MITSUBISHI ELECTRIC

Changes for the Better

AIR CONDITIONING SYSTEMS

CITY MULTI

DATA BOOK

MODEL

PUMY-SM112-140VKM2 (-BS)

PUMY-SM112-140YKM2 (-BS)

GENERAL LINE-UP

Line-up of Outdoor Units of R32 CITY MULTI

Heat Pump S Series

PUMY-SM112VKM2 (-BS)	PUMY-SM112YKM2 (-BS)
PUMY-SM125VKM2 (-BS)	PUMY-SM125YKM2 (-BS)
PUMY-SM140VKM2 (-BS)	PUMY-SM140YKM2 (-BS)

4.5, 5, 6HP

PUMY-SM-VKM2, PUMY-SM-YKM2

1. SPECIFICATIONS

Model					PUMY-SM112VKM2(-BS) PUMY-SM112VKM2-ET(-BS)	PUMY-SM125VKM2(-BS) PUMY-SM125VKM2-ET(-BS)	PUMY-SM140VKM2(-BS) PUMY-SM140VKM2-ET(-BS)
Power source					1-phase 220-230-240 V, 50 Hz		
Cooling capacity (Nominal)*1		kW			12.5	14.0	15.5
		kcal/h			10,750	12,040	13,330
		Btu/h			42,650	47,768	52,886
	Power input	kW			3.32	4.19	4.81
	Current input	A			15.40 / 14.73 / 14.12	19.43 / 18.59 / 17.81	22.45 / 21.47 / 20.58
	COP	kW/kW			3.76	3.34	3.22
	SEER	kW/kW			8.19	8.09	7.94
Temp. range of cooling	Indoor	W.B.			15 to 24°C *7		
	Outdoor	D.B.			-5 to 52°C *3		
Heating capacity (Nominal)*2		kW			14.0	16.0	17.5
		kcal/h			12,040	13,760	15,050
		Btu/h			47,768	54,592	59,712
	Power input	kW			3.33	3.73	4.15
	Current input	A			15.45 / 14.77 / 14.16	17.30 / 16.55 / 15.86	19.25 / 18.41 / 17.64
	COP	kW/kW			4.20	4.28	4.21
	SCOP	kW/kW			4.96	4.87	4.85
Temp. range of heating	Indoor	D.B.			17 to 28°C *8		
	Outdoor	W.B.			−20 to 15°C		
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity		
	Model/ Quantity	CITY MULTI			M/MS10 - M/MS140/12		
		Branch box*4			M/S/P15 - M/S/P100/8		
		Mixed system	4-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/5		
				Branch box	M/S/P15-M/S/P100/4		
			6-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/3		
				Branch box	M/S/P15-M/S/P100/6		
			4-branch box 2 unit	CITY MULTI	M/MS10-M/MS140/3		
				Branch box	M/S/P15-M/S/P100/8		
			4-branch box 1 unit + 6-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/2		
				Branch box	M/S/P15-M/S/P100/8		
Sound pressure level (SPL) (measured in anechoic room)		dB		Cooling	52	53	54
				Heating	54	56	56
Sound power level (PWL) (measured in anechoic room)		dB		Cooling	72	73	74
				Heating	74	76	76
Refrigerant piping diameter	Liquid pipe	mm (in)			9.52 (3/8)		
	Gas pipe	mm (in)			15.88 (5/8)		
Fan	Type × Quantity				Propeller Fan x 1		
	Air flow rate	m³/min			77/75	81/83	81/83
		L/s			1,283/1,250	1,350/1,383	1,350/1,383
		cfm			2,719/2,648	2,860/2,931	2,860/2,931
	Control, Driving mechanism				DC control		
	Motor output	kW			0.20 × 1		
	External static press.				0 Pa/30 Pa*5		
Compressor	Type × Quantity				Twin rotary hermetic compressor x 1		
	Manufacturer				Mitsubishi Electric Corporation		
	Starting method				Inverter		
	Capacity control	%		Cooling	27 to 100	24 to 100	20 to 100
				Heating	16 to 100	15 to 100	14 to 100
	Motor output	kW			3.0	3.3	3.6
	Case heater	kW			0		
	Lubricant				FW68CA (1.4 liter)		
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1		
External dimension H × W × D		mm			981 × 1,050 × 330 (+40)		
		in			38-5/8 × 41-3/8 × 13 (+1-37/64)		
Protection devices	High pressure protection				High pressure switch		
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection (Heat sink thermistor)		
	Compressor				Compressor thermistor, Overcurrent detection		
	Fan motor				Overheating, Voltage protection,		
Refrigerant	Type × original charge				R32 3.0 kg		
	Control				Linear expansion valve		
Net weight		kg (lb)			94 (208)*6		
Heat exchanger					Cross Fin and Copper tube		
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit		
Defrosting method					Reversed refrigerant circuit		
Standard attachment	Document				Installation Manual		
	Accessory				Grounded lead wire, Muffler, Joint pipe-L		
Optional parts					Joint: CMY-Y62-G-E, Header: CMY-Y64/68-G-E		

Remarks

*1. Nominal cooling conditions:
Indoor: 27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]
Outdoor: 35°C D.B. [95°F D.B.]
Pipe length: 7.5 m [24-9/16 ft]
Level difference: 0 m [0 ft]

*2. Nominal heating conditions:
Indoor: 20°C D.B. [68°F D.B.]
Outdoor: 7°C D.B./6°C W.B. [45°F D.B./43°F W.B.]
Pipe length: 7.5 m [24-9/16 ft]
Level difference: 0 m [0 ft]

*3. −15 to 52°C D.B. [50 to 126°F D.B.] when using an optional air protect guide [PAC-SH95AG-E]
10 to 52°C D.B. when the following indoor units are connected: M/S/P series type indoor unit
15 to 52°C D.B. when the following indoor units are connected: PKFY*VLM or PKFY*VKM

*4. At least two indoor units must be connected when using branch box.

*5. It is possible to set the external static pressure to 30 Pa by Dip Switch.

*6. 95 (210), for PUMY-SM112/125/140VKM2-BS

*7. 15 to 23°C W.B. [59 to 73°F W.B.] when using branch box (M/S/P series)

*8. 20 to 27°C D.B. [68 to 81°F W.B.] when using branch box (M/S/P series)

*9. **Notes:**

- Nominal conditions *1, *2 are subject to ISO 15042.
- Due to continuing improvement, above specifications are subject to change without notice.
- See the following for unit conversion: kcal/h = kW × 860, Btu/h = kW × 3,412, cfm = m³/min × 35.31, lb = kg/0.4536
  Above specification data is subject to rounding variation.

1. SPECIFICATIONS

Model					PUMY-SM112YKM2(-BS) PUMY-SM112YKM2-ET(-BS)	PUMY-SM125YKM2(-BS) PUMY-SM125YKM2-ET(-BS)	PUMY-SM140YKM2(-BS) PUMY-SM140YKM2-ET(-BS)
Power source					3-phase 380-400-415 V, 50 Hz		
Cooling capacity (Nominal)*1		kW			12.5	14.0	15.5
		kcal/h			10,750	12,040	13,330
		Btu/h			42,650	47,768	52,886
	Power input	kW			3.32	4.19	4.81
	Current input	A			5.31 / 5.04 / 4.86	6.70 / 6.37 / 6.14	7.74 / 7.35 / 7.09
	COP	kW/kW			3.76	3.34	3.22
	SEER	kW/kW			8.19	8.09	7.94
Temp. range of cooling	Indoor	W.B.			15 to 24°C *7		
	Outdoor	D.B.			-5 to 52°C *3		
Heating capacity (Nominal)*2		kW			14.0	16.0	17.5
		kcal/h			12,040	13,760	15,050
		Btu/h			47,768	54,592	59,712
	Power input	kW			3.33	3.73	4.15
	Current input	A			5.33 / 5.06 / 4.88	5.97 / 5.67 / 5.46	6.64 / 6.31 / 6.08
	COP	kW/kW			4.20	4.28	4.21
	SCOP	kW/kW			4.96	4.87	4.85
Temp. range of heating	Indoor	D.B.			17 to 28°C *8		
	Outdoor	W.B.			−20 to 15°C		
Indoor unit connectable	Total capacity				50 to 130% of outdoor unit capacity		
	Model/ Quantity	CITY MULTI			M/MS10 - M/MS140/12		
		Branch box*4			M/S/P15 - M/S/P100/8		
		Mixed system	4-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/5		
				Branch box	M/S/P15-M/S/P100/4		
			6-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/3		
				Branch box	M/S/P15-M/S/P100/6		
			4-branch box 2 unit	CITY MULTI	M/MS10-M/MS140/3		
				Branch box	M/S/P15-M/S/P100/8		
			4-branch box 1 unit + 6-branch box 1 unit	CITY MULTI	M/MS10-M/MS140/2		
				Branch box	M/S/P15-M/S/P100/8		
Sound pressure level (SPL) (measured in anechoic room)		dB		Cooling	52	53	54
				Heating	54	56	56
Sound power level (PWL) (measured in anechoic room)		dB		Cooling	72	73	74
				Heating	74	76	76
Refrigerant piping diameter	Liquid pipe	mm (in)			9.52 (3/8)		
	Gas pipe	mm (in)			15.88 (5/8)		
Fan	Type × Quantity				Propeller Fan x 1		
	Air flow rate						
		L/s			1,283/1,250	1,350/1,383	1,350/1,383
		cfm			2,719/2,648	2,860/2,931	2,860/2,931
	Control, Driving mechanism				DC control		
	Motor output	kW			0.20 × 1		
	External static press.				0 Pa/30 Pa*5		
Compressor	Type × Quantity				Twin rotary hermetic compressor x 1		
	Manufacturer				Mitsubishi Electric Corporation		
	Starting method				Inverter		
	Capacity control	%		Cooling	27 to 100	24 to 100	20 to 100
				Heating	16 to 100	15 to 100	14 to 100
	Motor output	kW			3.0	3.3	3.6
	Case heater	kW			0		
	Lubricant				FW68CA (1.4 liter)		
External finish					Galvanized Steel Sheet Munsell No. 3Y 7.8/1.1		
External dimension H × W × D		mm			981 × 1,050 × 330 (+40)		
		in			38-5/8 × 41-3/8 × 13 (+1-37/64)		
Protection devices	High pressure protection				High pressure switch		
	Inverter circuit (COMP./FAN)				Overcurrent detection, Overheat detection (Heat sink thermistor)		
	Compressor				Compressor thermistor, Overcurrent detection		
	Fan motor				Overheating, Voltage protection,		
Refrigerant	Type × original charge				R32 3.0 kg		
	Control				Linear expansion valve		
Net weight		kg (lb)			95 (210)*6		
Heat exchanger					Cross Fin and Copper tube		
HIC circuit (HIC: Heat Inter-Changer)					HIC circuit		
Defrosting method					Reversed refrigerant circuit		
Standard attachment	Document				Installation Manual		
	Accessory				Grounded lead wire, Muffler, Joint pipe-L		
Optional parts					Joint: CMY-Y62-G-E, Header: CMY-Y64/68-G-E		

Remarks

*1. Nominal cooling conditions:
Indoor: 27°C D.B./19°C W.B. [81°F D.B/66°F W.B.]
Outdoor: 35°C D.B. [95°F D.B.]
Pipe length: 7.5 m [24-9/16 ft]
Level difference: 0 m [0 ft]

*2. Nominal heating conditions:
Indoor: 20°C D.B. [68°F D.B.]
Outdoor: 7°C DB/6°C W.B. [45°F D.B./43°F W.B.]
Pipe length: 7.5 m [24-9/16 ft]
Level difference: 0 m [0 ft]

*3. −15 to 52°C D.B. [50 to 126°F D.B.], when using an optional air protect guide [PAC-SH95AG-E]
10 to 52°C D.B. when the following indoor units are connected: M/S/P series type indoor unit
15 to 52°C D.B. when the following indoor units are connected: PKFY*VLM or PKFY*VKM

*4. At least two indoor units must be connected when using branch box.

*5. It is possible to set the external static pressure to 30 Pa by Dip Switch.

*6. 96 (212), for PUMY-SM112/125/140YKM2-BS

*7. 15 to 23°C W.B. [59 to 73°F W.B.] when using branch box (M/S/P series)

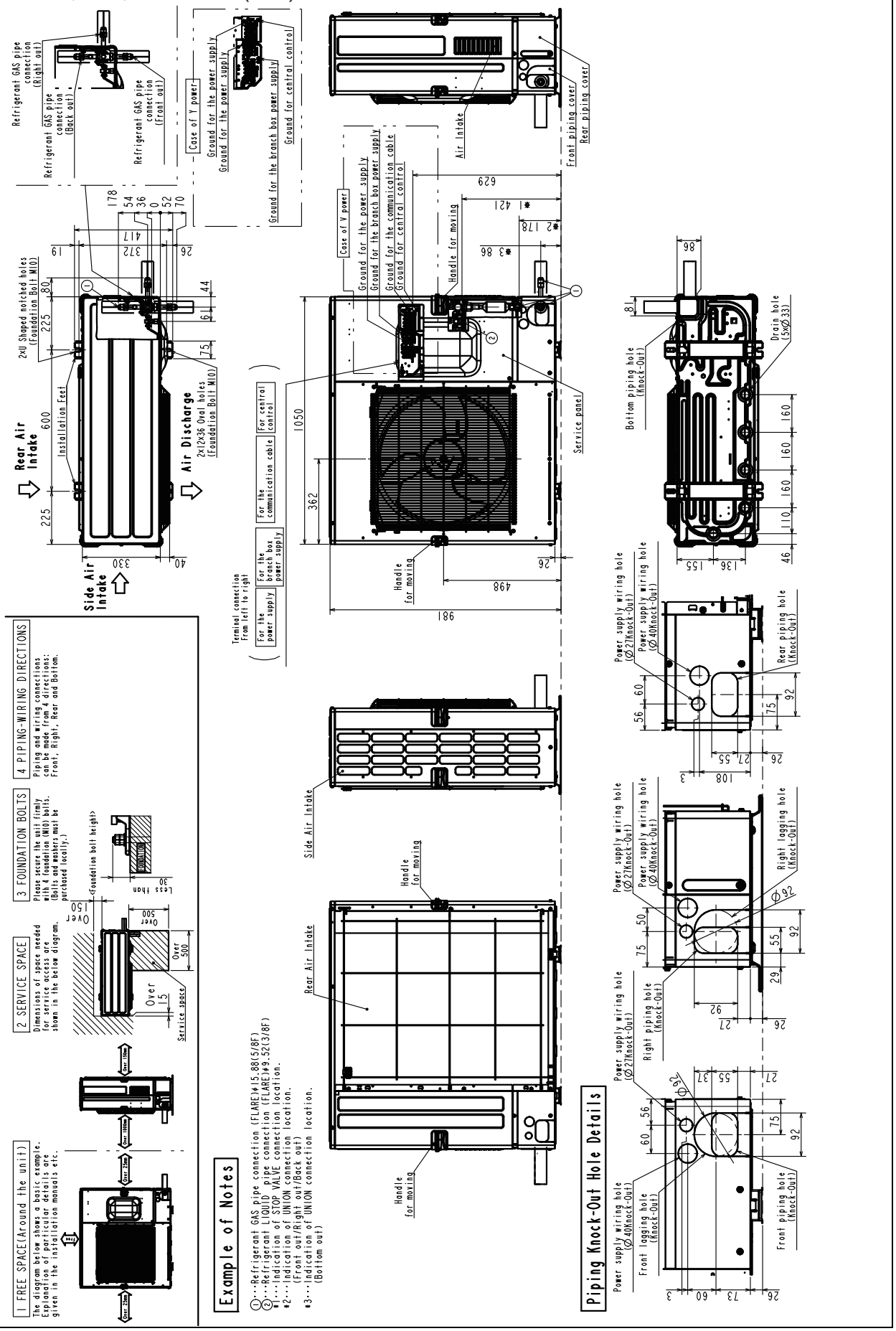
*8. 20 to 27°C D.B. [68 to 81°F W.B.] when using branch box (M/S/P series)

Notes:

- Nominal conditions *1, *2 are subject to ISO 15042.
- Due to continuing improvement, above specifications are subject to change without notice.
- See the following for unit conversion: kcal/h = kW × 860, Btu/h = kW × 3,412, cfm = m³/min × 35.31, lb = kg/0.4536
  Above specification data is subject to rounding variation.

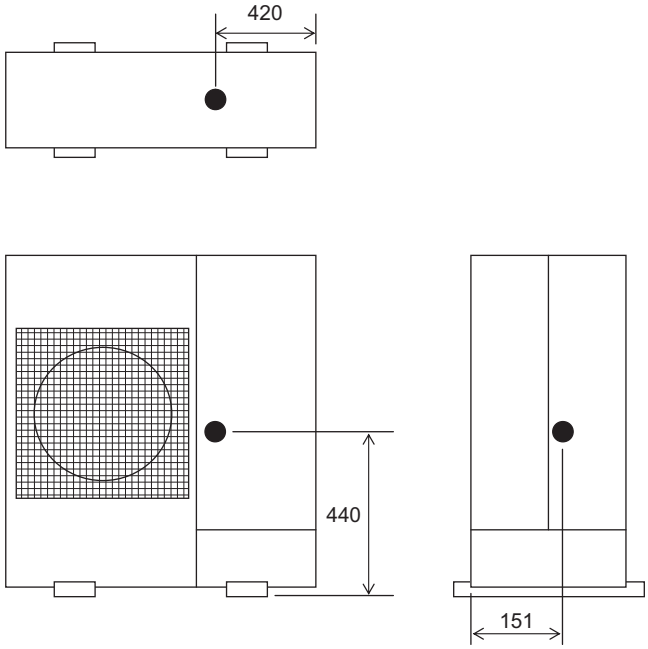
PUMY-SM112, 125, 140VKM2 (-BS)
PUMY-SM112, 125, 140YKM2 (-BS)

Unit: mm

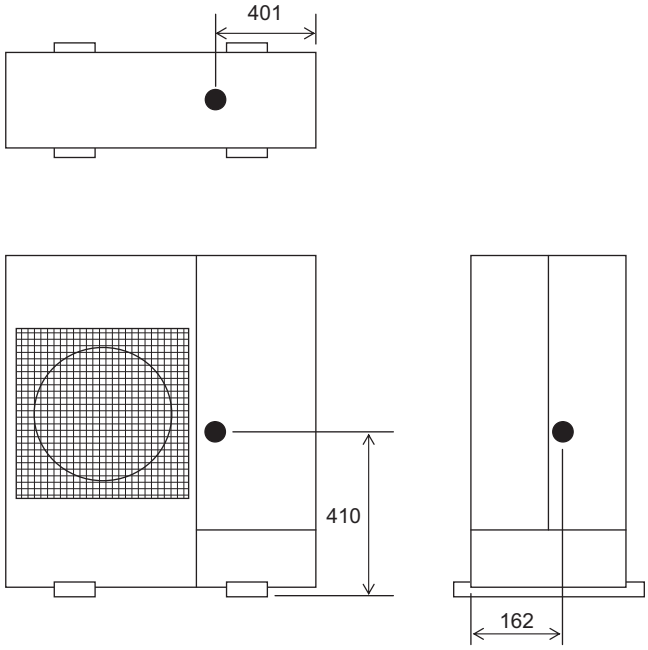


PUMY-SM112, 125, 140VKM2 (-BS)

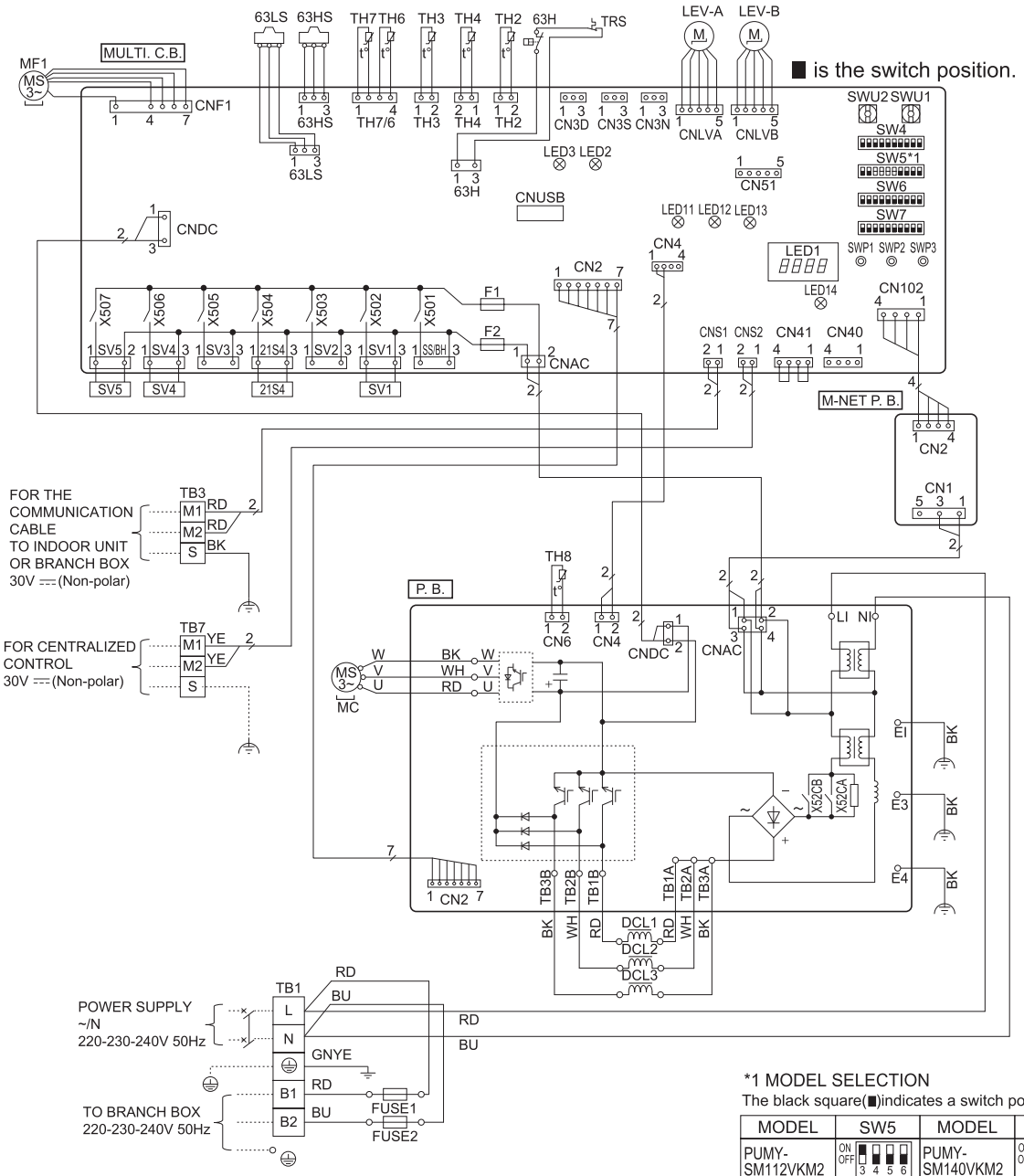
Unit: mm



PUMY-SM112, 125, 140YKM2 (-BS)



PUMY-SM112, 125, 140VKM2 (-BS)



*1 MODEL SELECTION

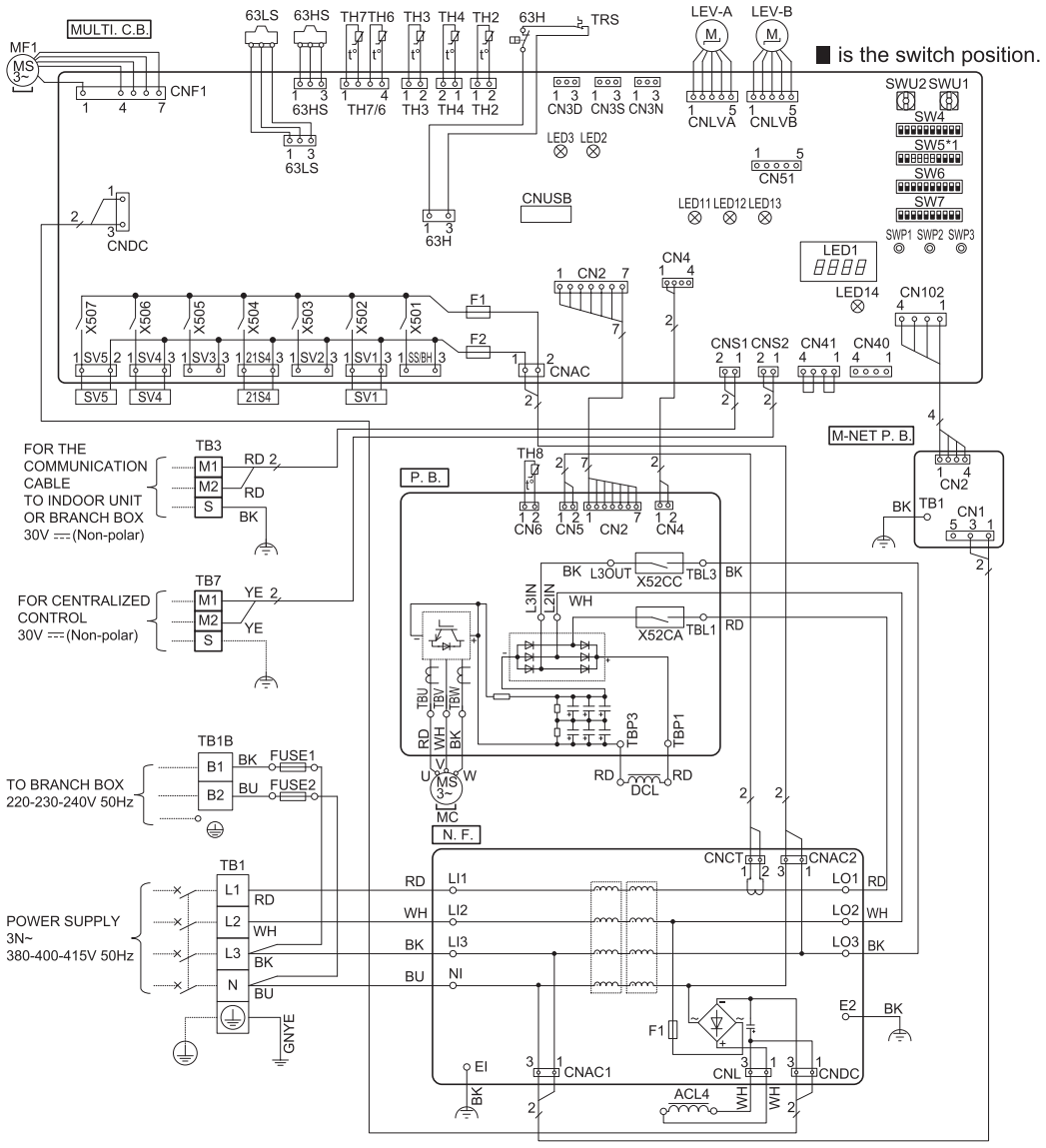
The black square(■)indicates a switch position.

