DAIKIN

ESiE06-07

Service Manual

RZQS71~125B7V3B
Sky-Air Inverter R-410A B series

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Table of Contents

1 Introduction

Part 1
System Outline

1 General Outline: Outdoor Units

2 Specifications

3 Functional Diagrams

4 Switch Box Layout

5 Wiring Diagrams

6 PCB Layout

Part 2
Functional Description

1 General Functionality

2 Indoor Unit Functional Concept

3 Outdoor Unit Functional Concept

Part 3
Troubleshooting

1 Troubleshooting

2 Error Codes: Indoor Units

3 Error Codes: Outdoor Units

4 Error Codes: System Malfunctions

5 Additional Checks for Troubleshooting

Part 4
Commissioning and Test Run

1 Pre-Test Run Checks

2 Field settings

3 Test Run and Operation Data

Part 5
Disassembly and Maintenance

1 Disassembly and Maintenance: Outdoor Units

1 Introduction

1.1 About This Manual

Target group

This service manual is intended for and should only be used by qualified engineers.

Purpose of this manual

This service manual contains all the information you need to do the necessary repair and maintenance tasks for the Sky Air RZQS single phase, 71~125 class.

Five parts

This service manual consists of an introduction, five parts and an index:

Introduction overview

The introduction contains the following topics:

Note:

This Service Manual is about Outdoor Models only. Please refer to the indoor unit Service Manual ESIE05-04 for details on the indoor units.

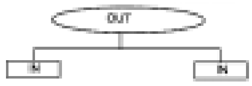
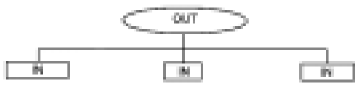
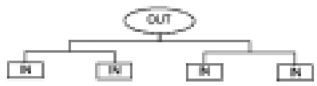
1.2 Combination Overview

RZQS71~125

The table below contains the possible combinations between indoor units and outdoor units of the Sky Air RZQS-series.

			GQI - LOW		
			DENV	DENV	DENV
		MODEL NAME	RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
New Super Cassette	DENV	FCQ35B	2	3	4
		FCQ50B		2	3
		FCQ60B			2
		FCQ71B	P		
		FCQ100B		P	
		FCQ125B			P
2x2 Cassette	DENV	FFQ35BV	2	3	4
		FFQ50BV		2	3
		FFQ60BV			2
Duct (medium ESP)	DENV	FBQ35B	2	3	4
		FBQ50B		2	3
		FBQ60B			2
		FBQ71B	P		
		FBQ100B		P	
		FBQ125B			P
Ceiling suspended	DIT	FHQ35B	2	3	4
		FHQ50B		2	3
		FHQ60B			2
		FHQ71B	P		
		FHQ100B		P	
		FHQ125B			P
Wall mounted	DIL	FAQ71B	P		
		FAQ100B		P	
High ESP duct	DENV	FDQ125B			P

Combination Matrix

	Possible indoor combination		
	Simultaneous operation		
Outdoor models	**Twin**	**Triple**	**Double Twin**
			
RZQS71B7V3B	35-35 (KHRQ22M20TA7)		
RZQS100B7V3B	50-50 (KHRQ22M20TA7)	35-35-35 (KHRQ127H7)	
RZQS125B7V3B	60-60 (KHRQ22M20TA7)	50-50-50 (KHRQ127H7)	35-35-35-35 (3 x KHRQ22M20TA7)

Notes:

1 Possible indoor types:
- FCQ35-60
- FFQ35-60
- FHQ35-60
- FBQ35-60

2 Individual indoor capacities are not given because the combinations are for simultaneous operation (=indoor units installed in same room).

3 When different indoor models are used in combination, designate the remote controller that is equipped with the most functions as the main unit. In note 1 are the indoor units mentioned in order of the possible function (most functions are on FCQ , less functions are on FBQ).

4 Between brackets are the required Refnet kits mentioned, that are necessary to install the combination.

1.3 Precautions on Handling New Refrigerants

1.3.1 Outline

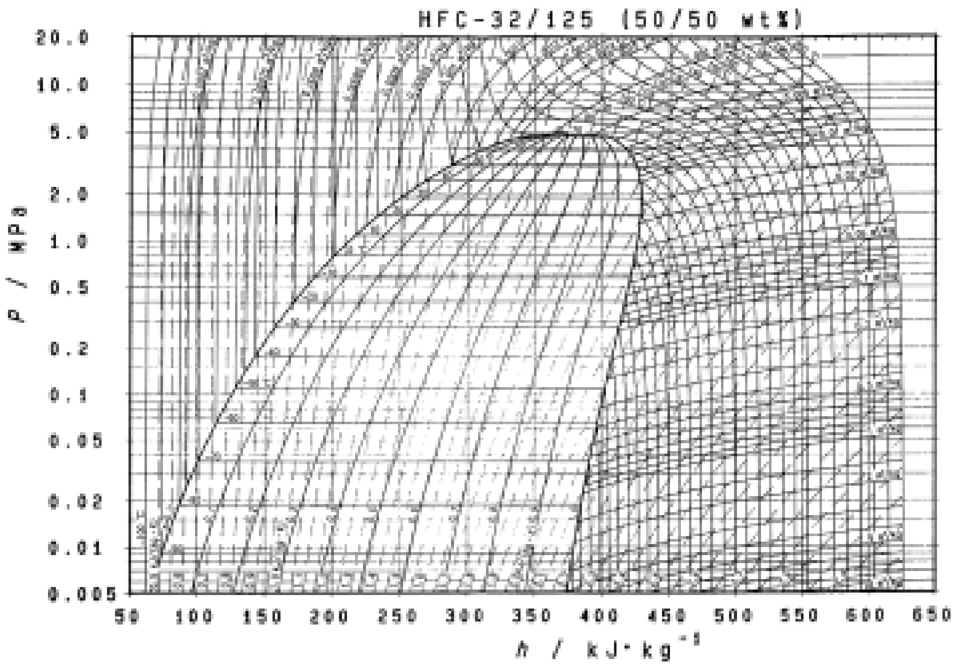
About Refrigerant R410A

■ Characteristics of new refrigerant, R410A

1. Performance
   Almost the same performance as R22 and R407C.
2. Pressure
   Working pressure is approx. 1.4 times more than R22 and R407C.
3. Refrigerant composition
   Few problems in composition control, since it is a Quasi-azeotropic mixture refrigerant.

	HFC units (Units using new refrigerants)		**HCFC units**
Refrigerant name	**R407C**	**R410A**	**R22**
Composing substances	Non-azeotropic mixture of HFC32, HFC125 and HFC134a (*1)	Quasi-azeotropic mixture of HFC32 and JFC125 (*1)	Single-component refrigerant
Design pressure	3.2 MPa (gauge pressure) = 32.6 kgf/cm^2	4.15 MPa (gauge pressure) = 42.3 kgf/cm^2	2.75 MPa (gauge pressure) = 28.0 kgf/cm^2
Refrigerant oil	Synthetic oil (Ether)		Mineral oil (Suniso)
Ozone destruction factor (ODP)	0	0	0.05
Combustibility	None	None	None
Toxicity	None	None	None

*1. Non-azeotropic mixture refrigerant: mixture of two or more refrigerants having different boiling points.
*2. Quasi-azeotropic mixture refrigerant: mixture of two or more refrigerants having similar boiling points.
*3. The design pressure is different at each product. Please refer to the installation manual for each product.
(Reference) 1 Mpa ≒ 1 0.19716 kgf / cm^2



Pressure-Enthalpy curves of HFC-32/125 (50/50wt%)

■ Thermodynamic characteristic of R410A

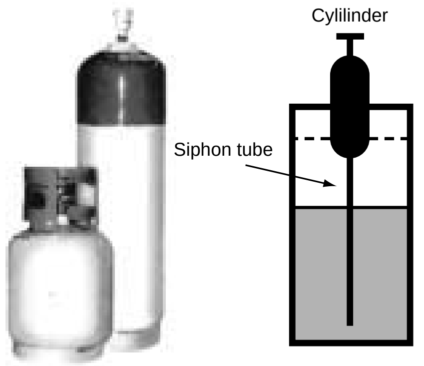
DAIREP ver2.0

Temperature (℃)	Steam pressure (kPa)		Density (kg/m³)		Specific heat at constant pressure (kJ/kgK)		Specific enthalpy (kJ/kg)		Specific entropy (kJ/KgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
-70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
-68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
-66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
-64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
-62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
-58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
-56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
-54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
-52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
-51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
-50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
-48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
-46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
-44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
-42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
-40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
-38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
-36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
-34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
-32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
-30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
-28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
-26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
-24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
-22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
-20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
-18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
-16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
-14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
-12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
-10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.014	1.906
-8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
-6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
-4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
-2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

1.3.2 Refrigerant Cylinders

Cylinder specifications

- The cylinder is painted refrigerant color (pink).
- The cylinder valve is equipped with a siphon tube.



- Note:
  1. Refrigerant can be charged in liquid state with cylinder in upright position.
  2. Do not lay cylinder on its side during charging, since it causes refrigerant in gas state to enter the system.

Handling of cylinders

1. Laws and regulations
   R410A is liquefied gas, and the High-Pressure Gas Safety Law must be observed in handling them. Before using, refer to the High-Pressure Gas Safety Law.
   The Law stipulates standards and regulations that must be followed to prevent accidents with high-pressure gases. Be sure to follow the regulations.
2. Handing of vessels
   Since R410A is high-pressure gas, it is contained in high-pressure vessels.
   Although those vessels are durable and strong, careless handling can cause damage that can lead to unexpected accidents. Do not drop vessels, let them fall, apply impact or roll them on the ground.
3. Storage
   Although R410A is not flammable, it must be stored in a well-ventilated, cool, and dark place in the same way as any other high-pressure gases.
   It should also be noted that high-pressure vessels are equipped with safety devices that releases gas when the ambient temperature reaches more than a certain level (fusible plug melts) and when the pressure exceeds a certain level (spring-type safety valve operates).

1.3.4 Service Tools

R410A is used under higher working pressure, compared to previous refrigerants (R22,R407C). Furthermore, the refrigerating machine oil has been changed from Suniso oil to Ether oil, and if oil mixing is occurred, sludge results in the refrigerants and causes other problems. Therefore, gauge manifolds and charge hoses that are used with a previous refrigerant (R22,R407C) can not be used for products that use new refrigerants.

Be sure to use dedicated tools and devices.

- Tool compatibility

Tool	Compatibility			Reasons for change
	HFC		HCFC	
	R410A	R407C	R22	
Gauge manifold Charge hose	X			■ Do not use the same tools for R22 and R410A. ■ Thread specification differs for R410A and R407C.
Charging cylinder	X		O	■ Weighting instrument used for HFCs.
Gas detector	O		X	■ The same tool can be used for HFCs.
Vacuum pump (pump with reverse flow preventive function)	O			■ To use existing pump for HFCs, vacuum pump adaptor must be installed.
Weighting instrument	O			
Charge mouthpiece	X			■ Seal material is different between R22 and HFCs. ■ Thread specification is different between R410A and others.
Flaring tool (Clutch type)	O			■ For R410A, flare gauge is necessary.
Torque wrench	O			■ Torque-up for 1/2 and 5/8
Pipe cutter	O			
Pipe expander	O			
Pipe bender	O			
Pipe assembling oil	X			■ Due to refrigerating machine oil change. (No Suniso oil can be used.)
Refrigerant recovery device	Check your recovery device.			
Refrigerant piping	See the chart below.			■ Only ϕ19.1 is changed to 1/2H material while the previous material is "O".

As for the charge mouthpiece and packing, 1/2UNF20 is necessary for mouthpiece size of charge hose.

Copper tube material and thickness

Pipe size	R407C		R410A	
	Material	Thickness tmmj	Material	Thickness tmmj
ϕ6.4	O	0.8	O	0.8
ϕ9.5	O	0.8	O	0.8
ϕ12.7	O	0.8	O	0.8
ϕ15.9	O	1.0	O	1.0
ϕ19.1	O	1.0	1/2H	1.0

* O: Soft (Annealed)
H: Hard (Drawn)

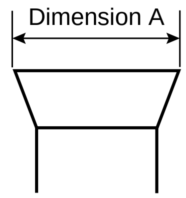
Flaring tool

Flare gauge

- ■ Specifications
- • Dimension A

Nominal size	Tube O.D.	$A^{+0}_{-0.4}$	
	Do	Class-2 (R410A)	Class-1 (Conventional)
1/4	6.35	9.1	9.0
3/8	9.52	13.2	13.0
1/2	12.70	16.6	16.2
5/8	15.88	19.7	19.4
3/4	19.05	24.0	23.3

■ Differences
• Change of dimension A



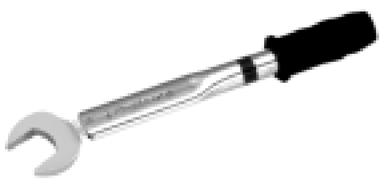
For class-1: R407C
For class-2: R410A

Conventional flaring tools can be used when the work process is changed. (change of work process)

Previously, a pipe extension margin of 0 to 0.5mm was provided for flaring. For R410A air conditioners, perform pipe flaring with a pipe extension margin of **1.0 to 1.5 mm**. (For clutch type only)

Conventional tool with pipe extension margin adjustment can be used.

Torque wrench

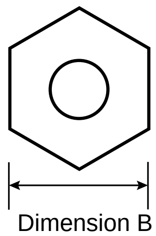


■ Specifications
• Dimension B Unit:mm

Nominal size	Class-1	Class-2	Previous
1/2	24	26	24
5/8	27	29	27

No change in tightening torque
No change in pipes of other sizes

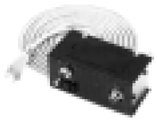
■ Differences
• Change of dimension B
Only 1/2", 5/8" are extended



For class-1: R407C
For class-2: R410A

Vacuum pump with check valve

Vacuum pump adaptor (Reverse flow preventive vacuum adaptor)



- ■ Specifications
- • Discharge speed
  50 l/min (50Hz)
  60 l/min (60Hz)
- • Suction port UNF7/16-20(1/4 Flare)
  UNF1/2-20(5/16 Flare) with adaptor
- ● Maximum degree of vacuum
  –100.7 kpa (5 torr – 755 mmHg)

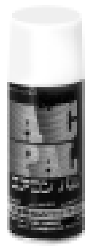
- ■ Differences
- • Equipped with function to prevent reverse oil flow
- • Previous vacuum pump can be used by installing adaptor.

Leak tester

- ■ Specifications
- • Hydrogen detecting type, etc.
- • Applicable refrigerants
  R410A, R407C, R404A, R507A, R134a, etc.

- ■ Differences
- • Previous testers detected chlorine. Since HFCs do not contain chlorine, new tester detects hydrogen.

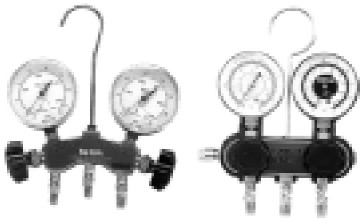
Refrigerant oil (Air compal)



- ■ Specifications
- • Contains synthetic oil, therefore it can be used for piping work of every refrigerant cycle.
- • Offers high rust resistance and stability over long period of time.

- ■ Differences
- • Can be used for R410A and R22 units.

Gauge manifold for R410A



- ■ Specifications
- High pressure gauge
  - 0.1 to 5.3 MPa (-76 cmHg to 53 kg/cm^2)
- Low pressure gauge
  - 0.1 to 3.8 MPa (-76 cmHg to 38 kg/cm^2)
- 1/4" → 5/16" (2min → 2.5min)
- No oil is used in pressure test of gauges.
  → For prevention of contamination
- Temperature scale indicates the relationship between pressure and temperature in gas saturated state.

- ■ Differences
- Change in pressure
- Change in service port diameter

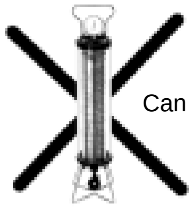
Charge hose for R410A

(Hose with ball valve)

- ■ Specifications
- Working pressure 5.08 MPa (51.8 kg/cm^2)
- Rupture pressure 25.4 MPa (259 kg/cm^2)
- Available with and without hand-operate valve that prevents refrigerant from outflow.

- ■ Differences
- Pressure proof hose
- Change in service port diameter
- Use of nylon coated material for HFC resistance

Charging cylinder



■ Specifications
- Use weigher for refrigerant charge listed below to charge directly from refrigerant cylinder.

■ Differences
- The cylinder can not be used for mixed refrigerant since mixing ratio is changed during charging.

  When R410A is charged in liquid state using charging cylinder, foaming phenomenon is generated inside charging cylinder.

Weigher for refrigerant charge

■ Specifications
- High accuracy
  TA101A (for 10-kg cylinder) = ± 2g
  TA101B (for 20-kg cylinder) = ± 5g
- Equipped with pressure-resistant sight glass to check liquid refrigerant charging.
- A manifold with separate ports for HFCs and previous refrigerants is equipped as standard accessories.

■ Differences
- Measurement is based on weight to prevent change of mixing ratio during charging.

Charge mouthpiece

■ Specifications
- For R410A, 1/4"→ 5/16" (2min → 2.5min)
- Material is changed from CR to H-NBR.

■ Differences
- Change of thread specification on hose connection side (For the R410A use)
- Change of sealer material for the HFCs use.

Part 1
System Outline

What is in this part?

This part contains the following chapters:

1 General Outline: Outdoor Units

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information on the outdoor units:

- Outlook and dimensions
- Installation and service space
- Components

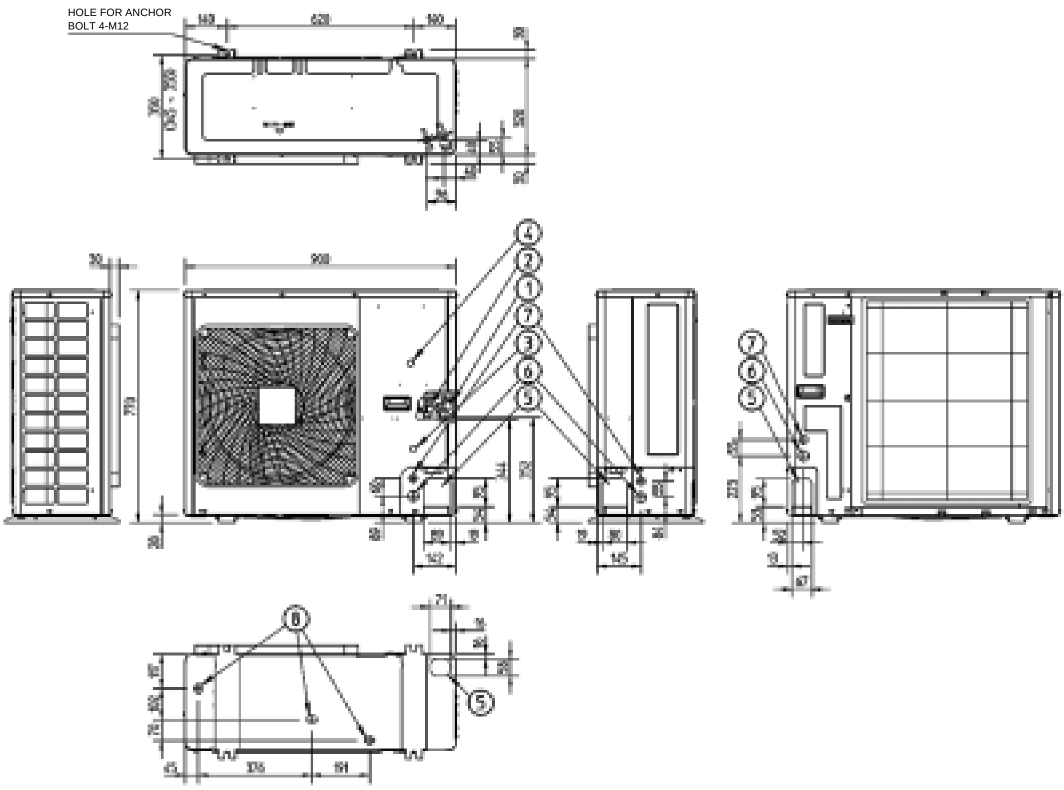
General outline

This chapter contains the following general outlines:

1.2 RZQS71~100: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–8.

Components

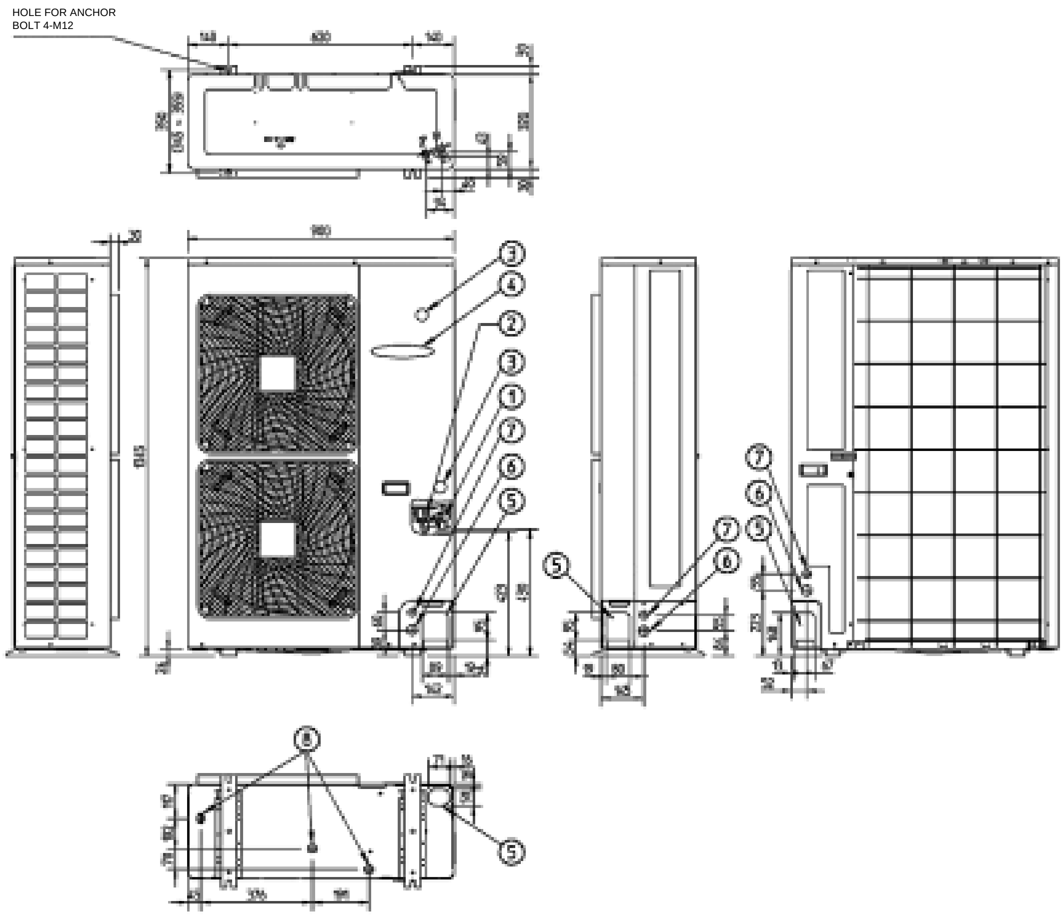
The table below contains the different components of the unit.

No.	Component
1	Gas pipe connection
2	Liquid pipe connection
3	Service port (inside the unit)
4	Grounding terminal M5 (inside the switch box)
5	Refrigerant piping intake
6	Power supply wiring intake
7	Control wiring intake
8	Drain outlet

1.3 RZQS125: Outlook and Dimensions

Outlook and dimensions

The illustration below shows the outlook and the dimensions of the unit (mm).



Installation and service space

See page 1–8.

Components

The table below contains the different components of the unit.

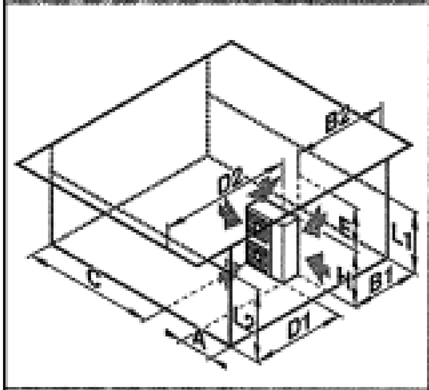
No.	Component
1	Gas pipe connection
2	Liquid pipe connection
3	Service port (inside the unit)
4	Electronic connection and grounding terminal M5 (inside the switch box)
5	Refrigerant piping intake
6	Power supply wiring intake
7	Control wiring intake
8	Drain outlet

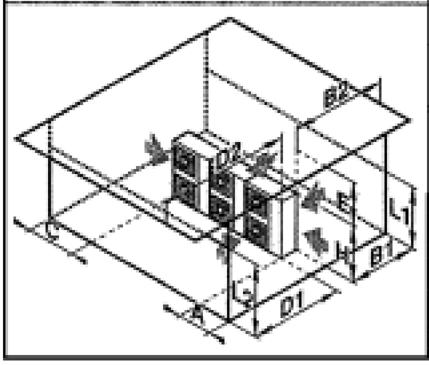
1

1.4 RZQS71~125: Installation and Service Space

Non stacked

The illustrations and table below show the required installation and service space (mm). The values between brackets are for the 125 class.





Suction	Discharge	Left	Right	Top			A	B1	B2	C	D1	D2	E	L1/L2	
✓								≥50(100)							
✓		✓	✓				≥100	≥100		≥100					
✓				✓				≥100				≤500	≥1000		
✓		✓	✓	✓			≥150	≥150		≥150		≤500	≥1000		
	✓										≥500				
	✓			✓					≤500		≥500		≥1000		
✓	✓				L1>L2			≥50(100)			≥500				
					L2>L1			≥50(100)			≥500				
✓	✓			✓	L1>L2	L1≤H		≥150(250)	≤500		≥750		≥1000	0<L1≤1/2H	1
											≥1000			1/2H<L1≤H	
						L1>H	L1≤H								
					L2>L1	L2≤H		≥50(100)			≥500	≥500	≥1000	0<L2≤1/2H	
								≥100(200)						1/2H<L2≤H	
						L2>H	L2≤H								
✓		✓	✓				≥200	≥200(300)		≥1000					
✓		✓	✓	✓			≥200	≥200(300)		≥1000		≤500	≥1000		
	✓										≥1000				
	✓			✓					≤500		≥1000		≥1000		
✓	✓				L1<L2			≥200(300)			≥1000				
					L2<L1			≥150(250)			≥1000			0<L2≤1/2H	
								≥200(300)						1/2H<L2≤H	
✓	✓			✓	L1<L2	L1≤H		≥200(300)	≤500		≥1000		≥1000	0<L1≤1/2H	1
											≥1250			1/2H<L1≤H	
						L1>H	L1≤H								
					L2<L1	L2≤H		≥150(250)			≥1000	≤500	≥1000	0<L2≤1/2H	2
								≥200(300)						1/2H<L2≤H	
						L2>H	L2≤H								

- Suction side obstacle
- Discharge side obstacle
- Left side obstacle
- Right side obstacle
- Top side obstacle
- ✓ Obstacle is present

1 In these cases, close the bottom of the installation frame to prevent discharged air from being bypassed

2 In these cases, only 2 units can be installed

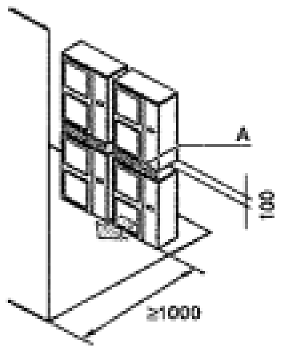
This situation is not allowed

Stacked

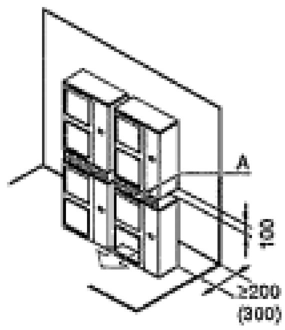
The illustration below shows the required installation and service space (mm). The values in brackets are for the 125 class.

- Do not stack more than one unit.
- ± 100 mm is required as the dimension for laying the upper outdoor unit’s drain pipe.
- Get the portion A sealed so that air from the outlet does not bypass.

Obstacles exist in front of the outlet side



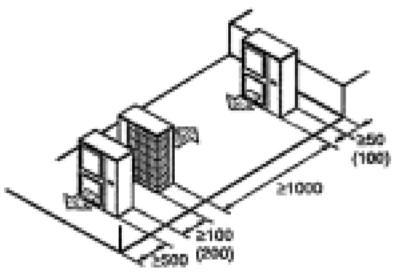
Obstacles exist in front of the air inlet



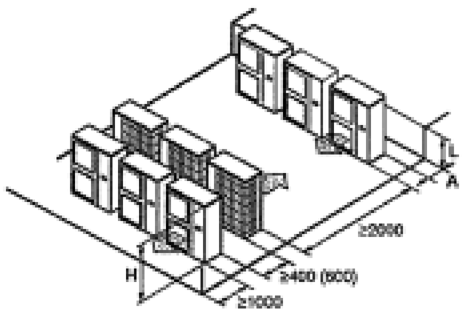
Multiple rows

The illustration below shows the required installation and service space (mm). The values in brackets are for the 125 class.

Installation of one unit per row



Installing multiple units (2 units or more) in lateral connection per row



Relation of dimensions of H, A and L are shown in the table below.

	L	A
L ≤ H	0 < L ≤ 1/2H	150 (250)
	1/2H < L	200 (300)
H < L	installation impossible	

2 Specifications

2.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Technical specifications
- Electrical specifications
- Electrical data

Outdoor units

This chapter contains the following specifications:

Specifications	See page
2.2–RZQS71, 100 and 125 (single phase)	1–12

1

2.2 RZQS71, 100 and 125 (single phase)

Technical specifications

The table below contains the technical specifications.

Specification		RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
Casing	Colour	Ivory white		
	Material	Painted galvanized steel plate		
Dimensions	Packing Height	900 mm		1475 mm
	Packing Width	980 mm		
	Packing Depth	420 mm		
	Unit Height	770 mm		1345 mm
	Unit Width	900 mm		
	Unit Depth	320 mm		
Weight	Machine weight	68 kg		106 kg
	Gross weight	72 kg		111 kg
Heat exchanger	Length	857 mm		
	Nr. of rows	2		
	Fin pitch	1.40 mm		
	Nr. of passes	3		5
	Face area	0.641 m²		1.131 m²
	Nr. of stages	34		60
	Empty tubeplate hole	0		
	Tube type	Hi-XSS(8)		
	Fin type	WF fin		
	Fin treatment	Anti-corrosion treatment (PE)		
Fan	Type	Propeller		
	Discharge direction	Horizontal		
	Quantity	1		2
	Air flow rate (nominal at 230 V) cooling	54.5 m³/min	55,8 m³/min	99.0 m³/min
	Air flow rate (nominal at 230 V) heating	48.1 m³/min	55.8 m³/min	100.0 m³/min
	Fan motor quantity	1		2
	Fan motor model	KFD-325-70-8A		
	Motor speed (nominal at 230 V) Nr. of steps	8		
	Motor speed (nominal at 230 V) cooling	818 rpm	850 rpm	782 rpm
	Motor speed (nominal at 230 V) heating	715 rpm	850 rpm	767 rpm
	Motor output	70 W		
	Motor Drive	direct drive		
Compressor	Quantity	1		
	Motor model	2YC838XD		JT100G-VD
	Motor type	Hermetically sealed swing compressor		Hermetically sealed scroll compressor
	Motor output	1800 W		2200 W
	Motor starting method	Inverter driven		
	Motor crankcase heater	–		33 W
Operation range	Cooling min.	-5.0°C DB		
	Cooling max.	46.0°C DB		
	Heating min.	-10.0°C WB		
	Heating max.	15.5°C WB		
Sound level (nominal)	Cooling sound power	65.0 dBA	67.0 dBA	67.0 dBA
	Cooling sound pressure	49.0 dBA	51.0 dBA	51.0 dBA
	Heating sound pressure	51.0 dBA	55.0 dBA	53.0 dBA
Sound level (night quiet)	Cooling sound pressure	47.0 dBA	49.0 dBA	
Refrigerant	Type	R-410A		
	Charge	2.80 kg		4.30 kg
	Control	Expansion valve (electronic type)		
	Nr. of circuits	1		

Specification		RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
Refrigerant oil	Type	Daphne FVC50K		Daphne FVC68D
	Charged volume	0.8 l		1.0 l
Piping connections	Liquid quantity	1		
	Liquid type	Flare connection		
	Liquid diameter (OD)	9.52 mm		
	Gas quantity	1		
	Gas type	Flare connection		
	Gas diameter (OD)	15.9 mm		
	Drain quantity	3		
	Drain type	Hole		
	Drain diameter (OD)	26.0 mm		
	Piping length min.	5 m		
	Piping length max.	30 m	50 m	
	Piping length equivalent	40 m	70 m	
	Piping length chargeless	30 m		
	Additional refrigerant charge	See installation manual Deside by DENV		
	Installation height difference max.	15.0 m	30.0 m	
	Max. intern unit level difference	0.50 m		
	Heat insulation	Both liquid and gas pipes		
Defrost method		Pressure equalising		
Defrost control		Sensor for outdoor heat exchanger temperature		
Capacity control method		Inverter controlled		
Safety devices		High pressure switch		
		Fan motor thermal protector		
		Fuse		
Standard accessories	Item	Tie-wraps		
	Quantity	2		
Standard accessories	Item	Installation manual		
	Quantity	1		

Notes:

1. Nominal cooling capacities are based on:
   - Indoor temperature: 27.0°C DB/19.0°C WB
   - Outdoor temperature: 35.0°C DB
   - Equivalent refrigerant piping: 5.0 m
   - Level difference: 0 m
2. Nominal heating capacities are based on:
   - Indoor temperature: 20°C DB
   - Outdoor temperature: 7.0°C DB/6.0° C WB
   - Equivalent refrigerant piping: 5.0 m
   - Level difference: 0 m

Electrical specifications

The table below contains the electrical specifications.

Specification		RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
Power supply	Name	V3B		
	Phase	1~		
	Frequency	50 Hz		
	Voltage	230 V		
Current	Zmax. List	Complies to EN61000-3-11		
	Recommended fuses	20 A		32 A
Voltage range	Mininum	207 V		
	Maximum	253 V		
Wire connections	For power supply - remark	See installation manual Deside by DENV		
	For connection with indoor - remark	See installation manual Deside by DENV		
Power supply intake		Outdoor unit only		
Notes		See separate drawing for electrical data.		See separate drawing for electrical data. Power supply intake for FDQ is outdoor and indoor unit.

Electrical data

Unit combination		Power supply					Compressor		OFM		IFM	
Indoor unit	Outdoor unit	Hz-Volts	Voltage range	MCA	TOCA	MFA	MSC	RLA	kW	FLA	kW	FLA
FCQ71B8V3B	RZQS71B7V3B	50-230		17.1	17.1	20	16.2	16.2	0.07	0.3	0.045	0.6
FCQ35B8V1x2	RZQS71B7V3B	50-230		17.7	17.7	20	16.2	16.2	0.07	0.3	0.045x2	0.6x2
FFQ35BV1Bx2	RZQS71B7V3B	50-230		17.7	17.7	20	16.2	16.2	0.07	0.3	0.055x2	0.6x2
FBQ71B7V3B	RZQS71B7V3B	50-230	Max.50Hz-253V Min.50Hz-207V	17.4	17.4	20	16.2	16.2	0.07	0.3	0.125	0.9
FBQ35B7V1x2	RZQS71B7V3B	50-230		17.5	17.5	20	16.2	16.2	0.07	0.3	0.065x2	0.5x2
FHQ71BUV1B	RZQS71B7V3B	50-230		17.1	17.1	20	16.2	16.2	0.07	0.3	0.062	0.6
FHQ35BUV1Bx2	RZQS71B7V3B	50-230		17.7	17.7	20	16.2	16.2	0.07	0.3	0.062x2	0.6x2
FAQ71BUV1B	RZQS71B7V3B	50-230		16.8	16.8	20	16.2	16.2	0.07	0.3	0.043	0.3
FCQ100B8V3B	RZQS100B7V3B	50-230		19.0	19.0	20	17.7	17.7	0.07	0.3	0.090	1.0
FCQ50B8V1x2	RZQS100B7V3B	50-230		19.2	19.2	20	17.7	17.7	0.07	0.3	0.045x2	0.6x2
FCQ35B8V1x3	RZQS100B7V3B	50-230		19.8	19.8	20	17.7	17.7	0.07	0.3	0.045x3	0.6x3
FFQ50BV1Bx2	RZQS100B7V3B	50-230		19.4	19.4	20	17.7	17.7	0.07	0.3	0.055x2	0.7x2
FFQ35BV1Bx3	RZQS100B7V3B	50-230		19.8	19.8	20	17.7	17.7	0.07	0.3	0.055x3	0.6x3
FBQ100B7V3B	RZQS100B7V3B	50-230	Max.50Hz-253V Min.50Hz-207V	19.0	19.0	20	17.7	17.7	0.07	0.3	0.135	1.0
FBQ50B7V1x2	RZQS100B7V3B	50-230		19.4	19.4	20	17.7	17.7	0.07	0.3	0.085x2	0.7x2
FBQ35B7V1x3	RZQS100B7V3B	50-230		19.5	19.5	20	17.7	17.7	0.07	0.3	0.065x3	0.5x3
FHQ100BUV1B	RZQS100B7V3B	50-230		18.7	18.7	20	17.7	17.7	0.07	0.3	0.130	0.7
FHQ50BUV1Bx2	RZQS100B7V3B	50-230		19.2	19.2	20	17.7	17.7	0.07	0.3	0.062x2	0.6x2
FHQ35BUV1Bx3	RZQS100B7V3B	50-230		19.8	19.8	20	17.7	17.7	0.07	0.3	0.062x3	0.6x3
FAQ100BUV1B	RZQS100B7V3B	50-230		18.4	18.4	20	17.7	17.7	0.07	0.3	0.049	0.4

Unit combination		Power supply					Compressor		OFM		IFM	
Indoor unit	Outdoor unit	Hz-Volts	Voltage range	MCA	TOCA	MFA	MSC	RLA	kW	FLA	kW	FLA
FCQ125B8V3B	RZQS125B7V3B	50-230	Max.50Hz-253V Min.50Hz-207V	25.0	25.0	32	23.4	23.4	0.07+0.07	0.3+0.3	0.090	1.0
FCQ60B8V1x2	RZQS125B7V3B	50-230		25.2	25.2	32	23.4	23.4	0.07+0.07	0.3+0.3	0.045x2	0.6x2
FCQ50B8V1x3	RZQS125B7V3B	50-230		25.8	25.8	32	23.4	23.4	0.07+0.07	0.3+0.3	0.045x3	0.6x3
FCQ35B8V1x4	RZQS125B7V3B	50-230		26.4	26.4	32	23.4	23.4	0.07+0.07	0.3+0.3	0.045x4	0.6x4
FFQ60BV1Bx2	RZQS125B7V3B	50-230		25.4	25.4	32	23.4	23.4	0.07+0.07	0.3+0.3	0.055x2	0.7x2
FFQ50BV1Bx3	RZQS125B7V3B	50-230		26.1	26.1	32	23.4	23.4	0.07+0.07	0.3+0.3	0.055x3	0.7x3
FFQ35BV1Bx4	RZQS125B7V3B	50-230		26.4	26.4	32	23.4	23.4	0.07+0.07	0.3+0.3	0.055x4	0.6x4
FBQ125B7V3B	RZQS125B7V3B	50-230		25.4	25.4	32	23.4	23.4	0.07+0.07	0.3+0.3	0.225	1.4
FBQ60B7V1x2	RZQS125B7V3B	50-230		25.8	25.8	32	23.4	23.4	0.07+0.07	0.3+0.3	0.125x2	0.9x2
FBQ50B7V1x3	RZQS125B7V3B	50-230		26.1	26.1	32	23.4	23.4	0.07+0.07	0.3+0.3	0.085x3	0.7x3
FBQ35B7V1x4	RZQS125B7V3B	50-230		26.0	26.0	32	23.4	23.4	0.07+0.07	0.3+0.3	0.065x4	0.5x4
FHQ125BUV1B	RZQS125B7V3B	50-230		24.7	24.7	32	23.4	23.4	0.07+0.07	0.3+0.3	0.130	0.7
FHQ60BUV1Bx2	RZQS125B7V3B	50-230		25.2	25.2	32	23.4	23.4	0.07+0.07	0.3+0.3	0.062x2	0.6x2
FHQ50BUV1Bx3	RZQS125B7V3B	50-230		25.8	25.8	32	23.4	23.4	0.07+0.07	0.3+0.3	0.062x3	0.6x3
FHQ35BUV1Bx4	RZQS125B7V3B	50-230		26.4	26.4	32	23.4	23.4	0.07+0.07	0.3+0.3	0.062x4	0.6x4
FDQ125B7V3B	RZQS125B7V3B	50-230		28.2	28.2	32	23.4	23.4	0.07+0.07	0.3+0.3	0.500	4.2

Symbols:

MCA: Min. Circuit Amps (A)

TOCA: Total Over-current Amps (A)

MFA: Max. Fuse Amps (see note 7) (A)

MSC : Max. current during the starting compressor (A)

RLA : Rated Load Amps (A)

OFM : Outdoor Fan Motor (A)

IFM : Indoor Fan Motor

FLA : Full Load Amps

kW : Fan Motor Rated Output (kW)

Notes:

1. RLA is based on the following conditions:
   - Power supply: 50Hz 230V
   - Indoor temp. - cooling: 27°C DB/19.0°C WB
   - Indoor temp. - heating: 20.0°C DB
   - Outdoor temp. - cooling: 35.0°C DB
   - Outdoor temp. - heating: 7.0°C DB/6.0°C WB
2. TOCA means the total value of each OC set.
3. Voltage range
   Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits.
4. Maximum allowable voltage variation between phases is 2%.
5. MCA represents maximum input current.
   MFA represents capacity which may accept MCA. (Next lower standard fuse rating, minimum 15A)
6. Select wire size based on the larger value of MCA or TOCA.
7. MFA is used to select the circuit breaker and the ground fault circuit interruptor. (earth leakage circuit breaker)

1

1

3 Functional Diagrams

3.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Functional diagrams
- Pipe connection diameters.

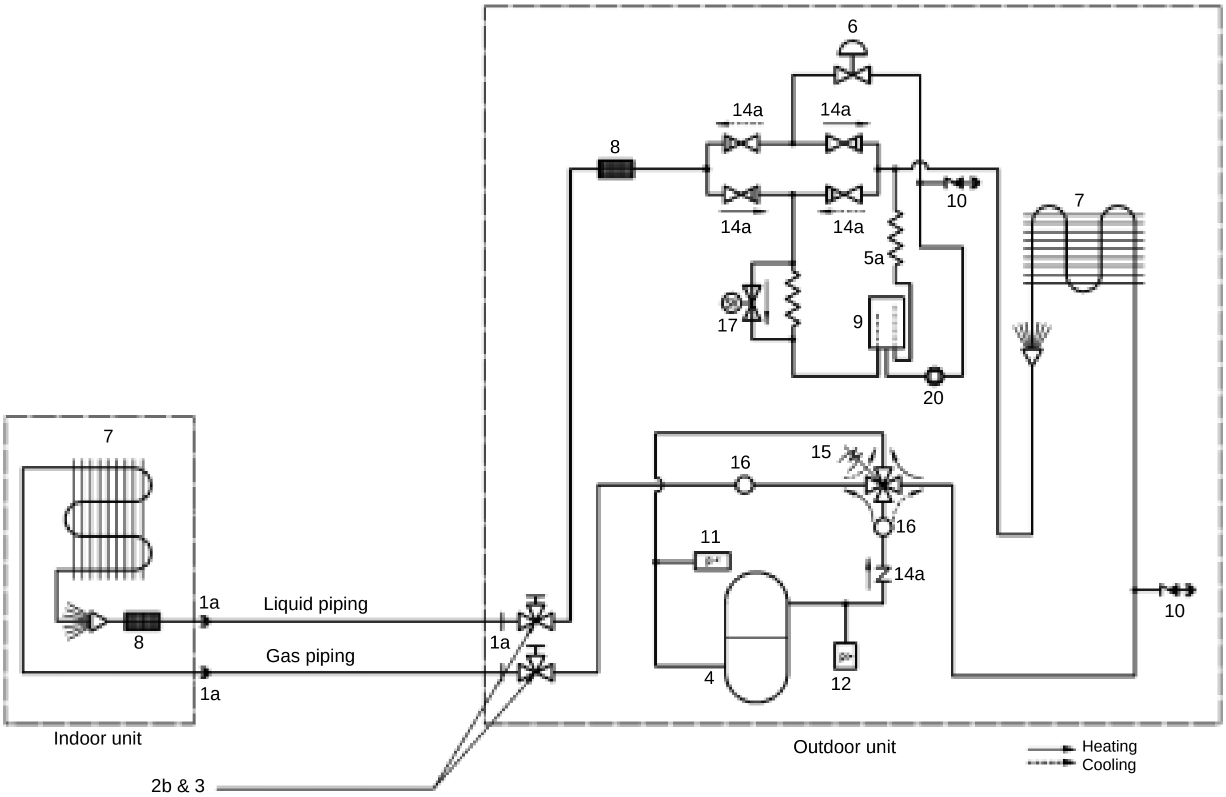
Functional diagrams

This chapter contains the following functional diagrams:

1

3.2 Pair System

RZQS71~100



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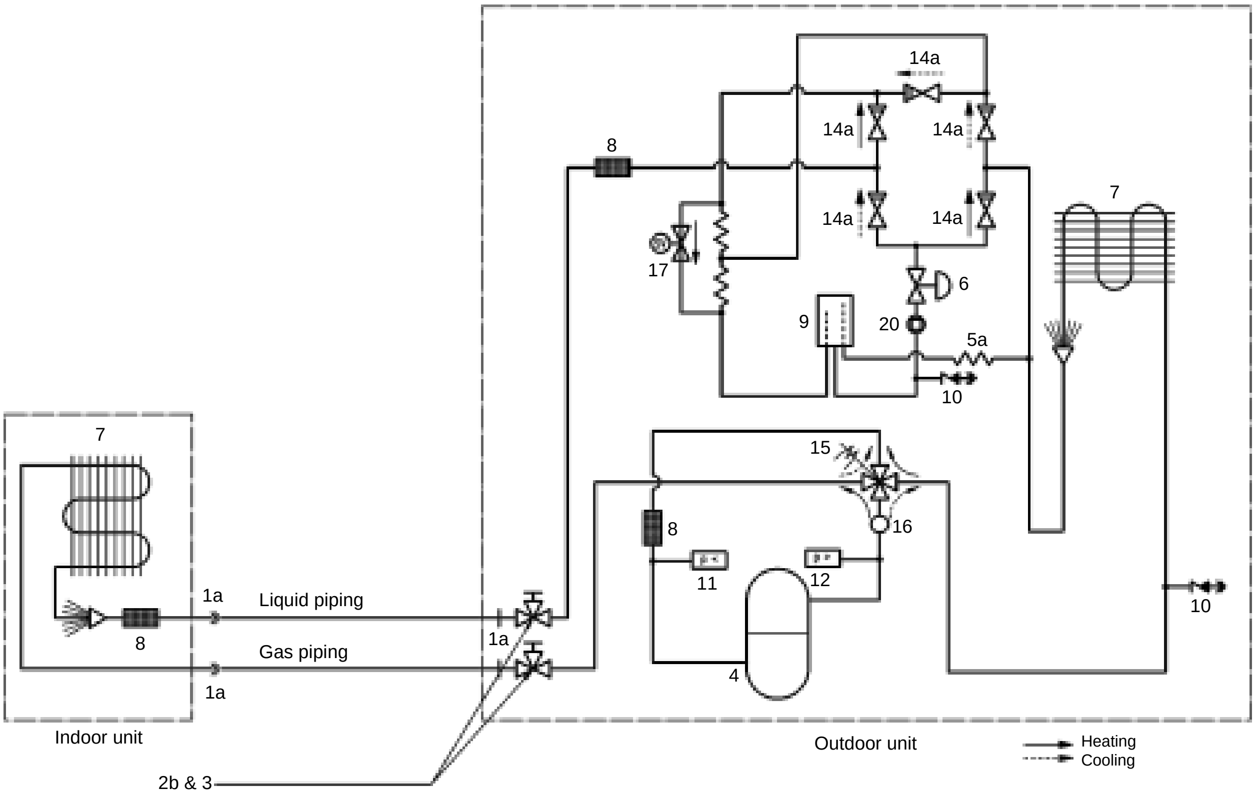
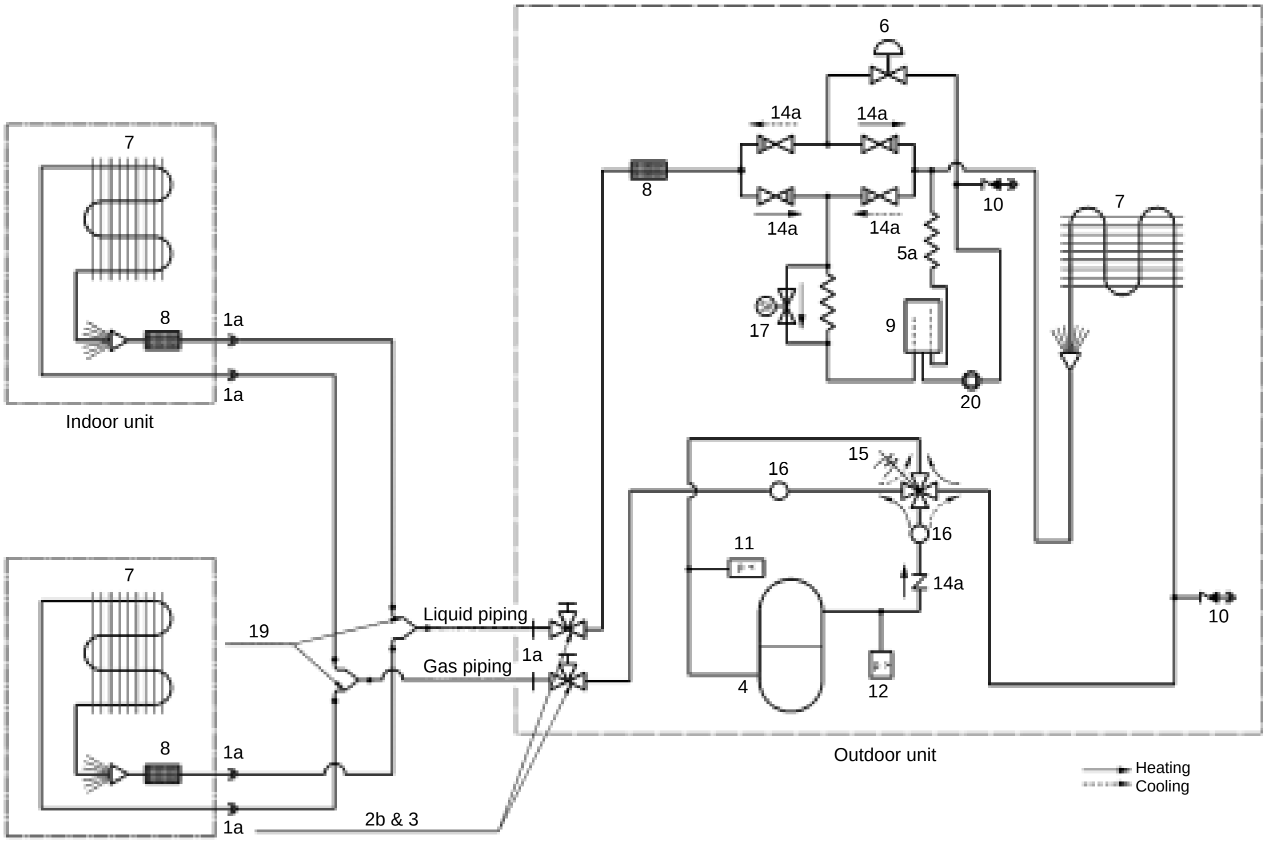
RZQS125


14a
14a
14a
8
7
14a
14a
17
6
9
20
5a
10
7
15
16
8
11
12
1a
Liquid piping
10
8
Gas piping
1a
1a
4
Indoor unit
Outdoor unit
Heating
Cooling
2b & 3

1

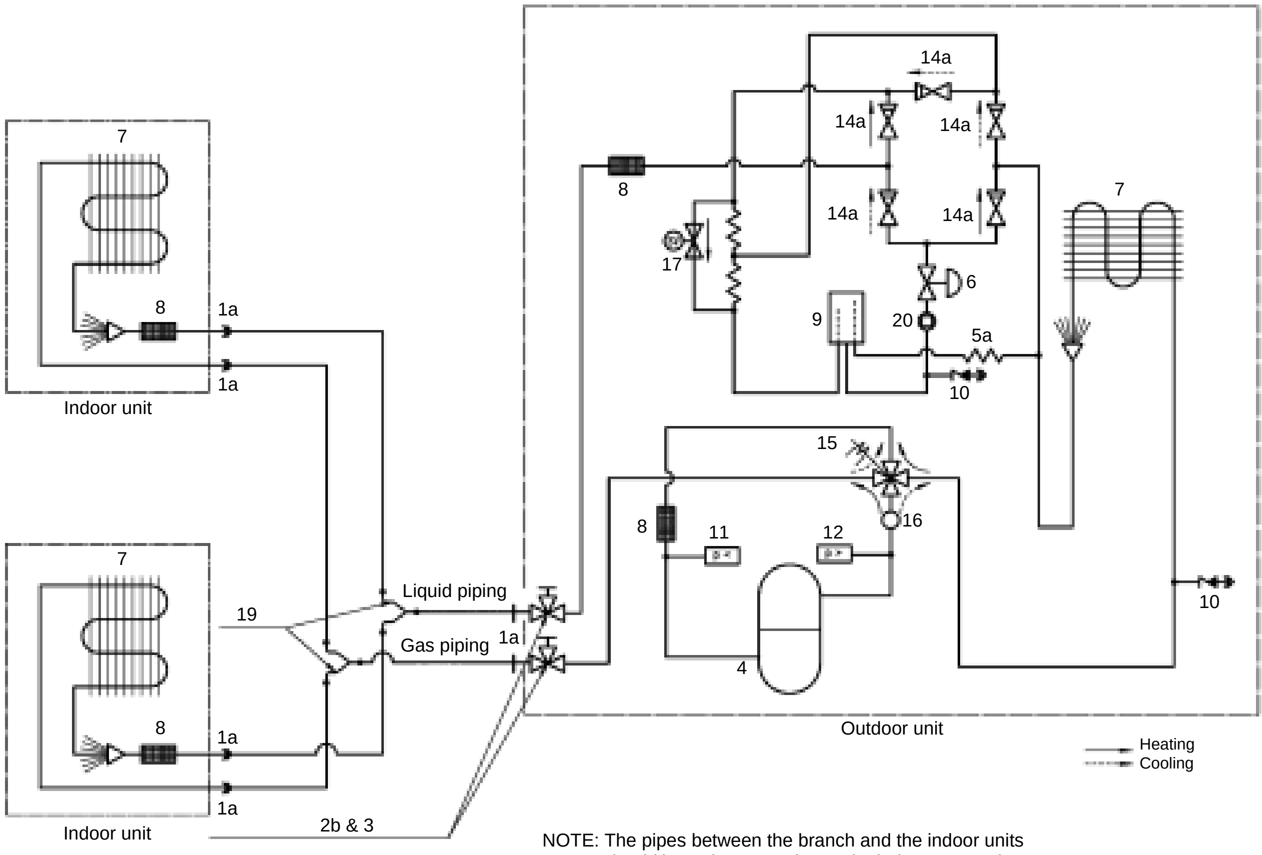
3.3 Twin System

RZQS71~100



NOTE: The pipes between the branch and the indoor units should have the same size as the indoor connections.

RZQS125



NOTE: The pipes between the branch and the indoor units should have the same size as the indoor connections.

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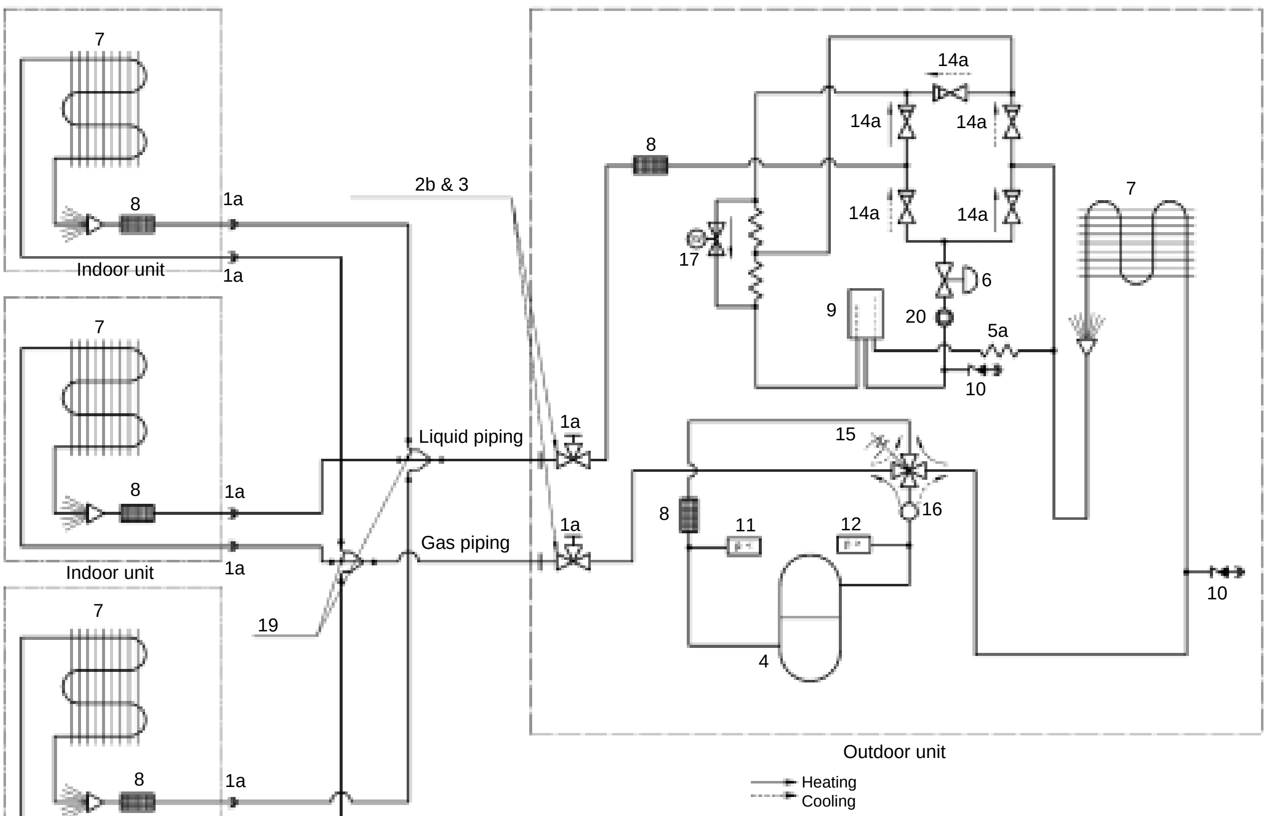
3.4 Triple System

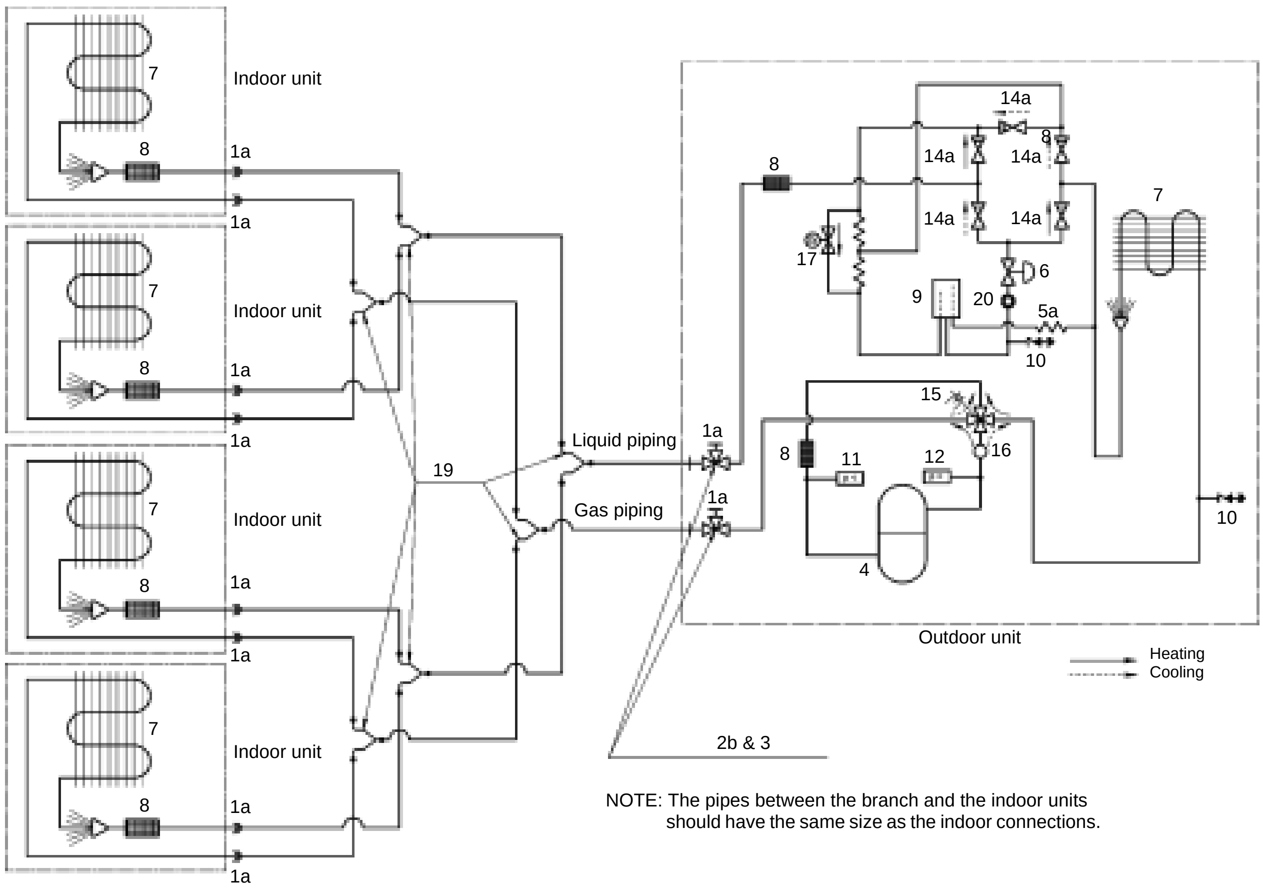
RZQS125



NOTE: The pipes between the branch and the indoor units should have the same size as the indoor connections.

