Changes for the Better

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

HFC utilized R410A

April 2013
No. OCH508
REVISED EDITION-A

TECHNICAL & SERVICE MANUAL

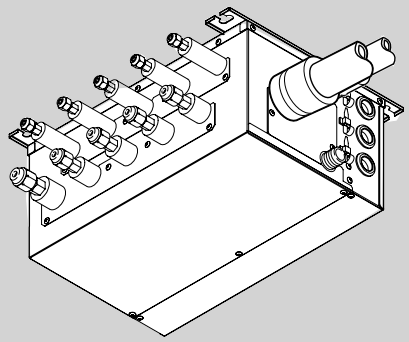
[Model name] <Branch box>	[Service Ref.]
PAC-AK50BC	PAC-AK50BC
PAC-AK51BC	PAC-AK51BC
PAC-AK52BC	PAC-AK52BC
PAC-AK53BC	PAC-AK53BC
PAC-AK30BC	PAC-AK30BC
PAC-AK31BC	PAC-AK31BC
PAC-AK32BC	PAC-AK32BC

(Indispensable optional parts for MXZ-8A series and MXZ-8B series.)

Revision:
- PAC-AK53BC and PAC-AK32BC have been added in REVISED EDITION-A.
- Some descriptions have been modified.

- Please void OCH508.

NOTE:
- This service manual describes technical data of branch box. As for indoor units and outdoor unit, refer to its service manual.



BRANCH BOX

CONTENTS

PARTS CATALOG (OCB508)

1 SAFETY PRECAUTION

1-1. ALWAYS OBSERVE FOR SAFETY

Before obtaining access to terminal, all supply circuit must be disconnected.

1-2. CAUTIONS RELATED TO NEW REFRIGERANT

Cautions for units utilizing refrigerant R410A

Use new refrigerant 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 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 smalll 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.

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.

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.

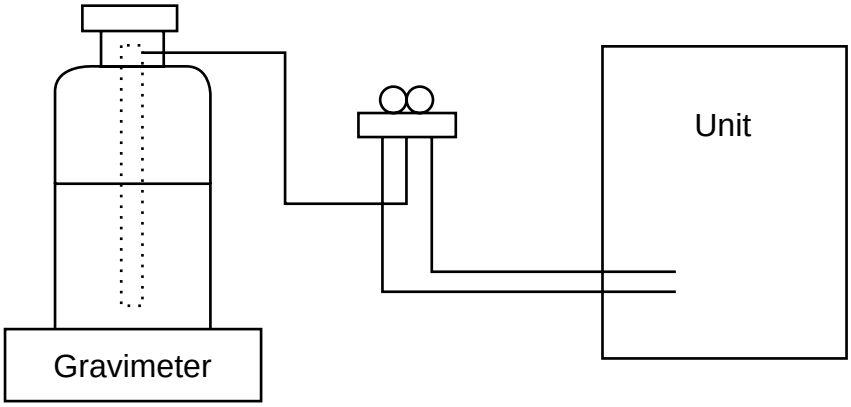
[1] Cautions for service

(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) When performing service, install a filter drier simultaneously.
Be sure to use a filter drier for new refrigerant.

[2] Additional refrigerant charge

When charging directly from cylinder

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



[3] Service tools

(1) 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 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	——

(2) 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.)

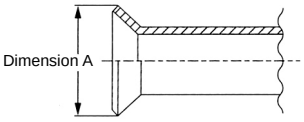
Diagram below: Piping diameter and thickness

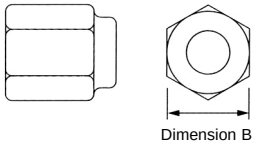
Nominal dimensions(inch)	Outside diameter (mm)	Thickness (mm)	
		R410A	R22
1/4	6.35	0.8	0.8
3/8	9.52	0.8	0.8
1/2	12.70	0.8	0.8
5/8	15.88	1.0	1.0
3/4	19.05	—	1.0

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 of its working pressure higher than that of other refrigerants. Therefore, to enhance airtightness and intensity, 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 intensity as shown below. Set copper pipe correctly referring to copper pipe flaring dimensions for R410A below. For 1/2" and 5/8", the dimension B changes.

Use torque wrench corresponding to each dimension.





Flare cutting dimensions (mm)

Nominal dimensions(inch)	Outside diameter	Dimension A ($^{+0}_{-0.4}$)	
		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 (mm)

Nominal dimensions(inch)	Outside diameter	Dimension B	
		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 and alkylbenzene oil (minimum amount)	×	Ester 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	×	—

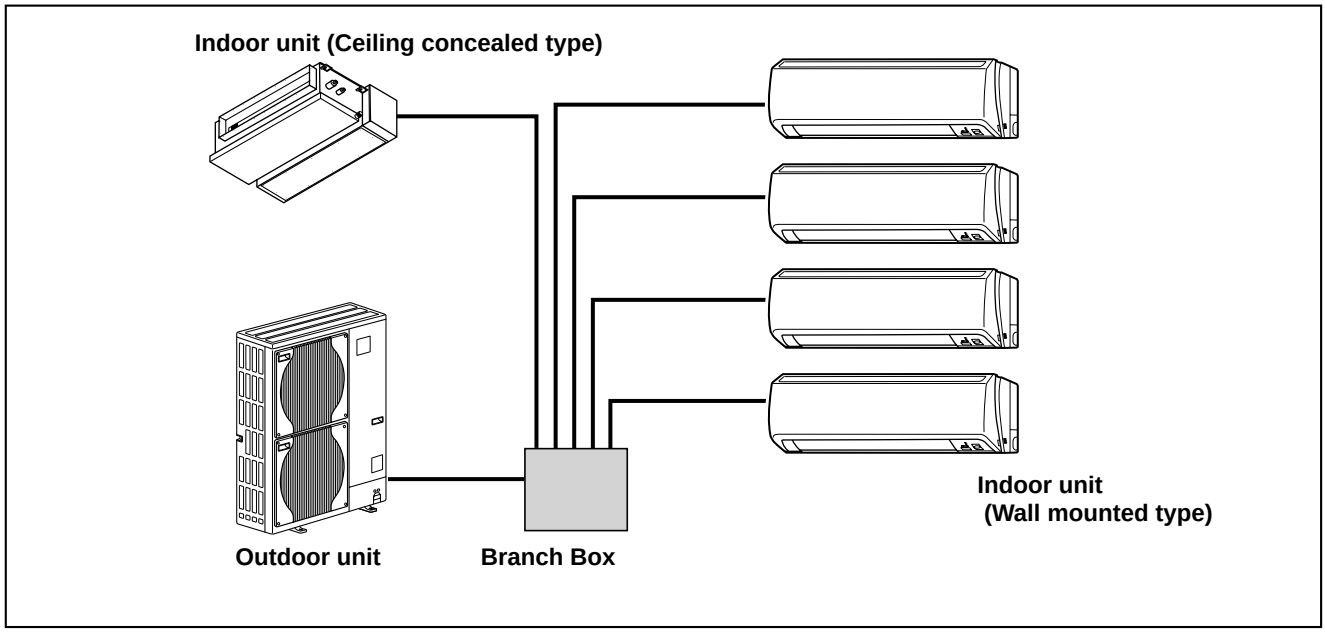
× : Prepare a new tool. (Use the new tool as the tool exclusive for R410A.)
△ : Tools for other refrigerants can be used under certain conditions.
○ : Tools for other refrigerants can be used.

2 OVERVIEW OF UNIT

2-1. SYSTEM OUTLINE

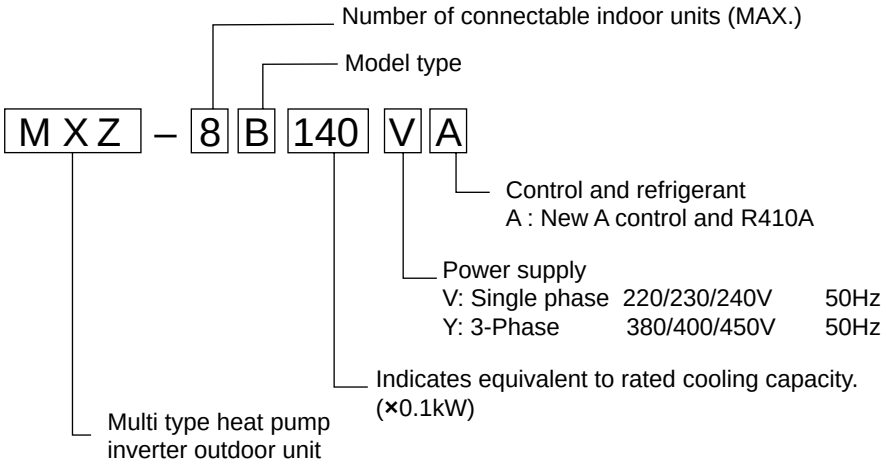
The additional connection of the Branch Box together with employment of the compact trunk-looking outdoor unit can successfully realizes a long distance piping for big houses. Equipped with a microprocessor, the Branch Box can translate the transmission signal of indoor units to achieve the optimum control.

