

AIR CONDITIONING SYSTEMS

CITY MULTI DATA BOOK

MODEL

PUMY-P36, 48, 60NKMU1(-BS)

Heat Pump S Series



Type(BTU/h)	36K	48K	60K
Model Name	PUMY-P36NKMU1	PUMY-P48NKMU1	PUMY-P60NKMU1

PUMY-P-NKMU1

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1. SPECIFICATIONS

Outdoor units

PUMY-P-NKMU1

Model			PUMY-P36NKMU1(-BS)	PUMY-P48NKMU1(-BS)
Power source			Single-phase 208-230V -5%~+10%,60Hz	
Cooling capacity (Nominal)	*1	BTU/h	36000	48000
	*1	kW	10.6	14.1
	Power input	kW	2.445	3.690
	Current input	A	11.9 - 10.8	18.0 - 16.3
	EER	BTU/h/W	14.7	13.0
Temp. range of cooling	Indoor	W.B.	59 to 75°F (15 to 24°C)	
	Outdoor	D.B.	23 to 115°F (-5 to 46°C) *3*4	
Heating capacity (Nominal)	*2	BTU/h	42000	54000
	*2	kW	12.3	15.8
	Power input	kW	3.100	4.085
	Current input	A	15.1 - 13.7	19.9 - 18.0
	COP	BTU/h/W	3.97	3.87
Temp. range of heating	Indoor	D.B.	59 to 81°F (15 to 27°C)	
	Outdoor	W.B.	-13 to 59°F (-25 to 15°C)	
Indoor unit connectable	Total capacity		50~130% of outdoor unit capacity	
	Model/Quantity		P06 - P36 / 1 - 7	P06 - P54 / 1 - 10
Sound pressure level (measured in anechoic room)		dB <A>	49 / 53	51 / 54
Refrigerant piping diameter	Liquid pipe	in. (mm)	3/8"(9.52) Flare	
	Gas pipe	in. (mm)	5/8"(15.88) Flare	
FAN	Type x Quantity		Propeller fan × 2	
	Air flow rate	cfm	3885	
		m³/min	110	
		L/s	1834	
	Control, Driving mechanism		DC-control	
	Motor output	kW	0.074 + 0.074	
	External static press.		0	
Compressor	Type x Quantity		Scroll hermetic compressor × 1	
	Manufacture		MITSUBISHI ELECTRIC CORPORATION	
	Starting method		Inverter	
	Motor output	kW	2.8	3.3
	Case heater	kW	-	
	Lubricant		FV50S	
External finish			Galvanized steel sheets <MUNSELL 3Y 7.8/1.1>	
External dimension H x W x D		in.	52-11/16 × 41-11/32 × 13 (+1)	
		mm	1,338 × 1,050 × 330 (+25)	
Protection devices	High pressure protection		High pressure switch, High pressure Sensor	
	Inverter circuit (COMP./FAN)		Overcurrent detection, Overheat detection (Heat sink thermistor)	
	Compressor		Compressor thermistor, Overcurrent detection	
	Fan motor		Overheating, Voltage protection	
Refrigerant	Type x original charge		R410A 10.6 lbs (4.8kg)	
	Control		Electronic expansion valve	
Net weight		lbs (kg)	269 (122)	
Heat exchanger			Cross fin and Copper tube	
HIC circuit (HIC: Heat Inter-Changer)			HIC circuit	
Defrosting method			Reversed refrigerant circuit	
Drawing	External		BK01V261	
	Wiring		BH78B813	
Standard attachment	Document		Installation Manual	
	Accessory		Grounded lead wire ×2, Conduit plate	
Optional parts			Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E	
Remarks			* Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual. * Due to continuing improvement, above specifications may be subject to change without notice.	

Notes:		Unit converter
*1.Cooling conditions (Test conditions are based on AHRI 210/240) Indoor: 80°F D.B./67°F W.B. (26.7°C D.B./19.4°C W.B.), Outdoor: 95°F D.B./75°F W.B. (35.0°C D.B./23.9°C W.B.) Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)		BTU/h =kW × 3.412
*2.Heating conditions (Test conditions are based on AHRI 210/240) Indoor: 70°F D.B./60°F W.B. (21.1°C D.B./15.6°C W.B.), Outdoor: 47°F D.B./43°F W.B. (8.3°C D.B./6.1°C W.B.) Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)		cfm =m³/min × 35.31
*3.50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P08NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU type indoor unit. *4.5 to 115 °F [-15 to 46 °C] D.B.: When using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor units listed in *3.		lbs =kg /0.4536
		*Above specification data is subject to rounding variation.

1. SPECIFICATIONS

Outdoor units

PUMY-P-NKMU1

Model			PUMY-P60NKMU1(-BS)	
Power source			Single-phase 208-230V -5%~+10%, 60Hz	
Cooling capacity (Nominal)	*1	BTU/h	60000	
	*1	kW	17.6	
		Power input	kW	4.680
		Current input	A	22.8 - 20.6
		EER	BTU/h/W	12.8
Temp. range of cooling	Indoor	W.B.	59 to 75°F (15 to 24°C)	
	Outdoor	D.B.	23 to 115°F (-5 to 46°C) *3*4	
Heating capacity (Nominal)	*2	BTU/h	66000	
	*2	kW	19.3	
		Power input	kW	5.450
		Current input	A	26.6 - 24.1
		COP	BTU/h/W	3.55
Temp. range of heating	Indoor	D.B.	59 to 81°F (15 to 27°C)	
	Outdoor	W.B.	-13 to 59°F (-25 to 15°C)	
Indoor unit connectable	Total capacity		50~130% of outdoor unit capacity	
	Model/Quantity		P06~P72 / 1 - 12	
Sound pressure level (measured in anechoic room)			dB <A>	58 / 59
Refrigerant piping diameter	Liquid pipe	in. (mm)	3/8" (9.52) Flare	
	Gas pipe	in. (mm)	3/4" (19.05) Flare	
FAN	Type x Quantity		Propeller fan × 2	
	Air flow rate	cfm	4879	
		m³/min	138	
		L/s	2300	
	Control, Driving mechanism		DC-control	
	Motor output	kW	0.200 + 0.200	
	External static press.		0	
	Compressor	Type x Quantity		Scroll hermetic compressor × 1
Manufacture		MITSUBISHI ELECTRIC CORPORATION		
Starting method		Inverter		
Motor output		kW	4.1	
Case heater		kW	-	
Lubricant		FV50S		
External finish			Galvanized steel sheets <MUNSELL 3Y 7.8/1.1>	
External dimension H x W x D		in.	52-11/16 × 41-11/32 × 13 (+1)	
		mm	1,338 × 1,050 × 330 (+25)	
Protection devices	High pressure protection		High pressure switch, High pressure Sensor	
	Inverter circuit (COMP./FAN)		Overcurrent detection, Overheat detection (Heat sink thermistor)	
	Compressor		Compressor thermistor, Overcurrent detection	
	Fan motor		Overheating, Voltage protection	
Refrigerant	Type x original charge		R410A 11.2 lbs (5.1kg)	
	Control		Electronic expansion valve	
Net weight		lbs (kg)	306 (139)	
Heat exchanger			Cross fin and Copper tube	
HIC circuit (HIC: Heat Inter-Changer)			HIC circuit	
Defrosting method			Reversed refrigerant circuit	
Drawing	External		BK01V261	
	Wiring		BH78B813	
Standard attachment	Document		Installation Manual	
	Accessory		Grounded lead wire *2, Conduit plate	
Optional parts			Joint: CMY-Y62-G-E Header: CMY-Y64/68-G-E	
Remarks			* Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual. * Due to continuing improvement, above specifications may be subject to change without notice.	

Notes:		Unit converter	
*1.Cooling conditions (Test conditions are based on AHRI 210/240)		BTU/h =kW x 3,412	
Indoor: 80°F D.B./67°F W.B. (26.7°C D.B./19.4°C W.B.), Outdoor: 95°F D.B./75°F W.B. (35.0°C D.B./23.9°C W.B.)		cfm =m ³ /min x 35.31	
Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)		lbs =kg /0.4536	
*2.Heating conditions (Test conditions are based on AHRI 210/240)			
Indoor: 70°F D.B./60°F W.B. (21.1°C D.B./15.6°C W.B.), Outdoor: 47°F D.B./43°F W.B. (8.3°C D.B./6.1°C W.B.)			
Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)			
*3.50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU and PKFY-P08NHMU type indoor unit.			
*4.5 to 115 °F [-15 to 46 °C] D.B.: When using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor units listed in *3.		*Above specification data is subject to rounding variation.	

Outdoor units

Unit : mm(in)

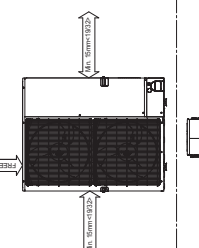
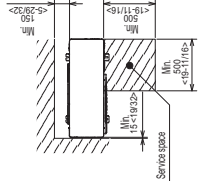
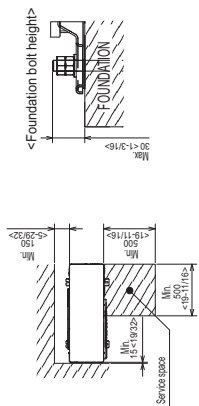
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Piping and wiring connections can be made from 4 directions: FRONT, Right, Rear and Below.

Please secure the unit firmly with 4 foundation (M10<W3/8>) bolts. Bolts and washers must be purchased locally.)

Dimensions of space needed for service access are shown in the below diagram.

he diagram below shows a basic example. Explanation of particular details are given in the installation manuals etc.

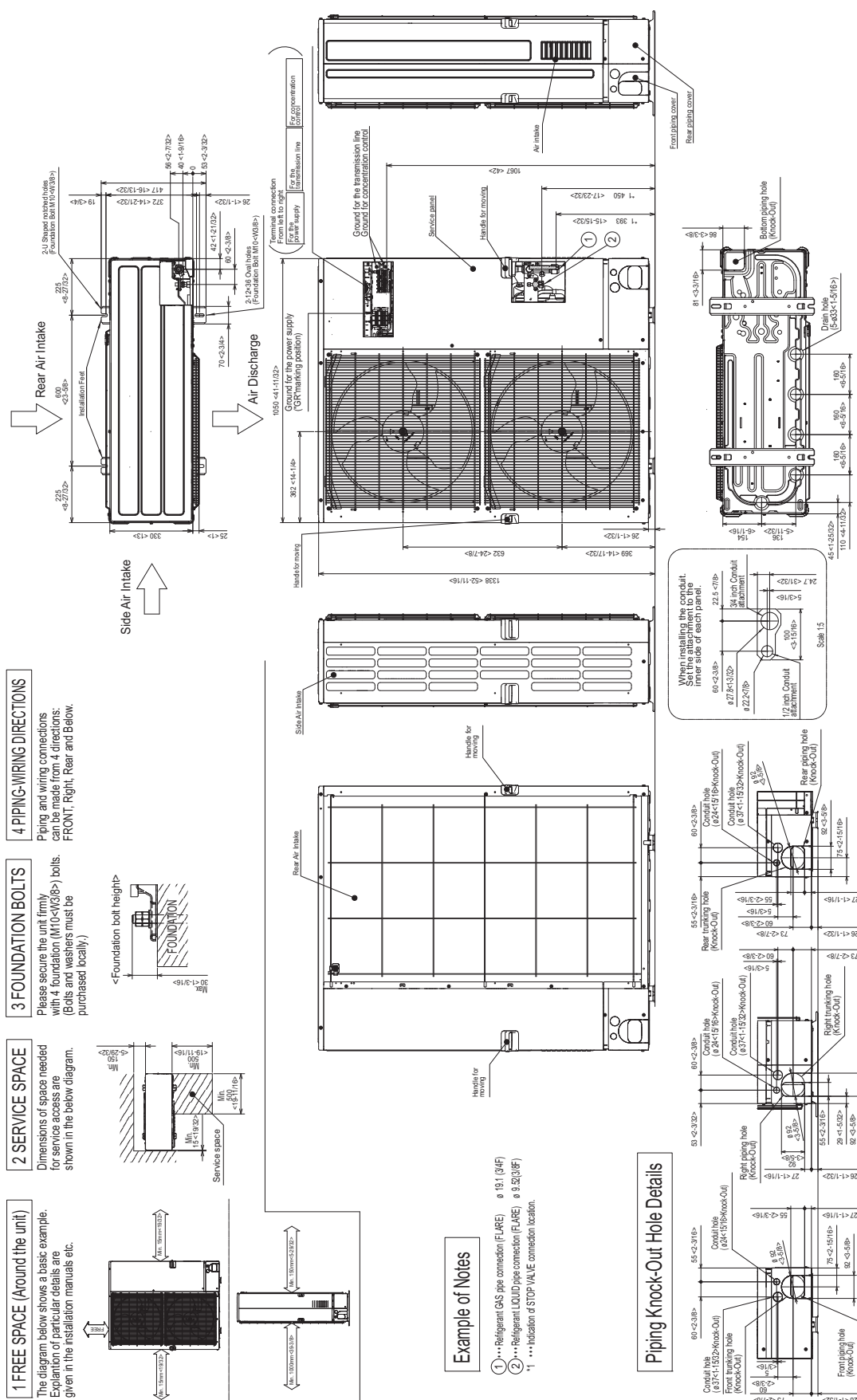


1 ...Refrigerant GAS pipe connection (FLARE) ø 15.88 (5/8F)
2 ...Refrigerant LIQUID pipe connection (FLARE) ø 9.52 (3/8F)
" ...Indication of STOP VALVE connection location.

Figure 10 shows three technical drawings of a 150mm diameter, 150mm high cylindrical container. The top drawing is a front view showing a front flange with a 3/16 inch thickness and a 3/8 inch diameter hole. The middle drawing is a side view showing a rear flange with a 3/16 inch thickness and a 3/8 inch diameter hole. The bottom drawing is a top view showing a circular base with a 3/16 inch thickness and a 3/8 inch diameter hole. Dimensions are given in inches and millimeters.

Unit : mm(in)

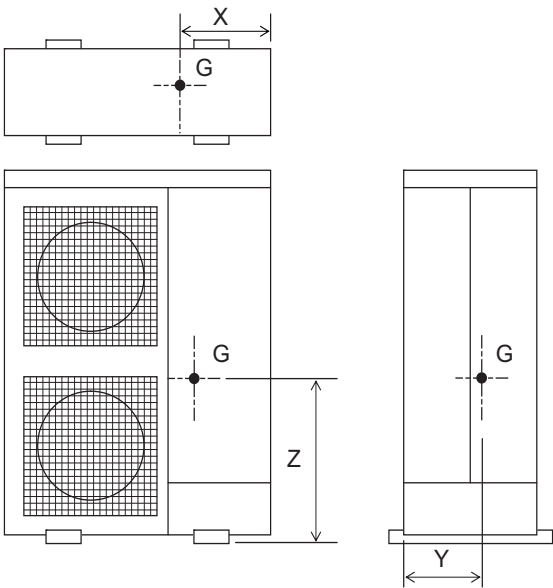
PUMY-P-NKMU1



PUMY-P-NKMU1

PUMY-P36, 48, 60NKMU1(-BS)

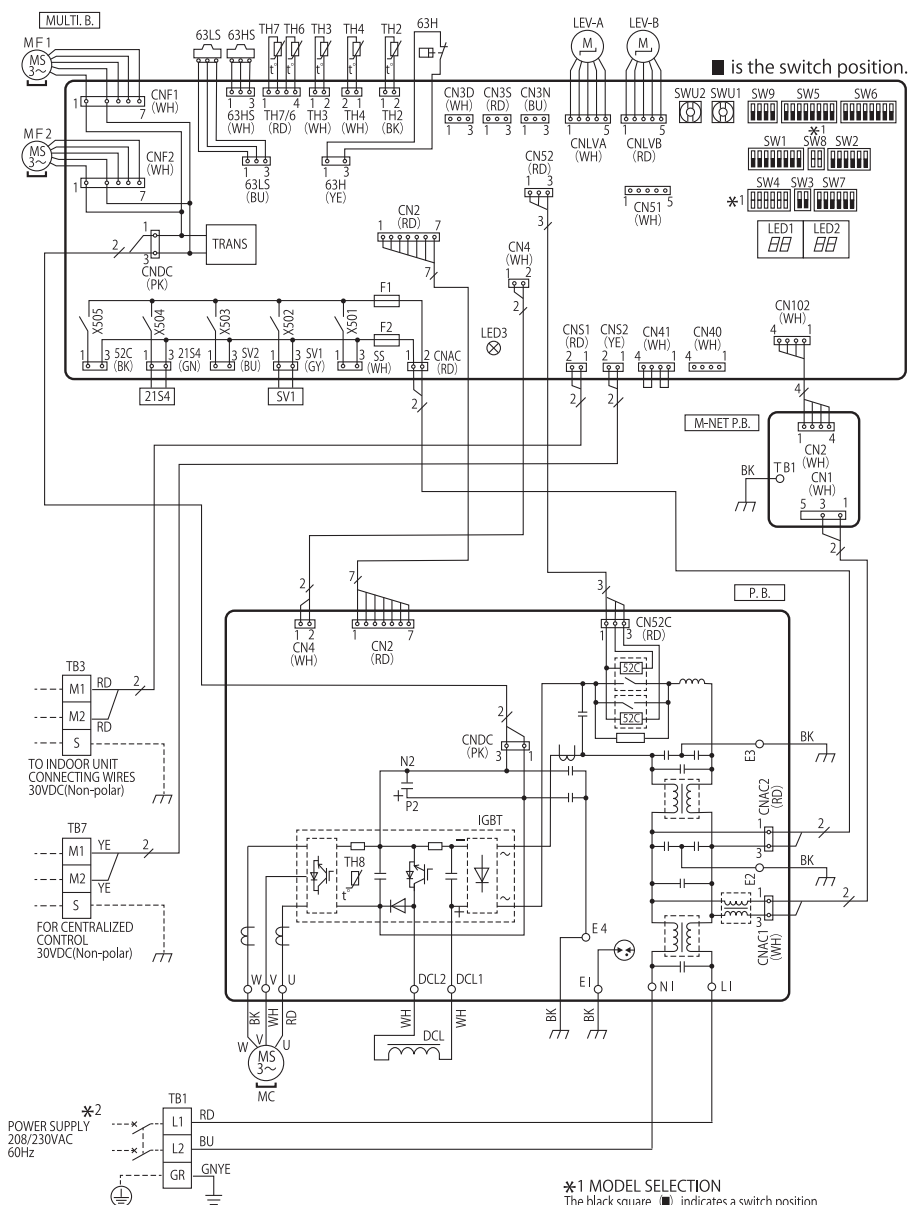
Unit : mm[in.]



Model	X	Y	Z
PUMY-P36NKMU1	380[15]	160[6-5/16]	586[23-1/16]
PUMY-P48NKMU1	380[15]	160[6-5/16]	586[23-1/16]
PUMY-P60NKMU1	390[15-3/8]	182[7-3/16]	582[22-15/16]

PUMY-P36, 48NKMU1(-BS)

SYMBOL	NAME
TB1	Terminal Block (Power Supply)
TB3	Terminal Block (Indoor/Outdoor Transmission Line)
TB7	Terminal Block (Centralized Control Transmission Line)
MC	Motor For Compressor
MF1,MF2	Fan Motor
21S4	Solenoid Valve Coil (4-Way Valve)
63H	High Pressure Switch
63HS	High Pressure Sensor
63LS	Low Pressure Sensor
SV1	Solenoid Valve Coil (Bypass Valve)
TH2	Thermistor (Hic Pipe)
TH3	Thermistor (Outdoor Liquid Pipe)
TH4	Thermistor (Compressor)
TH6	Thermistor (Suction Pipe)
TH7	Thermistor (Ambient)
TH8	Thermistor (Heat Sink)
LEV-A,LEV-B	Linear Expansion Valve
DCL	Reactor
P.B.	Power Circuit Board
U/V/W	Connection Terminal (U/V/W-Phase)
LI	Connection Terminal (L-Phase)
NI	Connection Terminal (N-Phase)
DCL1,DCL2	Connection Terminal (Reactor)
IGBT	Power Module
E1,E2,E3,E4	Connection Terminal (Electrical Parts Box)
MULTI.B.	Multi Controller Circuit Board
SW1	Switch (Display Selection)
SW2	Switch (Function Selection)
SW3	Switch (Test Run)
SW4	Switch (Model Selection)
SW5	Switch (Function Selection)
SW6	Switch (Function Selection)
SW7	Switch (Function Selection)
SW8	Switch (Model Selection)
SW9	Switch (Function Selection)
SWU1	Switch (Unit Address Selection, ones digit)
SWU2	Switch (Unit Address Selection, tens digit)
CNS1	Connector (Indoor/Outdoor Transmission Line)
CNS2	Connector (Centralized Control Transmission Line)
SS	Connector (Connection For Option)
CN3D	Connector (Connection For Option)
CN3S	Connector (Connection For Option)
CN3N	Connector (Connection For Option)
CN51	Connector (Connection For Option)
LED1,LED2	LED (Operation Inspection Display)
LED3	LED (Power Supply to Main Microcomputer)
F1,F2	Fuse (UL6.3A250V)
X501~505	Relay
M-NET P.B.	M-NET Power Circuit Board
TB1	Connection Terminal (Electrical Parts Box)



Cautions when Servicing

- ⚠ WARNING: When the main supply is turned off, the voltage [340 V] in the main capacitor will drop to 20 V in approx. 2 minutes (input voltage: 230 V). When servicing, make sure that LED1, LED2 on the outdoor multi controller circuit board goes out, and then wait for at least 1 minute.
- Components other than the outdoor circuit boards may be faulty: Check and take corrective action, referring to the service manual. Do not replace the outdoor circuit boards without checking.

NOTES:

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

- During normal operation
The LED indicates the drive state of outdoor unit.

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

- When fault requiring inspection has occurred
The LED alternately indicates the check code and the address of the unit in which the fault has occurred.

(Example)
When the compressor and SV1 are on during cooling operation.



*1 MODEL SELECTION

The black square ■ indicates a switch position.

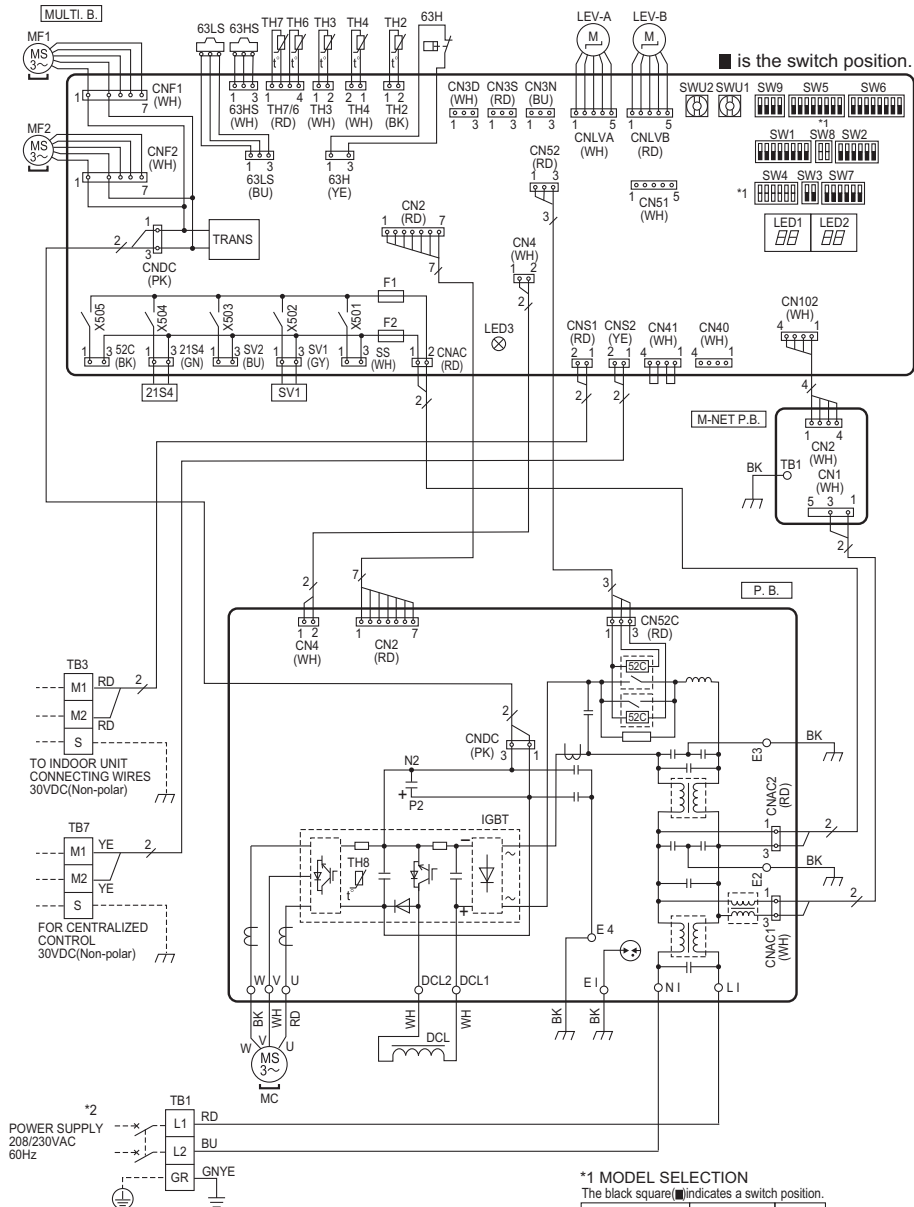
MODELS	SW4	SW8
PUMY-P36NKMU1	ON OFF	ON OFF
PUMY-P48NKMU1	ON OFF	ON OFF

*2 Use copper supply wires.

Utilisez des fils d'alimentation en cuivre.

PUMY-P60NKMU1(-BS)

SYMBOL	NAME
TB1	Terminal Block <Power Supply>
TB3	Terminal Block <Indoor/Outdoor Transmission Line>
TB7	Terminal Block <Centralized Control Transmission Line>
MC	Motor For Compressor
MF1,MF2	Fan Motor
21S4	Solenoid Valve Coil<4-Way Valve>
63H	High Pressure Switch
63HS	High Pressure Sensor
63LS	Low Pressure Sensor
SV1	Solenoid Valve Coil<Bypass Valve>
TH2	Thermistor<Hic Pipe>
TH3	Thermistor<Outdoor Liquid Pipe>
TH4	Thermistor<Compressor>
TH6	Thermistor<Suction Pipe>
TH7	Thermistor<Ambient>
TH8	Thermistor<Heat Sink>
LEV-A,LEV-B	Linear Expansion Valve
DCL	Reactor
P.B.	Power Circuit Board
U/V/W	Connection Terminal<U/V/W-Phase>
LI	Connection Terminal<L-Phase>
NI	Connection Terminal<N-Phase>
DCL1,DCL2	Connection Terminal<Reactor>
IGBT	Power Module
E1,E2,E3,E4	Connection Terminal<Electrical Parts Box>
MULTI.B.	Multi Controller Circuit Board
SW1	Switch<Display Selection>
SW2	Switch<Function Selection>
SW3	Switch<Test Run>
SW4	Switch<Model Selection>
SW5	Switch<Function Selection>
SW6	Switch<Function Selection>
SW7	Switch<Function Selection>
SW8	Switch<Model Selection>
SW9	Switch<Function Selection>
SWU1	Switch<Unit Address Selection, ones digit>
SWU2	Switch<Unit Address Selection, tens digit>
CNS1	Connector <Indoor/Outdoor Transmission Line>
CNS2	Connector<Centralized Control Transmission Line>
SS	Connector<Connection For Option>
CN3D	Connector<Connection For Option>
CN3S	Connector<Connection For Option>
CN3N	Connector<Connection For Option>
CN51	Connector<Connection For Option>
LED1,LED2	LED<Operation Inspection Display>
LED3	LED<Power Supply to Main Microcomputer>
F1,F2	Fuse<UL6.3A250V>
X501~505	Relay
M-NET P.B.	M-NET Power Circuit Board
TB1	Connection Terminal<Electrical Parts Box>



Cautions when Servicing

- ⚠ WARNING: When the main supply is turned off, the voltage [340 V] in the main capacitor will drop to 20 V in approx. 2 minutes (input voltage: 230 V). When servicing, make sure that LED1, LED2 on the outdoor multi controller circuit board goes out, and then wait for at least 1 minute.
- Components other than the outdoor circuit boards may be faulty: Check and take corrective action, referring to the service manual. Do not replace the outdoor circuit boards without checking.

Précautions pendant l'entretien

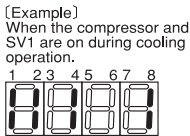
- ⚠ AVERTISSEMENT : Lorsque l'alimentation principale est hors tension, la tension [340 V] dans le condensateur principal chute à 20 V en 2 minutes environ (tension d'entrée : 230 V). Lors de l'entretien, assurez-vous que la diode LED1, LED2 sur la carte de circuit extérieure s'éteint, puis patientez au moins 1 minute.
- Des composants autres que la carte de circuit extérieure peuvent être défectueux : vérifiez et prenez des mesures de correction, en vous reportant au manuel d'entretien. Ne remplacez pas la carte de circuit extérieure sans vérification.

NOTES:

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

During normal operation								
The LED indicates the drive state of outdoor unit.								
Bit	1	2	3	4	5	6	7	8
Indication	Compressor operated	52C	21S4	SV1	(SV2)	—	—	Always lit

- When fault requiring inspection has occurred
The LED alternately indicates the check code and the address of the unit in which the fault has occurred.

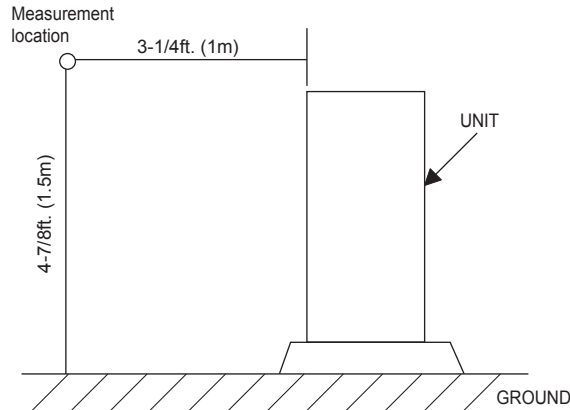


*1 MODEL SELECTION
The black square indicates a switch position.

