MITSUBISHI ELECTRIC

HFC utilized R410A

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

April 2018
No. OCH668
REVISED EDITION-B

TECHNICAL & SERVICE MANUAL

<Outdoor unit>

[Model Name]	[Service Ref.]	
PUMY-SP112VKM	PUMY-SP112VKM.TH	PUMY-SP112VKMR1.TH
PUMY-SP125VKM	PUMY-SP125VKM.TH	PUMY-SP125VKMR1.TH
PUMY-SP140VKM	PUMY-SP140VKM.TH	PUMY-SP140VKMR1.TH
PUMY-SP112YKM	PUMY-SP112YKM.TH	PUMY-SP112YKMR1.TH
PUMY-SP125YKM	PUMY-SP125YKM.TH	PUMY-SP125YKMR1.TH
PUMY-SP140YKM	PUMY-SP140YKM.TH	PUMY-SP140YKMR1.TH

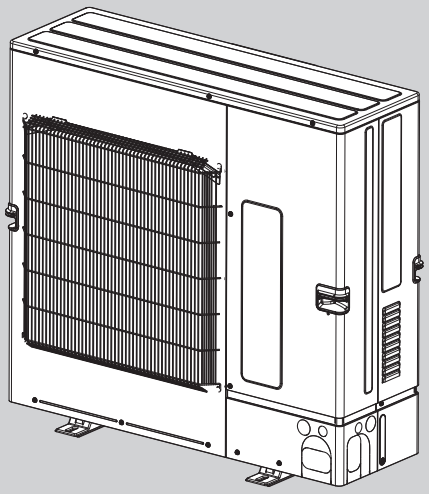
Salt proof model

PUMY-SP112VKM-BS	PUMY-SP112VKM.TH-BS	PUMY-SP112VKMR1.TH-BS
PUMY-SP125VKM-BS	PUMY-SP125VKM.TH-BS	PUMY-SP125VKMR1.TH-BS
PUMY-SP140VKM-BS	PUMY-SP140VKM.TH-BS	PUMY-SP140VKMR1.TH-BS
PUMY-SP112YKM-BS	PUMY-SP112YKM.TH-BS	PUMY-SP112YKMR1.TH-BS
PUMY-SP125YKM-BS	PUMY-SP125YKM.TH-BS	PUMY-SP125YKMR1.TH-BS
PUMY-SP140YKM-BS	PUMY-SP140YKM.TH-BS	PUMY-SP140YKMR1.TH-BS

Revision:
- Added PUMY-SP112VKMR1.TH, PUMY-SP125VKMR1.TH, PUMY-SP140VKMR1.TH, PUMY-SP112YKMR1.TH, PUMY-SP125YKMR1.TH and PUMY-SP140YKMR1.TH in REVISED EDITION-B.
- Some other descriptions have been also modified.

OCH668 REVISED EDITION-A is void.

Note:
- This service manual describes technical data of the outdoor units only.



OUTDOOR UNIT

CONTENTS

PARTS CATALOG (OCB668)

CITY MULTI

1 SAFETY PRECAUTION

1-1. CAUTIONS RELATED TO NEW REFRIGERANT

Cautions for units utilizing refrigerant R410A

Use new refrigerant pipes.

Avoid using thin pipes.

Make sure that the inside and outside of refrigerant piping is clean and it has no contaminants such as sulfur, oxides, dirt, shaving particles, etc, which are hazard to refrigerant cycle.
In addition, use pipes with specified thickness.

Contamination inside refrigerant piping can cause deterioration of refrigerant oil, etc.

Store the piping indoors, and keep both ends of the piping sealed until just before brazing. (Leave elbow joints, etc. in their packaging.)

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

The refrigerant oil applied to flare and flange connections must be ester oil, ether oil or alkylbenzene oil in a small amount.

If large amount of mineral oil enters, that can cause deterioration of refrigerant oil, etc.

Charge refrigerant from liquid phase of gas cylinder.

If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Do not use refrigerant other than R410A.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R410A refrigerant.

The following tools are necessary to use R410A refrigerant.

Tools for R410A	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adaptor
Torque wrench	Electronic refrigerant charging scale

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

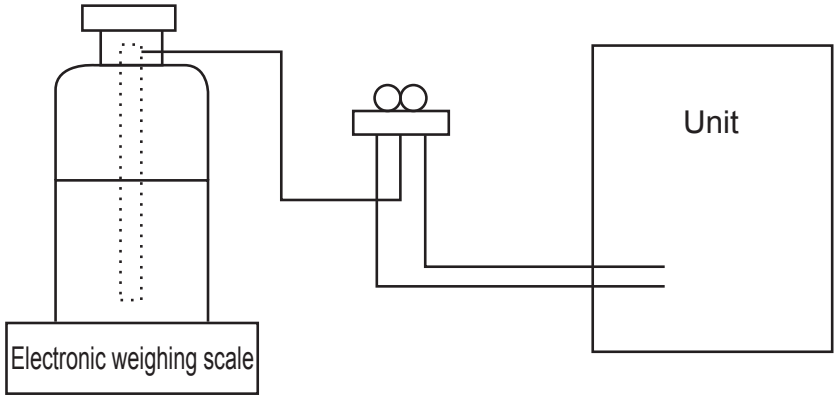
[1] Cautions for service

(1) Perform service after recovering the refrigerant left in unit completely.
(2) Do not release refrigerant in the air.
(3) After completing service, charge the cycle with specified amount of refrigerant.
(4) If moisture or foreign matter might have entered the refrigerant piping during service, ensure to remove them.

[2] Additional refrigerant charge

When charging directly from cylinder

(1) Check that cylinder for R410A on the market is a syphon type.
(2) Charging should be performed with the cylinder of syphon stood vertically. (Refrigerant is charged from liquid phase.)



[3] Service tools

Use the below service tools as exclusive tools for R410A refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	· Only for R410A
		· Use the existing fitting specifications. (UNF1/2)
		· Use high-tension side pressure of 5.3MPa·G or over.
②	Charge hose	· Only for R410A
		· Use pressure performance of 5.09MPa·G or over.
③	Electronic weighing scale	—
④	Gas leak detector	· Use the detector for R134a, R407C or R410A.
⑤	Adaptor for reverse flow check	· Attach on vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	· Only for R410A · Top of cylinder (Pink) · Cylinder with syphon
⑧	Refrigerant recovery equipment	—

1-2. PRECAUTIONS FOR SALT PROOF TYPE "-BS" MODEL

Although "-BS" model has been designed to be resistant to salt damage, observe the following precautions to maintain the performance of the unit.

(1) Avoid installing the unit in a location where it will be exposed directly to seawater or sea breeze.
(2) If the cover panel may become covered with salt, be sure to install the unit in a location where the salt will be washed away by rainwater. (If a sunshade is installed, rainwater may not clean the panel.)
(3) To ensure that water does not collect in the base of the outdoor unit, make sure that the base is level, not at angle. Water collecting in the base of the outdoor unit could cause rust.
(4) If the unit is installed in a coastal area, clean the unit with water regularly to remove any salt build-up.
(5) If the unit is damaged during installation or maintenance, be sure to repair it.
(6) Be sure to check the condition of the unit regularly.
(7) Be sure to install the unit in a location with good drainage.

Cautions for refrigerant piping work

New refrigerant R410A is adopted for replacement inverter series. Although the refrigerant piping work for R410A is same as for R22, exclusive tools are necessary so as not to mix with different kind of refrigerant. Furthermore as the working pressure of R410A is 1.6 times higher than that of R22, their sizes of flared sections and flare nuts are different.

① Thickness of pipes

Because the working pressure of R410A is higher compared to R22, be sure to use refrigerant piping with thickness shown below. (Never use pipes of 0.7 mm or below.)

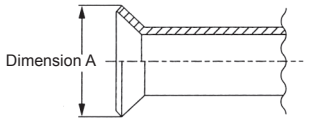
Diagram below: Piping diameter and thickness

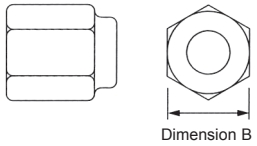
Nominal dimensions (in)	Outside diameter (mm)	Thickness (mm)	
		R410A	R22
1/4	6.35	0.8	0.8
3/8	9.52	0.8	0.8
1/2	12.70	0.8	0.8
5/8	15.88	1.0	1.0
3/4	19.05	—	1.0

② Dimensions of flare cutting and flare nut

The component molecules in HFC refrigerant are smaller compared to conventional refrigerants. In addition to that, R410A is a refrigerant, which has higher risk of leakage because its working pressure is higher than that of other refrigerants. Therefore, to enhance airtightness and strength, flare cutting dimension of copper pipe for R410A has been specified separately from the dimensions for other refrigerants as shown below. The dimension B of flare nut for R410A also has partly been changed to increase strength as shown below. Set copper pipe correctly referring to copper pipe flaring dimensions for R410A below. For 1/2 and 5/8 inch pipes, the dimension B changes.

Use torque wrench corresponding to each dimension.





Flare cutting dimensions

Nominal dimensions (in)	Outside diameter (mm)	Dimension A ($^{+0}_{-0.4}$) (mm)	
		R410A	R22
1/4	6.35	9.1	9.0
3/8	9.52	13.2	13.0
1/2	12.70	16.6	16.2
5/8	15.88	19.7	19.4
3/4	19.05	—	23.3

Flare nut dimensions

Nominal dimensions (in)	Outside diameter (mm)	Dimension B (mm)	
		R410A	R22
1/4	6.35	17.0	17.0
3/8	9.52	22.0	22.0
1/2	12.70	26.0	24.0
5/8	15.88	29.0	27.0
3/4	19.05	—	36.0

③ Tools for R410A (The following table shows whether conventional tools can be used or not.)

Tools and materials	Use	R410A tools	Can R22 tools be used?	Can R407C tools be used?
Gauge manifold	Air purge, refrigerant charge and operation check	Tool exclusive for R410A	×	×
Charge hose		Tool exclusive for R410A	×	×
Gas leak detector	Gas leak check	Tool for HFC refrigerant	×	○
Refrigerant recovery equipment	Refrigerant recovery	Tool exclusive for R410A	×	×
Refrigerant cylinder	Refrigerant charge	Tool exclusive for R410A	×	×
Applied oil	Apply to flared section	Ester oil, ether oil and alkylbenzene oil (minimum amount)	×	Ester oil, ether oil: ○ Alkylbenzene oil: minimum amount
Safety charger	Prevent compressor malfunction when charging refrigerant by spraying liquid refrigerant	Tool exclusive for R410A	×	×
Charge valve	Prevent gas from blowing out when detaching charge hose	Tool exclusive for R410A	×	×
Vacuum pump	Vacuum drying and air purge	Tools for other refrigerants can be used if equipped with adopter for reverse flow check	△ (Usable if equipped with adopter for reverse flow)	△ (Usable if equipped with adopter for reverse flow)
Flare tool	Flaring work of piping	Tools for other refrigerants can be used by adjusting flaring dimension	△ (Usable by adjusting flaring dimension)	△ (Usable by adjusting flaring dimension)
Bender	Bend the pipes	Tools for other refrigerants can be used	○	○
Pipe cutter	Cut the pipes	Tools for other refrigerants can be used	○	○
Welder and nitrogen gas cylinder	Weld the pipes	Tools for other refrigerants can be used	○	○
Refrigerant charging scale	Refrigerant charge	Tools for other refrigerants can be used	○	○
Vacuum gauge or thermistor vacuum gauge and vacuum valve	Check the degree of vacuum. (Vacuum valve prevents back flow of oil and refrigerant to thermistor vacuum gauge)	Tools for other refrigerants can be used	○	○
Charging cylinder	Refrigerant charge	Tool exclusive for R410A	×	—

× : Prepare a new tool. (Use the new tool as the tool exclusive for R410A.)
△ : Tools for other refrigerants can be used under certain conditions.
○ : Tools for other refrigerants can be used.

2 OVERVIEW OF UNITS

2-1. UNIT CONSTRUCTION

Outdoor unit		4.5HP	5HP	6HP
		PUMY-SP112VKM(R1).TH(-BS) PUMY-SP112YKM(R1).TH(-BS)	PUMY-SP125VKM(R1).TH(-BS) PUMY-SP125YKM(R1).TH(-BS)	PUMY-SP140VKM(R1).TH(-BS) PUMY-SP140YKM(R1).TH(-BS)
Applicable indoor unit	Capacity	Type 15 to Type 140		
	Number of units	1 to 9 units	1 to 10 units	1 to 12 units
	Total system capacity range	50 to 130% of outdoor unit capacity *1		

	CMY-Y62-G-E	CMY-Y64-G-E	CMY-Y68-G-E
Branching pipe components	Branch header (2 branches)	Branch header (4 branches)	Branch header (8 branches)

Model / Capacity	Cassette Ceiling					Ceiling concealed	Wall Mounted	Ceiling Suspended	Floor standing		Ceiling concealed		Lossnay
	2 by 2	4-way flow		2-way flow	1-way flow				Exposed	Concealed	Fresh air*2	Built-in	
	PLFY-P	PLFY-P	PLFY-EP*6	PLFY-P	PMFY-P	PEFY-P	PKFY-P	PCFY-P	PFFY-P	PFFY-P	PEFY-P	PDFY-P	GUF*4
15	15VFM-E1	–	–	–	–	15VMS1(L)-E	15VBM-E	–	–	–	–	–	–
20	20VFM-E1	20VEM-E	–	20VLMD-E	20VBM-E	20VMS1(L)-E 20VMA(L)-E 20VMR-E-L/R	20VBM-E	–	20VLEM-E 20VKM-E(2)	20VLRM-E 20VLRMM-E	–	20VM-E	–
25	25VFM-E1	25VEM-E	–	25VLMD-E	25VBM-E	25VMS1(L)-E 25VMA(L)-E 25VMR-E-L/R 25VMA3-E*5	25VBM-E	–	25VLEM-E 25VKM-E(2)	25VLRM-E 25VLRMM-E	–	25VM-E	–
32	32VFM-E1	32VEM-E	–	32VLMD-E	32VBM-E	32VMS1(L)-E 32VMA(L)-E 32VMR-E-L/R 32VMA3-E*5	32VHM-E	–	32VLEM-E 32VKM-E(2)	32VLRM-E 32VLRMM-E	–	32VM-E	–
40	40VFM-E1	40VEM-E	–	40VLMD-E	40VBM-E	40VMS1(L)-E 40VMA(L)-E 40VMH(S)-E 40VMA3-E*5	40VHM-E	40VKM-E	40VLEM-E 40VKM-E(2)	40VLRM-E 40VLRMM-E	–	40VM-E	–
50	50VFM-E1	50VEM-E	50VEM-E	50VLMD-E	–	50VMS1(L)-E 50VMA(L)-E 50VMH(S)-E	50VHM-E	–	50VLEM-E	50VLRM-E 50VLRMM-E	–	50VM-E	50RD(H)4
63	–	63VEM-E	63VEM-E	63VLMD-E	–	63VMS1(L)-E 63VMA(L)-E 63VMH(S)-E	63VKM-E	63VKM-E	63VLEM-E	63VLRM-E 63VLRMM-E	–	63VM-E	–
71	–	–	–	–	–	71VMA(L)-E 71VMH(S)-E	–	–	–	–	–	71VM-E	–
80	–	80VEM-E	80VEM-E	80VLMD-E	–	80VMA(L)-E 80VMH(S)-E	–	–	–	–	80VMH-E-F	80VM-E	–
100	–	100VEM-E	–	100VLMD-E	–	100VMA(L)-E 100VMH(S)-E	100VKM-E	100VKM-E	–	–	–	100VM-E	100RD(H)4
125	–	125VEM-E	–	125VLMD-E	–	125VMA(L)-E 125VMH(S)-E	–	125VKM-E	–	–	–	125VM-E	–
140	–	–	–	–	–	140VMA(L)-E 140VMH(S)-E	–	–	–	–	140VMH-E-F	–	–

CONNECTION KIT
PAC-LV11M-J

M series indoor unit *3
MSZ-GE Series
MSZ-SF Series
MSZ-EF Series
MSZ-FH Series
MSZ-LN Series
MSZ-AP Series *7

M series remote controller

Remote controller	Name	M-NET remote controller	MA remote controller
	Model number	PAR-F27MEA-E, PAR-U02MEDA	PAR-21MAA, PAR-31/32MAA
	Functions	• A handy remote controller for use in conjunction with the Melans centralized management system. • Addresses must be set.	• Addresses setting is not necessary.

*1 When the indoor unit of Fresh Air type is connected with the outdoor unit, the maximum connectable total indoor unit capacity is 110%.

*2 PUMY is connectable to Fresh Air type indoor unit.
It is possible to connect 1 Fresh Air type indoor unit to 1 outdoor unit. (1:1 system)
Operating temperature range (outdoor temperature) for fresh air type indoor units differ from other indoor units.
Refer to "2-4-(3). Operating temperature range".

*3 When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT.

*4 Do not connect Lossnay remote controller(s). (PZ-61DR-E, PZ-60DR-E, PZ-52SF-E, PZ-43SMF-E)

*5 Authorized connectable indoor units are as follows;
PUMY-SP112:PEFY-P25VMA3-E×2 + PEFY-P32VMA3-E×2
PUMY-SP125: PEFY-P25VMA3-E×1 + PEFY-P32VMA3-E×3
PUMY-SP140: PEFY-P32VMA3-E×2 + PEFY-P40VMA3-E×2

*6 For the PLFY-EP/VEM-E, up to 2 units can be connected . Other indoor units (Excluding the PEFY-P/ VMA3-E and PEFY-P/ VMH-EF) can be connected within the total rated capacity and maximum number of connected units.

*7 Connectable only for PUMY-SP▪VKMR1.TH(-BS),PUMY-SP▪YKMR1.TH(-BS).

2-2. UNIT CONSTRUCTION (BRANCH BOX SYSTEM)

Outdoor unit		4.5HP	5HP	6HP
		PUMY-SP112VKM(R1).TH(-BS) PUMY-SP112YKM(R1).TH(-BS)	PUMY-SP125VKM(R1).TH(-BS) PUMY-SP125YKM(R1).TH(-BS)	PUMY-SP140VKM(R1).TH(-BS) PUMY-SP140YKM(R1).TH(-BS)
Applicable indoor unit	Capacity	kW unit: Type 15 to Type 100		
	Number of units	2 to 8 units		
	Total system capacity range	50 to 130% of outdoor unit capacity (6.3 to 16.2 kW)	50 to 130% of outdoor unit capacity (7.1 to 18.2 kW)	50 to 130% of outdoor unit capacity (8.0 to 20.2 kW)
Branch box that can be connected	Number of units	1 to 2 units		

Model / capacity [kW type]	Wall Mounted							1-way ceiling cassette		4-way ceiling cassette		
										2 by 2 type		Standard
	MSZ-FH	MSZ-LN	MSZ-GF	MSZ-SF	MSZ-EF	MSZ-SF	MSZ-AP*1	MLZ-KA	MLZ-KP*1	SLZ-KF	SLZ-M*1	PLA-RP
15	-	-	-	-	-	15VA	15VF	-	-	-	15FA	-
18	-	-	-	-	18VE3	-	-	-	-	-	-	-
20	-	-	-	-	-	20VA	20VF	-	-	-	-	-
22	-	-	-	-	22VE3	-	-	-	-	-	-	-
25	25VE2	25VG	-	25VE3	25VE3	-	25VG	25VA	25VE	25VA2	25FA	-
35	35VE2	35VG	-	35VE3	35VE3	-	35VG	35VA	35VE	35VA2	35FA	35EA
42	-	-	-	42VE3	42VE3	-	42VG	-	-	-	-	-
50	50VE2	-	-	50VE3	50VE3	-	50VG	50VA	50VE	50VA2	50FA	50EA
60	-	-	60VE	-	-	-	-	-	-	-	-	60EA
71	-	-	71VE	-	-	-	-	-	-	-	-	71EA
80	-	-	-	-	-	-	-	-	-	-	-	-
100	-	-	-	-	-	-	-	-	-	-	-	100EA

Model / capacity [kW type]	Ceiling concealed				Ceiling suspended		Floor standing
	Low static pressure		Middle static pressure				
	SEZ-KD	SEZ-M	*1 PEAD-RP	PEAD-M	PCA-RP	PCA-M	MFZ-KJ*1
15	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-
25	25VAQ(L)	25DA	-	-	-	-	25VE
35	35VAQ(L)	35DA	-	-	35KAQ	35KA	35VE
42	-	-	-	-	-	-	-
50	50VAQ(L)	50DA	50JAQ(L)	50JA(L)	50KAQ	50KA	50VE
60	60VAQ(L)	60DA	60JAQ(L)	60JA(L)	60KAQ	60KA	-
71	71VAQ(L)	71DA	71JAQ(L)	71JA(L)	71KAQ	71KA	-
80	-	-	-	-	-	-	-
100	-	-	100JAQ(L)	100JA(L)	100KAQ	100KA	-

*1 Connectable for only PUMY-SP▪VKMR1.TH(-BS),PUMY-SP▪YKMR1.
Note: The lineup of a connectable indoor unit depends on a district/areas/country.

Branch box	PAC-MK5*BC	PAC-MK3*BC
Number of branches (Indoor unit that can be connected)	5-branches (MAX. 5 units)	3-branches (MAX. 3 units)

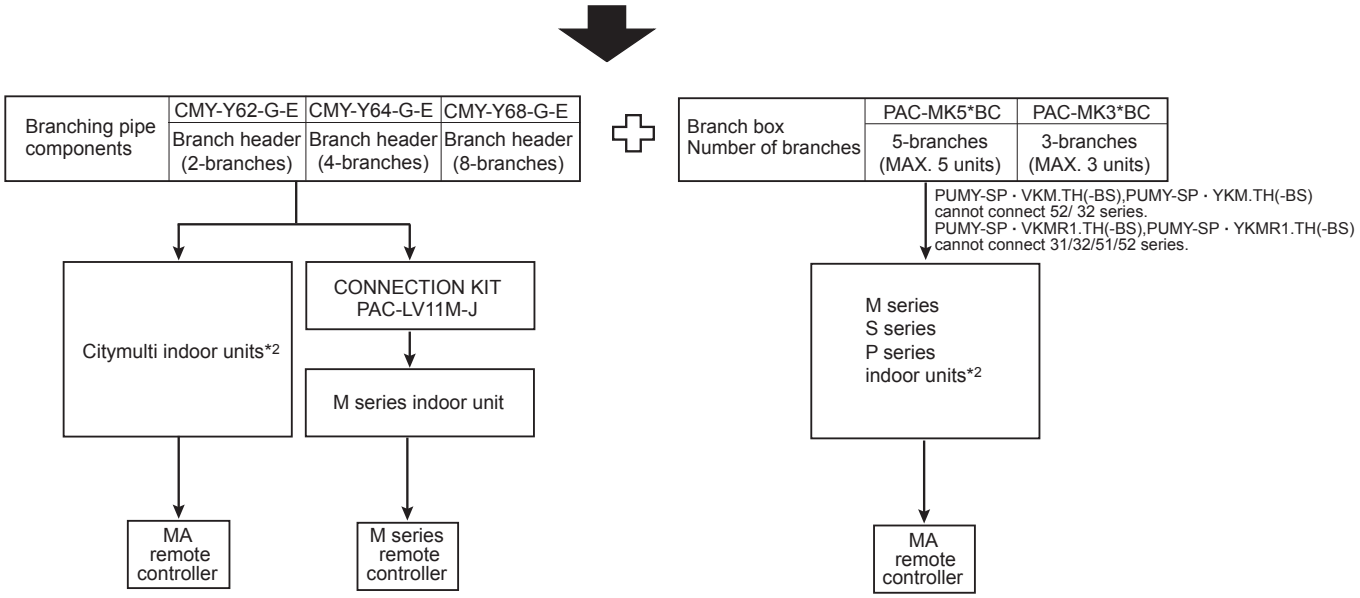
Note:
A maximum of 2 branch boxes can be connected to 1 outdoor unit.
PUMY-SP▪VKM.TH(-BS),PUMY-SP▪YKM.TH(-BS) cannot connect 52/ 32 series.
PUMY-SP▪VKMR1.TH(-BS),PUMY-SP▪YKMR1.TH(-BS) cannot connect 31/32/51/52 series.

2-branch pipe (joint): Optional parts	
In case of using 1- branch box	No need
In case of using 2- branch boxes	Model name: Connection method MSDD-50AR-E: flare MSDD-50BR-E: brazing Select a model according to the connection method.

Option	Optional accessories of indoor units and outdoor units are available.

2-3. UNIT CONSTRUCTION (MIXED SYSTEM)

Outdoor unit			4.5HP		5HP		6HP	
			PUMY-SP112VKM(R1).TH(-BS) PUMY-SP112YKM(R1).TH(-BS)		PUMY-SP125VKM(R1).TH(-BS) PUMY-SP125YKM(R1).TH(-BS)		PUMY-SP140VKM(R1).TH(-BS) PUMY-SP140YKM(R1).TH(-BS)	
Applicable indoor unit	Capacity	City multi indoor unit	Type 15 to Type 140					
		Via branch box	kW unit: Type 15 to Type 100					
	Number of units		Via branch box	City multi indoor	Via branch box	City multi indoor	Via branch box	City multi indoor
		1 branch box	5	5	5	5	5	5
		2 branch boxes	7 or 8*1	3 or 2*1	8	3	8	3
	Total system capacity range		6.3 to 16.2 kW		7.1 to 18.2 kW		8.0 to 20.2 kW	



*1 When connecting 7 indoor units via branch box, connectable citymulti indoor units are 3; connecting 8 indoor units via branch box, connectable citymulti indoor units are 2.

*2 Refer to “2-1. UNIT CONSTRUCTION” or “2-2. UNIT CONSTRUCTION (BRANCH BOX SYSTEM)”, for more detail.

2-4. UNIT SPECIFICATIONS

(1) Outdoor Unit

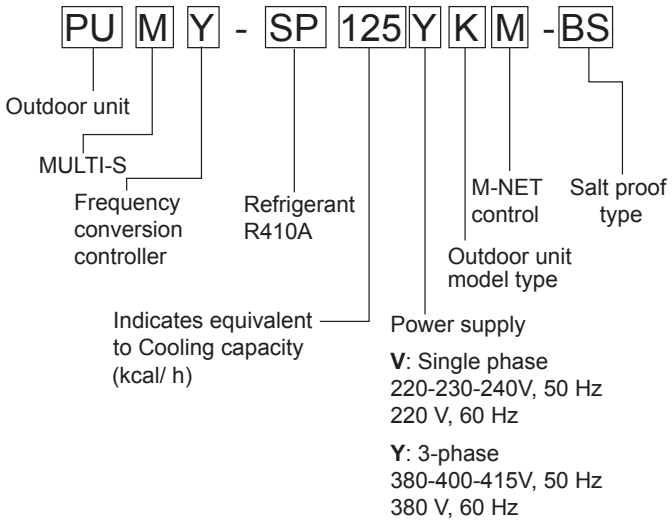
Outdoor unit		PUMY-SP112VKM.TH(-BS) PUMY-SP112YKM.TH(-BS) PUMY-SP112VKMR1.TH(-BS) PUMY-SP112YKMR1.TH(-BS)	PUMY-SP125VKM.TH(-BS) PUMY-SP125YKM.TH(-BS) PUMY-SP125VKMR1.TH(-BS) PUMY-SP125YKMR1.TH(-BS)	PUMY-SP140VKM.TH(-BS) PUMY-SP140YKM.TH(-BS) PUMY-SP140VKMR1.TH(-BS) PUMY-SP140YKMR1.TH(-BS)
Capacity	Cooling (kW)	12.5	14.0	15.5
	Heating (kW)	14.0	16.0	16.5
Compressor (kW)		3.1	3.5	3.7

Cooling capacity indicates the maximum value at operation under the following condition.

*Cooling Indoor : D.B. 27°C/W.B. 19.0°C
Outdoor : D.B. 35°C
*Heating Indoor : D.B. 20°C
Outdoor : D.B. 7°C/W.B. 6°C

(2) Method for identifying MULTI-S model

■ **Outdoor unit <When using model 125 >**



(3) Operating temperature range

	Cooling	Heating
Indoor-side intake air temperature	W.B. 15 to 24°C	D.B. 15 to 27℃
Outdoor-side intake air temperature	D.B. -5 to 52℃ *1	W.B. -20 to 15℃

Note: D.B. : Dry Bulb Temperature
W.B. : Wet Bulb Temperature

*1 10 to 52°C D.B. °C : When connecting PKFY-P15/20/25VBM, PFFY-P20/25/32VKM, PFFY-P20/25/32VLE(R)M, PEFY-P25/32/40VMA3-E, M series , S series , and P series type indoor unit with branch box , M series type indoor unit with connection kit.

■ When connecting fresh air type indoor unit

	Capacity of Fresh air type indoor	Cooling	Heating
Indoor-side and Outdoor-side intake air temperature	P80	D.B. 21 to 43℃ *2 W.B. 15.5 to 35℃	D.B. -10 to 20℃*3
	P140	D.B. 21 to 43℃ *2 W.B. 15.5 to 35℃	D.B. -5 to 20℃*3

*1 Thermo-OFF (FAN-mode) automatically starts if the outdoor temp. is lower than 21℃ D.B..

*2 Thermo-OFF (FAN-mode) automatically starts if the outdoor temp. is lower than 21°C D.B.
*3 Thermo-OFF (FAN-mode) automatically starts if the outdoor temp. is lower than 20°C D.B.

3 SPECIFICATIONS

Model					PUMY-SP112VKM(R1).TH(-BS)			PUMY-SP125VKM(R1).TH(-BS)			PUMY-SP140VKM(R1).TH(-BS)		
Power source					1-phase 220-230-240 V, 50 Hz; 1-phase 220 V, 60 Hz								
					220	230	240	220	230	240	220	230	240
					50/60	50	50	50/60	50	50	50/60	50	50
Cooling capacity (Nominal)		kW*1			12.5			14.0			15.5		
		kcal/h*1			10,750			12,040			13,330		
		BTU/h*1			42,650			47,768			52,886		
	Power input	kW			3.10			3.84			4.70		
	Current input	A			14.38	13.75	13.18	17.81	17.04	16.33	21.80	20.85	19.98
	COP	kW/kW			4.03			3.65			3.30		
Temp. range of cooling	Indoor temp.	W.B.			15 to 24°C								
	Outdoor temp.	D.B.			-5 to 52°C *3,*4								
Heating capacity (Nominal)		kW*2			14.0			16.0			16.5		
		kcal/h*2			12,040			13,760			14,190		
		BTU/h*2			47,768			54,592			56,298		
	Power input	kW			3.17			3.90			4.02		
	Current input	A			14.70	14.06	13.48	18.09	17.30	16.58	18.65	17.83	17.09
	COP	kW/kW			4.42			4.10			4.10		
Temp. range of heating	Indoor temp.	D.B.			15 to 27°C								
	Outdoor temp.	W.B.			-20 to 15°C								
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity								
	Model/ Quantity	City multi			15-140/9			15-140/10			15-140/12		
		Branch box			15-100/8			15-100/8			15-100/8		
		"Mixed system"	Branch box 1 unit	City multi	15-140/5			15-140/5			15-140/5		
				Branch box	15-100/5			15-100/5			15-100/5		
			Branch box 2 units	City multi	15-140/3 or 2 *7			15-140/3			15-140/3		
				Branch box	15-100/7 or 8 *7			15-100/8			15-100/8		
Sound pressure level (measured in anechoic room)		dB <A>			52/54			53/56			54/56		
Power pressure level (measured in anechoic room)		dB <A>			72/74			73/76			74/76		
Refrigerant piping diameter	Liquid pipe	mm (inch)			9.52 (3/8)								
	Gas pipe	mm (inch)			15.88 (5/8)								
FAN *2	Type × Quantity				Propeller Fan × 1								
	Air flow rate	m³/min			77			83			83		
		L/s			1283			1383			1383		
		cfm			2719			2931			2931		
	Control, Driving mechanism				DC control								
	Motor output	kW			0.20 × 1								
	External static press.				0								
Compressor	Type × Quantity				Twin rotary hermetic compressor × 1								
	Manufacturer				Mitsubishi Electric Corporation								
	Starting method				Inverter								
	Capacity control	%			Cooling 26 to 100 Heating 20 to 100			Cooling 24 to 100 Heating 18 to 100			Cooling 21 to 100 Heating 17 to 100		
	Motor output	kW			3.1			3.5			3.7		
	Case heater	kW			0								
	Lubricant				FV50S (1.4litter)								
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1								
External dimension H × W × D		mm			981 × 1,050 × 330(+40)								
		inch			38-5/8 × 41-3/8 × 13 (+1-37/64)								
Protection devices	High pressure protection				High pressure Switch								
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection(Heat sink thermistor)								
	Compressor				Compressor thermistor, Overcurrent detection								
	Fan motor				Overheating, Voltage protection								
Refrigerant	Type × original charge				R410A 3.5 kg								
	Control				Electronic expansion valve								
Net weight		kg (lb)			93 (205) *8								
Heat exchanger					Cross Fin and Copper tube								
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit								
Defrosting method					Reversed refrigerant circuit								
Drawing	External				RK01B171								
	Wiring				BH79J995								
Standard attachment	Document				Installation Manual								
	Accessory				Grounded lead wire × 2								
Optional parts					Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E								

Remarks *1 Nominal cooling conditions *2 Nominal heating conditions

Indoor:	27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]	20°C D.B. [68°F D.B.]
Outdoor:	35°C D.B. [95°F D.B.]	7°C DB/6°C W.B. [45°F D.B./43°F W.B.]
Pipe length:	7.5 m [24-9/16 ft]	7.5 m [24-9/16 ft]
Level difference:	0 m [0 ft]	0 m [0 ft]

*3 10 to 52°C(D.B):, when connecting following models: PKFY-P15/20/25VBM, PFFY-P20/25/32VLE(R)M, PFFY-P20/25/32VKM, and M series , S series , and P series type indoor unit with branch box , M series type indoor unit with connection kit.

*4 −15 to 52°C(D.B):, when using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor unit listed in *3.

*5 Up to P100 when connecting via branch box.

*6 Up to 11 units when connecting via 2 branch boxes.

*7 When connecting 7 indoor units via branch box, connectable citymulti indoor units are 3; connecting 8 indoor units via branch box, connectable citymulti indoor units are 2.

*8 94 (207), for PUMY-SP112/125/140VKM(R1).TH-BS.

Notes :1. Nominal conditions *1, *2 are subject to ISO 15042.

2. Due to continuing improvement, above specifications may be subject to change without notice.

Unit converter

kcal/h = kW × 860
BTU/h = kW × 3,412
cfm = m³/min × 35.31
lb = kg/0.4536

Above specification data is subject to rounding variation.

Model					PUMY-SP112YKM(R1).TH(-BS)			PUMY-SP125YKM.(R1)TH(-BS)			PUMY-SP140YKM(R1).TH(-BS)		
Power source					3-phase380-400-415V, 50 Hz; 3-phase 380 V, 60 Hz								
					380	400	415	380	400	415	380	400	415
					50/60	50	50	50/60	50	50	50/60	50	50
Cooling capacity (Nominal)		kW*1			12.5			14.0			15.5		
		kcal/h*1			10,750			12,040			13,330		
		BTU/h*1			42,650			47,768			52,886		
	Power input	kW			3.10			3.84			4.70		
	Current input	A			4.96	4.71	4.54	6.14	5.83	5.62	7.52	7.14	6.88
	COP	kW/kW			4.03			3.65			3.30		
Temp. range of cooling	Indoor temp.	W.B.			15 to 24°C								
	Outdoor temp.	D.B.			-5 to 52°C *3,*4								
Heating capacity (Nominal)		kW*2			14.0			16.0			16.5		
		kcal/h*2			12,040			13,760			14,190		
		BTU/h*2			47,768			54,592			56,298		
	Power input	kW			3.17			3.90			4.02		
	Current input	A			5.07	4.82	4.64	6.24	5.93	5.71	6.43	6.11	5.89
	COP	kW/kW			4.42			4.10			4.10		
Temp. range of heating	Indoor temp.	D.B.			15 to 27°C								
	Outdoor temp.	W.B.			-20 to 15°C								
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity								
	Model/ Quantity	City multi			15-140/9			15-140/10			15-140/12		
		Branch box			15-100/8			15-100/8			15-100/8		
		Mixed system	Branch box	City multi	15-140/5			15-140/5			15-140/5		
			1 unit	Branch box	15-100/5			15-100/5			15-100/5		
			Branch box	City multi	15-140/3 or 2 *7			15-140/3			15-140/3		
			2 units	Branch box	15-100/7 or 8 *7			15-100/8			15-100/8		
Sound pressure level (measured in anechoic room)		dB <A>			52/54			53/56			54/56		
Power pressure level (measured in anechoic room)		dB <A>			72/74			73/76			74/76		
Refrigerant piping diameter	Liquid pipe	mm (inch)			9.52 (3/8)								
	Gas pipe	mm (inch)			15.88 (5/8)								
FAN *2	Type × Quantity				Propeller Fan × 1								
	Air flow rate	m³/min			77			83			83		
		L/s			1283			1383			1383		
		cfm			2719			2931			2931		
	Control, Driving mechanism				DC control								
	Motor output	kW			0.20 × 1								
	External static press.				0								
Compressor	Type × Quantity				Twin rotary hermetic compressor × 1								
	Manufacturer				Mitsubishi Electric Corporation								
	Starting method				Inverter								
	Capacity control	%			Cooling 26 to 100 Heating 20 to 100			Cooling 24 to 100 Heating 18 to 100			Cooling 21 to 100 Heating 17 to 100		
	Motor output	kW			3.1			3.5			3.7		
	Case heater	kW			0								
	Lubricant				FV50S (1.4litter)								
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1								
External dimension H × W × D		mm			981 × 1,050 × 330(+40)								
		inch			38-5/8 × 41-3/8 × 13 (+1-37/64)								
Protection devices	High pressure protection				High pressure Switch								
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection(Heat sink thermistor)								
	Compressor				Compressor thermistor, Overcurrent detection								
	Fan motor				Overheating, Voltage protection								
Refrigerant	Type × original charge				R410A 3.5 kg								
	Control				Electronic expansion valve								
Net weight		kg (lb)			94 (207) *8								
Heat exchanger					Cross Fin and Copper tube								
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit								
Defrosting method					Reversed refrigerant circuit								
Drawing	External				RK01B171								
	Wiring				BH79J996								
Standard attachment	Document				Installation Manual								
	Accessory				Grounded lead wire × 2								
Optional parts					Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E								

Remarks

	*1 Nominal cooling conditions	*2 Nominal heating conditions
Indoor :	27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]	20°C D.B. [68°F D.B.]
Outdoor :	35°C D.B. [95°F D.B.]	7°C DB/6°C W.B. [45°F D.B./43°F W.B.]
Pipe length :	7.5 m [24-9/16 ft]	7.5 m [24-9/16 ft]
Level difference :	0 m [0 ft]	0 m [0 ft]

*3 10 to 52°C(D.B):, when connecting following models: PKFY-P15/20/25VBM, PFFY-P20/25/32VLE(R)M, PFFY-P20/25/32VKM, and M series , S series , and P series type indoor unit with branch box , M series type indoor unit with connection kit.

*4 −15 to 52°C(D.B):, when using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor unit listed in *3.

*5 Up to P100 when connecting via branch box.

*6 Up to 11 units when connecting via 2 branch boxes.

*7 When connecting 7 indoor units via branch box, connectable citymulti indoor units are 3; connecting 8 indoor units via branch box, connectable citymulti indoor units are 2.

*8 95 (209), for PUMY-SP112/125/140YKM(R1).TH-BS.

Notes : 1. Nominal conditions *1, *2 are subject to ISO 15042.

2. Due to continuing improvement, above specifications may be subject to change without notice.

Unit converter

kcal/h = kW × 860
BTU/h = kW × 3,412
cfm = m³/min × 35.31
lb = kg/0.4536

Above specification data is subject to rounding variation.

4 DATA

4-1. SELECTION OF COOLING/HEATING UNITS

<Cooling>

Design Condition	
Outdoor Design Dry Bulb Temperature	**44.7ºC**
Total Cooling Load	**9.0 kW**
Room1	
Indoor Design Dry Bulb Temperature	**27ºC**
Indoor Design Wet Bulb Temperature	**20ºC**
Cooling Load	**4.0 kW**
Room2	
Indoor Design Dry Bulb Temperature	**24ºC**
Indoor Design Wet Bulb Temperature	**18ºC**
Cooling Load	**4.5 kW**
<Other>	
Indoor/Outdoor Equivalent Piping Length	**60 m**

Capacity of indoor unit

P•FY Series	**Model Number for indoor unit**	**Model 15**	**Model 20**	**Model 25**	**Model 32**	**Model 40**	**Model 50**	**Model 63**	**Model 71**	**Model 80**	**Model 100**	**Model 125**	**Model 140**
	Model Capacity	1.7	2.2	2.8	3.6	4.5	5.6	7.1	8.0	9.0	11.2	14.0	16.0
M Series S Series P Series	**Model Number for indoor unit [kW type]**	**Model 15**	**Model 18**	**Model 20**	**Model 22**	**Model 25**	**Model 35**	**Model 42**	**Model 50**	**Model 60**	**Model 71**	**Model 80**	**Model 100**
	Model Capacity	1.5	1.8	2.0	2.2	2.5	3.5	4.2	5.0	6.0	7.1	8.0	10.0

1. Cooling Calculation

(1) Temporary Selection of Indoor Units

Room1

PEFY-P40 **4.5 kW (Rated)**

Room2

PEFY-P50 **5.6 kW (Rated)**

(2) Total Indoor Units Capacity

P40 + P50 = P90

(3) Selection of Outdoor Unit

The SP112 outdoor unit is selected as total indoor units capacity is P90

PUMY-SP112 **12.5 kW**

(4) Total Indoor Units Capacity Correction Calculation

Room1

Indoor Design Wet Bulb Temperature Correction (20ºC) 1.03 (Refer to Figure 1)

Room2

Indoor Design Wet Bulb Temperature Correction (18ºC) 0.94 (Refer to Figure 1)

Total Indoor Units Capacity (CTi)

CTi = Σ (Indoor Unit Rating × Indoor Design Temperature Correction)

= 4.5 × 1.03 + 5.6 × 0.94

= 9.9 kW

(5) Outdoor Unit Correction Calculation

Outdoor Design Dry Bulb Temperature Correction (44.7ºC) 0.88 (Refer to Figure 2)

Piping Length Correction (60 m) 0.88 (Refer to Figure 3)

Total Outdoor Unit Capacity (CTo)

CTo = Outdoor Rating × Outdoor Design Temperature Correction × Piping Length Correction

= 12.5 × 0.88 × 0.88

= 9.7 kW

(6) Determination of Maximum System Capacity

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

CTi = 9.9 > CTo = 9.7, thus, select CTo.

CTx = CTo = 9.7 kW

(7) Comparison with Essential Load

Against the essential load 9.0kW, the maximum system capacity is 9.7 kW: Proper outdoor units have been selected.

(8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTo, thus, calculate by the calculation below

Room1

Maximum Capacity × Room1 Capacity after the Temperature Correction/(Room1,2 Total Capacity after the Temperature Correction

= 9.7 × (4.5 × 1.03)/(4.5 × 1.03 + 5.6 × 0.94)

= 4.5 kW **OK: fulfills the load 4.0 kW**

Room2

Maximum Capacity × Room2 Capacity after the Temperature Correction/(Room1,2 Total Capacity after the Temperature Correction)

= 9.7 × (5.6 × 0.94)/(4.5 × 1.03 + 5.6 × 0.94)

= 5.1 kW **OK: fulfills the load 4.5 kW**

Note: If CTx = CTi, please refer to the <Heating> section to calculate the Maximum Indoor Unit Capacity of Each Room.

Go on to the heating trial calculation since the selected units fulfill the cooling loads of Room 1, 2.

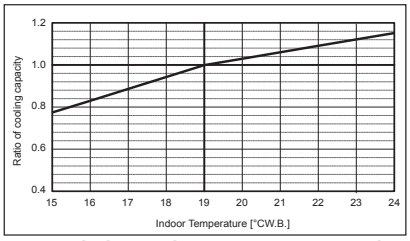


Figure 1 **Indoor unit temperature correction**
To be used to correct indoor unit only

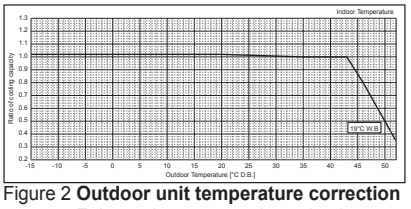


Figure 2 **Outdoor unit temperature correction**
To be used to correct outdoor unit only

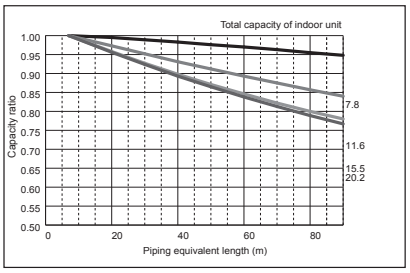


Figure 3 **Correction of refrigerant piping length**

<Heating>

Design Condition	
Outdoor Design Wet Bulb Temperature	**2ºC**
Total Heating Load	**10.3 kW**
Room1	
Indoor Design Dry Bulb Temperature	**21ºC**
Heating Load	**4.8 kW**
Room2	
Indoor Design Dry Bulb Temperature	**23ºC**
Heating Load	**5.5 kW**
<Other>	
Indoor/Outdoor Equivalent Piping Length	**100 m**

Capacity of indoor unit

P•FY Series	**Model Number for indoor unit**	**Model 15**	**Model 20**	**Model 25**	**Model 32**	**Model 40**	**Model 50**	**Model 63**	**Model 71**	**Model 80**	**Model 100**	**Model 125**	**Model 140**
	Model Capacity	1.9	2.5	3.2	4.0	5.0	6.3	8.0	9.0	10.0	12.5	16.0	18.0
M Series S Series P Series	**Model Number for indoor unit [kW type]**	**Model 15**	**Model 18**	**Model 20**	**Model 22**	**Model 25**	**Model 35**	**Model 42**	**Model 50**	**Model 60**	**Model 71**	**Model 80**	**Model 100**
	Model Capacity	1.7	2.1	2.3	2.5	2.9	4.0	4.8	5.7	6.9	8.1	9.3	11.2

2. Heating Calculation

(1) Temporary Selection of Indoor Units

Room1

PEFY-P40 **5.0 kW (Rated)**

Room2

PEFY-P50 **6.3 kW (Rated)**

(2) Total Indoor Units Capacity

P40 + P50 = P90

(3) Selection of Outdoor Unit

The SP112 outdoor unit is selected as total indoor units capacity is P90

PUMY-SP112 **14.0 kW**

(4) Total Indoor Units Capacity Correction Calculation

Room1

Indoor Design Dry Bulb Temperature Correction (21ºC) 0.96 (Refer to Figure 4)

Room2

Indoor Design Dry Bulb Temperature Correction (23ºC) 0.88 (Refer to Figure 4)

Total Indoor Units Capacity (CTi)

CTi = Σ (Indoor Unit Rating × Indoor Design Temperature Correction)

= 5.0 × 0.96 + 6.3 × 0.88

= 10.3 kW

(5) Outdoor Unit Correction Calculation

Outdoor Design Wet Bulb Temperature Correction (2ºC) 1.0 (Refer to Figure 5)

Piping Length Correction (100 m) 0.94 (Refer to Figure 6)

Defrost Correction 0.89 (Refer to Table 1)

Total Outdoor Unit Capacity (CTo)

CTo = Outdoor Unit Rating × Outdoor Design Temperature Correction × Piping Length Correction × Defrost Correction

= 14.0 × 1.0 × 0.94 × 0.89

= 11.7 kW

(6) Determination of Maximum System Capacity

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

CTi = 10.3 < CTo = 11.7, thus, select CTi.

CTx = CTi = 10.3 kW

(7) Comparison with Essential Load

Against the essential load 10.3kW, the maximum system capacity is 10.3 kW: Proper indoor units have been selected.

(8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTo, thus, calculate by the calculation below

Room1

Indoor Unit Rating × Indoor Design Temperature Correction

= 5.0 × 0.96

= 4.8 kW **OK: fulfills the load 4.8 kW**

Room2

Indoor Unit Rating × Indoor Design Temperature Correction

= 6.3× 0.88

= 5.5 kW **OK: fulfills the load 5.5 kW**

Note: If CTx = CTo, please refer to the <Cooling> section to calculate the Maximum Indoor Unit Capacity of Each Room. Completed selecting units since the selected units fulfill the heating loads of Room 1, 2.

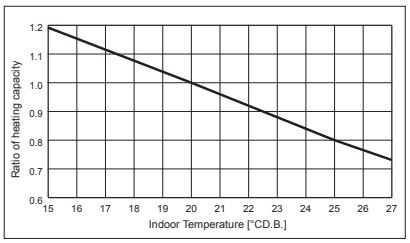


Figure 4 **Indoor unit temperature correction**
To be used to correct indoor unit only

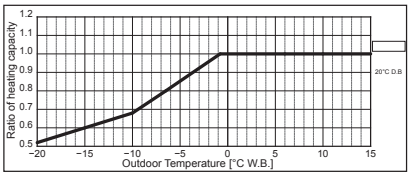


Figure 5 **Outdoor unit temperature correction**
To be used to correct outdoor unit only

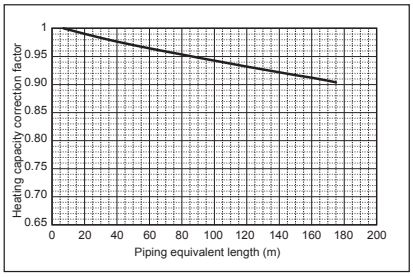


Figure 6 **Correction of refrigerant piping length**

Table 1 Table of correction factor at frost and defrost

Outdoor inlet air temp. °C	6	4	2	0	−2	−4	−6	−8	−10	−15	−20
PUMY-SP112,125,140VKM	1.0	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95
PUMY-SP112,125,140YKM	1.0	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95

4-2. CORRECTION BY TEMPERATURE

CITY MULTI could have varied capacity at different designing temperature. Using the nominal cooling capacity value and the ratio below, the capacity can be observed at various temperature.

<Cooling>

		PUMY-SP•V(Y)KM.TH(-BS)		
		112	125	140
Nominal cooling capacity	kW	12.5	14.0	15.5
	BTU/h	42,700	47,800	52,900
Input	kW	3.10	3.84	4.70

Figure 7 Indoor unit temperature correction
To be used to correct indoor unit capacity only

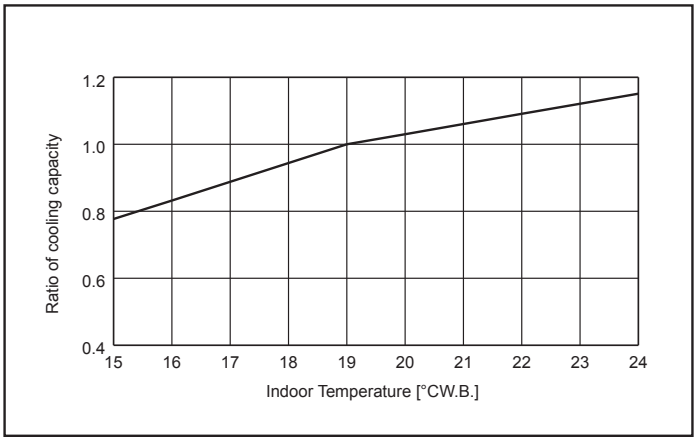
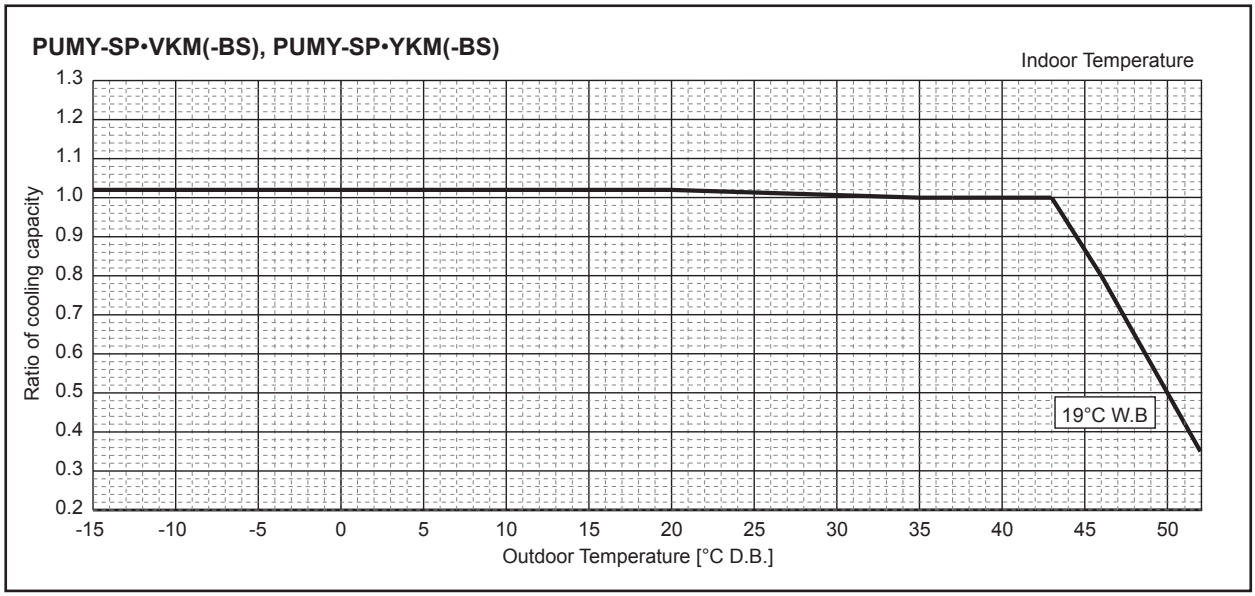


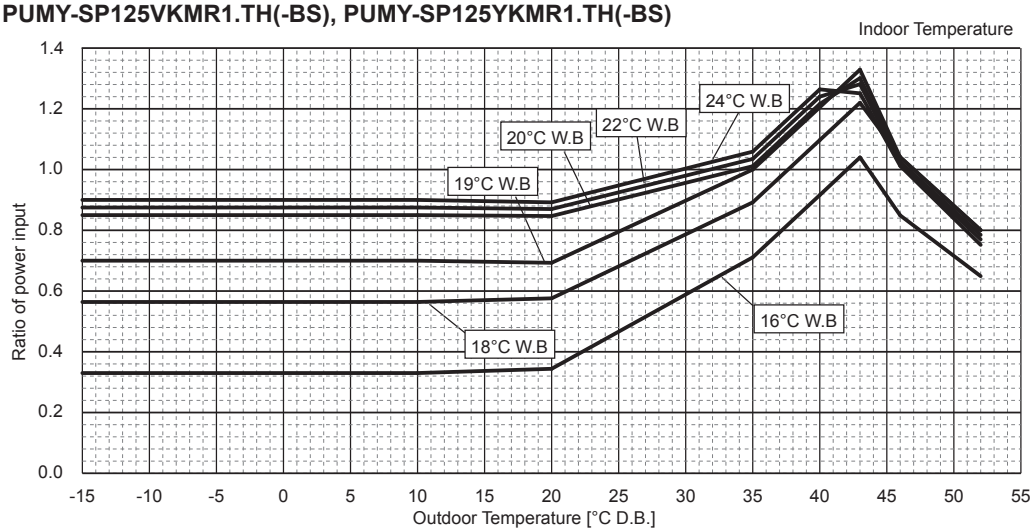
Figure 8 Outdoor unit temperature correction
To be used to correct outdoor unit capacity only



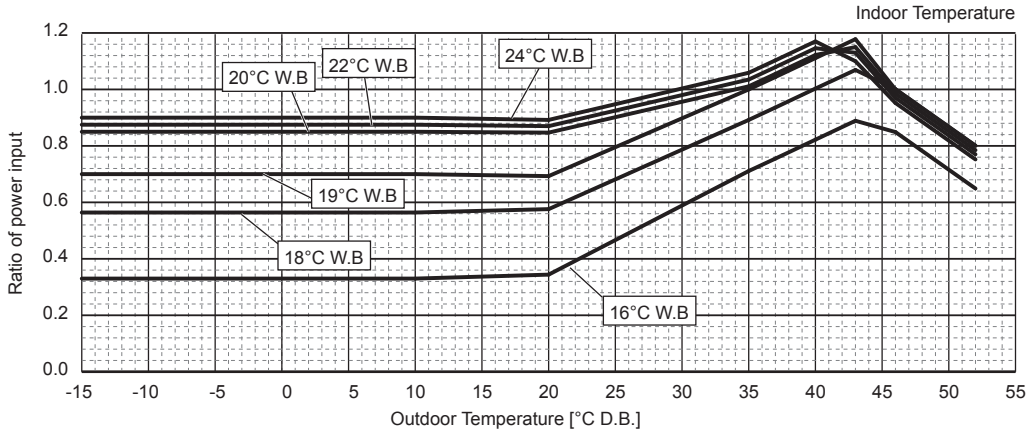
Continue to the next page

Figure 9 Outdoor unit temperature correction
To be used to correct outdoor unit capacity only

PUMY-SP112VKM.TH(-BS), PUMY-SP112YKM.TH(-BS)
PUMY-SP112VKMR1.TH(-BS), PUMY-SP112YKMR1.TH(-BS)
PUMY-SP125VKM.TH(-BS), PUMY-SP125YKM.TH(-BS)
PUMY-SP125VKMR1.TH(-BS), PUMY-SP125YKMR1.TH(-BS)



PUMY-SP140VKM.TH(-BS), PUMY-SP140YKM.TH(-BS)
PUMY-SP140VKMR1.TH(-BS), PUMY-SP140YKMR1.TH(-BS)



<Heating>

		PUMY-SP・V(Y)KM.TH(-BS)		
		112	125	140
Nominal heating capacity	kW	14.0	16.0	16.5
	BTU/h	47,768	54,592	56,298
Input	kW	3.17	3.90	4.02

Figure 10 Indoor unit temperature correction
To be used to correct indoor unit capacity only

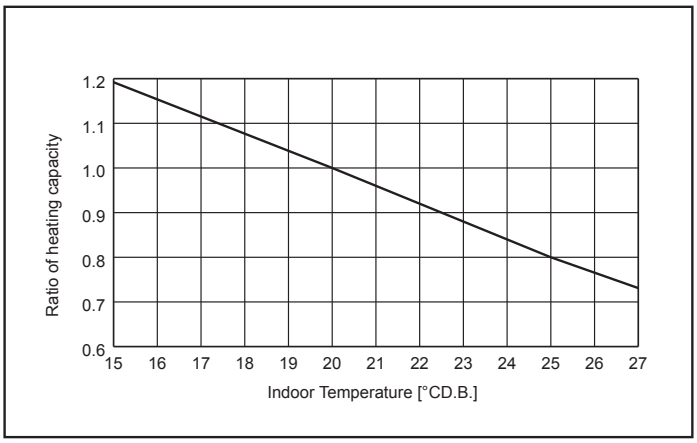
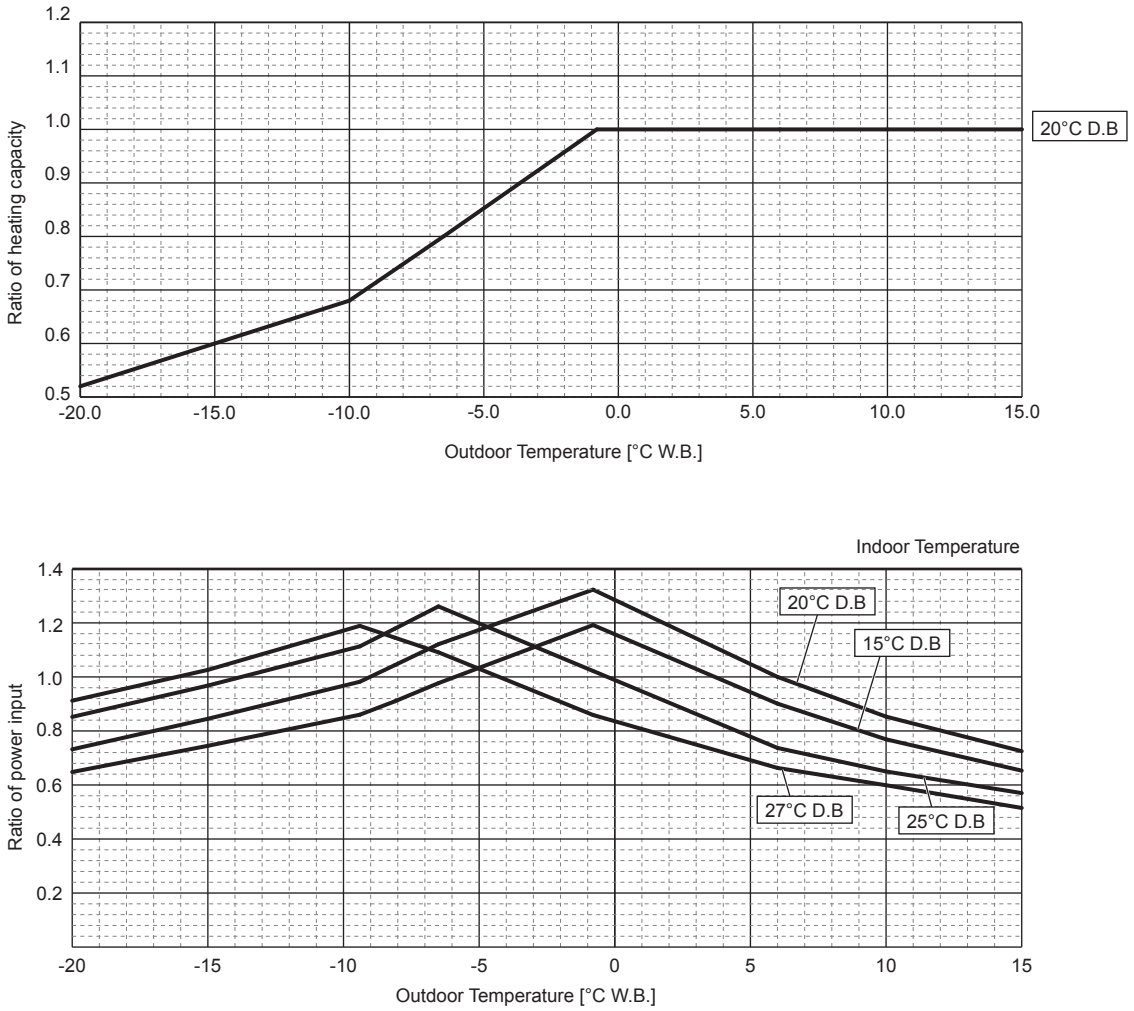


Figure11 Outdoor unit temperature correction
To be used to correct outdoor unit capacity only



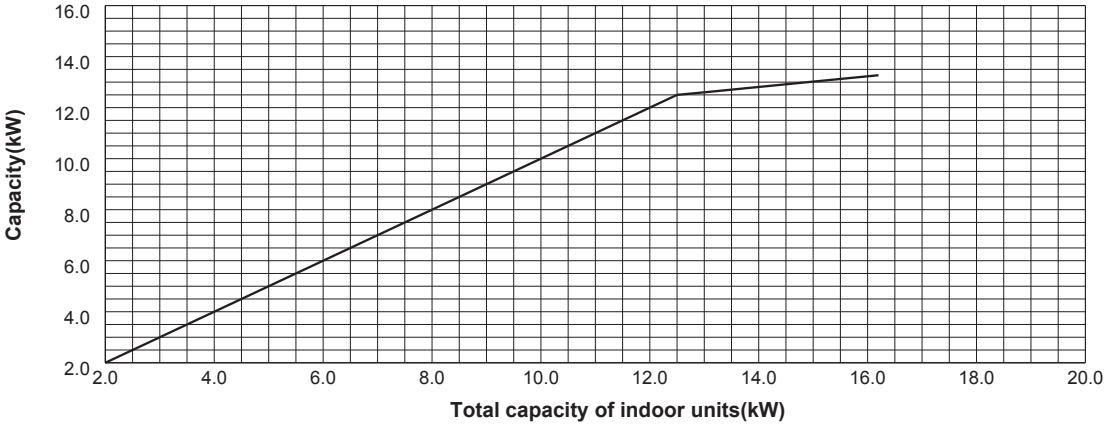
4-3. STANDARD OPERATION DATA (REFERENCE DATA)

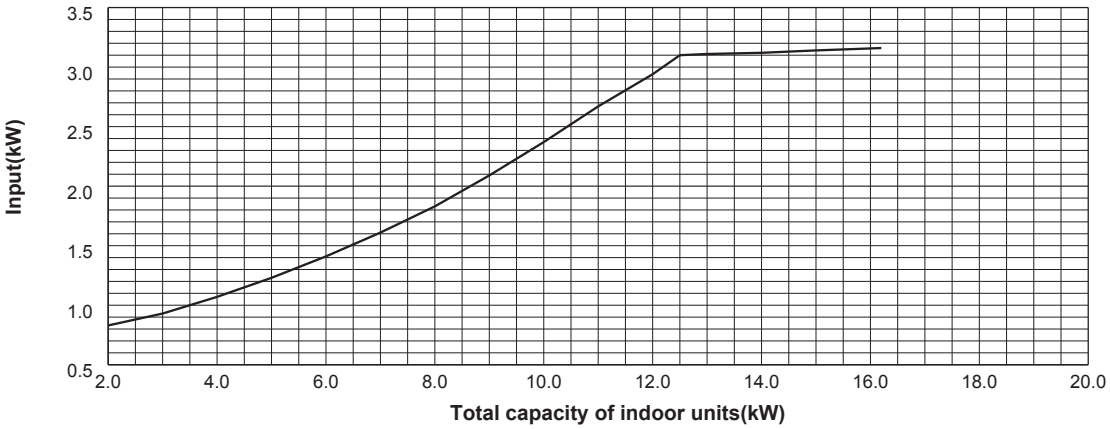
Operation				PUMY-SP112VKM.TH(-BS) PUMY-SP112VKMR1.TH(-BS) PUMY-SP112YKM.TH(-BS) PUMY-SP112YKMR1.TH(-BS)		PUMY-SP125VKM.TH(-BS) PUMY-SP125VKMR1.TH(-BS) PUMY-SP125YKM.TH(-BS) PUMY-SP125YKMR1.TH(-BS)		PUMY-SP140VKM.TH(-BS) PUMY-SP140VKMR1.TH(-BS) PUMY-SP140YKM.TH(-BS) PUMY-SP140YKMR1.TH(-BS)	
Operating conditions	Ambient temperature	Indoor	DB/ WB	27/19°C	20°C	27/19°C	20°C	27/19°C	20°C
		Outdoor		35°C	7/6°C	35°C	7/6°C	35°C	7/6°C
	Indoor unit	No. of connected units	Unit	4		4		4	
		No. of units in operation		4		4		4	
		Model	—	25×2 + 32×2		25×1 + 32×3		32×2 + 40×2	
	Piping	Main pipe	m	5		5		5	
		Branch pipe		2.5		2.5		2.5	
		Total pipe length		15		15		15	
	Fan speed		—	Hi		Hi		Hi	
	Amount of refrigerant		kg	6.5		6.5		6.5	
Outdoor unit	Electric current		A	15.69	14.88	18.78	18.38	22.27	19.62
	Voltage		V	230	230	230	230	230	230
	Compressor frequency		Hz	57	74	65	84	73	88
LEV opening	Indoor unit		Pulse	226	396	264	335	262	358
Pressure	High pressure/Low pressure		MPaG	2.96/1.08	1.93/0.63	3.12/1.02	2.06/0.60	3.25/0.99	2.08/0.60
Temp. of each section	Outdoor unit	Discharge	°C	67.6	43.1	81.6	46.4	83.9	47.6
		Heat exchanger outlet		48.5	2.0	49.9	1.3	51.2	-0.3
		Accumulator inlet		14.8	-1.2	17.6	-2.0	15.4	-2.4
		Compressor inlet		15.7	-1.6	19.6	-2.7	17.5	-2.8
	Indoor unit	LEV inlet		30.6	25.2	32.7	44.6	33.7	45.0
		Heat exchanger inlet		16.6	39.2	14.5	24.4	14.3	26.5

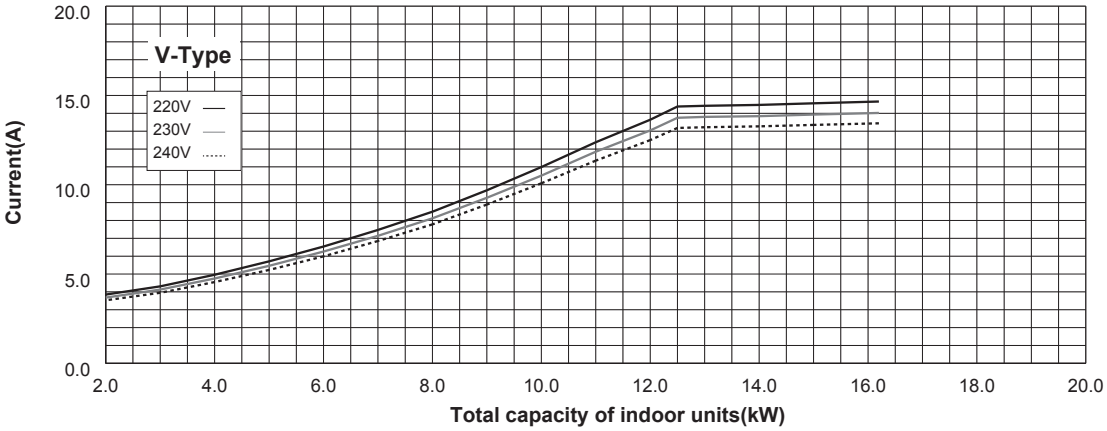
4-4. STANDARD CAPACITY DIAGRAM

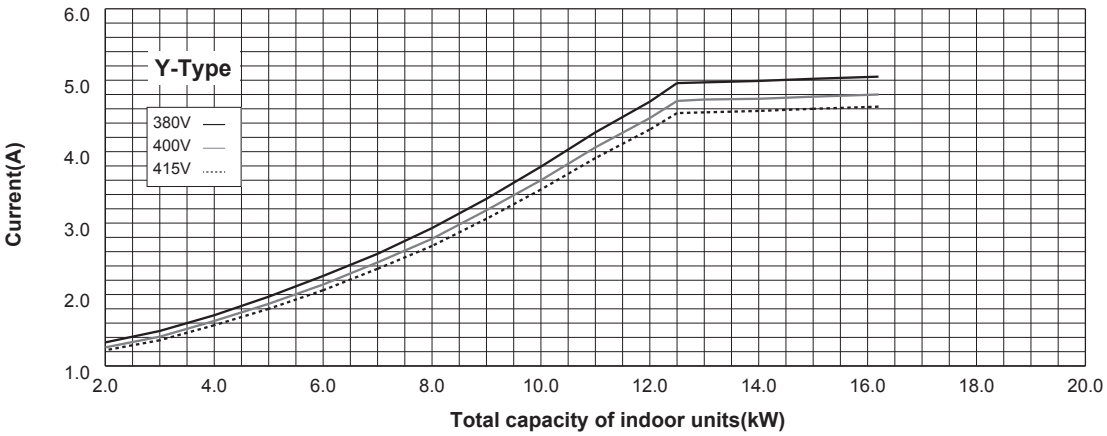
4-4-1. PUMY-SP112VKM.TH(-BS) PUMY-SP112YKM.TH(-BS) <cooling>
PUMY-SP112VKMR1.TH(-BS) PUMY-SP112YKMR1.TH(-BS)

Before calculating the sum of total capacity of indoor units, please convert the value into the kW model capacity following the formula on "4-1-1. Method for obtaining system cooling capacity".