MODEL	SW5	MODEL	SW5
PUMY-SM112VKM2	ON OFF 3 4 5 6	PUMY-SM140VKM2	ON OFF 3 4 5 6
PUMY-SM125VKM2	ON OFF 3 4 5 6		

【LEGEND】

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply/Branch Box>	TH7	Thermistor <Ambient>	SWU2	Switch <Unit Address Selection, tens digit>
TB3	Terminal Block <Indoor/Outdoor, Branch Box/Outdoor Transmission Line>	TH8	Thermistor <Heat Sink>	SWP3	Switch <Function Selection>
		LEV-A, LEV-B	Linear Expansion Valve	SS/BH	Connector <Connection for Option>
TB7	Terminal Block <Centralized Control Transmission Line>	DCL1, DCL2, DCL3	Reactor	CN3D	Connector <Connection for Option>
		TRS	Thermal Protector	CN3S	Connector <Connection for Option>
FUSE1,FUSE2	Fuse <T20AL250V>	P.B.	Power Circuit Board	CN3N	Connector <Connection for Option>
MC	Motor for Compressor	U/V/W	Connection Terminal <U/V/W-Phase>	CN51	Connector <Connection for Option>
MF1	Fan Motor	LI	Connection Terminal <L-Phase>	LED1	LED <Operation Inspection Display>
63H	High Pressure Switch	NI	Connection Terminal <N-Phase>	LED11	Normal operation(Lit)/IC Error(Blink)
63HS	High Pressure Sensor	TB1A, TB2A, TB3A, TB1B, TB2B, TB3B	Connection Terminal <Reactor>	LED12	Normal operation(Lit)Error(Blink) for central control transmission
63LS	Low Pressure Sensor				
SV1	Solenoid Valve Coil <Bypass Valve>	EI, E3, E4	Connection Terminal <Electrical Parts Box>	LED13	Normal operation(Lit)Error(Blink) for indoor / outdoor transmission
SV4	Solenoid Valve Coil <Liquid Shut-off Valve>	X52CA/B	52C Relay		
SV5	Solenoid Valve Coil <Gas Shut-off Valve>	MULTI. C.B.	Multi Controller Circuit Board	LED14	LED <Power Supply to Main Microcomputer>
21S4	Solenoid Valve Coil <4-Way Valve>	SW4	Switch <Display Selection>	F1,F2	Fuse <T6.3AL250V>
TH2	Thermistor <HIC Pipe>	SW5	Switch <Model Selection>	X501~507	Relay
TH3	Thermistor <Outdoor Liquid Pipe>	SW6	Switch <Function Selection/Test Run>	CNUSB	USB TYPE A
TH4	Thermistor <Compressor>	SW7	Switch <Function Selection>	M-NET P.B.	M-NET Power Circuit Board
TH6	Thermistor <Suction Pipe>	SWU1	Switch <Unit Address Selection, ones digit>		

PUMY-SM112, 125, 140YKM2 (-BS)



*1 MODEL SELECTION

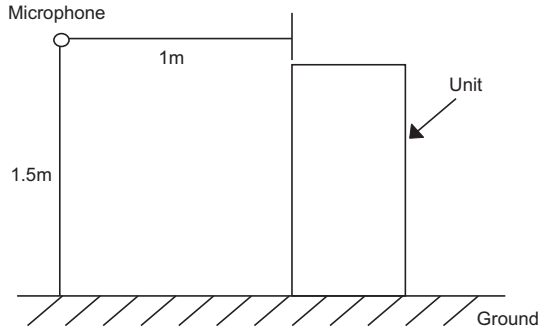
The black square(■)indicates a switch position.

MODEL	SW5	MODEL	SW5
PUMY-SM112YKM2	ON OFF 3 4 5 6	PUMY-SM140YKM2	ON OFF 3 4 5 6
PUMY-SM125YKM2	ON OFF 3 4 5 6		

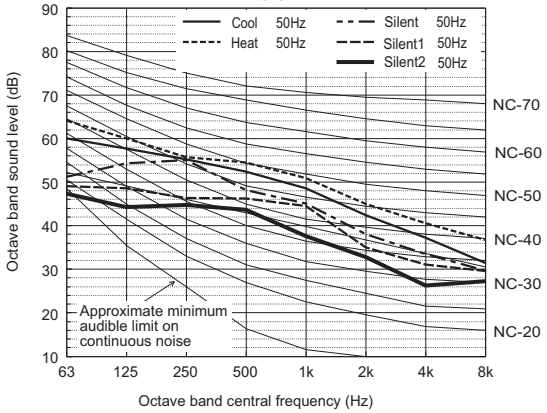
【LEGEND】

SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply>	TH8	Thermistor <Heat Sink>	SWU2	Switch <Unit Address Selection, tens digit>
TB1B	Terminal Block <Branch Box>	LEV-A, LEV-B	Linear Expansion Valve	SWP3	Switch <Function Selection>
TB3	Terminal Block <Indoor/Outdoor, Branch Box/Outdoor Transmission Line>	ACL4	Reactor	SS/BH	Connector <Connection for Option>
		DCL	Reactor	CN3D	Connector <Connection for Option>
TB7	Terminal Block <Centralized Control Transmission Line>	TRS	Thermal Protector	CN3S	Connector <Connection for Option>
		P.B.	Power Circuit Board	CN3N	Connector <Connection for Option>
FUSE1,FUSE2	Fuse <T20AL250V>	TBU/V/W	Connection Terminal <U/V/W-Phase>	CN51	Connector <Connection for Option>
MC	Motor for Compressor	TBL1,L2IN,TBL3	Connection Terminal <L1/L2/L3-Power Supply>	LED1	LED <Operation Inspection Display>
MF1	Fan Motor	TBP1/P3	Connection Terminal	LED11	Normal operation(Lit)/IC Error(Blink)
63H	High Pressure Switch	X52CA/C	52C Relay	LED12	Normal operation(Lit)Error(Blink) for central control transmission
63HS	High Pressure Sensor	N.F.	Noise Filter Circuit Board		
63LS	Low Pressure Sensor	LO1/LO2/LO3	Connection Terminal <L1/L2/L3-Power Supply>	LED13	Normal operation(Lit)Error(Blink) for indoor / outdoor transmission
SV1	Solenoid Valve Coil <Bypass Valve>	LI1/LI2/LI3/NI	Connection Terminal <L1/L2/L3/N-Power Supply>		
SV4	Solenoid Valve Coil <Liquid Shut-off Valve>	EI, E2	Connection Terminal <Electrical Parts Box>	LED14	LED <Power Supply to Main Microcomputer>
SV5	Solenoid Valve Coil <Gas Shut-off Valve>	F1	Fuse <T6.3AL250V>	F1,F2	Fuse <T6.3AL250V>
21S4	Solenoid Valve Coil <4-Way Valve>	MULTI. C.B.	Multi Controller Circuit Board	X501~X507	Relay
TH2	Thermistor <HIC Pipe>	SW4	Switch <Display Selection>	CNUSB	USB TYPE A
TH3	Thermistor <Outdoor Liquid Pipe>	SW5	Switch <Model Selection>	M-NET P.B.	M-NET Power Circuit Board
TH4	Thermistor <Compressor>	SW6	Switch <Function Selection/Test Run>	TB1	Connection Terminal <Electrical Parts Box>
TH6	Thermistor <Suction Pipe>	SW7	Switch <Function Selection>		
TH7	Thermistor <Ambient>	SWU1	Switch <Unit Address Selection, ones digit>		

Measurement condition
PUMY-SM112, 125, 140VKM2 (-BS)
PUMY-SM112, 125, 140YKM2 (-BS)



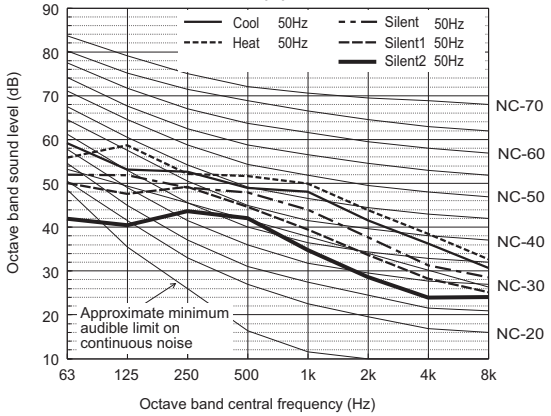
Sound level of PUMY-SM140V(Y)KM2



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	50Hz	60.1	57.7	55.3	52.4	48.6	42.4	37.2	31.5	54.0
Standard Heating	50Hz	64.1	60.0	55.7	54.5	50.9	45.0	40.6	36.7	56.0
Silent	50Hz	51.2	54.3	55.0	48.1	45.1	38.1	33.5	29.6	51.0
Super silent1	50Hz	49.1	48.6	46.4	46.3	44.5	35.0	31.1	29.6	48.0
Super silent2	50Hz	47.4	44.3	44.7	43.6	37.6	32.8	26.3	27.2	44.0

When Silent/Super Silent1/Super Silent2 mode is set,the A/C system's capacity is limited. The system could return to normal operation from Silent/Super Silent1/Super Silent2 mode automatically in the case that the operation condition is severe.

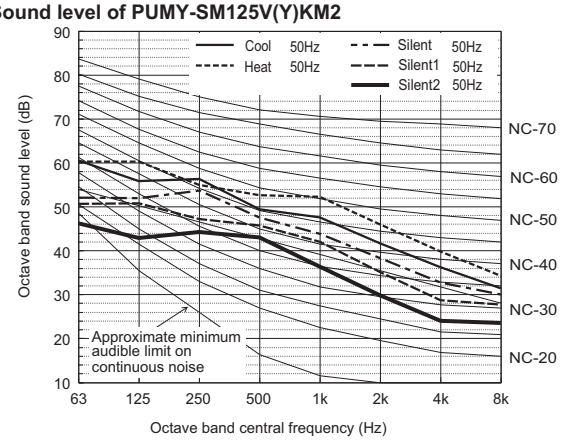
Sound level of PUMY-SM112V(Y)KM2



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	50Hz	59.2	53.2	52.6	48.9	48.1	41.6	36.2	30.7	52.0
Standard Heating	50Hz	55.8	58.7	52.1	51.7	49.9	43.9	38.5	32.7	54.0
Silent	50Hz	52.0	51.9	49.0	47.9	43.9	37.7	31.3	28.5	49.0
Super silent1	50Hz	50.1	47.6	49.2	44.6	39.4	33.7	28.3	25.2	46.0
Super silent2	50Hz	41.9	40.5	43.7	42.1	34.8	28.6	23.9	24.1	42.0

When Silent/Super Silent1/Super Silent2 mode is set,the A/C system's capacity is limited. The system could return to normal operation from Silent/Super Silent1/Super Silent2 mode automatically in the case that the operation condition is severe.

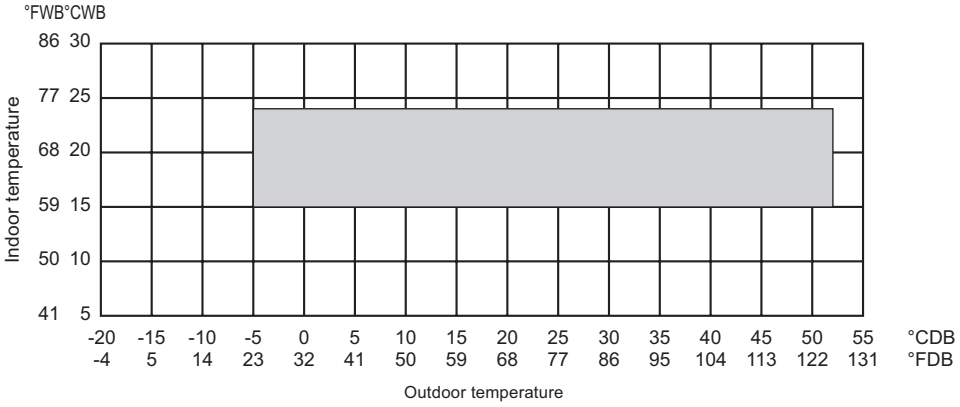
Sound level of PUMY-SM125V(Y)KM2



		63	125	250	500	1k	2k	4k	8k	dB(A)
Standard Cooling	50Hz	60.6	55.8	56.4	49.5	47.6	41.7	36.3	31.5	53.0
Standard Heating	50Hz	60.3	60.3	55.0	52.7	52.3	46.0	39.8	34.3	56.0
Silent	50Hz	52.1	52.0	53.7	47.5	43.8	38.3	32.8	30.0	50.0
Super silent1	50Hz	50.7	50.8	47.2	45.8	42.0	35.2	28.7	27.8	47.0
Super silent2	50Hz	46.2	42.9	44.3	43.0	36.4	29.8	24.0	23.5	43.0

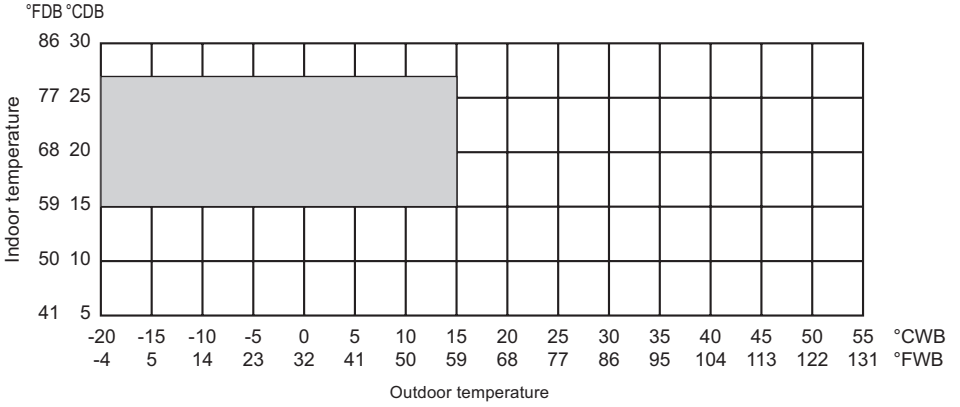
When Silent/Super Silent1/Super Silent2 mode is set,the A/C system's capacity is limited. The system could return to normal operation from Silent/Super Silent1/Super Silent2 mode automatically in the case that the operation condition is severe.

• **Cooling**



* 10 to 52°CD.B. [50 to 126°FD.B.]: in case of connecting M series, S series, and P series type indoor unit with branch box.
*15 to 52°CD.B. [59 to 126°FD.B.]: in case of connecting PKFY-*VLM or PKFY-*VKM type indoor unit.
* 15 to 23°C W.B. [59 to 73°F W.B.] when using branch box (M/S/P series)

• **Heating**

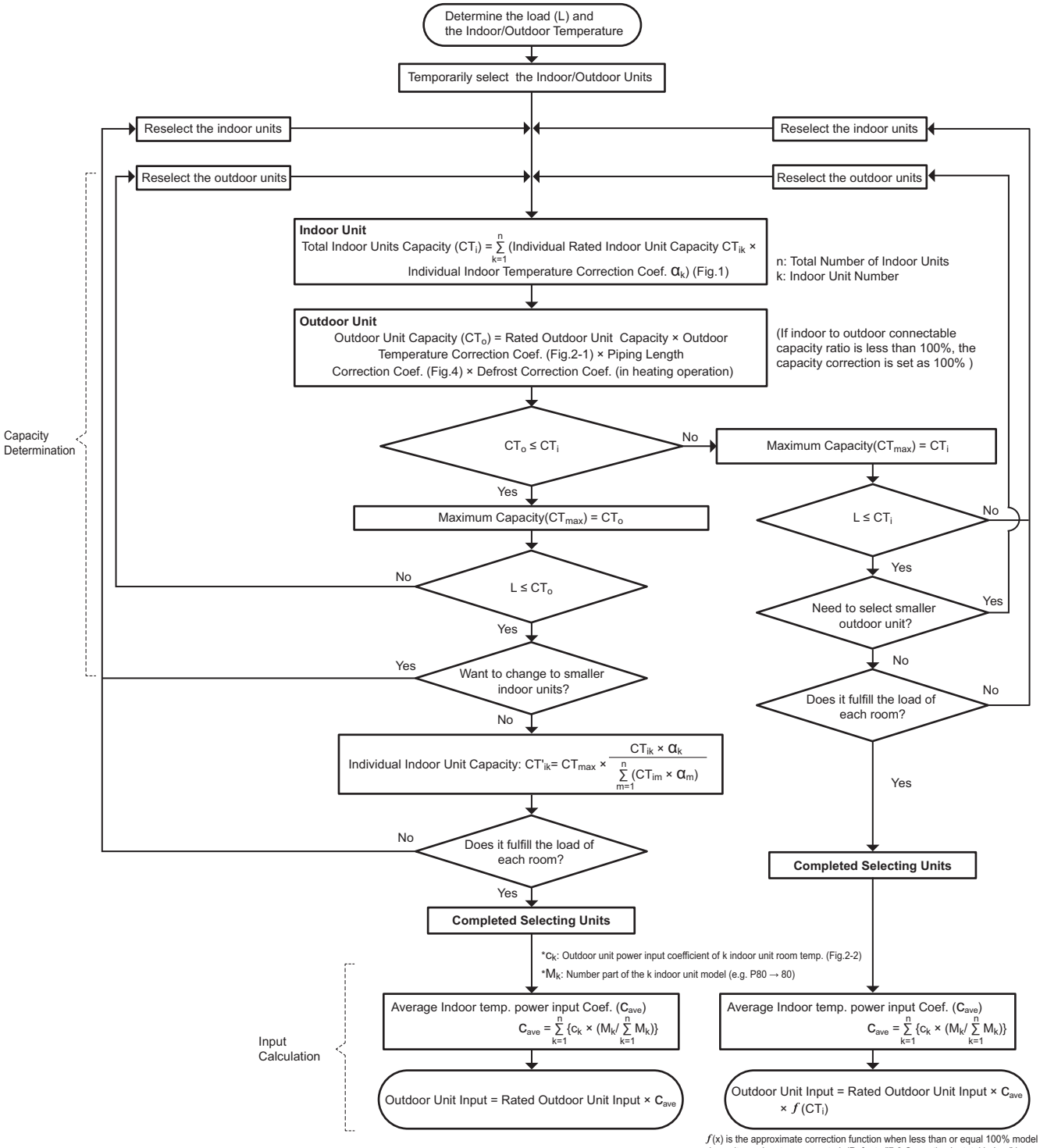


* 20 to 27°C D.B. [68 to 81°F W.B.] when using branch box (M/S/P series)

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.



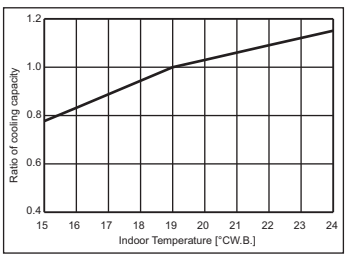


Fig.1 Indoor unit temperature correction *1

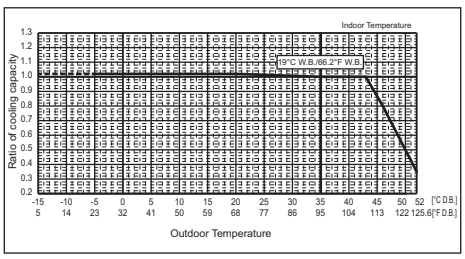


Fig.2-1 Outdoor unit temperature correction (capacity) *1

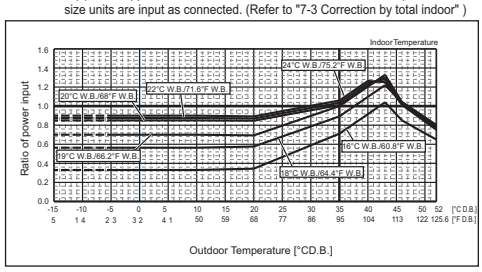


Fig.2-2 Outdoor unit temperature correction (power input) *1

* Values in the temperature correction diagram in the range below -5°C (23°F) are reference values and not guaranteed values. Do not use these reference values for selecting outdoor unit models.

*1 These figures show characteristics of a different model. For details, please refer to examples of calculations page.

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.

Determine the load (L) and the Indoor/Outdoor Temperature

Temporarily select the indoor/outdoor units

Reselect the indoor units / Reselect the outdoor units

Indoor Unit

Total Indoor Units Capacity (CT_i) = $\sum_{k=1}^{n}$ (Individual Rated Indoor Unit Capacity CT_{ik} × Individual Indoor Temperature Correction Coef. α_k) (Fig.1)

n: Total Number of Indoor Units
k: Indoor Unit Number

Outdoor Unit *1

Outdoor Unit Capacity (CT_o) = Rated Outdoor Unit Capacity × $G(CT_i)$ × Outdoor Temperature Correction Coef. (Fig.2-1) × Piping Length Correction Coef. (Fig.4) × Defrost Correction Coef. (in heating)

$G(x)$ is the approximate correction function when greater than 100% model size units are connected. (Refer to "7-3 Correction by total indoor")

$CT_o \le CT_i$?

No → Maximum Capacity(CT_{max}) = CT_i

Yes → Maximum Capacity(CT_{max}) = CT_o

$L \le CT_i$?

No → Reselect the indoor units

Yes → Need to select smaller outdoor unit?

Yes → Reselect the outdoor units

No → Does it fulfill the load of each room?

No → Reselect the indoor units

Yes → **Completed Selecting Units**

$L \le CT_o$?

No → Reselect the outdoor units

Yes → Want to change to smaller indoor units?

Yes → Reselect the indoor units

No → Individual Indoor Unit Capacity: $CT'_{ik} = CT_{max} \times \frac{CT_{ik} \times \alpha_k}{\sum_{m=1}^{n} (CT_{im} \times \alpha_m)}$

Does it fulfill the load of each room?

No → Reselect the indoor units

Yes → **Completed Selecting Units**

Rated Outdoor Unit Capacity < Total Indoor Units Capacity ?

No → Outdoor Unit Input = Rated Outdoor Unit Input × Outdoor Temperature Correction Coef. (Fig.2-2) × $f(CT_i)$

$f(x)$ is the approximate correction function when less than or equal 100% model size units are input as connected. (Refer to "7-3 Correction by total indoor")

Yes

*c_k: Outdoor unit power input coefficient of k indoor unit room temp. (Fig.2-2)
*M_k: Number part of the k indoor unit model (e.g. P80 → 80)

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

Outdoor Unit Input = Rated Outdoor Unit Input × C_{ave} × $F(CT_i)$

$F(x)$ is the approximate correction function when greater than 100% model size units are input as connected. (Refer to "7-3 Correction by total indoor")

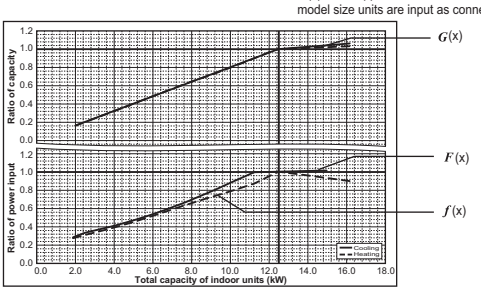


Fig.3 Correction by total indoor *1

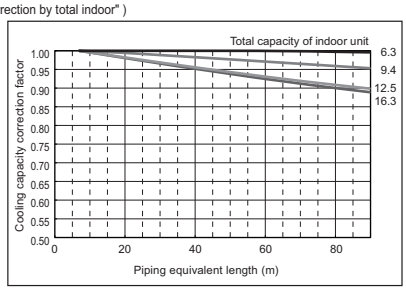


Fig.4 Correction of refrigerant piping length *1

*1 These figures show characteristics of a different model. For details, please refer to examples of calculations page.