2-1-1. System example

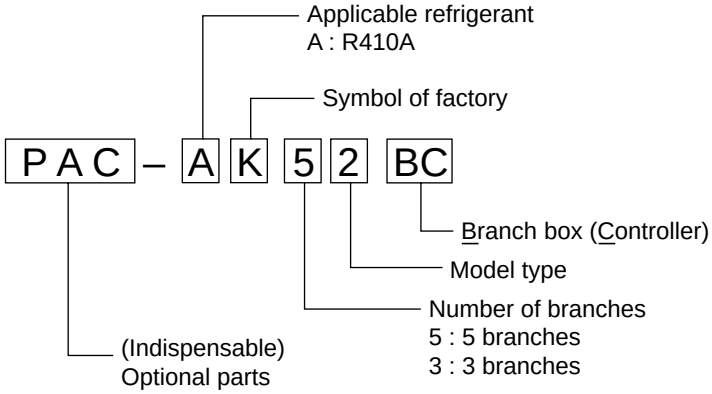


2-1-2. Method for identifying

■ **Outdoor unit**



■ **Branch box**



2-2. INSTALLATION

2-2-1. Space required for Installation and servicing for Branch box.

(1) Front View (Fig. 2-1)

Ⓐ Branch box

Ⓑ On the side of piping

(2) Side View (Fig. 2-2, Fig. 2-3)

Ⓒ For indoor installations

Ⓓ Ceiling board

Ⓔ Maintenance hole

Ⓕ PCB side

*1: A minimum 350 mm is required for 90° bends in refrigerant piping.

*2**:** Ⓐ is “Min. 200 mm”.

(Premise: The slope of drain piping is securable 1/100 or more. Required 200 mm or more, when not securable.)

In the case of less than 200 mm (for example Ⓐ is 100 mm), the exchange work of Branch box from a maintenance hole becomes difficult (Only exchange work of a PCB, linear expansion valve coils, sensors and drain pan is possible).

*3**:** Ⓑ is “ □ 600”**.**

In the case of “ □ 450”, prepare a maintenance hole at a PCB side as it is shown in Fig. 2-3, and “Min. 300 mm” is needed as distance Ⓐ.

In the case of less than 300 mm (for example Ⓐ is 100 mm), the exchange work of Branch box, linear expansion valve coils, sensors, and drain pan from a maintenance hole becomes difficult. Only exchange work of a PCB is possible.

(3) Top View (Fig. 2-4)

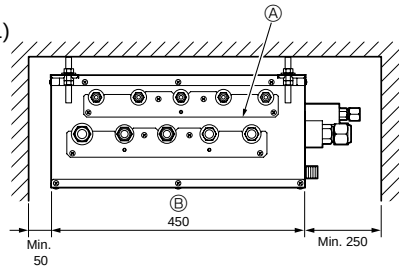
Ⓖ Refrigerant piping

Ⓗ When facing in the opposite direction to the refrigerant piping.

NOTE1: The branch box is only for indoor use.

NOTE2: Please attach the special optional cover (PAC-AK350CVR-E) to install branch box in the outdoors.

(1)



unit : mm

Fig. 2-1

(2)

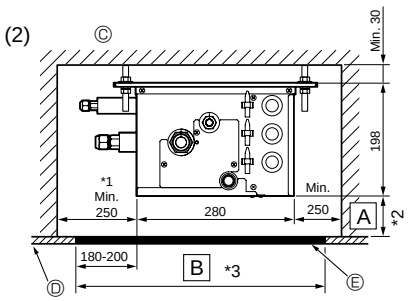


Fig. 2-2

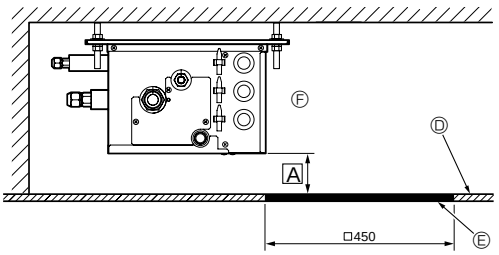


Fig. 2-3

(3)

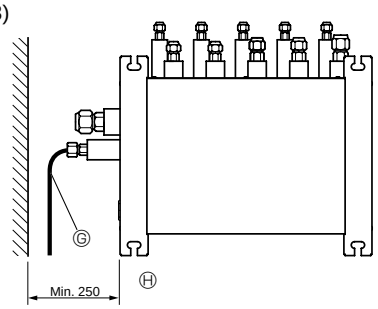


Fig. 2-4

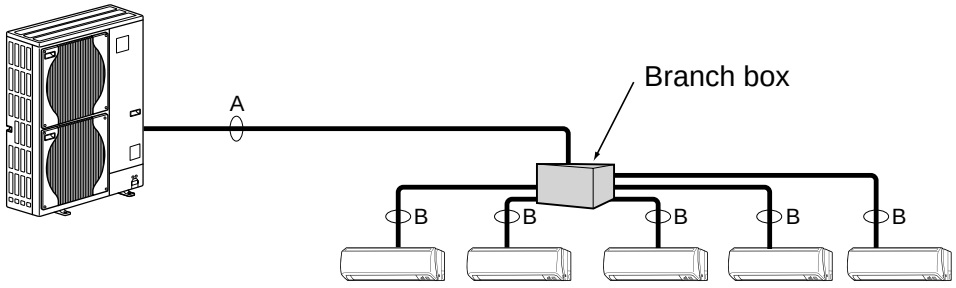
2-3. SIMPLIFIED PIPING SYSTEM

Piping connection size

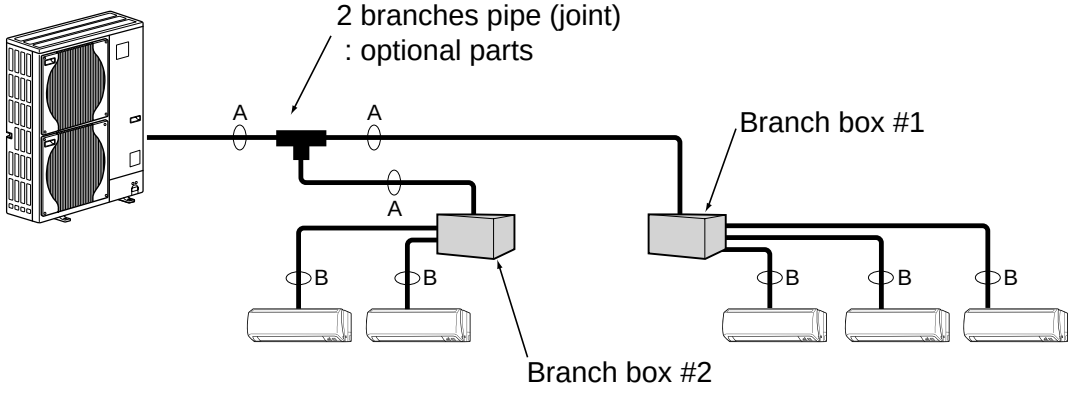
	A	B
Liquid (mm)	ϕ9.52	The piping connection size differs according to the type and capacity of indoor units. Match the piping connection size of branch box with indoor unit. If the piping connection size of branch box does not match the piping connection size of indoor unit, use optional different-diameter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

Flare connection employed. (No brazing!)

■ 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 and MSDD-50BR-E.