3.5 Double Twin System

RZQS125



NOTE: The pipes between the branch and the indoor units should have the same size as the indoor connections.

1

3.6 Pipe Connection Diameters

Outdoor units

The table below contains the refrigerant pipe connection diameters.

Model	∅ Gas pipe (flare)	∅ Liquid pipe (flare)
RZQS71B7V3B	15.9 mm	9.52 mm
RZQS100B7V3B		
RZQS125B7V3B		

3.7 Piping Components

Components

The table below contains the different components of the functional diagrams.

No.	Component	Function / remark
1a	Flare connection	See pipe connection diameter.
2a	Liquid stop valve	The liquid stop valve is used as shut-off valve in case of a pump-down.
2b	Liquid stop valve with service port	
3	Gas stop valve with service port	The gas stop valve is used as shut-off valve in case of a pump-down.
4	Compressor	The compressor can restart after 3 min from last stop.
5a	Capillary tube	The capillary tube allows pressure equalization during a compressor OFF-cycle.
5b		The capillary tube expands the liquid to enable evaporation in the evaporator.
6	Electronic expansion valve	The expansion valve expands the liquid to enable evaporation in the evaporator. The opening degree is controlled to obtain the optimum discharge temperature.
7	Heat exchanger	The heat exchanger is of the multi louvre fin type. Hi-X -tubes and coated waffle louvre fins are used.
8	Filter	The filter is used to collect impurities, which may enter the system during installation and is also used to avoid blockage of the capillaries and other fine mechanical parts of the unit.
9	Liquid receiver	The liquid receiver is used to make sure only completely liquefied refrigerant is sent to the expansion valve. It is also used as a container in which surplus refrigerant is stored.
10	Check valve with service port	The check valve allows you to connect a gauge.
11	Low-pressure sensor (RZQS71~100)	The low pressure sensor is used to control the unit's actuators (expansion valve, frequency,...)
	Low-pressure switch (RZQS125)	The low-pressure switch stops the operation of the unit when the pressure becomes abnormally low.
12	High-pressure switch	The high-pressure switch stops the operation of the unit when the pressure becomes abnormally high.
13	Propeller fan and fan motor	The propeller fan creates air displacement across the heat exhanger.
14a	One-way valve	The one-way valve is used to force the refrigerant liquid to flow through the receiver and the expansion valve in the same direction both in cooling and heating.
14b		The one-way valve is used to release overpressure in the liquid receiver during stand-still.
15	4-way valve (reversing solenoid valve)	The 4-way valve is used to select refrigerant flow in cooling or heating mode. When the 4-way valve switches from ON to OFF, a timer starts counting up to 150 as soon as the cooling or defrosting operation is stopped. This delay time is to eliminate the switching sound.
16	Muffler	The muffler is used to absorb the refrigerant noise from the compressor.
17	Solenoid valve	■ Y1S: Capacity control solenoid valve ■ Y3S: Liquid injection solenoid valve ■ SV: Solenoid valve (Purge liquid receiver)
18	Thermistor	■ R1T: Air thermistor ■ R2T: Coil thermistor ■ R3T: Discharge pipe thermistor
19	Branch pipe	
20	Strainer	

1

4 Switch Box Layout

4.1 What Is in This Chapter?

Introduction

This chapter shows the switch box components.

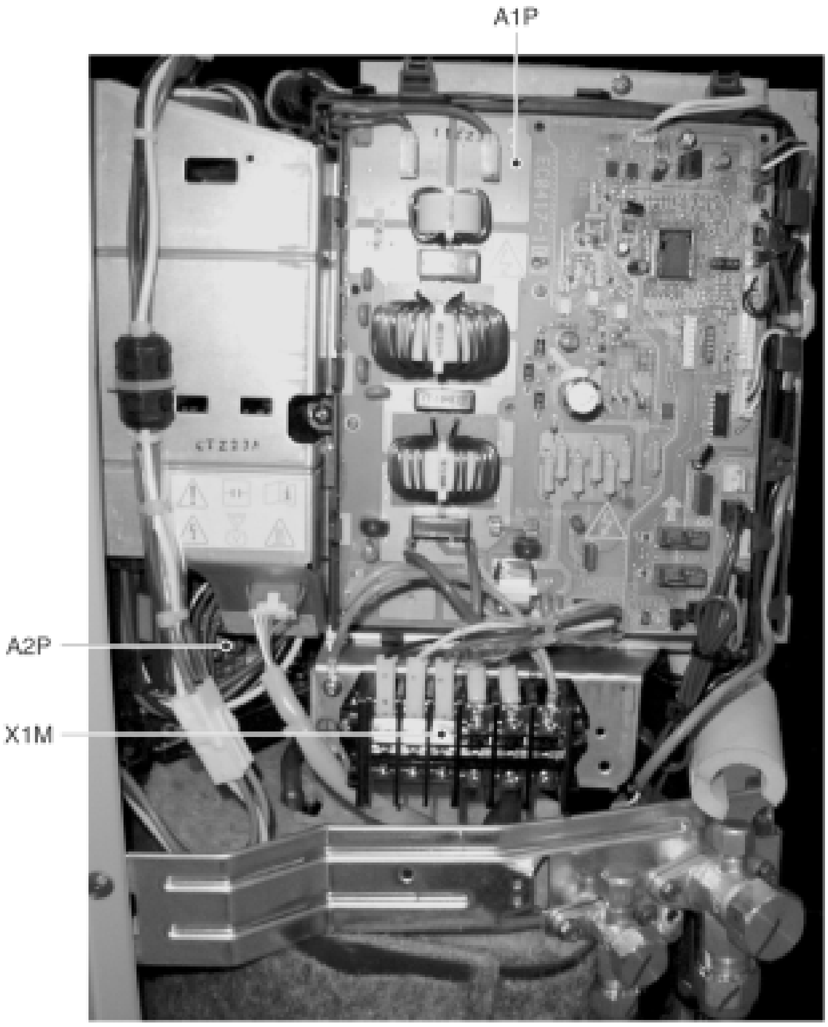
Outdoor units

This chapter contains the following switch box layouts:

1

4.2 RZQS71~100B7V3B

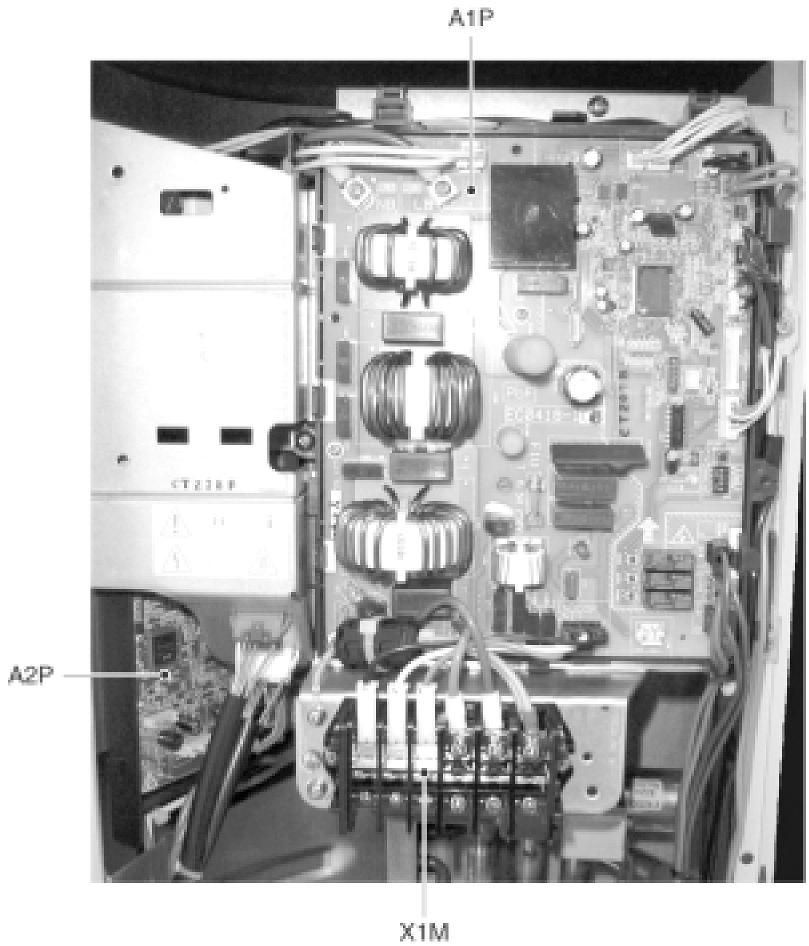
The illustration below shows the switch box layout:



Item	Description
A1P	Printed circuit board (control)
A2P	Printed circuit board (inverter)
X1M	Terminal strip

4.3 RZQS125B7V3B

The illustration below shows the switch box layout:



Item	Description
A1P	Printed circuit board (control)
A2P	Printed circuit board (inverter)
X1M	Terminal strip

5 Wiring Diagrams

5.1 What Is in This Chapter?

Introduction

This chapter contains the wiring diagrams of the outdoor and indoor units.

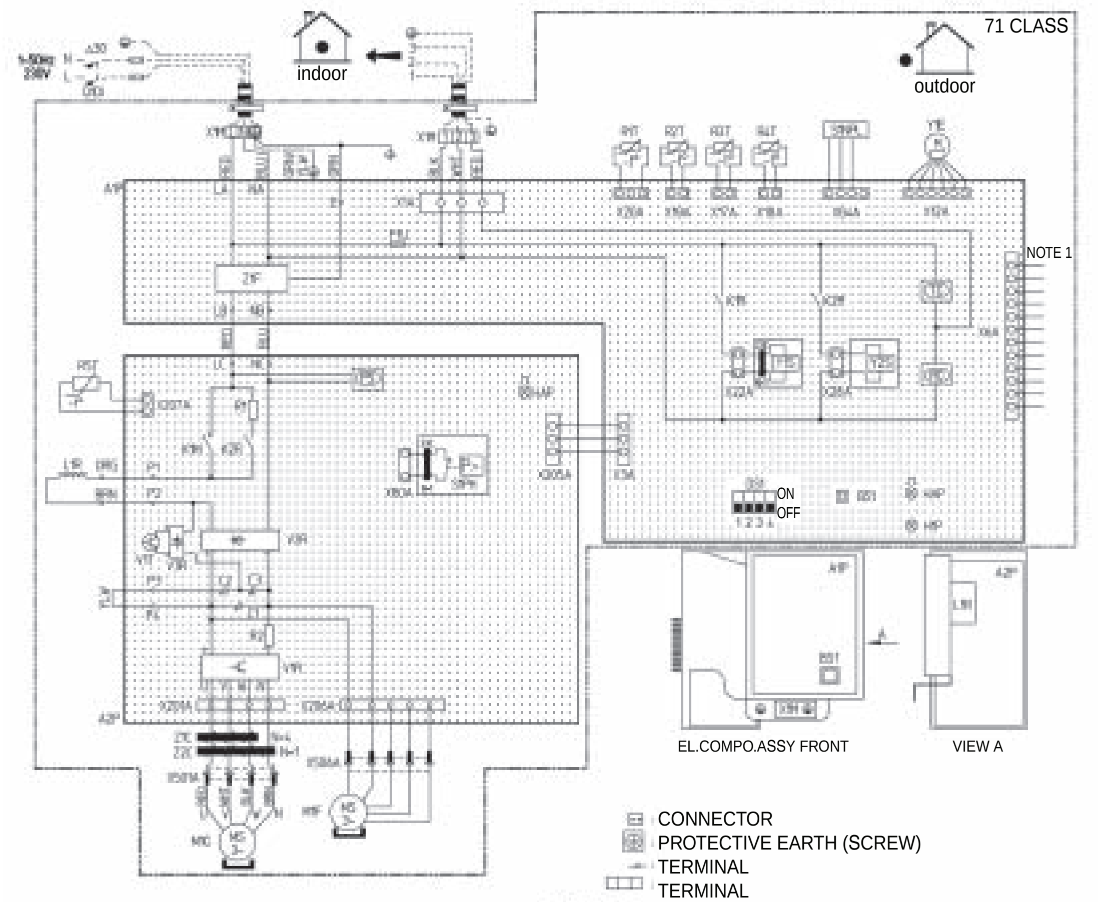
Outdoor units:

This chapter contains the following wiring diagrams:

1

5.2 RZQS71~100B7V3B

Wiring diagram The illustration below shows the wiring diagram of the unit.



: CONNECTOR
: PROTECTIVE EARTH (SCREW)
: TERMINAL
: TERMINAL
: FIELD WIRING
: RELAY CONNECTOR

BLK : BLACK
BLU : BLUE
BRN : BROWN
GRN : GREEN
ORG : ORANGE
RED : RED
WHT : WHITE
YLW : YELLOW

L : LIVE
N : NEUTRAL

NOTES :

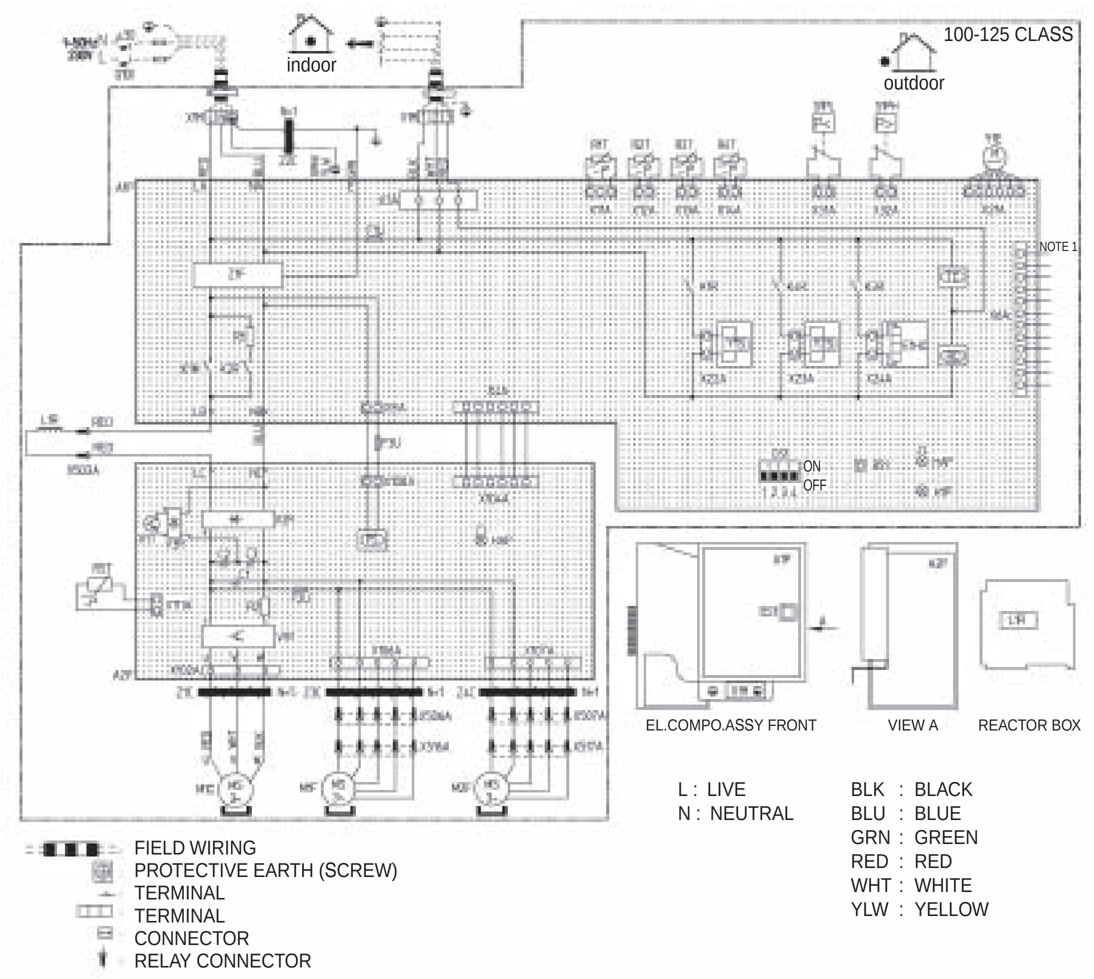
1. REFER TO THE OPTION MANUAL, FOR CONNECTING WIRING TO X6A.
2. CONFIRM THE METHOD OF SETTING THE SELECTOR SWITCHES (DS1) BY SERVICE MANUAL. WHEN UNIT IS SHIPPED BY FACTORY ALL SWITCHES ARE SET TO BE OFF.

1

A1P	Printed circuit board	R1T	Thermistor (Air)
A2P	Printed circuit board (INV.)	R2T	Thermistor (Coil)
BS1	Push button switch (Forced defrost-pump down)	R3T	Thermistor (Discharge pipe)
		R4T	Thermistor (Suction pipe)
C1, C2, C3	Capacitor	R5T	Thermistor (Power module)
DS1	Dip switch	RC	Signal receiver circuit
F1U	Fuse (T 6.3/250V)	S1PH	Pressure switch (High)
HAP (A1P, A2P)	Light emitting diode (Service monitor green)	S1NPL	Pressure sensor (Low)
		TC	Signal transmission circuit
H1P (A1P)	Light emitting diode (Service monitor red)	V1R	Power module
		V2R, V3R	Diode module
K1M (A2P)	Magnetic contactor	V1T	IGBT
K1R (A1P)	Magnetic relay (Y1S)	X6A	Connector (Option)
K2R (A1P)	Magnetic relay (Y2S)	X1M	Terminal strip
K2R (A2P)	Magnetic relay	Y1E	Expansion valve
L1R	Reactor	Y1S	4-way valve
M1C	Motor compressor	Y2S	Solenoid valve
M1F	Motor fan	Z1C, Z2C, Z3C, Z4C	Noise filter
PS	Power supply		
Q1DI	Earth leakage breaker (30mA)	Z1F	Noise filter (with surge absorber)
R1, R2	Resistor		

5.3 RZQS125B7V3B

Wiring diagram The illustration below shows the wiring diagram of the unit.



NOTES :

1. REFER TO THE OPTION MANUAL, FOR CONNECTING WIRING TO X6A.
2. CONFIRM THE METHOD OF SETTING THE SELECTOR SWITCHES (DS1) BY SERVICE MANUAL. WHEN UNIT IS SHIPPED BY FACTORY ALL SWITCHES ARE SET TO BE OFF.

A1P	Printed circuit board	Q1DI	Earth leakage breaker (30mA)
A2P	Printed circuit board (INV.)	R1, R2	Resistor
BS1	Push button switch (Forced defrost-pump down)	R1T	Thermistor (Air)
		R2T	Thermistor (Coil)
C1, C2, C3	Capacitor	R3T	Thermistor (Discharge pipe)
DS1	Dip switch	R4T	Thermistor (Suction pipe)
E1HC	Crankcase heater	R5T	Thermistor (Power module)
F1U	Fuse (T 6.3/250V)	RC	Signal receiver circuit
F2U	Fuse	S1PH	Pressure switch (High)
F3U	Fuse (B 5A/250V)	S1PL	Pressure switch (Low)
HAP (A1P, A2P)	Light emitting diode (Service monitor green)	TC	Signal transmission circuit
		V1R	Power module
H1P (A1P)	Light emitting diode (Service monitor red)	V2R, V3R	Diode module
		V1T	IGBT
K1M (A1P)	Magnetic contactor	X6A	Connector (Option)
K1R (A1P)	Magnetic relay (Y1S)	X1M	Terminal strip
K2R (A1P)	Magnetic relay	Y1E	Expansion valve
K3R (A1P)	Magnetic relay (E1HC)	Y1S	4-way valve
K4R (A1P)	Magnetic relay (Y2S)	Y2S	Solenoid valve
L1R	Reactor	Z1C, Z2C, Z3C, Z4C	Noise filter
M1C	Motor compressor		
M1F, M2F	Motor fan	Z1F	Noise filter (with surge absorber)
PS	Power supply		

6 PCB Layout

6.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- It describes which unit uses which PCB types
- It shows the PCB connectors.

Outdoor units

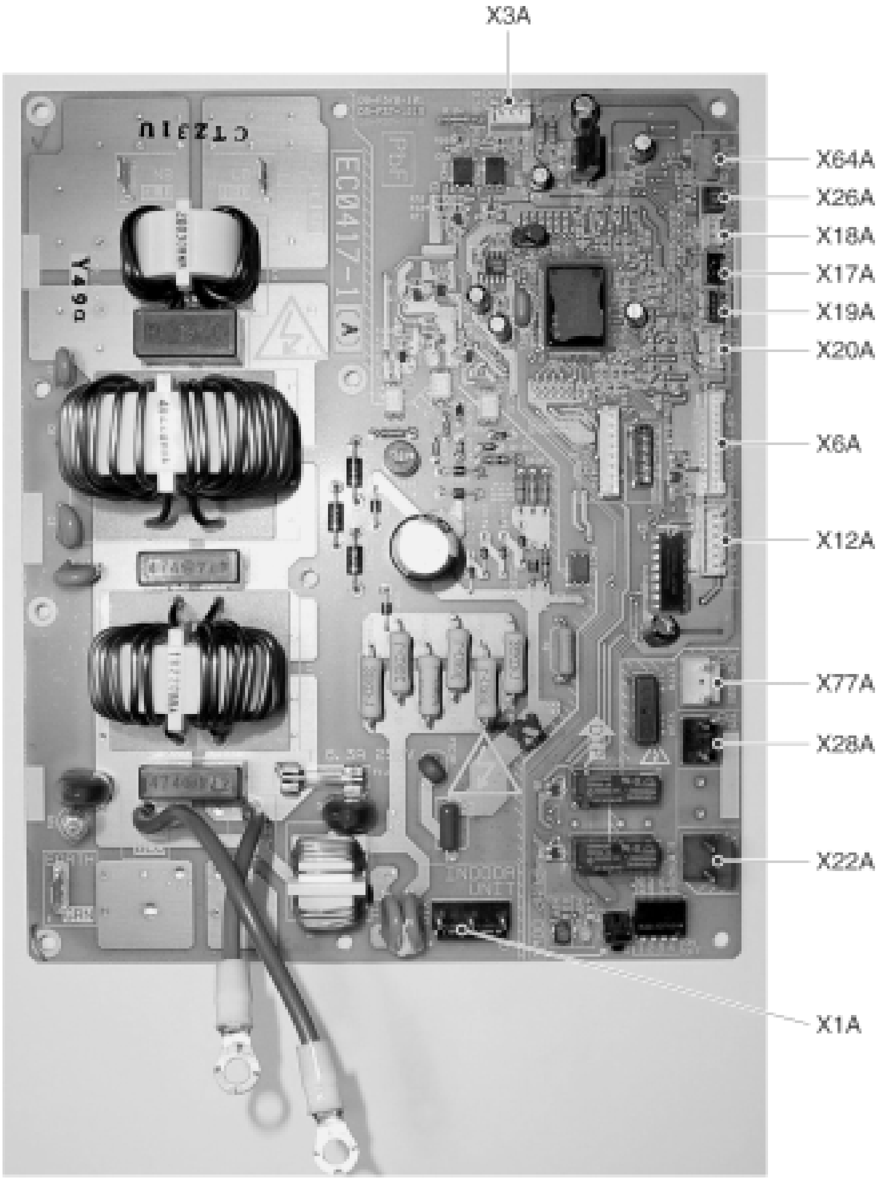
This chapter contains the following PCB layouts:

1

6.2 RZQS71~100B7V3B

Control PCB

The illustration below shows the PCB connectors.



Connectors

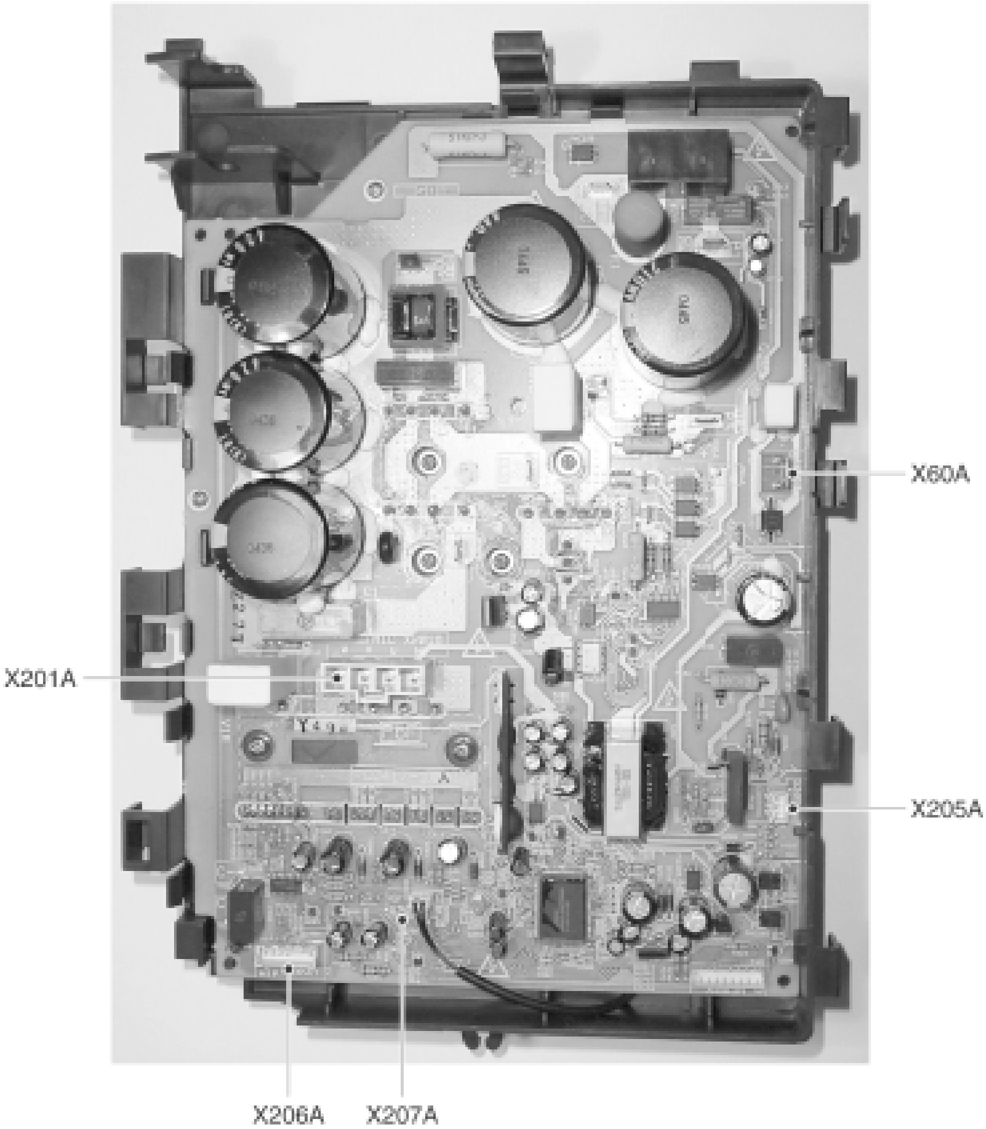
The table below describes the PCB connectors.

Connector	Connected to	Description
X1A	X1M	Terminal strip connector
X3A	X205A (on inverter PCB)	
X6A		For optional PCB KRP58M51
X12A	Y1E	Expansion valve
X17A	R3T	Discharge pipe thermistor
X18A	R4T	Suction pipe thermistor
X19A	R2T	Coil thermistor
X20A	R1T	Air thermistor
X22A	Y1S	4-way valve
X26A		Connector for spare part adaptor
X28A	Y2S	Solenoid valve
X64A	S1NPL	Low pressure sensor
X77A		For optional PCB KRP58M51

1

Inverter PCB

The illustration below shows the PCB connectors.



Connectors

The table below describes the PCB connectors.

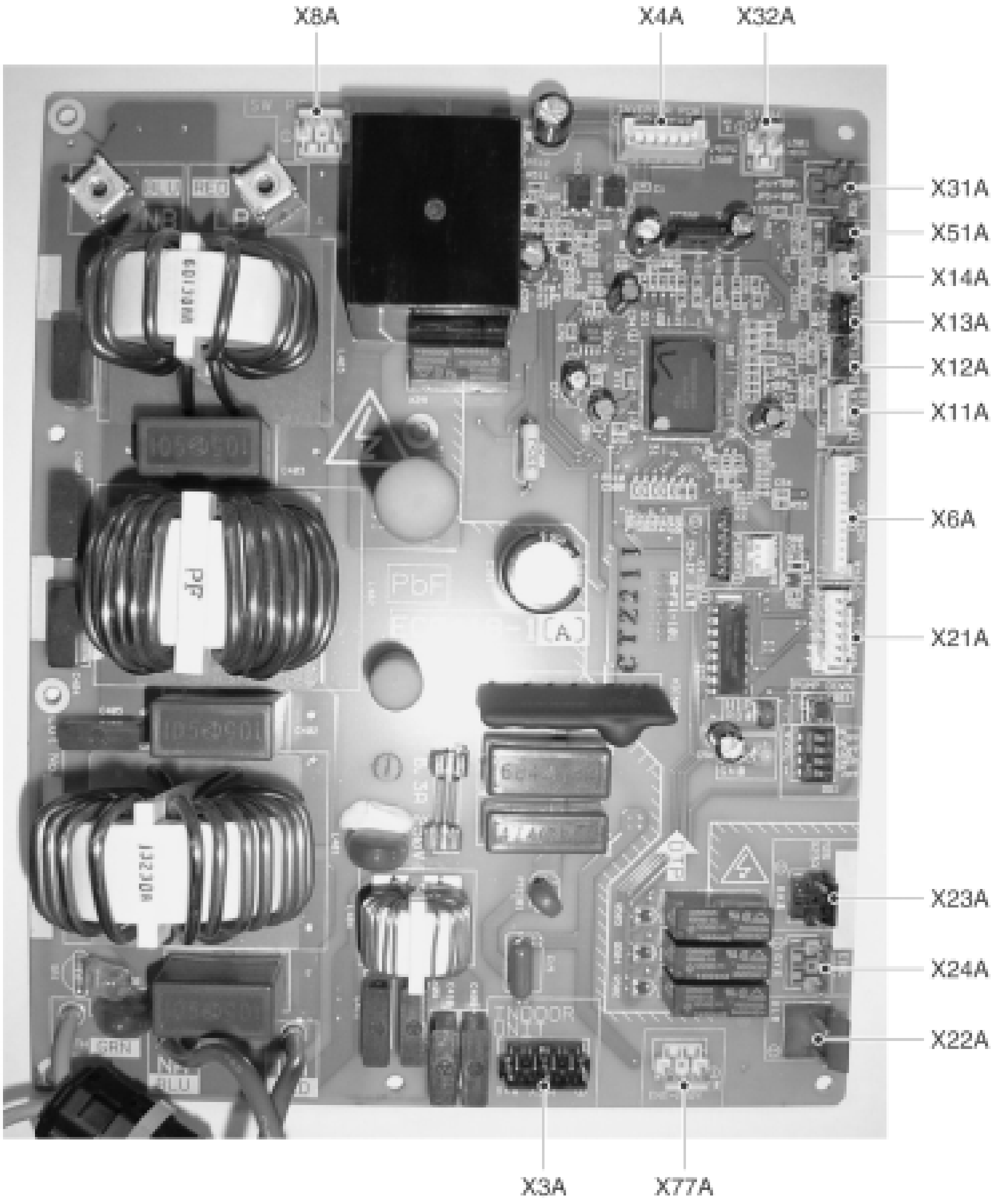
Connector	Connected to	Description
X60A	S1PH	High pressure switch
X201A	M1C	Compressor motor
X205A	X3A on control PCB	
X206A	M1F	Fan motor
X207A	R5T	Power module thermistor

1

6.3 RZQS125B7V3B

Control PCB

The illustration below shows the PCB connectors.



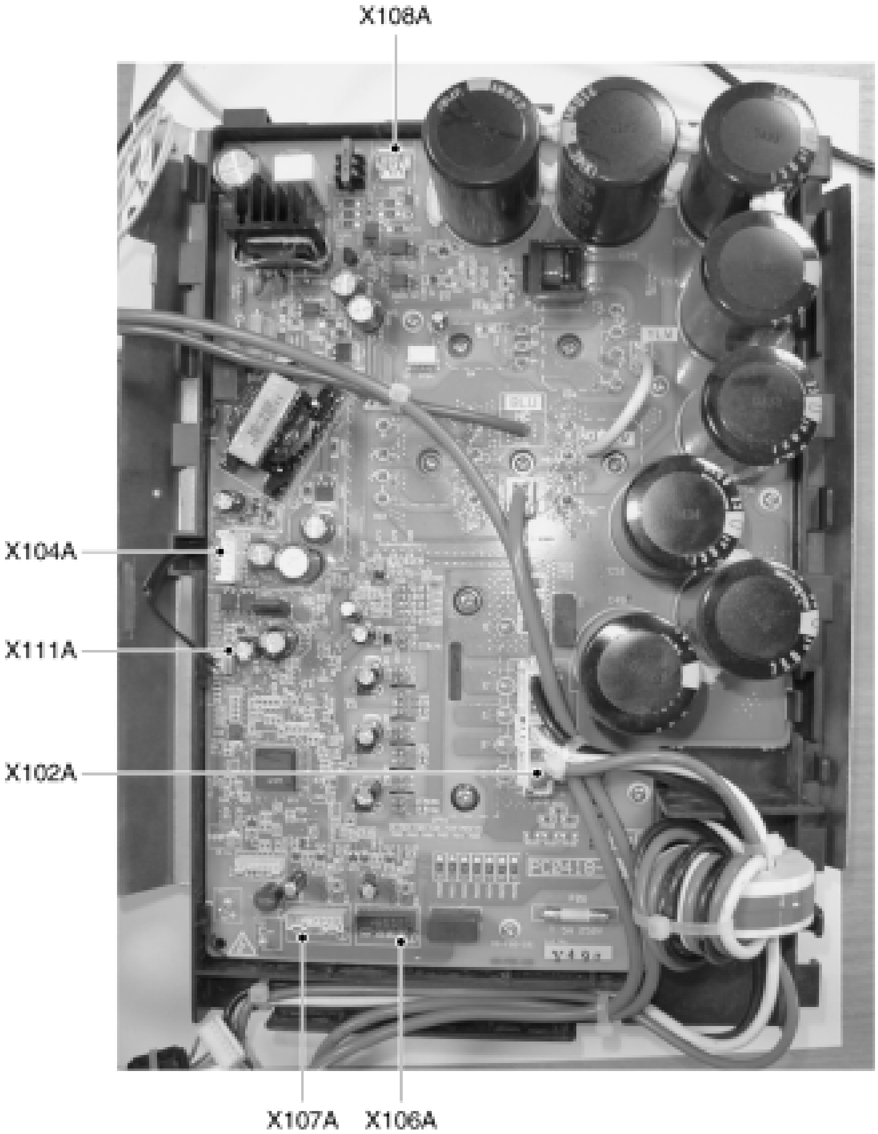
Connectors

The table below describes the PCB connectors.

Connector	Connected to	Description
X3A	X1M	Terminal strip connector
X4A	X104A (on inverter PCB)	
X6A		For optional PCB KRP58M51
X8A	X108A (on inverter PCB)	
X11A	R1T	Air thermistor
X12A	R2T	Coil thermistor
X13A	R3T	Discharge pipe thermistor
X14A	R4T	Suction pipe thermistor
X21A	Y1E	Expansion valve
X22A	Y1S	4-way valve
X23A	Y2S	Solenoid valve
X24A	E1HC	Crankcase heater
X31A	S1PL	Low pressure switch
X32A	S1PH	High pressure switch
X51A		Connector for spare parts adaptor
X77A		For optional PCB KRP58M51

Inverter PCB

The illustration below shows the PCB connectors.



Connectors

The table below describes the PCB connectors.

Connector	Connected to	Description
X102A	M1C	Compressor motor
X104A	X4A (on control PCB)	
X106A	M1F	Fan motor
X107A	M2F	Fan motor
X108A	X8A (on control PCB)	
X111A	R5T	Power module thermistor

Part 2
Functional Description

2

What is in this part?

This part contains information on the functions used to control the system. Understanding these functions is vital when diagnosing a malfunction that is related to the functional control.

Overview

This part contains the following chapters:

2

1 General Functionality

1.1 What Is in This Chapter?

Introduction

This chapter will explain all functions not related to the compressor frequency control, outdoor unit fan control and expansion valve control. These functions have been programmed to ensure the unit's reliability and lifetime, enable the operation in case of malfunction, or increase the customer's comfort.

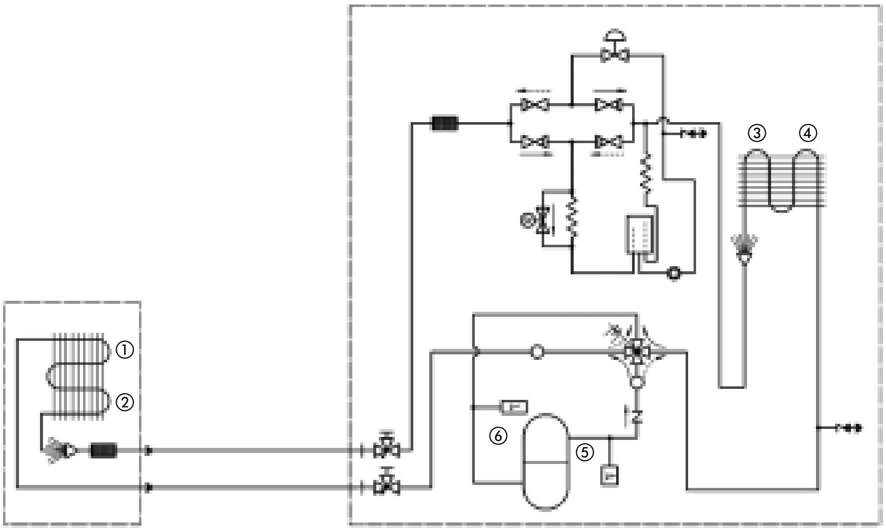
Overview

This chapter contains the following topics:

2

1.2 Functions of Thermistors

Locating the thermistors



Remark

Sensor R3T on indoor coil of FCQ35~60B7V1, FFQ35~60B7V1B, FBQ35~60B7V1 & FHQ35~60BUV1B is not used when the indoor units are connected to RZQS outdoor units.

Functions of the thermistors

Ther-mistor	Location	Wiring symbol	Mode	Function
1	Indoor heat exchanger	R2T	Cooling	■ Compressor frequency control (target Te) ■ Inverter current protection control ■ Freeze-up control
			Heating	■ Compressor frequency control (target Tc) ■ Inverter current protection control ■ Hot start control ■ Peak cut-off
2	Indoor air return	R1T	Cooling	■ Thermostat control ■ PMV control ■ General frequency control
			Heating	■ Thermostat control ■ PMV control ■ General frequency control
3	Outdoor heat exchanger	R2T	Cooling	■ Inverter current protection control
			Heating	■ Inverter current protection control ■ Defrost control

Ther-mistor	Location	Wiring symbol	Mode	Function
4	Outdoor ambient	R1T	Cooling	■ Outdoor fan speed control ■ PMV control ■ Pressure difference control ■ Overall current protection control ■ Preheating operation control (RZQS71~100)
			Heating	■ Defrost control ■ PMV control ■ Forced thermostat OFF ■ Overall current protection control ■ Preheating operation control (RZQS71~100S)
5	Discharge pipe	R3T	Cooling	■ Discharge superheat control ■ Expansion valve control ■ Crankcase heater / preheating control
			Heating	■ Expansion valve control ■ Crankcase heater / preheating control
6	Suction pipe	R4T	Cooling	■ Expansion valve control (SH control)
			Heating	■ Expansion valve control (SH control) ■ Suction pipe superheat protection control
7	Inverter power module	R5T	Cooling	■ Outdoor fan speed control ■ Inverter fin temperature control ■ Pressure difference control
			Heating	■ Inverter fin temperature control

1.3 Forced Operating Mode (Emergency Operation)

Purpose

The table below describes the purpose of the forced operating mode.

If...	Then...
■ R/C is defective ■ Indoor PCB is defective ■ Outdoor PCB is defective	Forced operating mode can be used to go to cooling or heating. In forced operating mode, the compressor is forced to operate until the defective indoor or outdoor PCB is back online.

Starting conditions

You can operate the system manually by changing the emergency switch on the indoor and outdoor PCB from "normal" to "emergency". When the system is operating in "emergency" it can not control the room temperature.

Both the indoor and outdoor unit must be set to "emergency" while the power is off.

Ending conditions

You can end the emergency operation by changing the "emergency" switch back to "normal" while the power is OFF.

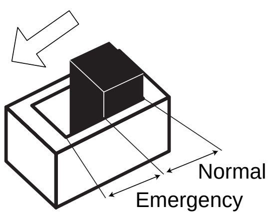
Emergency operation

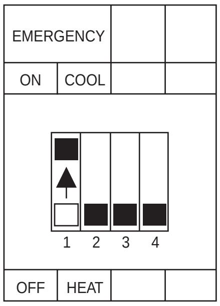
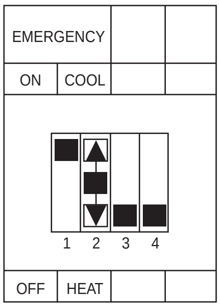
Below table explains what will happen when the switch is set to "emergency":

Changing the switch to "emergency" for the…	Switches ON the…
Indoor unit	■ Indoor fan§ ■ Drain pump
Outdoor unit	■ Compressor§ ■ Outdoor fan(s)

How to set Emergency Operation

To set emergency operation, proceed as follows:

Step	Action
1	Turn OFF the power.
2	Switch ON the emergency switch (SS1) on the indoor PCB. 

Step	Action
3	Switch ON the emergency switch on the outdoor PCB. 
4	Set the emergency switch on the outdoor PCB to the forced mode you prefer (Cooling or Heating). 
5	Turn ON the power supply.

Active components

Component	Forced cooling	Forced heating	Forced defrosting
Compressor	ON	ON	ON
4-way valve	OFF	ON	OFF
Outdoor unit fan	H fan speed	H fan speed	OFF
Indoor unit fan	H fan speed	H fan speed	H fan speed
Drain pump	ON	ON	ON

Additional info

- During emergency operation, do not attempt to operate the equipment from the remote controller. The remote controller shows "88" while the emergency operation is active on the indoor unit
- If a safety device is activated during emergency, all actuators are turned OFF
- In cooling, the unit runs for 20min and then stops for 10min in order to avoid freeze-up of the indoor coil.
- In heating, defrost is activated for 3 minutes once every hour.
- Emergency operation can not be carried out when the PCB board itself is defective.
- Be sure to set the emergency switch on both the outdoor and indoor unit.
- The unit will not regulate the temperature during emergency operation.
- Change the position of the emergency switch only when the power is turned off.

1.4 Outdoor Unit Identification Function

Purpose

The purpose of the outdoor unit identification function is to enable the indoor unit to automatically determine which operating mode has to be set in function of the type of connected outdoor unit (c/o or h/p).

2

Operating modes

The possible operating modes are:

Outdoor unit	Operating modes
h/p	■ Fan ■ Cooling ■ Dry keep ■ Heating
c/o	■ Fan ■ Cooling ■ Dry keep

Used input

The outdoor unit identification function uses the following inputs:

Input	Connection on indoor PCB	Connection on outdoor PCB
Indoor PCB	TC & RC	—
Outdoor PCB	—	TC & RC

TC: Transmission circuit
RC: Receiving circuit

1.5 Simulated Operation Function

Outline

When a malfunction on one of the below thermistors occurs, operation will continue while displaying the applicable alarm on the remote-controller. Fin thermistor malfunction is only displayed when pressing the "Inspection" button on the remote-controller.

Sensors

- Outside temperature thermistor
- Outdoor heat exchanger thermistor
- Fin thermistor
- Discharge pipe thermistor
- Indoor unit air suction thermistor
- Indoor heat exchanger thermistor (RZQS71)

Remark

Simulated operation will not be conducted in case the below mentioned thermistors are malfunctioning:

- Low pressure sensor (RZQS71~100)
- Suction thermistor
- Indoor heat exchanger thermistor (RZQS125)
- Outdoor heat exchanger thermistor (RZQS125 in heating mode)

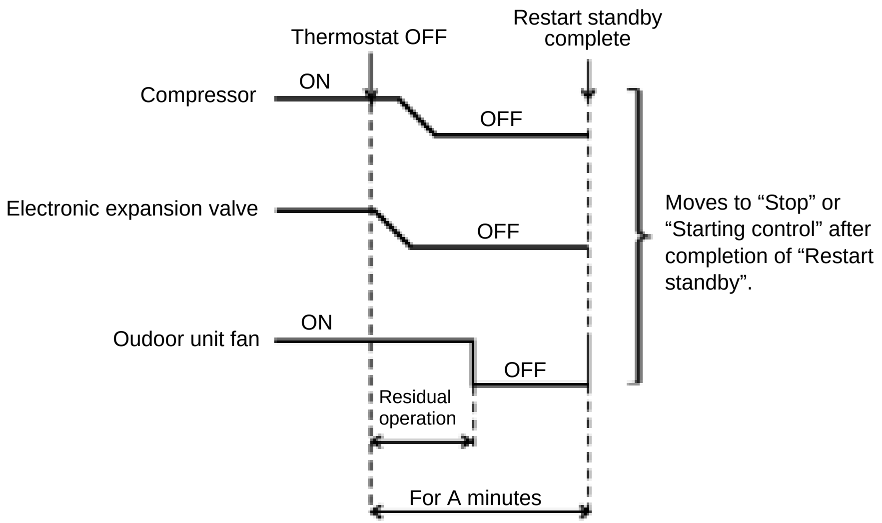
1.6 Restart Standby

Outline

To prevent the compressor from frequently turning ON and OFF and allow pressure equalization, forced thermostat OFF will be conducted after compressor stopping (compressor guard timer).

2

Graph



Parameters

	A minutes
RZQS71~100	2 minutes
RZQS125	3 minutes

1.7 Automatic Restart

Purpose

The purpose of the auto-restart function is to automatically resume the same operating mode as when the unit was operating when the power supply is restored after a power failure.

Do not use the "Automatic Restart" function to daily start/stop the unit.

Precautions when turning OFF power

- When you have to turn OFF the power supply in order to carry out maintenance, make sure to turn the remote control's ON/OFF switch OFF firstly.
- If you turn OFF the power supply while the remote control's ON/OFF switch is still ON, the "automatic restart function" automatically starts the indoor fan immediately and the outdoor unit fan starts automatically 3 minutes after the power supply is turned back ON.
- Do not start/stop the unit by disconnecting the power supply.Stop the unit by stop commando from the remote controller or optional controller before disconnecting the power supply. Be sure that the compressor and the outdoor fans are stopped before disconnecting the power supply so the "Refrigerant Recovery function" has been finished correctly.
- When restarting the unit after the power was disconnected for a longer period leave the unit OFF with the power supply connected for about half an hour (See "Crankcase Heater Control" & "Preheating Operation Control").

2

1.8 Using Conditions for Remote Controller Thermostat

Applicable

The remote control thermostat is only available in wired remote controls.

Method

The remote control sensor is standard disabled for sky-air units. The use of the remote control sensor can be enabled by changing field setting 10(20)-2-02 to 10(20)-2-01.

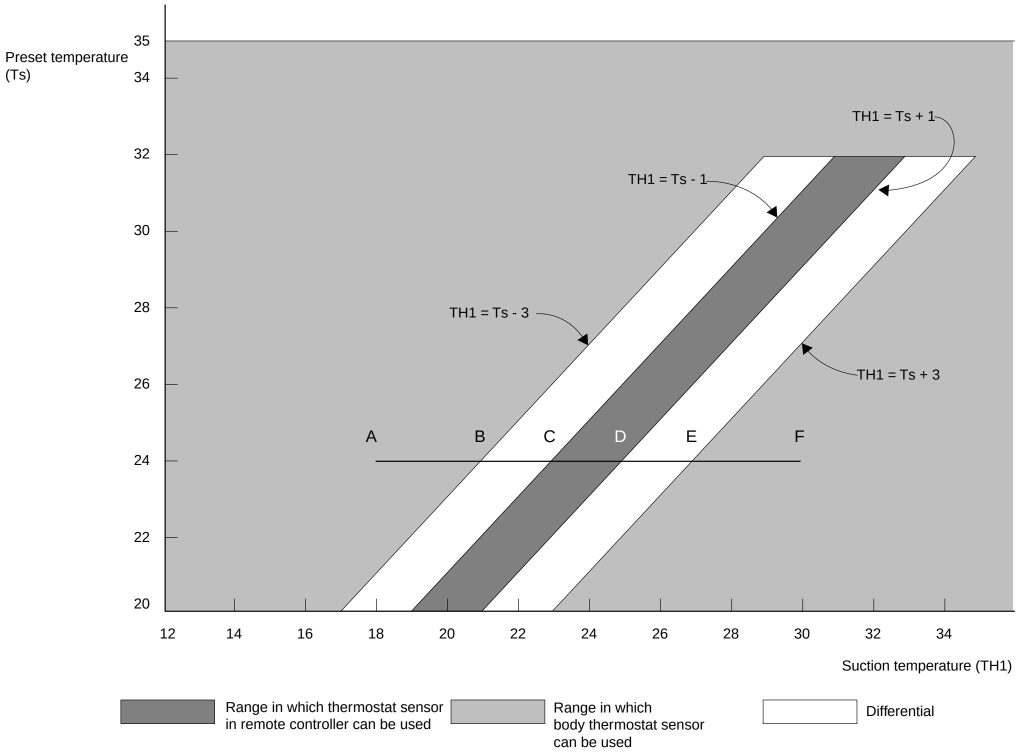
Conditions

The table below contains the condition in which the remote control thermostat is not used:

Condition	The remote controller thermostat is not used when...
1	The remote controller thermostat malfunctions.
2	Group control is used.
3	The set temperature / air suction temperature combination is out of range. (See below graph)

Cooling

The diagram below shows the operation range of the set temperature / air suction temperature combination in cooling operation:



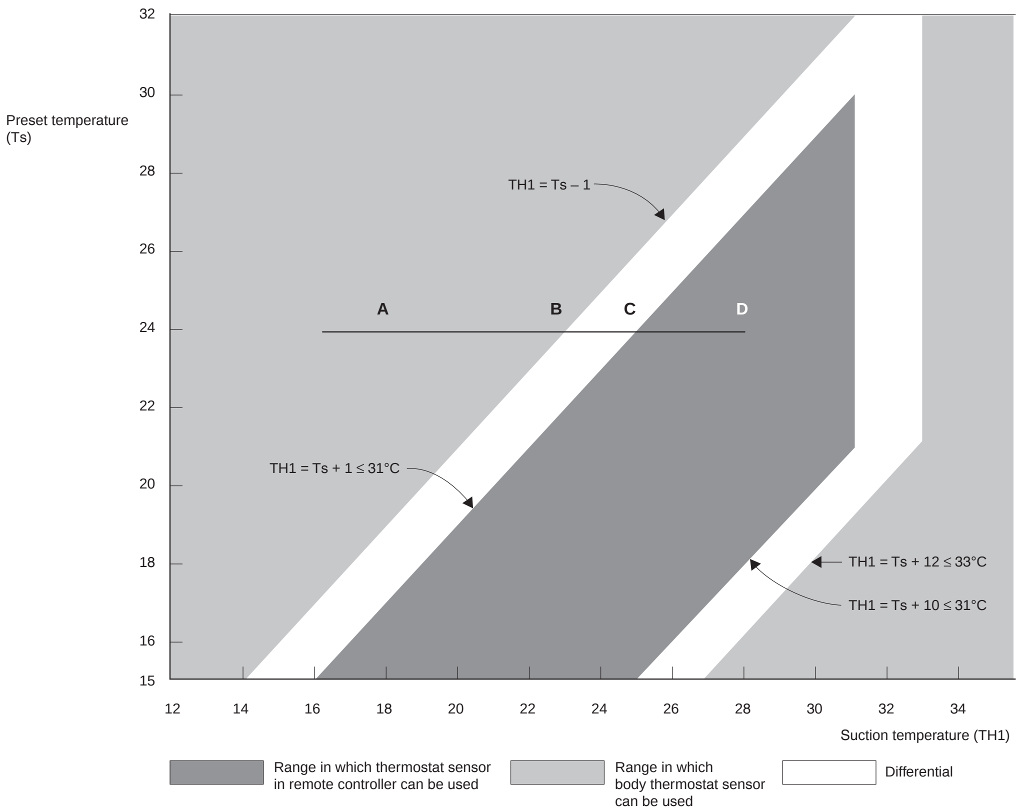
Example

Assuming the preset temperature above is 24°C, and the suction temperature has changed from 18°C to 30°C (A --> F):
(This example also assumes there are several other air conditioners, the VRV system is off, and that temperature changes even when the thermostat sensor is off.)
Body thermostat sensor is used for temperatures from 18°C to 23°C (A --> C).
Remote controller thermostat sensor is used for temperatures from 23°C to 27°C (C --> E).
Body thermostat sensor is used for temperatures from 27°C to 30°C (E --> F).

And assuming suction temperature has changed from 30°C to 18°C (F --> A):
Body thermostat sensor is used for temperatures from 30°C to 25°C (F --> D).
Remote controller thermostat sensor is used for temperatures from 25°C to 21°C (D --> B).
Body thermostat sensor is used for temperatures from 21°C to 18°C (B --> A).

Heating

The diagram below shows the operation range of the set temperature / air suction temperature combination in heating operation:



Example

Assuming the preset temperature above is 24°C, and the suction temperature has changed from 18°C to 28°C (A --> D):
(This example also assumes there are several other air conditioners, the VRV system is off, and that temperature changes even when the thermostat sensor is off.)
Body thermostat sensor is used for temperatures from 18°C to 25°C (A --> C).
Remote controller thermostat sensor is used for temperatures from 25°C to 28°C (C --> D).

And assuming suction temperature has changed from 28°C to 18°C (D --> A):
Remote controller thermostat sensor is used for temperatures from 28°C to 23°C (D --> B).
Body thermostat sensor is used for temperatures from 23°C to 18°C (B --> A).

When heating, the hot air rises to the top of the room, resulting in the temperature being lower near the floor where the occupants are.When controlling by body thermostat sensor only, the unit may therefore be turned off by the thermostat before the lower part of the room reaches the preset temperature. The temperature can be controlled so the lower part of the room where the occupants are doesn’t become cold by widening the range in which thermostat sensor in remote controller can be used so that suction temperature is higher than the preset temperature.

1.9 Forced Thermostat OFF

Outline

The unit will perform the forced thermostat off function in following conditions:

Condition 1 (cooling)

Thermostat off due to freeze-up prevention.

Prevent the indoor unit heat exchanger from freezing in cooling operation when one of the below conditions is applicable:

- Indoor unit heat exchanger temperature < -5°C for 1 minute continuously.
- Indoor unit heat exchanger temperature < -1°C for 40 minutes accumulated.

Condition 2 (heating)

Thermostat off due to high outdoor temperature.

When the outside temperature is > 30°CDB in heating mode, the unit will conduct a forced thermostat off operation to protect the system.

Reference

"Freeze Prevention Function". Refer to page 2-22.

1.10 Test Run Control

Purpose

When operating the RZQS units for the first time after installation, the unit will - depending on the selected operation mode - perform a test run operation first.

Situation 1

Cooling - first operation after installation in "Cooling mode"

Cooling thermostat ON	→	Cooling operation in "Test run mode" for 3 minutes	→	Normal cooling operation

Situation 2

Cooling - first operation after installation in "Test run mode"

Cooling Operation by Test run button	→	Cooling operation in "Test run mode" for 3 minutes	→	Cooling operation in forced thermostat ON.

Situation 3

Heating - first operation after installation in "Heating mode"

Heating thermostat ON	—	Cooling operation in test run mode for 3 minutes	→	Normal heating operation

Situation 4

Heating - first operation after installation in "Test run mode"

Heating Operation by Test run button	—	Cooling operation in test run mode for 3 minutes	→	Heating operation in forced thermostat ON.

Remarks

- When running in test run mode, the unit will sense on site installation parameters (e.g.: failure to open stop valves,..) and indicate the applicable malfunction code if required.
- If the remote controller shows E3, E4 or L8 as an error code, there is possibility that either the stop valve is closed or the air flow outlet is obstructed.
- Check the inter unit branch wiring connection (1-2-3 wiring) when the error code U4 or UF is displayed on the remote controller.
- This "Test Run Control" function is only performed after first power on at installation or after first power on after a pump down by using the pump down switch is.

2

1.11 4-way Valve Control

Purpose

The purpose of the 4-way valve control is to control how the superheated refrigerant passes through the 4-way valve. The 4-way valve control carries out the changeover switching of the 4-way valve. This changeover switching is only carried out during operation, because a certain pressure difference is required to move the internal cylinder.

When...	Then the 4-way valve connects the outlet of the compressor with...
Cooling	Outdoor heat exchanger
Heating	Indoor heat exchanger

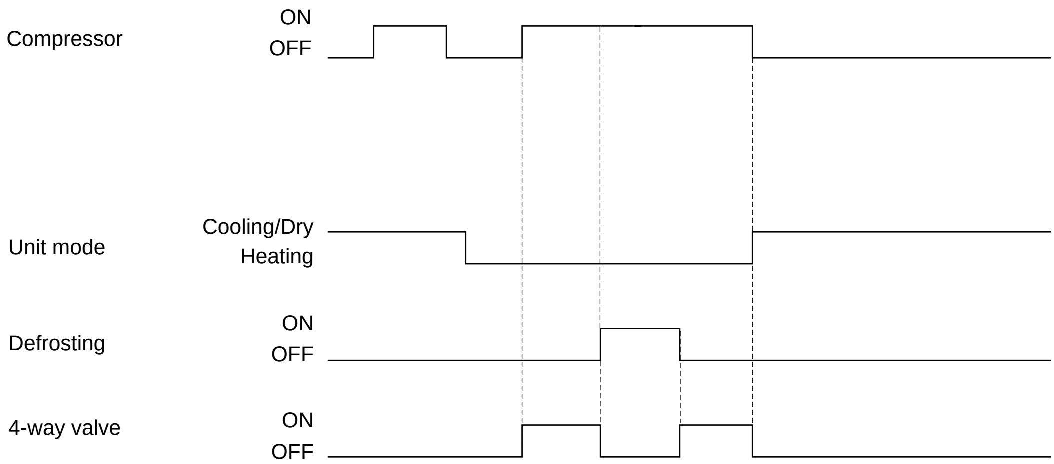
Method

The table below describes the 4-way valve control operation.

In...	The 4-way valve is...
Heating, except for defrosting	ON
■ Cooling ■ Dry keep ■ Defrosting	OFF

Time chart

The time chart below illustrates the 4-way valve control.