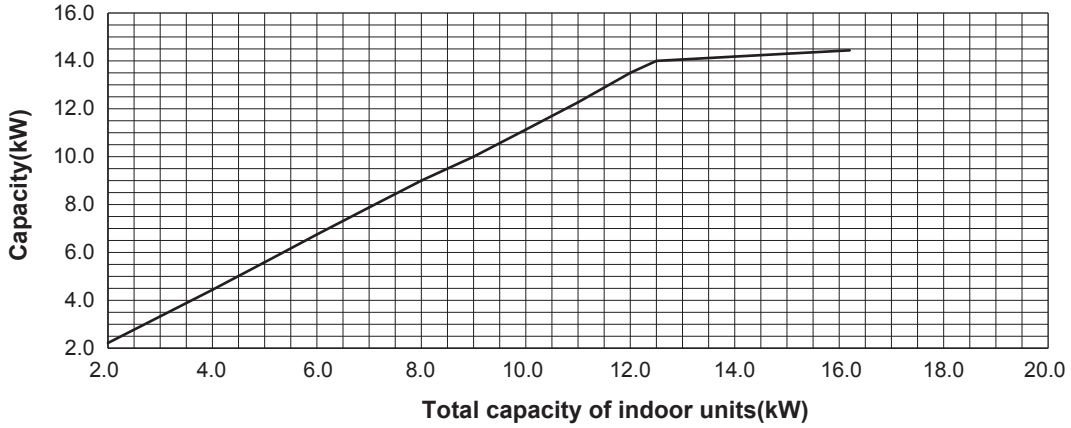


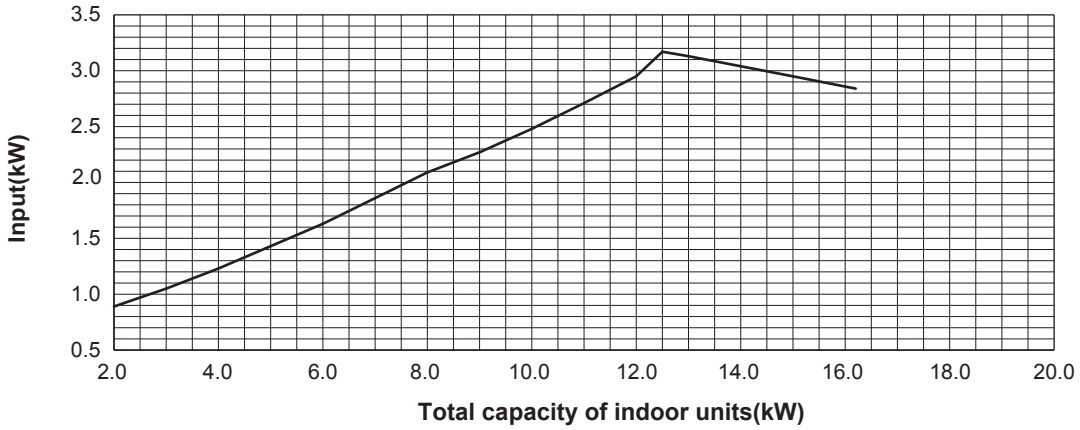


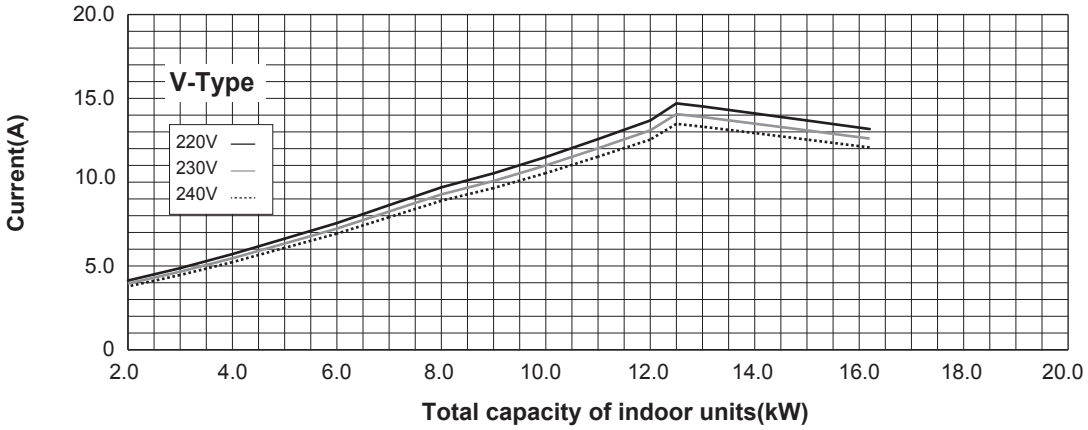


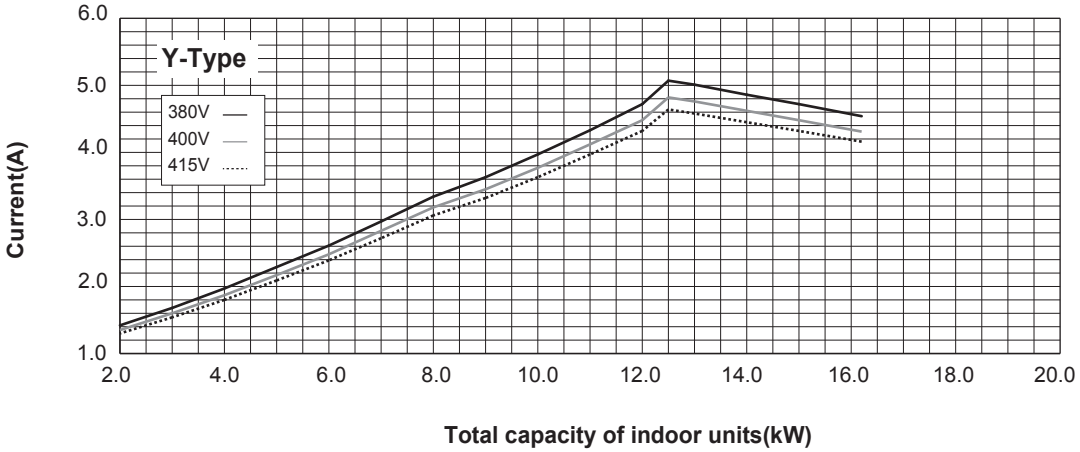


4-4-2. PUMY-SP112VKM.TH(-BS) PUMY-SP112YKM.TH(-BS) <heating>
PUMY-SP112VKMR1.TH(-BS) PUMY-SP112YKMR1.TH(-BS)



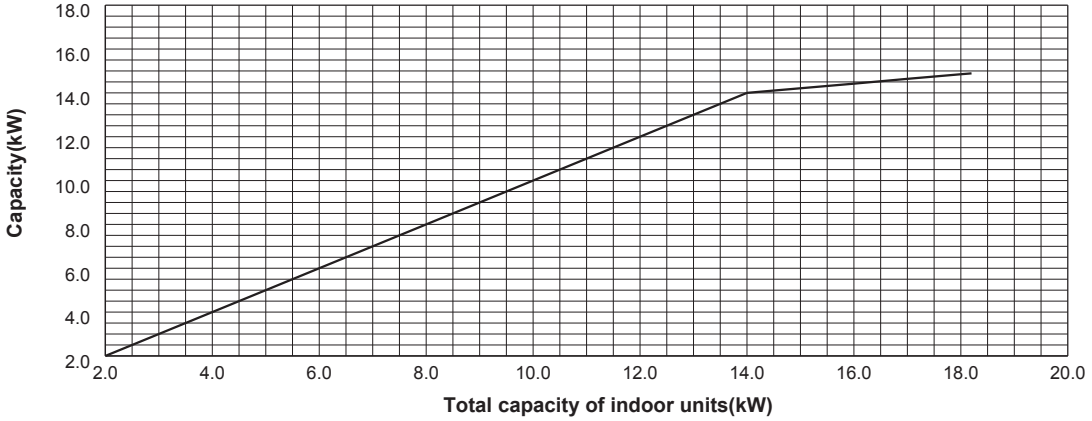


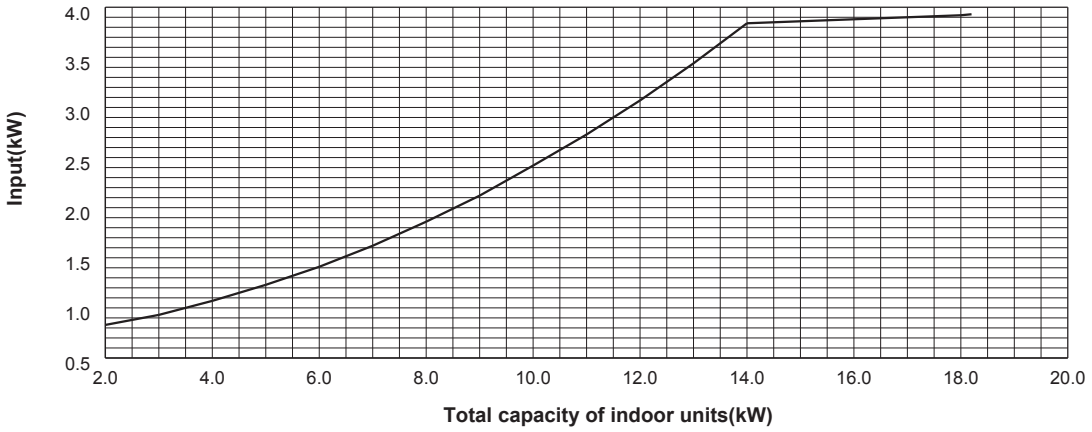


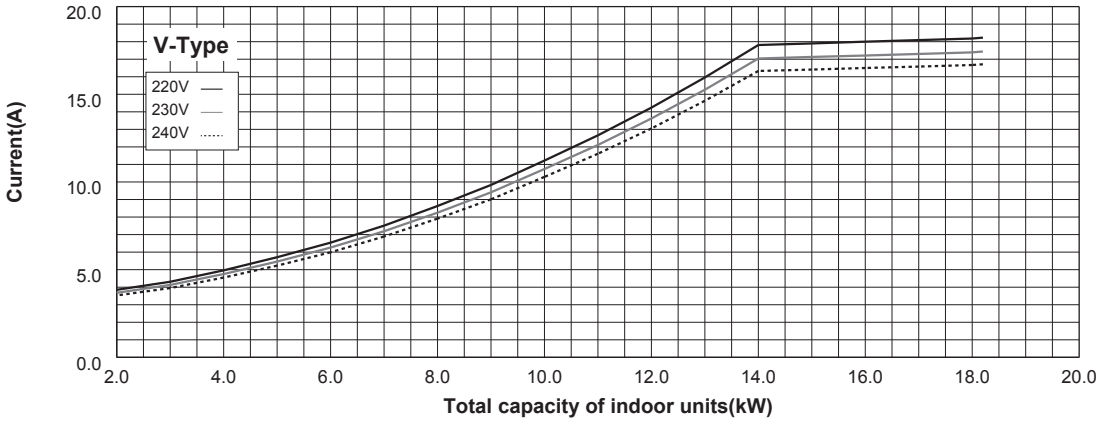


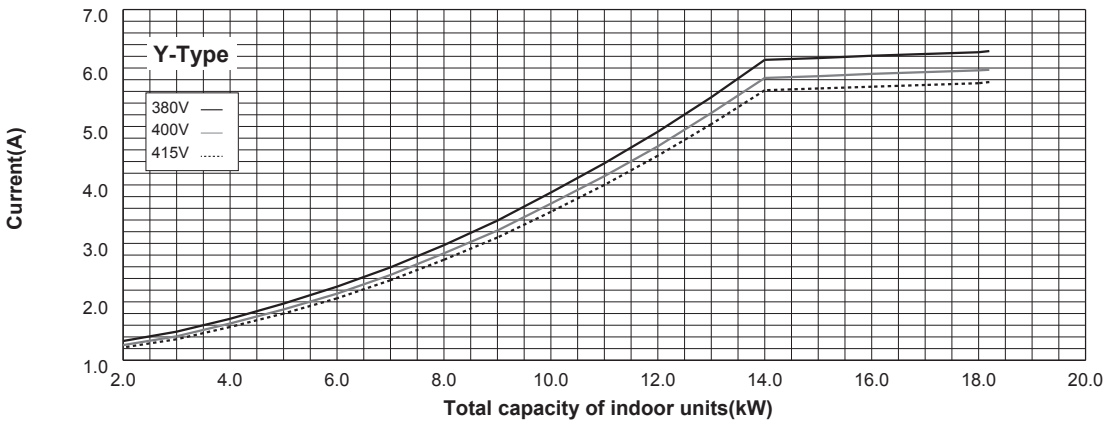
4-4-3. PUMY-SP125VKM.TH(-BS) PUMY-SP125YKM.TH(-BS) <cooling>
PUMY-SP125VKMR1.TH(-BS) PUMY-SP125YKMR1.TH(-BS)

Before calculating the sum of total capacity of indoor units, please convert the value into the kW model capacity following the formula on "4-1-1. Method for obtaining system cooling capacity".

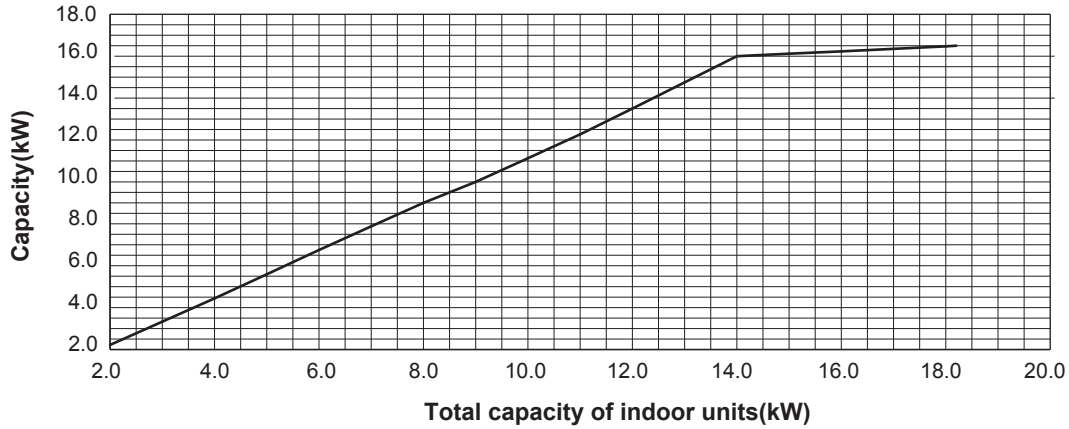


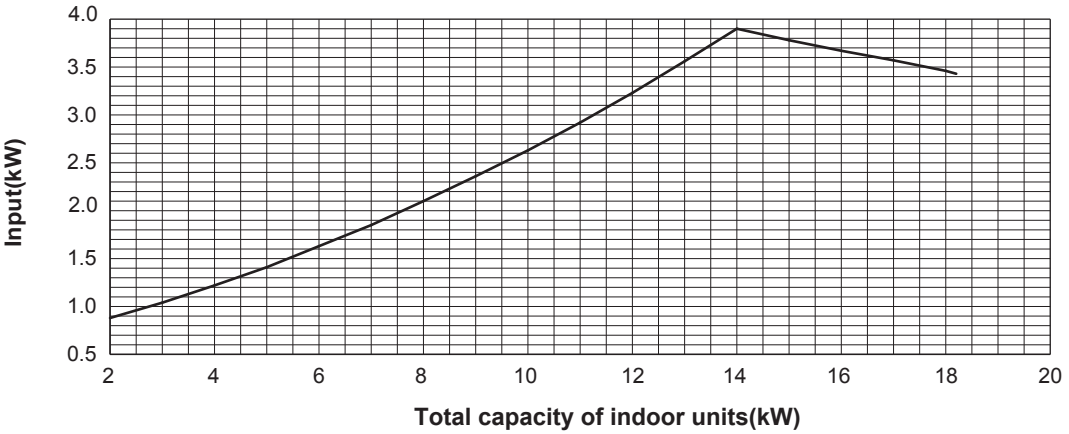


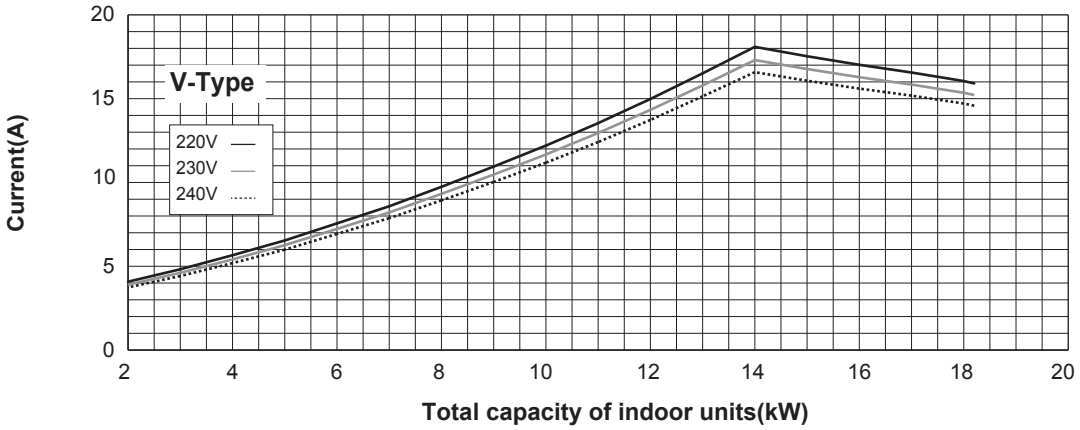


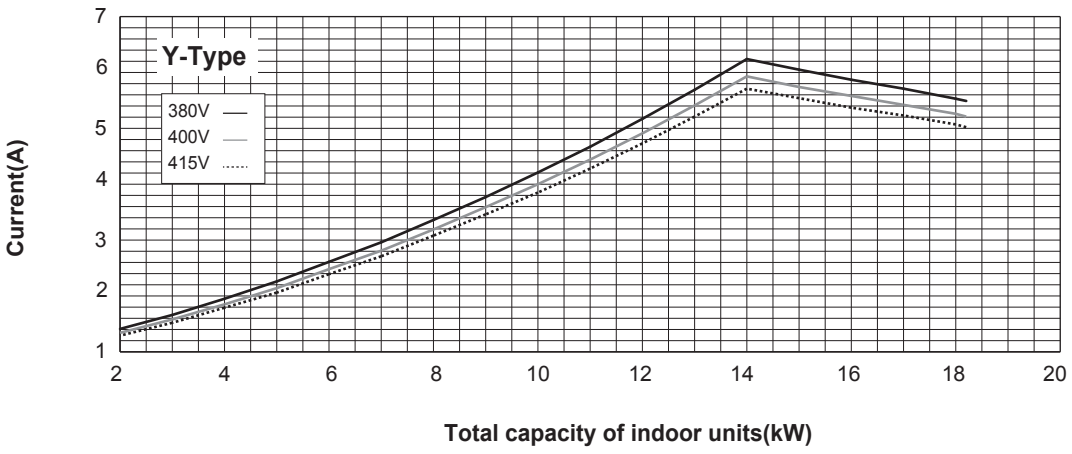


4-4-4. PUMY-SP125VKM.TH(-BS) PUMY-SP125YKM.TH(-BS) <heating>
PUMY-SP125VKMR1.TH(-BS) PUMY-SP125YKMR1.TH(-BS)



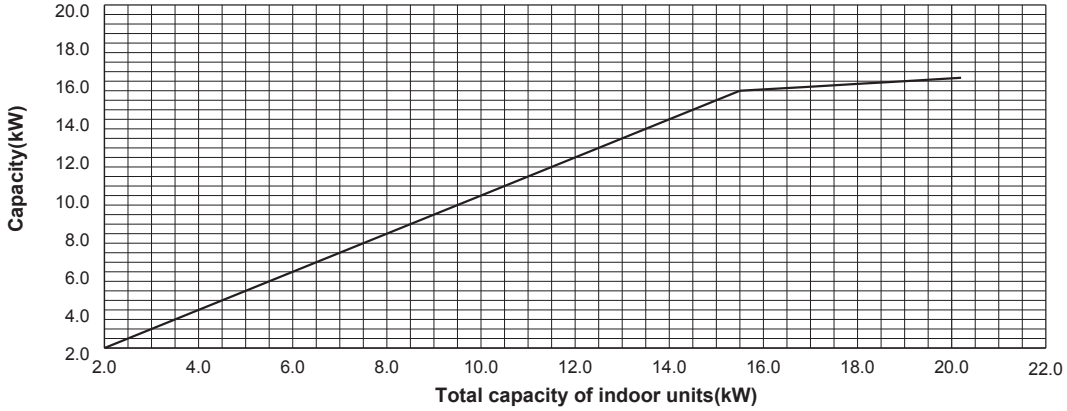


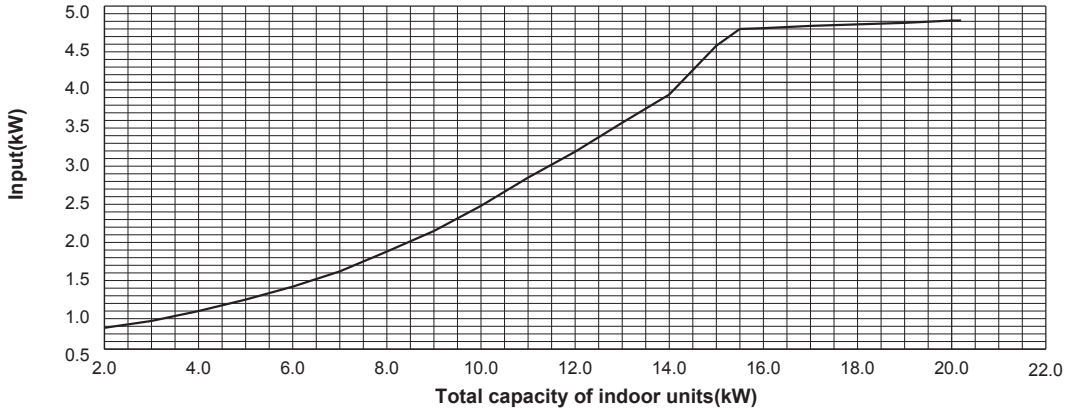


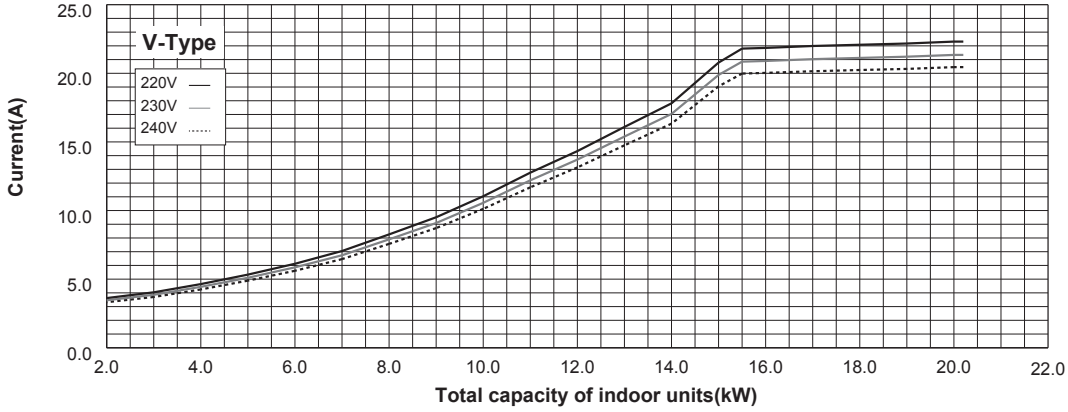


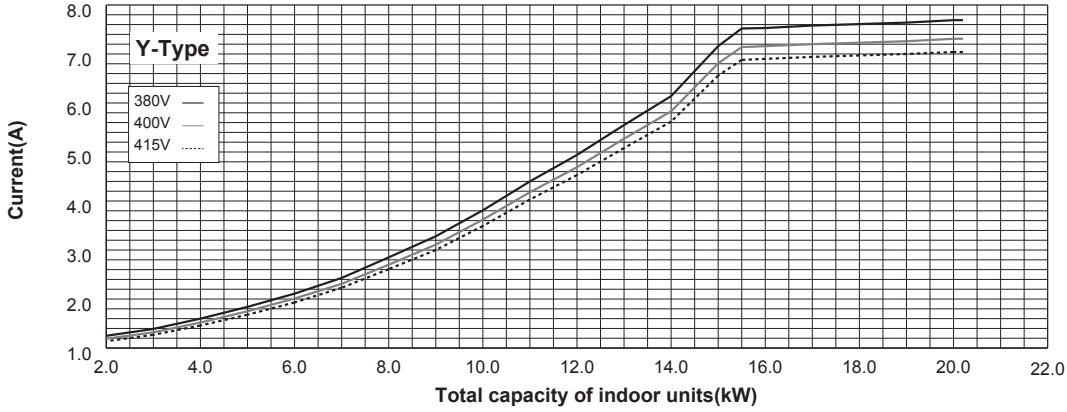
4-4-5. PUMY-SP140VKM.TH(-BS) PUMY-SP140YKM.TH(-BS) <cooling>
PUMY-SP140VKMR1.TH(-BS) PUMY-SP140YKMR1.TH(-BS)

Before calculating the sum of total capacity of indoor units, please convert the value into the kW model capacity following the formula on "4-1-1. Method for obtaining system cooling and heating capacity".

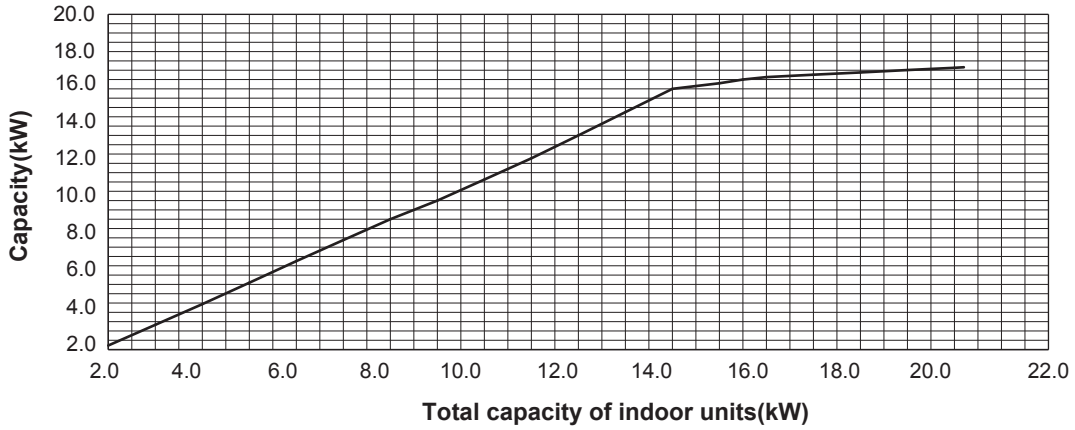


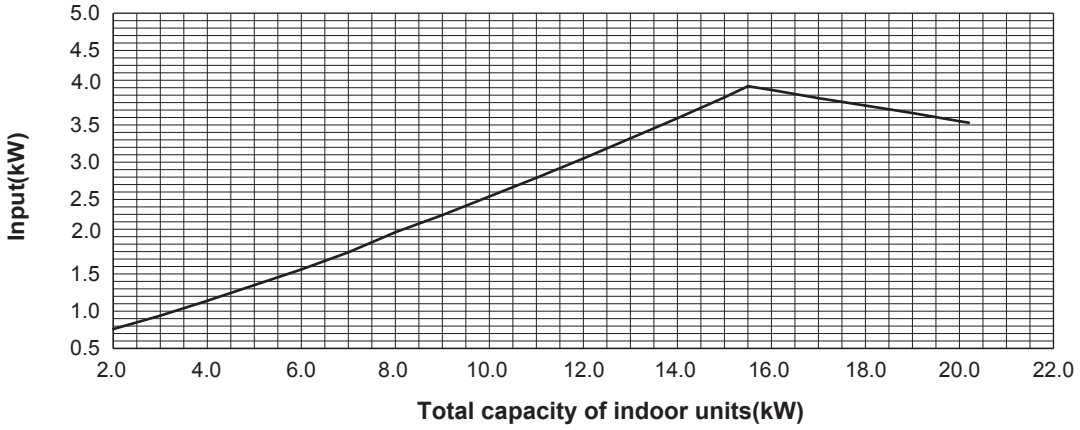


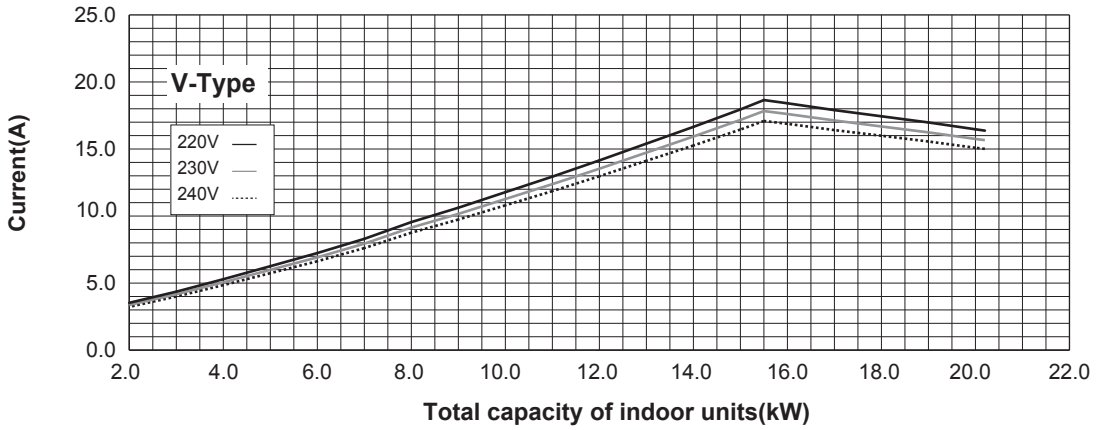


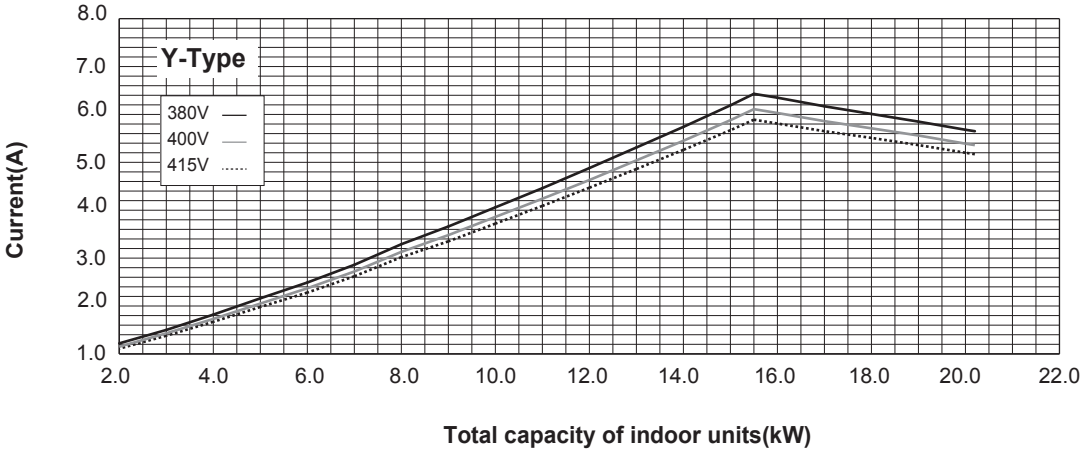


4-4-6. PUMY-SP140VKM.TH(-BS) PUMY-SP140YKM.TH(-BS) <heating>
PUMY-SP140VKMR1.TH(-BS) PUMY-SP140YKMR1.TH(-BS)









4-5. CORRECTING CAPACITY FOR CHANGES IN THE LENGTH OF REFRIGERANT PIPING

(1) During cooling, obtain the ratio (and the equivalent piping length) of the outdoor units rated capacity and the total in-use indoor capacity, and find the capacity ratio corresponding to the standard piping length from Figure 6 to 8. Then multiply by the cooling capacity from Figure 4 and 5 in "4-2. CORRECTION BY TEMPERATURE" to obtain the actual capacity.

(1) Capacity Correction Curve

Figure 12 PUMY-SP112VKM.TH(-BS) PUMY-SP112YKM.TH(-BS) <Cooling>
PUMY-SP112VKMR1.TH(-BS) PUMY-SP112YKMR1.TH(-BS)

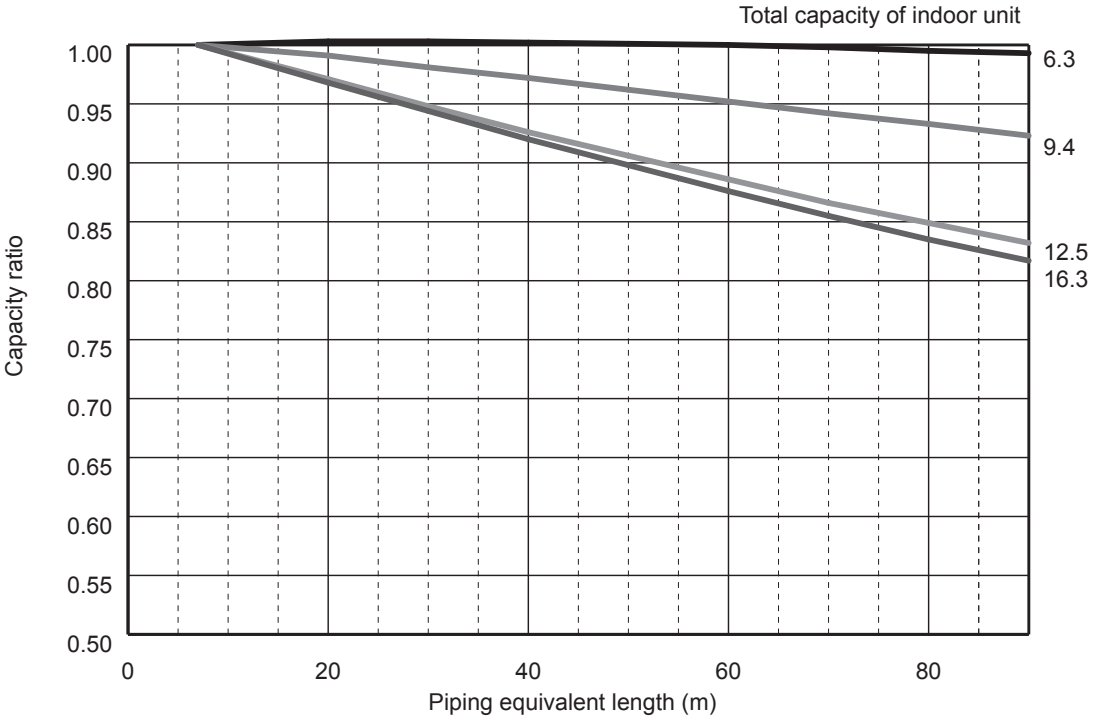


Figure 13 PUMY-SP125VKM.TH(-BS) PUMY-SP125YKM.TH(-BS) <Cooling>
PUMY-SP125VKMR1.TH(-BS) PUMY-SP125YKMR1.TH(-BS)

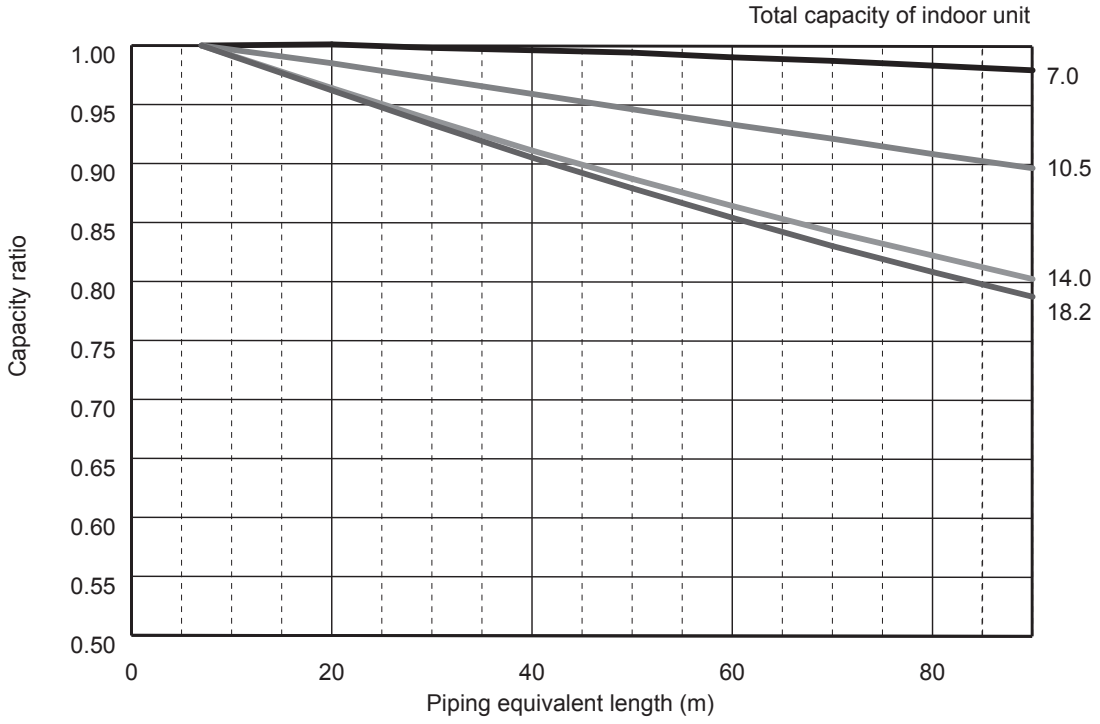


Figure 14 PUMY-SP140VKM.TH(-BS) PUMY-SP140YKM.TH(-BS) <Cooling>
PUMY-SP140VKMR1.TH(-BS) PUMY-SP140YKMR1.TH(-BS)

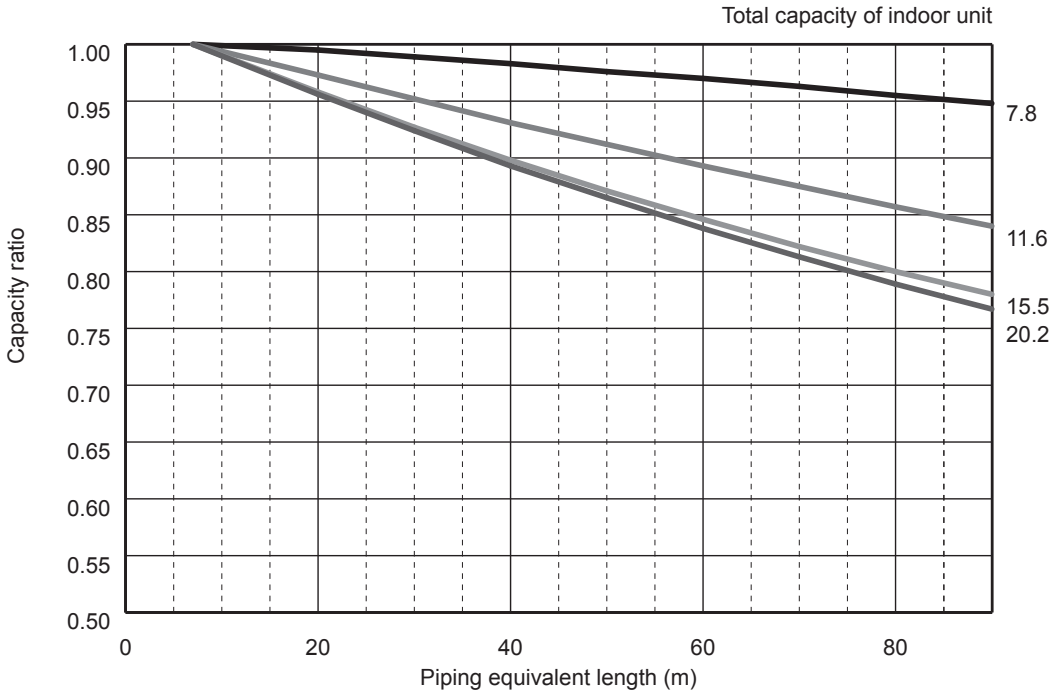
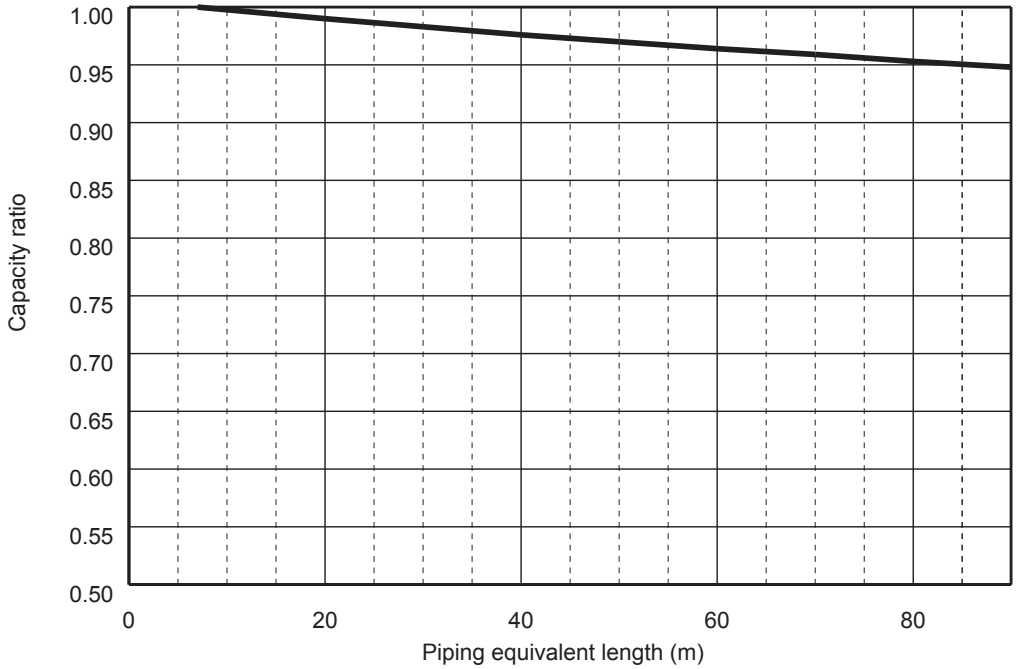


Figure 15 PUMY-SP112/125/140VKM(-BS) PUMY-SP112/125/140VKMR1(-BS) <Heating>
PUMY-SP112/125/140YKM(-BS) PUMY-SP112/125/140YKMR1(-BS) <Heating>



(2) Method for Obtaining the Equivalent Piping Length

Equivalent length for type SP112·125·140 = (length of piping to farthest indoor unit) + (0.3 × number of bends in the piping) (m)
Length of piping to farthest indoor unit: type SP112–SP140.....70 m

4-5-1. Correction of Heating Capacity for Frost and Defrosting

If heating capacity has been reduced due to frost formation or defrosting, multiply the capacity by the appropriate correction factor from the following table to obtain the actual heating capacity.

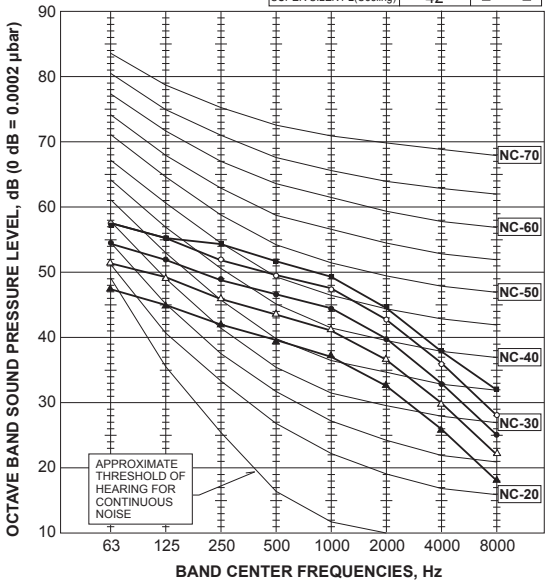
Correction factor diagram

Outdoor Intake temperature (W.B.°C)	6	4	2	0	−2	−4	−6	−8	−10	−15	−20
Correction factor	1.0	0.98	0.89	0.88	0.89	0.9	0.95	0.95	0.95	0.95	0.95

4-6. NOISE CRITERION CURVES

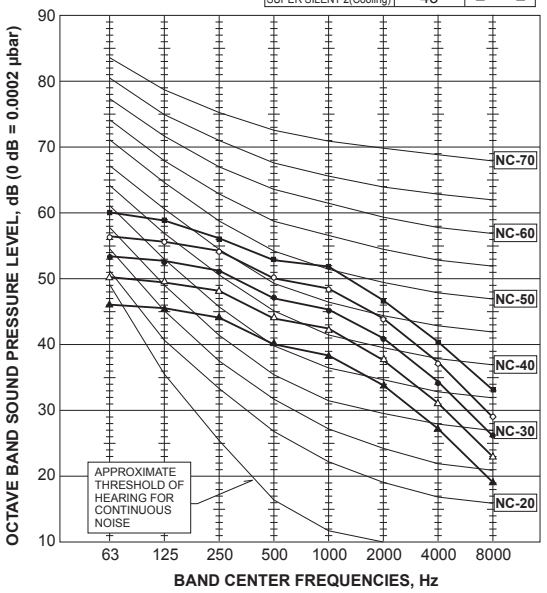
PUMY-SP112VKM.TH(-BS)
PUMY-SP112VKMR1.TH(-BS)
PUMY-SP112YKM.TH(-BS)
PUMY-SP112YKMR1.TH(-BS)

MODE	SPL(dB)	LINE
HEATING	54	
COOLING	52	
SILENT(Cooling)	49	
SUPER SILENT 1(Cooling)	46	
SUPER SILENT 2(Cooling)	42	



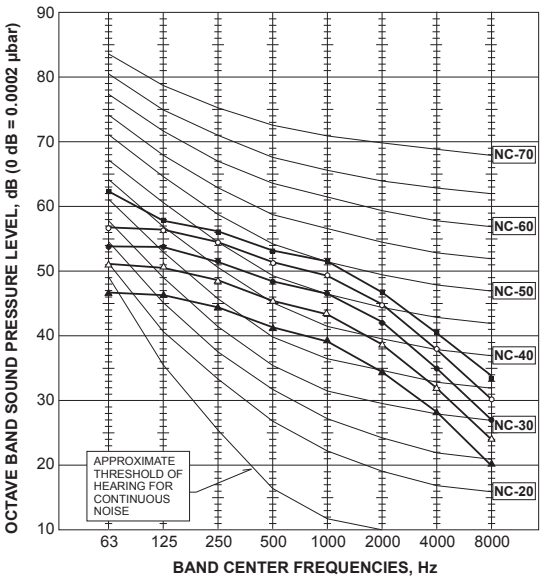
PUMY-SP125VKM.TH(-BS)
PUMY-SP125VKMR1.TH(-BS)
PUMY-SP125YKM.TH(-BS)
PUMY-SP125YKMR1.TH(-BS)

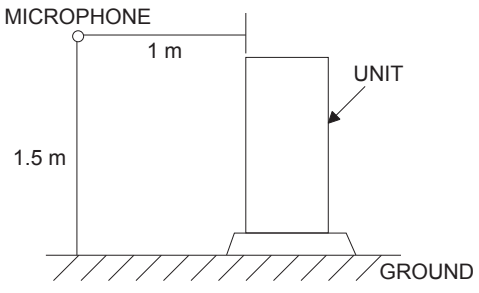
MODE	SPL(dB)	LINE
HEATING	56	
COOLING	53	
SILENT(Cooling)	50	
SUPER SILENT 1(Cooling)	47	
SUPER SILENT 2(Cooling)	43	



PUMY-SP140VKM.TH(-BS)
PUMY-SP140VKMR1.TH(-BS)
PUMY-SP140YKM.TH(-BS)
PUMY-SP140YKMR1.TH(-BS)

MODE	SPL(dB)	LINE
HEATING	56	
COOLING	54	
SILENT(Cooling)	51	
SUPER SILENT 1(Cooling)	48	
SUPER SILENT 2(Cooling)	44	

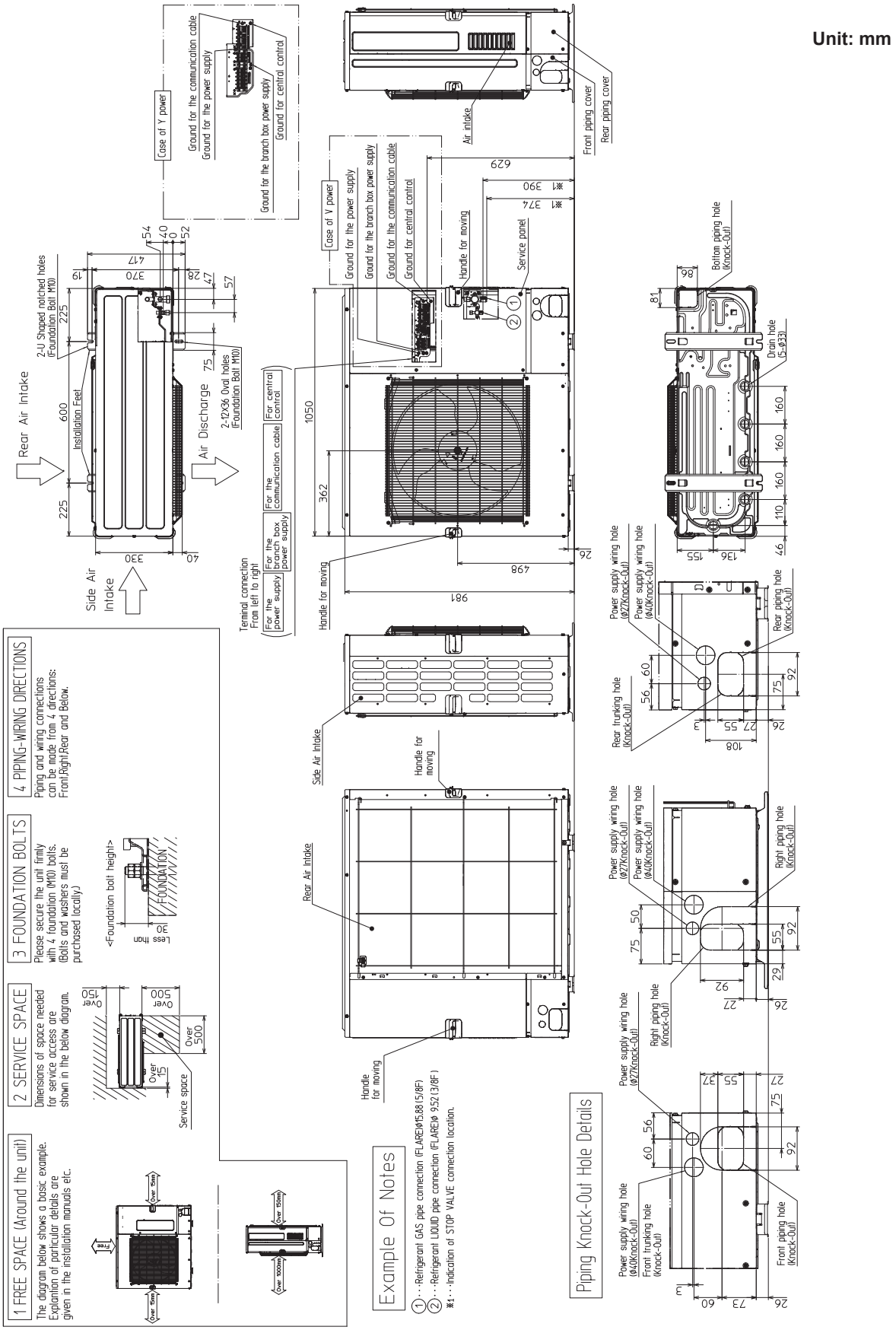




5 OUTLINES AND DIMENSIONS

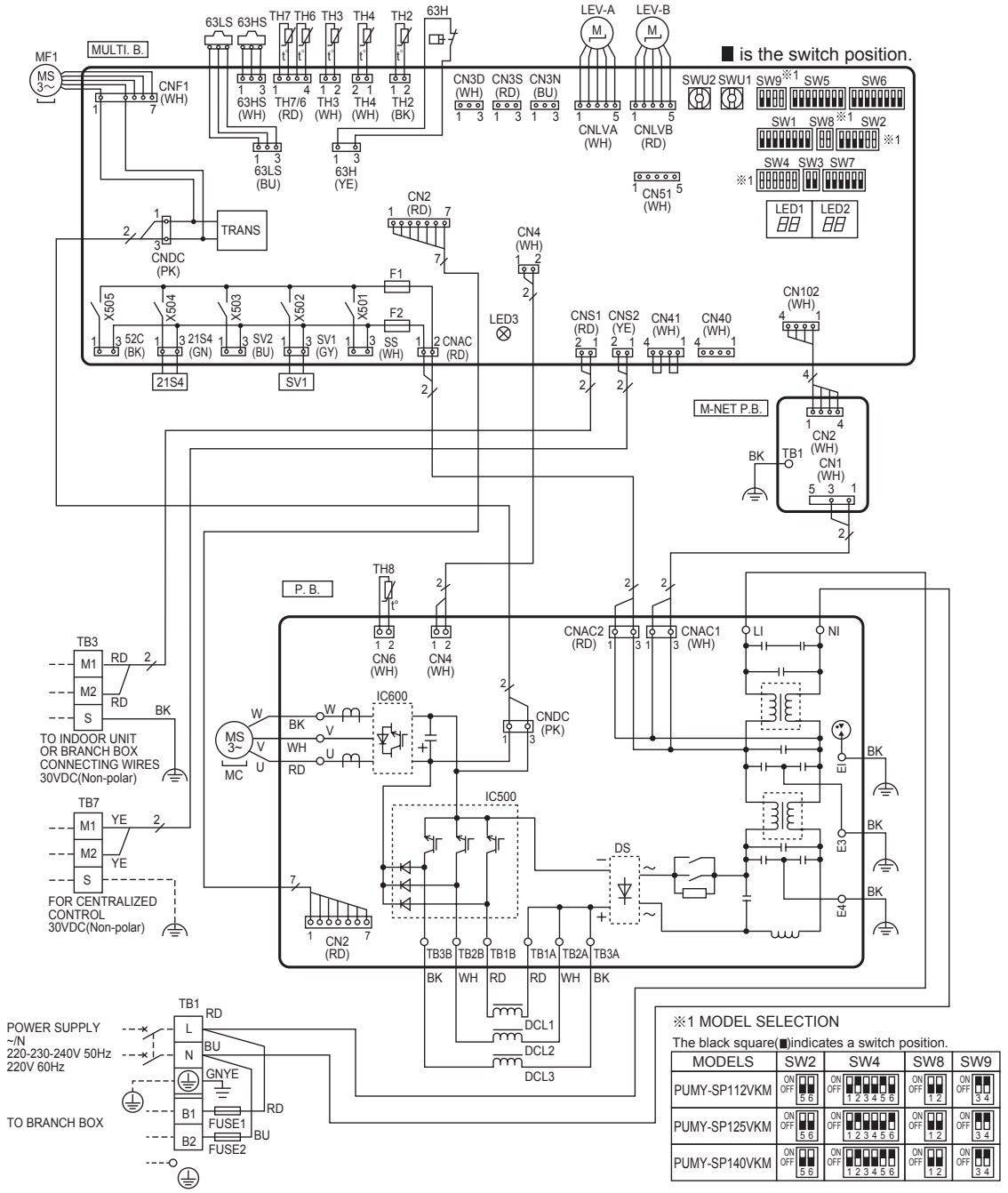
PUMY-SP112VKM(R1).TH **PUMY-SP125VKM(R1).TH** **PUMY-SP140VKM(R1).TH**
PUMY-SP112YKM(R1).TH **PUMY-SP125YKM(R1).TH** **PUMY-SP140YKM(R1).TH**
PUMY-SP112VKM(R1).TH-BS **PUMY-SP125VKM(R1).TH-BS** **PUMY-SP140VKM(R1).TH-BS**
PUMY-SP112YKM(R1).TH-BS **PUMY-SP125YKM(R1).TH-BS** **PUMY-SP140YKM(R1).TH-BS**

Unit: mm



6 WIRING DIAGRAM

PUMY-SP112VKM(R1).TH PUMY-SP125VKM(R1).TH PUMY-SP140VKM(R1).TH
PUMY-SP112VKM(R1).TH-BS PUMY-SP125VKM(R1).TH-BS PUMY-SP140VKM(R1).TH-BS



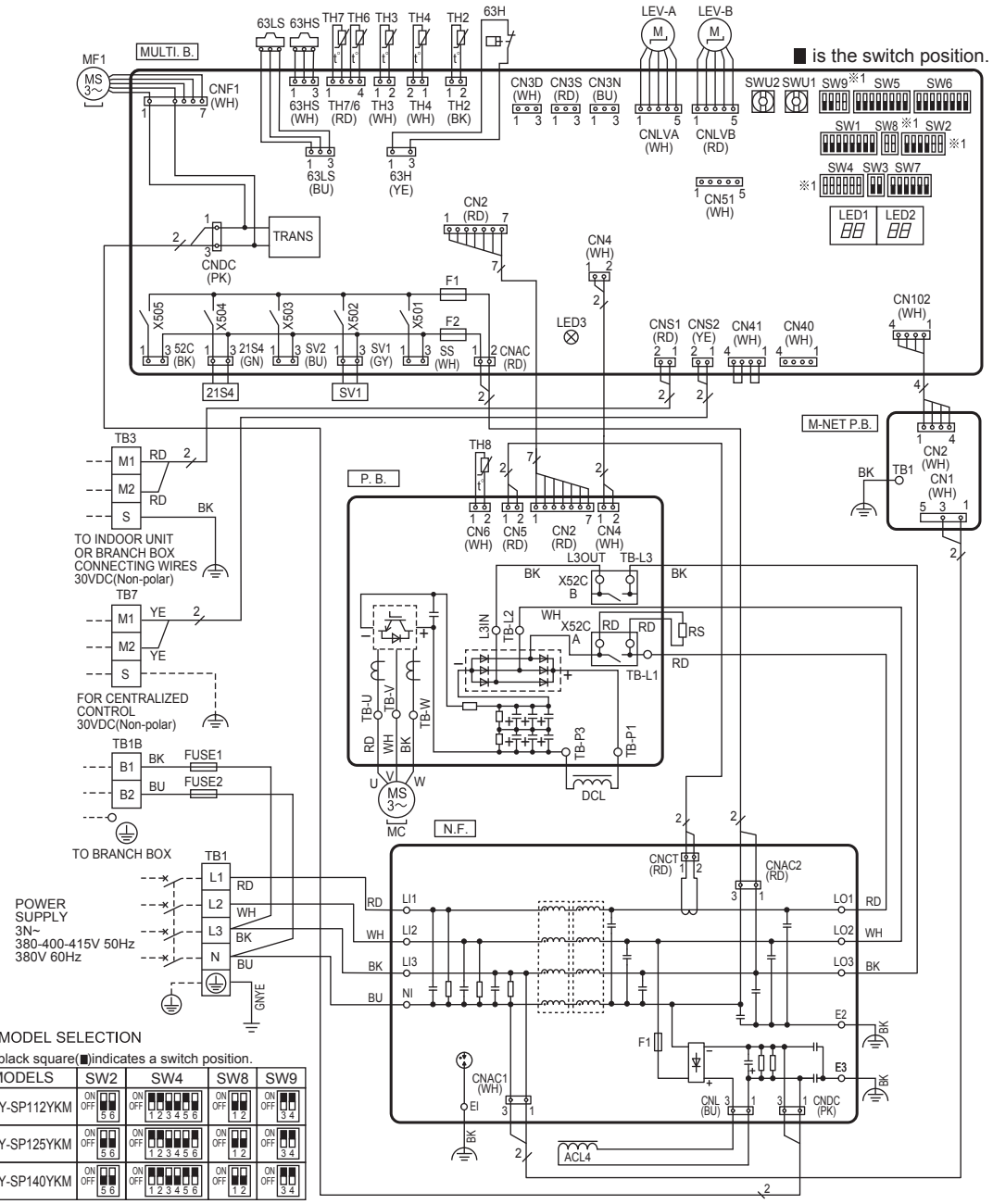
※1 MODEL SELECTION

The black square(■)indicates a switch position.

MODELS	SW2	SW4	SW8	SW9
PUMY-SP112VKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4
PUMY-SP125VKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4
PUMY-SP140VKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply/Branch Box>	TH8	Thermistor <Heat Sink>	SW8	Switch <Model Selection>
TB3	Terminal Block <Indoor/Outdoor, Branch Box/Outdoor Transmission Line>	LEV-A, LEV-B	Linear Expansion Valve	SW9	Switch <Function Selection>
		DCL1, DCL2, DCL3	Reactor	SWU1	Switch <Unit Address Selection, ones digit>
TB7	Terminal Block <Centralized Control Transmission Line>	P.B.	Power Circuit Board	SWU2	Switch <Unit Address Selection, tens digit>
		U/V/W	Connection Terminal <U/V/W-Phase>	CNS1	Connector <Indoor/Outdoor, Branch Box/ Outdoor Transmission Line>
FUSE1,FUSE2	Fuse <T20AL250V>	LI	Connection Terminal <L-Phase>		
MC	Motor for Compressor	NI	Connection Terminal <N-Phase>	CNS2	Connector <Centralized Control Transmission Line>
MF1	Fan Motor	TB1A, TB2A, TB3A, TB1B, TB2B, TB3B	Connection Terminal <Reactor>	SS	Connector <Connection for Option>
63H	High Pressure Switch			CN3D	Connector <Connection for Option>
63HS	High Pressure Sensor	EI, E3, E4	Connection Terminal <Electrical Parts Box>	CN3S	Connector <Connection for Option>
63LS	Low Pressure Sensor	MULTI.B.	Multi Controller Circuit Board	CN3N	Connector <Connection for Option>
SV1	Solenoid Valve Coil <Bypass Valve>	SW1	Switch <Display Selection>	CN51	Connector <Connection for Option>
21S4	Solenoid Valve Coil <4-Way Valve>	SW2	Switch <Function Selection>	LED1,LED2	LED <Operation Inspection Display>
TH2	Thermistor <Hic Pipe>	SW3	Switch <Test Run>	LED3	LED <Power Supply to Main Microcomputer>
TH3	Thermistor <Outdoor Liquid Pipe>	SW4	Switch <Model Selection>	F1,F2	Fuse <T6.3AL250V>
TH4	Thermistor <Compressor>	SW5	Switch <Function Selection>	X501～505	Relay
TH6	Thermistor <Suction Pipe>	SW6	Switch <Function Selection>	M-NET P.B.	M-NET Power Circuit Board
TH7	Thermistor <Ambient>	SW7	Switch <Function Selection>	TB1	Connection Terminal <Electrical Parts Box>

PUMY-SP112YKM(R1).TH PUMY-SP125YKM(R1).TH PUMY-SP140YKM(R1).TH
PUMY-SP112YKM(R1).TH-BS PUMY-SP125YKM(R1).TH-BS PUMY-SP140YKM(R1).TH-BS



※1 MODEL SELECTION

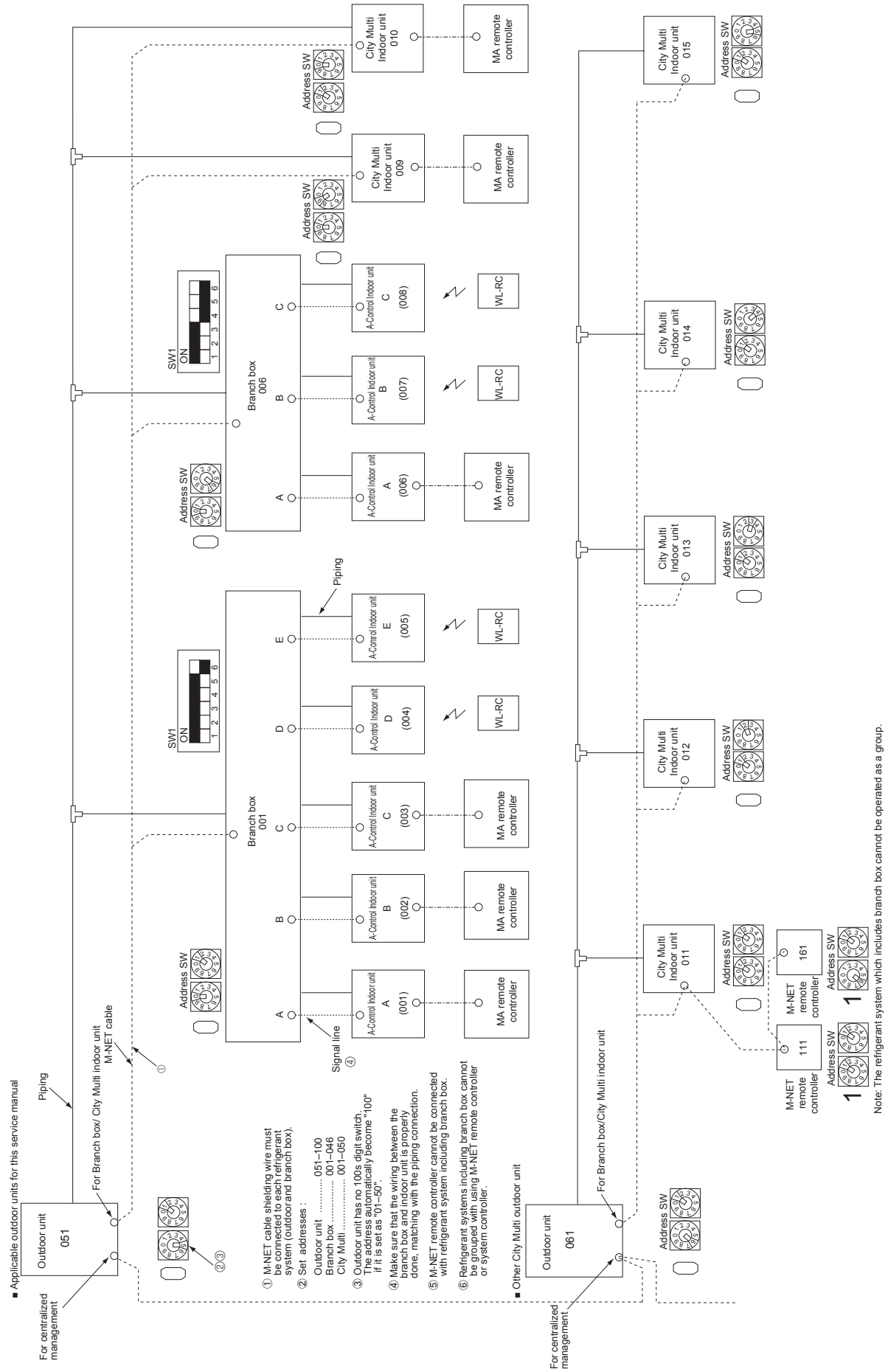
The black square(■)indicates a switch position.