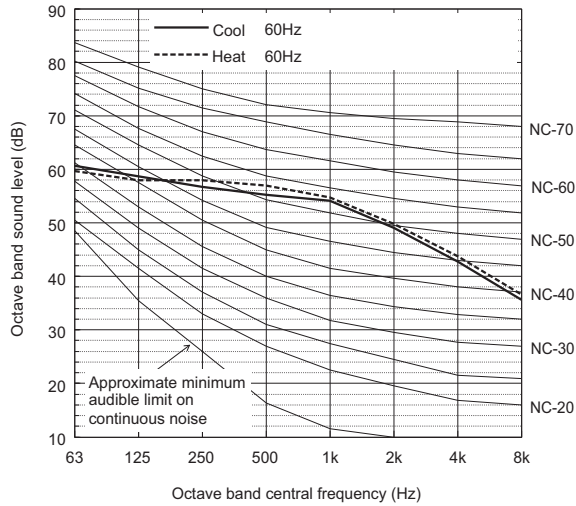
MODEL	SW4	SW8
PUMY-P60NKMU1	ON OFF 1 2 3 4 5 6	ON OFF 1 2

*2 Use copper supply wires.
Utilisez des fils d'alimentation en cuivre.

Measurement condition
PUMY-P36, 48, 60NKMU1(-BS)

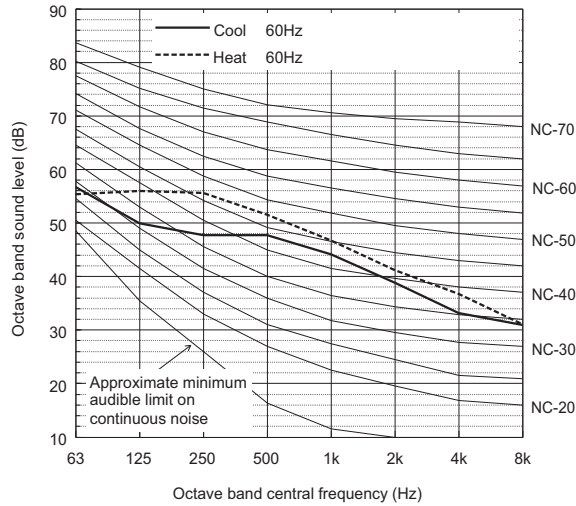


Sound level of PUMY-P60NKMU1(-BS)



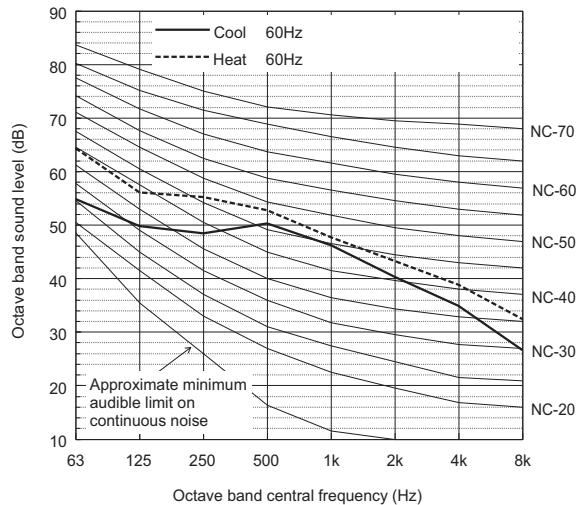
		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	60Hz	60.7	58.7	56.7	55.2	54.1	49.1	42.8	35.6	58.0
Standard Heating	60Hz	59.7	58.0	58.0	56.9	54.7	49.8	43.8	36.6	59.0

Sound level of PUMY-P36NKMU1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	60Hz	56.7	49.9	47.7	47.7	44.2	38.9	33.1	31.0	49.0
Standard Heating	60Hz	55.4	56.0	55.6	51.6	46.7	41.2	36.7	31.1	53.0

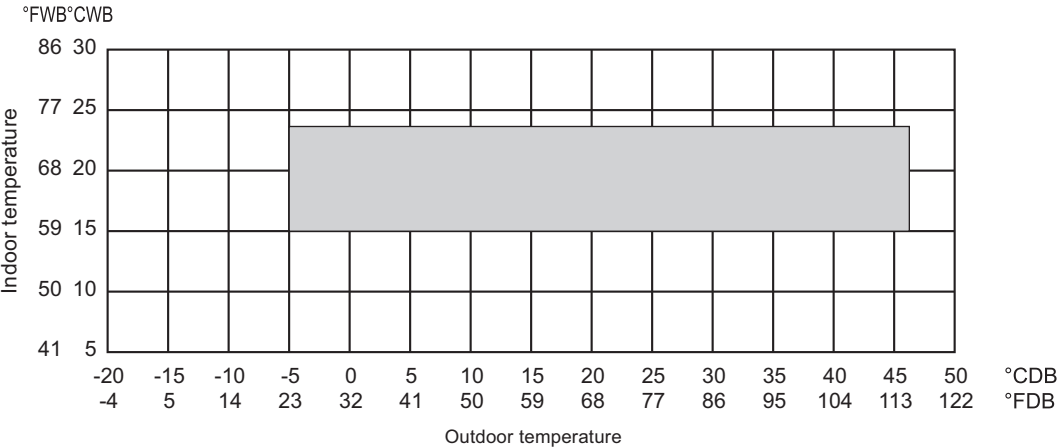
Sound level of PUMY-P48NKMU1(-BS)



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	60Hz	54.8	49.9	48.5	50.3	46.3	40.3	34.8	26.7	51.0
Standard Heating	60Hz	64.3	56.1	55.2	52.8	47.7	43.3	38.8	32.5	54.0

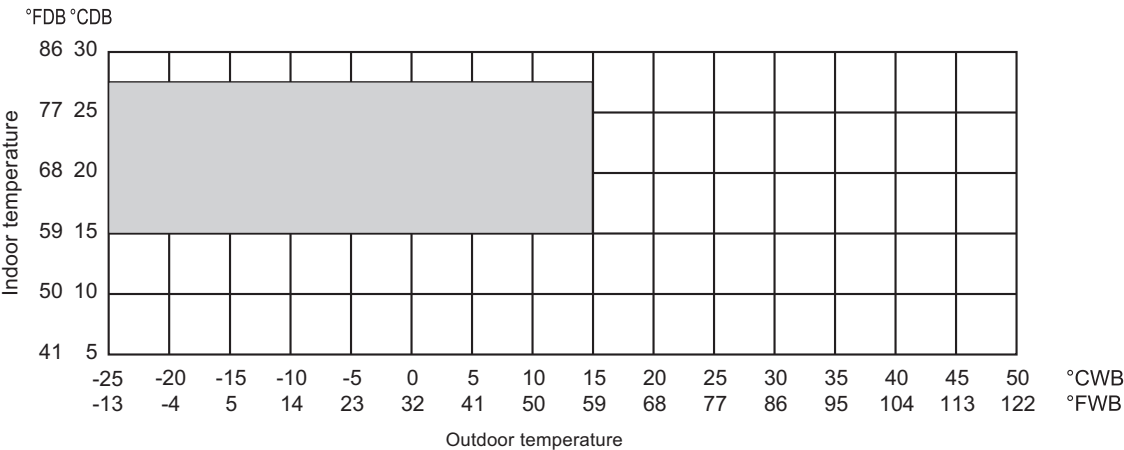
PUMY-P-NKMU1

• Cooling



*For PUMY-P36, 48NKMU1(-BS), 50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU type indoor unit.
*For PUMY-P60NKMU1(-BS), 50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU and PKFY-P08NHMU type indoor unit.

• Heating



Section 7-1.
Shows an example of how to select the indoor and outdoor units according to the required heating/cooling load.

Section 7-2. through 7-5.
Show the actual correction data of indoor and outdoor units.

7-1. Selection of Cooling/Heating Units

How to determine the capacity when less than or equal 100% indoor model size units are connected in total:

The purpose of this flow chart is to select the indoor and outdoor units. For other purposes, this flow chart is intended only for reference.

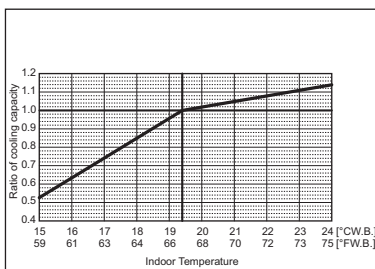
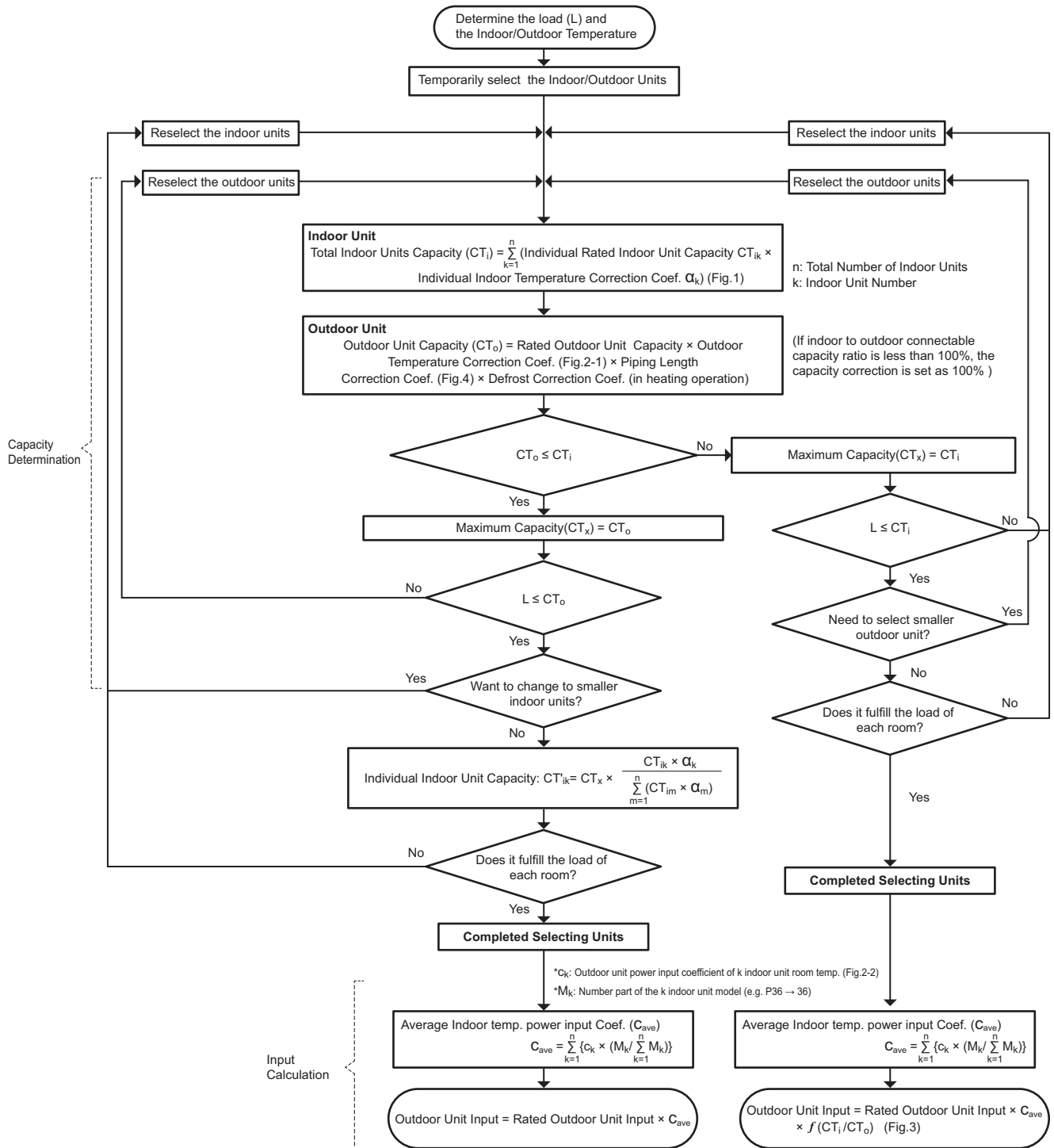


Fig.1 Indoor unit temperature correction

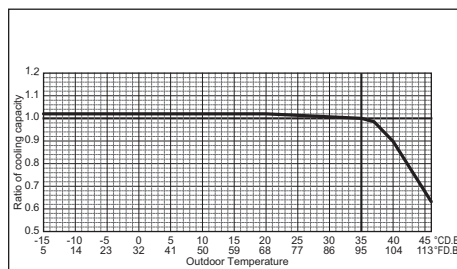


Fig.2-1 Outdoor unit temperature correction (capacity)

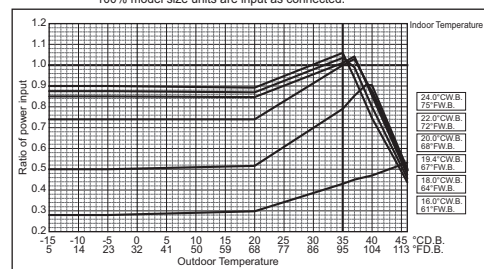
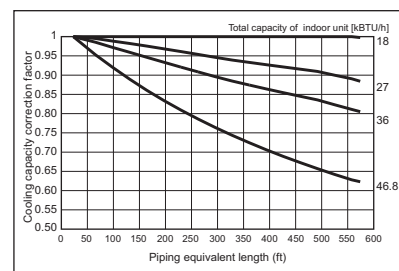
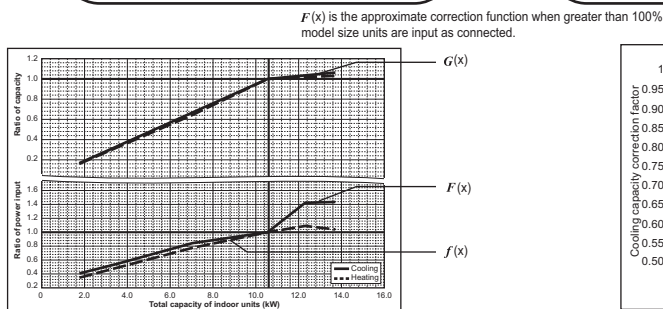
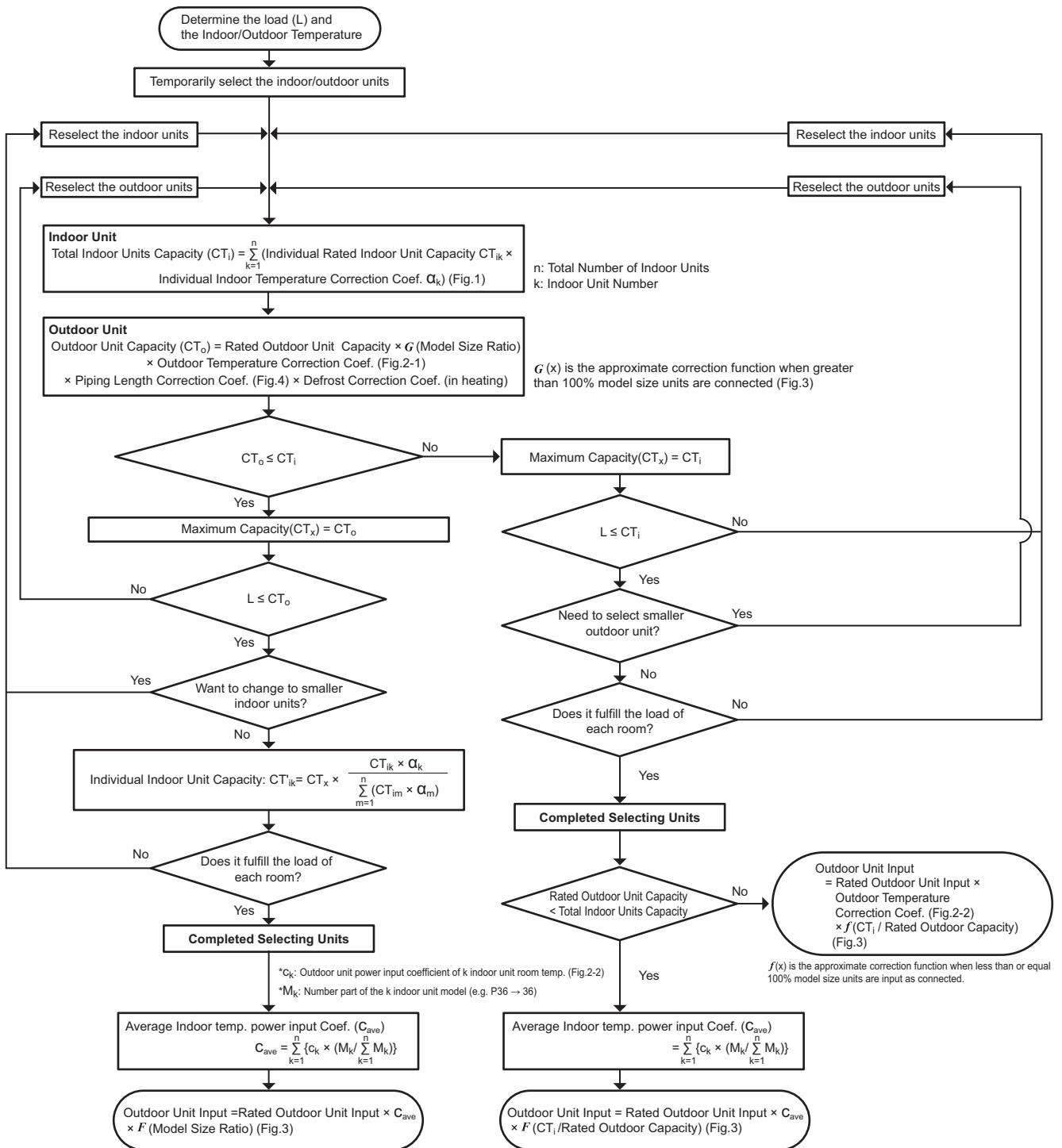


Fig.2-2 Outdoor unit temperature correction (power input)

How to determine the capacity when greater than 100% indoor model size units are connected in total:

The purpose of this flow chart is to select the indoor and outdoor units. For other purposes, this flow chart is intended only for reference.



<Cooling>

Design Condition	
Outdoor Design Dry Bulb Temperature	37 °C
Total Cooling Load	9.0 kW
Room1	
Indoor Design Dry Bulb Temperature	28 °C
Indoor Design Wet Bulb Temperature	22 °C
Cooling Load	5.0 kW
Room2	
Indoor Design Dry Bulb Temperature	24 °C
Indoor Design Wet Bulb Temperature	18 °C
Cooling Load	4.0 kW
<Other>	
Indoor/Outdoor Equivalent Piping Length	30 m

1. Cooling Calculation

(1) Temporary Selection of Indoor Units

Room1

PEFY-P18

5.3 kW (Rated)

Room2

PEFY-P18

5.3 kW (Rated)

(2) Total Indoor Units Capacity

P18 + P18 = P36

(3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36

10.6 kW

(4) Total Indoor Units Capacity Correction Calculation

Room1

Indoor Design Wet Bulb Temperature Correction (22°C)

1.08 (Refer to Fig.1)

Room2

Indoor Design Wet Bulb Temperature Correction (18°C)

0.85 (Refer to Fig.1)

Total Indoor Units Capacity (CTi)

$$\begin{aligned}
 CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\
 &= 5.3 \times 1.08 + 5.3 \times 0.85 \\
 &\approx 10.2 \text{ kW}
 \end{aligned}$$

(5) Outdoor Unit Correction Calculation

Outdoor Design Dry Bulb Temperature Correction (37°C)

0.99 (Refer to Fig.2)

Piping Length Correction (30 m)

0.97 (Refer to Fig.3)

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned}
 CTo &= \text{Outdoor Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length Correction} \\
 &= 10.6 \times 0.99 \times 0.97 \\
 &\approx 10.1 \text{ kW}
 \end{aligned}$$

(6) Determination of Maximum System Capacity (CTx)

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

CTi = 10.2 > CTo = 10.1, thus, select CTo.

CTx = CTo = 10.1 kW

(7) Comparison with Essential Load

Against the essential load 9.0kW, the maximum system capacity is 10.1kW: Proper outdoor units have been selected.

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

CTx = CTo, thus, calculate by the calculation below

Room1

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room1 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 10.1 \times (5.3 \times 1.08) / (5.3 \times 1.08 + 5.3 \times 0.85) \\
 &\approx 5.7 \text{ kW} \quad \text{OK: fulfills the load 5.0kW}
 \end{aligned}$$

Room2

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room2 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 10.1 \times (5.3 \times 0.85) / (5.3 \times 1.08 + 5.3 \times 0.85) \\
 &\approx 4.4 \text{ kW} \quad \text{OK: fulfills the load 4.0kW}
 \end{aligned}$$

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

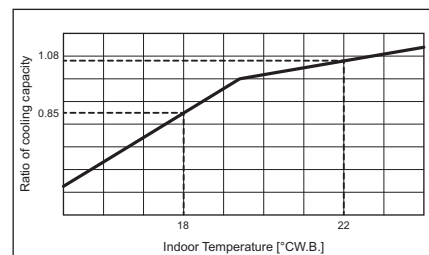
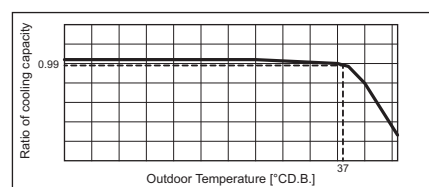
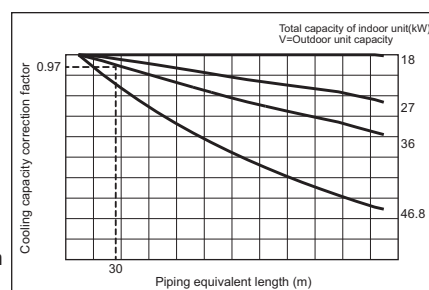
Fig.1 Indoor unit temperature correction
To be used to correct indoor unit onlyFig.2 Outdoor unit temperature correction
To be used to correct outdoor unit only

Fig.3 Correction of refrigerant piping length

<Heating>

Design Condition	
Outdoor Design Wet Bulb Temperature	2 °C
Total Heating Load	9.0 kW
Room1	
Indoor Design Dry Bulb Temperature	26 °C
Heating Load	4.0 kW
Room2	
Indoor Design Dry Bulb Temperature	21.1 °C
Heating Load	5.0 kW
<Other>	
Indoor/Outdoor Equivalent Piping Length	30 m

2. Heating Calculation

(1) Temporary Selection of Indoor Units

Room1	
PEFY-P18	5.9 kW (Rated)
Room2	
PEFY-P18	5.9 kW (Rated)

(2) Total Indoor Units Capacity

$$P18 + P18 = P36$$

(3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36	12.3 kW
----------	---------

(4) Total Indoor Units Capacity Correction Calculation

Room1	
Indoor Design Dry Bulb Temperature Correction (26°C)	0.81 (Refer to Fig.4)
Room2	
Indoor Design Dry Bulb Temperature Correction (21°C)	1.00 (Refer to Fig.4)

Total Indoor Units Capacity (CTi)

$$\begin{aligned} CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\ &= 5.9 \times 0.81 + 5.9 \times 1.00 \\ &\approx 10.6 \text{ kW} \end{aligned}$$

(5) Outdoor Unit Correction Calculation

Outdoor Design Wet Bulb Temperature Correction (2°C)	1.00 (Refer to Fig.5)
Piping Length Correction (30 m)	0.98 (Refer to Fig.6)
Defrost Correction	0.89 (Refer to Tbl.1)

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned} CTo &= \text{Outdoor Unit Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length} \\ &\quad \times \text{Correction} \times \text{Defrost Correction} \\ &= 12.3 \times 1.00 \times 0.98 \times 0.89 \\ &\approx 10.7 \text{ kW} \end{aligned}$$

(6) Determination of Maximum System Capacity (CTx)

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

$$CTi = 10.6 < CTo = 10.7, \text{ thus, select } CTi.$$

$$CTx = CTi = 10.6 \text{ kW}$$

(7) Comparison with Essential Load

Against the essential load 9.0kW, the maximum system capacity is 10.6kW: Proper outdoor units have been selected.

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

$CTx = CTi$, thus, calculate by the calculation below

Room1	
Indoor Unit Rating × Indoor Design Temperature Correction	
$= 5.9 \times 0.81$	
$\approx 4.8 \text{ kW}$	OK: fulfills the load 4.0kW

Room2	
Indoor Unit Rating × Indoor Design Temperature Correction	
$= 5.9 \times 1.00$	
$= 5.9 \text{ kW}$	OK: fulfills the load 5.0kW

Completed selecting units since the selected units fulfill the heating loads of Room 1, 2.

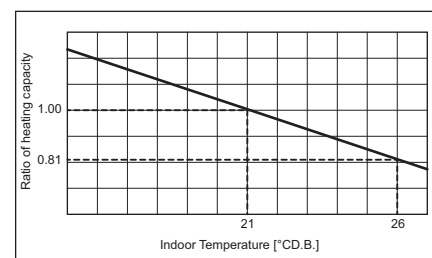


Fig.4 Indoor unit temperature correction
To be used to correct indoor unit only

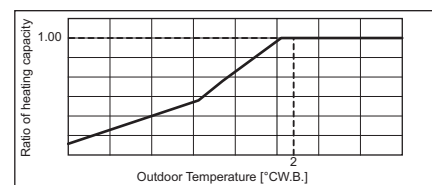


Fig.5 Outdoor unit temperature correction
To be used to correct outdoor unit only

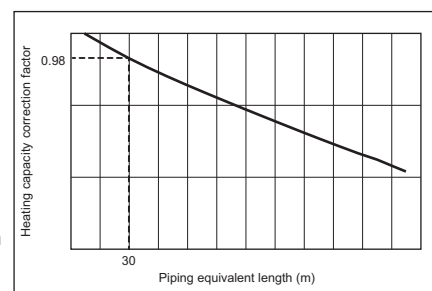


Fig.6 Correction of refrigerant piping length

Tbl.1 Table of correction factor at frost and defrost

Outdoor inlet air temp. °FWB	43	39	36	32	28	25	21	18	14	5	-4	-13
Outdoor inlet air temp. °CWB	6	4	2	0	-2	-4	-6	-8	-10	-15	-20	-25
PUMY-P36NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P48NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P60NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95

PJMY-P-NKMU1

3. Power input of outdoor unit
<Cooling>

(1) Rated power input of outdoor unit 2.45 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 37 °CD.B., Indoor temp. 22 °CW.B.)
0.99
Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 37 °CD.B., Indoor temp. 18 °CW.B.)
0.85

Average indoor temp. power input coefficient (C_{ave}) = $\sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$
n: Total number of the indoor units
k: Number of the indoor unit
 c_k : Outdoor unit power input coefficient of k indoor unit room temp.
 M_k : Number part of the k indoor unit model (e.g. P36 → 36)

= $0.99 \times 18 / (18 + 18) + 0.85 \times 18 / (18 + 18)$
= 0.92

(3) No need to consider Coefficient of the partial load $f(CTi/CTo)$ -

(4) Outdoor power input (Plo)

Maximum System Capacity (CTx) = Total Outdoor unit Capacity (CTo), so use the following formula
Plo = Outdoor unit Cooling Rated Power Input × Correction Coefficient of Indoor temperature
= 2.445×0.92
≈ 2.20 kW

<Heating>

(1) Rated power input of outdoor unit 3.1 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 2 °CW.B., Indoor temp. 26 °CD.B.)

0.87

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 2 °CW.B., Indoor temp. 21.1 °CD.B.)

1.20

Average indoor temp. power input coefficient $(C_{ave}) = \sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$

n: Total number of the indoor units

k: Number of the indoor unit

c_k : Outdoor unit power input coefficient of k indoor unit room temp.

M_k : Number part of the k indoor unit model (e.g. P36 → 36)

$$= 0.87 \times 18 / (18 + 18) + 1.2 \times 18 / (18 + 18)$$

$$\approx 1.04$$

(3) Coefficient of the partial load $f(CTi/CTo)$ 0.99

(4) Outdoor power input (Plo)

Maximum System Capacity (CTx) = Total Indoor unit Capacity (CTi), so use the following formula

Plo = Outdoor unit Heating Rated Power Input × Correction Coefficient of Indoor temperature × $f(CTi/CTo)$

$$= 3.1 \times 1.04 \times 0.99$$

$$\approx 3.20 \text{ kW}$$

<Cooling>

Design Condition	
Outdoor Design Dry Bulb Temperature	99 °F
Total Cooling Load	31,000 BTU/h
Room1	
Indoor Design Dry Bulb Temperature	82 °F
Indoor Design Wet Bulb Temperature	72 °F
Cooling Load	17,000 BTU/h
Room2	
Indoor Design Dry Bulb Temperature	75 °F
Indoor Design Wet Bulb Temperature	64 °F
Cooling Load	14,000 BTU/h
<Other>	
Indoor/Outdoor Equivalent Piping Length	98 ft.

1. Cooling Calculation

(1) Temporary Selection of Indoor Units

Room1	
PEFY-P18	18,000 BTU/h (Rated)
Room2	
PEFY-P18	18,000 BTU/h (Rated)

(2) Total Indoor Units Capacity

$$P18 + P18 = P36$$

(3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36	36,000 BTU/h
----------	--------------

(4) Total Indoor Units Capacity Correction Calculation

Room1	
Indoor Design Wet Bulb Temperature Correction (72°F)	1.08 (Refer to Fig.1)
Room2	
Indoor Design Wet Bulb Temperature Correction (64°F)	0.85 (Refer to Fig.1)

Total Indoor Units Capacity (CTi)

$$\begin{aligned}
 CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\
 &= 18,000 \times 1.08 + 18,000 \times 0.85 \\
 &\approx 34,700 \text{ BTU/h}
 \end{aligned}$$

(5) Outdoor Unit Correction Calculation

Outdoor Design Dry Bulb Temperature Correction (99°F)	0.99 (Refer to Fig.2)
Piping Length Correction (98 ft.)	0.97 (Refer to Fig.3)

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned}
 CTo &= \text{Outdoor Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length Correction} \\
 &= 36,000 \times 0.99 \times 0.97 \\
 &\approx 34,600 \text{ BTU/h}
 \end{aligned}$$

(6) Determination of Maximum System Capacity (CTx)

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

$$CTi = 34,700 > CTo = 34,600, \text{ thus, select } CTo.$$

$$CTx = CTo = 34,600 \text{ BTU/h}$$

(7) Comparison with Essential Load

Against the essential load 31,000BTU/h, the maximum system capacity is 34,600BTU/h: Proper outdoor units have been selected.