Cooling

Design condition		
Outdoor dry bulb temperature		45ºC
Total cooling load		10.6 kW
Room 1	Indoor dry bulb temperature	27ºC
	Indoor wet bulb temperature	20ºC
	Cooling load	4.6 kW
Room 2	Indoor dry bulb temperature	24ºC
	Indoor wet bulb temperature	18ºC
	Cooling load	6.0 kW
Other	Indoor/Outdoor piping equivalent length	60 m

Capacity of indoor unit

P·FY series	Model class of indoor unit	10	15	—	20	—	25	32	—	40	—	50	—	63	71	80	100	125	140
	Model capacity (kW)	1.2	1.7	—	2.2	—	2.8	3.6	—	4.5	—	5.6	—	7.1	8.0	9.0	11.2	14.0	16.0
M series S series P series	Model class of indoor unit	—	15	18	20	22	25	—	35	—	42	50	60	—	71	—	100	—	—
	Model capacity (kW)	—	1.5	1.8	2.0	2.2	2.5	—	3.5	—	4.2	5.0	6.0	—	7.1	—	10.0	—	—

■ Cooling calculation

- Tentative selection of indoor units
  Room1: PEFY-MS50 5.6 kW (Rated)
  Room2: PEFY-MS71 8.0 kW (Rated)
  In this case, the total capacity is 13.6. (5.6 + 8.0 = 13.6)
- Tentative selection of outdoor unit
  Proper outdoor unit in this case is SM125 as the total capacity of the indoor units is 13.6.
  PUMY-SM125 14.0 kW (Rated)
- Calculation for the corrected capacity of the total indoor units (CTi)
  Correction factor for indoor design wet bulb temperature: Room 1 (20°C) 1.03 (Refer to Figure 1 in 7-2.)
  Room 2 (18°C) 0.94 (Refer to Figure 1 in 7-2.)
  CTi = Σ (Rated capacity of indoor unit × Correction factor for indoor temperature)
  = 5.6 × 1.03 + 8.0 × 0.94
  = 13.3 kW
- Calculation for the corrected capacity of the outdoor unit (CTo)
  Correction factor for outdoor temperature (45°C) 0.86 (Refer to Figure 2 in 7-2.)
  Correction factor for piping length (60 m) 0.90 (Refer to Figure 2 in 7-2.)
  CTo = Rated capacity of outdoor unit × Correction factor for outdoor temperature × Correction factor for piping length
  = 14.0 × 0.86 × 0.90
  = 10.8 kW
- Determination of maximum system capacity (CTx)
  Comparison between CTi and CTo:
  CTi = 13.3 > CTo = 10.8, thus, select CTo.
  CTx = CTo = 10.8 kW
- Comparison with essential load
  Against the essential load 10.6 kW, the maximum system capacity is 10.8 kW: A proper outdoor unit is selected.
- Calculation for the maximum indoor unit capacity of each room
  When CTx = CTo, use the calculation formula below.
  Room1: CTx × Corrected capacity for Room1/CTi
  = 10.8 × (5.6 × 1.03)/13.3
  = 4.7 kW
  The capacity is enough for the cooling load of Room 1 (4.6 kW): A proper indoor unit is selected.
  Room2: CTx × Corrected capacity for Room2/CTi
  = 10.8 × (8.0 × 0.94)/13.3
  = 6.1 kW
  The capacity is enough for the cooling load of Room 2 (6.0 kW): A proper indoor unit is selected.

Note:

- If CTx = CTi, refer to the calculation formula in "Heating" to calculate the maximum indoor unit capacity of each room.
- Go on to the selection of units for heating after the selection for cooling has successfully completed. If failed, try again until proper units are selected.

Heating

Design condition		
Outdoor wet bulb temperature		2°C
Total heating load		13.2 kW
Room 1	Indoor dry bulb temperature	23°C
	Heating load	5.4 kW
Room 2	Indoor dry bulb temperature	23°C
	Heating load	7.8 kW
Other	Indoor/Outdoor piping equivalent length	60 m

Capacity of indoor unit

P·FY series	Model class of indoor unit	10	15	—	20	—	25	32	—	40	—	50	—	63	71	80	100	125	140
	Model Capacity (kW)	1.4	1.9	—	2.5	—	3.2	4.0	—	5.0	—	6.3	—	8.0	9.0	10.0	12.5	16.0	18.0
M series S series P series	Model class of indoor unit	—	15	18	20	22	25	—	35	—	42	50	60	—	71	—	100	—	—
	Model Capacity (kW)	—	1.7	2.1	2.3	2.5	2.9	—	4.0	—	4.8	5.7	6.9	—	8.1	—	11.2	—	—

■ Heating calculation

- Tentative selection of indoor units
  Room1: PEFY-MS50 6.3 kW.(Rated)
  Room2: PEFY-MS71 9.0 kW.(Rated)
  In this case, the total capacity is 15.3. (6.3 + 9.0 = 15.3)
- Tentative selection of outdoor unit
  Proper outdoor unit in this case is SM125 as the total capacity of the indoor units is 15.3.
  PUMY-SM125 16.0 kW
- Calculation for the corrected capacity of the total indoor units (CTi)
  Correction factor for indoor temperature: Room 1 (23°C) 0.88 (Refer to Figure 3 in 7-2.)
  Room 2 (23°C) 0.88 (Refer to Figure 3 in 7-2.)
  CTi = Σ (Rated capacity of indoor unit × Correction factor for indoor temperature)
  = 6.3 × 0.88 + 9.0 × 0.88
  = 13.5 kW
- Calculation for the corrected capacity of the outdoor unit (CTo)
  Correction factor for outdoor temperature (2°C WB) 1.00 (Refer to Figure 4 in 7-2.
  Correction factor for piping length (60 m) 0.96 (Refer to "Correcting Capacity".)
  Correction factor for defrosting 0.83 (Refer to Table 1.)
  CTo = Rated capacity of outdoor unit × Correction factor for outdoor temperature × Correction factor for piping length × Correction factor for defrosting
  = 16.0 × 1.00 × 0.96 × 0.83
  = 12.8 kW

Table 1 Table of correction factor for frosting and defrosting

Outdoor inlet air temp. (°C)	6	4	2	0	-2	-4	-6	-8	-10	-15	-20
Correction factor	1.00	0.91	0.83	0.82	0.83	0.84	0.89	0.89	0.89	0.89	0.89

- Determination of maximum system capacity (CTx)
  Comparison between CTi and CTo:
  CTi = 13.5 < CTo = 13.7, thus, select CTi.
  CTx = CTi = 13.5 kW
- Comparison with essential load
  Against the essential load 13.2 kW, the maximum system capacity is 13.5 kW: Proper indoor units have been selected.
- Calculation for the maximum indoor unit capacity of each room
  When CTx = CTi, use the calculation formula below.
  Room1: Rated capacity of Indoor unit × Correction factor for indoor temperature
  = 6.3 × 0.88
  = 5.5 kW
  The capacity is enough for the heating load of Room 1 (5.4 kW): A proper indoor unit is selected.
  Room2: Rated capacity of indoor unit × Corrected capacity for the indoor design temperature
  = 9.0 × 0.88
  = 7.9 kW
  The capacity is enough for the heating load of Room 2 (7.8 kW): A proper indoor unit is selected.

Note:

- If CTx = CTo, refer to the calculation formula in "Cooling" to calculate the maximum indoor unit capacity of each room.
- The selection of units is completed when proper units are selected.

3. Power input of outdoor unit

<Cooling>

(1) Rated power input of outdoor unit **4.19 kW**

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

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 45 °CD.B., Indoor temp. 20 °CW.B.)

1.12

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 45 °CD.B., Indoor temp. 18 °CW.B.)

1.10

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. MS80 → 80)

= 1.12 × 50/(50+71)+1.10×71/(50+71)
= 1.11

(3) No need to consider Coefficient of the partial load f(CTi) **-**

(4) Outdoor power input (PI_o)

Maximum System Capacity (CT_{max}) = Total Outdoor unit Capacity (CT_o), so use the following formula
PI_o = Outdoor unit Cooling Rated Power Input × C_{ave}
= 4.19 × 1.11
= 4.64 kW

<Heating>

(1) Rated power input of outdoor unit **3.73 kW**

(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. 23 °CD.B.)
1.0

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 2 °CW.B., Indoor temp. 23 °CD.B.)
1.0

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. MS80 → 80)

= 1.0 × 50/(50+71)+1.0×71/(50+71)
= 1.0

(3) Coefficient of the partial load $f(CT_i)$ **0.96**

(4) Outdoor power input (PI_o)

Maximum System Capacity (CT_{max}) = Total Indoor unit Capacity (CT_i), so use the following formula
PI_o = Outdoor unit Heating Rated Power Input × C_{ave} × $f(CT_i)$
= 3.73 × 1.0 × 0.96
= 3.58 kW

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.

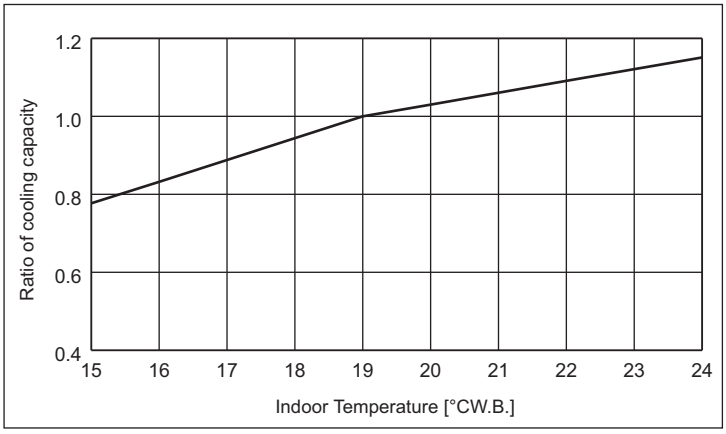
<Cooling>

PUMY-		SM112VKM2	SM125VKM2	SM140VKM2
Nominal Cooling Capacity	kW	12.5	14.0	15.5
	BTU/h	42,650	47,768	52,886
Input	kW	3.32	4.19	4.81

PUMY-		SM112YKM2	SM125YKM2	SM140YKM2
Nominal Cooling Capacity	kW	12.5	14.0	15.5
	BTU/h	42,650	47,768	52,886
Input	kW	3.32	4.19	4.81

<Figure 1> Indoor unit temperature correction

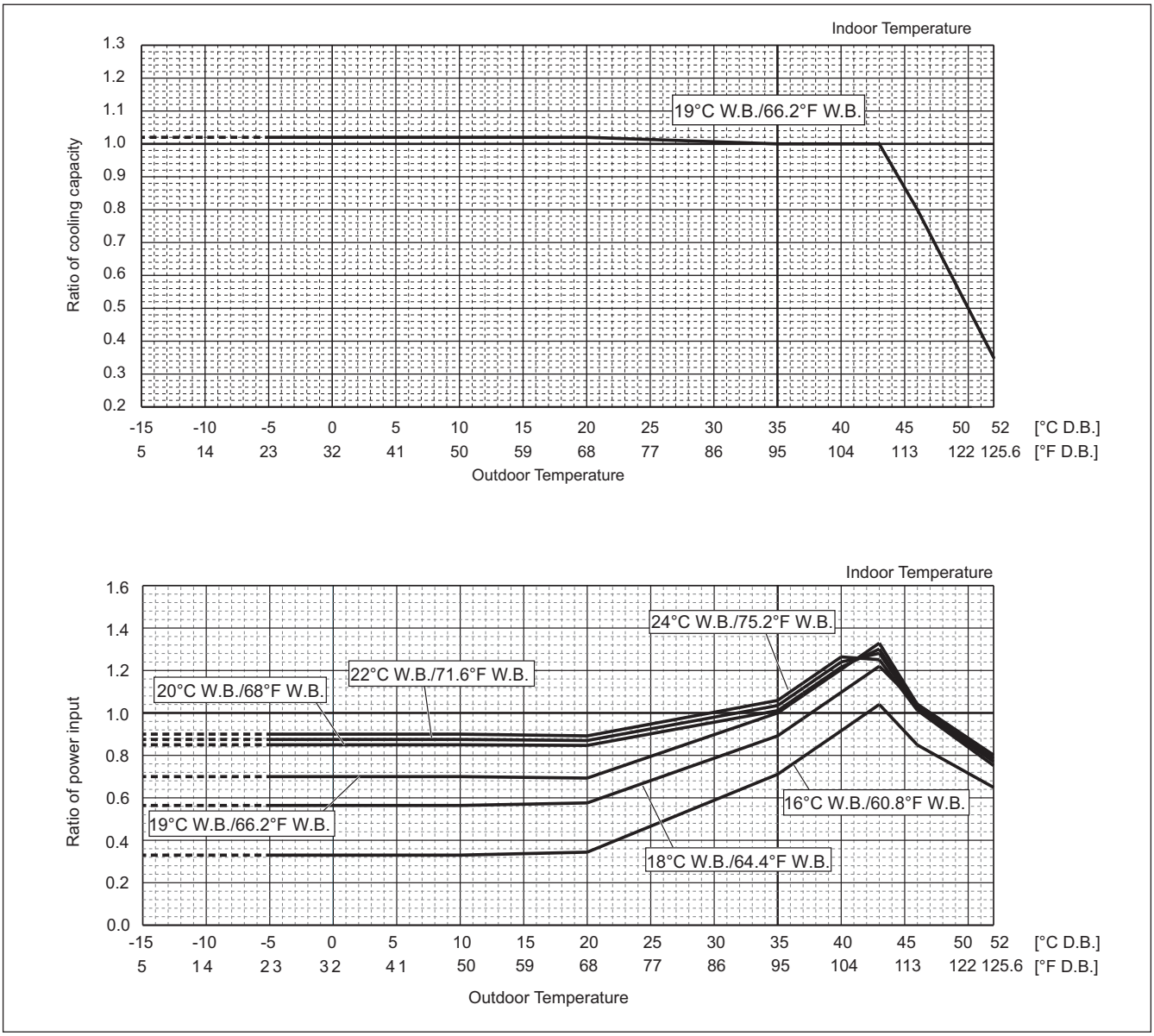
To be used to correct indoor unit capacity only



<Figure 2> 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.



Values in the temperature correction diagram in the range below -5°C (23°F) are reference values and not guaranteed values. Do not use these reference values for selecting outdoor unit models.

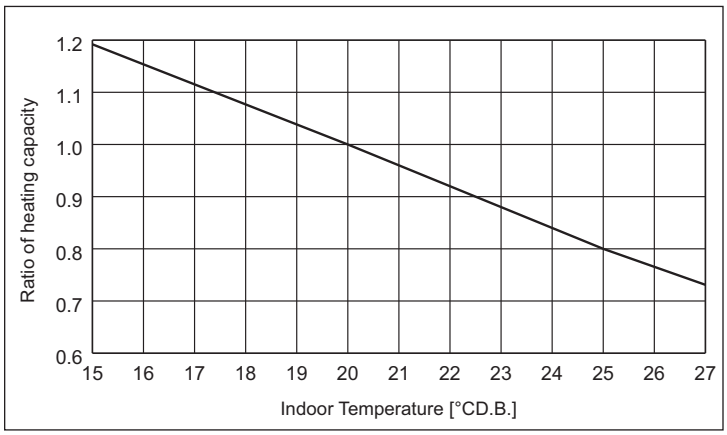
<Heating>

PUMY-		SM112VKM2	SM125VKM2	SM140VKM2
Nominal Heating Capacity	kW	14.0	16.0	17.5
	BTU/h	47,768	54,592	59,712
Input	kW	3.33	3.73	4.15

PUMY-		SM112YKM2	SM125YKM2	SM140YKM2
Nominal Heating Capacity	kW	14.0	16.0	17.5
	BTU/h	47,768	54,592	59,712
Input	kW	3.33	3.73	4.15

<Figure 3> Indoor unit temperature correction

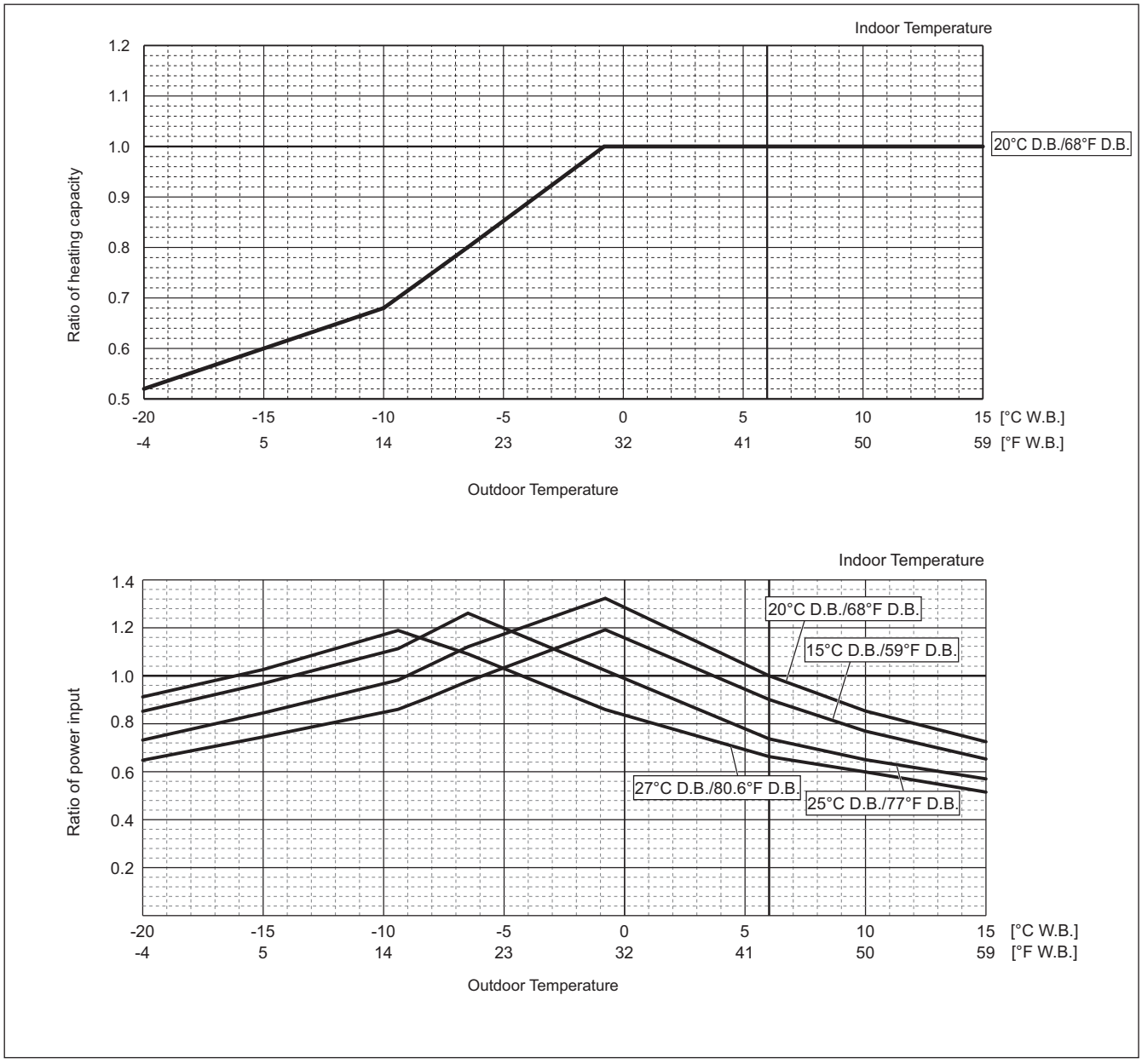
To be used to correct indoor unit capacity only



<Figure 4> 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.



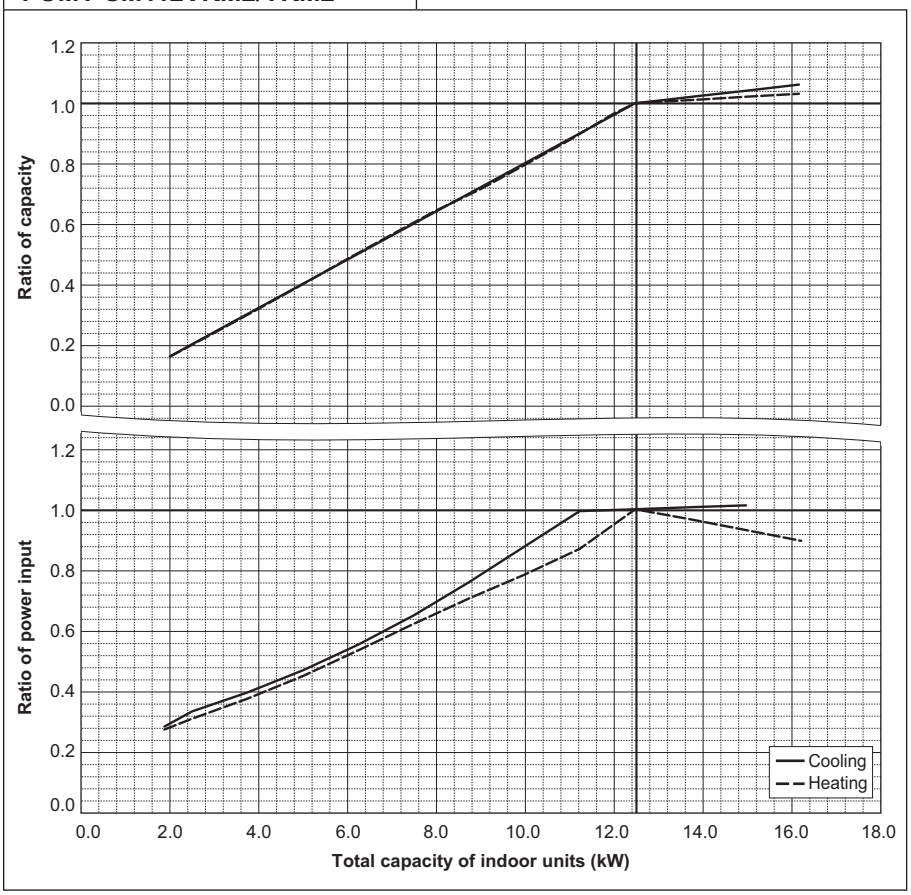
7-3. Correction by total indoor

CITY MULTI system has 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-SM112VKM2/YKM2		
Nominal Cooling Capacity	kW	12.5
	BTU/h	42,650
Input	kW	3.32

PUMY-SM112VKM2/YKM2		
Nominal Heating Capacity	kW	14.0
	BTU/h	47,768
Input	kW	3.33

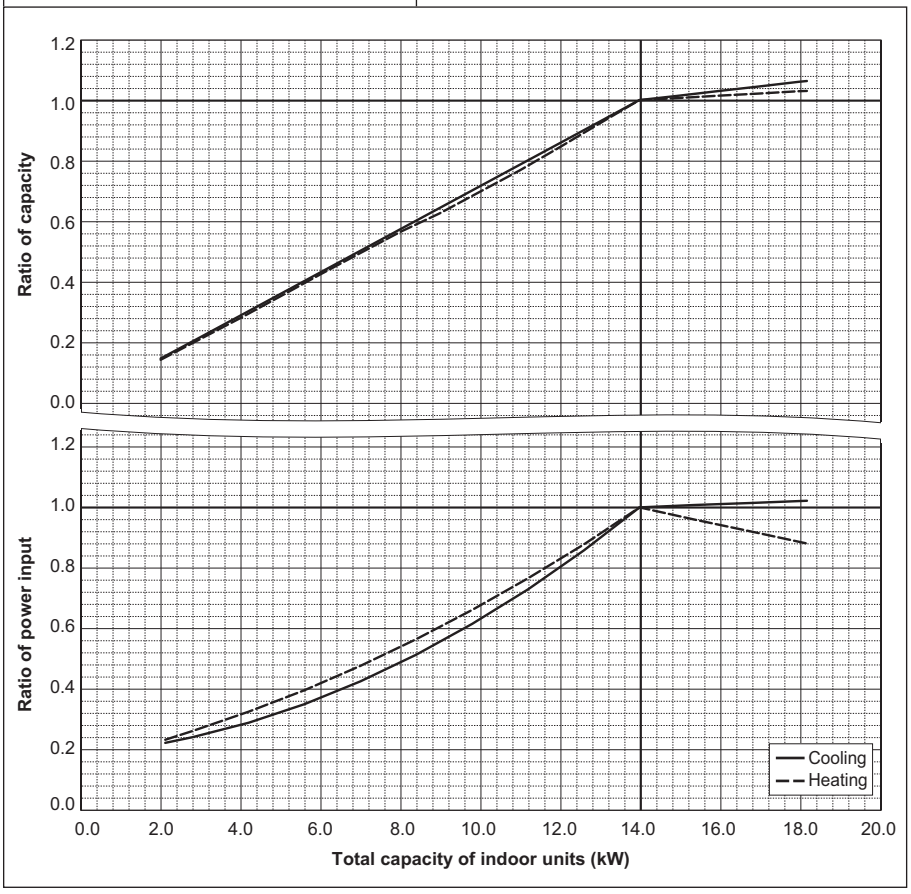
PUMY-SM112VKM2/YKM2



PUMY-SM125VKM2/YKM2		
Nominal Cooling Capacity	kW	14.0
	BTU/h	47,768
Input	kW	4.19

PUMY-SM125VKM2/YKM2		
Nominal Heating Capacity	kW	16.0
	BTU/h	54,592
Input	kW	3.73

