HITACHI

SERVICE MANUAL

SET FREE SERIES

Heat pump system
Heat recovery system



MODELS

RAS-(8-96)FSXNS2E - air365 Max
RAS-(5-54)FSXNP2E - air365 Max Pro

Cooling & Heating

SMGB0147 rev.0- 01/2024

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1.1 General information

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1.2 Introduction

Hitachi proudly presents the air365 Max and air365 Max Pro models in the SET FREE series. The requirements for air conditioning have diversified in line with the evolution of the space, structure, necessary functions and building design and the new series are designed to meet them.

Because the most suitable unit can be selected from a wide range of models for the standard type air365 Max and the high efficiency type air365 Max Pro, you can create a custom air conditioning environment to satisfy your specific building conditions.

air365 Max and air365 Max Pro are available for heat pump systems (2 pipe system) and heat recovery systems (3 pipe system).

air365 Max : Nominal capacity from 22.4kW to 268kW. Up to 64 indoor units can be connected depending on the model and total combination of power from 50 % up to 200 % (130 % when the system includes any 0.4 or 0.6HP indoor unit). The range consists of 9 modules with different horsepower for each of the heat pump and heat recovery variants.

air365 Max Pro : Nominal capacity from 14kW to 150kW. Up to 64 indoor units can be connected depending on the model and total combination power from 50 % up to 200 % (150 % when the system includes any 0.4 or 0.6HP indoor unit). The range consists of 8 modules for each of the variants.

Model	HP											Combination ratio
	5	6	8	10	12	14	16	18	20	22	24	
air365 Max			●	●	●	●	●	●	●	●	●	50-200 (130) %
air365 Max Pro	●	●	●	●	●	●	●	●				50-200 (150) %

1.3 Applied symbols

During normal air to air heat pump system design work or unit installation, greater attention must be paid in certain situations in order to avoid damage to the unit, the installation or the building or property.

Situations that pose a risk to the safety of those in the surrounding area or to the unit itself are clearly indicated in this technical documentation.

A series of special symbols are used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

DANGER

The text following this symbol contains information and instructions relating directly to your safety, in addition to hazards or unsafe practices which could result in severe personal injuries or death.

Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others in the proximities of the unit.

In the texts following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

The text following this symbol contains information and instructions relating directly to your safety, in addition to hazards or unsafe practices which could result in minor personal injury or product or property damage.

Not taking these instructions into account could lead to minor injuries to you and others in the proximities of the unit.

Not taking these instructions into account could lead to unit damage.

In the texts following the caution symbol you can also find information on safe procedures during unit installation.

NOTE

The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.

Instructions regarding inspections to be made on unit parts or systems may also be included.

1.4 Norms and Regulations

Following Regulation EU No. 517/2014 on Certain Fluorinated Greenhouse gases, it is mandatory to fill in the label attached to the unit with the total amount of refrigerant charged on the installation.

Do not vent R410A into the atmosphere: R410A are fluorinated greenhouse gases covered by the Kyoto protocol global warming potential (GWP) R410A = 2088.

Tn of CO_2 equivalent of fluorinated greenhouse gases contained is calculated by indicated GWP multiply by Total Charge (in kg) indicated in the product label and divided by 1000.

Appropriate refrigerant

The refrigerant used in each unit is identified on the specification label and manuals of the unit. Hitachi shall not be held liable for any failure, trouble, malfunction or accident caused by units illegally charged with refrigerants other than the specified one.

Consequences of charging non-specified refrigerant

It may cause mechanical failure, malfunction and other accidents. It may cause operational failure of protection and safety devices of air conditioners. It may also cause lubrication failure of the sliding part of the compressor due to deterioration of refrigerant oil.

In particular, hydrocarbon refrigerants (such as propane, R441A, R443A, GF-08, etc.) are not allowed, since these are combustible and may cause major accidents such as fire and explosion in case of improper handling.

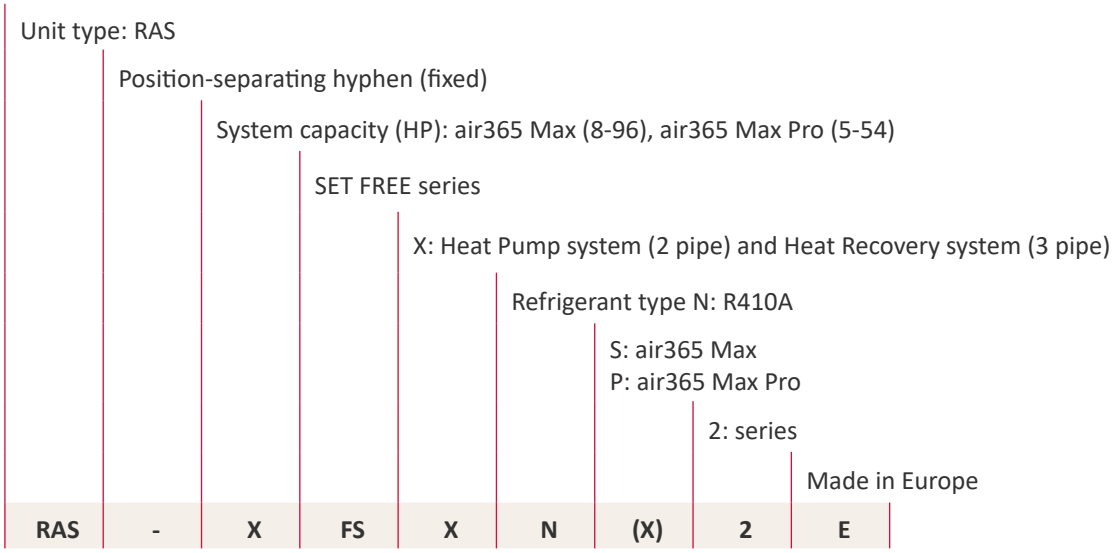
Once a non-specified refrigerant has been charged, no further servicing (including draining of refrigerant) shall be performed, even in case of malfunction. Improper handling of refrigerant may be a cause of fire and explosion, and servicing in such cases may be considered an illegal act.

End clients and costumers shall be informed that servicing is not approved, and the installer who charged the non-specified refrigerant shall be asked to fix the unit.

Hitachi will accept no responsibility for units that have been charged with non-specified refrigerant once.

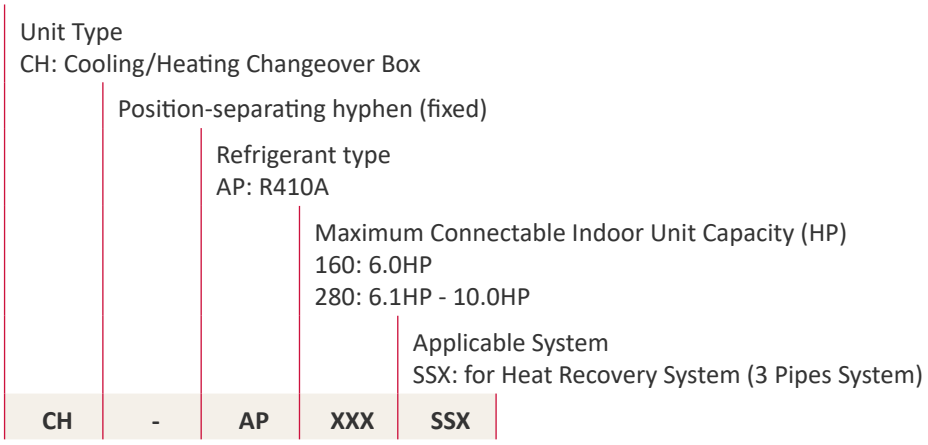
1.5 Product guide

1.5.1 Classification of outdoor unit

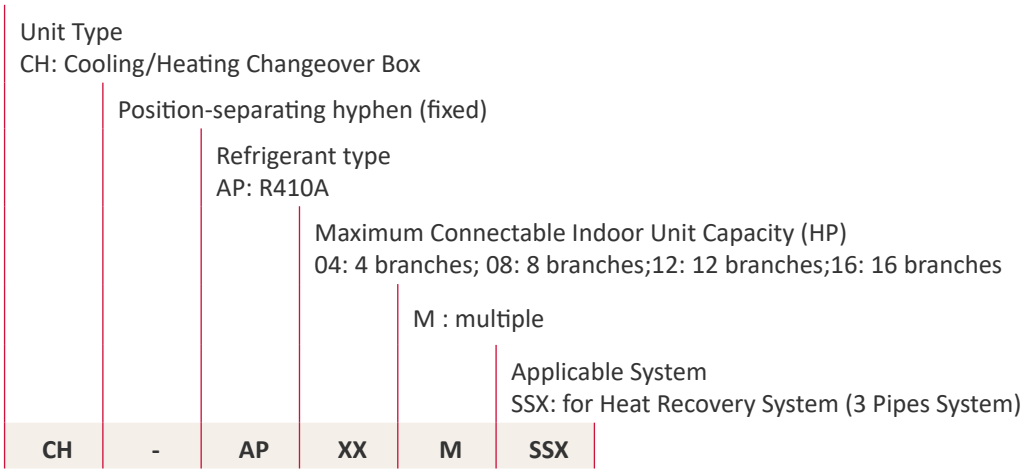


1.5.2 Classification of the CH-Box

◆ CH-Box single



◆ CH-Box multi



1.5.3 Icons description

Icons between brackets mean possible extra operations to the factory-supplied ones (additional accessories, field-supplied accessories or systems might be required).

- Cooling operation
- Heating operation
- Domestic hot water (DHW)
- Additional heater (electrical heater accessory or boiler)
- Swimming pool application
- Solar combination

1.5.4 Product line-up: Outdoor units

air365 Max

Heat recovery: 3 pipe system
Heat pump: 2 pipe system





Unit	Code	Unit	Code	Unit	Code
RAS-8FSXNS2E	7E335010	RAS-14FSXNS2E	7E335030	RAS-20FSXNS2E	7E335039
RAS-10FSXNS2E	7E335011	RAS-16FSXNS2E	7E335031	RAS-22FSXNS2E	7E335051
RAS-12FSXNS2E	7E335012	RAS-18FSXNS2E	7E335032	RAS-24FSXNS2E	7E335040

air365 Max Pro

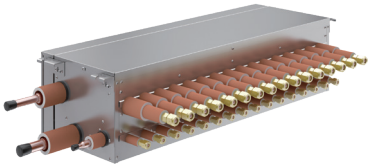
Heat recovery: 3 pipe system
Heat pump: 2 pipe system





Unit	Code	Unit	Code	Unit	Code
RAS-5FSXNP2E	7E335108	RAS-8FSXNP2E	7E335110	RAS-16FSXNP2E	7E335131
RAS-6FSXNP2E	7E335109	RAS-10FSXNP2E	7E335111	RAS-18FSXNP2E	7E335132
		RAS-12FSXNP2E	7E335112		
		RAS-14FSXNP2E	7E335130		

1.5.5 Product line-up: CH-Box

CH-Box				
Single branch		CH-AP160SSX	60292158	
		CH-AP280SSX	60292159	
Multiple	4 Branch	CH-AP04MSSX	60292160	
	8 Branch	CH-AP08MSSX	60292161	
	12 Branch	CH-AP12MSSX	60292162	
	16 Branch	CH-AP16MSSX	60292163	

1.5.6 Base units

◆ air365 Max

HP	8	10	12	14	16
Model	RAS-8FSXNS2E	RAS-10FSXNS2E	RAS-12FSXNS2E	RAS-14FSXNS2E	RAS-16FSXNS2E

HP	18	20	22	24
Model	RAS-18FSXNS2E	RAS-20FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E

◆ air365 Max Pro

HP	5	6	8	10	12
Model	RAS-5FSXNP2E	RAS-6FSXNP2E	RAS-8FSXNP2E	RAS-10FSXNP2E	RAS-12FSXNP2E

HP	14	16	18
Model	RAS-14FSXNP2E	RAS-16FSXNP2E	RAS-18FSXNP2E

1.5.7 Build up capacity combination

	Base unit	Build up the total capacity Heat Recovery (3 pipe system)	Build up the total capacity Heat Pump (2 pipe system)
air365 Max	from 8 to 24 HP	from 8 to 54 HP	from 8 to 96 HP
air365 Max Pro	from 5 to 18 HP	from 5 to 54 HP	from 5 to 54 HP

1.5.8 Unit combinations

◆ air365 Max

Models from 26 HP to 96 HP range consist of the combination of two, three or four base units, according to the details provided in the following tables.

⚠ CAUTION

Only the combinations in the table are allowed, not being possible to mix heat pump system (2 pipes system) and heat recovery system (3 pipes system) in the same combination. It is not possible to mix air365 Max and air365 Max Pro units either.

Combination of base units (heat recovery / heat pump system)

HP	26	28	30	32	34
Model	RAS-26FSXNS2E	RAS-28FSXNS2E	RAS-30FSXNS2E	RAS-32FSXNS2E	RAS-34FSXNS2E
Combination	RAS-14FSXNS2E	RAS-16FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E
	RAS-12FSXNS2E	RAS-12FSXNS2E	RAS-12FSXNS2E	RAS-14FSXNS2E	RAS-16FSXNS2E
	-	-	-	-	-
	-	-	-	-	-

HP	36	38	40	42	44
Model	RAS-36FSXNS2E	RAS-38FSXNS2E	RAS-40FSXNS2E	RAS-42FSXNS2E	RAS-44FSXNS2E
Combination	RAS-18FSXNS2E	RAS-22FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-22FSXNS2E
	RAS-18FSXNS2E	RAS-16FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-22FSXNS2E
	-	-	-	-	-
	-	-	-	-	-

HP	46	48	50	52	54
Model	RAS-46FSXNS2E	RAS-48FSXNS2E	RAS-50FSXNS2E	RAS-52FSXNS2E	RAS-54FSXNS2E
Combination	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E
	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E
	-	-	RAS-14FSXNS2E	RAS-16FSXNS2E	RAS-18FSXNS2E
	-	-	-	-	-

Combinations of base units only for heat pump system

DSW7 pin4 must be set OFF in all the modules of the combination.

HP	56	58	60	62	64
Model	RAS-56FSXNS2E	RAS-58FSXNS2E	RAS-60FSXNS2E	RAS-62FSXNS2E	RAS-64FSXNS2E
Combination	RAS-22FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E
	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-22FSXNS2E	RAS-22FSXNS2E
	RAS-16FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E
	-	-	-	-	-

HP	66	68	70	72	74
Model	RAS-66FSXNS2E	RAS-68FSXNS2E	RAS-70FSXNS2E	RAS-72FSXNS2E	RAS-74FSXNS2E
Combination	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-22FSXNS2E
	RAS-24FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-18FSXNS2E
	RAS-18FSXNS2E	RAS-22FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-18FSXNS2E
	-	-	-	-	RAS-16FSXNS2E

HP	76	78	80	82	84
Model	RAS-76FSXNS2E	RAS-78FSXNS2E	RAS-80FSXNS2E	RAS-82FSXNS2E	RAS-84FSXNS2E
Combination	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E
	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-22FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E
	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E
	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E

HP	86	88	90	92	94
Model	RAS-86FSXNS2E	RAS-88FSXNS2E	RAS-90FSXNS2E	RAS-92FSXNS2E	RAS-94FSXNS2E
Combination	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E
	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E	RAS-24FSXNS2E
	RAS-22FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E	RAS-22FSXNS2E	RAS-24FSXNS2E
	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-18FSXNS2E	RAS-22FSXNS2E	RAS-22FSXNS2E

HP	96
Model	RAS-96FSXNS2E
Combination	RAS-24FSXNS2E
	RAS-24FSXNS2E
	RAS-24FSXNS2E
	RAS-24FSXNS2E

◆ air365 Max Pro

Models from 20 HP to 54 HP range consist of the combination of two, three or four base units, according to the details provided in the following tables.

⚠ CAUTION

Only the combinations in the table are allowed, not being possible to mix heat pump system (2 pipes system) and heat recovery system (3 pipes system) in the same combination. It is not possible to mix air365 Max and air365 Max Pro units either.

Combination of base units (heat recovery / heat pump system)

HP	20	22	24	26	28
Model	RAS-20FSXNP2E	RAS-22FSXNP2E	RAS-24FSXNP2E	RAS-26FSXNP2E	RAS-28FSXNP2E
Combination	RAS-10FSXNP2E	RAS-12FSXNP2E	RAS-12FSXNP2E	RAS-16FSXNP2E	RAS-16FSXNP2E
	RAS-10FSXNP2E	RAS-10FSXNP2E	RAS-12FSXNP2E	RAS-10FSXNP2E	RAS-12FSXNP2E
	-	-	-	-	-
	-	-	-	-	-

HP	30	32	34	36	38
Model	RAS-30FSXNP2E	RAS-32FSXNP2E	RAS-34FSXNP2E	RAS-36FSXNP2E	RAS-38FSXNP2E
Combination	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-14FSXNP2E
	RAS-12FSXNP2E	RAS-14FSXNP2E	RAS-16FSXNP2E	RAS-18FSXNP2E	RAS-12FSXNP2E
	-	-	-	-	RAS-12FSXNP2E
	-	-	-	-	-

HP	40	42	44	46	48
Model	RAS-40FSXNP2E	RAS-42FSXNP2E	RAS-44FSXNP2E	RAS-46FSXNP2E	RAS-48FSXNP2E
Combination	RAS-14FSXNP2E	RAS-14FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E
	RAS-14FSXNP2E	RAS-14FSXNP2E	RAS-14FSXNP2E	RAS-14FSXNP2E	RAS-16FSXNP2E
	RAS-12FSXNP2E	RAS-14FSXNP2E	RAS-12FSXNP2E	RAS-14FSXNP2E	RAS-14FSXNP2E
	-	-	-	-	-

HP	50	52	54
Model	RAS-50FSXNP2E	RAS-52FSXNP2E	RAS-54FSXNP2E
Combination	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E
	RAS-18FSXNP2E	RAS-18FSXNP2E	RAS-18FSXNP2E
	RAS-14FSXNP2E	RAS-16FSXNP2E	RAS-18FSXNP2E
	-	-	-

1.5.9 Accessory code list

Hitachi offers a range of different accessories and remote control systems that can be used with the air365 outdoor units. Please consult the corresponding Technical Catalogue for controls.

Name	Description	Code	Figure
MC-20AN1	Branch pipe (OU pipe connection kit)	70526209	
MC-21AN1		70526210	
MC-30AN1		70526211	
MC-NP31SA		60292293	
MC-NP40SA		60292294	
MC-20XN1		70526309	
MC-21XN1		70526310	
MC-30XN1		70526311	
DBS-TP10A	Drain Boss	60291683	
E-102SN4	Line branch	70524201	
E-162SN4		70524202	
E-242SN3		70524104	
E-302SN3		70524105	
MW-NP2682A3		60292295	
E-52XN3		70525100	
E-102XN3		70525101	
E-162XN3		70525102	
E-202XN3		70525103	
E-242XN3		70525104	
E-322XN3		70525106	
MH-84AN1	Header branch	70522009	
MH-108AN		70522008	
MH-108XN		70523108	

1.5.10 Product line-up: indoor units

◆ RCI and RCIM indoor units

RCI (R32 / R410A)		RCIM (R32 / R410A)	
			
4-way cassette		4-way cassette (compact)	
Unit	Code	Unit	Code
		RCIM-0.4FSRE (*1)	7E414148
		RCIM-0.6FSRE (*2)	7E414137
		RCIM-0.8FSRE	7E414100
RCI-1.0FSR1	7C405314	RCIM-1.0FSRE	7E414101
RCI-1.5FSR1	7C405315	RCIM-1.5FSRE	7E414102
RCI-2.0FSR1	7C405316	RCIM-2.0FSRE	7E414103
RCI-2.5FSR1	7C405317	RCIM-2.5FSRE	7E414104
RCI-3.0FSR1	7C405318		
RCI-4.0FSR1	7C405320		
RCI-5.0FSR1	7C405321		
RCI-6.0FSR1	7C405322		
Panel		Panel	
P-N23NA2 (without Motion Sensor)	70532000	P-AP56NAM (without Motion Sensor)	70533000
P-AP160KA3 (Standard panel without Motion Sensor, black)	60297337	P-AP56NAMS (Motion Sensor embedded)	70533100
P-AP160NAE2 (with motion and radiation sensor)	60297328	P-AP56NAMR (Receiver kit embedded)	70533500
P-GP160NAP (Silent-Iconic panel, white)	60297331		
P-GP160KAP (Silent-Iconic panel, black)	60297339		
P-GP160NAPU (Silent-Iconic panel, with elevating grille)	60297334		

The RCI and RCIM models must be used in combination with the indicated panels.

*(*1): Follow the detailed information about the combinability and restrictions for 0.4 HP Indoor Units, which can only be used in combination with SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME), SET FREE Sigma (RAS-FSXN(S/P)E) and air365 Max(Pro) (RAS-FSXN(S/P)2E).*

*(*2): 0.6 HP Indoor Units can only be used in combination with SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME), SET FREE Sigma (RAS-FSXN(S/P)E) and air365 Max(Pro) (RAS-FSXN(S/P)2E).*

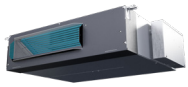
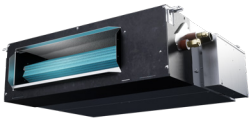
◆ RCD and RPC indoor units

RCD (R32 / R410A)				RPC (R32 / R410A)	
					
2-way cassette				Ceiling type	
Unit	Code	Unit	Code	Unit	Code
RCD-0.8FSR (*)	60279168				
RCD-1.0FSR (*)	60279169				
RCD-1.5FSR (*)	60279170			RPC-1.5FSR	60279267
RCD-2.0FSR (*)	60279171			RPC-2.0FSR	60279268
RCD-2.5FSR (*)	60279172			RPC-2.5FSR	60279269
RCD-3.0FSR (*)	60279173			RPC-3.0FSR	60279270
		RCD-4.0FSR (*)	60279174	RPC-4.0FSR	60279271
		RCD-5.0FSR (*)	60279175	RPC-5.0FSR	60279272
		RCD-6.0FSR (*)	60279176	RPC-6.0FSR	60279273
Panel		Panel			
P-AP90DNA	60297319	P-AP160DNA	60297320		

The RCD models must be used in combination with the indicated panels.

(*): 1 indoor unit combinations with UTOPIA Prime / UTOPIA IVX Prime and UTOPIA IVX Standard / Premium series are not allowed.

◆ RPI indoor units

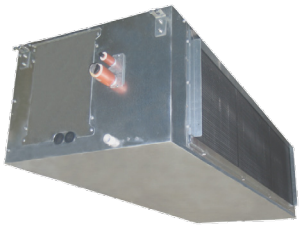
RPIL (R32 / R410A)	RPI (R32 / R410A)	RPIH (R32 / R410A)
		

Ducted indoor units					
Unit	Code	Unit	Code	Unit	Code
RPIL-0.4FSR1E(*1)	7E426062				
RPIL-0.6FSR1E (*2)	7E426050				
RPIL-0.8FSR1E	7E426000				
RPIL-1.0FSR1E	7E426001				
RPIL-1.5FSR1E	7E426063	RPI-1.5FSR1E	7E426064		
		RPI-2.0FSR1E	7E426003		
		RPI-2.5FSR1E	7E426004		
		RPI-3.0FSR1E	7E426005		
		RPI-4.0FSR1E	7E426034	RPIH-4.0FSR1E	7E426045
		RPI-5.0FSR1E	7E426035	RPIH-5.0FSR1E	7E426046
		RPI-6.0FSR1E	7E426036	RPIH-6.0FSR1E	7E426047

*(*1): Follow the detailed information about the combinability and restrictions for 0.4 HP Indoor Units, which can only be used in combination with current SET FREE Sigma (RAS-FSXN(S/P)E), air365 Max (Pro) (RAS-FSXN(S/P)2E) series and SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME).*

*(*2) 0.6 HP Indoor Units can only be used in combination with SET FREE Sigma (RAS-FSXN(S/P)E), air365 Max (Pro) (RAS-FSXN(S/P)2E) series and SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME).*

RPI (R410A)





Ducted indoor units

Unit	Code	Unit	Code
RPI-8.0FSN3E (*1) RPI-8.0FSN3E-f (*1)	7E424010 7E424410		
RPI-10.0FSN3E (*1) RPI-10.0FSN3E-f (*1)	7E424011 7E424411		
		RPI-16.0FSN3PE (*2) RPI-16.0FSN3PE-f (*2)	7E425038 7E425438
		RPI-20.0FSN3PE (*2) RPI-20.0FSN3PE-f (*2)	7E425039 7E425439

*(*1): In combination with UTOPIA Prime / UTOPIA IVX Prime and UTOPIA IVX Standard / Premium series: 1 indoor unit system only.*

*(*2): RPI-FSN3PE(-f) can only be used in combination with SET FREE Sigma (RAS-FSXN(S/P)E) and air365 Max (Pro) (RAS-FSXN(S/P)2E) series.*

◆ RPK, RPF and RPFI indoor units

RPK (R32 / R410A)		RPF (R410A)		RPFI (R410A)	
					
Wall type		Floor type		Floor concealed type	
Unit	Code	Unit	Code	Unit	Code
RPK-0.4FSRM (*1)	60279204				
RPK-0.4FSRHM (*1)	60279221				
RPK-0.6FSRM (*2)	60279205				
RPK-0.6FSRHM (*2)	60279222				
RPK-0.8FSRM	60279206				
RPK-0.8FSRHM	60279223				
RPK-1.0FSRM	60279207				
RPK-1.0FSRHM	60279224	RPF-1.0FSN2E	7E450001	RPFI-1.0FSN2E	7E460001
RPK-1.5FSRM	60279208				
RPK-1.5FSRHM	60279225	RPF-1.5FSN2E	7E450002	RPFI-1.5FSN2E	7E460002
RPK-2.0FSRM	60279209	RPF-2.0FSN2E (*3)	7E450003	RPFI-2.0FSN2E (*3)	7E460003
RPK-2.5FSRM	60279210	RPF-2.5FSN2E (*3)	7E450004	RPFI-2.5FSN2E (*3)	7E460004
RPK-3.0FSRM	60279211				
RPK-4.0FSRM	60279212				
Expansion valve kit (*4)					
EV-1.5N1 (*4)	60291791				

*(*1): Follow the detailed information about the combinability and restrictions for 0.4 HP Indoor Units, which can only be used in combination with current SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME), SET FREE Sigma (RAS-FSXN(S/P)E) and air365 Max (Pro) (RAS-FSXN(S/P)2E).*

*(*2): 0.6 HP Indoor Units can only be used in combination with SET FREE Mini (RAS-(4-6)FSNME, RAS-(8-12)FSXNME), SET FREE Sigma (RAS-FSXN(S/P)E) and air365 Max (Pro) (RAS-FSXN(S/P)2E)*

*(*3) 1 indoor unit combinations with UTOPIA Prime / UTOPIA IVX Prime and UTOPIA IVX Standard / Premium series not allowed.*

*(*4) For RPK-(0.4-1.5)FSRHM models only.*

1.5.11 Product line-up: HYDRO FREE

◆ Low temperature

RWLT (R410A)					
					
Unit	Code	Unit	Code	Unit	Code
RWLT-3.0VN1E	7E476018	-	-	-	-
		RWLT-5.0VN1E	7E476021	-	-
		-	-	RWLT-10.0VN1E	7E476024

NOTE

The PC-ARFWE controller required for the operation of the HYDRO FREE Low temperature is factory built in these models.

◆ High temperature

RWHT (R410A)	
~ 230V 50Hz	
	
Unit	Code
RWHT-5.0VNF1E	7E484021

NOTE

The PC-ARFWE controller required for the operation of the HYDRO FREE High temperature is not factory supplied in these models, and must be ordered as an accessory separately.

HYDRO FREE compatibility

RWLT-(3.0-10.0)VN1E and RWHT-5.0VNF1E are compatible only with the following SET FREE series:

- SET FREE Sigma - RAS-FSXN(P/S)E(1)
- air365 Max and air365 Max Pro - RAS-FSXN(S/P)2E
- Set Free Mini - RAS-(8-12)FSXNME(1) (DSW3 setting is required)

1.5.12 Product line-up: KPI energy recovery units

KPI			
			
Energy recovery		Active (Energy Recovery+ R410A DX section)	
Unit	Code	Unit	Code
KPI-252E4E	70603000		
KPI-502E4E	70603001	KPI-502X4E	70603201
KPI-802E4E	70603002	KPI-802X4E	70603202
KPI-1002E4E	70603003	KPI-1002X4E	70603203
KPI-1502E4E	70603004		
KPI-2002E4E	70603005		

1.5.13 Product line-up: DX-Interface

DX-Interface EVX (R410A)		
	Unit	Code
 Control box	EXV-2.0E2	7E611000
	EXV-2.5E2	7E611001
	EXV-3.0E2	7E611002
	EXV-4.0E2	7E611003
	EXV-5.0E2	7E611004
	EXV-6.0E2	7E611005
 Expansion valve box	EXV-8.0E2	7E611006
	EXV-10.0E2	7E611007

Electrical wiring

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2.1 Outdoor unit

2.1.1 General information

⚠ CAUTION

- *Before any work to the electrical wiring or regular inspections, switch off the mains power supply of the indoor and outdoor units. Wait three minutes before starting installation or maintenance work.*
- *Make sure that the interior and exterior fans have come to a complete standstill before starting work on the electrical wiring or regular inspections.*
- *Protect cables, the drainage pipe, electrical components, etc. from rodents and insects; otherwise these might damage unprotected components and this could result in fire.*
- *Do not allow cables to come into contact with the refrigerant pipes, metal edges, printed circuit boards (PCB) or the electric components inside the unit; the cables may be damaged and this could result in fire.*
- *Firmly secure the cables inside the indoor unit with plastic flanges.*
- *Before starting work on the installation of the outdoor unit, place the DSW7 in the correct position according to the system type (heat pump or heat recovery).*

⚠ DANGER

- ***Use an earth leakage breaker with medium sensitivity, and an activation speed of 0.1 s or less. If this is not fitted, there is a risk of electric shock and/or fire.***
- ***Install an earth leakage breaker, fuse and circuit breaker for each outdoor unit power line. Not fitting it may cause an electric shock or fire.***

General verifications

1 Make sure the electric components supplied by the fitter (main power switches, circuit breakers, wires, connectors and connection terminals) have been selected correctly in line with the electrical data given.

   a. The electricity supply to the unit should be via an exclusive power control switch and protective circuit breaker, certified and installed in accordance with local or national safety regulations.

   b. The electricity supply for the outdoor and indoor units should be separate. Connect the voltage supply wiring for each group of indoor units to the same outdoor unit (maximum capacity for each group of indoor units: 26HP).

   c. For heat recovery systems, the CH-Box and the indoor unit of the same refrigerant cycle can be supplied from the same mains power switch.

2 Check that the supply voltage is between 90 and 110 % of the rated voltage. Where the voltage capacity is too low, it will not be possible to start the system due to the drop in voltage.

3 Sometimes, the refrigeration/heating system is not able to operate correctly in the following cases:

✓ When the system is supplied from the same supply line as other major consumers (heavy machinery, power inverter systems, cranes, welding machinery, etc).

✓ When the supply cables of the major consumers and the refrigeration/heating system are very close together.

In these cases, induction in the wiring to the refrigeration/heating system may arise due to a rapid change in the electricity consumption of the above consumers and their start-up. Therefore before starting installation work, check the regulations and standards concerning adequate protection of the power supply line.

NOTE

For further information, please refer to the applicable legislation in the country in which the unit is to be fitted.

4 During the preliminary preparation work of the electricity supply line for the unit, the provisions in local and national legislation must never be violated.

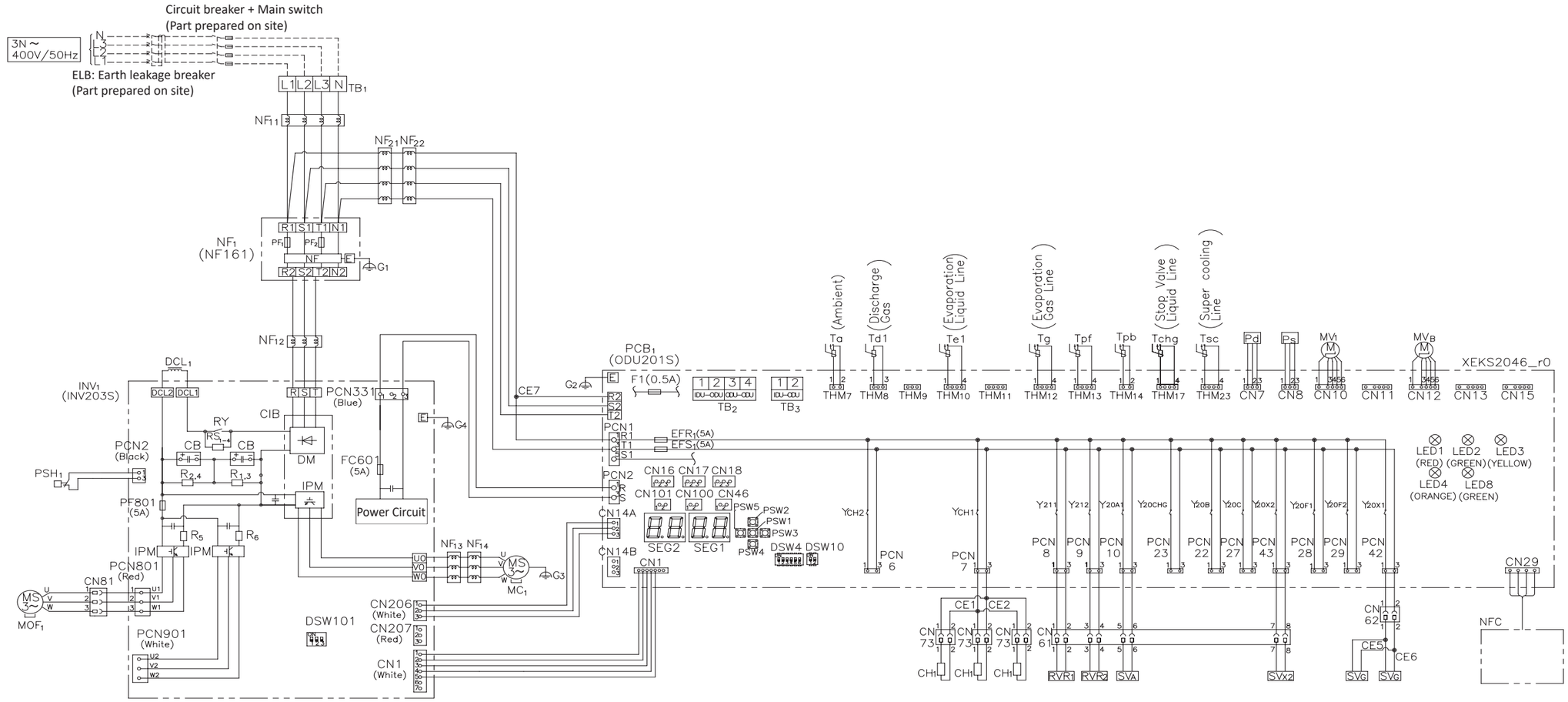
5 Check that the earth cable is correctly connected.

DANGER

- ***Never connect the earth cable to the refrigerant pipes. The gas in the pipes could cause a fire.***
- ***Do not connect the earth cable to the lighting rod. The electrical potential of earth would increase abnormally.***

2.1.2 Electrical wiring diagrams of the outdoor units

◆ RAS-(8-12)FSXNS2E/RAS-(5-6)FSXNP2E



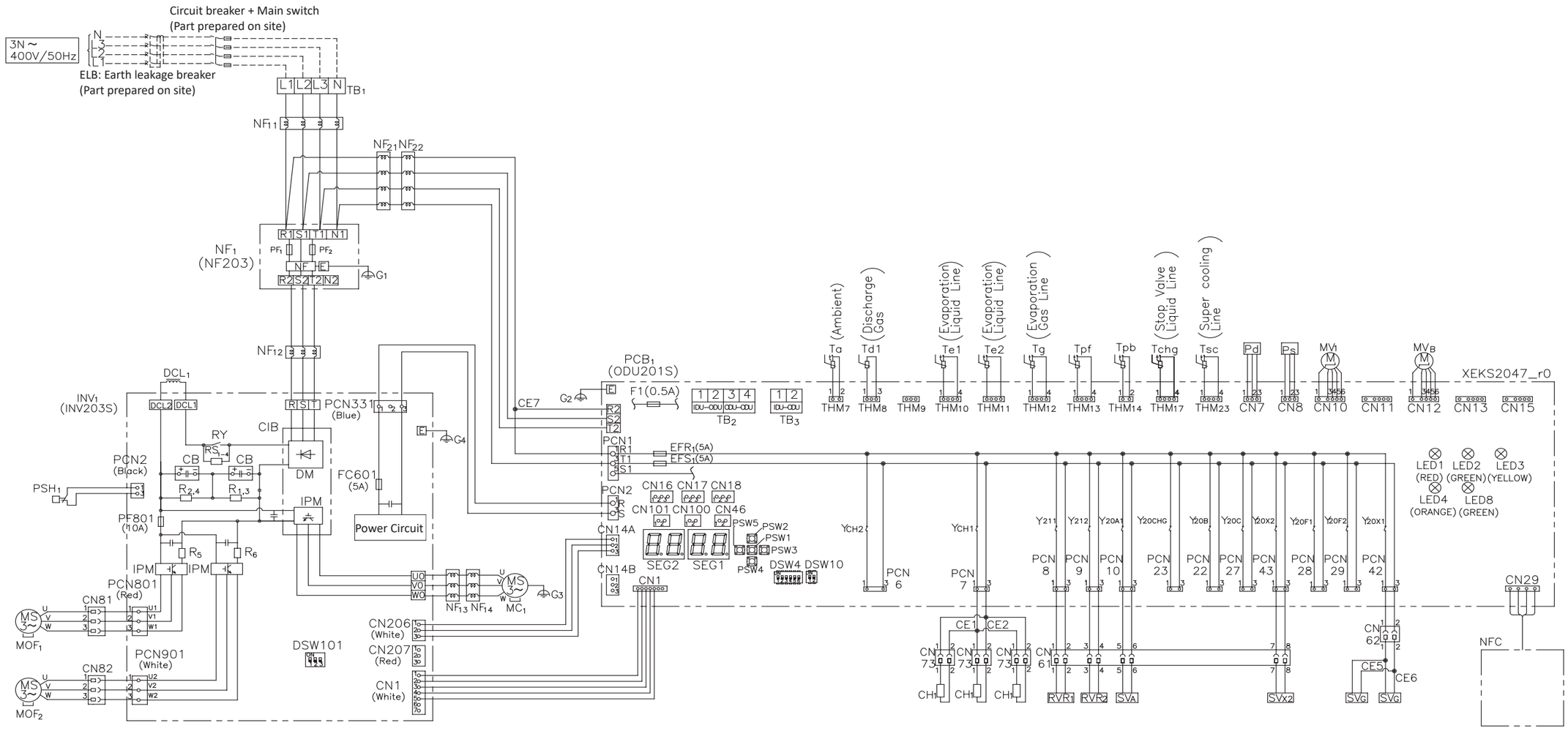
Mark	Name
CH_1	Crankcase heater
CN16	Connector for external output (Optional functions)
CN17,18	Connector for external input (Optional functions)
CN46	Connector for control software installation
CN100	Connector for EEPROM access (data logging)
CN101	Connector for H-LINKII
DCL_1	Reactor
$DSW_{4,10}$	Dip switch (PCB)
DSW_{101}	Dip switch (Inverter)
$EF_{R1,S1}$	Fuse (For operating circuit)
FC_{601}	Fuse (For control circuit)

Mark	Name
$G_{1\sim4}$	Grounding (Field wiring)
INV_1	Inverter PCB
LED_1	Signal light (Red) for power status
LED_2	Signal light (Green) for INV communication
LED_3	Signal light (Yellow) for H-LINK communication
LED_4	Signal light (Orange) for ODU-ODU communication
LED_8	Signal light (Green) for communication
MC_1	Motor for compressor
MOF_1	Motor for outdoor fan
$MV_{1,8}$	Electrical expansion valve
NF_1	Noise filter
$NF_{11\sim22}$	Noise filter (For harnesses)

Mark	Name
NFC	PCB control
PCB_1	PCB control
Pd	Sensor for refrigerant pressure (Discharge side)
Ps	Sensor for refrigerant pressure (Suction side)
PSH_1	Pressure switch for protection
$PSW_{1\sim5}$	Push button switch
RVR_1	Reversing valve relay (For high/low pressure switching)
RVR_2	Reversing valve relay (For cooling/heating switching)
$SEG_{1,2}$	Alarm display
SV_A	Solenoid valve (For high/low pressure bypass)
SV_G	Solenoid valve (For high/low pressure cutoff)

Mark	Name
SV_{X2}	Solenoid valve (For super cooling bypass)
TB_1	Terminal block for power source wiring
$TB_{2,3}$	Terminal block for communication source wiring
$THM_{7\sim23}$	Thermistor
Y_{CH1}	Auxiliary relay for crankcase heater (CH_1)
Y_{211}	Auxiliary relay for reversing valve relay (RVR_1)
Y_{212}	Auxiliary relay for reversing valve relay (RVR_2)
Y_{20A1}	Auxiliary relay for solenoid valve (SV_A)
Y_{20X1}	Auxiliary relay for solenoid valve (SV_G)
Y_{20X2}	Auxiliary relay for solenoid valve (SV_{X2})

◆ RAS-(14-18)FSXNS2E/RAS-(8-14)FSXNP2E



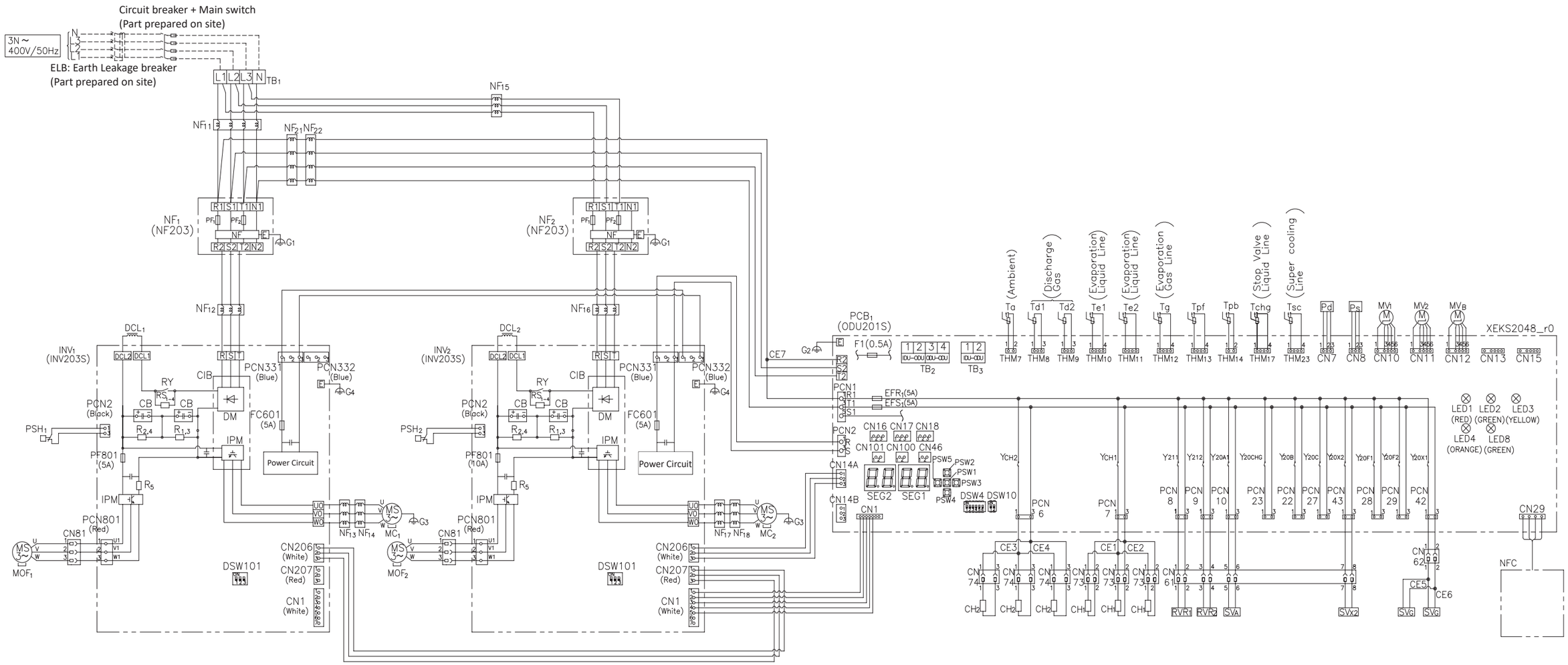
Mark	Name
CH_1	Crankcase heater
CN16	Connector for external output (Optional functions)
CN17,18	Connector for external input (Optional functions)
CN46	Connector for control software installation
CN100	Connector for EEPROM access (data logging)
CN101	Connector for H-LINKII
DCL_1	Reactor
$DSW_{4,10}$	Dip switch (PCB)
DSW_{101}	Dip switch (Inverter)
$EF_{R1,S1}$	Fuse (For operating circuit)
FC_{601}	Fuse (For control circuit)

Mark	Name
$G_{1\sim4}$	Grounding (Field wiring)
INV_1	Inverter PCB
LED_1	Signal light (Red) for power status
LED_2	Signal light (Green) for INV communication
LED_3	Signal light (Yellow) for H-LINK communication
LED_4	Signal light (Orange) for ODU-ODU communication
LED_8	Signal light (Green) for communication
MC_1	Motor for compressor
$MOF_{1,2}$	Motor for outdoor fan
$MV_{1,B}$	Electrical expansion valve
NF_1	Noise filter
$NF_{11\sim22}$	Noise filter (For harnesses)

Mark	Name
NFC	PCB control
PCB_1	PCB control
Pd	Sensor for refrigerant pressure (Discharge side)
Ps	Sensor for refrigerant pressure (Suction side)
PSH_1	Pressure switch for protection
$PSW_{1\sim5}$	Push button switch
RVR_1	Reversing valve relay (For high/low pressure switching)
RVR_2	Reversing valve relay (For cooling/heating switching)
$SEG_{1,2}$	Alarm display
SV_A	Solenoid valve (For high/low pressure bypass)
SV_G	Solenoid valve (For high/low pressure cutoff)

Mark	Name
SV_{X2}	Solenoid valve (For super cooling bypass)
TB_1	Terminal block for power source wiring
$TB_{2,3}$	Terminal block for communication source wiring
$THM_{7\sim23}$	Thermistor
Y_{CH1}	Auxiliary relay for crankcase heater (CH_1)
Y_{211}	Auxiliary relay for reversing valve relay (RVR_1)
Y_{212}	Auxiliary relay for reversing valve relay (RVR_2)
Y_{20A1}	Auxiliary relay for solenoid valve (SV_A)
Y_{20X1}	Auxiliary relay for solenoid valve (SV_G)
Y_{20X2}	Auxiliary relay for solenoid valve (SV_{X2})

◆ RAS-(20-24)FSXNS2E/RAS-(16-18)FSXNP2E



Mark	Name
$CH_{1,2}$	Crankcase heater
CN16	Connector for external output (Optional functions)
CN17,18	Connector for external input (Optional functions)
CN46	Connector for control software installation
CN100	Connector for EEPROM access (data logging)
CN101	Connector for H-LINKII
$DCL_{1,2}$	Reactor
$DSW_{4,10}$	Dip switch (PCB)
DSW_{101}	Dip switch (Inverter)
$EF_{R1,S1}$	Fuse (For operating circuit)
FC_{601}	Fuse (For control circuit)

Mark	Name
$G_{1\sim4}$	Grounding (Field wiring)
$INV_{1,2}$	Inverter PCB
LED_1	Signal light (Red) for power status
LED_2	Signal light (Green) for INV communication
LED_3	Signal light (Yellow) for H-LINK communication
LED_4	Signal light (Orange) for ODU-ODU communication
LED_8	Signal light (Green) for communication
$MC_{1,2}$	Motor for compressor
$MOF_{1,2}$	Motor for outdoor fan
$MV_{1,2,B}$	Electrical expansion valve
$NF_{1,2}$	Noise filter
$NF_{11\sim22}$	Noise filter (For harnesses)

Mark	Name
NFC	PCB control
PCB_1	PCB control
Pd	Sensor for refrigerant pressure (Discharge side)
Ps	Sensor for refrigerant pressure (Suction side)
$PSH_{1,2}$	Pressure switch for protection
$PSW_{1\sim5}$	Push button switch
RVR_1	Reversing valve relay (For high/low pressure switching)
RVR_2	Reversing valve relay (For cooling/heating switching)
$SEG_{1,2}$	Alarm display
SV_A	Solenoid valve (For high/low pressure bypass)
SV_G	Solenoid valve (For high/low pressure cutoff)

Mark	Name
SV_{X2}	Solenoid valve (For super cooling bypass)
TB_1	Terminal block for power source wiring
$TB_{2,3}$	Terminal block for communication source wiring
$THM_{7\sim23}$	Thermistor
$Y_{CH1,2}$	Auxiliary relay for crankcase heater ($CH_{1,2}$)
Y_{211}	Auxiliary relay for reversing valve relay (RVR_1)
Y_{212}	Auxiliary relay for reversing valve relay (RVR_2)
Y_{20A1}	Auxiliary relay for solenoid valve (SV_A)
Y_{20X1}	Auxiliary relay for solenoid valve (SV_G)
Y_{20X2}	Auxiliary relay for solenoid valve (SV_{X2})

2.2 CH-Box

2.2.1 General information

⚠ DANGER

- ***Turn OFF the main power switch to the CH-Box, the indoor unit and the outdoor unit before electrical wiring work or a periodical check is performed.***
- ***Protect the wires, electrical parts, etc. from rats or other vermin.***
- ***Use a medium sensing speed type ELB (Electric Leakage Breaker, activation speed of 0.1 s. or less). If not used, it will cause an electric shock or a fire.***
- ***Fix the cables securely. External forces on the terminals could lead to a fire.***

⚠ CAUTION

- *Wrap the accessory packing around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensate water or insects.*
- *Tightly secure the wires with the cord clamp inside the electrical box.*
- *Use twisted shielded pair cable or shield pair cable for transmission wires between the indoor and the outdoor units (Maximum 1000 m), and connect the shielded part to the earth screw in the electrical box of the indoor unit as shown the next page figure.*

General verifications

1 Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data indicated in Technical Catalogue. Make sure that the components comply with National Electrical code (NEC).

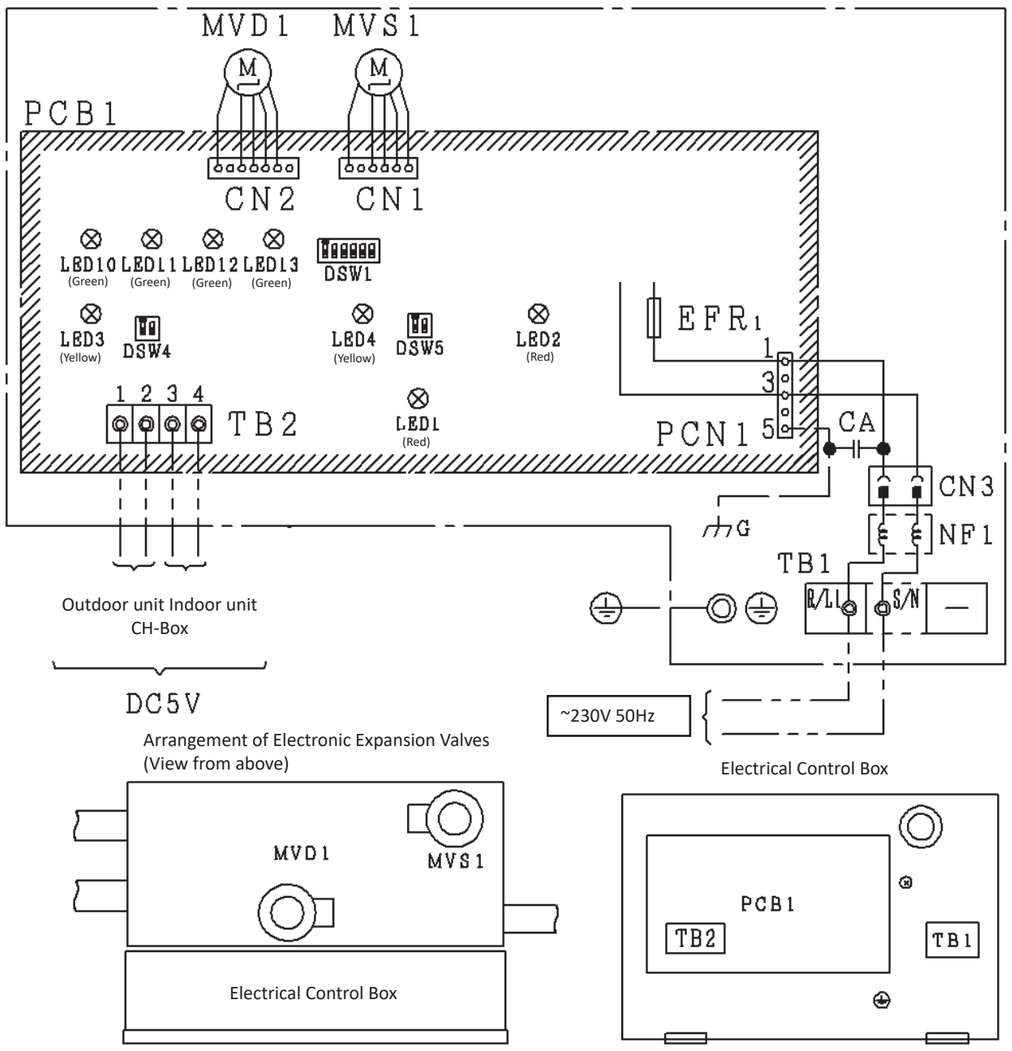
2 Check to ensure that the power supply voltage is within ±10 % of rated voltage.

3 Check the power source capacity is too low, the system cannot be started due to the voltage drop.

4 Check to ensure that the ground wire is connected.

2.2.2 Electrical wiring diagrams CH-Box

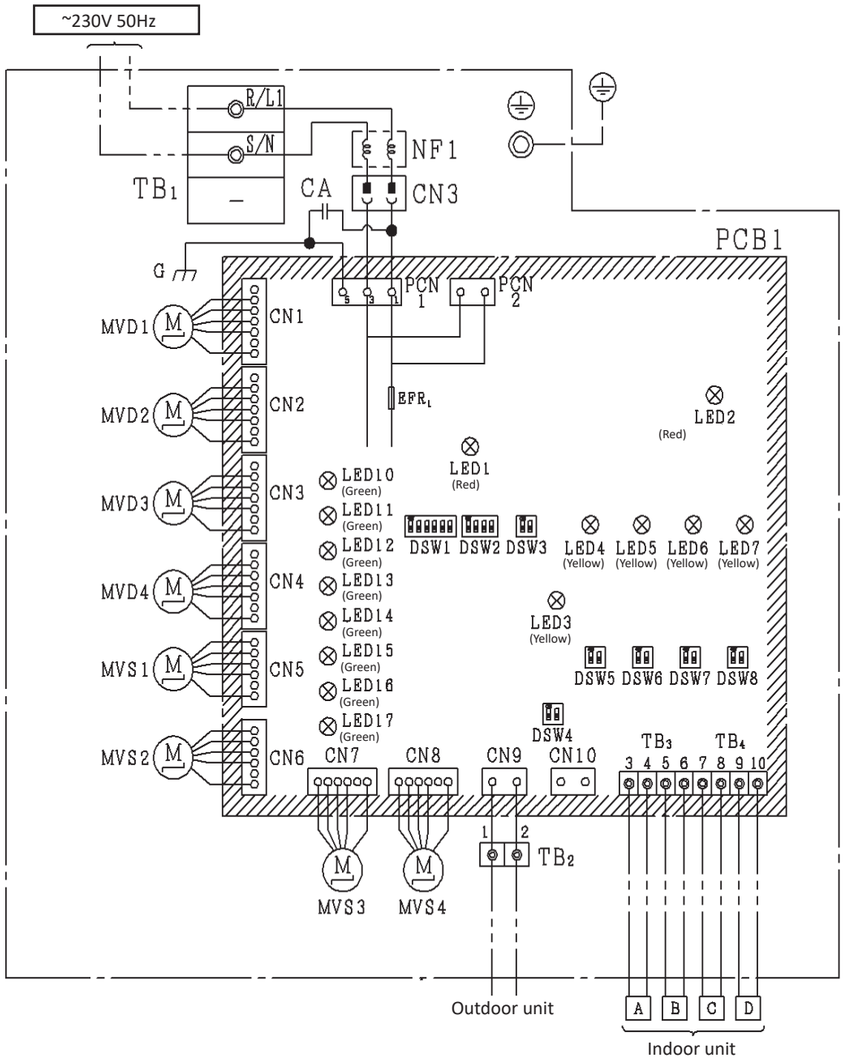
◆ CH-AP160SSX and CH-AP280SSX

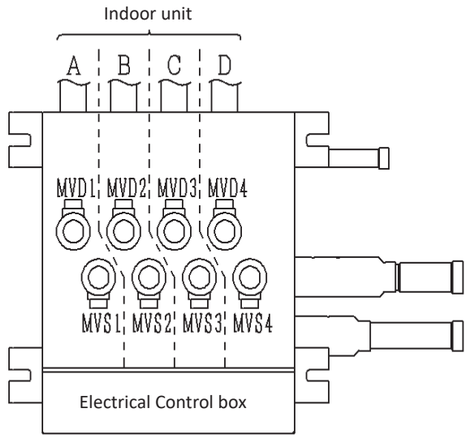


Mark	Torque tightening the terminal	Screw Size
TB1	1.0~1.3 (Nm)	M4
TB2	0.7~1.1 (Nm)	M3.5

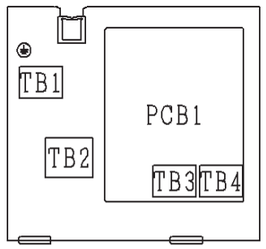
Mark	Name	Remark
PCB1	Printed circuit board	
TB1	Terminal Block	For Power Supply
TB2	Terminal Block	For Communication
MVD_1,MVS_1	Electronic Expansion Valve	
NF1	Noise filter	
EFR_1	Fuse	
LED1	LED(Red)	Power supply signal
LED2	LED(Red)	DC Power Status
LED3	LED(Yellow)	Operating line (indoor unit)
LED4	LED(Yellow)	Operating line (outdoor Unit)
LED10~13	LED(Green)	
DSW1	DIP Switch	
DSW4	DIP Switch	Communication (outdoor unit)
DSW5	DIP Switch	Communication (indoor unit)
CA	Capacitor	

◆ CH-AP04MSSX





Arrangement of Electronic Expansion Valves
(View from above)

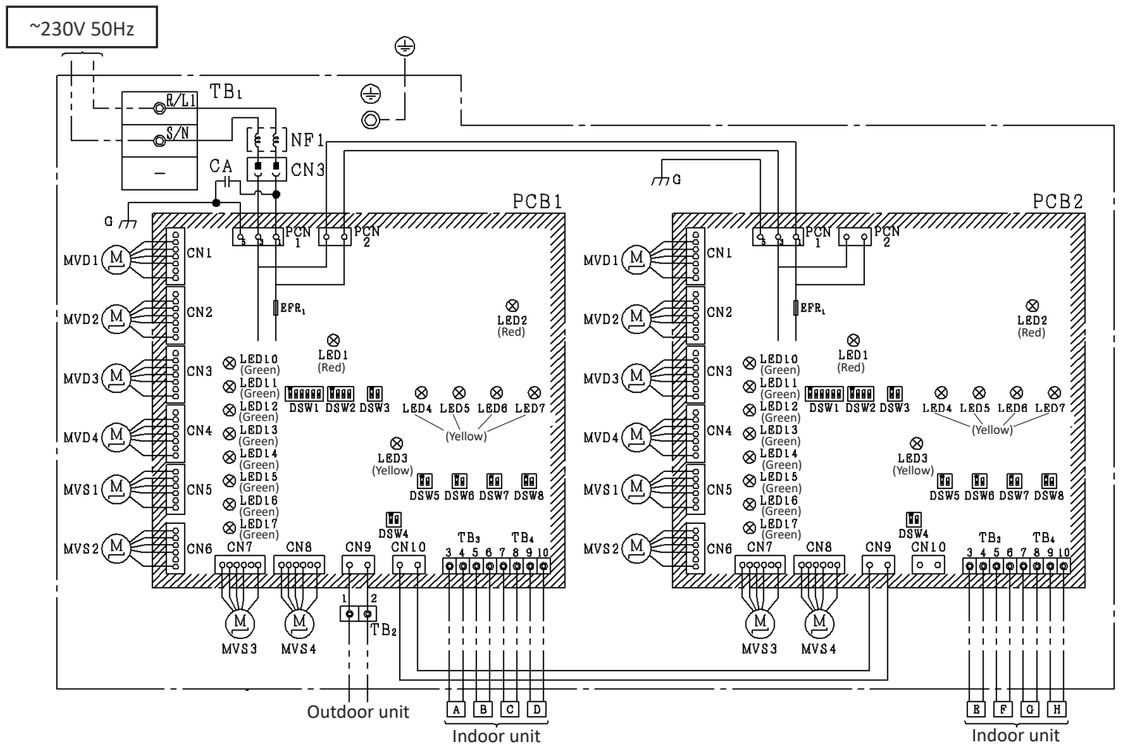


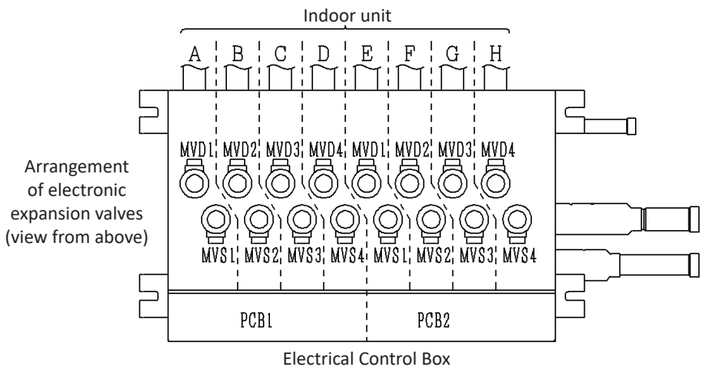
Mark	Torque tightening the terminal	Screw Size
TB1	1.0~1.3 (Nm)	M4
TB2	1.0~1.3 (Nm)	
TB3.4	0.7~1.1 (Nm)	M3.5

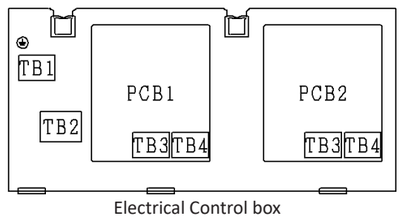
Indoor unit	Wiring position		
Indoor unit A	PCB1	TB3-3 TB3-4	MVD 1 MVS 1
Indoor unit B		TB3-5 TB3-6	MVD 2 MVS 2
Indoor unit C		TB4-7 TB4-8	MVD 3 MVS 3
Indoor unit D		TB4-9 TB4-10	MVD 4 MVS 4

Mark	Name	Remark
PCB1	Printed circuit board	
TB1	Terminal Block	For Power Supply
TB2	Terminal Block	For Communication (outdoor unit)
TB3, 4	Terminal Block	For Communication (indoor unit)
$MVD_{1\sim4}$	Electronic Expansion Valve	
$MVS_{1\sim4}$	Electronic Expansion Valve	
NF1	Noise Filter	
EFR_1,	Fuse	
LED1	LED(Red)	Power status
LED2	LED(Red)	DC Power Status
LED3	LED(Yellow)	Communication (outdoor unit)
LED4~7	LED(Yellow)	Communication (indoor unit)
LED10~17	LED(Green)	
DSW1~3	DIP Switch	
DSW4	DIP Switch	Communication (outdoor unit)
DSW5~8	DIP Switch	Communication (indoor unit)
CA	Capacitor	

◆ CH-AP08MSSX





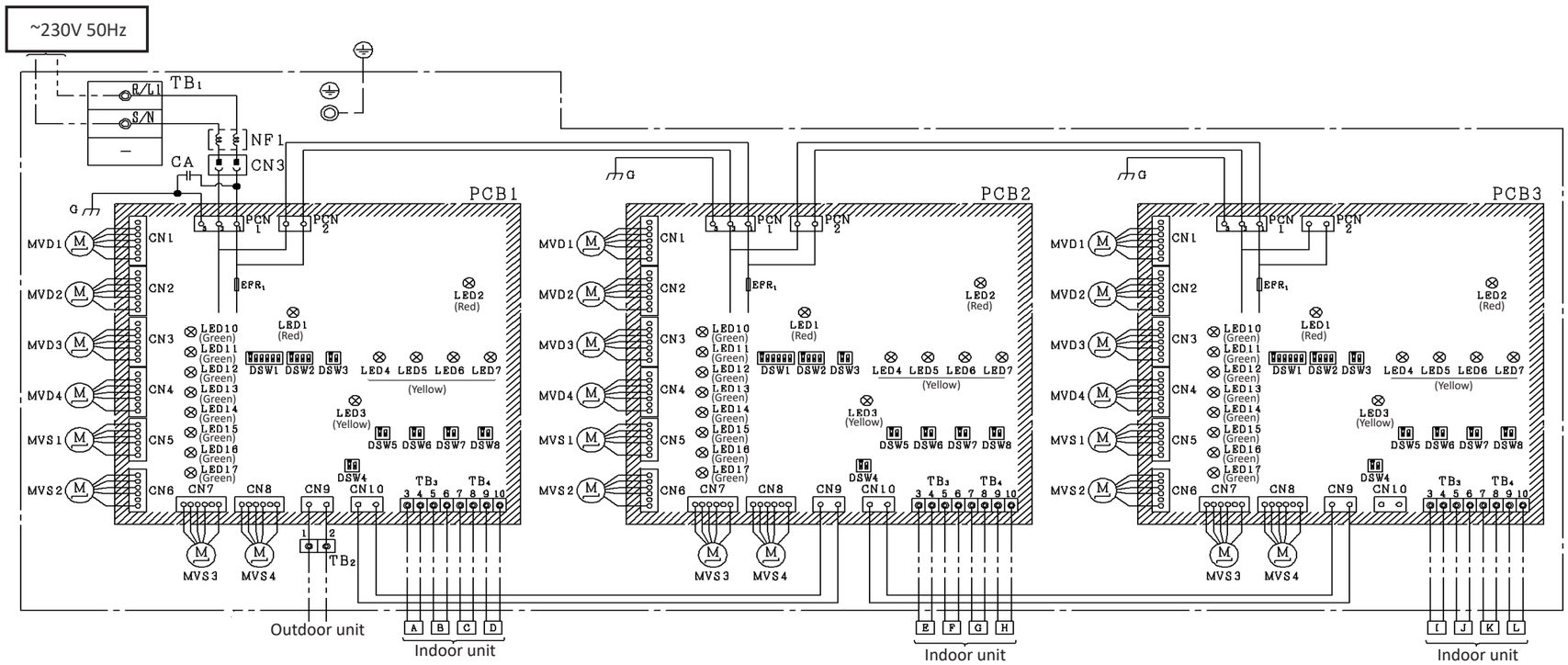


Mark	Torque tightening the terminal	Screw Size
TB1	1.0~1.3 (Nm)	M4
TB2	1.0~1.3 (Nm)	
TB3.4	0.7~1.1 (Nm)	M3.5

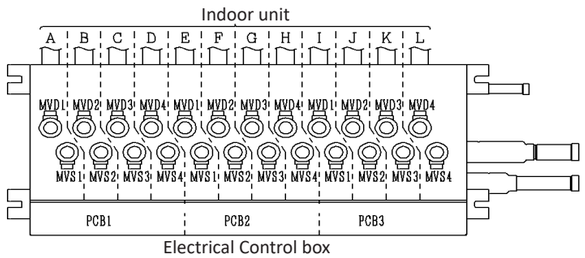
Indoor unit	Wiring position		Indoor unit	Wiring position		
Indoor unit A	PCB1	TB3-3 MVD 1 TB3-4 MVS 1	Indoor unit E	PCB2	TB3-3 MVD 1 TB3-4 MVS 1
Indoor unit B		TB3-5 MVD 2 TB3-6 MVS 2	Indoor unit F		TB3-5 MVD 2 TB3-6 MVS 2
Indoor unit C		TB4-7 MVD 3 TB4-8 MVS 3	Indoor unit G		TB4-7 MVD 3 TB4-8 MVS 3
Indoor unit D		TB4-9 MVD 4 TB4-10 MVS 4	Indoor unit H		TB4-9 MVD 4 TB4-10 MVS 4

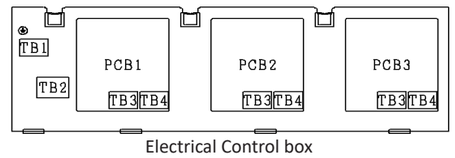
Mark	Name	Remark
PCB1,2	Printed circuit board	
TB1	Terminal Block	For Power Supply
TB2	Terminal Block	For Communication (outdoor unit)
TB3, 4	Terminal Block	For Communication (indoor unit)
$MVD_{1\sim4}$	Electronic Expansion Valve	
$MVS_{1\sim4}$	Electronic Expansion Valve	
NF1	Noise filter	
EFR_1	Fuse	
LED1	LED(Red)	Power status
LED2	LED(Red)	DC Power Status
LED3	LED(Yellow)	Communication (outdoor unit)
LED4~7	LED(Yellow)	Communication (indoor unit)
LED10~17	LED(Green)	
DSW1~3	DIP Switch	
DSW4	DIP Switch	Communication (outdoor unit)
DSW5~8	DIP Switch	Communication (indoor unit)
CA	Capacitor	

◆ CH-AP12MSSX



Arrangement of electronic expansion valves (view from above)



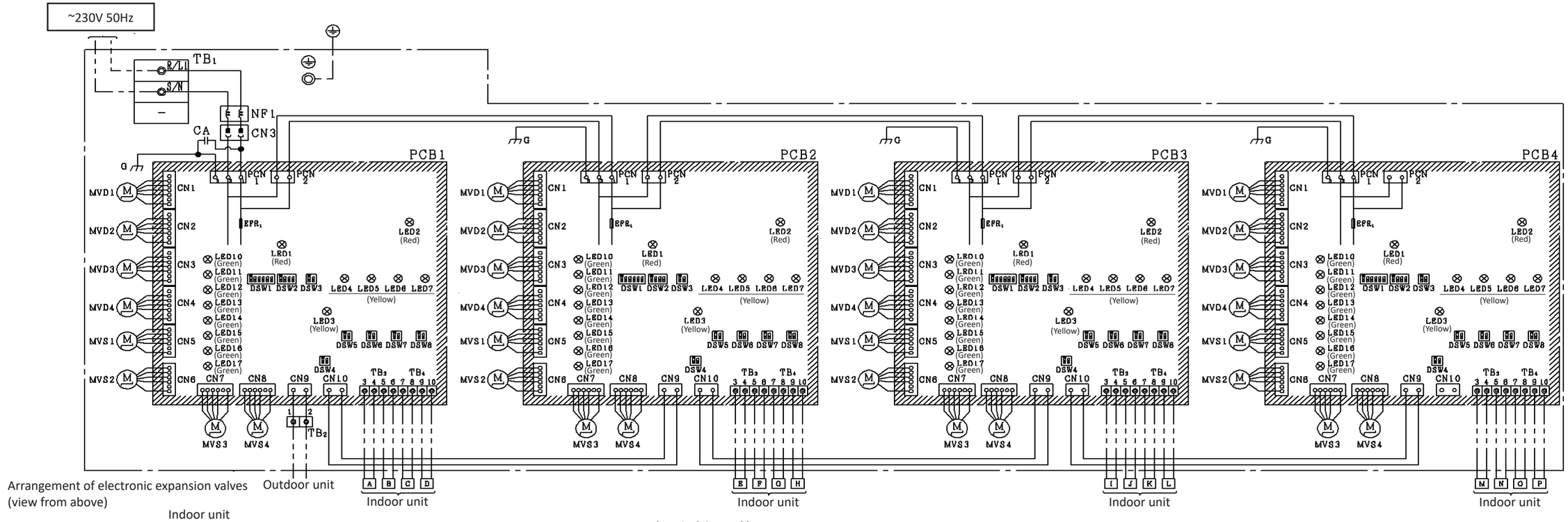


Mark	Torque tightening the terminal	Screw Size
TB1	1.0~1.3 (Nm)	M4
TB2	1.0~1.3 (Nm)	
TB3.4	0.7~1.1 (Nm)	M3.5

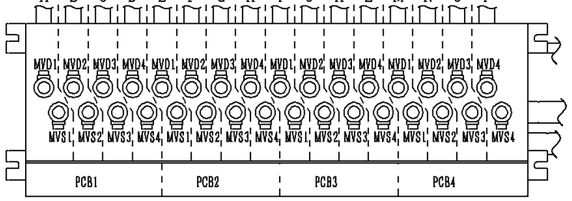
Indoor unit	Wiring position		Indoor unit	Wiring position		Indoor unit	Wiring position	
Indoor unit A	PCB1	TB3-3 MVD 1 TB3-4 MVS 1	Indoor unit E	PCB2	TB3-3 MVD 1 TB3-4 MVS 1	Indoor unit I	PCB3	TB3-3 MVD 1 TB3-4 MVS 1
Indoor unit B		TB3-5 MVD 2 TB3-6 MVS 2	Indoor unit F		TB3-5 MVD 2 TB3-6 MVS 2	Indoor unit J		TB3-5 MVD 2 TB3-6 MVS 2
Indoor unit C		TB4-7 MVD 3 TB4-8 MVS 3	Indoor unit G		TB4-7 MVD 3 TB4-8 MVS 3	Indoor unit K		TB4-7 MVD 3 TB4-8 MVS 3
Indoor unit D		TB4-9 MVD 4 TB4-10 MVS 4	Indoor unit H		TB4-9 MVD 4 TB4-10 MVS 4	Indoor unit L		TB4-9 MVD 4 TB4-10 MVS 4

Mark	Name	Remark
PCB1~3	Printed circuit board	
TB1	Terminal Block	For Power Supply
TB2	Terminal Block	For Communication (outdoor unit)
TB3, 4	Terminal Block	For Communication (indoor unit)
$MVD_{1\sim4}$	Electronic Expansion Valve	
$MVS_{1\sim4}$	Electronic Expansion Valve	
NF1	Noise filter	
EFR_1	Fuse	
LED1	LED(Red)	Power status
LED2	LED(Red)	DC Power Status
LED3	LED(Yellow)	Communication (outdoor unit)
LED4~7	LED(Yellow)	Communication (indoor unit)
LED10~17	LED(Green)	
DSW1~3	DIP Switch	
DSW4	DIP Switch	Communication (outdoor unit)
DSW5~8	DIP Switch	Communication (indoor unit)
CA	Capacitor	

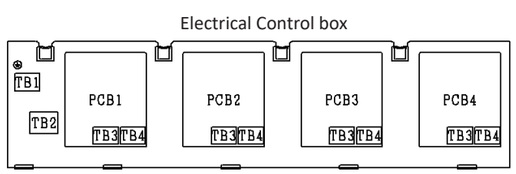
◆ CH-AP16MSSX



Arrangement of electronic expansion valves (view from above)



Electrical Control box



Indoor unit	Wiring position		Indoor unit	Wiring position	
Indoor unit A	PCB1	TB3-3 MVD 1 TB3-4 MVS 1	Indoor unit E	PCB2	TB3-3 MVD 1 TB3-4 MVS 1
Indoor unit B		TB3-5 MVD 2 TB3-6 MVS 2	Indoor unit F		TB3-5 MVD 2 TB3-6 MVS 2
Indoor unit C		TB4-7 MVD 3 TB4-8 MVS 3	Indoor unit G		TB4-7 MVD 3 TB4-8 MVS 3
Indoor unit D		TB4-9 MVD 4 TB4-10 MVS 4	Indoor unit H		TB4-9 MVD 4 TB4-10 MVS 4

Indoor unit	Wiring position		Indoor unit	Wiring position	
Indoor unit I	PCB3	TB3-3 MVD 1 TB3-4 MVS 1	Indoor unit M	PCB4	TB3-3 MVD 1 TB3-4 MVS 1
Indoor unit J		TB3-5 MVD 2 TB3-6 MVS 2	Indoor unit N		TB3-5 MVD 2 TB3-6 MVS 2
Indoor unit K		TB4-7 MVD 3 TB4-8 MVS 3	Indoor unit O		TB4-7 MVD 3 TB4-8 MVS 3
Indoor unit L		TB4-9 MVD 4 TB4-10 MVS 4	Indoor unit P		TB4-9 MVD 4 TB4-10 MVS 4

Mark	Torque tightening the terminal	Screw Size
TB1	1.0~1.3 (Nm)	M4
TB2	1.0~1.3 (Nm)	
TB3.4	0.7~1.1 (Nm)	M3.5

Mark	Name	Remark
PCB1~4	Printed circuit board	
TB1	Terminal Block	For Power Supply
TB2	Terminal Block	For Communication (outdoor unit)
TB3, 4	Terminal Block	For Communication (indoor unit)
$MVD_{1\sim4}$	Electronic Expansion Valve	
$MVS_{1\sim4}$	Electronic Expansion Valve	
NF1	Noise Filter	
EFR_1	Fuse	
LED1	LED(Red)	Power status
LED2	LED(Red)	D.C Power Status
LED3	LED(Yellow)	Communication (outdoor unit)
LED4~7	LED(Yellow)	Communication (indoor unit)
LED10~17	LED(Green)	
DSW1~3	DIP Switch	
DSW4	DIP Switch	Communication (outdoor unit)
DSW5~8	DIP Switch	Communication (indoor unit)
CA	Capacitor	

Control system

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3.1 Control system

3.1.1 Cycle control for heat pump

Control device	Cooling operation (*)		Heating operation		Defrosting
	Control Category	Purpose of Control	Control Category	Purpose of Control	Condition
Compressor inverter frequency	Total indoor unit operating capacity	Inverter frequency control is carried out to make indoor unit air inlet temperature to temperature setpoint	Total indoor unit operating capacity	Inverter frequency control is carried out to make indoor unit air inlet temperature to temperature setpoint	All the compressors operating
Electronic expansion valve for the outdoor unit heat exchanger	When the outdoor unit is a base unit: -	Fully open	Outdoor unit heat exchanger SH	PI control is performed to reach the target value of outdoor unit heat exchanger SH	Fully open
	When the outdoor unit is a combination of base units: Liquid pressure control	PI control is performed to reach the target liquid pressure value			
Electronic expansion valve for the supercooling heat exchanger	Tsc-Tchg	PI control is performed to reach the target of Tsc-Tchg	Tchg-Tsc	PI control is performed to reach the target of Tchg-Tsc	Tsc-Tchg
Electronic expansion valve for indoor unit heat exchanger	Indoor unit heat exchanger SH	PI control is performed to reach the target of indoor unit heat exchanger SH	Indoor unit heat exchanger SC	Controls supercooling of indoor unit liquid thermistor to reach the target value	Indoor unit heat exchanger SH control
Outdoor unit fan	Pd control	PI control is performed to reach the target of Pd	Ps Control	PI control is performed to reach the target of Ps	Stop
Gas bypass valve (SVA)	1. Increase in Pd protection 2. Decrease in Ps protection	1. Pd>3.6 MPa: ON 2. Ps<0.2 MPa: ON	1. Increase in Pd protection 2. Decrease in Ps protection	1. Pd>3.5 MPa: ON 2. Ps<0.2 MPa: ON	Closed
Gas injection switch valve / supercooling bypass circuit (SVX2)	Switch gas injection / supercooling bypass circuit	Gas injection is controlled: Closed	Switch between gas injection / supercooling bypass circuit	Gas injection is controlled: Closed	Open
		Supercooling bypass circuit is controlled: Open		Supercooling bypass circuit is controlled: Open	

(*) Dry operation is included in the cooling operation.

Pd	*Discharge pressure*	*SC*	*Supercool*
Ps	*Suction pressure*	*Tsc*	*Subcooler Temperature*
SH	*Superheat*	*Tchg*	*Liquid Stop Valve Temperature*

Proportional integral control (PI control)

3.1.2 Cycle control for heat recovery

Control device	Cooling operation (*)		Heating operation		Cooling and Heating operation		Defrosting
	Control Category	Purpose of Control	Control Category	Purpose of Control	Control Category	Purpose of Control	Condition
Compressor inverter frequency	Total indoor unit operating capacity	Inverter frequency control is carried out to make indoor unit air inlet temperature to temperature setpoint	Total indoor unit operating capacity	Inverter frequency control is carried out to make indoor unit air inlet temperature to temperature setpoint	Cooling mainly: cooling capacity of the indoor unit	Inverter frequency control is carried out to make indoor unit air inlet temperature for the cooling setting to temperature setpoint	All the compressors operating
					Heating mainly: heating capacity of the indoor unit	Inverter frequency control is carried out to make indoor unit air inlet temperature for the heating setting to temperature setpoint	
Electronic expansion valve for the outdoor unit heat exchanger	When the outdoor unit is a base unit: -	Fully open	Outdoor unit heat exchanger SH	The control is performed to reach the target value of outdoor unit heat exchanger SH	Cooling mainly: liquid pressure control	PI control is performed to reach the target liquid pressure value	Fully open
	When the outdoor unit is a combination of base units: Liquid pressure control	PI control is performed to reach the target liquid pressure value			Heating mainly: outdoor unit heat exchanger SH	PI control is performed to reach the target value of outdoor unit heat exchanger SH	
Electronic expansion valve for the supercooling heat exchanger	Tsc-Tchg	PI control is performed to reach the target of Tsc-Tchg	Tchg-Tsc	PI control is performed to reach the target of Tchg-Tsc	-	Fully open	PI control is performed to reach the target of Tsc-Tchg
Electronic expansion valve for indoor unit heat exchanger	Indoor unit heat exchanger SH	PI control is performed to reach the target of indoor unit heat exchanger SH	Indoor unit heat exchanger SC	Controls supercooling of indoor unit liquid thermistor to reach the target value	Cooling setting:(*) indoor unit heat exchanger SH	PI control is performed to reach the target value of indoor unit heat exchanger SH	Indoor unit heat exchanger SH control
					Heating setting: indoor unit heat exchanger SC	Controls supercooling of indoor unit liquid thermistor to reach the target value	

Control device	Cooling operation (*)		Heating operation		Cooling and Heating operation		Defrosting
	Control Category	Purpose of Control	Control Category	Purpose of Control	Control Category	Purpose of Control	Condition
Outdoor unit fan	Pd control	PI control is performed to reach the target of Pd	Ps Control	PI control is performed to reach the target of Ps	Cooling mainly: Pd control	PI control is performed to reach the target value of Pd	For a base unit: Pd control For a combination of units: Stop
					Heating mainly: Ps control	PI control is performed to reach the target value of Ps	
Gas bypass valve (SVA)	1. Increase in Pd protection 2. Decrease in Ps protection	1. Pd≥3.2 MPa: ON 2. Ps≤0.2 MPa: ON	1. Increase in Pd protection 2. Decrease in Ps protection	1. Pd≥3.2 MPa: ON 2. Ps≤0.2 MPa: ON	1. Increase in Pd protection 2. Decrease in Ps protection	1. Pd≥3.2 MPa: ON 2. Ps≤0.2 MPa: ON	Closed
High and low pressure shut-off valve (SVG)	Shut-off high and low pressure valve inside the cycle during stoppage	Compressor run: ON Compressor stop: OFF	Shut-off high and low pressure valve inside the cycle during stoppage	Compressor run: ON Compressor stop: OFF	Shut-off high and low pressure valve inside the cycle during stoppage	Compressor run: ON Compressor stop: OFF	Open
Gas injection switch valve / supercooling bypass circuit (SVX2)	Switch gas injection / supercooling bypass circuit	Gas injection is controlled: Closed Supercooling bypass circuit is controlled: Open	Switch gas injection / supercooling bypass circuit	Gas injection is controlled: Closed Supercooling bypass circuit is controlled: Open	-	Open	Open

(*) Dry operation is included in the cooling operation.

Pd	*Discharge pressure*	*SC*	*Supercool*
Ps	*Suction pressure*	*Tsc*	*Subcooler temperature*
SH	*Superheat*	*Tchg*	*Liquid stop valve temperature*

3.1.3 Compressor operation control

3.1.3.1 Compressor rotation control

The purpose of this compressor rotation control is to ensure equal operating time for each outdoor unit.

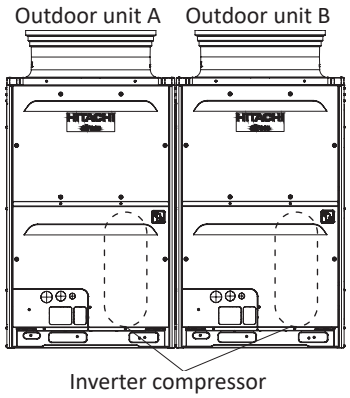
This control is carried out when the outdoor unit is in thermo-OFF or switch OFF mode.

When the outdoor unit is switched ON, the inverter compressor with the shortest operating time (based on the average operating time of the outdoor unit with two inverter compressors installed) will be given priority for operation.

This function requires a minimum of 2 outdoor units.

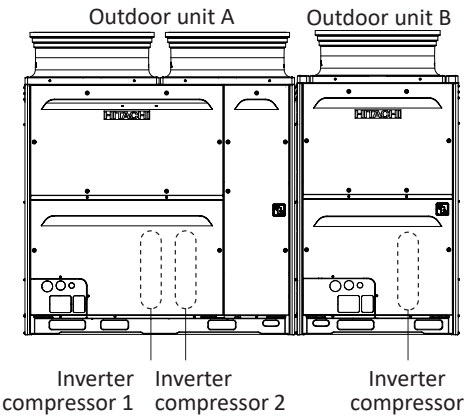
The operating sequence of the compressor rotation is described below:

RAS-(26-36)FSXNS2E and RAS-(20-24)FSXNP2E



	Outdoor unit A	Outdoor unit B
Last time	1	2
Currently	2	1
Next time	1	2

RAS-(38-42)FSXNS2E and RAS-(26-32)FSXNP2E

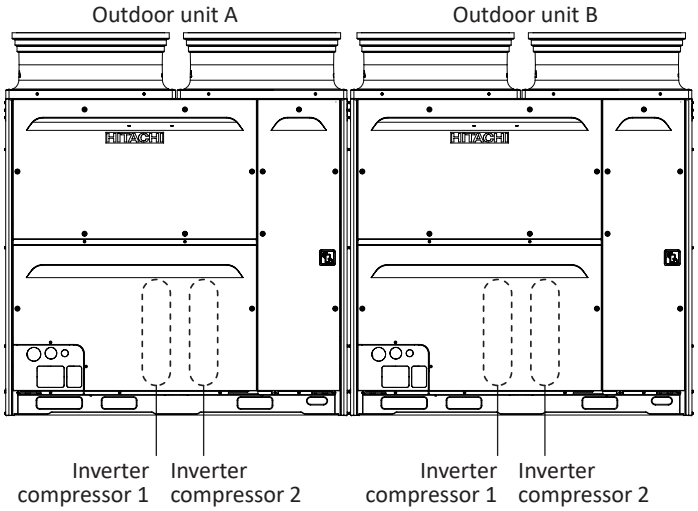


	Outdoor unit A		Outdoor unit B
	Inverter compressor 1	Inverter compressor 2	Inverter compressor
Last time	1	3	2
Currently	2	3	1
Next time	1	3	2

NOTE

When turning ON the outdoor unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-(44-48)FSXNS2E and RAS-(34/36)FSXNP2E

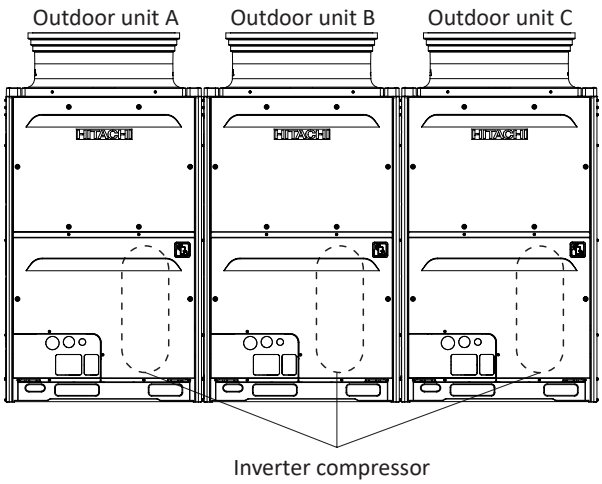


	Outdoor unit A		Outdoor unit B	
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2
Last time	1	3	2	3
Currently	2	3	1	3
Next time	1	3	2	3

NOTE

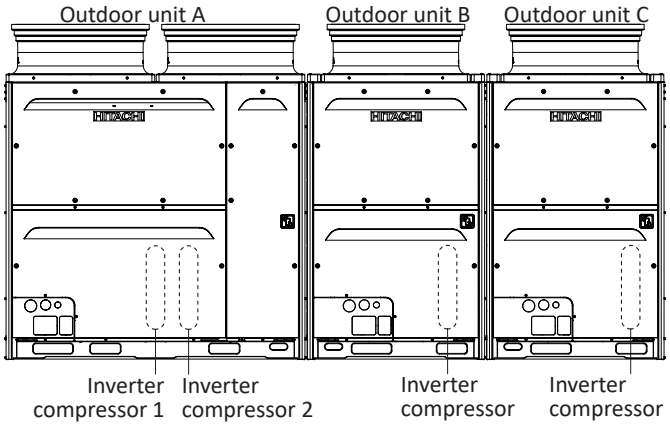
When turning ON the outdoor units, the inverter compressor of each outdoor unit with the shortest operating time will operate preferentially.

RAS-(50-54)FSXNS2E and RAS-(38-42)FSXNP2E



	Outdoor unit A	Outdoor unit B	Outdoor unit C
Last time	1	2	3
Currently	3	1	2
Next time	2	3	1

RAS-(56-60)FSXNS2E and RAS-(44/46)FSXNP2E

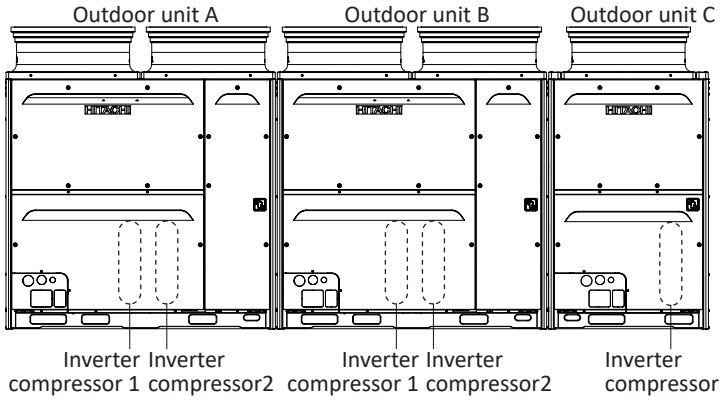


	Outdoor unit A		Outdoor unit B	Outdoor unit C
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2
Last time	1	4	2	3
Currently	3	4	1	2
Next time	2	4	3	1

NOTE

When turning ON the outdoor unit A, the inverter compressor 1 or 2 with the shortest operating time will operate preferentially.

RAS-(62-66)FSXNS2E and RAS-(48/50)FSXNP2E

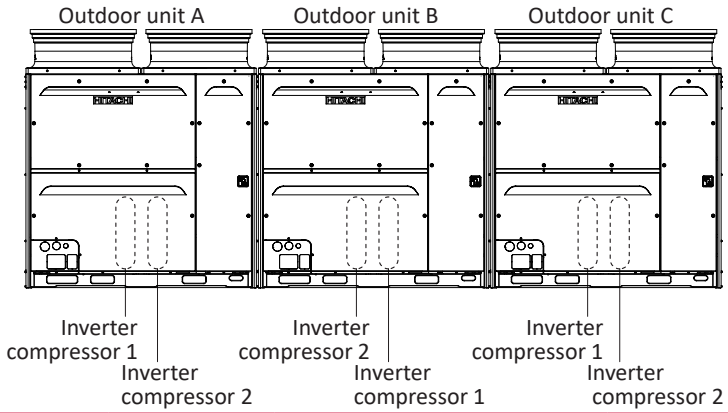


	Outdoor unit A		Outdoor unit B		Outdoor unit C
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2	Inverter compressor
Last time	1	4	2	4	3
Currently	3	4	1	4	2
Next time	2	4	3	4	1

NOTE

When turning ON the outdoor units, the inverter compressor of the outdoor unit A and B with the shortest operating time will operate preferentially.

RAS-(68-72)FSXNS2E and RAS-(52/54)FSXNP2E

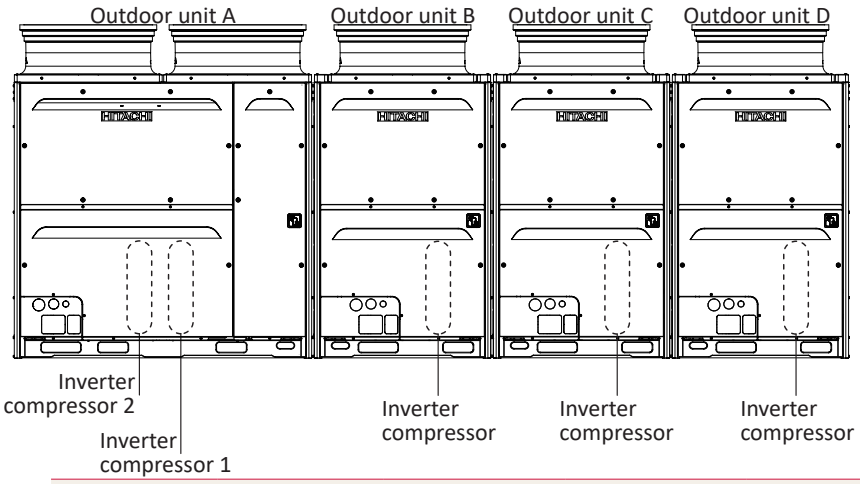


	Outdoor unit A		Outdoor unit B		Outdoor unit C	
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2
Last time	1	4	2	4	3	4
Currently	3	4	1	4	2	4
Next time	2	4	3	4	1	4

NOTE

When turning ON the outdoor units, the inverter compressor of each outdoor unit with the shortest operating time will operate preferentially.

RAS-(74-78)FSXNS2E

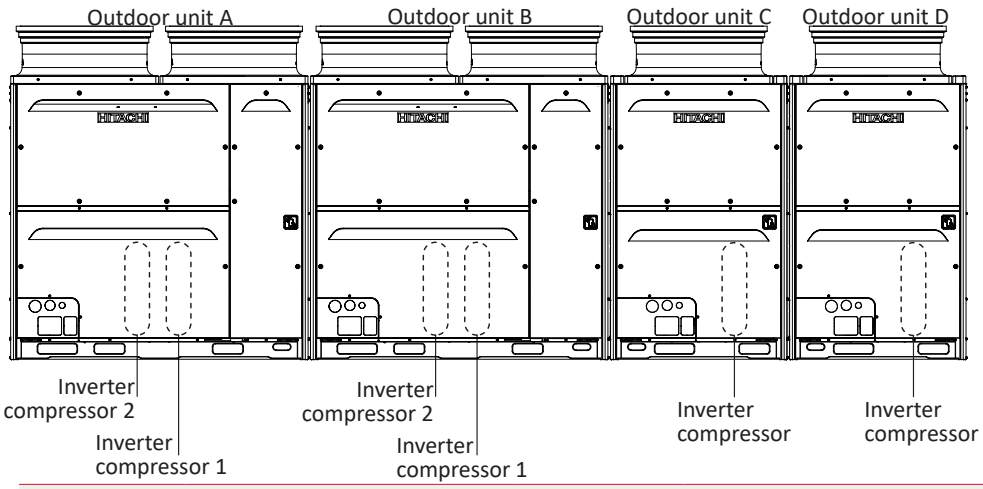


	Outdoor unit A		Outdoor unit B	Outdoor unit C	Outdoor unit D
	Inverter compressor 1	Inverter compressor 2	Inverter compressor	Inverter compressor	Inverter compressor
Last time	1	5	2	3	4
Currently	4	5	1	2	3
Next time	3	5	4	1	2

NOTE

When turning ON the outdoor units, the inverter compressor of outdoor unit A, B or C with the shortest operating time will operate preferentially.

RAS-(80-84)FSXNS2E

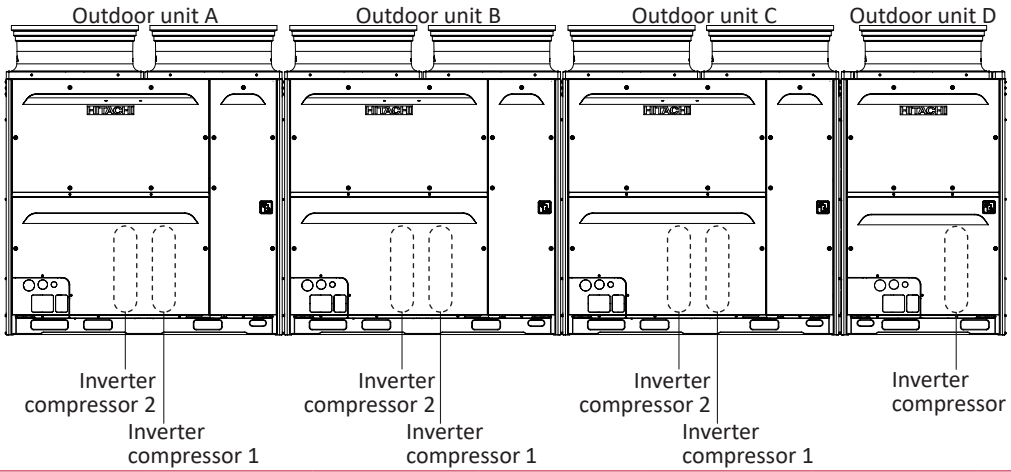


	Outdoor unit A		Outdoor unit B		Outdoor unit C	Outdoor unit D
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2	Inverter compressor	Inverter compressor
Last time	1	5	2	5	3	4
Currently	4	5	1	5	2	3
Next time	3	5	4	5	1	2

NOTE

When turning ON the outdoor units, the inverter compressor of outdoor unit A, B or C with the shortest operating time will operate preferentially.

RAS-(86-90)FSXNS2E

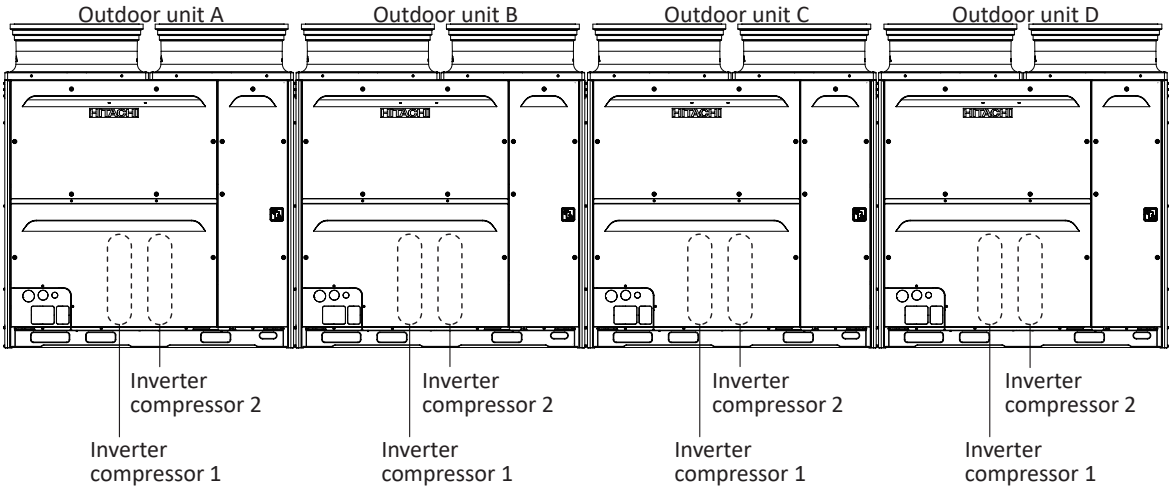


	Outdoor unit A		Outdoor unit B		Outdoor unit C		Outdoor unit D
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2	Inverter compressor
Last time	1	5	2	5	3	5	4
Currently	4	5	1	5	2	5	3
Next time	3	5	4	5	1	5	2

NOTE

When turning ON the outdoor units, the inverter compressor of outdoor unit A, B or C with the shortest operating time will operate preferentially.

RAS-(92-96)FSXNS2E



	Outdoor unit A		Outdoor unit B	
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2
Last time	1	5	2	5
Currently	4	5	1	5
Next time	3	5	4	5

	Outdoor unit C		Outdoor unit D	
	Inverter compressor 1	Inverter compressor 2	Inverter compressor 1	Inverter compressor 2
Last time	3	5	4	5
Currently	2	5	3	5
Next time	1	5	2	5

NOTE

When turning ON the outdoor units, the inverter compressor of each outdoor unit with the shortest operating time will operate preferentially.

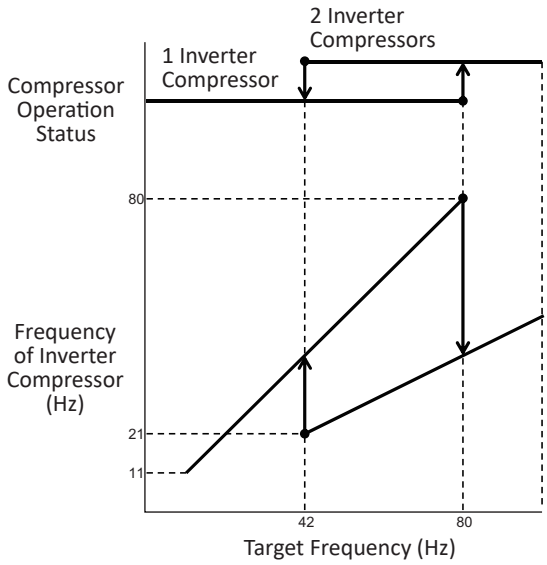
3.1.3.2 Compressor frequency control

Operational control is carried out to optimise the compressor output frequency or to carry out the turning on and stopping while in constant operation in accordance with the target frequency (the target frequency is determined by the calculation of the PID control and the heating and cooling load).

Therefore, when the load is small, the constant compressor may not operate.

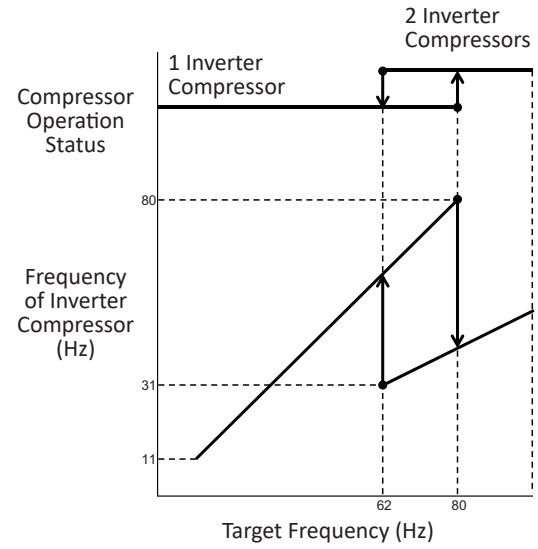
◆ In case of single outdoor unit with two inverter compressors installed

RAS-(20/22)FSXNS2E and RAS-(16/18)FSXNP2E



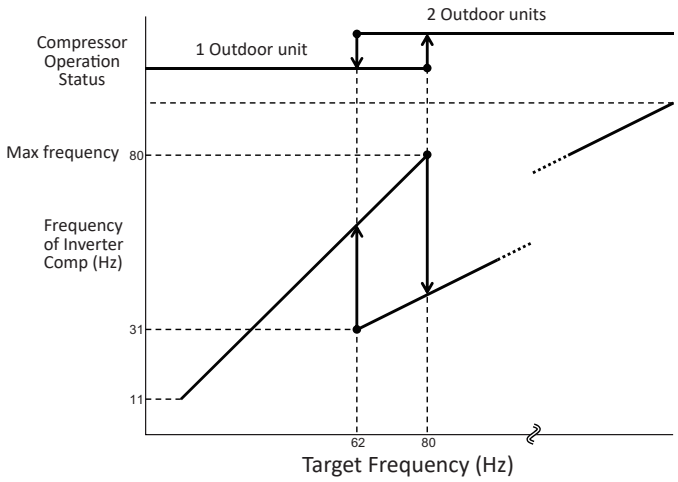
Target frequency (Hz)	Each Compressor Frequency (Hz)					
	Increase direction			Decrease direction		
	Compressor Operation Status	No.1 Comp	No.2 Comp	Compressor Operation Status	No.1 Comp	No.2 Comp
11.0	1	11.0	-	1	11.0	-
41.0	1	41.0	-	1	41.0	-
42.0	1	42.0	-	2	21.0	21.0
80.0	1	80.0	-	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5

RAS-(24)FSXNS2E



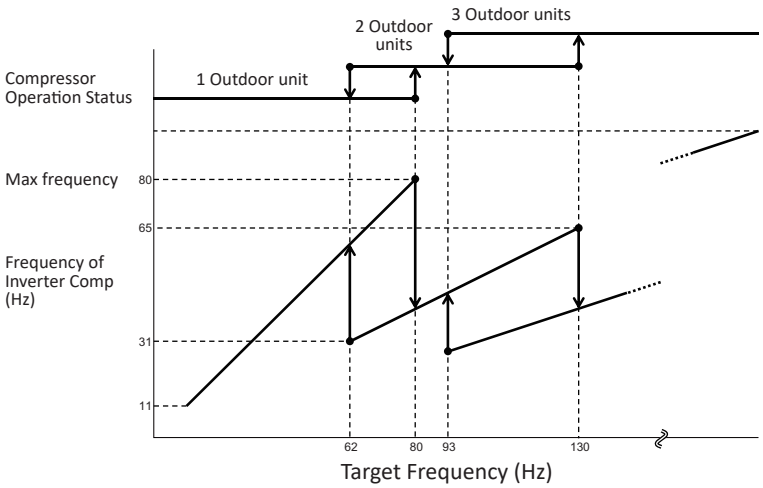
Target frequency (Hz)	Each Compressor Frequency (Hz)					
	Increase direction			Decrease direction		
	Compressor Operation Status	No.1 Comp	No.2 Comp	Compressor Operation Status	No.1 Comp	No.2 Comp
11.0	1	11.0	-	1	11.0	-
61.0	1	61.0	-	1	61.0	-
62.0	1	62.0	-	2	31.0	31.0
80.0	1	80.0	-	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5

◆ In case of multiple outdoor units (two outdoor units)



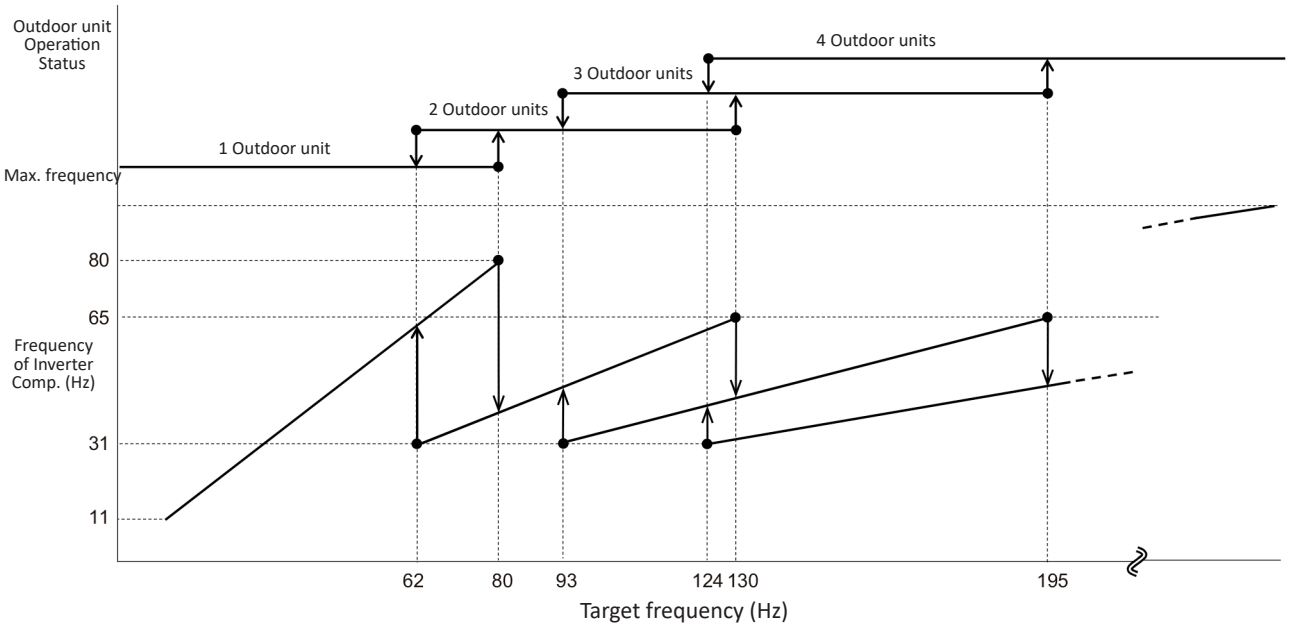
Target frequency (Hz)	Each compressor frequency (Hz)					
	Increase direction			Decrease direction		
	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)
11.0	1	11.0	-	1	11.0	-
61.0	1	61.0	-	1	61.0	-
62.0	1	62.0	-	2	31.0	31.0
80.0	1	80.0	-	2	40.0	40.0
81.0	2	40.5	40.5	2	40.5	40.5

◆ In case of multiple outdoor units (three outdoor units)



Target frequency (Hz)	Each compressor frequency (Hz)							
	Increase direction				Decrease direction			
	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)	Outdoor unit (C)	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)	Outdoor unit (C)
11.0	1	11.0	-	-	1	11.0	-	-
61.0	1	61.0	-	-	1	61.0	-	-
62.0	1	62.0	-	-	2	31.0	31.0	-
80.0	1	80.0	-	-	2	40.0	40.0	-
81.0	2	40.5	40.5	-	2	40.5	40.5	-
92.0	2	46.0	46.0	-	2	46.0	46.0	-
93.0	2	46.5	46.5	-	3	31.0	31.0	31.0
130.0	2	65.0	65.0	-	3	43.3	43.3	43.3
131.0	3	43.6	43.6	43.6	3	43.6	43.6	43.6

◆ In case of multiple outdoor units (four outdoor units)



Target frequency (Hz)	Each compressor frequency (Hz)									
	Increase direction					Decrease direction				
	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)	Outdoor unit (C)	Outdoor unit (D)	Compressor operation status	Outdoor unit (A)	Outdoor unit (B)	Outdoor unit (C)	Outdoor unit (D)
11.0	1	11.0	-	-		1	11.0	-	-	
61.0	1	61.0	-	-		1	61.0	-	-	
62.0	1	62.0	-	-		2	31.0	31.0	-	
80.0	1	80.0	-	-		2	40.0	40.0	-	
81.0	2	40.5	40.5	-		2	40.5	40.5	-	
92.0	2	46.0	46.0	-		2	46.0	46.0	-	
93.0	2	46.5	46.5	-		3	31.0	31.0	31.0	
123.0	2	61.5	61.5			3	41.0	41.0	41.0	
124.0	2	62.0	62.0			4	31.0	31.0	31.0	31.0
130.0	2	65.0	65.0	-		4	32.5	32.5	32.5	32.5
131.0	3	43.6	43.6	43.6		4	32.7	32.7	32.7	32.7
195.0	3	65.0	65.0	65.0		4	48.7	48.7	48.7	48.7
196.0	4	49.0	49.0	49.0	49.0	4	49.0	49.0	49.0	49.0

3.1.3.3 Compressor capacity control

The operating speed of the compressor is determined according to the temperature difference (ΔT) between setting temperature and indoor unit air inlet temperature detected by each indoor unit under cooling/heating thermo-ON operation and the variation of ΔT to control compressor frequency.

The frequency is calculated as follows:

Current Frequency × Coefficient Based on the Temperature

The coefficient becomes larger when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is large) or variation of ΔT is larger.

The coefficient becomes smaller when the value of ΔT (the temperature difference between setting temperature and air inlet temperature is small) or variation of ΔT is smaller.

NOTE

The temperature of the thermistor in the wired controller is utilized instead of indoor unit air inlet temperature when the thermistor in the wired controller is set by functional setting mode.

3.1.4 Heat exchanger mode control (2 pipe system)

Heat pump system and heat recovery system: in accordance with the connected load of indoor units, the outdoor unit heat exchanger can switch as indicated in the following table.

Outdoor unit heat exchanger mode at cooling: Condenser (COND)

Outdoor unit heat exchanger mode at heating: Evaporator (EVAP)

Number of outdoor unit: 1

Heat exchanger mode		Cooling mode	Heating mode	Defrost mode
Heat exchanger condition		COND	EVAP	COND
Reversing valve	RVR	OFF	ON	OFF
Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
	MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg

Number of outdoor unit: 2

Heat exchanger mode			Cooling mode	Heating mode	Defrost mode
Main outdoor unit	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg

Number of outdoor unit: 3

Heat exchanger mode			Cooling mode	Heating mode	Defrost mode
Main outdoor unit	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 1	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR2	OFF	ON	OFF
	Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 2	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR2	OFF	ON	OFF
	Expansion valve	MV1	Fully open	Heat exchanger SH	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg

Number of outdoor unit (only heat pump system): 4

Heat exchanger mode			Cooling mode	Heating mode	Defrost mode
Main outdoor unit	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR2	OFF	ON	OFF
	Expansion valve	MV1	Fully open	HEX	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 1	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	HEX	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 2	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	HEX	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 3	Heat exchanger condition		COND	EVAP	COND
	Reversing valve	RVR	OFF	ON	OFF
	Expansion valve	MV1	Fully open	HEX	Fully open
		MVB	Tsc-Tchg	Tchg-Tsc	Tsc-Tchg

3.1.5 Heat exchanger mode control (3 pipe system)

Heat pump system and heat recovery system: in accordance with the connected load of indoor units, the outdoor unit heat exchanger can switch as indicated in the following table.

Outdoor unit heat exchanger mode at cooling: Condenser (COND)

Outdoor unit heat exchanger mode at heating: Evaporator (EVAP)

Number of outdoor unit: 1

Heat exchanger mode		Cooling mode	Mainly cooling mode		Mainly heating mode	Heating mode	Defrost mode
		COND	D1	D1-1	D4	EVAP	DEF1
Heat exchanger condition		COND	COND	cond	EVAP	EVAP	COND
Reversing valve	RVR2	OFF	OFF	OFF	ON	ON	OFF
	RVR1	ON	OFF	OFF	OFF	OFF	ON
Expansion valve	MV1	Fully open	Pd	Pd	Heat exchanger SH	Heat exchanger SH	Fully open
	MVB	Tsc-Tchg	Tsc-Tchg	Closed	Tchg-Tsc	Tchg-Tsc	Tsc-Tchg

Number of outdoor unit: 2

Heat exchanger mode			Cooling mode	Mainly cooling mode		Mainly heating mode		Heating mode
			COND	D1	D2	D3	D4	EVAP
Main outdoor unit	Heat exchanger condition		COND	COND	COND	cond	EVAP	EVAP
	Reversing valve	RVR2	OFF	OFF	OFF	OFF	ON	ON
		RVR1	ON	OFF	OFF	OFF	OFF	OFF
	Expansion valve	MV1	Pd	Pd	Pd	Pd	Heat exchanger SH	Heat exchanger SH
		MVB	Tsc-Tchg	Tsc-Tchg	Tsc-Tchg	Closed	Tchg-Tsc	Tchg-Tsc
Secondary outdoor unit	Heat exchanger condition		COND	COND	evap	EVAP	EVAP	EVAP
	Reversing valve	RVR2	OFF	OFF	ON	ON	ON	ON
		RVR1	ON	OFF	OFF	OFF	OFF	OFF
	Expansion valve	MV1	Pd	Pd	Closed	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH
		MVB	Tsc-Tchg	Tsc-Tchg	Closed	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc

Heat exchanger mode			Defrost mode	
			DEF1	DEF2
			with CH-Box	with-out CH-Box
Main outdoor unit	Heat exchanger condition		COND/EVAP	COND
	Reversing valve	RVR2	ON/OFF	OFF
		RVR1	OFF	ON
	Expansion valve	MV1	Fully open/Heat exchanger SHPd	Fully open
		MVB	Tsc-Tchg/Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit	Heat exchanger condition		COND/EVAP	COND
	Reversing valve	RVR2	ON/OFF	OFF
		RVR1	OFF	ON
	Expansion valve	MV1	Fully open/Heat exchanger SHPd	Fully open
		MVB	Tsc-Tchg/Tchg-Tsc	Tsc-Tchg

Number of outdoor unit: 3

Heat exchanger mode			Cooling mode	Mainly cooling mode		
			COND	D1	D2-1	D2-2
Main outdoor unit	Heat exchanger condition		COND	COND	COND	COND
	Reversing valve	RVR2	OFF	OFF	OFF	OFF
		RVR1	ON	OFF	OFF	OFF
	Expansion valve	MV1	Pd	Pd	Pd	Pd
		MVB	Tsc-Tchg	Tsc-Tchg	Tsc-Tchg	Tsc-Tchg
Secondary outdoor unit 1	Heat exchanger condition		COND	COND	evap	evap
	Reversing valve	RVR2	OFF	OFF	ON	ON
		RVR1	ON	OFF	OFF	OFF
	Expansion valve	MV1	Pd	Pd	Closed	Closed
		MVB	Tsc-Tchg	Tsc-Tchg	Closed	Closed
Secondary outdoor unit 2	Heat exchanger condition		COND	COND	COND	evap
	Reversing valve	RVR2	OFF	OFF	OFF	ON
		RVR1	ON	OFF	OFF	ON
	Expansion valve	MV1	Pd	Pd	Pd	Closed
		MVB	Tsc-Tchg	Tsc-Tchg	Tsc-Tchg	Closed

Heat exchanger mode			Mainly heating mode				Heating mode
			D2-3	D3-1	D3-2	D4	EVAP
Main outdoor unit	Heat exchanger condition		cond	cond	cond	EVAP	EVAP
	Reversing valve	RVR2	OFF	OFF	OFF	ON	ON
		RVR1	OFF	OFF	OFF	OFF	OFF
	Expansion valve	MV1	Pd	Pd	Pd	Heat exchanger SH	Heat exchanger SH
		MVB	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc
Secondary outdoor unit 1	Heat exchanger condition		EVAP	EVAP	EVAP	EVAP	EVAP
	Reversing valve	RVR2	ON	ON	ON	ON	ON
		RVR1	OFF	OFF	OFF	OFF	OFF
	Expansion valve	MV1	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH
		MVB	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc
Secondary outdoor unit 2	Heat exchanger condition		evap	EVAP	EVAP	EVAP	EVAP
	Reversing valve	RVR2	ON	ON	ON	ON	ON
		RVR1	OFF	OFF	OFF	OFF	OFF
	Expansion valve	MV1	Closed	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH	Heat exchanger SH
		MVB	Closed	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc	Tchg-Tsc

Heat exchanger mode			Defrostin mode	
			DEF2	DEF1
			with CH-Box	without CH-Box
Main outdoor unit	Heat exchanger condition		COND/EVAP	COND
	Reversing valve	RVR2	ON/OFF	OFF
		RVR1	OFF	ON
	Expansion valve	MV1	Fully open/Heat exchanger SHPd	Fully open
		MVB	Tsc-Tchg/Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 1	Heat exchanger condition		COND/EVAP	COND
	Reversing valve	RVR2	ON/OFF	OFF
		RVR1	OFF	ON
	Expansion valve	MV1	Fully open/Heat exchanger SHPd	Fully open
		MVB	Tsc-Tchg/Tchg-Tsc	Tsc-Tchg
Secondary outdoor unit 2	Heat exchanger condition		COND/EVAP	COND
	Reversing valve	RVR2	ON/OFF	OFF
		RVR1	OFF	ON
	Expansion valve	MV1	Fully open/Heat exchanger SHPd	Fully open
		MVB	Tsc-Tchg/Tchg-Tsc	Tsc-Tchg

Outdoor Unit Heat exchanger mode:

COND: operating as condenser.

cond: avoid using the heat exchanger (under high pressure conditions).

EVAP: operating as evaporator.

evap: avoid using the heat exchanger (under low pressure conditions).

Expansion valve control method:

Pd: normally, fully open (the opening depends on the refrigerant cycle conditions). PI control is carried out to reach the discharge pressure objective value when it decreases.

Tsc-Tchg and Tchg-Tsc : PI control is carried out to reach temperature difference between Tsc and Tchg objective value.

HEX: Heat exchanger SH: PI control is carried out to reach the heat exchanger SH objective value.

RVR1: Reversing valve (only for Heat recovery (3 pipes).

RVR2: Reversing valve.

MV1: Electronic expansion valve (for the outdoor unit).

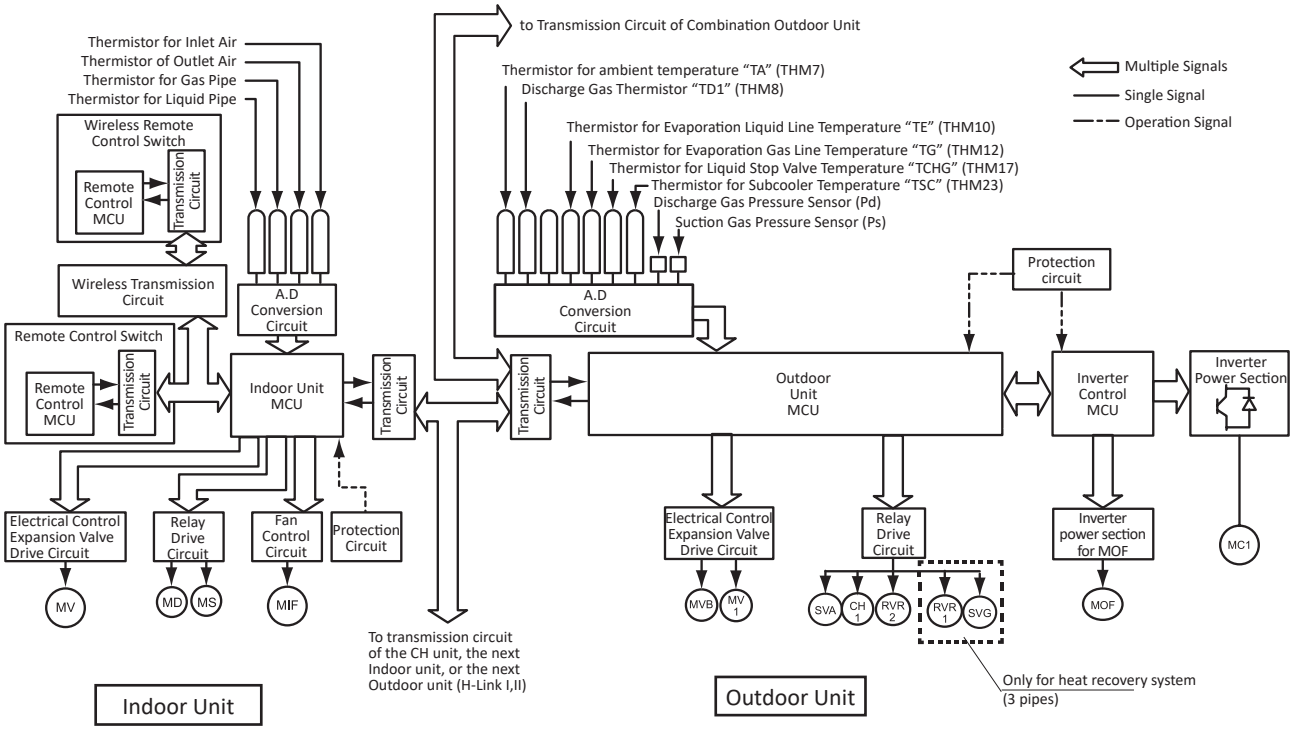
MVB: Electronic expansion valve (for supercooling Heat exchanger).

TSC: Thermistor for Subcooler Temperature

TCHG: Thermistor for Liquid Stop Valve Temperature.

3.1.6 Outline of the control system

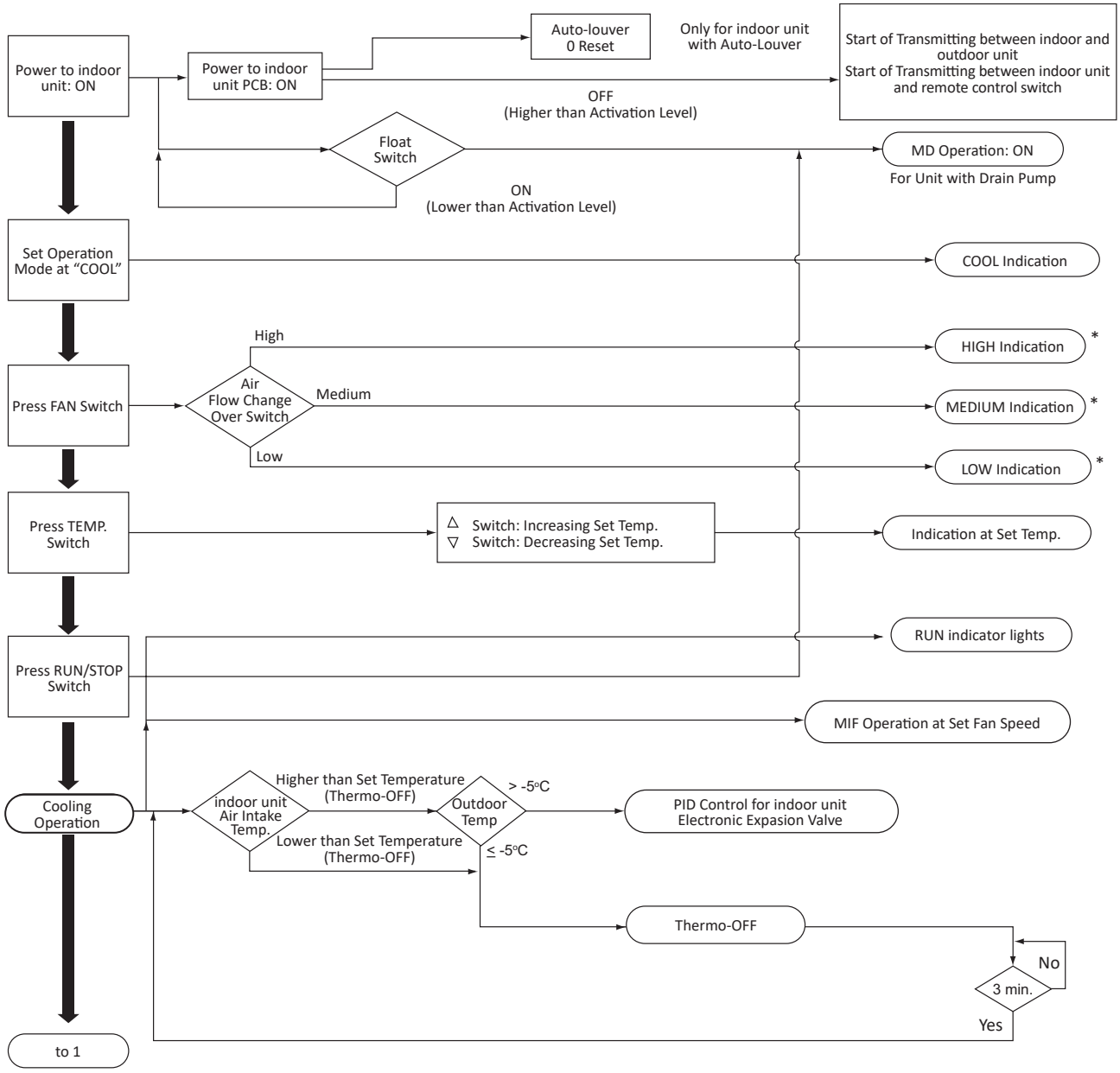
The figure below shows the outline of the control system.



