CITY MULTI® R2-SERIES
System Design

© 2015 Mitsubishi Electric US, Inc.

1-1. General Cautions

① Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations, and guidance of each electric power company.

② Wiring for control (hereinafter referred to as transmission cable) shall be (50mm[1-5/8in] or more) apart from power source wiring so that it is not influenced by electric noise from power source wiring. (Do not insert transmission cable and power source wire in the same conduit.)

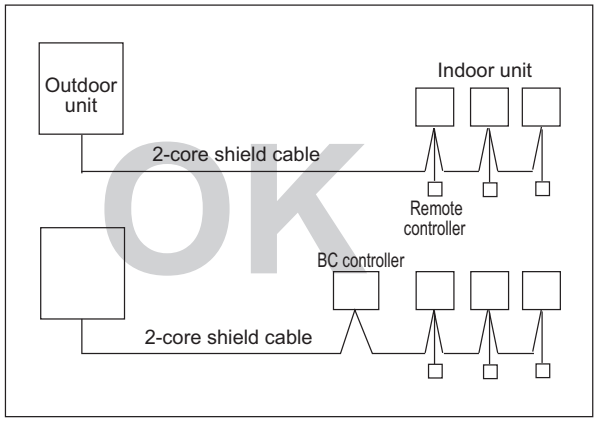
③ Be sure to provide designated grounding work to outdoor unit.

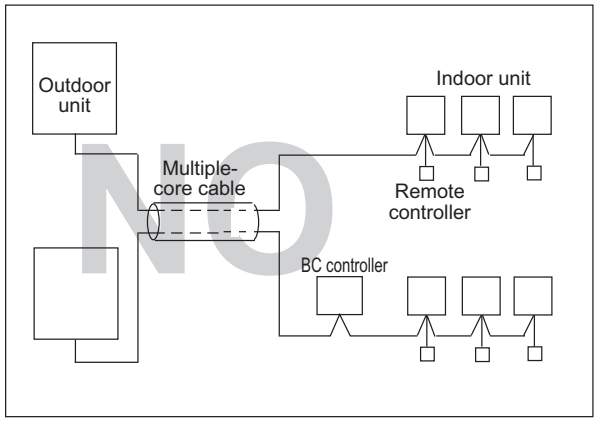
④ Give some allowance to wiring for electrical part box of indoor and outdoor units, because the box is sometimes removed at the time of service work.

⑤ Never connect 100V, 208~230,460V 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-corecable, 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.





⑧ When the System controller is connected to TB7 side and TKMU outdoor unit model is used, connect a PAC-SC51KUA to TB7 side. If a PAC-SC51KUA cannot be used, connect the System controller to TB3 side.

- When YKMU outdoor unit model is used, the male power supply connector can be connected to CN40, and the System controller can be connected to TB7 side.
- When the male power supply connector is connected from TKMU outdoor unit to CN40, the power is supplied to TB7 side even when the main power of the TKMU outdoor unit is switched off, and the System controller may store an error in the error history and emit an alarm signal.
- If only LOSSNAY units or outdoor units in different refrigerant circuits are connected to TB7 side, the male power supply connector can be connected from TKMU outdoor unit to CN40.
- Up to three System controllers can be connected to TB3 side.

For the details, refer to 2-3 “System configuration restrictions”.

© 2015 Mitsubishi Electric US, Inc.

1-2. Power Supply for Indoor and Outdoor Units

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

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps

IFM :Indoor Fan Motor

Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PLFY-P08NCMU-ER4	60Hz	208 / 230V	198 to 253V	0.29 / 0.29	0.23 / 0.23
PLFY-P12NCMU-ER4				0.35 / 0.35	0.28 / 0.28
PLFY-P15NCMU-ER4				0.35 / 0.35	0.28 / 0.28
PLFY-P12NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P15NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P18NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P24NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P30NBMU-ER2				0.64 / 0.64	0.51 / 0.51
PLFY-P36NBMU-ER2				1.25 / 1.25	1.00 / 1.00
PMFY-P06NBMU-ER5	60Hz	208 / 230V	188 to 253V	0.25 / 0.25	0.20 / 0.20
PMFY-P08NBMU-ER5				0.25 / 0.25	0.20 / 0.20
PMFY-P12NBMU-ER5				0.26 / 0.26	0.21 / 0.21
PMFY-P15NBMU-ER5				0.33 / 0.33	0.26 / 0.26
PEFY-P06NMAU-E3	60Hz	208 / 230V	188 to 253V	1.05 / 1.05	0.84 / 0.84
PEFY-P08NMAU-E3				1.05 / 1.05	0.84 / 0.84
PEFY-P12NMAU-E3				1.20 / 1.20	0.96 / 0.96
PEFY-P15NMAU-E3				1.45 / 1.45	1.16 / 1.16
PEFY-P18NMAU-E3				1.56 / 1.56	1.25 / 1.25
PEFY-P24NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P27NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P30NMAU-E3				2.73 / 2.73	2.18 / 2.18
PEFY-P36NMAU-E3				3.32 / 3.32	2.66 / 2.66
PEFY-P48NMAU-E3				3.41 / 3.41	2.73 / 2.73
PEFY-P54NMAU-E3				3.31 / 3.31	2.65 / 2.65
PEFY-P06NMSU-ER2	60Hz	208 / 230V	188 to 253V	0.47 / 0.50	0.32 / 0.31
PEFY-P08NMSU-ER2				0.47 / 0.50	0.41 / 0.39
PEFY-P12NMSU-ER2				0.68 / 0.74	0.46 / 0.43
PEFY-P15NMSU-ER2				1.20 / 1.33	0.47 / 0.45
PEFY-P18NMSU-ER2				1.20 / 1.33	0.64 / 0.60
PEFY-P24NMSU-ER2				1.57 / 1.73	0.88 / 0.83
PEFY-P15NMHU-E2				1.63 / 1.50	1.30 / 1.20
PEFY-P18NMHU-E2				1.63 / 1.50	1.30 / 1.20
PEFY-P24NMHU-E2				2.11 / 1.83	1.69 / 1.46
PEFY-P27NMHU-E2				2.35 / 2.13	1.88 / 1.70
PEFY-P30NMHU-E2				2.70 / 2.45	2.16 / 1.96
PEFY-P36NMHU-E2				4.16 / 3.67	3.32 / 2.94
PEFY-P48NMHU-E2				4.16 / 3.67	3.32 / 2.94
PEFY-P54NMHU-E2				4.18 / 3.69	3.34 / 2.95
PEFY-P72NMHSU-E			187 to 253V	7.7	6.2
PEFY-P96NMHSU-E				8.2	6.6

© 2015 Mitsubishi Electric US, Inc.

Symbols: MCA : Min.Circuit Amps (=1.25xFLA) FLA : Full Load Amps

IFM :Indoor Fan Motor

Model	Indoor Unit				IFM
	Hz	Volts	Voltage range	MCA(A)	FLA(A)
PCFY-P15NKMU-ER1	60Hz	208 / 230V	188 to 253V	0.44 / 0.44	0.35 / 0.35
PCFY-P24NKMU-ER1				0.52 / 0.52	0.41 / 0.41
PCFY-P30NKMU-ER1				1.22 / 1.22	0.97 / 0.97
PCFY-P36NKMU-ER1				1.22 / 1.22	0.97 / 0.97
PKFY-P06NBMU-E2	60Hz	208 / 230V	198 to 253V	0.19 / 0.19	0.15 / 0.15
PKFY-P08NHMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P12NHMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P15NHMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P18NHMU-E2				0.38 / 0.38	0.30 / 0.30
PKFY-P24NKMU-E2.TH				0.63 / 0.63	0.50 / 0.50
PKFY-P30NKMU-E2.TH				0.63 / 0.63	0.50 / 0.50
PFFY-P06NEMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NEMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NEMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NEMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NEMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NEMU-E				0.59 / 0.64	0.47 / 0.51
PFFY-P06NRMU-E	60Hz	208 / 230V	188 to 253V	0.32 / 0.34	0.25 / 0.27
PFFY-P08NRMU-E				0.32 / 0.34	0.25 / 0.27
PFFY-P12NRMU-E				0.34 / 0.38	0.27 / 0.30
PFFY-P15NRMU-E				0.40 / 0.44	0.32 / 0.35
PFFY-P18NRMU-E				0.48 / 0.53	0.38 / 0.42
PFFY-P24NRMU-E				0.59 / 0.64	0.47 / 0.51
PVFY-P12E00B	60Hz	208 / 230V	188 to 253V	0.52	0.42
PVFY-P18E00B				0.78	0.63
PVFY-P24E00B				0.99	0.79
PVFY-P30E00B				1.33	1.07
PVFY-P36E00B				1.51	1.21
PVFY-P48E00B				2.02	1.62
PVFY-P54E00B				2.04	1.63
PWFY-P36NMU-E-BU	60Hz	208 / 230V	188 to 253V	25	-
PWFY-P36NMU-E-AU				0.09	-
PWFY-P72NMU-E-AU				0.09	-

© 2015 Mitsubishi Electric US, Inc.

1-2-2. Electrical Characteristics of the Outdoor Units at Cooling Mode

Symbols : MCA : Min. Circuit Amps								
PURY-P-TKMU		SC : Starting Current						
Model	Unit combination	Outdoor units						Compressor
		Hz	Volts	Voltage range	MCA(A)	Maximum Fuse / Breaker Size (A)	MOCP(A)	SC(A)
PURY-P72TKMU-A(-BS)	-	60Hz	208/230V	188 to 253V	23 / 21	30	38 / 35	15
PURY-P96TKMU-A(-BS)	-				34 / 31	40	57 / 52	15
PURY-P120TKMU-A(-BS)	-				45 / 42	50	74 / 68	15
PURY-P144TKMU-A(-BS)	-				53 / 48	60	87 / 80	15
PURY-P168TSKMU-A(-BS)	PURY-P72TKMU-A(-BS)				23 / 21	30	38 / 35	15
	PURY-P96TKMU-A(-BS)				34 / 31	40	57 / 52	15
PURY-P192TSKMU-A(-BS)	PURY-P96TKMU-A(-BS)				34 / 31	40	57 / 52	15
	PURY-P96TKMU-A(-BS)				34 / 31	40	57 / 52	15
PURY-P216TSKMU-A(-BS)	PURY-P96TKMU-A(-BS)				34 / 31	40	57 / 52	15
	PURY-P120TKMU-A(-BS)				45 / 42	50	74 / 68	15
PURY-P240TSKMU-A(-BS)	PURY-P120TKMU-A(-BS)				45 / 42	50	74 / 68	15
	PURY-P120TKMU-A(-BS)				45 / 42	50	74 / 68	15
PURY-P264TSKMU-A(-BS)	PURY-P120TKMU-A(-BS)				45 / 42	50	74 / 68	15
	PURY-P144TKMU-A(-BS)				53 / 48	60	87 / 80	15
PURY-P288TSKMU-A(-BS)	PURY-P144TKMU-A(-BS)				53 / 48	60	87 / 80	15
	PURY-P144TKMU-A(-BS)				53 / 48	60	87 / 80	15

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

Symbols : MCA : Min. Circuit Amps								
PURY-P-YKMU		SC : Starting Current						
Model	Unit combination	Outdoor units						Compressor
		Hz	Volts	Voltage range	MCA(A)	Maximum Fuse / Breaker Size (A)	MOCP(A)	SC(A)
PURY-P72YKMU-A(-BS)	-	60Hz	460V	414 to 506V	11	15	17	7
PURY-P96YKMU-A(-BS)	-				15	20	26	7
PURY-P120YKMU-A(-BS)	-				21	25	34	7
PURY-P144YKMU-A(-BS)	-				24	30	40	7
PURY-P144YSKMU-A(-BS)	PURY-P72YKMU-A(-BS)				11	15	17	7
	PURY-P72YKMU-A(-BS)				11	15	17	7
PURY-P168YSKMU-A(-BS)	PURY-P72YKMU-A(-BS)				11	15	17	7
	PURY-P96YKMU-A(-BS)				15	20	26	7
PURY-P192YSKMU-A(-BS)	PURY-P96YKMU-A(-BS)				15	20	26	7
	PURY-P96YKMU-A(-BS)				15	20	26	7
PURY-P216YSKMU-A(-BS)	PURY-P96YKMU-A(-BS)				15	20	26	7
	PURY-P120YKMU-A(-BS)				21	25	34	7
PURY-P240YSKMU-A(-BS)	PURY-P120YKMU-A(-BS)				21	25	34	7
	PURY-P120YKMU-A(-BS)				21	25	34	7
PURY-P264YSKMU-A(-BS)	PURY-P120YKMU-A(-BS)				21	25	34	7
	PURY-P144YKMU-A(-BS)				24	30	40	7
PURY-P288YSKMU-A(-BS)	PURY-P144YKMU-A(-BS)				24	30	40	7
	PURY-P144YKMU-A(-BS)				24	30	40	7

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

© 2015 Mitsubishi Electric US, Inc.

