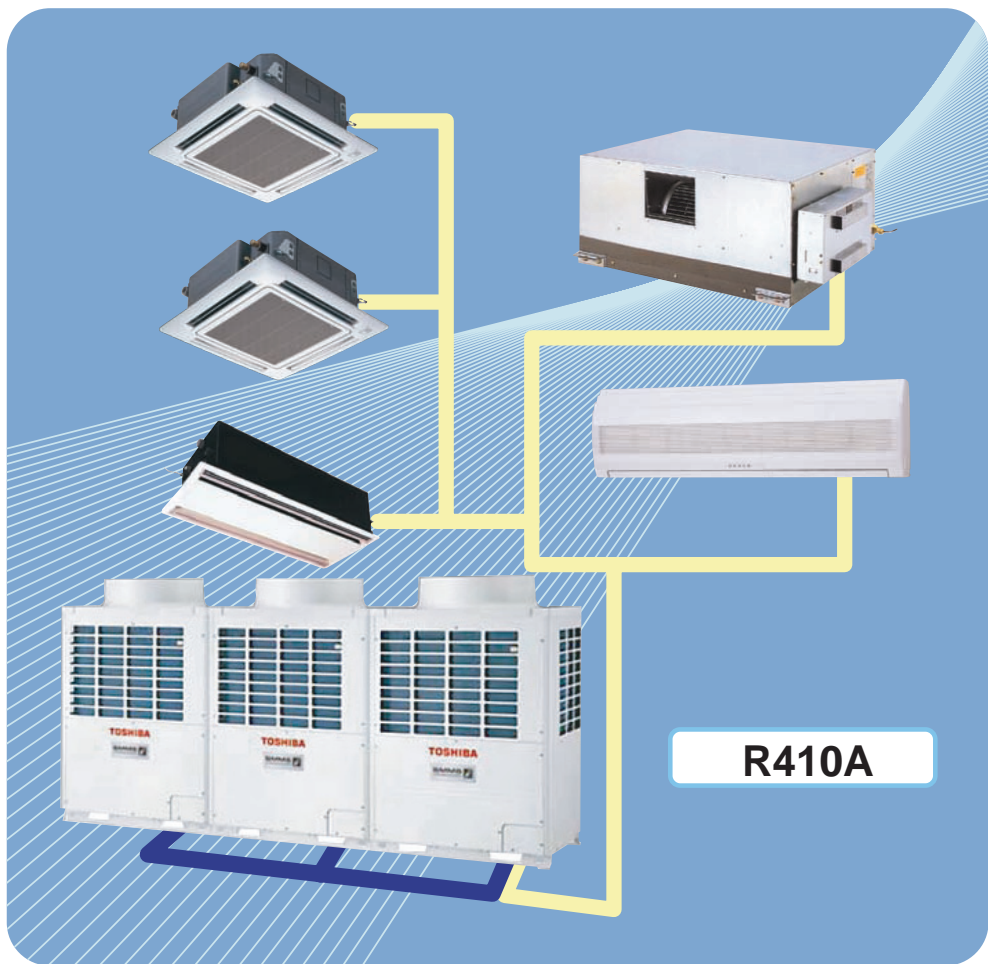


**TOSHIBA**

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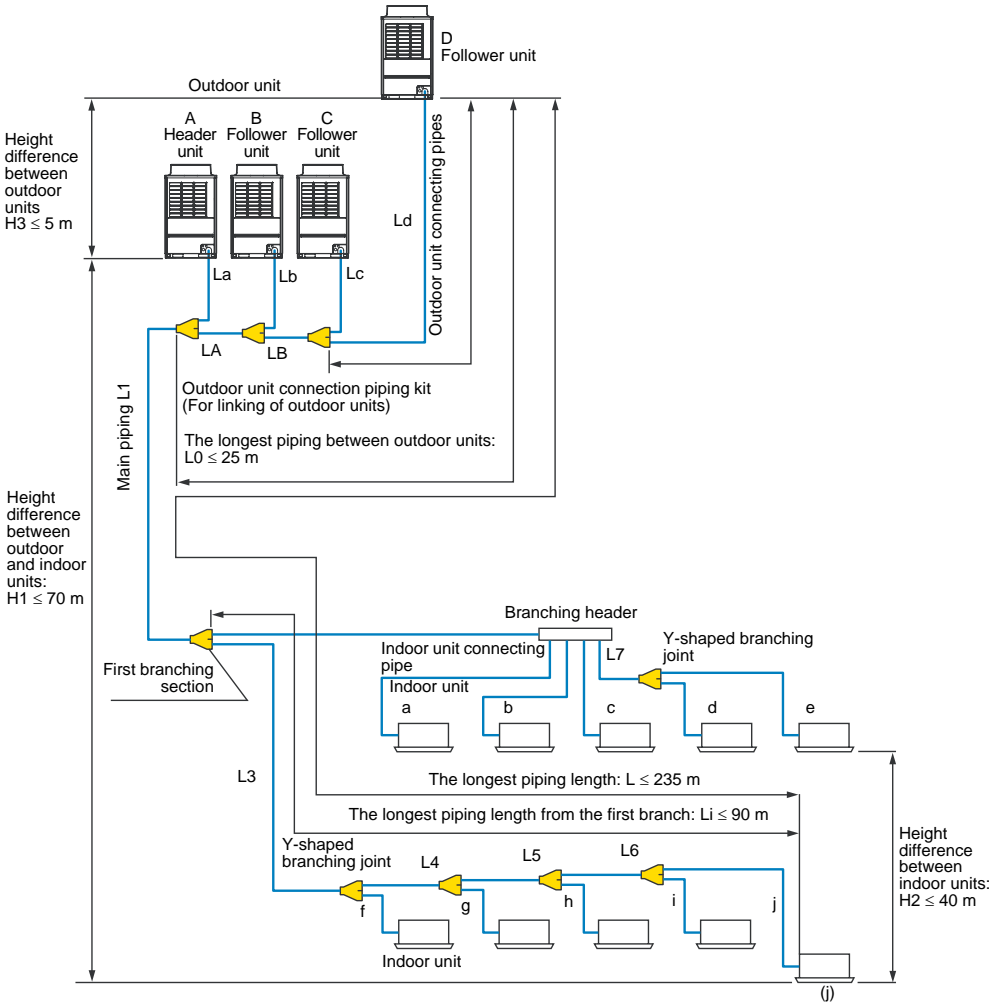
# Quick reference

**SMMS**  
SUPER MODULAR MULTI SYSTEM



# 01 Refrigerant Piping

## Allowable Length of Refrigerant Pipes and Allowable Height Difference between Units



## System Restriction

Outdoor unit combination	Up to 4 units	
Total capacity of outdoor units	Up to 48 HP	
Indoor unit connection	Up to 48 units	
Total capacity of indoor units (varies depending on the height difference between indoor units.)	H2 ≤ 15m	135% of outdoor units' capacity
	15m < H2	105% of outdoor units' capacity

## Cautions for Installation

- Set the outdoor unit first connected to the bridging pipe to the indoor units as the header unit.
- Install the outdoor units in order of their capacity codes: A (header unit) ≥ B ≥ C ≥ D
- When connecting gas pipes to indoor units, use Y-shaped branching joints to keep pipes level.
- When piping to outdoor units using Outdoor unit connection piping kits, intersect the pipes to the outdoor unit and those to indoor units at a right angle as shown in figure 1 on "INSTALLATION MANUAL (6. INSTALLATION OF THE OUTDOOR UNIT)". Do not connect them as in figure 2 on "INSTALLATION MANUAL (6. INSTALLATION OF THE OUTDOOR UNIT)".

## Allowable Length and Allowable Height Difference of Refrigerant Piping

Item			Allowable value	Pipes	
Pipe length	Total extension of pipe (liquid pipe, real length)	Less than 96kW	Less than 34HP or less	300m	LA + LB + La + Lb + Lc + Ld + L1 + L2 + L3 + L4 + L5 + L6 + L7 + a + b + c + d + e + f + g + h + i + j
		96kW or more	34HP or more	500m	
	Farthest piping length L (*1)	Equivalent length		235m	LA + LB + Ld + L1 + L3 + L4 + L5 + L6 + j
		Real length		190m	
	Main piping length	Equivalent length		120m (*2)	L1
		Real length		100m (*2)	
	Farthest equivalent piping length from the first branch Li (*1)			90m (*3)	L3 + L4 + L5 + L6 + j
	Farthest equivalent piping length between outdoor units L0 (*1)			25m	LA + LB + Ld (LA + Lb, LA + LB + Lc)
	Maximum equivalent piping length of pipes connected to outdoor units			10m	La, Lb, Lc, Ld
	Maximum real length of pipes connected to indoor units			30m	a, b, c, d, e, f, g, h, i, j
Maximum equivalent length between branching sections			50m	L2, L3, L4, L5, L6, L7	
Height difference	Height between outdoor and indoor units H1	Upper outdoor units	70m (*4)	—	
		Lower outdoor unit	40m (*5)	—	
	Height between indoor units H2		40m	—	
Height between indoor units H3		5m	—		

\*1: Farthest outdoor unit from the first branch: (D), farthest indoor unit: (j)

\*2: If the total capacity of outdoor units is 46HP or more, make the equivalent length 70m (real length 50m) or less.

\*3: Make the difference 65m or less if the height difference between outdoor and indoor units (H1) is more than 3m.

\*4: Make the difference 50m or less if the height difference between indoor units (H2) is more than 3m.

\*5: Make the difference 30m or less if the height difference between indoor units (H2) is more than 3m.

After finishing vacuuming, exchange the vacuum pump with a refrigerant cylinder and start additional charging of refrigerant.

### Calculation of additional refrigerant charge amount

Refrigerant charge amount at shipment from the factory does not include the refrigerant for pipes at the local site. For refrigerant to be charged in pipes at the local site, calculate the amount and charge it additionally.

#### NOTE

If the additional refrigerant amount indicates minus as the result of calculation, use the air conditioner without additional refrigerant.

Heat pump type	Outdoor unit type	MAP080	MAP100	MAP120	MAP140	MAP160
	Charging amount (kg)		11.5			

$$\text{Additional re frigerant charge amount at local site} = \text{Real length of liquid pipe} \times \text{Additional refrigerant charge amount per 1 m liquid pipe (Table 1)} + \text{Corrective amount of refrigerant depending on HP of cooperating outdoor units (Table 2)}$$

Table 1

Liquid pipe dia. (mm)	6.4	9.5	12.7	15.9	19.1	22.2
Additional refrigerant amount/1m liquid pipe (kg/m)	0.025	0.055	0.105	0.160	0.250	0.350

Table 2

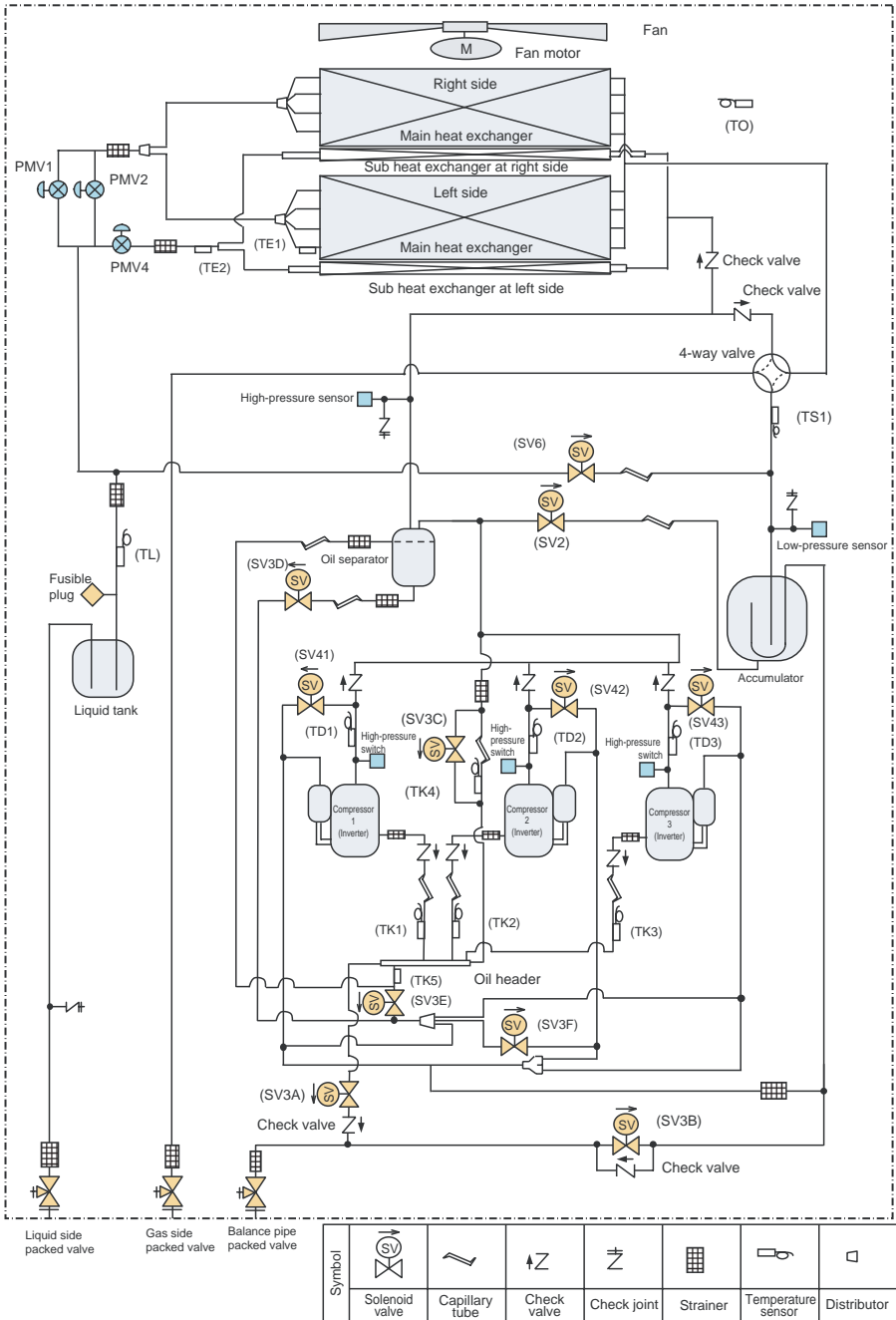
	Combined HP (HP)	Combined outdoor units (HP)				C (Corrective amount of refrigerant) (kg)
Standard type	8	8HP	—	—	—	1.5
	10	10HP	—	—	—	2.5
	12	12HP	—	—	—	3.5
	14	14HP	—	—	—	8.5
	16	16HP	—	—	—	10.5
	18	10HP	8HP	—	—	0.0
	20	10HP	10HP	—	—	3.0
	22	12HP	10HP	—	—	5.0
	24	12HP	12HP	—	—	7.5
	26	16HP	10HP	—	—	8.5
	28	16HP	12HP	—	—	9.5
	30	16HP	14HP	—	—	11.5
	32	16HP	16HP	—	—	12.5
	34	12HP	12HP	10HP	—	3.0
	36	12HP	12HP	12HP	—	4.0
	38	16HP	12HP	10HP	—	6.0
	40	16HP	12HP	12HP	—	7.0
	42	16HP	14HP	12HP	—	8.0
44	16HP	16HP	12HP	—	10.0	
46	16HP	16HP	14HP	—	12.0	
48	16HP	16HP	16HP	—	14.0	
High Efficiency type	16	8HP	8HP	—	—	0.0
	24	8HP	8HP	8HP	—	-4.0
	26	10HP	8HP	8HP	—	-4.0
	28	10HP	10HP	8HP	—	-2.0
	30	10HP	10HP	10HP	—	0.0
	32	8HP	8HP	8HP	8HP	-6.0
	34	10HP	8HP	8HP	8HP	-6.0
	36	10HP	10HP	8HP	8HP	-6.0
	38	10HP	10HP	10HP	8HP	-6.0
	40	10HP	10HP	10HP	10HP	-5.0
	42	12HP	10HP	10HP	10HP	-4.0
	44	12HP	12HP	10HP	10HP	-2.0
46	12HP	12HP	12HP	10HP	0.0	
48	12HP	12HP	12HP	12HP	2.0	

### Charging of refrigerant

- Keeping the valve of the outdoor unit closed, be sure to charge the liquid refrigerant into the service port at the liquid side.
- If the specified amount of refrigerant cannot be charged, fully open the valves of the outdoor unit at liquid and gas sides, operate the air conditioner in COOL mode, and then charge refrigerant into service port at the gas side.  
In this time, choke the refrigerant slightly by operating the valve of the canister to charge liquid refrigerant.
- The liquid refrigerant may be charged suddenly, therefore be sure to charge refrigerant gradually.