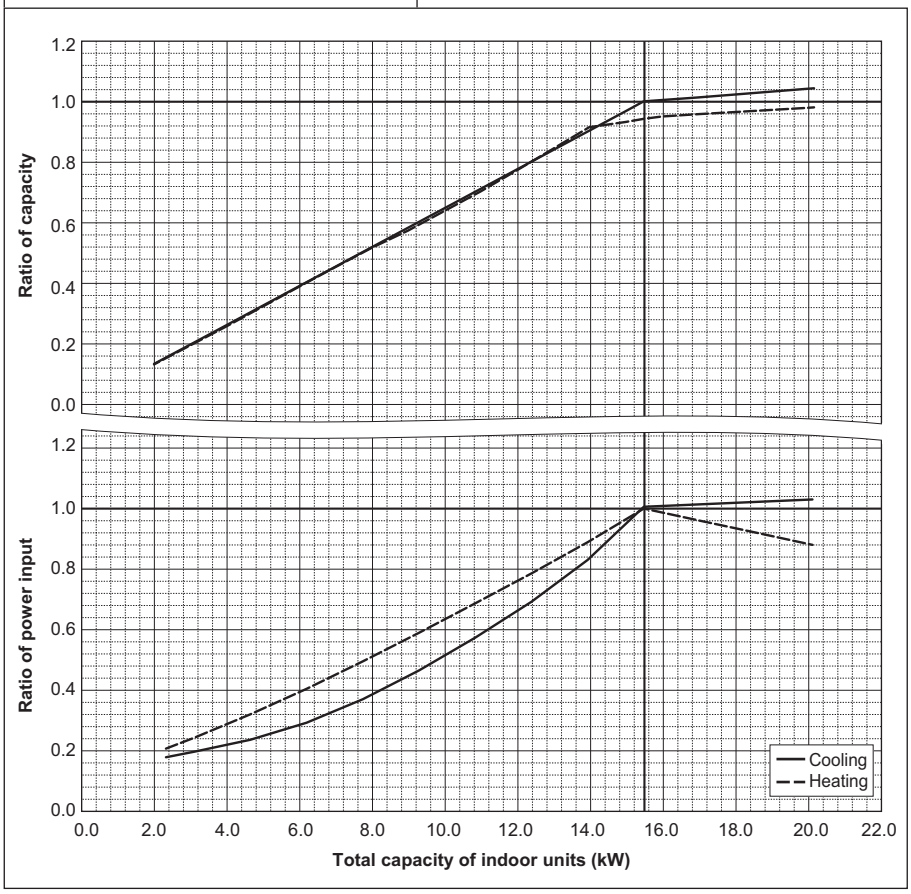
PUMY-SM125VKM2/YKM2



PUMY-SM140VKM2/YKM2		
Nominal Cooling Capacity	kW	15.5
	BTU/h	52,886
Input	kW	4.81

PUMY-SM140VKM2/YKM2		
Nominal Heating Capacity	kW	17.5
	BTU/h	59,712
Input	kW	4.15

PUMY-SM140VKM2/YKM2

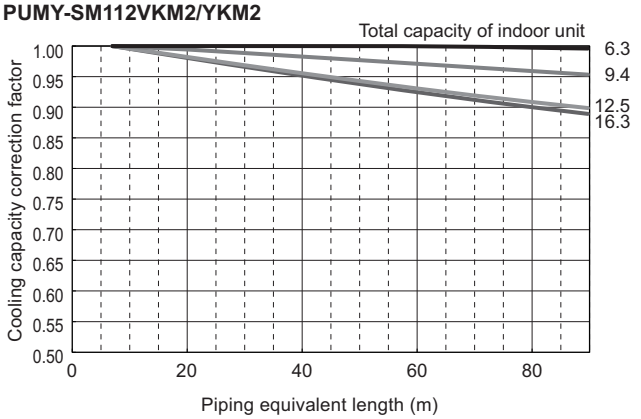


7-4. Correction by refrigerant piping length

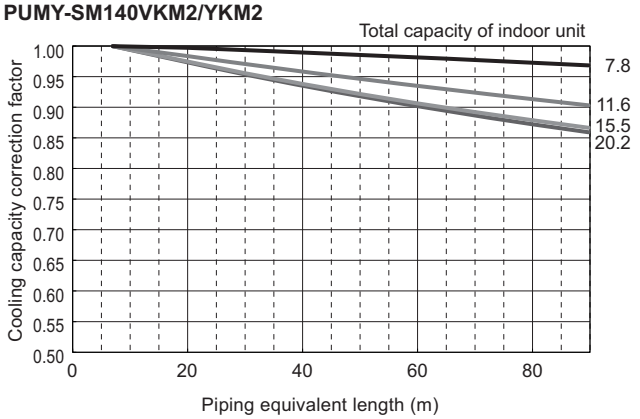
CITY MULTI systems can have extended piping lengths if certain limitations are followed, but cooling/heating capacity could be reduced. Using following correction factor by equivalent piping length shown at 7-4-1 and 7-4-2, capacity can be found.
7-4-3 shows how to obtain the equivalent piping length.

7-4-1. Cooling capacity correction

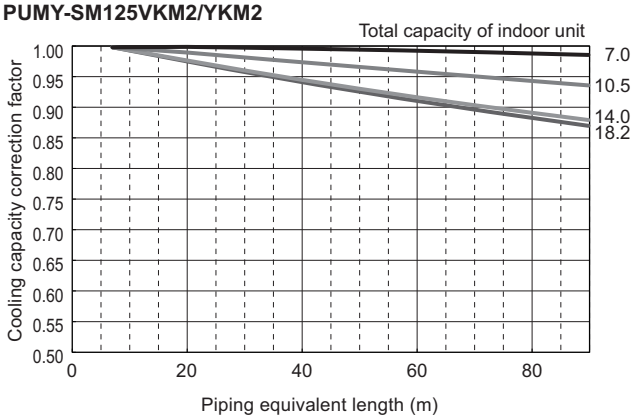
PUMY-SM112VKM2/YKM2



PUMY-SM140VKM2/YKM2

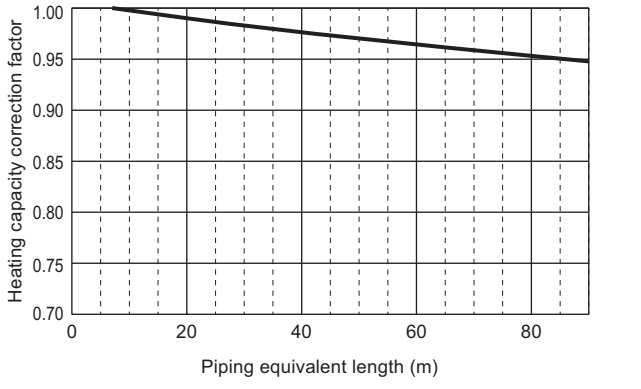


PUMY-SM125VKM2/YKM2



7-4-2. Heating capacity correction

PUMY-SM112, 125, 140VKM2/YKM2



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

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

7-5. Correction at frost and defrost

Due to frost at the outdoor heat exchanger and the automatical defrosting operation, the heating capacity of the outdoor unit should be considered by multiplying the correction factor which shown in the table below.

Table of correction factor at frosting and defrosting

Outdoor inlet air temp. °CWB	6	4	2	0	-2	-4	-6	-8	-10	-15	-20
Outdoor inlet air temp. °FWB	43	39	36	32	28	25	21	18	14	-5	-4
PUMY-SM112, 125, 140VKM2/YKM2	1.0	0.91	0.83	0.82	0.83	0.84	0.89	0.89	0.89	0.89	0.89

Note

- The high humidity condition (e.g., a foggy atmosphere) which causes frost forming on the heat exchanger will worsen the heating performance of the unit.
- The snow blowing to the heat exchanger will worsen the heating performance of the unit. Install a snow hood as a preventive measure.

8-1. JOINT

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric.
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-E

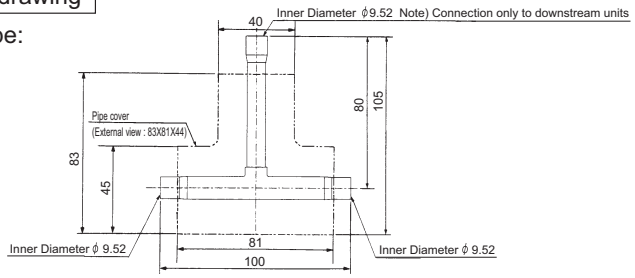
Unit: mm

1. Specification

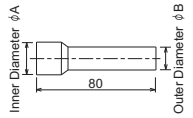
Items		Details
Main	Number of ports	2 ports
	Number of branch joints	One for each liquid and gas pipe
	Pipe material	Phosphorus deoxidized copper C1220T-OL (JIS H3300)
Accessory	Insulation material	Foamed polyethylene (one for each liquid and gas pipe)
	Reducer	10 reducers of 7 types (Refer to the external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

2. External drawing

For liquid pipe:

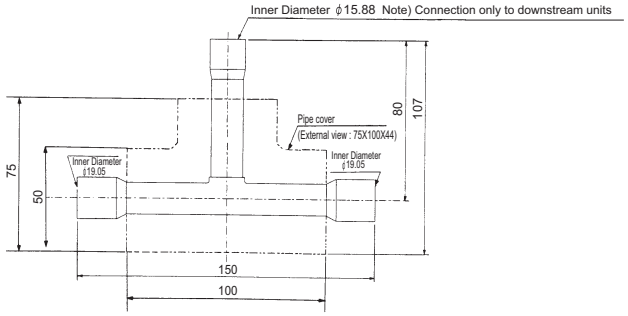


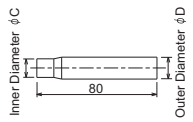
Reducer (Accessory):



A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 12.7	ϕ 9.52	2
ϕ 19.05	ϕ 15.88	1
ϕ 22.2	ϕ 19.05	1

For gas pipe:





C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 6.35	ϕ 9.52	2
ϕ 12.7	ϕ 15.88	1
ϕ 12.7	ϕ 19.05	1
ϕ 15.88	ϕ 19.05	2

8-2. HEADER

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric.
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-E

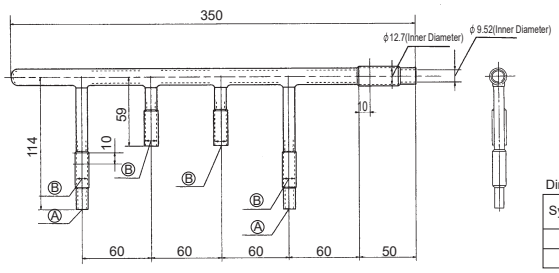
Unit: mm

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

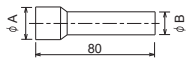
For liquid pipe:



Dimension table

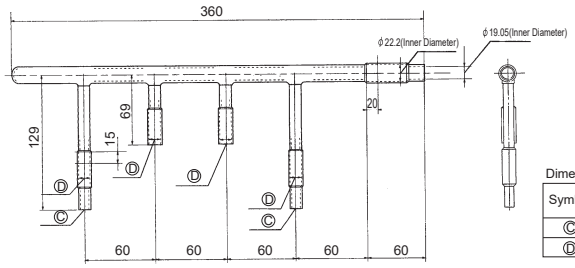
Symbol	Inner Diameter (mm)
Ⓐ	ϕ 6.35
Ⓑ	ϕ 9.52

Reducer (Accessory):



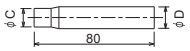
A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 19.05	ϕ 15.88	1
ϕ 15.88	ϕ 12.7	2
ϕ 9.52	ϕ 6.35	2

For gas pipe:



Dimension table

Symbol	Inner Diameter (mm)
Ⓒ	ϕ 12.7
Ⓓ	ϕ 15.88



C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 15.88	ϕ 19.05	1
ϕ 9.52	ϕ 12.7	1

CMY-Y68-G-E

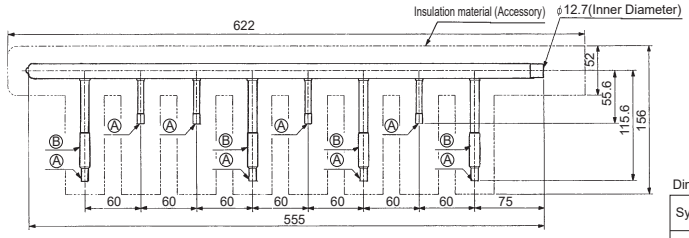
Unit: mm

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

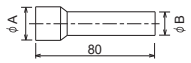
For liquid pipe:



Dimension table

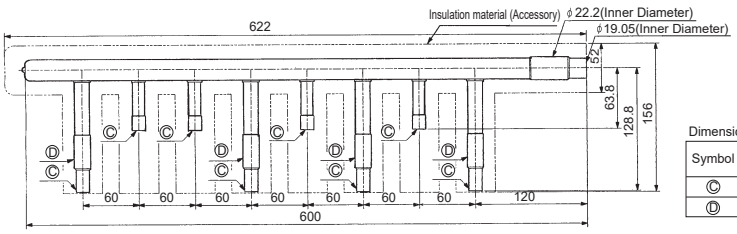
Symbol	Inner Diameter (mm)
Ⓐ	ϕ 6.35
Ⓑ	ϕ 9.52

Reducer (Accessory):



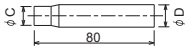
A (Inner Diameter)	B (Outer Diameter)	Number of reducers
ϕ 19.05	ϕ 15.88	1
ϕ 12.7	ϕ 9.52	1

For gas pipe:



Dimension table

Symbol	Inner Diameter (mm)
Ⓒ	ϕ 12.7
Ⓓ	ϕ 15.88



C (Inner Diameter)	D (Outer Diameter)	Number of reducers
ϕ 15.88	ϕ 19.05	1

8-3. BRANCH BOX

PUMY-SM112/125/140V(Y)KM units can be easily connected to M/S/P-Series indoor units by using Branch box provided by Mitsubishi Electric. Refer to section "Piping Design" or the Installation Manual that comes with the Branch box for how to install the Branch box.

(1) PAC-MMK40/60BC

PAC-MMK40BC

1. Specification

Model Name				PAC-MMK40BC
Connectable number of indoor units				Maximum 4
Power supply (from outdoor unit)				Single phase, 220/230/240V, 50Hz, Single phase, 220/230V, 60Hz
Input			kW	0.003
Running current			A	0.15 (Max. 6)
External finish				Galvanized sheets
Dimensions	Width		mm	450
	Depth		mm	372
	Height		mm	170
Weight			kg	10.4
Piping connection (Flare)	Branch (indoor side)	Liquid	mm	ø6.35 × 4 {A,B,C,D}
		Gas	mm	ø9.52 × 4 {A,B,C,D}
	Main (outdoor side)	Liquid	mm	ø9.52
		Gas	mm	ø15.88

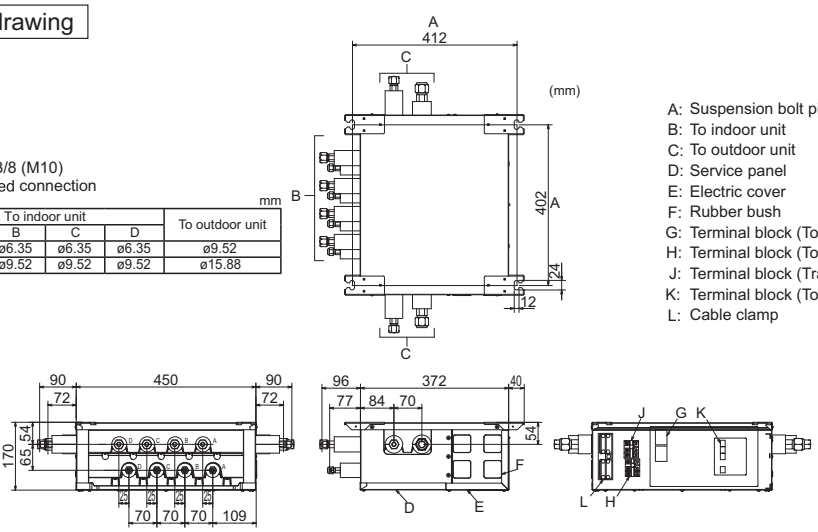
* The piping connection size differs according to the type and capacity of outdoor/indoor units.
Match the piping connection size of branch box with outdoor/indoor unit. If the piping connection size of branch box does not match the piping connection size of outdoor/indoor unit, use optional different-diameter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

2. External drawing

Suspension bolt: W3/8 (M10)
Refrigerant pipe flared connection

mm

	To indoor unit				To outdoor unit
	A	B	C	D	
Liquid pipe	ø6.35	ø6.35	ø6.35	ø6.35	ø9.52
Gas pipe	ø9.52	ø9.52	ø9.52	ø9.52	ø15.88



A: Suspension bolt pitch
B: To indoor unit
C: To outdoor unit
D: Service panel
E: Electric cover
F: Rubber bush
G: Terminal block (To indoor unit on controller board)
H: Terminal block (To power supply / To outdoor unit)
J: Terminal block (Transmission line)
K: Terminal block (To SENSOR AND ALARM KIT)
L: Cable clamp

PAC-MMK60BC

1. Specification

Model Name				PAC-MMK60BC
Connectable number of indoor units				Maximum 6
Power supply (from outdoor unit)				Single phase, 220/230/240V, 50Hz, Single phase, 220/230V, 60Hz
Input			kW	0.006
Running current			A	0.30 (Max. 6)
External finish				Galvanized sheets
Dimensions	Width		mm	665
	Depth		mm	420
	Height		mm	170
Weight			kg	15.8
Piping connection (Flare)	Branch (indoor side)	Liquid	mm	ø6.35 × 5 {1A,1B,1C,2A,2B}, ø9.52 × 1 {2C}
		Gas	mm	ø9.52 × 4 {1A,1B,2A,2B}, ø12.7 × 1 {1C}, ø15.88 × 1 {2C}
	Main (outdoor side)	Liquid	mm	ø9.52
		Gas	mm	ø15.88

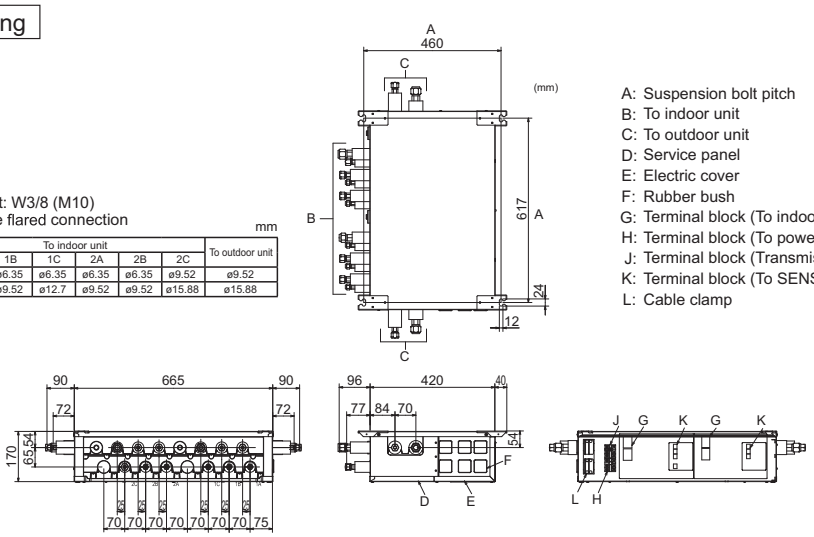
* The piping connection size differs according to the type and capacity of outdoor/indoor units.
Match the piping connection size of branch box with outdoor/indoor unit. If the piping connection size of branch box does not match the piping connection size of outdoor/indoor unit, use optional different-diameter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

2. External drawing

Suspension bolt: W3/8 (M10)
Refrigerant pipe flared connection

mm

	To indoor unit						To outdoor unit
	1A	1B	1C	2A	2B	2C	
Liquid pipe	ø6.35	ø6.35	ø6.35	ø6.35	ø6.35	ø9.52	ø9.52
Gas pipe	ø9.52	ø9.52	ø12.7	ø9.52	ø9.52	ø15.88	ø15.88



A: Suspension bolt pitch
B: To indoor unit
C: To outdoor unit
D: Service panel
E: Electric cover
F: Rubber bush
G: Terminal block (To indoor unit on controller board)
H: Terminal block (To power supply / To outdoor unit)
J: Terminal block (Transmission line)
K: Terminal block (To SENSOR AND ALARM KIT)
L: Cable clamp

8-4. Sensor and alarm kit

When connecting a Branch Box to the PUMY-SM112/125/140V(Y)KM2 unit, necessary to connect the Sensor and alarm kit provided by Mitsubishi Electric. Refer to the Installation Manual for the outdoor unit, branch box and Sensor and alarm kit for how to install the Sensor and alarm kit.

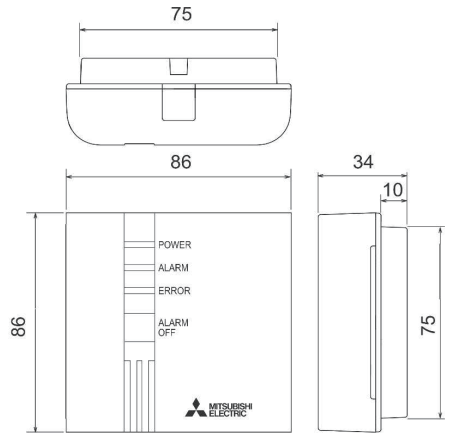
PAC-SL72SA-E

Unit: mm

1. Specification

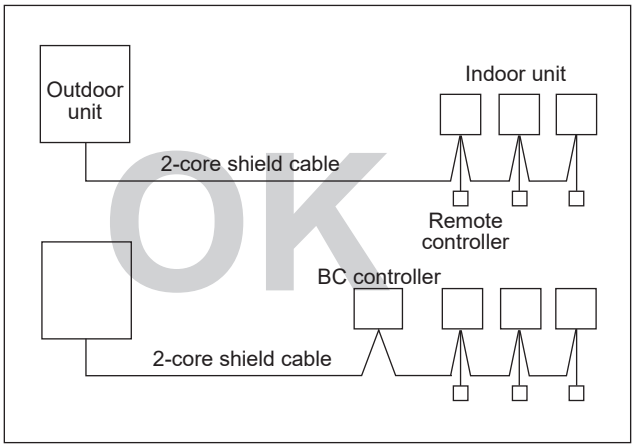
Input Voltage	10.5-13.5VDC
Power consumption	2W
Size H×W×D	86×86×34 (mm)
Sounder	65dB (1m)

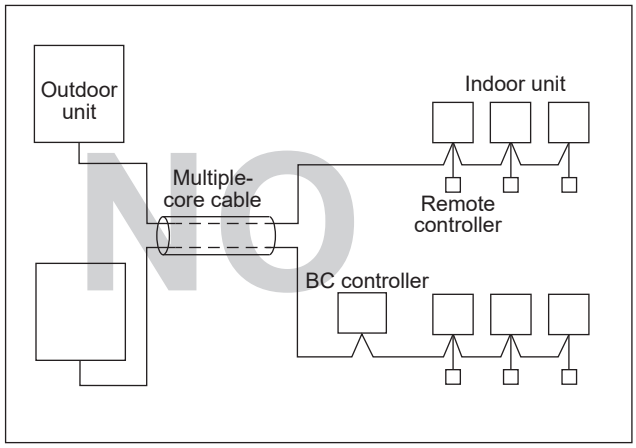
2. External drawing



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 380~415V(220~240V) 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 multiple-core 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.





9-2. Power supply for Outdoor unit

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

Symbols: MCA (Max Circuit Amps =1.25 × Temperature correction × RLA)
RLA (Rated Load Amps), SC (Starting Current)

Model name	Units			Power supply	Compressor		FAN	RLA (A)
	Hz	Volts	Voltage range	MCA (A)	Output (kW)	SC (A)	Output (kW)	
PUMY-SM112VKM2	50	220 230 240	Max.: 264V Min.: 198V	30.5	3.0	8	0.20 × 1	15.40/14.73/14.12
PUMY-SM125VKM2				30.5	3.3	8	0.20 × 1	19.43/18.59/17.81
PUMY-SM140VKM2				30.5	3.6	8	0.20 × 1	22.45/21.47/20.58

Model name	Units			Power supply	Compressor		FAN	RLA (A)
	Hz	Volts	Voltage range	MCA (A)	Output (kW)	SC (A)	Output (kW)	
PUMY-SM112YKM2	50	380 400 415	Max.: 456V Min.: 342V	13.0	3.0	4	0.20 × 1	5.31/5.04/4.86
PUMY-SM125YKM2				13.0	3.3	4	0.20 × 1	6.70/6.37/6.14
PUMY-SM140YKM2				13.0	3.6	4	0.20 × 1	7.74/7.35/7.09

9-3. Power cable specifications

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

■ PUMY-SM-VKM2 / PUMY-SM-VKM2

<Outdoor unit> <When power is supplied to outdoor unit and branch box separately>

	Model	Minimum wire thickness (mm^2)			Ground-fault interrupter *1	Local switch (A)		Breaker for wiring (A) (Non-fuse breaker)	Max. Permissive System Impedance
		Main cable	Branch	Ground		Capacity	Fuse		
Outdoor unit	PUMY-SM112VKM2	6.0	-	6.0	32A 30mA 0.1sec. or less	32	32	32	-
	PUMY-SM125VKM2	6.0	-	6.0	32A 30mA 0.1sec. or less	32	32	32	-
	PUMY-SM140VKM2	6.0	-	6.0	32A 30mA 0.1sec. or less	32	32	32	-
	PUMY-SM112YKM2	2.5	-	2.5	16A 30mA 0.1sec. or less	16	16	16	-
	PUMY-SM125YKM2	2.5	-	2.5	16A 30mA 0.1sec. or less	16	16	16	-
	PUMY-SM140YKM2	2.5	-	2.5	16A 30mA 0.1sec. or less	16	16	16	-

<Outdoor unit> <When power is supplied to branch box from the outdoor unit>

	Model	Minimum wire thickness (mm^2)			Ground-fault interrupter *1	Local switch (A)		Breaker for wiring (A) (Non-fuse breaker)	Max. Permissive System Impedance
		Main cable	Branch	Ground		Capacity	Fuse		
Outdoor unit	PUMY-SM112VKM2	6.0	-	6.0	40A 30mA 0.1sec. or less	40	40	40	-
	PUMY-SM125VKM2	6.0	-	6.0	40A 30mA 0.1sec. or less	40	40	40	-
	PUMY-SM140VKM2	6.0	-	6.0	40A 30mA 0.1sec. or less	40	40	40	-
	PUMY-SM112YKM2	4.0	-	4.0	25A 30mA 0.1sec. or less	25	25	25	-
	PUMY-SM125YKM2	4.0	-	4.0	25A 30mA 0.1sec. or less	25	25	25	-
	PUMY-SM140YKM2	4.0	-	4.0	25A 30mA 0.1sec. or less	25	25	25	-

<Indoor units> <When power is supplied to indoor unit and outdoor unit separately>

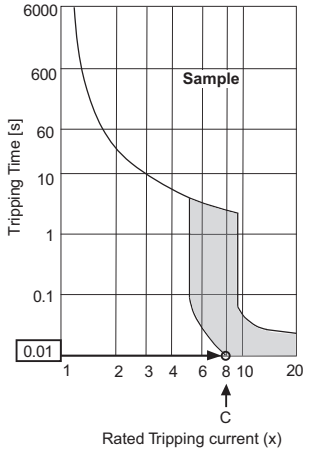
	Model	Minimum wire thickness (mm^2)			Ground-fault interrupter *1	Local switch (A)		Breaker for wiring (A) (Non-fuse breaker)	Max. Permissive System Impedance
		Main cable	Branch	Ground		Capacity	Fuse		
Total operating current of the indoor unit	F0 = 16A or less *2	1.5	1.5	1.5	20A current sensitivity *3	16	16	20	-
	F0 = 25A or less *2	2.5	2.5	2.5	30A current sensitivity *3	25	25	30	-
	F0 = 32A or less *2	4.0	4.0	4.0	40A current sensitivity *3	32	32	40	-

*1 The Ground-fault interrupter should support Inverter circuit.
The Ground-fault interrupter should combine using of local switch or wiring breaker.