3 SPECIFICATIONS

PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC
PAC-AK30BC PAC-AK31BC PAC-AK32BC

Model name				**PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC**	**PAC-AK30BC PAC-AK31BC PAC-AK32BC**
Connectable number of indoor units				MAX. 5	MAX. 3
Power supply (from outdoor unit)				Single phase, 220/230/240V, 50Hz, Single phase, 220V, 60Hz	
Input			kW	0.003	
Running current			A	0.05	
External finish				Galvanized sheets	
Drain hose size (on site)			mm	O.D.20 (VP-16)	
Dimensions	Width		mm	450	
	Depth		mm	280	
	Height		mm	198	
Weight			kg	9.3	8.1
Piping connection (Flare)	Branch (indoor side)*	Liquid	mm	ϕ6.35 × 5 {A,B,C,D,E}	ϕ6.35 × 3 {A,B,C}
		Gas	mm	ϕ9.52 × 4 {A,B,C,D}, ϕ12.7 × 1{E}	ϕ9.52 × 3 {A,B,C}
	Main (outdoor side)	Liquid	mm	ϕ9.52	
		Gas	mm	ϕ15.88	
Wiring	To indoor unit			Each 3-wire, plus earth wire	
	To outdoor unit			3-wire, plus earth wire	

* The piping connection size differs according to the type and capacity of indoor units. Match the piping connection size for indoor and branch box. If the piping connection size of branch box does not match the piping connection size of indoor units, use optional different-diameter (deformed) joints to the branch box side. (Connect deformed joint directly to the branch box side.)

4 OUTLINES AND DIMENSIONS

PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC

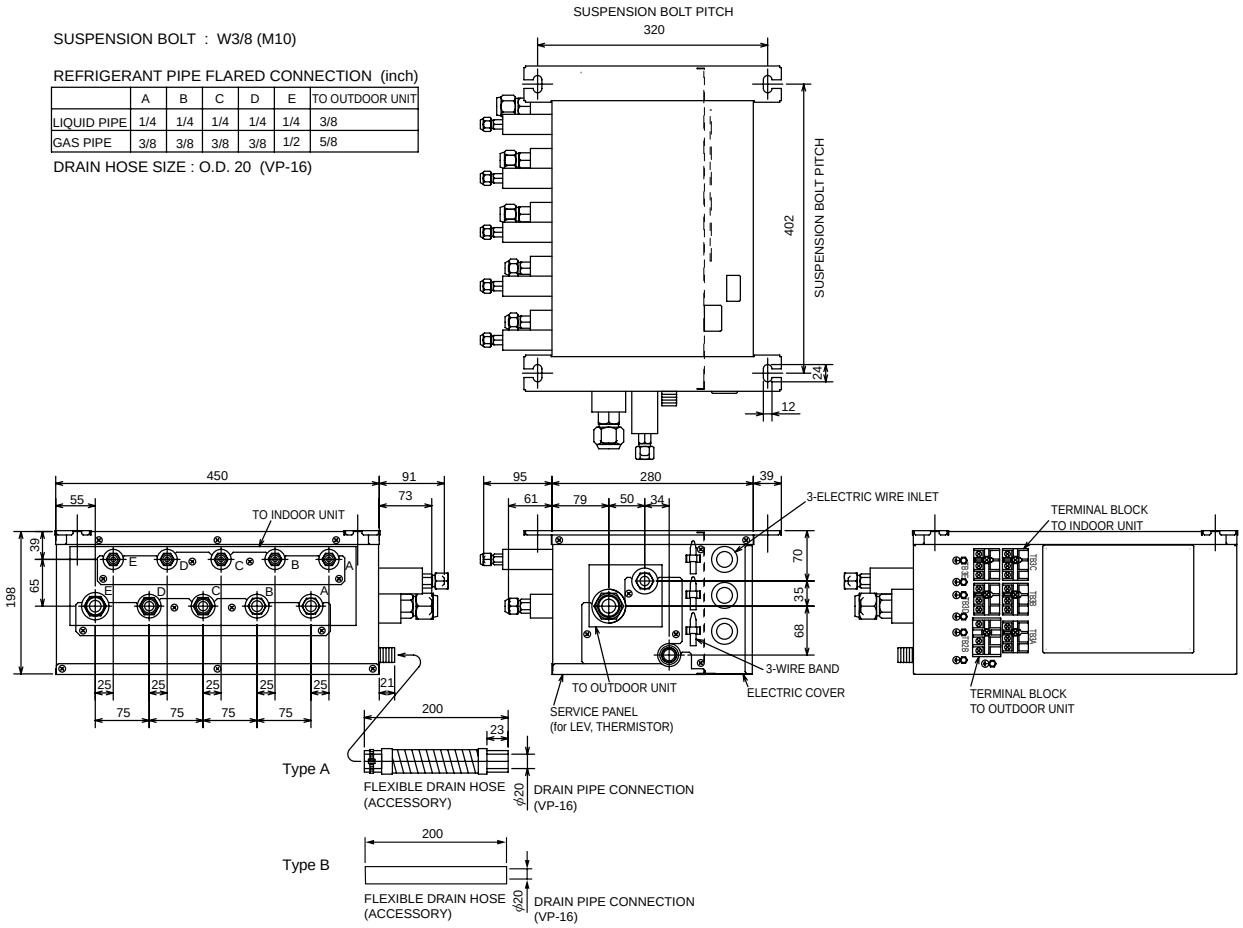
unit: mm

SUSPENSION BOLT : W3/8 (M10)

REFRIGERANT PIPE FLARED CONNECTION (inch)

	A	B	C	D	E	TO OUTDOOR UNIT
LIQUID PIPE	1/4	1/4	1/4	1/4	1/4	3/8
GAS PIPE	3/8	3/8	3/8	3/8	1/2	5/8

DRAIN HOSE SIZE : O.D. 20 (VP-16)



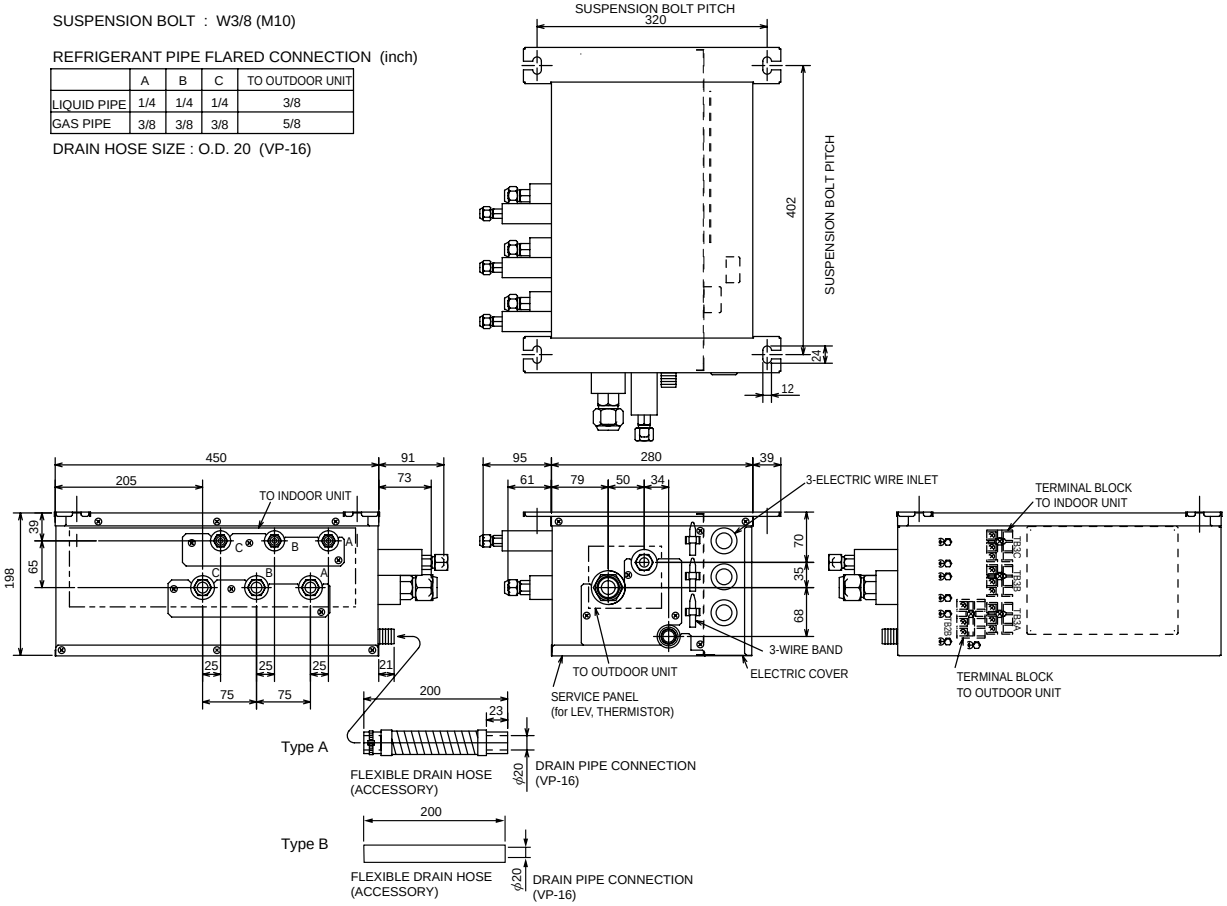
PAC-AK30BC PAC-AK31BC PAC-AK32BC

SUSPENSION BOLT : W3/8 (M10)

