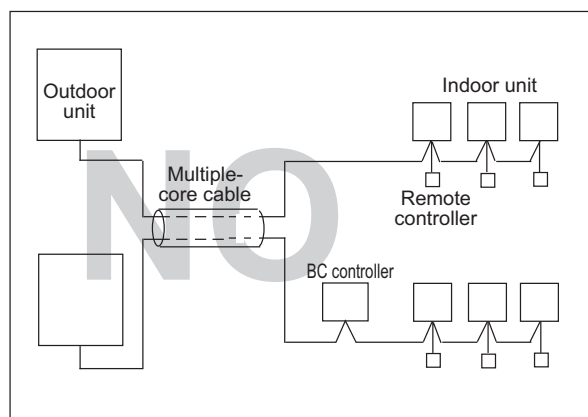
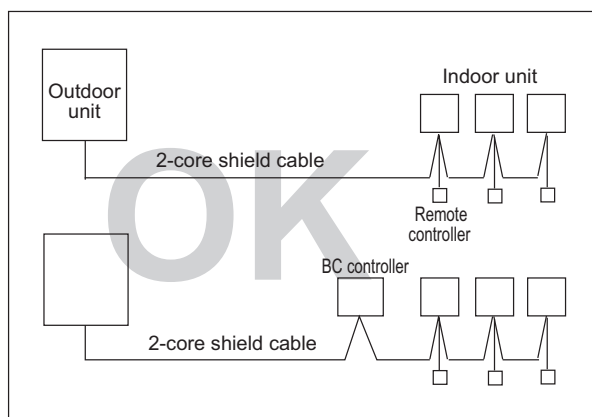

CITY MULTI® H2i® Y-SERIES Hyper-heating Inverter System Design

1. ELECTRICAL WORK	H2i-YSD-2
1-1. General Cautions	H2i-YSD-2
2. M-NET CONTROL	H2i-YSD-6
2-1. Transmission Cable Length Limitations	H2i-YSD-6
2-2. Transmission Cable Specifications	H2i-YSD-7
2-3. System Configuration Restrictions	H2i-YSD-8
2-4. Address Setting	H2i-YSD-11
3. PIPING DESIGN	H2i-YSD-23
3-1. R410A Piping Material	H2i-YSD-23
3-2. Piping Design	H2i-YSD-24
3-3. Refrigerant Charge Calculation	H2i-YSD-26
4. OUTDOOR INSTALLATION	H2i-YSD-27
4-1. Installation Site Requirements	H2i-YSD-27
4-2. Installation Clearance Space	H2i-YSD-28
4-3. Piping Direction	H2i-YSD-30
4-4. Weather Countermeasures	H2i-YSD-35
4-5. Low Ambient Kit Application Guidelines	H2i-YSD-36
5. INSTALLATION INFORMATION	H2i-YSD-38
5-1. General precautions	H2i-YSD-38
5-2. Precautions for Indoor unit	H2i-YSD-39
5-3. Precautions for Fresh air intake type indoor unit	H2i-YSD-40
5-4. Precautions for Outdoor unit/Heat source unit	H2i-YSD-40
5-5. Precautions for Control-related items	H2i-YSD-41
6. STANDARD AND SEACOAST (BS) PROTECTION TREATMENT	H2i-YSD-42
6-1. H2i Y-Series	H2i-YSD-42
7. CAUTIONS	H2i-YSD-43
7-1. Refrigerant Leakage Considerations	H2i-YSD-43

1. ELECTRICAL WORK

1-1. General Cautions

- ① Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations, and guidance of each electric power company.
- ② Wiring for control (hereinafter referred to as transmission cable) shall be (50mm[1-5/8in] or more) apart from power source wiring so that it is not influenced by electric noise from power source wiring. (Do not insert transmission cable and power source wire in the same conduit.)
- ③ Be sure to provide designated grounding work to outdoor unit.
- ④ Give some allowance to wiring for electrical part box of indoor and outdoor units, because the box is sometimes removed at the time of service work.
- ⑤ Never connect 100V, 208~230V power source to terminal block of transmission cable. If connected, electrical parts will be burnt out.
- ⑥ Use 2-core shield cable for transmission cable. If transmission cables of different systems are wired with the same multicore cable, the resultant poor transmitting and receiving will cause erroneous operations.



1. ELECTRICAL WORK

1-2. Power Supply for Indoor and Outdoor Units

1-2-1. Electrical Characteristics of the Indoor Units

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps					
IFM :Indoor Fan Motor					
Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PLFY-P08NCMU-ER4	60Hz	208 / 230V	198 to 253V	0.29 / 0.29	0.23 / 0.23
PLFY-P12NCMU-ER4				0.35 / 0.35	0.28 / 0.28
PLFY-P15NCMU-ER4				0.35 / 0.35	0.28 / 0.28
PLFY-P12NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P15NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P18NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P24NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P30NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P36NBMU-ER2					
PMFY-P06NBMU-ER5	60Hz	208 / 230V	188 to 253V	0.25 / 0.25	0.20 / 0.20
PMFY-P08NBMU-ER5				0.25 / 0.25	0.20 / 0.20
PMFY-P12NBMU-ER5				0.26 / 0.26	0.21 / 0.21
PMFY-P15NBMU-ER5				0.33 / 0.33	0.26 / 0.26
PEFY-P06NMAU-E3	60Hz	208 / 230V	188 to 253V	1.05 / 1.05	0.84 / 0.84
PEFY-P08NMAU-E3				1.05 / 1.05	0.84 / 0.84
PEFY-P12NMAU-E3				1.20 / 1.20	0.96 / 0.96
PEFY-P15NMAU-E3				1.45 / 1.45	1.16 / 1.16
PEFY-P18NMAU-E3				1.56 / 1.56	1.25 / 1.25
PEFY-P24NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P27NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P30NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P36NMAU-E3				3.32 / 3.32	2.66 / 2.66
PEFY-P48NMAU-E3				3.41 / 3.41	2.73 / 2.73
PEFY-P54NMAU-E3				3.31 / 3.31	2.65 / 2.65
PEFY-P06NMSU-ER2	60Hz	208 / 230V	188 to 253V	0.47 / 0.50	0.32 / 0.31
PEFY-P08NMSU-ER2				0.47 / 0.50	0.41 / 0.39
PEFY-P12NMSU-ER2				0.68 / 0.74	0.46 / 0.43
PEFY-P15NMSU-ER2				1.20 / 1.33	0.47 / 0.45
PEFY-P18NMSU-ER2				1.20 / 1.33	0.64 / 0.60
PEFY-P24NMSU-ER2				1.57 / 1.73	0.88 / 0.83
PEFY-P15NMHU-E2				1.63 / 1.50	1.30 / 1.20
PEFY-P18NMHU-E2				1.63 / 1.50	1.30 / 1.20
PEFY-P24NMHU-E2				2.11 / 1.83	1.69 / 1.46
PEFY-P27NMHU-E2				2.35 / 2.13	1.88 / 1.70
PEFY-P30NMHU-E2				2.70 / 2.45	2.16 / 1.96
PEFY-P36NMHU-E2				4.16 / 3.67	3.32 / 2.94
PEFY-P48NMHU-E2				4.16 / 3.67	3.32 / 2.94
PEFY-P54NMHU-E2				4.18 / 3.69	3.34 / 2.95
PEFY-P72NMHSU-E			187 to 253V	7.7	6.2
PEFY-P96NMHSU-E				8.2	6.6

1. ELECTRICAL WORK

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps					
IFM :Indoor Fan Motor					
Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PCFY-P15NKMU-ER1	60Hz	208 / 230V	188 to 253V	0.44 / 0.44	0.35 / 0.35
PCFY-P24NKMU-ER1				0.52 / 0.52	0.41 / 0.41
PCFY-P30NKMU-ER1				1.22 / 1.22	0.97 / 0.97
PCFY-P36NKMU-ER1				1.22 / 1.22	0.97 / 0.97
PKFY-P06NBMU-E2	60Hz	208 / 230V	198 to 253V	0.19 / 0.19	0.15 / 0.15
PKFY-P08NBMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P12NBMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P15NBMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P18NBMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P24NKMU-E2.TH				0.63 / 0.63	0.50 / 0.50
PKFY-P30NKMU-E2.TH				0.63 / 0.63	0.50 / 0.50
PFFY-P06NEMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NEMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NEMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NEMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NEMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NEMU-E				0.59 / 0.64	0.47 / 0.51
PFFY-P06NRMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NRMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NRMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NRMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NRMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NRMU-E				0.59 / 0.64	0.47 / 0.51
PVfy-P12E00B	60Hz	208 / 230V	188 to 253V	0.52	0.42
PVfy-P18E00B				0.78	0.63
PVfy-P24E00B				0.99	0.79
PVfy-P30E00B				1.33	1.07
PVfy-P36E00B				1.51	1.21
PVfy-P48E00B				2.02	1.62
PVfy-P54E00B				2.04	1.63
PWFY-P36NEMU-E-AU	60Hz	208 / 230V	188 to 253V	0.09	-
PWFY-P72NEMU-E-AU				0.09	-

1. ELECTRICAL WORK

1-2-2. Electrical characteristics of Outdoor unit of cooling mode

Symbols: MCA : Minimum Circuit Ampacity MOCP : Maximum Overcurrent Protection

SC : Starting Current RLA : Rated Load Amps

PUHY-HP-T(S)JMU

Model	Unit Combination	Outdoor Units							Compressor		Fan
		Hz	Volts	Voltage range	RLA(A)	RLA(MAX)(A)	MCA(A)	MOCP	Output(kW)	SC(A)	
PUHY-HP72TJMU-A		60Hz	208 / 230V	188 to 253V	19.4 / 17.6	38.4 / 38.4	59 / 54	101 / 92	5.3	15	0.92
PUHY-HP96TJMU-A		60Hz	208 / 230V		28.2 / 25.5	52.4 / 52.4	74 / 68	127 / 116	6.7	15	0.92
PUHY-HP 144TSJMU-A	PUHY-HP72TJMU-A	60Hz	208 / 230V		19.4 / 17.6	38.4 / 38.4	59 / 54	101 / 92	5.3	15	0.92
	PUHY-HP72TJMU-A	60Hz	208 / 230V		19.4 / 17.6	38.4 / 38.4	59 / 54	101 / 92	5.3	15	0.92
PUHY-HP 192TSJMU-A	PUHY-HP96TJMU-A	60Hz	208 / 230V		28.2 / 25.5	52.4 / 52.4	74 / 68	127 / 116	6.7	15	0.92
	PUHY-HP96TJMU-A	60Hz	208 / 230V		28.2 / 25.5	52.4 / 52.4	74 / 68	127 / 116	6.7	15	0.92

To size breakers, see "Recommended Fuse/Breaker Size" in the Specifications table.

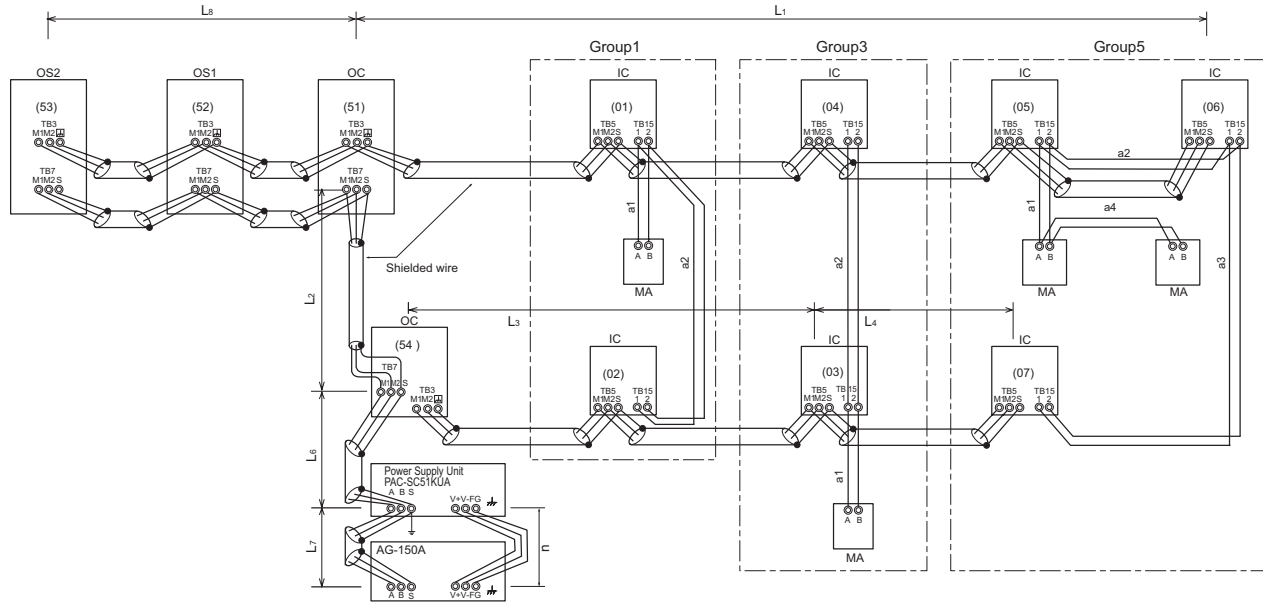
2. M-NET CONTROL

2-1. Transmission Cable Length Limitations

2-1-1. Using MA Remote controller

Long transmission cable causes voltage down, therefore, the length limitation should be obeyed to secure proper transmission.

Max. length via Outdoor (M-NET cable)	$L1+L2+L3+L4, L1+L2+L6+L7, L3+L4+L6+L7$	$\leq 500\text{m}[1640\text{ft.}]$	1.25mm ² [AWG16] or thicker
Max. length to Outdoor (M-NET cable)	$L1+L8, L3+L4, L6, L2+L6+L8, L7$	$\leq 200\text{m}[656\text{ft.}]$	1.25mm ² [AWG16] or thicker
Max. length from MA to Indoor	$a1+a2, a1+a2+a3+a4$	$\leq 200\text{m}[656\text{ft.}]$	0.3-1.25 mm ² [AWG22-16]
24VDC to AG-150A	n	$\leq 50\text{m}[164\text{ft.}]$	0.75-2.0 mm ² [AWG18-14]



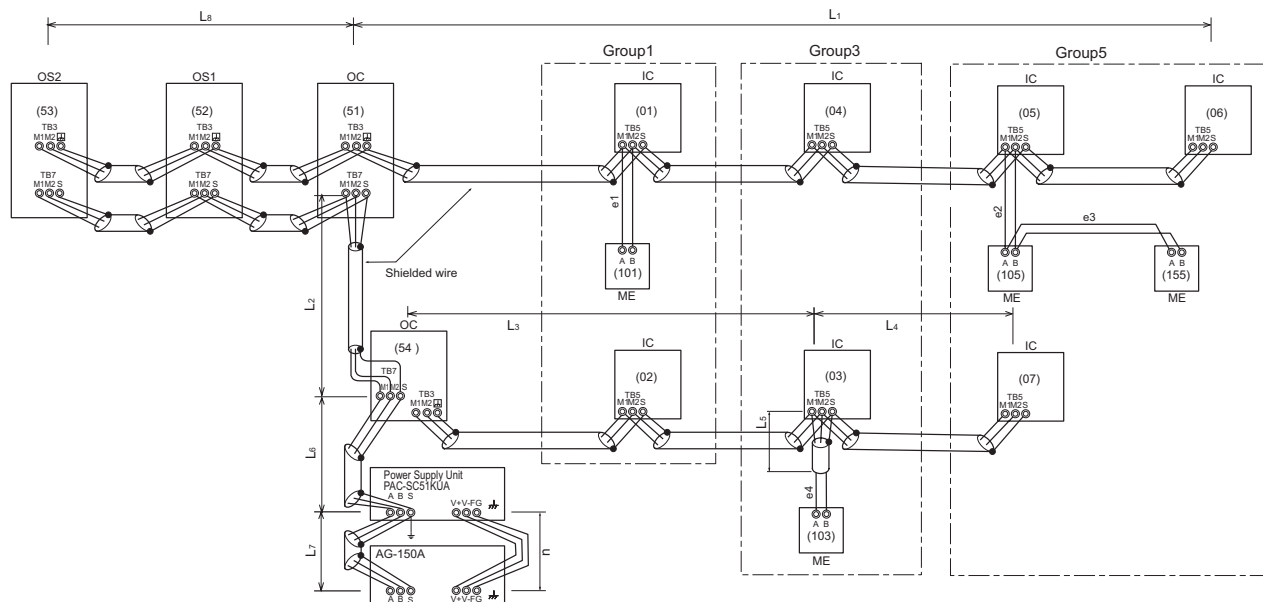
OC, OS1, OS2 : Outdoor unit controller; IC: Indoor unit controller; MA: MA remote controller

2-1-2. Using ME Remote controller

Long transmission cable causes voltage down, therefore, the length limitation should be obeyed to secure proper transmission.

Max. length via Outdoor (M-NET cable)	$L1+L2+L3+L4, L1+L2+L6+L7, L1+L2+L3+L5, L3+L4+L6+L7$	$\leq 500\text{m}[1640\text{ft.}]$	1.25mm ² [AWG16] or thicker
Max. length to Outdoor (M-NET cable)	$L1+L8, L3+L4, L6, L2+L6+L8, L7, L3+L5$	$\leq 200\text{m}[656\text{ft.}]$	1.25mm ² [AWG16] or thicker
Max. length from ME to Indoor	$e1, e2+e3, e4$	$\leq 10\text{m}[32\text{ft.}]^*1$	0.3-1.25 mm ² [AWG22-16] *1
24VDC to AG-150A	n	$\leq 50\text{m}[164\text{ft.}]$	0.75-2.0 mm ² [AWG18-14]

*1. If the length from ME to Indoor exceed 10m, use 1.25 mm² [AWG16] shielded cable, but the total length should be counted into Max. length via Outdoor.



OC, OS1, OS2: Outdoor unit controller; IC: Indoor unit controller; ME: ME remote controller

2. M-NET CONTROL

2-2. Transmission Cable Specifications

	Transmission cables (Li)	ME Remote controller cables	MA Remote controller cables
Type of cable	Shielding wire (2-core) CVVS, CPEVS or MVVS	Sheathed 2-core cable (unshielded) CVV	
Cable size	More than 1.25mm ² [AWG16]	0.3 ~ 1.25mm ² [AWG22~16] *2	0.3 ~ 1.25mm ² [AWG22~16] *1 *2
Remarks	—	When 10m [32ft] is exceeded, use cables with the same specification as transmission cables.	Max length : 200m [656ft]

*1 To wire PAC-YT53CRAU, use a wire with a diameter of 0.3 mm² [AWG22]

*2 The use of cables 0.75 mm² [AWG18] or greater is recommended for easy handling.