1-2-3. Electrical Characteristics of BC Controller

Symbols: MCA : Min.Circuit Amps (=1.25 x RLA) FLA : Full Load Amps RLA : Rated Load Amps						
BC-Controller for PURY-P-TKMU, PURY-P-YKMU, PQRY-P-THMU, PQRY-P-YHMU						
Model	Hz	Volts	Voltage range	MCA(A)	FLA(A)	RLA(A)
CMB-P104NU-G	60Hz	208 / 230V	198 to 253V	0.36 / 0.33	15 / 15	0.29 / 0.26
CMB-P105NU-G				0.44 / 0.40	15 / 15	0.35 / 0.32
CMB-P106NU-G				0.52 / 0.47	15 / 15	0.41 / 0.37
CMB-P108NU-G				0.68 / 0.61	15 / 15	0.54 / 0.49
CMB-P1010NU-G				0.83 / 0.75	15 / 15	0.66 / 0.60
CMB-P1013NU-G				1.08 / 0.97	15 / 15	0.86 / 0.77
CMB-P1016NU-G				1.30 / 1.18	15 / 15	1.04 / 0.94
CMB-P108NU-GA				0.68 / 0.61	15 / 15	0.54 / 0.49
CMB-P1010NU-GA				0.83 / 0.75	15 / 15	0.66 / 0.60
CMB-P1013NU-GA				1.08 / 0.97	15 / 15	0.86 / 0.77
CMB-P1016NU-GA				1.30 / 1.18	15 / 15	1.04 / 0.94
CMB-P104NU-GB				0.32 / 0.29	15 / 15	0.25 / 0.23
CMB-P108NU-GB				0.64 / 0.58	15 / 15	0.51 / 0.46
CMB-P1016NU-HA			188 to 253V	1.65 / 1.93	15 / 15	1.32 / 1.54
CMB-P1016NU-HB				2.22 / 1.71	15 / 15	1.17 / 1.37

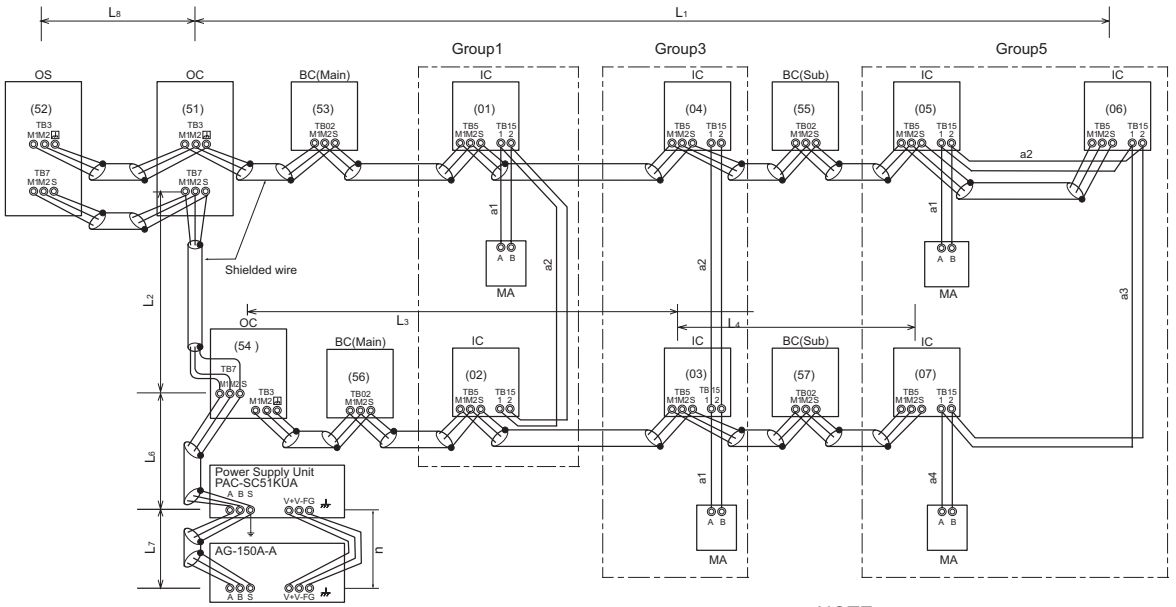
© 2015 Mitsubishi Electric US, Inc.

2-1. Transmission Cable Length Limitations

2-1-1. Using MA Remote controller

MA remote controller refers to Simple MA remote controller and wireless remote controller.
Long transmission cable causes voltage down, therefore, the length limitation should be obeyed to secure proper transmission.

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



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

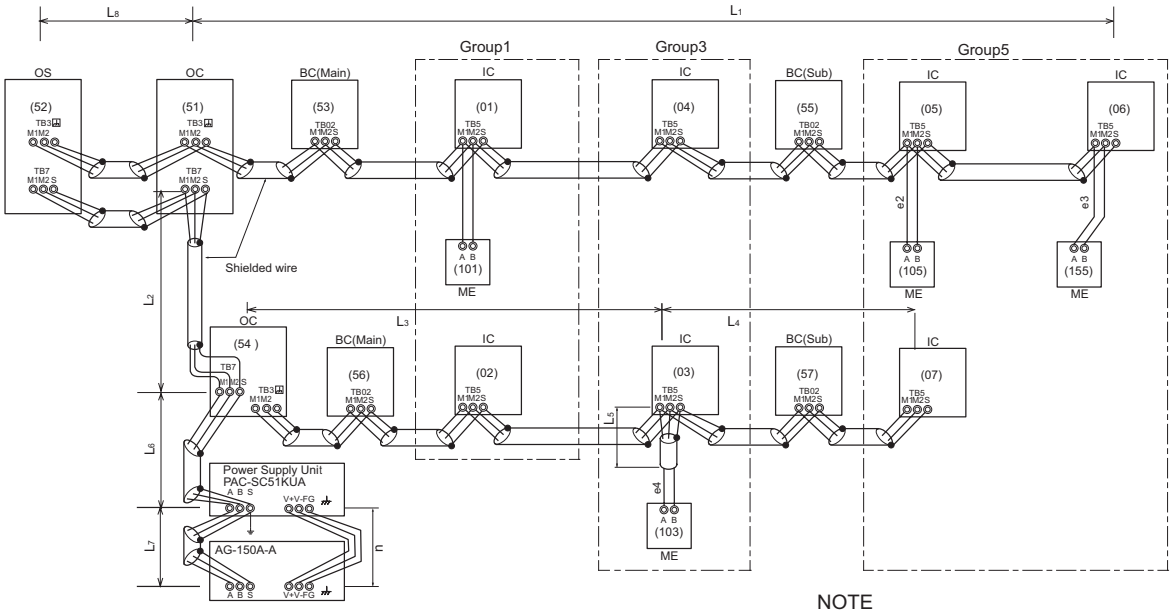
NOTE
Do not daisy-chain remote controllers.

2-1-2. Using ME Remote controller

ME remote controller refers to Smart ME 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	<=500m[1640ft.]	1.25mm^2 [AWG16] or thicker
Max. length to Outdoor (M-NET cable)	L1+L8, L3+L4, L6, L2+L6+L8, L7, L3+L5	<=200m[656ft.]	1.25mm^2 [AWG16] or thicker
Max. length from ME to Indoor	e1, e2+e3, e4	<=10m[32ft.]*1	0.3-1.25 mm^2 [AWG22-16] *1
24VDC to AG-150A-A	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, OS: Outdoor unit controller; IC: Indoor unit controller; ME: ME remote controller

NOTE
Do not daisy-chain remote controllers.

© 2015 Mitsubishi Electric US, Inc.

2-2. Transmission Cable Specifications

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

*1 To wire PAC-YT53CRAU, use a wire with a diameter of 0.3 mm^2 [AWG22]
*2 The use of cables 0.75 mm^2 [AWG18] or greater is recommended for easy handling.

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

© 2015 Mitsubishi Electric US, Inc.

2-3. System Configuration Restrictions

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

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

A) 1 Group of Indoor units can have 1-16 Indoor units;

B) Maximum 2 remote controllers for 1 Group;
*MA/ME remote controllers cannot be present together in 1group.
*To wire PAC-YT53CRAU, use a wire with a diameter of 0.3 mm^2 [AWG22]

C) 1 LOSSNAY unit can interlock maximum 16 Indoor units; 1 Indoor unit can interlock only 1 LOSSNAY unit.

D) Maximum 3 System controllers are connectable when connecting to TB3 of the Outdoor unit.

E) Maximum 6 System controllers are connectable when connecting to TB7 of the Outdoor unit, if the transmission power is supplied by the Outdoor unit. (Not applicable to TKMU model)

F) 4 System controllers or more are connectable when connecting to TB7 of the Outdoor unit, if the transmission power is supplied by the power supply unit PAC-SC51KUA. Details refer to 2-3-3-C.
*System controller connected as described in D) and E) would have a risk that the failure of connected Outdoor unit would stop power supply to the System controller.

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

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

Table 2-3-1 The equivalent power consumption

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

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

*RC: Remote Controller

Table 2-3-2 The equivalent power supply

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

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

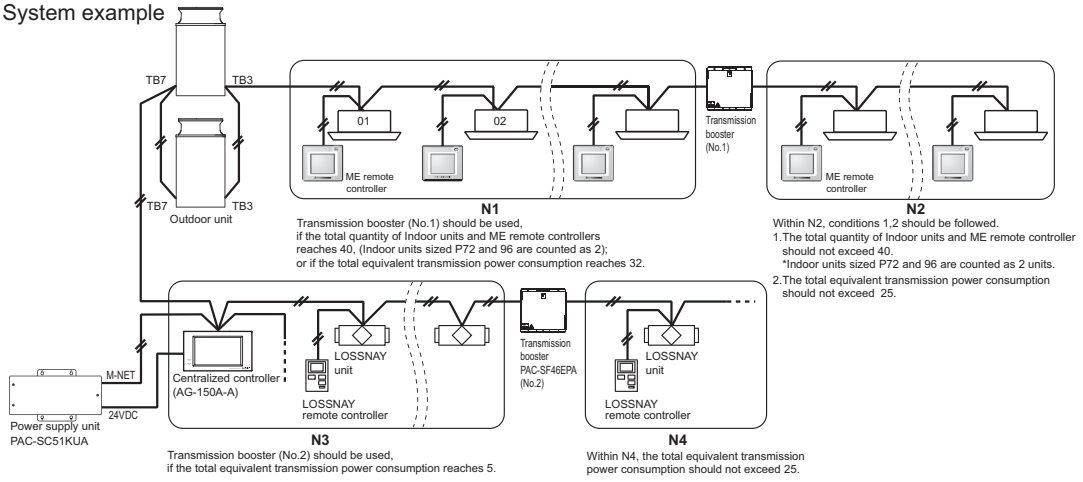
With the equivalent power consumption values in Table 2-3-1 and Table 2-3-2, PAC-SF46EPA can be designed into the air-conditioner system to ensure proper system communication according to 2-3-2-A, B, C.