*2 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 Type13)/C}

Connect to Branch box (PAC-MMK·BC)

Indoor unit		V1	V2
Type 1	PCA-M·KA3	19.8	2.4
	SEZ-M·DA(L)3		
Type 2	PEAD-M·JA(L)3	18.6	3.0
Type 3	PLA-M·EA3	17.1	2.4
	SLZ-M·FA3		
Type 4	MLZ-KP·VG	9.9	
Type 5	MLZ-KY·VG	7.4	
	MSZ-AY·VG(K)(P)2		
	MSZ-EF·VG(K)2		
	MSZ-LN·VG2, MSZ-LN·VG3		
	MSZ-RW·VG2		
Type 6	MSZ-BT·VG(K)2	6.1	
Type 7	Branch box (PAC-MMK40BC)	5.1	3.0
Type 8	Branch box (PAC-MMK60BC)	10.2	6.0



Connect to City Multi

Indoor unit		V1	V2
Type 9	PMFY-MS·VCM	19.8	2.4
	PCFY-MS·VKM2		
	PKFY-MS·VLM2		
	PKFY-MS·VKM2		
Type 10	PEFY-MS·VMA(L)	18.6	3.0
	PEFY-M·VMA(L)-A1		
Type 11	PLFY-M·VEM6	17.1	2.4
	PLFY-MS·VEM2		
	PLFY-MS·VFM2		
Type 12	PEFY-MS·VMS(L)	18.6	2.4
Type 13	PEFY-MS·VMHS	26.8	1.6

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 PLFY-VBM × 4 + PEFY-VMA × 1, C = 8 (refer to right sample chart)
F2 = 19.8 × 4/8 + 38 × 1/8
= 14.65
→16 A breaker (Tripping current = 8 × 16 A at 0.01s)

*3 Current sensitivity is calculated using the following formula.
G1 = (V2 × Quantity of Type1) + (V2 × Quantity of Type2) + (V2 × Quantity of Type3) + (V2 × Quantity of Type4) + · · · · · + (V2 × Quantity of Type13) + (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 dedicated power supplies 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. If the voltage drops, use a wire that is one rank thicker in diameter. 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 60245 IEC57). For example, use wiring such as YZW.
6. A switch with at least 3 mm contact separation in each pole shall be provided by the Air Conditioner installer.

⚠WARNING

- Be sure to use specified wires for connections and ensure no external force is imparted to terminal connections. If connections are not fixed firmly, heating or fire may result.
- 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-S-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.

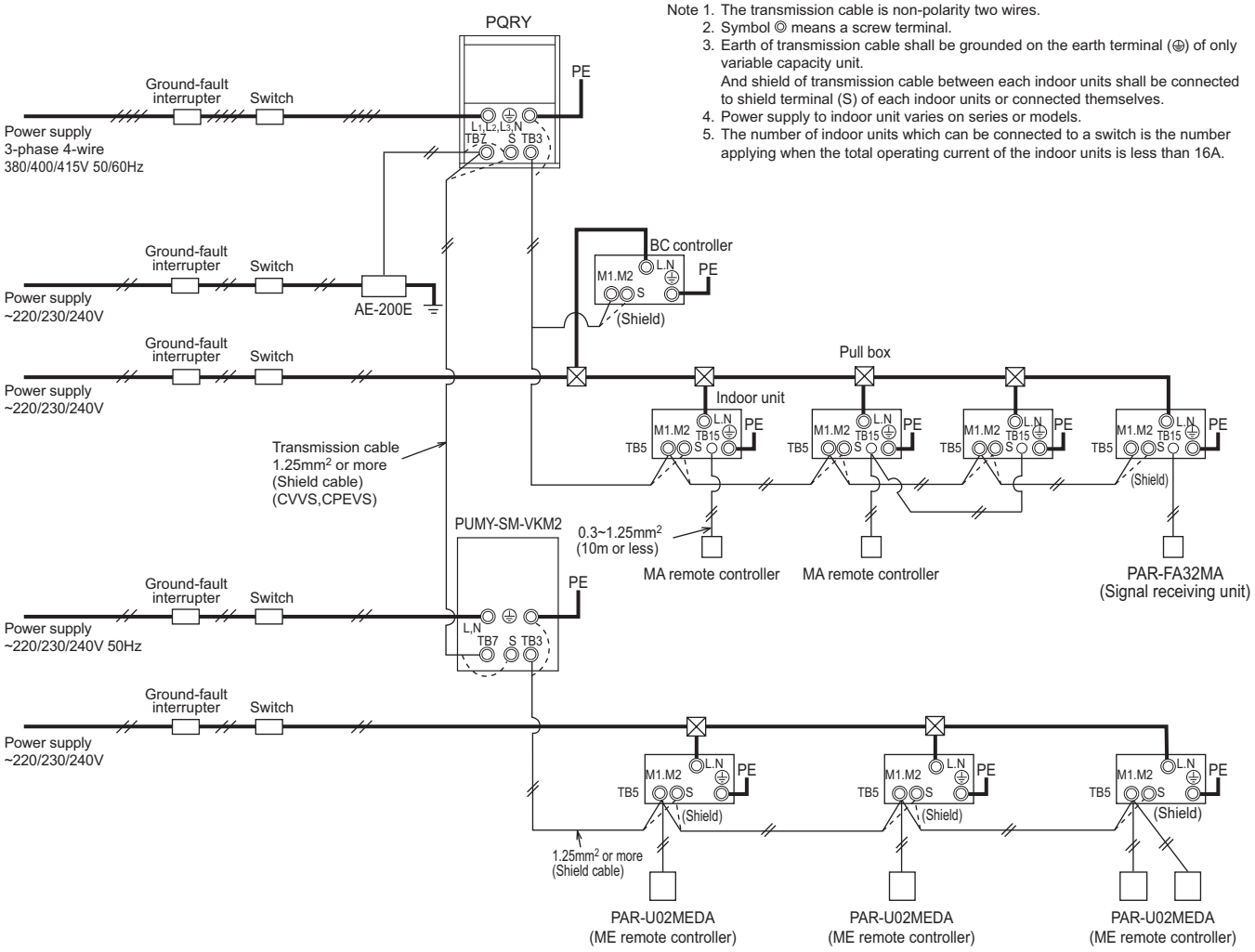
Note

- This device is intended for the connection to a power supply system with a maximum permissible system impedance shown in the above table at the interface point (power service box) of the user's supply.
- The user must ensure that this device is connected only to a power supply system which fulfils the requirement above.
  If necessary, the user can ask the public power supply company for the system impedance at the interface point.

9-4. Power supply examples

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

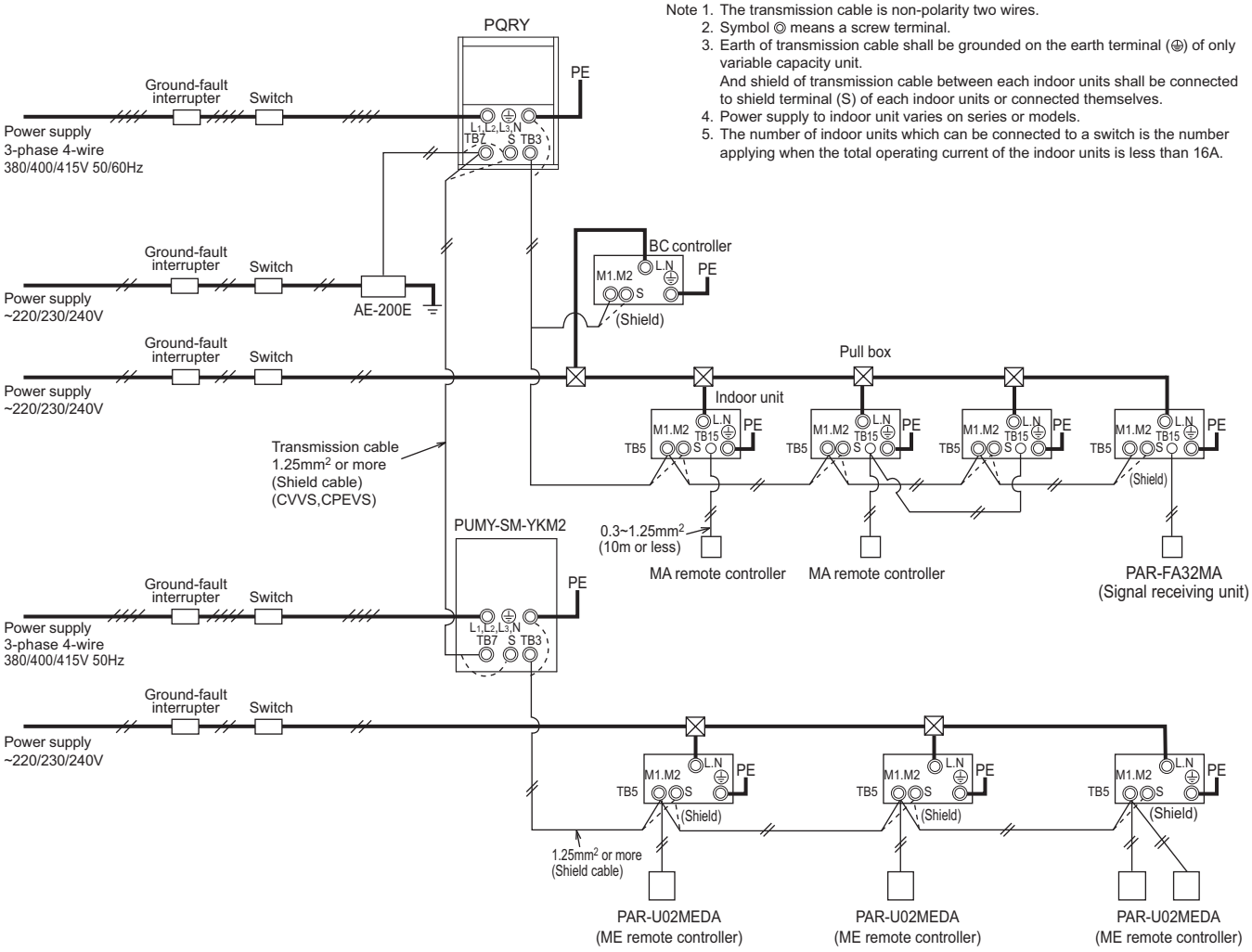
9-4-1. PUMY-SM112, 125, 140VKM2



Note 1. The transmission cable is non-polarity two wires.
2. Symbol ◎ means a screw terminal.
3. Earth of transmission cable shall be grounded on the earth terminal (⏚) of only variable capacity unit.
And shield of transmission cable between each indoor units shall be connected to shield terminal (S) of each indoor units or connected themselves.
4. Power supply to indoor unit varies on series or models.
5. The number of indoor units which can be connected to a switch is the number applying when the total operating current of the indoor units is less than 16A.

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

9-4-2. PUMY-SM112, 125, 140YKM2

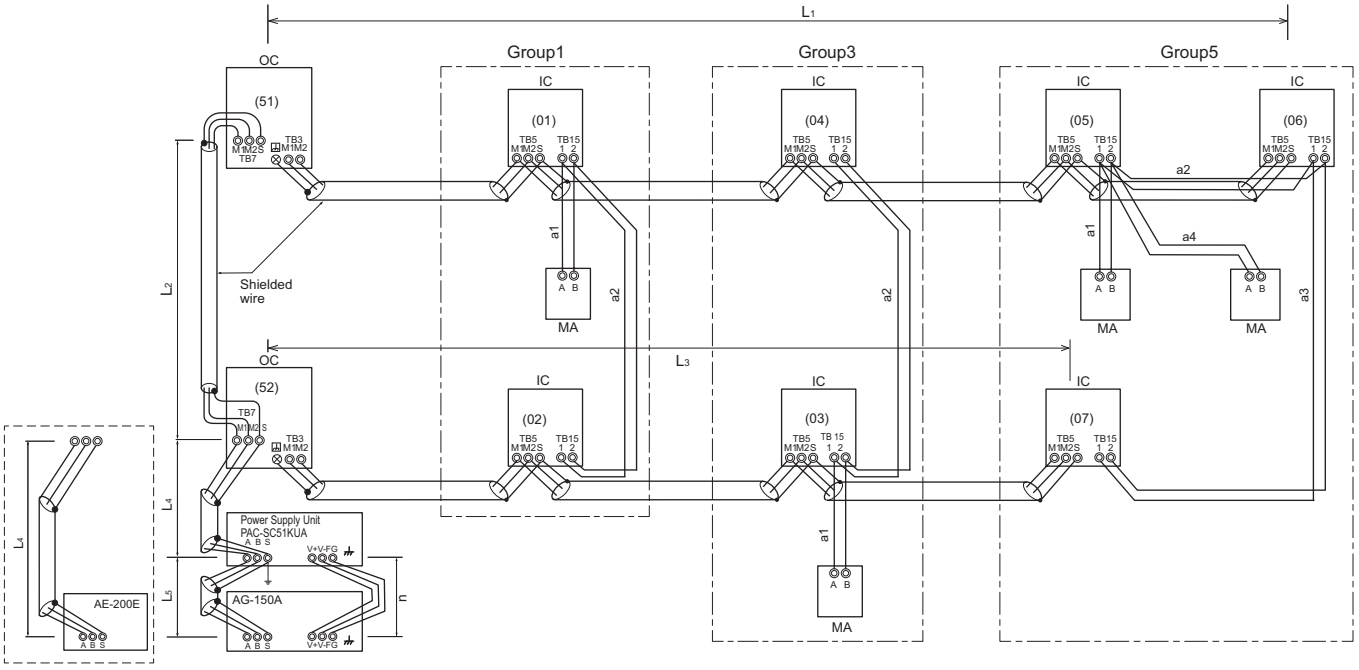


10-1. Transmission cable length limitation

10-1-1. Using MA Remote controller

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

Max. length via Outdoor (M-NET cable)	L1+L2+L3, L1+L2+L4+L5, L3+L4+L5	<=500m[1640ft]	1.25mm^2 [AWG16] or thicker
Max. length to Outdoor (M-NET cable)	L1, L3, L2+L4, L5	<=200m[656ft]	1.25mm^2 [AWG16] or thicker
Max. length from MA to Indoor for each group	a1+a2, a1+a2+a3+a4	<=200m[656ft]	0.3-1.25mm^2 [AWG22-16]
24VDC to AG-150A	n	<=50m[164ft.]	0.75-2.0 mm^2 [AWG18-14]



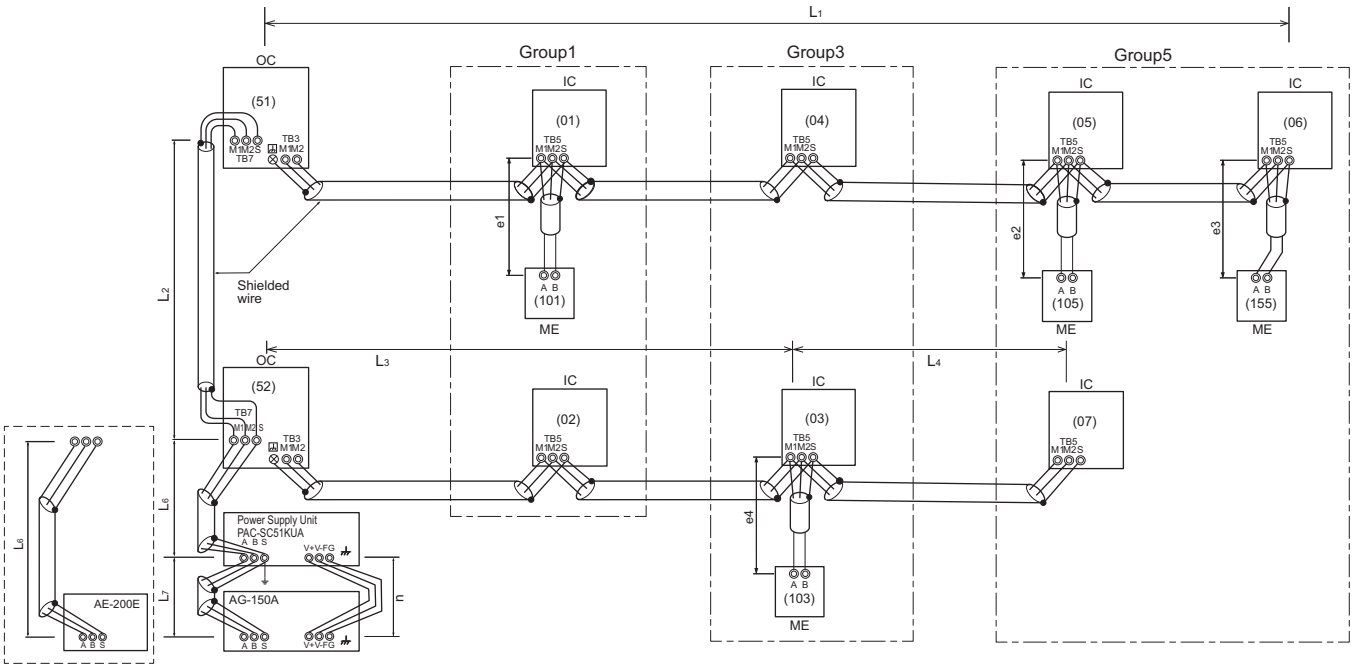
OC: Outdoor unit; IC: Indoor unit; MA: MA remote controller

10-1-2. Using ME Remote controller

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

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



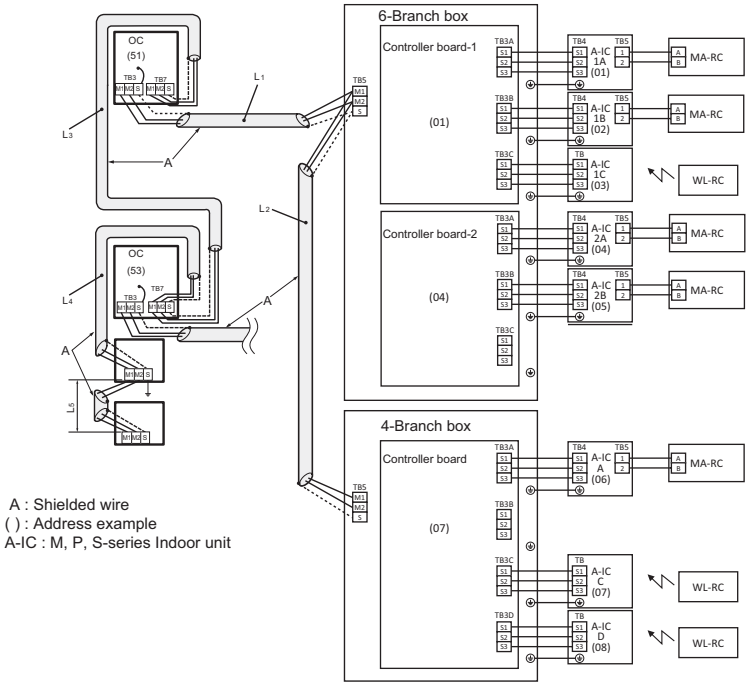
OC: Outdoor unit; IC: Indoor unit; ME: ME remote controller

10-1-3. Using a Branch Box

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

Max length via outdoor units (M-NET cable):	$L_1 + L_2 + L_3 + L_4 + L_5$	<=500m[1640ft]	1.25mm^2 [AWG16] or thicker
Max transmission cable length (M-NET cable):	$L_1 + L_2$, $L_3 + L_4$, L_5	<=200m[656ft]	1.25mm^2 [AWG16] or thicker

<Example of Transmission Cable Wiring: When Using a Branch Box>



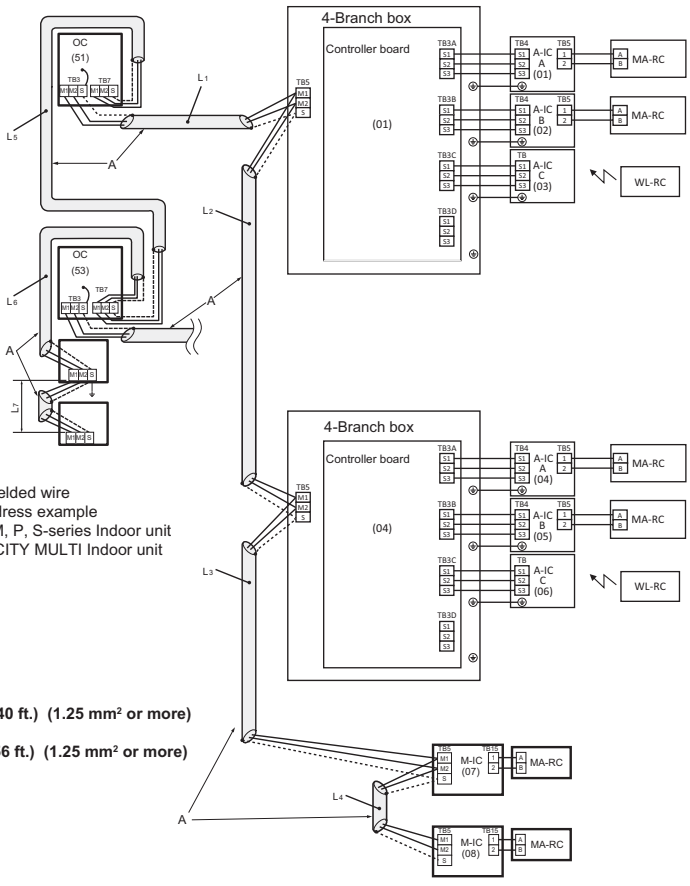
A : Shielded wire
( ) : Address example
A-IC : M, P, S-series Indoor unit

10-1-4. Mixing system

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

Max length via outdoor units:	$L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7$	<=500m[1640ft]	1.25mm^2 [AWG16] or thicker
Max transmission cable length:	$L_1 + L_2 + L_3 + L_4$, $L_5 + L_6$, L_7	<=200m[656ft]	1.25mm^2 [AWG16] or thicker

<Example of Transmission Cable Wiring: Mixing system>



A : Shielded wire
( ) : Address example
A-IC : M, P, S-series Indoor unit
M-IC : CITY MULTI Indoor unit

<Permissible length>
Longest length via outdoor units:
$L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 \leq 500$ m (1640 ft.) (1.25 mm^2 or more)
Longest transmission cable length:
$L_1 + L_2 + L_3 + L_4, L_5, L_5 + L_6, L_7 \leq 200$ m (656 ft.) (1.25 mm^2 or more)

10-2. Transmission cable specifications

	Transmission cables (Li)	MA Remote controller cables	ME Remote controller cables
Type of cable	Shielded cables (2-core) CVVS, CPEVS, and MVVS	VCTF, VCTFK, CVV, VVR, VVF, VCT	Shielded cables (2-core) CVVS, CPEVS, and MVVS
Cable size	Larger than 1.25 mm^2 [AWG16], or ø1.2 mm or above	0.3 to 1.25 mm^2 [AWG22 to 16] *1 *5	0.3 to 1.25 mm^2 [AWG22 to 16] *1 *6
Maximum overall line length	Refer to 10-1.	200 m [656 ft] *3 *4	10 m [32 ft] *2

*1 The use of cables that are smaller than 0.75 mm^2 (AWG18) is recommended for easy handling.
*2 The section of the cable that exceeds 10 m [32 ft] must be included in the maximum indoor-outdoor transmission line distance.
*3 Max. 70 m [229 ft] for PAR-CT01MA series
*4 Max. 150 m [492 ft] for PAR-FS01MA series
*5 To wire PAR-CT01MA series, PAR-FS01MA series, PAR-4"x"MA series, PAR-3"x"MA series ("x" represents 0 or later), or Simple MA remote controller, use a cable with a size of 0.3 mm^2 (AWG 22).
*6 When connected to the terminal block on the Simple remote controller, use a cable with a size of 0.75 to 1.25 mm^2 (AWG18 to 16).

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 CITY MULTI 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;
*OA processing unit GUF-RD(H) is considered as Indoor unit.

B) Maximum 2 remote controllers for 1 group;
*MA/ME remote controllers cannot be present together in 1 group.
*When the PAR-CT01MA series, PAR-FS01MA series, PAR-4"x"MA series, or PAR-3"x"MA series ("x" represents 0 or later) is connected to a group, no other MA remote controllers can be connected to the same group.

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) A maximum of 6 system controllers are connectable to TB3 and TB7 of Outdoor/Heat source unit.