CVVS, MVVS: PVC insulated PVC jacketed shielded control cable
CPEVS: PE insulated PVC jacketed shielded communication cable
CVV: PV insulated PVC sheathed control cable

2. M-NET CONTROL

2-3. System Configuration Restrictions

2-3-1. Common restrictions for the CITY MULTI system

For each Outdoor unit, the maximum connectable quantity of Indoor unit is specified at its Specifications table.

- A) 1 Group of Indoor units can have 1-16 Indoor units;
- B) Maximum 2 remote controllers for 1 Group;
 *MA/ME remote controllers cannot be present together in 1 group.
 *To wire PAC-YT53CRAU, use a wire with a diameter of 0.3 mm² [AWG22]
- C) 1 LOSSNAY unit can interlock maximum 16 Indoor units; 1 Indoor unit can interlock only 1 LOSSNAY unit.
- D) Maximum 3 System controllers are connectable when connecting to TB3 of the Outdoor unit.
- E) Maximum 6 System controllers are connectable when connecting to TB7 of the Outdoor unit, if the transmission power is supplied by the Outdoor unit. (Not applicable to TKMU model)
- F) 4 System controllers or more are connectable when connecting to TB7 of the Outdoor unit, if the transmission power is supplied by the power supply unit PAC-SC51KUA. Details refer to 2-3-3-C.
 *System controller connected as described in D) and E) would have a risk that the failure of connected Outdoor unit would stop power supply to the System controller.

2-3-2. Ensuring proper communication power for M-NET

In order to ensure proper communication among Outdoor unit, Indoor unit, LOSSNAY and Controllers, the transmission power situation for the M-NET should be observed. In some cases, Transmission booster should be used. Taking the power consumption index of Indoor unit sized P06-P54 as 1, the equivalent power consumption index and supply capability index of others are listed at Table 2-3-1 and Table 2-3-2.

Table 2-3-1 The equivalent power consumption

Indoor unit				LOSSNAY	BC controller	PWFY			MA RC.	ME Remote controller/Adapter	
Sized P06-P54	Sized P72, 96	PEFY-AF1200 CFMR	LGH-RX-E		CMB	P36NMU-E-BU	P36NMU-E-AU	P72NMU-E-AU	PAC-YT53CRAU PAR-FA32MA PZ-41SLB PZ-60DR-E	PZ-52SF PAC-YG60MCA PAC-YG66DCA PAC-YG63MCA	PAR-U01MEDU PAC-IF01AHC-J
1	7	2	0		2	6	1	5	0	1/4	1/2

Centralized Remote controller				ON/OFF controller	MN Converter		M-NET Interface/Converter	Outdoor unit
AG-150A-A EB-50GU-A	TC-24B	GB-24A	LMAP04U-E BAC-HD150	PAC-YT40ANRA	CMS-MNF-B	CMS-MNG-E	MAC-333 PAC-SF83MA-E	TB7 power consumption
1/2	4	3	0	1	1/2	2	0	0

*RC: Remote Controller

Table 2-3-2 The equivalent power supply

Transmission Booster	Power supply unit	BM ADAPTER	System Controller	Outdoor unit	Outdoor unit (except TKMU)	Outdoor unit TKMU
PAC-SF46EPA	PAC-SC51KUA	BAC-HD150	GB-50ADA-A	Connector TB3 and TB7 total *	Connector TB7 only	Connector TB7 only
25	5	6	6	32	6	0

*If PAC-SC51KUA is used to supply power at TB7 side, no power supply need from Outdoor unit at TB7, Connector TB3 itself will therefore have 32.
 Not applicable to the PUMY model.

With the equivalent power consumption values in Table 2-3-1 and Table 2-3-2, PAC-SF46EPA can be designed into the air-conditioner system to ensure proper system communication according to 2-3-2-A, B, C.

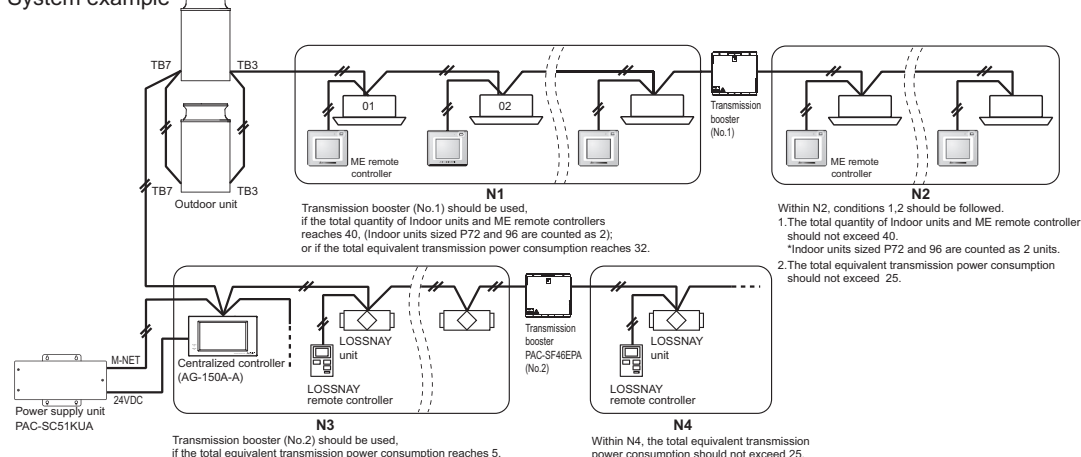
2-3-2-A) Firstly, count from TB3 at TB3 side the total quantity of Indoor units, ME remote controller, and System controllers.

If the total quantity reaches 40, a PAC-SF46EPA should be set. In this case, Indoor units sized P72 and 96 are counted as 2 indoor units, but MA remote controller(s) and PZ-41SLB are NOT counted.

2-3-2-B) Secondly, count from TB7 side to TB3 side the total transmission power consumption index. If the total power consumption reaches 32, a PAC-SF46EPA should be set. Yet, if a PAC-SC51KUA or another controller with a built-in power supply is used to supply power at TB7 side, count from index TB3 side only.

2-3-2-C) Thirdly, count from TB7 at TB7 side the total transmission power consumption index, If the total power consumption reaches 6, a PAC-SF46EPA should be set.

■ System example



2. M-NET CONTROL

2-3-3. Ensuring proper power supply to System controller

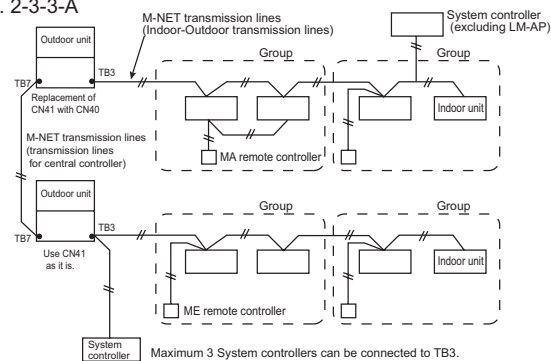
The power to System controller (excluding LM-AP) is supplied via M-NET transmission line. M-NET transmission line at TB7 side is called Central control transmission line while one at TB3 side is called Indoor-Outdoor transmission line. There are 3 ways to supply power to the System controller.

- A) Connecting to TB3 of the Outdoor unit and receiving power from the Outdoor unit.
- B) Connecting to TB7 of the Outdoor unit and receiving power from the Outdoor unit.
- C) Connecting to TB7 of the Outdoor unit but receiving power from power supply unit PAC-SC51KUA.

2-3-3-A. When connecting to TB3 of the Outdoor unit and receiving power from the Outdoor unit.

Maximum 3 System controllers can be connected to TB3. If there is more than 1 Outdoor unit, it is necessary to replace power supply switch connector CN41 with CN40 on one Outdoor unit.

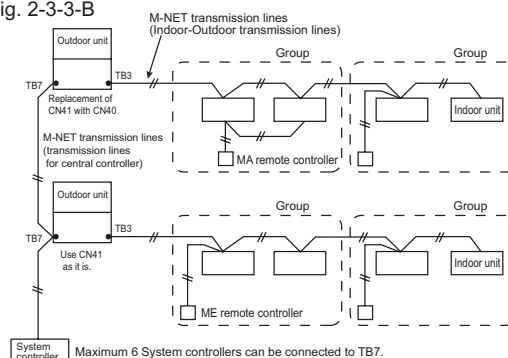
Fig. 2-3-3-A



2-3-3-B. When connecting to TB7 of the Outdoor unit and receiving power from the Outdoor unit.

Maximum 6 System controllers can be connected to TB7 and receiving power from the Outdoor unit. It is necessary to replace power supply switch connector CN41 with CN40 on one Outdoor unit.

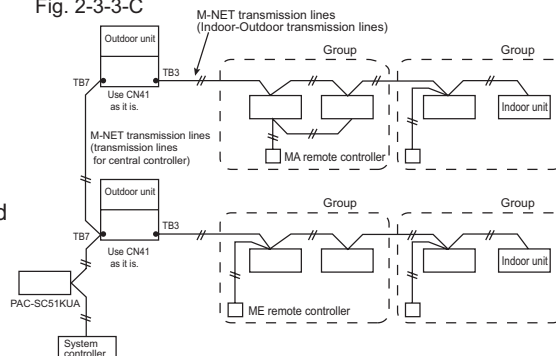
Fig. 2-3-3-B



2-3-3-C. When connecting to TB7 of the Outdoor unit but receiving power from PAC-SC51KUA.

When using PAC-SC51KUA to supply transmission power, the power supply connector CN41 on the Outdoor units should be kept as it is. It is also a factory setting. 1 PAC-SC51KUA supports maximum 1 AG-150A-A or 1 EB-50GU-A unit due to the limited power 24VDC at its TB3. However, 1 PAC-SC51KUA supplies transmission power at its TB2 equal to 5 Indoor units, which is referable at Table 2-3-2. If PZ-52SF, System controller, ON/OFF controller connected to TB7 consume transmission power more than 5 (Indoor units), Transmission booster PAC-SF46EPA is needed. PAC-SF46EPA supplies transmission power equal to 25 Indoor units.

Fig. 2-3-3-C



CAUTION

AG-150A-A/EB-50GU-A*1 are recommended to connect to TB7 because it performs back-up to a number of data.

In an air conditioner system has more than 1 Outdoor units, AG-150A-A/EB-50GU-A receiving transmission power through TB3 or TB7 on one of the Outdoor units would have a risk that the connected Outdoor unit failure would stop power supply to AG-150A-A/EB-50GU-A and disrupt the whole system.

When applying apportioned electric power function, AG-150A-A/EB-50GU-A are necessary to connected to TB7 and has its own power supply unit PAC-SC51KUA.

Note: Power supply unit PAC-SC51KUA is for AG-150A-A/EB-50GU-A.

*1: AG-150A-A is an example model of system controllers.

2. M-NET CONTROL

2-3-4. Power supply to LM-AP

1-phase 208-230V AC power supply is needed.

The power supply unit PAC-SC51KUA is not necessary when connecting only the LM-AP. Yet, make sure to change the power supply changeover connector CN41 to CN40 on the LM-AP.

2-3-5. Power supply to BM ADAPTER

1-phase 100-240VAC power supply is needed.

The power supply unit PAC-SC51KUA is not necessary when only BM ADAPTER is connected.

Yet, make sure to move the power jumper from CN41 to CN40 on the BM ADAPTER.

2-3-6. Power supply to GB-50ADA-A

1-phase 100-240VAC power supply is needed.

The power supply unit PAC-SC51KUA is not necessary.

GB-50ADA-A supplies power through TB3, which equals 6 indoor units. (refer to Table 2-3-2)

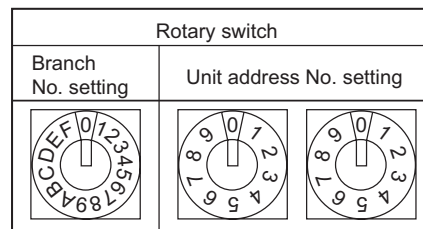
2. M-NET CONTROL

2-4. Address Setting

2-4-1. Switch operation

In order to constitute CITY MULTI in a complete system, switch operation for setting the unit address No. and connection No. is required.

- ① Address No. of outdoor unit, indoor unit and ME remote controller.
The address No. is set at the address setting board.
In the case of R2 system, it is necessary to set the same No. at the branch No. switch of indoor unit as that of the BC controller connected. (When connecting two or more branches, use the lowest branch No.)



- ② Caution for switch operations

- Be sure to shut off power source before switch setting. If operated with power source on, switch can not operate properly.
- No units with identical unit address shall exist in one whole air conditioner system. If set erroneously, the system can not operate.

- ③ MA remote controller

- When connecting only one remote controller to one group, it is always the main remote controller. When connecting two remote controllers to one group, set one remote controller as the main remote controller and the other as the sub remote controller.
- The factory setting is "Main".

PAC-YT53CRAU

Setting the dip switches

There are switches on the back of the top case. Remote controller Main/Sub and other function settings are performed using these switches. Ordinarily, only change the Main/Sub setting of SW1.
(The factory settings are ON for SW1, 3, and 4 and OFF for SW2.)

SW No	SW contents Main	ON	OFF	Comment
1	Remote controller Main/Sub setting	Main	Sub	Set one of the two remote controllers at one group to "ON".
2	Temperature display units setting	Celsius	Fahrenheit	When the temperature is displayed in [Fahrenheit], set to "OFF".
3	Cooling/heating display in AUTO mode	Yes	No	When you do not want to display "Cooling" and "Heating" in the AUTO mode, set to "OFF".
4	Indoor temperature display	Yes	No	When you do not want to display the indoor temperature, set to "OFF".

2. M-NET CONTROL

2-4-2. Rule of setting address

Unit	Address setting	Example	Note
Indoor unit	01 ~ 50	 10  1	Use the most recent address within the same group of indoor units. Make the indoor units address connected to the BC controller (Sub) larger than the indoor units address connected to the BC controller (Main). If applicable, set the sub BC controllers in an PURY system in the following order: (1) Indoor unit to be connected to the BC controller (Main) (2) Indoor unit to be connected to the BC controller (No.1 Sub) (3) Indoor unit to be connected to the BC controller (No.2 Sub) Set the address so that (1)<(2)<(3)
Outdoor unit	51 ~ 99, 100 (Note1)	 10  1	The smallest address of indoor unit in same refrigerant system + 50 Assign sequential address numbers to the outdoor units in one refrigerant circuit system. OC and OS are automatically detected. (Note 2) * Please reset one of them to an address between 51 and 99 when two addresses overlap. * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Main)	52 ~ 99, 100	 10  1	The address of outdoor unit + 1 * Please reset one of them to an address between 51 and 99 when two addresses overlap. * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Sub)	52 ~ 99, 100	 10  1	Lowest address within the indoor units connected to the BC controller (Sub) plus 50.
Local remote controller	ME, LOSSNAY Remote controller (Main)	101 ~ 150 1 Fixed  10  1	The smallest address of indoor unit in the group + 100 * The place of "100" is fixed to "1"
	ME, LOSSNAY Remote controller (Sub)	151 ~ 199, 200 1 Fixed  10  1	The address of main remote controller + 50 * The address automatically becomes "200" if it is set as "00"
System controller	ON/OFF remote controller	000, 201 ~ 250  100  10  1	The smallest group No. to be managed + 200 * The smallest group No. to be managed is changeable.
	AG-150A-A GB-50ADA-A GB-24A EB-50GU-A	000, 201 ~ 250 0 100 0 10 0 1	
	BAC-HD150	000, 201 ~ 250 0 100 0 10 0 1	* Settings are made with setting tool of BM ADAPTER.
	LMAP04U-E	201 ~ 250 2 Fixed  10  1	

Note1: To set the address to "100", set it to "50"

Note2: Outdoor units OC and OS in one refrigerant circuit system are automatically detected.

OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.

2. M-NET CONTROL

2-4-3. System examples

Factory setting

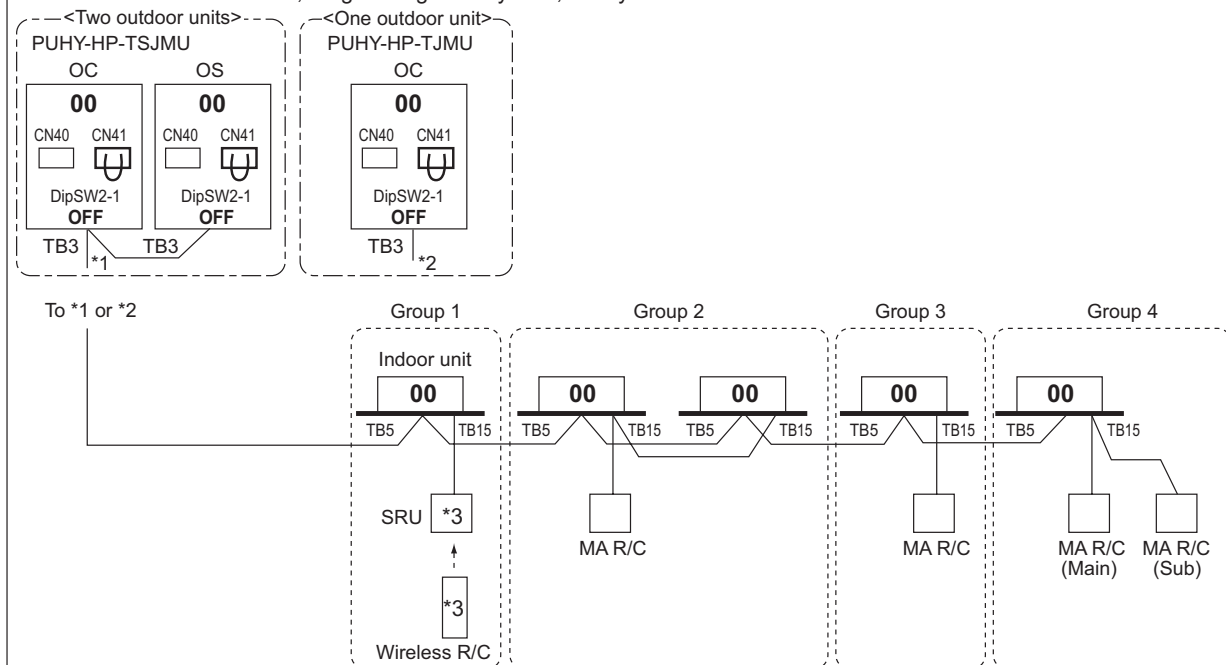
Original switch setting of the outdoors, indoors, controllers, LM-AP, and BM ADAPTER at shipment is as follows.

