

TECHNICAL & SERVICE MANUAL

Air Conditioner Optional Parts

R-Converter Unit

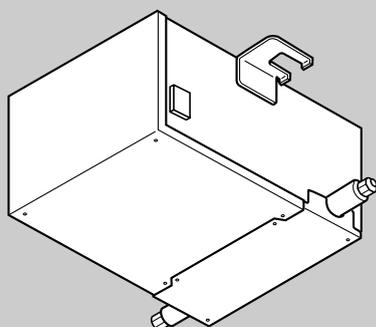
[Model name]

[Service Ref.]

PAC-SF29LB

PAC-SF29LB

※ Refer to the technical & service manuals of the indoor and outdoor units.



R-Converter Unit

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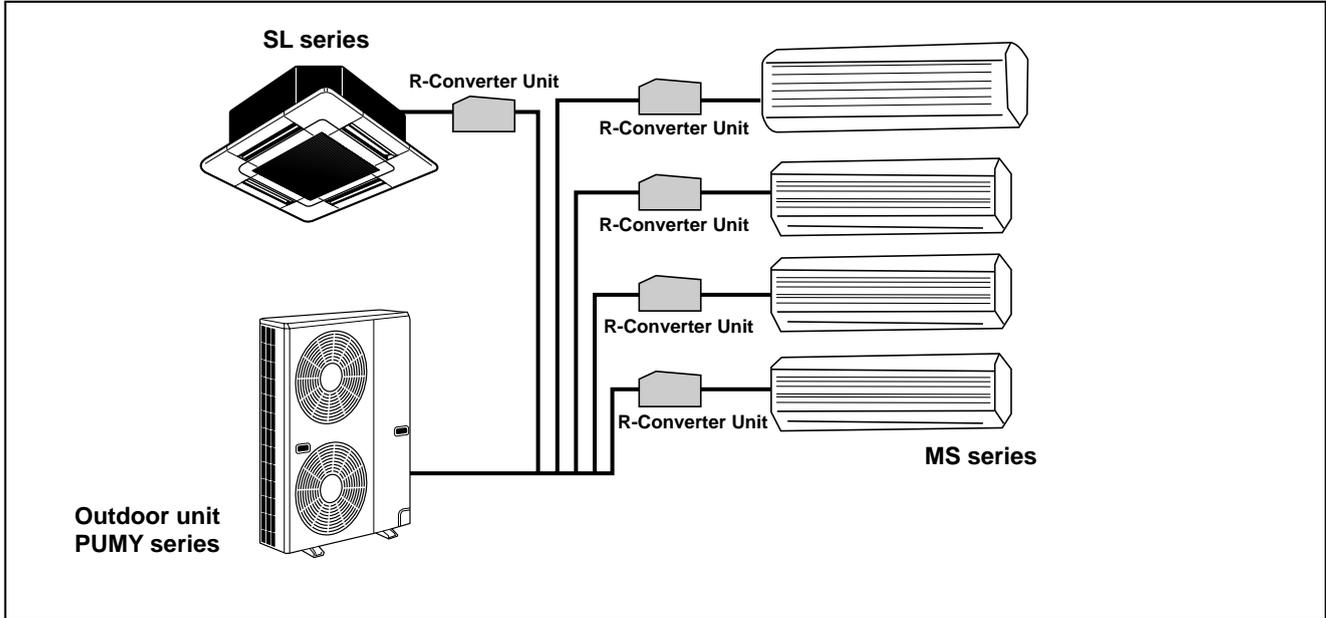
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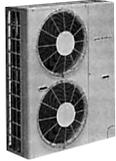
OVERVIEW OF UNITS

1-1. SYSTEM OUTLINE

1-1-1. System example



1-2. UNIT CONSTRUCTION

Outdoor unit	PUMY-P125VMA PUMY-P125YMA	
		
Indoor unit that can be connected	Capacity	Type 20~Type 125
	Number of units	1~8 units
	Total system wide capacity	50~130% of outdoor unit capacity

+

Branching Pipe

Rated capacity			Model	4-way folw Cassette Ceiling	Wall Mounted
Capacity type	Cooling (kW)	Heating (kW)		SL series	MS series
20	2.2	2.5	—	—	MSC-07RV-E5, MSH-07RV-A3
25	2.8	3.2	—	SLH-1AR1.TH	MSC-09RV-E5, MSH-09RV-A3
32	3.6	4.0	—	—	—
40	4.5	5.0	—	SLH-1.6AR1.TH	MSC-12RV-E5, MSH-12RV-A3
50	5.6	6.3	—	SLH-2AR1.TH	MSH-18RV-E2, MSH-18RV-A2
63	7.1	8.0	—	—	MSH-24RV-E2, MSH-24TV-A2

CITY MULTI indoor Units
(P•FY series)

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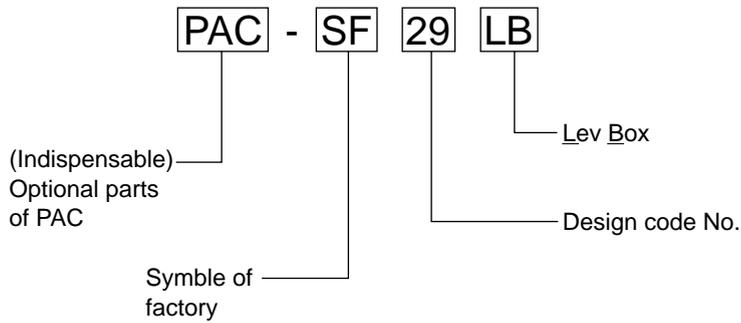
Remote Controller

Panel SLP-2AL

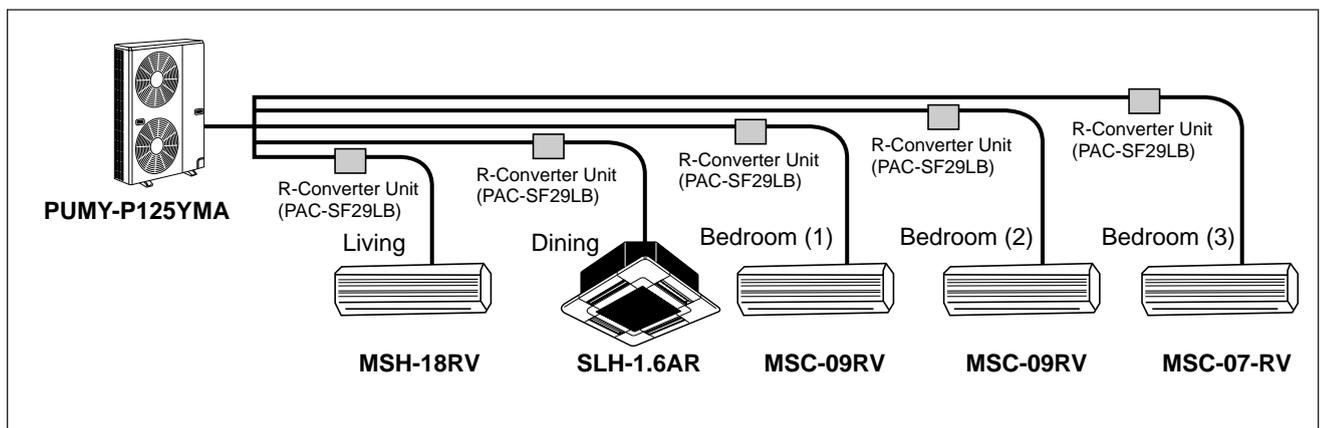
R-Converter Unit PAC-SF29LB

1-3. METHOD FOR IDENTIFYING

■ R-Converter Unit



1-4. TYPICAL COMBINATION EXAMPLE



■ Verification

The rated capacity should be determined by observing the below. The unit's quantities are limited in 1 to 8 units. For the next step, make sure that the selected total indoor unit capacity is in a range of 63 ~ 163.

The total indoor unit capacity should be within the outdoor units. (=125 is preferred).

Combination of excessive indoor units and an outdoor unit may reduce the cooling capacity of each indoor unit.

The rated indoor capacity is as blow table.

Example:

MSH-18	= 50	} Total rated capacity
SLH-1.6	= 40	
MSC-09	= 25	
MSC-09	= 25	
MSC-07	= 20	
		160 ≤ 163

* Capacity type of indoor units
Refer to page 2.

1-5. INSTALLATION

1-5-1. Installing the R-Converter Unit (mm)

Parts to procure locally

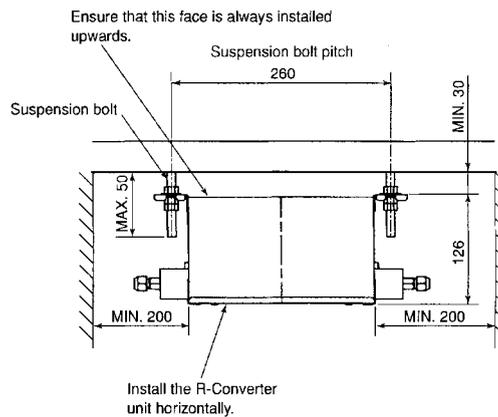
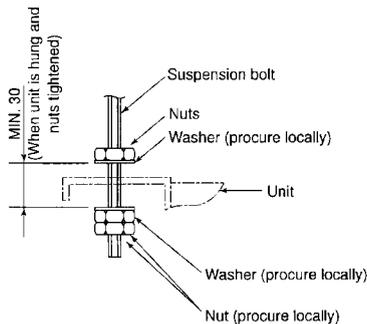
- Suspension bolts or anchor bolts : W3/8 (M10)
- Nut : W3/8 (M10)
- Washer : W3/8 (M10)

Installing the unit in a ceiling

(1) Install the suspension bolts

	<p>Wooden structures</p> <ul style="list-style-type: none"> • Use tie beams (single storied houses) or second floor beams (two story houses) as reinforcing members. • Wooden beams for suspending air conditioners must be sturdy and their sides must be at least 6 cm long if the beams are separated by not more than 90 cm. The size of the suspension bolts should be M10 (W3/8). (The bolts are not supplied with the unit.) <p>Ⓐ Ceiling Ⓑ Rafter Ⓒ Beam Ⓓ Roof beam B* Suspension bolt pitch</p>
	<p>Ferro-concrete structures</p> <p>Secure the suspension bolts using the method shown, or use steel or wooden hangers, etc. to install the suspension bolts.</p> <p>Ⓔ Use inserts rated at 100-150 kg each (procure locally) Ⓕ Suspension bolts M10 (W3/8) (procure locally) Ⓖ Steel reinforcing rod</p>