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

CTx = CTo, thus, calculate by the calculation below

Room1

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room1 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 34,600 \times (18,000 \times 1.08) / (18,000 \times 1.08 + 18,000 \times 0.85) \\
 &\approx 19,400 \text{ BTU/h} \quad \text{OK: fulfills the load 17,000BTU/h}
 \end{aligned}$$

Room2

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room2 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 34,600 \times (18,000 \times 0.85) / (18,000 \times 1.08 + 18,000 \times 0.85) \\
 &\approx 15,200 \text{ BTU/h} \quad \text{OK: fulfills the load 14,000BTU/h}
 \end{aligned}$$

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

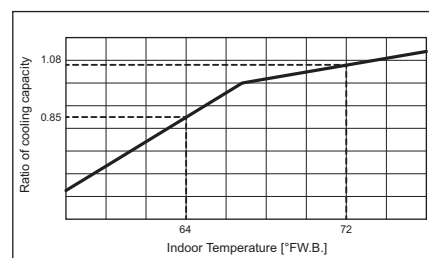


Fig.1 Indoor unit temperature correction
To be used to correct indoor unit only

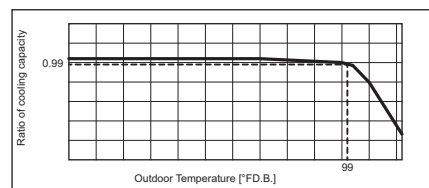


Fig.2 Outdoor unit temperature correction
To be used to correct outdoor unit only

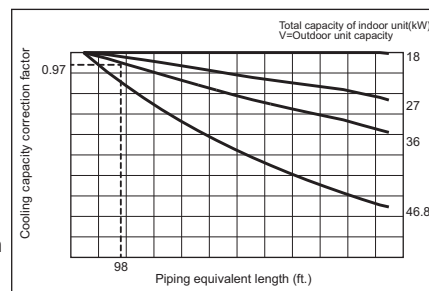


Fig.3 Correction of refrigerant piping length

<Heating>

Design Condition	
Outdoor Design Wet Bulb Temperature	36 °F
Total Heating Load	31,000 BTU/h
Room1	
Indoor Design Dry Bulb Temperature	79 °F
Heating Load	14,000 BTU/h
Room2	
Indoor Design Dry Bulb Temperature	70 °F
Heating Load	17,000 BTU/h
<Other>	
Indoor/Outdoor Equivalent Piping Length	98 ft.

2. Heating Calculation

(1) Temporary Selection of Indoor Units

Room1	
PEFY-P18	20,000 BTU/h (Rated)
Room2	
PEFY-P18	20,000 BTU/h (Rated)

(2) Total Indoor Units Capacity

$$P18 + P18 = P36$$

(3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36	42,000 BTU/h
----------	--------------

(4) Total Indoor Units Capacity Correction Calculation

Room1	
Indoor Design Dry Bulb Temperature Correction (79°F)	0.81 (Refer to Fig.4)
Room2	
Indoor Design Dry Bulb Temperature Correction (70°F)	1.00 (Refer to Fig.4)

Total Indoor Units Capacity (CTi)

$$\begin{aligned} CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\ &= 20,000 \times 0.81 + 20,000 \times 1.00 \\ &= 36,200 \text{ BTU/h} \end{aligned}$$

(5) Outdoor Unit Correction Calculation

Outdoor Design Wet Bulb Temperature Correction (36°F)	1.00 (Refer to Fig.5)
Piping Length Correction (98 ft.)	0.98 (Refer to Fig.6)
Defrost Correction	0.89 (Refer to Tbl.1)

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned} CTo &= \text{Outdoor Unit Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length} \\ &\quad \times \text{Correction} \times \text{Defrost Correction} \\ &= 42,000 \times 1.00 \times 0.98 \times 0.89 \\ &\approx 36,700 \text{ BTU/h} \end{aligned}$$

(6) Determination of Maximum System Capacity (CTx)

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

$$CTi = 36,200 < CTo = 36,700, \text{ thus, select } CTi.$$

$$CTx = CTi = 36,200 \text{ BTU/h}$$

(7) Comparison with Essential Load

Against the essential load 31,000BTU/h, the maximum system capacity is 36,200BTU/h: Proper outdoor units have been selected.

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

CTx = CTi, thus, calculate by the calculation below

Room1	
Indoor Unit Rating × Indoor Design Temperature Correction	
= 20,000 × 0.81	
= 16,200 BTU/h	OK: fulfills the load 14,000BTU/h

Room2	
Indoor Unit Rating × Indoor Design Temperature Correction	
= 20,000 × 1.00	
= 20,000 BTU/h	OK: fulfills the load 17,000BTU/h

Completed selecting units since the selected units fulfill the heating loads of Room 1, 2.

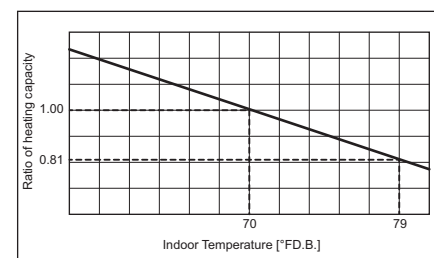


Fig.4 Indoor unit temperature correction
To be used to correct indoor unit only

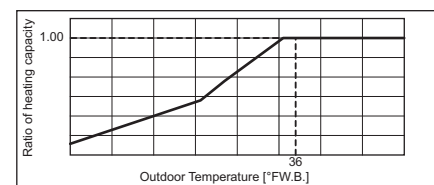


Fig.5 Outdoor unit temperature correction
To be used to correct outdoor unit only

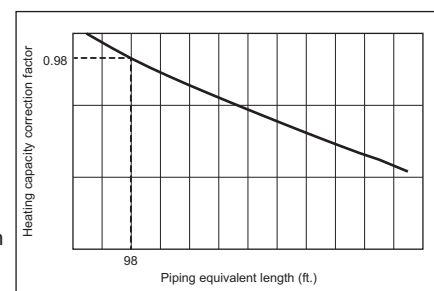


Fig.6 Correction of refrigerant piping length

Tbl.1 Table of correction factor at frost and defrost

Outdoor inlet air temp. °FWB	43	39	36	32	28	25	21	18	14	5	-4	-13
Outdoor inlet air temp. °CWB	6	4	2	0	-2	-4	-6	-8	-10	-15	-20	-25
PUMY-P36NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P48NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P60NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95

PJMY-P-NKMU1

3. Power input of outdoor unit
<Cooling>

(1) Rated power input of outdoor unit 2.45 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 99 °FD.B., Indoor temp. 72 °FW.B.)
0.99
Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 99 °FD.B., Indoor temp. 64 °FW.B.)
0.85

Average indoor temp. power input coefficient $(C_{ave}) = \sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$
n: Total number of the indoor units
k: Number of the indoor unit
c_k: Outdoor unit power input coefficient of k indoor unit room temp.
M_k: Number part of the k indoor unit model (e.g. P36 → 36)

= 0.99 × 18/(18 + 18) + 0.85 × 18/(18 + 18)
= 0.92

(3) No need to consider Coefficient of the partial load f'(CTi/CTo) -

(4) Outdoor power input (Plo)

Maximum System Capacity (CTx) = Total Outdoor unit Capacity (CTo), so use the following formula
Plo = Outdoor unit Cooling Rated Power Input × Correction Coefficient of Indoor temperature
= 2.445 × 0.92
≈ 2.20 kW

<Heating>

(1) Rated power input of outdoor unit 3.1 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 36 °FW.B., Indoor temp. 79 °FD.B.)
0.87

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 36 °FW.B., Indoor temp. 70 °FD.B.)
1.20

$$\text{Average indoor temp. power input coefficient } (C_{ave}) = \sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$$

n: Total number of the indoor units
k: Number of the indoor unit
c_k: Outdoor unit power input coefficient of k indoor unit room temp.
M_k: Number part of the k indoor unit model (e.g. P36 → 36)

$$= 0.87 \times 18 / (18 + 18) + 1.2 \times 18 / (18 + 18) \\ \approx 1.04$$

(3) Coefficient of the partial load $f'(CTi/CTo)$ 0.99

(4) Outdoor power input (P_{lo})

Maximum System Capacity (CT_x) = Total Indoor unit Capacity (CT_i), so use the following formula
P_{lo} = Outdoor unit Heating Rated Power Input × Correction Coefficient of Indoor temperature × $f'(CTi/CTo)$
= 3.1 × 1.04 × 0.99
≈ 3.20 kW

PUMY-P-NKMU1

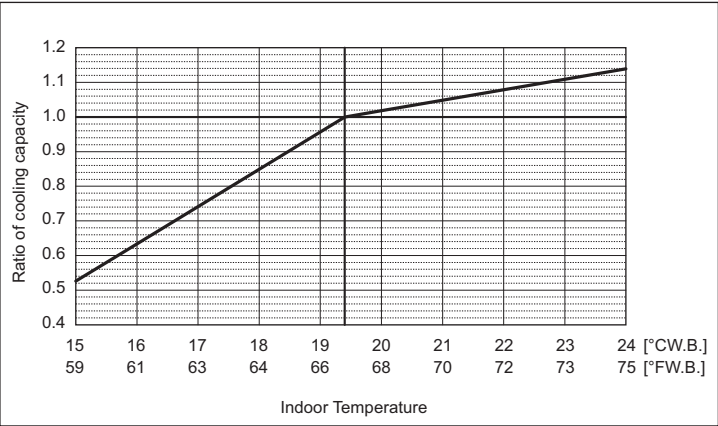
7-2. Correction by temperature

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

PUMY-		P36NKMU1	P48NKMU1
Nominal cooling capacity	BTU/h	36,000	48,000
	kW	10.6	14.1
	Input kW	2.445	3.690

Indoor unit temperature correction

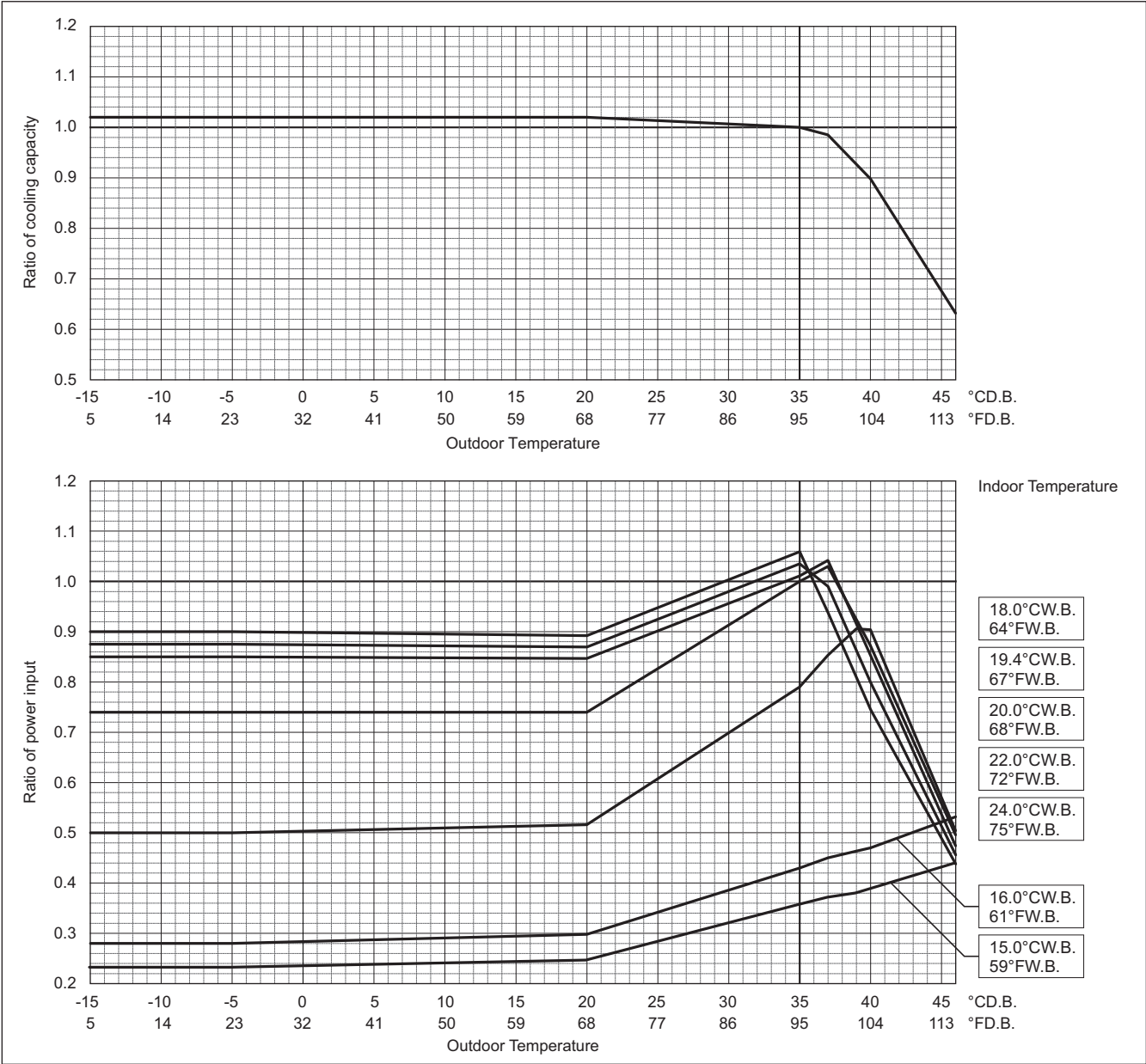
To be used to correct indoor unit capacity only



Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.
Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



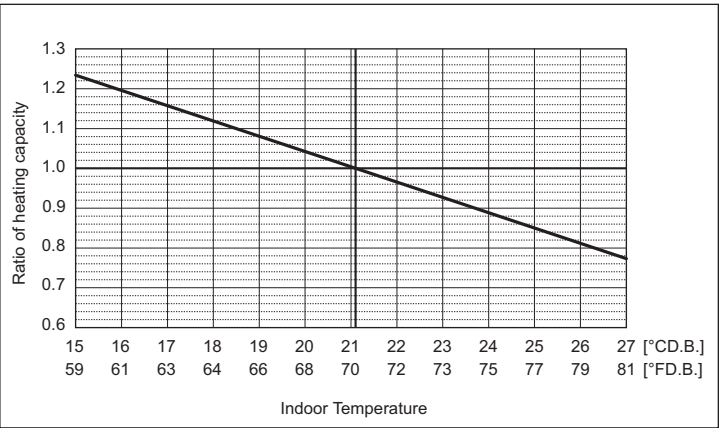
7. CAPACITY TABLES

Outdoor units

PUMY-		P36NKMU1	P48NKMU1
Nominal Heating capacity	BTU/h	42,000	54,000
	kW	12.3	15.8
	Input kW	3.100	4.085

Indoor unit temperature correction

To be used to correct indoor unit capacity only

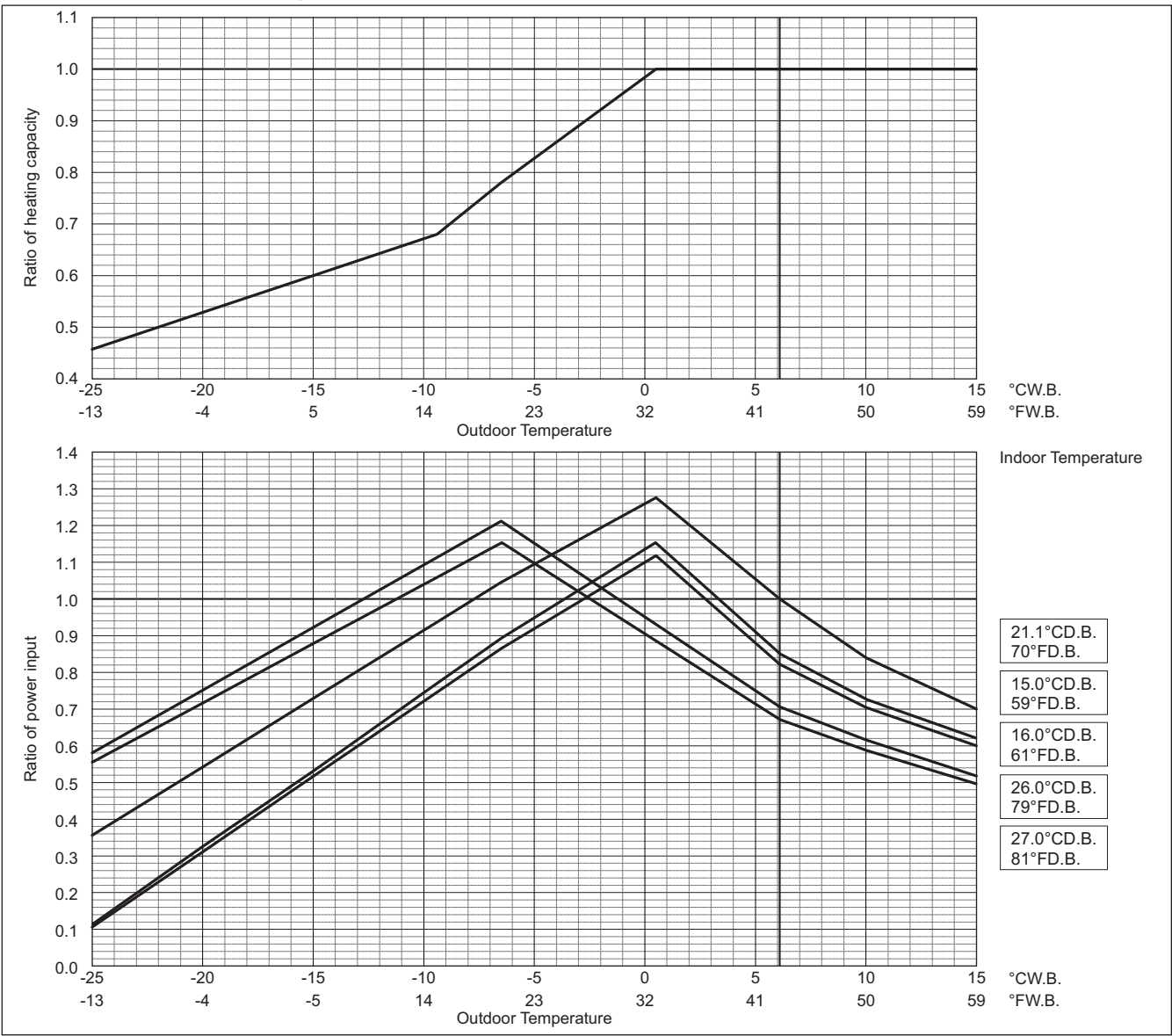


Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



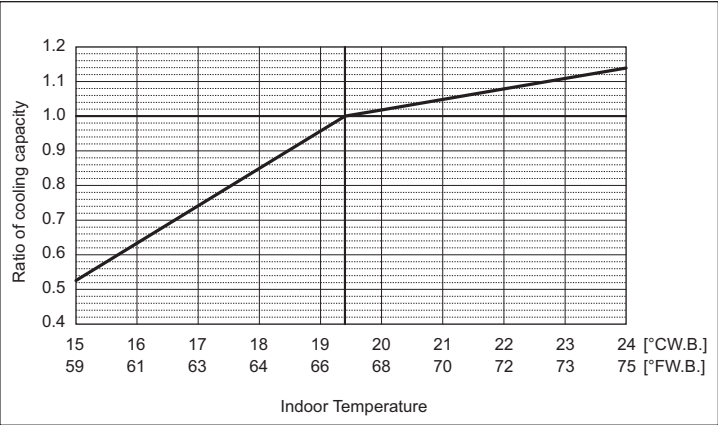
PUMY-P-NKMU1

PUMY-P-NKMU1

PUMY-		P60NKMU1
Nominal cooling capacity	BTU/h	60,000
	kW	17.6
	Input kW	4.680

Indoor unit temperature correction

To be used to correct indoor unit capacity only

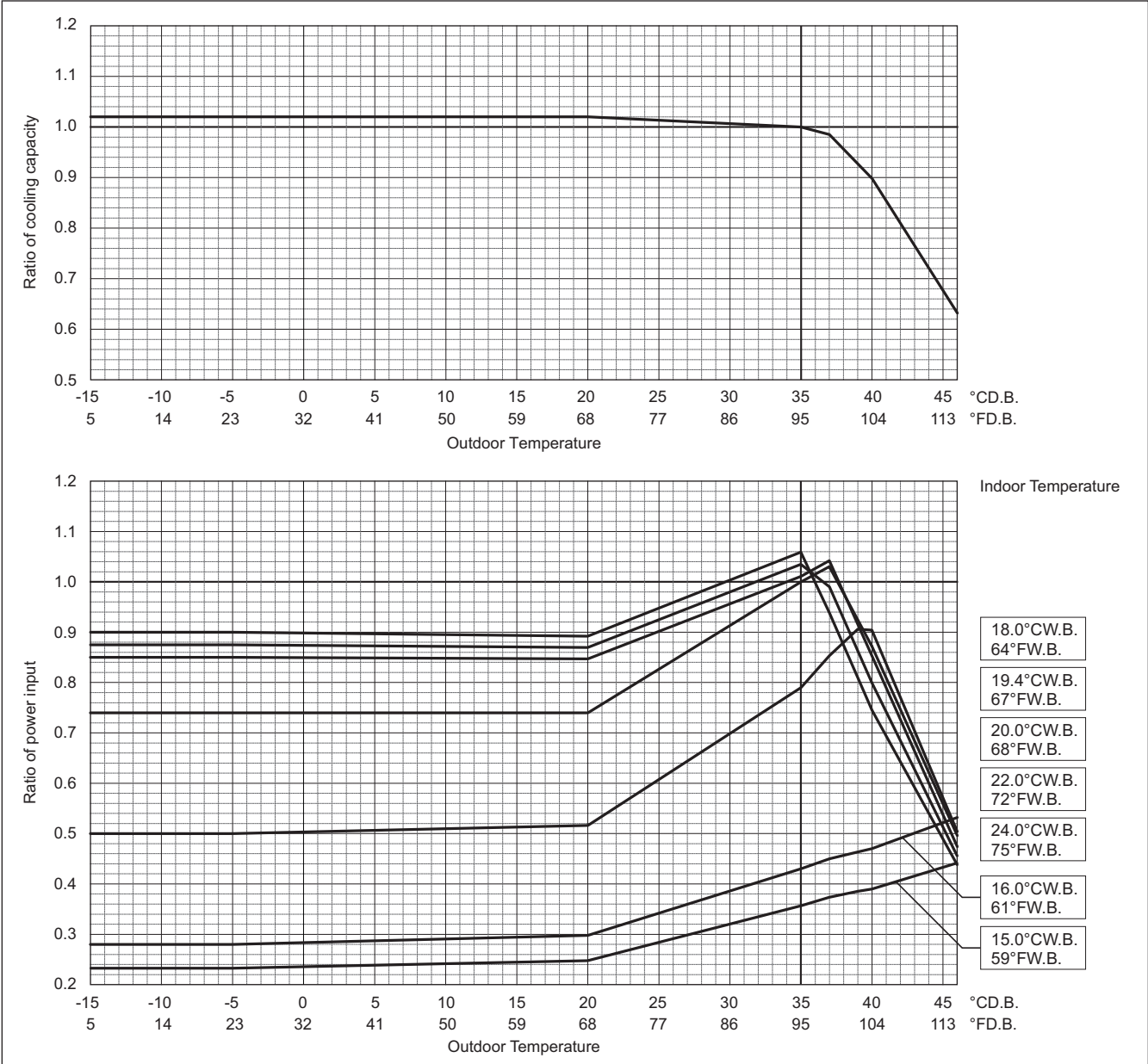


Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



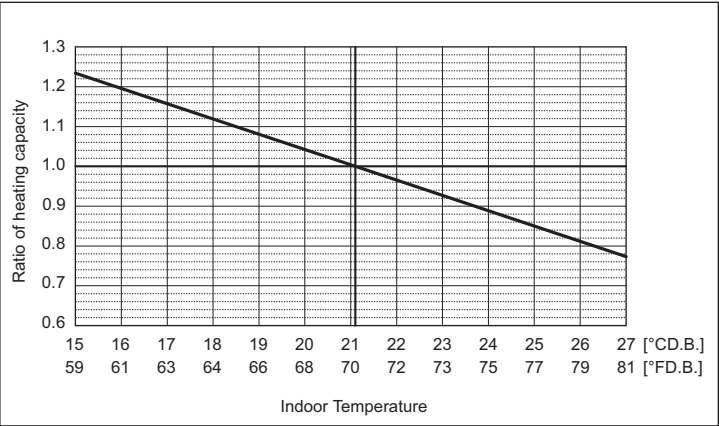
7. CAPACITY TABLES

Outdoor units

PUMY-		P60NKMU1
Nominal Heating capacity	BTU/h	66,000
	kW	19.3
Input	kW	5.450

Indoor unit temperature correction

To be used to correct indoor unit capacity only

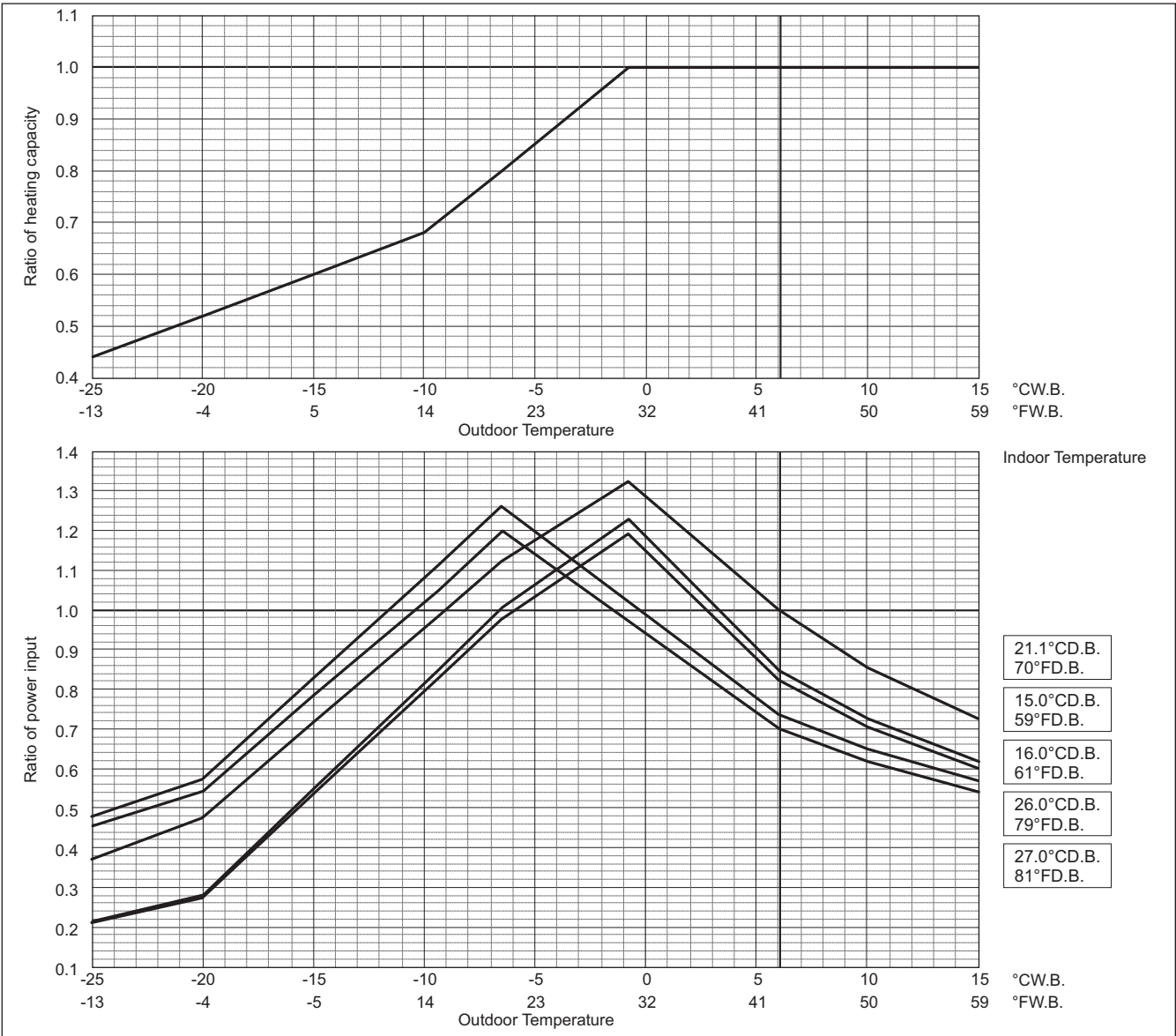


Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



PUMY-P-NKMU1

PUMY-P-NKMU1

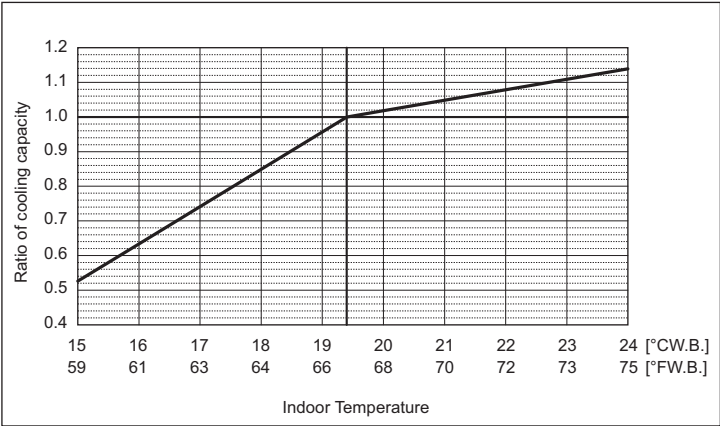
Correction by temperature (High Heating Performance Mode)

CITY MULTI could have various capacities at different designing temperatures. Using the nominal cooling/heating capacity values and the ratios below, the capacity can be found for various temperatures.
To select high heating performance mode, DipSW 7-3 must be set to ON. (In the low ambient temperature, heating capacity and power input become higher than those under standard mode.)