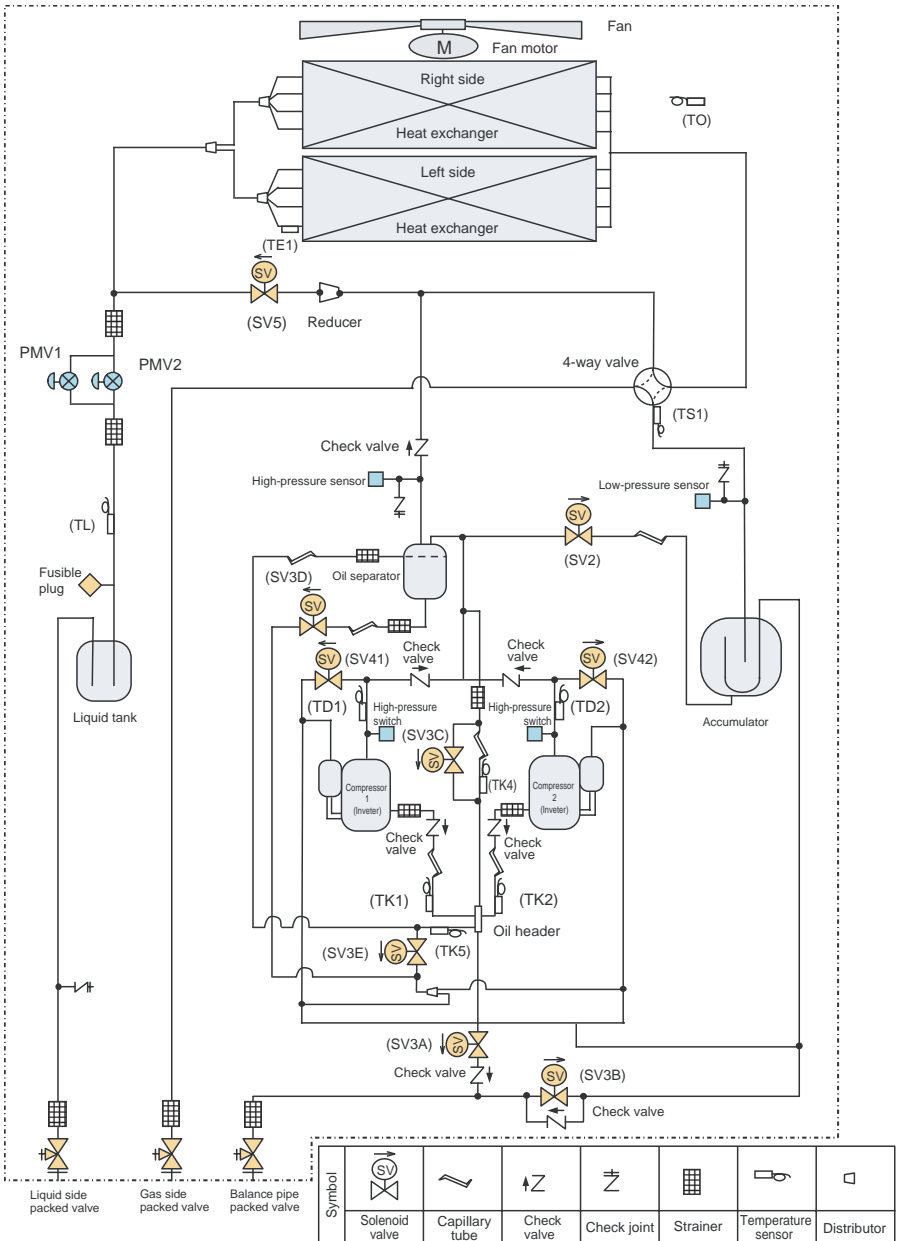
## Outdoor Unit (14, 16HP)

Model: MMY-MAP1404\*, MMY-MAP1604\*



Outdoor Unit (8, 10, 12HP)

Model: MMY-MAP0804\*, MMY-MAP1004\*, MMY-MAP1204\*



## Explanation of Functional Parts

Functional part name		Functional outline
Solenoid valve	SV3A	(Connector CN321: White) 1) Supplies oil reserved in the oil header during ON time.
	SV3B	(Connector CN321: White) 1) Returns oil supplied in the balance pipe to the compressor.
	SV3C	(Connector CN321: White) 1) Pressurizes oil reserved in the oil header during ON time.
	SV3D	(Connector CN322: White) 1) Reserves oil in the oil separator during OFF time. 2) Returns oil reserved in the oil separator to the compressor during ON time.
	SV3E	(Connector CN322: White) 1) Turns on during operation and balances oil between compressors.
	SV3F	(Connector CN323: White) 1) Controls oil level balances between compressors.
	SV2	(Hot gas bypass) (Connector CN311: White) 1) Low pressure release function 2) High pressure release function 3) Gas balance function during stop time
	SV41 SV42 SV43	(Start compensation valve of compressor) (SV41 Connector CN312: Blue, SV42 Connector CN312: Blue, SV43 Connector CN313: Red) 1) For gas balance start 2) High pressure release function 3) Low pressure release function
	SV5	(Connector CN314: White) 1) Preventive function for high-pressure rising in heating operation
	SV6	(Connector CN315: White) 1) Liquid bypass function for discharge temperature release (cooling bypass function)
4-way valve		(Connector CN317: Blue) 1) Cooling/heating exchange 2) Reverse defrost
Pulse motor valve	PMV1, 2	(Connector CN300, 301: White) 1) Super heat control function in heating operation 2) Liquid line shut-down function while follower unit stops 3) Under cool adjustment function in cooling operation 4) Exchange function between main and sub exchangers in cooling operation
	PMV4	(Connector CN303: Red) 1) Exchange function between main and sub exchangers in cooling operation 2) Preventive function for high-pressure rising in heating operation
Oil separator		1) Prevention for rapid decreasing of oil (Decreases oil flowing to the cycle) 2) Reserve function of surplus oil
Temp. Sensor	TD1 TD2 TD3	(TD1 Connector CN502: White, TD2 Connector CN503: Pink, TD3 Connector CN504: Blue) 1) Protection of compressor discharge temp. 2) Used for discharge temperature release
	TS1	(Connector CN505: White) 1) Controls PMV super heat in heating operation
	TE1	(Connector CN520: Green) 1) Controls defrost in heating operation 2) Controls outdoor fan in heating operation
	TE2	(Connector CN521: Red) 1) Controls exchange function between main and sub exchangers
	TK1, TK2, TK3, TK4, TK5	(TK1 Connector CN531: Black, TK2 Connector CN532: Green, TK3 Connector CN533: Red, TK4 Connector CN534: Yellow, TK5 Connector CN535: Red) 1) Judges oil level of the compressor
	TL	(Connector CN523: White) 1) Detects under cool in cooling operation
	TO	(Connector CN507: Yellow) 1) Detects outside temperature
Pressure sensor	High pressure sensor	(Connector CN501: Red) 1) Detects high pressure and controls compressor capacity 2) Detects high pressure in cooling operation, and controls the fan in low ambient cooling operation 3) Detects under cool in indoor unit in heating operation
	Low pressure sensor	(Connector CN500: White) 1) Detects low pressure in cooling operation and controls compressor capacity 2) Detects low pressure in heating operation, and controls the super heat
Heater	Compressor case heater	(Compressor 1 Connector CN331: White, Compressor 2 Connector CN332: Blue, Compressor 3 Connector CN333: Black) 1) Prevents liquid accumulation to compressor
	Accumulator case heater	(Connector CN334: Red) 1) Prevents liquid accumulation to accumulator
Balance pipe		1) Oil balancing in each outdoor unit

## Check Codes Displayed on Remote Controller and SMMS-i Outdoor Unit (7-Segment Display on I/F Board) and Locations to Be Checked

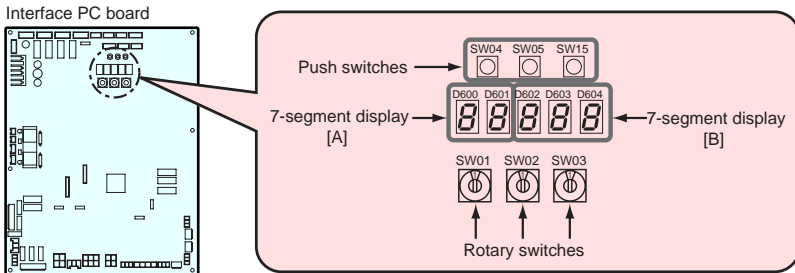
Main remote controller	Description	Main remote controller	Description
E01	Indoor-remote controller communication error (detected at remote controller end)	H01	Compressor breakdown
E02	Remote controller transmission error	H02	Compressor error (lockup) MG-CTT error
E03	Indoor-remote controller communication error (detected at indoor end)	H03	Current detection circuit error
E04	Indoor-outdoor communication circuit error (detected at indoor end)	H05	TD1 sensor miswiring (incomplete insertion)
E06	Dropping out of indoor unit	H06	Activation of low-pressure protection
—	Indoor-outdoor communication circuit error (detected at outdoor end)	H07	Low oil level protection
E08	Duplicated indoor address	H08	Error in temperature sensor for oil level detection
E09	Duplicated master remote controller	H15	TD2 sensor miswiring (incomplete insertion)
E10	Indoor inter- MCU communication error	H16	Oil level detection circuit error
E12	Automatic address starting error	H25	TD3 sensor miswiring (incomplete insertion)
E15	Indoor unit not found during automatic address setting	L03	Duplicated indoor header unit
E16	Too many indoor units connected	L04	Duplicated outdoor line address
E18	Error in communication between indoor header and follower units	L05	Duplicated priority indoor unit (as displayed on priority indoor unit)
E19	Error in number of outdoor header units	L06	Duplicated priority indoor unit (as displayed on indoor unit other than priority indoor unit)
E20	Connection to other line found during automatic address setting	L07	Connection of group control cable to standalone indoor unit
E23	Outdoor-outdoor communication transmission error	L08	Indoor group/addresses not set
E25	Duplicated follower outdoor address	L09	Indoor capacity not set
E26	Dropping out of outdoor unit	L10	Outdoor capacity not set
E28	Outdoor follower unit error	L20	Duplicated central control address
E31	IPDU communication error	L28	Too many outdoor units connected
F01	Indoor TCJ sensor error	L29	Error in No. of IPDUs
F02	Indoor TC2 sensor error	L30	External interlock of indoor unit
F03	Indoor TC1 sensor error	—	Extended IC error
F04	TD1 sensor error	P01	Indoor fan motor error
F05	TD2 sensor error	P03	Discharge temperature TD1 error
F06	TE1/TE2 sensor error	P04	Activation of highpressure SW
F07	TL sensor error	P05	Detection of open phase/phase sequence
F08	To sensor error	P07	Inverter DC voltage (Vdc) error (compressor) MG-CTT error
F10	Indoor TA sensor error	P10	Heat sink overheating error
F11	Indoor TF sensor error	P12	Indoor overflow error
F12	TS1 sensor error	P13	Indoor fan motor error
F13	TH sensor error	P15	Outdoor liquid backflow detection error
F15	Outdoor temperature sensor wiring error (TE1, TL)	P15	Gas leakdetection (TS1 condition)
F16	Outdoor pressure sensor wiring error (Pd, Ps)	P15	Gas leak detection (TD condition)
F22	TD3 sensor error	P17	Discharge temperature TD2 error
F23	Ps sensor error	P18	Discharge temperature TD3 error
F24	Pd sensor error	P19	4-way valve reversing error
F29	Other indoor error	P20	Activation of high-pressure protection
F31	Outdoor EEPROM error	P22	Outdoor fan IPDU error
		P26	G-TR shortcircuit protection error
		P29	Compressor position detection circuit error
		P31	Other indoor error (group follower unit error)

## Check at Main Power-on

After turning on the main power of the indoor units and outdoor unit in the refrigerant line to conduct a test operation, check the following items in each outdoor and indoor unit.  
(After turning on the main power, be sure to check in order: indoor unit → outdoor unit.)

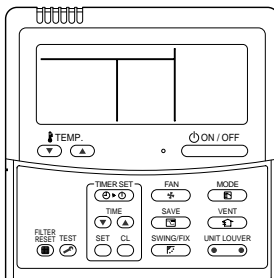
### <Check on the outdoor unit>

- (1) Check that all the rotary switches, SW01, SW02, and SW03, on the interface PC board of the header unit are set to "1."
- (2) If another check code is displayed on the 7-segment display [B], remove the cause of the problem referring to Section, "TROUBLESHOOTING".
- (3) Check that "L08" is displayed on the 7-segment display [B] on the interface PC board of the header unit. (L08: Indoor address not set up)  
(If the address setup operation has already been completed during servicing, etc., the above check code is not displayed, and only "U1" is displayed on the 7-segment display [A].)

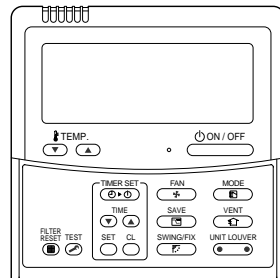


### <Check on the indoor unit>

- (1) Display check on the remote controller (in the case of a wired remote controller)  
Check that a frame, as shown in the following figure at left, is displayed on the LC display section of the remote controller.



Normal status  
(Power supplied and operation stopped)



When power is not supplied normally

If no frame is displayed, as shown in the above figure at right, the remote controller does not have a normal supply of power; check the following items.

- Check the power supply of the indoor unit.
- Check the wiring between the indoor unit and the remote controller.
- Check whether there is a cutoff of wire around the indoor control PC board or not, and check for connection failures of the connectors.
- Check for failure of the transformer for the indoor electrical control box.
- Check for failure of the indoor control PC board

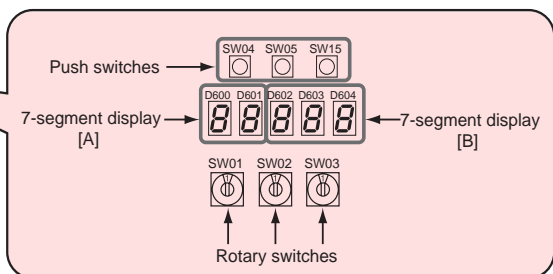
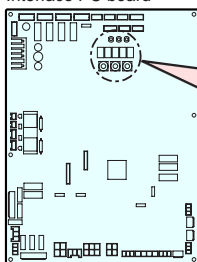
## Precautions

- (1) Address setup is not performed simply by turning on the power supply.
- (2) For indoor units, address setup can be done either by manual address setup or by automatic address setup:  
Automatic address setup: Setup from SW15 on the interface PC board of the header unit  
Manual address setup: Setup from the wired remote controller.  
(For details, refer to "Address Setup Procedure.")
- (3) Automatic setup usually takes about 5 minutes per line. In some cases, however, it may take up to 10 minutes.
- (4) It is unnecessary to operate the air conditioner to achieve address setup.

## Address Setup and Check Procedure

Procedure	Item	Operation and check contents																													
1	Indoor unit power-on	Turn on the power of the indoor unit for the refrigerant line for which the address is to be set up.																													
2	Outdoor unit power-on	Turn on the power of all the outdoor units for the refrigerant line for which the address is to be set up.																													
3	7-segment display check	Check that "L08" is displayed on the 7-segment display [B] on the interface PC board of the header unit in the system where the address is to be set up.																													
4	Address setup start	Confirm the items in "Address Setup Procedure," and then set up the address according to the operation procedure. (Be careful to note that the setup operation may differ in group control and central control systems.)  <b>Note:</b> The address cannot be set up if switches are not operated.																													
5	Display check after setup	<ul style="list-style-type: none"> <li>• After address setup, "U1" " " is displayed on the 7-segment display.</li> <li>• For follower outdoor units, "U2" to "U4" are displayed on the 7-segment display [A].</li> <li>• If an error code is displayed on the 7-segment display [B], remove the cause of the problem referring to "TROUBLESHOOTING."</li> </ul>																													
6	System information check after setup	Using the 7-segment display function, check the system information of the scheduled system. (This check is executed on the interface PC board of the header unit.) <table border="1" style="margin-top: 10px;"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Rotary switch setup</th> <th colspan="2">7-segment display</th> </tr> <tr> <th>SW01</th> <th>SW02</th> <th>SW03</th> <th>[A]</th> <th>[B]</th> </tr> </thead> <tbody> <tr> <td>System capacity</td> <td>1</td> <td>2</td> <td>3</td> <td>[Number of horsepower]</td> <td>[H P]</td> </tr> <tr> <td>Number of connected outdoor units</td> <td>1</td> <td>3</td> <td>3</td> <td>[Number of units]</td> <td>[ P]</td> </tr> <tr> <td>Number of connected indoor units</td> <td>1</td> <td>4</td> <td>3</td> <td>[Number of connected units]</td> <td></td> </tr> </tbody> </table> <p>After the above checks, return rotary switches SW01, SW02, and SW03 to 1/1/1.</p>		Rotary switch setup			7-segment display		SW01	SW02	SW03	[A]	[B]	System capacity	1	2	3	[Number of horsepower]	[H P]	Number of connected outdoor units	1	3	3	[Number of units]	[ P]	Number of connected indoor units	1	4	3	[Number of connected units]	
	Rotary switch setup			7-segment display																											
	SW01	SW02	SW03	[A]	[B]																										
System capacity	1	2	3	[Number of horsepower]	[H P]																										
Number of connected outdoor units	1	3	3	[Number of units]	[ P]																										
Number of connected indoor units	1	4	3	[Number of connected units]																											

Interface PC board



## Address Setup Procedure

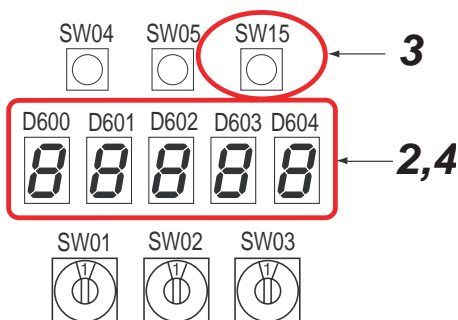
No central control: go to Address setting procedure 1  
 Central control of 2 or more refrigerant lines: go to Address setting procedure 2

(Example)	When controlling a single refrigerant line centrally	When controlling 2 or more refrigerant lines centrally
Address setting procedure	To procedure 1	To procedure 2
System wiring diagram		

### Address setting procedure 1

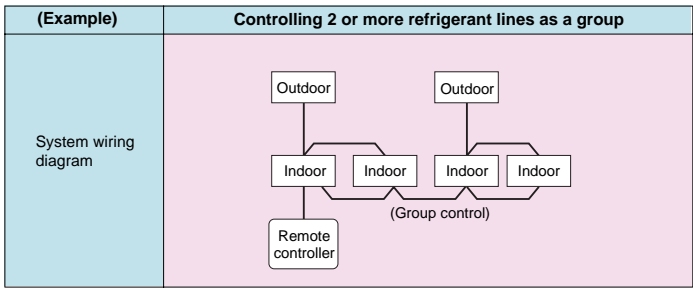
- Turn on indoor units first, and then turn on outdoor units.
- About one minute after turning the power on, confirm that the 7-segment display on the interface P.C. board of the header outdoor unit indicates. **U. 1. L08 (U. 1. flash)**
- Push SW 15 to start the automatic address setting.  
 (It may take up to 10 minutes (normally about 5 minutes) to complete one line's setting.)
- The 7-segment display indicates. **Auto 1 → Auto 2 → Auto 3**  
 After the indication, **U. 1. --- (U. 1. flash)** starts flashing on the display.  
 When the flashing stops and **U. 1. --- (U. 1. light)** remain lit on the display, the setting is complete.