2-3-2-A) Firstly, count from TB3 at TB3 side the total quantity of Indoor units, ME remote controller, and System controllers. If the total quantity reaches 40, a PAC-SF46EPA should be set. In this case, Indoor units sized P72 and 96 are counted as 2 indoor units, but MA remote controller(s) and PZ-41SLB are NOT counted.

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

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

■ System example



© 2015 Mitsubishi Electric US, Inc.

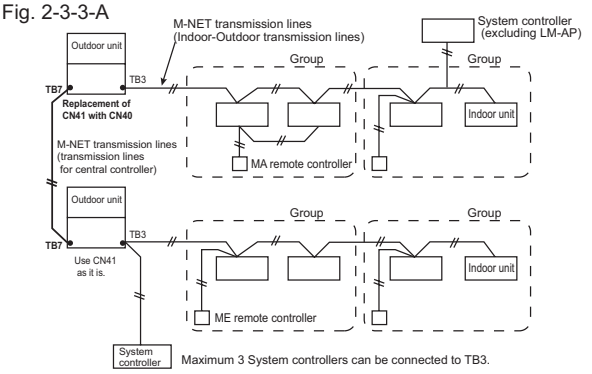
2-3-3. Ensuring proper power supply to System controller

The power to System controller (excluding LM-AP) is supplied via M-NET transmission line. M-NET transmission line at TB7 side is called Central control transmission line while one at TB3 side is called Indoor-Outdoor transmission line.
There are 3 ways to supply power to the System controller .
A) Connecting to TB3 of the Outdoor unit and receiving power from the Outdoor unit.
B) Connecting to TB7 of the Outdoor unit and receiving power from the Outdoor unit. (Not applicable to TKMU model)
C) Connecting to TB7 of the Outdoor unit but receiving power from power supply unit PAC-SC51KUA.

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

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

Fig. 2-3-3-A

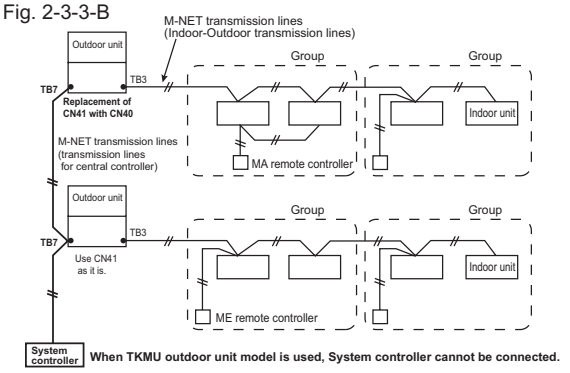


2-3-3-B. When connecting to TB7 of the Outdoor unit and receiving power from the Outdoor unit. (Not applicable to TKMU model)

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

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

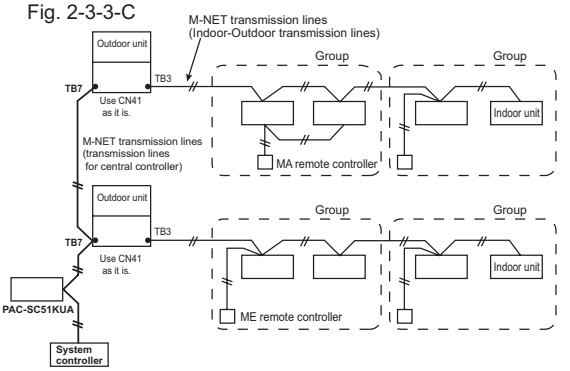
Fig. 2-3-3-B



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

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

Fig. 2-3-3-C



⚠ CAUTION

AG-150A-A/EB-50GU-A*1 are recommended to connect to TB7 because it performs back-up to a number of data.
In an air conditioner system has more than 1 Outdoor units, AG-150A-A/EB-50GU-A receiving transmission power through TB3 or TB7 on one of the Outdoor units would have a risk that the connected Outdoor unit failure would stop power supply to AG-150A-A/EB-50GU-A and disrupt the whole system.
When applying apportioned electric power function, AG-150A-A/EB-50GU-A are necessary to connected to TB7 and has its own power supply unit PAC-SC51KUA.
Note: Power supply unit PAC-SC51KUA is for AG-150A-A/EB-50GU-A.
*1: AG-150A-A is an example model of system controllers.

© 2015 Mitsubishi Electric US, Inc.

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

1-phase 208-230V AC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary when connecting only the LM-AP. Yet, make sure to change the power supply changeover connector CN41 to CN40 on the LM-AP.

2-3-5. Power supply to BM ADAPTER

1-phase 100-240VAC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary when only BM ADAPTER is connected.
Yet, make sure to move the power jumper from CN41 to CN40 on the BM ADAPTER.

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

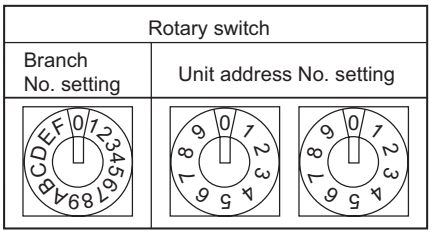
1-phase 100-240VAC power supply is needed.
The power supply unit PAC-SC51KUA is not necessary.
GB-50ADA-A supplies power through TB3, which equals 6 indoor units. (refer to Table 2-3-2)

© 2015 Mitsubishi Electric US, Inc.

2-4. Address Setting

2-4-1. Switch operation

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



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

② Caution for switch operations

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

③ MA remote controller

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

PAC-YT53CRAU

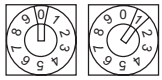
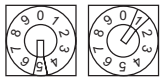
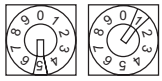
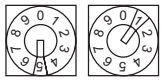
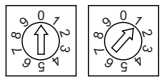
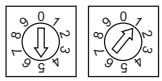
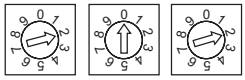
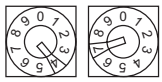
Setting the dip switches

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

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

© 2015 Mitsubishi Electric US, Inc.

2-4-2. Rule of setting address

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

Note1: To set the address to "100", set it to "50"
Note2: Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.

© 2015 Mitsubishi Electric US, Inc.

2-4-3. System examples

Factory setting

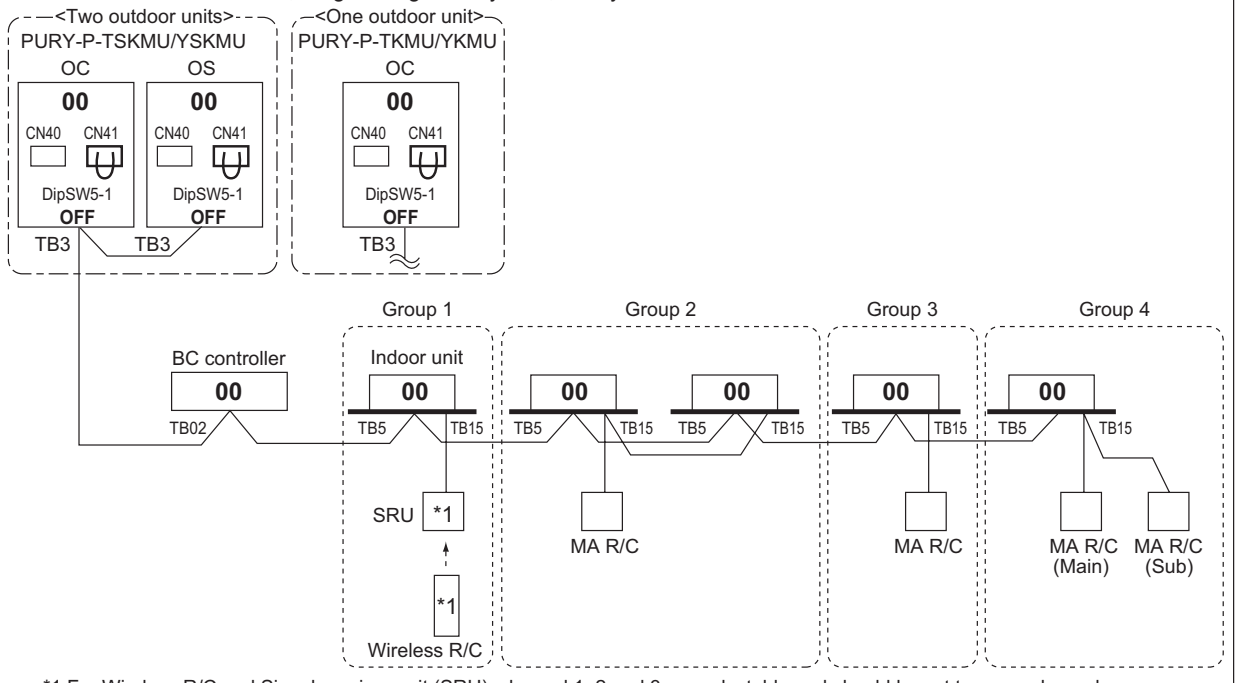
Original switch setting of the outdoors, indoors, controllers, LM-AP, and BM ADAPTER at shipment is as follows.

- Outdoor unit : Address: 00, CN41: ON (Jumper), DipSW5-1: OFF
- Indoor unit : Address: 00
- BC controller : Address: 00
- ME remote controller : Address: 101
- LM-AP : Address: 247, CN41: ON (Jumper), DipSW1-2: OFF
- BM ADAPTER : Address: 000, CN41: ON (Jumper)

Setting at the site

- DipSW5-1(Outdoor) : When the System Controller is used, all the Dip SW5-1 at the outdoor units should be set to "ON". * Dip SW5-1 remains OFF when only LM-AP is used.
- DipSW1-2(LM-AP) : When the LM-AP is used together with System Controller, DipSW1-2 at the LM-AP should be set to "ON".
- CN40/CN41 : Change jumper from CN41 to CN 40 at outdoor control board will activate central transmission power supply to TB7;
  (Change jumper at only one outdoor unit when activating the transmission power supply without using a power supply unit.)
  Change jumper from CN41 to CN 40 at LM-AP will activate transmission power supply to LM-AP itself;
  Power supply unit is recommended to use for a system having more than 1 outdoor unit, because the central transmission power supply from TB7 of one of outdoor units is risking that the outdoor unit failure may let down the whole central control system.

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



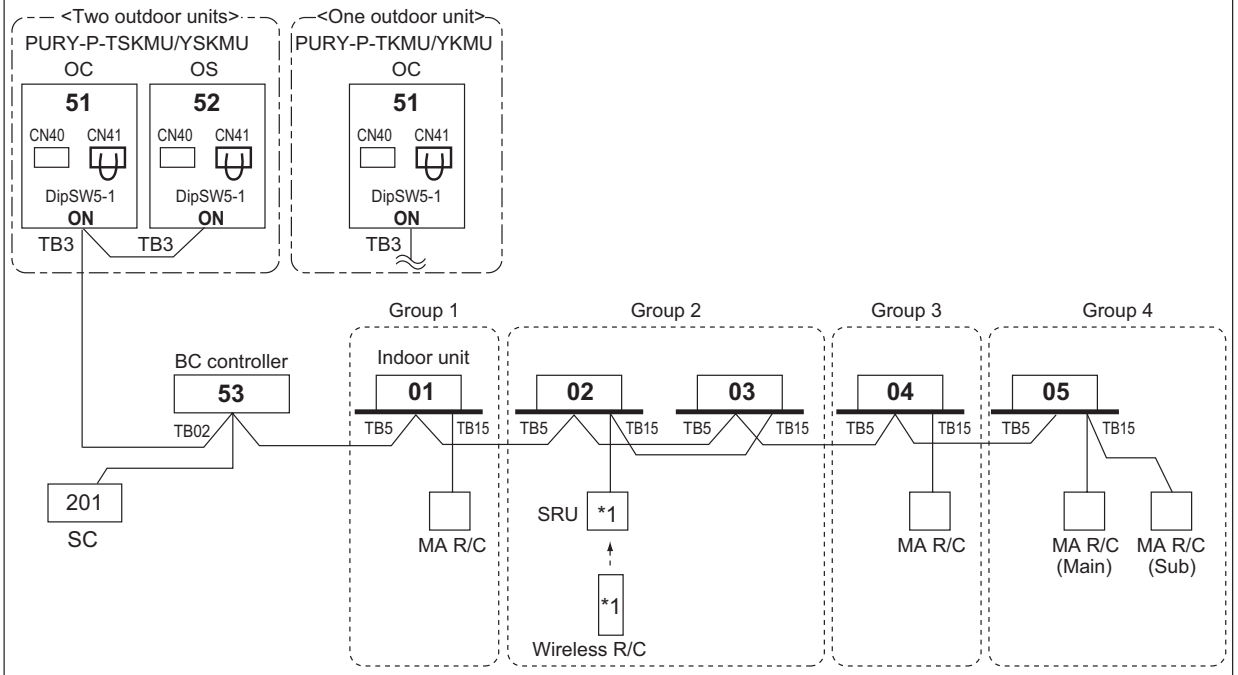
*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
   OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. No address setting is needed.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**
4. Indoor units should be set with a branch number.
5. Address setting is required if a sub BC controller is connected.