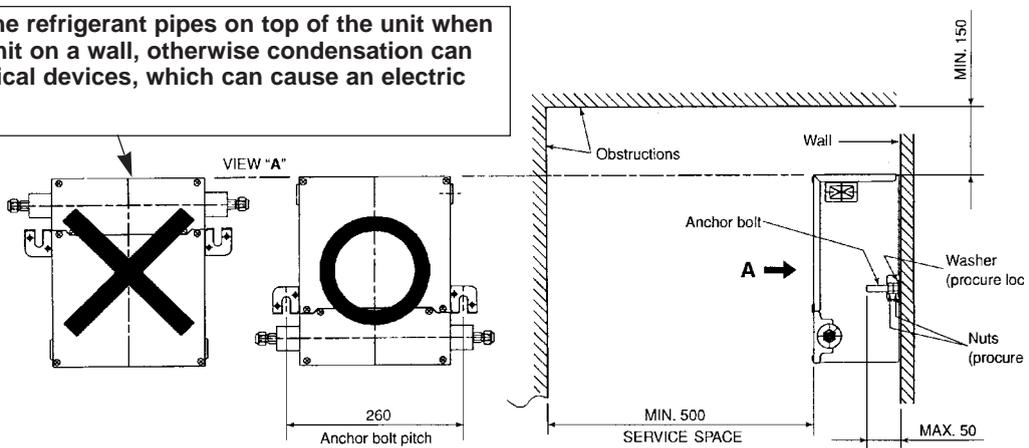
(2) Install the R-Converter unit.



Installing the unit on a wall

(1) Install the anchor bolts.
(2) Install the R-Converter unit.

Do not install the refrigerant pipes on top of the unit when installing the unit on a wall, otherwise condensation can enter the electrical devices, which can cause an electric shock or a fire.



1-5-2. Installing Refrigerant Piping (mm)

Check the R-Converter unit accessories and parts

- ① Pipe cover × 2 ② Band (long) × 4 ③ Thermistor holder— $\phi 6.35$ (liquid) × 1 ④ Thermistor holder— $\phi 9.52$ (liquid or gas) × 1
 ⑤ Thermistor holder— $\phi 12.7$ (gas) × 1 ⑥ Thermistor holder— $\phi 15.88$ (gas) × 1 ⑦ Thermistor insulation ($3 \times 150 \times 60$) × 2
 ⑧ Band (short) × 2

Connect R-Converter unit to the liquid pipe

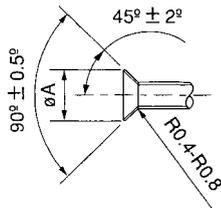
- For identification purposes, list the indoor unit model names in the nameplate on the control box of the R-Converter unit.
- To prevent water from dripping from the refrigerant piping, wrap both the liquid and gas piping with commercially available thermal insulation that is at least 12 mm thick and which is able to withstand temperatures in excess of 100 °C.
- See the indoor and outdoor unit installation manual when creating a vacuum and opening or closing valves.
- Install the piping so that vibrations from the piping do not transmit to the unit.

Installing piping to the unit

- (1) Remove the flared nuts and caps from the R-Converter unit.
- (2) Flare the ends of the liquid and gas piping, and apply refrigeration oil (procure locally) to the flared seat.
- (3) Connect the refrigerant piping immediately. Always tighten the flared nuts to the specified torque using a torque wrench and double spanner.
- (4) Press the pipe covers ① on the liquid piping against the unit and wrap it to hold it in place.
- (5) Fasten the supplied bands ② 10-20 mm from each end of the pipe covers ①.

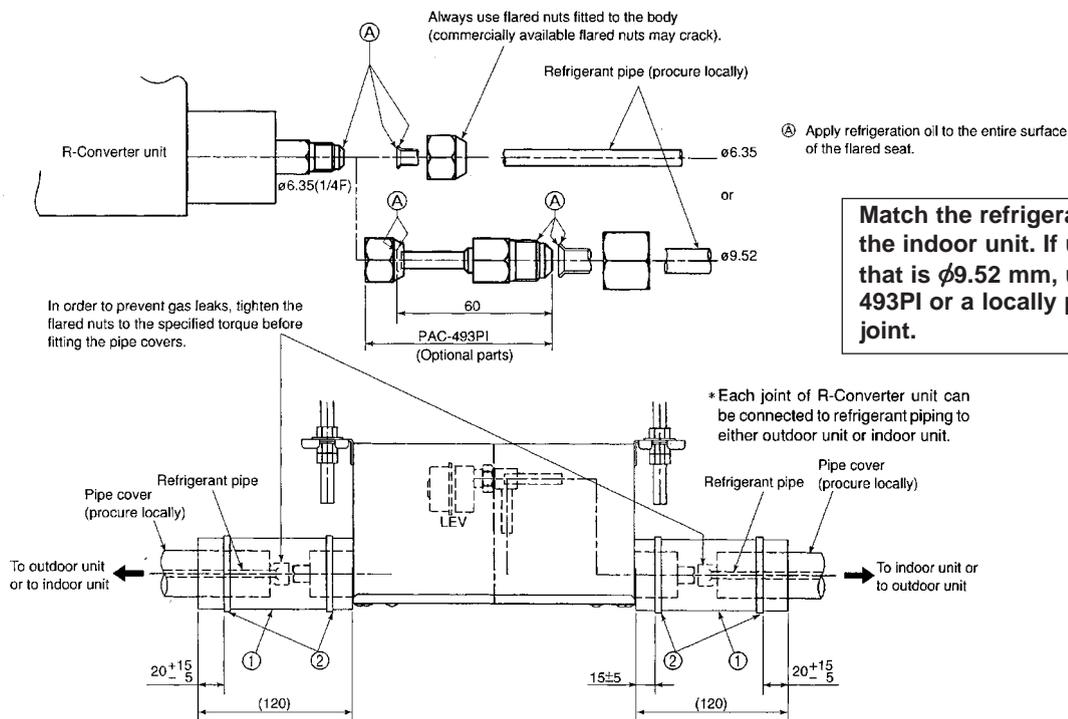
⚠ Caution :

- Tighten the flare nut with a torque wrench in the specified method.
- Do not use the existing refrigerant piping, when use R407C refrigerant.
- Take precautions so that the Freon gas is not leaked during a fire.

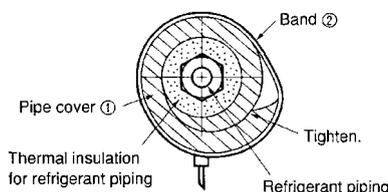


Copper piping O.D. (mm)	Flare dimensions φA dimension (mm)	Torque N-m (kgf·cm)
φ6.35	8.6-9.0	14-18 (140-180)
φ9.52	12.6-13.0	34-42 (340-420)

In order to prevent gas leaks, tighten the flared nut to the specified torque even when not connecting the indoor unit refrigerant piping.



Section of connection



- Refrigerant charge :
See the outdoor unit installation manual.
Use only R407C or R22 refrigerant.
- Use the following procedures for connecting parts to the indoor unit.
 - a) Tighten the flared nuts to prevent refrigerant leaks.
 - b) Fasten the pipe covers ① to the pipes with the bands ② to prevent condensation.

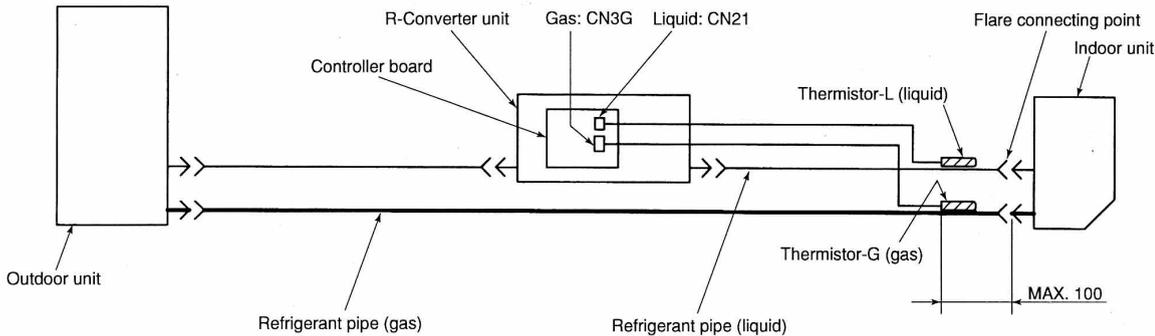
1-5-3. Installing the thermistors (mm)

Be sure to install the thermistors (gas and liquid) supplied with the unit as shown in the illustration.

- If the thermistors are not installed, the unit will not operate. If the thermistors are installed incorrectly, the unit will not operate properly.

Take precaution so that condensation does not contact the thermistor leads or enters the electrical devices.

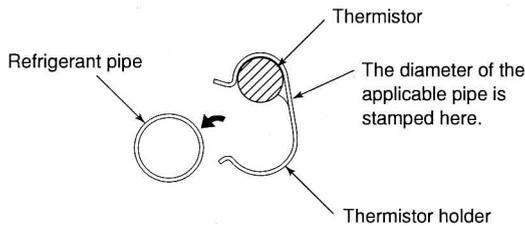
Before installing thermal insulation to the frame connecting points of the indoor unit, be sure to install the thermistors according to the procedures given on this page.



Thermistor installation order

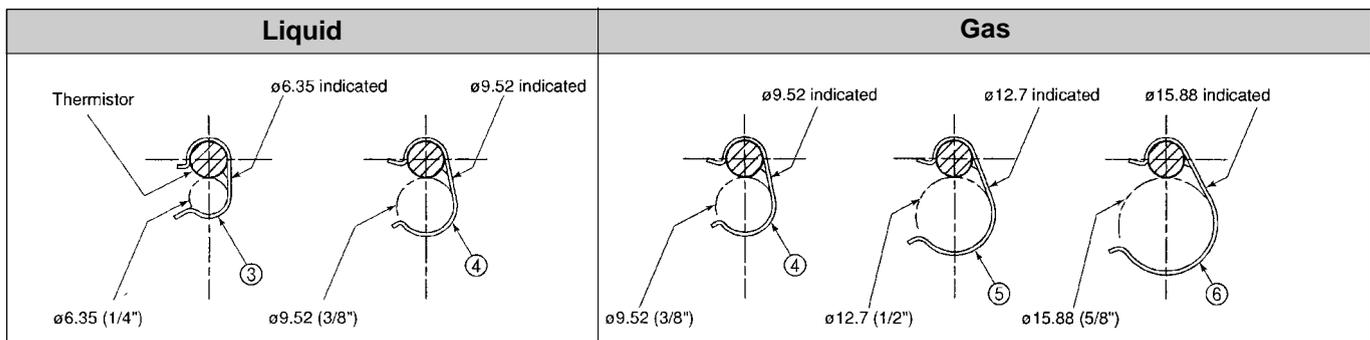
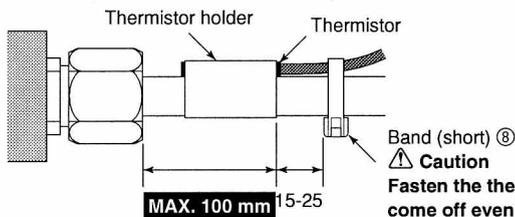
(1) Securely fasten the thermistors (liquid and gas) supplied with the unit using the thermistor holders (③, ④, ⑤, ⑥) at the fastening points of indoor unit refrigerant pipes.

