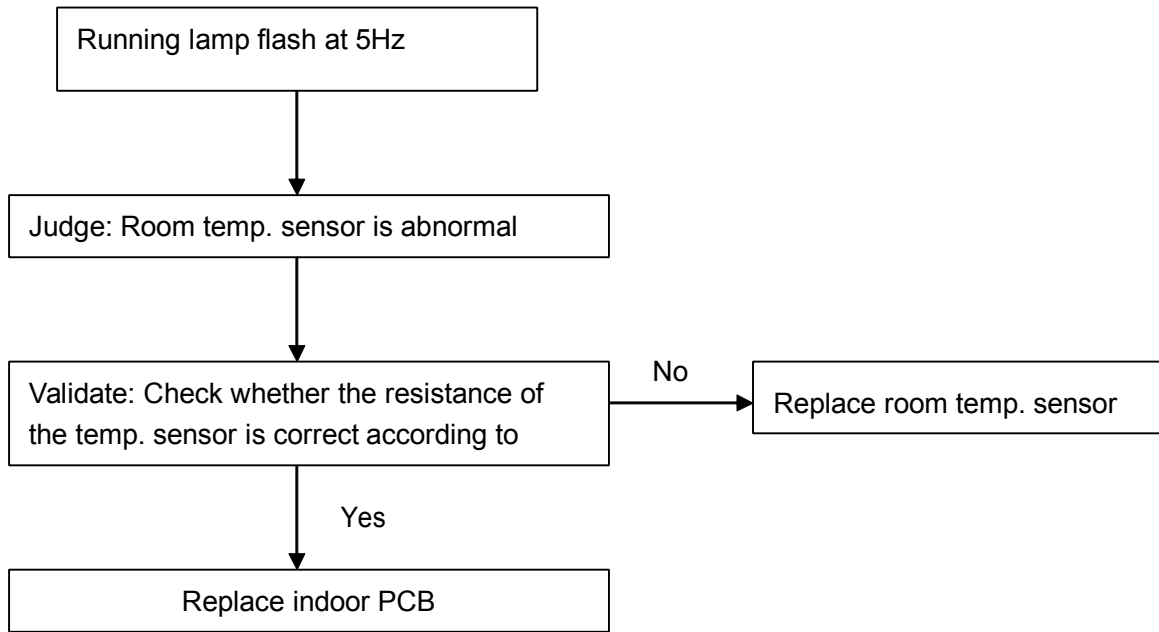
(× Extinguish, ☆ Flash at 5Hz, ● On)

### ◆ LED Indication (MFA-18HRDN1 (-Q))

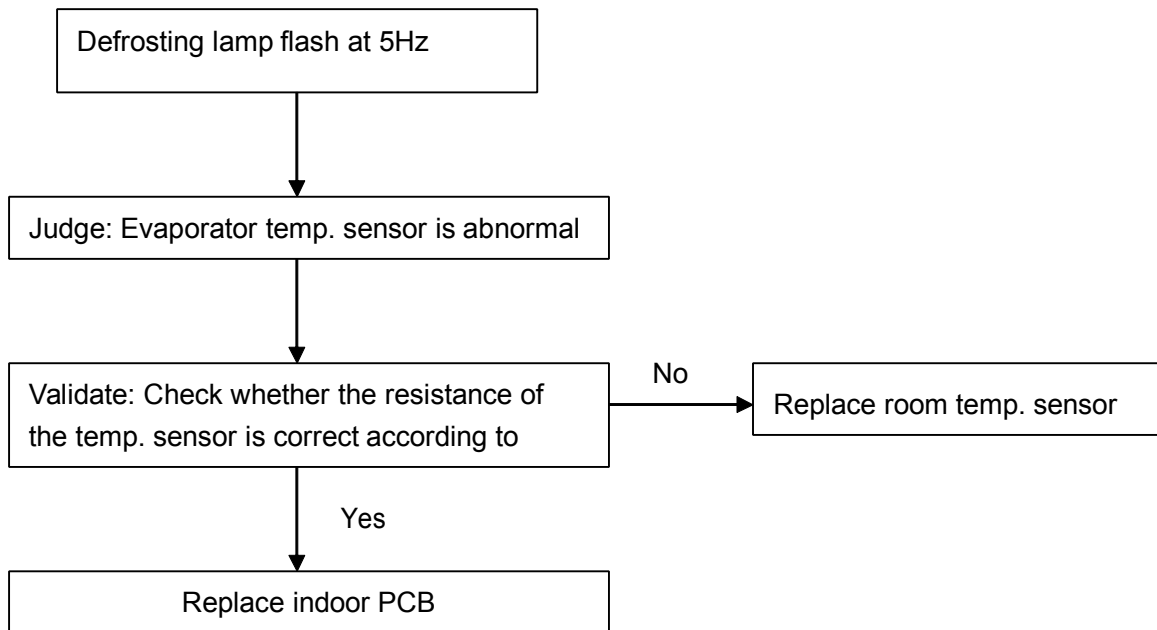
No.	Running lamp	Timer lamp	Defrosting lamp	Malfunction
1	☆	×	×	Room temperature sensor malfunction
2	×	☆	×	Indoor/outdoor unit communication is abnormal
3	×	×	◎	Outdoor unit is abnormal.