REFRIGERANT PIPE FLARED CONNECTION (inch)

	A	B	C	TO OUTDOOR UNIT
LIQUID PIPE	1/4	1/4	1/4	3/8
GAS PIPE	3/8	3/8	3/8	5/8

DRAIN HOSE SIZE : O.D. 20 (VP-16)



5 WIRING DIAGRAM

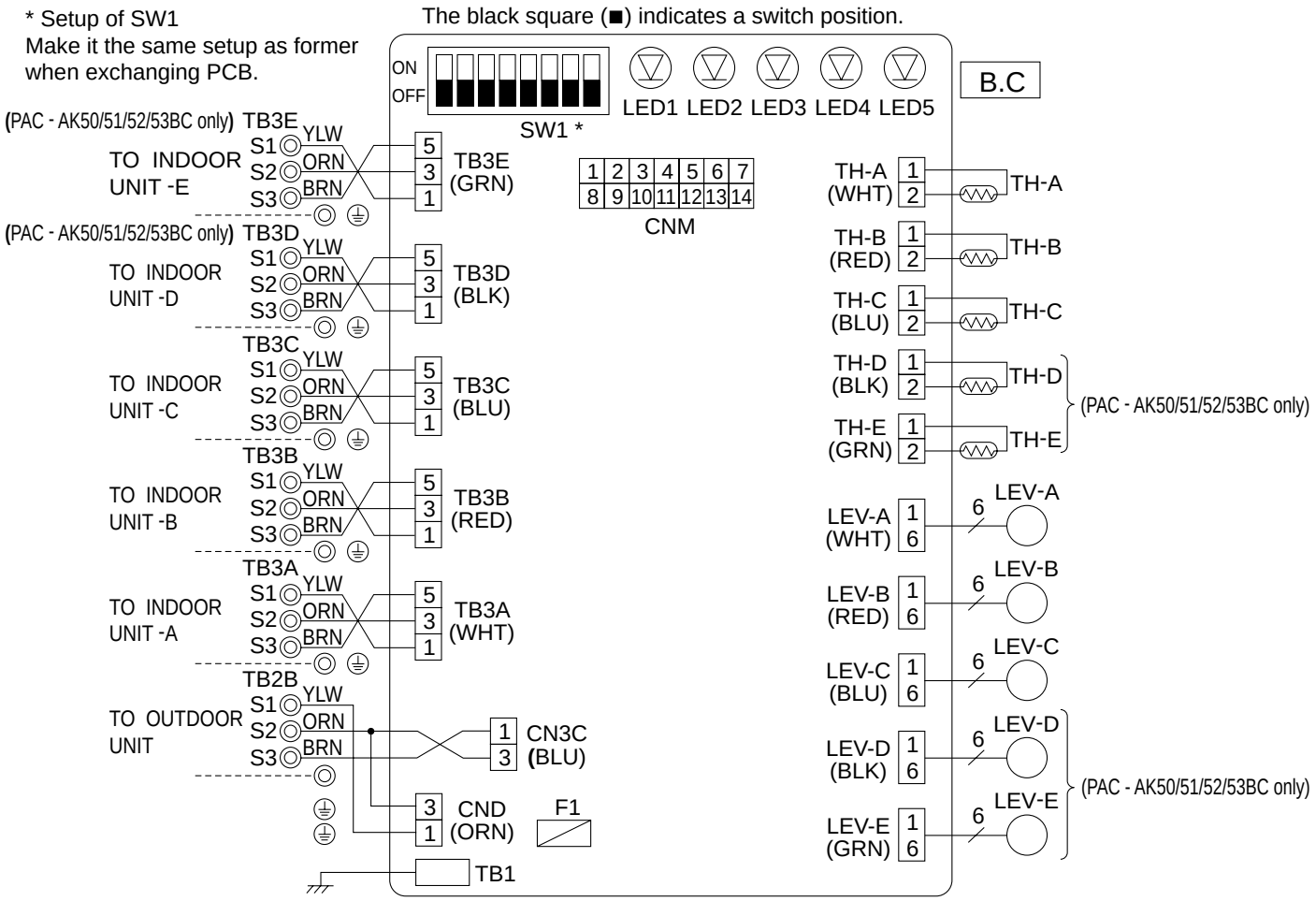
PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC
PAC-AK30BC PAC-AK31BC PAC-AK32BC

Note : " PAC - AK30 · 50BC, PAC - AK31 · 51BC, PAC-AK32 · 52BC, PAC-AK53BC " is only for R410A.

SYMBOL	NAME
B.C	Branch box controller board
F1 <B.C>	Fuse 250V 6.3A
SW1<B.C>	Switch for service
CNM<B.C>	Connector
LED1~5< B.C>	Light emitting diode
LEV-A~E	Linear expansion valve
TH-A~E	Thermistor Pipe temp.detection / Gas (0 ℃ / 15kΩ, 25 ℃ / 5.4kΩ)
TB2B	Terminal block / To outdoor unit
TB3A	Terminal block / To indoor unit - A
TB3B	Terminal block / To indoor unit - B
TB3C	Terminal block / To indoor unit - C
TB3D	Terminal block / To indoor unit - D
TB3E	Terminal block / To indoor unit - E

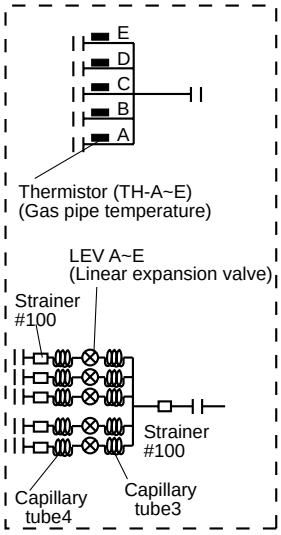
Note
1. At servicing for outdoor unit, always follow the wiring diagram of Outdoor unit.
2. Symbols used in wiring diagram above are, ◎ : terminal block, □□□ : connector.
(Combination of indoor units**)**
Enter the location of combined indoor units with model name in each blank below because it is necessary for service and maintenance.

Indoor unit - A	Indoor unit - B	Indoor unit - C	Indoor unit - D	Indoor unit - E

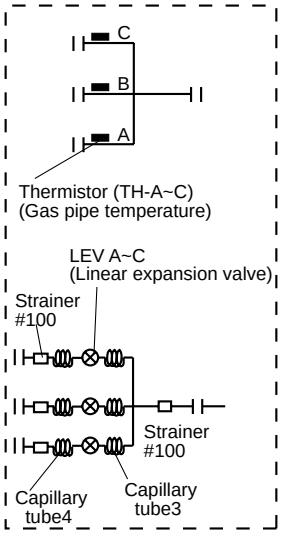


6 REFRIGERANT SYSTEM DIAGRAM

■ **PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC**



■ **PAC-AK30BC PAC-AK31BC PAC-AK32BC**



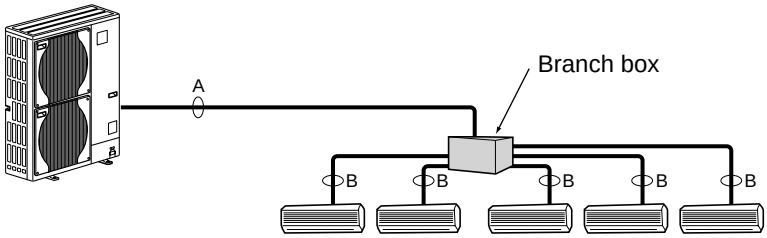
unit : mm

		Capillary tube 1 (For return of oil from oil separator)	Capillary tube 2 (For SV2)	Capillary tube 3 ahead of LEV (in cooling mode)	Capillary tube 4 behind LEV (in cooling mode)
Branch box	PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC	———	———	(ϕ4 × ϕ2.4 × L140) × 5	(ϕ4 × ϕ2.2 × L130) × 5
	PAC-AK30BC PAC-AK31BC PAC-AK32BC	———	———	(ϕ4 × ϕ2.4 × L140) × 3	(ϕ4 × ϕ2.2 × L130) × 3

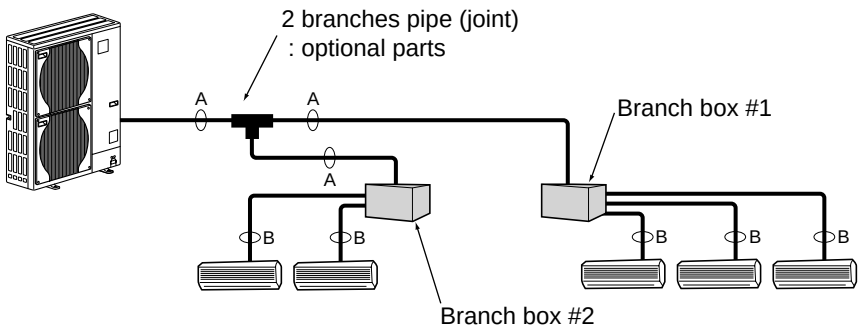
Piping connection size

	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

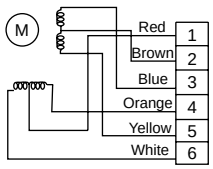


■ installation procedure (2 branch pipe (joint))
Refer to the installation manuals of MSDD-50AR-E and MSDD-50BR-E.