Interface P.C. board on the header outdoor unit



### REQUIREMENT

- When 2 or more refrigerant lines are controlled as a group, be sure to turn on all the indoor units in the group before setting addresses.
- If you set the unit addresses of each line separately, each line's header indoor unit is set separately. In that case, the CODE No. "L03" (Indoor header unit overlap) is indicated as running starts. Change the group address to make one unit the header unit using wired remote controller.



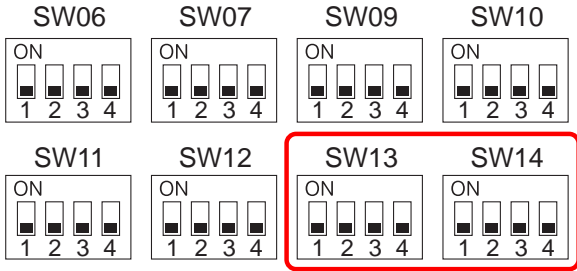
### Address setting procedure 2

- 1 Set a system address for each system using SW 13 and 14 on the interface P.C. board on the header outdoor unit of each system.  
(Factory default: Address 1)

**NOTE**

Be sure to set a unique address on each system.  
Do not use a same address as another system (refrigerant line) or a custom side.

### Interface P.C. board on the header outdoor unit



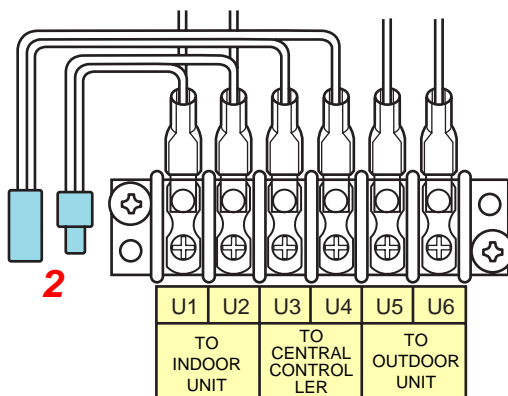
Line address switches on the outdoor interface P.C. board ( O : switch ON, x : switch OFF )

Line address	SW13				SW14			
	1	2	3	4	1	2	3	4
1				x	x	x	x	x
2				x	O	x	x	x
3				x	x	O	x	x
4				x	O	O	x	x
5				x	x	x	O	x
6				x	O	x	O	x
7				x	x	O	O	x
8				x	O	O	O	x
9				x	x	x	x	O
10				x	O	x	x	O
11				x	x	O	x	O
12				x	O	O	x	O
13				x	x	x	O	O
14				x	O	x	O	O

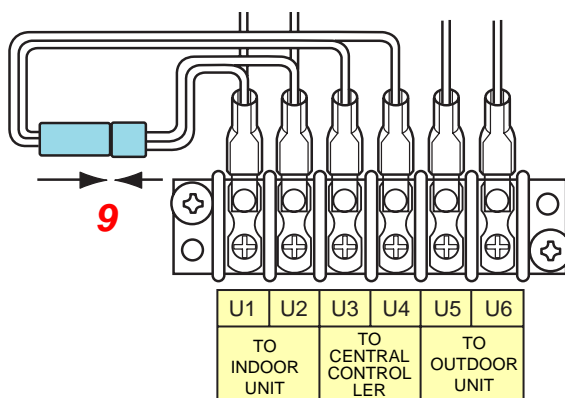
Line address	SW13				SW14			
	1	2	3	4	1	2	3	4
15				x	x	O	O	O
16				x	O	O	O	O
17				O	x	x	x	x
18				O	O	x	x	x
19				O	x	O	x	x
20				O	O	O	x	x
21				O	x	x	O	x
22				O	O	x	x	x
23				O	x	O	O	x
24				O	O	O	O	x
25				O	x	x	x	O
26				O	O	x	x	O
27				O	x	O	x	O
28				O	O	O	x	O

Not used for setup of line address (do not change setup.)

- 2** Be sure to disconnect the relay connectors between the [U1U2] and [U3U4] terminals on all the header outdoor units that will be connected to the central control. (Factory default: disconnected)



- 3** Turn on indoor units first, and then turn on outdoor units.
- 4** About 1 minute after turning the power on, confirm that the 7-segment display on the interface P.C. board of the header outdoor unit indicates . **U. 1. L08 (U. 1. flash)**
- 5** Push SW 15 to start the automatic address setting.  
(It may take up to 10 minutes (normally about 5 minutes) to complete one line's setting.)
- 6** The 7-segment display indicates **Auto 1 → Auto 2 → Auto 3** .  
After the indication, **U. 1. - - - (U. 1. flash)** starts flashing on the display.  
When the flashing stops and **U. 1. - - - (U. 1. light)** , remains lit on the display, the setting is complete.
- 7** Repeat steps 4 to 6 for other refrigerant lines.
- 8** After completing address setting of all systems, turn off dip switch 2 of SW30 on the interface P.C. boards of all the header outdoor units connected to the same central control, except the unit that has the lowest address.  
(For unifying the termination of the wiring for the central control of indoor and outdoor units)
- 9** Connect the relay connectors between the [U1, U2] and [U3, U4] terminals of the header outdoor unit of each refrigerant line.



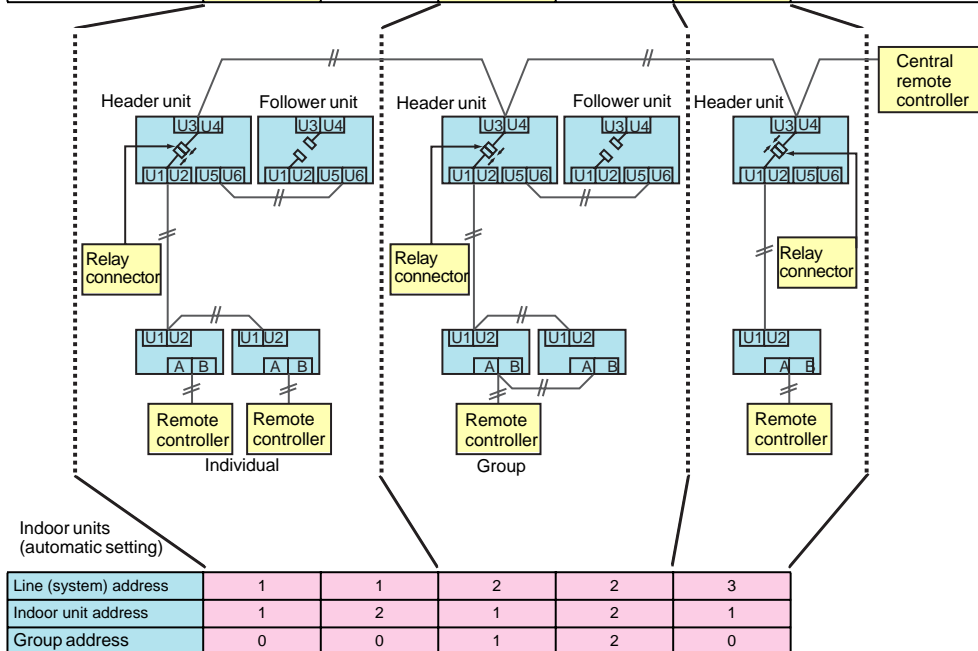


## Switch setting (setting example when controlling 2 or more refrigerant lines centrally)

### Outdoor units (setting manually)

\*The items in bold font must be set manually.

Outdoor unit's interface P.C. board	Header unit	Follower unit	Header unit	Follower unit	Header unit	Factory default
SW13, 14 (Line (system) address)	1	(No setting required)	<b>2</b>	(No setting required)	<b>3</b>	1
Dip switch 2 of SW30 (Terminator of indoor/ outdoor communication line and central control line)	ON	(No setting required)	Set to OFF after setting addresses.	(No setting required)	Set to OFF after setting addresses.	ON
Relay connector	Connect after setting addresses.	Open	Connect after setting addresses.	Open	Connect after setting addresses.	Open



### CAUTION

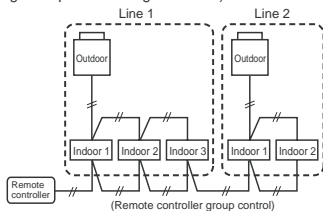
#### Relay connector connection

Never connect relay connectors between the [U1, U2] and [U3, U4] terminals before completing address setting of all the refrigerant lines. Otherwise, the addresses cannot be set correctly.

## Manual Address Setup from the Remote Controller

With indoor wiring work completed and outdoor wiring work not done. In cases where indoor unit addresses are decided in advance from the wired remote controller, or in cases where addresses are changed after address setup.

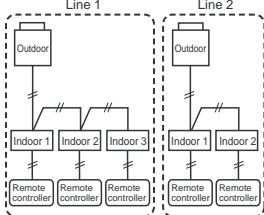
(Wiring example for 2 refrigerant lines)



Line address	1	1	1	2	2
Indoor address	1	2	3	1	2
Group address	1	2	2	2	2
	Header	Follower	Follower	Follower	Follower

In the above example, where remote controllers are not yet wired, set the address manually after individually connecting the wired remote controller.

(Wiring during manual address setup)

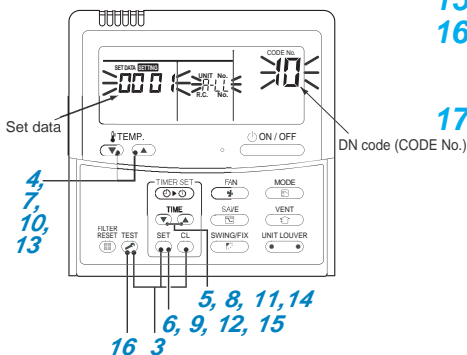


After address setup, return to the original wiring over remote controllers.

Group address

Individual: 0000  
 Header unit: 0001  
 Follower unit: 0002

In cases of remote controller group control



**1** Arrange one indoor unit and one remote controller set to 1 by 1.

**2** Turn on the power.

**3** Push the **SET** + **CL** + **TEST** buttons simultaneously for 4 seconds or more.  
 LCD begins blinking.

▼ (Refrigerant line address)

**4** Using the **TIME** buttons, set the DN code to **12**.

**5** Using the **TIME** buttons, set up the line address

(match it with the line address on the interface PC board of the header unit on the same refrigerant line).

**6** Push the **SET** button (OK when the display goes on).

▼ (Indoor address)

**7** Using the **TEMP** buttons, set the DN code to **13**.

**8** Using the **TIME** buttons, set up the indoor address.

(**000 ~ 10048**)

**9** Push the **SET** button (OK when the display goes on).

▼ (Group address)

**10** Using the **TEMP** buttons, set the DN code to **14**.

**11** Using the **TIME** buttons, set Individual = **0000**,  
 Header unit = **0001**, Follower unit = **0002**.

**12** Push the **SET** button (OK when the display goes on).

▼ (Central control address)

**13** Using the **TEMP** buttons, set DN code to **03**.

**14** Using the **TIME** buttons, set up the central control address. (**0001 ~ 0064**)

**15** Push **SET** button. (OK when display goes on).

**16** Push the **TEST** button.

Setup is finished ("Setting up" blinks; when "Setting up" goes off, operation is possible).

**17** Return to the original wiring over remote controllers.

## Resetting the Address (Resetting to the Factory Default (Address Undecided))

### Method 1

Clearing each address separately using a wired remote controller.

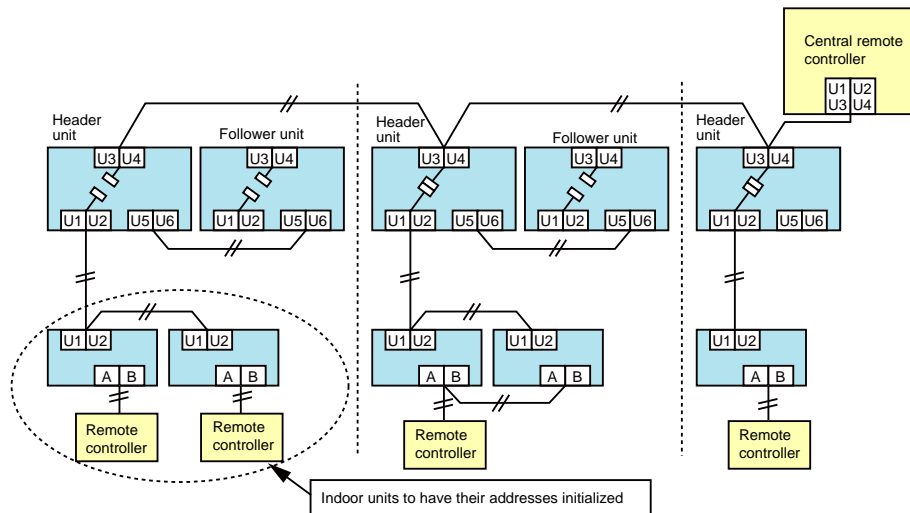
Set the system address, indoor unit address and group address to "0099" using a wired remote controller. (For the setting procedure, refer to the address setting procedures using the wired remote controller on the previous pages.)

### Method 2

Clearing all the indoor unit addresses on a refrigerant line at once from the outdoor unit.

#### 1 Turn off the refrigerant line to reset to the factory default and set the header outdoor unit of the line as below.

- 1) Disconnect the relay connectors between the [U1, U2] and [U3, U4] terminals. (Leave them as they are if they have already been disconnected.)
- 2) Turn on dip switch 2 of SW30 on the interface P.C. board of the header outdoor unit if the switch is OFF. (Leave it as it is if it has already been set to ON.)



#### 2 Turn on the indoor and outdoor units of the refrigerant line for which you want to initialize the addresses. About one minute after turning on the power, confirm that the 7-segment display on the header outdoor unit indicates "U.1. ---" and operate the interface P.C. board on the header outdoor unit of the refrigerant line as follows.

SW01	SW02	SW03	SW04	Clearable addresses
2	1	2	Confirm that the 7-segment display indicates "A.d.buS" and turn SW04 ON for more than 5 seconds.	System/indoor unit/group address
2	2	2	Confirm that the 7-segment display indicates "A.d.nEt" and turn SW04 ON for more than 5 seconds.	Central control address

#### 3 Confirm that the 7-segment display indicates "A.d. c.L." and set SW01, SW02 and SW03 to 1, 1, 1 respectively.

#### 4 After a time "U.1.L08" appears on the 7-segment display if the address clearing has been completed successfully. If the 7-segment display indicates "A.d. n.G.", the outdoor unit may still be connected with other refrigerant lines. Check the connection of the relay connectors between [U1, U2] and [U3, U4].

### NOTE

Take care to carry out the procedure above correctly; otherwise, addresses in other refrigerant lines may also be cleared.

#### 5 Set the addresses again after finishing the clearance.

## In the Case of an Increase in Address-undefined Indoor Units (Extension, etc.)

To set up the indoor address of a unit with an address that is undefined due to the extension of indoor units or replacement of PC board, etc., follow the methods below.

### Method 1

Set up an address individually from a wired remote controller.

(Line address, Indoor address, Group address, Central address)

For the setup method, refer to “Manual address setup from the remote controller.” above.

### Method 2

Set up an address from the outdoor unit.

\* Leave the addresses of the units for which addresses have already been set up as they are.

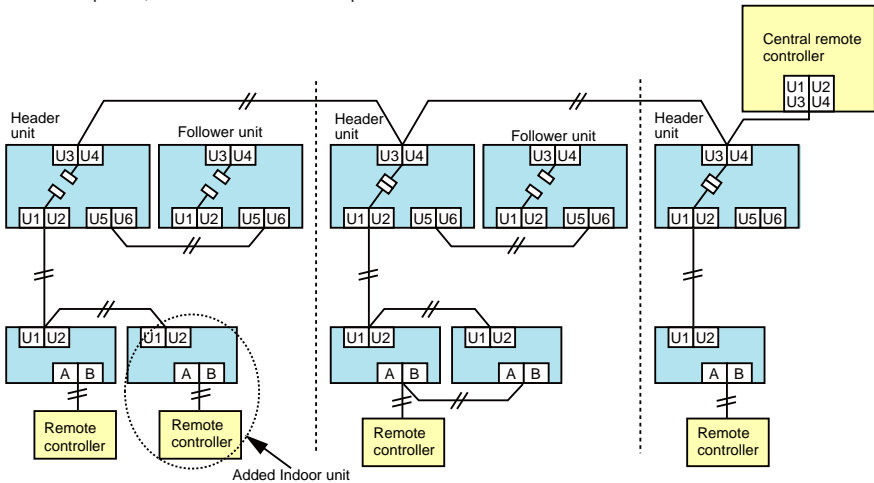
Set up an address only for the unit where the address is undefined.

Addresses are allocated from lower numbers.

### Setup procedure

Set up the outdoor header units in the refrigerant line to which indoor units have been added, as follows.