### ◆ MFA-12HRDN1 (-Q)

#### 1. Running lamp flash at 5Hz

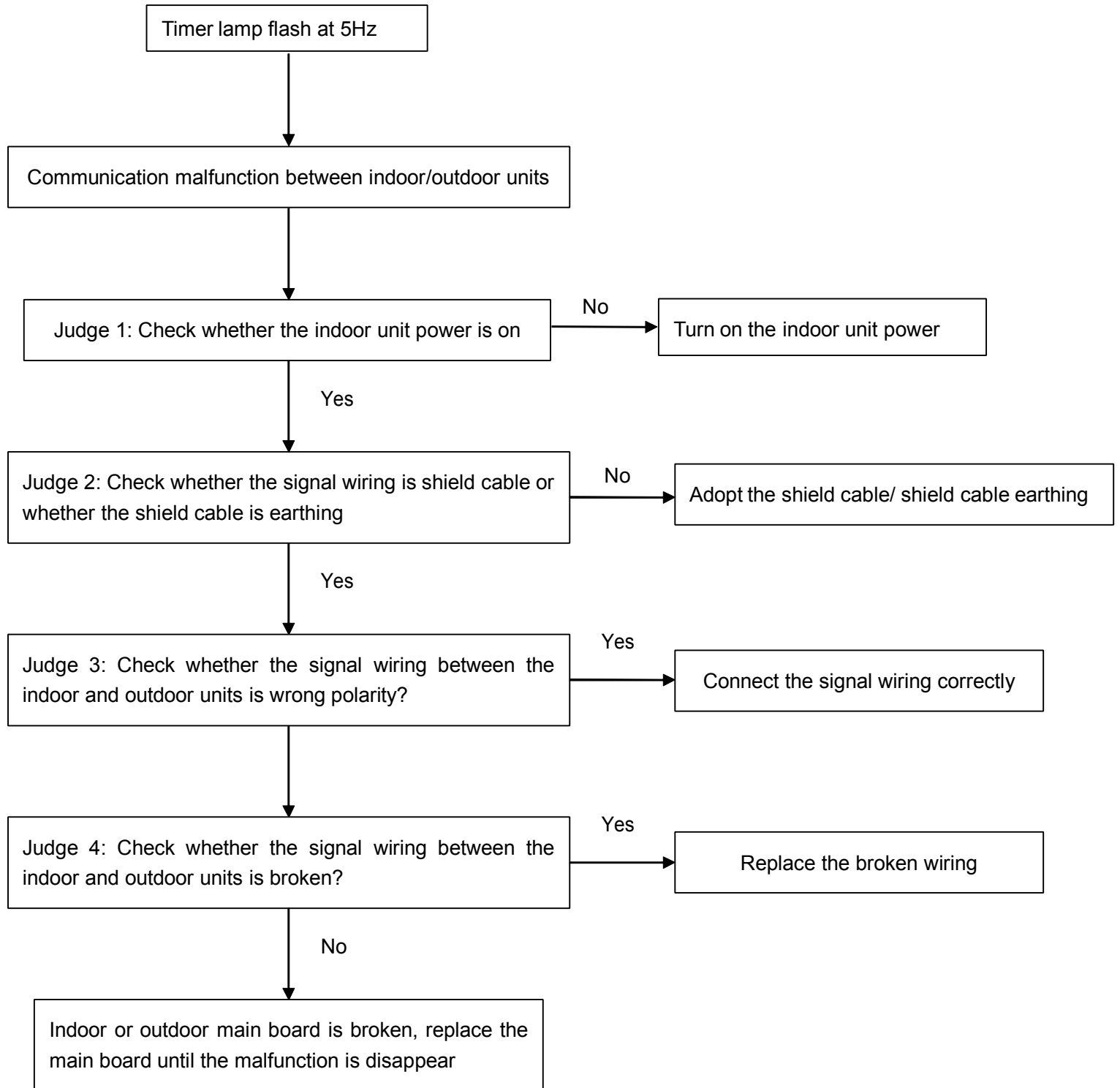


## 2. Defrosting lamp flash at 5Hz

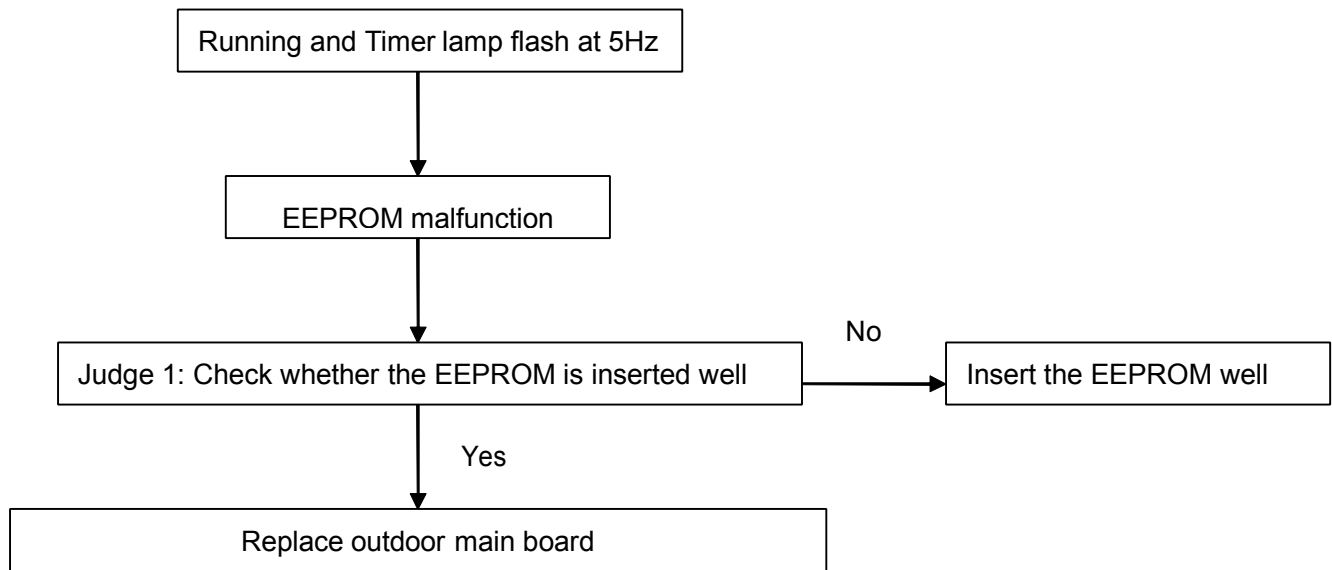




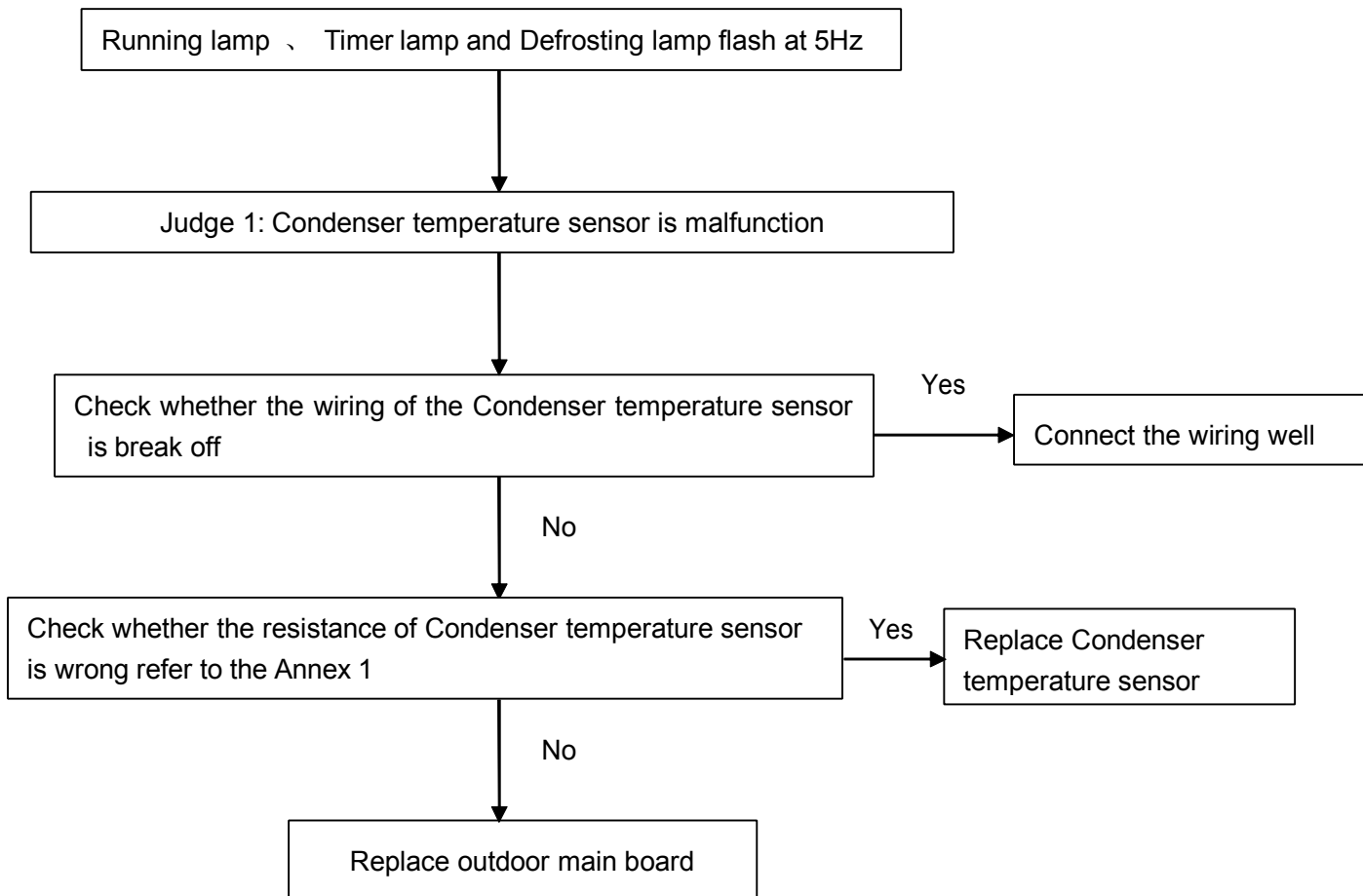
### 3. Timer lamp flash at 5Hz



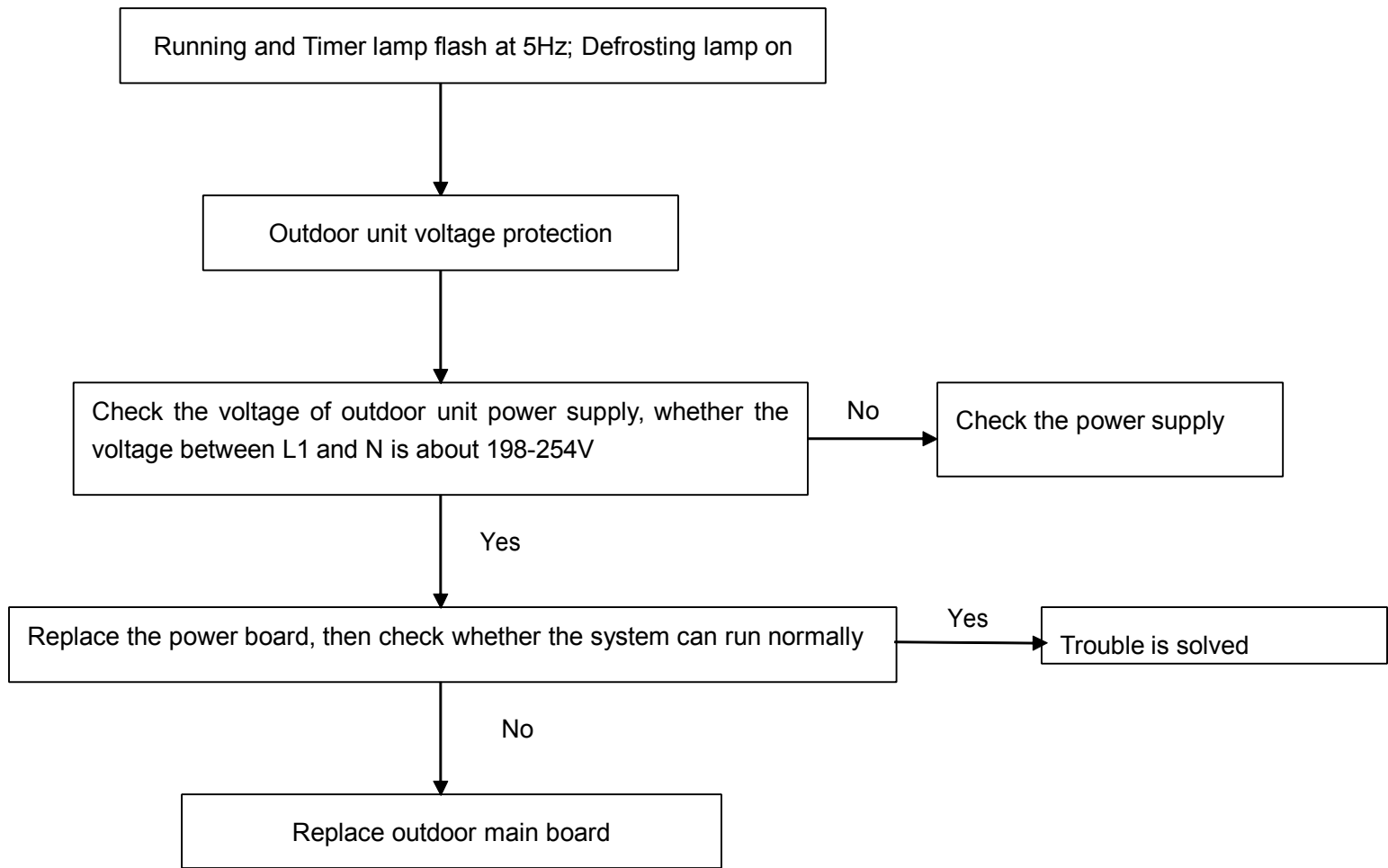
#### 4. Running and Timer lamp flash at 5Hz



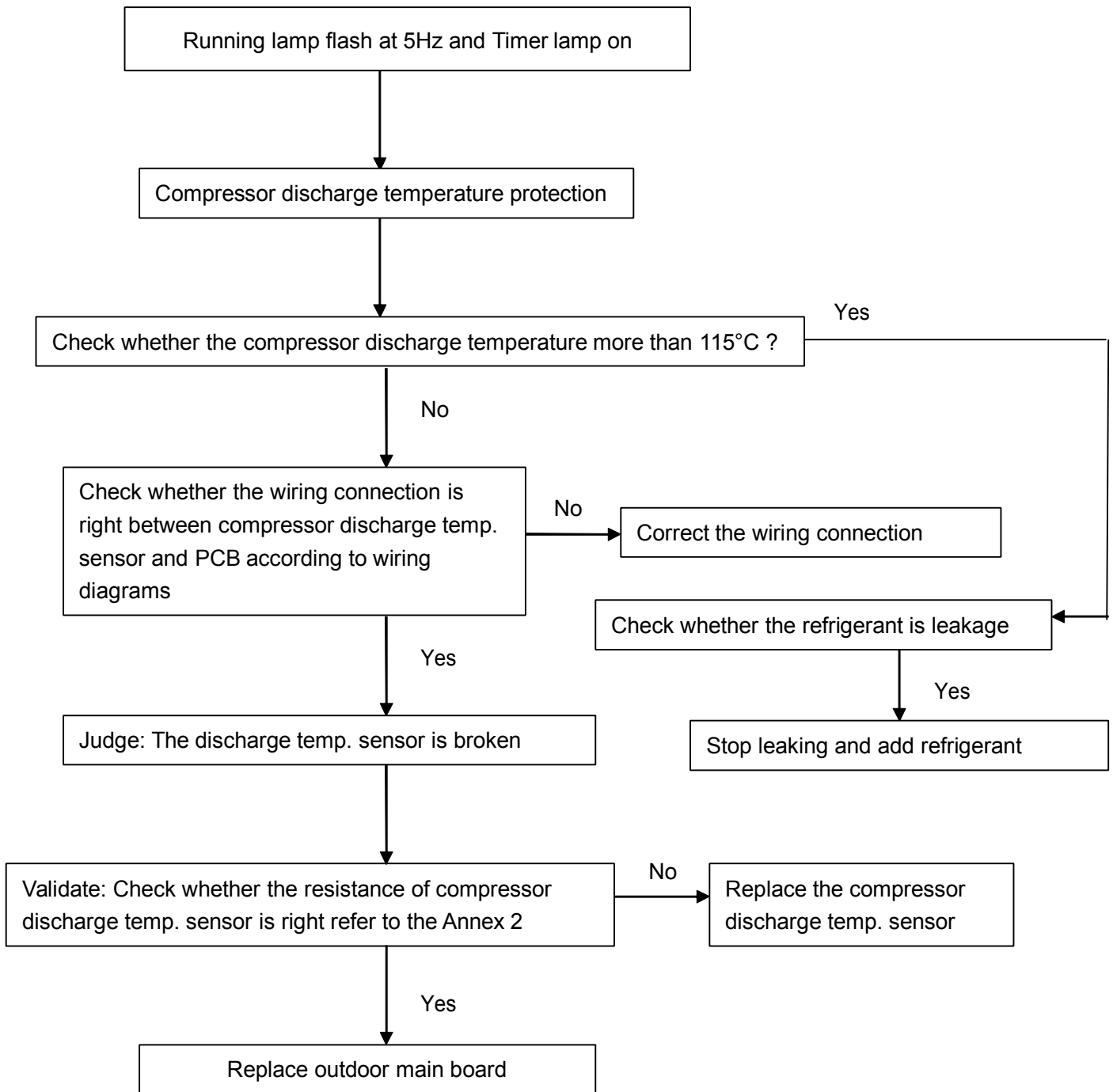
**5. Running lamp 、 Timer lamp and Defrosting lamp flash at 5Hz:**