1.12 Pump Down Residual Operation

Outline

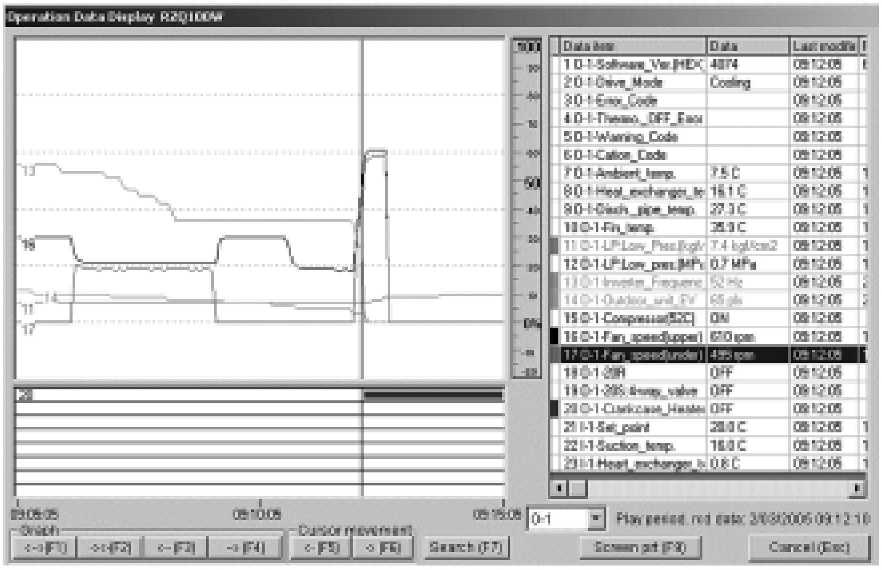
The unit will conduct a pump down residual operation after each compressor stop command.

Purpose of this function is to collect the refrigerant in the liquid receiver and outdoor heat exchanger in order to prevent liquid refrigerant from remaining in the indoor heat exchanger.

Parameters

	RZQS71~100B	RZQS125B
Compressor	38 Hz	52 HZ
Expansion valve	65 to 0 pulses (RZQS71~100: after 20 seconds, RZQS125: after 10 seconds)	

Graph



Ending condition

	RZQS71~100	RZQS125
	30 seconds have elapsed since start of residual operation	10 seconds have elapsed since start of residual operation
OR	LP < 0.2 MPa (in cooling*) LP < 0.1 MPa (in heating*)	
OR	---	LPS is activated

* Low pressure value is calculated in case of RZQS125B.

2

1.13 Pump Down Operation

Outline

Whenever the units need to be moved or removed, perform a pump-down operation before disconnecting the field piping. By performing a pump-down operation, all of the refrigerant will be collected in the outdoor unit.

Procedure

Procedure		Precautions
1	Start "Fan only operation" from the remote controller.	Confirm that both the liquid and gas stop valves are open.
2	Push the pump-down button BS1 on the outdoor PCB.	Compressor and outdoor fan will start automatically.
3	Once the operation stops (after 3~5 minutes) close the liquid stop valve first and then the gas stop valve.	
	After the "Pump Down Operation" has been finished the wired remote controller screen may be blank or show "U4" error indication.It will not be able to start the unit from the remote controller without switching OFF the power supply first.	Make sure the stop valves are opened before restarting the unit.

Cautions

- Pressing the pump down switch (BS1) on the outdoor PCB may cause the outdoor and indoor fan to start operating automatically.
- Be sure to open the stop valves after the pipe work has been finished. Be sure not to operate the unit with closed stop valves, or the compressor may brake down.

1.14 Defrost Operation

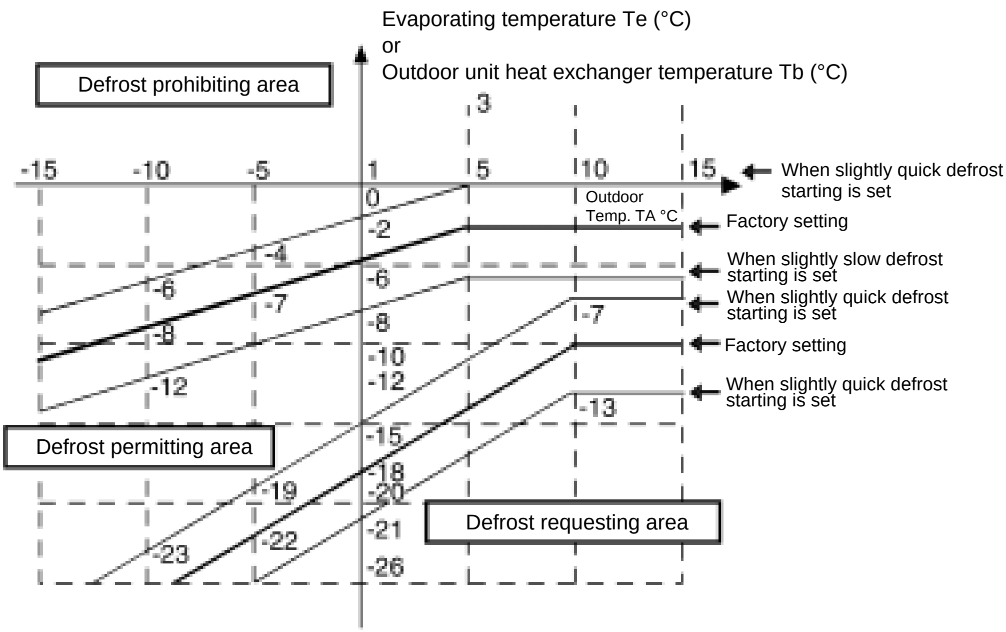
Outline

When the unit is operating in heating mode, a defrost operation will be conducted in order to avoid ice formation on the outdoor unit heat exchanger.

Defrost starting conditions

Defrost will start when the following conditions have been realized:

&
- Integrated compressor running time is 25 minutes or more since the completion of the previous defrost operation.
- OR
  - Defrost upper limit time A is met.
  - Low pressure saturated temperature (Te) is within the defrost requesting area. (RZQS71~100)
  - Outdoor unit heat exchanger area temperature (Tb) is within the defrost requesting area.



Areas

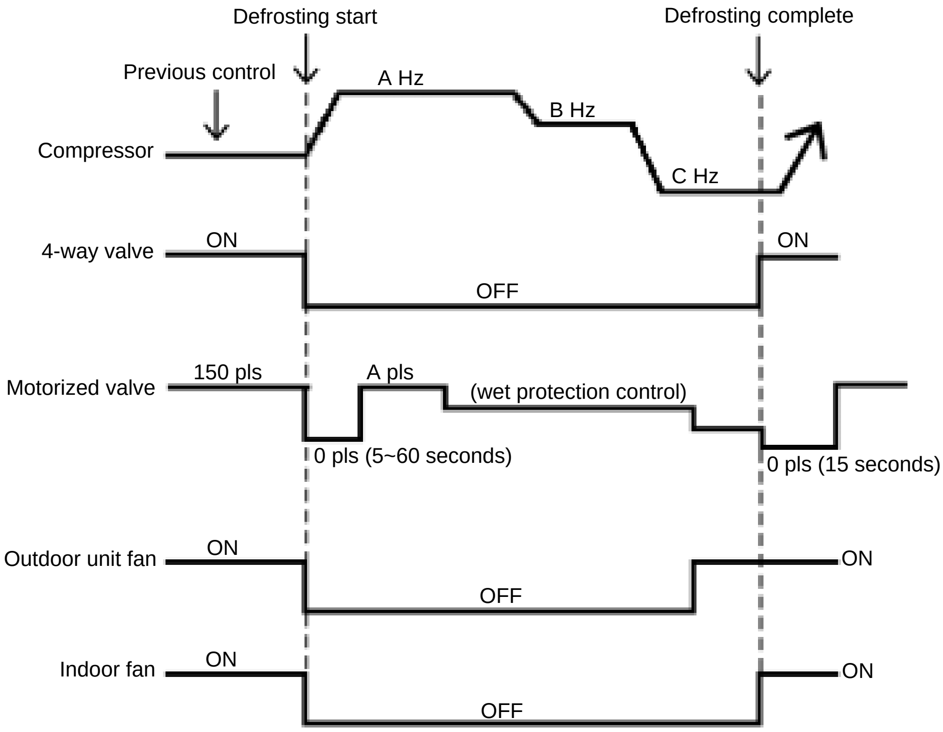
Defrost upper limit A

	When quick defrost starting is set 16(26)-3-03	Factory setting 16(26)-3-01	When slow defrost starting is set 16(26)-3-02
Outdoor temperature > -5°C	40 minutes	A hours	6 hours
Outdoor temperature ≤ -5°C	40 minutes	6 hours	8 hours

	A hours
RZQS71~100	3 hours
RZQS125	2 hours

2

Defrost control



Parameters

	RZQS71~100	RZQS125
A Hz	162 Hz	155 Hz
B Hz	122 Hz	155 Hz
C Hz	48 Hz	72 Hz
A pls	300 pulses	250 pulses

Defrost ending conditions RZQS71~100

The defrost cycle will be ended when one of the following conditions have been reached :

OR
- &
  - 1 minute has elapsed since start of defrost operation
  - Outdoor unit heat exchanger temperature ≥ 10°C
- &
  - 10 seconds have elapsed since start of defrost operation
  - High Pressure ≥ 2.45 MPa (calculated from LP, inv frequency and PI)
- 10 minutes have elapsed since start of defrost operation

Defrost ending conditions RZQS125

The defrost cycle will be ended when one of the following conditions have been reached :

OR
- &
  - 1 minute has elapsed since start of defrost operation
  - Outdoor unit heat exchanger temperature ≥ 10°C
- &
  - 10 seconds have elapsed since start of defrost operation
  - High Pressure ≥ 2.45 MPa (calculated from indoor unit heat exchanger temperature, inv frequency and PI)
- &
  - 7 minutes have elapsed since start of defrost operation
  - Outdoor unit heat exchanger temperature ≥ 6°C
- 8 minutes have elapsed since start of defrost operation.

2

1.15 Freeze Prevention Function

Purpose

In order to avoid formation of ice on the indoor unit heat exchanger in cooling and dry mode, the system automatically starts up a freeze prevention cycle when a number of specific conditions are fulfilled.

Freeze Prevention start conditions

Freeze prevention start decided by the indoor unit (factory setting):

OR
- Indoor coil temperature ≤ -1°C for 40 minutes accumulated
- &
  - Indoor coil temperature < A°C for 1 minute continuous
  - Compressor is running for minimum 8 minutes since operation start or end of previous freeze up cycle.

Freeze Prevention stop conditions

Freeze prevention stop decided by the indoor unit (factory setting):

- Indoor coil temperature > 7°C for 10 minutes continuous

Parameters

	FAQ	FHQ	All except FAQ & FHQ
A	-1°C	-3°C	-5°C

Reference

Please refer to "Outdoor Field Settings" in Part 4 "Commissioning and Test Run" for details on possible use of EDP room settings in case of low latent heat applications. (See page 4-21)

1.16 PMV Control

Outline

When the automatic mode is selected on the remote-controller, the unit will automatically activate the PMV control.

The PMV index is a calculated average comfort level.

Refer to ISO 7730 for details.

Function

An optimized indoor temperature will be calculated using the following inputs:

- Outdoor air temperature
- Indoor air temperature
- Remote controller set temperature

In practice, the set point will be moved with 1 or 2 degrees whenever the conditions change. This will result in a combination of power saving and increased comfort level.

PMV control can be disabled by changing the field settings:
From: 11(21)-4-01 to: 11(21)-4-02

2

1.17 Preheating Operation Control

Applicable units

RZQS71~100

Outline

After the compressor has been turned off, the preheating operation will be activated in order to avoid refrigerant from dissolving in the compressor oil.

Trigger conditions

Starting conditions &

- or
  - Power supply ON to First operation
  - 60 minutes or more elapsed after compressor stop
- T2 (Discharge pipe temperature) < 40°C
- Ta (Outside temperature) < 40°C

Ending conditions or

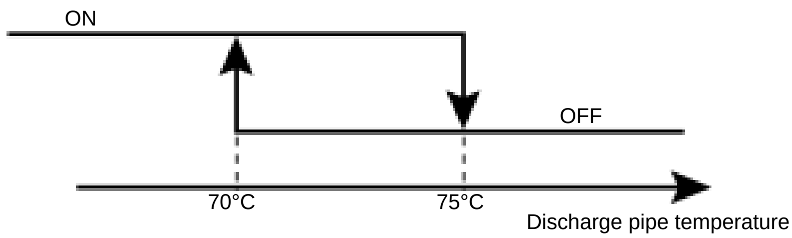
- T2 (Discharge pipe temperature) > 43°C
- Ta (Outside temperature) > 43°C
- Thermostat ON confirmation

1.18 Crankcase Heater Control

Applicable units RZQS125

Outline After the compressor has been turned off, the crankcase heater control will be activated in order to avoid refrigerant from dissolving in the compressor oil.

Trigger conditions



2 Indoor Unit Functional Concept

2.1 What Is in This Chapter?

Introduction

This chapter will explain more details about the various functions that are programmed for the Sky-Air R410A inverter indoor units.

Overview

This chapter contains the following topics:

2.2 Thermostat Control

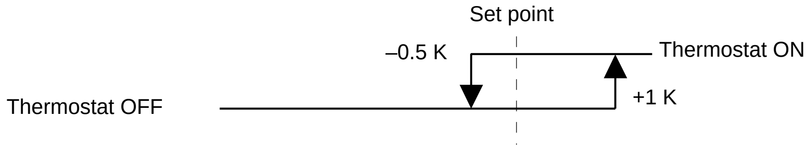
2

Purpose

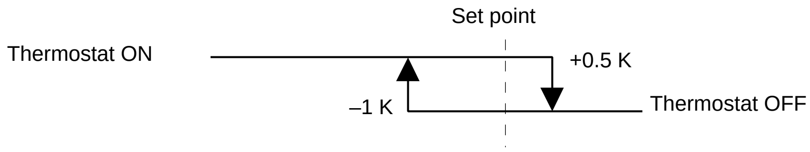
Based on the information received from the air return sensor, the thermostat control will decide the required operation status of the system.

Thermostat control

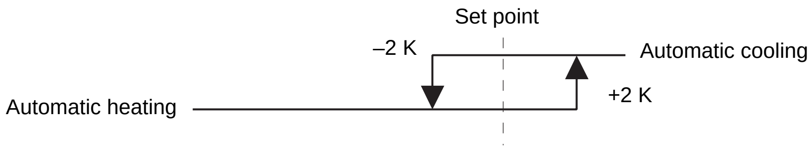
Cooling mode:



Heating mode:



Cool / heat changeover in automatic mode:



Preventing thermostat OFF conditions

The thermostat control prevents the thermostat from turning OFF in the following conditions:

- For the first 2.5 minutes after operation starts, or
- Defrosting, or
- Forced Operating Mode, or
- Within the first 6 hours after power ON, initial operation for the first 10 minutes (See note)

Note: To protect the compressor, make sure to turn on the power supply 6 hours before starting operation.

Remark:

The thermostat control will be changed when using field settings for low humidity applications, setting 16(26)-2-03 & 16(26)-2-04.

See "Part 4–Commissioning and Test Run" for details.

2.3 Drain Pump Control

Purpose

Control the water draining from the drain pan.

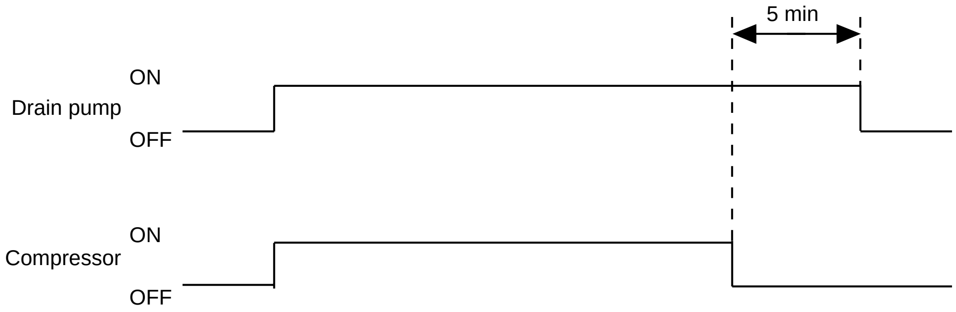
Starting conditions

The drain pump control starts the drain pump motor when one of the following conditions is fulfilled:

- Cooling operation is activated
- Abnormal high water level is detected in the drain pan

Normal control

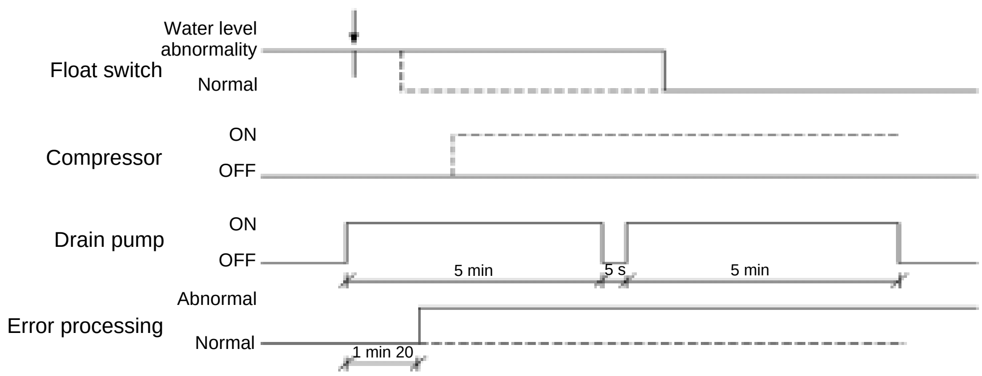
In normal control, the drain pump is turned ON at compressor starting and turned OFF 5 minutes after the compressor has stopped (residual operation).



Float switch activation during thermostat OFF

When an abnormal drain level is detected in the drain pan, the float switch opens:

1. The thermostat stays forced OFF.
2. The drain pump starts to operate for minimum 10 minutes (even if abnormality is solved within the 10 minutes).
3. If the float switch closes again within 80 seconds, cooling operation can restart within the 10 minutes recovery period.

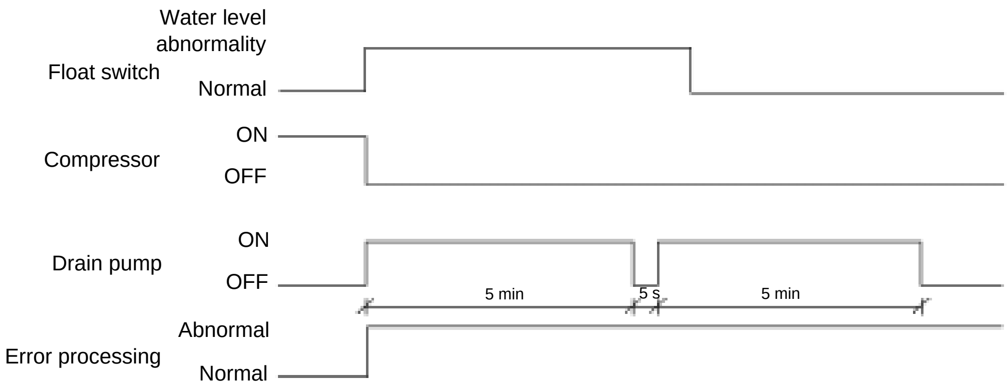


Float switch activation during thermostat ON

1 The thermostat is immediately turned OFF.

2 The drain pump continues to operate for minimum 10 minutes (even if abnormality is solved within the 10 minutes).

3 If the float switch closes again within 80 seconds, cooling operation can restart within the 10 minutes recovery period.



Used inputs

Input	Connection on indoor PCB	Connection on outdoor PCB
Float switch (33H)	X15A	—

2.4 Condensation Avoidance Control

Purpose

Avoid condensation on the swing flap when the most downward position of the swing flap (position 4) is selected on the remote controller.

Applicable units

This function is applicable for the FHQ units only.

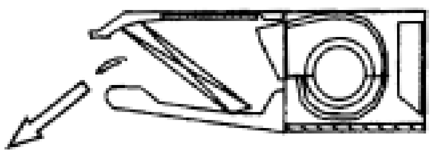
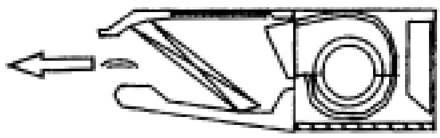
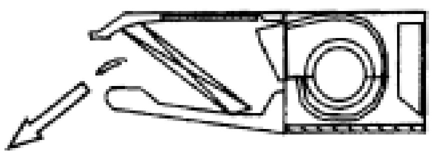
Method

The condensation avoidance control will function in the following operating modes:

- Cooling (automatic)
- Dry keep.

Method

To avoid condensation on the swing flap, the condensation avoidance control is activated:

Stage	Description
1	The fan operates in cooling mode with the blade in downward position (set on the remote control). 
2	After 30 min, the blade moves to a horizontal position. 
3	After 1 h operation in horizontal position, the blade moves back to its downward position for 30 min. 
4	The unit operation is reset by: ■ Changing the operating mode into “heating” or “fan” ■ Changing the air flow direction ■ Turning the unit operation OFF and ON.

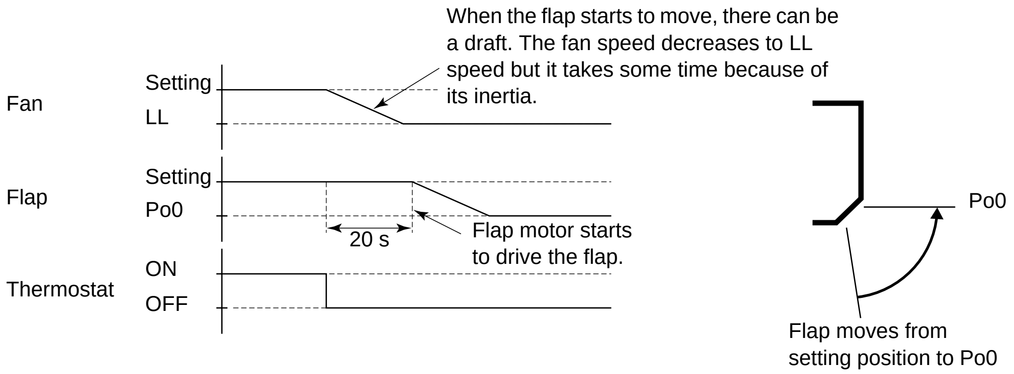
2.5 Draft Avoidance Control 1

Purpose

Avoid draft for the customer by delaying transfer of the flap to the Po0 (horizontal) position for a certain amount of time when defrosting and in heating thermostat OFF.

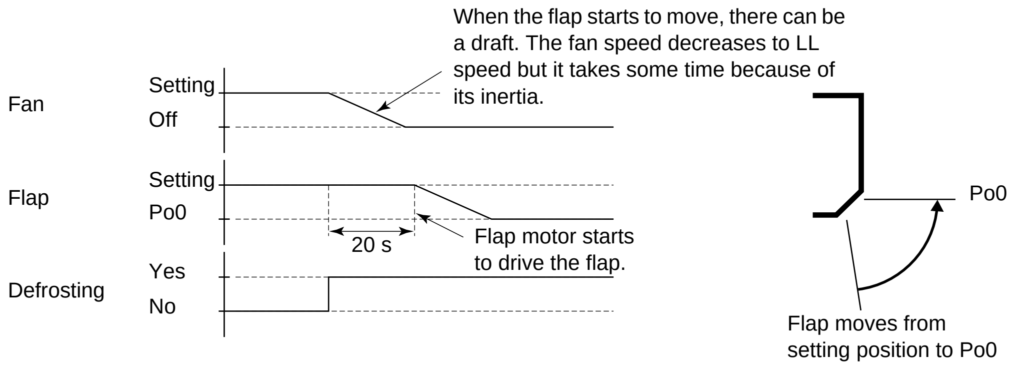
Heating thermostat OFF

The time chart below illustrates the draft avoidance control 1 in heating thermostat OFF.



Defrosting

The time chart below illustrates the draft avoidance control 1 in defrosting.



Used inputs

The draft avoidance control 1 uses the following inputs:

Input	Connection on indoor PCB	Connection on outdoor PCB
Limit switch for flap	33S	—
No. of fan turns	X26A	—
Outdoor heat exchanger thermistor (defrost control)	—	R2T

2

2.6 Draft Avoidance Control 2

Purpose

The purpose of the draft avoidance control 2 is to avoid draft when the flap is moving.

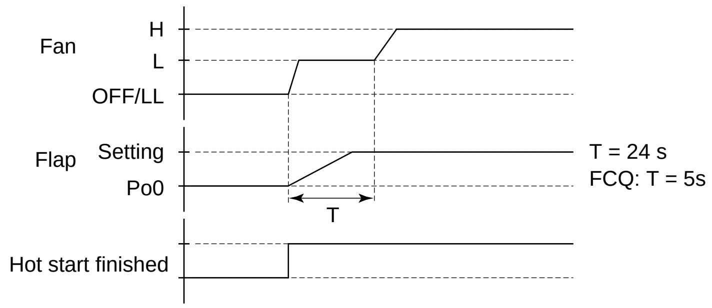
Starting conditions

The draft avoidance control 2 is activated when:

- Hot start is finished, or
- Cold air prevention control is finished.

Time chart

If the fan speed is set to "H", the fan turns at low speed for a certain amount of time.



Used input

Draft avoidance control 2 uses the following inputs:

Input	Connection on indoor PCB	Connection on outdoor PCB
Limit switch for flap	33S	—
No. of fan turns	X26A	—

2.7 Fan and Flap Operations

Cooling operation

The table below contains the fan and flap operations.

Function	In…	Fan	Flap (FCQ and FHQ)	Flap (FAQ)	Remote control indication
Thermostat ON in Dry Keep Mode	Swing operation	L	Swing	Swing	Swing
	Airflow direction setting		Set position	Set position	Set position
Thermostat OFF in Dry Keep Mode	Swing operation	OFF	Horizontal	Horizontal	Swing
	Airflow direction setting		Set position	Set position	Set position
Thermostat OFF in Cooling Mode	Swing operation	Set	Horizontal	Horizontal	Swing
	Airflow direction setting		Set position	Set position	Set position
Stop (Error)	Swing operation	OFF	Horizontal	Downward	---
	Airflow direction setting		Set position	Downward	
Freeze-prevention	Swing operation	L(*)	Horizontal	Horizontal	Swing
	Airflow direction setting		Set position	Set position	Set position

(*) LL operation on cassette type units

Heating operation

The table below contains the fan and flap operations.

Function	In…	Fan	Flap (FCQ and FHQ)	Flap (FAQ)	Remote control indication
Hot start after defrost	Swing operation	OFF	Horizontal	Horizontal	Swing
	Airflow direction setting				Set position
Defrost	Swing operation				Swing
	Airflow direction setting				Set position
Thermostat OFF	Swing operation	LL			Swing
	Airflow direction setting				Set position
Hot start after thermostat OFF (cold air prevention)	Swing operation				Swing
	Airflow direction setting				Set position
Stop (error)	Swing operation	OFF		Fully closed (horizontal)	---
	Airflow direction setting			Fully closed	
Overload thermostat OFF	Swing operation	LL		Horizontal	Swing
	Airflow direction setting				Set position

2.8 Indoor Unit Fan Control

Outline

During compressor start and stop control, the indoor fan will receive instruction from the outdoor unit in order to protect the compressor from receiving liquid and to assure a smooth compressor start up:

- Indoor fan control before compressor stop
- Indoor fan control during compressor stop
- Indoor fan control before compressor startup
- Indoor fan control at compressor startup

Before compressor stop

After thermostat off or remote-controller signal off has been sent from the outdoor unit to the indoor unit, the compressor will keep on running for a period of time in order to execute the "residual pump down operation". During this pump down operation, the indoor fan will keep on operating.

Purpose:

- Cooling: Minimize the remaining refrigerant amount in indoor unit heat exchanger
- Heating: Lower the high pressure by avoiding high temperature build up around the indoor unit heat exchanger.

		Indoor fan tap
Indoor cooling / Automatic cooling	Thermostat OFF	L
	Remote controller OFF	LL
Indoor heating / Automatic heating	Thermostat OFF	LL
	Remote controller OFF	LL
Indoor drying	Thermostat OFF	LL
	Remote conntrolle OFF	LL

During compressor stop

		Indoor fan tap
Indoor cooling / Automatic cooling	Thermostat OFF	Remote controller setting
	Remote controller OFF	OFF
Indoor heating / Automatic heating	Thermostat OFF	LL
	Remote controller OFF	OFF
Indoor drying	Thermostat OFF	OFF
	Remote controller OFF	OFF

Before compressor startup

	Indoor fan tap
Indoor cooling / Automatic cooling	Remote controller setting
Indoor heating / Automatic heating	OFF
Indoor drying	L

At compressor startup

- In cooling: The indoor fan is operated at low speed until the low-pressure value reaches 0.6 MPa.
- In heating: Hot startup controlWhen performing a startup, or after the defrosting cycle has been completed, the indoor fan will be controlled as to prevent cold air draft and secure the starting performance (quick pressure build-up).

Indoor unit fan: OFF

↓ Heating operation is turend on with remote controller.

Indoor unit fan: LL tap

↓ Condition A is met.

Indoor unit fan: L tap

↓ Condition B is met.

Indoor unit fan: M tap (Continuing L tap on indoor unit without M tap equipped)

↓ Condition C is met.

Indoor unit fan: Set fan speed

	Condition A	Condition B	Condition C
Indoor unit h/e temp > 34°C	O	O	O
Indoor unit h/e temp > indoor suction air temp +17°C (+12°C if outside temperature is < 5°C)	O	O	---
Indoor unit h/e temp > indoor suction air temp +22°C (+20°C if outside temperature is < 5°C)	---	---	O
3 minutes elapsed after compressor startup	O	---	---
5.5 minutes elapsed after compressor startup	---	O	---
10.5 minutes elapsed after compressor startup	---	---	O

3 Outdoor Unit Functional Concept

2

3.1 What Is in This Chapter?

Introduction

This chapter will explain more details about the various functions that are programmed for the sky-air R410A inverter outdoor units.

Overview

This chapter contains the following topics:

2

3.2 Function Outline

Introduction

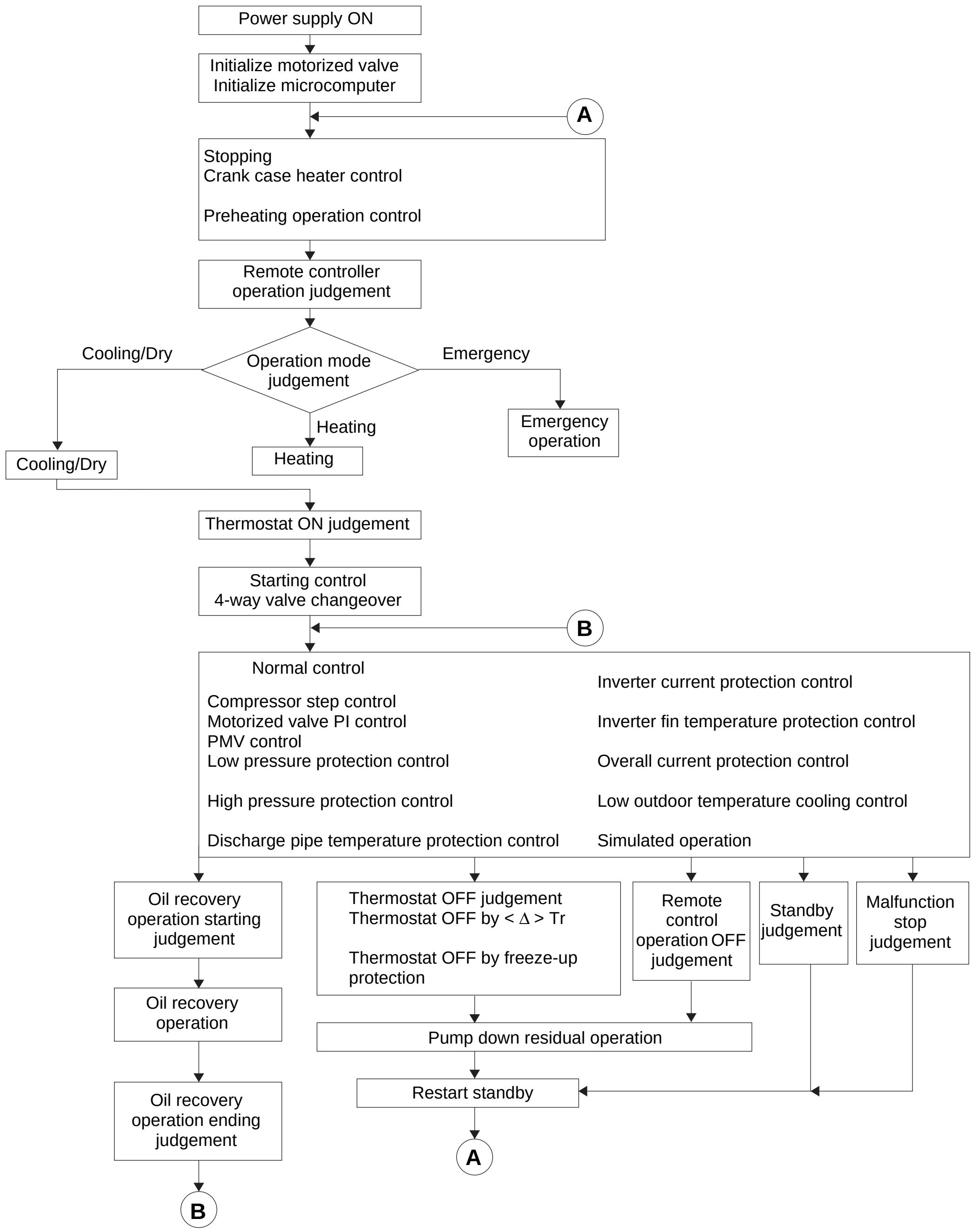
This chapter will show an overview of all applicable functions in cooling and heating mode.

Content

3.2.1 Function Outline in Cooling Mode

Flow chart

Cooling/Dry operation

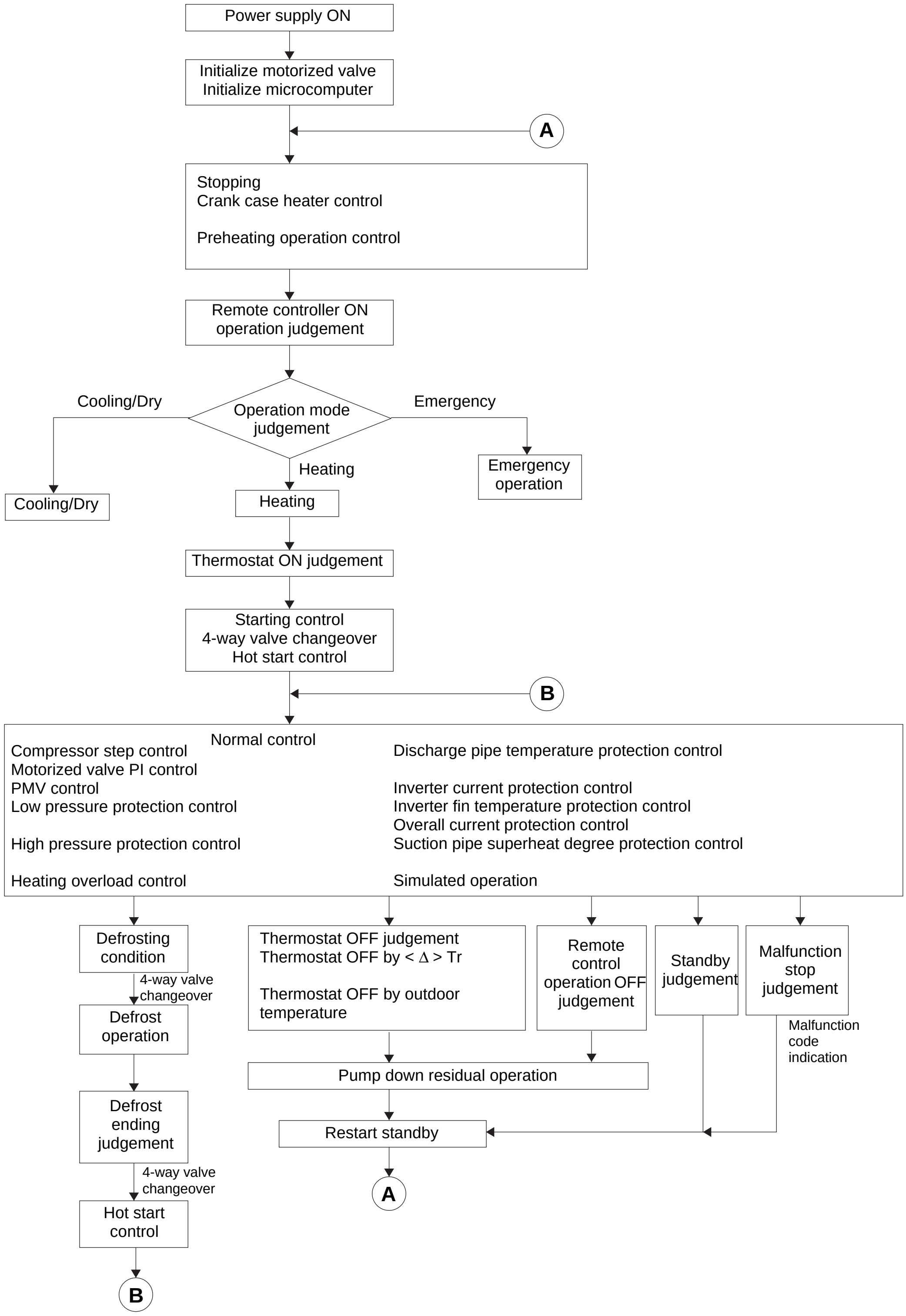


2

3.2.2 Function Outline in Heating Mode

Flow chart

Heating operation



3.3 Frequency Regulating Functions

Introduction

One of the main functions of the μ-controller will be the control of the compressor frequency. The next chapter will explain how the compressor frequency is determined.

Content

3.3.1 Starting Frequency Control

Outline

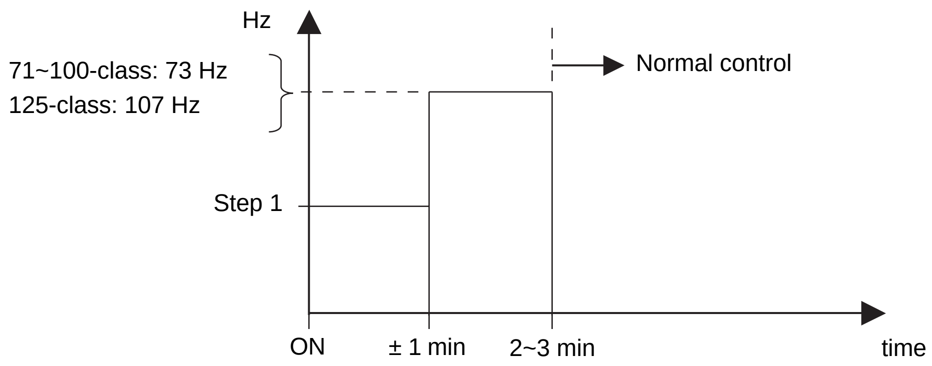
The inverter compressor will start up with a limited fixed frequency value for a specified period of time in order to prevent liquid back to the compressor, and to limit the starting current.

General

The normal starting control time is 2~3 minutes. The maximum starting frequency control time is limited to 10 minutes.

During compressor start-up, a pressure difference will be build up in order to have sufficient pressure difference for the 4-way valve to change over.

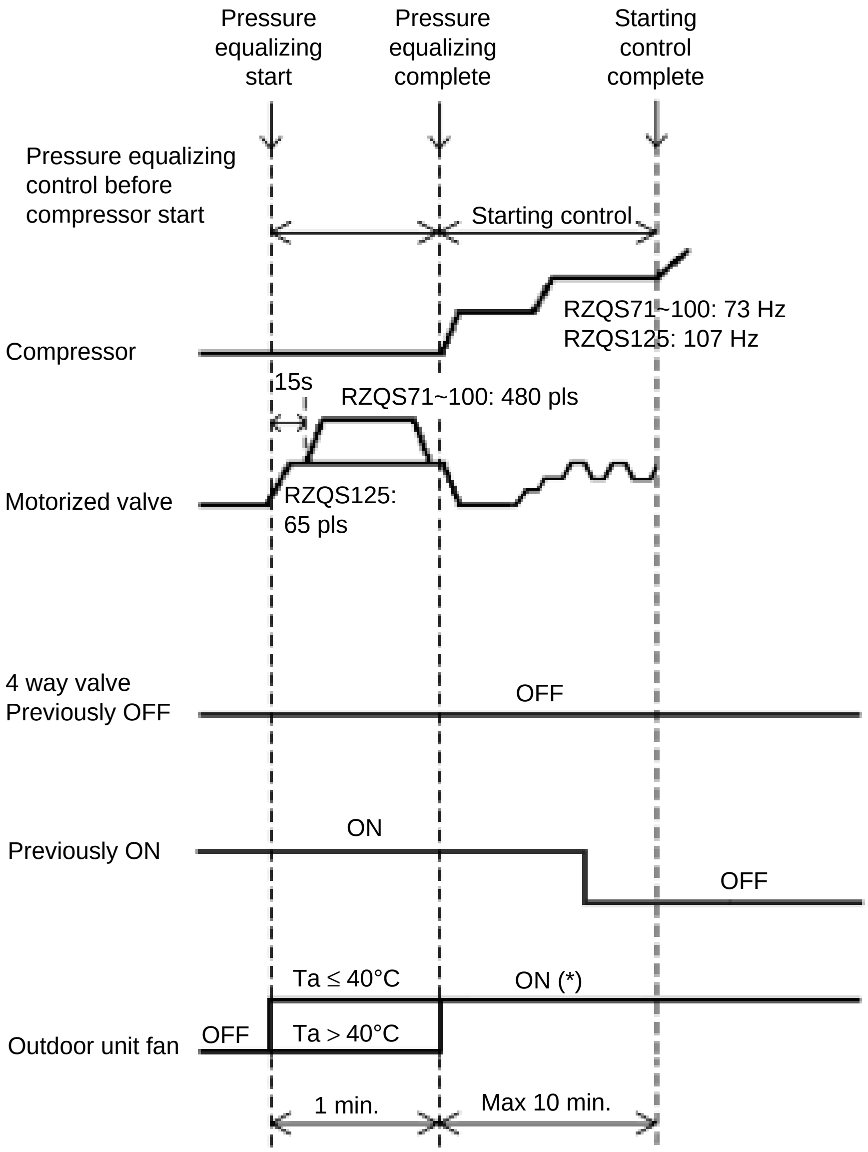
Graph



Ending condition

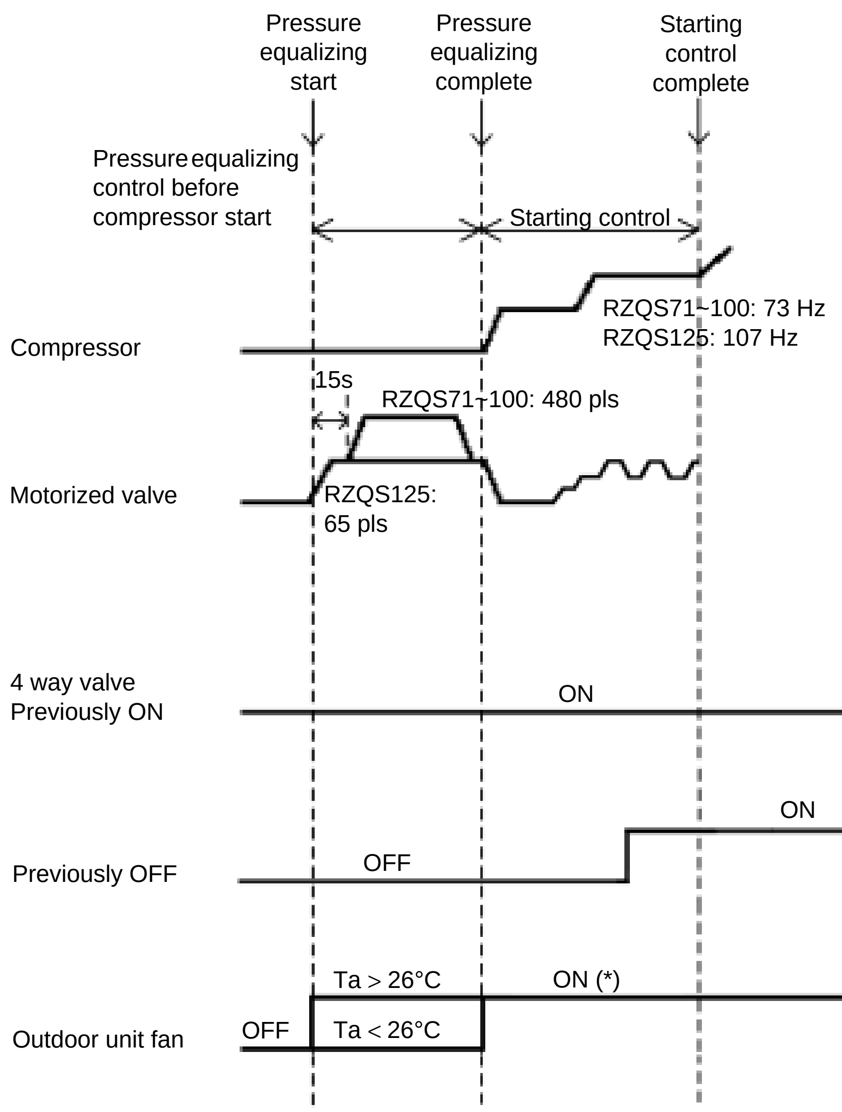
The starting control will be terminated when the low pressure value < 0.6 MPa or when the maximum starting time of 10 minutes has been reached in case the low pressure value stays > 0.6 MPa.

Cooling


Pressure equalizing start
Pressure equalizing complete
Starting control complete
Pressure equalizing control before compressor start
Starting control
Compressor
RZQS71~100: 73 Hz
RZQS125: 107 Hz
15s
RZQS71~100: 480 pls
Motorized valve
RZQS125: 65 pls
4 way valve
Previously OFF
OFF
Previously ON
ON
OFF
Ta ≤ 40°C
ON (*)
Outdoor unit fan
OFF
Ta > 40°C
1 min.
Max 10 min.

2

Heating



Pressure equalizing start
Pressure equalizing complete
Starting control complete
Pressure equalizing control before compressor start
Starting control
Compressor
RZQS71~100: 73 Hz
RZQS125: 107 Hz
15s
RZQS71~100: 480 pls
Motorized valve
RZQS125:
65 pls
4 way valve
Previously ON
ON
Previously OFF
OFF
ON
Ta > 26°C
ON (*)
Outdoor unit fan
OFF
Ta < 26°C

3.3.2 General Frequency Control

Outline

After the "Starting frequency control" function has been terminated, the ideal compressor frequency will be determined by the "General frequency control".

General

The compressor operation frequency is controlled in order to keep a constant evaporation temperature in cooling and a constant condensing temperature in heating.

The frequency can be changed every 20 seconds.The maximum frequency change = 2 steps/change. (= max 6 steps/min)

During abnormal situations (e.g. inverter current protection) the change per step is also = 2 steps/change, but the 20 seconds interval may be decreased, so a quicker change is possible.

Note

When other control functions are activated (e.g. discharge pipe control), they can change the compressor frequency using other inputs than the ones normally being used by the "General frequency control" function.

Cooling

In cooling, the target operation frequency will be determined by the indoor Δt and the evaporating temperature.

Δt cool = Remote controller set temperature - Indoor return air temperature.

Depending on the cooling load, the target evaporating temperature (Te) will be a value between $2°C \leq Te \leq 20°C$.

Heating

In heating, the target operation frequency will be determined by the indoor Δt and the condensing temperature.

Δt heat = Indoor return air temperature - Remote controller set temperature.

Depending on the heating load, the target condensing temperature (Tc) will be a value between $42°C \leq Tc \leq 51°C$.

2

Frequency steps

The operating frequency for the sky-air RZQ inverter units will be a value chosen from a list with fixed frequency settings that is programmed in the unit's memory:

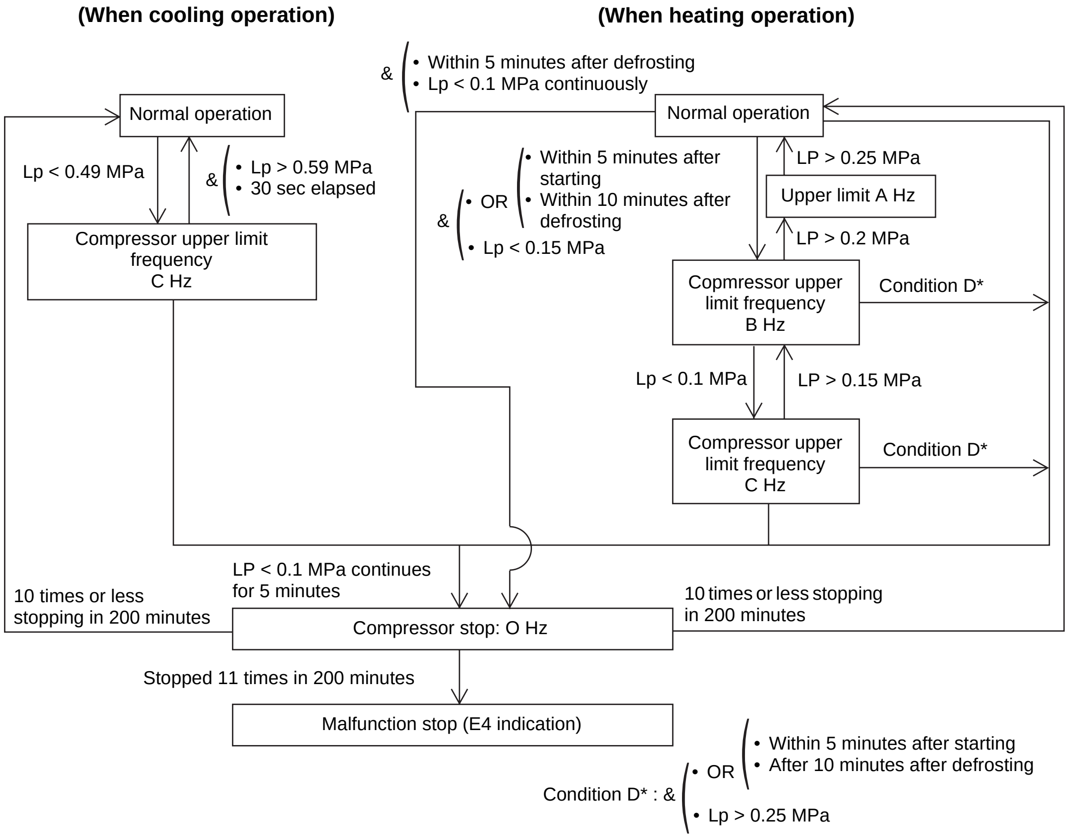
Step No.	Compressor operation frequency		
	RZQS71B	RZQS100B	RZQS125B
1	38Hz	38Hz	41Hz
2	41Hz	41Hz	44Hz
3	44Hz	44Hz	48Hz
4	48Hz	48Hz	52Hz
5	52Hz	52Hz	55Hz
6	57Hz	57Hz	58Hz
7	62Hz	62Hz	69Hz
8	67Hz	67Hz	72Hz
9	73Hz	73Hz	78Hz
10	79Hz	79Hz	84Hz
11	85Hz	85Hz	90Hz
12	91Hz	91Hz	94Hz
13	97Hz	97Hz	98Hz
14	103Hz	103Hz	102Hz
15	109Hz	109Hz	107Hz
16	116Hz	116Hz	112Hz
17	122Hz	122Hz	117Hz
18	128Hz	128Hz	123Hz
19	134Hz	134Hz	131Hz
20	141Hz	141Hz	139Hz
21	148Hz	148Hz	147Hz
22	155Hz	155Hz	155Hz
23	162Hz	162Hz	164Hz
24	169Hz	---	174Hz
25	177Hz	---	---

3.3.3 Low Pressure Protection Control (RZQS71~100)

Outline

In order to prevent abnormal low pressures in the system, the below control function will be activated. Low pressure is measured by the low pressure sensor.

Flow chart



Parameters

	RZQS71~100B
A Hz	128 Hz
B Hz	67 Hz
C HZ	38 Hz

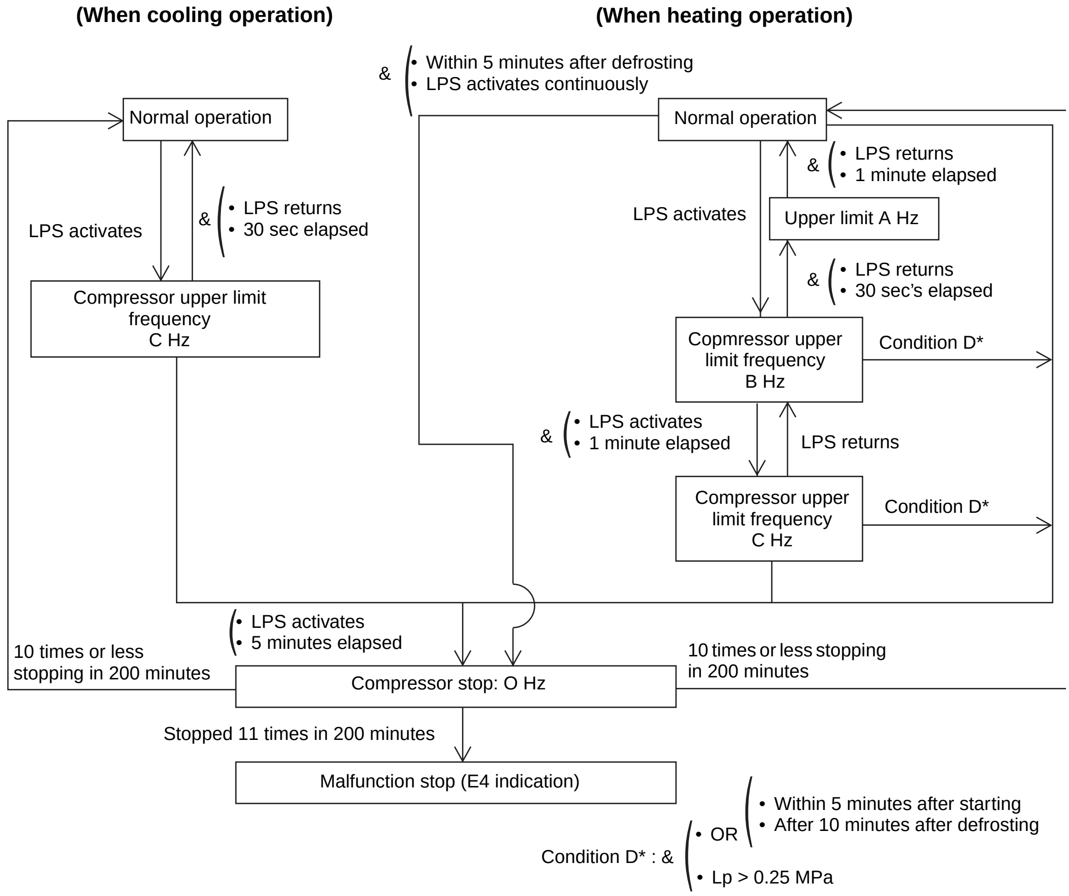
2

3.3.3 Low Pressure Protection Control (RZQS125)

Outline

In order to prevent abnormal low pressures in the system, the below control function will be activated. Low pressure is detected by the low pressure switch.

Flow chart



Parameters

	RZQS125
A Hz	123 Hz
B Hz	72 Hz
C HZ	41 Hz

3.3.4 High Pressure Protection Control

Outline

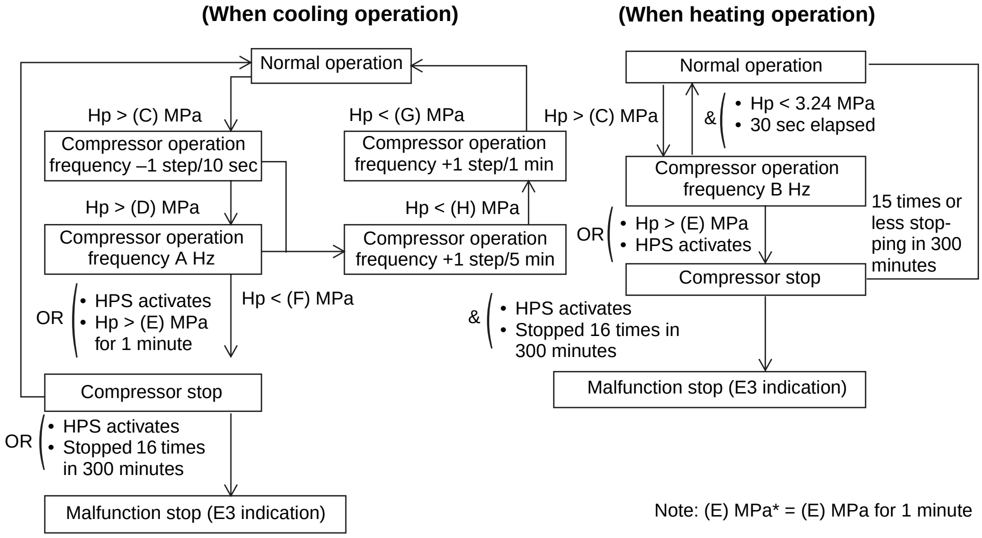
In order to prevent abnormal high pressures in the system and hence avoiding activation of the high pressure safety device the below control function will be activated.

Details

The high pressure value will be calculated from the low pressure, power input and compressor frequency. In case of RZQS125, low pressure is a calculated value.

- HPS opens at : 4.0 MPa (tolerance: +0 / -0.15)
- HPS closes at : 3.0 MPa (tolerance : +/- 0.15)

Flow chart



Parameters

	RZQS71~100B	RZQS125B
A Hz	79 Hz	58 Hz
B Hz	62 Hz	58 Hz

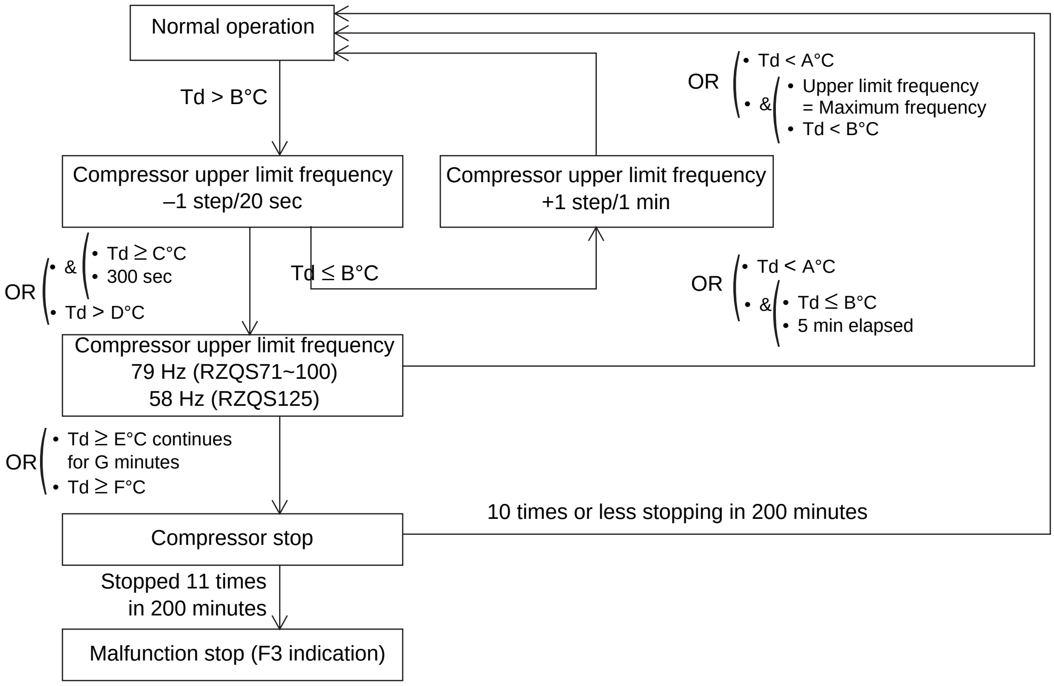
	RZQS71~100B	RZQS125B
C MPa	3.53 MPa	3.53 MPa
D MPa	3.63 MPa	3.63 MPa
E MPa	3.82 MPa	3.82 MPa
F MPa	3.48 MPa	3.48 MPa
G MPa	3.29 MPa	3.29 MPa
H MPa	3.38 MPa	3.38 MPa
I MPa	3.82 MPa	3.82 MPa

3.3.5 Discharge Pipe Temperature Control

Outline

The compressor operating frequency will be controlled in order to avoid abnormal high compressor temperatures (see also expansion valve control).