MODELS	SW2	SW4	SW8	SW9
PUMY-SP112YKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4
PUMY-SP125YKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4
PUMY-SP140YKM	ON OFF 5 6	ON OFF 1 2 3 4 5 6	ON OFF 1 2	ON OFF 3 4

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply>	RS	Rush Current Protect Resistor	SW6	Switch <Function Selection>
TB1B	Terminal Block <Branch Box>	LEV-A, LEV-B	Linear Expansion Valve	SW7	Switch <Function Selection>
TB3	Terminal Block <Indoor/Outdoor, Branch Box/Outdoor Transmission Line>	ACL4	Reactor	SW8	Switch <Model Selection>
		DCL	Reactor	SW9	Switch <Function Selection>
TB7	Terminal Block <Centralized Control Transmission Line>	P.B.	Power Circuit Board	SWU1	Switch <Unit Address Selection, ones digit>
		TB-U/V/W	Connection Terminal <U/V/W-Phase>	SWU2	Switch <Unit Address Selection, tens digit>
FUSE1,FUSE2	Fuse <T20AL250V>	TB-L1/L2/L3	Connection Terminal <L1/L2/L3-Power Supply>	CNS1	Connector <Indoor/Outdoor, Branch Box/ Outdoor Transmission Line>
MC	Motor for Compressor	TB-P1/P3	Connection Terminal		
MF1	Fan Motor	X52CA/B	52C Relay	CNS2	Connector <Centralized Control Transmission Line>
63H	High Pressure Switch	N.F.	Noise Filter Circuit Board	SS	Connector <Connection for Option>
63HS	High Pressure Sensor	LO1/LO2/LO3	Connection Terminal <L1/L2/L3-Power Supply>	CN3D	Connector <Connection for Option>
63LS	Low Pressure Sensor	LI1/LI2/LI3/NI	Connection Terminal <L1/L2/L3-Power Supply>	CN3S	Connector <Connection for Option>
SV1	Solenoid Valve Coil <Bypass Valve>	EI, E2, E3	Connection Terminal <Electrical Parts Box>	CN3N	Connector <Connection for Option>
21S4	Solenoid Valve Coil <4-Way Valve>	F1	Fuse <T6.3AL250V>	CN51	Connector <Connection for Option>
TH2	Thermistor <Hic Pipe>	MULTI.B.	Multi Controller Circuit Board	LED1,LED2	LED <Operation Inspection Display>
TH3	Thermistor <Outdoor Liquid Pipe>	SW1	Switch <Display Selection>	LED3	LED <Power Supply to Main Microcomputer>
TH4	Thermistor <Compressor>	SW2	Switch <Function Selection>	F1,F2	Fuse <T6.3AL250V>
TH6	Thermistor <Suction Pipe>	SW3	Switch <Test Run>	X501～505	Relay
TH7	Thermistor <Ambient>	SW4	Switch <Model Selection>	M-NET P.B.	M-NET Power Circuit Board
TH8	Thermistor <Heat Sink>	SW5	Switch <Function Selection>	TB1	Connection Terminal <Electrical Parts Box>

7 NECESSARY CONDITIONS FOR SYSTEM CONSTRUCTION

7-1. TRANSMISSION SYSTEM SETUP



7-2. Special Function Operation and Settings for M-NET Remote Controller

(M-NET remote controller cannot be connected with a refrigerant system which includes branch box.)

- It is necessary to perform “group settings” and “paired settings” at making group settings of different refrigerant systems (multiple outdoor unit).
  (A) Group settings: Enter the indoor unit controlled by the remote controller, check the content of entries, and clear entries, etc.
  (B) Paired settings: Used to set the linked operation of a Lossnay unit.

(1) Entering address: Follow the steps below to enter the addresses of the indoor unit using the remote controller.

a) Group settings

- Turning off the remote controller: Press the ON/OFF button to stop operation (the indicator light will go off).
- Changing to indoor unit address display mode: If the FILTER and buttons on the remote controller are pressed simultaneously and held for 2 seconds, the display shown in Figure 1 will appear.
- Changing address: Press the temperature adjustment buttons to change the displayed address to the address to be entered.
- Entering the displayed address: Press the TEST RUN button to enter the indoor unit with the displayed address.
  The type of the unit will be displayed as shown in Figure 2 if entry is completed normally.
  If a selected indoor unit does not exist, an error signal will be displayed as shown in Figure 3. When this happens, check whether the indoor unit actually exists and perform entry again.
- Returning to the normal mode after completing entry: Press the FILTER and buttons simultaneously and hold for 2 seconds to return to the normal mode.

Figure 1. (A) Group setting display

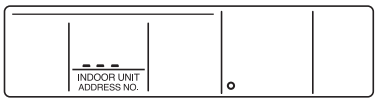
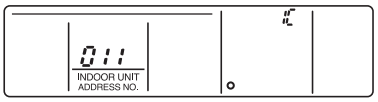
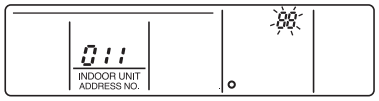


Figure 2. Normal completion of entry



Type of unit is displayed.

Figure 3. Entry error signal

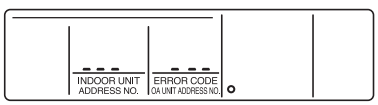


Flashing “88” indicates entry error.

b) Paired Settings

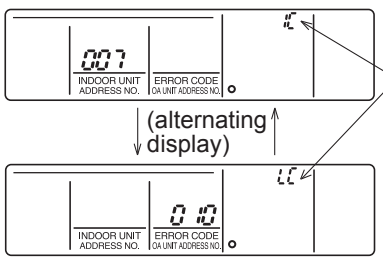
- Turn off the remote controller: Press the remote controller’s ON/OFF button to turn it off (the indicator light will go off).
- Put in indoor unit address display mode: Press the FILTER and buttons on the remote controller simultaneously and hold for 2 seconds.
  Note: The above steps are the same as when making group settings (A).
- Changing to the linked operation unit address display state: The display shown in Figure 4 will appear when the button on the remote control is pressed.
- Displaying the address of the Lossnay unit and linked indoor unit: In this situation, the indoor unit number will be the lowest address of the group. The Lossnay unit will not operate if this setting is incorrect.
  Notes:
  1. If the temperature adjustment buttons are pressed, the address may be changed to the indoor unit that is to be linked.
  2. If the time setting buttons are pressed, the address of the linked units may be changed to the address where it is desired to enter the Lossnay.
- Linking the Lossnay and the indoor unit: The display shown in Figure 5 will appear when the TEST RUN button is pressed. The indoor unit whose address is displayed and the Lossnay unit with a linked address will operate in a linked manner.
  Notes:
  1. If it is desired to display the address of the Lossnay in the indoor unit address, display the indoor unit address in the linked unit address, and the above content will also be recorded.
  2. Apart from the indoor unit with the lowest address in the group, display and enter the addresses of the other indoor unit that are to be linked with the Lossnay unit.
- Returning to the normal mode after completing entry: Press the FILTER and buttons on the remote controller simultaneously and hold for 2 seconds to return to the normal mode.

Figure 4. (B) Making paired settings



The addresses of indoor unit and linked units are displayed simultaneously.

Figure 5. Completing normal entry



These alternating IC or LC displays will appear when entry is completed normally.

A flashing “88” will appear if there is a problem with the entry (indicating that the unit does not exist).

(2) Address check: Refer to section (1) regarding address entry.

a) In making group settings:

- Turn off the remote controller: Press the remote controller's ON/OFF button to stop operation (the indicator light will go off).
- Locate the indoor unit address display mode: Press the FILTER and buttons on the remote controller simultaneously and hold for 2 seconds.
- Display indoor unit address: The entered indoor units address and type will be displayed each time the button is pressed.
  * When 1 entry is made, only 1 address will be displayed no matter how many times the button is pressed.
- Returning to the normal mode after completing check: Simultaneously press the FILTER and buttons on the remote controller and hold for 2 seconds to return to the normal mode.

b) In making paired settings:

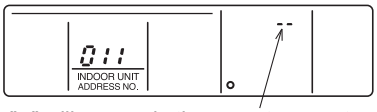
- Turn off the remote controller: Press the remote controller's ON/OFF button to stop operation (the indicator light will go off).
- Put in indoor unit address display mode: Press the FILTER and buttons on the remote controller simultaneously and hold for 2 seconds.
- Changing to the linked operation unit address display state: Press the button on the remote control.
- Displaying the address of the indoor unit to be checked: Change the address to that of the indoor unit to be checked by pressing the temperature adjustment buttons .
- Displaying the address of the linked Lossnay unit: Press the button to display the addresses of the linked Lossnay and indoor unit in alternation.
- Displaying the addresses of other entered units: The addresses of the other entered units will be displayed in alternating fashion after resting the button again.
- Returning to the normal mode after completing the check: Simultaneously press the FILTER and buttons on the remote controller and hold for 2 seconds to return to the normal mode.

(3) Clearing an address: Refer to section (1) regarding the address entry and section (2) regarding checking addresses.

a) In making group settings:

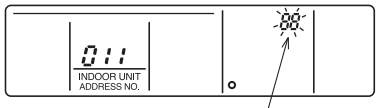
- Turn off the remote controller: The procedure is the same as described in **a)** under (2) Address check.
- Put in the indoor unit address display mode: The procedure is the same as described in **a)** under (2) Address check.
- Displaying the indoor unit address to be cleared: The procedure is the same as described in **a)** under (2) Address check.
- Clearing indoor unit address : Pressing the button on the remote controller twice will clear the address entry of the displayed indoor unit, resulting in the display shown in Figure 6.
  The display shown in Figure 7 will appear if an abnormality occurs and the entry is not cleared.
  Please repeat the clearing procedure.
- Returning to the normal mode after clearing an address: The procedure is the same as described in **a)** under (2) Address check.

Figure 6. Display after address has been cleared normally



"--" will appear in the room temperature display location.

Figure 7. Display when an abnormality has occurred during clearing

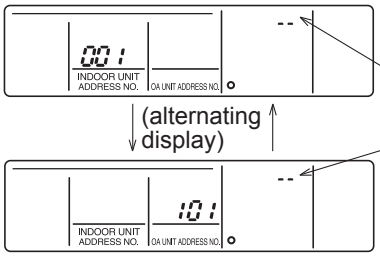


"88" will appear in the room temperature display location.

b) In making paired settings:

- Turn off the remote controller: The procedure is the same as described in **b)** under (2) Address check.
- Put into the indoor unit address display mode: The procedure is the same as described in **b)** under (2) Address check.
- Put into the linked unit address display mode: The procedure is the same as described in **b)** under (2) Address check.
- Display the address of the Lossnay unit or the indoor unit to be cleared.
- Deleting the address of a linked indoor unit: Pressing the button on the remote controller twice will clear the address entry of the displayed indoor unit, resulting in the display shown in Figure 8.
- Returning to the normal mode after clearing an address: The procedure is same as **b)** in (2) Address check.

Figure 8. Display after address has been cleared normally

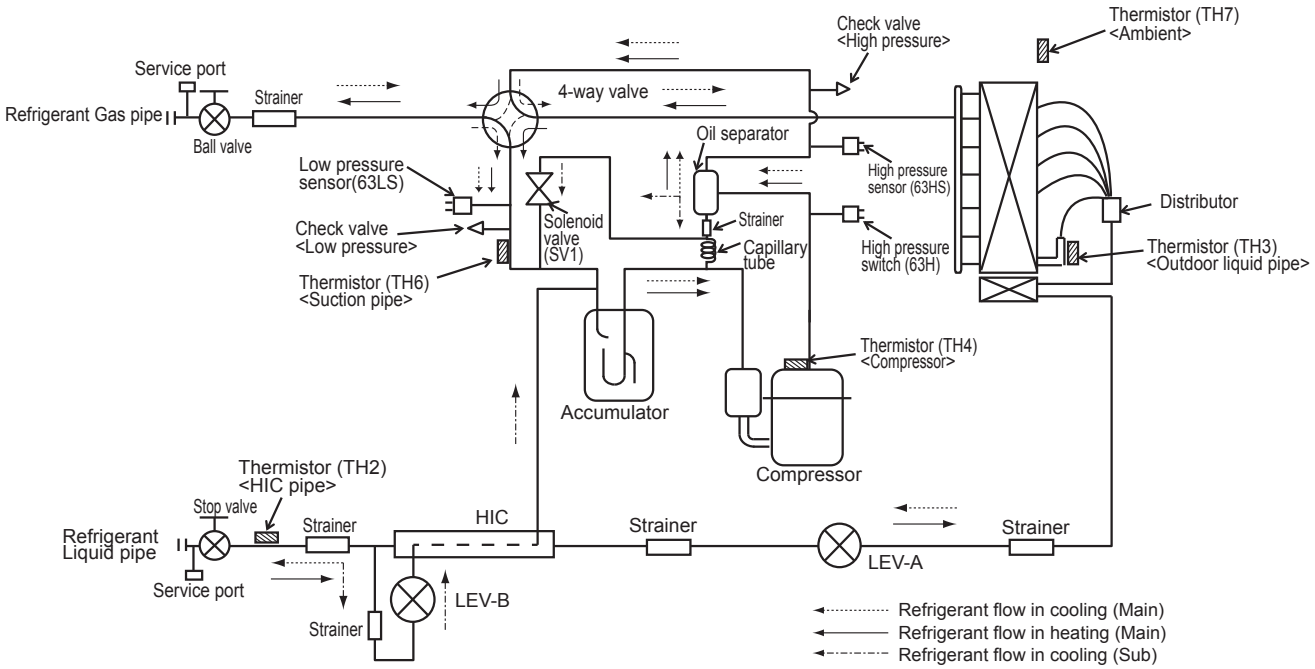


"--" will appear in the unit type display location when an address has been cleared normally.

"88" will appear in the unit type display location when an abnormality has occurred during clearing.

7-3. REFRIGERANT SYSTEM DIAGRAM

PUMY-SP112VKM(R1).TH PUMY-SP125VKM(R1).TH PUMY-SP140VKM(R1).TH
PUMY-SP112YKM(R1).TH PUMY-SP125YKM(R1).TH PUMY-SP140YKM(R1).TH
PUMY-SP112VKM(R1).TH-BS PUMY-SP125VKM(R1).TH-BS PUMY-SP140VKM(R1).TH-BS
PUMY-SP112YKM(R1).TH-BS PUMY-SP125YKM(R1).TH-BS PUMY-SP140YKM(R1).TH-BS



Capillary tube for oil separator : ϕ2.5 × ϕ0.6 × L1000

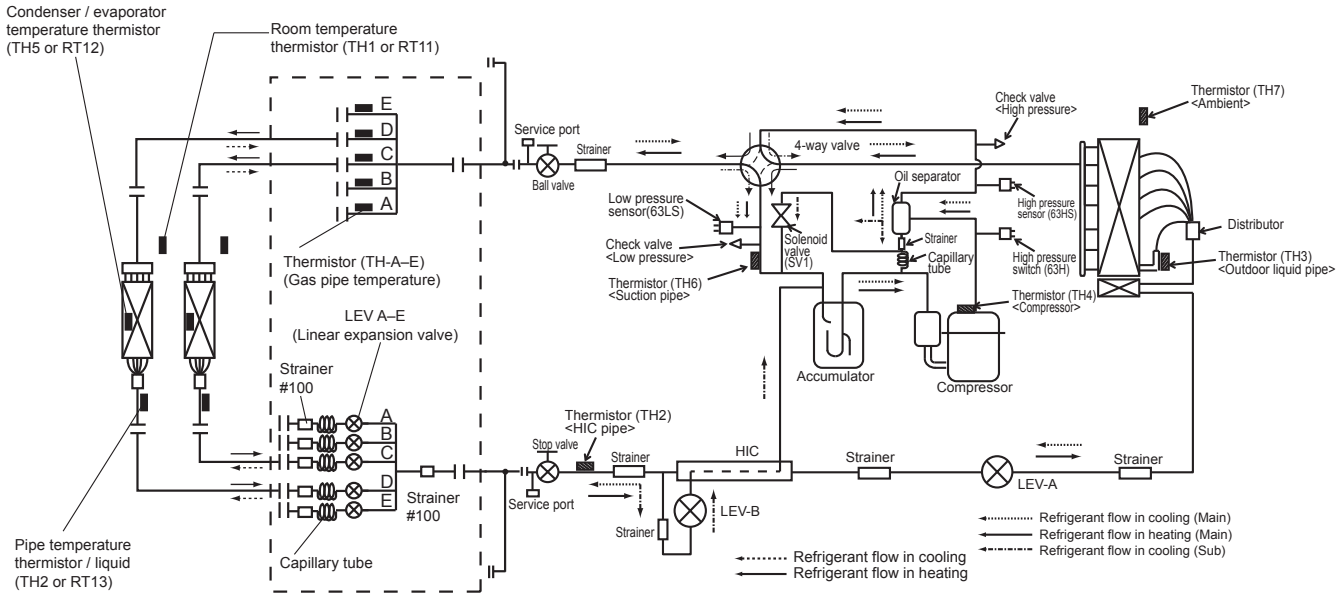
Refrigerant piping specifications <dimensions of flared connector>

Unit: mm <inch>

Capacity \ Item		Liquid piping		Gas piping
City multi indoor unit	P15, P20, P25, P32, P40, P50	The farthest piping length from the first joint ≦ 30 m	ϕ6.35 <1/4>	ϕ12.7 <1/2>
		The farthest piping length from the first joint > 30 m	ϕ9.52 <3/8>	
	P63, P80, P100, P125, P140	ϕ9.52 <3/8>		ϕ15.88 <5/8>
Outdoor unit	SP112, SP125, SP140	ϕ9.52 <3/8>		ϕ15.88 <5/8>

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT.

7-4. REFRIGERANT SYSTEM DIAGRAM (WHEN USING BRANCH BOX)



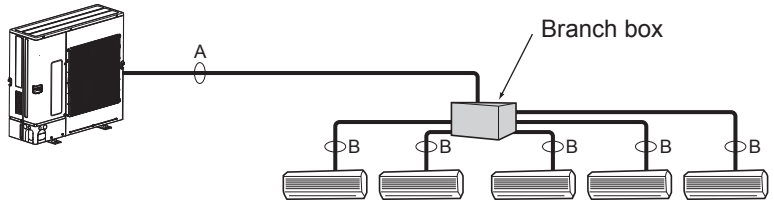
Unit: mm

		Capillary tube behind LEV (in cooling mode)
Branch box	PAC-MK31/33BC(B)	(ϕ4.0 × ϕ3.0 × L130) × 3
	PAC-MK51/53BC(B)	(ϕ4.0 × ϕ3.0 × L130) × 5

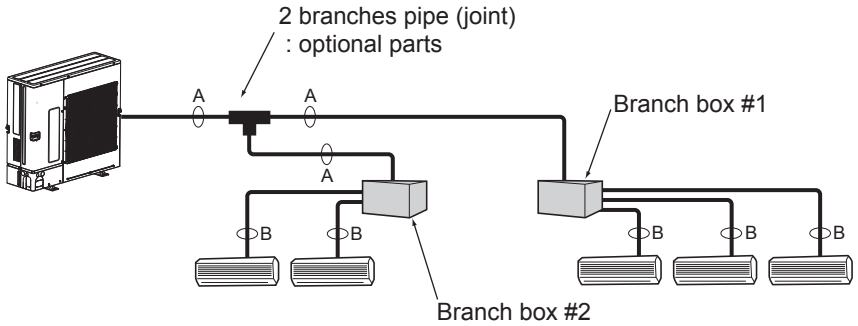
Piping connection size

	A	B
Liquid (mm)	ϕ9.52	The pipe connection size differs according to the type and capacity of indoor units. Match the piping connection size of branch box with indoor unit. If the piping connection size of branch box does not match the piping connection size of indoor unit, use optional different-diameter (deformed) joints to the branch box side. (Connect deformed joint directly to the branch box side.)
Gas (mm)	ϕ15.88	

■ In case of using 1-branch box
Flare connection employed (No brazing)



■ In case of using 2-branch boxes



■ Installation procedure (2 branch pipe (joint))
Refer to the installation manuals of MSDD-50AR-E.

■ Pipe size (Branch box-indoor unit)

Indoor unit series	Model number	Liquid pipe	Gas pipe
M series or S series	15–42	ϕ6.35	ϕ9.52
	50	ϕ6.35	ϕ12.7
	60	ϕ6.35	ϕ15.88
	71	ϕ9.52	ϕ15.88
P series	35–50	ϕ6.35	ϕ12.7
	60–100	ϕ9.52	ϕ15.88

* If the pipe size of indoor unit is different, use a different-diameter joint.

When using 35, 50 type indoor unit of P series, use the flare nut (for R410A) attached to the indoor unit.
Do not use the flare nut (for R407C) in the indoor unit accessory. If it is used, a gas leakage or even a pipe extraction may occur.

(1) Valve size for outdoor unit

For liquid	ϕ9.52 mm
For gas	ϕ15.88 mm

(2) Valve size for branch unit

* Ⓐ UNIT	Liquid pipe	ϕ6.35 mm
	Gas pipe	ϕ9.52 mm
* Ⓑ UNIT	Liquid pipe	ϕ6.35 mm
	Gas pipe	ϕ9.52 mm
* Ⓒ UNIT	Liquid pipe	ϕ6.35 mm
	Gas pipe	ϕ9.52 mm
Ⓓ UNIT	Liquid pipe	ϕ6.35 mm
	Gas pipe	ϕ9.52 mm
Ⓔ UNIT	Liquid pipe	ϕ6.35 mm
	Gas pipe	ϕ12.7 mm

* 3- branch type is only for Ⓐ, Ⓑ, and Ⓒ unit.

Different-diameter joint (optional parts)

Type	Model name	Connected pipes diameter mm	Diameter A mm	Diameter B mm
Flare (Fig.7-1)	MAC-A454JP	ϕ9.52 → ϕ12.7	ϕ9.52	ϕ12.7
	MAC-A455JP	ϕ12.7 → ϕ9.52	ϕ12.7	ϕ9.52
	MAC-A456JP	ϕ12.7 → ϕ15.88	ϕ12.7	ϕ15.88
	PAC-493PI	ϕ6.35 → ϕ9.52	ϕ6.35	ϕ9.52
	PAC-SG76RJ-E	ϕ9.52 → ϕ15.88	ϕ9.52	ϕ15.88

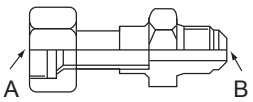


Fig.7-1

Conversion formula

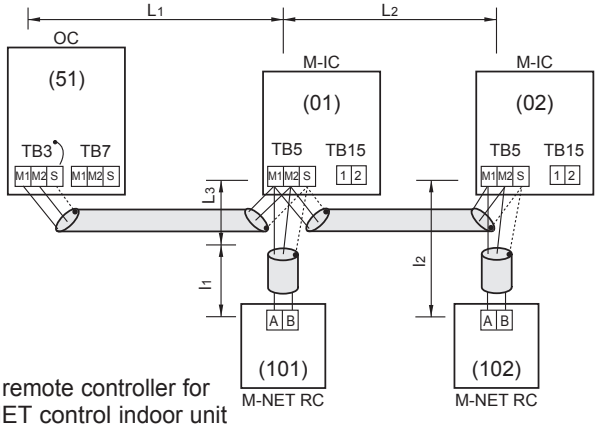
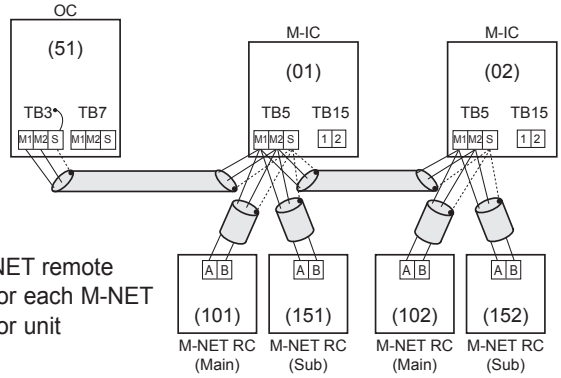
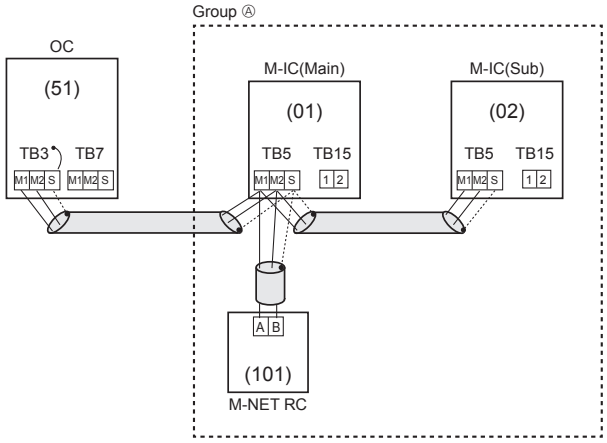
1/4 inch	ϕ6.35 mm
3/8 inch	ϕ9.52 mm
1/2 inch	ϕ12.7 mm
5/8 inch	ϕ15.88 mm
3/4 inch	ϕ19.05 mm

7-5. SYSTEM CONTROL

7-5-1. Example for the System

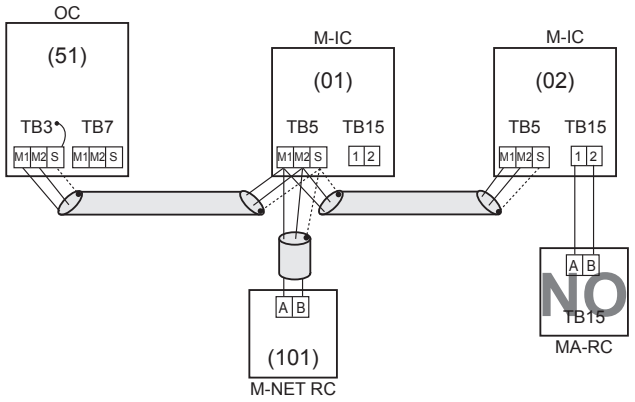
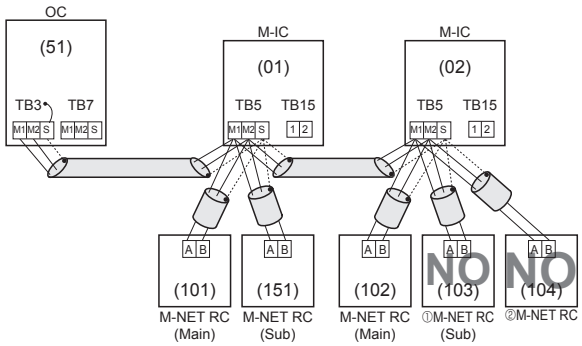
• Example for wiring control cables, wiring method and address setting, permissible lengths, and the prohibited items are listed in the standard system with detailed explanation.

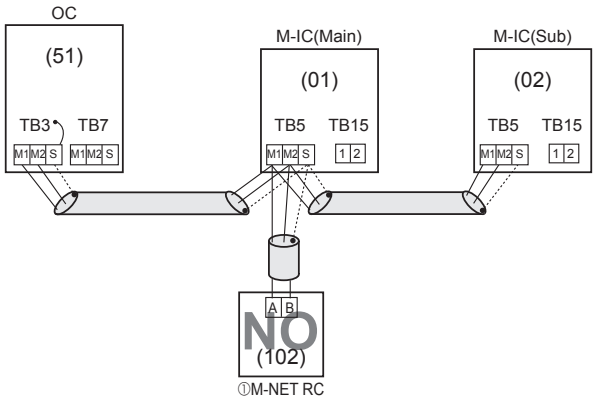
A. Example of a M-NET remote controller system (address setting is necessary.)

Example of wiring control cables	Wiring Method and Address Setting
1. Standard operation  • 1 M-NET remote controller for each M-NET control indoor unit • There is no need for setting the 100 position on the M-NET remote controller.	a. Use feed wiring to connect terminals M1 and M2 on transmission cable block (TB3) for the outdoor unit (OC) to terminals M1 and M2 on the transmission cable block (TB5) of each M-NET control indoor unit (M-IC). Use non-polarized 2-core wire. b. Connect terminals M1 and M2 on transmission cable terminal block (TB5) for each indoor unit with the terminal block (TB6) for M-NET the remote controller (M-NET RC). c. Set the address setting switch (on outdoor unit P.C.B) as shown below. Unit / Range / Setting Method M-NET control indoor unit (M-IC) / 001 to 050 / — Outdoor unit (OC) / 051 to 100 / Use the smallest address of all the indoor unit plus 50. M-NET Remote controller (M-NET RC) / 101 to 150 / Indoor unit address plus 100
2. Operation using 2 M-NET remote controllers  • Using 2 M-NET remote controllers for each M-NET control indoor unit	a. Same as above a b. Same as above b c. Set address switch (on outdoor unit P.C.B) as shown below. Unit / Range / Setting Method M-NET control indoor unit (M-IC) / 001 to 050 / — Outdoor unit (OC) / 051 to 100 / Use the smallest address of all the indoor units plus 50. Main M-NET Remote Controller (M-NET RC) / 101 to 150 / Indoor unit address plus 100 Sub M-NET Remote Controller (M-NET RC) / 151 to 200 / Indoor unit address plus 150
3. Group operation  • Multiple M-NET control indoor units operated together by 1 M-NET remote controller	a. Same as above a b. Connect terminals M1 and M2 on transmission cable terminal block (TB5) of the M-IC main unit with the most recent address within the same M-NET control indoor unit (M-IC) group to terminal block (TB6) on the M-NET remote controller. c. Set the address setting switch (on outdoor unit P.C.B) as shown below. Unit / Range / Setting Method M-IC (Main) / 001 to 050 / Use the smallest address within the same group of M-NET control indoor units. M-IC (Sub) / 001 to 050 / Use an address, other than that of the M-IC (Main) from among the units within the same group of indoor units. This must be in sequence with the M-IC (Main). Outdoor unit / 051 to 100 / Use the smallest address of all the M-NET control indoor units plus 50. Main M-NET Remote Controller (M-NET RC) / 101 to 150 / Set at an M-IC (Main) address within the same group plus 100. d. Use the M-NET control indoor unit (M-IC) within the group with the most functions as the M-IC (Main) unit.
Combinations of 1 through 3 above are possible.	

• Name, Symbol and the Maximum Remote controller Units for Connection

Name	Symbol	Maximum units for connection
Outdoor unit	OC	—
M-NET control Indoor unit	M-IC	1 OC unit can be connected to 1 to 9 (SP112)/1 to 10 (SP125)/1 to 12 (SP140) M-IC units
M-NET remote controller	M-NET RC	Maximum 2 M-NET RC for 1 indoor unit, Maximum 12 M-NET RC for 1 OC

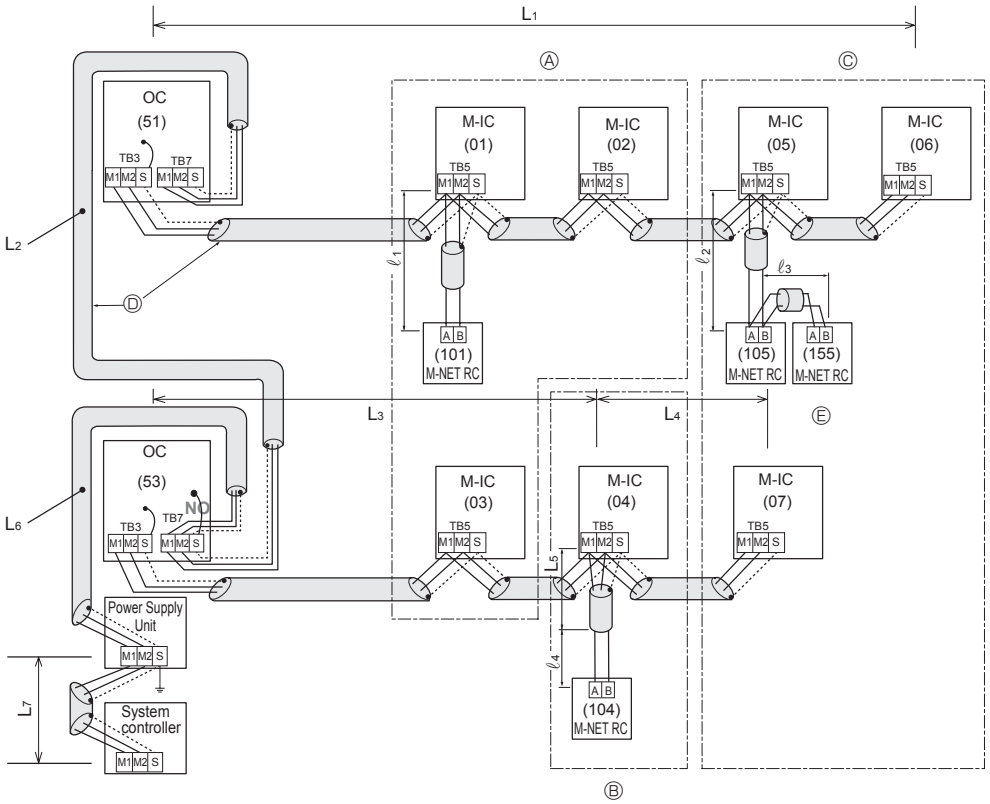
<table>
<tr><th>Permissible Lengths</th><th>Prohibited items</th></tr>
<tr><td>Longest transmission cable length (1.25 mm²)
$L_1 + L_2$, $L_3 + L_1 \leqq 200$ m
M-NET Remote controller cable length
1. If 0.5 to 1.25 mm²
ℓ_1, $\ell_2 \leqq 10$ m
2. If the length exceeds 10 m, the exceeding section should be 1.25 mm² and that section should be a value within the total extension length of the transmission cable and maximum transmission cable length. (L_3)</td><td>• M-NET remote controller (M-NET RC) and MA remote controller (MA RC) cannot be used together.
• Do not connect anything with TB15 of M-NET control indoor unit (M-IC).
 
</td></tr>
<tr><td>Same as above</td><td> 

① Use the M-NET control indoor unit (M-IC) address plus 150 as the sub M-NET remote controller address. In this case, it should be 152.
② 3 or more M-NET remote controllers (M-NET RC) cannot be connected to 1 M-NET control indoor unit.</td></tr>
<tr><td>Same as above</td><td> 

① The M-NET remote controller address is the M-NET control indoor unit main address plus 100. In this case, it should be 101.</td></tr>
</table>

B. Example of a group operation system with 2 or more outdoor units and a M-NET remote controller.
(Address settings are necessary.)

Examples of Transmission Cable Wiring



Ⓐ : Group
Ⓑ : Group
Ⓒ : Group
Ⓓ : Shielded Wire
Ⓔ : Sub M-NET Remote Controller
( ): Address example

Wiring Method Address Settings

a. Always use shielded wire when making connections between the outdoor unit (OC) and the M-NET control indoor unit (M-IC), as well for all OC-OC, and IC-IC wiring intervals.
b. Use feed wiring to connect terminals M1 and M2 and the ground terminal on the transmission cable terminal block (TB3) of each outdoor unit (OC) to terminals M1 and M2 on the terminal S on the transmission cable terminal block of the M-NET control indoor unit (M-IC).
c. Connect terminals M1 and M2 on the transmission cable terminal block of the M-NET control indoor unit (M-IC) that has the most recent address within the same group to the terminal block on the M-NET remote controller (M-NET RC).
d. Connect together terminals M1, M2 and terminal S on the terminal block for centralized control (TB7) for the outdoor unit (OC).
e. DO NOT change the jumper connector CN41 on outdoor multi controller circuit board.
f. The earth processing of S terminal for the centralized control terminal block (TB7) is unnecessary. Connect the terminal S on the power supply unit with the earth.
g. Set the address setting switch as follows.

Unit	Range	Setting Method
M-IC (Main)	01 to 50	Use the smallest address within the same group of M-NET control indoor units.
M-IC (Sub)	01 to 50	Use an address, other than the M-IC (Main) in the same group of M-NET control indoor units. This must be in sequence with the M-IC (Main).
Outdoor Unit	51 to 100	Use the smallest address of all the M-NET control indoor units plus 50. The address automatically becomes “100” if it is set as “01–50”.
Main M-NET Remote Controller	101 to 150	Set at an M-IC (Main) address within the same group plus 100.
Sub M-NET Remote Controller	151 to 200	Set at an M-IC (Main) address within the same group plus 150.
MA Remote Controller	—	Address setting is not necessary. (Main/sub setting is necessary.)

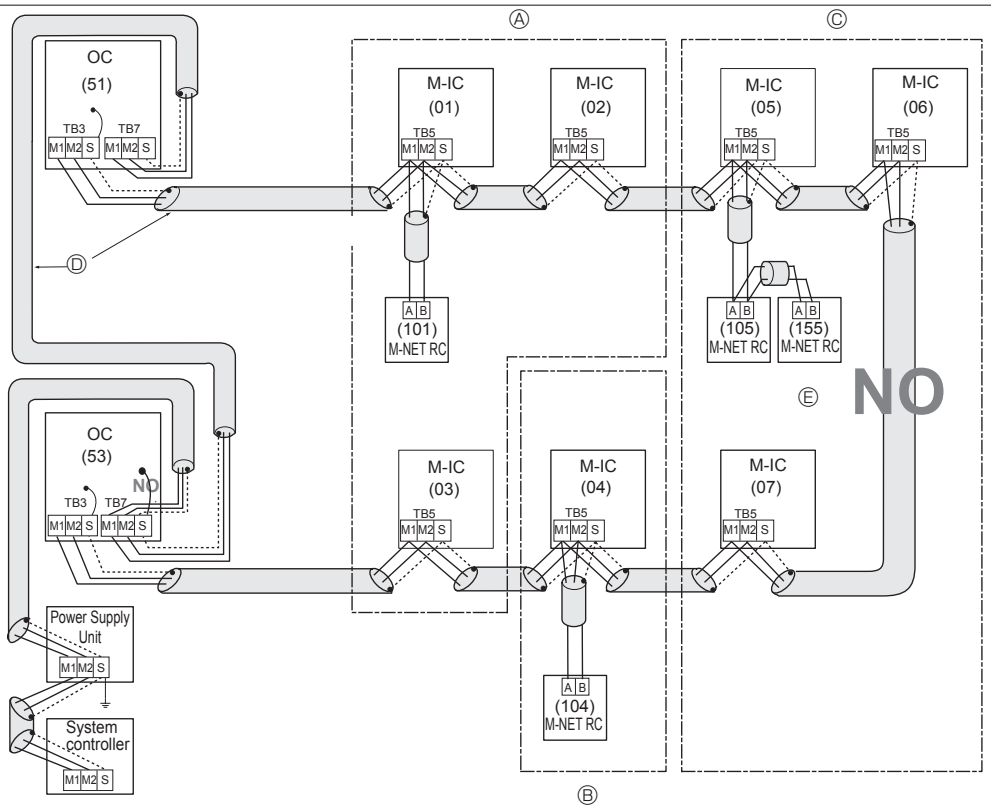
h. The group setting operations among the multiple M-NET control indoor units is done by the M-NET remote controller (M-NET RC) after the electrical power has been turned on.

• Name, Symbol, and the Maximum Units for Connection

Permissible Length

- Longest length via outdoor units : $L_1+L_2+L_3+L_4$, $L_1+L_2+L_3+L_5$, $L_1+L_2+L_6+L_7 \leqq 500$ m (1.25 mm²)
- Longest transmission cable length : L_1, L_3+L_4, L_3+L_5, L_2+L_6, $L_7 \leqq 200$ m (1.25 mm²)
- M-NET Remote controller cable length : ℓ_1, ℓ_2, $\ell_2+\ell_3$, $\ell_4 \leqq 10$ m (0.5 to 1.25 mm²)
  If the length exceeds 10 m, use a 1.25 mm² shielded wire. The length of this section (L_8) should be included in the calculation of the maximum length and overall length.

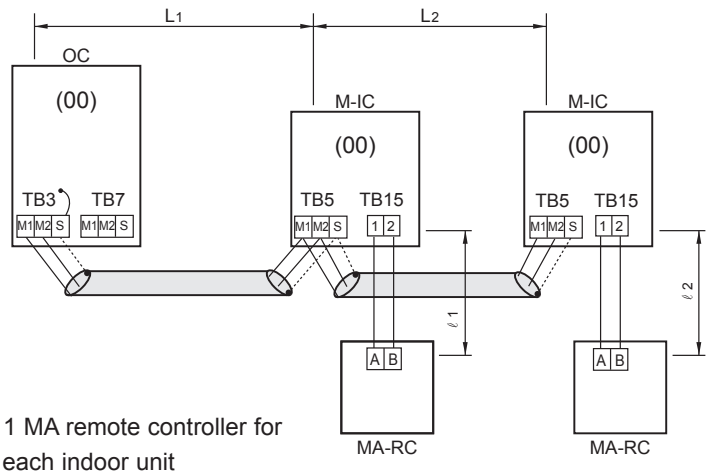
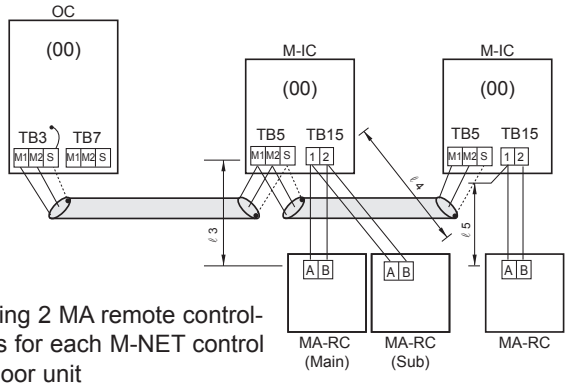
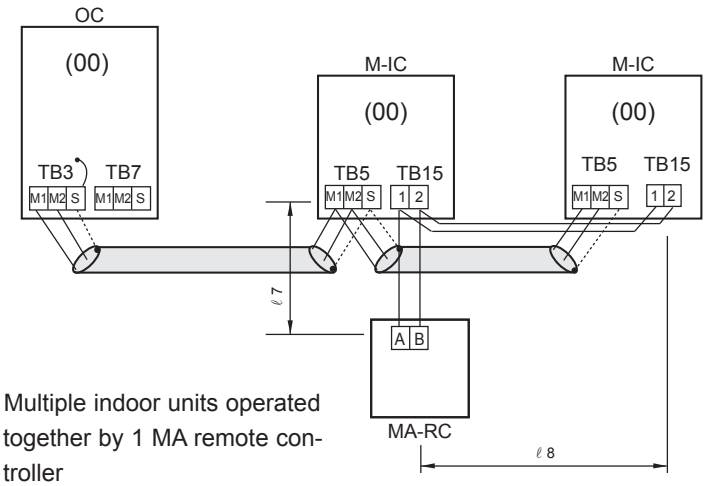
Prohibited items

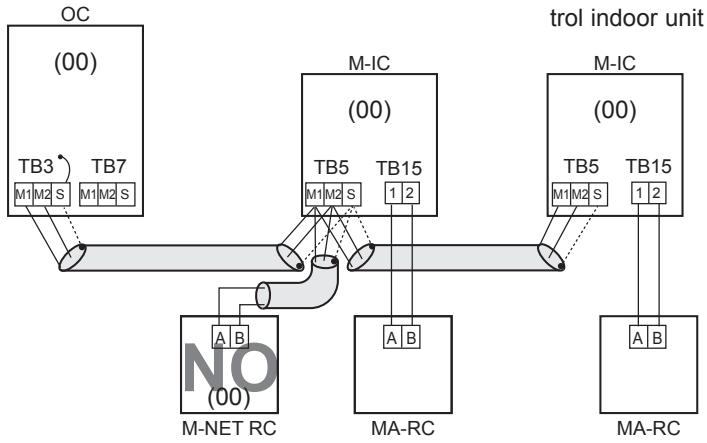
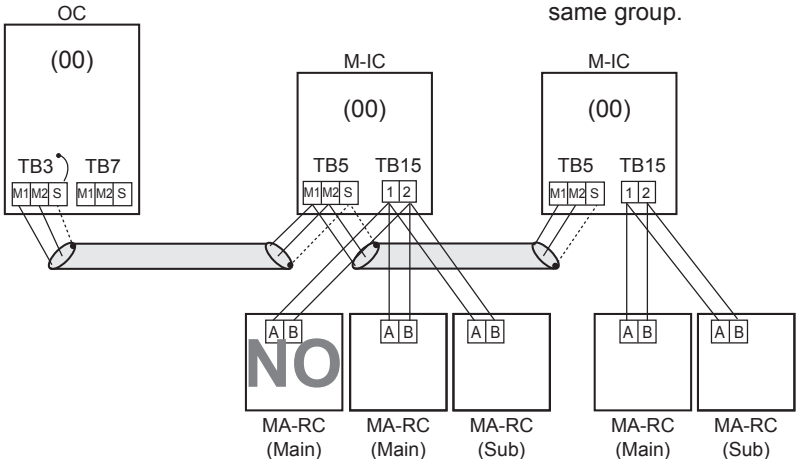
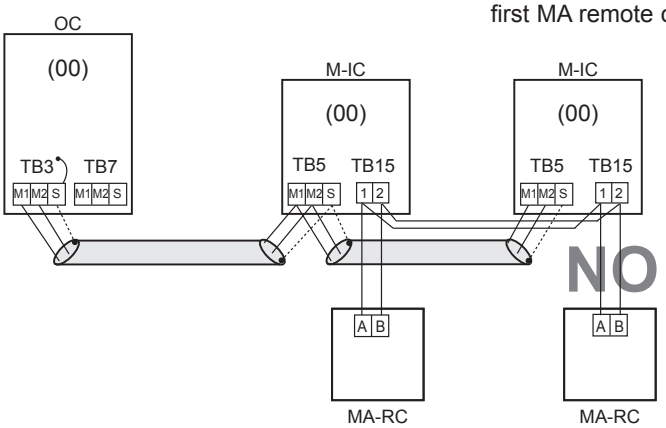


Ⓐ : Group
Ⓑ : Group
Ⓒ : Group
Ⓓ : Shielded Wire
Ⓔ : Sub M-NET Remote Controller
( ): Address example

- Never connect together the terminal blocks (TB5) for transmission wires for M-NET control indoor units (M-IC) that have been connected to different outdoor units (OC).
- Set all addresses to ensure that they are not overlapped.
- M-NET remote controller and MA remote controller cannot be connected with the M-NET control indoor unit of the same group wiring together.

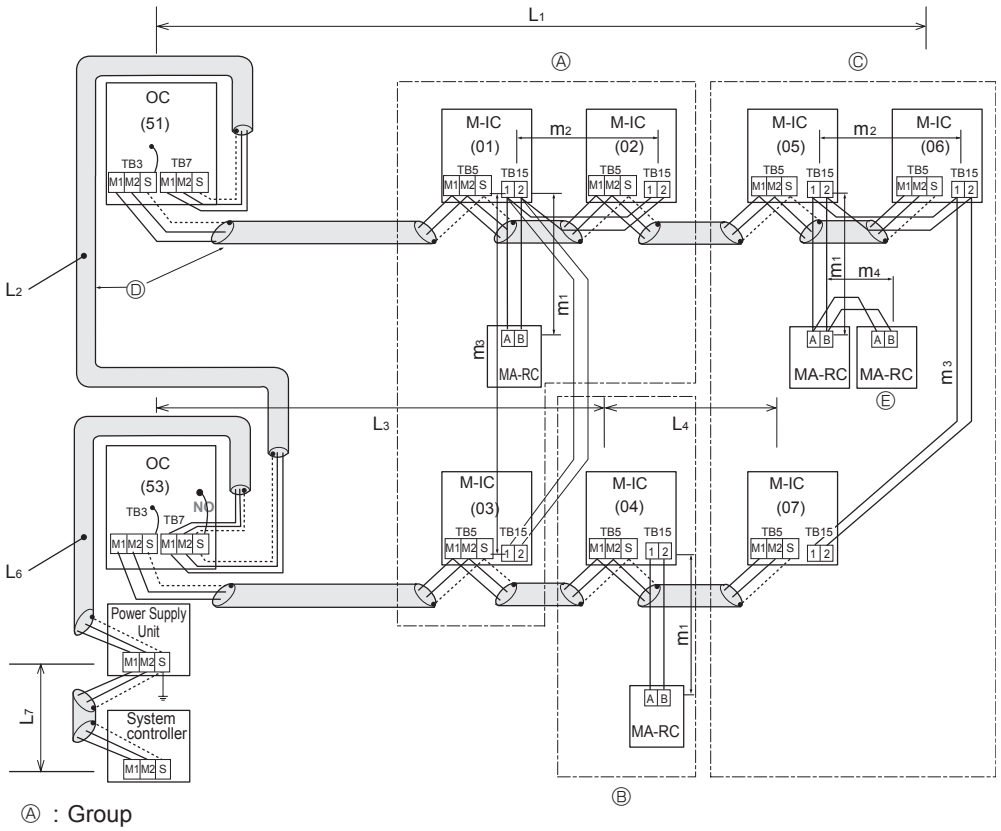
C. Example of a MA remote controller system (address setting is not necessary.)
NOTE : In the case of same group operation, need to set the address that is only main M-NET control indoor unit.

Example of wiring control cables	Wiring Method and Address Setting
1. Standard operation  • 1 MA remote controller for each indoor unit	a. Use feed wiring to connect terminals M1 and M2 on transmission cable block (TB3) for the outdoor unit (OC) to terminals M1 and M2 on the transmission cable block (TB5) of each M-NET control indoor unit (M-IC). Use non-polarized 2-core wire. b. Connect terminals 1 and 2 on transmission cable terminal block (TB15) for each M-NET control indoor unit with the terminal block for the MA remote controller (MA-RC).
2. Operation using 2 remote controllers  • Using 2 MA remote controllers for each M-NET control indoor unit	a. The same as above a b. The same as above b c. In the case of using 2 remote controllers, connect terminals 1 and 2 on transmission cable terminal block (TB15) for each indoor unit with the terminal block for 2 MA remote controllers. · Set either one of the MA remote controllers to "sub remote controller". Refer to the installation manual of MA remote controller.
3. Group operation  • Multiple indoor units operated together by 1 MA remote controller	a. The same as above a b. The same as above b c. Connect terminals 1 and 2 on transmission cable terminal block (TB15) of each M-NET control indoor unit, which is doing group operation with the terminal block the MA remote controller. Use non-polarized 2-core wire. d. In the case of same group operation, need to set the address that is only main M-NET control indoor unit. Please set the smallest address within number 01–50 of the M-NET control indoor unit with the most functions in the same group.
Combinations of 1 through 3 above are possible.	

Permissible Lengths	Prohibited items
Longest transmission cable length: $L_1 + L_2 \leqq 200$ m (1.25 mm²) MA remote controller cable length: $\ell_1, \ell_2 \leqq 200$ m (0.3 to 1.25 mm²)	The MA remote controller and the M-NET remote controller cannot be used together with the M-NET control indoor unit of the same group. 
Longest transmission cable length: $L_1 + L_2 \leqq 200$ m (1.25 mm²) MA remote controller cable length: $\ell_3 + \ell_4, \ell_5 \leqq 200$ m (0.3 to 1.25 mm²)	3 MA remote controllers or more cannot be connected with the M-NET control indoor unit of the same group. 
Longest transmission cable length: $L_1 + L_2 \leqq 200$ m (1.25 mm²) MA remote controller cable length: $\ell_7 + \ell_8 \leqq 200$ m (0.3 to 1.25 mm²)	The second MA remote controller is connected with the terminal block (TB15) for the MA remote controller of the same M-NET control indoor unit (M-IC) as the first MA remote control. 

D. Example of a group operation with 2 or more outdoor units and a MA remote controller.
(Address settings are necessary.)

Examples of Transmission Cable Wiring



Ⓐ : Group
Ⓑ : Group
Ⓒ : Group
Ⓓ : Shielded Wire
Ⓔ : Sub MA Remote Controller
( ): Address example

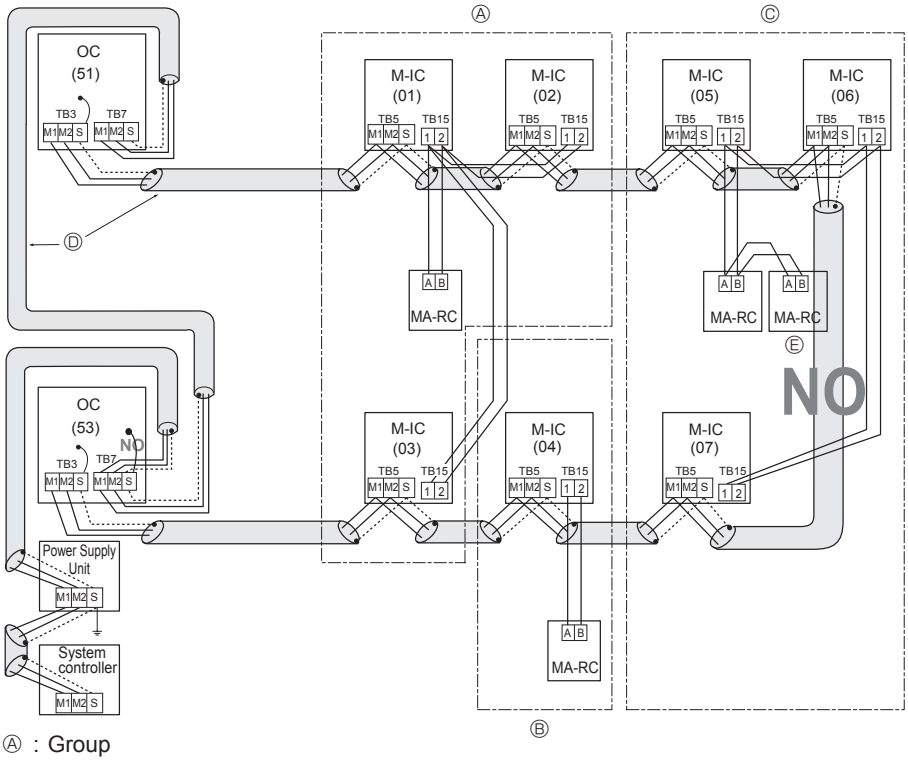
Wiring Method Address Settings

a. Always use shielded wire when making connections between the outdoor unit (OC) and the M-NET control indoor unit (M-IC), as well for all OC-OC, and IC-IC wiring intervals.
b. Use feed wiring to connect terminals M1 and M2 and the ground terminal on the transmission cable terminal block (TB3) of each outdoor unit (OC) to terminals M1 and M2 on the terminal S on the transmission cable terminal block of the M-NET control indoor unit (M-IC).
c. Connect terminals M1 and M2 on the transmission cable terminal block of the M-NET control indoor unit (M-IC) that has the most recent address within the same group to the terminal block on the M-NET remote controller (M-NET RC).
d. Connect together terminals M1, M2 and terminal S on the terminal block for centralized control (TB7) for the outdoor unit (OC).
e. DO NOT change the jumper connector CN41 on outdoor multi controller circuit board.
f. The earth processing of S terminal for the centralized control terminal block (TB7) is unnecessary. Connect the terminal S on the power supply unit with the earth.
g. Set the address setting switch as follows.

Unit	Range	Setting Method
M-IC (Main)	01 to 50	Use the smallest address within the same group of indoor units.
M-IC (Sub)	01 to 50	Use an address, other than the M-IC (Main) in the same group of M-NET indoor units. This must be in sequence with the M-IC (Main).
Outdoor Unit	51 to 100	Use the smallest address of all the indoor units plus 50. The address automatically becomes “100” if it is set as “01–50”.
Main M-NET Remote Controller	101 to 150	Set at an M-IC (Main) address within the same group plus 100.
Sub M-NET Remote Controller	151 to 200	Set at an M-IC (Main) address within the same group plus 150.
MA Remote Controller	—	Address setting is not necessary. (Main/sub setting is necessary.)

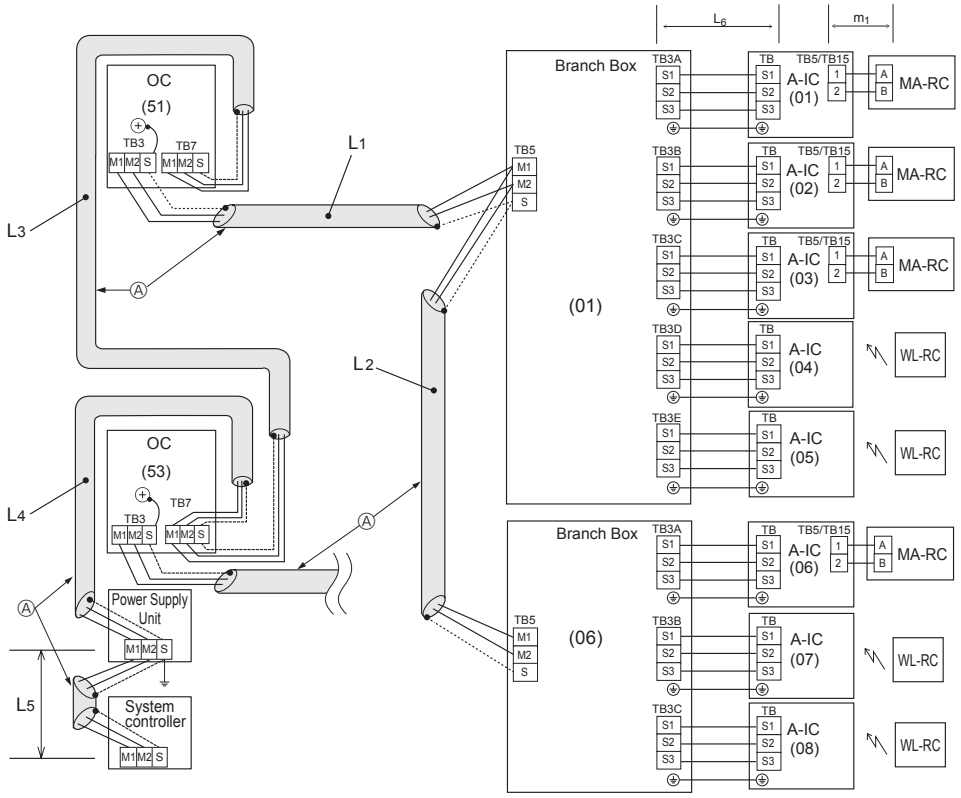
h. The group setting operations among the multiple M-NET control indoor units is done by the M-NET remote controller (M-NET RC) after the electrical power has been turned on.

• Name, Symbol, and the Maximum Units for Connection

Permissible Length	Longest length via outdoor unit (M-NET cable): $L_1+L_2+L_3+L_4$ and $L_1+L_2+L_6+L_7 \leqq 500$ m (1.25 ㎟ more) Longest transmission cable length (M-NET cable): L_1 and L_3+L_4 and L_2+L_6 and $L_7 \leqq 200$ m (1.25 ㎟ or more) MA Remote controller cable length: m1 and m1+m2+m3 and m1+m2+m3+m4 $\leqq$ 200 m (0.3 to 1.25 ㎟)
Prohibited items	 Ⓐ : Group Ⓑ : Group Ⓒ : Group Ⓓ : Shielded Wire Ⓔ : Sub MA Remote Controller ( ): Address example • Never connect together the terminal blocks (TB5) for transmission wires for M-NET control indoor units (M-IC) that have been connected to different outdoor units (OC). • M-NET remote controller and MA remote controller cannot be connected with the M-NET control indoor unit of the same group wiring together.

E. Example of a system using Branch Box and A-Control indoor unit

Examples of Transmission Cable Wiring



Ⓐ : Shielded wire

( ): Address example

Wiring Method Address Settings

a. Always use shielded wire when making connections between the outdoor unit (OC) and the Branch Box, as well for all OC-OC wiring intervals.
b. Use feed wiring to connect terminals M1 and M2 and the ground terminal on the transmission cable terminal block (TB3) of each outdoor unit (OC) to terminals M1 and M2 on the terminal S on the transmission cable terminal block (TB5) of the Branch Box.
c. Connect terminals 1 and 2 on the transmission cable terminal block (TB5/TB15) of the A-control indoor unit (A-IC), to the terminal block on the MA remote controller (MA-RC).
d. Connect together terminals M1, M2 and terminal S on the terminal block for centralized control (TB7) for the outdoor unit (OC).
e. DO NOT change the jumper connector CN41 on outdoor multi controller circuit board.
f. The earth processing of S terminal for the centralized control terminal block (TB7) is unnecessary. Connect the terminal S on the power supply unit to the earth.
g. Set the address setting switch as follows.

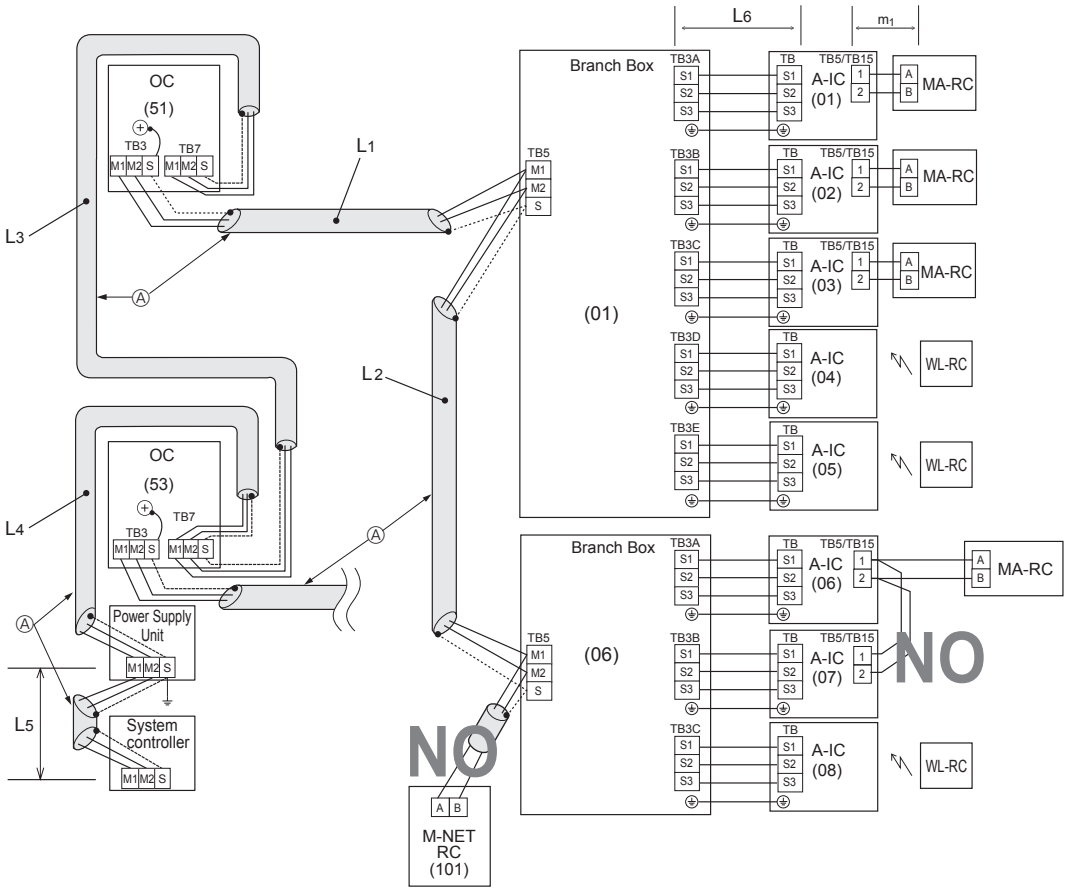
Unit	Range	Setting Method
A-IC	01 to 50	According to the set address of connected Branch Box, set the A-IC addresses sequentially by SW1 on Branch Box. (For example, when setting the Branch Box address to 01, A-IC addresses set 02,03,04, and 05.)
Branch Box	01 to 50	Use a number within the range 1–50, but it should not make the highest address of connected A-IC exceed 50.
Outdoor Unit	51 to 100	Use the smallest address of all the Branch Box plus 50. The address automatically becomes “100” if it is set as “01–50”.
MA Remote Controller	–	Address setting is not necessary.

• **Name, Symbol, and the Maximum Units for Connection**

Permissible Length

Longest length via outdoor unit (M-NET cable): $L_1+L_2+L_3+L_4+L_5 \leqq 500$ m (1.25 ㎟ or more)
Longest transmission cable length (M-NET cable): L_1+L_2, L_3+L_4, $L_5 \leqq 200$ m (1.25 ㎟ or more)
Longest transmission cable length (A-Control cable): $L_6 \leqq 25$ m (1.5 ㎟)
Remote controller cable length: m1 ≦ 200 m (0.3 to 1.25 ㎟)

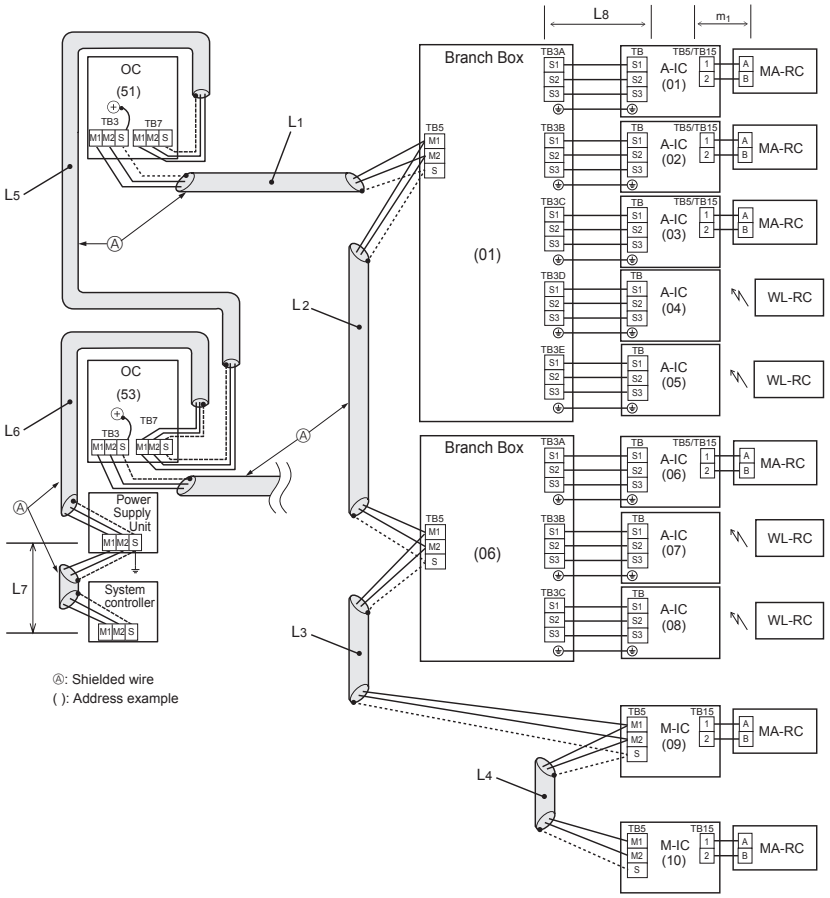
Prohibited items



• Plural indoor units cannot be operated by a single remote controller
• Different refrigerant systems cannot be connected together.
• M-NET remote controller cannot be connected.