7 TROUBLESHOOTING

7-1. HOW TO CHECK THE PARTS

BRANCH BOX : PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC
PAC-AK30BC PAC-AK31BC PAC-AK32BC

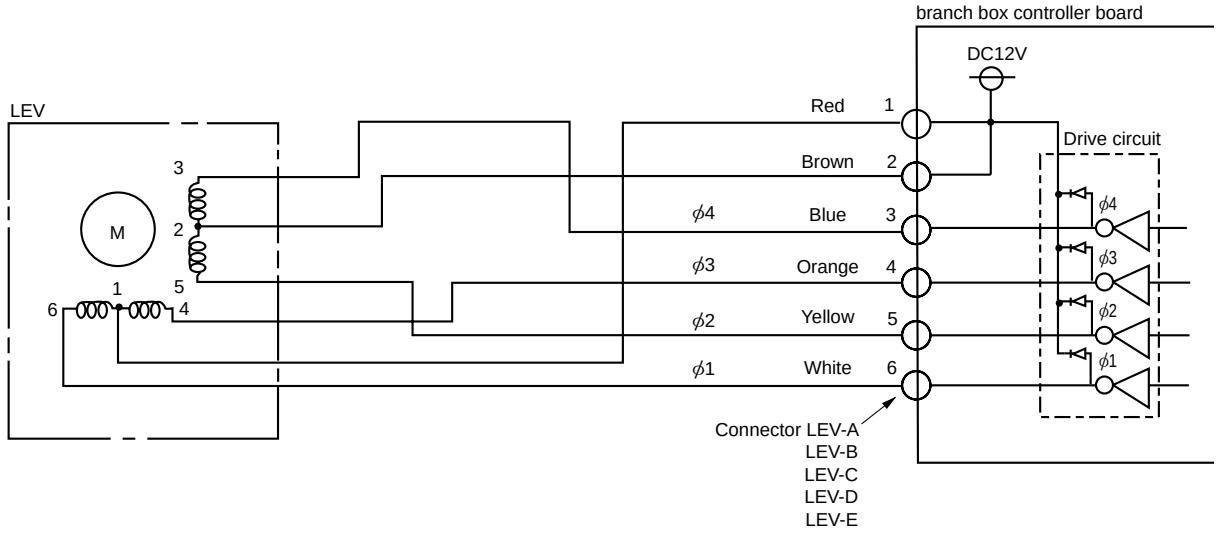
<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>Thermistor (TH-A~E)
<Gas pipe></td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature 10℃~30℃)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>4.3kΩ ~ 9.6kΩ</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Linear expansion valve
(LEV-A~E)
  </td><td>Disconnect the connector then measure the resistance with a tester.
(Winding temperature 20℃)
<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>Red - White</td><td>Red - Orange</td><td>Brown - Yellow</td><td>Brown - Blue</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">46 ± 4Ω</td></tr></table></td></tr>
</table>

Linear expansion valve (LEV) in Branch box

(1) Operation summary of the linear expansion valve

- Linear expansion valve open/close through stepping motor after receiving the pulse signal from the branch box controller board.
- Valve position can be changed in proportion to the number of pulse signal.

<Connection between the branch box controller board and the linear expansion valve>



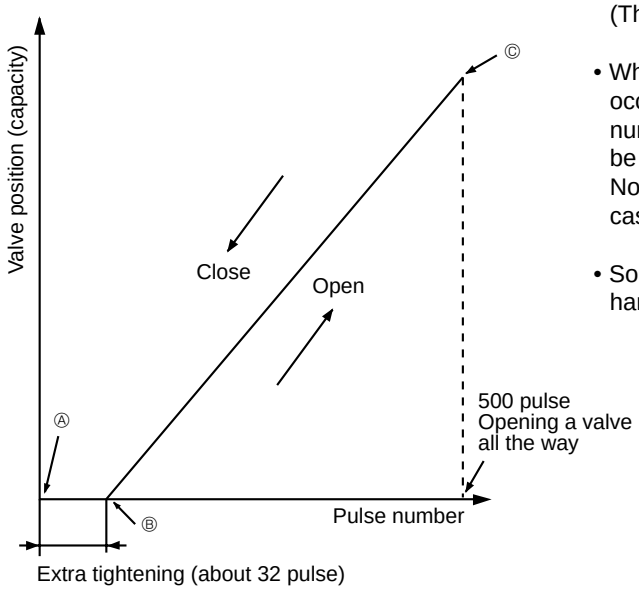
<Output pulse signal and the valve operation>

Output (Phase)	Output							
	1	2	3	4	5	6	7	8
ϕ1	ON	ON	OFF	OFF	OFF	OFF	OFF	ON
ϕ2	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
ϕ3	OFF	OFF	OFF	ON	ON	ON	OFF	OFF
ϕ4	OFF	OFF	OFF	OFF	OFF	ON	ON	ON

Opening a valve : 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8
Closing a valve : 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1
The output pulse shifts in above order.

- When linear expansion valve operation stops, all output phase become OFF.

(2) Linear expansion valve operation

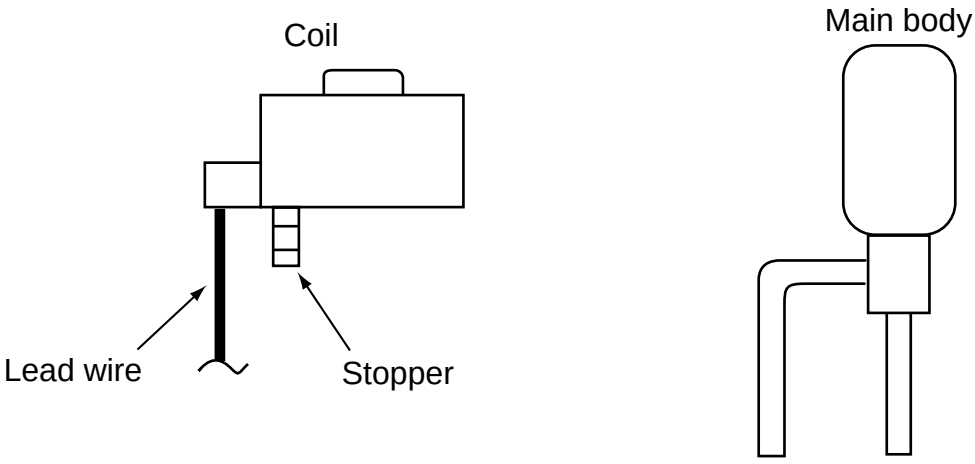


- When the switch is turned on, 700 pulse closing valve signal will be sent till it goes to Ⓐ point in order to define the valve position. (The pulse signal is being sent for about 20 seconds.)
- When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valve : however, when the pulse number moves from Ⓑ to Ⓐ or when the valve is locked, sound can be heard.
  No sound is heard when the pulse number moves from Ⓑ to Ⓐ in case coil is burnt out or motor is locked by open-phase.
- Sound can be detected by placing the ear against the screw driver handle while putting the screw driver to the linear expansion valve.

(3) How to attach and detach the coil of linear expansion valve

<Composition>

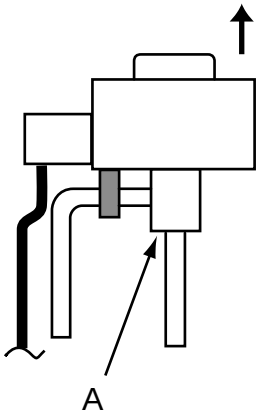
Linear expansion valve is separable into the main body and the coil as shown in the diagram below.