PUMY-		P36NKMU1	P48NKMU1
Nominal cooling capacity	BTU/h	36,000	48,000
	kW	10.6	14.1
	Input kW	2.445	3.690

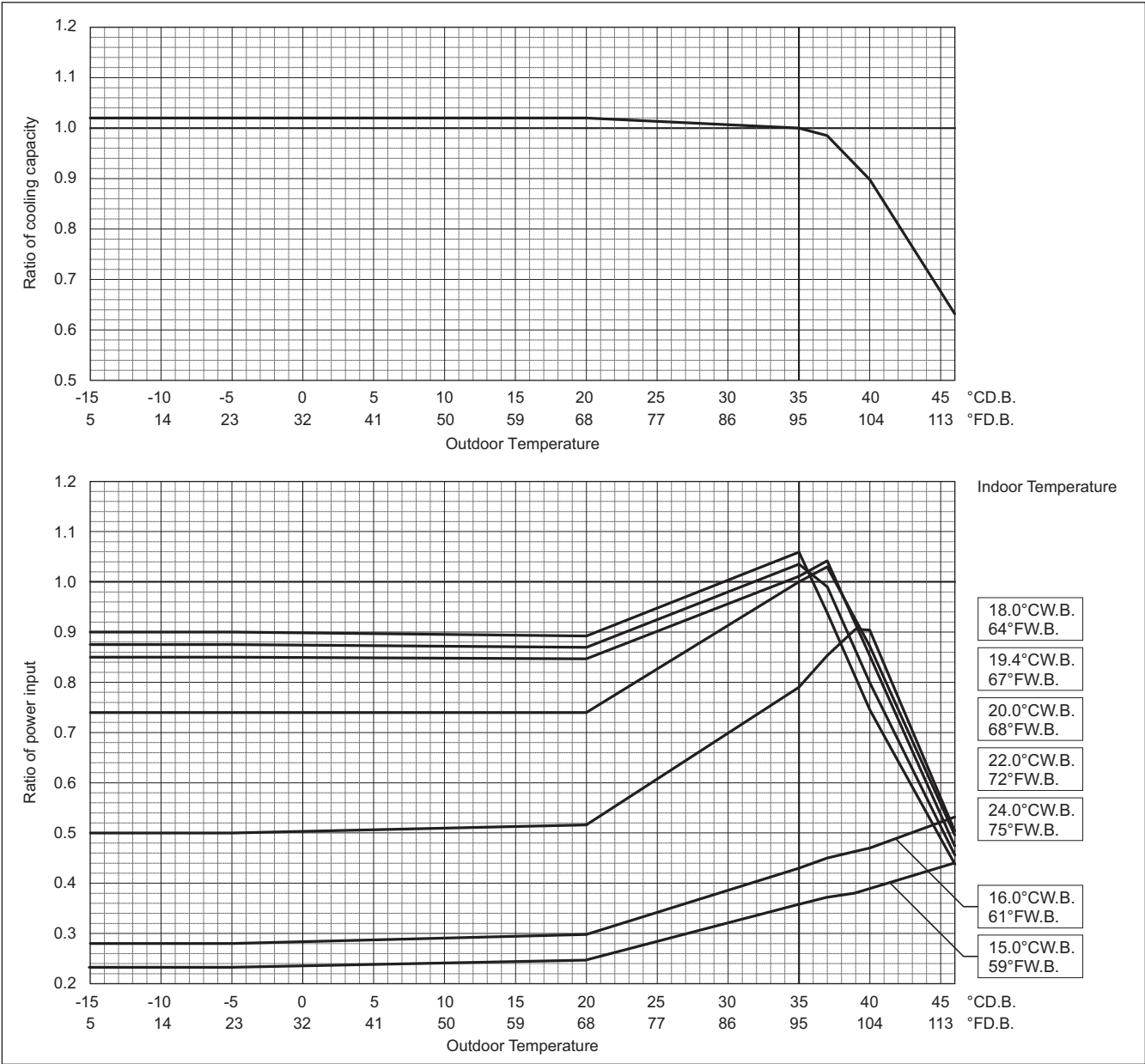
Indoor unit temperature correction

To be used to correct indoor unit capacity only



Outdoor unit temperature correction

To be used to correct outdoor unit only
Outdoor unit capacity is NOT affected by the indoor temperature.
Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



7. CAPACITY TABLES

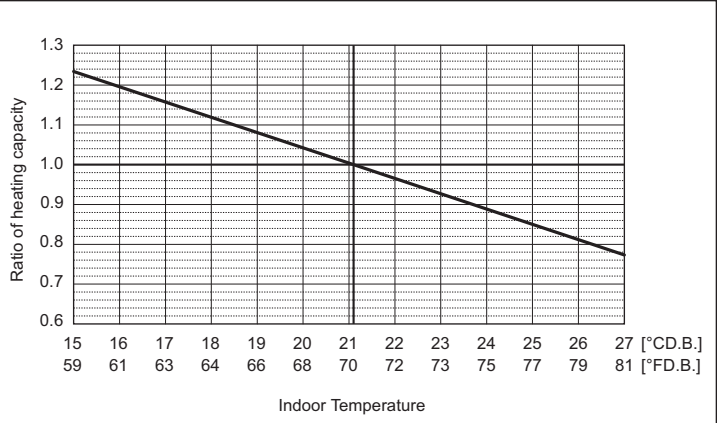
Outdoor units

High Heating Performance Mode

PUMY-		P36NKMU1	P48NKMU1
Nominal Heating capacity	BTU/h	42,000	54,000
	kW	12.3	15.8
	Input kW	3.100	4.085

Indoor unit temperature correction

To be used to correct indoor unit capacity only

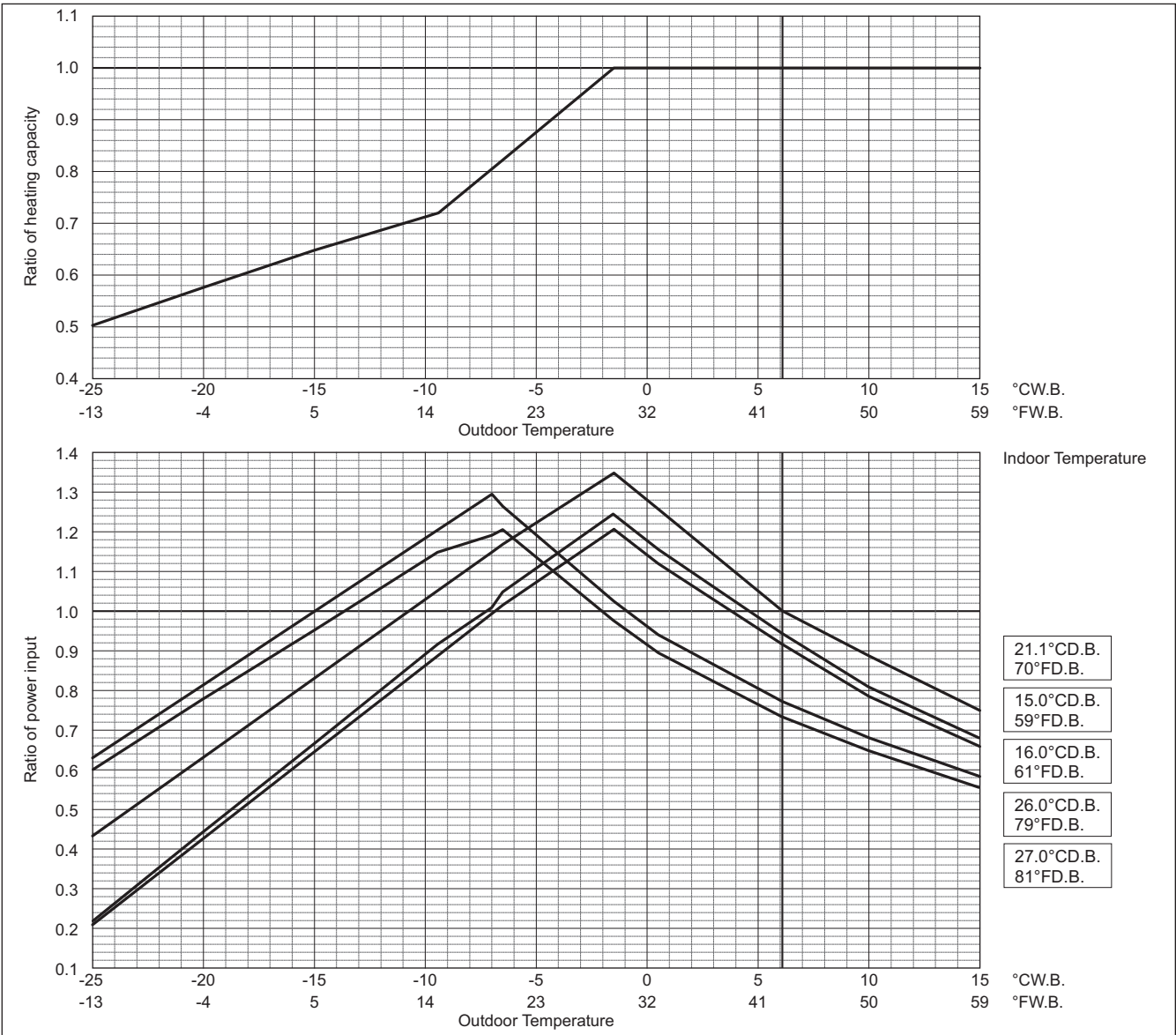


Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.

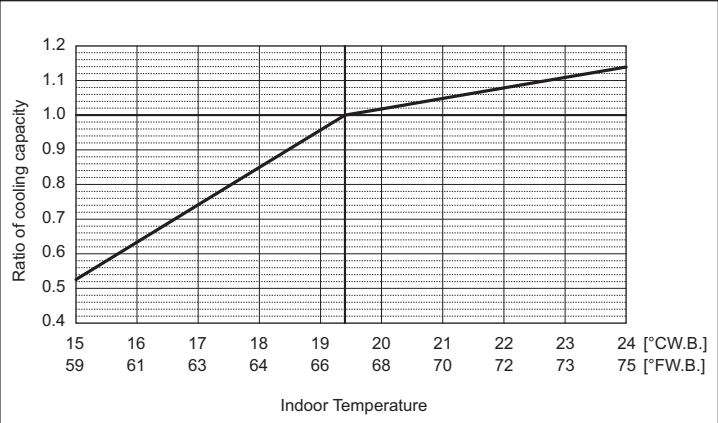


PUMY-P-NKMU1

PUMY-P-NKMU1

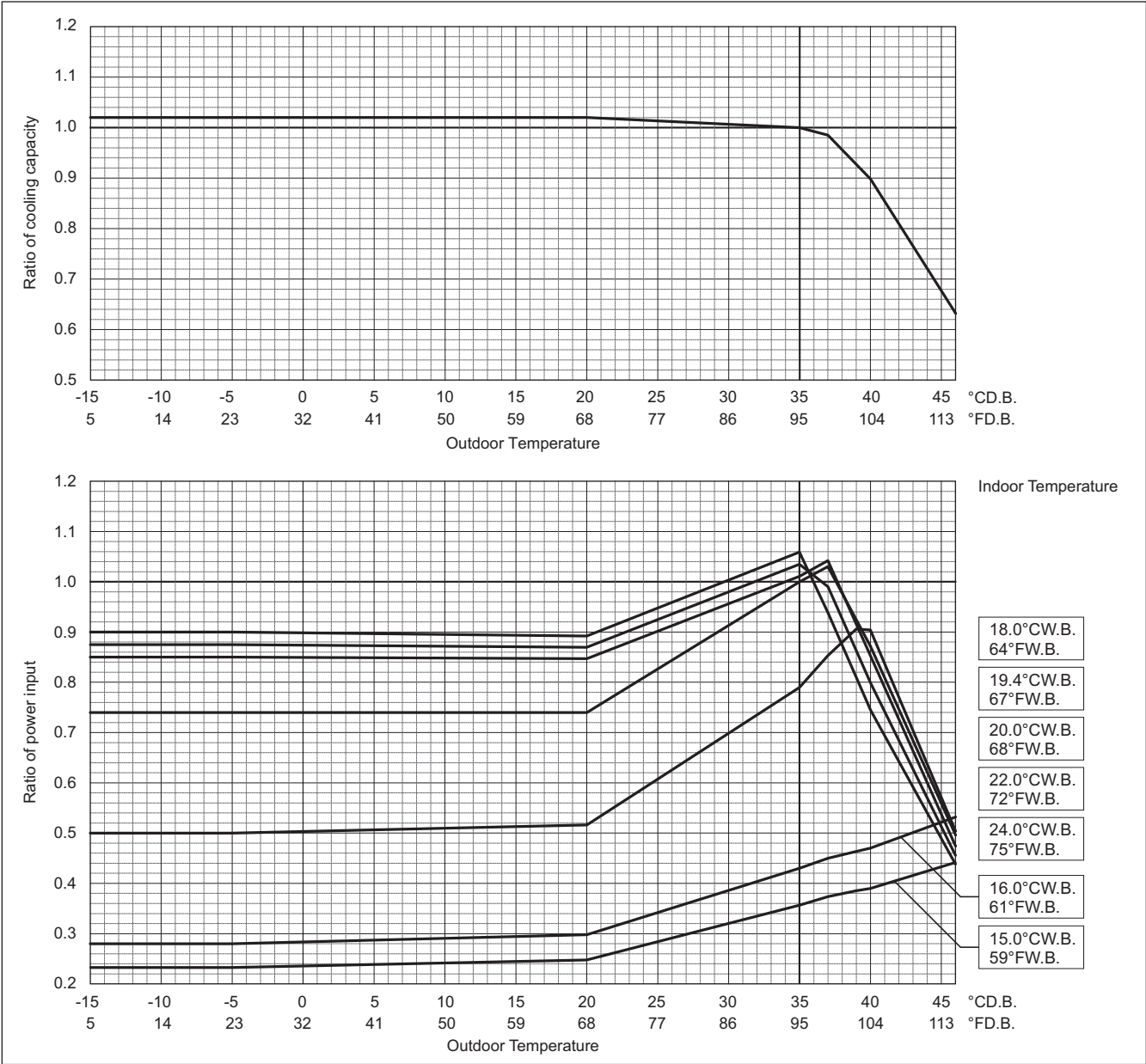
PUMY-		P60NKMU1
Nominal cooling capacity	BTU/h	60,000
	kW	17.6
	Input kW	4.680

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



Outdoor unit temperature correction

To be used to correct outdoor unit only
Outdoor unit capacity is NOT affected by the indoor temperature.
Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



7. CAPACITY TABLES

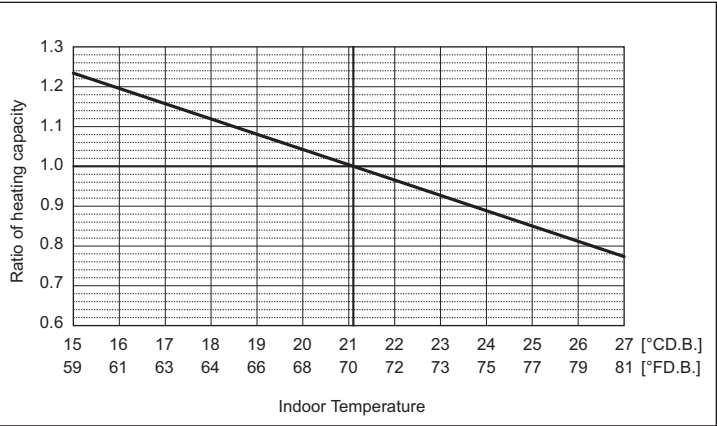
Outdoor units

High Heating Performance Mode

PUMY-		P60NKMU1
Nominal Heating capacity	BTU/h	66,000
	kW	19.3
	Input kW	5.450

Indoor unit temperature correction

To be used to correct indoor unit capacity only

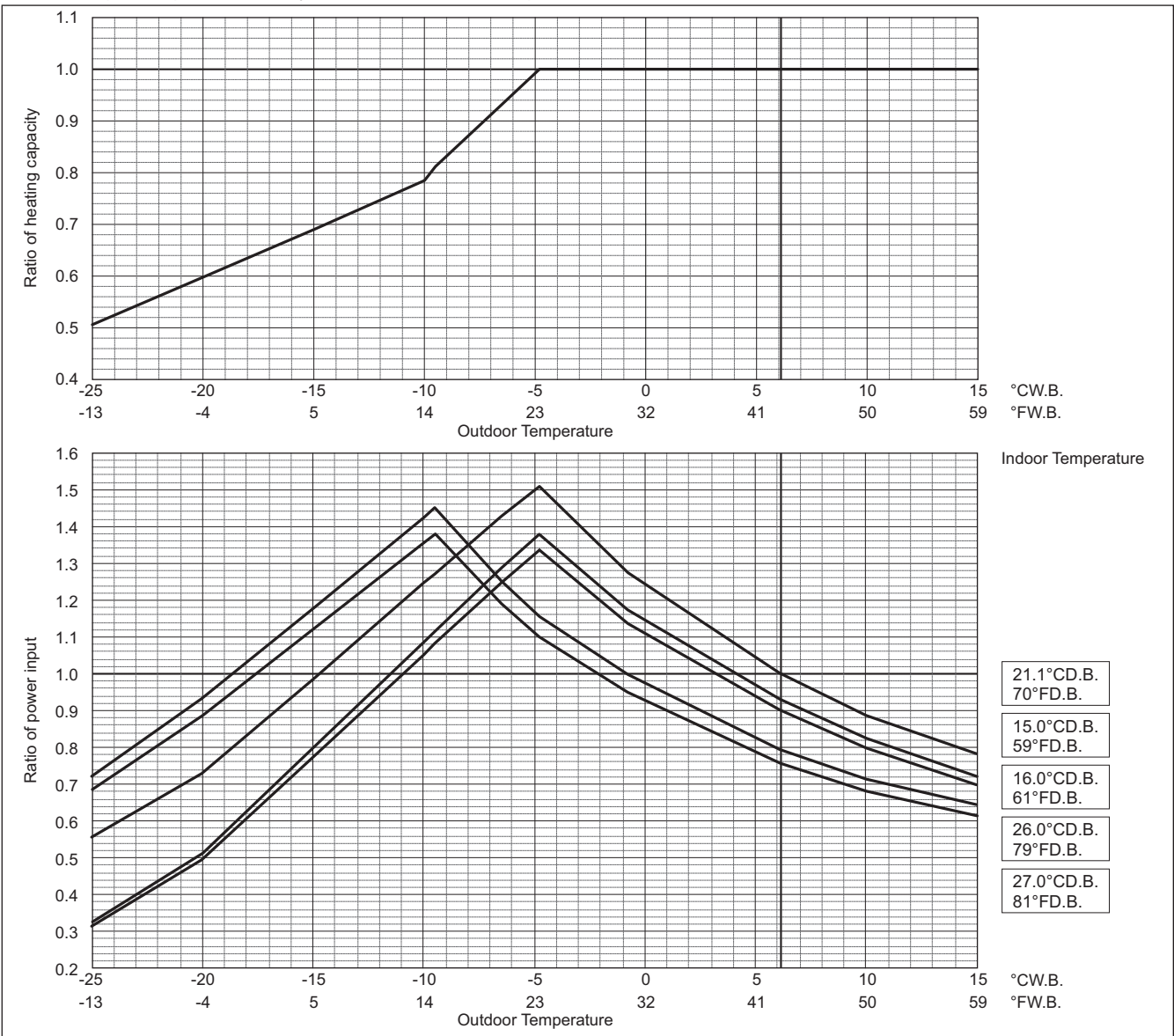


Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



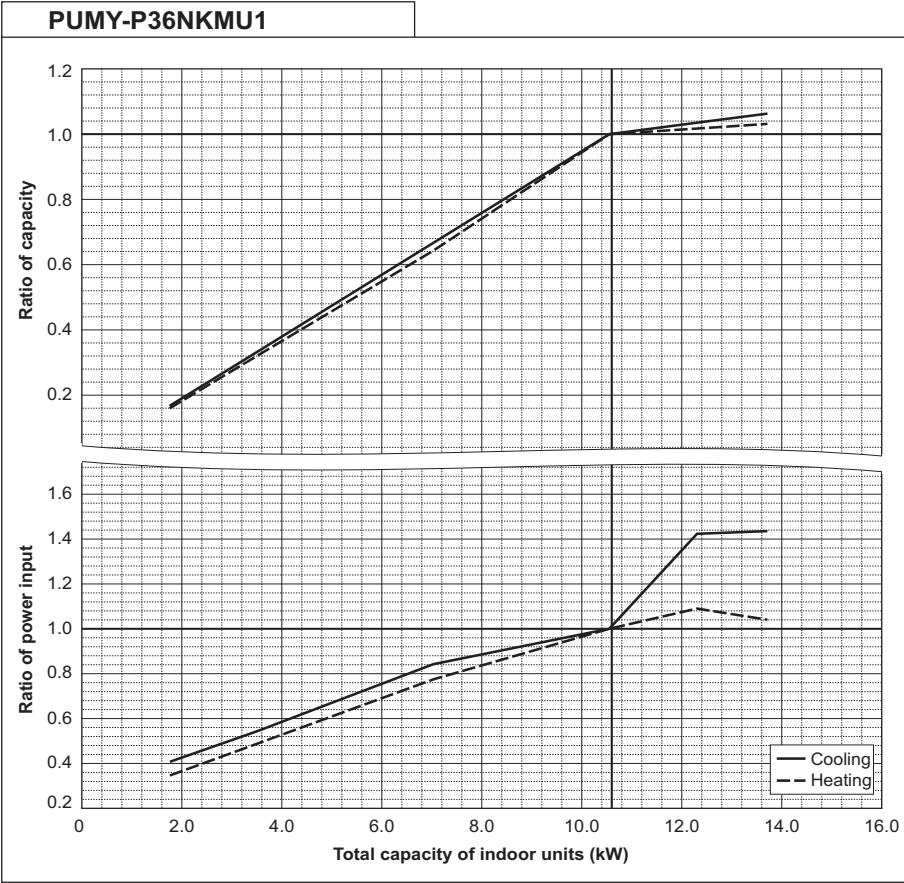
PUMY-P-NKMU1

PUMY-P-NKMU1

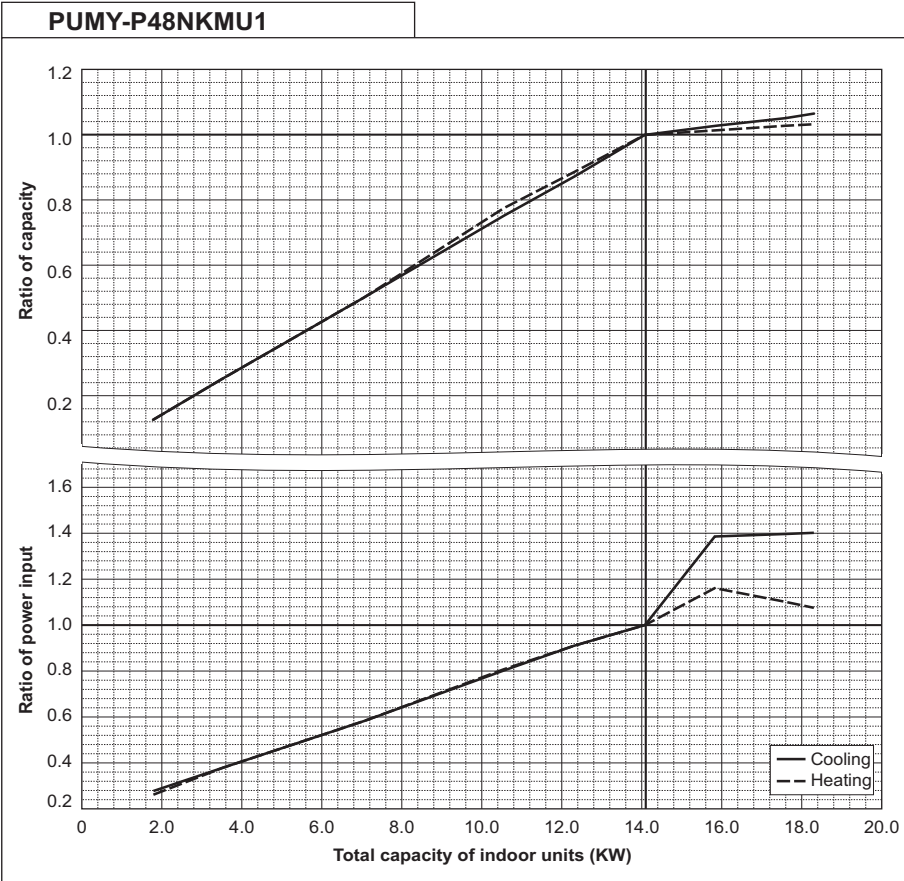
7-3. Correction by total indoor

CITY MULTI system have different capacities and inputs when many combinations of indoor units with different total capacities are connected. Using following tables, the maximum capacity can be found to ensure the system is installed with enough capacity for a particular application.

PUMY-		P36NKMU1
Nominal cooling capacity	BTU/h	36,000
	kW	10.6
	Input kW	2.445
PUMY-		P36NKMU1
Nominal Heating capacity	BTU/h	42,000
	kW	12.3
	Input kW	3.100



PUMY-		P48NKMU1
Nominal cooling capacity	BTU/h	48,000
	kW	14.1
	Input kW	3.690
PUMY-		P48NKMU1
Nominal Heating capacity	BTU/h	54,000
	kW	15.8
	Input kW	4.085

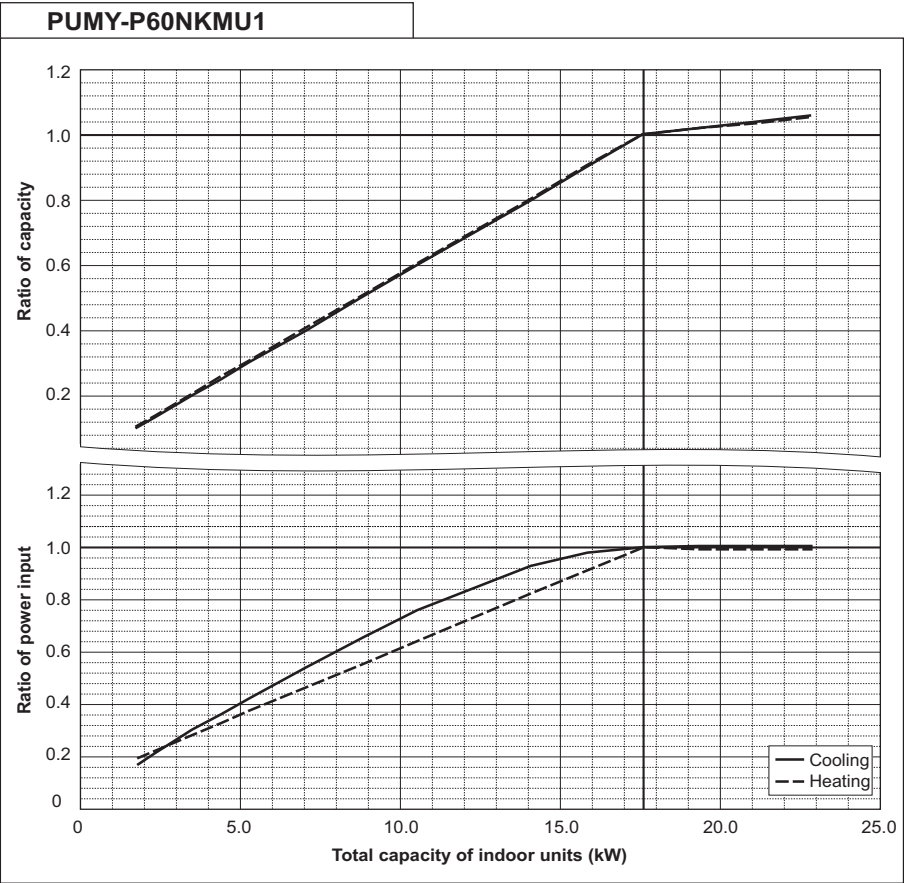


7. CAPACITY TABLES

Outdoor units

PUMY-		P60NKMU1
Nominal cooling capacity	BTU/h	60,000
	kW	17.6
Input	kW	4.680

PUMY-		P60NKMU1
Nominal Heating capacity	BTU/h	66,000
	kW	19.3
Input	kW	5.450

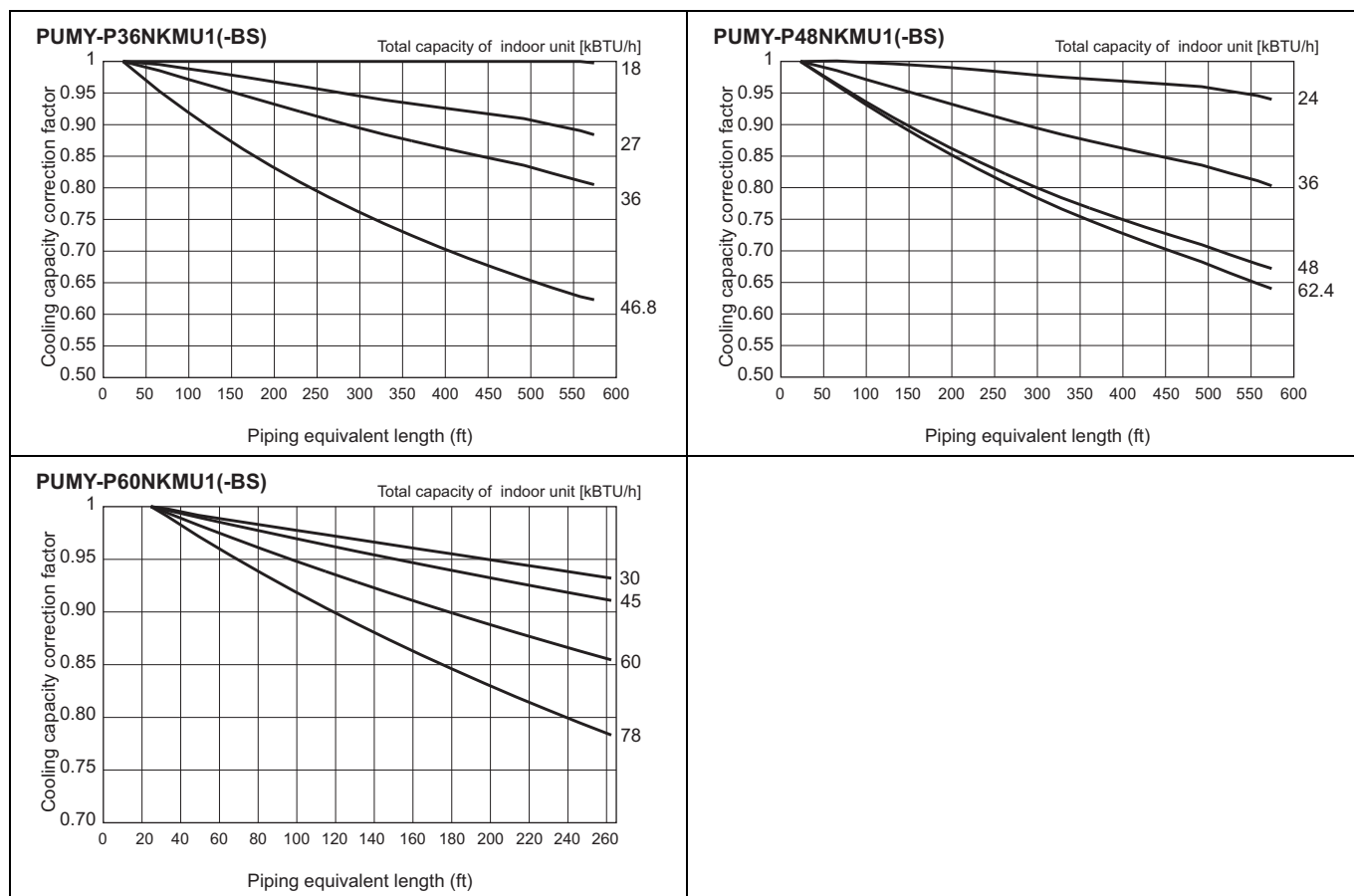


PUMY-P-NKMU1

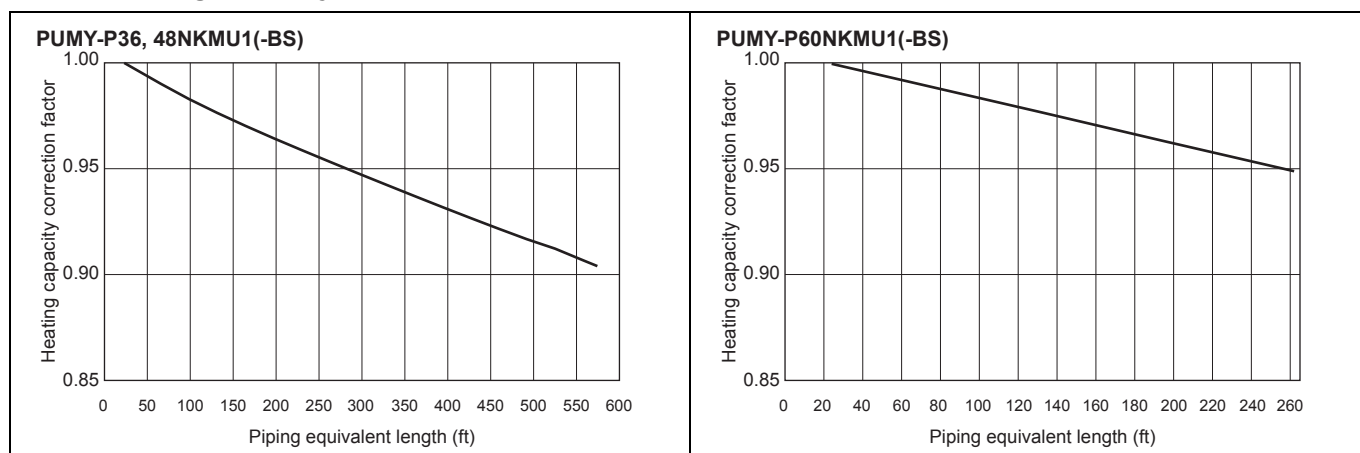
7-4. Correction by refrigerant piping length

CITY MULTI systems can have extended piping lengths if certain limitations are followed, but cooling/heating capacity could be reduced. Using following correction factor by equivalent piping length shown at 7-4-1 and 7-4-2, capacity can be found. 7-4-3 shows how to obtain the equivalent piping length.