F. Example of a system using Branch Box, A-Control indoor unit, and M-NET Control indoor unit.

Examples of Transmission Cable Wiring

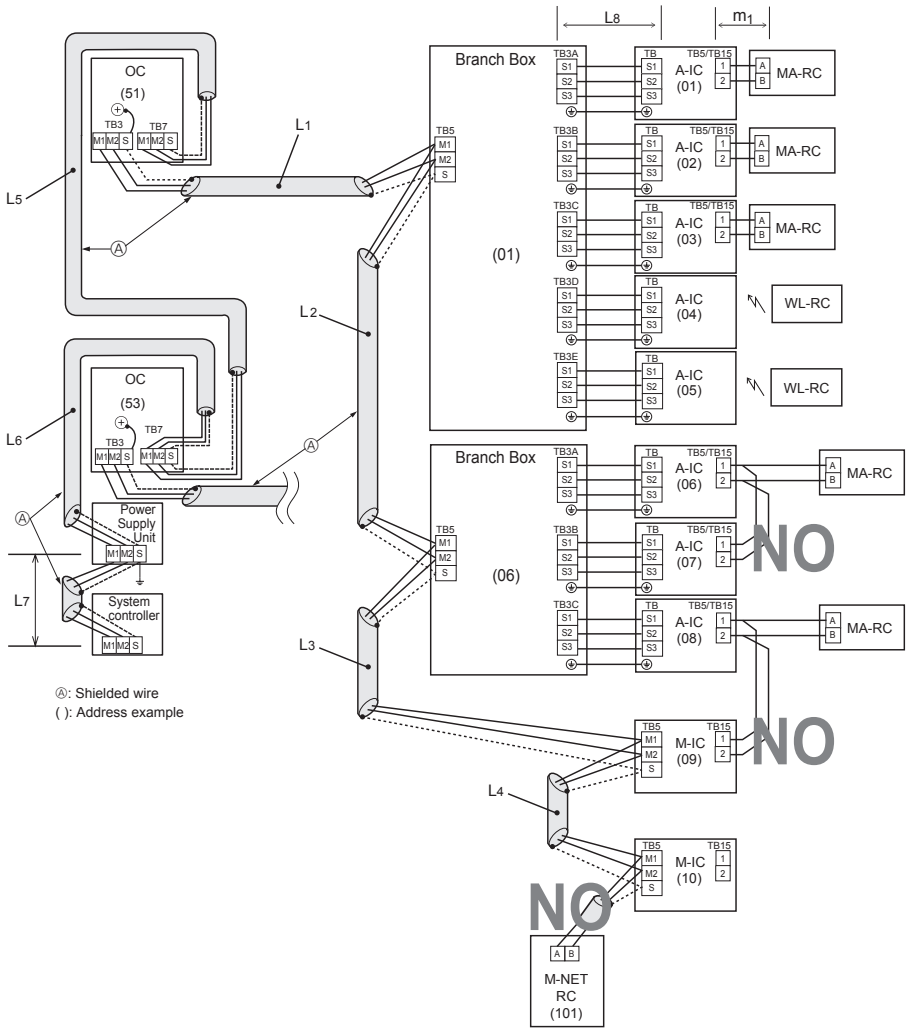


Wiring Method Address Settings

a. Always use shielded wire when making connections between the outdoor unit (OC) and the Branch Box or M-NET control indoor unit (M-IC), as well for all OC-OC wiring intervals.
b. Use feed wiring to connect terminals M1 and M2 and the ground terminal on the transmission cable terminal block (TB3) of each outdoor unit (OC) to terminals M1 and M2 on the terminal S on the transmission cable terminal block (TB5) of the Branch Box or M-NET control indoor unit (M-IC).
c. Connect terminals 1 and 2 on the transmission cable terminal block (TB5/TB15) of the A-control indoor unit (A-IC) or M-NET control indoor unit (M-IC), to the terminal block on the MA remote controller (MA-RC).
d. Connect together terminals M1, M2 and terminal S on the terminal block for centralized control (TB7) for the outdoor unit (OC).
e. DO NOT change the jumper connector CN41 on MULTI controller board.
f. The earth processing of S terminal for the centralized control terminal block (TB7) is unnecessary. Connect the terminal S on the power supply unit to the earth.
g. Set the address setting switch as follows.

Unit	Range	Setting Method
M-IC	01 to 50	–
A-IC	01 to 50	According to the set address of connected Branch Box, set the A-IC addresses sequentially by SW1, SW11, SW12 on Branch Box. (For example, when the Branch Box address is set to 01, set the A-IC addresses to 01, 02, 03, 04 and 05.)
Branch Box	01 to 50	Use a number within the range 1-50, but it should not make the highest address of connected A-IC exceed 50.
Outdoor Unit	51 to 100	Use the smallest address of all the Branch Box plus 50. The address automatically becomes “100” if it is set as “01–50”.
MA Remote Controller	–	Address setting is not necessary.

• Name, Symbol, and the Maximum Units for Connection

Permissible Length	Longest length via outdoor unit (M-NET cable): $L_1+L_2+L_3+L_4+L_5+L_6+L_7 \leqq 500$ m (1.25 ㎟ or more) Longest transmission cable length (M-NET cable): $L_1+L_2+L_3+L_4$, L_5+L_6 and $L_7 \leqq 200$ m (1.25 ㎟ or more) Longest transmission cable length (A-Control cable): $L_8 \leqq 25$ m (1.5 ㎟) Remote controller cable length: m1 ≦ 200 m (0.3 to 1.25 ㎟)
Prohibited items	 • Plural indoor units cannot be operated by a single remote controller. • Different refrigerant systems cannot be connected together. • M-NET remote controller cannot be connected.

8 TROUBLESHOOTING

8-1. CHECK POINTS FOR TEST RUN

8-1-1. Procedures before test run

(1) Before test run, make sure that the following work is completed.

- Installation related :
  Make sure that the panel of cassette type and electrical wiring are done.
  Otherwise electrical functions like auto vane will not operate normally.
- Piping related :
  Perform leakage test of refrigerant and drain piping.
  Make sure that all joints are perfectly insulated.
  Check stop valves on both liquid and gas side for full open.
- Electrical wiring related :
  Check ground wire, transmission cable, remote controller cable, and power supply cable for secure connection.
  Make sure that all switch settings of address or adjustments for special specification systems are correctly settled.

(2) Safety check :
With the insulation tester of 500 V, inspect the insulation resistance.
Do not touch the transmission cable and remote controller cable with the tester.
The resistance should be over 1.0 MΩ. Do not proceed inspection if the resistance is under 1.0 MΩ.
Inspect between the outdoor unit power supply terminal block and ground first, metallic parts like refrigerant pipes or the electrical box next, then inspect all electrical wiring of outdoor unit, indoor unit, and all linked equipment .

(3) Before operation :
a) Turn the power supply switch of the outdoor unit to on for compressor protection. For a test run, wait at least 12 hours from this point.
b) Register control systems into remote controller(s). Never touch the ON/OFF switch of the remote controller(s). Refer to “7-2. Special Function Operation and Settings for M-NET Remote Controller” as for settings. In MA remote controller(s), this registration is unnecessary.

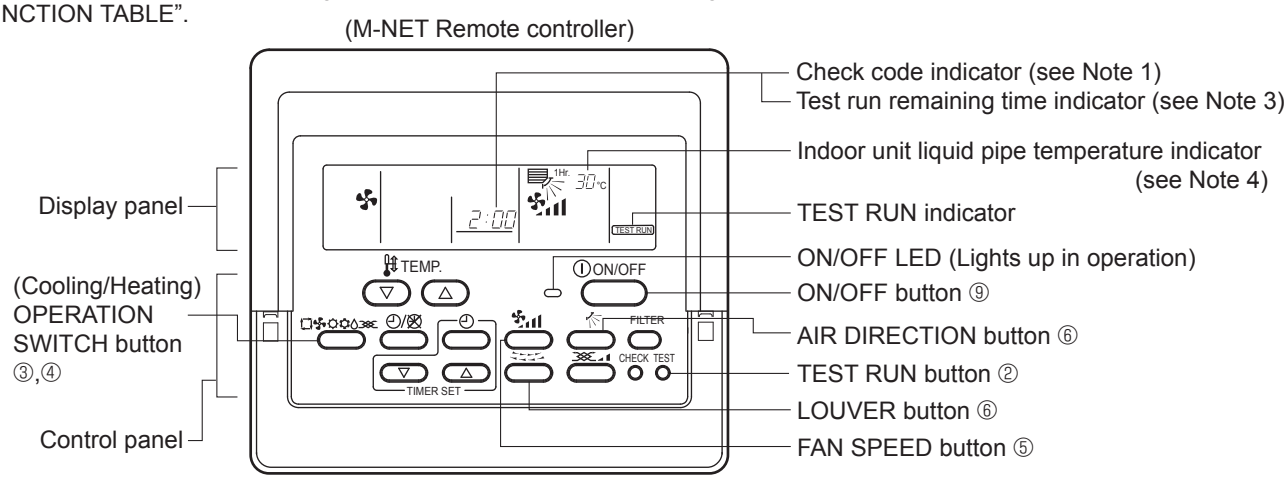
(4) More than 12 hours later from power supply to the outdoor unit, turn all power switch to on for the test run. Perform test run according to the “Operation procedure” table of the bottom of this page. While test running, make test run reports .

8-1-1-1. Test run for M-NET Remote controller

(M-NET remote controller cannot be connected with a refrigerant system which includes branch box.)

When you deliver the unit after the test run, instruct the end user for proper usage of the system using owners' manual and the test run report you made to certificate normal operation. If abnormalities are detected during test run, refer to “8-1-2. Countermeasures for Error During Test Run”. As for DIP switch setting of outdoor unit, refer to “8-5. INTERNAL SWITCH FUNCTION TABLE”.

(M-NET Remote controller)

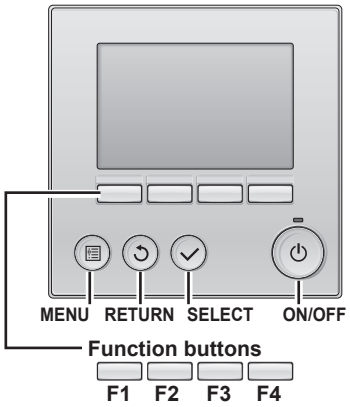


Operation procedure	
①	Turn on the main power supply of all units at least 12 hours before test run. ”HO” appears on display panel for 3 minutes.
②	12 hours later, press TEST RUN button twice to perform test run. “TEST RUN “ appears on display panel.
③	Press OPERATION SWITCH button to make sure that air blows out.
④	Select Cooling (or Heating) by OPERATION SWITCH button to make sure that cool (or warm) air blows out.
⑤	Press Fan speed button to make sure that fan speed is changed by the button.
⑥	Press AIR DIRECTION button or LOUVER button to make sure that air direction is adjustable (horizontal, downward, upward, and each angle).
⑦	Check outdoor fans for normal operation.
⑧	Check interlocked devices (like ventilator) for normal operation, if any. This is the end of test run operation.
⑨	Press ON/OFF button to stop and cancel test run.

Notes:

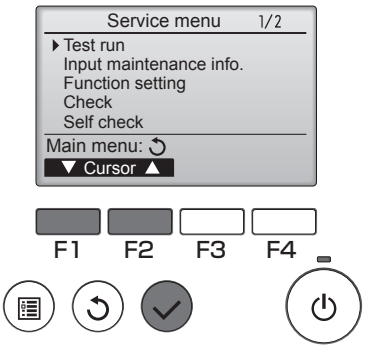
1. If check code appears on remote controller or remote controller malfunctions, refer to “8-1-2. Countermeasures for Error During Run”.
2. During test run operation, 2-hour off timer activates automatically and remaining time is displayed on remote controller and test run will stop 2 hours later.
3. During test run, the indoor liquid pipe temperature is displayed on remote controller instead of room temperature.
4. Depending on a model, “This function is not available” appears when air direction button is pressed. However, this is not malfunction.

8-1-1-2. Test run for wired remote controller <PAR-31MAA> <PAR-32MAA>

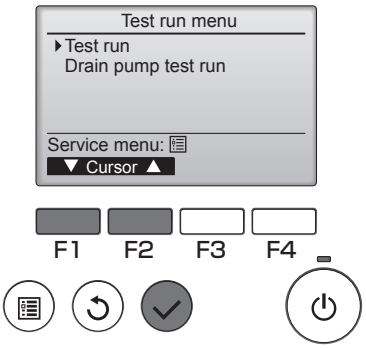


① **Select "Service" from the Main menu, and press the ⓒ button.**

Select "Test run" with the F1 or F2 button, and press the ⓒ button.



② **Select "Test run" with the F1 or F2 button, and press the ⓒ button.**

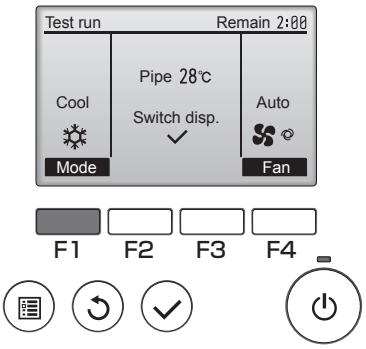


Test run operation

Press the F1 button to go through the operation modes in the order of "Cool and Heat".

Cool mode: Check the cold air blows out.
Heat mode: Check the heat blows out.

Press the ⓒ button and open the Vane setting screen.



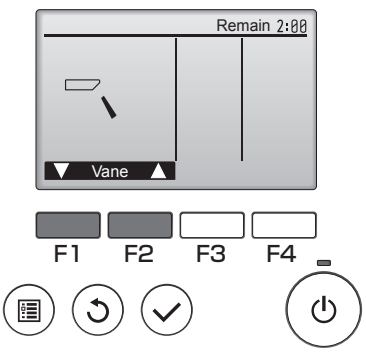
Auto vane check*

Check the auto vane with the F1 F2 buttons.
Check the operation of the outdoor unit fan, also.

Press the ⓑ button to return to "Test run operation".

Press the ⓟ button.

When the test run is completed, the "Test run menu" screen will appear.
The test run will stop automatically after 2 hours.
*The function is available only for the model with vanes.



8-1-2. Countermeasures for Error During Test Run

• If a problem occurs during test run, a code number will appear on the remote controller (or LED on the outdoor unit), and the air conditioning system will automatically cease operating.

Determine the nature of the abnormality and apply corrective measures.

Check code (2 digits)	Check code (4 digits)	Trouble	Detected Unit			Remarks
			Indoor	Outdoor	Remote Controller	
Ed	0403	Serial communication error		○		Outdoor unit outdoor multi controller circuit board – Power circuit board communication trouble
U2	1102	Compressor temperature trouble		○		Check delay code 1202
UE	1302	High pressure trouble		○		Check delay code 1402
U7	1500	Superheat due to low discharge temperature trouble		○		Check delay code 1600
U2	1501	Refrigerant shortage trouble		○		Check delay code 1601
		Closed valve in cooling mode		○		Check delay code 1501
P6	1503	Freeze protection of branch box or indoor unit	○			
EF	1508	4-way valve trouble in heating mode		○		Check delay code 1608
L6	2135	Circulation water freeze protection	○			
PA	2500	Water leakage	○			
P5	2502	Drain overflow protection	○			
P4	2503	Drain sensor abnormality	○			
UF	4100	Compressor current interruption (locked compressor)		○		Check delay code 4350
Pb	4114	Fan trouble (Indoor unit)	○			
UP	4210	Compressor overcurrent interruption		○		
U9	4220	Voltage shortage/overvoltage/PAM error/L1open phase/primary current sensor error/power synchronization signal error		○		Check delay code 4320
U5	4230	Heat sink temperature trouble		○		Check delay code 4330
U6	4250	Power module trouble or Overcurrent trouble		○		Check delay code 4350
U8	4400	Fan trouble (Outdoor unit)		○		Check delay code 4500
U3	5101	Air inlet thermistor (TH21) open/short	○			
		Compressor temperature thermistor (TH4) open/short		○		Check delay code 1202
U4	5102	Liquid pipe temperature thermistor (TH22) open/short	○			
		Suction pipe temperature thermistor (TH6) open/short		○		Check delay code 1211
U4	5103	Gas pipe temperature thermistor (TH23) open/short	○			
U4	5105	Outdoor liquid pipe temperature thermistor (TH3) open/short		○		Check delay code 1205
U4	5106	Ambient temperature thermistor (TH7) open/short		○		Check delay code 1221
U4	5109	HIC pipe temperature thermistor (TH2) open/short		○		Check delay code 1222
U4	5110	Heat sink temperature thermistor (TH8) open/short		○		Check delay code 1214
F5	5201	High pressure sensor (63HS) trouble		○		Check delay code 1402
F3	5202	Low pressure sensor (63LS) trouble		○		Check delay code 1400
UH	5300	Primary current error		○		Check delay code 4310
P4	5701	Contact failure of drain float switch	○			
A0	6600	Duplex address error	○	○	○	Only M-NET Remote controller is detected.
A2	6602	Transmission processor hardware error	○	○	○	Only M-NET Remote controller is detected.
A3	6603	Transmission bus BUSY error	○	○	○	Only M-NET Remote controller is detected.
A6	6606	Signal communication error with transmission processor	○	○	○	Only M-NET Remote controller is detected.
A7	6607	No ACK error	○		○	Only M-NET Remote controller is detected.
A8	6608	No response frame error	○		○	Only M-NET Remote controller is detected.
E0/E4	6831	MA communication receive error	○		○	Only MA Remote controller is detected.
E3/E5	6832	MA communication send error	○		○	Only MA Remote controller is detected.
E3/E5	6833	MA communication send error	○		○	Only MA Remote controller is detected.
E0/E4	6834	MA communication receive error	○		○	Only MA Remote controller is detected.
EF	7100	Total capacity error		○		
EF	7101	Capacity code error	○	○		
EF	7102	Connecting excessive number of units and branch boxes		○		
EF	7105	Address setting error		○		
EF	7130	Incompatible unit combination		○		

Notes:

1. When the outdoor unit detects No ACK error/No response error, an object indoor unit is treated as a stop, and not assumed to be abnormal.

2. The check codes displayed on the units may be different between the error source and others. In that case, please refer to the check code of error source by displayed attribute and address.

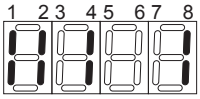
3. Refer to the service manual of indoor unit or remote controller for the detail of error detected in indoor unit or remote controller.

• Self-diagnosis function
The indoor and outdoor units can be diagnosed automatically using the self-diagnosis switch (SW1) and LED1, LED2 (LED indication) found on the multi-controller of the outdoor unit.
LED indication : Set all contacts of SW1 to OFF.

• During normal operation
The LED indicates the drive state of the controller in the outdoor unit.

Bit	1	2	3	4	5	6	7	8
Indication	Compressor operated	52C	21S4	SV1	(SV2)	—	—	Always lit

[Example]
When the compressor and SV1 are turned during cooling operation.



Check code

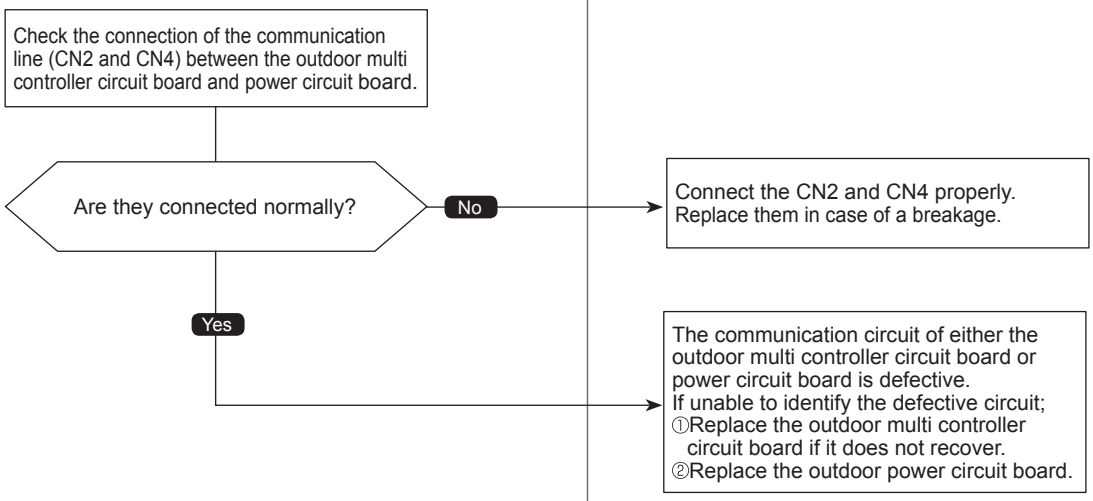
0403
(Ed)

Serial communication error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if serial communication between the outdoor multi controller circuit board and outdoor power circuit board is defective.	①Wire breakage or contact failure of connector CN2 or CN4 ②Malfunction of communication circuit to power circuit board on outdoor multi controller circuit board ③Malfunction of communication circuit on outdoor power circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
	

Check code

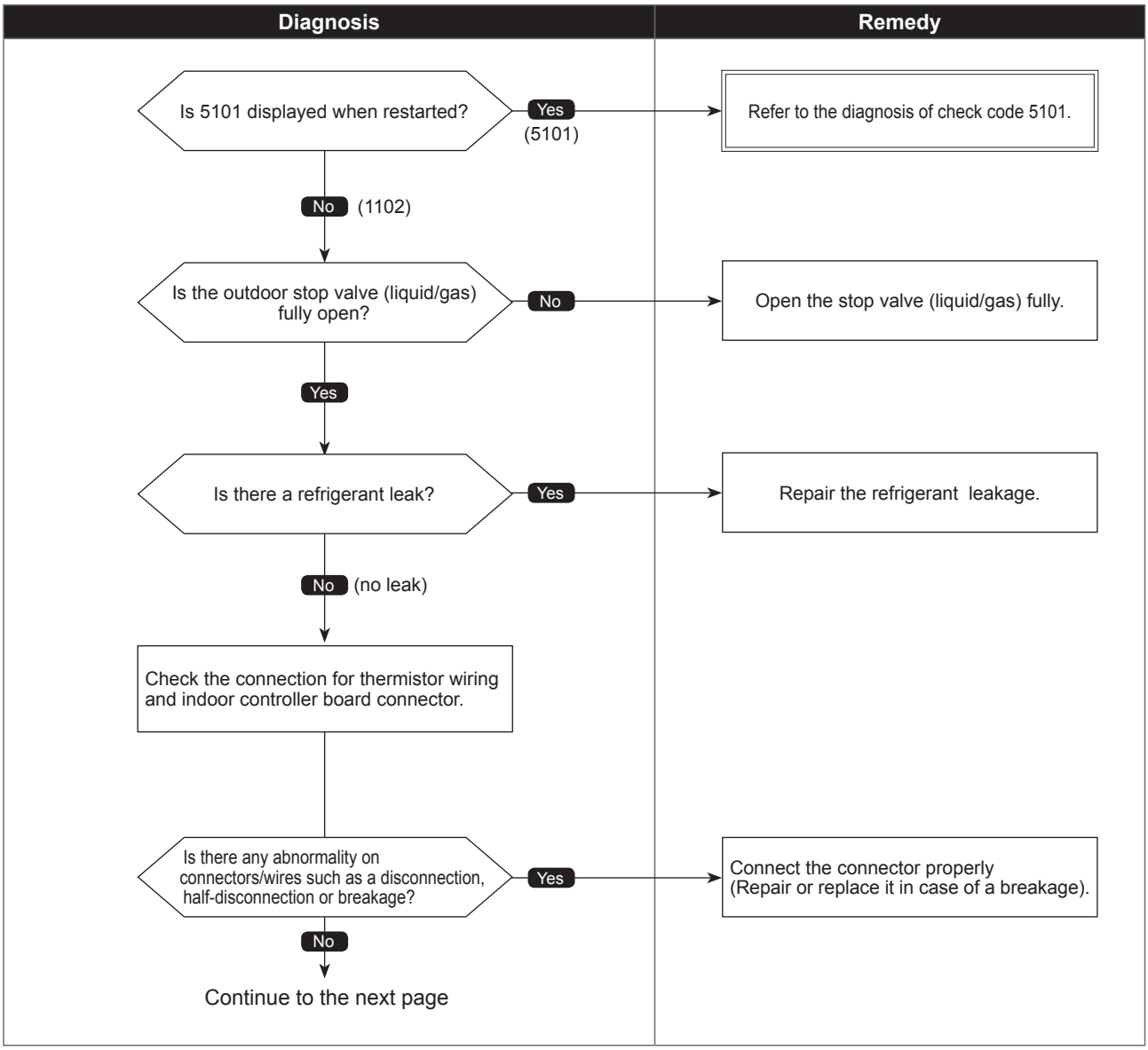
1102 (U2)

Compressor temperature trouble

Abnormal points and detection methods	Causes and checkpoints
(1) Abnormal if TH4 falls into following temperature conditions; ●exceeds 105℃ [221°F] continuously for 5 minutes ●exceeds 115℃ [239°F] TH4: Thermistor <Compressor> LEV: Linear expansion valve	①Malfunction of stop valve ②Over-heated compressor operation caused by shortage of refrigerant ③Defective thermistor ④Defective outdoor multi controller circuit board ⑤LEV performance failure ⑥Defective indoor controller board ⑦Clogged refrigerant system caused by foreign object ⑧Refrigerant shortage (Refrigerant liquid accumulation in compressor while indoor unit is OFF/thermo-OFF.)

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



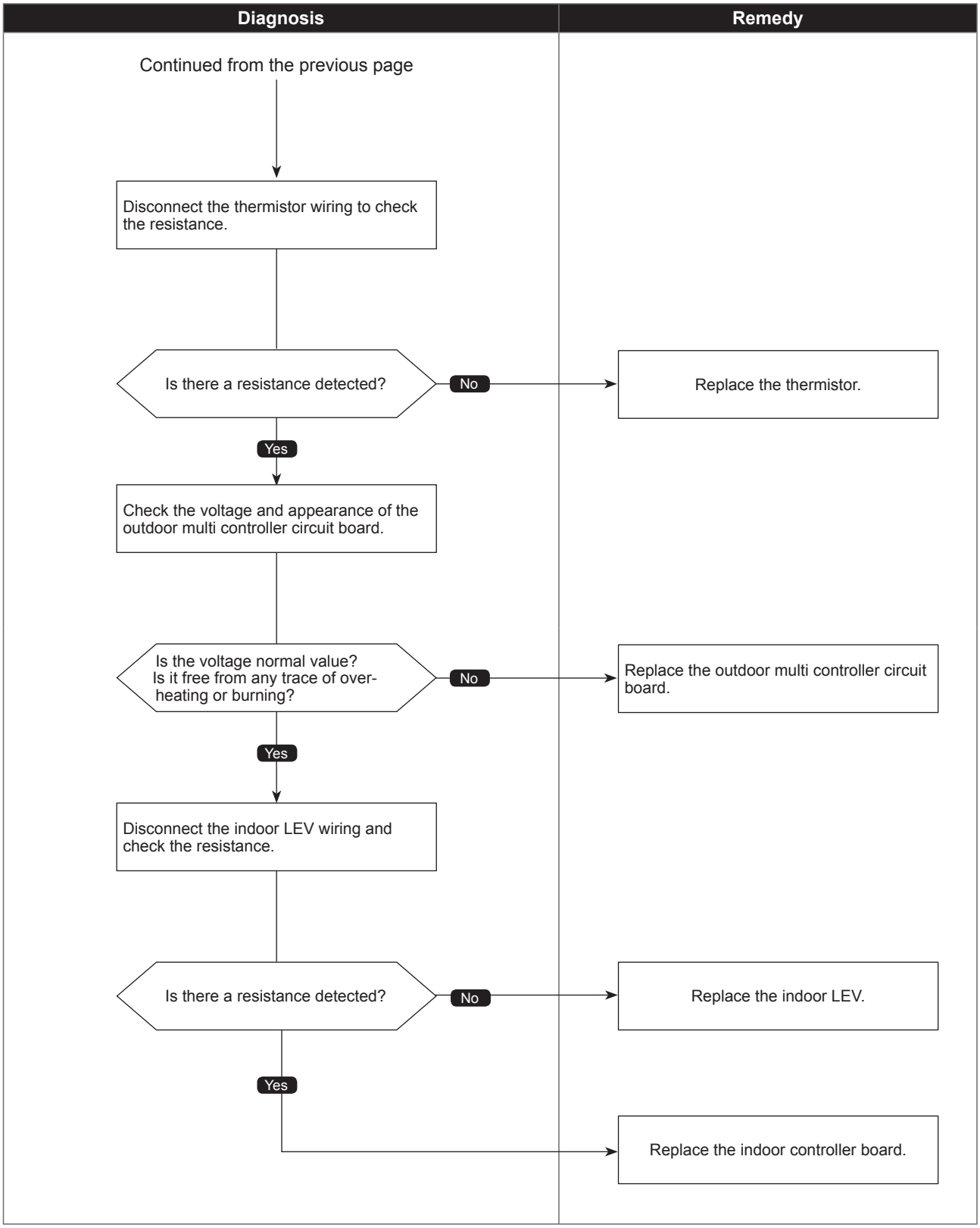
Check code

1102
(U2)

Compressor temperature trouble

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

1302 (UE)

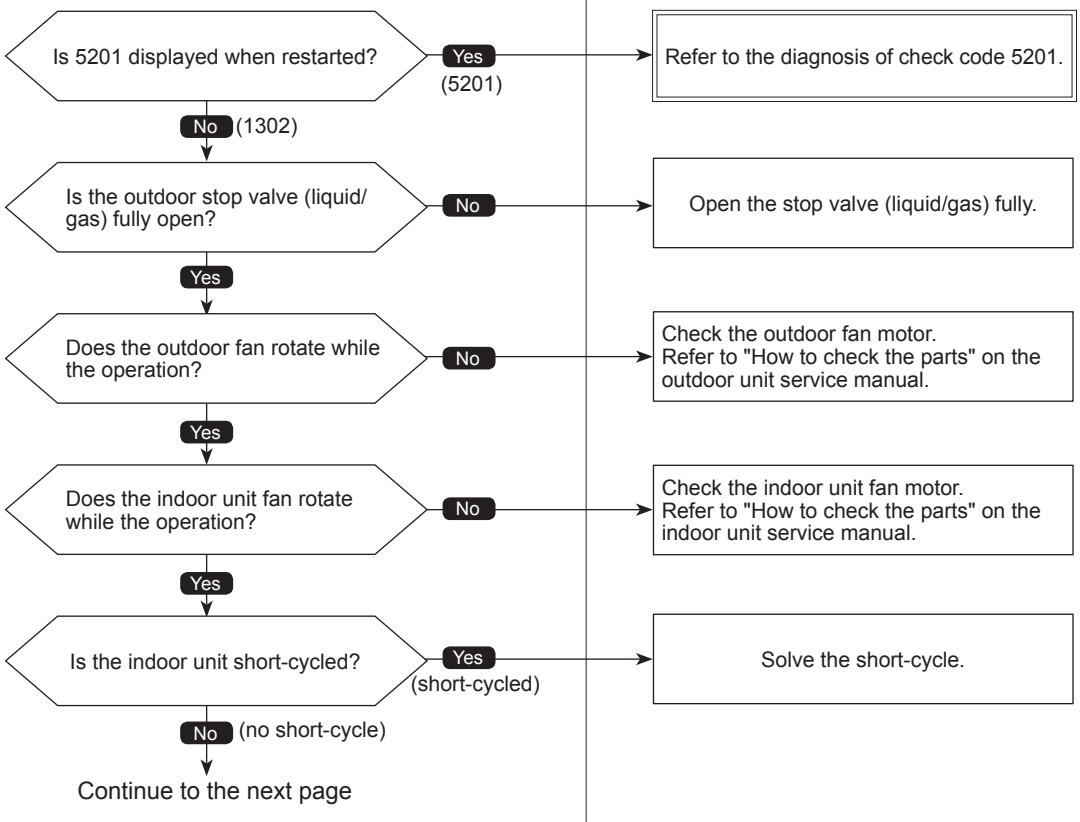
High pressure trouble

Abnormal points and detection methods	Causes and checkpoints
(1) High pressure abnormality (63H operation) Abnormal if 63H operates(*) during compressor operation. (* 4.15 MPaG [602 PSIG]) 2) High pressure abnormality (63HS detected) 1. Abnormal if a pressure detected by 63HS is 4.31 MPaG [625 PSIG] or more during compressor operation. 2. Abnormal if a pressure detected by 63HS is 4.14 MPaG [600 PSIG] or more for 3 minutes during compressor operation. 63H : High pressure switch 63HS: High pressure sensor LEV : Linear expansion valve SV1 : Solenoid valve TH7 : Thermistor <Ambient>	① Defective operation of stop valve (not fully open) ② Clogged or broken pipe ③ Malfunction or locked outdoor fan motor ④ Short-cycle of outdoor unit ⑤ Dirt of outdoor heat exchanger ⑥ Remote controller transmitting error caused by noise interference ⑦ Contact failure of the outdoor multi controller circuit board connector ⑧ Defective outdoor multi controller circuit board ⑨ Short-cycle of indoor unit ⑩ Decreased airflow, clogged filter, or dirt on indoor unit. ⑪ Malfunction or locked indoor fan motor ⑫ Decreased airflow caused by defective inspection of outdoor temperature thermistor (It detects lower temperature than actual temperature.) ⑬ Indoor LEV performance failure ⑭ Malfunction of fan driving circuit ⑮ SV1 performance failure ⑯ Defective High pressure sensor ⑰ Defective High pressure sensor input circuit on outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis

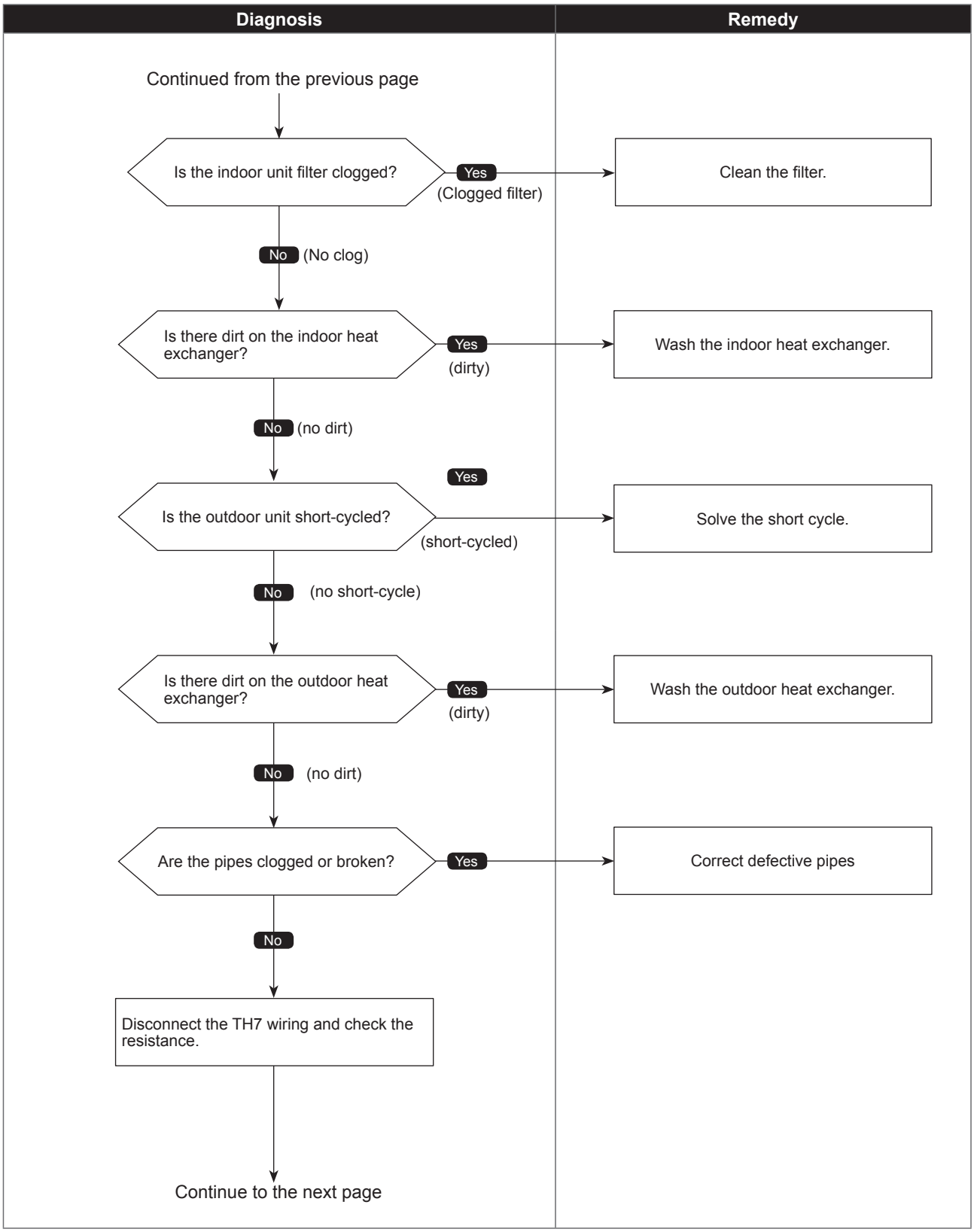


Check code

1302
(UE)

High pressure trouble

●Diagnosis of defectives
Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



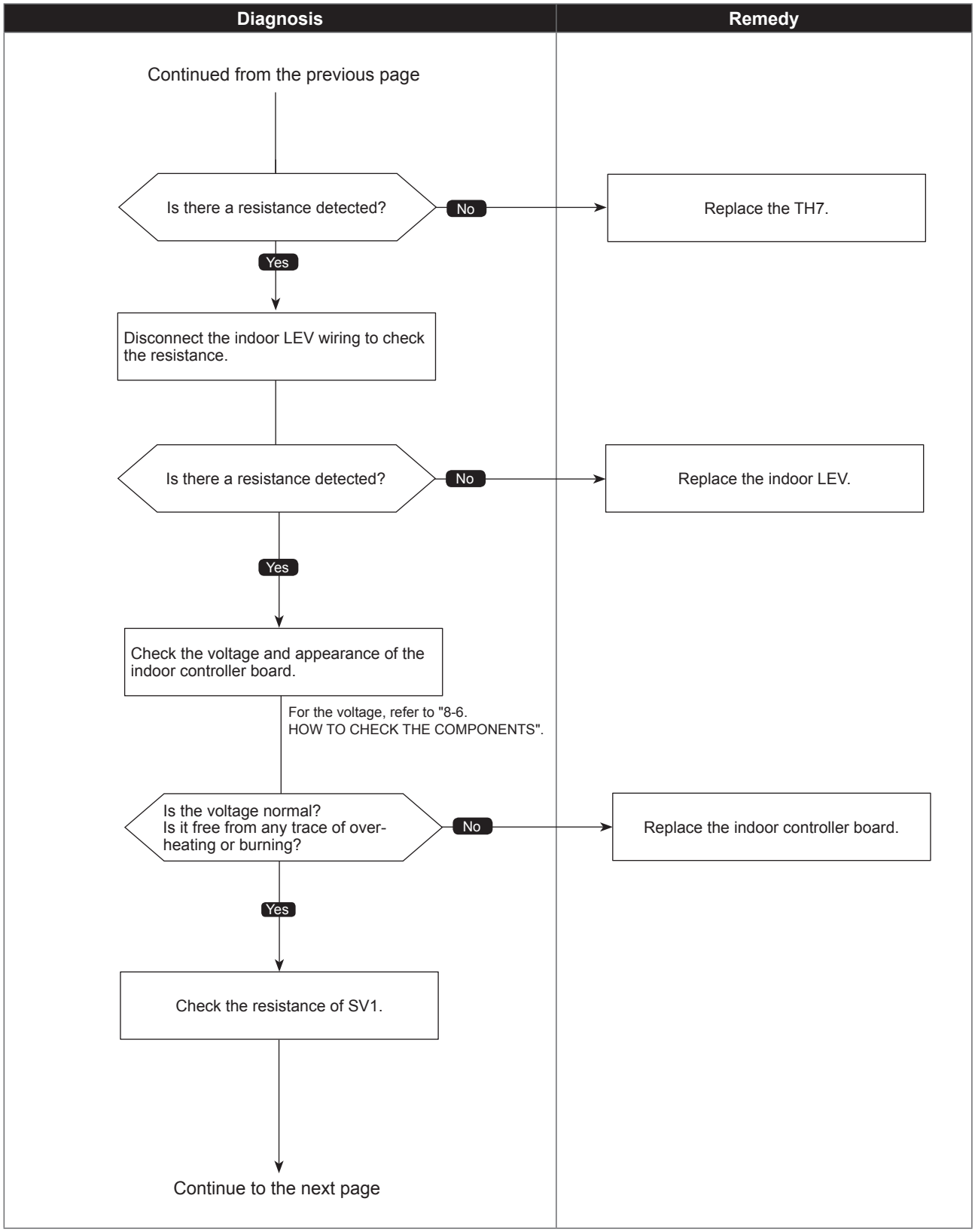
Check code

1302
(UE)

High pressure trouble

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



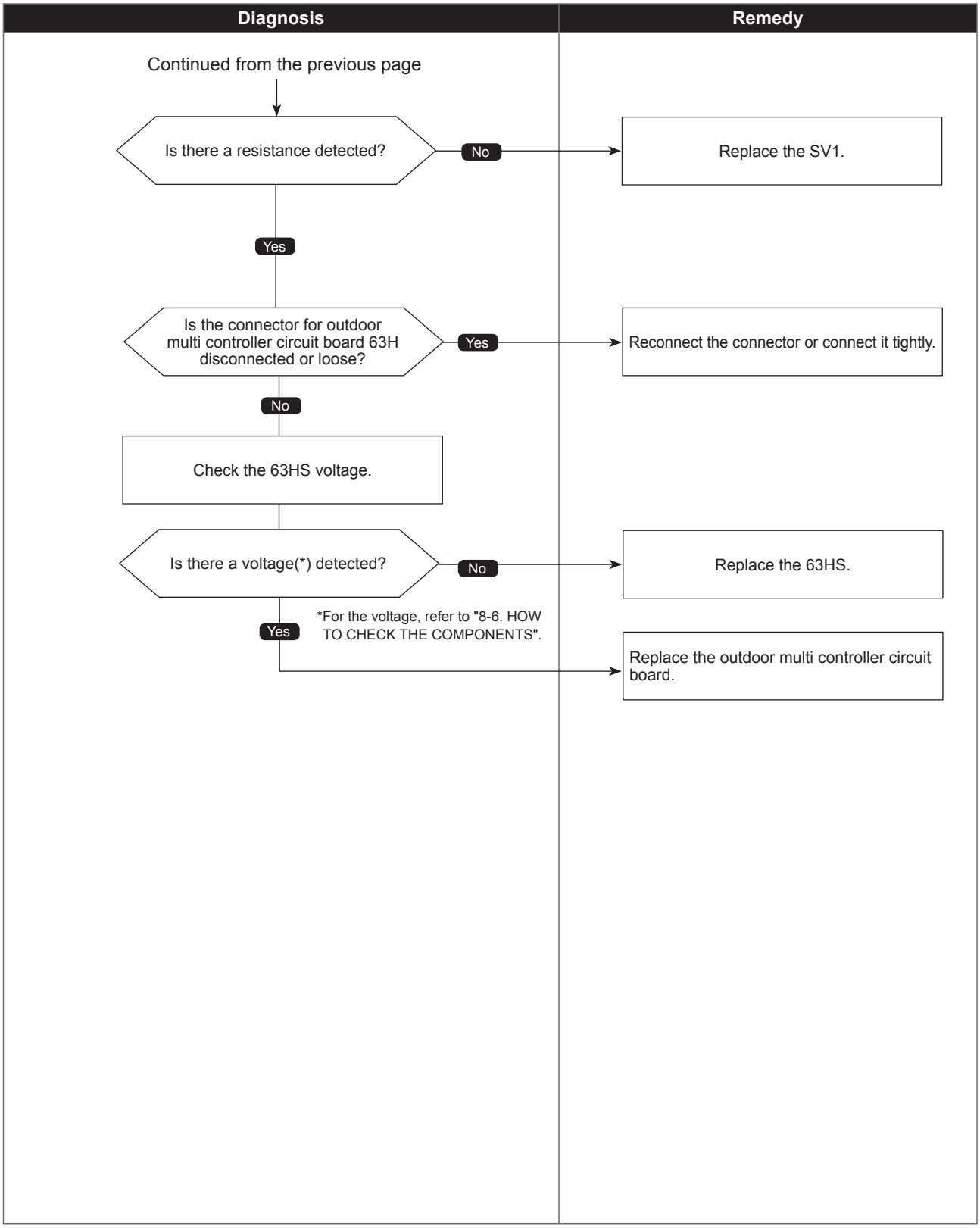
Check code

1302
(UE)

High pressure trouble

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

1500 (U7)

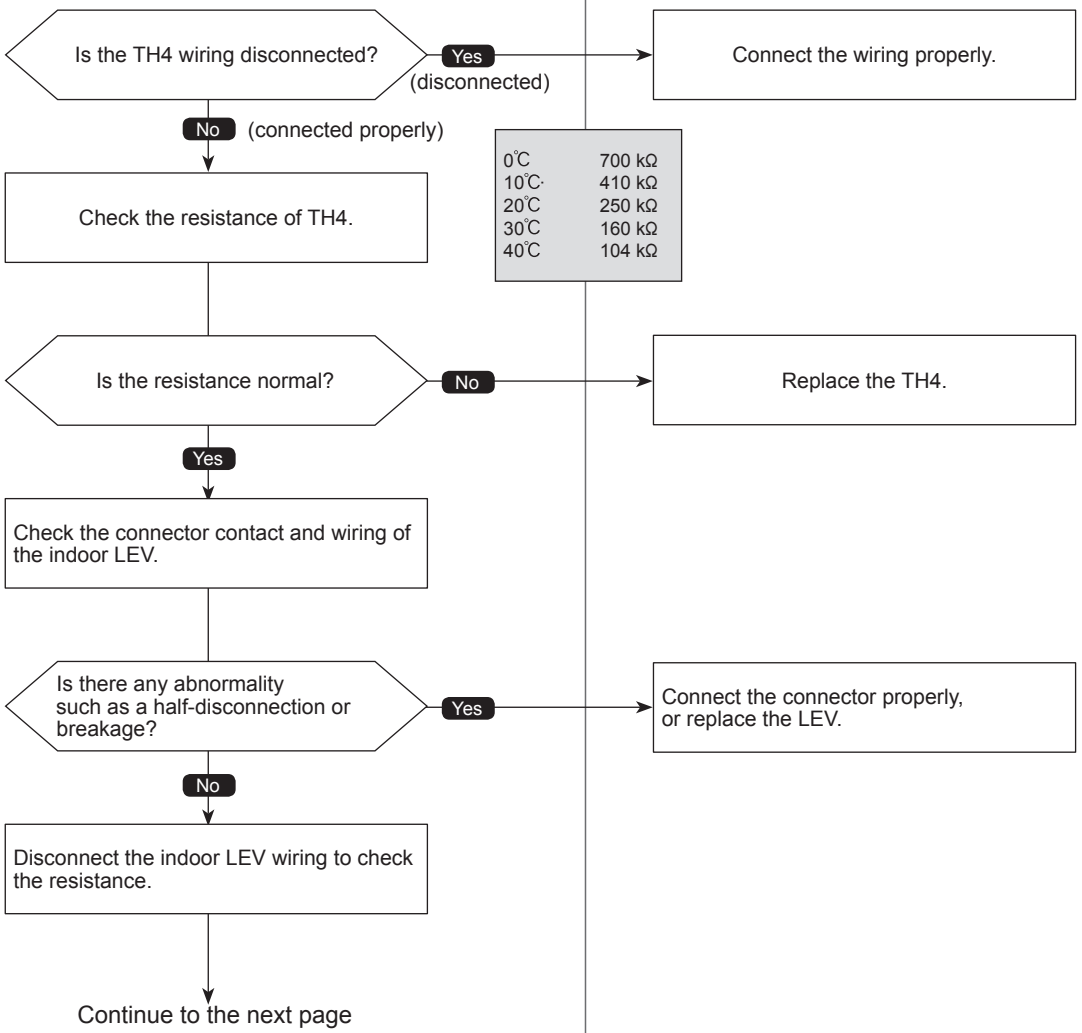
Superheat due to low discharge temperature trouble

Abnormal points and detection methods	Causes and checkpoints
Abnormal if the discharge superheat is continuously detected −15℃ [−27°F](*) or less for 5 minutes even though the indoor LEV has minimum open pulse after the compressor starts operating for 10 minutes. LEV : Linear expansion valve TH4 : Thermistor <Compressor> 63HS : High pressure sensor *At this temperature, conditions for the abnormality detection will not be satisfied if no abnormality is detected on either TH4 or 63HS.	① Disconnection or loose connection of TH4 ② Defective holder of TH4 ③ Disconnection of LEV coil ④ Disconnection of LEV connector ⑤ LEV performance failure

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis



Remedy

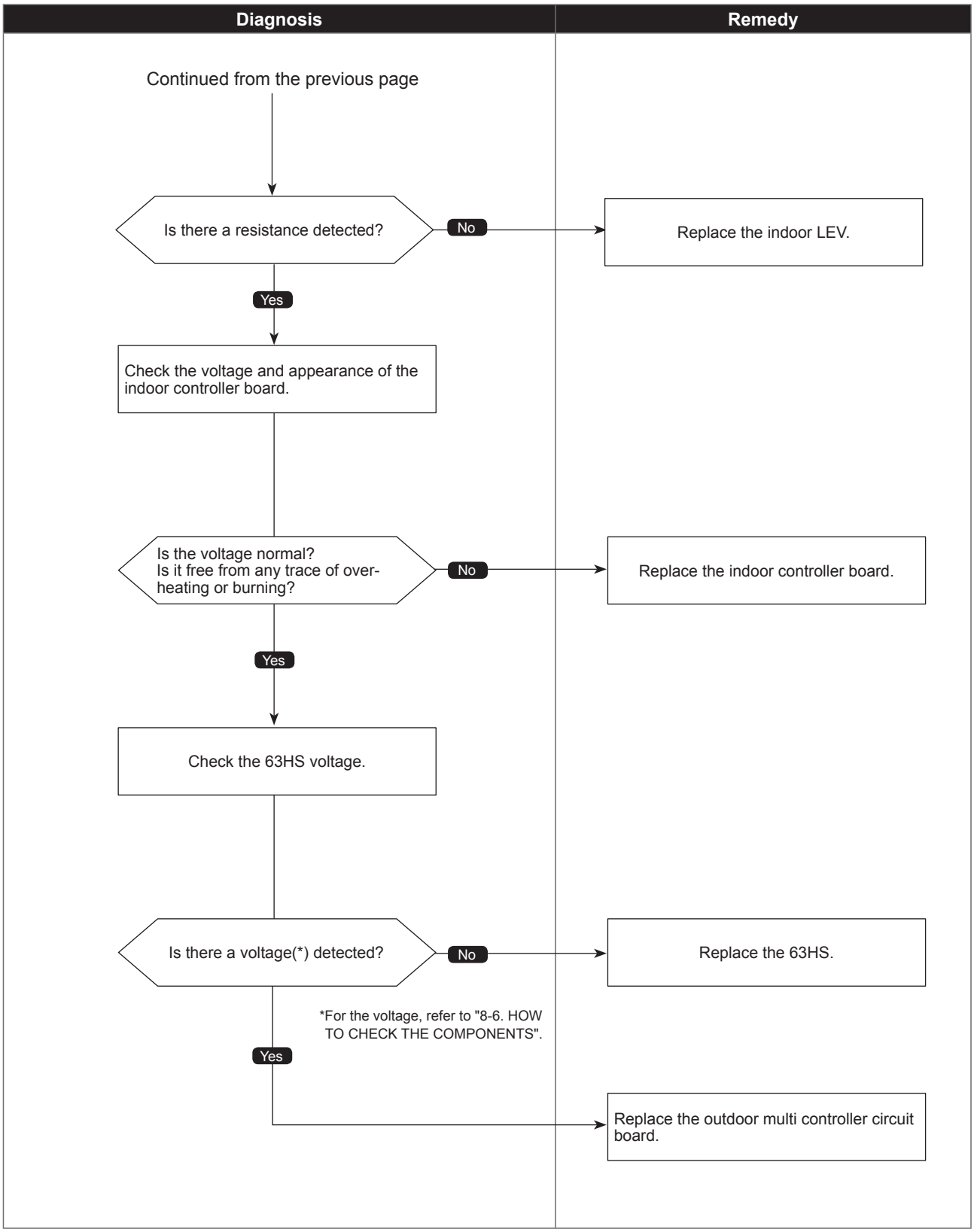
Check code

1500 (U7)

Superheat due to low discharge temperature trouble

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

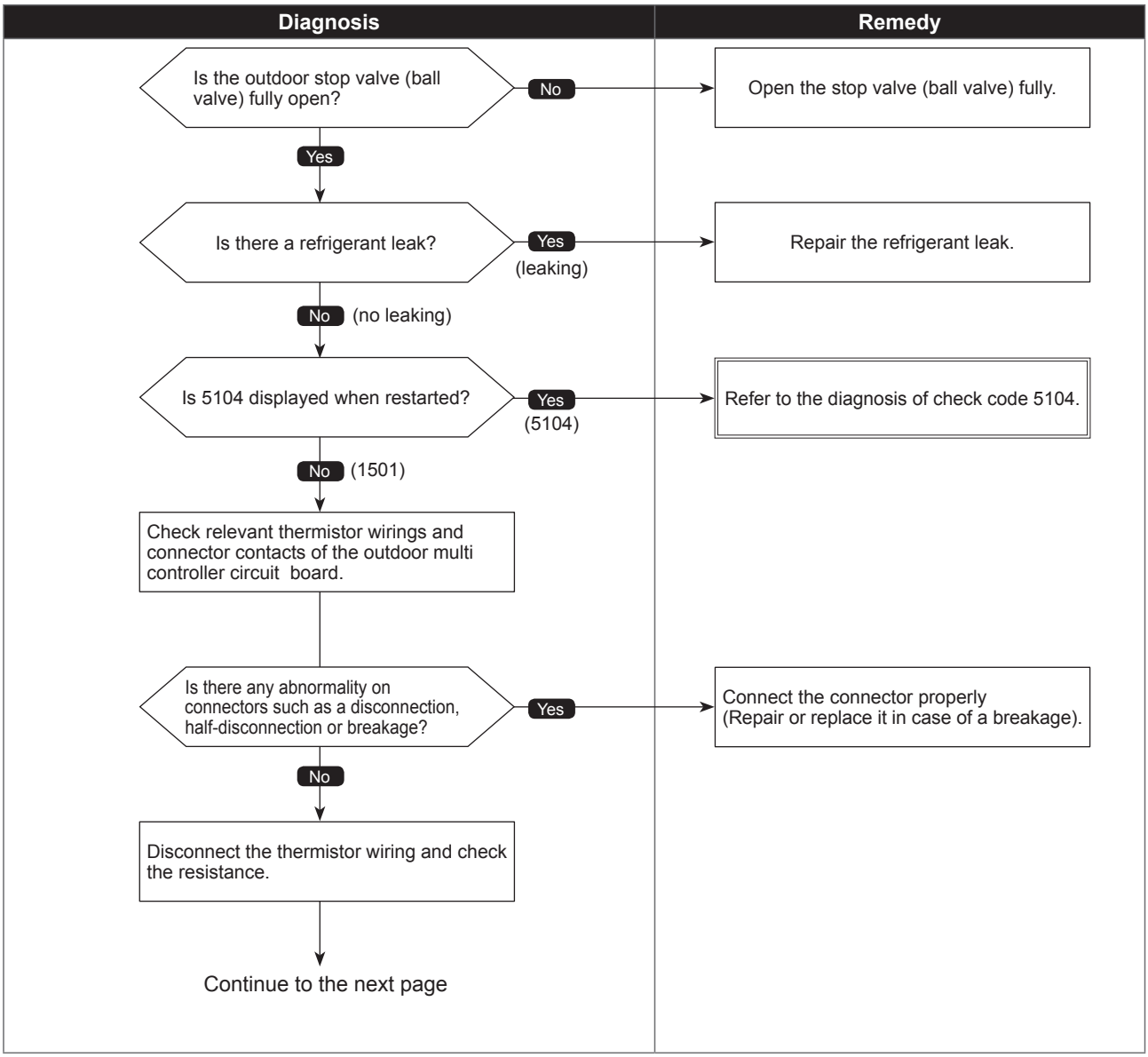
1501 (U2)

Refrigerant shortage trouble

Abnormal points and detection methods	Causes and checkpoints
(1) Abnormal when all of the following conditions have been satisfied for 15 consecutive minutes: 1. The compressor is operating in HEAT mode. 2. Discharge superheat is 80℃ [144°F] or more. 3. Difference between TH7 and TH3 applies to the formula of (TH7−TH3 < 5℃[9°F]) 4. The saturation temperature converted from a high pressure sensor detects below 35℃ [95°F]. (2) Abnormal when all of the following conditions have been satisfied: 1. The compressor is in operation. 2. When cooling, discharge superheat is 80℃ [144°F] or more, and the saturation temperature converted from a high pressure sensor is over −40℃ [−40°F]. 3. When heating, discharge superheat is 90℃[162°F] or more.	①Defective operation of stop valve (not fully open) ②Defective thermistor ③Defective outdoor multi controller circuit board ④Indoor LEV performance failure ⑤Gas leakage or shortage ⑥Defective 63HS TH3 : Thermistor <Outdoor liquid pipe> TH7 : Thermistor <Ambient> LEV : Linear expansion valve 63HS: High pressure sensor

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

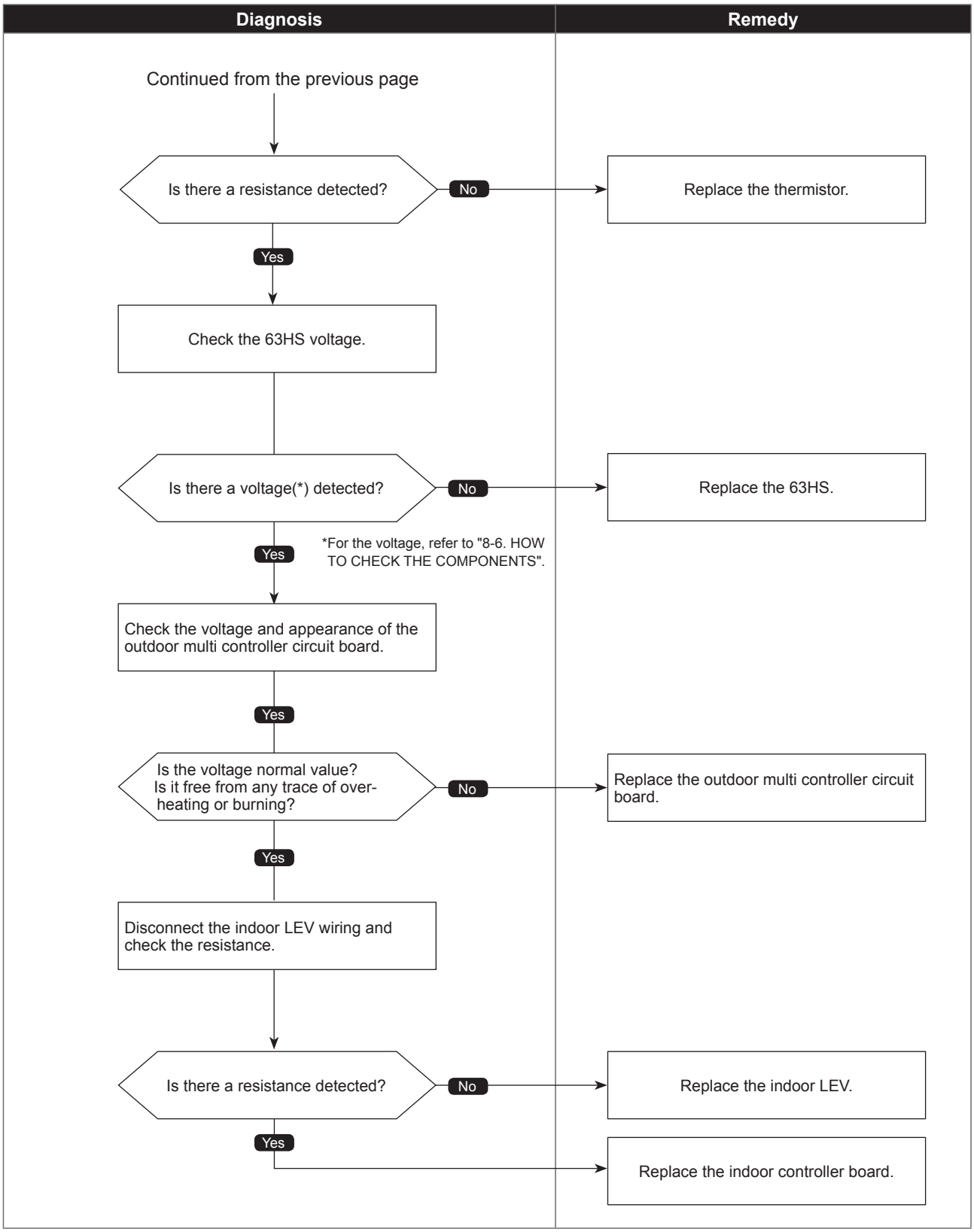


Check code

1501
(U2)

Refrigerant shortage trouble

●Diagnosis of defectives
Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

1501
(U2)

Closed valve in cooling mode

Abnormal points and detection methods	Causes and checkpoints
Abnormal if stop valve is closed during cooling operation. Abnormal when both of the following temperature conditions have been satisfied for 20 minutes or more during cooling operation. 1. TH22j−TH21j ≧ −2°C [−3.6°F] 2. TH23j−TH21j ≧ −2°C [−3.6°F] Note: For indoor unit, the abnormality is detected if an operating unit satisfies the condition.	① Outdoor liquid/gas valve is closed. ② Malfunction of outdoor LEV (LEV-A)(blockage) TH21: Indoor intake temperature thermistor (RT11 or TH1) TH22: Indoor liquid pipe temperature thermistor (RT13 or TH2) TH23: Indoor gas pipe temperature thermistor (TH-A to E) LEV: Linear expansion valve

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
Is the outdoor stop valve (liquid/gas) fully open?	
No	Open the outdoor stop valve (liquid/gas) fully.
Yes	
Disconnect the outdoor LEV wiring to check the resistance.	
Is there a resistance detected?	
No	Replace the outdoor LEV.
Yes	Replace the outdoor multi controller circuit board.