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) 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, OA processing unit GUF-RD(H), 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 (Table 1)] ≤ [40]

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

Category	Model	The equivalent power consumption	The equivalent number of units
CITY MULTI indoor unit OA unit CITY MULTI connection kit Air handling unit controller	Except for the models indicated by *2 PEFY-AF2500, 3000, 4000, 5000, 6000MH GUF-50, 100 PAC-LV11M-J PAC-AH125, 140, 250, 500M-J	1	1
CITY MULTI indoor unit *2	PDFY-P100VM-E-RE	2	2
BC controller	CMB-P/M	2	1
HBC controller	CMB-WP CMB-WM-V-AA/AB	2	1
	CMB-WM-F-AA CMB-WM-V-BB	2	2
Hydro unit	CMH-WM-V-A	2	1
PWFY *1	P100VM-E-BU	6	1
	P200VM-E1-AU P200VM-E2-AU	5	1
	(E)P100VM-E1-AU (E)P100VM-E2-AU P140VM-E1-AU P140VM-E2-AU	1	1
PFAV	P250, 300, 500, 600VM-E(-F)	1	1
	P750, 900VM-E(-F)	2	2
PFV, PEV	P200, 250, 400, 500YM-A	1	1
MA remote controller/ LOSSNAY	PAR-CT01MA PAR-FS01MA PAR-21, 31, 32, 33, 40, 41MA PAC-YT52CRA PAR-FA32MA LGH PZ-60, 61, 62DR PZ-43SMF-E	0	0
ME remote controller	PAR-U02MEDA	0.5	1
	PZ-52SF	0.25	1
System controller	AE-200E/AE-50E/EW-50E LM-AP	0	0
	AG-150A EB-50GU-J PAC-IF01AHC-J	0.5	1
	AT-50B	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-SF83MA-E		

*1 PWFY cannot be connected to PUMY model.

Table 2 The equivalent power supply

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

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

Table 3

Category	Model
Indoor unit	Sized P200/P250 PEFY-AF4000/5000/6000MH, PFFY-P400/500YM-E, PFFY-P400/500YMH-C PFFY-P300/600YM-E-F, PFFY-P300/600YM-C-F, PDFY-P100VM-E-RE
Air handling unit controller	PAC-AH250/500M-J
PFAV	PFAV-P500/600/750/900VM-E(-F)
PFV	PFV-P400/500YM-A
PEV	PEV-P400/500YM-A

*2 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.
*3 Do not supply power to TB7 from TKA outdoor units.
Use PAC-SC51KUA or PAC-SF46EPA-G when connecting an M-NET device to TB7.

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

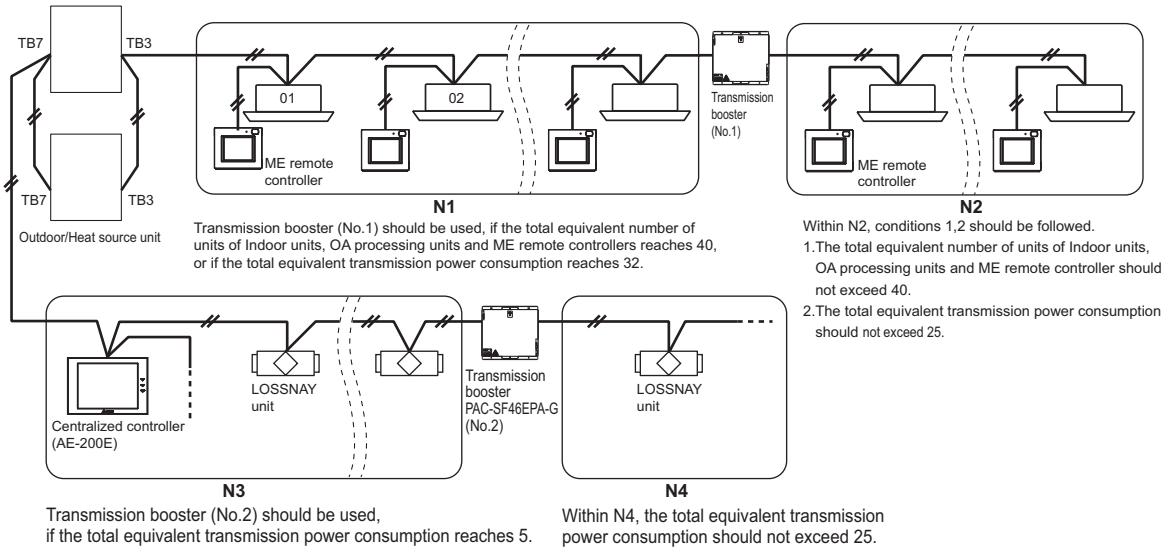
(A) Firstly, count from TB3 at TB3 side the total equivalent number of units of Indoor units, OA processing units, ME remote controller, and System controllers. If the total equivalent number of units reaches 40, a PAC-SF46EPA-G should be set.

(B) Secondly, count from TB7 side to TB3 side the total transmission power consumption. If the total equivalent power supply reaches 32, a PAC-SF46EPA-G 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.

(C) Thirdly, count from TB7 at TB7 side the total transmission power consumption. If the total equivalent power supply for only TB7 reaches 6, a PAC-SF46EPA-G 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-G should be set.

* The equivalent power supply of S-Series outdoor unit is 12.
* When one or more indoor units listed in Table 3 is connected, subtract 3 from the equivalent power supply.

■ System example



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

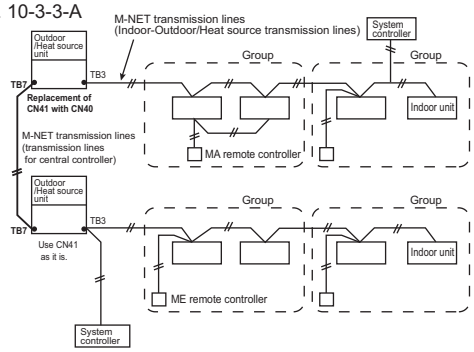
The power to System controller (excluding AE-200E, AE-50E, EW-50E, BAC-HD150, LM-AP) is supplied via M-NET transmission line. M-NET transmission line at TB7 side is called Centralized control transmission line while one at TB3 side is called Indoor-Outdoor/Heat source transmission line. There are 3 ways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

A) Connecting to TB3 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit.
B) Connecting to TB7 of the Outdoor/Heat source unit and receiving power from the Outdoor/Heat source unit.
(Not applicable to the PUMY model)
C) Connecting to TB7 of the Outdoor/Heat source unit but receiving power from power supply unit PAC-SC51KUA.
* System controllers (AE-200E, AE-50E, EW-50E, 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.

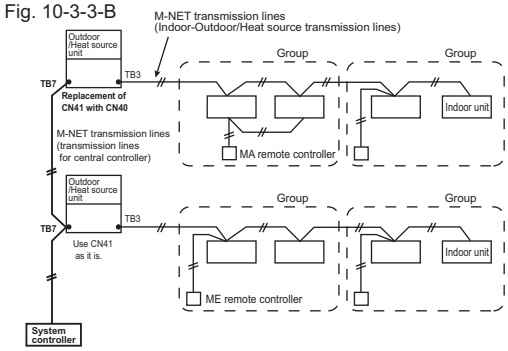
Fig. 10-3-3-A



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)

A maximum of 6 system controller are connectable to TB3 and TB7 of Outdoor/Heat source unit. (Not applicable to the PUMY model)
It is necessary to replace power supply switch connector CN41 with CN40 on one Outdoor/Heat source unit.

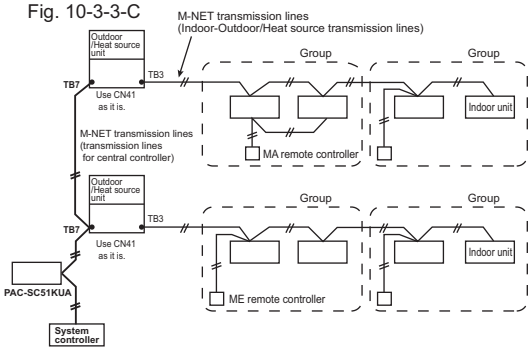
Fig. 10-3-3-B



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 or
1 EB-50GU-J 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-G is needed. PAC-SF46EPA-G supplies transmission power equal to 25 Indoor units.

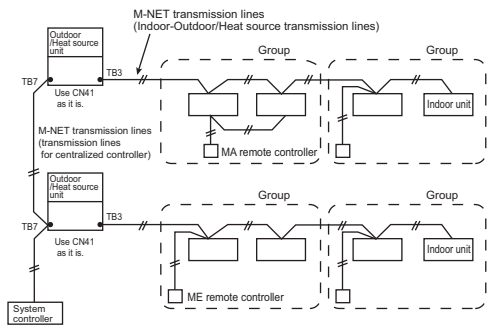
Fig. 10-3-3-C



⚠ CAUTION

■How to connect system controllers (AE-200E, AE-50E, EW-50E, BAC-HD150, LM-AP) to a given system
System controllers (AE-200E, AE-50E, EW-50E, 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-50E, 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 220-240VAC 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.

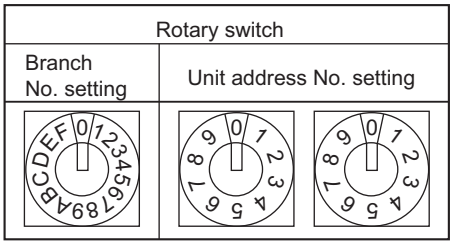
10-3-7. Power supply to AE-200E/AE-50E/EW-50E

1-phase 100-240VAC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary when connecting only the AE-200E/AE-50E/EW-50E.

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 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".

PAR-4"x"MAA ("x" represents 0 or later), PAR-CT01MA, PAR-FS01MA
The MA remote controller does not have the switches listed above.
Refer to the installation manual for the function setting.

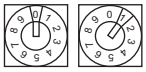
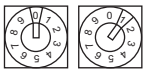
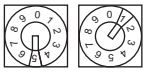
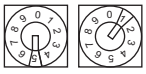
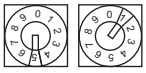
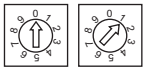
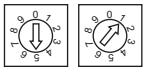
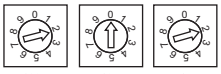
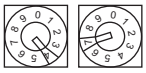
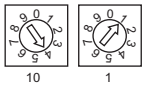
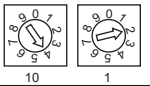
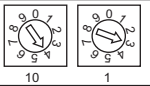
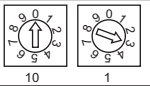
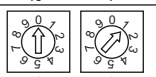
PAC-YT52CRA

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, 2, and 3 and OFF for SW4.)

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 want to display the indoor temperature, set to "ON".

10-4-2. Rule of setting address

Unit		Address setting	Example	Note
Indoor unit		01 ~ 50	 10 1	Use the most recent address within the same group of indoor units. Make the indoor units address connected to the BC controller (Sub) larger than the indoor units address connected to the BC controller (Main). If applicable, set the sub BC controllers in an PURY/PQRY 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)
Branch Box		01 ~ 50	 10 1	Use a number within the range 01~ 50, but it should not make the highest address of connected A-IC exceed 50. • Specify whether indoor units are connected to each port (A, B, C, D, and E). SW1 | 1 | 2 | 3 | 4 | 5 | (6) Port | A | B | C | D | E | not use indoor units are connected ON indoor units are not connected OFF
Outdoor unit		51 ~ 99, 100	 10 1	The smallest address of indoor unit in same refrigerant system + 50 * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Main)		52 ~ 99, 100	 10 1	The address of outdoor unit + 1 * Please reset another address between 51 and 99 when two addresses overlap. * The address automatically becomes "100" if it is set as "01~ 50"
BC controller (Sub)		53 ~ 99, 100	 10 1	Lowest address within the indoor units connected to the BC controller (Sub) plus 50.
Local remote controller	ME Remote controller (Main)	101 ~ 150	1 Fixed  10 1	The smallest address of indoor unit in the group + 100 * The place of "100" is fixed to "1"
	ME Remote controller (Sub)	151 ~ 199, 200	1 Fixed  10 1	The address of main remote controller + 50 * The address automatically becomes "200" if it is set as "00"
System controller	ON/OFF remote controller	201 ~ 250	 100 10 1	The smallest group No. to be managed + 200 * The smallest group No. to be managed is changeable.
	AE-200E/AE-50E AG-150A EB-50GU-J EW-50E AT-50B	000, 201 ~ 250	0 0 0 100 10 1	* AT-50B cannot be set to "000".
	PAC-YG50ECA	000, 201 ~ 250	0 0 0 100 10 1	* Settings are made on the initial screen of AG-150A.
	BAC-HD150	000, 201 ~ 250	0 0 0 100 10 1	* Settings are made with setting tool of BM ADAPTER.
	LMAP04-E	201 ~ 250	2 Fixed  10 1	
PI, AI, DIDO	PAC-YG60MCA	01 ~ 50	 10 1	
	PAC-YG63MCA	01 ~ 50	 10 1	
	PAC-YG66DCA	01 ~ 50	 10 1	
LOSSNAY, OA processing unit		01 ~ 50	 10 1	After setting the addresses of all the indoor units, assign an arbitrary address.
PAC-IF01AHC		201 ~ 250	2 Fixed  10 1	

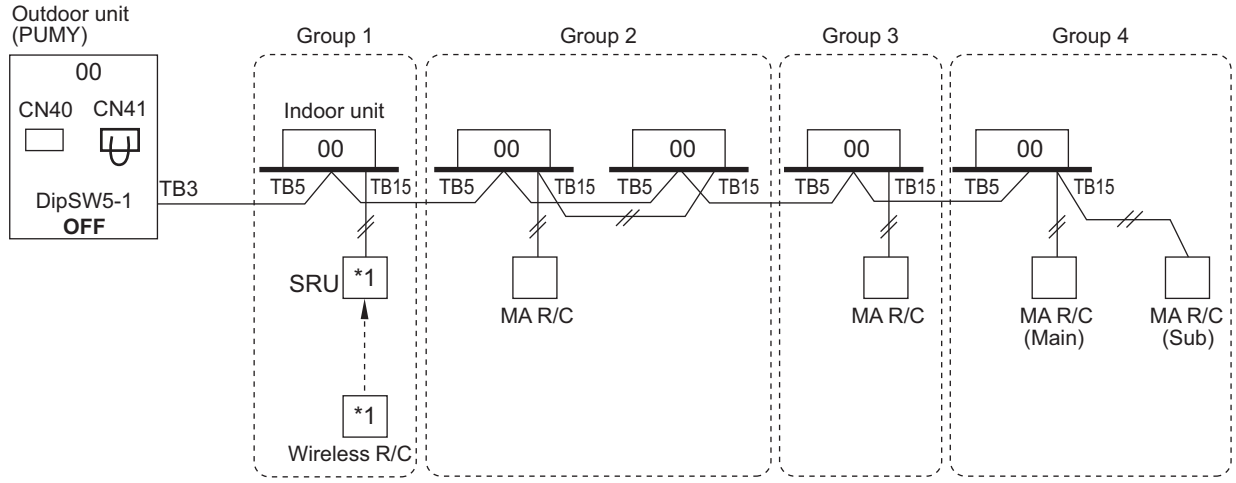
10-4-3. System example

Factory setting

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

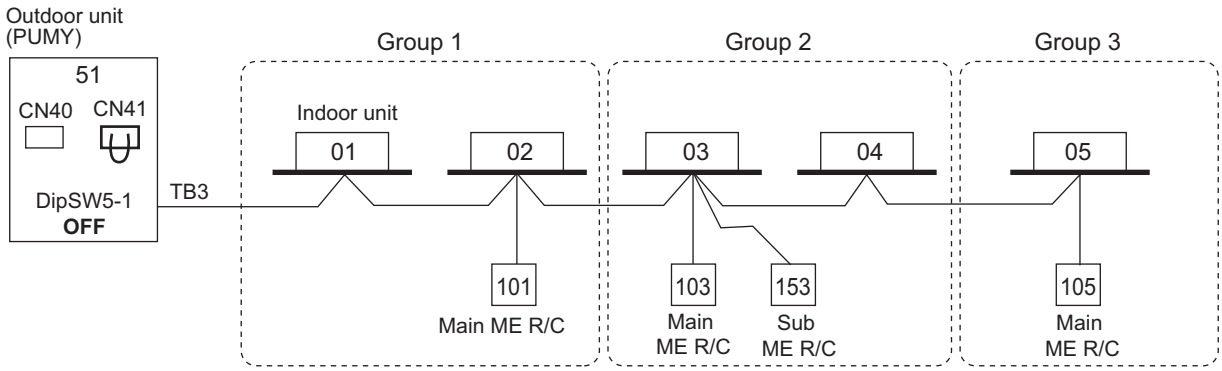
- Outdoor unit : Address: 00, CN41: ON (Jumper), DipSW5-1: OFF
- Indoor unit : Address: 00
- ME Remote controller : Address: 101
- LM-AP : Address: 247, CN41: ON (Jumper), DipSW1-2: OFF
- BM ADAPTER : Address: 000, CN41: ON (Jumper)
- AE-200E/AE-50E/EW-50E : Address: 000, CN21: ON (Jumper)

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

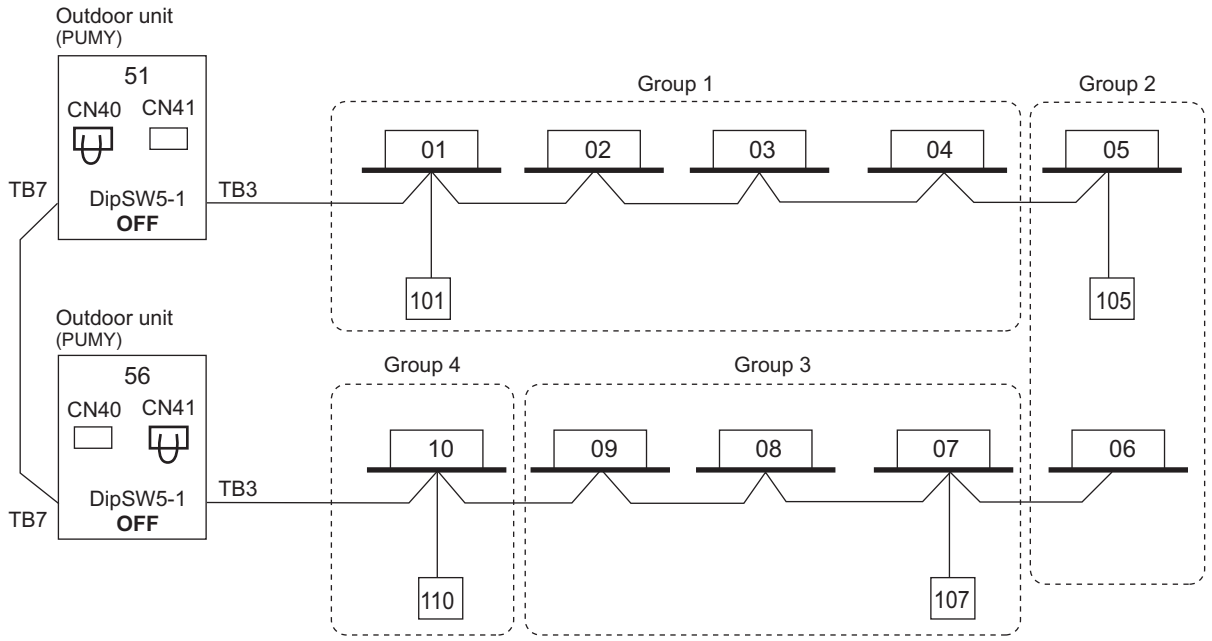


*1 For wireless R/C and Signal receiver unit(SBU), channel 1, 2 and 3 are selectable and should be set same channel.

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

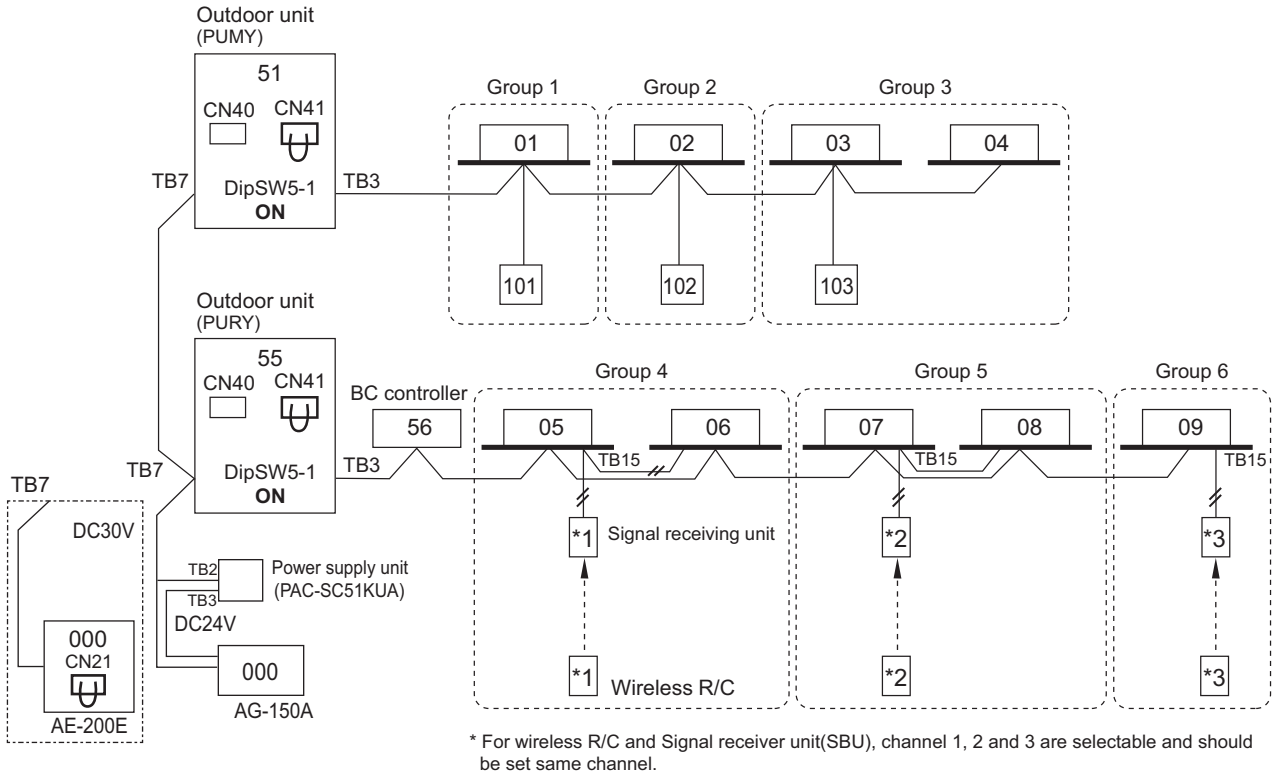


10-4-3-3. Grouping in different refrigerant system



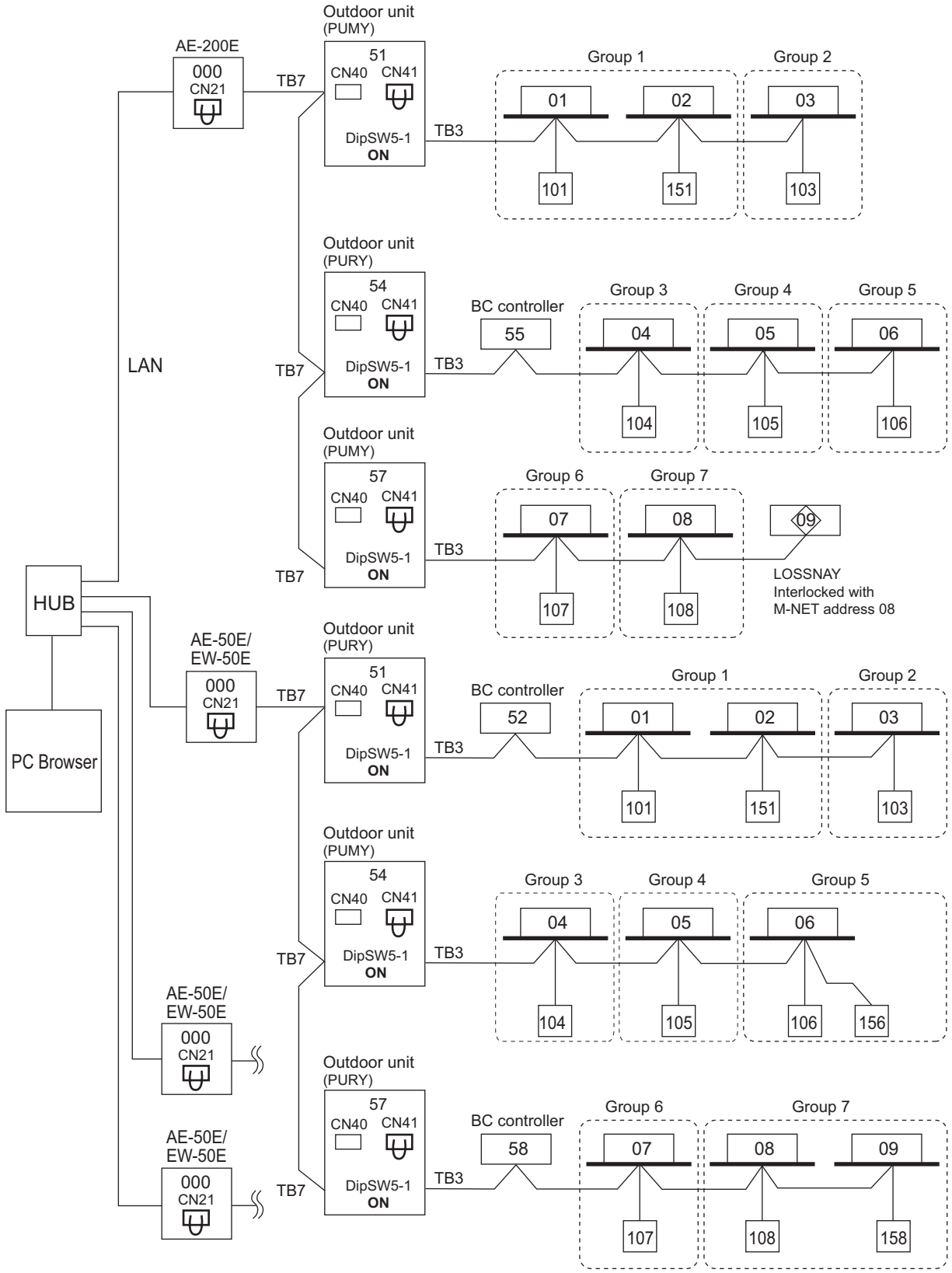
NOTE
- It is necessary to change the connecter to CN40 on the outdoor unit (Heat source unit) control board (only one outdoor unit (Heat source unit)) when the group is set between other refrigerant systems.
- It is necessary to set on the remote controller by manual when group sets on the different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