Symbol	Description
THM	Thermistor
MCU	Microcontroller
MC1	DC motor (for Inverter compressor)
MOF	DC motor (for outdoor unit fan)
MIF	Motor (for the indoor unit fan)
MS	Motor (for the automatic louver)
MD	Motor (for the drain pump)
MV	Electronic expansion valve (for the indoor unit)
MV1	Electronic expansion valve (for the outdoor unit)
MVB	Electronic expansion valve (for supercooling Heat exchanger)
SVA	Solenoid valve
SVG	Solenoid valve (only for heat recovery (3 pipes))
RVR1	Reversing valve (only for heat recovery (3 pipes))
RVR2	Reversing valve
CH1	Compressor heater resistance

3.2 Standard operation sequence

3.2.1 Cooling operation

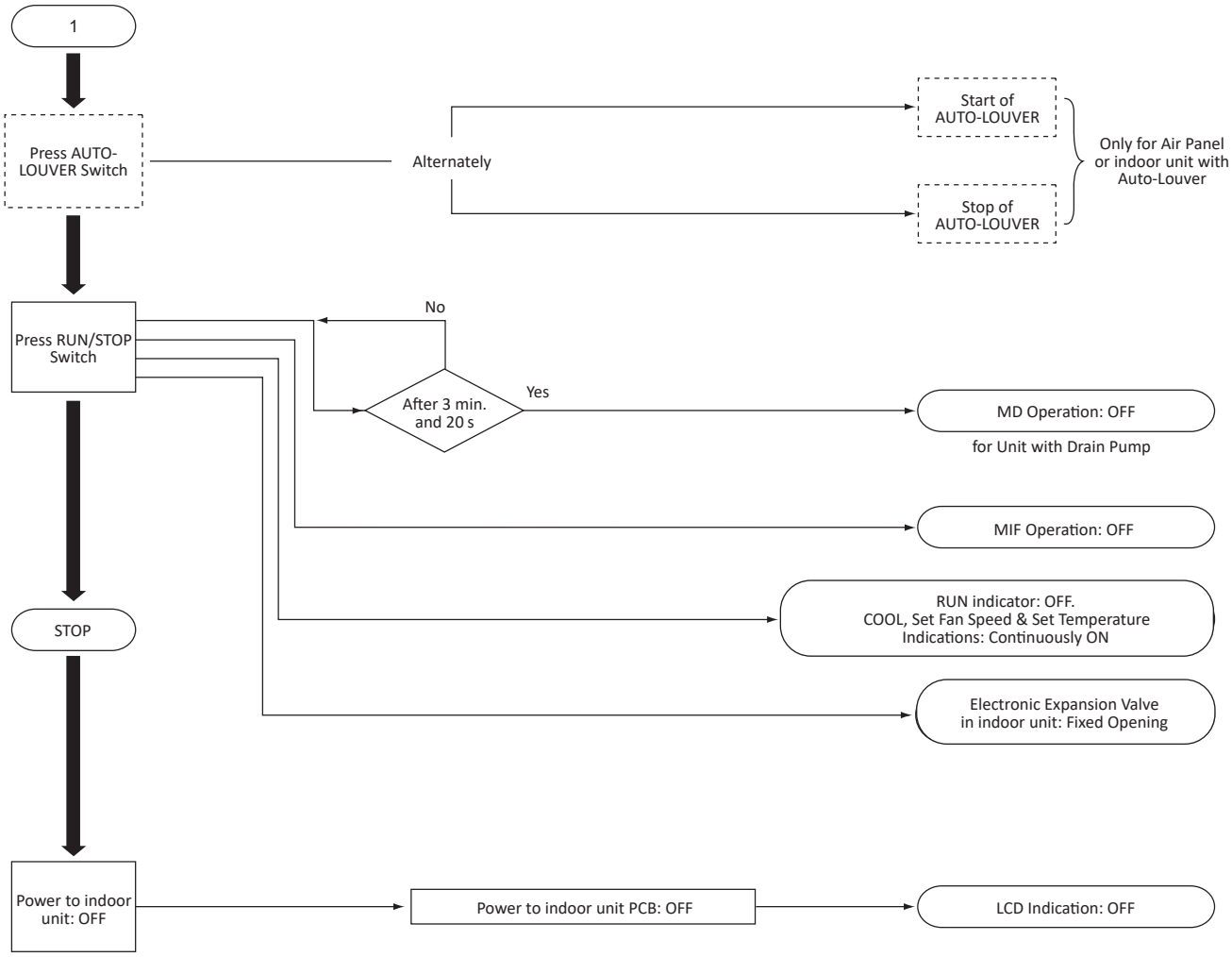


NOTE

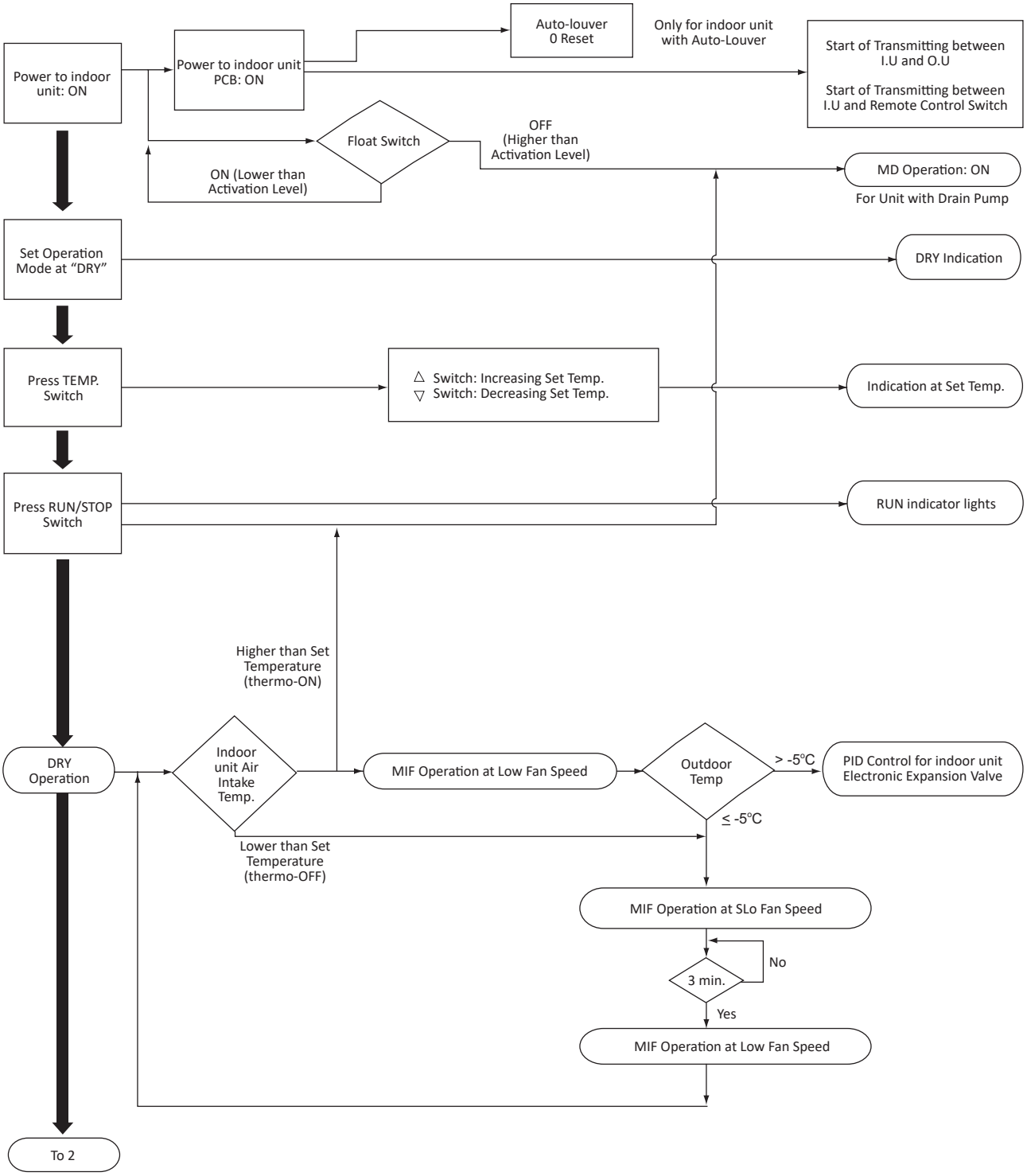
(*) For RPI-8.0FSN3E(-f) and RPI-10.0FSN3E(-f), the fan speed is "HIGH" and "LOW" only. By pressing the FAN SPEED SWITCH of remote control switch, the indication of LCD is changed as Hi → Me → Lo *, but the actual fan speed is as shown in the table right.*

LCD indication	Actual fan speed
HIGH	HIGH
MED	MED
LOW	LOW

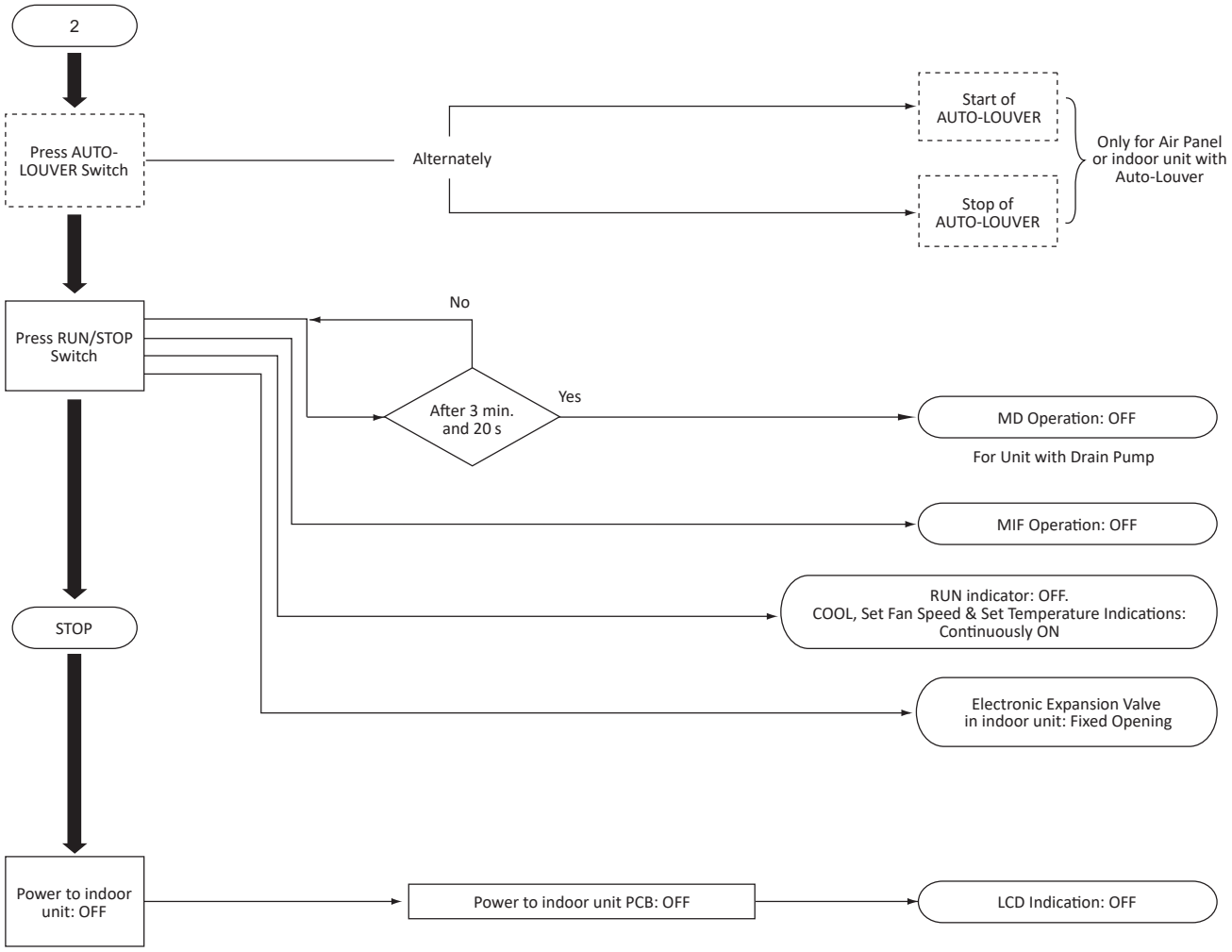
Cooling operation (continued)



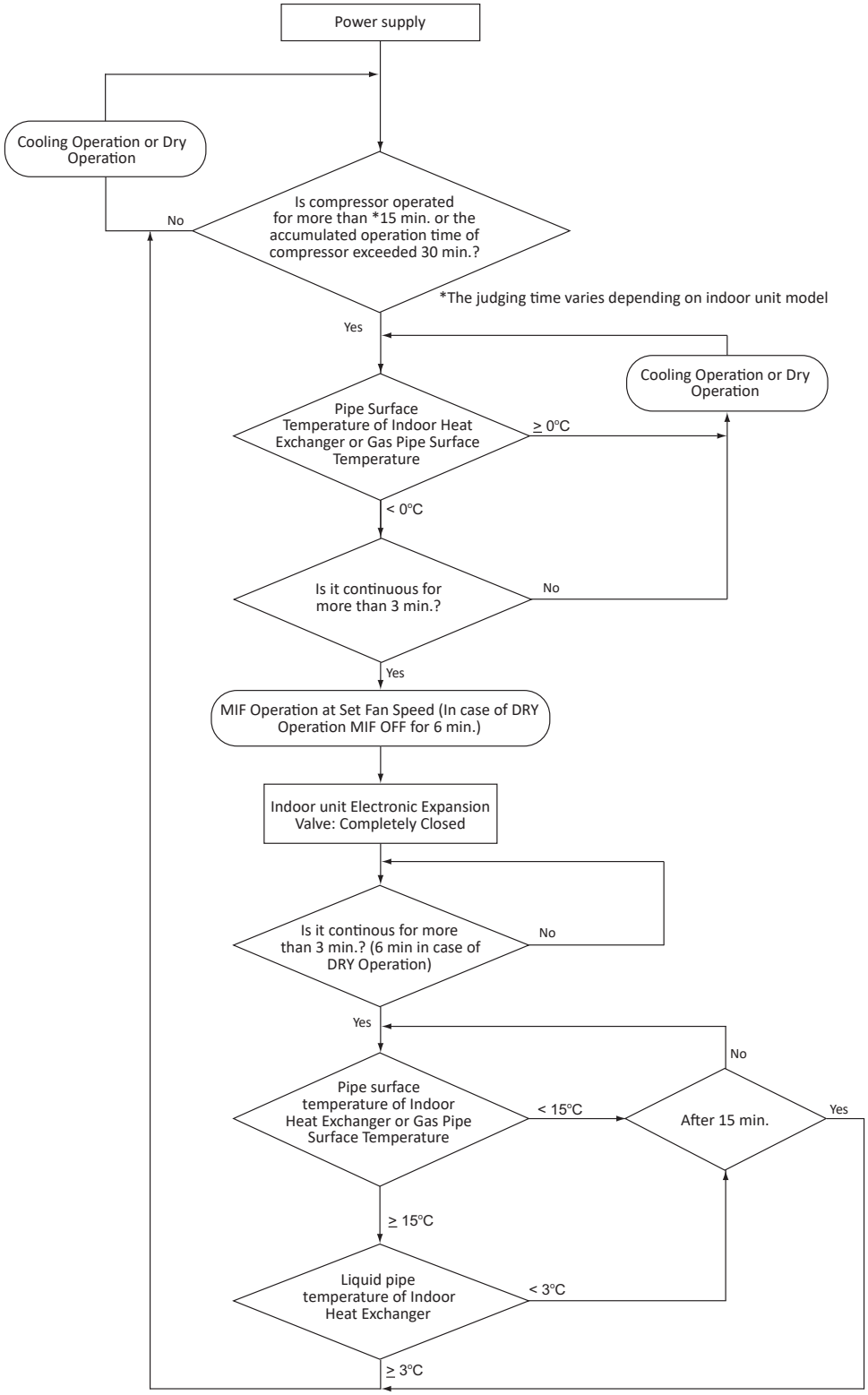
3.2.2 Dry operation



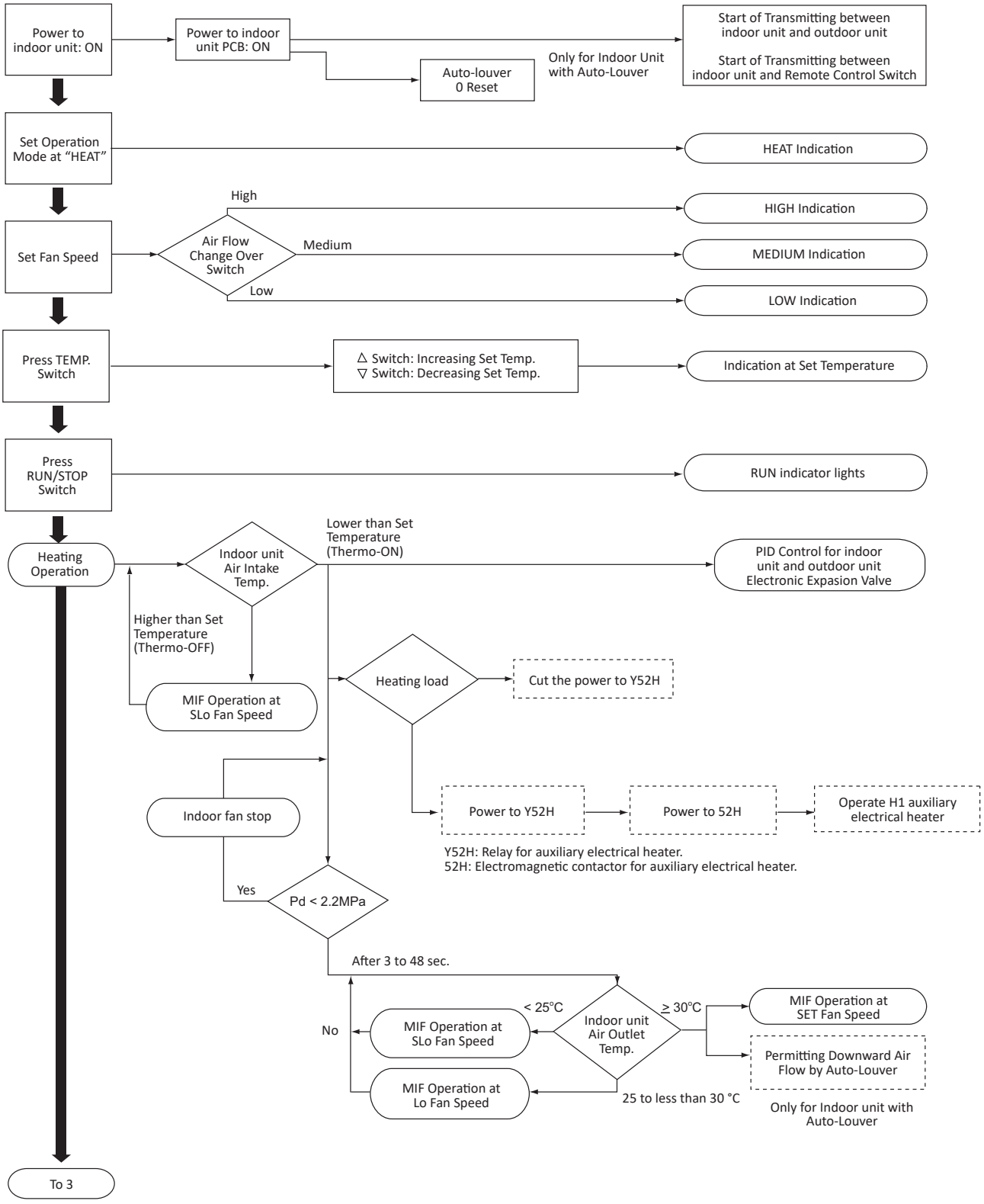
Dry operation (continued)



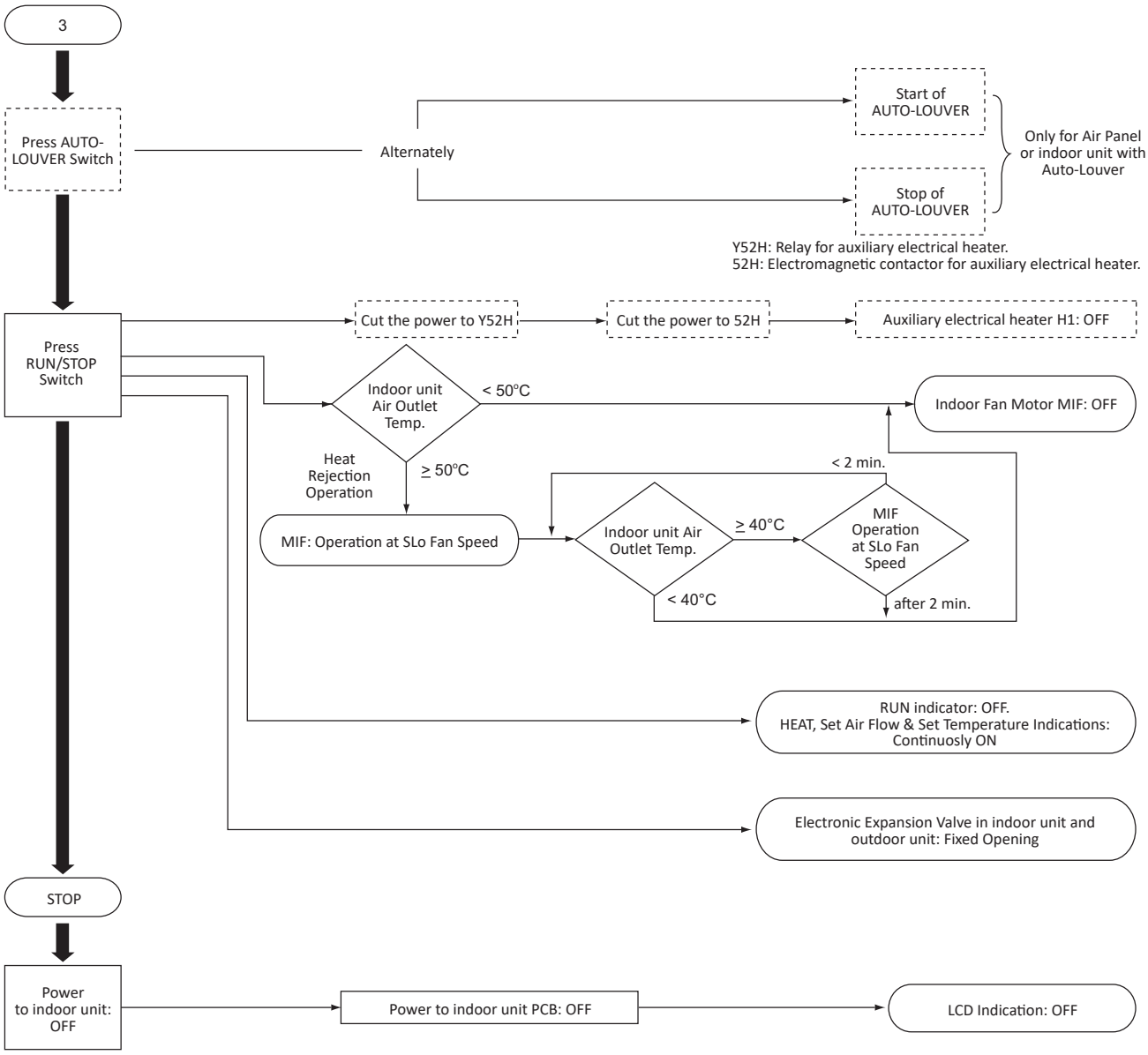
3.2.3 Antifreeze protection control during the cooling or dry operation



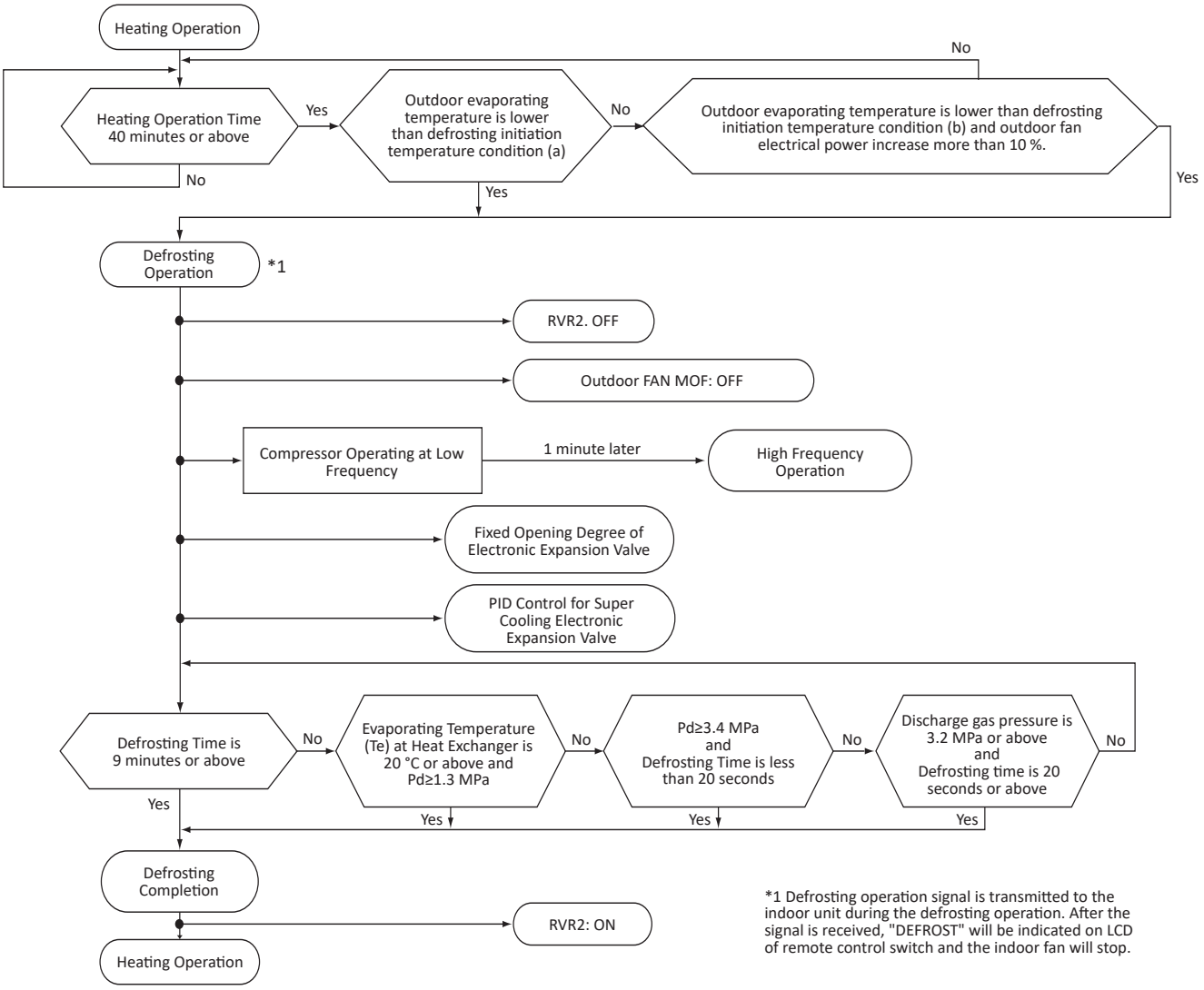
3.2.4 Heating operation



Heating operation (continued)



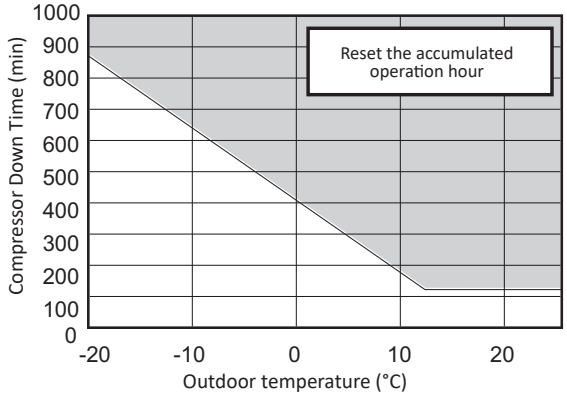
3.2.5 Defrost operation



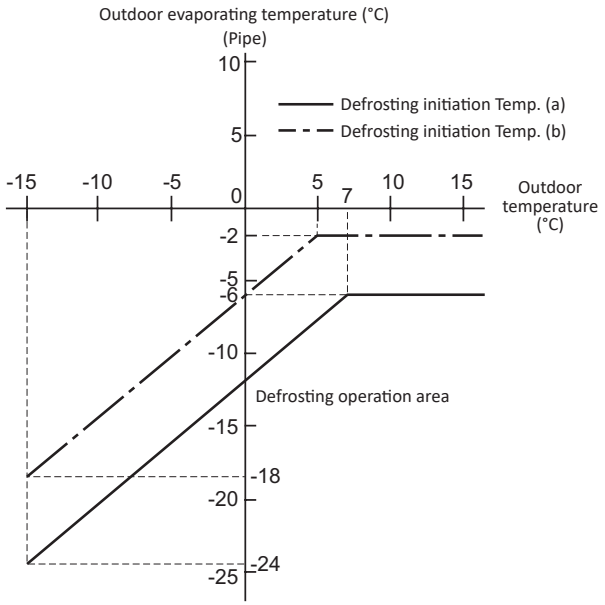
*1 Defrosting operation signal is transmitted to the indoor unit during the defrosting operation. After the signal is received, "DEFROST" will be indicated on LCD of remote control switch and the indoor fan will stop.

Accumulated heating operation time resetting condition

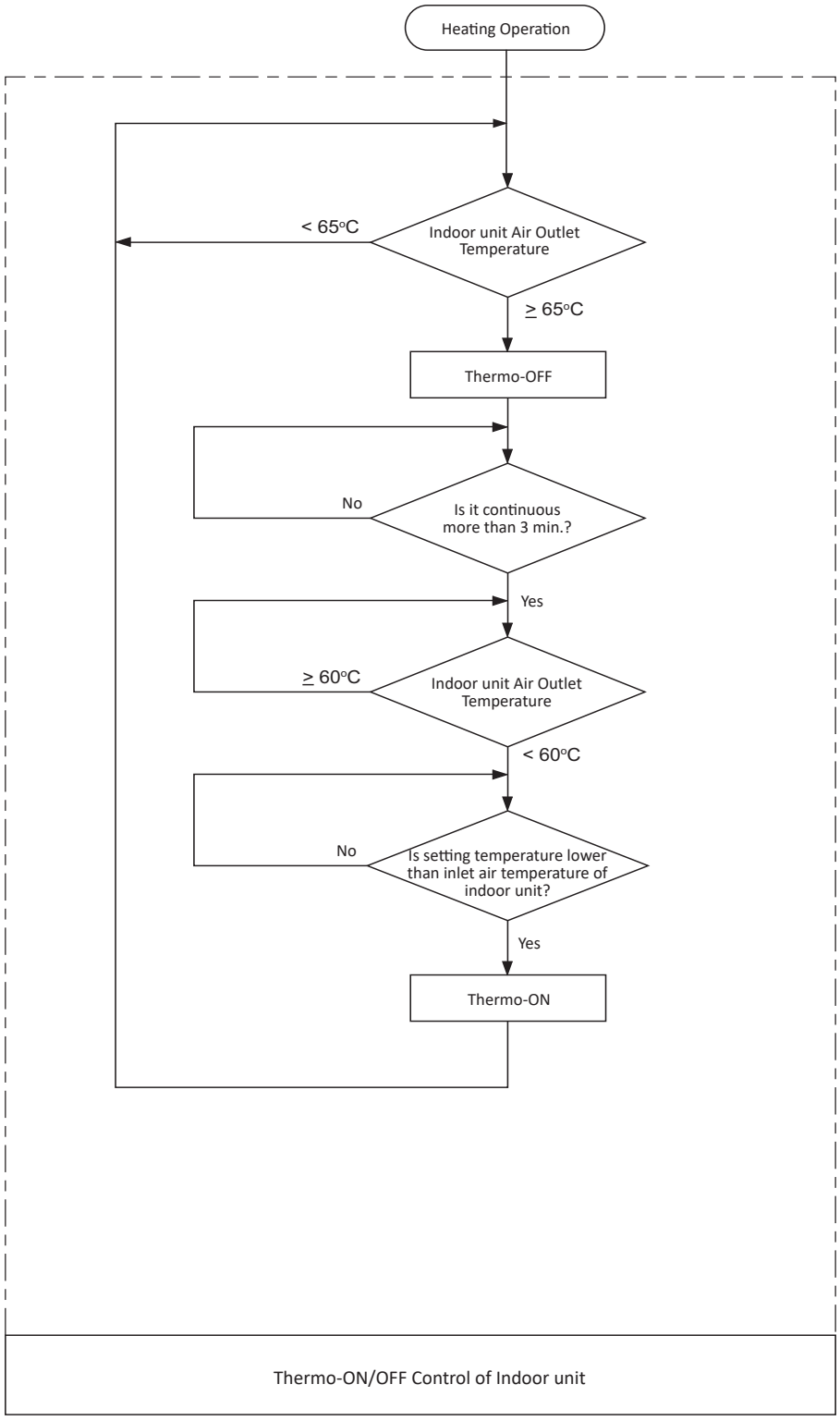
To prevent entring in defrosting in a short time upon starting after long-term stoppage, accumated heating time is cleared with the outdoor air temperature (Ta) at the time of switch ON and compressor stop time.



Temperature condition under defrosting operation



3.2.6 Excessive high discharge air temperature prevention control (depending on the indoor unit model)



3.3 Protection control

3.3.1 Control of the outdoor unit

Whenever protection control sequences are activated, the corresponding code is displayed on the 7-segment LED array of the main control board.

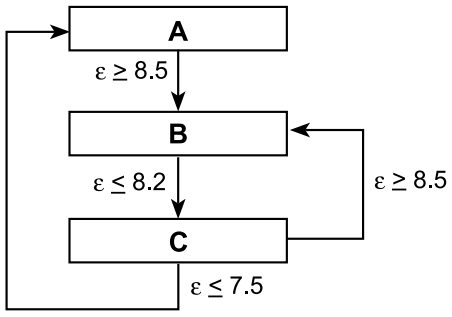
Protection control code is displayed when a unit protection mode has been initiated. The code will disappear once the cause of protection has been addressed.

Indication	Protection control contents	Code during degeneration control
P01	Pressure ratio protection control	Pc1
P02	High pressure increase protection control	Pc2
P03	Inverter current protection control	Pc3
P04	Inverter fin temperature increase protection control	Pc4
P05	Discharge temperature increase protection control	Pc5
P06	Low pressure decrease Protection control	-
P09	High pressure decrease protection control	
P0A	Demand current control	
P0d	Low pressure increase protection control	

◆ P01: Pressure ratio increase protection control

a. Pressure ratio increase protection control

It is performed in order to protect the compressor from an increase of pressure ratio.



A. Normal operation
B. Forced decrease in frequency (1.0 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)

NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *In order to carry out this control, the pressure ratio of each outdoor unit is calculated and the maximum value is used.*

Pressure ratio ε=(Pd+0.1)/(Ps+0.06)

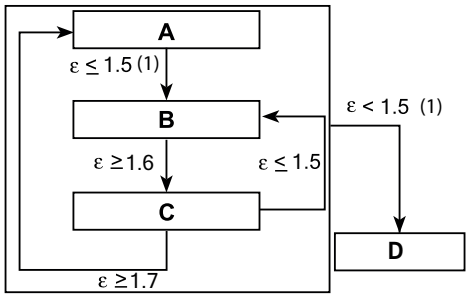
Pressure ratio ε=(Pd+15)/(Ps+9)

Pd: High pressure sensor detected value.

Ps: Low pressure sensor detected value.

b. Low compression ratio protection function

This function is activated to protect the compressor during occurrences of low compression ratio.



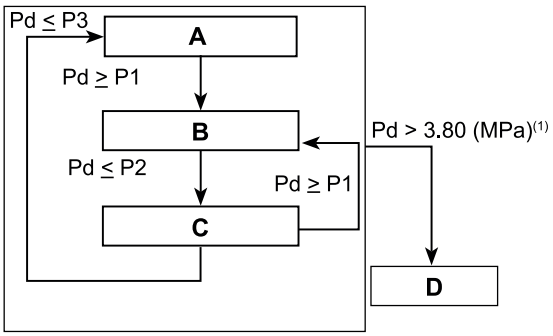
A. Normal operation
B. Forced increase in frequency (0.25 Hz/s)
C. Not allowing frequency decreases (only frequency increase are allowed)
D. Abnormal stoppage (cause of stoppage d1-11)
(1). For 1 min.
Ɛ. Pressure ratio

NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *The pressure ratio is calculated in each outdoor unit, and this control uses the minimum value.*

◆ P02: High pressure protection control

The high pressure protection control is carried out to prevent the protection device from being activated due to an increase in high pressure during an anomaly and protect the compressor from excessive high pressure increases.



A. Normal operation
B. Not allowing frequency increases (only frequency decreases are allowed)
C. Forced decrease in frequency (1.5 Hz/s)
D. Abnormal stoppage (cause of stoppage d1-13)
(1). For 2 seconds

Operation mode	P1	P2	P3
Cooling	3.50	3.55	3.30
Heating	3.50	3.55	3.30

Units in MPa

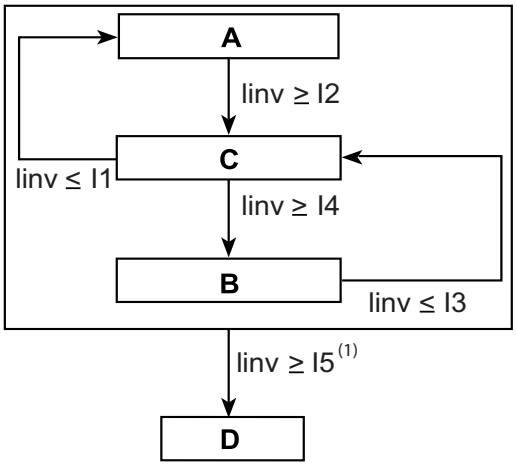
NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *High pressure is detected in each outdoor unit, and this control uses the maximum value. Pd: high pressure sensor detected value.*

◆ P03: Inverter current protection control

The Inverter current protection control is carried out to prevent the damage of the inverter caused by the increase of inverter secondary current value.

a. Inverter Secondary Current Protection



A. Normal operation
B. Forced decrease in frequency (3.0 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
D. Abnormal stoppage (cause of stoppage d1-17)
(1). For 30 seconds or totally 3 min. in 10 min.
linv. Detected value of inverter secondary current sensor (A)

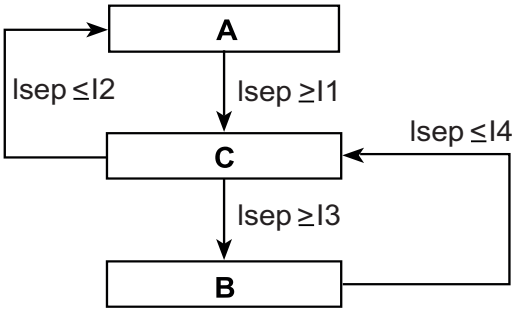
NOTE

- *With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.*
- *In case of two inverter PCB installed in an outdoor unit, the Maximum current value detected at each inverter PCB is utilized.*

Model	I1	I2	I3	I4	I5
RAS-(8/10)FSXNS2E RAS-(16-20)FSXNS2E RAS-(5-8)FSXNP2E RAS-16FSXNP2E	18.0	18.5	19.0	19.5	19.5
RAS-10FSXNP2E	24.5	25.0	25.5	26.0	26.0
RAS-(12/14)FSXNS2E RAS-(22-24)FSXNS2E RAS-(12/14)FSXNP2E RAS-18FSXNP2E	24.5	25.0	25.5	26.0	26.0

Units in A

b. Primary current protection for each inverter PCB



A. Normal operation
B. Forced decrease in frequency (1.0 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
Isep. Inverter primary current

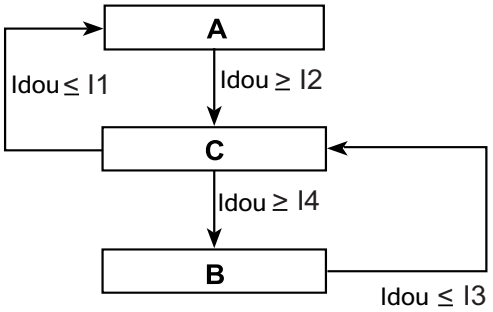
NOTE

- *With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in Prohibition of Frequency Increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in Frequency Forced Decrease, all the outdoor units in operation are forced to decrease frequency.*
- *In case of two inverter PCB installed in an outdoor unit, the Maximum current value detected at each inverter PCB is utilized.*

Model	I1	I2	I3	I4
RAS-(8-24)FSXNS2E RAS-(5-18)FSXNP2E	26.5	27.5	27.5	28.0

Units in A

c. Primary current protection for each outdoor unit



A. Normal operation
B. Forced decrease in frequency (1.0 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
Idou. Total value of primary current of all the inverter PCB in an outdoor unit

NOTE

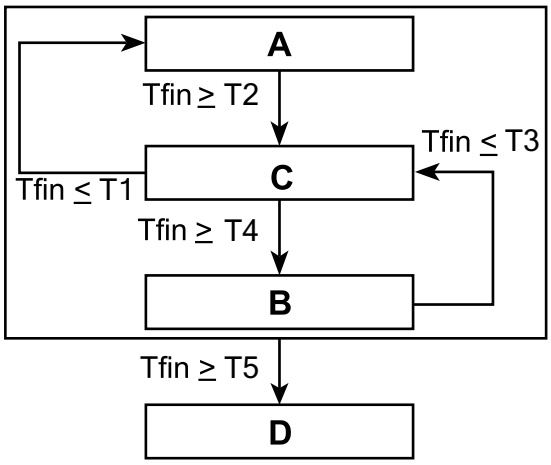
- *With a combination of base units, the control in the figure is performed for each outdoor unit connected. When there is outdoor unit in prohibition of frequency increase, all the outdoor units in operation are prohibited to increase frequency. When there is outdoor unit in frequency forced decrease, all the outdoor units in operation are forced to decrease frequency.*

Model	I1	I2	I3	I4	Model	I1	I2	I3	I4
RAS-8FSXNS2E	13.0	14.0	14.0	14.5	RAS-5FSXNP2E	9.1	10.1	10.1	10.6
RAS-10FSXNS2E	18.6	19.6	19.6	20.1	RAS-6FSXNP2E	9.7	10.7	10.7	11.2
RAS-12FSXNS2E	20.9	21.9	21.9	22.4	RAS-8FSXNP2E	12.5	13.5	13.5	14.0
RAS-14FSXNS2E	26.2	27.2	27.2	27.7	RAS-10FSXNP2E	16.4	17.4	17.4	17.9
RAS-16FSXNP2E	29.8	30.8	30.8	31.3	RAS-12FSXNP2E	20.3	21.3	21.3	21.8
RAS-18FSXNS2E	34.0	35.0	35.0	35.5	RAS-14FSXNP2E	24.8	25.8	25.8	26.3
RAS-20FSXNS2E	40.5	41.5	41.5	42.0	RAS-16FSXNP2E	29.5	30.5	30.5	31.0
RAS-22FSXNS2E	41.0	42.0	42.0	42.5	RAS-18FSXNP2E	30.9	31.9	31.9	32.4
RAS-24FSXNS2E	48.9	49.9	49.9	50.4					

Units in A

◆ P04: Inverter fin temperature increase protection control

The inverter fin temperature increase protection control is carried out to prevent the damage of the inverter caused by the increase in inverter fin temperature.



A. Normal operation
B. Forced decrease in frequency (0.5 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
D. Abnormal stoppage (cause of stoppage d1-17)
Tfin. Inverter fin temperature sensor detected value

NOTE

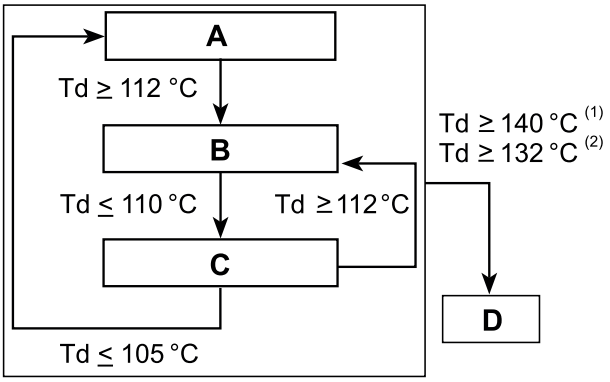
- *In the case of base unit combinations, the control of the figure is carried out for the whole outdoors units to be connected.*
- *In order to carry out this control, the inverter fin temperature of each outdoor unit is calculated and the maximum value is used.*

Model	T1	T2	T3	T4	T5
RAS-(8-24)FSXNS2E RAS-(5-18)FSXNP2E	102	100	104	102	110

Units in °C

◆ P05: Discharge temperature increase protection control

The discharge temperature increase protection control is carried out to protect the compressor motor coil from a discharge pressure increase during an anomaly.



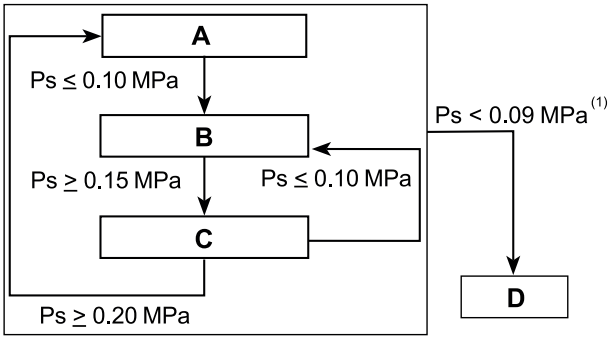
A. Normal operation
B. Forced decrease in frequency (1.0 Hz/s)
C. Not allowing frequency increases (only frency decreases are allowed)
D. Abnormal stoppage (cause of stoppage d1-15)
(1). For 5 seconds
(2). For 10 minutes
Td. Discharge gas temperature sensor detected value

NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *Discharge temperature is detected in each outdoor unit, and this control uses the maximum value.*
- *In case of two inverter compressors installed in an outdoor unit, the maximum temperature detected at each inverter compressor is utilized.*

◆ P06: Low pressure decrease protection control

Low pressure decrease protection control is performed in order to protect the compressor from a transitional decrease of suction pressure.



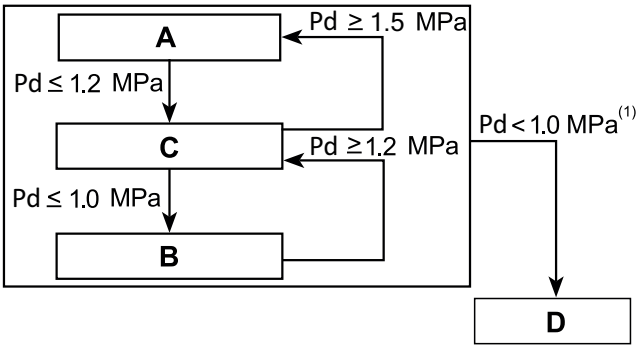
A. Normal operation
B. Forced decrease in frequency (0.25 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
D. Abnormal stoppage (cause of stoppage d1-15)
(1). For 12 minutes
Ps. Detected value of low pressure sensor

NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *Low pressure is detected in each outdoor unit, and this control uses the minimum value.*

◆ P09: High pressure decrease protection control

The suction pressure protection control is carried out to protect the compressor from a transitory decrease in suction pressure.



A. Normal operation
B. Forced increase in frequency (0.125 Hz/s)
C. Not allowing frequency decreases (only frequency increases are allowed)
D. Abnormal stoppage (cause of stoppage d1-26)
(1). For 1 hour
Pd. Detected value of high pressure sensor

NOTE

- *In the case of base unit combinations, the control of the figure is carried out for the whole outdoor units to be connected.*
- *High pressure is detected in each outdoor unit, and this control uses the minimum value.*

◆ P0A: Demand current control

The compressor operation frequency is controlled to set at the setting value of the outdoor unit inverter primary current (40 % to 100 % of rated current of cooling operation). This function is detailed in the “External Input and Output Setting”.

Operating conditions

The demand current control can be performed under the following conditions.

a. The demand signal is input from the centralized operation controller.
b. The demand signal is input at the external input terminals of the outdoor unit from external equipment such as a building management system or a utility with a smart meter.
c. The demand function settings are set from the outdoor unit PCB.
d. The wave function is set from the outdoor unit PCB.
e. The demand signal is input from the indoor unit (wired controller).

If the operation current exceeds each setting function value, the compressor operation frequency is controlled.

Cancellation condition

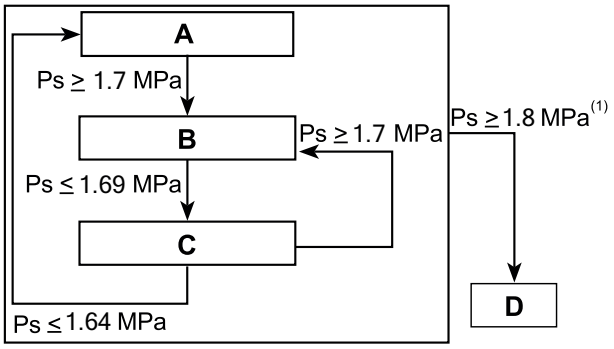
The input signal is stopped at each condition (a) to (e).

NOTE

This function is not available when the compressor starts or during a defrosting operation.

◆ P0d: Low pressure increase protection control

The compressor operation frequency is controlled to protect the compressor from suction pressure transitional increasing.



A. Normal operation
B. Forced increase in frequency (0.125 Hz/s)
C. Not allowing frequency decreases (only frequency increases are allowed)
D. Abnormal stoppage (cause of stoppage d1-26)
(1). For 1 min
Ps. Detected value of low pressure sensor

NOTE

- *With a combination of base units, the control in the figure is performed for the entire number of outdoor units to be connected.*
- *Low pressure is detected in each outdoor unit, and this control uses the maximum value.*

◆ Priority of protection control

If two or more protection controls meet a condition, the protection controls perform according to the following.

Rank order	Indication	Protection control contents
1	P01	Pressure Ratio Protection Control
2	P02	High Pressure Increase Protection Control
3	P03	Inverter Current Protection Control
4	P04	Inverter Fin Temperature Increase Protection Control
5	P05	Discharge Temperature Increase Protection Control
6	P06	Low Pressure Decrease Protection Control
7	P0A	Demand Current Control
8	P0d	Low Pressure Increase Protection Control
9	P09	High Pressure Decrease Protection Control

NOTE

- *In the event that a higher priority protection control is activated, the lower priority ones will not be available.*
- *If a higher priority protection control is the compressor frequency increase/decrease prohibition protection while a lower priority protection control is the compressor frequency forced increase/decrease protection, the forced increase/decrease protection shall have priority.*

The relative of priority

		② Lower priority order of protection control function			
		Forced decrease	Forced increase	Prohibited increase	Prohibited decrease
① Higher priority order of protection control function	Forced decrease	①	①	①	①
	Forced increase	①	①	①	①
	Prohibited increase	②	①	② *1	①
	Prohibited decrease	②	②	②	②

**1 Discharge temperature increase protection control (P05) is higher than the following protection controls.*

1 Low pressure decrease protection control (P06).

2 Demand current control (P0A).

◆ Degeneration control

The degeneration control is carried out to modify the protection control range. Prevents frequent ON/OFF caused by alarm when retry stoppage by the abnormal control occurs.

Related protection control

a. Pressure ratio decrease protection control (P01).

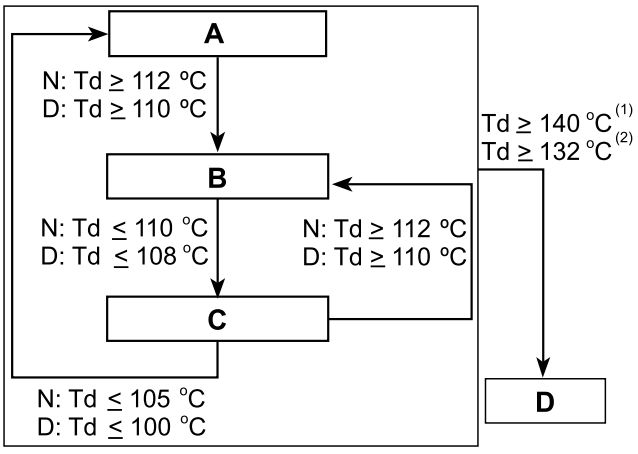
b. Discharge pressure increase protection control (P02).

c. Inverter overcurrent protection control (P03).

d. Inverter fin temperature increase protection control (P04).

e. Discharge temperature increase protection control (P05).

Example of discharge temperature increase protection control:



A. Normal operation
B. Forced decrease in frequency (1.0 Hz/s)
C. Not allowing frequency increases (only frequency decreases are allowed)
D. Abnormal stoppage (cause of stoppage d1-15)
(1). For 5 seconds
(2). For 10 minutes
N. Normal
D. Degeneration
Td. Discharge gas temperature thermistor detected value

◆ Oil return control

Oil return control is performed in order to avoid insufficient oil supply to the compressor caused by long time low frequency operation. This control is utilized to return the oil flow out to the indoor unit side from the compressor.

Activating condition

This control function is started the compressor runs below the specified speed for 1 hour continuously.

Compressor speed for oil return control

Heat Pump

Outdoor unit (HP)	Cooling operation			Heating operation		
	Psmin<Ps1	Ps1≤Psmin<Ps2	Ps2≤Psmin	Psmin<Ps1	Ps1≤Psmin<Ps2	Ps2≤Psmin
8	16.5	13.5	11.5	28	22	15.5
10	24	19	16.5	40	32	22.5
12, 14	33	26	22.5	55	44	31
16 to 24	43	35	29	72	57	40
26 to 34	68	55	47	112	90	64
36 to 54	132	105	90	165	132	93
56 to 72	146	117	99	238	190	134
74 to 96	162	130	110	264	212	150

Units in Hz

Heat Recovery

Outdoor unit (HP)	Cooling operation			Heating operation		
	Ps min < Ps1	Ps1≤Ps min < Ps2	Ps2≤Ps min	Ps min < Ps1	Ps1≤Psmin<Ps2	Ps2≤Psmin
5, 6, 8	18.5	14.5	12.5	11	11	11
10	29	23	19.5	18	14.5	11
12, 14	53	42.5	36	27.5	22	15.5
16 to 20	53	42.5	36	27.5	22	15.5
22 to 24	59.5	47.5	40	40	32	22.5
26	93.5	75	63.5	55	44	31
28 to 34	93.5	75	63.5	55	44	31
36	126.5	101	85.5	55	44	31
38 to 54	178	134	114	92.5	74	52

Units in Hz

	Ps1 (MPa)	Ps2 (MPa)
Cooling mode	1.00	1.40
Heating mode or simultaneous cooling mode	0.90	1.30

Detail of control

Compressor:

Increase the compressor speed above the required value to return the oil to the compressor.

Expansion valve:

(In the vase of cooling operation) Open the expansion valve of the indoor unit under thermo-ON.

(In the case of heating operation) Open the expansion valve of the outdoor unit.

Deactivating condition:

This control function is cancelled when the oil return control continues for more than 60 sec. (for cooling operation) /120 sec. (for heating operation).

3.3.2 Control of CH-Box

Single branch type: CH-AP160SSX, CH-AP280SSX.

Multiple branch type: CH-AP04MSSX, CH-AP08MSSX, CH-AP12MSSX, CH-AP16MSSX.

The following table shows the expansion valve opening of CH-Box at the steady condition.

The expansion valve opening right after the operation mode change (such as thermo-ON → thermo-OFF) may not be matched with the table below. Make sure that the opening should be checked after at least 6 minutes of mode change.

NOTE:

Thermo-ON: The outdoor unit and some indoor units are running.

Thermo-OFF: The outdoor unit and some indoor units stay on, but don't run.

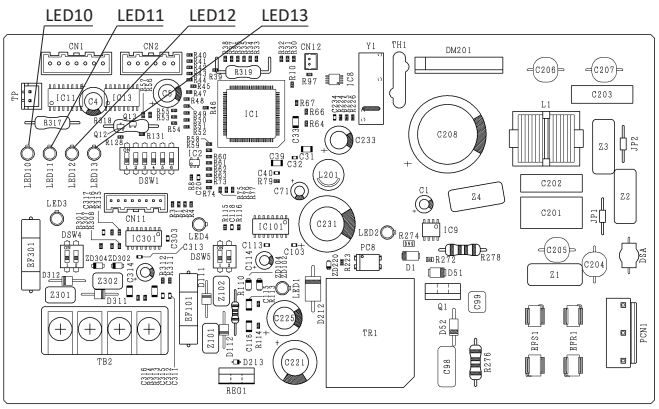
1 Checking method of CH-Box performance.

Check the LED on the PCB of CH-Box to inspect the expansion valve opening.

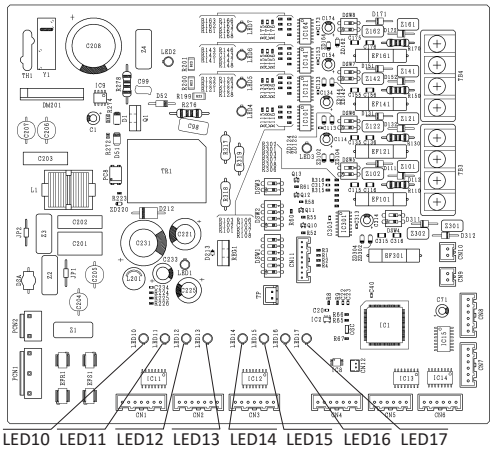
Refer to the table below for the relation between expansion valve opening and LEDs.

LED	Expansion valve		LED display
	Single branch type	Multiple branch type	
LED10	MVD1	MVD1	Light ON: Fully open OFF: Closed Flashing: Other than the above (Half open and the others)
LED11	MVS1	MVD2	
LED12		MVD3	
LED13		MVD4	
LED14		MVS1	
LED15		MVS2	
LED16		MVS3	
LED17		MVS4	

PCB1 (PI163) of single branch type CH-Box



Multiple branch type CH-Box



2 CH-Box expansion valve opening at OFF or with each operation mode

Outdoor unit operation mode		Indoor unit operation mode when connected to CH-Box		Expansion valve opening of indoor unit (pls)	Expansion valve opening of CH-Box (pls)	
	Reversing valve (RVR1)				MVS	MVD
Right after switching reversing valve (Within 2 minutes after d1-09 stoppage)	RVR1 ON	HEATING · COOLING		-	6000	6000
	RVR1 OFF	HEATING	SW OFF thermo-OFF	40 or less	6000 or 500	500 or 25
				more than 40	500 or 25	6000 or 500
			thermo-ON	-	500 or 25	6000 or 500
		COOLING		-	6000 or 500	500 or 25
Normal operation (other than the above)	RVR1 ON	HEATING		-	500	6000
		COOLING		-	6000	500
	RVR1 OFF	HEATING · COOLING		-	6000	6000
Defrosting		-	-	-	Maintain the opening before defrosting	

- Refer to the table below for the indoor unit operation mode for each indoor unit operation mode.
- When indoor units in cooling mode and indoor units in heating mode are connected to the CH-Box at the same time, priority is given to the operation mode of the first unit selected

Indoor unit operation mode	Operation mode
COOLING	Cooling mode, fan mode, dry
HEATING	Heating mode

NOTE

When the unit is at thermo-OFF or stopped, the operation mode remains the same as the operation mode immediately before.

3.4 Control and safety devices

3.4.1 Compressor protection

3.4.1.1 Outdoor unit

The compressor is protected by the following devices and their combinations:

1. High pressure switch: this switch stops the compressor when the discharge pressure exceeds the set value.

2. Oil heater: this band-type heater protects against the formation of foam on the oil during cold starts and remains enabled when the compressor is at a standstill.

Model			RAS-(8-12)FSXNS2E	RAS-(14-18)FSXNS2E	RAS-(20-24)FSXNS2E
For compressor					
Pressure switches			Automatic restart, non adjustable (each one for each compressor)		
High pressure	Cut-Out	MPa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-In	MPa	$3.20^{\pm0.15}$	$3.20^{\pm0.15}$	$3.20^{\pm0.15}$
Fuse capacity (3N~ 400V 50Hz)		A	50	50	50
Oil heater capacity		W	37.3x3	37.3x3	37.3x6
CCP timer			Not adjustable	Not adjustable	Not adjustable
Time setting		min.	3	3	3
For DC fan module					
Fuse capacity (3N~ 400V 50Hz)		A	5	10	5

Model			RAS-(5/6)FSXNP2E	RAS-(8-14)FSXNP2E	RAS-(16/18)FSXNP2E
For compressor					
Pressure switches			Automatic restart, non adjustable (each one for each compressor)		
High pressure	Cut-Out	MPa	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$	$4.15^{-0.05}_{-0.15}$
	Cut-In	MPa	$3.20^{\pm0.15}$	$3.20^{\pm0.15}$	$3.20^{\pm0.15}$
Fuse capacity (3N~ 400V 50Hz)		A	50	50	50
Oil heater capacity		W	37.3x3	37.3x3	37.3x6
CCP timer			Not adjustable	Not adjustable	Not adjustable
Time setting		min.	3	3	3
For DC fan module					
Fuse capacity (3N~ 400V 50Hz)		A	5	10	5

3.4.1.2 CH-Box

Model		CH-AP(160-280)SSX, CH-AP(04-16)MSSX
Fuse for control circuit	A	5

Optional functions

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4.1 Optional functions available in the outdoor units

External input function	
Optional function	Explanation
Fixing operation mode (heating/cooling)	This function fixes the operation mode, heating or cooling. If indoor unit is set on Heating (cooling) mode when cooling (heating) mode is fixed, the indoor unit will be thermo-OFF.
Demand stoppage	When this function is enabled, the compressor is stopped and the indoor units are put under thermo-OFF condition.
Outdoor unit fan motor stop/start (snow sensor)	This function starts all the outdoor fan motors and are operated at the full speed if the outdoor temperature is below 10 °C (When the outdoor temperature is higher than 10 °C, the fan motor will not be operated) during compressor stoppage in order to prevents the outdoor units from a condition covered with snow.
Forced stoppage	This function produces an emergency stoppage. The compressor and indoor fans do not operate.
Demand current control	This function stablish the maximum limit of the outdoor unit running current according to it's set to 40 %, 60 %, 70 % 80 % or 100 % of the reference power consumption. If the outdoor unit running current exceeds the maximum limit for twenty minutes, the indoor unit is put under Thermo-OFF condition.
Forced noise reduction	This function reduces the compressor and fan rotation frequency and, as a result, the sound level and capacity. (4 sound pressure level cases can be selected)

External output function	
Optional function	Explanation
Operation signal	The operation signal is sent to output terminals when the indoor units (or a single indoor unit) are operating. This function can be used for the circulation or humidification operation.
Alarm signal	This function is used to receive the alarm signal. The alarm signal will be sent to output terminals when the indoor units (or a single indoor unit) are operating and an alarm occurs in the system.
Compressor ON signal	This function is used to receive the compressor operation signal.
Defrosting signal	This function is used to receive the defrosting signal.

Optional functions (by 7–segment display)	
Optional function	Explanation
Indoor unit fan control during the thermo-OFF in heating mode	Normally, the fan speed is changed to "LOW" at heating thermo-OFF. However, the indoor fan motor is operated at "LOW" and stopped repeatedly by setting this function.
Night-shift (low noise)	The night shift operation shall be applied in case the cooling capacity has the allowed range to decrease the capacity and the low noise level operation is required especially at night.
Cancellation of the outdoor ambient temperature limit.	The heating operation is continued under a high outdoor temperature or the cooling operation is continued under a low temperature.
Defrost for cold area (change in the defrost condition)	This function changes the defrosting operation conditions. It is particularly useful in cold areas.
SLo (fan speed) Defrost setting	When this function is enabled, the indoor fan speed in defrost mode switches to slow instead of stopping the fan.
Cancellation of the hot start	Hot start protection control can be canceled thought the function setting.
Priority capacity mode	By setting this function, the target frequency and current limit of the compressor are set higher.

Optional functions (by 7–segment display)	
Optional function	Explanation
Minimum evaporating temperature setting for cooling	These configurations are used to optimize the system's operation, adapting it to the actual installation.
Target value of the compressor frequency for heating	
Target value of the Indoor unit expansion valve control for cooling	
Target value of the Indoor unit expansion valve control for heating	
Indoor expansion valve opening change for stoppage indoor unit in heating mode	
Indoor expansion valve opening change for thermo-OFF indoor unit in heating mode	
Indoor expansion valve initial opening of thermo-ON indoor unit in heating mode	
Fine adjustment of indoor expansion valve initial opening in cooling mode (initial opening)	
Fine adjustment of indoor expansion valve initial opening in heating mode (initial opening)	
Low noise setting (in the case of low noise setting, the working range in cooling/heating will be restricted)	This setting reduce the compressor frequency and the outdoor fan motor rotation frequency.
Demand function setting	Demand control setting is adapting the self-demand function, which causes the power consumption to drop drastically for the purpose of saving energy.
Wave function setting	This function sets the outdoor flow. If the flow demanded is above the flow set, the capacity of the indoor unit is reduced and the thermostat may even be disabled if necessary. Control of the operation flow is not a set value and may vary within a range.
Cold draft protection	The discharge air temperature of the indoor unit is also low, the outdoor unit is switching operation mode to prevent this low discharge air temperature.
Fan rotation adjustment (to prevent humming noises in multiple installation)	If the outdoor unit fans makes a whining sound in case of the multiple installation, set this operation in the required outdoor units.
Intermittent operations of outdoor fan motor	When the outdoor temperature reaches the setting temperature, all the outdoor fan motors start intermitted operation. When the outdoor temperature is at least 5 °C higher than the setting temperature, the outdoor fan motors stop operating.
Indoor Expansion Valve Control Target SH/SC Correction Value for Cooling/Heating	This item is not usually used.

4.2 Optional functions field settings

There are three methods to set the advanced functions.

1 Using a smartphone (NFC)
2 Using push switches (PSW)
3 Using dip switches (DSW)

Since the last setting of the three methods of setting will take effect, the dip switch (DSW) setting may not match the setting stored in the outdoor unit memory.

When the power is turned OFF, if both the settings are performed - one by the smartphone and the other by the dip switch (DSW), the setting made through the smartphone (NFC) will take effect.

To disable writing from a smartphone (NFC), set the DIP switch (DSW4-3) to ON.

List of available functions per setting method

Setting		Description	NFC	DSW	PSW
Installation setting	Refrigerant system number	This is a function to be set when multiple refrigerant systems are connected via H-LINK II	O	O	O
	Outdoor unit number	This function is set when multiple outdoor units are connected	O	O	O
	High static pressure mode	This setting is used, when the outdoor unit is installed to spaces such as a balcony or a floor where an external static pressure is required to secure a gallery or a duct, etc.	O	O	O
	Low ambient temperature at cooling operations	This function is set when cooling operation is performed where the outside temperature is 5 degrees or less	O	O	O
	Fan speed fine adjustment disable	No setting is required. (Not normally used)	O	O	O
	Power supply voltage	No setting is required. (Not normally used)	O	O	O
	Indoor unit fan restriction	This function limits the indoor fan air flow rate to enable operation when the indoor connection capacity ratio exceeds 130 %	O	O	O
Function selection		This function selects and changes the function	O	X	O
External input/output		This function sets external input/output	O	X	O
System forced stop		The operation of the outdoor units in the same refrigeration cycle system is forcibly stopped	O (*1)	O	X
Configuration		This is not normally used. This function is used to set the product type and capacity	O	X	O

O: Avaliable X: Not available

**1 : This setting mode is enabled only when the dip switch (DSW4-4) is set to ON.*

Even if you set forced shutdown with NFC, the unit will not enter the setting mode.

4.3 Installation settings

Installation setting items by 7-segment display symbol: n5E

No.	Installation setting item	7 segment display	Description
1	Refrigerant system setting	CA	0 Refrigerant system No. 0 (Initial setting)
			: :
			63 Refrigerant system No. 63
2	Outdoor No. setting	od	0 Single unit A (No. 0 unit) (Initial setting)
			1 Combination unit A (No. 0 unit)
			2 Combination unit B (No. 1 unit)
			3 Combination unit C (No. 2 unit)
			4 Combination unit D (No. 3 unit)
3	High static pressure mode setting	Pr	0 Disabled (Initial setting)
			1 30 Pa
			2 60 Pa
			3 80 Pa
4	Low ambient temperature at cooling operation	LA	0 Disabled (Initial setting)
			1 Enabled
5	Prohibit fan speed adjustment for outdoor module (Fo set.)	FS	0 Disabled
			1 Enabled
6	Power supply voltage setting	uo	0 Usually not used
			1 220V
			2 380V
			3 400V
			4 415V
			5 Usually not used
			6 Usually not used
			7 Usually not used
7	Indoor fan limited *1	iF	0 Disabled (Initial setting)
			1 Enabled
8	NFC communication prohibited	n5	0 Disabled (Allow read / write) Initial setting
			1 Enabled (Prohibited read / write)

**1. Be sure to enable this function when the connection capacitance ratio exceeds 130%. The DIP switch (DSW5 - pin 4 ON) can also be set to enable this function.*

The action of this F5 setting is to prohibit the outdoor unit fan speed adjustment with Fα setting.

When the function is set to 0, the function is not activated so the fan speed adjustment can be done (Fα setting).

- ✓ In case of F5 = 0 (Disabled), Fan rotation adjustment is available.
- ✓ In case of F5 = 1 (Enabled), Fan rotation adjustment is not applied (or not considered).

3 module units

10HP Outdoor unit	10HP Outdoor unit	10HP Outdoor unit
Main unit	Subsidiary unit	Subsidiary unit
Fα setting = 01		
-12 rpm against original setting	-12 rpm against original setting	-12 rpm against original setting
F5 setting (Prohibit fan speed adjustment for outdoor module)		
0 = Allow	1 = Prohibit	0 = Allow
-12 rpm against original setting	Original setting before shipment	-12 rpm against original setting

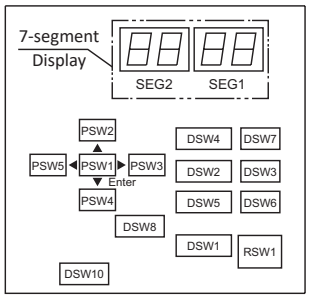
4.4 External input and output setting

External input / output setting items (7 segment symbol: E. io)

No.	Installation setting item	7 segment display		Description
1	Input 1 connector (Terminal No.) CN17 (1-2)	i1	0	No setting
			1	Fixing heating operation mode (initial setting)
			:	:
			14	No setting
2	Input 2 connector (Terminal No.) CN17 (2-3)	i2	0	No setting
			:	:
			2	Fixing cooling operation mode (initial setting)
			:	:
			14	No setting
3	Input 3 connector (Terminal No.) CN18 (1-2)	i3	0	No setting
			:	:
			3	Demand stoppage (initial setting)
			:	:
			14	No setting
4	Output 1 connector (Terminal No.) CN16 (1-2)	o1	0	No setting
			1	Operation signal (initial setting)
			:	:
			4	Defrosting signal
5	Output 2 connector (Terminal No.) CN16 (1-2)	o2	0	No setting
			:	:
			2	Alarm signal (initial setting)
			:	:
			4	Defrosting signal

4.5 Menu mode accessing (by 7-segment display)

Make sure to perform external input/output and setting while the outdoor unit is stopped. It cannot be set while the outdoor is operating or in check mode.



7-segment display, DSWs and PSWs location.

4.5.1 Check mode

It is used to check the condition of the outdoor and indoor units. It also displays the last 15 items in the alarm code history. It is mainly used for servicing.

Start setting	Exit setting
Press PSW1 for 3 seconds	Press PSW1 for 3 seconds

4.5.2 External input and output setting

It is used to set the functions by external input and output signals.

Start setting	Exit setting
1° Turn ON DSW4 PIN4 2° Turn ON DSW4 PIN6	1° Turn OFF DSW4 PIN6 during indicated external Input/Output setting mode 2° Turn OFF DSW4 PIN4

4.5.3 Function setting

It is used to set the operation mode of the indoor units depending on the requirements of the system.

Start setting	Exit setting
1° Turn ON DSW4 PIN4 2° Turn ON DSW4 PIN5	1° Turn OFF DSW4 PIN5 during indicated function setting mode 2° Turn OFF DSW4-PIN4

NOTE

- *After setting, confirm that the DSW4 state is the same as before shipment.*
- *Release "Menu Mode" after the setting is completed. Otherwise, the air conditioner may not operate correctly.*

4.6 External input and output setting (by 7-segment display)

4.6.1 Available control functions

The outdoor unit PCB1 has three input terminals (CN17, CN18) that receive external signals and two output terminals (CN16) that send signals to the exterior. The control functions are available by setting the input and output terminals as shown below:

Control function number	Setting of input functions	Configuration of output functions
1	Fixing heating operation mode	Operating signal
2	Fixing cooling operation mode	Alarm signal
3	Demand stoppage	Compressor ON signal
4	Outdoor unit fan motor start/stop	Defrost signal
5	Forced stoppage	
6	Control of 40 % current demand	
7	Control of 60 % current demand	
8	Control of 70 % current demand	
9	Control of 80 % current demand	
10	Control of 100 % current demand	
11	Low noise level setting 1	
12	Low noise level setting 2	
13	Low noise level setting 3	
0	Without setting	Without setting

The following functions are set before shipment:

Input terminal			
Name of the input terminal	Connector pin number	Setting function	Control function number
Input 1	CN17 (1-2)	Setting the heating mode	1
Input 2	CN17 (2-3)	Setting the cooling mode	2
Input 3	CN18 (1-2)	Stoppage demand	3

Output terminal			
Name of the output terminal	Connector pin number	Setting function	Control function number
Output 1	CN16 (1-2)	Operating signal	1
Output 2	CN16 (1-3)	Alarm signal	2

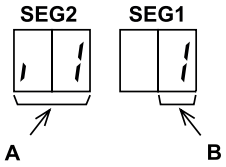
NOTE

The same input/output function cannot be assigned to different input/output terminals. In such case, the setting of the higher terminal number would become invalid.

4.6.2 Setting of external input and output

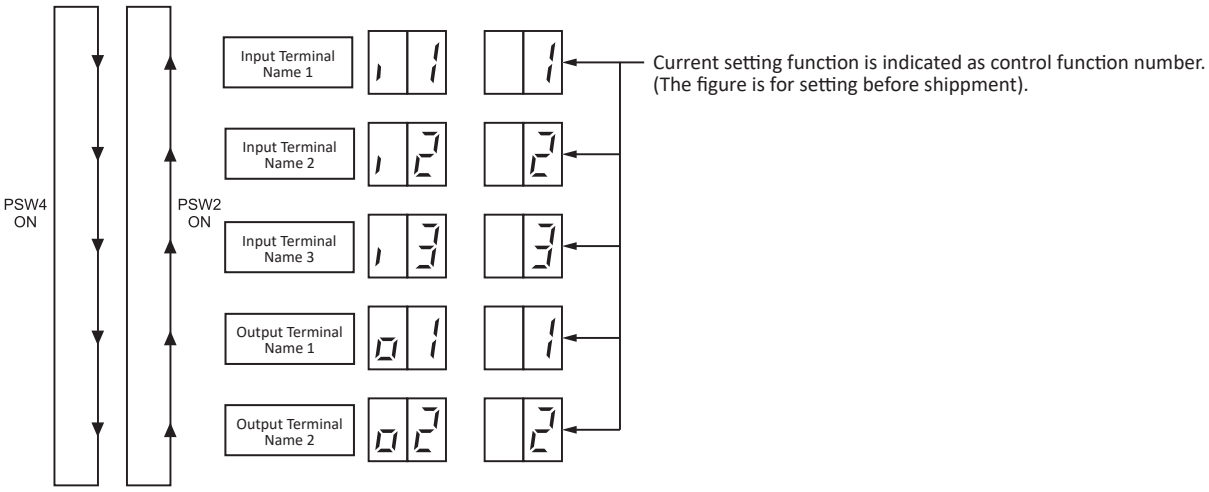
If the initial setting has to be modified, the following instructions must be followed:

1 Selecting “External input and output setting” it will be displayed on the 7-segment display. (The setting must be carried out during the stoppage of the outdoor unit. Also, the DSW4 PIN4 of the outdoor unit PCB1 must be set to “ON” before the modification in order to prevent activation of the compressor).
This display shows the control function Number 1 (fixed heating operation mode) is set at input 1.



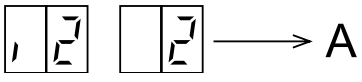
A. Input/output terminal name
B. Control function number

2 Pressing PSW2 and PSW4 changes the input/output terminal name. The following shows the display changes when PSW2 or PSW4 are pushed.



3 After selecting input/output terminal name, press PSW3 or PSW5, and then choose control function number.

A
By pressing PSW3, the number increases by 1. By pressing PSW5, the number decreases by 1. (Control Function Number 14 → Press PSW3 → return to 0)



4 After selecting the control function no, turn OFF DSW4 PIN6. The display will be back to the normal operation. Then turn OFF the DSW4 PIN4. Confirm if the DSW4 is set to factory settings. The selected data is stored in the outdoor unit PCB1 and the “External input and output setting” is completed. The stored data is maintained even when the power source is cut OFF.

Refer to the *"Specifications of required main parts"* table for the details for the electrical wiring connection and the required parts.

Specifications of required main parts

Components		Specifications	Remarks
Auxiliary relay (X1, X2)		Mini power relay, MY1F (or MY2F) made by OMRON	230V
Changeover switch (SS2, SS3)		Manual switch	230V
3-pin connector cable		PCC-1A (connected to a JST Connector, XARP-3)	5 cables with connectors in a single assembly
Cable (Inside the unit)	Low voltage	0.3 mm^2	less than 24V
	230V	0.5 to 0.75 mm^2	—
Cable (Outside the unit)	Low voltage	0.5 to 0.75 mm^2	less than 24V
	230V	2 mm^2	—

NOTE

- *The terminal cable must be as short as possible.*
- *Do not place the cables alongside the high voltage cables. Maintain at least 30 cm of distance between the cable and the high voltage cable. The cables may be crossed. If necessary to place the cables alongside the high voltage cable, insert the low voltage cables inside a metal conduit and ground it one of the end. If sealed cables are used for the low voltage cables, ground it one of the end of the shield cable.*
- *The maximum length must be within 70 m.*

4.6.3 External input function setting

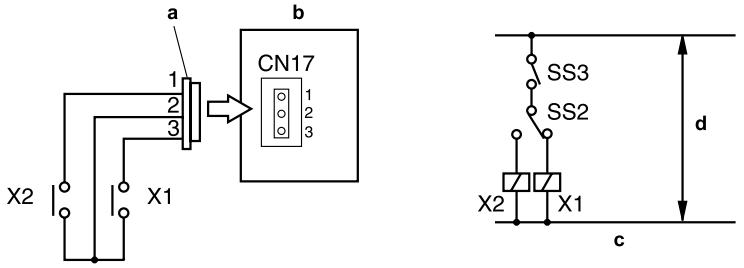
The following signals can be received by the outdoor unit PCB1.

◆ Fixing heating operation mode (Control function n° 1) / Fixing cooling operation mode (Control function n° 2)

When the input terminals for setting the operation mode of the outdoor unit PCB1 are short-circuited, the operation mode can be fixed for cooling or heating mode.

Setting example:

- Fixing heating operation at input 1 (between 1 and 2 pins of CN17)
- Fixing cooling operation at input 2 (between 3 and 2 pins of CN17)



a. 3-pin connector
b. Outdoor unit PCB1
c. Control circuit
d. Power source
X1. Auxiliary relay (cool)
X2. Auxiliary relay (heat)
SS3. Switch for fixing the operation mode
SS2. Switch for changing the operation mode

Operating exmple:

- Short-circuit between terminals 1 and 2 (input 1) of the CN17 to fix heating operation mode.
- Short-circuit between terminals 2 and 3 (input 2) of the CN17 to fix cooling operation mode.

During the setting of heating (or cooling) mode, cooling (or heating) mode will not be available. The indoor units in cooling or dry operation (or heating operation) will be switched to Thermo-OFF condition during the setting of the operation, and stoppage code number “20” is given.

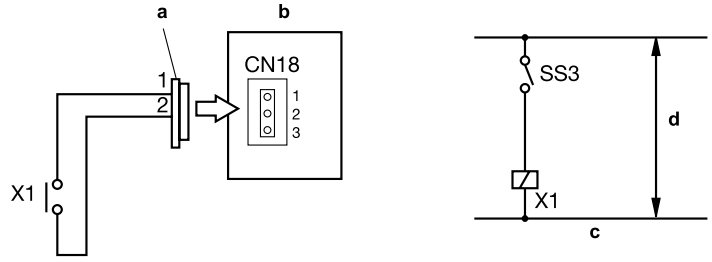
◆ Demand stoppage (Control function n° 3) / Forced stoppage (Control function n° 5)

When the input terminals for demand stoppage or forced stoppage on the outdoor unit PCB1 are shortcircuited while running, the compressor(s) is stopped. The fan motor of indoor unit(s) is operated as shown below.

Demand stoppage (control function number 3)		Cooling: Airflow setting, heating Lo setting
Forced stoppage (control function number 5)	Function setting “FE”=0	Stop
	Function setting “FE”=1	Cooling: Airflow setting, heating Lo setting

Setting example:

- Demand stoppage at Input 3 (between 1 and 2 pins of CN18)
- Forced stoppage at Input 3 (between 1 and 2 pins of CN18)



a. 3-pin connector
b. Outdoor unit PCB1
c. Control circuit
d. Power source
X1. Auxiliary relay
SS3. Demand stoppage switch

Operating example:

- Short-circuit terminals 1 and 2 (input 3) of CN18 to set the stoppage demand.
- Short-circuit terminals 1 and 2 (input 3) of CN18 to set the stoppage forced.
- The stoppage code is number 10. By disconnecting the demand switch contact, restarting is available.

In case the control demand (ON/OFF) is completed, it is recommended that the control (ON/OFF) time configuration is set according to the heat load recommendation. Also set the demand control time once in 15 minutes, the minimum to save energy.

◆ Outdoor unit fan motor start/stop (Control function n° 4)

This is an auxiliary function to protect the outdoor unit from snow. When the input terminals for Outdoor Fan Motor Start/Stop on the outdoor unit PCB1 are short-circuited during the compressor stoppage, all the outdoor fan motors start operating. If the compressor restarts operating, the outdoor fan motors will be restored to normal operation. If the input terminals of Outdoor Fan Motor Start/Stop are opened during the outdoor fan motor operation following the short circuit of these terminals, the outdoor fan motor will stop. This function is possible only during the compressor stoppage (during Switch-OFF or Thermo-OFF of the Switch-ON). Therefore, this function will not be possible even if the input signal is sent during the normal cooling or heating operation.

NOTE

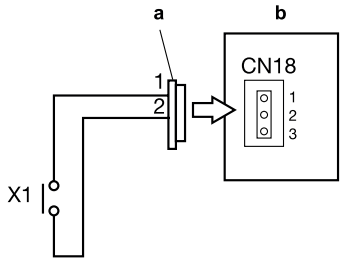
- *This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence (Field-Supplied) or snow-prevention hood (optional), etc. Otherwise, abnormal vibrations due to imbalanced propeller fan will be caused.*
- *If the fan motor or fan controller fail during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated.*
- *When setting the snow sensor switch for Outdoor Fan Motor Start/Stop, make sure that the continuous operating time is 30 seconds or more. Also the outdoor fan motor start/stop intervals shall be at least 10 minutes. Otherwise, malfunction of the outdoor fan motors will be caused by frequent start/stop.*

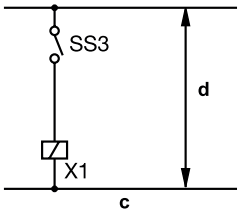
CAUTION

Because of this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops. Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.

Setting example:

Outdoor fan motor start/stop at input 2 (between 2 and 3 pins of CN18)





a. 3-pin connector
b. Outdoor unit PCB1
c. Control circuit
d. Power source
X1. Auxiliary relay
SS3. Snow sensor switch

◆ Demand current control of 40, 60, 70, 80 and 100 % (Control function n° 6 to 10)

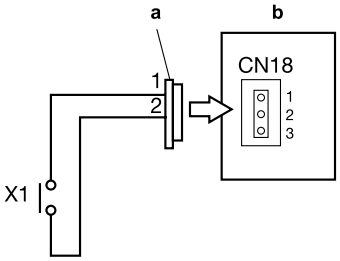
When the demand current control input terminals for the outdoor unit PCB1 are short-circuited, the compressor frequency is controlled by the maximum current limit of the outdoor unit, which is set at 100 %, 80 %, 70 %, 60 % and 40 %. If the outdoor unit running current exceeds the maximum limit for twenty minutes, the indoor unit is put under Thermo-OFF condition. In this case, the stoppage code Number “10” is given. When the input terminal is opened during the demand current control, its control is released.

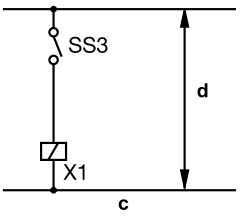
NOTE

- *Thermo-ON: The outdoor unit and some indoor units are running.*
- *Thermo-OFF: The outdoor unit and some indoor units stay on, but don’t run.*
- *The demand current control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.*
- *The actual value may temporarily be higher than the indicated value (by 40 % to 100 %) depending on the operating control conditions such as protection control.*

Setting example:

Demand current control at Input 3 (between 1 and 2 pins of CN18), Control Function Number 6 to 10.





a. 3-pin connector
b. Outdoor unit PCB1
c. Control circuit
d. Power source
X1. Auxiliary relay
SS3. Demand current switch

◆ Low noise setting 1, 2, 3 (Control function n° 11 to 13)

When the input terminals for low noise setting of the outdoor unit PCB1 are short-circuited, the frequency of the compressor and the fan rotation frequency are controlled and the outdoor unit operating sound is within the values shown in the table below:

The sound operation can be adjusted by selecting the control function number.

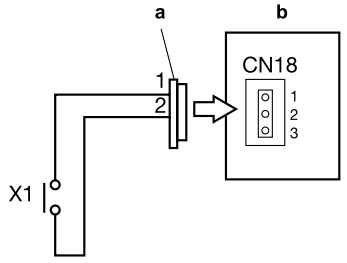
Control function number	Operating sound (targeted value)		Outdoor unit capacity (specification ratio)
No setting	Catalogue value		100 %
11 (Low noise level setting 1)	RAS-(5/6)FSXNP2E	71.5 dB(A)	80 %
	RAS-(8-14)FSXNS2E RAS-(8-14)FSXNP2E	75.5 dB(A)	
	RAS-(16-24)FSXNS2E RAS-(16-24)FSXNP2E	81.5 dB(A)	
12 (Low noise level setting 2)	RAS-(8-14)FSXNS2E RAS-(8-14)FSXNP2E	71.5 dB(A)	60 %
	RAS-(16-24)FSXNS2E RAS-(16-24)FSXNP2E	76.5 dB(A)	
13 (Low noise level setting 3)	RAS-(8-14)FSXNS2E RAS-(8-14)FSXNP2E	67.5 dB(A)	40 %
	RAS-(16-24)FSXNS2E RAS-(16-24)FSXNP2E	71.5 dB(A)	

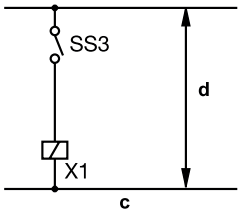
NOTE

- *The capacity of the outdoor unit will decrease because the compressor frequency and the outdoor unit fan frequency necessarily decreases. The range of operation may be restricted.*
- *In some cases, the sound operation (key values) can be temporarily higher than the values in the table. In case of combination unit sound will be higher than the values showed in the table.*
- *If low noise setting is always required without input signal, refer to item "4.7.9 Low noise setting (db)".*

Setting example:

Low noise setting at input 3 (between 1 and 2 pins of CN18), control function number 12

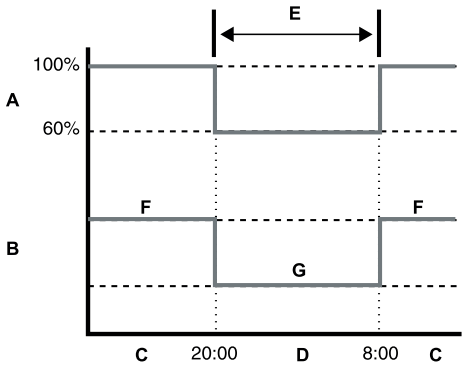




a. 3-pin connector
b. Outdoor unit PCB1
c. Control circuit
d. Power source
X1. Auxiliary relay
SS3. Demand current stoppage

Example:

"Low noise setting 2" during night time only:



A. Capacity
B. Operating sound
C. Day time schedule
D. Night time schedule
E. Input terminal short-circuited
F. 82 (Catalogue value) [dB(A)]
G. 72.5 [dB(A)]

Parts		Specifications	Remarks
Auxiliary relay (X1, X2)		Mini-Power relay (model MY1F or MY2F) made by OMRON	220/240V
Change-over switch (SS2, SS3)		Manual switch	220/240V
3 Pin connector cord		Model: PCC-1A Connected to JST connector, XARP-3)	Five cords with connectors as one set
Electric wiring (Inside of unit)	Low voltage	0.3 mm^2	Lower than 24V
	220/240V	0.5 to 0.75 mm^2	
Electric wiring (Outside of unit)	Low voltage	0.5 to 0.75 mm^2	Lower than 24V
	220/240V	2 mm^2	

NOTE

- *Make the wiring to the terminals as short as possible.*
- *Do not lay wiring too close to the high-voltage cable. Keep at least 30 cm between the wiring and the high-voltage cable. (Crossing of cables is allowed)*
- *If it is necessary to lay the wiring within 30 cm of the high-voltage cable, insert the low-voltage cable(s) into a metal tube and ground it at one end. If sealed wiring is used on the low-voltage side of the wiring, ground it at one end of the shielded wiring.*
- *The maximum length must not exceed 70 cm.*

4.6.4 External output function setting

The following signals can be received by the outdoor unit PCB.
Specification for the main component requirements:

Components	Specifications
Auxiliary relay (*)	High power relay, LY2F DC12V made by OMRON

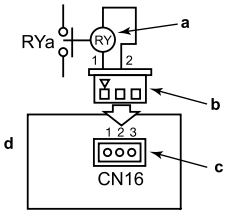
(*) Do not use the relays made with diodes.

◆ Operation signal (Control function n°1)

This function is used to receive the operation signal.
The auxiliary contact relay (RYa) is closed during the operation. The operation signal is sent to output terminals when the indoor units (or a single indoor unit) are operating. This function can be used for the circulation or humidification operation.

Setting example:

Operation Signal at Output 1 (between 1 and 2 pins of CN16).



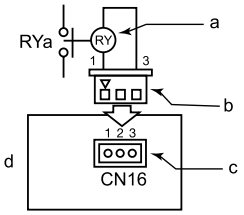
a. Auxiliary relay
b. 3-pin connector
c. Connector CN16
d. Outdoor unit PCB1

◆ Alarm signal (Control function n°2)

This function is used to receive the alarm signal.
The auxiliary contact relay (RYa) is closed when the alarm occurs. The alarm signal will be sent to output terminals when the indoor units (or a single indoor unit) are operating and an alarm occurs in the system.

Setting example:

Alarm Signal at Output 2 (between 1 and 3 pins of CN16).



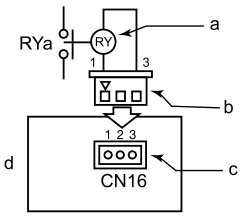
a. Auxiliary relay
b. 3-pin connector
c. Connector CN16
d. Outdoor unit PCB1

◆ Compressor ON signal (Control function n°3)

This function is used to receive the compressor operation signal.
The auxiliary contact relay (RYa) is closed during the compressor operation. Compressor ON Signal at Output 2 (between 1 and 3 pins of CN16).

Setting example:

Compressor ON Signal at Output 2 (between 1 and 3 pins of CN16).



a. Auxiliary relay
b. 3-pin connector
c. Connector CN16
d. Outdoor unit PCB1

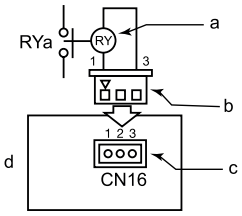
◆ Defrosting signal (Control function n°4)

This function is used to receive the defrosting signal.

The auxiliary contact relay (RYa) is closed during defrosting.

Setting example:

Defrosting Stoppage at Output 2 (between 1 and 3 pins of CN16).



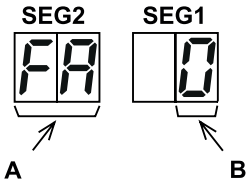
a. Auxiliary relay
b. 3-pin connector
c. Connector CN16
d. Outdoor unit PCB1

4.7 Function setting (by 7-segment display)

4.7.1 Sequence of the function setting

This setting must be carried out during stoppage of the outdoor unit.
For a combination of outdoor units, set it to the main outdoor unit. (The setting cannot be performed to sub outdoor units.) The main outdoor unit is the unit to which the communication cable between the outdoor unit and indoor unit is connected. Set DSW4 PIN4 and PIN5 of the outdoor unit PCB to ON position before performing in order to prevent the compressor from being activated.

1 By selecting “Function Setting”, the following appears on the 7-segment display. The setting should be performed during an outdoor unit stoppage.

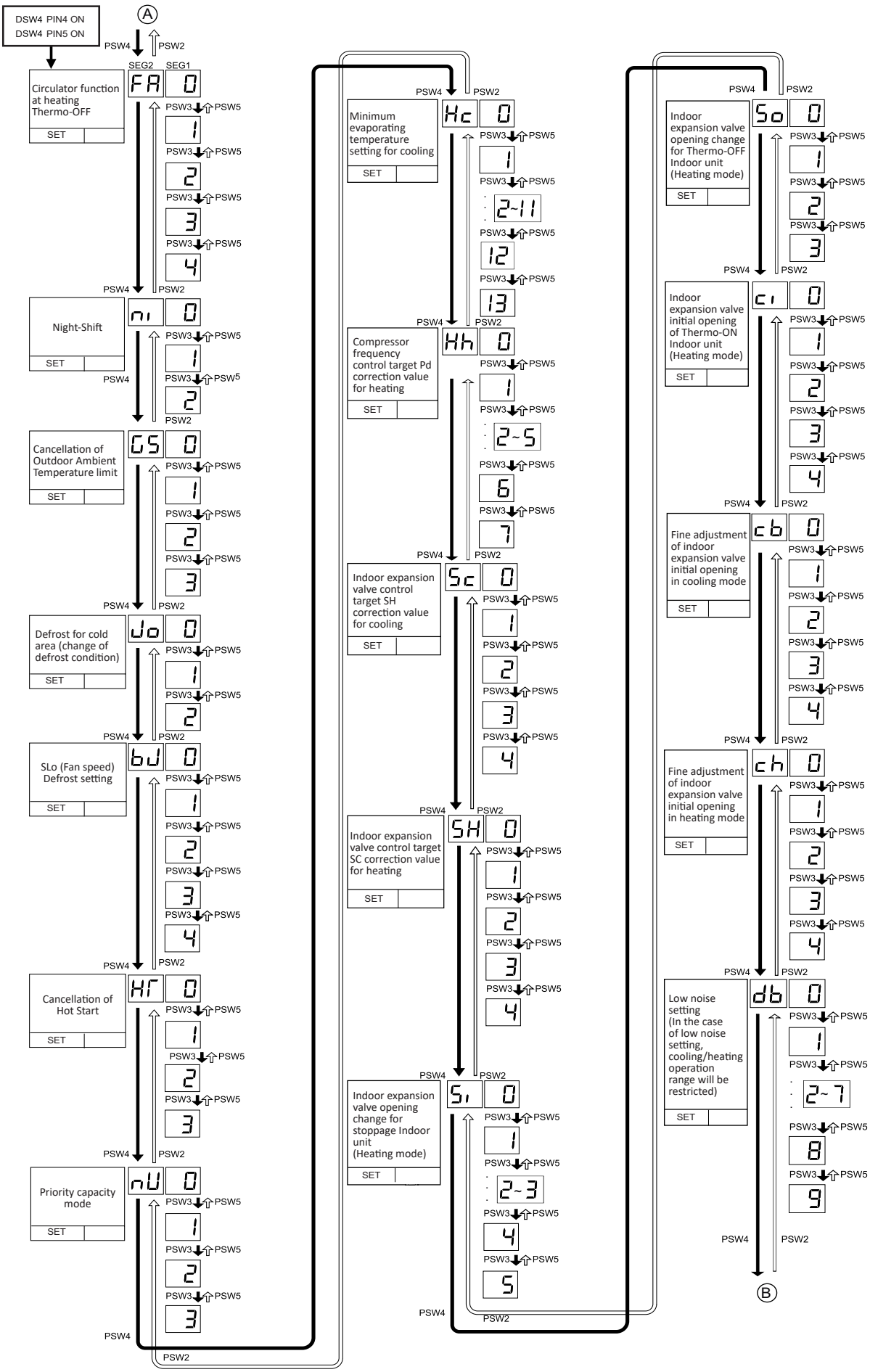


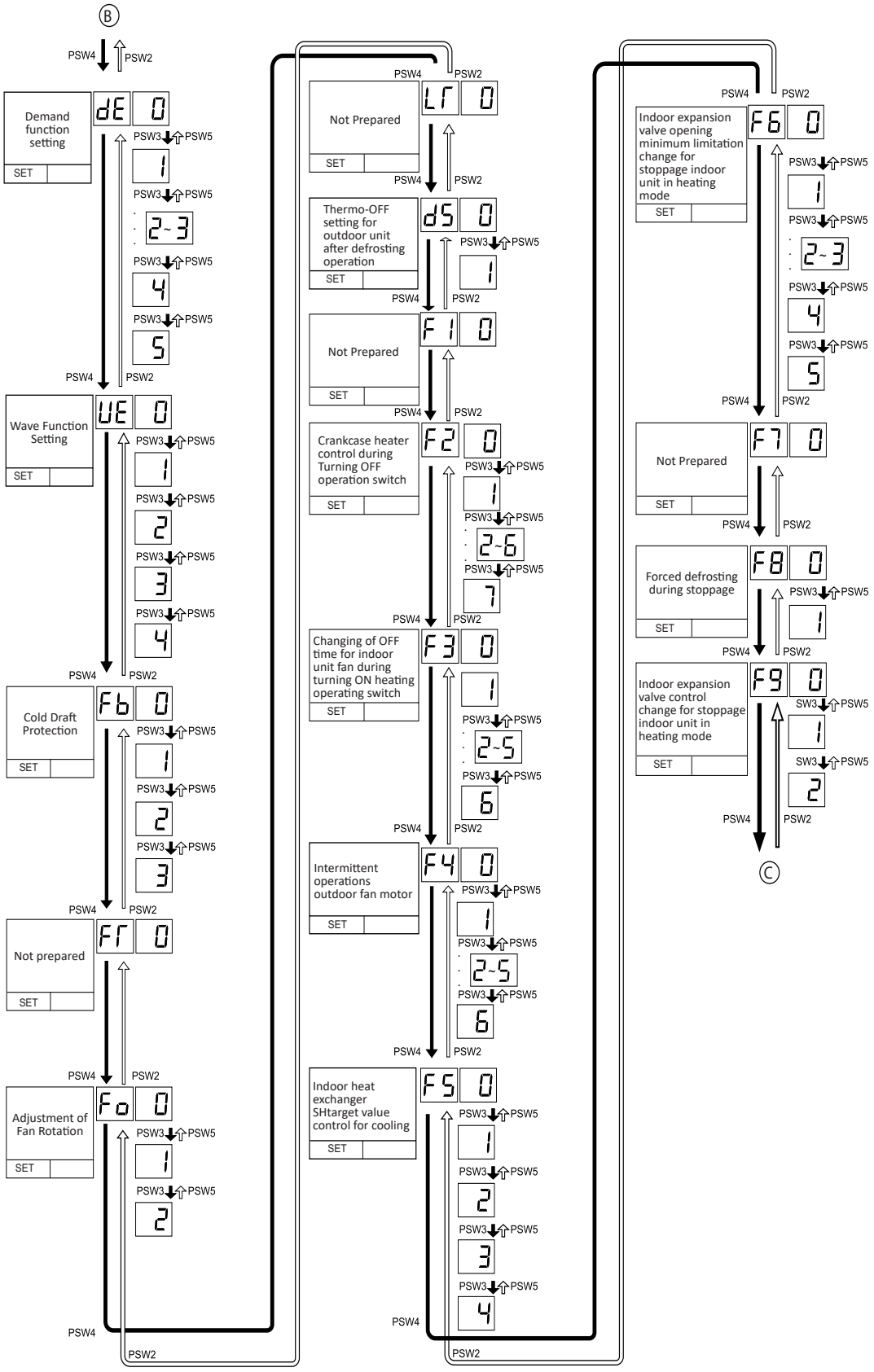
A. Function setting item
B. Setting Number

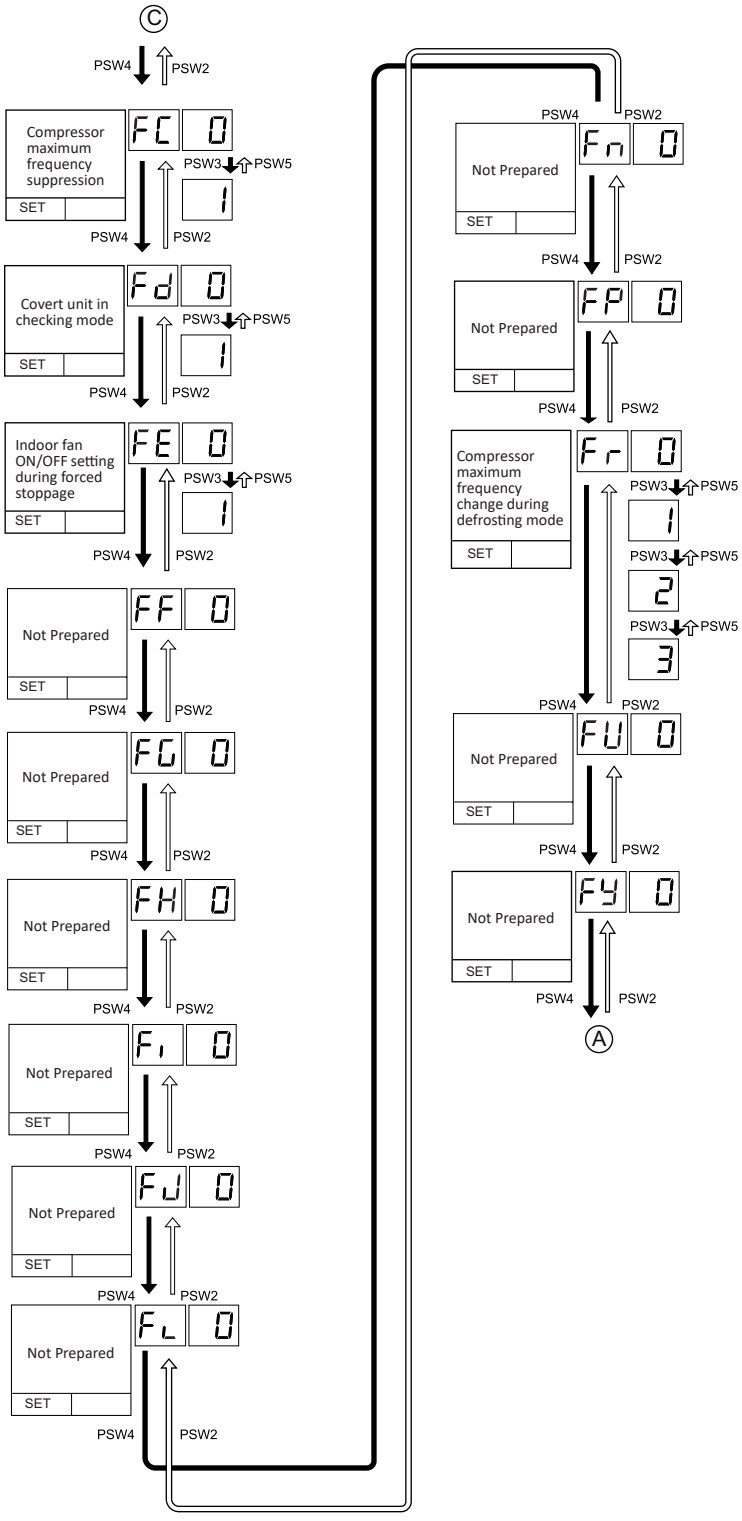
NOTE

After the setting is completed, check that “Menu” is not shown in the display, otherwise the air conditioner may not operate correctly.

2 By pressing PSW2 or PSW4, the function setting item is changed. After selecting the “Function Setting” , press PSW3 or PSW5, and then choose the Setting Number. The following shows the display changes when PSW is pushed.


DSW4 PIN4 ON
DSW4 PIN5 ON
A
PSW4
PSW2
SEG2
SEG1
Circulator function at heating Thermo-OFF
SET
FA
0
PSW3
PSW5
1
2
3
4
Night-Shift
ni
Cancellation of Outdoor Ambient Temperature limit
CS
Defrost for cold area (change of defrost condition)
do
SLo (Fan speed) Defrost setting
bu
Cancellation of Hot Start
HF
Priority capacity mode
nU
Minimum evaporating temperature setting for cooling
Hc
2~11
12
13
Compressor frequency control target Pd correction value for heating
HH
2~5
6
7
Indoor expansion valve control target SH correction value for cooling
Sc
Indoor expansion valve control target SC correction value for heating
SH
Indoor expansion valve opening change for stoppage Indoor unit (Heating mode)
Si
2~3
5
Indoor expansion valve opening change for Thermo-OFF Indoor unit (Heating mode)
So
Indoor expansion valve initial opening of Thermo-ON Indoor unit (Heating mode)
ci
Fine adjustment of indoor expansion valve initial opening in cooling mode
cb
Fine adjustment of indoor expansion valve initial opening in heating mode
ch
Low noise setting (In the case of low noise setting, cooling/heating operation range will be restricted)
db
2~7
8
9
B


Ⓑ
PSW4
PSW2
Demand function setting
SET
dE 0
PSW3 PSW5
1
2~3
4
5
Wave Function Setting
UE 0
2
3
Cold Draft Protection
Fb 0
Not prepared
FI 0
Adjustment of Fan Rotation
Fo 0
Not Prepared
LI 0
Thermo-OFF setting for outdoor unit after defrosting operation
dS 0
Crankcase heater control during Turning OFF operation switch
F2 0
2-6
7
Changing of OFF time for indoor unit fan during turning ON heating operating switch
F3 0
2~5
6
Intermittent operations outdoor fan motor
F4 0
Indoor heat exchanger SHtarget value control for cooling
F5 0
Indoor expansion valve opening minimum limitation change for stoppage indoor unit in heating mode
F6 0
Forced defrosting during stoppage
F8 0
Indoor expansion valve control change for stoppage indoor unit in heating mode
F9 0
SW3 PSW5
Ⓒ



3 After selecting the Function Setting, turn OFF DSW4 PIN5. The display will be back to the normal operation. Then turn OFF DSW4-Number 4. Confirm if DSW4 is set to factory settings. The selected data is stored in the outdoor unit PCB1 and the “Function Setting” is completed. The stored data is maintained even when the power source is cut OFF.

4.7.2 Function setting

No.	Setting item	7-Segment display SEG2	7-Segment display SEG1	Contents
1	Circulator function at heating thermo-OFF	FA	00	No setting
			01	Indoor unit fan forced ON and OFF (2 min. ON / 6 min. OFF)
			02	Indoor unit fan forced ON and OFF (2 min. ON / 13 min. OFF)
			03	Indoor unit fan forced ON and OFF (2 min. ON / 28 min. OFF)
			04	Indoor unit fan stop
2	Night-shift	n1	00	No setting
			01	Setting of night-shift 1 (for Cooling / Heating)
			02	Setting of night-shift 2 (for Cooling only)
3	Cancellation of outdoor ambient temperature limit	CS	00	No setting
			01	For heating
			02	For cooling
			03	For cooling/heating
4	Defrost for cold area (change of defrost condition)	Jo	00	No setting
			01	Condition 2 of defrost operation
			02	Not used
5	SLo (fan speed) defrost setting	bJ	00	Indoor unit fan stop when heating operation is activated/during defrost operation
			01	Indoor unit fan SLo operation during defrost operation
			02	Indoor unit fan SLo operation when heating operation is activated
			03	Fan operation when heating operation is activated/ Indoor fan SLo operation during defrost operation
			04	Indoor unit fan SLo operation when heating operation is activated (including Start Up after Defrost)
6	Cancellation of hot start	HF	00	Hot start control is available
			01	Cancellation of hot start
			02	Not used
			03	Not used
7	Priority capacity mode	nU	00	No setting
			01	Change of frequency maximum limit value
			02	Change of current limit value
			03	Change of frequency maximum limit value, current limit value and fan speed limit
8	Minimum evaporating temperature setting for cooling	Hc	00	Not used
			01	Enable minimum evaporating temperature setting for cooling
			02	Minimum 9 °C
			03	Minimum 10 °C
			04	Minimum 11 °C
			05	Minimum 12 °C
			06	Minimum 4 °C
			07	Minimum 5 °C
			08	Minimum 6 °C
			09	Minimum 7 °C
			10	Minimum 2 °C (Usually not used)
			11	Minimum 3 °C (Usually not used)
			12	Minimum 13 °C (Usually not used)
			13	Minimum 14 °C (Usually not used)

No.	Setting item	7-Segment display SEG2	7-Segment display SEG1	Contents
9	Compressor frequency control target Pd correction value for heating	Hh	00	Initial setting (Pd targeted value 0.00(MPa))
			01	Pd targeted value -0.15(MPa)
			02	Pd targeted value -0.10(MPa)
			03	Pd targeted value -0.05(MPa)
			04	Pd targeted value -0.03(MPa)
			05	Pd targeted value +0.03(MPa)
			06	Pd targeted value +0.05(MPa)
			07	Pd targeted value +0.10(MPa)
10	Indoor expansion valve control target SH correction value for cooling	SC	00	Initial setting (SH targeted value +0 °C)
			01	SH targeted value -2 °C
			02	SH targeted value -1 °C
			03	SH targeted value +1 °C
			04	SH targeted value +2 °C
11	Indoor expansion valve control target SC correction value for heating	SH	00	Initial setting (SC targeted value +0 °C)
			01	SC targeted value -6 °C
			02	SC targeted value -3 °C
			03	SC targeted value +3 °C
			04	SC targeted value +6 °C
12	Indoor expansion valve opening change for stoppage indoor unit in heating mode	Si	00	Initial setting (stoppage unit expansion valve opening) 0.8~2.0HP: 100~300 pulse, 2.5HP or over: 200~400 pulse
			01	Expansion valve opening: 150~325 pulse
			02	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			03	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			04	Expansion valve opening 0.8~2.0HP: 90 pulse, 2.5HP or over: 100 pulse
			05	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
13	Indoor expansion valve opening change for thermo-OFF indoor unit in heating mode	So	00	Thermo-OFF unit expansion valve opening (150~325 pulse)
			01	Expansion valve opening 0.8~2.0HP: 175 pulse, 2.5HP or over: 300 pulse
			02	Expansion valve opening 0.8~2.0HP: 100 pulse, 2.5HP or over: 150 pulse
			03	Expansion valve opening 0.8~2.0HP: 40 pulse, 2.5HP or over: 40 pulse
14	Indoor expansion valve initial opening of thermo-ON indoor unit in heating mode	ci	00	Initial setting (600~1300 pulse)
			01	Expansion valve opening 600~1300 pulse
			02	Expansion valve opening 600~650 Pulse
			03	Expansion valve opening 0.8~2.0HP: 950 Pulse 2.5 and 3HP or greater: 1500 Pulse
			04	Expansion valve opening 0.8~2.0HP: 1440 Pulse 2.5 and 3HP or greater: 2000 Pulse
15	Fine adjustment of indoor expansion valve initial opening in cooling mode	cb	00	Initial setting
			01	Cooling operation initial opening -5 %
			02	Cooling operation initial opening +3 %
			03	Cooling operation initial opening +5 %
			04	Cooling operation initial opening +10 %

No.	Setting item	7-Segment display SEG2	7-Segment display SEG1	Contents
16	Fine adjustment of indoor expansion valve initial opening in heating mode	ch	00	Initial setting
			01	Heating operation initial opening -5 %
			02	Heating operation initial opening +3 %
			03	Heating operation initial opening +5 %
			04	Heating operation initial opening +10 %
17	Low noise setting (In the case of low noise setting, cooling/heating operation range will be restricted.)	db	00	Initial setting
			01	Fan rotation maximum limit 1
			02	Fan rotation maximum limit 2
			03	Fan rotation maximum limit 3
			04	Frequency limit 1
			05	Frequency limit 2
			06	Frequency limit 3
			07	Operation sound value, limit 1
			08	Operation sound value, limit 2
			09	Operation sound value, limit 2
18	Demand function setting	dE	00	No demand control
			01	Demand control 40 %
			02	Demand control 60 %
			03	Demand control 70 %
			04	Demand control 80 %
			05	Demand control 100 %
19	Wave function setting	UE	00	No wave function
			01	Minimum limit 40 %
			02	Minimum limit 60 %
			03	Minimum limit 70 %
			04	Minimum limit 80 %
20	Cold draft protection (protection in decrease in indoor temperature for cooling)	Fb	00	Initial setting
			01	Indoor unit outlet temperature > 10 °C
			02	Indoor unit outlet temperature > 12 °C
			03	Indoor unit outlet temperature > 14 °C
21	Outlet air temperature control for DOAS[*1]	Fr	00	Initial setting
			01	Not used
			02	Not used
			03	Not used
			04	Not used
			05	Not used
			06	Not used
22	Adjustment of fan rotation (To avoid a whining sound for the multiple installation.)	Fo	00	Initial Setting
			01	Change of fan rotation -12 rpm
			02	Change of fan rotation -24 rpm
23	Alternate defrosting function	Lr	00	Initial setting (Disabled)
			01	Enabled
24	Thermo-OFF setting for outdoor unit after defrosting operation	dS	00	No setting
			01	Thermo-OFF stoppage setting for outdoor unit after defrosting operation

No.	Setting item	7-Segment display SEG2	7-Segment display SEG1	Contents
25	FrostWash interval	F1	00	No setting
			01	Total compressor operation time: 500 h / Manual FrostWash (outdoor PCB)
			02	Total compressor operation time: 1000 h / Manual FrostWash (outdoor PCB)
			03	Total compressor operation time: 500 h / Time zone scheduled or manual FrostWash (outdoor PCB)
			04	Total compressor operation time: 1000 h / Time zone scheduled or manual FrostWash (outdoor PCB)
			05	Total fan operation time by wired controller: Time zone scheduled or manual FrostWash (outdoor PCB)
26	Crankcase heater control during turning OFF operation switch	F2	00	No setting
			01	Optional switch OFF for 20 days
			02	Optional switch OFF for 15 days
			03	Optional switch OFF for 10 days
			04	Optional switch OFF for 5 days
			05	Optional switch OFF for 3 days
			06	Optional switch OFF for 2 days
			07	Optional switch OFF for 0 days
27	Changing of OFF time for indoor unit fan during turning ON heating operation switch	F3	00	Initial setting (Maximum 12 minutes)
			01	Maximum 3 minutes
			02	Maximum 6 minutes
			03	Maximum 9 minutes
			04	Maximum 15 minutes
			05	Maximum 30 minutes
			06	Maximum 60 minutes
28	Intermittent operation of outdoor fan motor	F4	00	No intermittent operation
			01	Set outdoor temperature ≤3 °C
			02	Set outdoor temperature ≤0 °C
			03	Set outdoor temperature ≤1 °C
			04	Set outdoor temperature ≤2 °C
			05	Set outdoor temperature ≤4 °C
			06	Set outdoor temperature ≤5 °C
29	Indoor heat exchanger SH target value control for cooling (Only for RCI-FSN4 series)	F5	00	Initial setting (Heat exchange target value +0 °C)
			01	Heat exchange SH target value +1 °C
			02	Heat exchange SH target value +2 °C
			03	Heat exchange SH target value +3 °C
			04	Heat exchange SH target value +4 °C
30	Indoor expansion valve opening minimum limitation change for stoppage indoor unit in heating mode	F6	00	Initial setting (stoppage unit expansion valve opening) 0.8HP~2.0HP: 90 Pulse, 2.5~3.0HP or greater: 90 Pulse
			01	Expansion valve opening 150~325 Pulse
			02	Expansion valve opening 0.8HP~2.0HP: 175 Pulse 2.5HP or greater: 300 Pulse
			03	Expansion valve opening 0.8HP~2.0HP: 100 Pulse 2.5HP or greater: 150 Pulse
			04	Expansion valve opening 0.8HP~2.0HP: 90 Pulse 2.5HP or greater: 100 Pulse
			05	Expansion valve opening 0.8HP~2.0HP: 40 Pulse 2.5HP or greater: 40 Pulse

No.	Setting item	7-Segment display SEG2	7-Segment display SEG1	Contents
31	Indoor expansion ealve initial opening for heat recovery cooling (heat recovery type only)	F7	00	Initial setting (expansion valve opening 100 pulse)
			01	Expansion valve opening 150 pulse
			02	Expansion valve opening 200 pulse
			03	Expansion valve opening 250 pulse
			04	Expansion valve opening 300 pulse
			05	Expansion valve opening (corrected based on the indoor unit capacity and operation frequency)
32	Forced defrosting during stoppage	F8	00	Initial setting (OFF)
			01	This function is ON.
33	Indoor expansion valve control change during heating operation stoppage	F9	00	SC control for stoppage unit
			01	40 pulse
			02	SC control for operation unit
34	Compressor maximum frequency suppression	FC	00	Initial setting (maximum frequency: 130Hz)
			01	Maximum frequency: 110Hz
35	Not prepared	Fd	00	-
36	Indoor fan ON/OFF setting during forced stoppage	FE	00	Initial setting (indoor unit fan: OFF)
			01	Indoor unit fan: ON
37	Not prepared	FF	00	-
38	Not prepared	FG	00	-
39	Not prepared	FH	00	-
40	Not prepared	F,	00	-
41	Outlet air temperature control	FJ	00	Initial setting
			01	This function in ON
42	Not prepared	FL	00	-
43	Not prepared	Fn	00	-
44	Not prepared	FP	00	-
45	CO_2 sensor sequiential compressor frequency control	Fr	00	Initial setting (enabled)
			01	Disabled
46	Not prepared	FU	00	-
47	Not prepared	F9	00	-
48	Not prepared	G1	00	-
49	Not prepared	G2	00	-
50	Not prepared	G3	00	-
51	Not prepared	G4	00	-
52	Not prepared	G6	00	-
53	Not prepared	G7	00	-

[1] Dedicated Outdoor Air System (for NA market only)

Record settings

Fill out the selected function setting number in the space of the table as shown (SET).

	Item	SEG2	SEG1	SET
1	Circulator function at Heating Thermo-OFF	FA	0	
2	Night-shift	n.	0	
3	Cancellation of outdoor ambient temperature limit	05	0	
4	Defrost for cold area (change of defrost condition)	do	0	
5	SLo (Fan speed) defrost setting	bd	0	
6	Cancellation of hot start	HF	0	
7	Priority capacity mode	nU	0	
8	Minimum evaporating temperature setting for cooling	Hc	0	
9	Compressor frequency control target Pd correction value for heating	Hh	0	
10	Indoor expansion valve control target SH correction value for cooling	SC	0	
11	Indoor expansion valve control target SC correction value for heating	SH	0	
12	Indoor expansion valve opening change for stoppage indoor unit in heating mode	S.	0	
13	Indoor expansion valve opening change for thermo-OFF indoor unit in heating mode	So	0	
14	Indoor expansion valve initial opening of thermo-ON indoor unit in heating mode	c.	0	
15	Fine adjustment of indoor expansion valve initial opening in cooling mode	cb	0	
16	Fine adjustment of indoor expansion valve initial opening in heating mode	ch	0	
17	Low noise setting (In the case of low noise setting, cooling/heating operation range will be restricted.)	db	0	
18	Demand function setting	dE	0	
19	Wave function setting	UE	0	
20	Cold draft protection (protection in decrease in indoor temperature for cooling)	Fb	0	
21	Outlet air temperature control for DOAS[*1]	FF	0	
22	Adjustment of fan rotation (To avoid a whining sound for the multiple installation.)	Fo	0	
23	Alternate defrosting function	LF	0	

	Item	SEG2	SEG1	SET
24	Thermo-OFF setting for outdoor unit after defrosting operation	d5	0	
25	FrostWash interval	F1	0	
26	Crankcase heater control during turning OFF operation switch	F2	0	
27	Changing of OFF time for indoor unit fan during turning ON heating operation switch	F3	0	
28	Intermittent operation of outdoor fan motor	F4	0	
29	Indoor heat exchanger SH target value control for cooling (only for RCI-FSN4 series)	F5	0	
30	Indoor expansion valve opening minimum limitation change for stoppage indoor unit in heating mode	F6	0	
31	Indoor expansion valve inital opening for heat recovery cooling (heat recovery type only)	F7	0	
32	Forced defrosting during stoppage	F8	0	
33	Indoor expansion valve control change for stoppage indoor unit in heating mode	F9	0	
34	Compressor maximum frequency suppression	FC	0	
35	Not prepared	Fd	0	
36	Indoor fan ON/OFF setting during forced stoppage	FE	0	
37	Not prepared	FF	0	
38	Not prepared	FG	0	
39	Not prepared	FH	0	
40	Not prepared	F.	0	
41	Outlet air temperature control	FJ	0	
42	Not prepared	FL	0	
43	Not Prepared	Fn	0	
44	Not prepared	FP	0	
45	CO_2 sensor sequential compressor frequency control	Fr	0	
46	Not prepared	FU	0	
47	Not prepared	FY	0	

	Item	SEG2	SEG1	SET
48	Not prepared	G1	00	
49	Not prepared	G2	00	
50	Not prepared	G3	00	
51	Not prepared	G4	00	
52	Not prepared	G6	00	
53	Not prepared	G7	00	

*[*1] Dedicated Outdoor Air System (for NA market only)*

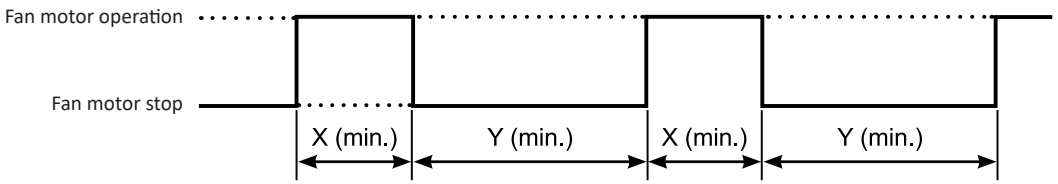
4.7.3 Circulator function at heating Thermo-OFF (FA)

Press PSW3 and select the setting of the condition "0" to "4" of the indoor unit fan control during the Thermo-OFF in heating mode "FA".
Normally, the fan speed is changed to "LOW" at heating Thermo-OFF. (There is a case that the room temperature is too high at the heating Thermo-OFF.) However, the indoor fan motor is operated at "LOW" and stopped repeatedly by setting this function.

NOTE

- *When the compressor is stopped, the indoor fan motor operates at "LOW" speed continuously.*
- *Thermo-ON: The indoor unit is running.*
- *Thermo-OFF: The indoor unit stays on, but doesn't run.*

The action when the indoor fan motor operates at the circulator function indicated as follows.



Contents of function setting item "FA"

	Contents of function setting item "FA"				
	0	1	2	3	4
Indoor fan motor "LOW" operation time X (min.)	(Continuous operation)	2	2	2	0
Indoor fan motor stop time Y (min.)	0	6	13	28	Stopped

NOTE

In case using the function setting Number 2 to 4, install the remote sensor (THM-R2A: Optional). Because the time period of stopping the indoor fan becomes longer, the detected value of the suction air thermistor for indoor unit becomes high, and it may take time to Thermo-ON.

4.7.4 Night-shift (low noise)(n 1)

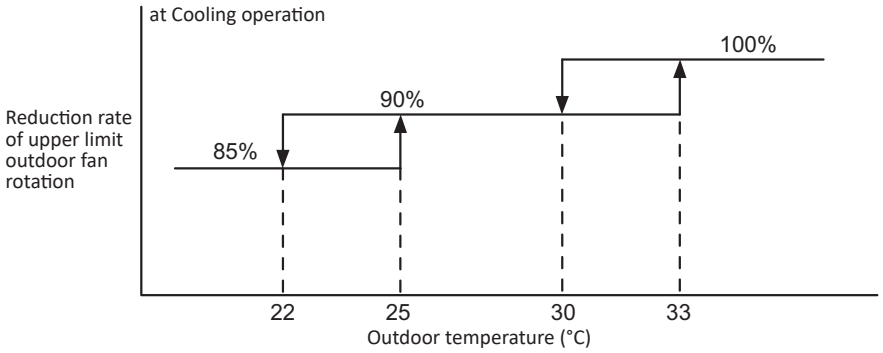
Press PSW3 and select the setting for condition " 1" of the night shift (low noise) "n 1" consequently, the function can be set. "n 1"=1 reduces the upper limit of the outdoor fan rotation and the compressor frequency as shown below.

The night shift operation shall be applied in case the cooling capacity has the allowed range to decrease the capacity and the low noise level operation is required especially at night.

NOTE

When the Night-shift is not set, the upper limit of the outdoor fan rotation is 100 % regardless of the outdoor temperature.

(Example) Relation between the upper limit of the outdoor fan rotation and the outside air temperature



"n 1" Setting condition	Operation
0	No effect (default setting)
1	Night shift (only for cooling)

NOTE

- *Reduction rates are approximate, these may change slightly depending on the outdoor unit model.*
- *This function setting is not possible to set with Priority Capacity Mode (nU) and the Low Noise Setting (db) at the same time.*

4.7.5 Cancellation of the outdoor ambient temperature limit (C5)

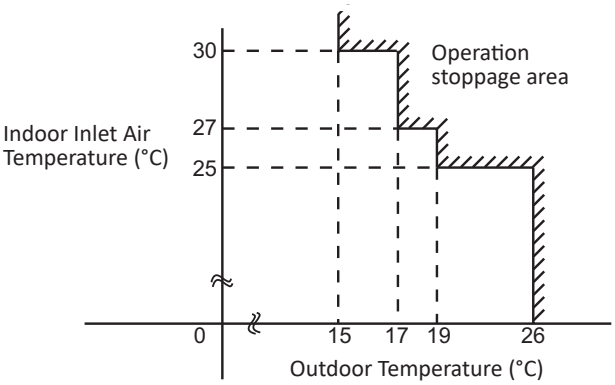
Press PSW3 and select the setting condition "0" to "3" at the cancellation of outdoor ambient temperature limit of C5. Then this function can be set.

The heating operation is continued under a high outdoor temperature or the cooling operation is continued under a low temperature.

Setting condition	Operation mode for cancellation
0	Not available (default setting)
1	Heating
2	Cooling
3	Heating/Cooling

◆ Heating operation

The limitation of the permissible outdoor temperature area in heating operation (factory setting) as shown in the right figure is cancelled.

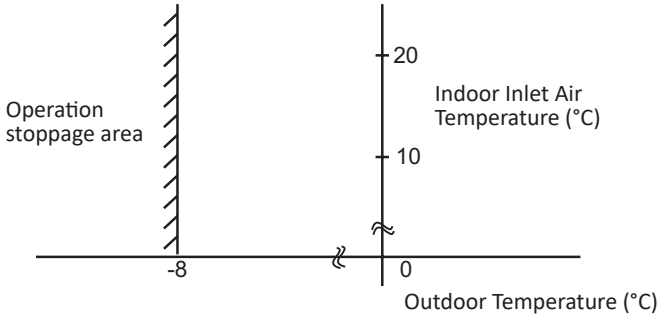


NOTE

When the outdoor ambient temperature limit for heating operation is cancelled, the operation may stop due to increasing high pressure since the protection control is not cancelled.

◆ Cooling operation

The limitation of the permissible outdoor temperature area in cooling operation (factory-set) as shown in the right figure is cancelled.

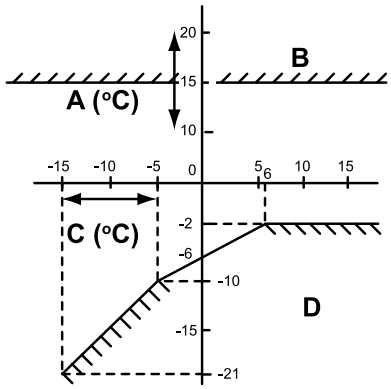
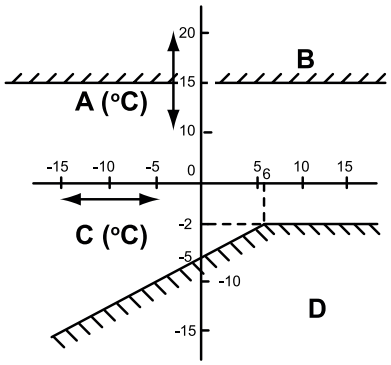


NOTE

- *When the outdoor ambient temperature limit for cooling operation is cancelled, the operation may stop due to decreasing low pressure since the protection control is not cancelled.*
- *If this function is set and the outdoor unit operates in the operation stoppage area shown in the above figure for a long time, the outdoor unit may be damaged since protection control is cancelled and some alarm codes by abnormal operation may occur. If the alarm codes occur frequently, contact your distributor or contractor.*

4.7.6 Defrost for cold area (Ud)

Press PSW3 and select the setting condition " 1" at the defrost for the cold area "Ud" to change the temperature condition for starting defrost operation.

Setting condition	Standard specifications When change of defrost condition is not set "Ud=0"	Cold area specifications When change of defrost condition is set "Ud=1"
Temperature conditions under defrosting operation		

A: Outdoor evaporation temperature (pipe) (°C)

B: Defrost operation in the stop area

C: Outdoor temperature (°C)

D: Defrost operation in the start area

4.7.7 SLo defrost setting (bJ)

Press PSW3 and select the settings condition "0" to "4" at the SLo defrost setting "bJ" .

The indoor fan stops during the defrost operation and starting of heating operation. However, the indoor fan can operate at low speed during the defrosting operation and starting of heating operation.

Setting condition	Indoor fan operation
0	Initial setting
1	SLo speed during defrost operation
2	SLo Speed at start of compressor
3	SLo Speed at start of compressor and during defrost operation
4	SLo Speed at start of compressor (including after defrost operation)
5	STOP at the start of compressor and during defrost operation (usually not used)

NOTE

The indoor fan may operate at other speed depending on outlet air temperature of the indoor unit.

4.7.8 Priority capacity mode setting (nU)

Press PSW3 and select the setting condition "0" to "3" at the priority capacity mode setting "nU". By setting this function, the target frequency, current limit of the compressor and the maximum indoor fan motor step are set higher.[*1]

Setting condition	Compressor frequency and current limit
0	Default setting
1	Compressor frequency limit is set higher
2	Compressor frequency limit and current limit are set higher

*[*1] The upper limit of the frequency will increase by about 10 %. The upper limit of fan speed of the outdoor fan will increase by about 5 %.*

NOTE

Depending on the operation control state (protection control, etc.), this function may not be effective.

4.7.9 Low noise setting (db)

Press PSW3 and select the setting condition "0" to "9" at the low noise setting "db" to reduce the upper limit compressor frequency and the outdoor fan motor rotation frequency.

NOTE

- *By setting this function, the compressor frequency and the outdoor fan motor rotation frequency are forcibly reduced and so the outdoor unit capacity decreases and the unit operation range is limited.*
- *The operating noise values for a single unit are shown below. These are targeted values and so the actual values can temporarily be higher depending on operation conditions. The operating noise values for combination units are higher than the values below.*

Setting condition	Compressor frequency limit	Outdoor fan motor step limit		Outdoor unit capacity (to specification)
		Standard Type: ≤18HP High Efficiency Type: ≤16HP	Standard Type: ≥20HP High Efficiency Type: ≥18HP	
0	Not changed	Not changed	Not changed	100 %
1	Not changed	20 steps	19 steps	-
2	Not changed	18 steps	17 steps	-
3	Not changed	16 steps	15 steps	-
4	80 %	Not changed	Not changed	-
5	60 %	Not changed	Not changed	-
6	40 %	Not changed	Not changed	-
7	80 %	20 steps	19 steps	80 %
8	60 %	18 steps	17 steps	60 %
9	40 %	16 steps	15 steps	40 %

4.7.10 Demand function setting(dE)

Press PSW3 and select the settings for conditions "0" to "5" to set the demand function "dE". This function is available by setting to " 1" for the demand current control without inputting the signal to the external input terminal on the outdoor unit PCB1. The table below is shown for the limit of the operating current for this function.

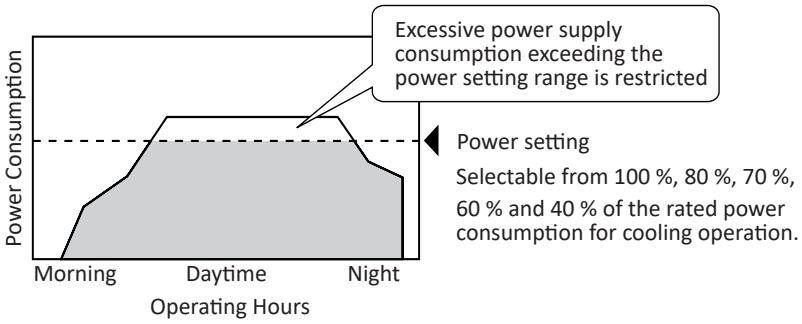
NOTE

- *If the outdoor unit running current exceeds the maximum limit for twenty minutes, the indoor unit is put under Thermo-OFF condition. In this case, the stoppage code Number "10" is given.*
- *In the case that the demand current control by external input is set and the external input signal is available, this function is not available even when the demand current control by external input signal is performed.*

Setting condition	Demand running current control
0	Not available (default setting)
1	40 %
2	60 %
3	70 %
4	80 %
5	100 %

Demand control

Adapting the self-demand function, which causes the power consumption to drop drastically for the purpose of saving energy.



NOTE

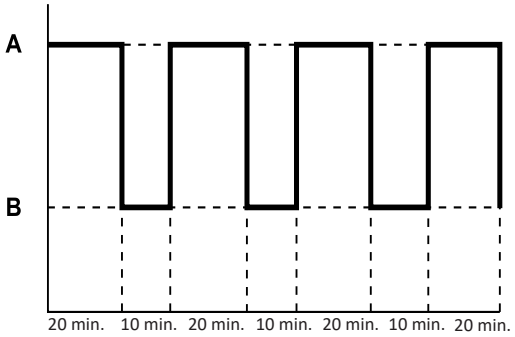
- *The demand current control (%) is value criterion. The value used for this control is calculated from the current, and therefore is different from the value indicated by a wattmeter. If it is required that the maximum power consumption is managed precisely, a field-supplied demand controller should be used.*
- *The actual value may temporarily be higher than the indicated value shown above depending on the operating control conditions such as protection control.*

4.7.11 Wave function setting (UE)

Press PSW3 and select the settings condition "0" to "4" to set wave function setting "UE". The maximum running current limit changes from 40 % to 80 %, as shown in the attached figure.

NOTE

In the case that the demand current control by external input is set and the external input signal is available,this function is not available even when the demand current control by external input signal is performed.



A. Electricity consumption (100 %)
B. Electricity consumption (40 to 80 %)

Setting condition	Current setting
0	Not available (default setting)
1	40 %
2	60 %
3	70 %
4	80 %

NOTE

- *The current limit value is targeted value. The actual current value may temporarily be higher than the value shown in the table above depending on the operating control condition.*
- *When the scheduled operation of "Demand Function Setting" is set from the centralized controller, refer to "Technical Catalog" and "Installation & Maintenance Manual" of the centralized controller.*

4.7.12 Cold draft protection (Fb)

Press PSW3 and select the setting condition "0" to "3" to set the cold draft protection "Fb". When the indoor unit discharge air temperature drops falls down at cooling operation, the outdoor unit fan stops and the compressor frequency decreases to prevent a drop in discharge air temperature. If the outlet temperature decreases and the temperature is less than Thermo-OFF condition even after the compressor frequency decreases, the indoor unit becomes Thermo-OFF condition. (When Thermo-OFF is activated under this condition, the operation will be restarted after 3 minutes).

NOTE

- *Thermo-ON: The indoor unit is running.*
- *Thermo-OFF: The indoor unit stays on, but doesn't run.*

Setting condition	Outlet temperature	
	Target value	at Thermo-OFF
0	-	-
1	10 °C	7 °C
2	12 °C	9 °C
3	14 °C	11 °C

4.7.13 Adjustment of fan rotation (Fo)

Press PSW3 and select the setting condition "0" or "2" to set the fan rotation setting "Fo".

The aim is to avoid resonance noise disturbances from adjacent outdoor units, because of a similar fan rotation speed on all the units. Set this operation in the required outdoor units, if fans makes a whining sound.

Setting condition	Adjustment of fan rotation
0	Not available (default setting)
1	-12 rpm
2	-24 rpm

NOTE

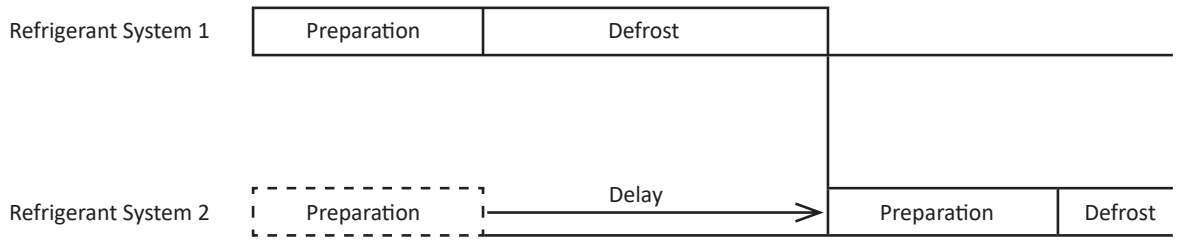
By setting this function, the outdoor fan rotation is slightly reduced, so the outdoor unit capacity may decrease and the operation range may be limited.

4.7.14 Alternate defrosting function (LF)

Select the setting condition " 1" for the Alternate Defrost Enable " " to defrost alternately multiple refrigerant systems connected to H-LINK II. Until one refrigerant system completes defrosting, other refrigerant system will not start defrosting.

NOTE

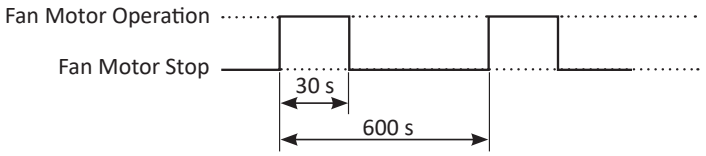
- *In this system, two refrigerant systems, Refrigerant System 1 (even number of refrigerant systems) and Refrigerant System 2 (refrigerant system is refrigerant system 1+1) connected by a H-LINK II are used as one set. In each combination, alternate frosting is performed.*
- *For the Heat Recovery type, this mode is available only when both the refrigerant systems 1 and 2 are single units.*



4.7.15 Outdoor fan motor intermittent operation setting (F4)

Press PSW3 and select the setting condition "0" to "5" to set the outdoor fan intermittent operation setting "F4" (auxiliary function) to protect the outdoor fan motor from snow.

When the outdoor temperature (selectable from 3 °C, 0 °C, 1 °C, 2 °C, 4 °C and 5 °C) reaches the setting temperature, all the outdoor fan motors start intermittent operation. When the outdoor temperature is at least 5 °C higher than the setting temperature, the outdoor fan motors stop operating.
If the compressor restarts operating, the outdoor fan motors will be restored to normal operation.



NOTE

- *This is an auxiliary function to protect the unit from snow. In snowy regions, make sure to protect the unit with a snow-prevention roof, fence or snow-prevention hood (Field-Supplied), etc. Otherwise, abnormal vibrations due to imbalanced propeller fan will be caused.*
- *If the fan motor or fan controller fail during the outdoor fan motor start/stop operation, stop all the outdoor fan motor to suspend the operation. Check the alarm code and deal properly with the failure next time the compressor is operated.*

DANGER

- ***With this setting, the outdoor fan can operate even while the outdoor unit (compressor) stops.***
- ***Display a notice to that effect on a readily visible part of the unit body, in order to avoid injuries caused by an unintended outdoor fan operation.***

4.7.16 FrostWash (F 1)

The FrostWash function prevents clogging of the indoor units heat exchanger.

a. The outside of the indoor unit heat exchanger freezes the condensing water when the whole system is stopped (all indoor units of the same refrigerant system are stopped).

b. The outside of the heat exchanger is defrosted and the water washes away dust and dirt from the surface of the heat exchanger. The FrostWash function can be selected "Automatic" or "Manual".

NOTE

The FrostWash function is only activated when the capacity ratio of the connectable indoor unit (total capacity of the indoor unit/total capacity of the outdoor unit) is 130 % or less.

Systems with a connectable capacity ratio higher than 130 % are not compatible.

FrostWash in VRF system

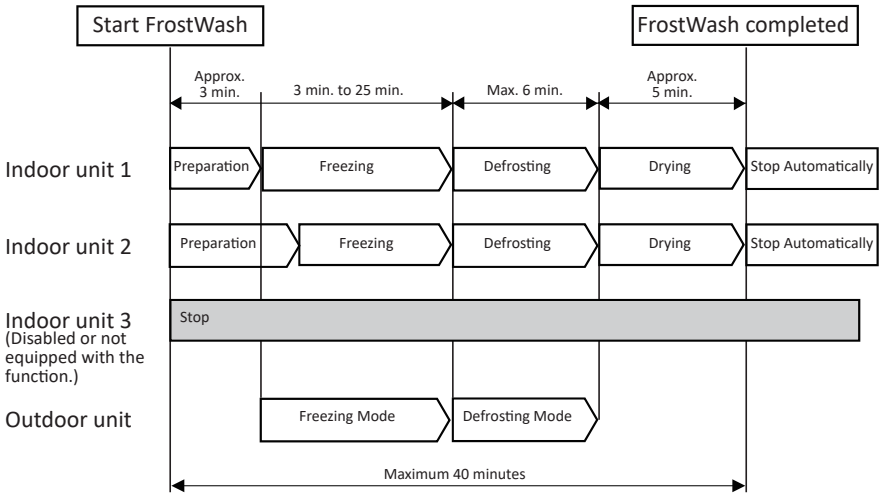
Set the FrostWash function for the VRF system in which several indoor units are connected, from the outdoor unit.

All indoor units enabled with the FrostWash function via wired controller start the sequence at the same time automatically or manually when the whole system is at stoppage.

Indoor units with the FrostWash function deactivated or not equipped with the FrostWash function remain in standby mode.

The FrostWash function consists of 4 phases: preparation, freezing, defrosting and drying.

The whole process takes a maximum of 40 minutes.



- The time required for the freezing phase varies depending on the type of indoor unit, room temperature and room temperature.
- All indoor units connected in a FrostWash operating system go from the freezing phase to the defrosting phase at the same time.
- The preparation time of a unit can be extended in the event that another unit in the system requires a longer freeze time. The time for carrying out the entire process will be adjusted so that all the units finish the different phases at the same time.
- The indoor unit that falls out of the FrostWash operation range during the preparation phase cannot start FrostWash. Only indoor units that remain within the FrostWash operation range can start the operation.
- Press the "OK" button on the wired controller panel when you cancel FrostWash in the middle of the operation.
- If FrostWash is cancelled for one of the indoor units during the freezing phase or defrosting phase, the FrostWash operation running in all connected indoor units in the same refrigerant cycle will be cancelled.
- If FrostWash is cancelled in the middle of the operation, the frost on the heat exchanger needs to be defrosted and the heat exchanger needs to be dried so the system cannot start operation at least 8 minutes after the cancellation.
- If FrostWash is cancelled during the Preparation Phase or Drying Phase, the cancellation command applies only to the indoor unit connected to the wired controller that sent the cancellation command.
- If the indoor unit which is in the same refrigerant system but not under FrostWash operation starts regular operation when FrostWash operation is in progress in the other indoor unit in the system, all indoor units in the same refrigerant system stop FrostWash operation. Normal operation cannot start for a maximum of 8 minutes until the frost on the heat exchanger has been defrosted and dried.
- FrostWash operation cannot be started immediately after finishing a previous FrostWash operation. 60 minutes of operation (cooling, heating or dry) are required before starting another FrostWash operation.

Setting the FrostWash function

The FrostWash function is deactivated at the factory. The detail of the function by setting condition is shown in the following table[*1].

"F 1" setting condition	Auto FrostWash		Manual FrostWash
	"Interval" time duration	Start-up timing	Operation
0	Factory setting (Default): FrostWash disabled		
1	Total Comp. Operation hour: 500 h	2 hours after system stopped	Operate outdoor unit PSW
2	Total Comp. Operation hour: 1000 h		
3	Total Comp. Operation hour: 500 h	Within the time zone scheduled by main wired controller[*2,*3]	
4	Total Comp. Operation hour: 1000 h		
5	Total indoor unit fan operation hour: Depending on main wired controller setting	Within the time zone scheduled by main wired controller[*2,*3]	Operate from main wired controller[*2] or operate outdoor unit PSW

**1. When using the FrostWash function, set both the outdoor unit and the wired controller.*

**2. There is only one "Wired Main Controller" in the same refrigerant cycle, and all others are "Sub-Wired Controllers". Refer to the wired controller installation manual for detailed information on wired master controller configuration.*

**3. If the schedule is not configured on the wired master controller, the FrostWash operation will start shortly after the system is stopped.*

FrostWash operation selection options

1 Function 1: Auto FrostWash based on total operation hour

The following table shows the FrostWash setting for the primary and secondary wired controllers that are required depending on the setting condition of the outdoor unit function.

Outdoor unit "F1" setting condition	Interval time duration	Start-up timing	Main wired controller				Sub wired controller		
			Main wired controller setting	Enable/ Disable Auto FrostWash setting	Frostwash interval setting	Auto FrostWash schedule setting	Enable/ Disable Auto FrostWash setting	FrostWash interval setting	Auto FrostWash schedule setting
1	Total Comp. Operation hour: 500 h	2 hours after system shutdown	-	√[*1]	-[*3]	X[*6]	√[*1]	-[*3]	X[*6]
2	Total Comp. Operation hour: 1000 h	2 hours after system shutdown	-	√[*1]	-[*3]	X[*6]	√[*1]	-[*3]	X[*6]
3	Total Comp. Operation hour: 500 h	Within the time zone programmed in the main wired controller	√	√[*2]	-[*3]	√[*4]	√[*1]	-[*3]	X[*6]
4	Total Comp. Operation hour: 1000 h	Within the time zone programmed in the main wired controller	√	√[*2]	-[*3]	√[*4]	√[*1]	-[*3]	X[*6]
5	Total indoor unit fan operation hour: Depending on main wired controller setting	Within the time zone programmed in the main wired controller	√	√[*2]	√[*5]	√[*4]	√[*1]	-[*3]	X[*6]

√: Required; -: Not Required; X: Prohibited

**1: This setting is only necessary when using the FrostWash function on the indoor unit connected to the wired controller. When operating the FrostWash function on all indoor units equipped with the FrostWash function in the*

system, set it on all wired controllers connected in the system. The FrostWash function is not available on the indoor unit if its setting is "OFF".

**2: When the setting on the main wired controller is "Disabled" for "Enable/Disable Auto FrostWash" setting, the FrostWash function is not performed on all indoor units connected in the system.*

**3: The FrostWash icon is shown on each remote controller display when the "Enable/Disable Auto FrostWash" option is set to "Disable" and if the programmed time interval has elapsed (factory setting: 100 hours): that means the FrostWash process needs to be started. If the automatic mode is enabled ("Enable/Disable Auto FrostWash is set to "Enable"), the icon is not displayed.*

**4: When activating the manual FrostWash using the PSW outdoor unit, first deactivate the "Schedule" on the main wired controller.*
Otherwise, the FrostWash function will not run on the indoor units connected to the main wired controller if it is outside the scheduled time zone.

**5: The factory setting of the interval on the cable controller is 100 hours. You can select between 50, 200 and 400 hours.*

**6: Do not set anything in the items marked "X: Prohibited" in the table above. If you do so, FrostWash may not work.*
Set "Enable/Disable Auto FrostWash", "FrostWash Interval" or "Auto FrostWash Schedule" first, then select the setting condition "1" in the Auto FrostWash function setting "r7" of Function Selection on the wired controller to prohibit changing the setting.

2 Function 2: Manual FrostWash command from outdoor unit

Outdoor unit "F1" setting condition	Operation	Main wired controller				Sub wired controller		
		Main wired controller setting	Enable/ disable Auto FrostWash setting	Frostwash interval setting	Auto FrostWash schedule setting	Enable/ Disable Auto FrostWash setting	FrostWash interval setting	Auto FrostWash schedule setting
1	Operate outdoor unit PSW	-	√*1	-*2	X*4	√*1	-*2	X*4
2	Operate outdoor unit PSW	-	√*1	-*2	X*4	√*1	-*2	X*4
3	Operate outdoor unit PSW	-	√*1	-*2	-*3	√*1	-*2	X*4
4	Operate outdoor unit PSW	-	√*1	-*2	-*3	√*1	-*2	X*4
5	Operate outdoor unit PSW	-	√*1	-*2	-*3	√*1	-*2	X*4

√: Required; -: Not Required; X: Prohibited

**1: This setting is necessary only when using the FrostWash function on the indoor unit connected to the wired controller. When operating FrostWash on all indoor units equipped with FrostWash function in the system, please set it on all wired controllers connected in the system.*
FrostWash function is not available on the indoor unit if its setting is "OFF".

**2: The FrostWash icon is shown on each remote controller display when the "Enable/Disable Auto FrostWash" option is set to "Disable" and if the programmed time interval has elapsed (factory setting: 100 hours): that means the FrostWash process needs to be started. If the automatic mode is enabled ("Enable/Disable Auto FrostWash is set to "Enable"), the icon is not displayed.*

**3: When activating the manual FrostWash using the PSW outdoor unit, first deactivate the "Schedule" on the main wired controller.*
Otherwise, the FrostWash function will not run on the indoor units connected to the main wired controller if it is outside the scheduled time zone.

**4: Do not set anything in the items marked "X: Prohibited" in the table above. If you do so, FrostWash may not work.*
Set "Enable/Disable Auto FrostWash", "FrostWash Interval" or "Auto FrostWash Schedule" first, then select the setting condition "1" in the Auto FrostWash function setting "r7" of Function Selection on the wired controller to prohibit changing the setting.