Check code

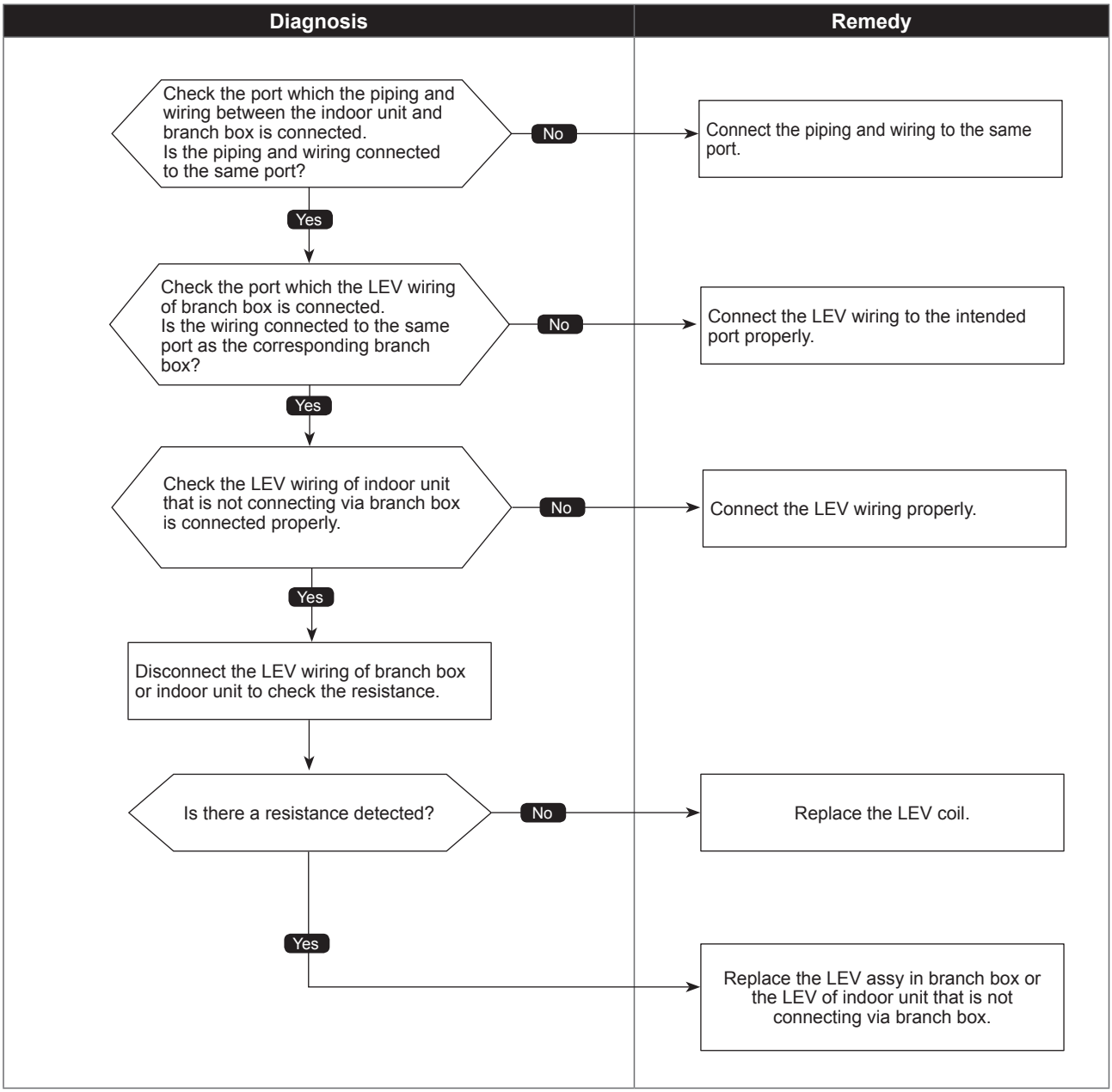
1503
(P6)

Freeze protection of branch box or indoor unit

Abnormal points and detection methods	Causes and checkpoints
The purpose of the check code is to prevent indoor unit from freezing or dew condensation which is caused when a refrigerant keeps flowing into the unit in STOP. Abnormal when all of the following conditions are satisfied: 1. The compressor is operating in COOL mode. 2. 15 minutes have passed after the startup of the compressor, or the change in the number of operating indoor units is made (including a change by turning thermo-ON/OFF). 3. After the condition 2 above is satisfied, the thermistor of indoor unit in STOP detects TH22j ≦ −5℃ [23°F] for 5 consecutive minutes.	①Wrong piping connection between indoor unit and branch box ②Miswiring between indoor unit and branch box ③Miswiring of LEV in branch box or indoor unit ④Malfunction of LEV in branch box or indoor unit

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

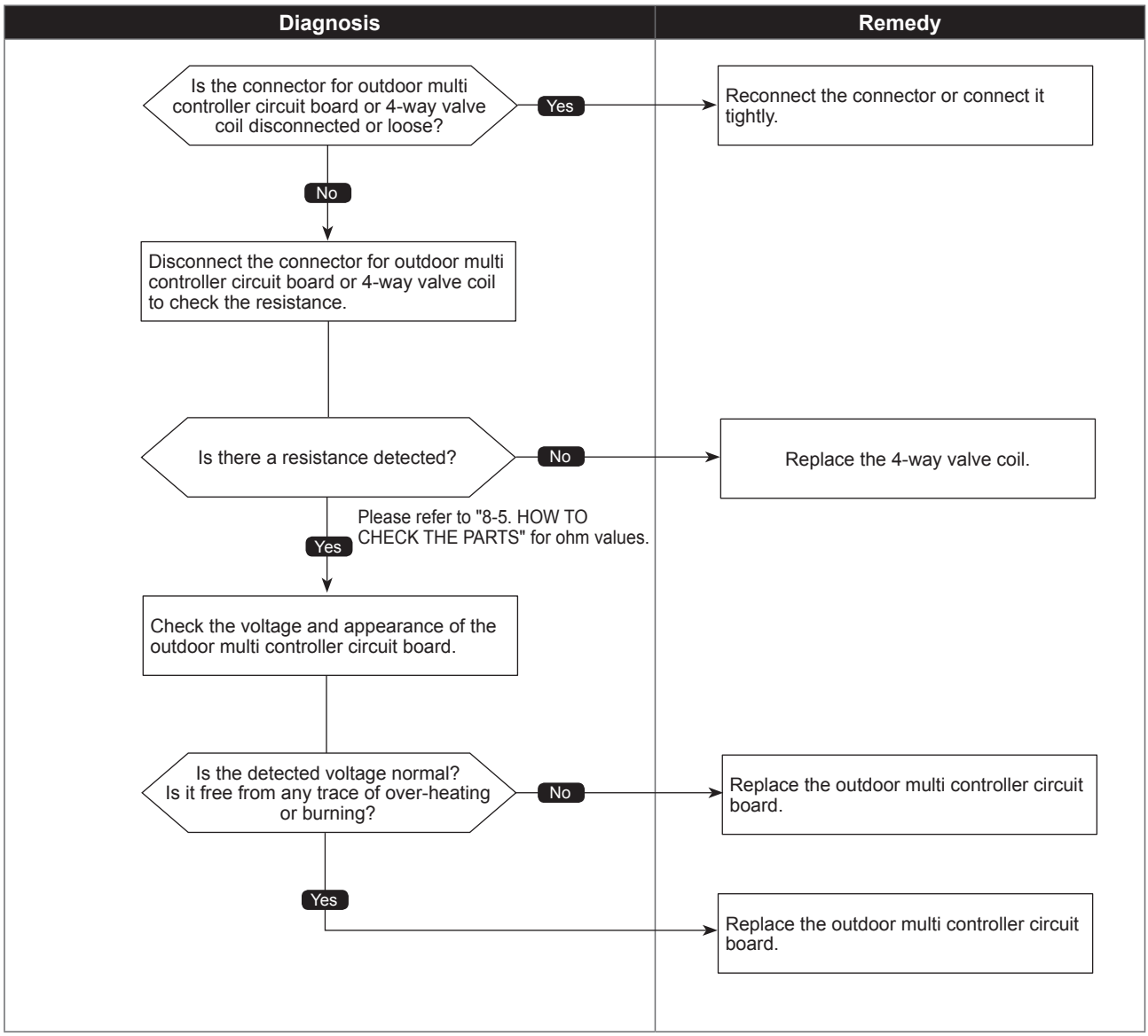
1508
(EF)

4-way valve trouble in heating mode

Abnormal points and detection methods	Causes and checkpoints
Abnormal if 4-way valve does not operate during heating operation. Abnormal when any of the following temperature conditions is satisfied for 3 min. or more during heating operation 1. TH22j−TH21j ≦ −10°C [−18°F] 2. TH23j−TH21j ≦ −10°C [−18°F] 3. TH22j ≦ 3℃ [37.4°F] 4. TH23j ≦ 3℃ [37.4°F] Note: For indoor unit, the abnormality is detected if an operating unit satisfies the condition.	①4-way valve failure ②Disconnection or failure of 4-way valve coil ③Clogged drain pipe ④Disconnection or loose connection of connectors ⑤Malfunction of input circuit on outdoor multi controller circuit board ⑥Defective outdoor power circuit board TH21: Indoor intake temperature thermistor (RT11 or TH1) TH22: Indoor liquid pipe temperature thermistor (RT13 or TH2) TH23: Indoor gas pipe temperature thermistor (TH-A to E)

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

4100
(UF)

Compressor current interruption (Locked compressor)

Abnormal points and detection methods	Causes and checkpoints
Abnormal if overcurrent of DC bus or compressor is detected before 30 seconds after the compressor starts operating.	①Closed stop valve ②Decrease of power supply voltage ③Looseness, disconnection, or wrong phase of compressor wiring connection ④Model selection error on indoor controller board or outdoor multi controller circuit board ⑤Defective compressor ⑥Defective outdoor power circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

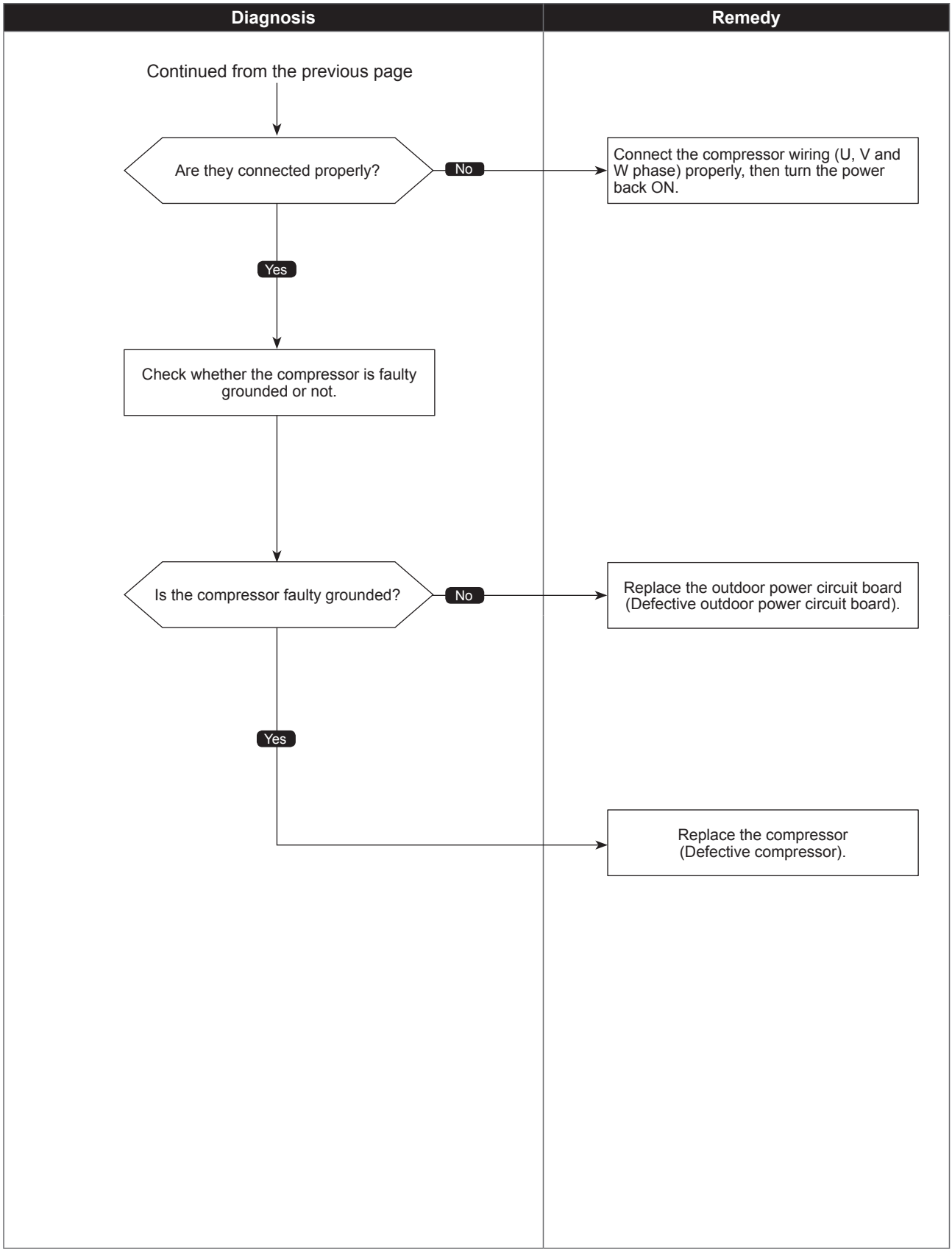
Diagnosis	Remedy
Check the stop valve.	
Is the stop valve (liquid/gas) fully open? — No	Open the stop valve (liquid/gas) fully.
Yes	
Check the power supply voltage.	
Is the power supply voltage normal? — No	• Check the looseness, disconnection, or breakage of compressor wiring. • Ensure power supply from the facility. (Check for power supply open phase.)
Yes	
Check if the model selection switch is set correctly on the indoor controller board or outdoor multi controller circuit board.	
Are they set properly? — No	Set the model selection switch correctly, then restart.
Yes	
Turn the power OFF to check for looseness, disconnection, or wrong phase of compressor wiring connection.	
Continue to the next page	

Check code

4100
(UF)

Compressor current interruption (Locked compressor)

●Diagnosis of defectives
Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

4210 (UP)

Compressor overcurrent interruption

Abnormal points and detection methods	Causes and checkpoints
Abnormal if overcurrent of DC bus or compressor is detected after 30 seconds since the compressor starts operating.	①Closed outdoor stop valve ②Decrease of power supply voltage ③Looseness, disconnection, or wrong phase of compressor wiring connection ④Model selection error on indoor controller board or outdoor multi controller circuit board ⑤Defective compressor ⑥Defective outdoor power circuit board ⑦Defective outdoor multi controller circuit board ⑧Malfunction of indoor/outdoor unit fan ⑨Short-cycle of indoor/outdoor unit

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
Check the outdoor stop valve.	
Is the stop valve (liquid/gas) fully open? — No	Open the stop valve (liquid/gas) fully.
Yes	
Check whether the power supply voltage is normal or not.	
Is the power supply voltage normal? — No	• Check the looseness, disconnection, or breakage of compressor wiring. • Ensure power supply from the facility. (Check for power supply open phase.)
Yes	
Check if the model selection switch is set correctly on the indoor controller board or outdoor multi controller circuit board.	
Are they set properly? — No	Set the model selection correctly.
Yes	
Turn the power OFF to check for looseness, disconnection, or wrong phases of the compressor wiring.	
Continue to the next page	

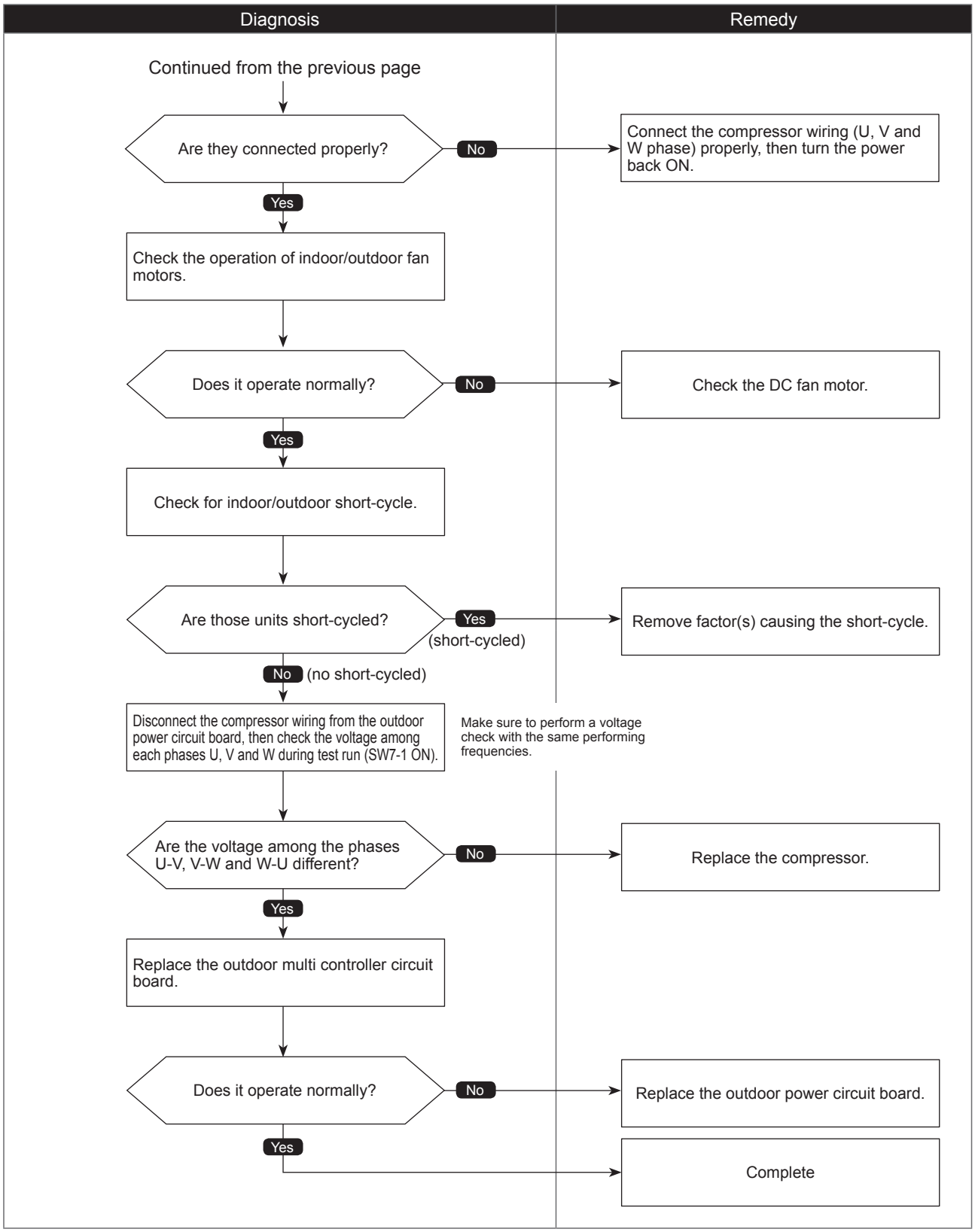
Check code

4210
(UP)

Compressor overcurrent interruption

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

4220
(U9)

Voltage shortage/overvoltage/PAM error/L1open phase/primary current sensor error/power synchronization signal error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if any of following symptoms are detected; ●Decrease of DC bus voltage to 200 V (V model), 350 V (Y model) ●Increase of DC bus voltage to 430 V (V model), 760 V (Y model) ●DC bus voltage stays at 310 V or less for consecutive 30 seconds when the operational frequency is over 20 Hz. ●When any one of the following conditions has been satisfied while the detection value of primary current is 0.1 A or less. 1. The operational frequency is 40 Hz or more. 2. The compressor current is 6 A or more.	① Decrease/increase of power supply voltage ② LI open-phase (Y model only) ③ Primary current sensor failure ④ Disconnection of compressor wiring ⑤ Malfunction of 52C ⑥ Defective outdoor power circuit board ⑦ Disconnection of CN5 (Y model only) ⑧ Disconnection of CN2 ⑨ Malfunction of primary current detecting circuit on outdoor power circuit board

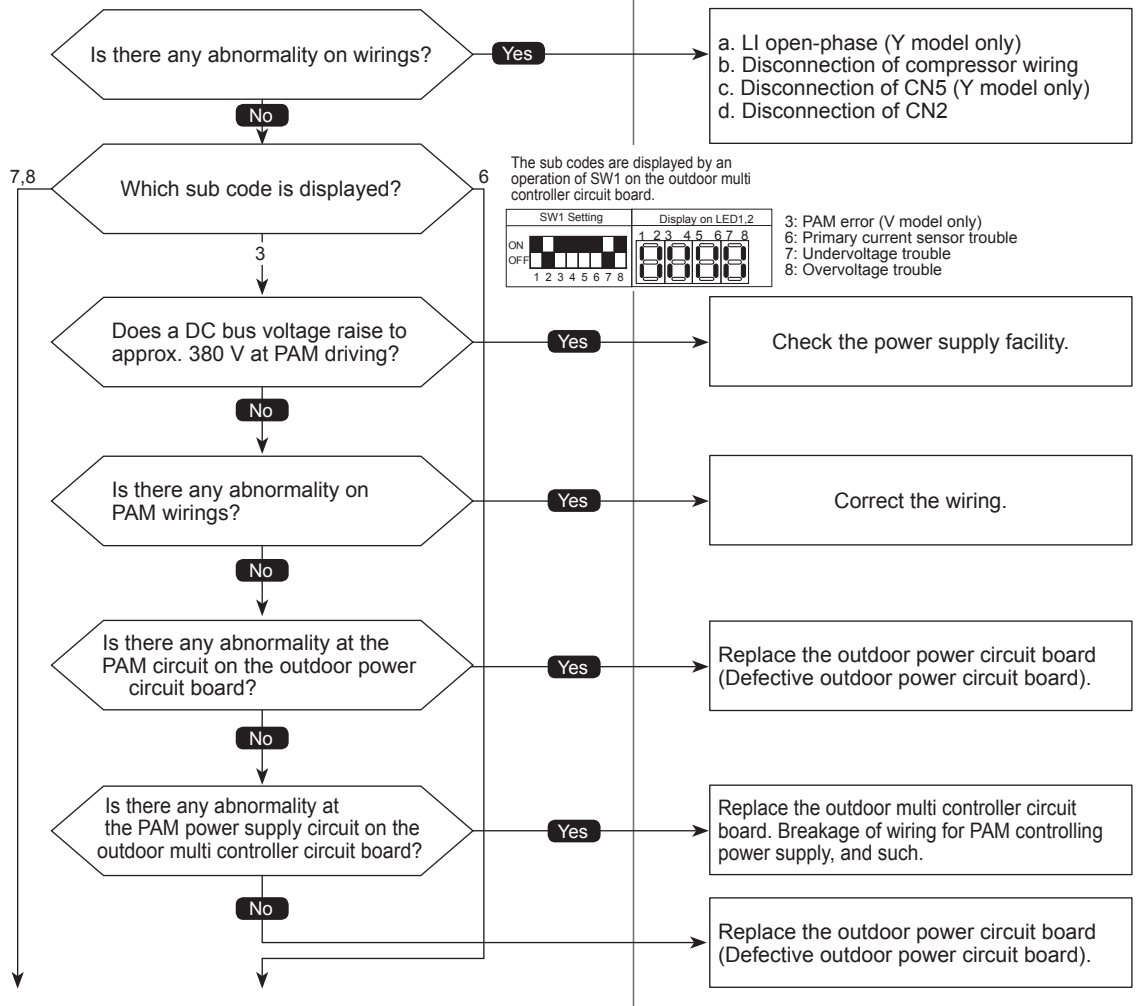
●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis

Remedy

The black square (■) indicates a switch position.



Continue to the next page

Check code

4220
(U9)

Voltage shortage/overvoltage/PAM error/L1open phase/primary current sensor error/power synchronization signal error

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis	Remedy

Continued from the previous page

7,8 → 6

Is the outdoor unit V model or Y model?

- V model → Replace the outdoor power circuit board (Defective outdoor power circuit board).
- Y model →

Is CN5 connected properly without any contact failure?

- No → Correct the CN5 wiring.
- Yes →

Is there any breakage of ACCT on the noise filter circuit board?

- Yes → Replace the noise filter circuit board.
- No → Replace the outdoor power circuit board (Defective outdoor power circuit board).

Check the bus voltage read by the microprocessor with an operation of SW1 on the outdoor multi controller circuit board.

The bus voltage can be displayed by an operation of SW1 on the outdoor multi controller circuit board.

SW1 Setting	Display on LED1,2	Unit
ON / OFF, 1 2 3 4 5 6 7 8	0–999.9	V

Is the power supply normal?

- No → • Decrease of power supply voltage • L1 open-phase
- Yes →

Check the bus voltage at the test points listed below on the outdoor power circuit board using a tester.
V model: CNDC 1-2pin
Y model: N2-P2

Is the bus voltage normal?

- No → Replace the outdoor power circuit board (Defective outdoor power circuit board).
- Yes →

The difference of the voltage between the one read by the LED1 and 2, and the one at the test points listed above is large.

- Yes → Replace the outdoor power circuit board (Trouble of an input current detection circuit is suspected).
- No → Check the power supply facility (Check if a receiving electricity is lowered).

Check code

4230
(U5)

Heat sink temperature trouble

Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH8 detects a temperature outside the specified range during compressor operation. TH8: Thermistor <Heat sink>	①Blocked outdoor fan ②Malfunction of outdoor fan motor ③Blocked airflow path ④Rise of ambient temperature ⑤Characteristic defect of thermistor ⑥Malfunction of input circuit on outdoor power circuit board ⑦Malfunction of outdoor fan driving circuit

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
Is 5110 displayed when restarted? — Yes	Refer to the diagnosis of check code 5110.
No	
Does the fan rotate during compressor operation? — No	Refer to the diagnosis of check code 4400.
Yes	
Is there any obstacle which blocks an airflow around the heat sink? — Yes (air path blocked)	Improve the airflow path.
No (no obstacle)	
Check the wiring and connector connection TH8.	
Is there any abnormality such as a disconnection, looseness or breakage? — Yes	Connect the wiring/connector properly. Replace it in case of a breakage.
No	
Check the resistance of TH8.	
Is the resistance normal? — No	Replace the thermistor (Defective thermistor).
Yes	Replace the outdoor power circuit board (Defective outdoor power circuit board).

TH8 temp. - resistance characteristic

0℃	180 kΩ
25℃	50 kΩ
50℃	17 kΩ
70℃	8 kΩ
90℃	4 kΩ

Check code

4250
(U6)

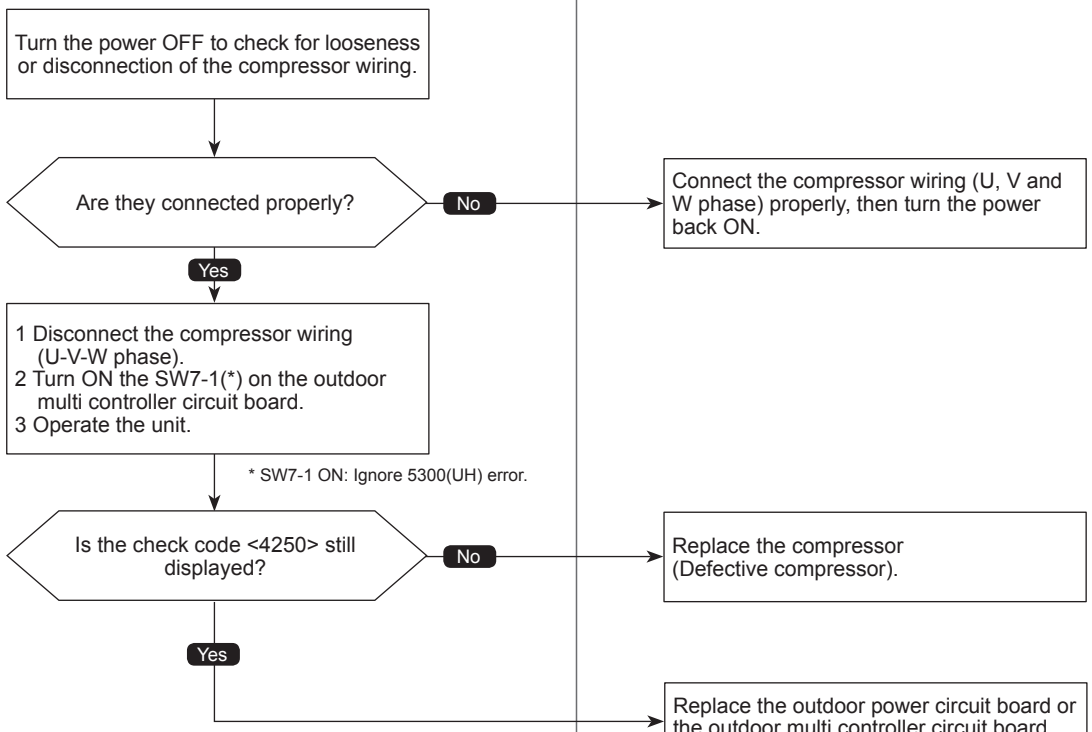
Power module trouble or Overcurrent trouble

Abnormal points and detection methods	Causes and checkpoints
Abnormal if both of the following conditions have been satisfied: 1. Overcurrent of DC bus or compressor is detected during compressor operation. 2. Inverter power module is determined to be defected.	① Short-circuit caused by looseness or disconnection of compressor wiring ② Defective compressor ③ Defective outdoor power circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy



Check code

4400
(U8)

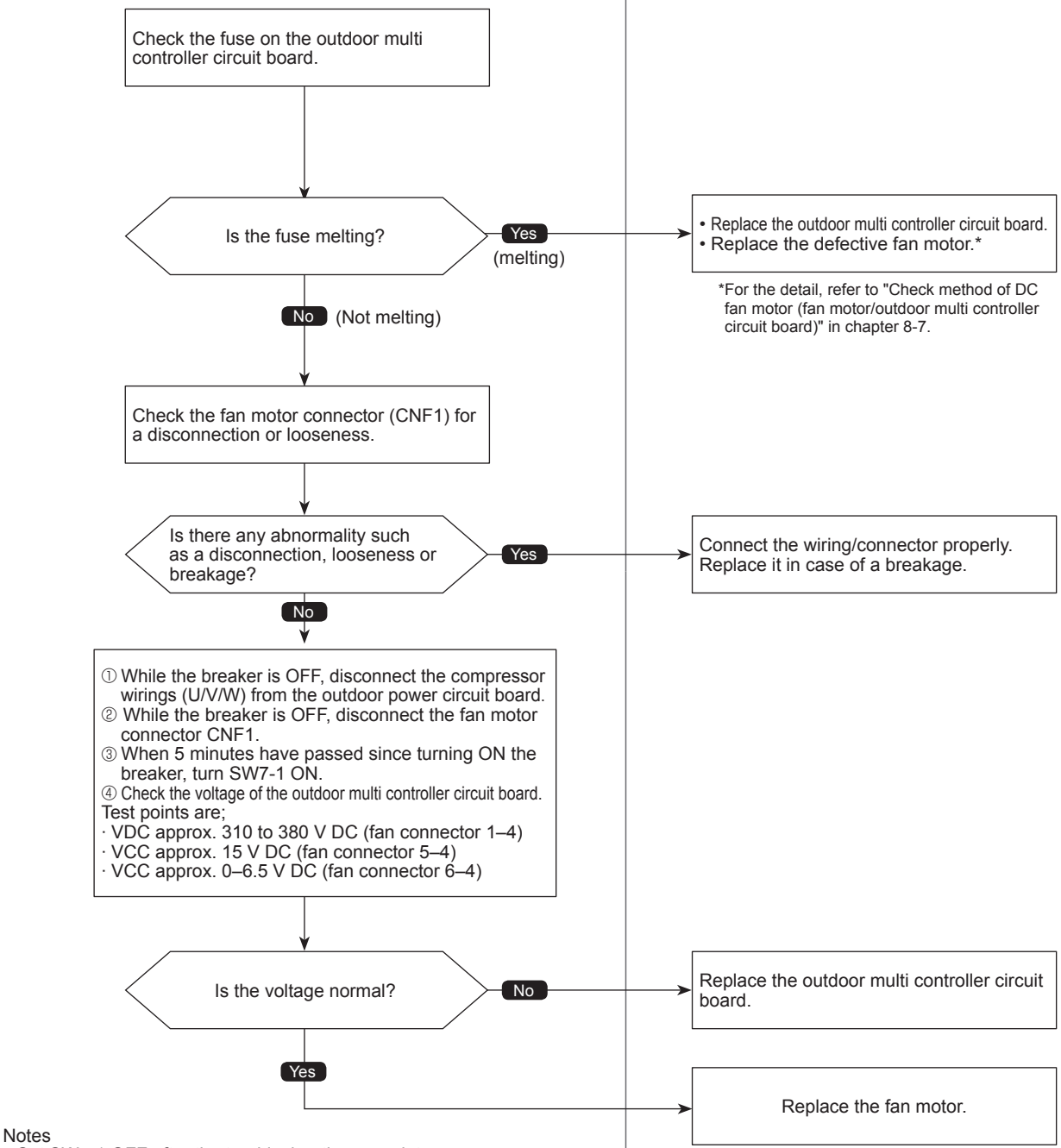
Fan trouble (Outdoor unit)

Abnormal points and detection methods	Causes and checkpoints
Abnormal if no rotational frequency is detected, or detected a value outside the specified range during fan motor operation.	①Malfunction of fan motor ②Disconnection of CNF connector ③Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis



Remedy

- Replace the outdoor multi controller circuit board.
- Replace the defective fan motor.*

*For the detail, refer to "Check method of DC fan motor (fan motor/outdoor multi controller circuit board)" in chapter 8-7.

Connect the wiring/connector properly. Replace it in case of a breakage.

Replace the outdoor multi controller circuit board.

Replace the fan motor.

Notes
- Set SW7-1 OFF after the troubleshooting completes.
- The fan sometimes starts on-off cycle operation during low-load operation or cooling at low outside temperature. It is not abnormal; the operation ensures reliability of the product.

Check code

5101
(U3)

Compressor temperature thermistor (TH4) open/short

<Detected in outdoor unit>

Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH4 detects to be open/short. (The open/short detection is disabled for 10 minutes after compressor starts, during defrosting operation, or for 10 minutes after returning from the defrosting operation.) Open: 3℃ [37°F] or less Short: 217℃ [423°F] or more TH4: Thermistor <Compressor>	①Disconnection or contact failure of connectors ②Characteristic defect of thermistor ③Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis | **Remedy**

Check the wiring and connector connection of TH4.

Is there any abnormality such as a disconnection, looseness or breakage?

Yes → Connect the wiring/connector properly. Replace the connector in case of a breakage.

No

Disconnect the connector to check the resistance of TH4 using a tester.

Is the detected resistance normal?

No → Replace the thermistor.

Yes

Check a temperature of TH4.

The detected temperature of TH4 can be displayed by an operation of SW1 on the outdoor multi controller circuit board.

SW1 Setting	Display on LED1, 2	Unit
ON / OFF 1 2 3 4 5 6 7 8	−99.9–999.9	℃

Is the detected temperature normal?

No → Replace the outdoor multi controller circuit board (Malfunction of thermistor circuit).

Yes → No abnormality (A connector contact failure is suspected.)

Check code

5102
(U4)

Suction pipe temperature thermistor (TH6) open/short

<Detected in outdoor unit>

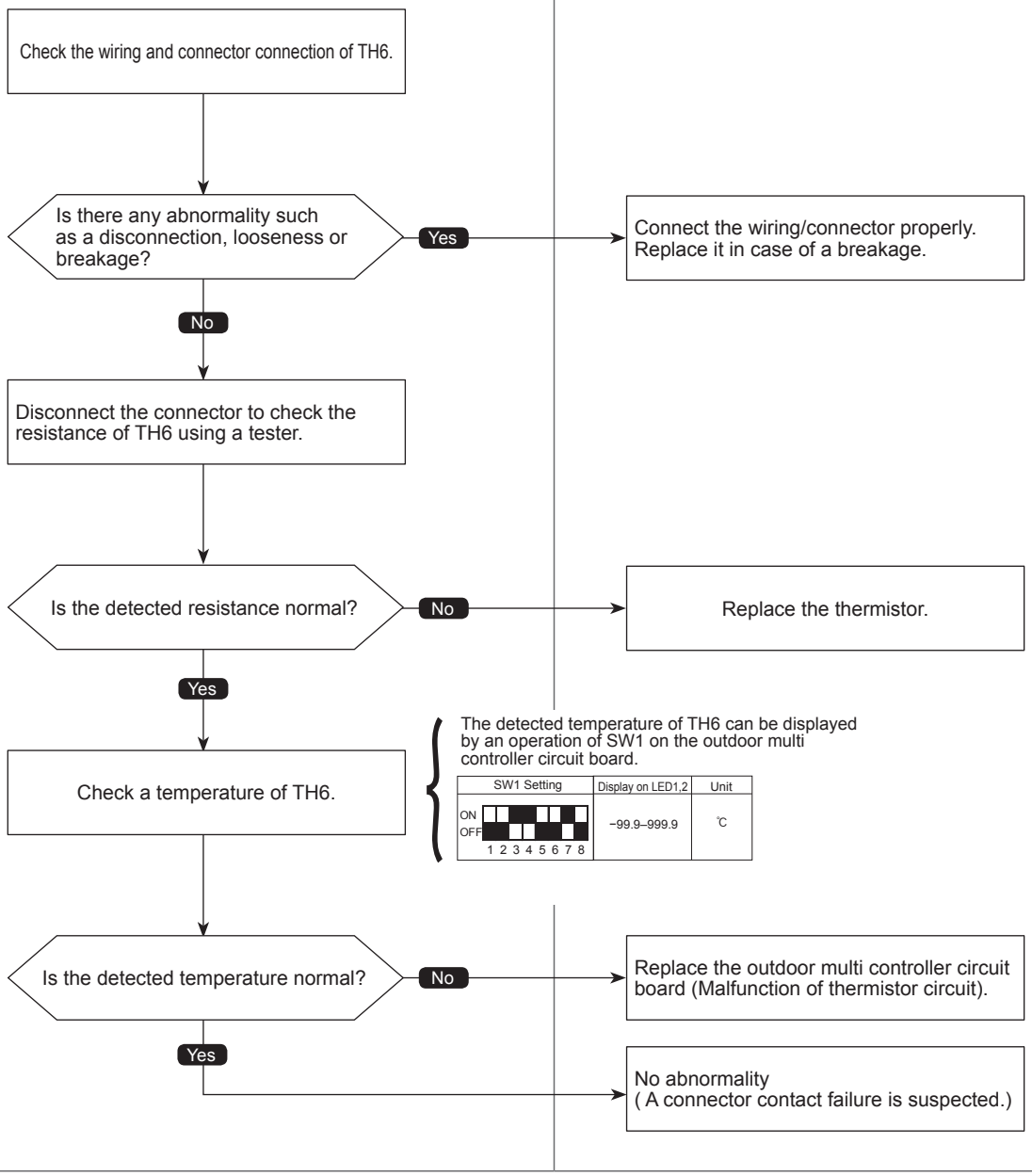
Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH6 detects to be open/short. (The open/short detection is disabled during 10 seconds to 10 minutes after compressor starts, during defrosting operation, or for 10 minutes after returning from the defrosting operation.) Open: −40℃ [−40°F] or less Short: 90℃ [162°F] or more TH6: Thermistor <Suction pipe>	① Disconnection or contact failure of connectors ② Characteristic defect of thermistor ③ Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis | **Remedy**



Check code

5105
(U4)

Outdoor liquid pipe temperature thermistor (TH3) open/short

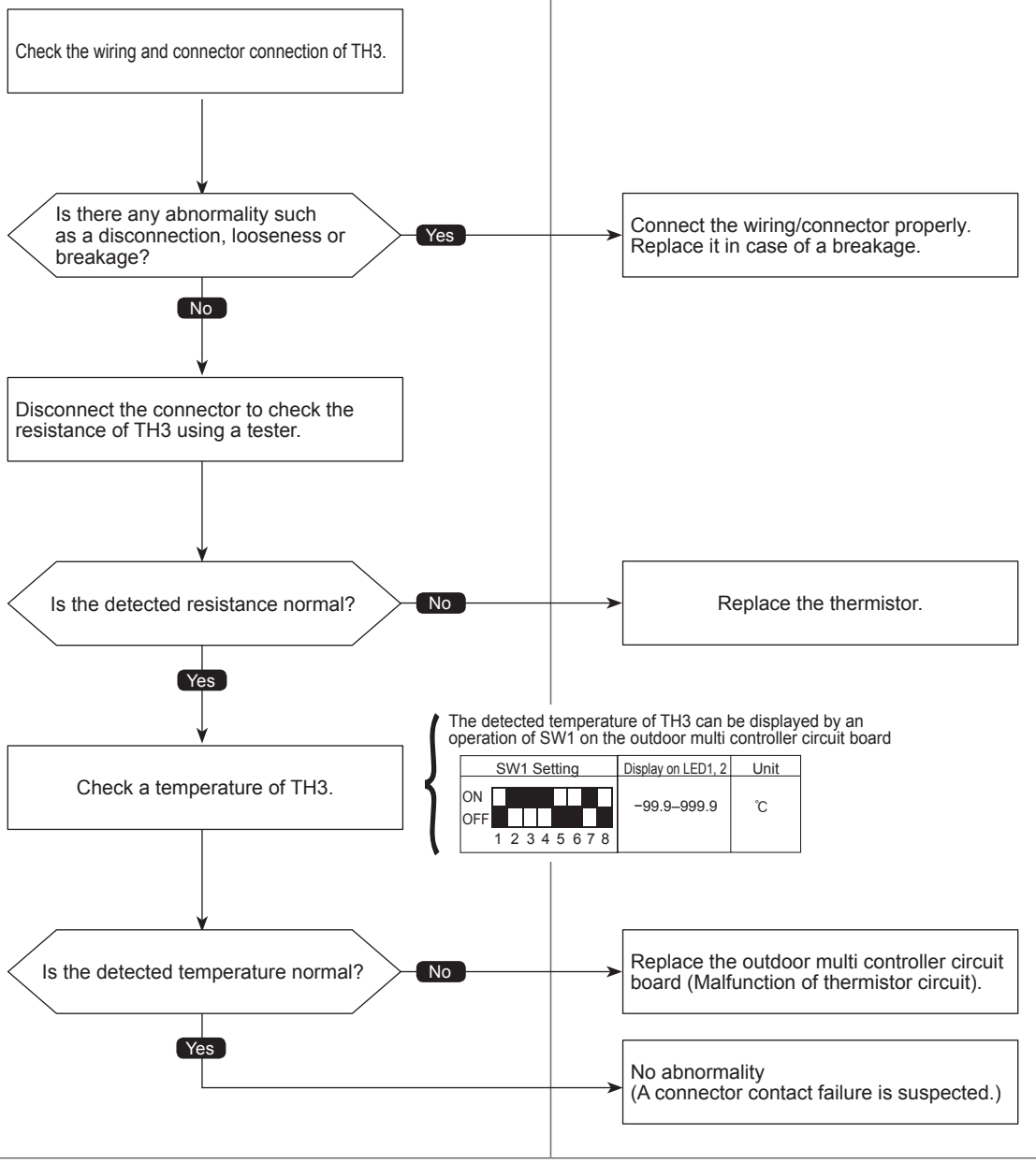
Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH3 detects to be open/short. (The open/short detection is disabled during 10 seconds to 10 minutes after compressor starts, during defrosting operation, or for 10 minutes after returning from the defrosting operation.) Open:−40℃ [−40°F] or less Short: 90℃ [162°F] or more TH3: Thermistor <Outdoor liquid pipe>	①Disconnection or contact failure of connectors ②Characteristic defect of thermistor ③Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis	Remedy



Check code

5106
(U4)

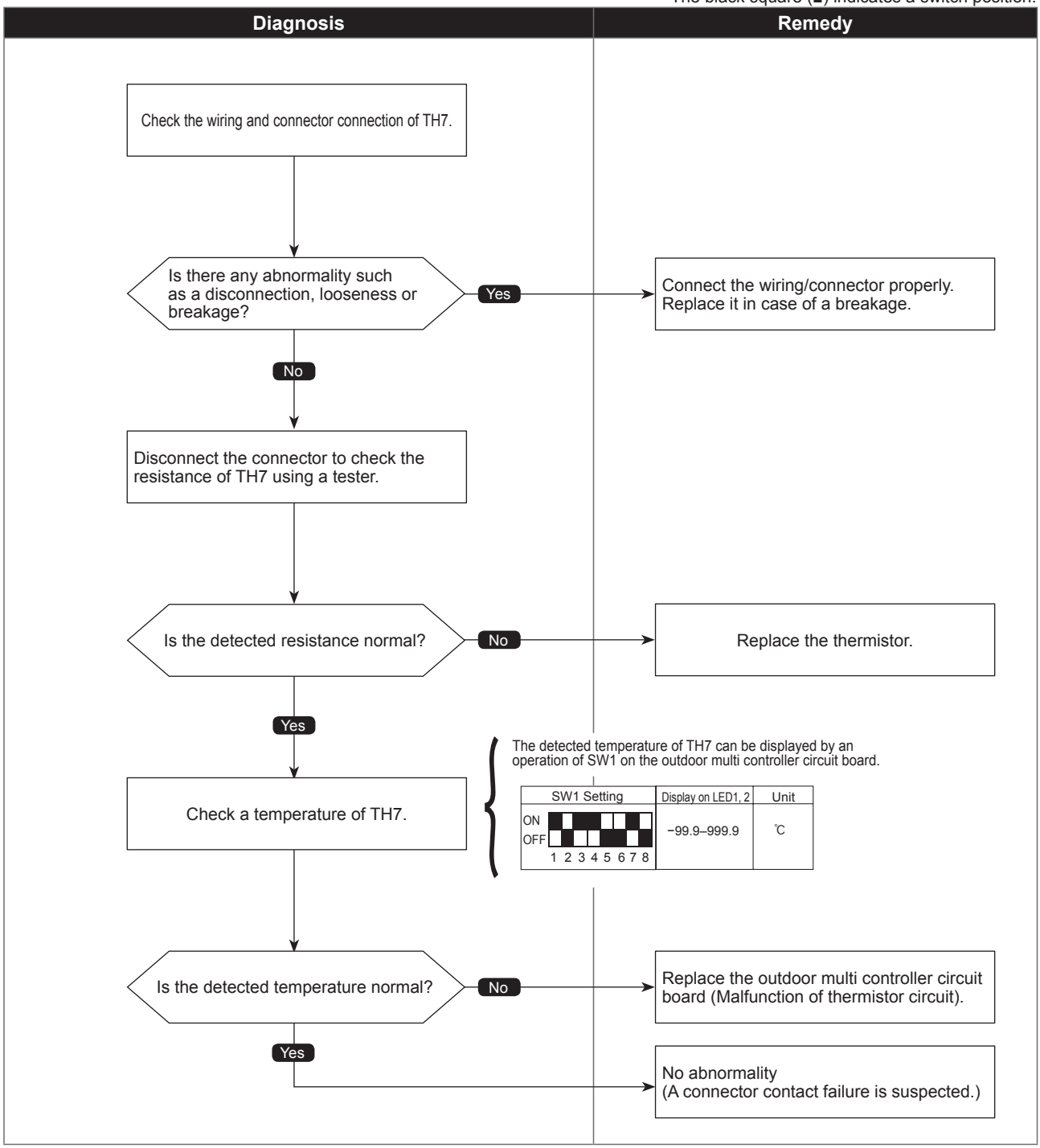
Ambient temperature thermistor (TH7) open/short

Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH7 detects to be open/short Open: −40℃ [−40°F] or less Short: 90℃ [162°F] or more TH7: Thermistor <Ambient>	① Disconnection or contact failure of connectors ② Characteristic defect of thermistor ③ Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.



Check code

5109
(U4)

HIC pipe temperature thermistor (TH2) open/short

Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH2 detects to be open/short. Open: −40℃ [−40°F] or less Short: 90℃ [162°F] or more TH2: Thermistor <HIC pipe>	① Disconnection or contact failure of connectors ② Characteristic defect of thermistor ③ Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis

Check the wiring and connector connection of TH2.

Is there any abnormality such as a disconnection, looseness or breakage?

Yes → Connect the wiring/connector properly. Replace it in case of a breakage.

No

Disconnect the connector to check the resistance of TH2 using a tester.

Is the detected resistance normal?

No → Replace the thermistor.

Yes

Check a temperature of TH2.

The detected temperature of TH2 can be displayed by an operation of SW1 on the outdoor multi controller circuit board.

SW1 Setting	Display on LED1,2	Unit
ON / OFF 1 2 3 4 5 6 7 8	−99.9–999.9	°C

Is the detected temperature normal?

No → Replace the outdoor multi controller circuit board (Malfunction of thermistor circuit).

Yes → No abnormality (A connector contact failure is suspected.)

Check code

5110
(U4)

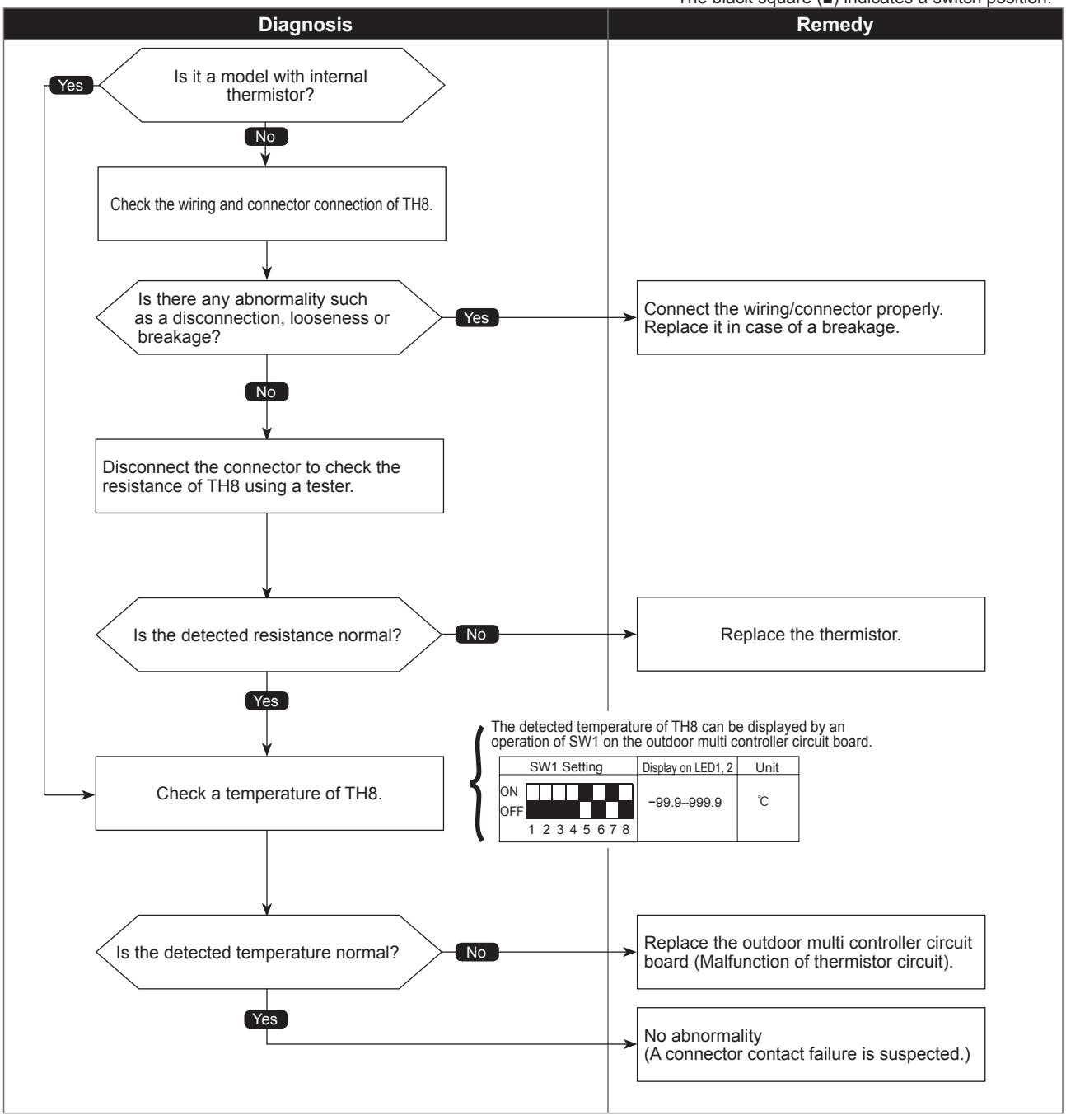
Heat sink temperature thermistor(TH8) open/short

Abnormal points and detection methods	Causes and checkpoints
Abnormal if TH8 (Internal thermistor) detects to be open/short. Open: −34.8℃ [−30.6°F] or less Short: 102℃ [215.6°F] or more TH8: Thermistor <Heat sink>	① Disconnection or contact failure of connectors ② Characteristic defect of thermistor ③ Defective outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.



Check code

5201
(F5)

High pressure sensor (63HS) trouble

Abnormal points and detection methods	Causes and checkpoints
① When the detected pressure in the High pressure sensor is 1kgf/㎠ or less during operation, the compressor stops operation and enters into an anti-restart mode for 3 minutes. ② When the detected pressure is 1kgf/㎠ or less immediately before restarting, the compressor falls into an abnormal stop with a check code <5201>. ③ For 3 minutes after compressor restarting, during defrosting operation, and for 3 minutes after returning from defrosting operation, above mentioned symptoms are not determined as abnormal.	① Defective High pressure sensor ② Decrease of internal pressure caused by gas leakage ③ Disconnection or contact failure of connector ④ Malfunction of input circuit on outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.

Diagnosis

Remedy

63HS: High pressure sensor

Check the wiring and connector connection.

Is there any abnormality such as a disconnection, looseness or breakage?

Yes → Connect the wiring/connector properly. Replace it in case of a breakage.

No

Check an internal pressure of the refrigerant circuit.

Is the detected internal pressure normal?

No → Check the refrigerant circuit, and recharge refrigerant after repairing the leakage.

Yes

Check the detected pressure in 63HS, then compare it with the internal pressure.

*For the voltage, refer to "8-6. HOW TO CHECK THE COMPONENTS".

The detected pressure in 63HS can be displayed by an operation of SW1 on the outdoor multi controller circuit board.

SW1 Setting	Display on LED1, 2	Unit
ON / OFF (1 2 3 4 5 6 7 8)	−99.9–999.9	kgf/㎠

Is the detected pressure normal?

No → Replace the 63HS.

Replace the outdoor multi controller circuit board.

Check code

5202
(F3)

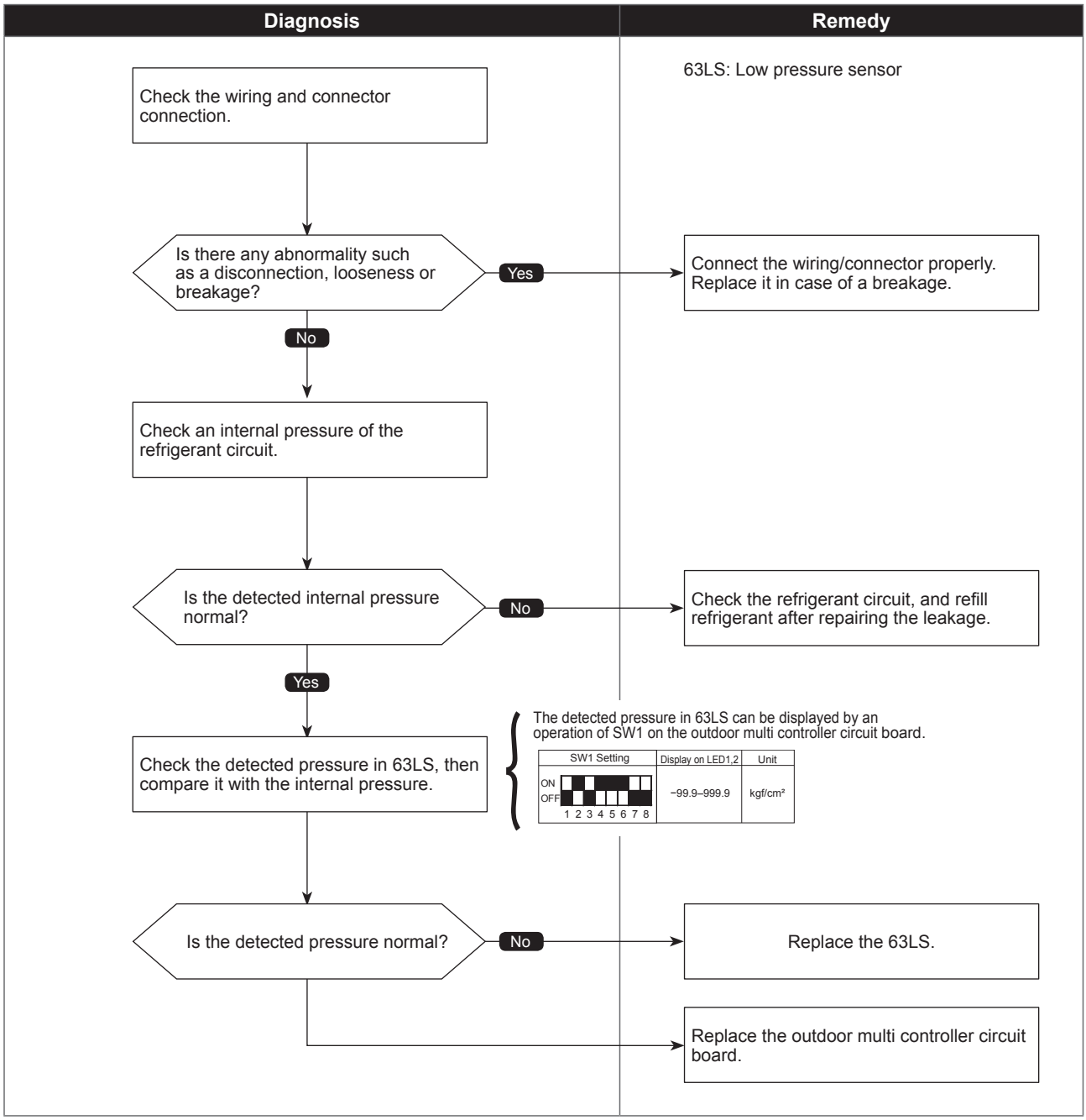
Low pressure sensor (63LS) trouble

Abnormal points and detection methods	Causes and checkpoints
①When the detected pressure in the Low pressure sensor is −2.3kgf/㎠ or less, or 23.1kgf/㎠ or more during operation, the compressor stops operation with a check code <5202>. ②For 3 minutes after compressor restarting, during defrosting operation, and for 3 minutes after returning from defrosting operation, above mentioned symptoms are not determined as abnormal.	①Defective Low pressure sensor ②Decrease of internal pressure caused by gas leakage ③Disconnection or contact failure of connector ④Malfunction of input circuit on outdoor multi controller circuit board

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

The black square (■) indicates a switch position.



Check code

5300
(UH)

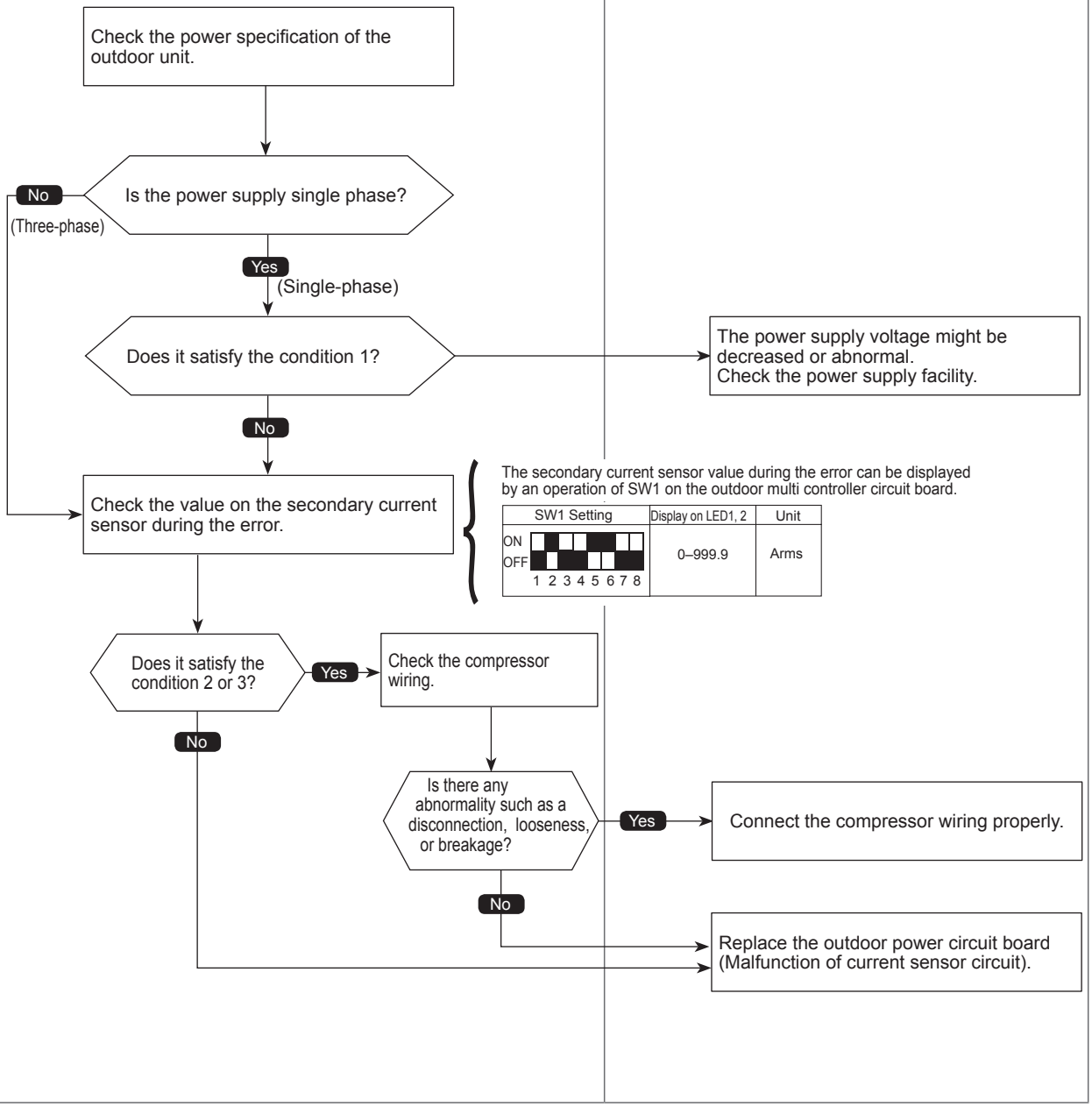
Primary current error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if any of the following conditions is detected: 1 Primary current sensor detects any of the following conditions (single phase unit only): 10 consecutive-second detection: 34 A One-time detection: 38 A 2 Secondary current sensor detects 25 A or more. 3 Secondary current sensor detects 1.0 A or less.	① Decrease/trouble of power supply voltage ② Disconnection of compressor wiring ③ Current sensor trouble on outdoor power circuit board ④ Wiring through current sensor (penetration type) is not done.

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis



Check code

6600
(A0)

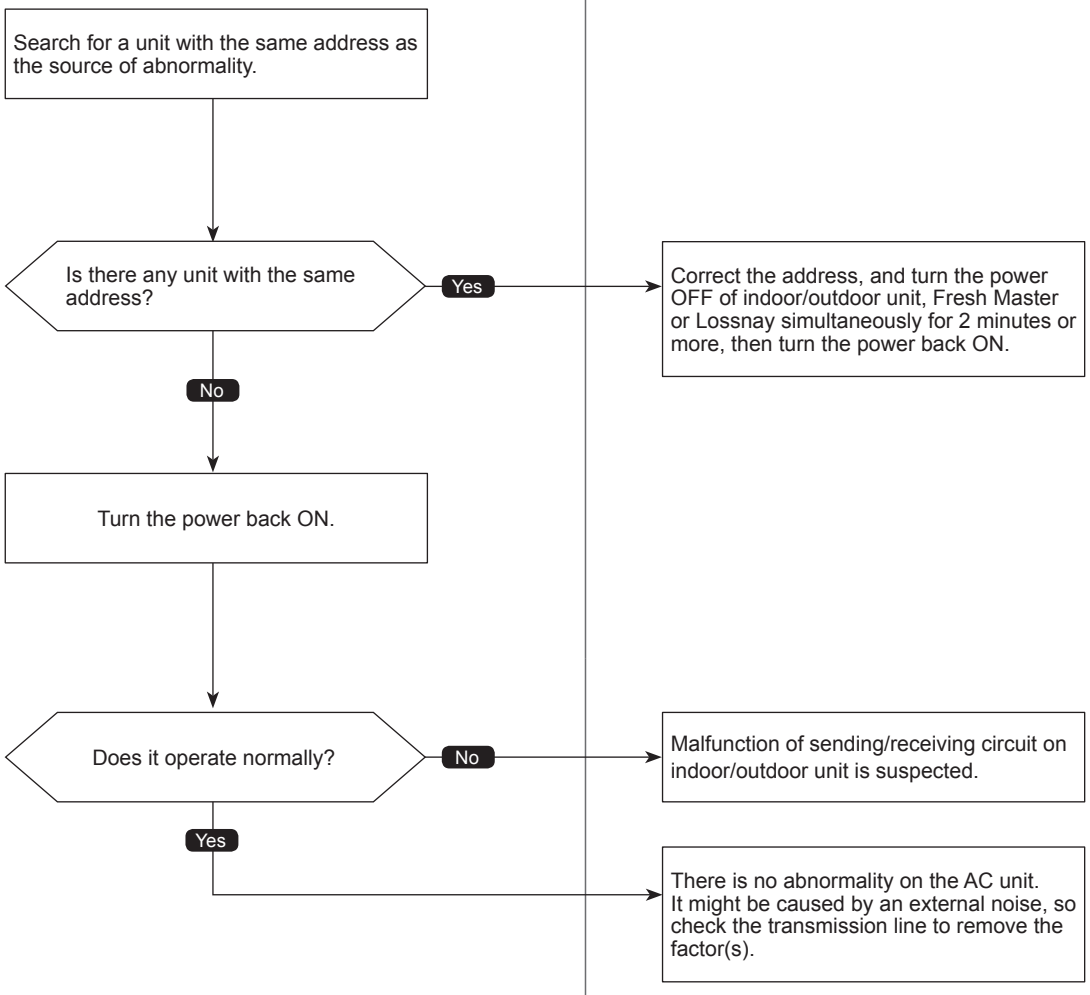
Duplex address error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if 2 or more units with the same address are existing.	① There are 2 units or more with the same address in their controller among outdoor unit, indoor unit, Fresh Master, Lossnay or remote controller ② Noise interference on indoor/outdoor connectors

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy



Check code

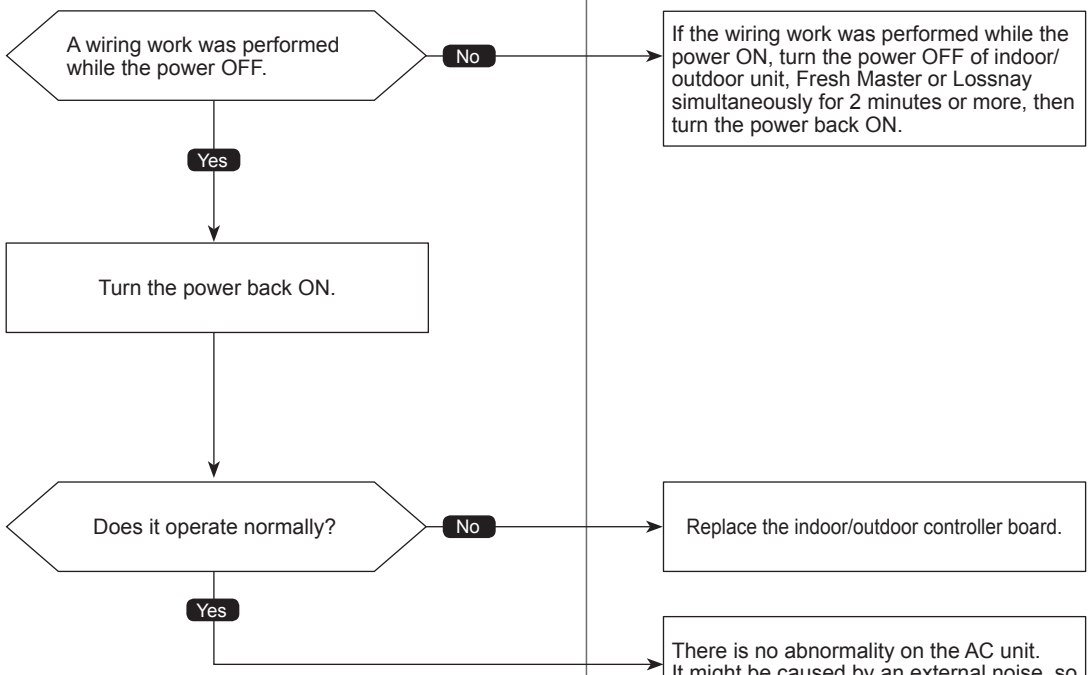
6602
(A2)

Transmission processor hardware error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if the transmission line shows "1" although the transmission processor transmitted "0".	①A transmitting data collision occurred because of a wiring work or polarity change has performed while the power is ON on either of the indoor/outdoor unit, Fresh Master or Lossnay ②Malfunction of transmitting circuit on transmission processor ③ Noise interference on indoor/outdoor connectors

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
	

Check code

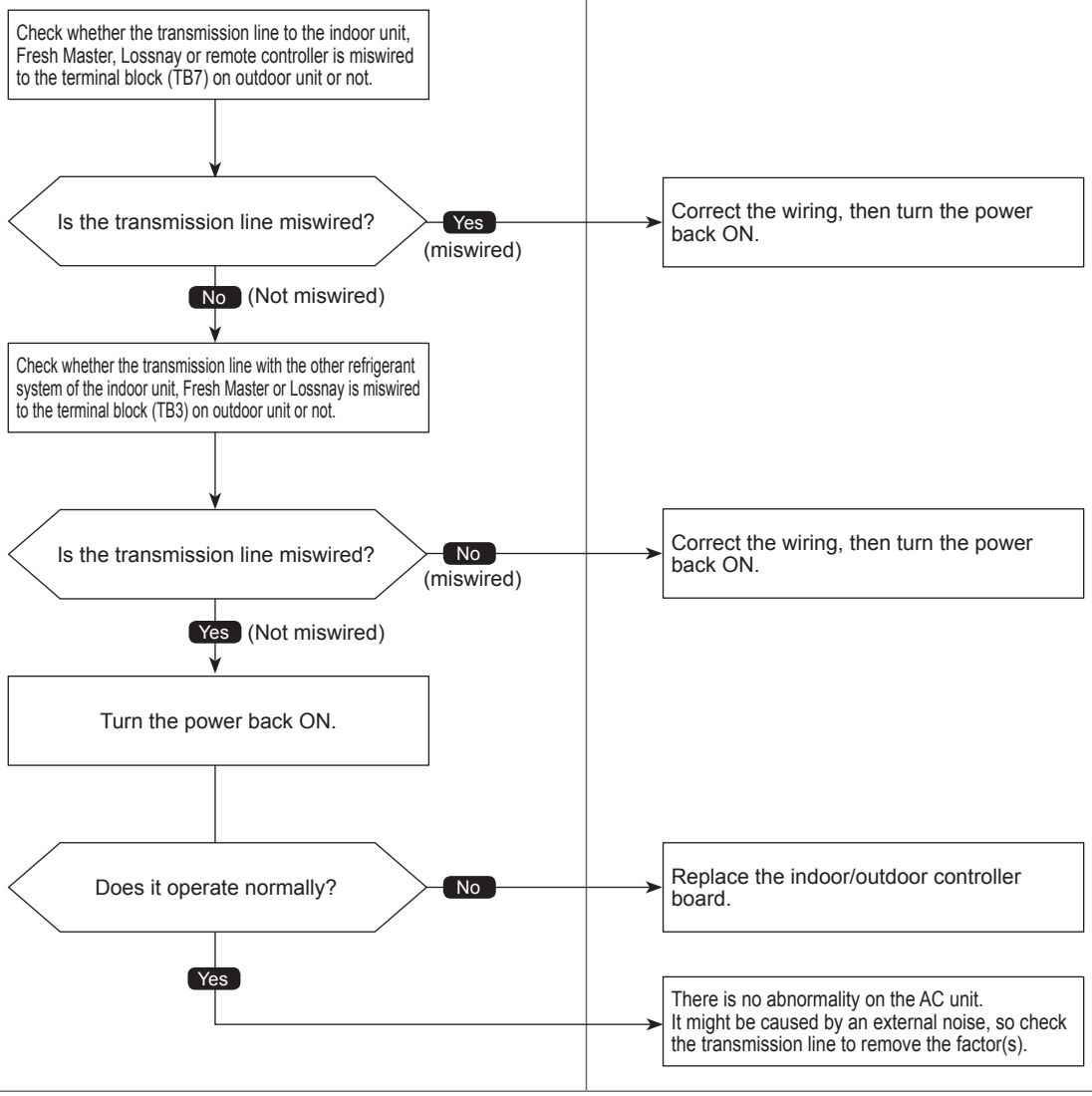
6603
(A3)

Transmission bus BUSY error

Abnormal points and detection methods	Causes and checkpoints
①Over error by collision Abnormal if no-transmission status caused by a transmitting data collision is consecutive for 8 to 10 minutes. ②Abnormal if a status, that data is not allowed on the transmission line because of noise and such, is consecutive for 8 to 10 minutes.	①The transmission processor is unable to transmit due to a short-cycle voltage such as noise is mixed on the transmission line. ②The transmission processor is unable to transmit due to an increase of transmission data amount caused by a miswiring of the terminal block (transmission line) (TB3) and the terminal block (centralized control line) (TB7) on the outdoor unit. ③The share on transmission line becomes high due to a mixed transmission caused by a malfunction of repeater on the outdoor unit, which is a function to connect/disconnect transmission from/to control system and centralized control system.

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
	

Check code

6606
(A6)

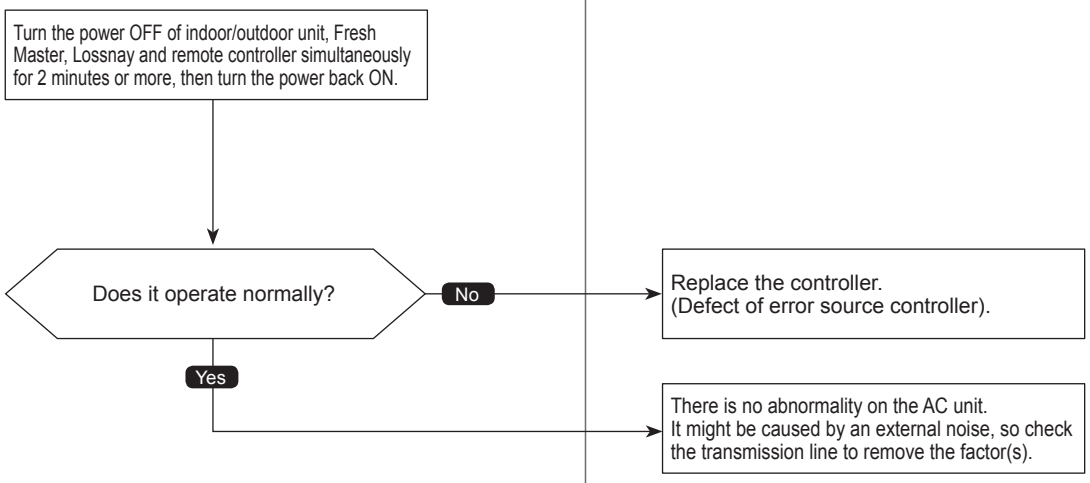
Signal communication error with transmission processor

Abnormal points and detection methods	Causes and checkpoints
① Abnormal if the data of unit/transmission processor were not normally transmitted. ② Abnormal if the address transmission from the unit processor was not normally transmitted.	① Accidental disturbance such as noise or lightning surge ② Hardware malfunction of transmission processor

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy



Check code

6607
(A7)

No ACK error

Abnormal points and detection methods	Causes and checkpoints
① Represents a common error detection An abnormality detected by the sending side controller when receiving no ACK from the receiving side, though signal was once sent. The sending side searches the error in 30 seconds interval for 6 times continuously.	① The previous address unit does not exist since the address switch was changed while in electric continuity status. ② Decline of transmission voltage/signal caused by tolerance over on transmission line ·At the furthest end: 200 m ·On remote controller line: (12 m) ③ Decline of transmission voltage/signal due to unmatched transmission line types ·Types for shield line: CVVS, CPEVS, or MVVS ·Line diameter: 1.25 ㎟ or more ④ Decline of transmission voltage/signal due to excessive number of connected units ⑤ Malfunction due to accidental disturbance such as noise or lightning surge ⑥ Defect of error source controller
② The cause of displayed address and attribute is on the outdoor unit side An abnormality detected by the indoor unit if receiving no ACK when transmitting signal from the indoor unit to the outdoor unit.	① Contact failure of indoor/outdoor unit transmission line ② Disconnection of transmission connector (CN2M) on indoor unit ③ Malfunction of sending/receiving circuit on indoor/outdoor unit
③ The cause of displayed address and attribute is on the indoor unit side An abnormality detected by the remote controller if receiving no ACK when sending data from the remote controller to the indoor unit.	① While operating with multi refrigerant system indoor units, an abnormality is detected when the indoor unit transmit signal to the remote controller during the other refrigerant-system outdoor unit is turned OFF, or within 2 minutes after it turned back ON. ② Contact failure of indoor unit or remote controller transmission line ③ Disconnection of transmission connector (CN2M) on indoor unit ④ Malfunction of sending/receiving circuit on indoor unit or remote controller
④ The cause of the displayed address and attribute is on the remote controller side An abnormality detected by the indoor unit if receiving no ACK when transmitting signal from the indoor unit to the remote controller.	① While operating with multi refrigerant system indoor units, an abnormality is detected when the indoor unit transmit signal to the remote controller during the other refrigerant-system outdoor unit is turned OFF, or within 2 minutes after it turned back ON. ② Contact failure of indoor unit or remote controller transmission line ③ Disconnection of transmission connector (CN2M) on indoor unit ④ Malfunction of sending/receiving circuit on indoor unit or remote controller

Check code

6607
(A7)

No ACK error

Abnormal points and detection methods	Causes and checkpoints
⑤ The cause of displayed address and attribute is on the Fresh Master side An abnormality detected by the indoor unit if receiving no ACK when transmitting signal from the indoor unit to the Fresh Master.	① While the indoor unit is operating with multi refrigerant system Fresh Master, an abnormality is detected when the indoor unit transmits signal to the remote controller while the outdoor unit with the same refrigerant system as the Fresh Master is turned OFF, or within 2 minutes after it turned back ON. ② Contact failure of indoor unit or Fresh Master transmission line ③ Disconnection of transmission connector (CN2M) on indoor unit or Fresh Master ④ Malfunction of sending/receiving circuit on indoor unit or Fresh Master
⑥ The cause of displayed address and attribute is on Lossnay side An abnormality detected by the indoor unit if receiving no ACK when the indoor unit transmit signal to the Lossnay.	① An abnormality is detected when the indoor unit transmits signal to Lossnay while the Lossnay is turned OFF. ② While the indoor unit is operating with the other refrigerant Lossnay, an abnormality is detected when the indoor unit transmits signal to the Lossnay while the outdoor unit with the same refrigerant system as the Lossnay is turned OFF, or within 2 minutes after it turned back ON. ③ Contact failure of indoor unit or Lossnay transmission line ④ Disconnection of transmission connector (CN2M) on indoor unit ⑤ Malfunction of sending/receiving circuit on indoor unit or Lossnay
⑦The controller of displayed address and attribute is not recognized	① The previous address unit does not exist since the address switch was changed while in electric continuity status. ② An abnormality detected at transmitting from the indoor unit since the Fresh Master/Lossnay address are changed after synchronized setting of Fresh Master/Lossnay by the remote controller.