- Outdoor unit : Address: 00, CN41: ON (Jumper), DipSW2-1: OFF
- Indoor unit : Address: 00
- ME remote controller : Address: 101
- LM-AP : Address: 247, CN41: ON (Jumper), DipSW1-2: OFF
- BM ADAPTER : Address: 000, CN41: ON (Jumper)

Setting at the site

- DipSW2-1(Outdoor) : When the System Remote Controller is used, all the Dip SW2-1 at the outdoor units should be set to "ON". * Dip SW2-1 remains OFF when only LM-AP is used.
- DipSW1-2(LM-AP) : When the LM-AP is used together with System Remote Controller, DipSW1-2 at the LM-AP should be set to "ON".
- CN40/CN41 : Change jumper from CN41 to CN 40 at outdoor control board will activate central transmission power supply to TB7;
(Change jumper at only one outdoor unit when activating the transmission power supply without using a power supply unit.)
Change jumper from CN41 to CN 40 at LM-AP will activate transmission power supply to LM-AP itself;
Power supply unit is recommended to use for a system having more than 1 outdoor unit, because the central transmission power supply from TB7 of one of outdoor units is risking that the outdoor unit failure may let down the whole system controller system.

2-4-3-1. MA remote controller, Single-refrigerant-system, No System Controller



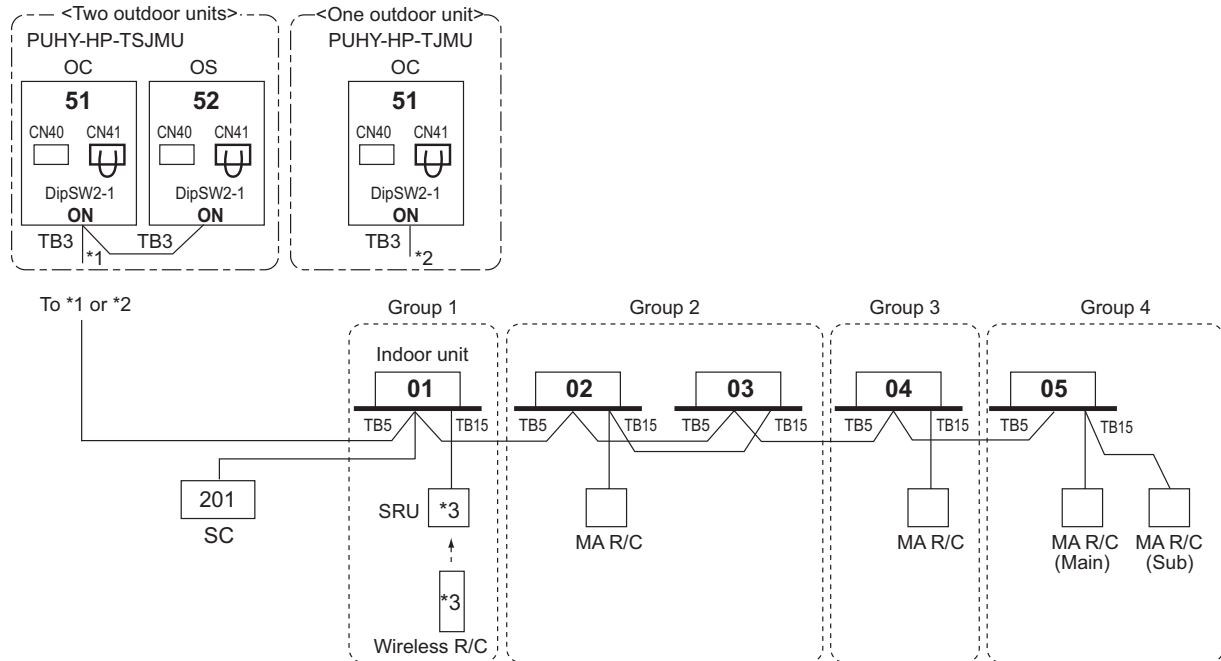
*3 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. No address setting is needed.
3. For a system having more than 16 indoor unit, confirm the need of Booster at 2-3 "System configuration restrictions".

2. M-NET CONTROL

2-4-3-2. MA remote controller, Single-refrigerant-system, System Controller



*3 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

*SC can be connected to TB3 side or TB7 side;

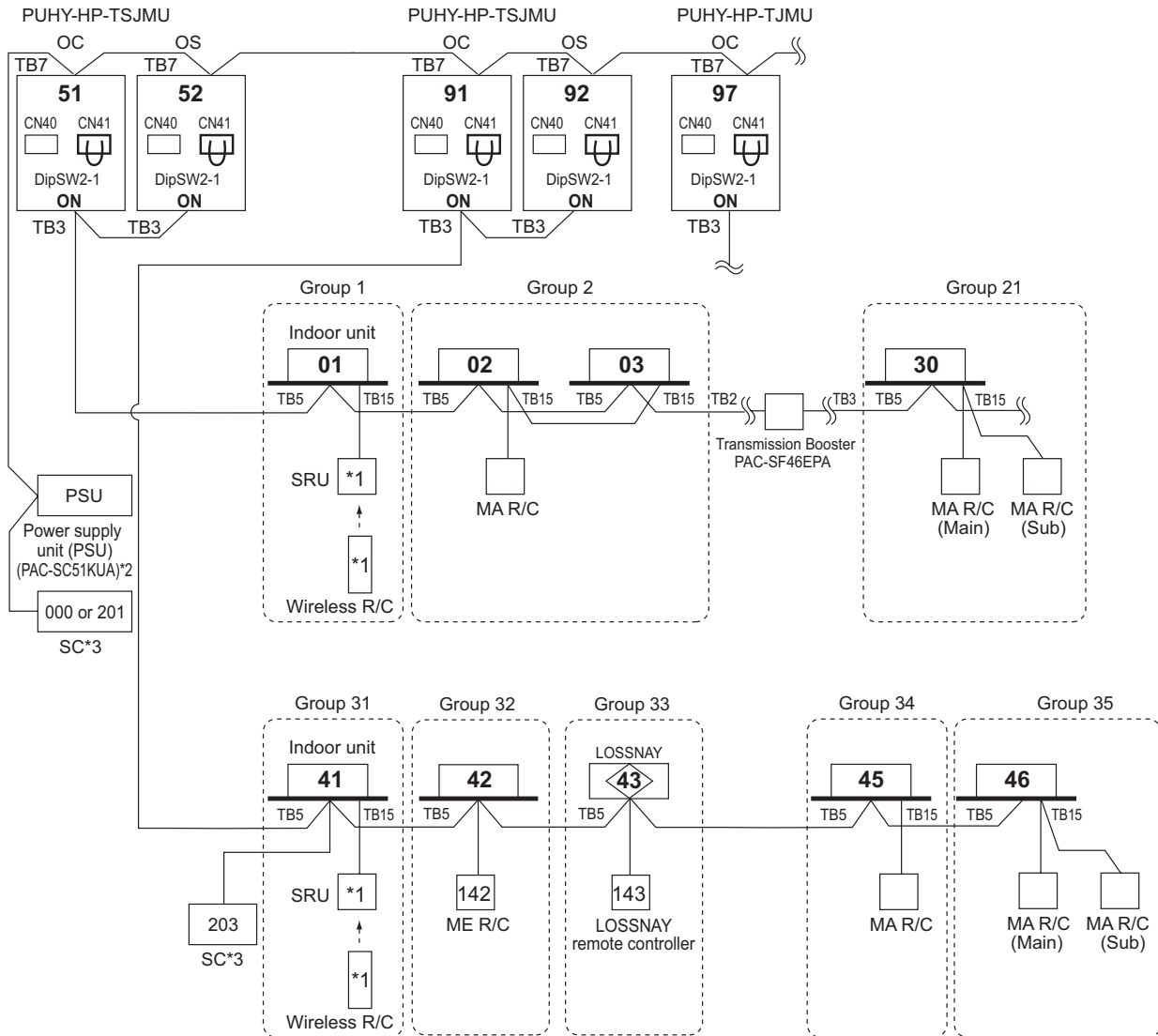
Should SC connected to TB7 side, change Jumper from CN41 to CN40 at the Outdoor unit module so as to supply power to the SC.

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units and central controller.
3. For a system having more than 16 indoor unit, confirm the need of Booster at 2-3 "System configuration restrictions".

2. M-NET CONTROL

2-4-3-3. MA remote controller, Multi-refrigerant-system, System Controller at TB7 side, Booster for long M-NET wiring



*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

*2 System controller should connect to TB7 at Outdoor and use power supply unit together in Multi-Refrigerant-System. For AG-150A, 24V DC should be used with the PAC-SC51KUA.

*3 When multiple system controllers are connected in the system, set the controller with more functions than others as a "main" controller and others as "sub".

TC-24A is for exclusive use as a "main" system controller and cannot be used as a "sub" system controller.

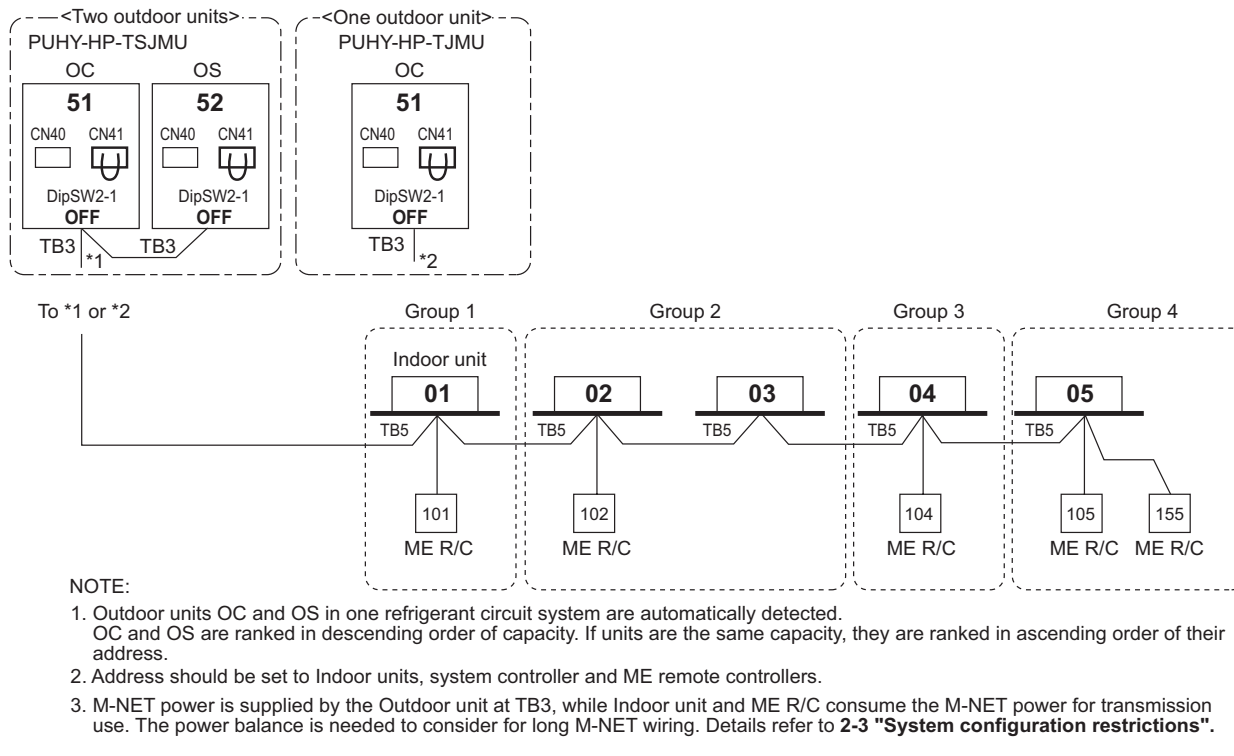
Make the setting to only one of the system controllers for "prohibition of operation from local remote controller".

NOTE:

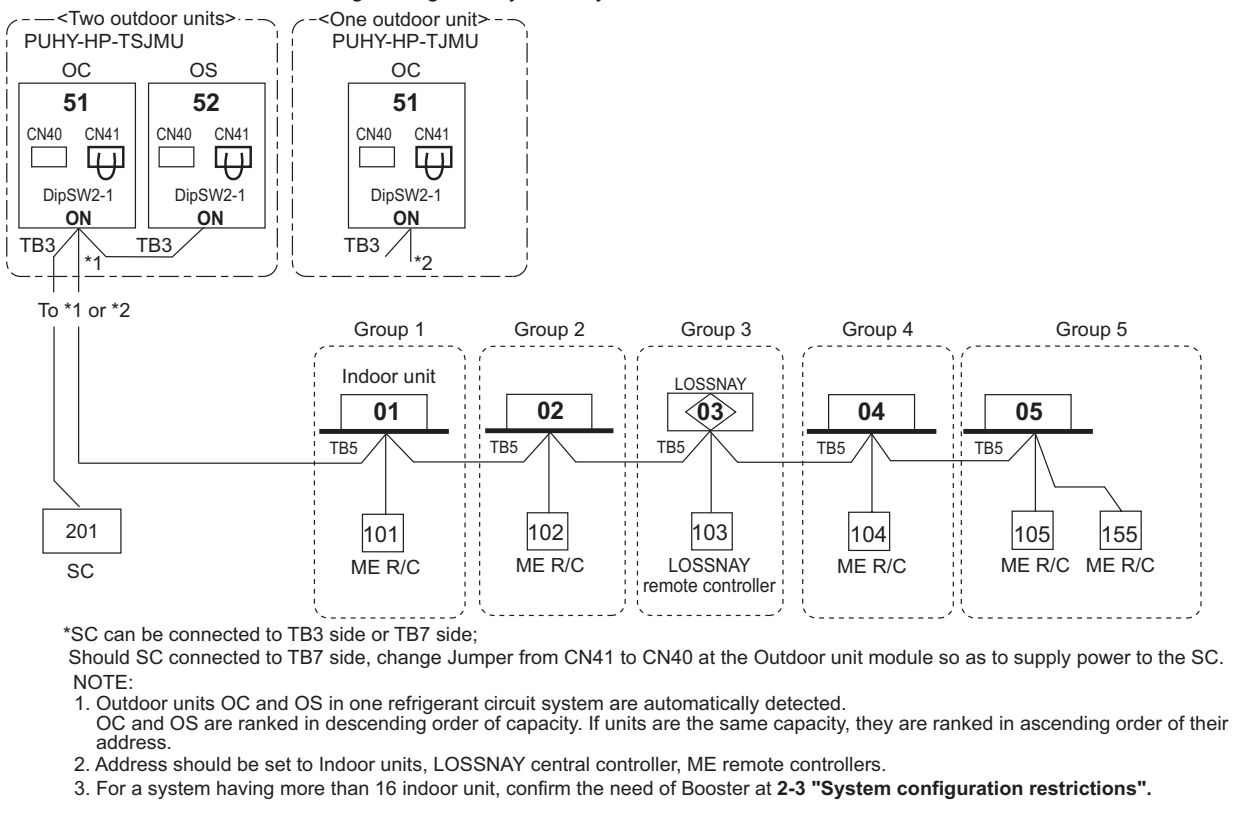
- Outdoor units OC and OS in one refrigerant circuit system are automatically detected. OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
- Address should be set to Indoor units, LOSSNAY and central controller.
- M-NET power is supplied by the Outdoor unit at TB3, while Indoor unit and ME remote controller consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to 2-3 "System configuration restrictions".

2. M-NET CONTROL

2-4-3-4. ME remote controller, Single-refrigerant-system, No system controller

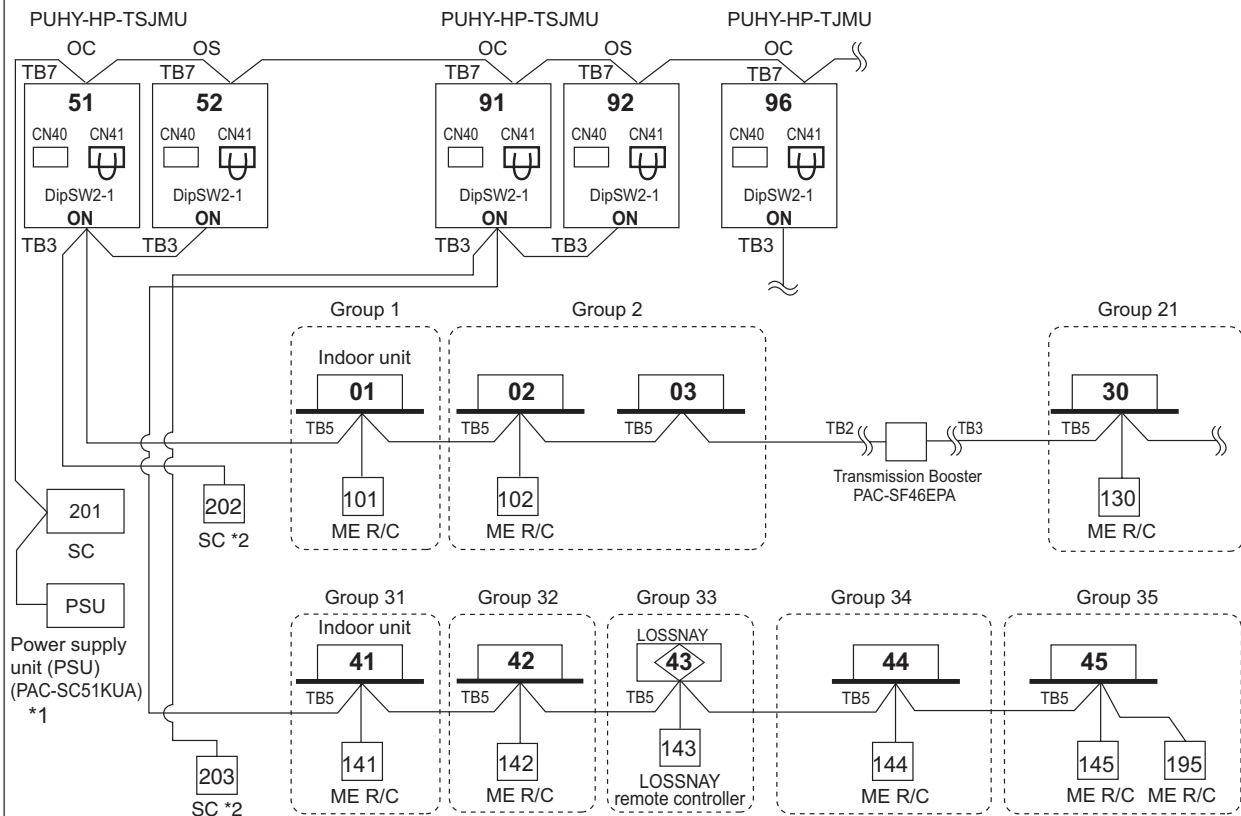


2-4-3-5. ME remote controller, Single-refrigerant-system, System controller, LOSSNAY



2. M-NET CONTROL

2-4-3-6. ME remote controller, Multi-refrigerant-system, System Controller at TB 7side, LOSSNAY, Booster for long M-NET wiring



*1 System controller should connect to TB7 at Outdoor and use power supply unit together in Multi-Refrigerant-System.

For AG-150A-A, 24V DC should be used with the PAC-SC51KUA.

*2 When multiple system controllers are connected in the system, set the controller with more functions than others as a "main" controller and others as "sub".