10-4-3-4. 2 Outdoor unit, AG-150A, AE-200E, MA

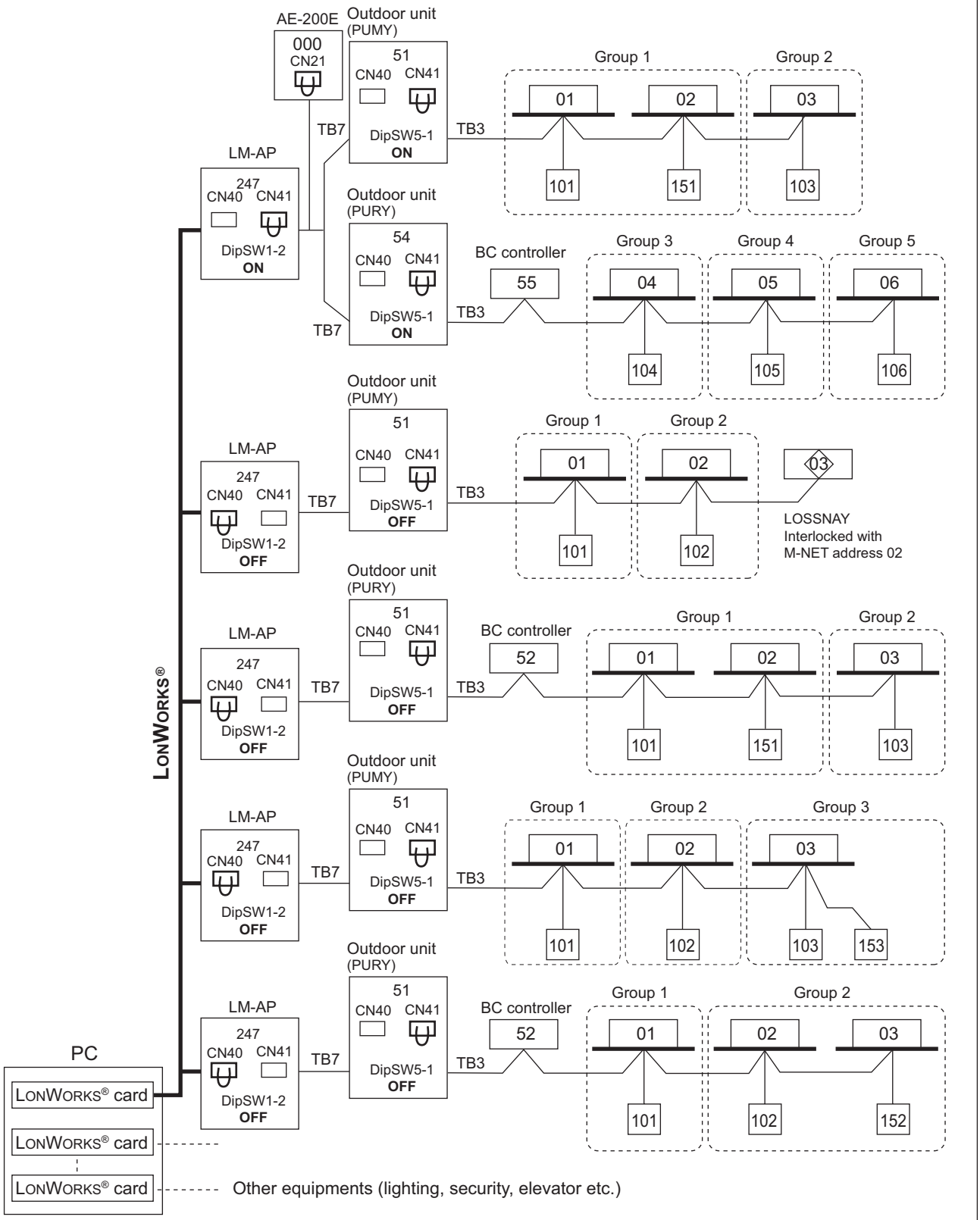


* For wireless R/C and Signal receiver unit(SBU), channel 1, 2 and 3 are selectable and should be set same channel.

10-4-3-5. AE-200E + AE-50E/EW-50E
AE-200E can control max. 200 indoor units/via AE-50E/EW-50E.



10-4-3-6. LM-AP



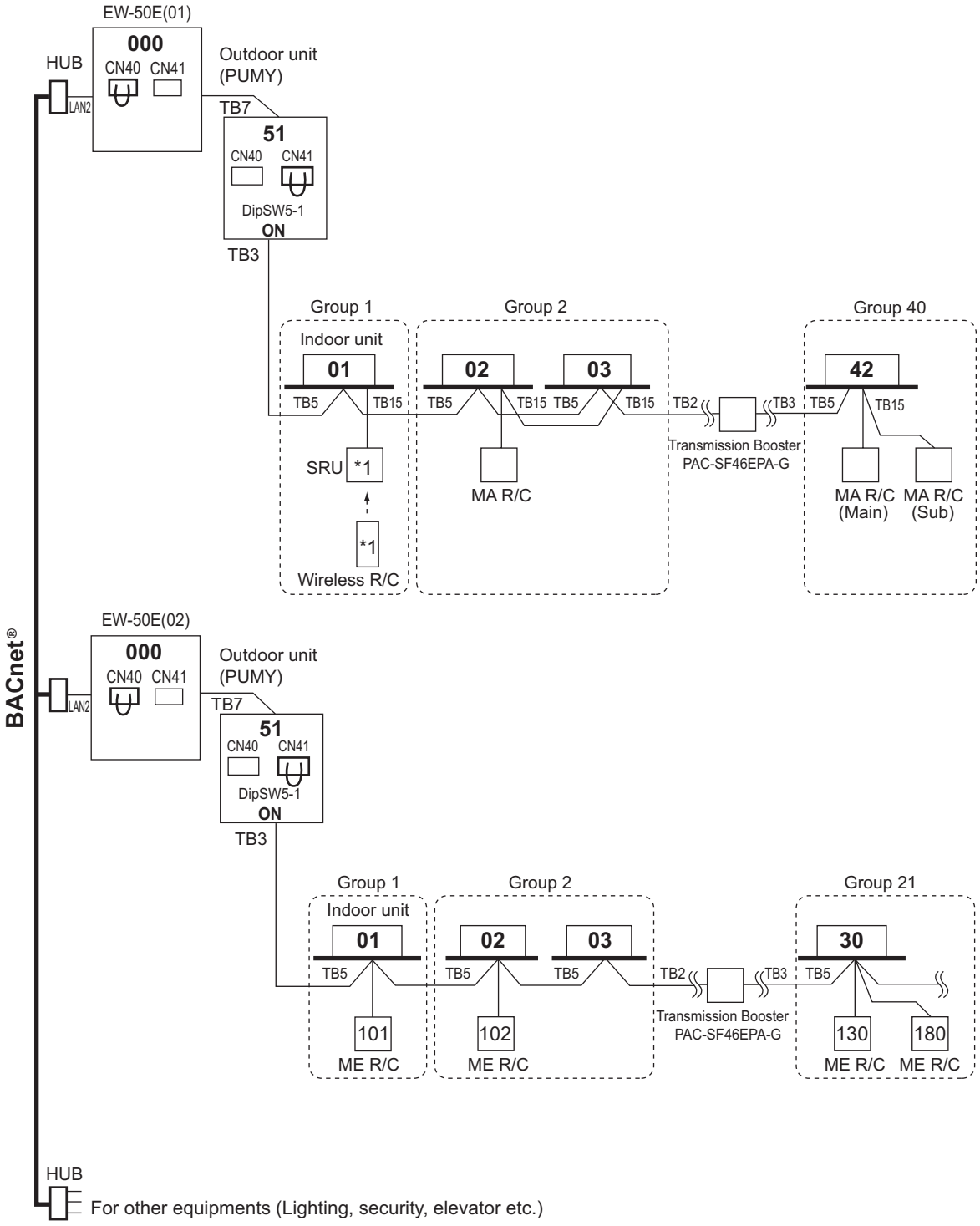
NOTE

- LM-AP can control 50 indoor units.
- It is necessary to turn on the DipSW1-2 on the LM-AP control board and the DipSW5-1 on the outdoor unit (heat source unit) control board with centralized controller (Power supply unit).
- It is necessary to change the connector to CN40 on the LM-AP control board without centralized controllers (Power supply unit).

10-4-3-7. BACnet®

EW-50E (AE-200E) can control up to 50 units/groups (including LOSSNAY).

*To use the BACnet® function on EW-50E (AE-200E), BACnet® license registration is required.



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

*2 When the PAR-CT01MA series, PAR-FS01MA series, PAR-4"x"MA series, or PAR-3"x"MA series ("x" represents 0 or later) is connected to a group, no other MA remote controllers can be connected to the same group.

11-1. R32 Piping material

Refrigerant pipe for CITY MULTI shall be made of phosphorus deoxidized copper, and has two types.
A. Type-O: Soft copper pipe (annealed copper pipe), can be easily bent with human's hand.
B. Type-1/2H pipe: Hard copper pipe (Straight pipe), being stronger than Type-O pipe of the same radical thickness.

The maximum operation pressure of R32 air conditioner is 4.30 MPa [623psi]. The refrigerant piping should ensure the safety under the maximum operation pressure. MITSUBISHI ELECTRIC recommends pipe size as Table1, or You shall follow the local industrial standard. Pipes of radical thickness 0.7mm or less shall not be used.

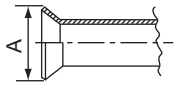
Table 1. Copper pipe size and radial thickness for R32 CITY MULTI.

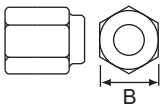
Size (mm)	Size (in.)	Radial thickness (mm)	Radial thickness (mil)	Pipe type
ø6.35	ø1/4"	0.8	[32]	Type-O
ø9.52	ø3/8"	0.8	[32]	Type-O
ø12.7	ø1/2"	0.8	[32]	Type-O
ø15.88	ø5/8"	1.0	[40]	Type-O
ø19.05	ø3/4"	1.2	[48]	Type-O
ø19.05	ø3/4"	1.0	[40]	Type-1/2H or H
ø22.2	ø7/8"	1.0	[40]	Type-1/2H or H
ø25.4	ø1"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

* For pipe sized ø19.05 (3/4") for R32 air conditioner, choice of pipe type is up to you.
* The figures in the radial thickness column are based on the Japanese standards and provided only as a reference. Use pipes that meet the local standards.

Flare

Due to the relative higher operation pressure of R32 compared to R22, the flare connection should follow dimensions mentioned below so as to achieve enough the air-tightness.

Flare pipe	Pipe size	A (For R32) (mm[in.])
	ø6.35 [1/4"]	9.1
	ø9.52 [3/8"]	13.2
	ø12.70 [1/2"]	16.6
	ø15.88 [5/8"]	19.7
	ø19.05 [3/4"]	24.0

Flare nut	Pipe size	B (For R32) (mm[in.])
	ø6.35 [1/4"]	17.0
	ø9.52 [3/8"]	22.0
	ø12.70 [1/2"]	26.0
	ø15.88 [5/8"]	29.0
	ø19.05 [3/4"]	36.0

11-2. Piping Design

11-2-1. Use of the existing refrigerant piping

⚠ WARNING

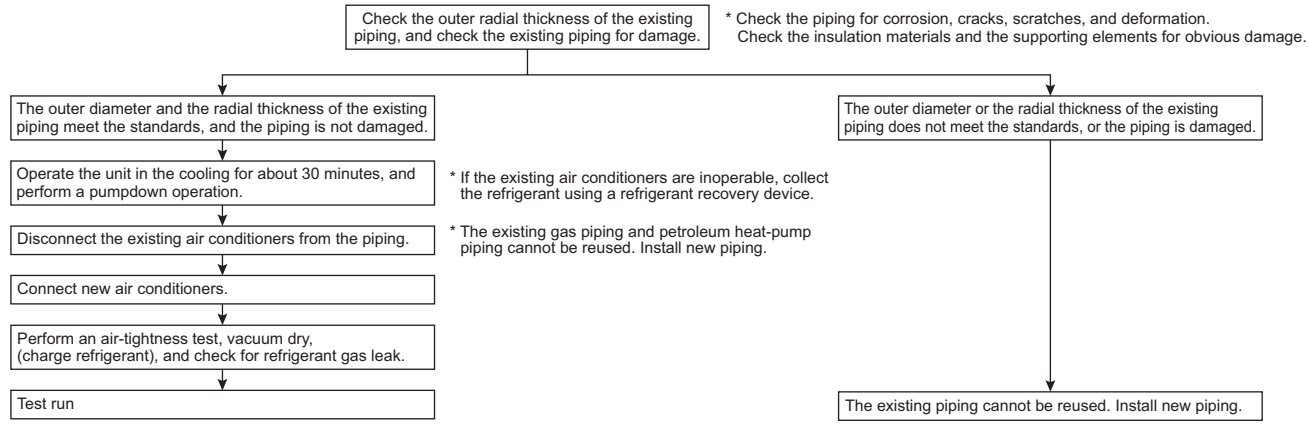
Before operating the compressor, make sure the refrigerant pipes are properly installed.

• Operating the compressor without the refrigerant pipes properly being connected and with the stop (ball) valve open, the compressor may suck in air, raising the pressure inside the refrigerant cycle abnormally high and resulting in pipe bursting and personal injury.

• Adequately insulate the liquid and gas refrigerant pipes to keep condensation from dripping.
• Provide additional insulation on the refrigerant pipes as necessary to keep condensation from forming on the insulation surface.
(Insulating material···Heat-resistance temperature: 120°C; Thickness: 15 mm or greater)
* Installation of the unit in high-temperature high-humidity conditions, such as in the ceiling of the top floor, may require additional insulation.
• Insulate refrigerant pipes with heat-resistant polyethylene foam and without leaving any gap between indoor unit and insulating material or between insulating materials. (Exposed pipes may cause condensation and pose burn hazard.)
• Keep the piping length within the limits, and charge the required amount of refrigerant (R410A).
* Before charging refrigerant, evacuate the extended piping and the indoor units, and charge refrigerant through the stop valve (applicable when the unit is stopped). When charging refrigerant through the check valve on the suction side, use a safety charger to prevent liquid refrigerant from being inhaled (applicable when the unit is operated).
* When charging refrigerant, record the amount of refrigerant charged in the relevant section of the maintenance manual (attached to the product).

• Determine the reusability of the existing piping, using the flowchart below.
• If the diameter of the existing piping differs from the standard diameter, check the reusability of the piping and restrictive conditions for reuse.

Cautionary notes on reusing the existing piping



Connecting non-standard diameter pipes

• The following restrictions apply when using pipes with a diameter different from the standard recommended size.

Usability of pipes with non-standard diameters

• Main pipe size

	Outside diameter(mm)	Radial thickness	SM112	SM125	SM140
Gas pipe	ø12.7	t 0.8	NA	NA	NA
	ø15.88	t 1.0	A	A	A
	ø19.05	t 1.0	C	C	C
	ø22.2	t 1.0	NA	NA	NA
	ø28.58 or greater	t 1.0 or greater	NA	NA	NA
Liquid pipe	ø9.52	t 0.8	A	A	A
	ø12.7	t 0.8	D	D	D
	ø15.88	t 1.0	D	D	D
	ø19.05 or greater	t 1.0 or greater	NA	NA	NA

A: Standard piping
B: Usable (with no loss of performance)
C: Usable (with loss of performance), Set the SW6-1 from OFF to ON.
D: Usable (Restrictions on refrigerant charge apply.)
NA: Unusable

• Size of the piping after branching and up to indoor units

	Outside diameter(mm)	Radial thickness	P10	P15	P20	P25	P32	P40	P50	P63	P71	P80	P100	P125	P140
Gas pipe	ø12.7	t 0.8	A	A	A	A	A	A	A	C	C	C	C	C	C
	ø15.88	t 1.0	NA	NA	NA	NA	NA	B	B	A	A	A	A	A	A
	ø19.05	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	B	B	B	B	B
	ø22.2	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ø25.4	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ø28.58	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Liquid pipe	ø6.35	t 0.8	A	A	A	A	A	A	A	A	15 m or less	NA	NA	NA	NA
	ø9.52	t 0.8	D	D	D	D	D	D	D	D	A	A	A	A	A
	ø12.7	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	D	D	D	D	D
	ø15.88	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	ø19.05	t 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Pipe diameter and radial thickness Note: For pipes with a diameter of ø22.2 and up, use 1/2-H or H-material.

Outside diameter (mm)	ø6.35	ø9.52	ø12.7	ø15.88	ø19.05	ø22.2	ø25.4	ø28.58
Radial thickness (mm)	0.8	0.8	0.8	1.0	1.0	1.0	1.0	1.0

Restrictions on extending piping/Amount of refrigerant to be charged (REPLACE units)

When reusing the existing piping, calculate the amount of refrigerant to be charged using the formula below. The existing piping is usable if the result of the calculation below is less than 4.5 kg. If the calculation result is at or above 4.5 kg, use new piping. When reusing the existing piping, charge the amount of refrigerant required for the piping and for the indoor units.

• Calculating the amount of refrigerant to be charged based on pipe size and length

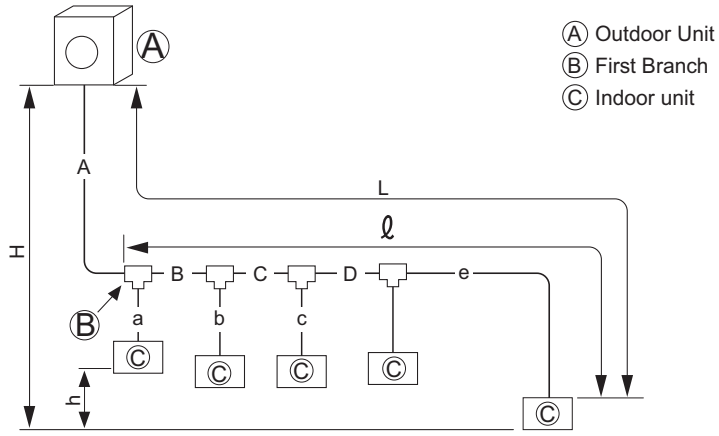
Total length of ø15.88 liquid pipes × 0.20 (m) × 0.20 (kg/m)	+	Total length of ø12.7 liquid pipes × 0.092 (m) × 0.092 (kg/m)	+	Total length of ø9.52 liquid pipes × 0.051 (m) × 0.051 (kg/m)	+	Total length of ø6.35 liquid pipes × 0.019 (m) × 0.019 (kg/m)	=	Amount of additional refrigerant to be charged (REPLACE units) (kg)

• Calculating the amount of refrigerant to be charged based on indoor unit capacity

Total capacity index of the connected indoor units	Amount of refrigerant to be charged
~ 8.0 kW	1.8 kg
8.1 kW ~ 16.0 kW	1.8 kg
16.1 kW ~	1.8 kg

11-2-2. PUMY-SM112, 125, 140VKM2/YKM2 Piping

Line-Branch Method
Connection Examples
(Connecting to 5 Indoor Units)



Permissible Length	Total Piping Length	A+B+C+D+a+b+c+d+e ≤ 120 m
	Farthest Piping Length (L)	A+B+C+D+e ≤ 70 m
	Farthest Piping Length After First Branch (ℓ)	B+C+D+e ≤ 50 m
Permissible High/ Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	H ≤ 50 m (In the case of outdoor unit is set higher than indoor unit) H ≤ 40 m (In the case of outdoor unit is set lower than indoor unit)
	High/Low Difference in Indoor/Indoor Section (h)	h ≤ 15 m

■ **Selecting the Refrigerant Branch Kit**

Use an optional branch piping kit (CMY-Y62-G-E).

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Sections From Branch to Indoor Unit (a,b,c,d)
(3) Section From Branch to Branch (B,C)

Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

Model number	Piping Diameter (mm)	
– 50	Liquid Pipe	R ≤ 30 m: ø6.35 R > 30 m: ø9.52
	Gas Pipe	ø12.7
63 – 140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(3) Refrigerant Piping Diameter In Section From Branch to Branch

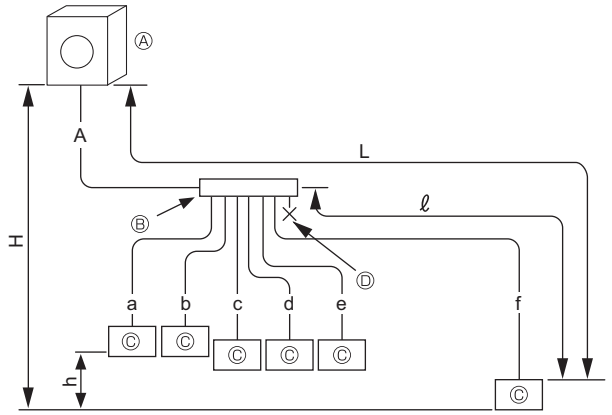
Liquid Pipe (mm)	Gas Pipe (mm)
ø9.52	ø15.88

Note:
• R indicates the piping length after the first branch.

■ **Additional refrigerant charge**

Refer to “11-3. Refrigerant charging calculation”.

Header-Branch Method
Connection Examples
(Connecting to 6 Indoor Units)



Ⓐ Outdoor Unit
Ⓑ First Branch
Ⓒ Indoor unit
Ⓓ Cap

Permissible Length	Total Piping Length	A+a+b+c+d+e+f ≤ 120 m
	Farthest Piping Length (L)	A+ f ≤ 70 m
	Farthest Piping Length After First Branch (ℓ)	f ≤ 50 m
Permissible High/ Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	H ≤ 50 m (In the case of outdoor unit is set higher than indoor unit) H ≤ 40 m (In the case of outdoor unit is set lower than indoor unit)
	High/Low Difference in Indoor/Indoor Section (h)	h ≤ 15 m

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Sections From Branch to Indoor Unit (a,b,c,d,e,f)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

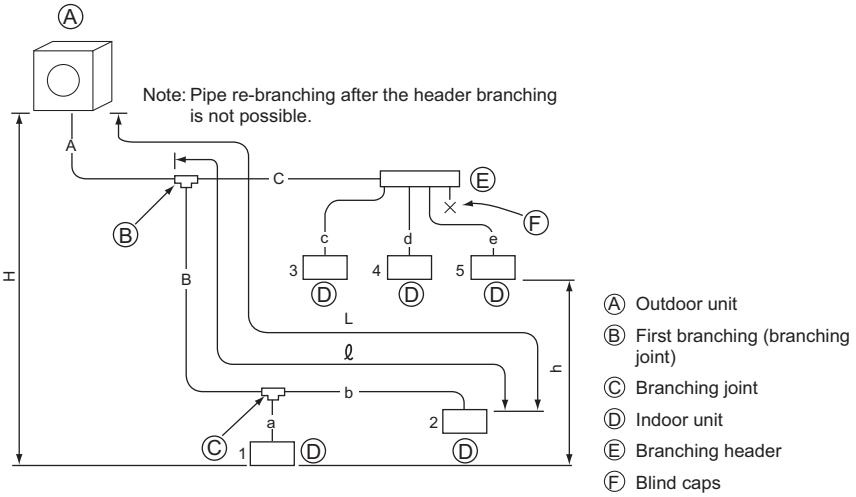
Model number	Piping Diameter (mm)		
– 50	Liquid Pipe	R ≤ 30 m	ø6.35
		R > 30 m	ø9.52
	Gas Pipe	ø12.7	
63 – 140	Liquid Pipe	ø9.52	
	Gas Pipe	ø15.88	

Note:
• R indicates the piping length after the first branch.