<How to detach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and detach the coil by pulling it upward.

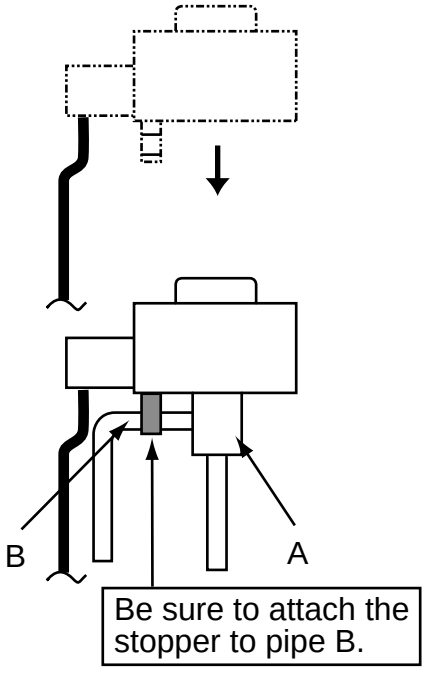
Be sure to detach the coil holding main body firmly. Otherwise pipes can bend due to pressure.



<How to attach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and attach the coil by inserting it downward into the main body. Then securely attach the coil stopper to pipe B. (At this time, be careful that stress is not added to lead wire and main body is not wound by lead wire.) If the stopper is not firmly attached to pipe B, coil may be detached from the main body and that can cause defective operation of linear expansion valve.

To prevent piping stress, be sure to attach the coil holding the main body of linear expansion valve firmly. Otherwise pipe may break.



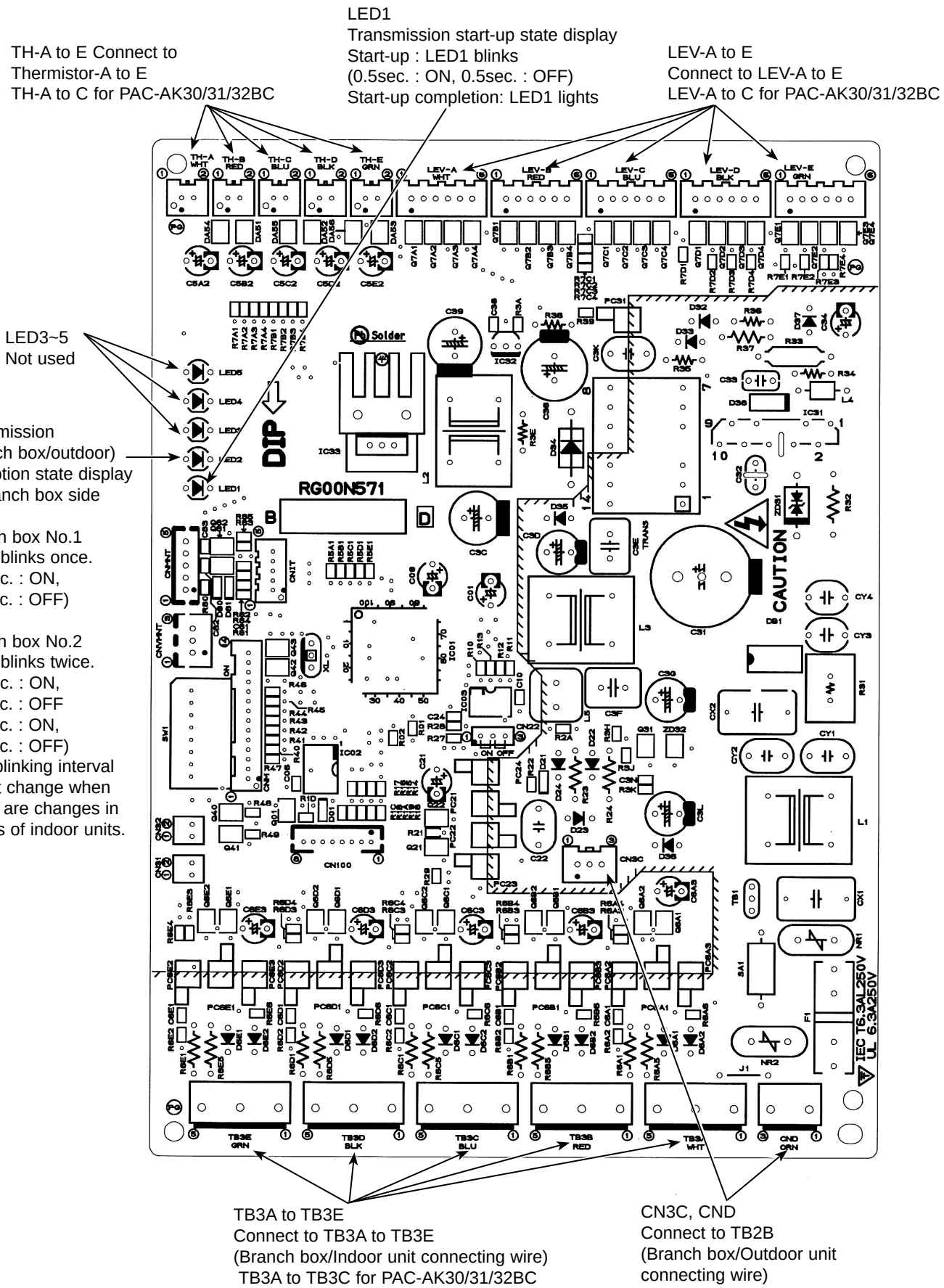
Troubleshooting

Problem	Check point	Corrective measure
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 46Ω ± 4%.	Replace the linear expansion valve.
Valve does not close completely.	In order to check the linear expansion valve, operate 1 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. 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

7-2. TEST POINT DIAGRAM

Branch box controller board

PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC
PAC-AK30BC PAC-AK31BC PAC-AK32BC



7-3. FUNCTION OF SWITCHES

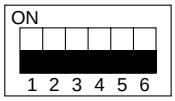
<Branch box unit operation monitor function>

[When option part 'A-Control Service Tool (PAC-SK52ST)' is connected to branch box controller board (CNM)]

Digital indicator LED1 displays 2 digit number or code to inform operation condition and the meaning of error code by controlling DIP SW2 on 'A-Control Service Tool'.

Operation indicator SW2 : Indicator change of self diagnosis

The black square (■) indicates a switch position.

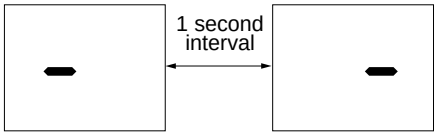
SW2 setting	Display detail	Explanation for display	Unit
			

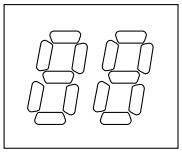
<Digital indicator LED1 working details>

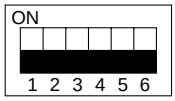
(Be sure that 1 to 6 in the SW2 are set to OFF.)

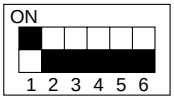
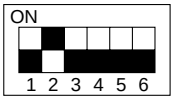
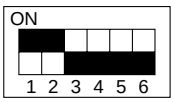
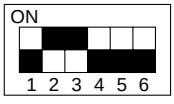
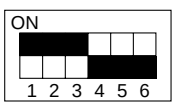
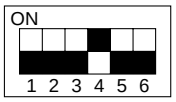
(1) Display when the power supply is ON.
When the power supply is ON, blinking displays by turns.
Wait for 2 minutes at the longest.