- Set thermistor-L (liquid) in thermistor holders ③ or ④ and thermistor-G (gas) in thermistor holders ④, ⑤ or ⑥, and then fasten the refrigerant pipes.



Select thermistor holders that match the size of the refrigerant piping.

Indoor unit capacity		pipe size (mm)	
BTU	HP	Liquid	Gas
07, 09	1	φ6.35	φ9.52
12, 13	1.6	φ6.35	φ12.7
18	2	φ6.35	φ15.88
24, 30	2.5	φ9.52	φ15.88



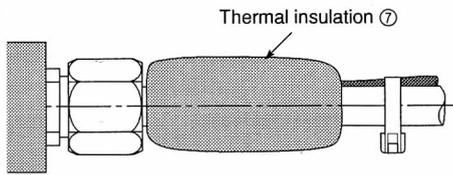
⚠ Caution :

- To prevent condensation from dripping on the thermistor fasteners, wrap them with sufficient thermal insulation.
- Install the thermistors so that the piping is on top (as shown in above illustration).
- Take out the thermistor lead from above the piping.
- Install the thermistors indoors.

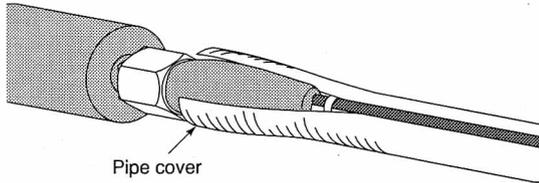
Route the following lead, line, and cable pairs so that they do not come into contact with each other.

- Thermistor lead and indoor unit-R-Converter transmission line
- Thermistor lead and power supply cable
- Transmission line and power supply cable

(2) Insulate the thermistors with the supplied thermal insulation ⑦.



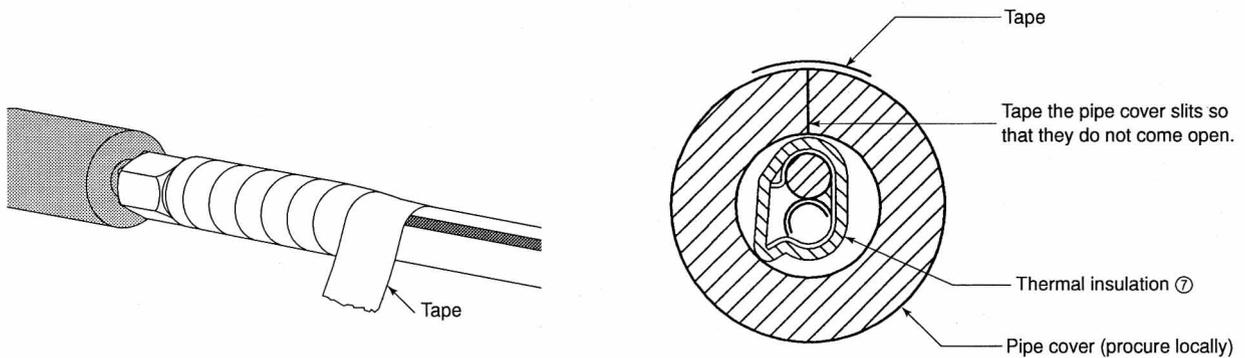
(3) Cut a 100 mm slit on the top portion of the extension piping pipe covers, and then cover the thermistors with the pipe covers.



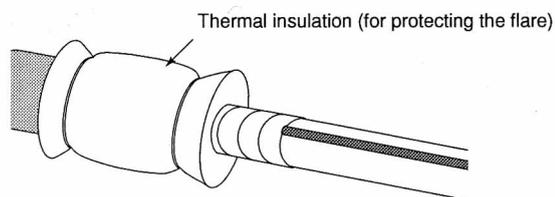
(4) Wrap the thermal insulation covering the thermistor with tape.

⚠ Caution :

Be sure to take out the thermistor lead from above.



(5) Cover the flare and thermistor with the thermal insulation (for protecting the flare) supplied with the indoor unit.



Bundle up the excess thermistor lead.

⚠ Caution :

- Do not make the thermistor lead taut.
- Do not add extensions to the thermistor lead.
- Do not cut the excess thermistor lead.
- Make sure that the bundled thermistor lead does not interfere with any other wiring.

R-Converter Unit : PAC-SF29LB

Model name		PAC-SF29LB	
Connectable number of indoor units		1	
Total capacity index of indoor units to be connected		Type 20-63	
Power supply		Single phase, 220/230/240V, 50Hz, Single phase, 220V, 60Hz	
External finish		Hot-dip Zinc - coated steel (No external finish)	
Drain hose size (on site)		mm	—
Dimensions	Width	mm	280
	Depth	mm	220
	Height	mm	126
Weight		kg	2.8
Piping connection (Flare)	Liquid	mm(in.)	6.35 (1/4)*
	Gas	mm(in.)	—
Wiring	To indoor unit	2-core cable	
	To outdoor unit	2-core shield cable (Non-polarized)	

* If using on indoor unit with $\phi 9.52$ piping connection and using a $\phi 9.52$ refrigerant pipe, use joint pipe "PAC-493PI" (optional parts) or a locally procured tandem joint ($\phi 6.35 \rightarrow \phi 9.52$)

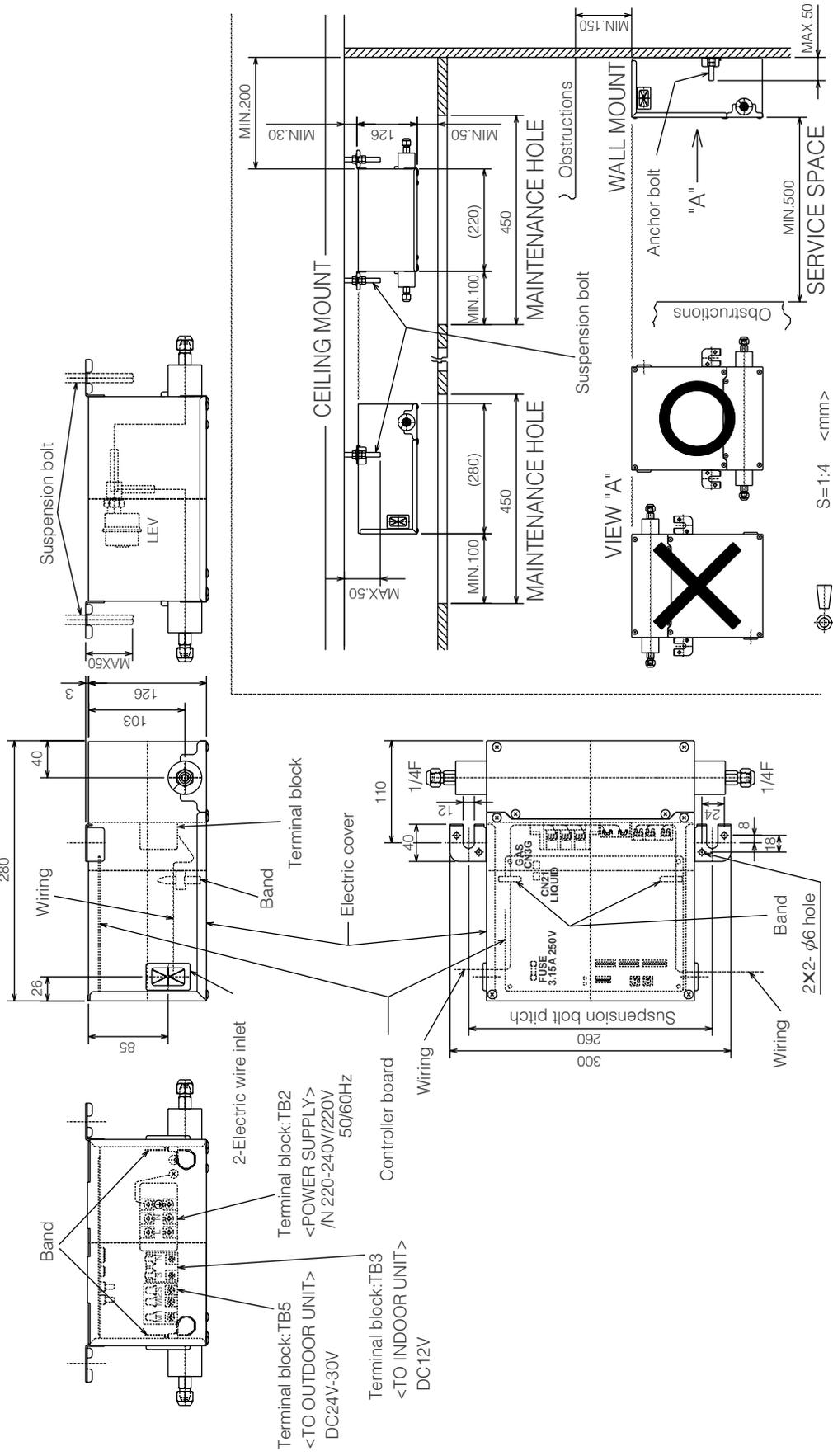
	Model Name (series)
Connectable indoor units	Wall mounted MS series* Cassette Ceiling SL series*
Connectable outdoor units	PUMY series *

* See page 2 for detail model name.