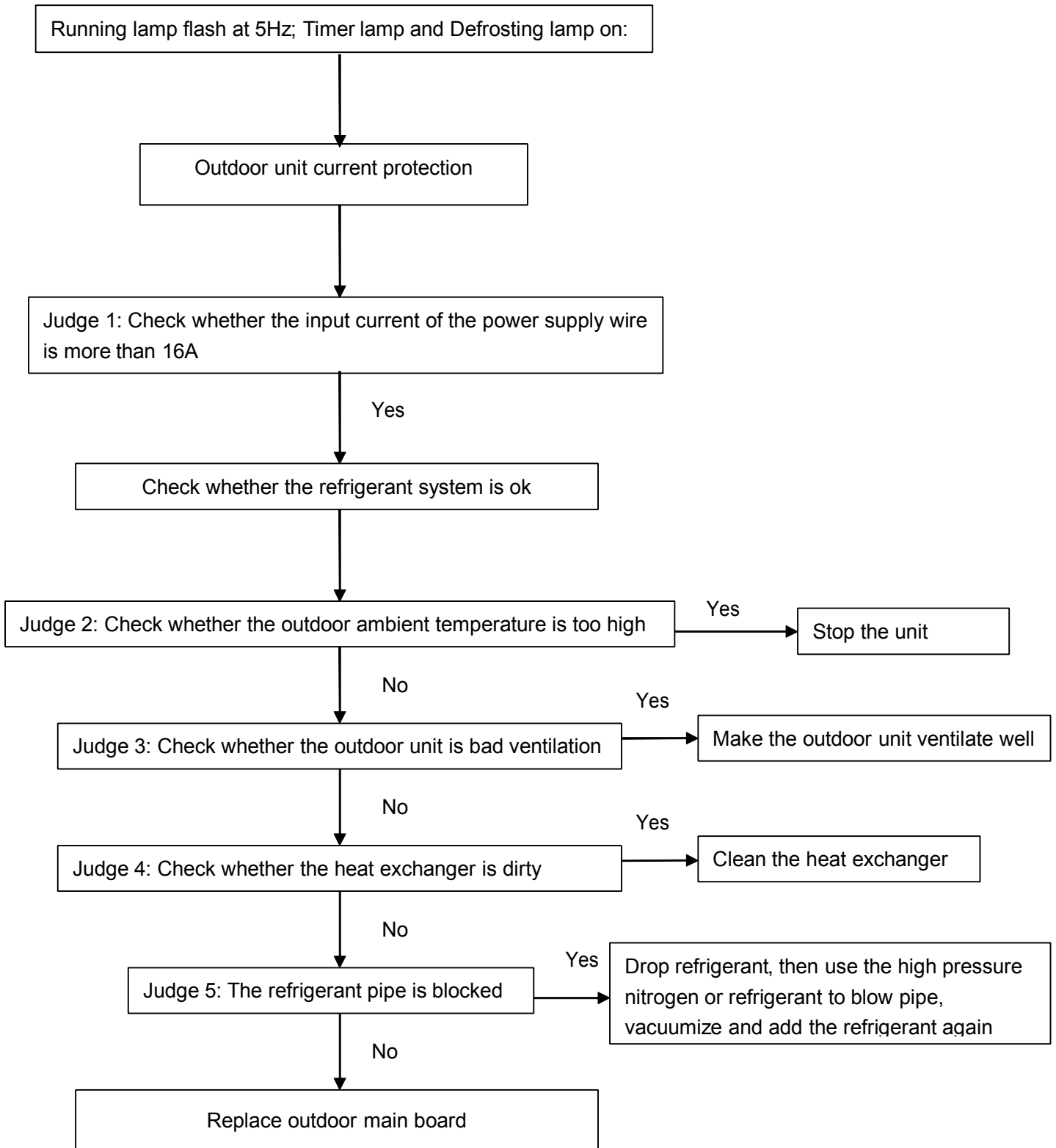
**6. Running and Timer lamp flash at 5Hz; Defrosting lamp on;**



**7. Running lamp flash at 5Hz and defrosting lamp on:**

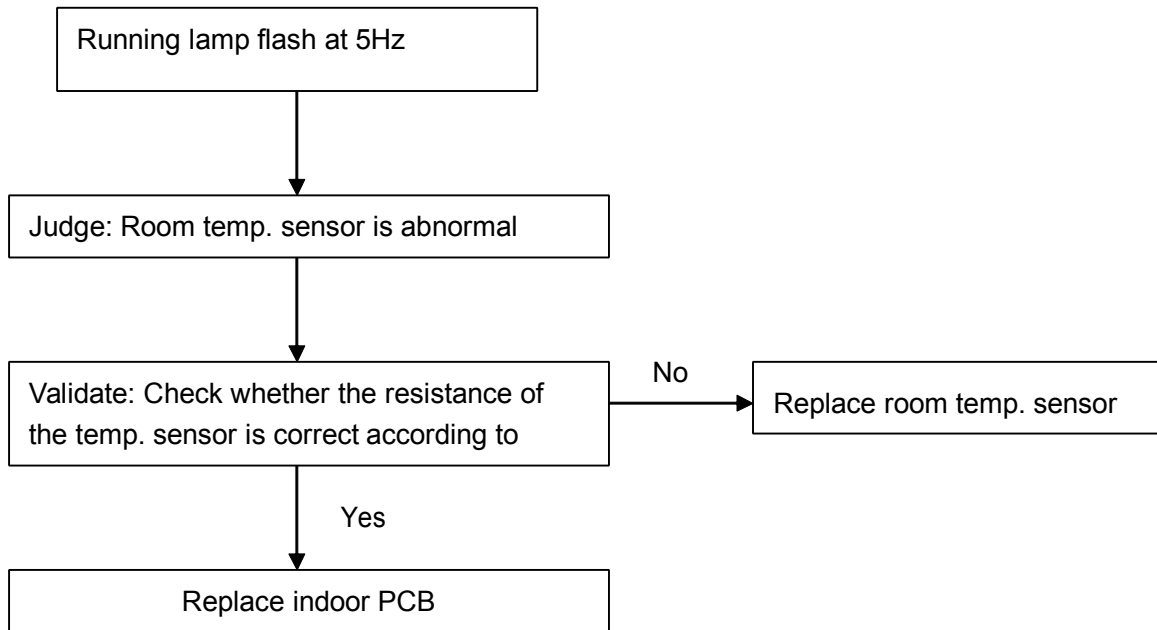


**8. Running lamp flash at 5Hz; Timer lamp and Defrosting lamp on:**

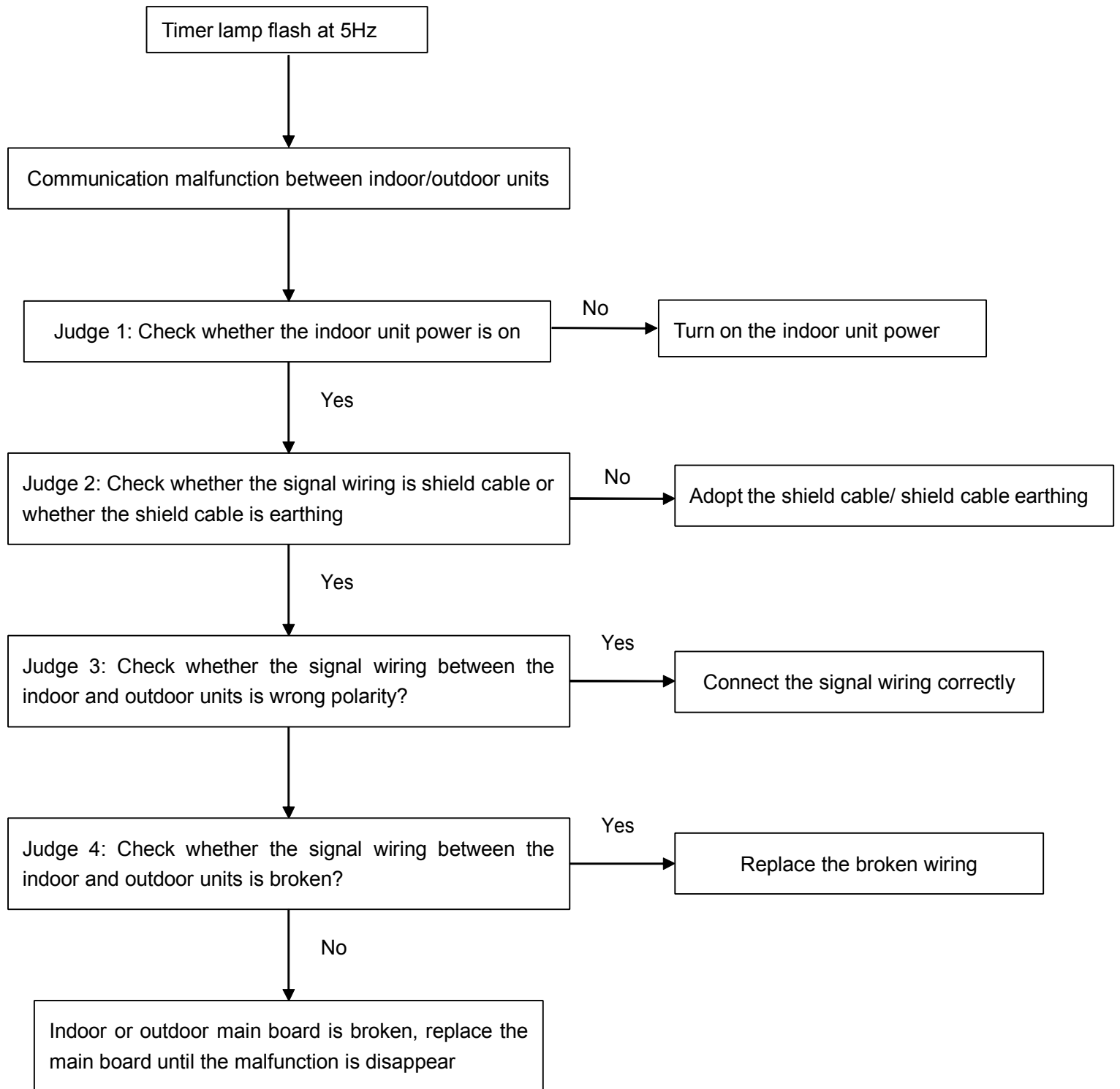


◆ MFA-18HRDN1 (-Q)