(2) When the display lights (Normal operation)
①The number of connected indoor units to this branch box (0 - 5)

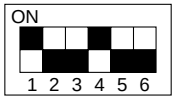
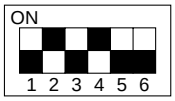
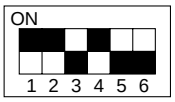
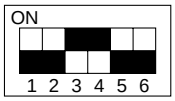
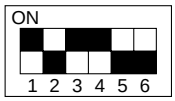
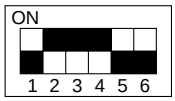
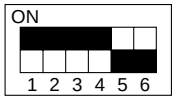
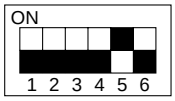
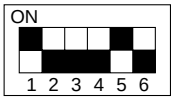
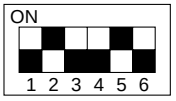


LED1  (Lighting)

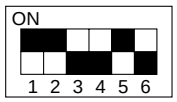
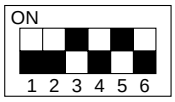
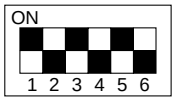
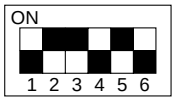
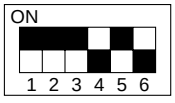
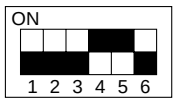
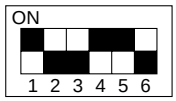
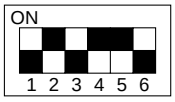
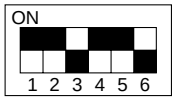
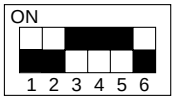
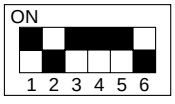
SW2  (Initial setting)

	Pipe temperature / Liquid (TH3) – 40 - 90	– 40 - 90 (When the coil thermistor detects 0℃ or below, "–" and temperature are displayed by turns.) (Example) When –10℃; 0.5 secs. 0.5 secs. 2 secs. -□ →10 →□□	℃
	Discharge temperature (TH4) 3 - 217	3 - 217 (When the discharge thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105℃; 0.5 secs. 0.5 secs. 2 secs. □1 →05 →□□	℃
	Output step of outdoor FAN 0 - 15	0 - 15	Step
	Unit number of this branch box 1 - 2	1 or 2 * Omit the figures after the decimal fractions.	code display
	Compressor operating frequency 0 - 225	0 - 255 (When it is 100Hz or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 125Hz; 0.5 secs. 0.5 secs. 2 secs. □1 →25 →□□	.Hz
	LEV-A opening pulse 0 - 500	0 - 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 150 pulse; 0.5 secs. 0.5 secs. 2 secs. □1 →50 →□□	Pulse

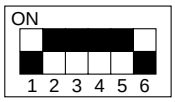
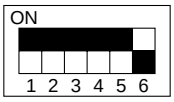
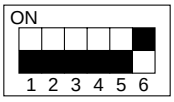
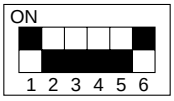
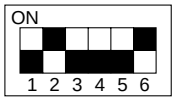
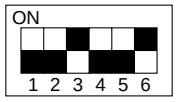
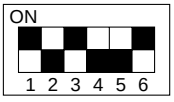
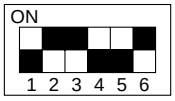
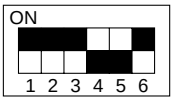
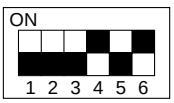
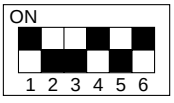
The black square (■) indicates a switch position.

<table>
<tr><th>SW2 setting</th><th>Display detail</th><th>Explanation for display</th><th>Unit</th></tr>
<tr><td>  </td><td>LEV-B opening pulse
0 - 500</td><td>0 - 500
(When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.
(Example)
When 150 pulse; 0.5 secs. 0.5 secs. 2 secs.
□1 →50 →□□</td><td>Pulse</td></tr>
<tr><td>  </td><td>LEV-C opening pulse
0 - 500</td><td>0 - 500
(When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.
(Example)
When 150 pulse; 0.5 secs. 0.5 secs. 2 secs.
□1 →50 →□□</td><td>Pulse</td></tr>
<tr><td>  </td><td>LEV-D opening pulse
0 - 500</td><td>0 - 500
(When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.
(Example)
When 150 pulse; 0.5 secs. 0.5 secs. 2 secs.
□1 →50 →□□</td><td>Pulse</td></tr>
<tr><td>  </td><td>LEV-E opening pulse
0 - 500</td><td>0 - 500
(When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.
(Example)
When 150 pulse; 0.5 secs. 0.5 secs. 2 secs.
□1 →50 →□□</td><td>Pulse</td></tr>
<tr><td>  </td><td>Capacity setting indoor-A
0 - 14</td><td rowspan="6"><table><tr><th>Code display (Not Qj)</th><th>Rated capacity</th></tr><tr><td>0</td><td>15</td></tr><tr><td>1</td><td>20</td></tr><tr><td>2</td><td>22</td></tr><tr><td>3</td><td>25</td></tr><tr><td>4</td><td>28</td></tr><tr><td>5</td><td>32</td></tr><tr><td>6</td><td>35</td></tr><tr><td>7</td><td>40</td></tr><tr><td>8</td><td>45</td></tr><tr><td>9</td><td>50</td></tr><tr><td>10</td><td>56</td></tr><tr><td>11</td><td>60</td></tr><tr><td>12</td><td>71</td></tr><tr><td>13</td><td>80</td></tr><tr><td>15</td><td>100</td></tr></table></td><td>Code display</td></tr>
<tr><td>  </td><td>Capacity setting indoor-B
0 - 14</td><td>Code display</td></tr>
<tr><td>  </td><td>Capacity setting indoor-C
0 - 14</td><td>Code display</td></tr>
<tr><td>  </td><td>Capacity setting indoor-D
0 - 14</td><td>Code display</td></tr>
<tr><td>  </td><td>Capacity setting indoor-E
0 - 14</td><td>Code display</td></tr>
<tr><td>  </td><td>Indoor pipe temperature / Liquid TH2
Indoor-A
– 39 - 88</td><td>– 39 - 88
(When the temperature is 0℃ or less, “–” and temperature are displayed by turns.)</td><td>℃</td></tr>
</table>

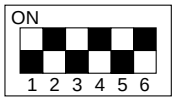
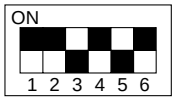
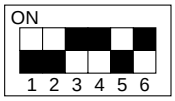
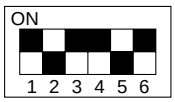
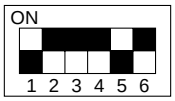
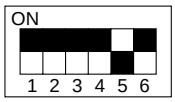
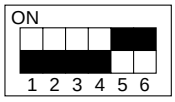
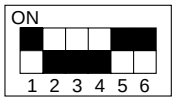
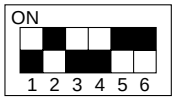
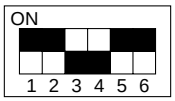
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Indoor pipe temperature / Liquid TH2 Indoor-B – 35 - 88	– 35 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Indoor pipe temperature / Liquid TH2 Indoor-C – 39 - 88	– 39 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Indoor pipe temperature / Liquid TH2 Indoor-D – 39 - 88	– 39 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Indoor pipe temperature / Liquid TH2 Indoor-E – 39 - 88	– 39 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	LEV-1 opening pulse 0 - 500	0 - 500	Pulse
	LEV-2 opening pulse 0 - 500	0 - 500	Pulse
	LEV-3 opening pulse 0 - 500	0 - 500	Pulse
	LEV-4 opening pulse 0 - 500	0 - 500	Pulse
	LEV-5 opening pulse 0 - 500	0 - 500	Pulse
	Outdoor pipe temperature / 2-phase (TH6) – 39 - 88	– 39 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃
	Outdoor outside temperature (TH7) – 39 - 88	– 39 - 88 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.)	℃

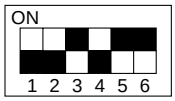
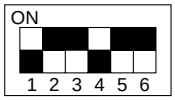
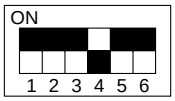
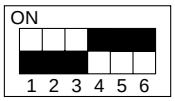
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Outdoor heatsink temperature (TH8) – 40 - 200	– 40 - 200 (When the temperature is 0℃ or less, "–" and temperature are displayed by turns.) (When the thermistor detects 100℃ or more, hundreds digit, tens digit and ones digit are displayed by turns.)	℃
	LEV-6 opening pulse 0 - 500	0 - 500	Pulse
	LEV-7 opening pulse 0 - 500	0 - 500	Pulse
	LEV-8 opening pulse 0 - 500	0 - 500	Pulse
	High pressure × 10 (63HS) 0 - 500	0 - 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.)	kgf/cm²
	Input current 0 - 50	0 - 50	A
	Indoor pipe temperature / Cond. / Eva. TH5 Indoor-A	– 39 - 88	℃
	Indoor pipe temperature / Cond. / Eva. TH5 Indoor-B	– 39 - 88	℃
	Indoor pipe temperature / Cond. / Eva. TH5 Indoor-C	– 39 - 88	℃
	Indoor pipe temperature / Cond. / Eva. TH5 Indoor-D	– 39 - 88	℃
	Indoor pipe temperature / Cond. / Eva. TH5 Indoor-E	– 39 - 88	℃