3 Function 3: Manual FrostWash command from main wired controller

Outdoor unit "F1" setting condition	Operation	Main wired controller				Sub wired controller		
		Main wired controller setting	Enable/ disable Auto FrostWash setting	Frostwash interval setting	Auto FrostWash schedule setting	Enable/ Disable Auto FrostWash setting	FrostWash interval setting	Auto FrostWash schedule setting
1-4	FrostWash setting not available from wired controller							
5	Main wired controller setting operation	√	-	-*2	-	√*1	-*2	X

√: Required; -: Not Required; X: Prohibited

**1: This setting is necessary only when using the FrostWash function on the indoor unit connected to the wired controller. When operating FrostWash on all indoor units equipped with FrostWash function in the system, please set it on all wired controllers connected in the system.*
FrostWash function is not available on the indoor unit if its setting is "OFF".

**2: The FrostWash icon is shown on each remote controller display when the "Enable/Disable Auto FrostWash" option is set to "Disable" and if the programmed time interval has elapsed (factory setting: 100 hours): that means the FrostWash process needs to be started. If the automatic mode is enabled ("Enable/Disable Auto FrostWash is set to "Enable"), the icon is not displayed.*

**3: Do not set anything in the items marked "X: Prohibited" in the table above. If you do so, FrostWash may not work.*

Set "Enable/Disable Auto FrostWash", "FrostWash Interval" or "Auto FrostWash Schedule" first, then select the setting condition "1" in the Auto FrostWash function setting "r7" of Function Selection on the wired controller to prohibit changing the setting.

4 Manual FrostWash function setting

When select "Function 2": Manual FrostWash command from outdoor unit

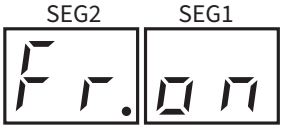
Operate PSW2 of outdoor unit A (FrostWash function cannot be operated from outdoor unit B, C and D). Outdoor unit A is the one connected to indoor unit with communication cable.

a. Select condition "1" to "5" in FrostWash Function Setting "F1" from the outdoor unit Function Selection.
b. Set "Enable" in the "Enable/Disable Auto FrostWash" option from wired remote controller connected to the indoor unit which perform FrostWash.
c. Press PSW2 of the outdoor unit A for 3 or more seconds to start FrostWash.

The display during preparation phase of FrostWash (Approx. 3 minutes)



The display during preparation FrostWash operation (Max. 40 minutes)



Display when FrostWash cannot start

- Possible reasons during system operation:
  - ✓ Out of FrostWash Temperature Range
  - ✓ Continuous FrostWash operating after previous FrostWash
  - ✓ Setting error on indoor unit, or wrong connection with wired controller



When select "Function 3": Manual FrostWash command from Main Wired Controller

a. Select "FrostWash Setting" from the Function Menu on the main wired controller screen and press "OK".

b. Select "FrostWash Started" and press "OK".

c. Select "Yes" and press "OK" when appear "Start FrostWash Now?" on the screen.

NOTE

Refer to the Installation and Operation Manual of the Wired Remote Controller for further information.

5 FrostWash Operation Condition

✓ FrostWash function is available only if the outdoor unit is connected to an indoor unit and to a wired remote controller, both equipped with the FrostWash function.

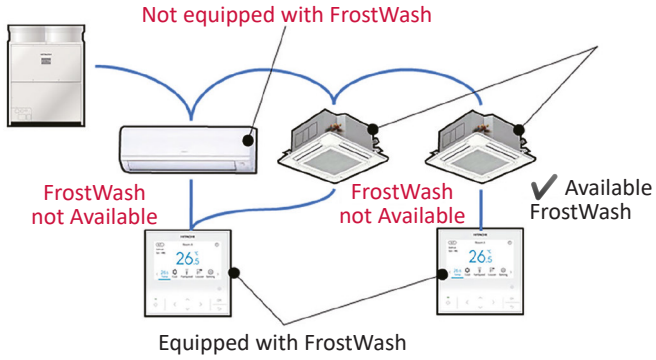
✓ The controller applicable with FrostWash function is as follow:

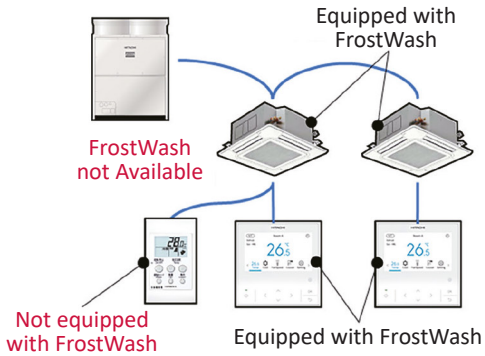
- PC-ARFG2-E

✓ FrostWash function is not available under following indoor unit condition:

- An indoor unit is not equipped with the FrostWash function.
- An indoor unit is connected to a wired remote controller that does not support the FrostWash function.
- An indoor unit is connected to a receiver kit.
- When the above indoor units are connected in the same controller group.

✓ The FrostWash menu is unavailable for operation on the controller connected to indoor units 1 to 4 above. However, the other indoor units within the same refrigerant cycle can still operate the FrostWash function, even if the aforementioned indoor units are also connected within the same refrigerant cycle system.



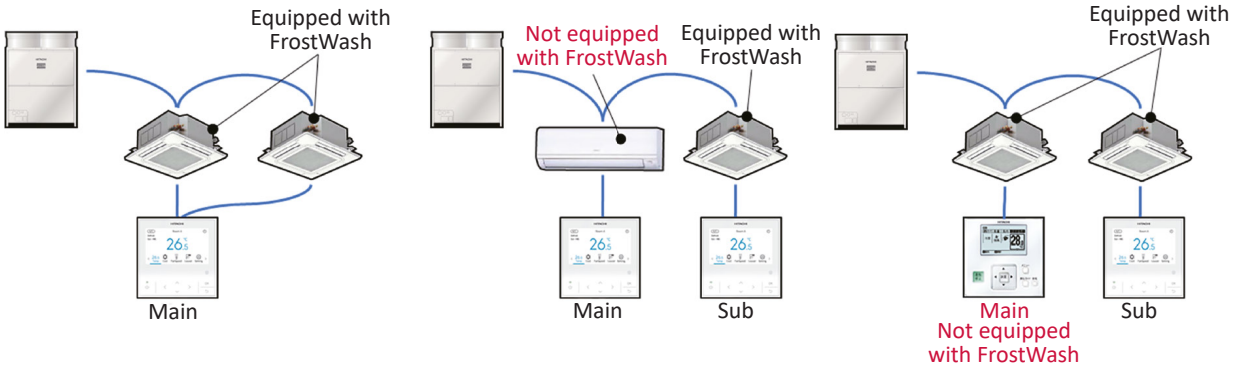


✓ The FrostWash function is not available to operate when the outside temperature is below 1 °C or above 43 °C.

✓ The FrostWash function is not available to operate when the room temperature is below 15 °C or above 30 °C.

- The level of dust removed depends on the usage environment.
- No frost may form on the heat exchanger when the outside temperature is 35 °C or above.
- It may happen that the FrostWash operation is stopped to protect the product.

- ✓ During the freezing or defrosting phase, cracking noise may be heard due to the temperature change. Refrigerant flow noise may also be heard.
- ✓ The noise may be heard relatively louder in a quiet environment. It is recommended to set "Auto FrostWash Schedule" when the room is not occupied.
- ✓ A white mist may come out of the air outlet during FrostWash operation. The mist is likely to be generated in a humid environment, such as when using a room humidifier or in a locker room.
- ✓ The temperature around the indoor unit may drop slightly during FrostWash operation.
- ✓ Condensation may occur during FrostWash operation if the protection cover or duct is installed. Disable the FrostWash function if these optional parts are installed.
- ✓ The FrostWash function is to remove dust from the heat exchanger to suppress air volume reduction and is not to remove oil stains. FrostWash is not the function to reduce the frequency of regular cleaning.
- ✓ Do not open or remove the grille or air inlet panel during FrostWash operation. It may cause injury or malfunction.
- ✓ The entire system must be stopped during FrostWash operation. FrostWash operation is not available for operation if even a single indoor unit connected in the system is in operation.
- ✓ Avoid creating a controller group that includes indoor units from different refrigerant cycles, as doing so will prevent the FrostWash function from operating throughout the entire system.
- ✓ When two controllers are connected with one indoor unit, the FrostWash function can only be set from the primary controller. Setting the function from the secondary controller is not available. (If one of the controllers is not equipped with the FrostWash function, all indoor units in the same controller group cannot perform FrostWash operation.)
- ✓ When selecting setting condition "3" to "5" in FrostWash function "F1", be sure to connect only one indoor unit to the main controller by wire and it must be equipped with the FrostWash function. Otherwise, the FrostWash function will not be available in cases (a) to (c) below.



- ✓ Refrain from configuring the "Auto FrostWash Schedule" using any sub-wired controllers, as doing so may lead to the inability to perform FrostWash due to potential clock misalignment within these controllers.
- ✓ Power is consumed when the "FrostWash" function is activated. Refer to below for power consumption during FrostWash operation.

✓ Operating conditions:

- Ambient temperature: 35 °C
- Room temperature: 28 °C
- Outdoor unit nominal cooling capacity: 28kW
- Indoor units nominal cooling capacity: 14kWx2
- Pipe length: 7.5 m
- Maximum power consumption: 2.0kWh/1 FrostWash Cycle

4.7.17 Minimum evaporating temperature setting for cooling (Hc)

By controlling the rotation speed of the compressor so that the evaporating temperature of the refrigerant flowing through the indoor unit, during refrigeration operation, becomes the set target evaporating temperature. High pressure sensitive operation (Hc=2~5) and simple dehumidification operation (Hc=6~9) can be realised.

Note that when this function is enabled (Hc≠0), smooth drive 2.0 is disabled, and the difference between the set temperature and the suction temperature tends to be larger.

1 High sensible heat operation (Hc=2~5)

In high sensible heat operation, the higher the target evaporating temperature, the higher the sensible heat ratio.

2 Simple dehumidification operation (Hc=6~9)

In single dehumidification operation, the lower the target evaporating temperature, the higher the dehumidification capacity.
Note that the outlet temperature is reduced and water splashing is likely to occur from the indoor unit outlet.

4.7.18 Cool/heat auto changeover enable/disable setting (F8)

1 Cool/heat auto changeover

The Cool/heat auto changeover function seamlessly transitions the operation mode of the heat recovery-type outdoor unit. This transition takes into account variations between the temperature settings of indoor units, the room temperature, and the number of air conditioning units in cooling or heating operation. This mode shift in the outdoor unit can be initiated using not only the traditional wired remote controller with first-press priority[*1] but also while the outdoor unit is already in operation, following preconfigured settings.

**1. During the remote control's first-press priority mode, the outdoor unit's operation mode is established based on the initial mode commanded by the wired remote controller while the outdoor unit is inactive. This selected mode persists until the outdoor unit is brought to a halt.*

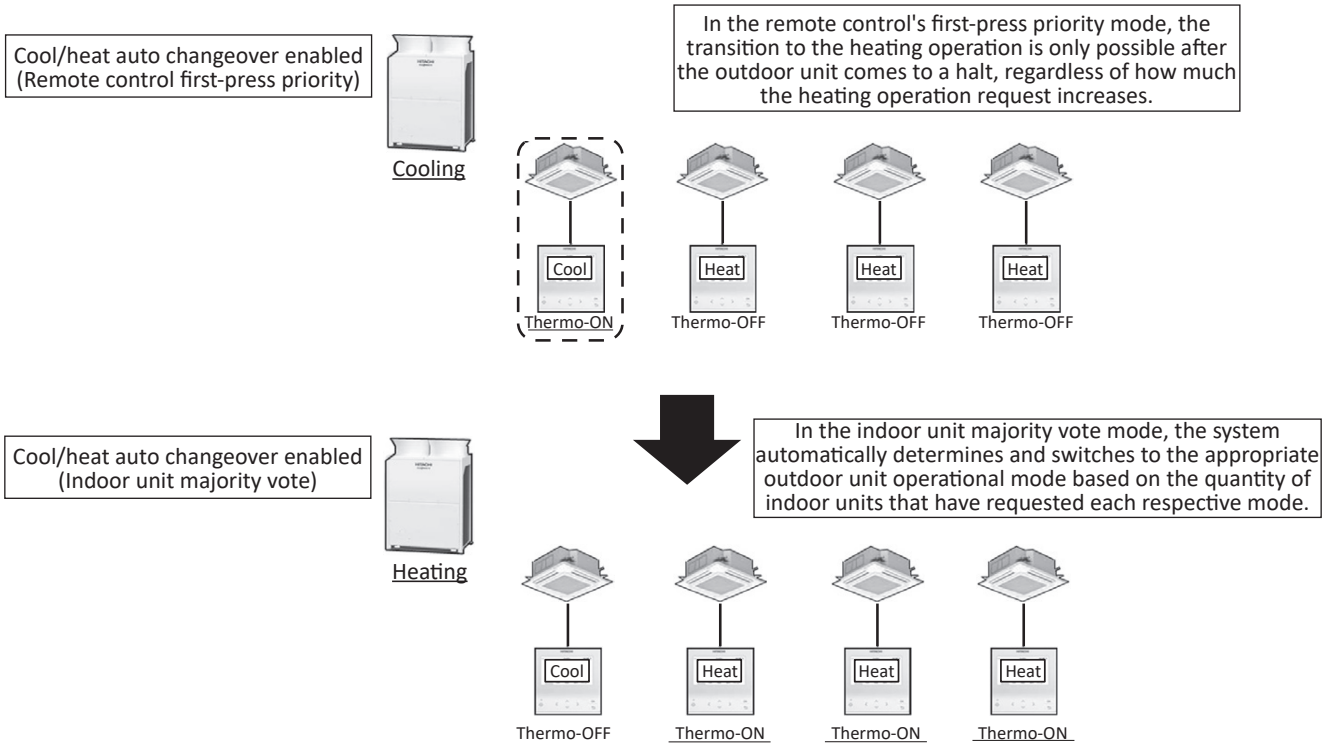
NOTE

After changing the operating mode, the same operating mode shall continue for at least 15 minutes.

There are three Cool/heat auto changeover modes:

◆ Indoor unit majority vote

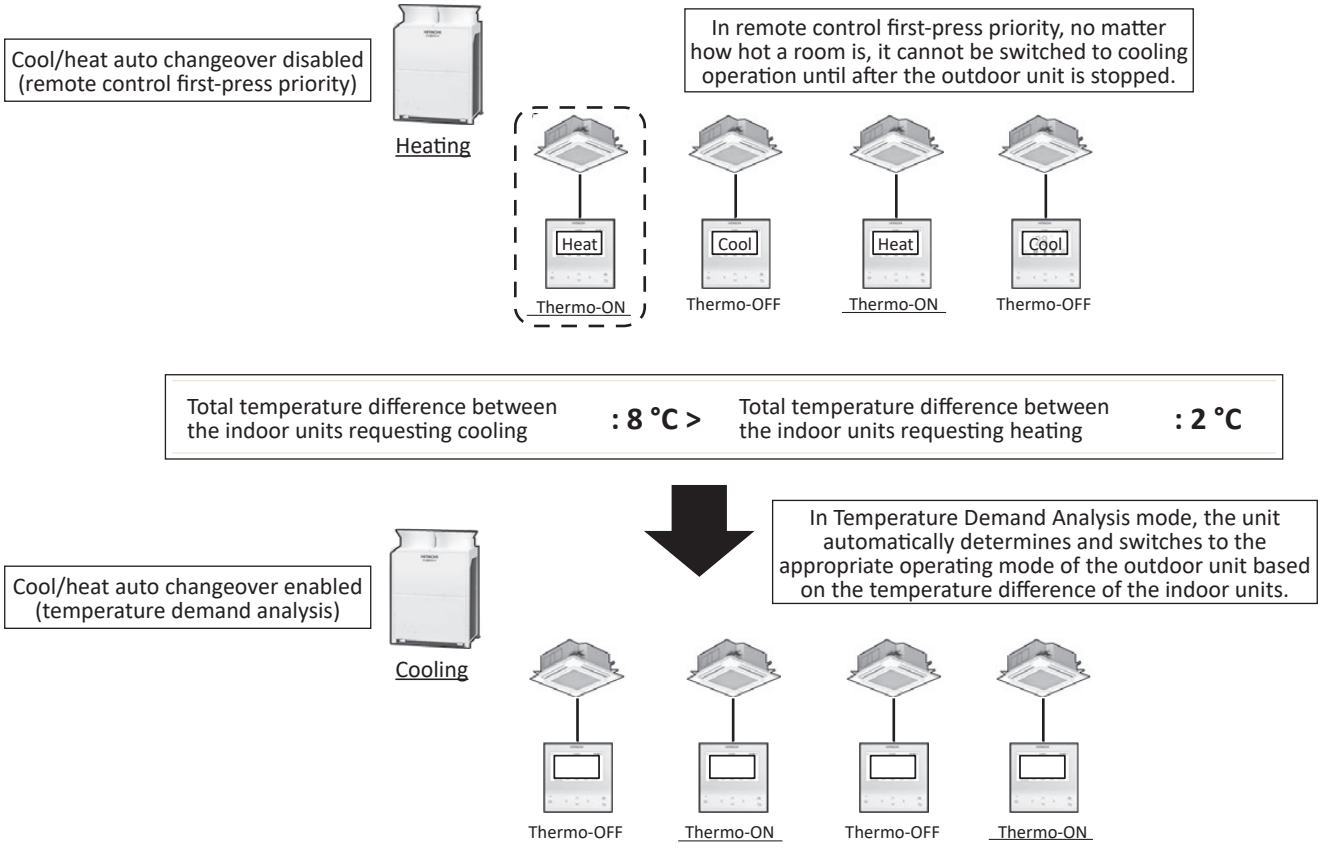
The number of indoor units requesting cooling operation and the number requesting heating operation are compared, so the operation mode is switched to the requested operation of the indoor units with the highest number of requests.



Example of an indoor unit majority vote

◆ Temperature demand analysis

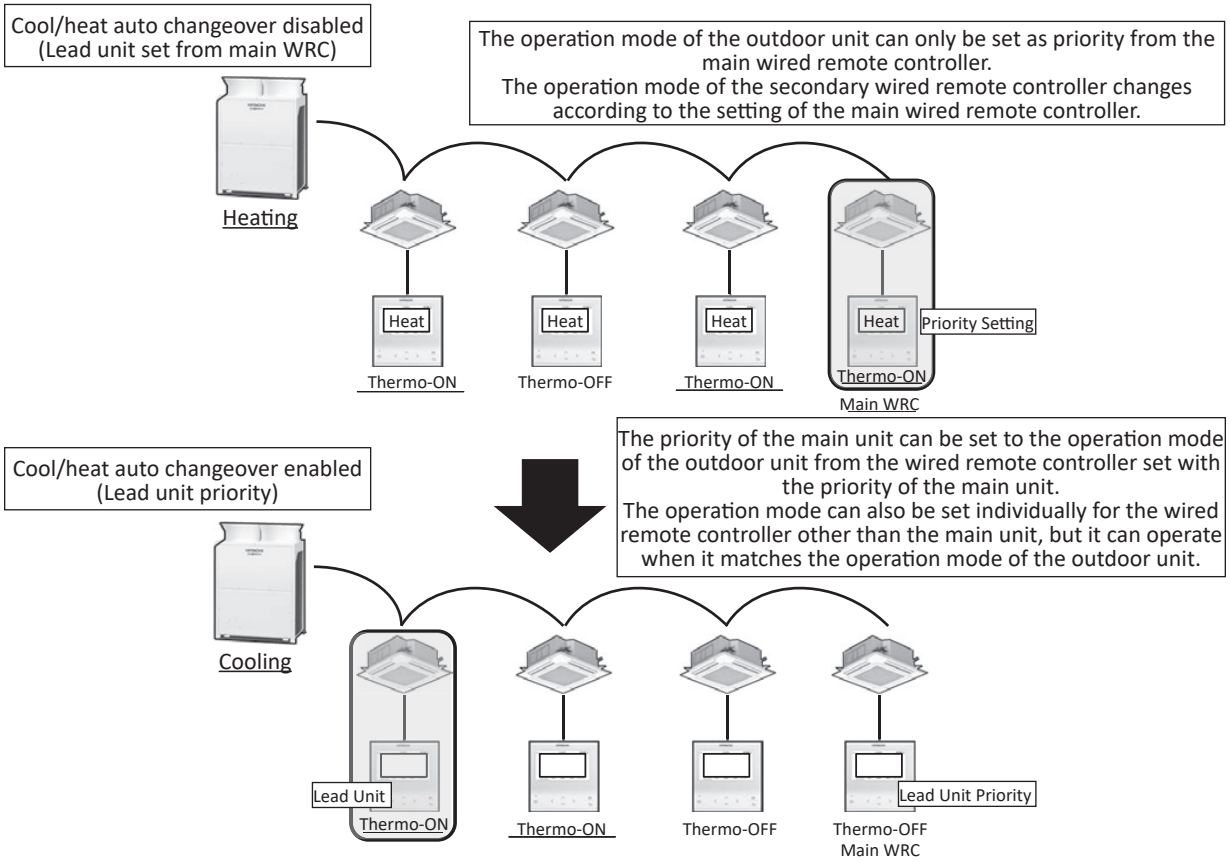
The total temperature difference (Inlet temperature - Set temperature) of the indoor units requesting cooling operation and the temperature difference (Set temperature - Inlet temperature) of the indoor units requesting heating operation are compared, and the operation mode is switched to the requested operation from the indoor units with the largest total temperature difference.



Example of temperature demand analysis

◆ Lead unit priority

The operation mode switches to the operation mode requested by the indoor unit set as Lead unit priority.



Example of Cool/Heat Auto Changeover

1 Setting cool/heat auto changeover from the outdoor unit

Cool/heat auto changeover enable/disable (FB)

It is enabled at the shipment. If you do not want the operation mode to be switched during outdoor unit operation, set to disabled.

2 Setting cool/heat auto changeover unit from the advanced color wired remote controller

NOTE

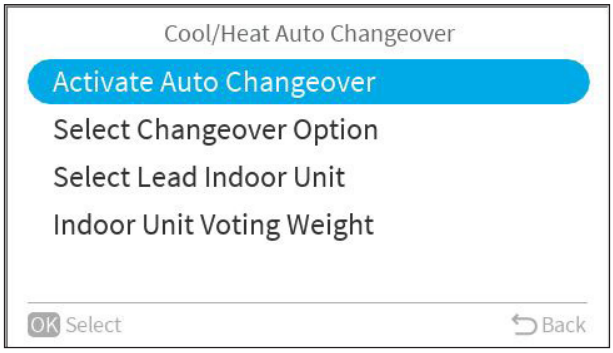
- *When there is at least one combination of an indoor unit that supports cool/heat auto changeover in the refrigerant system and an advanced wired colour remote controller, cool/heat auto changeover can be performed.*
- *Cool/heat auto changeover and lead unit priority cannot be adjusted at the same time. In addition, the lead unit is canceled when cool/heat auto changeover is enabled.*
- *For two wired remote controllers, cool/heat auto changeover can be set from the primary wired remote controller only.*

Setting item	Description
Activate Auto Changeover	Enable/Disable Cool/Heat Auto Changeover
Select Changeover Option	Changes Cool/Heat Auto Changeover modes: Temperature Demand Analysis, Indoor Unit Majority Vote, and Lead Unit Priority.
Select Lead Indoor Unit	Sets Cool/Heat Auto Changeover to the Lead Unit. When Select Lead Indoor Unit is selected in Select Changeover Option, the operation mode is determined based on the mode set in the Lead Unit.
Indoor Unit Voting Weight	Determines Voting Weight for the advanced colour wired remote controller when Indoor Unit Majority Vote is selected in Select Changeover Option. Selectable from *1, *2, *3, or *0.

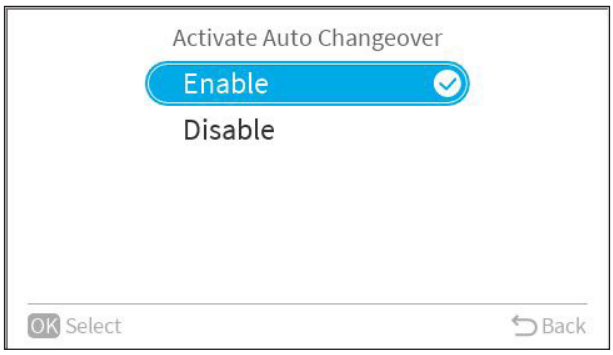
Activate Auto Changeover

1 On the Service & Installation screen, select “Cool/Heat Auto Changeover”.

2 Select “Activate Auto Changeover” and press the “OK” button.



3 Press the “⌃” and “⌄” buttons and select “Enable”. Press the “⮌” button to return to Step 2.



4 Use the “<“ and “>“ buttons and select “Yes” and press the “OK” button. The screen will return to Step 3.



Select Changeover Option

This function is used to change cool/heat auto changeover modes: Temperature demand analysis, indoor unit majority vote, and lead unit priority.

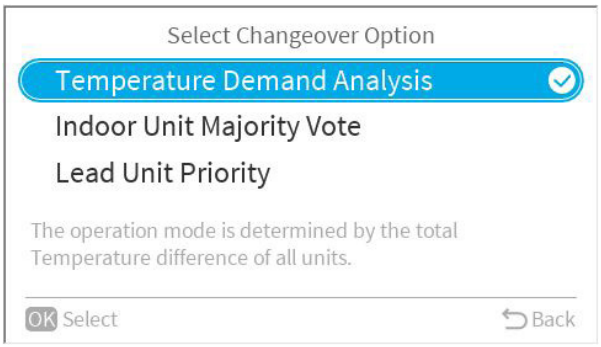
Mode	Description
Temperature Demand Analysis	Determines the operation mode by the total temperature difference (Cooling setting: Indoor unit inlet air temperature - Indoor unit setting temperature, Heating setting: Indoor unit setting temperature - Indoor unit inlet air temperature) of all units.
Indoor Unit Majority Vote	The operation mode is determined by the total of number of all indoor units in operation.
Lead Unit Priority	The operation mode is determined according to the setting of the lead unit.

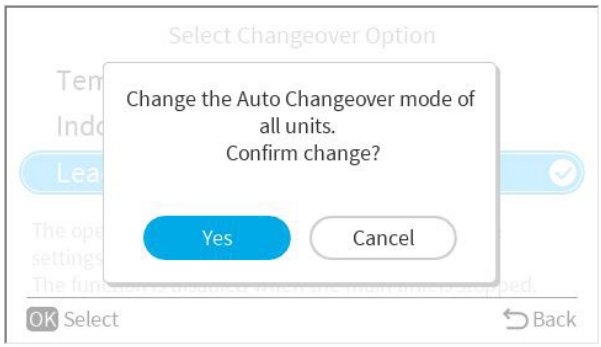
1 On the Service Menu screen, select "Cool/Heat Auto Changeover".

2 Select "Select Changeover Option" and press the "OK" button.



3 Press the "⌃" and "⌄" buttons to change the options.

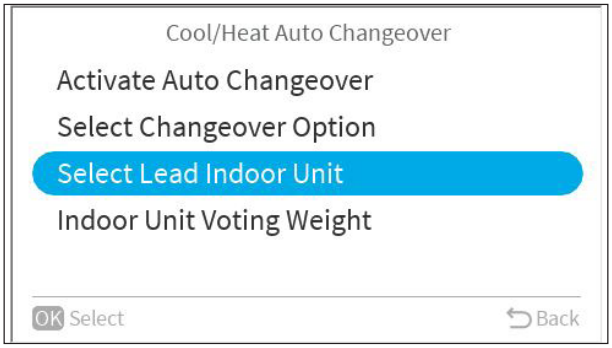




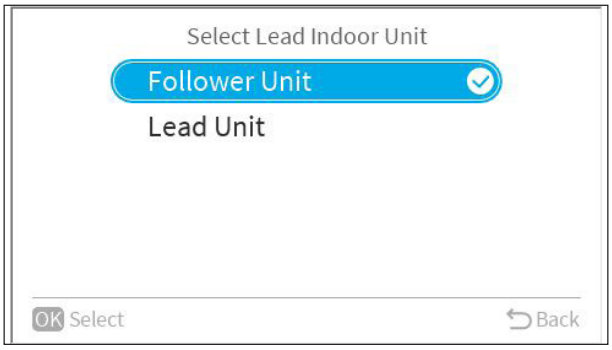
Select Lead Indoor Unit

1 On the Service Menu screen, select “Cool/Heat Auto Changeover”.

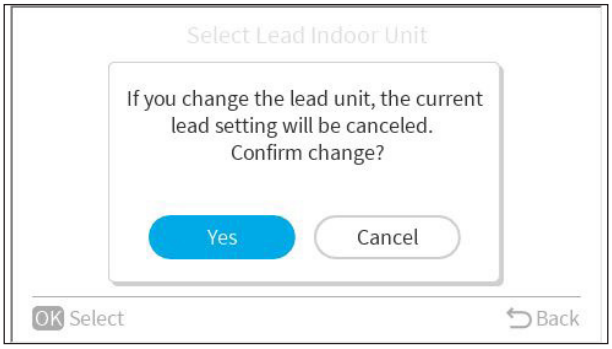
2 Select “Select Lead Indoor Unit” and press the “OK” button.



3 Press the “^” and “v” buttons and select “Lead Unit”. Press the “⮌” button to return to Step 2.



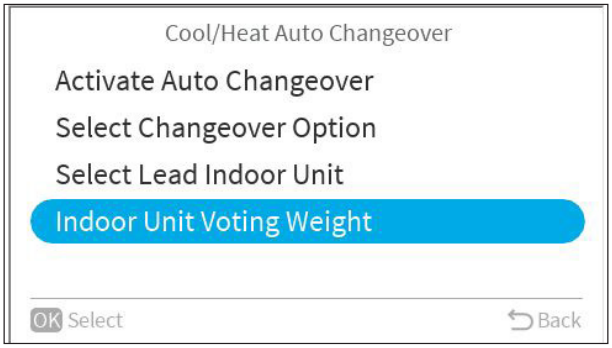
4 Use the “<“ and “>“ buttons and select “Yes” and press the “OK” button. The screen will return to Step 3.



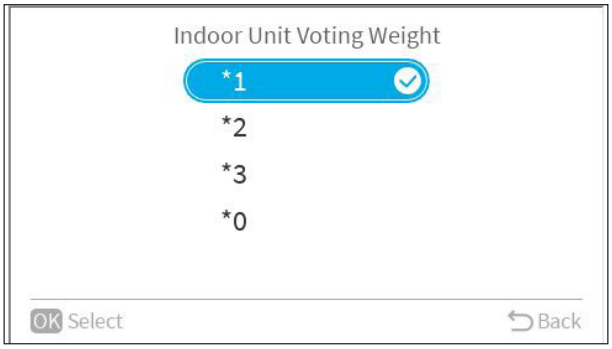
Indoor Unit Voting Weight

1 On the Service Menu screen, select “Cool/Heat Auto Changeover”.

2 Select “Indoor Unit Voting Weight” and press the “OK” button.



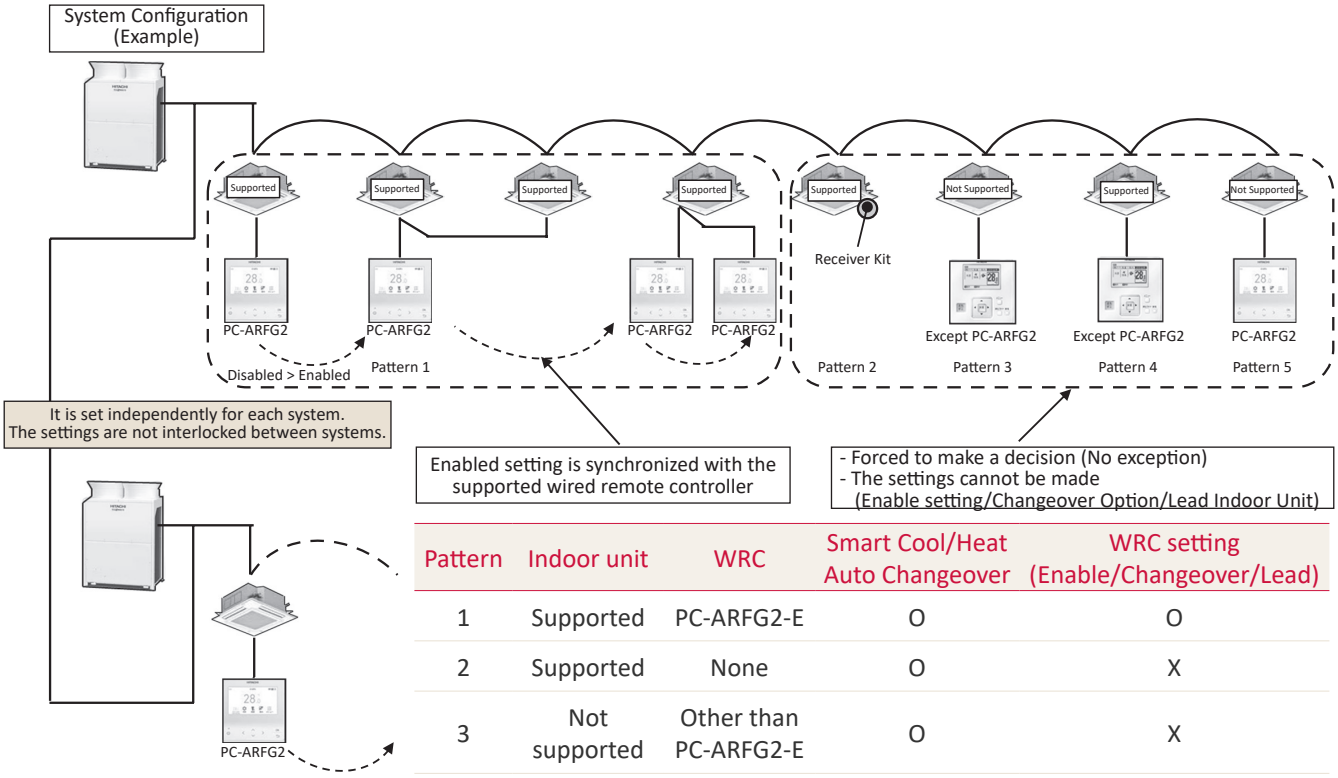
3 Press the “^” and “v” buttons to change the options in the following order: “*1” <=> “*2” <=> “*3” <=> “*0”.



4 Notes on setting "Cool/Heat Auto Changeover".

- The Cool/Heat Auto Changeover function is enabled when the following conditions do not apply:
  - ✓ Disabled using outdoor unit function selection "F8"
  - ✓ Test run
  - ✓ Fixed in cooling or fixed in heating using external input
- If there is at least one combination of one indoor unit compatible with cool/heat Auto changeover and one advanced color wired remote controller in the same refrigerant system, cool/heat auto changeover can be performed. This function is compatible with generation 3 or later indoor units. Refer to the technical documents of the indoor units.

✓ Supported advanced color wired remote controller PC-ARFG2-E

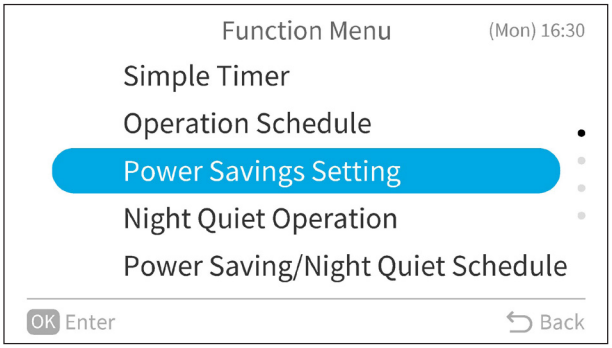


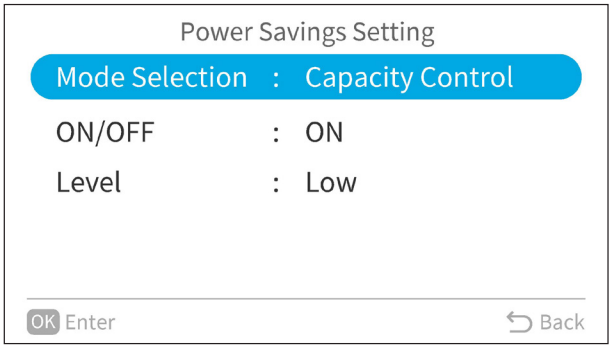
Pattern	Indoor unit	WRC	Smart Cool/Heat Auto Changeover	WRC setting (Enable/Changeover/Lead)
1	Supported	PC-ARFG2-E	O	O
2	Supported	None	O	X
3	Not supported	Other than PC-ARFG2-E	O	X
4	Supported	Other than PC-ARFG2-E	O	X
5	Not supported	PC-ARFG2-E	O	X

4.8 Power saving function from wired controller

4.8.1 Power savings mode settings

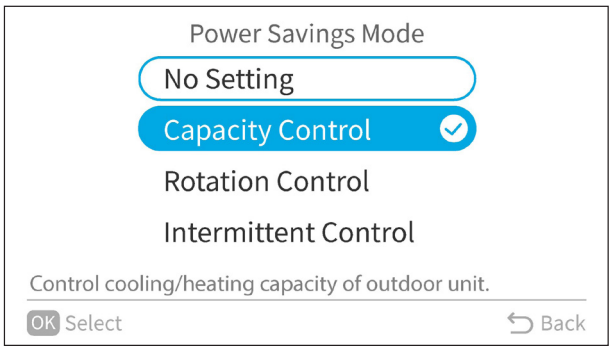
Select "Power Savings Setting" on the "Function Menu" screen and press "OK", then is possible to select the "Mode Selection".

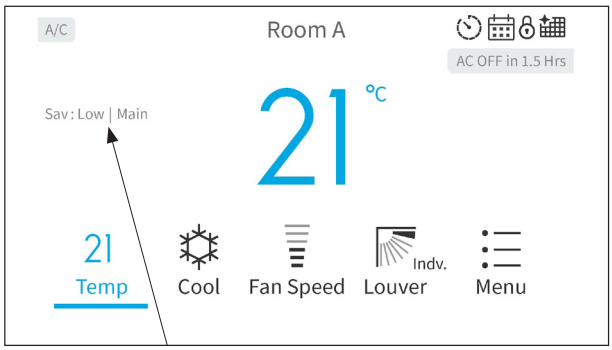




The "Power Savings Mode" changes as follows:

"No setting" ↔ "Capacity Control" ↔ "Rotation Control" ↔ "Intermittent Control"





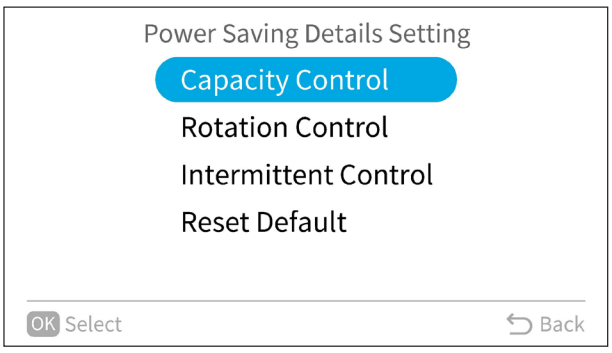
When power savings is ON, power savings level is displayed to indicate the power savings setting

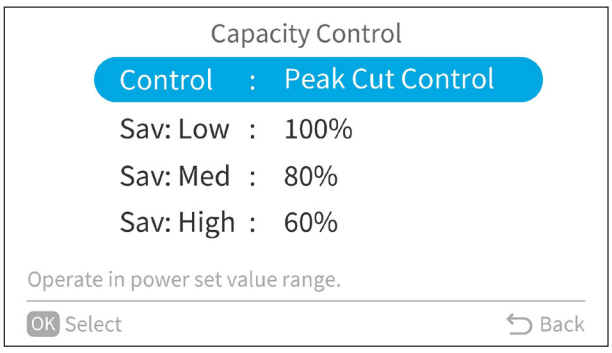
◆ Outdoor unit capacity control

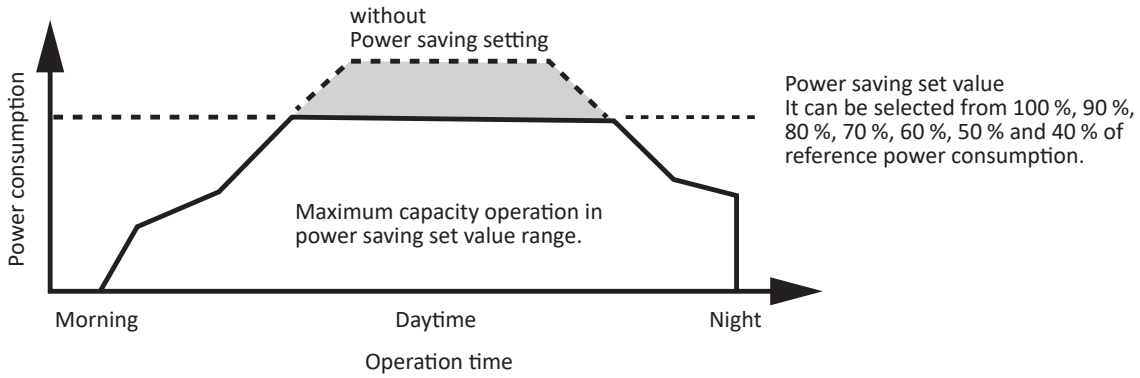
The demand function setting can be controlled from wired controller. Select from “Peak Cut Control” and “Moderate Control” according to the situation.

“Peak Cut Control” function

The peak cut control reduces the power consumption range when it exceeds the value of the power saving setting.







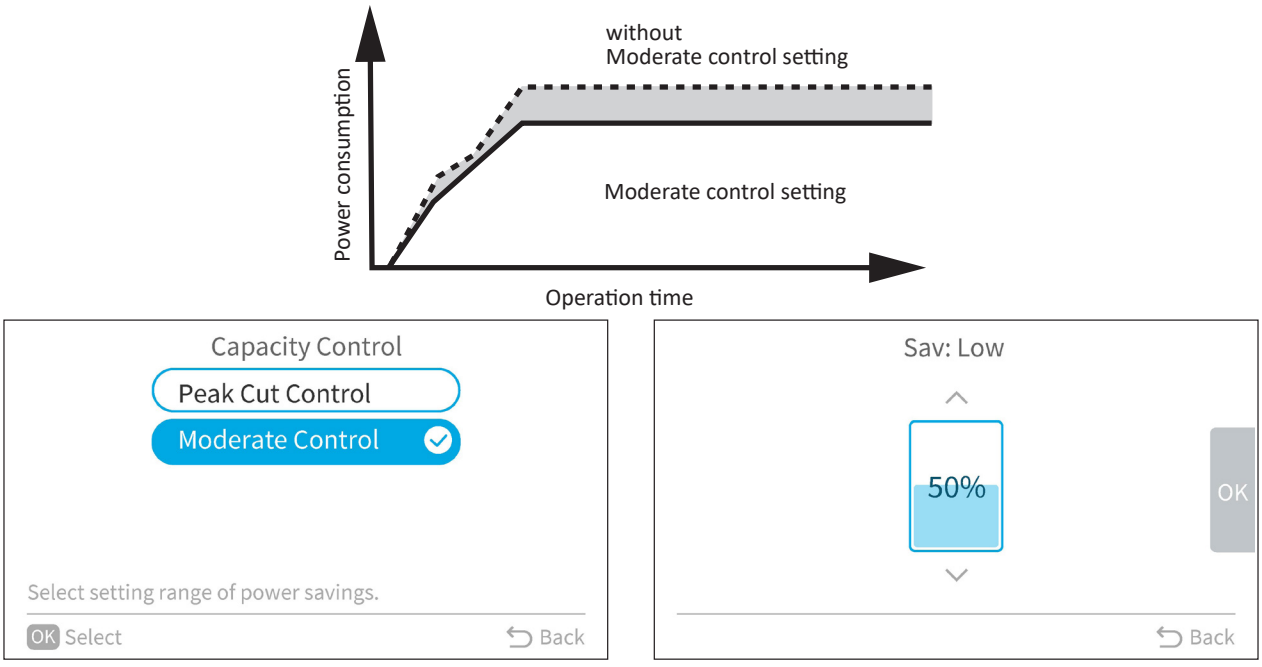
Power saving set value
It can be selected from 100 %, 90 %, 80 %, 70 %, 60 %, 50 % and 40 % of reference power consumption.

NOTE

- *The power set value (%) is just a criterion. The power set value for this function is different from the actual power value in precision. Use the demand controller (option) when it is necessary to manage the maximum power correctly.*
- *The cooling capacity will be decreased according to the power saving setting value for the reducing of compressor motor revolution.*
- *The actual electrical power consumption may be higher than the value displayed on the screen under certain operating condition such as protective control.*
- *This function is used to inhibit power consumption of the operating. Do not use it for minimize the capacity of current and the voltage for the power circuit, power source wiring, ELB, transformer, etc. It may cause actuation of interrupter and equipment fault.*

"Moderate Control" function

The moderate control adjusts the air conditioning capacity not to exceeds the value of the power saving setting.



The moderate control setting value can be set from 40 % to 100 % of regular capacity in 10 % intervals.

100 % ↔ 90 % ↔ 80 % ↔ 70 % ↔ 60 % ↔ 50 % ↔ 40 % ↔ 0 %

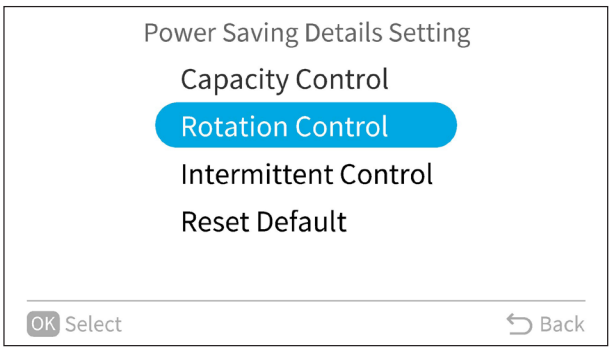
NOTE

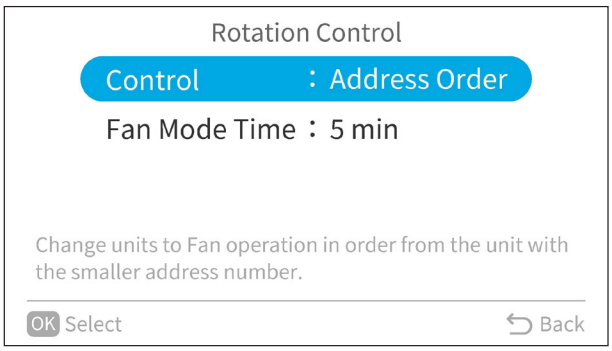
- *The setting value is just a criterion. It might be different according to the actual service condition and operating condition.*

◆ Rotation control function

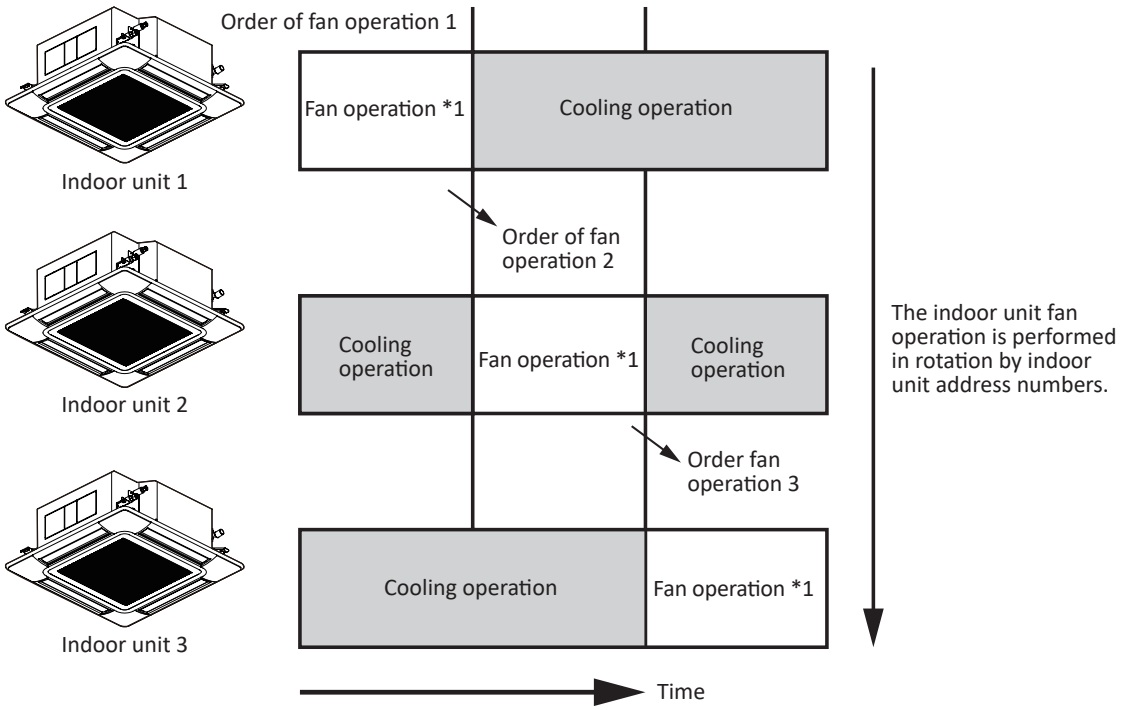
	Item	Description
Control method	Address order	Indoor units are set to fan mode in ascending order, one by one, depending on their H-link address.
	Temperature order	Indoor units are set to fan mode according to the temperature difference between the temperature set point and the air inlet temperature, in ascending order: units for which Tset is closer to the setting temperature are the first to be switched to fan mode.
	Sensor order(*)	If the motion sensor is used, fan mode will be applied to the indoor unit that has the lowest activity detected. Once the fan mode operation time is elapsed, this unit returns to heating/cooling (previous operation) mode and fan mode is applied to another indoor unit with the lowest activity.
Change level		It is possible to change the timing of the operation mode switch to fan mode, for the concerned indoor units.

(*)Cannot be set if the indoor/outdoor unit does not support this function





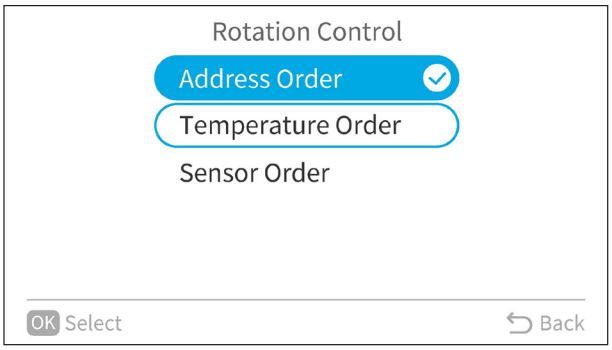
The rotation control switches multiple indoor unit operating mode, of the same outdoor unit system, to fan mode (Thermo-OFF) in order one by one.

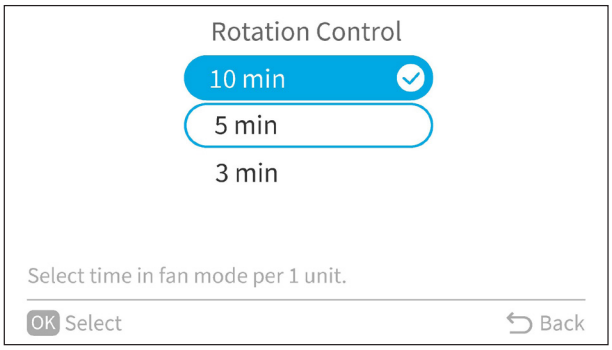


*(*1)The fan mode time can be selected in the interval of three minutes, five minutes and ten minutes.*

NOTE

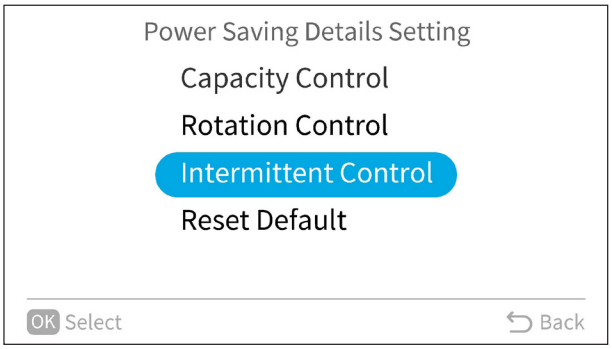
- *It is possible to change the rotation assigned number according to the minimum differential between the setting temperature and indoor temperature.*

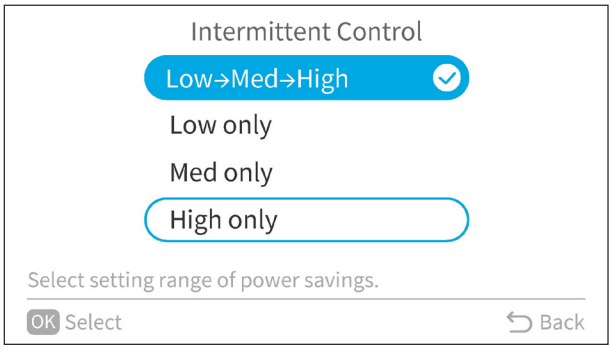




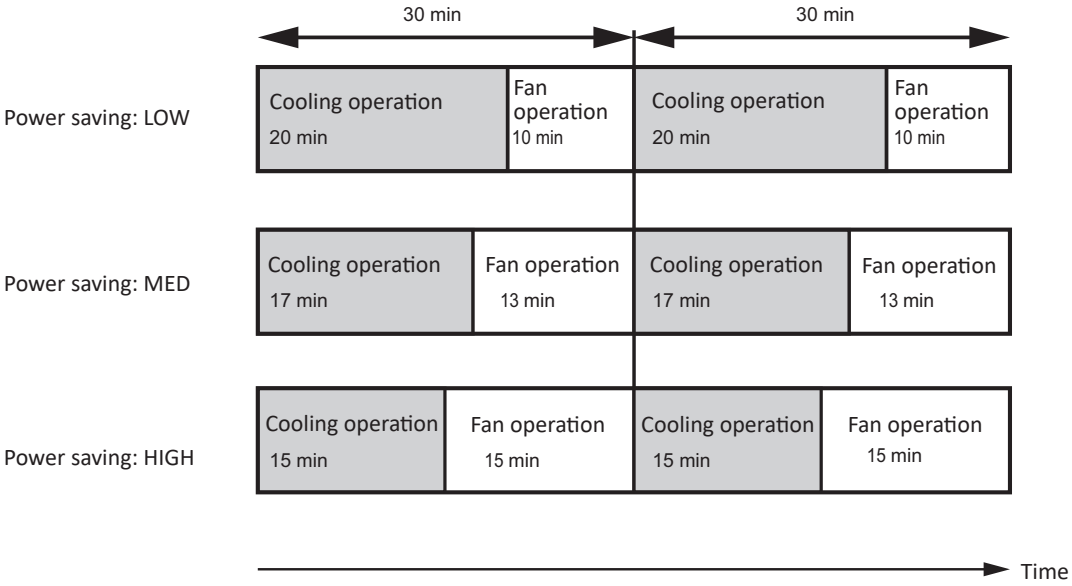
4.8.2 Intermittent control function

Item	Description
Level Change	The power saving level can be set.





The intermittent control repeats cooling/heating and fan (Thermo-OFF) mode in fixed intervals.



NOTE

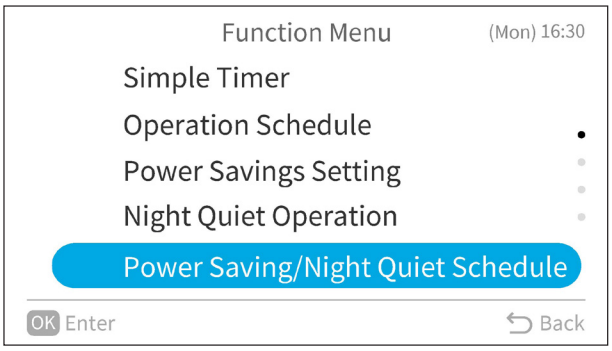
The fan mode will be repeated in the interval of five minutes (LOW), ten minutes (MED) and fifteen minutes (HIGH) during heating operation. Power Saving Schedule Function.

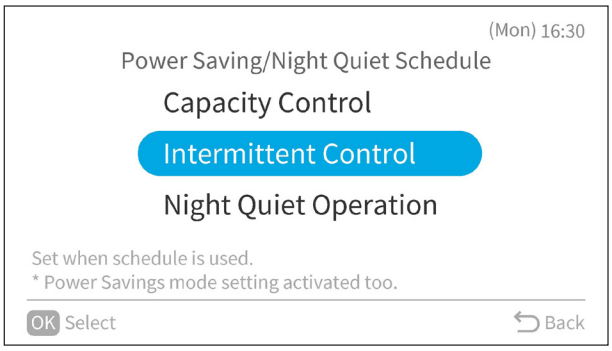
◆ Power Saving/Night Quiet Schedule Setting

This function starts and stops power savings control and operation noise reduction control at the desired time.

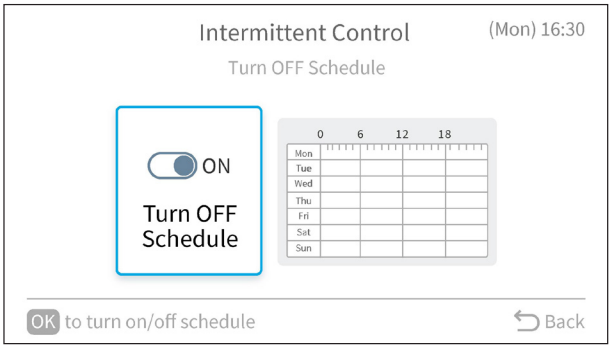
Power saving/night quiet schedule settings can be set up to five times a day on each day of the week.

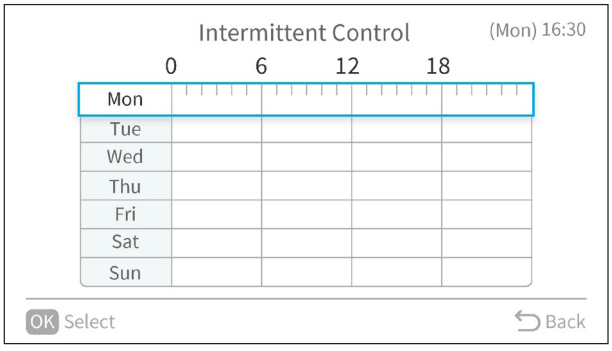
The power savings schedule controls the schedule set in the power savings mode setting on indoor unit capacity control and intermittent control.



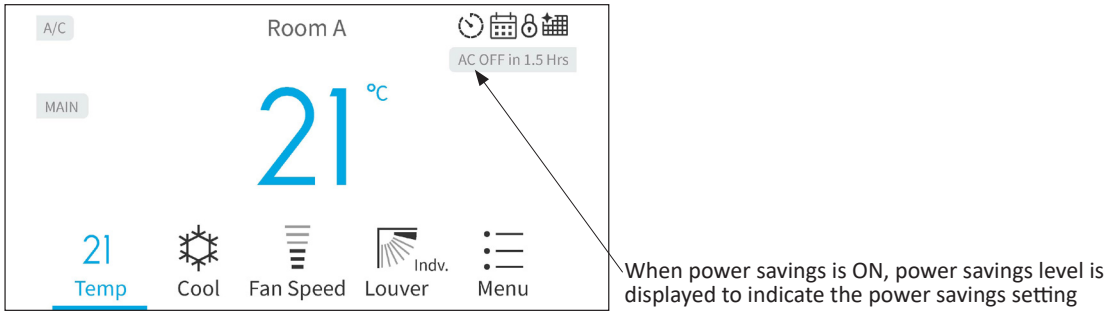


Schedule operation is not performed while the schedule is disabled. This is a function that temporarily prevents the schedule from running.

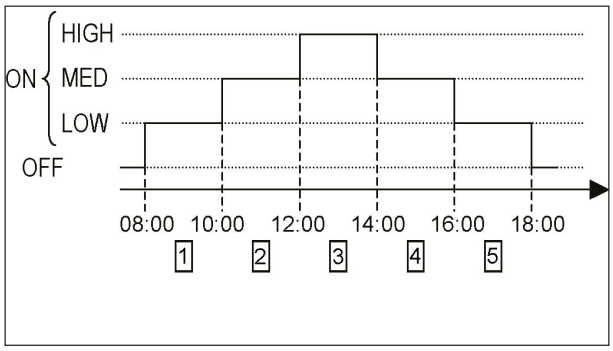




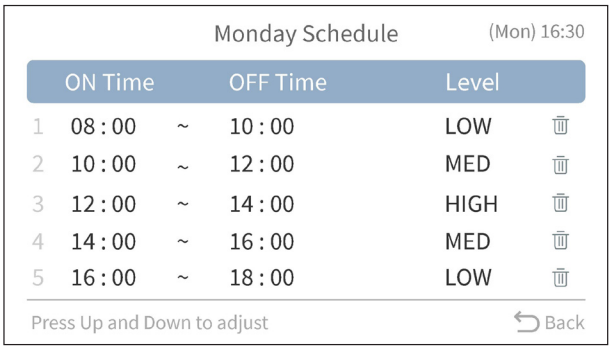
When the schedule operation is in operation the screen shows as follows:

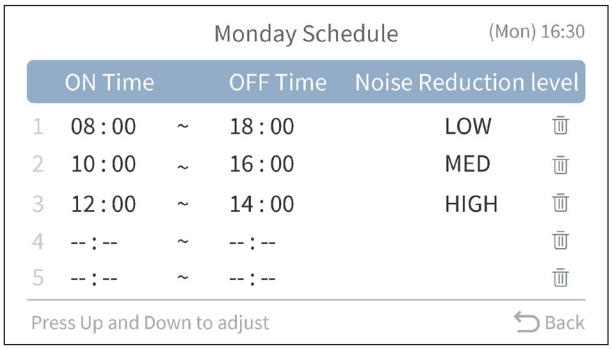


Example of power saving operation and schedule setting



Example of power saving and night quiet schedule operation





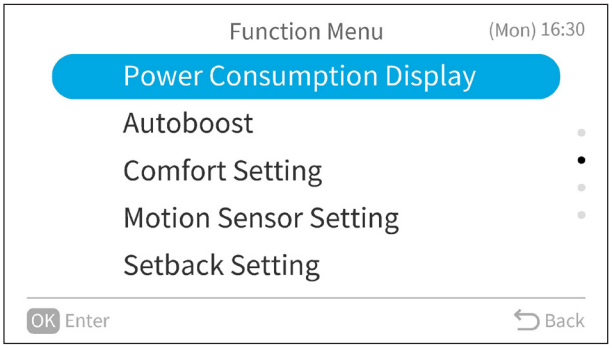
The operation noise reduction schedule function is utilized to set the operation noise reduction schedule up to five settings a day each day of the week.

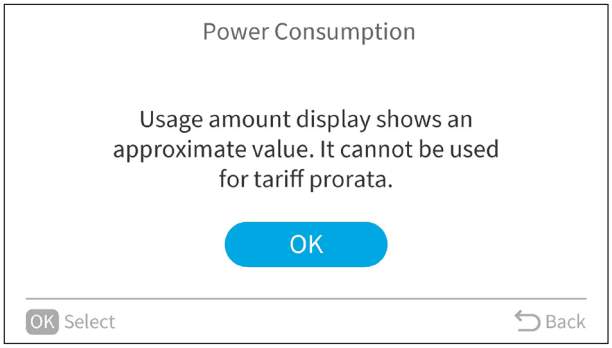
NOTE

The operation noise reduction setting may decreases the cooling/heating capacity.

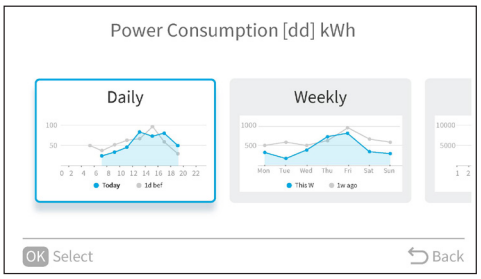
4.8.3 Power Consumption Display Function

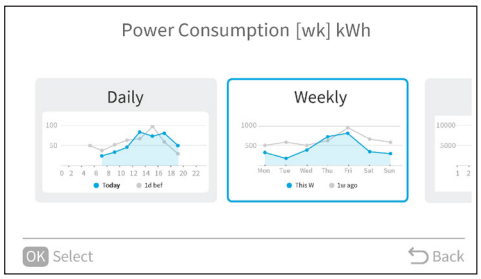
This function displays the power consumption of the outdoor unit compressor. The value of each displayed in Graph/List format is one day, one week and one year. The display period of consumption comparison can be selected from one day before/Today to 1 year ago/This year.

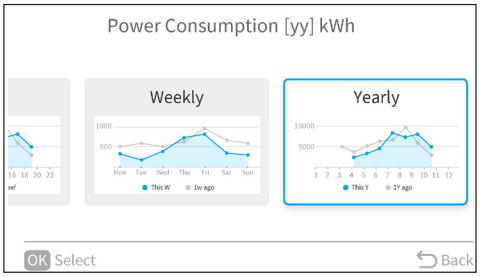




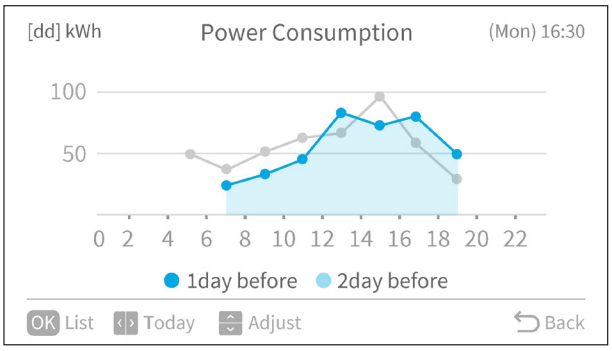
The power consumption for outdoor unit compressor will be displayed.

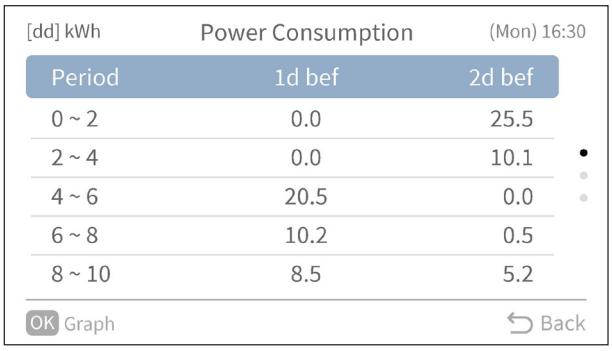






Switch the comparison target for the display period, the display scale and press "OK" to switch between the graph and list display of the power consumption display.





Test run

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5.2 Before the test run 147
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5.6 Reset for accumulated operation time of compressor 1-2 (cU1-cU2) 155
5.7 Setting of forced open valve mode 156
5.8 Refrigerant cycle checklist 158
5.9 Test run check list 161

5.1 Preliminary checks

The test run must be performed according to the instructions in this chapter.

DANGER

Do not use the system until all the checkpoints have been verified. As with the test run for the indoor unit, check the Installation and maintenance manual for the indoor unit and the CH unit.

- Make sure that the refrigerant pipes and the communication cables between the outdoor and indoor units are connected to the same refrigerant cycle. Failure to do so could lead to abnormal operations or a serious accident. Check that the setting of the refrigerant cycle DSW (DSW1 and RSW1 on outdoor units, DSW5 and RSW2 on indoor units) and of the unit number (DSW6 RSW1) of the indoor units is suitable for the system. Check whether the DSW setting specified on the printed circuit of the indoor and outdoor units is correct. Pay special attention to the outdoor unit number, the refrigerant cycle number and the terminal resistance.
- Make sure that the electric resistance is greater than 1MΩ; to do this, measure the resistance between the earth and the terminal of the electrical components. If not, do not use the system until the electrical leak has been detected and repaired. Do not apply voltage to the communication terminals (Outdoor unit: TB2; terminals 1, 2, 3, 4 / Indoor unit: TB2; terminals 1, 2, A, B / CH-Box: TB2; terminals 1, 2, 3, 4).
- Check that all the cables, L1, L2, L3 and N (R, S and T) are correctly connected to the power supply line. If they are not correctly connected, the unit will not work and the remote control will indicate alarm code "05". When this happens, check and change the phase of the power supply line according to the sheet on the back of the service cover.

CAUTION

Make sure that the unit's main power supply line switch has been on for more than 12 hours, to heat the compressor oil with the heating resistors.

- If several base units have been combined, stick the main unit label in a visible place (outdoor unit 1), so outdoor unit A can be easily identified. Do not stick the main label on the secondary unit (outdoor units 2, 3 and 4).

NOTE

- *Make sure the electric components in the installation (earth leakage breaker, circuit breaker, cables, connectors and cable terminals) have been selected correctly in line with the electrical data given in this Manual. Also ensure that these components meet the local and national codes.*
- *Use shielded cables (> 0.75 mm^2) for the communication installation wiring to avoid electromagnetic noise (the shielded cable must have a total length shorter than 1000 m, and its size must comply with local codes).*
- *Check the connection of the power supply wiring terminals (terminals “L1 to L1 (R)”, “L2 to L2 (S)”, “L3 to L3 (T)” and “N to N”). Supply voltage 3N ~ 400V 50Hz. If it is different, some components could be damaged.*

5.2 Before the test run

⚠ CAUTION

- *Disconnect all the power supply switches.*
- *Use a multimeter and check that all the switches are disconnected.*

Before carrying out the test run, check that the unit is properly installed in accordance with the Installation and Operation Manual. After that, check the following parts.

	Check items	Contents
1	Damage	Is the unit or its internal parts damaged?
2	Fan motor	Is the fan runner installed in the centre of the casing? Is the fan motor installed outside the casing? (The fan motor must not make contact with the casing.)
3	Screws	Have the screws loosened due to vibration during transport? Check that the screws are firmly fastened during the installation, especially the screws for the electrical wiring.
4	Refrigerant leak	Check that no refrigerant leaks are present. The pipe torque part (flare part) may be loosened due to vibration during transport.
5	Setting the DSW	Check that the DSW setting is the same as before shipment. RSW, DSW and LED functions, see *"8.5 RSW, DSWs and LEDs functions"*.
6	Insulation *	Measure the resistance between electrical components terminal and ground using a multimeter. It is normal for the resistance to be 1 MΩ and greater. If it is 1 MΩ or less, do not start-up the unit due to insulation failures in the electrical parts. Do not apply power to the operating line terminal board (The control PCB may be damaged).
7	Stop valve completely open	Before the test run, check that the outdoor unit stop valve is completely open.
8	Power phases	Operation is not available with an incorrect power phase or absence of a phase. • *Alarm "03" or "05" will be displayed on the remote control LCD screen.* • *Alarm "03" or "05" will be displayed on the outdoor unit 7 segment display.* Check the power phase in accordance with the caution label located near the terminal board of the outdoor unit or on the back side of the service cover.
9	Turn ON crankcase heater **	Once items 1 to 8 have been completed, turn ON power supply to the outdoor unit. The electricity is provided to the crankcase heater to heat the compressor. The compressor may be damaged if not pre-heated. Therefore, the compressor must be activated after the power supply is turned ON for at least 12 hours.
10	Indoor and outdoor temperature	To be used with cooling and heating operation: Is the indoor temperature 27 °C DB or lower during the heating operation? (The heating operation may not be operated due to the activation of the operating overload prevention with an ambient temperature of 19 °C or over). In order to carry out the operational test, set the test mode via the remote control.

**** Insulation resistance***

In the case that the unit has been turned OFF for large periods of time, the insulation resistance may be reduced to 1 MΩ or less because the refrigerant is maintained in the compressor. Check the following points.

- *Disconnect the compressor cables and measure the insulation resistance of the compressor itself. If the resistance is 1 MΩ and over, failures have occurred in the insulation of other electrical parts.*
- *If the resistance is 1 MΩ or lower, reconnect the compressor and turn ON the main power supply. The compressor will automatically be heated. Re-check the insulation resistance after current has been applied for at least 3 hours (the pre-heating time depends on the air conditions, the length of the piping or the condition of the refrigerant).*

Before connecting the circuit breaker, check the rated capacity.

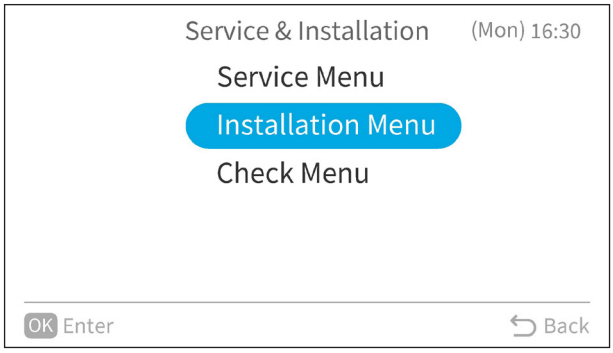
***** Stoppage of the compressor operation***

The compressor may not be available for a maximum time period of 4 hours if the power supply is not previously turned ON. At this time, stoppage code (d1-22) is displayed on the LCD screen of the remote control and the forced Thermo-OFF function is started.

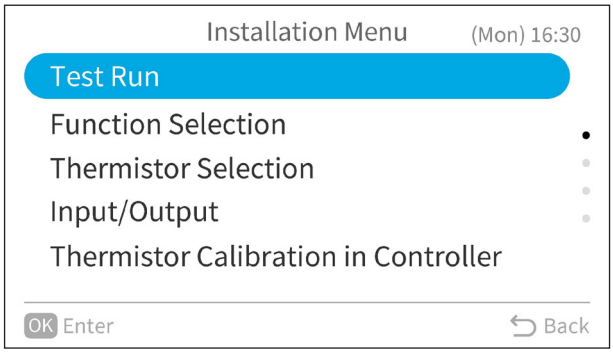
If compressor operation is required, turn ON the power supply to the outdoor unit, wait 30 seconds and press PSW5 on PCB1 of the outdoor unit for at least 3 seconds. The forced Thermo-OFF function (d1-22) will be cancelled and the operation of the compressor will be available.

5.3 Test run using the PC-ARFG2-E remote control

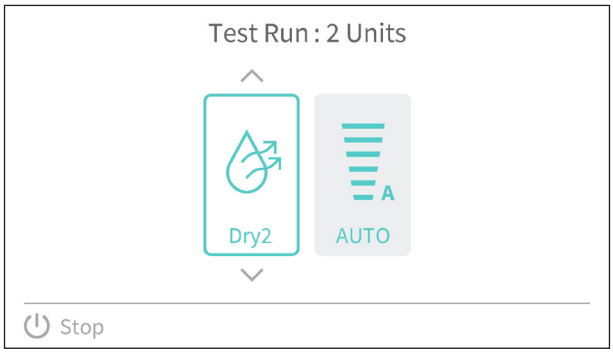
1 Select “Installation Menu” and press “OK”.



2 Select “Test Run” and press “OK”.



3 The total number of the indoor units connected to the wired controller or to the system is indicated on the screen.



("2 units" is indicated for a twin combination, "3 units" for a triple, and "4 units" for a quad, etc.)

4 If the number of indoor units displayed on the screen is matching with the real quantity of units connected to this controller, the connection of remote control cable is correct.

a. The operation mode and the air flow volume can be set on the Test Run screen. Select the item by pressing the directional key "▲▼◀▶".

b. The test run will be started by pressing "⏻" (On/Off).

- The default setting of the test run time is 2-hours OFF timer. The indoor temperature shall be 21 ºC DB / 15 ºC WB or higher and outdoor temperature shall be -5 ºC DB or higher for the cooling operation.
- The indoor temperature shall be 27 ºC DB or lower for the heating operation.
  The cooling operation is not performed if the outdoor temperature is below -5 ºC DB.
  The temperature detections by the thermistors are invalid through the protection device are valid during test run. Remove the abnormality according to the table below and perform test run again.

c. The test run will be finished by pressing "⮌" switch during the stoppage or "⏻" (On/Off) switch during the operation.

5 If the number of indoor units displayed on the screen is not matching with the real quantity of units connected to this controller, follow the procedure below.

a. Turn OFF the power supply, check the following items and perform the correct connection. (Do not repeat turning ON and OFF within 10 seconds).

- The power supply to the indoor unit was not turned ON or there is an incorrect wiring issue.
- There was an incorrect connection issue regarding interconnecting cables between indoor units or of the controller cable.
- There was an incorrect setting of the rotary switch and DIP switches (the settings were overlapped), on the printed circuit board (PCB) for the indoor unit.

b. Checking procedure for abnormalities.

Remote control switch indication	Unit condition	Fault	Inspection points after the power source OFF
No indication	-	The power source is not turned ON. The connection of the remote control cable is incorrect.	1. Connection between Connector and Wires 2. Connecting Points of Remote Control Cable 3. Contact of Connectors of Remote Control Cable
	-	The connecting wires of power supply line are incorrect or loosened.	4. Connection Order of each Terminal Board 5. Screw Fastening of each Terminal Board
Counting number of connected units is incorrect	-	The electrical wiring between indoor unit and outdoor unit is disconnected, or the power source is not turned ON.	-
	-	The setting of unit number is incorrect.	6. RSW Setting on Indoor Unit Printed Circuit Board
	-	The connection of control cables between each indoor unit are incorrect. (When one remote control switch controls multiple units)	7. Wire Connecting Order of Bridge Cable 8. Connecting Points of Bridge Cable 9. Contact of Connectors of Bridge Cable
Alarm Code “03” flash	The unit does not start	The power source is not turned ON.	-
		The connecting wires of operating line are incorrect or loosened.	1. Connecting Order of each Terminal Board. The fuse on the PCB may be blown out due to miswiring. (Can be recovered only once by the DSW on the PCB). (*) 2. Screw fastening of each terminal board. 3. Connecting order of power line between indoor units and outdoor unit.
No indication	The unit does not start	The connection of remote control cable is incorrect.	
Other alarm codes refer to the alarm code table	The unit does not start, or starts once and then stops	The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, or else.	Check the unit by the alarm code table in the service manual (by authorized service persons only).
Alarm Code dd and Unit Code E.00 flash	The unit does not start	The connecting wires of operating line are incorrect or loosened.	Check the unit by the alarm code table in the service manual (by authorized service persons only).

(*) Procedures for recovery when transmitting circuit fuse is blown out:

a. Correct the wiring for the terminal board.

b. Setting positions of the model code are shown below.

Indoor unit PCB	Outdoor unit PCB
DSW7	DSW10
	

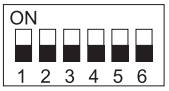
6 Cancel “Test Run” Mode.

✓ When the unit is not in operation, press “⮌”.

✓ When the unit is in operation, press “⏻” (On/Off).

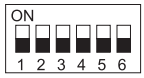
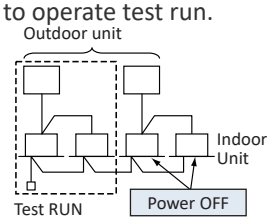
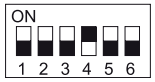
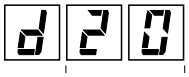
5.4 Test run from the outdoor unit

The procedure of test run from the outdoor unit is indicated below. The setting of this DSW is available with power source ON. Setting of DSW (before shipment):

DSW4	
Switch for setting of service operation and function	
	1 Test run 2 COOL / HEAT setting (OFF: cooling mode) (ON: heating mode) 3 OFF (fixed) 4 Manual compressor OFF 5 No.1 compressor driving exemption 6 No.2 compressor driving exemption

DANGER

- ***Do not touch any other electrical component part when operating switches on the PCB.***
- ***Do not attach or detach service cover when the power source for the outdoor unit is supplied and the outdoor unit is operated.***
- ***Turn all the dip switches of DSW4 OFF when the test run operation is completed.***

	Setting the DSW	Operation	Remarks
Test run	1. Setting the operation mode.  Cooling: Set DSW4 PIN2 OFF  Heating: Set DSW4 PIN2 ON 2. Start of the test run. Set DSW4-PIN1 ON and the operation starts after approximately 20 seconds.  **NOTE** *In the heating mode, leave DSW4-PIN2 in the ON position.*	1. The indoor unit automatically starts operating when the test run of the outdoor unit is set. 2. The ON/OFF can be performed from the remote control or DSW4 PIN1 on the outdoor unit. 3. The operation continues for 2 hours without Thermo-OFF.	Note that the indoor units operate in conjunction with the test run operation of the outdoor unit. If the test run is started from the outdoor unit and stopped from the remote control switch, the test run function of the remote control switch is cancelled. However, the test run of the outdoor unit is not cancelled. Check that DSW4 PIN1 of the outdoor unit PCB1 is turned OFF. In the case that several indoor units are connected with one remote control, perform the test run operation individually for each refrigerant system one by one. Then, make sure to turn the power source OFF for the indoor units in other refrigerant systems not to operate test run.  The setting of DSW4 is not required for the test run from the remote control switch.
Manual OFF of the compressor	1. Setting. Compressor manual OFF set DSW4 PIN4 to the ON position.  2. Reset. Compressor ON: set DSW4 PIN4 in the OFF position.  	1. When DSW4 PIN4 is ON during the compressor operation, the compressor stops operating immediatly and the indoor unit is under the condition of Thermo-OFF. 2. When DSW4 PIN4 is OFF, the compressor starts to operating after the cancellation of 3-minutes guard.	Do not repeat the compressor ON/OFF with frequency.
Manual defrost	1. Manual defrost operation. Press PSW5 for more than 3 seconds during the heating operation, and the defrosting operation is started after 2 minutes. This function is not available within 5 minutes after starting heating operation. 2. Manual defrost operation completion. Defrosting operation automatically ends and the heating operation restarts.	1. Defrost operation is available regardless of the frost condition and total time of the heating operation. 2. Defrost operation is not performed when the temperature of outdoor unit heat exchanger is higher than 10 °C, high pressure is higher than 3.2 MPa or the unit is Thermo-OFF .	Do not repeat defrosting operation frequently. When manual defrosting operation is accepted by PSW5, the time left before starting defrosting operation is indicated on the 7-segment indicator on the PCB.  Time left (Every 4 seconds)

When the test run operation is completed, turn all the switches of DSW4 OFF.

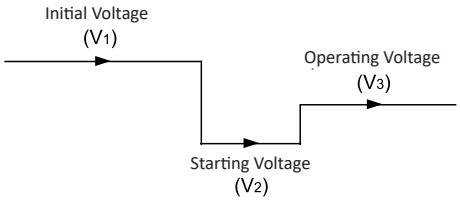
1 If the remote control switch is set to a different mode, the test run function will not start. In this case, perform the following actions before the test run.
   - ✓ Wired remote Control Switch: STOP
   - ✓ Central Station: STOP and Remote Control Switch is available mode.
   - ✓ COOL/HEAT Changeover Switch: Connector (CN17) of outdoor unit PCB is opened.
   - ✓ During the test run mode, do not control the wired remote control switch, the central station and cool/heat changeover switch. Otherwise, the operation mode will be changed or the test run will be ended. If necessary, control them after the test run is completed.
2 If an alarm code is indicated during the test run, reset the system by turning the main power supply off then back on. The system should then operate.

5.5 Checking at test run

1 Indoor and outdoor fan.
Check that the indoor and outdoor fan rotate properly and the airflow is smooth.

2 Power supply voltage.
Check the power supply. If the power supply is abnormal, contact the electric power company. Usually, voltage drop will occur when starting the operation as shown in the figure (V_2).

In order to protect the device, comply with the following normal range of the power supply voltage.



Normal power supply voltage range

- Supply voltage: rated voltage ≤ ±10 %
- Starting voltage (V_2): rated voltage ≥ -15 %
- Operating voltage (V_3): rated voltage ≤ ±10 %
- Imbalance voltage between phase: ≤ 3 %

3 Normal operating pressure.

Normal operating suction pressure is 0.2 at 1.1 MPa and the normal operating discharge pressure is 1.0 at 3.5 MPa when the refrigerant charge quantity is correct. Check the operating pressure in the test run mode.

4 High pressure switch.

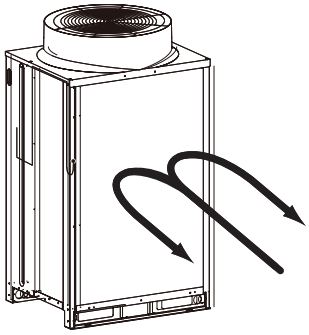
Check the operating pressure of the high pressure switch in the following table.

Refrigerant	Operating pressure
R410A	4.15 MPa

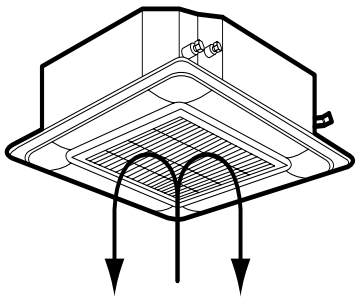
5 High pressure increase retry (protection control).

a. The high pressure will increase when the following procedure is performed.

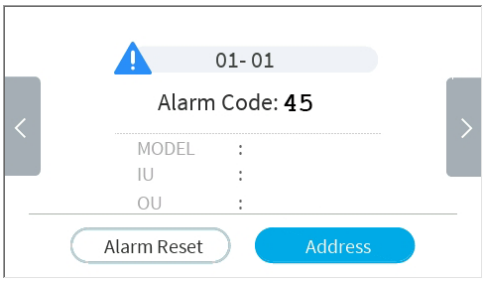
Cover the air inlet of the outdoor unit during the cooling operation.



Cover the air inlet of the indoor unit during the heating operation.



b. When the high pressure retry control is activated, alarm code "P 13" will be indicated on the 7 segment display of the outdoor unit PCB1. If the high pressure retry control occurs 3 times or more in 30 minutes, alarm code "45" will be indicated on the remote control LCD screen or on the 7 segment display of the outdoor unit PCB1.



NOTE

The high pressure may not increase until the high pressure switch is activated due to the temperature condition.

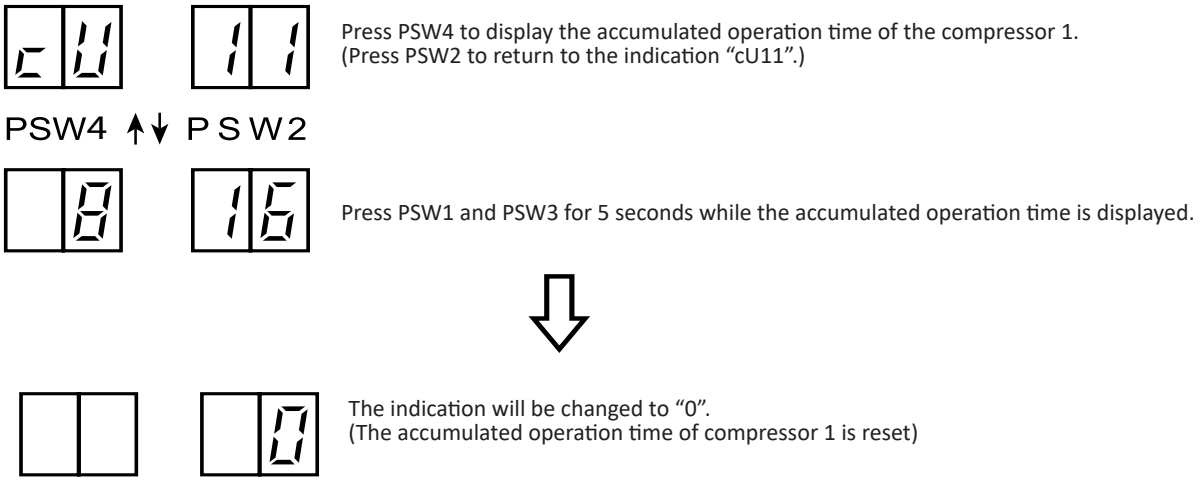
5.6 Reset for accumulated operation time of compressor 1-2 (cU1-cU2)

There are accumulated operation time of compressor after maintenance and after starting operation. The following procedure shows how to reset the accumulated operation time of compressor after maintenance. Perform it for each outdoor unit.

◆ Procedure

Press PSW1 and PSW3 for 5 seconds while the accumulated operation time of compressor data is displayed. The accumulated operation time of compressor is reset.

◆ Example of compressor 1



Press PSW4 to display the accumulated operation time of the compressor 1.
(Press PSW2 to return to the indication “cU11”.)

Press PSW1 and PSW3 for 5 seconds while the accumulated operation time is displayed.

The indication will be changed to “0”.
(The accumulated operation time of compressor 1 is reset)

NOTE

In the case of the combined units (26HP to 96HP), reset the accumulated operation time is required for each outdoor units.

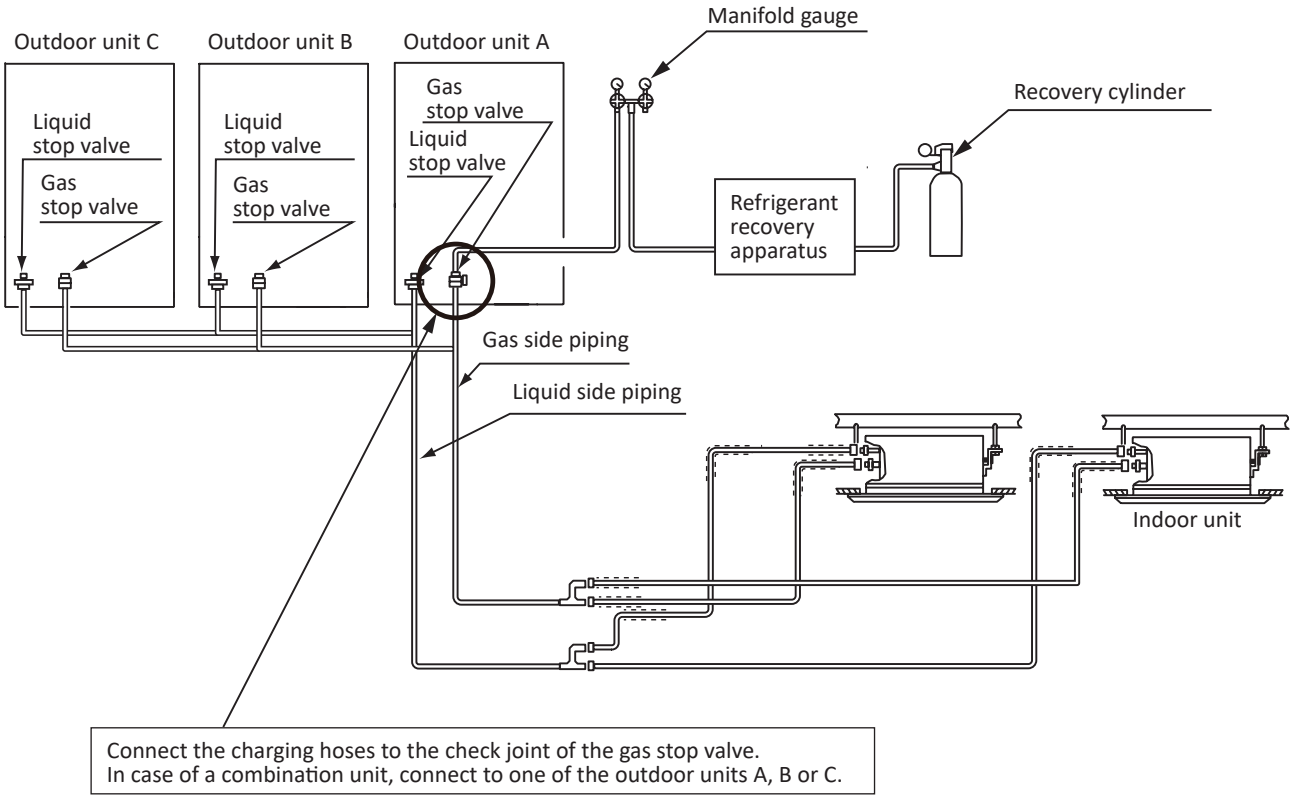
5.7 Setting of forced open valve mode

This system is equipped with “Refrigerant Recovery mode” where all the electric expansion valves and solenoid valves in the system will be open during refrigerant recovery. Refrigerant in all outdoor units can be recovered from the check joint from one outdoor unit.

Heat pump

1 Turn on the power to the air conditioner.
2 Switch the DSW4-4 pin on the outdoor PCB1 to the On position (forces compressor stop)[*1].
3 Press and hold the PSW4 (▼) switch for 3 seconds or more to move all electronic expansion valves and solenoid valves to the open position[*1].
All electric expansion valves and solenoid valves will be open.
4 Recover the refrigerant.
5 After the refrigerant is recovered, switch the DSW4-4 pin to the OFF position.

*[*1] Operate the DIP switch (DSW) and push switch (PSW) of outdoor unit A (main unit).*



Heat recovery

1 Turn on the power to the air conditioner.

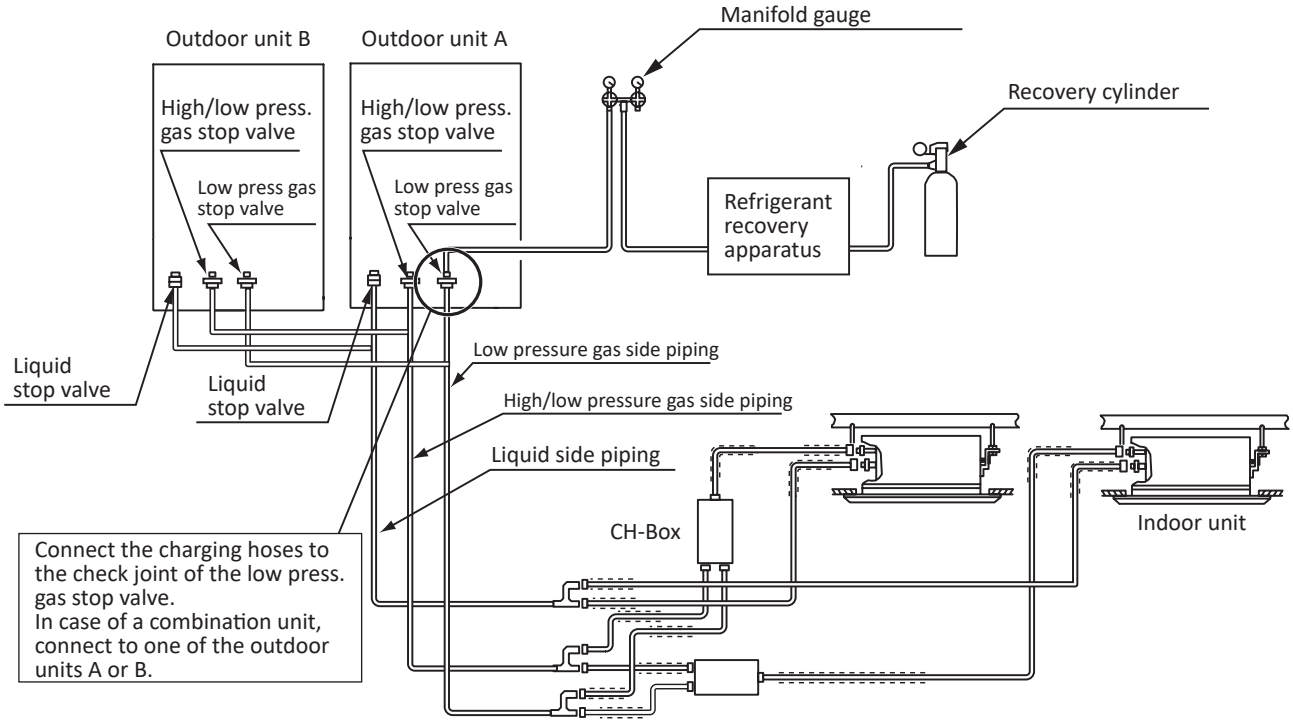
2 Switch the DSW4-4 pin on the outdoor PCB1 to the On position (forces compressor stop)[*1].

3 Press and hold the PSW4 (▼) switch for 3 seconds or more to move all electronic expansion valves and solenoid valves to the open position[*1].
All electric expansion valves and solenoid valves will be open.

4 Recover the refrigerant.

5 After the refrigerant is recovered, switch the DSW4-4 pin to the OFF position.

*[*1] Operate the DIP switch (DSW) and push switch (PSW) of outdoor unit A (main unit).*



5.8 Refrigerant cycle checklist

The refrigerant cycle data can be checked on 7-segment of outdoor unit PCB during the test run and the troubleshooting. However, it may take time for the checking because the operation cycle changes depending on the operating condition.

To check the quality of refrigerant cycle, the following check list shall be used at the test run, troubleshooting and emergency check.

1 The most important thing in the refrigerant cycle check is to check that each expansion valve opening and the operating frequency is within the specified range. Each item varies in the value depending on the operating frequency, indoor temperature and ambient temperature.

2 The service system tester, which automatically calculates Td and SH, facilitates the refrigerant cycle check. If possible, record the operating cycle data by the service system tester.

CHECKLIST ON TEST OPERATION		
CUSTOMER: _____	INSTALLER: _____	DATE: _____
OUTDOOR UNIT MODEL: _____	OUTDOOR UNIT SERIAL NO.: _____	INSPECTOR:_____

Indoor unit model							
Indoor unit serial number							

Piping length: _____ m Additional refrigerant charge: _____ kg

1 General

No.	Check item	Result
1	**Combination of base units** Is the setting of DSW6 correct for the outdoor unit number?	
2	Are the power source wire and the transmission wire separated from the refrigerant pipes?	
3	Is the earth wire connected?	
4	Is there any short-circuit?	
5	Is there any voltage anomaly between each phase? (L1-L2, L2-L3, L3-L1)	

2 Refrigerant cycle

a. Operation (cooling/heating).

No.	Check item	Result
1	Start-up all the units ("TEST RUN" mode).	
2	Start-up all the indoor units in HIGH speed.	
3	In the case that the constant speed compressor is repeatedly turned ON and OFF, turn off the indoor unit (small capacity).	

b. Data samples (cooling/heating, indoor temperature 21-30 °C).

No.	Check item	Result
1	Check the operating data after it has been operating for 20 minutes.	
2	Check Pd and Td. IsTd-SH between 15 and 45 °C?	
3	Is Ps between 0.15 and 1.3 MPa?	
4	Is Pd between 1.0 and 3.6 MPa? (If the outdoor temperature is high, Pd becomes high).	

NOTE

- *Underlined _____ indicates a checking item.*

3 Check item after the data sample

a. Cooling operation (this applies when the outside temperature is above 15 ºC).

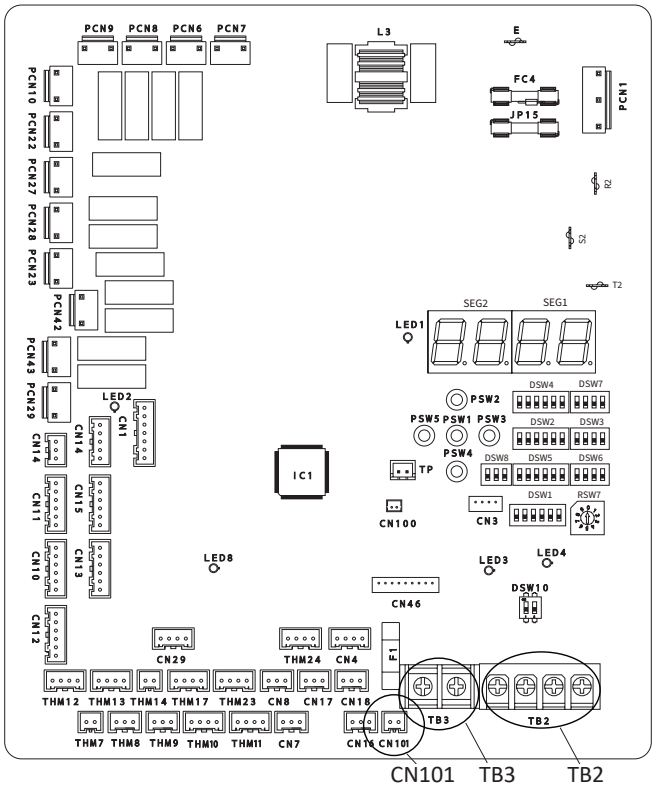
No.	Check item	Standard	Causes	Result
1	Is the fan currently operating when Fo (airflow rate of outdoor unit fan) is not "0"?	—	• Fan motor failure • PCB1 failure • Condenser failure	
2	Is the sum of iEs (indoor unit expansion valve) extremely high or low?	—	• Low → Excessive Refrigerant • High → Insufficient Refrigerant Excessive Pipe Resistance	
3	Is TL (indoor unit heat exchanger liquid pipe temperature) lower than Ti (Indoor unit air inlet temperature)?	It is normal when TL-Ti < -5 ºC.	• TL thermistor failure • Indoor unit expansion valve fully closed • Short-circuit	
4	Is TG (indoor unit heat exchanger gas pipe temperature) lower than Ti (indoor unit inlet air temperature)? (This is applicable when the inlet air temperature is 3 ºC higher than setting temperature).	It is normal when TG-Ti < -5 ºC.	• TL thermistor failure • Indoor unit expansion valve fully closed or partially open • Short-circuit	
5	Is there any excessive difference between indoor unit at SH (TG - TL) of indoor unit heat exchangers? (This is applicable when the inlet air temperature is 3 ºC higher than setting).	It is normal if the difference between units is within 7 ºC.	• TL / TG thermistor failure • Indoor unit expansion valve fully open, partially open or completely closed	
6	Is there any indoor unit with a heat exchanger value of SH (TG - TL) excessively different from the value of other units and is iE (opening of the indoor unit expansion valve) less than "5"?	It is normal if SH is within 3 ºC lower than other units.	• Indoor unit expansion valve locked when fully open • Mismatched wiring and piping	
7	Is there any indoor unit with a heat exchanger value of SH (TG - TL) excessively different from the value of other units and is iE (opening of the indoor unit expansion valve) less than "100"?	It is normal if SH is within 3 ºC higher than other units.	• Indoor unit expansion valve locked when partially open or closed • Mismatched cabling and piping	
8	Is the temperature difference between indoor units* more than 7 ºC? * The difference in temperature between indoor units means the following: b3 (discharge air temperature) - b2 (air inlet temperature) indicated on the remote control by the check mode.	7 ºC and over	—	

b. Heating operation (this is applicable when the outdoor temperature is higher than 0 ºC).

No.	Check item	Standard	Causes	Result
1	When TdSH "15 - 45 ºC", is the value of oE1 (outdoor unit expansion valve) extremely high or low? (The higher the operation frequency, the higher the value of oE1.)	15 - 45 ºC	• Low: excessive refrigerant. • High: insufficient refrigerant. • Outdoor unit Expansion Valve; Locked and Slightly Open or Closed.	
2	Is Pd between "1.5" and "3.3"?	1.5 - 3.3	• Low: solenoid valve SVA leak. • High: excessive pressure loss in the gas pipe.	
3	Is Ps between "0.15" and "1.3"?	0.15 - 1.3	• Low: outdoor unit short-circuit. • low/high: outdoor unit fan motor failure, fan module failure or outdoor unit ambient temperature thermistor failure.	
4	Is the difference in temperature between indoor units* more than 10 ºC when iE (indoor unit expansion valve) is "100? * The difference in temperature between indoor units means the following: b3 (discharge air temperature) - b2 (air inlet temperature) indicated on the remote control by the check mode. However, this is only applicable when b2 (Air inlet temperature) - b1 (setting temperature) is higher than 3 ºC.	10 ºC and over	• Failure such as PCB, wiring, indoor unit expansion valve and coil. • Excessive pressure loss in the pipe. • Thermistor failure for air discharge	

NOTE

- *The symbol with an underline _____ indicates checking item and the mark " " indicates checking data.*
- *When there are two or more outdoor unit modules in a system, outdoor unit may display "Mainly Heating (Lo)" age for the cycle condition during the compressor stoppage at cooling operation. This is NOT abnormal. "Mainly Heating (Lo)" is displayed for the control reason of the outdoor unit stopped during cooling operation.*
- *Service checker can be connected to TB2-No.1, 2 or TB3-No.1,2 on PCB1 or CN101 connector (H-LINK circuit) on PCB1. When connecting to CN101 connector (XA connector), use "2P Connector Cable" .which is a service part.*



5.9 Test run check list

MODEL:	SERIAL No.:
COMPRESSOR MFG No.:	NAME AND CUSTOMER ADDRESS:
DATE:	

1 Does the indoor unit fan rotation in the correct direction? _____

2 Does the outdoor unit fan rotation in the correct direction? _____

3 Can you hear strange noises in the compressor?

4 Has the unit been operating for at least twenty (20) minutes? _____

5 Check the temperature of the room:

Inlet:	No. 1	DB____ °C WB____ °C	No. 2	DB____ °C WB____ °C	No. 3	DB____ °C WB____ °C	No. 4	DB____ °C WB____ °C
Outlet:		DB____ °C WB____ °C		DB____ °C WB____ °C		DB____ °C WB____ °C		DB____ °C WB____ °C
Inlet:	No. 5	DB____ °C WB____ °C	No. 6	DB____ °C WB____ °C	No. 7	DB____ °C WB____ °C	No. 8	DB____ °C WB____ °C
Outlet:		DB____ °C WB____ °C		DB____ °C WB____ °C		DB____ °C WB____ °C		DB____ °C WB____ °C

6 Check the outdoor ambient temperature:

Inlet	DB _____°C	WB _____°C
Outlet	DB _____°C	WB _____°C

7 Check the temperature of the refrigerant:

Discharge gas temperature	Td = _____°C
Liquid pipe temperature	Te = _____°C

8 Check the pressure:

Discharge pressure	Pd = _____ MPa
Suction pressure	Ps = _____ MPa

9 Check the voltage:

Rated voltage	_____ V	—	—
Operating voltage	R–S _____ V	R–T _____ V	S–T _____ V
Starting voltage	_____ V	—	—
Phase imbalance	1-(V/Vm) = _____	—	—

10 Check the compressor input running current:

Input	_____ kW
Running current	_____ A

11 Is the refrigerant charge OK? _____

12 Do the operating control devices work correctly? _____

13 Do the safety devices work correctly? _____

14 Has the unit been checked for refrigerant leaks? _____

15 Is the unit clean inside and outside? _____

16 Are all the panels of the unit fastened securely? _____

17 Are the panels of the cabinet fastened so that they do not make any noise? _____

18 Is the filter clean? _____

19 Is the heat exchanger clean? _____

20 Are the stop valves open? _____

21 Does the water flow freely through the drain hose? _____

Electrical checks of the main parts

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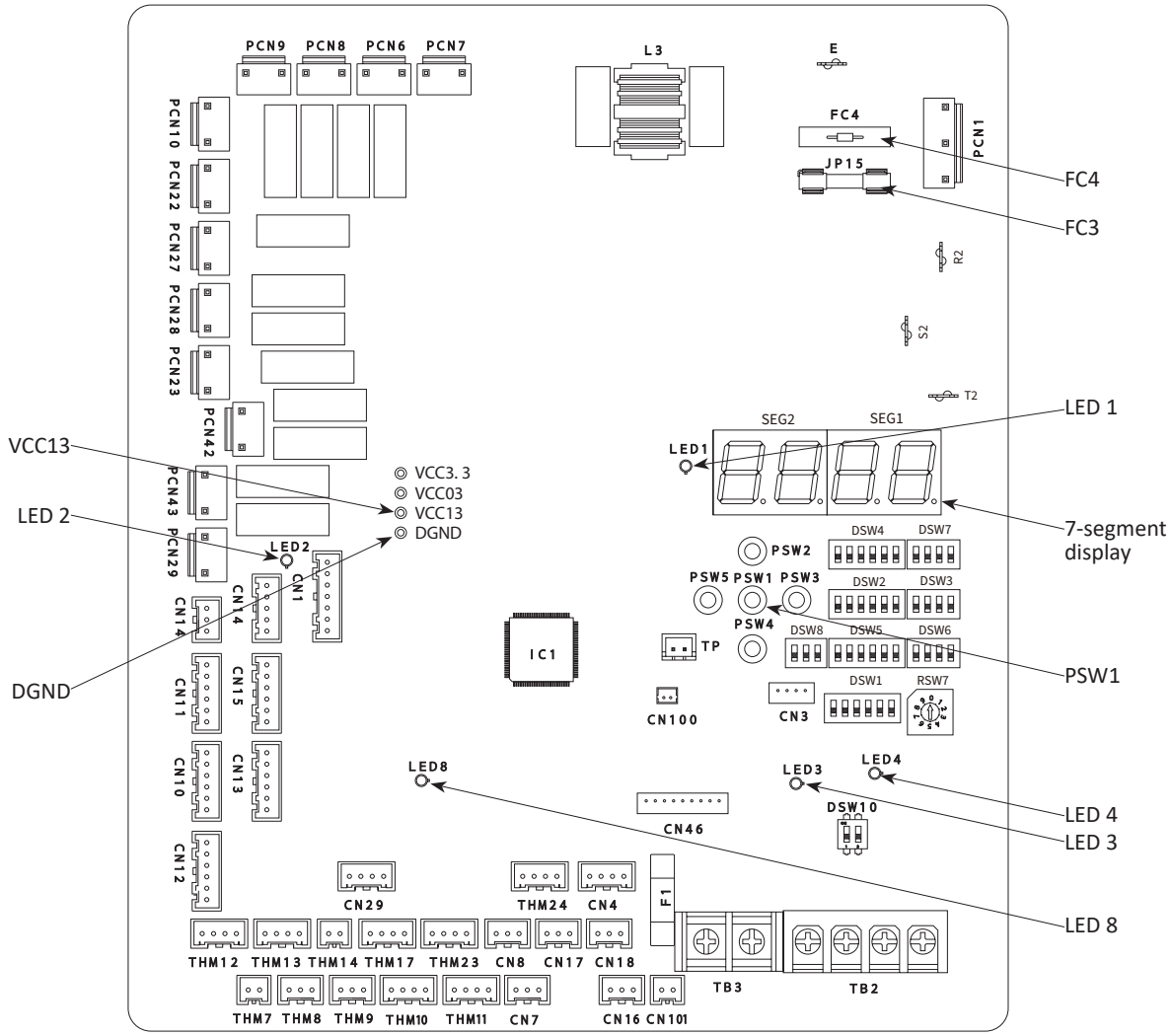
6.5.3 Thermistor positions for RAS-(20-24)FSXNS2E and RAS-(16/18)FSXNP2E 188

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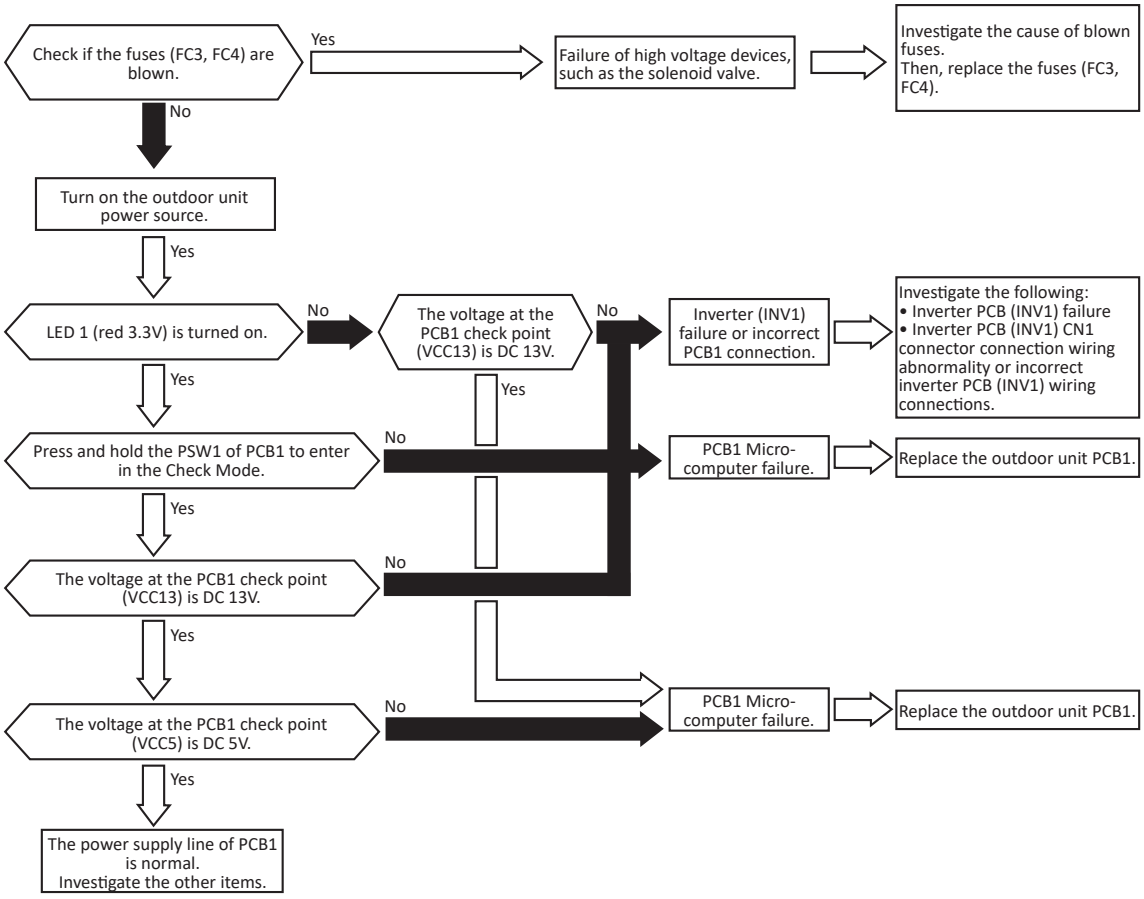
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6.1 Outdoor unit PCB (PCB1)

6.1.1 Arrangement of connectors and check points

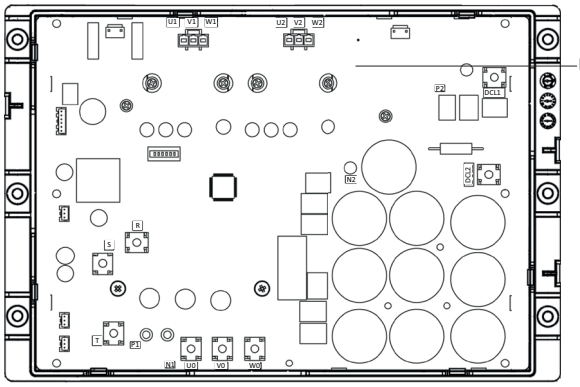


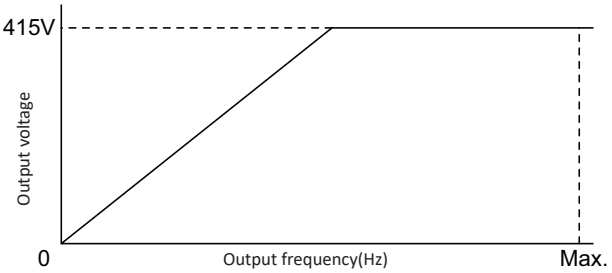
6.1.2 Checking procedures for outdoor unit PCB1

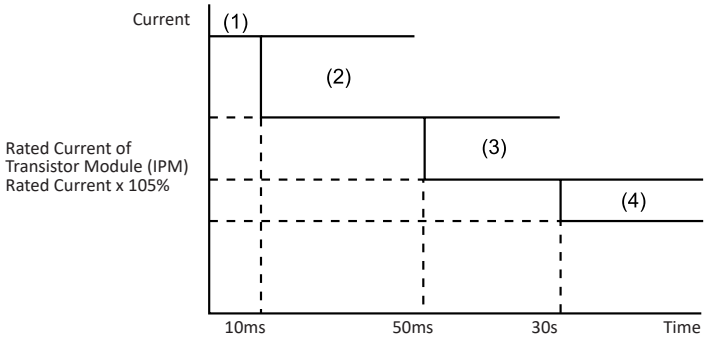


6.2 Inverter (INV1, INV2)

6.2.1 Inverter specifications



Inverter model		INV 1	INV 2
Applicable models	air365Max	RAS-(8-12)FSXNS2E RAS-(20/22)FSXNS2E	RAS-(14-18)FSXNS2E RAS-24FSXNS2E
	air365Max Pro	RAS-(5-10)FSXNP2E RAS-(16/18)FSXNP2E	RAS-(12/14)FSXNP2E
Applicable power source		3N~ 400V 50Hz	3N~ 400V 50Hz
Maximum output voltage		415V (Depends on power source voltage)	415V (Depends on power source voltage)
Maximum output current	Inverter PCB	26.7A	38.1A
	Fan controller	3.5A (x2)	3.5A (x2)
Control method		Vector control PWM (Pulse width modulator)	
Output frequency range	Inverter PCB	15Hz to 130Hz	10Hz to 130Hz
	Fan controller	0 to 18.9 rps	0 to 15.1rps
Frequency accuracy		0.1Hz	0.1Hz
Output / characteristics			
Speed rate		0.125 Hz/s, 0.25 Hz/s, 0.5 Hz/s, 1 Hz/s, 3 Hz/s (5 steps)	
Excessively high or low inverter voltage		Abnormality code for inverter (iT) = 5, Excessive low voltage at DC voltage is lower than 396V Abnormality code for inverter (iT) = 6, Excessive high voltage at DC voltage is higher than 844V	
Malfunction in the current sensor		Abnormality code for inverter (iT) = 8 The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).	

Protection function: Overcurrent protection for Inverter	 Abnormality code for inverter (iT) = 1 1 Short-Circuit trip of arm 2 Instantaneous overcurrent trip Abnormality code for inverter (iT) = 2 3 Instantaneous overcurrent trip, when detecting current is more than rated current (8 - 12 HP: 106.1A, 14 - 18 HP: 141.4A) of transistor module, overcurrent is detected. Abnormality code for inverter (iT) = 4 4 Electronic thermal trip, when the current detected by current sensor exceeds 105 % of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected.
Protection of transistor module (IPM)	Abnormality code for inverter (iT) = 1 Power module (CIB, IPM) has three protection function for self-protection. 1 Some of the output terminals between “U” and “V”, “V and “W”, “W” and “U” have a short-circuit. 2 Running current reaches the maximum rated current. 3 Control voltage decreases abnormally.
Overload control	The overload control is controlled as follows. • Condition of activation: When the running current is more than 105 % of the rated current. • Condition of cancellation: When the running current is less than 88 % of the rated current.
Fin temperature increase	Stoppage code for inverter (iTC) = 3 The unit is stopped when the CIB and IPM temperature is higher than 112 °C. Stoppage code for inverter (iTC) = 3 The unit is stopped when the CIB and IPM temperature is higher than 115 °C.
Earth detection	Stoppage code for inverter (iTC) = 12 The unit is stopped when the compressor is grounded

	Model		
INV1	RAS-(8-12)FSXNS2E RAS-(5-6)FSXNP2E	RAS-(14-18)FSXNS2E RAS-(8-14)FSXNP2E	RAS-(20-24)FSXNS2E RAS-(16/18)FSXNP2E
INV2	-	-	

6.2.2 High voltage discharge work for replacing parts

⚠ CAUTION

- *Perform this high voltage discharge work to avoid an electric shock.*
- *Take special care to avoid a short circuit between terminal P and N.*

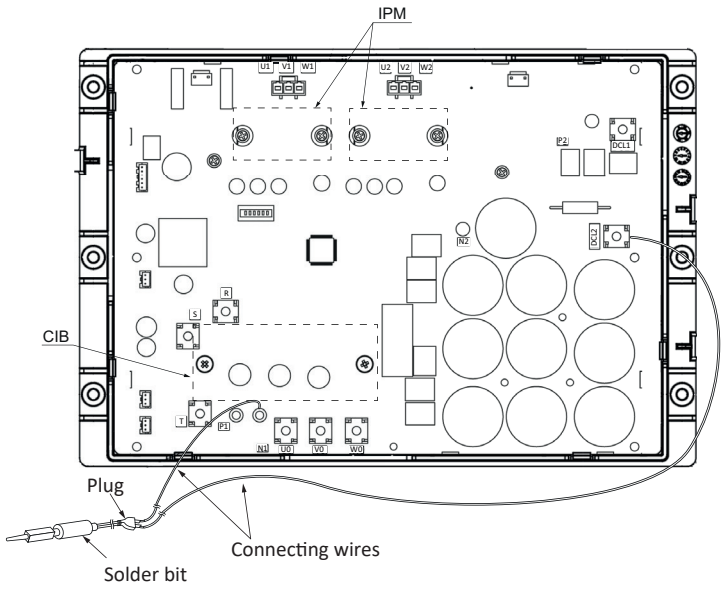
◆ Procedures

a. Turn OFF the main switches and wait for three minutes. Check to ensure that no high coltage exists. If LED401 on the inverter PCB (INV) is ON after start-up and LED401 on INV is OFF after turning OFF power source, the voltage will decrease to DC50V or less.

b. Connect connecting wires to an electrical solder bit.

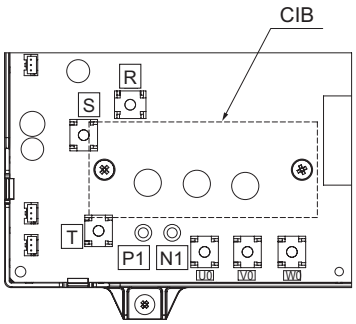
c. Connect the wires to terminals, N1 and DCL2 on the inverter PCB (INV). Discharging is started, resulting in hot solder bit.

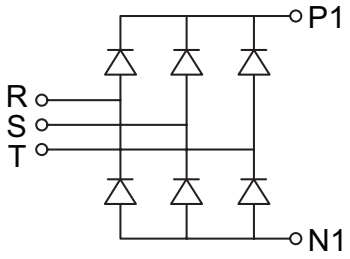
d. Wait for two or three minutes and measure the voltage again. Check to ensure that no voltage is charged.



6.2.3 Checking method of inverter PCB (INV)

◆ Outer appearance and rectifier circuit of CIB



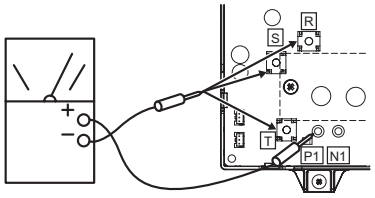


If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

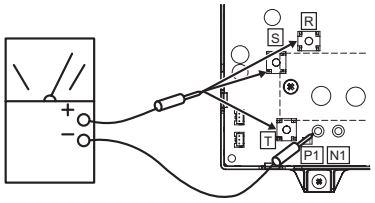
NOTE

Recommended using an analogue tester.

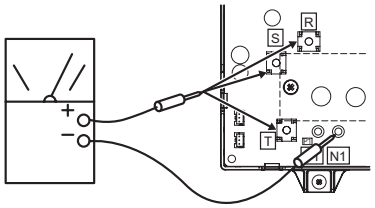
a. By touching the + side of the tester to the P1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



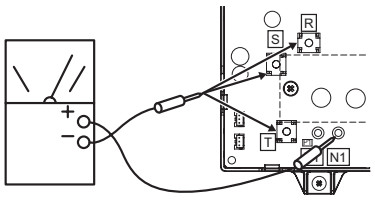
b. By touching the - side of the tester to the P1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.



c. By touching the - side of the tester to the N1 terminal of the inverter PCB and the + side of tester to R, S, and T of the inverter PCB, measure the resistance.

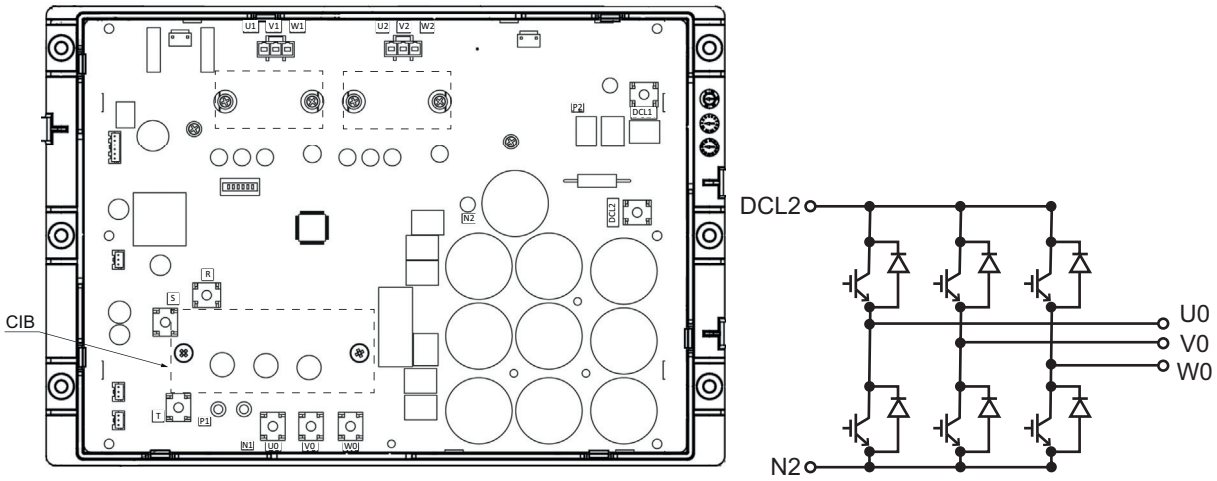


d. By touching the + side of the tester to the N1 terminal of the inverter PCB and the - side of tester to R, S, and T of the inverter PCB, measure the resistance.



Item	Measurement point		Criterion	
	Tester		Analogue tester	Digital tester
	(+)	(-)		
(a)	P1	R/S/T	1kΩ or more (Measured range: 1kΩ)	Over load
(b)	R/S/T	P1	30kΩ or more (Measured range: 10kΩ)	1.0V or less
(c)	R/S/T	N1	1kΩ or more (Measured range: 1kΩ)	Over load
(d)	N1	R/S/T	30kΩ or more (Measured range: 10kΩ)	1.0V or less

◆ Internal circuit of CIB outlet part



If procedures (a) to (d) are performed and the results are satisfactory, the CIB on the inverter PCB is normal.

NOTE

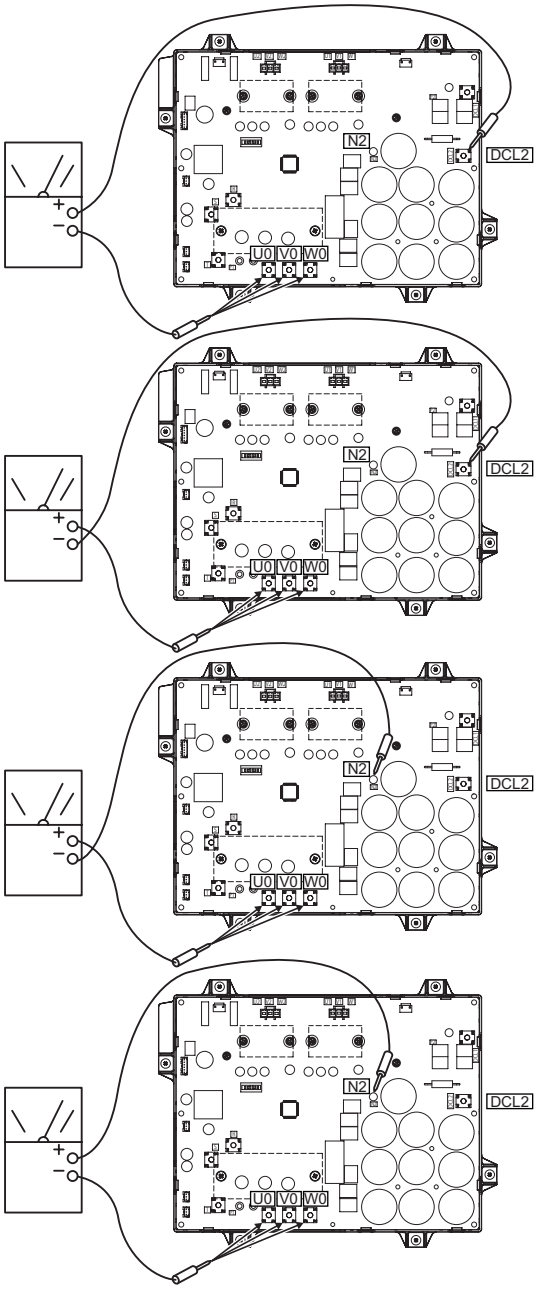
Recommended using an analogue tester.

a. By touching the + side of the tester to the DCL2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.

b. By touching the - side of the tester to the DCL2 terminal of the inverter PCB and the + side of tester toU0, V0, and W0 of the inverter PCB, measure the resistance.

c. By touching the - side of the tester to the N2 terminal of the inverter PCB and the + side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.

d. By touching the + side of the tester to the N2 terminal of the inverter PCB and the - side of tester to U0, V0, and W0 of the inverter PCB, measure the resistance.



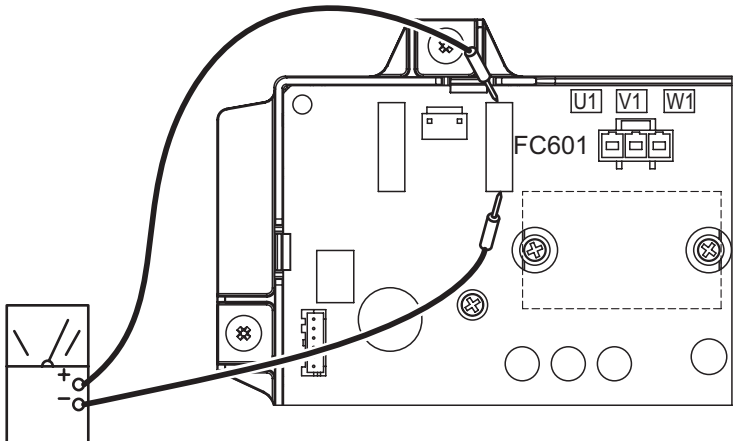
Item	Measurement point		Criterion	
	Tester		Analogue tester	Digital tester
	(+)	(-)		
(a)	DCL2	U0/V0/W0	1kΩ or more (Measured range: 1kΩ)	Over load
(b)	R/S/T	DCL2	20kΩ or more (Measured range: 10kΩ)	1.0V or less
(c)	U0/V0/W0	N2	1kΩ or more (Measured range: 1kΩ)	Over load
(d)	N2	U0/V0/W0	20kΩ or more (Measured range: 10kΩ)	1.0V or less

◆ Testing the fuse for inverter power

By touching the + and - side of the tester on each side of the fuse (FC601), measure the resistance. If the resistance is 0Ω, it is normal.

NOTE

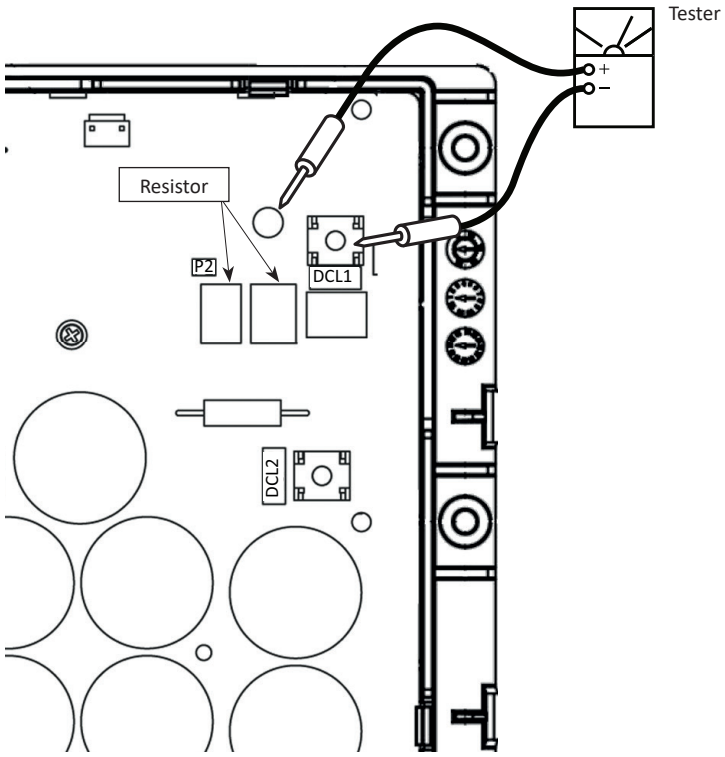
Set analog, or digital tester at 1kΩ.



◆ Testing the resistor

Measure the resistance using the tester between the DCL1 and P2 terminal.

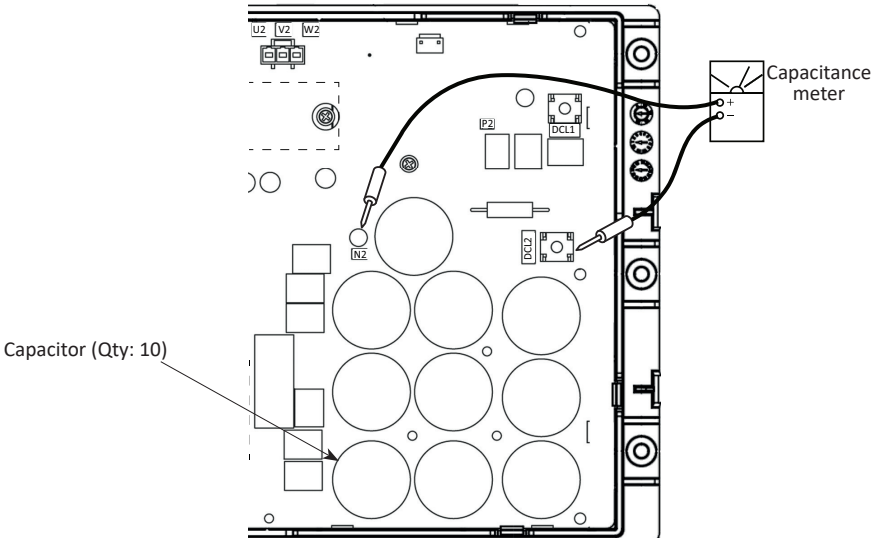
If the resistance is 1kΩ+5 %, it is normal. (0Ω or ∞Ω: abnormal)



◆ Testing the Capacitor

1 Check that the capacitor does not show signs of burns or isn't swollen.

2 Measure the capacitance using the capacitance meter between the DCL2 and N2 terminal. If the capacitance is 2000mF+10 %, it is normal.



◆ Testing the IPM for fan motor

⚠ CAUTION

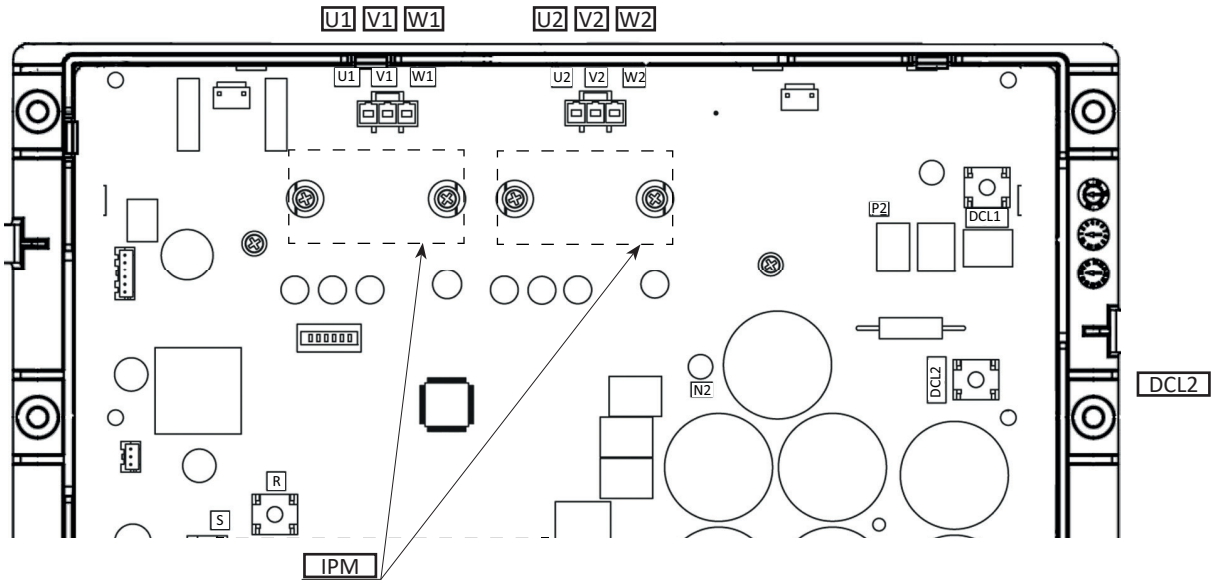
Perform this high voltage discharge work to avoid an electric shock.

NOTE

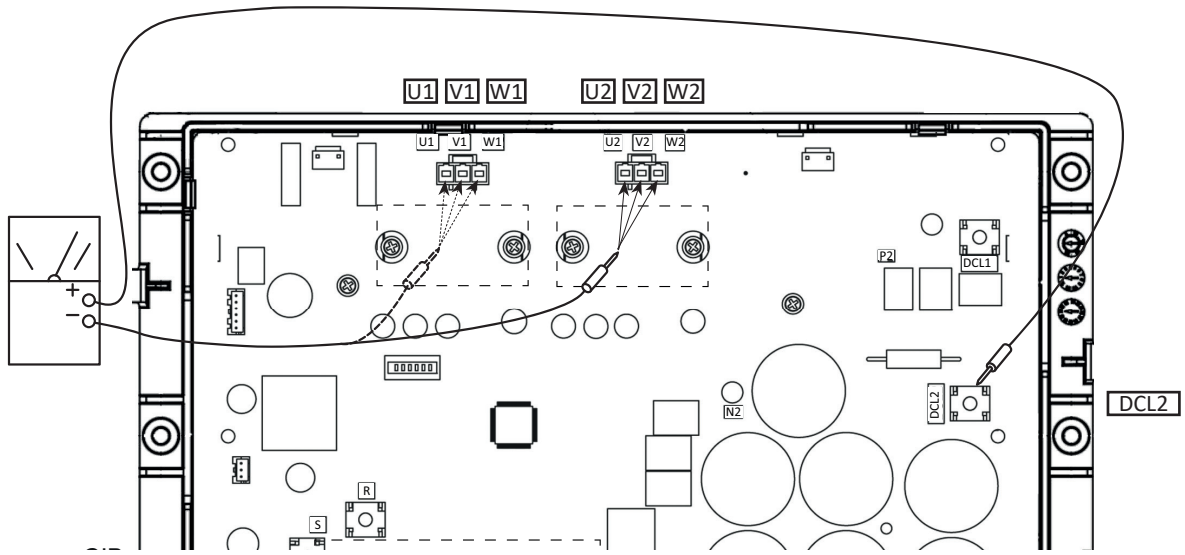
Recommend using an analogue tester.

a. Turn OFF the main source before this work. Ensure that LED3 (red) on the inverter (INV) is turned OFF. If LED3 on INV is turned ON, an electrical shock may occur from residual voltage over DC 50V to the inverter PCB (INV).

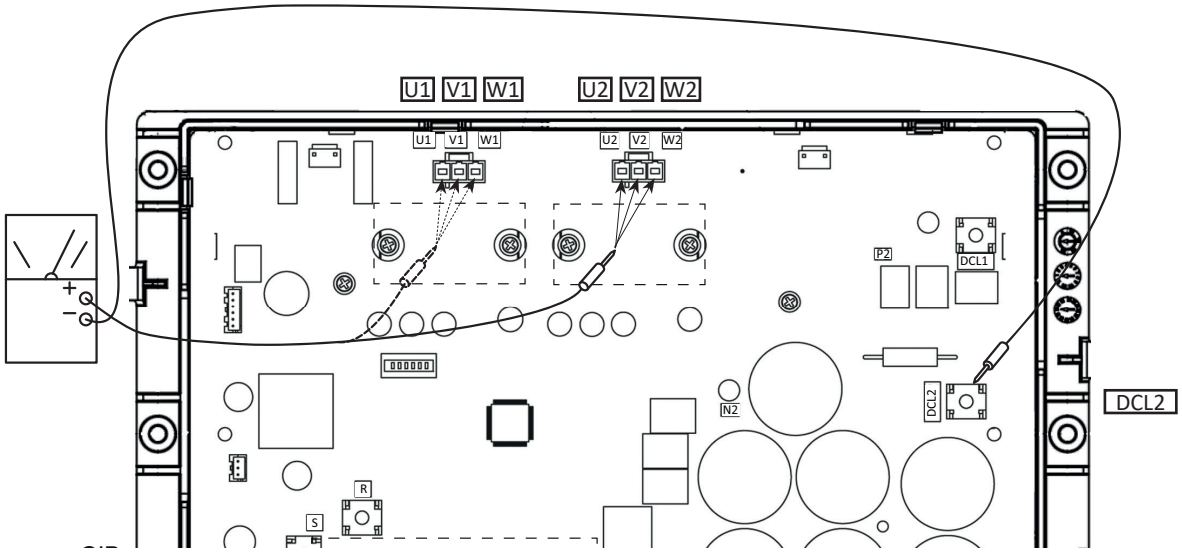
b. Disconnect all the wirings connected to the inverter PCB (INV).