TC-24A, AG-150A-A, GB-50ADA-A and GB-24A are for exclusive use as a "main" system controller and cannot be used as a "sub" system controller.

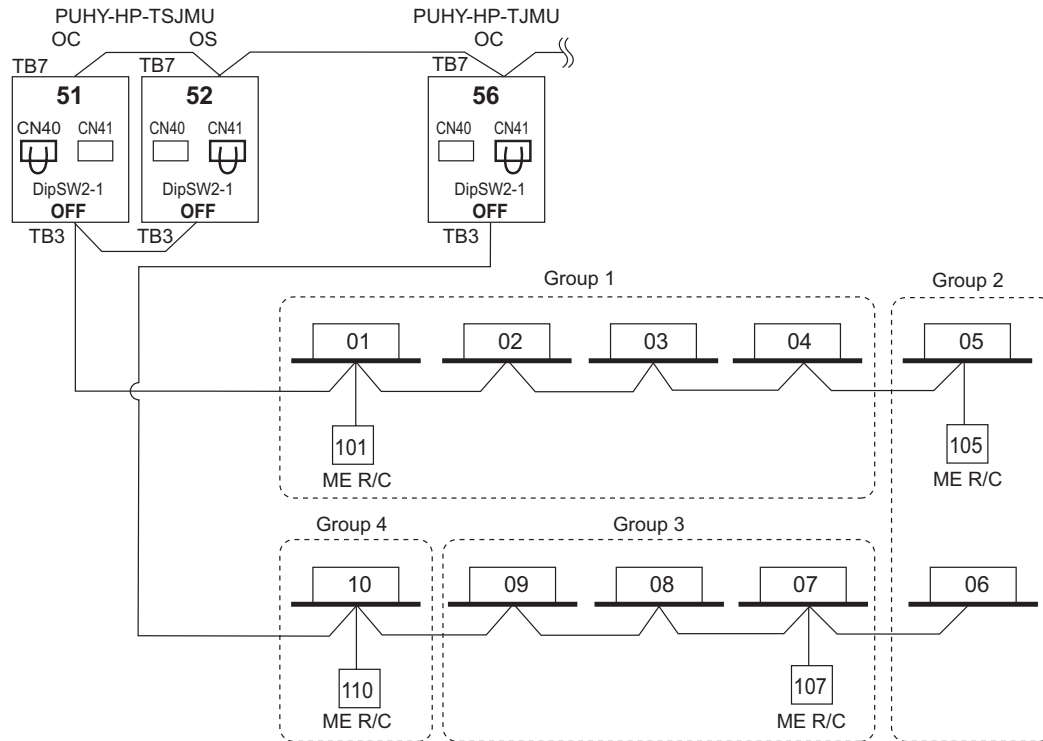
Make the setting to only one of the system controllers for "prohibition of operation from local remote controller".

NOTE:

- Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
- M-NET power is supplied by the Outdoor unit at TB3, while Indoor unit and ME remote controller consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to 2-3 "System configuration restrictions".

2. M-NET CONTROL

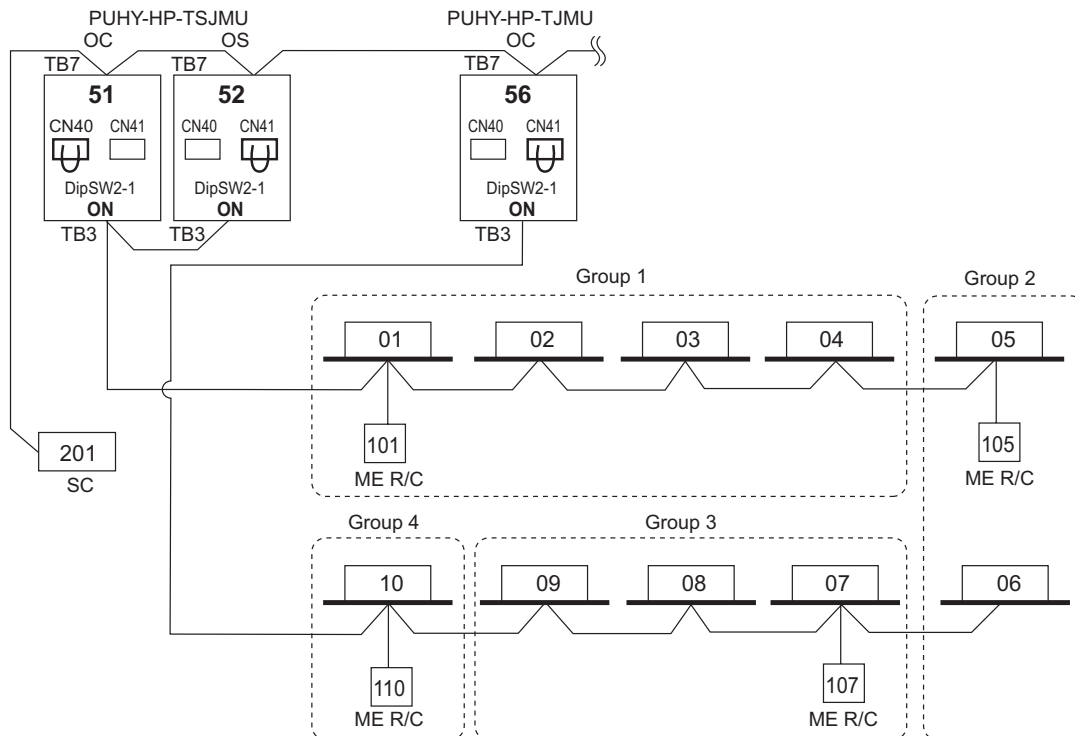
2-4-3-7. ME remote controller, Multi-refrigerant-system, No Power supply unit



NOTE

- It is necessary to change the connector to CN40 on the outdoor unit control board (only one outdoor unit) when the group is set between other refrigerant systems.
- It is necessary to set on the remote controller by manual when group sets on the different refrigerant system. Please refer to remote controller installation manual.

2-4-3-8. ME remote controller, Multi-refrigerant-system, System Controller at TB7 side, No Power supply unit



NOTE

- It is necessary to change the connector to CN40 on the outdoor unit control board (only one outdoor unit) when the group is set between other refrigerant systems.
- It is necessary to set on the remote controller by manual when group sets on the different refrigerant system. Please refer to remote controller installation manual.

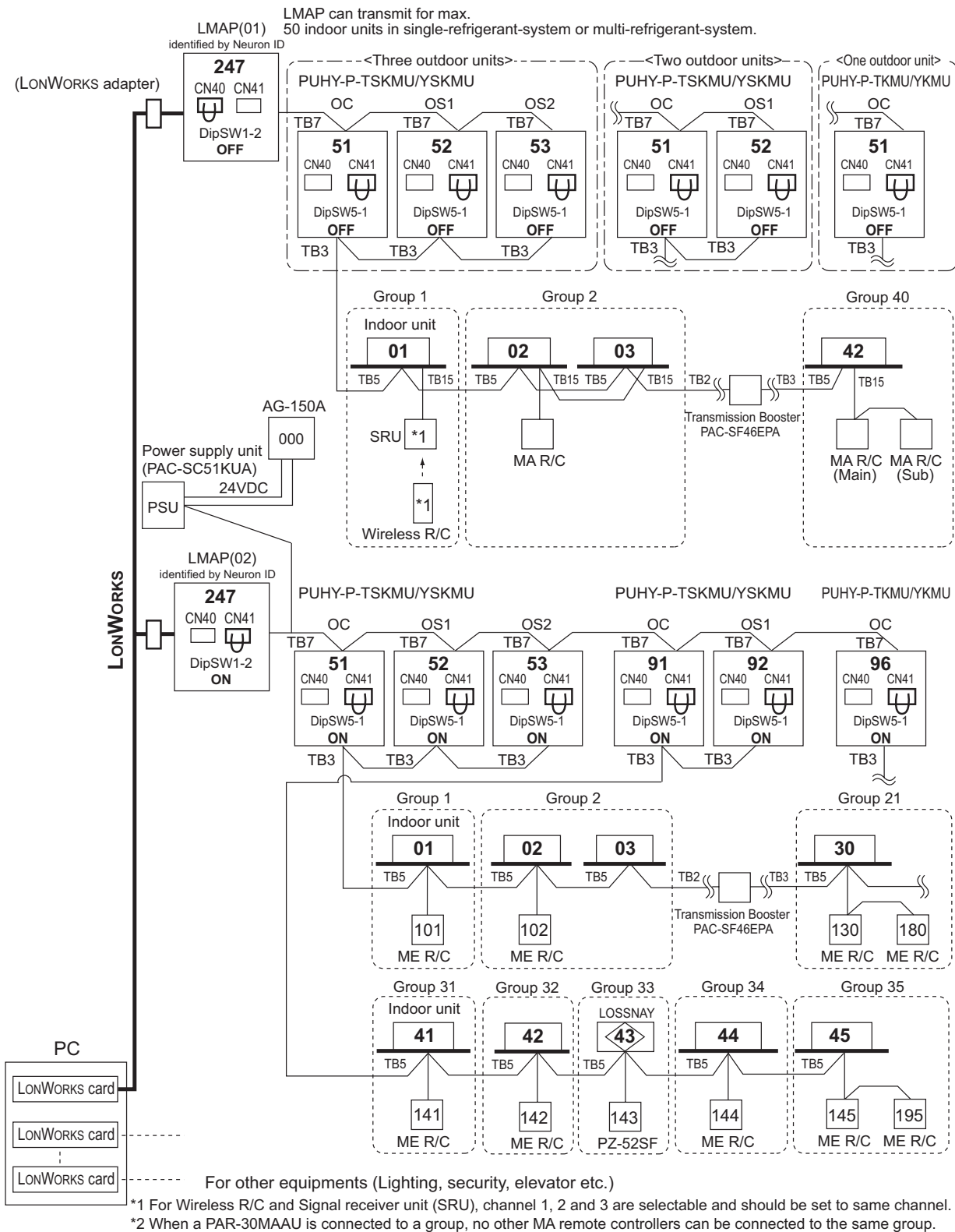
2. M-NET CONTROL

2-4-3-8. LMAP

LMAP can transmit max. 50 indoor units;

If system controller (SC) is used, DipSW1-2 at LMAP and DipSW5-1 at Outdoor unit should set to "ON".

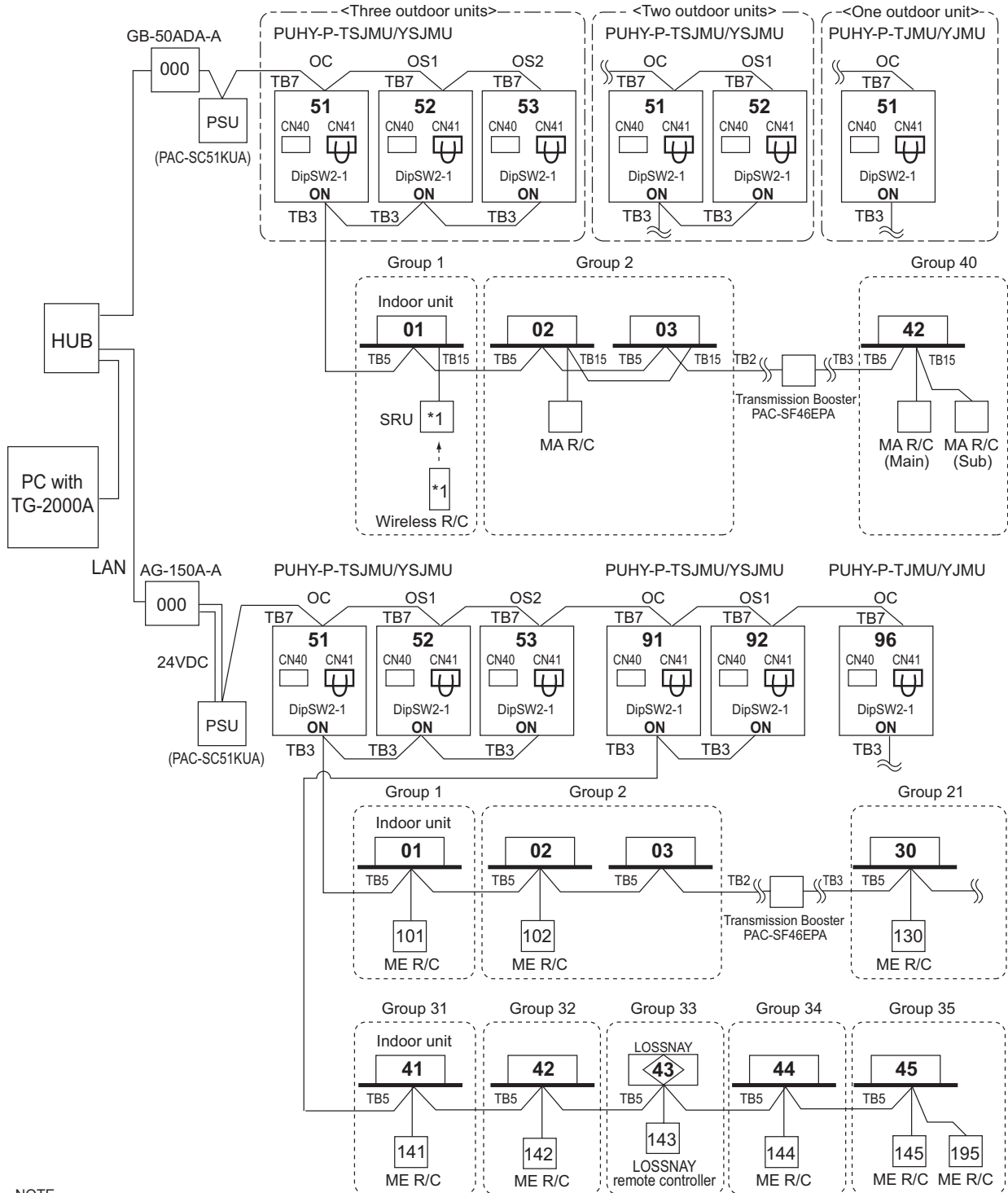
Change Jumper from CN41 to CN40 to activate power supply to LMAP itself for those LMAP connected without system controller (SC).



2. M-NET CONTROL

2-4-3-9. TG-2000A(*1)+AG-150A-A*2,EB-50GU-A

AG-150A-A can control max. 50 indoor units;
 GB-50ADA-A can control max. 50 indoor units;
 TG-2000A can control max. 40 of AG-150A-A and EB-50GU-A
 TG-2000A can control max. 2000 indoor units.



NOTE

- *1 TG-2000A (Ver.5.5 or later) supports AG-150A-A (Ver.1 series).
 TG-2000A (Ver. 6.4 or later) supports EB-50GU-A.
- *2 AG-150A-A (Ver.1 series) does not support the expansion controller (EC).

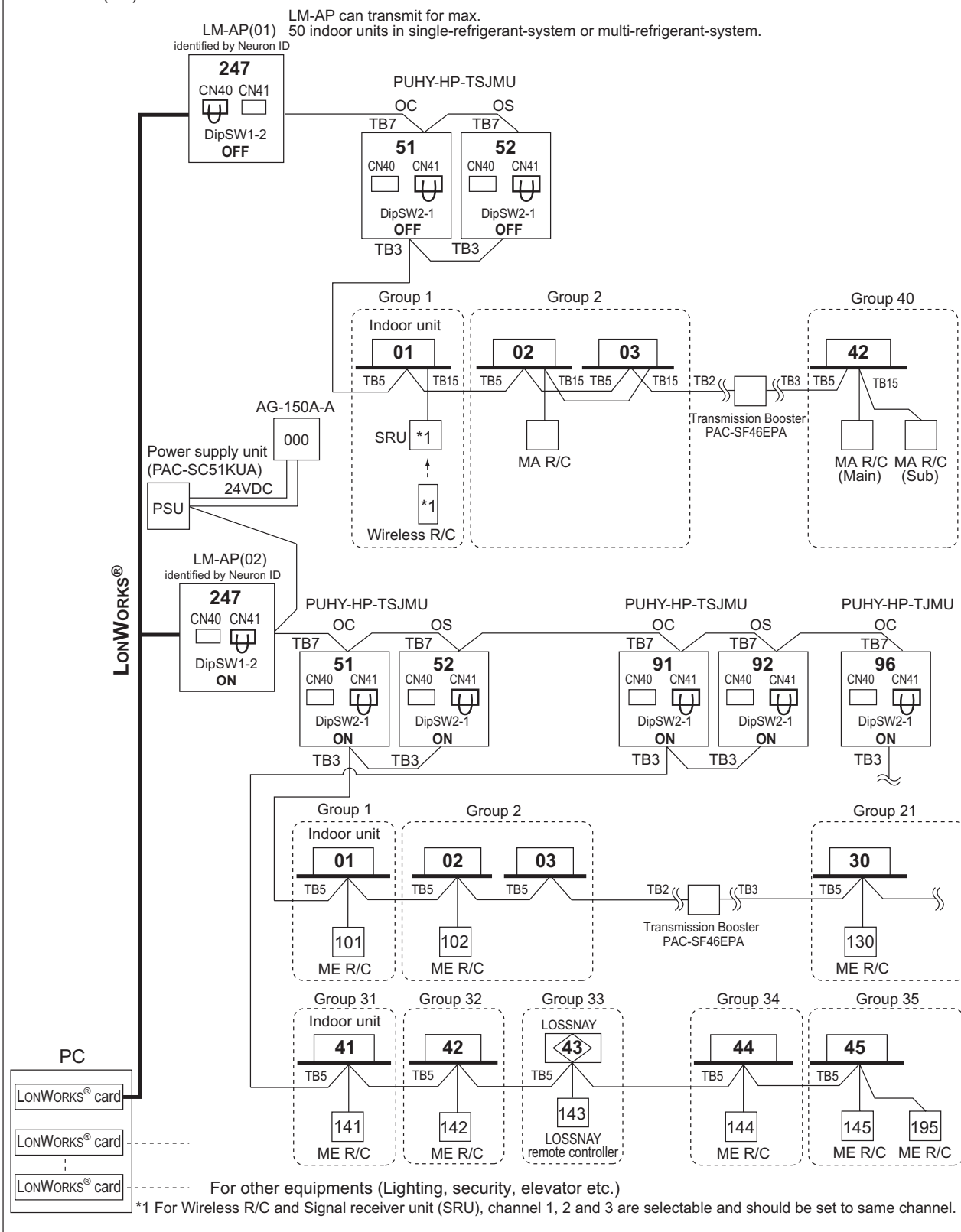
2. M-NET CONTROL

2-4-3-10. LM-AP

LM-AP can transmit max. 50 indoor units;

If system controller (SC) is used, DipSW1-2 at LM-AP and DipSW2-1 at Outdoor unit should set to "ON".

Change Jumper from CN41 to CN40 to activate power supply to LM-AP itself for those LM-AP connected without system controller (SC).