Flow chart



Parameters

	RZQS71~100B	RZQS125B
A°C	100°C	100°C
B°C	105°C	105°C
C°C	110°C	110°C
D°C	120°C	120°C
E°C	110°C	115°C
F°C	125°C	135°C
Gmin	15min	10min

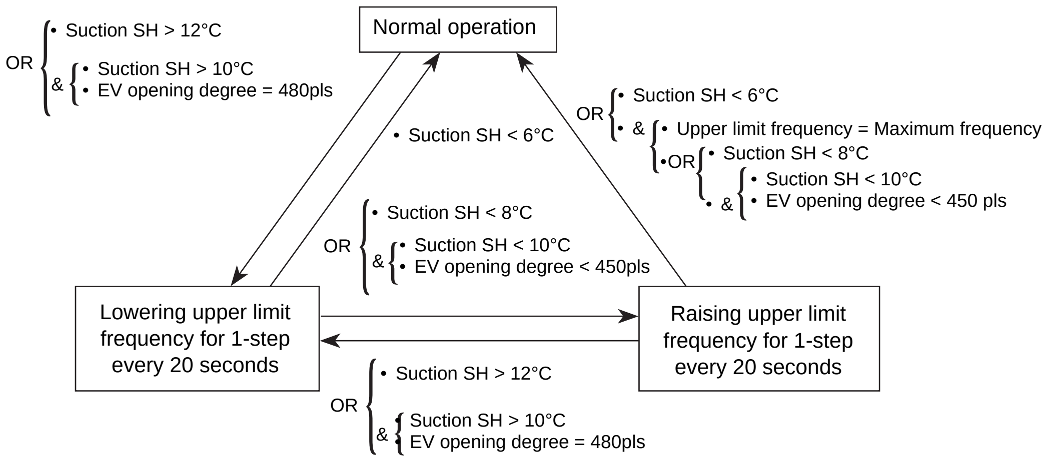
Td = Discharge pipe temperature

3.3.6 Suction Pipe Superheat Protection Control (Heating Mode)

Outline

In case the suction superheat value in heating mode is too high, the oil return to the compressor will be insufficient. In order to avoid that the compressor oil will be accumulated in the outdoor unit heat exchanger, the upper limit frequency will be decreased.

Flow chart

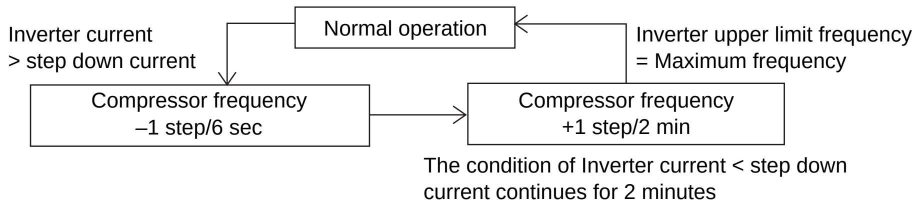


3.3.7 Inverter Current Protection Control

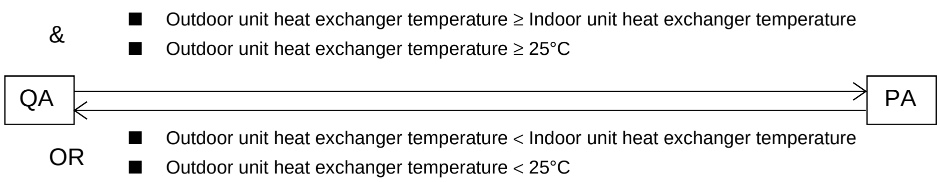
Outline

The compressor operating frequency will be restricted in order to prevent an over-current to the compressor.

Flow chart



Parameters



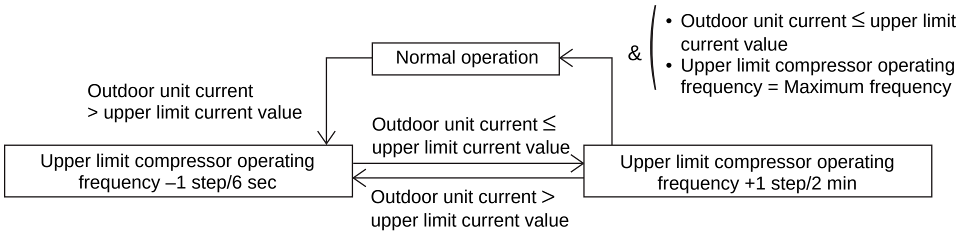
	RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
P(A)	11.7 A	12.9 A	19.0 A
Q(A)	12.9 A	13.7 A	19.0 A

3.3.8 Input Current Control

Outline

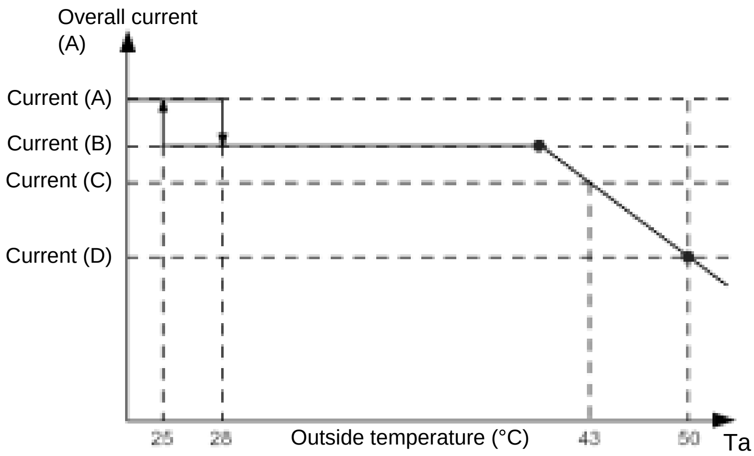
Unlike the inverter current control, this function will monitor the overall input current and will restrict the compressor upper limit operating frequency as to prevent activation of the circuit breakers.

Flow chart



Upper limit current

The outdoor model type and the outdoor air temperature will determine the upper limit current value.



	A	B	C	D
RZQS71B7V3B	16.5 A	16.5 A	14.2 A	8.4 A
RZQS100B7V3B	18.0 A	18.0 A	16.4 A	13.6 A
RZQS125B7V3B	24.0 A	24.0 A	22.0 A	10.0 A

2

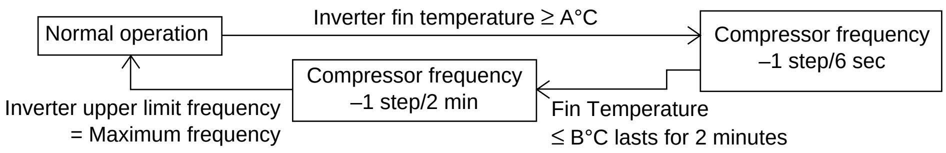
3.3.9 Inverter Cooling Fin Temperature Control

Outline

This control will restrict the compressor upper limit frequency in order to protect the electronic components in the switch box from overheating (L4-error activation).

By lowering the compressor frequency, the current drawn by the compressor will be reduced and as a result the temperature inside the switch box will drop.

Flow chart



Parameters

	RZQS71B7V3B	RZQS100B7V3B	RZQS125B7V3B
A°C	82°C	82°C	74°C
B°C	79°C	79°C	71°C

3.3.10 Pressure Difference Control

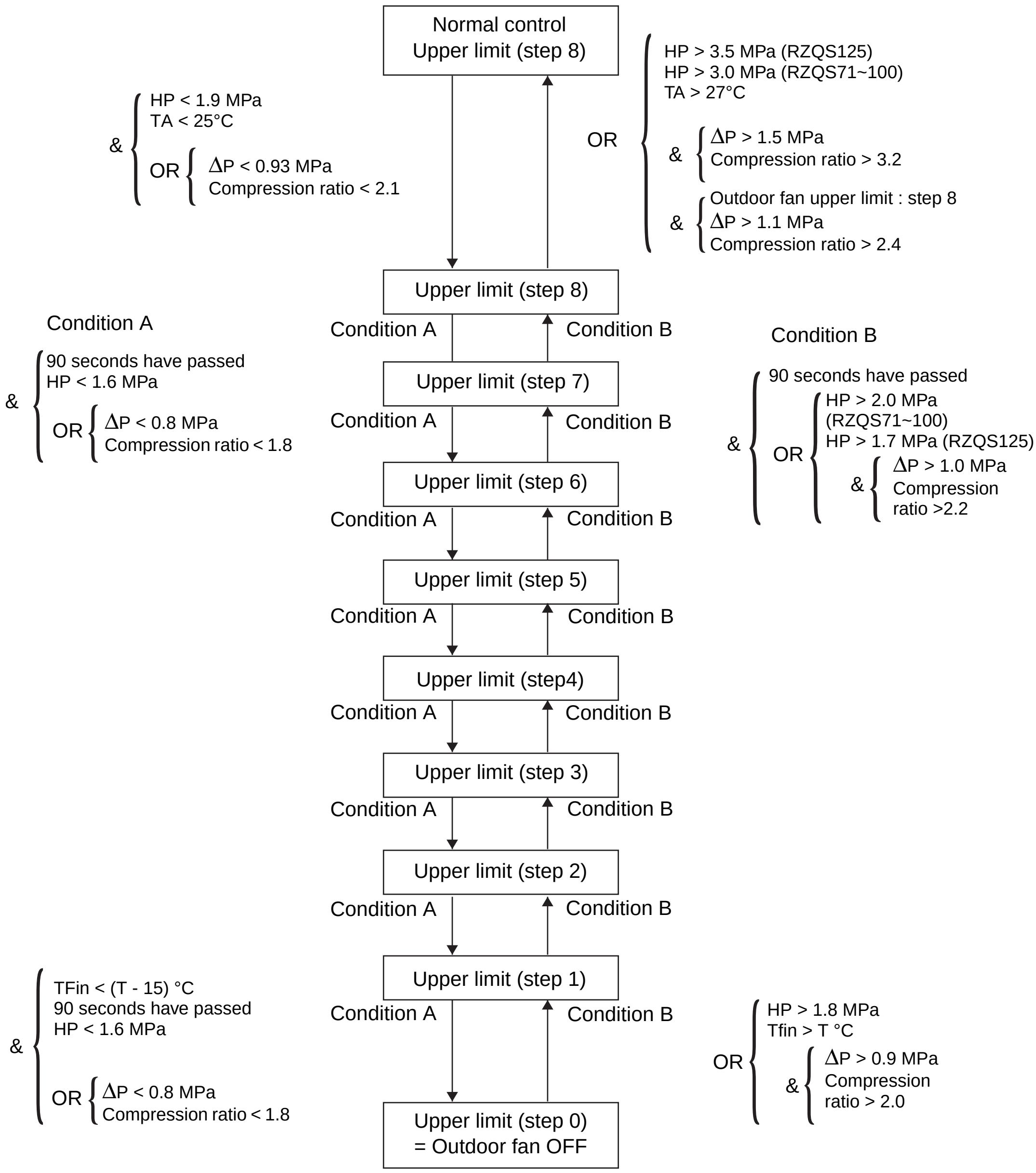
Outline

To ensure the compression ratio (pressure difference between high and low pressure) at low outdoor temperature conditions in cooling mode and high outdoor temperature conditions in heating mode, the outdoor fan and target compressor frequency may be varied.

Cooling

In cooling low ambient conditions, the outdoor fan speed and compressor frequency will be adapted to secure the differential pressure between high and low pressure.

Fan control in cooling



Parameters

	RZQS71~100B7V3B	RZQS125B7V3B
T°C	79°C	71°C

2

Frequency restriction in cooling

	Normal control			
	Used indoor unit	**71**	**100**	**125**
Upper limit frequency	Wall mounted indoor	109Hz	162Hz	139Hz
	Other than wall mounted indoor	169Hz	162Hz	174Hz
Lower limit frequency	---	38Hz	38Hz	41Hz

Ta ≤ 20°C ↓ ↑ Ta ≥ 21°C

	71	**100**	**125**
Upper limit frequency	109Hz	112Hz	139Hz
Lower limit frequency	48Hz	48Hz	72Hz

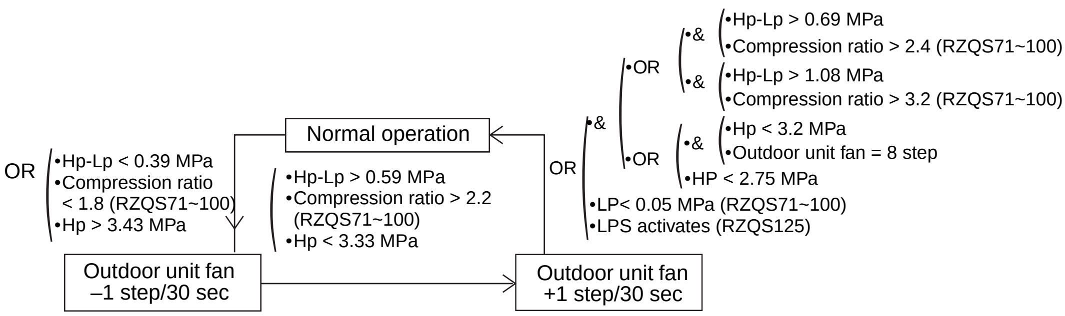
Ta ≤ -8°C ↓ ↑ Ta ≥ -7°C

	71	**100**	**125**
Upper limit frequency	109Hz	112Hz	139Hz
Lower limit frequency	62Hz	62Hz	72Hz

Heating

High outdoor ambient (overload conditions):

In heating overload conditions, the outdoor fan speed will be adapted to secure the differential pressure between high and low pressure.



Only the fan speed will be adapted in heating overload conditions.
No adjustments to the compressor frequency will be made.

3.3.11 Oil Recovery Operation

Outline

When the compressor operates for a certain period of time at low frequency, the oil level in the compressor may become low due to incomplete oil return.To prevent damage to the compressor and in worst case avoid compressor lock, an oil recovery operation will be conducted.

Details

During the oil recovery operation, the operation frequency of the compressor will be increased for a time period of 10 minutes.Oil recovery operation is only executed in cooling mode.In heating mode, oil return to the compressor is guaranteed by the defrost operation.

Example

Trigger conditions for 71~100-class:

- Compressor frequency ≤ 63 Hz for 10 minutes continuously.

When the above conditions are fulfilled, a calculation of the oil discharge amount will be executed according to the below formula:

- Oil discharge amount = inverter frequency (Hz) x D x Δ time
  (D = constant value depending on outdoor unit type).

When the result of the above calculation is lower than a reference value programmed in the unit's memory, the oil recovery operation will be started:

- The compressor will operate at a frequency above 63Hz for 10 minutes continuously.

3.4 Expansion Valve Regulating Functions

Introduction

This chapter will explain the functions that are used to control the expansion valve opening.

Content

3.4.1 Expansion Valve Control at Startup

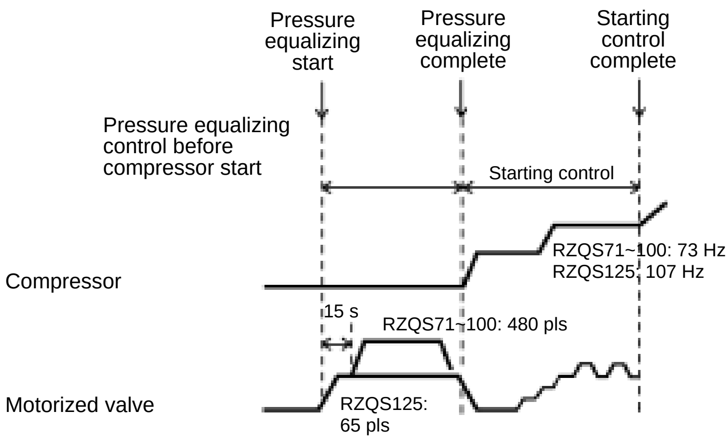
Outline

Before going to the general expansion valve control, the expansion valve opening will be limited in order to avoid the risk of liquid back and allow quick build up of pressure difference.

Details

During startup, the opening degree is determined by both the compressor frequency & the suction superheat. During startup, it is not possible to use only the value of the suction superheat because the operation is not stable yet. As a consequence also the SH value will not be stable.

Graph



Expansion valve opening during pressure equalization

On RZQS71~100 units (using double swing compressor) the expansion valve will be fully opened (to 480 pulses) for pressure equalisation before compressor start-up. Just before compressor start up, the expansion valve opening will be set to 65 pulses, same as for the 125 class.

Ending condition

The starting control will be terminated when the low pressure value < 0.6 MPa or when the maximum starting time of 10 minutes has been reached in case the low pressure value stays > 0.6 MPa.

2

3.4.2 General Expansion Valve Control

Outline

After the start up control function has been terminated the general expansion valve control function will regulate the expansion valve opening in function of the target suction SH value.

The discharge SH value will be used to set the target SH value.

The measured suction SH value will be used to control the opening of the expansion to the target SH value.

Details

When the unit is in cooling or heating operation the opening of the expansion valve will be controlled in order to keep the amount of superheat at the evaporator outlet constant. This way the evaporator can be used at maximum efficiency under all conditions. The initial target heat exchanger outlet superheat value = 5°C.

The target heat exchanger outlet superheat value can be increased in case the discharge superheat value decreases.

The target heat exchanger outlet superheat value can be decreased in case the discharge superheat value increases.

Control

During normal control 2 situations can decide on the expansion valve opening degree:

1. Target superheat amount:
   When the target heat exchanger outlet superheat > actual heat exchanger outlet superheat --> the expansion valve will close.
   When the target heat exchanger outlet superheat < actual heat exchanger outlet superheat --> the expansion valve will open.
   The superheat amount is checked every 10 seconds.
2. Frequency change: At the time of compressor frequency change, the expansion valve opening will be changed with a fixed value. This value will be in function of the amount of compressor frequency change.

Calculations RZQ71

The heat exchanger outlet superheat value is calculated from the saturated suction temperature Te(using LP sensor) and the suction pipe temperature R4T : SH = R4T-Te

The discharge superheat value is calculated from the saturated discharge temperature Td (HP value calculated out of PI, frequency and LP) and the discharge pipe temperature R3T : SH = R3T-Td

Calculations RZQ100~140

The heat exchanger outlet superheat value is calculated from the saturated suction temperature Te(using indoor coil sensor in cooling, outdoor coil sensor in heating) and the suction pipe temperature R4T : SH = R4T-Te

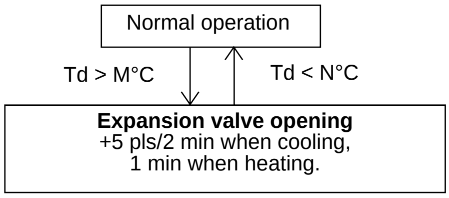
The discharge superheat value is calculated from the saturated discharge temperature Td (HP value calculated out of PI, frequency and Te) or Tc and the discharge pipe temperature R3T : SH = R3T-Td or R3T or SH = R3T-Tc (whichever is the lowest)

3.4.3 Discharge Pipe Temperature Control

Outline

The expansion valve opening will be controlled in order to avoid abnormal high compressor discharge temperatures (see also compressor operating frequency control).

Details



	RZQS71~125B
M°C	95°C
N°C	80°C

3.5 Outdoor Unit Fan Speed Control

Introduction

This chapter will explain how the outdoor fan speed is determined in cooling and heating operation.

Content

2

3.5.1 Outdoor Unit Fan Speed Control

Fan speed control

The outdoor fan speed will be controlled in function of the actual outdoor ambient temperature, the condensation pressure, pressure difference between low and high pressure and compression ratio.

For details please refer to "Pressure Difference Control".

2

Fan step table RZSQ71

Step	Cooling	Heating
0	0 rpm	0 rpm
1	200 rpm	200 rpm
2	250 rpm	250 rpm
3	300 rpm	300 rpm
4	360 rpm	360 rpm
5	430 rpm	430 rpm
6	515 rpm	515 rpm
7	620 rpm	715 rpm
8	818 rpm	738 rpm

Fan step table RZQS100

Step	Cooling	Heating
0	0 rpm	0 rpm
1	200 rpm	200 rpm
2	250 rpm	250 rpm
3	300 rpm	300 rpm
4	360 rpm	360 rpm
5	430 rpm	430 rpm
6	515 rpm	515 rpm
7	620 rpm	620 rpm
8	850 rpm	850 rpm

2

Fan step table RZQS125

	Cooling		Heating	
Step	**M1F**	**M2F**	**M1F**	**M2F**
0	0 rpm	0 rpm	0 rpm	0 rpm
1	250 rpm	0 rpm	250 rpm	0 rpm
2	400 rpm	0 rpm	285 rpm	250 rpm
3	285 rpm	250 rpm	335 rpm	300 rpm
4	360 rpm	325 rpm	395 rpm	360 rpm
5	445 rpm	410 rpm	470 rpm	435 rpm
6	545 rpm	510 rpm	560 rpm	525 rpm
7	660 rpm	625 rpm	660 rpm	625 rpm
8	850 rpm	815 rpm	842 rpm	807 rpm

Reference

See also:

- "Pressure Difference Control" on page 2–55
- "Defrost Operation" on page 2–19

Part 3
Troubleshooting

What is in this part?

This part contains the following chapters:

3

1 Troubleshooting

1.1 What Is in This Chapter?

3

Introduction

When a problem occurs, you have to check all possible malfunctions. This chapter gives a general idea of where to look for malfunctions.

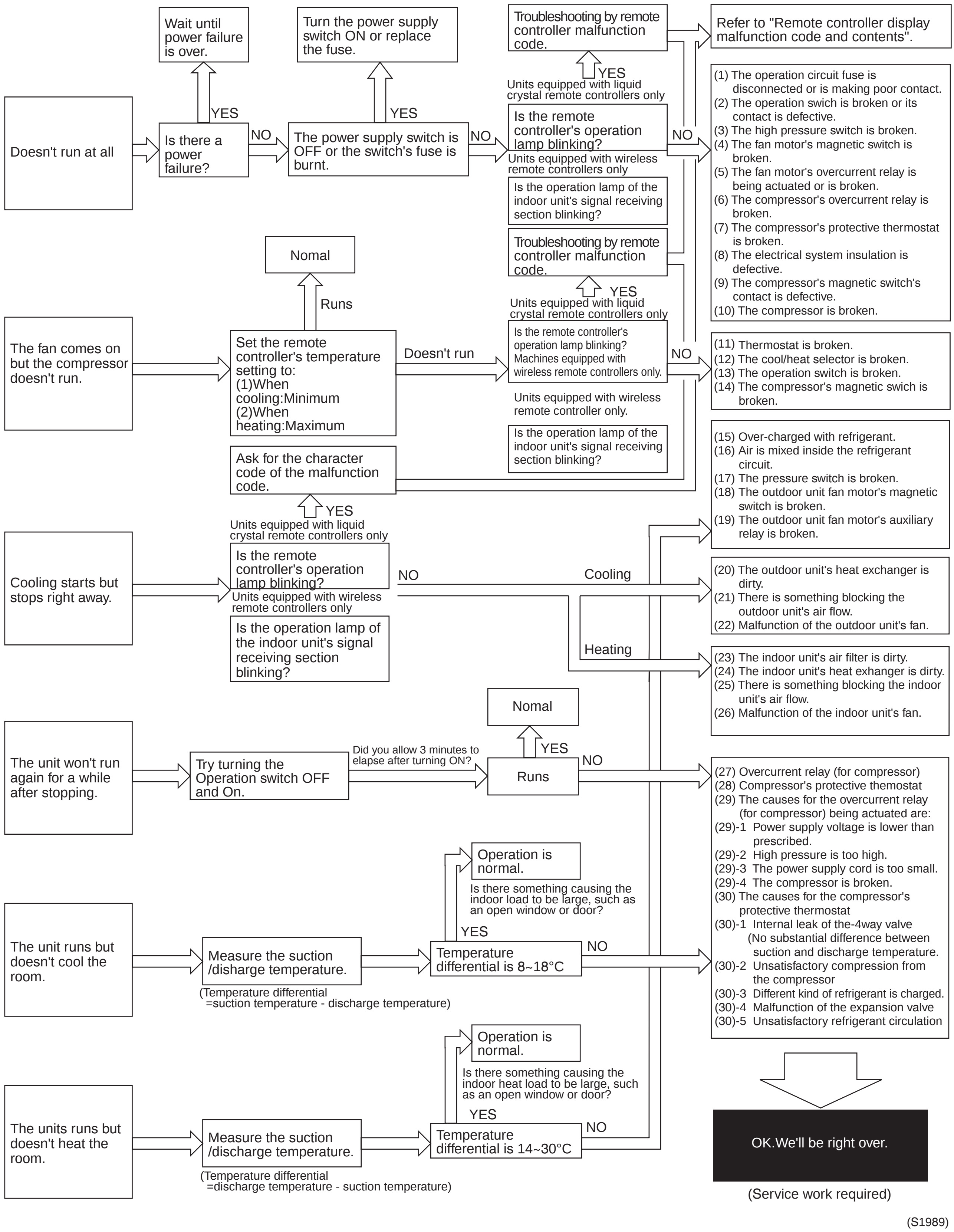
Not all repair procedures are described. Some procedures are considered common practice.

Overview

This chapter contains the following topics:

1.2 General Troubleshooting Flowchart

Find out the situation according to the following procedure when there is a request for service from the customer.



1.3 Overview of General Problems

Overview

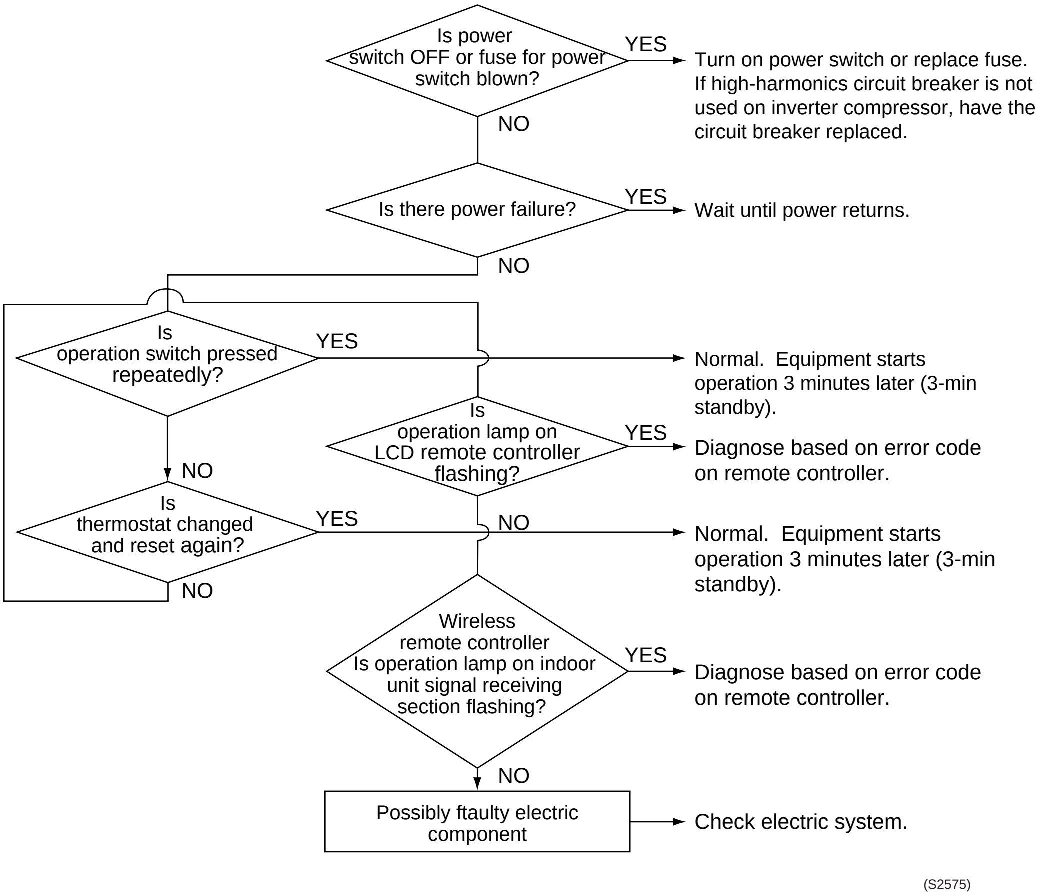
	Equipment Condition	Remedy
1	Equipment does not operate.	See page 3-6
2	Fan operates, but compressor does not.	See page 3-6
3	Cooling/heating operation starts but stops immediately.	See page 3-10
4	After unit shuts down, it cannot be restarted for a while.	See page 3-12
5	Equipment operates but does not provide cooling.	See page 3-14
6	Equipment operates but does not provide heating.	See page 3-16
7	Equipment discharges white mist.	See page 3-18
8	Equipment produces loud noise or shakes.	See page 3-19
9	Equipment discharges dust.	See page 3-21
10	Remote controller LCD displays “88.”	See page 3-22
11	Indoor swing flap does not operate.	See page 3-23
12	Equipment emits odor.	Room smell and cigarette odors accumulated inside the indoor unit are discharged with air. Inside of the indoor unit must be cleaned.
13	Flap operates when power is turned on.	It is normal. The flap initializes for accurate positioning.
14	Change of operation mode causes flap to move.	It is normal. There is a control function that moves the flap when operation mode is changed.
15	Fan operates in “M” mode during heating even if remote controller is set to “Low.”	It is normal. It is caused by the activation of the overload control (airflow shift control).
16	Flap automatically moves during cooling.	It is normal. It is caused by the activation of the dew prevention function or ceiling soiling prevention function.
17	Indoor unit fan operates in “L” mode for 1 minute in microcomputer-controlled dry mode even if compressor is not operating.	It is normal. The monitoring function forcibly operates the fan for one minute.
18	In simultaneous ON/OFF multi-system setup, indoor unit (sub) does not operate in sync with the other indoor unit (main). (Flat, fan, etc.)	It is normal. It is caused by a signal transmission lag.
19	Indoor unit fan operates after heating operation stops.	It is normal. The fan operates in the “LL” mode for 60 to 100 seconds to dissipate the residual heat in the heater.
20	Drain pump operates when equipment is not operating.	It is normal. The drain pump continues to operate for several minutes after equipment is turned off.
21	Horizontal swing sends air to different directions in cooling and heating even if it is set to the same position.	It is normal. The airflow direction in cooling/dry operation is different from that in heating/fan operation.
22	Flap remains horizontal even if it is set to Swing.	It is normal. The flap does not swing in the thermostat OFF mode.

3

1.3.1 Equipment does not operate

Applicable Model	All models of SkyAir series
Error Detection Method	
Error Generating Condition	
Possible Causes	■ Fuse blown or disorder of contact in operation circuit ■ Faulty operation switch or contact point ■ Faulty high pressure switch ■ Faulty magnetic switch for fan motor ■ Activation or fault of overcurrent relay for fan motor ■ Faulty overcurrent relay for compressor ■ Faulty compressor protection thermostat ■ Insufficient insulation in electric system ■ Faulty contact point of magnetic switch for compressor ■ Malfunction of compressor ■ Fefective remote controller or low batteries (wireless) ■ Check if address is set correctly on wireless R.C.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.2 Indoor fan operates, but compressor does not

Applicable Model

All models of SkyAir series

Method of Malfunction Detection

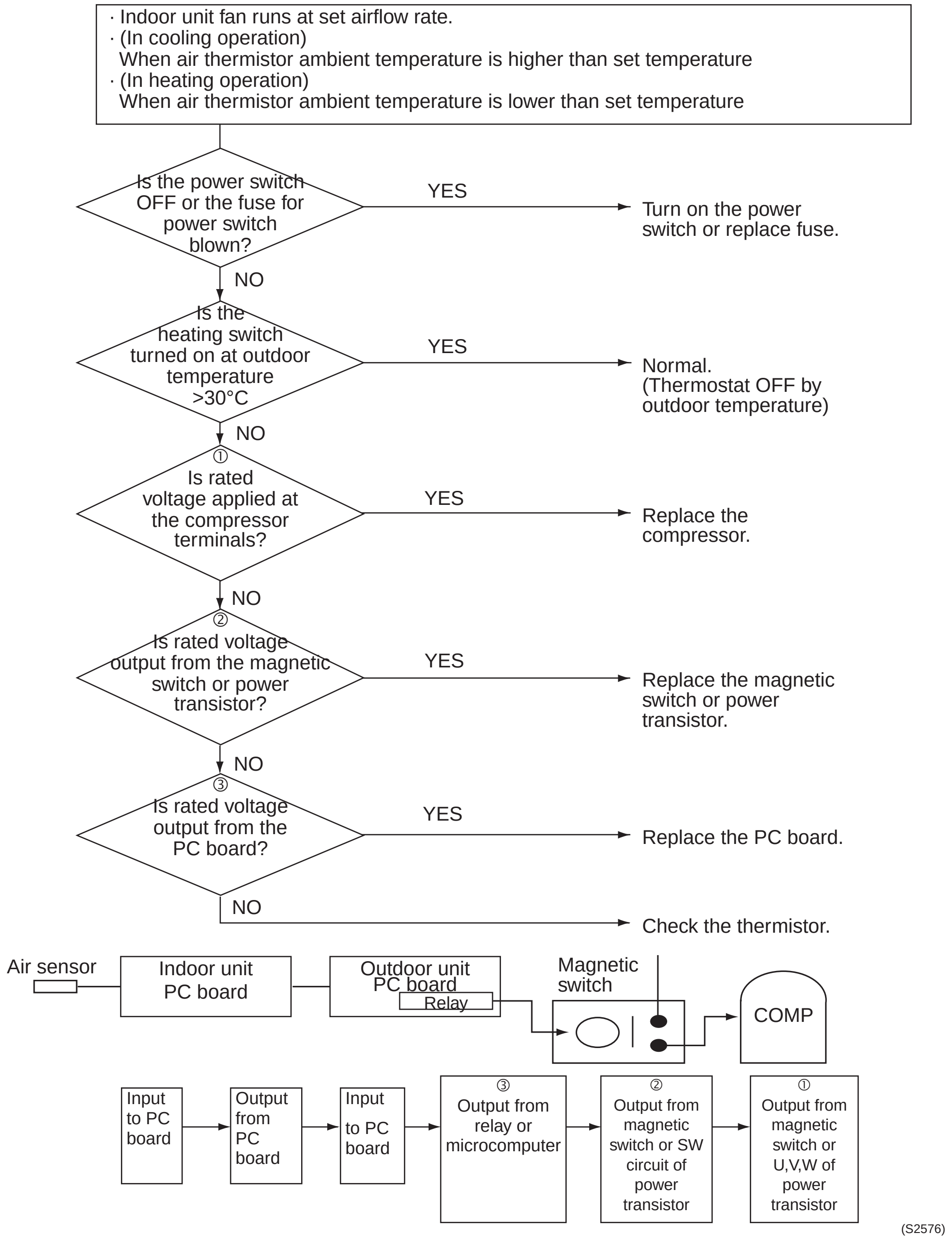
Malfunction Decision Conditions

3

Possible Causes

- Faulty thermistor
- Faulty indoor/outdoor unit PCB
- Faulty magnetic switch
- Faulty power transistor
- Faulty compressor

Troubleshooting



Caution

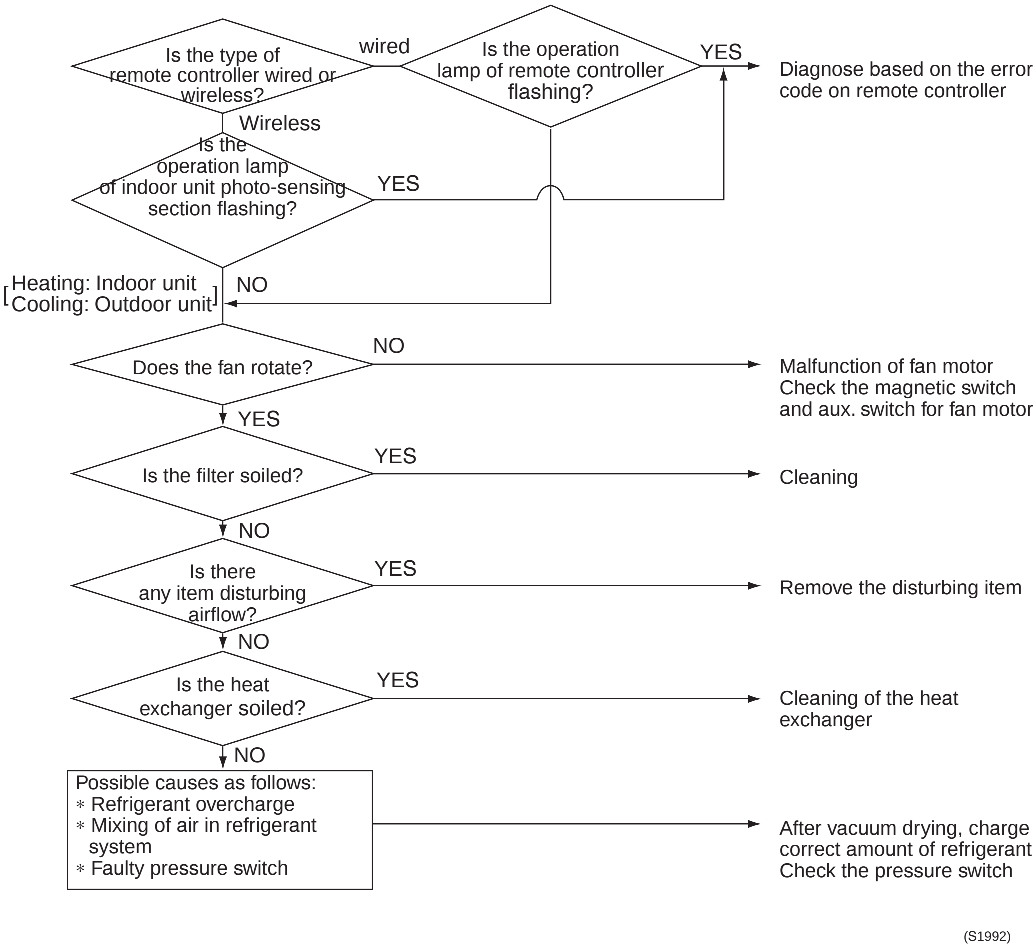
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.3 Cooling/heating operation starts but stops immediately

Applicable Model	All models of SkyAir series
Error Detection Method	
Error Generating Condition	
Possible Cause	■ Excess charge of refrigerant ■ Air intrudes into refrigerant system ■ Faulty pressure switch ■ Faulty magnetic switch for outdoor unit fan motor ■ Faulty aux. relay for outdoor unit fan motor ■ Soiled heat exchanger of outdoor unit ■ There is an interfering item in air flow of outdoor unit ■ Malfunction of outdoor unit fan ■ Soiled air filter of indoor unit ■ Soiled heat exchanger of indoor unit ■ There is some interfering item in airflow of indoor unit ■ Malfunction of indoor unit fan

3

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.4 After unit shuts down, it cannot be restarted for a while

Applicable Model

All models of SkyAir series

Error Detection Method

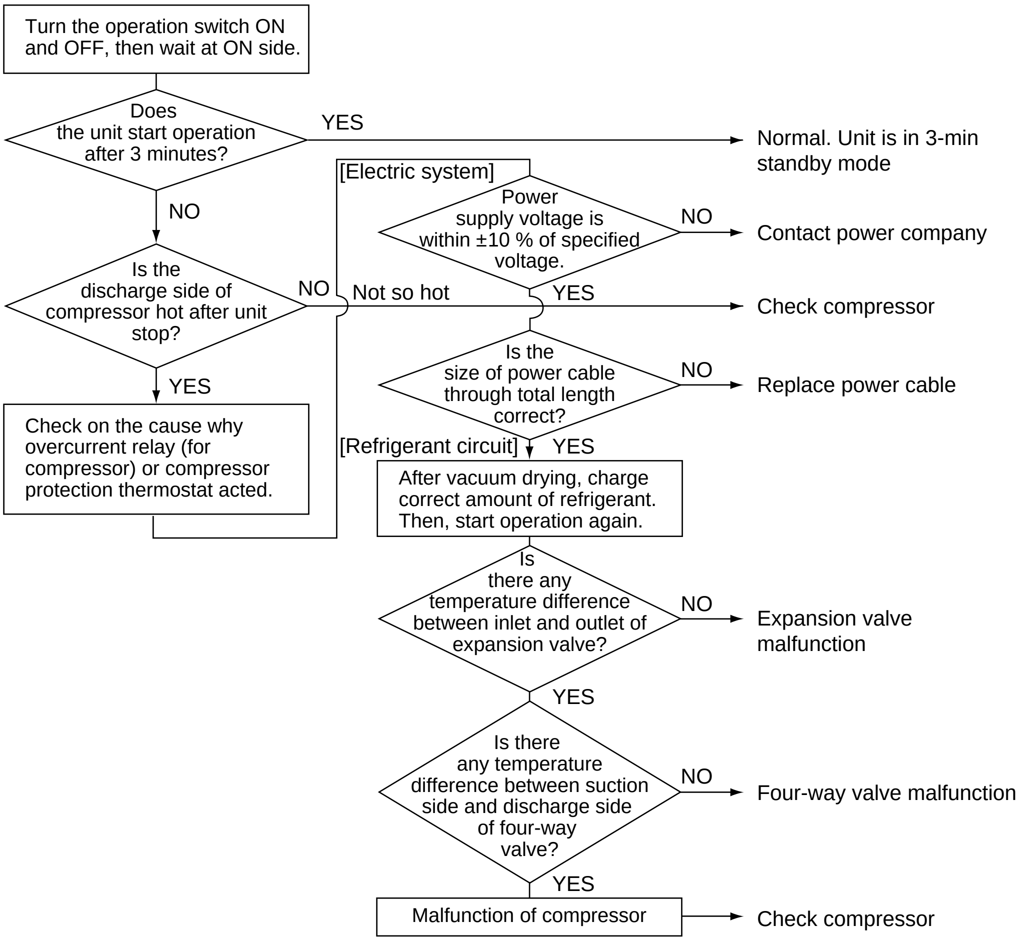
Error Generating Condition

3

Possible Cause

- Overcurrent relay (for compressor)
- Compressor protection thermostat
- Overcurrent relay may act due to the following reasons
  Lower voltage of power supply
  Excess level of high pressure
  Insufficient size of power cable
  Malfunction of compressor
- Compressor protection thermostat may act due to the following reasons
  Internal leakage of four-way valve (There is no difference between suction and discharge temperature)
  Insufficient compression of compressor
  Incorrect refrigerant
  Faulty expansion valve
  Insufficient circulation of refrigerant

Troubleshooting



Caution

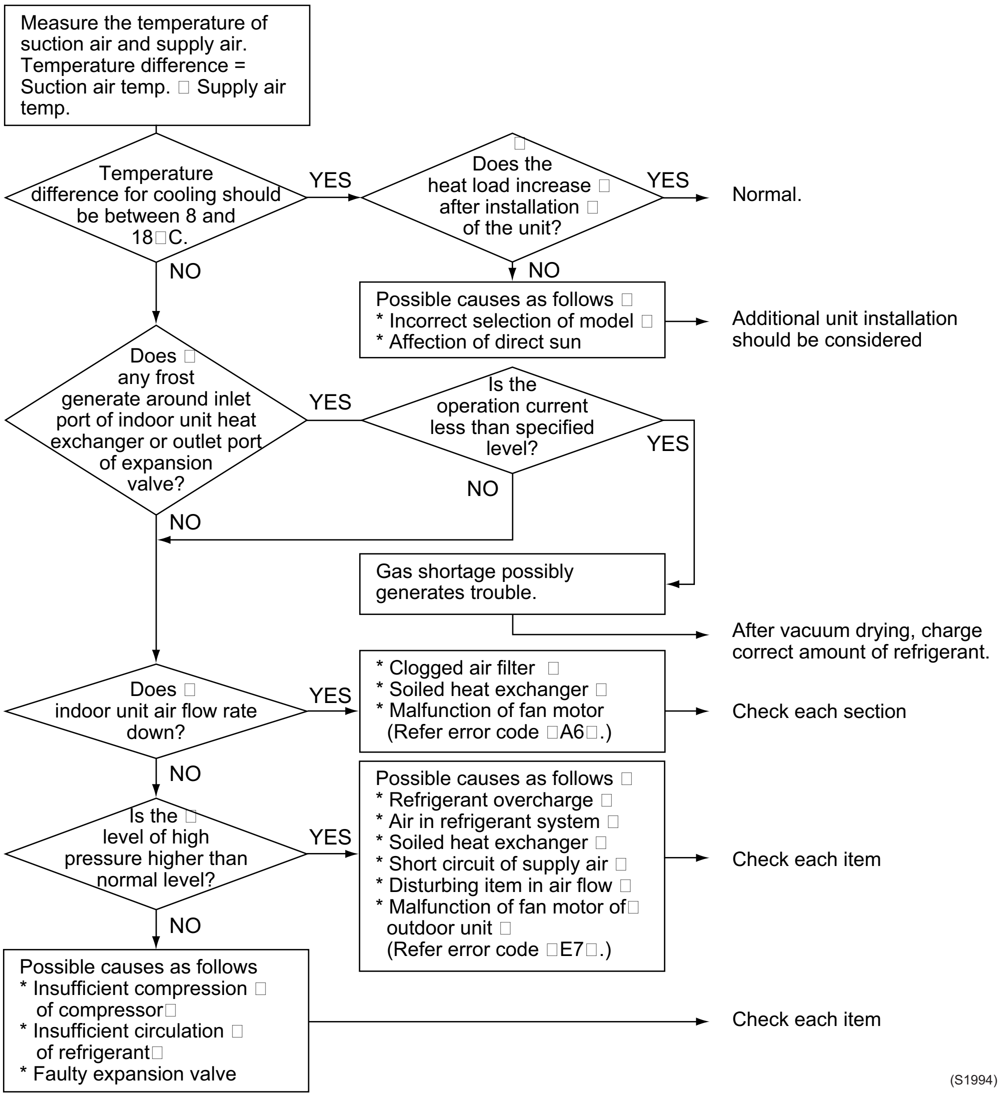
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.5 Equipment operates but does not provide cooling

Applicable Model	All models of SkyAir series
Error Detection Method	
Error Generating Condition	
Possible Cause	■ Overcurrent relay (for compressor) ■ Compressor protection thermostat ■ Overcurrent relay may act due to the following reasons Lower voltage of power supply Excess level of high pressure Insufficient size of power cable Malfunction of compressor ■ Compressor protection thermostat may act due to the following reasons Internal leakage of four-way valve (There is no difference between suction and discharge temperature) Insufficient compression of compressor Incorrect refrigerant charge/leak Faulty expansion valve Insufficient circulation of refrigerant ■ Malfunction of thermistors or thermistor out of position.

3

Troubleshooting



Caution

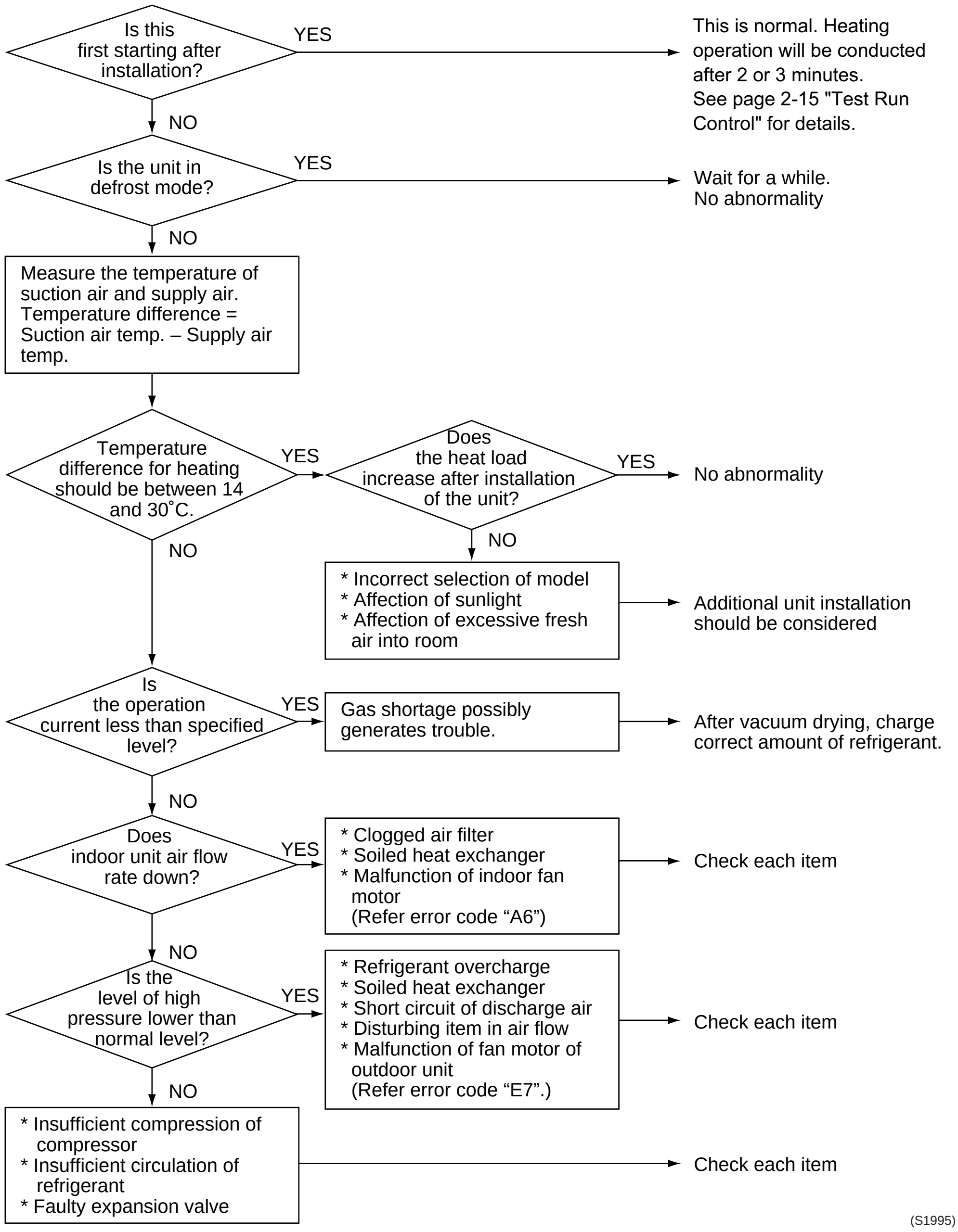
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.6 Equipment operates but does not provide heating

Applicable Model	All models of SkyAir series
Error Detection Method	
Error Generating Condition	
Possible Cause	■ Excess charge of refrigerant ■ Air intrudes into refrigerant system ■ Faulty pressure switch ■ Faulty magnetic switch for outdoor unit fan motor ■ Faulty aux. relay for outdoor unit fan motor ■ Soiled heat exchanger of outdoor unit ■ There is an interfering item in air flow of outdoor unit ■ Malfunction of outdoor unit fan ■ Soiled air filter of indoor unit ■ Soiled heat exchanger of indoor unit ■ There is some interfering item in airflow of indoor unit ■ Malfunction of indoor unit fan

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.7 Equipment discharges white mist

Applicable Model All models of SkyAir series

Error Detection Method

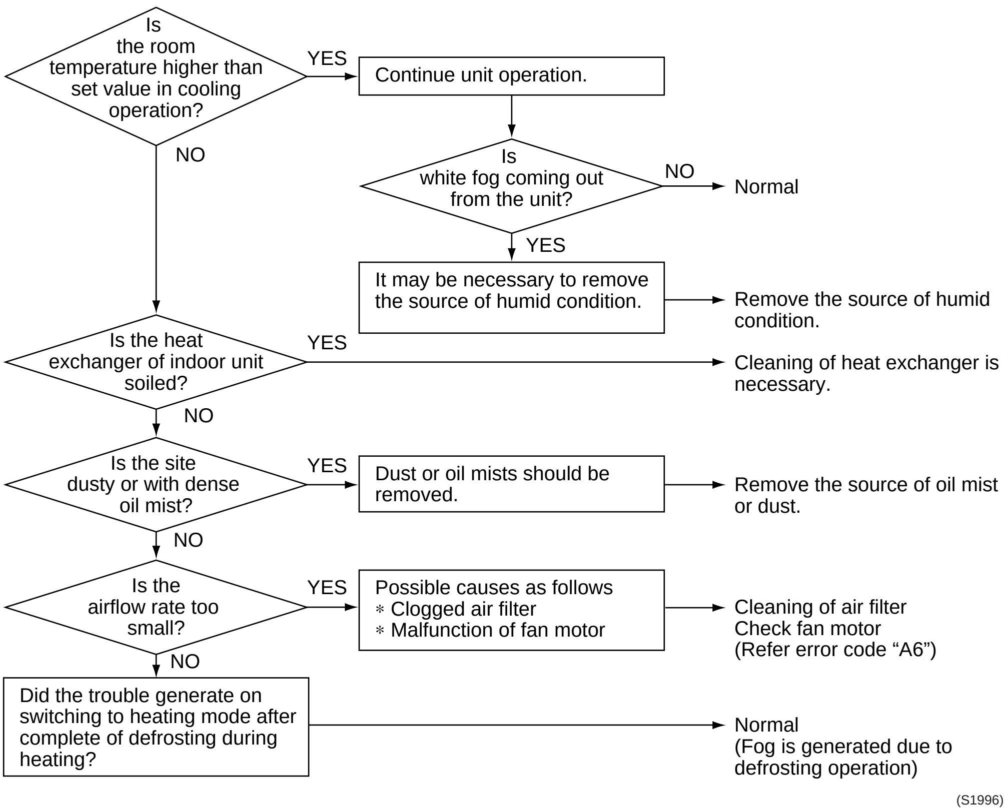
Error Generating Condition

3

Possible Cause

- Humid installation site
- Installation site is dirty and with dense oil mists.
- Soiled heat exchanger
- Clogged air filter
- Malfunction of fan motor

Troubleshooting

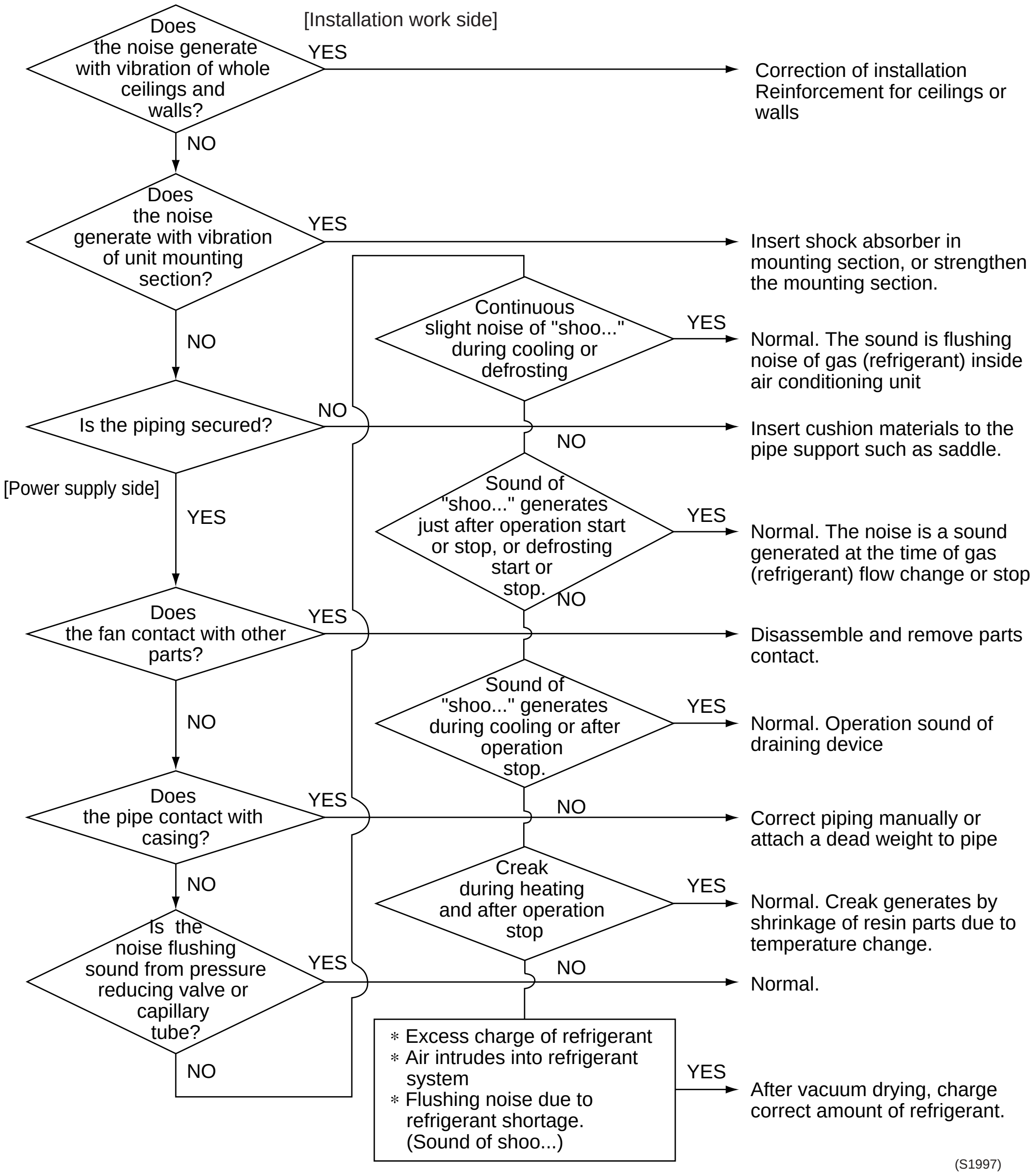


Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.8 Equipment produces loud noise or shakes

Applicable Model	All models of SkyAir series
Error Detection Method	
Error Generating Condition	
Possible Cause	■ Faulty installation ■ Excess charge of refrigerant ■ Air intrudes into refrigerant system ■ Flushing noise due to refrigerant shortage. (Sound of shoo...)

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.9 Equipment discharges dust

Applicable Model All models of SkyAir series

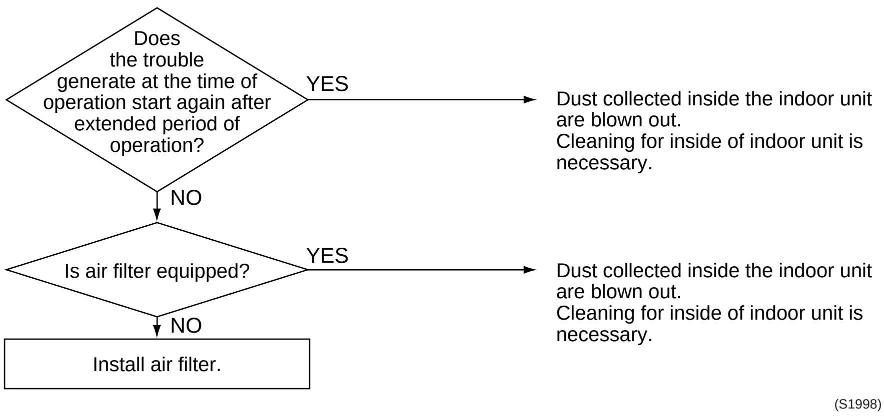
Error Detection Method

Error Generating Condition

Possible Cause

- Carpet
- Animal's hair
- Application (cloth shop,...)