* Suspension bolt or Anchor bolt : M10(W3/8)

* Weight : 2.8kg

* V = 126H * 280W * 220D = 0.0078 m²



PAC-SF29LB (R-CONVERTER UNIT) WIRING DIAGRAM

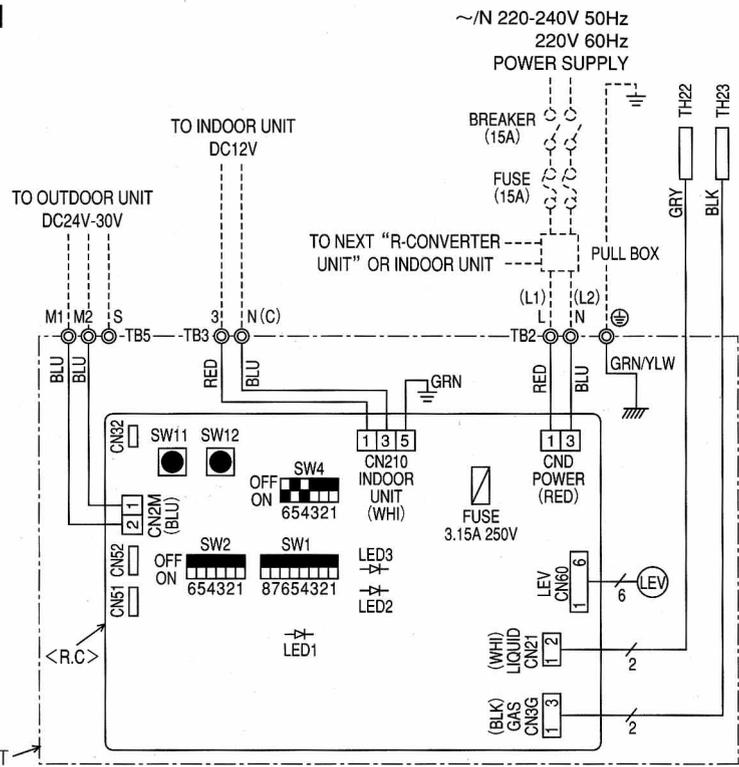
SYMBOL	NAME
R.C	CONTROLLER BOARD
FUSE (R.C)	FUSE 3.15A 250V
SW1 (R.C)	SWITCH for MODE SELECTION
※ SW2 (R.C)	SWITCH for CAPACITY CODE
※ SW4 (R.C)	SWITCH for MODEL SELECTION
※ SW11 (R.C)	SWITCH for ADDRESS SETTING 1st DIGIT
※ SW12 (R.C)	SWITCH for ADDRESS SETTING 2nd DIGIT
LED1 (R.C)	POWER SUPPLY
LED2 (R.C)	ERROR MESSAGE, INDOOR UNIT ON/OFF
LED3 (R.C)	TRANSMISSION (INDOOR-R-CONVERTER)
TB2	Terminal Block (POWER)
TB3	Terminal Block (To indoor unit)
TB5	Terminal Block (To outdoor unit)
LEV	Linear expansion valve
TH22	Thermistor (0°C/15kΩ, 25°C/5.4kΩ) Pipe temp. detection/Liquid
TH23	Thermistor (0°C/15kΩ, 25°C/5.4kΩ) Pipe temp. detection/Gas

※Please set up correctly according to Installation Manual.
(In the case of a forgetting to set up or a setting mistake, it does not operate normally.)

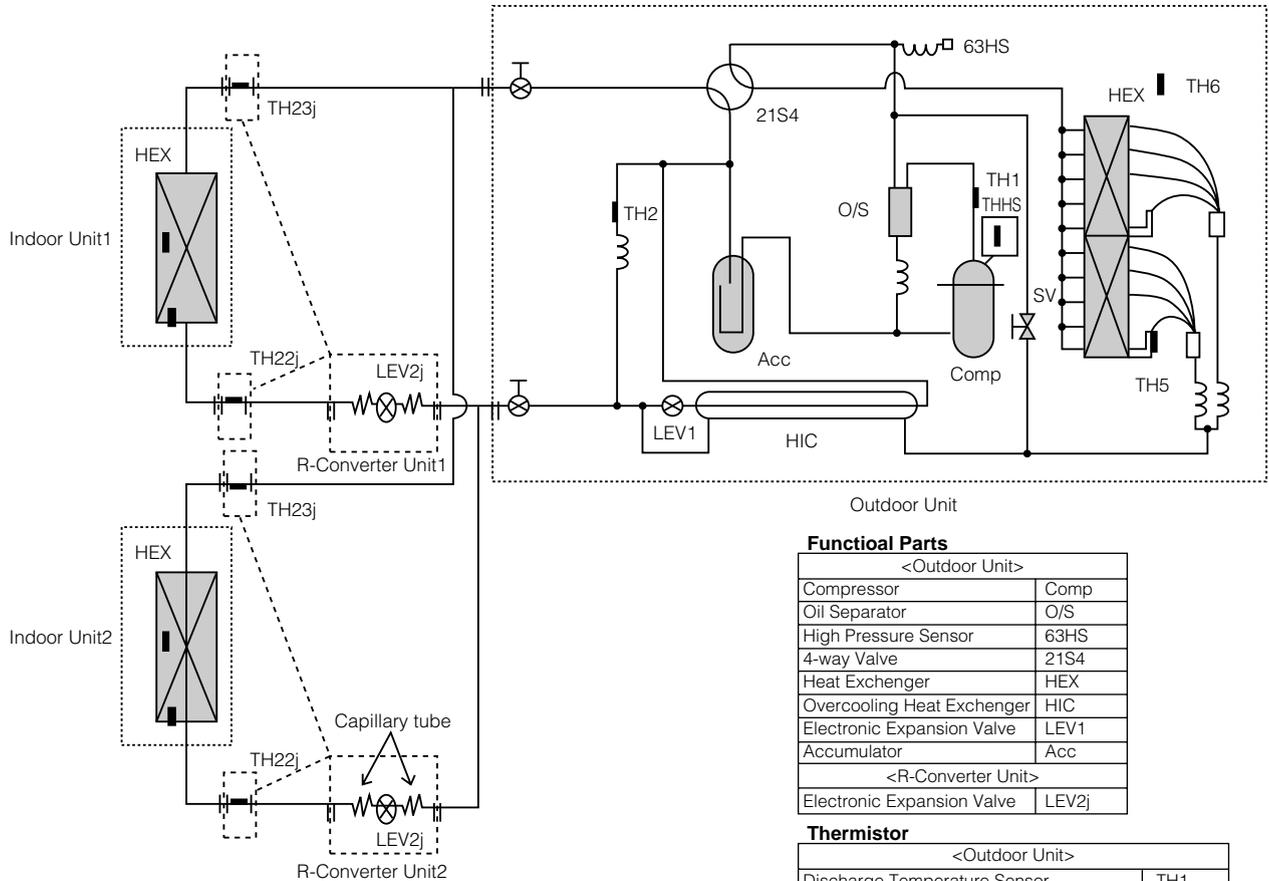
NOTES:

1. At servicing for outdoor unit and indoor units, always follow the wiring diagram of outdoor unit and indoor units.
2. Symbol (S) of TB5 is the shield wire connection.
3. Symbols used in wiring diagram above are as follows,
 ◎ :terminal block, □ □ □ :connector.

R-CONVERTER UNIT



5-1. REFRIGERANT SYSTEM DIAGRAM



Capillary tube in R-Converter Unit	
1	: $\phi 3.6 \times \phi 2.4 \times L95$
2	: $\phi 3.6 \times \phi 2.4 \times L150$

• Piping connection size of R-Converter Unit

Liquid (mm)	$\phi 6.35^*$ (IN/OUT)
Gas (mm)	—

* If using a $\phi 9.52$ refrigerant pipe, use joint pipe "PAC-493PI" (optional parts) or a locally procured tandem joint ($\phi 6.35 \rightarrow \phi 9.52$)

<Reference>
Conversion formula

1/4F	$\phi 6.35$
3/8F	$\phi 9.52$
1/2F	$\phi 12.7$
5/8F	$\phi 15.88$
3/4F	$\phi 19.05$

Functional Parts

<Outdoor Unit>	
Compressor	Comp
Oil Separator	O/S
High Pressure Sensor	63HS
4-way Valve	21S4
Heat Exchanger	HEX
Overcooling Heat Exchanger	HIC
Electronic Expansion Valve	LEV1
Accumulator	Acc
<R-Converter Unit>	
Electronic Expansion Valve	LEV2j

Thermistor

<Outdoor Unit>	
Discharge Temperature Sensor	TH1
Saturation Temperature of Suction Pressur	TH2
Piping Temperature	TH5
Outdoor Air Temperature	TH6
<R-Converter Unit>	
Liquid Pipe Temperature	Th22j
Gas Pipe Temperature	Th23j

• Piping connection size of indoor unit

Select piping that match the size of the Indoor Unit piping connection.

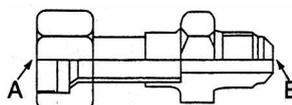
Indoor unit capacity		pipe size (mm)	
BTU	HP	Liquid	Gas
07, 09	1	$\phi 6.35$	$\phi 9.52$
12, 13	1.6	$\phi 6.35$	$\phi 12.7$
18	2	$\phi 6.35$	$\phi 15.88$
24, 30	2.5	$\phi 9.52$	$\phi 15.88$

• Piping connection size of outdoor unit

Outdoor unit capacity		pipe size (mm)	
kcal/h	kW	Liquid	Gas
12500	14.0	$\phi 9.52$	$\phi 19.05$

• Different-diameter joint (Optional parts)

Model name	Connected pipes diameter	Diameter A	Diameter B
	mm	mm	mm
PAC-493PI	$\phi 6.35 \rightarrow \phi 9.52$	$\phi 6.35$	$\phi 9.52$



6-1. Test Run

⚠ Caution :

Before operating the unit, check that the wiring, piping, and thermistors are installed and that the switches have been set.

Refer to the "Test run" section of the indoor units and outdoor unit installation manuals.

After installation of an indoor unit, R-Converter unit, and outdoor unit, begin a test run to check water leaks in the R-Converter unit.

Be sure to perform a test run in cooling mode for each indoor unit installed. Make sure that each indoor unit operates properly following the installation manual supplied with the unit.

If a test run is performed on all indoor units at once, improper connection of the refrigerant pipes and the indoor and outdoor unit connecting wires cannot be detected.

⚠ Caution :

- Always use the remote controller to operate the indoor unit.
- When using an R-Converter unit, operation from the outdoor unit is not possible.
- The following symptoms are not malfunctions.