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Branch pipe temperature TH-A	– 39 - 88	℃
	Branch pipe temperature TH-B	– 39 - 88	℃
	Branch pipe temperature TH-C	– 39 - 88	℃
	Branch pipe temperature TH-D	– 39 - 88	℃
	Branch pipe temperature TH-E	– 39 - 88	℃
	TH1 Indoor-A 8 - 39	8 - 39	℃
	TH1 Indoor-B 8 - 39	8 - 39	℃
	TH1 Indoor-C 8 - 39	8 - 39	℃
	TH1 Indoor-D 8 - 39	8 - 39	℃
	TH1 Indoor-E 8 - 39	8 - 39	℃

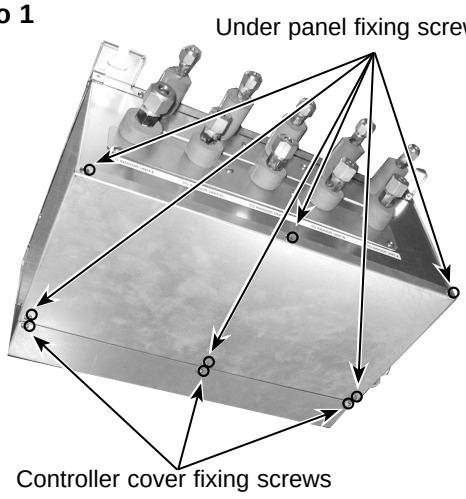
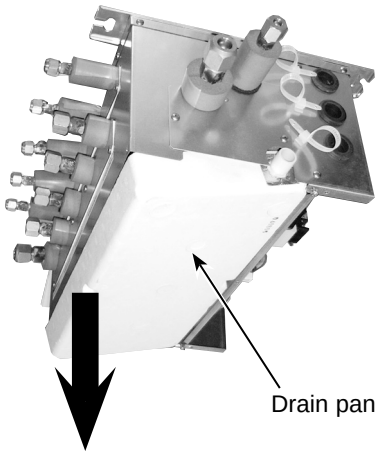
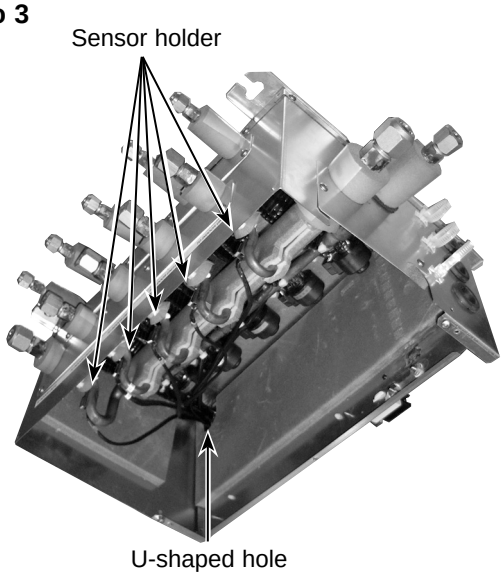
The black square (■) indicates a switch position.

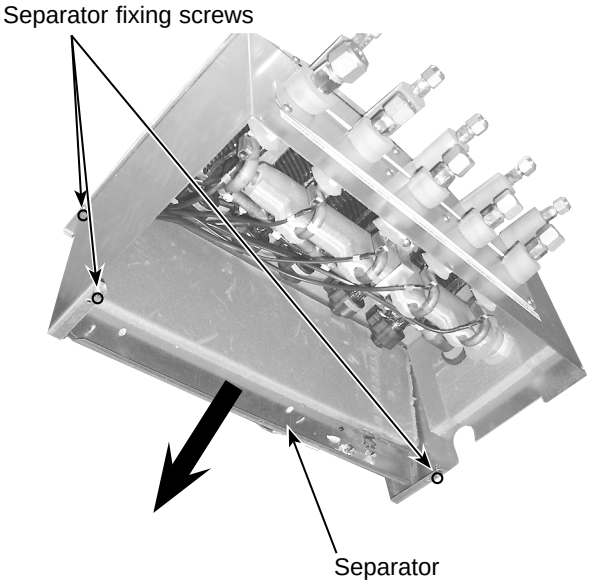
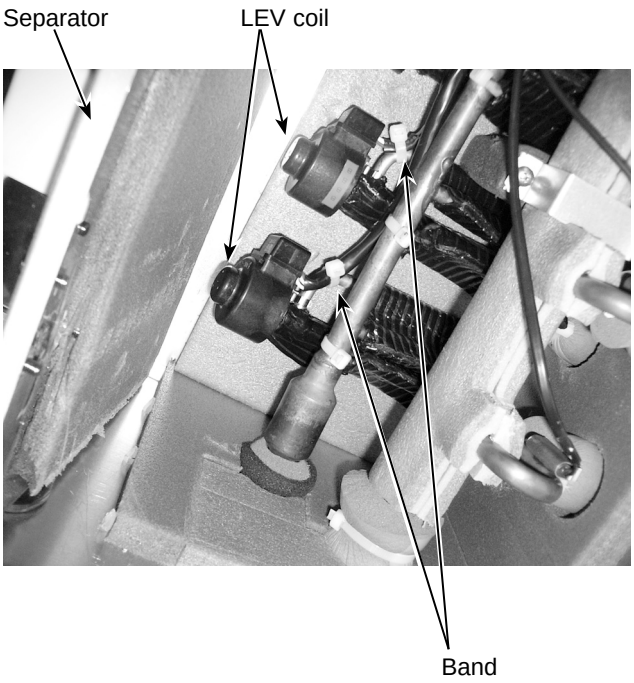
SW2 setting	Display detail	Explanation for display	Unit
	Indoor - setting temperature 16 - 31 Indoor-A	16 - 31	℃
	Indoor - setting temperature 16 - 31 Indoor-B	16 - 31	℃
	Indoor - setting temperature 16 - 31 Indoor-C	16 - 31	℃
	Indoor - setting temperature 16 - 31 Indoor-D	16 - 31	℃
	Indoor - setting temperature 16 - 31 Indoor-E	16 - 31	℃

8 DISASSEMBLY PROCEDURE

PAC-AK50BC PAC-AK51BC PAC-AK52BC PAC-AK53BC
PAC-AK30BC PAC-AK31BC PAC-AK32BC

Note:
1. Before disassembling/servicing the branch box, be sure to power off the outdoor unit.
2. Be careful of dropping of the panel or controller board during the service.
3. When servicing the parts associated with refrigerant, recover refrigerant in advance.
4. Be sure to practice non-oxidation welding.

OPERATING PROCEDURE	PHOTOS
1. Removing the controller cover and under panel (1) Remove 3 controller cover fixing screws (4 × 10) to detach the cover. (See Photo 1.) (2) Remove 6 under panel fixing screws (4 × 10) to remove the panel. (See Photo 1.)	**Photo 1** 
2. Removing the drain pan (1) Remove the under panel. (See Photo 1.) (2) Remove the drain hose. (3) Incline the side of the drain pan that faces the piping to remove the pan. *** When removing the drain pan, be careful with remaining water on the pan.** **Also, be careful not to make cracks on the pan.**	**Photo 2** 
3. Removing the thermistors (TH-A–E) (1) Remove the controller cover. (See Photo 1.) (2) Remove the under panel. (See Photo 1.) (3) Pull out the thermistors, TH-A–E, from the sensor holders mounted on the gas pipe. (See Photo 3.) (4) Pull out those thermistors through the U-shaped hole to the board side. (5) Loosen the side clamps of the board and disconnect the connectors on the board.	**Photo 3** 

OPERATING PROCEDURE	PHOTOS
4. Removing the LEV coil (LEV-A–E) (1) Remove the controller cover. (See Photo 1.) (2) Remove the under cover. (See Photo 1.) (3) Remove 4 separator fixing screws (4 × 10) in the side of the branch box. (See Photo 4.) (4) Tilt the separator to the board side. (See Photo 4.) (5) Loosen the side clamps of the board and disconnect the connectors on the board. (6) Pull out the lead wire through the U-shaped hole. (See Photo 3.) (7) Cut the band that fixes the lead wire to pull out the LEV coil (LEV-A–E). (See Photo 5.)	**Photo 4**  **Photo 5** 

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO100-8310, JAPAN

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