1. Running lamp flash at 5Hz



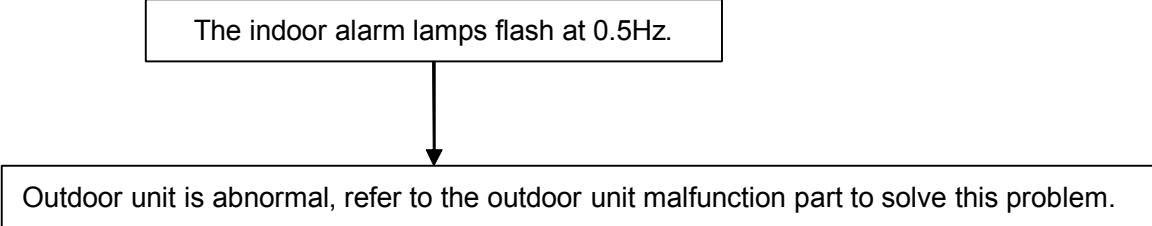
## 2. Timer lamp flash at 5Hz





### 3. Defrosting lamp flash at 0.5Hz

The indoor alarm lamps flash at 0.5Hz.



Outdoor unit is abnormal, refer to the outdoor unit malfunction part to solve this problem.

## 9.2 Outdoor unit 18000Btu/h malfunctions:

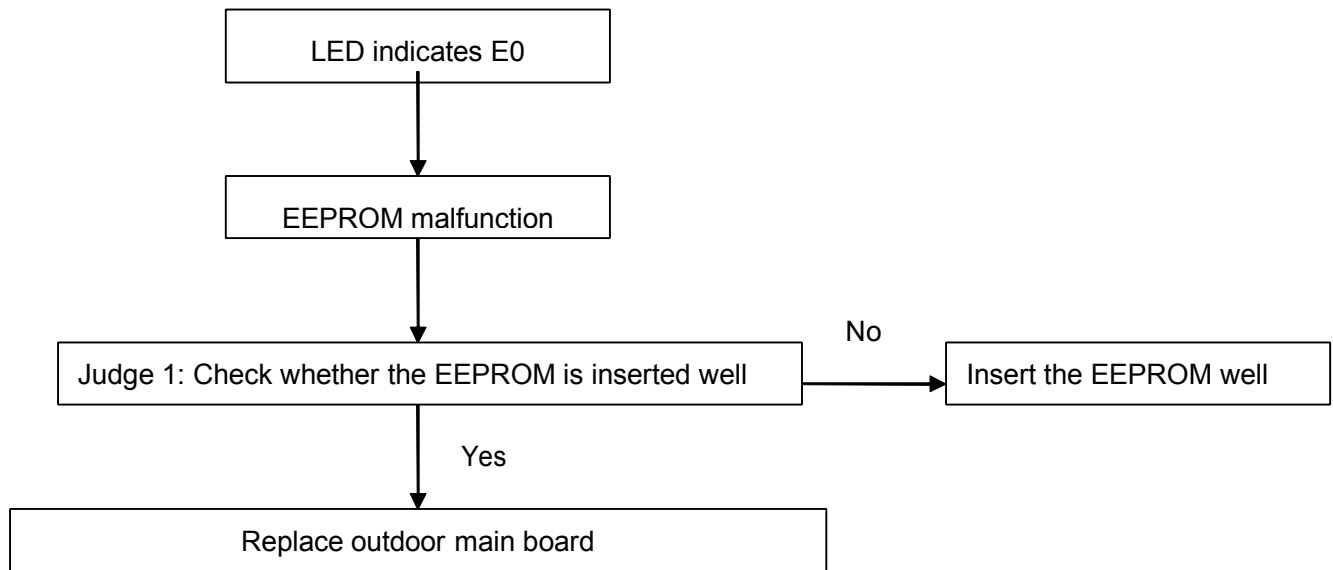
Display	Malfunction or Protection
E0	EEPROM malfunction
E2	Communication malfunction between indoor/outdoor units
E3	Communication malfunction in outdoor PCB
E4	Outdoor temperature sensors malfunction
E5	Compressor voltage protection
P0	Compressor top temp. protection
P1	High pressure protection
P2	Low pressure protection
P3	Compressor current protection
P4	Compressor discharge temperature protection
P5	Condenser high temperature protection
P6	IPM protection

**Note:**

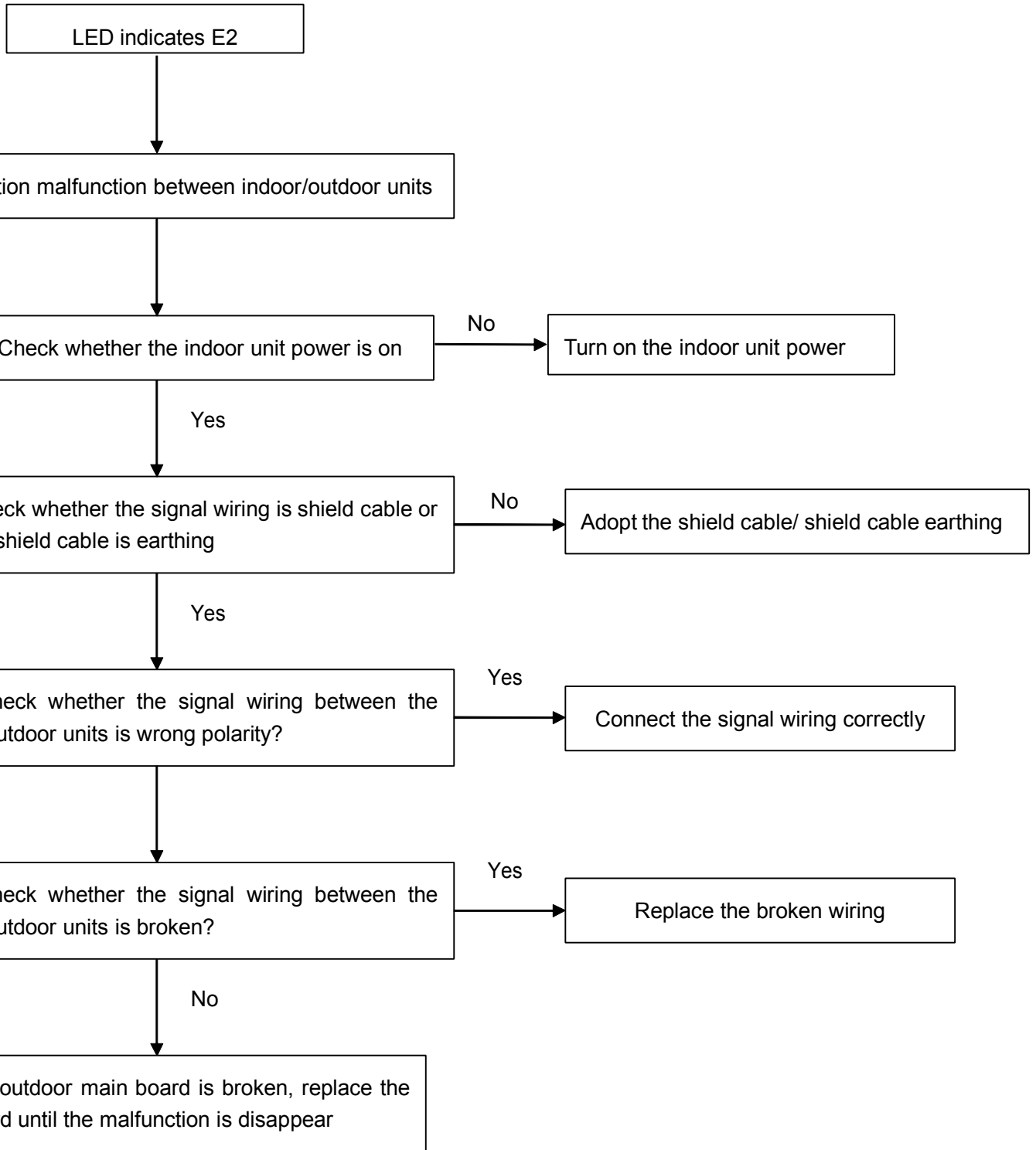
**12000Btu/h: Its malfunctions are displayed on the indoor units' indicator.**