Symptom	Cause	Indoor unit LED display *
Indoor unit does not operate even if set to cooling (heating) operation	The cooling (heating) operation cannot be operated when the cooling (heating) operation of another indoor unit is operating.	Stand by (For Multi System)
Indoor unit fan stops during heating operation	The fan stops during defrosting operation.	—
	Fan stops when the refrigerant collecting mode ** is activated. When this occurs, the vanes close.	Stand by (For Multi System)

* See the operation manual of indoor units for details.

** This mode is activated for approximately 1 minute to help avoid an insufficient supply of refrigerant during heating operation when refrigerant is stored in an indoor unit that has been turned off or thermo-off.

- A hissing noise can be heard immediately after the air conditioner is started or stopped. This is the sound of the refrigerant flowing inside R-Converter unit. The problem is insignificant.

6-2. Self-diagnosis and Remedy (Display on Outdoor controller board)

<Abnormalities detected with the power on>

Error codes will be displayed in LD1 on the outdoor controller board if abnormalities occur while unit is running. Therefore, check LD1 on the outdoor controller board first in that case. If no code is displayed in LD1, check LED on the indoor controller board.

<List of error codes in LD1>

Error code	Trouble	Error code	Trouble
1102	Discharge temperature trouble	5201	Pressure sensor trouble (63HS)
1108	Compressor's inner thermal sensor trouble	6600	Duplicated unit address setting
1302	High pressure trouble	6602	Transmission error (Transmission processor hardware error)
1500	Excessive refrigerant replenishment		
1501	Insufficient refrigerant	6603	Transmission error (Transmission route BUSY)
1505	Vacuum operation protection	6606	Transmission and reception error (Communication trouble with transmission processor)
2502	Drain pump trouble		
2503	Drain sensor trouble (THd)	6607	Transmission and reception error (No ACK error)
4115	Power synchronization signal trouble	6608	No response
4116	Indoor unit fan rotation trouble	6831	MA communication receive signal error (no receive signal)
4220	Inverter main voltage drop		
4230	Overheat protection of radiator panel	6832	MA communication send signal error (starting bit detection error)
4250	Multiple IPM errors		
5101	Intake thermistor trouble (TH21) or discharge thermistor trouble (TH1)	6833	MA communication send error (H/W error)
5102	Liquid pipe thermistor trouble (TH22) or intake pressure saturation pressure thermistor trouble (TH2)	6834	MA communication receive error (Synchronous recovery error)
		7100	total capacity error
5103	Gas pipe temperature sensor trouble (TH23)	7101	Capacity code error
5105	Piping temperature sensor trouble (TH5)	7102	Connecting unit number error
5106	Outdoor temperature sensor trouble (TH6)	7105	Address set error
5110	IPM heat sink thermistor trouble (THHS)	7111	Remote controller sensor trouble

* Read the technical manual of outdoor unit if codes listed up above are displayed.

Display	Meaning and detecting method	Causes	Check points
7101	Capacity code error ①Abnormal if capacity code SW of R-Converter unit is set to "0". ②Abnormal if capacity code setting of R-Converter unit is not the same as that of indoor unit.	①No setting or setting mistakes of capacity code SW. ②Mis-wiring connection between indoor unit and R-Converter unit (Converse wiring).	①Check capacity code setting. ②Check if there is no mis-wiring connection.
7103	Combination error ①Abnormal if R-Converter unit is connected to the indoor unit which is not designed for connecting to R-Converter type. ②Abnormal if system remote controller (SC) remote controller is connected to R-Converter unit.	①The indoor unit is not designed for connecting to R-Converter unit. ②System remote controller (SC) remote controller is connected to R-Converter unit.	①Check if the model name of the indoor unit is listed up on page 2. ②Check if system remote controller (SC) remote controller is a part of R-Converter
1110	Converse connection error ①Abnormal if the equation below is continuously detected for 10 minutes during cooling operation. Intake temperature - piping temperature (TH22 or TH23) \leq 3deg ②Abnormal if the equation below is continuously detected for 10 minutes during cooling operation. Indoor main pipe temperature - gas pipe temperature (TH23) \geq 25deg	①Converse connection of extension pipe between indoor unit and R-Converter unit ②Converse connection of communication wire between indoor unit and R-Converter unit. ③Disconnection of sensor, No installation or installation mistakes of sensor ④Shortage or leakage of refrigerant, Clogged refrigerant circuit	①Check if the connection of extension pipe is converse. ②Check if the communication wire is converse. ③Check if sensor is correctly installed. ④Check piping temperature by test run.

6-3. Internal Switch Function Table R-Converter Unit

Switch	Pole	Function	Operation by Switch		When to set	Remarks	
			ON	OFF			
SW1	1	Converse connection error (1110) detection	Inactive	Active	During stopping the operation	Setting made at the factory ON  OFF  1 2 3 4 5 6 7 8	
	2	No Function					
	3	Correction of liquid pipe temperature in heating operation	Active	Inactive			
	4	Change of LEV opening pulse	Change	No change			
	5	Change of Remote display	On signal of thermostat	Output from Fan			
	6	Humidifier control	Always in heating	Thermo-on in heating			
	7	Correction of liquid pipe temperature in cooling operation (1)					
	8	Correction of liquid pipe temperature in cooling operation (2)					
SW2	Capacity code setting				Before turning the power on	R-Converter unit controller board Set the capacity setting of the R-Converter unit equal to the capacity setting of the indoor unit. Setting made at the factory ON  OFF  1 2 3 4 5 6	
	Capability description	SW2		Capability description			SW2
	Btu	HP	Btu	HP			
	07	-	ON  OFF  1 2 3 4 5 6	15 17 18			2
08 09 10	1	ON  OFF  1 2 3 4 5 6	24	2.5	ON  OFF  1 2 3 4 5 6		
12 13	1.6	ON  OFF  1 2 3 4 5 6	30	-	ON  OFF  1 2 3 4 5 6		
SW4	1	No Function			Before turning the power on	Setting made at the factory ON  OFF  1 2 3 4 5 6	
	2	No Function					
	3	No Function					
	4	Correction of LEV opening pulse in dry operation	Active	Inactive			
	5	Solutions for refrigerant flowing sound after defrosting operation	Active	Inactive			
	6	Solutions for refrigerant flowing sound during defrosting operation	Active	Inactive			
SW11	Indoor unit addresses setting switch				Before turning the power on	Addresses setting on board Setting made at the factory	
SW12	SW12	SW11	 Digits of ten (2ND Digit)	 Digits of one (1ST Digit)			 SW12

- (1) Before turning on the power of the indoor unit, be sure to set the SW2. If the switches are not set or if the setting are incorrect, the device will not operate properly.
- (2) After setting the switches, turn the indoor unit, R-Converter unit, and outdoor unit on in that order.
- (3) In case capacity code setting or address setting is mistaken, reset it, turn off power supply of the outdoor unit, R-Converter unit and indoor unit for 2 minutes or more at the same time and turn on power supply again in the order of (2).

6-4. How to check the parts PAC-SF29LB

6-4-1. Thermistor

Parts name	Check points				
Liquid pipe thermistor (TH22) Gas pipe thermistor (TH23)	Disconnect the connector then measure the resistance using a tester. (Surrounding temperature 10°C-30°C)				
	<table border="1"> <thead> <tr> <th>Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>4.3kΩ-9.6kΩ</td> <td>Open or short</td> </tr> </tbody> </table> (Refer to the thermistor)	Normal	Abnormal	4.3kΩ-9.6kΩ	Open or short
Normal	Abnormal				
4.3kΩ-9.6kΩ	Open or short				

<Thermistor Characteristic graph>

Thermistor for lower temperature

Liquid pipe thermistor (TH22)
Gas pipe temperature thermistor (TH23)

Thermistor R0 = 15kΩ ± 3%

B constant = 3480kΩ ± 1%

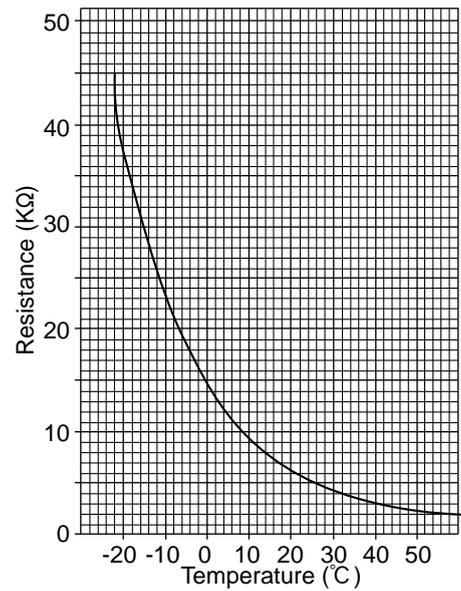
$$R_t = 15 \exp \left\{ 3480 \left(\frac{1}{273+t} - \frac{1}{273} \right) \right\}$$

0°C 15kΩ 30°C 4.3kΩ

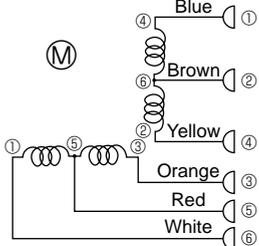
10°C 9.6kΩ 40°C 3.0kΩ

20°C 6.3kΩ

25°C 5.2kΩ



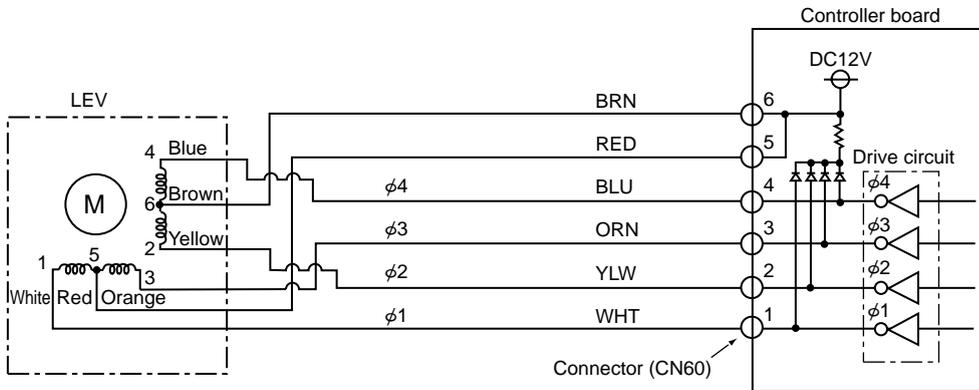
6-4-2. Linear Expansion Valve

Parts name	Check points														
Linear expansion valve 	Disconnect the connector then measure the resistance valve using a tester. Refer to the next page for a detail.														
	<table border="1"> <thead> <tr> <th colspan="4">Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>(1)-(5) White-Red</td> <td>(2)-(6) Yellow-Brown</td> <td>(3)-(5) Orange-Red</td> <td>(4)-(6) Blue-Brown</td> <td rowspan="2">Open or short</td> </tr> <tr> <td colspan="4" style="text-align: center;">150kΩ ±10%</td> </tr> </tbody> </table>	Normal				Abnormal	(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short	150kΩ ±10%			
	Normal				Abnormal										
(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short											
150kΩ ±10%															

Linear expansion valve

① Operation summary of the linear expansion valve.