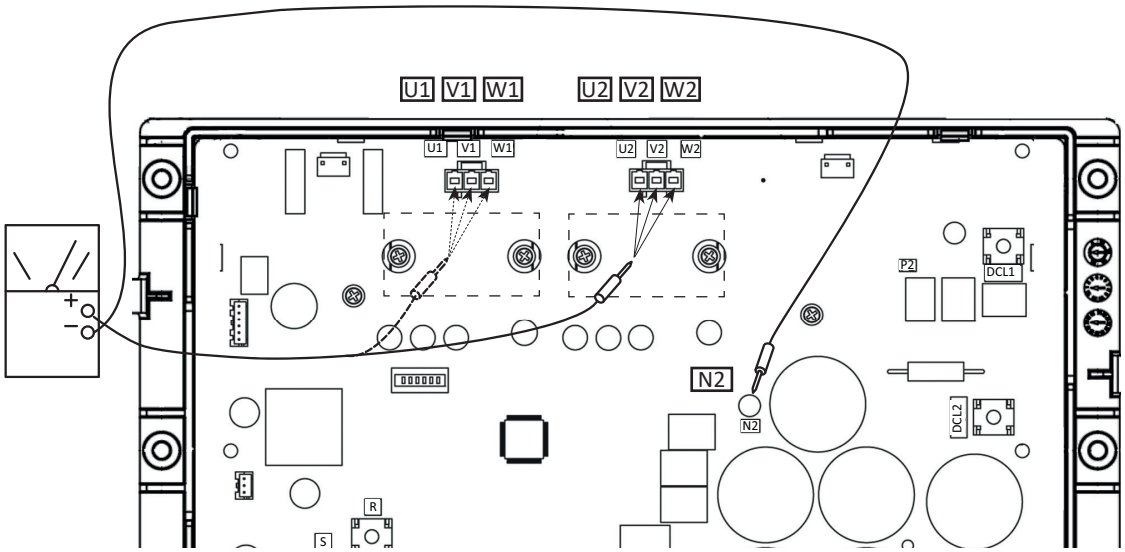
c. By touching the + side of the tester to the DCL2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



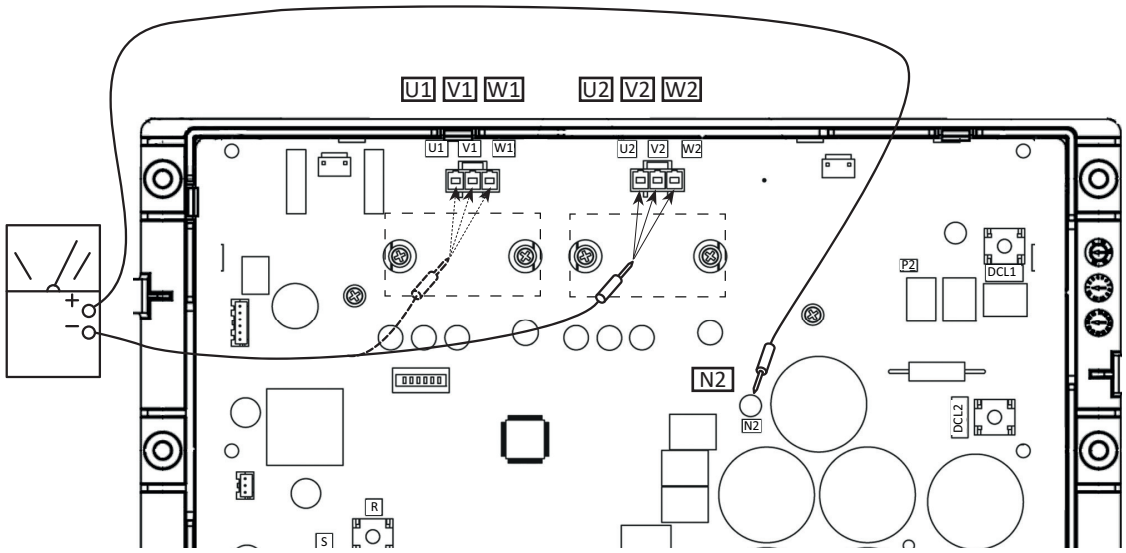
d. By touching the - side of the tester to the DCL2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



e. By touching the - side of the tester to the N2 terminal of fan controller and the + side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



f. By touching the + side of the tester to the N2 terminal of fan controller and the - side of tester to U1, V1, and W1 of the fan controller, measure the resistance.



NOTE

In case of the outdoor unit is RAS-14FSXNS2E / RAS-(8-14)FSXNP2E , additional test will be required by replacing "U1/V1/W1" with "U2/V2/W2".

Item	Measurement point		Criterion	
	Tester		Analogue tester	Digital tester
	(+)	(-)		
(c)	DCL2	U1/V1/W1 (U2/V2/W2)	1kΩ or more (Measured range: 1kΩ)	Over load
(d)	U1/V1/W1 (U2/V2/W2)	DCL2	20kΩ or more (Measured range: 10kΩ)	1.0V or less
(e)	U1/V1/W1 (U2/V2/W2)	N2	1kΩ or more (Measured range: 1kΩ)	Over load
(f)	N2	U1/V1/W1 (U2/V2/W2)	20kΩ or more (Measured range: 10kΩ)	1.0V or less

6.2.4 Protection function

1 Excessively high or low Inverter voltage

a. Level of detection at 400V 50Hz:

- When the voltage of direct current is greater than 844V, abnormalities are detected.
- When the voltage of direct current is smaller than 396V, abnormalities are detected.

b. Function:

- When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to outdoor unit PCB1.

c. Cancellation of the protection function:
   - The transmitted fault will be reset when outdoor unit power is cut off.

2 Abnormality of current sensor

a. Level of detection:
   - The wave height value of running current for the phase positioning is less than the determination value before the compressor is started (at completion of the phase positioning).

b. Function:
   - When abnormalities are detected, the inverter compressor is stopped, and transmit the signal code for the cause of the stoppage to outdoor unit PCB1.

c. Cancellation of the protection function:
   - The transmitted fault will be reset when outdoor unit power is cut off.

3 Inverter overcurrent protection

a. Level of detection:
   - When the compressor current detected by current sensor excesses the rated current of power module (CIB, IPM), overcurrent is detected. (Instantaneous Overcurrent)
   - When the current detected by current sensor exceeds 105 % of the rated current continuously for 30 seconds or for 3 minutes in total during a 10-minute period, overcurrent is detected. (Electric Thermal Relay)

b. Function:
   - When abnormalities are detected, the inverter compressor is stopped and transmit the signal code for the cause of the stoppage to outdoor unit PCB1.

c. Cancellation of the protection function:
   - The transmitted fault will be reset when outdoor unit power is cut off.

4 Transistor module (IPM) protection

a. Level of detection:
   - When some of the output terminals between “U” and “V”, “V” and “W”, “W” and “U” of power module (CIB, IPM) are short-circuited, an abnormality is detected.
   - When the running current of power module (IPM) reaches the maximum rated current, an abnormality is detected.
   - When the control voltage of power module (IPM) abnormally decreases, an abnormality is detected.

b. Function:
   - When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB1.

c. Cancellation of the protection function:
   - The transmitted fault will be reset when outdoor unit power is cut off.

5 Fin temperature increase

a. Level of detection:

◉ When the temperature of internal thermistor exceeds 110 °C, an abnormality is detected.

b. Function:

◉ When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB1.

c. Cancellation of the protection function:

◉ The transmitted fault will be reset when outdoor unit power has been reset.

6 Earth detection

a. Level of detection:

◉ When the terminal U, V, W and earth of the compressor are short-circuited before compressor activation, abnormalities are detected.

◉ When the output terminals (U, V, W) of power module (CIB, IPM) are short-circuited, abnormalities are detected.

b. Function:

◉ When abnormalities are detected, the inverter compressor is stopped and the signal code for the cause of the stoppage is transmitted to outdoor unit PCB1.

c. Cancellation of the protection function:

◉ Communication signal the cause of the stoppage cause is canceled when remote control switch is off or main power source is cut off.

6.2.5 Overload protection control

1 Level of detection:

- When the output current exceeds 105 % of the maximum output current, an abnormality is detected.

2 Function:

- An overload signal is transmitted to the outdoor unit PCB1 when output current exceeds 105 % of the maximum output current, and the frequency decreases. For 10 seconds after the output current decreases lower than 88 % of the rated current, the compressor maximum frequency is limited to the specified value. However, if the frequency order is smaller than the maximum value, the operation is performed according to the order.

3 Cancellation of the protection function:

- After the operation described in the above item is performed for 10 seconds, this control is canceled.

6.2.6 Inverter failure diagnosis mode

If alarm code 03, 48 or 53 occurs, use the inverter failure diagnosis mode to identify the failure location according to the following procedure.

NOTE

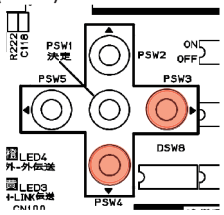
After completing the inverter failure diagnoses mode, be sure to perform steps3 and 4. Otherwise the aire conditioner cannot be operated after the faulty is restored because the compressor forced stop state is maintained.

Step 1.

Switch DSW4-4 (compressor forced stop) on the outdoor unit PCB (PCB1) to the ON position.

Step 2.

Press and hold PSW3 (▶) and PSW4 (▼) on the outdoor PCB (PCB1) for 3 sec.



Step 3.

Press and hold PSW3 and PSW4 on the outdoor PCB (PCB1) for 3 sec. to leave the diagnosis mode. This can be performed when the inverter is selected in Step 2-1. or the results of the check are shown in Step 2-4.

Step 4.

Switch DSW4-4 on the outdoor unit PCB (PCB1) to the OFF position.

Step 2-1.
To select the relevant inverter, display the faulty inverter and press PSW1 (Enter).

Unit 1



Press PSW1 (Confirm) to return to the inverter unit number selection screen.

Step 2-2.

Press PSW1 (Confirm).

Step 2-3.

Inverter failure diagnosis will start . (Judgment time is 5 to 10 sec.)

Step 2-4.

Results of the diagnosis will be shown.

Error Code	Details	Remarks
EC01	Normal	
EC02	Inverter PCB Failure	Failure of the current detection circuit or power relay.
EC03	Open or Short Circuit	The compressor or Inverter PCB has failed due to an open/short circuit.
EC04	Abnormality of Outdoor Unit Protective Device (Pressure Switch)	Check the outdoor unit protective device (PSH) according to the troubleshooting Alarm Code 38.
EC99	Judgment Error	Carry out the diagnosis again. Turn outdoor unit power off and then turn it on again before diagnosis. If the result is EC99, it may be a EC02 Inverter PCB failure.

NOTE

- *Perform the inverter failure diagnosis in the outdoor unit in which the alarm occurred.*
- *"Co02" is displayed only for models with 2 compressors.*
- *The system will stop during the inverter failure diagnosis.*

- *Electrical parts are energized during the fault diagnosis. Make sure not to touch anything other than the DIP switch (DSW) and push switch (PSW).*
- *If the inverter power module (IPM) is short-circuited, a loud noise may be generated.*

6.3 Scroll compressor

6.3.1 Reliable mechanism for low vibration and low sound

1 The direction of rotation is definite.

2 The pressure inside the chamber is high pressure and its surface temperature is between 60 °C and 110 °C.

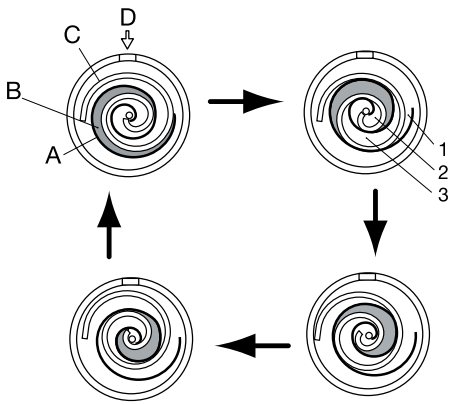
6.3.2 Compression principles

(1) The gas is sucked from the inlet port at the outer frame of the fixed scroll.

(2) The gas inside of the compression space is compressed toward the center of the scroll.

(3) The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port at the center of the scroll.

(4) The above procedures (Suction-Compression-Discharge) is repeated continuously.

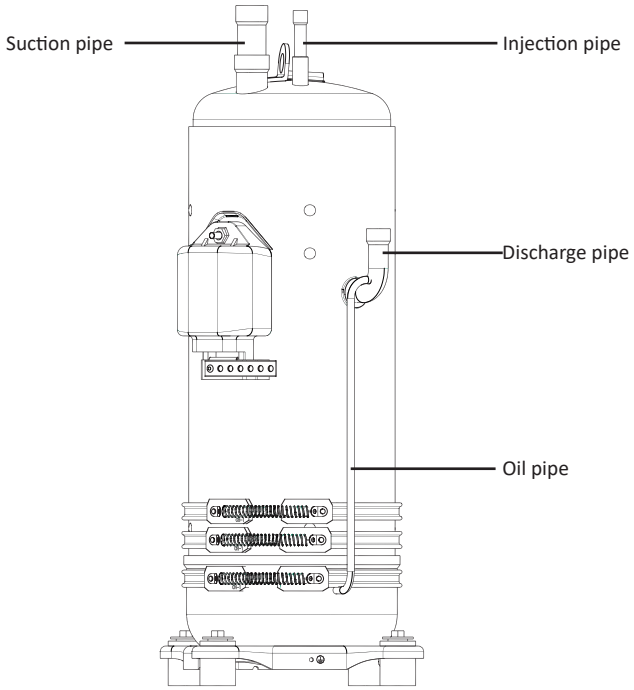


A	Fixed scroll
B	Compression space
C	Rotating scroll
D	Gas
1	Suction process
2	Discharge process
3	Compression process

6.3.3 Structure

The compressor has a structure for supplying oil from the outdoor oil separator.

Inside the oil separator, the pressure is high and the surface temperature of the oil separator is between 60 °C and 110 °C just like the compressor.



6.3.4 Compressor type

Model	Voltage	Inverter compressor 1	Inverter compressor 2	Total quantity
RAS-(8)FSXNS2E RAS-(5/6)FSXNP2E	400V 50Hz	AA55PHDPA-D1Y2		1
RAS-(10/12)FSXNS2E RAS-(8/10)FSXNP2E		DC65PHDPA-D1Y2		1
RAS-(14/16)FSXNS2E RAS-(12/14)FSXNP2E		DA80PHDPA-D1Y2		1
RAS-18FSXNS2E		DD98PHDPA-D1Y2		1
RAS-(20/22)FSXNS2E RAS-(16/18)FSXNP2E		DC65PHDPA-D1Y2	DC65PHDPA-D1Y2	2
RAS-24FSXNS2E		DA80PHDPA-D1Y2	DA80PHDPA-D1Y2	2

6.3.5 Checking of compressor motor

Inverter compressor	Resistance
AA55PHDPA-D1Y2	0.229±7% Ω at 75 °C
DC65PHDPA-D1Y2	0.171±7% Ω at 75 °C
DA80PHDPA-D1Y2	0.209±7% Ω at 75 °C
DD98PHDPA-D1Y2	0.167±7% Ω at 75 °C

6.3.6 Check list on compressor

CLIENT:_____ MODEL:_____ DATE:_____

Serial No:_____ Production date:_____ Checker:_____

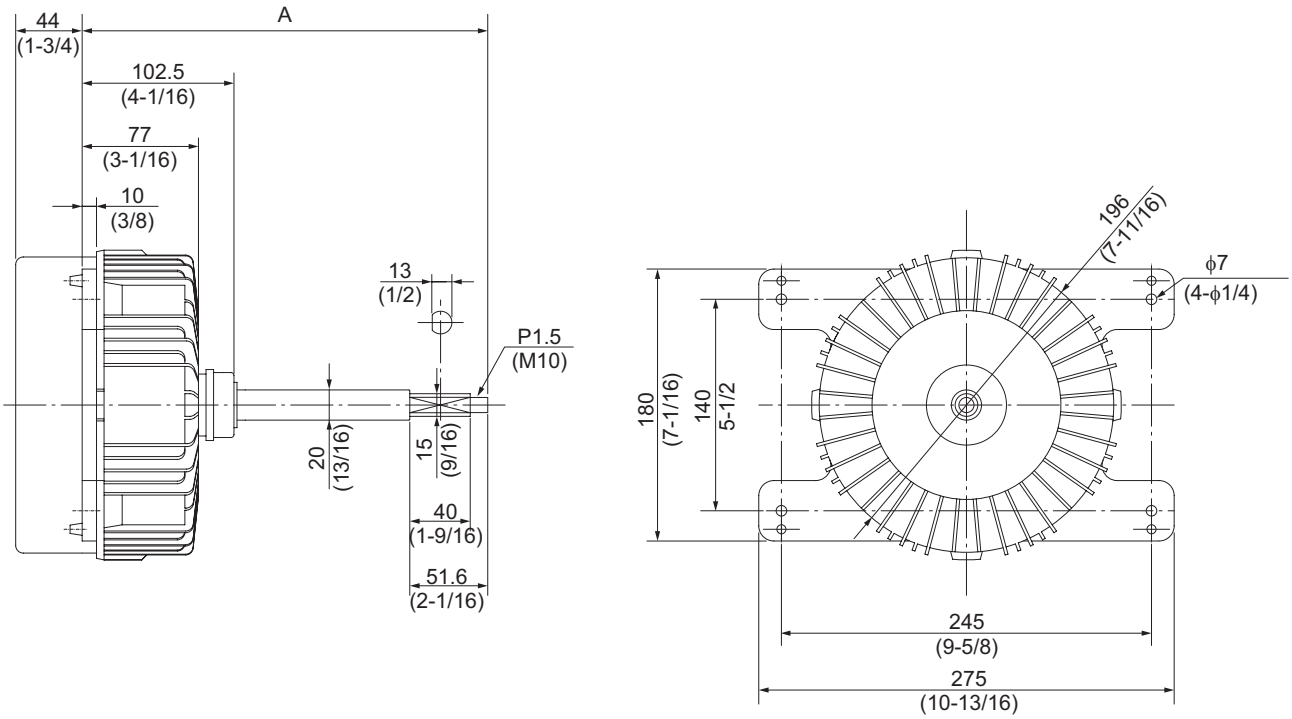
No.	Check Item	Check method	Result	Remarks
1	Are THM8 and THM9 correctly connected? THM8 and THM9: Discharge Gas Thermistor	(1) Are wires of each thermistor correctly connected by viewing? (2) Check to ensure that 7-segment indication of Td1 is higher than Td2 when No.1 Compressor is operating. Td1: Temperature of THM8, Td2: Temperature of THM9.		
2	Are thermistor, THM8 and THM9 disconnected?	(1) Check to ensure that thermistor on the top of Compressor is correctly installed.(2) Check to ensure that actually measured Temperature are greatly different from the indication (Td1, Td2) during check mode.		
3	Is current sensing part on inverter PCB (INV) faulty?	(1) Check to ensure that 7-segment indication A1 and A2 are 0 during compressor stopping. (2) Check to ensure that indication A1 and A2 are not 0 during compressor running. (However, A2 is 0 during stopping of No.2 Compressor)		
4	Are expansion valves (MV1, MV2 and MVB) correctly connected?	Check to ensure that MV1 to CN10, MV2 to CN11 and MVB to CN12 are correctly connected.		
5	Are expansion valve coils (MV1, MV2 and MVB) correctly installed?	Check to ensure that each coil is correctly installed on the valve.		
6	Are the refrigeration system and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one system only from the outdoor unit.		
7	Is opening of expansion valve completely closed (locked)?	Check the following using the check mode of outdoor units. (1) Liquid Pipe Temp. (TL) < Air Intake Temp. (Ti) during Cooling Operation (2) Liquid Pipe Temp. (TL) > Air Intake Temp. (Ti) during Heating Operation		

8	Is opening of expansion valve fully opened (locked)?	Check to ensure that liquid pipe temperature is lower than air intake temperature of stopped indoor unit when the other indoor units are operating under cooling operation.
9	Are the relay on the main power PCB (PCB2) faulty?	Check the main power PCB (PCB2).
10	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3 %. Please note that power source voltage must be within 220V or 400V/380V - 415V/ 380V+10 %.
11	Is the Compressor oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.

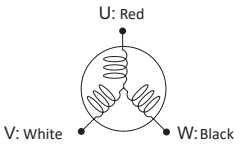
6.3.7 Additional information for “check list on compressor”

Check Item	Additional information (mechanism of compressor failure)
1,2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td1 when only No.1 compressor is operating. If Td1 and Td2 are reversely connected, the liquid refrigerant return volume will become smaller by detecting the temperatures even if the actual discharge gas temperature is high. Therefore, this abnormal overheating operation will result in insulation failure of the motor winding.
3	Overcurrent control (operating frequency control) is performed by detecting current by the current sensor. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
4, 5	During a cooling operation, Pd is controlled by fan revolution of outdoor unit, and Td and SH are controlled by MV of each indoor unit. During a heating operation, Td and SH are controlled by MV1 and MV2. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor failure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
6	If the refrigeration system and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
7	For additional information, refer to *“6.4 Fan motor”* in this document.
8	The compressor may be locked due to the liquid return operation during the cooling operation.
9	If the contacting resistance increases, voltage imbalance among each phase will cause abnormal overcurrent.
10	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
11	In this case, it will result in motor burning or a failed compressor.

6.4 Fan motor

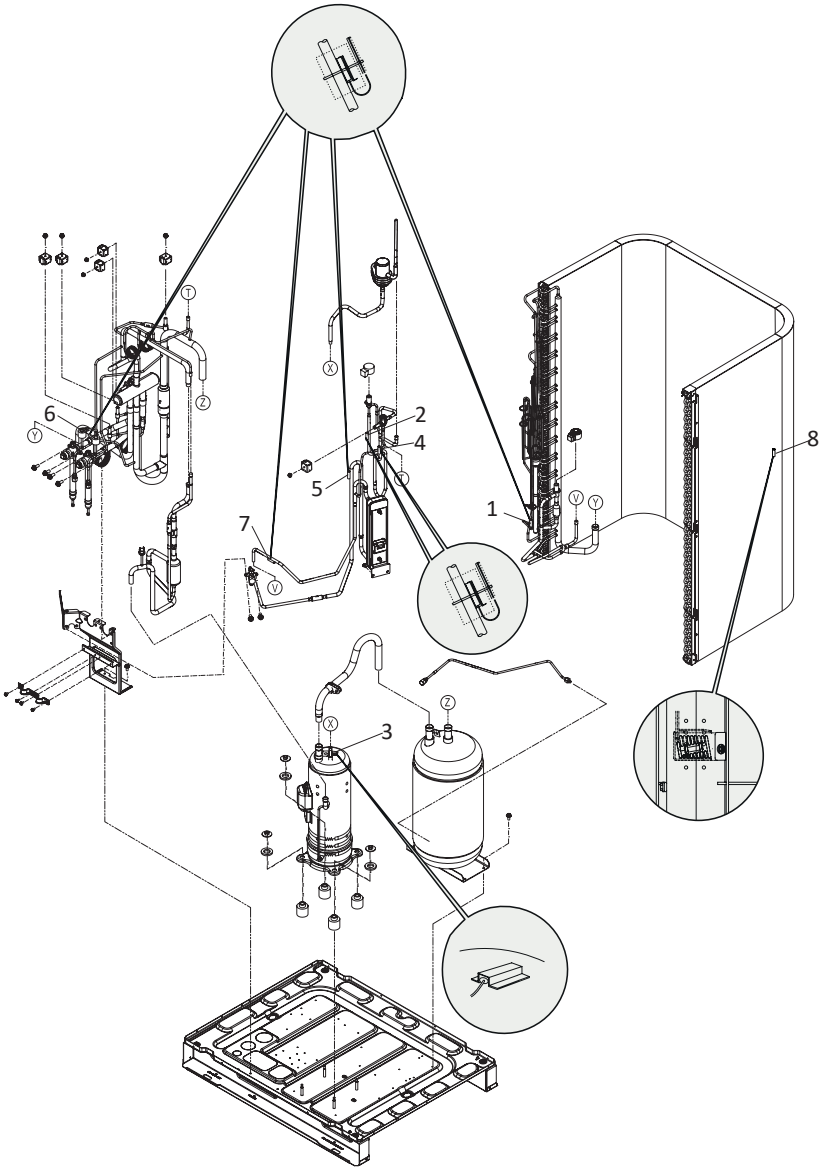


Model	A
RAS-(8-12)FSXNS2E, RAS-(20-24)FSXNS2E RAS-(5/6)FSXNP2E, RAS-(16/18)FSXNP2E	268.5 mm
RAS-(14-18)FSXNS2E RAS-(8-14)FSXNP2E	224.8 mm

Applicable model	Power source voltage	Rated voltage	Rated output	Electrical wiring diagram	Resistance
RAS-(8-24)FSXNS2E RAS-(5-18)FSXNP2E	400V 50Hz	DC650V	750W		9.42+0.94Ω at 20 °C

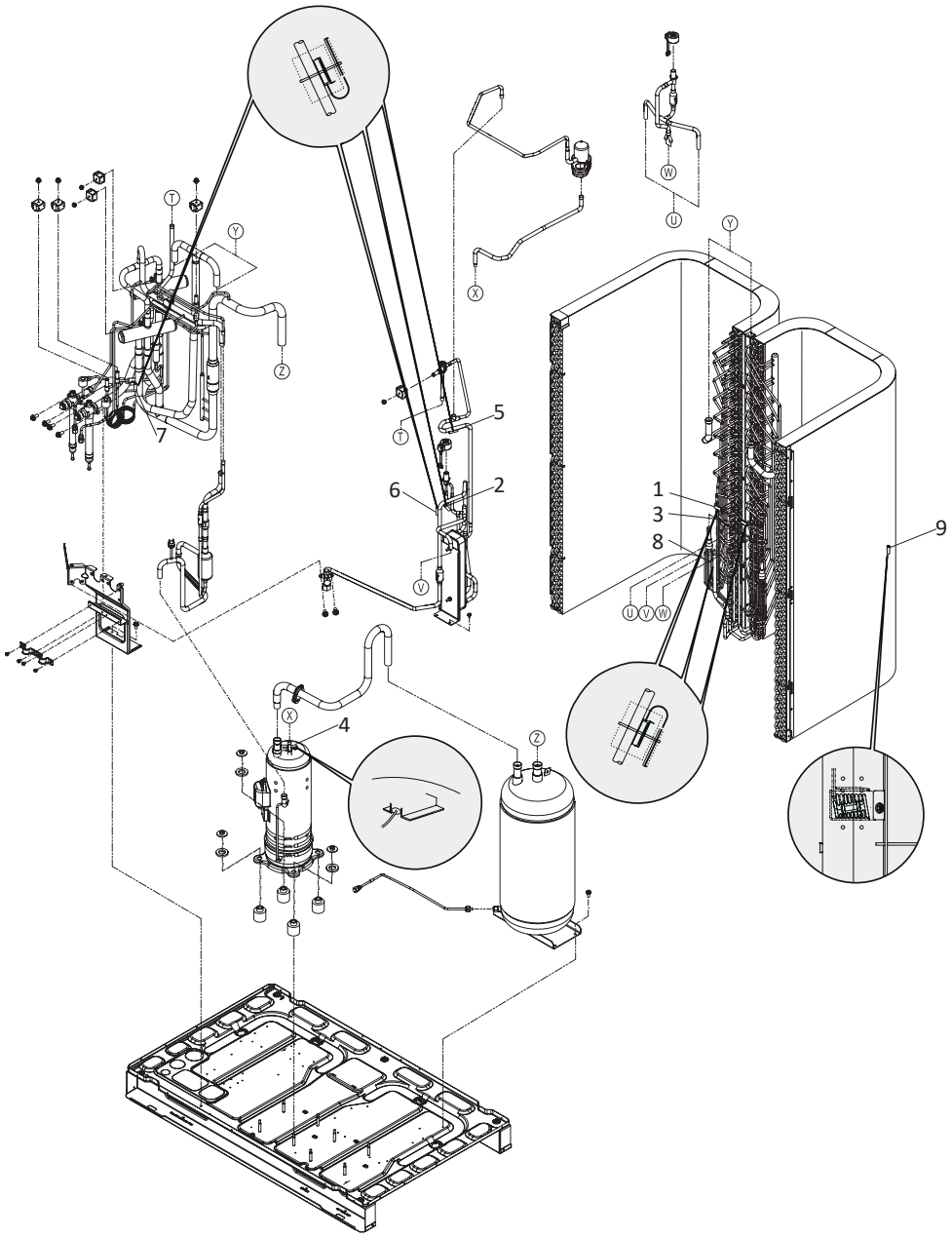
6.5 Thermistors

6.5.1 Thermistor positions for RAS-(8-12)FSXNS2E and RAS-(5/6)FSXNP2E



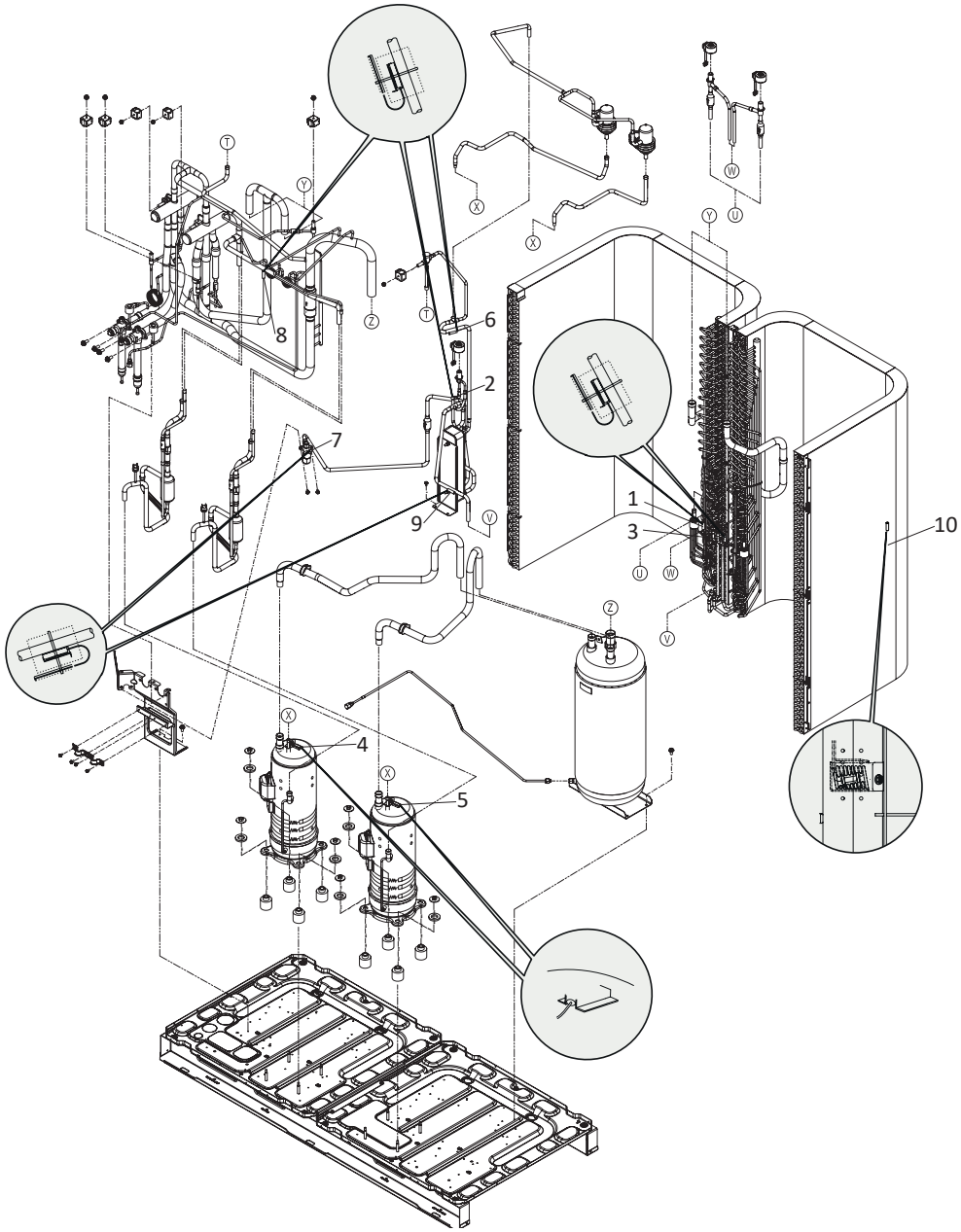
Nº	Name	Uds
1	Te (THM10) - thermistor (Liquid evaporation line)	1
2	Tpf (THM13) - thermistor (for supercooler Bypass inlet)	1
3	Td (THM8) - thermistor (for discharge gas temperature)	1
4	Tpb (THM14) - thermistor (for supercooler Bypass outlet)	1
5	Tchg (THM17) - thermistor (Super-cooling main line)	1
6	Tg (THM12) - thermistor (Gas evaporation line)	1
7	Tsc (THM23) - thermistor (for super-cooler)	1
8	Ta - thermistor (for outdoor ambient)	1

6.5.2 Thermistor positions for RAS-(14-18)FSXNS2E and RAS-(8-14)FSXNP2E



Nº	Name	Uds
1	Te1 (THM10) - thermistor (Liquid evaporation line)	1
2	Tpf (THM13) - thermistor (for supercooler Bypass inlet)	1
3	Te2 (THM11) - thermistor (Liquid evaporation line)	1
4	Td (THM8) - thermistor (for discharge gas temperature)	1
5	Tpb (THM14) - thermistor (for supercooler Bypass outlet)	1
6	Tchg (THM17) - thermistor (Super-cooling main line)	1
7	Tg (THM12) - thermistor (Gas evaporation line)	1
8	Tsc (THM23) - thermistor (for super-cooler)	1
9	Ta - thermistor (for outdoor ambient)	1

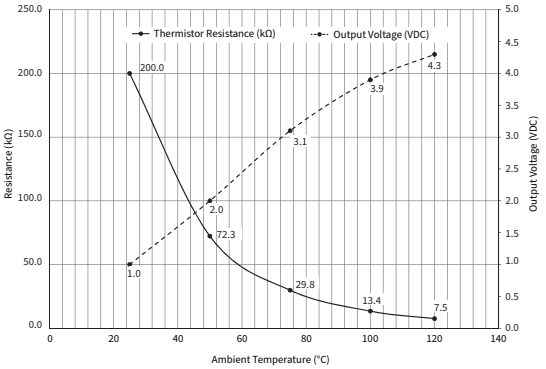
6.5.3 Thermistor positions for RAS-(20-24)FSXNS2E and RAS-(16/18)FSXNP2E



Nº	Name	Uds	Nº	Name	Uds
1	Te1 (THM10) - Thermistor (Liquid evaporation line)	1	6	Tpb (THM14) - Thermistor (for supercooler Bypass outlet)	1
2	Tpf (THM13) - Thermistor (for supercooler Bypass inlet)	1	7	Tchg (THM17) - Thermistor (Super-cooling main line)	1
3	Te2 (THM11) - Thermistor (Liquid evaporation line)	1	8	Tg (THM12) - Thermistor (Gas evaporation line)	1
4	Td1 (THM8) - Thermistor (for discharge gas temperature)	1	9	Tsc (THM23) - Thermistor (for super-cooler)	1
5	Td2 (THM9) - Thermistor (for discharge gas temperature)	1	10	Ta - Thermistor (for outdoor ambient)	1

6.5.4 Thermistor (Td) for discharge gas temperature

1 The thermistor for the temperature of the upper part of the compressor is installed for the purpose of preventing discharge gas due to overheating. If the discharge gas temperature increases excessively, the lubricating oil deteriorates and loses its properties and consequently, the compressor's life is shortened.



2 If the discharge gas temperature increases excessively, the compressor temperature increases. Consequently, the compressor motor will burn out.

3 When the temperature of the upper part of the compressor increases during heating operation, the unit is controlled according to the following method:

   a. The expansion valve of the outdoor unit opens to return the liquid refrigerant to the compressor through the accumulator, decreasing the compressor's temperature.

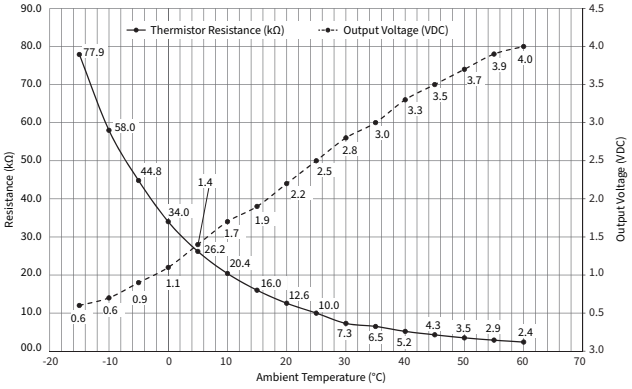
   b. If the temperature of the upper part of the compressor increases over 132 °C, even if the expansion valve opens, the compressor stops in order to protect itself. This procedure is also available in the cooling operation.

4 If the temperature of the upper part of the compressor increases excessively, protection control will be activated and the compressor will stop according to the following method:

Operation	Temperature of the upper part of the compressor	Stopping period
Cooling	Over 132 °C	10 minutes (continuous)
	Over 140 °C	5 seconds (continuous)
Heating	Over 132 °C	10 minutes (continuous)
	Over 140 °C	5 seconds (continuous)
Defrosting	Over 132 °C	5 seconds (continuous)

6.5.5 Thermistor for the outdoor ambient temperature

Thermistor resistance characteristics are shown in the figure.



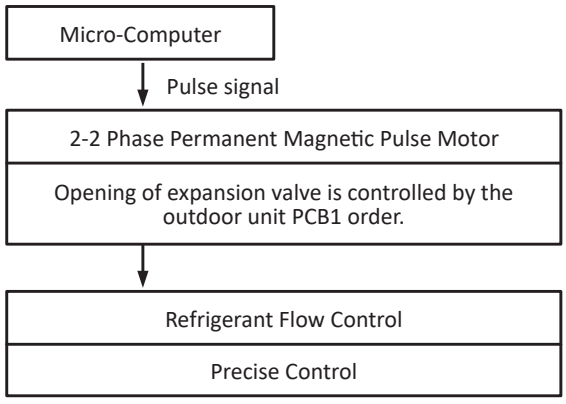
6.5.6 Thermistor for the evaporating temperature of the outdoor unit in the heating operation (For defrosting)

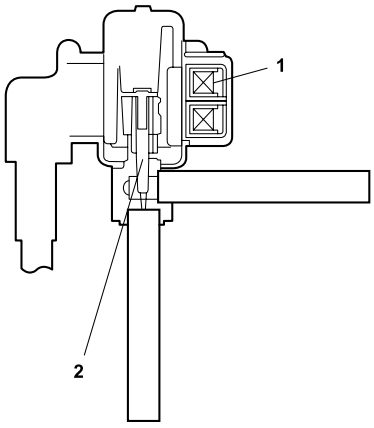
The thermistor resistance characteristics are the same as in the outdoor ambient temperature thermistor.

6.5.7 Thermistor for super cooling bypass and main line temperature of outdoor unit

The thermistor resistance characteristics are the same as in the outdoor ambient temperature thermistor.

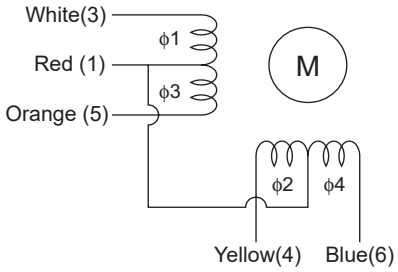
6.6 Electronic expansion valve (MV1, MV2, MVB)

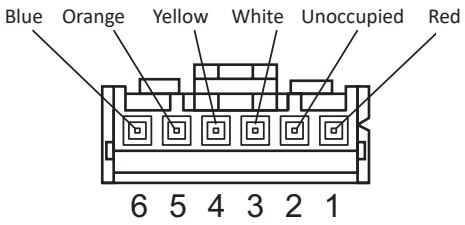




1	Pulse motor
2	Needle

6.6.1 Specifications for MV1 and MV2

Items	Specifications
Models	PAM-BBOYGHS-1 (MV)
Working temperature range	-30 °C to 70 °C
Refrigerant used	R410A
Insulation resistance	Min. 100MΩ (at 500VDC Megohmmeter)
Withstand voltage	500VAC for 1 minute or 600VAC for 1 second
Rated voltage	DC 12V±1.2V
Drive condition	100 - 200 PPS 2-2 phase excitation
Coil resistance (for each phase)	100Ω (at 20 °C)
Insulation class	Class E
Wiring diagram, drive circuit and activation mode	



Phase	1	2	3	4
1	ON	OFF	OFF	ON
2	ON	ON	OFF	OFF
3	OFF	ON	ON	OFF
4	OFF	OFF	ON	ON

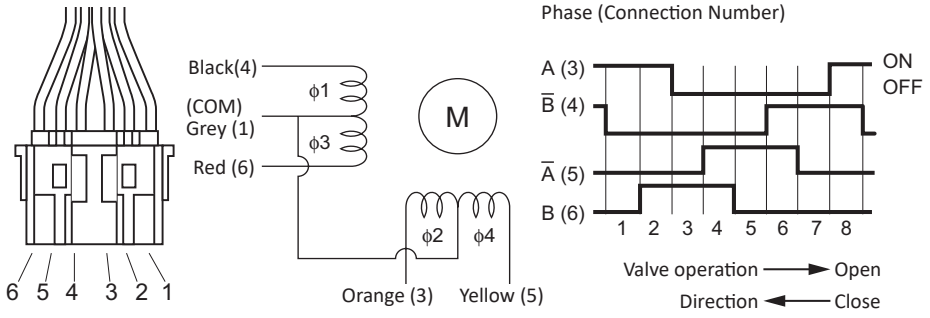
OPEN: 4 - 3 - 2 - 1 - 4
CLOSE: 1 - 2 - 3 - 4 - 1

Checking method

Measure the coil resistances between Red (common) and each phase. The measured resistance value is normal if approximately 100Ω[*1]).

[*1]: Ambient Temperature 20 °C

6.6.2 Specifications for MVB

Items	Specifications
Models	UKV-U029E or UKV-A027
Working temperature range	-30 °C to 70 °C
Refrigerant used	R410A
Insulation resistance	Min. 100MΩ (at 500VDC Megohmmeter)
Withstand voltage	1800VAC for 1 second
Rated voltage	DC 12V±1.2V
Drive condition	83±5 PPS 1-2 phase excitation
Coil resistance (for each phase)	46±3Ω (at 20 °C)
Insulation class	Class E
Wiring diagram, drive circuit and activation mode	

Connector number	Color of lead wire	Phase
1	Grey	Common (x)
2	-	-
3	Orange	A
4	Black	B̄
5	Yellow	Ā
6	Red	B

Checking method

Measure the coil resistances between connector number 1 (common) and each phase.

The measured resistance value is normal if approximately 46Ω[*1].

[*1]: Ambient Temperature 20 °C

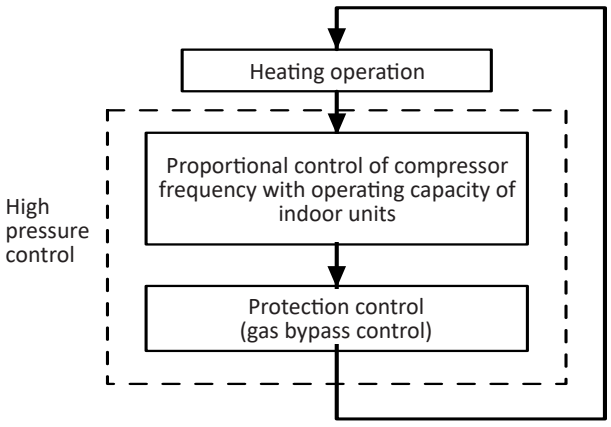
◆ Checking method of electronic expansion valve

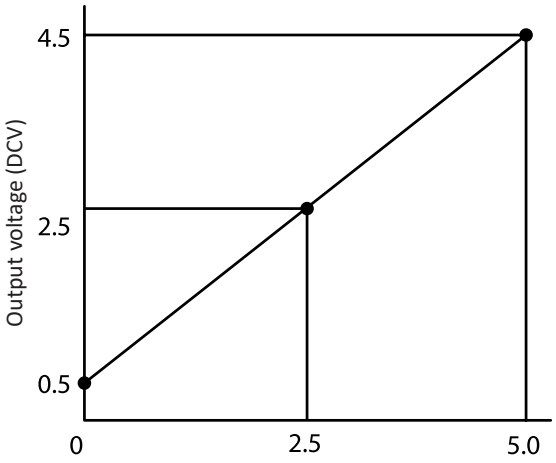
	Outdoor unit electronic expansion valve
Locked (fully closed)	It is abnormal if the liquid pipe pressure does not increase during cooling operation.
Locked (slightly open)	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling operation is started.
Locked (fully open)	It is abnormal under the following conditions. After heating operation for more than 30 min., the discharge gas temperature of compressor is not 10 °C higher than the condensing temperature and there is no other fault such as excessive charge of refrigerant.

6.7 Pressure sensor (Pd)

6.7.1 High pressure control

The high pressure is detected during the heating mode by means of a high pressure sensor and the compressor frequencies are controlled by the proportional control method with operating capacity of the indoor units (or PID control for the compressor frequency); therefore, the high pressure is controlled within an appropriate range. The output of the high pressure sensor during the heating operation activates the protection control, the gas bypass.



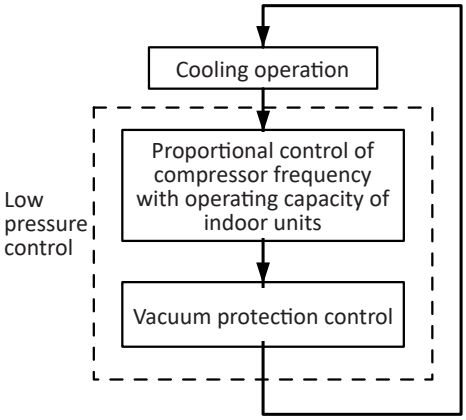


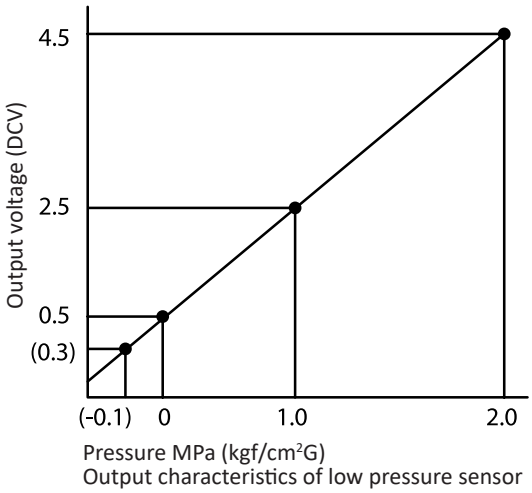
Output characteristics of high pressure sensor

6.7.2 Low pressure control

The suction pressure is detected during the cooling operation by means of a low pressure sensor and the compressor frequencies are controlled by the proportional control method with operating capacity of the indoor units (or PID control for the compressor frequency); therefore, the suction pressure is controlled within an appropriate range.

If the suction pressure is excessively low, the cooling may not be sufficient and the parts of the refrigerant cycle may be damaged. For this reason, if the output of the low pressure sensor indicates vacuum and a constant value for twelve or more minutes, the compressor stops in order to protect itself.



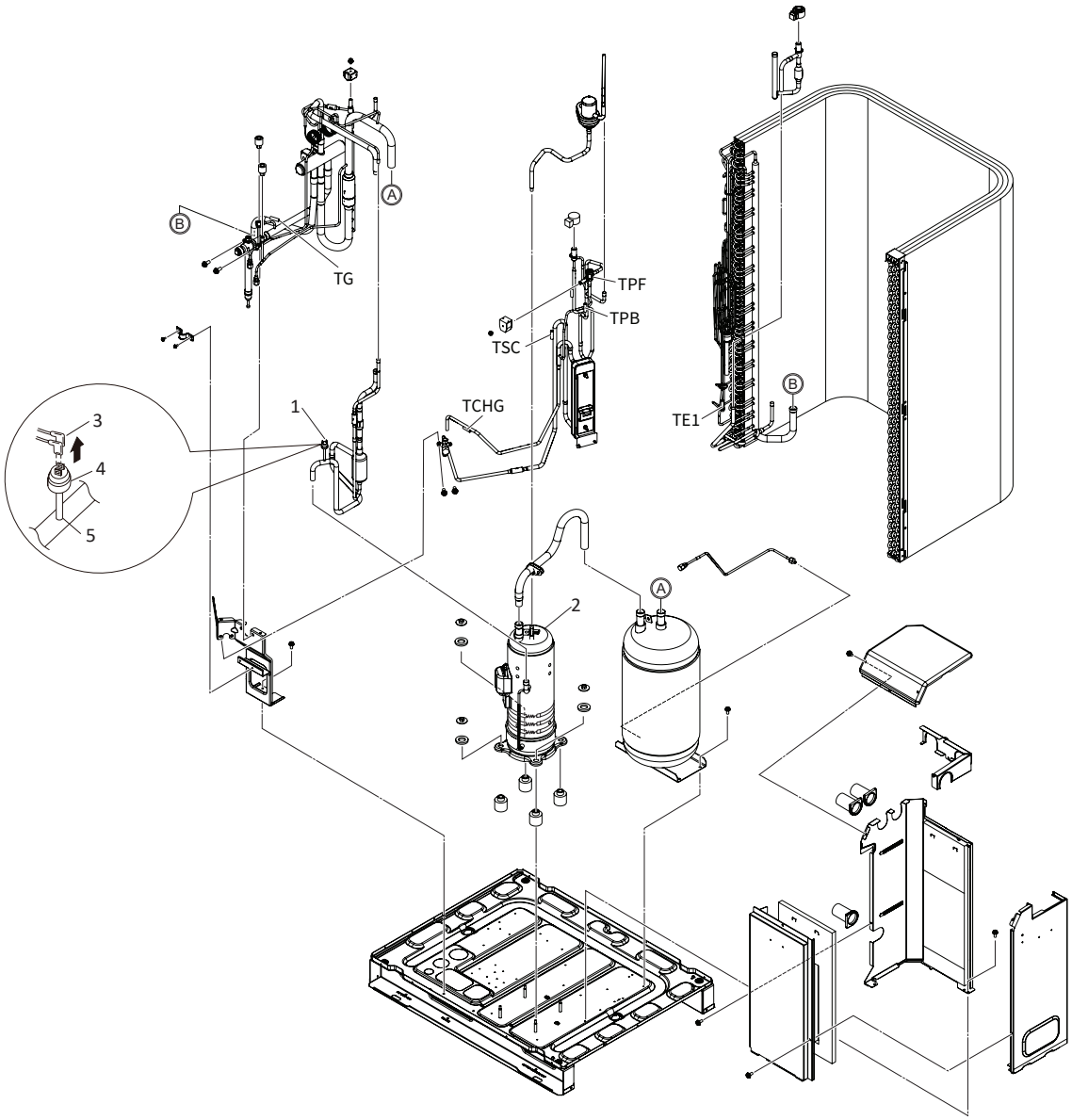


Output characteristics of low pressure sensor

6.8 High pressure protection device (PSH)

If the discharge pressure is excessively high, the compressor and the refrigerant cycle components may be damaged. However, if the discharge pressure is higher than 4.15 MPa (R410A), the protection control is activated and the compressor will stop.

Example: RAS-8FSXNSE



1	PSH
2	Inverter compressor
3	Faston terminal
4	High pressure switch
5	Welding

6.9 Electrical coil parts

◆ Solenoid valve (SVA)

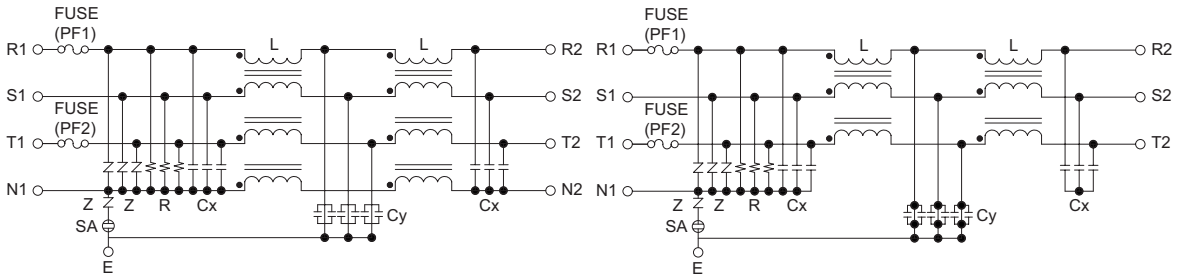
Applicable model	Electrical coil model			Resistance
RAS-8FSXNS2E to 24FSXNS2E RAS-5FSXNP2E to 18FSXNP2E	SVA	Coil	FQ-A0520D	2142±214Ω at 20 °C
		Body	FDF5A11	
	SVG	Coil	TEV-SM0AJ2066A1	2496±174.7Ω at 20 °C
		Body	TEV-S2020DQ50	

◆ Reversing valve (RVR)

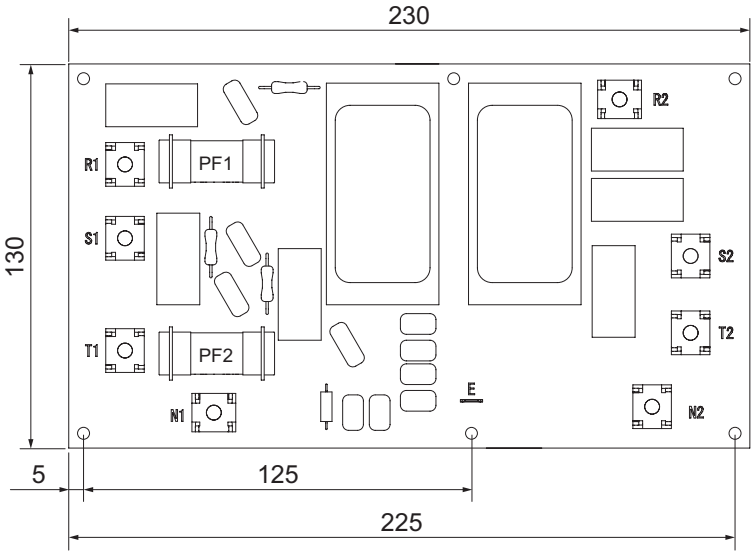
Applicable model	Electrical coil model		Resistance
RAS-8FSXNS2E to 18FSXNS2E RAS-5FSXNP2E to 14FSNXP2E	Coil	STF-H01AQ2338A1	1567.5±156.8Ω at 20 °C
	Body	STF-H0712	
RAS-20FSXNS2E to 24FSXNS2E RAS-16FSXNP2E and 18FSXNP2E	Coil	STF-01AQ2339A1	1190.35±119Ω at 20 °C
	Body	STF-1511G	

6.10 Noise filter (NF1, NF2)

The noise filter decreases the noise caused by the inverter to the power supply line. The terminals that indicate "LOAD" are connected to the inverter and terminals that indicate "LINE" are connected to the power supply line.

Items	Specifications	
Model	NF161	NF202S
Rated current	AC 380-415V	
Rated current	28A	40A
Circuit diagram		

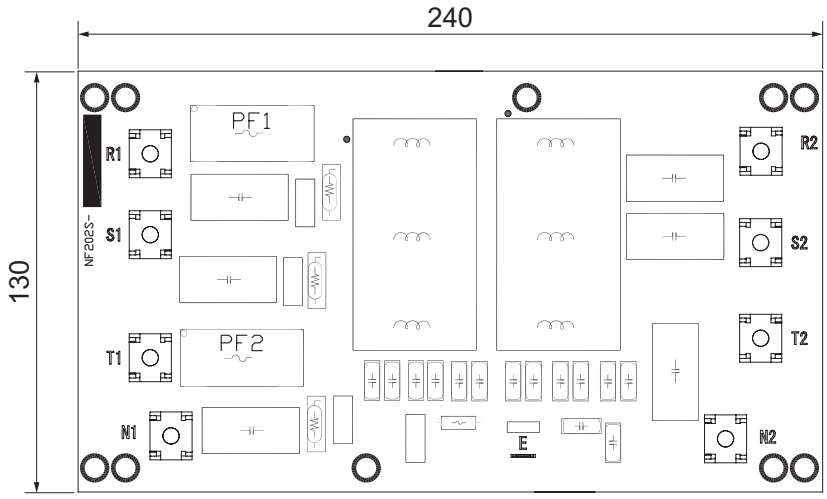
NF161



NOTE

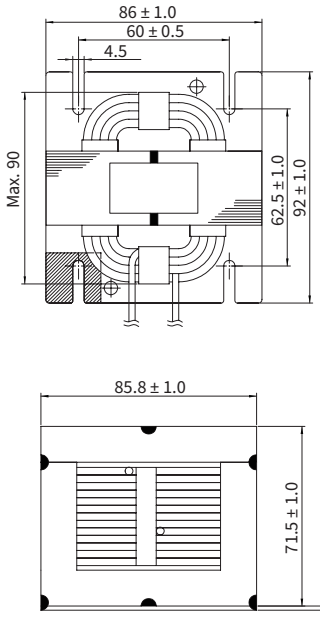
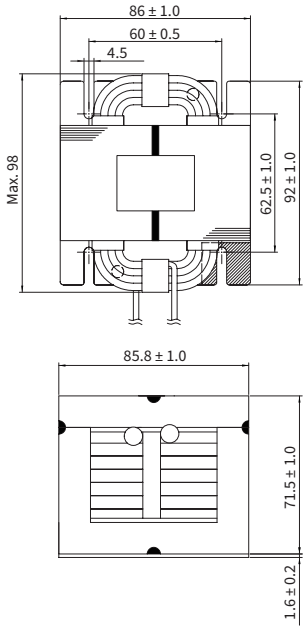
All measurements are in mm.

NF202S



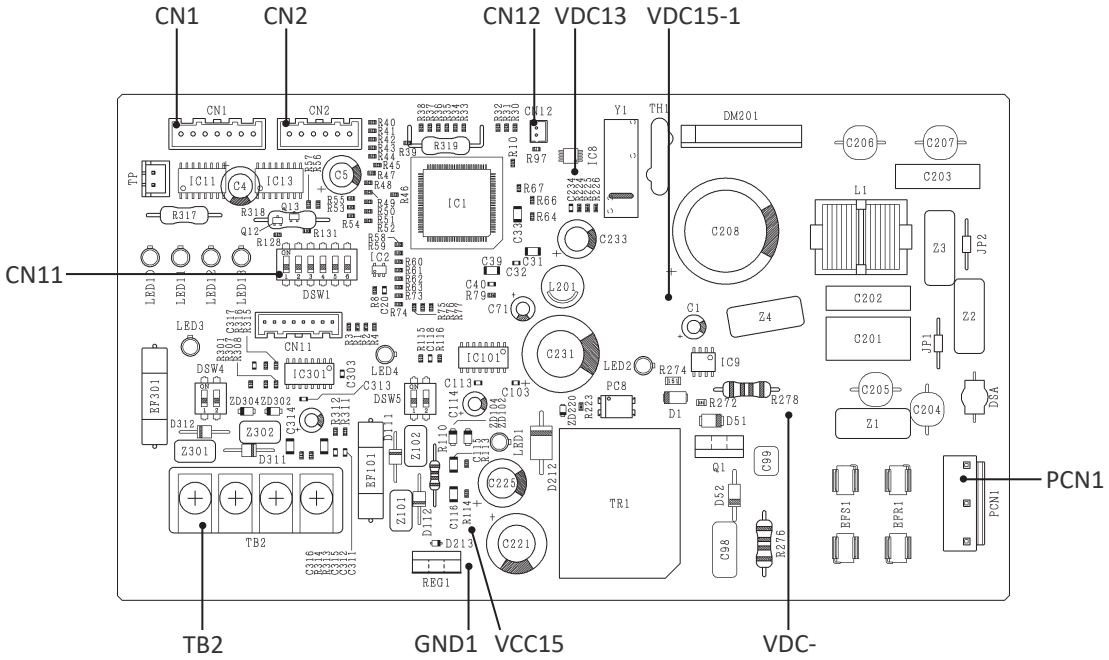
6.11 Reactor (DCL1 and DCL2)

This part is used to change the alternating current to direct current for the inverter.

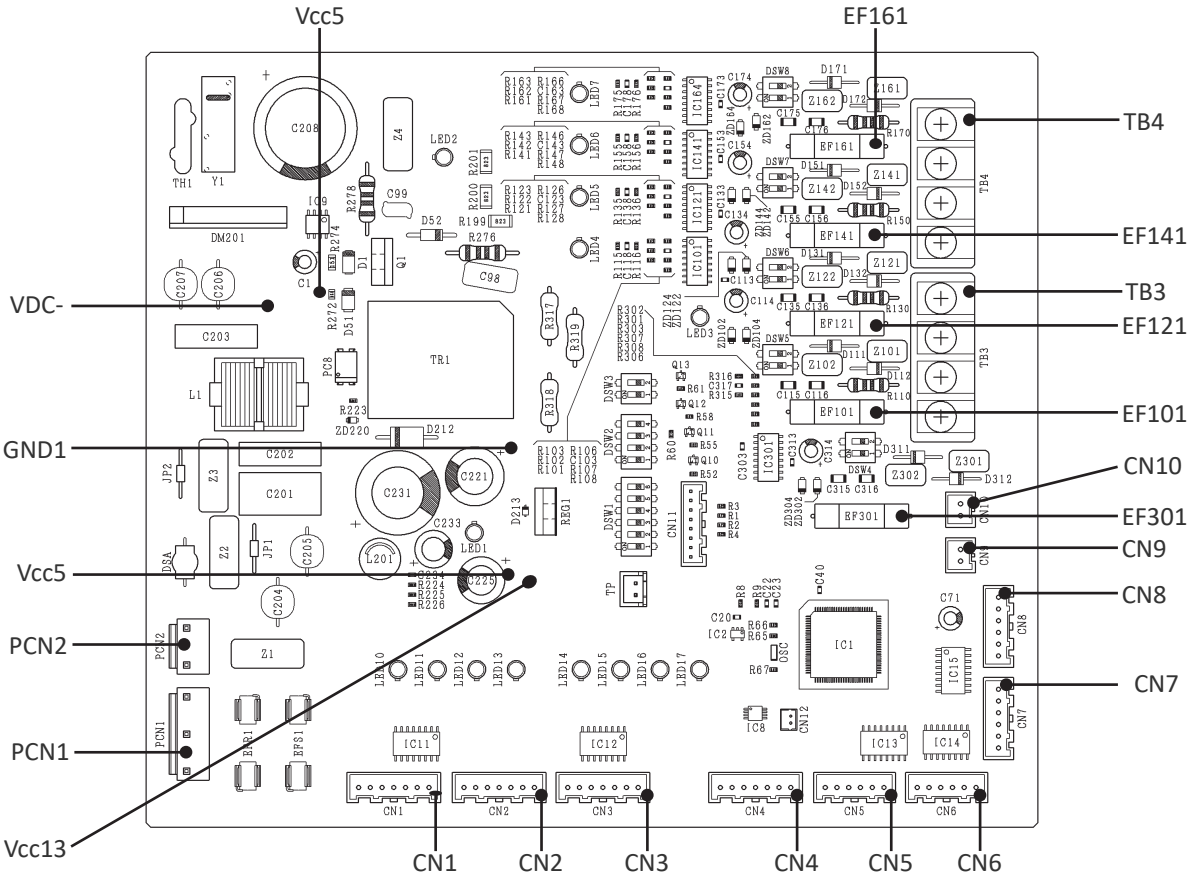
Items	Specifications	
Model	DCL1	DCL2
Character	1.0mH+15 %, -10 % (at 1KHz)	
Rated current	35A	50A
	Coil internal temperature is less than 170 °C	
Direct current resistance	28mΩ±20 % (20 °C)	17mΩ±20 % (20 °C)
Appearance		
	Units in mm	*Units in mm*

6.12 CH-Box PCB (PCB1)

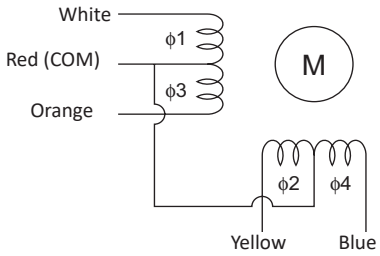
6.12.1 Check points PCB1 of single type CH-Box



6.12.2 Check points PCB1-4 of multi type CH-Box



6.12.3 Specifications for MVD1 and MVS1

Items	Specifications
Models	PAM-MD12HS-17 - PAM-MD12HS-26
Working temperature range	-30 °C to 70 °C
Refrigerant used	R410A
Insulation resistance	Min. 100MΩ (at 500VDC Megohmmeter)
Withstand voltage	500VAC for 1 minute or 600VAC for 1 second
Rated voltage / operating voltage	DC 12V±1.2V
Driving current	80mA/phase (at 12VDC 20 °C)
Coil resistance (for each phase)	150Ω+10 %/phase (at 20° C)
Insulation class	Class E
Wiring diagram, drive circuit and activation mode	

Connector number	Color of lead wire	Switching mode			
		1	2	3	4
1	White (3)	ON	OFF	OFF	ON
2	Yellow (4)	ON	ON	OFF	OFF
3	Orange (5)	OFF	ON	ON	OFF
4	Blue (6)	OFF	OFF	ON	ON

Movement method

OPEN: 1 - 2 - 3 - 4 - 1
CLOSE: 4 - 3 - 2 - 1 - 4

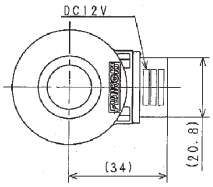
Checking method

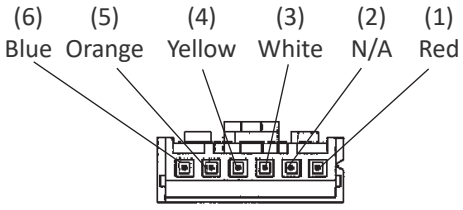
Measure the coil resistances between connector No.1 (common) and each phase.

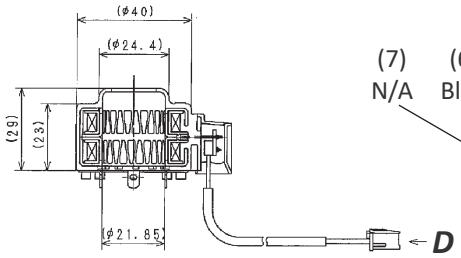
The measured resistance value is normal if approximately 150Ω *.

(*): Ambient Temperature 20 °C

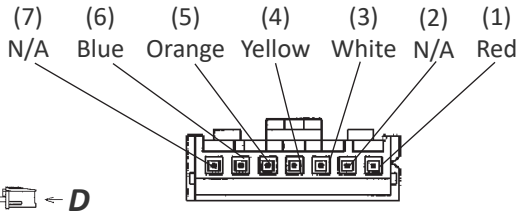
Appearance







View from D



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7.1 Removing the front covers

DANGER

Turn OFF all the power source switches.

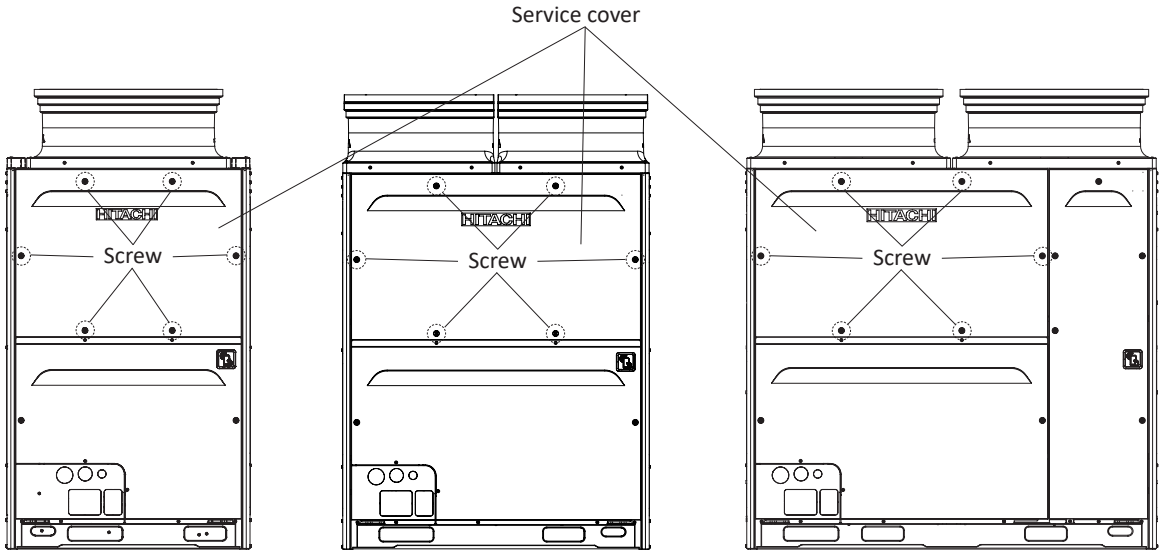
NOTE

- *For servicing use Phillips screwdriver tool.*
- *When fitting and removing the covers take care not to get injured with the edges of the cover.*

7.1.1 Removing service front cover

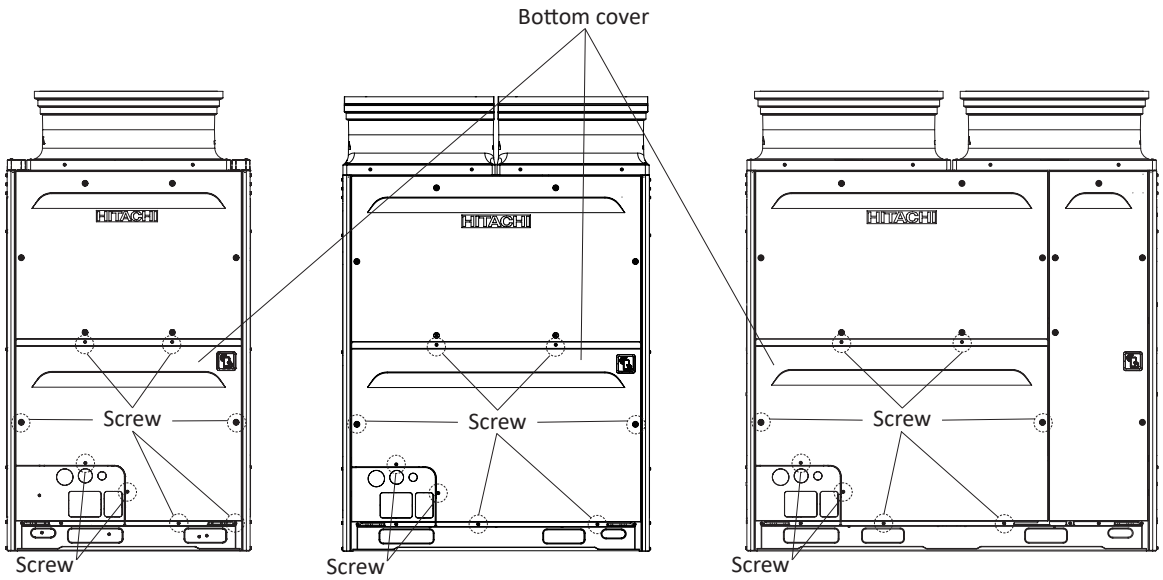
1 Remove the 6 screws from the service cover.

2 Lift the maintenance cover slightly and draw it frontward.



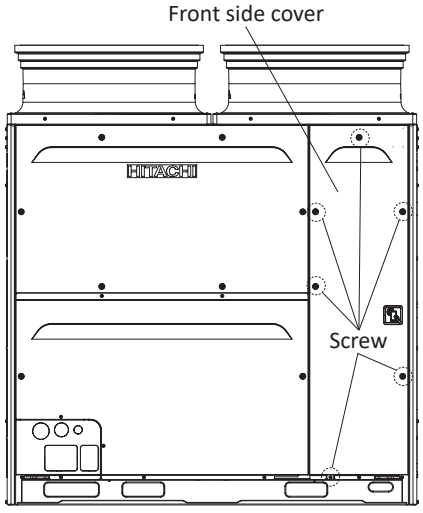
7.1.2 Removing bottom front cover

1 Remove the service front cover.
2 Remove the 2 screws from the front piping cover.
3 Remove the 6 screws from the bottom cover and remove it pulling to back.
4 Remove the 2 lower screws from the front piping cover and remove it.



7.1.3 Removing front right cover

1 Remove the service front cover.
2 Remove the bottom front cover.
3 Remove the 6 screws from the front right cover and hold the bottom side of the front right cover.
4 Lift the cover up slightly and draw it frontward.
5 Remove the cover from the hooks on the right and left sides.



7.2 Removing the electrical box covers

DANGER

Turn OFF all the power source switches.

NOTE

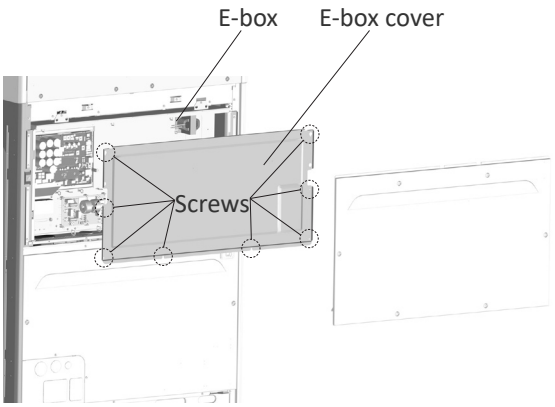
- *For servicing use Phillips screwdriver tool.*
- *Take care not get injured with the edges of the front cover when removing the electrical box cover.*

7.2.1 Removing the electrical box cover

1 Remove the front service cover as described in the procedure *"7.1.1 Removing service front cover"*.

2 Remove the 8 screws of the electrical box cover.

3 Lift the electrical box cover and remove it frontward from the electrical box.



7.3 Removing the electrical box

DANGER

Turn OFF all the power source switches.

NOTE

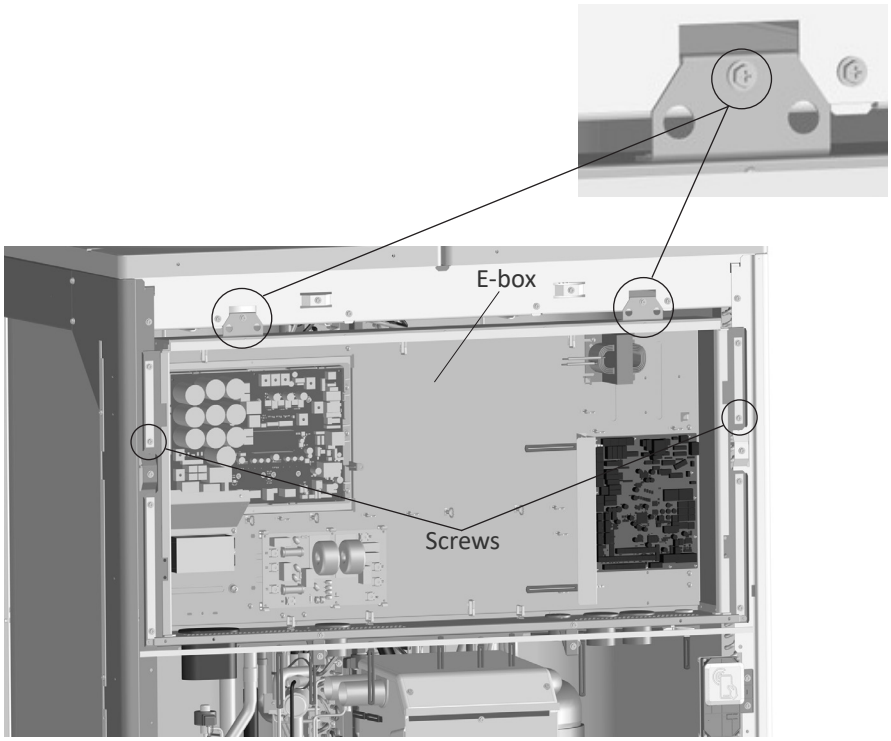
- *For servicing use Phillips screwdriver tool.*
- *When removing the E-Box from the outdoor unit, hold the bottom side of the hook on the electrical box. Do not hold the centre of the electrical box. It may cause deformation of the electrical box.*

7.3.1 Removing the electrical box

NOTE

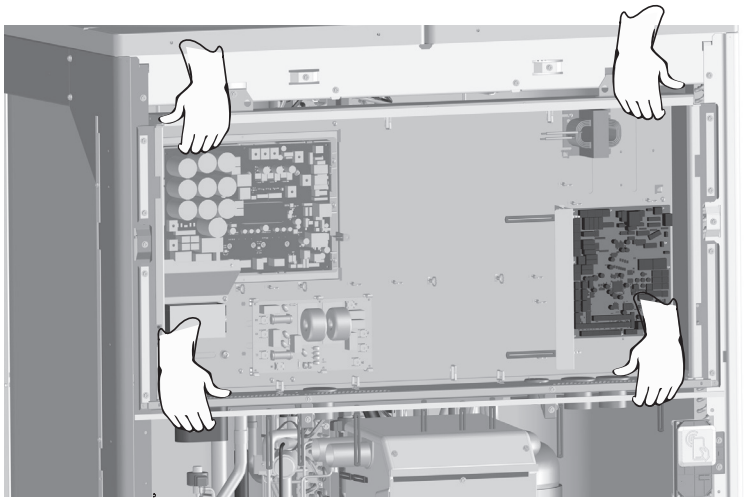
Two people are required to perform this operation, due to the weight of the electrical box.

1 Remove the front covers as described in the procedure *"7.1 Removing the front covers"*.
2 Remove the electrical box cover as described in the procedure *"7.3.1 Removing the electrical box cover"*.
3 Unfix the wiring from the cord clamps at the bottom of the electrical box.
4 Remove the screws fixing the power source wiring, compressor wiring, transmission wiring and earth wiring.
5 Disconnect the connectors for the fan motor, solenoid valve and crankcase heater.
6 Disconnect the connector for each thermistor, the electronic expansion valve and the pressure sensor of the outdoor unit PCB (PCB1).
7 Disconnect the connector for high pressure switch on the main power PCB (INV).
8 Remove 2 screws fixing the sides of the electrical box and remove the 2 screws fixing the fastening tabs.
9 Slide the upper cover slightly upward and remove it pulling to back.



DANGER

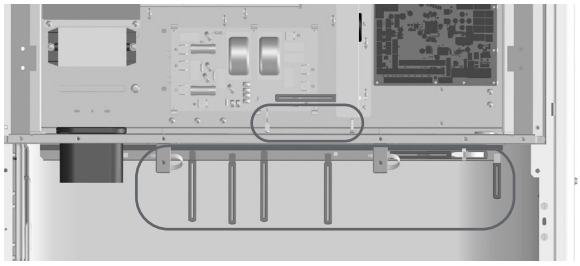
When removing the electrical box from the outdoor unit, hold the bottom side of the hook on the electrical box as shown in the figure below.



CAUTION

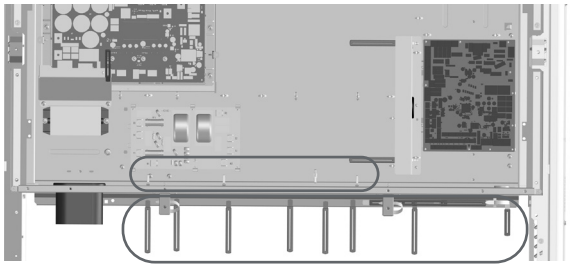
Hold the electrical box by the corners to avoid deforming the electrical box.

RAS-(8-12)FSXNS2E
RAS-(5/6)FSXNP2E



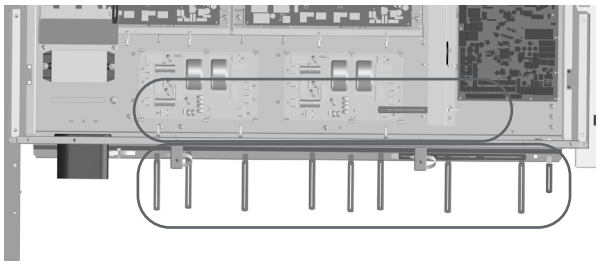
Cord clamp
(7 portions)

RAS-(14-18)FSXNS2E
RAS-(8-14)FSXNP2E



Cord clamp
(12 portions)

RAS-(20-24)FSXNS2E
RAS-(16/18)FSXNP2E



Cord clamp
(12 portions)

7.3.2 Reassembling the electrical box

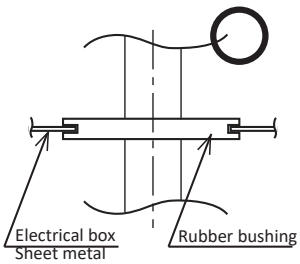
1 Check to ensure that the tube end of waterproof vinyl pipe and the connectors are in the electrical box. Fix them firmly with a cord clamp when wiring.

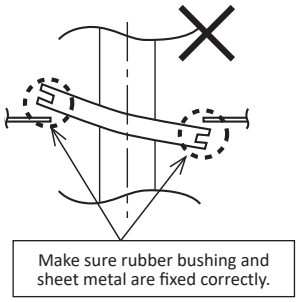
2 Fix the wiring connecting each electrical part and the electrical box with a plastic band to avoid direct contact with the compressor, piping and plate edges.

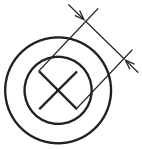
3 Fix the wiring neatly with a cord clamp and make sure that the wiring will not be held down by the electrical box cover. Otherwise, the wiring may be damaged when the cover is closed.

4 Fix the fan motor wiring with a cord clamp.

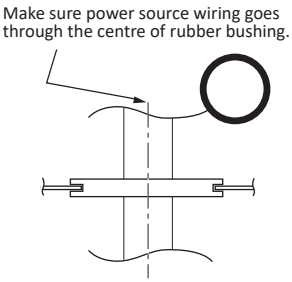
5 Make sure rubber bushing and sheet metal are fixed correctly. If not, electric components may be damaged by water.

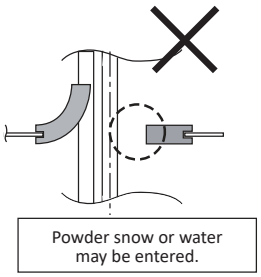






Since there is no slits on rubber bushing for transition power source wiring outlet, make slits with a utility knife as shown in the figure.





NOTE

- *When reassembling the electrical component, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.*
- *Settings of dip switches differ according to the model. When replacing the outdoor unit PCB, refer to "Product manual".*

7.4 Removing the fan grill

DANGER

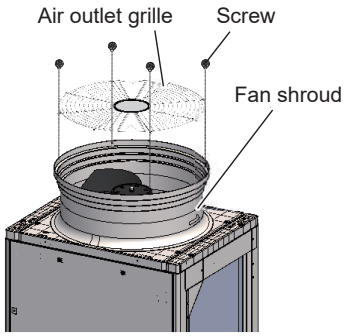
Turn OFF all the power source switches.

NOTE

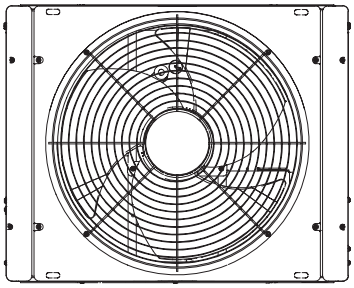
For servicing use Phillips screwdriver tool.

1 Remove the screws that attach the fan grill.

2 Lift the upper cover upward.

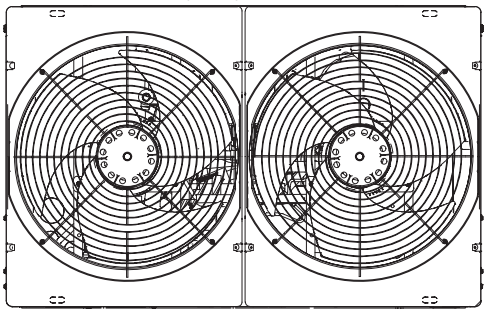


RAS-(8-12)FSXNS2E
RAS-(5/6)FSXNP2E



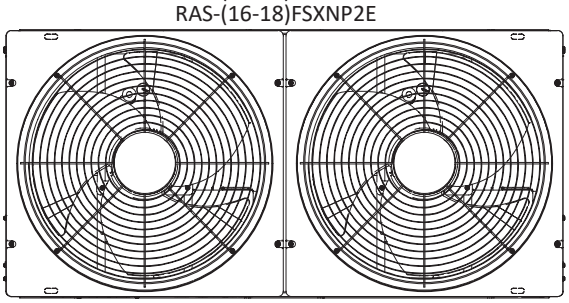
(4 screws)

RAS-(14-18)FSXNS2E
RAS-(8-14)FSXNP2E



(8 screws, 2 fan grills)

RAS-(20-24)FSXNS2E
RAS-(16-18)FSXNP2E



(8 screws, 2 fan grills)

7.5 Removing the fan of the outdoor

DANGER

Turn OFF all the power source switches.

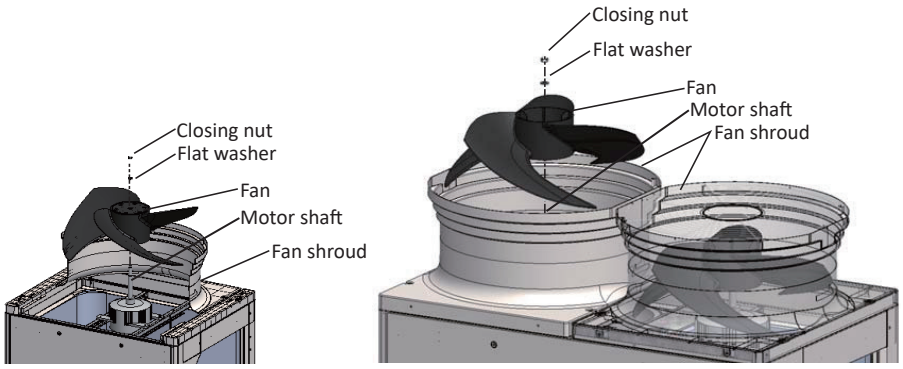
NOTE

For servicing use the following tools: adjustable wrench, spanner, puller, Phillips screwdriver, nippers, box wrench.

1 Remove the air grille as described in the procedure *"7.2 Removing the fan grill"*.

2 Remove the closing nut and the flat washer fixing the propeller fan to the motor shaft using a box wrench.

3 Remove the propeller fan from the motor shaft (lift the propeller fun up).



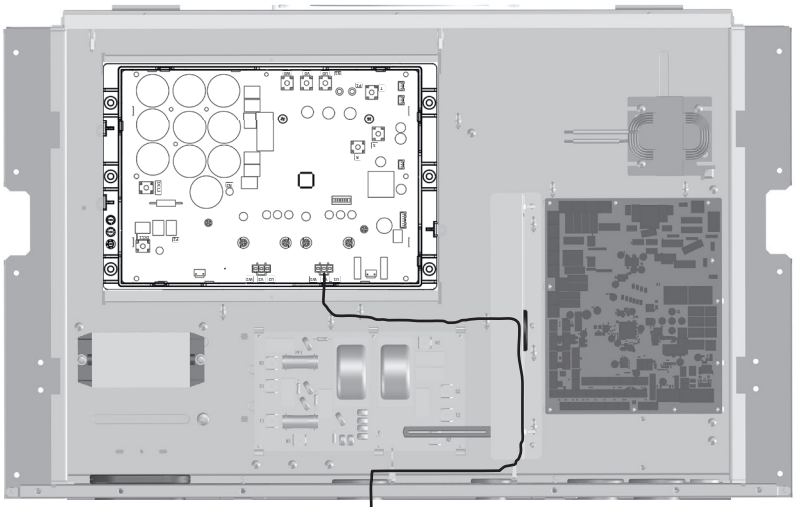
CAUTION

When attaching the propeller fan to the motor shaft, in the assembly operation, make the D-cut at the boss portion connected to the D-cut of the fan motor shaft.

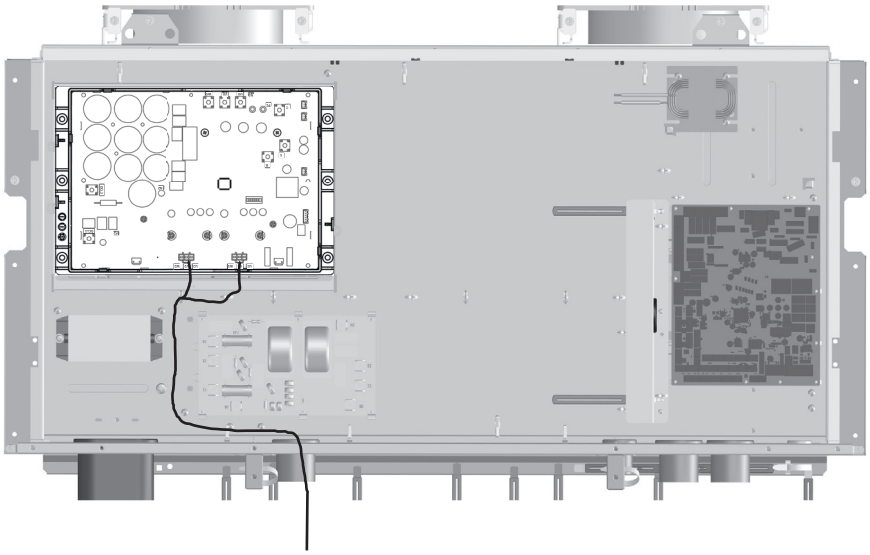
4 Remove the fan motor.

a. Remove the service front cover and the electrical box according to *"7.1 Removing the front covers"* and *"7.3 Removing the electrical box covers".*

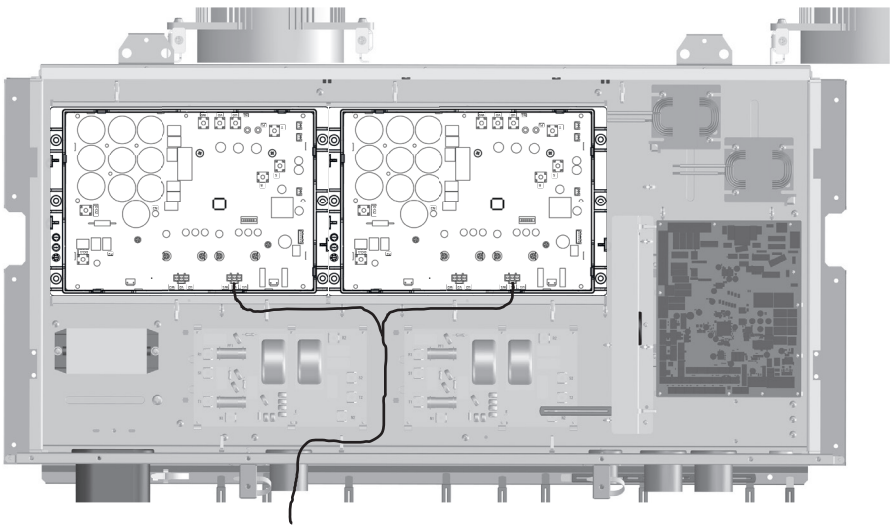
b. Disconnect the wire connector for the fan motor in the electrical box. Paying attention to the routing.



RAS-(8-12)FSXNS2E, RAS (5/6)FSXNP2E:
CN801 from INV1



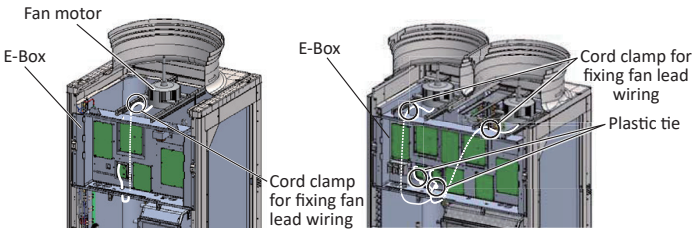
RAS-(14-18)FSXNS2E, RAS-(8-14)FSXNP2E:
CN801 and CN901 from INV1



RAS-(20-24)FSXNS2E, (16/18)FSXNP2E:
CN801 fom INV1 and CN801 from INV2.

c. Then cut the plastic tie fixing the piping insulation.

d. Remove four M6 bolts fixing the fan motor, and remove the fan motor.



RAS-(8-12)FSXNS2E, RAS-(5/6)FSXNP2E: 4 screws (x1 motor).
RAS-(14-24)FSXNS2E, RAS-(8-18)FSXNP2E: 4 screws (x2 motor).

5 Set up the wire in reverse procedure.

NOTE

- *The cord outlet end should be downward-facing when mounting the fan motor (make a wire trap).*
- *Fix the motor wire to the motor clamp using a plastic tie to avoid contact with the propeller fan.*
- *When mounting the propeller fan on the motor shaft, make the D-cut at the boss portion (Θ mark part) connected to the D-cut of the fan motor shaft. Firmly fix the propeller fan after the head of the fan shaft comes up.*
  Torque for tightening propeller fan: 30 Nm.
- *Connect the motor wire in the electrical box connector.*

6 Check from above that gap between the propeller fan and the upper cover is even.

7 Check that there is no noise caused by contact between the propeller fan and the upper cover during the propeller fan operation.

7.6 Removing the compressor

DANGER

Turn OFF all the power source switches.

NOTE

For servicing use the following tools: adjustable wrench, Phillips screwdriver, pliers, burner (welder), pipe cutter, nippers, box wrench.

1 Remove the front service cover and the bottom front cover as described in the procedures *"7.1 Removing the front covers"* . In the case that the outdoor unit is installed close to the wall, remove the refrigerant piping and move the outdoor unit away from the wall.

2 Close the high/low pressure gas stop valve, low pressure gas stop valve and liquid stop valve.

3 Collect the refrigerant by a refrigerant collector.

a. Collect the refrigerant in the outdoor unit from the low pressure check joint and the high pressure check joint into a cylinder.

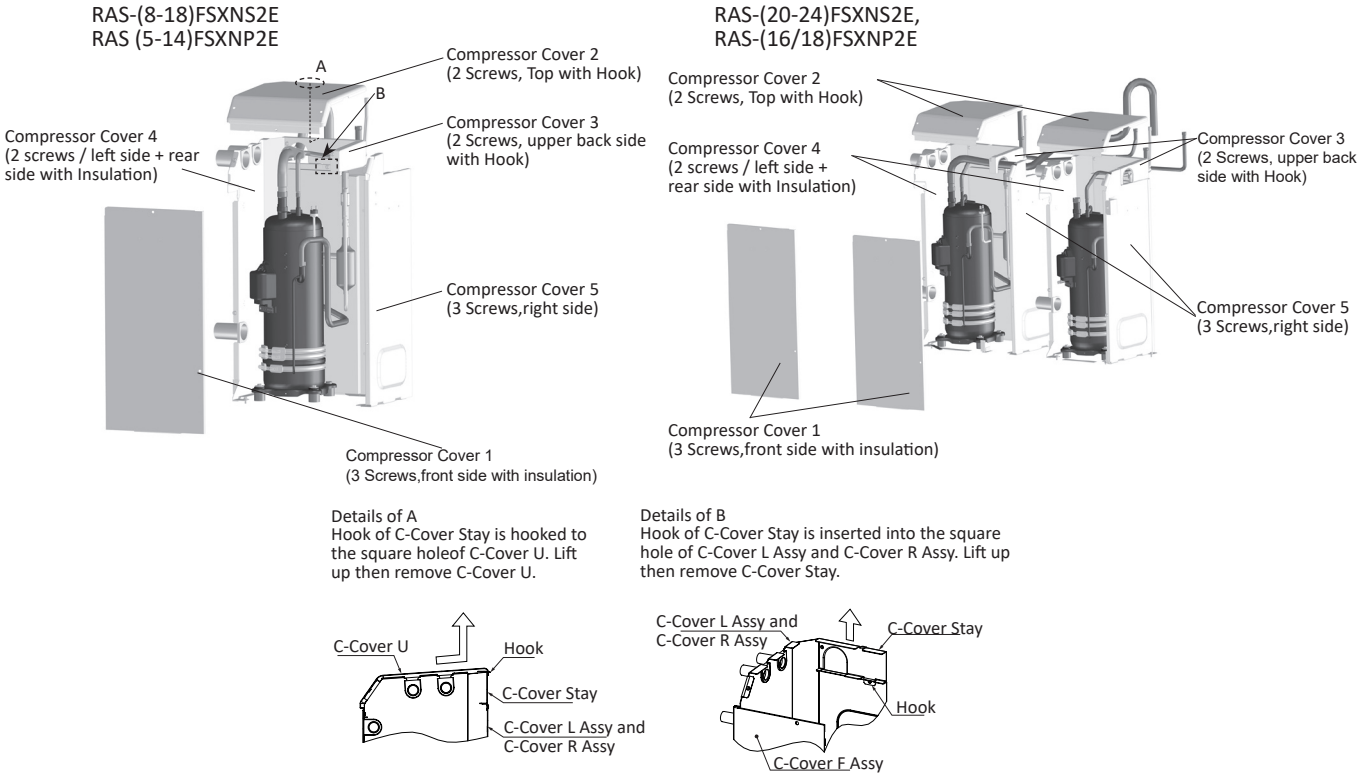
b. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

c. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

4 Remove the compressor cover (C-cover) by following the numbers in the figure below.

NOTE

- *Pay attention not to deform the piping around the compressor when removing the C-cover. It may cause the damage on brazing parts.*
- *Be careful not to get injured by the sheet metal edge or heat exchanger fin when removing the compressor cover.*

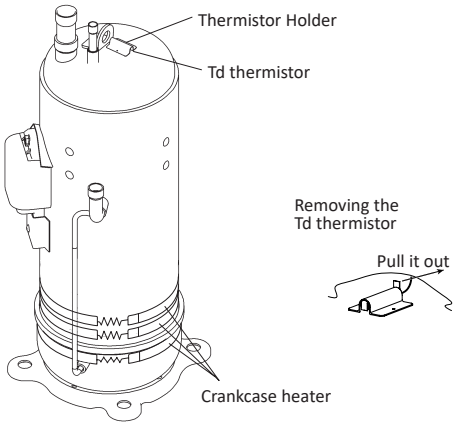


5 Remove the mounting bracket to remove the Td thermistor, on the top of the compressor.

6 Release the spring for the crankcase heater to remove it.

NOTE

The mounting braket and the other elements will be used again for the reassembly. Keep them in a box and such during the replacement, in order not to lose them.



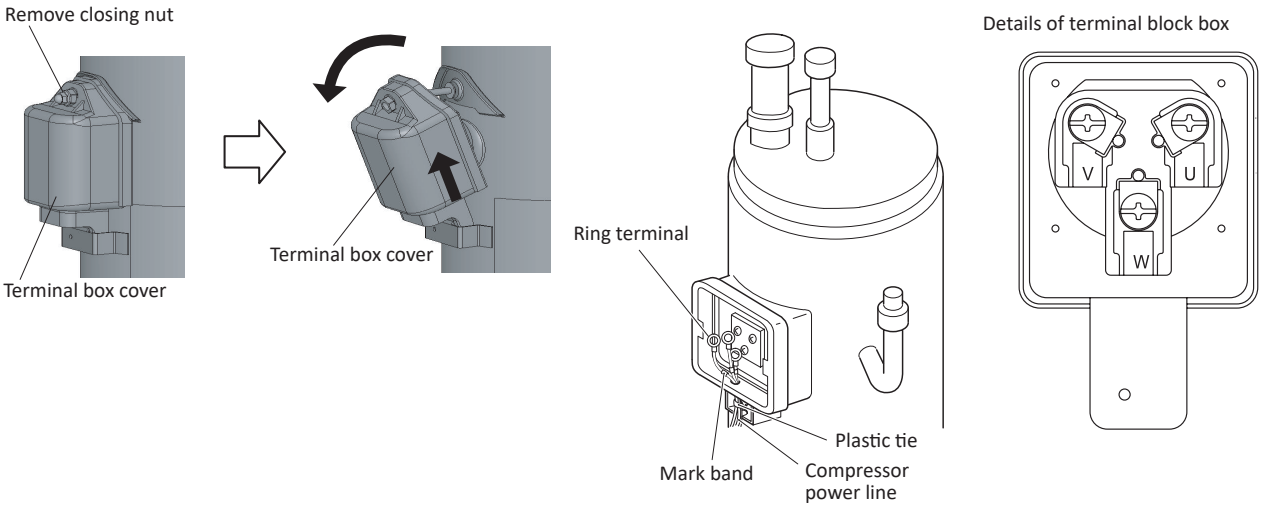
7 Remove the terminal box cover for the compressor and disconnect the wiring to the compressor terminals.

8 Check the terminals numbers and the mark band numbers.

✓ Match the terminal numbers with the mark band numbers when rewiring the compressor. If they are incorrectly connected, the compressor may be damaged due to reverse rotation.

NOTE

- *When replacing the compressor, check for the ring terminal condition. If there is something wrong with any of the ring terminals, replace it with a new one.*
- *Fix the lead wire firmly with plastic ties.*
- *Retighten the compressor screws after the replacement.*



9 Disconnect the discharge and suction pipes and the injection pipe from the compressor.

a. Check the air pressure in the piping is equal to the atmospheric pressure.

b. Cut the pipes at the closer position to the compressor from each brazing part.

c. Remove the pipes from the brazing parts of the compressor.

10 Remove the suction and injection pipes by heating up the brazed section with a torch.

NOTE

- *All the pipes are connected by brazing. When applying the burner to the pipe connections, the oil adhered inside the pipes may burn. So clear flammable materials around the compressor before the work.*
- *Burner work under applying gas pressure is very dangerous. Make sure to cut the pipes first before burner work.*

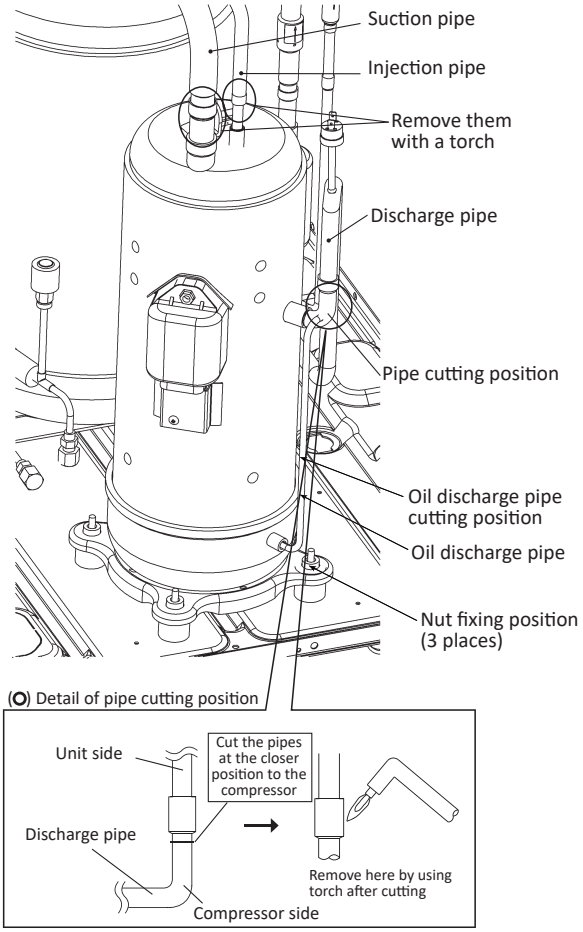
11 Pinch and cut the oil discharge pipe at the closer position to the compressor from the brazing part so that the refrigerant oil remaining inside the compressor will not spill out from the oil discharge pipe.

12 Disconnect the oil discharge pipe from the compressor.

NOTE

- *If the oil discharge pipe is disconnected without performing the above procedure (for example, applying burner directly to the brazing part), the refrigerant oil may pill out from the oil discharge pipe and catch fire. Make sure to follow the procedure for safety.*
- *When disconnecting the oil discharge pipe, use an oil pan and such in case the remaining refrigerant oil spills.*
- *Do not throw out the oil collected with the oil pan and such. The oil quantity must be measured afterward.*

13 Remove 3 nuts fixing the compressor and remove the compressor.



NOTE

- *When removing the compressor, take special care not to touch with the surrounding pipes. If contacted, the pipes may be deformed.*
- *Take special care not to be injured with the sheet metal edges while working.*
- *When removing the compressor fixed with the oil discharge pipe, seal the pipe end with tapes so that the refrigerant oil remaining inside the compressor will not spill out from the oil discharge pipe.*
- *To prevent water and foreign particles from entering the refrigerant cycle, mount the new compressor immediately after removing the old one.*
- *When removing the compressor, remove the electrical box located above the compressor to make the work easier. 10 mm box wrench is required to remove the nuts fixing the compressor.*

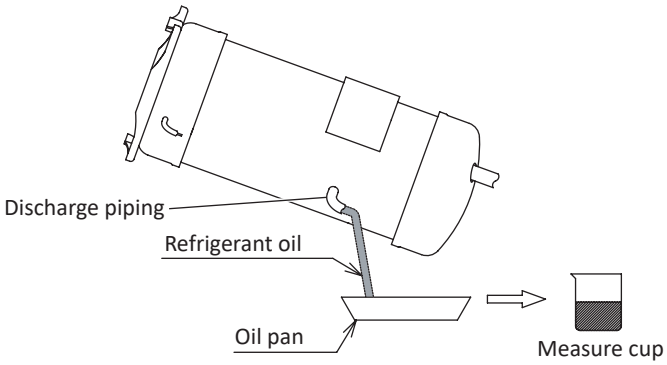
14 Withdraw the remaining refrigerant oil in the compressor from the discharge pipe, and measure the oil quantity.

NOTE

- *Additional refrigerant oil charge is required if: remaining refrigerant oil quantity in the old compressor > pre-charged refrigerant oil in the new compressor.*
- *No additional refrigerant oil charge is required if: remaining refrigerant oil quantity in the old compressor < pre-charged refrigerant oil in the new compressor.*
- *The recharged quantity of the refrigerant oil to the cycle is calculated as follows: (Remaining quantity in the old compressor + 200 cc*) - (Initial charged quantity in the compressor for each model)*

Compressor	Initial charged refrigerant oil
AA50PHDPA - D1Y2	1100 cc
DC65PHDPA - D1Y2	1100 cc
DA80PHDPA - D1Y2	1100 cc
DD98PHDPA - D1Y2	1100 cc
*200 cc: This value is not considered to be removed from the chamber.	

15 Replace all of the refrigerant oil with new refrigerant oil if it is contaminated.



16 Mount the new compressor.

⚠ CAUTION

- *When attaching the nut at the front side, take care not to deform the oil discharge pipe.*
- *When mounting the new compressor on the base, take special care not to contact the piping. If contacted, piping may be deformed.*

17 File away brazing material remaining on the end of the refrigerant pipes.

a. Verify that filed brazing material does not enter the pipes.

b. Insert the pipes fully in to prevent brazing material from entering them.

c. Refer to the table for the recommended amount of brazing material.

⚠ CAUTION

- *If using more brazing material than the recommended amount, brazing material may drop into the pipes.*
- *When brazing the pipes prevent oxidized scale formation by nitrogen substitution.*

d. Perform brazing work according to the following order.

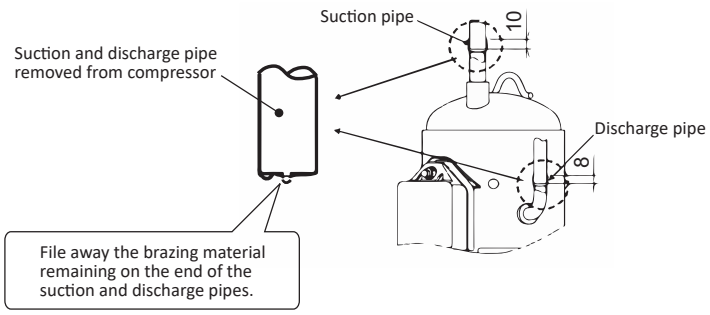
i. Discharge Pipe

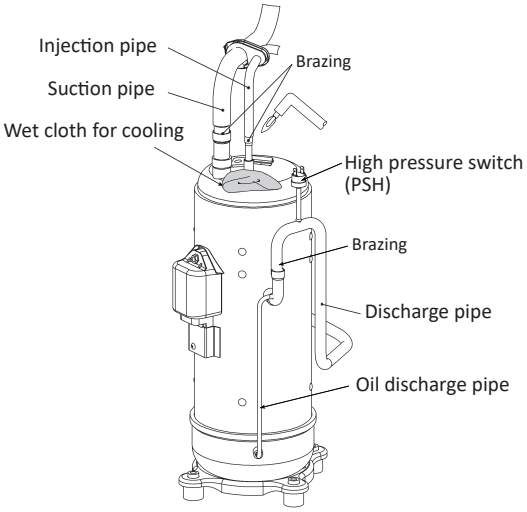
ii. Suction Pipe

iii. Injection Pipe

NOTE

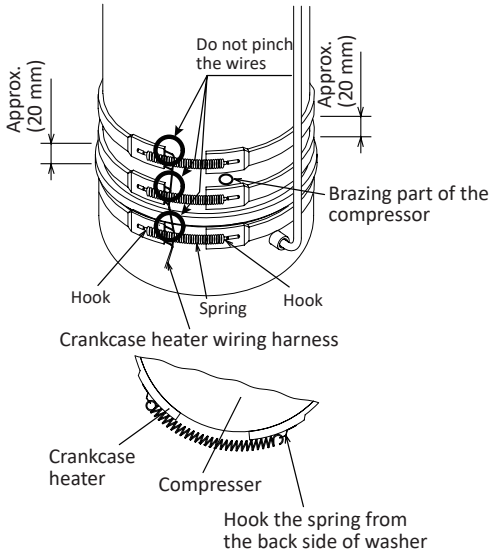
- *For piping connection, perform securely non-oxidation brazing with nitrogen substitution. If brazing the pipes without the nitrogen substitution, a large amount of oxidized scale will be generated in the pipes. This oxidized scale may cause clogging in the expansion valve, solenoid valve, accumulator and compressor, which can prevent the unit from operating properly. Do not use field-supplied antioxidant, etc. Which may corrode pipes and deteriorate the refrigerant oil.*
- *When mounting the new compressor on the base, take special care not to contact the piping. If contacted, piping may be deformed.*
- *The new compressor should be mounted with the cap, and remove the cap just before starting the brazing work.*
- *Connect the charging hose with the check joint at the low pressure side to release pressure.*
- *When brazing the suction pipe, make sure that the connecting part is firmly inserted into the compressor and that the piping root is cooled, in order to prevent the brazing material from entering the compressor.*





Thickness of brazing material	Piping diameter (refrigerant cycle side)						
	ø6.4	ø9.5	ø12.7	ø15.9	ø19.1	ø22.2	ø28.2
ø1.6	25 mm	30 mm	35 mm	75 mm	100 mm	110 mm	225 mm
ø2.0	15 mm	15 mm	20 mm	45 mm	55 mm	70 mm	135 mm
ø2.4	10 mm	10 mm	15 mm	30 mm	35 mm	45 mm	90 mm

18 Wind the crankcase heater around the compressor. Each crankcase heater shall be apart approximately 20 mm.



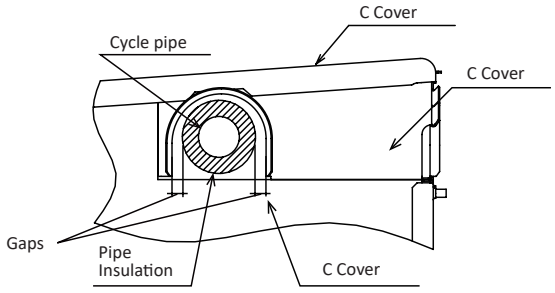
19 Reassemble the compressor cover (C-cover) using reverse procedure.

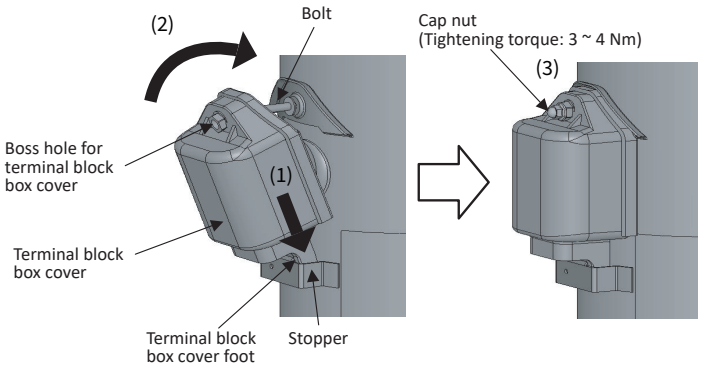
20 Reconnect all wiring according to the procedure on the following pages.

NOTE

- *If the power line or the crankcase heater lead line contacts the high temperature part such as the oil discharge pipe or compressor chamber, the wire may be cut or catch fire. Check that all the wiring do not contact with the compressor, pipe and the edge of the sheet metal.If contact, wiring may be cut or fired.*

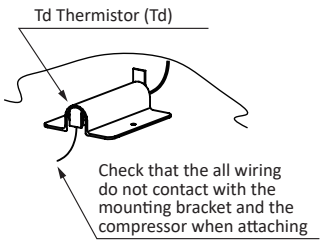
- *Check that the high pressure switch (PSH) does not contact the compressor cover aluminium sheet.*
- *Attach the crankcase heater firmly to the compressor and fix it with springs as shown in the figure.*
- *If there is clearance between the crankcase heater and the compressor due to wire overlapping, excessive heat will be generated there. Then crankcase heater may break down due to overheating. When mounting the reassembled crankcase heater, this point should be taken into account.*
- *If the crankcase heater lead wire catches on the springs, the lead wire may be cut due to vibration. When reassembling the crankcase heater, attention should be paid to the lead wire.*



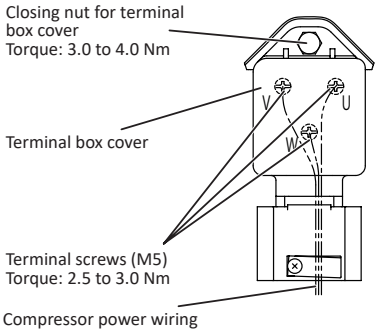


◆ All models

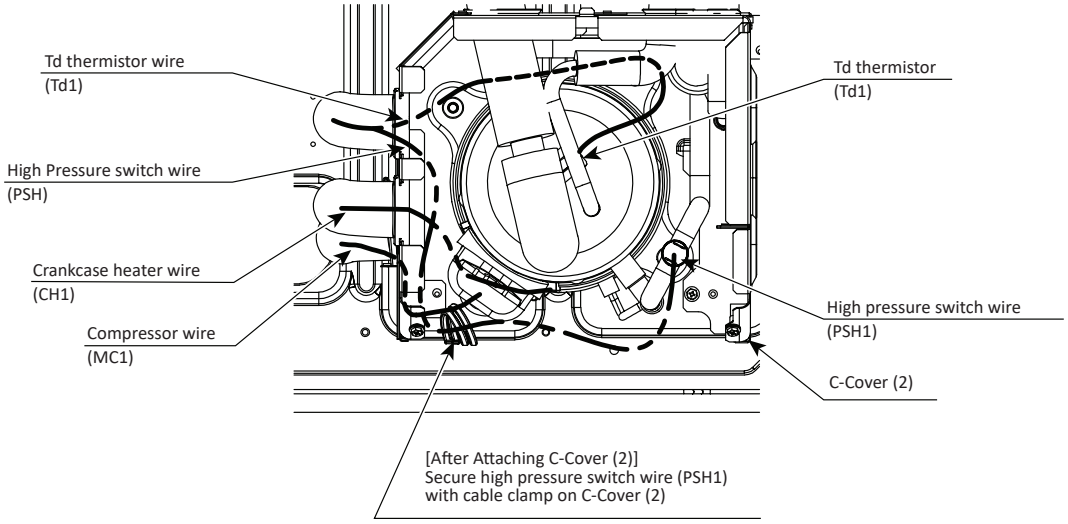
Details of A

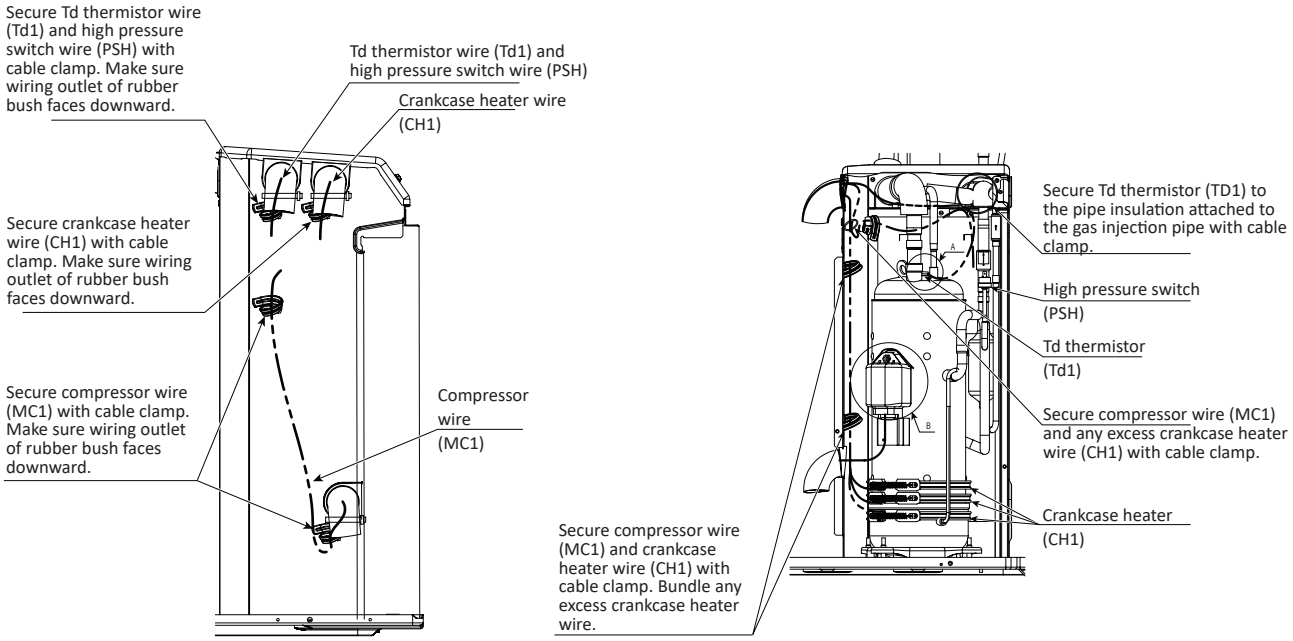


Details of B



◆ RAS-(8-12)FSXNS2E, RAS-(5/6)FSXNP2E

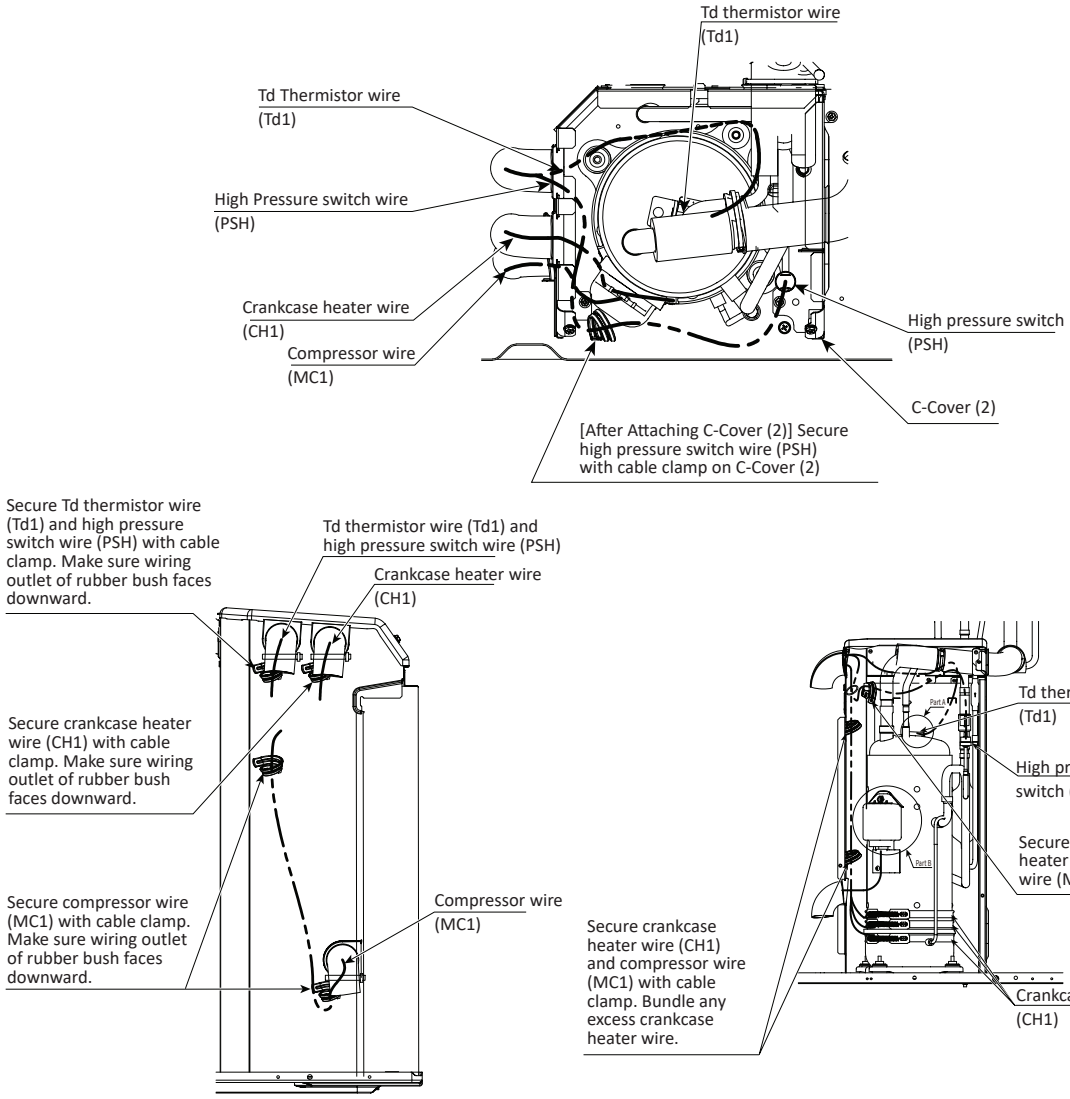




After compressor installation is complete, put the pipe insulation back in place as shown in the figure above.

When installing the C-cover, be careful that the cables do not get caught in the gaps or overlapping parts of the cover. Otherwise, a fire could occur, such as ignition due to disconnection of the cables.

◆ RAS-(14-24)FSXNS2E, RAS-(8-18)FSXNP2E



After compressor installation is complete, put the pipe insulation back in place as shown in the figure above.

When installing the C-cover, be careful that the cables do not get caught in the gaps or overlapping parts of the cover. Otherwise, a fire could occur, such as ignition due to disconnection of the cables.

- The cabinet size L is equipped with 2 compressors, in this case the removing compressor operation can be double.

7.7 Replacing the refrigerant oil

DANGER

Turn OFF all the power source switches.

NOTE

For servicing use the following tool: adjustable wrench or spanner.

7.7.1 No clogging in return oil circuit

1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

2 Close (A) high/low pressure gas stop valve, (B) low pressure gas stop valve and (C) liquid stop valve.

3 Connect the charge hose (for R410A) to (D) the check joint, to collect the refrigerant oil.

4 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

5 Charge with nitrogen (0.15 MPa) from (E) low pressure check joint and collect the refrigerant oil in the accumulator by applying pressure for approximately 20 minutes.

NOTE

The residual refrigerant oil indicated in the figure cannot be collected because of the accumulator structure.

CAUTION

Make sure that the pressure of the high pressure check joint is not abnormal when the nitrogen is charged.

6 Stop charging with nitrogen after the refrigerant oil is completely collected.

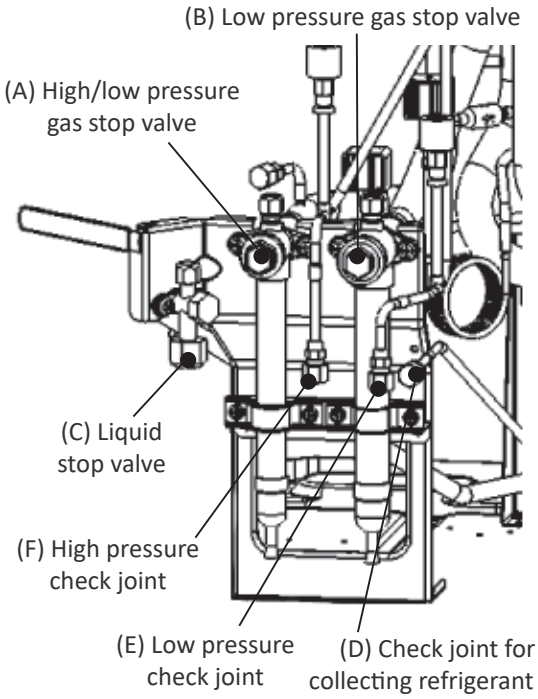
7 Perform vacuuming from (E) low pressure check joint and add the same quantity as the collected refrigerant oil.

NOTE

When the collected refrigerant oil is 3 L. or less, clogging may exist in the return oil circuit. In this case, replace the return oil circuit as described in the procedure "7.7.2 Clogging in return oil circuit and replacing return oil circuit".

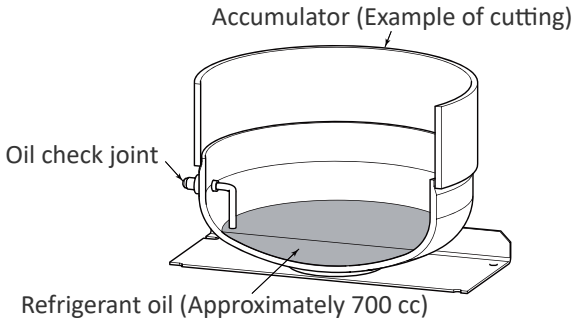
8 When the procedure is finished, perform the vacumming again from the low pressure check joint and recharge the refrigerant.

9 After recharging, open the stop valves.



NOTE

- *Use a clean charge hose.*
- *Charge the refrigerant oil in a short period of time (approximately 20 minutes). Use a container with a small opening so the refrigerant oil does not absorbe the moisture in the atmosphere.*



7.7.2 Clogging in return oil circuit and replacing return oil circuit

NOTE

In the case of replacing the return oil circuit only, the procedures 8 and 9 are not required.

1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

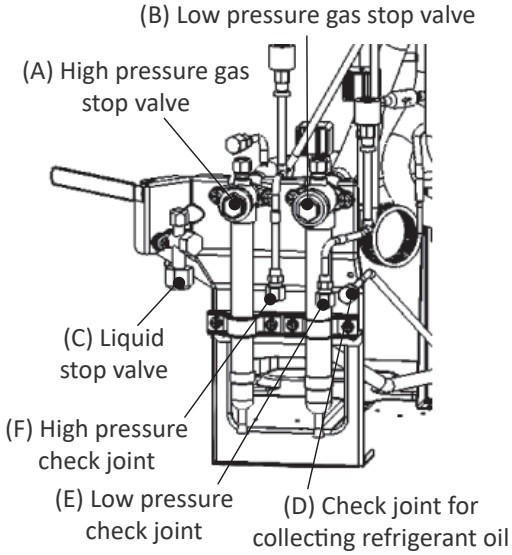
2 Remove the electrical box as described in the procedures *"7.4 Removing the electrical box"*.

3 Close (A) high/low pressure gas stop valve, (B) low pressure gas stop valve and (C) liquid stop valve.

4 Collect the outdoor unit refrigerant from (E) low pressure check joint and (F) high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

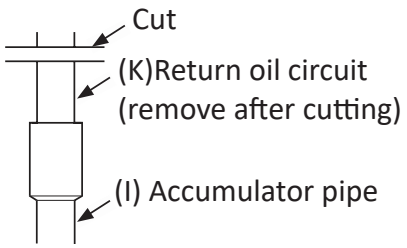
   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.



5 Cut off (G) return oil circuit with (I) accumulator pipe at the cutting position 1.

6 Cut off (G) return oil circuit with (H) oil separator at the point indicated in position 2. Remove (G) return oil circuit from the unit. Then, remove (J) brazing part of accumulator pipe and (L) brazing part of the oil separator outlet port.

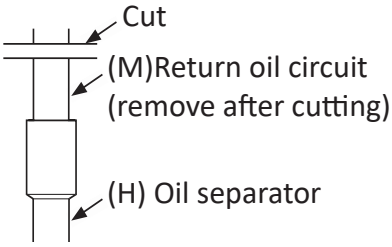
Detail of cutting position 1: All models



NOTE

- *When cutting (K) (M) return oil circuit pipes off, cut the closer part to (K) (M) return oil circuit to prevent the refrigerant oil remaining in (G) return oil circuit from spilling out.*
- *When cutting return oil circuit off, do not use a tool spewing swarf such as a saw.*
- *After cutting return oil circuit off, remove the cut-off piping from (L) brazing part of the oil separator outlet port.*
- *When removing (J) brazing part of accumulator pipe and (L) brazing part of the oil separator outlet port, refrigerant oil may come out. Prepare the oil pan and such before the work to receive the refrigerant oil.*

Detail of cutting position 2: All models



7 Connect a charging hose to (L) brazing part of oil separator outlet port. Then, charge nitrogen (0.15MPa) from (J) brazing part of accumulator pipe and collect refrigerant oil in (H) oil separator by applying pressure.

8 Stop charging nitrogen after the refrigerant oil has completely been collected. Perform vacuuming from (E) low pressure check joint and add the same quantity of oil as the collected refrigerant oil from (D) check joint for collecting refrigerant oil.

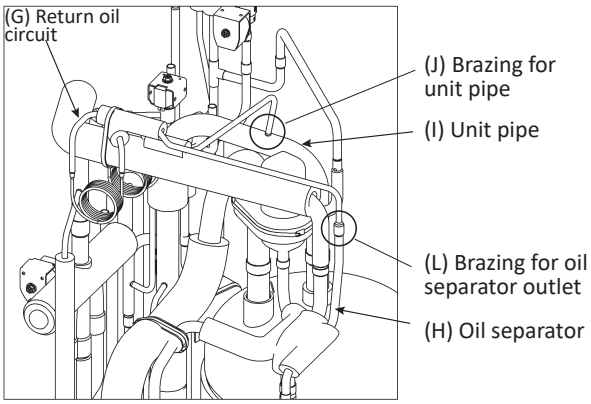
9 Connect the return oil pipe for replacement. After connecting the pipe, perform the nitrogen pressurization from (E) low pressure check joint. During the work, check that the oil does not spill out from brazing part.

10 When the procedures have been completed, perform vacuuming again from (E) low pressure check joint and recharge the refrigerant. After recharging, open the stop valves.

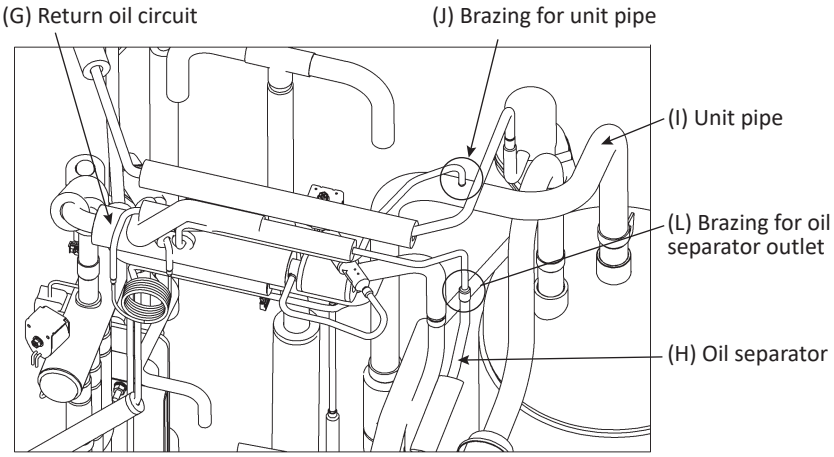
NOTE

- *Use a clean charging hose.*
- *Charge the refrigerant oil in a short time (within approx. 20 minutes). Use a container with a small opening so that the refrigerant oil will not absorb the moisture in the atmosphere.*

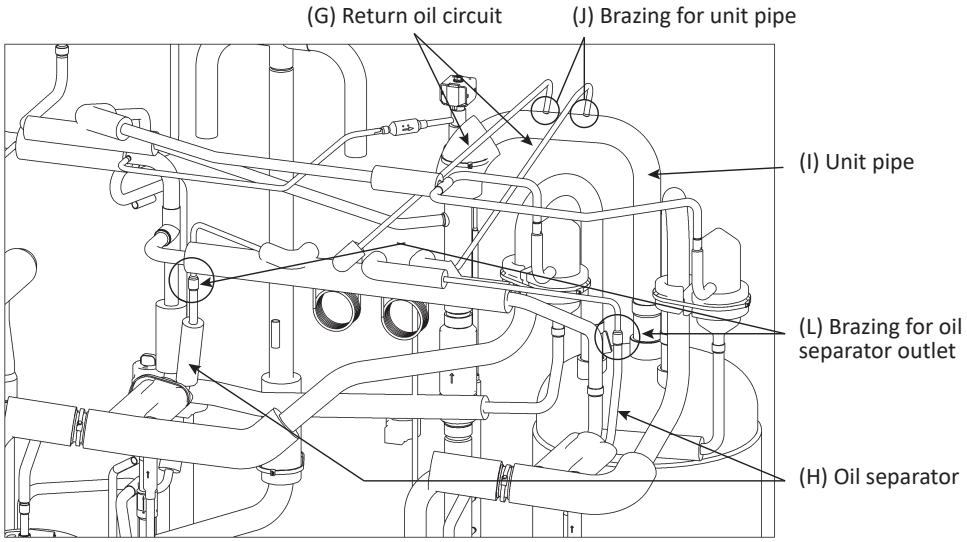
◆ RAS-(8-12)FSXNS2E / RAS-(5-6)FSXNP2E



◆ RAS-(14-18)FSXNS2E / RAS-(8-14)FSXNP2E



◆ RAS-(20-24)FSXNS2E / RAS-(16-18)FSXNP2E



7.8 Removing the coils

DANGER

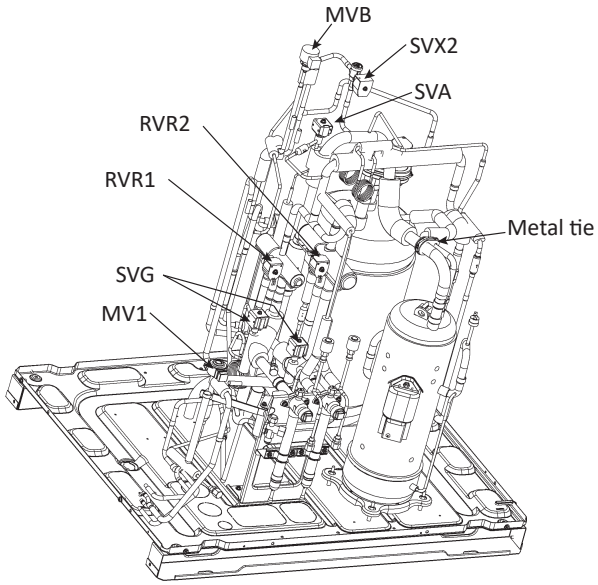
Turn OFF all the power source switches.

NOTE

For servicing use the following tools: pliers, wet cloth, charging hose, pipe cutter, Phillips screwdriver, adjustable wrench or spanner, burner, pincher.

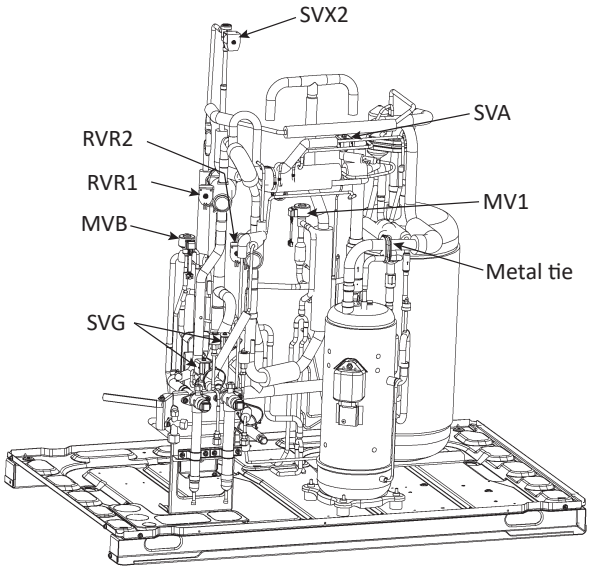
7.8.1 Coil position

◆ RAS-(8-12)FSXNS2E / RAS-(5-6)FSXNP2E



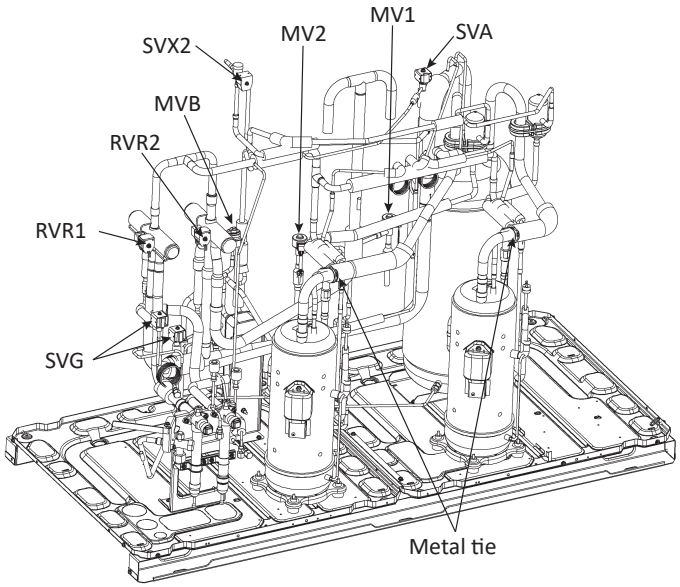
SVA	Solenoid valve coil
SVX2	
SVG	
RVR1	Reversing valve coil
RVR2	
MV1	Expansion valve coil
MVB	

◆ RAS-(14-18)FSXNS2E / RAS-(8-14)FSXNP2E



SVA	Solenoid valve coil
SVX2	
SVG	
RVR1	Reversing valve coil
RVR2	
MV1	Expansion valve coil
MVB	

◆ RAS-(20-24)FSXNS2E / RAS-(16-18)FSXNP2E



SVA	Solenoid valve coil
SVX2	
SVG	
RVR1	Reversing valve coil
RVR2	
MV1	Expansion valve coil
MV2	
MVB	

7.8.2 Removing the expansion valve coil (MV1, MV2, MVB)

DANGER

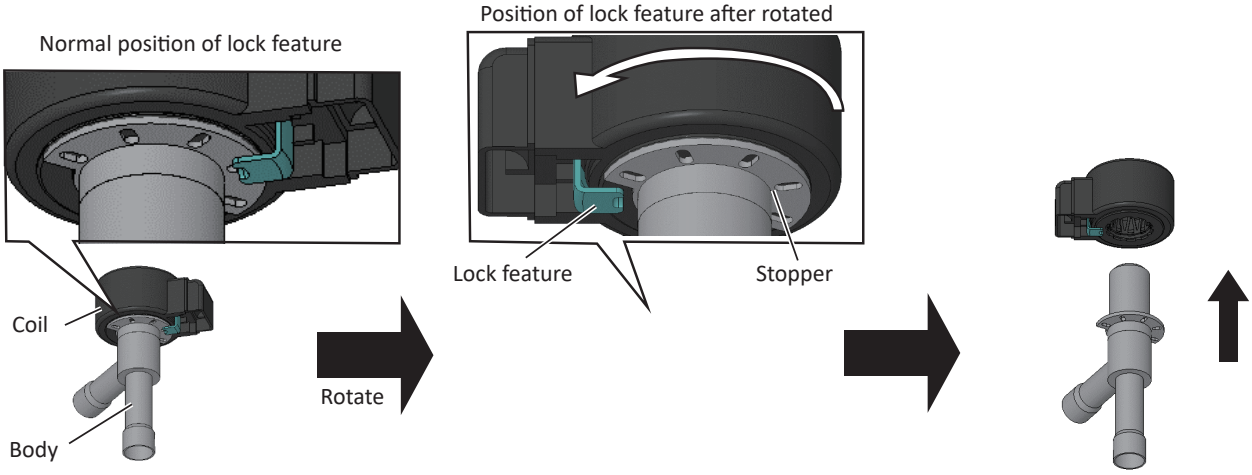
- ***There is a risk of electrocution due to residual voltage.***
- ***Be sure to disconnect the power supply before starting to check any electrical components.***
- ***Be sure that the residual voltage is discharged after disconnecting the power supply.***
- ***Do not touch the electrical parts when the control lights are on.***
  LED1 (red) on the outdoor PCB
  LED3 (orange) on the inverter PCB
- ***Be sure that the above lights are not lit before repairing electrical parts and wiring.***

1 Remove the service front cover and bottom front cover as described in the procedure *"7.1.1 Removing service front cover"* and *"7.1.3 Removing bottom front cover"*.