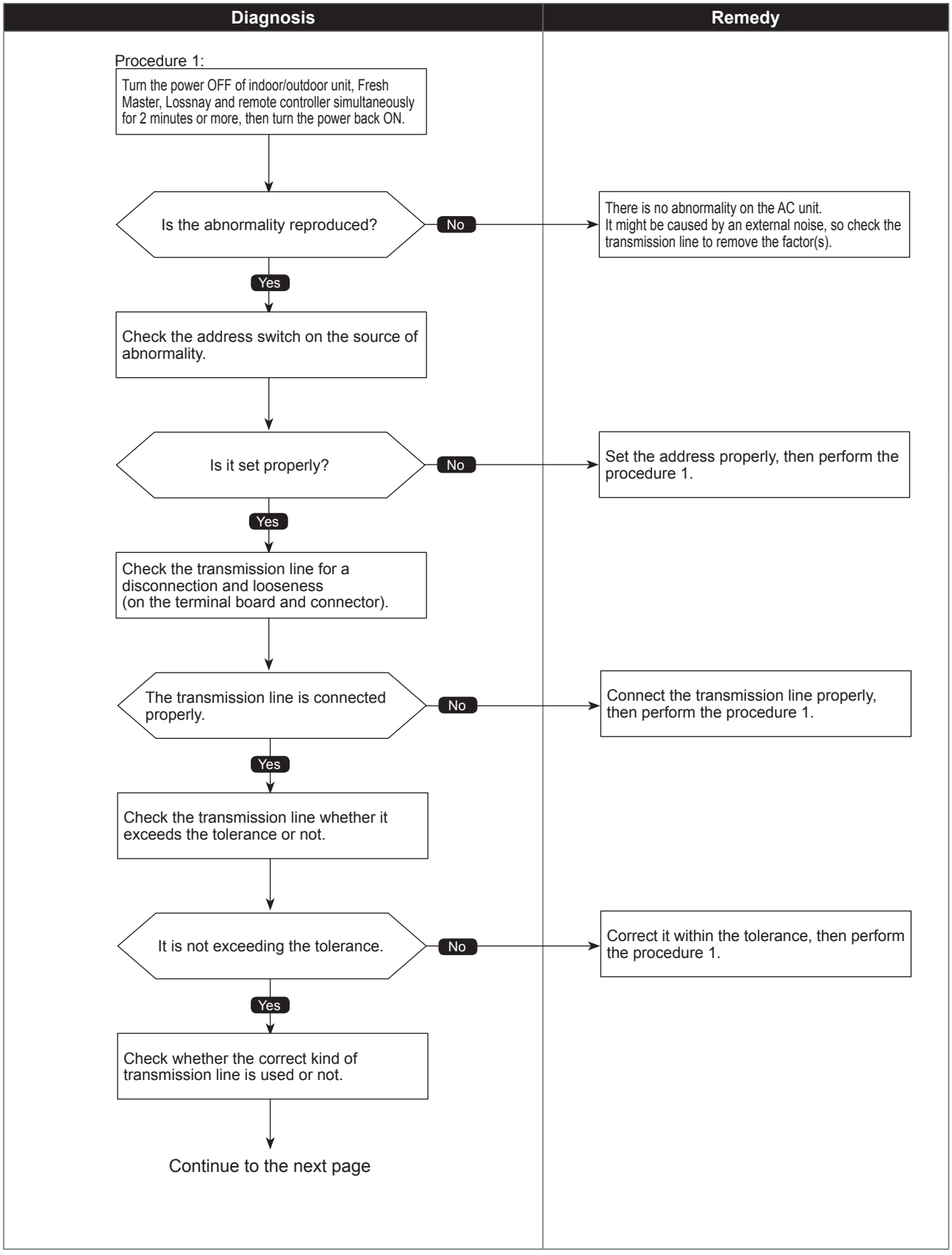
Check code

6607
(A7)

No ACK error

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



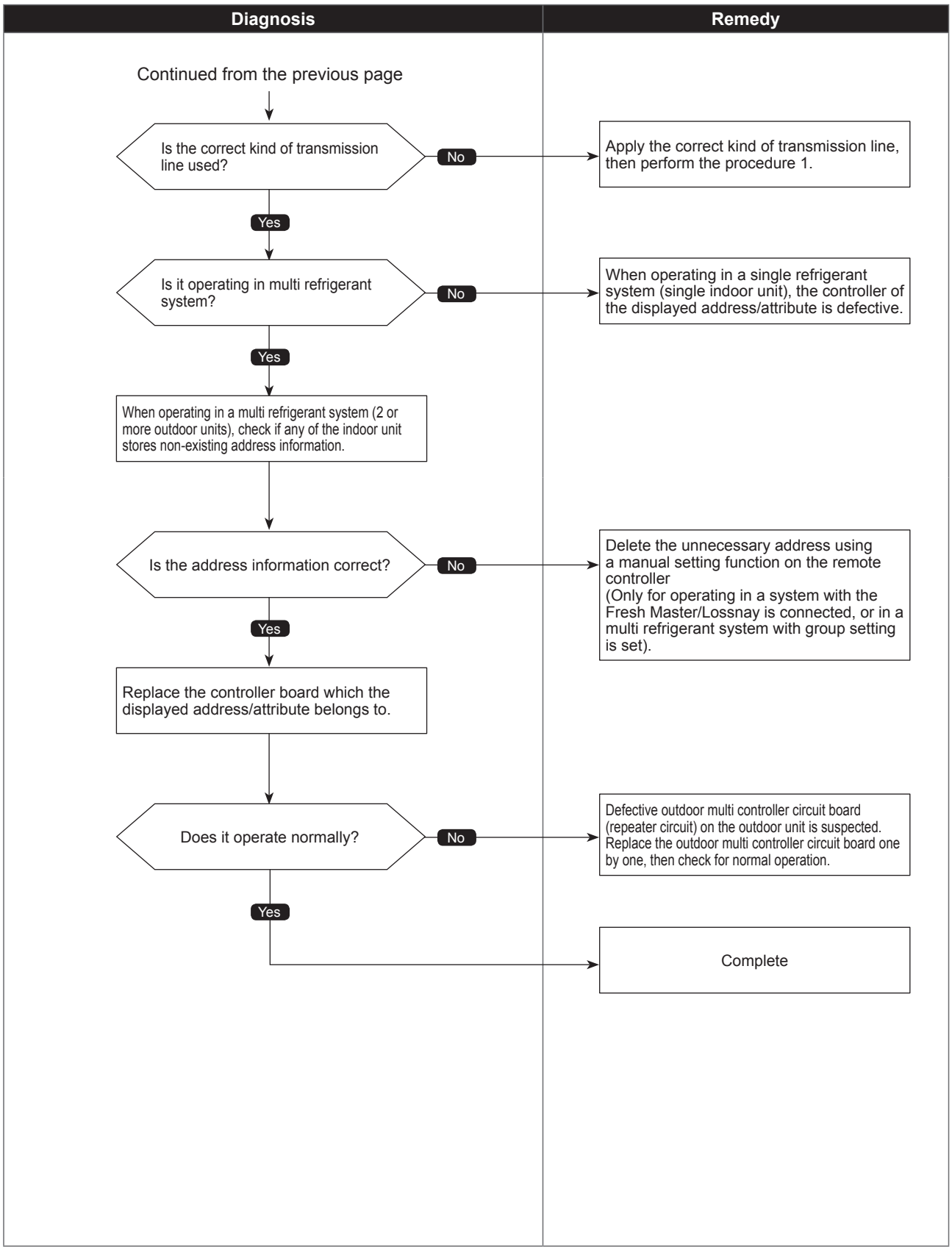
Check code

6607
(A7)

No ACK error

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

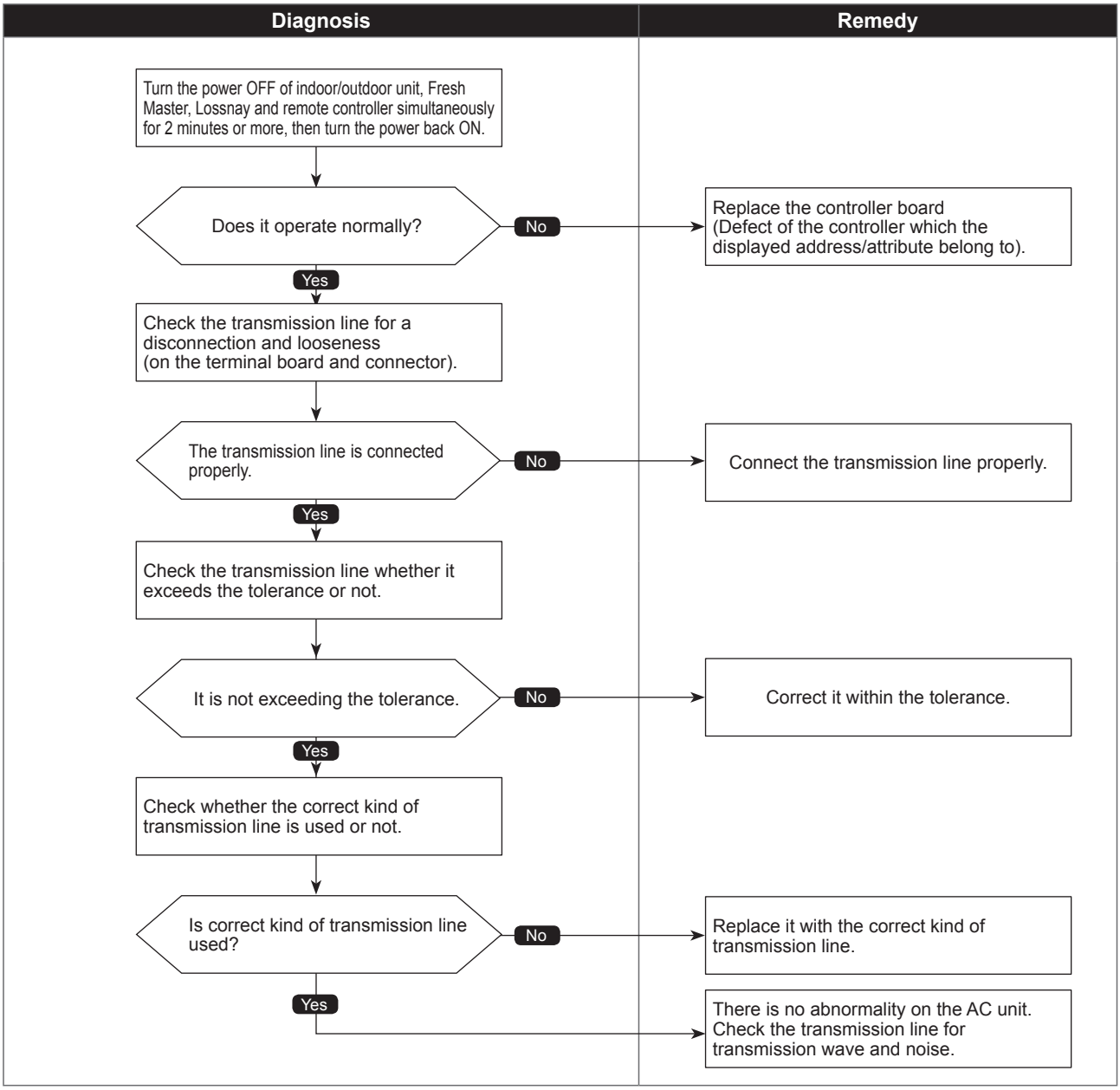
6608
(A8)

No response frame error

Abnormal points and detection methods	Causes and checkpoints
Abnormal if receiving no response command while already received ACK. The sending side searches the error in 30 seconds interval for 6 times continuously.	①Continuous failure of transmission due to noise, etc ②Decline of transmission voltage/signal caused by tolerance over on transmission line ·At the furthest end: 200 m ·On remote controller line: (12 m) ③Decline of transmission voltage/signal due to unmatched transmission line types ·Types for shield line: CVVS, CPEVS, or MVVS ·Line diameter: 1.25 ㎟ or more ④Accidental malfunction of error source controller

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

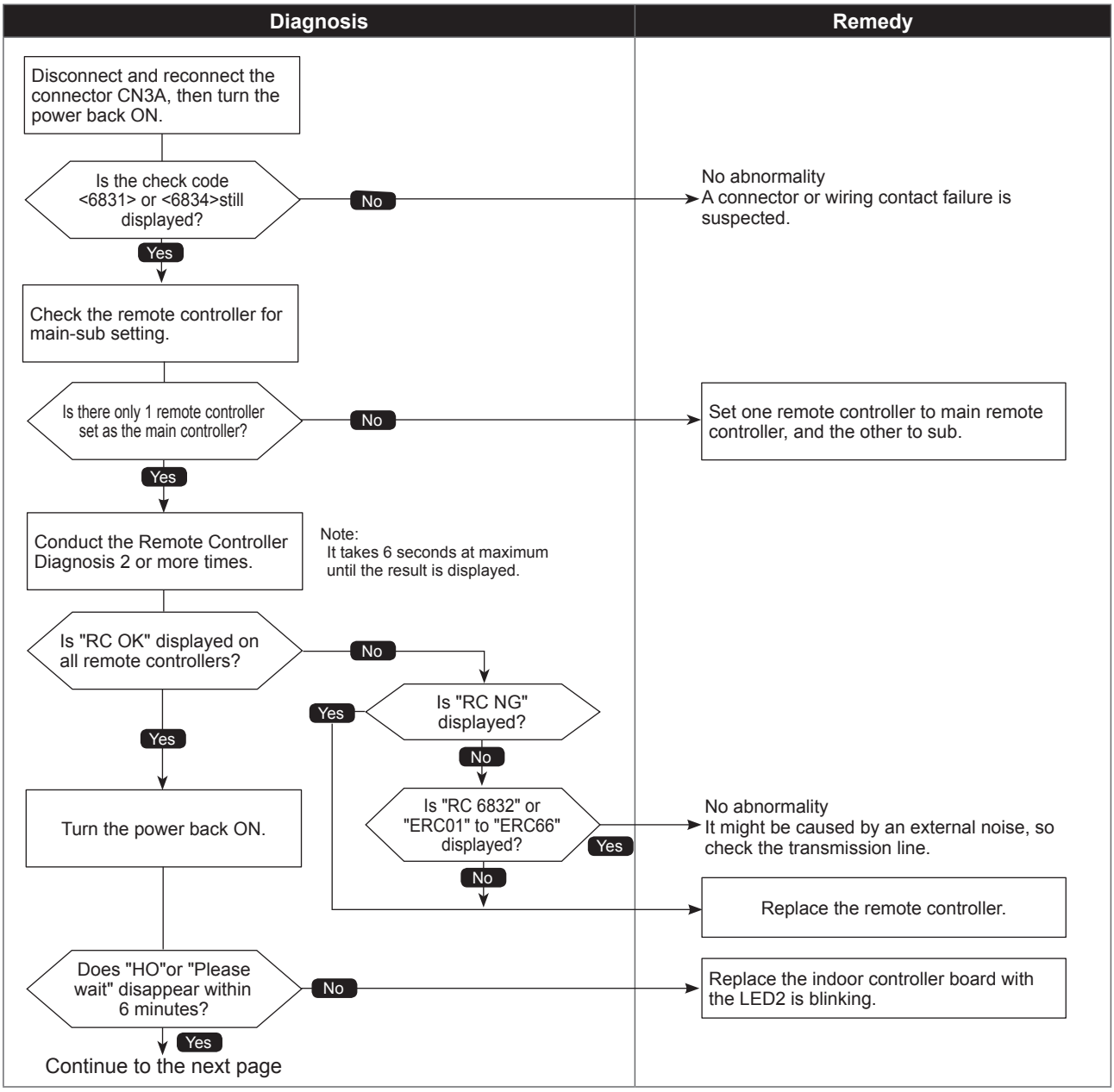
6831, 6834 (E0/E4)

MA communication receive error

Abnormal points and detection methods	Causes and checkpoints
Detected in remote controller or indoor unit: ①When the main or sub remote controller cannot receive signal from indoor unit which has the "0" address. ②When the sub remote controller cannot receive signal. ③When the indoor controller board cannot receive signal from remote controller or another indoor unit. ④When the indoor controller board cannot receive signal.	①Contact failure of remote controller wirings ②Irregular Wiring (A wiring length, number of connecting remote controllers or indoor units, or a wiring thickness does not meet the conditions specified in the chapter "Electrical Work" in the indoor unit Installation Manual.) ③Malfunction of the remote controller sending/ receiving circuit on indoor unit with the LED2 is blinking. ④Malfunction of the remote controller sending/ receiving circuit ⑤ Remote controller transmitting error caused by noise interference

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards



Check code

6831, 6834
(E3/E5)

MA communication receive error

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards

Diagnosis	Remedy
Continued from the previous page	
Refer to the chapter "Electrical Work".	
Is the wiring connected properly, meeting the condition?	
No	Connect the wiring properly as specified in the chapter "Electrical Work" in the indoor unit Installation Manual.
Yes	No abnormality It might be caused by an external noise, so check the transmission line to remove the factor(s).

Check code

6832, 6833 (EF)

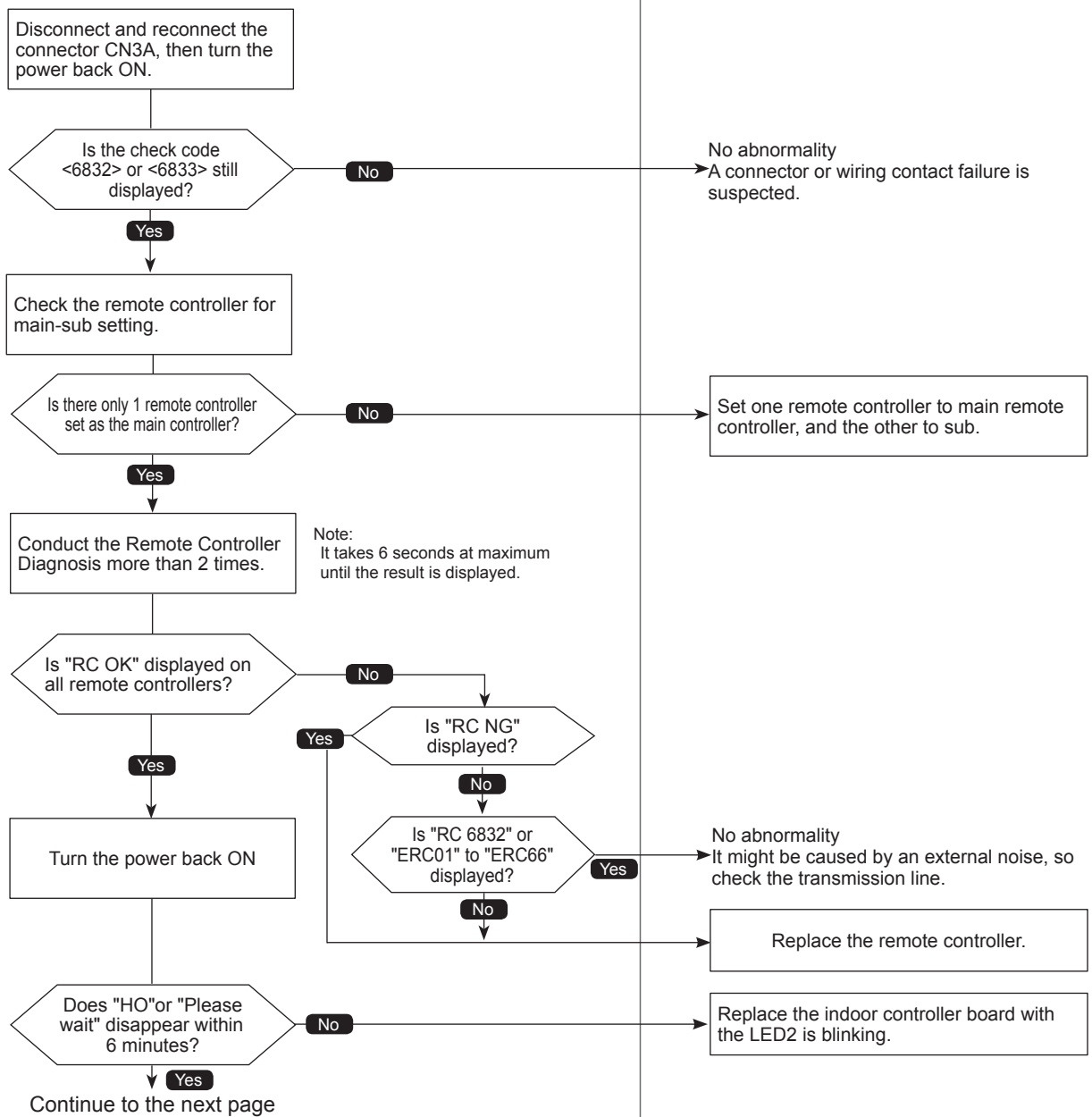
MA communication send error

Abnormal points and detection methods	Causes and checkpoints
Detected in remote controller or indoor unit.	① There are 2 remote controllers set as main. ② Malfunction of remote controller sending/receiving circuit ③ Malfunction of sending/receiving circuit on indoor controller board ④ Remote controller transmitting error caused by noise interference

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards

Diagnosis



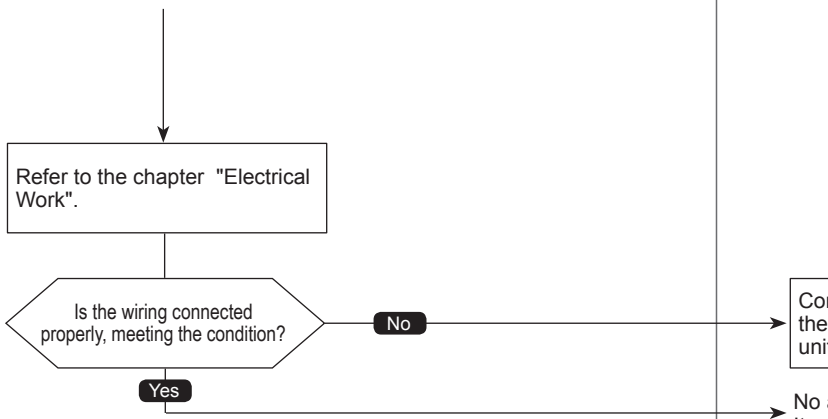
Remedy

Check code

6832, 6833
(EF)

MA communication send error

●Diagnosis of defectives
Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards

Diagnosis	Remedy
Continued from the previous page 	Connect the wiring properly as specified in the chapter "Electrical Work" in the indoor unit Installation Manual. No abnormality It might be caused by an external noise, so check the transmission line to remove the factor(s).

Check code

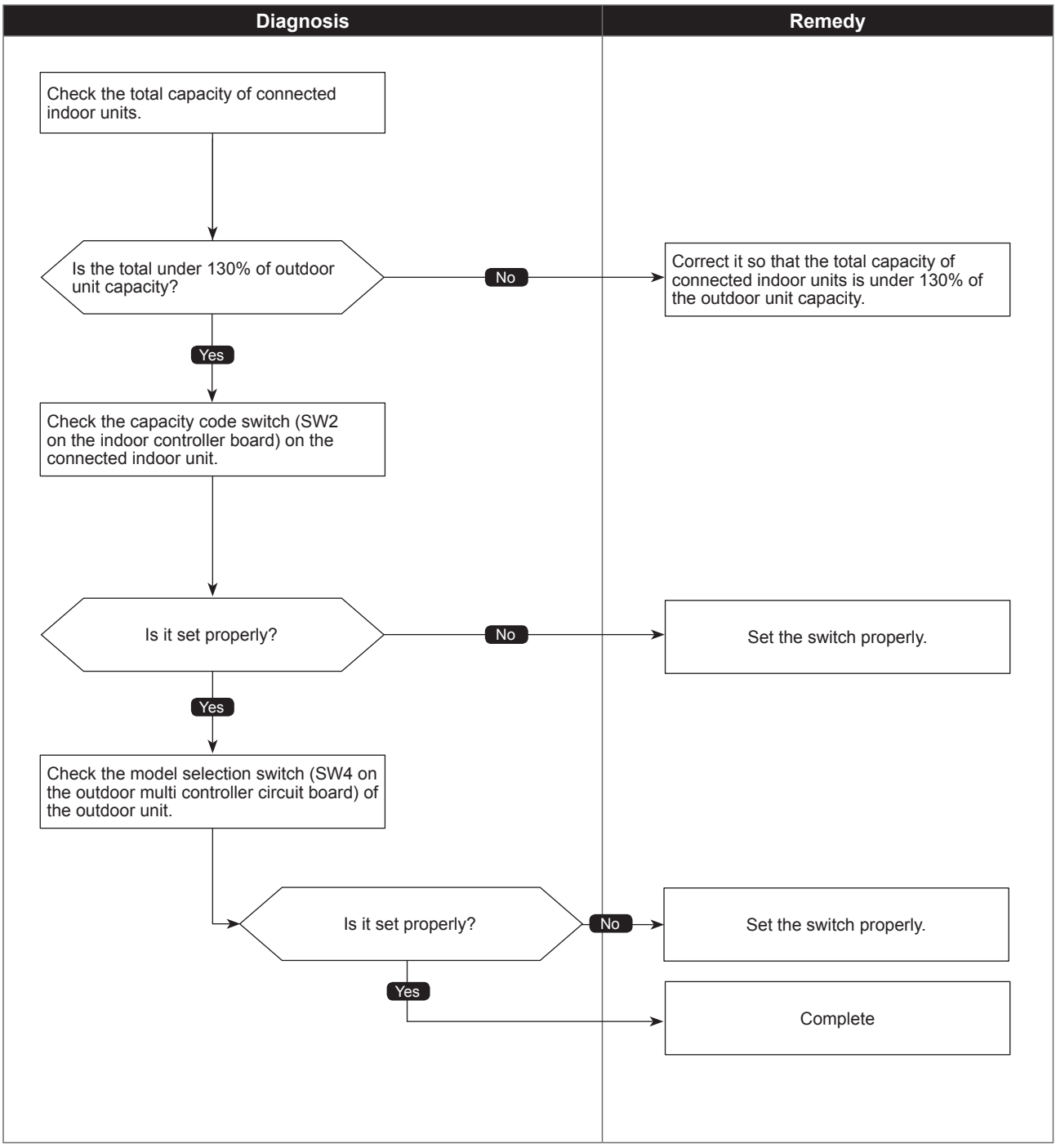
7100
(EF)

Total capacity error

Abnormal points and detection methods	Causes and checkpoints
When the total capacity of connected indoor units exceeds the specified capacity (130% of the outdoor unit capacity), a check code <7100> is displayed.	① The total capacity of connected indoor units exceeds the specified capacity. · SP112 model: up to code 35 · SP125 model: up to code 41 · SP140 model: up to code 47 ② The model name code of the outdoor unit is registered wrongly.

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.



Check code

7101
(EF)

Capacity code error

Abnormal points and detection methods	Causes and checkpoints
When a connected indoor unit is incompatible, a check code <7101> is displayed.	The model name of connected indoor unit (model code) is read as incompatible. The connectable indoor units are: · SP112 to SP140 model: P15 to P140 model (code 3 to 28) · When connecting via branch box: P15 to P100 model (code 3 to 20)

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
Check the model selection switch (SW4 on the indoor controller board) of the connected indoor unit. ↓ Is it set properly? No → Set the switch properly. Yes → The model code of the connected indoor unit can be displayed by an operation of SW1 on the outdoor unit.	

Check code

7102
(EF)

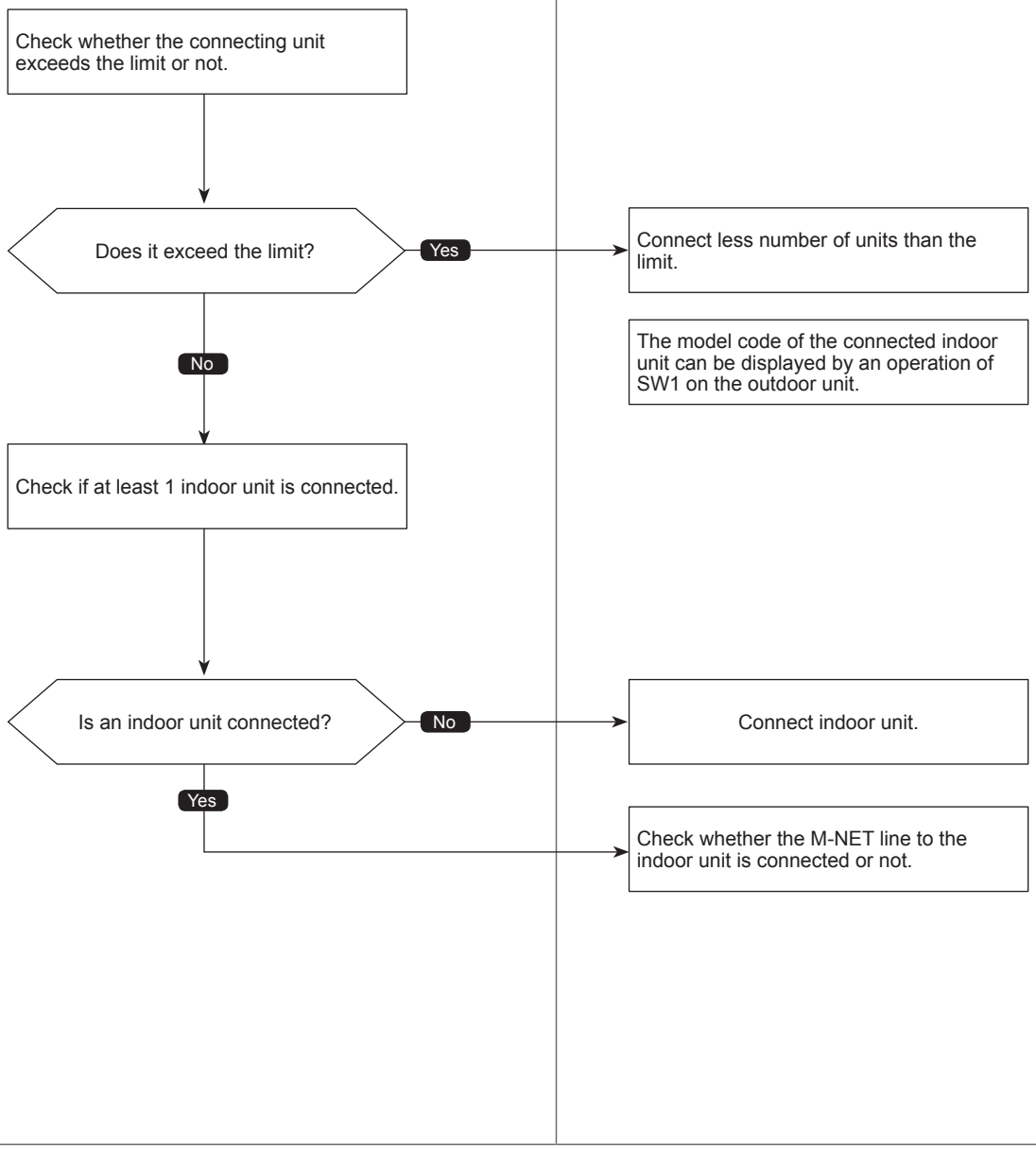
Connecting excessive number of units and branch boxes

Abnormal points and detection methods	Causes and checkpoints
When the connected indoor unit exceeds the limit, a check code <7102> is displayed.	Connecting more indoor units and branch boxes than the limit. Abnormal if connecting status does not comply with the following limit; ① Connectable up to 12 indoor units ② Connect at least 1 indoor unit (Abnormal if connected none). ③ Connectable up to 2 branch boxes

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy



Check code

7105
(EF)

Address setting error

Abnormal points and detection methods	Causes and checkpoints
The address setting of connected unit is wrong.	There is a unit without correct address setting in the range specified in "7-5. SYSTEM CONTROL".

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy

<Outdoor unit>

Check whether the outdoor unit address is set in 000, or in the range of 51 to 100.

Is the address setting correct?

No → Set the address properly, then turn the power OFF of indoor/outdoor unit, Fresh Master, Lossnay and remote controller simultaneously for 2 minutes or more, and turn the power back ON.

Yes → Replace the outdoor multi controller circuit board.

<Indoor unit>

Check whether the indoor unit address is set in 00, or in the range of 01 to 50.

Is the address setting correct?

No → Set the address properly, then turn the power OFF of indoor/outdoor unit, Fresh Master, Lossnay and remote controller simultaneously for 2 minutes or more, and turn the power back ON.

Yes → Replace the indoor controller board.

<Branch box>

Check whether the branch box address is set in 00, or in the range of 01 to 46.

Is the address setting correct?

No → Set the address properly, then turn the power OFF of indoor/outdoor unit, Fresh Master, Lossnay and remote controller simultaneously for 2 minutes or more, and turn the power back ON.

Yes → Replace the branch box controller board.

Check code

7105
(EF)

Address setting error

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis	Remedy
<M-NET RC (main)> Check whether the M-NET RC (main) address is set in 000, or in the range of 101 to 150. Is the address setting correct? No → Set the address properly, then turn the power OFF of indoor/outdoor unit, Fresh Master, Lossnay and remote controller simultaneously for 2 minutes or more, and turn the power back ON. Yes → Replace the M-NET RC (main).	
<M-NET RC (sub)> Check whether the M-NET RC (sub) address is set in 000, or in the range of 151 to 200. Is the address setting correct? No → Set the address properly, then turn the power OFF of indoor/outdoor unit, Fresh Master, Lossnay and remote controller simultaneously for 2 minutes or more, and turn the power back ON. Yes → Replace the M-NET RC (sub).	

Check code

7130
(EF)

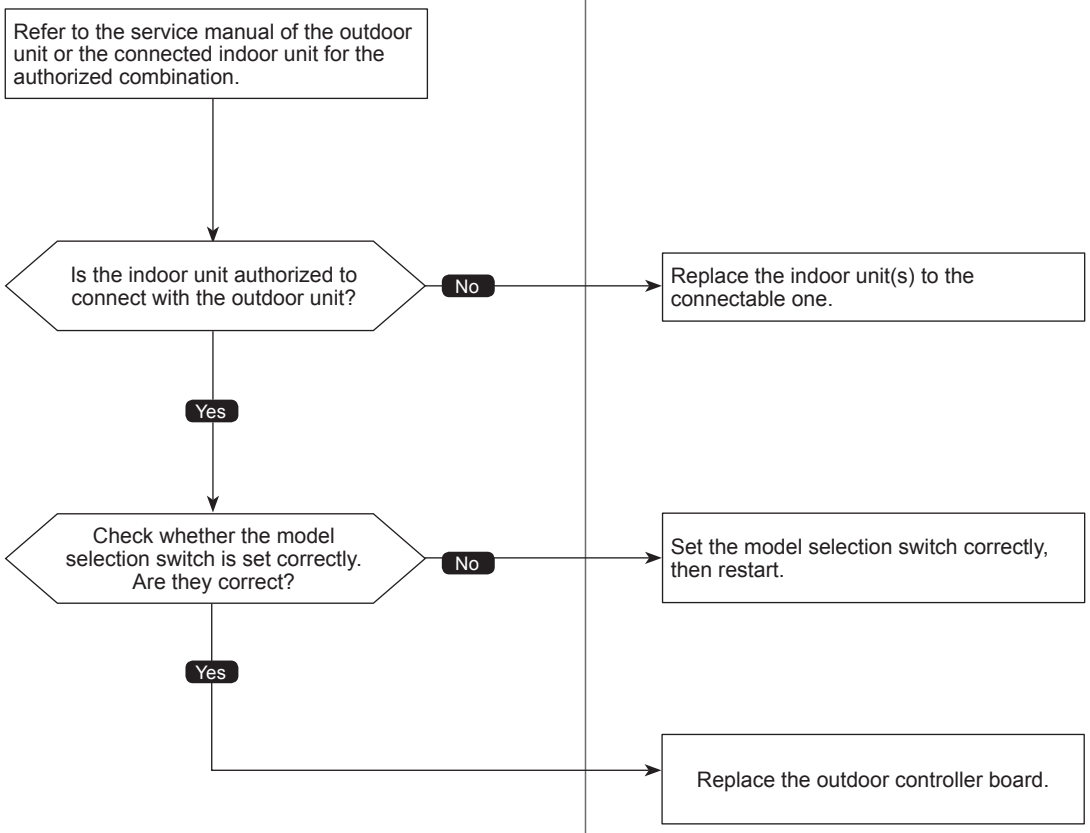
Incompatible unit combination error

Abnormal points and detection methods	Causes and checkpoints
When the connected indoor unit is not connectable with the outdoor unit, the outdoor unit detects the error at startup.	Connecting indoor unit(s) which is not authorized to connect to the outdoor unit.

●Diagnosis of defectives

Make sure to turn the power OFF before connecting/disconnecting any connectors, or replacing boards.

Diagnosis



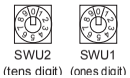
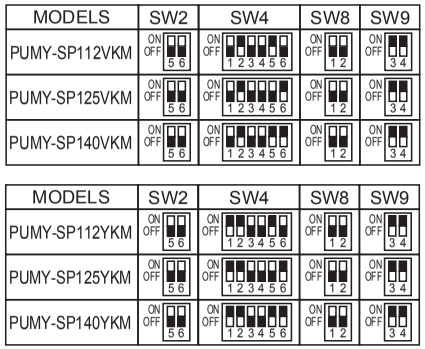
Remedy

8-2. THE FOLLOWING SYMPTOM DO NOT REPRESENT TROUBLE (EMERGENCY)

Symptom	Display of remote controller	CAUSE
Even the cooling (heating) operation selection button is pressed, the indoor unit cannot be operated.	"Cooling (Heating)" blinks	The indoor unit cannot cool (heat) if other indoor units are heating (Cooling).
The auto vane runs freely.	Normal display	Because of the control operation of auto vane, it may change over to horizontal blow automatically from the downward blow in cooling in cause the downward blow operation has been continued for 1 hour. At defrosting in heating, hot adjusting and thermostat OFF, it automatically changes over to horizontal blow.
Fan setting changes during heating.	Normal display	Ultra-low speed operation is commenced at thermostat OFF. Light air automatically change over to set value by time or piping temperature at thermostat ON.
Fan stops during heating operation.	"Defrost ☼"	The fan is to stop during defrosting.
Fan does not stop while operation has been stopped.	Light out	Fan is to run for 1 minute after stopping to exhaust residual heat (only in heating).
No setting of fan while start SW has been turned on.	STAND BY ☼	Ultra-low speed operation for 5 minutes after SW ON or until piping temperature reach 35°C. There low speed operate for 2 minutes, and then set notch is commenced. (Hot adjust control)
Indoor unit remote controller shows “HO” or “PLEASE WAIT ” indicator for about 2 minutes when turning ON power supply.	“HO” blinks “PLEASE WAIT” blinks	The system is in the process of start-up. Operate remote controller again after “HO” or “PLEASE WAIT” disappears.
Drain pump does not stop while unit has been stopped.	Light out	After a stop of cooling operation, unit continues to operate drain pump for 3 minutes and then stops it.
Drain pump continues to operate while unit has been stopped.	—	Unit continues to operate drain pump if drainage is generated, even during a stop.

8-3. INTERNAL SWITCH FUNCTION TABLE

PUMY-SP112VKMR1.TH PUMY-SP125VKMR1.TH PUMY-SP140VKMR1.TH
PUMY-SP112YKMR1.TH PUMY-SP125YKMR1.TH PUMY-SP140YKMR1.TH
PUMY-SP112VKMR1.TH-BS PUMY-SP125VKMR1.TH-BS PUMY-SP140VKMR1.TH-BS
PUMY-SP112YKMR1.TH-BS PUMY-SP125YKMR1.TH-BS PUMY-SP140YKMR1.TH-BS

Switch	Step	Function	Operation in Each Switch Setting			Remarks	Purpose	Additional Information
			ON	OFF	When to Set			
SWU1 ones digit SWU2 tens digit	Rotary switch				Before turning the power ON	<Initial settings> 		
SW1 Digital Display Switch	1–8				Can be set either during operation or not.	<Initial settings> 	To display outdoor unit's information to the LED on outdoor multi controller circuit board. Refer to "8-8. OUTDOOR UNIT INFORMATION DISPLAY".	
SW2 Function Switch	1	Selects operating system startup	With centralized controller	Without centralized controller	Before turning the power ON	<Initial settings> 	Turn ON when the centralized controller is connected to the outdoor unit.	• SW2-1 must be turned ON if a central controller is connected to the system. An example of this would be a TC-24, EB50A, AG150, AE50 or AE200. If SW2-1 is not turned on, while using a central controller, in rare circumstances problems may be encountered such as indoor units not responding to group commands. Therefore, turning SW2-1 ON is recommended if a central controller is used. • Group setting of 2 or more A-IC units which is connected to branch box via centralized controller is not allowed.
	2	Connection Information Clear Switch	Clear	Do not clear			When relocating units or connecting additional units.	—
	3	Abnormal data clear switch input	Clear abnormal data	Normal	OFF to ON any time after the power is turned on.		To delete an error history.	
	4	Pump down	Run adjustment mode	Normal	During compressor running		To facilitate outdoor unit the pumping down operation. Frequency = Fixed to 65 Hz Indoor-Electronic expansion valve = Fully open Outdoor fan step = Fixed to 10	Please refer to a section referring to the pumping down on outdoor units Installation Manuals. It might not be possible to collect all the refrigerant if the amount is excessive.
	5	—	—	—	—		—	—
	6	—	—	—	—		—	—
SW3 Trial operation	1	ON/OFF from outdoor unit	ON	OFF	Any time after the power is turned ON.	<Initial settings> 	—	—
	2	Mode setting	Heating	Cooling			—	—
SW4/ SW8 Model Switch	1–6				Before the power is turned ON.	<Initial settings> Set for each capacity.	—	—

Continue to the next page

The black square (■) indicates a switch position.

Switch	Step	Function	Operation in Each Switch Setting			Remarks	Purpose	Additional Information
			ON	OFF	When to Set			
SW5 Function switch	1	Demand control setting for Australia	Australia setting	Normal*1	Can be set when off or during operation	<Initial settings> ON OFF 1 2 3 4 5 6 7 8	Turn ON to activate the demand control for Australia.	(Do not turn this ON if the unit is in outside Australia)
	2	Change the indoor unit's LEV opening at startup	Enable	Normal			To set the LEV opening at startup higher than usual. (+150 pulses) To improve the operation with the LEV almost clogged.	The refrigerant flow noise at startup become louder.
	3	—	—	—	—		—	—
	4	—	—	—	—		—	—
	5	Change the indoor unit's LEV opening at defrost	Enable	Normal	Can be set when OFF or during operation		To set the LEV opening higher than usual during defrosting operation. (Only Qj ≦ 10 is valid, + 300 pulses) To avoid the discharge temperature increase and provide efficient defrosting operation.	The refrigerant flow noise during the defrosting operation become louder.
	6	Switching the target sub cool (Heating mode)	Enable	Normal	Can be set when OFF or during operation		To decrease the target sub cool value. To reduce the discharge temperature decrease due to refrigerant liquid accumulation in the units.	A refrigerant flow noise might be generated if the sub cool value is too small.
	7	During the outdoor unit is in HEAT operation, additionally increase about 50 to 70 pulses of the LEV opening on the indoor unit which is in FAN, STOP, COOL or thermo-OFF*2.	Active	Inactive			To additionally increase about 50 to 70 pulses of the LEV opening for units other than in HEAT operation. To avoid a refrigerant shortage (less capacity) due to refrigerant liquid accumulation in the units which is not in operation.	A refrigerant flow noise might be generated in units other than the one in operation.
	8	During the outdoor unit is in operation, fully closes the electronic expansion valve on the indoor unit which is in FAN, COOL, STOP, or thermo-OFF.*3	Enable	Normal	Before turning the power ON.		To reduce the room temperature increase by setting the LEV opening lower for the units in thermo-OFF operation.	The refrigerant is more likely to collect in the units with thermo-OFF operation, and causing the units refrigerant shortage. (Results in less capacity and increase of discharge temperature.)
SW6 function switch	1	—	—	—	—	<Initial settings> ON OFF 1 2 3 4 5 6 7 8	—	—
	2	—	—	—	—		—	—
	3	—	—	—	—		—	—
	4	Change of defrosting control	Enable (For high humidity)	Normal	Can be set when OFF or during operation		To shorten the defrosting prohibition time in high humidity (or heavy snow) region, in order to reduce malfunctions caused by frost .	The performance of the HEAT operation is somewhat reduced since the defrosting operation is frequently performed.
	5	External static pressure mode	Enable	Normal			To raise the fan rotation to raise the performance when an external static pressure is applied.	It can support the external static pressure up to 30 Pa. The power input and the sound level become larger due to increasing the outdoor unit's fan rotation.
	6	Switching the target discharge pressure (Pdm)	Enable	Normal			To raise the performance by setting the PDm higher during HEAT operation.	Power consumption is raised due to a higher frequency. (The performance would not be raise at the maximum operating frequency.) SW6-6: OFF / ON Target Pdm (kg/cm²): 29.5 / 31.5
	7	Switching (1) the target evaporation temperature (ETm)	Enable	Normal			To raise/reduce the performance by changing the target ETm during COOL operation. Switch to raise the performance: raises the performance Switch to reduce the performance: prevents dew condensation	Switching it to raise the performance, it raises the power consumption, and produces more dew condensation. Switching it to reduce the performance, it makes the performance insufficient. SW6-7: OFF / OFF / ON / ON SW6-8: OFF / ON / OFF / ON Target ETm (℃): 9 / 11 / 6 / 5 Note: The target ETm varies according to an intake temperature.
	8	Switching (2) the target evaporation temperature (ETm)	Enable	Normal				

*1 Refer to "8-4. OUTDOOR UNIT INPUT/OUTPUT CONNECTOR".

*2 SW5-7 Opens the indoor-electronic expansion valve as a countermeasure against the indoor unit in FAN, COOL, STOP, or thermo-OFF operation with refrigerant-shortage status due to an accumulation of liquid refrigerant in the indoor unit.

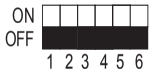
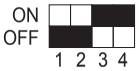
*3 SW5-8 Countermeasure against room temperature rise for indoor unit in FAN, COOL, and thermo-OFF (heating) mode.

*4 During heating operation and the ambient temperature is 4℃(39°F) or below, the freeze prevention heater is energized.

*5 During heating mode is OFF (include thermo-OFF in cooling mode), and the ambient temperature is 4℃(39°F) or below, the freeze prevention heater is energized.

Continue to the next page

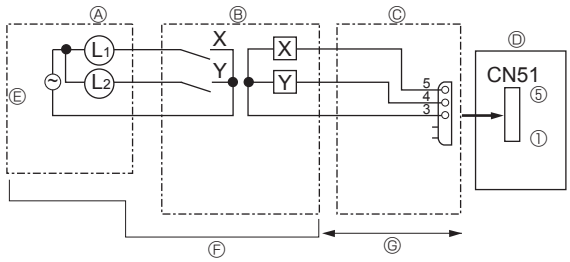
The black square (■) indicates a switch position.

Switch	Step	Function	Operation in Each Switch Setting			Remarks	Purpose	Additional Information
			ON	OFF	When to Set			
SW7 function switch	1	Ignore current sensor abnormality and rotational frequency abnormality of outdoor fan motor	Enable	Normal	After turning the power ON*6	<Initial settings> 	To perform a test run for electrical parts alone without running the compressor. Also, to perform the troubleshooting of electrical parts without operating the outdoor unit's fan.	Make sure to connect the connectors to the compressor after checking the electrical parts. Be careful not to get electrical shock while working on electrical parts.
	2	Setting to energize the freeze stat heater (optional part)	During heating operation only*4	Include when the heating operation is OFF.*5	Can be set when OFF or during operation		It reduces snow on the base, even it blows inside the unit, by setting the base heater ON while the HEAT operation is stopped.	Power consumption raises while the operation is stopped.
	3	—	—	—	—		—	—
	4	Maximum frequency down at 1 hour after COOL operation	Enable	Normal	Can be set when OFF or during operation		To reduce dew condensation on the indoor unit by lowering the frequency.	The performance might be insufficient.
	5	—	—	—			—	—
	6	Manual defrost	Manual defrost	Normal	During compressor running in HEAT mode.		Turn ON when it is necessary to perform the defrosting operation forcedly. (Effective only at startup, or 10 minutes after the last defrosting operation)	It performs the defrosting operation forcedly. (HEAT operation is stopped temporarily.)
SW9 Function Switch	1	Auto change over from remote controller (IC with the minimum address)	Enable	Disable	Before turning the power ON	<Initial settings> 	Enables the indoor unit with the minimum address to select AUTO mode, and switches the operation mode of the other indoor units to the same mode.	Cannot be set when the centralized control is ON.
	2	Switching the Silent/Demand mode	Demand control	Silent mode	Can be set when OFF or during operation		—	About the Silent mode/Demand control setting, refer to "8-4. OUTDOOR UNIT INPUT/OUTPUT CONNECTOR".
	3	—	—	—	—		—	—
	4	—	—	—	—		—	—

*4 During heating operation and the ambient temperature is 4℃ (39°F) or below, the freeze prevention heater is energized.
*5 During heating mode is OFF (include thermo-OFF in cooling mode), and the ambient temperature is 4℃ (39°F) or below, the freeze prevention heater is energized.
*6 Make sure to wait for 5 minutes after turning the breaker ON.

8-4. OUTDOOR UNIT INPUT/OUTPUT CONNECTOR

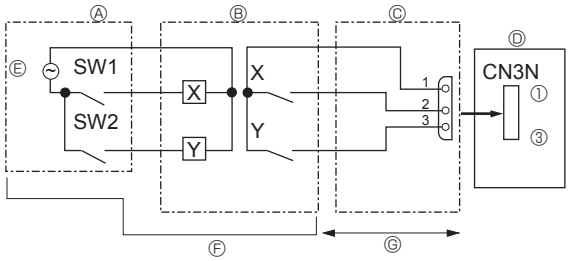
● State (CN51)



Ⓐ Distant control board
Ⓑ Relay circuit
Ⓒ External output adapter (PAC-SA88HA-E)
Ⓓ Outdoor unit control board
Ⓔ Lamp power supply
Ⓕ Procure locally
Ⓖ Max. 10m

L_1: Error display lamp
L_2: Compressor operation lamp
X, Y: Relay (Coil standard of 0.9W or less for 12 V DC)
X, Y: Relay (1 mA DC)

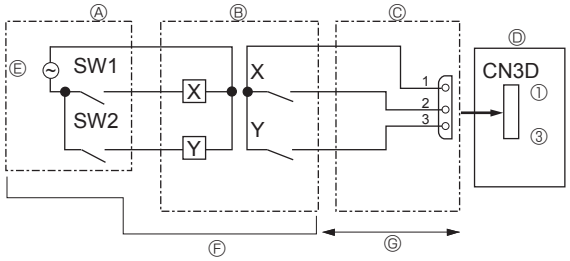
● Auto change over (CN3N)



Ⓐ Remote control panel
Ⓑ Relay circuit
Ⓒ External input adapter (PAC-SC36NA-E)
Ⓓ Outdoor unit control board
Ⓔ Relay power supply
Ⓕ Procure locally
Ⓖ Max. 10 m

	ON	OFF
SW1	Heating	Cooling
SW2	Validity of SW1	Invalidity of SW1

● Silent Mode/Demand Control (CN3D)



Ⓐ Remote control panel
Ⓑ Relay circuit
Ⓒ External input adapter (PAC-SC36NA-E)
Ⓓ Outdoor unit control board
Ⓔ Relay power supply
Ⓕ Procure locally
Ⓖ Max. 10 m

The silent mode and the demand control are selected by switching the DIP switch 9-2 on outdoor controller board.
It is possible to set it to the following power consumption (compared with ratings) by setting SW1, 2.

	Outdoor controller board DIP SW9-2	SW1	SW2	Function
Silent mode (Cooling only)	OFF	OFF	OFF	Normal
		ON	OFF	Silent mode
		OFF	ON	Super silent mode 1
		ON	ON	Super silent mode 2
Demand control	ON	OFF	OFF	100% (Normal)
		ON	OFF	75%
		ON	ON	50%
		OFF	ON	0% (Stop)

8-5. HOW TO CHECK THE PARTS

PUMY-SP112VKM(R1).TH PUMY-SP125VKM(R1).TH PUMY-SP140VKM(R1).TH
PUMY-SP112YKM(R1).TH PUMY-SP125YKM(R1).TH PUMY-SP140YKM(R1).TH
PUMY-SP112VKM(R1).TH-BS PUMY-SP125VKM(R1).TH-BS PUMY-SP140VKM(R1).TH-BS
PUMY-SP112YKM(R1).TH-BS PUMY-SP125YKM(R1).TH-BS PUMY-SP140YKM(R1).TH-BS

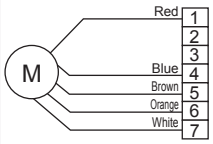
Parts name: Thermistor (TH2) <HIC pipe> / Thermistor (TH3) <Outdoor liquid pipe> / Thermistor (TH4) <Compressor> / Thermistor (TH6) <Suction pipe> / Thermistor (TH7) <Ambient> / Thermistor (TH8) <Heat sink>

Check points

Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature 10 to 30°C)

	Normal	Abnormal
TH4	160 to 410 kΩ	Open or short
TH2 TH3 TH6 TH7	4.3 to 9.6 kΩ	
TH8*	39 to 105 kΩ	

Fan motor (MF1)



Measure the resistance between the connector pins with a tester.
(At the ambient temperature 20°C)

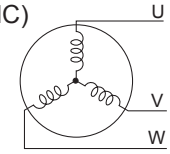
Normal				Abnormal
Red - Blue	Brown - Blue	Orange - Blue	White - Blue	Open or short (Short, for White - Blue)
1.1 ± 0.05 MΩ	40 ± 4 kΩ	220 ± 22 kΩ	Open	

Solenoid valve coil <4-way valve> (21S4)

Measure the resistance between the terminals with a tester.
(At the ambient temperature 20°C)

Normal	Abnormal
1725 ± 172.5 Ω	Open or short

Motor for compressor (MC)



Measure the resistance between the terminals with a tester.
(Winding temperature 20°C)

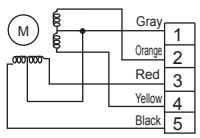
Normal		Abnormal
PUMY-SP•VKM	PUMY-SP•YKM	
0.015 Ω	0.466 Ω	Open or short

Solenoid valve coil <Bypass valve> (SV1)

Measure the resistance between the terminals with a tester.
(At the ambient temperature 20°C)

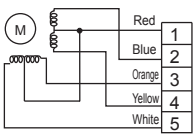
Normal	Abnormal
1182.5 ± 83 Ω	Open or short

Linear expansion Valve (LEV-A)



Normal				Abnormal
Gray - Black	Gray - Red	Gray - Yellow	Gray - Orange	Open or short
46 ± 3 Ω				

Linear expansion Valve (LEV-B)

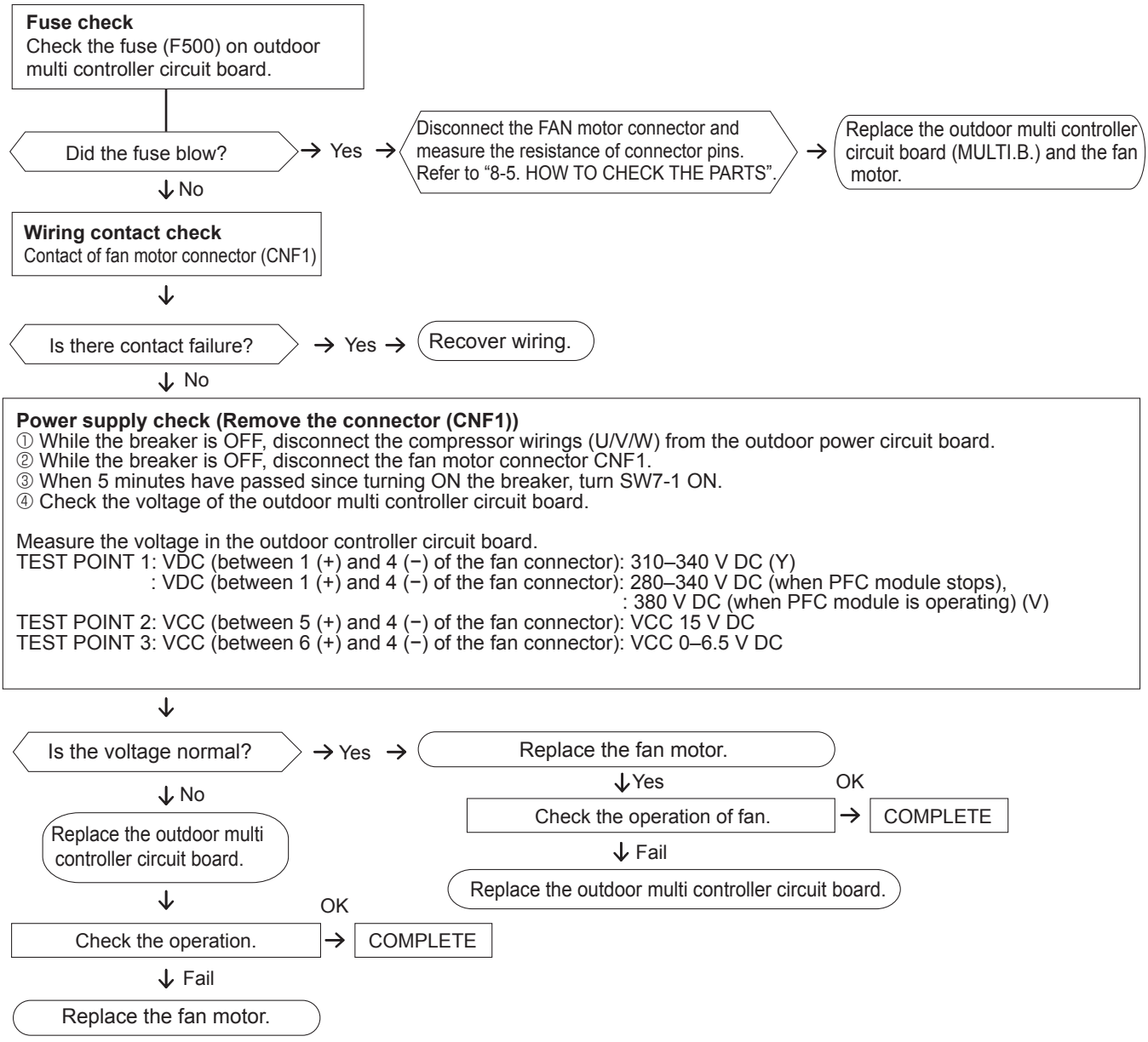


Normal				Abnormal
Red - White	Red - Orange	Red - Yellow	Red - Blue	Open or short
46 ± 4 Ω				

Check method of DC fan motor (fan motor/outdoor multi controller circuit board)

① Notes
- · High voltage is applied to the connecter (CNF1) for the fan motor. Pay attention to the service.
- · Do not pull out the connector (CNF1) for the motor with the power supply on.
  (It causes trouble of the outdoor multi controller circuit board and fan motor.)

② Self check
Symptom : The outdoor fan cannot rotate.



Note:
- Turn SW7-1 OFF after the troubleshooting completes.
- The fan sometimes starts on-off cycle operation during low-load operation or cooling at low outside temperature. It is not abnormal; the operation ensures reliability of the product.

8-6. HOW TO CHECK THE COMPONENTS

<Thermistor feature chart>

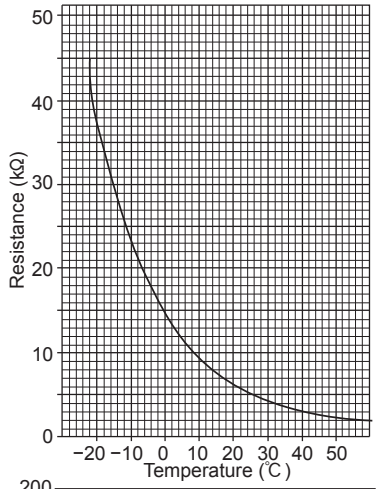
Low temperature thermistors

- Thermistor <HIC pipe> (TH2)
- Thermistor <Outdoor liquid pipe> (TH3)
- Thermistor <Suction pipe> (TH6)
- Thermistor <Ambient> (TH7)

Thermistor R0 = 15 kΩ ± 3 %
B constant = 3480 ± 2 %

$$R_t = 15\exp\{3480(\frac{1}{273+t} - \frac{1}{273})\}$$

0℃	15 kΩ	30℃	4.3 kΩ
10℃	9.6 kΩ	40℃	3.0 kΩ
20℃	6.3 kΩ		
25℃	5.2 kΩ		



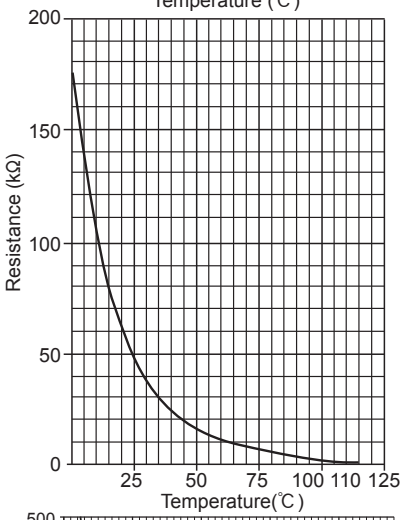
Medium temperature thermistor

- Thermistor <Heat sink> (TH8)

Thermistor R50 = 17 kΩ ± 2 %
B constant = 4170 ± 3 %

$$R_t = 17\exp\{4170(\frac{1}{273+t} - \frac{1}{323})\}$$

0℃	180 kΩ
25℃	50 kΩ
50℃	17 kΩ
70℃	8 kΩ
90℃	4 kΩ



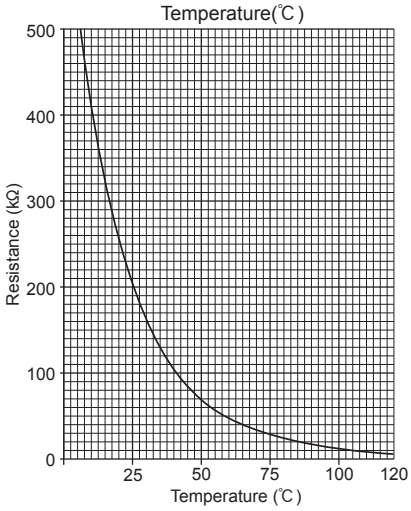
High temperature thermistor

- Thermistor <Compressor> (TH4)

Thermistor R120 = 7.465 kΩ ± 2 %
B constant = 4057 ± 2 %

$$R_t = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$$

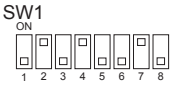
20℃	250 kΩ	70℃	34 kΩ
30℃	160 kΩ	80℃	24 kΩ
40℃	104 kΩ	90℃	17.5 kΩ
50℃	70 kΩ	100℃	13.0 kΩ
60℃	48 kΩ	110℃	9.8 kΩ

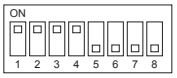


<HIGH PRESSURE SENSOR>

• Comparing the High Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW1) as shown in the figure below, the pressure as measured by the high pressure sensor appears on the LED1 on the control board.





The figure at left shows that the switches 1 through 4 are set to ON and 5 through 8 are set to OFF.

(1) While the outdoor unit is stopped, compare the gauge pressure and the pressure displayed on self-diagnosis LED1, 2.

1) When the gauge pressure is between 0 and 0.098 MPaG [14 PSIG], internal pressure is caused due to gas leak.
2) When the pressure displayed on self-diagnosis LED1, 2 is between 0.098 MPaG [14 PSIG], the connector may be defective or be disconnected. Check the connector and go to (4).
3) When the pressure displayed on self-diagnosis LED1, 2 exceeds 5.0 MPaG [725 PSIG], go to (3).
4) If other than 1), 2) or 3), compare the pressures while the sensor is running. Go to (2).

(2) Compare the gauge pressure and the pressure displayed on self-diagnosis LED1,2 after 15 minutes have passed since the start of operation. (Compare them by MPaG [PSIG] unit.)

1) When the difference between both pressures is within 0.25 MPaG [36 PSIG], both the high pressure sensor and the control board are normal.
2) When the difference between both pressures exceeds 0.25 MPaG [36 PSIG], the high pressure sensor has a problem. (performance deterioration)
3) When the pressure displayed on self-diagnosis LED1, 2 does not change, the high pressure sensor has a problem.

(3) Remove the high pressure sensor from the control board to check the pressure on the self-diagnosis LED1, 2.

1) When the pressure displayed on self-diagnosis LED1, 2 is between 0 and 0.098 MPaG [14 PSIG], the high pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LED1, 2 is approximately 5.0 MPaG [725 PSIG], the control board has a problem.

(4) Remove the high pressure sensor from the control board, and short-circuit between the pin 2 and pin 3 connectors (63HS) to check the pressure with self-diagnosis LED1, 2.

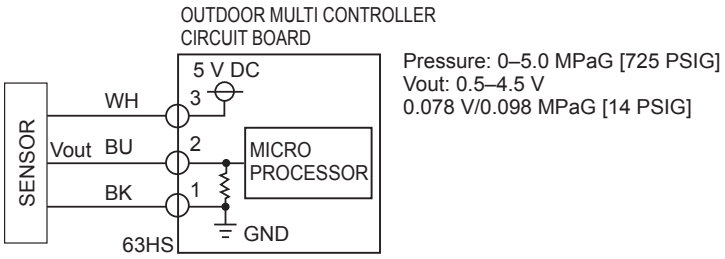
1) When the pressure displayed on the self-diagnosis LED1, 2 exceeds 5.0 MPaG [725 PSIG], the high pressure sensor has a problem.
2) If other than 1), the control board has a problem.

• High Pressure Sensor Configuration (63HS)

The high pressure sensor consists of the circuit shown in the figure below. If 5 V DC is applied between the white and the black wires, voltage corresponding to the pressure between the blue and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output voltage is 0.078 V per 0.098 MPaG [14 PSIG].

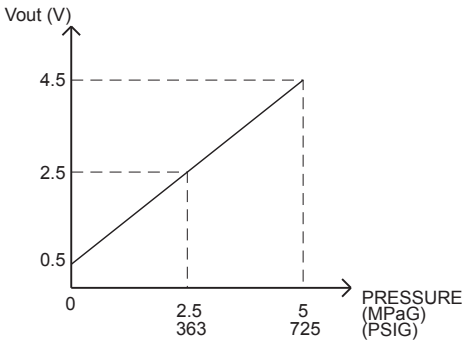
Note:
The pressure sensor on the body side is designed to connect to the connector. The connector pin number on the body side is different from that on the control board side.