**18000Btu/h: Its malfunctions are displayed on the outdoor units' digital tube.**

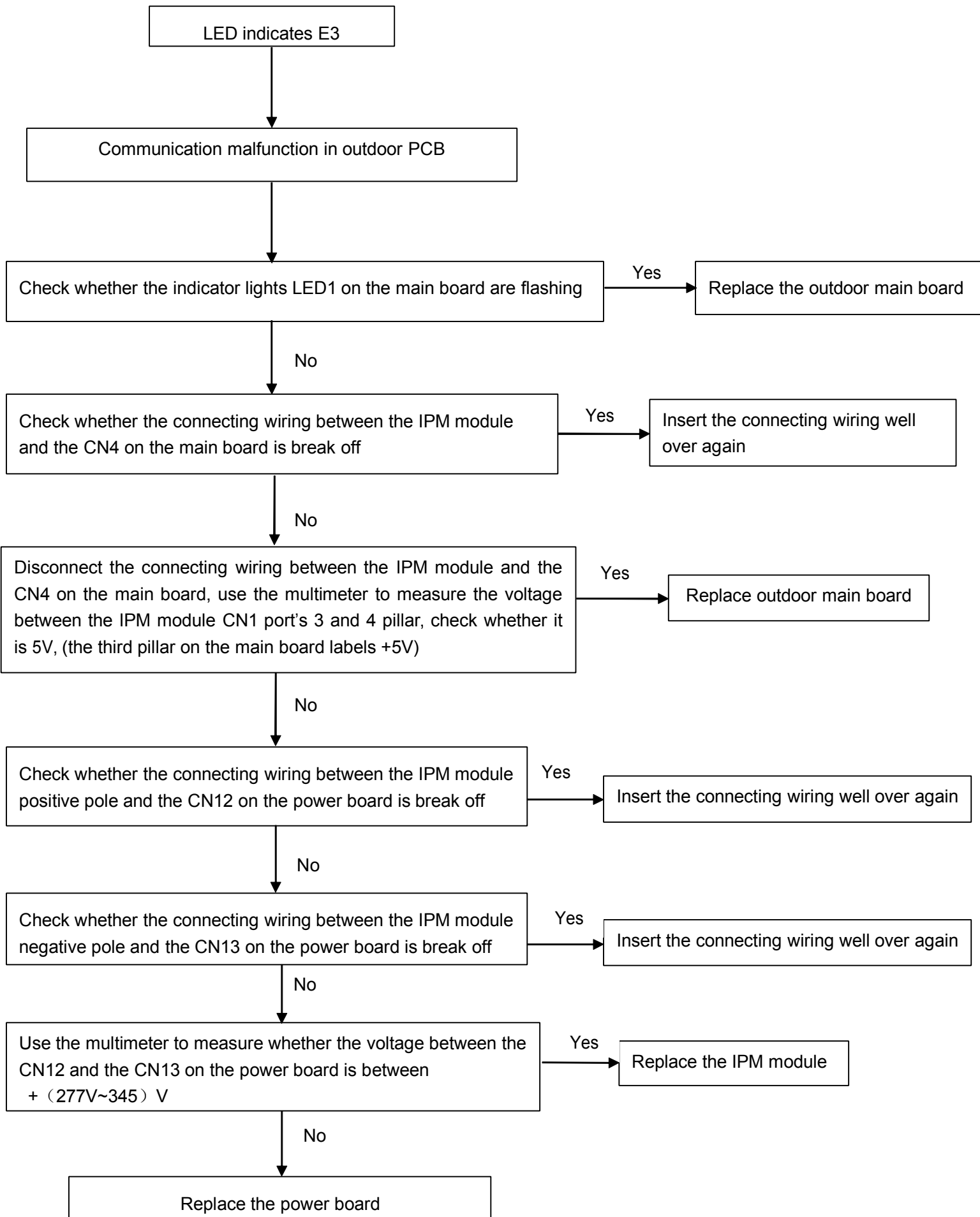
## 1. E0 malfunction



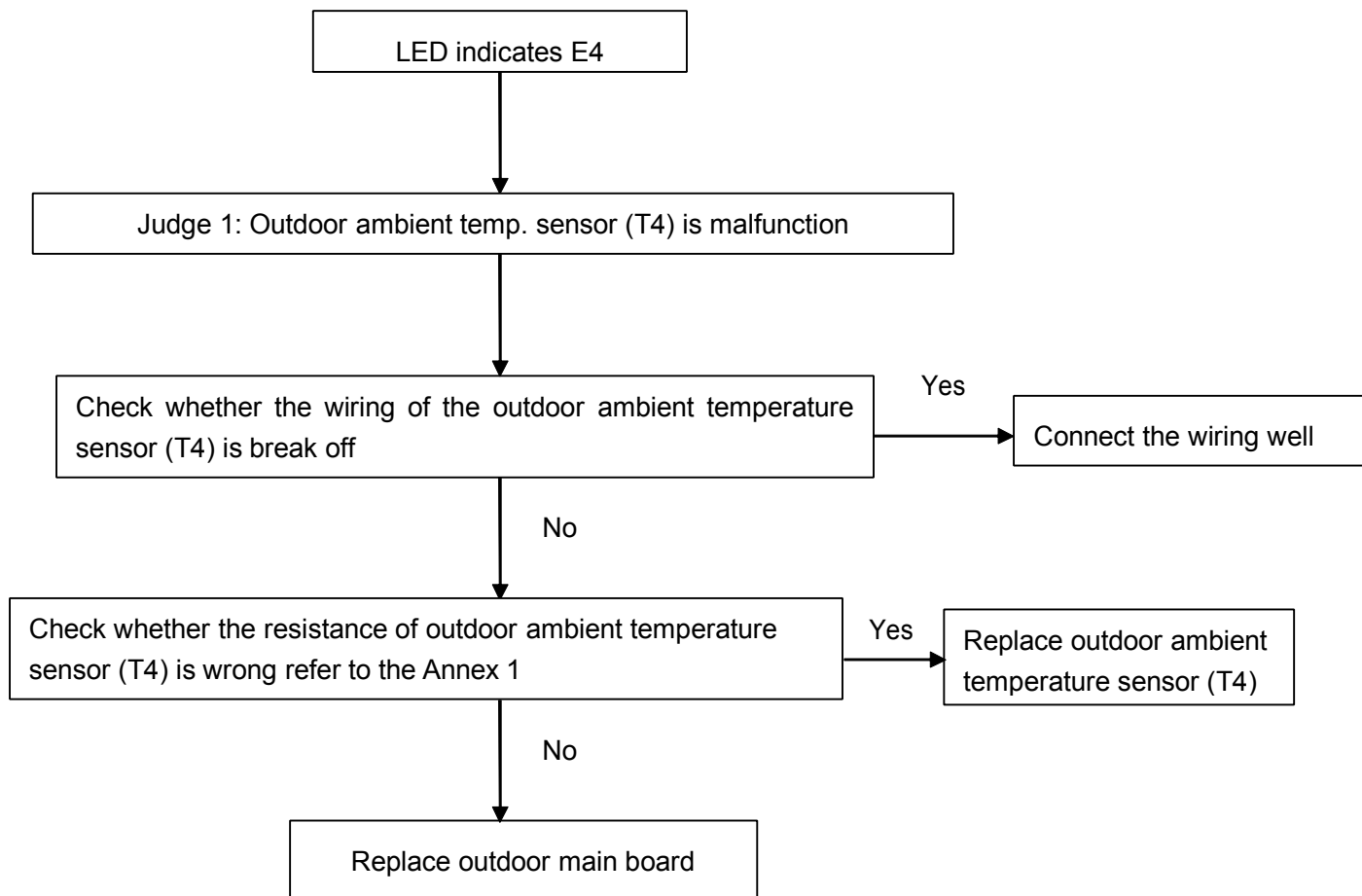
## 2. E2 malfunction



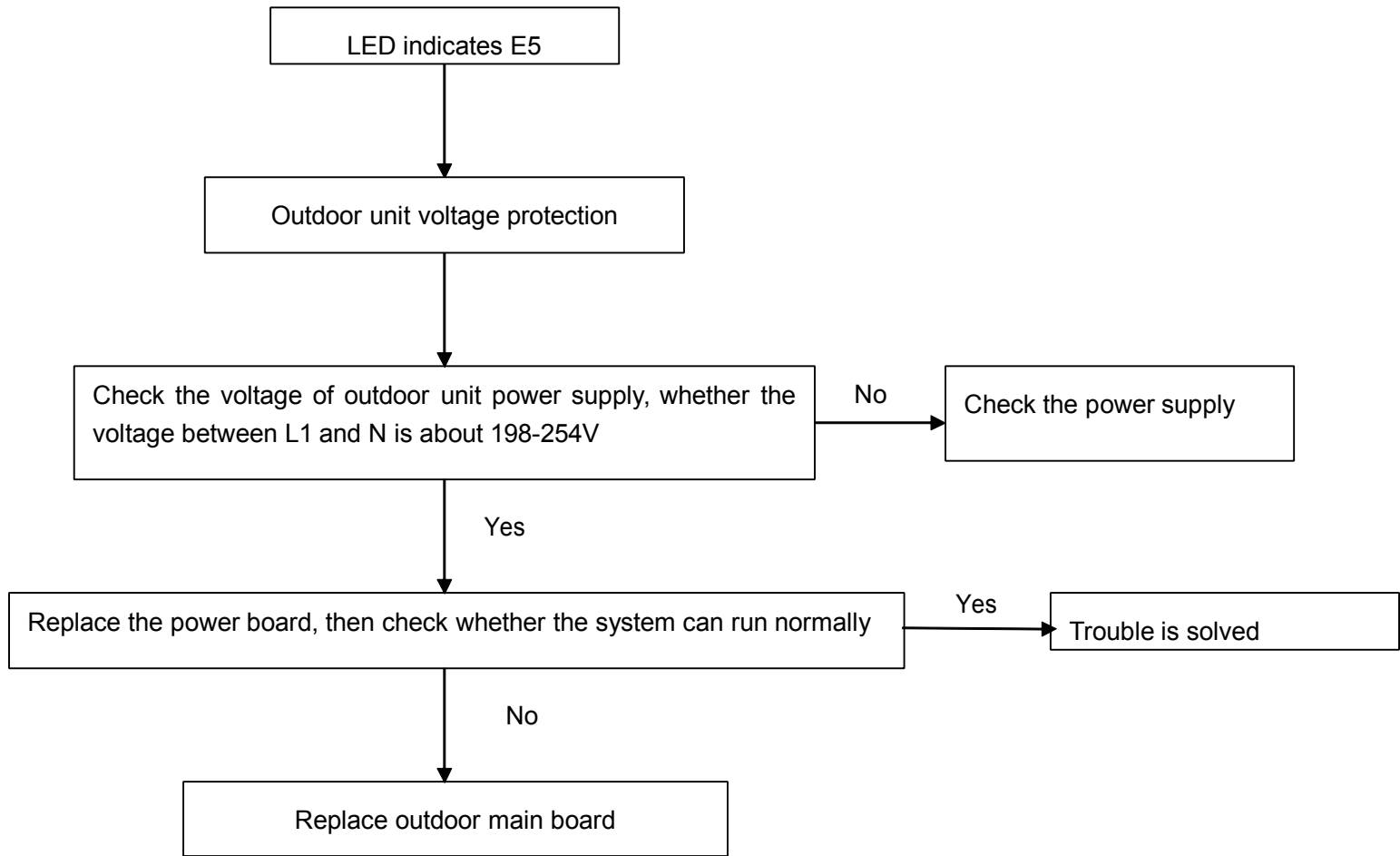
### 3. E3 malfunction



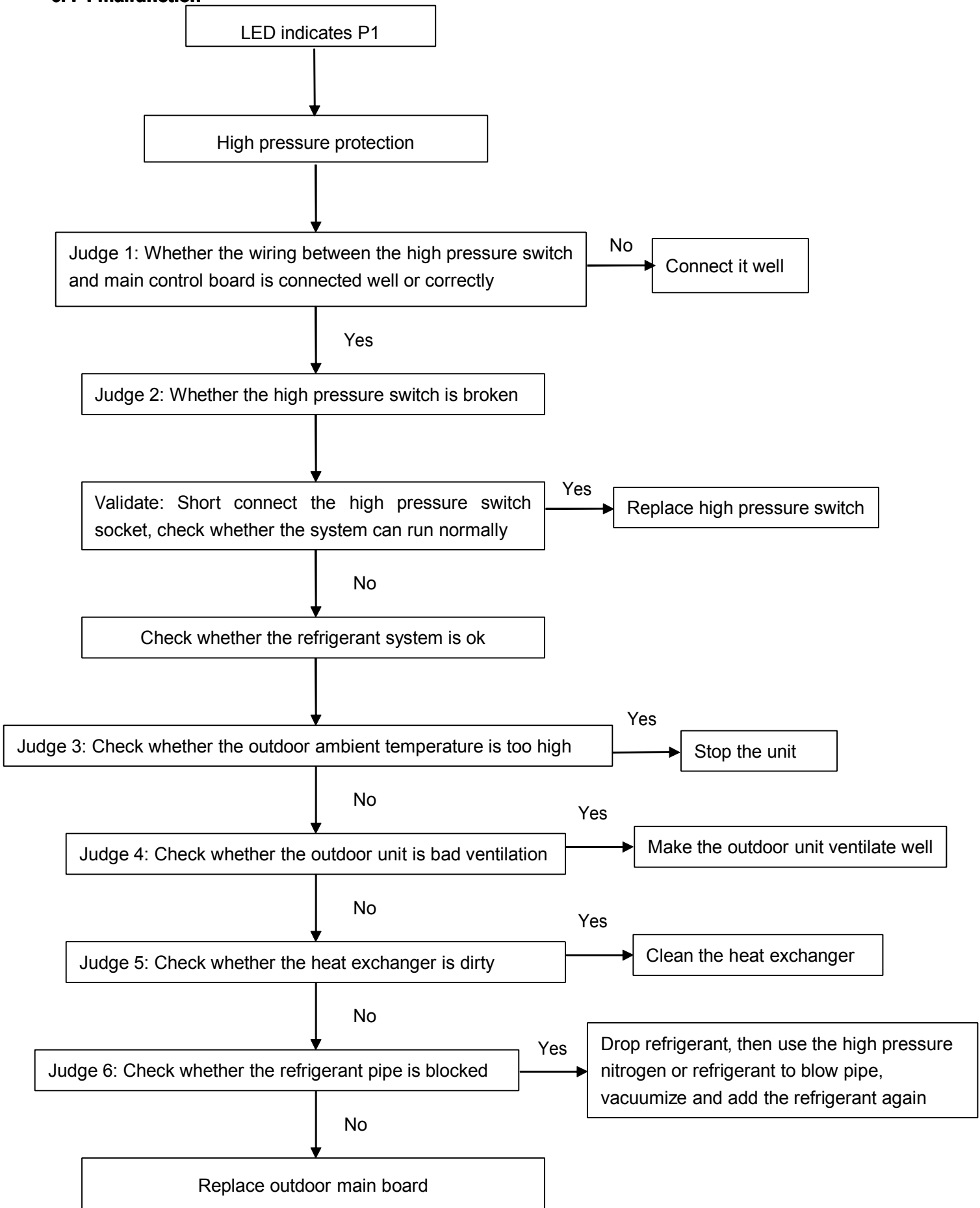
#### 4. E4 malfunction



## 5. E5 malfunction

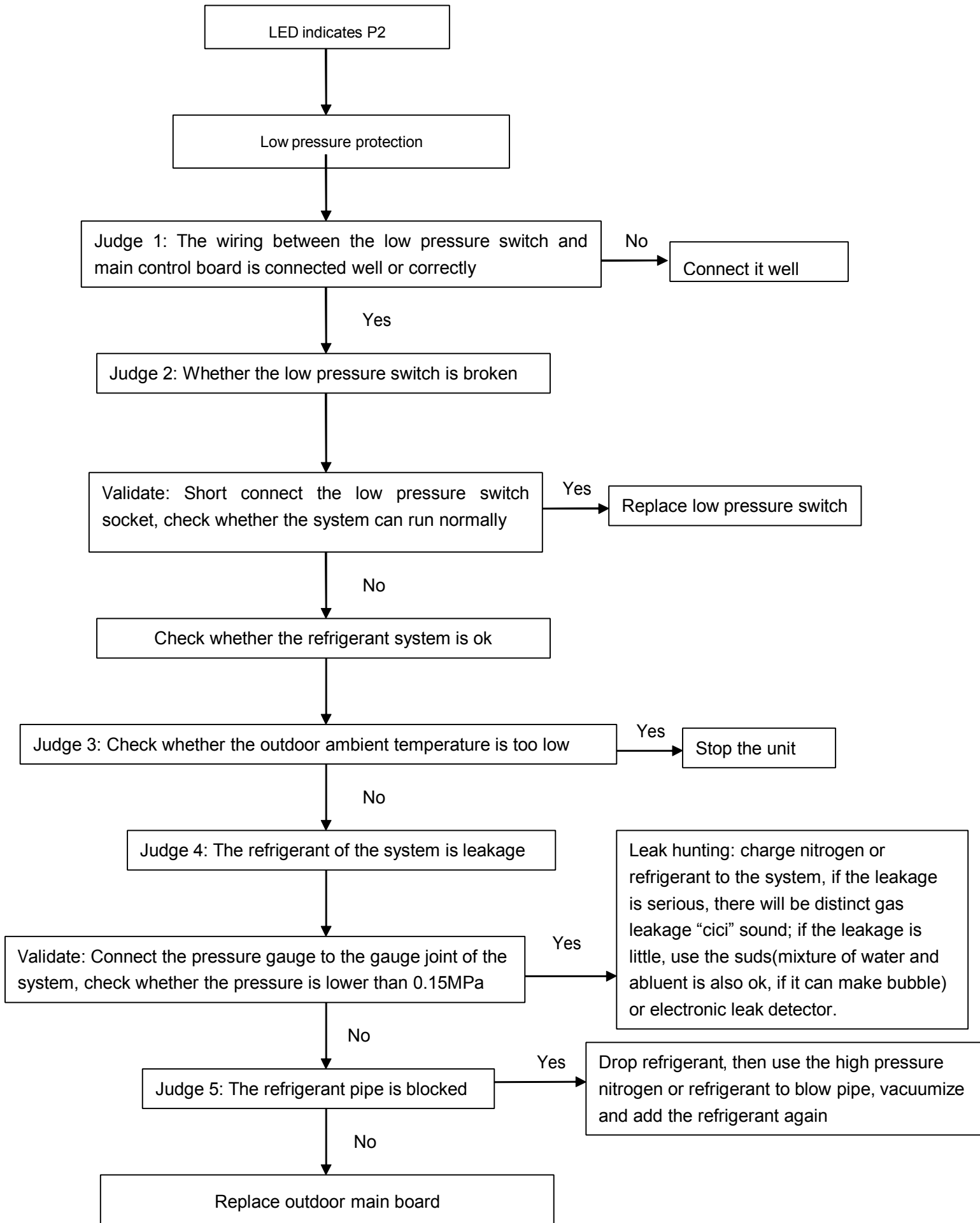


## 6. P1 malfunction

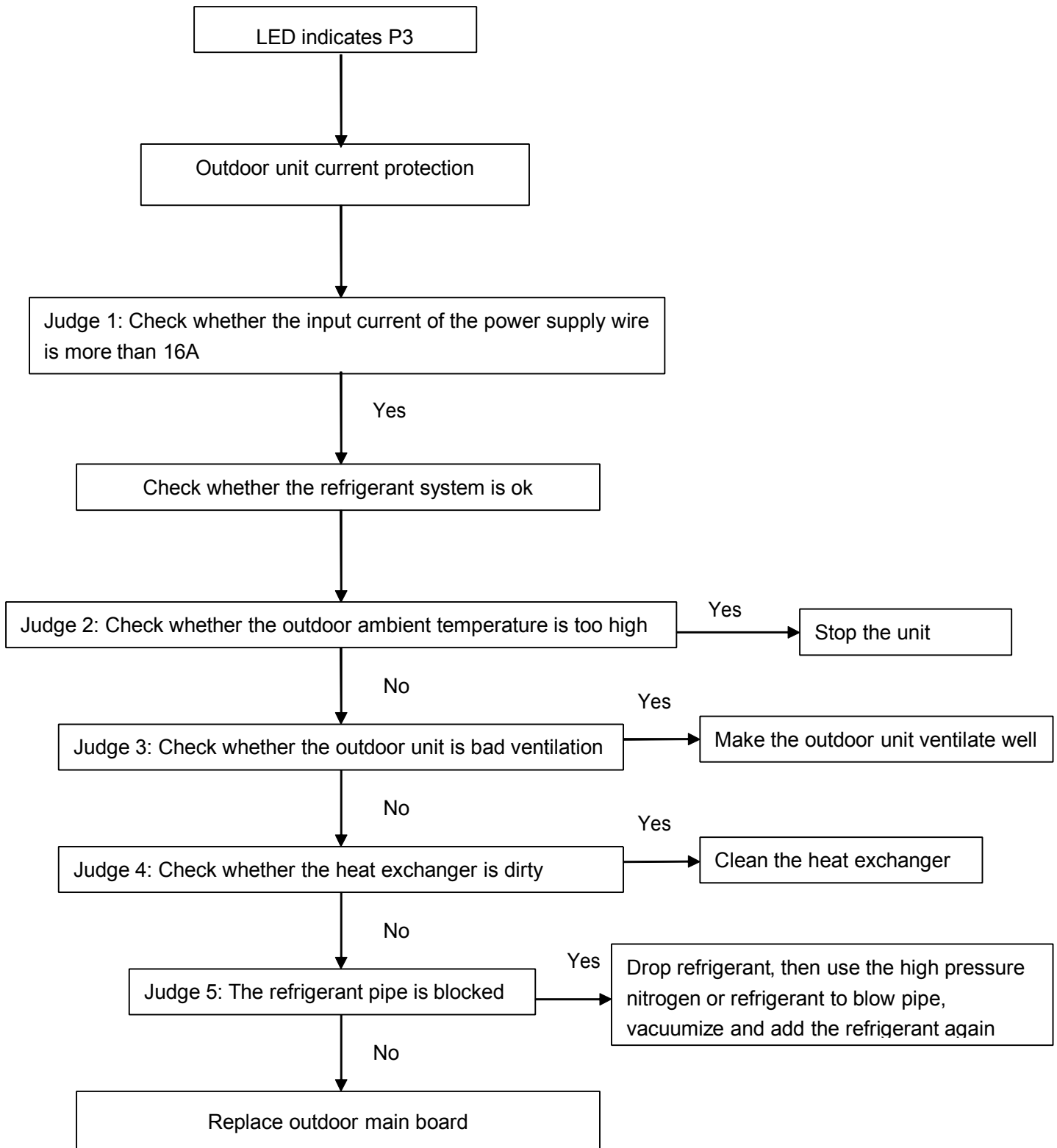




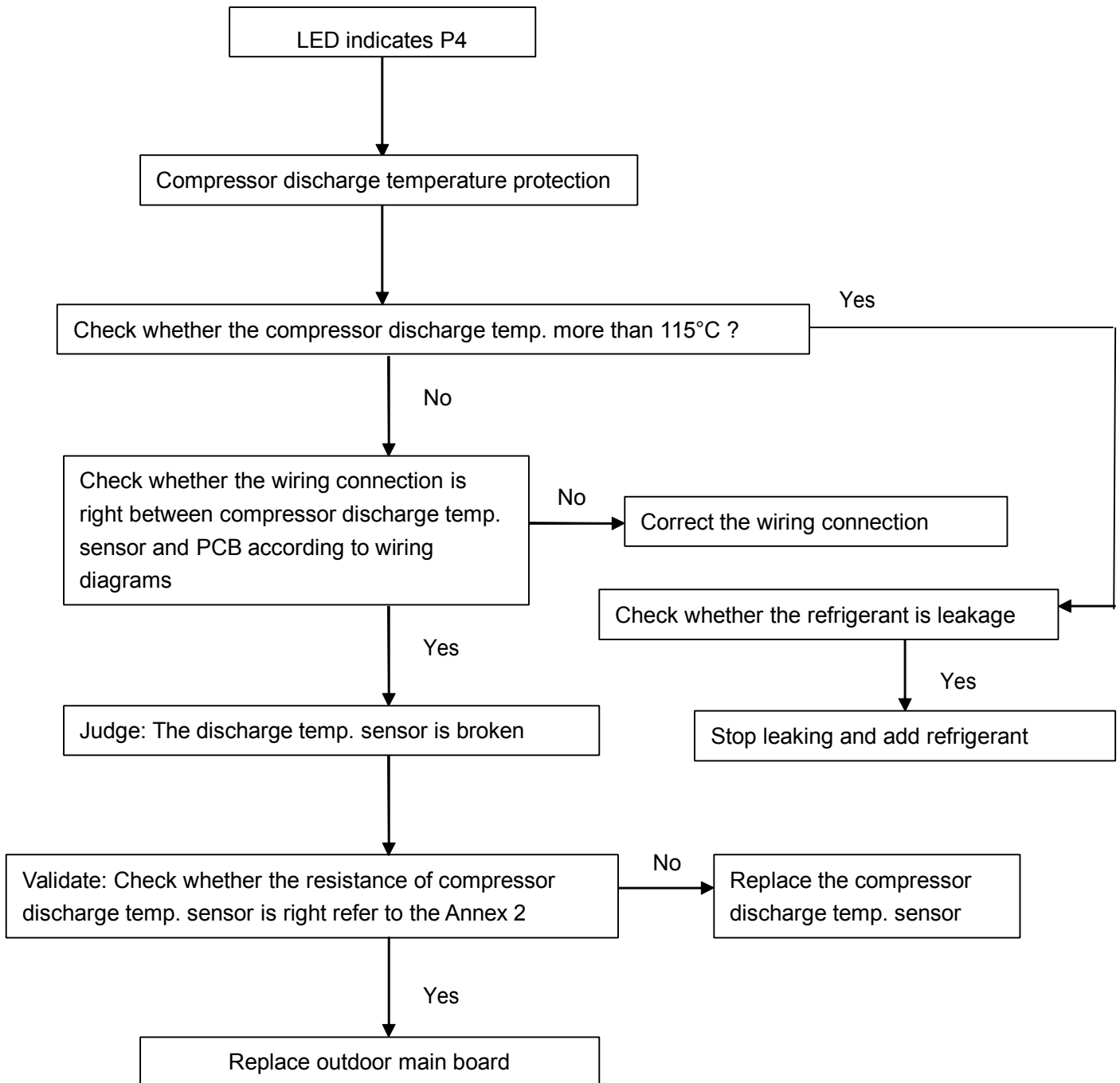
## 7. P2 malfunction



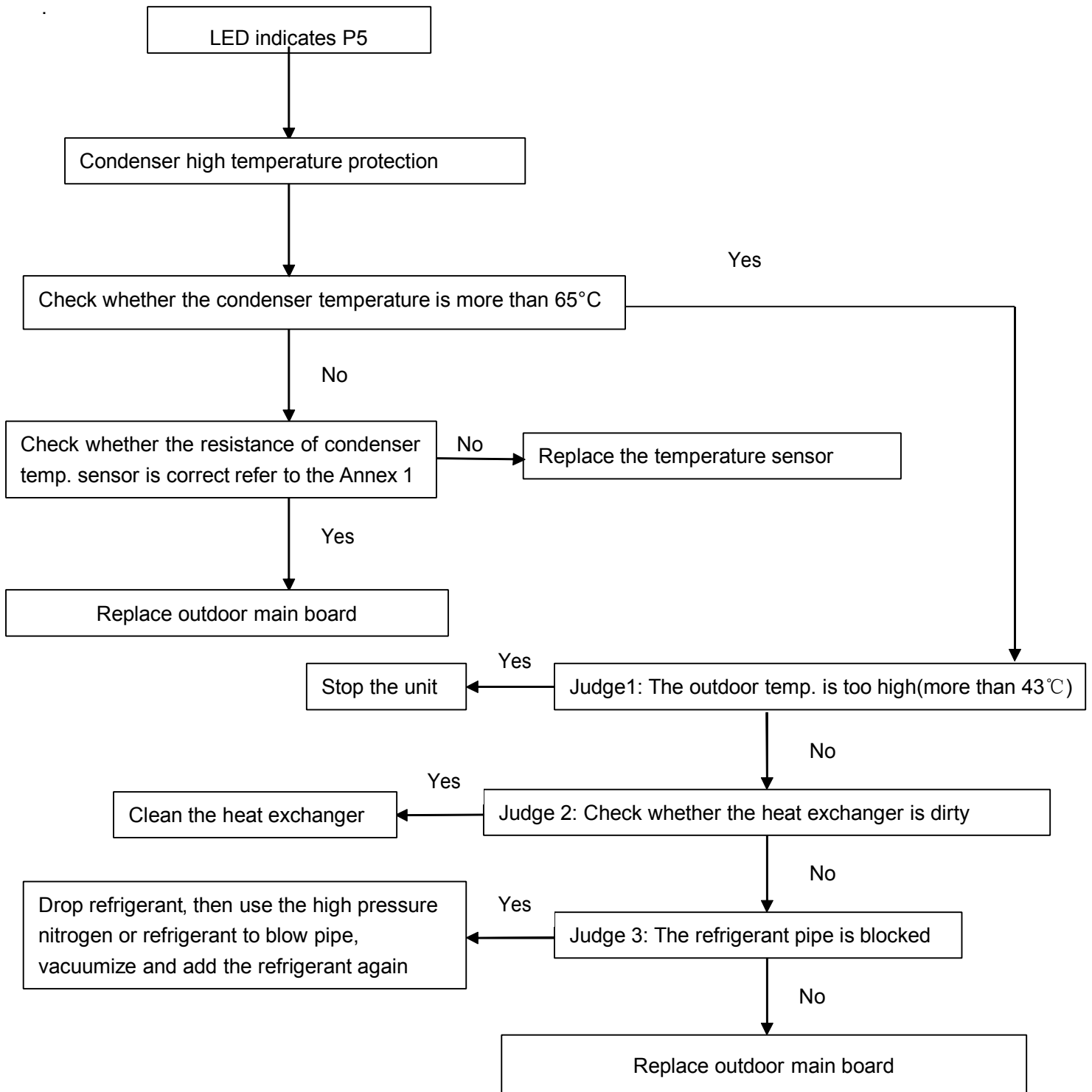
## 8. P3 malfunction



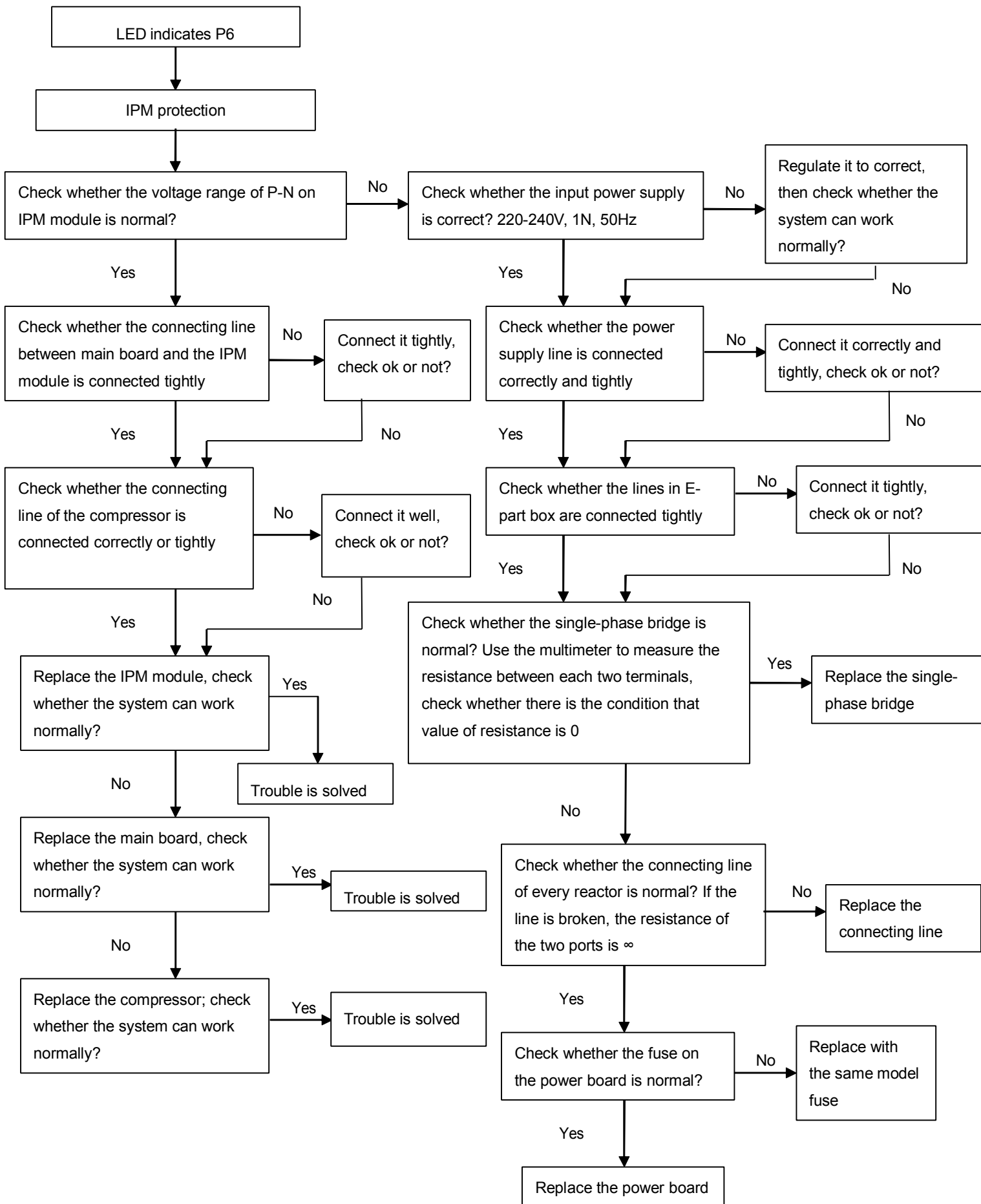
## 9. P4 malfunction



## 10. P5 malfunction



## 11. P6 malfunction



## Annex 1

Temp	Resistance (KΩ)			Resist.tol %		Temp.tol°C	
(°C)	Rmax	R (t) Normal	Rmin	MAX(+)	MIN(-)	MAX(+)	MIN(-)
-20	116.539	106.732	96.920	9.19	9.19	1.59	1.59
-19	110.231	100.552	91.451	9.63	9.05	1.57	1.57
-18	103.743	94.769	86.328	9.47	8.91	1.56	1.55
-17	97.673	89.353	81.525	9.31	8.76	1.54	1.54
-16	91.990	84.278	77.017	9.15	8.62	1.53	1.52
-15	86.669	79.521	72.788	8.99	8.47	1.51	1.50
-14	81.684	75.059	68.815	8.83	8.32	1.49	1.48
-13	77.013	70.873	65.083	8.66	8.17	1.47	1.47
-12	72.632	66.943	61.574	8.50	8.02	1.45	1.45
-11	68.523	63.252	58.274	8.33	7.87	1.44	1.43
-10	64.668	59.784	55.169	8.17	7.72	1.42	1.41
-9	61.048	56.524	52.246	8.00	7.57	1.40	1.39
-8	57.649	53.458	49.492	7.84	7.42	1.38	1.37
-7	54.456	50.575	46.899	7.67	7.27	1.35	1.35
-6	51.456	47.862	44.455	7.51	7.12	1.33	1.32
-5	48.636	45.308	42.150	7.35	6.97	1.31	1.30
-4	45.984	42.903	39.977	7.18	6.82	1.29	1.28