2 Disconnect the CN10 (MV1), CN11 (MV2) and CN12 (MVB) connectors on the outdoor unit PCB of the E-Box.

3 Rotate the expansion valve coil to make sure that is released from the stopper and pull it upward.

4 Remove the coil carefully to avoid damaging the cycle piping.



When assembling the parts, reverse de removal procedure.

The electronic expansion valve coil has a locking feature. Once installated, rotate it and make sure that it clicks into the slot in the electronic expansion valve.

Any slot can be used as long as the electronic expansion valve coil does not come in contact with other parts.

5 Fix the wiring with a cable tie so that it remains in the original state before removal.

NOTE

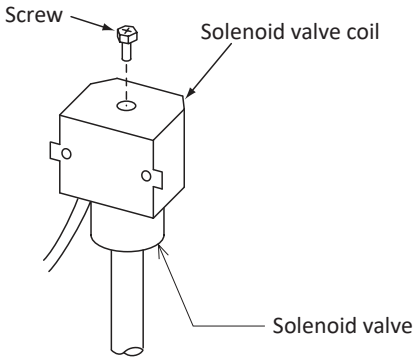
Be sure that the coil mounting angle is the same as before removal.

7.8.3 Removing the solenoid valve coil (SVA, SVG)

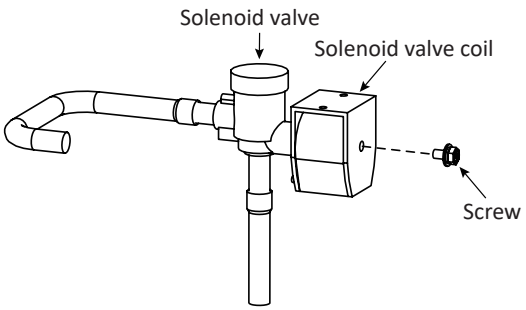
1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers".*

2 Remove the screw from the solenoid valve coil with a Phillips screwdriver. If the screw is difficult to remove, use an adjustable wrench or spanner.

3 Remove the solenoid valve coil.



SVA, SVG

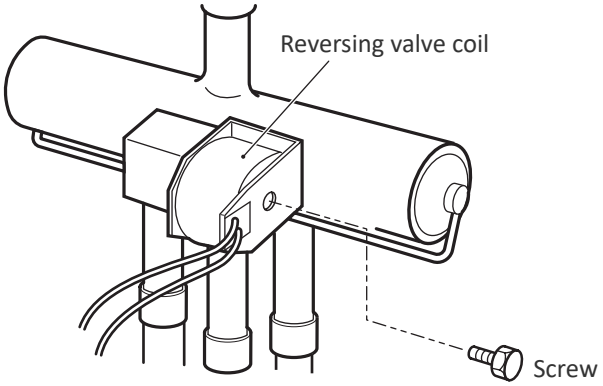


SVX2

7.8.4 Removing the reversing valve coil (RVR1, RVR2)

1 Remove the screw from the reversing valve coil with a Phillips screwdriver. If the screw is difficult to remove, use an adjustable wrench or spanner.

2 Remove the reversing valve coils.



7.9 Removing the valves

DANGER

Turn OFF all the power source switches.

7.9.1 Removing the expansion valve (MV1, MV2, MVB)

1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

2 Close the high/low pressure gas stop valve, low pressure gas stop valve and liquid stop valve.

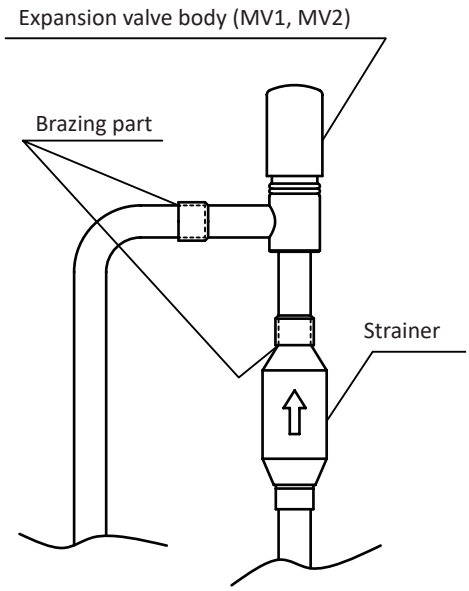
3 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

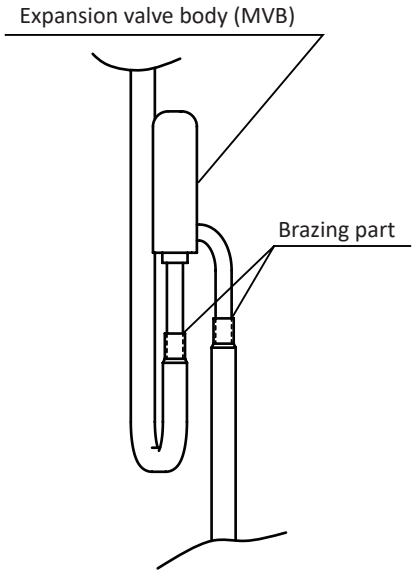
   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

4 Remove the expansion valve coils according to *"7.8.2 Removing the expansion valve coil (MV1, MV2, MVB)"*.

5 Remove the brazing at the position shown in the figure below.





6 The positions of expansion valves (MV1, MV2, MVB) are shown in the item *"7.8 Removing the coils"*.

NOTE

- *During brazing work, cover the solenoid valves with wet cloth for cooling.*
- *Take special care not to burn the connecting wiring and the piping insulation during brazing work.*

7 Reassemble the expansion valves in the reverse procedure.

7.9.2 Removing the solenoid valve (SVA, SVX2, SVG)

1 Remove the front service cover as described in the procedure *"7.1.1 Removing service front cover"*.

2 Close the high/low pressure gas stop valve, low pressure gas stop valve and liquid stop valve.

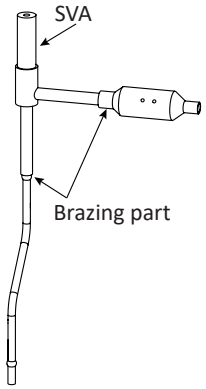
3 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

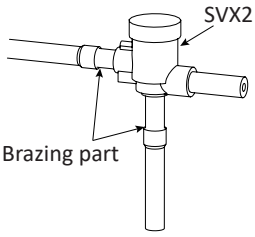
   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

4 Remove the solenoid valve coil as described in the procedure *"7.8.3 Removing the solenoid valve coil (SVA, SVG)"*.

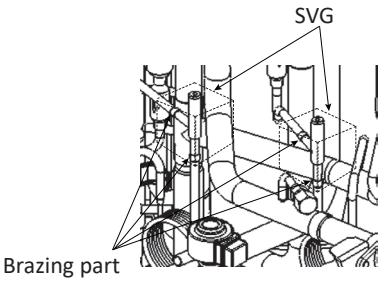
5 Remove the brazing at the position shown in the figure below.



Removing SVA



Removing SVX2



Removing SVG

NOTE

- *During brazing work, cover the solenoid valves with wet cloth for cooling.*
- *Take special care not to burn the connecting wiring and the piping insulation during brazing work.*

6 Reassemble the solenoid valves in the reverse procedure.

7.9.3 Removing the reversing valve

1 Remove the front service cover and front bottom cover as described in the procedure *"7.1 Removing the front covers"*.

2 Remove the electrical box and wirings as described in the procedure *"7.4 Removing the electrical box"*.

3 Close the high/low pressure gas stop valve, low pressure gas stop valve and liquid stop valve.

4 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

5 The reversing valves are fixed at the positions shown in the figure.

6 Remove the reversing valve coils as described in the procedure.*"7.8.4 Removing the reversing valve coil (RVR1, RVR2)"*.

7 Remove the brazing portion shown in the figures below with the reversing valves and the stop valves covered with wet cloth for cooling.

NOTE

- *Make sure to remove the brazing portion at the indicated positions in the figures. If not, leakage may occur when reassembling the valves.*
- *Connect the charging hose to the check joint for the low pressure gas stop valve before removing the brazing.*

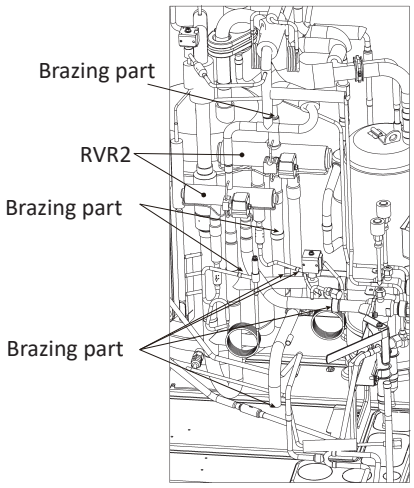
8 Cover the reversing valves with wet cloth for cooling.

9 Remove the brazing of the reversing valve assembly as shown in the following order:

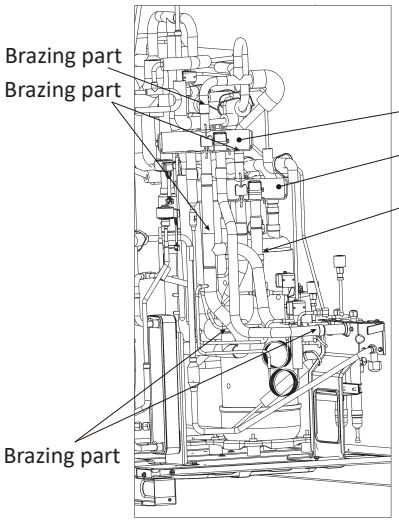
a. Brazing at the right and left branch pipes of the three pipes coming from the reversing valve.

b. Brazing at the centre branch pipe of the three pipes coming from the reversing valve.

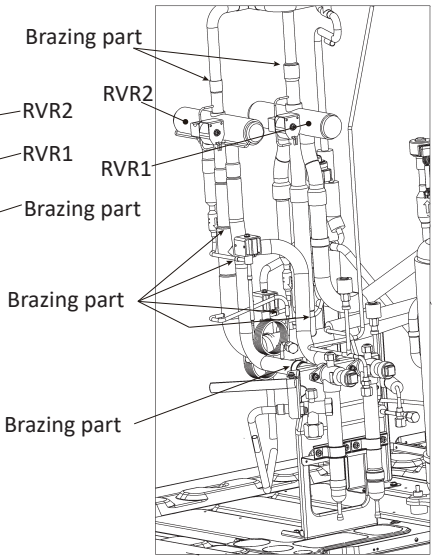
RAS-(8-12)FSXNS2E
RAS-(5/6)FSXNP2E



RAS-(14-18)FSXNS2E
RAS-(8-14)FSXNP2E



RAS-(20-24)FSXNS2E
RAS-(16-18)FSXNP2E



10 Remove the reversing valve assembly.

11 Set the reversing valves in the reverse procedure.

NOTE

During brazing work, cover the reversing valves and the stop valves with wet cloth for cooling.

7.9.4 Removing the stop valve

NOTE

For servicing use the following tools: pliers, burner, Phillips screwdriver, wet cloth.

1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

2 Close the high/low pressure gas stop valve, low pressure gas stop valve and liquid stop valve.

3 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

4 When removing (A) gas stop valve, cover the stop valves with wet cloth for cooling and then remove the brazing.

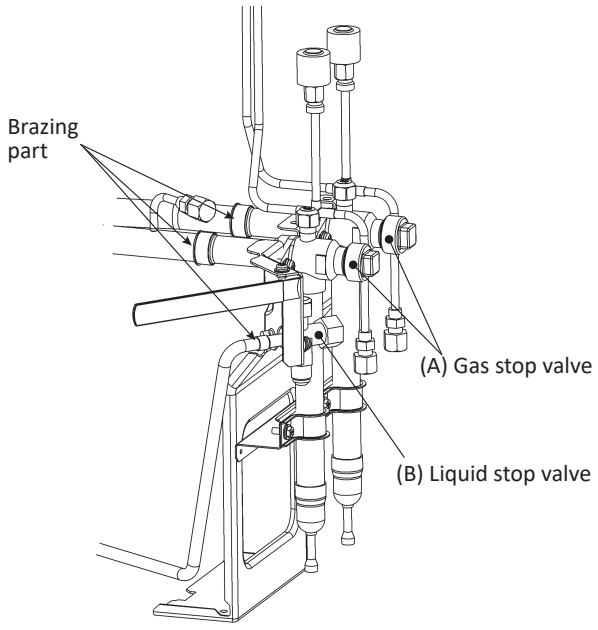
5 When removing (B) liquid stop valve, remove the brazing of the pipe for the stop valve as shown in the figure.

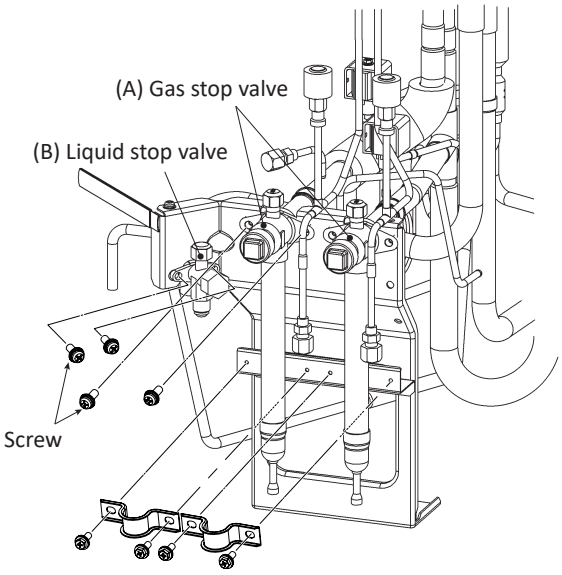
NOTE

- *When removing the brazing for high pressure stop valve and low pressure stop valve, the compressor cover should be removed or protected with a metal plate.*
- *When brazing the stop valves or removing the brazing, cover the stop valves with wet cloth for cooling. Be sure not to burn the connecting wiring and piping insulations.*

6 After removing the brazing for the stop valves, remove the screws fixing the plates as shown in the figure and pull out the stop valves and the plates.

7 Reassemble the stop valves in the reverse procedure.





7.10 Removing the PSH, high and low pressure sensors and thermistors

DANGER

Turn OFF all the power source switches.

NOTE

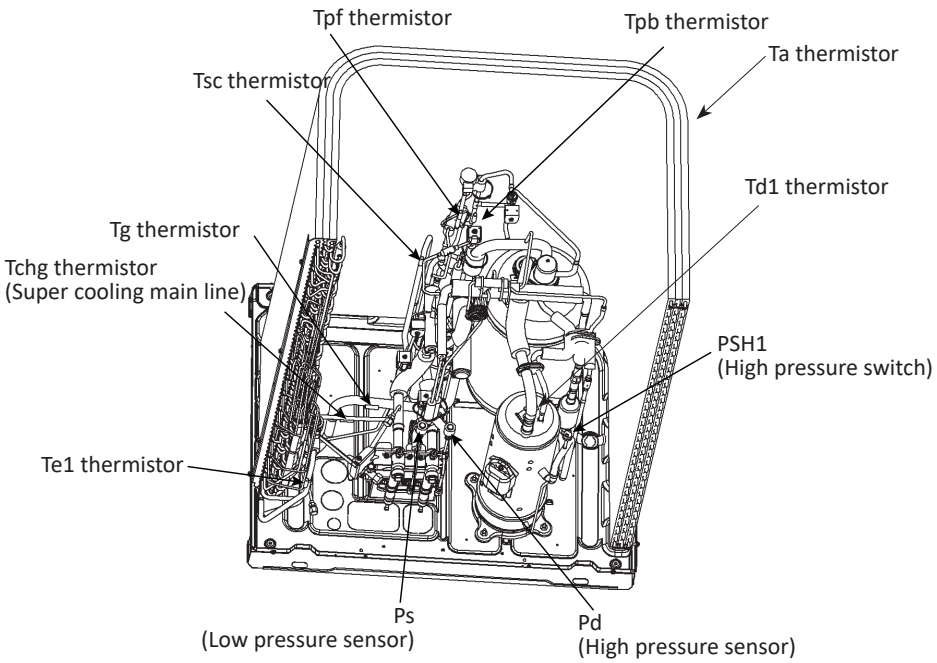
For servicing use the following tools: adjustable wrench or spanner, Phillips screw driver, burner.

1 Remove the front covers as described in the procedure *"7.1 Removing the front covers"*.

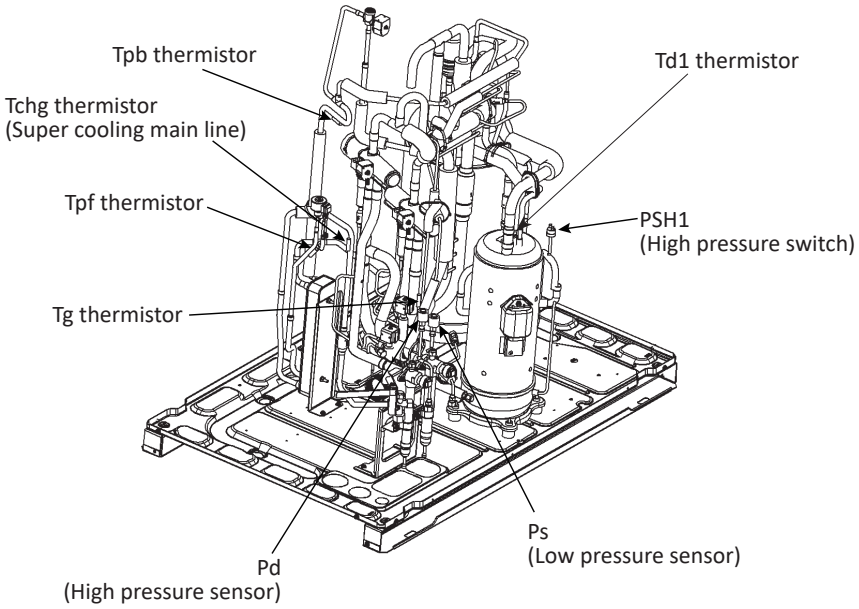
2 High pressure switch (PSH1 and PSH2), high pressure sensor, low pressure sensor and thermistor (Tg, Tchg, Tsc, Te1, Te2, Tpf, Tpb, Td1, Td2, Ta) are fixed as shown in the figure below.

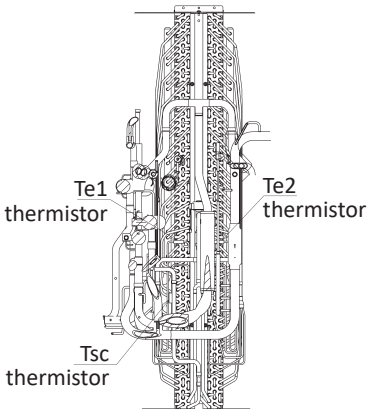
7.10.1 High pressure switch, high/low pressure sensor position and thermistors

RAS-(8-12)FSXNS2E, RAS-(5/6)FSXNP2E



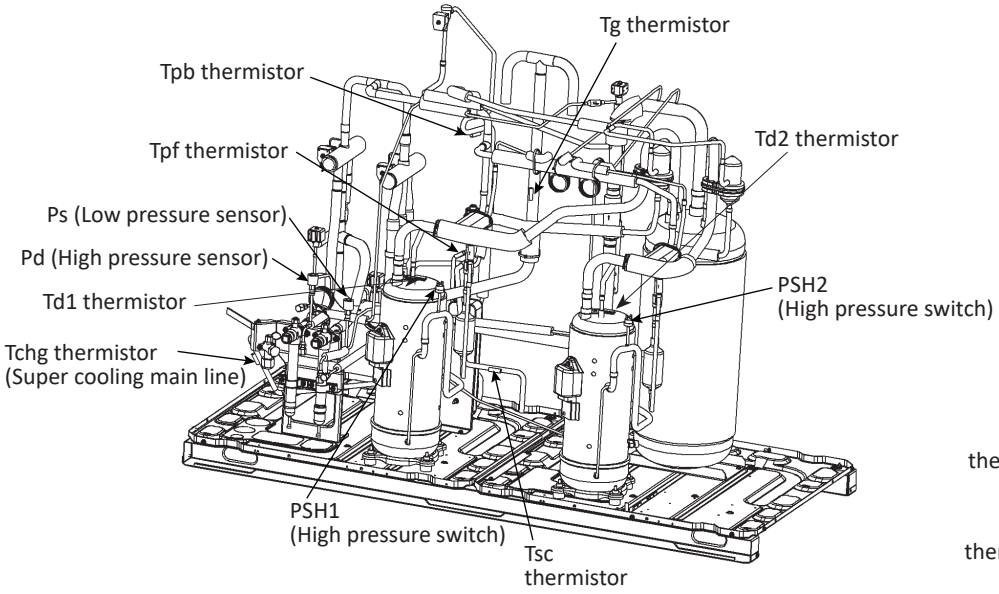
RAS-(14-18)FSXNS2E, RAS-(8-14)FSXNP2E

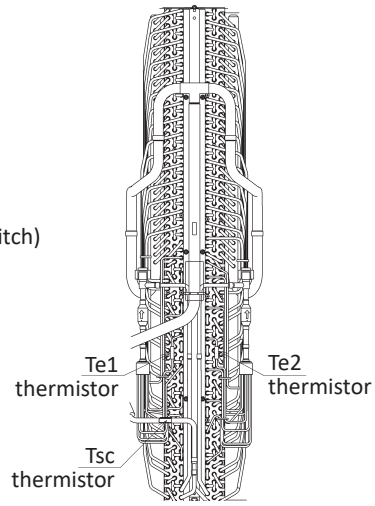




Details of the centre of heat exchanger

RAS-(20-24)FSXNS2E, RAS-(16-18)FSXNP2E





Details of the centre of heat exchanger

7.10.2 Removing the high pressure switch (PSH1, PSH2)

1 Close the gas stop valve and the liquid stop valve.

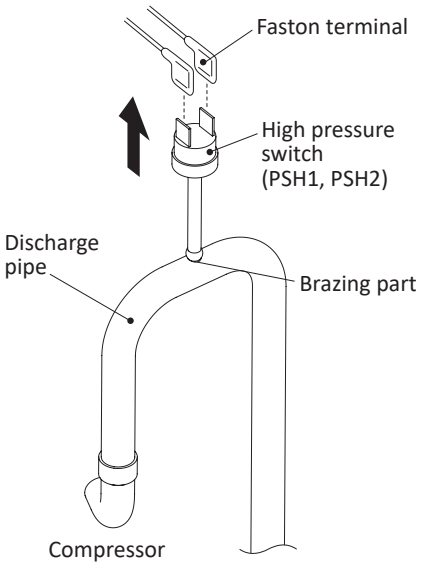
2 Collect the outdoor unit refrigerant from the low pressure check joint and the high pressure check joint.

   a. Check that the pressure of the refrigerant cycle does not increase at this time. If the pressure increase, this means that the refrigerant collection has not been completed.

   b. Refer to the item *"5.7 Setting of forced open valve mode"* and collect all the refrigerant in the refrigerant cycle.

3 Disconnect the faston terminals.

4 Remove the high pressure switch from the brazing part of the discharge pipe with a burner.



NOTE

- *To prevent water and foreign particles from entering the refrigerant cycle, mount the new high pressure switch immediately after removing the old one. If it is impossible by necessity, seal the hole with tapes.*
- *Check that the compressor cover inner side (aluminium sheet) does not contact the terminals of the high pressure switch.*
- *Make sure to fix the insulating sleeve of the faston terminals as shown in the figure. If the terminals of the high pressure switch are exposed and contact with the compressor cover, the electrical components may be damaged.*

7.10.3 Removing the high pressure (Pd) and low pressure (Ps) sensor

NOTE

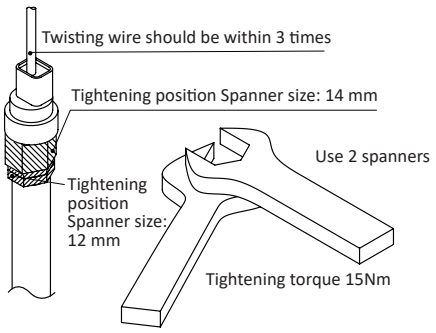
Adjustable wrench or spanner, Phillips screwdriver, pliers

1 Remove the connector for the pressure sensor wiring from the outdoor unit PCB1.

NOTE

First, remove the connector. If not, the wiring may be damaged.

2 Remove the refrigerant piping for the high pressure sensor or low pressure sensor with 2 spanners.



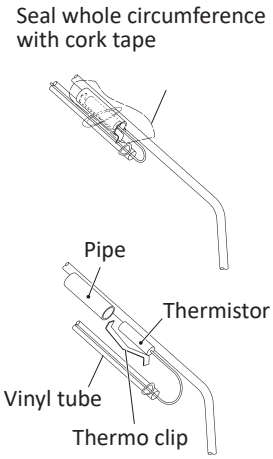
7.11 Removing the pipe thermistor

DANGER

Turn OFF all the power source switches.

NOTE

- *For servicing use the following tools: wet cloth, burner, pliers, Phillips screwdriver, nippers.*
- *When removing the thermistor of the liquid pipe, take care not to cause damage to your hands or the thermistor with the valve stay fixing the stop valve.*
- *When reassembling the thermistor, fix the thermistor with the vinyl pipe end downward to prevent water from entering the pipe.*



1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

2 Remove the electrical box cover as described in the procedure *"7.3 Removing the electrical box covers"*.

3 Remove the cork tape. Then, remove the thermistor for the liquid pipe by pulling out the thermo clip from the pipe.

4 Reassemble the thermistor for liquid pipe in the reverse procedure.

7.12 Removing the ambient temperature thermistor

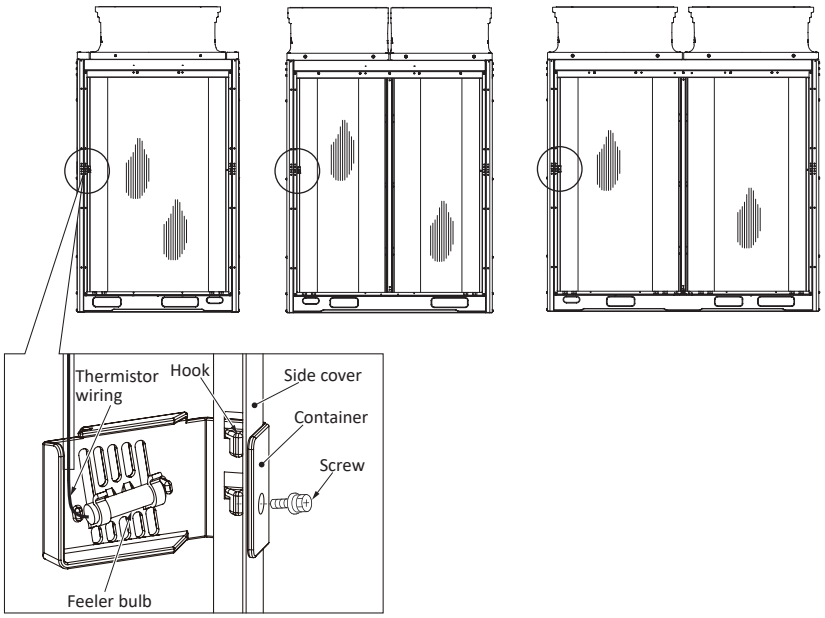
DANGER

Turn OFF all the power source switches.

NOTE

For servicing use the following tools: Phillips screwdriver, nippers.

1 Remove the front service cover and the upper service cover as described in the procedure *"7.1 Removing the front covers"*.
2 Remove the electrical box cover as described in the procedure *"7.3 Removing the electrical box covers"*.
3 Remove the fan grill as described in the procedure *"7.2 Removing the fan grill"*.
4 Remove the screws securing the container for the thermistor to the outdoor unit side cover.
5 Hold the container and lift it upward.
6 Remove the container from the hook on the outdoor unit side cover.
7 Remove the feeler bulb of the thermistor from the container for the thermistor.



8 Pull the wire off along its routing, release the clamps fixing the wire and pass all the rubber bushing until the e-box.
9 Remove the thermistor cable from the THM7 connector on PCB1 and pull through the rubber bushing outside the electrical box.
10 Reassemble the thermistor for ambient temperature in the reverse procedure.

7.13 Removing other electrical components

DANGER

- ***Turn OFF all the power source switches.***
- ***Do not touch any electrical component if the LED201 (Red) of the PCB2 is ON. Otherwise, an electric shock will occur.***

1 Remove the front service cover as described in the procedure *"7.1.1 Removing service front cover"*.

2 Remove the electrical box cover as described in the procedures *"7.3 Removing the electrical box covers"*.

NOTE

- *When replacing the components of the radiation fin such as Inverter PCB (INV) and main power PCB (PCB1), apply conductive silicon grease (Service Parts No.: P22760) slightly over the contact surface of the fin.*
- *When reassembling the electrical components, match the terminal Nos. with the mark band Nos. If they are incorrectly connected, malfunction may occur or the electrical components may be damaged.*
- *When fixing PCBs or sheet metals for outdoor unit PCB, protect the electric wiring from caught on the sheet metals or the electrical components.*
- *Make sure to use screws, bushes and collars when fixing inverter PCBs. If not, it may cause equipment malfunction.*
- *When replacing the outdoor unit PCB and inverter PCB, set the dip switches the same as before replacing the PCBs. An incorrect setting will cause malfunction. Refer to the instruction manual attached to servicing outdoor unit PCB.*
- *Do not apply an excessive force to the electrical components on PCBs or PCBs themselves. It may lead to PCBs failure.*

7.13.1 Removing the PCB1 and electrical components

◆ Removing the outdoor unit PCB1

1 Remove all the connectors for wiring connected to the outdoor unit PCB1.

2 Hold the convex part of the holder fixing the outdoor unit PCB1 with a long-nose pliers and pull it out to remove.

◆ Removing the electrical components from the electrical box

1 Disconnect all the wirings connected with the electrical components.

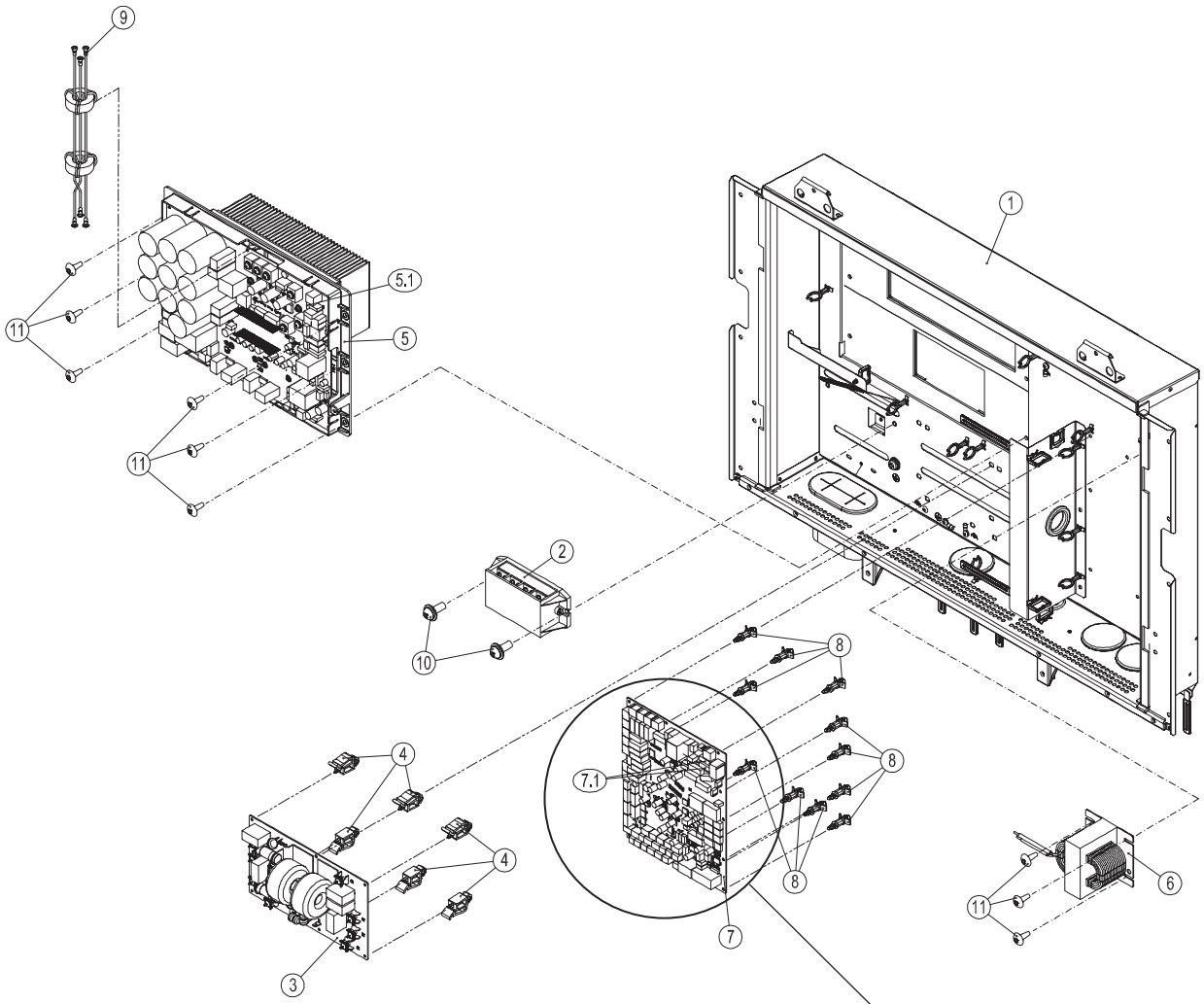
2 Remove the screws fixing the electrical components.

NOTE

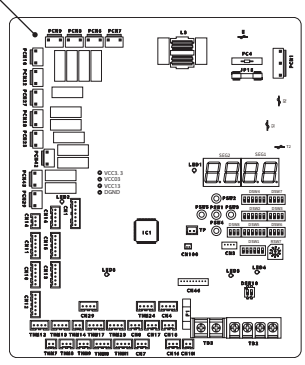
- *Do not touch the electrical components on the outdoor unit PCBs while LED (red) of the PCB is ON to avoid electrical shock.*
- *Do not bend or apply an excessive force to the outdoor unit PCB1. Otherwise, it may cause outdoor unit PCB1 failure.*
- *When reassembling the electrical components, match the terminal numbers with the mark band numbers. If incorrectly connected, malfunction may occur or the electrical components may be damaged.*
- *When closing the outdoor unit PCB1 fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.*
- *The capacitor is charged with electricity even when the power source is turned off. DO NOT touch the terminals, to avoid an electrical shock.*
- *For servicing use the following tools: Phillips screwdriver, long-nose pliers, pliers.*

◆ RAS-(8-12)FSXNS2E - RAS-(5/6)FSXNP2E

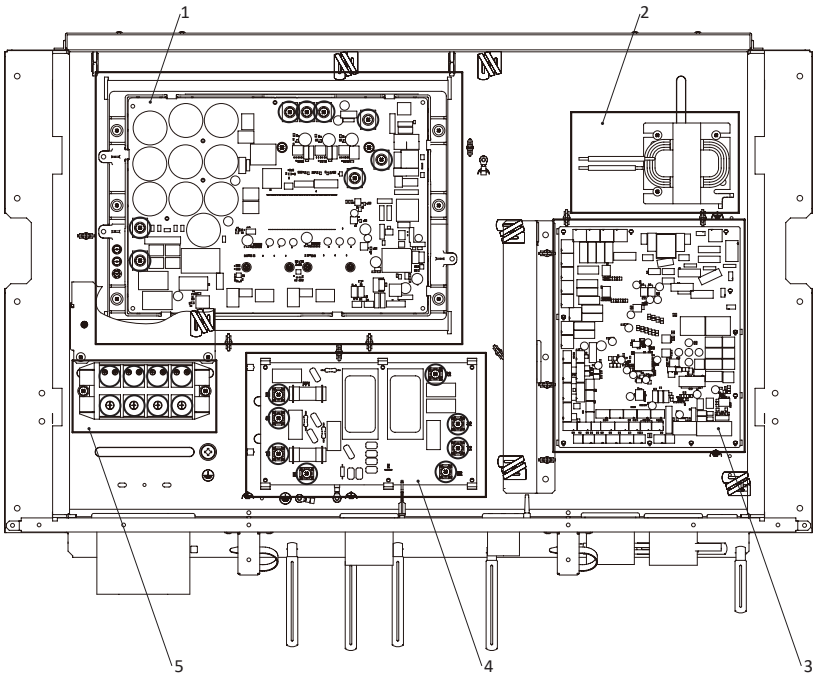
Removing the screws fixing the electrical components to the electrical box.



No.	Name	Units
1	Electrical box	1
2	Terminal block	1
3	Noise filter (NF)	1
4	Holder	6
5	Inverter PCB (INV)	1
5.1	Fuse	6
6	Reactor	1
7	Control PCB	1
7.1	Fuse	2
8	Spacer	11
9	Harness MC	1
10	Screw	2
11	Screw	9



Removing the power wiring connected to each electrical component.

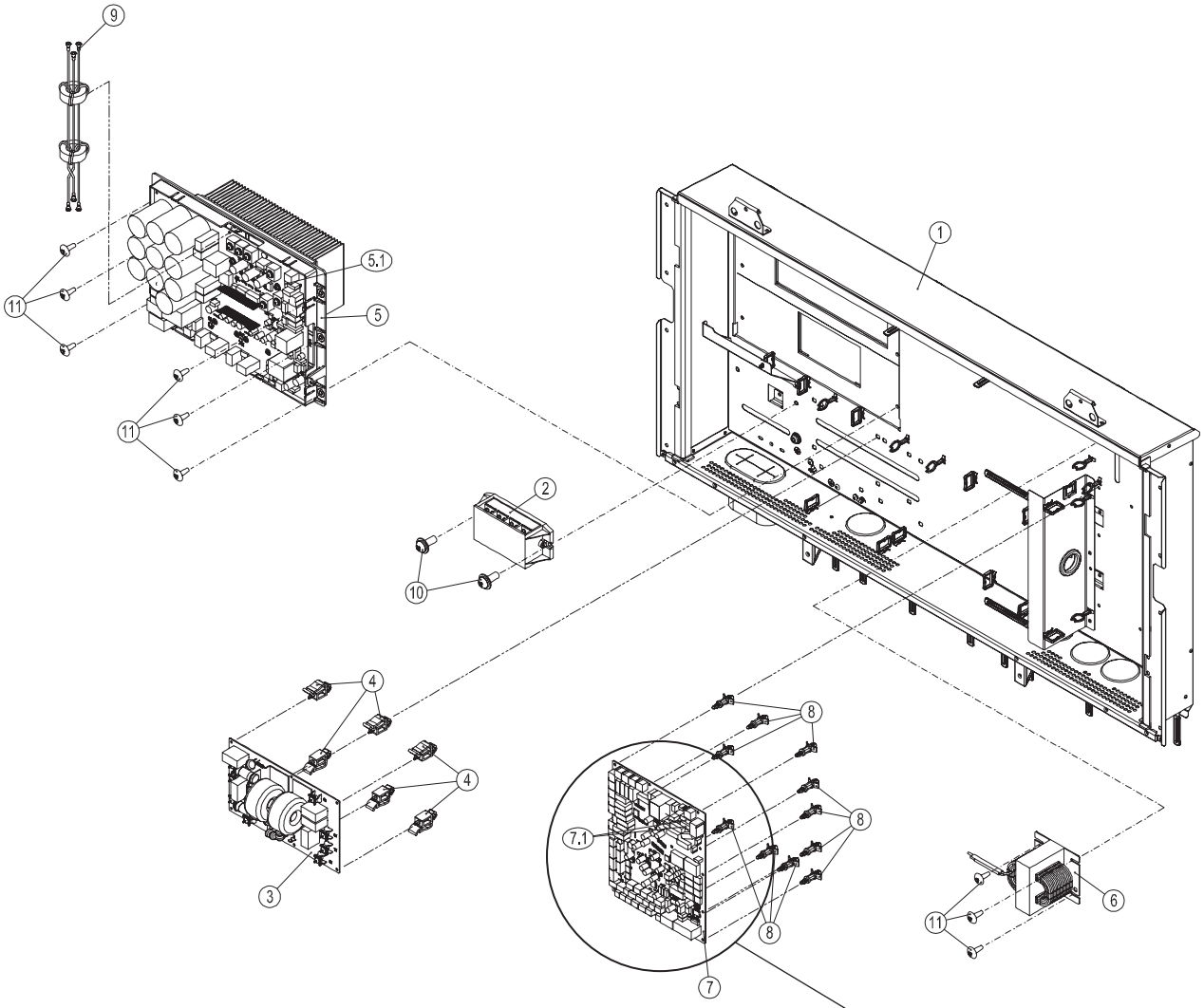


◯ : Fixing screw for wire (M5)

No.	Name	Quantity of power wiring connectors
1	Inverter PCB (INV)	8
2	Reactor	-
3	Control PCB1	-
4	Noise filter (NF)	8
5	Terminal block 1 (TB1)	8

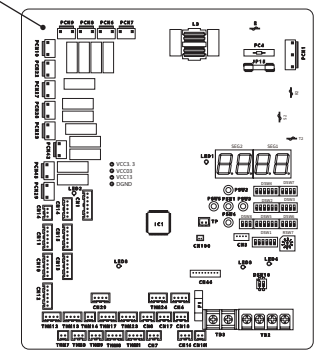
◆ RAS-(14-18)FSXNS2E - RAS-(8-14)FSXNP2E

Removing the screws fixing the electrical components to the electrical box.

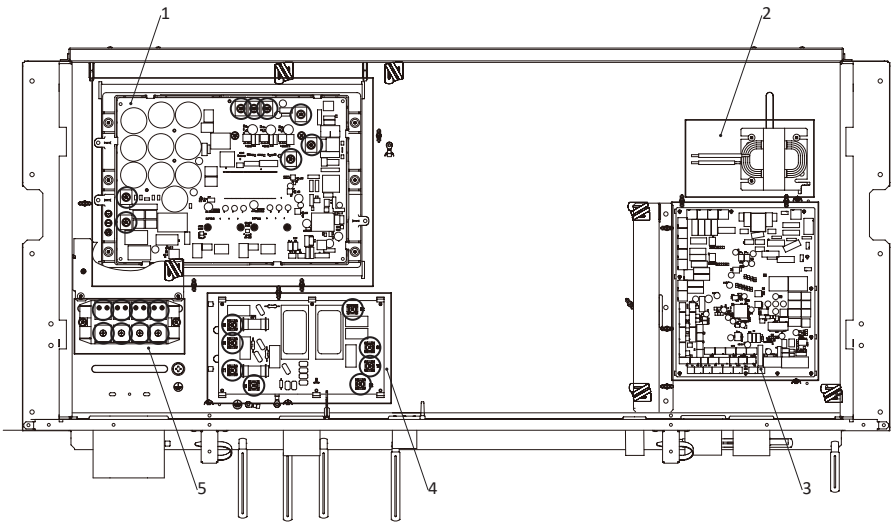


No.	Name	Units
1	Electrical box	1
2	Terminal block	1
3	Noise filter	1
4	Holder	6
5	Inverter PCB (INV)	1
5.1	Fuse	1
6	Reactor	1

No.	Name	Units
7	Control PCB	1
7.1	Fuse	2
8	Spacer	11
9	Harness MC	1
10	Screw	2
11	Screw	9



Removing the power wiring connected to each electrical component.

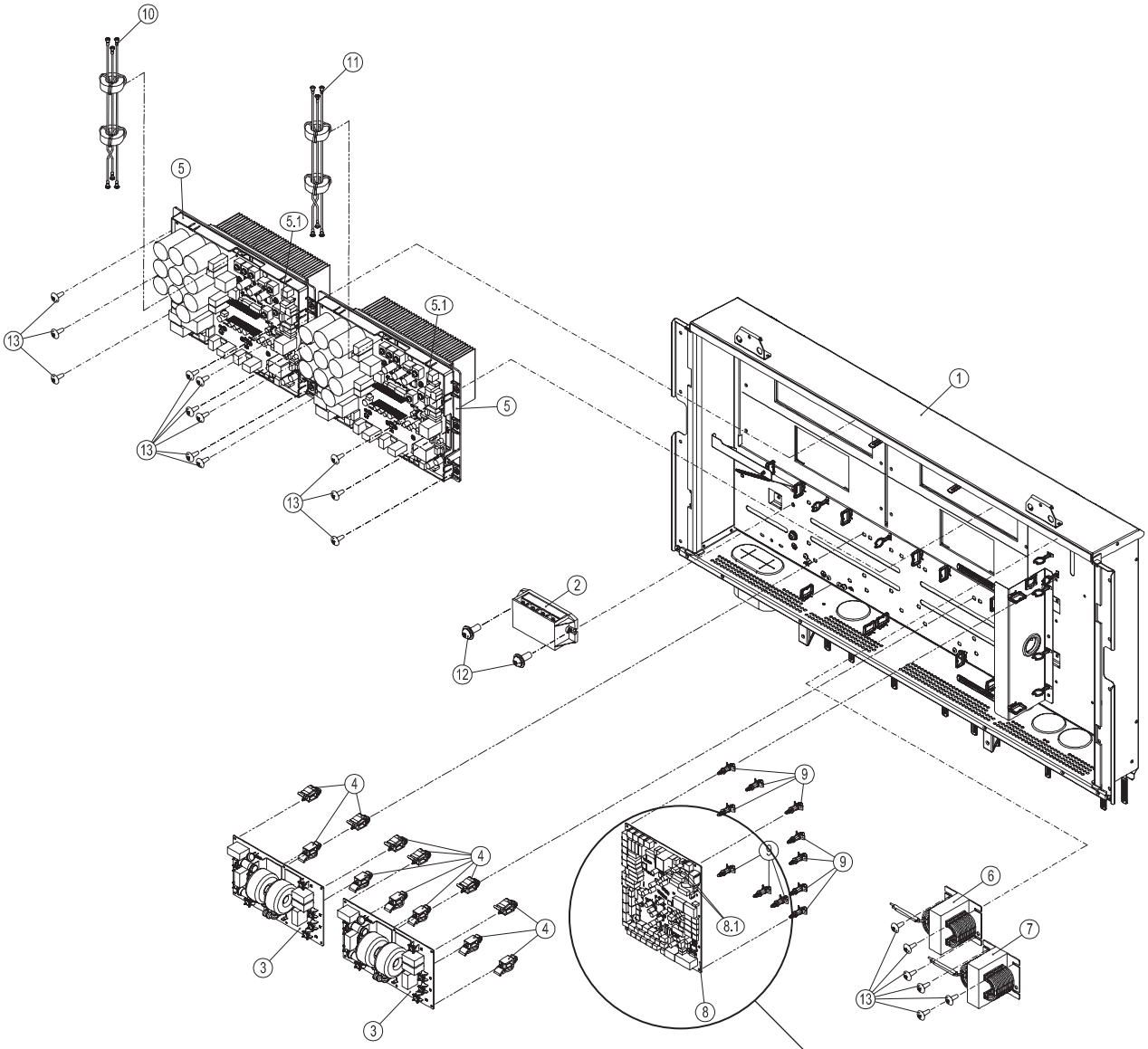


◯ : Fixing screw for wire (M5)

No.	Name	Quantity of power wiring connectors
1	Inverter PCB (INV)	8
2	Reactor	-
3	Control PCB1	-
4	Noise filter (NF)	8
5	Terminal block 1 (TB1)	8

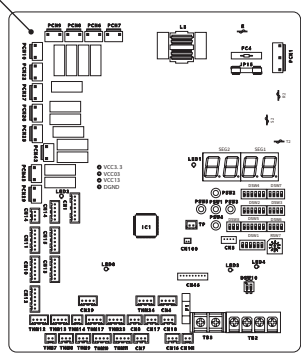
◆ RAS-(20-24)FSXNS2E - RAS-(16-18)FSXNP2E

Remove the screws fixing the electrical components to the electrical box.

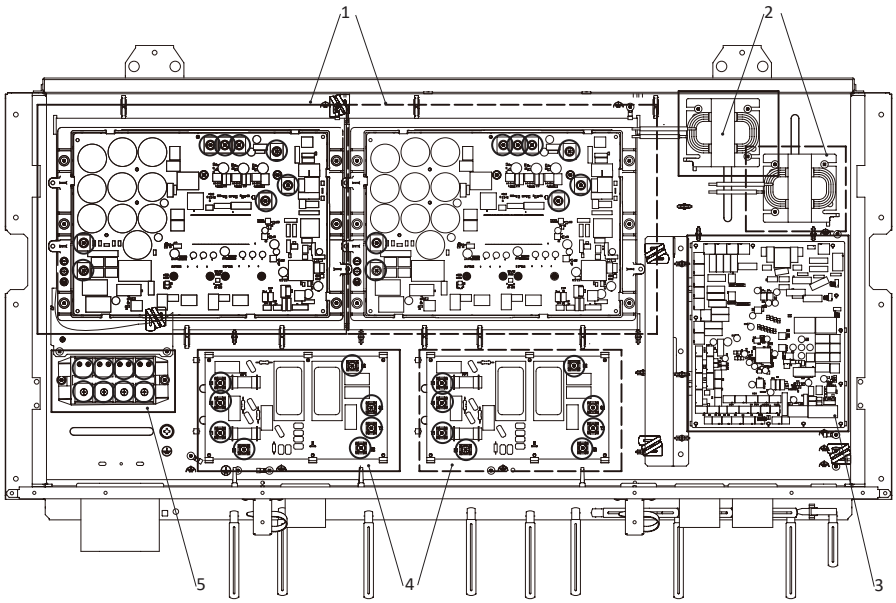


No.	Name	Units
1	Electrical box	1
2	Terminal block	1
3	Noise filter	2
4	Holder	12
5	Inverter PCB (INV)	2
5.1	Fuse	2
6	Reactor	1
7	Reactor	1

No.	Name	Units
8	Control PCB1	1
8.1	Fuse	2
9	Spacer	11
10	Harness MC1	1
11	Harness MC2	1
12	Screw	2
13	Screw	18



Remove the power wiring connected to each electrical component.



◯ : Fixing screw for wire (M5)

No.	Name	Quantity of power wiring connectors
1	Inverter PCB (INV)	8
2	Reactor	-
3	Control PCB1	-
4	Noise filter (NF)	8
5	Terminal block 1 (TB1)	8

7.13.2 Removing the inverter PCB

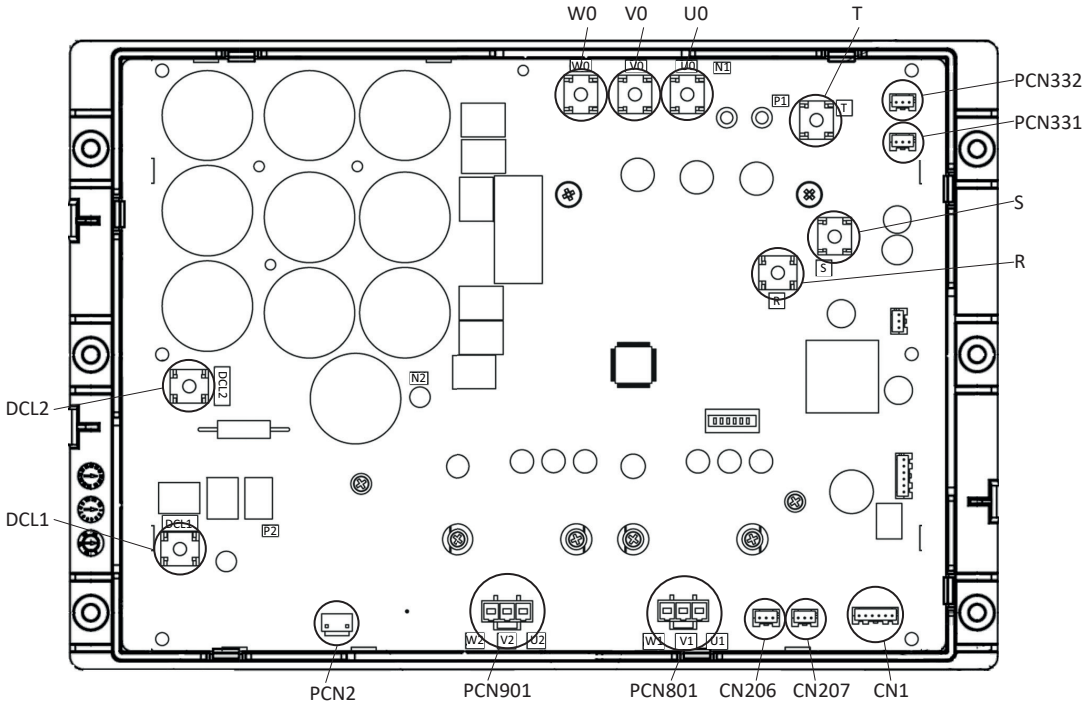
1 Disconnect all the wirings connected to the U0, V0, W0, CN206, CN207, PCN801, PCN901, PCN2, CN1, PCN331 and PCN332.

2 Disconnect all the terminal blocks on the Inverter PCB. DCL1, DCL2, R, S and T.

3 After removing screws, remove the inverter PCB.

NOTE

- *Do not touch any electrical components while LED201 (red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.*
- *When reassembling the electrical components, match the terminal Nos with the mark band Nos. If they are incorrectly connected, malfunction may occur or the electrical components may be damaged.*
- *When closing the outdoor unit PCB1 fixing plate for reassembly, protect the cables from catching on the plate edges or electrical components.*

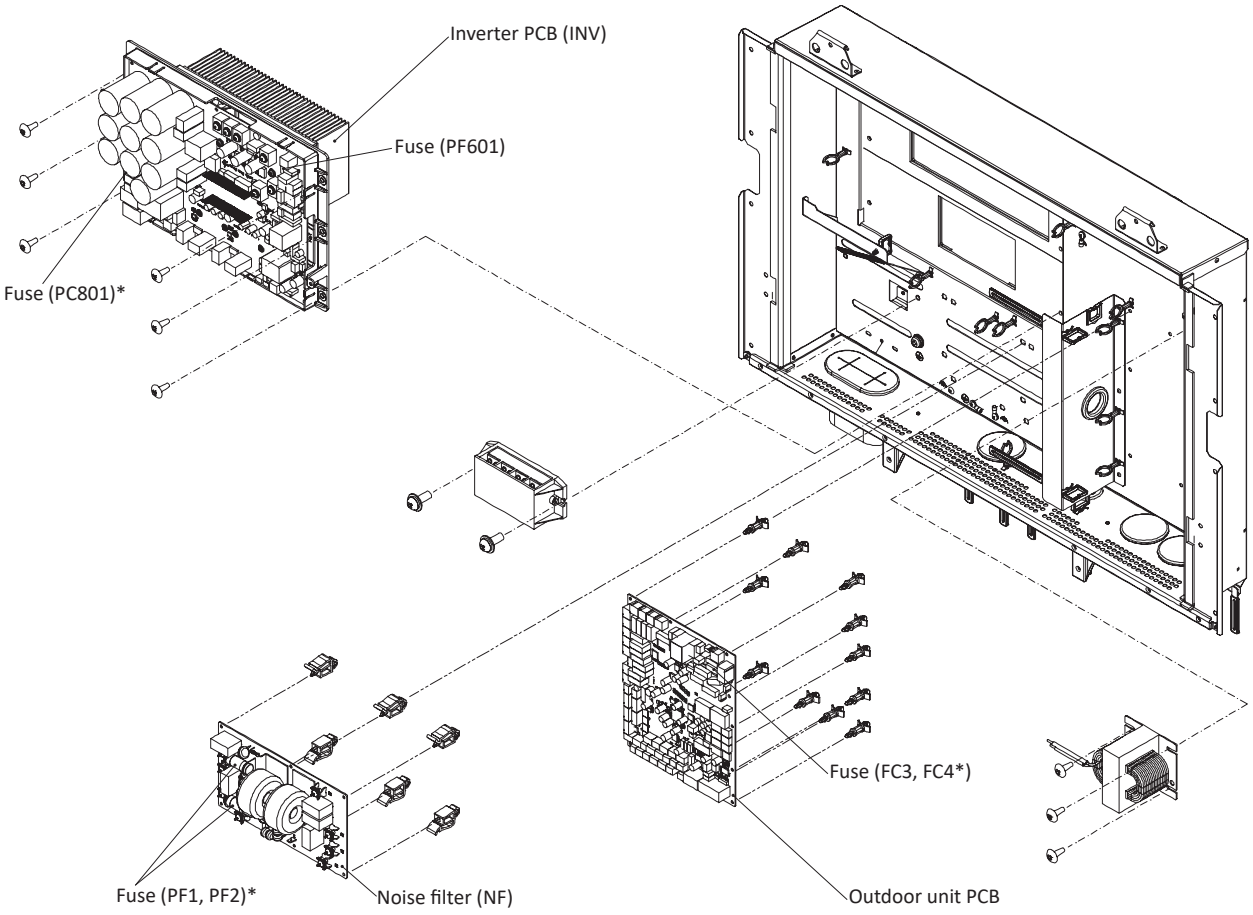


7.13.3 Location of the fuses on electrical components

DANGER

- ***Turn OFF all the power sources switches.***
- ***Do not touch any electrical components while LED401 or LED501 (Red) of inverter PCB is ON. Otherwise, it may lead to an electrical shock.***

The following example illustrate a small electrical box.



** Fuse is not replaceable*

1 Remove the fuse covers from the fuse holder.

2 Remove the fuse from the fuse holder.

3 Attach replacement fuses to the fuse holder and reattach the fuse covers.

NOTE

- *Be sure to match the fuse shown in the Service Parts List. If incorrectly selected, malfunction may occur or the electrical components may be damaged.*
- *When removing the fuse, take care not to damage the fuse holder.*
- *Be sure to reattach the fuse cover to the original position to reduce risks while the fuse cover is off during fuse open.*

7.14 Removing components for CH-Box

DANGER

Turn OFF all the power source switches.

NOTE

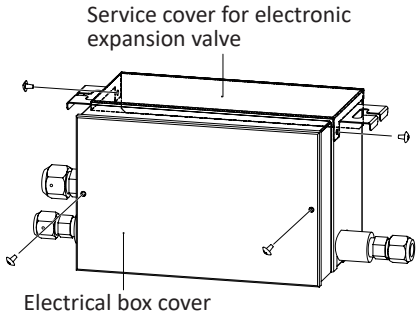
- *For servicing use the following tools: Phillips screwdriver.*
- *When attaching / removing the front service cover, take special attention to be not injured with the plate edges.*

7.14.1 Removing the front service cover for electrical box and electronic expansion valve

Remove the screws securing the electrical box cover and the electronic expansion valve cover.

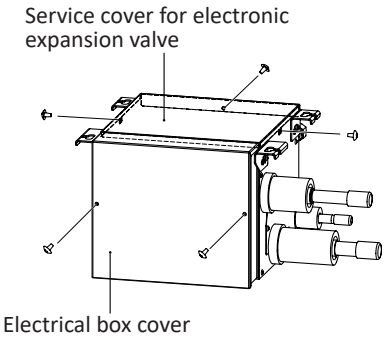
CH-AP160SSX, CH-AP280SSX

Service cover for electrical box: 2 screws
Service cover for electronic expansion valve: 2 screws



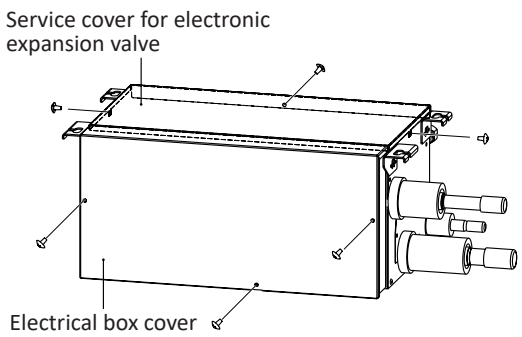
CH-AP04MSSX

Service cover for electrical box: 2 screws
Service cover for electronic expansion valve: 3 screws



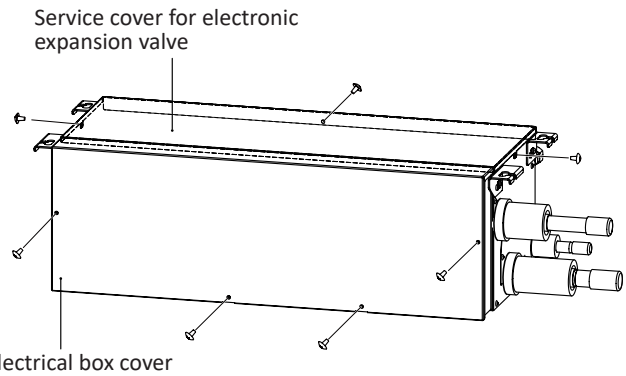
CH-AP08MSSX

Service cover for electrical box: 3 screws
Service cover for electronic Expansion valve: 3 screws



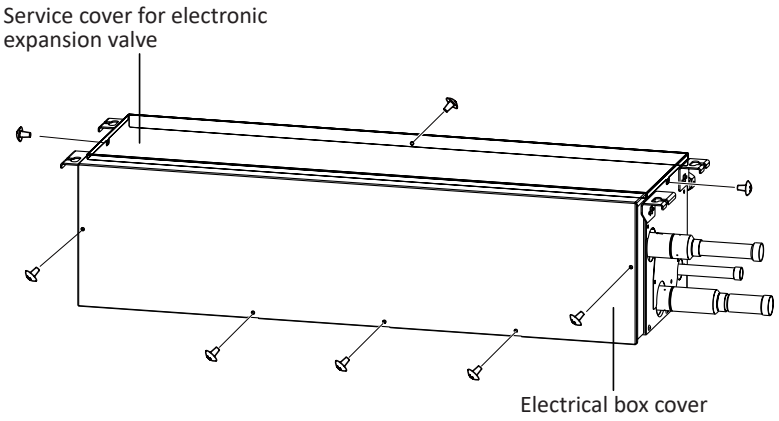
CH-AP12MSSX

Service cover for electrical box: 4 screws
Service cover for electronic expansion valve: 3 screws



CH-AP16MSSX

Service cover for electrical box: 5 screws
Service cover for electronic expansion valve: 3 screws



7.14.2 Removing the electrical components

NOTE

For servicing use the following tools: Phillips screwdriver, long-nose pliers, nippers.

◆ Removing PCB

1 Remove all connectors and transmission wirings connected to the CH-Box PCB.
2 Do not touch the electrical components on the PCB during the work. Otherwise, the PCB may be damaged.
3 Hold the convex part of the 4 holders fixing the PCB with a long-nose pliers and pull it out to remove.

◆ Removing electrical component (terminal board for power source)

CH-AP160SSX, CH-AP280SSX

1 Remove all the wirings connected to the electrical components.
2 Remove the screws fixing the electrical components.

CH-AP04MSSX, CH-AP08MSSX, CH-AP12MSSX, CH-AP16MSSX

1 Remove all the wirings connected to the electrical components.

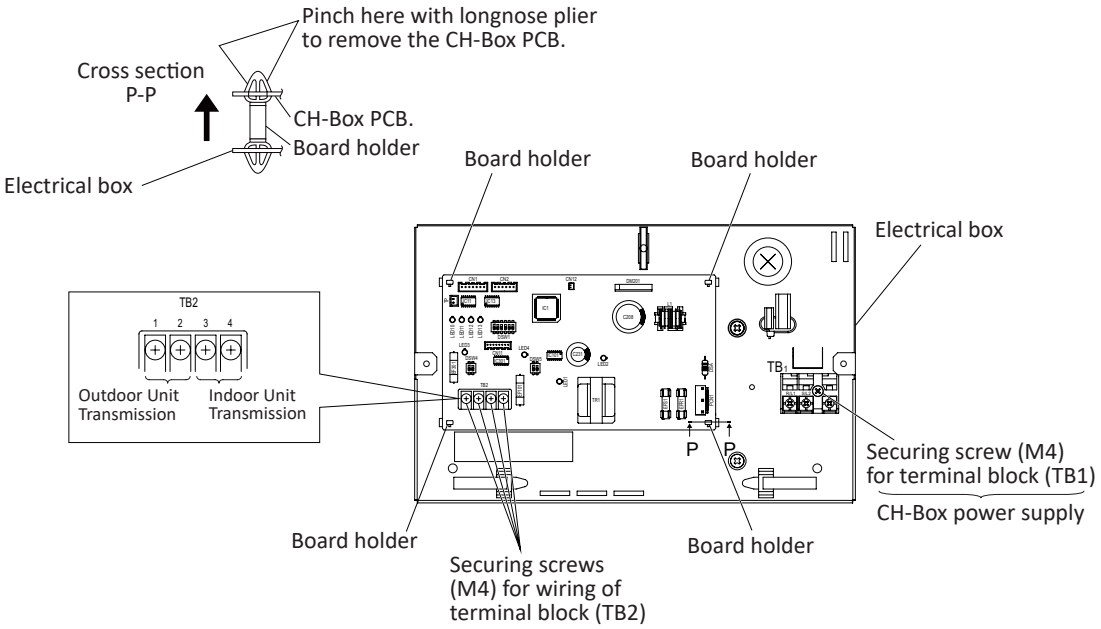
2 Remove the communication wirings connected to the terminal block (TB2).

3 Remove the screws securing the electrical components.

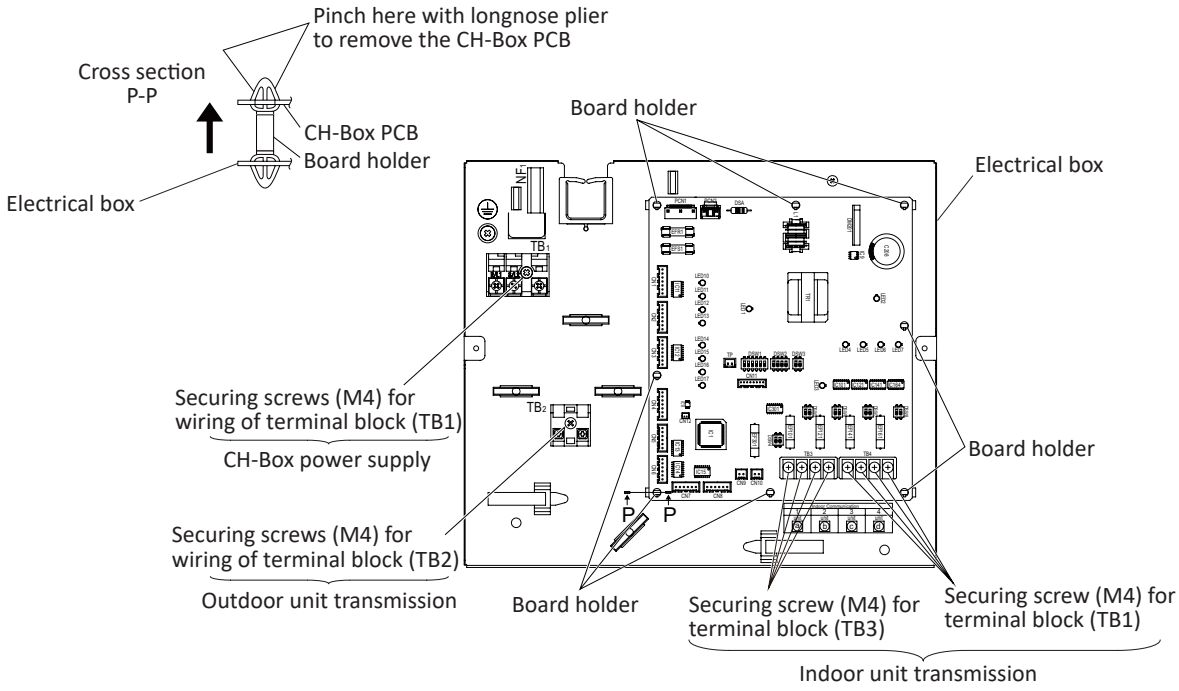
NOTE

When reassembling the electrical components, match the terminal Nos. with the mark band Nos. and also match the colors of the connectors on the PCB with the colors of the connector for wiring. If they are incorrectly connected, malfunction may occur or the electrical components may be damaged.

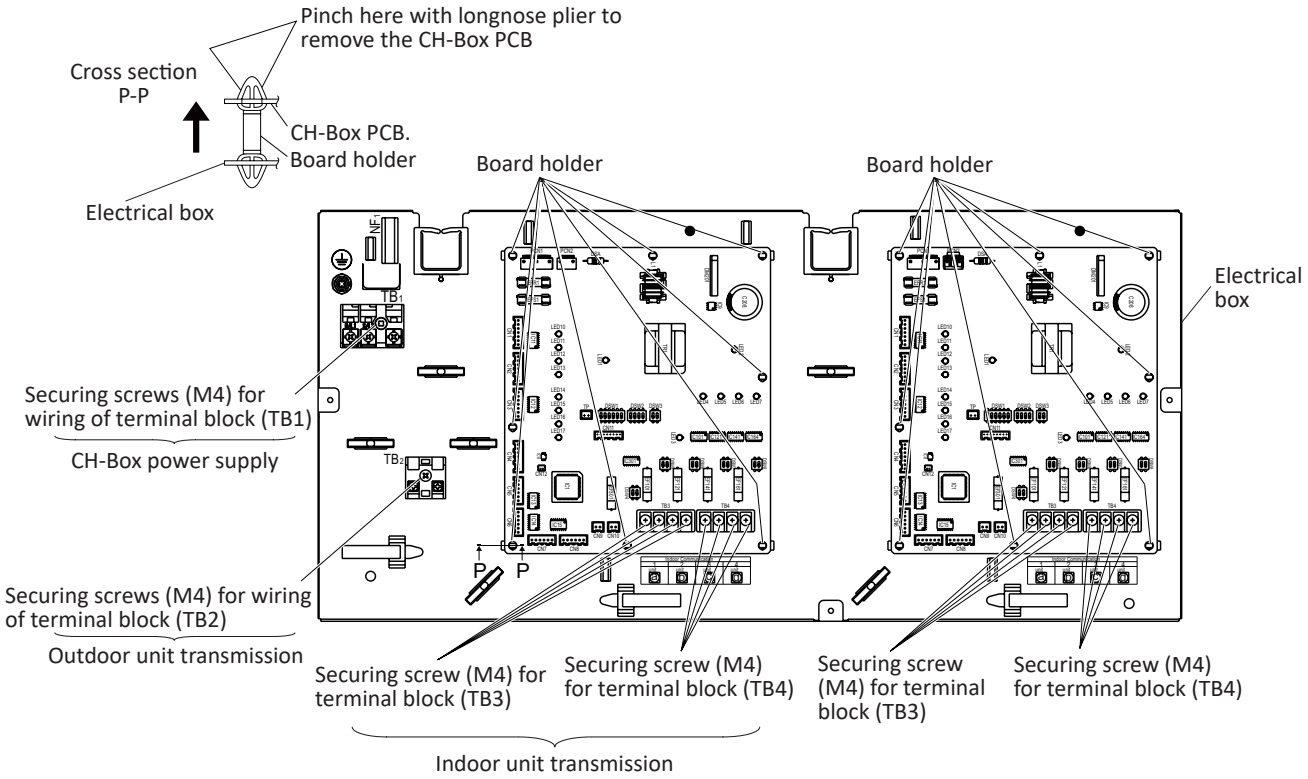
CH-AP160SSX, CH-AP280SSX



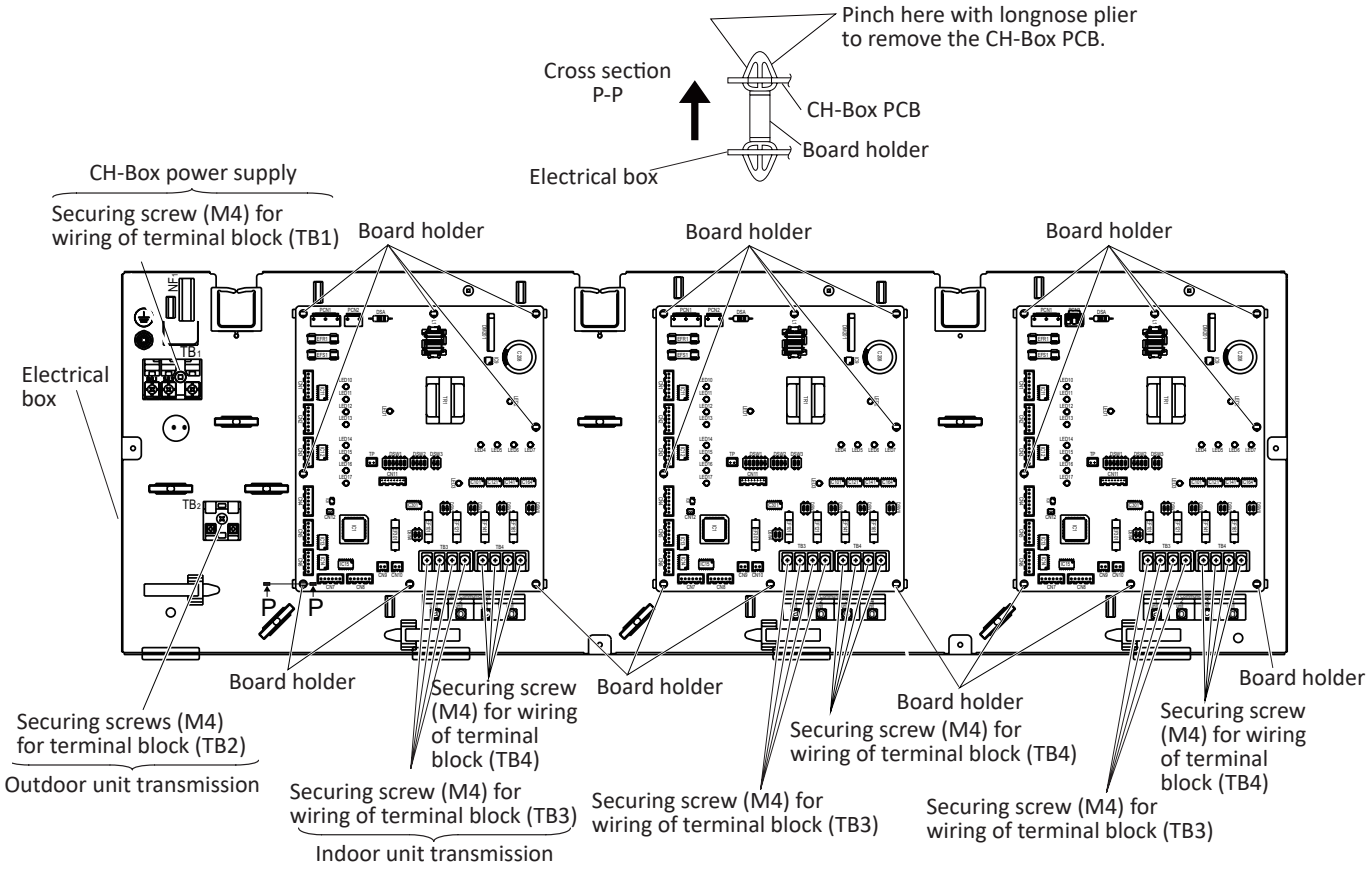
CH-AP04MSSX



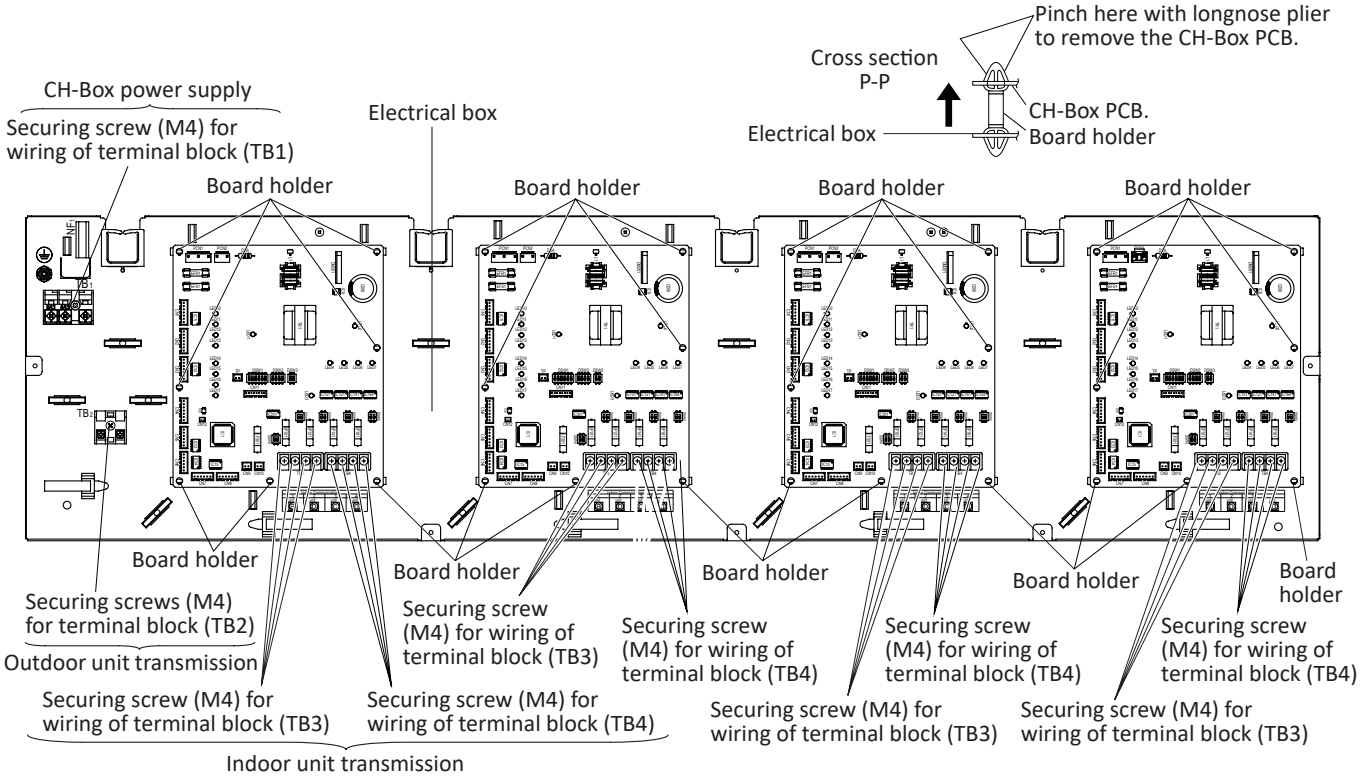
CH-AP08MSSX



CH-AP12MSSX



CH-AP16MSSX



7.14.3 Removing electronic expansion valve coil

1 Remove the front service cover as described in the procedure *"7.1 Removing the front covers"*.

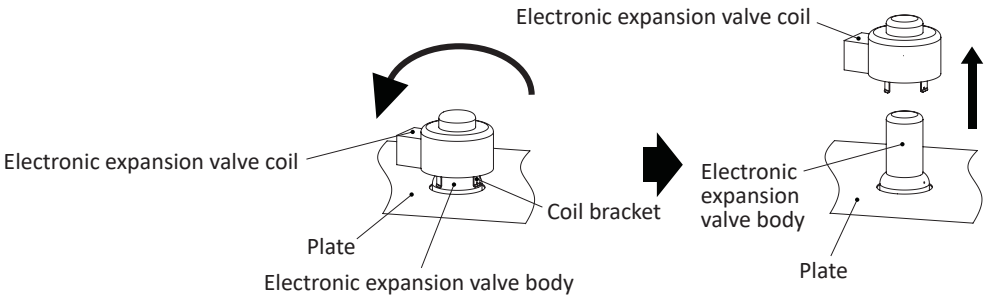
2 Removing Electronic Expansion Valve (MVD1~4, MVS1~4):

a. Turn the electronic expansion valve coil. Remove the electronic expansion valve coil bracket from the electronic expansion valve slot. Then, pull the coil upward and remove it.

b. When replacing the electronic expansion valve coil, turn the coil bracket and press the coil into the electronic expansion valve slot.

NOTE

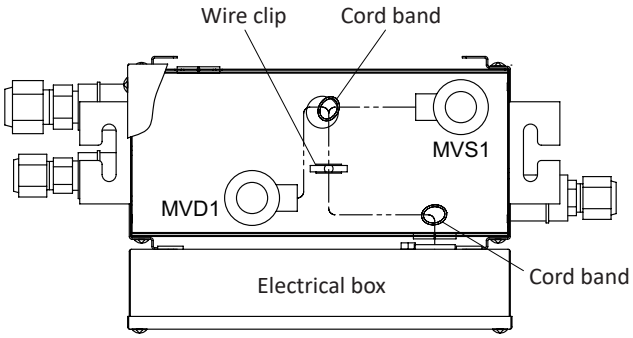
- *When replacing the electronic expansion valve, bind up the wirings with a cord clamp at the 2 parts indicated in the figure. Make sure to bind up extra wirings and fix them with a wire clip. If not, water may enter the electrical box.*
- *When attaching Electronic Expansion Valve Coil to Electronic Expansion Valve, match the marking colour in the table below.*



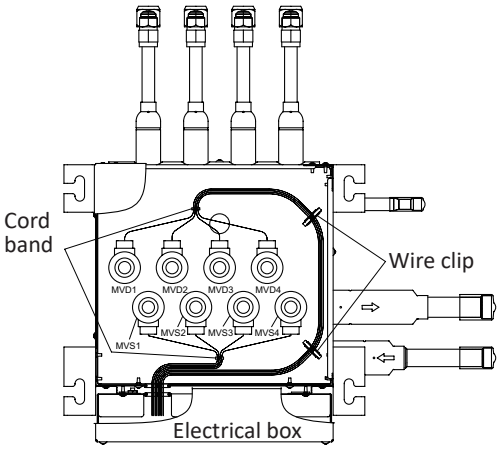
CH-AP160SSX, CH-AP280SSX	
Mark	Marking color
MVS1	White
MVD1	Blue

CH-AP04MSSX, CH-AP08MSSX, CH-AP12MSSX, CH-AP16MSSX			
Mark	Marking Color	Mark	Marking color
MVD1, MVS1	White	MVD3, MVS3	Blue
MVD2, MVS2	Red	MVD4, MVS4	Black

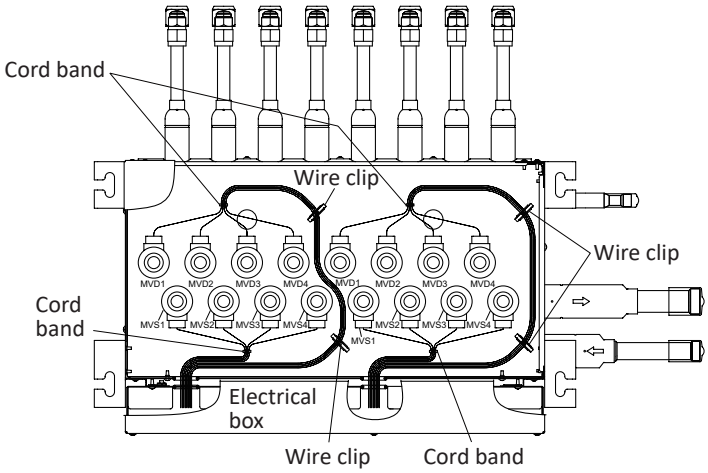
CH-AP160SSX, CH-AP280SSX



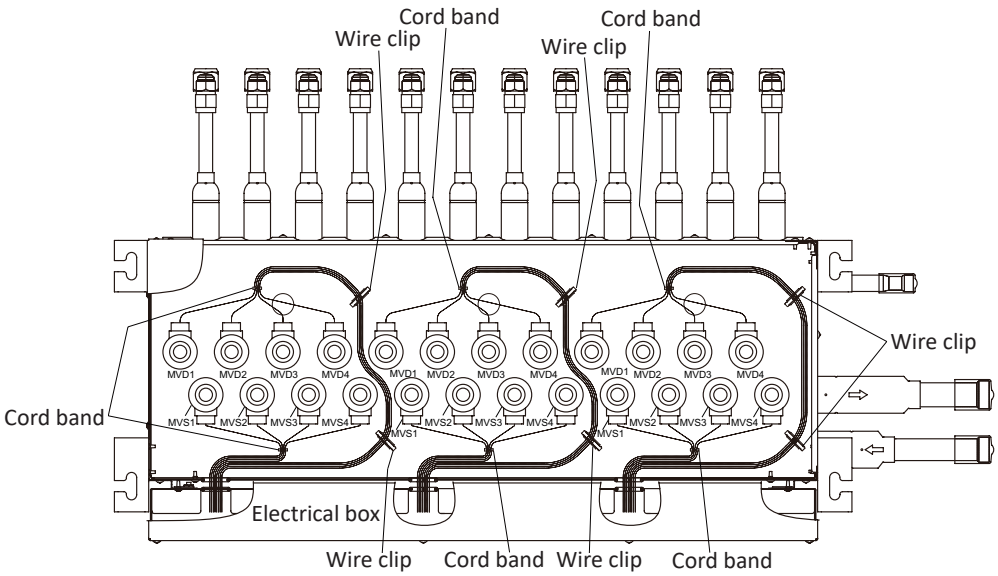
CH-AP04MSSX



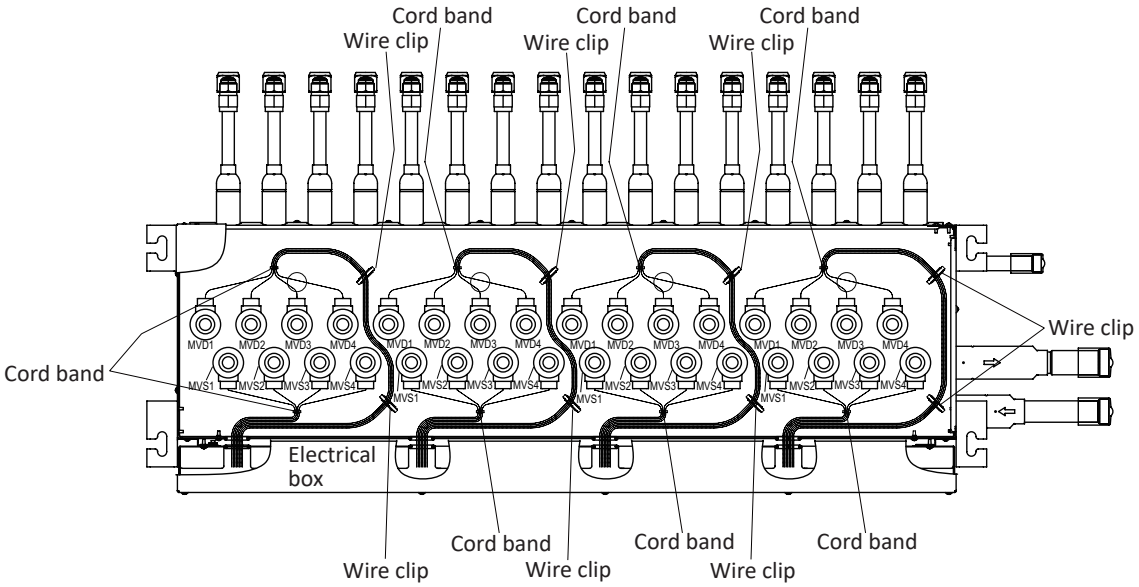
CH-AP08MSSX



CH-AP12MSSX



CH-AP16MSSX



NOTE

The electronic expansion valves cannot be removed or replaced.

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8.1 Initial troubleshooting

8.1.1 Checking the electrical wires and the power source

No.	Item to check	Check method
1	Is the power source breaker or the fuse blown out?	Check the voltage (secondary side) of the breaker and using a tester, check the conductivity of the fuse.
2	Is the transformer's secondary voltage correct?	Remove the transformer's secondary connection and check the voltage using a tester.
3	Is the electrical wiring properly secured and are the connections correctly fixed?	Check that the following wiring connection on outdoor unit/indoor unit PCBs is not loosened. ✓ The connection for thermistors. ✓ The connection for the communication cable. ✓ The communication cable connects to a terminal block at the outdoor unit / indoor unit not PCB. ✓ Power supply wiring is connected to a terminal block, not PCB. ✓ The connection for transformer. ✓ Each connection for power source line. Check that the wiring connections on outdoor unit and indoor unit PCBs is not loosened or misconnected on the site according to “Electrical Wiring Diagram” of the technical catalogue.

NOTE

If the fuse on an indoor unit PCB is blown, diagnose the cause of overcurrent and replace the fuse(s). In addition, check the power source of optional parts because the fuses may blow out by the power source failure. Turn off power for safety.

8.1.2 Checking by 7-segment display

1 (*)Turn on all indoor units

(*) All the indoor units connected to the outdoor unit

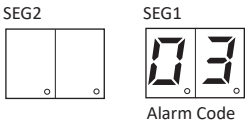
2 Turn on the outdoor unit

3 Auto-addressing starts

Outdoor unit printed circuit board PCB

During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display.

(1) Disconnection of power supply to the indoor unit.
(2) Reverse connection of the operating line between the outdoor and indoor units. In this case, "03" appears after 30 seconds.
(3) Duplication of indoor unit number. See Alarm Code 35.

Normal case	1 The outdoor unit's on-board 7-segment LED display is not indicated.
Abnormal case	2 The outdoor unit's on-board 7-segment LED display indicates the followings if there is something wrong. a. Alarm code will be displayed on the 7-segment when alarm is received from indoor unit in normal mode. As for the following alarm codes, however, alarm code will be displayed on the 7- segment when alarm is detected by outdoor unit itself. ◉ Alarm Code "03" (Abnormal transmission between indoor unit and outdoor unit) ◉ Alarm Code "35" (Incorrect indoor and outdoor unit no.setting) b. Alarm code of smaller indoor unit address number will be displayed when alarm is received from multiple indoor units. c. The following 7-segment is displayed and flashed every 0.5 seconds.  Alarm Code d. SEG1 and SEG2 are as follows. 7-Segment Display In Case of unit number 63, Alarm code "01" SEG2: Indoor unit number (0-63) SEG1: Alarm code 

8.1.3 Checking of the alarm code history

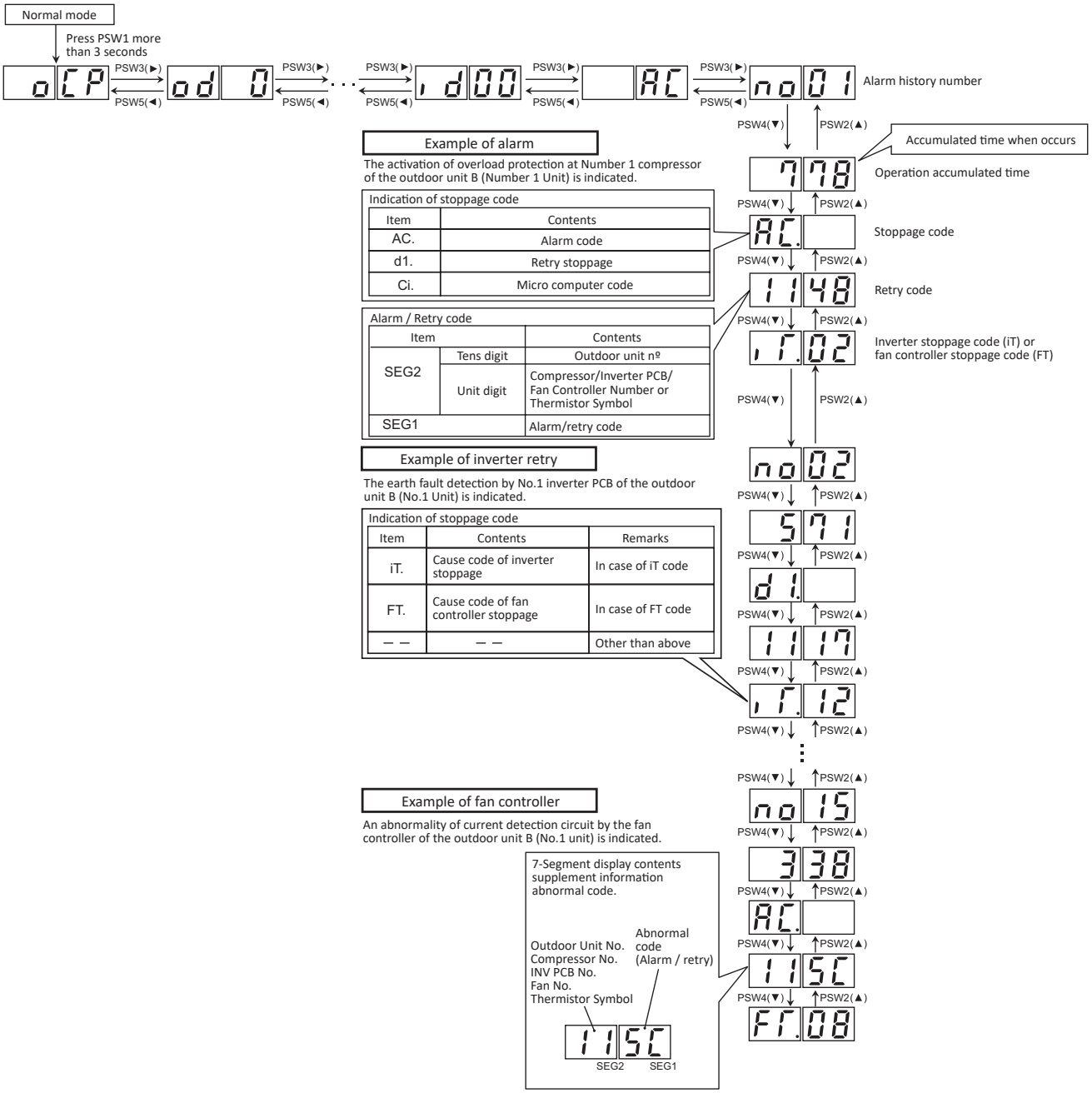
Alarm code history is indicated in the following order while the check mode is displayed.

"no 01" (latest)←→history data ~ "no 15" (oldest)←→history data

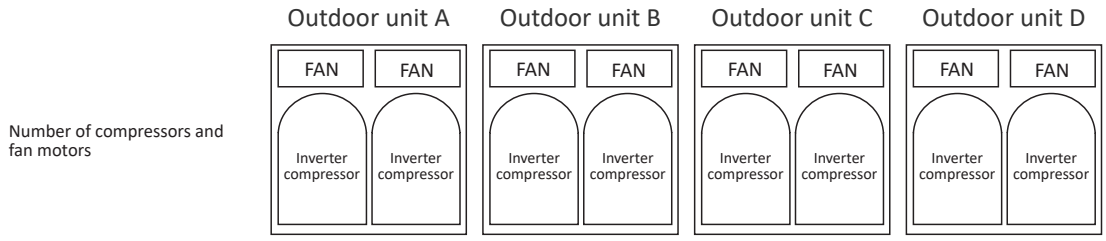
Refer to the figure below as an example. The alarm code is displayed only on PCB1 of the outdoor unit A.

NOTE

Alarm code history is displayed up to 15 cases at the maximum in alarm occurrence order.



Applicable compressors and fan motors
During abnormal code (alarm or retry code) occurrence
Example: RAS-54FSXNS2E



Unit number	0		1		2		3	
Compressor number	1	2	1	2	1	2	1	2
Fan number	1	2	1	2	1	2	1	2

◆ Alarm code history record

Cause of stoppage (alarm code or stoppage code)	Contents	Alarm code history indication					
		Time	Alarm (1)	Alarm code			Abnormal data
				Outdoor unit No.	Compressor No.	Fan No.	
02	Activation of the protection device	Accumulated time	AC	0	0		--
03	Abnormality transmitting between the indoor and outdoor units	Accumulated time	AC				--
04	Abnormality transmitting between the inverter PCB and the outdoor unit PCB1	Accumulated time	AC	0	0		--
05	Abnormal power source phase	Accumulated time	AC	0			--
06	Abnormal inverter voltage	Accumulated time	AC	0	0		iTC
d1-18		Accumulated time	d1	0	0		iTC
07	Decrease in discharge gas super-heat	Accumulated time	AC	0			--
d1-16		Accumulated time	d1	0			--
08	Temperature increase of the discharge gas at the upper part of the compressor	Accumulated time	AC	0			--
d1-15		Accumulated time	d1	0			--
0A	Abnormality transmitting between outdoor units	Accumulated time	AC				--
0b	Incorrect outdoor unit address setting	Accumulated time	AC				--

Cause of stoppage (alarm code or stoppage code)	Contents	Alarm code history indication					
		Time	Alarm (1)	Alarm code			Abnormal data
				Outdoor unit No.	Compressor No.	Fan No.	
0c	Incorrect setting of the main outdoor unit	Accumulated time	AC				--
21	Abnormality high pressure sensor	Accumulated time	AC	0			--
22	Abnormality of thermistor for outdoor air temperature	Accumulated time	AC	0			--
23	Abnormality of discharge gas temperature thermistor at the upper part of the compressor	Accumulated time	AC	0	0		--
24	Abnormality of the liquid pipe thermistor of the outdoor unit's heat exchanger (Te/Tchg/ Tsc)	Accumulated time	AC	0	Thermistor signal Te1: 1, Te2: 2 Tchg: C, Tsc: S		--
25	Abnormality of the gas pipe thermistor of the outdoor unit's heat exchanger (Tg)	Accumulated time	AC	0			--
29	Abnormality of low pressure sensor	Accumulated time	AC	0			--
30	Incorrect connection of change-over box	Accumulated time	AC				--
31	Incorrect capacity setting on outdoor and indoor unit	Accumulated time	AC				--
35	Incorrect indoor unit number setting	Accumulated time	AC				--
36	Incorrect indoor unit combination	Accumulated time	AC				--
38	Abnormality of the collection circuit for outdoor unit protection	Accumulated time	AC	0			--
3A	Abnormal outdoor unit capacity	Accumulated time	AC				--
3b	Incorrect setting of voltage or combination of outdoor unit models	Accumulated time	AC				--
3d	Abnormality transmitting between the main unit and the secondary unit(s)	Accumulated time	AC				--
3E	Abnormal combination between inverter PCB and outdoor unit PCB1	Accumulated time	AC	0			

Cause of stoppage (alarm code or stoppage code)	Contents	Alarm code history indication					
		Time	Alarm (1)	Alarm code			Abnormal data
				Outdoor unit No.	Compressor No.	Fan No.	
43	Abnormality of low compression ratio	Accumulated time		0			--
d1-11		Accumulated time	d1	0			--
44	Abnormality of low pressure increase	Accumulated time	AC	0			--
d1-12		Accumulated time	d1	0			--
45	Abnormality of high pressure increase	Accumulated time	AC	0			--
d1-13		Accumulated time	d1	0			--
47	Activation of the low pressure decrease protection device (Vacuum operation protection)	Accumulated time	AC	0			--
d1-15		Accumulated time	d1	0			--
48	Activation of the inverter overcurrent protection device	Accumulated time	AC	0	0		iTC
d1-17		Accumulated time	d1	0	0		iTC
51	Abnormal inverter current sensor	Accumulated time	AC	0	0		iTC
d1-17		Accumulated time	d1	0	0		iTC
53	Inverter error signal detection	Accumulated time	AC	0	0		iTC
d1-17		Accumulated time	d1	0	0		iTC
54	Abnormal inverter fin temperature	Accumulated time	AC	0	0		iTC
d1-17		Accumulated time	d1	0	0		iTC
55	Inverter failure	Accumulated time	AC	0	0		iTC
d1-18		Accumulated time	d1	0	0		iTC
57	Activation of the fan controller protection device	Accumulated time	AC	0		0	FTC
5A	Abnormality of fan controller fin temperature	Accumulated time	AC	0		0	FTC

Cause of stoppage (alarm code or stoppage code)	Contents	Alarm code history indication					
		Time	Alarm (1)	Alarm code			Abnormal data
				Outdoor unit No.	Compressor No.	Fan No.	
56	Activation of overcurrent protection	Accumulated time	AC	0		0	FTC
5C	Abnormality of a fan controller sensor	Accumulated time	AC	0		0	FTC
A1	Detection of external abnormality	Accumulated time	AC	0			--
b5	Incorrect setting of indoor unit connection number	Accumulated time	AC				--
EE	Compressor protection alarm	Accumulated time	AC				--
d1-05	Instant power failure	Accumulated time	d1				--
d1-18	Inverter malfunction and others	Accumulated time	d1				iTC
d1-26	Abnormality of high pressure decrease	Accumulated time	d1				--
d1-32	Retry stoppage due to automatic address setting of the indoor unit	Accumulated time	d1				--
Control information	Restarting of the microcomputer due to an Inverter malfunction	Accumulated time	Ci				1
	Restarting of the microcomputer due to an indoor unit transmission malfunction	Accumulated time	Ci				3
	Restarting of the microcomputer due to a transmission malfunction between the indoor unit and the outdoor unit	Accumulated time	Ci				4
	Restarting of the microcomputer due to a status control malfunction	Accumulated time	Ci				6

(1) Alarm details:

AC.: Alarm.

d1.: Retry.

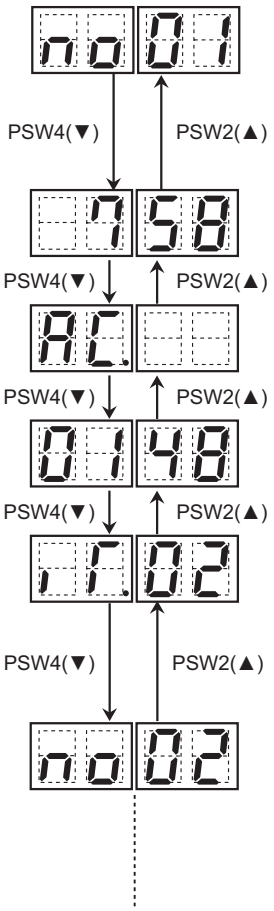
Ci.: control information.

iTC: Inverter stoppage code.

FTC: Fan controller stoppage code.

◆ Deletion of the alarm code history

Press PSW1 and PSW3 for five seconds to delete the alarm code history while it is shown on the display (the entire history can be deleted).



In order to delete all the history, press PSW1 and PSW3 (▸) for 5 seconds while history is displayed.

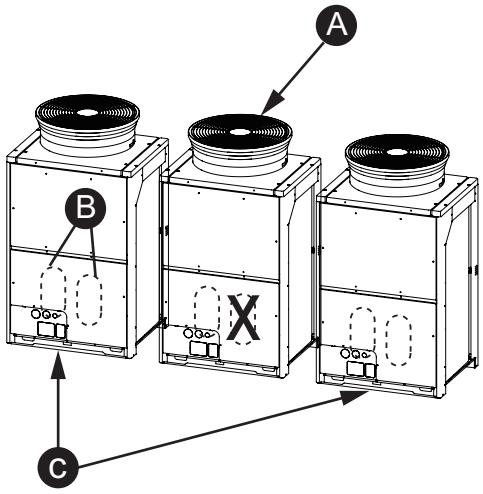
8.1.4 Emergency mode operation from the remote control

For models RAS-(26-96)FSXNS2E and RAS-(20-54)FSXNP2E only.

If the compressor fails, the emergency mode operation is available from the remote control.

Even if the compressor fails, the operation of the air conditioner is continuously available until the troubleshooting and problem resolution procedure is carried out.

A	Outdoor unit failed
B	Compressor
C	Even though one unit has failed, the other units can operate continuously

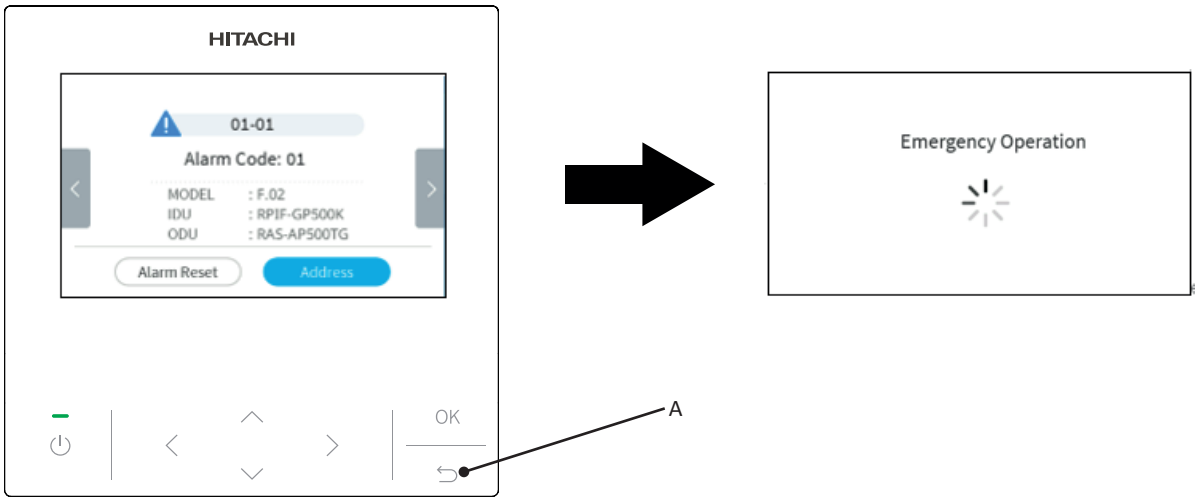


The emergency operation can be activated when the following alarm codes are displayed on the remote control screen:

Inverter compressor failure	
Alarm code	Description of the failure
06	Abnormal inverter voltage
23	Abnormal discharge gas thermistor
48	Activation of the inverter overcurrent protection device
51	Abnormal inverter current sensor
53	Inverter error signal detection
54	Abnormal inverter radiator temperature

◆ Procedure (remote control PC-ARFG2-E example)

After an alarm is occurred (for example an outdoor unit compressor failure), by pressing "⮌" for 3 seconds (A) on the alarm screen, emergency operation mode starts.



◆ Operating condition

The emergency operation is not applicable to the outdoor unit whose compressor has failed.

NOTE

- *The emergency operation is only available when all the indoor units and the connected remote controllers are H-LINKII.*
- *The emergency operation is only available when the alarm codes shown in the previous table are displayed.*
- *The emergency operation is not available in case of failure of the inverter PCB or the fan controller.*
- *The emergency operation is not a normal operating mode but a temporary operating mode until technical service maintenance personnel arrive. If the alarm is indicated again during the emergency operation, the alarm cannot be cancelled.*
- *Do not run the emergency operation for more than eight hours. Otherwise, it may damage the unit.*
- *Power off the system in order to release the emergency operation.*

8.1.5 Emergency mode operation from the outdoor unit PCB1 for compressor failure

8.1.5.1 For combination of outdoor units

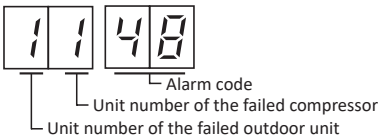
For models RAS-(26-96)FSXNS2E and RAS-(20-54)FSXNP2E only.

◆ Alarms corresponding to inverter compressor failure

Inverter compressor failure	
Alarm code	Description of the failure
04	Abnormal transmission between inverter PCB and outdoor unit PCB
06	Abnormal inverter voltage
23	Abnormal discharge gas thermistor
48	Activation of the Inverter overcurrent protection device
51	Abnormal Inverter current sensor
53	Inverter error signal detection
54	Abnormal inverter fin temperature

◆ Alarm code

The number of the failed outdoor unit, the number of the failed compressor and the alarm code are displayed on 7-segment of the outdoor unit PCB1.



◆ Procedure

1 Turn OFF the main switches to all the indoor and outdoor units.

2 Disconnect the inverter compressor wiring of the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure insulate the disconnected terminals.

The number of failed compressor	Procedure
Inverter compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3 Turn DSW4 ON to stop the compressor operation according to the table below. If either is set, NONE of the compressor in the failed outdoor unit will operate. If all compressor of the failed outdoor unit are not operated, fully close the stop valves (for gas/liquid).

The number of failed compressor	Procedure
Inverter compressor 1	Turn ON DSW4-No.5
Inverter compressor 2	Turn ON DSW4-No.6

4 Turn ON the power supply.

5 Start operation using the remote control switch.

NOTE

- *Measure the insulation resistance of the Inverter compressor. Do not activate the emergency operation when the insulation resistance is 0 Ω. Another compressor may suffer damage due to the possibility that refrigerant oil may be oxidized.*
- *In emergency operation, the compressor frequency can not normally be controlled. Consequently, alarm codes "07", "43", "44", "45" or "47" can be displayed on the LCD.*
- *The emergency operation cannot provide sufficient cooling and heating capacity.*
- *The emergency operation is a temporary mode of operation used when the Inverter compressor is damaged. Therefore, replace it with a new one as soon as possible.*
- *Turn DSW4-5 and DSW4-6 OFF on PCB1 of the outdoor unit after replacing the compressor. If this setting is not carried out, the Inverter compressor will be damaged.*

8.1.5.2 For outdoor units without combination

For models RAS-(20-24)FSXNS2E and RAS-(16/18)FSXNP2E only.

◆ Alarms corresponding to inverter compressor failure

Inverter compressor failure	
Alarm code	Description of the failure
04	Abnormal transmitting between inverter PCB and outdoor unit PCB1
06	Abnormality of inverter voltage
23	Abnormality of discharge gas thermistor
48	Activation of overcurrent protection device
51	Abnormality of inverter current sensor
53	Inverter error signal detection
54	Abnormality of inverter fin temperature

◆ Procedure

1 Turn OFF the main switches to all the indoor and outdoor units.

2 Disconnect the inverter compressor wiring of the inverter PCB (INV1 or INV2) terminals according to the following procedure. Be sure insulate the disconnected terminals.

The number of failed compressor	Procedure
Inverter compressor 1	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV1) terminals.
Inverter compressor 2	Disconnect the power supply wiring for the inverter compressor from the inverter PCB (INV2) terminals.

3 Set DSW4 of the outdoor unit PCB1 with the failed compressor according to the following procedure. Be sure to insulate the disconnect terminals.

The number of failed compressor	Procedure
Inverter compressor 1	Turn ON DSW4-No.5
Inverter compressor 2	Turn ON DSW4-No.6

4 Turn ON the power supply.

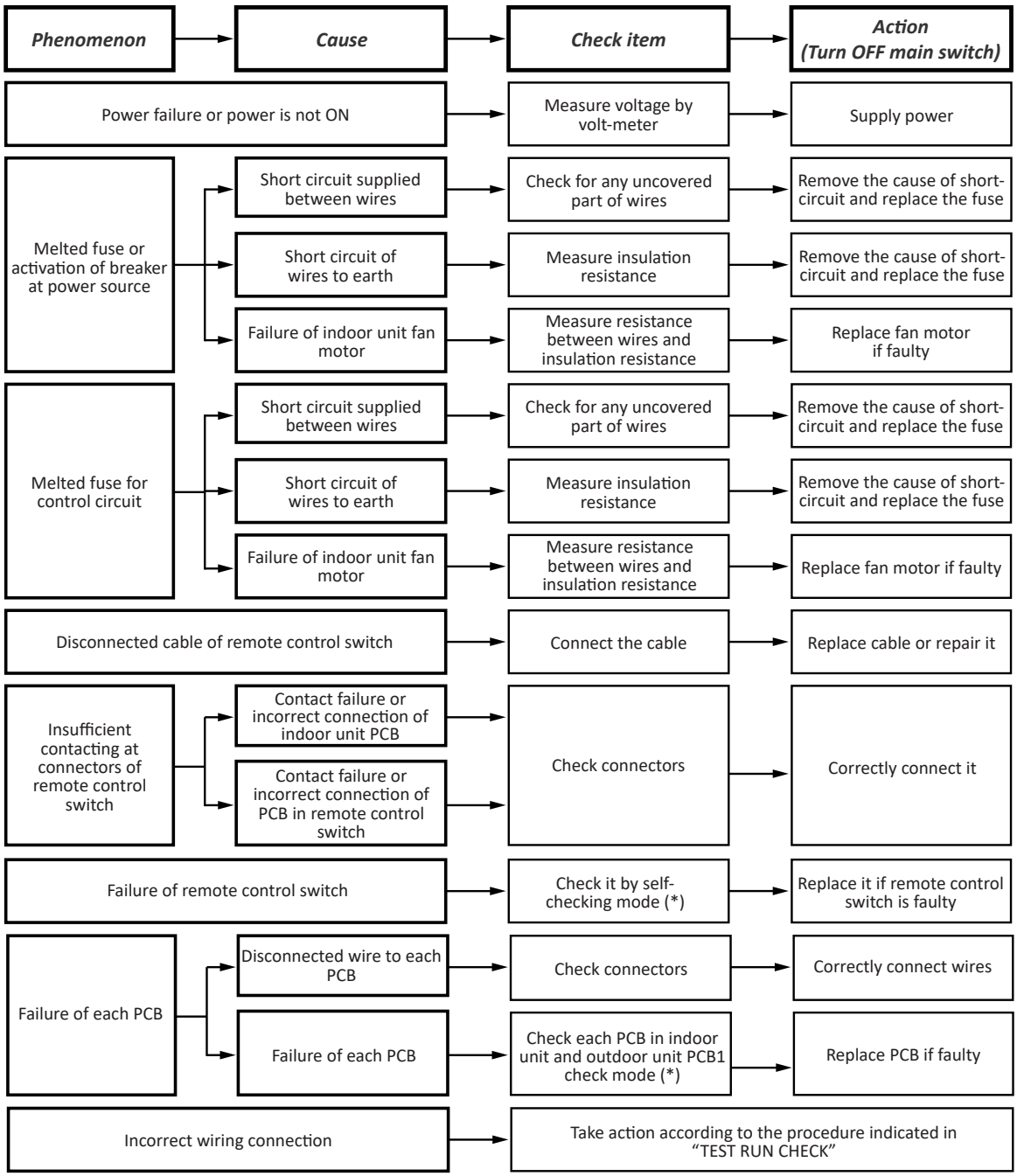
5 Start operation using the remote control switch.

NOTE

- *Not all the compressors in the failed outdoor unit will stop the operation. If two compressors are stopped simultaneously, the stoppage cause is supposed to be d1-30.*
- *Measure the insulation resistance of the Inverter compressor. Do not activate the emergency operation when the insulation resistance is 0 Ω. Another compressor may suffer damage due to the possibility that refrigerant oil may be oxidized.*
- *In emergency operation, the compressor frequency can not normally be controlled. Consequently, alarm codes "07", "43", "44", "45" or "47" can be displayed on the LCD.*
- *The emergency operation cannot provide sufficient cooling and heating capacity.*
- *The emergency operation is a temporary mode of operation used when the Inverter compressor is damaged. Therefore, replace it with a new one as soon as possible.*
- *Turn DSW4-5 and DSW4-6 OFF on PCB1 of the outdoor unit after replacing the compressor. If this setting is not carried out, the Inverter compressor will be damaged.*

8.1.6 Failure of the power supply to indoor units and the remote control switch

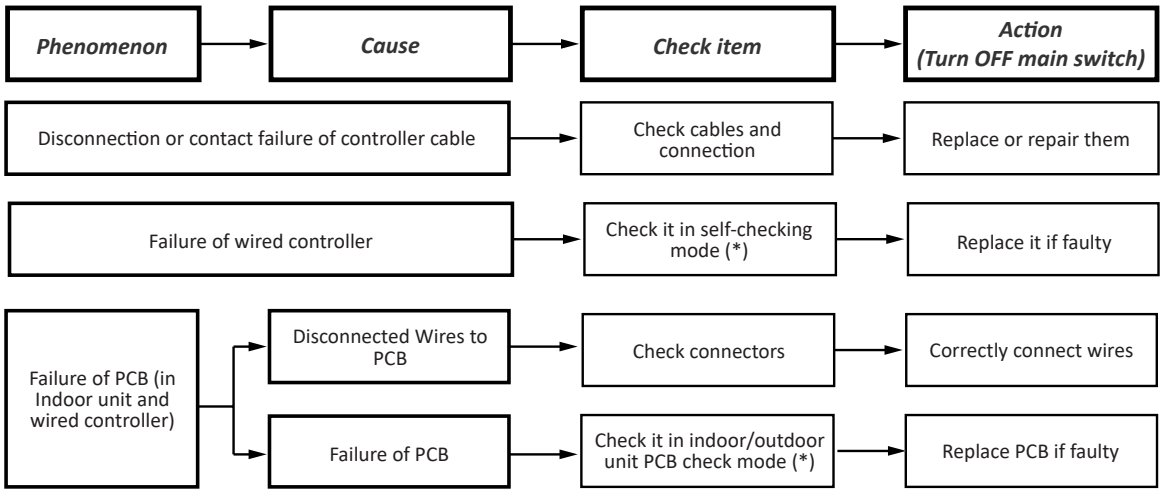
- The lights and the LCD are not indicated.
- Inoperative. If the fuses are blown or the circuit breaker is activated, investigate the cause of the excessive current and take the necessary measures.



(*): Refer to the remote control manual for further information.

8.1.7 Abnormal transmission between remote control switch and indoor unit

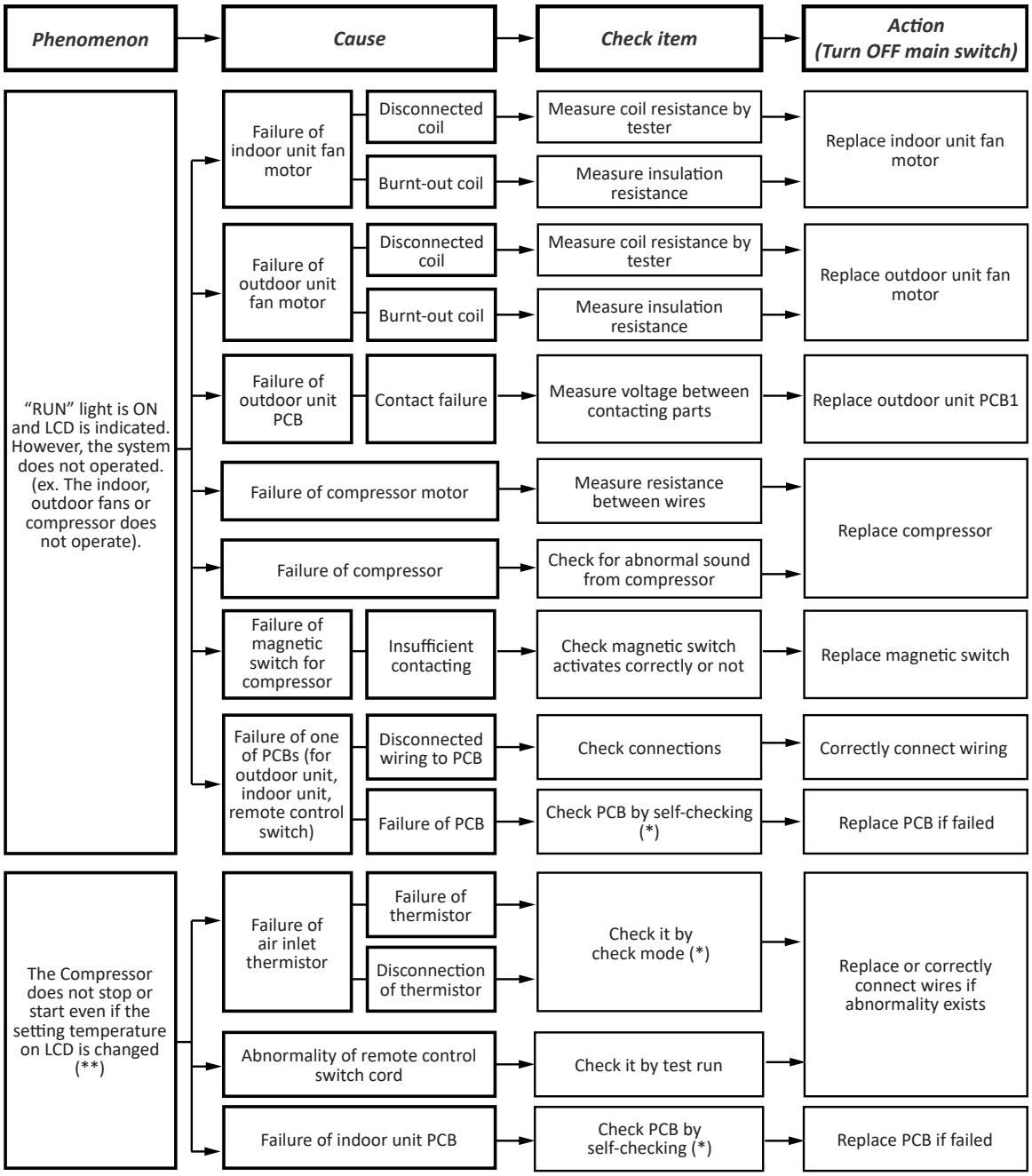
- The RUN indicator on the remote control: Flashes every two seconds.

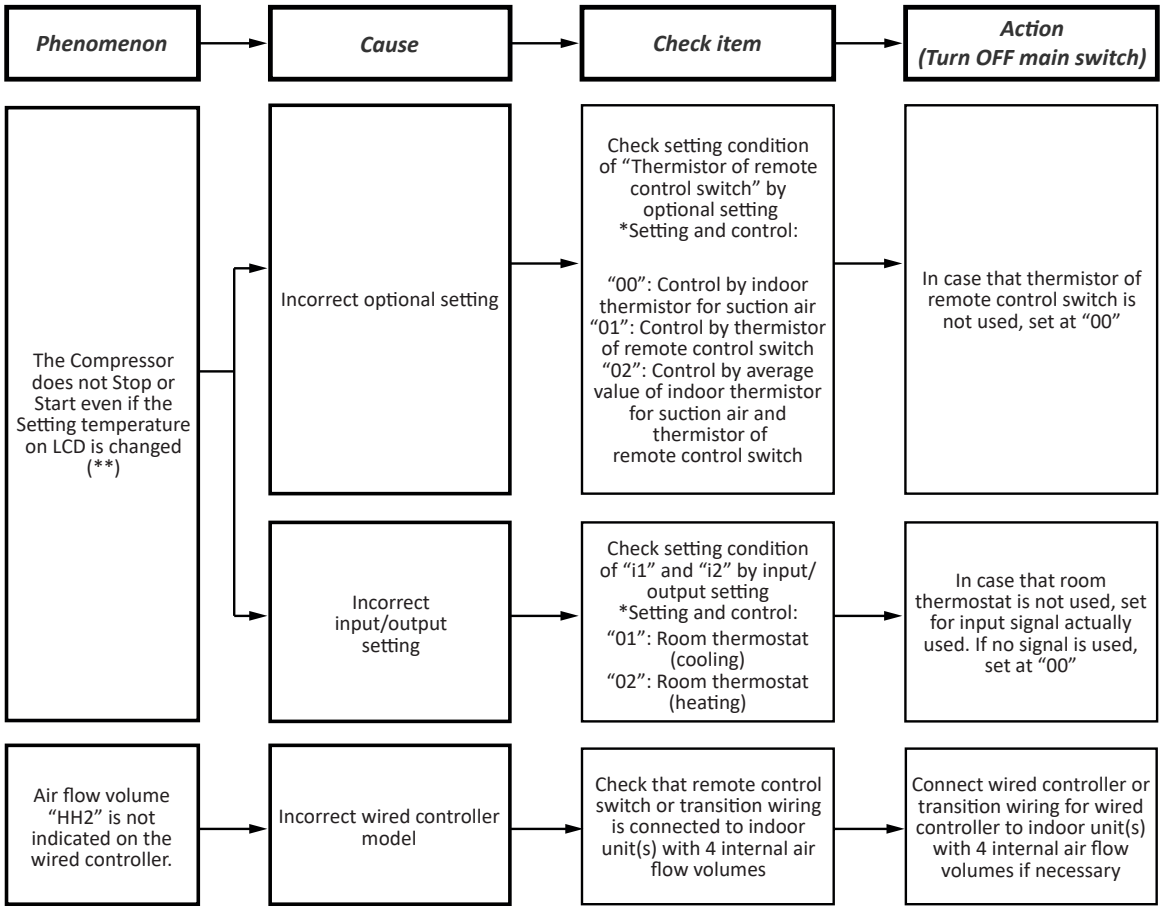


(*): Refer to the remote control manual for further information.

8.1.8 Abnormal operation of the devices

In the case no anomalies are detected (alarm codes) in the remote control switch, and normal operation is not available, carry out the required actions in accordance with the procedures described below.





(*): Refer to the remote control manual for further information.

(**): Even if the controllers are correct, the compressor does not operate under the following conditions:

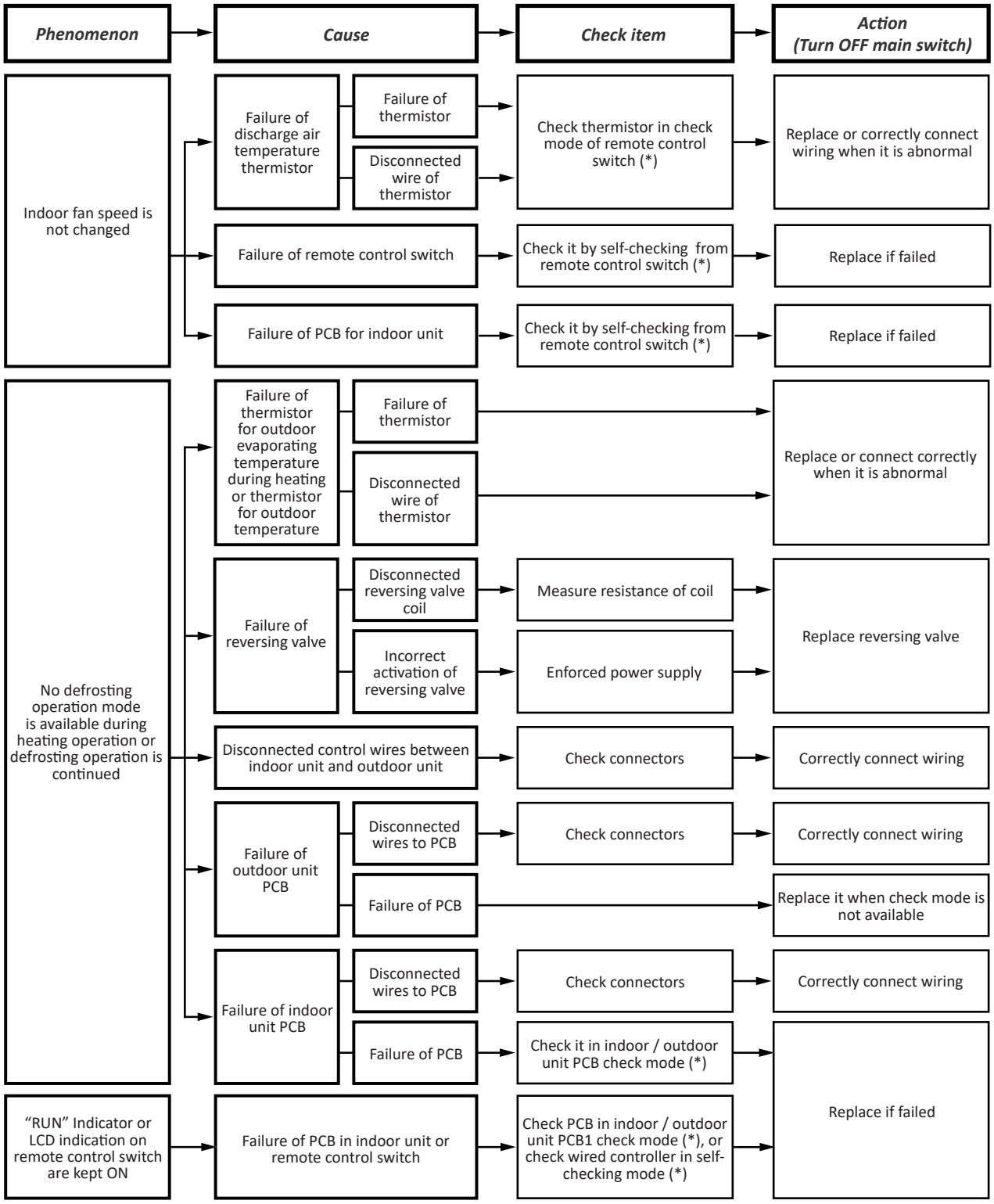
Indoor air temperature is lower than -21 °C or the outdoor air temperature lower than -5 °C during the cooling operation.

Indoor air temperature is higher than 30 °C or outdoor air temperature higher than 23°C during the heating operation.

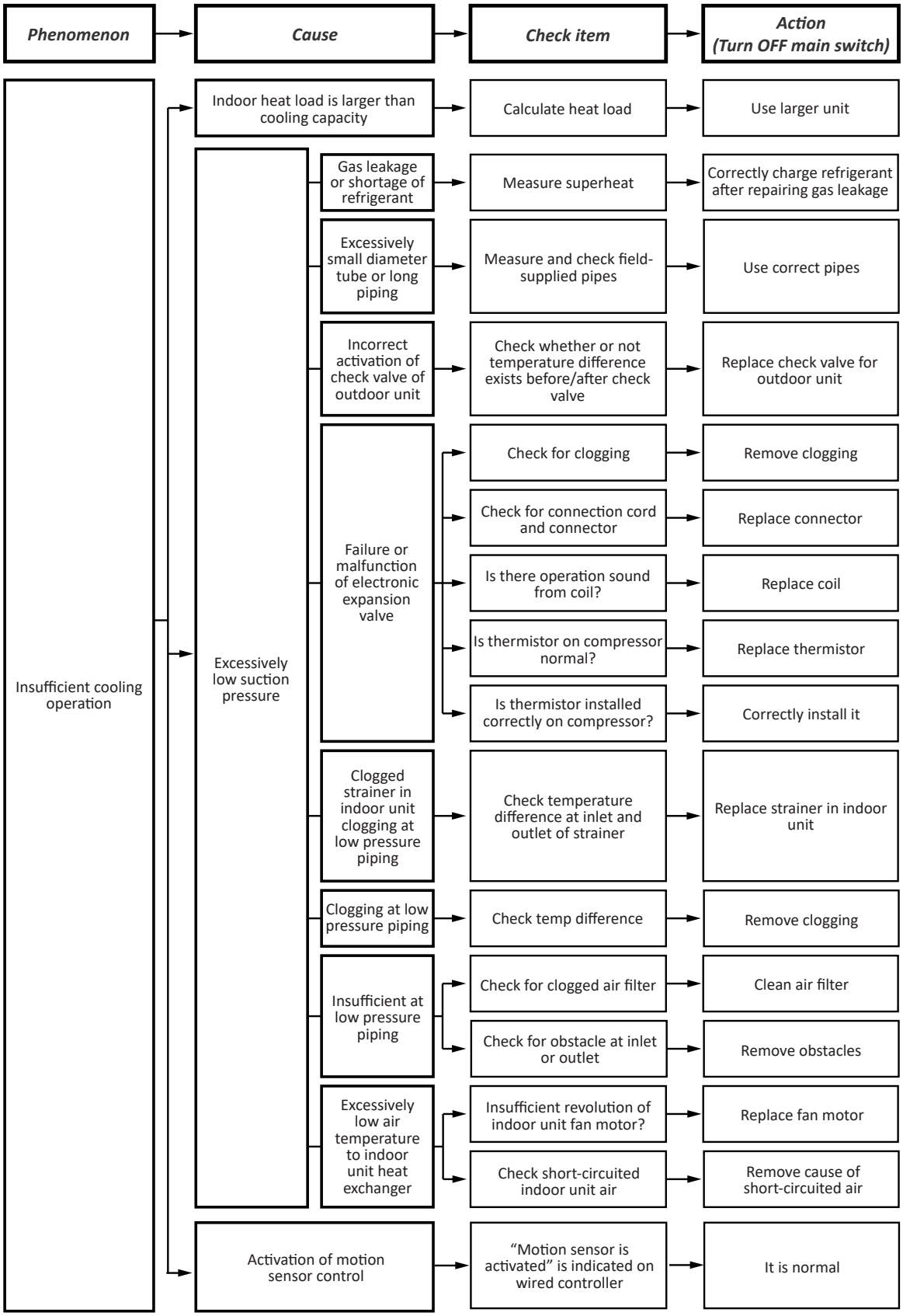
Outdoor air temperature is lower than -25 °C during the heating operation.

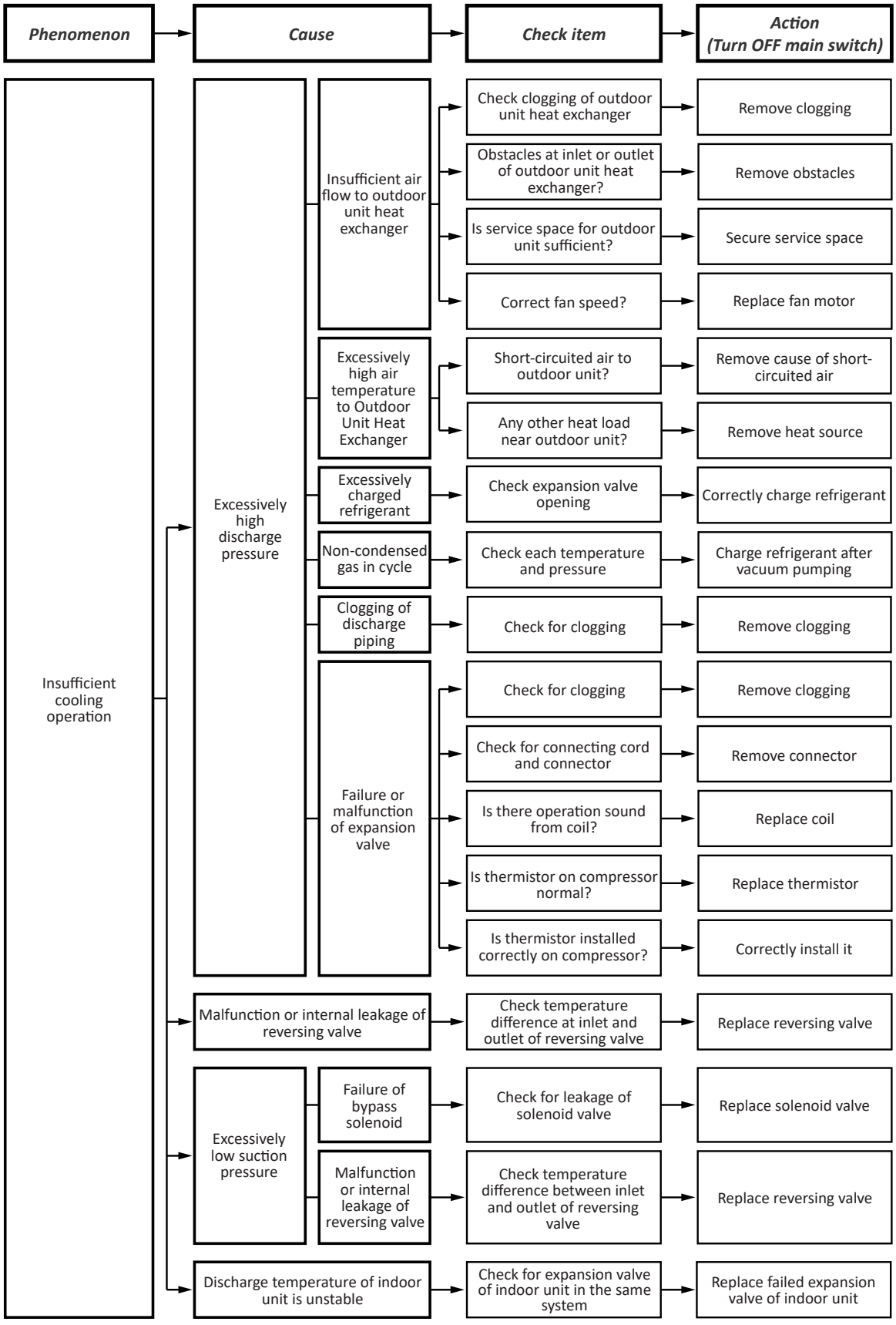
When the cooling (or heating) operation signal is sent to the outdoor unit and a different mode as heating (or cooling) operation signal is sent to the indoor units.

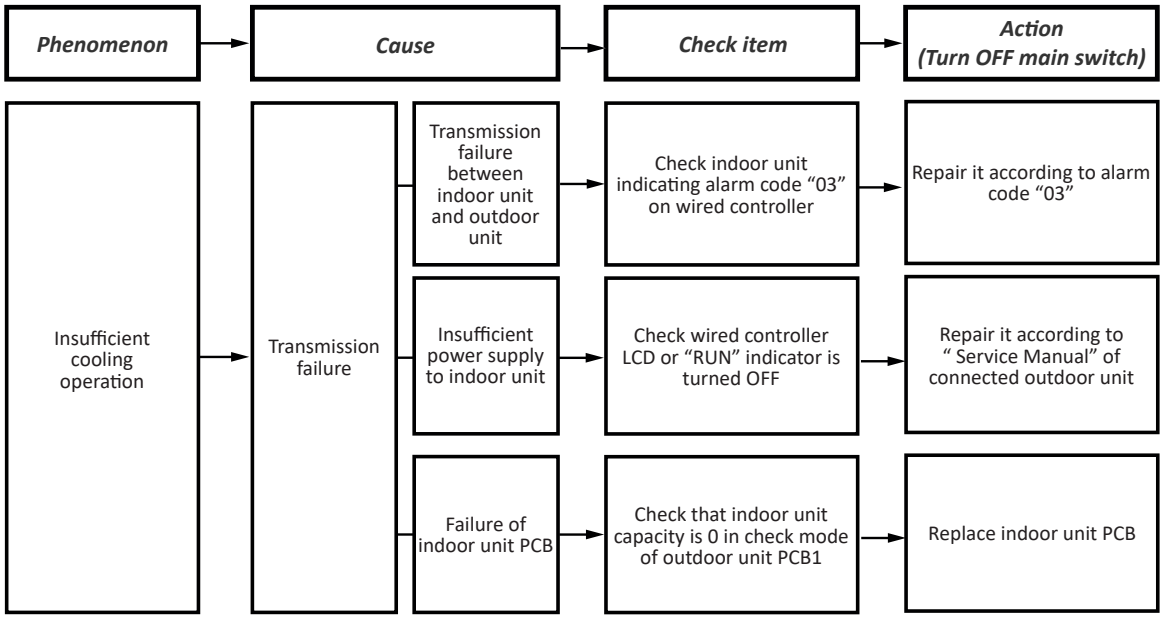
When the demand or emergency stop signal is sent to the outdoor unit.