	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1



③–①: 5 V (DC)
②–①: Output Vout (DC)

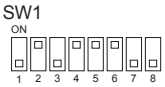
Pressure: 0–5.0 MPaG [725 PSIG]
Vout: 0.5–4.5 V
0.078 V/0.098 MPaG [14 PSIG]



<LOW PRESSURE SENSOR>

• Comparing the Low Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW1) as shown in the figure below, the pressure as measured by the low pressure sensor appears on the LED1 on the control board.



The figure at left shows that the switches 1 through 4 are set to ON and 5 through 8 are set to OFF.

(1) While the outdoor unit is stopped, compare the gauge pressure and the pressure displayed on self-diagnosis LED1, 2.

1) When the gauge pressure is between 0 and 0.098 MPaG [14 PSIG], internal pressure is caused due to gas leak.
2) When the pressure displayed on self-diagnosis LED1, 2 is between 0 and 0.098 MPaG [14 PSIG], the connector may be defective or be disconnected. Check the connector and go to (4).
3) When the outdoor temperature is 30°C [86°F] or less, and the pressure displayed on self-diagnosis LED1, 2 exceeds 1.7 MPaG [247 PSIG], go to (3).
   When the outdoor temperature exceeds 30°C [86°F], and the pressure displayed on self-diagnosis LED1, 2 exceeds 1.7 MPaG [247 PSIG], go to (5).
4) If other than 1), 2) or 3), compare the pressures while the sensor is running. Go to (2).

(2) Compare the gauge pressure and the pressure displayed on self-diagnosis LED1, 2 after 15 minutes have passed since the start of operation. (Compare them by MPaG [PSIG] unit.)

1) When the difference between both pressures is within 0.2 MPaG [29 PSIG], both the low pressure sensor and the control board are normal.
2) When the difference between both pressures exceeds 0.2 MPaG [29 PSIG], the low pressure sensor has a problem. (performance deterioration)
3) When the pressure displayed on the self-diagnosis LED1, 2 does not change, the low pressure sensor has a problem.

(3) Remove the low pressure sensor from the control board to check the pressure with the self-diagnosis LED1, 2 display.

1) When the pressure displayed on the self-diagnosis LED1,2 is between 0 and 0.098 MPaG [14 PSIG], the low pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LED1, 2 is approximately 1.7 MPaG [247 PSIG], the control board has a problem.

(4) Remove the low pressure sensor from the control board, and short-circuit between the pin 2 and pin 3 connectors (63LS) to check the pressure with the self-diagnosis LED1, 2.

1) When the pressure displayed on the self-diagnosis LED1, 2 exceeds 1.7 MPaG [247 PSIG], the low pressure sensor has a problem.
2) If other than 1), the control board has a problem.

(5) Remove the high pressure sensor (63HS) from the control board, and insert it into the connector for the low pressure sensor (63LS) to check the pressure with the self-diagnosis LED1, 2.

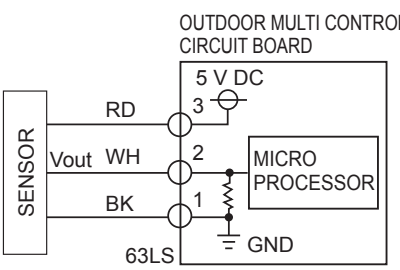
1) When the pressure displayed on the self-diagnosis LED1, 2 exceeds 1.7 MPaG [247 PSIG], the control board has a problem.
2) If other than 1), go to (2).

• Low Pressure Sensor Configuration (63LS)

The low pressure sensor consists of the circuit shown in the figure below. If 5 V DC is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output voltage is 0.173 V per 0.098 MPaG [14 PSIG].

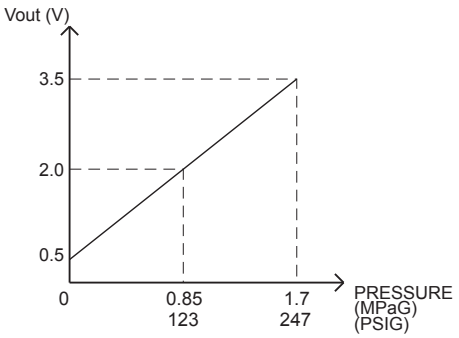
Note:
The pressure sensor on the body side is designed to connect to the connector. The connector pin number on the body side is different from that on the control board side.

	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1



③–① : 5 V (DC)
②–① : Output Vout (DC)

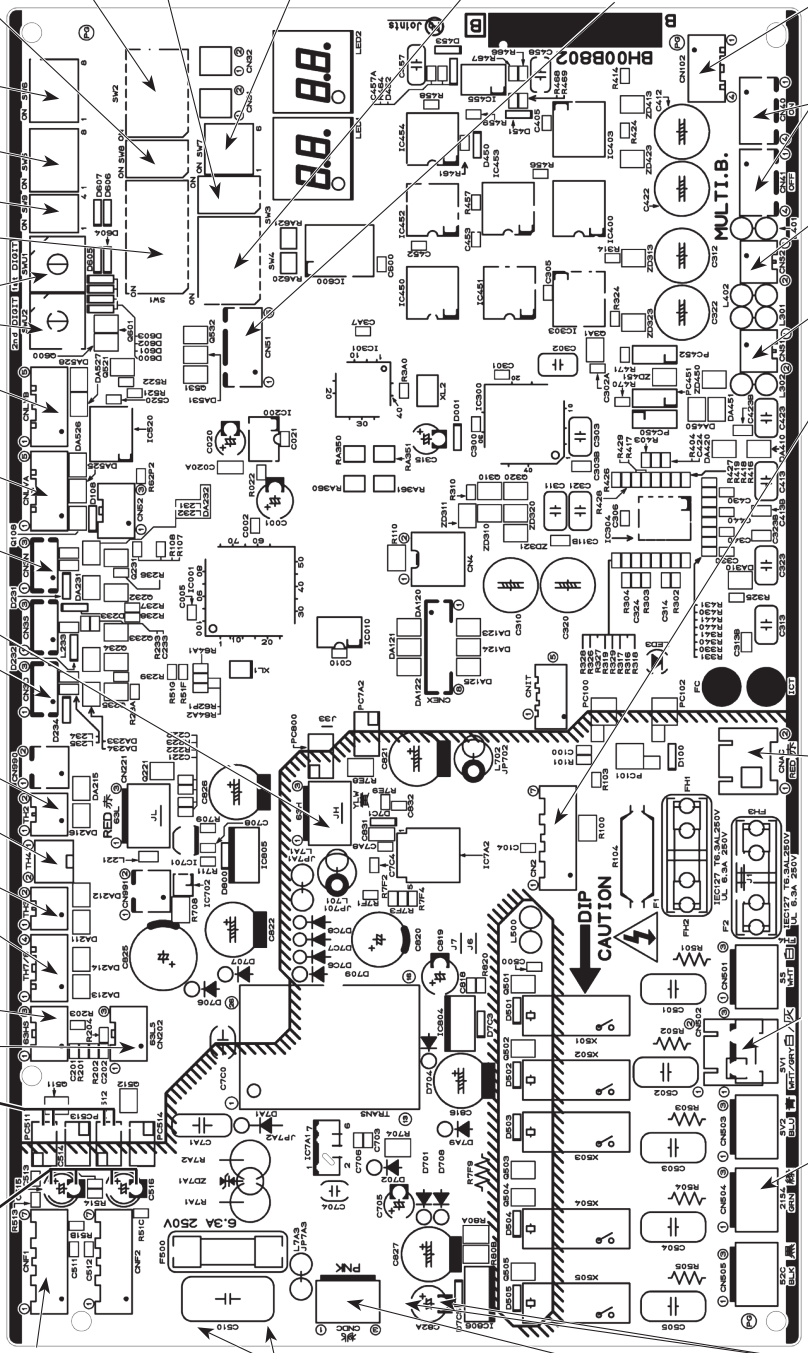
Pressure: 0–1.7 MPaG [247 PSIG]
Vout: 0.5–3.5 V
0.173 V/0.098 MPaG [14 PSIG]



8-7. TEST POINT DIAGRAM
Outdoor multi controller circuit board

PUMY-SP112VKM(R1).TH **PUMY-SP125VKM(R1).TH** **PUMY-SP140VKM(R1).TH**
PUMY-SP112YKM(R1).TH **PUMY-SP125YKM(R1).TH** **PUMY-SP140YKM(R1).TH**
PUMY-SP112VKM(R1).TH-BS **PUMY-SP125VKM(R1).TH-BS** **PUMY-SP140VKM(R1).TH-BS**
PUMY-SP112YKM(R1).TH-BS **PUMY-SP125YKM(R1).TH-BS** **PUMY-SP140YKM(R1).TH-BS**

<CAUTION> TEST POINT ① is high voltage.



SW8
Model selection

SW2
Pump down

SW3
Test run

SW7
Manual defrost

SW4
Model selection

CN51
External signal output

SW6
Function selection

SW5
Function selection

SW9
Function selection

SW1
Display selection
(Self diagnosis)

SWU2, SWU1
Address setting

CNLVB
Linear expansion valve

CNLVA
Linear expansion valve

CN3N
Auto change over

63H
High pressure switch

CN3D
Input of silent mode or demand control

TH2 Thermistor
<HIC pipe>

TH4 Thermistor
<Compressor>

TH3 Thermistor
<Outdoor liquid pipe>

TH7/TH6 Thermistor
<Ambient/Suction pipe>

63HS
High pressure sensor

63LS
Low pressure sensor

V_{FG} (TEST POINT④)
(Voltage between pin3 and pin4 of PC511 or PC512) :
(Correspond to CNF1 ⑦(+)–④(−))

V_{SP}
(Voltage between pins of C515 and C516) :
0 V DC (when stopped)
1–6.5 V DC (when operated)
(Same as CNF1 ⑥(+)–④(−))

CNF1
Connect to fan motor
①–④ : 310–340 V DC (Y)
: 310–380 V DC (V)
⑤–④ : 15 V DC
⑥–④ : 0–6.5 V DC
⑦–④ : 15 V DC (when stopped)
0–15 V DC pulse
(when operated)

V_{DC} (TEST POINT①)
(Voltage between pins of C510)
: 310–340 V DC (Y)
: 310–380 V DC (V)
(Same as CNF1 ①(+)–④(−))

CNDC
310–340 V DC (Y)
310–380 V DC (V)
(①(+)–③(−))

V_{CC} (TEST POINT②)
(Voltage between pins of C82A) : 15 V DC
(Same as CNF1 ⑤(+)–④(−))

CN102
Connect to the M-NET power circuit board

CN40,CN41
Centralized control power supply/For storing jumper connector selection

CNS2
Transmission wire of centralized control

CNS1
Indoor/outdoor unit connecting wire

CN2
Connect to the outdoor power circuit board
①–⑤:
Power circuit board →
Transmitting signal to the outdoor multi controller circuit board
(0–5 V DC)
②–⑤: Zero cross signal
(0–5 V DC)
③–④: Not used
⑥–⑤: 16 V DC
⑦–⑤: 16 V DC

CNAC
Power supply for outdoor multi controller circuit board
230 V AC

SV1
Bypass valve

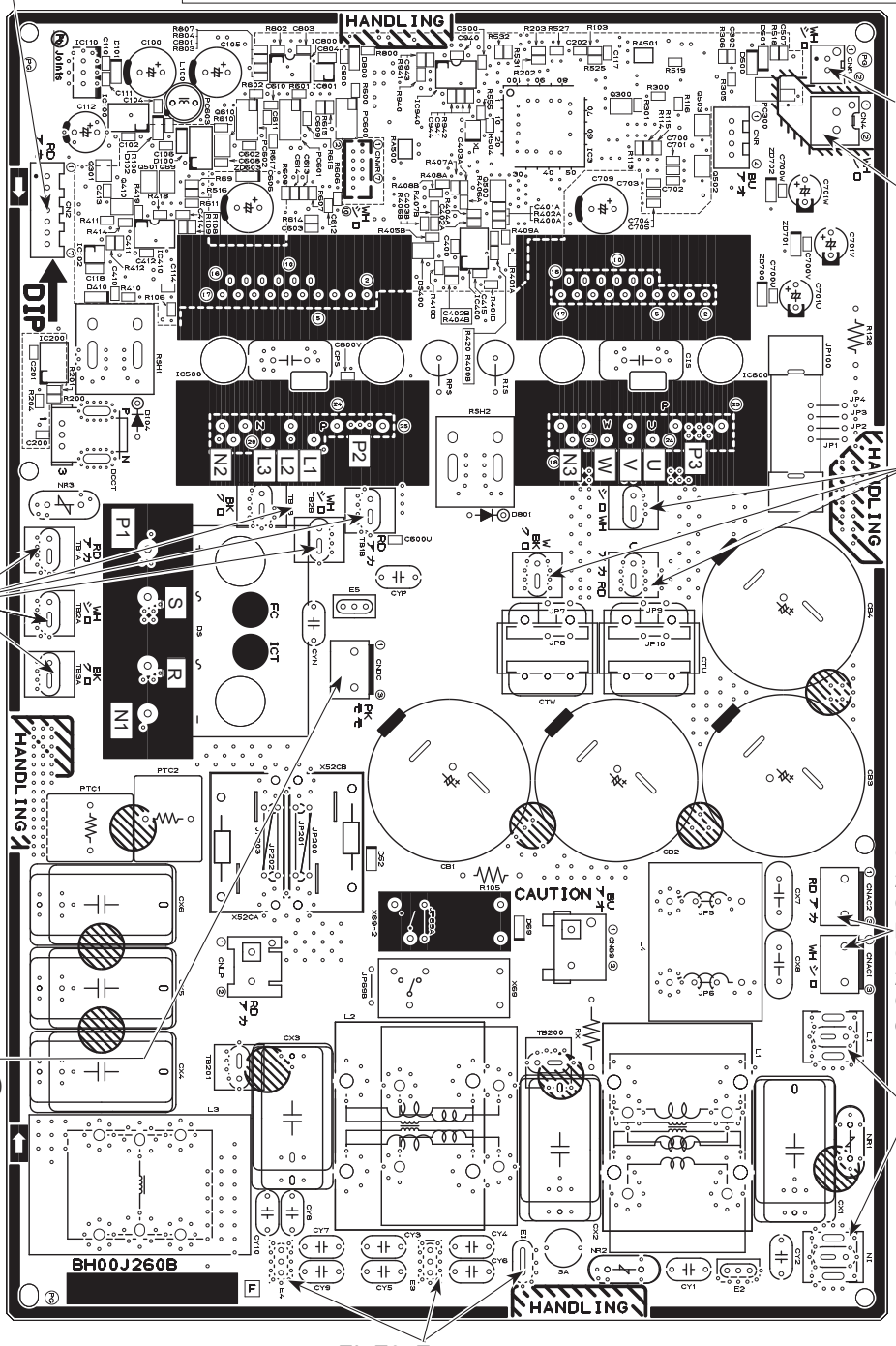
21S4
4-way valve

Outdoor power circuit board

PUMY-SP112VKM(R1).TH PUMY-SP125VKM(R1).TH PUMY-SP140VKM(R1).TH
PUMY-SP112VKM(R1).TH-BS PUMY-SP125VKM(R1).TH-BS PUMY-SP140VKM(R1).TH-BS

Brief Check of POWER MODULE
Usually, they are in a state of being short-circuited if they are broken.
Measure the resistance in the following points (connectors, etc.).
If they are short-circuited, it means that they are broken.
1. Check of POWER MODULE
 ① Check of DIODE circuit
 R-P1 S-P1 R-N1 S-N1
 ② Check of IGBT circuit
 P2-L1, P2-L2, P2-L3, N2-L1, N2-L2, N2-L3
 ③ Check of INVERTER circuit
 P3- U , P3 - V , P3 -W , N3- U , N3- V , N3-W
Note: The marks R , S, L1 , L2 , L3 , P1 , P2 , P3 , N1 , N2 , N3 , U , V and W shown in the diagram are not actually printed on the board.

CN2
Connect to the outdoor controller circuit board (CN2)
①–⑤: Transmitting signal to outdoor controller circuit board (0–5 V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: 16 V DC
⑥–⑤: 16 V DC
⑦–⑤: 16 V DC



CN6
Thermistor

CN4
Connect to the outdoor controller circuit board (CN4)

U/V/W
Connect to the compressor (MC)
Voltage amang phases: 10-180V AC

TB1A, TB2A, TB3A,
TB1B, TB2B, TB3B
Connect to DCL

CNAC1
230 V AC
Connect to the M-NET power circuit board (CN1)
CNAC2
230 V AC
Connect to the outdoor multi controller circuit board (CNAC)

CNDC
280–380 V DC (①+, ③–)
Connect to the outdoor controller circuit board (CNDC)

NI, LI
Voltage of 230 V AC is input (Connect to the terminal block (TB1))

EI, E3, E4
Connect to the electrical parts box

Outdoor power circuit board

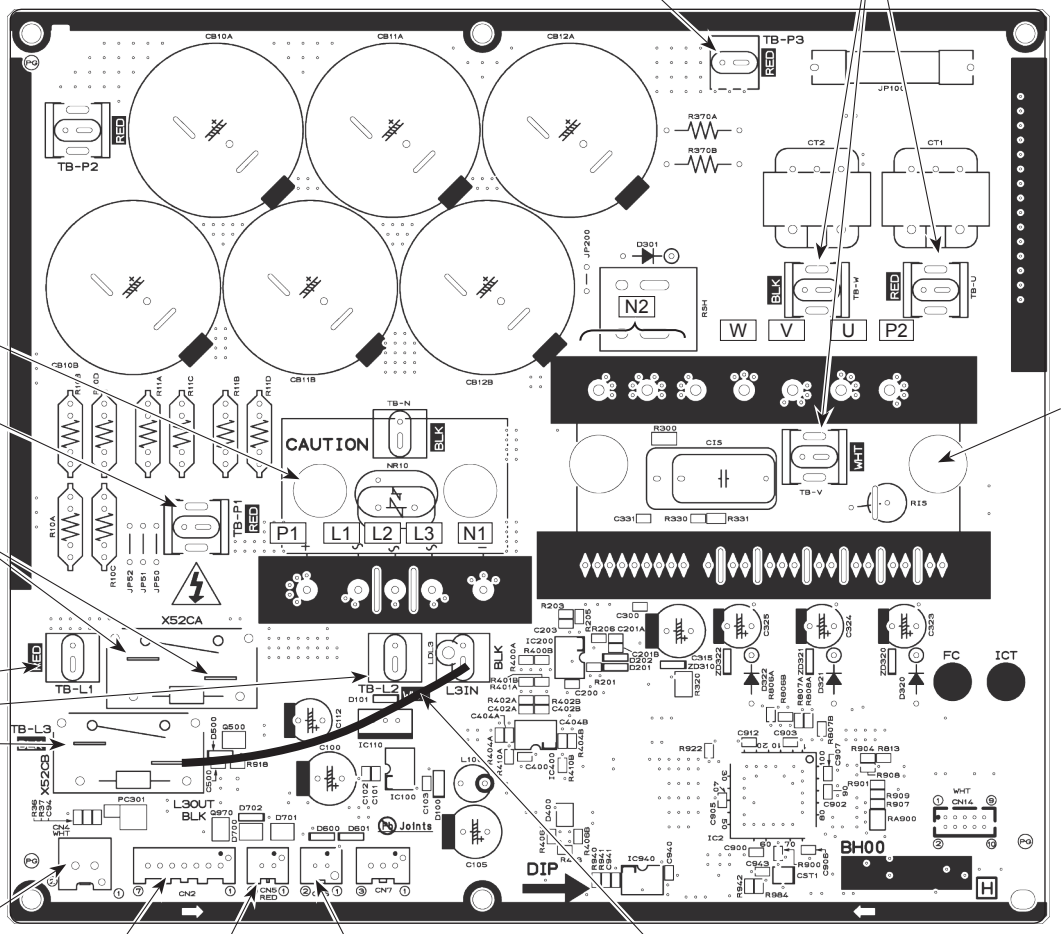
PUMY-SP112YKM(R1).TH
PUMY-SP125YKM(R1).TH
PUMY-SP140YKM(R1).TH
PUMY-SP112YKM(R1).TH-BS
PUMY-SP125YKM(R1).TH-BS
PUMY-SP140YKM(R1).TH-BS

Brief Check of POWER MODULE
Usually, they are in a state of being short-circuited if they are broken.
Measure the resistance in the following points (connectors, etc.).
If they are short-circuited, it means that they are broken.
1. Check of DIODE MODULE
L1-P1, L2-P1, L3-P1, L1-N1, L2-N1, L3-N1
2. Check of DIP-IPM
P2-U, P2-V, P2-W, N2-U, N2-V, N2-W

Note: The marks L1, L2, L3, N1, N2, P1, P2, U, V and W shown in the diagram are not actually printed on the board.

TB-U, TB-V, TB-W
Connect to the compressor (MC)
Voltage among phases:
10–400 V AC

TB-P3
Connect to the DCL



Diode module

TB-P1
Connect to the DCL

TAB connector on X52CA
Connect to the RS resistor

TB-L1, TB-L2, TB-L3
Connect to the outdoor noise filter circuit board (L01, L02, L03) 400 V AC

DIP-IPM

CN4
Connect to the outdoor multi controller circuit board (CN4)

CN5
Detection of primary current (Connect to the outdoor noise filter circuit board (CNCT))

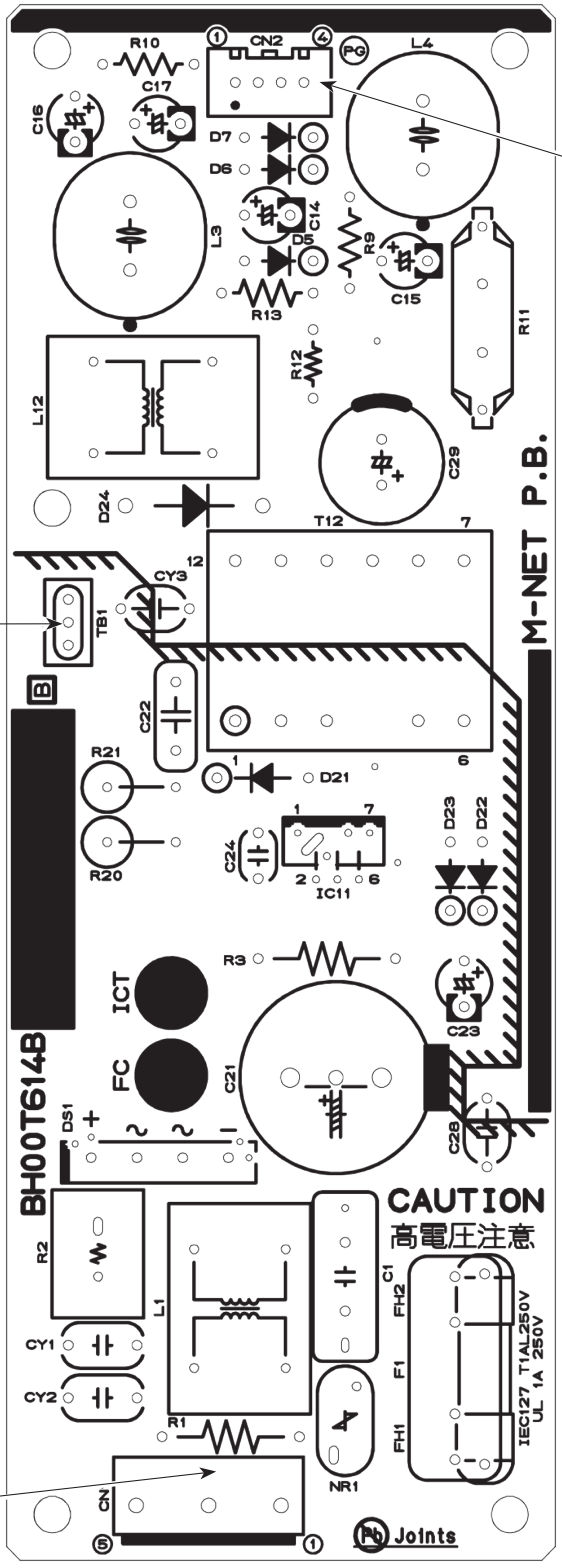
L3OUT-L3IN
Lead connect

CN2
Connect to the outdoor multi controller circuit board (CN2)
①–⑤: Power circuit board → Transmitting signal to the outdoor multi controller circuit board (0–5 V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: Not used
⑥–⑤: 16 V DC
⑦–⑤: 16 V DC
[⑤ : ⊖ ①, ②, ⑥, ⑦ : ⊕]

CN6
Thermistor
<Heat sink> (TH8)

M-NET power circuit board

PUMY-SP112VKM(R1).TH **PUMY-SP125VKM(R1).TH** **PUMY-SP140VKM(R1).TH**
PUMY-SP112YKM(R1).TH **PUMY-SP125YKM(R1).TH** **PUMY-SP140YKM(R1).TH**
PUMY-SP112VKM(R1).TH-BS **PUMY-SP125VKM(R1).TH-BS** **PUMY-SP140VKM(R1).TH-BS**
PUMY-SP112YKM(R1).TH-BS **PUMY-SP125YKM(R1).TH-BS** **PUMY-SP140YKM(R1).TH-BS**



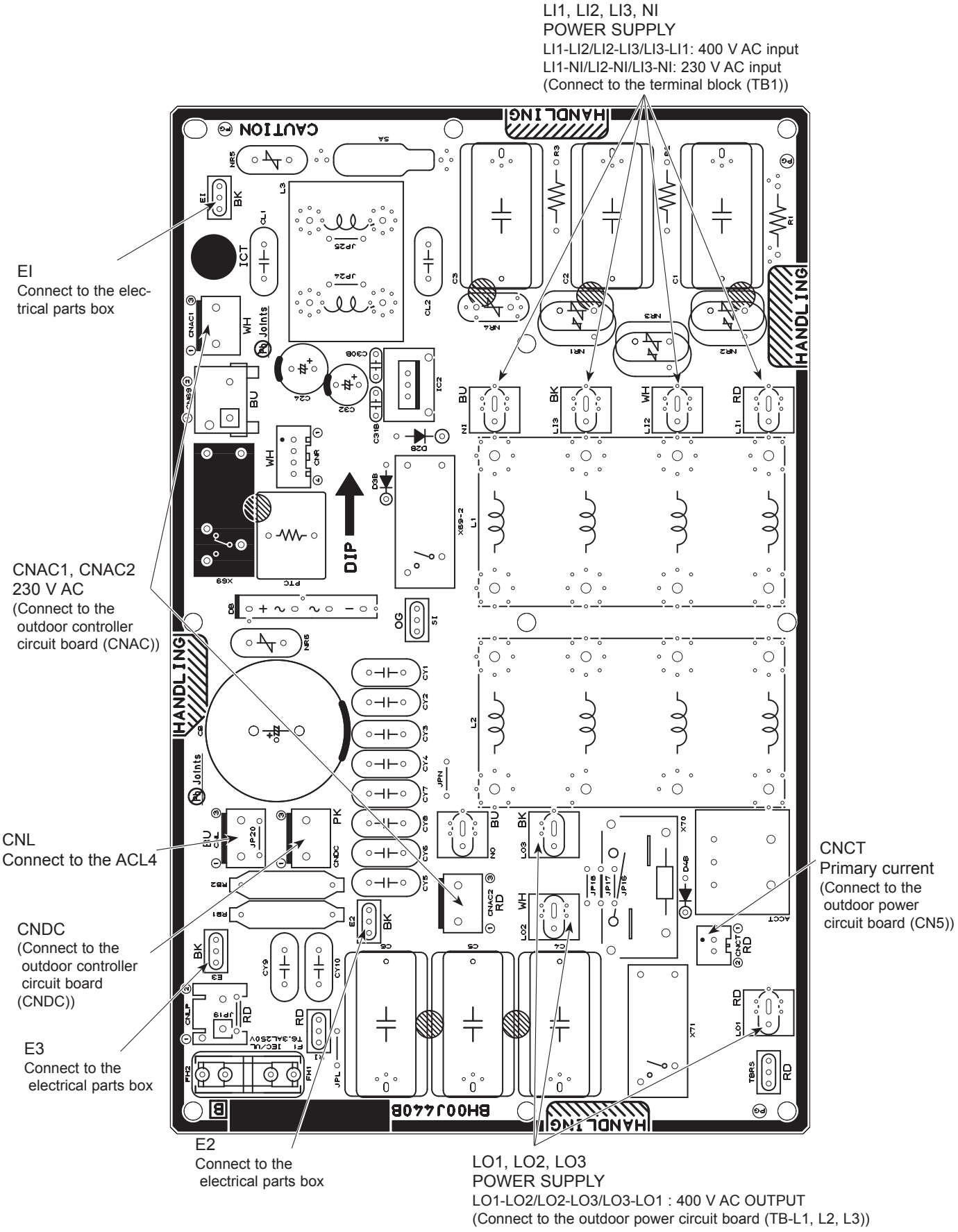
CN2
Connect to the outdoor multi controller circuit board (CN102)
①–②: 24–30 V DC
③–④: 24–30 V DC

TB1
Connect to the electrical parts box

CN1
- Connect to the outdoor noise filter circuit board (CNAC1) (Y)
- Connect to the outdoor power circuit board (CNAC1) (V)
  ①–③ : 230V AC

Outdoor noise filter circuit board

PUMY-SP112YKM(R1).TH **PUMY-SP125YKM(R1).TH** **PUMY-SP140YKM(R1).TH**
PUMY-SP112YKM(R1).TH-BS **PUMY-SP125YKM(R1).TH-BS** **PUMY-SP140YKM(R1).TH-BS**



No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
0	00000000	Relay output display	Compressor operation	52C	21S4	SV1	(SV2)			Always lighting	ON: light on OFF: light off
		Check display	0000–9999 (Alternating display of addresses and check code)								•When abnormality occurs, check display.
1	10000000	Indoor unit check status	No.1 unit check	No.2 unit check	No.3 unit check	No.4 unit check	No.5 unit check	No.6 unit check	No.7 unit check	No.8 unit check	Light on at time of abnormality
2	01000000	Protection input	High pressure abnormality	Superheat due to low discharge temperature	Compressor shell temperature abnormality	TH4 abnormality	TH3 abnormality	Outdoor fan rotation frequency abnormality	TH7 abnormality	TH8 abnormality	Display detected microprocessor protection or abnormality
3	11000000	Protection input	Heat sink overheating	Compressor over current interception	Voltage abnormality	Insufficient refrigerant amount abnormality	Current sensor/ primary current abnormality	63LS abnormality	63HS abnormality	start over current interception abnormality delay	
4	00100000	Protection input	Abnormality in the number of indoor units	Address double setting abnormality	Indoor unit capacity error	Over capacity	Indoor unit address error	Outdoor unit address error	Current sensor open/short	serial communication abnormality (outdoor unit)	
5	10100000	Abnormality delay display 1	High pressure abnormality delay	Superheat due to low discharge temperature delay	Compressor shell temperature abnormality delay	TH4 abnormality delay	TH3 abnormality delay	Outdoor fan rotation frequency abnormality delay	TH7 abnormality delay	TH8 abnormality delay	Display all abnormalities remaining in abnormality delay
6	01100000	Abnormality delay display 2	Heat sink overheating delay	Compressor over current interception delay	Voltage abnormality delay	Insufficient refrigerant amount abnormality delay	Current sensor/ primary current abnormality delay	63LS abnormality delay	63HS abnormality delay	start over current interception abnormality delay	
7	11100000	Abnormality delay display 3	63LS abnormality delay	TH2 abnormality delay	4-way valve abnormality delay	Delay caused by blocked valve in cooling mode	Power module abnormality delay	TH6 abnormality delay	Current sensor open/short delay		
8	00010000	Abnormality delay history 1	High pressure abnormality delay	Superheat due to low discharge temperature delay	Compressor shell temperature abnormality delay	TH4 abnormality delay	TH3 abnormality delay	Outdoor fan rotation frequency abnormality delay	TH7 abnormality delay	TH8 abnormality delay	Display all abnormalities remaining in abnormality delay
9	10010000	Abnormality delay history 2	Heat sink overheating delay	Compressor over current interception delay	Voltage abnormality delay	Insufficient refrigerant amount abnormality delay	Current sensor/ primary current abnormality delay	63LS abnormality delay	63HS abnormality delay	start over current interception abnormality delay	
10	01010000	Abnormality delay history 3	63LS abnormality delay	TH2 abnormality delay	4-way valve abnormality delay	Delay caused by blocked valve in cooling mode	Power module abnormality delay	TH6 abnormality delay	Current sensor open/short delay		
11	11010000	Abnormality code history 1 (the latest)	Alternating display of addresses 0000–9999 and abnormality code (including abnormality delay code)								• Display abnormalities up to present (including abnormality terminals) • History record in 1 is the latest; records become older in sequence; history record in 10 is the oldest.
12	00110000	Abnormality code history 2									
13	10110000	Abnormality code history 3									
14	01110000	Abnormality code history 4									
15	11110000	Abnormality code history 5									
16	00001000	Abnormality code history 6									
17	10001000	Abnormality code history 7									
18	01001000	Abnormality code history 8									
19	11001000	Abnormality code history 9									
20	00101000	Abnormality code history 10 (the oldest)									
21	10101000	Cumulative time	0–9999 (unit: 1 hour)								Display of cumulative compressor operating time
22	01101000	Cumulative time	0–9999 (unit: 10 hour)								
23	11101000	Outdoor unit operation display	Compressor energizing	Compressor operating prohibition	Compressor in operation	Abnormality detection					Light ON/Light OFF
24	00011000	Indoor unit operation mode	No.1 unit mode	No.2 unit mode	No.3 unit mode	No.4 unit mode	No.5 unit mode	No.6 unit mode	No.7 unit mode	No.8 unit mode	Cooling : light on, Heating: light blinking Stop fan: light off
25	10011000	Indoor unit operation display	No.1 unit operation	No.2 unit operation	No.3 unit operation	No.4 unit operation	No.5 unit operation	No.6 unit operation	No.7 unit operation	No.8 unit operation	Thermo ON : light on Thermo OFF : light off

Delay code	Abnormality delay	Delay code	Abnormality delay
1202	Discharge/Comp. temperature	1600	Discharge superheat (SHd)
	Thermistor <Compressor>(TH4)		Over charge refrigerant
1205	Thermistor <Outdoor liquid pipe> (TH3)	1601	Insufficient refrigerant
1211	Thermistor <Suction pipe> (TH6)		Closed cooling valve
1214	Thermistor <Heat sink> (TH8)	1608	4-way valve disconnection
1221	Thermistor <Ambient> (TH7)	4310	Current sensor open/short
1222	Thermistor <HIC> (TH2)	4320	Undervoltage, overvoltage, or power module
1400	Low pressure sensor	4330	Heat sink temperature
1402	High pressure (63H)	4350	Power module
	High pressure sensor (63HS)	4500	Outdoor fan motor

SW:setting
0....OFF
1....ON

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
26	01011000	Capacity code (No. 1 indoor unit)	0–255								•Display of indoor unit capacity code •The No. 1 unit will start from the M-NET address with the lowest number
27	11011000	Capacity code (No. 2 indoor unit)									
28	00111000	Capacity code (No. 3 indoor unit)									
29	10111000	Capacity code (No. 4 indoor unit)									
30	01111000	Capacity code (No. 5 indoor unit)									
31	11111000	IC1 operation mode	STOP	Fan	Cooling thermo-ON	Cooling thermo-OFF	Heating thermo-ON	Heating thermo-OFF			•Display of indoor unit operating mode
32	00000100	IC2 operation mode									
33	10000100	IC3 operation mode									
34	01000100	IC4 operation mode									
35	11000100	IC5 operation mode									
36	00100100	OC operation mode	Compressor ON/OFF	Heating/Cooling	Abnormal/normal	DEFROST/NO	Refrigerant pull back/no	Excitation current/no	3-minutes delay/ no		Light on/light off
37	10100100	External connection status	CN3N1–3 input	CN3N1–2 input	CN3S1–2 input	CN3D1-3 input	CN3D1-2 input				Input: light off No input: light on
38	01100100	Communication demand capacity	0–255 (%)								Display of communication demand capacity
39	11100100	Number of compressor ON/OFF	0000–9999 (unit: x10)								Display a count of compressor operation/stop
40	00010100	Compressor operating current	0–999.9 (Arms)								Display detected current
41	10010100	Input current of outdoor unit									
42	01010100	Thermo-ON operating time	0000–9999 (unit: x10)								Display cumulative time of thermo-ON operation
43	11010100	Total capacity of thermo-ON	0–255								Display total capacity code of indoor units in thermo-ON
44	00110100	Number of indoor units	0–255								Display number of connected indoor units
45	10110100	DC bus voltage	0–999.9 (V)								Display bus voltage
46	01110100	State of LEV control	Td over heat prevention	SHd decrease prevention	Minimum Sj correction depends on Td	Minimum Sj correction depends on Shd	LEV opening correction depends on Pd	LEV opening correction depends on Td	Correction of high compression ratio prevention		Display active LEV control
47	11110100	State of compressor frequency control 1	Condensing temperature limit control	Compressor temperature control		Discharge temp. (heating) backup control	Pd abnormality control (heating)	Pd Back up control(heating)		Freeze prevention control at the beginning of SHd	Display active compressor frequency control
48	00001100	State of compressor frequency control 2	Heat sink over heat prevention control	Secondary current control	Input current control		Frequency restrain of receipt voltage change	Low pressure decrease prevention	Hz-up inhibit control at the beginning of SHd		
49	10001100	Protection input	63LS abnormality	HIC abnormality		Frozen protection	4-way valve disconnection abnormality	Delay caused by blocked valve in cooling mode	TH6 abnormality	Power module abnormality	
50	01001100	The second current value when microprocessor of POWER BOARD abnormality is detected	0–999.9[Arms]								Display data at time of abnormality
51	11001100	Heatsink temperature when microprocessor of POWER BOARD abnormality is detected	−99.9–999.9 (℃)								

State of compressor frequency(Hz) control	Content
Discharge pressure control	Hz control by pressure limitation
Compressor temperature control	Hz control by discharge temperature limitation
SV control	Hz control by bypass valve
Abnormal rise of Pd control	Control that restrains abnormal rise of discharge pressure
Heat sink over heat prevention control	Heat sink over heat prevention control
Secondary current control	Secondary current control
Input current control	Input current control
Hz correction of receipt voltage decrease prevention	Max.Hz correction control due to voltage decrease
Hz restrain of receipt voltage change	Max.Hz correction control due to receipt voltage change

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
52	00101100	Outdoor LEV-A opening pulse	0–2000 (pulse)								Display of opening pulse of outdoor LEV
53	10101100	Outdoor LEV-A opening pulse abnormality delay									
54	01101100	Outdoor LEV-A opening pulse abnormality									
55	11101100	Outdoor LEV-B opening pulse									
56	00011100	Outdoor LEV-B opening pulse abnormality delay									
57	10011100	Outdoor LEV-B opening pulse abnormality									
58	01011100	63LS (Low pressure)	−99.9–999.9 (kgf/cm²)								Display of data from sensor and thermistor
59	11011100	63LS abnormality delay	−99.9–999.9 (kgf/cm²)								
60	00111100	63 LS abnormality									
61	10111100	TH2 (HIC pipe)	−99.9–999.9 (℃)								
62	01111100	TH2(HIC) abnormality delay	−99.9–999.9 (℃)								
63	11111100	TH2 (HIC) abnormality									
64	00000010	Operational frequency	0–255 (Hz)								Display of actual operating frequency
65	10000010	Target frequency	0–255 (Hz)								Display of target frequency
66	01000010	Outdoor fan control step number	0–15								Display of number of outdoor fan control steps (target)
69	10100010	IC1 LEV Opening pulse	0–2000 (pulse)								Display of opening pulse of indoor LEV
70	01100010	IC2 LEV Opening pulse									
71	11100010	IC3 LEV Opening pulse									
72	00010010	IC4 LEV Opening pulse									
73	10010010	IC5 LEV Opening pulse									
74	01010010	High pressure sensor (Pd)	−99.9–999.9 (kgf/cm²)								Display detected data of outdoor unit sensors and thermistors
75	11010010	TH4(Compressor)(Td) data	−99.9–999.9 (℃)								
76	00110010	TH6(Suction pipe) (ET) data									
77	10110010	TH7(Ambient) data									
78	01110010	TH3(Outdoor liquid pipe) data									
80	00001010	TH8(Heat sink) data									
81	10001010	IC1 TH23 (Gas)	−99.9–999.9 (℃) (When indoor unit is not connected, it is displayed as 0.)								Display detected data of indoor unit thermistor
82	01001010	IC2 TH23 (Gas)									
83	11001010	IC3 TH23 (Gas)									
84	00101010	IC4 TH23 (Gas)									
85	10101010	IC5 TH23 (Gas)									

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
86	01101010	IC1 TH22 (Liquid)	−99.9–999.9 (℃) (When the indoor unit is not connected, it is displayed as 0.)								Display detected data of indoor unit thermistors
87	11101010	IC2 TH22 (Liquid)									
88	00011010	IC3 TH22 (Liquid)									
89	10011010	IC4 TH22 (Liquid)									
90	01011010	IC5 TH22 (Liquid)									
91	11011010	IC1 TH21 (Intake)									
92	00111010	IC2 TH21 (Intake)									
93	10111010	IC3 TH21 (Intake)									
94	01111010	IC4 TH21 (Intake)									
95	11111010	IC5 TH21 (Intake)									
96	00000110	Outdoor SC (cooling)	−99.9–999.9 (℃)								Display of outdoor subcool (SC) data
97	10000110	Target subcool step	−2–4								Display of target subcool step data
98	01000110	IC1 SC/SH	−99.9–999.9 (℃) during heating: subcool (SC)/during cooling: superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data
99	11000110	IC2 SC/SH									
100	00100110	IC3 SC/SH									
101	10100110	IC4 SC/SH									
102	01100110	IC5 SC/SH									
103	11100110	Discharge superheat (SHd)	−99.9–999.9 (℃)								Display of outdoor discharge superheat (SHd) data
105	10010110	Target Pd display (heating) kgf/F	Pdm (0.0–30.0) (kgf/cm²)								Display of all control target data
106	01010110	Target ET display (cooling)	ETm (−2.0–23.0) (℃)								
107	11010110	Target outdoor SC (cooling)	SCm (0.0–20.0) (℃)								
108	00110110	Target indoor SC/SH (IC1)	SCm/SHm (0.0–20.0) (℃)								
109	10110110	Target indoor SC/SH (IC2)									
110	01110110	Target indoor SC/SH (IC3)									
111	11110110	Target indoor SC/SH (IC4)									
112	00001110	Target indoor SC/SH (IC5)									
113	10001110	Indoor unit check status (IC9-12)	No.9 unit check	No.10 unit check	No.11 unit check	No.12 unit check					Light on at time of abnormality
114	01001110	Indoor unit operation mode (IC9-12)	No.9 unit mode	No.10 unit mode	No.11 unit mode	No.12 unit mode					COOL/DRY: light on HEAT: light blinking FAN/STOP: light off
115	11001110	Indoor unit operation display (IC9-12)	No.9 unit operation	No.10 unit operation	No.11 unit operation	No.12 unit operation					Thermo-ON: light on Thermo-OFF: light off
116	00101110	IC9 operation mode	STOP	Fan	Cooling Thermo-ON	Cooling thermo-OFF	Heating thermo-ON	Heating thermo-OFF			Display of indoor unit operation mode
117	10101110	IC10 operation mode									
118	01101110	IC11 operation mode									
119	11101110	IC12 operation mode									
120	00011110	Target indoor SC/SH (IC9)	SCm/SHm (0.0–20.0) (℃)								Display of all control target data
121	10011110	Target indoor SC/SH (IC10)									
122	01011110	Target indoor SC/SH (IC11)									
123	11011110	Target indoor SC/SH (IC12)									
124	00111110	IC9 LEV opening pulse abnormality delay	0–2000 (pulse)								Display of opening pulse of indoor LEV at time of abnormality delay
125	10111110	IC10 LEV opening pulse abnormality delay									
126	01111110	IC11 LEV opening pulse abnormality delay									
127	11111110	IC12 LEV opening pulse abnormality delay									

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
128	00000001	Actual frequency of abnormality delay	0–255 (Hz)								Display of actual frequency at time of abnormality delay
129	10110001	Fan step number at time of abnormality delay	0–15								Display of fan step number at time of abnormality delay
131	11000001	IC1 LEV opening pulse abnormality delay	0–2000 (pulse)								Delay of opening pulse of indoor LEV at time of abnormality delay
132	00100001	IC2 LEV opening pulse abnormality delay									
133	10100001	IC3 LEV opening pulse abnormality delay									
134	01100001	IC4 LEV opening pulse abnormality delay									
135	11100001	IC5 LEV opening pulse abnormality delay									
136	00010001	High pressure sensor data at time of abnormality delay kgf/cm2	−99.9–999.9 (kgf/cm²)								Display of data from High pressure sensor, all thermistors, and SC/SH at time of abnormality delay
137	10010001	TH4 (Compressor) sensor data at time of abnormality delay	−99.9–999.9 (℃)								
138	01010001	TH6 (Suction pipe) sensor data at time of abnormality delay									
139	11010001	TH3 (Outdoor liquid pipe) sensor data at time of abnormality delay									
140	00110001	TH8 (Heat sink) sensor data at time of abnormality delay									
141	10110001	OC SC (cooling) at time of abnormality delay	−99.9–999.9(℃) During heating: subcool (SC) During cooling; superheat (SH) (Fixed to "0" during cooling operation)								
142	01110001	IC1 SC/SH at time of abnormality delay									
143	11110001	IC2 SC/SH at time of abnormality delay									
144	00001001	IC3 SC/SH at time of abnormality delay									
145	10001001	IC4 SC/SH at time of abnormality delay									
146	01001001	IC5 SC/SH at time of abnormality delay									
147	11001001	IC9 SC/SH at time of abnormality delay									
148	00100001	IC10 SC/SH at time of abnormality delay									
149	10101001	IC11 SC/SH at time of abnormality delay									
150	01101001	IC12 SC/SH at time of abnormality delay									

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
151	11101001	IC9 LEV opening pulse at time of abnormality	0–2000 (pulse)								Display of opening pulse of indoor LEV at time of abnormality
152	00011001	IC10 LEV opening pulse at time of abnormality									
153	10011001	IC11 LEV opening pulse at time of abnormality									
154	01011001	IC12 LEV opening pulse at time of abnormality									
155	11011001	IC9 SC/SH at time of abnormality	−99.9–999.9(℃) During heating: subcool (SC) During cooling; superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data at time of abnormality
156	00111001	IC10 SC/SH at time of abnormality									
157	10111001	IC11 SC/SH at time of abnormality									
158	01111001	IC12 SC/SH at time of abnormality									
159	11111001	IC9 Capacity code	0–255								Display of indoor unit capacity code The No.1 unit will start from the M-NET address with the lowest number
160	00000101	IC10 Capacity code									
161	10000101	IC11 Capacity code									
162	01000101	IC12 Capacity code									
163	11000101	IC9 SC/SH	−99.9–999.9(℃) During heating: subcool (SC) During cooling; superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data
164	00100101	IC10 SC/SH									
165	10100101	IC11 SC/SH									
166	01100101	IC12 SC/SH									
170	01010101	ROM version monitor	0.00–99.99 (ver)								Display of version data of ROM
171	11010101	ROM type									Display of ROM type
172	00110101	Check sum mode	0000–FFFF								Display of check sum code of ROM
173	10110101	IC9 TH23 (Gas)	−99.9–999.9 (℃)								Display detected data of indoor unit thermistors
174	01110101	IC10 TH23 (Gas)									
175	11110101	IC11 TH23 (Gas)									
176	00001101	IC12 TH23 (Gas)									
177	10001101	IC9 TH22 (Liquid)									
178	01001101	IC10 TH22 (Liquid)									
179	11001101	IC11 TH22 (Liquid)									
180	00101101	IC12 TH22 (Liquid)									
185	10011101	IC9 TH21 (Intake)									
186	01011101	IC10 TH21 (Intake)									
187	11011101	IC11 TH21 (Intake)									
188	00111101	IC12 TH21 (Intake)									
189	10111101	History of voltage error (U9/4220)	-	-	PAM error	Converter Fault	Power synchronization signal error	L1 open phase error	Under voltage error	Over voltage error	
192	00000011	Actual frequency of abnormality	0–255 (Hz)								Display of actual frequency at time of abnormality
193	10000011	Fan step number at time of abnormality	0–15								Display of fan step number at time of abnormality

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
195	11000011	IC1 LEV opening pulse at time of abnormality	0–2000 (pulse)								Display of opening pulse of indoor LEV at time of abnormality
196	00100011	IC2 LEV opening pulse at time of abnormality									
197	10100011	IC3 LEV opening pulse at time of abnormality									
198	01100011	IC4 LEV opening pulse at time of abnormality									
199	11100011	IC5 LEV opening pulse at time of abnormality									
200	00010011	High pressure sensor data at time of abnormality	−99.9–999.9 (kgf/cm²)								Display of data from High pressure sensor, all thermistors, and SC/SH at time of abnormality.
201	10010011	TH4 (Compressor) sensor data at time of abnormality	−99.9–999.9 (℃)								
202	01010011	TH6 (Suction pipe) sensor data at time of abnormality									
203	11010011	TH3 (Outdoor liquid pipe) sensor data at time of abnormality									
204	00110011	TH8 (Heat sink) sensor data at time of abnormality									
205	10110011	OC SC (cooling) at time of abnormality	−99.9–999.9(℃) During heating: subcool (SC) During cooling; superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data at time of abnormality
206	01110011	IC1 SC/SH at time of abnormality									
207	11110011	IC2 SC/SH at time of abnormality									
208	00001011	IC3 SC/SH at time of abnormality									
209	10001011	IC4 SC/SH at time of abnormality									
210	01001011	IC5 SC/SH at time of abnormality									
211	11001011	IC6 Capacity code	0–255								Display of indoor unit capacity code The No.1 unit will start from the M-NET address with the lowest number
212	00101011	IC7 Capacity code									
213	10101011	IC8 Capacity code									
214	01101011	IC6 operation mode	STOP	Fan	Cooling thermo-ON	Cooling thermo-OFF	Heating thermo-ON	Heating thermo-OFF			Display of indoor unit operation mode
215	11101011	IC7 operation mode									
216	00011011	IC8 operation mode									
217	10011011	IC6 LEV opening pulse	0–2000 (pulse)								Display of opening pulse of indoor LEV
218	01011001	IC7 LEV opening pulse									
219	11011001	IC8 LEV opening pulse									

No.	SW1 setting	Display mode	Display on the LED1, 2 (display data)								Notes
	12345678		1	2	3	4	5	6	7	8	
220	00111011	IC6 TH23 (Gas)	−99.9–999.9 (℃)								Display detected data of indoor unit thermistor
221	10111011	IC7 TH23 (Gas)									
222	01111011	IC8 TH23 (Gas)									
223	11111011	IC6 TH22 (liquid)									
224	00000111	IC7 TH22 (liquid)									
225	10000111	IC8 TH22(liquid)									
226	01000111	IC6 TH21 (intake)									
227	11000111	IC7 TH21 (intake)									
228	00100111	IC8 TH21 (intake)									
229	10100111	IC6 SC/SH	−99.9–999.9 (℃) during heating: subcool (SC)/during cooling: superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data
230	01100111	IC7 SC/SH									
231	11100111	IC8 SC/SH									
232	00010111	Target indoor SC/SH (IC6)	SCm/SHm (0.0–20.0) (℃)								Display of all control target data
233	10010111	Target indoor SC/SH (IC7)									
234	01010111	Target indoor SC/SH (IC8)									
235	11010111	IC6 LEV opening pulse abnormality delay	0–2000 (pulse)								Display of opening pulse of indoor LEV at time of abnormality delay
236	00110111	IC7 LEV opening pulse abnormality delay									
237	10110111	IC8 LEV opening pulse abnormality delay									
238	01110111	IC6 SC/SH at time of abnormality delay	−99.9–999.9 (℃) During heating: subcool (SC) During cooling: superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data at time of abnormality delay
239	11110111	IC7 SC/SH at time of abnormality delay									
240	00001111	IC8 SC/SH at time of abnormality delay									
241	10001111	IC6 LEV opening pulse at time of abnormality	0–2000 (pulse)								Display of opening pulse of indoor LEV at time of abnormality
242	01001111	IC7EV opening pulse at time of abnormality									
243	11001111	IC8 LEV opening pulse at time of abnormality									
244	00101111	IC6 SC/SH at time of abnormality	−99.9–999.9 (℃) During heating: subcool (SC) During cooling: superheat (SH) (Fixed to "0" during cooling operation)								Display of indoor SC/SH data at time of abnormality delay
245	10101111	IC7 SC/SH at time of abnormality									
246	01101111	IC8 SC/SH at time of abnormality									
250	01011111	IC9 LEV opening pulse	0–2000 (pulse)								Display of opening pulse of indoor LEV
251	11011111	IC10 LEV opening pulse									
252	00111111	IC11 LEV opening pulse									
253	10111111	IC12 LEV opening pulse									

9 ELECTRICAL WIRING

This chapter provides an introduction to electrical wiring for the CITY MULTI-S series, together with notes concerning power wiring, wiring for control (transmission wires and remote controller wires), and the frequency converter.

9-1. OVERVIEW OF POWER WIRING

(1) Use a separate power supply for the outdoor unit and indoor unit.
(2) Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water,etc.) when proceeding with the wiring and connections.
(3) The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker consideration of voltage drops. Make sure the power-supply voltage does not drop more than 10 %.
(4) Specific wiring requirements should adhere to the wiring regulations of the region.
(5) Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 60245 IEC57). For example, use wiring such as YZW.
(6) Install an earth line longer than power cables.

⚠ Warning:
- Be sure to use specified wires to connect so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.
- Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.

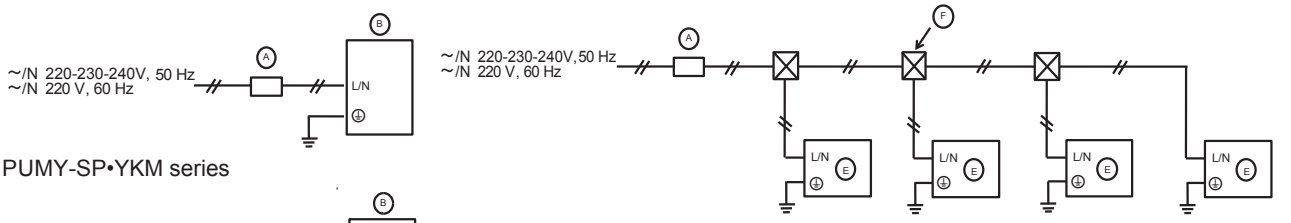
⚠ Caution:
- Some installation site may require attachment of an earth leakage breaker. If no earth leakage breaker is installed, it may cause an electric shock.
- Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.
- Be sure to install N-Line. Without N-Line, it could cause damage to the unit.

9-2. WIRING OF MAIN POWER SUPPLY AND EQUIPMENT CAPACITY

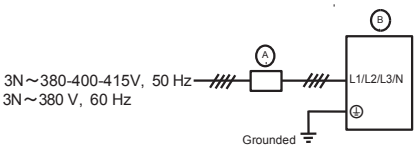
9-2-1. Wiring diagram for main power supply

■ Schematic Drawing of Wiring : When NOT using a Branch Box (example)

PUMY-SP•VKM series



PUMY-SP•YKM series

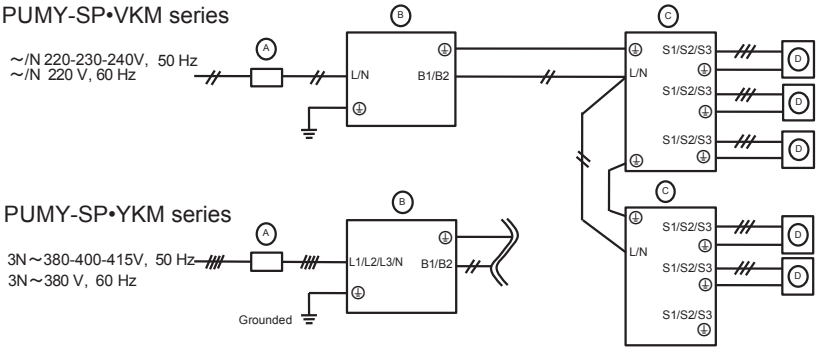


Note: The M-NET control indoor unit cannot receive power supplied from an outdoor unit, so provide it with power separately.

Ⓐ Switch (Breakers for Wiring and Current Leakage)
Ⓑ Outdoor Unit
Ⓒ Branch Box
Ⓓ A-Control Indoor Unit
Ⓔ M-NET Control Indoor unit
Ⓕ Pull Box

■ Schematic Drawing of Wiring : When using a Branch Box (example)
<When power is supplied from the outdoor unit>

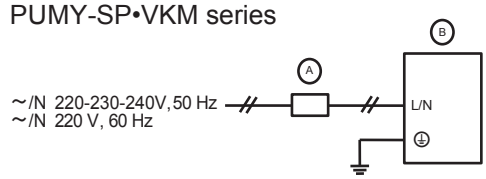
PUMY-SP•VKM series



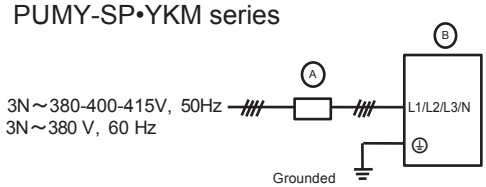
PUMY-SP•YKM series

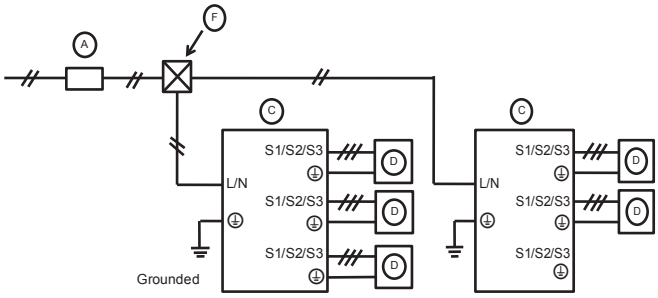
<When power is supplied separately>

PUMY-SP•VKM series



PUMY-SP•YKM series



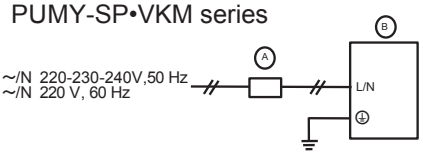


Ⓐ Switch (Breakers for Wiring and Current Leakage)
Ⓑ Outdoor Unit
Ⓒ Branch Box
Ⓓ A-Control Indoor Unit
Ⓔ M-NET Control Indoor unit
Ⓕ Pull Box

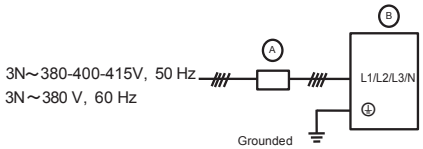
■ Schematic Drawing of Wiring : When using a Branch Box and M-NET control indoor unit (example)

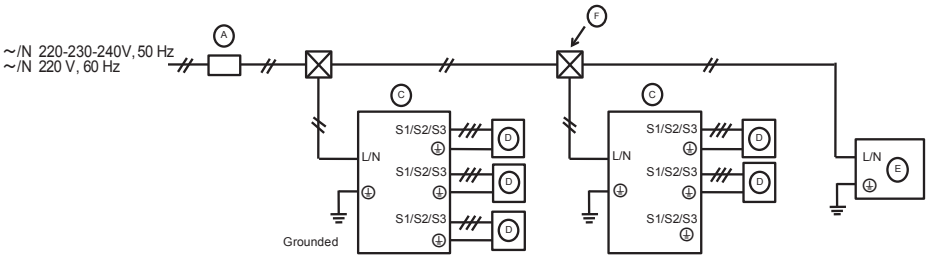
<When power is supplied separately>

PUMY-SP•VKM series



PUMY-SP•YKM series

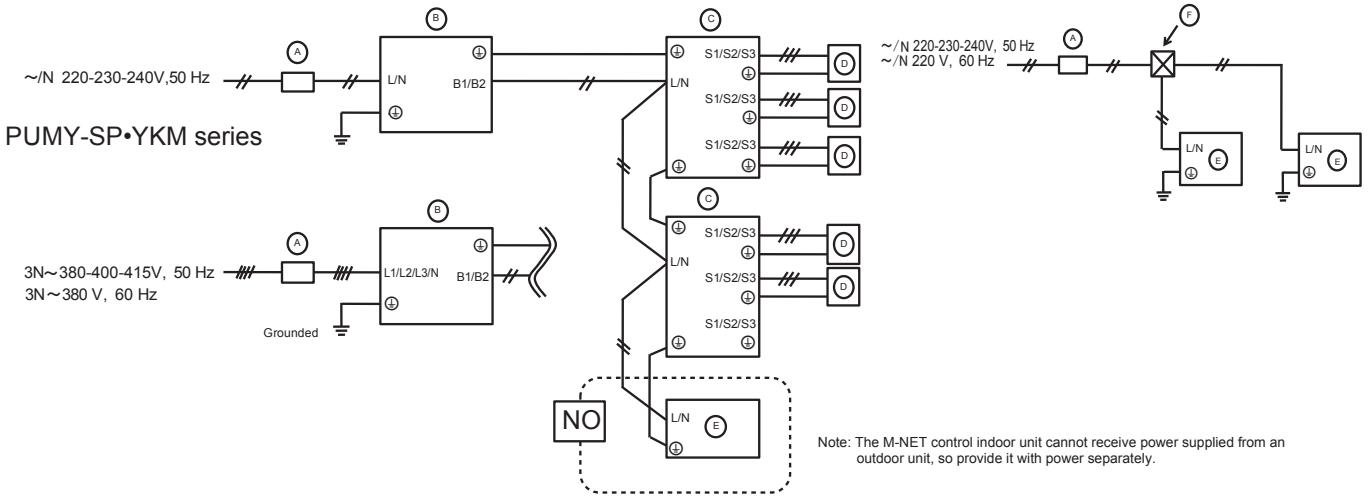




<When power is supplied from the outdoor unit>

PUMY-SP•VKM series

PUMY-SP•YKM series



Note: The M-NET control indoor unit cannot receive power supplied from an outdoor unit, so provide it with power separately.

9-2-2. Cross section area of Wire for Main Power and ON/OFF capacities

PUMY-SP112VKM(R1).TH PUMY-SP125VKM(R1).TH PUMY-SP140VKM(R1).TH
PUMY-SP112YKM(R1).TH PUMY-SP125YKM(R1).TH PUMY-SP140YKM(R1).TH
PUMY-SP112VKM(R1).TH-BS PUMY-SP125VKM(R1).TH-BS PUMY-SP140VKM(R1).TH-BS
PUMY-SP112YKM(R1).TH-BS PUMY-SP125YKM(R1).TH-BS PUMY-SP140YKM(R1).TH-BS

<Outdoor unit> <When power is supplied to outdoor unit and branch box separately>

Model		Power Supply	Minimum Wire Cross-sectional area (mm²)			Breaker for Wiring *1	Breaker for Current Leakage
			Main Cable	Branch	Ground		
Outdoor Unit	SP112–140V	~/N 220-230-240V, 50 Hz ~/N 220 V, 60 Hz	6	–	6	32 A	32 A 30 mA 0.1 seconds or less
	SP112–140Y	3N~380-400-415V, 50 Hz 3N~380 V, 60 Hz	1.5	–	1.5	16 A	16 A 30 mA 0.1 seconds or less

<Outdoor unit> <When power is supplied to branch box from the outdoor unit>

Model		Power Supply	Minimum Wire Cross-sectional area (mm²)			Breaker for Wiring *1	Breaker for Current Leakage
			Main Cable	Branch	Ground		
Outdoor Unit	SP112–140V	~/N 220-230-240V, 50 Hz ~/N 220 V, 60 Hz	6	–	6	40 A	40 A 30 mA 0.1 seconds or less
	SP112–140Y	3N~380-400-415V 50 Hz 3N~380 V, 60 Hz	2.5	–	2.5	25 A	25 A 30 mA 0.1 seconds or less

*1 A breaker with at least 3.0 mm contact separation in each poles shall be provided. Use non-fuse breaker (NF) or earth leakage breaker (NV).

<Indoor units> <When power is supplied to indoor unit and outdoor unit separately>

Total operating current of the indoor unit	Minimum wire thickness (mm²)			Ground-fault interrupter *2	Local switch (A)		Breaker for wiring (NFB)
	Main Cable	Branch	Ground		Capacity	Fuse	
F0 = 16 A or less *3	1.5	1.5	1.5	20 A current sensitivity *4	16	16	20
F0 = 25 A or less *3	2.5	2.5	2.5	30 A current sensitivity *4	25	25	30
F0 = 32 A or less *3	4.0	4.0	4.0	40 A current sensitivity *4	32	32	40

Apply to IEC61000-3-3 about max. permissive system impedance.

*2 The Ground-fault interrupter should support inverter circuit.
The Ground-fault interrupter should combine using of local switch or wiring breaker.

*3 Please take the larger of F1 or F2 as the value for F0.

F1 = Total operating maximum current of the indoor units × 1.2

F2 = F2 = {V1 × (Quantity of Type 1)/C} + {V1 × (Quantity of Type 2)/C} + {V1 × (Quantity of Type 3)/C} + ··· + {V1 × (Quantity of Type 15)/C}

Connect to Branch box (PAC-MK·BC)

Indoor unit		V1	V2
Type 1	PEAD-RP·JAQ(L).UK, PEAD-M·JA(L)	26.9	2.4
Type 2	SEZ-KD·VA, SEZ-M·DA, PCA-RP·KAQ, PCA-M·KA,SLZ-KF·VA, PLA-RP·EA(.UK)	19.8	
Type 3	SLZ-M·FA	17.1	
Type 4	MLZ-KA·VA, MLZ-KP·VF	9.9	
Type 5	MSZ-LN·VG, MSZ-AP·VF, MSZ-AP·VG, MFZ-KJ·VE	7.4	
Type 6	MSZ-FH·VE, MSZ-GF·VE, MSZ-SF·VE, MSZ-EF·VE, MSZ-SF·VA	6.8	
Type 7	Branch box (PAC-MK·BC(B))	5.1	3.0

Connect to Connection kit (PAC-LV11M)

Indoor unit		V1	V2
Type 8	MSZ-LN·VG, MSZ-AP·VF, MSZ-AP·VG	7.4	2.4
Type 9	MSZ-SF·VA, MSZ-SF·VE, MSZ-EF·VE, MSZ-FH·VE	6.8	
Type10	Connection kit (PAC-LV11M)	3.5	

Indoor unit		V1	V2
Type 11	PEFY-P·VMA(L)-E, PEFY-P·VMA3-E	38.0	1.6
Type 12	PMFY-P·VBM-E, PLFY-P·VBM-E, PLFY-P·VEM-E, PLFY-EP·VEM-E, PLFY-P·VFM-E, PEFY-P·VMS1(L)-E, PCFY-P·VKM-E, PKFY-P·VHM-E, PKFY-P·VKM-E, PFFY-P·VKM-E, PFFY-P·VLRMM-E	19.8	2.4
Type 13	PLFY-P·VCM-E	9.9	
Type 14	PKFY-P·VBM-E	3.5	
Type 15	PLFY-P·VLMD-E, PEFY-P·VMH-E, PEFY-P·VMR-E-L/R, PEFY-P·VMH-E-F, PFFY-P·VLEM-E, PFFY-P·VLRM-E, GUF*4-RD(H)4	0	0

C: Multiple of tripping current at tripping time 0.01 s
Please pick up “C” from the tripping characteristic of the breaker.

<Example of “F2” calculation>
Condition PLFY-VBM × 4 + PEFY-VMA × 1, C = 8 (refer to right sample chart)
F2 = 19.8 × 4/8 + 38 × 1/8
= 14.65
→ 16 A breaker (Tripping current = 8 × 16 A at 0.01 s)

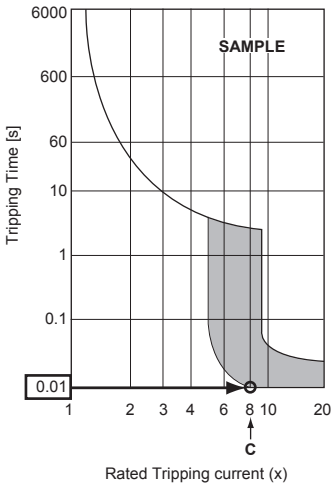
*4 Current sensitivity is calculated using the following formula.
G1 = V2 × (Quantity of Type1) + V2 × (Quantity of Type2) + V2 × (Quantity of Type3) + ··· + V2 × (Quantity of Type15) + V3 × (Wire length[km])

<Example of "G1" calculation>
When connecting 3 units of the SEZ-KD respectively to a branch box with a wire that is 20 m long and 1.5 mm² in diameter, then connecting the branch box and PEFY-VMA to a single breaker with a wire that is 100 m long in total and 2.5 mm² in diameter.
G1 = 2.4 × 3 + 3 + 1.6 + 48 × 0.02 × 3 + 56 × 0.1
= 20.28

G1	Current sensitivity
30 or less	30 mA 0.1 seconds or less
100 or less	100 mA 0.1 seconds or less

Wire thickness	V3
1.5 mm²	48
2.5 mm²	56
4.0 mm²	66

Sample chart



1. **Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.**
2. **The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker consideration of voltage drops. Make sure the power-supply voltage does not drop more than 10%.**
3. **Specific wiring requirements should adhere to the wiring regulations of the region.**
4. **Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 60245 IEC57). For example, use wiring such as YZW.**
5. **Install an earth line longer than power cables.**

9-3. DESIGN FOR CONTROL WIRING

Please note that the types and numbers of control wires needed by the CITY MULTI-S series depend on the remote controllers and whether they are linked with the system or not.