-3	43.490	40.638	37.927	7.02	6.67	1.27	1.26
-2	41.144	38.504	35.992	6.86	6.52	1.25	1.24
-1	38.935	36.492	34.165	6.70	6.38	1.23	1.21
0	36.857	34.596	32.440	6.53	6.23	1.21	1.19
1	34.898	32.807	30.810	6.38	6.09	1.18	1.17
2	33.055	31.120	29.271	6.22	5.94	1.16	1.15
3	31.317	29.528	27.815	6.06	5.80	1.14	1.12
4	29.681	28.026	26.440	5.90	5.66	1.12	1.10
5	28.138	26.608	25.140	5.75	5.52	1.10	1.08
6	26.682	25.268	23.909	5.60	5.38	1.07	1.06
7	25.310	24.003	22.745	5.45	5.24	1.05	1.03
8	24.016	22.808	21.644	5.30	5.10	1.03	1.01
9	22.794	21.678	20.601	5.15	4.97	1.01	0.99
10	21.641	20.610	19.614	5.00	4.83	0.99	0.97
11	20.553	19.601	18.680	4.86	4.70	0.96	0.94
12	19.525	18.646	17.794	4.71	4.57	0.94	0.92
13	18.554	17.743	16.955	4.57	4.44	0.92	0.90
14	17.636	16.888	16.160	4.43	4.31	0.90	0.88
15	16.769	16.079	15.406	4.29	4.19	0.88	0.85
16	15.949	15.313	14.691	4.15	4.06	0.86	0.83
17	15.174	14.588	14.014	4.02	3.94	0.84	0.81
18	14.442	13.902	13.372	3.89	3.81	0.81	0.79
19	13.748	13.251	12.762	3.75	3.69	0.79	0.76
20	13.093	12.635	12.183	3.62	3.57	0.77	0.74
21	12.471	12.050	11.634	3.50	3.46	0.75	0.72

22	11.883	11.496	11.112	3.37	3.34	0.73	0.70
23	11.327	10.971	10.617	3.25	3.23	0.71	0.68
24	10.800	10.473	10.147	3.12	3.11	0.69	0.66
25	10.300	10.000	9.700	3.00	3.00	0.67	0.63
26	9.848	9.551	9.255	3.11	3.10	0.69	0.66
27	9.418	9.125	8.834	3.21	3.19	0.72	0.69
28	9.010	8.721	8.434	3.31	3.29	0.75	0.71
29	8.621	8.337	8.055	3.41	3.38	0.77	0.74
30	8.252	7.972	7.695	3.51	3.47	0.80	0.77
31	7.900	7.625	7.353	3.61	3.57	0.83	0.79
32	7.566	7.296	7.029	3.70	3.66	0.85	0.82
33	7.247	6.982	6.721	3.80	3.74	0.88	0.84