- Linear expansion valve open/close through stepping motor after receiving the pulse signal from the indoor controller board.
 - Valve position can be changed in proportion to the number of pulse signal.
- <Connection between the indoor controller board and the linear expansion valve.>



Note : Since the number of the connector at the controller board side and the relay connector are different, follow the color of the lead wire.

② Output pulse signal and valve action

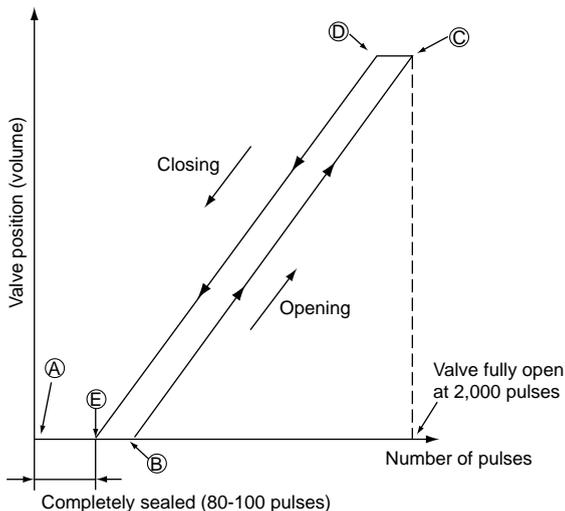
Output(phase)	Output			
	1	2	3	4
φ1	ON	OFF	OFF	ON
φ2	ON	ON	OFF	OFF
φ3	OFF	ON	ON	OFF
φ4	OFF	OFF	ON	ON

Valve closing: 1→2→3→4→1
 Valve opening: 4→3→2→1→4

The address of the pulse output is shifted using the procedures mentioned earlier.

- ※1. All output phase will turn OFF when the LEV stops operating.
- 2. When the output phase is terminated or when the phase shift is not according to frequency, the motor rotation will become irregular, causing the motor to vibrate or lockup.
- ※ When the power supply is on, the closing signal of 2,200 pulse will be transmitted to decide the position of the valve. The valve position can be determined when point (A) is reached.

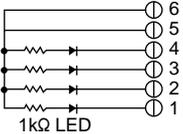
(a) LEV action



The LEV will not vibrate or make noise when the valve is operating smoothly. However, when the number of pulses change from (E) to (A), or if the valve lockup, there may be more noise than under normal circumstances.

- The noise can be heard by resting your ear on the handle of a screwdriver that is pressed against the top of the LEV valve.

③ Troubleshooting

Problem	Check point	Corrective measure
Malfunction in microprocessor operating circuit	Remove the connector from the controller board and connect diagnostic LEDs.  Pulses will be issued for 10 seconds when the power is turned on. It indicates that there is an abnormality in the operating circuit if any LEDs don't turn on or off.	Replace the R-Converter controller board
Locked expansion valve	If the linear expansion valve becomes locked and the motor is still operating, the motor will emit a clicking noise and will not function. This clicking noise indicates an abnormality.	Replace the linear expansion valve
Short circuit or broken circuit in expansion valve motor coil	Use an all-purpose electrical meter to measure the resistance between the different coils (red-white, red-orange, brown-yellow, brown-blue). Normal resistance is within a range of $150\Omega \pm 10\%$.	Replace the linear expansion valve
Valve does not close completely	In order to check the linear expansion valve, operate one indoor unit in the fan mode and another in the cooling mode. Then, use the outdoor multi controller board to operate the monitor and check the pipe temperature of the indoor unit (RT12). The linear expansion valve should be fully closed when the fan is operating. The temperature measured by the temperature sensor will drop if there is any leakage. If the measured temperature is significantly lower than that on the remote controller, this indicates that the valve is not closed. It is not necessary to replace the linear expansion valve if the leak of refrigerant is small and does not cause a malfunction.	Replace the linear expansion valve if there is a major leak of refrigerant.
Incorrect connection or connection failure	① Check improperly connected connector terminals and the wire colors. ② Remove the connector on the controller board side and check electrical conductance	Continuity check of wrong part.

6-5. Monitoring Function

6-5-1. R-Converter Unit

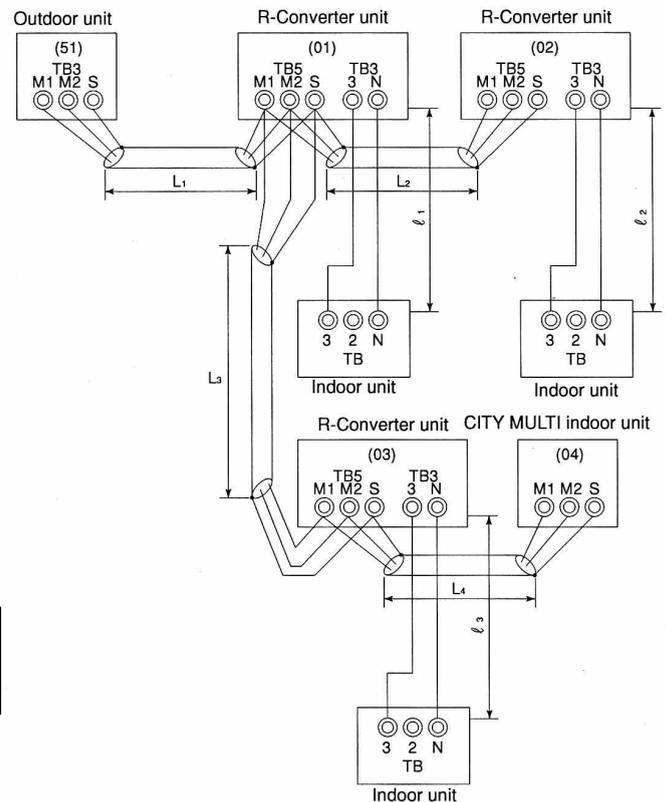
Operating status		LED1	LED2	LED3
		Green	Red	Red
When power supply is turned on.	During start-up	Lighting	Blinking (ever 1.0 sec.)	OFF
	Completion on start-up	Lighting	OFF	OFF
Operating status of the indoor unit.	During operation	Lighting	Blinking (ever 0.2 sec.)	Lighting
	Under suspension	Lighting	Blinking (ever 0.2 sec.)	OFF
Error occurring on R-Converter Unit		—	—	Blinking
When main supply for R-Converter unit is OFF. (220V~240V 50Hz/220V 60Hz)		OFF	—	—

Note LED2 blinks ever 0.2 secs, all the time once after the indoor unit is operated.

7-1. Caution

- (1) Follow local regulations and ordinances for technical standards related to electrical equipment, wiring, and specifications of each electric power company.
- (2) Wiring for control (hereinafter referred to as transmission line) must be situated at least 5 cm from the power source wiring so that it is not influenced by electrical noise. (Do not insert transmission line and power source wire in the same conduit.)
- (3) Be sure to provide designated grounded work to outdoor unit.
- (4) Never connect the main power source to the terminal block of a transmission line. If connected, electrical parts will be burnt out.
- (5) Use a 2-core shield cable for connecting a transmission line to TB5 of the R-Converter unit. If transmission of different systems are wired with the same multicore cable, which can result in poor transmission and receipt and can cause incorrect operation.
- (6) The system will not operate if connected improperly.
TB2 : Terminal block for power supply
TB3 : Terminal block for transmission line to indoor unit
TB5 : Terminal block for transmission line to outdoor unit

- (7) **Before turning the indoor unit and the R-Converter unit on, be sure to set the switches. (See page 14).**
- (8) **To turn the power on, turn on the indoor unit, R-Converter unit, then the outdoor unit, in that order.**
- (9) For identification purposes, list the indoor unit model names in the nameplate on the control box of the R-Converter unit.

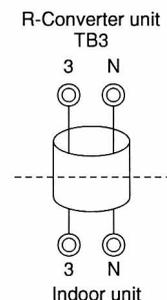


7-2. Connecting the R-Converter unit, indoor unit and outdoor unit transmission cables

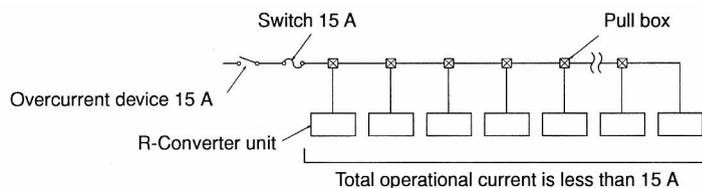
- Connect the outdoor unit (TB3) to the R-Converter unit (TB5). (Non-polarized 2-wire) The "S" terminal on the R-Converter unit (TB5) is a shielding wire connection. For connecting cable specifications, refer to the outdoor unit installation manual.
- Connect the indoor unit (TB) to the R-Converter unit (TB3). For connecting cable specifications, refer to the indoor unit installation manual.

Permissible Length

- ① "Indoor unit - R-Converter unit"
Maximum transmission cable length : l_1 and $l_2, l_3 \leq 10$ m (2-Core 1.0 mm²)
- ② "Outdoor unit - R-Converter unit" + "R-Converter unit - R-Converter unit"
Maximum transmission cable length : $(L_1 + L_2)$ or $(L_1 - L_3 + L_4)$ or $(L_2 + L_3 + L_4) \leq 200$ m



7-3. Wiring of main power supply and equipment capacity



Thickness of wire for main power supply and on/off capacities

Model	Minimum wire thickness (mm ²)			Breaker for wiring (NFB)	Breaker for current leakage
	Main cable	Branch	Ground		
R-Converter unit	1.5	1.5	1.5	15A	15A

1. Use separate power supplies for the outdoor unit and R-Converter unit.
2. Consider the ambient conditions (ambient temperature, direct sunlight, rain, etc.) when wiring and making connections.
3. The wire size is the minimum value for metal conduit wiring. The power cord size must be 1 rank thicker in consideration of voltage drops.
Make sure that the power supply voltage does not drop more than 10%.
4. Select non-fuse breaker (NFB) or earth leakage breaker (NV).
(A means for the disconnection of the supply with an isolation switch, or similar device, in all active conductors shall be incorporated in the fixed wiring.)
5. Power supply codes of appliance must not be lighter than design 245 IEC 53 or 227 IEC 53.
6. A switch with at least a 3 mm contact separation in each pole must be provided by the air conditioner installation.
Power cable size : more than 1.5 mm².