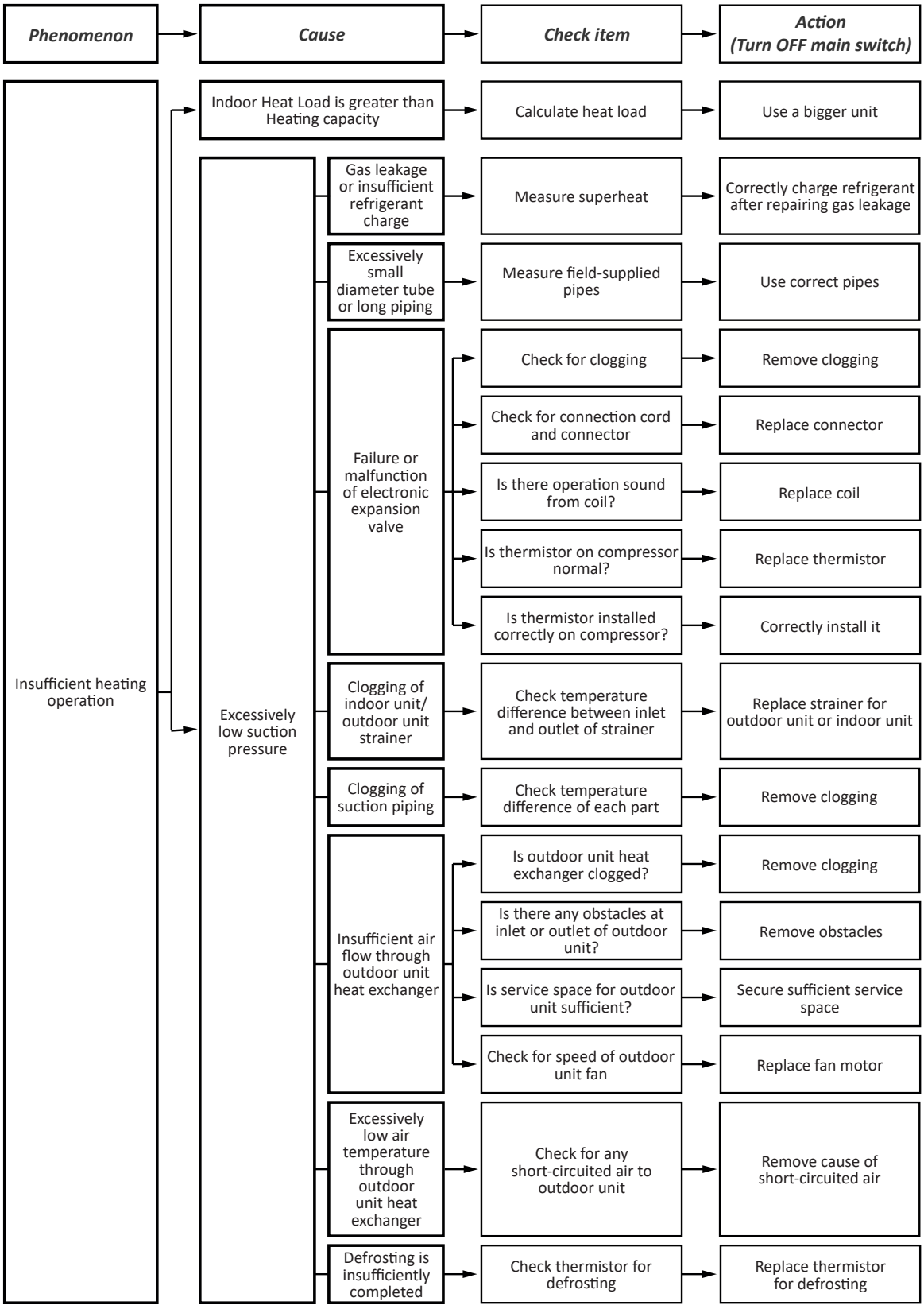


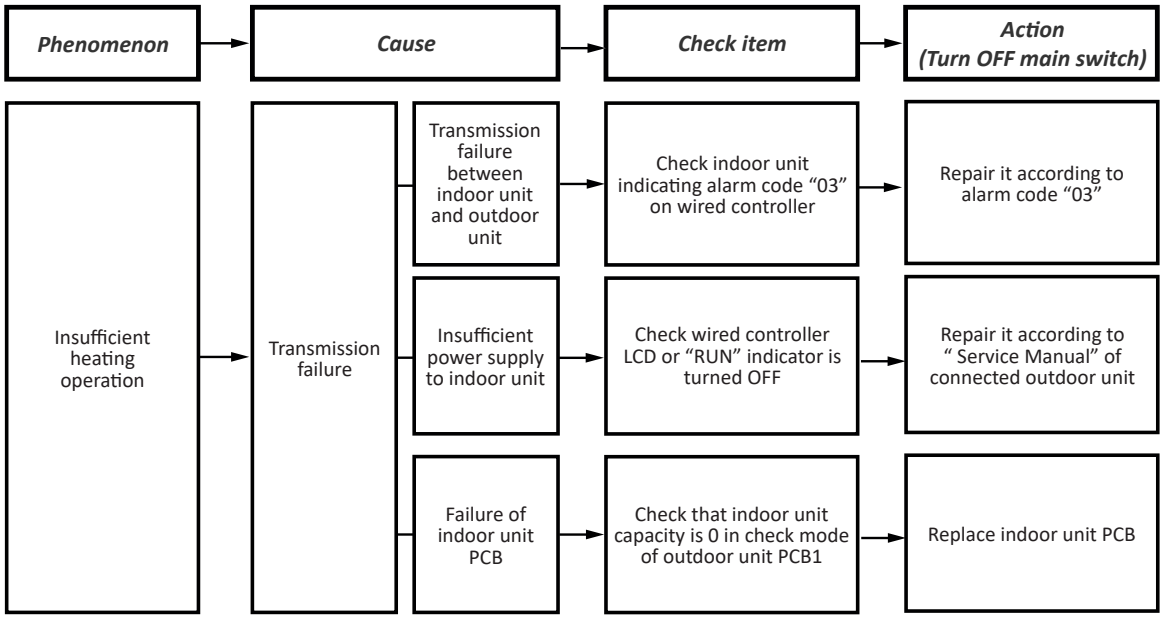
(*): Refer to the remote control manual for further information.

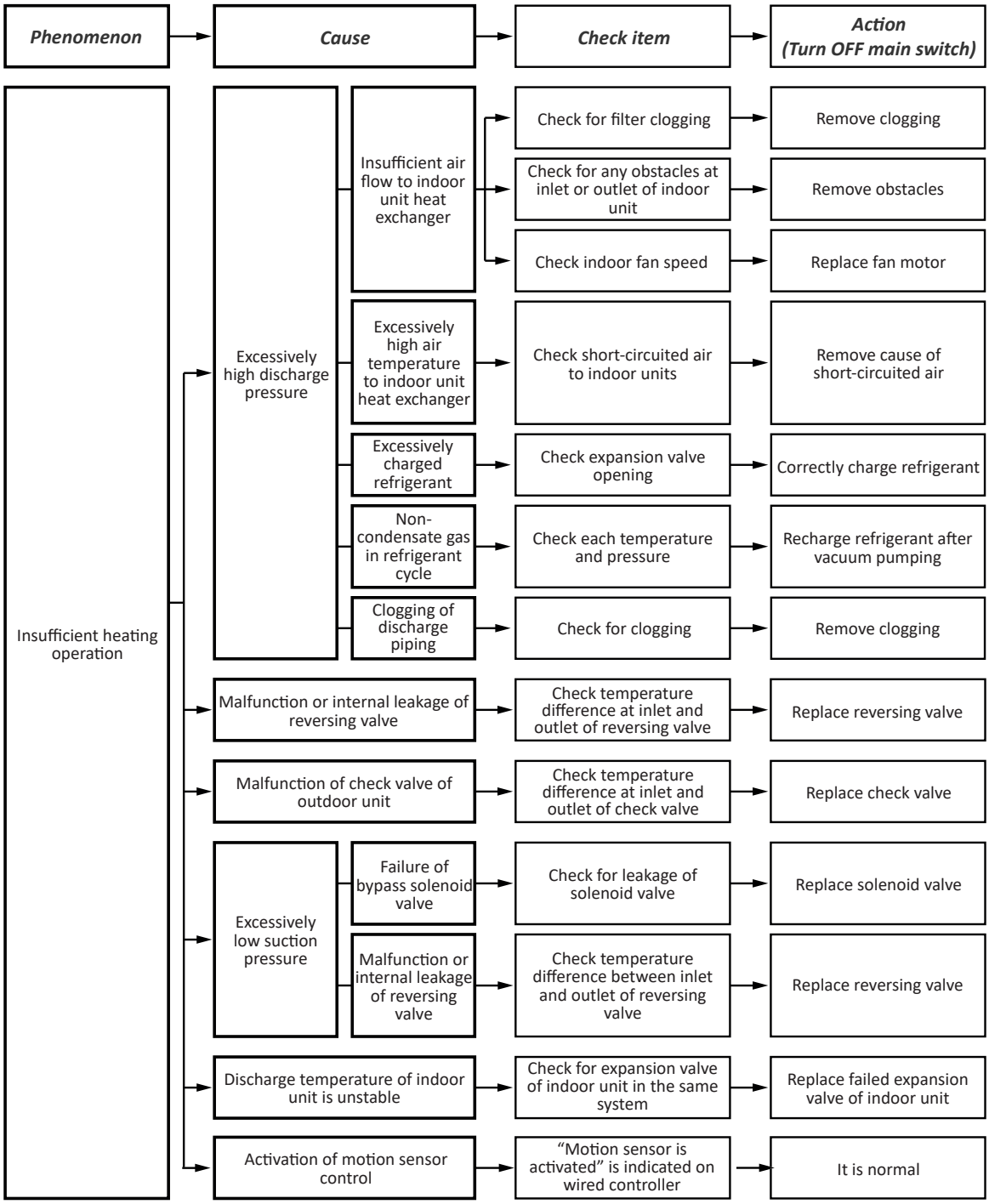

Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Insufficient cooling operation
Indoor heat load is larger than cooling capacity
Calculate heat load
Use larger unit
Excessively low suction pressure
Gas leakage or shortage of refrigerant
Measure superheat
Correctly charge refrigerant after repairing gas leakage
Excessively small diameter tube or long piping
Measure and check field-supplied pipes
Use correct pipes
Incorrect activation of check valve of outdoor unit
Check whether or not temperature difference exists before/after check valve
Replace check valve for outdoor unit
Failure or malfunction of electronic expansion valve
Check for clogging
Remove clogging
Check for connection cord and connector
Replace connector
Is there operation sound from coil?
Replace coil
Is thermistor on compressor normal?
Replace thermistor
Is thermistor installed correctly on compressor?
Correctly install it
Clogged strainer in indoor unit clogging at low pressure piping
Check temperature difference at inlet and outlet of strainer
Replace strainer in indoor unit
Clogging at low pressure piping
Check temp difference
Remove clogging
Insufficient at low pressure piping
Check for clogged air filter
Clean air filter
Check for obstacle at inlet or outlet
Remove obstacles
Excessively low air temperature to indoor unit heat exchanger
Insufficient revolution of indoor unit fan motor?
Replace fan motor
Check short-circuited indoor unit air
Remove cause of short-circuited air
Activation of motion sensor control
“Motion sensor is activated” is indicated on wired controller
It is normal

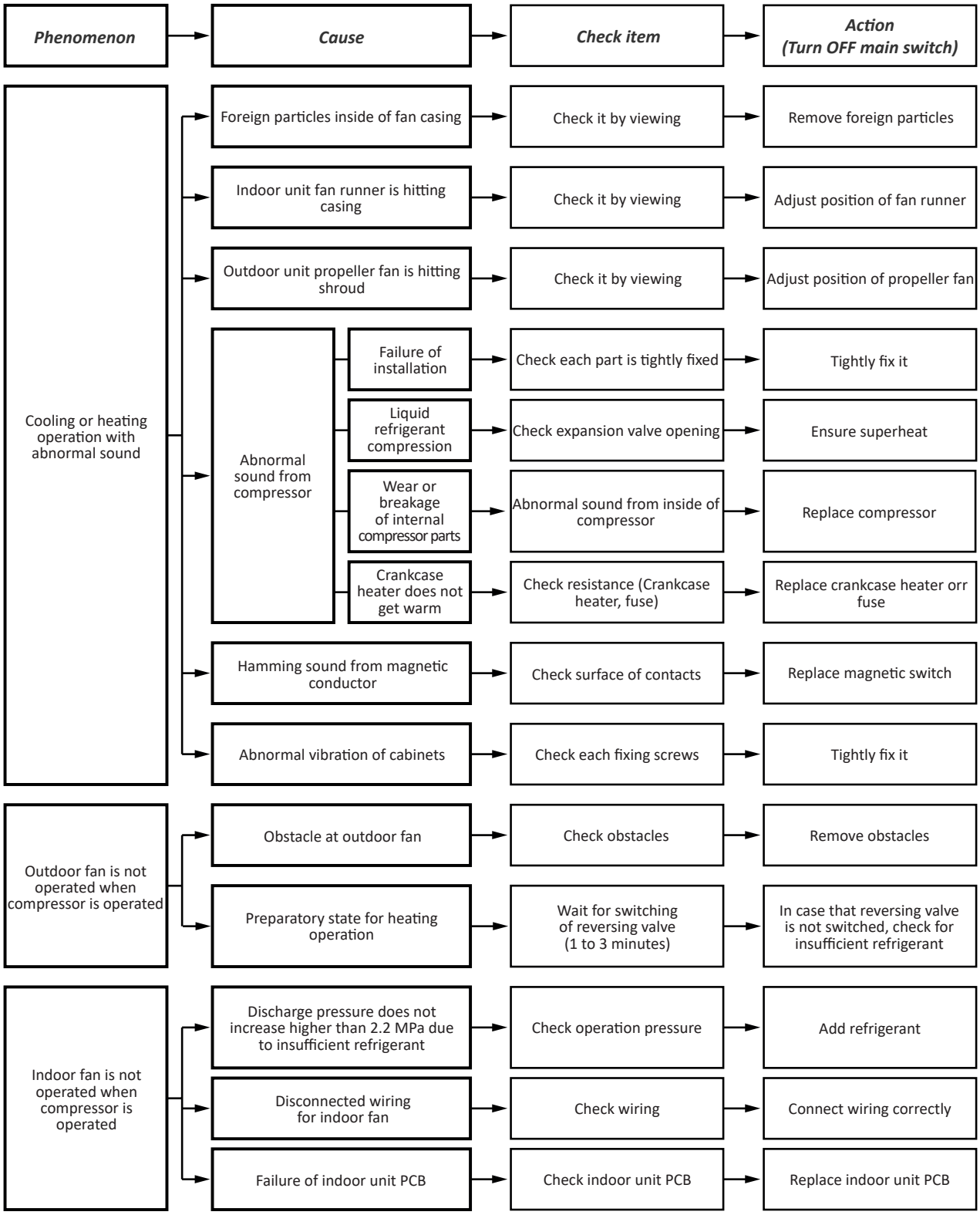

Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Insufficient cooling operation
Excessively high discharge pressure
Insufficient air flow to outdoor unit heat exchanger
Check clogging of outdoor unit heat exchanger
Remove clogging
Obstacles at inlet or outlet of outdoor unit heat exchanger?
Remove obstacles
Is service space for outdoor unit sufficient?
Secure service space
Correct fan speed?
Replace fan motor
Excessively high air temperature to Outdoor Unit Heat Exchanger
Short-circuited air to outdoor unit?
Remove cause of short-circuited air
Any other heat load near outdoor unit?
Remove heat source
Excessively charged refrigerant
Check expansion valve opening
Correctly charge refrigerant
Non-condensed gas in cycle
Check each temperature and pressure
Charge refrigerant after vacuum pumping
Clogging of discharge piping
Check for clogging
Remove clogging
Failure or malfunction of expansion valve
Check for clogging
Remove clogging
Check for connecting cord and connector
Remove connector
Is there operation sound from coil?
Replace coil
Is thermistor on compressor normal?
Replace thermistor
Is thermistor installed correctly on compressor?
Correctly install it
Malfunction or internal leakage of reversing valve
Check temperature difference at inlet and outlet of reversing valve
Replace reversing valve
Excessively low suction pressure
Failure of bypass solenoid
Check for leakage of solenoid valve
Replace solenoid valve
Malfunction or internal leakage of reversing valve
Check temperature difference between inlet and outlet of reversing valve
Replace reversing valve
Discharge temperature of indoor unit is unstable
Check for expansion valve of indoor unit in the same system
Replace failed expansion valve of indoor unit


Phenomenon
Cause
Check item
Action
(Turn OFF main switch)
Insufficient cooling operation
Transmission failure
Transmission failure between indoor unit and outdoor unit
Check indoor unit indicating alarm code “03” on wired controller
Repair it according to alarm code “03”
Insufficient power supply to indoor unit
Check wired controller LCD or “RUN” indicator is turned OFF
Repair it according to “ Service Manual” of connected outdoor unit
Failure of indoor unit PCB
Check that indoor unit capacity is 0 in check mode of outdoor unit PCB1
Replace indoor unit PCB


Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Insufficient heating operation
Indoor Heat Load is greater than Heating capacity
Calculate heat load
Use a bigger unit
Excessively low suction pressure
Gas leakage or insufficient refrigerant charge
Measure superheat
Correctly charge refrigerant after repairing gas leakage
Excessively small diameter tube or long piping
Measure field-supplied pipes
Use correct pipes
Failure or malfunction of electronic expansion valve
Check for clogging
Remove clogging
Check for connection cord and connector
Replace connector
Is there operation sound from coil?
Replace coil
Is thermistor on compressor normal?
Replace thermistor
Is thermistor installed correctly on compressor?
Correctly install it
Clogging of indoor unit/ outdoor unit strainer
Check temperature difference between inlet and outlet of strainer
Replace strainer for outdoor unit or indoor unit
Clogging of suction piping
Check temperature difference of each part
Remove clogging
Insufficient air flow through outdoor unit heat exchanger
Is outdoor unit heat exchanger clogged?
Remove clogging
Is there any obstacles at inlet or outlet of outdoor unit?
Remove obstacles
Is service space for outdoor unit sufficient?
Secure sufficient service space
Check for speed of outdoor unit fan
Replace fan motor
Excessively low air temperature through outdoor unit heat exchanger
Check for any short-circuited air to outdoor unit
Remove cause of short-circuited air
Defrosting is insufficiently completed
Check thermistor for defrosting
Replace thermistor for defrosting


Phenomenon
Cause
Check item
Action
(Turn OFF main switch)
Insufficient heating operation
Transmission failure
Transmission failure between indoor unit and outdoor unit
Check indoor unit indicating alarm code “03” on wired controller
Repair it according to alarm code “03”
Insufficient power supply to indoor unit
Check wired controller LCD or “RUN” indicator is turned OFF
Repair it according to “ Service Manual” of connected outdoor unit
Failure of indoor unit PCB
Check that indoor unit capacity is 0 in check mode of outdoor unit PCB1
Replace indoor unit PCB


Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Insufficient heating operation
Excessively high discharge pressure
Insufficient air flow to indoor unit heat exchanger
Check for filter clogging
Remove clogging
Check for any obstacles at inlet or outlet of indoor unit
Remove obstacles
Check indoor fan speed
Replace fan motor
Excessively high air temperature to indoor unit heat exchanger
Check short-circuited air to indoor units
Remove cause of short-circuited air
Excessively charged refrigerant
Check expansion valve opening
Correctly charge refrigerant
Non-condensate gas in refrigerant cycle
Check each temperature and pressure
Recharge refrigerant after vacuum pumping
Clogging of discharge piping
Check for clogging
Remove clogging
Malfunction or internal leakage of reversing valve
Check temperature difference at inlet and outlet of reversing valve
Replace reversing valve
Malfunction of check valve of outdoor unit
Check temperature difference at inlet and outlet of check valve
Replace check valve
Excessively low suction pressure
Failure of bypass solenoid valve
Check for leakage of solenoid valve
Replace solenoid valve
Malfunction or internal leakage of reversing valve
Check temperature difference between inlet and outlet of reversing valve
Replace reversing valve
Discharge temperature of indoor unit is unstable
Check for expansion valve of indoor unit in the same system
Replace failed expansion valve of indoor unit
Activation of motion sensor control
“Motion sensor is activated” is indicated on wired controller
It is normal


Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Cooling or heating operation with abnormal sound
Foreign particles inside of fan casing
Check it by viewing
Remove foreign particles
Indoor unit fan runner is hitting casing
Check it by viewing
Adjust position of fan runner
Outdoor unit propeller fan is hitting shroud
Check it by viewing
Adjust position of propeller fan
Abnormal sound from compressor
Failure of installation
Check each part is tightly fixed
Tightly fix it
Liquid refrigerant compression
Check expansion valve opening
Ensure superheat
Wear or breakage of internal compressor parts
Abnormal sound from inside of compressor
Replace compressor
Crankcase heater does not get warm
Check resistance (Crankcase heater, fuse)
Replace crankcase heater orr fuse
Hamming sound from magnetic conductor
Check surface of contacts
Replace magnetic switch
Abnormal vibration of cabinets
Check each fixing screws
Tightly fix it
Outdoor fan is not operated when compressor is operated
Obstacle at outdoor fan
Check obstacles
Remove obstacles
Preparatory state for heating operation
Wait for switching of reversing valve (1 to 3 minutes)
In case that reversing valve is not switched, check for insufficient refrigerant
Indoor fan is not operated when compressor is operated
Discharge pressure does not increase higher than 2.2 MPa due to insufficient refrigerant
Check operation pressure
Add refrigerant
Disconnected wiring for indoor fan
Check wiring
Connect wiring correctly
Failure of indoor unit PCB
Check indoor unit PCB
Replace indoor unit PCB

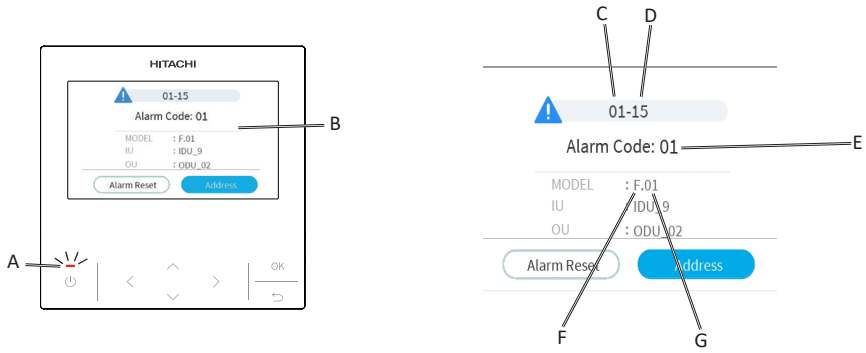
Phenomenon	*Cause / Check item*	*Action (Turn OFF main switch)*
"Motion sensor is activated" is NOT indicated on wired controller LCD	Check connection of connector	Connect it securely
Operation stops though someone is present	Check reaction rate (Check mode 1:q1) (reaction rate is always 0 %: abnormal)	Replace motion sensor
	Check connection of connector	Connect it securely
Operation continues though no one in present	Check reaction rate (Check mode 1:q1) (reaction rate is always 100 %: abnormal)	Replace motion sensor
	Check heat source (a moving object whose temperature is different from atmosphere)	Remove it
	Check connection of connector	Connect it securely

Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Outdoor fan does not operate even when compressor is operating	Obstacle at outdoor fan	Check obstacles	Remove obstacles
	Preparatory state for heating operation	Wait for switching of reversing valve (1 to 3 minutes)	If the reversing valve is not switched, check for insufficient refrigerant
Indoor fan does not operate even when compressor is operating	Discharge pressure does not increase higher than 2.2 MPa due to insufficient refrigerant	Check operation pressure	Add refrigerant
	Disconnected wire for indoor fan	Check wiring	Correctly connect wires
	Failure of indoor unit PCB	Check indoor unit PCB	Replace indoor unit PCB

8.2 Procedure for troubleshooting

8.2.1 Alarm codes of wired controller

PC-ARFG2-E(B) example



A: The RUN (red) indicator flashes.

B: The alarm indicator appears on the remote controller liquid crystal display (LCD).

The alarm screen displays the following items:

- ✓ C+D: Indoor unit number:
  - ◉ C: Refrigerant system number (Abnormal refrigerant cycle number).
  - ◉ D: indoor unit address number (Abnormal indoor unit number).
- ✓ E: Alarm code
- ✓ F+G: Installet unit number
  - ◉ F: Unit model code.

Model code	
Indication	Model
H	Heat pump
P	Inverter
F	Multi (SET-FREE)
E	Other
L	KPI

- ◉ E: connected number of indoor units

If there are various indoor units connected with an alarm, the above mentioned information is shown for each one of them, changing the unit each 5 seconds.

If the RUN indicator flashes 5 times (5 seconds) with unit number and alarm code displayed, note the alarm code (see table Alarm codes) and contact your service provider.

Code	Category	Content of abnormality	Leading cause
01	Indoor unit	Activation of protection device (float switch)	Activation of float switch (high water level in drain pan, abnormality of drain pipe, float switch, or drain pan)
02	Outdoor unit	Activation of protection device (high pressure cut)	Activation of PSH (pipe clogging, excessive refrigerant, inert gas mixing)
03	Communication	Abnormal communication between indoor units and outdoor units	Incorrect wiring, loose terminals, disconnected communication cable, blowout of fuse, indoor unit power OFF
04		Abnormal communication between inverter PCB and outdoor PCB	Inverter PCB -outdoor PCB communication failure (loose connector, wire breaking, blowout of fuse)
05	Supply phase	Abnormality of power supply phases	Incorrect power supply, connection to reversed phase, open-phase
06	Voltage	Abnormal inverter voltage	Outdoor voltage decrease, insufficient power capacity
07	Cycle	Decrease in discharge gas superheat	Excessive refrigerant charge, failure of thermistor, incorrect wiring, incorrect piping connection, expansion valve locking at opened position (disconnect connector)
08		Increase in discharge gas temperature	Insufficient refrigerant charge, pipe clogging, failure of thermistor, incorrect wiring, incorrect piping connection, expansion valve locking at closed position (disconnect connector)
0A	Communication	Abnormal communication between outdoor units	Incorrect wiring, breaking wire, loose terminals
0b	Outdoor unit	Incorrect outdoor unit address setting	Duplication of address setting for outdoor units (sub units) in same refrigerant cycle number
0C		Incorrect outdoor unit main unit setting	Two (or more) outdoor units set as "Main unit" exist in same refrigerant cycle number
11	Sensor on indoor unit	Abnormality of inlet air thermistor	Incorrect wiring, disconnecting wiring, breaking wire, short circuit
12		Abnormality of outlet air thermistor	
13		Abnormality of freeze protection thermistor	
14		Abnormality of gas piping thermistor	
15		Abnormality of outdoor air thermistor (EconoFresh)	
16		Abnormality of remote sensor (DOAS*)	
17		Abnormality of thermistor built-in remote controller (DOAS*)	
18	Indoor fan motor	Abnormality of indoor fan system	Abnormality of indoor fan motor (step-out), indoor fan controller failure
19		Activation of protection device for indoor fan	Fan motor overheat, lockup

Code	Category	Content of abnormality	Leading cause
1A	Indoor fan controller	Abnormality of fan controller fin temperature	Abnormality of fin thermistor or fan controller, heat exchanger clogging, abnormality of fan motor
1b		Activation of overcurrent protection	Abnormality of fan motor
1C		Problem with current sensor	Abnormality of fan controller current sensor
1d		Activation fan controller protection	Driver IC error signal detection, instantaneous overcurrent
1E		Abnormality of indoor fan controller voltage	Indoor voltage decrease, insufficient capacity of power supply wiring
21	Sensor on outdoor unit	Abnormality of high pressure sensor	Incorrect wiring, disconnecting wiring, breaking wire, short circuit
22		Abnormality of outdoor air thermistor	
23		Abnormality of discharge gas thermistor on top of compressor	
24		Abnormality of heat exchanger liquid pipe thermistor	
25		Abnormality of heat exchanger gas pipe thermistor	
29		Abnormality of low pressure sensor	
30	System	Incorrect DSW settings of outdoor unit for CH-Box	Connection of CH-Box to heat pump system, disconnection of CH-Box to heat recover system. CH Unit (CH-(6.0/10.0)N1) and CH-Box (CH-(6.0/10.0)N2) are used in the same system together.
31		Incorrect capacity setting of outdoor unit and indoor unit	Incorrect capacity setting of outdoor unit and indoor unit, excessive or insufficient indoor unit total capacity code
35		Incorrect setting of indoor unit no.	Duplication of indoor unit number in same refrigerant cycle number
36		Incorrect of indoor unit combination	Indoor unit is designed for R22
38		Abnormality of picking up circuit for protection in outdoor unit	Failure of protection detecting device (incorrect wiring of outdoor PCB)
3A	Outdoor unit	Abnormality of outdoor unit capacity	Outdoor unit capacity > 54HP
3b		Incorrect setting of outdoor unit models combination or voltage	Incorrect setting of main and sub units(s) combination or voltage
3d		Abnormal communication between main unit and sub unit(s)	Incorrect wiring, disconnect wire, breaking wire, PCB failure
3E		Abnormal combination between inverter PCB and outdoor PCB	Incorrect combination between inverter PCB and outdoor PCB

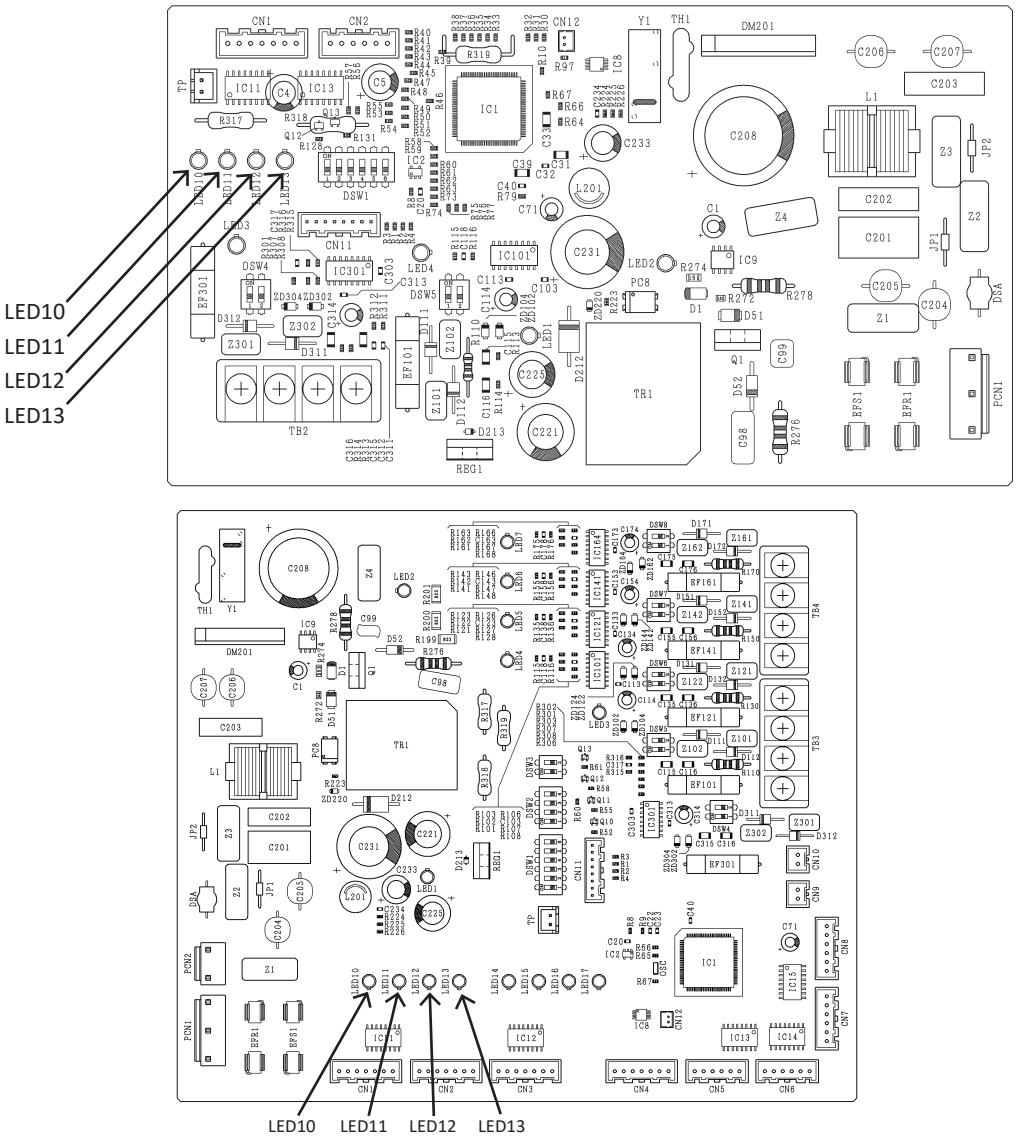
Code	Category	Content of abnormality	Leading cause
43	Protection device	Activation of pressure ratio decrease protection	Defective compression (failure of compressor or inverter, loose power supply connection)
44		Activation of low pressure increase protection	Overload at cooling, high temperature at heating, expansion valve locking at open position (loose connector)
45		Activation of high pressure increase protection	Overload operation (heat exchanger clogging, short circuit of airflow), pipe clogging, excessive refrigerant, inert gas mixing
47		Activation of low pressure decrease protection	Insufficient refrigerant, piping clogging, expansion valve locking at close position (loosen connector)
48		Activation of inverter overcurrent protection	Overload operation, compressor failure
51	Sensor	Abnormal inverter current sensor	Current sensor failure
53	Inverter	Inverter error signal detection	Driver IC error signal detection (protection for overcurrent, voltage decrease, short circuit), instantaneous overcurrent
54		Abnormality of inverter fin temperature	Abnormal inverter fin thermistor, heat exchanger clogging, fan motor failure
55		Inverter failure	Inverter PCB failure
57	Fan controller	Activation of fan controller protection	Driver IC error signal detection (protection for overcurrent, voltage decrease, short circuit), instantaneous overcurrent
5A		Abnormality of fan controller fin temperature	Fin thermistor failure, heat exchanger clogging, fan motor failure
5b		Activation of overcurrent protection	Fan motor failure
5C		Abnormality of fan controller sensor	Failure of current sensor (instantaneous overcurrent, increase of fin femperature, voltage decrease, grand fault, step-out)
A1	External input	Detection of external abnormality	Input signal by external abnormality detection setting
b0	Indoor unit	Incorrect setting of unit model code	Incorrect setting of indoor unit model
b1		Incorrect setting of unit and refrigerant cycle number	64 or more number is set for address or refrigerant cycle
b2		Abnormality of EEPROM	EEPROM failure, incorrect data of EEPROM
b5		Incorrect indoor unit number setting	There are 17 or more non-corresponding to H-LINK II units are connected to one system
b6		Abnormal communication between indoor PCB and indoor fan controller	Communication failure, disconnected communication cable, abnormal connection

Code	Category	Content of abnormality	Leading cause
C1	CH-Box	Incorrect CH-Box connection	2 or more CH-Boxes are connected between outdoor unit and indoor unit
C2		Incorrect indoor unit connection number	9 or more indoor units connected to single branch type CH-Box 7 or more indoor units connected per a branch of multiple branch type CH-Box
C3		Incorrect indoor unit refrigerant number setting	Indoor units of different refrigerant cycle number are connected to CH-Box
C4		Incomplatible outdoor unit connection (CH-Box)	
C5		Incorrect connection port setting	Indoor unit is connected to a port that is set to not used for multiple branch type CH-Box
EE	Compressor	Compressor protection alarm (It can not be reset from wired controller)	This alarm code appears when the following alarms* occurs three times within 6 hours. *02, 07, 08, 39, 43 to 45, 47

**DOAS: Dedicated Outdoor Air System*

8.2.2 Alarm code CH-Box

The alarm code is indicated by LED on the CH-Box PCB:



LED				Alarm code	Content of abnormality
10	11	12	13		
O	O	X	X	03	Abnormal transmission between single branch type CH-Box and outdoor unit
X	X	O	O	03	Abnormal transmission between single branch type CH-Box and indoor unit
O	O	O	O	C1	There are 2 or more single branch type CH-Box are connected between the outdoor and indoor units
O	O	O	X	C2	There are 7 or more indoor units connected to multiple branch type CH-Box There are 9 or more indoor units connected to single branch type CH-Box
X	O	O	X	C3	Indoor units from different refrigerant cycles have been connected to single branch type CH-Box
O	X	X	O	C4	This outdoor unit is not compatible with this CH-Box
X	O	O	O	C5	Incorrect connection port setting

O: Flashing (turn ON; 0.5 sec / turn OFF; 0.5 sec), X: Turn OFF.

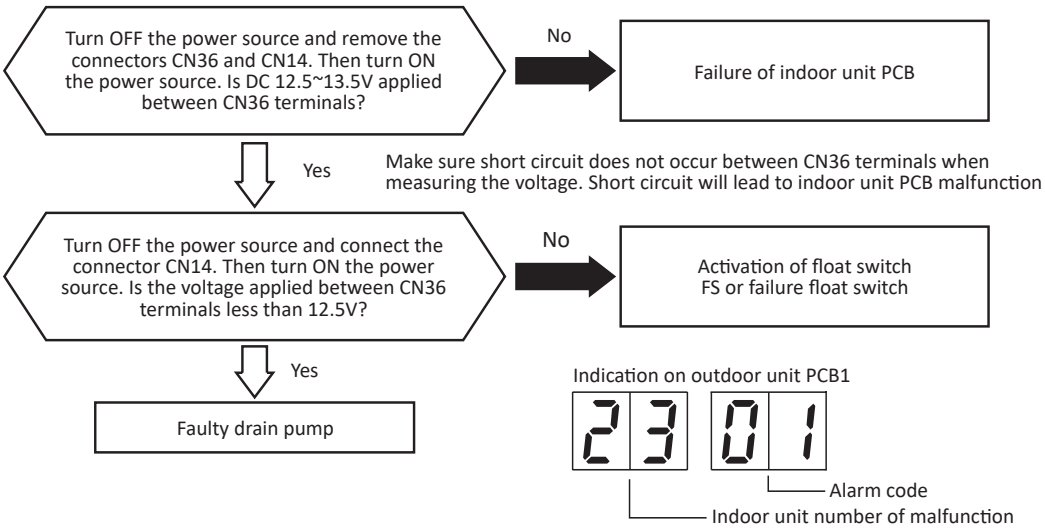
8.3 Troubleshooting by alarm code

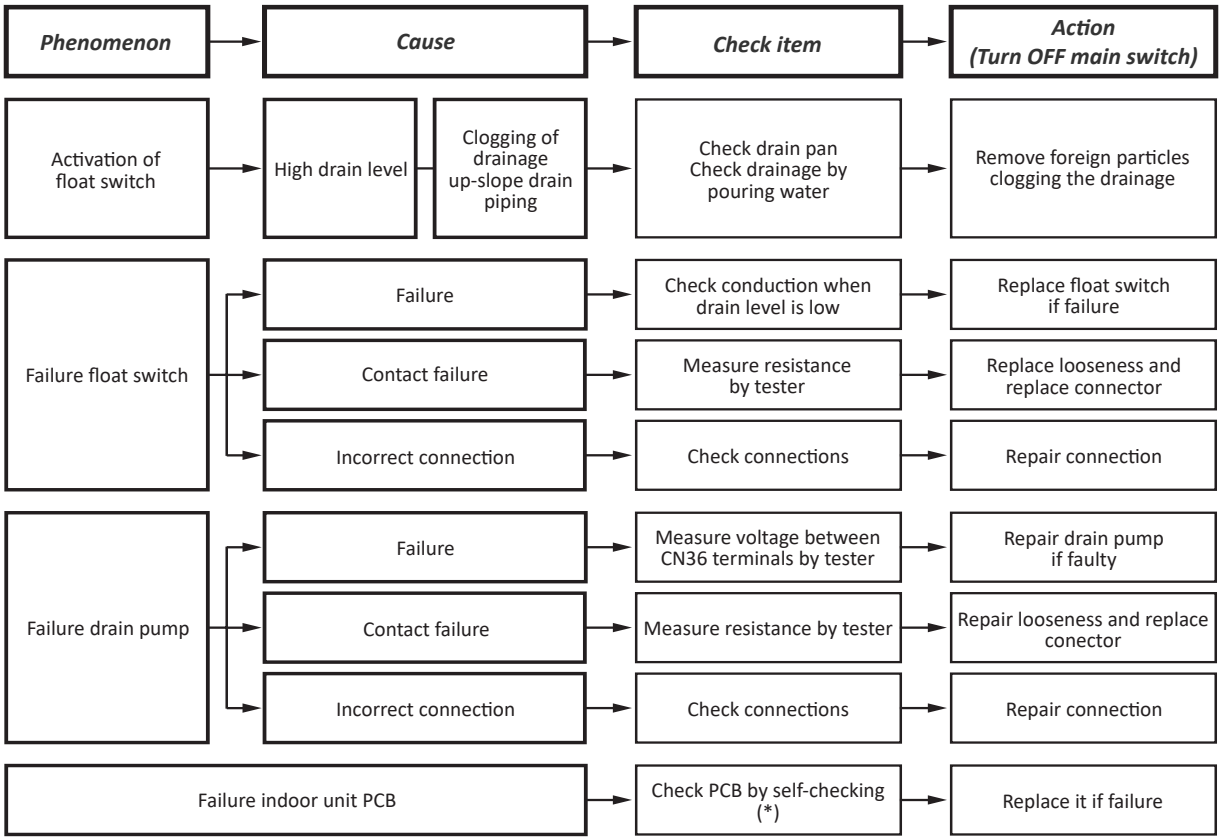
Alarm code	01	Activation of the indoor unit protection device (float switch) in indoor unit.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the LCD, and the indoor unit number and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

Example of RCI-(1.0-6.0)FSN4 type

This alarm code is displayed when the contact between number 1 and number 2 of CN14 on the indoor unit PCB is opened for over 120 seconds during the cooling, dry, fan or heating operation.



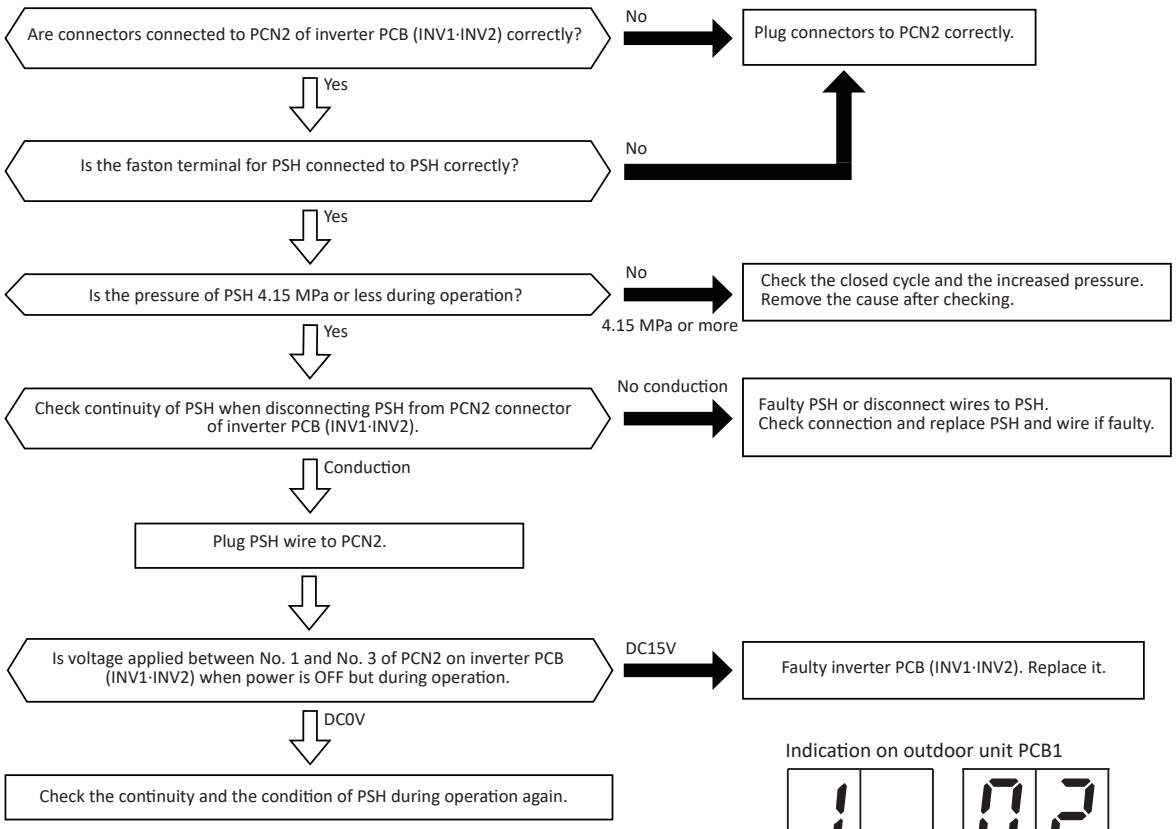


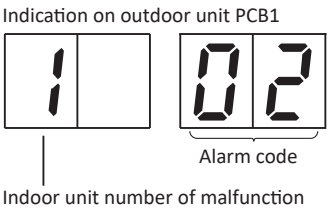
(*) Refer to the remote control manual for further information.

Alarm code 02 Activation of the outdoor unit protection device.

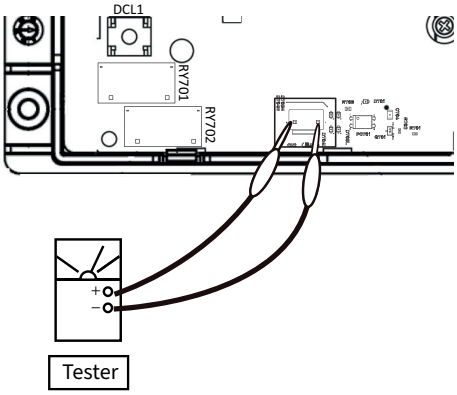
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the outdoor unit number and the alarm code are displayed on the 7-segment display of outdoor unit PCB.

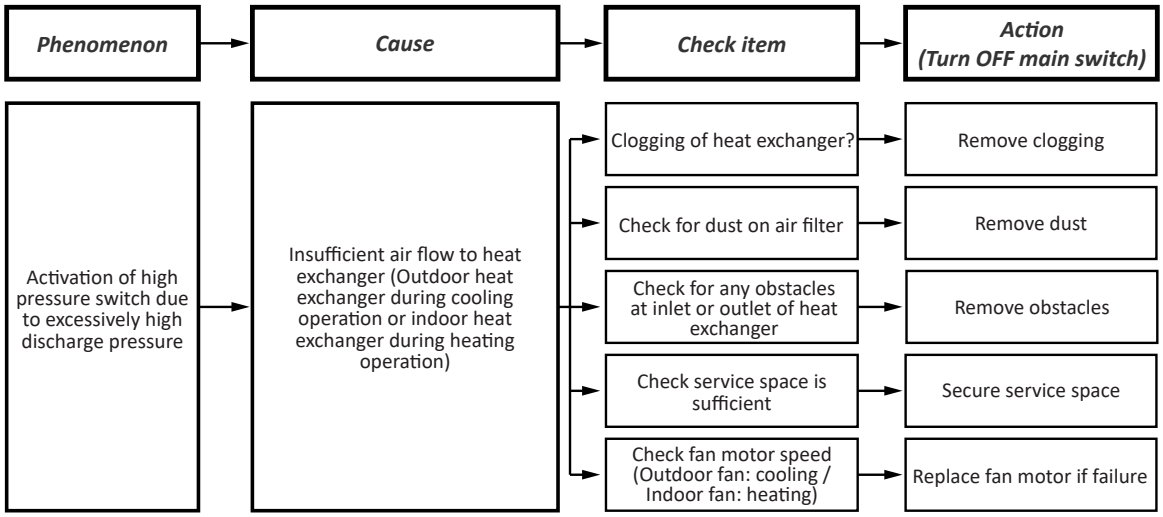
This alarm is indicated when one of the safety devices is activated during the compressor running (Relay is turned ON).





PCB	Inverter PCB (INV)
Connector	PCN2
Pin number	1,3




Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Activation of high pressure switch due to excessively high discharge pressure
Insufficient air flow to heat exchanger (Outdoor heat exchanger during cooling operation or indoor heat exchanger during heating operation)
Clogging of heat exchanger?
Remove clogging
Check for dust on air filter
Remove dust
Check for any obstacles at inlet or outlet of heat exchanger
Remove obstacles
Check service space is sufficient
Secure service space
Check fan motor speed (Outdoor fan: cooling / Indoor fan: heating)
Replace fan motor if failure

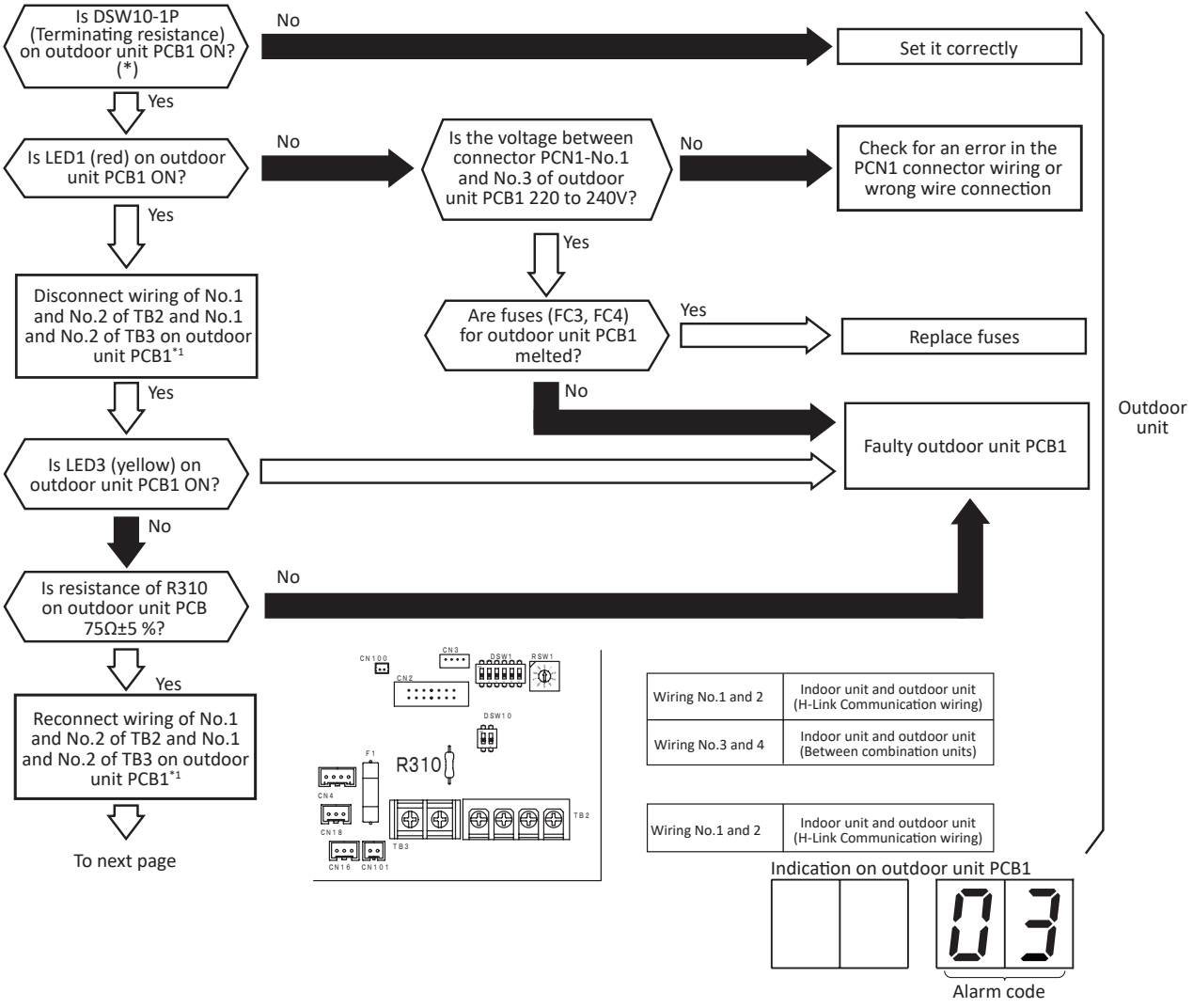
Alarm code 03 Abnormal transmitting between indoor units and outdoor units.

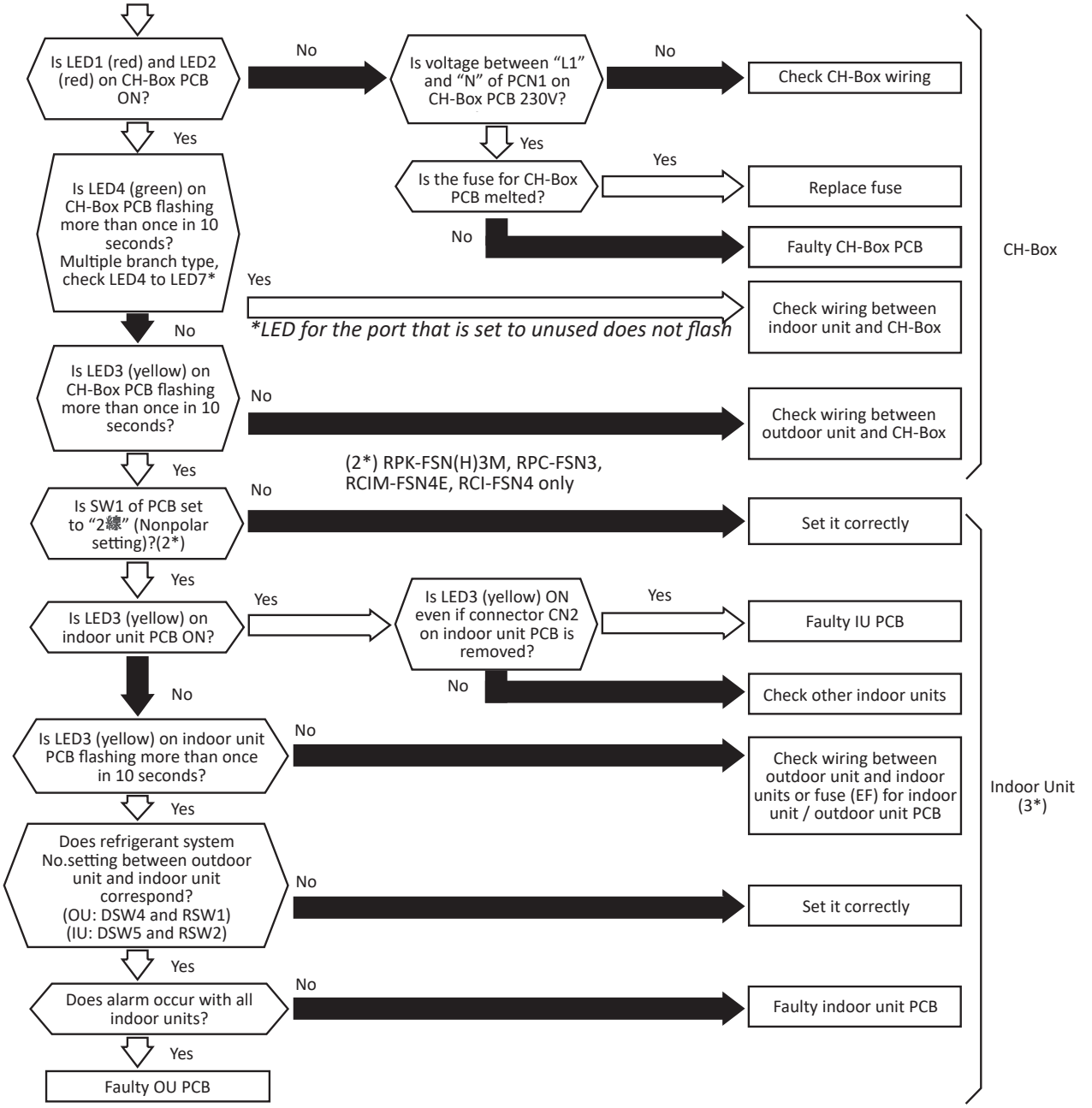
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

Investigate the cause of the excessive current consumption and take the necessary measures when fuses are blown or the circuit breakers for the outdoor unit are activated.
This alarm is indicated when an anomaly is maintained for 3 minutes after the normal transmission between indoor, CH-Box and outdoor units, and also if the anomaly is maintained for 30 seconds after the microcomputer is automatically reset. The alarm is indicated when the abnormal transmission is maintained for 30 seconds from the start up of the outdoor unit.

NOTE

Check the electrical wiring and the power supply according to "8.1.1 Checking the electrical wires and the power source".





(1) In the case that terminating resistance (DSW10) is set to OFF for H-LINK connection, set the end terminal resistance to ON when CN2 is disconnected. Set the end terminal resistance to OFF when CN2 is reconnected.*

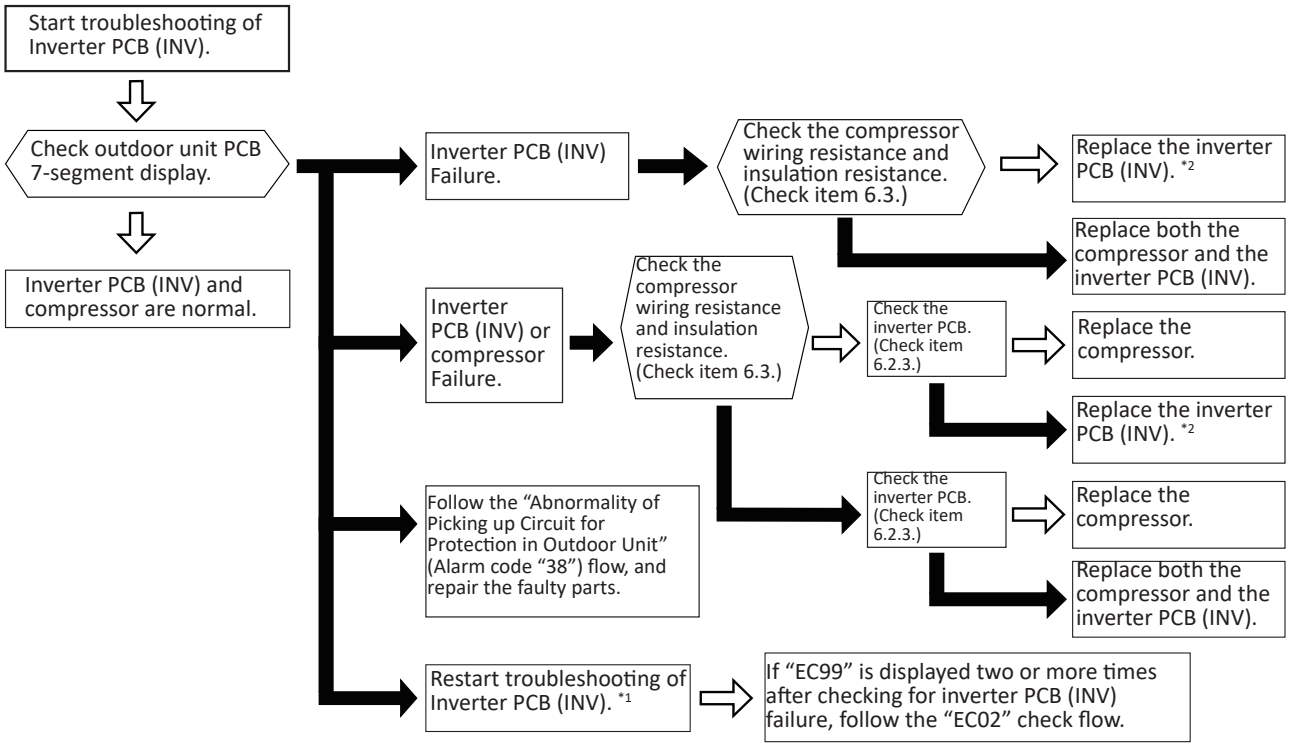
(2)Refer to service manual of the indoor unit for details.*

(3)Transmission setting for the wall mounted (SW1): for communication on the indoor unit PCB is set to "2線" by default. No setting is required for SW1. If it is set to "3線" , alarm 03 will occur.*

Item	Setting position
SW1	

NOTE

- *Before performing the flowchart, check that the crankcase heater of the compressor is energized.*
- *Refer to item "6.2.6 Inverter failure diagnosis mode" for how to diagnose the inverter.*

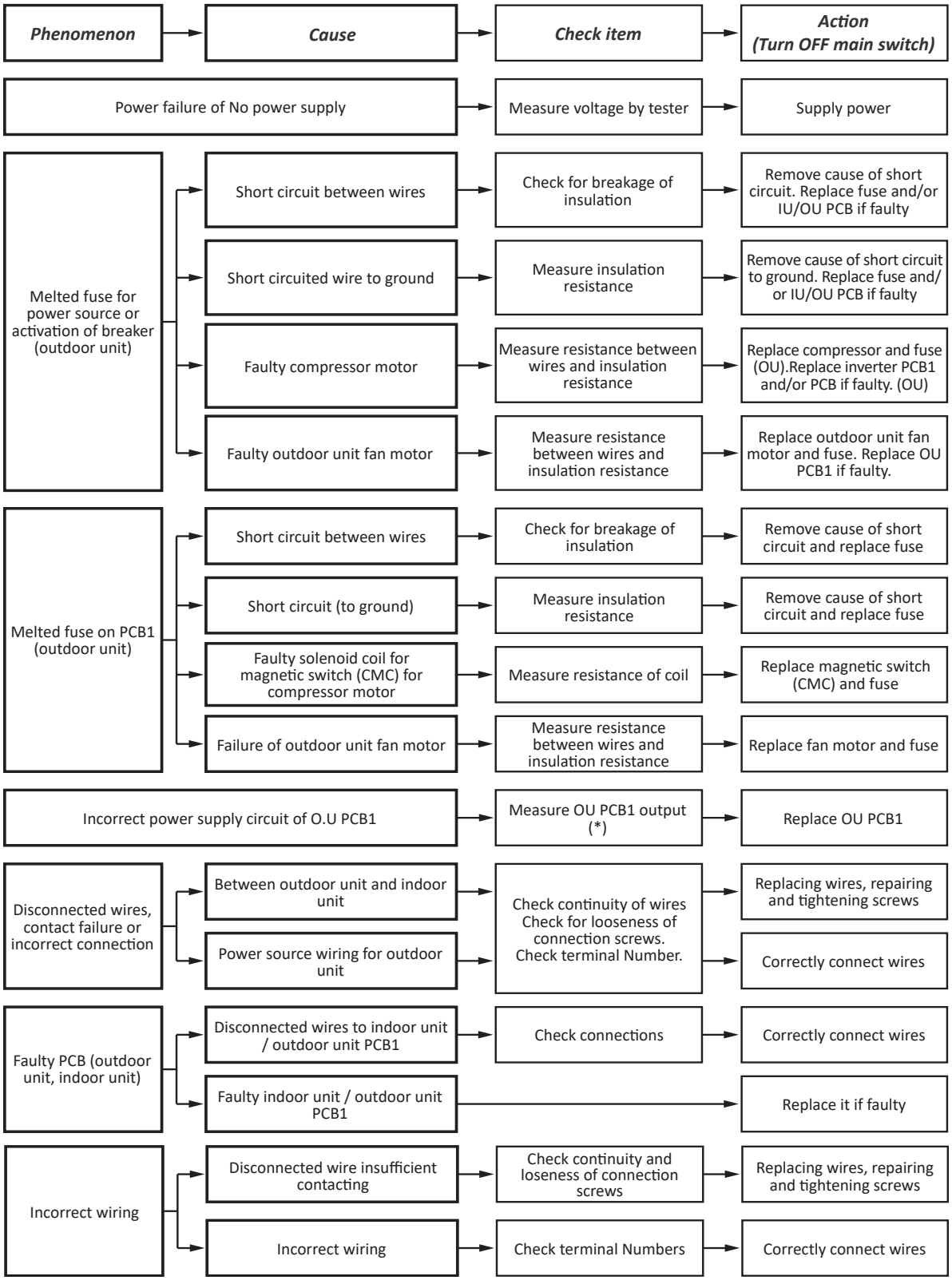


*[*1] Turn the outdoor unit off before restarting troubleshooting. After the troubleshooting, turn it back on.*

*[*2] The abnormalities of the operating current and the cycle operation (higher current and lower Pd) are activated, the structure of the compressor may be broken.*

NOTE

- *If the abnormality is not resolved after the troubleshooting, check the resistance between wires and the insulation resistance for the outdoor fan motor.*
- *Refer to item "6.1 Outdoor unit PCB (PCB1)".*

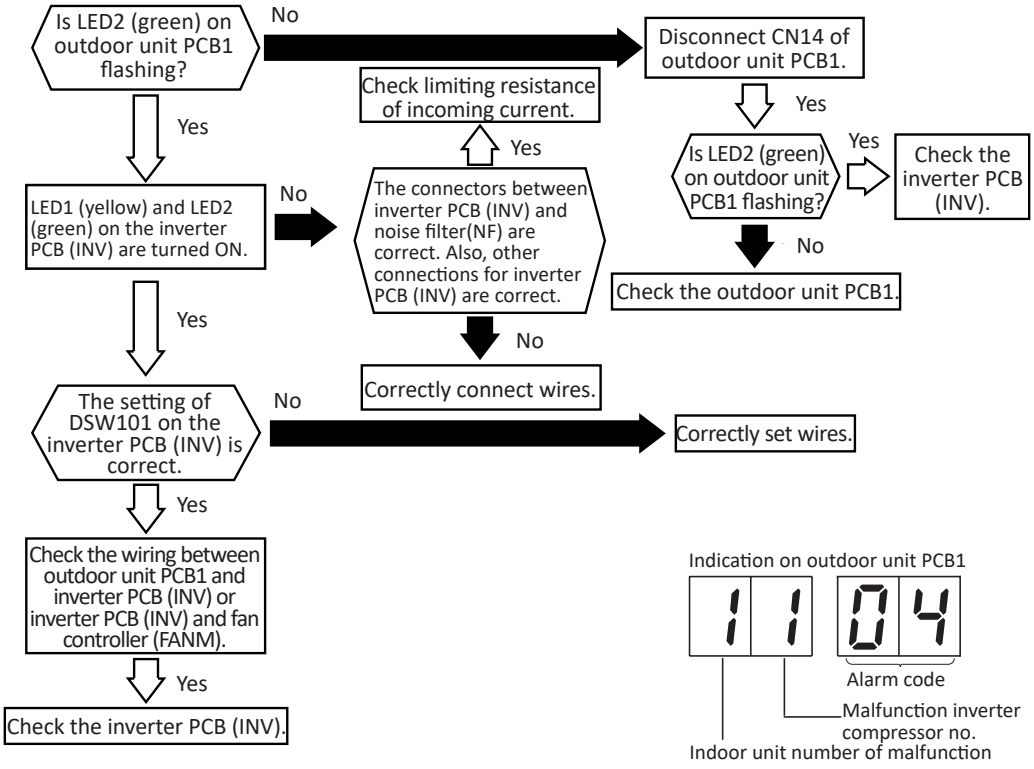


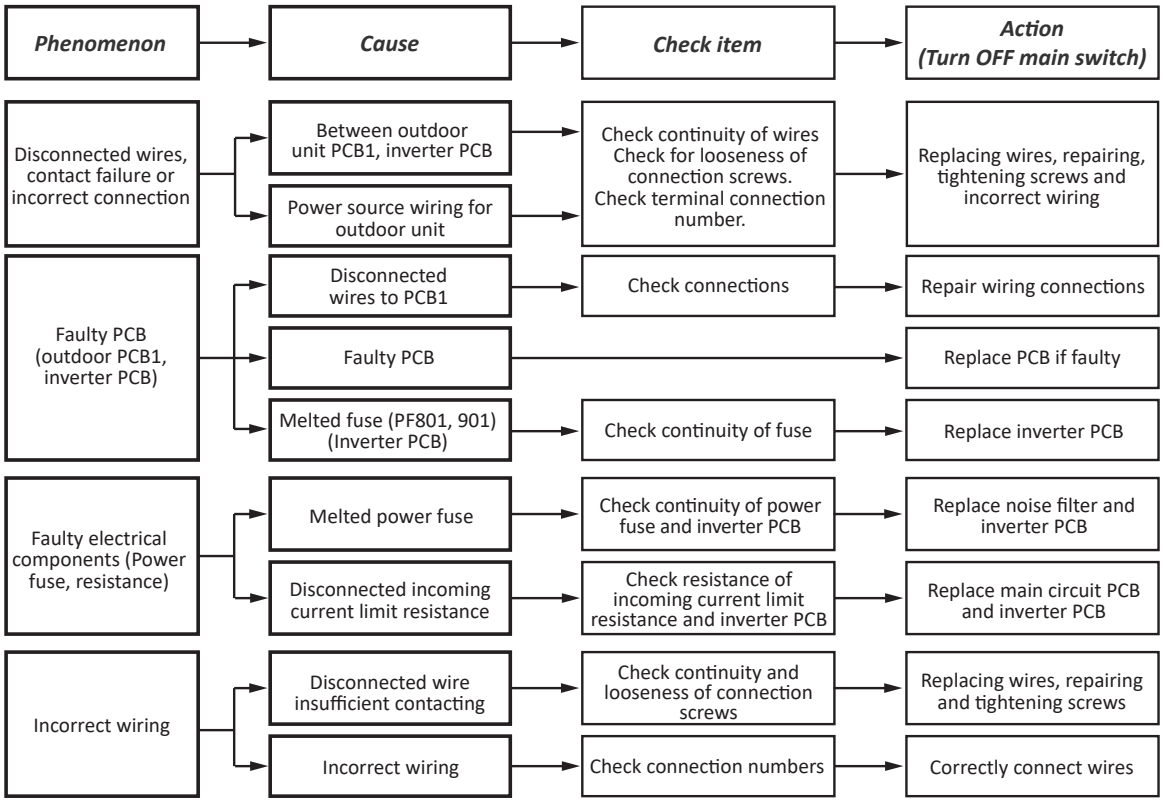
(*) Refer to outdoor unit PCB1 check method for details.

Alarm code 04 Abnormal transmission between Inverter PCB and the outdoor unit PCB1.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when an anomaly is maintained for 30 seconds after the normal transmission between PCB1 of the outdoor unit and the inverter PCB, and also if the anomaly condition is maintained for 30 seconds after the microcomputer is automatically reset. The alarm is indicated when abnormal transmission is maintained for 30 seconds after the outdoor unit is turned on.





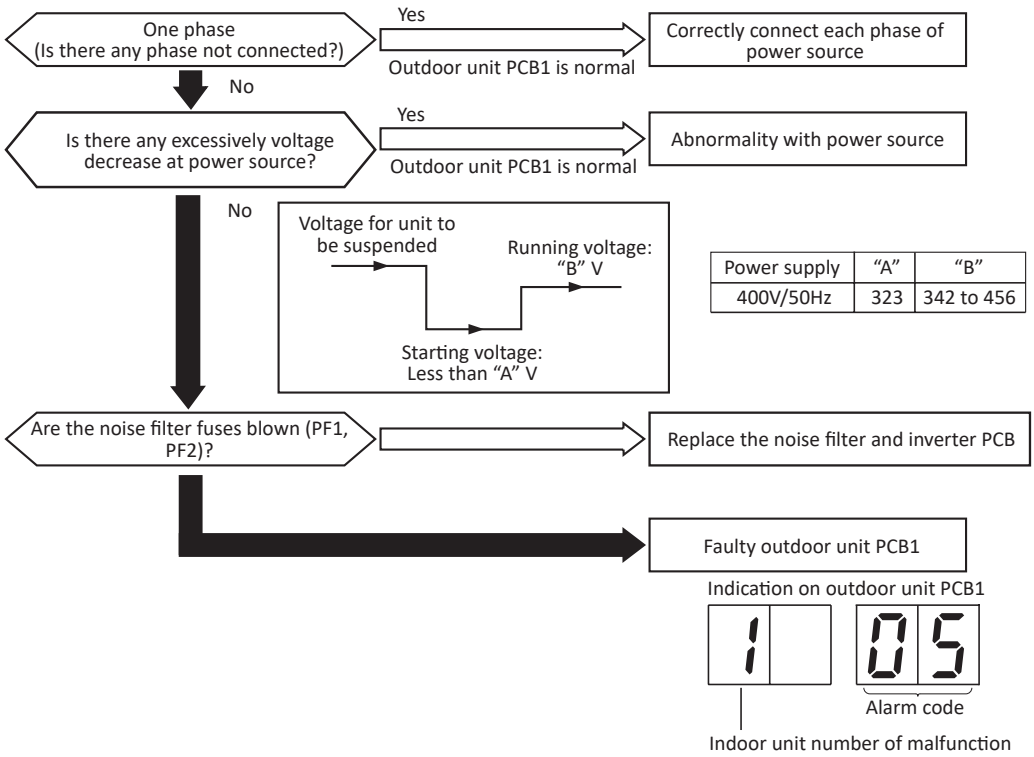
NOTE

- *When replacing or checking for the inverter part, make sure to perform the electric discharge work according to the item "6.2 Inverter (INV1, INV2)".*
- *When the fuse for the fan controller is blown, the fan controller may be broken too. In this instance, the fan controller should be replaced.*

Alarm code 05 Abnormal power source phase.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the main power source phase is reversely connected or one phase is not connected.

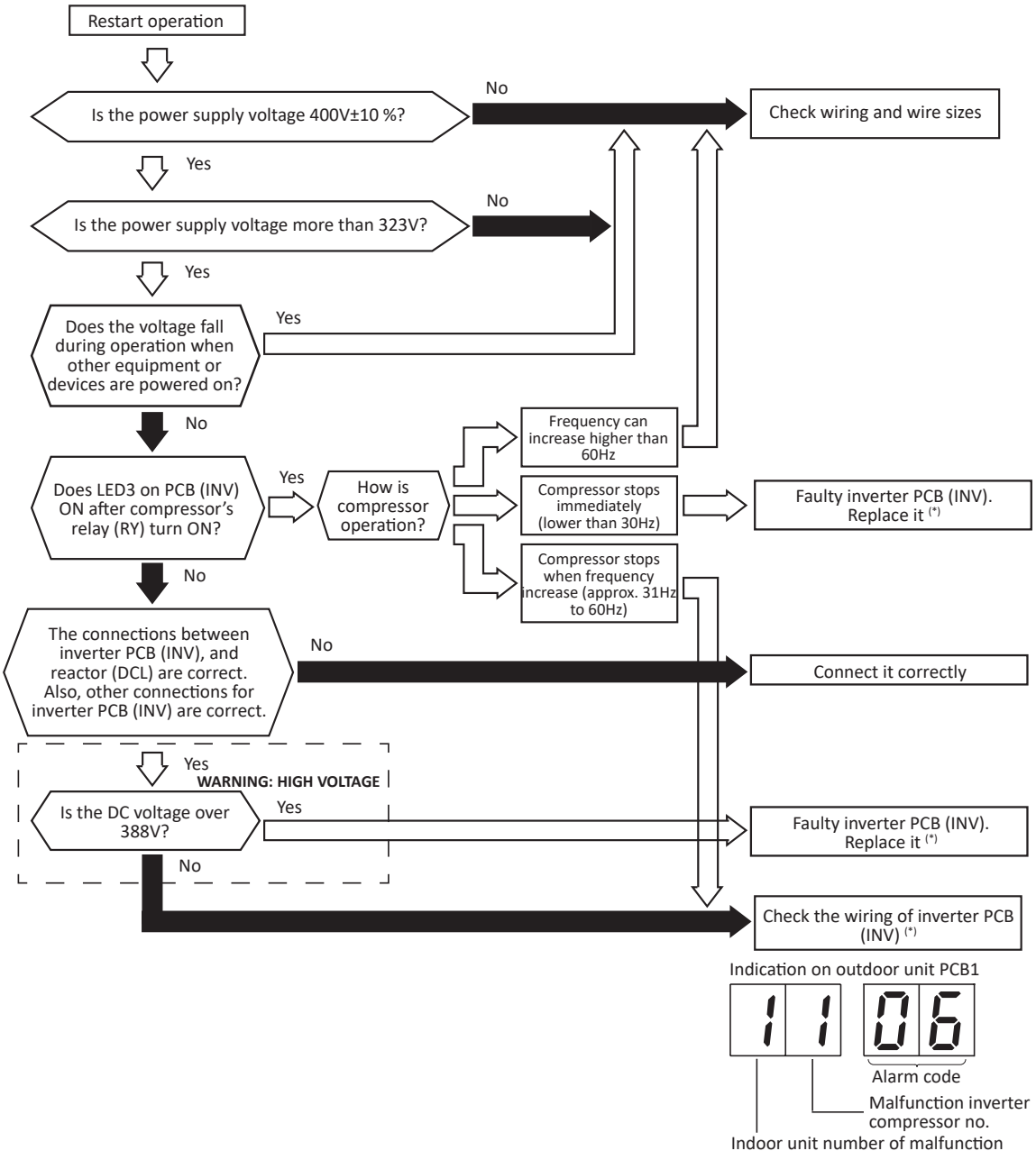


Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Activation of reverse phase sensor in outdoor unit	Open phase	Check it according to electrical wiring	Replace wires, repair, tightening screws or correct wiring
	Faulty outdoor unit PCB1		Replace outdoor unit PCB1 if faulty
	Noise filter fuses melted		Replace the noise filter and inverter PCB

Alarm code 06 Abnormal Inverter voltage (Insufficient inverter voltage or over voltage).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the voltage between terminal "P" and "N" of the inverter PCB is insufficient and occurs 3 times within a 30 minute period. If it occurs less than 3 times, a retry is carried out.

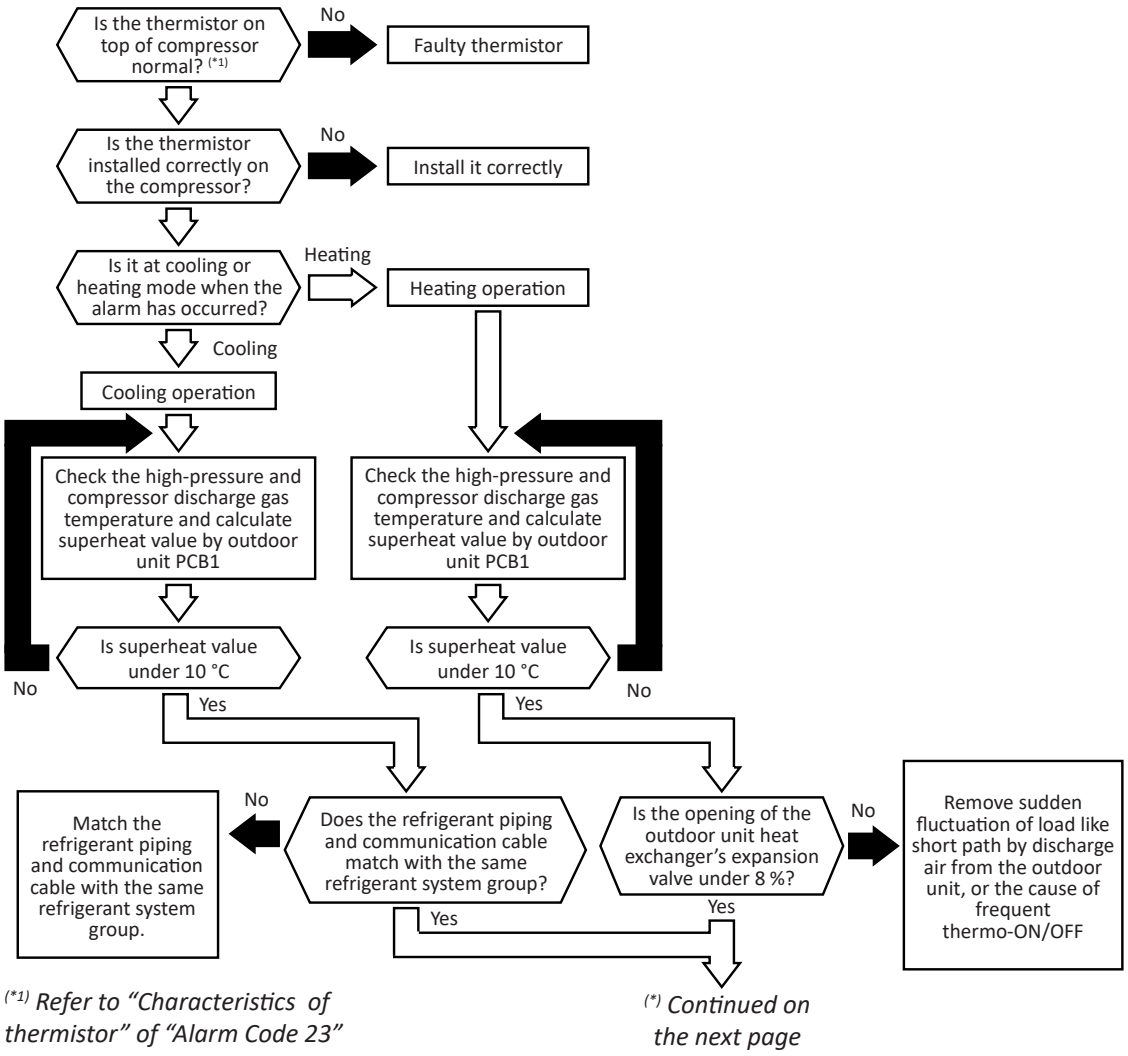


(*)Refer to the item "6.2 Inverter (INV1, INV2)" for checking procedures of the inverter PCB. If high voltage remains, perform the high voltage discharge work according to this item.

Alarm code 07 Drop in discharge gas superheat.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

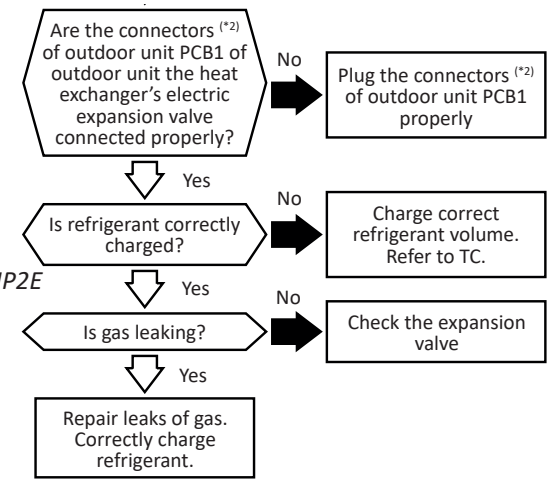
In the case that the discharge gas superheat is less than 10 degrees on the upper part of the compressor is maintained for 30 minutes, a retry operation is carried out. However, when the alarm occurs twice in 2 hours, the alarm code is indicated.



*(*1) Refer to "Characteristics of thermistor" of "Alarm Code 23"*

(*) Continued on the next page

(*) Continued from previous page



*(*2) PCB1 Connector number is shown in the below table*

*(*3) Only for: RAS-(20-24)FSXNS2E, RAS-(16/18)FSXNP2E*

MV1	MV2(*3)	MVB
CN10	CN11	CN12

Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
RAS-(8-18)FSXNS2E RAS-(5-14)FSXNP2E	O	-
RAS-(20-24)FSXNS2E RAS-(16/18)FSXNP2E	O	O

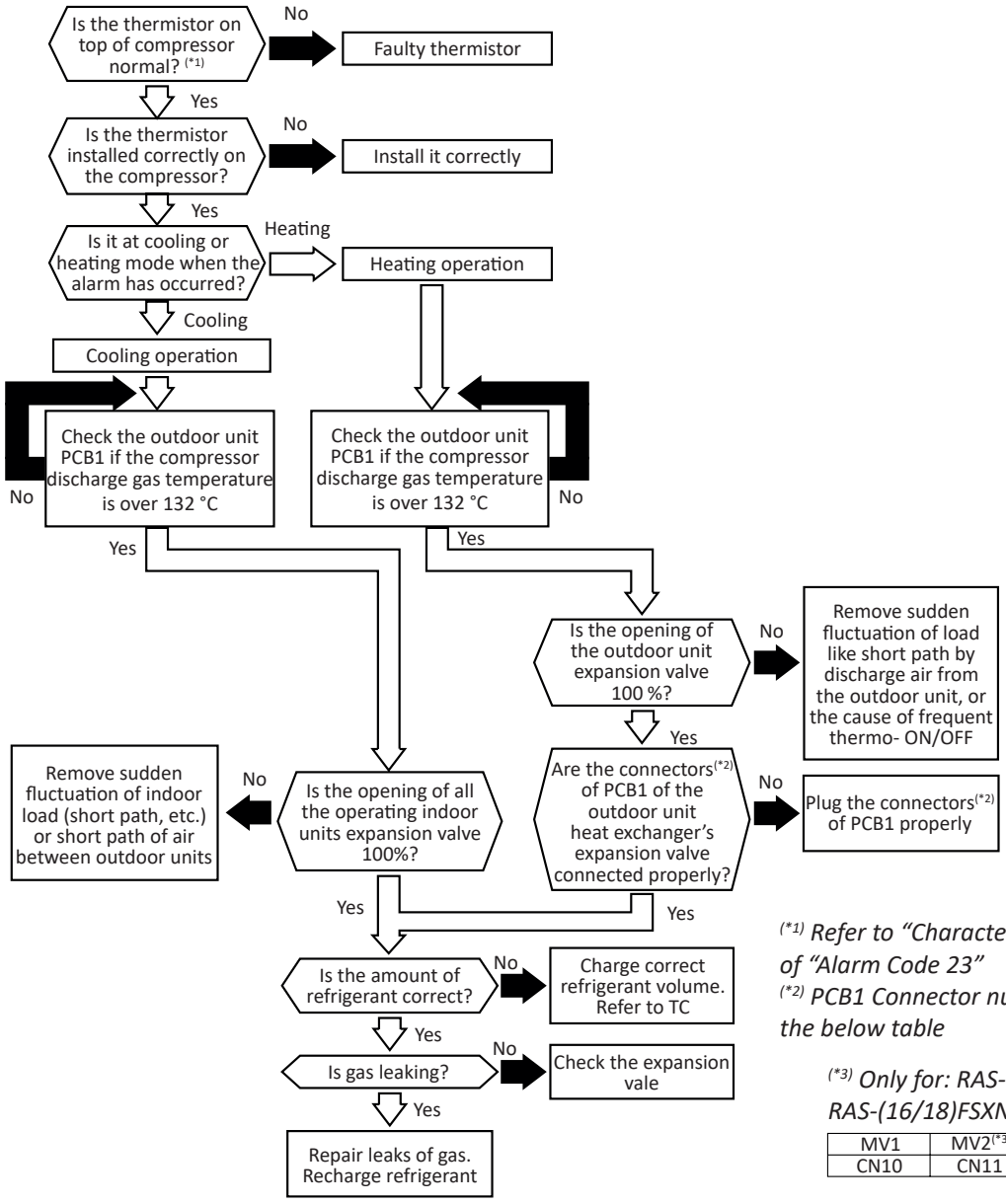
Phenomenon	*Cause*		*Check item*	*Action (Turn OFF main switch)*
Decrease of discharge gas superheat	Refrigerant cycle is different from the electrical system		Check refrigerant cycle and the electrical system	Repair wiring
	Overcharged refrigerant		Check pressures	Correctly charge refrigerant
	Faulty expansion valve		Check expansion valve (Refer to the item *6.6*)	Replace expansion valve if faulty
	Faulty PCB	Fault	Replace PCB and check operation	Replace PCB if faulty
		Disconnected wires for expansion valve control	Check connections	Repair wiring connections
	Faulty discharge gas thermistor	Fault	Check resistance of thermistor	Replace thermistor if faulty
		Incorrect mounting	Check mounting state	Correctly mount thermistor
		Incorrect connection	Check connections	Remove looseness, replace connector or repair connections

Alarm code **08** Increase in discharge gas temperature at the upper part of the compressor.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is displayed when the following conditions occurs three times in one hour:

The temperature of the thermistor on the upper part of the compressor is maintained higher than 132 °C for 10 minutes or the temperature of the thermistor on the upper part of the compressor is maintained higher than 140 °C for 5 seconds.



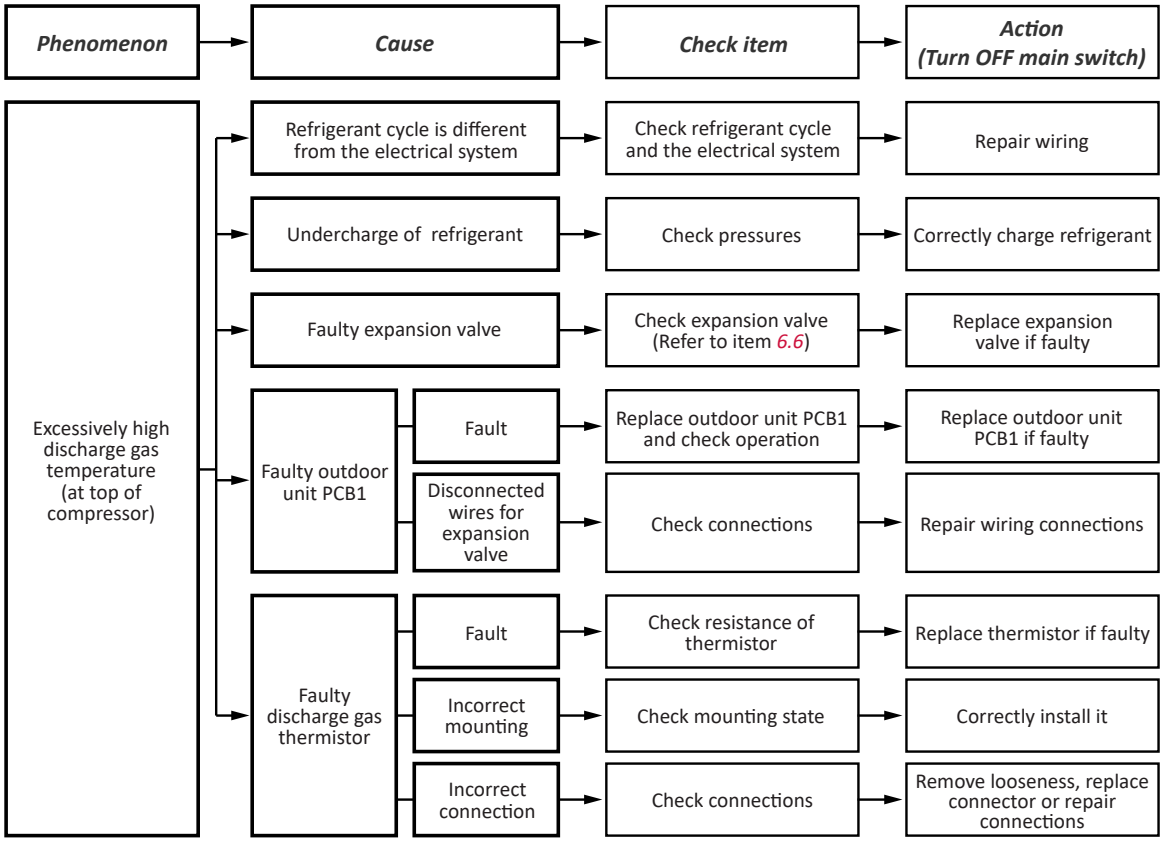
*(*1) Refer to "Characteristics of thermistor" of "Alarm Code 23"*

*(*2) PCB1 Connector number is shown in the below table*

*(*3) Only for: RAS-(20-24)FSXNS2E, RAS-(16/18)FSXNP2E*

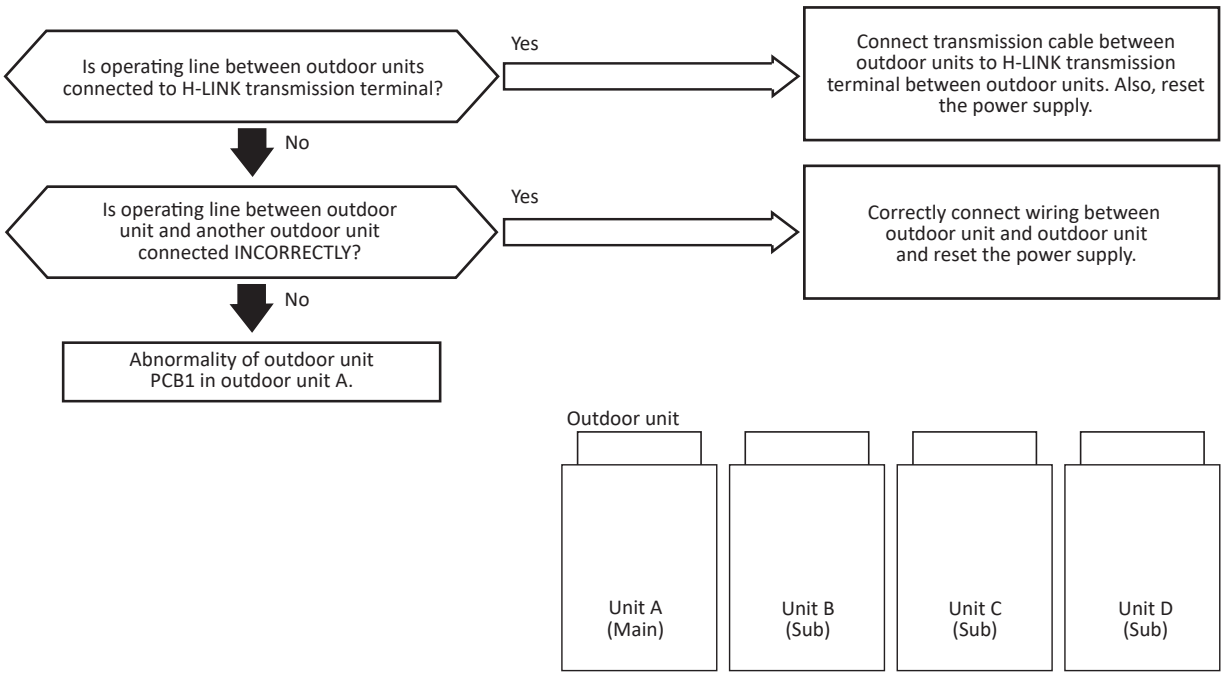
MV1	MV2(*3)	MVB
CN10	CN11	CN12

Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
RAS-(8-18)FSXNS2E RAS-(5-14)FSXNP2E	O	-
RAS-(20-24)FSXNS2E RAS-(16/18)FSXNP2E	O	O



Alarm code 0A Abnormal transmission between outdoor units.

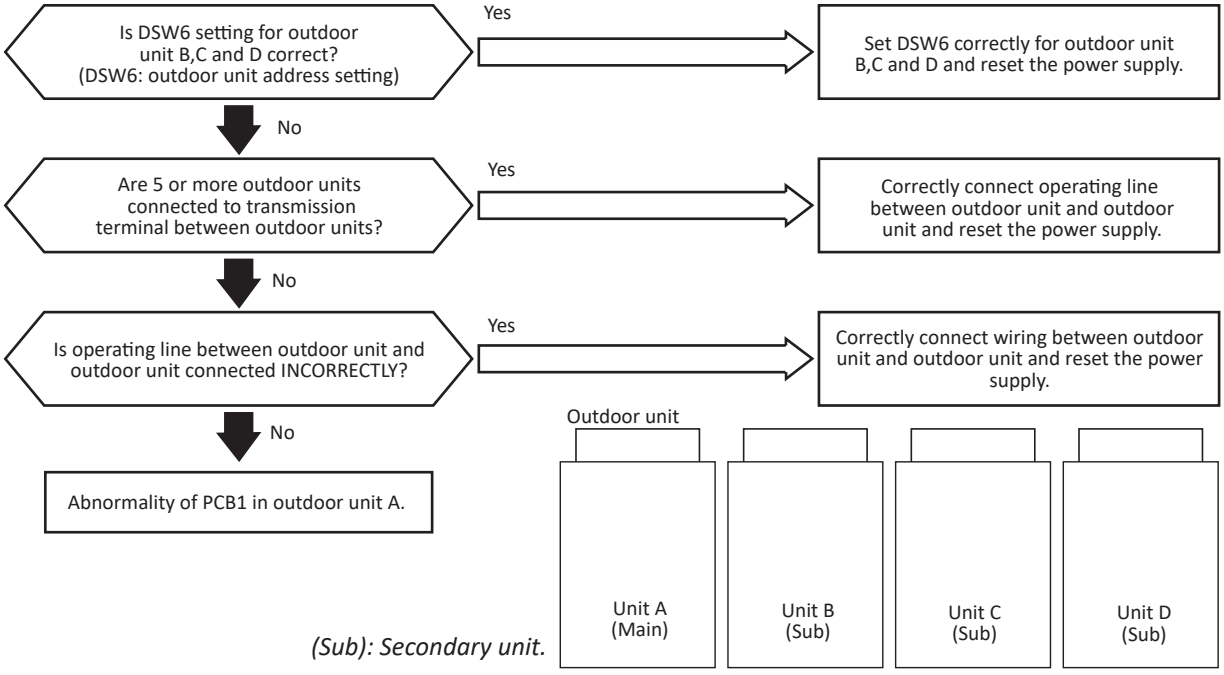
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.



(Sub): Secondary unit.

Alarm code  Incorrect outdoor unit address setting.

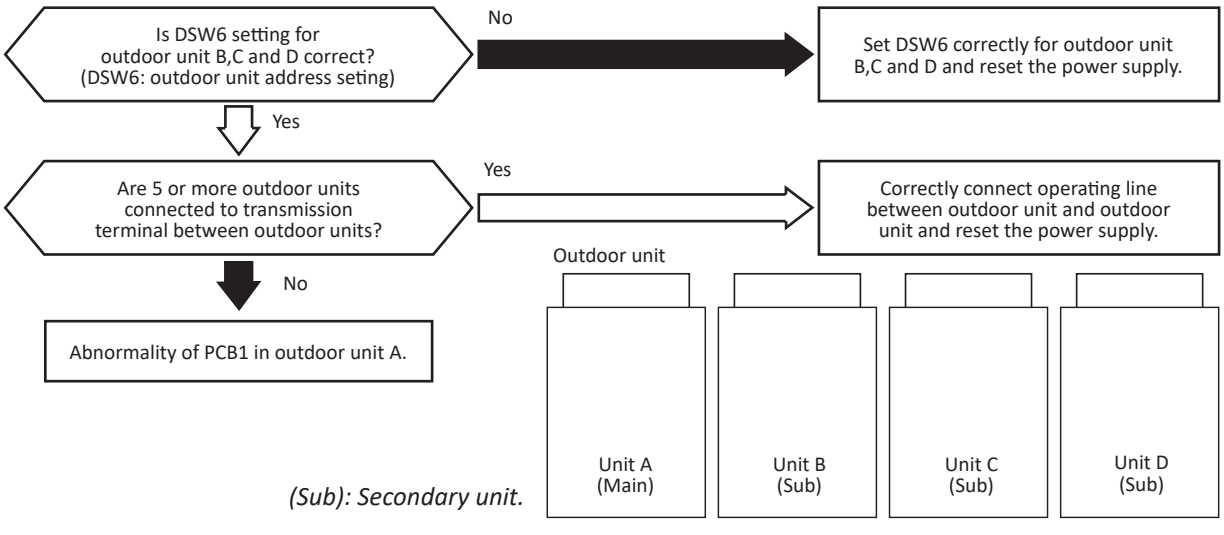
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.



(Sub): Secondary unit.

Alarm code  Incorrect outdoor main unit setting.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

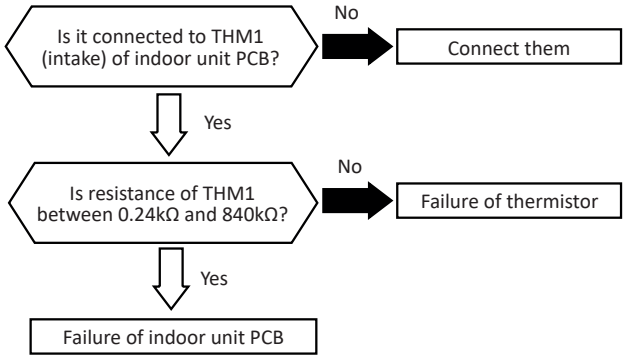


(Sub): Secondary unit.

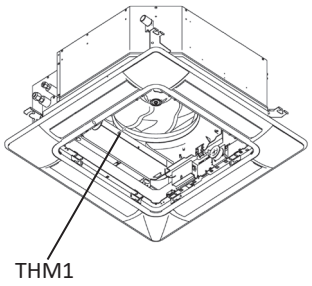
Alarm code	1 1	Abnormal operation of thermistor for indoor unit inlet air temperature (air inlet thermistor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

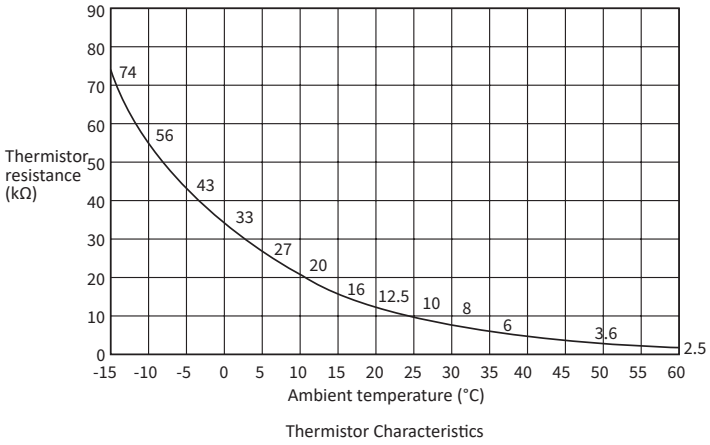
This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ or less) or cut (greater than 840kΩ) during the cooling or heating operation. The system automatically restarts when the fault is eliminated.



4-way Cassette Type example

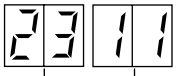


Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty intake air thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check connection	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace indoor unit PCB if faulty



Thermistor Characteristics

Outdoor unit PCB1 display indication (alarm code 11~19)



(Alarm code 11~19)

Number of malfunctioning indoor unit

This data is applicable to the following thermistors:

Inlet air thermistor (THM1).

Outlet air thermistor (THM2).

Liquid pipe thermistor (freeze protection) (THM3).

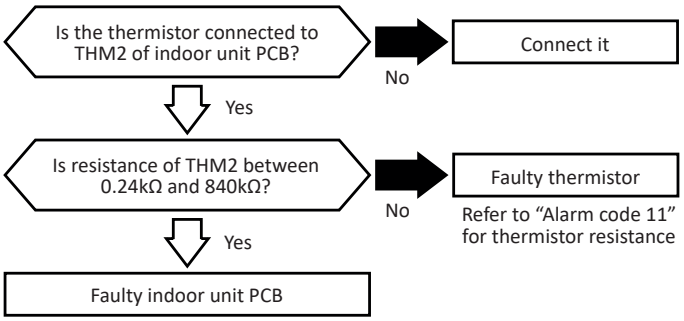
Outside air thermistor or remote thermistor (THM4).

Gas pipe thermistor (THM5).

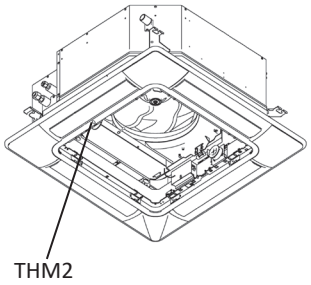
Alarm code	12	Abnormal operation of thermistor for indoor unit discharge air temperature (air outlet thermistor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling or heating operation. The system automatically restarts when the fault is eliminated.



4-way Cassette type example

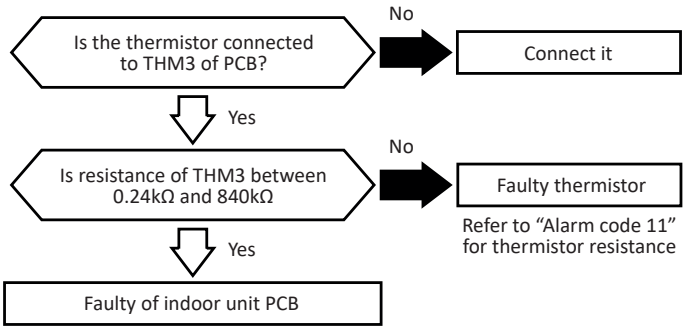


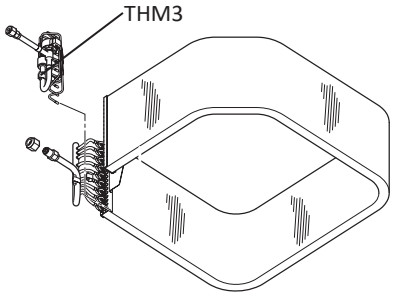
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty air outlet thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check connection to indoor unit PCB	Connect wiring correctly
Faulty indoor unit PCB		Replace indoor unit PCB and check operation	Replace indoor unit PCB if faulty

Alarm code	13	Abnormal operation of thermistor for indoor unit heat exchanger liquid refrigerant pipe temperature (freeze protection thermistor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling or heating operation. The system automatically restarts when the fault is eliminated.



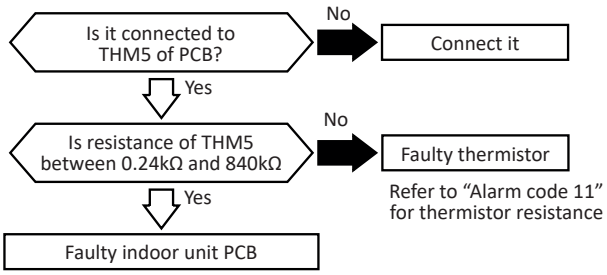


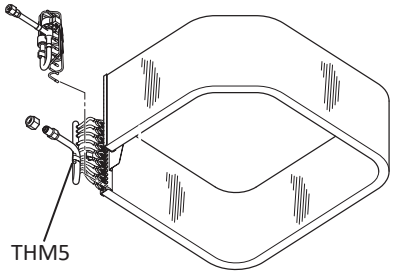
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty freeze protection thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to indoor unit PCB	Connect wiring correctly
Faulty indoor unit PCB		Replace indoor unit PCB and check operation	Replace indoor unit PCB if faulty

Alarm code	14	Abnormal operation of thermistor for indoor unit heat exchanger gas refrigerant pipe temperature (gas pipe thermistor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling or heating(*1) operation. The system automatically restarts when the fault is eliminated.





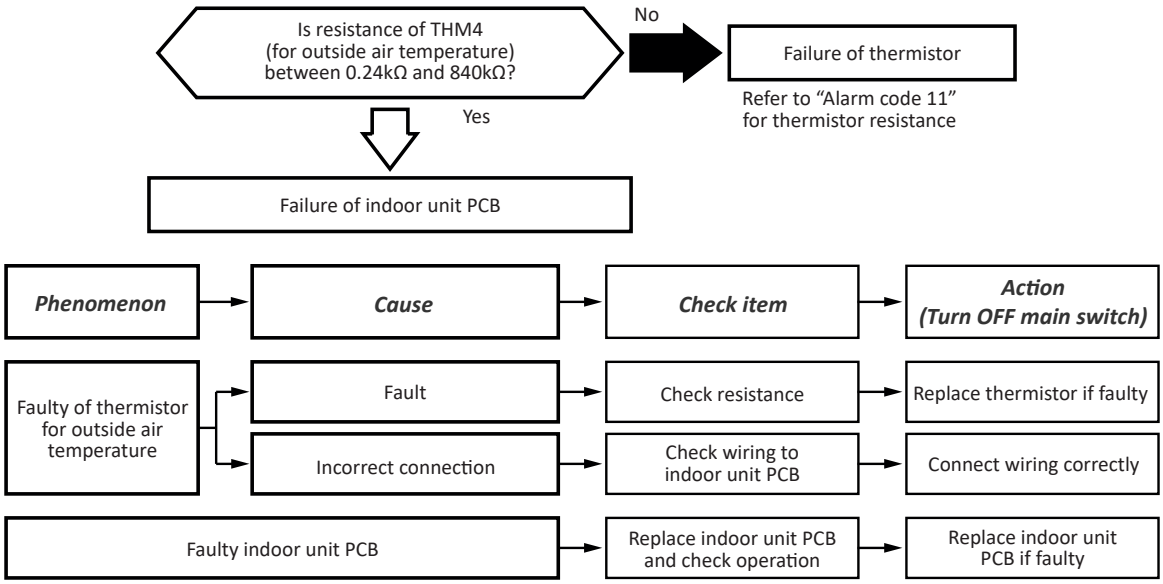
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty gas pipe thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to indoor unit PCB	Connect wiring correctly
Faulty indoor unit PCB		Replace PCB and check operation	Replace PCB if faulty

*(*1)The heating operation is available only during the test run.*

Alarm code	15	Abnormal operation of thermistor for outside air temperature (for ducted with econofresh kit).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

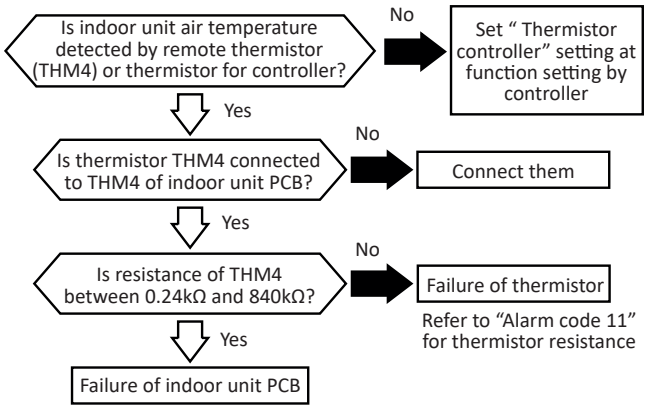
This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling or heating operation. The system automatically restarts when the fault is eliminated.



Alarm code 16 Abnormal operation of remote thermistor (for DOAS[*1]).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling, heating operation. The system automatically restarts when the fault is eliminated.



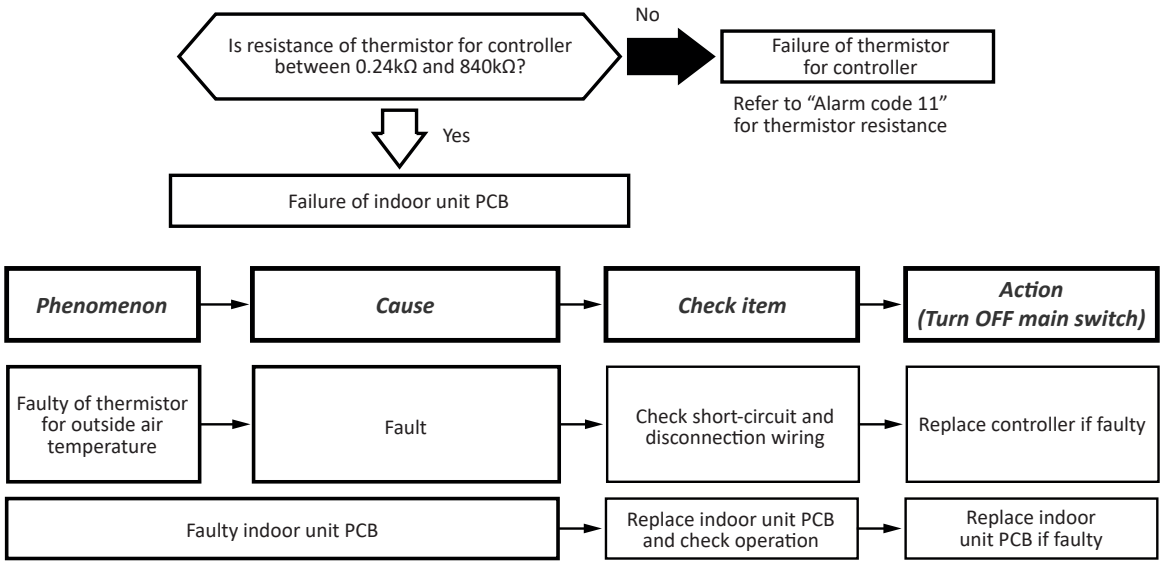
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty of thermistor for outside air temperature	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to indoor unit PCB	Connect wiring correctly
Faulty indoor unit PCB		Replace indoor unit PCB and check operation	Replace indoor unit PCB if faulty

*[*1] Dedicated outdoor air system, all fresh air indoor unit.*

Alarm code	17	Abnormality of remote controller thermistor (for DOAS[*1]).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.24kΩ) or cut (greater than 840kΩ) during the cooling, heating operation. The system automatically restarts when the fault is eliminated.



NOTE

- *The DOAS[*1] is able to operate while utilizing the remote thermistor and the controller thermistor under certain mode.*
  While operating in this mode:
  - » *If one of the thermistors fail, operation can be continued by using the value measured from the only thermistor working.*
  - » *If both of the thermistors fail, this alarm code is displayed.*
- *This alarm code will only appear when both thermistors are being used and both have failed. For checking follow the "Alarm Code 16".*

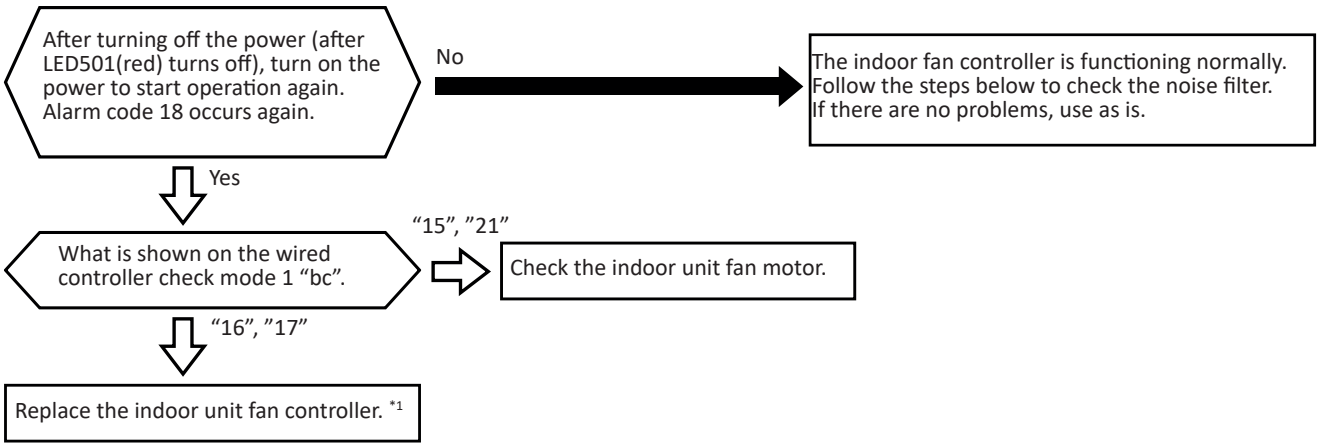
*[*1] Dedicated outdoor air system, all fresh air indoor unit.*

Alarm code 18 Abnormality of indoor fan system (Indoor unit with DC motor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

Check the indoor unit stoppage code when troubleshooting.

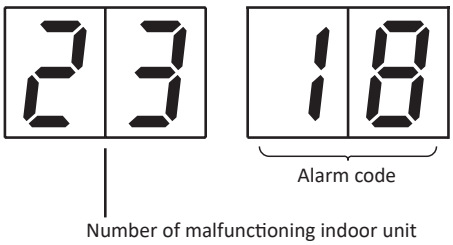
If reverse drive of the indoor unit fan motor, indoor unit fan controller malfunction, abnormal transmission or abnormality of the indoor unit fan motor occurs 10 times in 30 minutes, this alarm code will be displayed. (The operation is retried if it occurs 9 times or less.)



*1 *When replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be performed.*

Indoor unit fan controller stoppage codes	
Stoppage code	Reason for stoppage
15	Reverse drive
16	Indoor unit fan controller malfunction
17	Transmission error
21	Indoor unit motor error

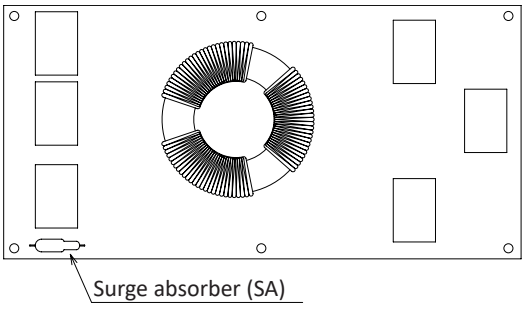
Outdoor unit PCB1 display indication



Check "Indoor unit fan controller stoppage codes" of 1A alarm for details.

When an excessive surge current flows through the product due to a lightning strike, etc., this "18" alarm code may be displayed, the indoor fan controller stop code may become "11" and the product may become inoperable. In this case, check the surge absorber (SA) on the noise filter (NF). If the inner surface of the surge absorber is discolored black, the surge absorber may be faulty, and the noise filter should be replaced.
If there is no abnormality in the surge absorber, shut off the power once, wait until the LED501 (red) of the indoor fan controller turns off (about 1 minute), and then turn on the power again.

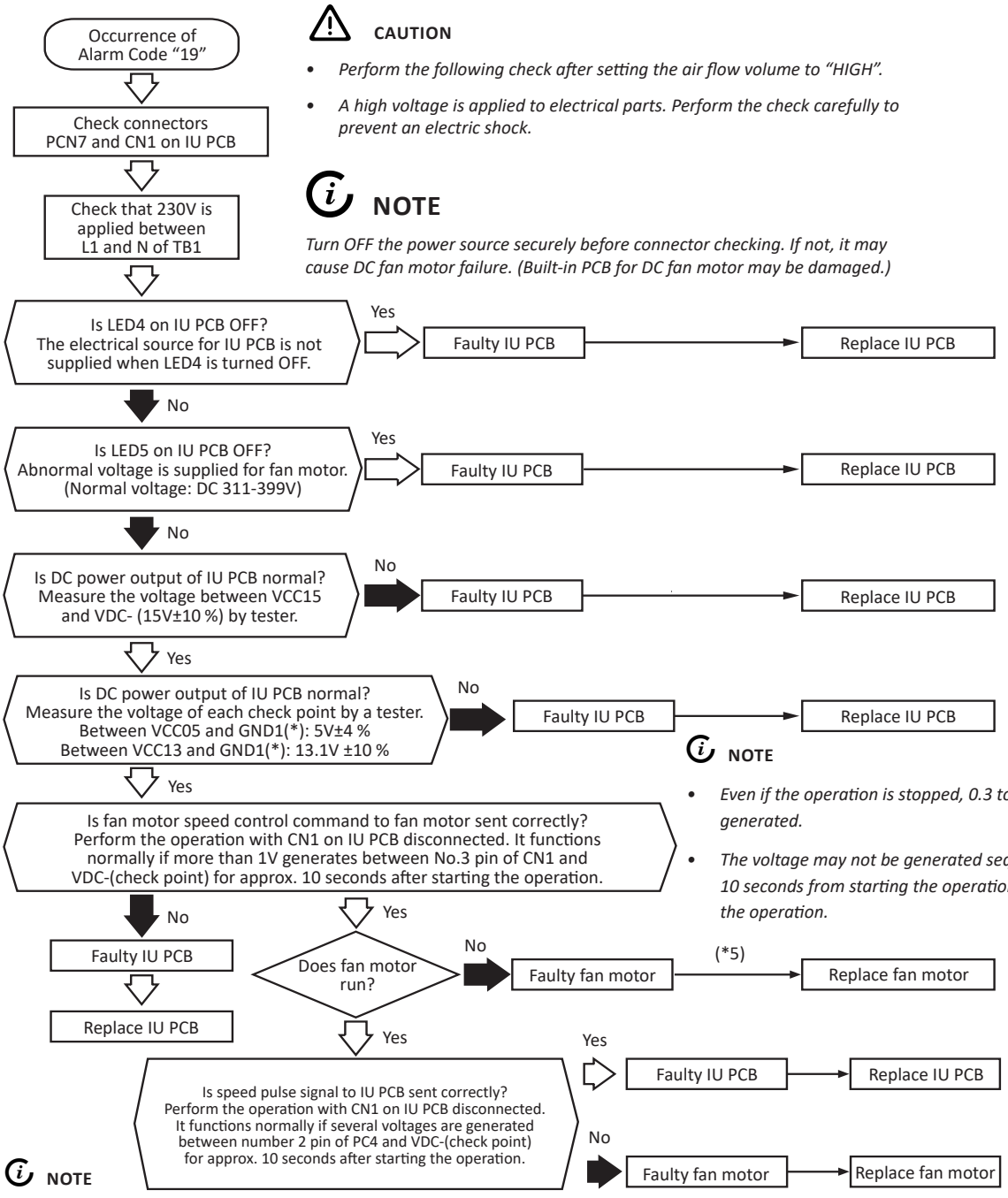
Surge absorber is located on the noise filter (NF)



Alarm code	19	Activation of the protection device for the indoor unit fan motor (Indoor unit with DC motor).

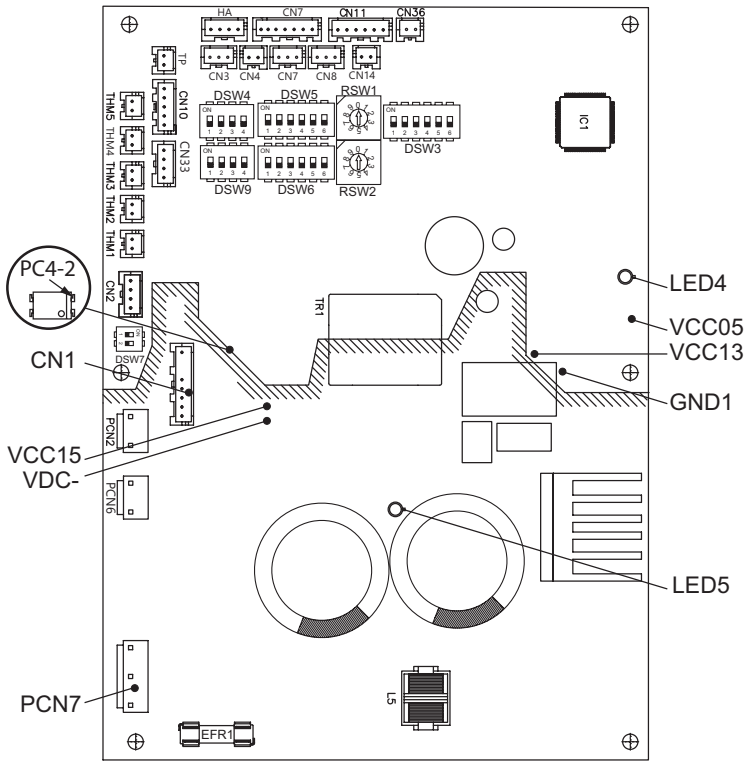
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following condition occur 3 times in 30 minutes: the indoor unit fan motor rotates less than 70 rpm for 5 seconds while it is operating.

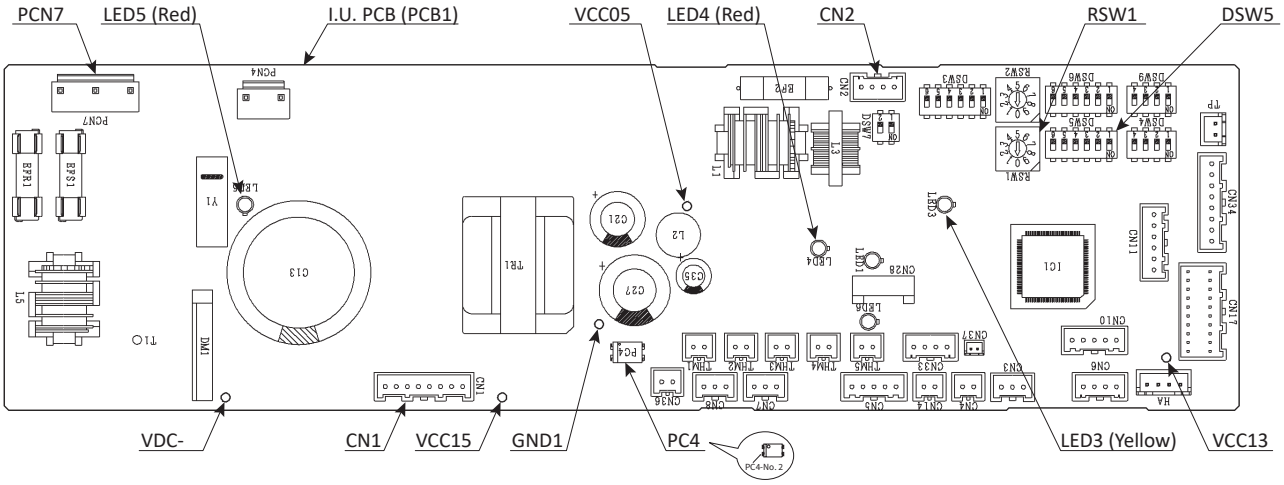


(*) GND in RCIM-FSN4E / RCD-FSN3 (PI143).

RPI(L/H)-FSR(1)E (PI161)



RCIM-FSRE (PI153)



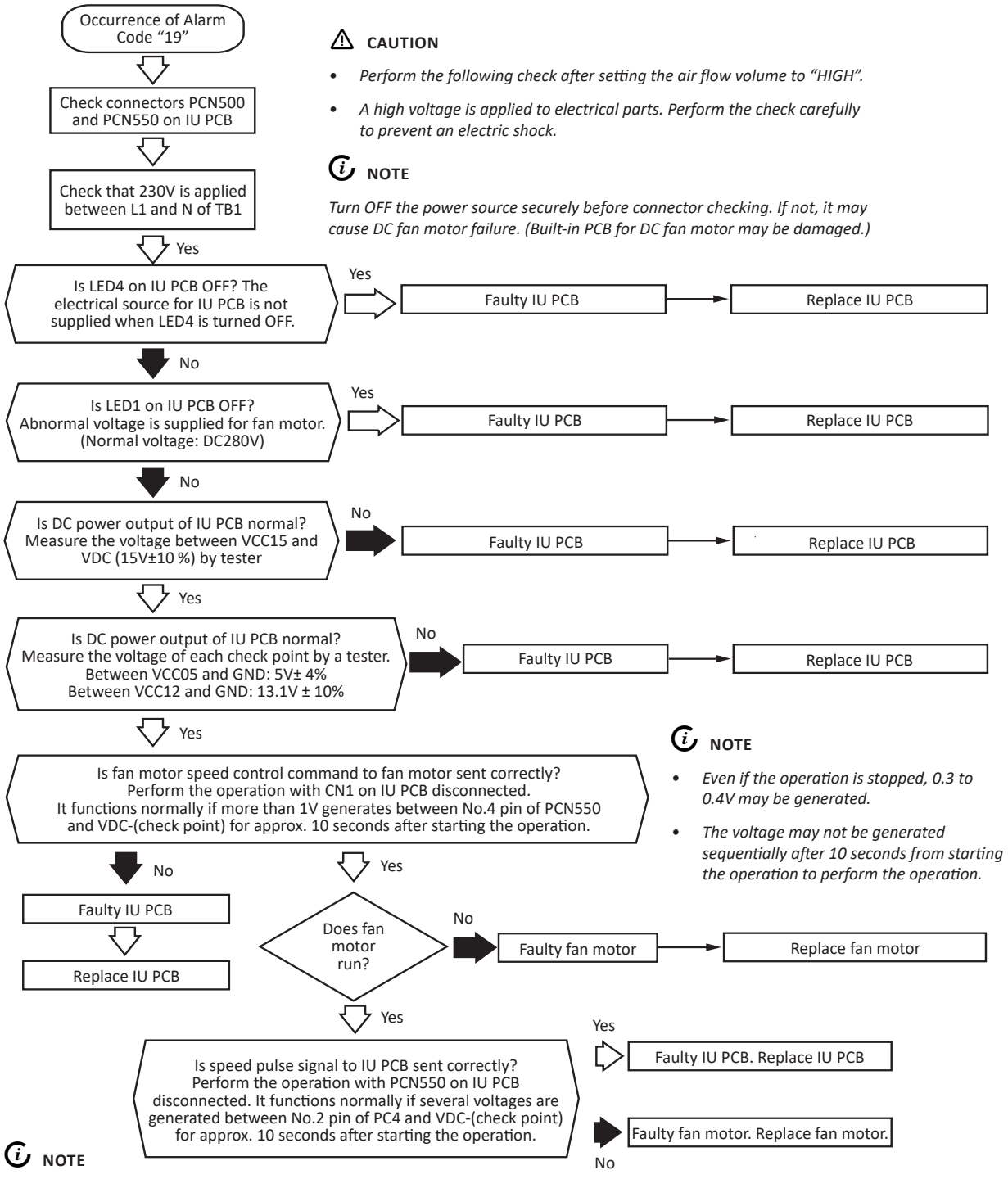
NOTE

For other items, refer to "Service Manual" of indoor unit.

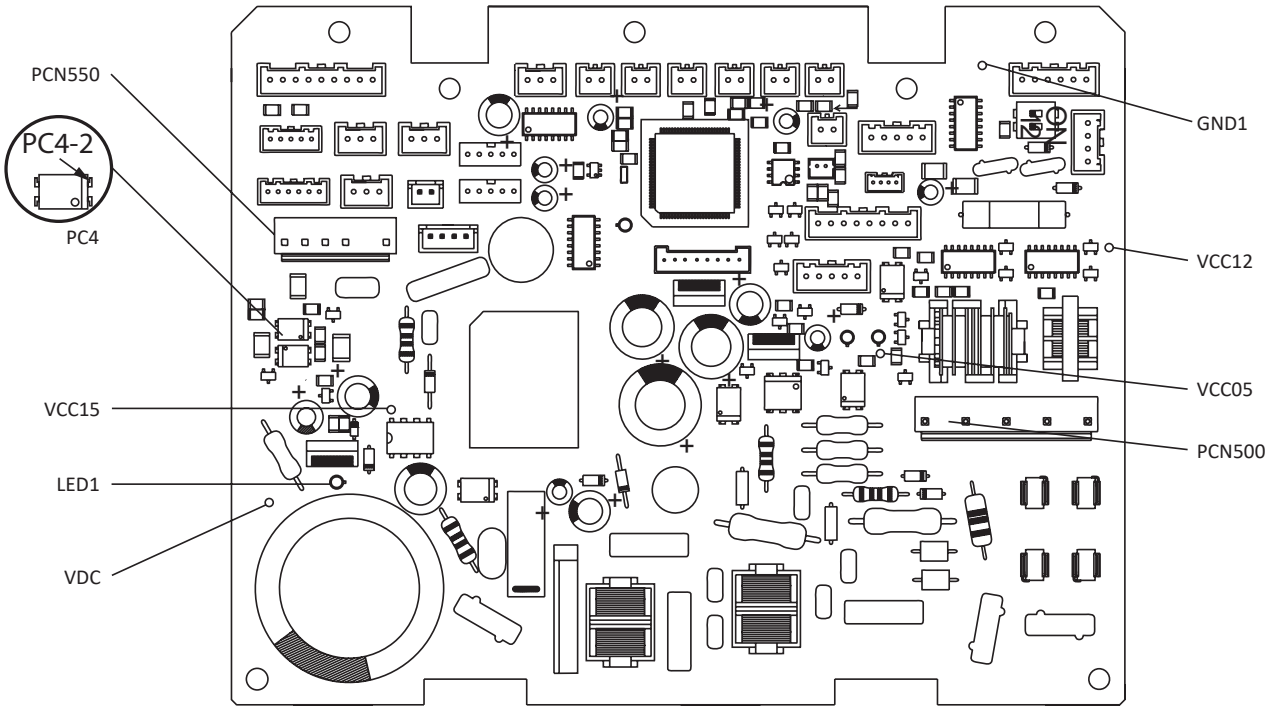
Alarm code 19 Activation of the protection device for the indoor unit fan motor (RPK models).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following condition occur 3 times in 30 minutes: the indoor unit fan motor rotates less than 70 rpm for five seconds while it is operating.



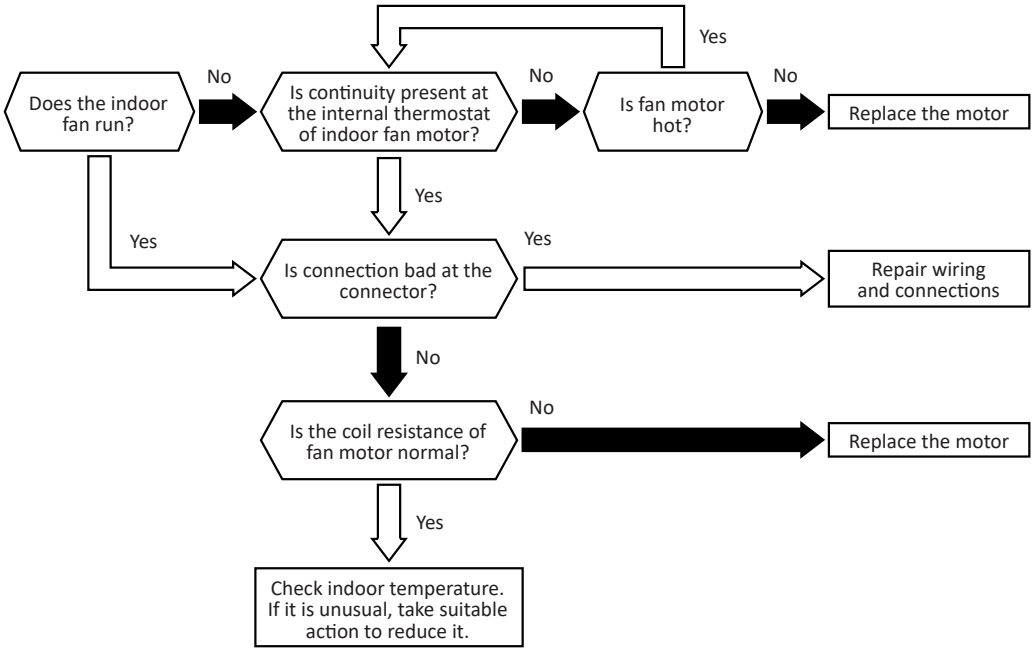
RPK-(0.4-4.0)FSN(H)3M (PI121)



Alarm code	19	Activation of the protection device for the indoor unit fan motor (Indoor unit with AC motor).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm code is indicated when over approximately 1 A is applied to the indoor unit fan motor.



Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Activation of internal thermostat for indoor unit fan motor	Faulty indoor unit fan motor	Measure coil resistance and insulation resistance	Replace motor if faulty
	Faulty internal thermostat — Fault	Check continuity after fan motor temperature decreases to room temperature	Replace fan motor if no continuity
	Faulty internal thermostat — Insufficient contacting	Measure resistance by tester	Correct looseness. Replace connectors
	Faulty internal thermostat — Incorrect connection	Check connections	Repair connections

NOTE

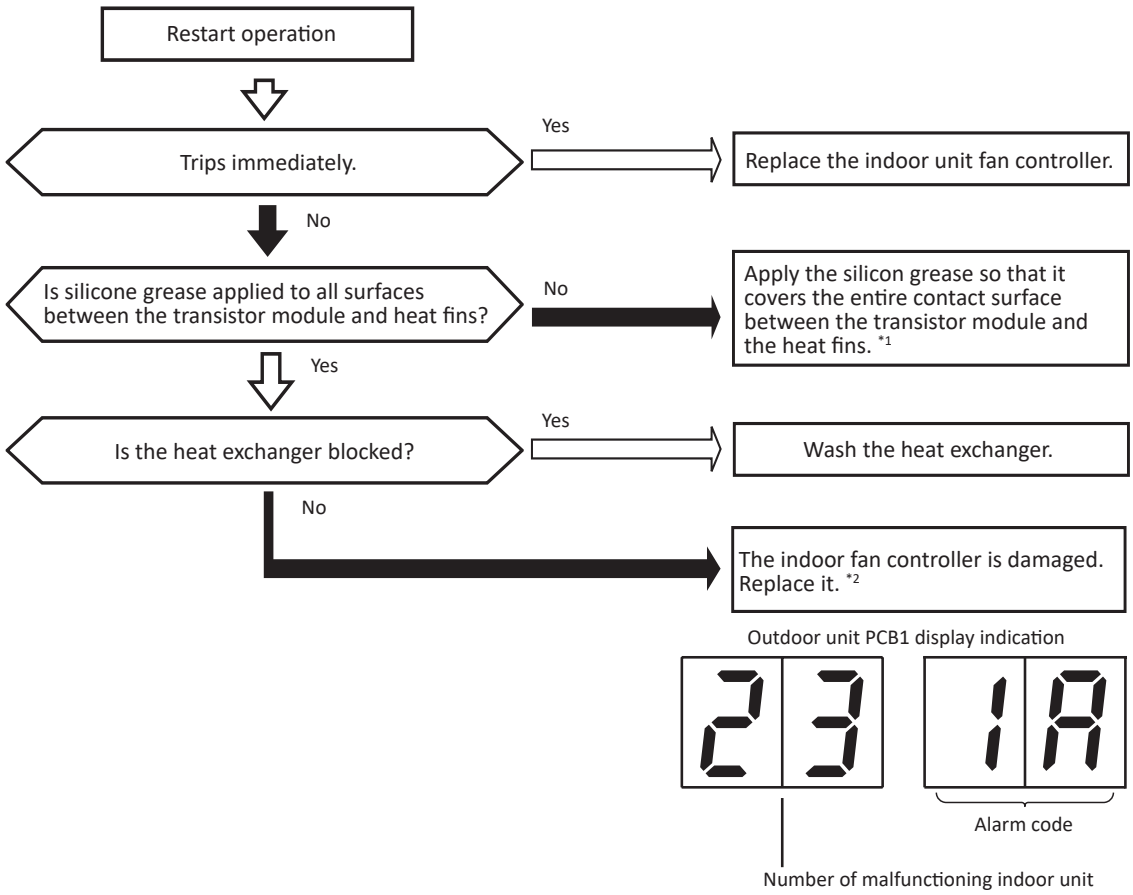
For other items, refer to "Service Manual" of indoor unit.

Alarm code	1A	Abnormality of fan controller fin temperature.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

If the fin temperature trip occurs 10 times in 30 minutes, this alarm will be shown.
(The operation is retried if it occurs 9 times or less.)

Conditions of Activation:
The alarm will be shown if the temperature of the transistor inside the transistor module exceeds 100 ºC.



[1] Use the silicon grease, service part number(P22760).

[2] When replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be performed.

Indoor unit fan controller stoppage codes

When the indoor fan controller protection is activated, the stoppage code is displayed as “bc” on the wired controller inspection mode 1.