7-4-1. Cooling capacity correction



7-4-2. Heating capacity correction



7-4-3. How to obtain the equivalent piping length

1. PUMY-P36, 48, 60NKMU1(-BS)

Equivalent length [m]= (Actual piping length to the farthest indoor unit) + (0.30 x number of bends in the piping)

Equivalent length [ft.]= (Actual piping length to the farthest indoor unit) + (0.99 x number of bends in the piping)

7-5. Correction at frost and defrost

Due to frost at the outdoor heat exchanger and the automatic defrost operation, the heating capacity of the outdoor unit can be calculated by multiplying the correction factor shown in the table below.

Table of correction factor at frost and defrost

Outdoor inlet air temp. °FWB	43	39	36	32	28	25	21	18	14	5	-4	-13
Outdoor inlet air temp. °CWB	6	4	2	0	-2	-4	-6	-8	-10	-15	-20	-25
PUMY-P36NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P48NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95
PUMY-P60NKMU1(-BS)	1.00	0.98	0.89	0.88	0.89	0.90	0.95	0.95	0.95	0.95	0.95	0.95

* The correction factors in the table above are used for a full-load and above.

Use the formula below to calculate the correction factor to use for a partial load.

Correction factor for partial load: K

Correction factor for a full load and above: K_0

Partial load factor: A

$$K = 1 - (1 - K_0) \times A$$

8-1. JOINT

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric. One kind of Joint sets are available for use. Refer to section "Piping Design" or the Installation Manual that comes with the Joint set for how to install the Joint set.

CMY-Y62-G

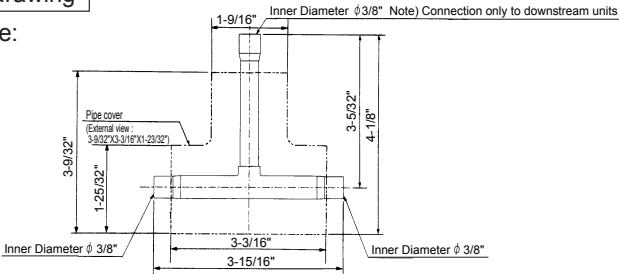
Ref.: 7FAGFA
in.

1. Specification

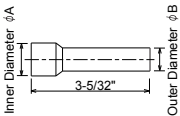
Main	Items	Details
	Number of ports	2 ports
Accessory	Number of branch joints	One for each liquid and gas pipe
	Pipe material	Phosphorus deoxidized copper C1220T-OL (JIS H3300)
	Insulation material	Foamed polyethylene (one for each liquid and gas pipe)
Accessory	Reducer	10 reducers of 7 types (Refer to the external drawing for details.)

2. External drawing

For liquid pipe:

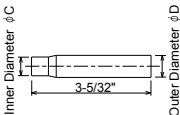
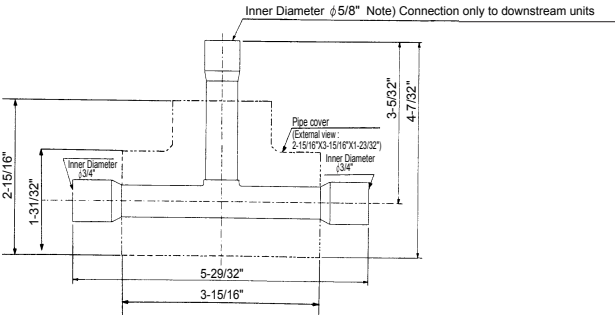


Reducer (Accessory):



A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 1/2"	ϕ 3/8"	2
ϕ 3/4"	ϕ 5/8"	1
ϕ 7/8"	ϕ 3/4"	1

For gas pipe:



C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 1/4"	ϕ 3/8"	2
ϕ 1/2"	ϕ 5/8"	1
ϕ 1/2"	ϕ 3/4"	1
ϕ 5/8"	ϕ 3/4"	2

8-2. HEADER

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric. Two kinds of Header sets are available for use. Refer to section "Piping Design" or the Installation Manual that comes with the Header set for how to install the Header set.

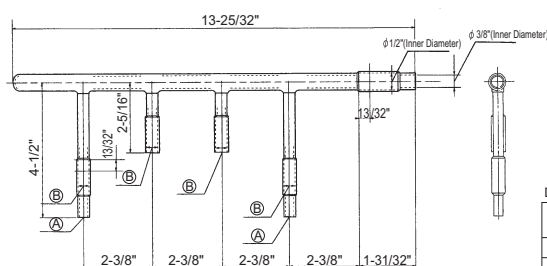
CMY-Y64-G

1. Specification

Items		Details
Main	Number of ports	3 ~ 4 ports
	Number of branch joints	One for each liquid and gas pipe
	Pipe material	Phosphorus deoxidized copper C1220T-OL (JIS H3300)
Accessory	Insulation material	Foamed polyethylene
	Reducer	7 reducers of 5 types
	Cap	2 caps of 2 different types for each liquid and gas pipe ; 4 caps in total

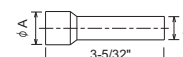
2. External drawing

For liquid pipe:



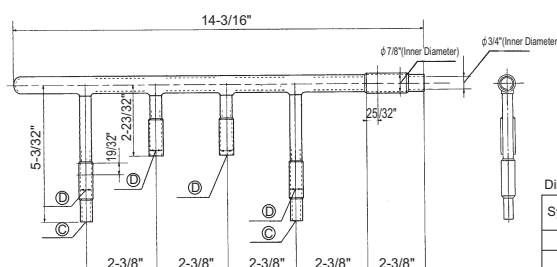
Dimension table	
Symbol	Inner Diameter (mm)
(A)	ϕ 1/4"
(B)	ϕ 3/8"

Reducer (Accessory):

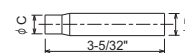


A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 3/4"	ϕ 5/8"	1
ϕ 5/8"	ϕ 1/2"	2
ϕ 3/8"	ϕ 1/4"	2

For gas pipe:



Dimension table	
Symbol	Inner Diameter (mm)
(C)	ϕ 1/2"
(D)	ϕ 5/8"



C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 5/8"	ϕ 3/4"	1
ϕ 3/8"	ϕ 1/2"	1

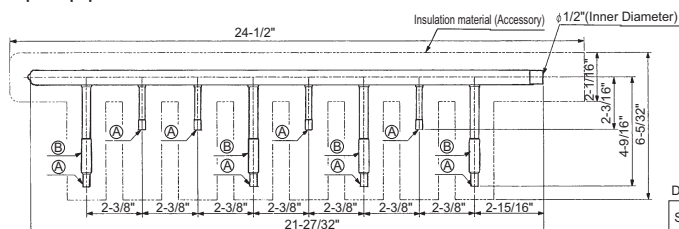
CMY-Y68-G

1. Specification

Items		Details
Main	Number of ports	5 ~ 8 ports
	Number of branch joints	One for each liquid and gas pipe
	Pipe material	Phosphorus deoxidized copper C1220T-OL (JIS H3300)
Accessory	Insulation material	Foamed polyethylene
	Reducer	3 reducers of 3 types
	Cap	3 caps for each liquid and gas pipe ; 6 in total

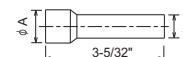
2. External drawing

For liquid pipe:



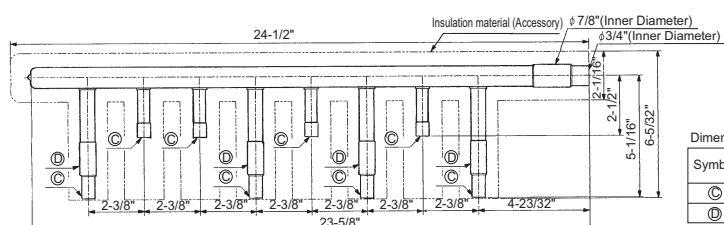
Dimension table	
Symbol	Inner Diameter (mm)
(A)	ϕ 1/4"
(B)	ϕ 3/8"

Reducer (Accessory):

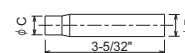


A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 3/4"	ϕ 5/8"	1
ϕ 1/2"	ϕ 3/8"	1

For gas pipe:



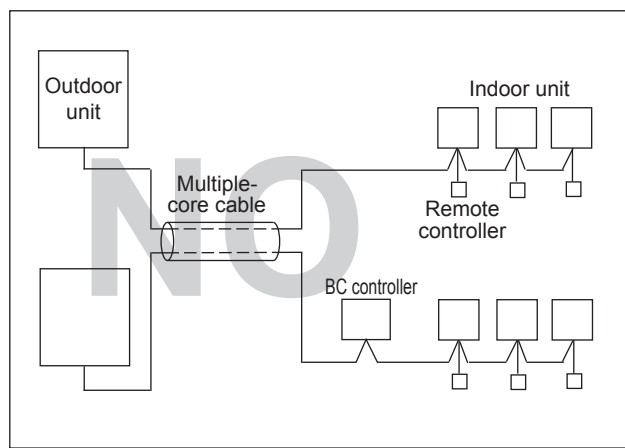
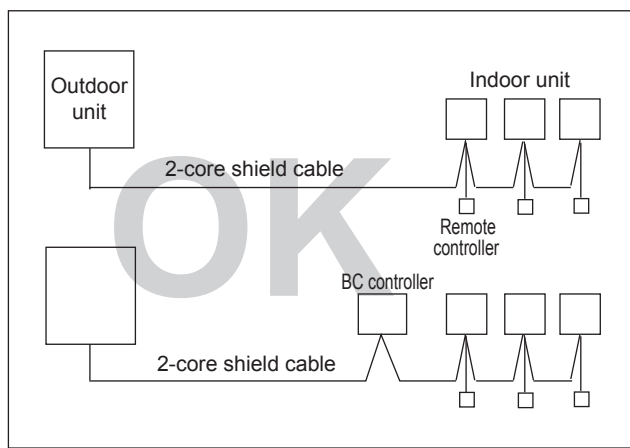
Dimension table	
Symbol	Inner Diameter (mm)
(C)	ϕ 1/2"
(D)	ϕ 5/8"



C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 5/8"	ϕ 3/4"	1

9-1. 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 damaged.
- 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.
- ⑦ When extending the transmission line, make sure to extend the shield cable as well.



9. ELECTRICAL WORK

Outdoor units

9-2. Power supply for Outdoor unit

9-2-1. Electrical characteristics of Outdoor unit at cooling mode

Symbols: MCA: Minimum Circuit Ampacity

PUMY-P-NKMU1

SC: Starting Current RLA: Rated Load Amps

Model	Outdoor Units						Compressor		Fan
	Hz	Volts	Voltage range	RLA(A)	MCA(A)	Max.Fuse(A)	Output (kW)	SC(A)	Output (kW)
PUMY-P36NKMU1(-BS)	60Hz	208/230V	198 to 253V	19	31	44	2.8	14	0.074 x 2
PUMY-P48NKMU1(-BS)	60Hz	208/230V	198 to 253V	19	31	44	3.3	14	0.074 x 2
PUMY-P60NKMU1(-BS)	60Hz	208/230V	198 to 253V	18	36	42	4.1	7	0.20 x 2

PUMY-P-NKMU1

9-3. Power cable specifications

Thickness of wire for main power supply, capacities of the switch and system impedance

1-phase 2-wire, 208V, 60Hz		Minimum wire thickness (mm ² /AWG)			Switch (A)		Breaker for wiring (NFB)	Breaker for current leakage
		Main cable	Branch	Ground	Capacity	Fuse		
PUMY-P-NKMU1	P36, P48	5.3/10	-	5.3/10	40	40	40	40A 30mA 0.1sec. or less
	P60	8.4/8	-	8.4/8	40	40	40	40A 30mA 0.1sec. or less
Total operating current of the indoor unit	F0 = 15 or less *1	2.1/14	2.1/14	2.1/14	15	15	15	15A current sensitivity *2
	F0 = 20 or less *1	3.3/12	3.3/12	3.3/12	20	20	20	20A current sensitivity *2
	F0 = 30 or less *1	5.3/10	5.3/10	5.3/10	30	30	30	30A current sensitivity *2

1-phase 2-wire, 230V, 60Hz		Minimum wire thickness (mm ² /AWG)			Switch (A)		Breaker for wiring (NFB)	Breaker for current leakage
		Main cable	Branch	Ground	Capacity	Fuse		
PUMY-P-NKMU1	P36, P48	5.3/10	-	5.3/10	40	40	40	40A 30mA 0.1sec. or less
	P60	8.4/8	-	8.4/8	40	40	40	40A 30mA 0.1sec. or less
Total operating current of the indoor unit	F0 = 15 or less *1	2.1/14	2.1/14	2.1/14	15	15	15	15A current sensitivity *2
	F0 = 20 or less *1	3.3/12	3.3/12	3.3/12	20	20	20	20A current sensitivity *2
	F0 = 30 or less *1	5.3/10	5.3/10	5.3/10	30	30	30	30A current sensitivity *2

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

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

F2 = {V1 × (Quantity of Type1)/C} + {V1 × (Quantity of Type2)/C} + {V1 × (Quantity of Type3)/C} + {V1 × (Quantity of Type4)/C} + {V1 × (Quantity of others)/C}

Indoor unit		V1	V2
Type1	PKFY-P-NHMu, PKFY-P-NKMu, PEFY-P-NMSU, PCFY-P-NKMu, PLFY-P-NEMU, PLFY-EP-NEMU, PMFY-P-NBMU	19.8	2.4
Type2	PEFY-P-NMAU, PVFY-P-NAMU	38.0	1.6
Type3	PKFY-P-NBMU, PLFY-P-NCMU	3.5	2.4
Type4	PEFY-P-NMHSU	13.8	4.8
Others	PEFY-P-NMHU, PDFY-P-NMU, PFFY-P-NEMU, PFFY-P-NRMU	0	0

C: Multiple of tripping current at tripping time 0.01s

Please pick up "C" from the tripping characteristic of the breaker.

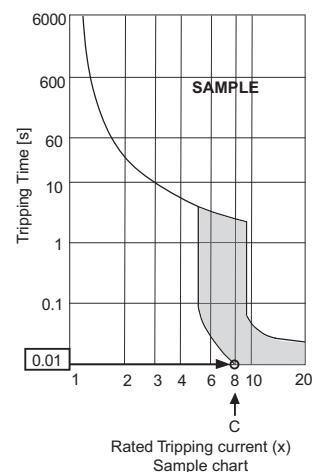
<Example of "F2" calculation>

*Condition PEFY-NMSU × 4 + PEFY-NMAU × 1, C = 8 (refer to right sample chart)

F2 = 19.8 × 4/8 + 38 × 1/8

= 14.55

→16 A breaker (Tripping current = 8 × 16 A at 0.01s)



*2 Current sensitivity is calculated using the following formula.

G1 = (V2 × Quantity of Type1) + (V2 × Quantity of Type2) + (V2 × Quantity of Type3) + (V2 × Quantity of Others) + (V3 × Wire length [km])

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

Wire thickness	V3
1.5 mm ²	48
2.5 mm ²	56
4.0 mm ²	66

1. Use a separate power supply for the outdoor unit and indoor unit.
2. Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
3. The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker consideration of voltage drops. Make sure the power-supply voltage does not drop more than 10%. Make sure that the voltage imbalance between the phases is 2% or less.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 245 IEC57). For example, use wiring such as YZW.
6. A switch with at least 3 mm [1/8 in] contact separation in each pole shall be provided by the Air conditioner installation.

WARNING

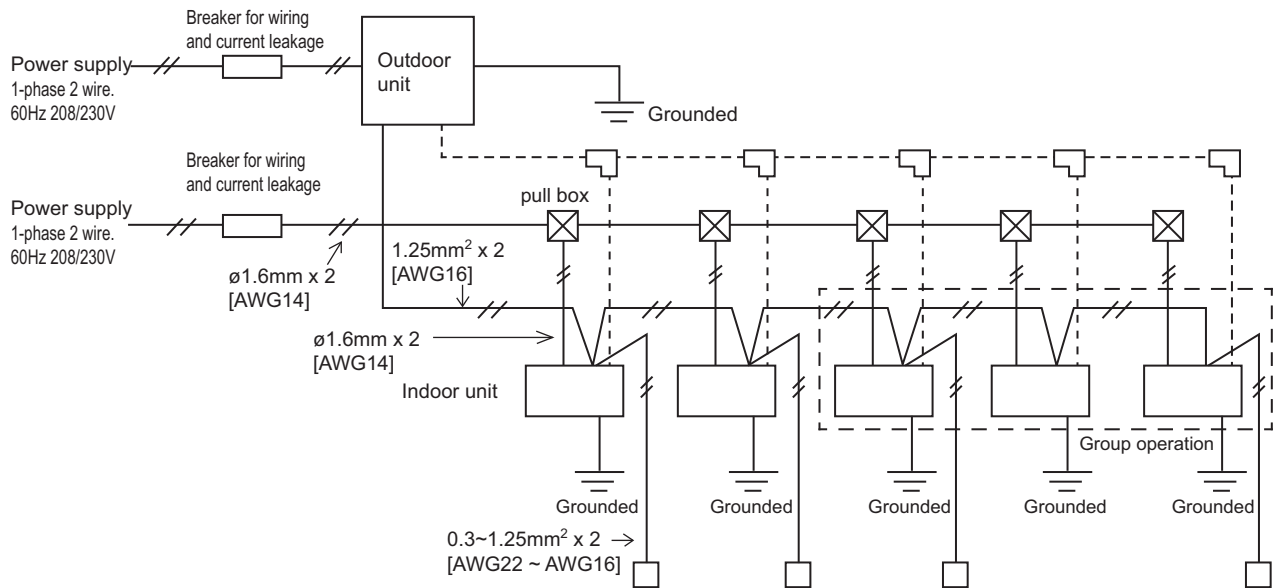
- ◆ Be sure to use specified wires to connect so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.
- ◆ Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount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

CAUTION

- ◆ The breakers for current leakage should support Inverter circuit. (e.g. Mitsubishi Electric's NV-C series or equivalent). If no earth leakage breaker is installed, it may cause an electric shock.
- ◆ Breakers for current leakage should combine using of switch.
- ◆ Do not use anything other than a breaker with the correct capacity. Using a breaker of too large capacity may cause malfunction or fire.
- ◆ If a large electric current flows due to malfunction or faulty wiring, earth-leakage breakers on the unit side and on the upstream side of the power supply system may both operate. Depending on the importance of the system, separate the power supply system or take protective coordination of breakers.

9-4. Power supply examples

The local standards and/or regulations is applicable at a higher priority.



PUMY-P-NKMU1

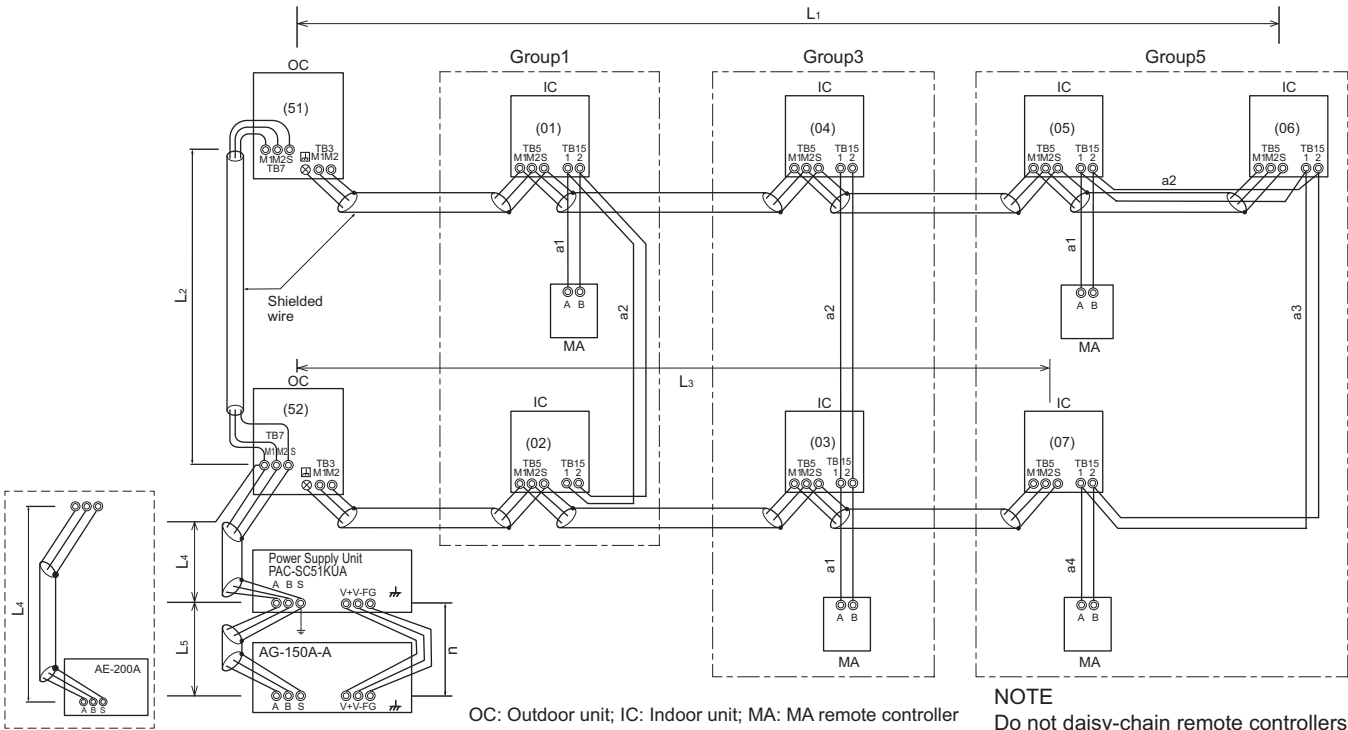
10-1. Transmission cable length limitation

10-1-1. Using MA Remote controller

MA remote controller refers to Simple MA remote controller and wireless remote controller.

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

PUMY-P-NKMU1	Max. length via Outdoor (M-NET cable)	$L_1+L_2+L_3$, $L_1+L_2+L_4+L_5$, $L_3+L_4+L_5$	$\leq 500\text{m}[1640\text{ft}]$	1.25mm^2 [AWG16] or thicker
	Max. length to Outdoor (M-NET cable)	L_1 , L_3 , L_2+L_4 , L_5	$\leq 200\text{m}[656\text{ft}]$	1.25mm^2 [AWG16] or thicker
	Max. length from MA to Indoor for each group	a_1+a_2 , $a_1+a_2+a_3+a_4$	$\leq 200\text{m}[656\text{ft}]$	-
	24VDC to AG-150A-A	n	$\leq 50\text{m}[164\text{ft}]$	$0.75\text{-}2.0\text{ mm}^2$ [AWG18-14]



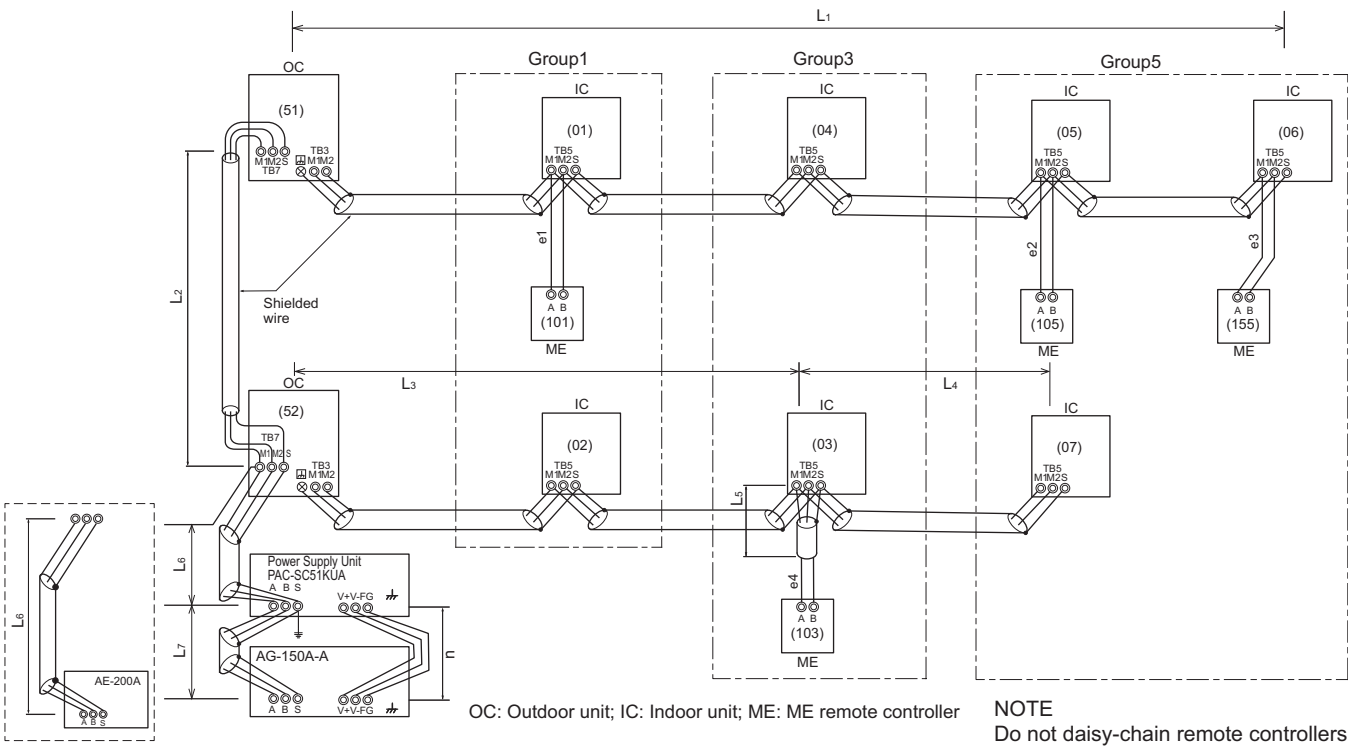
10-1-2. Using ME Remote controller

ME remote controller refers to Smart ME controller.