- 1** Remove the relay connector between **U1/U2** and **U3/U4**.
- 2** If it is off, turn on **SW30-bit 2** on the interface PC board at outdoor header unit side.  
\* Turn off the power, and then execute the operation.



- 3** Turn on the indoor/outdoor power for the refrigerant line for which an address is to be set up. After approximately 1 minute, check that “U.1. - - -” is displayed on the 7-segment display.
- 4** Execute the following operation on the interface PC board of the header unit.

SW01	SW02	SW03	SW04
2	14	2	After checking that “In.A” is displayed on the 7-segment display, push SW04 for 5 seconds or more.

“AUTO1” → “AUTO2” → “AUTO3” → ... → “AUTO9” ... is counted and displayed on the 7-segment display.

- 5** When “U.1. - - -” is displayed on the 7-segment display, the setup operation finished.

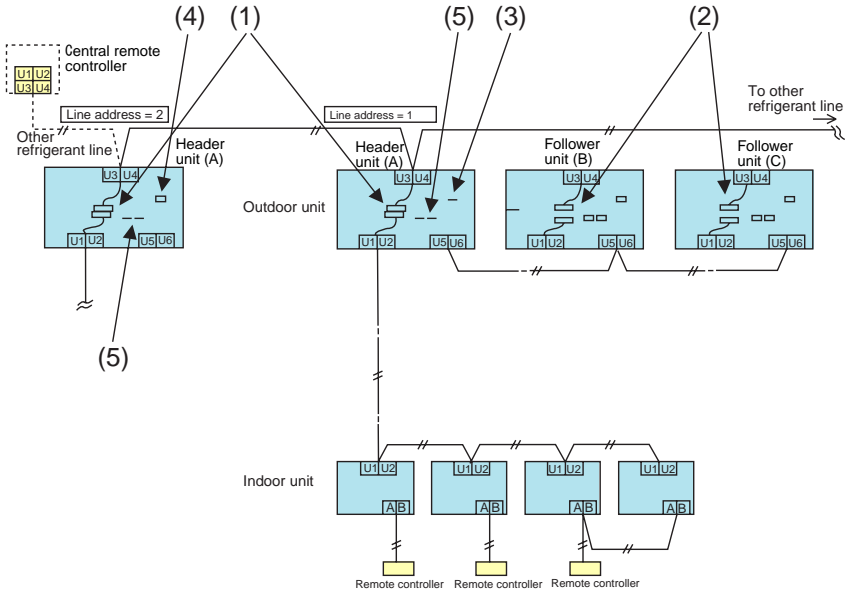
Turn off the indoor/outdoor power.

- 6** Return to the following setup as before.

- Relay connector
- SW30-bit 2
- SW01, SW02, SW03

## Check after Address Setup when Central Control System Is Connected

When the central control system is connected, check that the following setup has finished after address setup.



	Main check items	Check
Relay connector	(1) Is the relay connector of the header unit connected after address setup?	
	(2) Is the relay connector of the follower unit removed?	
Terminal resistance	(3) Is the end resistance (SW30-bit 2) of the header unit with the smallest line address number in the central control turned on? (Setup is unnecessary for follower units.)	
	(4) Is the terminal resistance (SW30-bit 2) of the header units, except for the line with the smallest central control line address, turned off? (Setup is unnecessary for follower units.)	
Line address	(5) Are addresses in the line address (SW13, SW14) not duplicated in each refrigerant line?	

### NOTE


The figure above does not show all the electric wires.

For details, refer to the installation manuals for the outdoor unit, indoor unit, remote controller, or optional devices.

# 19 Troubleshooting in Test Operation

If there are phenomena such as the output of a check code or the remote controller is not accepted when powered on after wiring work or during address setup operation, the following causes are considered.


## A Check Code Is Displayed on the Remote Controller

Check the code displayed on the indoor remote controller	Header unit 7-segment display	Cause	Countermeasures	
E04	—	When outdoor power is off	Check that the header outdoor unit power is on	
	L08	Address setup error <ul style="list-style-type: none"> <li>• Only line addresses of the connected indoor units are undefined.</li> <li>• The outdoor line address and the line addresses of all the indoor units do not match.</li> <li>• The indoor addresses are duplicated. (Units except those displaying E04 are duplicated.)</li> <li>• A header unit is not set up in group control (except groups displaying E04).</li> </ul>	Set up the address again.	
	E08 ⇄ -XX Alternate blinking	Duplication of indoor addresses (address number in the subcode of the check code are duplicated).	Set up the address again.	
	E07	There is no outdoor terminal resistance, or there are two or more resistances. (After address setup, when terminal resistance setup is changed after powering on)	 SW30	Check SW30 bit 2 of the header unit. No connection between multiple refrigerant lines: SW30 bit 2 is on. Connection between multiple refrigerant lines: SW30 bit 2 of the connected header unit is turned on only for one line.
		Transmission circuit error at the interface side (PC board failure)	Replace the interface PC board.	
E06	After address setup, communication from all the indoor units is interrupted under the condition that a normal operation can be performed.	Check and correct disconnection of the indoor/outdoor communication line (the communication line between the header unit and the leading indoor unit). Check for the influence of communication noise.		
E16	E16 ⇄ -XX Alternate blinking	Exceeded the number or capacity of connected indoor units	Adjust the number or capacity of connected indoor units.	
E23	E23	Communication between outdoor units has stopped.	Check the number of connected outdoor units. Check that outdoor unit power is on.	
E25	E25	Duplication of outdoor addresses (only when an outdoor address was manually set up)	Do not use manual setup for outdoor addresses.	
E26	E26 ⇄ -XX Alternate blinking	Number of connected outdoor units has decreased. <ul style="list-style-type: none"> <li>• When installing an outdoor backup</li> <li>• The power of a follower unit is not turned on.</li> </ul>	Correction of the cause of error occurrence <ul style="list-style-type: none"> <li>• If it occurs when installing a backup, clear the error after setup finishes.</li> <li>• If the power of a follower unit is not turned on, turn on the power.</li> </ul>	
L04	L04	Duplication of outdoor line addresses <ul style="list-style-type: none"> <li>• Line address setup error (occurred after connection between U1/U2 and U3/U4 connectors)</li> </ul>	Modify the line address setup of the header unit between lines. (Set up SW13 and SW14 on the interface PC board.)	
L05 (*)	—	Duplication of indoor units with priority	Set up priority only for one indoor unit.	
L06 (*)	L06	There are two or more indoor units set up with priority.	Among indoor units indicating "L05," set one unit with priority.	
L08	L08	Address setup error <ul style="list-style-type: none"> <li>• Only indoor addresses of all the connected indoor units are undefined.</li> </ul>	Set up the addresses again. Modify the setup.	

\* "L05": Displayed on the indoor unit set up with priority

"L06": Displayed on the indoor units except the one set up with priority

### Operation from the Indoor Remote Controller is not Accepted, and a Check Code is Displayed on the 7-Segment Display of the Interface P.C. Board of the Header Unit

Indoor remote controller status	Header unit 7-segment display	Cause	Countermeasures	
No response	L08	Line addresses and indoor addresses of all the connected indoor units are not set.	Set up addresses.	
		There is no header unit of group control.	Set up a group address.	
	E19 ⇔ -00 Alternate blinking	Indoor unit power is not turned on.	Turn on the power again. (In the order: indoor → outdoor)	
		Indoor/outdoor communication line is not correctly connected to the U1/U2 terminal of the header unit. (Indoor/outdoor cannot communicate before address setup.)	Correct wiring	
		There is no of outdoor terminal resistance, or there are two or more resistances (before address setup).	 SW30	Check SW30 bit 2 of the header unit. No connection between multiple refrigerant lines: SW30 bit 2 is on. Connection between multiple refrigerant lines: SW30 bit 2 of the connected header unit is turned on only for one line.
			Correct wiring	
	E19 ⇔ -02 Alternate blinking	When connecting an indoor/outdoor communication line between outdoor units under the condition of a connected communication line between outdoor units.	Correct wiring	
		SW08 setup error	Turn all SW08 switches to "off."	
	E20 ⇔ -01 Alternate blinking	Address setup is performed with connecting an indoor/outdoor communication line between outdoor units.	Correct wiring	
		Address setup is performed under the condition of connecting multiple refrigerant lines.	Correct wiring	

### There is no Display of a Check Code on the 7-Segment Display on the Interface P.C. Board of the Header Unit, Although there is Indoor Unit that is not Accepting Operation from the Indoor Remote Controller

Indoor remote controller status	Header unit 7-segment display	Cause	Countermeasures
No response	None	The communication line is not connected between indoor and outdoor (the unit that does not respond to the indoor remote controller).	Modify the wiring.
		Line address and indoor address are not set (the unit that does not respond to the indoor remote controller).	Set up the address.
		The power of the header unit of the group is not turned on in indoor group control (the unit that does not respond to the indoor remote controller).	Turn on the power.
		Group address is set to the follower unit for individual control (the unit that does not respond to the indoor remote controller).	Set the group address to "0" in the case of individual control.
No display on the indoor remote controller (no line is output.)	None	The power is not turned on (the unit that is not displayed on the indoor remote controller).	Turn on the power.
		The indoor remote controller is not connected with a wire (the unit that is not displayed on the indoor remote controller).	Modify the wiring.
		Miswiring of the indoor remote controller (the unit that is not displayed on the indoor remote controller)	Modify the wiring.
		Indoor remote controller communication circuit error (the unit that is not displayed on the indoor remote controller) If 220 V is incorrectly applied to the indoor remote controller terminal, the remote controller communication circuit fails.	Remove the fast-on terminal connected to indoor remote controller terminals A/B, and check the voltage. If voltage is not applied (normally 15 to 18V), replace the PC board.

**In Checking the Number of Connected Outdoor Units and Connected Indoor Units after Address Setup, a Lower Number of Connected Units is Displayed. (There are Outdoor/Indoor Units that do not Operate in a Test Operation.)**

Status	Cause	Countermeasures
The number of connected outdoor units is too few.	Miswiring of communication lines between outdoor units or an unconnected wire . (Address setup operation finished without recognizing a miswired follower unit.)	After modification of wiring, set up the addresses again and check the number of connected outdoor units.
The number of connected indoor units is too few.	Miswiring of communication lines between indoor units or an unconnected wire . (Address setup operation finished without recognizing a miswired indoor unit.)	After modification of wiring, set up the addresses again and check the number of connected indoor units.
The number of outdoor units connected to a group is too few in group operation from an indoor remote controller.	The indoor remote controller is not connected with wire. Miswiring of the indoor remote controller	Using the main indoor remote controller connected to a group, start a test operation, specify the unit that is not operating (the unit not connected to the group), and then check the wiring.
	Indoor remote controller communication circuit error If 220 V is incorrectly applied to the remote controller terminal, the remote controller communication circuit fails.	Using the main indoor remote controller connected to a group, start a test operation and then specify the unit that is not operating (the unit not connected to the group). Remove the fast-on terminal connected to remote controller terminals A/B, and check the voltage. If voltage is not applied (normally 15 to18 V), replace the PC board.

## When using a remote controller with the model name RBC-AMT32E

	CODE No.	Data name	Display format	Unit	Remote controller display example
System data	00	Room temperature (During control)	x1	°C	[0024]=24°C
	01	Room temperature (Remote controller)	x1	°C	
	02	Indoor suction temperature (TA)	x1	°C	
	03	Indoor coil temperature (TCJ)	x1	°C	
	04	Indoor coil temperature (TC2)	x1	°C	
	05	Indoor coil temperature (TC1)	x1	°C	
	06	Indoor discharge temperature (TF) *1	x1	°C	
	08	Indoor PMV opening	x1/10	pls	
	0A	No. of connected indoor units	x1	unit	[0048]=48 units
	0B	Total horsepower of connected indoor units	x10	HP	[0415]=41.5HP
	0C	No. of connected outdoor units	x1	unit	[0004]=4 units
	0D	Total horsepower of outdoor units	x10	HP	[0420]=42HP

	CODE No.	Data name	Display format	Unit	Remote controller display example
Outdoor unit individual data 1 *3	U1 U2 U3 U4				
	10 20 30 40	High-pressure sensor detention pressure (Pd)	x100	MPa	[0123]=1.23MPa
	11 21 31 41	Low-pressure sensor detention pressure (Ps)	x100	MPa	
	12 22 32 42	Compressor 1 discharge temperature (Td1)	x1	°C	[0024]=24°C
	13 23 33 43	Compressor 2 discharge temperature (Td2)	x1	°C	
	14 24 34 -	Compressor 3 discharge temperature (Td3)	x1	°C	
	15 25 35 45	Suction temperature (TS)	x1	°C	
	16 26 36 46	Outdoor coil temperature 1 (TE1)	x1	°C	
	17 27 37 -	Outdoor coil temperature 2 (TE2)	x1	°C	
	18 28 38 48	Temperature at liquid side (TL)	x1	°C	
	19 29 39 49	Outside ambient temperature (TO)	x1	°C	
	1A 2A 3A 4A	PMV1 + 2 opening	x1	pls	[0500]=500pls
	1B 2B 3B -	PMV4 opening	x1	pls	
	1C 2C 3C 4C	Compressor 1 current (I1)	x10	A	[0135]=13.5A
	1D 2D 3D 4D	Compressor 2 current (I2)	x10	A	
	1E 2E 3E -	Compressor 3 current (I3)	x10	A	
	1F 2F 3F 4F	Outdoor fan current (IFan)	x10	A	

	CODE No.	Data name	Display format	Unit	Remote controller display example
Outdoor unit individual data 2 *4	U1 U2 U3 U4				
	50 60 70 80	Compressor 1 revolutions	x10	rps	[0642]=64.2rps
	51 61 71 81	Compressor 2 revolutions	x10	rps	
	52 62 72 -	Compressor 3 revolutions	x10	rps	
	53 63 73 83	Outdoor fan mode	x1	mode	[0058]= 58 mode
	54 64 74 84	Compressor IPDU 1 heat sink temperature	x1	°C	[0024]=24°C
	55 65 75 85	Compressor IPDU 2 heat sink temperature	x1	°C	
	56 66 76 -	Compressor IPDU 3 heat sink temperature	x1	°C	
	57 67 77 87	Outdoor fan IPDU heat sink temperature	x1	°C	
	58 - - -	Heating/cooling recovery controlled *5	0: Normal 1: Recovery controlled		[0010]=Heating recovery controlled [0001]=Cooling recovery controlled
	59 - - -	Pressure release *5			[0010]=Pressure release controlled
	5A - - -	Discharge temperature release *5	0: Normal 1: Release controlled		[0001]=Discharge temperature release controlled
	5B - - -	Follower unit release (U2/U2/U4 outdoor units) *5			[0100]=U2 outdoor unit release controlled [0010]=U3 outdoor unit release controlled [0001]=U4 outdoor unit release controlled
	5F 6F 7F 8F	Outdoor unit horsepower	x1	HP	[0016]=16HP

\*1 Only a part of indoor unit types is installed with the discharge temperature sensor. This temperature is not displayed for other types.

\*2 When the units are connected to a group, data of the header indoor unit only can be displayed.

\*3 The first digit of an CODE No. indicates the outdoor unit number.

\*4 The upper digit of an CODE No. -4 indicates the outdoor unit number.

1\*, 5\* ... U1 outdoor unit (Header unit)

2\*, 6\* ... U2 outdoor unit (Follower unit 1)

3\*, 7\* ... U3 outdoor unit (Follower unit 2)

4\*, 8\* ... U4 outdoor unit (Follower unit 3)

\*5 Only the CODE No. 5\* of U1 outdoor unit (Header unit) is displayed.

## NOTE

- (1) When setting the line address from the remote controller, do not use addresses 29 and 30.  
Addresses 29 and 30 cannot be set up on the outdoor unit. If they are incorrectly used, the code "E04" (indoor/outdoor communication circuit error) is output.
- (2) When manual address setup has been done from a remote controller, and central control over refrigerant lines is to be done, setup the header unit of each line as follows:
  - Using SW13 and SW14 on the interface PC board of the header unit of each line, setup the line address for each line.
  - Except for the line with the smallest line address number, set SW03-bit 2 to "off" for the interface PC board of the header unit of lines connected to the same central control (put the resistance of the end terminals of the central control line, indoors and outdoors, into one).
  - Connect the relay connector between U1/U2 and U3/U4 of the header unit for each refrigerant line.
  - After that, set up the central control address.  
(For central control address setup, refer to the installation manual of the central control devices.)


## Confirming the Indoor Unit Addresses and the Position of an Indoor Unit Using the Remote Controller

### ◆ Confirming the numbers and positions of indoor units

To see the indoor unit address of an indoor unit which you know the position of

- When the unit is individual (the indoor unit is paired with a wired remote controller one-to-one), or it is a group-controlled one.

(Execute it while the units are running.)

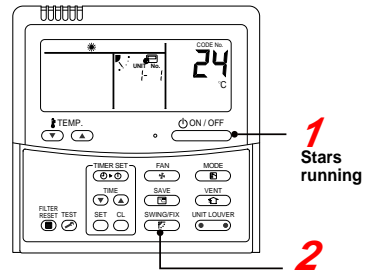
**1** Push the  button if the units stop.

**2** Push the  button (left side of the button).

A unit *-/-* numbers is indicated on the LCD (it will disappear after a few seconds).

The indicated number shows the system address and indoor unit address of the unit.

When 2 or more indoor units are connected to the remote controller (group-controlled units), a number of other connected units appears each time you push the  button (left side of the button).




### To find an indoor unit's position from its address


- When checking unit numbers controlled as a group

(Execute it while the units are stopped.)

The indoor unit numbers in a group are indicated one after another. The fan and louvers of the indicated units are activated.