© 2015 Mitsubishi Electric US, Inc.

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



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

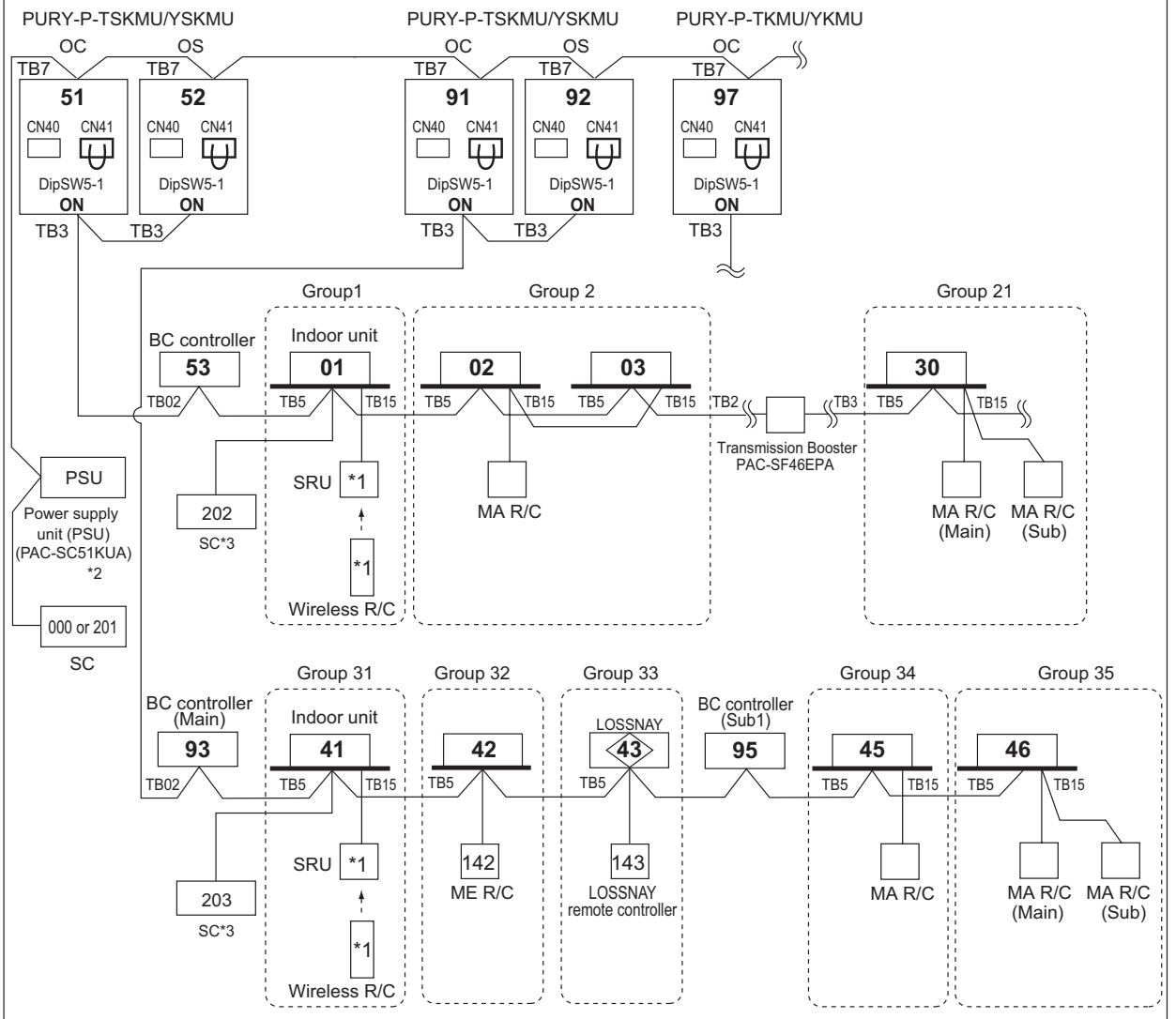
*SC can be connected to TB3 side or TB7 side;
Should SC connected to TB7 side, change Jumper from CN41 to CN40 at the Outdoor unit module (except TKMU model) so as to supply power to the SC. When the SC is connected to TB7 side and TKMU outdoor unit model is used, connect the PAC-SC51KUA to TB7 side. If a PAC-SC51KUA cannot be used, connect the System controller to TB3 side. Up to three System controllers can be connected to TB3 side.

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
   OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units and central controller.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**
4. Indoor units should be set with a branch number.

© 2015 Mitsubishi Electric US, Inc.

2-4-3-3. MA remote controller, Multi-refrigerant-system, System Controller at TB7/TB3 side, Booster for long M-NET wiring



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

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

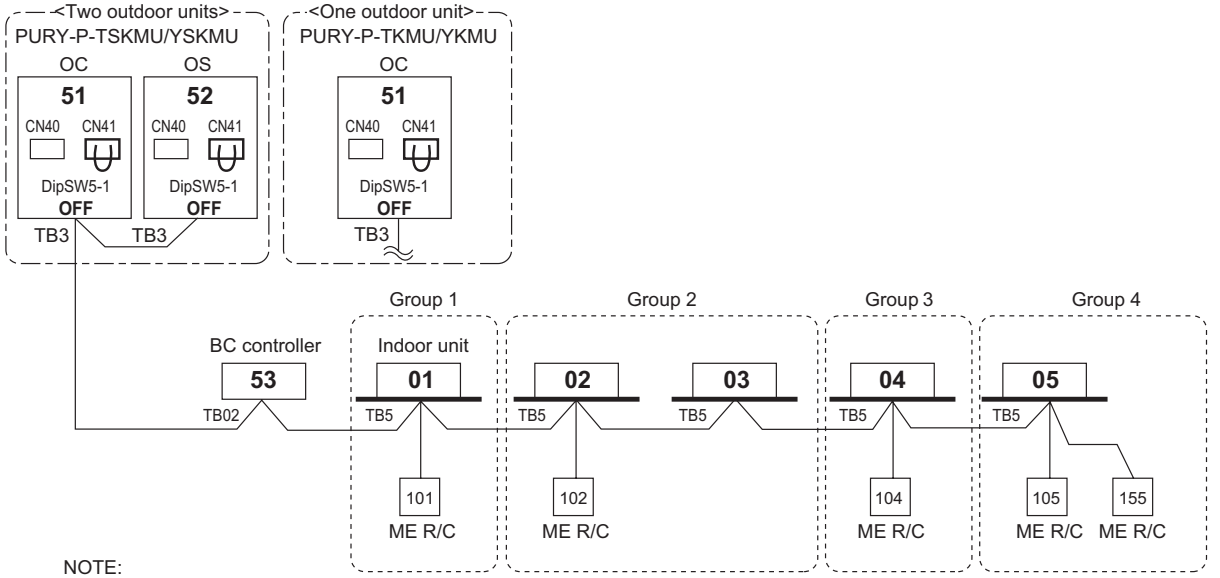
*3 When multiple system controllers are connected in the system, set the controller with more functions than others as a "main" controller and others as "sub".
TC-24A, AG-150A-A, GB-50ADA-A and GB-24A are for exclusive use as a "main" system controller and cannot be used as a “sub” system controller.
Make the setting to only one of the system controllers for "prohibition of operation from local remote controller".

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected. OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units, LOSSNAY and system controller.
3. M-NET power is supplied by the Outdoor unit at TB3, while Indoor unit and ME remote controller consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to **2-3 "System configuration restrictions".**
4. Indoor units should be set with a branch number.
5. Assign an address to each of the sub BC controllers which equals the sum of the smallest address of the indoor units that are connected to each sub BC controller and 50.

© 2012 Mitsubishi Electric Corporation & Mitsubishi Electric US, Inc.

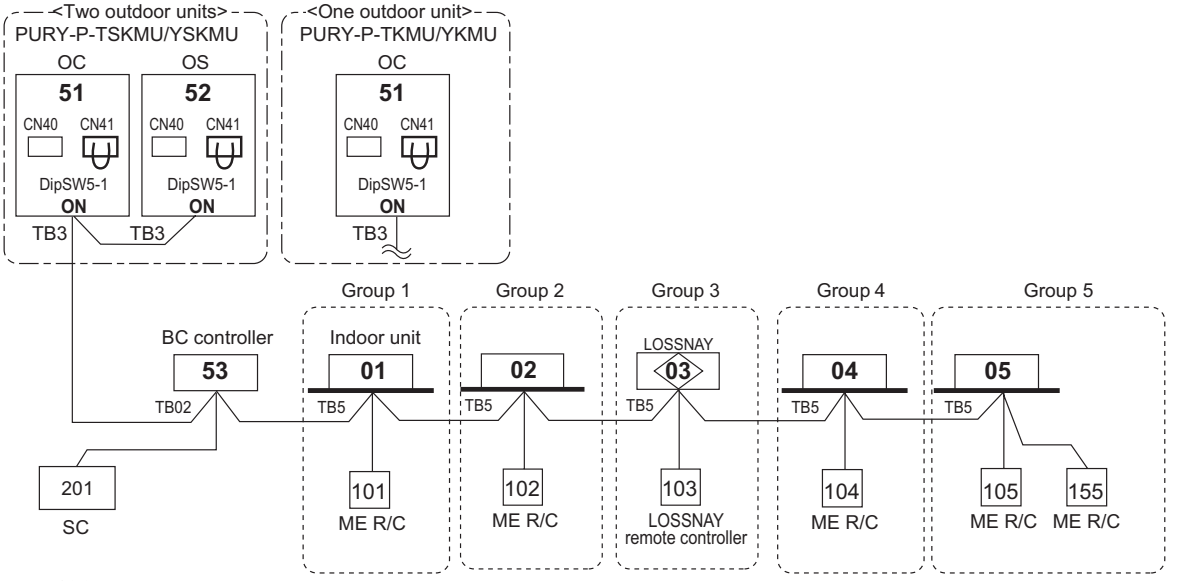
2-4-3-4. ME remote controller, Single-refrigerant-system, No system controller



NOTE:

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

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



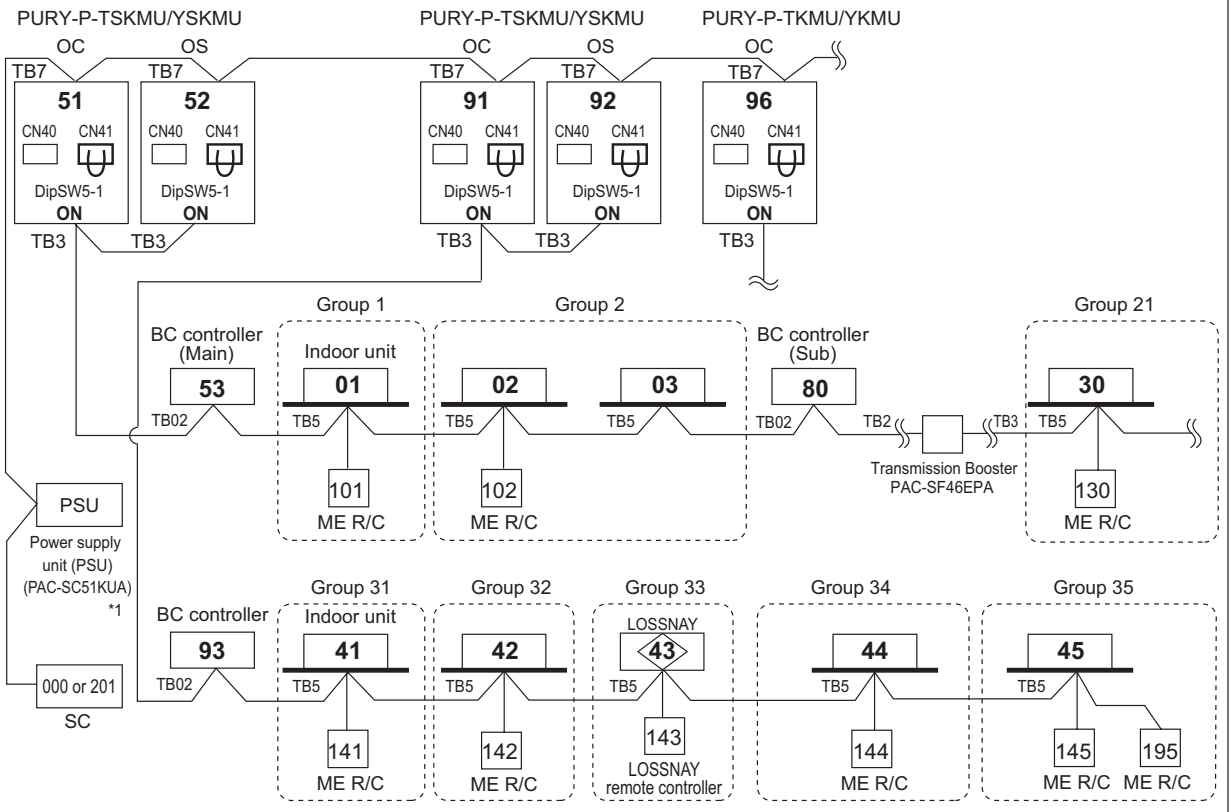
*SC can be connected to TB3 side or TB7 side;
Should SC connected to TB7 side, change Jumper from CN41 to CN40 at the Outdoor unit module (except TKMU model) so as to supply power to the SC. When the SC is connected to TB7 side and TKMU outdoor unit model is used, connect the PAC-SC51KUA to TB7 side. If a PAC-SC51KUA cannot be used, connect the System controller to TB3 side. Up to three System controllers can be connected to TB3 side.

NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
   OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. Address should be set to Indoor units, LOSSNAY central controller, ME remote controllers.
3. For a system having more than 32 indoor unit (P06-P54), confirm the need of Booster at **2-3 "System configuration restrictions".**
4. Indoor units should be set with a branch number.

© 2012 Mitsubishi Electric & Electronics USA, Inc.

2-4-3-6. ME remote controller, Multi-refrigerant-system, System Controller at TB7 side, LOSSNAY, Booster for long M-NET wiring



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

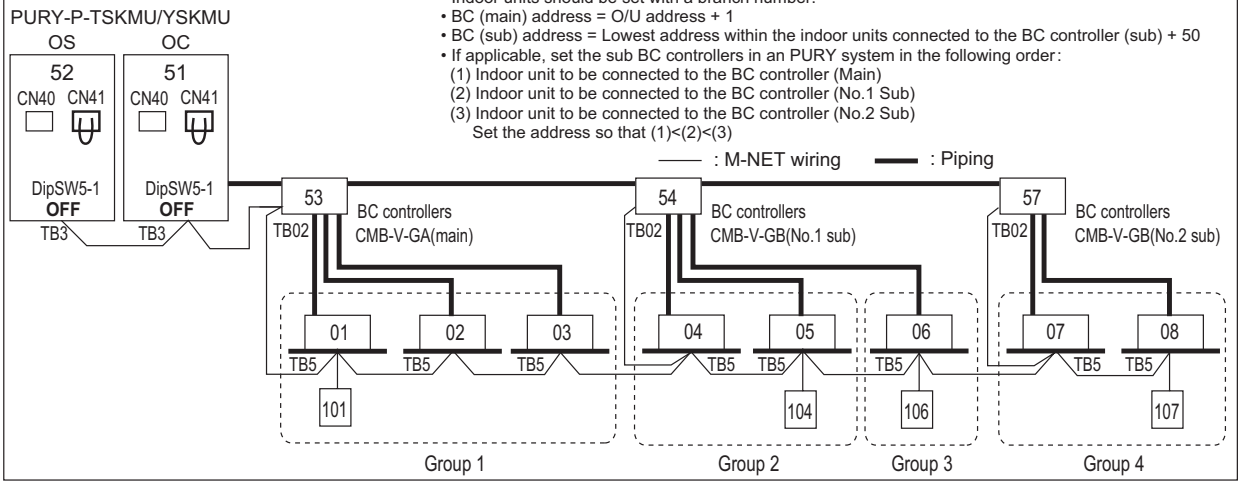
NOTE:

1. Outdoor units OC and OS in one refrigerant circuit system are automatically detected.
   OC and OS are ranked in descending order of capacity. If units are the same capacity, they are ranked in ascending order of their address.
2. M-NET power is supplied by the Outdoor unit at TB3, while Indoor unit and ME R/C consume the M-NET power for transmission use. The power balance is needed to consider for long M-NET wiring. Details refer to **2-3 "System configuration restrictions".**
3. Indoor units should be set with a branch number.
4. Assign an address to each of the sub BC controllers which equals the sum of the smallest address of the indoor units that are connected to each sub BC controller and 50.
   When the address assigned to sub BC controller overlaps those of any other units including outdoor units (OC/OS) or main BC controller, sub BC controller will be given priority to have the address.

2-4-3-7. Example : BC, BC sub

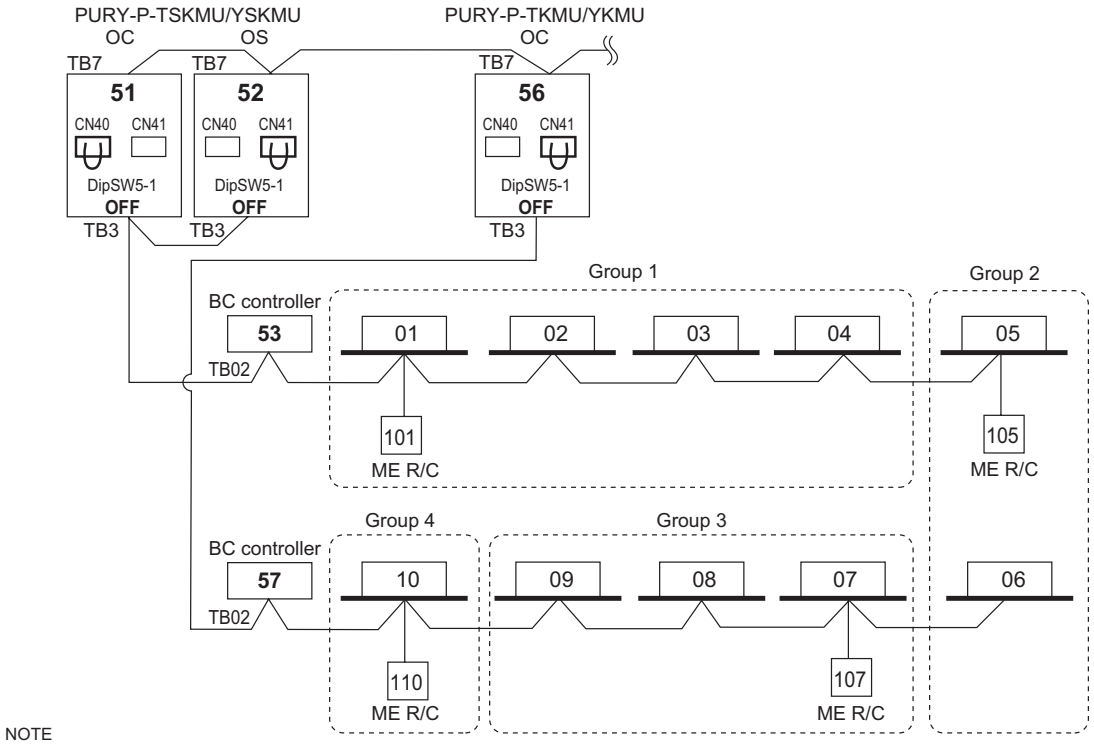
NOTE

- Indoor units should be set with a branch number.
- BC (main) address = O/U address + 1
- BC (sub) address = Lowest address within the indoor units connected to the BC controller (sub) + 50
- If applicable, set the sub BC controllers in an PURY system in the following order:
  (1) Indoor unit to be connected to the BC controller (Main)
  (2) Indoor unit to be connected to the BC controller (No.1 Sub)
  (3) Indoor unit to be connected to the BC controller (No.2 Sub)
  Set the address so that (1)<(2)<(3)



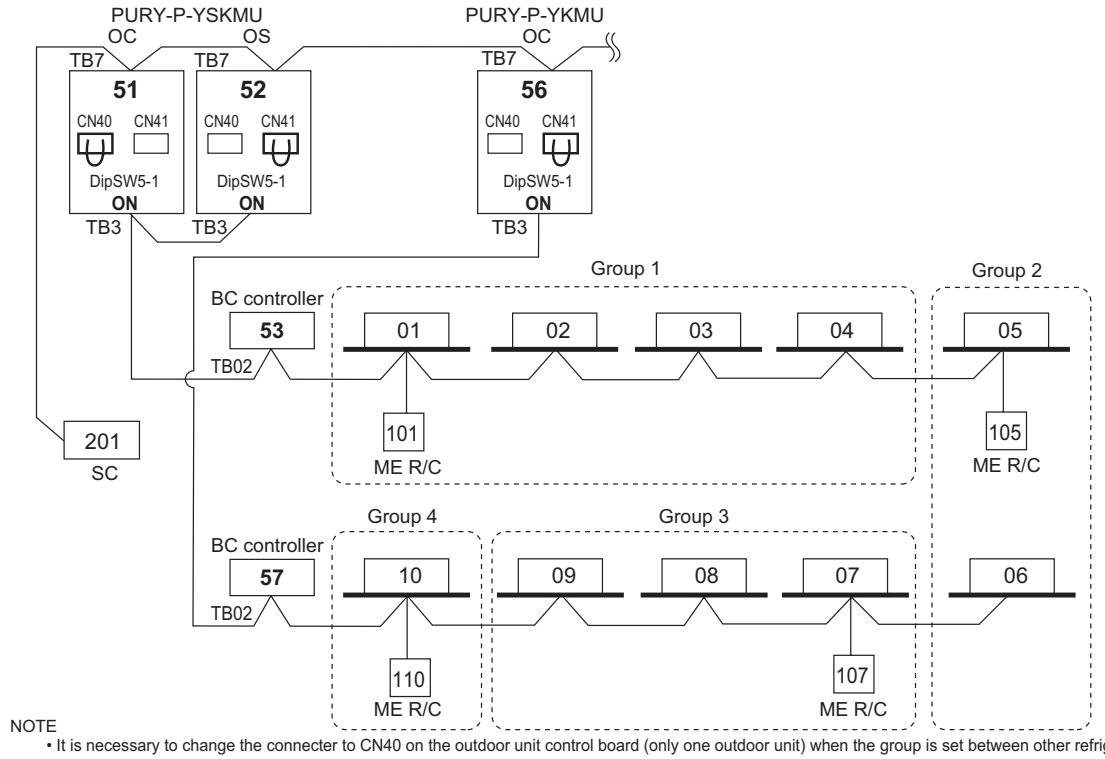
© 2015 Mitsubishi Electric US, Inc.