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.10 Remote controller LCD displays "88"

Applicable Model

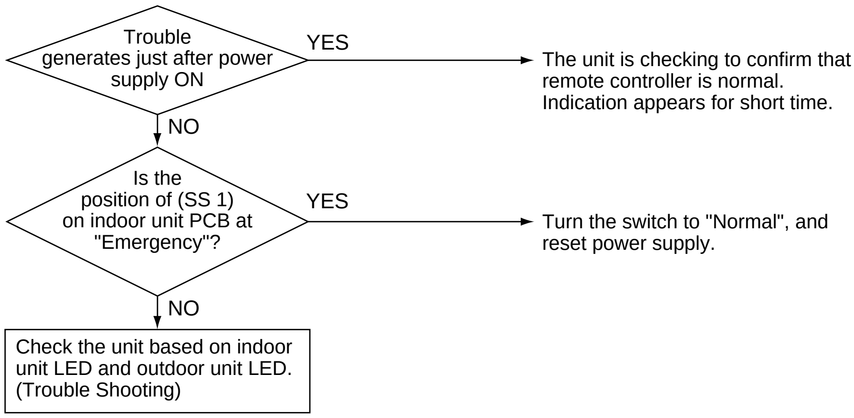
All models of SkyAir series

Error Detection Method

Error Generating Condition

Possible Cause

Troubleshooting



(S1999)

Caution

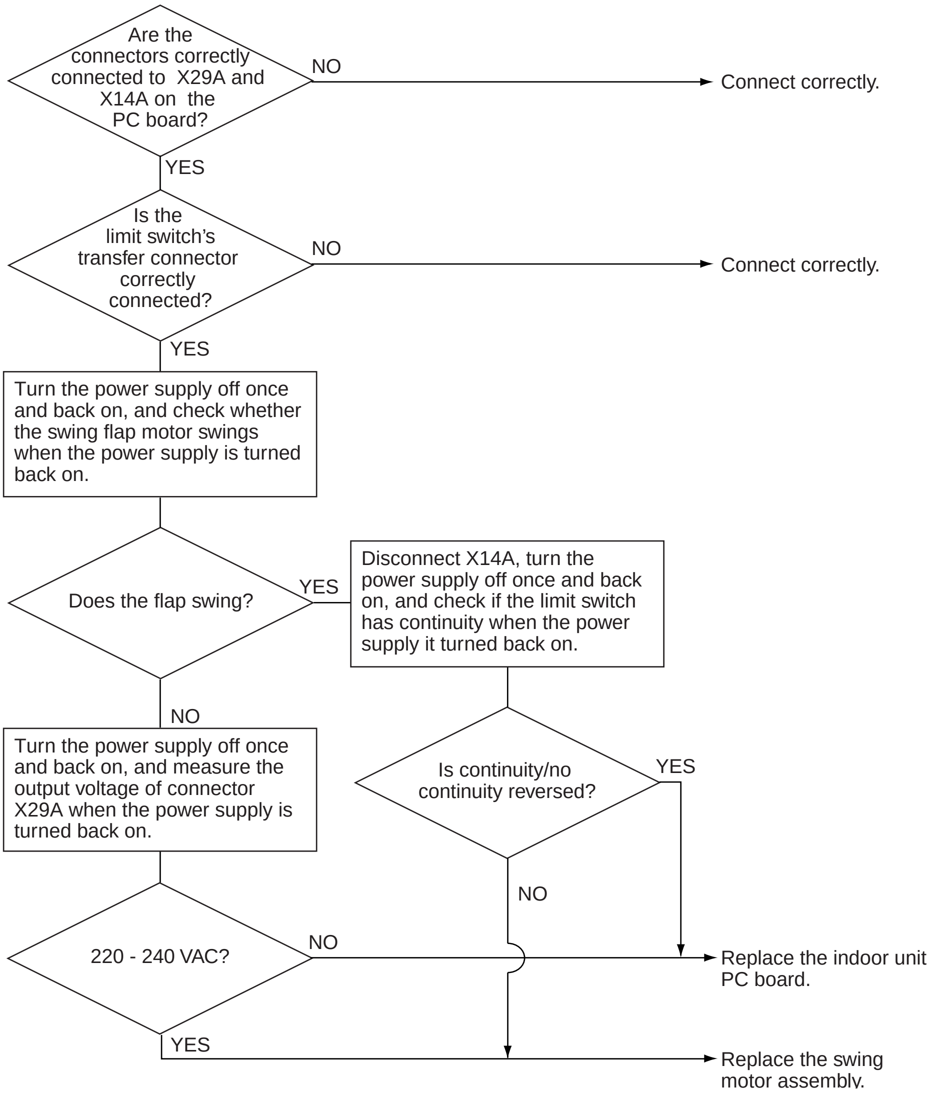
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.3.11 Swing flap does not operate

Applicable Models	FHQ, FAQ100
Method of Malfunction Detection	Utilizes ON/OFF of the limit switch when the motor turns.
Malfunction Decision Conditions	When ON/OFF of the micro switch for positioning cannot be reversed even through the swing flap motor for a specified amount of time (about 30 seconds).
Remark	Some functions can force the swing flap into a fixed position, altough swing mode is selected on the remote controller. This is not an unit error, but a control function to prevent draft to the customer. Before starting the troubleshooting, make sure the swing flap is not forced into such a fixed position. (e.g. Hot start, defrost operation, thermostat OFF in heating operation or freeze prevention in cooling operation. For details see "Fan and Flap Operations" on page 2-34)
Possible Causes	■ Faulty swing motor ■ Faulty micro switch ■ Faulty connector connection ■ Faulty indoor unit PC board

3

Troubleshooting



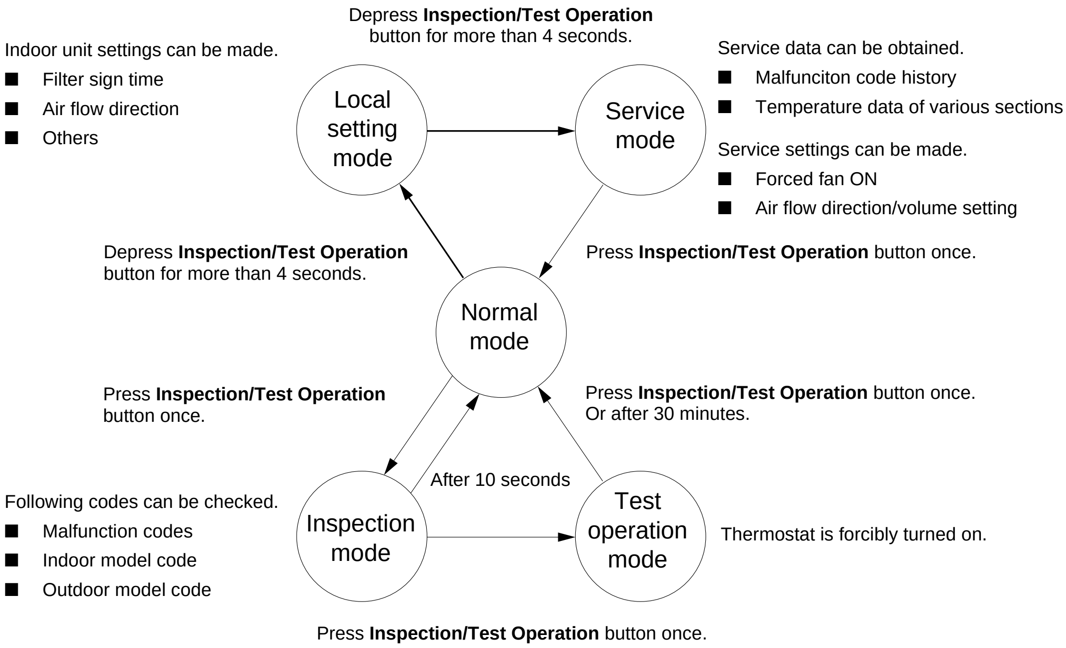
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

1.4 Procedure of Self-Diagnosis by Remote Controller

The inspection/test button

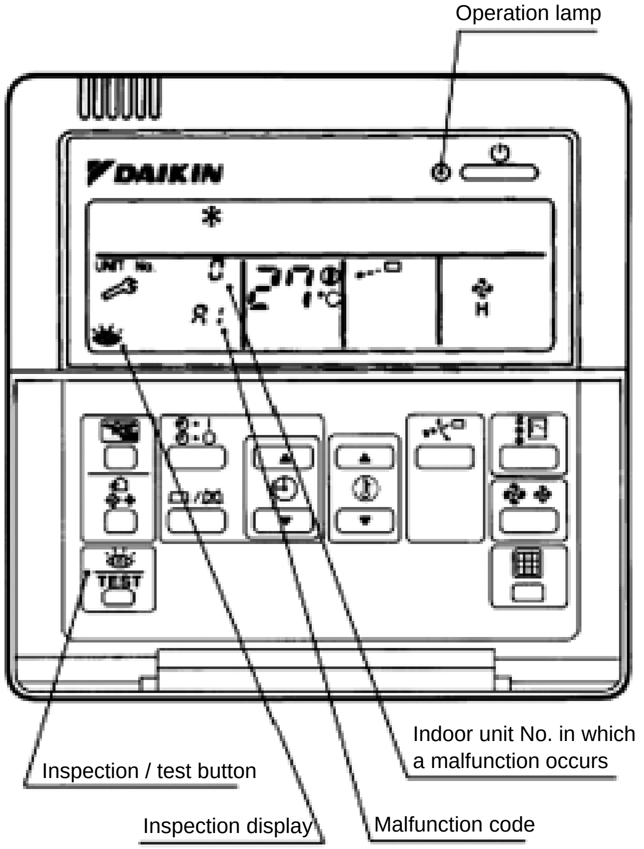
The following modes can be selected by using the [Inspection/Test Operation] button on the remote control.



1.5 Fault-diagnosis by Wired Remote Controller

Explanation

If operation stops due to malfunction, the remote controller's operation LED blinks, and malfunction code is displayed. (Even if stop operation is carried out, malfunction contents are displayed when inspection mode is entered.) The malfunction code enables you to tell what kind of malfunction caused operation to stop. See page 3-31 for malfunction code and malfunction contents.



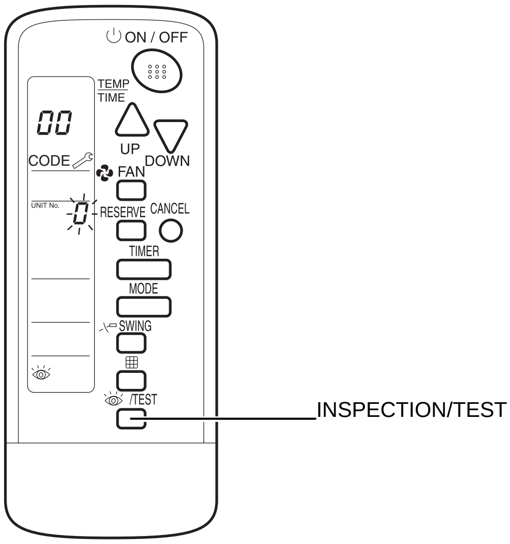
1.6 Fault-diagnosis by Wireless Remote Controller

Introduction

Contrary to the wired remote controller, the wireless remote controller does not display the error code. Instead, the operation LED on the light reception section flashes.

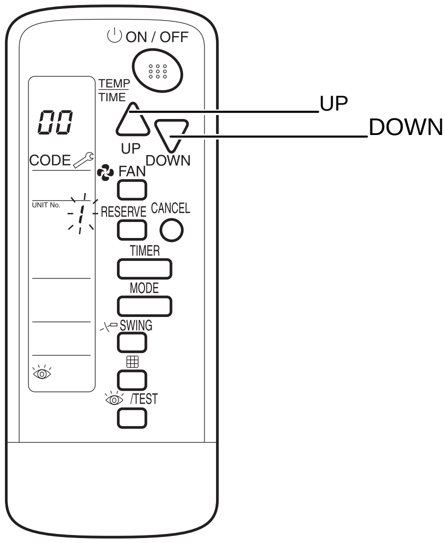
Checking

To find the error code, proceed as follows:

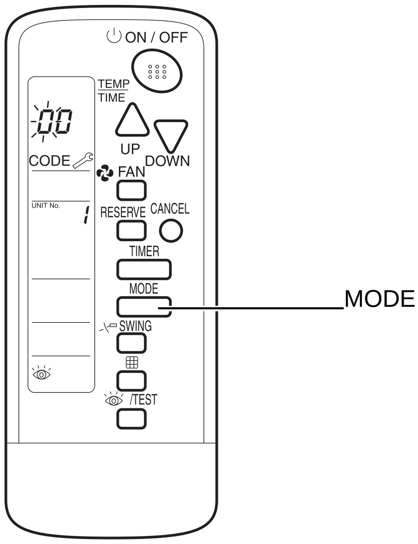
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Press the INSPECTION/TEST button to select “inspection”. The equipment enters the inspection mode. “0” flashes in the UNIT No. display.


</td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Press the UP or DOWN button and change the UNIT No. until the receiver of the remote controller starts to beep.

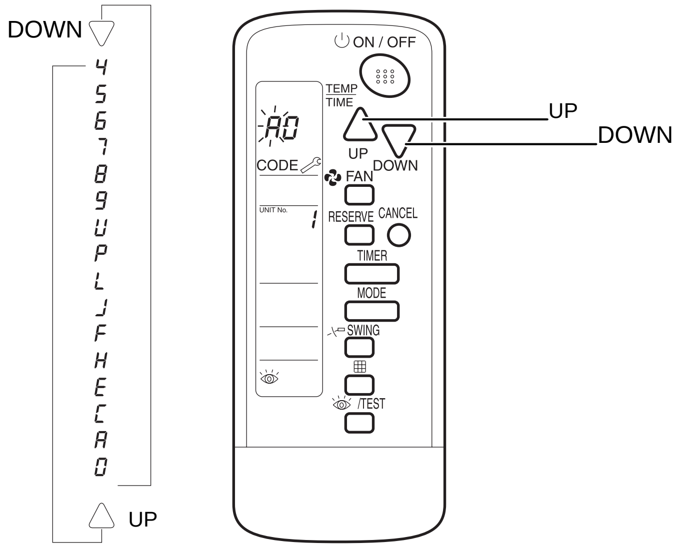


<table>
<tr><th>If you hear...</th><th>Then...</th></tr>
<tr><td>3 short beeps</td><td>Follow all steps below.</td></tr>
<tr><td>1 short beep</td><td>Follow steps 3 and 4. Continue the operation in step 4 until you hear a continuous beep. This continuous beep indicates that the error code is confirmed.</td></tr>
<tr><td>1 continuous beep</td><td>There is no abnormality.</td></tr>
</table>
</td></tr>
<tr><td>3</td><td>Press the MODE selector button.The left “0” (upper digit) indication of the error code flashes.’

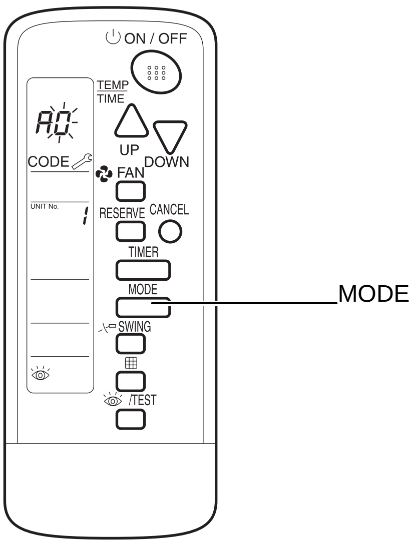


</td></tr>
</table>

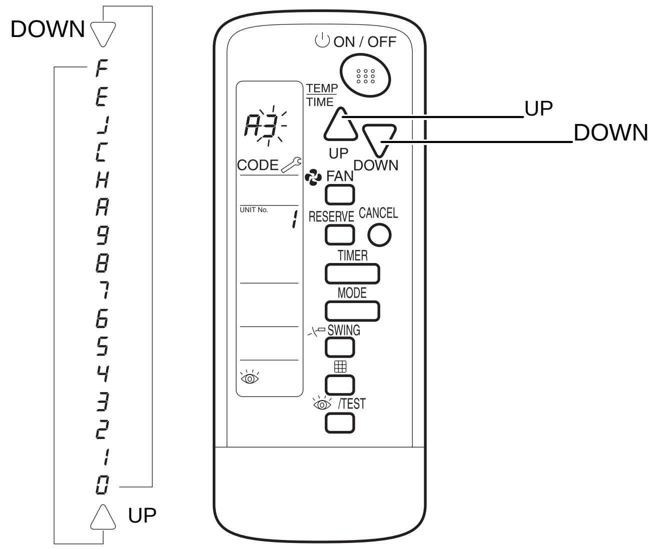
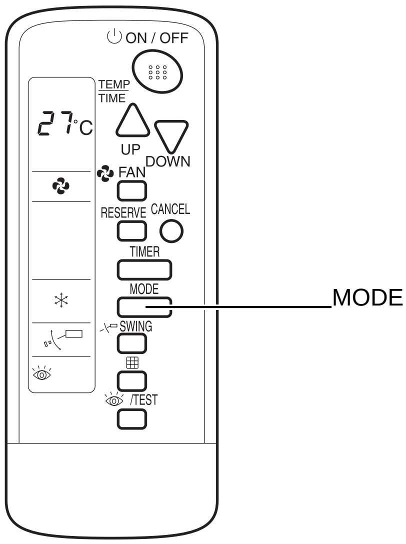
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Press the UP or DOWN button to change the error code upper digit until the receiver of the remote controller starts to beep.



<table>
<tr><th>If you hear...</th><th>Then...</th></tr>
<tr><td>2 short beeps</td><td>The upper digit matches.</td></tr>
<tr><td>1 short beep</td><td>No digits match.</td></tr>
<tr><td>1 continuous beep</td><td>Both upper and lower digits match.</td></tr>
</table>
</td></tr>
<tr><td>5</td><td>Press the MODE selector button.The right “0” (lower digit) indication of the error code flashes.



</td></tr>
</table>

Step	Action
6	Press the UP or DOWN button and change the error code lower digit until the receiver of the remote controller generates a continuous beep. 
7	Press the MODE button to return to normal status. If you do not press any button for at least 1 min, the remote controller returns automatically to normal status. 

1.7 Overview of Error Codes

Malfunction Code	Contents/Processing	Remarks
A1	Failure of PC board ass'y for indoor unit	
A3	Malfunction of drain water level system	
A6	Indoor unit fan motor overload / overcurrent / lock	(Note 1)
A7	Swing flap motor lock	
AF	Abnormal drain water level	Activation of float switch during compressor off.
AJ	Failure of capacity setting	Either capacity data is set incorrectly, or capacity has not been set for the data IC
C4	Malfunction of heat exchanger temperature sensor system	
C5	Malfunction of gas piping temperature sensor system	
C9	Malfunction of suction air temperature sensor system	
CJ	Malfunction of remote control air temperature sensor system	Failure of remote controller air thermistor. Unit can be operated by indoor unit thermistor.
CC	Malfunction of humidity sensor system	
E1	Outdoor unit PC board malfunction	
E3	High pressure malfunction (outdoor unit)	
E4	Abnormality of low pressure (outdoor)	Failure of low pressure sensor system. Check if the stop valve open.
E5	Compressor motor lock malfunction	Compressor motor lock, incorrect wiring.
E7	Outdoor fan motor lock or outdoor fan instantaneous overcurrent malfunction	
E9	Malfunction of electronic expansion valve (outdoor unit)	
F3	Discharge pipe temperature malfunction (outdoor unit)	
H3	Failure of high pressure switch (outdoor unit)	
H9	Malfunction of outdoor air temperature sensor system (outdoor unit)	(Note 2)
J3	Malfunction of discharge pipe temperature sensor system (outdoor unit)	
J5	Suction pipe thermistor malfunction	Failure of suction pipe thermister system
J6	Malfunction of heat exchanger temperature sensor system (outdoor unit)	(Note 2)
JC	Malfunction of suction pressure sensor	Failure of suction pressure sensor system
L4	Radiation fin temperature rise	Malfunction of inverter cooling
L5	Instantaneous over current	Possibility of compressor motor grounding or shortage of motor winding
L8	Electronic thermal	Possibility of compressor overload, open circuit in compressor motor
L9	Stall prevention	Possibility of compressor seizing
LC	Malfunction of transmission system (between control PCB and inverter PCB)	

3

Malfunction Code	Contents/Processing	Remarks
P1	Open phase or voltage unbalance	
P4	Abnormal radiation fin temperature sensor (outdoor unit)	
PJ	Failure of capacity setting (outdoor unit)	Either capacity data is set incorrectly, or capacity has not been set for the data IC
U0	Lack of gas malfunction	Abnormal suction pipe temperature
U2	Abnormal power supply voltage	Including malfunction of K1M, K2M
U4/UF	Failure of transmission (between indoor and outdoor unit)	Transmission between indoor and outdoor unit is not being correctly carried out. (Note 1, Note 2)
U5	Failure of transmission (between indoor unit and remote controller)	Transmission between indoor and remote controller is not being correctly carried out.
U8	Failure of transmission (between “main” and “sub” remote controller	Transmission between “main” and “sub” remote controller is not being correctly carried out.
UA	Failure of fieldsetting	System fieldsetting error pair, twin, triple, double twin or wrong capacity class.
UC	Address error of central remote controller	

- In the case of the shaded error codes, “inspection” is not displayed. The system operates, but be sure to inspect and repair it.

Notes:

1 There is a possibility of open phase power supply, check power supply also.

2 Operation when a malfunction occurs may differ according to the model.

1.8 Troubleshooting by LED Indications

1.8.1 Troubleshooting by LED on the indoor unit's

Foreword

Troubleshooting can be carried out by service monitor LED (green). (Blinks when normal)

☼ : LED on / ● : LED off / ◐ : LED blinks / — : No connection with troubleshooting

Microcomputer Normal Monitor	Transmission Normal Monitor	Contents/Processing
HAP (LED-A)	**HBP (LED-B)**	
◐	◐	Indoor unit normal → Outdoor unit trouble shooting
◐	☼	Incorrect transmission wiring between indoor and outdoor unit
	●	If outdoor unit's LED-A is off, proceed outdoor unit's trouble shooting. If outdoor unit's LED-A blinks, failure of wiring or indoor or outdoor unit P.C board ass'y. (Note 4)
☼	—	Failure of indoor unit PC board ass'y (Note 5)
●		Malfunction of power supply or failure of PC board ass'y or broken transmission wire between indoor and outdoor unit. (Note 5)

Notes:

1. When the INSPECTION/TEST button of remote controller is pushed, **INSPECTION** display blinks entering **INSPECTION** mode.
2. In the **INSPECTION** mode, when the ON/OFF button is pushed and held for 5 seconds or more, the aforementioned malfunctioning history display is off. In this case, after the malfunction code blinks 2 times, the code display turns to "00" (=Normal) and the unit No. turns to "0". The INSPECTION mode automatically switches to the normal mode (set temperature display).
3. Operation halts due to malfunction depending on the model or condition.
4. If LED-B is off, the transmission wiring between indoor and outdoor unit may be incorrect or disconnected. Before performing the previously described troubleshooting, check the transmission wiring.
5. Troubleshoot by turning off the power supply for a minimum of 5 seconds, turning it back on, and then rechecking the LED display.

1.8.2 Troubleshooting by LED on outdoor unit PCB

The following diagnosis can be conducted by turning on the power switch and checking the LED indication on the printed circuit board of the outdoor unit.

☼ : LED on / ● : LED off / ◐ : LED blinks / — : Not used for diagnosis

LED detection		Description
HAP	H1P	
(Green)	(Red)	
◐	●	Normal
☼	—	Faulty outdoor unit PCB (Note 1)
●	—	Power supply abnormality, or faulty outdoor unit PCB (Note 2)
◐	☼	Activation of protection device (Note 3)

Notes:

1. Turn off the power switch, and turn it on again after 5 seconds or more. Check the error condition, and diagnose the problem.
2. Turn off the power switch. After 5 seconds or more, disconnect the connection wire (2). Then turn on the power switch. If the HAP on the outdoor unit PCB flashes after about 10 seconds, the indoor unit PCB is faulty.
3. Also check for open phase.

Remark: The error detection monitor continues to indication the previously generated error until the power switch is turned off.
Be sure to turn off the power switch after inspection.

1.9 Troubleshooting by Remote Controller Display / LED Display

Explanation for Symbols

☀ : LED blinks / ☼ : LED on / ● : LED off / — : No connection with troubleshooting

◎ : High probability of malfunction
○ : Possibility of malfunction
☐ : Low probability of malfunction
— : No possibility of malfunction (do not replace)

1.9.1 Indoor malfunctions

Indoor Unit Malfunctions	Indoor Unit LED Display Note 2		Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
				Other than PC Board	PC Board				
	H1P	H2P			Outdoor Unit	Indoor Unit	Remote Controller		
	☀	☀	*Note 1	—	—	—	—	Normal → to outdoor unit	—
	☀	☼	A1	—	—	○	—	Malfunction indoor unit PC board (For troubleshooting by LED, refer to p.33.)	3–42
	☀	●							
	☼	—							
	●	—							
	☀	☀	A3	◎	—	—	—	Malfunction of drain water level system	3–43
	☀	☀	AF	◎	—	—	—	Malfunction of drain system	3–45
	☀	☀	A6	◎	—	☐	—	Indoor unit fan motor lock	3–47
	☀	☀	A7	◎	—	☐	—	Swing flap motor malfunction / Lock	3–49
	☀	☀	AJ	◎	—	○	—	Malfunction of capacity setting	3–51
	☀	☀	C4	◎	—	☐	—	Malfunctioning heat exchanger thermistor system.	3–53
	☀	☀	C5	◎	—	☐	—	Malfuncioning gaspipe thermistor system.	3–53
	☀	☀	C9	◎	—	☐	—	Malfunctioning suction air thermistor system.	3–53
	☀	☀	CJ	—	—	☐	—	Malfunctioning remote controller air thermisto	3–55
	☀	☀	CC	◎	—	☐	—	Humidity sensor system malfunction	3–56

1.9.2 Outdoor malfunctions

Outdoor Unit Malfunction	Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
		Other than PC Board	PC Board				
			Outdoor Unit	Indoor Unit	Remote Controller		
	E1	◎	◎	—	—	Outdoor unit P.C board malfunction	3–58
	E3	◎	—	—	—	Abnormality of high pressure (HPS)	3–59
	E4	◎	□	—	—	Abnormality of low pressure (outdoor)	3–61
	E5	◎	□	—	—	Compressor motor lock malfunction	3–65
	E7	◎	□			Malfunction of outdoor unit fan motor	3–67
	E9	◎	□	—	—	Malfunction of Electronic expansion valve	3–69
	F3	◎	□	—	—	Discharge pipe temperature malfunction	3–71
	H3	◎	◎	—	—	Faulty high pressure switch (HPS)	3–73
	H4	◎	◎	—	—	Abnormal low pressure switch	3–74
	H9	◎	□	—	—	Malfunction of outdoor air temperature sensor system	3–76
	J3	◎	□	—	—	Malfunction of discharge pipe temperature sensor system	3–76
	J5	◎	□	—	—	Suction pipe thermistor malfunction	3–76
	J6	◎	□	—	—	Malfunction of heat exchanger temperature sensor system	3–76
	JC	◎	□	—	—	Suction pipe pressure sensor malfunction	3–77
	L4	◎	□	—	—	High temperature of radiation fin	3–79
	L5	◎	□	—	—	Overcurrent of DC output (instantaneous)	3–80
	L8 Note 2	◎	□	—	—	Electronic thermal switch (time lag)	3–82
	L9	◎	□	—	—	Stall prevention (time lag)	3–84
	LC	◎	○	—	—	Malfunction of transmission system (between control PCB and inverter PCB)	3–86
	P1	◎	□	—	—	Open phase or voltage unbalance	3–88
	P4	◎	□	—	—	Malfunction of radiator fin temperature thermistor	3–90
	PJ	◎	□	—	—	Error in capacity setting	3–91
	U0	◎	—	—	—	Gas shortage	3–92
	U2	◎	□	—	—	Abnormal power supply voltage	3–93

Notes:
1. Possibility of open phase in power supply.
2. In RZQ model, L8 is not displayed on remote controller. Please see 3–82 for more detail.

1.9.3 System malfunctions

Outdoor Unit Malfunction	Remote Controller Display	Location of Malfunction				Contents of Malfunction	Details of Malfunction (Reference Page)
		Other than PC Board	PC Board				
			Outdoor Unit	Indoor Unit	Remote Controller		
	U4 or UF	◎	○	○	—	Transmission error (between indoor and outdoor unit)	3–96
	U5	◎	—	○	○	Transmission error (between indoor and remote controller)	3–98
	U8	◎	—	○	○	Transmission error between “main” remote controller and “sub” remote controller	3–99
	UA	◎	—	○	—	Excessive indoor units connected to this system.	3–100
	UC	◎	—	—	○	Centralized address setting error	3–102

1.10 Overview of the Outdoor Safety Devices

	High pressure switch		Fuse
	Open	Close	
RZQS71	4.0 Mpa +0/-0.15	3.0 +/-0.15	6.3A/250V
RZQS100			
RZQS125			

3

1.11 Overview of the Indoor Safety Devices

	Thermal protector		Thermal fuse fan motor
	Abnormal	Reset (automatic)	
FFQ35~60	>130°C +/-5°C	<83°C +/-20°C	N.A.
FCQ35~60	>130°C +/-5°C	<83°C +/-20°C	N.A.
FCQ100/125B	>140°C +/-5°C	<45°C +/-15°C	N.A.
FBQ35~125	N.A.	N.A.	>152°C
FDQ125	N.A.	N.A.	>160°C
FHQ35~125	>130°C +/-5°C	<83°C +/-20°C	N.A.
FAQ71/100	>130°C +/-5°C	<83°C +/-20°C	N.A.

2 Error Codes: Indoor Units

2.1 What Is in This Chapter?

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

Shutdown

For some errors, the system only shuts down when the error occurs several times. This means that you have to wait until the system shuts down to be able to see the flashing LED on the front panel and the error code on the remote controller.

Overview

This chapter contains the following topics:

3

2.2 Malfunctioning Indoor PCB (A1)

Error code

A1

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☀	☀
Malfunctioning	☀	☼
	☀	●
	☼	—
	●	—

Error generation

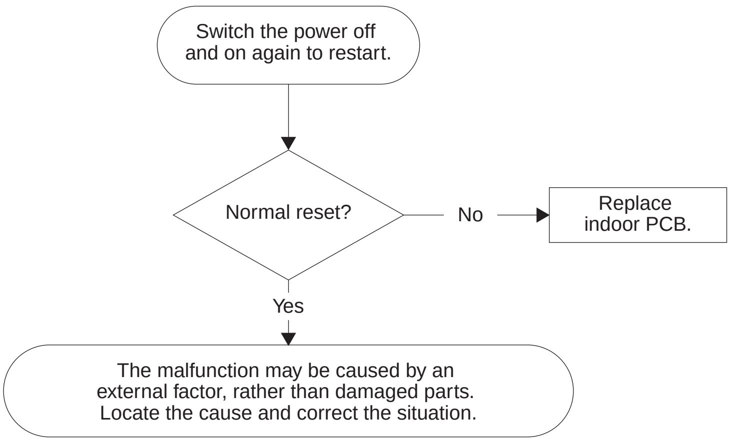
The error is generated when the data from the EEPROM is not received correctly.

EEPROM (Electrically Erasable Programmable Read Only Memory): A memory chip that holds its content without power. It can be erased, either within the computer or externally and usually requires more voltage for erasure than the common +5 volts used in logic circuits. It functions like non-volatile RAM, but writing to EEPROM is slower than writing to RAM.

Causes

The possible cause is a malfunctioning indoor PCB.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.3 Malfunction of Drain Water Level System (A3)

Error code

A3

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal		
Malfunctioning		

Error generation

The error is generated when the water level reaches its upper limit and when the float switch turns OFF.

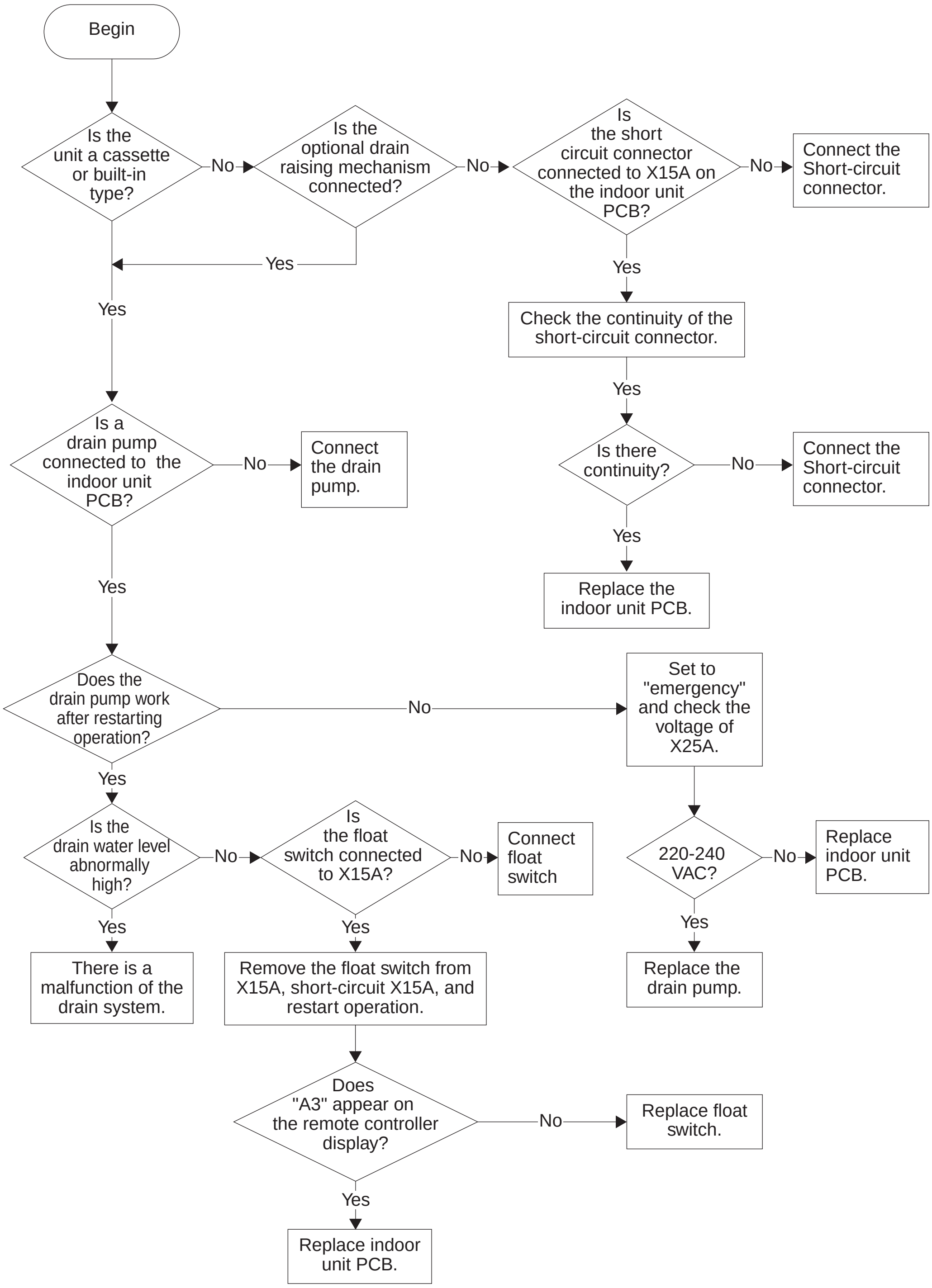
Causes

The possible causes are:

- Malfunctioning drain pump
- Improper drain piping work
- Drain piping clogging
- Malfunctioning float switch
- Malfunctioning indoor unit PCB
- Malfunctioning short-circuit connector X15A on PCB.

3

Troubleshooting



Remark If "A3" is detected by a PC board which is not mounted with X15A, the PC board is defective.

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.4 Malfunctioning Drain System (AF)

Error code

AF

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

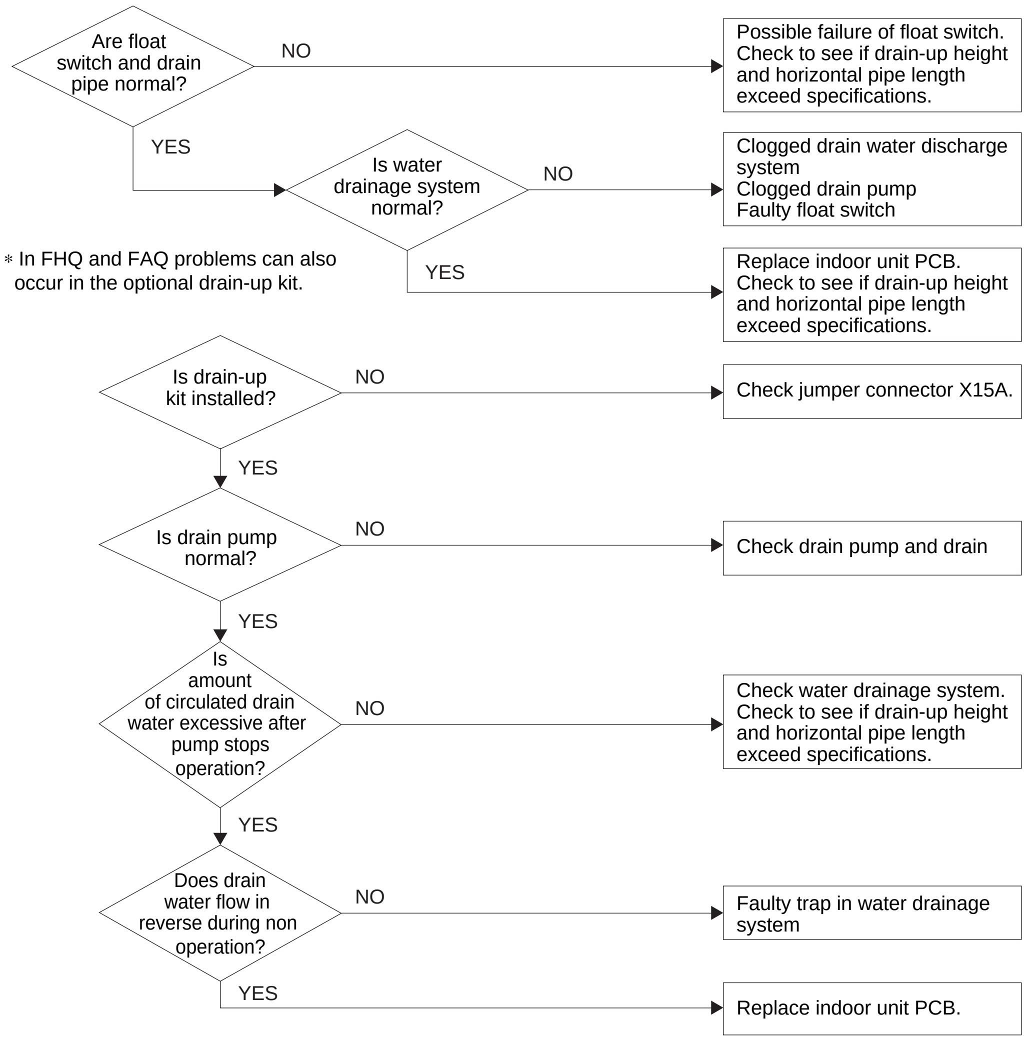
The error is generated when the float switch changes from ON to OFF while the compressor is OFF.

Causes

The possible causes are:

- Error in the drain pipe installation
- Malfunctioning float switch
- Malfunctioning indoor unit PCB.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3

2.5 Indoor Unit Fan Motor Lock (A6)

Error code

A6

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

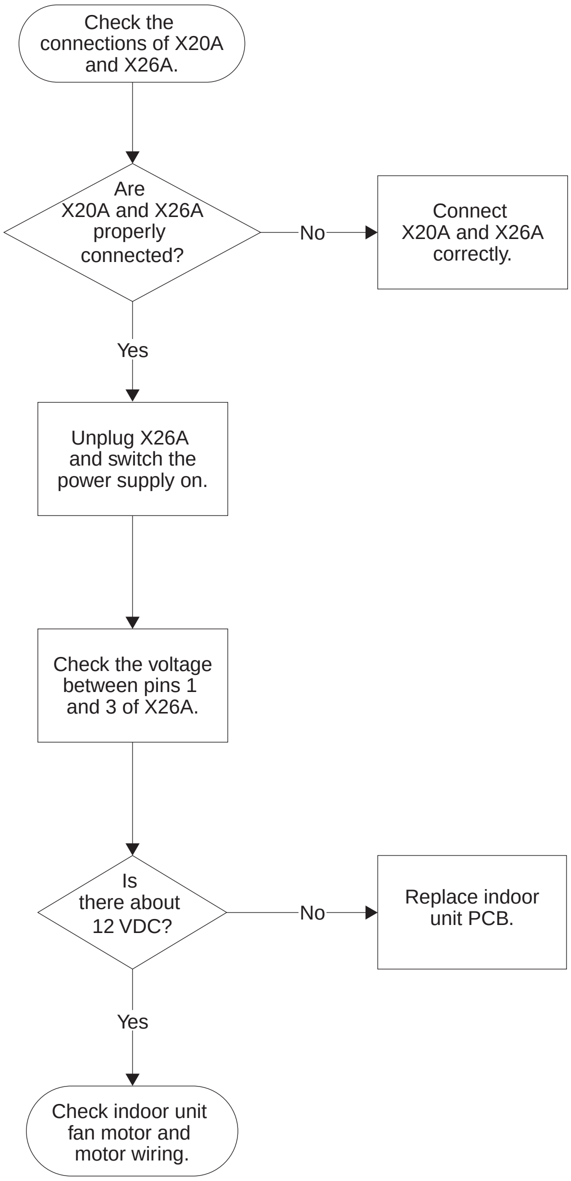
The error is generated when the fan rotations are not detected while the output voltage to the fan is at its maximum.

Causes

The possible causes are:

- Malfunctioning indoor unit fan motor
- Broken or disconnected wire
- Malfunctioning contact
- Malfunctioning indoor unit PCB.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.6 Swing Flap Motor Malfunction / Lock (A7)

Error code

A7

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

The error is detected by the limit switch when the motor turns.

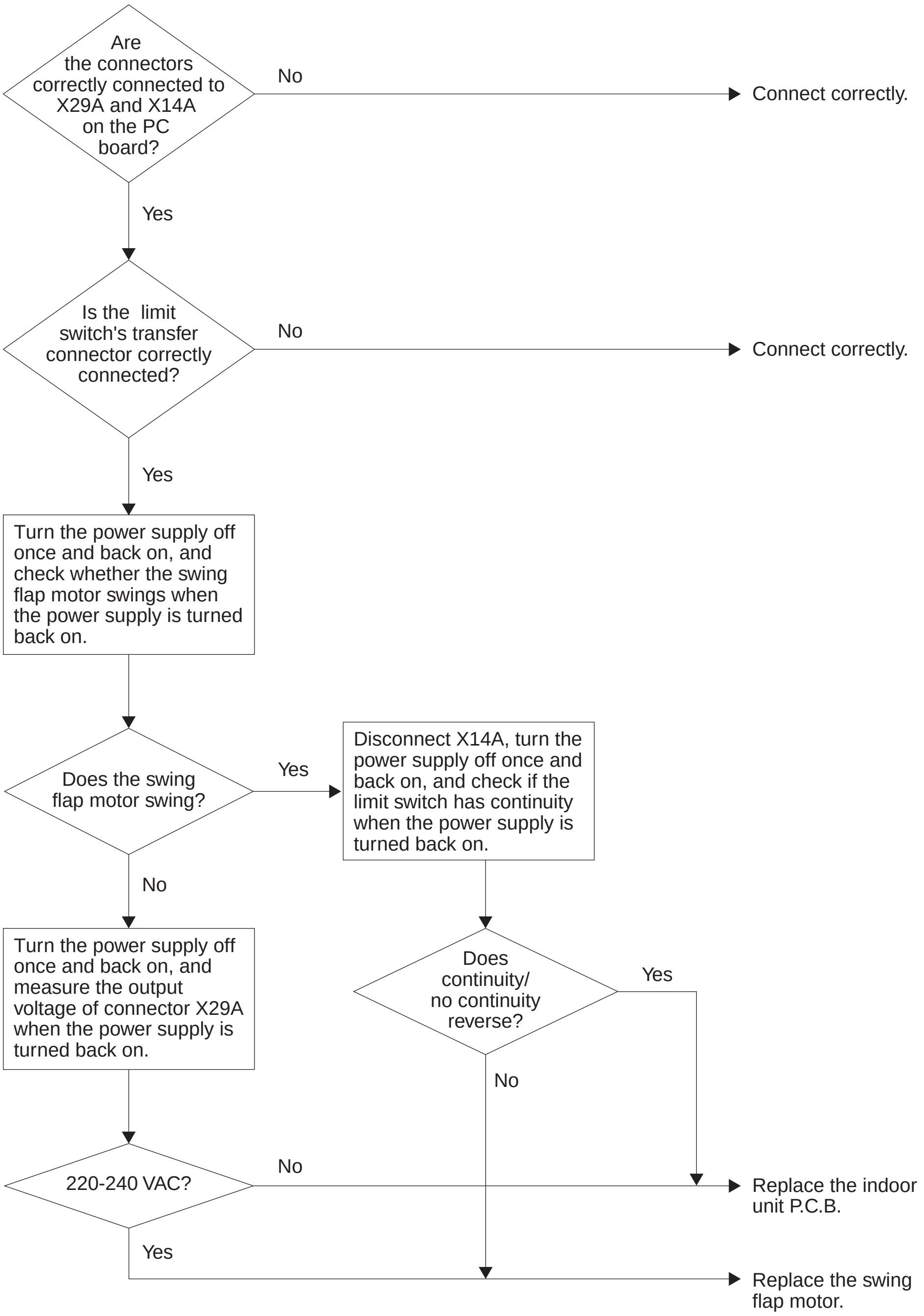
When ON/OFF of the microswitch for position detection cannot be reversed eventhough the swing flap motor is energized for a specified amount of time (about 30 seconds).

Causes

The possible causes are:

- Failure of swing flap motor
- Failure of microswitch
- Failure of connector connection
- Failure of indoor unit PCB

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.7 Malfunctioning Capacity Setting (AJ)

Error code

AJ

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

The error is generated when the following conditions are fulfilled:

Condition	Description
1	■ The unit is in operation. ■ The PCB’s memory IC does not contain the capacity code. ■ The capacity setting adaptor is not connected.
2	■ The unit is in operation. ■ The capacity that is set, does not exist for that unit.

Causes

The possible causes are:

- Malfunctioning capacity setting adaptor connection
- Malfunctioning indoor unit PCB.

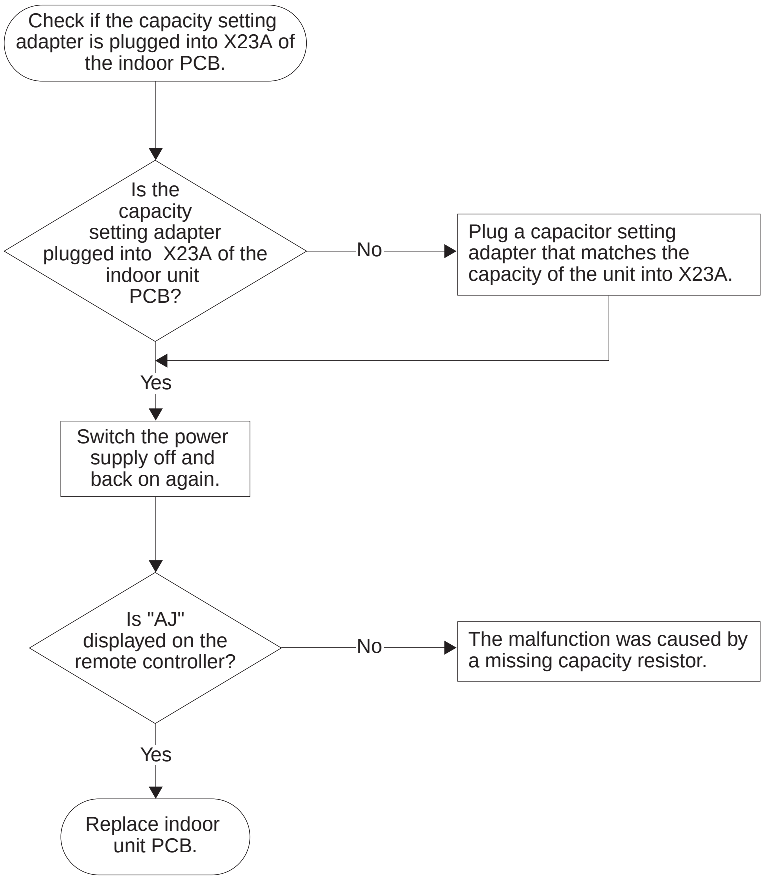
Capacity setting adaptor

The capacity is set in the PCB’s memory IC. A capacity setting adaptor that matches the capacity of the unit is required in the following case:

In case the indoor PCB installed at the factory is for some reason changed at the installation site, the capacity will not be contained in the replacement PCB. To set the correct capacity for the PCB you have to connect a capacity setting adaptor with the correct capacity setting to the PCB. The capacity setting for the PCB will become the capacity setting of the adaptor because the capacity setting adaptor has priority.

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.8 Thermistor Abnormality (C4, C5, C9)

Error code

The table below describes the two thermistor abnormalities.

Error	Description
C4	Malfunctioning heat exchanger thermistor system.
C5	Malfuncioning gaspipe thermistor system.
C9	Malfunctioning suction air thermistor system.

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

The error is generated when during compressor operation:

- Thermistor input > 4.96 V, or
- Thermistor output < 0.04 V.

Causes

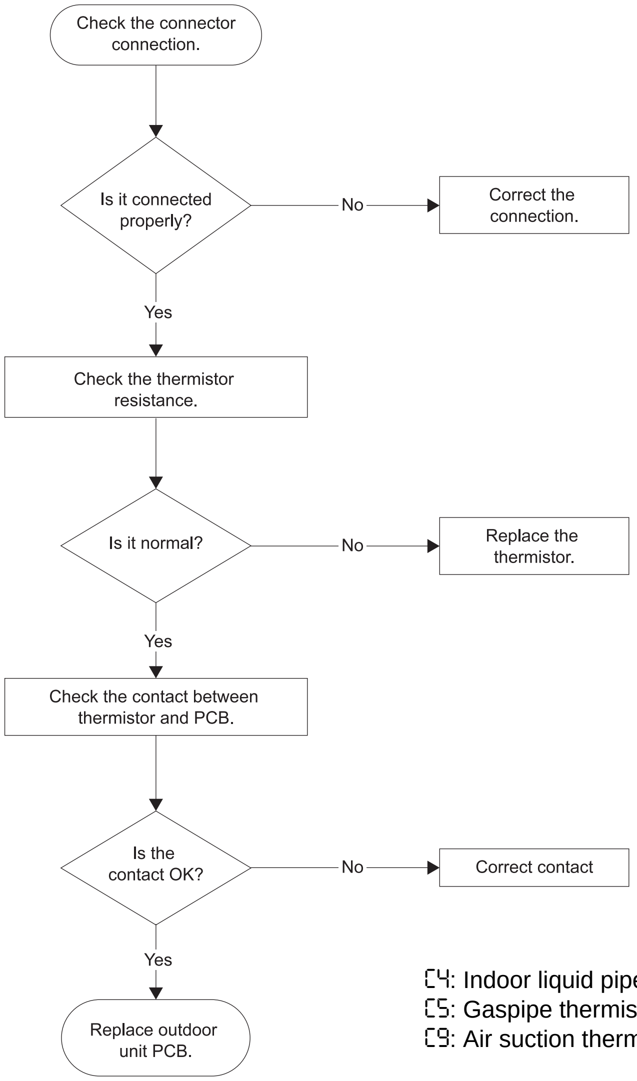
The possible causes are:

- Malfunctioning connector connection
- Malfunctioning thermistor
- Malfunctioning PCB
- Broken or disconnected wire.

Checking thermistors

See page 3–106.

Troubleshooting



C4: Indoor liquid pipe thermistor (R2T).
C5: Gaspipe thermistor (R3T)
C9: Air suction thermistor (R1T).

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.9 Malfunctioning Remote Controller Air Thermistor (CJ)

Error code

CJ

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

The error is generated when the remote controller thermistor becomes disconnected or shorted while the unit is running.

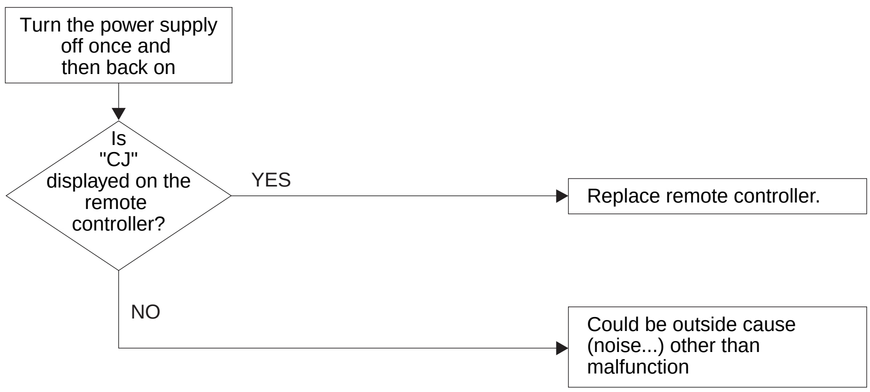
Even if the remote controller thermistor is malfunctioning, the system can operate with the system thermistor.

Causes

The possible causes are:

- Malfunctioning thermistor
- Broken wire.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

2.10 Humidity Sensor System Malfunction (CC)

Error code

CC

LED indications

The table below shows the LED indications.

Operation	HAP (green)	HBP (green)
Normal	☼	☼
Malfunctioning	☼	☼

Error generation

The error is generated when the humidity sensor becomes disconnected or shorted while the unit is running.

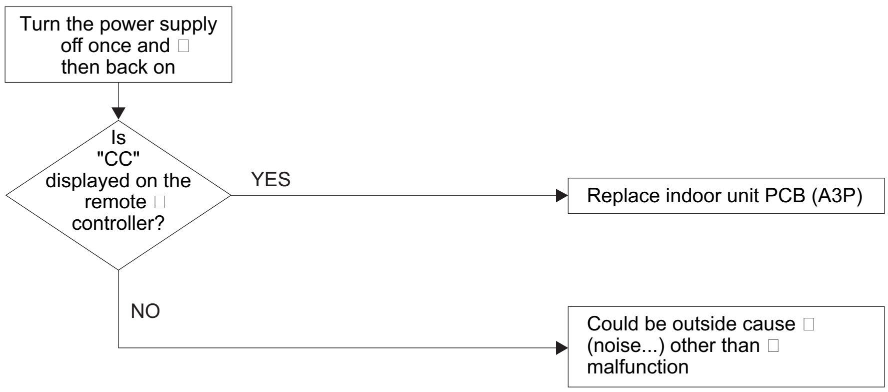
Even if the sensor is malfunctioning, the system can operate.

Causes

The possible causes are:

- Malfunctioning sensor
- Broken wire.

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3 Error Codes: Outdoor Units

3.1 What Is in This Chapter?

3

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

Overview

This chapter contains the following topics:

3.2 Failure of Outdoor Unit PC Board (E1)

Remote Controller Display

E1

Method of Malfunction Detection

Microcomputer checks whether E2PROM is normal.

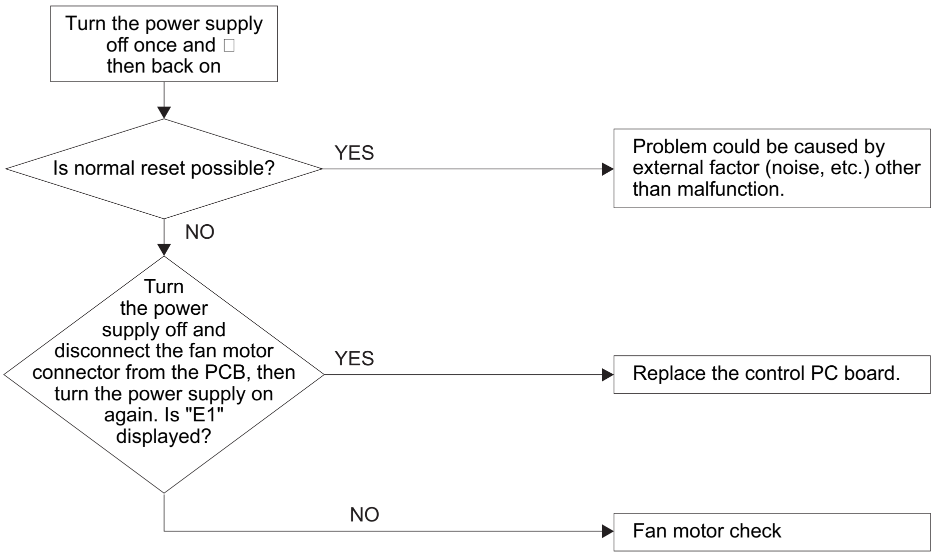
Malfunction Decision Conditions

E2PROM:
When E2PROM malfunctions when turning the power supply on

Supposed Causes

- Faulty outdoor unit PC board

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.3 Abnormal High Pressure (Detected by the HPS) (E3)

Remote Controller Display

E3

Method of Malfunction Detection

The protection device circuit checks continuity in the high pressure switch.

Malfunction Decision Conditions

When the high pressure switch is actuated
Actuating pressure:
RZQS71~125

Supposed Causes

- Faulty high pressure switch
- Disconnection in high pressure switch harness
- Faulty connection of high pressure switch connector
- Clogged indoor unit suction filter (in heating operation)
- Dirty outdoor unit heat exchanger
- Faulty outdoor unit fan
- Refrigerant overcharge
- Stop valve is left in closed.

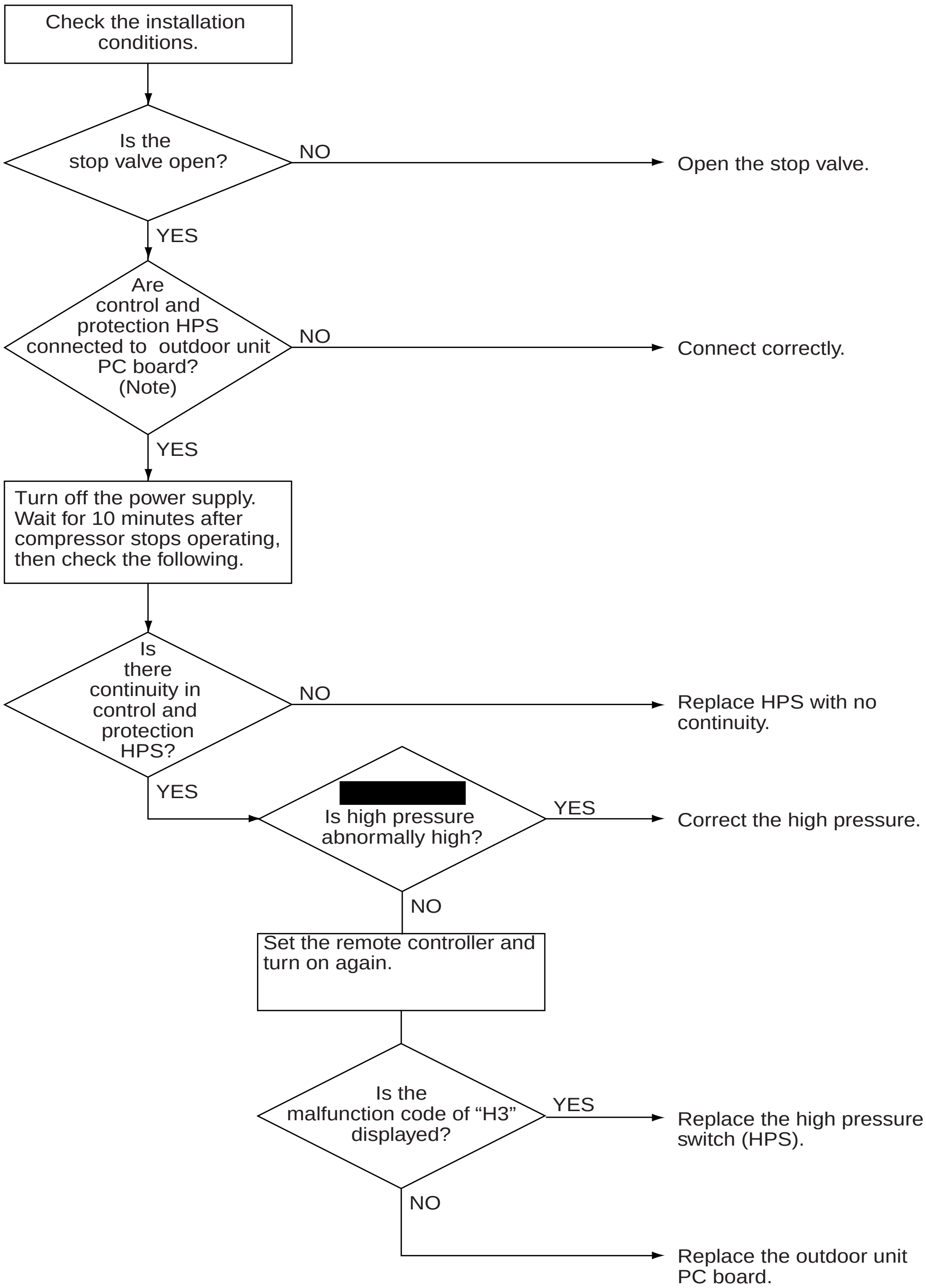
HPS settings

The table below contains the preset HPS values.

	High pressure switch		Fuse
	Open	Close	
RZQS71	4.0 Mpa +0/-0.15	3.0 +/-0.15	6.3A/250V
RZQS100			
RZQS125			

3

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.4 Actuation of Low Pressure Sensor: RZQS71~100B7V3B (E4)

Remote Controller Display

E4

Method of Malfunction Detection

Actual value of the low pressure is continuously measured using the low pressure sensor.

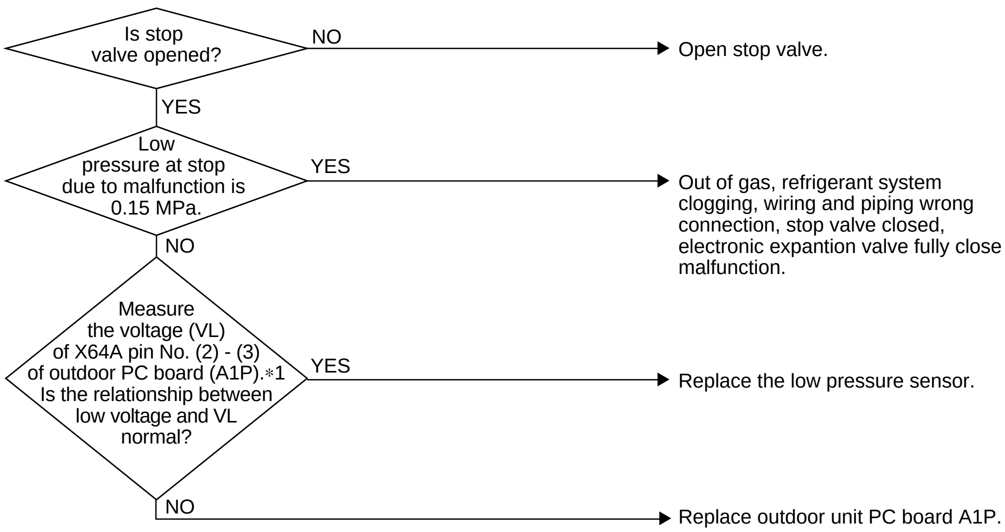
Malfunction Decision Conditions

Error is generated when the low pressure is dropped under specific pressure.