**1** Push and hold the  and  buttons at the same time for more than 4 seconds.

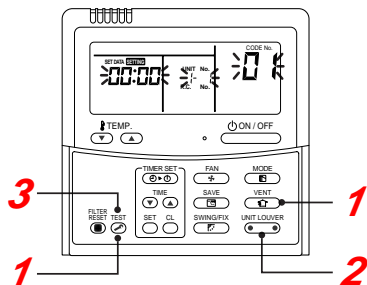
- **ALL** appears on UNIT No. on the LCD display.
- The fans and louvers of all the indoor units in the group are activated.

**2** Push the  button (left side of the button). Each time you push the button, the indoor unit numbers are indicated one after another.

- The first-indicated unit number is the address of the header unit.
- Only the fan and louvers of the indicated indoor unit are activated.

**3** Push the  button to finish the procedure.

All the indoor units in the group stop.



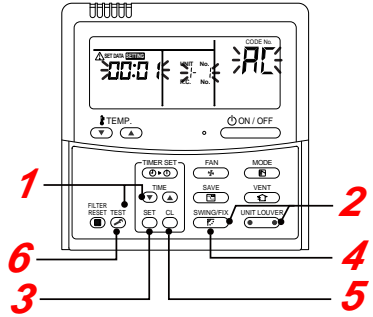
- To check all the indoor unit addresses using an arbitrary wired remote controller.  
(When communication wirings of 2 or more refrigerant lines are interconnected for central control)

### (Execute it while the units are stopped.)

You can check indoor unit addresses and positions of the indoor units in a single refrigerant line.

When an outdoor unit is selected, the indoor unit numbers of the refrigerant line of the selected unit are indicated one after another and the fan and louvers of the indicated indoor units are activated.

- Push and hold the **TIME** (▼) and **TEST** (⊙) buttons at the same time for more than 4 seconds.  
At first, the line 1 and CODE No. **RL** (Address Change) are indicated on the LCD display. (Select an outdoor unit.)
- Push the **UNIT LOUVER** (left side of the button) and **SWING/FIX** buttons repeatedly to select a system address.
- Push the **SET** button to confirm the system address selection.
  - The address of an indoor unit connected to the selected refrigerant line is indicated on the LCD display and its fan and louvers are activated.
- Push the **UNIT LOUVER** button (left side of the button).  
Each time you push the button, the indoor unit numbers of the selected refrigerant line are indicated one after another.
  - Only the fan and louvers of the indicated indoor unit are activated.
- To select another system address
- Push the **CL** button to return to step 2.
  - After returning to step 2, select another system address and check the indoor unit addresses of the line.
- Push the **TEST** button to finish the procedure.



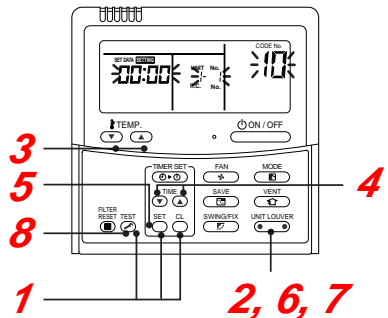
## Changing the Indoor Unit Address Using a Remote Controller

To change an indoor unit address using a wired remote controller.

- The method to change the address of an individual indoor unit (the indoor unit is paired with a wired remote controller one-to-one), or an indoor unit in a group.  
(The method is available when the addresses have already been set automatically.)

### (Execute it while the units are stopped.)

- Push and hold the **SET**, **CL**, and **TEST** buttons at the same time for more than 4 seconds.  
(If 2 or more indoor units are controlled in a group, the first indicated UNIT No. is that of the head unit.)
- Push the **UNIT LOUVER** button (left side of the button) repeatedly to select an indoor unit number to change if 2 or more units are controlled in a group. (The fan and louvers of the selected indoor unit are activated.)  
(The fan of the selected indoor unit is turned on.)
- Push the **TEMP.** (▼) / (▲) buttons repeatedly to select **13** for CODE No..
- Push the **TIME** (▼) / (▲) buttons repeatedly to change the value indicated in the SET DATA section to that you want.
- Push the **SET** button.
- Push the **UNIT LOUVER** button (left side of the button) repeatedly to select another indoor UNIT No. to change.  
Repeat steps 4 to 6 to change the indoor unit addresses so as to make each of them unique.
- Push the **UNIT LOUVER** button (left side of the button) to check the changed addresses.
- If the addresses have been changed correctly, push the **TEST** button to finish the procedure.

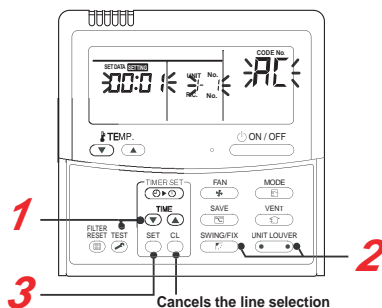


- To change all the indoor unit addresses using an arbitrary wired remote controller. (The method is available when the addresses have already been set automatically.)  
(When communication wirings of 2 or more refrigerant lines are interconnected for central control)

**NOTE**

You can change the addresses of indoor units in each refrigerant line using an arbitrary wired remote controller.

- \* Enter the address check/change mode and change the addresses.

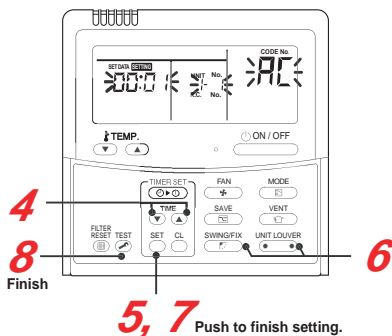


If no number appears on UNIT No., no outdoor unit exists on the line.

Push button and select another line following step 2.

(Execute it while the units are stopped.)

- Push and hold the TIME and buttons at the same time for more than 4 seconds.  
At first, the line 1 and CODE No. **RL** (Address Change) are indicated on the LCD display.
- Push (left side of the button) and buttons repeatedly to select a system address.
- Push the button.
  - The address of one of the indoor units connected to the selected refrigerant line is indicated on the LCD display and the fan and louvers of the unit are activated.  
At first, the current indoor unit address is displayed in SET DATA. (No system address is indicated.)
- Push the TIME / buttons repeatedly to change the value of the indoor unit address in SET DATA.  
Change the value in SET DATA to that of a new address.
- Push the button to confirm the new address on SET DATA.
- Push the button (left side of the button) repeatedly to select another address to change.  
Each time you push the button, the indoor unit numbers in a refrigerant line are indicated one after another.  
Only the fan and louvers of the selected indoor unit are activated.  
Repeat steps 4 to 6 to change the indoor unit addresses so as to make each of them unique.
- Push the button.  
(All the segments on the LCD display light up.)
- Push the button to finish the procedure.



## Clearing From the Main Remote Controller

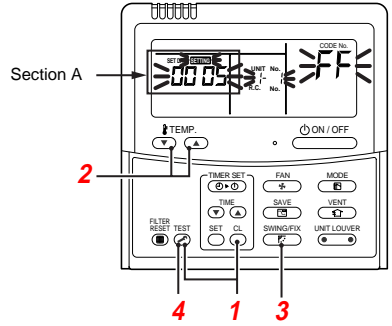
### ● Error clearing in outdoor unit

Error of the outdoor unit currently detected is cleared by the unit of one refrigerant circuit system to which the indoor units operated by the remote controller is connected. (Error of the indoor unit is not cleared.)

For clearing errors, the service monitor function of the remote controller is used.

#### <Method>

- 1 Change the mode to service monitor mode by pushing **TEST** + **CL** buttons simultaneously for 4 seconds or more.
- 2 Using **TEMP** buttons, set CODE No. to "FF".
- 3 The display in Section A in the following figure is counted with interval of 5 seconds as "0005" → "0004" → "0003" → "0002" → "0001" → "0000".  
When the count arrives "0000", the error is cleared.  
\* However, counting from "0005" is repeated on the display.
- 4 When **TEST** button is pushed, the status returns to the normal status.



### ● Error clearing in indoor unit

Error in the indoor unit is cleared by **ON/OFF** button on the remote controller. (Only error of the indoor unit connected with operating remote controller is cleared.)

## Clearing Error by Using Switches on the Interface P.C. Board of the Header Unit

Using the switches on the interface P.C. board of the header unit, this function is to clear the currently detected error for each refrigerant circuit system without resetting the power supply.

Errors in both outdoor and indoor units are once cleared, and error detection is performed again.

## Clearing Error by Resetting Power

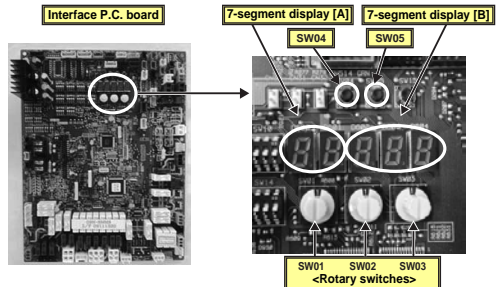
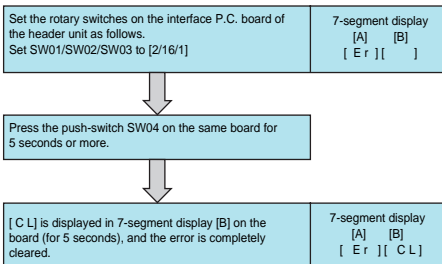
This function is provided to clear error in a system by resetting the power of all the outdoor and the indoor units. As same as the clearing method by the interface P.C. board, errors of both the outdoor and the indoor units are once cleared, and error detection is performed again.

#### <Method>

- (1) Be sure to reset power of both the outdoor and the indoor units.
- (2) Turn on the power of the indoor unit prior to the power of the outdoor unit.  
(If the power is turned on in reverse order, a check code [E19] (No. of header unit error) is output.)

### NOTE

After power reset, it requires usually 3 minutes to power-on due to the initial communication of the system. In some cases, it requires max. 10 minutes.



### When Performing this Task, be sure to Use a Wired Remote Controller

<Procedure> To be performed only when system at rest

- 1** Push the **TEST** + **SET** + **CL** buttons simultaneously and hold for at least 4 seconds.

The unit No. displayed first is the address of the header indoor unit in group control. Then the fan and louver of the selected indoor unit move.

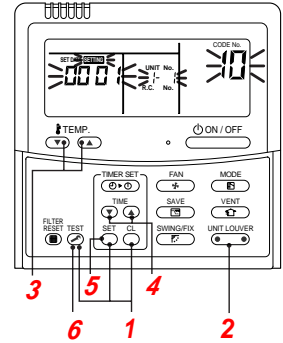
- 2** Each time the "Select unit" side of the **UNIT LOUVER** button is pressed, one of the indoor unit Nos. under group control is displayed in turn. Then the fan and louver of the selected indoor unit move.

- 3** Use the **TEMP** button to select the CODE No. (DN code) of the desired function.

- 4** Use the **TIME** button to select the desired SET DATA associated with the selected function.

- 5** Push the **SET** button. (The display changes from flashing to steady.)
- To change the selected indoor unit, go back to step **2**.
  - To change the selected function, go back to step **3**.

- 6** When the **SET** button is pushed, the system returns to normal off state.



### Type DN code "10"

Value	Type	Model
0000	1-way Air Discharge Cassette	MMU-AP***SH
0001*1	4-way Air Discharge Cassette	MMU-AP***H
0002	2-way Air Discharge Cassette	MMU-AP***WH
0003	1-way Air Discharge Cassette (Compact)	MMU-AP***YH
0004	Concealed Duct Standard	MMD-AP***BH
0005	Slim Duct	MMD-AP***SPH (SH)
0006	Concealed Duct High Static Pressure	MMD-AP***H
0007	Under Ceiling	MMC-AP***H
0008	High Wall	MMK-AP***H
0010	Floor Standing Cabinet	MML-AP***H
0011	Floor Standing Concealed	MML-AP***BH
0013	Floor Standing	MMF-AP***H
0014	Compact 4-way Air Discharge Cassette	MMU-AP***MH
0016	Fresh Air Intake indoor unit (Duct type)	MMD-AP***HFE
0018	Console	MML-AP***NH-E
0050	DX coil	MMD-VNK***HEX E

### Indoor Unit Capacity DN code "11"

Value	Capacity
0000*1	Invalid
0001	007 type
0003	009 type
0005	012 type
0007	015 type
0009	018 type
0011	024 type
0012	027 type
0013	030 type
0015	036 type
0017	048 type
0018	056 type
0021	072 type
0023	096 type

\*1 Default value stored in EEPROM mounted on service P.C. board

## Function CODE No. (DN Code) Table (Includes All Functions Needed to Perform Air Control on Site)

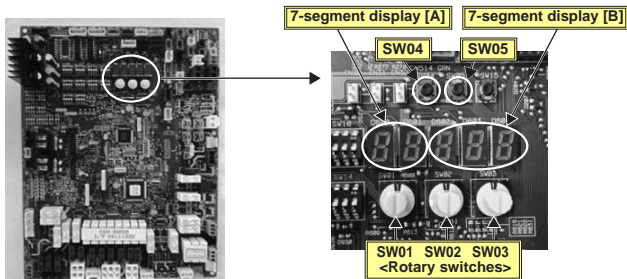
DN	Item	Description		At shipment
01	Filter display delay timer	0000: None 0002: 2500H 0004: 10000H	0001: 150H 0003: 5000H	According to type
02	Dirty state of filter	0000: Standard 0001: High degree of dirt (Half of standard time)		0000: Standard
03	Central control address	0001: No.1 unit 0099: Unfixed	to 0064: No.64 unit	0099: Unfixed
04	Specific indoor unit priority	0000: No priority	0001: Priority	0000: No priority
06	Heating temp shift	0000: No shift 0002: +2°C	to 0001: +1°C 0010: +10°C (Up to +6 recommended)	0002: +2°C (Floor type 0000: 0°C)
0d	Existence of [AUTO] mode	0000: Provided 0001: Not provided (Automatic selection from connected outdoor unit)		0001: Not provided
0F	Cooling only	0000: Heat pump 0001: Cooling only (No display of [AUTO] [HEAT])		0000: Heat pump
10	Type	0001: 4-way Air Discharge Cassette		Depending on model type
11	Indoor unit capacity	0000: Unfixed	0001 to 0034	According to capacity type
12	Line address	0001: No.1 unit	to 0030: No.30 unit	0099: Unfixed
13	Indoor unit address	0001: No.1 unit	to 0064: No.64 unit	0099: Unfixed
14	Group address	0000: Individual 0002: Follower unit of group	0001: Header unit of group	0099: Unfixed
19	Louver type (Air direction adjustment)	0000: No louver 0001: Swing only 0002: (1-way Air Discharge Cassette type, Under Ceiling type) 0003: (2-way Air Discharge Cassette type) 0004: (4-way Air Discharge Cassette type)		According to type
1E	Temp difference of [AUTO] mode selection COOL → HEAT, HEAT → COOL	0000: 0 deg	to 0010: 10 deg (For setup temperature, reversal of COOL/HEAT by ± (Data value) /2)	0003: 3 deg (Ts±1.5)
28	Automatic restart of power failure	0000: None	0001: Restart	0000: None
2A	Selection of option/error input (CN70)	0000: Filter input 0002: None	0001: Alarm input (Air washer, etc.)	0002: None
31	Ventilating fan control	0000: Unavailable	0001: Available	0000: Unavailable
32	TA sensor selection	0000: Body TA sensor	0001: Remote controller sensor	0000: Body TA sensor
33	Temperature unit select	0000: °C (at factory shipment)	0001: °F	0000: °C
F0	Swing mode	0001: Standard 0003: Cycle swing	0002: Dual swing	0001: Standard
F1	Louver fixed position (Louver No.1)	0000: Release 0005: Downward discharge position	0001: Horizontal discharge position	0000: Not fixed
F2	Louver fixed position (Louver No.2)	0000: Release 0005: Downward discharge position	0001: Horizontal discharge position	0000: Not fixed
F3	Louver fixed position (Louver No.3)	0000: Release 0005: Downward discharge position	0001: Horizontal discharge position	0000: Not fixed
F4	Louver fixed position (Louver No.4)	0000: Release 0005: Downward discharge position	0001: Horizontal discharge position	0000: Not fixed

The following functions of the indoor unit can start or stop by the switches on the interface P.C. board of the header unit.

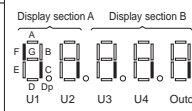
No	Function	Outline	Setup/Release	7-segment display
1	Cooling test operation	Changes the mode of all the connected indoor units collectively to cooling test operation. <b>Note)</b> Control operation same as usual test operation from remote control is performed.	<b>[Setup]</b> Set SW01/SW02/SW03 to [2/5/1], and push SW04 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1/1/1].	Section A [C.]    Section B [—C]
2	Heating test operation	Changes the mode of all the connected indoor units collectively to heating test operation. <b>Note)</b> Control operation same as usual test operation from remote control is performed.	<b>[Setup]</b> Set SW01/SW02/SW03 to [2/6/1], and push SW04 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1/1/1].	Section A [H.]    Section B [—H]
3	Batch start	Starts all the connected indoor units collectively. <b>Note)</b> The contents follow to the setup of remote controller.	<b>[Setup]</b> Set SW01/SW02/SW03 to [2/7/1], and push SW04 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1]	Section A [C.H]    Section B [11] [00] is displayed on Section B for 5 seconds.
	Batch stop	Stops all the connected indoor units collectively.	<b>[Setup]</b> Set SW01/SW02/SW03 to [2/7/1], and push SW05 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1].	Section A [C.H]    Section B [00] [00] is displayed on Section B for 5 seconds.
4	Individual start	Starts the specified indoor unit. <b>Notes)</b> • The contents follow to the setup of remote controller. • The other indoor units keep the status as they are.	<b>[Setup]</b> Set SW01 to [16], set SW02 and SW03 to address No. (1 to 64) to be started, and push SW04 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1/1/1].	Section A [ ]    Section [ ] <b>Section A:</b> Displays the corresponding indoor address. <b>Section B:</b> Displays [ 11] for 5 seconds from operation-ON.
	Individual stop	Stops the specified indoor unit. <b>Note)</b> The other indoor units keep the status as they are.	<b>[Setup]</b> Set SW01 to [16], set SW02 and SW03 to address No. (1 to 64) to be stopped, and push SW05 for 2 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1/1/1].	Section A [ ]    Section [ ] <b>Section A:</b> Displays the corresponding indoor address. <b>Section B:</b> Displays [ 00] for 5 seconds from operation-OFF.
	Individual test operation	Operates the specified indoor unit. <b>Note)</b> The other indoor units keep the status as they are.	<b>[Setup]</b> Set SW01 to [16], set SW02 and SW03 to address No. to be operated, and push SW04 for 10 seconds or more. <b>[Release]</b> Return SW01/SW02/SW03 to [1/1/1].	Section A [ ]    Section [ ] <b>Section A:</b> Displays the corresponding indoor address. <b>Section B:</b> Displays [ FF] for 5 seconds from test operation-ON.