2-4-3-8. ME remote controller, Multi-refrigerant-system, No Power supply unit



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

2-4-3-9. ME remote controller, Multi-refrigerant-system, System Controller at TB7 side, No Power supply unit (except TKMU model)

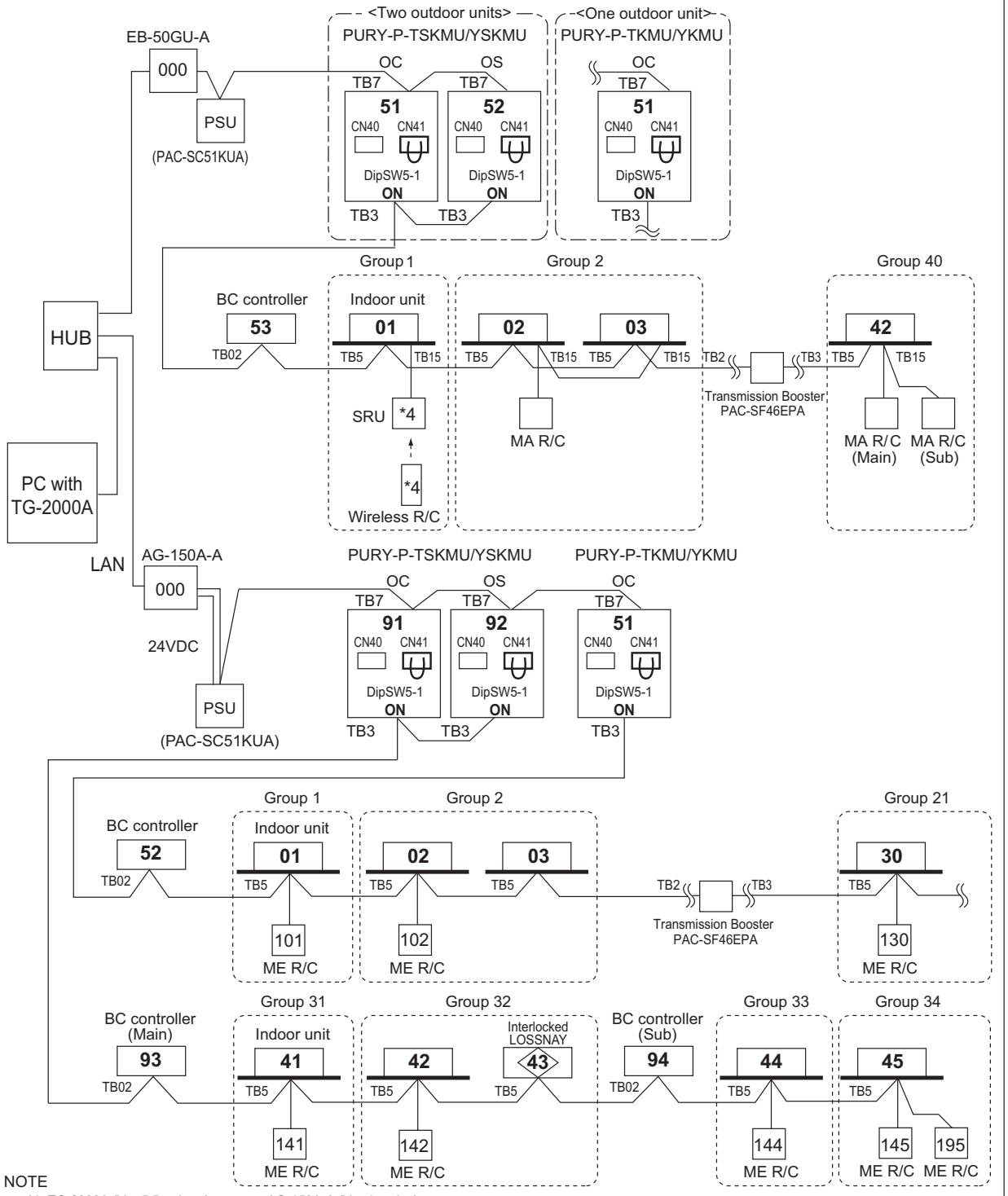


NOTE
- It is necessary to change the connecter to CN40 on the outdoor unit control board (only one outdoor unit) when the group is set between other refrigerant systems.
- When the SC is connected to TB7 side and TKMU outdoor unit model is used, connect the PAC-SC51KUA to TB7 side. If a PAC-SC51KUA cannot be used, connect the System controller to TB3 side. Up to three System controllers can be connected to TB3 side.

© 2015 Mitsubishi Electric US, Inc.

2-4-3-10. TG-2000A(*1)+AG-150A-A*2,EB-50GU-A

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



NOTE

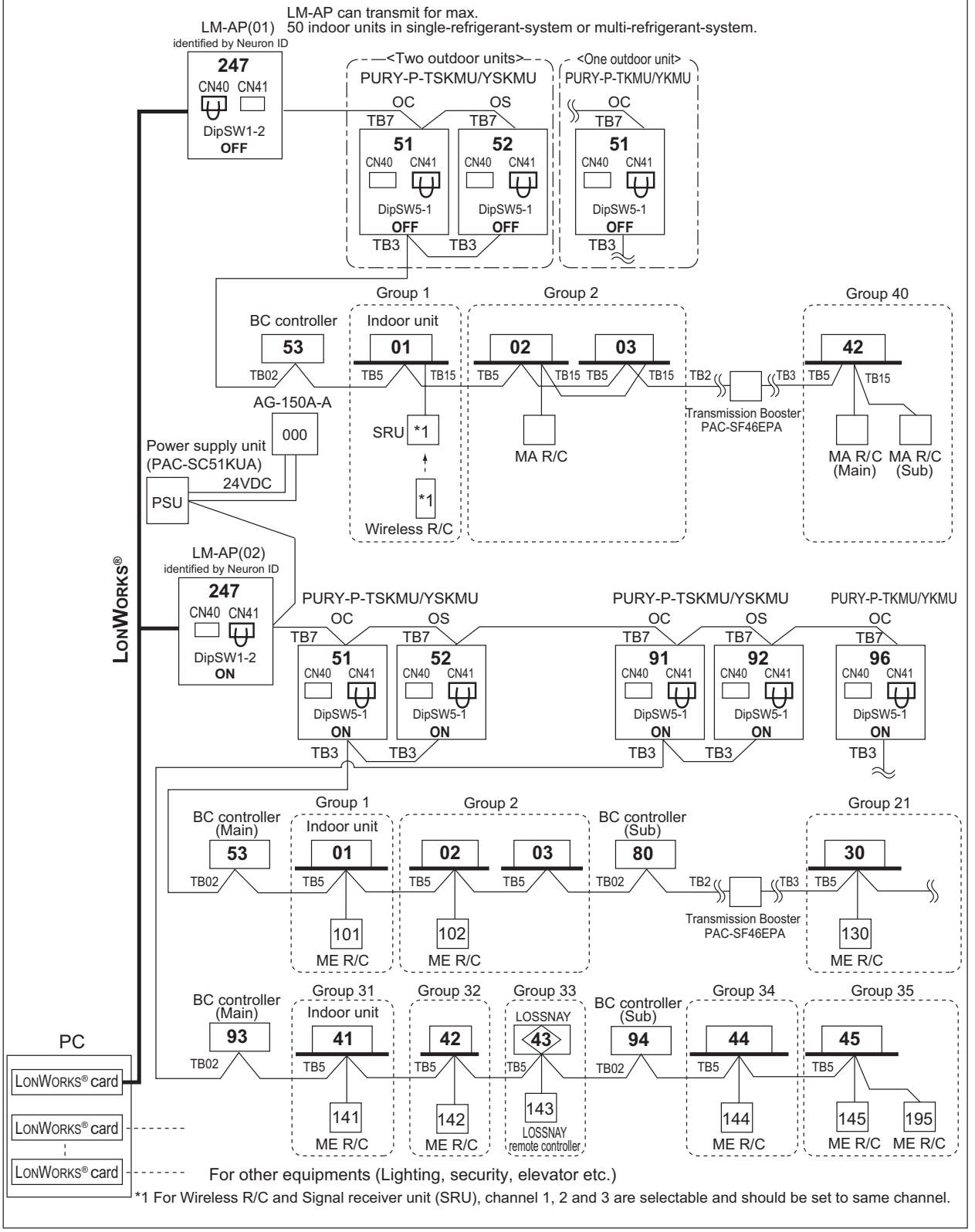
*1 TG-2000A (Ver.5.5 or later) supports AG-150A-A (Ver.1 series).
TG-2000A (Ver. 6.4 or later) supports EB-50GU-A.

*2 AG-150A-A (Ver.1 series) does not support the expansion controller (EC).

© 2015 Mitsubishi Electric US, Inc.

2-4-3-11. LM-AP

LM-AP can transmitmax.50 indoor units;
If system controller (SC) is used, DipSW1-2 at LM-AP and DipSW5-1 at Outdoor unit should set to "ON".
Change Jumper from CN41 to CN40 to activate power supply to LM-AP itselffor those LM-AP connected without system controller (SC).

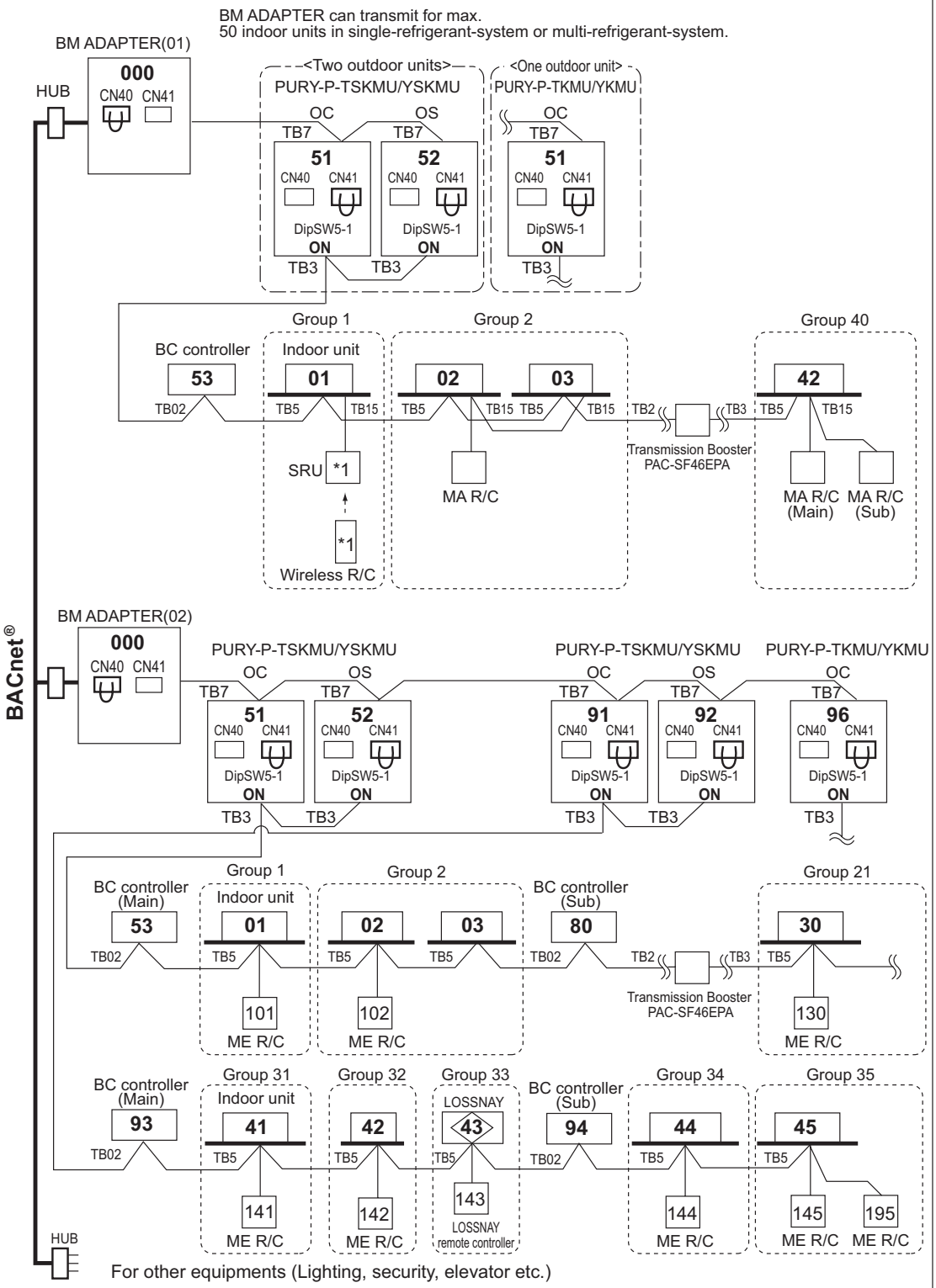


*1 For Wireless R/C and Signal receiver unit (SRU), channel 1, 2 and 3 are selectable and should be set to same channel.