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

PUMY-P-NKMU1	Max. length via Outdoor (M-NET cable)	$L_1+L_2+L_3+L_4$, $L_1+L_2+L_6+L_7$, $L_1+L_2+L_3+L_5$, $L_3+L_4+L_6+L_7$, $L_3+L_5+L_6+L_7$, L_4+L_5	$\leq 500\text{m}[1640\text{ft}]$	1.25mm^2 [AWG16] or thicker
	Max. length to Outdoor (M-NET cable)	L_1 , L_3+L_4 , L_2+L_6 , L_7 , L_3+L_5	$\leq 200\text{m}[656\text{ft}]$	1.25mm^2 [AWG16] or thicker
	Max. length from ME to Indoor	e_1, e_2, e_3, e_4	$\leq 10\text{m}[32\text{ft}] *1$	$0.3\text{-}1.25\text{ mm}^2$ [AWG22-16] *1
	24VDC to AG-150A-A	n	$\leq 50\text{m}[164\text{ft}]$	$0.75\text{-}2.0\text{ mm}^2$ [AWG18-14]

*1. If the length from ME to Indoor exceed 10m, use 1.25 mm^2 [AWG16] shielded cable, but the total length should be counted into Max. length via Outdoor.



10-2. 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]	0.3 ~ 1.25mm ² [AWG22~16] *1
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]

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

10-3. System configuration restrictions

10-3-1. Common restrictions for the CITYMULTI system

For each Outdoor/Heat source 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 1group.
 *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/Heat source unit.
- E) Maximum 6 System controllers are connectable when connecting to TB7 of the Outdoor/Heat source unit, if the transmission power is supplied by the Outdoor/Heat source unit.
 (Not applicable to the PUMY model and PUHY/PURY-TLMU/TKMU model)
- F) 4 System controllers or more are connectable when connecting to TB7 of the Outdoor/Heat source unit, if the transmission power is supplied by the power supply unit PAC-SC51KUA.
 *System controller connected as described in D) and E) would have a risk that the failure of connected Outdoor/Heat source unit would stop power supply to the System controller.

10-3-2. Ensuring proper communication power and the number of connected units for M-NET

In order to ensure proper communication among Outdoor/Heat source 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 of Indoor unit as 1, the equivalent power consumption or supply of others are listed at Table 1 and Table 2.

Both the transmission line for centralized controller and indoor-outdoor transmission line must meet the conditions listed below. (Both conditions a) and b) must be met.)

- a) [Total equivalent power consumption] ≤ [The equivalent power supply]
- b) [Total equivalent number of units (Table1)] ≤ [40]

Table 1 The equivalent power consumption and the equivalent number of units

Category	Model	The equivalent power consumption	The equivalent number of units
Indoor unit	Sized P06-P96, PEFY-AF1200CFM-E	1	1
	PEFY-AF1200CFMR-E	2	2
BC controller	CMB	2	1
PWFY *1	P36NMU-E-BU	6	1
	P36NMU-E2-AU	1	1
	P72NMU-E2-AU	5	1
MA remote controller/LOSSNAY	PAC-YT53CRAU PAR-FA32MA LGH-F-RX ₅ -E1 PZ-60DR-E PZ-41SLB	0	0
ME remote controller	PAR-U01MEDU PAC-IF01AHC-J	0.5	1
	PZ-52SF	0.25	1
System controller	AE-200A AE-50A EW-50A	0	0
	AG-150A-A EB-50GU-A	0.5	1
	TC-24B	1.5	5
	PAC-YG60MCA PAC-YG66DCA PAC-YG63MCA	0.25	1
ON/OFF controller	PAC-YT40ANRA	1	1
MN converter	CMS-MNG-E	2	1
Outdoor/Heat source unit	TB7 power consumption	0	0
System control interface	MAC-333IF-E	0	0
A-M converter	PAC-IF01MNT-E	1	2

*1 PWFY cannot be connected to PUMY model.

Table 2 The equivalent power supply

Category	Model	The equivalent power supply		
Transmission Booster	PAC-SF46EPA	25 *1		
Power supply unit	PAC-SC51KUA	5		
Expansion controller	PAC-YG50ECA	6		
BM ADAPTER	BAC-HD150	6		
System controller	AE-200A/AE-50A	0.75 *2		
	EW-50A	1.5 *2		
Outdoor/Heat source unit		TB3 and TB7 total	TB7 only	TB3 only
	Outdoor unit except S series*3	32 *1	6	32 - equivalent power supplied to TB7
	S series outdoor unit	12 *1	0	12
	TLMU/TKMU outdoor unit	32	0	32

*1 When one or more indoor units listed below is connected, subtract 3 from the equivalent power supply.

Category	Model
Indoor unit	Sized P72, P96 PEFY-AF1200CFM(R)-E

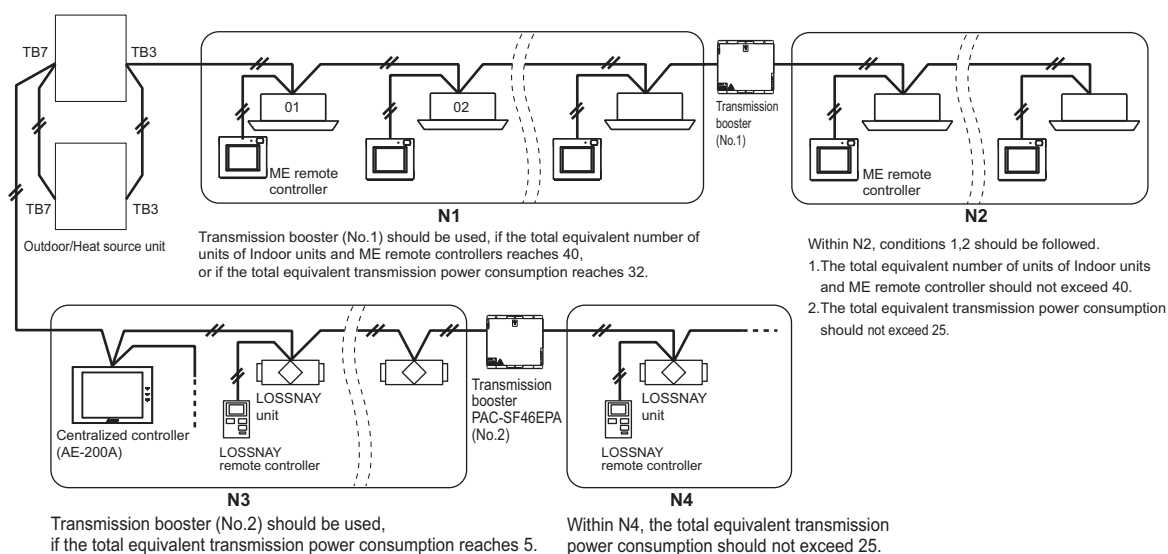
*2 AE-200A/AE-50A/EW-50A has a built-in function to supply power to a MN converter (CMS-MNG-E) for maintenance. Besides MN converter, EW-50A can supply the equivalent power 1.5.

*3 If PAC-SC51KUA is used to supply power at TB7 side, no power supply need from Outdoor/Heat source unit at TB7, Connector TB3 itself will therefore have 32.

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

- Firstly, count from TB3 at TB3 side the total equivalent number of units of Indoor units, ME remote controller, and System controllers. If the total equivalent number of units reaches 40, a PAC-SF46EPA should be set.
- Secondly, count from TB7 side to TB3 side the total transmission power consumption. 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, such as PAC-YG50ECA, is used to supply power at TB7 side, count from TB3 side only.
- Thirdly, count from TB7 at TB7 side the total transmission power consumption. If the total power consumption reaches 6, a PAC-SF46EPA should be set. Also, count from TB7 at TB7 side the total equivalent number of units of System controllers, and so on. If the total equivalent number of units reaches 40, a PAC-SF46EPA should be set.

■ System example



10-3-3. Ensuring proper power supply to System controller

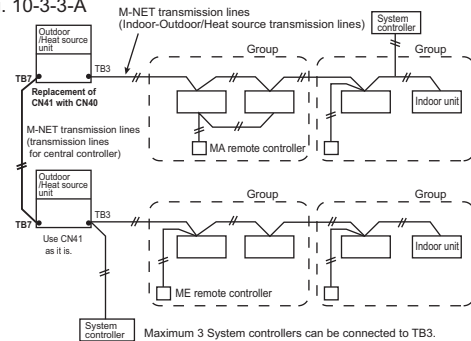
The power to System controller (excluding AE-200A, AE-50A, EW-50A, BAC-HD150, LM-AP) is supplied via M-NET transmission line. M-NET transmission line at TB7 side is called Centralized control transmission line while one at TB3 side is called Indoor-Outdoor/Heat source transmission line. There are 3 ways to supply power to the System controller.

- Connecting to TB3 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit.
- Connecting to TB7 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit.
(Not applicable to the PUMY model and PUHY/PURY-TLMU/TKMU model)
- Connecting to TB7 of the Outdoor/Heat source unit but receiving power from power supply unit PAC-SC51KUA.
* System controllers (AE-200A, AE-50A, EW-50A, BAC-HD150, LM-AP) have a built-in function to supply power to the M-NET transmission lines, so no power needs to be supplied to the M-NET transmission lines from the Outdoor/Heat source units or from PAC-SC51KUA.

10-3-3-A. When connecting to TB3 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit.

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

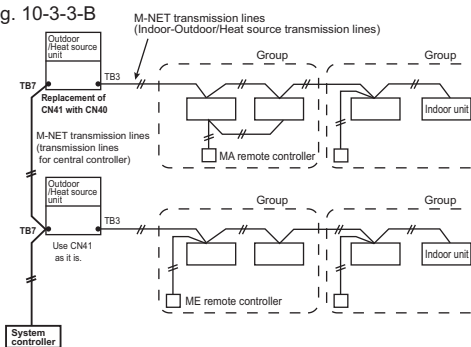
Fig. 10-3-3-A



10-3-3-B. When connecting to TB7 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit. (Not applicable to the PUMY model and PUHY/PURY-TLMU/TKMU model)

Maximum 6 System controllers can be connected to TB7 and receiving power from the Outdoor/Heat source unit.
(Not applicable to the PUMY model and PUHY/PURY-TLMU/TKMU model)
It is necessary to replace power supply switch connector CN41 with CN40 on one Outdoor/Heat source unit.

Fig. 10-3-3-B



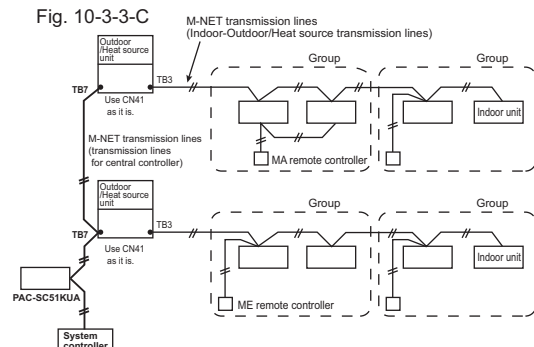
Note (only for PUHY/PURY model)

- When YLMU/YKMU Outdoor unit model is used, the male power supply connector can be connected to CN40, and the System controller can be connected to TB7 side.
- When the male power supply connector is connected from TLMU/TKMU Outdoor unit to CN40, the power is supplied to TB7 side even when the main power of the TLMU/TKMU outdoor unit is switched off, and the System controller may store an error in the error history and emit an alarm signal.
- If only LOSSNAY units or outdoor units in different refrigerant circuits are connected to TB7 side, the male power supply connector can be connected from TLMU/TKMU outdoor unit to CN40.

10-3-3-C. When connecting to TB7 of the Outdoor/Heat source unit but receiving power from PAC-SC51KUA.

When using PAC-SC51KUA to supply transmission power, the power supply connector CN41 on the Outdoor/Heat source 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.
If 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. 10-3-3-C

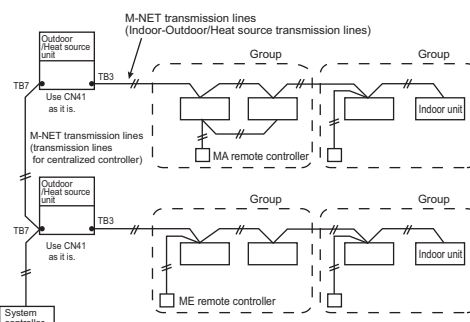


CAUTION

- 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/Heat source units, AG-150A-A/EB-50GU-A receiving transmission power through TB3 or TB7 on one of the Outdoor/Heat source units would have a risk that the connected Outdoor/Heat source 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 be 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.

- How to connect system controllers (AE-200A, AE-50A, EW-50A, BAC-HD150, LM-AP) to a given system
System controllers (AE-200A, AE-50A, EW-50A, BAC-HD150, LM-AP) have a built-in function to supply power to the M-NET transmission lines, so no power needs to be supplied to the M-NET transmission lines from the Outdoor/Heat source units or from PAC-SC51KUA.
Leave the power supply connector on the Outdoor/Heat source unit connected to CN41 as it is.
Refer to 10-3-2 for information about the power-supply capacity of each system controller (EW-50A, BAC-HD150, LM-AP) to the low-level system controllers.

Fig. 10-3-3-D



10-3-4. Power supply to LM-AP

1-phase 208-230VAC 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.

10-3-5. Power supply to expansion controller

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

The power supply unit PAC-SC51KUA is not necessary.

The expansion controller supplies power through TB3, which equals 6 indoor units. (refer to Table 2)

10-3-6. 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.

10-3-7. Power supply to AE-200A/AE-50A/EW-50A

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

The power supply unit PAC-SC51KUA is not necessary when connecting only the AE-200A/AE-50A/EW-50A.

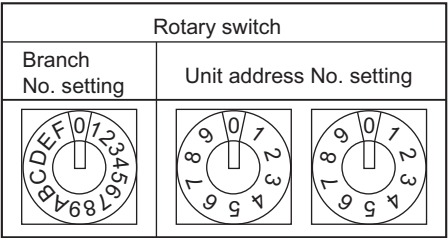
PJMY-P-NKMU1

10-4. Address setting

10-4-1. 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”.

10-4-2. Rule of setting address

Unit		Address setting	Example	Note
Indoor unit System control interface (MAC-333IF-E) A-M converter (PAC-IF01MNT-E)		01 ~ 50	 	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)	 	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	 	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	 	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  	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  	The address of main remote controller + 50 *The address automatically becomes "200" if it is set as "00"
System controller	ON/OFF remote controller	201 ~ 250	  	The smallest group No. to be managed + 200 * The smallest group No. to be managed is changeable.
	AE-200A/AE-50A AG-150A-A EB-50GU-A EW-50A TC-24B	000, 201 ~ 250	  	* TC-24B cannot be set to "000".
	PAC-YG50ECA	000, 201 ~ 250	  	* Settings are made on the initial screen of AG-150A-A.
	BAC-HD150	000, 201 ~ 250	  	* Settings are made with setting tool of BM ADAPTER.
	LMAP04U-E	201 ~ 250	2 Fixed  	
PI, AI, DIDO	PAC-YG60MCA	01 ~ 50	 	
	PAC-YG63MCA	01 ~ 50	 	
	PAC-YG66DCA	01 ~ 50	 	
LOSSNAY		01 ~ 50	 	After setting the addresses of all the indoor units, assign an arbitrary address.
PAC-IF01AHC-J		201 ~ 250	2 Fixed  	

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.

10-4-3. System example

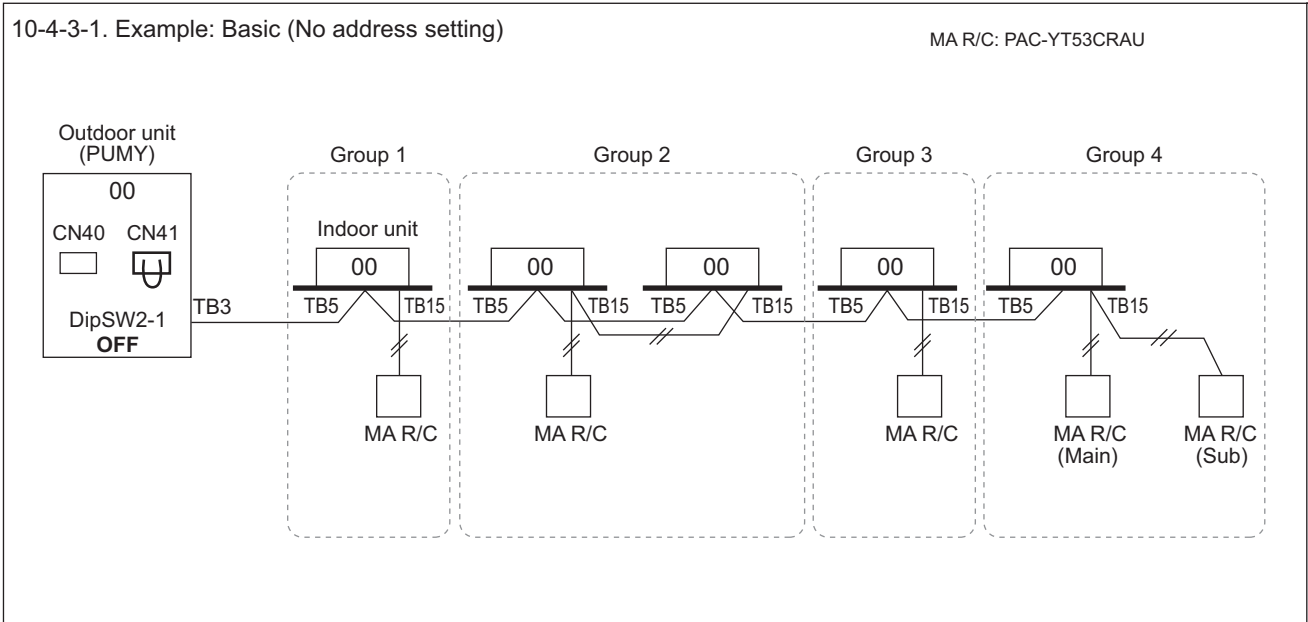
Factory setting

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)

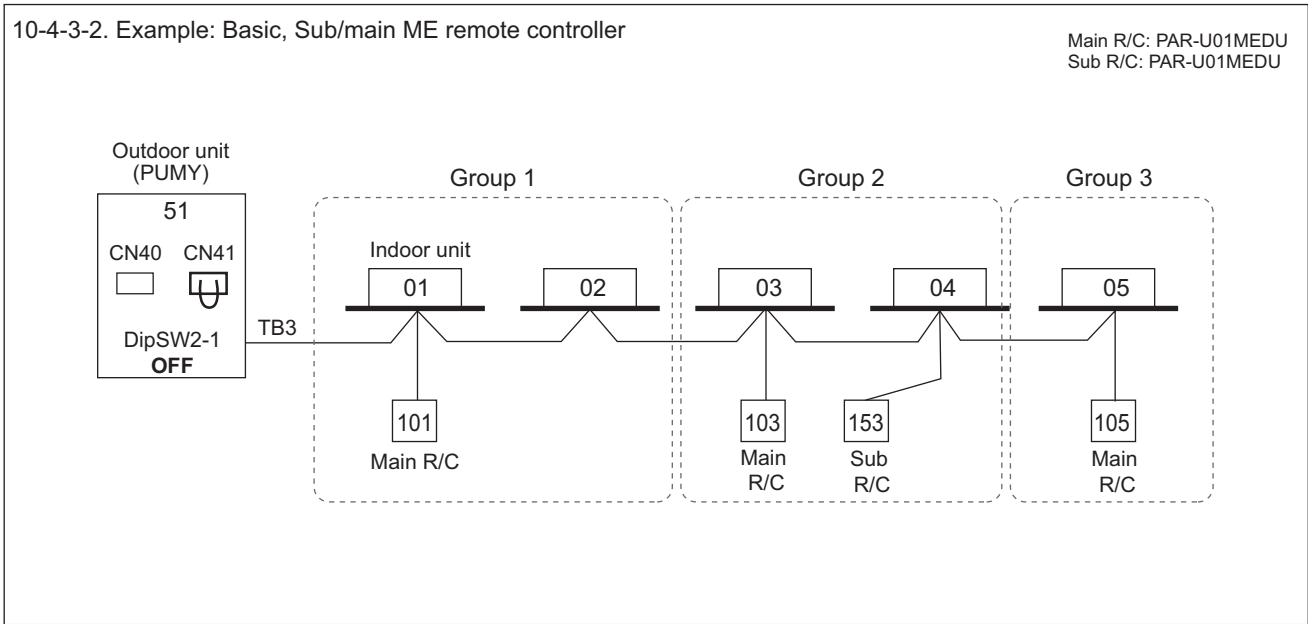
10-4-3-1. Example: Basic (No address setting)

MA R/C: PAC-YT53CRAU

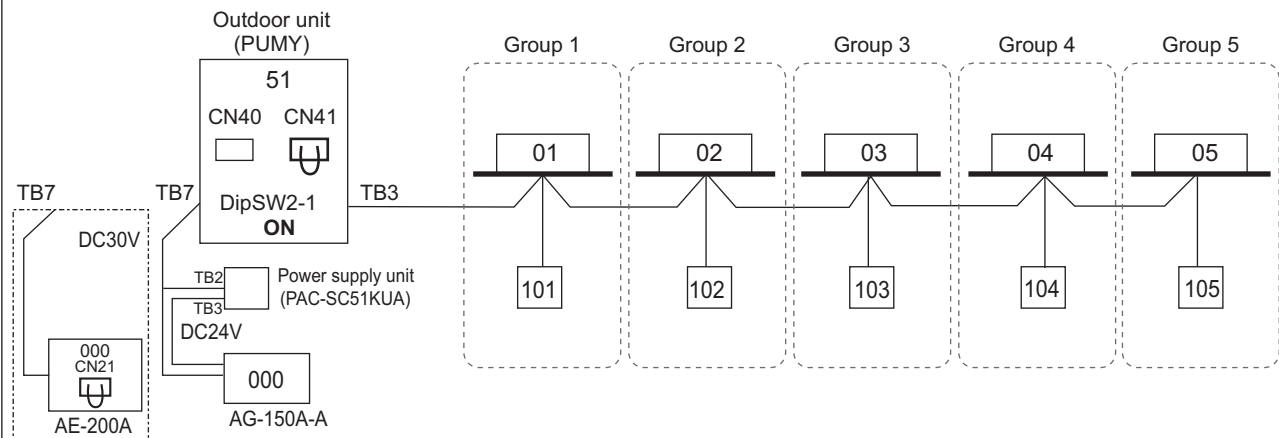


10-4-3-2. Example: Basic, Sub/main ME remote controller

Main R/C: PAR-U01MEDU
Sub R/C: PAR-U01MEDU



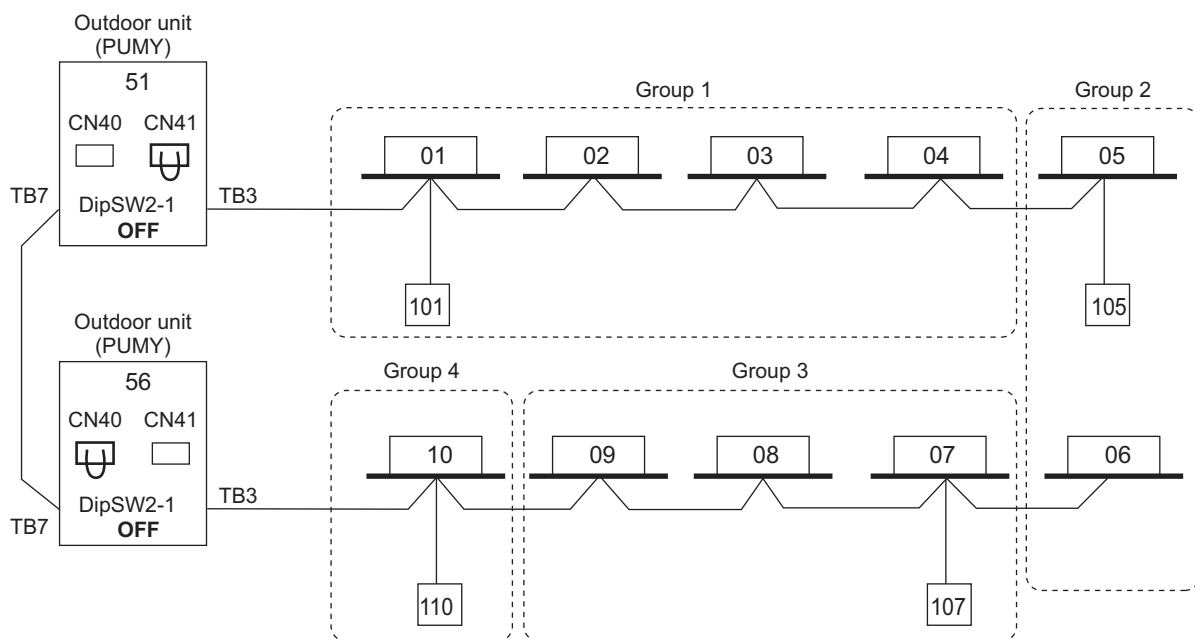
10-4-3-3. Example: AG-150A-A, AE-200A, TB7



NOTE

- It is necessary to turn on the DipSW 2-1 on the outdoor unit control board when the central controller is connected.

10-4-3-4. Example: Grouping in different refrigerant system

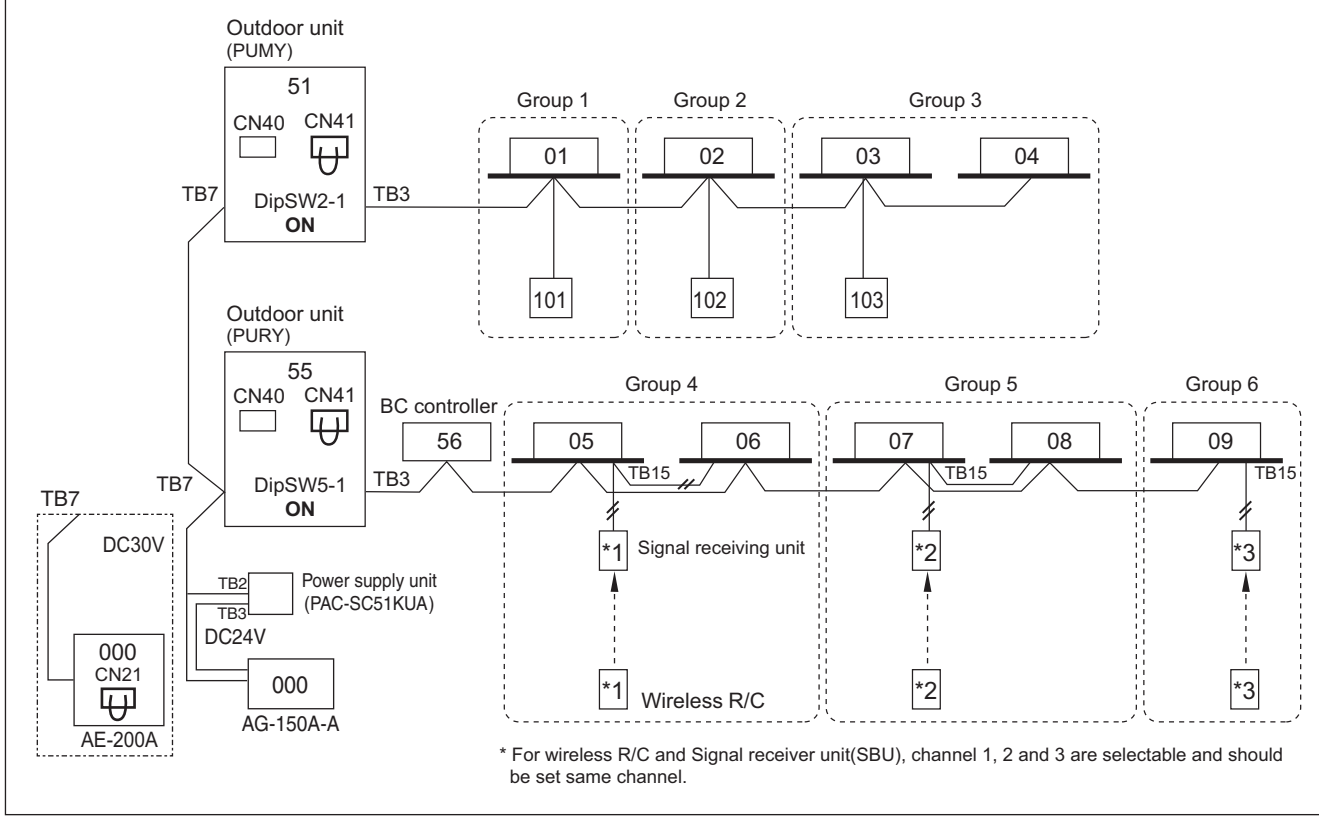


NOTE

- 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.