## NOTES

- 1) This start/stop function only sends the signals from the outdoor unit to the indoor unit, such as start, stop, operation mode, etc. It does not resend the signals even if the indoor unit does not follow the sent signals.
- 2) The above controls are not used during abnormal stop.



## (1) Display of System Information (Displayed on Header Outdoor Unit Only)

SW01	SW02	SW03	Display detail				
1	3	Unused	Unused				
			1		A	B	
			2	System capacity	A [...8]-[48]:8 to 48 HP B [HP]		
			3	No. of outdoor units	A [...1]-[...4]:1 to 4 B [...P]		
			4	No. of indoor units connected/ No. of units with cooling thermo ON	A [...0.]-[48.]:0 to 48 (No. of units connected) B [C...0]-[C48]:0 to 48 (No. of units with cooling thermo ON)		
			5	No. of indoor units connected/ No. of units with heating thermo ON	A [...0.]-[48.]:0 to 48 (No. of units connected) B [H...0]-[H48]:0 to 48 (No. of units with heating thermo ON)		
			6	Amount of compressor command correction	A Value displayed in hexadecimal format B —		
			7	Release control	A Normal: [r. ...], During release control: [r.1] B —		
			8	Oil equalization control	Normal: [oil-0] During oil equalization control: [oil-1]		
			9	Oil equalization request	A Displayed through LED segment lighting pattern B  If element F shown on sketch at right turned on: Header unit oil equalization request If element C shown on sketch at right turned on: Follower unit oil equalization request		
			10	Refrigerant/oil recovery operation	A Oil recovery in cooling: [C1], Normal: [C ...] B Refrigerant recovery in heating: [H1], Normal: [H ...]		
			11	Automatic addressing	A [Ad] B During automatic addressing: [... FF], Normal: [... .. ...]		
			12	Power pick-cut	A [dU] B Normal: [... .. ...], During 50-90% capacity operation: [_ 50- 90] While control is based on BUS line input: [E50-E90]		
			13	Optional control (P.C. board input)	Displays optional control status	A	B
					Operation mode selection: During priority heating (normal)	h.*	*.*.*
					Priority cooling	c.*	*.*.*
		Heating only	H.*	*.*.*			
		Cooling only	C.*	*.*.*			
		Priority given to No. of indoor units in operation	n.*	*.*.*			
		Priority given to specific indoor unit	U.*	*.*.*			
		External master ON/OFF: Normal	*....	*.*.*			
		Start input	*.1	*.*.*			
		Stop input	*.0	*.*.*			
		Night operation: Normal	*.*	...*.*			
		Start input	*.*	1.*.*			
		Snowfall operation: Normal	*.*	*....*			
		Start input	*.*	*.1.*			
14	Optional control (BUS line input)	Same as above					
15	Unused						
16		A — B —					

## (2) Display of Outdoor Unit Information (Displayed on Each Outdoor Unit)

SW01	SW02	SW03	Display detail						
1	1	1	Error data	A	Outdoor unit No.: [U1] to [U4]				
				B	Check code (only latest one displayed) If there is no check code, [---] is displayed. If there is sub-code, check code [***] and sub-code [-**] are displayed alternately, for 3 seconds and 1 second, respectively.				
						<SW04> push SW function: Fan operation at outdoor unit with error. 7-segment display section A: [E.1] <SW04 + SW05> push SW function: Fan operation at outdoor unit without error. 7-segment display section A: [E.0] <SW05> push SW function: Fan operation function check mode is cancelled.			
			2	A	---				
				B	---				
			3	Operation mode	A	Stop [... ...]			
					B	Normal cooling: [... C], Normal heating: [... H], Normal defrosting: [... J]			
			4	Outdoor unit HP capacity	A	8HP: [... 8], 10HP: [... 10], 12HP: [... 12], 14HP: [14], 16HP: [16]			
					B	[... HP]			
			5	Compressor operation command	* Operation data of each compressor is displayed in turn in 2 second intervals. If compressor No. 3 does not exist, [-,---] is displayed.				
					Normal: Compressor speed (rps) is displayed in decimal format. 7-segment display (A/B): [C1.***] ⇨ [C2.***] ⇨ [C3.***] ⇨ ...				
					<SW04> push SW function: Switches to display of operating current (decimal value). 7-segment display (A/B): [i1 ***] ⇨ [i2 ***] ⇨ [i3 ***] ⇨ ... Pushing of <SW05> restores normal display.				
			6	Outdoor fan mode	A	[FP]			
					B	Mode 0 to 63: [... 0] to [63]			
			7	Compressor backup	A	[C.b.]			
					B	Displays compressor backup setting status Normal: [... ..] Compressor No. 1 backup: [1 ... ..] Compressor No. 2 backup: [... 1 ...] Compressor No. 3 backup: [... .. 1]			
8	---	A	---						
		B	---						
9	Control valve output data	Displays control output status of solenoid valve		A	B				
		4-way valve: ON / 4-way valve 2: OFF		H. 1	... ..				
10	---	4-way valve: OFF / 4-way valve 2: ON		H. 0	... ..				
		SV2: ON / SV5: OFF / SV6: OFF		2. ...	1 0 0				
		SV2: OFF / SV5: ON / SV6: ON		2. ...	0 1 0				
		SV2: OFF / SV5: OFF / SV6: ON		2. ...	0 0 1				
11	---	SV3A: ON / SV3B: OFF / SV3C: OFF / SV3D: OFF		3. 1	0 0 0				
		SV3A: OFF / SV3B: ON / SV3C: OFF / SV3D: OFF		3. 0	1 0 0				
		SV3A: OFF / SV3B: OFF / SV3C: ON / SV3D: OFF		3. 0	0 1 0				
		SV3A: OFF / SV3B: OFF / SV3C: OFF / SV3D: ON		3. 0	0 0 1				
12	---	SV41: ON / SV42: OFF / SV43: OFF		4. ...	1 0 0				
		SV41: OFF / SV42: ON / SV43: OFF		4. ...	0 1 0				
		SV41: OFF / SV42: OFF / SV43: ON		4. ...	0 0 1				
13	---	SV3F: OFF		A. ...	... .. 0				
		SV3F: ON		A. ...	... .. 1				
14	PMV1/PMV2 opening	Displays opening data in decimal format (total opening)		** *	** *.P				
15	PMV4 opening	Displays opening data in decimal format		... *	** *.P				
16	Oil level judgment status	Normal							
		A	[o L.]						
		B	Initial display: [... ..], Oil level judgment result: [#.*.\$] Displayed letters #, * and \$ represent judgment results for compressor Nos. 1, 2 and 3, respectively ("0" for normal and "1" or "2" for low level).						
		<SW04> push SW function: Displays low level confirmed judgment result of each compressor. * Pushing of <SW05> restores normal display.							
		A	[L d.]						
		B	Compressor No. 1 low level being confirmed: [L ... ..] Compressor No. 2 low level being confirmed: [... L ...] Compressor No. 3 low level being confirmed: [... .. L]						

**(3) Display of Outdoor Cycle Data (Displayed at Each Outdoor Unit)**

SW01	SW02	SW03	Display detail		
1	2		Pd pressure data	Pd pressure (MPaG) is displayed in decimal format. (MPaG: Approx. 10 times magnitude of kg/cm2G)	A Pd. *.*.*
			Ps pressure data	Ps pressure (MPaG) is displayed in decimal format.	PS. *.*.*
			PL pressure conversion data	Converted PL pressure (MPaG) is displayed in decimal format.	PL. *.*.*
			TD1 sensor data	Temperature sensor reading (°C) is displayed in decimal format.	Letter symbol td 1 ... .. Data *.*.*
			TD2 sensor data	• Letter symbol and data are displayed alternately, for 1 second and display for 3 seconds, respectively.	Letter symbol td 2 ... .. Data *.*.*
			TD3 sensor data	• Data with negative value is displayed as [-.*] [*.*].	Letter symbol td 3 ... .. Data *.*.*
			TS sensor data		Letter symbol tS ... .. Data *.*.*
			TE1 sensor data		Letter symbol tE 2 ... .. Data *.*.*
			TE2 sensor data		Letter symbol tL ... .. Data *.*.*
			TL sensor data		Letter symbol tE ... .. Data *.*.*
			TO sensor data		Letter symbol to ... .. Data *.*.*
			TK1 sensor data		Letter symbol F1 ... .. Data *.*.*
			TK2 sensor data		Letter symbol F2 ... .. Data *.*.*
			TK3 sensor data		Letter symbol F3 ... .. Data *.*.*
			TK4 sensor data		Letter symbol F4 ... .. Data *.*.*
			TK5 sensor data		Letter symbol F5 ... .. Data *.*.*

**(4) Display of Outdoor Cycle Data (Displayed at Header Unit)**

\* This method is used when displaying follower unit information on the 7-segment display of the header unit.

SW01	SW02	SW03	Display detail		
3	1-3	1	Error data	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B Check code is displayed (latest one only). If there is no check code: [---]	
			Type of compressor installed	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B	
		3	Outdoor unit HP capacity	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B 8HP: [..8], 10HP: [..10], 12HP: [...12], 14HP: [14], 16HP: [16] 14HP: [14], 16HP: [16]	
			Compressor operation command	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B Indicates which compressor is ON. * Any unconnected compressors is represented by "-".	B 1 0 0 0 1 0 0 0 1
		5	Fan operation mode	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B At rest: [F ... 0], In mode 63: [F 6 3]	
		6	Release signal	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B Normal: [r ... ..], Upon receiving release signal: [r ... 1]	
		7	Oil level judgment	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B Normal: [r ... ..], Upon receiving release signal: [r ... 1]	
		8	Compressor 1 operating current	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B [*.*.*], [*.*.*] is value of operating current in decimal format.	
		9	Compressor 2 operating current	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B [*.*.*], [*.*.*] is value of operating current in decimal format.	
		10	Compressor 3 operating current	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B [*.*.*], [*.*.*] is value of operating current in decimal format.	
		11	Fan operating current	A [U.*], *: SW03 setting No. + 1 (Outdoor unit No. U2 to U4) B [*.*.*], [*.*.*] is value of operating current in decimal format.	

Note: Follower unit is selected by setting SW03.

SW03	7-segment display section A
1	U2
2	U3
3	U4

## (5) Display of Indoor Unit Information (Displayed on Header Unit Only)

SW01	SW02	SW03	Display detail	
4	1~16	1~4	Indoor BUS communication signal receiving status	B Upon receiving signal: [... .. 1], Other times: [... ..]
5			Indoor check code	B No check code: [- - -]
6			Indoor HP capacity	B 0, 2, 0, 5, 0, 8, ... 1, 1, 2, 1, 7, ... 2, 2, 5, ...3, 3, 2, ...4, ...5, ...6, ...8, 1 0, 1 6, 2 0
7			Indoor request command (S code, operation mode)	B [# ... *] # represents mode: COOL: [C. ... *], HEAT: [H. ... *] FAN: [F. ... *], OFF: [S ... *] * represents S code: [# ... 0] to [# ... F]
8		Indoor PMV opening data	B Displayed in decimal format	
9		Indoor TA sensor data	B Displayed in decimal format	
11		1~4	Indoor TCJ sensor data	B Displayed in decimal format
12			Indoor TC1 sensor data	B Displayed in decimal format
13			Indoor TC2 sensor data	B Displayed in decimal format

Note: Indoor address No. is selected by setting SW02 and SW03 and displayed on 7-segment display, section A.

SW03	SW02	Indoor address	7-segment display section A
1	1~16	SW02 setting number	[01]~[16]
2	1~16	SW02 setting number +16	[17]~[32]
3	1~16	SW02 setting number +32	[33]~[48]
4	1~16	SW02 setting number +48	[49]~[64]

\* Although 64 indoor unit addresses (Nos. 01-64) are theoretically available, the number of indoor units that can be connected to the same refrigerant piping system is limited to 48.

## (6) Display of Outdoor EEPROM Writing Error Code (Displayed on Header Unit Only)

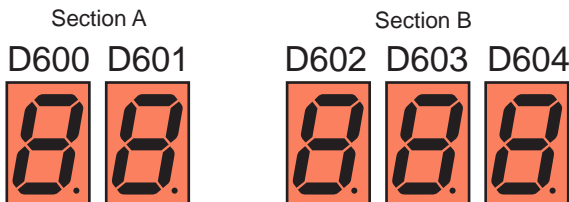
\* The latest error code written in the EEPROM of each outdoor unit is displayed.

(This function is used to check the error code after the resetting of the power supply.)

To display the error code, push SW04 and hold for at least 5 seconds after setting SW01 to 03 as shown in the table below.

SW01	SW02	SW03	Indoor address	7-segment display section A	
1	1	16	Latest error code of header unit (U1)	E. 1.	***
	2		Latest error code of follower unit No. 1 (U2)	E. 2.	***
	3		Latest error code of follower unit No. 2 (U3)	E. 3.	***
	4		Latest error code of follower unit No. 3 (U4)	E. 4.	***

## • 7-Segment Display



Set SW01/SW02/SW03 to [1/1/16] and push SW04 and hold for at least 5 seconds. The latest error code of the header unit (U1) will be displayed.

If the setting of SW02 is changed, the latest error code of a follow unit (U2-U4) will be displayed.

## Pulse Motor Valve (PMV) Forced Open/Close Function in Indoor Unit

This function is provided to open or close forcedly PMV for 2 minutes in all the indoor units by the switch operation on the interface P.C. board of the header unit.

This function is also used to open PMV fully when turning off the power and executing an operation.

### <Operation>

#### [Open fully]

Set the switches **SW01/SW02/SW03** on the interface P.C. board of the header unit to [2/3/1], and push **SW04** for 2 seconds or more. (Display appears on 7-segment display for 2 minutes as follows.) [P ] [ FF]

#### [Close fully]

Set the switches **SW01/SW02/SW03** on the interface P.C. board of the header unit to [2/3/1], and push **SW05** for 2 seconds or more. (Display appears on 7-segment display for one minute as follows.) [P ] [ 00]

#### [Clear]

After 2 minutes (1 minutes for "Close fully") after setting up, the opening automatically returns to the normal opening.

## Solenoid Valve Forced Open/Close Function in Outdoor Unit

This function is provided to forcedly open each solenoid valve mounted in the outdoor unit by the switch operation on the interface P.C. board in the outdoor unit.

Use this function to check there is no refrigerant clogging with ON/ OFF operation of the solenoid valve.

### [Operation]

- Set the switches SW01/SW02/SW03 on the interface P.C. board of the outdoor unit to [2/1/3].
- When [H. r] is displayed in 7-segment display [A], keep pushing the switch SW04 for 2 seconds or more.
- From when [ 2 ] is displayed in 7-segment display [B], SV2 is turned on.
- After then, ON and OFF of each solenoid valve are exchanged by changing the setup number of the switch **SW02**. (ON/OFF output pattern of each solenoid valve is as shown below.)

#### NOTE 1)

Display in 7-segment display [B] is exchanged just when the number of SW02 has been changed; on the other hand, the solenoid valve output is exchanged when **SW02** has been kept with the same number for 5 seconds or more.

#### NOTE 2)

The mark [O] in the table indicates that the corresponding solenoid valve is forcedly turned on.

#### NOTE 3)

The mark [-] in the table indicates that ON/OFF of the solenoid valve is controlled based upon the specifications of the air conditioner.

#### NOTE 4)

The mark [x] in the table indicates that the corresponding solenoid valve is forcedly turned off with this operation.

#### NOTE 5)

The case heater output is for both the compressor and accumulator heaters.

SW02	7-segment display [B]	Operation pattern of solenoid valve										Case heater output relay		
		SV2	SV5	SV41	SV42	SV43	SV3A	SV3B	SV3C	SV3D	SV3E		SV3F	SV61
1	[ 2 ]	○	—	—	—	—	—	—	—	—	○	—	—	○
2	[ 5 ]	—	○	—	—	—	—	—	—	—	○	—	—	○
3	[41]	—	—	○	—	—	—	—	—	—	○	—	—	○
4	[42]	—	—	—	○	—	—	—	—	—	○	—	—	○
5	[43]	—	—	—	—	○	—	—	—	—	○	—	—	○
6	[3A]	—	—	—	—	—	○	—	—	—	○	—	—	○
7	[3b]	—	—	—	—	—	—	○	—	—	○	—	—	○
8	[3C]	—	—	—	—	—	—	—	○	×	○	○	—	○
9	[3b]	—	—	—	—	—	—	—	—	○	×	○	—	○
10	[3-]	—	—	—	—	—	○	○	○	×	○	×	—	○
11	[61]	—	—	—	—	—	—	—	—	—	○	—	○	○
12-15	—	—	—	—	—	—	—	—	—	—	○	—	—	○
16	ALL	○	○	○	○	○	○	○	○	○	○	○	○	○

\* If the outdoor unit has no valve, then 7-segment display [B] shows [ - - ].