© 2015 Mitsubishi Electric US, Inc.

2-4-3-12. BM ADAPTER

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



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

© 2015 Mitsubishi Electric US, Inc.

3-1. R410A Piping Material

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

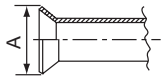
Table 3-1. Copper pipe size and radial thickness for R410A CITY MULTI.

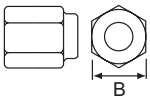
Size (mm)	Size (inch)	Radial thickness (mm)	Radial thickness (mil)	Pipe type
ø6.35	ø1/4"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø9.52	ø3/8"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø12.7	ø1/2"	0.8	[32]	ACR-Annealed or ACR-Drawn Temper
ø15.88	ø5/8"	1.0	[40]	ACR-Annealed or ACR-Drawn Temper
ø19.05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

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

Flare

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

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

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

© 2015 Mitsubishi Electric US, Inc.

3-2. Piping Design

3-2-1. IF 16 ports or less are in use, I.e., if only one BC controller is in use with no sub BC controller.

Note1. PURY systems do not require headers.
Note2. Indoor units sized P72-P96 should be connected to a BC controller using the Y-shaped CMY-R160C-J joint adapter. These indoor units cannot use the same BC controller ports as other units. (They must use their own individual BC controller port.)
Note3. As bends cause pressure loss on transportation of refrigerant, the fewer bends in the system, the better it is. Piping length needs to factor in the actual length and equivalent length in which the bends are counted.
Note4. Indoor units connected to the BC controller sharing one port cannot operate separately in heating and cooling modes simultaneously; i.e., they must function in either heating or cooling in tandem.
Note5. Indoor unit capacities are included in the model name. For example, PEFY-P24NMSU-E has a capacity of 24,000 BTUs.
Note6. Total "downstream indoor capacity" is the total of all the indoor units connected downstream. For example, PEFY-P24NMSU-E + PEFY-P12NMSU-E: Total Indoor Unit Capacity = P24 + P12 = P36.

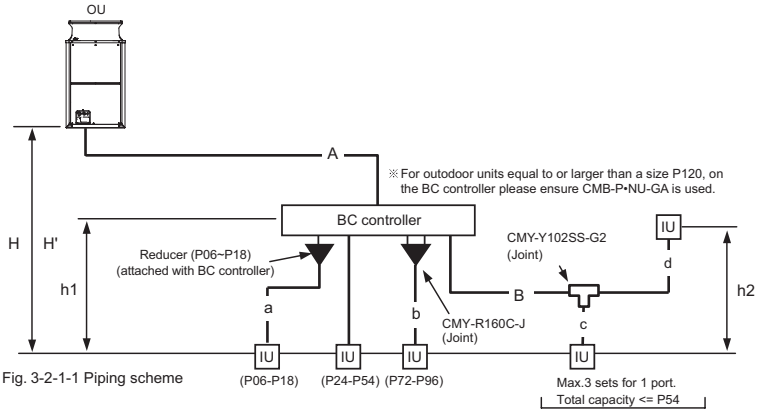


Fig. 3-2-1-1 Piping scheme

Table 3-2-1-1. Piping length limitation **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+B+a+b+c+d	*1	-
Farthest IU from OU	A+B+d	165 [541']	190 [623']
Distance between OU and BC	A	110 [360'] *1	110 [360'] *1
Farthest IU from BC controller	B+d	40 [131'] *2	40 [131'] *2
Height between OU and IU (OU above IU)	H	50 [164'] *4	-
Height between OU and IU (OU under IU)	H'	40 [131'] *5	-
Height between IU and BC	h1	15 [49'] (10 [32']) *3	-
Height between IU and IU	h2	15 [49'] (10 [32']) *3	-

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

Outdoor Model	M (m/bends [ft./bends])
P72TKMU,YKMU	0.35 [1.15']
P96TKMU,YKMU	0.42 [1.38']
P120TKMU,YKMU	0.50 [1.64']
P144TKMU,YKMU	0.50 [1.64']

OU : Outdoor Unit ; IU : Indoor Unit ; BC : BC controller

*1. Please refer to Fig.3-2-4
*2. Farthest Indoor from BC controller "B+d" can exceed 40m(131ft.) till 60m(197ft.) if no Indoor sized P72, P96 connected. Depending on the vertical difference between the indoor units and the BC controllers, the refrigerant piping can be extended to a maximum of 60 meters. Details refer to Fig.3-2-1-2
*3. Height between Indoor sized P72, P96 and BC must be less than 10m(33ft.), if any.
*4. 90m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*5. 60m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.

Fig. 3-2-1-2 Piping length and height between IU and BC controller

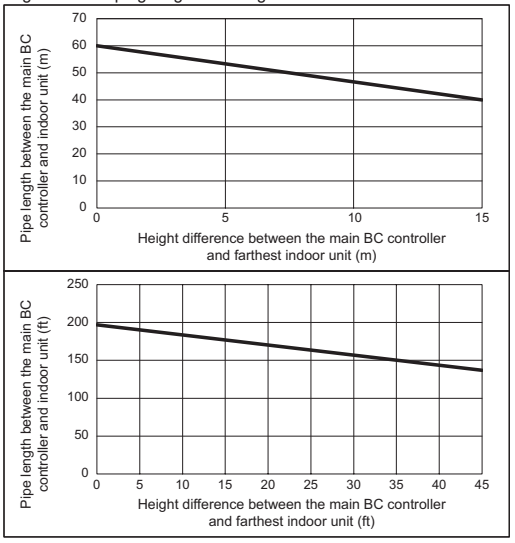


Table3-2-1-3. Piping "A"size selection rule **(mm [in.])**

Outdoor Model	Pipe(High pressure)	Pipe(Low pressure)
P72TKMU,YKMU	ø15.88 [5/8"]	ø19.05 [3/4"]
P96TKMU,YKMU	ø19.05 [3/4"]	ø22.20 [7/8"]
P120TKMU,YKMU	ø19.05 [3/4"]	ø28.58 [1-1/8"]
P144TKMU,YKMU	ø22.2 [7/8"]	ø28.58 [1-1/8"]

Table3-2-1-4. Piping "B" size seleciton rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P54 or less	ø9.52 [3/8"]	ø15.88 [5/8"]

Table3-2-1-5. Piping "a", "b", "c", "d" size selection rule **(mm [in.])**

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

© 2015 Mitsubishi Electric US, Inc.

3-2-2. IF more than 16 ports are in use, or if there is more than one BC controller in use for one outdoor unit

Note1. PURY systems do not require headers.
Note2. Indoor units sized P72-P96 should be connected to a BC controller using the Y-shaped CMY-R160C-J joint adapter. These indoor units cannot use the same BC controller ports as other units. (They must use their own individual BC controller port.)
Note3. As bends cause pressure loss on transportation of refrigerant, the fewer bends in the system, the better it is. Piping length needs to factor in the actual length and equivalent length in which the bends are counted.
Note4. Indoor units connected to the BC controller sharing one port cannot operate separately in heating and cooling modes simultaneously; i.e., they must function in either heating or cooling in tandem.
Note5. For sub BC controller CMB-P-NU-GB, the total connectable indoor unit capacity can be 126,000 BTUs or less.
If two sub BC controllers are used, the total indoor unit capacity connected to BOTH sub BC controllers also cannot exceed 126,000 BTUs.
For sub BC controller CMB-P1016NU-HB the total connectable indoor unit capacity can be 126,000 BTUs or less. However, if two sub controllers are used, the total indoor unit capacity connected to BOTH sub controllers must NOT exceed 168,000BTUs.
Note6. Indoor unit capacities are included in the model name. For example, PEFY-P24NMSU-E has a capacity of 24,000 BTUs.
Note7. Total "downstream indoor capacity" is the total of all the indoor units connected downstream.
For example, PEFY-P24NMSU-E + PEFY-P12NMSU-E: Total Indoor Unit Capacity = P24 + P12 = P36.

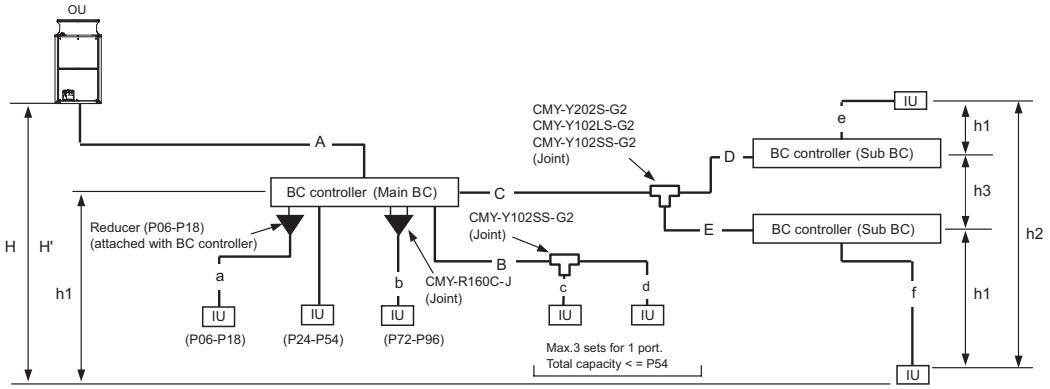


Fig. 3-2-2-1 Piping scheme

OU : Outdoor unit, IU : Indoor unit

Table 3-2-2-1. Piping length limitation (m [ft.])

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+B+C+D+E+a+b+c+d+e+f	*1	-
Farthest IU from OU	A+C+E+f	165 [541']	190 [623']
Distance between OU and BC	A	110 [360'] *1	110 [360'] *1
Farthest IU from BC controller	B+d or C+D+e or C+E+f	40 [131'] *2	40 [131'] *2
Height between OU and IU (OU above IU)	H	50 [164'] *5	-
Height between OU and IU (OU under IU)	H'	40 [131'] *6	-
Height between IU and BC	h1	15 [49'] (10 [32']) *3	-
Height between IU and IU	h2	15 [49'] (10 [32']) *3	-
Height between BC(Main or Sub) and BC(Sub)	h3	15 [49'] (10 [32']) *4	-

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

Outdoor Model	M (m/bends [ft./bends])
P72TKMU,YKMU	0.35 [1.15']
P96TKMU,YKMU	0.42 [1.38']
P120TKMU,YKMU	0.50 [1.64']
P144TKMU,YKMU	0.50 [1.64']

OU : Outdoor Unit ; IU : Indoor Unit ; BC : BC controller
*1. Please refer to Fig.3-2-4
*2. Farthest Indoor from BC controller "B+d or C+D+e or C+E+f " can exceed 40m(131ft.) till 60m(197ft.) if no Indoor sized P72, P96 connected. Depending on the vertical difference between the indoor units and the BC controllers, the refrigerant piping can be extended to a maximum of 60 meters. Details refer to Fig.3-2-2-2
*3. Height between Indoor sized P72, P96 and BC must be less than 10m(32ft.), if any.
*4. Height between BC (Main or Sub) and BC (Sub) must be less than 10m (32ft.) if IU size is P72,P96.
*5. 90m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*6. 60m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.