PUMY-P-NKMU1

10-4-3-5. Example: 2 Outdoor unit, AG-150A-A, AE-200A, MA

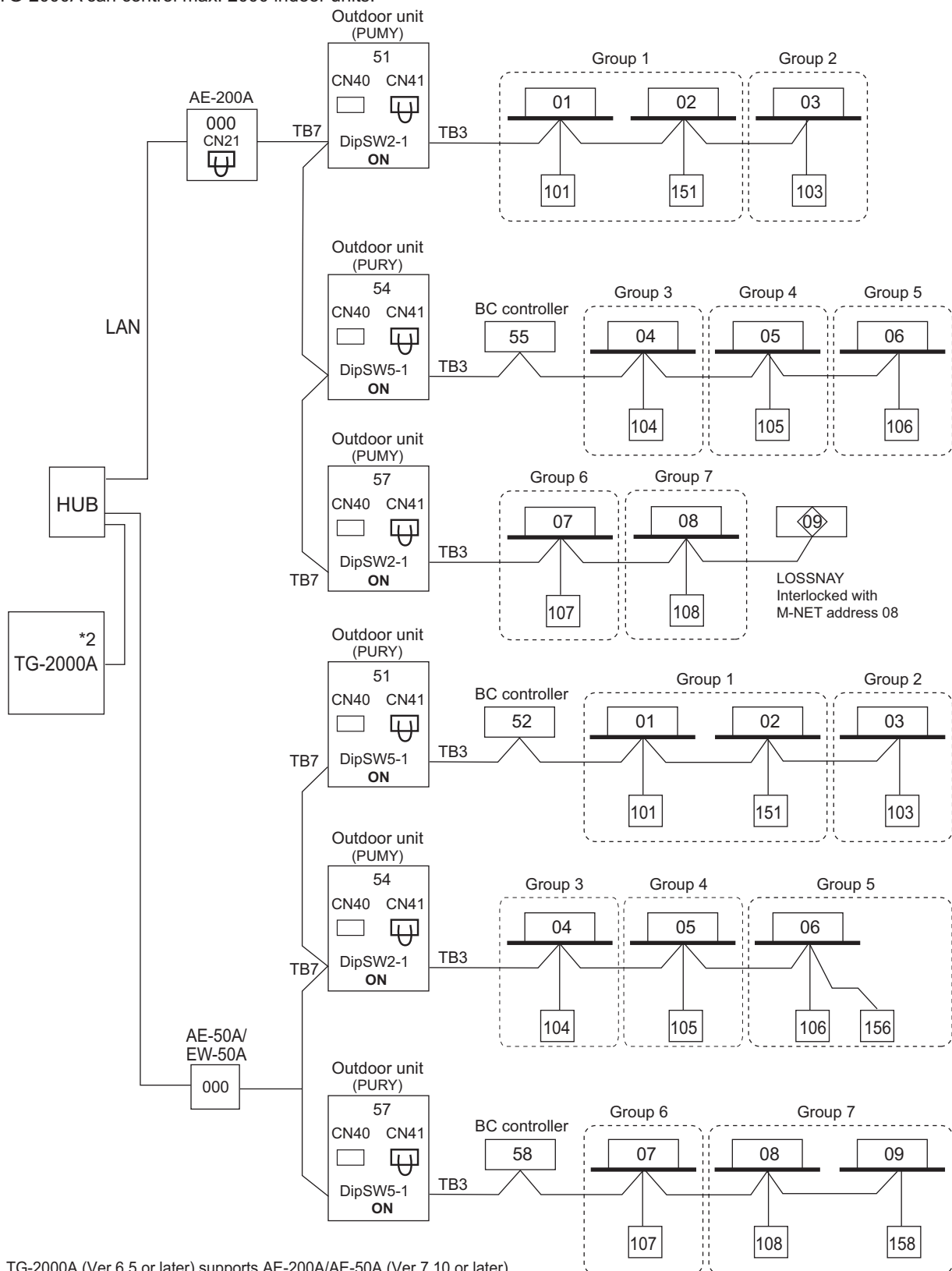


10-4-3-6. Example: TG-2000A(*1)+AE-200A/AE-50A/EW-50A

AE-200A can control max. 50 indoor units;

TG-2000A can control max. 40 of AE-200A/AE-50A/EW-50A;*2

TG-2000A can control max. 2000 indoor units.



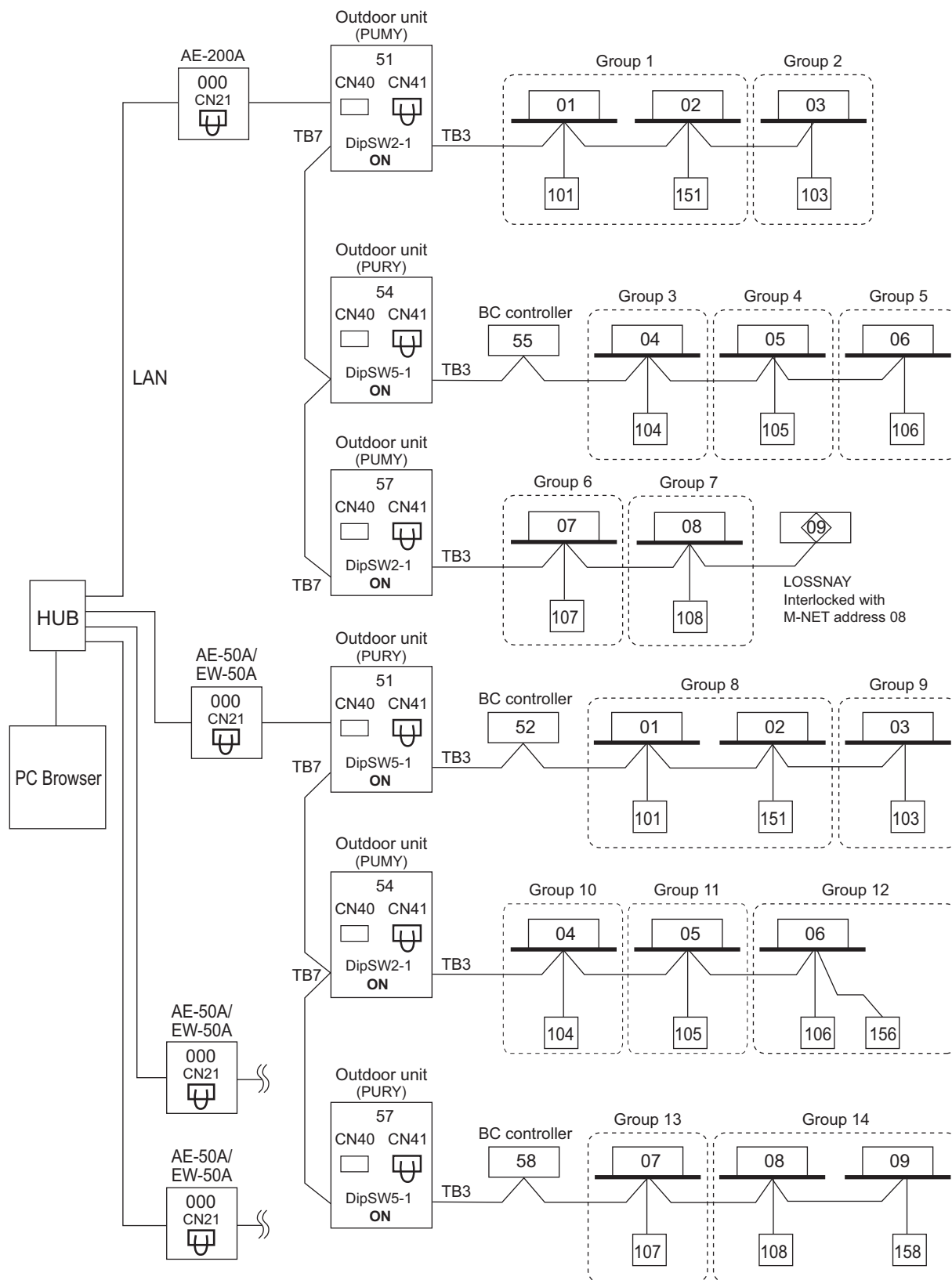
*1 TG-2000A (Ver.6.5 or later) supports AE-200A/AE-50A (Ver.7.10 or later).

TG-2000A (Ver.6.60 or later) supports EW-50A.

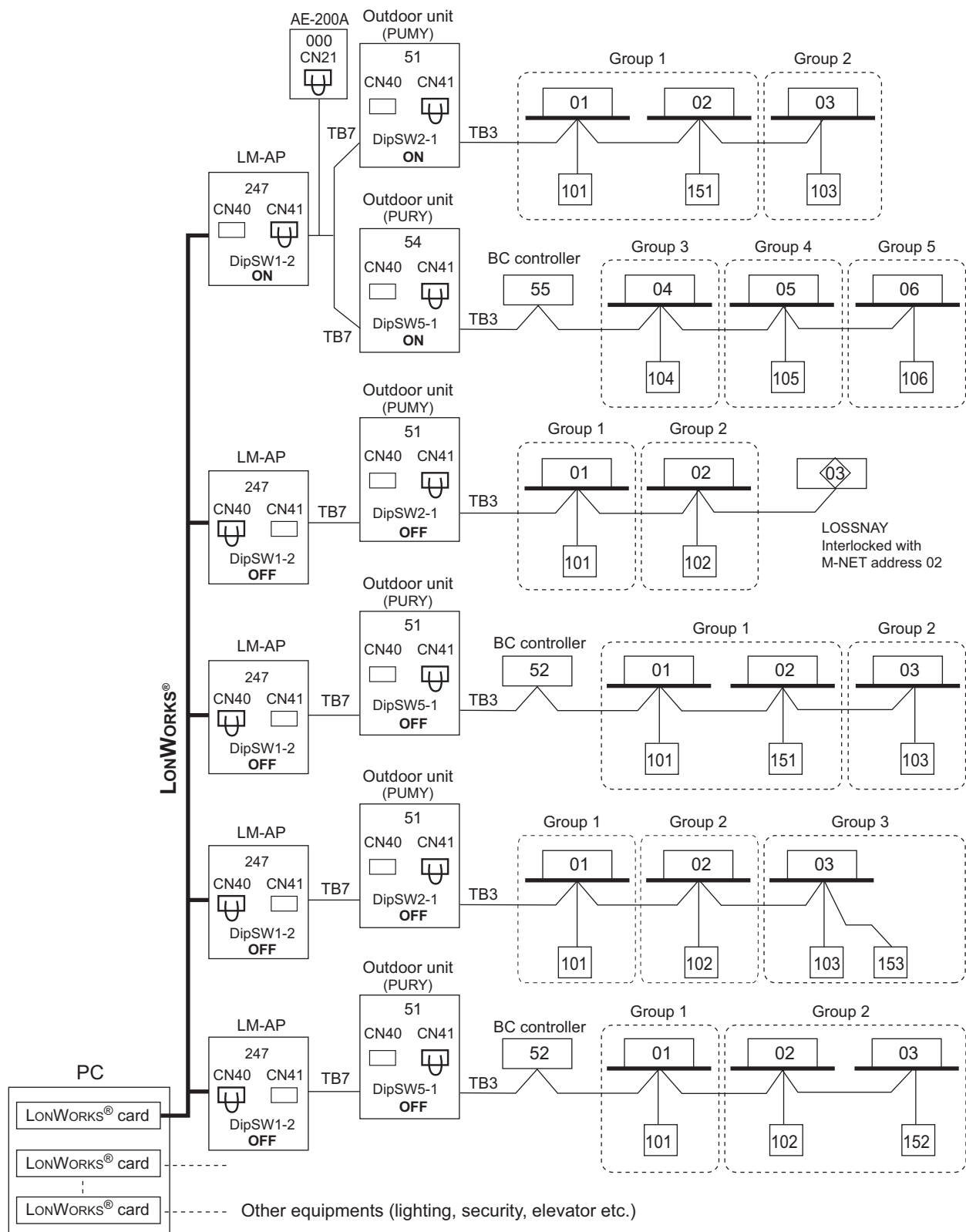
*2 When AE-200A connected with AE-50A/EW-50A is connected, the number of AE-50A/EW-50A will be the maximum controllable number. TG-2000A can control up to 40 AE-200A/AE-50A/EW-50A or AE-200A without AE-50A/EW-50A connection.

10-4-3-7. AE-200A + AE-50A/EW-50A

AE-200A can control max. 200 indoor units/via AE-50A/EW-50A.



10-4-3-8. LM-AP

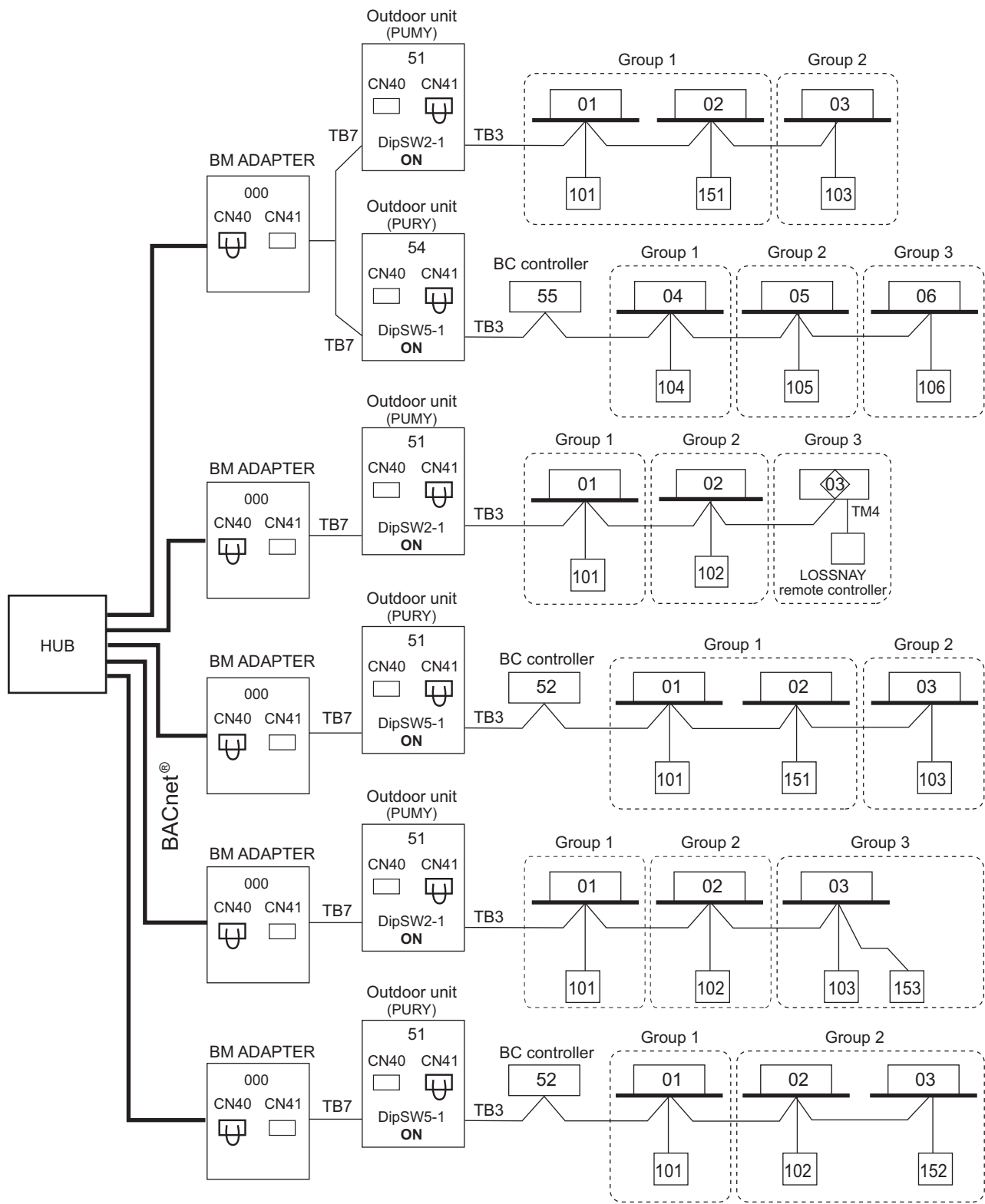


NOTE

- LM-AP can control 50 indoor units.
- It is necessary to turn on the DipSW1-2 on the LM-AP control board and the DipSW2-1 on the outdoor unit control board with central controllers (Power supply unit).
- It is necessary to change the connector to CN40 on the LM-AP control board without central controllers (Power supply unit).

10-4-3-9. BM ADAPTER

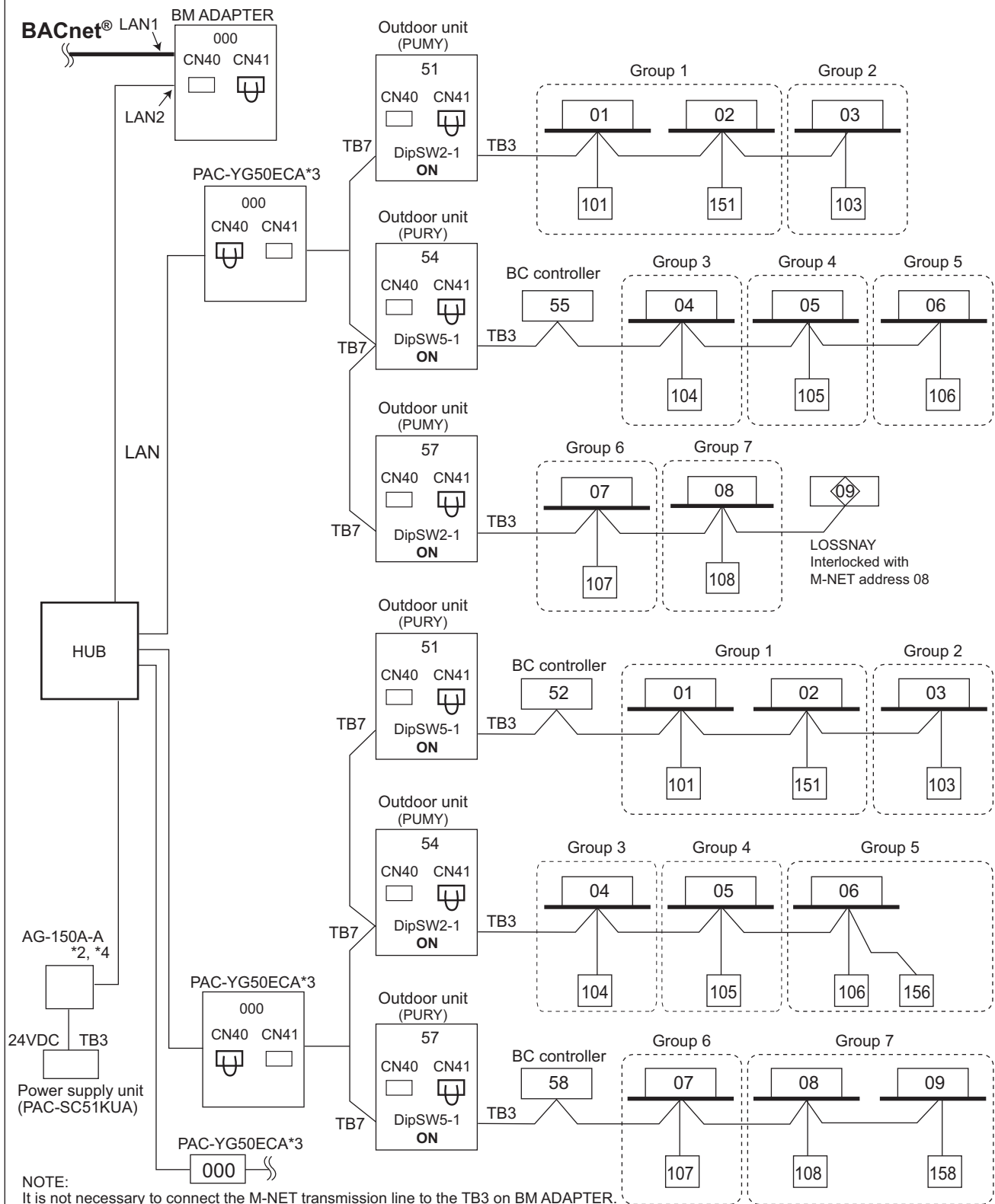
BM ADAPTER can transmit max. 50 indoor units;
Change Jumper from CN41 to CN40 to activate power supply to BM ADAPTER itself for those BM ADAPTER connected without the power supply unit.



10-4-3-10. BM ADAPTER + PAC-YG50ECA (Expansion controller)

BM ADAPTER*1 can transmit max. 150 indoor units via expansion controllers (PAC-YG50ECA).

When the dual-set-point function is used, no expansion controllers can be connected, and only up to 50 units can be controlled from each BAC-HD150.



11-1. R410A Piping material

The maximum operation pressure of R410A air conditioner is 4.15 MPa [601 psi]. The refrigerant piping should ensure the safety under the maximum operation pressure. You shall follow the local industrial standard.

11-2. Piping Design

11-2-1. PUMY-P36, 48NKMU1 Piping

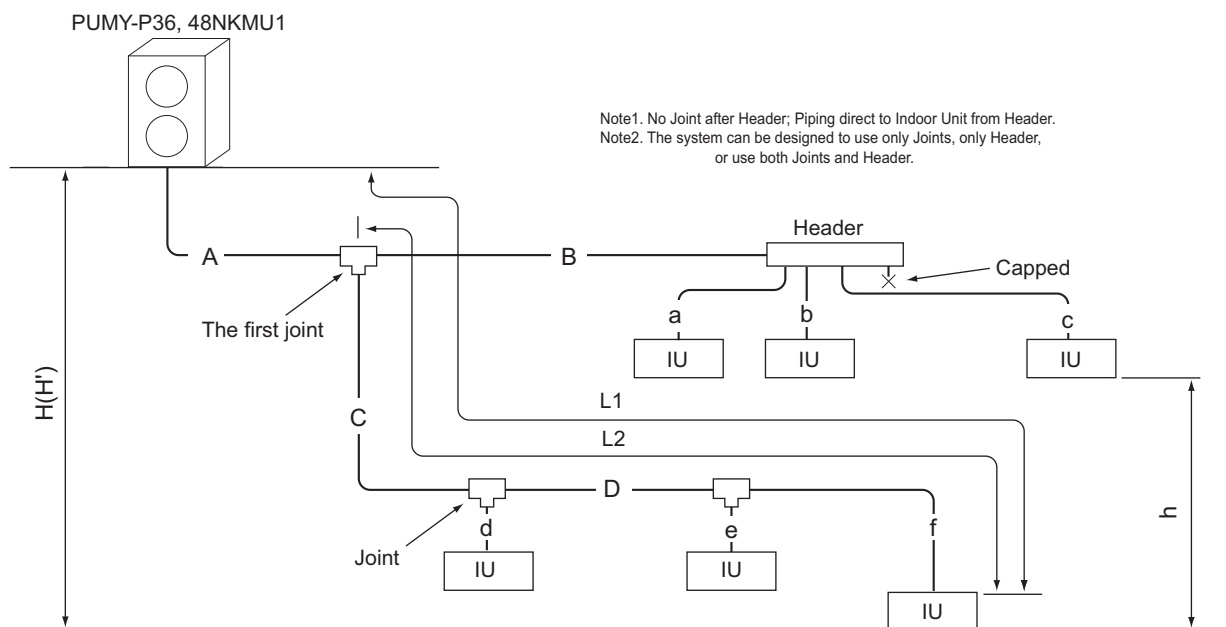


Fig. 11-2-1A Piping scheme

IU : Indoor unit , OU : Outdoor unit

Table11-2-1-1. Piping length (m [ft.])		
Item	Piping in the figure	Max. length
Total piping length	A+B+C+D+a+b+c+d+e+f	300 [984"]
Farthest IU from OU (L1)*	A+C+D+f / A+B+c	150 [492"]
Farthest IU from the first Joint (L2)	C+D+f / B+c	30 [98"]
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

* The maximum pipe length between each indoor unit and an outdoor unit is 262 ft [80 m] for the following indoor units: PKFY-P06NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU. If using a pipe longer than 262 ft [80 m], an optional external LEV box (PAC-SG95LE-E) is required.

Table11-2-1-2. Piping "A" size selection rule (mm [in.])		
Outdoor and the first Joint/Header	Pipe(Liquid)	Pipe(Gas)
PUMY-P36, 48NKMU1=CMY-Y62-G-E	ø9.52 [3/8"]	ø15.88 [5/8"]
PUMY-P36, 48NKMU1=CMY-Y64,Y68-G-Eb	ø9.52 [3/8"]	ø15.88 [5/8"]

Table11-2-1-3. Piping "B", "C", "D" size selection rule (mm [in.])		
	Pipe(Liquid)	Pipe(Gas)
	ø9.52 [3/8"]	ø15.88 [5/8"]

Table11-2-1-4. Piping "a", "b", "c", "d", "e", "f" size selection rule (mm [in.])		
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"]

Table11-2-1-5. Joint, Header selection rule		
Joint	4-branch Header	8-branch Header
CMY-Y62-G-E	CMY-Y64-G-E	CMY-Y68-G-E

* For details of installation of Joint, header, and distributor, refer to its Installation Manual.

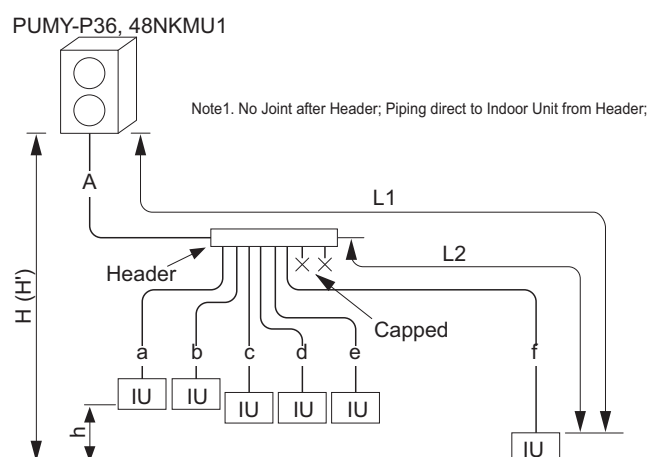


Fig. 11-2-1B Piping scheme

Table11-2-1B1. Piping length (m [ft.])		
Item	Piping in the figure	Max. length
Total piping length	A+a+b+c+d+e+f	300 [984"]
Farthest IU from OU (L1)*	A+f	150 [492"]
Farthest IU from Header (L2)	f	30 [98"]
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"]

* The maximum pipe length between each indoor unit and an outdoor unit is 262 ft [80 m] for the following indoor units: PKFY-P06NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU. If using a pipe longer than 262 ft [80 m], an optional external LEV box (PAC-SG95LE-E) is required.

11-2-2. PUMY-P60NKMU1

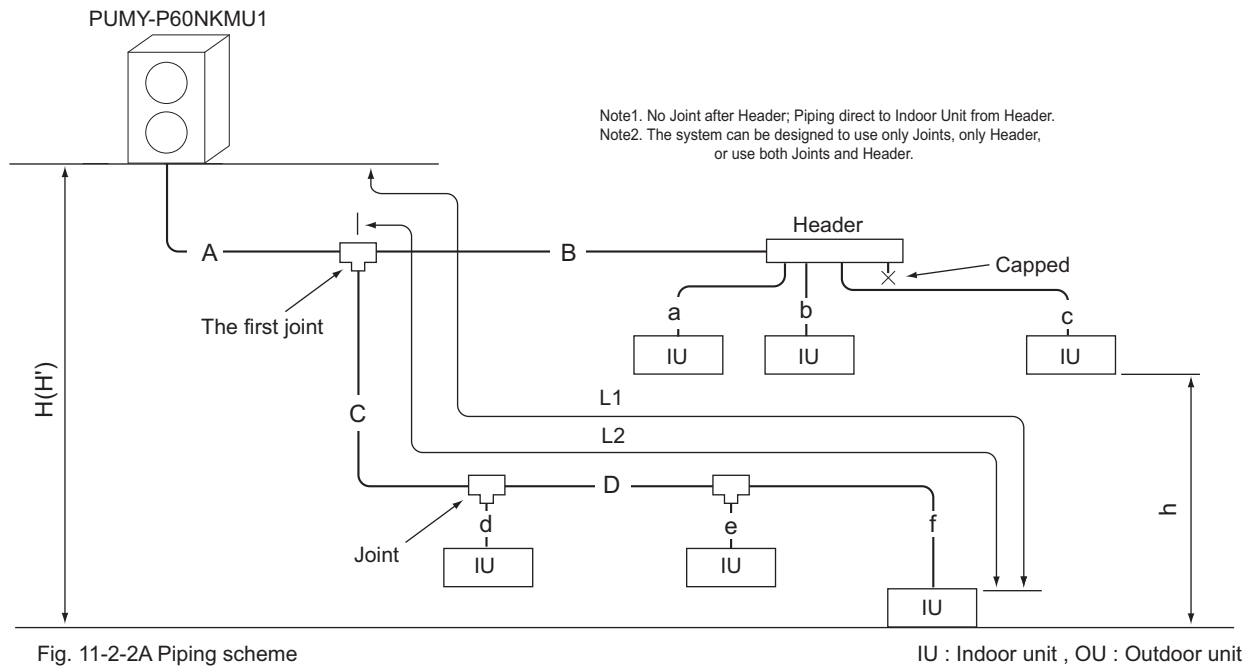


Table11-2-2-1. Piping length		(m [ft.])
Item	Piping in the figure	Max. length
Total piping length	A+B+C+D+a+b+c+d+e+f	150 [492']
Farthest IU from OU (L1)	A+C+D+f / A+B+c	80 [262']
Farthest IU from the first Joint (L2)	C+D+f / B+c	30 [98']
Height between OU and IU (OU above IU)	H	50 [164']
Height between OU and IU (OU under IU)	H'	40 [131']
Height between IU and IU	h	15 [49']

OU: Outdoor Unit, IU: Indoor Unit

Table11-2-2-2. Piping "A"size selection rule			(mm [in.])
Outdoor and the first-Joint/Header	Pipe(Liquid)	Pipe(Gas)	
PUMY-P60NKMU1=CMY-Y62-G-E	ø9.52 [3/8"]	ø19.05 [3/4"]	
PUMY-P60NKMU1=CMY-Y64,Y68-G-Eb	ø9.52 [3/8"]	ø19.05 [3/4"]	

Table11-2-2-3. Piping "B","C","D"size selection rule			(mm [in.])
	Pipe(Liquid)	Pipe(Gas)	
	ø9.52 [3/8"]	ø19.05 [3/4"]	

Table11-2-2-4. Piping "a","b","c","d","e","f"size selection rule			(mm [in.])
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"]	

Table11-2-2-5. Joint, Header selection rule		
Joint	4-branch Header	8-branch Header
CMY-Y62-G-E	CMY-Y64-G-E	CMY-Y68-G-E

* For details of installation of Joint, header, and distributor, refer to its Installation Manual.