#### [Clear]

Return switches **SW01/SW02/SW03** on the interface P.C. board to [1/1/1].

**NOTE)** As this function is not based on the specified general control, be sure to release this mode after checking.

### Abnormal Outdoor Unit Discrimination Method By Fan Operating Function

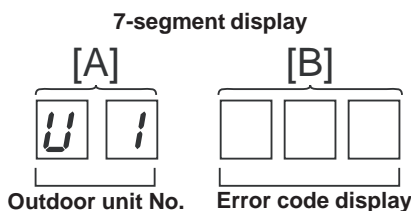
This function is provided to forcibly operate the fan of the outdoor unit in which an error occurred or the fan of the normal outdoor unit by the switch operation on the interface P.C. board in the header unit.

To specify which one of the follower units connected to the system was faulty, use this function for the system stop due to a follower unit fault (Check code [E28]).

#### [Operation]

<In case to operate the fan in the erroneous outdoor unit only>

(1) Check that the switches **SW01/SW02/SW03** on the interface P.C. board in the header unit are set to [1/1/1].



(2) Push the push-switch **SW04** for 2 seconds or more.

(3) [E 1] is displayed on 7-segment display [A].

(4) The fan of the outdoor unit in which error occurred starts operation within approx. 10 seconds after [E 1] was displayed.

<In case to operate the fans in all the normal outdoor units>

(1) Check that the switches **SW01/SW02/SW03** on the interface P.C. board in the header unit are set to [1/1/1].

(2) Push the push-switches **SW04** and **SW05** at the same time for 2 seconds or more.

(3) [E 0] is displayed on 7-segment display [A].

(4) The fans of all the normal outdoor units start operation with the Max. fan speed within approx. 10 seconds after [E 0] was displayed.

#### [Release]

Push the push-switch **SW05** on the interface P.C. board in the header unit for 2 seconds or more.

The outdoor fan which was operated stops.

\* Check that [U. 1] is displayed on 7-segment display [A], and then finish the work.

### Pulse Motor Valve (PMV) Forced Open Fully/Close fully Function in Outdoor Unit

This function is provided to forcibly open or close fully P.M.V. (PMV1/PMV2, PMV4) used in the outdoor unit for 2 minutes.

#### [PMV1/PMV2 Open fully]

On the interface board of the outdoor unit, set the dip switch [SW12 • bit1] to [OFF], [SW12 • bit2] to [OFF], and shortcircuit **CN30**.

#### [PMV1/PMV2 Close fully]

On the interface board of the outdoor unit, set the dip switch [SW12 • bit1] to [OFF], [SW12 • bit2] to [OFF], and shortcircuit **CN31**.

#### [PMV4 Open fully]

On the interface board of the outdoor unit, set the dip switch [SW12 • bit1] to [OFF], [SW12 • bit2] to [ON], and shortcircuit **CN30**.

#### [PMV4 Close fully]

On the interface board of the outdoor unit, set the dip switch [SW12 • bit1] to [OFF], [SW12 • bit2] to [ON], and shortcircuit **CN31**.

#### [Clear]

For both open fully and close fully, after 2 minutes, the opening returns to the normal opening.

Be sure to remove the cord used for short-circuit after confirmation, and set the dip switch [SW12 • bit1] to [OFF] and [SW12 • bit2] to [OFF].

This product offers backup modes of operation to get over certain emergency situations. If a fault occurs in one of the compressors, it is possible to operate the system on an emergency basis by operating only the remaining compressor(s), (compressor backup operation).

If one of the outdoor units fails in a combined outdoor unit system, the system can be operated on an emergency basis by keeping only the remaining outdoor unit(s), (outdoor unit backup operation).

Perform backup operation setting in accordance with the procedure described below.

## Note for Backup Operation

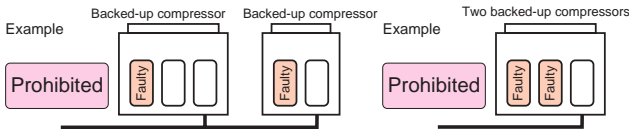
The method of backup operation differs according to the contents of fault as shown in the table below.

Contents of fault	Method of backup operation	Setting procedure
One of the compressors in the same unit fails (see Note 1)	Compressor backup (see Note 2)	Go to page 37.
All the compressors in the same unit fail	Outdoor unit backup or coolingseason outdoor unit backup (see Notes 1, 3, 4 and 5)	Go to page 38 or 39.
A fault occurs in a compressor motor coil (e.g. a layer short-circuit)		
A fault occurs in a refrigerating cycle part, fan or related part, or electrical part		
A fault occurs in a temperature sensor or pressure sensor		

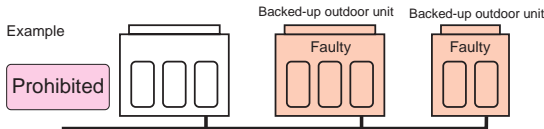
**Note 1:** If the compressor has failed due to a fault in its motor coil (e.g. a layer short-circuit), do not preform compressor backup operation because of severe oil degradation. It could damage other outdoor units.

**Note 2:** Keep the number of backed-up outdoor units under compressor backup operation to one in the system (single refrigerant line).

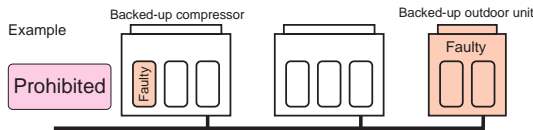
For a three-compressor model, the backing up of two faulty compressors is prohibited.



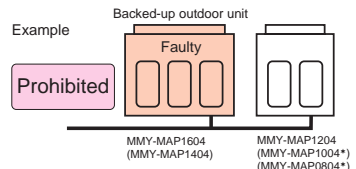
**Note 3:** Keep the number of backed-up outdoor units under outdoor unit backup operation to one in the system (single refrigerant line).



**Note 4:** It is prohibited to combine compressor backup operation and outdoor unit backup operation.



**Note 5:** With a two-outdoor unit system containing an MMYMAP1604\* (or MAP1404\*) and an MMY-MAP1204\* (or MMY-MAP0804\* or MAP1004\*), do not preform outdoor unit backup operation to back up the MMY-MAP1604\* (or MAP1404\*). It could lead to compressor failure due to the abnormal operation.



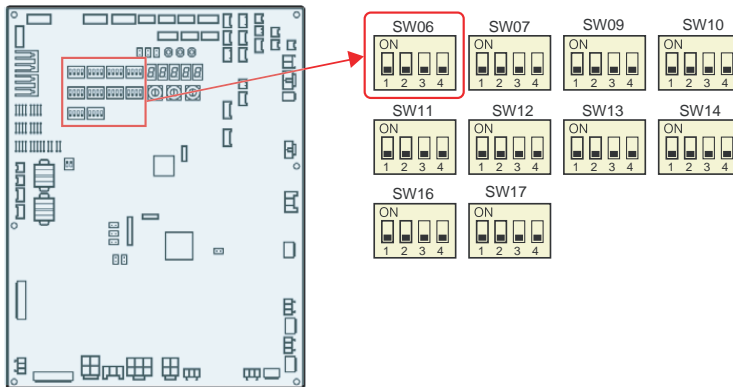
## Compressor Backup Operation Setting

### <Outline>

If a fault occurs to one of the compressors installed in outdoor unit, follow the procedure described below to back up the faulty compressor by using the remaining, normal compressor(s).

### <Work Procedure>

- (1) Turn off the power supply to all the outdoor units connected to the system.
- (2) Set the DIP switches of SW06, provided on the interface P.C. board of the outdoor unit with the faulty compressor, as shown in the table below.



Three-compressor model	SW06			
	Bit 1	Bit 2	Bit 3	Bit 4
Factory default setting	OFF	OFF	OFF	OFF
When compressor No. 1 (front left) is faulty	ON	OFF	OFF	OFF
When compressor No. 2 (front center) is faulty	OFF	ON	OFF	OFF
When compressor No. 3 (front right) is faulty	OFF	OFF	ON	OFF

Two-compressor model	SW06			
	Bit 1	Bit 2	Bit 3	Bit 4
Factory default setting	OFF	OFF	OFF	OFF
When compressor No.1 (front left) is faulty	ON	OFF	OFF	OFF
When compressor No.2 (front right) is faulty	OFF	ON	OFF	OFF

- (3) Turn on the power supply to all the units connected to the system.

This is the end of compressor backup operation setting.

## Outdoor Unit Backup Operation Setting

### <Outline>

This product allows outdoor unit backup operation setting to be performed either at the header unit or a follower unit. If any of the fault modes specified below occurs to one of the outdoor units in a multi-outdoor unit system, proceed with outdoor unit backup operation.

- A compressor failure  
(e.g. a layer short-circuit or a compressor failure in which no compressor is available to back up the faulty compressor)
- A failure of a pressure sensor (Pd or Ps) or a temperature sensor  
(TD1, TD2, TD3, TS1, TE1, TE2, TK1, TK2, TK3, TK4, TK5, or TL)

**Note:** Keep the number of backed-up outdoor units to one in the system (single refrigerant line).

### (1) Follower Outdoor Unit Backup Operation Setting (Failure of Follower Outdoor Unit)

#### <Work procedure>

(1) Turn off the power supply to all the indoor and outdoor units connected to the system.

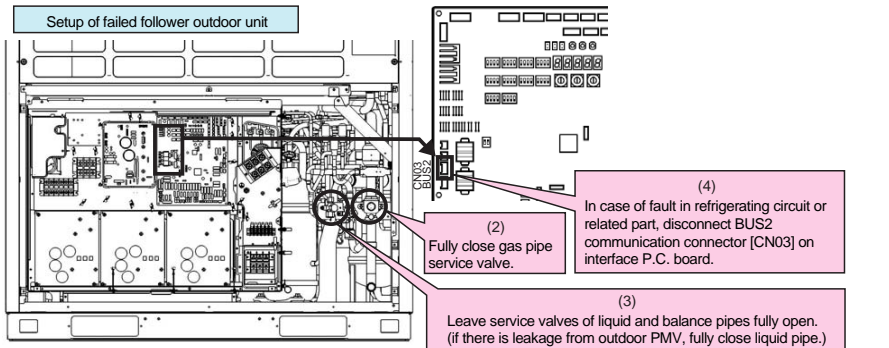
#### [Setup of failed follower outdoor unit]

- (2) Fully close the gas pipe service valve of the failed outdoor unit.
- (3) Leave the service valves of the liquid and balance pipe fully open (to prevent refrigerant stagnation in the unit). However, if there is a leakage from an outdoor PMV (unable to close), fully close the liquid pipe service valve.
- (4) **<In case of fault in compressor, electrical part, I/F P.C. board, or IPDU P.C. board>**

From this point on, keep the power supply to the failed unit off.

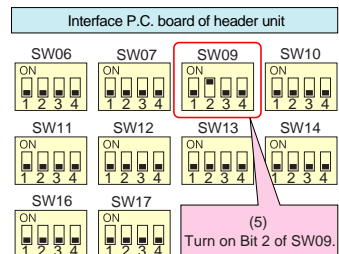
**<In case of fault in refrigerating circuit or related part (pressure sensor, temperature sensor, refrigerating cycle part, or fan system part)>**

Disconnect the connector [CN03] for outdoor-outdoor communication (BUS2) provided on the interface P.C.board.



#### [Setup of header unit]

- (5) Turn on Bit 2 of SW09 on the interface P.C. board of the header unit. (Setting to prevent connected indoor units capacity over error. (E16))



- (6) Turn on the power supply to all the units connected to the system other than the failed follower unit.  
Determine what to do with the power supply to the failed follower unit in the following manner.

**<In case of fault in compressor, electrical part, I/F P.C. board, or IPDU P.C. board>**

Leave the power supply off.

**<In case of fault in refrigerating circuit or related part (pressure sensor, temperature sensor, refrigerating cycle part, or fan system part)>**

Turn on the power supply to protect the compressor (by turning on the case heater).

(When the power supply to the unit is turned on, [E19] (error in the number of outdoor header units) will be displayed on the 7-segment display. However, this will not cause any problems.)

- (7) Perform settings needed to gain permission for backup operation from the header unit (error clearance).
- 1) Set SW01/02/03 on the interface P.C. board to 1/1/1 and confirm that [U1] [E26] (dropping out of an outdoor unit) is displayed on the 7-segment display.
  - 2) Set SW01/02/03 on the interface P.C. board to 2/16/1. Upon confirming that [Er] [... ..] is displayed on the 7-segment display, push SW04 and hold for 5 seconds or more.
  - 3) [Er] [... CL] (error clearance completed) will be displayed on the 7-segment display.
  - 4) Set SW01/02/03 back to 1/1/1. (The display should change to [U1] [- - -].)

(7)

Set SW01/02/03 to 1/1/1

[U1] [E26] will be displayed.



Set SW01/02/03 to [2/16/1].

[Er] [... ..] will be displayed.



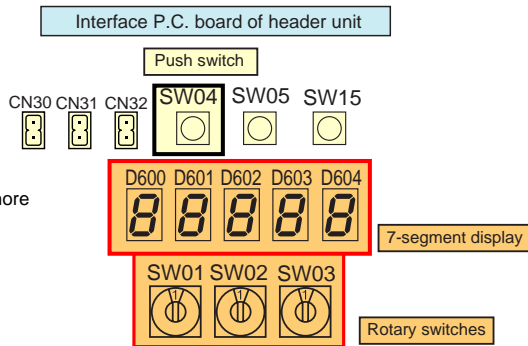
Push SW04 and hold for 5 seconds or more

[Er] [... CL] will be displayed.



Set SW01/02/03 back to 1/1/1.

[U1] [- - -] will be displayed.



This is the end of follower outdoor unit backup operation setting. Check the operation.

## (2) Header Outdoor Unit Backup Operation Setting (Failure of Header Outdoor Unit)

### <Work procedure>

(1) Turn off the power supply to all the units connected to the system at the source.

### [Setup of failed header outdoor unit]

(2) Fully close the gas pipe service valve of the failed outdoor unit.

(3) Leave the service valves of the liquid and balance pipes fully open (to prevent refrigerant stagnation in the failed outdoor unit).

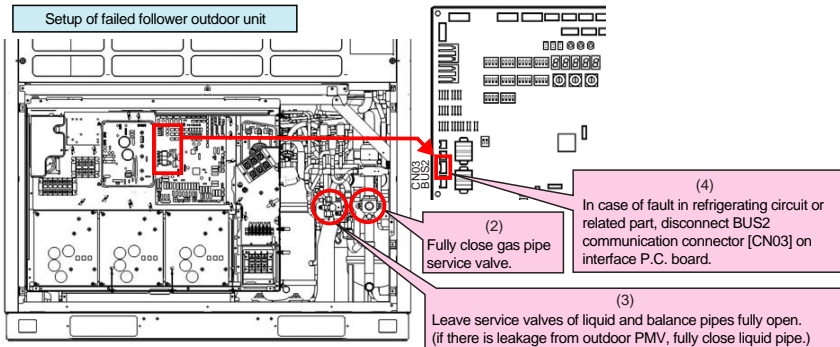
However, if there is a leakage from an outdoor PMV (unable to close), fully close the liquid pipe service valve.

(4) **<In case of fault in compressor, electrical part, I/F P.C. board, or IPDU P.C. board>**

From this point on, keep the power supply to the failed unit off.

**<In case of fault in refrigerating circuit or related part (pressure sensor, temperature sensor, refrigerating cycle part, or fan system part)>**

Disconnect the connector [CN03] for outdoor-outdoor communication (BUS2) provided on the interface P.C.board.



### [Selection of new header unit]

(5) Select a new header unit from the follower units on the basis of the following criteria:

- If only one follower unit is connected, select it as the header unit.
- If two or more follower units are connected, select the follower unit that is nearest to the failed header unit.

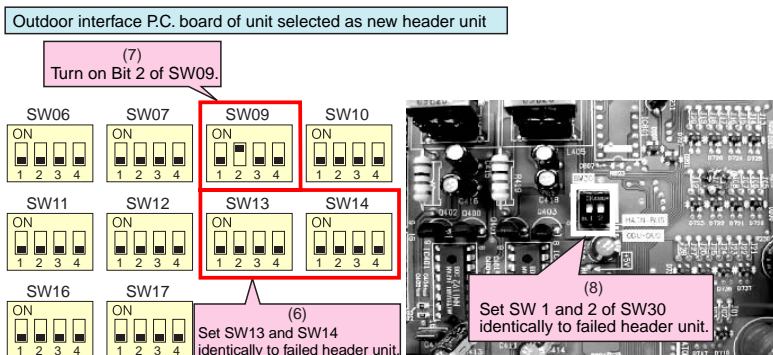
### [Setup of new header unit]

(6) Set SW13 and SW14 on the interface P.C. board same as the setting of failed header unit (refrigerant line address setting).