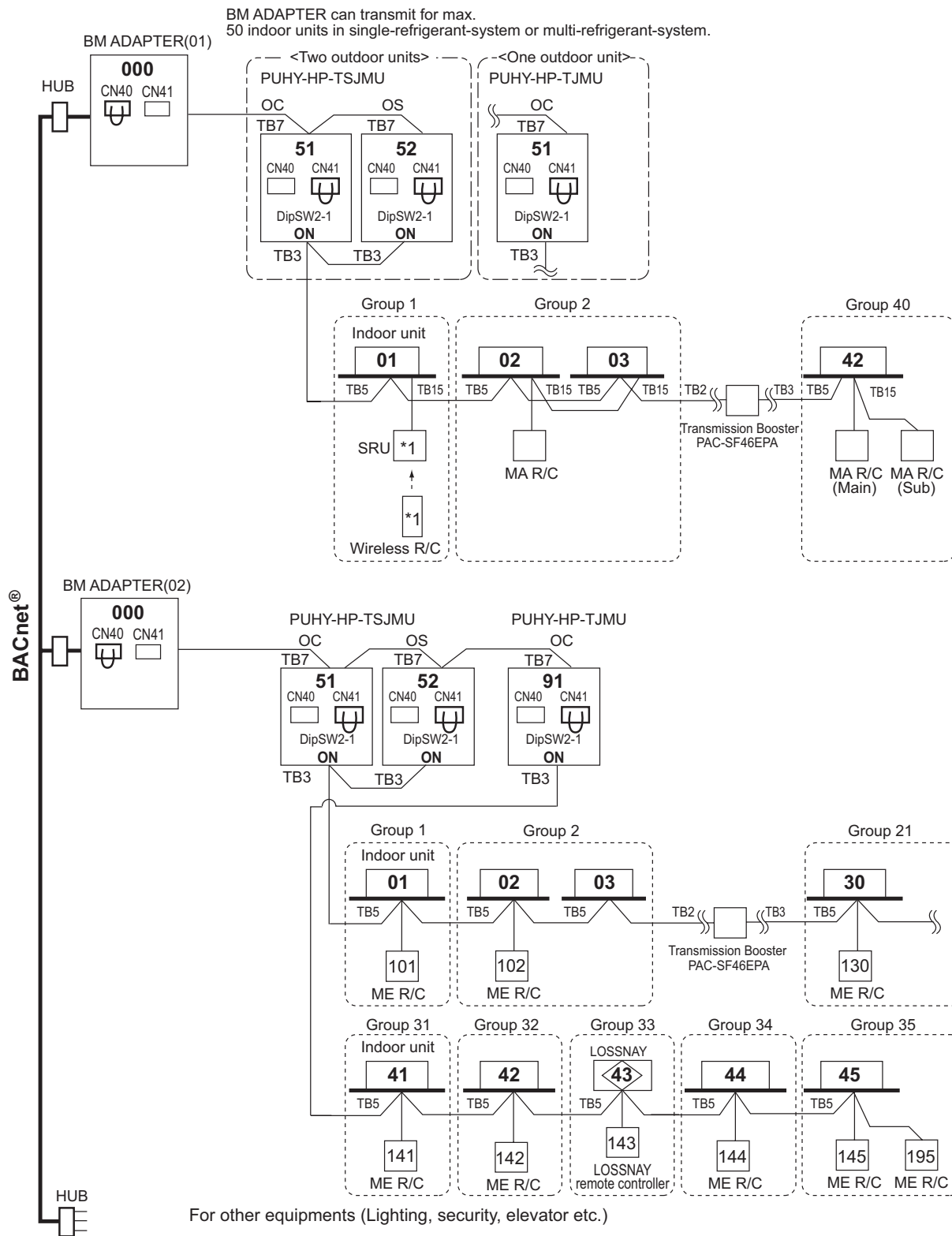


2. M-NET CONTROL

2-4-3-11. BM ADAPTER

BM ADAPTER can transmit max. 50 indoor units;

Change Jumper from CN41 to CN40 to activate power supply to BM ADAPTER itself for those BM ADAPTER connected without the power supply unit.



3. PIPING DESIGN

3-1. R410A Piping Material

The maximum operation pressure of R410A air conditioner is 4.30 MPa [623psi]. The refrigerant piping should ensure the safety under the maximum operation pressure. MITSUBISHI ELECTRIC recommends pipe size as Table 3-1, or You shall follow the local industrial standard. Pipes of radial thickness 0.7mm or less shall not be used.

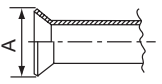
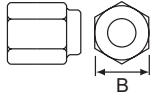
Table 3-1. Copper pipe size and radial thickness for R410A CITY MULTI.

Size (mm)	Size (inch)	Radial thickness (mm)	Radial thickness (mil)	Pipe type
ø6.35	ø1/4"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø9.52	ø3/8"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø12.7	ø1/2"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø15.88	ø5/8"	1.0	[40]	ACR-Annealed or ACR-Drawn Temper
ø19.05	ø3/4"	1.2	[48]	ACR-Annealed or ACR-Drawn Temper
ø22.2	ø7/8"	1.0	[40]	ACR-Drawn Temper
ø25.4	ø1"	1.0	[40]	ACR-Drawn Temper
ø28.58	ø1-1/8"	1.0	[40]	ACR-Drawn Temper
ø31.75	ø1-1/4"	1.1	[44]	ACR-Drawn Temper
ø34.93	ø1-3/8"	1.2	[48]	ACR-Drawn Temper
ø41.28	ø1-5/8"	1.4	[56]	ACR-Drawn Temper

* The figures in the radial thickness column are based on the Japanese standards and provided only as a reference. Use pipes that meet the local standards.

Flare

Due to the relative higher operation pressure of R410A compared to R22, the flare connection should follow dimensions mentioned below so as to achieve enough the air-tightness.

Flare pipe	Pipe size	A (For R410A) (mm[in.])	Flare nut	Pipe size	B (For R410A) (mm[in.])
	ø6.35 [1/4"]	9.1 [3/8"]		ø6.35 [1/4"]	17.0 [3/4"]
	ø9.52 [3/8"]	13.2 [9/16"]		ø9.52 [3/8"]	22.0 [7/8"]
	ø12.70 [1/2"]	16.6 [11/16"]		ø12.70 [1/2"]	26.0 [1-1/16"]
	ø15.88 [5/8"]	19.7 [13/16"]		ø15.88 [5/8"]	29.0 [1-1/8"]
	ø19.05 [3/4"]	24.0 [1"]		ø19.05 [3/4"]	36.0 [1-7/16"]

3. PIPING DESIGN

3-2. Piping Design

3-2-1. PUHY-HP-72, 96TJMU Piping

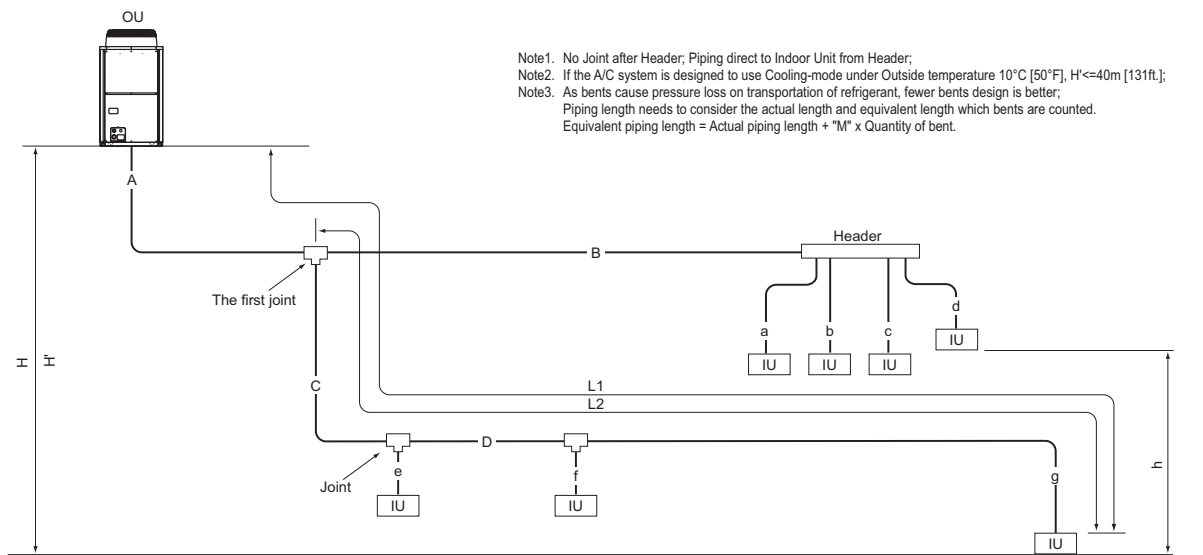


Fig. 3-2-1A Piping scheme

IU : Indoor unit , OU : Outdoor unit

Table3-2-1-1. Piping length

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+B+C+D+a+b+c+d+e+f+g	300 [984']	-
Farthest IU from OU (L1)	A+C+D+g / A+B+d	150 [492']	175 [574']
Farthest IU from first Joint (L2)	C+D+g / B+d	40 [131']	40 [131']
Height between OU and IU (OU above IU)	H	50 [164']	-
Height between OU and IU (OU under IU)	H'	40 [131']	-
Height between IU and IU	h	15 [49']	-

OU: Outdoor Unit, IU: Indoor Unit

Table3-2-1-2. Bent equivalent length "M"

Outdoor Model	M (m/bends [ft./bends])
PUHY-HP72TJMU	0.30 [0.99]
PUHY-HP96TJMU	0.35 [1.15]

Table3-2-1-3. Piping "A" size selection rule

	Pipe(Liquid)	Pipe(Gas)
Outdoor and the first Joint		
PUHY-HP72TJMU=CMY-Y102SS-G2	ø12.70 [1/2"]	ø19.05 [3/4"]
PUHY-HP96TJMU=CMY-Y102LS-G2	ø12.70 [1/2"]	ø22.20 [7/8"]

Table3-2-1-6. R410A Joint selection rule

Total down-stream Indoor capacity	Joint
~ P72	CMY-Y102SS-G2
P73 ~ P144	CMY-Y102LS-G2
P145 ~ P234	CMY-Y202S-G2
P235 ~	CMY-Y302S-G2

*Concerning detailed usage of Joint parts, refer to its Installation Manual.

Table3-2-1-4. Piping "B","C","D"size selection rule

	Pipe(Liquid)	Pipe(Gas)
Total down-stream Indoor capacity		
~ P54	ø9.52 [3/8"]	ø15.88 [5/8"]
P55 ~ P72	ø9.52 [3/8"]	ø19.05 [3/4"]
P73 ~ P108	ø9.52 [3/8"]	ø22.20 [7/8"]
P109 ~ P144	ø12.70 [1/2"]	ø28.58 [1-1/8"]
P145 ~ P234	ø15.88 [5/8"]	ø28.58 [1-1/8"]

Table3-2-1-7. R410A Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104C-G	CMY-Y108C-G	CMY-Y1010C-G
Total down-stream Indoor capacity	≤P72	≤P144	≤P234

* CMY-Y104C-G can directly connect PUHY-HP72TJMU, but can NOT directly connect PUHY-HP96TJMU or above;

* CMY-Y108C-G can directly connect PUHY-HP72-144T(S)JMU, but can NOT directly connect PUHY-HP192TSJMU

* CMY-Y1010C-G can directly connect PUHY-HP72-192T(S)JMU;

* CMY-Y104C-G can NOT connect P72, P96 Indoor, but CMY-Y108, Y1010C-G can do;

* Concerning detailed usage of Header parts, refer to its Installation Manual.

Table3-2-1-5. Piping "a","b","c","d","e","f","g"size selection rule

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P06,P08,P12,P15,P18	ø6.35 [1/4"]	ø12.70 [1/2"]
P24,P27,P30,P36,P48,P54	ø9.52 [3/8"]	ø15.88 [5/8"]
P72	ø9.52 [3/8"]	ø19.05 [3/4"]
P96	ø9.52 [3/8"]	ø22.20 [7/8"]

Note4. Indoor capacity is described as its model size;

For example, PEFY-P08NMAU-E, its capacity is P06;

Note5. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.

For example, PEFY-P06NMAU-E+PEFY-P08NMAU-E: Total Indoor capacity=P06+P08=P14

Note6. Piping sized determined by the Total down-stream indoor capacity is NOT necessary

to be bigger than the up-stream one.

i.e. A>=B, A>=C>=D

3. PIPING DESIGN

3-2-2. PUHY-HP144-192TSJMU Piping

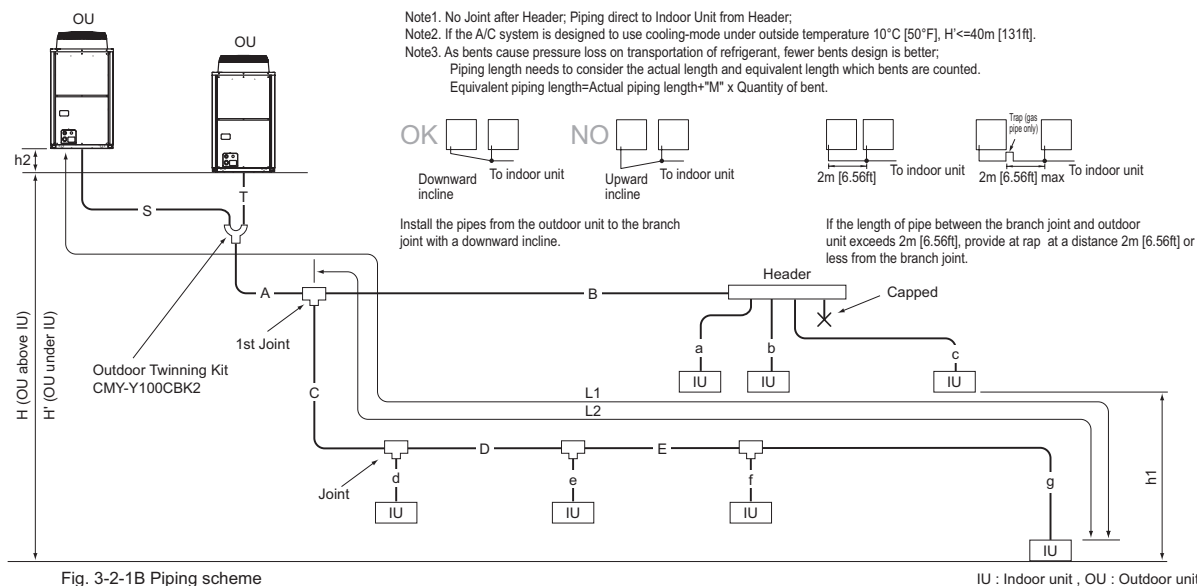


Table3-2-2-1. Piping length

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	S+T+A+B+C+D+E+a+b+c+d+e+f+g	300 [984']	-
Distance between OU and OU	S+T	10[32']	-
Height between OU and OU	h2	0.1[0.3']	-
Farthest IU from OU (L1)	S(T)+A+C+D+E+g / S(T)+A+B+c	150 [492']	175 [574']
Farthest IU from the first Joint (L2)	C+D+E+g / B+c	40 [131']	40 [131']
Height between OU and IU (OU above IU)	H	50 [164']	-
Height between OU and IU (OU under IU)	H'	40 [131']	-
Height between IU and IU	h1	15 [49']	-

OU: Outdoor Unit, IU: Indoor Unit

Table3-2-2-2. Bent equivalent length "M"

Outdoor Model	M (m/bends [ft./bends])
PUHY-HP144TSJMU	0.50 [1.64]
PUHY-HP192TSJMU	0.50 [1.64]

Table3-2-2-3. Piping "A" size selection rule

	mm [in.]
Outdoor and the first Joint	Pipe(Liquid) Pipe(Gas)
CMY-Y100CBK2=CMY-Y202S-G2	ø15.88[5/8"] ø28.58[1-1/8"]

For Piping size "S", "T", please refer to specification of the Twining kit CMY-Y100CBK2 at the Outdoor unit's external drawing.

Table3-2-2-4. R410A Joint selection rule

Total down-stream Indoor capacity	Joint
~ P72	CMY-Y102SS-G2
P73 ~ P144	CMY-Y102LS-G2
P145 ~ P234	CMY-Y202S-G2

*First Joint is always CMY-Y202S-G2;

*Concerning detailed usage of Joint parts, refer to its Installation Manual.

3. PIPING DESIGN

3-3. Refrigerant Charge Calculation

At the time of shipping, the outdoor unit is charged with the refrigerant. As this charge does not include the amount needed for extended piping, additional charging for each refrigerant line will be required on site. In order that future servicing may be properly provided, always keep a record of the size and length of each refrigerant line and the amount of additional charge by writing it in the space provided on the outdoor unit.

(1) Calculation of additional refrigerant charge

- Calculate the amount of additional charge based on the length of the piping extension and the size of the refrigerant line.
- Use the table to the below as a guide to calculating the amount of additional charging and charge the system accordingly.
- If the calculation results in a fraction of less than 0.1kg, round up to the next 0.1kg. For example, if the result of the calculation was 12.38kg, round the result up to 12.4kg.
- If the calculation results in a fraction of less than 1oz, round up to the next 1oz. For example, if the result of the calculation was 435.1oz, round the result up to 436oz.

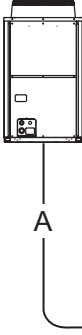
<Additional Charge>

Additional refrigerant charge	=	Total length of liquid pipe sized $\phi 19.05$ [3/4"]	+	Total length of liquid pipe sized $\phi 15.88$ [5/8"]	+	Total length of liquid pipe sized $\phi 12.7$ [1/2"]	+	Total length of liquid pipe sized $\phi 9.52$ [3/8"]	+	Total length of liquid pipe sized $\phi 6.35$ [1/4"]	+	α
(kg)		(m) x 0.29 (kg/m)		(m) x 0.20 (kg/m)		(m) x 0.12 (kg/m)		(m) x 0.06 (kg/m)		(m) x 0.024 (kg/m)		
(oz)		(ft.) x 3.1 [oz/ft.]		(ft.) x 2.15 [oz/ft.]		(ft.) x 1.29 [oz/ft.]		(ft.) x 0.65 [oz/ft.]		(ft.) x 0.26 [oz/ft.]		