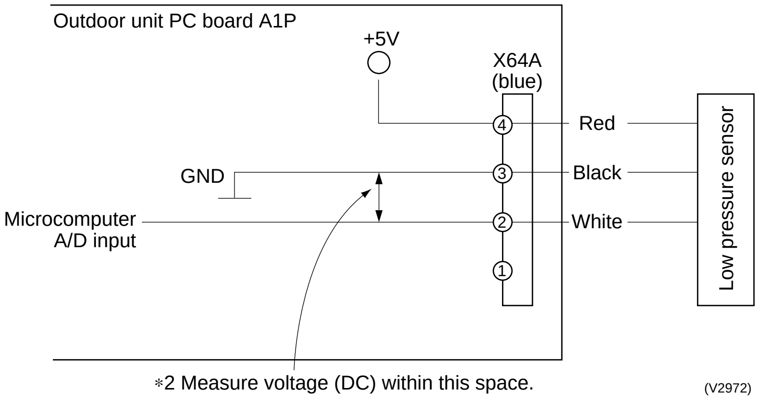
Supposed Causes

- Abnormal drop of low pressure (Lower than 0.15MPa)
- Defect of low pressure sensor
- Defect of outdoor unit PC board
- Stop valve is not opened.

Troubleshooting



*1: Voltage measurement point



*2 Refer to Low pressure sensor, check on page 3–115.

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.5 Actuation of Low Pressure Switch: RZQS125B7V3B (E4)

Error code

E4

Method of Malfunction Detection

The protection device circuit checks continuity in the low pressure switch.

Error generation

The error is generated when the low-pressure switch is activated during compressor operation.

Causes

The possible causes are:

- Malfunctioning refrigerant piping circuit
- Malfunctioning low-pressure switch
- Disconnected or broken low-pressure switch harness
- Malfunctioning low-pressure switch connector connection
- Malfunctioning outdoor unit PCB
- Stop valve is not opened.

3

LPS settings

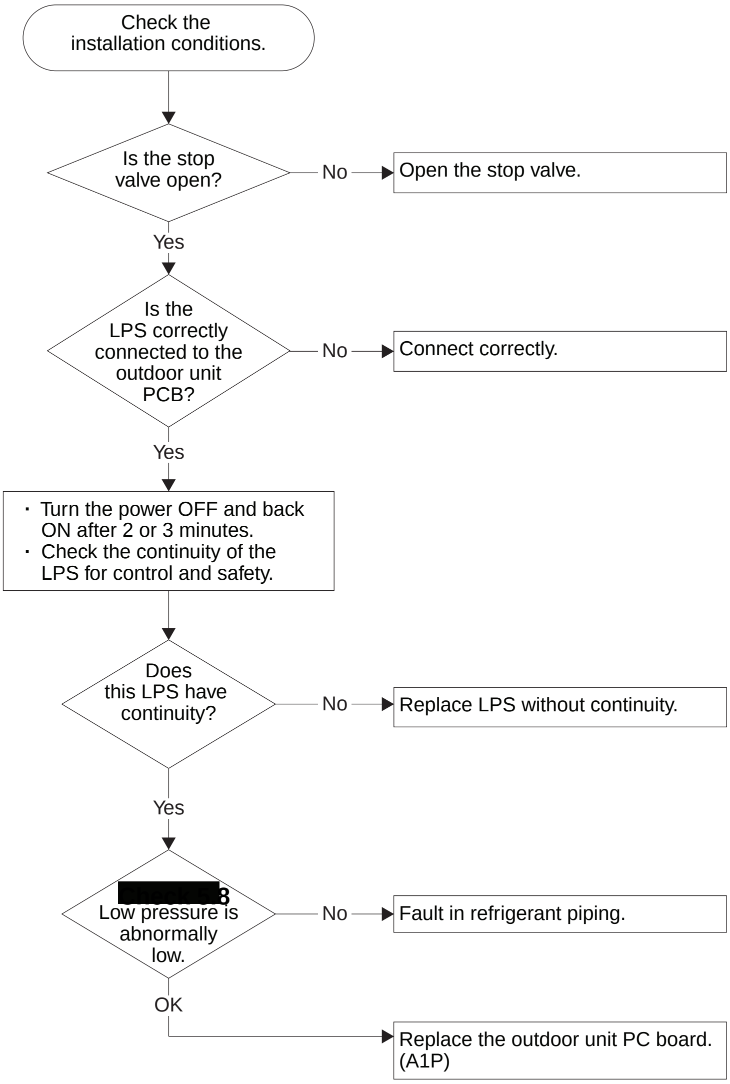
The table below contains the preset LPS values.

Applicable units	Abnormal	Reset
RZQS125	< 0.12 MPa	> 0.2 MPa

See page page 2-48 for details

Troubleshooting

To troubleshoot, proceed as follows:



Caution

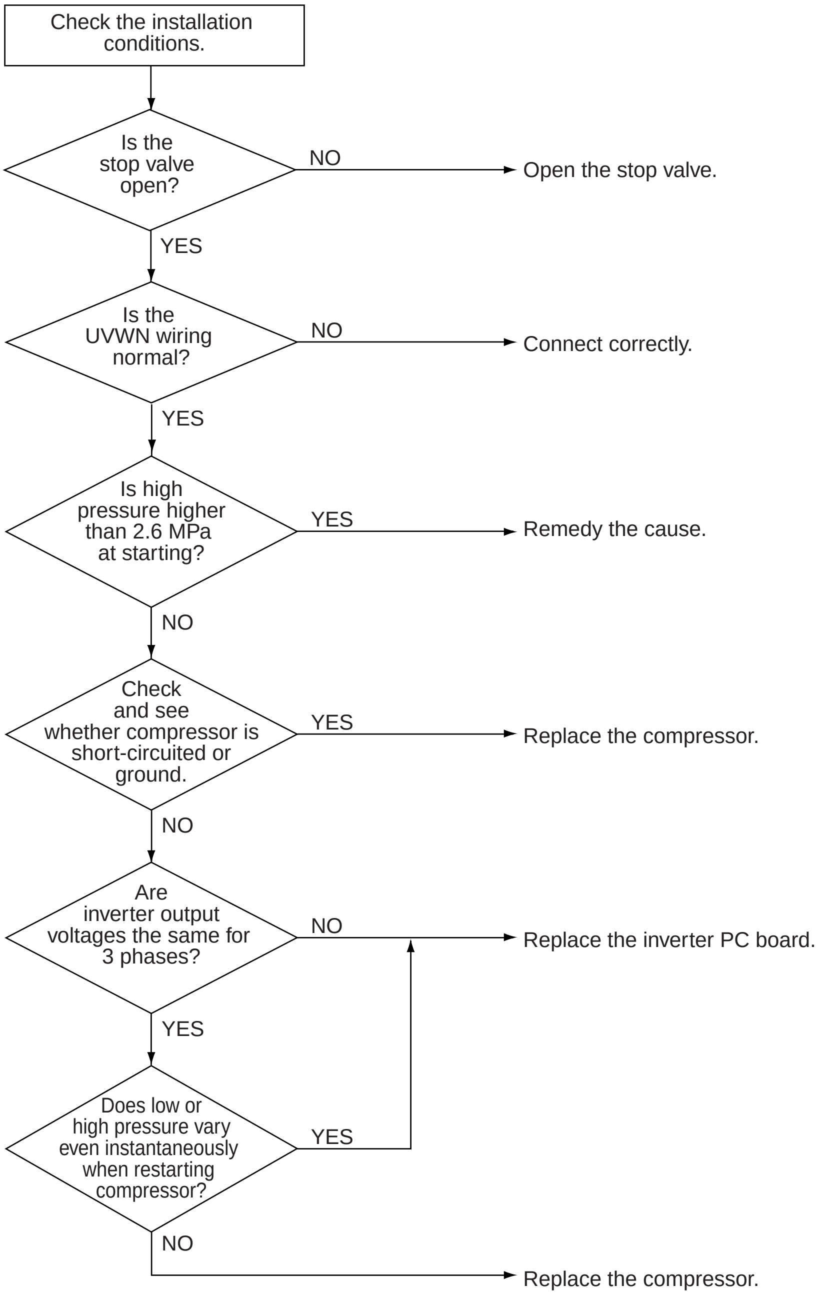
Be sure to turn off power switch before connecting or disconnecting the connector, or parts damage may occur.

3.6 Compressor Motor Lock (E5)

Remote Controller Display	E5
Method of Malfunction Detection	Inverter PC board takes the position signal from UVWN line connected between the inverter and compressor, and detects the position signal pattern.
Malfunction Decision Conditions	The position signal with 3 times cycle as imposed frequency is detected when compressor motor operates normally, but 2 times cycle when compressor motor locks. When the position signal in 2 times cycle is detected
Supposed Causes	n Compressor lock n High differential pressure (2.6MPa or more) starting n Incorrect UVWN wiring n Faulty inverter PC board n Stop valve is left in closed.

3

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.7 Malfunction of Outdoor Unit Fan Motor (E7)

Remote Controller Display

E7

Method of Malfunction Detection

Abnormality of fan motor system is detected according to the fan speed detected by hall IC when the fan motor runs.

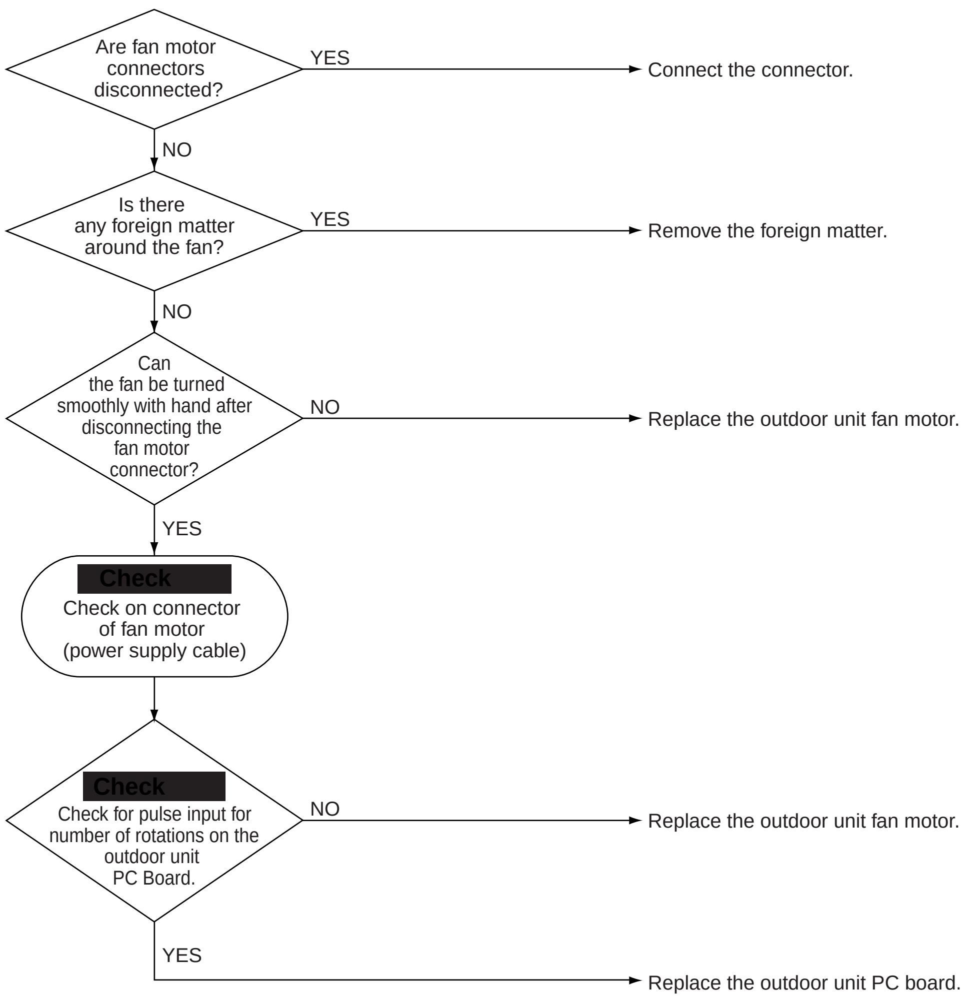
Malfunction Decision Conditions

- When the fan runs with speed less than a specified one for 15 seconds or more when the fan motor running conditions are met
- When connector detecting fan speed is disconnected
- When malfunction is generated 4 times, the system shuts down.

Supposed Causes

- Malfunction of fan motor
- The harness connector between fan motor and PC board is left in disconnected, or faulty connector
- Fan does not run due to foreign matters tangled
- Clearing condition: Operate for 5 minutes (normal)

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.8 Malfunction of Electronic Expansion Valve (E9)

Remote Controller Display

E9

Method of Malfunction Detection

Method is determined according to the suction pipe superheat degree and electronic expansion valve opening degree calculated by values of low pressure sensor and suction pipe temperature thermistor.

Malfunction Decision Conditions

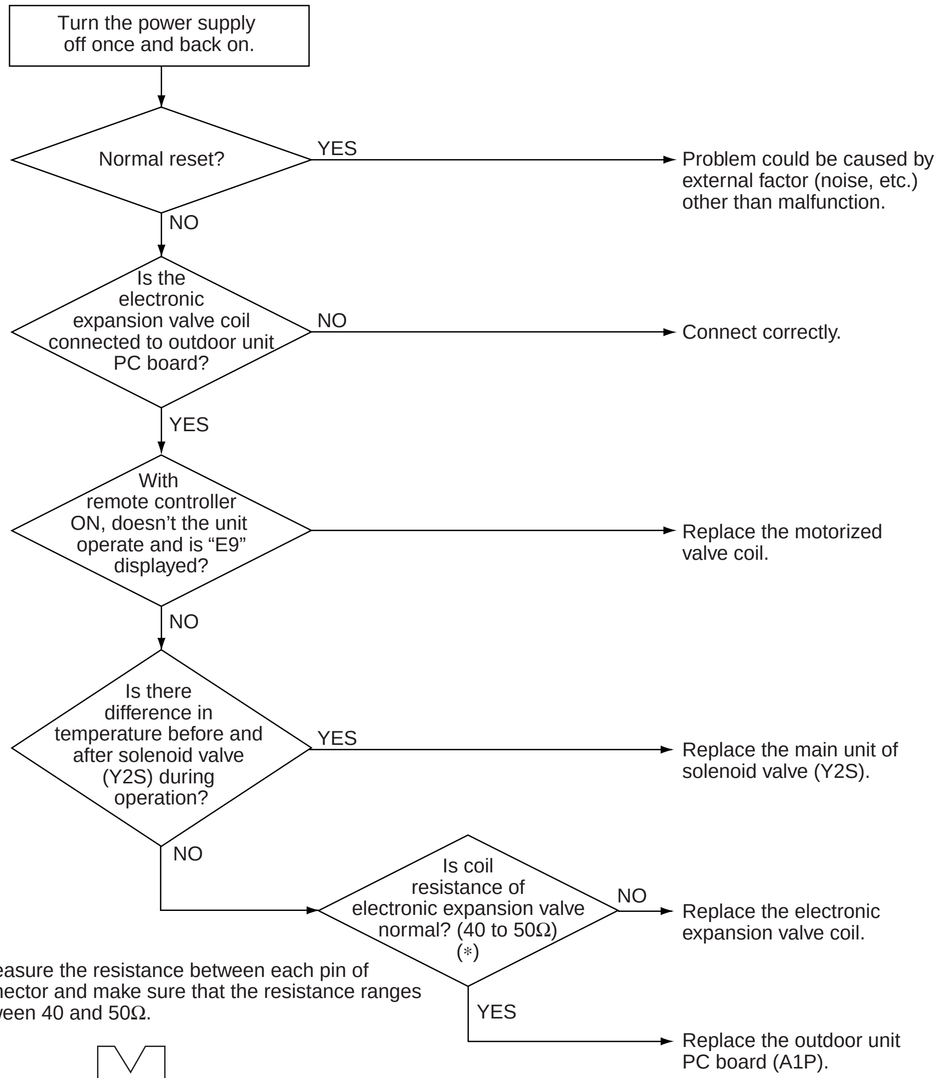
When the following conditions are met for 10 minutes

- Suction pipe superheat degree < 4°C
- Minimum electronic expansion valve opening degree

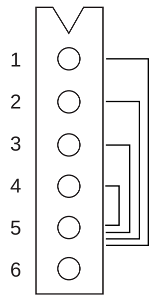
Supposed Causes

- Faulty electronic expansion valve
- Faulty solenoid valve
- Faulty check valve
- Disconnection of electronic expansion valve harness
- Faulty connection of electronic expansion valve connector

Troubleshooting



∗ Measure the resistance between each pin of connector and make sure that the resistance ranges between 40 and 50Ω.



Measurement point
1—5
2—5
3—5
4—5

Caution

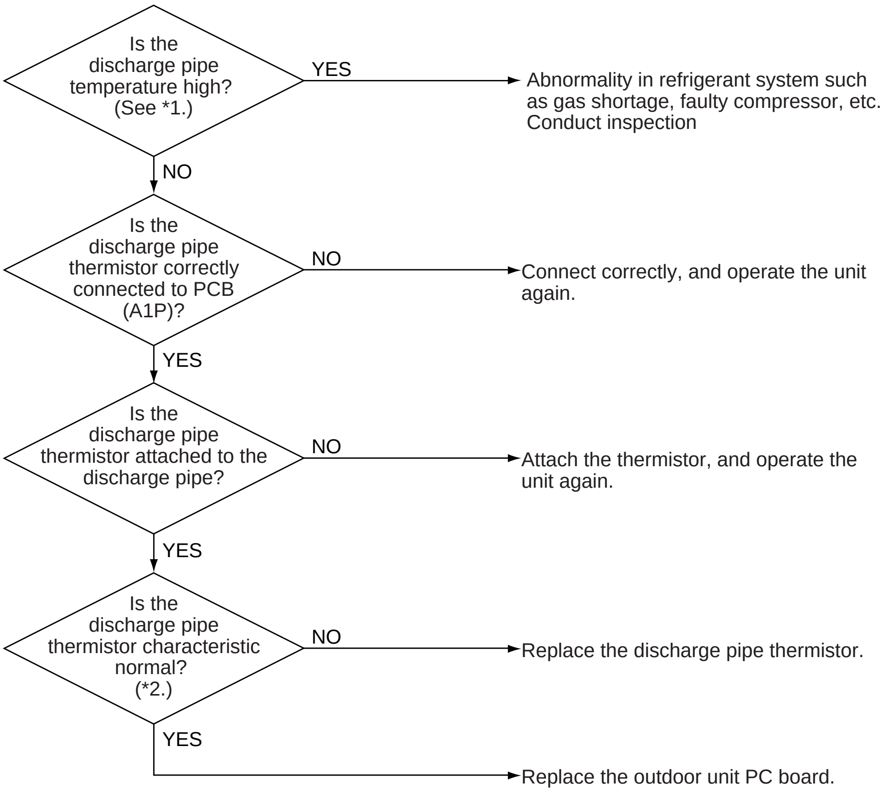
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.9 Malfunctioning in Discharge Pipe Temperature (F3)

Remote Controller Display	F3
Method of Malfunction Detection	Abnormality is detected according to the temperature detected by the discharge pipe temperature sensor.
Malfunction Decision Conditions	n When the discharge pipe temperature rises to an abnormally high level n When the discharge pipe temperature rises suddenly
Supposed Causes	n Faulty discharge pipe thermistor n Faulty connection of discharge pipe thermistor n Insufficient refrigerant amount n Faulty compressor n Disconnection of discharge pipe temperature thermistor piping

3

Troubleshooting



*1 Temperature varies depending on model type.

Model name	Temperature
RZQS71~100	110˚C
RZQS125	115˚C

*2 See “Check 5.6” for "Thermistor temperature – resistance conversion

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.10 Malfunctioning HPS System (H3)

Remote Controller Display

H3

Method of Malfunction Detection

The protection device circuit checks continuity in the high pressure switch.

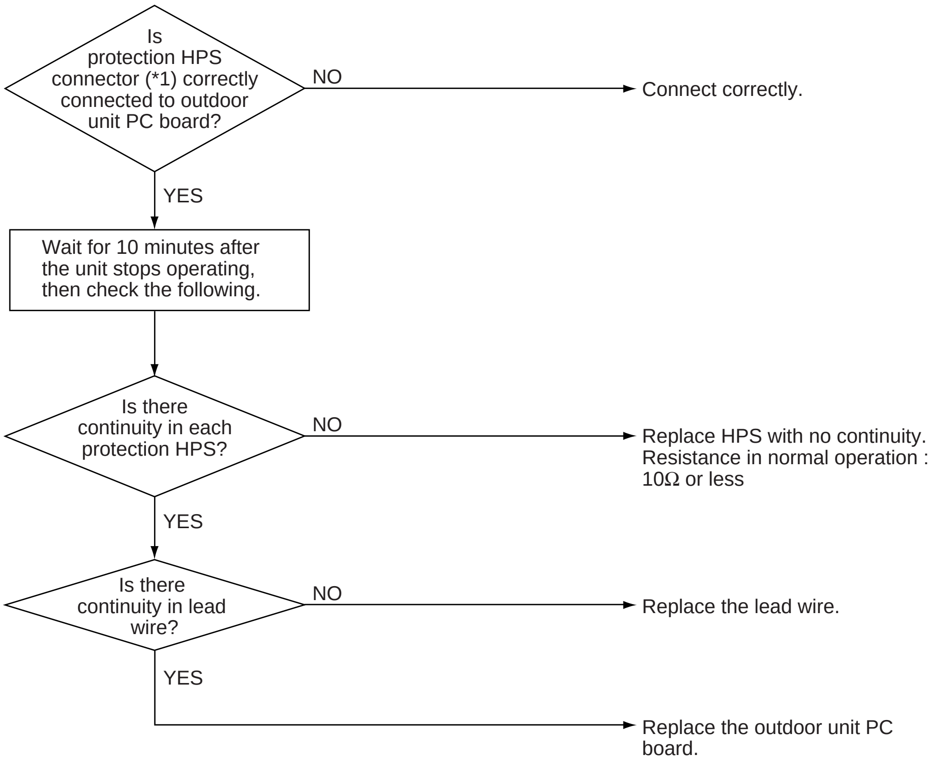
Malfunction Decision Conditions

When there is no continuity in the high pressure switch during compressor stops operating.

Supposed Causes

- Incomplete high pressure switch
- Disconnection in high pressure switch harness
- Faulty connection of high pressure switch connector
- Faulty outdoor unit PC board
- Disconnected lead wire

Troubleshooting



*1 Connector symbol
RZQS71~100 : X60A (A2P)
RZQS125 : X32A (A1P)

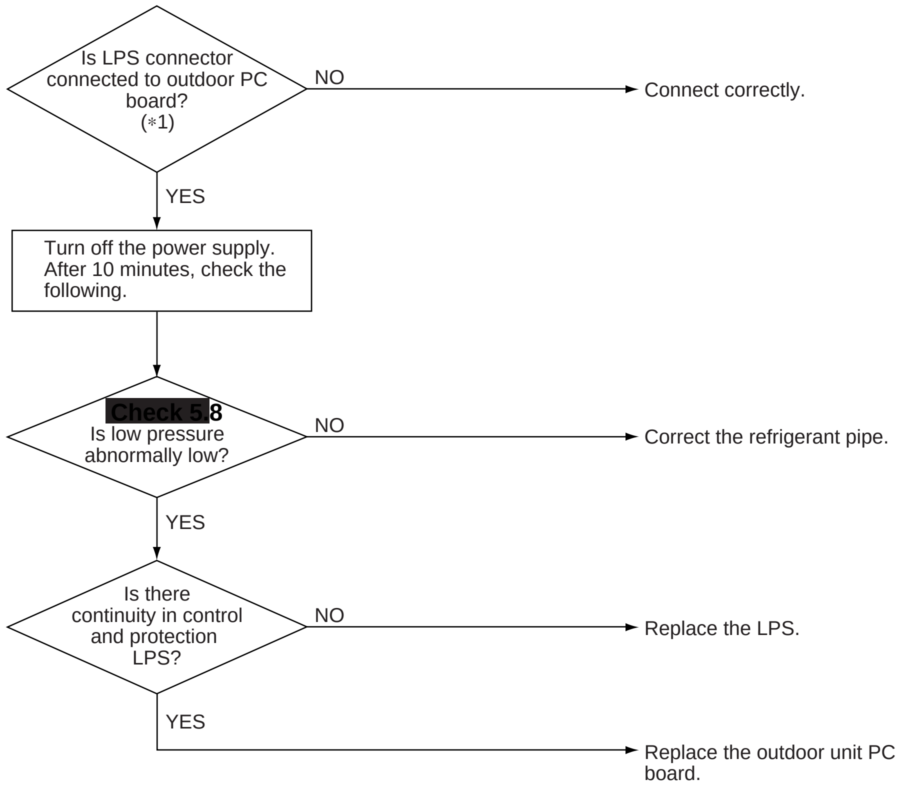
Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.11 Abnormal Low Pressure Switch (H4)

Applicable model	RZQS125
Remote Controller Display	H4
Method of Malfunction Detection	n Check the continuity of LPS n LPS is not operated when the low pressure is dropped under specific pressure (0.12MPa).
Malfunction Decision Conditions	When there is no continuity in the LPS during compressor start operating. LPS is not operated when the low pressure is dropped under specific pressure (0.12MPa) during compressor operating.
Supposed Causes	n Faulty LPS n Disconnection in LPS harness n Faulty connection of LPS connector n Defect of outdoor unit PC board n Refrigerant shortage n Stop valve is not opened n Defective expansion valve n Clogged check valve

Troubleshooting



*1

Model name		
RZQS125	S1PL	X31A

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.12 Malfunction of Thermistor System (H9, J3, J5, J6)

Remote Controller Display

H9, J3, J5, J6

Method of Malfunction Detection

Abnormality is detected according to the temperature detected by each individual thermistor.

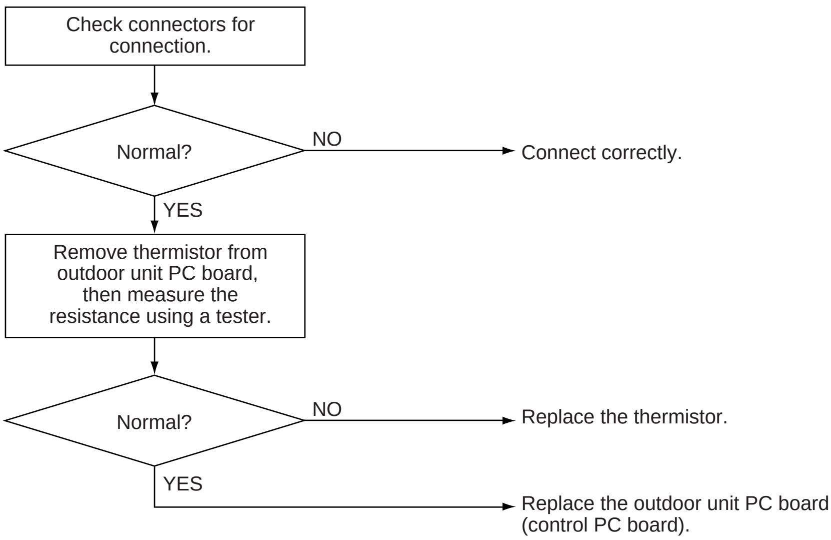
Malfunction Decision Conditions

When thermistor is disconnected or short-circuited during operation

Supposed Causes

- Faulty thermistor
- Faulty connection of connector
- Faulty outdoor unit PC board (control PC board)

Troubleshooting



H9 : Malfunction of outdoor temperature thermistor system
J3 : Malfunction of discharge pipe thermistor system
J5 : Malfunction of suction pipe thermistor system
J6 : Malfunction of heat exchange thermistor

* See page 3-107 and page 3-108 for “Thermistor temperature/Resistance

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.13 Malfunction of Suction Pipe Pressure Sensor (JC)

Remote Controller Display

JC

Method of Malfunction Detection

Malfunction is detected from pressure detected by low pressure sensor.

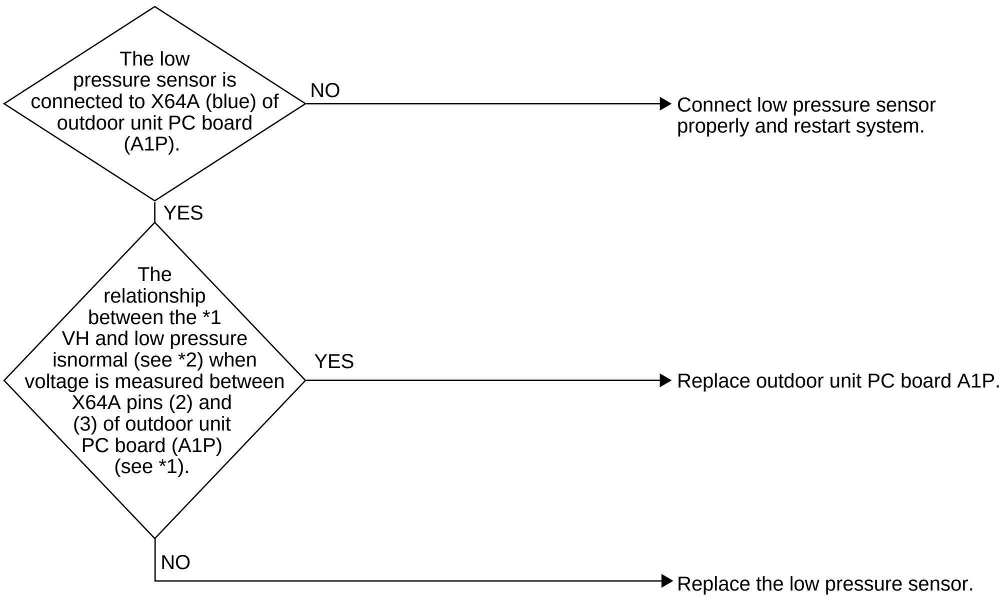
Malfunction Decision Conditions

When the suction pipe pressure sensor is short circuit or open circuit.

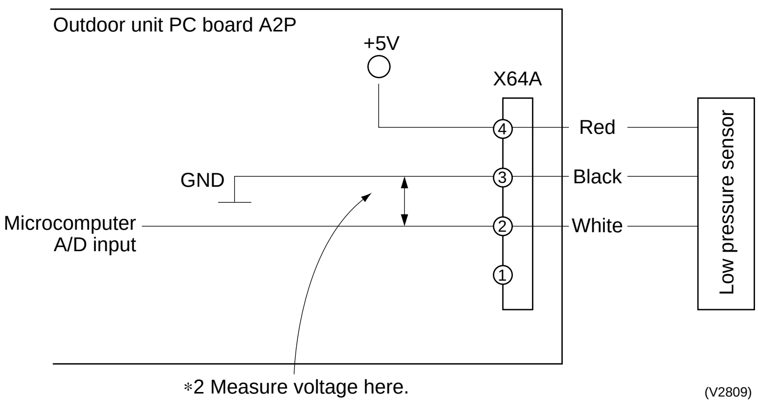
Supposed Causes

- Defect of low pressure sensor system
- Connection of high pressure sensor with wrong connection.
- Defect of outdoor unit PC board.

Troubleshooting



*1 : Voltage measurement point



*2: Refer to pressure sensor, pressure/voltage characteristics table on page 3–115.

Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3

3.14 Radiation Fin Temperature Increased (L4)

Remote Controller Display

L4

Method of Malfunction Detection

Fin temperature is detected by the thermistor of the radiation fin.

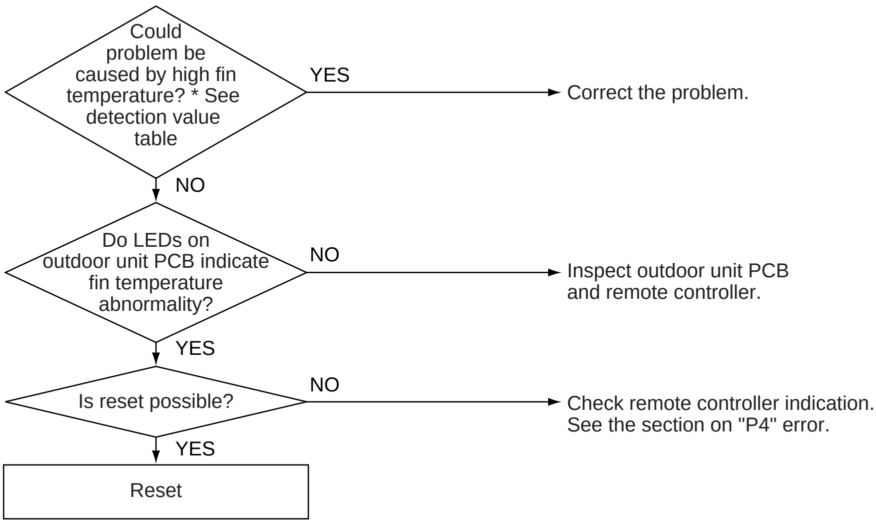
Malfunction Decision Conditions

When the temperature of the inverter radiation fin increases abnormally due to faulty heat dissipation.

Supposed Causes

- Activation of fin thermal switch
- Faulty fin thermistor
- High outside air temperature
- Insufficient cooling of inverter radiation fin
- Blocked suction opening
- Dirty radiation fin
- Faulty outdoor unit PCB

Troubleshooting



* Fin temperature detection values

	Detection	Reset
RZQS71~100	87°C	77°C
RZQS125	79°C	69°C

Caution

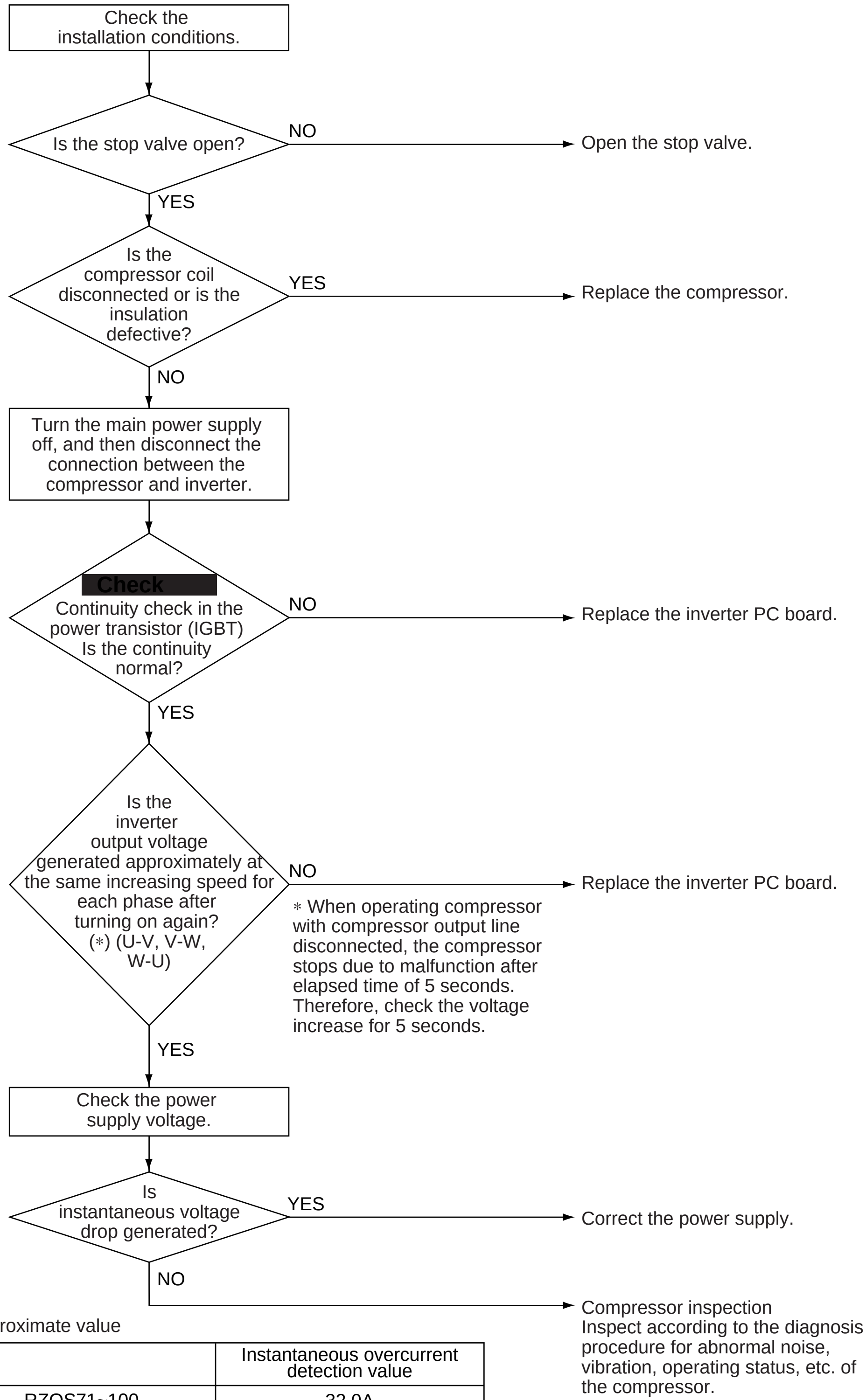
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.15 DC Output Overcurrent (Instantaneous) (L5)

Remote Controller Display	L5
Method of Malfunction Detection	Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor).
Malfunction Decision Conditions	When overcurrent has run to power transistor. (Actuated even by instantaneous overcurrent)
Supposed Causes	n Faulty compressor coil (disconnection, poor insulation) n Compressor startup malfunction (mechanical lock) n Faulty inverter PC board n Instantaneous fluctuation of power supply voltage n Faulty compressor (if bearing is scratched) n The stop valve is left in closed.

3

Troubleshooting



∗ Approximate value

	Instantaneous overcurrent detection value
RZQS71~100	32.0A
RZQS125	51.7A

Caution

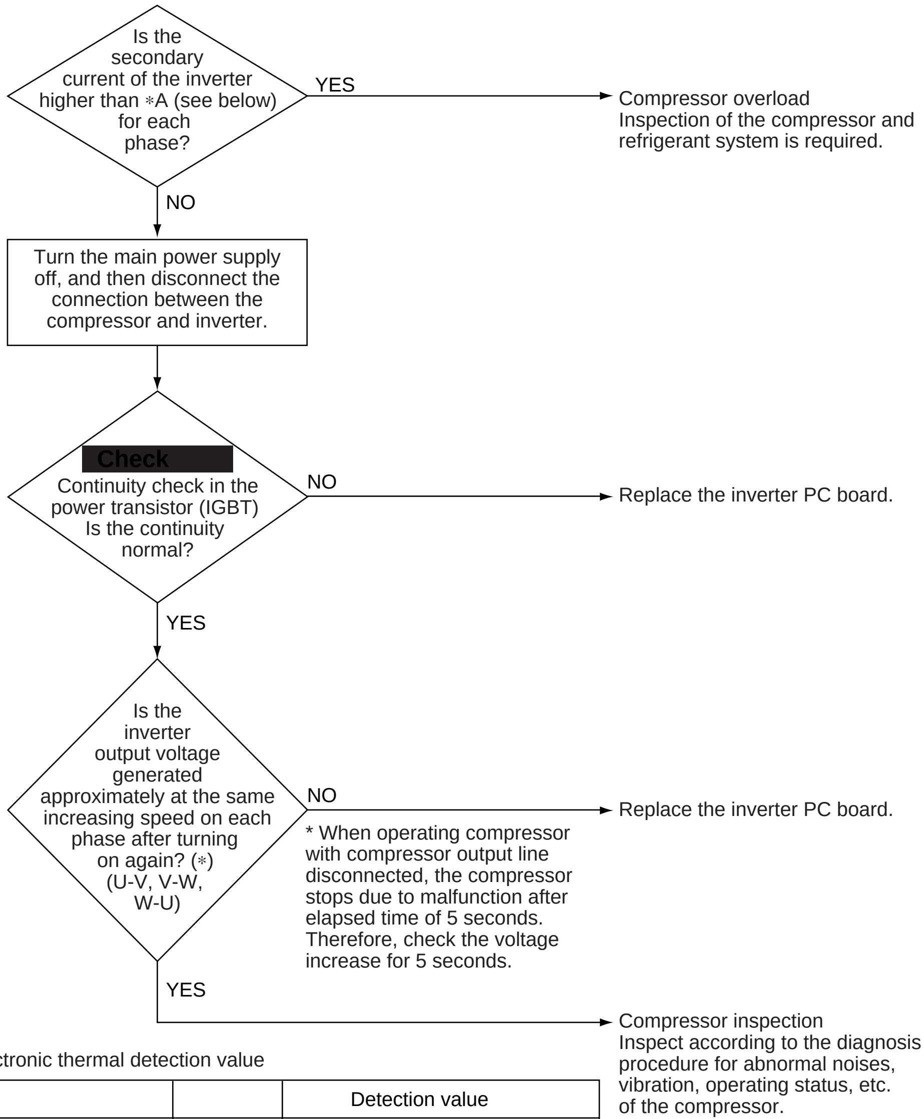
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.16 Electronic Thermal (Time Lag) (L8)

3

Remote Controller Display	L8
Method of Malfunction Detection	Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor). Inverter PC board detects the disorder of position signal.
Malfunction Decision Conditions	When compressor overload (except for when startup) is detected.
Supposed Causes	n Compressor overload (during operation) n Disconnected compressor coil n Faulty inverter n Faulty compressor (if bearing is scratched)

Troubleshooting



∗ Electronic thermal detection value

		Detection value
RZQS71~100	Cooling	17A x 5 seconds or 14.8A x 260 seconds
	Heating	
RZQS125	Cooling	31A × 5 seconds or 20.1A × 260 seconds
	Heating	

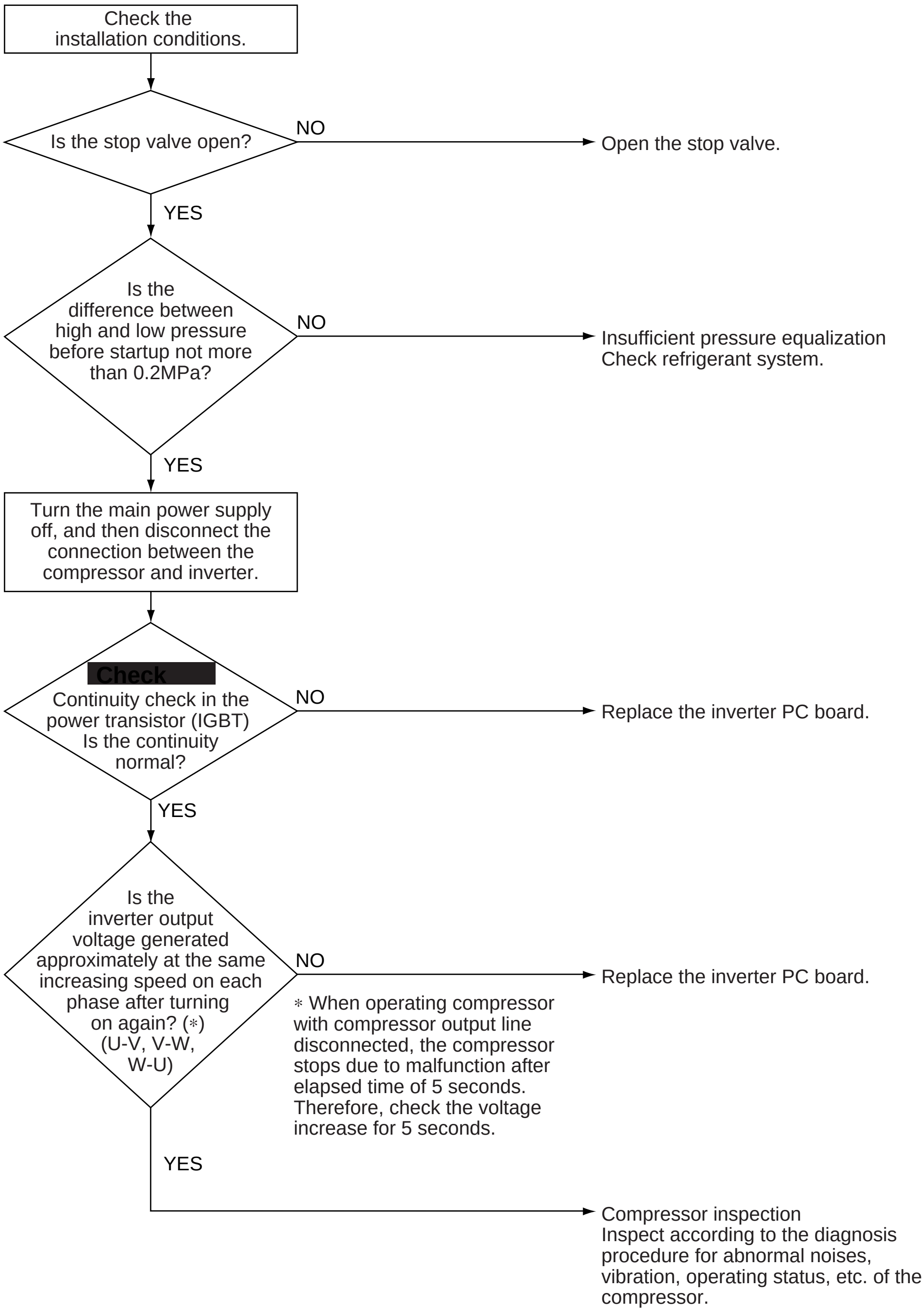
Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3

3.17 Stall Prevention (Time Lag) (L9)

Remote Controller Display	L9
Method of Malfunction Detection	Malfunction is detected by converting the current flowing to power transistor into voltage with CT1 (DC current sensor). Inverter PC board detects the disorder of position signal.
Malfunction Decision Conditions	When compressor overload (except for when startup) is detected When position signal is disordered
Supposed Causes	n Faulty compressor (lock) n Pressure differential startup n Faulty inverter n The stop valve is left in closed.

Troubleshooting



Caution

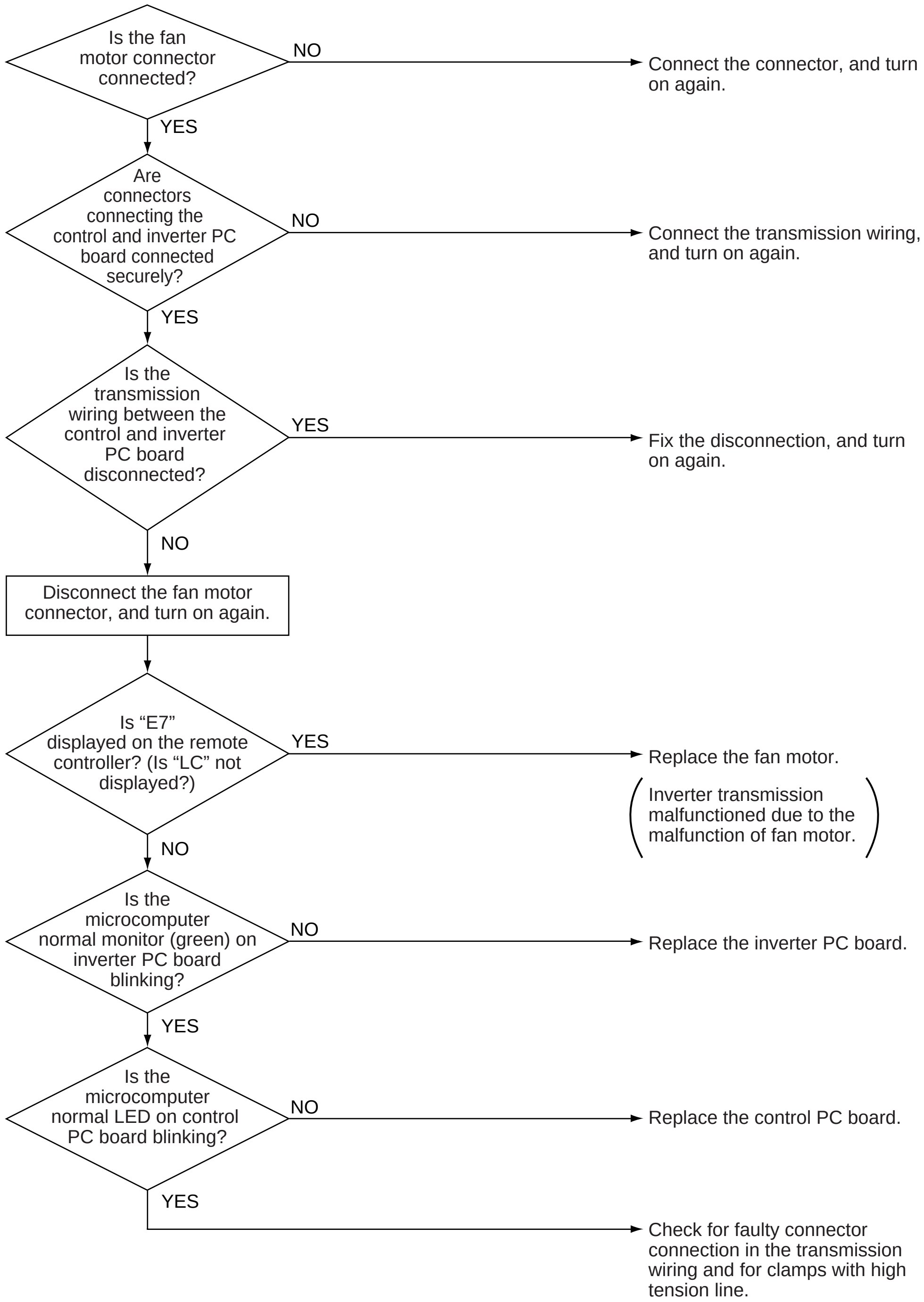
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.18 Malfunction of Transmission system (Between Control PCB and Inverter PCB) (LC)

Remote Controller Display	LC
Method of Malfunction Detection	Checks and sees whether transmission between control and inverter PC board is carried out normally.
Malfunction Decision Conditions	When the transmission is not carried out in a specified period of time or longer
Supposed Causes	n Incorrect transmission wiring between control and inverter PC board/insufficient contact in wiring n Faulty control and inverter PC board n External factors (noise, etc.)

3

Troubleshooting



Caution

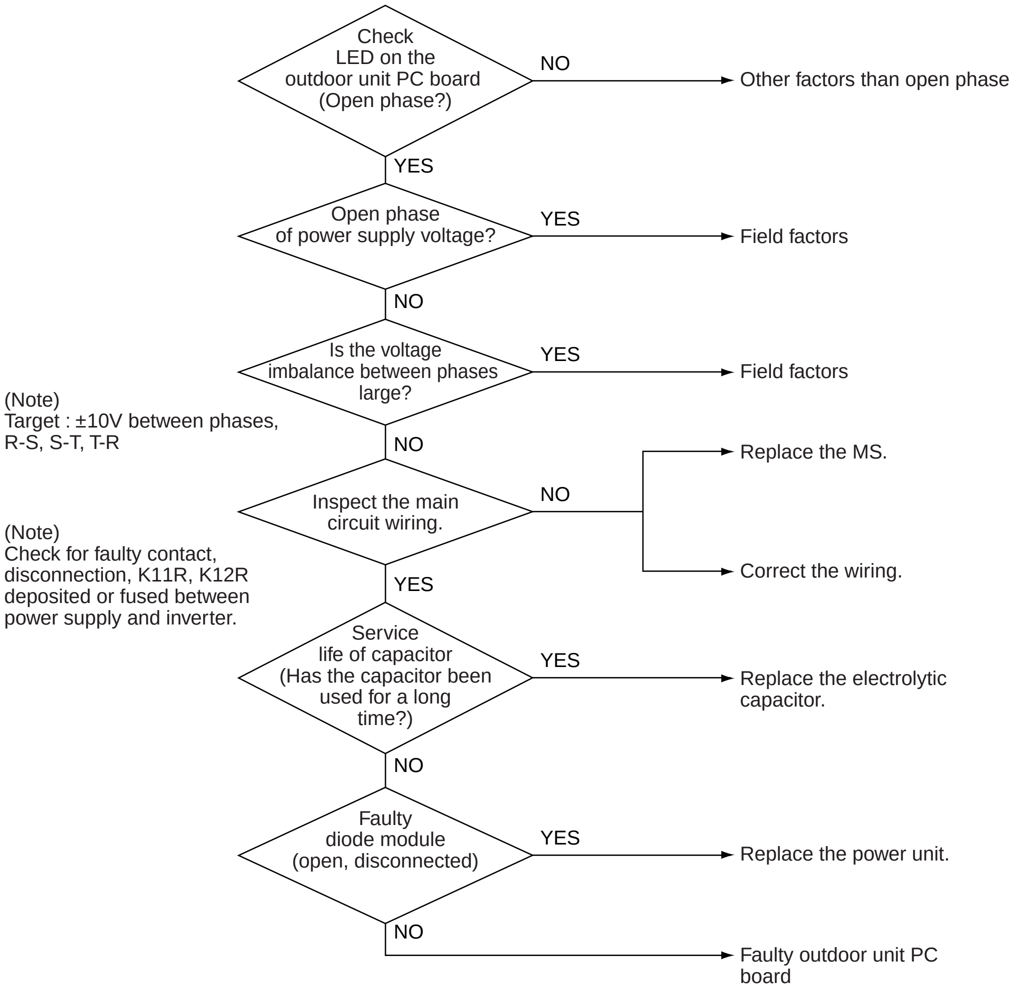
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.19 Open Phase or Power Supply Voltage Imbalance (P1)

Remote Controller Display	P1
Method of Malfunction Detection	Malfunction is detected according to the voltage waveform of main circuit capacitor built in inverter.
Malfunction Decision Conditions	When the aforementioned voltage waveform becomes identical with the waveform of the power supply open phase.
Supposed Causes	n Open phase n Voltage imbalance between phases n Faulty main circuit capacitor n Power unit (Disconnection in diode module) n Faulty outdoor unit PC board n Faulty Magnetic Relay (K11R, K12R) n Improper main circuit wiring

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.20 Malfunction of Radiator Fin Temperature Thermistor (P4)

Remote Controller Display

P4

Method of Malfunction Detection

Detection by open or short circuit of the radiator fin temperature thermistor during the compressor stops operating.

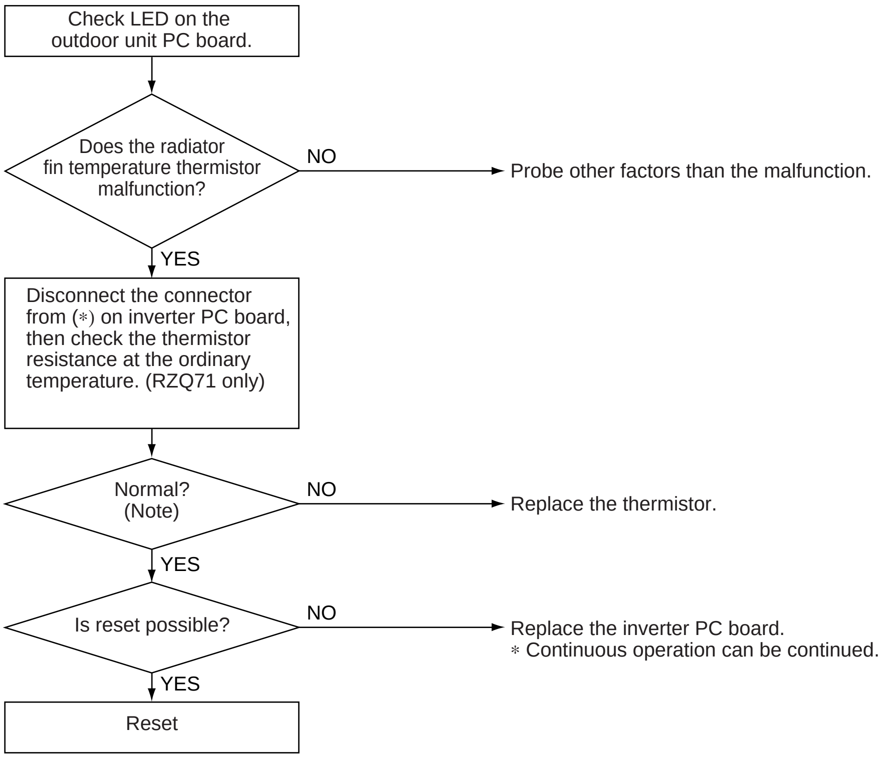
Malfunction Decision Conditions

When open or short circuit of the radiator fin temperature thermistor is detected during the compressor stops operating

Supposed Causes

- Faulty radiator fin temperature thermistor
- Faulty outdoor unit PC board

Troubleshooting



(∗) Connector number :

RZQS71~100 : X207A
RZQS125 : X111A

* See page 3-107 and page 3-108 for “Thermistor temperature/Resistance

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.21 Failure of Capacity Setting (PJ)

Remote Controller Display

PJ

Method of Malfunction Detection

Check whether set value written in E2PROM (at factory) or set value of capacity setting adaptor (for replacement) is the same as outdoor unit capacity.

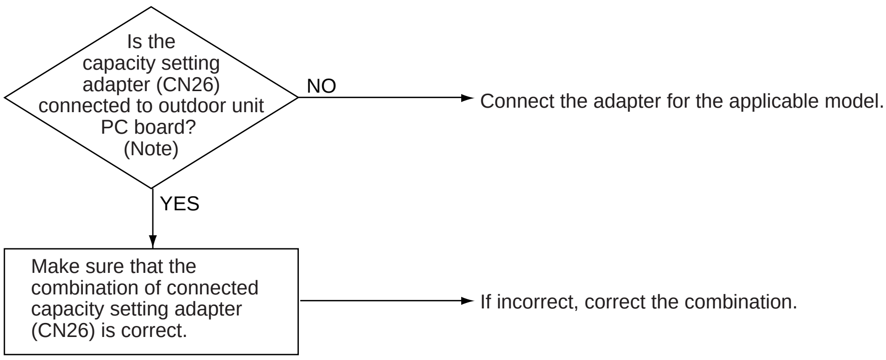
Malfunction Decision Conditions

When the set value on E2PROM differs from the outdoor unit capacity or a capacity setting adaptor except for PC board applicable models is installed. (Malfunction decision is made only when turning the power supply on.)

Supposed Causes

- Improper set value of E2PROM
- Improper capacity setting adaptor
- Faulty outdoor unit PC board

Troubleshooting



(Note)
Capacity setting adapter is not connected at factory. (Capacity is written in E^2PROM.) Capacity setting adapter is required only when the PC board was replaced with spare PC board.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

3.22 Gas Shortage (Malfunction) (U0)

Remote Controller Display

U0

Method of Malfunction Detection

(In test operation)
Detection by closed stop valve.

(In normal operation)
Gas shortage is detected according to the electronic expansion valve opening degree and measured temperatures and pressures.

Malfunction Decision Conditions

(In test operation)
Variations of the indoor unit heat exchange temperature judge whether stop valve is open or closed.

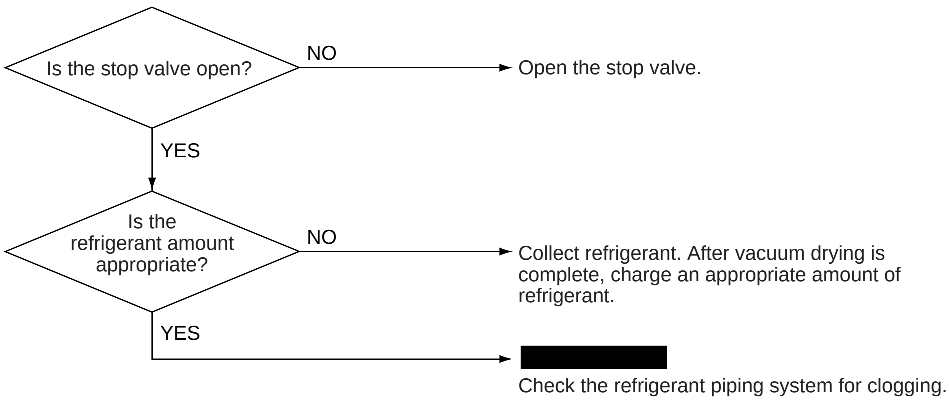
(In cooling operation)
When the electronic expansion valve opens fully and low pressure is below 0.1 MPa continuously for 30 minutes.

(In heating operation)
When the electronic expansion valve opens fully and the suction superheat is large (more than 20°C) continuously for 30 minutes.

Supposed Causes

- The stop valve is left in closed.
- Insufficient refrigerant amount
- Clogged refrigerant piping system

Troubleshooting



* Gas shortage alarm is indicated but operation continues.

Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

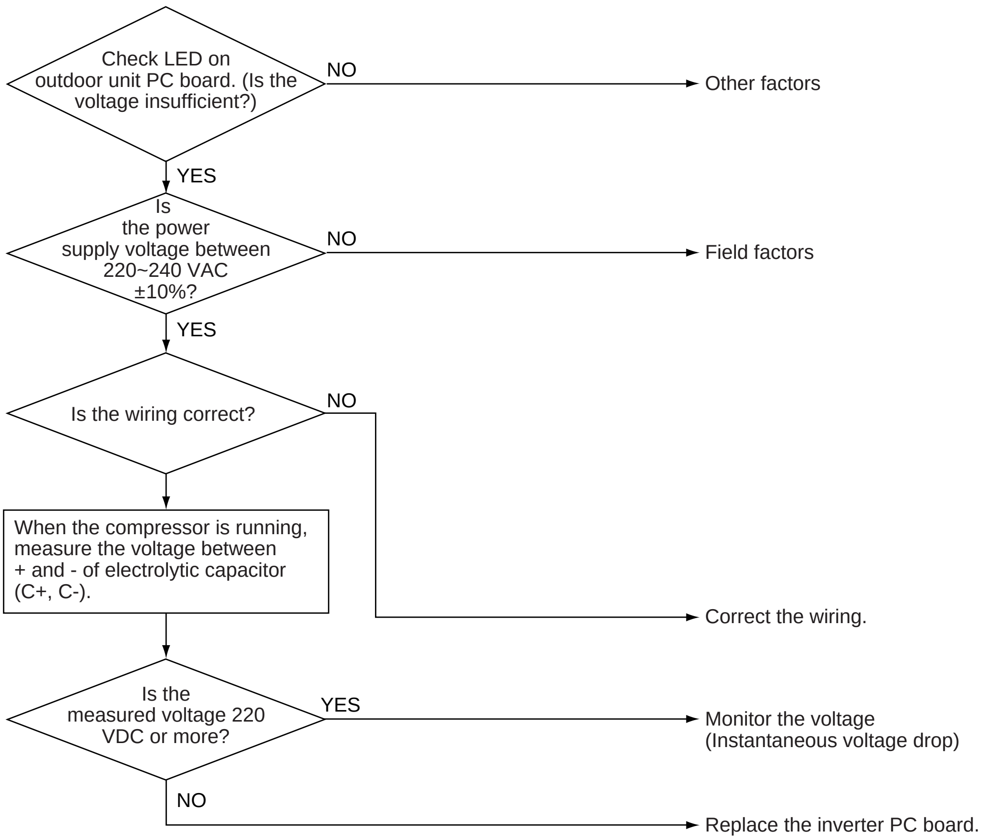
3.23 Abnormal Power Supply Voltage (U2)

Remote Controller Display	U2
Method of Malfunction Detection	Malfunction is detected according to the voltage of main circuit capacitor built in the inverter and power supply voltage.
Malfunction Decision Conditions	When the voltage of main circuit capacitor built in the inverter and power supply voltage drop (150-170 VAC) or when the power failure of several tons of ms or longer is generated. * Remote controller does not decide the abnormality.
Supposed Causes	n Drop in power supply voltage (180 V or less) n Instantaneous power failure n Inverter open phase (Phase T) n Faulty main circuit wiring n Faulty outdoor unit PC board n Main circuit parts damaged

3

3

Troubleshooting



Caution Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4 Error Codes: System Malfunctions

4.1 What Is in This Chapter?

Introduction

In the first stage of the troubleshooting sequence, it is important to correctly interpret the error code on the remote controller display. The error code helps you to find the cause of the problem.

Overview

This chapter contains the following topics:

3

4.2 Malfunction of Transmission between Indoor and Outdoor Unit (U4 or UF)

Error code

U4 or UF

Error generation

The error is generated when the microprocessor detects that the transmission between the indoor and the outdoor unit is not normal over a certain amount of time.

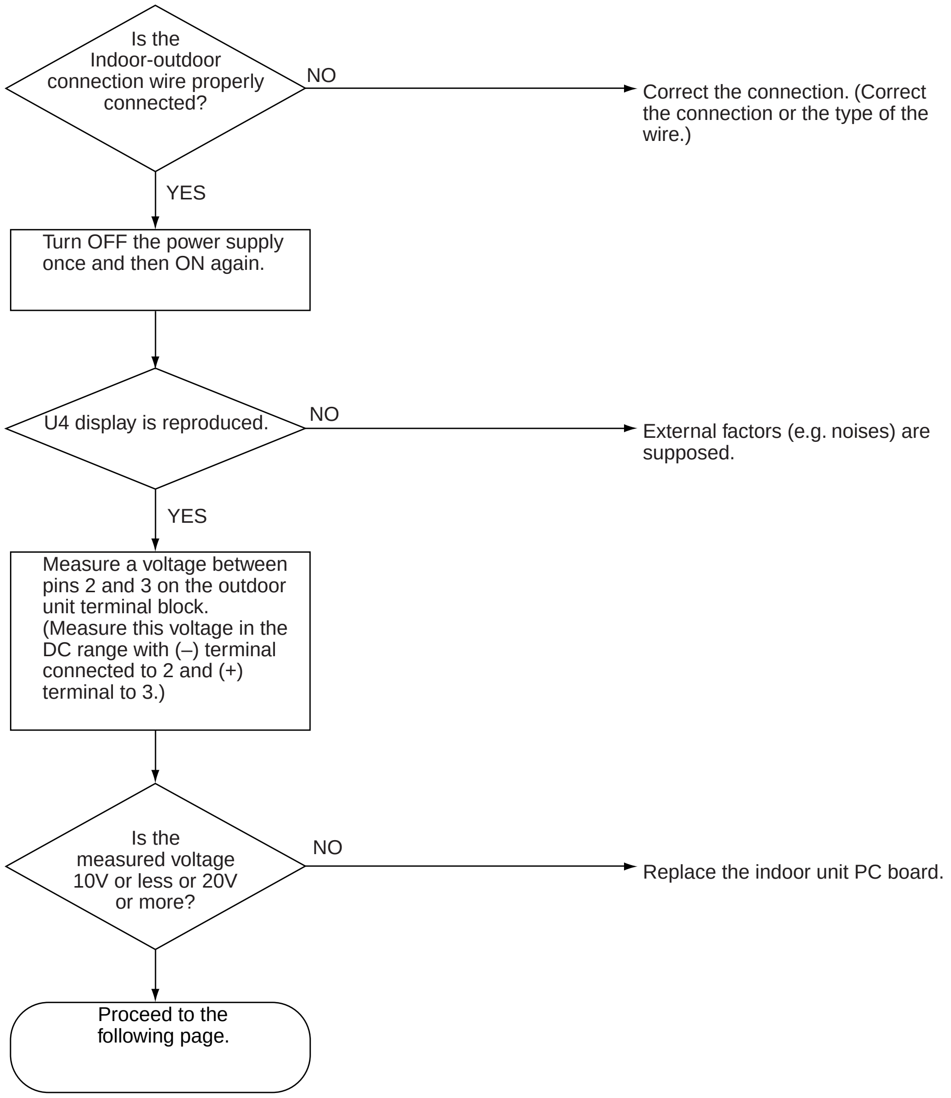
Causes

The possible causes are:

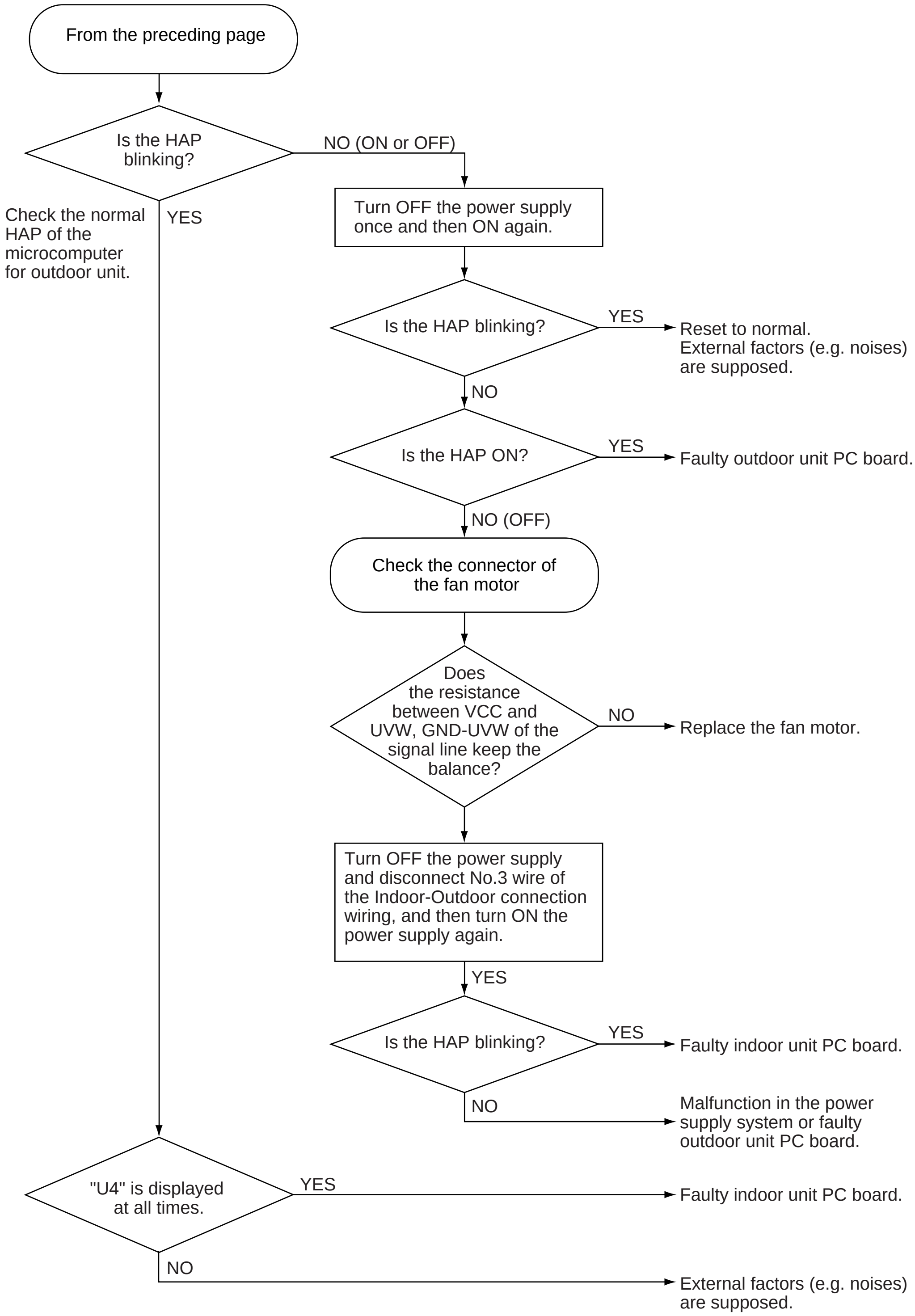
- Wiring indoor-outdoor transmission wire is incorrect
- Malfunctioning indoor unit PCB
- Malfunctioning outdoor unit PCB
- Outside cause (noise...).

Troubleshooting 1

Diagnosis of incorrect or broken/disconnected wiring. If the LEDs on the indoor unit PC board are off, it indicates that the transmission wiring between indoor and outdoor units may be incorrect or broken/disconnected.



Troubleshooting 2



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.3 Malfunction of Transmission between Indoor Unit and Remote Controller (U5)

Error code

U5

Error generation

The error is generated when the microprocessor detects that the transmission between the indoor unit and the remote controller is not normal over a certain amount of time.

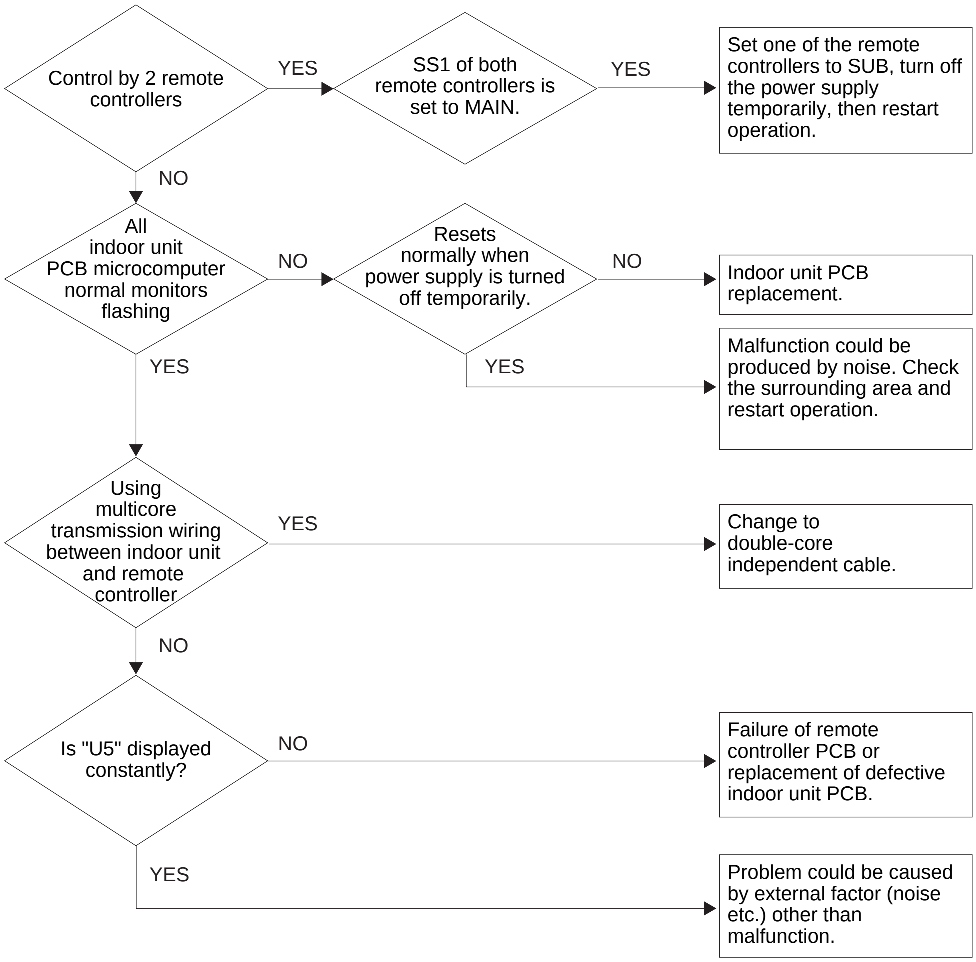
Causes

The possible causes are:

- Malfunctioning remote controller
- Malfunctioning indoor PCB
- Outside cause (noise...)
- Connection of two master remote controllers (when using two remote controllers).

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.4 Malfunction of Transmission between MAIN Remote Controller and SUB Remote Controller (U8)

Error code

U8

Error generation

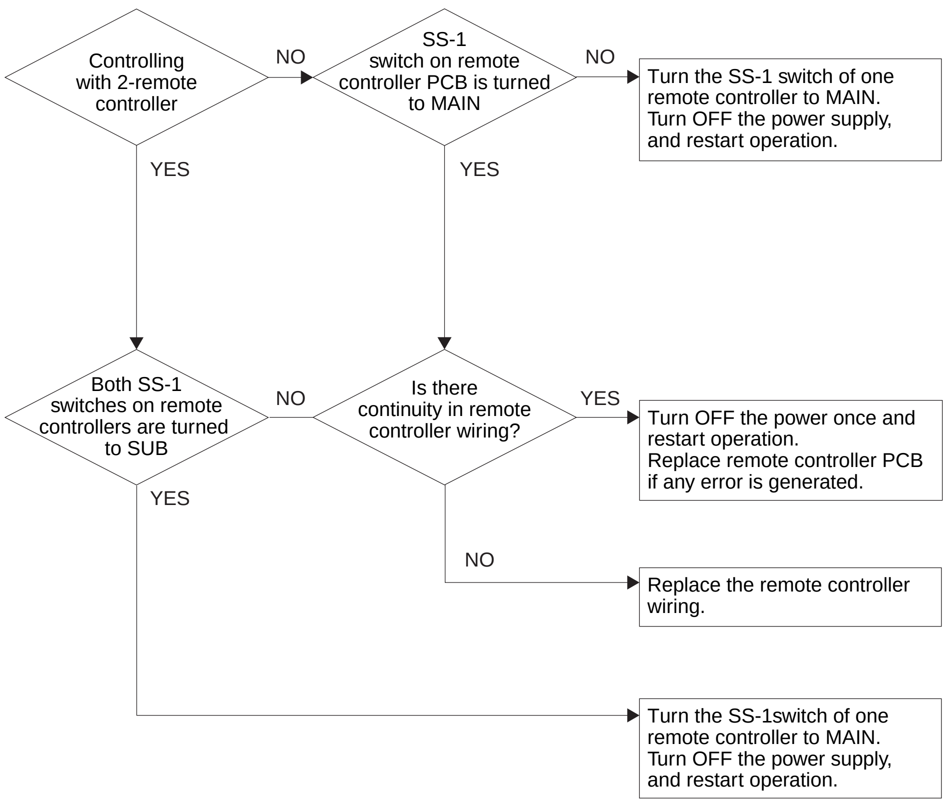
The error is generated when, in case of controlling with two remote controllers, the microprocessor detects that the transmission between the indoor unit and the remote controllers (MAIN and SUB) is not normal over a certain amount of time.

Causes

The possible causes are:

- Transmission error between MAIN remote controller and SUB remote controller
- Connection among SUB remote controllers
- Malfunctioning remote controller PCB.

Troubleshooting



Caution

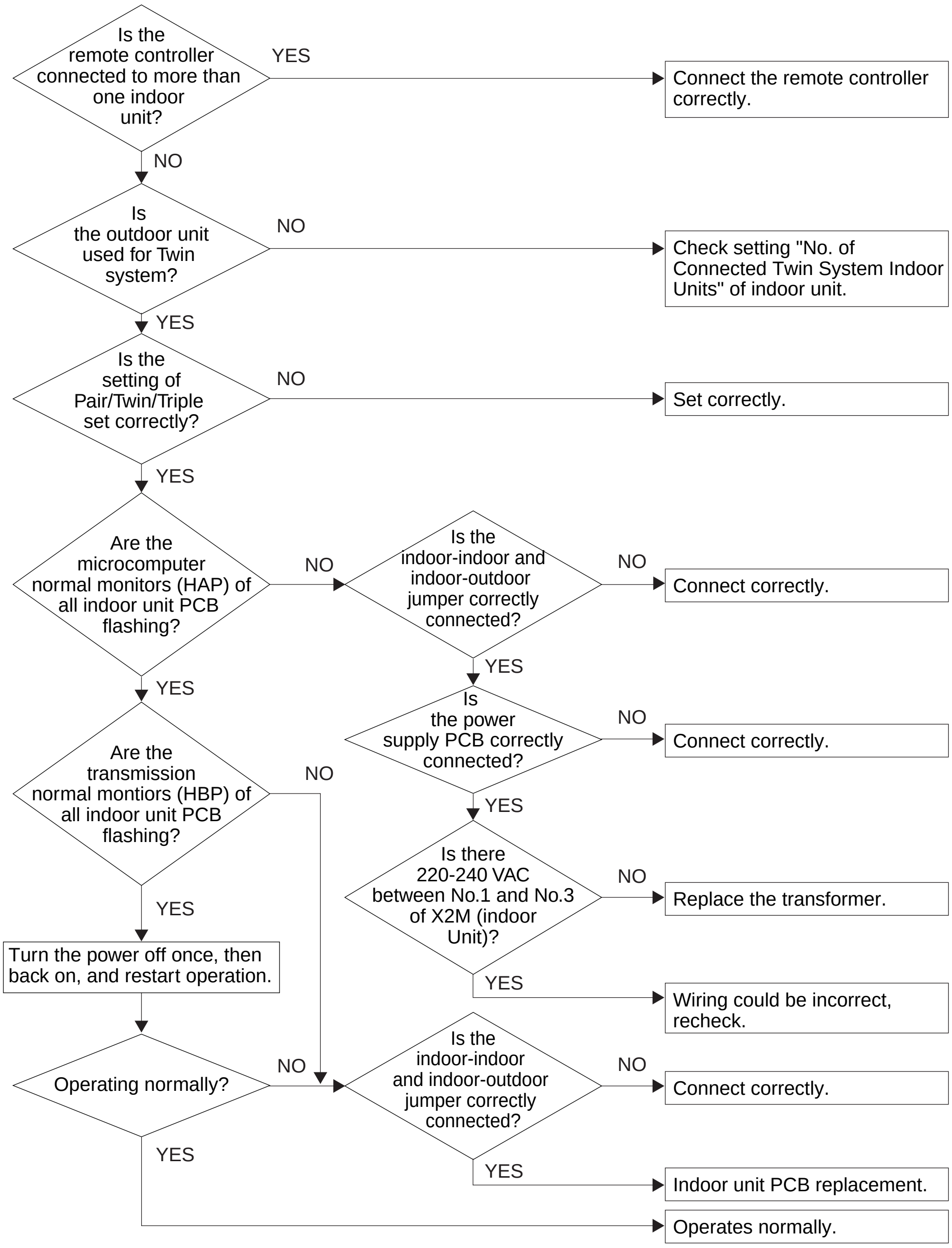
Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.5 Malfunctioning Field Setting Switch (UA)

Error code	UA
Error generation	The error is generated when incorrect field settings have been set for pair/twin/triple/double twin.
Causes	The possible causes are: ■ Malfunctioning indoor or outdoor unit PCB ■ Malfunctioning power supply PCB ■ Indoor-outdoor, indoor-indoor unit transmission wiring ■ Malfunctioning remote controller wiring.

3

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

4.6 Centralized Address Setting Error (UC)

Remote Controller Display

UC

Applicable Models

All indoor unit models

Method of Malfunction Detection

Indoor unit microcomputer detects and judges the centralized address signal according to the transmission between indoor units.

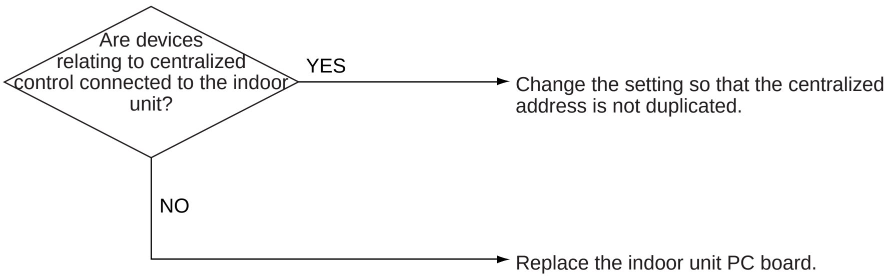
Malfunction Decision Conditions

When the microcomputer judges that the centralized address signal is duplicated

Supposed Causes

- Faulty centralized address setting
- Faulty indoor unit PC board

Troubleshooting



Caution

Be sure to turn off power switch before connect or disconnect connector, or parts damage may be occurred.

5 Additional Checks for Troubleshooting

5.1 What Is in This Chapter?

Introduction

This chapter explains how you must check the units to carry out troubleshooting correctly.

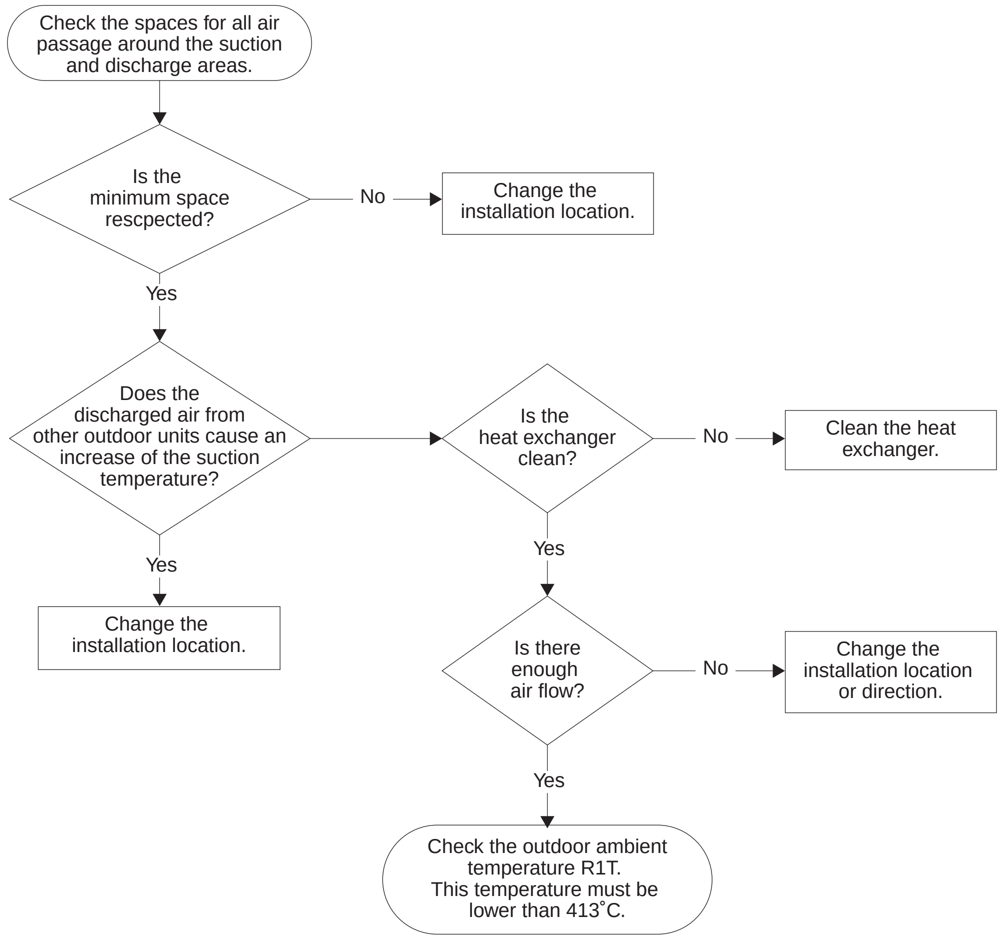
Overview

This chapter contains the following topics:

5.2 Outdoor unit: Checking the Installation Condition

Checking

To check the installation condition, proceed as follows:



5.3 Outdoor Unit: Checking the Expansion Valve

Checking

To check the electronic expansion valve, proceed as follows:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Check if the expansion valve connector is correctly inserted in the X12A of A1P.</td></tr>
<tr><td>2</td><td>Compare the expansion valve unit with the number of the connector to make sure it is correctly connected.</td></tr>
<tr><td>3</td><td>Switch the power OFF.</td></tr>
<tr><td>4</td><td>Switch the power ON to check whether the expansion valve is producing a clicking sound.
<table>
<tr><th>If...</th><th>Then...</th></tr>
<tr><td>The expansion valve has no clicking sound</td><td>Disconnect the valve connector without the clicking sound and proceed to step 5.</td></tr>
</table></td></tr>
<tr><td>5</td><td>Check the coil current: Open circuit < normal < short circuit
The table below contains the reference resistance values.
<table>
<tr><th>—</th><th>White</th><th>Grey</th><th>Black</th><th>Yellow</th><th>Red</th><th>Orange</th></tr>
<tr><td>White</td><td>—</td><td>∞</td><td>45 Ω</td><td>∞</td><td>45 Ω</td><td>∞</td></tr>
<tr><td>Grey</td><td>∞</td><td>—</td><td>∞</td><td>45 Ω</td><td>∞</td><td>45 Ω</td></tr>
<tr><td>Black</td><td>45 Ω</td><td>∞</td><td>—</td><td>∞</td><td>90 Ω</td><td>∞</td></tr>
<tr><td>Yellow</td><td>∞</td><td>45 Ω</td><td>∞</td><td>—</td><td>∞</td><td>90 Ω</td></tr>
<tr><td>Red</td><td>45 Ω</td><td>∞</td><td>90 Ω</td><td>∞</td><td>—</td><td>∞</td></tr>
<tr><td>Orange</td><td>∞</td><td>45 Ω</td><td>∞</td><td>90 Ω</td><td>∞</td><td>—</td></tr>
</table></td></tr>
<tr><td>6</td><td>Check the clicking sound again.
<table>
<tr><th>If...</th><th>Then...</th></tr>
<tr><td>There is a clicking sound</td><td>The expansion valve works properly.</td></tr>
<tr><td>There is no clicking sound</td><td>Replace the expansion valve unit.</td></tr>
<tr><td>There is still no clicking sound</td><td>Replace outdoor PCB A1P.</td></tr>
</table></td></tr>
</table>

3

5.4 Checking the Thermistors

Thermistors

If the cause of the problem is related to the thermistors, then the thermistors should be checked prior to changing the PCB.

For more information about these thermistors, see:

- ’Wiring Diagrams’’ (outdoor units)
- “Functions of Thermistors” on page 2-4.

Overview of thermistors

The table below contains an overview of the thermistors:

Thermistor		Description
Indoor	R1T	Suction air thermistor
	R2T	Heat exchanger thermistor
	R3T	Gas pipe thermistor
Outdoor	R1T	Ambient air thermistor
	R2T	Heat exchanger thermistor
	R3T	Discharge pipe thermistor
	R4T	Suction pipe thermistor
	R5T	Power module fin thermistor

Checking

To check the thermistors, proceed as follows:

Step	Action
1	Disconnect the thermistor from the PCB.
2	Read the temperature and the resistor value.
3	Check if the measured values correspond with the values in the table on the next pages.

5.5 Resistance Conversion Table (Ambient, Coil, Fin)

Temperature – resistance

The table below is the thermistor (R1T and R2T) temperature – resistance conversion table.

Temp. (°C)	A (kΩ)	B (kΩ)	Temp. (°C)	A (kΩ)	B (kΩ)	Temp. (°C)	A (kΩ)	B (kΩ)
-20	197.81	192.08	20	25.01	24.45	60	4.96	4.87
-19	186.53	181.16	21	23.91	23.37	61	4.79	4.70
-18	175.97	170.94	22	22.85	22.35	62	4.62	4.54
-17	166.07	161.36	23	21.85	21.37	63	4.46	4.38
-16	156.80	152.38	24	20.90	20.45	64	4.30	4.23
-15	148.10	143.96	25	20.00	19.56	65	4.16	4.08
-14	139.94	136.05	26	19.14	18.73	66	4.01	3.94
-13	132.28	128.63	27	18.32	17.93	67	3.88	3.81
-12	125.09	121.66	28	17.54	17.17	68	3.75	3.68
-11	118.34	115.12	29	16.80	16.45	69	3.62	3.56
-10	111.99	108.96	30	16.10	15.76	70	3.50	3.44
-9	106.03	103.18	31	15.43	15.10	71	3.38	3.32
-8	100.41	97.73	32	14.79	14.48	72	3.27	3.21
-7	95.14	92.61	33	14.18	13.88	73	3.16	3.11
-6	90.17	87.79	34	13.59	13.31	74	3.06	3.01
-5	85.49	83.25	35	13.04	12.77	75	2.96	2.91
-4	81.08	78.97	36	12.51	12.25	76	2.86	2.82
-3	76.93	74.94	37	12.01	11.76	77	2.77	2.72
-2	73.01	71.14	38	11.52	11.29	78	2.68	2.64
-1	69.32	67.56	39	11.06	10.84	79	2.60	2.55
0	65.84	64.17	40	10.63	10.41	80	2.51	2.47
1	62.54	60.96	41	10.21	10.00			
2	59.43	57.94	42	9.81	9.61			
3	56.49	55.08	43	9.42	9.24			
4	53.71	52.38	44	9.06	8.88			
5	51.09	49.83	45	8.71	8.54			
6	48.61	47.42	46	8.37	8.21			
7	46.26	45.14	47	8.05	7.90			
8	44.05	42.98	48	7.75	7.60			
9	41.95	40.94	49	7.46	7.31			
10	39.96	39.01	50	7.18	7.04		—	
11	38.08	37.18	51	6.91	6.78			
12	36.30	35.45	52	6.65	6.53			
13	34.62	33.81	53	6.41	6.53			
14	33.02	32.25	54	6.65	6.53			
15	31.50	30.77	55	6.41	6.29			
16	30.06	29.37	56	6.18	6.06			
17	28.70	28.05	57	5.95	5.84			
18	27.41	26.78	58	5.74	5.43			
19	26.18	25.59	59	5.14	5.05			

Applicable sensors

A: Indoor: R1T, R2T, R3T
Outdoor: R1T, R2T, R4T

B: Outdoor: R5T

5.6 R3T: Resistance Conversion Table (Discharge Pipe Sensor)

Temperature – resistance

The table below is the thermistor (R3T) temperature – resistance conversion table.

Temp. (°C)	Resist. (kΩ)	Temp. (°C)	Resist. (kΩ)	Temp. (°C)	Resist. (kΩ)
—	—	60.0	52.8	130.0	5.4
—	—	62.0	48.9	132.0	5.4
-6.0	1120.0	64.0	45.3	134.0	4.8
-4.0	1002.5	66.0	42.0	136.0	4.6
-2.0	898.6	68.0	39.0	138.0	4.3
0.0	806.5	70.0	36.3	140.0	4.1
2.0	724.8	72.0	33.7	142.0	3.9
4.0	652.2	74.0	31.4	144.0	3.7
6.0	587.6	76.0	29.2	146.0	3.5
8.0	530.1	78.0	27.2	148.0	3.3
10.0	478.8	80.0	25.4	150.0	3.2
12.0	432.9	82.0	23.7	152.0	3.0
14.0	392.0	—	—	154.0	2.9
16.0	355.3	—	—	156.0	2.7
18.0	322.4	—	—	158.0	2.6
20.0	292.9	—	—	160.0	2.5
22.0	266.3	92.0	16.9	162.0	2.3
24.0	242.5	94.0	15.8	164.0	2.5
26.0	221.0	96.0	14.8	166.0	2.1
28.0	201.6	98.0	13.9	168.0	2.0
30.0	184.1	100.0	13.1	170.0	1.9
32.0	168.3	102.0	12.3	172.0	1.9
34.0	154.0	104.0	11.5	174.0	1.8
36.0	141.0	106.0	10.8	176.0	1.7
38.0	129.3	108.0	10.2	178.0	1.6
40.0	118.7	110.0	9.6	180.0	1.5
42.0	109.0	112.0	9.0		
44.0	100.2	114.0	8.5		
46.0	92.2	116.0	8.0		
48.0	84.9	118.0	7.6		
50.0	78.3	120.0	7.1	—	
52.0	72.2	122.0	6.7		
54.0	66.7	124.0	6.4		
56.0	61.6	126.0	6.0		
48.0	57.0	128.0	5.7		

5.7 Evaluation of Abnormal High Pressure

Abnormally high pressure level is mostly caused by the condenser side. The following contents are provided by service engineer based on their field checks. Further, the number is listed in the order of degree of influence.

In cooling operation

Check items (Possible causes)	Judgment
Does the outdoor unit fan run normally?	Visual inspection
Is the outdoor unit heat exchanger clogged?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged? *Heat pump model only	Check if there is a temperature difference before and after check valve. → If YES, the check valve is caught.
Is the HPS normal?	Check continuity by using a tester.
Is the outdoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is the piping length 5 meters or less?	Visual inspection
Does air enter the refrigerant system?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.
Is the refrigerant overcharged?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

In heating operation

Check items (Possible causes)	Judgment
Does the indoor unit fan run normally?	Visual inspection
Is the indoor unit heat exchanger clogged?	Visual inspection
Is the indoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged?	Check if there is a temperature difference before and after check valve. → If YES, the check valve is caught.
Is the HPS normal?	Check continuity using a tester.
Is the piping length 5 meters or less?	Visual inspection
Does air enter the refrigerant system?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.
Is the refrigerant overcharged?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

5.8 Evaluation of Abnormal Low Pressure

Abnormally low pressure level is mostly caused by the evaporator side. The following contents are provided based on field checking of service engineer. Further, the number is listed in the order of degree of influence.

In cooling operation

Check items (Possible causes)	**Judgment**
Does the outdoor unit fan run normally?	Visual inspection
Is the indoor unit filter clogged?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged? *Heat pump model only	Check if there is a temperature difference before and after check valve. → If YES, the check valve is caught.
Is the LPS normal?	Check continuity using a tester.
Is the indoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is the refrigerant gas short?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

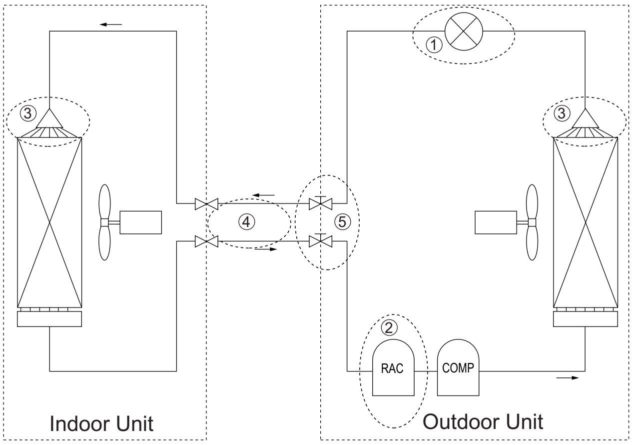
In heating operation

Check items (Possible causes)	**Judgment**
Does the outdoor unit fan run normally?	Visual inspection
Is the outdoor unit heat exchanger clogged?	Visual inspection
Is the outdoor unit installed under such conditions that short circuit easily occurs?	Visual inspection
Is there clogging before or after the EV (capillary)?	Check if there is a temperature difference before and after EV (capillary). Check if the main valve unit of EV operates (by noise, vibration).
Is the check valve clogged?	Check if there is a temperature difference before and after check valve. → If YES, the check valve is caught.
Is the LPS normal?	Check continuity using a tester.
Is the refrigerant gas short?	Conduct refrigerant collection and vacuum drying, and then add proper amount refrigerant.

5.9 Checks

5.9.1 Clogged Points

Temperature differences must occur before or after the clogged points!



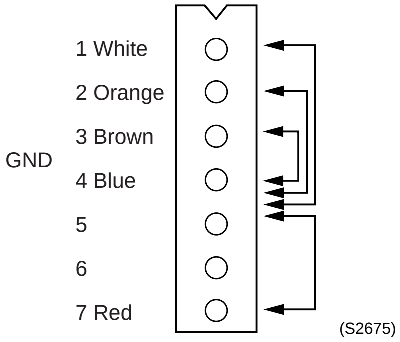
Check points		Check factor	Causes	Remedies
1	Around expansion mechanism	Temperature difference	■ Dust ■ Choked moisture ■ Reduced effective pipe diameter due to adherent contamination, etc.	Replace the expansion valve.
2	Accumulator	Frosting	■ Choked moisture	Blow a nitrogen gas, and then replace the refrigerant.
3	Distributor	Temperature difference	■ Dust ■ Choked moisture ■ Reduced effective pipe diameter due to adherent contamination, etc.	Replace the heat exchanger or distributor.
4	Field piping	Temperature difference	■ Collapsed pipe	Replace the pipe.
5	Stop valve	Temperature difference	■ The stop valve is not fully open.	Open the stop valve fully.

5.9.2 Outdoor Unit: Fan Motor Signal Line

For RZQS71~125 models

(1) Turn the power supply off.

(2) With the fan motor connector disconnected, measure the resistance between each pin, then make sure that the resistance is more than the value mentioned in the following table.



Measurement point	Judgment
1 - 4	1MΩ or more
2 - 4	100kΩ or more
3 - 4	100Ω or more
4 - 7	100kΩ or more

5.9.3 Outdoor unit: Fan Speed Pulse

For RZQS71~125 models

(1) Disconnect the connector X206A with the power supply OFF and Operation OFF.

(2) Is the voltage between pins 4 and 3 of X206A about 15 VDC after turning the power supply on?

(3) Is the voltage between pins 4 and 1 of X206A about 5 VDC?

(4) Connect the connector X206A with the power supply OFF and Operation OFF.

(5) When making one turn of the upper fan motor by hand after turning the power supply on, is a pulse (0 and 5 V) generated 4 times between pins 4 and 1 of X206A? (Measure at the contact terminal on the harness side with the connector connected.)

For RZQS125 models

(6) Disconnect the connector X207A with the power supply OFF and Operation OFF.

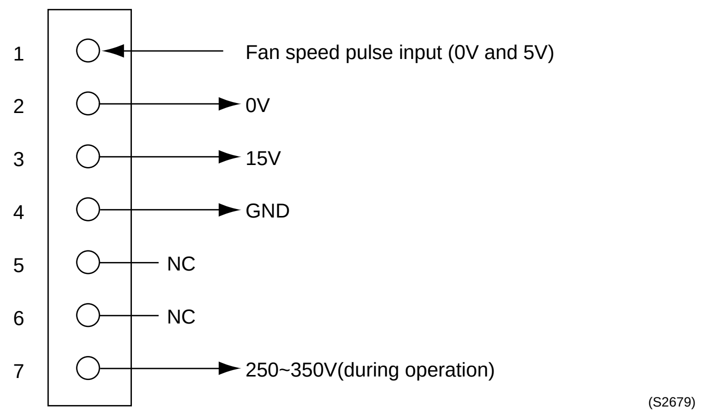
(7) Is the voltage between pins 4 and 3 of X207A about 15 VDC after turning the power supply on?

(8) Is the voltage between pins 4 and 1 of X207A about 5 VDC?

(9) Connect the connector X207A with the power supply OFF and Operation OFF.

(10) When making one turn of the lower fan motor by hand after turning the power supply on, is a pulse (0 and 5 V) generated 4 times between pins 4 and 1 of X207A?

(2) (7): NO → Faulty PC board → Replace the PC board.
(3) (8): NO → Faulty PC board → Replace the PC board.
(5)(10): NO → Faulty hall IC → Replace the DC fan motor.
(2) (3) (5) (7) (8) (10): YES → Replace the PC board.



5.9.4 Outdoor unit: Check for Power Transistor

Judgment according to the continuity check by using an analog tester:

(1) Do not touch the charged area (high voltage) for 10 minutes after turning the power supply off.

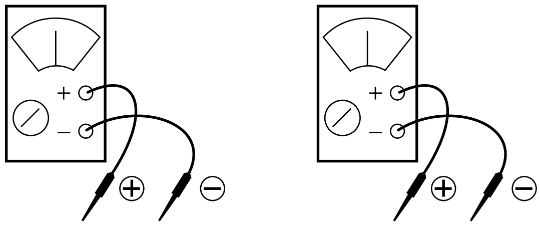
(2) If you must touch such an area, make sure that the power supply voltage of power transistor is 50 V or less.

(3) Before measuring the continuity, disconnect the connection between compressor and power transistor.

(4) Measure the continuity in the following procedure.
[Judgment] Normal if the continuity check results in the following.

3

Power transistor (on inverter PC board)



P — U	Continuity ※	U — P	∞
P — V	Continuity ※	V — P	∞
P — W	Continuity ※	W — P	∞
U — P	∞	P — U	Continuity ※
V — P	∞	P — V	Continuity ※
W — P	∞	P — W	Continuity ※

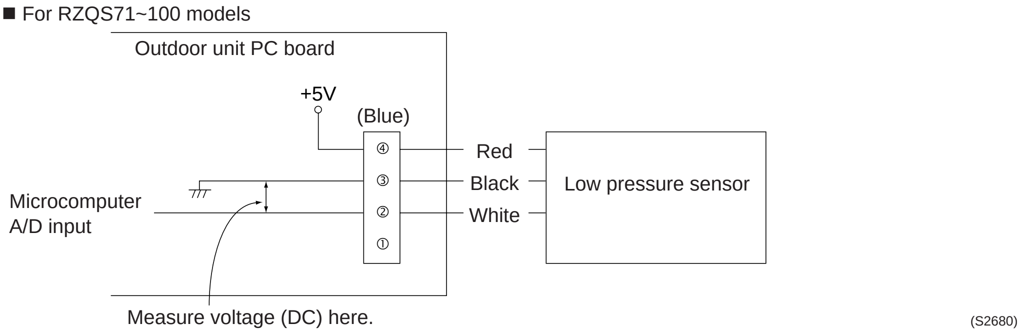
(S2678)

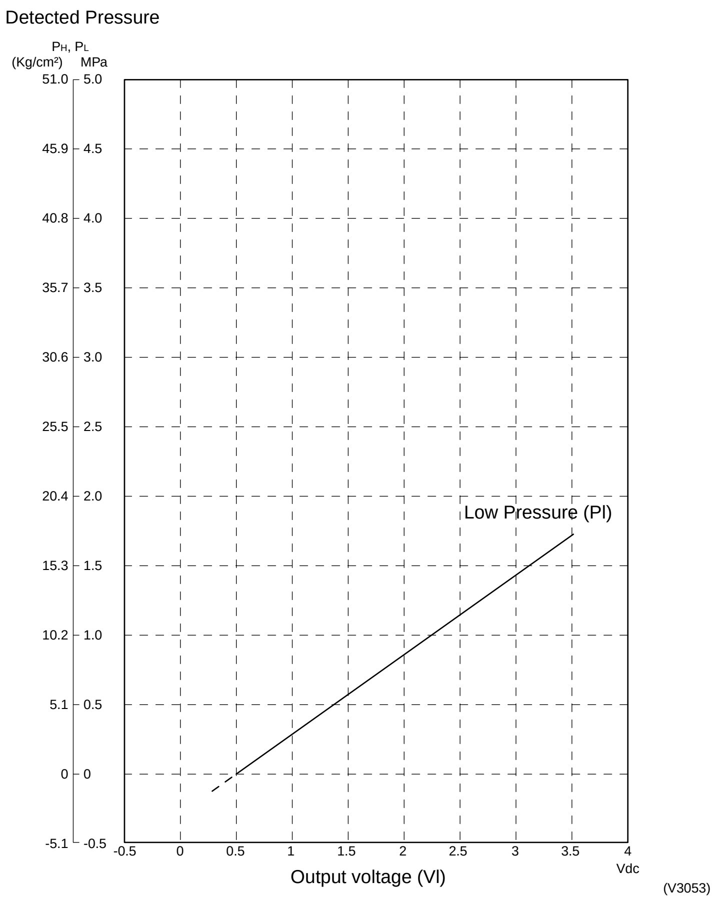
* If there is continuity, the resistance should be the same as each phase.

* If a digital tester is used for the measurement of continuity, ∞ and continuity may be reversed.

5.9.5 Outdoor unit: Check Low Pressure Sensor

Measure the voltage (DC) between pins 2 and 3 of the connector.





Pl = 0.57V-0.28
Pl: Low pressure (MPa)
V: Voltage (V)

Pl = Detected Pressure (Low side) MPa
Vl: Output voltage (Low side) Vdc

3

Part 4
Commissioning and Test Run

What is in this part?

This part contains the following chapters:

4

1 Pre-Test Run Checks

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- Checks before test run
- Test run checks
- Setting the address for the receiver of the wireless remote controller
- Setting the address for the wireless remote controller.

Overview

This chapter contains the following topics:

4

1.2 Test Run Checks

Checks before test run

Before carrying out a test run, proceed as follows:

Step	Action
1	Make sure the voltage at the primary side of the safety breaker is 230 V ± 10%.
2	Fully open the liquid and the gas stop valve.

Test run checks

To carry out a test run, check the following:

- Check that the temperature setting of the remote controller is at the lowest level in cooling mode or use test mode.
- Go through the following checklist:

Checkpoints	Cautions or warnings
Are all units securely installed?	■ Dangerous for turning over during storm. ■ Possible damage to pipe connections.
Is the earth wire installed according to the applicable local standard?	Dangerous if electric leakage occurs.
Are all air inlets and outlets of the indoor and outdoor units unobstructed?	■ Poor cooling. ■ Poor heating.
Does the drain flow out smoothly?	Water leakage.
Is piping adequately heat-insulated?	Water leakage.
Have the connections been checked for gas leakage?	■ Poor cooling. ■ Poor heating. ■ Stop.
Is the supply voltage conform to the specifications on the name plate?	Incorrect operation.
Are the cable sizes as specified and according to local regulations?	Damage of cables.
Are the remote controller signals received by the unit?	No operation.

1.3 Setting the Wireless Remote Controller

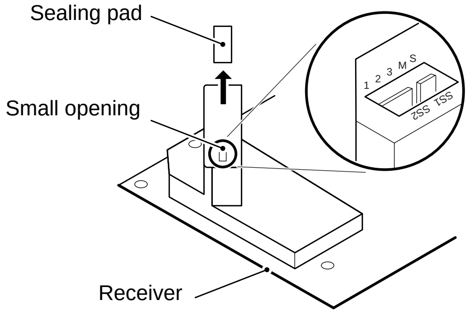
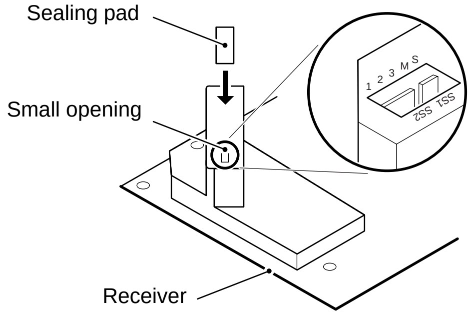
Introduction

To set the wireless remote controller, you have to set the address for:

- The receiver of the wireless remote controller
- The wireless remote controller.

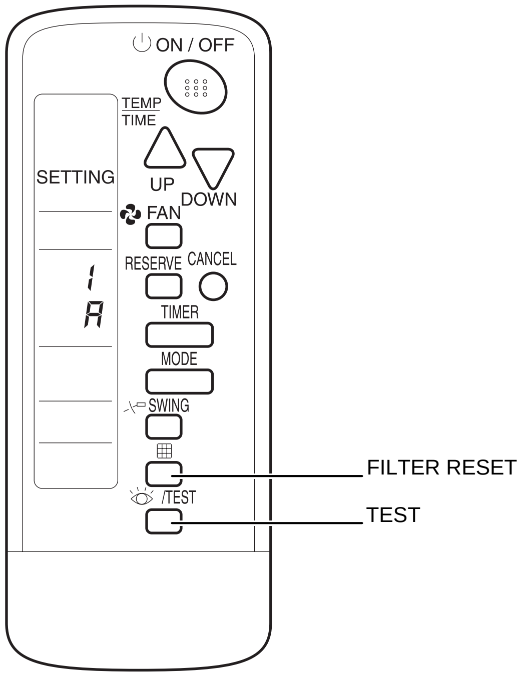
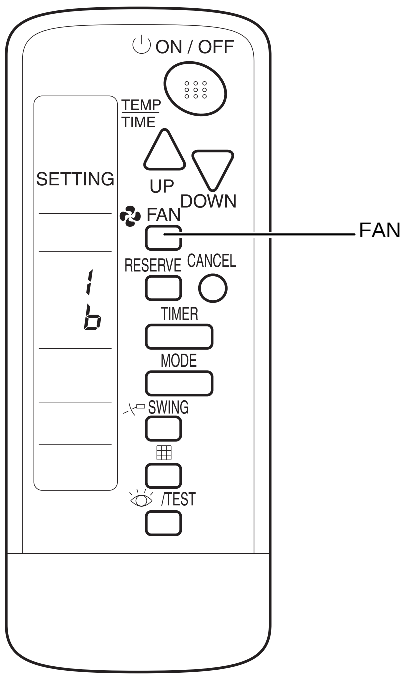
Setting the address for the receiver

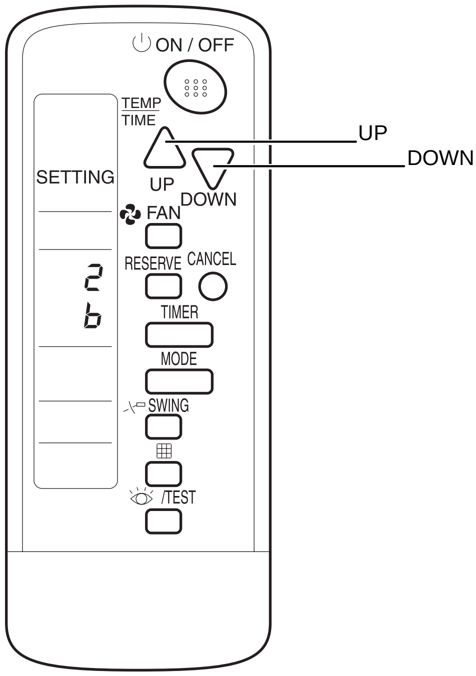
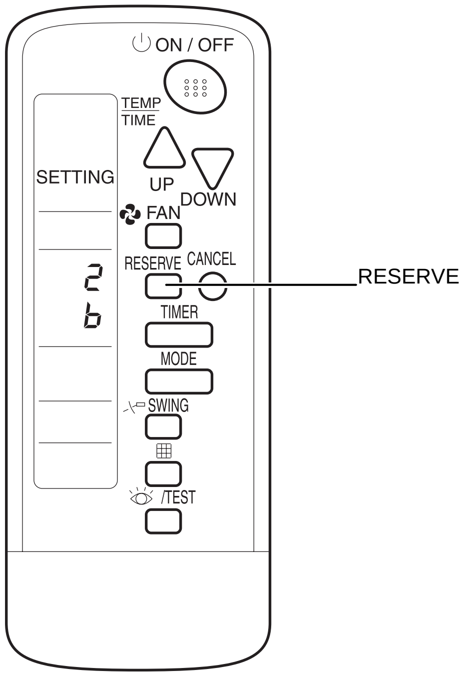
The address for the receiver of the wireless remote controller is factory set to 1. To change this setting, proceed as follows:

Step	Action
1	Turn OFF the power.
2	Remove the sealing pad on the top of the receiver. 
3	Set the wireless address switch (SS2) according to the table below. You can find the wireless address switch attached on the PCB of the receiver and it is visible through the small opening on the back of the receiver. <table><tr><th>Unit No.</th><th>No. 1</th><th>No. 2</th><th>No. 3</th></tr><tr><td>SS2</td><td>1 2 3</td><td>1 2 3</td><td>1 2 3</td></tr></table>
4	If you use a wired and a wireless remote controller for one indoor unit, proceed as follows: 1. Set the wired remote controller to MAIN: On the remote controller. 2. Set the wireless remote controller to SUB: On the receiver with the MAIN/SUB switch (SS1). <table><tr><th>MAIN/SUB</th><th>MAIN</th><th>SUB</th></tr><tr><td>SS1</td><td>S M</td><td>S M</td></tr></table>
5	Seal off the opening of the address switch and the MAIN/SUB switch with the attached sealing pad. 
6	Make sure to also change the address on the remote controller.

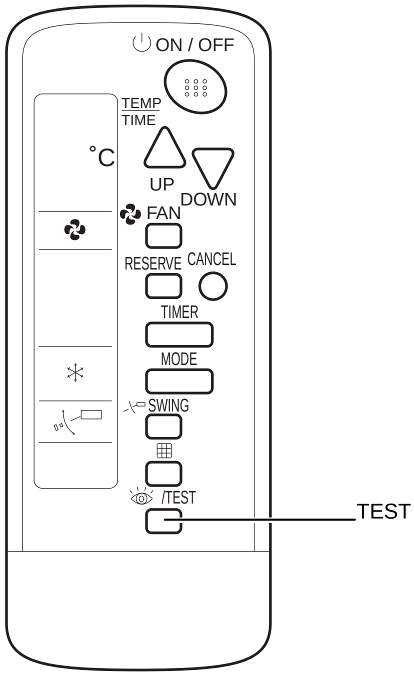
Setting the address for the wireless remote controller

The address for the wireless remote controller is factory set to 1. To change this setting, proceed as follows:

Step	Action
1	Hold down the FILTER RESET button and the TEST button for at least 4 s, to go to field set mode. The display indicates the field set mode. 
2	Press the FAN button to select a multiple setting (A/b), see ‘Multiple settings A/b’ further in this section. Each time you press the button, the display switches between “A” and “b”. 

Step	Action
3	Press the UP and DOWN buttons to set the address. Set the same address as the receiver (1, 2 or 3). The receiver does not work with addresses 4, 5 and 6. 
4	Press the RESERVE button to confirm the setting. 

Step	Action
5	Press the TEST button to quit the field set mode and return to the normal display.



Multiple settings A/b

When an outside control (central remote controller...) controls an indoor unit, sometimes the indoor unit does not respond to ON/OFF and temperature settings commands from this controller.

Remote controller		**Indoor unit**	
Setting	**Remote controller display**	**Control of other air conditioners and units**	**No other control**
A: Standard	All items are displayed.	Commands other than ON/OFF and temperature setting accepted. (1 long beep or 3 short beeps emitted)	
b: Multi System	Only one item is displayed. This item is only shown for a few seconds.	All commands accepted (2 short beeps)	

2 Field settings

2.1 What Is in This Chapter?

Introduction

This chapter contains the following information:

- How to change the field settings
- The field settings
- The factory settings.

Overview

This chapter contains the following topics:

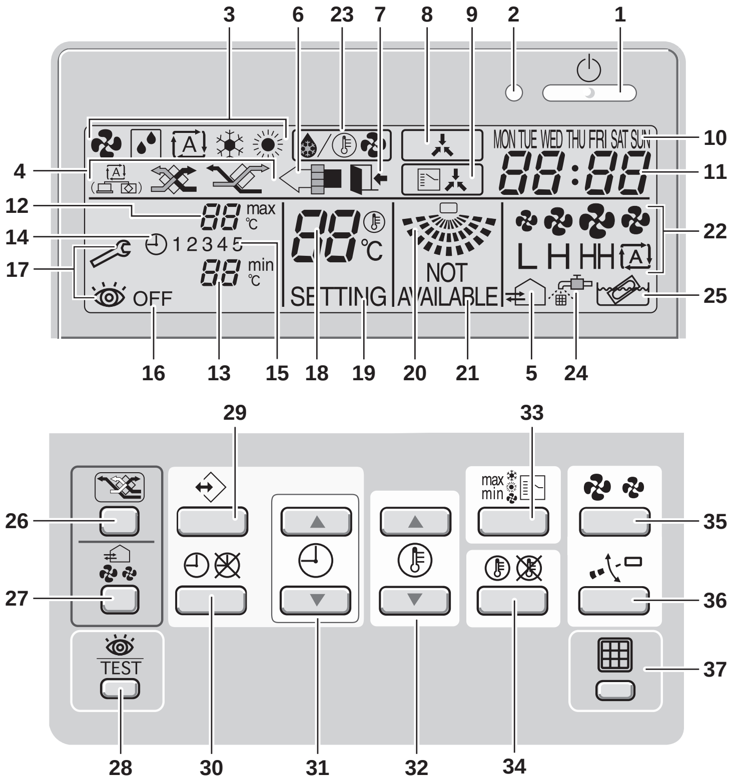
2.2 How to Change the Field Settings with the Wired Remote Controller

Installation conditions

The field settings have to be changed with the remote controller according to the installation conditions.

Wired remote controller (BRC1D527)

The illustration below shows the wired remote controller.



Components

The table below contains the components of the wired remote controller.

No.	Component	No.	Component
1	ON/OFF BUTTON	20	AIR FLOW DIRECTION ICON
2	OPERATION LAMP	21	NOT AVAILABLE
3	OPERATION MODE ICON	22	FAN SPEED ICON
4	VENTILATION MODE ICON	23	DEFROST/HOTSTART MODE ICON
5	VENTILATION ICON	24	AIR FILTER CLEANING TIME ICON
6	AIR CLEANING ICON	25	ELEMENT CLEANING TIME ICON
7	LEAVE HOME ICON	26	VENTILATION MODE BUTTON
8	EXTERNAL CONTROL ICON	27	VENTILATION AMOUNT BUTTON
9	CHANGE-OVER UNDER CENTRALISED CONTROL ICON	28	INSPECTION/TEST OPERATION BUTTON
10	DAY OF THE WEEK INDICATOR	29	PROGRAMMING BUTTON
11	CLOCK DISPLAY	30	SCHEDULE TIMER BUTTON
12	MAXIMUM SET TEMPERATURE	31	TIME ADJUST BUTTON
13	MINIMUM SET TEMPERATURE	32	TEMPERATURE ADJUST BUTTONS
14	SCHEDULE TIMER ICON	33	OPERATION CHANGE/ BUTTON
15	ACTION ICONS	34	SETPOINT/LIMIT BUTTON
16	OFF ICON	35	FAN SPEED BUTTON
17	INSPECTION REQUIRED	36	AIR FLOW DIRECTION ADJUST BUTTON

No.	Component	No.	Component
18	SET TEMPERATURE DISPLAY	37	AIR FILTER CLEANING TIME ICON RESET
19	SETTING		

Setting

To set the field settings, you have to change:

- "Mode No."
- "First code No."
- "Second code No.".

To change the field settings, proceed as follows:

Step	Action
1	Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the "Field setting mode".
2	Press the TEMPERATURE CONTROL button until the desired "Mode No." appears.
3	■ If the indoor unit is under group control, all settings for all the indoor units are set at the same time. Use the codes 10 to 15 to apply this group control and proceed to the next step. ■ If you want to set the indoor units of one group individually or if you want to read out the last settings, use the codes 20 to 25 which are displayed in brackets. Press the TIMER SELECTION button to select the "Indoor unit No." for which you want to adjust the field settings.
4	Press the upper part of the PROGRAMMING TIME button to select the "First code No.".
5	Press the lower part of the PROGRAMMING TIME button to select the "Second code No".
6	Press the CONFIRMATION button to confirm the changed setting.
7	Press the INSPECTION/TEST button to return to "Normal mode".