(7) Turn on Bit 2 of SW09 on the interface P.C. board. (Setting to prevent connected indoor unit capacity over error. (E16))

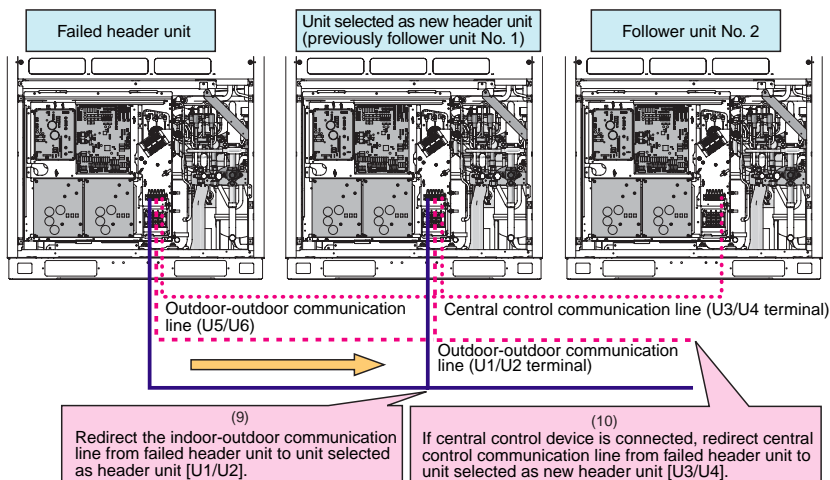
# BACKUP OPERATION (EMERGENCY OPERATION) (continue)

- (8) Set Bits 1 and 2 of SW30 on the interface P.C. board same as that of the failed header unit (terminator resistance setting).



## [Wiring changes to communication line]

- (9) Redirect the indoor-outdoor communication line connected to the failed header unit [U1/U2] to the unit selected as the header unit [U1/U2].
- (10) If a central control device is connected, connect the central control communication line [U3/U4] to the communication line terminal of the unit selected as the new header unit [U3/U4], and connect up the tie connector between the [U1/U2] and [U3/U4] terminals.



- (11) Turn on the power supply to all the units connected to the system other than the failed unit. Determine what to do with the power supply to the failed unit in the following manner.
- <In case of fault in compressor, electrical part, I/F P.C. board, or IPDU P.C. board>  
Leave the power supply off.
- <In case of fault in refrigerating circuit or related part (pressure sensor, temperature sensor, refrigerating cycle part, or fan system part)>  
Turn on the power supply to protect the compressor (by turning on the case heater).  
(When the power supply to the unit is turned on, [E19] (error in the number of outdoor header units) will be displayed on the 7-segment display. However, this will not cause any problems.)

This is the end of header outdoor unit backup operation setting. Check the operation.

## Refrigerant Recovery from Failed Outdoor Unit (Pump-Down)

This product supports refrigerant pump-down, a function which allows refrigerant to be recovered from an outdoor unit in need of repair using a normal outdoor unit in a system featuring multiple outdoor units.

### (1) Note for Refrigerant Recovery Operation

When performing pump-down operation, take note of the following matters:

- Note 1:** The pump-down refrigerant recovery rate changes with outside temperature and other factors. After pump-down is completed, recover any residual gas using a refrigerant recovery device, etc., and be sure to measure the amount of recovered refrigerant. (The refrigerant recovery rate can be improved by heating the accumulator of the outdoor unit to be repaired during pump-down operation.)
- Note 2:** If pump-down has been performed, the system cannot be operated until the faulty outdoor unit is repaired. (Continued operation would be impossible due to a refrigerant overcharge.)
- Note 3:** If outdoor PMVs 1 and 2 both happen to be faulty (unable to open) or PMV 4 fails while fully closed, the refrigerant in the heat exchangers (or sub-heat exchangers) cannot be recovered. In that case, recover any residual gas in the heat exchangers (or sub-heat exchangers) using a tube piercing valve or some other tool. After a pump-down operation, do not perform any welding until the residual gas in the heat exchangers is recovered.

### (2) Refrigerant Recovery Procedure A (Case of No Outdoor Unit Backup Operation Setting)

#### <Work procedure>

Turn on the power supply to the system at the source, but leave the system switched off.

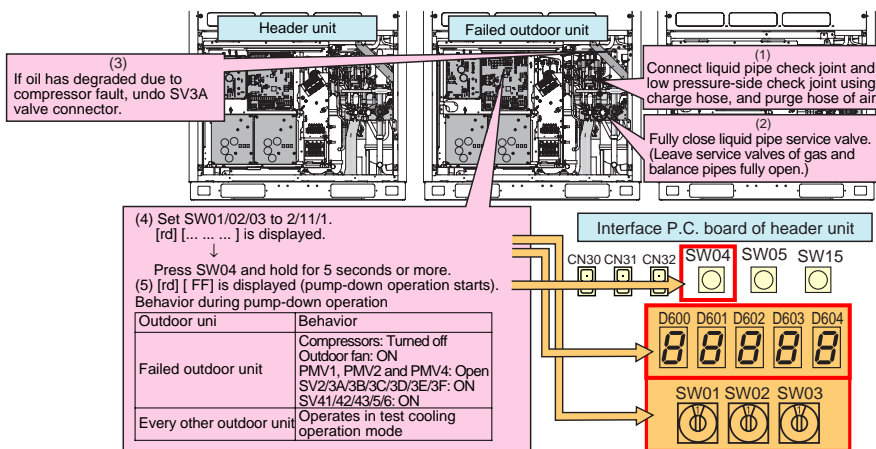
If the fault involves poor insulation of a compressor motor, remove the motor leads before the power is turned on.

#### [Setup of failed outdoor unit]

- (1) Connect the check joint of liquid pipe and the low pressure-side check joint using a charge hose, and purge the hose of air (to recover refrigerant from the liquid tank and heat exchangers).
- (2) Fully close the liquid pipe service valve of the failed outdoor unit.  
(Leave the service valves of the gas and balance pipes fully open.)
- (3) If the oil is likely to have degraded due to a compressor fault, disconnect the SV3A valve connector of the failed outdoor unit (to prevent the degraded oil from flowing into other outdoor units).
- (4) Set SW01/02/03 on the interface P.C. board of the failed outdoor unit to 2/11/1.  
After [rd] [... ..] is displayed on the 7-segment display, push SW04 and hold for 5 seconds or more.

(5) [rd] [... FF] will be displayed on the 7-segment display, and pump-down operation will start.

\* To put the operation on hold midway, turn off the power supply to all the outdoor units, or push **SW05** on the interface P.C. board.

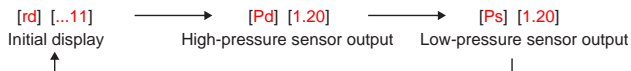


(6) Approx. 10 minutes after the system starts up, fully close the gas pipe service valve of the failed outdoor unit.

(7) Push **SW04** of the failed outdoor unit to have pressure data (MPa) displayed.s

(The display switches each time **SW04** is pushed.)

### Display Example



### [Selection of outdoor unit for pressure adjustment]

(8) Of all outdoor units operating in the pump-down mode, select the one with the lowest unit No. as an outdoor unit for pressure adjustment.

#### Identifying Unit No.

The unit No. is the number displayed on the 7-segment display when SW01/02/03 are set to 1/1/1.

[U#] [ . . ]: # represents the unit No.)

### [Setup of outdoor units other than unit for pressure adjustment and failed unit]

(9) Leaving the balance pipes of the unit for pressure adjustment and the failed unit fully open, fully close the balance pipe service valves of all other outdoor units.

### [Setup of outdoor unit for pressure adjustment]

(10) Set **SW01/02/03** on the interface P.C. board of the outdoor unit for pressure adjustment to 1/2/2.

(11) As the low-pressure sensor output is displayed on the 7-segment display, adjust the pressure to around 0.12 MPa by slowly closing the gas pipe service valve, with checking pressure data.

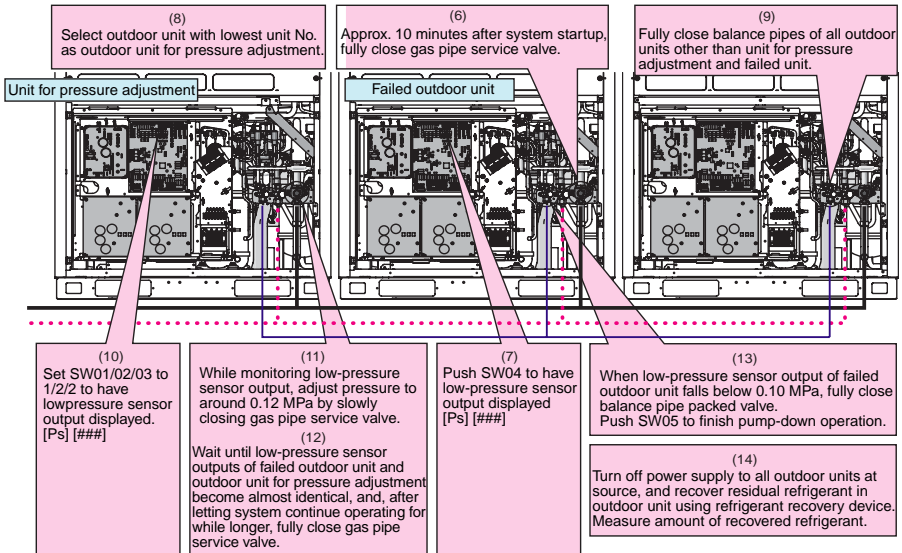
(12) Compare the low-pressure sensor outputs of the failed unit with that of the unit for pressure adjustment, and wait until the two pressure readings become almost the same. After letting the system continue operating for a while longer, fully close the gas pipe service valve of the unit for pressure adjustment.

### [Setup of failed outdoor unit]

- (13) When the low-pressure sensor output of the failed outdoor unit falls below 0.10MPa, fully close the balance pipe packed valve, and push **SW05** on the interface P.C. board to finish the pump-down operation.
- (14) Turn off the power supply to all the outdoor units, and recover the residual refrigerant in the outdoor unit using a refrigerant recovery device.

Be sure to measure the amount of recovered refrigerant.

(This is necessary to determine how much additional refrigerant will be needed after the completion of the repair.)



This is the end of the refrigerant recovery operation.

Set **SW01/02/03** of the failed outdoor unit and the outdoor unit for pressure adjustment back to 1/1/1.

## (3) Refrigerant Recovery Procedure B (Case of Outdoor Unit Backup Operation Setting)

### <Outline>

If outdoor unit backup operation setting is performed, use an alternative refrigerant recovery procedure as described below, provided that the power cannot be turned on for the failed outdoor unit.

(Refrigerant will be recovered from the failed outdoor unit using the test cooling operation function.)

**Note 1:** If cooling-season outdoor unit backup operation or outdoor unit backup operation is in progress with the power supply to the failed outdoor unit turned on, follow the procedure described in “(2) Refrigerant recovery procedure A (Case of no outdoor unit backup operation setting)”.

If outdoor unit backup operation setting is performed with the power supply to the failed outdoor unit turned on, recovery operation can only start after putting the outdoor-outdoor communication connector on the interface P.C.board of that unit [CN03] back to its initial state and resetting the power supply.

**Note 2:** If the power cannot be turned on the failed outdoor unit, the solenoid valves and PMVs of the unit cannot be turned on, so that it reduces the amount of recovered refrigerant compared to a standard pump-down operation. Recover the residual gas in the unit using a refrigerant recovery device, and be sure to measure the amount of recovered refrigerant.

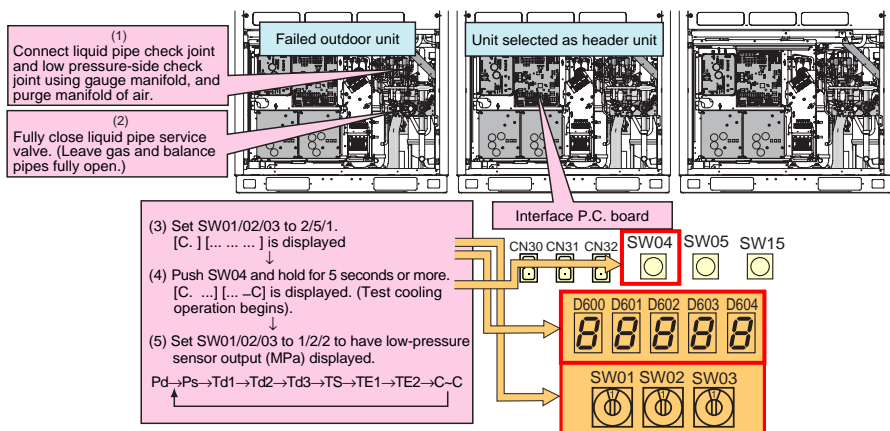
### <Work procedure>

#### [Setup of failed outdoor unit]

- Connect the liquid pipe check joint and the low pressure-side check joint using a gauge manifold, and purge the manifold of air (to recover refrigerant from the liquid tank and heat exchangers).
- Fully close the liquid pipe packed valve of the failed outdoor unit.  
(Leave the service valve of the gas pipe and the packed valve of the balance pipe fully open.)

#### [Setup of unit selected as header unit (hereafter “header outdoor unit”)]

- Set SW01/02/03 on the interface P.C. board of the header outdoor unit to 2/5/1. After [C.] [... ..] is displayed on the 7-segment display, push SW04 and hold for 5 seconds or more.
- After [C. ...] [... - C] is displayed on the 7-segment display, the system starts operating in the test cooling operation mode.
- Set SW01/02/03 on the interface P.C. board of the header outdoor unit to 1/2/2 to have the low-pressure sensor output (MPa) displayed on the 7-segment display.



- Approx. 10 minutes after the system starts up, fully close the gas pipe service valve of the failed outdoor unit.

#### [Setup of outdoor unit for pressure adjustment]

- Select the header unit as the unit for pressure adjustment.

### [Setup of outdoor units other than header unit and failed unit]

- (8) Leaving the balance pipes of the unit for pressure adjustment and the failed unit fully open, fully close the balance pipe packed valves of all other outdoor units.

### [Setup of header unit]

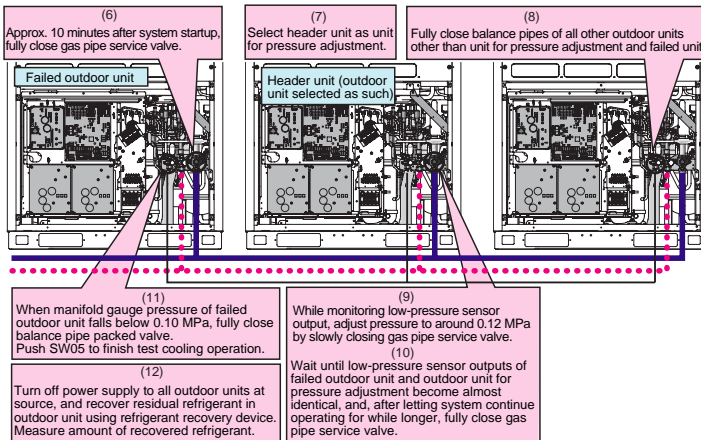
- (9) While monitoring the low-pressure sensor output, adjust the pressure to around 0.12 MPa by slowly closing the gas pipe service valve.
- (10) Compare the manifold gauge pressure of the failed unit with the low-pressure sensor output of the header unit, and wait until the two pressure readings become almost identical.
- After letting the system continue operating for a while longer, fully close the gas pipe service valve of the unit for pressure adjustment.

### [Setup of failed outdoor unit]

- (11) When the manifold gauge pressure of the failed outdoor unit falls below 0.10 MPa, fully close the balance pipe packed valve, and push SW05 on the interface P.C. board to finish the test cooling operation.
- (12) Turn off the power supply to all the outdoor units, and recover the residual refrigerant in the outdoor unit using a refrigerant recovery device.

Be sure to measure the amount of recovered refrigerant.

(This is necessary to determine how much additional refrigerant will be needed after the completion of the repair.)



This is the end of the refrigerant recovery operation.

Set SW01/02/03 of the header unit back to 1/1/1.

## How to Operate System While Failed Outdoor Unit Being Repaired

### <Outline>

After refrigerant is recovered from the failed outdoor unit through a pump-down operation, the overall amount of refrigerant held by the system becomes excessive, and this makes it impossible to operate the remaining outdoor units even though they are not faulty. However, operation is still possible if the system-wide amount of refrigerant is adjusted in accordance with the procedure described below.

### <Work procedure>

- Follow the steps specified in "Refrigerant Recovery from Failed Outdoor Unit (Pump-Down)".
- Adjust the amount of refrigerant held by the system by removing some of it using a refrigerant recovery device, etc. Determine the amount of refrigerant to be removed according to the capacity of the failed outdoor unit. (See the table below.)

### Example:

If a 10HP outdoor unit is under repair in a 30HP system:

Amount of refrigerant required by system as it was initially (30HP in capacity) = **34.5kg**

Amount of refrigerant required by system with available outdoor units only (20HP in capacity) = **26.0kg**

Amount of refrigerant to be removed from system = **34.5 - 26.0 = 8.5kg**

- Set up the outdoor unit from which refrigerant has been recovered in the manner described in "Outdoor Unit Backup Operation Setting".

This completes the procedure.

System capacity (HP)	Outdoor unit combination				Amount of refrigerant (kg)
8	8				13.0
10	10				14.0
12	12				15.0
14	14				20.0
16	8	8			23.0
	16				22.0
18	8	10			23.0
20	10	10			26.0
22	10	12			28.0
24	8	8	8		30.5
	12	12			30.5
26	8	8	10		30.5
	10	16			30.5
28	8	10	10		32.5
	12	16			32.5
30	10	10	10		34.5
	14	16			34.5
32	8	8	8	8	40.0
	16	16			35.5
34	8	8	8	10	40.0
	10	12	12		37.5
36	8	8	10	10	40.0
	12	12	12		38.5
38	8	10	10	10	40.0
	10	12	16		40.5
40	10	14	10	10	41.0
	12	12	16		41.5
42	10	10	10	12	42.0
	12	14	16		42.5
44	10	10	12	12	44.0
	12	16	16		44.5
46	10	12	12	12	46.0
	14	16	16		46.5
48	12	12	12	12	48.0
	16	16	16		48.5







**TOSHIBA**