Table3-2-3-1. Value of α

Total capacity of connecting indoor units		α
Models	~ 27	2.0 kg [71 oz]
Models	28 ~ 54	2.5 kg [89 oz]
Models	55 ~ 126	3.0 kg [106 oz]
Models	127 ~ 144	3.5 kg [124 oz]
Models	145 ~ 180	4.5 kg [159 oz]
Models	181 ~ 234	5.0 kg [177 oz]
Models	235 ~	6.0 kg [212 oz]

Example: PUHY-HP96TJMU



m [kg]						ft. [oz]					
Indoor	1: P48	A: $\phi 12.7$	40 m	a: $\phi 9.52$	10 m	Indoor	1: P48	A: $\phi 1/2"$	131ft.	a: $\phi 3/8"$	32ft.
	2: P36	B: $\phi 9.52$	10 m	b: $\phi 9.52$	5 m		2: P36	B: $\phi 3/8"$	32ft.	b: $\phi 3/8"$	16ft.
	3: P15	C: $\phi 9.52$	15 m	c: $\phi 6.35$	10 m		3: P15	C: $\phi 3/8"$	49ft.	c: $\phi 1/4"$	32ft.
	4: P12	D: $\phi 9.52$	10 m	d: $\phi 6.35$	10 m		4: P12	D: $\phi 3/8"$	32ft.	d: $\phi 1/4"$	32ft.
	5: P24			e: $\phi 9.52$	10 m		5: P24			e: $\phi 3/8"$	32ft.

The total length of liquid pipe of each size is as follows:
 $\phi 12.7$: A = 40 = 40 m
 $\phi 9.52$: B + C + D + a + b + e = 10 + 15 + 10 + 10 + 5 + 10 = 60 m
 $\phi 6.35$: c + d = 10 + 10 = 20 m

Total capacity of connecting Indoor units Pt :
Pt = P48 + P36 + P15 + P12 + P24 = P135, therefore $\alpha = 3.5$ kg

The total length of liquid pipe of each line is as follows:
 $\phi 1/2"$: A = 131 = 131ft.
 $\phi 3/8"$: B + C + D + a + b + e = 32 + 49 + 32 + 32 + 16 + 32 = 193ft.
 $\phi 1/4"$: c + d = 32 + 32 = 64ft.

Total capacity of connecting Indoor units Pt :
Pt = P48 + P36 + P15 + P12 + P24 = P135, therefore $\alpha = 124$ oz

m [kg]						ft. [oz]						
Additional refrigerant charge	=	Total length of liquid pipe sized $\phi 19.05$	+	Total length of liquid pipe sized $\phi 15.88$	+	Total length of liquid pipe sized $\phi 12.7$	+	Total length of liquid pipe sized $\phi 9.52$	+	Total length of liquid pipe sized $\phi 6.35$	+	3.5
(kg)		x 0.29 (kg/m)		x 0.20 (kg/m)		x 0.12 (kg/m)		x 0.06 (kg/m)		x 0.024 (kg/m)		
		0 (m) x 0.29 (kg/m)		0 (m) x 0.20 (kg/m)		40 (m) x 0.12 (kg/m)		60 (m) x 0.06 (kg/m)		20 (m) x 0.024 (kg/m)		
	=	0	+	0	+	40 x 0.12	+	60 x 0.06	+	20 x 0.024	+	3.5
	=	12.4 kg										

or

ft. [oz]												
Additional refrigerant charge	=	Total length of liquid pipe sized $\phi 3/4"$	+	Total length of liquid pipe sized $\phi 5/8"$	+	Total length of liquid pipe sized $\phi 1/2"$	+	Total length of liquid pipe sized $\phi 3/8"$	+	Total length of liquid pipe sized $\phi 1/4"$	+	124
(oz)		x 3.1 (oz/ft.)		x 2.15 (oz/ft.)		x 1.29 (oz/ft.)		x 0.65 (oz/ft.)		x 0.26 (oz/ft.)		
		0 (ft.) x 3.1 (oz/ft.)		0 (ft.) x 2.15 (oz/ft.)		131 (ft.) x 1.29 (oz/ft.)		193 (ft.) x 0.65 (oz/ft.)		64 (ft.) x 0.26 (oz/ft.)		
	=	0	+	0	+	131 x 1.29	+	193 x 0.65	+	64 x 0.26	+	124
	=	436 [oz]										

4. OUTDOOR INSTALLATION

4-1. Installation Site Requirements

1. No direct thermal radiation to the unit.
2. No possibility of annoying the neighbors by the sound of the unit.

Valves and refrigerant flow on the outdoor unit may generate noise.

3. Avoid the sites where strong winds blow.
4. With strength to bear the weight of the unit.
5. Drain flow from the unit is cared at heating mode.
6. Enough space for installation and service as shown at 4-2.
7. Avoid the sites where acidic solutions or chemical sprays (sulfur series) are used frequently.
8. The unit should be secure from combustible gas, oil, steam, chemical gas like acidic solution, sulfur gas and so on.

4. OUTDOOR INSTALLATION

4-2. Installation Clearance Space

In case of single installation

- Secure enough space around the unit as shown in the figure.

<A> : Top view

(A) : Front

(C) : Back

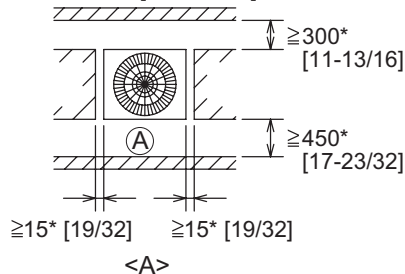
 : Side view

(B) : Unit height

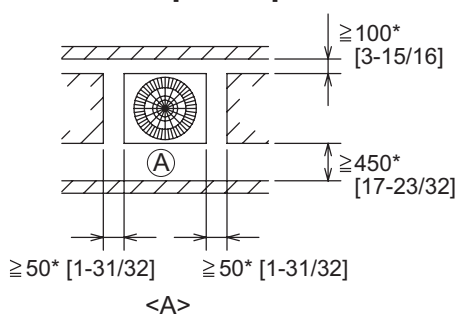
(D) : Air outlet guide (Procured at the site)

<C> : When there is little space up to an obstruction

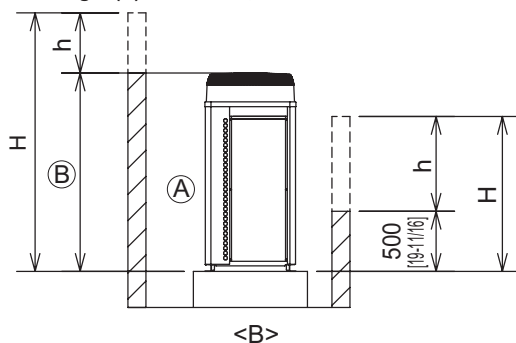
(1) If the distance is 300 mm [11-13/16 in.] or more between the rear side and the wall



(2) If the distance is 100 mm [3-15/16 in.] or more between the rear side and the wall



(3) If the wall height (H) of the front, rear or side exceeds the wall height restriction



- When the height of the walls on the front, back or on the sides <H> exceeds the wall height limit as defined below, add the height that exceeds the height limit <h> to the figures that are marked with an asterisk.

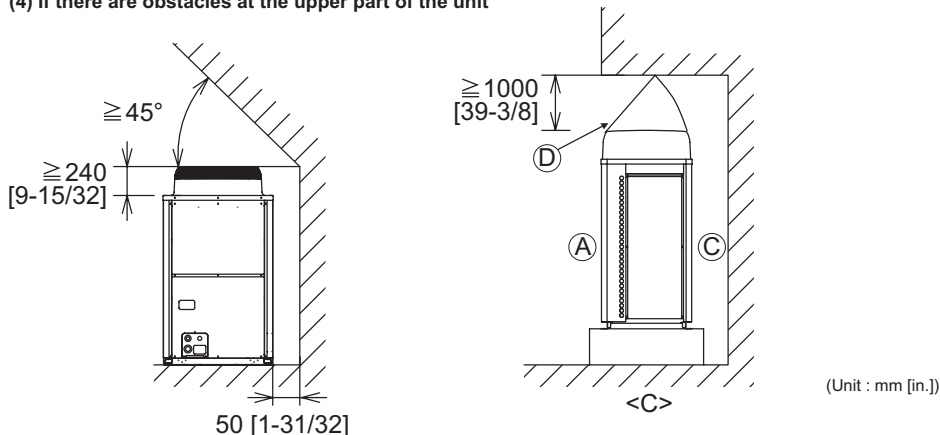
<Wall height limit> Front: Up to the unit height

Back: Up to 500mm [19-11/16 in.] from the unit bottom

Side: Up to the unit height

If the unit cannot be kept clear of the wall, please change the direction of the air outlet of the unit to blow against the wall to avoid air short cycle.

(4) If there are obstacles at the upper part of the unit



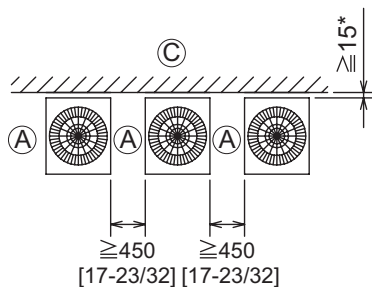
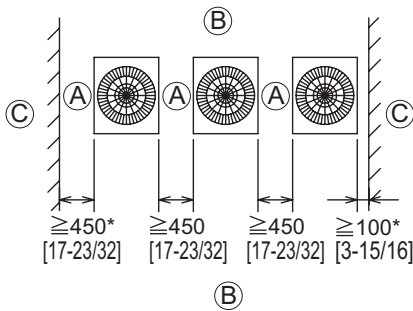
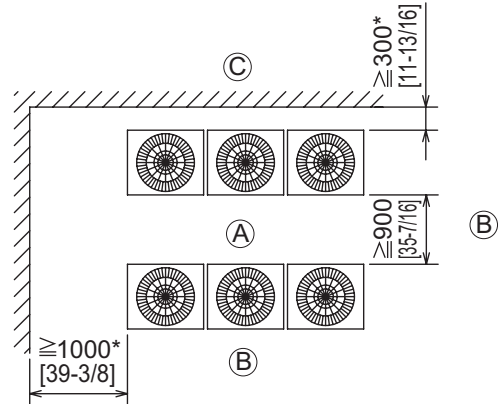
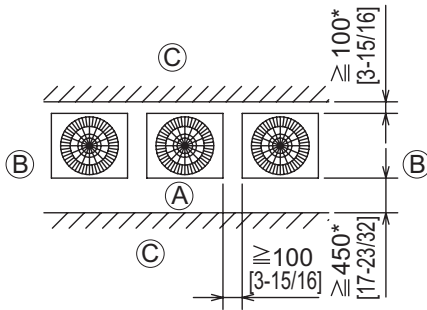
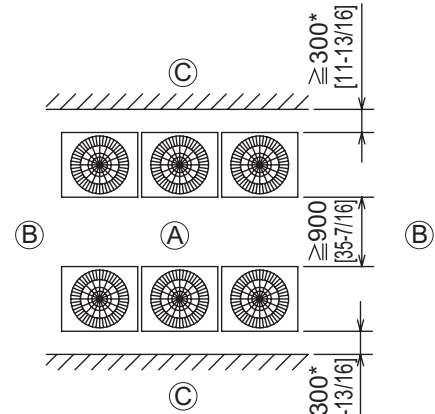
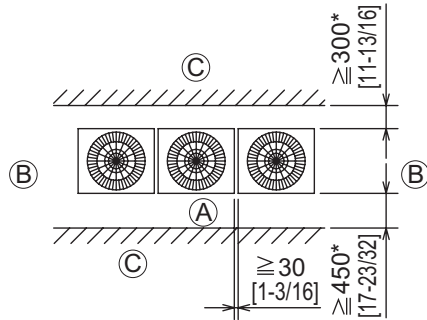
(Unit : mm [in.])

4. OUTDOOR INSTALLATION

In case of collective installation and continuous installation

- (A) : Front (C) : Wall height (H)
 (B) : Must be open

- When multiple units are installed adjacent to each other, secure enough space to allow for air circulation and passageways between groups of units as shown in the figures.
- At least two sides must be left open.
- As with the single installation, add the height that exceeds the height limit <h> to the figures that are marked with an asterisk.
- If there is a wall at both the front and the rear of the unit, install up to six units consecutively in the side direction and provide a space of 1000mm [33-3/8] or more as inlet space/passage space for each six units.



(Unit : mm [in.])

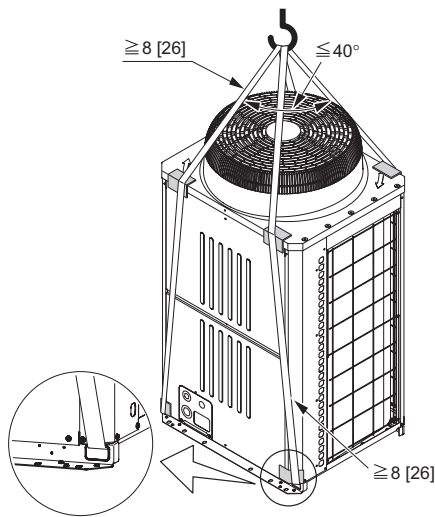
4. OUTDOOR INSTALLATION

4-3. Piping Direction

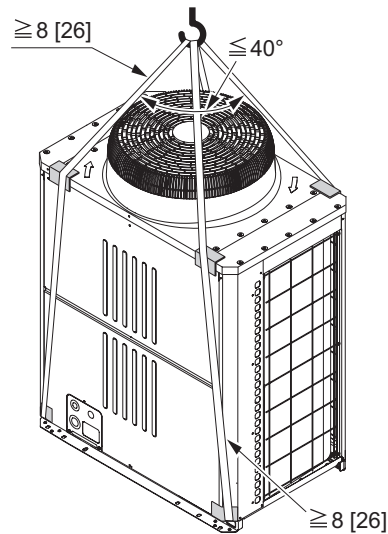
4-3-1. Lifting method

- When lifting the unit with ropes, run the ropes under the unit and use the lifting hole.
- Support the unit at four points with two ropes, and avoid giving mechanical shock.
- Suspension rope angle must be 40° or less, so as to avoid compressing fan guard.
- Use two ropes, each at least 8m [26 ft.] in length
- Use ropes strong enough to support the weight of the unit.
- Always suspend the unit from four corners. (It is dangerous to suspend a unit from two corners and must not be attempted.)
- Use protective pads to keep the ropes from scratching the panels on the unit.

① HP72



② HP96



CAUTION

Exercise caution when transporting products.

- Products weighing more than 20 kg [45 LBS] should not be carried alone.
- Do not carry the product by the PP bands.
- To avoid the risk of injury, do not touch the heat exchanger fins.
- Plastic bags may pose a risk of choking hazard to children. Tear plastic bags into pieces before disposing of them.
- When lifting and transporting outdoor units with ropes, run the ropes through lifting hole at the unit base. Securely fix the unit so that the ropes will not slide off, and always lift the unit at four points to prevent the unit from falling.

4. OUTDOOR INSTALLATION

4-3-2. Installation

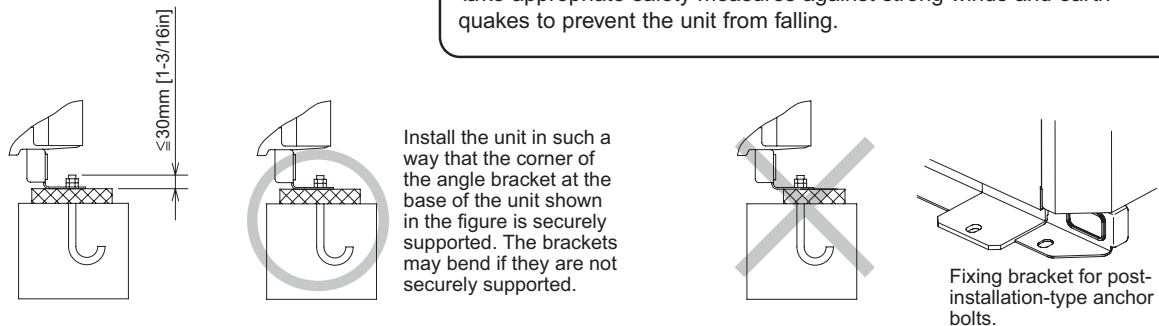
- Secure the unit with anchor bolts as shown in the figure below so that the unit will not topple over with strong wind or during an earthquake.
- Install the unit on a durable base made of such materials as concrete or angle steel.
- Take appropriate anti-vibration measures (e.g., vibration damper pad, vibration isolation base) to keep vibrations and noise from being transmitted from the unit through walls and floors.
- Install the unit in such a way that the corner of the angle bracket at the base of the unit shown in the figure below is securely supported.
- Install the anchor bolt in such a way that the top end of the anchor bolt do not stick out more than 30 mm [1-3/16in].
- This unit is not designed to be anchored with post-installation-type anchor bolts, although by adding fixing brackets anchoring with such type of anchor bolts becomes possible.

⚠ WARNING

Properly install the unit on a surface that can withstand the weight of the unit. Unit installed on an unstable surface may fall and cause injury.

⚠ WARNING

Take appropriate safety measures against strong winds and earthquakes to prevent the unit from falling.



Take into consideration the durability of the base, water drainage route (Drain water is discharged from outdoor units during operation.), piping route, and wiring route when performing foundation work.

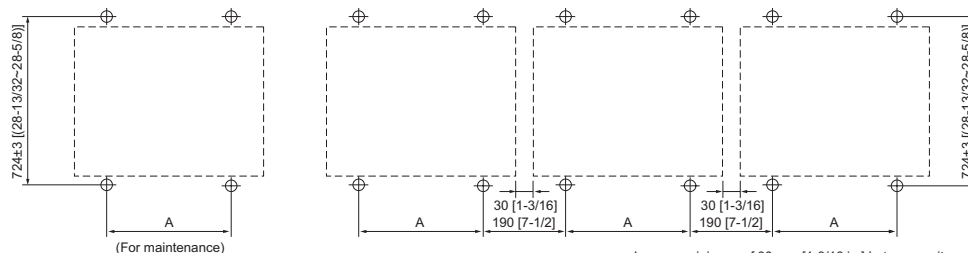
4-3-3. Anchor bolt positions

<HP72, 96>

• Individual installation

• Collective installation

(Unit : mm [in.])



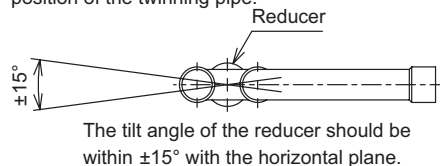
PUHY	HP72	HP96
A	760±2 [29-15/16(29-27/32~30)]	1060±2 [41-3/4(41-21/32~41-13/16)]

4. OUTDOOR INSTALLATION

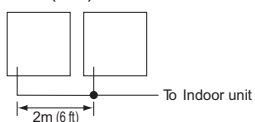
4-3-6. Twinning on the outdoor unit side

- The tilt angle of the twinning pipe
The tilt angle of the twinning pipe must be within $\pm 15^\circ$ with the horizontal plane.
Tilting the twinning pipe more than specified will cause damage to the unit.
- The length of the straight part of the pipe before the branching
For the twinning kit, always use the accessory piping parts.
The length of the straight part of pipe connected in front of the twinning pipe must be 500 mm (19 in) or longer.
(Connect the field piping so that the length of the straight part of pipe connected in front of the twinning pipe can be 500 mm (19 in) or longer.)
If the length is less than 500 mm (19 in), it will cause damage to the unit.
- The piping connection
When connecting the twinning kit to the outdoor unit, note the following:
If the length of piping from the twinning kit to the outdoor unit is more than 2 m (6 ft), install a trap within 2 m (6 ft) from the outdoor unit. The height of the trap must be 200 mm (7 in) or higher.