4

2.3 How to Change the Field Settings with the Wireless Remote Controller

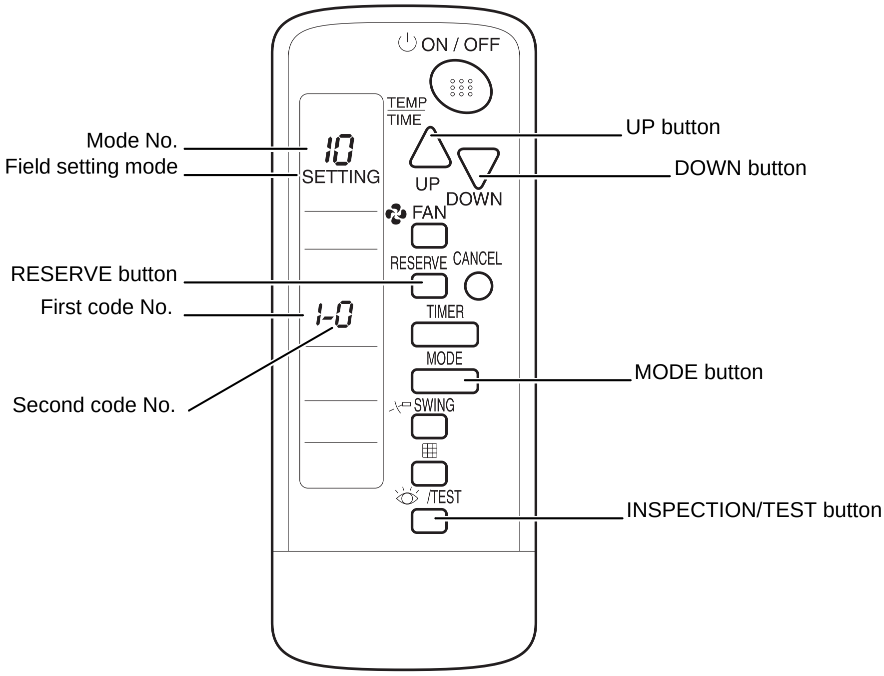
Optional accessories

If optional accessories are mounted on the indoor unit, the indoor unit setting may have to be changed.

Refer to OH98-2 or the installation manual (optional handbook) for each optional accessory.

Wireless remote controller

The illustration below shows the wireless remote controller.



Setting

To set the field settings, you have to change:

- "Mode No."
- "First code No."
- "Second code No.".

To change the field settings, proceed as follows:

Step	Action
1	Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the "Field setting mode".
2	Press the MODE button to select the desired "Mode No.".
3	Press the UP button to select the "First code No.".
4	Press the DOWN button to select the "Second code No."
5	Press the RESERVE button to set the present settings.
6	Press the INSPECTION/TEST button to return to the "Normal mode".

2.4 Overview of the Field Settings on the Indoor Units

Field settings

The table below contains the possible field settings of all indoor units.

Mode No.	First code No.	Description of the setting	Second code No.			
			01	02	03	04
10 or 20	0	Filter counter	Light contamination	heavy contamination	—	—
	1	Filter type	Long	Super long	External	Oil mist
	2	Remote thermistor of the remote controller	TH1 = rem. controller	TH1 = air return	—	—
	3	Filter display	Filter indic.	No filter indic.	—	—
11 or 21	0	Number indoor to 1 outdoor	Pair	Twin	Triple	Double twin
	1	Unified or indiv. set twin	Group setting	Indiv. setting	—	—
	2	Fan OFF at thermostat OFF	LL-speed	OFF	—	—
12 or 22	0	KRP1B51/52/53 X1/X2 output	Thermostat ON	Option	Operation	Malfunction
	1	EKRORO	Forced OFF	ON/OFF operation	—	—
	3	Fan speed heating thermostat OFF	LL-speed	Set speed	—	—
	5	Automatic restart	Disabled	Enabled	—	—
13 or 23	0	Ceiling height setting	Normal ≤ 2.7 m	High >2.7≤3.0 m	Extra high >3.0≤3.5 m	— —
	1	Selection of air flow direction (setting for when a blocking pad kit has been inst alled).	4-way flow	3-way flow	2-way flow	—
	3	Horizontal discharge grill	Enabled	Disabled	—	—
	4	Air flow direction adjust range setting	Draft prevention	Standard	Ceil soil prevention	—
	5	Field fan speed changeover air outlet (domestic only)	Standard	Option 1	Option 2	—
	6	External static pressure	Normal	High	Low	—
14 or 24	0	Additional timer to guard timer	0 s	5 s	10 s	15 s
1b (Only in case of BRC1D52)	0	Permission level setting	Level 2	Level 3	—	—
	1	Leave home function	Not permitted	Permitted	—	—
	2	Thermostat sensor in remote controller (for limit operation and leave home function only)	Use	Not use	—	—

2.5 Overview of the Factory Settings on the Indoor Units

Factory settings The table below contains the factory settings of all indoor units

Mode No.	First code No.	Second code No.						
		FCQ-B	**FFQ**	**FBQ**	**FAQ**	**FDQ**	**FHQ**	**FCQ-D**
10 or 20	0	01	01	01	01	01	01	01
	1	01	01	01	—	02	—	01
	2	02	02	02	02	02	02	02
	3	01	01	01	01	01	01	01
11 or 21	0	01	01	01	01	01	01	01
	1	01	01	01	01	01	01	01
	2	01	01	01	01	01	01	01
12 or 22	0	01	01	01	01	01	01	01
	3	01	01	01	—	—	—	01
	5	02	02	02	02	02	02	02
13 or 23	0	01	—	—	01	—	01	01
	1	01	01	—	—	—	—	01
	3	—	—	—	—	—	—	—
	4	02	02	—	—	—	—	02
	5	01	01	—	01	—	01	01
	6	—	—	01	—	—	—	—
14 or 24	0	01	01	01	—	01	01	01

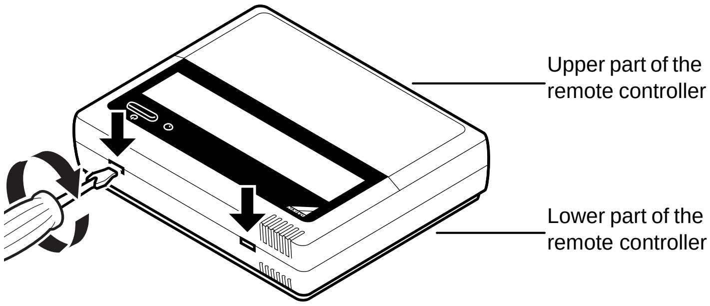
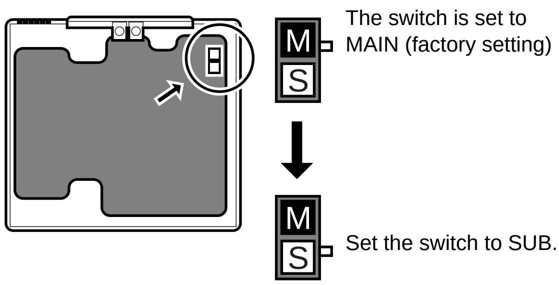
2.6 MAIN/SUB Setting when Using Two Remote Controllers

Situation

The MAIN/SUB setting is necessary when one indoor unit is controlled by two remote controllers. When you use two remote controllers (control panel and separate remote controller), set one to MAIN and the other to SUB. You can do this by setting the switch on the remote controller's PCB.

Setting

The remote controllers are factory set to MAIN, so you only have to change one remote controller from MAIN to SUB. To change a remote controller from MAIN to SUB, proceed as follows:

Step	Action
1	Insert a flathead screwdriver into the recess between the upper and lower part of the remote controller, as shown in the illustration below. Gently pry off the upper part of the controller, working from the two possible positions. 
2	Turn the MAIN/SUB changeover switch on the PCB to "S". 

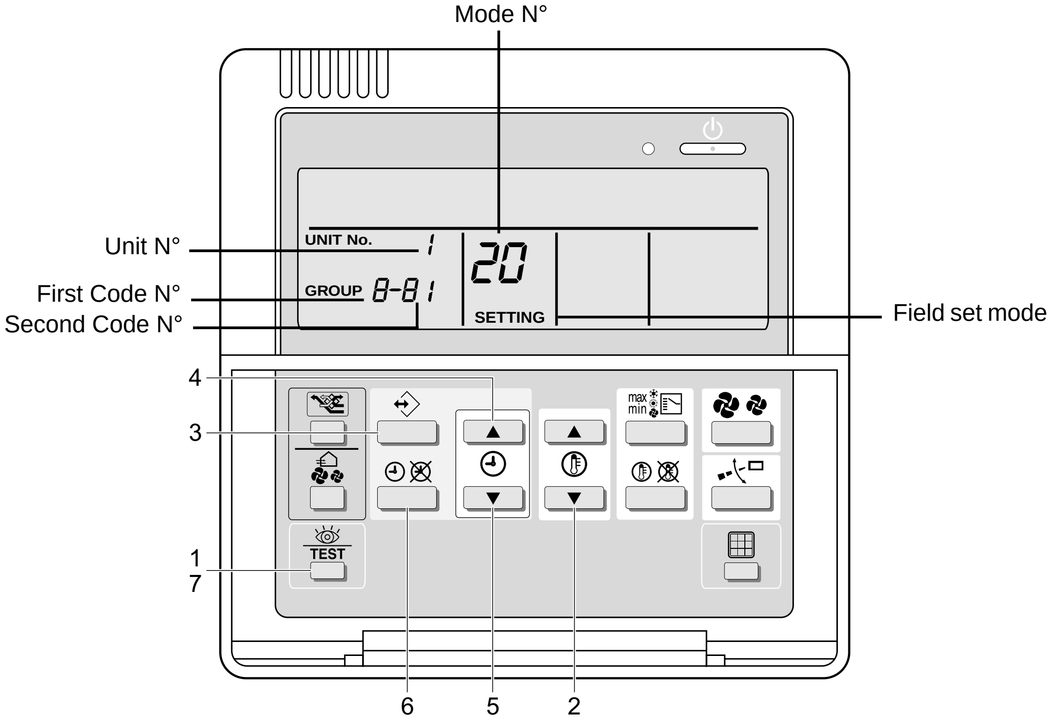
2.7 Setting the Centralized Group No.

When?

If you want to carry out centralized control with a central remote controller and a unified ON/OFF controller, you have to set the group No. for each group with the remote controller.

Wired remote controller

The illustration below shows the wired remote controller.



Setting

To set the “Centralized group No.”, proceed as follows:

Step	Action
1	Switch ON the power supply of the central remote controller, the unified ON/OFF controller and the indoor unit(s).
2	Hold down the INSPECTION/TEST button for at least 4 s during normal mode to enter the “Field setting mode”.
3	Press the TEMPERATURE CONTROL button until “Mode No.” “00” appears.
4	Press the INSPECTION/TEST button to inspect the group No. display.
5	Set the “Group No.” for each group by pressing the PROGRAMMING TIME button. The “Group No.” rises in the order of 1—00, 1—01, ..., 1—15, 2—00, ..., 2—15, 3—00, etc. The unified ON/OFF controller however displays only the range of group numbers selected by the switch for setting each address.
6	Press the CONFIRMATION button to enter the selected group No.
7	Press the INSPECTION/TEST button to return to normal mode.

Individually address setting

If the address must be set individually for each unit, set the “Mode No.” to “30”. For example, for power consumption counting.

4

2.8 The Field Setting Levels

Introduction

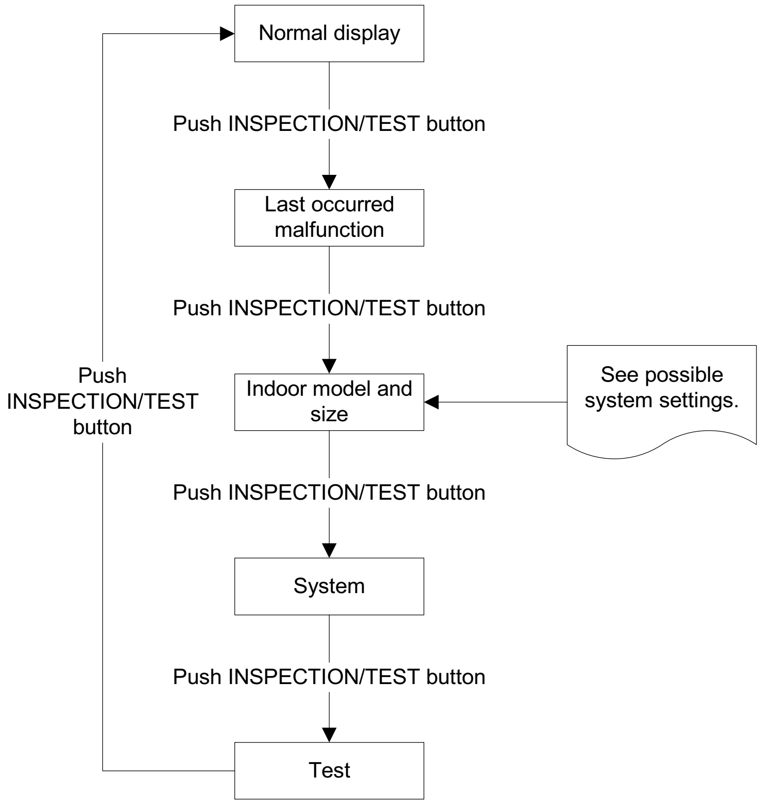
The three field setting levels are:

- Inspection level
- Monitoring level
- Maintenance mode settings.

The inspection level

The inspection level is the highest level of the three field setting levels. You can change the views in the inspection level by pressing the INSPECTION/TEST button.

The flow chart below explains the different windows of the inspection level.



Possible system settings

The table below contains the possible system settings, which are displayed on the remote controller if the TEST button is pushed twice shortly.

Size		Software	Type	
Settings	Display		Settings	Display
35	35	5	FCQ-B	FJ
45	45		FHQ	HJ
60	63		FAQ	AJ
71	71		FFQ	GJ
100	100		FBQ	JJ
125	125		FDQ	UJ

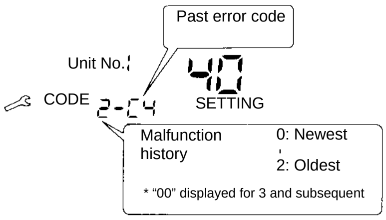
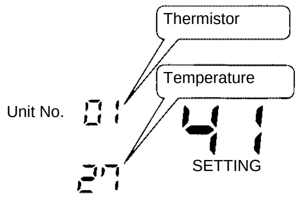
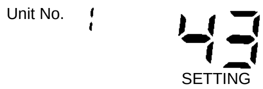
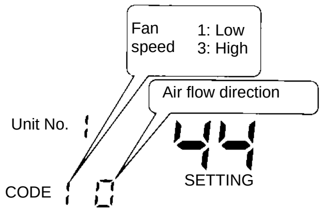
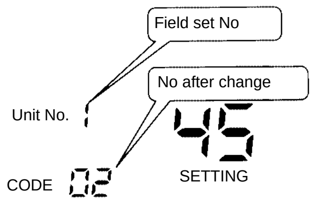
Changing the mode settings

To enter the monitoring level and to change the maintenance mode settings, proceed as follows:

Step	Action
1	Hold down the INSPECTION/TEST button for at least 4 s to enter the field setting mode.
2	Hold down the INSPECTION/TEST button for at least 4 s to enter the maintenance mode.
3	Press the TEMPERATURE CONTROL buttons as many times as needed to select the mode No. you want.
4	Press the TIMER SELECTION button as many times as needed to select the unit No. you want.
5	Carry out the settings for modes 44 and 45. See “Maintenance Mode Settings” further in this section.
6	Press the CONFIRMATION button to confirm the settings of modes 44 and 45.
7	Press the INSPECTION/TEST button to return to the normal operating mode.

Maintenance Mode Settings

The table below describes the maintenance mode settings.

Mode No.	Function	Content and operation method	Example of the remote controller display
40	History error codes	Display malfunction history The history No. can be changed with the programming time button.	
41	Thermistor data display	Select the display thermistor with the programming time button. Thermistor: 0. Remote control thermistor 1. Suction thermistor 2. Heat exchanger thermistor.	
43	Forced fan ON	Turns the fan ON for each unit individually.	
44	Individual setting	Sets fan speed and air flow direction for each unit individually when using group control. Settings are made using the "air flow direction adjust" and "fan speed adjust" buttons. Confirmation by the confirmation button is required.	
45	Unit No. change	Changes unit No. Set the unit No. after changing with the programming time buttons. Confirmation by the confirmation button is required.	

2.9 Overview of the Field Settings on the Outdoor Units

Remote controller settings

The table below contains the remote controller settings.

Mode N°	First code	Description	Second n°						Details
			01	02	03	04	05	06	
16 or 26	0	Night time low noise operation	Disabled (Factory setting)	Auto-matic low noise activation	—	—	—	—	4–24
	1	Automatic low noise start and stop time	—	—	—	Low noise activation (Factory) for RZQS71, 125	—	Low noise activation for RZQS100	4–24
	3	Defrost starting set-ting	Standard (Factory setting)	Defrost slow starting setting	Defrost quick starting setting	—	—	—	2–19

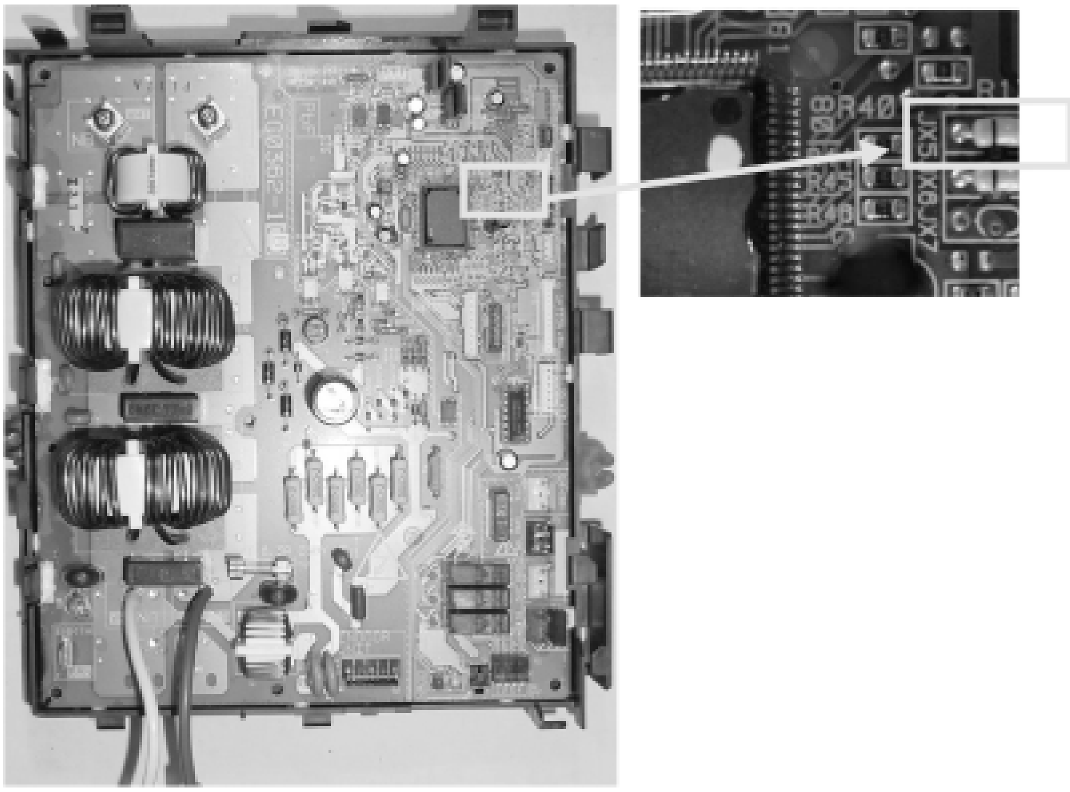
Jumpers

The table below contains the jumper field settings.

Jumper	Label on PCB	Function	Details
JX5	JX5	Set as cooling only	—

Location on PCB A1P: see drawing on next page.

This drawing shows the position of jumper JX5 on PCB A1P.



DIP switches

The table below contains the DIP switch field settings.

DIP switch	Label on PCB	Function	Details
DS1-1	ON/OFF	Switch emergency operation outdoor unit ON/OFF.	See page 2-6.
DS1-2	Cool / Heat	Select cooling / heating emergency operation.	See page 2-6.
DS1-3	ON/OFF	Test purposes only. Keep factory setting “OFF”.	—
DS1-4	ON/OFF	Test purposes only. Keep factory setting “OFF”.	—

BS

The table below contains the BS field setting.

BS	Label on PCB	Function	Details
BS	BS1	Cooling / fan only: Pump down Heating: Forced defrosting function	See page 2-18. See page 2-6.

2.10 Overview of the Factory Settings on the Outdoor Units

Factory settings

The table below contains the factory settings of all outdoor units

		RZQS71	RZQS100	RZQS125
26	0	01	01	01
	1	04	04	04
	2	01	01	01
	3	01	01	01

2.11 Quiet Operation

Purpose

Lower the operation sound of the outdoor unit.

Setting

Quiet Operation can be activated by:

1. Automatic control (By field setting from remote controller)
2. External activation (from optional PCB KRP58M)

2.11.1 Quiet Operation by Automatic control

Table RZQS71, 125

Quiet operation can be set by field setting from the wired remote controller:

Mode	First Code	Second Code					
		01	02	03	04	05	06
16(26)	0	OFF (Factory setting)	Low noise activation	—	—	—	—
	1	—	—	—	Low noise activation (Factory setting)	—	—

Table RZQS100

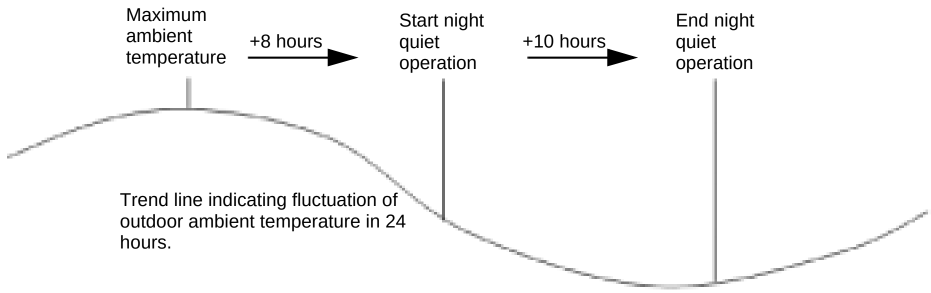
Quiet operation can be set by field setting from the wired remote controller:

Mode	First Code	Second Code					
		01	02	03	04	05	06
16(26)	0	OFF (Factory setting)	Low noise activation	—	—	—	—
	1	—	—	—	— (Factory setting)	—	Low noise activation

Method

When setting mode 16(26)-0-02, quiet operation will be carried out by presuming the current time in accordance with the outside temperature.
Automatic mode will start when the outdoor temperature is = average max of last 10 days -5°C and will be conducted for 10 hours.

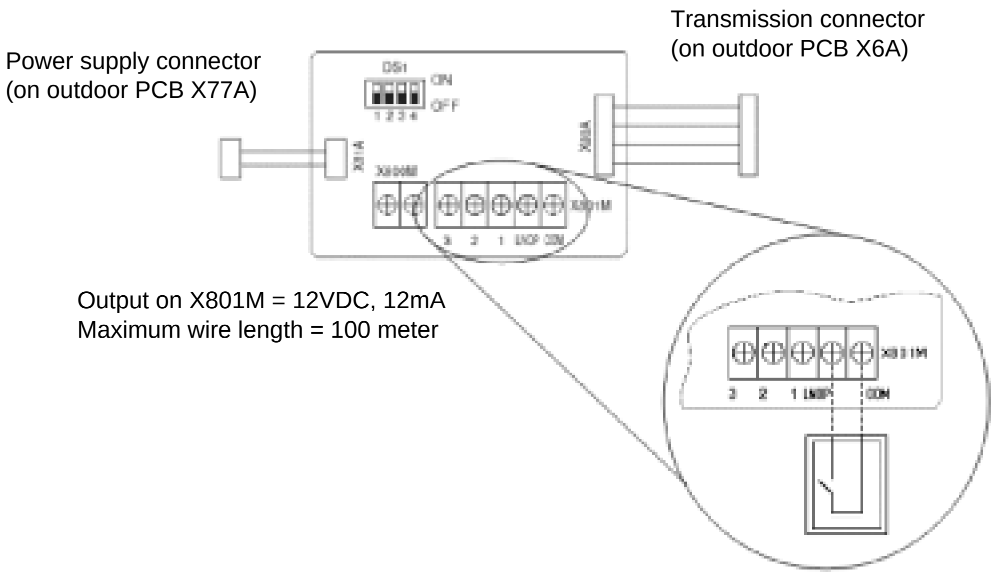
Graph



2.11.2 External activation from optional PCB

Graph

Quiet operation can also be activated from the optional PCB.



Quiet operation will start when the contact on LNOP-COM is closed and will remain active as long as the contact is closed. No field setting on the outdoor unit or by remote controller is required.
Quiet operation will be ended when the contact is re-opened.
Use of the KRP58M enables the use of an external time clock.

Exceptions

The quiet operation will be overruled in the following conditions:

- Pump down residual operation
- Startup control
- Defrost operation
- Oil recovery

2.12 Defrost Start Setting

See ‘Defrost Operation’ on page 2-19.

4

3 Test Run and Operation Data

Introduction

This chapter contains the following information:

- General operation data
- Operation ranges.

Overview

This chapter contains the following topics:

4

3.1 General Operation Data

Guide Lines for Optimal Operation Condition

The operation value guide lines when operating under standard conditions **(at Rated frequency)** by pushing the test run button on the remote controller are as given in the table below.

Indoor Unit Fan:

"H" Operation Compressor: Rated Frequency

	High Pressure (MPa)	Low Pressure (MPa)	Discharge Pipe Temperature (°C)	Suction Temperature (°C)	Indoor Unit Side: Differential Between Suction Temperature and Discharge Temperature (°C)	Outdoor Unit Side: Differential Between Suction Temperature and Discharge Temperature (°C)
Cooling	2.6 MPa ~ 3.4 MPa	0.6 MPa ~ 1.0 MPa	60~100	–2~10	8~18	7~12
Heating	2.5 MPa ~ 3.3 MPa	0.5 MPa ~ 0.8 MPa	60~100	–6~2	14~30	2~6

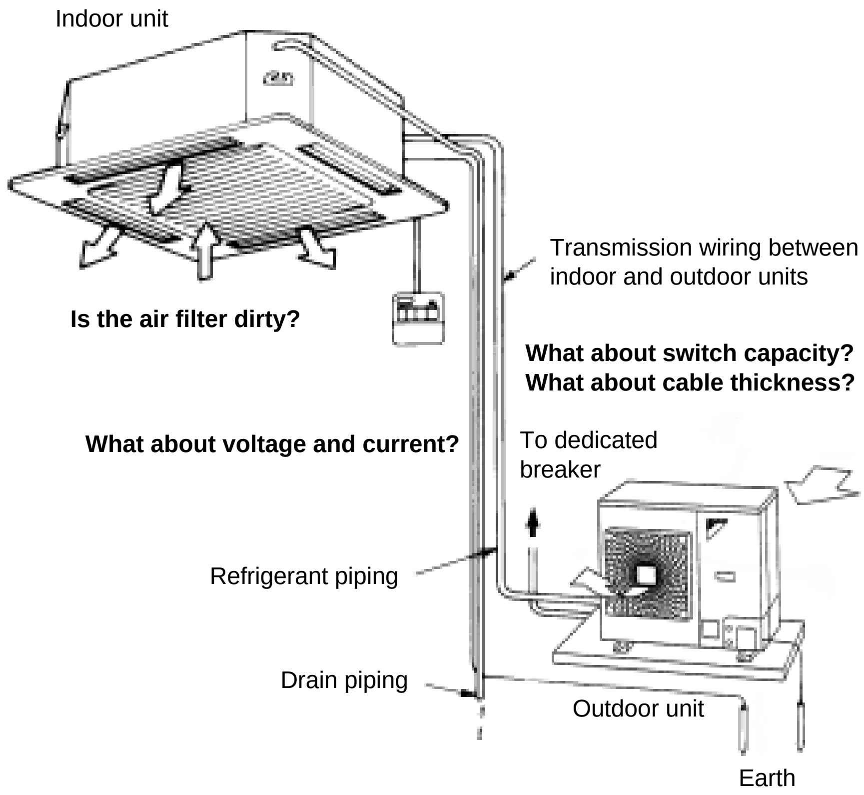
4

Standard Conditions

	Indoor Unit Conditions	Outdoor Unit Conditions
Cooling Operation	27°C DB/19°C WB	35°C DB
Heating Operation	20°C DB	7°C DB/6°C WB

During or after maintenance, when the power supply is turned back on, operation restarts automatically by the “auto restart function.” Please exercise the proper caution.

When perfoming maintenance, you should at least perform the following inspections:



Correlation of Air-Conditioner's Operation Status and Pressure / Running Current

What happens in comparison to normal values is summarized in the table below.
(Measured from 15 ~ 20 minutes or more after operation starts.)

When Cooling

Air-Conditioner Status	Low Pressure	High Pressure	Running Current
Air Filter Fouling	Lower	Lower	Lower
Short Circuit of Indoor Unit Inlet/Outlet Air	Lower	Lower	Lower
Outdoor Unit Fin Fouling	Higher	Higher	Higher
Short Circuit of Outdoor Unit Inlet/Outlet Air	Higher	Higher	Higher
Air Mixed in Refrigerant	Higher	Higher	Higher
Water Mixed in Refrigerant	∗1 Lower	Lower	Lower
Dirt Mixed in Refrigerant	∗2 Lower	Lower	Lower
Lack of Refrigerant (Gas)	Lower	Lower	Lower
Unsatisfactory Compression	∗3 Higher	Lower	Lower

4

When Heating

Air-Conditioner Status	Low Pressure	High Pressure	Running Current
Air Filter Fouling	Higher	Higher	Higher
Short Circuit of Indoor Unit Inlet/Outlet Air	Higher	Higher	Higher
Outdoor Unit Fin Fouling	Lower	Lower	Lower
Short Circuit of Outdoor Unit Inlet/Outlet Air	Lower	Lower	Lower
Air Mixed in Refrigerant	Higher	Higher	Higher
Water Mixed in Refrigerant	∗1 Lower	Lower	Lower
Dirt Mixed in Refrigerant	∗2 Lower	Lower	Lower
Lack of Refrigerant (Gas)	Lower	Lower	Lower
Unsatisfactory Compression	∗3 Higher	Lower	Lower

Notes:

- ∗1. Water in the refrigerant freezes inside the capillary tube or expansion valve, and is basically the same phenomenon as pump down.
- ∗2. Dirt in the refrigerant clogs filters inside the piping, and is basically the same phenomenon as pump down.
- ∗3. Pressure differential between high and low pressure becomes low.

3.2 Operation Range

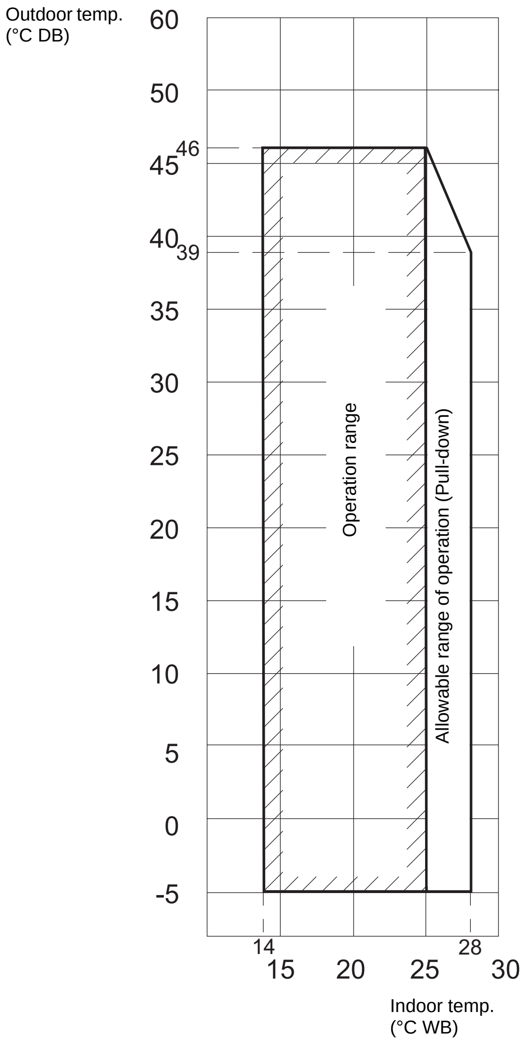
Conditions

The illustrations in this section are based on the following conditions:

- Equivalent piping length: 5.0 m
- Level difference: 0 m
- Air flow rate: High.

Operation range: Cooling

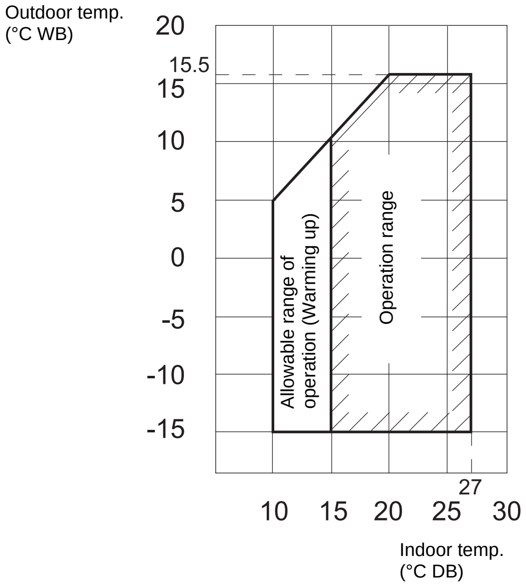
The illustration below shows the operation range.



- Oudoor: -5 ~ 46°C DB
- Indoor: 14 ~ 28°C DB

Operation range: Heating

The illustration below shows the operation range.



4

- Outdoor: -10 ~ 15,5°C DB
- Indoor: 10 ~ 27°C DB

Notes:

- Depending on operation and installation conditions, the indoor unit can change over to freeze-up operation (Indoor de-icing).
- To reduce the freeze-up operation (Indoor de-icing) frequency it is recommended to install the outdoor unit in a location not exposed to wind.

Part 5
Disassembly and Maintenance

What is in this part?

This part contains the following chapters:

5

1 Disassembly and Maintenance: Outdoor Units

1.1 What Is in This Chapter?

Introduction

This chapter contains the following information on the outdoor units:

- Disassembly procedures

Overview

This chapter contains the following topics:

1.2 RZQS71~125B

Overview

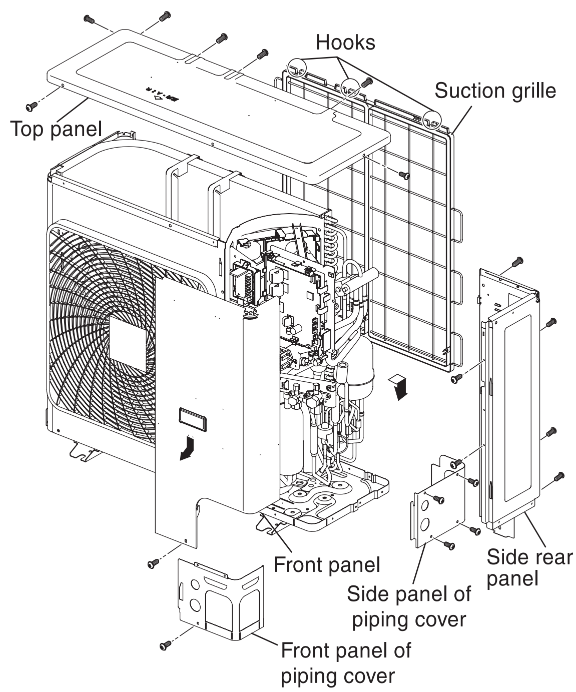
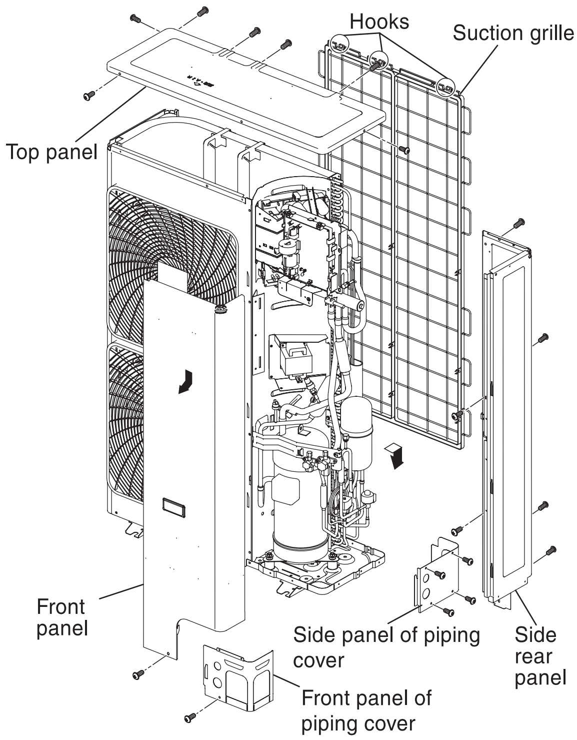
This part contains the following topics:

5

1.2.1 Removal of Outside Panels

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

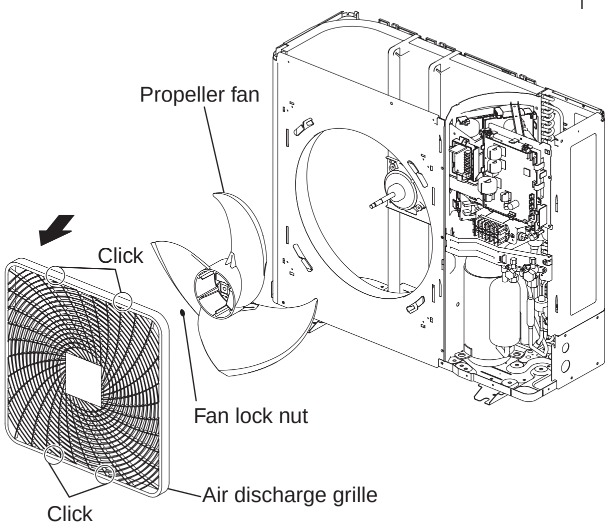
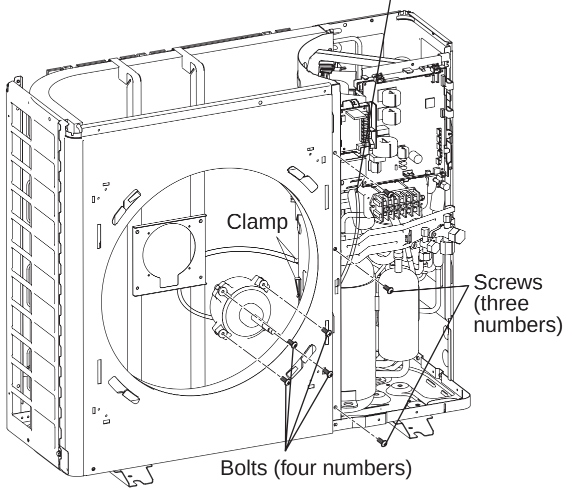
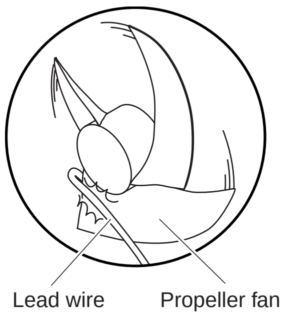
Procedure

<table>
<tr><th>Step</th><th colspan="2">Procedure</th><th>Points</th></tr>
<tr><td>1</td><td>For the suction grille, pull the lower parts (in 7 places) frontward, disengage the hooks at the top of the grille with a slotted screwdriver, and then push the overall grille downward to disassemble it.</td><td rowspan="3">■ RZQS71~100B

</td><td rowspan="6"></td></tr>
<tr><td>2</td><td>For the front panel (side front panel), unscrew a single mounting screw and then push this panel downward to remove it.</td></tr>
<tr><td>3</td><td>For the top panel, unscrew the eight mounting screws and then remove this panel.</td></tr>
<tr><td>4</td><td>For the front panel of the piping cover, unscrew a single mounting screw and then remove this panel.</td><td rowspan="3">■ RZQS125B

</td></tr>
<tr><td>5</td><td>For the side panel of the piping cover, unscrew the four mounting screws and then remove this panel.</td></tr>
<tr><td>6</td><td>For the rear panel, unscrew the six mounting screws and then remove this panel.</td></tr>
</table>

1.2.2 Removal of Propeller Fan and Fan Motor

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

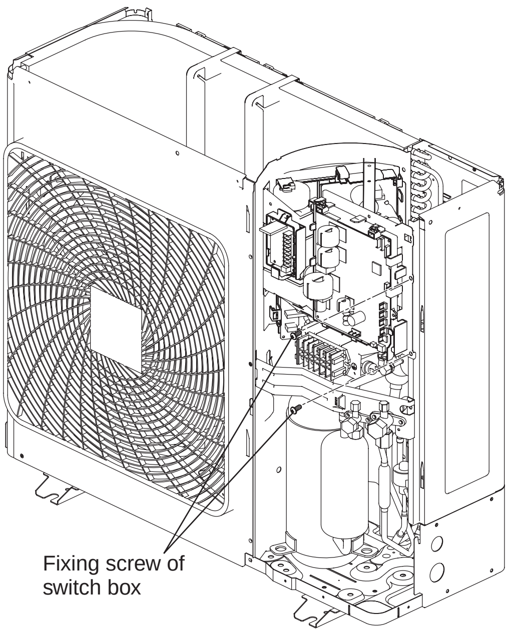
<table>
<tr><th>Step</th><th colspan="2">Procedure</th><th>Points</th></tr>
<tr><td colspan="2">■ Remove the front and top panels in accordance with the Removal Procedure for Outside Panel.</td><td rowspan="4">
</td><td rowspan="4"></td></tr>
<tr><td colspan="2">1 Remove the propeller fan</td></tr>
<tr><td>1</td><td>Unscrew the four screws that fix the air discharge grille and disengage the four clicks at the top and bottom of the grille, and then remove this air discharge grille.</td></tr>
<tr><td>2</td><td>Unfasten the fan lock nut that fixes the propeller fan.</td></tr>
<tr><td colspan="2">2 Remove the fan motor</td><td rowspan="5">
</td><td rowspan="5">■ In order to disconnect the connector, do not pull the lead wire. Hold the connector part and then push the clicks.


■ Cautions in mounting the motor
Be sure to fix the motor lead wire with a clamp. Not heeding this caution will cause the entanglement of the lead wire around the fan, which will result in damage to the fan.</td></tr>
<tr><td>1</td><td>Remove the connector (*) for the fan motor from the PC board.
(*) Symbol of connector:
RZQS71~100B: X206A
RZQS125B:
X206A, X207A</td></tr>
<tr><td>2</td><td>The lead wire is clamped in three places. (Click on partition plate×3 places)</td></tr>
<tr><td>3</td><td>Unscrew the three screws that fix the front panel and then pull up the lead wire.</td></tr>
<tr><td>4</td><td>Unfastening the four lock bolts from the fan motor enables the removal of this fan motor.</td></tr>
</table>

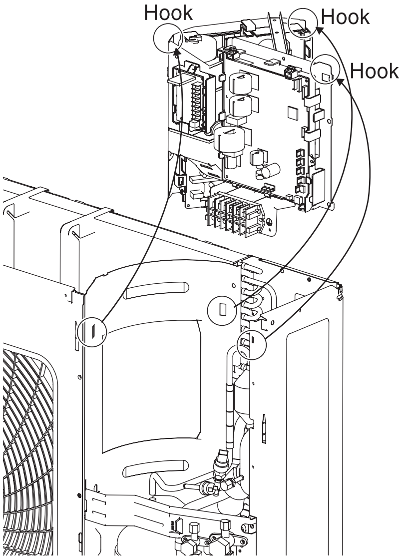
1.2.3 Removal of Switch Box

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

Step	Procedure		Points
■ Remove the front and top panels in accordance with the Removal Procedure for Outside Panel.		 	■ If the top panel cannot be removed, this switch box will be able to be dismounted without removing the top panel.

1	Remove all connectors and Faston terminals, which have a connection to the switch box.
	■ Disconnect the relay connector from the lead wire of the compressor. (Only on RZQS71~100B)
	■ Remove the lead wire of the compressor from the terminal cover of this compressor. (RZQS125B)
	■ Disconnect the relay connector from the lead wire of the reactor. (Only on RZQS125B)
	■ Disconnect the relay connector(s) from the lead wire of the fan motor(s).
	■ Remove the lead wire from the terminal of the high pressure switch (all models) and low pressure switch. (Only on RZQS125B)
	■ Disconnect the respective connectors from the following parts on the PC board.
	  ■ Each thermistor
	  ■ Low pressure sensor (RZQS71~100B)
	  ■ Coil of four way valve
	  ■ Coil of solenoid valve
	  ■ Coil of motorized valve		

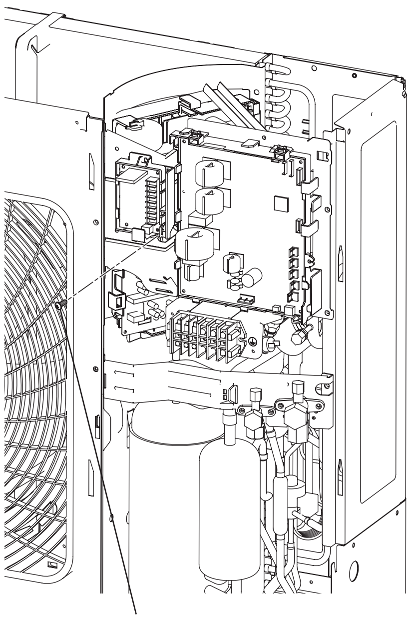
Step	Procedure		Points
2	Unscrew the 2 screws that fix the switch box.		
3	In order to remove the switch box, disengage the three clicks (one on the right and two on the left), and then pull out this switch box frontward or upward.		

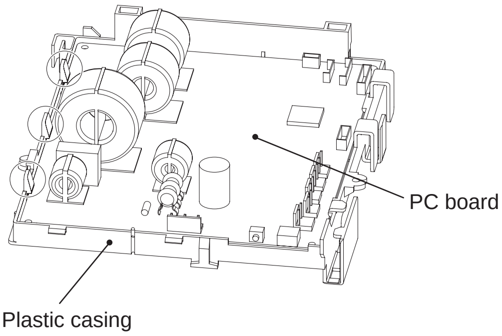
5

1.2.4 Removal of PC Board Ass'y (1)

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

Step	Procedure		Points
■ Remove the front and top panels in accordance with the Removal Procedure for Outside Panel		 Fixing screw of PC board ass'y (for control use)	
1	Remove the PC board (for control use)		
1	Disconnect all connectors. ■ Disconnect the relay connector from the lead wire of the compressor. (Only on RZQS71~100B) ■ Remove the lead wire from the terminal cover of the compressor. ■ Remove the lead wire from the terminal of the high pressure switch (all models) and low pressure switch. (Only on RZQS125B) ■ Disconnect the respective connectors from the following parts on the PC board. ■ Each thermistor ■ Low pressure sensor (RZQS71~100B) ■ Coil of four way valve ■ Coil of solenoid valve ■ Coil of motorized valve		

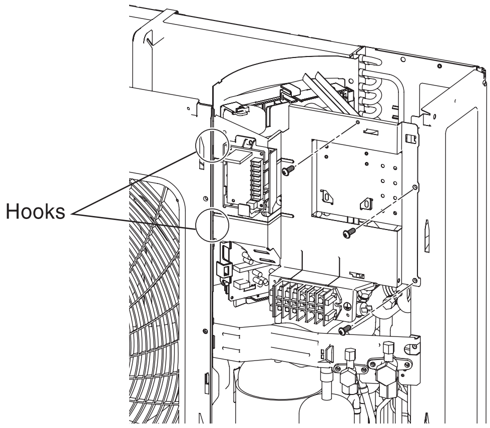
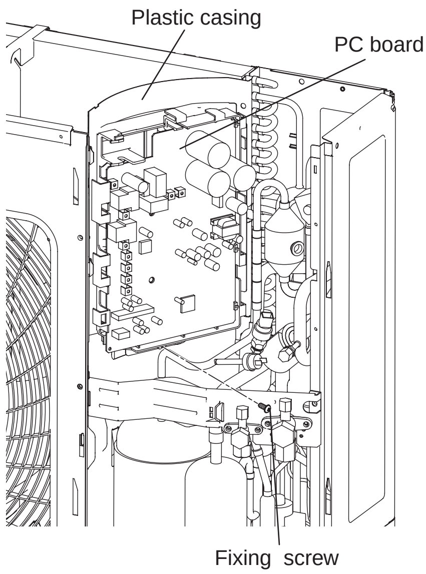
Step	Procedure		Points
2	■ Unscrew a single screw from the PC board ass'y (for control use).		**Note:** The plastic casing and the PC board are bonded to each other. Therefore, for the replacement of these parts, replace by a set of the PC board ass'y.

5

1.2.5 Removal of PC Board Ass'y (2)

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

Step	Procedure		Points
2	Remove the PC board (for inverter use)	  **Note:** The plastic casing and the PC board are bonded to each other. Therefore, for the replacement of these parts, replace by a set of the PC board ass'y.	
1	Disconnect all connectors. Unscrew the three screws that fix the mounting plate of electrical components (for control use).		
2	Disengage the hooks in two places to remove the mounting plate of electrical components (for control use).		
3	In order to remove the PC board ass'y (for inverter use), unscrew a single screw.		

5

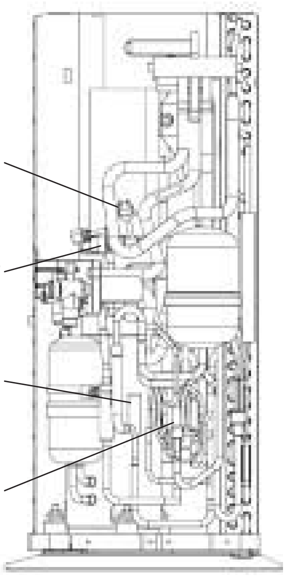
1.2.6 Removal of Low Pressure Sensor, Electronic Expansion Valve, and Others

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

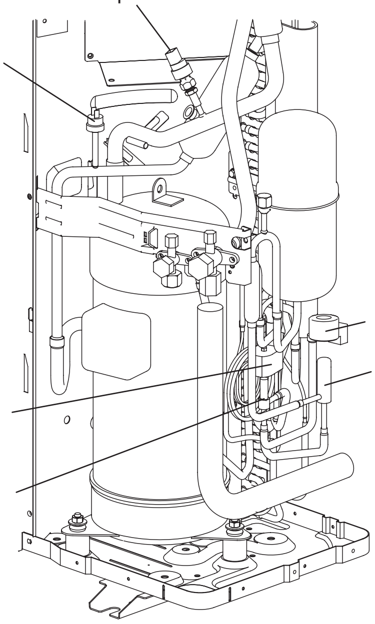
Procedure

Step		Procedure	Points
■		Remove the parts related to the outside panel and the switch box in accordance with the Removal Procedure for Outside Panel and others.	
1		Remove the low pressure sensor. (RZQS71~100B)	
	1	Rotate the connection port on the low pressure sensor with a spanner or the like and then remove this sensor.	
2		Remove the electronic expansion valve	
	1	Pull out the coil from the electronic expansion valve upward.	
	2	Strip off the brazed sections in two places on the body of the valve and then remove this body.	
3		Remove the high pressure switch	
	1	Disconnect the terminals from the high pressure switch and then strip off the brazed section on the switch.	
4		Remove the solenoid valve	
	1	Unscrew a single screw from the coil of the solenoid valve and then remove this coil.	
	2	Strip off the brazed sections in two places on the main unit of the solenoid valve and then remove this body.	
5		Remove the low pressure switch (RZQS125B)	
	1	Disconnect the terminals from the low pressure switch and then strip off the brazed section on the switch.	

■ RZQS71~100B



■ RZQS125B

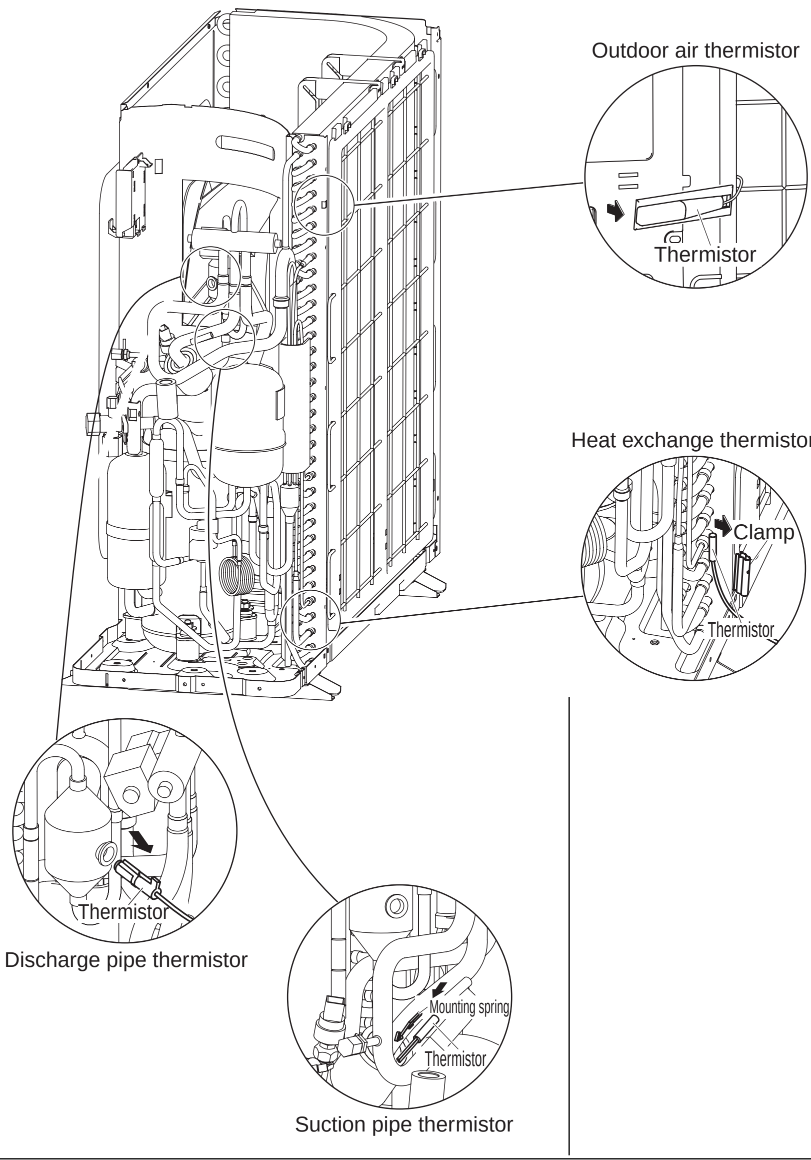


1.2.7 Removal of Thermistor

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

Step	Procedure	Points
■ Remove the front and top panels in accordance with the Removal Procedure for Outside Panel and others	■ RZQS125B	
1	In order to remove the discharge pipe thermistor, pinch the mounting spring and pull out this thermistor.	
2	For the heat exchange thermistor, pull the clamp frontward and then remove this thermistor.	
3	In order to remove the outdoor air thermistor, pull out this thermistor frontward and then slide it to the right.	
4	For the suction pipe thermistor, pull this thermistor frontward and then remove it.	



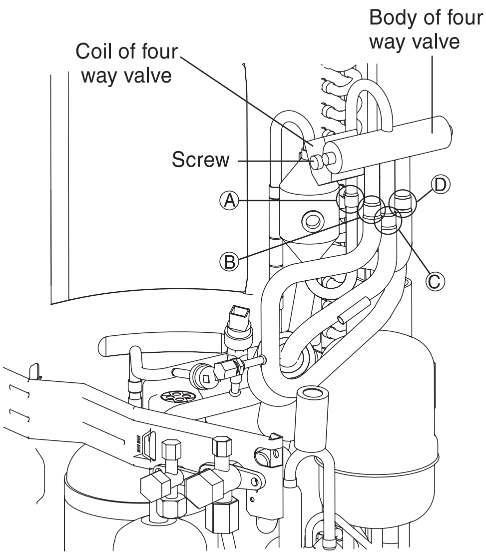
5

1.2.8 Removal of Four Way Valve

Warning

Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

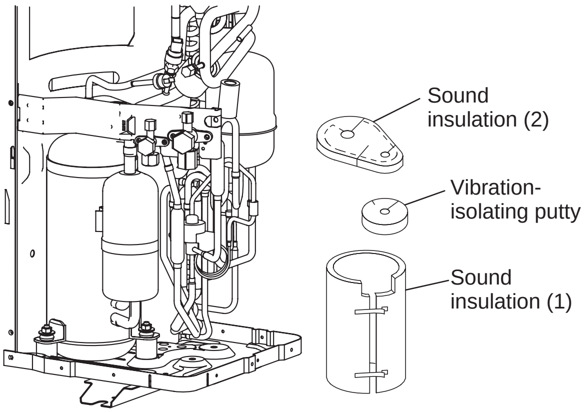
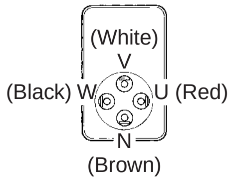
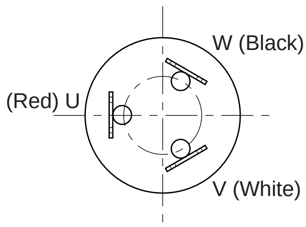
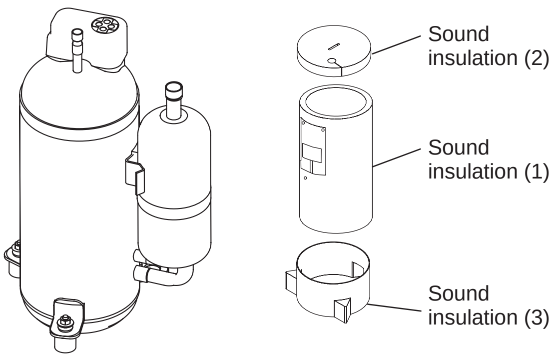
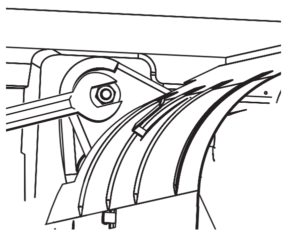
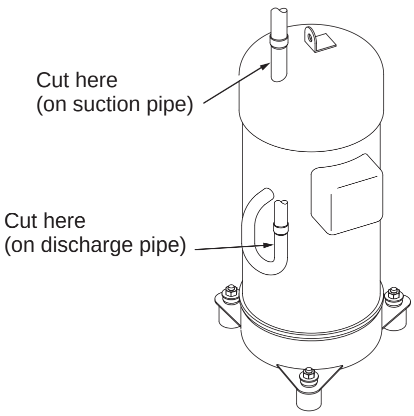
Procedure

<table>
<tr><th>Step</th><th colspan="2">Procedure</th><th>Points</th></tr>
<tr><td colspan="2">■ Remove the parts related to the outside panel and the switch box in accordance with the Removal Procedure for Outside Panel and others.</td><td rowspan="3">
</td><td rowspan="3">■ Check to be sure there are no more refrigerants left in the unit before starting this removal.
■ In order to prevent a gas welding flame from having influence on other pipes, protect them with a sheet or iron plate used for welding operation.
■ Caution:
While in installation of the four way valve, in order to prevent the main unit from reaching a temperature of 120°C or more, expose the valve to a flame while cooling it with a wet rag.</td></tr>
<tr><td>1</td><td>Unscrew a single screw that fixes the coil of the four way valve and then remove this coil.</td></tr>
<tr><td>2</td><td>Strip off the brazed sections in four places on body of the four way valve and then remove this body.</td></tr>
</table>

1.2.9 Removal of Compressor

Warning Be sure to wait 10 minutes or more after turning off all power supplies before disassembling work.

Procedure

Step	Procedure		Points
■	Remove the parts related to the outside panel and the switch box in accordance with the Removal Procedure for Outside Panel and others.	■ RZQS71~100B  	■ Check to be sure there are no more refrigerants left in the unit before starting this removal.
1	Unscrew the five screws from the stop valve mounting plate.		■ Color of terminal pins ■ RZQS71~100B 
2	Disconnect the gas piping and liquid piping.		
3	Push the protrusion from both sides to remove the terminal cover.		■ RZQS125B 
4	Remove the lead wires from the terminal pins.		
5	Remove the sound insulation (1), (2), and (3), and vibration-isolating putty.	■ Compressor for RZQS71~100B  	■ One out of the two nuts that fix the compressor is located outside the partition plate.
6	Unlock the nuts (*) that fix the compressor. A total of three nuts are provided.		
7	Strip off the brazed sections (in two places*). *For RZQS125B Before stripping off the brazed sections, be sure to cut the suction and discharge pipes with a pipe cutter. (See Caution in the column of Points.)	■ Compressor for RZQS125B  	**Caution:** For RZQS125B If the brazed sections are directly stripped off from the pipes, oil may catch fire. Be sure to cut the pipes in advance with a pipe cutter.
8	Lift up the compressor to pull out it.		

Index

Symbols

Numerics

A

B

C

D

E

F

M

O

P

R

S

T

U

W

DAIKIN EUROPE N.V.

Zandvoordestraat 300

B-8400 Ostend - Belgium

www.daikineurope.com

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Prepared in Belgium by Lannoo

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