Indoor unit fan controller stoppage code	Reason for stoppage	Details
1	Transistor module protection activation	1. A short circuit occurs in each U, V, W phase of the transistor module. 2. Maximum rated current has flowed through the transistor module. 3. The transistor module thermistor temperature rises abnormally. 4. The transistor module operating voltage decreases abnormally.
2	Instant overcurrent	The indoor fan motor current becomes 150% or more of the rated current.
3	Fin temperature Increase	The transistor module thermistor temperature increases to 100 ºC or more.
4	Electric thermals	The indoor fan motor current is 105% or more of the rated current for 30 seconds, or when the total time is 3 minutes or more in 10 minutes.
5	Insufficient voltage	Direct current is less than 194V
6	Overvoltage	Direct current is more than 376V
7	Transmission error	-
8	Current sensor error	1. When the indoor fan motor starts and passes through 30Hz, the effective current value detected by the current sensor is 1.5A or less. 2. Before the indoor fan motor starts operating(when deciding the place), the current wave high detected by the U-phase current sensor is 4A or less.
9	Instant power failure detection	-
11	Micro-computer reset	-
12	Earth fault detection	When the current of the indoor fan motor reaches 80% of the overcurrent protection value when the indoor fan motor starts.
15	Reverse drive	When the indoor fan motor is in reverse drive, the current is 105% or more than that of the rated current
16	Indoor fan controller malfunction	The actual frequency is not transmitted from the indoor fan controller after the start control is completed.
17	Transmission error	When the actual frequency is zero even though the command frequency is available after the start control is completed.
21	Indoor fan motor error	The indoor fan motor stalls.

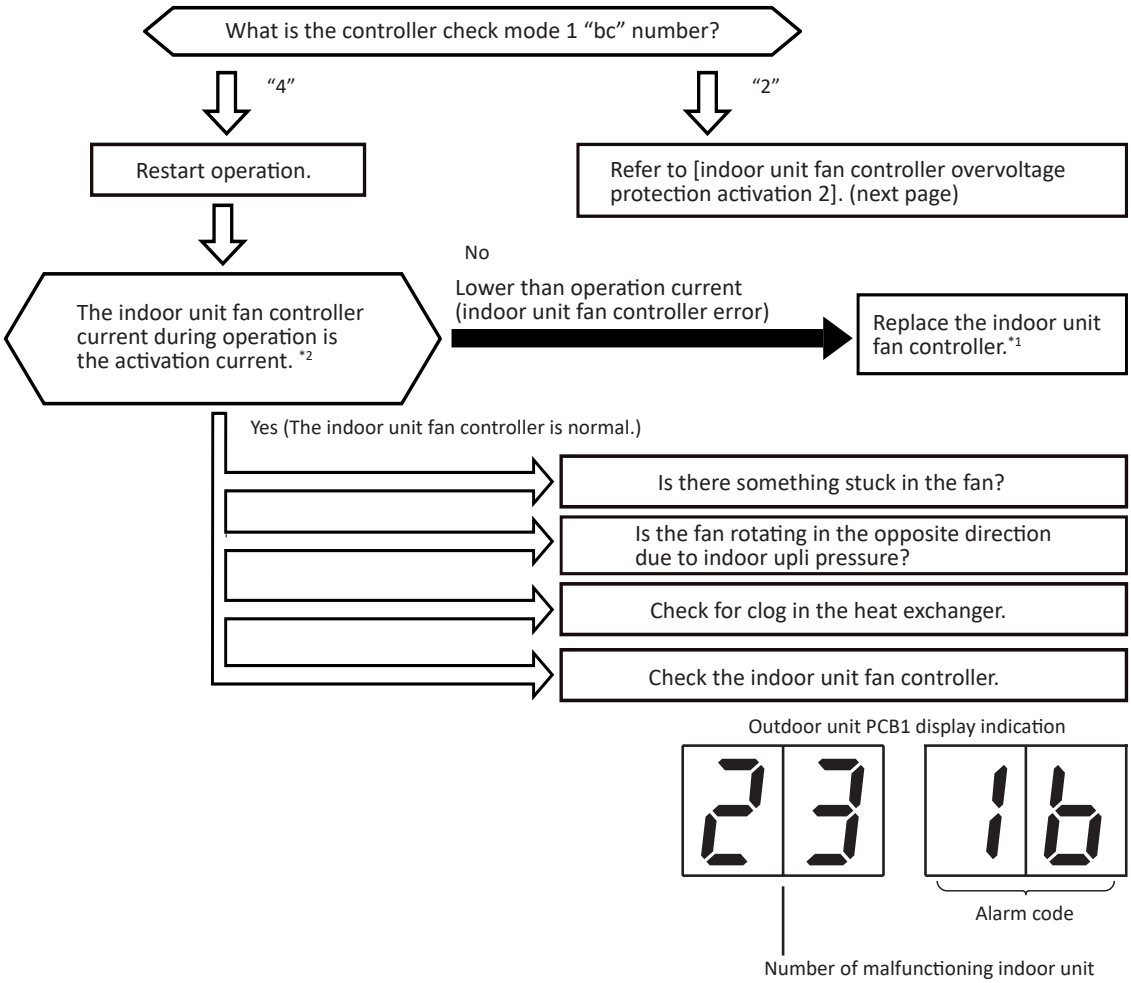
Alarm code	1b	Activation of overcurrent protection. (1)

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

If the indoor unit fan controller electrical thermals protection activation occurs 10 times in 30 minutes, this alarm will be shown. (The operation is retried if it occurs 9 times or less.)

Conditions of activation:

This alarm is displayed when 105 % of rated current flows continuously for 30 seconds or intermittently for a total time of 3 minutes in 10 minutes.



*1 *When replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be carried out.*

*2 *For details of activation current settings, refer to the indoor unit service manual.*

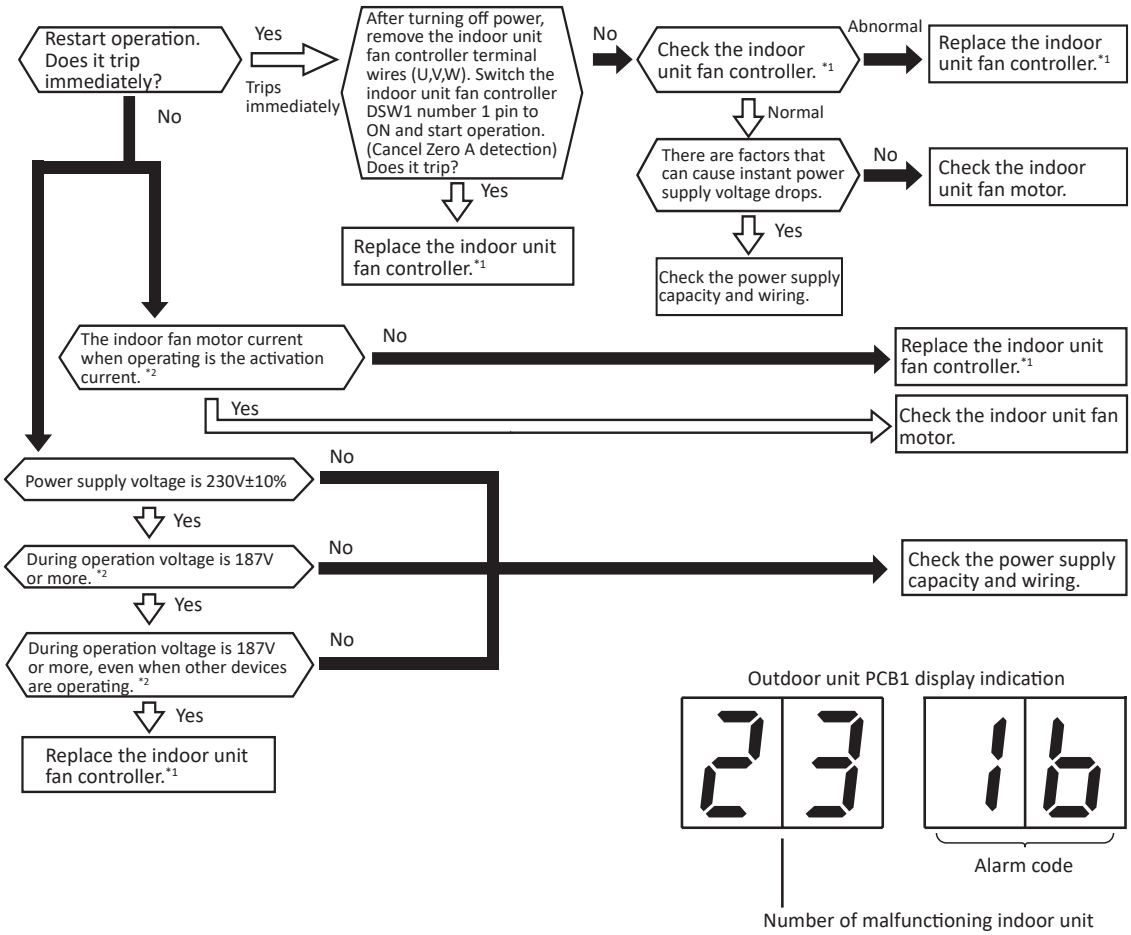
Alarm code	1b	Activation of overcurrent protection. (2)

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

If the indoor unit fan controller electrical thermals protection activation occurs 10 times in 30 minutes, this alarm will be shown. (The operation is retried if it occurs 9 times or less.)

Conditions of activation:

This alarm is displayed when current equal to or greater than the transistor module rated current flows.



[1] When replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be carried out.

[2] For details of activation current settings, refer to the indoor unit service manual.

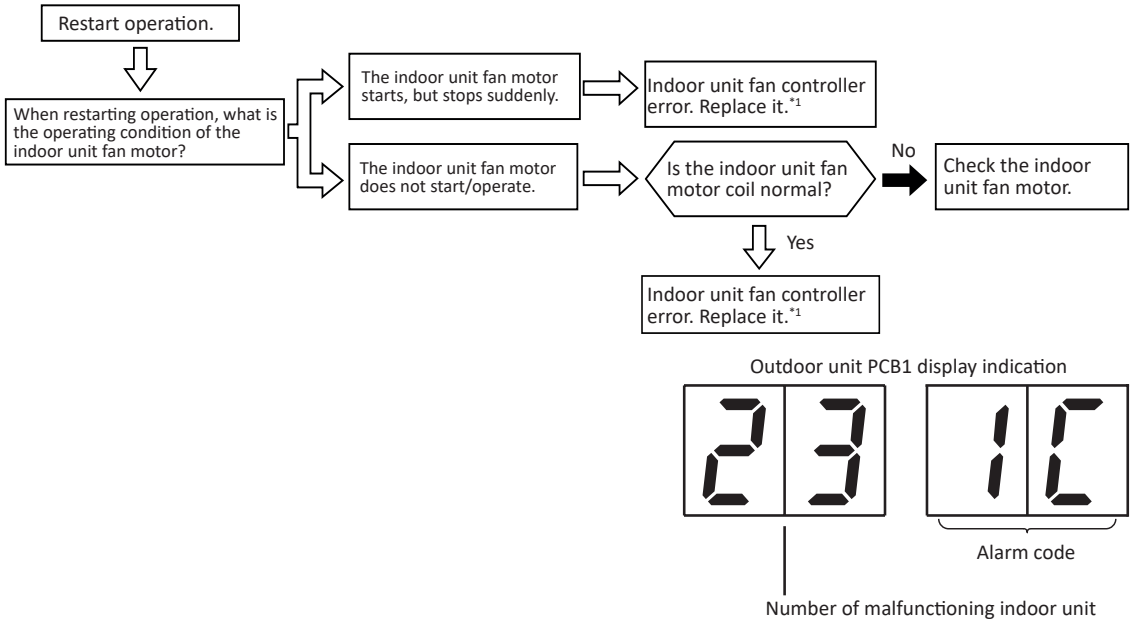
Alarm code	1C	Problem with current sensor.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

Conditions of activation:

1 This function is activated when the effective current value detected by the current detection circuit does not exceed 1.5A when the internal fan motor starts operation and passes through the forward rotation synchronous frequency.

2 Before the fan motor operation is started (at completing the phase positioning), the wave height value of the running current for the phase positioning is less than 4A.



[1] When replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be carried out.

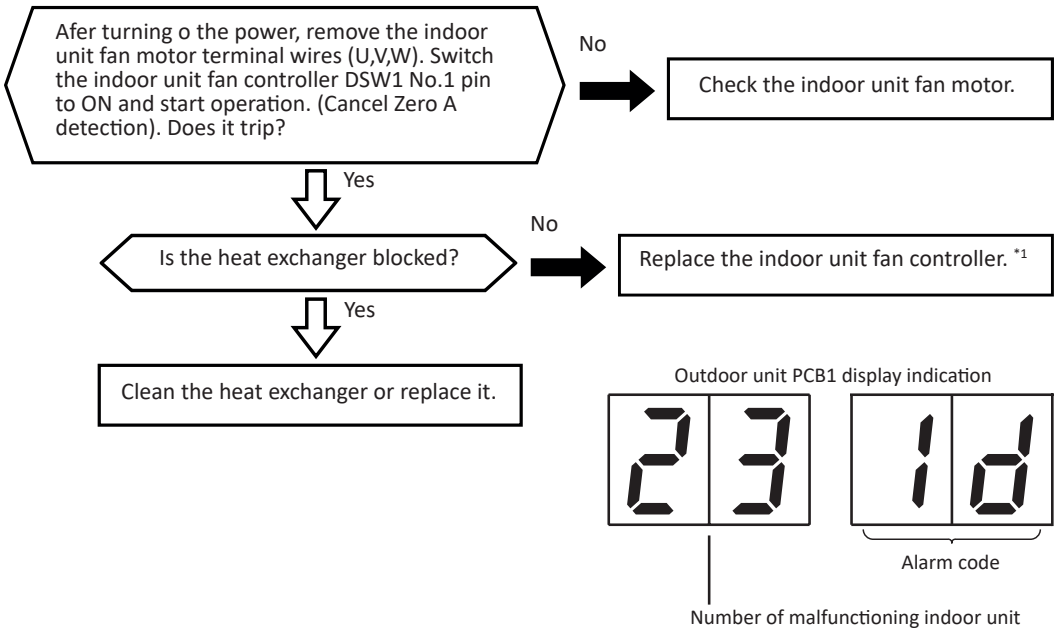
Alarm code	1d	Activation fan controller protection.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

The transistor module itself can detect an error. If it is tripped 10 times within 30 minutes, the alarm code will be displayed. (The operation is retried if it occurs 9 times or less.)

Conditions of activation:

This alarm will be displayed if an abnormal current flows through the transistor module (short circuit, ground fault), in case of an overvoltage or if the control voltage is low.

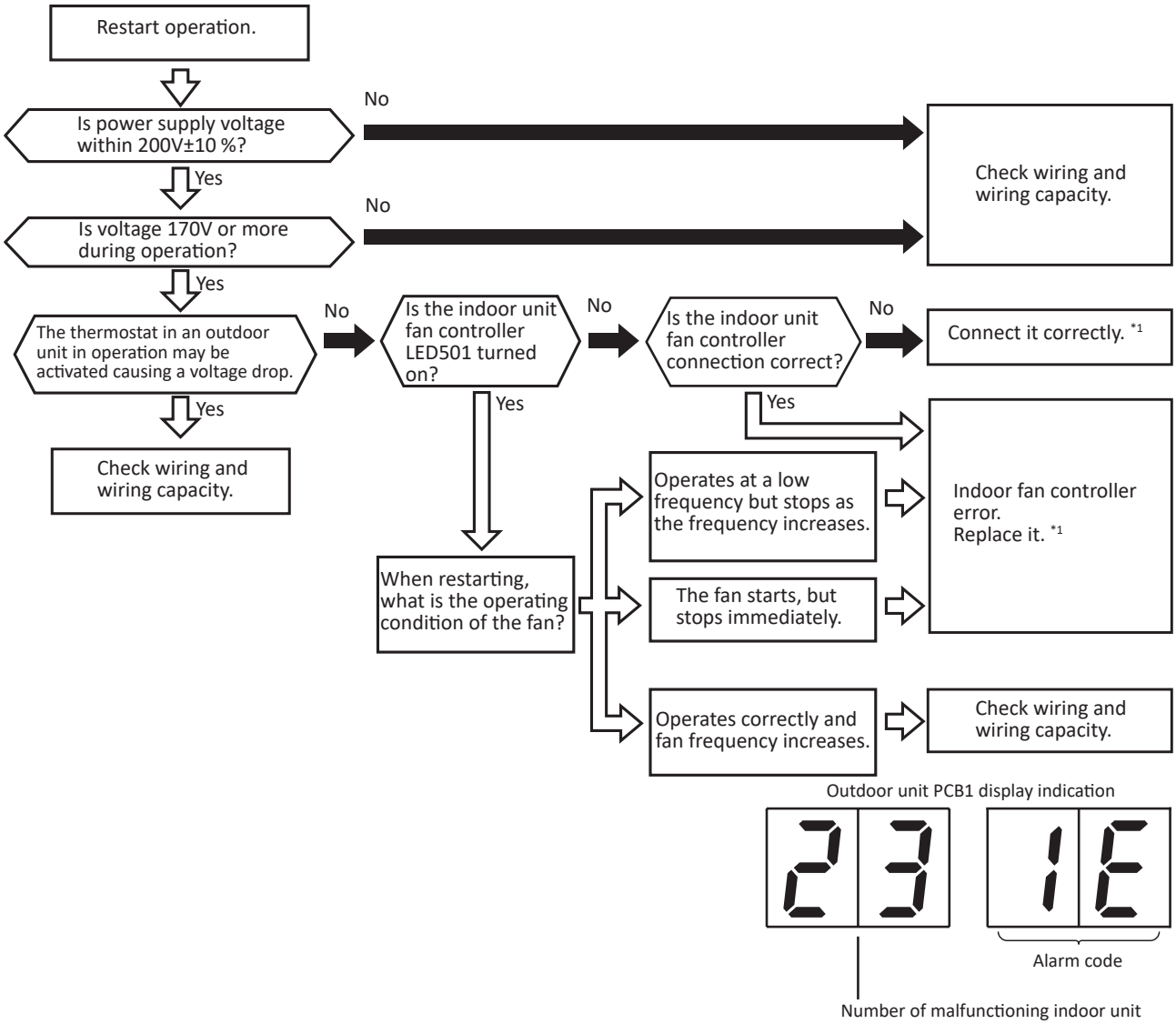


[1] When checking and replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be carried out.

Alarm code	1E	Abnormality of indoor fan controller voltage.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is displayed when there is a lack of voltage between the indoor unit fan controller P-N terminal or if overvoltage occurs 10 times or more within 30 minutes. (The operation is retried if it occurs 9 times or less.)

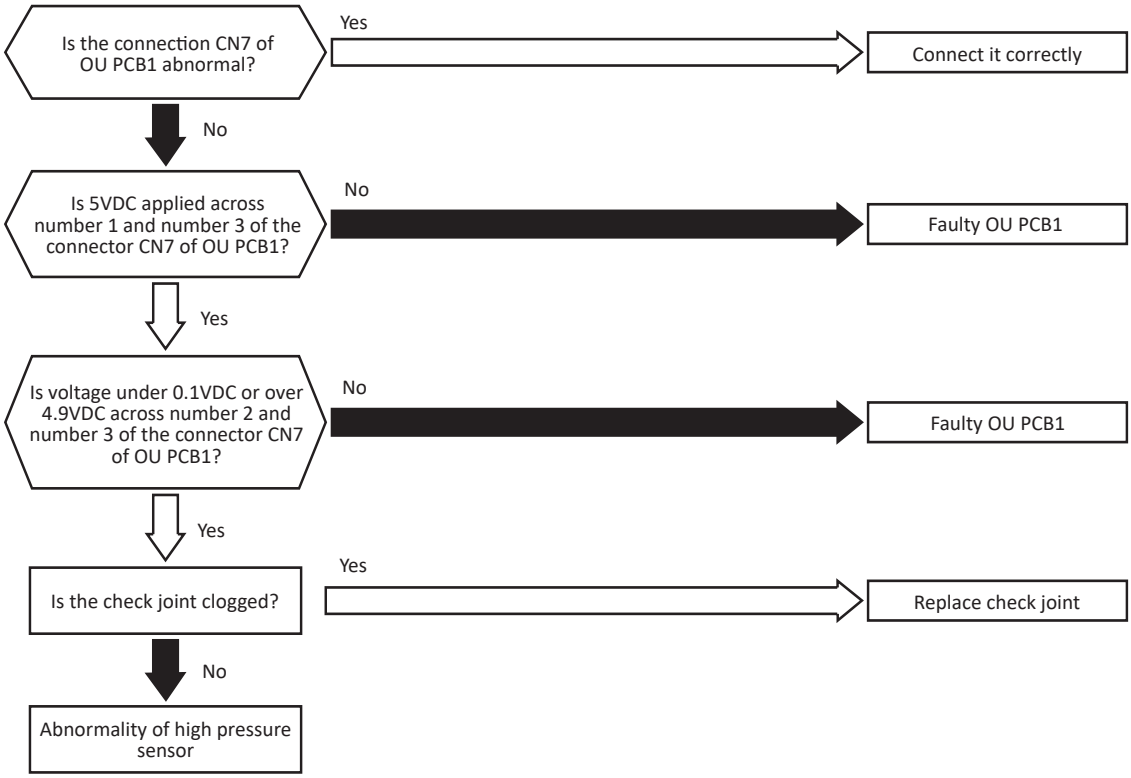


[1] When checking and replacing the indoor unit fan controller, refer to the indoor unit service manual for details. Electrical discharge work must be carried out.

Alarm code	21	Abnormal operation of the high pressure sensor of the outdoor unit.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during the operation.

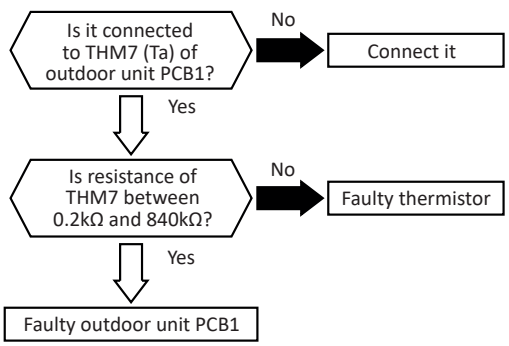


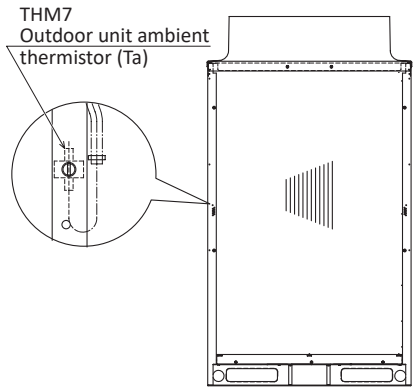
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty high pressure sensor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check connections	Repair wiring and connections
Faulty outdoor unit PCB1		Replace outdoor unit PCB1 and check operation	Replace outdoor unit PCB1 if faulty
Indicated pressure value is excessively high or low	Malfunction of pressure sensor due to faulty check joint	Check for clogging of check joint	Replace check joint

Alarm code	22	Abnormal operation of the thermistor for outdoor air temperature (outdoor unit ambient thermistor).

- The RUN indicator flashes and the ALARM indication is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternatively displayed in the temperature setting section and the unit number and alarm code are displayed on the outdoor unit's PCB1 display.

This alarm is indicated when the thermistor is short-circuited (less than 0.2kΩ) or cut (greater than 840kΩ) during the operation.



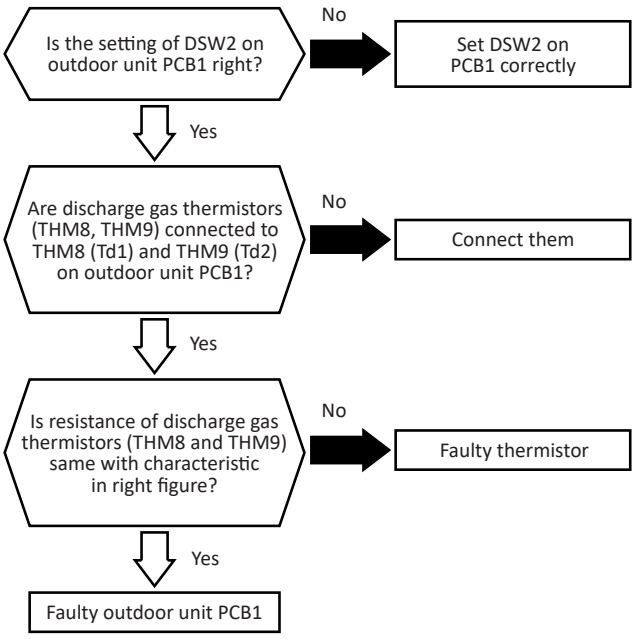


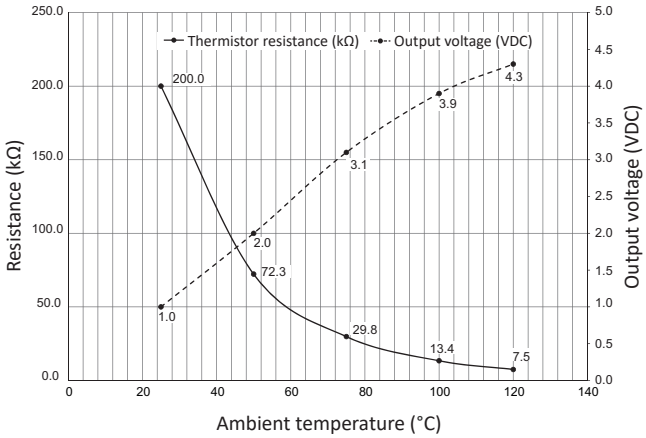
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty outdoor unit ambient thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to outdoor unit PCB1	Repair wiring and connections
Faulty outdoor unit PCB1		Replace outdoor unit PCB1 and check operation	Replace outdoor unit PCB1 if faulty

Alarm code	23	Abnormal operation of thermistor for discharge gas temperature at the upper part of the compressor.

- The RUN indicator flashes and the ALARM indication is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternatively displayed in the temperature setting section and the unit number and alarm code are displayed on the outdoor unit's PCB1 display. For the combination of outdoor units, the alarm code is displayed on PCB of outdoor unit A. Additionally for the outdoor unit number and compressor number with abnormal thermistor, check the alarm code history.

This alarm is indicated when the thermistor is short-circuited (less than 0.9kΩ) or cut (greater than 5946kΩ) during the operation.





R_{25} = 200kΩ
When T = 25 °C, RT = 200kΩ
B = 3920K
$R_T = R_{25} \cdot \exp B (1/T[K]-1-298)$

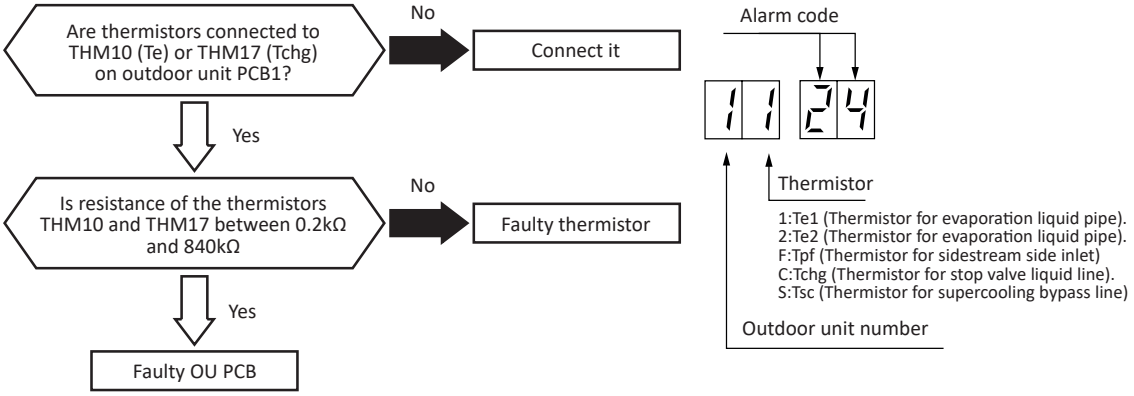
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty discharge gas thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to outdoor unit PCB1	Repair wiring and connections
Faulty outdoor unit PCB1		Replace outdoor unit PCB1 and check operation	Replace outdoor unit PCB1 if faulty
Incorrect setting of DSW2 on outdoor unit PCB1		Check setting of DSW2 on outdoor unit PCB1	Correctly set DSW2 on outdoor unit PCB1

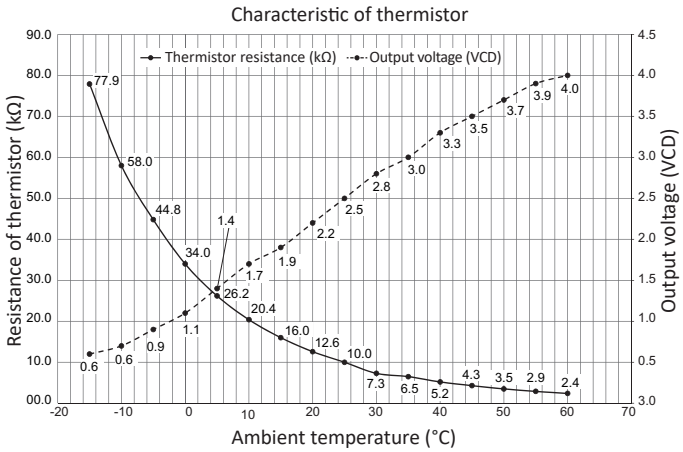
Model	Thermistor	
	Td1 (THM8)	Td2 (THM9)
RAS-(8-18)FSXNS2E RAS-(5-14)FSXNP2E	O	-
RAS-(20-24)FSXNS2E RAS-(16/18)FSXNP2E	O	O

Alarm code	24	Abnormal operation of the thermistor for the outdoor unit heat exchanger liquid pipe (Te/Tchg).

- The RUN indicator flashes and the ALARM indication is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternatively displayed in the temperature setting section and the unit number and alarm code are displayed on the outdoor unit's PCB1 display. For the combination of outdoor units, the alarm code is displayed on PCB of outdoor unit A. Additionally for the outdoor unit number and compressor number with abnormal thermistor, check the alarm code history.

This alarm is indicated when the thermistor is short-circuited (less than 0.2kΩ) or cut (greater than 840kΩ) for 8 minutes during operation.





This data is applicable to the following thermistors:

- *Evaporation liquid line thermistor (THM10, THM11)*
- *Evaporation gas line thermistor (THM12)*
- *Sidestream side inlet thermistor (THM13)*
- *Sidestream side outlet thermistor (THM14*
- *Stop valve liquid line thermistor (THM17)*
- *Super cooling bypass line thermistor (THM23)*

R_{25} =200kΩ
When T=25 °C, RT= 200kΩ
B=3920K

$R_T = R_{25} \cdot \exp B\ (1/T[K]-1-298)$

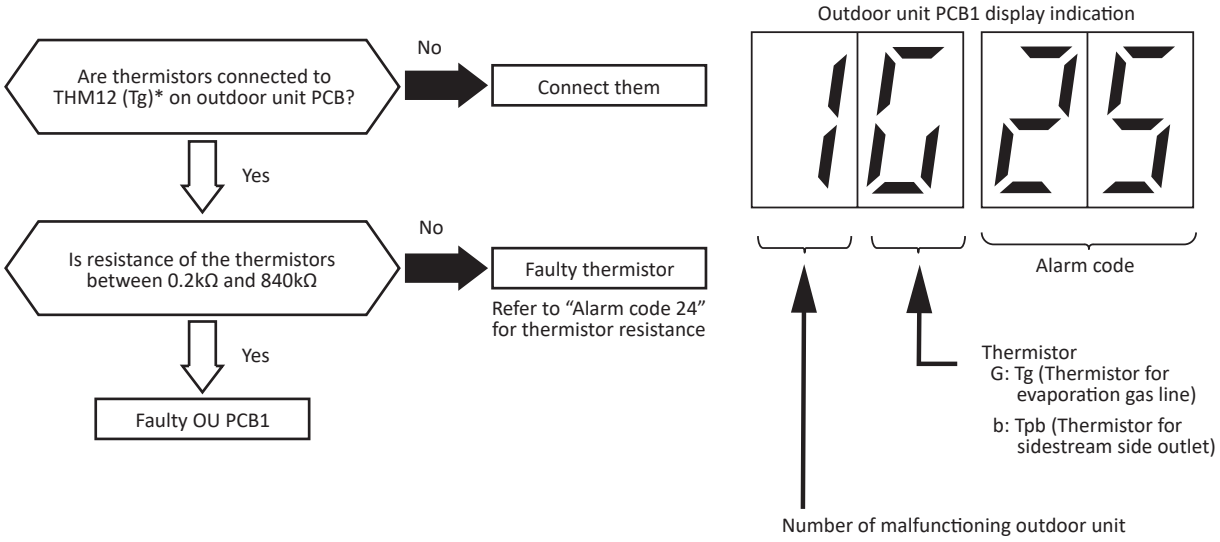
Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty outdoor unit liquid pipe thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty outdoor unit PCB1		Replace PCB1 and check operation	Replace PCB1 if faulty

Model	Thermistor				
	Te1 (THM10)	Te2 (THM11)	Tpf(THM13)	Tcgh(THM17)	Tsc(THM23)
RAS-(8-18)FSXNS2E RAS-(5-14)FSXNP2E	O	-	O	O	O
RAS-(20-24)FSXNS2E RAS-(16/18)FSXNP2E	O	O	O	O	O

Alarm code 25 Abnormal operation of the thermistor for the outdoor unit heat exchanger gas pipe (Tg).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the thermistor is short-circuited (less than 0.2kΩ) or cut (greater than 840kΩ) for 8 minutes during operation.



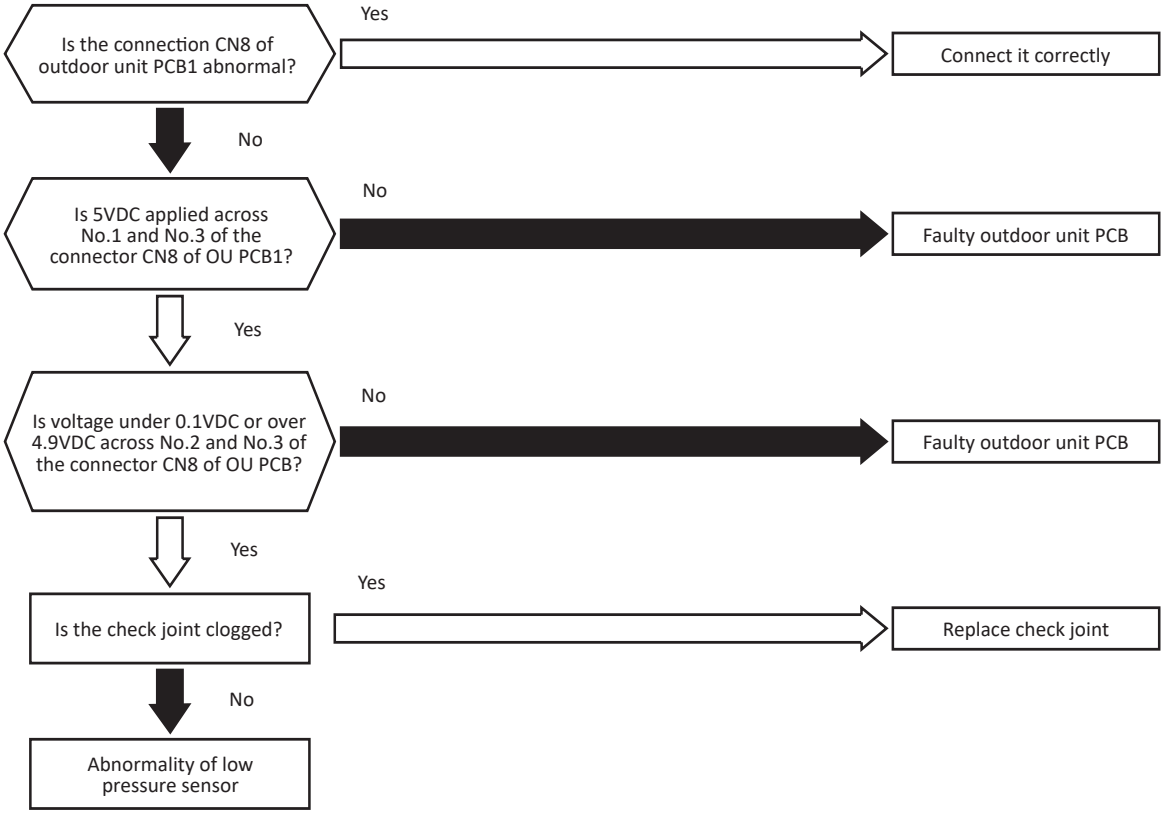
(Tg): Thermistor for evaporation gas line*

Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty outdoor unit gas pipe thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to outdoor unit PCB1	Repair wiring and connections
Faulty PCB1		Replace outdoor unit PCB1 and check operation	Replace PCB1 if faulty

Alarm code 29 Abnormal operation of the low pressure sensor for the outdoor unit.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the pressure sensor voltage decreases lower than 0.1V or increases higher than 4.9V during operation.



Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Faulty low pressure sensor	Fault	Check output voltage is correct	Replace thermistor if faulty
	Incorrect connection	Check wiring to outdoor unit PCB1	Repair wiring and connections
Failure outdoor unit PCB1		Replace outdoor unit PCB1 and check operation	Replace outdoor unit PCB1 if faulty
Indicated pressure value is excessively high or low	Malfunction of pressure sensor due to faulty check joint	Check for clogging of check joint	Replace check joint

Alarm code	30	Incorrect connection of CH-Box.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number (refrigerant cycle number - address number), the alarm code, the model code[*1], the model name[*1] and the number of connected indoor units are displayed on the LCD. The outdoor unit number and the alarm code are displayed on the 7-segment display of the outdoor unit PCB.

*[*1] Except for some models.*

This alarm code is displayed when CH-Boxes are connected to the refrigerant cycle system.

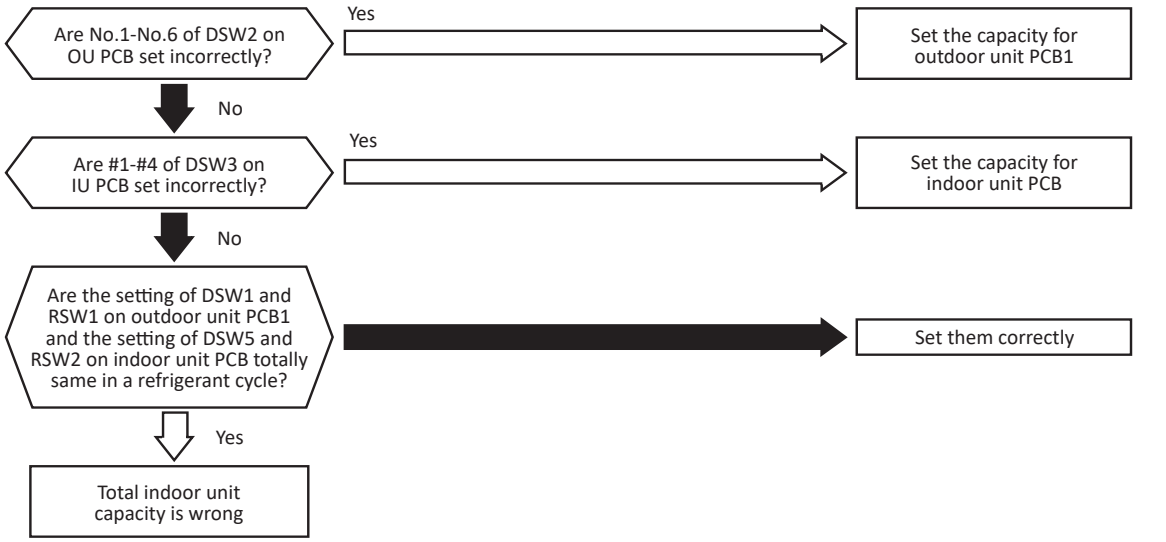
This alarm code is displayed when the power supply setting, DSW7, DSWs on the outdoor unit PCB1 is set incorrectly (number 4 is ON).

Alarm code 31 Incorrect capacity setting of the outdoor and indoor unit.

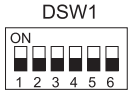
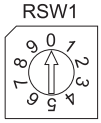
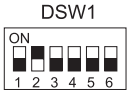
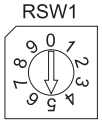
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the capacity setting DIP switch, DSW2 on PCB1 of the outdoor unit is not set (all the contacts from No.1 to No.6 are in the OFF position) or it is incorrectly set.

This alarm is indicated when the total indoor unit capacity is lower than 50 % or higher than the maximum limit established for the combined outdoor unit capacity.



Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
	Incorrect capacity setting of indoor unit	Check combination of indoor units and capacity setting on indoor unit PCB	Correctly set DSW, DSW3
	Incorrect capacity setting of outdoor unit	Check capacity setting on outdoor unit PCB1	Correctly set dip switch, DSW2
	Total indoor unit capacity connected to the outdoor unit is beyond permissible range	Check outdoor unit model by calculating total indoor units capacity	Ensure that total indoor unit capacity is from 50 % to 130 %
	Refrigerant cycle setting of outdoor unit and indoor unit is different	Check refrigeration cycle setting on outdoor unit PCB1 and indoor unit PCB	Set them correctly

	Setting of the refrigerant cycle number		Setting example of the refrigerant cycle number 25	
	DSW1 	RSW1 	DSW1 	RSW1 
Outdoor unit	DSW1, (10 digits)	RSW1, (1 digit)		
Indoor unit (H-LINK II)	DSW5	RSW2		

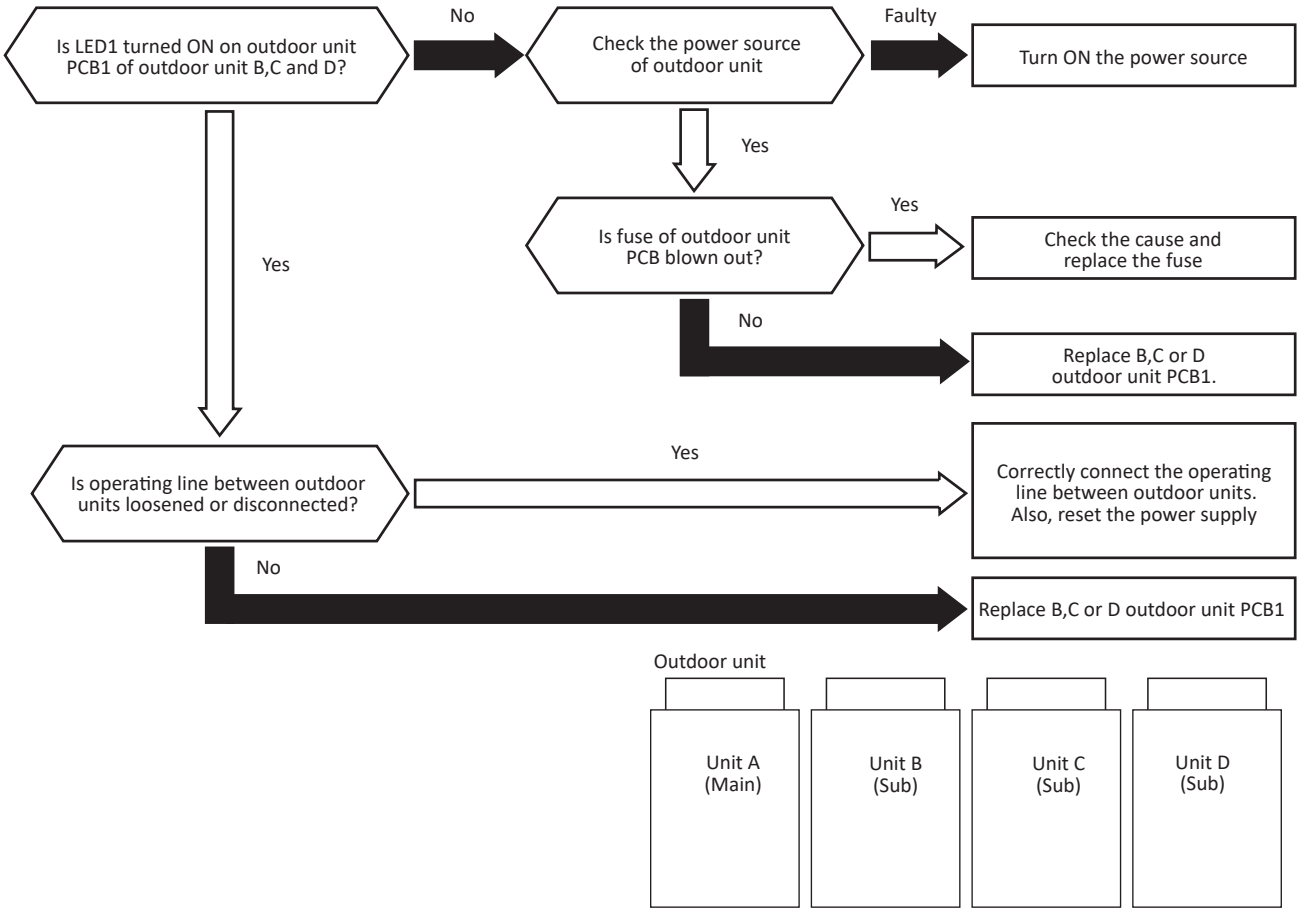
Setting before shipment RSW1 and DSW1 is 0. Maximum refrigerant cycle number setting: 63.

Alarm code 31 Abnormal transmission between outdoor units.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following conditions occur after maintaining a normal transmission between the outdoors units.

- The anomaly is maintained for 30 seconds.
- The anomaly is maintained for 30 seconds after the microcomputer automatically reset.



NOTE

- *(Sub): Secondary unit.*
- *In case the outdoor unit is intended for single unit use but communication cable is incorrectly connected between communication terminal of outdoor units and power supply is turned ON then outdoor unit no. setting is automatically configured and recognized as combination unit. Alarm may still occur even though the communication cable is removed.*
  After communication cable is correctly connected and the power supply is reset (or during alarm occurrence), be sure to reset the memory of all the outdoor units PCB1 of incorrectly connected outdoor units by pressing "PSW1+PSW3" for 5 seconds.

Alarm code  Incorrect indoor unit number setting.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated 5 minutes after power is supplied to the outdoor unit when the indoor unit number connected to the outdoor unit is duplicated by the DSW6 and RSW1 setting.

NOTE

- *In the case of H-LINK systems, this alarm code is indicated when DSW1 and RSW1 of PCB1 of the outdoor unit and DSW5 and RSW2 of the PCB of the indoor unit are incorrectly set. In this case, set them properly after turning OFF the main power switch and turn ON again the main power switch.*
- *When the setting of the refrigerant cycle number of the outdoor unit (H-LINK II) and one of the outdoor unit (H-LINK) is duplicated, alarm code "35" can be ON and OFF repeatedly.*

Alarm code  Incorrect indoor unit combination.

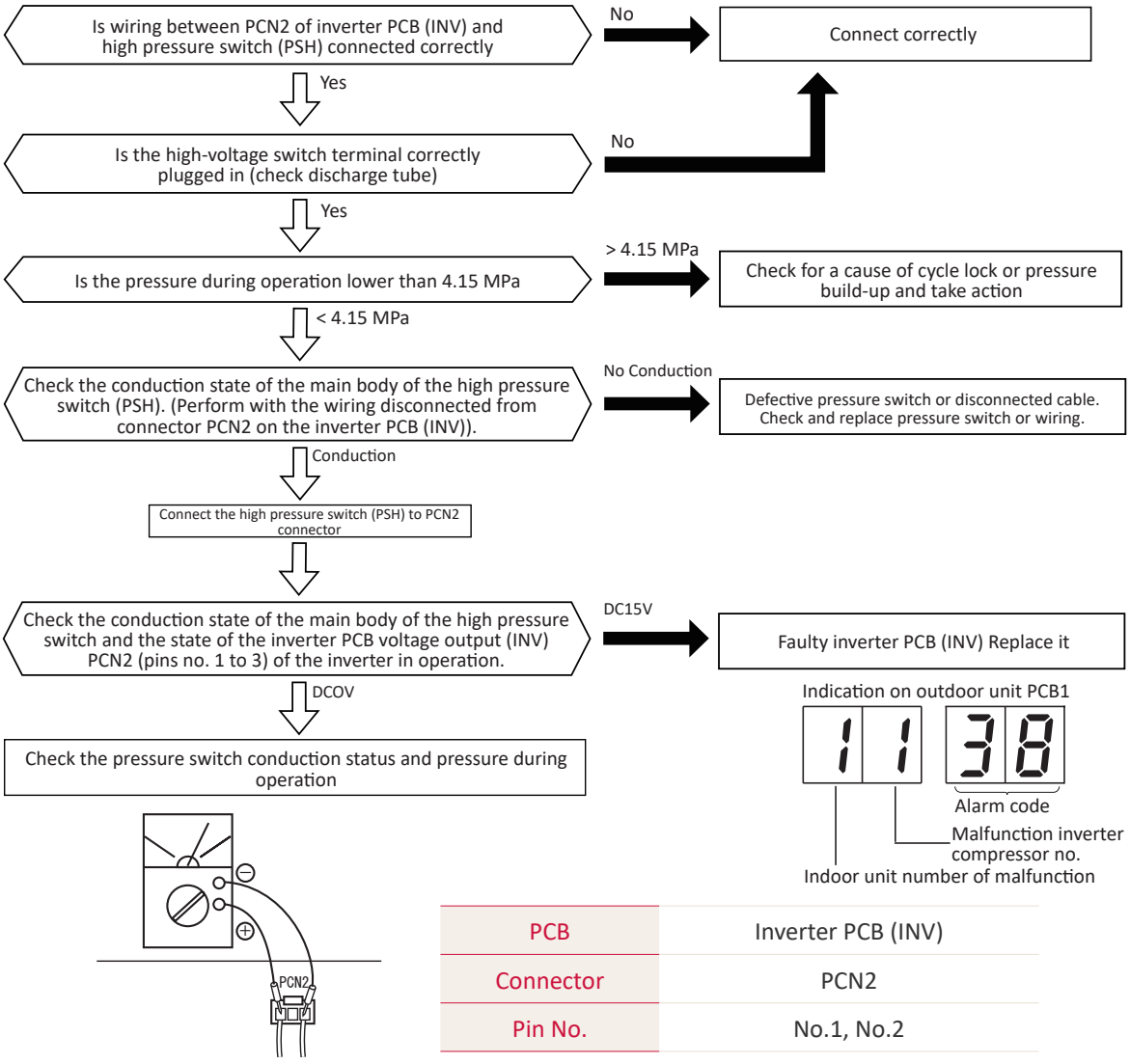
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the indoor unit connected to the outdoor unit is designed for other refrigerants (R22, R407C,...).

Alarm code	38	Abnormality of picking up circuit for protection in the outdoor unit.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm code is displayed when DC13V is applied to the main circuit PCB connector at the time inverter compressor operation command is transmitted to outdoor unit PCB1 (approximately 5 sec passed after turning ON RUN/STOP switch). Make sure to connect each wiring to PCN2, CN5 and CN6 before use tester. If PCN2 wiring is not connected correctly when using the tester, DC13V is continuously detected and end in checking failure.



PCB	Inverter PCB (INV)
Connector	PCN2
Pin No.	No.1, No.2

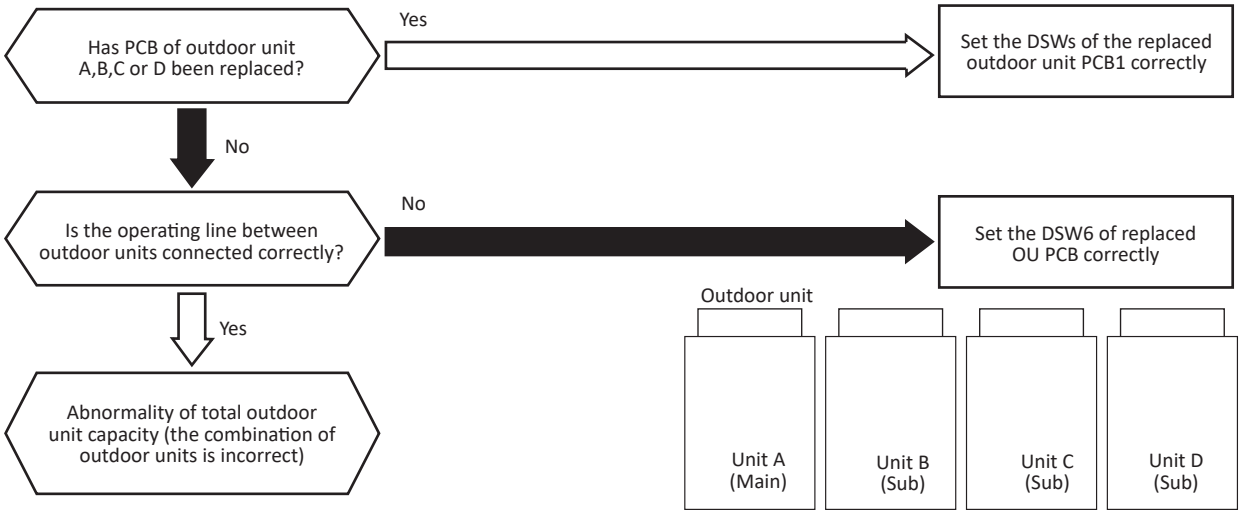
NOTE

- *For the maintenance or replacement of inverter PCB, perform the high voltage discharge work according to the item"6.2 Inverter (INV1, INV2)".*
- *If the high pressure switch (PSH) failure (open phase or disconnecting wiring), this alarm code may occur. Check alarm code 02 trouble shooting too.*

Alarm code 3A Abnormal outdoor unit capacity.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the total capacity of the outdoor unit connected to the transmission terminal between outdoor units exceeds the maximum total power allowed.

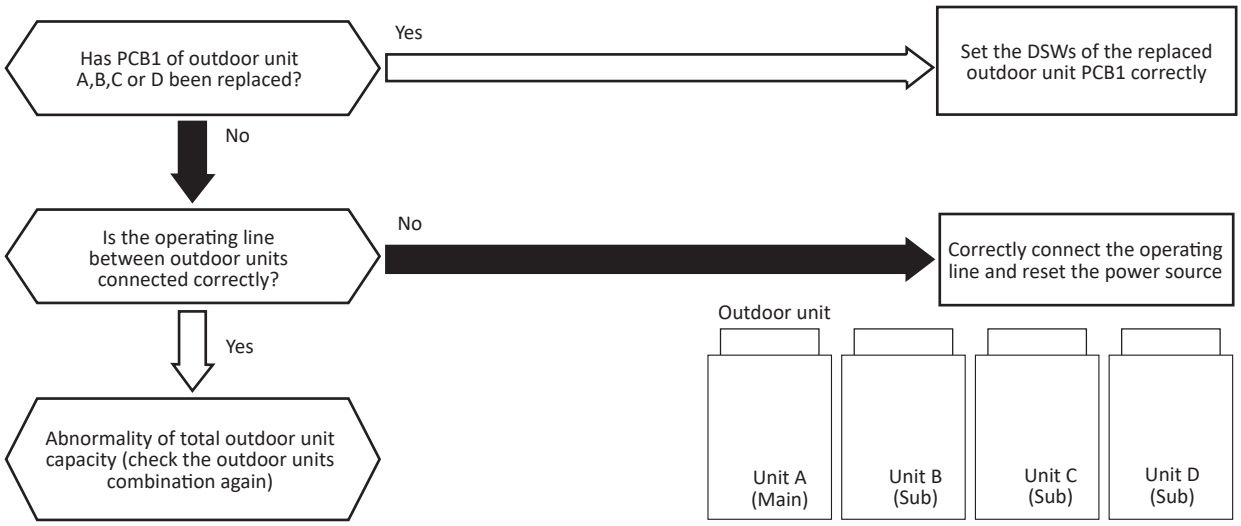


(Sub): Secondary unit(s)

Alarm code 3b Incorrect setting of outdoor unit model combination or voltage.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the model setting of the outdoor unit connected to the transmission terminal between outdoor units.

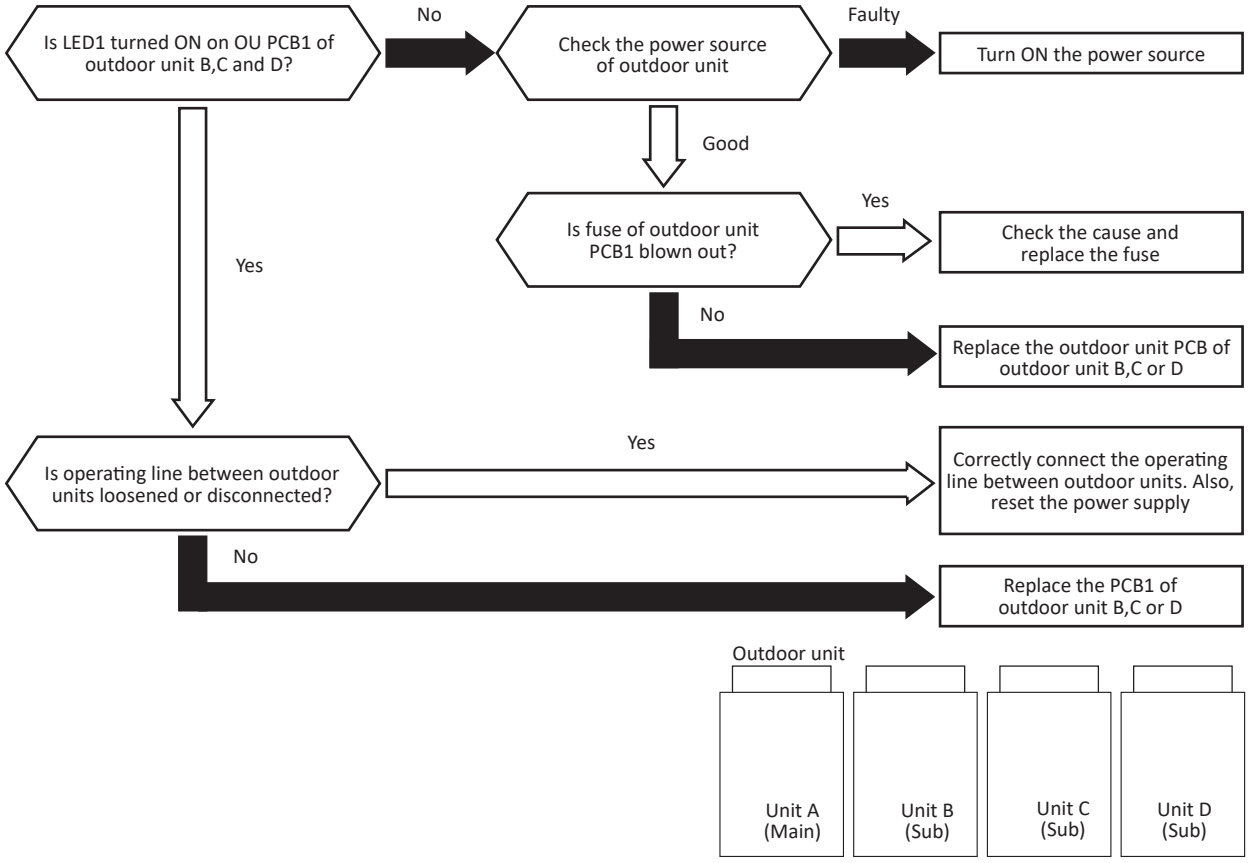


(Sub): Secondary unit

Alarm code 3d Abnormal transmission between the main unit and the secondary unit(s).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the transmission to outdoor unit B, C or D is not maintained for 30 seconds (alarm code "31" will be indicated when the transmission to all the outdoor units connected to transmission terminals between outdoor units is not provided).

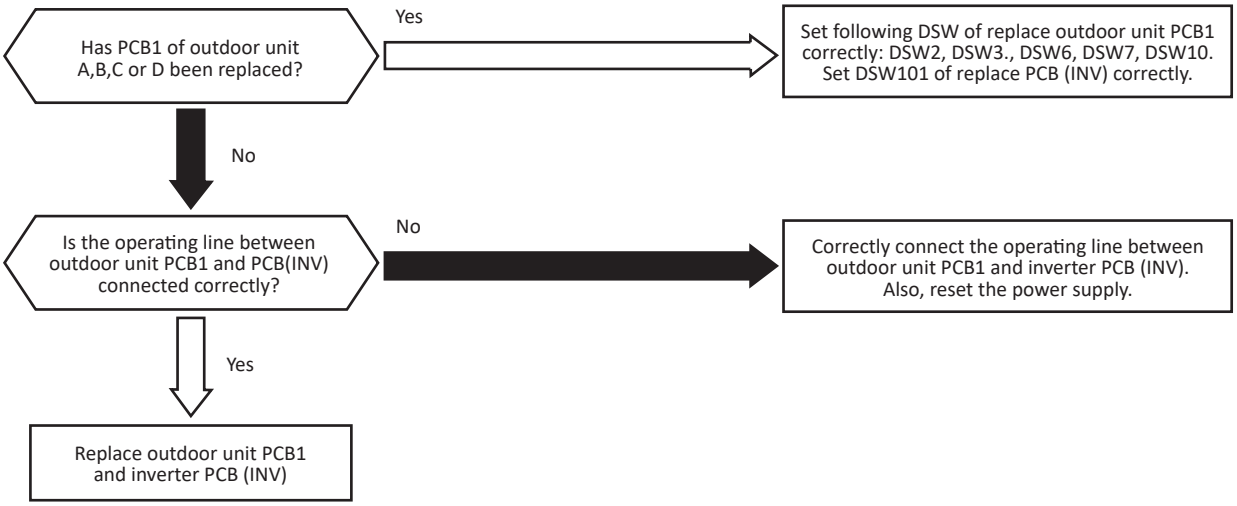


(Sub): Secondary unit

Alarm code	3E	Incorrect combination of outdoor unit inverter PCBs.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm code is indicated when an incorrect model code setting of the outdoor unit is connected to the terminals between the outdoor units communication terminal (TB2 number 3 and 4 terminals on the PCB1 for the outdoor unit combination).

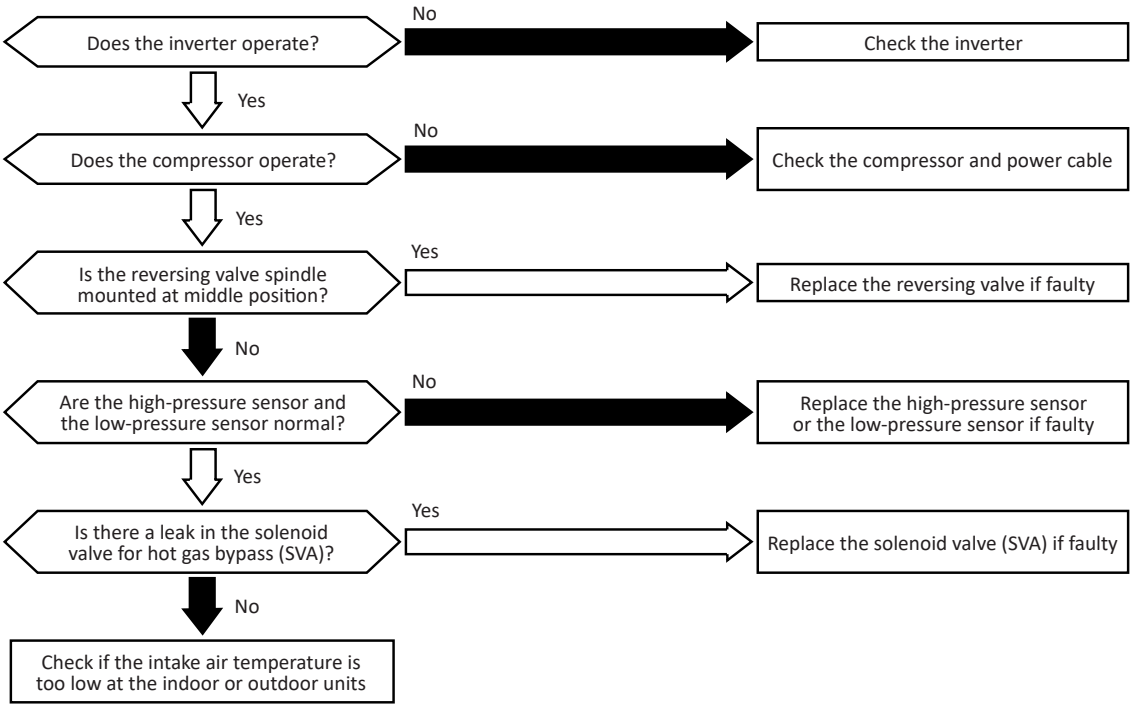


Alarm code 43 Activation of the low compression ratio protection device.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following condition occurs more than twice in an 30 minutes. If the following condition is continued for one minute, all the compressors may be stopped and the unit automatically retried after 3 minutes.

Compression ratio, Ɛ=((Pd+0.1)/(Ps+0.06)) (calculated from the discharge pressure (Pd MPa) and the suction pressure (Ps MPa) is less than 1.5.

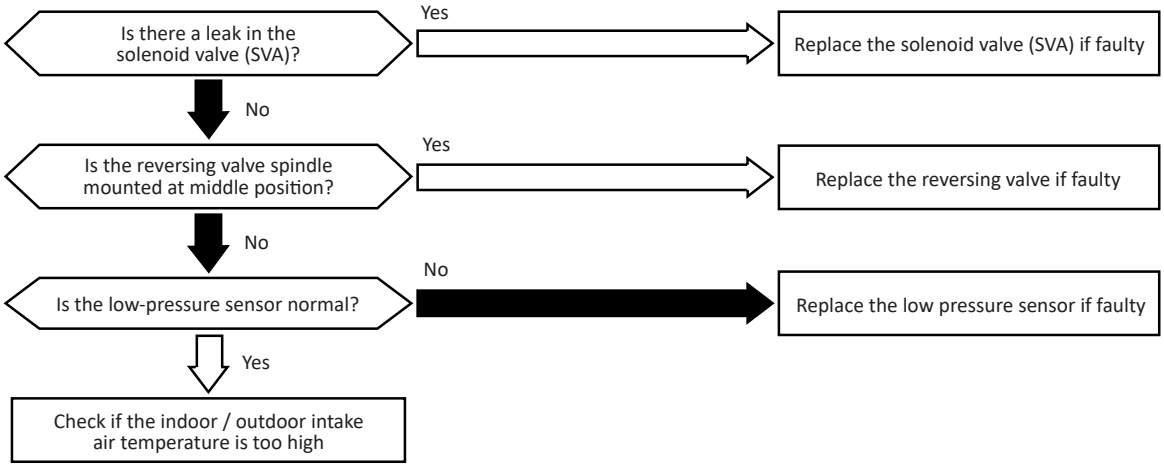


Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Excessively low compression ratio	Inverter is not functioning	Check inverter	Repair faulty part
	Compressor is not operating	Check compressor	Replace compressor if faulty
	Valve stoppage at middle position of reversing valve	Measure suction pipe temperature of reversing valve	Replace reversing valve if faulty
	Abnormality of high or low pressure sensor	Check connector for OU PCB1, power source and pressure indication	Replace sensor if faulty
	Excessively low indoor intake air temperature	Check indoor unit and outdoor unit air temperature thermistor	Replace thermistor if faulty
	Leakage from solenoid valve (SVA)	Check solenoid valve	Replace SVA if leaking

Alarm code 44 Activation of the low pressure increase protection device.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following condition occurs 3 times in 30 minutes: the suction pressure (Ps) continues to be higher than 1.4 MPa for more than a minute, all the compressors stop and then retry the operation after 3 minutes.

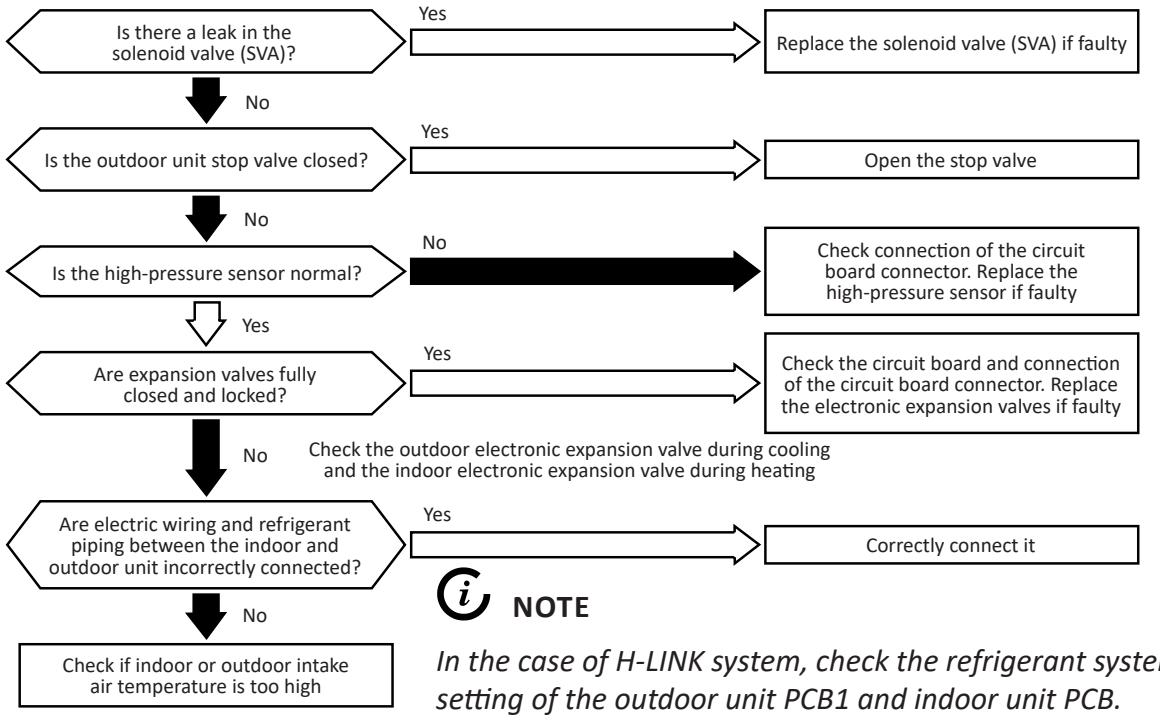


Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Excessively low sutcion pressure	Leakage of solenoid valve (SVA)	Check outlet pipe temperature of solenoid valve (SVA)	Check connecting wires. Replace SVA if faulty.
	Valve stoppage at middle position of reversing valve	Measure suction gas pipe temperature of reversing valve	Replace reversing valve if faulty
	Abnormal suction pressure sensor	Check connector for PCB1, and power source	Replace sensor if faulty
	Excessively high indoor unit and outdoor unit suction air temperature	Check IU and OU suction air temperature thermistor	Replace thermistor if faulty

Alarm code 45 Activation of the high pressure increase protection device.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

If the discharge pressure (Pd) of the compressor is more than 3.8 MPa for 2 seconds, all the compressors stop and the operation is automatically retried after 3 minutes. If this occurs again twice in the next 30 minutes, this alarm code is displayed.



NOTE

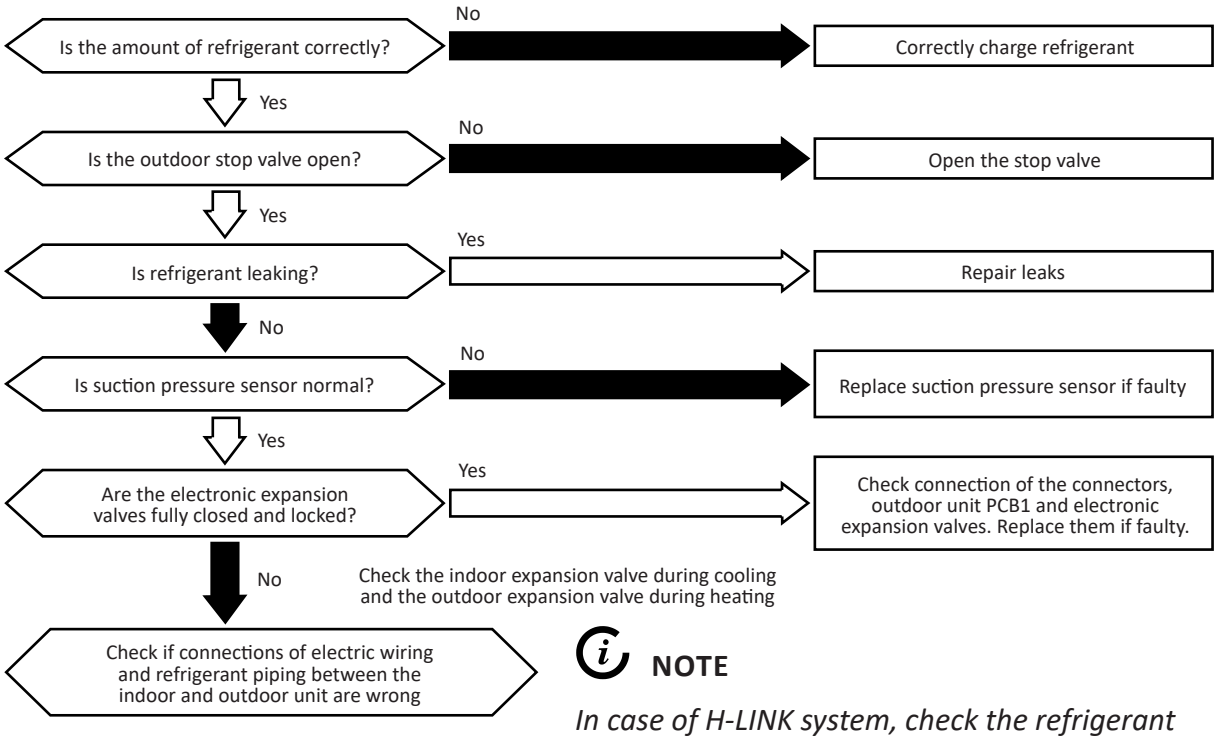
In the case of H-LINK system, check the refrigerant system setting of the outdoor unit PCB1 and indoor unit PCB.

Phenomenon	*Cause*	*Check item*	*Action (Turn OFF main switch)*
Excessively high discharge pressure	Leakage of solenoid valve (SVA)	Check outlet pipe temperature of solenoid valve (SVA)	Check connecting wires. Replace SVA if faulty
	Closed stop valve	Check stop valve	Open stop valve
	Abnormal high pressure sensor	Check connectors for outdoor unit PCB1	Replace pressure sensor if faulty
	Excessively high indoor unit and outdoor unit inlet air temperature	Check indoor unit and outdoor unit inlet air temperature thermistor	Replace thermistor if faulty
	Incorrect connection between indoor unit and outdoor unit	Check electrical system and refrigerant cycle	Correctly connect
	Locked expansion valve with fully closed	Check connectors for PCB	Repair connector for PCB or expansion valve. Replace if faulty
Stoppage of indoor fan (wall type 1.0 to 3.0 HP only)	Melted fuses	Check continuity of fuses	Replace fuses
	Faulty IU PCB	Replace IU PCB and check operation	Replace IU PCB if faulty

Alarm code	47	Activation of the low pressure decrease protection device (Vacuum operation protection).

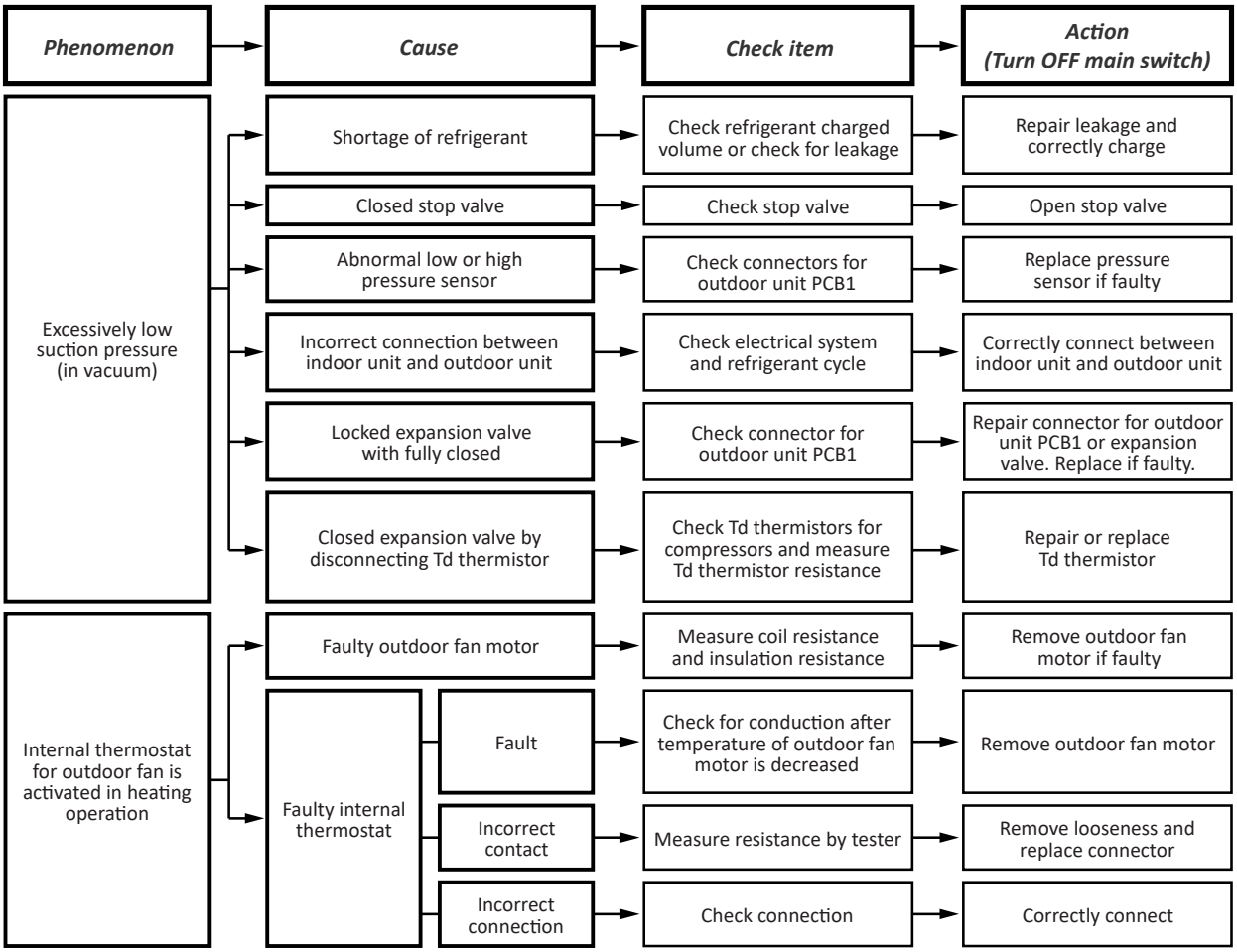
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the following condition occurs 2 or more times in 1 hour: the suction pressure (Ps) is lower than 0.09 MPa for more than 12 minutes.



NOTE

In case of H-LINK system, check the refrigerant system setting of the outdoor PCB1 and indoor PCB.


Phenomenon
Cause
Check item
Action (Turn OFF main switch)
Excessively low suction pressure (in vacuum)
Shortage of refrigerant
Check refrigerant charged volume or check for leakage
Repair leakage and correctly charge
Closed stop valve
Check stop valve
Open stop valve
Abnormal low or high pressure sensor
Check connectors for outdoor unit PCB1
Replace pressure sensor if faulty
Incorrect connection between indoor unit and outdoor unit
Check electrical system and refrigerant cycle
Correctly connect between indoor unit and outdoor unit
Locked expansion valve with fully closed
Check connector for outdoor unit PCB1
Repair connector for outdoor unit PCB1 or expansion valve. Replace if faulty.
Closed expansion valve by disconnecting Td thermistor
Check Td thermistors for compressors and measure Td thermistor resistance
Repair or replace Td thermistor
Internal thermostat for outdoor fan is activated in heating operation
Faulty outdoor fan motor
Measure coil resistance and insulation resistance
Remove outdoor fan motor if faulty
Faulty internal thermostat
Fault
Check for conduction after temperature of outdoor fan motor is decreased
Remove outdoor fan motor
Incorrect contact
Measure resistance by tester
Remove looseness and replace connector
Incorrect connection
Check connection
Correctly connect

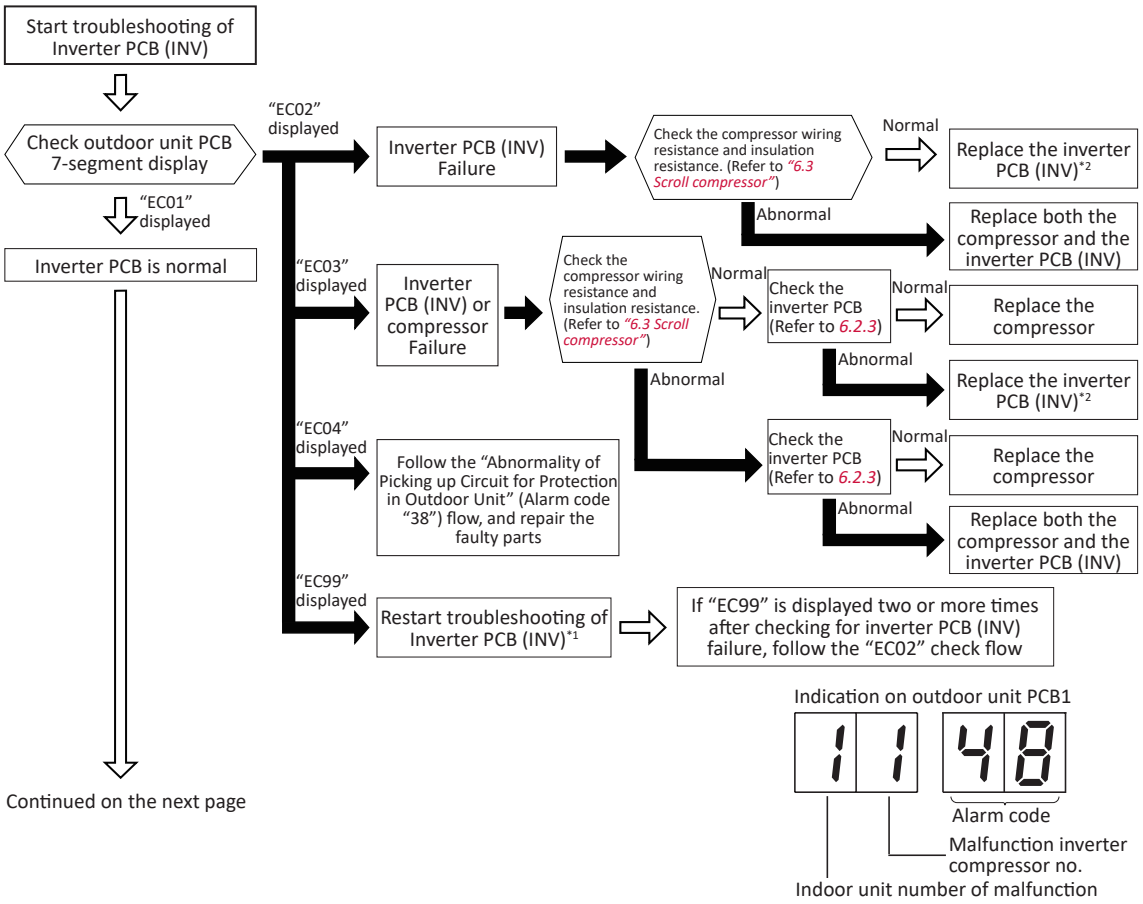
Alarm code 48 Activation of Inverter overcurrent protection device (1).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the inverter electronic thermal protection is activated 6 times in 30 minutes (retry operation is carried out up to 5 times).

Activation conditions:

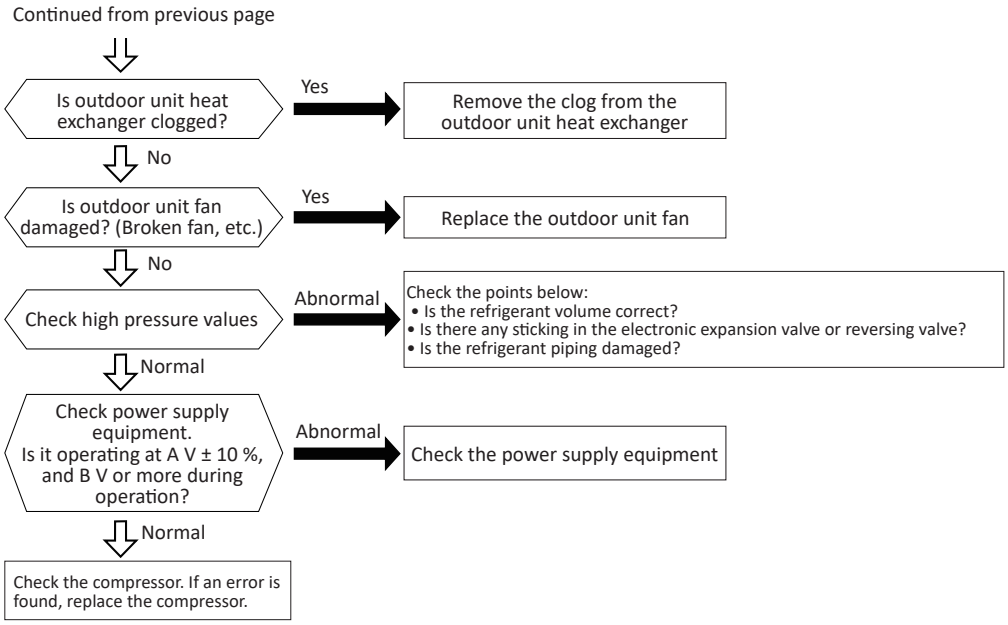
- Inverter current with 105 % of the rated current runs continuously for 30 seconds.
- Inverter current runs intermittently and the accumulated time is reaches up to 3 minutes in a 10 minute period.



1. To redo the inverter damage check, turn off the power to the outdoor unit and then turn it back on.

2. If an error in the current value during operation is confirmed, or if a cycle abnormality (high current value, no pressure increase) is confirmed, the mechanism inside the compressor may be damaged.

Alarm code 48 Activation of Inverter overcurrent protection device (2).



iTC	Cause of inverter stoppage
2	Instantaneous overcurrent
4	Inverter overcurrent

Power Supply	A	B
380-415V	380-415V	323V

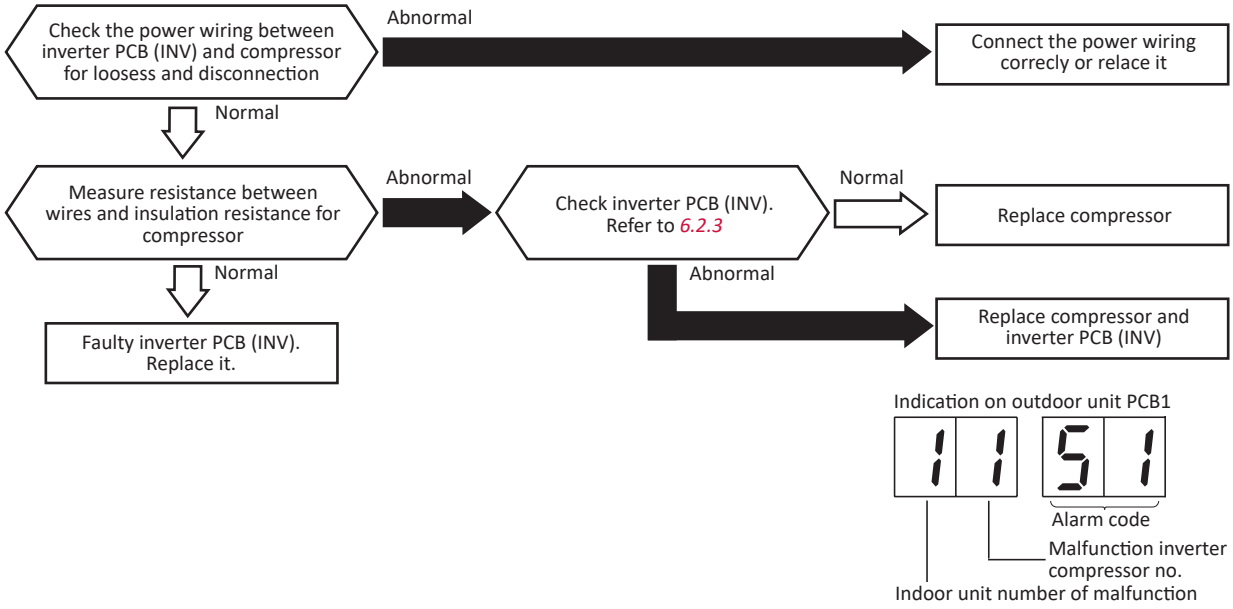
NOTE

- *Regarding the activation current value setting, refer to item "6.2.1 Inverter specifications".*
- *For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to "6.2.3 Checking method of inverter PCB (INV)".*

Alarm code	5 1	Abnormal inverter current sensor.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when an abnormality of current transformer (0A detecting) occurs 3 times within 30 minutes (retry operation is carried up for the first two times).



NOTE

For the maintenance and replacement of inverter PCB, perform the high voltage discharge work according to the "6.2 Inverter (INV1, INV2)".

iTC	Cause of inverter stoppage
8	Abnormal current sensor

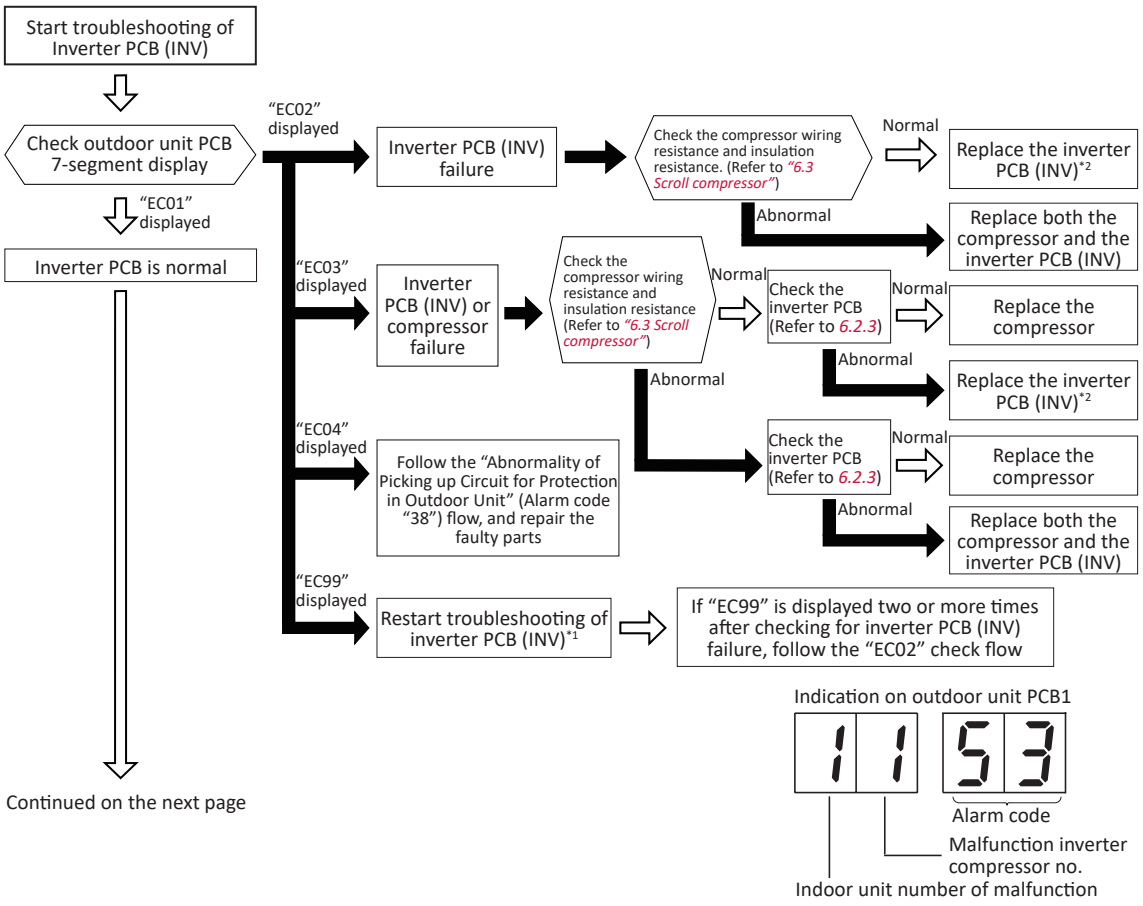
Alarm code 53 Inverter error signal detection.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the IMP (transistor module) detects an abnormal function 7 times in 30 minutes (retry operation is carried out up to sixth times).

Activation conditions:

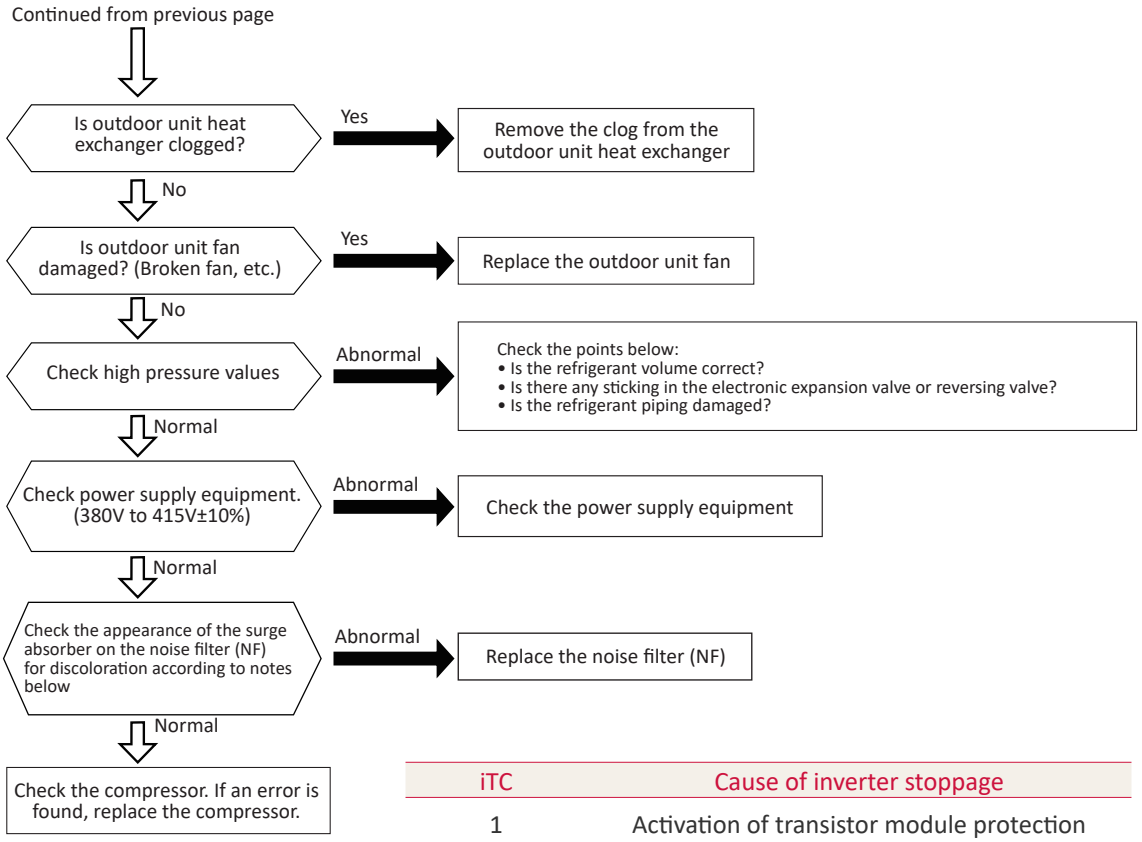
- Abnormal current is applied to the inverter current sensor due to a short circuit, a ground fault or overcurrent.
- Abnormal increase of temperature in the transistor module.
- Decrease in control voltage.
- The angle difference between the shaft in compressor and the shaft in the control program exceeds 60°.



1. To redo the inverter damage check, turn off the power to the outdoor unit and then turn it back on.

2. If an error in the current value during operation is confirmed, or if a cycle abnormality (high current value, no pressure increase) is confirmed, the mechanism inside the compressor may be damaged.

Alarm code 53 Inverter error signal detection (2).

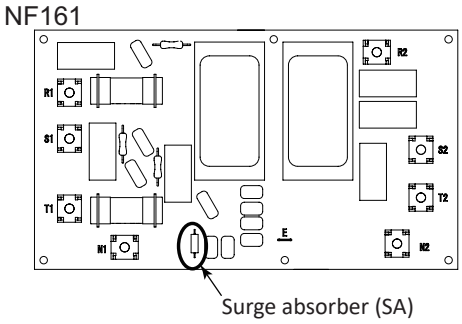


iTC	Cause of inverter stoppage
1	Activation of transistor module protection
12	Ground fault detection
21	Out-of-synchronism detection

NOTE

- *When excessive overvoltage current is applied to the unit due to lightning or other causes and only when another excessive overvoltage current is applied while the withstand capability of the noise filter parts (NF) is exceeded, this alarm code "53" or the inverter stoppage code (iTC) "11" will be indicated and the unit cannot operate.*
  In this case, check the surge absorber/surge arrester (SA) in the noise filter (NF1). The surge absorber may be damaged if the inner surface of the surge absorber is black. In this case, replace it.
  If the inside of the surge absorber is normal, turn off the power once and wait for LED3 on the inverter's printed circuit board (INV1) to turn off (approximately five minutes) and then turn it on again.
- *For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to the item "6.2 Inverter (INV1, INV2)".*
- *To diagnose the inverter refer to "6.2.6 Inverter failure diagnosis mode".*

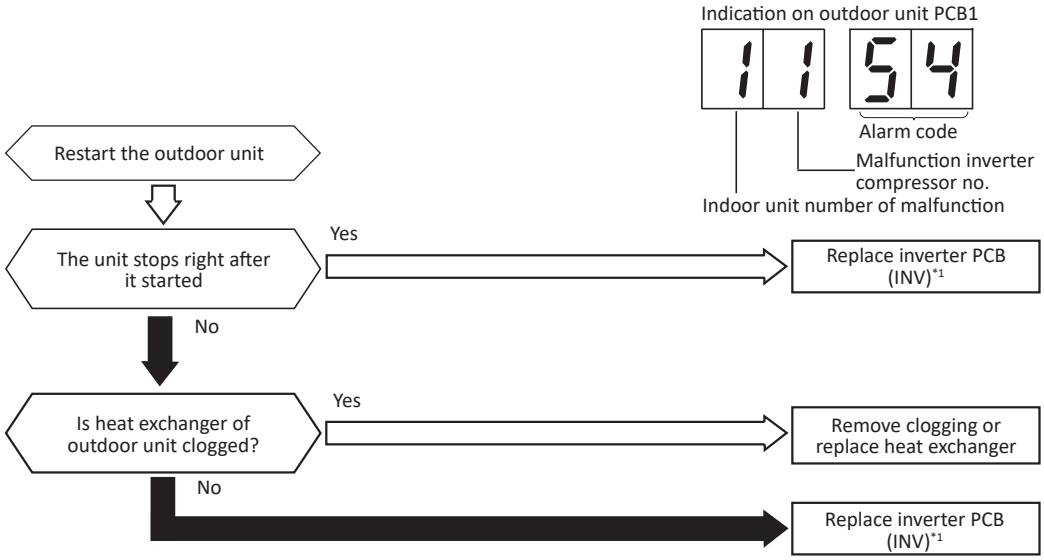
Position of surge absorber



Alarm code	54	Abnormal inverter fin temperature.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when an abnormality of inverter fin temperature occurs 3 times in 30 minutes (retry operation is carried out up to the second time the anomaly occurs). Activation condition: the radiation fin thermistor temperature exceeds 112 °C or 115 °C.



[1] For the maintenance and replacement of inverter PCB (INV), perform the high voltage discharge work according to the item "6.2.2 High voltage discharge work for replacing parts".

iTC	Cause of inverter stoppage
3	Abnormal inverter fin temperature

Alarm code	55	Inverter failure.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

An abnormality is detected when the actual frequency from the inverter PCB is less than 10Hz after the inverter frequency is output from the outdoor unit PCB to the inverter PCB. This alarm code is displayed when this occurs 3 times in 30 minutes. If it occurs less than 3 times in 30 minutes, the operation is automatically retried.



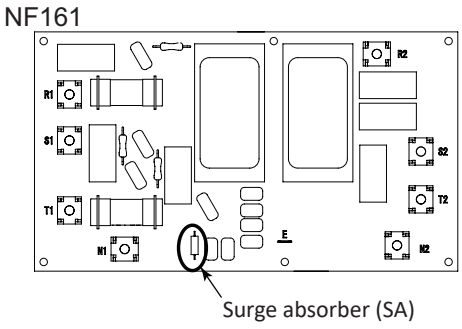
[1] When an excessive surge current is applied to the unit due to lighting or other causes, this alarm code "55" or the inverter stoppage code (iTC) "17" will be indicated and the unit can not be operated. In this case, check the surge absorber/surge arrester (SA) on the noise filter (NF1, NF2). The surge absorber may be damaged if the inner surface of the surge absorber is black. In that case, replace the surge absorber.

NOTE

If the inside of the surge absorber is normal, turn OFF the power once and wait for LED3 (red) on the main circuit PCB (PCB2) or LED401 (red) on the inverter PCB (INV) OFF (approximately five minutes) and turn it ON again.

iTC	Cause of inverter stoppage
17	Abnormal control

Position of surge absorber



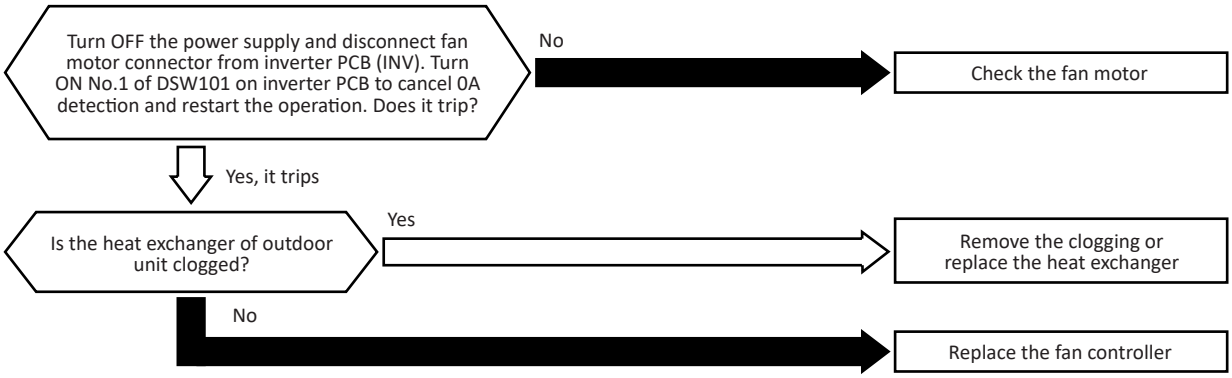
Alarm code 57 Activation of fan controller protection.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the IMP (transistor module) detects an abnormality 10 times in 30 minutes (retry operation is performed up to the ninth time).

Activation conditions:

- Abnormal current to the transistor module, such as a short-circuit or earth leakage, or overcurrent occurs at the transistor module.
- Decrease in control voltage.

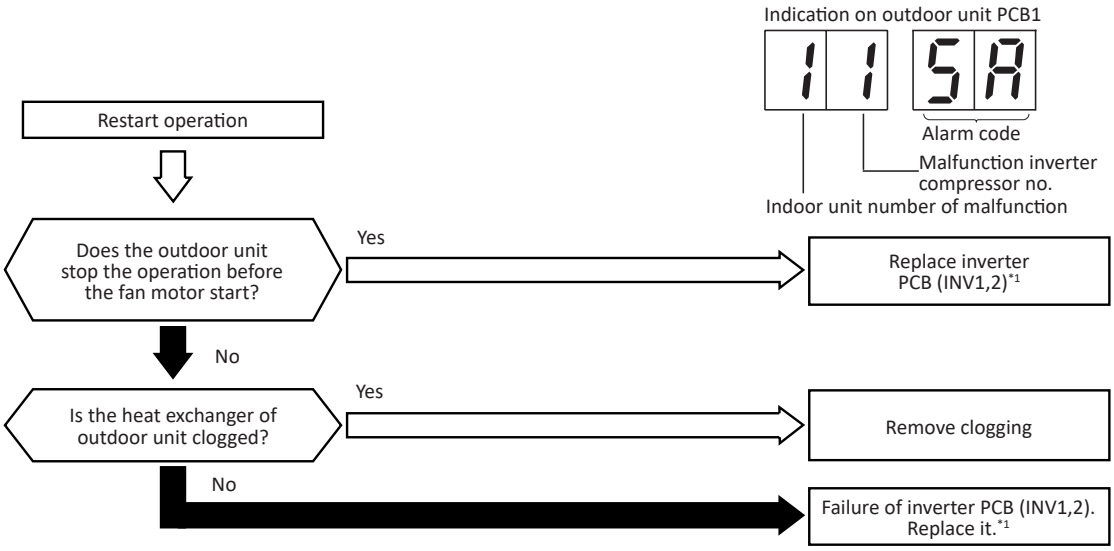


iTC	Cause of inverter stoppage
1	Driver IC error signal detection
12	Earth fault detection

Alarm code	5A	Abnormal fan controller fin temperature.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is indicated when the fan controller fin temperature anomaly occurs 10 times in 30 minutes (retry operation is carried out up to 9 times). Activation condition: this alarm is indicated when the thermistor temperature inside the transistor module increases over 100 °C.



*1 *For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to item "6.2 Inverter (INV1, INV2)".*

iTC	Cause of inverter stoppage
3	Inverter fin temperature increase

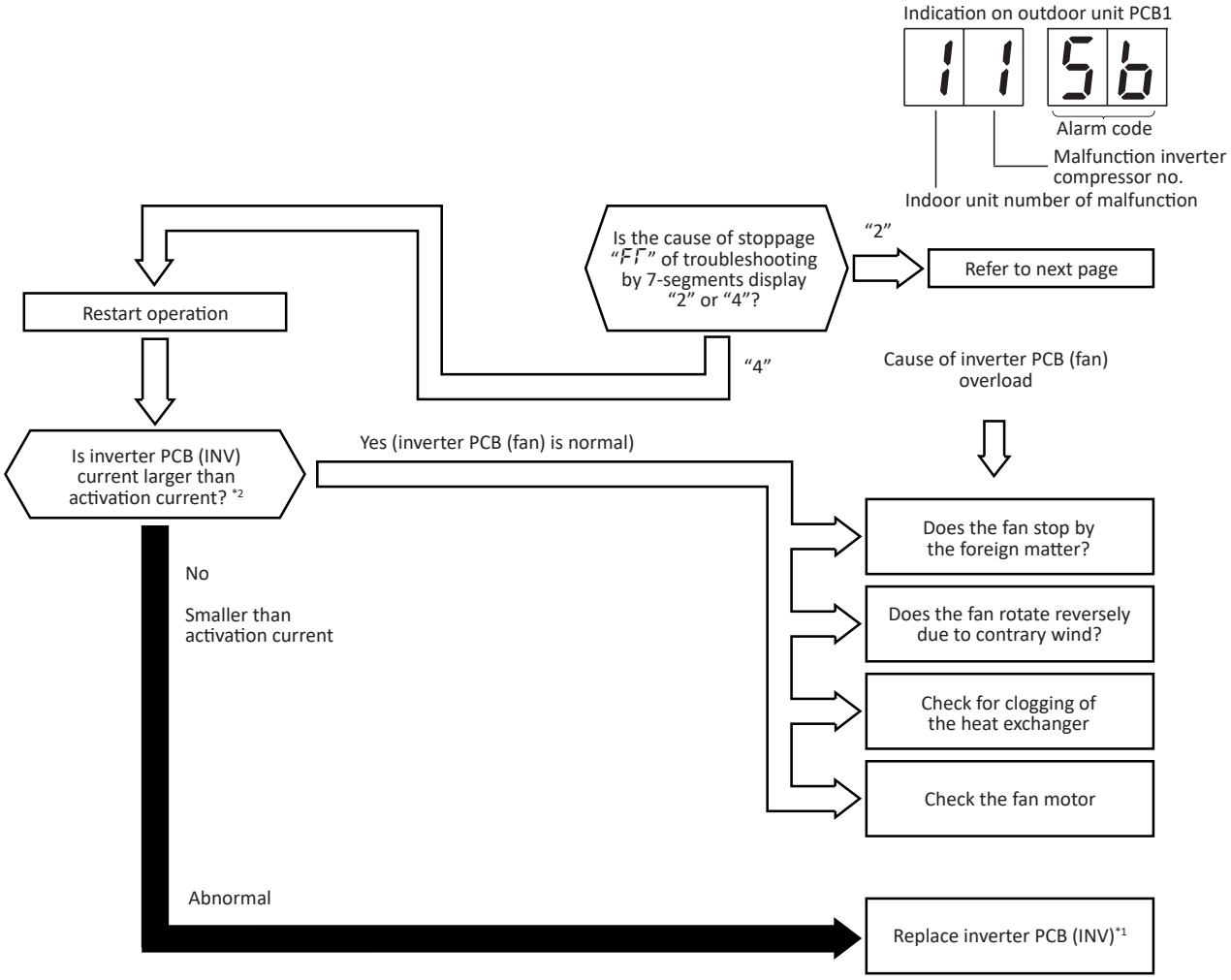
Alarm code	5b	Activation of fan controller overcurrent protection device (1).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

In this case, the outdoor unit number of abnormal inverter PCB is displayed. Check the fan controller stoppage code when this alarm code is displayed.

Activation conditions:

- Electrical current with 105 % of the rated current runs continuously for 30 seconds.
- Electrical current runs intermittently and the accumulated time reaches to 3 minutes in a 10 minute period.



[1] For the maintenance and replacement of an inverter PCB, perform the high voltage discharge work according to item "6.2 Inverter (INV1, INV2)".

[2] Regarding the setting value of activation current, refer to the item "6.2 Inverter (INV1, INV2)".

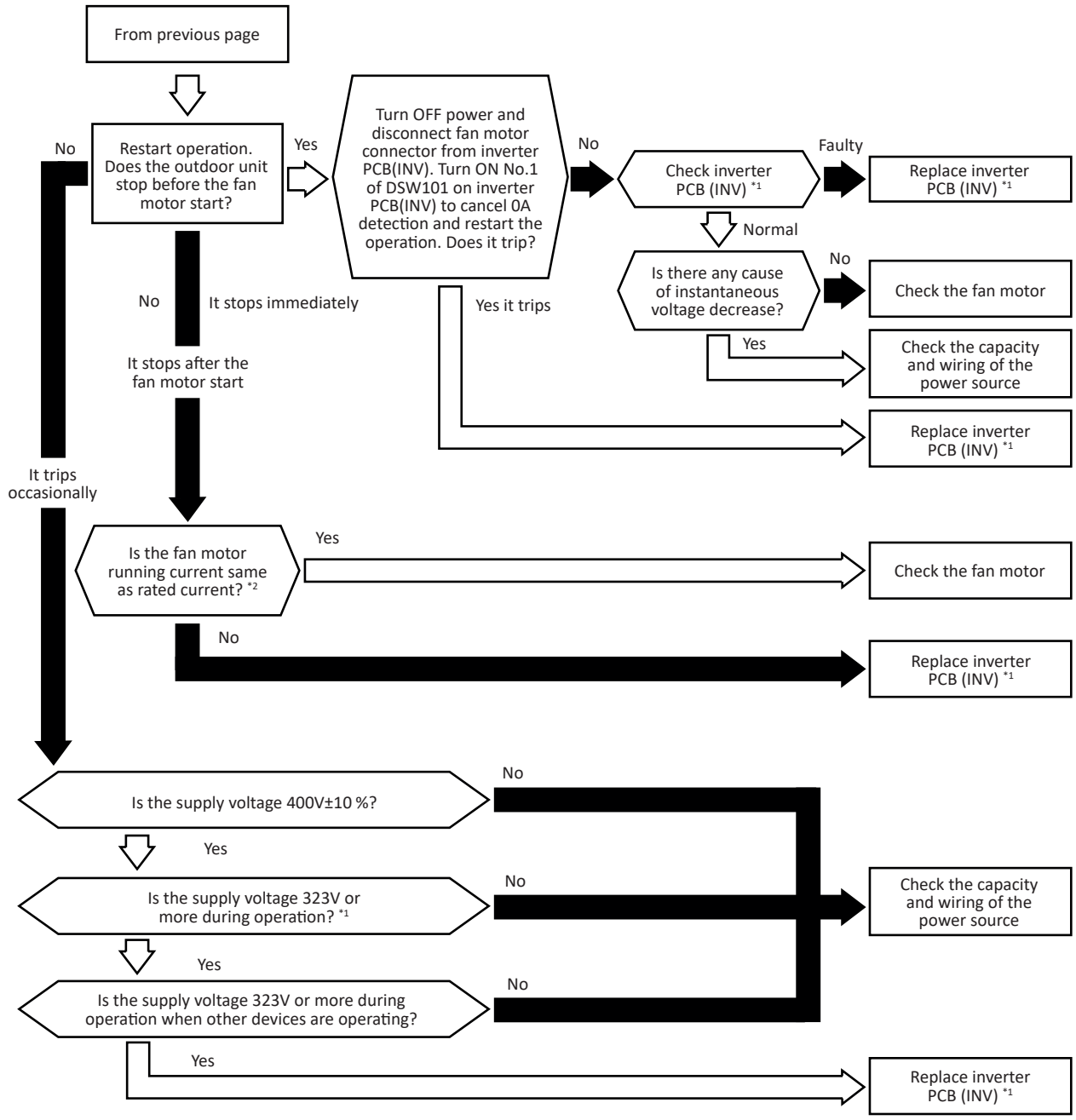
iTC	Cause of inverter stoppage
2	Instantaneous overcurrent
4	Electronic thermal protection (inverter overcurrent)

Alarm code 5b Activation of fan controller overcurrent protection device (2).

This alarm is indicated when the instantaneous overcurrent occurs 10 times in 30 minutes (retry operation is carried out up to 9 times).

Activation conditions:

- Electrical current with 105 % of the rated current runs continuously for 30 seconds.
- Electrical current runs intermittently and the accumulated time reaches to 3 minutes in a 10 minute period.



*1 *For the maintenance and replacement of an inverter PCB, perform the high voltage discharge work according to item "6.2 Inverter (INV1, INV2)".*

*2 *Regarding the setting value of activation current, refer to the item "6.2 Inverter (INV1, INV2)".*

Alarm code	5C	Abnormal fan controller sensor.

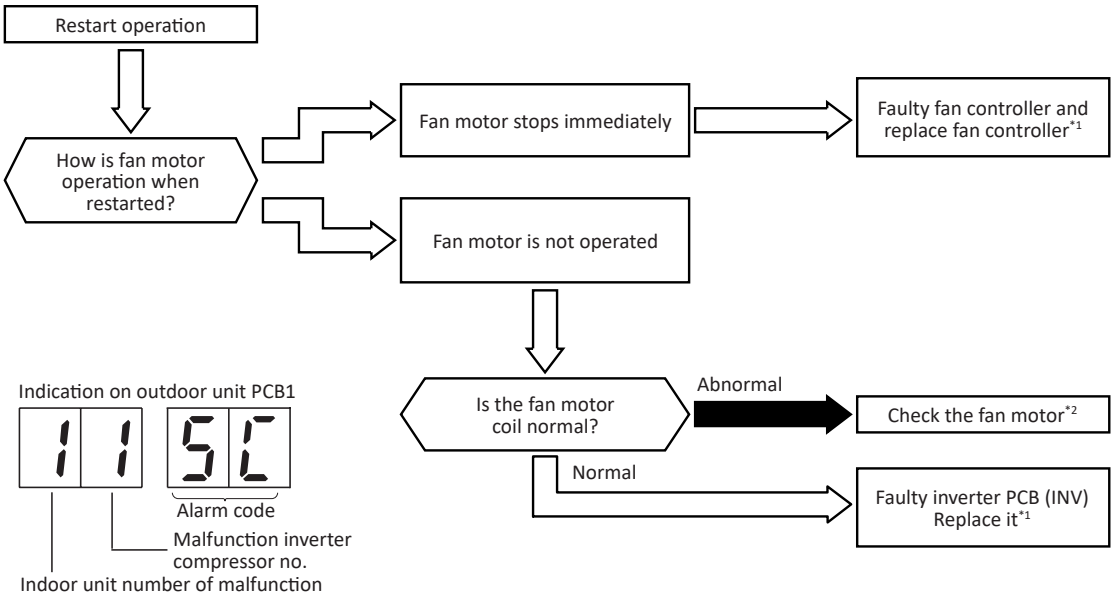
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

In this case, the number of the outdoor unit with an abnormal inverter PCB as well as the number of the abnormal inverter PCB are displayed. Check the fan controller stoppage code when this alarm code is displayed.

This alarm code is displayed when the fan controller electronic thermal protection is activated 10 times within 30 minutes. If this occurs less than 10 times in 30 minutes, the operation automatically restarts.

Activation conditions:

- Electric current with 105 % of the rated current runs for 30 seconds continuously.
- Before the fan motor operation is started (at completing the phase positioning), the wave height value of the running current for the phase positioning is less than criterion value.



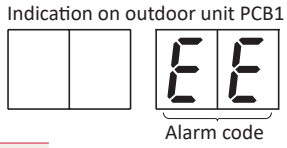
*1 *For the maintenance and replacement of the inverter PCB, perform the high voltage discharge work according to the "6.2 Inverter (INV1, INV2)".*

*2 *For checking fan motor, refer to the fan motor specification in "6.2 Inverter (INV1, INV2)".*

FTC	Cause of fan controller stoppage
8	Abnormal current sensor

Alarm code	EE	Compressor protection.

This alarm code is displayed when any of the following alarms causing serious compressor damages occurs 3 times in 6 hours. While this alarm is displayed, alarm reset is unavailable.



Alarm code	Content of anomaly
02	Activation of protection device (high pressure cut)
07	Decrease in discharge gas superheat
08	Increase in discharge gas temperature at the upper part of the compressor
43	Activation of the low compression ratio protection device
44	Activation of the low pressure increase protection device
45	Activation of the high pressure increase protection device
47	Activation of the low pressure decrease protection device (Vacuum operation protection)

NOTE

- *These alarms can be checked by the CHECK Mode 1. Follow the action indicated in each alarm chart.*
- *These alarms are cleared only by turning OFF the main power switch to the system.*

CAUTION

Great care must be taken before starting, since there is a possibility of causing serious damages to the compressors.

Alarm code	A1	External abnormality detection.

This alarm code is displayed when the external input is set the control function number 14 is detected an abnormality (input terminals are short-circuited).

Alarm code	b0	Incorrect setting of the unit model code

This alarm code is indicated when the unit model code setting (DSW4) is not set (all pins are “OFF”), or is set for the incorrect indoor unit type. Check the unit model code setting (DSW4) of indoor unit PCB after turning OFF the power source. Set DSW4 correctly.

Alarm code b1 Incorrect setting of unit and refrigerant cycle number

This alarm code is indicated in the following condition. Check the settings of the dip switch (DSW) and the rotary switch (RSW) after turning OFF the power source.

Conditions	Countermeasures:
The unit number setting (DSW6 and RSW1) or the refrigerant cycle unit number setting (DSW5 and RSW2) is set as “64” or more, or more than 2 pins of DSW5 or DSW6 are set.	Unit number setting / refrigerant cycle number setting starting from “1” (recommended). ✓ Set the unit number and the refrigerant cycle number from “1” to “63”. (Setting number for the 64th unit shall be “0”.) Unit number setting / refrigerant cycle number setting starting from “0”. ✓ Set the unit number and the refrigerant cycle number from “0” to “63.” (Setting number for the 64th unit shall be “63”)
The unit unit number setting and the refrigerant cycle unit number setting are set between “16” and “63,” and the indoor unit does not support H-LINK ll.	Set the unit number and the refrigerant cycle unit number between “0” and “15”.

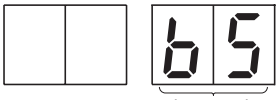
Alarm code b5 Incorrect setting of indoor unit connection number.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code[*1], the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

*[*1] The alarm code displayed on the wired controller is “3”.*

Conditions:	The number of the connected indoor units not supporting H-LINK II are 17 or more.
Countermeasures:	The number of the connected indoor units must be 16 or less.

Indication on outdoor unit PCB1



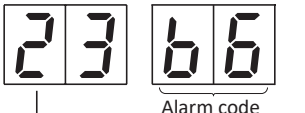
Alarm code

Alarm code b6 Abnormal communication between indoor unit PCB and indoor fan controller.

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.

This alarm is displayed when there is a connection check error including no response or no connection for 30 seconds.

Indication on outdoor unit PCB1



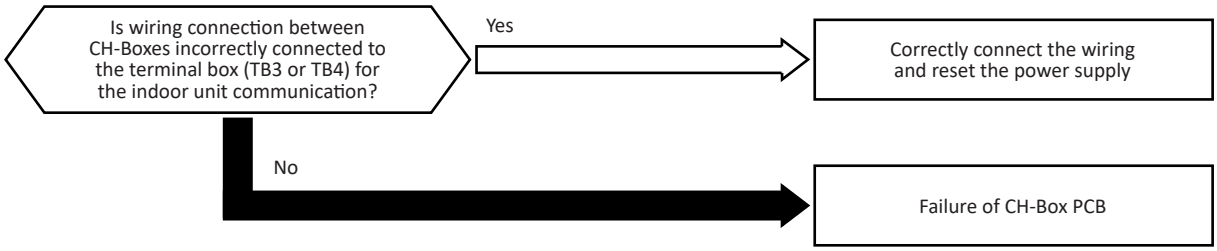
Alarm code

Indoor unit number of malfunction

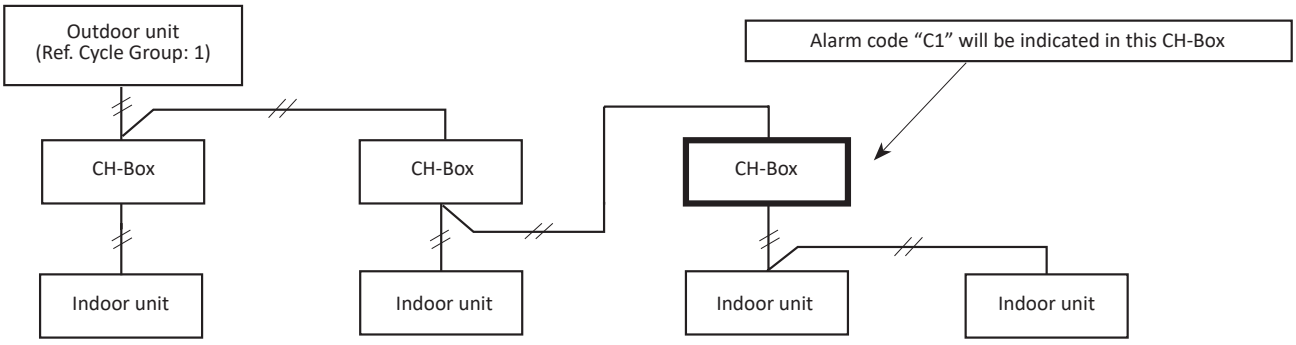
Alarm code	C 1	Incorrect indoor unit connection (CH-Box).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.
- LED (LED4, 5, 6, 7) on CH-Box PCB flashes.

This alarm is indicated when 2 or more CH-Boxes are connected between the outdoor unit and the indoor unit.



- Alarm code "C1" will be indicated when the units are connected as follows.

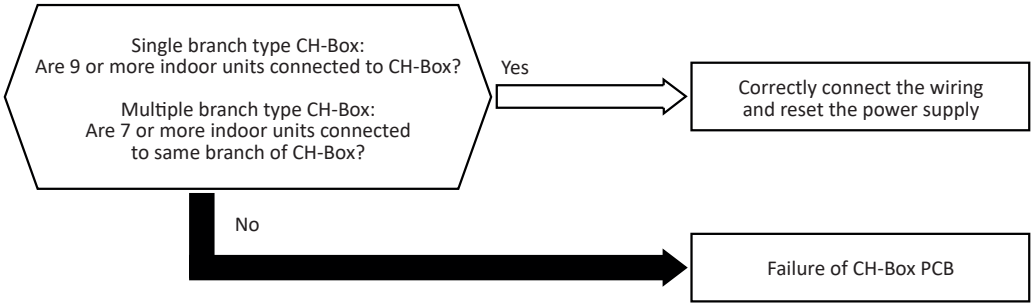


Example of connection that causes an alarm.

Alarm code	C2	Incorrect indoor unit connection number setting (CH-Box).

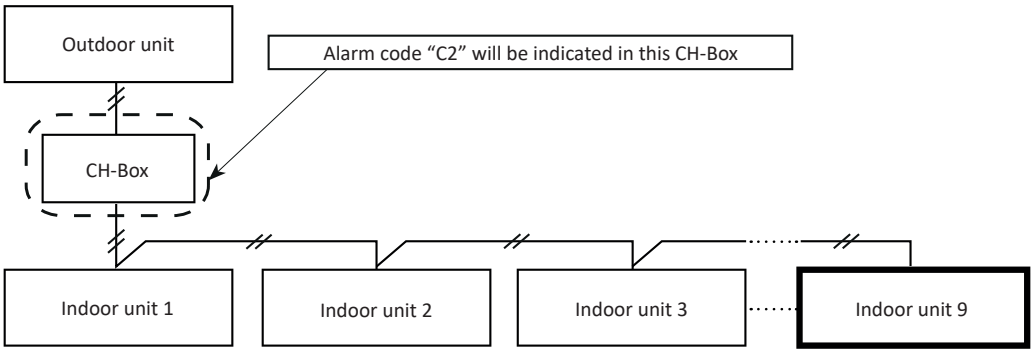
- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code ("35"), the unit model code and the number of connected indoor units are displayed on the wired controller which is connected to the indoor unit with abnormal CH-Box.
- LED (LED4, 5, 6) on CH-Box PCB flashes (for multiple branch type CH-Box, only LED on PCBs with abnormality flashes).

This alarm is indicated when 9 or more indoor units are connected to the CH-Box.



- Alarm code "C2" will be indicated when the units are connected as follows.

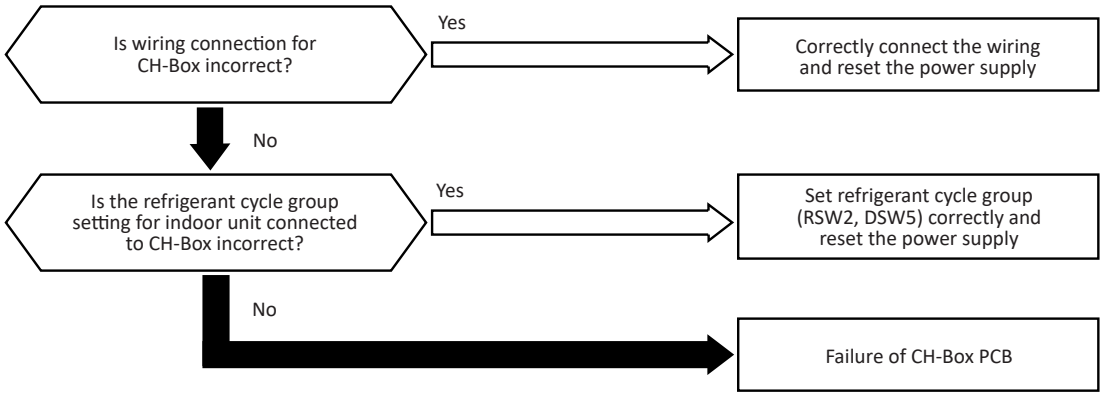
Example: Single branch type CH-Box



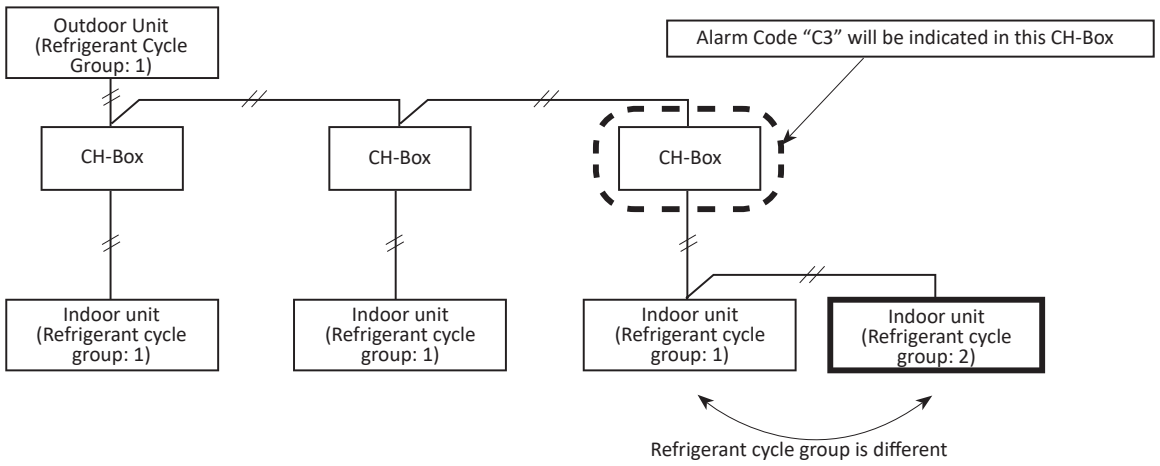
Alarm code C3 Incorrect indoor unit connection (CH-Box).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code ("35"), the unit model code and the number of connected indoor units are displayed on the wired controller which is connected to the indoor unit with abnormal CH-Box.
- LED (LED5, 6) on CH-Box PCB flashes (for multiple branch type CH-Box, only LED on PCBs with abnormality flashes).

This alarm is indicated when an indoor unit with a different refrigerant cycle group is connected to the CH-Box.



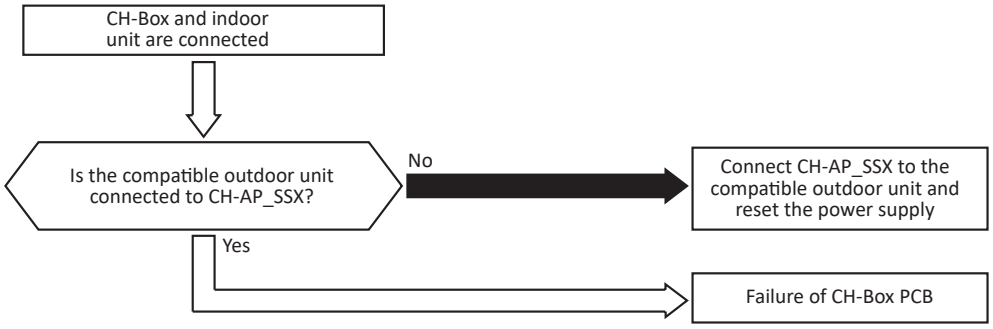
- Alarm code "C3" will be indicated when the units are connected as follows.



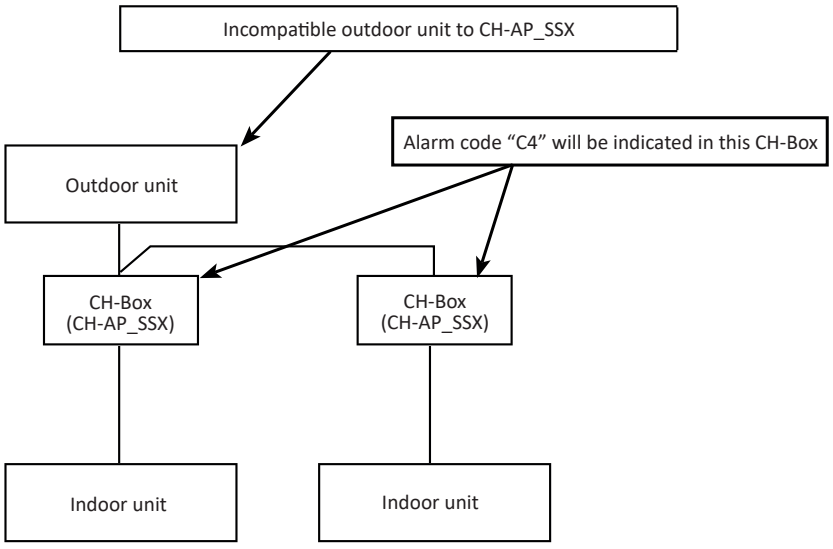
Alarm code	C4	Incorrect indoor unit connection (CH-Box).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code, the unit model code and the number of connected indoor units are displayed on the wired controller, and the alarm code is displayed on the 7-segment display of outdoor unit PCB.
- LED (LED10, 13) on CH-Box PCB flashes.

This alarm code is displayed when incompatible outdoor unit is connected to CH-AP_SSX.



- Alarm code “C4” will be indicated when the units are connected as follows.

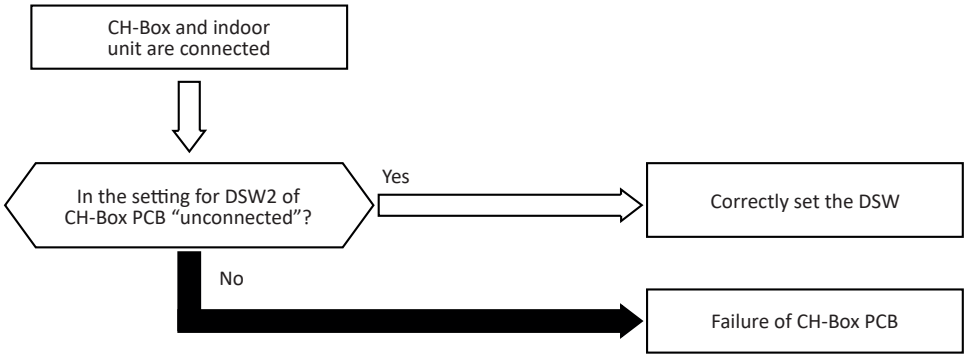


Alarm code C5 Incorrect connection port setting (CH-Box).

- The RUN indicator (Red) flashes on the wired controller.
- The indoor unit number, the alarm code ("35"), the unit model code and the number of connected indoor units are displayed on the wired controller which is connected to the indoor unit with abnormal CH-Box.
- LED (LED11, 12, 13) on CH-Box PCB flashes (for multiple branch type CH-Box, only LED on PCBs with abnormality flashes).

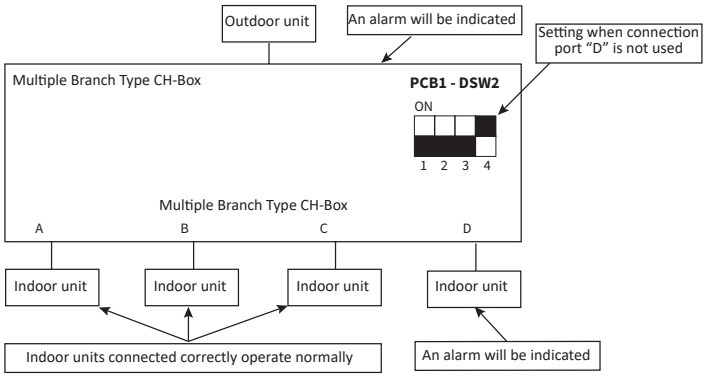
This alarm code is displayed when communication cable for indoor unit is connected to a port of multiple branch type CH-Box that is set to "unused". Setting DSW2 for CH-Box PCB is required if any ports are not in use with multiple branch type CH-Box.

03 alarm code is displayed when DSW2 is not set and indoor unit is not connected to CH-Box.



- Alarm code "C5" will be indicated when the DSW is set as follows.

Example of incorrect "D" setting:



8.4 Troubleshooting by using the 7-segment display

NOTE

Only the authorized person can carry out checks using this method.

The operating conditions and each part of the refrigerant cycle can be checked with the 7-segment display and push switches on the PCB1 in the outdoor unit.

8.4.1 Before carrying out checks

1 Turn ON the main power supply switch. Wait more than 20 seconds before starting the checks.

2 Check items:

- ✓ Connection information.
- ✓ Information of the outdoor unit.
- ✓ Information of the indoor unit.
- ✓ Information of the cause of the alarm code.
- ✓ Alarm code historical information.

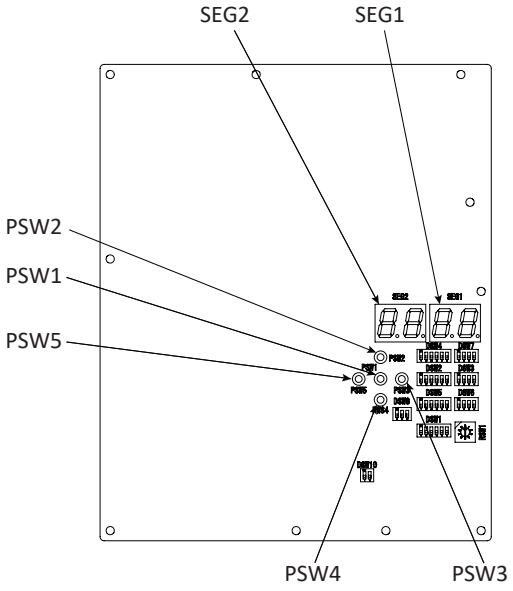
3 Check the location of the 7-segment display and the push switches.

DANGER

AC220-240V is applied to the PCB and electrical parts. Never touch the electrical parts and the cables when carrying out the checks.

8.4.2 Location of the pushswitches and the 7-segment display

The pushswitches and the 7-segment display are located on PCB1.



8.4.3 Protection control code on the 7-segment display

- A protection control code is displayed on the 7-segment display during the operation when the protection control has been activated.
- A protection control code is displayed while the function is operating, and it is cancelled when it is released.
- When several protection controls are activated, the code number with the highest priority is displayed (see below for the order of priority).

1 Higher priority will be given to the protection control related with the frequency control.

<1> Pressure ratio control
<2> High pressure increase protection
<3> Current protection
<4> Inverter fin temperature increase protection
<5> Discharge gas temperature increase protection
<6> Low pressure decrease protection
<7> Demand current control (running current limit control)
<8> Low pressure increase protection
<9> High pressure decrease protection

2 Regarding the retry control, the lastest retry code will be indicated unless the protection control related with the frequency control is indicated.

Code	Protection control	Code during the degeneration control
P01	Pressure ratio protection control	Pc1
P02	High pressure increase protection	Pc2
P03	Inverter current protection	Pc3
P04	Inverter fin temperature increase protection	Pc4
P05	Discharge gas temperature increase protection at the upper part of the compressor	Pc5
P06	Low pressure decrease protection	Without
P09	High pressure decrease protection	
P0A	Demand current protection control	
P0d	Low pressure increase protection	

Code			Retry control	Code during the degeneration control
P	1	1	Pressure ratio decrease retry	Without
P	1	2	Low pressure increase retry	
P	1	3	High pressure increase retry	
P	1	4	Constant speed compressor overcurrent retry	
P	1	5	Discharge gas temperature increase retry / Low pressure decrease retry	
P	1	6	Discharge gas super-heat decrease retry	
P	1	7	Inverter anomaly retry	
P	1	8	Abnormal Inverter voltage retry / Inverter failure retry	
P	2	6	High pressure decrease retry	

NOTE

- *The retry indication is prolonged for 30 minutes unless a protection control is indicated.*
- *The retry indication disappears if the stop signal comes from all rooms.*
- *The protection control code indicated on the 7 segment display changes to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control.*
- *In the case that the degeneration control is activated, indications Pc1 to Pc5 are displayed instead of P01 to P05.*

8.4.4 Activation condition of the protection retry control code

The protection control or the retry control is carried out to prevent abnormal operation. The activation conditions are listed in the following table.