⚠ Warning :

- Be sure to use the specified wires for connection so that no external force is imparted to the terminal connections. If the wires are not securely connected, a fire can occur.
- Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.

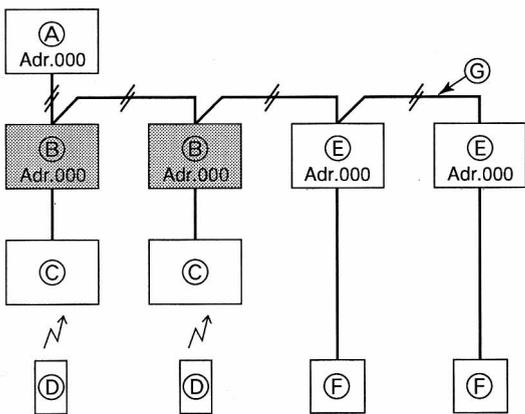
⚠ Caution :

- Some installation sites may require a ground-fault interrupter. If a ground-fault interrupter is not installed, an electric shock can occur.
- Use only a circuit breaker and fuse of the specified capacity. Using a fuse and copper wire with excessive capacity can cause a malfunction or a fire.

When connected to a CITY MULTI indoor unit in a system

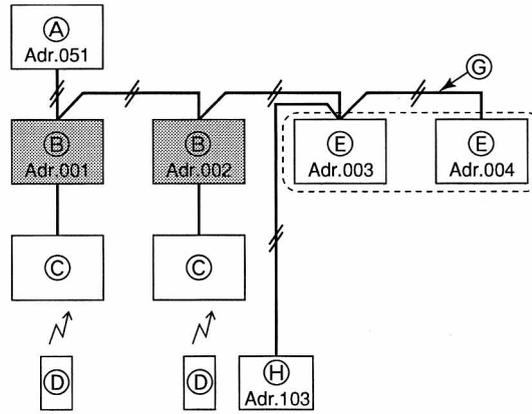
M-NET system remote controllers cannot be used to operate the indoor unit that is connected to the R-Converter.

(1) Example of setting an address automatically



- Ⓐ Outdoor unit
- Ⓑ R-Converter unit
- Ⓒ Indoor unit
- Ⓓ Remote controller
- Ⓔ CITY MULTI indoor unit
- Ⓕ Unit remote controller (MA)
- Ⓖ M-NET transmission cable

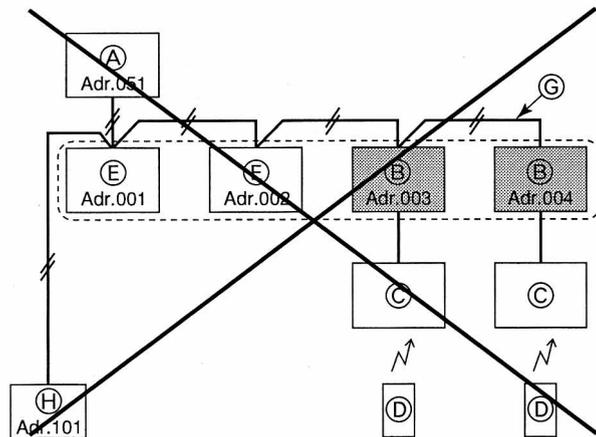
(2) Example of a group setting not including R-Converter units



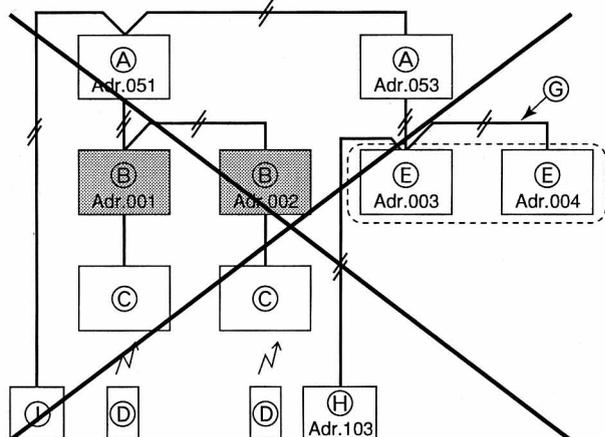
- Ⓐ Outdoor unit
- Ⓑ R-Converter unit
- Ⓒ Indoor unit
- Ⓓ Remote controller
- Ⓔ CITY MULTI indoor unit
- Ⓖ M-NET transmission cable
- Ⓖ Network remote controller (NR)

(3) Group setting including R-Converter units are not possible.

(4) Connecting to a system remote controller is not possible.



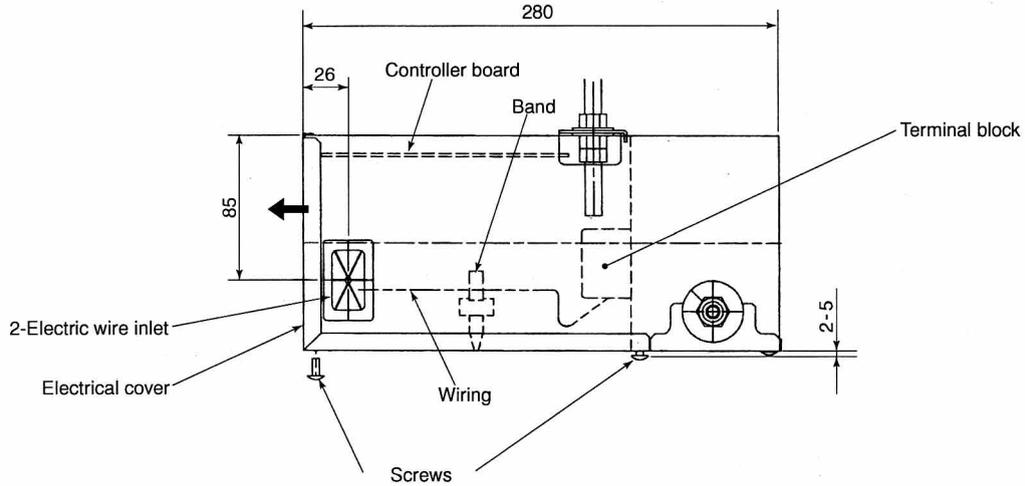
- Ⓐ Outdoor unit
- Ⓑ R-Converter unit
- Ⓒ Indoor unit
- Ⓓ Remote controller
- Ⓔ CITY MULTI indoor unit
- Ⓖ M-NET transmission cable
- Ⓖ Network remote controller (NR)



- Ⓐ Outdoor unit
- Ⓑ R-Converter unit
- Ⓒ Indoor unit
- Ⓓ Remote controller
- Ⓔ CITY MULTI indoor unit
- Ⓖ M-NET transmission cable
- Ⓖ Network remote controller (NR)
- Ⓖ System remote controller (SC)

7-4. Wiring (mm)

(1) Remove the electrical cover.



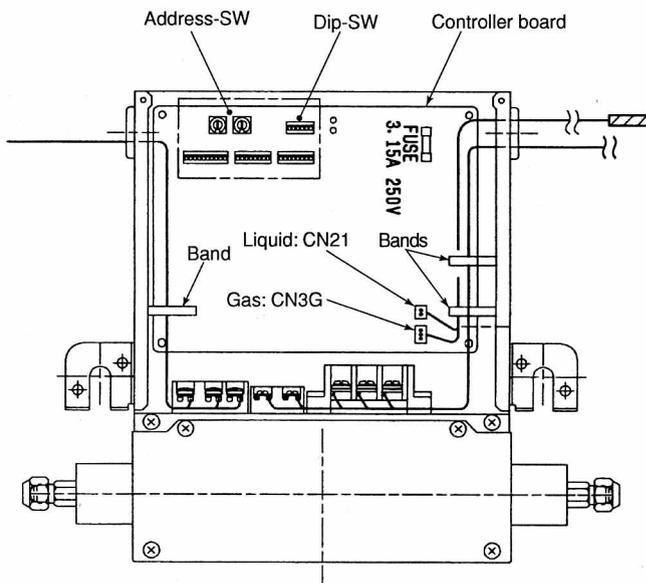
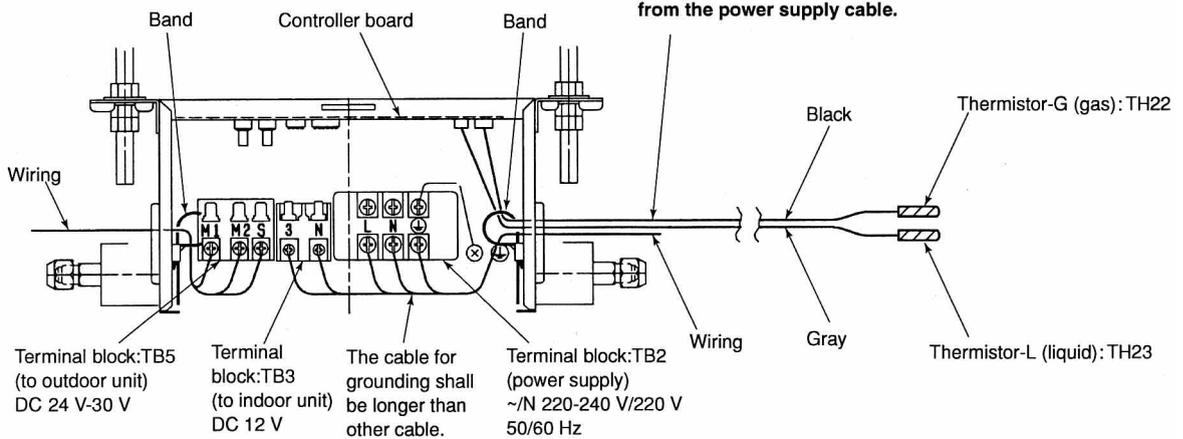
(2) Insert the wiring and each thermistor into the unit, and then fasten them with the bands on the inside of the unit.

(3) Connect each wire to the terminal block securely.