34	6.944	6.684	6.428	3.89	3.83	0.91	0.87
35	6.656	6.401	6.150	3.98	3.92	0.93	0.90
36	6.381	6.131	5.886	4.08	4.00	0.96	0.93
37	6.119	5.874	5.634	4.17	4.09	0.98	0.95
38	5.870	5.630	5.395	4.26	4.17	1.01	0.98
39	5.631	5.397	5.167	4.34	4.26	1.03	1.01
40	5.404	5.175	4.951	4.43	4.34	1.06	1.03
41	5.188	4.964	4.745	4.52	4.42	1.09	1.06
42	4.982	4.763	4.549	4.60	4.50	1.12	1.09
43	4.785	4.571	4.362	4.69	4.58	1.14	1.12
44	4.596	4.387	4.183	4.77	4.66	1.17	1.14
45	4.417	4.213	4.014	4.85	4.74	1.19	1.17
46	4.246	4.046	3.851	4.93	4.81	1.22	1.20
47	4.082	3.887	3.697	5.02	4.89	1.25	1.23
48	3.925	3.735	3.550	5.10	4.97	1.28	1.25
49	3.776	3.590	3.409	5.18	5.04	1.30	1.28
50	3.632	3.451	3.274	5.25	5.12	1.33	1.30
51	3.495	3.318	3.146	5.33	5.19	1.35	1.33
52	3.363	3.191	3.023	5.41	5.26	1.41	1.36
53	3.237	3.069	2.905	5.49	5.34	1.43	1.38
54	3.116	2.952	2.793	5.56	5.41	1.46	1.41
55	3.001	2.841	2.685	5.64	5.48	1.48	1.44
56	2.890	2.734	2.582	5.71	5.55	1.51	1.46
57	2.784	2.632	2.484	5.79	5.62	1.54	1.49
58	2.682	2.534	2.390	5.86	5.69	1.56	1.52
59	2.585	2.440	2.299	5.93	5.76	1.59	1.54
60	2.491	2.350	2.213	6.01	5.83	1.62	1.57
61	2.401	2.264	2.130	6.08	5.90	1.64	1.60
62	2.315	2.181	2.051	6.15	5.96	1.67	1.62
63	2.233	2.102	1.975	6.22	6.03	1.70	1.65
64	2.154	2.026	1.903	6.29	6.10	1.72	1.68
65	2.077	1.953	1.833	6.36	6.16	1.75	1.70
66	2.004	1.883	1.766	6.42	6.23	1.77	1.73
67	1.934	1.816	1.702	6.49	6.29	1.80	1.76
68	1.867	1.752	1.641	6.56	6.35	1.83	1.78
69	1.802	1.690	1.582	6.62	6.41	1.85	1.81
70	1.740	1.631	1.525	6.69	6.48	1.88	1.84
71	1.680	1.574	1.471	6.75	6.54	1.91	1.86
72	1.622	1.519	1.419	6.82	6.60	1.93	1.89