■ **Additional refrigerant charge**
■ **Calculation of additional refrigerant charge**

Refer to " 11-3. Refrigerant charging calculation "

Method of Combined Branching of Lines and Headers
Connection Examples
(Connecting to 5 Indoor Units)



Permissible Length	Total Piping Length	A+B+C+a+b+c+d+e ≤ 120 m
	Farthest Piping Length (L)	A+B+b ≤ 70 m
	Farthest Piping Length After First Branch (ℓ)	B+b ≤ 50 m
Permissible High/Low Difference	High/Low Difference in Indoor/Outdoor Section (H)	H ≤ 50 m (In the case of outdoor unit is set higher than indoor unit) H ≤ 40 m (In the case of outdoor unit is set lower than indoor unit)
	High/Low Difference in Indoor/Indoor Section (h)	h ≤ 15 m

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch Joint	Branch Header (4 branches)	Branch Header (8 branches)
CMY-Y62-G-E	CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to First Branch (A)
(2) Section From Branch to Indoor Unit (a,b,c,d,e)
(3) Section From Branch to Branch (B,C)

Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to First Branch (Outdoor Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch to Indoor Unit (Indoor Unit Piping Diameter)

Model number	Piping Diameter (mm)	
– 50	Liquid Pipe	R ≤ 30 m: ø6.35 R > 30 m: ø9.52
	Gas Pipe	ø12.7
63 – 140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(3) Refrigerant Piping Diameter In Section From Branch to Branch

Liquid Pipe (mm)	Gas Pipe (mm)
ø9.52	ø15.88

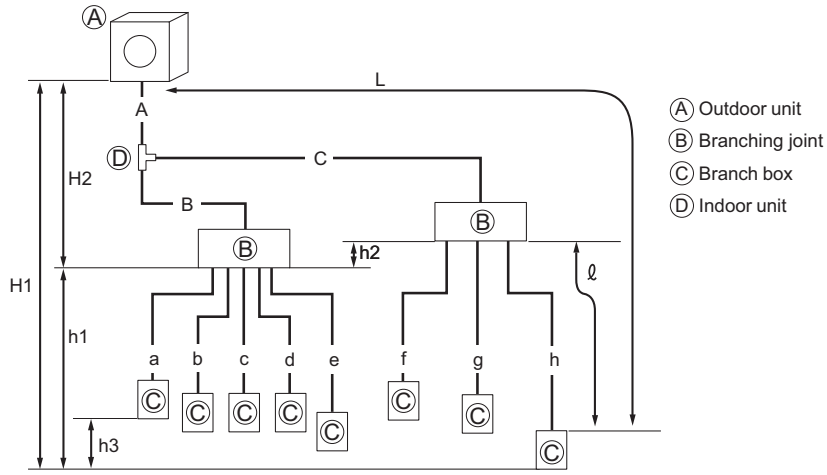
Note:
• R indicates the piping length after the first branch.

■ **Additional refrigerant charge**

Refer to “11-3. Refrigerant charging calculation”.

11-2-3. PUMY-SM112, 125, 140VKM2/YKM2 (WHEN USING BRANCH BOX)

Branch box Method
Connection Examples
(Connecting to 8 Indoor Units)



Permissible length (One-way)	Total piping length	A + B + C + a + b + c + d + e + f + g + h ≤ 120 m
	Farthest piping length (L)	A + C + h ≤ 80 m
	Piping length between outdoor unit and branch boxes	A + B + C ≤ 55 m
	Farthest Branch box from the first joint	C ≤ 50 m
	Farthest piping length after branch box (ℓ)	ℓ ≤ 25m
	Total piping length between branch boxes and indoor units	a + b + c + d + e + f + g + h ≤ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H1) Branch box/outdoor unit section (H2)	H1, H2 ≤ 50 m (When outdoor unit is set higher than indoor unit) H1, H2 ≤ 40 m (When outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1 + h2 ≤ 15 m
	In each branch unit (h2)	h2 ≤ 15 m
	In each indoor unit (h3)	h3 ≤ 12 m
Number of bends	When using a branch joint	|A + B + a|, |A + B + b|, |A + B + c|, |A + B + d|, |A + B + e|, |A + C + f|, |A + C + g|, |A + C + h| ≤ 15
	When not using a branch joint	|A + a|, |A + b|, |A + c|, |A + d|, |A + C + e|, |A + C + f|, |A + C + g|, |A + C + h| ≤ 15

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to Branch box (A, B, C)
(2) Section From Branch box to Indoor Unit (a to h)
} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box (Outdoor Unit Piping Diameter)

Model number	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch box to Indoor Unit (Indoor Unit Piping Diameter) (mm)

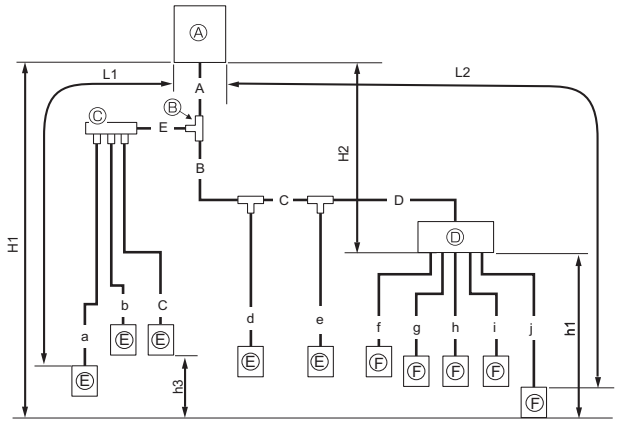
Indoor unit series	Model number	Liquid Pipe	Gas Pipe
M series or S series	15 – 42	ø6.35	ø9.52
	50, 60	ø6.35	ø12.7
	71, 80	ø9.52	ø15.88
P series	35 – 60	ø6.35	ø12.7
	71 – 100	ø9.52	ø15.88

* If the pipe size of indoor unit is different, use a different-diameter joint.

■ **Additional refrigerant charge**

Refer to “11-3. Refrigerant charging calculation”.

Mixed Method
Connection Examples
(Connecting to 1 Branch box)



Ⓐ Outdoor Unit
Ⓑ First joint
Ⓒ Branch header
Ⓓ Branch box
Ⓔ CITY MULTI Indoor unit
Ⓕ M, S, P series Indoor unit

Permissible length (One-way)	Total piping length	A+B+C+D+E+a+b+c+d+e+f+g+h+i+j ≤ 120 m
	Farthest piping length (L1)	A+E+a or A+B+C+e ≤ 70 m
	Farthest piping length. Via Branch box (L2)	A+B+C+D+j ≤ 80 m
	Piping length between outdoor unit and branch box	A+B+C+D ≤ 55 m
	Farthest piping length from the first joint	B+C+D or B+C+e ≤ 50 m
	Farthest piping length after branch box	j ≤ 25 m
	Total piping length between branch boxes and indoor units	f+g+h+i+j ≤ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H1) Branch box/outdoor unit section (H2)	H1, H2 ≤ 50 m (When outdoor unit is set higher than indoor unit)
		H1, H2 ≤ 40 m (When outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1 ≤ 15 m
	In each indoor unit (h3)	h3 ≤ 12 m
Number of bends		|A + E + a|, |A + E + b|, |A + E + c|, |A + B + d|, |A + B + C + e|, |A + B + C + D + f|, |A + B + C + D + g|, |A + B + C + D + h|, |A + B + C + D + i|, |A + B + C + D + j| ≤ 15

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to Branch box or Branch header (A to E)
(2) Sections From Branch box or Branch header to Indoor Unit (a to j)

} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box or Branch header (Out-door Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch box or Branch header to Indoor Unit (Indoor Unit Piping Diameter)

Indoor unit series	Model number	Liquid Pipe	Gas Pipe
CITY MULTI	– 50	R ≤ 30 m ø6.35 R > 30 m ø9.52	ø12.7
	63 – 140	ø9.52	ø15.88
M series or S series	15 – 42	ø6.35	ø9.52
	50, 60	ø6.35	ø12.7
	71, 80	ø9.52	ø15.88
P series	35 – 60	ø6.35	ø12.7
	71 – 100	ø9.52	ø15.88

(mm)

* If the pipe size of indoor unit is different, use a different-diameter joint.

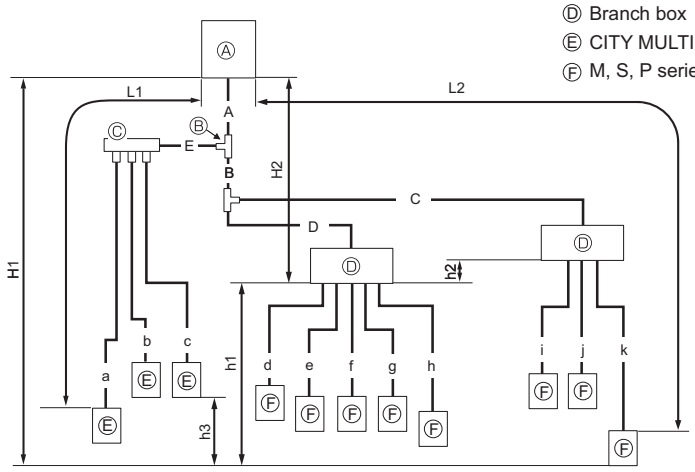
Note:
• R indicates the piping length after the first branch.

■ **Additional refrigerant charge**

Refer to “11-3. Refrigerant charging calculation”.

Mixed Method
Connection Examples
(Connecting to 2 Branch boxes)

Ⓐ Outdoor Unit
Ⓑ First joint
Ⓒ Branch header (CMY)
Ⓓ Branch box
Ⓔ CITY MULTI Indoor unit
Ⓕ M, S, P series Indoor unit



Permissible length (One-way)	Total piping length	A+B+C+D+E+a+b+c+d+e+f+g+h+i+j+k ≤ 120 m
	Farthest piping length (L1)	A+E+a ≤ 70 m
	Farthest piping length. Via Branch box (L2)	A+B+C+k ≤ 80 m
	Piping length between outdoor unit and branch boxes	A+B+C+D ≤ 55 m
	Farthest piping length from the first joint	B+C or E+a ≤ 50 m
	Farthest piping length after branch box	k ≤ 25 m
	Farthest branch box form outdoor unit	A+B+C ≤ 55 m
	Total piping length between branch boxes and indoor units	d+e+f+g+h+i+j+k ≤ 95 m
Permissible height difference (One-way)	In indoor/outdoor section (H1) Branch box/outdoor unit section (H2)	H1, H2 ≤ 50 m (When outdoor unit is set higher than indoor unit)
		H1, H2 ≤ 40 m (When outdoor unit is set lower than indoor unit)
	In branch box/indoor unit section (h1)	h1+h2 ≤ 15 m
	In each branch unit (h2)	h2 ≤ 15 m
	In each indoor unit (h3)	h3 ≤ 12 m
Number of bends		|A + E + a|, |A + E + b|, |A + E + c|, |A + B + D + d|, |A + B + D + e|, |A + B + D + f|, |A + B + D + g|, |A + B + D + h|, |A + B + C + i|, |A + B + C + j|, |A + B + C + k| ≤ 15

■ **Selecting the Refrigerant Branch Kit**

Please select branching kit, which is sold separately, from the table below.
(The kit comprises sets for use with liquid pipes and for use with gas pipes.)

Branch header (4 branches)	Branch header (8 branches)
CMY-Y64-G-E	CMY-Y68-G-E

■ **Select Each Section of Refrigerant Piping**

(1) Section From Outdoor Unit to Branch box or Branch header (A to E)
(2) Sections From Branch box or Branch header to Indoor Unit (a to k)

} Each Section of Piping

Select the size from the table to the right.

(1) Refrigerant Piping Diameter In Section From Outdoor Unit to Branch box or Branch header (Out-door Unit Piping Diameter)

Model	Piping Diameter (mm)	
PUMY-SM112 PUMY-SM125 PUMY-SM140	Liquid Pipe	ø9.52
	Gas Pipe	ø15.88

(2) Refrigerant Piping Diameter In Section From Branch box or Branch header to Indoor Unit (Indoor Unit Piping Diameter)

Indoor unit series	Model number	Liquid Pipe		Gas Pipe
CITY MULTI	– 50	R ≤ 30 m	ø6.35	ø12.7
		R > 30 m	ø9.52	
	63 – 140	ø9.52		ø15.88
M series or S series	15 – 42	ø6.35		ø9.52
	50, 60	ø6.35		ø12.7
	71, 80	ø9.52		ø15.88
P series	35 – 60	ø6.35		ø12.7
	71 – 100	ø9.52		ø15.88

(mm)

* If the pipe size of indoor unit is different, use a different-diameter joint.

Note:
• R indicates the piping length after the first branch.

■ **Additional refrigerant charge**

Refer to “11-3. Refrigerant charging calculation”.

11-3. Refrigerant charging calculation

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 and total capacity of connected indoor units.
- Calculate the additional refrigerant charge using the procedure below, 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 6.01 kg, round up the charge to 6.1 kg.)

<Additional Charge>

Calculation of refrigerant charge

Additional refrigerant charge for the indoor units	+	Liquid pipe size Total length of ø9.52×0.051	+	Liquid pipe size Total length of ø6.35×0.019	–	Refrigerant amount for outdoor unit
1.8 kg		(m) × 0.051 (kg/m)		(m) × 0.019 (kg/m)		1.4 kg *1

Additional charge amount for piping *2

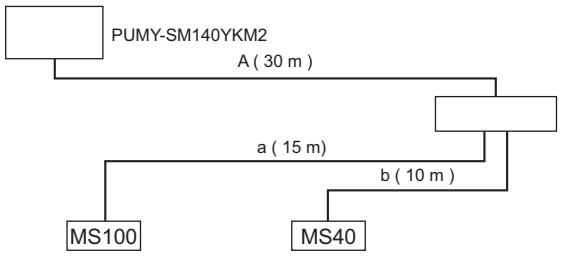
*1 Refrigerant of 1.4 kg is already included when the outdoor unit is shipped.
In case of the PKFY model indoor unit is in the refrigerant cycle, refrigerant of 0.6 kg is already included when the outdoor unit is shipped.

*2 If this value is less than 0, the additional charge amount for the piping shall be 0.

Included refrigerant amount when shipped from the factory

Included refrigerant amount
3.0 kg

Example:



<Example>
Outdoor model: SM140
Indoor 1: MS100 (11.2 kW) A: ø9.52 30 m a: ø9.52 15 m
2: MS40 (4.5 kW) b: ø6.35 10 m

<Calculation example>
Additional refrigerant charge

$$10 \times \frac{19.0}{1000} + 45 \times \frac{50.0}{1000} + 1.8 - 1.4 = 2.9 \text{ kg (rounded up)}$$

The total length of each liquid line is as follows:
ø9.52: A + a = 30 + 15 = 45 m
ø6.35: b = 10 m
The total capacity of connected indoor unit is as follows:
11.2 + 4.5 = 15.7

■Maximum refrigerant charge

There is a limit to the amount of refrigerant that can be charged into a unit.
Regardless of the amount yielded by the formula above, observe the maximum refrigerant charge in the table below.

Maximum refrigerant charge	Factory charge	kg	3.0
	Charged on site	kg	4.5
	Total for system	kg	7.5

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

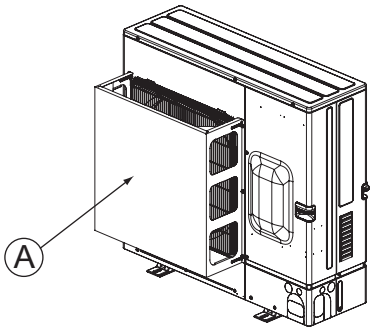


Fig. 12-1-2a

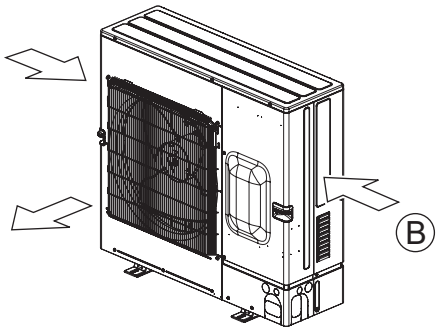


Fig. 12-1-2b

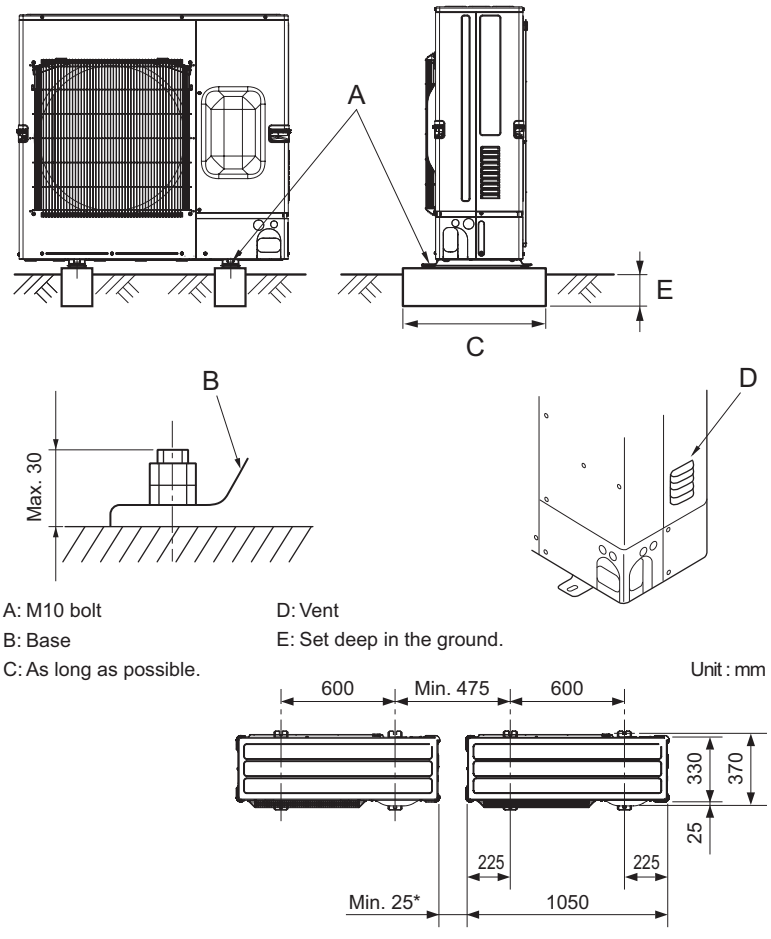
12-1-3. Foundation

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.

Thickness of concrete	Weight-bearing capacity	Foundation bolt	Bolt length
120 mm	320 kg	M10	70 mm

C. Make sure that the length of the foundation bolt is within 30 mm of the bottom surface of the base.
D. Secure the base of the unit firmly with four-M10 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 injures.
B. The unit must be installed according to the instructions in order to minimize the risk of damage from earthquakes, typhoons, or strong winds.



A: M10 bolt
B: Base
C: As long as possible.
D: Vent
E: Set deep in the ground.

Unit : mm

* When installing a single outdoor unit, the clearance is 15 mm or more.

Fig. 12-1-3

12-2. Spacing

12-2-1. PUMY-SM112, 125, 140VKM2/YKM2

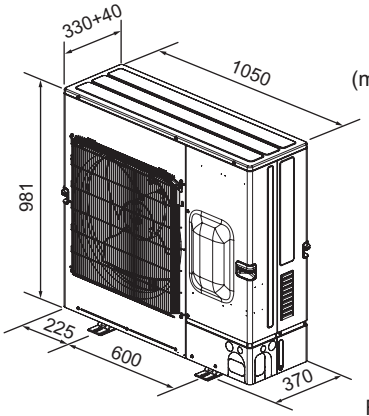


Fig. 12-2-1

12-2-1-1. In case of single installation

mm[in.]

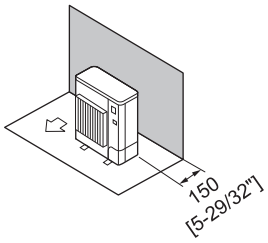


Fig. 12-2-2
Obstacles at rear only

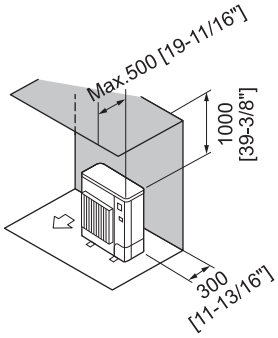


Fig. 12-2-3
Obstacles at rear and above only

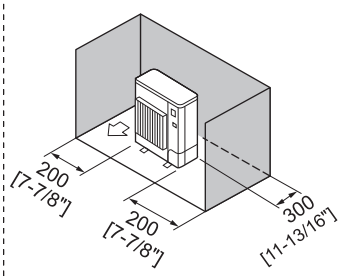
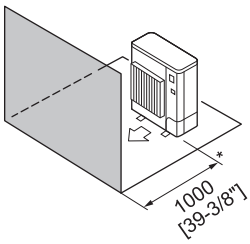
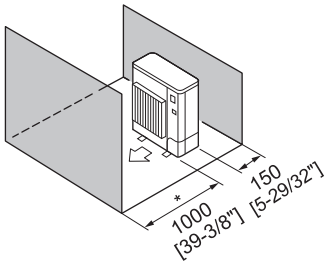


Fig. 12-2-4
Obstacles at rear and sides only



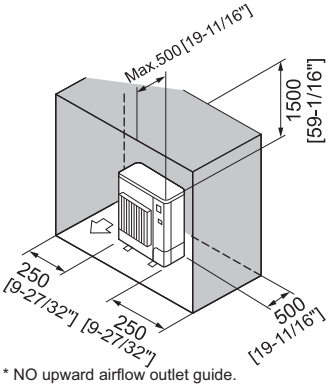
* Using an optional air outlet guide, the clearance >= 500 mm [19-11/16"].

Fig. 12-2-5
Obstacles at front only



* Using an optional air outlet guide, the clearance >= 500 mm [19-11/16"].

Fig. 12-2-6
Obstacles at front and rear only



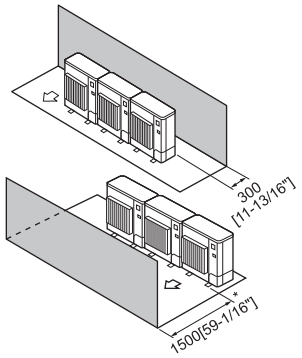
* NO upward airflow outlet guide.

Fig. 12-2-7
Obstacles at rear, sides and above only

12-2-1-2. In case of collective installation and continuous installation

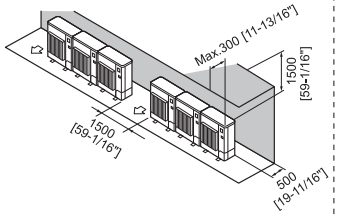
Leave 25 mm space or more between units.

mm[in.]



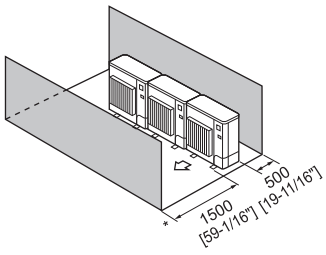
* When using an optional air outlet guide, the clearance is 1000 mm [39-3/8"] or more.

Fig. 12-2-8
Obstacles at rear or front only



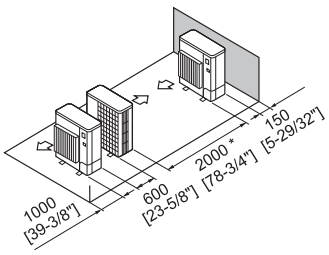
* In case of side-by-side installation, <=3 units;
* Do not install the optional air outlet guides for upward airflow.

Fig. 12-2-9
Obstacles at rear and above only



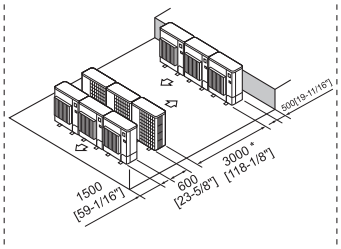
* Using an optional air outlet guide, the clearance >= 1000 mm [39-3/8"].

Fig. 12-2-10
Obstacles at front and rear only



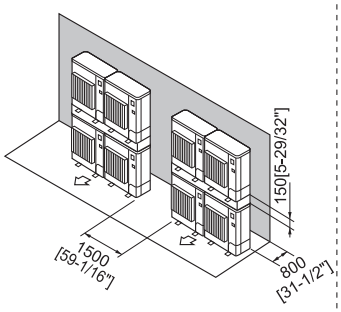
* Using an optional air outlet guide, the clearance >= 1000 mm [39-3/8"].

Fig. 12-2-11
Parallel individuals arrangement



* Using an optional air outlet guide for upward airflow, the clearance >= 1500 mm [59-1/16"].

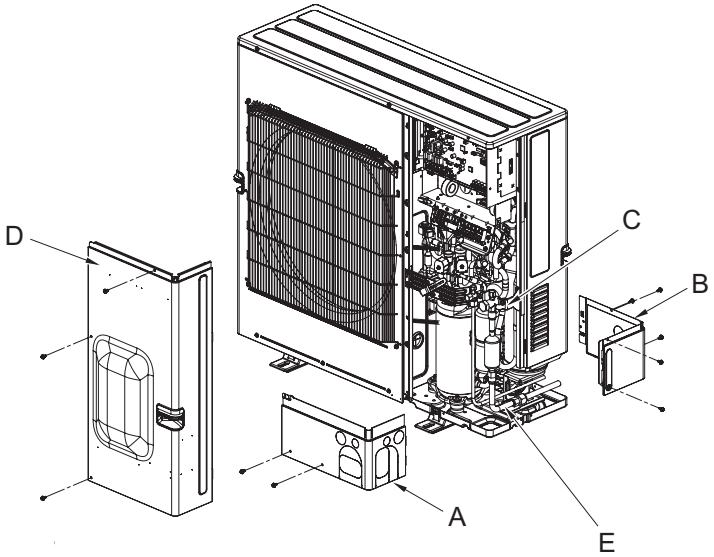
Fig. 12-2-12
Parallel groups arrangement



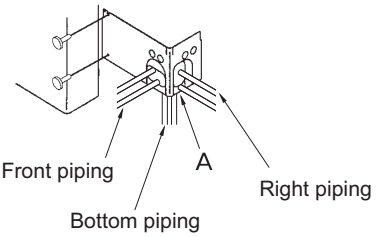
* Stacked layer <= 2 units;
* Side-by-side stacked groups <= 2 groups;

Fig. 12-2-13
Stacked groups arrangement

12-3. Piping direction



A: Front piping cover
B: Piping cover
C: Stop valve
D: Service panel
E: Bend radius : 100 mm - 150 mm



⚠ 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, 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 equipment and heat pumps contain a fluorinated greenhouse gas, R32.

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