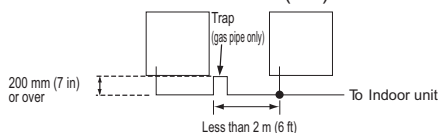
Note: See the following drawing for the fitting position of the twinning pipe.



<2 m (6 ft) or less>

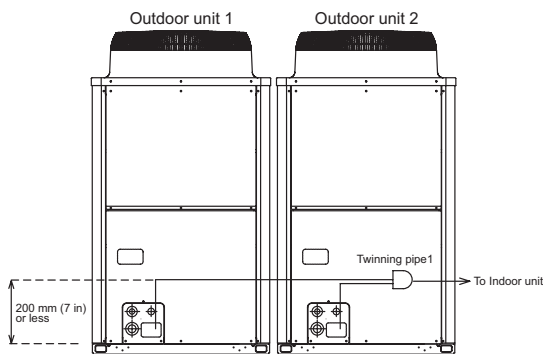


<More than 2 m (6 ft)>

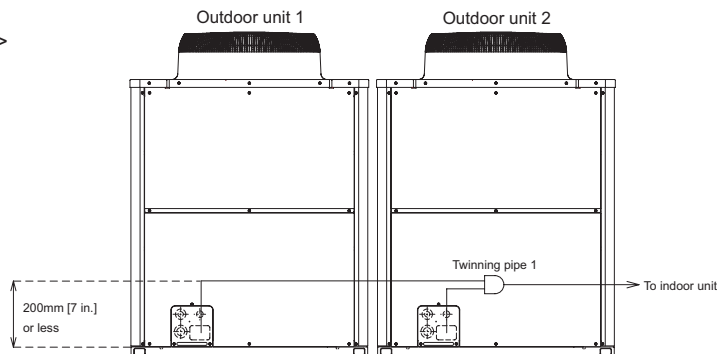


When installing the twinning kit in a higher position than the outdoor unit base, make sure that the twinning kit is installed in a position lower than 200 mm (7 in) from the outdoor unit base.

<PUHY-HP144TSJMU-A>



<PUHY-HP192TSJMU-A>

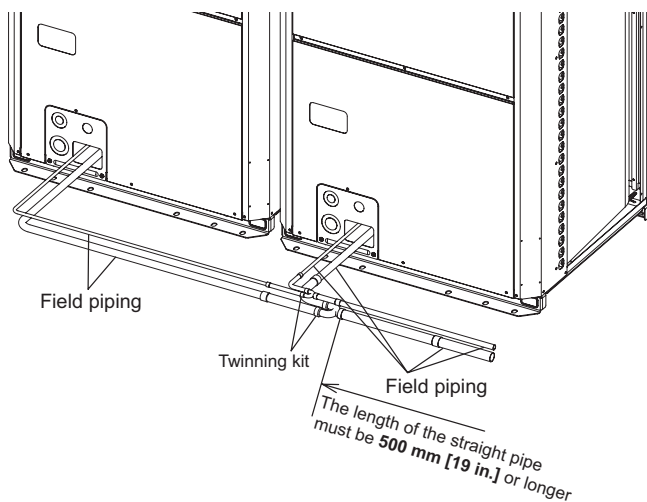


4. OUTDOOR INSTALLATION

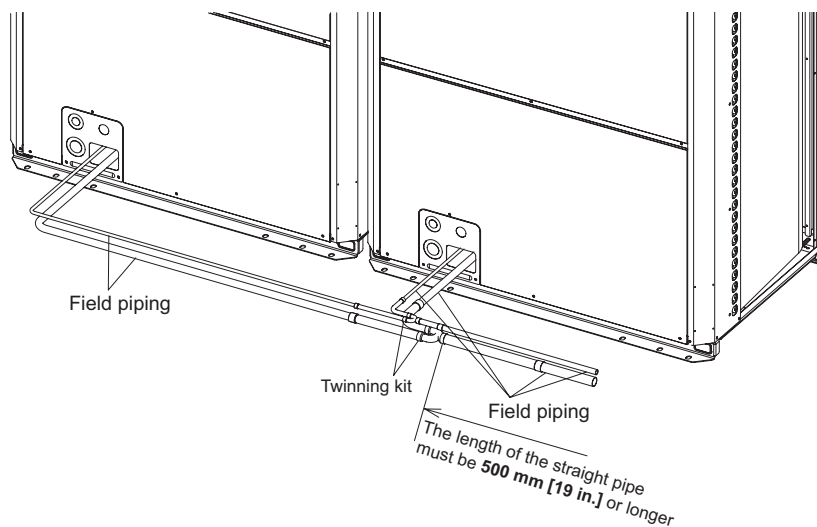
4-3-7. Twinning on the outdoor unit side

See the following drawing for connecting the pipes between the outdoor units.

<PUHY-HP144TSJMU-A>



<PUHY-HP192TSJMU-A>



CAUTION

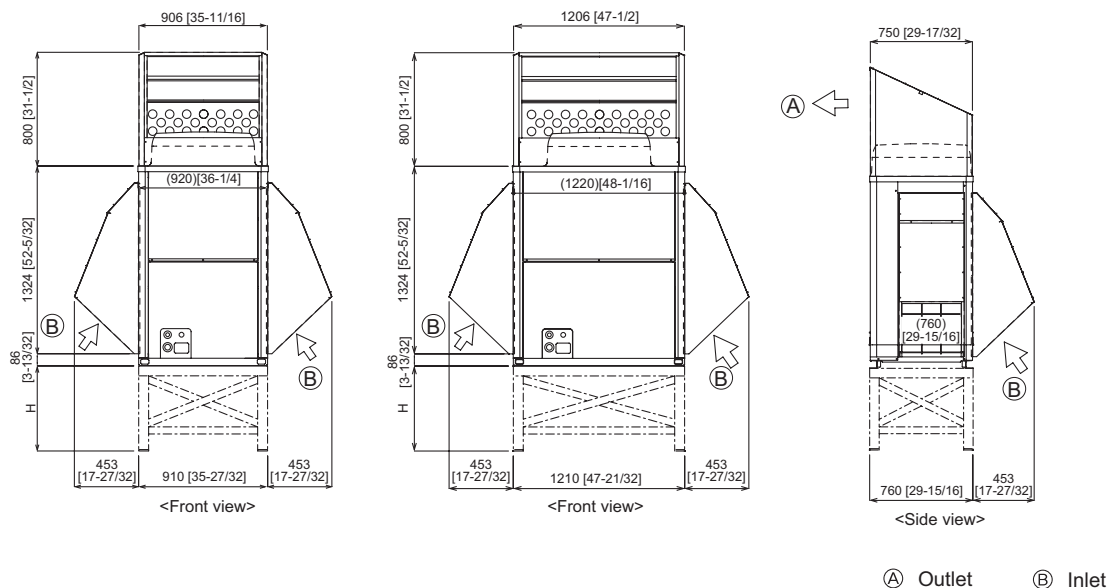
The length of the straight pipe must be 500mm[19in.] or longer.
If not, it may cause improper operation.

4. OUTDOOR INSTALLATION

4-4. Weather Countermeasures

- Snow hood

Unit : mm[in]

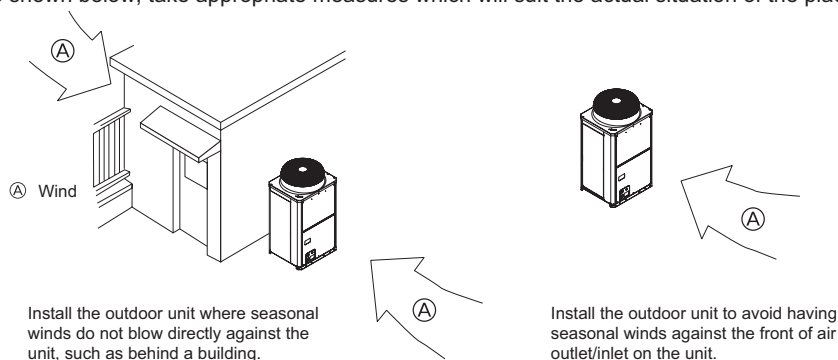


Note:

- Height of frame base for snow damage prevention (H) shall be twice as high as expected snowfall. Width of frame base shall not exceed that of the unit. The frame base shall be made of angle steel, etc., and designed so that snow and wind slip through the structure. (If frame base is too wide, snow will be accumulated on it.)
- Install unit so that wind will not directly lash against openings of inlet and outlet ducts.
- Build frame base at customer referring to this figure.
Material: Galvanized steel plate 1.2T [1/16 in T]
Painting: Overall painting with polyester powder
Color: Munsell 5Y8/1 (same as that of unit)
- When the unit is used in a cold region and the heating operation is continuously performed for a long time when the outside air temperature is below freezing, install a heater to the unit base or take other appropriate measures to prevent water from freezing on the base.
- Do not use a snow hood made of stainless steel, which may cause the unit to rust. If the use of a stainless snow hood is the only option, contact the sales office before installing it.

Countermeasure to wind

Referring to the figure shown below, take appropriate measures which will suit the actual situation of the place for installation.



4. OUTDOOR INSTALLATION

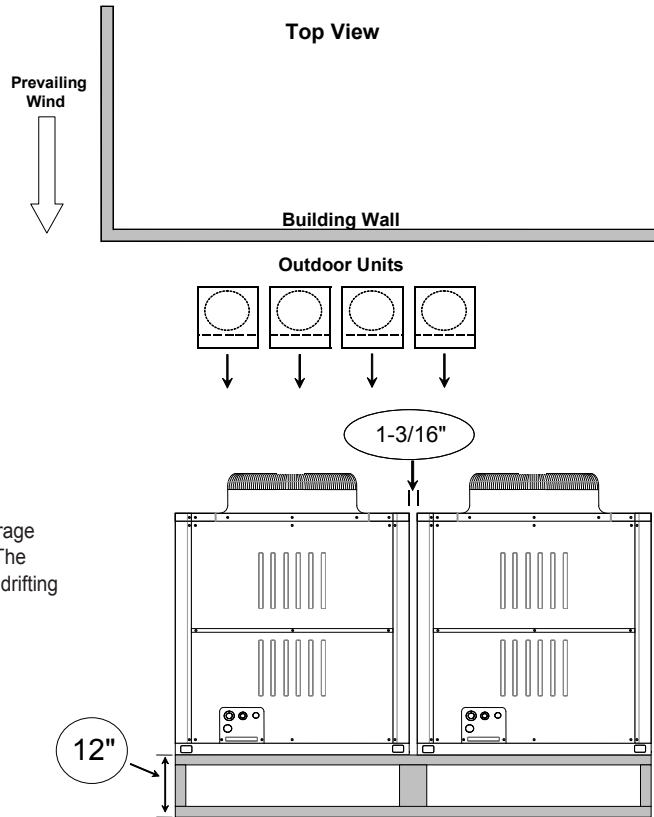
4-5. Low Ambient Kit Application Guidelines

General Unit Placement and Clearances

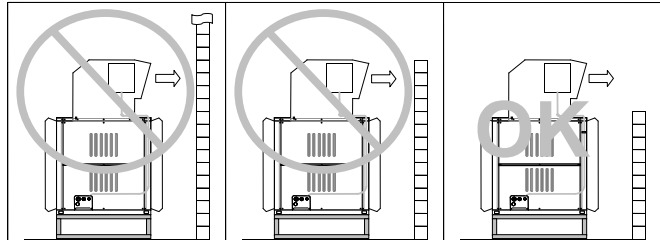
- Outdoor units should be located in an area protected from prevailing winds.
- In high wind locations, it may be advisable to install the outdoor units within a walled area.
- Hood discharge should be directed away from or perpendicular to the prevailing winds. Do not direct the hood discharge towards prevailing winds.
- When using the low ambient components, add an additional 7" to the standard mounting clearances.

Note:

Equipment supports must elevate the unit at least 12" above the average expected snow depth or 12" above the ground, whichever is higher. The equipment supports must be an open construction to minimize snow drifting and/or ice formation during defrost.



If the units are surrounded by an enclosure, the hood must be positioned that the air is directed out and over the walls to prevent air recirculation.



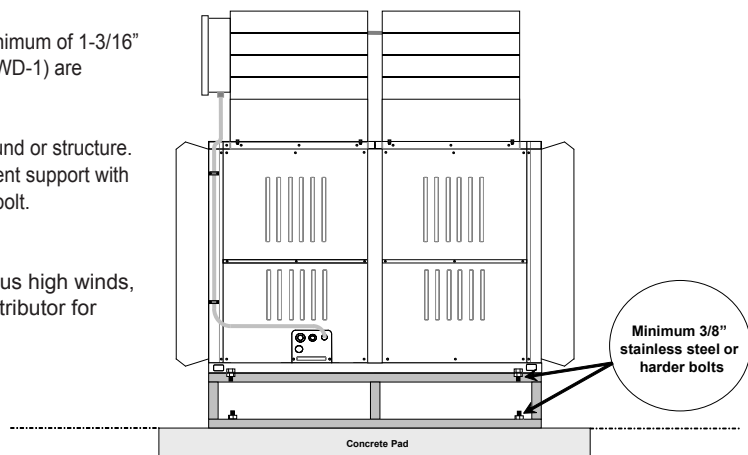
Equipment Supports

When modules are combined, they should be placed a minimum of 1-3/16" apart. By doing so, only one set of side wind deflectors (SWD-1) are required per group of modules.

The equipment support must be firmly attached to the ground or structure. The outdoor unit must be properly attached to the equipment support with 3/8" stainless steel or equal strength to at least a grade 5 bolt.

Note:

If the outdoor unit is located in an area with continuous high winds, additional braced may be required. Contact your distributor for assistance.



4. OUTDOOR INSTALLATION

Additional Rooftop Mounting Guidelines

Ground-level installation is preferred for outdoor units that include a low ambient kit. If ground-level installation is not possible, follow general, as well as all additional installation guidelines for rooftop mounting. If you have any questions, please contact your distributor.

Note:

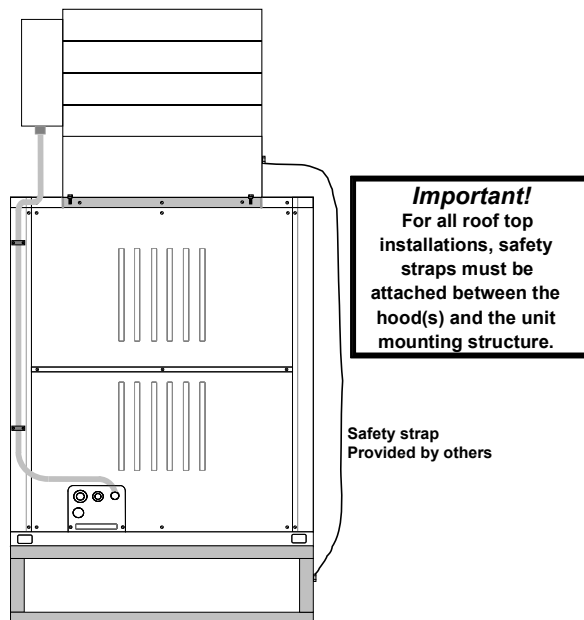
Low ambient hood(s) increase the overall height of the outdoor units and make them more susceptible to wind stresses. Follow all guidelines when using these for rooftop applications.

- Straps must be attached to the hood where they will not interfere with the movement of the dampers.

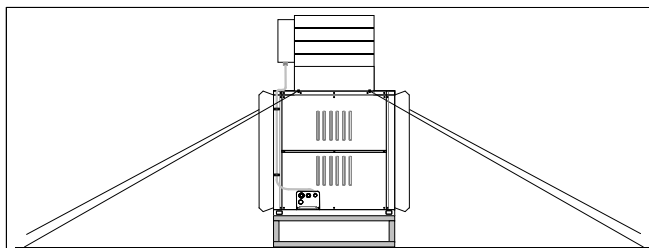
Note:

For all rooftop installation, safety straps must be attached between the hood(s) and the equipment support structure. Straps should be 3/16" (or larger) vinyl-coated cables.

- Straps must be connected to both the hood and mounting structure through using 1/4" diameter (or larger) bolt.
- The outdoor unit and equipment support should be firmly attached to the structure. If the equipment support does not attach to the structure, refer to the support manufacturer's guidelines for proper size and construction.



Depending on location, exposure and other factors influencing wind access or blockage, additional support may be required such as shown at right. Contact your distributor for assistance.



5. INSTALLATION INFORMATION

5-1. General precautions

5-1-1. Usage

- The air-conditioning system described in this Data Book is designed for human comfort.
- This product is not designed for preservation of food, animals, plants, precision equipment, or art objects. To prevent quality loss, do not use the product for purposes other than what it is designed for.
- To reduce the risk of water leakage and electric shock, do not use the product for air-conditioning vehicles or vessels.

5-1-2. Installation environment

- Do not install any unit other than the dedicated unit in a place where the voltage changes a lot, large amounts of mineral oil (e.g., cutting oil) are present, cooking oil may splash, or a large quantity of steam can be generated such as a kitchen.
- Do not install the unit in acidic or alkaline environment.
- Installation should not be performed in the locations exposed to chlorine or other corrosive gases. Avoid near a sewer.
- To reduce the risk of fire, do not install the unit in a place where flammable gas may be leaked or inflammable material is present.
- This air conditioning unit has a built-in microcomputer. Take the noise effects into consideration when deciding the installation position. Especially in a place where antenna or electronic device are installed, it is recommended that the air conditioning unit be installed away from them.
- Install the unit on a solid foundation according to the local safety measures against typhoons, wind gusts, and earthquakes to prevent the unit from being damaged, toppling over, and falling.

5-1-3. Backup system

- In a place where air conditioner's malfunctions may exert crucial influence, it is recommended to have two or more systems of single outdoor units with multiple indoor units.

5-1-4. Unit characteristics

- Heat pump efficiency depends on outdoor temperature. In the heating mode, performance drops as the outside air temperature drops. In cold climates, performance can be poor. Warm air would continue to be trapped near the ceiling and the floor level would continue to stay cold. In this case, heat pumps require a supplemental heating system or air circulator. Before purchasing them, consult your local distributor for selecting the unit and system.
- When the outdoor temperature is low and the humidity is high, the heat exchanger on the outdoor unit side tends to collect frost, which reduces its heating performance. To remove the frost, Auto-defrost function will be activated and the heating mode will temporarily stop for 3-10 minutes. Heating mode will automatically resume upon completion of defrost process.
- Air conditioner with a heat pump requires time to warm up the whole room after the heating operation begins, because the system circulates warm air in order to warm up the whole room.
- The sound levels were obtained in an anechoic room. The sound levels during actual operation are usually higher than the simulated values due to ambient noise and echoes. Refer to the section on "SOUND LEVELS" for the measurement location.
- The total capacity of the connected indoor units can be greater than the capacity of the outdoor unit. However, when the connected indoor units operate simultaneously, each unit's capacity may become smaller than the rated capacity.
- When the unit is started up for the first time within 12 hours after power on or after power failure, it performs initial startup operation (capacity control operation) to prevent damage to the compressor. The initial startup operation requires 90 minutes maximum to complete, depending on the operation load.