73	1.567	1.466	1.369	6.88	6.66	1.96	1.92

74	1.514	1.416	1.321	6.94	6.71	1.98	1.94
75	1.463	1.367	1.275	7.00	6.77	2.01	1.97
76	1.414	1.321	1.230	7.06	6.83	2.04	2.00
77	1.367	1.276	1.188	7.12	6.88	2.06	2.02
78	1.321	1.233	1.147	7.17	6.94	2.09	2.05
79	1.277	1.191	1.108	7.23	6.99	2.12	2.08
80	1.235	1.151	1.070	7.28	7.04	2.14	2.11
81	1.195	1.113	1.034	7.33	7.09	2.17	2.13
82	1.156	1.076	0.999	7.39	7.14	2.20	2.16
83	1.118	1.041	0.966	7.44	7.18	2.22	2.19
84	1.082	1.007	0.934	7.48	7.23	2.25	2.21
85	1.047	0.974	0.903	7.53	7.27	2.27	2.24
86	1.014	0.942	0.874	7.57	7.31	2.30	2.27
87	0.982	0.912	0.845	7.62	7.35	2.33	2.29
88	0.951	0.883	0.818	7.66	7.39	2.35	2.32
89	0.921	0.855	0.791	7.69	7.43	2.38	2.35
90	0.892	0.828	0.766	7.73	7.46	2.41	2.37
91	0.864	0.802	0.742	7.76	7.49	2.43	2.40
92	0.838	0.777	0.719	7.80	7.52	2.46	2.43
93	0.812	0.753	0.696	7.82	7.54	2.48	2.45
94	0.787	0.730	0.675	7.85	7.57	2.51	2.48
95	0.763	0.708	0.654	7.87	7.59	2.54	2.51
96	0.740	0.686	0.634	7.89	7.61	2.56	2.53
97	0.718	0.666	0.615	7.91	7.62	2.59	2.56
98	0.697	0.646	0.597	7.93	7.63	2.62	2.59
99	0.677	0.627	0.579	7.94	7.64	2.64	2.61
100	0.657	0.609	0.562	7.94	7.65	2.67	2.64
101	0.638	0.591	0.546	7.95	7.65	2.70	2.67
102	0.620	0.574	0.530	7.95	7.65	2.72	2.69
103	0.602	0.558	0.515	7.94	7.64	2.75	2.72
104	0.585	0.542	0.501	7.94	7.63	2.77	2.75
105	0.569	0.527	0.485	7.92	7.92	2.80	2.77



## Annex 2

Unit: °C---K		Discharge temp. sensor table					
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294	B(25/50)=3950K	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045	R(90°C)=5KΩ±3%	
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		