Code	Protection control	Activation conditions	Notes
P01	Pressure ratio protection control	Compression ratio Ɛ≥8.5 or compression ratio Ɛ≤1.5	Ɛ=(Pd[MPa]+0.1)/(Ps[MPa]+0.06)
P02	High pressure increase protection	Discharge pressure Pd≥3.50 (in cooling mode) Pd≥3.30 (in heating mode)	-
P03	Inverter current protection	Inverter output current ≥ (Control value) A	-
P04	Inverter fin temperature increase protection	Inverter fin temperature ≥ (Control value) °C	-
P05	Discharge gas temperature increase protection	Temperature of the upper part of the compressor Td≥112 °C	-
P06	Low pressure decrease protection	Suction pressure Ps≤0.1 MPa	-
P09	High pressure decrease protection	Discharge pressure Pd≤1.0 MPa	-
P0A	Demand current protection control	Compressor running current ≥ Demand current setting value	Demand current setting value: the Upper limit of the total running current is set to 100 %, 80 %, 70 %, 60 % and 40 % in normal operation
P0d	Low pressure increase protection	Suction pressure Ps≥1.70 MPa	-

Code	Retry control	Activation conditions	Notes
P11	Pressure ratio decrease retry	Pressure ratio Ɛ<1.5 over 1 minute	When activating three times in thirty minutes, alarm code "43" is indicated.
P12	Low pressure increase retry	Ps>1.80 MPa over 1 minute	When activating three times in thirty minutes, alarm code "44" is indicated.
P13	High pressure increase retry	Pd≥3.8 MPa over 2 minute	When activating three times in thirty minutes, alarm code "45" is indicated.
P15	Discharge gas temperature increase retry	Discharge gas temperature ≥132 °C for more than 10 minutes, or Discharge gas temperature ≥140 °C for more than 5 seconds	When activating three times in sixty minutes, alarm code "08" is indicated.
	Low pressure decrease retry	Ps<0.09 MPa more than 12 minutes	When activating three times in sixty minutes, alarm code "47" is indicated.
P16	Discharge gas super-heating decrease retry	Discharge gas superheat ≤Tc+10 °C more than 30 minutes Tc: Saturation temperature	When activating three times in one hundred and twenty minutes, alarm code "07" is indicated.
P17	Inverter anomaly retry	Instantaneous overcurrent	When activating six times in thirty minutes, alarm code "48" is indicated.
		Abnormal current sensor	When activating three times in thirty minutes, alarm code "51" is indicated.
		IPM error, earth fault, Motor step-out	When activating seven times in thirty minutes, alarm code "53" is indicated.
		Fin temperature≥(Control value) °C	When activating three times in thirty minutes, alarm code "54" is indicated.
P18	Inverter voltage anomaly retry	Insufficient voltage in the Inverter circuit	When activating three times in thirty minutes, alarm code "06" is indicated.
		Excessive voltage in the Inverter circuit	When activating three times in thirty minutes, alarm code "06" is indicated.
	Inverter failure retry	The actual Inverter frequency is 0Hz more than 3 seconds after the Inverter frequency is outputted	When activating three times in thirty minutes, alarm code "55" is indicated.
P26	High pressure decrease retry	Pd<Ta/130+0.1 MPa more than 4 minutes, or Pd<1.0 MPa more than 60 minutes Ta: Ambient temperature	No alarm.

Ps: Compressor suction pressure; Pd: compressor discharge pressure.

8.4.5 Check method by checking mode

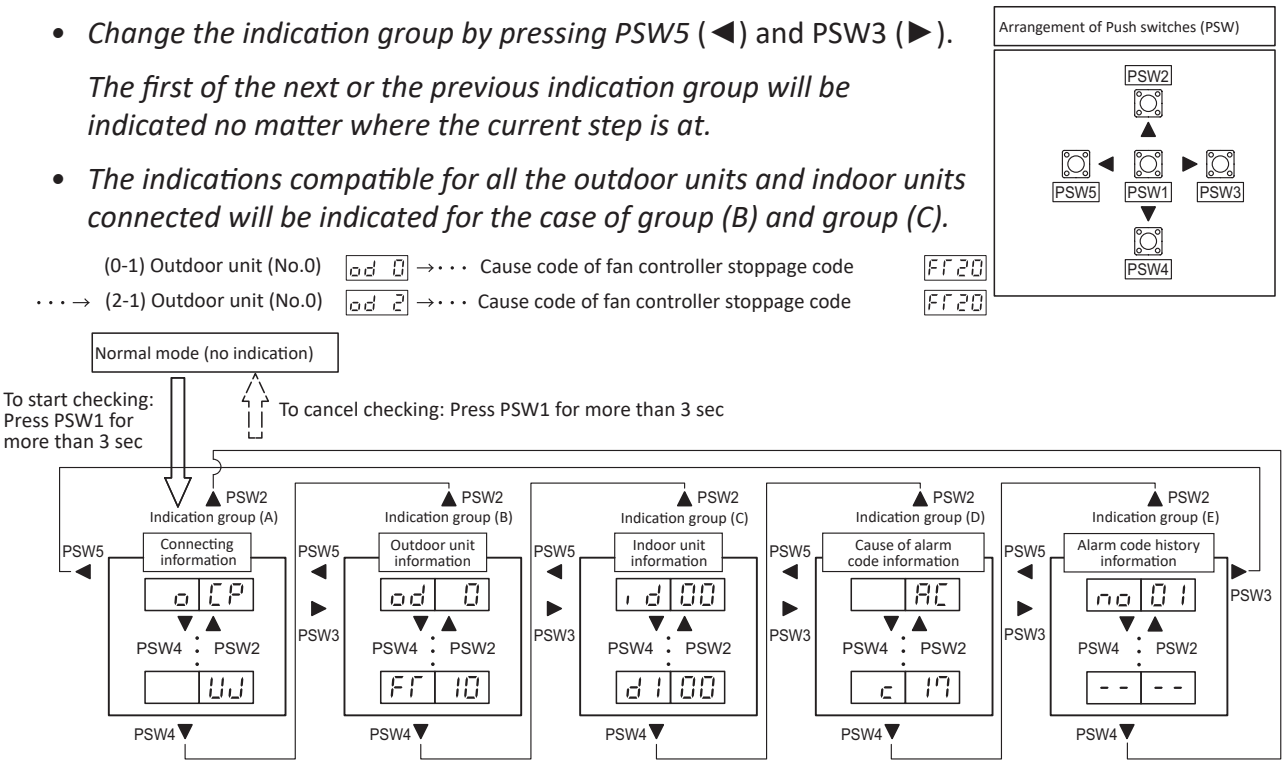
Operating conditions and each part of a system can be checked using the 7-segment display on the PCB1 in the outdoor unit.

NOTE

- *Change the indication group by pressing PSW5* (◄) and PSW3 (►).

  The first of the next or the previous indication group will be indicated no matter where the current step is at.

- *The indications compatible for all the outdoor units and indoor units connected will be indicated for the case of group (B) and group (C).*



NOTE

Ensure the check mode is cancelled after the checks have been carried out.

◆ Connection information

This information is indicated on unit A (main unit) only.

Press PSW4 (▼) to move forward or PSW2 (▲) to move back.

This information will be alternatively indicated as “Item” → “Details”.

	Item	7-segment display		Details
		SEG2	SEG1	
1	Total capacity of the connected outdoor units	o	CP	Total capacity of the combination of outdoor units. Refer to the "Capacity table for the outdoor units".
2	Number of connected outdoor units	o	AA	Number of outdoor units in the combination
3	Total capacity of the connected indoor units	'	CP	Total capacity of the connected indoor units
4	Number of connected indoor units	'	AA	Number of connected indoor units
5	Refrigerant group		CA	Refrigerant group number (0 to 64)
6	Total capacity of the operating indoor units		oP	Total capacity of the operating indoor units. Refer to the "Capacity table for the indoor units".
7	Total compressor frequency		Hz	Units: Hz
8	Accumulated operating time		UJ	Units: hour (indication x 10 hours)

◆ Information for the outdoor unit

Select the outdoor unit combination number to be displayed only for the example of Unit A (number 0).

Units B,C and D (numbers 1 to 3) show each unit number only.

When changing the selection, press PSW3 (►) to move forward or PSW5 (◄) to move back.

Select the outdoor unit combination number for indication.

Unit	Indication
Unit A (No.0)	od 0
Unit B (No.1)	od 1
Unit C (No.2)	od 2
Unit D (No.3)	od 3

Press PSW4 (▼) for detailed information of selected unit number.

Press PSW4 (▼) to move forward or PSW2 (▲) to go backward.
The information will be indicated alternately as “Item”→ “Details”.

Press PSW3 (►) or PSW5 (◄) to change the outdoor combination unit number to be indicated or to move other indication group.

Indication details:

	Item	7-segment display		Details
		SEG2	SEG1 (*1)	
1	Outdoor unit number	od	0	Outdoor unit number indication
2	Capacity of the outdoor unit	CA	0	Unit capacity indication. Refer to the "Capacity table for the outdoor units".
3	Output status of the outdoor unit microcomputer	SC	0	Output status of the outdoor unit microcomputer. Refer to section "location of push switches and the 7-segment display".
4	Running frequency of the Inverter compressor MC1	H1	0	Running frequency of number 1 compressor indication (Hz)
5	Running frequency of the Inverter compressor MC2 (*2)	H2	0	Running frequency of number 2 compressor indication (Hz)
6	Total number of compressors running	CC	0	Indication of the total number of compressors running
7	Outdoor fan step	Fo	0	Outdoor fan step indication (0 to 27 steps)
8	Opening of the expansion valve MV1 of outdoor unit	E1	0	Opening indication of the expansion valve MV1 for outdoor unit (Unit: %)
9	Opening of the expansion valve MV2 of outdoor unit (*3)	E2	0	Opening indication of the expansion valve MV2 for outdoor unit (Unit: %)

	Item	7-segment display SEG2	7-segment display SEG1 (*1)	Details
10	Opening of the expansion valve MVB of the outdoor unit for bypass	Eb	0	Opening indication of the expansion valve MVB for the bypass indication (Unit: %)
11	Discharge pressure (High)	Pd	0	Thermistor open circuit indication: 5.62 MPa Thermistor short-circuit indication: -0.62 MPa
12	Suction pressure (Low)	PS	0	Thermistor open circuit indication: 2.25 MPa Thermistor short-circuit indication: -0.25 MPa
13	Ambient air temperature (Ta)	Ta	0	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
14	Discharge gas temperature at the upper part of the compressor MC1 (TD1)	Td	10	Thermistor open circuit indication: 0 °C Thermistor short-circuit indication: 255 °C
15	Discharge gas temperature at the upper part of the compressor MC2 (Td2) (*2)	Td	20	Thermistor open circuit indication: 0°C Thermistor short-circuit indication: 255°C
16	Outdoor heat exchanger liquid temperature (Te1)	tE	10	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
17	Outdoor heat exchanger liquid temperature (Te2) (*4)	tE	20	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
18	Gas temperature in the outdoor unit heat exchanger (Tg)	tG	0	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
19	Liquid stop valve temperature (Tchg)	tC	H0	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
20	Subcooling heat exchanger temperature (Tsc)	tS	C0	Thermistor open circuit indication: - 127 °C Thermistor short-circuit indication: 127 °C
21	Inverter fin temperature 1	tF	10	Unit: °C
22	Inverter fin temperature 2 (*2)	tF	20	Unit: °C
23	Fan controller fin temperature 1	tF	10	Units °C
24	Fan controller fin temperature 2 (*4)	tF	20	Units °C
25	Compressor MC1 current (*5)	A1	0	INV1 Primary current. Unit: A
26	Compressor MC2 current (*2),(*5)	A2	0	INV2 Primary current. Unit: A
27	Fan motor MFO1 current (*5)	AF	10	Fan controller 1 secondary current Unit: A
28	Fan motor MFO2 current (*4),(*5)	AF	20	Fan controller 2 secondary current Unit: A
29	Compressor MC1 accumulated operating time	UJ	10	Unit: hour (indication x 10 hours)

	Item	7-segment display		Details
		SEG2	SEG1 (*1)	
30	Compressor MC2 accumulated operating time (*2)	UJ	20	Unit: hour (indication x 10 hours)
31	Compressor MC1 accumulated operating time (resettable)	cU	10	Unit: hour (Indication x 10 hours) The accumulated operating time can be reset. (*6)
32	Compressor MC1 accumulated operating time (resettable) (*2)	cU	20	Unit: hour (Indication x 10 hours) The accumulated operating time can be reset. (*6)
33	Cause of the Inverter stoppage 1	,F	10	Refer to the "Inverter stoppage cause table".
34	Cause of the Inverter stoppage 2 (*2)	,F	20	Refer to the "Inverter stoppage cause table".
35	Cause code of fan controller stoppage 1	FF	10	Cause of fan motor MOF1 stoppage. Refer to “Cause code of fan controller stoppage”
36	Cause code of fan controller stoppage 2 (*4)	FF	20	Cause of fan motor MOF2 stoppage. Refer to “Cause code of fan controller stoppage”

NOTE

*(*1): The outdoor unit number is indicated on the one digit of “SEG1”.*

*(*2): Indication item only for outdoor unit model: 16HP or more.*

*(*3): Indication item only for outdoor unit model: FSXNSE 20HP or more, FSXNPE 16HP or more.*

*(*4): Indication item only for outdoor unit model: FSXNSE 14HP or more, FSXNPE 8HP or more.*

*(*5): The indicated current is reference value. Use a clamp meter for the accurate current value.*

*(*6): To reset the accumulated operation time, press “PSW1+PSW3” for five seconds while the accumulated data is indicated.*

Capacity table for the outdoor units

Indication	Capacity (kW)	Horsepower (HP)
40	14.0	5.0
48	16.0	6.0
64	22.4	8.0
80	28.0	10.0
96	33.5	12.0
112	40.0	14.0
128	45.0	16.0
144	50.4	18.0
160	56.0	20.0
176	61.5	22.0
192	67.0	24.0
208	73.0	26.0
224	77.5	28.0

NOTE

In case of combination unit, the indication of outdoor unit capacity is total capacity of each unit.

Example:

In the case of 432 type:

432 type = 144 type x3

144x3=432

Indication "432" will be displayed.

◆ Indoor unit information

This information is indicated on unit A (main unit) only.

Select the indoor unit number for information indication. Press PSW4 (▼) to move forward or PSW2 (▲) to move backward. This information will be alternatively indicated as “Item” → “Details”.

Unit number	Indication
No.0	, d00
No.1	, d01
↓	↓
No.63	, d63

	Item	7-segment display		Details
		SEG2	SEG1 (*1)	
1	Alarm cause code	,d	00	Indoor unit number indication.
2	Capacity of the indoor unit	CA	00	Unit capacity indication. Refer to the "Capacity table for the indoor units".
3	Opening of the expansion valve	,E	00	Unit: %
4	Heat exchanger liquid pipe temperature	rL	00	Unit: °C
5	Heat exchanger gas pipe temperature	rG	00	Unit: °C
6	Air inlet temperature	r,	00	Unit: °C
7	Air outlet temperature	ro	00	Unit: °C
8	Unit stoppage cause code	d1	00	Indoor unit stoppage cause code indication. Refer to the "Indoor unit stoppage cause table".

NOTE

*(*1)The indoor unit number is indicated on the one digit of "SEG1".*

Capacity table for the indoor units

Indication	Capacity (kW)	Horsepower (HP)	Indication	Capacity (kW)	Horsepower (HP)
3	1.1	0.4	20	7.1	2.8
5	1.8	0.6	22	8.0	3.0
6	2.2	0.8	26	9.0	3.3
8	2.8	1.0	32	11.2	4.0
10	3.6	1.3	40	14.0	5.0
11	4.0	1.5	48	16.0	6.0
13	4.5	1.8	64	22.4	8.0
14	5.0	2.0	80	28.0	10.0
16	5.6	2.3	128	45.0	16.0
18	6.3	2.5	160	56.0	20.0

◆ Cause for alarm code information

This information is indicated in unit A (main unit) only. Press PSW4 (▼) to move forward or PSW2 (▲) to go back.

This information will be indicated alternating as “Item” → “Details”. Indication details:

	Item	7-segment display		Details
		SEG2	SEG1	
1	Alarm cause code		AC	Outdoor unit lastest stoppage alarm code indication. Refer to the "Alarm codes table".
2	Degeneracy control for pressure ratio decrease protection	c	11	0: degeneracy control is not activated. 1: degeneracy control is activated.
3	Degeneracy control for high pressure increase protection	c	13	0: degeneracy control is not activated. 1: degeneracy control is activated.
4	Degeneracy control for Inverter fin temperature increase protection	c	14	0: degeneracy control is not activated. 1: degeneracy control is activated.
5	Degeneracy control for discharge gas temperature increase protection	c	15	0: degeneracy control is not activated. 1: degeneracy control is activated.
6	Degeneracy control for TdSH decrease protection	c	16	0: degeneracy control is not activated. 1: degeneracy control is activated.
7	Degeneracy control for overcurrent protection	c	17	0: degeneracy control is not activated. 1: degeneracy control is activated.

◆ Alarm code history information

This information is indicated in unit A (main unit) only. If a story of abnormality exists, it is indicated up to a maximum of a 15 instances in chronological order.

Press PSW4 (▼) to move forward or PSW2 (▲) to go back.

Press PSW3 (►) for detailed information.

Press PSW5 (◄) to return to the unit number combination selection.

Number of data	7-segment display	
	SEG2	SEG1
Number 1 (lastest data)	no	01
↓	↓	↓
Number 15 (oldest data)	no	15

Indication details:

Item		7-segment display		Details
		SEG2	SEG1	
1	Unit accumulated operating time	07	08	Outdoor unit accumulated operating time when the stoppage is carried out Unit: hour (indication x 10 hours)
2	Cause for stoppage	AC		Alarm stoppage
		d1		Retry stoppage
		C.		Control information
3	Alarm / Stoppage cause code	01	48	Alarm and stoppage cause code. The outdoor unit number is indicated in 10 digit of SEG2. The compressor and fan controller number are indicated in one digit of SEG2. The alarm and stoppage cause code are indicated in SEG1.
4	Abnormal data indication	iF	12	The Inverter stoppage cause code is indicated when the IT code exists in SEG2.
		FF	12	The fan controller stoppage cause code is indicated when the FT code exists in SEG2.
		Sc.	01	Sub Code of inverter stoppage or fan controller stoppage is indicated on SEG1.
		--	--	With the exception of the above.

◆ Communication board information

This information is displayed on outdoor unit A (Unit No. 0) only.

Press PSW4 (▼) to move forward or PSW2 (▲) to go back.

Press PSW3 (►) to move to the next unit No.

Press PSW5 (◄) to return to the previous unit No

Indication details:

	Item	7-segment display		Details
		SEG2	SEG1	
1	Information status	rC	0*1	0 : Normal 1 : Communication error 2 : Abnormality in sub communication board
2	Information limited status	nr	0*1	0 : Allow read / write 1 : Allow read / Prohibit write 2 : Prohibit read / write

**1 "SEG1" displays the outdoor unit No.*

◆ Cause of indoor unit stoppage

Code	Cause	Code	Cause
0	Operation OFF, power OFF	17	Retry due to inverter tripping
1	Thermo-OFF	18	Retry due to voltage decrease / Increase, other retry of inverter
2	Alarm (Not always indicated)	19	Expansion valve opening difference protection
3	Freeze protection, overheating protection	21	Forced thermo-OFF for oil return
5	Instantaneous power failure at outdoor unit	22	Enforced thermo-OFF for hot start control at crankcase heater preheating
6	Instantaneous power failure at indoor unit	26	Retry due to high pressure decrease
7	Stoppage of cooling operation due to high/ low outdoor air temperature stoppage of heating operation due to high outdoor air temperature	28	Stoppage due to outlet temperature decrease in cooling
		30	Stoppage of thermo-OFF due to compressor excepting
9	Stoppage of reversing valve switching control	32	Retry due to abnormal communication of outdoor unit
10	Demand enforced stoppage	34	Stoppage of thermo-OFF by motion sensor
11	Retry due to pressure ratio decrease	36	Retry after defrosting operation
12	Retry due to low pressure increase	39	Stoppage of thermo-OFF due to power saving control
13	Retry due to high pressure increase	46	Stoppage of thermo-OFF due to FrostWash
15	Retry due to discharge gas temperature increase, retry due to low pressure decrease	47	Stoppage of thermo-OFF due to econofresh control
16	Retry due to decrease of discharge gas superheat	48	Stoppage of thermo-OFF du to smart cool/heat changeover

NOTE

Even if stoppage alarm, "02" is not always indicated.

- ✓ Thermo-ON: The outdoor unit and some indoor units are running.
- ✓ Thermo-OFF: The outdoor unit and some indoor units stay on, but don't run.

◆ Cause of inverter stoppage (check the item dF)

Code	Cause
1	Driver IC error signal detection
2	Instantaneous overcurrent
3	Inverter fin temperature increase
4	Electronic thermal protection (inverter overcurrent)
5	Inverter voltage decrease
6	Inverter voltage increase
8	Abnormal current sensor
9	Instantaneous power failure detection
11	Microcomputer reset
12	Earth fault detection
13	Open-phase detection
16	Inverter failure
17	Abnormal control
18	Forced stoppage by high pressure detection
19	Abnormality of picking up circuit for protection
21	Abnormal compressor motor (Step-out)
22	Abnormal combination of PCB
25	Abnormal instruction frequency

◆ Cause of fan controller stoppage (Check the item Fr)

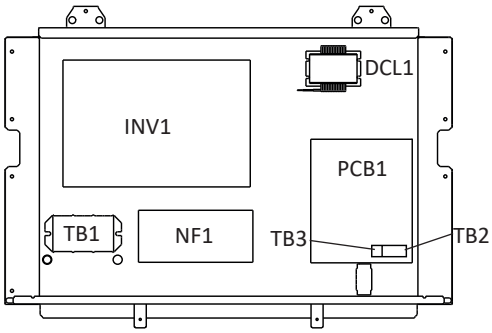
Code	Cause
1	Driver IC error signal detection
2	Instantaneous overcurrent
3	Fan controller fin temperature increase
4	Electronic thermal protection (overcurrent)
8	Abnormal current sensor
12	Ground fault detection
15	Reverse driving
16	Fan controller malfunction
21	Abnormal fan motor (step-out)
25	Abnormal instruction frequency

8.5 RSW, DSWs and LEDs functions

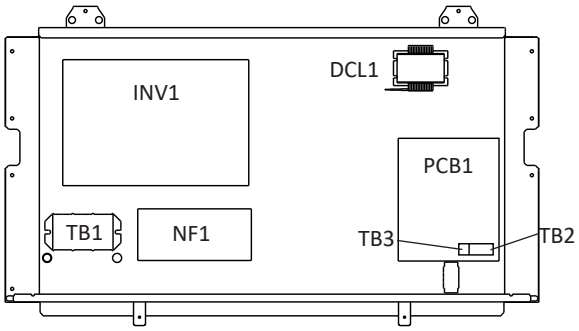
8.5.1 Outdoor unit

8.5.1.1 Location of print circuit boards (PCBs)

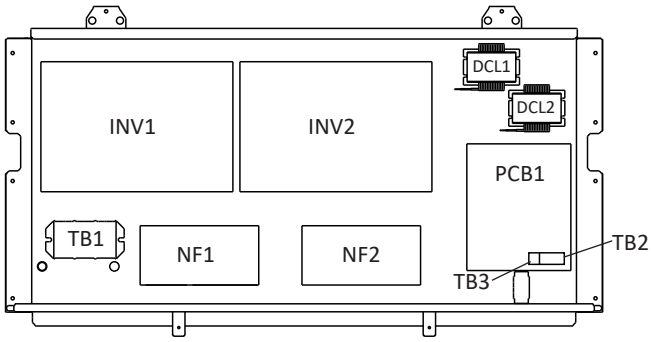
RAS-(8-12)FSXNS2E - RAS-(5/6)FSXNP2E



RAS-(14-18)FSXNS2E - RAS-(8-14)FSXNP2E



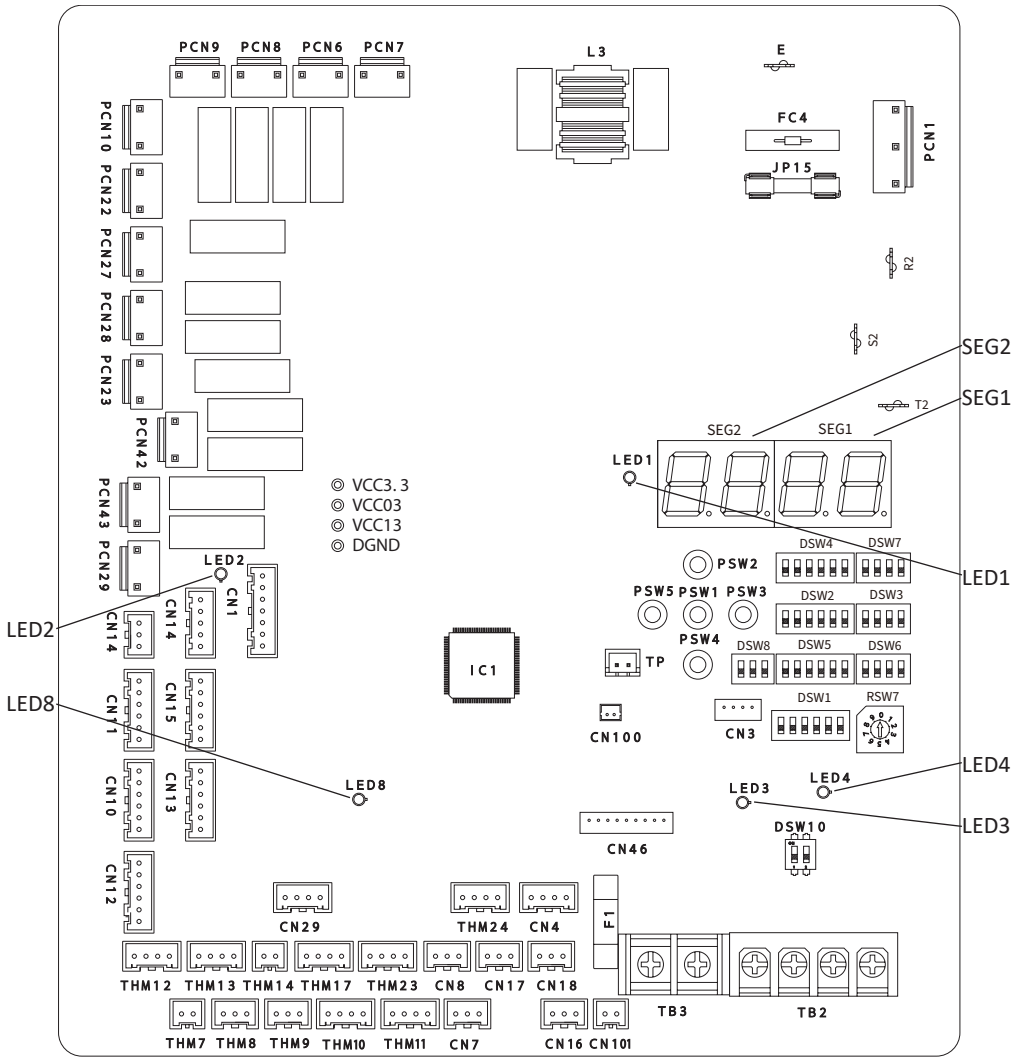
RAS-(20-24)FSXNS2E - RAS-(16-18)FSXNP2E



8.5.1.2 Purpose

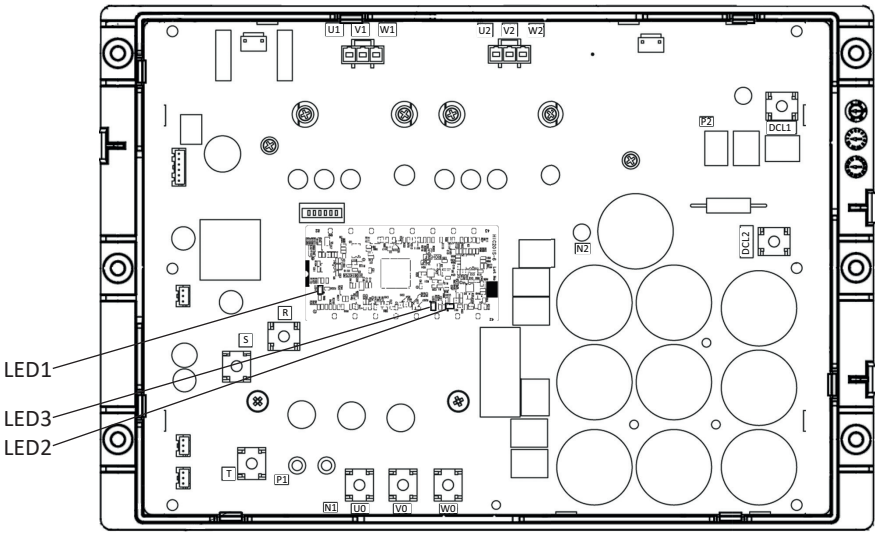
Symbol	PCB	Purpose
PCB1	Outdoor unit PCB	1. Transmission between the indoor and outdoor units. 2. Processing for sensor input. 3. Processing for dip switch input. 4. Operation control for parts 1 to 3. Compressor operating control, control of the bypass valve, fan control and overcurrent control. 5. 7-segment display indication. 6. Processing of the safety device input. 7. Processing of the relay output. 8. Detection of reverse phase for power source.
INV1, 2	Inverter PCB	1. Inverter components are driven by outdoor unit PCB to drive compressor. 2. Overcurrent control. 3. Protection control for inverter part. 4. DC fan motor speed control.

Printed circuit board for control: PCB1



Part name		Contents of functions
LEDs	LED1 (Red)	PCB1 power indication (Low voltage). Normal condition: activated. Abnormal condition: not activated.
	LED2 (Green)	LED2 indicates the transmission status between outdoor unit PCB1 and inverter PCB. Normal condition: flashing. Abnormal condition: activated or not activated.
	LED3 (Yellow)	LED3 indicates the transmission status between the indoor and outdoor units. Normal condition: flashing. Abnormal condition: activated or not activated.
	LED4 (Orange)	LED4 indicates the transmission status between outdoor units. Normal condition: flashing. Abnormal condition: activated or not activated.
	LED8 (Green)	LED8 indicates the transmission status between the outdoor units and the NFC PCB. Normal condition: flashing. Abnormal condition: activated or not activated.
SEGs	SEG1, SEG2	Indicate the following: "Alarm", "Safety protection device has been activated' or "Checking items".

Inverter printed circuit board for control: INV1,2



Part name	Contents of functions
LED2 (Orange)	Power source indicator for inverter PCB. Normal condition: activated. Abnormal condition: not activated.
LED1 (Yellow)	This indicates the state of the microcomputer Normal condition: activated. Abnormal condition: not activated.
LED2 (Green)	This indicates the state of communication between inverter PCB and fan controller. Normal condition: activated. Abnormal condition: not activated.

DSW101

No setting is required for outdoor unit installation. When setting the number 1 pin to ON, the electric current detection is cancelled. The number 1 pin should be set back to OFF after electrical work.

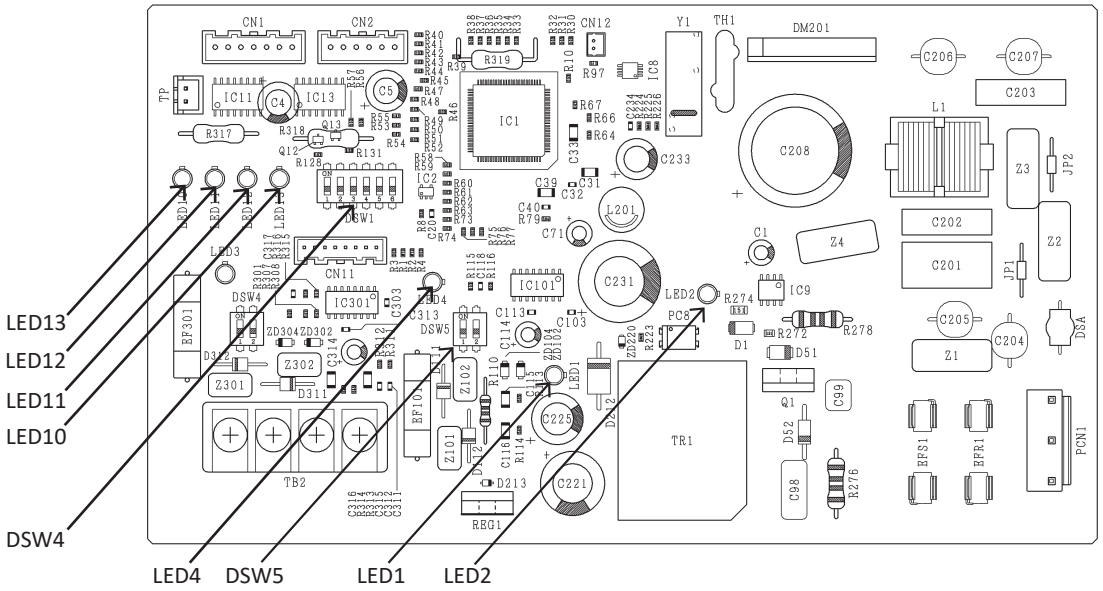
INV1	INV2
	

⚠ CAUTION

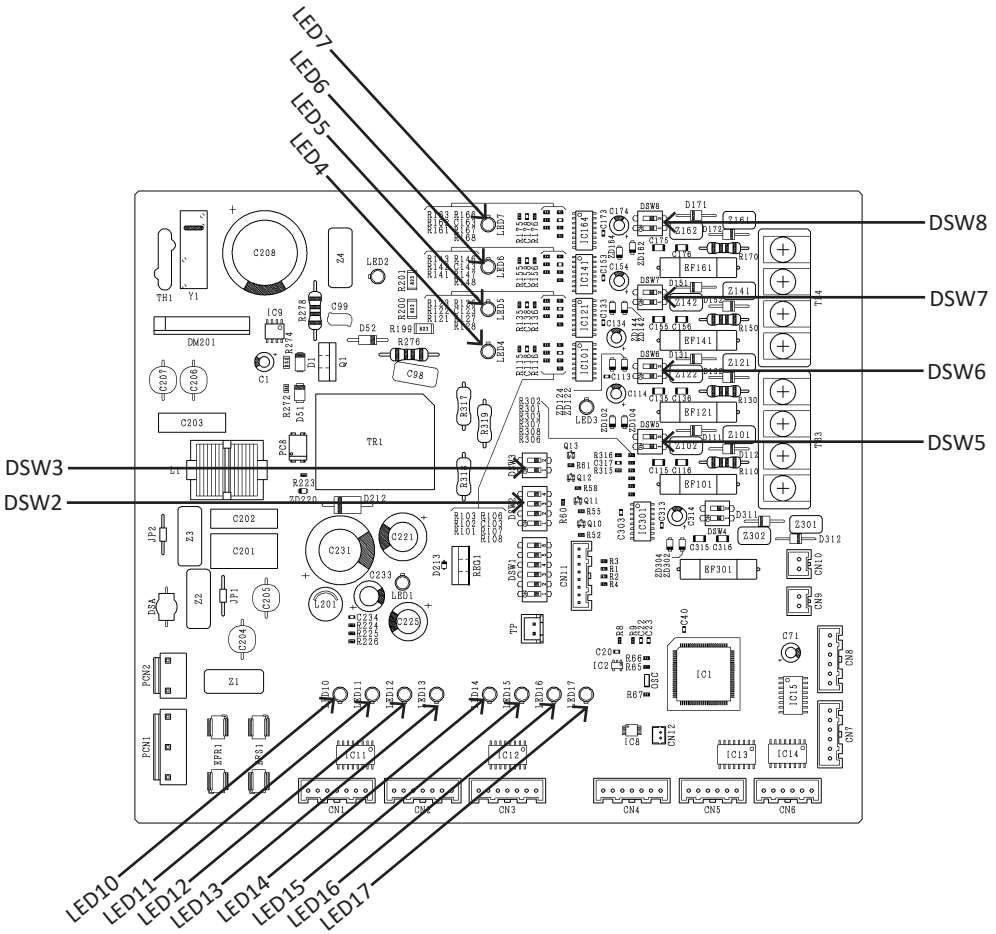
Before modifying the DSW settings, the power supply must be disconnected. Otherwise, the new setting will not be valid.

8.5.2 CH-Box

PCB1 of single branch type CH-Box



PCB1-4 of multiple branch type CH-Box



Part name			Contents of functions
LED1 (Red)	O	O	Power source indication for CH-Box PCB. (For AC Power supply)
LED2 (Red)	O	O	Power source indication for CH-Box PCB. (For DC Power supply)
LED3 (Yellow)	O	O	This indicates the state of communication between CH-Box and outdoor unit.
LED4 (Yellow)	O	O	This indicates the state of communication between CH-Box and indoor unit.
LED5-7 (Yellow)	X	O	
LED10 (Green)	O	O	Operation confirmation of expansion valve. Check the alarm codes
LED11 (Green)	O	O	
LED12 (Green)	O	O	
LED13 (Green)	O	O	
LED14 (Green)	X	O	
LED15 (Green)	X	O	
LED16 (Green)	X	O	
LED17 (Green)	X	O	

NOTE

- *X: Not available.*
- *O: Available.*

Maintenance notes

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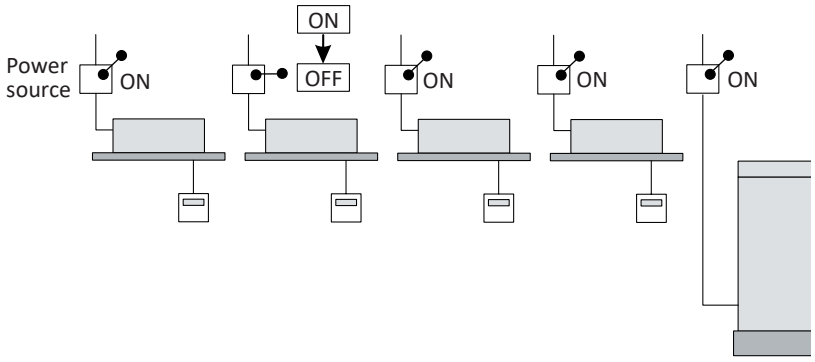
9.1 Burnt-out compressor due to an insufficient refrigerant charge

Question and answer for the field work

Example: Burnt-out compressor due to an insufficient refrigerant charge	
Phenomenon	After commissioning, the alarm code “08” sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The refrigerant piping work was performed during the summer season, the additional refrigerant was not sufficiently charged from the discharge gas side. This insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration, which was finally due to the separated operation despite the alarm code “08”.
Countermeasure	1. The compressor was replaced with a new compressor. 2. The correct refrigerant amount was charged according to the refrigerant piping length and the connected indoor units.
Remarks	Additional refrigerant charge: Open the liquid stop valves slightly when you charge the additional refrigerant from the check joint of the liquid stop valves (the discharge gas side) during the cooling process. If the liquid stop valve is fully open, it is difficult to charge the additional refrigerant. Do not charge the refrigerant from the gas stop valve.

9.2 Alarm code "31"

Question and answer for the field work

Example: Alarm code “31”	
Phenomenon	Alarm code “31” sometimes occurred and the system stopped.
Cause	The combination of the indoor units and the outdoor unit was the following.  This system was used in a tenant building. One of the tenant’s customers turned OFF the main switch for the indoor unit while other indoor units are running. This results in a different setting of the total indoor unit capacity in the same refrigerant cycle.
Countermeasure	All the main switches for the indoor units were always ON.

9.3 Not cooling well due to insufficient installation space for the outdoor unit

Question and answer for the field work

Example: Not cooling well due to insufficient installation space for outdoor unit	
Phenomenon	Cooling operation was well performed through the intermediate season. However, the cooling operation was not well available when the outdoor temperature was higher than 35 °C.
Cause	As the outdoor units were installed without a sufficient installation space, the hot discharge air from other outdoor units was circulated. In this case, though the outdoor temperature was 35 °C, the actual suction air temperature was nearly 50 °C and the protection system for excessively high suction pressure was activated, the frequency of the compressor was decreased and the cooling capacity was also decreased accordingly. As the outdoor units in-line were installed back to back with a distance of 600 mm between each outdoor unit's back, the hot discharged air from other outdoor units was circulated.
Countermeasure	To protect the unit from a short circuit, fences were mounted at the discharge air side as shown.

9.4 Maintenance work

For outdoor and indoor units

(A) Fan and fan motor.

- ✓ Lubrication. All the fan motors are lubricated and sealed in the factory. Consequently, lubrication is not necessary.
- ✓ Noise and vibrations. Check there are no strange noises or vibrations.
- ✓ Rotation. Check that fan rotates clockwise and that the speed is suitable.
- ✓ Insulation. Check the electric insulation resistance.

(B) Heat exchanger.

- ✓ Clogging. Check regularly that there is no accumulated dirt or dust. Regarding the outdoor unit, also check there are no obstacles for the air circulation such as pieces of paper, twigs, grass, etc. If necessary, remove them.

(C) Pipe connection.

- ✓ Leakage. Check there is no leakage in the connections of the refrigerant pipes.

(D) Cabinet.

- ✓ Stains and lubricant. Check there are no stains or lubricant.
- ✓ Tightening of screws. Check all screws are correctly tightened. If not, tighten them to the prescribed torque.
- ✓ Insulation. Check for imperfections in the thermal insulation of the unit cabinet and repair if necessary.

(E) Electrical equipment.

- ✓ Activation. Check the normal operation of the magnetic contactor, auxiliary relay, PCB, etc.
- ✓ State of the power supply line. Check the power supply, the current consumption (amperage) and the phase balance in particular. Check that there are no contact faults caused by loose terminals, rusty contacts, foreign objects or other causes. Check the electric insulation resistance.

(F) Control and protection devices.

- ✓ Setting. Do not readjust the setting in the field, except those indicated in section *"Only for outdoor units"*.

Only for outdoor units

(A) Compressor.

- ✓ Noise and vibrations. Check there are no strange noises or vibrations.
- ✓ Activation. Check that the voltage drop of the power supply line is within 16 % at start-up and within 2 % during operation.

(B) Reversing valve.

- ✓ Activation. Check there is no abnormal activation noise.

(C) Filter/strainers.

- ✓ Clogging. Check there are no differences in temperature between the two ends.

(D) Earthing connection wire.

- ✓ Earth line. Check the continuity to earth.

(E) Compressor crankcase heater.

- ✓ Activation. The crankcase heater should be activated at least 12 hours before start-up, by switching ON the main power source.

Only for indoor units

(A) Air filter.

- ✓ Cleanliness. Check regularly that there is no accumulated dirt or dust.

(B) Drain pan, drain-up mechanism and drain pipe.

- ✓ Drain line. Check and clean the drainage system at least twice a year.
- ✓ Drain-up mechanism. Check the activation of the drain-up mechanism.

(C) Float switch.

- ✓ Activation. Check the activation of the float switch.

9.5 Service and maintenance table through the 7-segment display

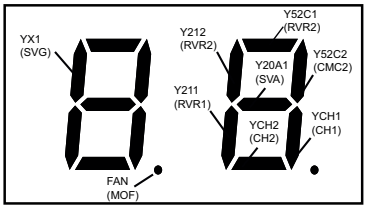
9.5.1 Information of connected outdoor/indoor capacity

Customer's name: _____		Date: _____	
Outdoor unit model (Serial number: _____)		RAS- (Serial number: _____)	RAS- (Serial number: _____)
1. Operation mode			
2. Start time of test run			
Total connection capacity of the outdoor unit	oCP		
Quantity of outdoor units connected	oAA		
Total connection capacity of the indoor unit	iCP		
Quantity of indoor units connected	iAA		
Refrigeration system address	GA		
Operation capacity of the indoor units	oP		
Total frequency	Ht		
Accumulated operation time of the unit	UJ		

9.5.2 Information of outdoor unit

Customer's name: _____			Date: _____
Outdoor unit model (Serial number: _____)		RAS- (Serial number: _____)	RAS- (Serial number: _____)
1. Operation mode			
2. Start time of test run			
3. Start time of data collection			
4. Read the data on the 7-segment display in the outdoor unit			
5. Protection control code			

SEG1



SC	CMC1	CMC2	MOF	CMC1	CMC2	MOF
	CH1	CH2		CH1	CH2	
	RVR2	RVR1		RVR2	RVR1	
	SVA	SVG		SVA	SVG	

Inverter frequency	Compressor 1	H1		
	Compressor 2	H2		
Quantity of compressor		CC		
Outdoor fan step		Fo		
Outdoor expansion valve ppening	Expansion valve 1	E1		
	Expansion valve 2	E2		
Outdoor bypass expansion valve opening		Eb		
Discharge pressure		Pd		
Suction pressure		Ps		
Outdoor temperature		To		
Discharge temperature (top of compressor)	Compressor 1	Td1		
	Compressor 2	Td2		
Evaporating temperature (top of compressor)	Liquid pipe 1	TE1		
	Liquid pipe 2	TE2		
Outdoor gas pipe temperature		TG		
Liquid stop valve temperature		TCH		
Sub-cooling temperature		TSC		
Inverter fin temperature	Inverter 1	TF1		
	Inverter 2	TF2		
Primary current of compressor	Compressor 1	A1		
	Compressor 2	A2		
Secondary current of DC fan	DC Fan 1	AF1		
	DC Fan 2	AF2		
Accumulated operating time of compressor	Compressor 1	UJ1		
	Compressor 2	UJ2		

Customer's name: _____			Date: _____	
Outdoor unit model (Serial number: _____)			RAS- (Serial number: _____)	RAS- (Serial number: _____)
Accumulated operating time of compressor (after reset)	Compressor 1	cU1		
	Compressor 2	cU2		
Cause code of inverter stoppage	Compressor 1	iT1		
	Compressor 2	iT2		
	DC fan 1	FT1		
	DC fan 2	FT2		

9.5.3 Information of Indoor unit

Indoor unit model		RAS- (Serial number: _____)	RAS- (Serial number: _____)
1. Test run start time			
2. Data collect start time			
Indoor unit capacity	CA		
Indoor expansion valve opening	iE		
Liquid pipe temperature of indoor unit	TL		
Gas pipe temperature of indoor unit	TG		
Indoor unit inlet air temperature	Ti		
Indoor unit outlet air temperature	To		
Cause code of indoor unit stoppage	d1		

9.5.4 Information of cause code of alarm

1. Test run start time					
2. Data collect start time					
Alarm cause code	AC				
Degeneracy control for pressure ratio decrease protection	c11				
Degeneracy control for high pressure increase protection	c13				
Degeneracy control for inverter fin temperature increase protection	c14				
Degeneracy control for discharge gas temperature increase protection	c15				
Degeneracy control for TdSH decrease protection	c16				
Degeneracy control for overcurrent protection	c17				

9.5.5 Information of cause code of alarm record

	№1	№2	№3	№4
1. Test run start time				
2. Data collect start time				
3. Alarm code/ cause code of stoppage				
4. Abnormal data indication				

9.6 Service and maintenance table through the remote control switch

Data sheet for the checks using the remote control switch:

Time			:	:	:	:	:
IU model							
IU serial number							
IU number / Alarm code							
	Check mode 1	Check mode 2	1 · 2	1 · 2	1 · 2	1 · 2	1 · 2
B TEMPERATURE INDICATION							
Temperature setting	b1	--					
Inlet air temperature	b2	q1					
Discharge air temperature	b3	q2					
Liquid pipe temperature	b4	q3					
Remote thermistor temperature	b5	--					
Outlet air temperature	b6	q4					
Gas pipe temperature	b7	q5					
Evaporating temperature in heating mode	b8	q6					
Control information	b9	q7					
Temperature of the upper part of the compressor	bA	q8					
Thermo temperature of remote control switch	bb	--					
Not prepared	bC	--					
C INDICATION OF THE MICROCOMPUTER STATE							
IU microcomputer	C1	--					
OU microcomputer	C2	--					
D STOPPAGE CAUSE STATE INDICATION							
Cause code of indoor unit stoppage	d1	--					
E ALARM FAULT							
Times of abnormality	E1	--					
Times of power failure	E2	--					
Times of abnormal communication	E3						
Times of inverter tripping	E4	--					
F AUTOMATIC LOUVER STATE							
Louver sensor state	F1	--					

H PRESSURE AND FREQUENCY STATE INDICATION			
Discharge pressure	H1	q9	
Suction pressure	H2	qA	
Control information	H3	qb	
Operating frequency	H4	qC	
J INDICATION OF THE IU CAPACITY			
IU capacity (x 1/8 HP)	J1	--	
OU code	J2	--	
Refrigerant cycle number	J3	--	
Refrigerant cycle number	J4	--	
L EXPANSION VALVE OPENING			
IU expansion valve	L1	9d	
OU expansion valve 1	L2	9E	
OU expansion valve 2	L3	--	
OU expansion valve B	L4	--	
P COMPRESSOR CONDITION INDICATION (REFERENCE)			
Compressor current	P1	qF	
Accumulated operation time of compressor	P2	--	

Customer:_____	Result
Installation date:_____	
System number:_____	
Inspection date:_____	
Inspection technician:_____	

9.7 Service and maintenance table

No.	Check item	Action	Judgement	
1	Is the service space sufficient?		Yes	No
2	Is there a short circuit in the discharge air?		Yes	No
3	Any heat influence?		Yes	No
4	Is the earth wire connected?		Yes	No
5	Refrigerant pipe		Correct	Incorrect
6	Fixing of units		Correct	Incorrect
7	Are the internal and external surfaces damaged?		Yes	No
8	Are the screws and bolts tightened?	Tighten if loose.	Tightened	Not tightened
9	Are the terminal screws tightened?	Tighten the screws on the terminals with a Philips screwdriver.	Tightened	Not tightened
10	Are the compressor terminals tightened?	Push all the terminals.	Push	Not push
11	Insulation resistance	Measure the insulation resistance with a multimeter. Fan and compressor: Motor: greater than 100MΩ. Others: greater than 1MΩ.	Correct	Incorrect
12	Are there drainage problems in the water flow?	Check the smoth flow with a little water.	Correct	Incorrect
13	Is there leakage in the compressor?	Check there is no leakage.	Correct	Incorrect
14	Is there leakage in the outdoor heat exchanger?	Check there is no leakage.	Correct	Incorrect
15	Is there leakage in the indoor heat exchanger?	Check there is no leakage.	Correct	Incorrect
16	Is there leakage in the 4-way valves?	Check there is no leakage.	Correct	Incorrect
17	Is there leakage in the check valve?	Check there is no leakage.	Correct	Incorrect
18	Is there leakage in the accumulator?	Check there is no leakage.	Correct	Incorrect
19	Is there leakage in the strainer?	Check there is no leakage.	Correct	Incorrect
20	Is there leakage in the expansion valve?	Check there is no leakage.	Correct	Incorrect
21	Is there leakage in the piping?	Check there is no leakage.	Correct	Incorrect
22	Check the direction of the fans	See the air flow volume.	Correct	Incorrect
23	Check the voltage of each phase	Greater than 220V.	Correct	Incorrect
24	Vibrations and noise	Check the compressor, the piping, the fan, etc.	Correct	Incorrect
25	Activation of the operation modes	Activate the COOL switch, the HEAT switch, the STOP switch and the TEMP switch.	Correct	Incorrect
26	Cut-out of the high pressure switch	Check the current activation valve.	Correct	Incorrect
27	Activate the drain-up mechanism	Check it is activated during cooling mode.	Correct	Incorrect
28	Indoor inlet air temperature DB/WB	—	_____(°C) DB / (°C) WB	

No.	Check item	Action	Judgement
29	Indoor outlet air temperature DB/WB	—	_____ (°C) DB / (°C) WB
30	Outdoor inlet air temperature DB/WB	—	_____ (°C) DB / (°C) WB
31	Outdoor outlet air temperature DB/WB	—	_____ (°C) DB / (°C) WB
32	High pressure switch	—	_____ MPa (G)
33	Low pressure switch	—	_____ MPa (G)
34	Operating voltage	—	_____ V
35	Operating current	—	_____ A
36	Instructions for the customer for cleaning the filters	—	Done Not yet
37	Instructions for the customer for the cleaning procedure	—	Done Not yet
38	Instructions for the customer for operation	—	Done Not yet

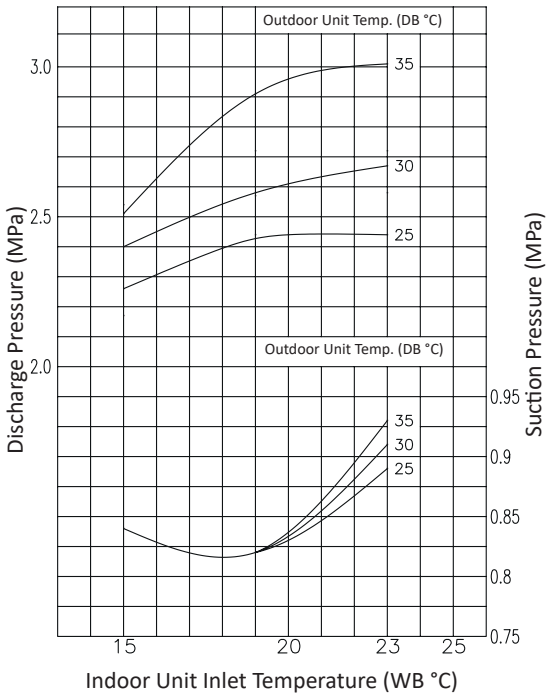
9.8 Reference of normal operating pressure

9.8.1 Standard type

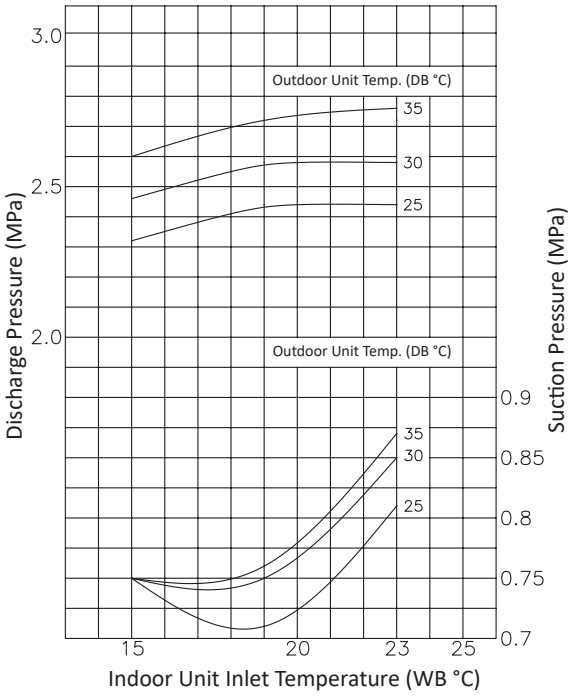
◆ RAS-8FSXNS2E

Cooling operation

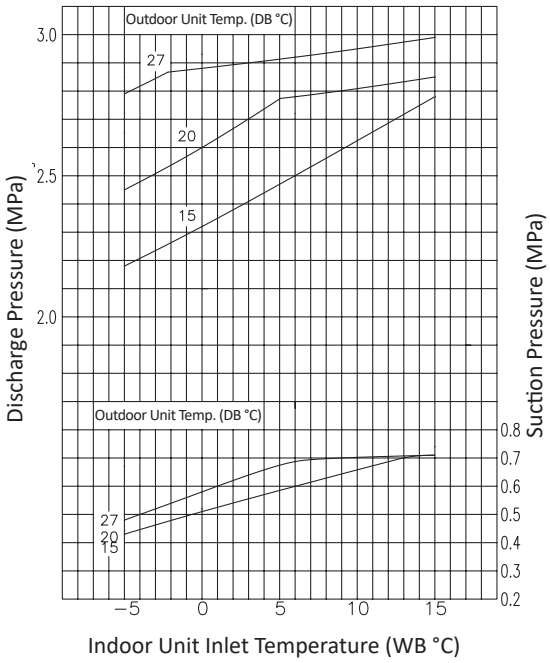
Piping length: 7.5m

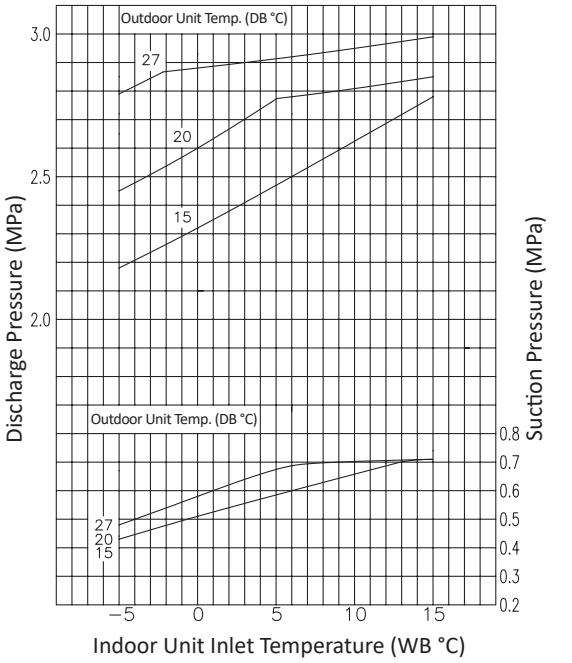


Piping length: 50m



Heating operation

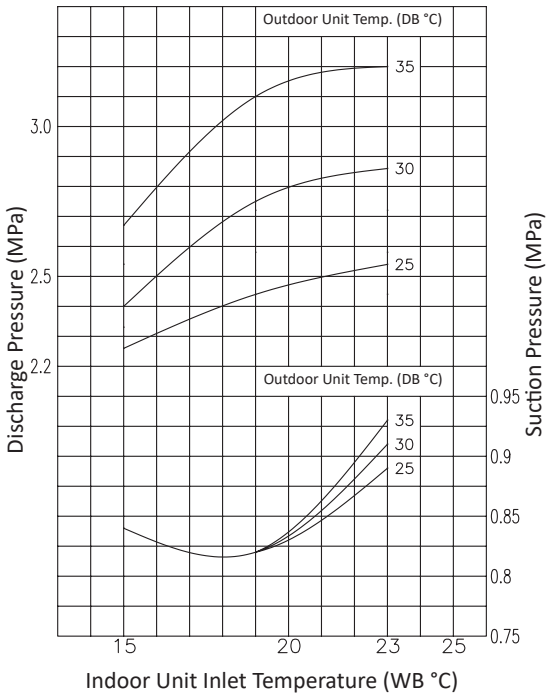




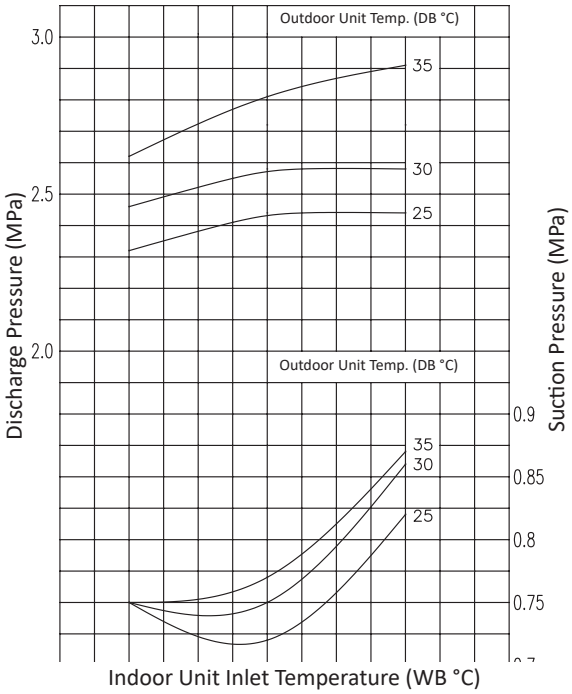
◆ RAS-10FSXNS2E

Cooling operation

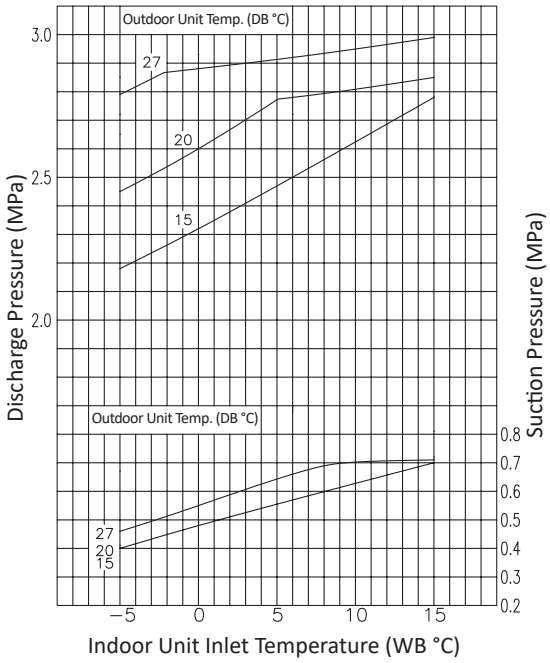
Piping length: 7.5m

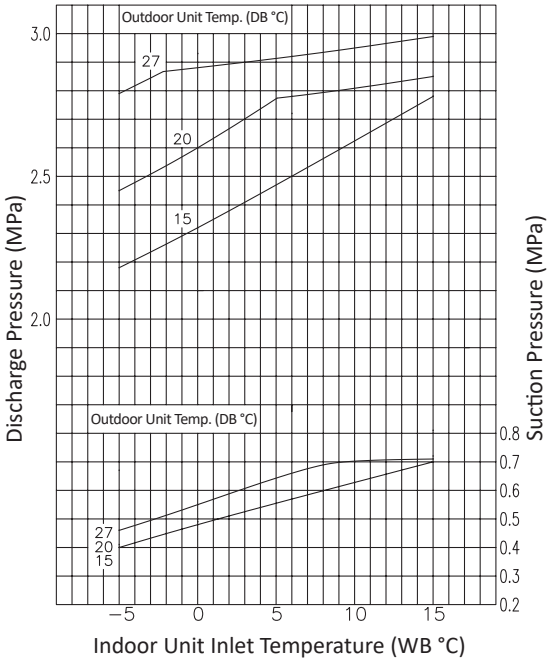


Piping length: 50m



Heating operation

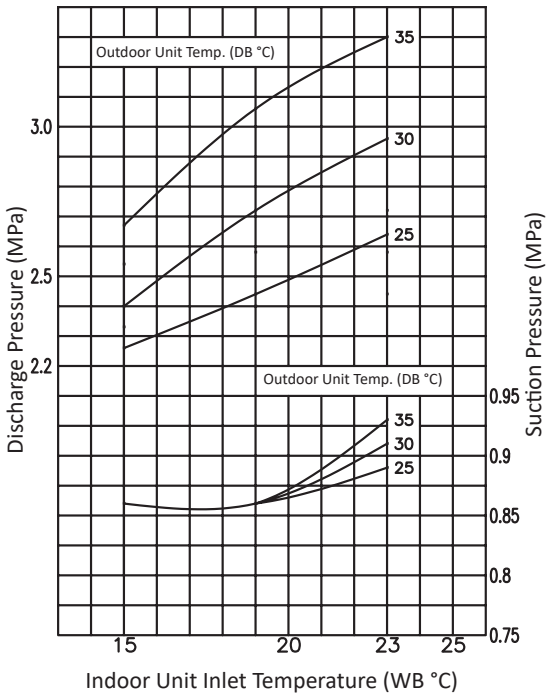




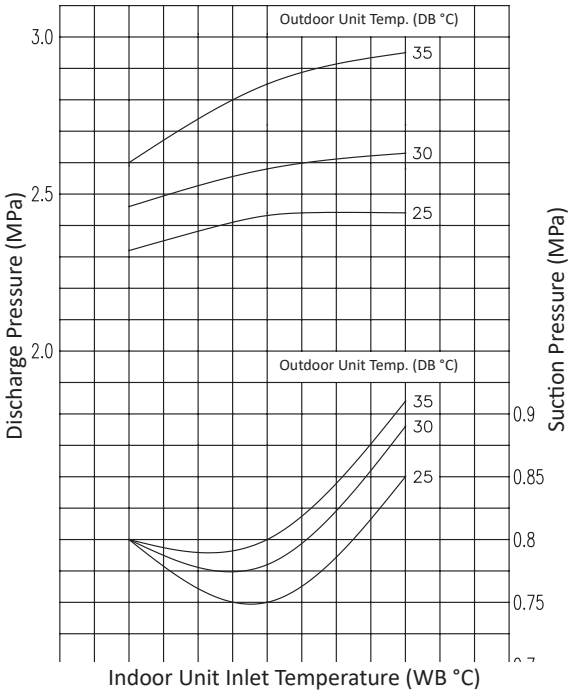
RAS-12FSXNS2E

Cooling operation

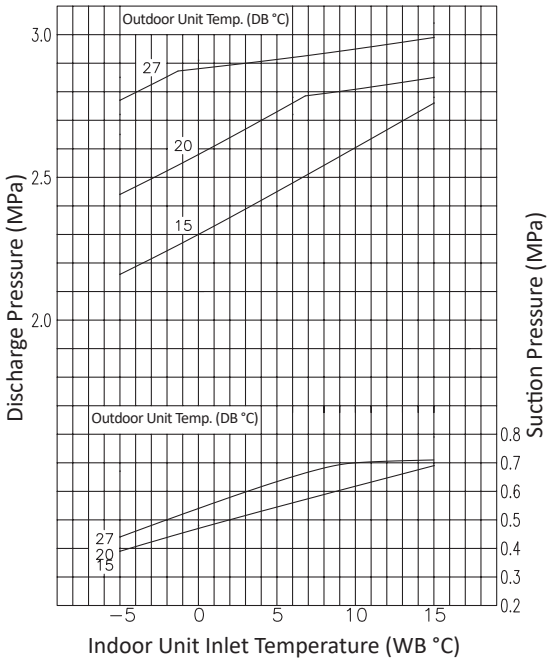
Piping length: 7.5m

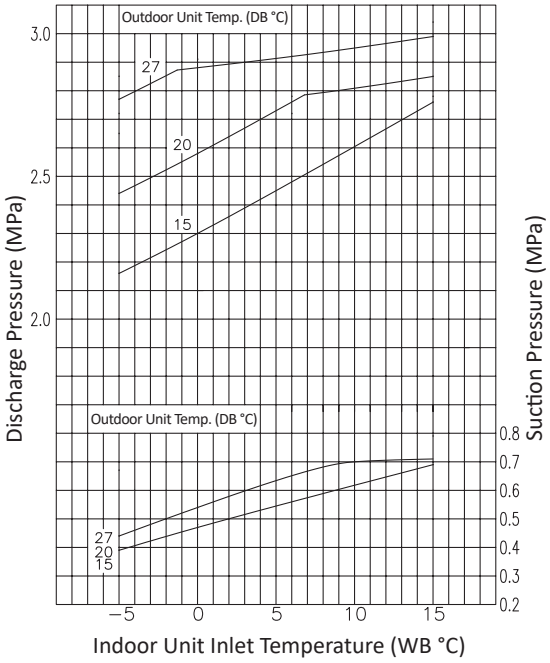


Piping length: 50m



Heating operation

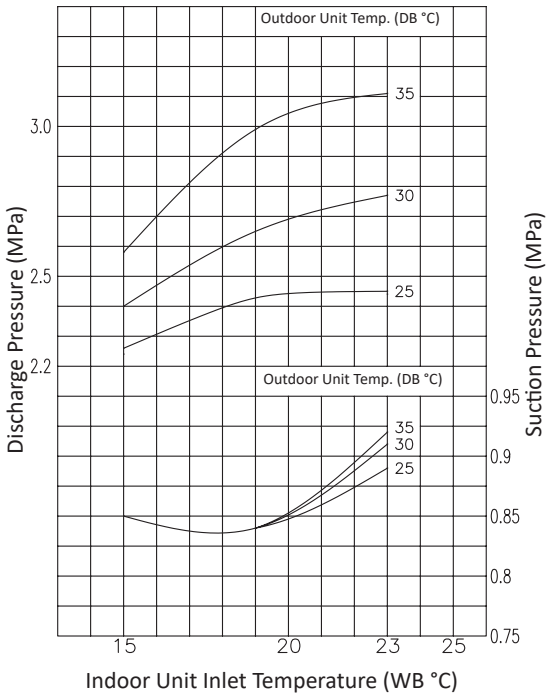




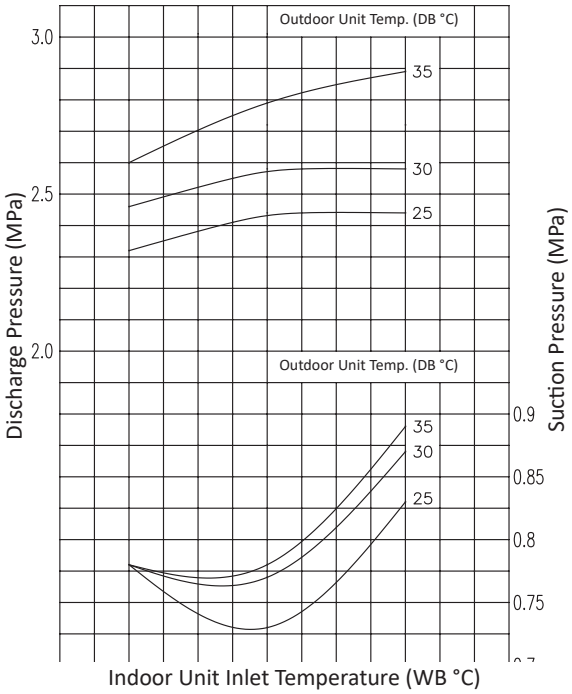
RAS-14FSXNS2E

Cooling operation

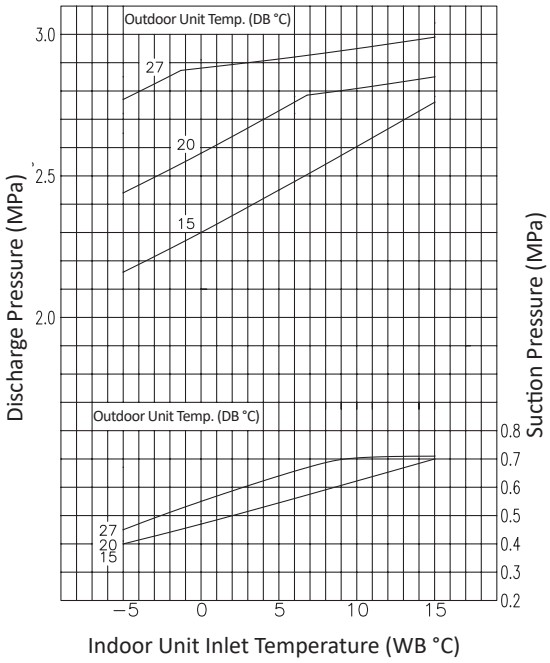
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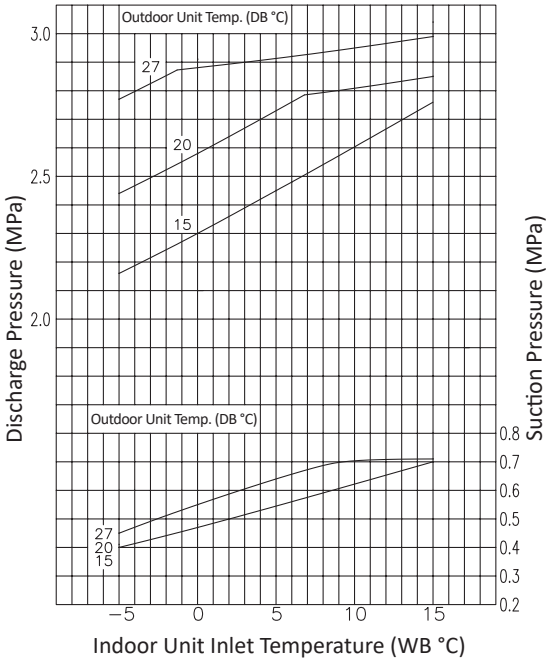


Piping length: 50m



Heating operation

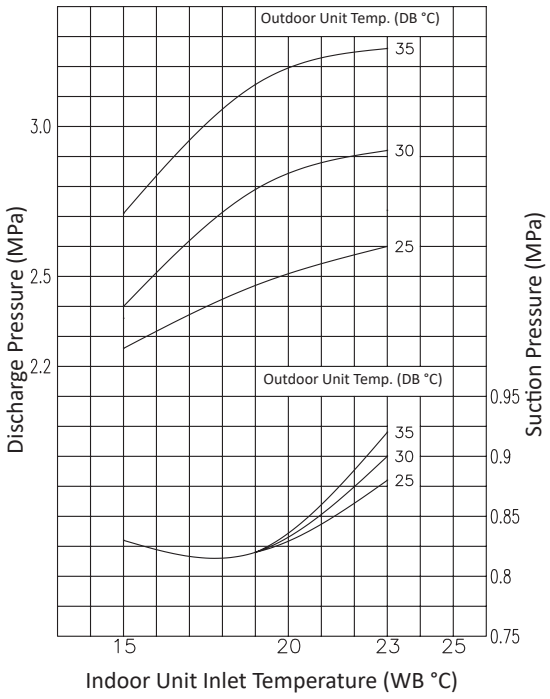




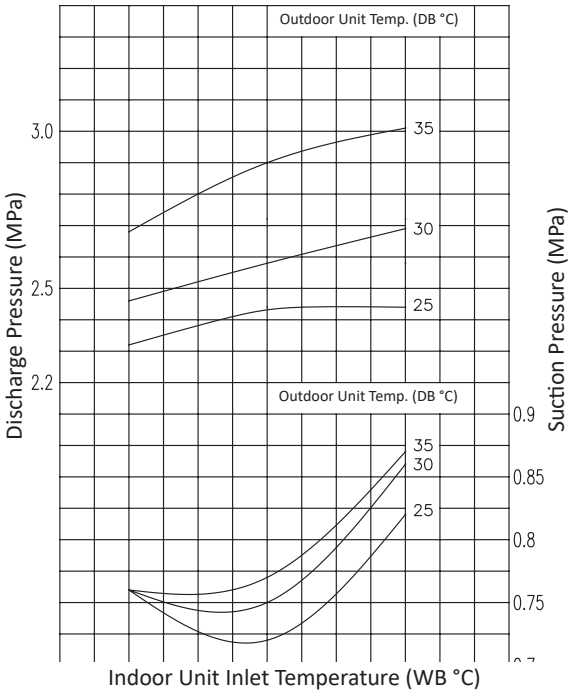
RAS-16FSXNS2E

Cooling operation

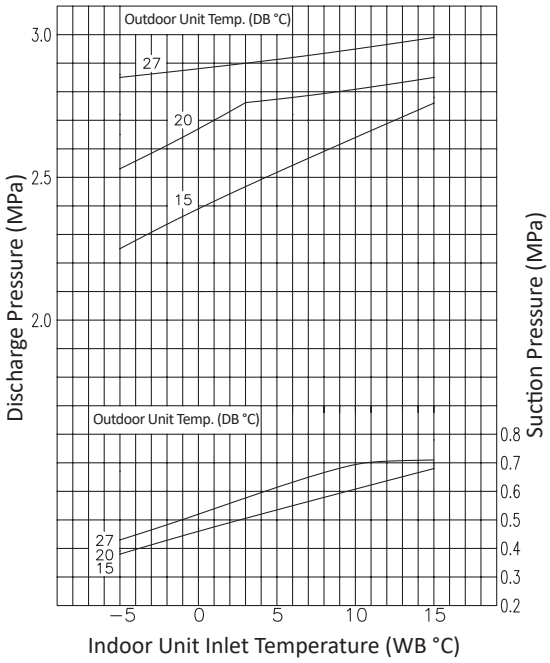
Piping length: 7.5m

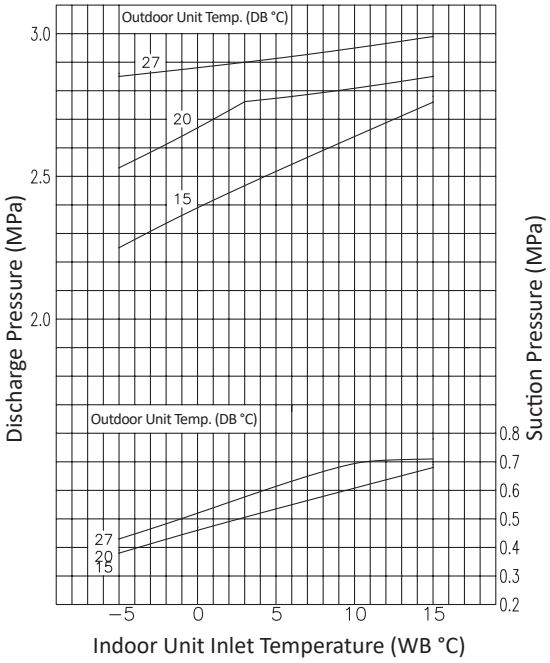


Piping length: 50m



Heating operation

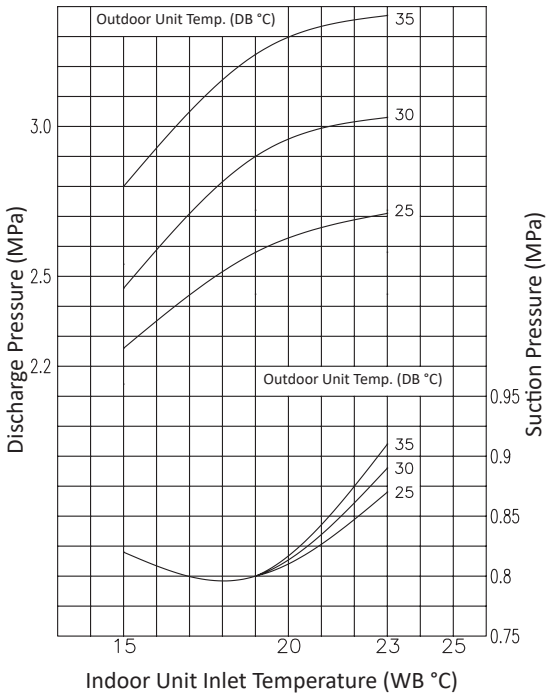




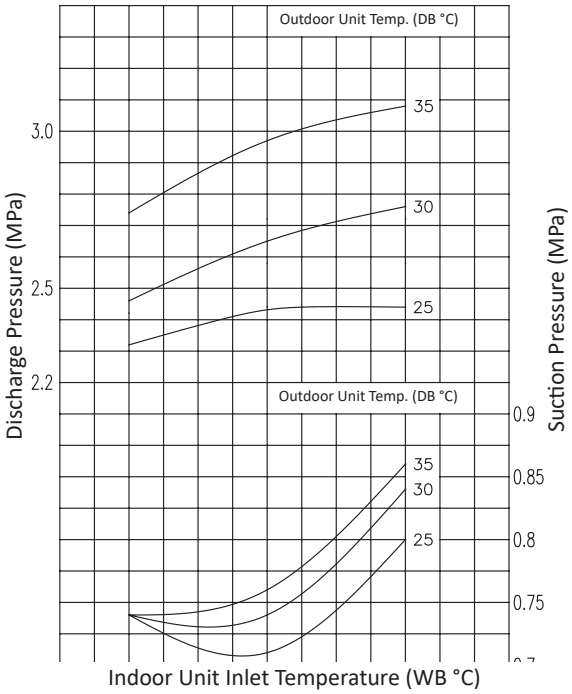
RAS-18FSXNS2E

Cooling operation

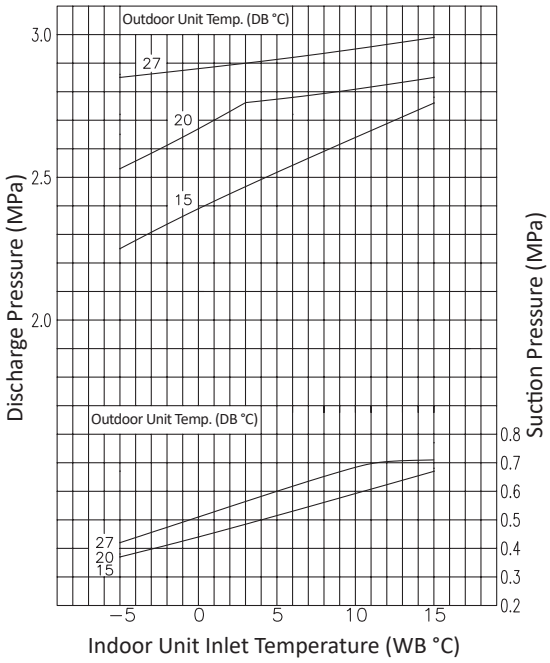
Piping length: 7.5m

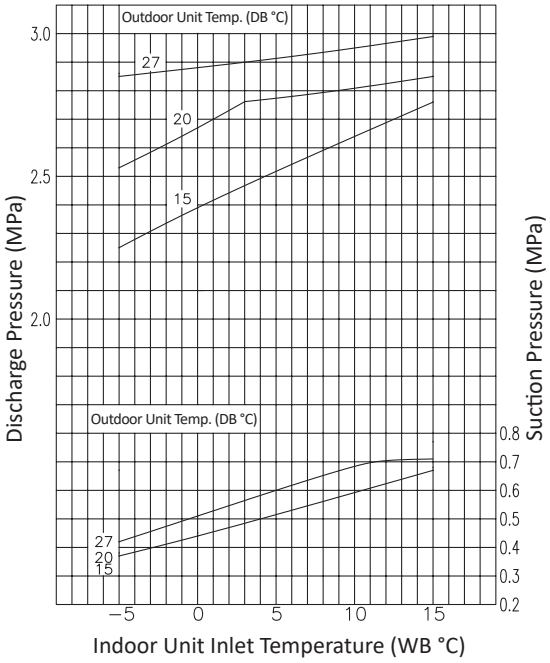


Piping length: 50m



Heating operation

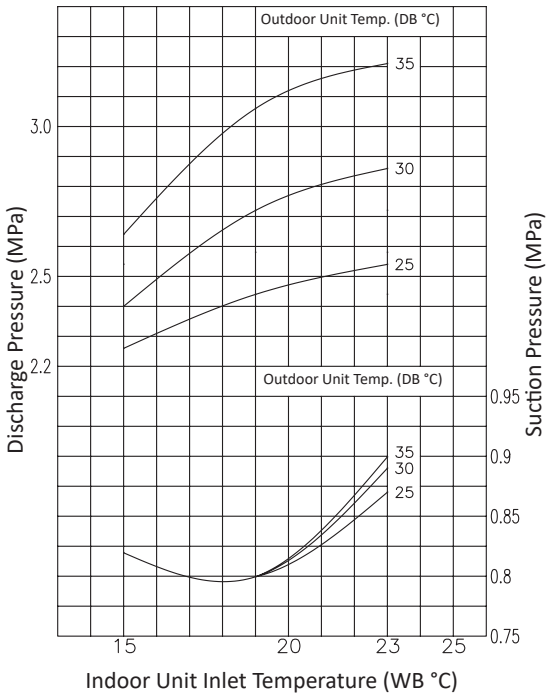




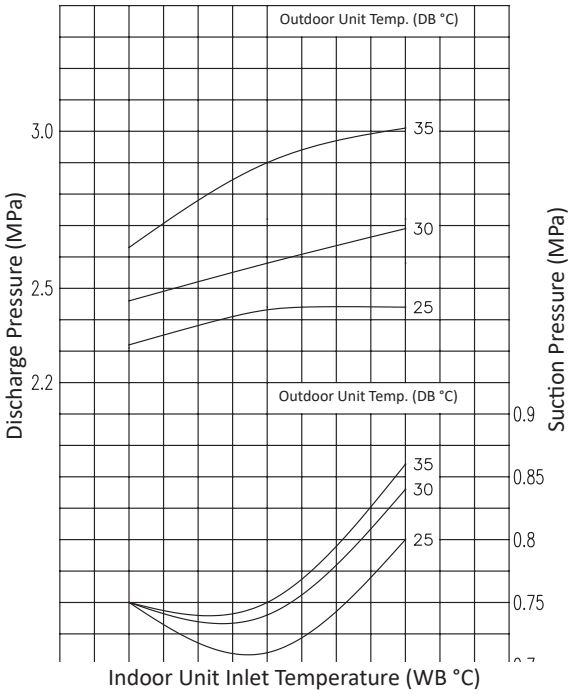
RAS-20FSXNS2E

Cooling operation

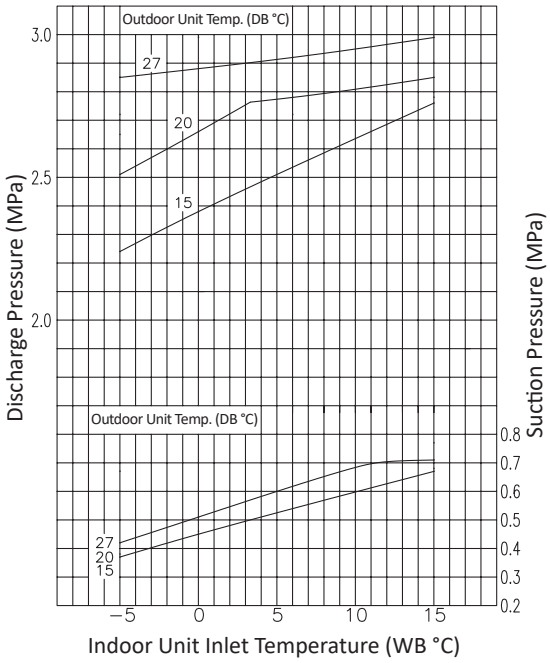
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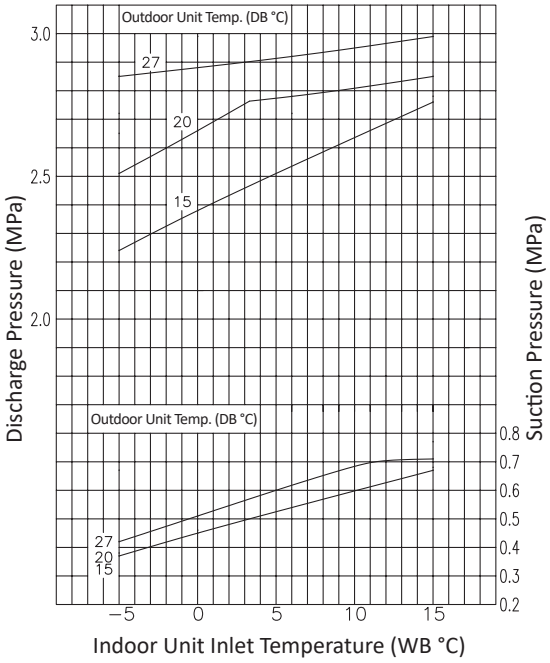


Piping length: 50m



Heating operation

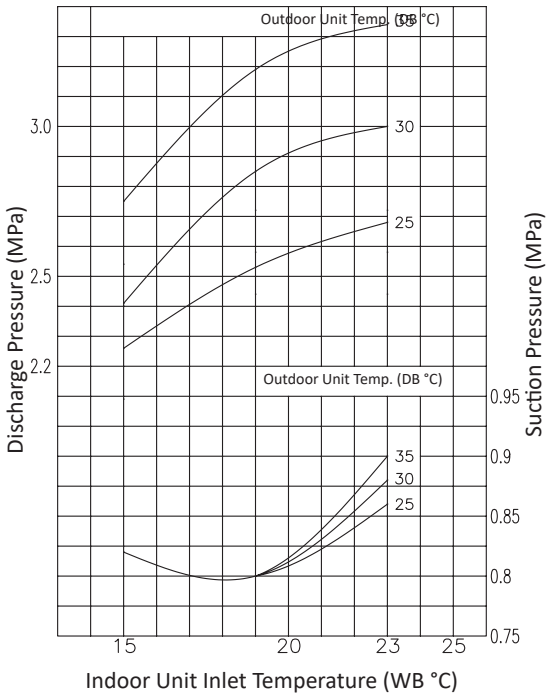




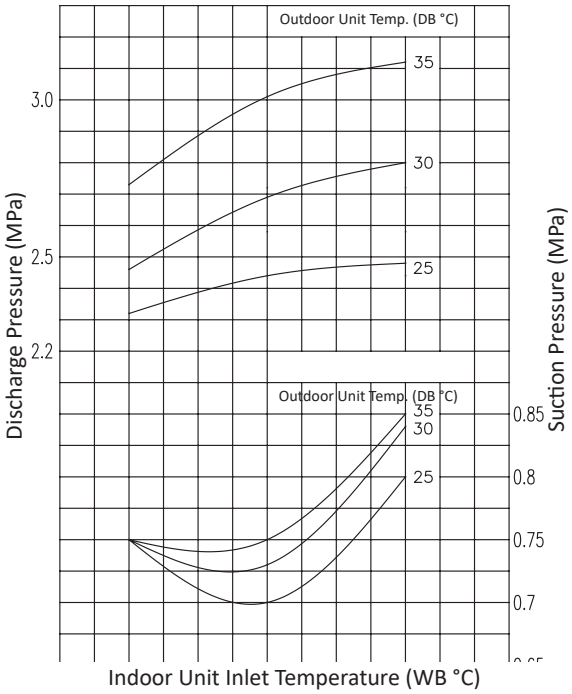
RAS-22FSXNS2E

Cooling operation

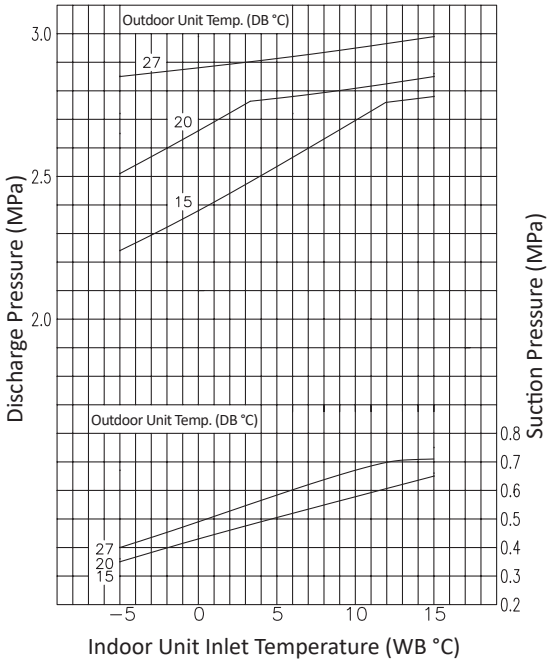
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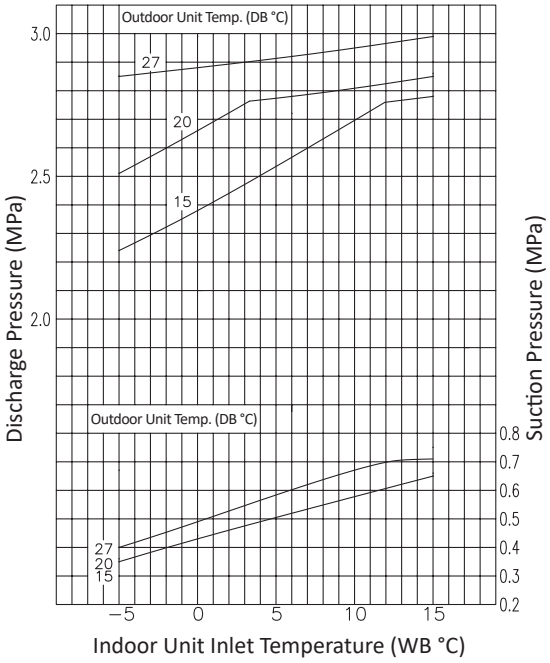


Piping length: 50m



Heating operation

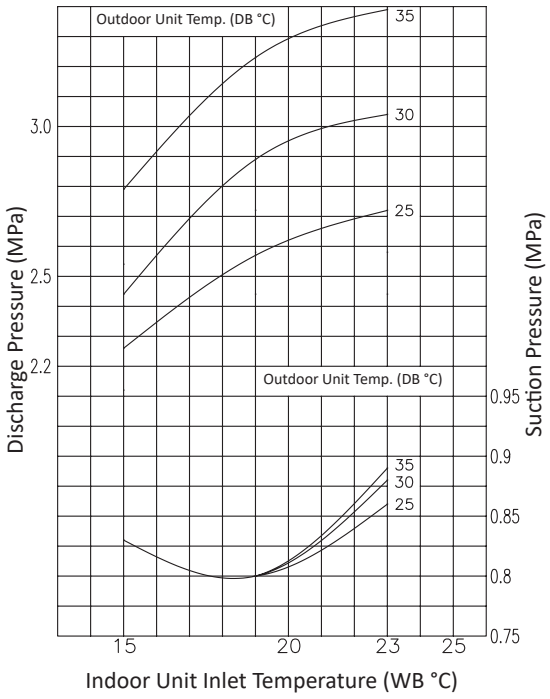




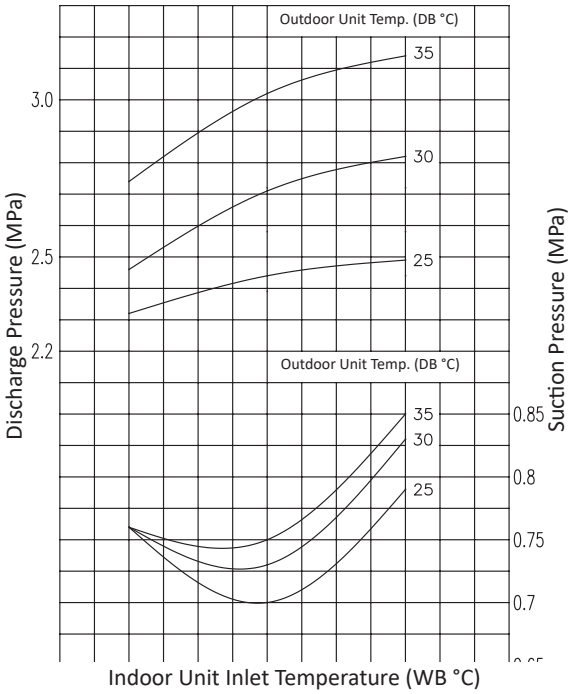
RAS-24FSXNS2E

Cooling operation

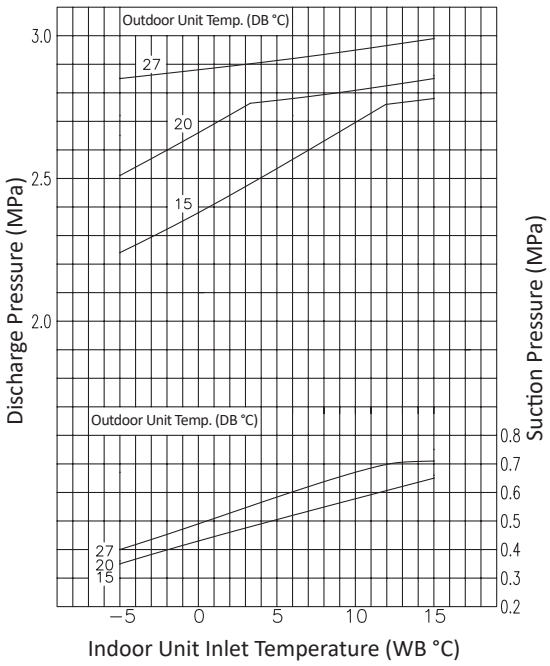
Piping length: 7.5m

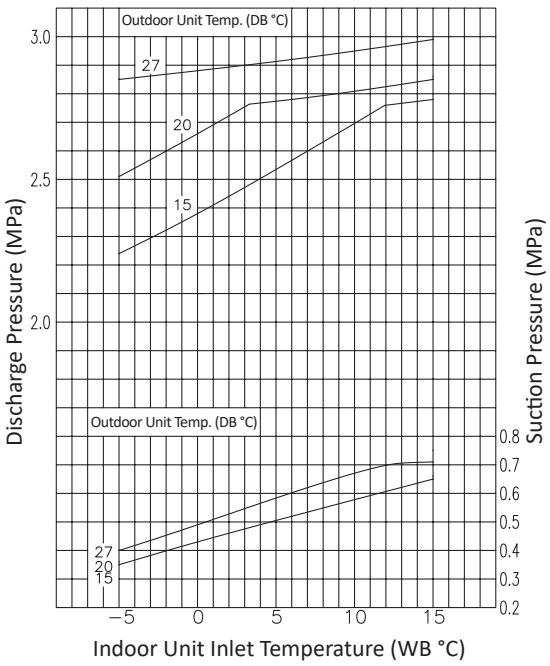


Piping length: 50m



Heating operation



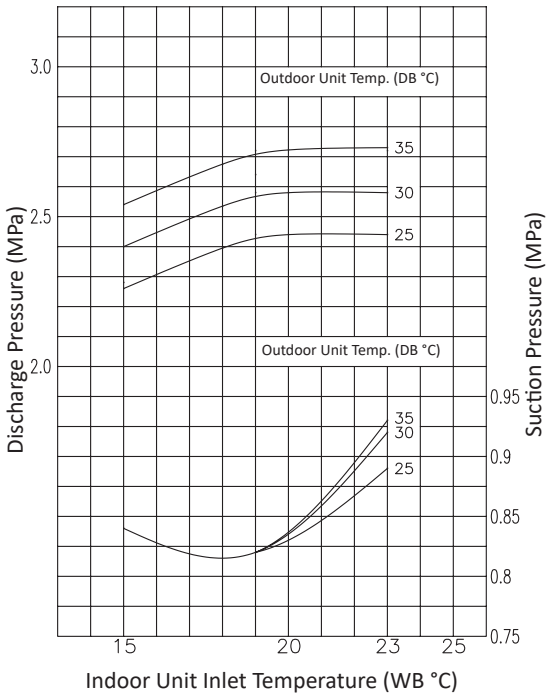


9.8.2 High efficiency type

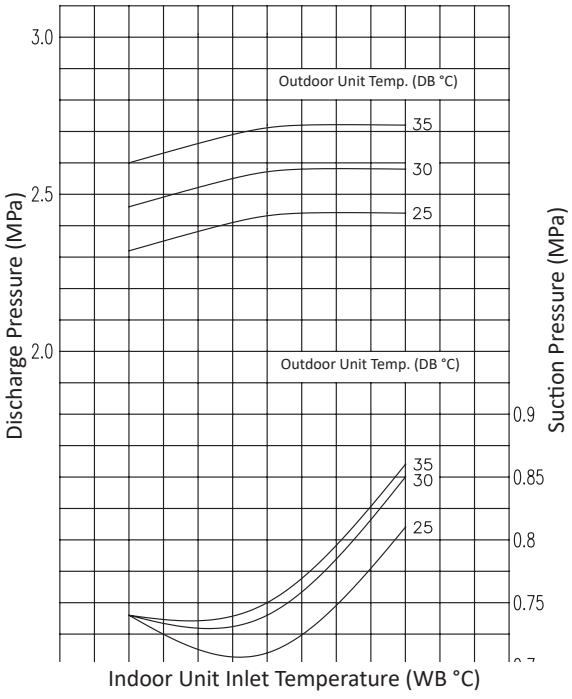
◆ RAS-5FSXNP2E

Cooling operation

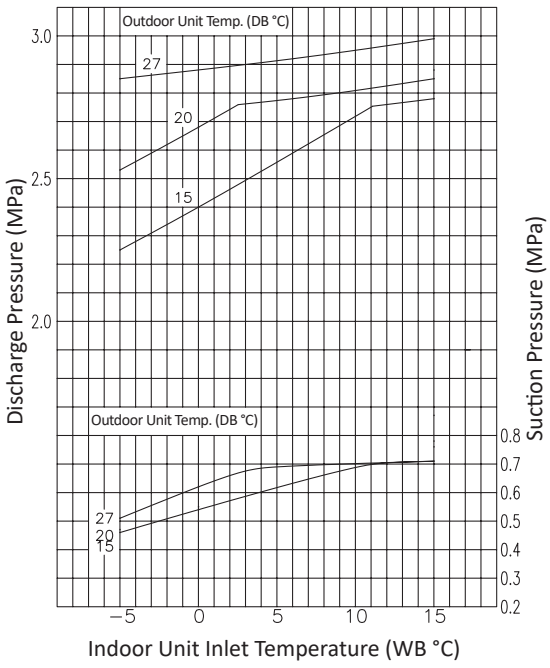
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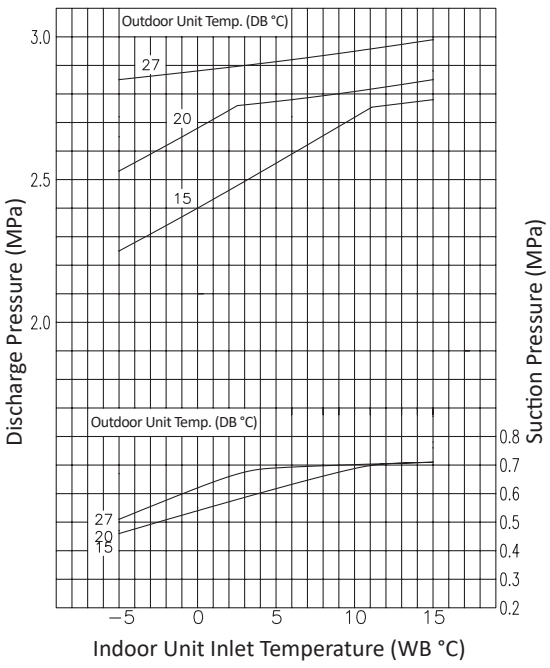


Piping length: 50m



Heating operation

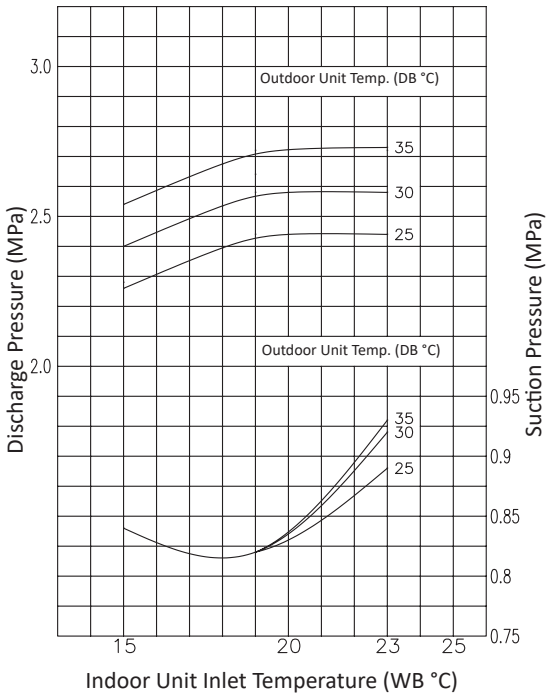




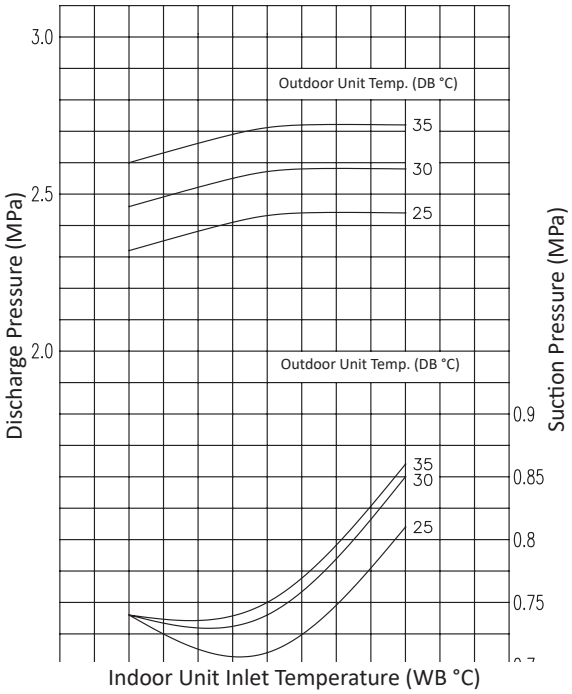
RAS-6FSXNP2E

Cooling operation

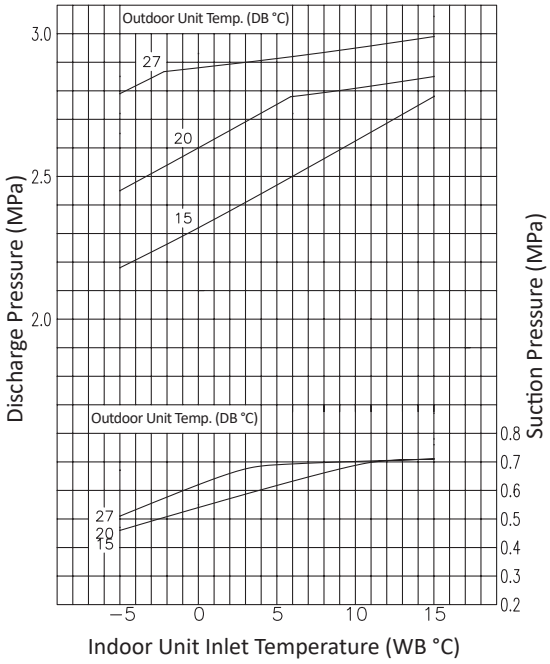
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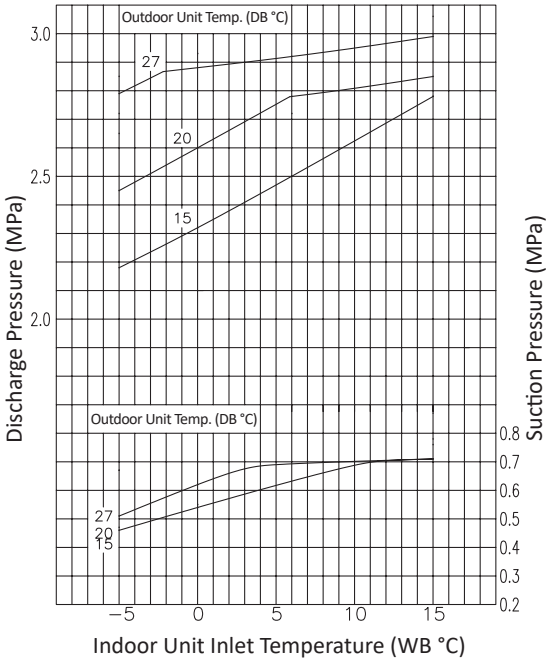


Piping length: 50m



Heating operation

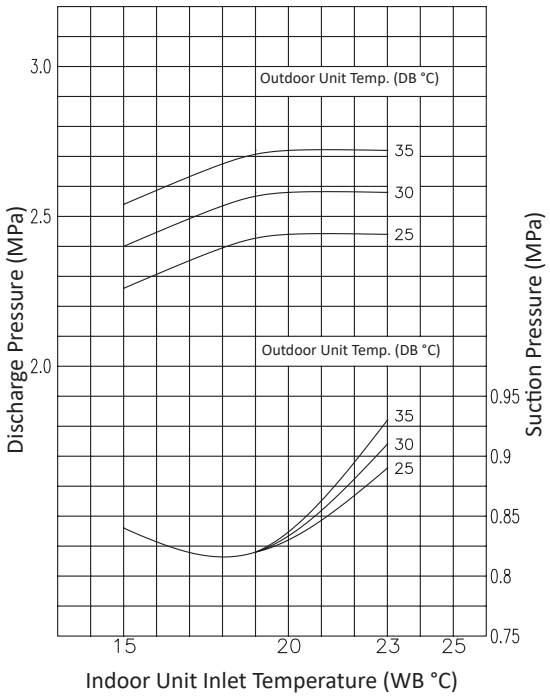




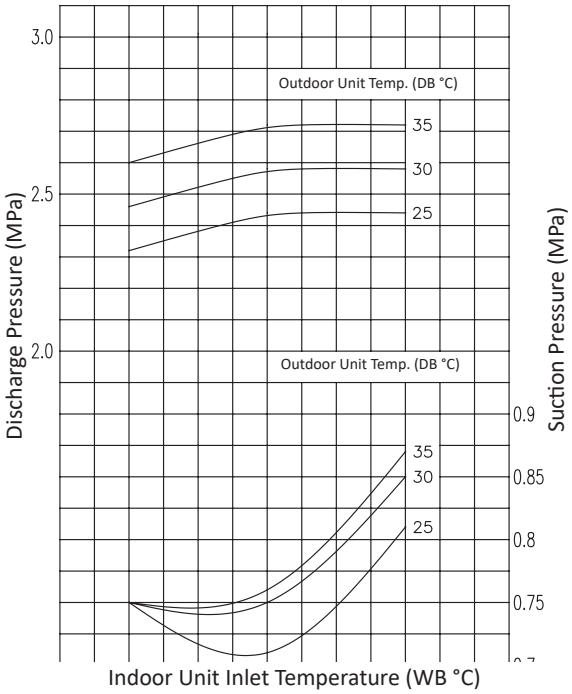
RAS-8FSXNP2E

Cooling operation

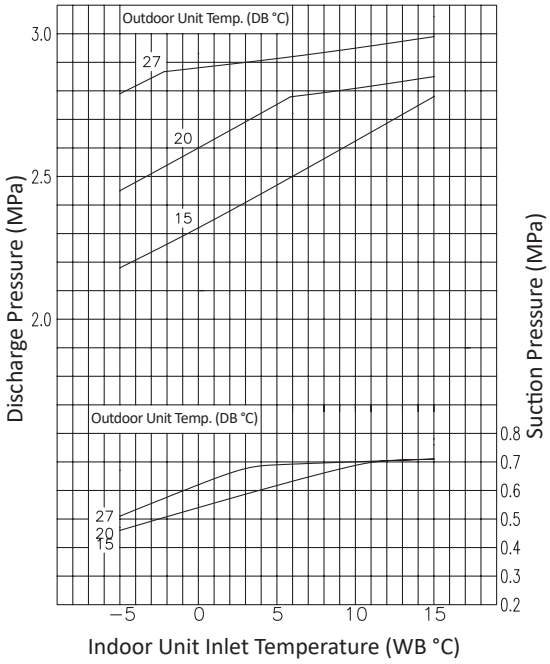
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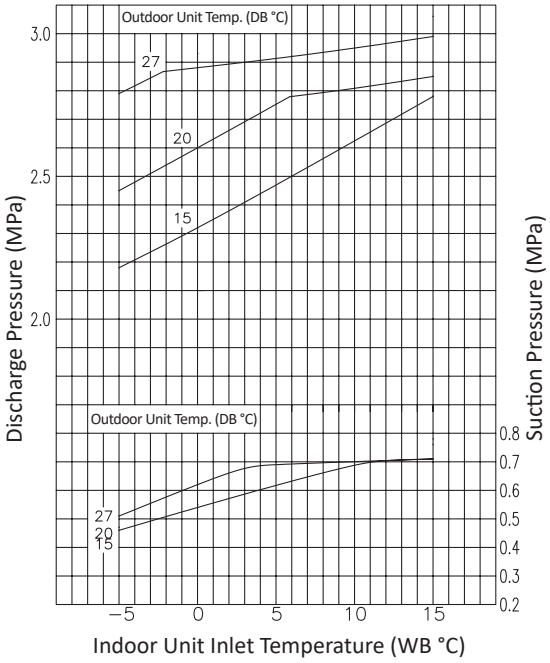


Piping length: 50m



Heating operation

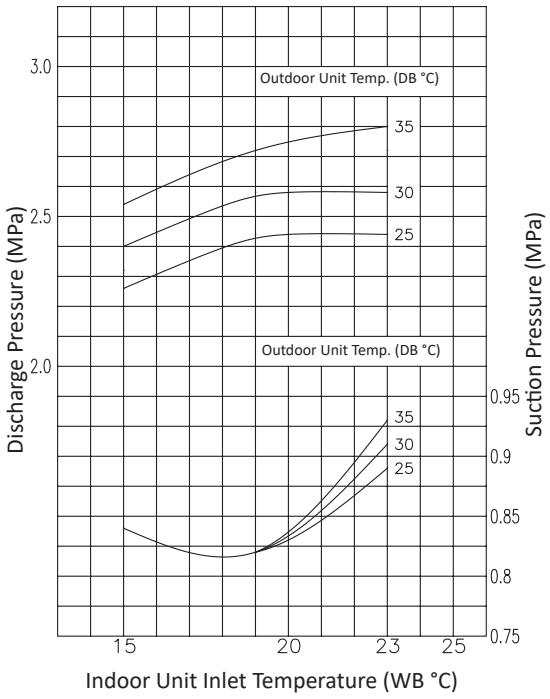




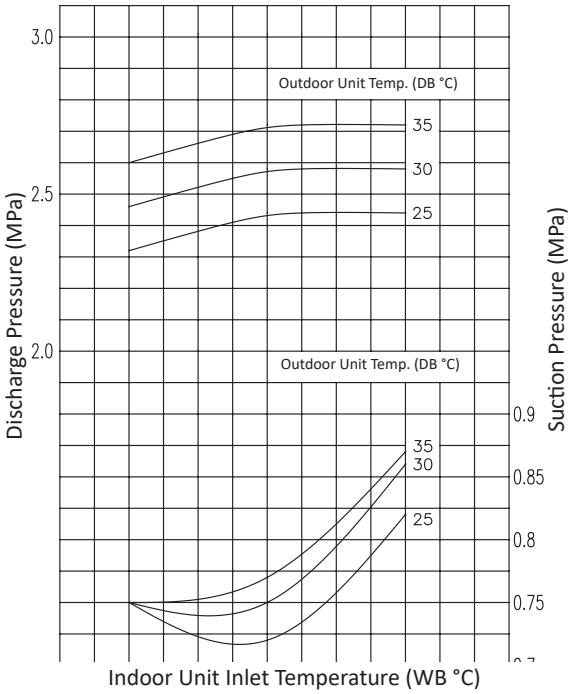
◆ RAS-10FSXNP2E

Cooling operation

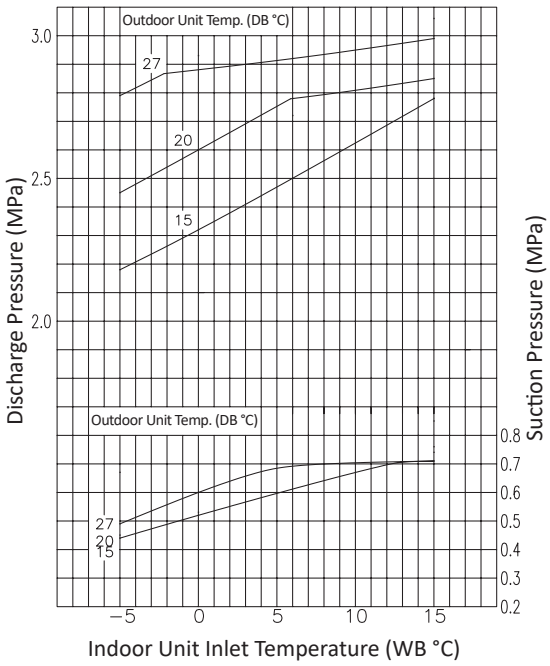
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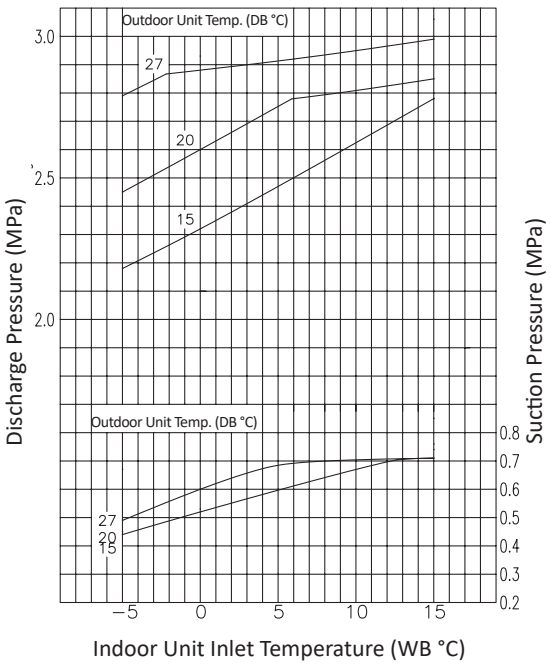


Piping length: 50m



Heating operation

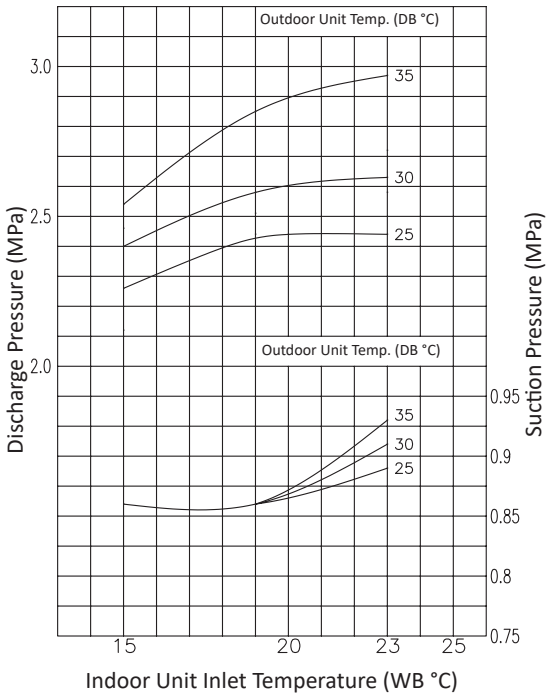




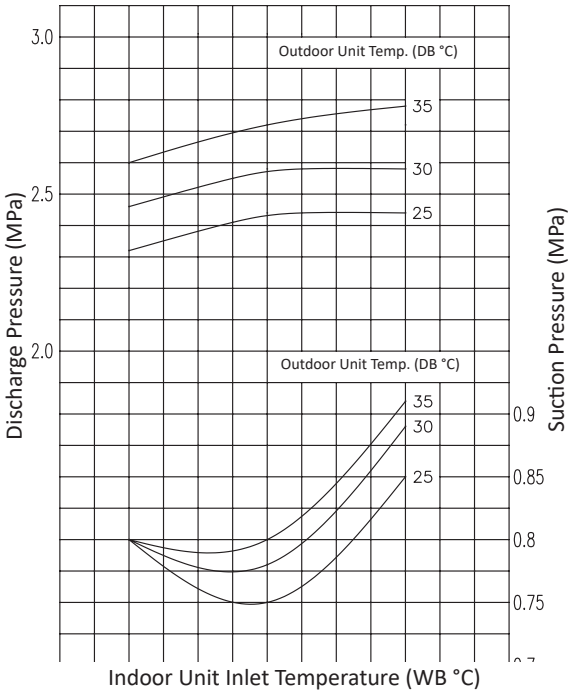
◆ RAS-12FSXNP2E

Cooling operation

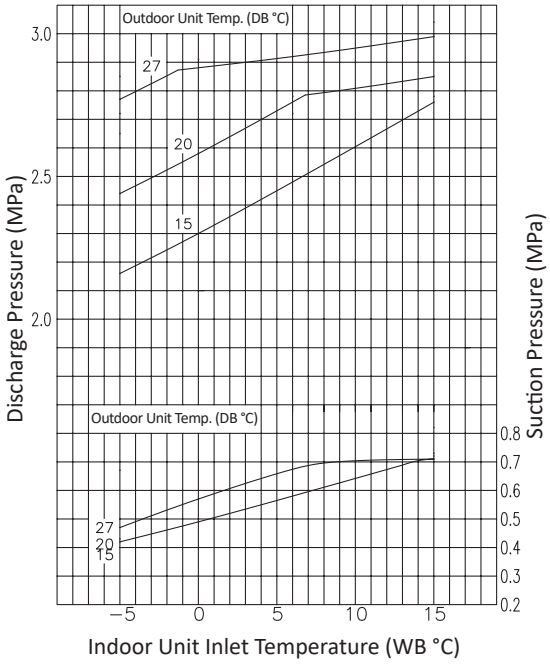
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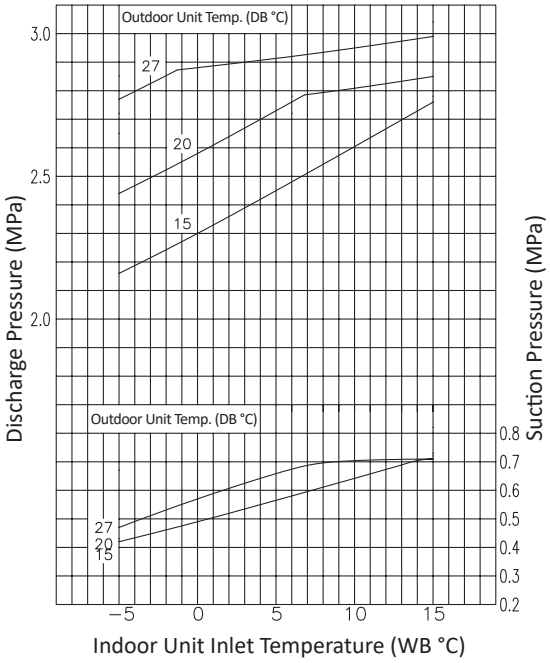


Piping length: 50m



Heating operation

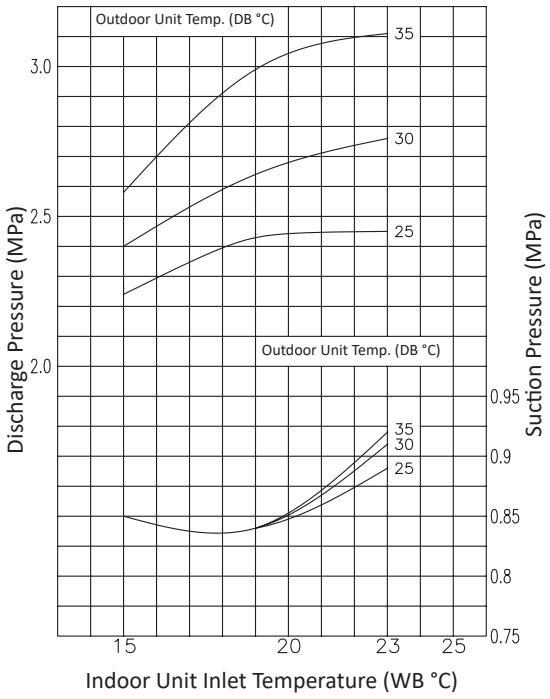




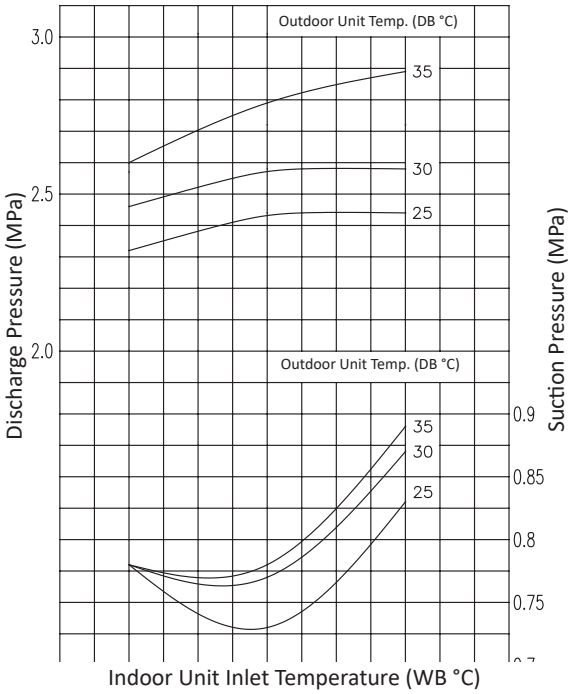
RAS-14FSXNP2E

Cooling operation

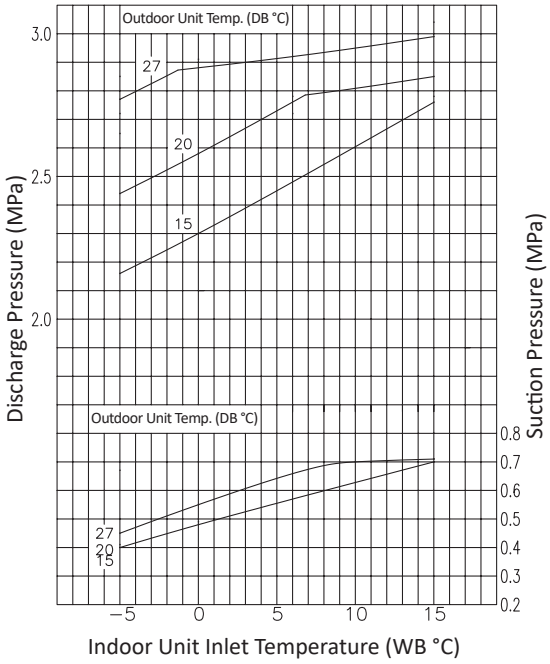
Piping length: 7.5m

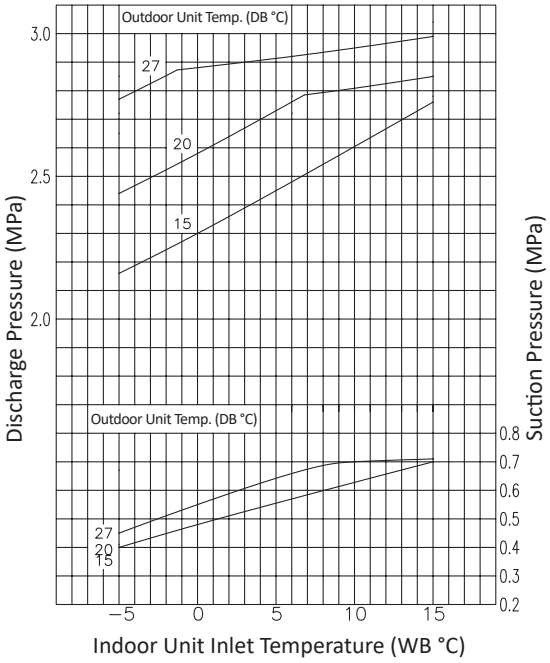


Piping length: 50m



Heating operation

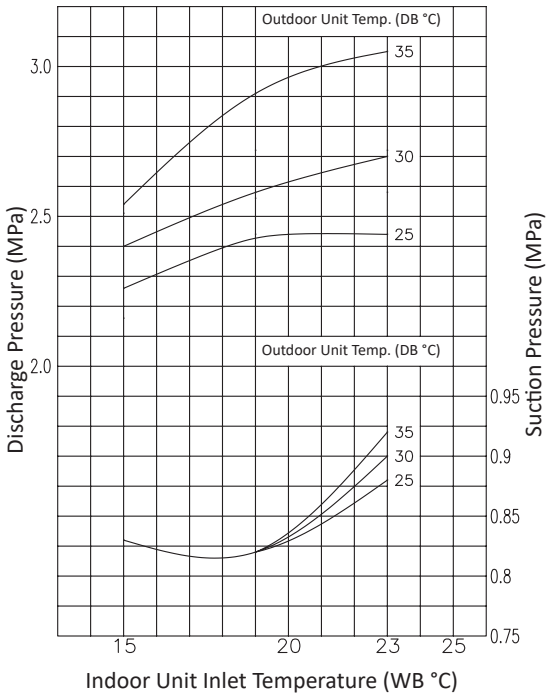




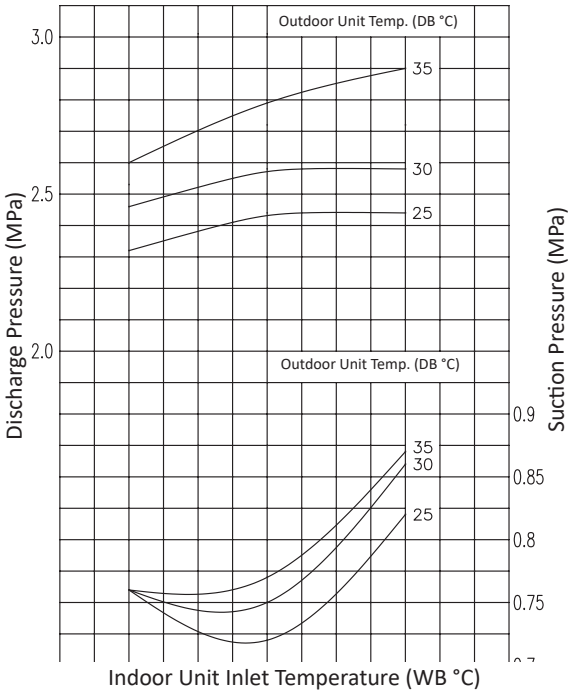
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Cooling operation

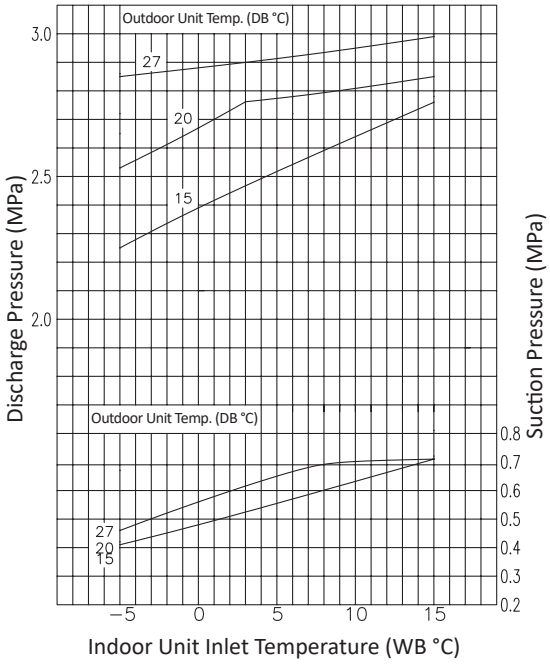
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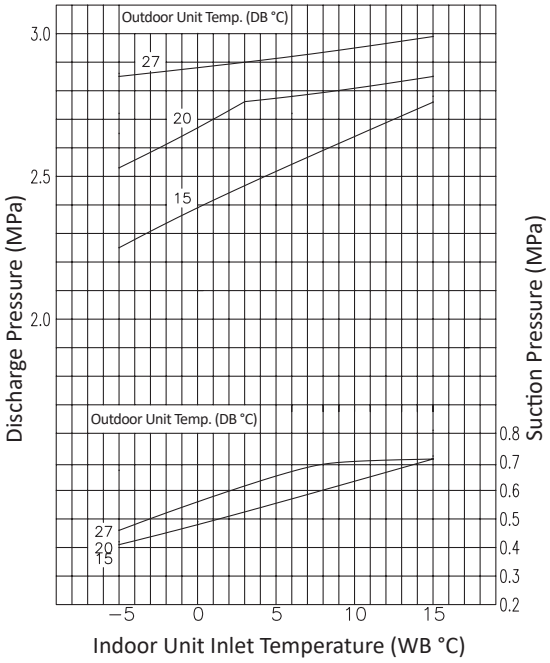


Piping length: 50m



Heating operation

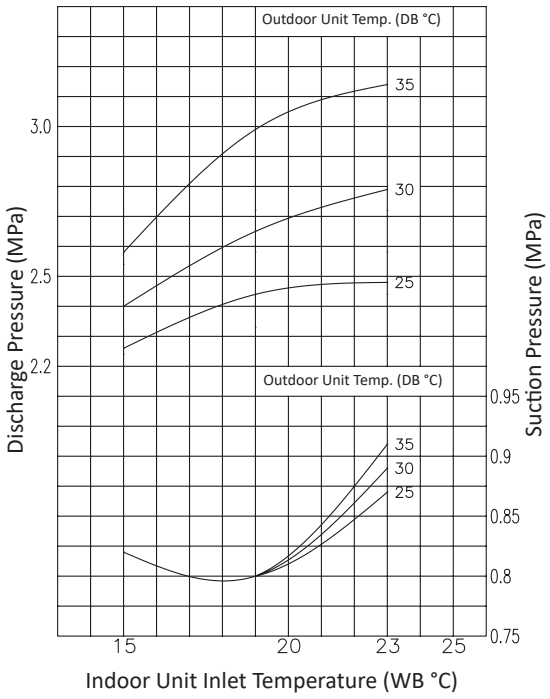




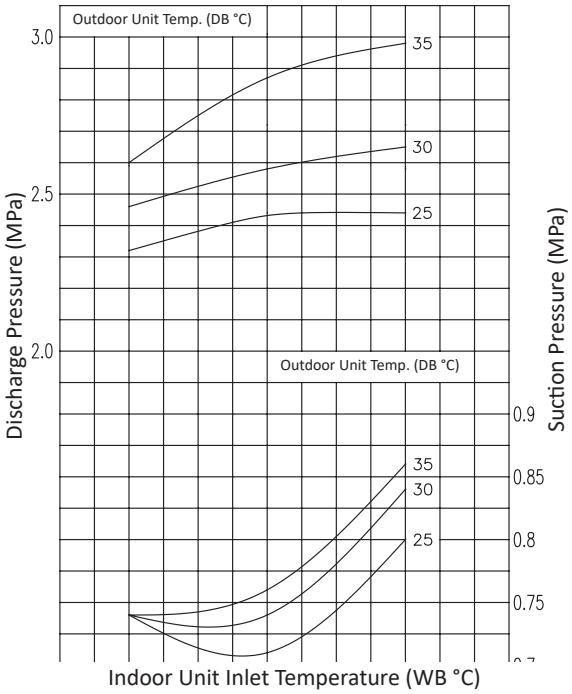
RAS-18FSXNP2E

Cooling operation

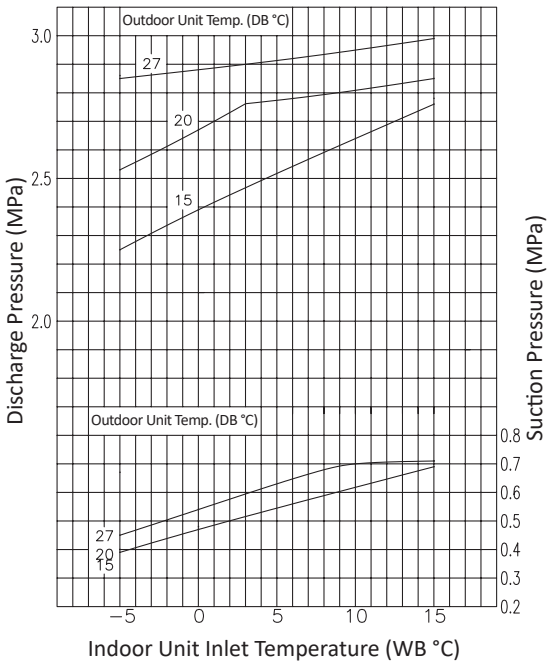
Piping length: 7.5m

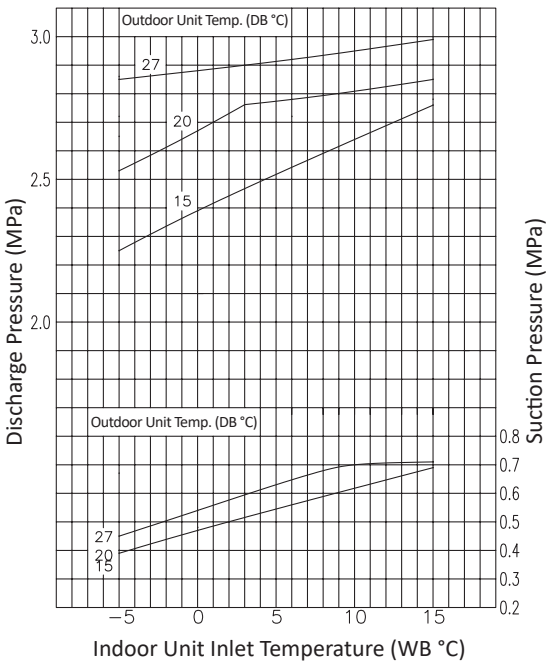


Piping length: 50m



Heating operation





9.9 How to collect refrigerant

9.9.1 The refrigerant collection method when replacing outdoor unit

Process No.	Procedure	Remarks
1	Turn OFF the main switch of outdoor unit.	-
2	Connect manifold to the check joint at low and high pressure side in outdoor unit.	-
3	Turn ON the main switch of outdoor unit.	-
4	**In case that compressor operates** Perform pre-refrigerant collection during cooling test run. • Turn ON the dip switch (DSW4#1) of outdoor unit PCB1 and start the test run. • The test run should be performed for approx. 20 min, (until Ps>0.3 MPa, Td>75 °C) • Check the suction pressure “Ps” on 7-seg. of OU PCB1. • Close the gas valve inmediately. Perform the forced stoppage by turning on the dip switch (DSW4#4) when Ps is ≤0.2 MPa. • Cancel cooling operation (by DSW4#1 is OFF). • Cancel the forced stoppage (by DSW4#4 is OFF). **In case that compressor does not operate** • Close all the gas stop valves (at low and high pressure sides).	After closing the gas stop valve, the decrease of Ps value is fast. To guarantee the reliability of the compressor., make sure that the decrease does not reach Ps<0.1 MPa when performing the forced stoppage.
5	Close the liquid stop valve completely.	-
6	Collect refrigerant by a refrigerant collector. Activate forced open valve mode. Collect the refrigerant from the check joints at low and high pressure sides in outdoor unit All the refrigerant of outdoor unit side is collected by a refrigerant collector.	• The discharge of the refrigerant in the atmosphere is strictly forbidden. Make sure that the refrigerant is collected by a refrigerant collector. • Measure the quantity of the collected refrigerant and record it.
7	After collecting the refrigerant, remove the charge hose at the collector side, so that the inside of the refrigerant cycle will be the atmosphere pressure. Cancel the forced open valve mode.	• Make sure that there is no pressure increase after collecting the refrigerant and then remove the charge hose. • Make sure that the refrigerant cycle is the atmosphere pressure. Otherwise, problems such as the blowing of gas and the suction of the cutting material will occur when removing the compressor.
8	Turn OFF the main switch of outdoor unit.	-
9	Perform replacing compressor, return oil circuit or electrical parts.	Removing electrical box may be required. Measure the quantity of the refrigerant oil and record it.

Process No.	Procedure	Remarks
10	Charge new refrigerant oil as the same quantity as the collected refrigerant oil. Perform the vacuuming from the check joint at a low and high pressure sides. Connect the charge hose to the charge port of return oil circuit and charge the refrigerant oil.	• When the refrigerant oil is collected from the accumulator or compressor, calculation for recharge amount is required. • Use a clean charge hose. • Use a container with a small opening so that the refrigerant oil does not absorb the moisture in the atmosphere and work in a short time (approx. within 20 minutes).
11	Disconnect the charge hose from the charger port of return oil circuit. Perform the vacuuming from the check joint at low and high pressure sides.	-
12	Recharge the collected refrigerant (process No.6) from the check joint at high pressure side. For the remainded quantity: Fully open the liquid and gas stop valve and set DSW4#1 to ON side of outdoor unit PCB1. Then recharge it from the liquid stop valve check joint during cooling operation.	-
13	Check the liquid and gas stop valves are fully opened.	-

9.9.2 The refrigerant collection method when replacing indoor unit

Process No.	Procedure	Remarks
1	Turn OFF the main switch of outdoor unit and indoor unit.	-
2	Close all the gas stop valves (at low and high pressure side) of outdoor unit and the liquid and gas stop valve completely.	-
3	Collect the refrigerant by a refrigerant collector. Activate forced open valve mode. Collect the refrigerant from the gas stop valves (at low and high pressure sides) of outdoor unit and the check joint of the liquid stop valve. Collect all the refrigerant in the indoor unit side by refrigerant collector.	• The discharge of the refrigerant in the atmosphere is strictly forbidden. Make sure that the refrigerant is collected by a refrigerant collector. • Measure the quantity of the collected refrigerant and record it.
4	After collecting the refrigerant, remove the charge hose at the collector side, so that the inside of the refrigerant cycle will be the atmosphere pressure. Cancel the forced open valve mode.	• Make sure that there is no pressure increase after collecting the refrigerant and then remove the charge hose. • Make sure that the refrigerant cycle is the atmosphere pressure. Otherwise, problems such as the blowing of gas and the suction of the cutting material may occur when removing the refrigerant cycle parts.
5	Perform replacing indoor unit.	-
6	Perform the vacuuming from the gas stop valves (at low and high pressure sides) of outdoor unit and the check joint of the liquid stop valve.	-
7	Recharge the collected refrigerant (Process No.3) from the liquid stop valve.	-
8	Check the liquid and gas stop valves are fully opened.	-

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Cooling & Heating

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