(4) Connect each thermistor to the controller board.

- Thermistor (liquid) → CN21
- Thermistor (gas) → CN3G

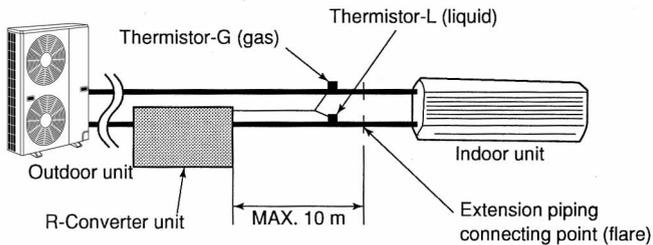
⚠ Caution
To prevent noise from occurring,
keep each thermistor wire away
from the power supply cable.



(5) After installing the unit, install the electric cover.

Indoor unit connection example

- Connect one R-Converter unit per indoor unit.
- **Connect the R-Converter unit the liquid pipe.**
- The thermistor-L (liquid) is installed close to the connecting point of the extension piping (liquid) for the indoor unit.
- The thermistor-G (gas) is installed close to the connecting point of the extension piping (gas) for the indoor unit.



Piping connection size

Indoor unit capacity		Liquid pipe size (mm)
BTU	HP	
07	-	φ6.35 × 0.8
09	1	
12, 13	1.6	
18	2	φ9.52 × 0.8
24, 30	2.5	

*R-Converter unit φ6.35 × 0.8

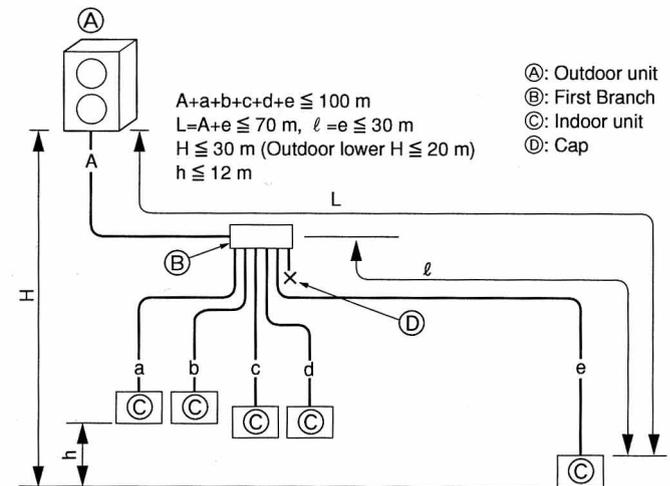
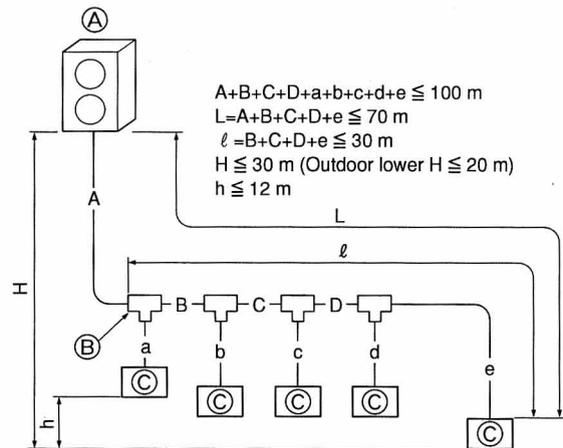
- If using a liquid pipe that is φ9.52 mm, use joint pipe "PAC-493PI" (optional parts) or a locally procured tandem joint (φ6.35→φ9.52 mm)

Additional refrigerant quantity

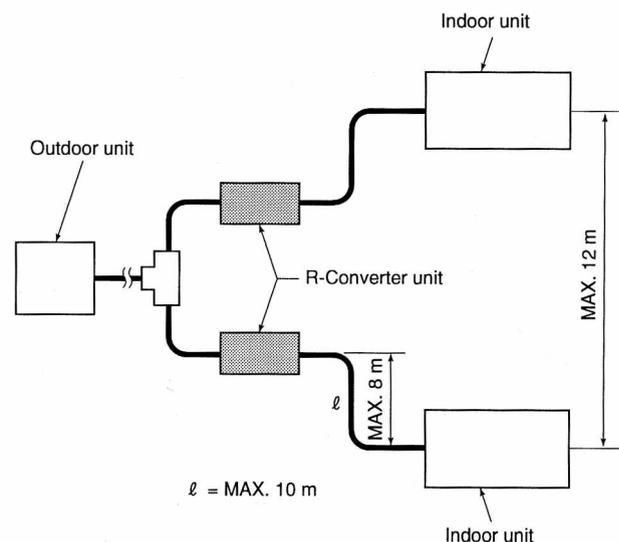
- If necessary, add additional refrigerant to the unit by following the calculation method given in the outdoor unit (PUMY) manual.
- When calculating the refrigerant quantity, be sure to include the R-Converter unit-to-indoor unit liquid pipe length.

Refrigerant piping system

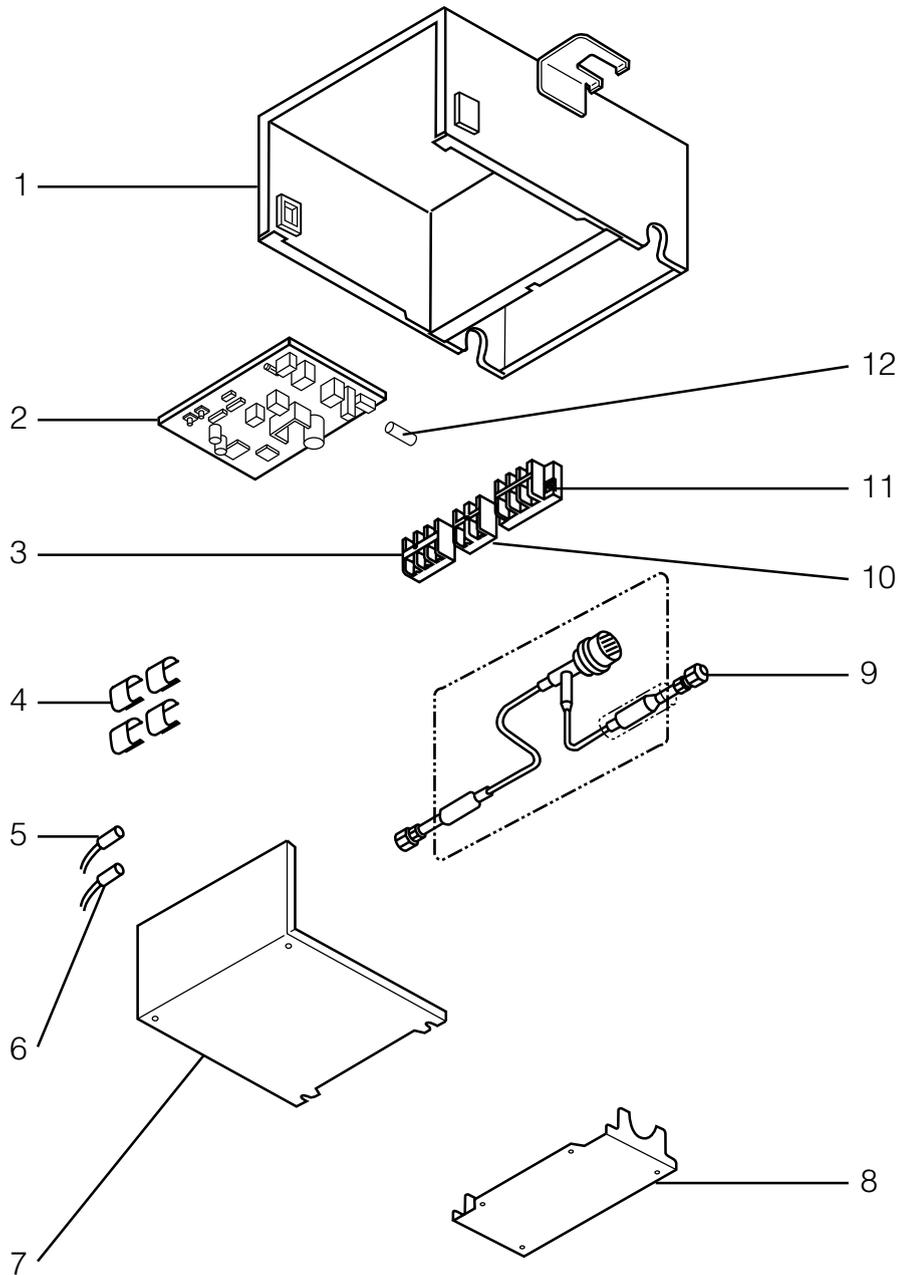
- For details, see PUMY series technical & service manual.
- Install sections a, b, c, d and e as shown in the illustration to the R-Converter unit.



- The installation condition for the R-Converter unit-to-indoor unit are as shown in the illustration below.
- **The refrigerant pipe length from the indoor unit to the R-Converter unit must be less than 10 m and its height difference less than 8 m.**
- Install the R-Converter unit within an indoor-unit-to-indoor-unit height difference of 12 m.
- Match the refrigerant piping size to the indoor unit.



PAC-SF29LB



No.	Part No.	Part Name	Specification	Q'ty/set	Remarks (Drawing No.)	Wiring Diagram Symbol	Recom- mended Q'ty	Price	
				PAC-SF29LB				Unit	Amount
1	—	LEV BOX		1	(RG02A916G05)				
2	T7W E17 315	CONTROLLER BOARD		1		R.C			
3	T7W E00 716	TERMINAL BLOCK	(M1, M2, S)	1		TB5			
4	T7W E00 241	TH. HOLDER ASSY		1					
5	T7W E34 202	THERMISTOR-L	(Liquid)	1		TH22			
6	T7W E35 202	THERMISTOR-G	(Gas)	1		TH23			
7	—	CONT COVER		1	(RG02T534H04)				
8	—	BOX COVER		1	(RG02T533H04)				
9	T7W E12 401	LEV ASSY		1		LEV			
10	T7W E20 716	TERMINAL BLOCK	(3, N)	1		TB3			
11	T7W 509 716	TERMINAL BLOCK	(L, N, \ominus)	1		TB2			
12	T7W E04 239	FUSE	250V 3.15A	1		FUSE			



HEAD OFFICE : MITSUBISHI DENKI BLDG., 2-2-3, MARUNOUCHI, CHIYODA-KU, TOKYO100-8310, JAPAN