9-3-1. Selection number of control wires

		M-NET remote controller
Use		Remote controller used in system control operations. • Group operation involving different refrigerant systems. • Linked operation with upper control system.
Remote controller → indoor unit		2-core wire (non-polar)
Transmission wires	Wires connecting → indoor units	
	Wires connecting → indoor units with outdoor unit	
	Wires connecting → outdoor units	

9-4. WIRING TRANSMISSION CABLES

9-4-1. Types of control cables

1. Wiring transmission cables
• Types of transmission cables: Shielding wire CVVS, CPEVS, or MVVS
• Cable diameter: More than 1.25 mm^2
• Maximum wiring length: Within 200 m

2. M-NET Remote control cables

Kind of remote control cable	Shielding wire (2-core) CVVS, CPEVS, or MVVS
Cable diameter	0.5 to 1.25 mm^2
Remarks	When 10 m is exceeded, use a cable with the same specifications as transmission line wiring.

3. MA Remote control cables

Kind of remote control cable	Sheathed 2-core cable (unshielded) CVV
Cable diameter	0.3 to 1.25 mm^2 (0.75 to 1.25 mm^2)*
Remarks	Within 200 m

* Connected with simple remote controller.

9-4-2. Wiring examples

• Controller name, symbol and allowable number of controllers.

Name	Symbol	Allowable number of controllers	
Outdoor unit controller	OC	—	
Indoor unit controller	M-IC	PUMY-SP112	1 to 9 units per 1 OC
		PUMY-SP125	1 to 10 units per 1 OC
		PUMY-SP140	1 to 12 units per 1 OC
	A-IC	PUMY-SP112	2 to 8 units per 1 OC
		PUMY-SP125	
		PUMY-SP140	
Branch box	—	—	0 to 2 units per 1 OC
Remote controller	RC	M-NET RC	Maximum of 12 controllers for 1 OC (Cannot be connected if Branch box is used.)
		MA-RC	Maximum of 2 per group

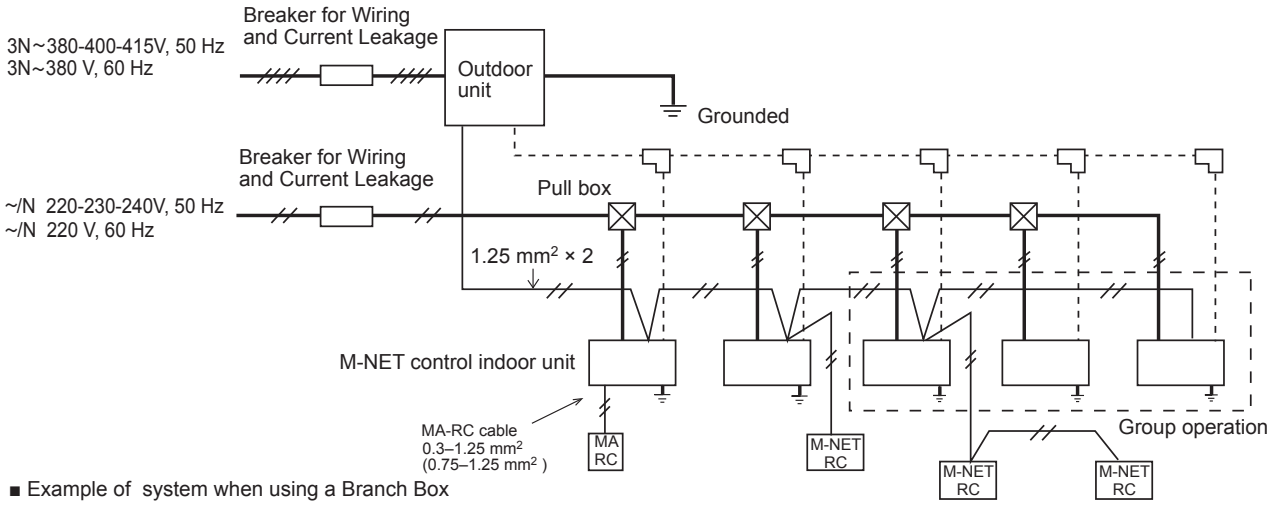
Note that the number of connectable units may be limited by some conditions such as an indoor unit's capacity or each unit's equivalent power consumption. (Refer to DATA BOOK.)

9-5. SYSTEM SWITCH SETTING

In order to identify the destinations of signals to the outdoor units, indoor units, and remote controller of the MULTI-S series, each microprocessor must be assigned an identification number (address). The addresses of outdoor units, indoor units, and remote controller must be set using their settings switches. Please consult the installation manual that comes with each unit for detailed information on setting procedures.

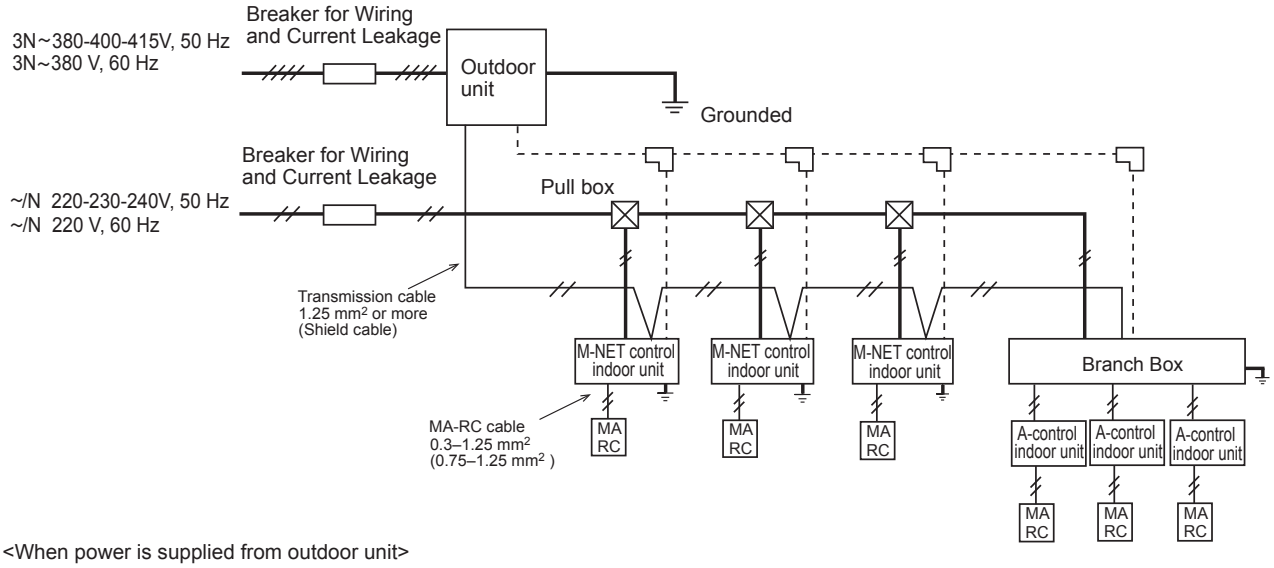
9-6. EXAMPLE EXTERNAL WIRING DIAGRAM FOR A BASIC SYSTEM (USING PUMY-SP·YKM)

■ Example of system when using a M-NET controller

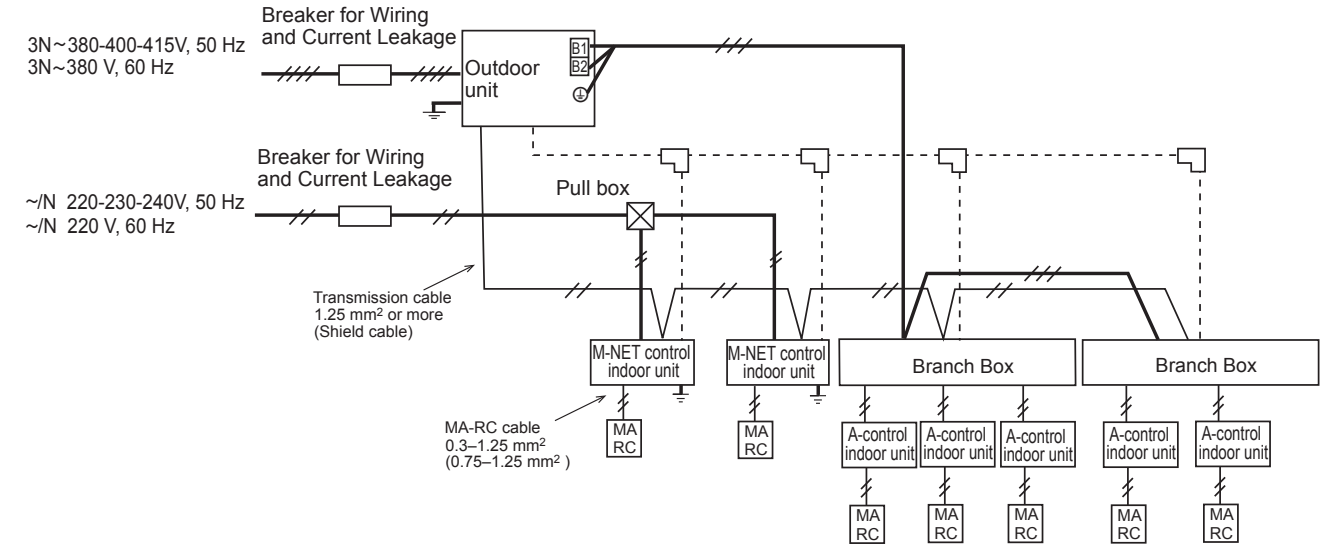


■ Example of system when using a Branch Box

<When power is supplied separately>



<When power is supplied from outdoor unit>



9-7. METHOD FOR OBTAINING ELECTRICAL CHARACTERISTICS WHEN A CAPACITY AGREEMENT IS TO BE SIGNED WITH AN ELECTRIC POWER COMPANY

The electrical characteristics of connected indoor unit system for air conditioning systems, including the MULTI-S series, depend on the arrangement of the indoor and outdoor units.
First read the data on the selected indoor and outdoor units and then use the following formulas to calculate the electrical characteristics before applying for a capacity agreement with the local electric power company.

9-7-1. Obtaining the electrical characteristics of a CITY MULTI-S series system

(1) Procedure for obtaining total power consumption

	Page numbers in this technical manual	Power consumption
Total power consumption of each indoor unit	See the technical manual of each indoor unit	①
Power consumption of outdoor unit*	Standard capacity diagram— Refer to 4-3.	②
Total power consumption of system	See the technical manual of each indoor unit	①+② <kW>

*The power consumption of the outdoor unit will vary depending on the total capacity of the selected indoor units.

(2) Method of obtaining total current

	Page numbers in this technical manual	Subtotal
Total current through each indoor unit	See the technical manual of each indoor unit	①
Current through outdoor unit*	Standard capacity diagram— Refer to 4-3.	②
Total current through system	See the technical manual of each indoor unit	①+② <A>

*The current through the outdoor unit will vary depending on the total capacity of the selected indoor units.

(3) Method of obtaining system power factor

Use the following formula and the total power and current obtained in parts ① and ② on the above tables to calculate the system power factor.

$$\text{System power factor} = \frac{\text{(Total system power consumption)}}{\text{(Total system current} \times \text{voltage)}} \times 100\ \%$$

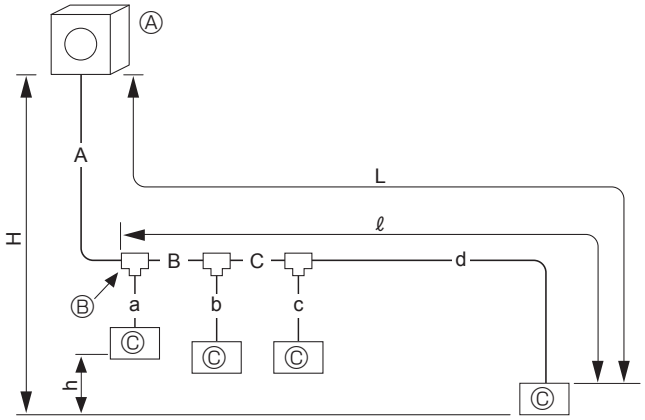
9-7-2. Applying to an electric power company for power and total current

Calculations should be performed separately for heating and cooling employing the same methods; use the largest resulting value in your application to the electric power company.

10 REFRIGERANT PIPING TASKS

10-1. REFRIGERANT PIPING SYSTEM

Line-Branch Method
Connection Examples
(Connecting to 4 Indoor Units)



Ⓐ Outdoor Unit
Ⓑ First Branch
Ⓒ Indoor unit

Permissible Length	Total Piping Length	A+B+C+a+b+c+d ≦ 120 m
	Farthest Piping Length (L)	A+B+C+d ≦ 70 m
	Farthest Piping Length After First Branch (ℓ)	B+C+d ≦ 50 m
Permissible High/ Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	50 meters or less (If the outdoor unit is lower, 30 meters or less)
	High/Low Difference in Indoor/Indoor Section (h)	15 meters or less
■ **Selecting the Refrigerant Branch Kit**		Use an optional branch piping kit (CMY-Y62-G-E).

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Sections From Branch to Indoor Unit (a,b,c,d)
(3) Section From Branch to Branch (B,C)

Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

Model number	Piping Diameter (mm)		
50 or lower	Liquid Line	ℓ ≦ 30 m	ϕ6.35
		ℓ > 30 m	ϕ9.52
	Gas Line	ϕ12.7	
63 to 140	Liquid Line	ϕ9.52	
	Gas Line	ϕ15.88	

(3) Refrigerant Piping Diameter In Section From Branch to Branch

Liquid Line (mm)	Gas Line (mm)
ϕ9.52	ϕ15.88

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT when selecting the pipe size and piping length.

■ **Additional refrigerant charge**

Refrigerant for the extended piping is not included in the outdoor unit when the unit is shipped from the factory. Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
  (For example, if the calculated charge is 6.01 kg, round up the charge to 6.1 kg.)

<Additional Charge>
Calculation of refrigerant charge

Pipe size Liquid pipe		Pipe size Liquid pipe		Total capacity of connected indoor units	Amount for the indoor units
ø6.35	+	ø9.52	+	up to 8.0 kW	1.5 kg
(m) × 19.0 (g/m)		(m) × 50.0 (g/m)		8.1 to 16.0 kW	2.5 kg
				16.1 kW or above	3.0 kg

Included refrigerant amount when shipped from the factory

Included refrigerant amount
3.5 kg

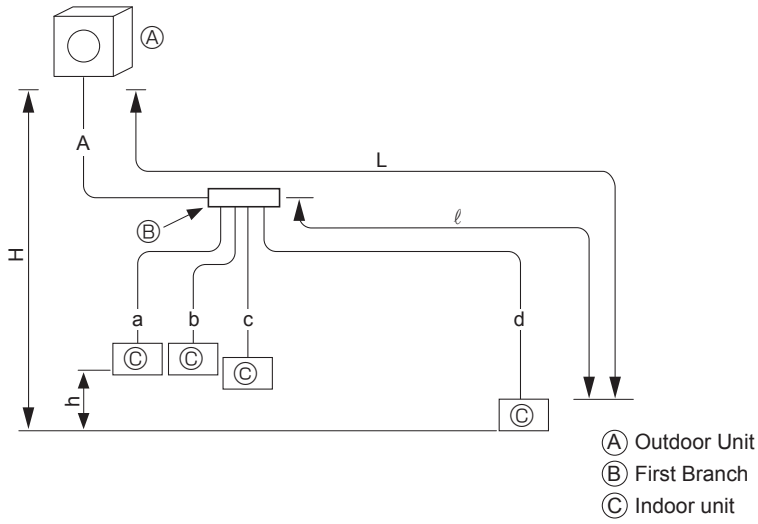
<Example>
Outdoor model : SP125
Indoor 1 : P63 (7.1 kW)
2 : P40 (4.5 kW)
3 : P25 (2.8 kW)
4 : P20 (2.2 kW)

A : ø9.52 20 m
B : ø9.52 5 m
C : ø9.52 5 m
a : ø9.52 15 m
b : ø6.35 10 m
c : ø6.35 10 m
d : ø6.35 20 m
} At the conditions below:

The total length of each liquid line is as follows:
ø9.52 : A + B + C + a = 20 + 5 + 5 + 15 = 45 m
ø6.35 : b + c + d = 10 + 10 + 20 = 40 m
The total capacity of connected indoor unit is as follows:
7.1 + 4.5 + 2.8 + 2.2 = 16.6
<Calculation example>
Additional refrigerant charge

$$40 \times \frac{19.0}{1000} + 45 \times \frac{50.0}{1000} + 3.0 = 6.1 \text{ kg (rounded up)}$$

Header-Branch Method
Connection Examples
(Connecting to 4 Indoor Units)



Permissible Length	Total Piping Length	A+a+b+c+d ≦ 120 m
	Farthest Piping Length (L)	A+d ≦ 70 m
	Farthest Piping Length After First Branch (ℓ)	d is 50 meters or less
Permissible High/Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	50 meters or less (If the outdoor unit is lower, 30 meters or less)
	High/Low Difference in Indoor/Indoor Section (h)	15 meters or less

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Sections From Branch to Indoor Unit (a,b,c,d)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

Model number	Piping Diameter (mm)		
50 or lower	Liquid Line	ℓ ≦ 30 m	ϕ6.35
		ℓ > 30 m	ϕ9.52
	Gas Line		ϕ12.7
63 to 140	Liquid Line		ϕ9.52
	Gas Line		ϕ15.88

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT when selecting the pipe size and piping length.

■ **Additional refrigerant charge**

Refrigerant for the extended piping is not included in the outdoor unit when the unit is shipped from the factory. Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
  (For example, if the calculated charge is 6.01 kg, round up the charge to 6.1 kg.)

<Additional Charge>
Calculation of refrigerant charge

Pipe size Liquid pipe ø6.35	+	Pipe size Liquid pipe ø9.52	+	Total capacity of connected indoor units	Amount for the indoor units
(m) × 19.0 (g/m)		(m) × 50.0 (g/m)		up to 8.0 kW	1.5 kg
				8.1 to 16.0 kW	2.5 kg
				16.1 kW or above	3.0 kg

Included refrigerant amount when shipped from the factory

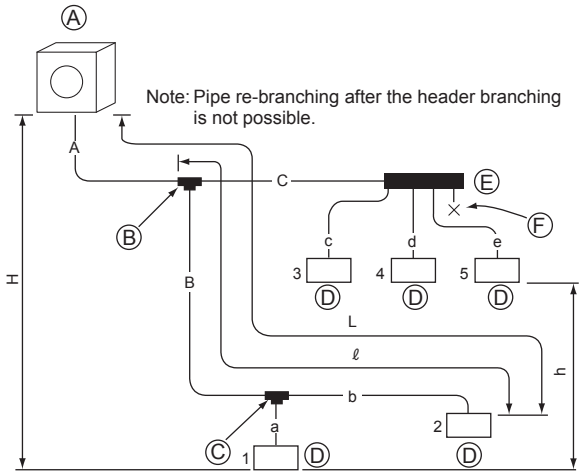
Included refrigerant amount
3.5 kg

<Example>
Outdoor model : SP125
Indoor 1 : P63 (7.1 kW)
2 : P40 (4.5 kW)
3 : P25 (2.8 kW)
4 : P20 (2.2 kW)
A : ø9.52 30 m
a : ø9.52 15 m
b : ø6.35 10 m
c : ø6.35 10 m
d : ø6.35 20 m
} At the conditions below:

The total length of each liquid line is as follows:
ø9.52 : A + a = 30 + 15 = 45 m
ø6.35 : b + c + d = 10 + 10 + 20 = 40 m
The total capacity of connected indoor unit is as follows:
7.1 + 4.5 + 2.8 + 2.2 = 16.6
<Calculation example>
Additional refrigerant charge

$$40 \times \frac{19.0}{1000} + 45 \times \frac{50.0}{1000} + 3.0 = 6.1 \text{ kg (rounded up)}$$

Method of Combined Branching of Lines and Headers
Connection Examples
(Connecting to 5 Indoor Units)



Ⓐ Outdoor unit
Ⓑ First branching (branching joint)
Ⓒ Branching joint
Ⓓ Indoor unit
Ⓔ Branching header
Ⓕ Blind caps

Permissible Length	Total Piping Length	A+B+C+a+b+c+d+e is 120 meters or less
	Farthest Piping Length (L)	A+B+b is 70 meters or less
	Farthest Piping Length After First Branch (ℓ)	B+b is 50 meters or less
Permissible High/Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	50 meters or less (If the outdoor unit is lower, 30 meters or less)
	High/Low Difference in Indoor/Indoor Section (h)	15 meters or less

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch Joint	Branch Header (4 branches)	Branch Header (8 branches)
CMY-Y62-G-E	CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Sections From Branch to Indoor Unit (a,b,c,d,e)
(3) Section From Branch to Branch (B,C)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

Model number	Piping Diameter (mm)	
50 or lower	Liquid Line	ℓ ≦ 30 m ϕ6.35
		ℓ > 30 m ϕ9.52
	Gas Line	ϕ12.7
63 to 140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(3) Refrigerant Piping Diameter In Section From Branch to Branch

Liquid Line (mm)	Gas Line (mm)
ϕ9.52	ϕ15.88

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT when selecting the pipe size and piping length.

■ **Additional refrigerant charge**

Refrigerant for the extended piping is not included in the outdoor unit when the unit is shipped from the factory. Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
  (For example, if the calculated charge is 6.01 kg, round up the charge to 6.1 kg.)

<Additional Charge>
Calculation of refrigerant charge

Pipe size Liquid pipe ø6.35	+	Pipe size Liquid pipe ø9.52	+	Total capacity of connected indoor units	Amount for the indoor units
(m) × 19.0 (g/m)		(m) × 50.0 (g/m)		up to 8.0 kW	1.5 kg
				8.1 to 16.0 kW	2.5 kg
				16.1 kW or above	3.0 kg

Included refrigerant amount when shipped from the factory

Included refrigerant amount
3.5 kg

<Example>
Outdoor model : SP140
Indoor 1 : P63 (7.1 kW)
2 : P40 (4.5 kW)
3 : P25 (2.8 kW)
4 : P20 (2.2 kW)
5 : P20 (2.2 kW)

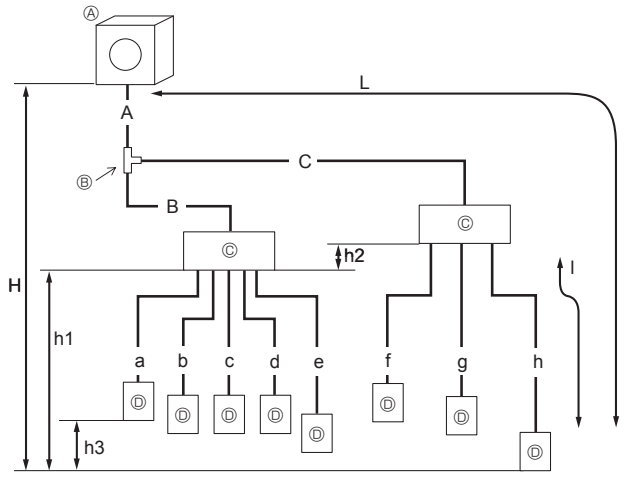
A : ø9.52 30 m
B : ø9.52 10 m
C : ø9.52 10 m
a : ø9.52 15 m
b : ø6.35 10 m
c : ø6.35 10 m
d : ø6.35 20 m
e : ø6.35 10 m
} At the conditions below:

The total length of each liquid line is as follows:
ø9.52 : A + B + C + a = 65 m
ø6.35 : b + c + d +e =50 m
The total capacity of connected indoor unit is as follows:
7.1 + 4.5 + 2.8 + 2.2+ 2.2 = 18.8
<Calculation example>
Additional refrigerant charge

$$50 \times \frac{19.0}{1000} + 65 \times \frac{50.0}{1000} + 3.0 = 7.2 \text{ kg (rounded up)}$$

10-2. REFRIGERANT PIPING SYSTEM (WHEN USING BRANCH BOX)

Branch box Method
Connection Examples
(Connecting to 8 Indoor Units)



ⒶOutdoor unit
ⒷBranching joint
ⒸBranch box
ⒹIndoor unit

Permissible length (One-way)	Total piping length	A + B + C + a + b + c + d + e + f + g + h ≦ 120 m
	Farthest piping length (L)	A + C + h ≦ 80 m (A + C ≦ 55 m, h ≦ 25 m)
	Piping length between outdoor unit and branch boxes	A + B + C ≦55 m
	Farthest piping length after branch box (1)	l ≦ 25m
	Total piping length between branch boxes and indoor units	a + b + c + d + e + f + g + h ≦ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H)*	H ≦ 50 m (In case of that outdoor unit is set higher than indoor unit)
		H ≦ 30 m (In case of that outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1 + h2 ≦15 m
	In each branch unit (h2)	h2 ≦ 15 m
	In each indoor unit (h3)	h3 ≦ 12 m
Number of bends		≦ 15

*Branch box should be placed within the level between the outdoor unit and indoor units.

■ Select Each Section of Refrigerant Piping

(1) Section From Outdoor Unit to Branch box (A, B, C)
(2) Sections From Branch box to Indoor Unit (a to h)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch box to Indoor Unit (Indoor Unit Piping Diameter)

Indoor unit series	kW type	A Liquid pipe	B Gas pipe
M series or S series	15 to 42	ϕ6.35	ϕ9.52
	50	ϕ6.35	ϕ12.7
	60	ϕ6.35	ϕ15.88
	71	ϕ9.52	ϕ15.88
P series	35,50	ϕ6.35	ϕ12.7
	60 to 100	ϕ9.52	ϕ15.88

* If the pipe size of indoor unit is different, use a different-diameter joint.

■ Additional refrigerant charge

Refrigerant for the extended piping is not included in the outdoor unit when the unit is shipped from the factory. Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
  (For example, if the calculated charge is 6.01 kg, round up the charge to 6.1 kg.)

<Additional Charge>
Calculation of refrigerant charge

Pipe size Liquid pipe ø6.35	+	Pipe size Liquid pipe ø9.52	+	Total capacity of connected indoor units	Amount for the indoor units
(m) × 19.0 (g/m)		(m) × 50.0 (g/m)		up to 8.0 kW	1.5 kg
				8.1 to 16.0 kW	2.5 kg
				16.1 kW or above	3.0 kg

Included refrigerant amount when shipped from the factory

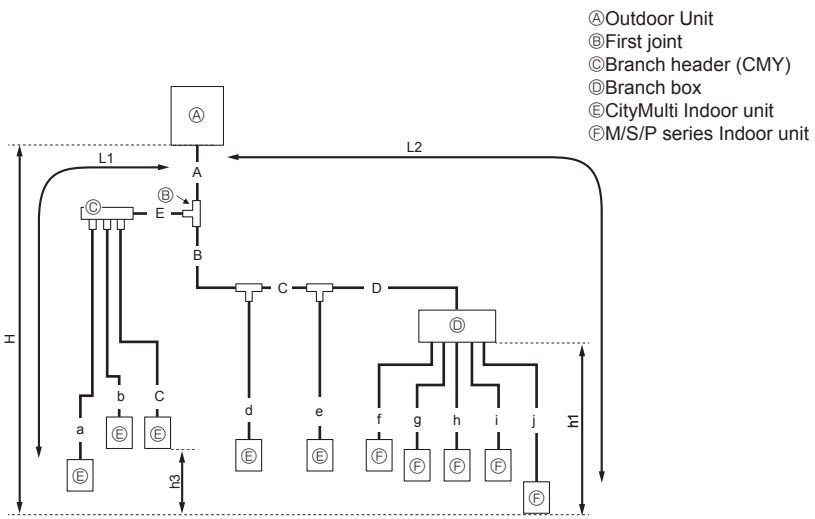
Included refrigerant amount
3.5 kg

<Example>
Outdoor model : SP125
Indoor 1 : P63 (7.1 kW)
2 : P40 (4.5 kW)
3 : P25 (2.8 kW)
4 : P20 (2.2 kW)
A : ø9.52 30 m
a : ø9.52 15 m
b : ø6.35 10 m
c : ø6.35 10 m
d : ø6.35 20 m
} At the conditions below:

The total length of each liquid line is as follows:
ø9.52 : A + a = 30 + 15 = 45 m
ø6.35 : b + c + d = 10 + 10 + 20 = 40 m
The total capacity of connected indoor unit is as follows:
7.1 + 4.5 + 2.8 + 2.2 = 16.6
<Calculation example>
Additional refrigerant charge

$$40 \times \frac{19.0}{1000} + 45 \times \frac{50.0}{1000} + 3.0 = 6.1 \text{ kg (rounded up)}$$

Mixed Method
Connection Examples
(Connecting to 1 Branch box)



Permissible length (One-way)	Total piping length	A+B+C+D+E+a+b+c+d+e+f+g+h+i+j ≦120 m
	Farthest piping length (L1)	A+E+a or A+B+C+e ≦ 70 m
	Farthest piping length. Via Branch box (L2)	A+B+C+D+j ≦ 80 m
	Piping length between outdoor unit and branch box	A+B+C+D ≦ 55 m
	Farthest piping length from the first joint	B+C+D or B+C+e≦ 50 m
	Farthest piping length after branch box	j ≦ 25 m
	Total piping length between branch boxes and indoor units	f+g+h+i+j ≦ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H)*	H ≦ 50 m (In case of outdoor unit is set higher than indoor unit)
		H ≦ 30 m (In case of outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1 ≦ 15 m
	In each indoor unit (h3)	h3 ≦ 12 m
Number of bends		≦ 12 m

*Branch box should be placed within the level between the outdoor unit and indoor units.

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to Branch box or Branch header (A to E)
(2) Sections From Branch box or Branch header to Indoor Unit (a to j)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box or Branch header (Out-door Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch box or Branch header to Indoor Unit (Indoor Unit Piping Diameter)

Indoor unit series	kW type	A Liquid pipe		B Gas pipe
CityMulti	15 to 50	ℓ ≦ 30 m	ϕ6.35	ϕ12.7
		ℓ > 30 m	ϕ9.52	
	63 to 140	ϕ9.52		ϕ15.88
M series or S series	22 to 42	ϕ6.35		ϕ9.52
	50	ϕ6.35		ϕ12.7
	60	ϕ6.35		ϕ15.88
	71	ϕ9.52		ϕ15.88
P series	35,50	ϕ6.35		ϕ12.7
	60 to 100	ϕ9.52		ϕ15.88

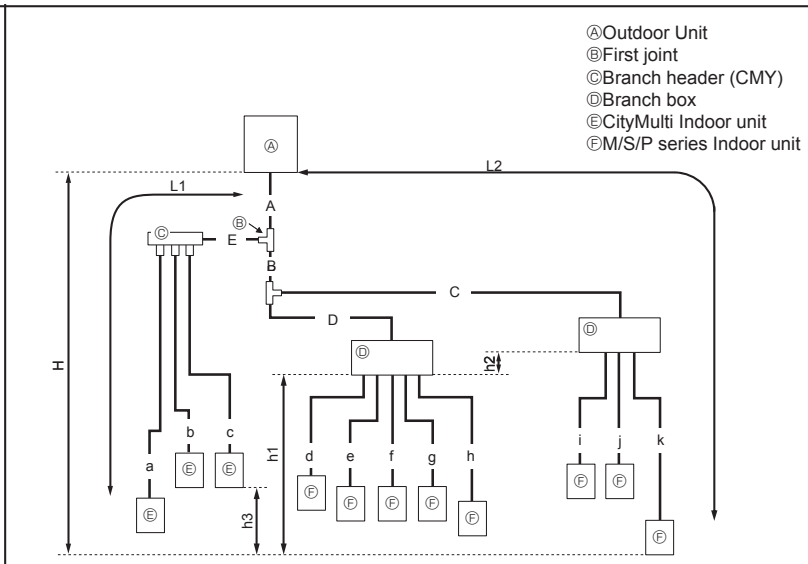
* If the pipe size of indoor unit is different, use a different-diameter joint.

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT when selecting the pipe size and piping length.

■ **Additional refrigerant charge**

Refer to the same section in the previous page.

Mixed Method
Connection Examples
(Connecting to 2 Branch boxes)



Permissible length (One-way)	Total piping length	A+B+C+D+E+a+b+c+d+e+f+g+h+i+j+k ≦120 m
	Farthest piping length (L1)	A+E+a ≦ 70 m
	Farthest piping length. Via Branch box (L2)	A+B+C+k ≦ 80 m
	Piping length between outdoor unit and branch boxes	A+B+C+D ≦ 55 m
	Farthest piping length from the first joint	B+C or E+a ≦ 50 m
	Farthest piping length after branch box	k ≦ 25m
	Farthest branch box form outdoor unit	A+B+C ≦ 55m
	Total piping length between branch boxes and indoor units	d+e+f+g+h+i+j+k ≦ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H)*	H ≦50 m (In case of outdoor unit is set higher than indoor unit)
		H ≦30 m (In case of outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1+h2 ≦ 15 m
	In each branch unit (h2)	h2 ≦ 15 m
	In each indoor unit (h3)	h3 ≦ 12 m
Number of bends		≦ 15

*Branch box should be placed within the level between the outdoor unit and indoor units.

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to Branch box or Branch header (A to E)
(2) Sections From Branch box or Branch header to Indoor Unit (a to k)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box or Branch header (Out-door Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SP112 PUMY-SP125 PUMY-SP140	Liquid Line	ϕ9.52
	Gas Line	ϕ15.88

(2) Refrigerant Piping Diameter In Section From Branch box or Branch header to Indoor Unit (Indoor Unit Piping Diameter)

Indoor unit series	kW type	A Liquid pipe		B Gas pipe
CityMulti	15 to 50	ℓ ≦ 30 m	ϕ6.35	ϕ12.7
		ℓ > 30 m	ϕ9.52	
	63 to 140	ϕ9.52		ϕ15.88
M series or S series	22 to 42	ϕ6.35		ϕ9.52
	50	ϕ6.35		ϕ12.7
	60	ϕ6.35		ϕ15.88
	71	ϕ9.52		ϕ15.88
P series	35,50	ϕ6.35		ϕ12.7
	60 to 100	ϕ9.52		ϕ15.88

* If the pipe size of indoor unit is different, use a different-diameter joint.

Note:
When connecting the CONNECTION KIT (PAC-LV11M-J) and an M-series indoor unit, refer to the installation manual for the CONNECTION KIT when selecting the pipe size and piping length.

■ **Additional refrigerant charge**

Refer to the same section in the previous page.

10-3. PRECAUTIONS AGAINST REFRIGERANT LEAKAGE

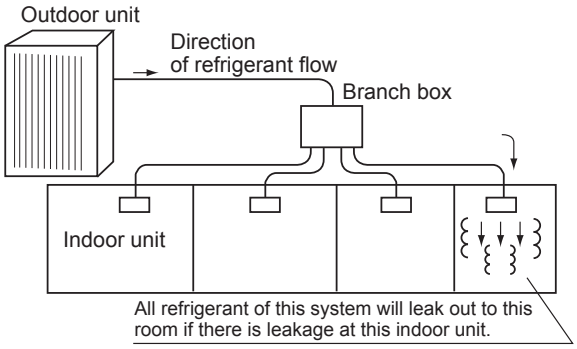
10-3-1. Introduction

R410A refrigerant of this air conditioner is non-toxic and non-flammable but leaking of large amount from an indoor unit into the room where the unit is installed may be deleterious. To prevent possible injury, the rooms should be large enough to keep the R410A concentration specified by ISO 5149-1 as follows.

Maximum concentration
Maximum refrigerant concentration of R410A of a room is 0.44kg/m³ accordance with ISO 5149-1.
To facilitate calculation, the maximum concentration is expressed in units of kg/m³ (kg of R410A per m³)

Maximum concentration of R410A: 0.44 kg/m³

(ISO 5149-1)



10-3-2. Confirming procedure of R410A concentration

Follow (1) to (3) to confirm the R410A concentration and take appropriate treatment, if necessary.

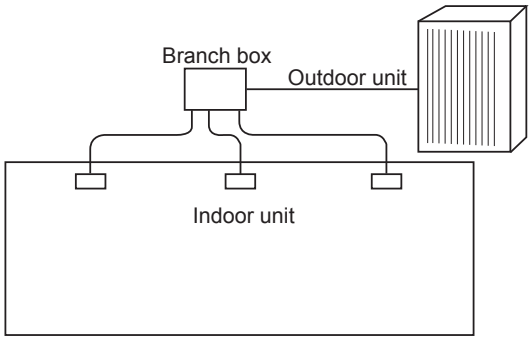
(1) Calculate total refrigerant amount by each refrigerant system. Total refrigerant amount is pre-charged refrigerant at ex-factory plus additional charged amount at field installation.

Note:
When single refrigeration system consists of several independent refrigeration circuit, figure out the total refrigerant amount by each independent refrigerant circuit.

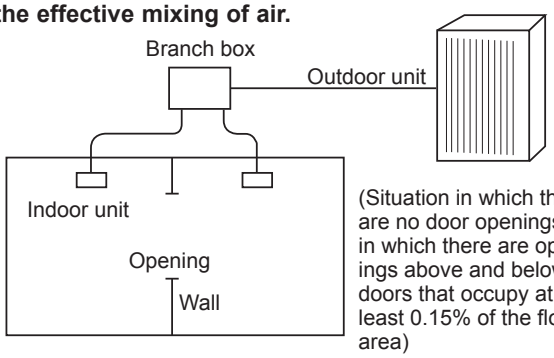
(2) Calculate room volumes (m³) and find the room with the smallest volume

The part with ☐ represents the room with the smallest volume.

(a) Situation in which there are no partitions

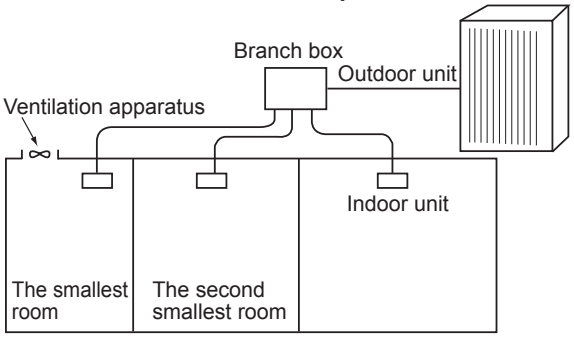


(b) There are partitions, but there are openings that allow the effective mixing of air.



(Situation in which there are no door openings or in which there are openings above and below doors that occupy at least 0.15% of the floor area)

(c) If the smallest room has mechanical ventilation apparatus that is linked to a household gas detection and alarm device, the calculations should be performed for the second smallest room.



(3) Use the results of calculations (1) and (2) to calculate the refrigerant concentration:

$$\frac{\text{Total refrigerant in the refrigerating unit (kg)}}{\text{The smallest room in which an indoor unit has been installed (m}^3\text{)}} \leqq \text{Maximum concentration(kg/m}^3\text{)}$$

Maximum concentration of R410A:0.44kg/m³

If the calculation results do not exceed the maximum concentration, perform the same calculations for the larger second and third room, etc., until it has been determined that nowhere the maximum concentration will be exceeded.

11 DISASSEMBLY PROCEDURE

PUMY-SP112VKM(R1).TH **PUMY-SP125VKM(R1).TH** **PUMY-SP140VKM(R1).TH**
PUMY-SP112YKM(R1).TH **PUMY-SP125YKM(R1).TH** **PUMY-SP140YKM(R1).TH**
PUMY-SP112VKM(R1).TH-BS **PUMY-SP125VKM(R1).TH-BS** **PUMY-SP140VKM(R1).TH-BS**
PUMY-SP112YKM(R1).TH-BS **PUMY-SP125YKM(R1).TH-BS** **PUMY-SP140YKM(R1).TH-BS**

OPERATING PROCEDURE

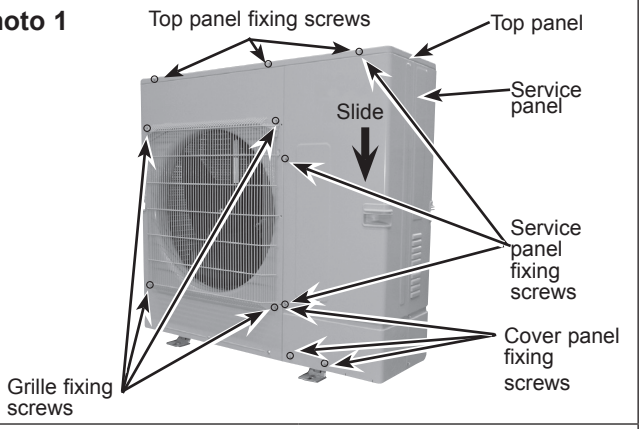
1. Removing the service panel and the top panel

(1) Remove 3 service panel fixing screws (5 × 12), and slide the hook on the right downward to remove the service panel.

(2) Remove screws (2 for front, 3 for rear/5 × 12) of the top panel and remove it.

PHOTOS/FIGURES

Photo 1



2. Removing the fan motor (MF1)

(1) Remove the service panel. (See Photo 1)

(2) Remove the top panel. (See Photo 1)

(3) Remove 4 fan grille fixing screws (5 × 12) to detach the fan grille. (See Photo 1)

(4) Remove a nut (for right handed screw of M6) to detach the propeller. (See Photo 2)

(5) Disconnect the connector CNF1 on the multi controller circuit board in the electrical parts box. (See Photo 4)

(6) Loosen a clamp on the side of the motor support. (See Photo 3)

(7) Remove 4 fan motor fixing screws (5 × 20) to detach the fan motor. (See Photo 3)

Note: Tighten the propeller fan with a torque of 5.7 ± 0.3 N·m.

Photo 2

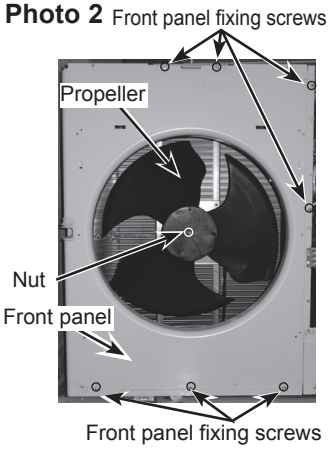
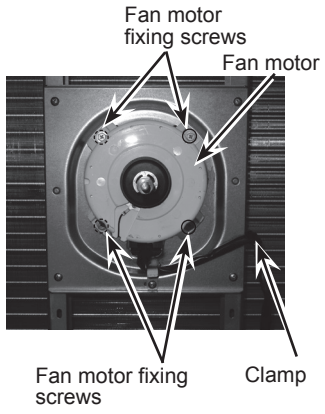


Photo 3



3. Removing the electrical parts box

(1) Remove the service panel. (See Photo 1)

(2) Remove the top panel. (See Photo 1)

(3) Disconnect the connecting wire from terminal block. (See Photo 5 for VKM type, or Photo 7 for YKM type)

(4) Disconnect the connector CNF1, 4-way valve coil, LEV-A and LEV-B on the multi controller circuit board.
<Symbols on the board>
- CNF1: Fan motor
- LEV-A: LEV
- LEV-B: LEV
- 21S4: 4-way valve coil
- 63HS: Pressure sensor
- SV1: Solenoid valve coil
- 63H: Pressure switch
- 63LS: Pressure sensor

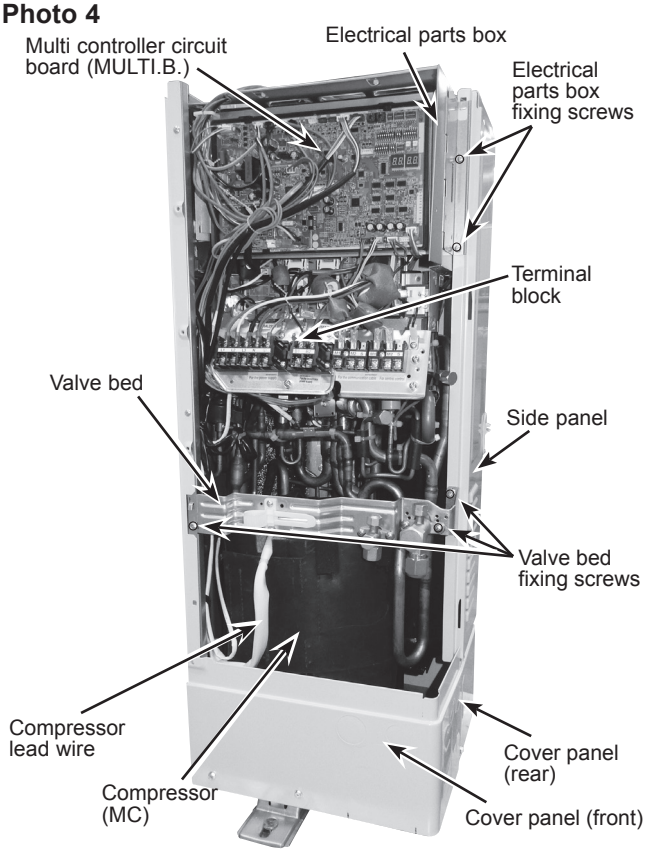
(5) Disconnect the pipe-side connections of the following parts:
- Thermistor <HIC> (TH2)
- Thermistor <Compressor> (TH4)
- Thermistor <Liquid> (TH3)
- Thermistor <Suction> (TH6)
- Thermistor <Ambient> (TH7)

(6) Remove the comp felt (top).

(7) Remove a nut from the terminal cover to remove the cover, and disconnect the compressor lead wire. (See Photo11)

(8) Remove 2 electrical parts box fixing screws (4 × 10), and detach the electrical parts box by pulling upward. The electrical parts box is fixed with 2 hooks on the left and 1 hook on the right.

Photo 4



OPERATING PROCEDURE

4. Disassembling the electrical parts box (VKM type)

(1) Disconnect all the connectors on the multi controller circuit board.
(2) Remove 2 screws ① which fix the plate holding the multi controller circuit board and the electrical parts box. (See Photo 5)
(3) Remove the multi controller circuit board. (See Photo 5)
(4) Disconnect the M-NET power board connector on the back plate of the controller circuit board.
(5) Disconnect the connectors of reactor on the back plate of the electrical parts box. (See Photo 6)
(6) Remove 2 screws ② on the back plate of the electrical parts box. (See Photo 6)
(7) Remove the 3 reactors. (See Photo 6)

Note 1: When reassembling the electrical parts box, make sure that the wirings are correct.
Note 2: When exchanging the reactor, make sure to exchange all the 3 reactors.

5. Disassembling the electrical parts box (YKM type)

(1) Disconnect all the connectors on the multi controller circuit board.
(2) Remove 2 screws ① which fix the plate holding the multi controller circuit board and the electrical parts box.
(3) Remove the multi controller circuit board. (See Photo 7.)
(4) Disconnect the M-NET power board connector on the back plate of the controller circuit board.
(5) Disconnect all the connectors on the noise filter circuit board. (See Photo 8)
(6) Remove 9 supports on the noise filter circuit board. (See Photo 8)
(7) Remove the noise filter circuit board. (See Photo 8)
(8) Remove the noise filter plate fixing screws. (See Photo 8)
(9) Disconnect the connectors of reactor on the bottom plate of the electrical parts box. (See Photo 9)
(10) Remove 4 screws ② on the bottom plate of the electrical parts box. (See Photo 9)
(11) Remove the reactor. (See Photo 9)

Note : When reassembling the electrical parts box, make sure that the wirings are correct.

PHOTOS/FIGURES

Photo 5

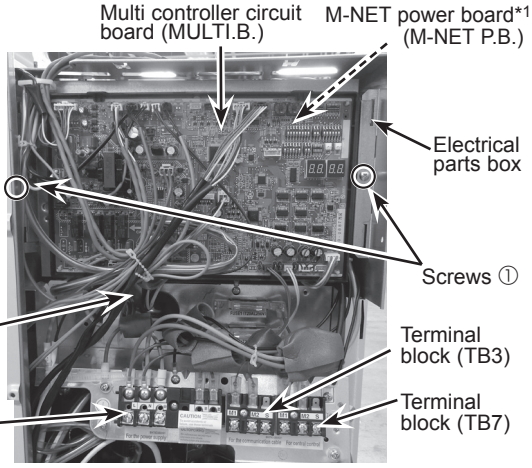
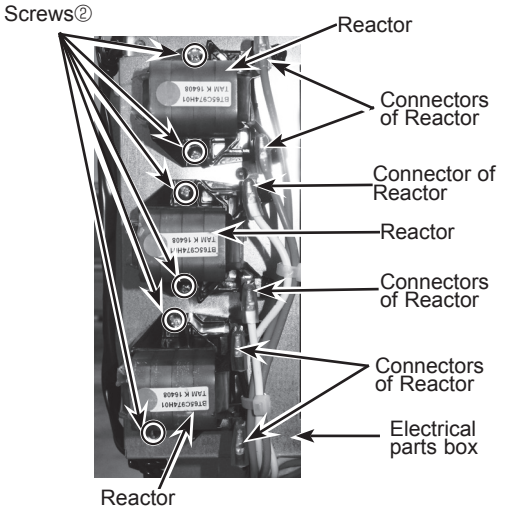
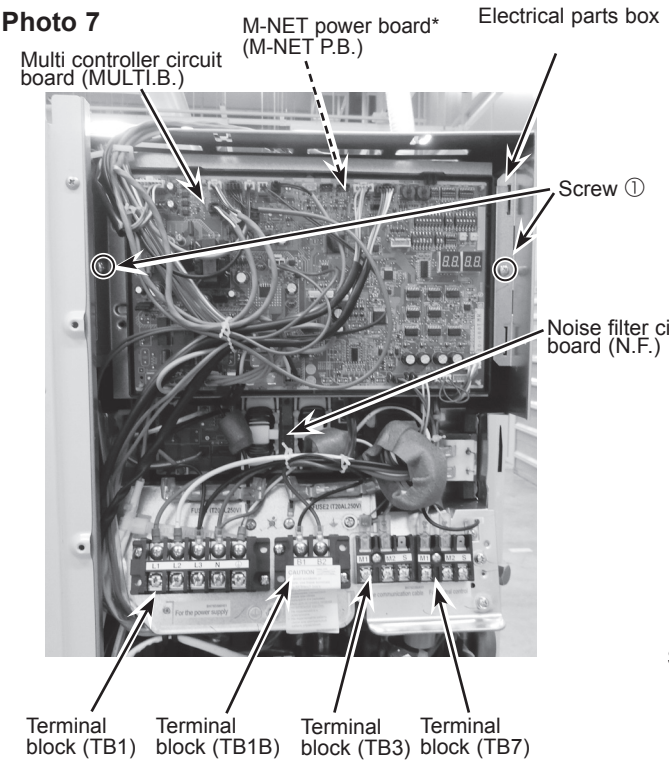


Photo 6



*1 The M-NET power board is installed behind the multi controller circuit board.

Photo 7



* The M-NET power board is installed behind the multi controller circuit board.

Photo 8

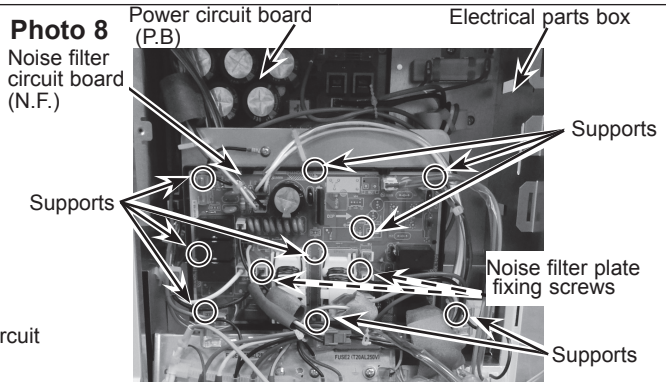
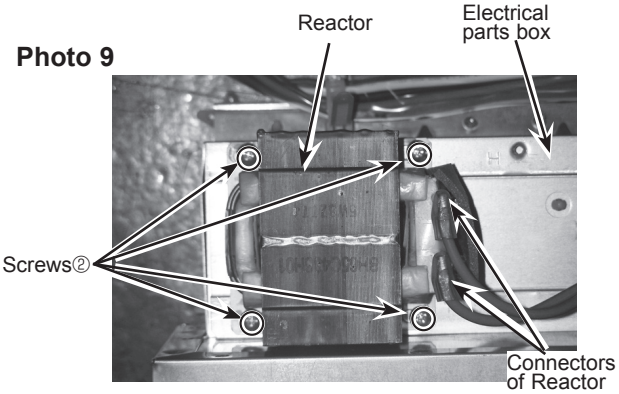
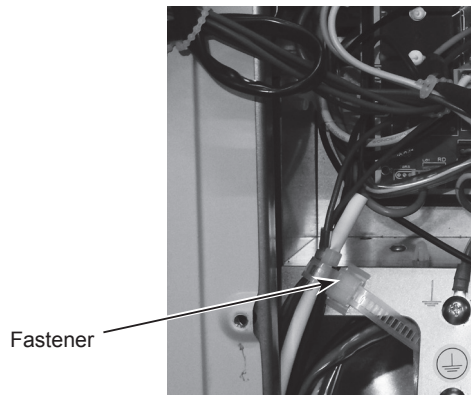
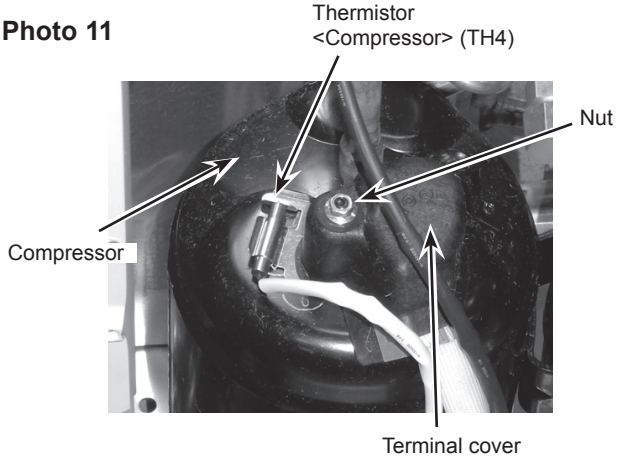
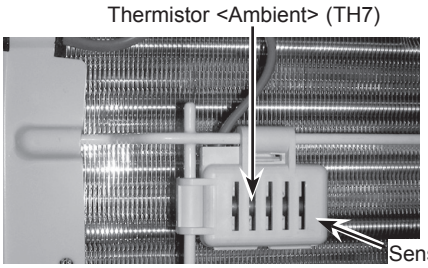
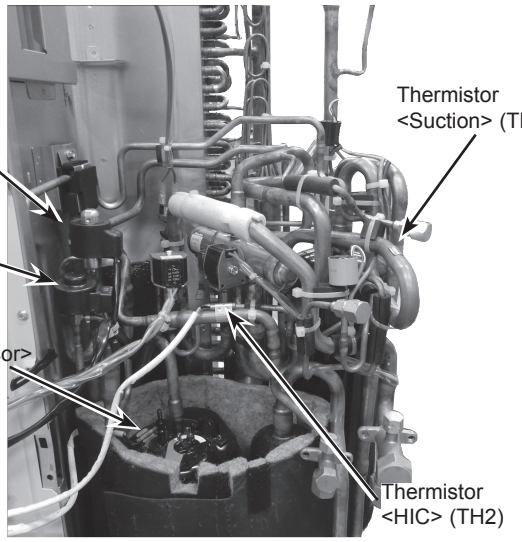
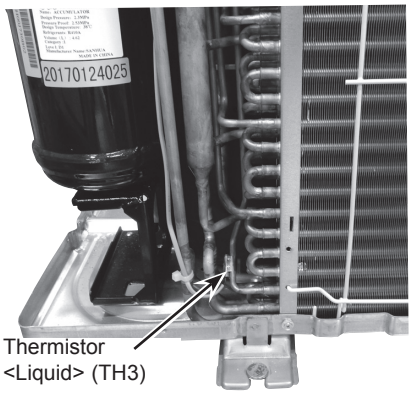
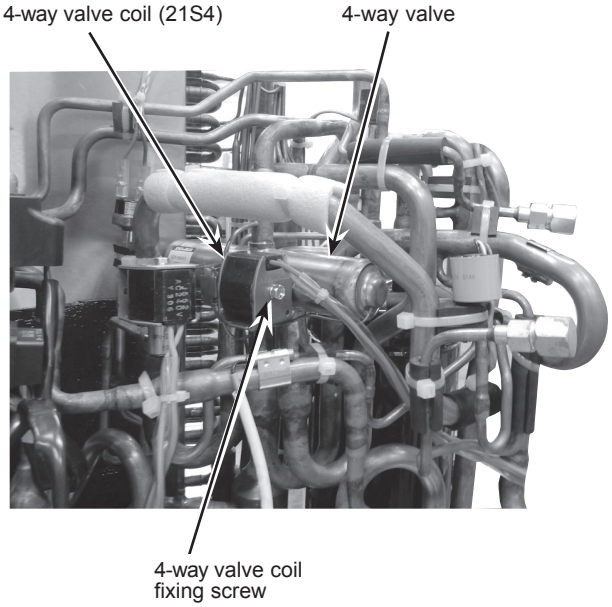


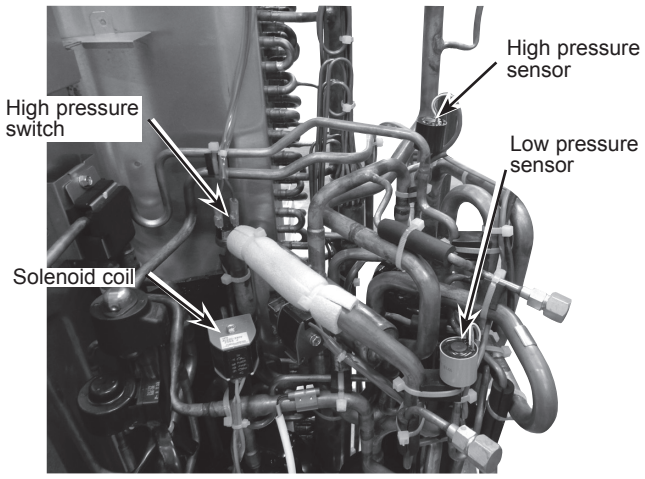
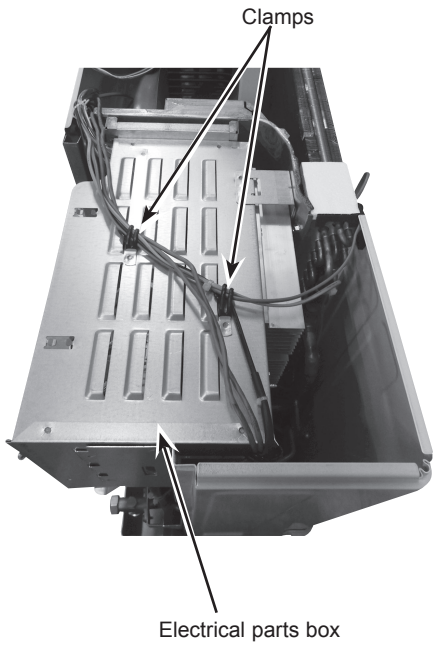
Photo 9

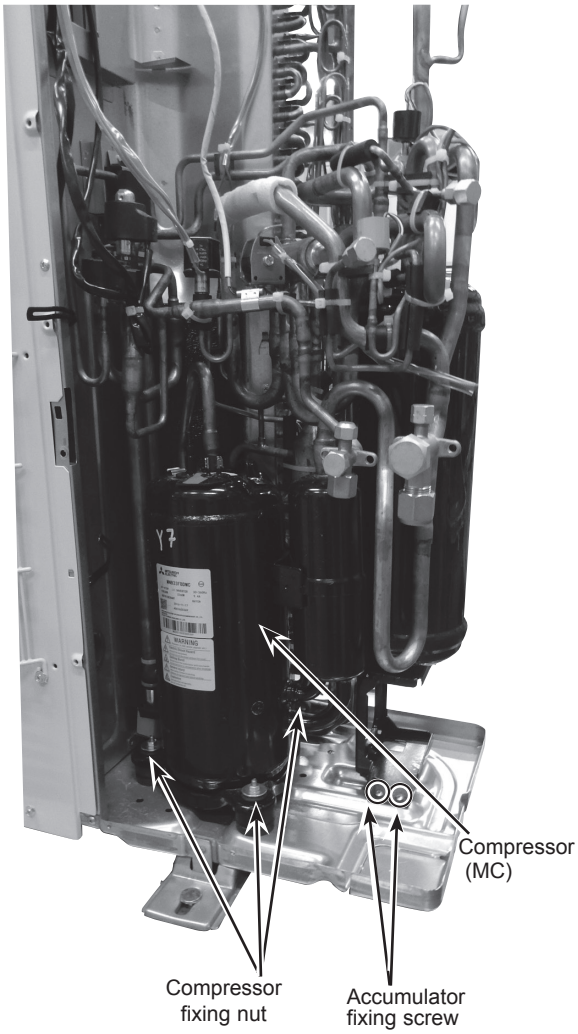


OPERATING PROCEDURE	PHOTOS/FIGURES
6.Removing the thermistor <HIC> (TH2) and the thermistor <Compressor> (TH4) (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Disconnect the following connectors on the controller circuit board in the electrical parts box. • TH2: Black • TH4:White [Removing the thermistor <HIC> (TH2)] (4) Loosen the fastener fixing the connector to the electrical parts box. (See Photo 10) (5) Pull out the thermistor <HIC> (TH2) from the sensor holder. (See Photo 13) [Removing the thermistor <Compressor> (TH4)] (4) Loosen the fastener fixing the connector to the electrical parts box. (See Photo 10) (5) Remove the comp felt (top). (6) Pull out the thermistor <Compressor> (TH4) from the sensor holder. (See Photo 11)	**Photo 10** 
7. Removing the thermistor <Liquid> (TH3), the thermistor <Suction> (TH6), and thermistor <Ambient> (TH7) (1) Remove the service panel. (See Photo 1.) (2) Remove the top panel. (See Photo 1.) (3) Remove the side panel (R) by removing the following screws: • Electrical parts box fixing screws (4 × 10): 2 pieces • Valve bed fixing screws (5 × 12): 2 pieces • Side panel fixing screw on the right side of the panel (5 × 12): 1 piece • Side panel fixing screw in the rear of the panel (5 × 12): 3 pieces (4) Disconnect the following connectors on the multi controller circuit board in the electrical parts box. • TH3: White • TH6/7: Red (5) Loosen the fastener fixing the connector to the electrical parts box. (See Photo 10) (6) Pull out each thermistor from the sensor holder. (See Photo 12, 13) **Note: When replacing thermistor <Ambient> (TH7), replace it together with thermistor <Suction> (TH6), since they are combined together.**	**Photo 11** 

OPERATING PROCEDURE	PHOTOS/FIGURES
8. Removing LEV coil [LEV-A] (1) Remove the service panel. (See Photo 1) (2) Disconnect the connector CNL VA (WH) on the multi controller circuit board in the electrical parts box. (3) Remove the LEV coil by sliding the coil upward. (See Photo 13) [LEV-B] (1) Remove the service panel. (See Photo 1) (2) Disconnect the connector CNL VB (RD) on the multi controller circuit board in the electrical parts box. (3) Remove the LEV coil by sliding the coil upward. (See Photo 13)	**Photo 12** 
9. Removing LEV (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the electrical parts box. (Refer to procedure 3) (4) Remove the LEV coil.(Refer to procedure 8) (5) Recover refrigerant. (6) Remove the welded part of LEV. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: The welded part can be removed easily by removing the right side panel.** **Note 3: When installing the LEV, cover it with a wet cloth to prevent it from heating (120°C or more), then braze the pipes so that the inside of pipes are not oxidized.**	**Photo 13**  **Photo 14** 

OPERATING PROCEDURE	PHOTOS/FIGURES
10. Removing the 4-way valve coil (21S4) (1) Remove the service panel. (See Photo 1) **[Removing the 4-way valve coil]** (2) Remove 4-way valve coil fixing screw (M5 × 7). (3) Remove the 4-way valve coil by sliding the coil toward you. (4) Disconnect the connector 21S4 (green) on the outdoor multi controller circuit board in the electrical parts box.	**Photo 15** 
11. Removing the 4-way valve (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the electrical parts box (Refer to procedure 3) (4) Remove 3 valve bed fixing screws (5 × 12) and 4 stop valve fixing screws (5 × 16) and then remove the valve bed. (See Photo 4) (5) Remove 4 right side panel fixing screw (5 × 12) in the rear of the unit and then remove the right side panel. (6) Remove the 4-way valve coil. (See Photo 15) (7) Recover refrigerant. (8) Remove the welded part of 4-way valve. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: The welded part can be removed easily by removing the right side panel.** **Note 3: When installing the 4-way valve, cover it with a wet cloth to prevent it from heating (120°C or more), then braze the pipes so that the inside of pipes are not oxidized.**	

OPERATING PROCEDURE	PHOTOS/FIGURES
12. Removing the solenoid valve coil (SV1) and the solenoid valve (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Disconnect the connector SV1 (Gray) on the multi controller circuit board in the electrical parts box. (4) Remove the electrical parts box. (Refer to procedure 3) (5) Remove the solenoid valve coil fixing screw (M4 ×6). (6) Remove the solenoid valve coil by sliding the coil upward. (7) Recover refrigerant. (8) Remove the welded part of solenoid valve. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: When installing the solenoid valve, cover it with a wet cloth to prevent it from heating (120°C or more), then braze the pipes so that the inside of pipes are not oxidized.**	**Photo 16** 
13. Removing the high pressure switch (63H) (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the electrical parts box. (Refer to procedure 3) (4) Remove the side panel (R). (Refer to the procedure 7 (3)) (5) Pull out the 2 lead wire of the high pressure switch. (6) Recover refrigerant. (7) Remove the welded part of high pressure switch. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: The welded part can be removed easily by removing the right side panel.** **Note 3: When installing the high pressure switch and high pressure sensor, cover them with a wet cloth to prevent them from heating (100°C or more), then braze the pipes so that the inside of pipes are not oxidized.**	**Photo 17** 
14. Removing the low pressure sensor (63LS) and the high pressure sensor (63HS) (1) Remove the service panel. (See Photo 1) (2) Remove the top panel. (See Photo 1) (3) Remove the side panel (R). (Refer to the procedure 7 (3)) (4) Disconnect the connector 63LS (blue) and the 63HS(white) on the multi controller circuit board in the electrical parts box. (5) Loosen the clamps, which are fixing the low pressure sensor and high pressure sensor lead wire to the top of the electrical parts box. (See Photo 17) (6) Recover refrigerant. (7) Remove the welded part of low pressure sensor and high pressure sensor. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: The welded part can be removed easily by removing the right side panel.** **Note 3: When installing the low pressure sensor and high pressure sensor, cover it with a wet cloth to prevent it from heating (100°C or more), then braze the pipes so that the inside of pipes are not oxidized.**	

OPERATING PROCEDURE	PHOTOS/FIGURES
15. Removing the compressor (MC) (1) Remove the service panel. (See Photo 1.) (2) Remove the top panel. (See Photo 1.) (3) Remove the electrical parts box. (Refer to procedure 3) (4) Remove the valve bed by removing the following screws: • Valve bed fixing screws (5 × 12): 3 pieces • Stop valve fixing screws (5 × 16): 4 pieces (5) Remove 2 cover panel (front) fixing screws (5 × 12) to remove the cover panel (front). (6) Remove 5 cover panel (rear) fixing screws (5 × 12) to remove the cover panel (rear). (7) Remove 2 side panel (R) fixing screws in the rear of the panel (5 × 12) and remove the side panel (R). (8) Remove the comp felt (top) and (body). (9) Remove the nut on the terminal cover to remove the terminal cover, and remove the compressor lead wire. (See Photo18) (10) Remove the thermistor <Compressor> (TH4). (11) Recover refrigerant. (12) Remove the welded pipe of compressor inlet and outlet. (13) Remove 3 compressor fixing nuts. **Note 1: Recover refrigerant without spreading it in the air.** **Note 2: When reconnecting the compressor wirings, ensure that the connection is correct: Check the color of the wiring and the label on the terminal block, and connect properly.**	**Photo 18** 
16. Removing the accumulator (1) Remove the service panel. (See Photo 1.) (2) Remove the top panel. (See Photo 1.) (3) Remove the electrical parts box. (Refer to procedure 3) (4) Remove the valve bed. (Refer to the procedure 15(4)) (5) Remove the cover panel (front). (Refer to the procedure 15 (5)) (6) Remove the cover panel (rear). (Refer to the procedure 15 (6)) (7) Remove the side panel (R). (Refer to the procedure 15 (7)) (8) Recover refrigerant. (9) Remove the welded pipe of accumulator inlet and outlet. (10) Remove 2 accumulator fixing screws. (See Photo18) **Note: Recover refrigerant without spreading it in the air.**	

CITY MULTI

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