5-1-5. Relevant equipment

- Use an earth leakage breaker (ELB) with medium sensitivity, and an activation speed of 0.1 second or less.
- Consult your local distributor or a qualified technician when installing an earth leakage breaker.
- If the unit is inverter type, select an earth leakage breaker for handling high harmonic waves and surges.
- Leakage current is generated not only through the air conditioning unit but also through the power wires. Therefore, the leakage current of the main power supply is greater than the total leakage current of each unit. Take into consideration the capacity of the earth leakage breaker or leakage alarm when installing one at the main power supply. To measure the leakage current simply on site, use a measurement tool equipped with a filter, and clamp all the four power wires together. The leakage current measured on the ground wire may not accurate because the leakage current from other systems may be included to the measurement value.
- Do not install a phase advancing capacitor on the unit connected to the same power system with an inverter type unit and its equipment.
- If a large current flows due to the product malfunctions or faulty wiring, both the earth leakage breaker on the product side and the upstream overcurrent breaker may trip almost at the same time. Separate the power system or coordinate all the breakers depending on the system's priority level.

5. INSTALLATION INFORMATION

5-1-6. Unit installation

- ♦Your local distributor or a qualified technician must read the Installation Manual that is provided with each unit carefully before performing installation work.
- ♦Consult your local distributor or a qualified technician when installing the unit. Improper installation by an unqualified person may result in water leakage, electric shock, or fire.
- ♦Ensure there is enough space around each unit.

5-1-7. Optional accessories

- ♦Only use accessories recommended by Mitsubishi Electric. Consult your local distributor or a qualified technician when installing them. Improper installation by an unqualified person may result in water leakage, electric leakage, system breakdown, or fire.
- ♦Some optional accessories may not be compatible with the air conditioning unit to be used or may not be suitable for the installation conditions. Check the compatibility when considering any accessories.
- ♦Note that some optional accessories may affect the air conditioner's external form, appearance, weight, operating sound, and other characteristics.

5-1-8. Operation/Maintenance

- ♦Read the Instruction Book that is provided with each unit carefully prior to use.
- ♦Maintenance or cleaning of each unit may be risky and require expertise. Read the Instruction Book to ensure safety. Consult your local distributor or a qualified technician when special expertise is required such as when the indoor unit needs to be cleaned.

5-2. Precautions for Indoor unit

5-2-1. Operating environment

- ♦The refrigerant (R410A) used for air conditioner is non-toxic and nonflammable. However, if the refrigerant leaks, the oxygen level may drop to harmful levels. If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit even if the refrigerant should leak.
- ♦If the units operate in the cooling mode at the humidity above 80%, condensation may collect and drip from the indoor units.

5-2-2. Unit characteristics

- ♦The return air temperature display on the remote controller may differ from the ones on the other thermometers.
- ♦The clock on the remote controller may be displayed with a time lag of approximately one minute every month.
- ♦The temperature using a built-in temperature sensor on the remote controller may differ from the actual room temperature due to the effect of the wall temperature.
- ♦Use a built-in thermostat on the remote controller or a separately-sold thermostat when indoor units installed on or in the ceiling operate the automatic cooling/heating switchover.
- ♦The room temperature may rise drastically due to Thermo OFF in the places where the air conditioning load is large such as computer rooms.
- ♦Be sure to use a regular filter. If an irregular filter is installed, the unit may not operate properly, and the operation noise may increase.
- ♦The room temperature may rise over the preset temperature in the environment where the heating air conditioning load is small.

5-2-3. Unit installation

- ♦For simultaneous cooling/heating operation type air conditioners (R2, WR2 series), the G-type BC controller cannot be connected to the P144 outdoor unit model or above, and the G- and GA-type BC controllers cannot be connected to the P264 model or above. The GB- and HB-type BC controllers (sub) cannot be connected to the outdoor unit directly, and be sure to use them with GA- and HA-type BC controllers (main).
- ♦The insulation for low pressure pipe between the BC controller and outdoor unit shall be at least 20 mm thick. If the unit is installed on the top floor or in a high-temperature, high-humidity environment, thicker insulation may be necessary.
- ♦Do not have any branching points on the downstream of the refrigerant pipe header.
- ♦When a field-supplied external thermistor is installed or when a device for the demand control is used, abnormal stop of the unit or damage of the electromagnetic contactor may occur. Consult your local distributor for details.
- ♦When indoor units operate a fresh air intake, install a filter in the duct (field-supplied) to remove the dust from the air.
- ♦The 4-way or 2-way Airflow Ceiling Cassette Type units that have an outside air inlet can be connected to the duct, but need a booster fan to be installed at site. Refer to the chapter "Indoor Unit" for the available range for fresh air intake volume.
- ♦Operating fresh air intake on the indoor unit may increase the sound pressure level.

5. INSTALLATION INFORMATION

5-3. Precautions for Fresh air intake type indoor unit

5-3-1. Usage

- ♦ This unit mainly handles the outside air load, and is not designed to maintain the room temperature. Install other air conditioners for handling the air conditioning load in the room.

5-3-2. Unit characteristics

- ♦ This unit cannot perform the drying operation. The unit will continue the fan operation and blow fresh air (air that is not air-conditioned) when the Heating Thermo-OFF or Cooling Thermo-OFF mode is selected.
- ♦ The fan may stop tentatively when the unit is connected to the simultaneous cooling/heating operation type outdoor unit (R2, WR2 series) or during the defrost cycle.
- ♦ This unit switches the Thermo ON or OFF depending on the room temperature. The outside air is directly supplied into the room during Thermo OFF. Take caution of the cold supply air due to low outside air temperature and of condensation in the room due to high humidity of the outside air.
- ♦ Outside air temperature ranges for the operation must be as follows:
Cooling: 21°C D.B./15.5°C W.B. ~ 43°C D.B./35°C W.B.
Heating: -10°C D.B. ~ 20°C D.B.
The unit is forced to operate Thermo OFF (fan operation) when the outside air temperature is as follows.
Cooling: 21°C D.B. or below; Heating: 20°C D.B. or above
- ♦ Either a remote controller (sold separately) or a remote sensor (sold separately) must be installed to monitor the room temperature.
- ♦ If only this unit is used as an indoor unit, condensation may form at the supply air grill while the unit is operated in the cooling mode. This unit cannot operate dehumidifying.
- ♦ Use the unit in the way that the airflow rate will not exceed the 110% of the rated airflow.

5-4. Precautions for Outdoor unit/Heat source unit

5-4-1. Installation environment

- ♦ Outdoor unit with salt-resistant specification is recommended to use in a place where it is subject to salt air.
- ♦ Even when the unit with salt-resistant specification is used, it is not completely protected against corrosion. Be sure to follow the directions or precautions described in Instructions Book and Installation Manual for installation and maintenance. The salt-resistant specification is referred to the guidelines published by JRAIA (JRA9002).
- ♦ Install the unit in a place where the flow of discharge air is not obstructed. If not, the short-cycling of discharge air may occur.
- ♦ Provide proper drainage around the unit base, because the condensation may collect and drip from the outdoor units. Provide water-proof protection to the floor when installing the units on the rooftop.
- ♦ In a region where snowfall is expected, install the unit so that the outlet faces away from the direction of the wind, and install a snow guard to protect the unit from snow. Install the unit on a base approximately 50 cm higher than the expected snowfall. Close the openings for pipes and wiring, because the ingress of water and small animals may cause equipment damage. If SUS snow guard is used, refer to the Installation Manual that comes with the snow guard and take caution for the installation to avoid the risk of corrosion.
- ♦ When the unit is expected to operate continuously for a long period of time at outside air temperatures of below 0°C, take appropriate measures, such as the use of a unit base heater, to prevent icing on the unit base. (Not applicable to the PUMY series)
- ♦ Install the snow guard so that the outlet/inlet faces away from the direction of the wind.
- ♦ When the snow accumulates approximately 50 cm or more on the snow guard, remove the snow from the guard. Install a roof that is strong enough to withstand snow loads in a place where snow accumulates.
- ♦ Provide proper protection around the outdoor units in places such as schools to avoid the risk of injury.

5-4-2. Unit characteristics

- ♦ When the Thermo ON and OFF is frequently repeated on the indoor unit, the operation status of outdoor units may become unstable.

5-4-3. Relevant equipment

- ♦ Provide grounding in accordance with the local regulations.

5-5. Precautions for Control-related items

5-5-1. Product specification

- To introduce the MELANS system, a consultation with us is required in advance. Especially to introduce the electricity charge apportioning function or energy-save function, further detailed consultation is required. Consult your local distributor for details.
- Billing calculation for AG-150A, GB-50ADA, TG-2000A, or the billing calculation unit is unique and based on our original method. (Backup operation is included.) It is not based on the metering method, and do not use it for official business purposes. It is not the method that the amount of electric power consumption (input) by air conditioner is calculated. Note that the electric power consumption by air conditioner is apportioned by using the ratio corresponding to the operation status (output) for each air conditioner (indoor unit) in this method.
- In the apportioned billing function for AG-150A and GB-50ADA, use separate watthour meters for A-control units, K-control units, and packaged air conditioner for City Multi air conditioners. It is recommended to use an individual watthour meter for the large-capacity indoor unit (with two or more addresses).
- When using the peak cut function on the AG-150A or GB-50ADA, note that the control is performed once every minute and it takes time to obtain the effect of the control. Take appropriate measures such as lowering the criterion value. Power consumption may exceed the limits if AG-150A or GB-50ADA malfunctions or stops. Provide a back-up remedy as necessary.
- The controllers cannot operate while the indoor unit is OFF. (No error)
Turn ON the power to the indoor unit when operating the controllers.
- When using the interlocked control function on the AG-150A, GB-50ADA, PAC-YG66DCA, or PAC-YG63MCA, do not use it for the control for the fire prevention or security. (This function should never be used in the way that would put people's lives at risk.) Provide any methods or circuit that allow ON/OFF operation using an external switch in case of failure.

5-5-2. Installation environment

- The surge protection for the transmission line may be required in areas where lightning strikes frequently occur.
- A receiver for a wireless remote controller may not work properly due to the effect of general lighting. Leave a space of at least 1 m between the general lighting and receiver.
- When the Auto-elevating panel is used and the operation is made by using a wired remote controller, install the wired remote controller to the place where all air conditioners controlled (at least the bottom part of them) can be seen from the wired remote controller. If not, the descending panel may cause damage or injury, and be sure to use a wireless remote controller designed for use with elevating panel (sold separately).
- Install the wired remote controller (switch box) to the place where the following conditions are met.
 - Where installation surface is flat
 - Where the remote controller can detect an accurate room temperature
The temperature sensors that detect a room temperature are installed both on the remote controller and indoor unit. When a room temperature is detected using the sensor on the remote controller, the main remote controller is used to detect a room temperature. In this case, follow the instructions below.
 - Install the controller in a place where it is not subject to the heat source.
(If the remote controller faces direct sunlight or supply air flow direction, the remote controller cannot detect an accurate room temperature.)
 - Install the controller in a place where an average room temperature can be detected.
 - Install the controller in a place where no other wires are present around the temperature sensor.
(If other wires are present, the remote controller cannot detect an accurate room temperature.)
- To prevent unauthorized access, always use a security device such as a VPN router when connecting AG-150A, GB-50ADA, or TG-2000A to the Internet.

6. STANDARD AND SEACOAST (BS) PROTECTION TREATMENT

6-1. H2i Y-Series

Component	Base Material	Standard Models	Seacoast Protection Models (-BS)	Surface Treatment	Coating Thickness	
					External Surface	Internal Surface
External Panel Base	Alloyed Galvanized Steel Sheet	●	●	Thermoset Polyester-resin Powder Coating	≥70μm	≥70μm
External Front Panel	Alloyed Galvanized Steel Sheet	●		Polyester-resin Coating	≥15μm	≥5μm
			●	Thermoset Polyester-resin Powder Coating	≥85μm	≥75μm
Pillar	Alloyed Galvanized Steel Sheet	●		Polyester-resin Coating	≥30μm	
			●	Thermoset Polyester-resin Powder Coating	≥70μm	≥70μm
Compressor Cover	Galvanized Steel Sheet	●		No Treatment		
	Galvanized Aluminum Sheet		●	Thermoset Polyester-resin Powder Coating	≥70μm	≥70μm
Fin Guard	Steel Wires	●	●	Weather-resistant Polypropylene-resin Coating	≥300μm	≥300μm
Fan Guard and Drum	Weather-resistant Polypropylene Plastic	●	●	No Treatment		
Fan	Weather-resistant Acrylic Nitrile Styrene Plastic	●	●	No Treatment		
Fan Motor Frame	Galvanized Steel Sheet	●	●	No Treatment		
Fan Motor Shaft	High-carbon S35C Steel	●	●	Rust-prevention Coating		
Fan Motor Support	Galvanized Steel Sheet	●		No Treatment		
			●	Thermoset Polyester-resin Powder Coating	≥70μm	≥70μm
Heat Exchanger (Fin Only)	Aluminum Plate	●		Cellulose- and Polyurethane-resin Coating (<i>Blue Fin</i>) (no unusual rust development to 480 hours)	≥1μm	
			●	Cellulose- and Polyurethane-resin Coating (<i>Blue Fin</i>) (no unusual rust development to 960 hours)	≥1 - 1.5μm	
Electrical Parts Box	Galvanized Steel Sheet	●		No Treatment		
	Galvanized Aluminum Sheet		●	Thermoset Polyester-resin Powder Coating	≥70μm	
Printed Circuit Board	Epoxy Resin	●		No Treatment		
			●	Polyurethane Coating	≥10μm	
Screws	Steel	●	●	Zinc-nickel Alloy Plating with a Chromate Film	≥5μm	

Application Guide

	Distance from the Sea		
	984' (300m)	1,640' (500m)	3,281' (1km)
Direct Exposure to Sea Breezes			
Facing Inland	Seacoast Protection (-BS) Models	Standard Models	
Facing Sea	Seacoast Protection (-BS) Models		
On an Island	Seacoast Protection (-BS) Models		
Indirect Exposure to Sea Breezes			
Facing Inland	Seacoast Protection (-BS) Models	Standard Models	
Facing Sea	Seacoast Protection (-BS) Models		
On an Island	Seacoast Protection (-BS) Models		

For optimum performance, follow the cautions listed below.

1. Avoid installing the unit in a location that is subjected to direct sea winds.
2. Do not attach a sunshade to the unit. Let the rain wash away any salt residue that may adhere to the unit.
3. Unit should be installed following instructions for proper operation and to ensure optimum water drainage.
4. Periodically wash the unit.
5. If the panels become scratched, repair as soon as possible.
6. Inspect the unit at regular intervals. Paint the unit or replace parts when necessary.

Material	Thermoset Polyester-resin Powder Coating	Cellulose- and Polyurethane-resin Coating (<i>Blue Fin</i>)	
Test Conditions	Salt-spray Test Method: JIS K2371 based on ISO9227	Salt-spray Test Method: JIS Z2371 based on ISO9227	
Test Results	Conform to JRA9002 Criteria (960-hour test)	No unusual rust development to 480 hours	No unusual rust development to 960 hours

"Blue Fin" treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants.

7. CAUTIONS

7-1. Refrigerant Leakage Considerations

In the United States safety classification of refrigerants is governed by ASHRAE Standard 34. Standard 34 prescribes safety group and flammability classifications for refrigerants. These groups are shown below:

F L A M M A B I L I T Y	SAFETY GROUP	
	Higher Flammability	A3 B3
	Lower Flammability	A2 B2 A2L* B2L*
	No Flame Propagation	A1 B1
	Lower Toxicity	Higher Toxicity
	INCREASING TOXICITY	

Mitsubishi VRF systems utilize R410A refrigerant. ASHRAE Standard 34 assigns a classification of A1 to this refrigerant, placing it in the lowest toxicity and no flame propagation category.

ASHRAE Standard 34 also prescribes maximum permissible concentration levels of any such refrigerant in an occupied space to protect the occupants from asphyxiation and or toxicity. ASHRAE Standard 34-2010, Addendum I sets the concentrations level to 26lbs/Mcf for R410A refrigerant.

ASHRAE Standard 15 prescribes safe design practices for refrigeration systems and references Standard 34 within when establishing where additional measures must be taken when refrigerant concentration level limits prescribed by Standard 34 are exceeded. Most state codes reference the International Mechanical Code (IMC). Chapter 11 of the IMC governs the safe design and install of refrigeration systems and references ASHRAE 15 & 34 for requirements of allowable concentration levels and other safety measures for designing refrigeration systems.

In any VRF design, it is imperative that the designer ensures that in the event of a major leakage of all system refrigerant into a single enclosed occupied space, that these concentration limits are not exceeded in order to protect the occupants.

ASHRAE Standard 15 specifies that the smallest occupied space volume to consider in event of a major leakage is that space volume which does not connect through permanent openings such as transfer openings or HVAC ducts. In any event the following must be evaluated for each smallest enclosed area:

$$\frac{\text{Area Leakage Concentration Level (lbs/Mcf)}}{\text{Total VRF System Charge}} = \frac{\text{Total VRF System Charge (lbs)}}{[\text{Area Volume (ft}^3\text{)/1000}]}$$
$$= \text{Factory Charge} + \text{Trim Charge In Field}$$

If a particular space, per this calculation, exceeds the concentration limit of 26 lbs/Mcf, the volume must be increased through connectivity to maintain the leakage concentration level below the threshold.

When determining smallest space volume when spaces are connected, ASHRAE 15 does not specifically address how much free area is required to claim connectivity of spaces. The Japanese Refrigeration Standard, JRA GL-13;2012, specifies that 0.15% of the floor area must be provided for a transfer opening to claim connectivity to an adjacent space. This can be used as guide, but again is not referenced to any specific US recognized codes / standard. Always consult the local code / jurisdiction for requirements with regard to refrigerant leakage in any event.

An example of a countermeasure to claim connectivity of spaces is shown below. In this example a dedicated outdoor air / or ventilation system is continuously supplying fresh air to the smallest occupied space. A transfer opening or a door under cut is provided so that the space is communicating with an adjacent space. A low wall exhaust could also be provided equal to the fresh air delivery amount to promote the capture of any leaked refrigerant. Utilizing a low wall exhaust in areas where space occupants are sleeping would be beneficial since R410A is heavier than air and will tend to migrate towards the floor.

7. CAUTIONS

Counter Measure Example for Critical Space Volumes Creating Connectivity of Spaces