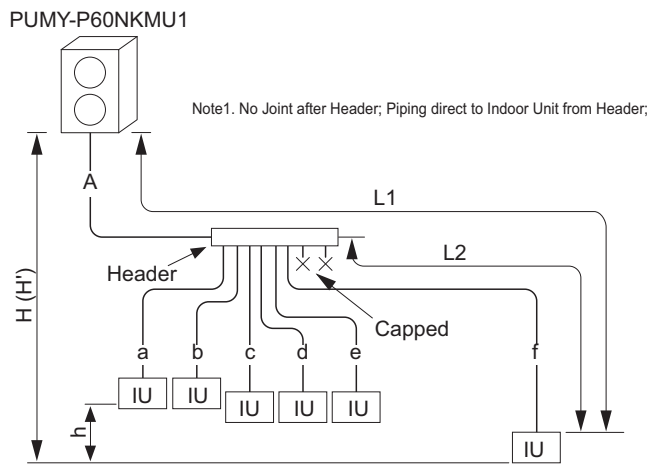


Table11-2-2B1. Piping length		(m [ft.])
Item	Piping in the figure	Max. length
Total piping length	A+a+b+c+d+e+f	150 [492']
Farthest IU from OU (L1)	A+f	80 [262']
Farthest IU from Header (L2)	f	30 [98']
Height between OU and IU (OU above IU)	H	50 [164']
Height between OU and IU (OU under IU)	H'	40 [131']
Height between IU and IU	h	15 [49']

11-3. Refrigerant charging calculation

11-3-1. PUMY-P36, 48NKMU1

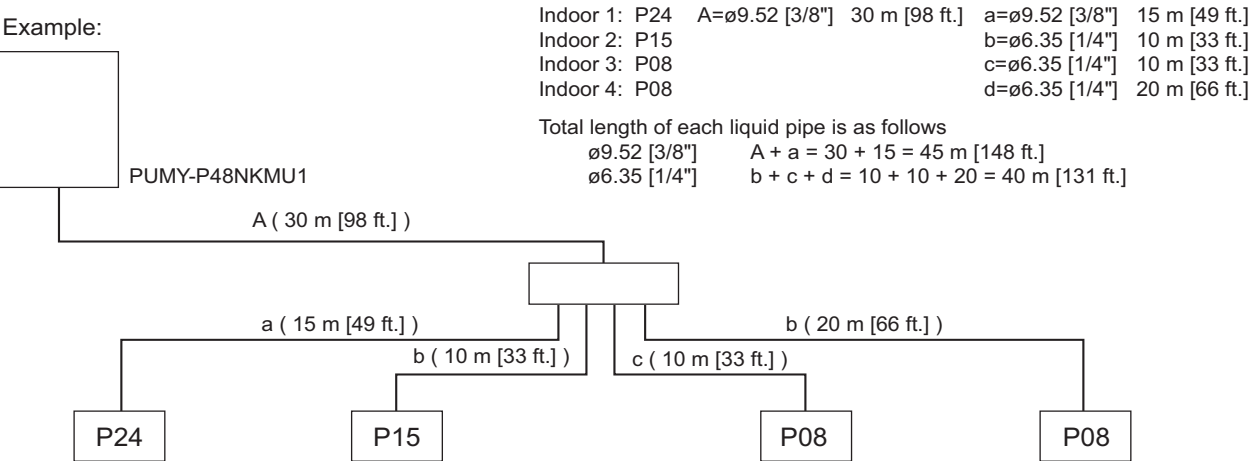
Additional refrigerant charge

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

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
(For example, if the calculated charge is 10.92 kg, round up the charge to 11.0 kg.)

Additional refrigerant charge	=	Pipe size Liquid pipe ø6.35	+	Pipe size Liquid pipe ø9.52	+	Total capacity of connected indoor units	Pipe size Liquid pipe ø9.52
(kg)		(m) x 0.019 (kg/m)		(m) x 0.05 (kg/m)		– 27	1.5 kg (53 oz)
[oz]		0.21 [oz/ft.]		x 0.55 [oz/ft.]		28 – 54	2.5 kg (88 oz)
						55 – 62	3.0 kg (106 oz)



Additional refrigerant charge	=	Total length of liquid pipe sized	+	Total length of liquid pipe sized	+	Total capacity of connected indoor units	Pipe size Liquid pipe ø9.52
(kg)		ø9.52 x 0.05 (kg/m)		ø6.35 x 0.019 (kg/m)		– 27	1.5 kg (53 oz)
		45 (m) x 0.05 (kg/m)		40 (m) x 0.019 (kg/m)		28 – 54	2.5 kg (88 oz)
						55 – 62	3.0 kg (106 oz)

= 2.25 + 0.76 + 3.00
= 6.01
≈ 6.1 kg (round-up)

Additional refrigerant charge	=	Total length of liquid pipe sized	+	Total length of liquid pipe sized	+	Total capacity of connected indoor units	Pipe size Liquid pipe ø9.52
(oz)		ø3/8" x 0.65 [oz/ft.]		ø1/4" x 0.26 [oz/ft.]		– 27	1.5 kg (53 oz)
		147 (ft.) x 0.65 [oz/ft.]		129 (ft.) x 0.26 [oz/ft.]		28 – 54	2.5 kg (88 oz)
						55 – 62	3.0 kg (106 oz)

= 81.40 + 27.51 + 106
= 214.91
≈ 215 [oz] (round-up)

11-3-2. PUMY-P60NKMU1

Additional refrigerant charge

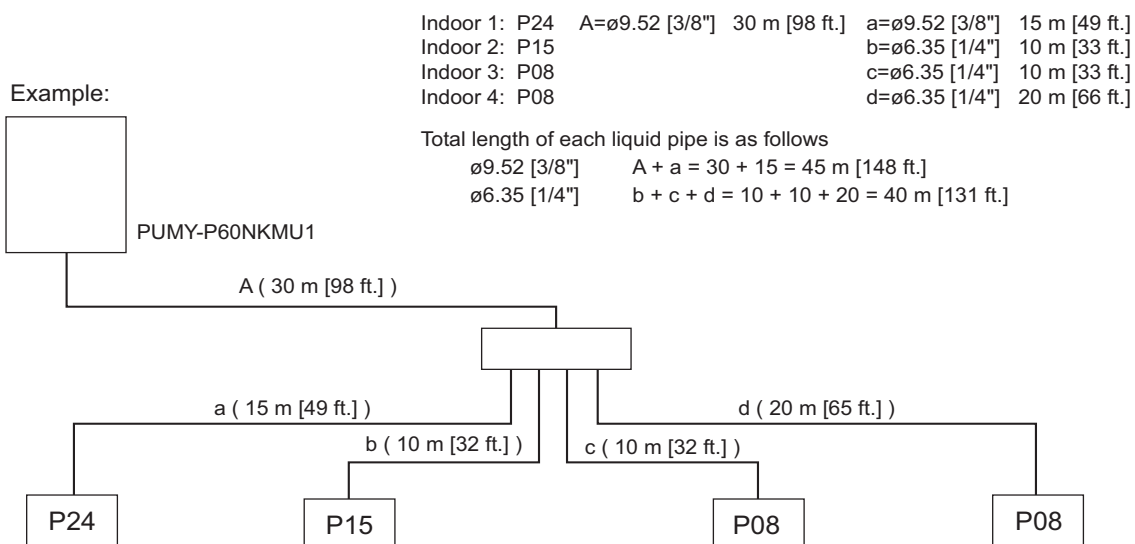
Refrigerant for the extended piping is not included in the outdoor unit when the unit is shipped from the factory.

Therefore, charge each refrigerant piping system with additional refrigerant at the installation site. In addition, in order to carry out service, enter the size and length of each liquid pipe and additional refrigerant charge amounts in the spaces provided on the "Refrigerant amount" plate on the outdoor unit.

Calculation of additional refrigerant charge

- Calculate the additional charge using the liquid pipe size and length of the extended piping.
- Calculate the additional refrigerant charge using the procedure shown to the right, and charge with the additional refrigerant.
- For amounts less than 0.1 kg, round up the calculated additional refrigerant charge.
(For example, if the calculated charge is 32.92 kg, round up the charge to 33.0 kg.)

Additional refrigerant charge	=	Pipe size Liquid pipe ø6.35	+	Pipe size Liquid pipe ø9.52	+	Total capacity of connected indoor units	Amount for the indoor units
(kg) [oz]		(m) × 0.027 (kg/m) 0.29 (oz/ft)		(m) × 0.07 (kg/m) 0.75 (oz/ft)		– 27 28 – 54 55 – 78	1.5 kg (53 oz) 2.5 kg (88 oz) 3.0 kg (106 oz)



Additional refrigerant charge	=	Total length of liquid pipe sized ø9.52 × 0.07 (kg/m)	+	Total length of liquid pipe sized ø6.35 × 0.027 (kg/m)	+	Total capacity of connected indoor units	Amount for the indoor units
(kg)		45 (m) × 0.07 (kg/m)		40 (m) × 0.027 (kg/m)		– 27 28 – 54 55 – 78	1.5 kg (53 oz) 2.5 kg (88 oz) 3.0 kg (106 oz)

$$= 3.15 + 1.08 + 3.0$$

$$= 7.23$$

$$\approx 7.3 \text{ kg (round-up)}$$

Additional refrigerant charge	=	Total length of liquid pipe sized ø3/8" × 0.75 [oz/ft.]	+	Total length of liquid pipe sized ø1/4" × 0.29 [oz/ft.]	+	Total capacity of connected indoor units	Amount for the indoor units
(oz)		148 (ft.) × 0.75 [oz/ft.]		131 (ft.) × 0.29 [oz/ft.]		– 42 43 – 60 61 – 78	2.0 kg (71 oz) 2.5 kg (88 oz) 3.0 kg (106 oz)

$$= 111.00 + 37.99 + 106$$

$$= 254.99$$

$$\approx 255 \text{ [oz] (round-up)}$$

PJMY-P-NKMU1

12-1. Requirement on installation site

12-1-1. General caution

- A. Avoid locations exposed to direct sunlight or other sources of heat.
- B. Select a location from which noise emitted by the unit will not inconvenience the neighbors.
- C. Select a location permitting easy wiring and pipe access to the power source and indoor unit.
- D. Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- E. Note that water may drain from the unit during operation.
- F. Select a level location that can bear the weight and vibration of the unit.
- G. Avoid locations where the unit can be covered by snow. In areas where heavy snow fall is anticipated, special precautions such as raising the installation location or installing a hood on the air intake must be taken to prevent the snow from blocking the air intake or blowing directly against it. This can reduce the airflow and a malfunction may result.
- H. Avoid locations exposed to oil, steam, or sulfuric gas.
- I. Use the transportation handles of the outdoor unit to transport the unit. If the unit is carried from the bottom, hands or fingers may be pinched.

12-1-2. Installation at windy location.

When installing the outdoor unit on a rooftop or other location unprotected from the wind, situate the air outlet of the unit so that it is not directly exposed to strong winds.Strong wind entering the air outlet may impede the normal airflow and a malfunction may result.

The following shows two examples of precautions against strong winds.

- ① Install an optional air guide if the unit is installed in a location where strong winds from a typhoon, etc. may directly enter the air outlet. (Fig. 12-1-2a)
 - Ⓐ Air guide
- ② Position the unit so that the air outlet blows perpendicularly to the seasonal wind direction, if possible. (Fig. 12-1-2b)
 - Ⓑ Wind direction

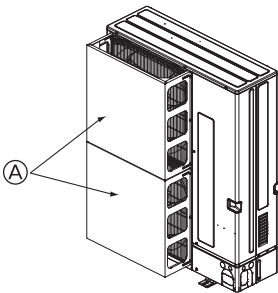


Fig. 12-1-2a

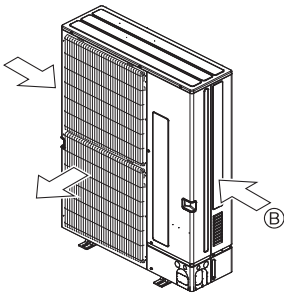


Fig. 12-1-2b

12-1-3. Foundation

- A. Be sure to install the unit in a sturdy, level surface to prevent rattling noises during operation. (see Fig. 12-1-3)
- B. Foundation specifications are as follows. mm [in.]

Thickness of concrete	Weight-bearing capacity	Foundation bolt	Bolt length
120 [4-3/4"]	320 kg [706lbs]	M10 [3/8"]	70 [2-25/32"]
- C. Make sure that the length of the foundation bolt is within 30 mm [1-3/16"] of the bottom surface of the base.
- D. Secure the base of the unit firmly with four-M10 [3/8"] foundation bolts in sturdy locations.

- ⚠ Warning:
 - A. The foundation base should be strong enough to support the outdoor unit, otherwise, it may fall down and cause damage or injuries.
 - B. The unit must be installed according to the instructions in order to minimize the risk of damage from earthquakes, typhoons, or strong winds.

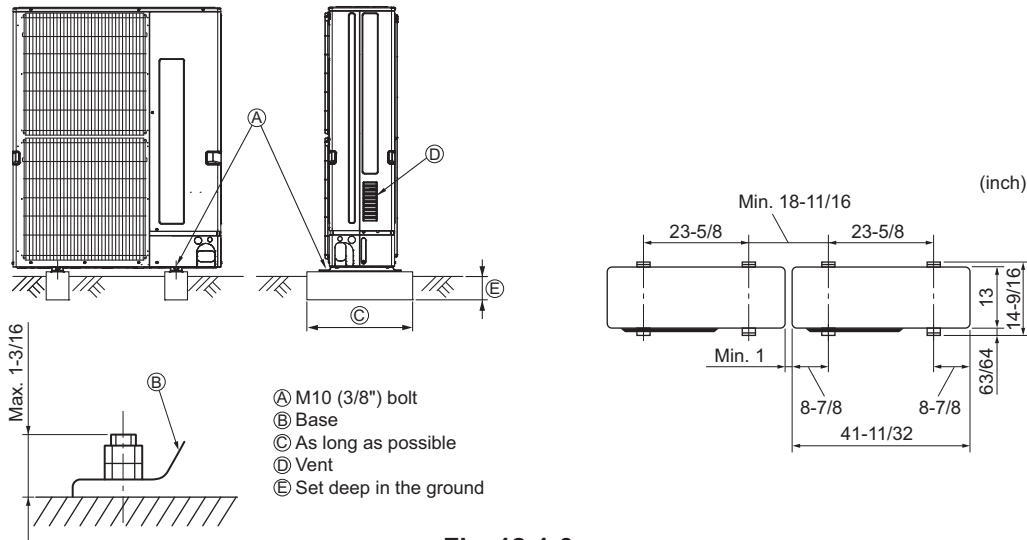


Fig. 12-1-3

12-2. Spacing

External dimension.

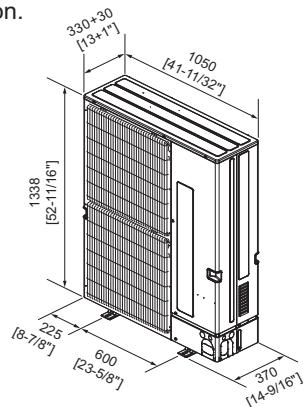


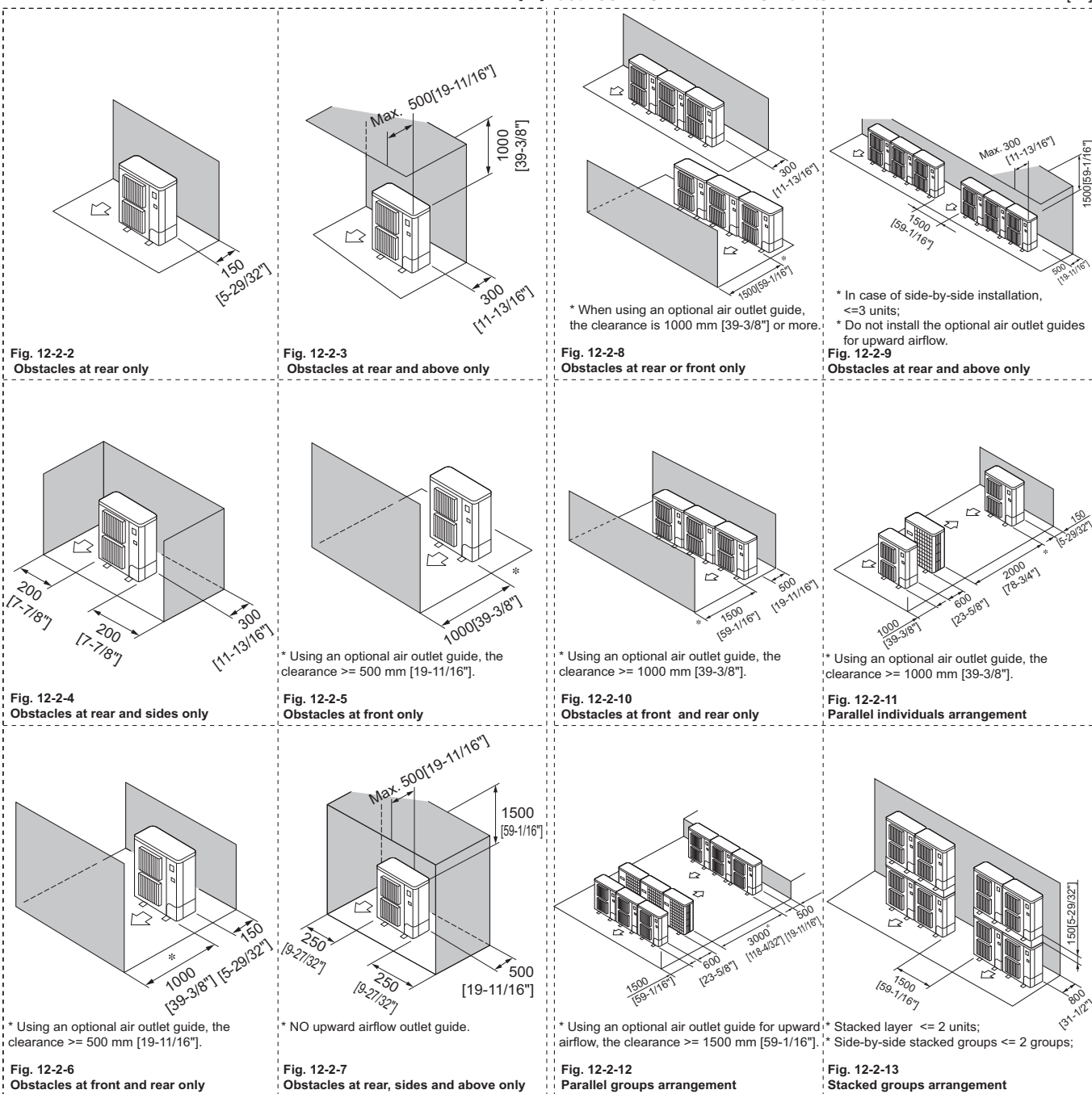
Fig. 12-2-1

12-2-1. Spacing individual PUMY-P-NKMU1

Follow Fig. 12-2-2~7 to space individual PUMY-P-NKMU1 at the installation site.

12-2-2. Spacing grouped PUMY-P-NKMU1

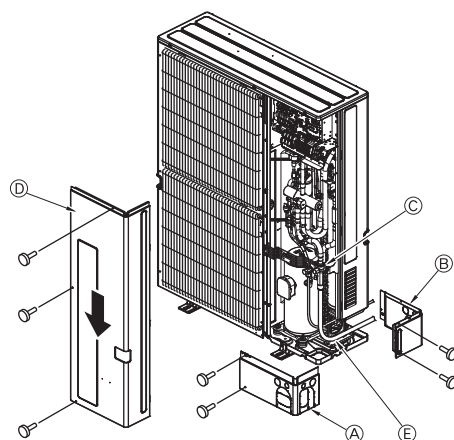
Follow Fig. 12-2-8~13 to space grouped PUMY-P-NKMU1 at the installation site. Leave 10 mm [13/32"] space or more between PUMY-P-NKMU1 units.



12-3. Piping direction

12-3-1. PUMY-P-NKMU1

PUMY-P-NKMU1



- (A) Front piping cover
- (B) Piping cover
- (C) Stop valve
- (D) Service panel
- (E) Bend radius : 100 mm [3-15/16"] - 150 mm [5-7/8"]

1. Installation information Ua-1-2

1-1. General precautions Ua-1-2

1-2. Precautions for Indoor unit and BC controller Ua-1-3

1-3. Precautions for Outdoor unit/Heat source unit..... Ua-1-4

1-4. Precautions for Control-related items Ua-1-5

1. Installation information

1-1. General precautions

1-1-1. 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.

1-1-2. 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.

1-1-3. 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/heat source units with multiple indoor units.

1-1-4. Unit characteristics

- Heat pump efficiency of outdoor unit 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.
- Depending on the operation conditions, the unit generates noise caused by valve actuation, refrigerant flow, and pressure changes even when operating normally. Please consider to avoid location where quietness is required. For BC/HBC controller, it is recommended to unit to be installed in places such as ceilings of corridor, restrooms and plant rooms.
- The total capacity of the connected indoor units can be greater than the capacity of the outdoor/heat source 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.

1-1-5. 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.

1. Installation information

1-1-6. 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.

1-1-7. 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.

1-1-8. 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.

1-2. Precautions for Indoor unit and BC controller

1-2-1. 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.

1-2-2. 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.

1-2-3. Unit installation

- For simultaneous cooling/heating operation type air conditioners (R2, H2i R2, WR2 series), the G-type BC controller cannot be connected to the P144 outdoor/heat source 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/heat source 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/heat source 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.

1. Installation information

1-3. Precautions for Outdoor unit/Heat source unit

1-3-1. Installation environment

- Outdoor/heat source 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/heat source 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-P-NHMu 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/heat source units in places such as schools to avoid the risk of injury.
 - A cooling tower and heat source water circuit should be a closed circuit that water is not exposed to the atmosphere. When a tank is installed to ensure that the circuit has enough water, minimize the contact with outside air so that the oxygen from being dissolved in the water should be 1 mg/L or less.
 - Install a strainer (50 mesh or more recommended) on the water pipe inlet on the heat source unit.
 - Interlock the heat source unit and water circuit pump.
 - Note the followings to prevent the freeze bursting of pipe when the heat source unit is installed in a place where the ambient temperature can be 0°C or below.
 - Keep the water circulating to prevent it from freezing when the ambient temperature is 0°C or below.
 - Before a long period of non use, be sure to purge the water out of the unit.
 - Salt-resistant unit is resistant to salt corrosion, but not salt-proof.
- Please note the following when installing and maintaining outdoor units in marine atmosphere.
1. Install the salt-resistant unit out of direct exposure to sea breeze, and minimize the exposure to salt water mist.
 2. Avoid installing a sun shade over the outdoor unit, so that rain will wash away salt deposits off the unit.
 3. Install the unit horizontally to ensure proper water drainage from the base of the unit. Accumulation of water in the base of the outdoor unit will significantly accelerate corrosion.
 4. Periodically wash salt deposits off the unit, especially when the unit is installed in a coastal area.
 5. Repair all noticeable scratches after installation and during maintenance.
 6. Periodically check the unit, and apply anti-rust agent and replace corroded parts as necessary.

1-3-2. Circulating water

- Follow the guidelines published by JRAIA (JRA-GL02-1994) to check the water quality of the water in the heat source unit regularly.
- A cooling tower and heat source water circuit should be a closed circuit that water is not exposed to the atmosphere. When a tank is installed to ensure that the circuit has enough water, minimize the contact with outside air so that the oxygen from being dissolved in the water should be 1 mg/L or less.

1-3-3. Unit characteristics

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

1-3-4. Relevant equipment

- Provide grounding in accordance with the local regulations.

1. Installation information

1-4. Precautions for Control-related items

1-4-1. 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 AE-200A/AE-50A/EW-50A/AG-150A-A/EB-50GU-A/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 AE-200A/AE-50A/EW-50A/AG-150A-A and EB-50GU-A, use separate watt-hour meters for A-control units, K-control units^{*1}, and packaged air conditioner for City Multi air conditioners. It is recommended to use an individual watt-hour meter for the large-capacity indoor unit (with two or more addresses).
- ♦When using the peak cut function on the AE-200A/AE-50A/EW-50A/AG-150A-A or EB-50GU-A, 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 AE-200A/AE-50A/EW-50A/AG-150A-A or EB-50GU-A 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 AE-200A/AE-50A/EW-50A/AG-150A-A/EB-50GU-A/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.

1-4-2. 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 AE-200A/AE-50A/EW-50A/AG-150A/EB-50GU-A or TG-2000A to the Internet.

^{*1}EB-50GU-A, AE-200A, AE-50A, and EW-50A cannot be used to control K-control units.

CAUTION FOR REFRIGERANT LEAKAGE

1. Caution for refrigerant leakage Ub-1-2

1-1. Refrigerant property Ub-1-2

1-2. Confirm the Critical concentration and take countermeasure Ub-1-2

1. Caution for refrigerant leakage

The installer and/or air conditioning system specialist shall secure safety against refrigerant leakage according to local regulations or standards. The following standard may be applicable if no local regulation or standard is available.

1-1. Refrigerant property

R410A refrigerant is harmless and incombustible. The R410A is heavier than the indoor air in density. Leakage of the refrigerant in a room has possibility to lead to a hypoxia situation. Therefore, the critical concentration specified below shall not be exceeded even if the leakage happens.

• Critical concentration

Critical concentration hereby is the refrigerant concentration in which no human body would be hurt if immediate measures can be taken when refrigerant leakage happens.

Critical concentration of R410A: 0.44kg/m³

(The weight of refrigeration gas per 1 m³ air conditioning space.);

* The Critical concentration is subject to ISO5149, EN378-1.

For the CITY MULTI system, the concentration of refrigerant leaked should not have a chance to exceed the critical concentration in any situation.

1-2. Confirm the Critical concentration and take countermeasure

The maximum refrigerant leakage concentration (Rmax) is defined as the result of the possible maximum refrigerant weight (Wmax) leaked into a room divided by its room capacity (V). It is referable to Fig.1-1. The refrigerant of Outdoor/Heat source unit here includes its original charge and additional charge at the site.

The additional charge is calculated according to the refrigerant charging calculation of each kind of Outdoor/Heat source unit, and shall not be over charged at the site. Procedure 1-2-1~3 tells how to confirm maximum refrigerant leakage concentration (Rmax) and how to take countermeasures against a possible leakage.

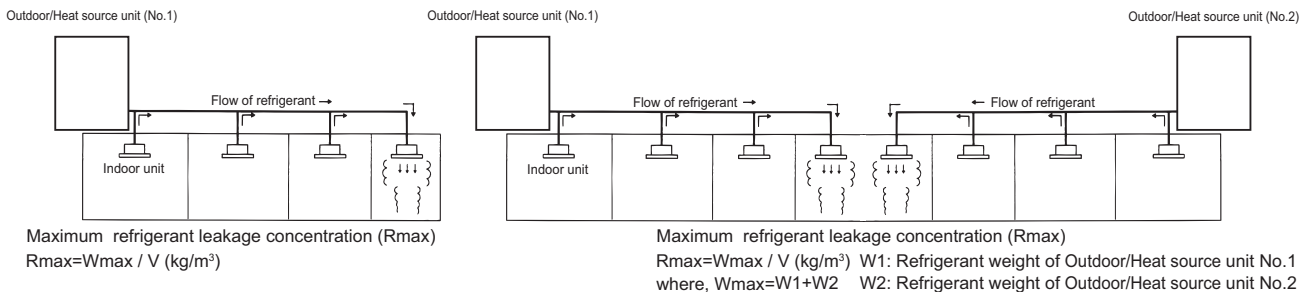


Fig. 1-1 The maximum refrigerant leakage concentration

1-2-1. Find the room capacity (V),

If a room having total opening area more than 0.15% of the floor area at a low position with another room/space, the two rooms/space are considered as one. The total space shall be added up.

1-2-2. Find the possible maximum leakage (Wmax) in the room. If a room has Indoor unit(s) from more than 1 Outdoor/Heat source unit, add up the refrigerant of the Outdoor/Heat source units.

1-2-3. Divide (Wmax) by (V) to get the maximum refrigerant leakage concentration (Rmax).

1-2-4. Find if there is any room in which the maximum refrigerant leakage concentration (Rmax) is over 0.44kg/m³.

If no, then the CITY MULTI is safe against refrigerant leakage.

If yes, following countermeasure is recommended to do at site.

Countermeasure 1: Let-out (making V bigger)

Design an opening of more than 0.15% of the floor area at a low position of the wall to let out the refrigerant whenever leaked.

e.g. make the upper and lower seams of door big enough.

Countermeasure 2: Smaller total charge (making Wmax smaller)

e.g. Avoid connecting more than 1 Outdoor/Heat source unit to one room.

e.g. Using smaller model size but more Outdoor/Heat source units.

e.g. Shorten the refrigerant piping as much as possible.

Countermeasure 3: Fresh air in from the ceiling (Ventilation)

As the density of the refrigerant is bigger than that of the air. Fresh air supply from the ceiling is better than air exhausting from the ceiling.

Fresh air supply solution refers to Fig. 1-2~4.

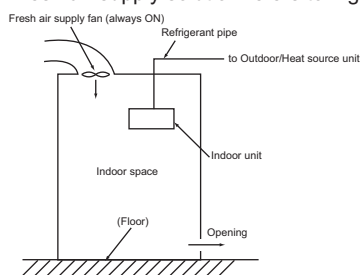


Fig. 1-2. Fresh air supply always ON

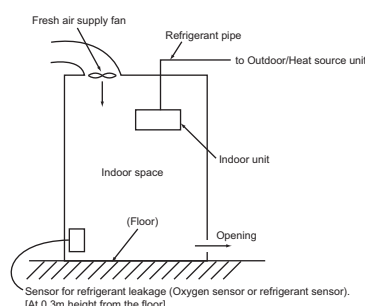


Fig. 1-3. Fresh air supply upon sensor action

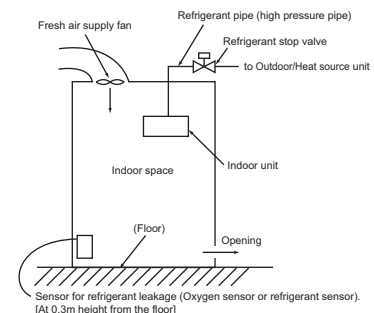


Fig. 1-4. Fresh air supply and refrigerant shut-off upon sensor action

Note 1. Countermeasure 3 should be done in a proper way in which the fresh air supply shall be on whenever the leakage happens.

Note 2. In principle, MITSUBISHI ELECTRIC requires proper piping design, installation and air-tight testing after installation to avoid leakage happening.

In the area should earthquake happen, anti-vibration measures should be fully considered.

The piping should consider the extension due to the temperature variation.



for a greener tomorrow

Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

⚠ Warning

- Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.
 - Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, during repair, or at the time of disposal of the unit.
 - It may also be in violation of applicable laws.
 - MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.
- Our air-conditioning equipments and heat pumps contain a fluorinated greenhouse gas, R410A.

mitsubishi electric corporation

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