Fig. 3-2-2-2 Piping length and height between IU and BC controller

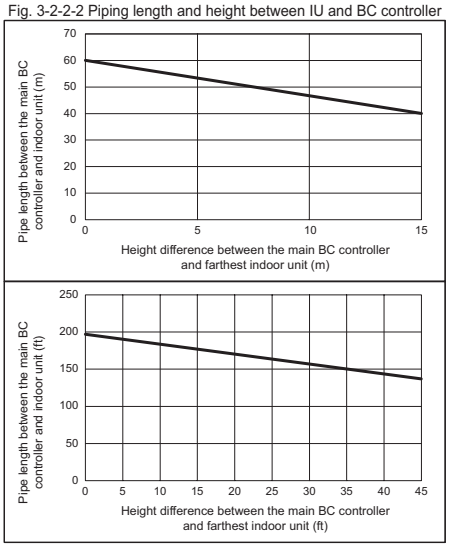


Table3-2-2-3. Piping "A"size selection rule (mm [in.])

Outdoor Model	Pipe(High pressure)	Pipe(Low pressure)
P72TKMU,YKMU	ø15.88 [5/8"]	ø19.05 [3/4"]
P96TKMU,YKMU	ø19.05 [3/4"]	ø22.20 [7/8"]
P120TKMU,YKMU	ø19.05 [3/4"]	ø28.58 [1-1/8"]
P144TKMU,YKMU	ø22.2 [7/8"]	ø28.58 [1-1/8"]

Table3-2-2-4. Piping "B" size selection rule (mm [in.])

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P54 or less	ø9.52 [3/8"]	ø15.88 [5/8"]

Table3-2-2-5. Piping "C", "D", "E" size selection rule (mm [in.])

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(HP Gas)	Pipe(LP Gas)
P72 or less	ø9.52 [3/8"]	ø15.88 [5/8"]	ø19.05 [3/4"]
P73 to P108	ø9.52 [3/8"]	ø19.05 [3/4"]	ø22.20 [7/8"]
P109 to P126	ø12.70 [1/2"]	ø19.05 [3/4"]	ø28.58 [1-1/8"]
P127 to P144	ø12.70 [1/2"]	ø22.20 [7/8"]	ø28.58 [1-1/8"]
P145 to P168	ø15.88 [5/8"]	ø22.20 [7/8"]	ø28.58 [1-1/8"]

HP : High pressure, LP:Low pressure

Table3-2-2-6. Piping "a", "b", "c", "d" saize selection rule (mm [in.])

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

© 2015 Mitsubishi Electric US, Inc.

3-2-3. IF more than 16 ports are in use, or if there is more than one BC controller in use for two outdoor units

Note1. PURY systems do not require headers.
Note2. Indoor units sized P72-P96 should be connected to a BC controller using the Y-shaped CMY-R160C-J joint adapter. These indoor units cannot use the same BC controller ports as other units. (They must use their own individual BC controller port.)
Note3. As bends cause pressure loss on transportation of refrigerant, the fewer bends in the system, the better it is. Piping length needs to factor in the actual length and equivalent length in which the bends are counted.
Note4. Indoor units connected to the BC controller sharing one port cannot operate separately in heating and cooling modes simultaneously; i.e., they must function in either heating or cooling in tandem.
Note5. For sub BC controller CMB-P-NU-GB, the total connectable indoor unit capacity can be 126,000 BTUs or less. If two sub BC controllers are used, the total indoor unit capacity connected to BOTH sub BC controllers also cannot exceed 126,000 BTUs.
For sub BC controller CMB-P1016NU-HB the total connectable indoor unit capacity can be 126,000 BTUs or less. However, if two sub controllers are used, the total indoor unit capacity connected to BOTH sub controllers must NOT exceed 168,000BTUs.
Note6. Indoor unit capacities are included in the model name. For example, PEFY-P24NMSU-E has a capacity of 24,000 BTUs.
Note7. Total "downstream indoor capacity" is the total of all the indoor units connected downstream.
For example, PEFY-P24NMSU-E + PEFY-P12NMSU-E: Total Indoor Unit Capacity = P24 + P12 = P36.

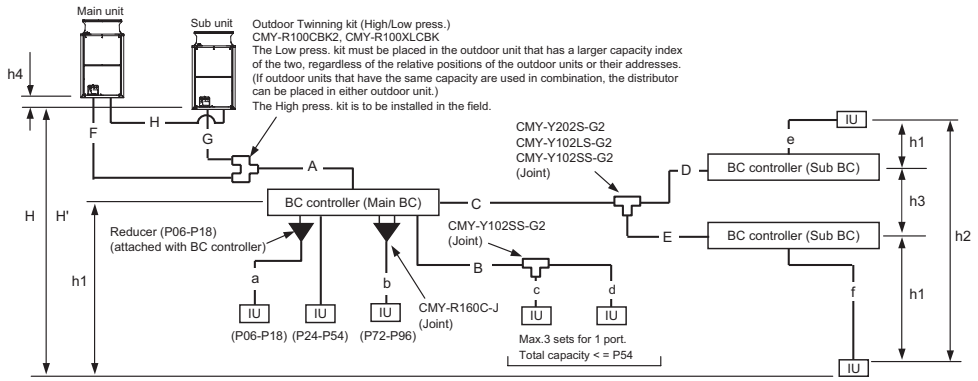


Fig. 3-2-3-1 Piping scheme

IU : Indoor unit

Table3-2-3-1. Piping length limitation (m [ft.])

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	F+G+H+A+B+C+D+E+a+b+c+d+e+f	*1	-
Farthest IU from OU	F(G)+A+C+E+f	165 [541']	190 [623']
Distance between OU and BC	F(G)+A	110 [360'] *1	110 [360'] *1
Farthest IU from BC controller	B+d or C+D+e or C+E+f	40 [131'] *2	40 [131'] *2
Height between OU and IU (OU above IU)	H	50 [164'] *5	-
Height between OU and IU (OU under IU)	H'	40 [131'] *6	-
Height between IU and BC	h1	15 [49'] (10 [32']) *3	-
Height between IU and IU	h2	15 [49'] (10 [32']) *3	-
Height between BC(Main or Sub) and BC(Sub)	h3	15 [49'] (10 [32']) *4	-
Distance between Main unit and Sub unit	F+G or H	5 [16']	-
Height between Main unit and Sub unit	h4	0.1 [0.3']	-

Table3-2-3-2. Bent equivalent length "M"

Outdoor Model	M (m/bends [ft./bends])
P144YSKMU	0.50 [1.64']
P168TSKMU,YSKMU	0.50 [1.64']
P192TSKMU,YSKMU	0.50 [1.64']
P216TSKMU,YSKMU	0.50 [1.64']
P240TSKMU,YSKMU	0.50 [1.64']
P264TSKMU,YSKMU	0.70 [2.30']
P288TSKMU,YSKMU	0.70 [2.30']

OU : Outdoor Unit ; IU : Indoor Unit ; BC : BC controller
*1. Please refer to Fig.3-2-4
*2. Farthest Indoor from BC controller "B+d or C+D+e or C+E+f " can exceed 40m(131ft.) till 60m(197ft.) if no Indoor sized P72, P96 connected.
Depending on the vertical difference between the indoor units and the BC controllers, the refrigerant piping can be extended to a maximum of 60 meters. Details refer to Fig.3-2-3-2
*3. Height between Indoor sized P72, P96 and BC must be less than 10m(33ft.), if any.
*4. When using 2 Sub BC controllers, max. height "h3" should be considered.
*5. 90m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*6. 60m is available depending on the model and installation conditions. For more detailed information, contact your local distributor.

Fig. 3-2-3-2 Piping length and height between IU and BC controller

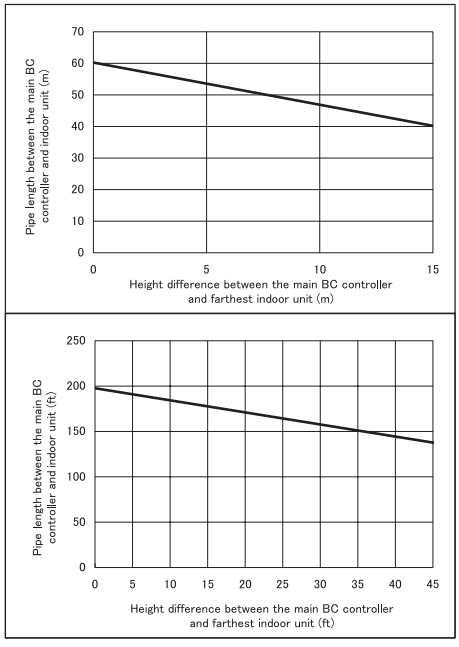


Table3-2-3-3. Piping "A"size selection rule (mm [in.])

Outdoor Model	Pipe(High pressure)	Pipe(Low pressure)
P144YSKMU	ø22.20 [7/8"]	ø28.58 [1-1/8"]
P168TSKMU,YSKMU	ø22.20 [7/8"]	ø28.58 [1-1/8"]
P192TSKMU,YSKMU	ø22.20 [7/8"]	ø28.58 [1-1/8"]
P216TSKMU,YSKMU	ø28.58 [1-1/8"]	ø28.58 [1-1/8"]
P240TSKMU,YSKMU	ø28.58 [1-1/8"]	ø34.93 [1-3/8"]
P264TSKMU,YSKMU	ø28.58 [1-1/8"]	ø34.93 [1-3/8"]
P288TSKMU,YSKMU	ø28.58 [1-1/8"]	ø34.93 [1-3/8"]

Table3-2-3-4. Piping "B" size seleciton rule (mm [in.])

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P54 or less	ø9.52 [3/8"]	ø15.88 [5/8"]

Table3-2-3-5. Piping "C", "D", "E" size selection rule (mm [in.])

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(HP Gas)	Pipe(LP Gas)
P72 or less	ø9.52 [3/8"]	ø15.88 [5/8"]	ø19.05 [3/4"]
P73 to P108	ø9.52 [3/8"]	ø19.05 [3/4"]	ø22.20 [7/8"]
P109 to P126	ø12.70 [1/2"]	ø19.05 [3/4"]	ø28.58 [1-1/8"]
P127 to P144	ø12.70 [1/2"]	ø22.20 [7/8"]	ø28.58 [1-1/8"]
P145 to P168	ø15.88 [5/8"]	ø22.20 [7/8"]	ø28.58 [1-1/8"]

HP : High pressure, LP:Low pressure

Table3-2-3-6. Piping "F", "G", "H" size selection rule (mm [in.])

Outdoor Model	Pipe(High pressure)	Pipe(Low pressure)
P72TKMU,YKMU	ø15.88 [5/8"]	ø19.05 [3/4"]
P96TKMU,YKMU	ø19.05 [3/4"]	ø22.20 [7/8"]
P120TKMU,YKMU	ø19.05 [3/4"]	ø28.58 [1-1/8"]
P144TKMU,YKMU	ø22.20 [7/8"]	ø28.58 [1-1/8"]

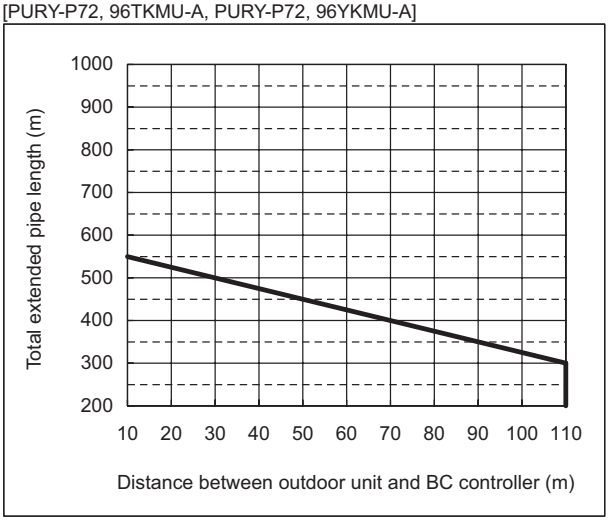
Table3-2-3-7. Piping "a", "b", "c", "d"size selection rule (mm [in.])

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

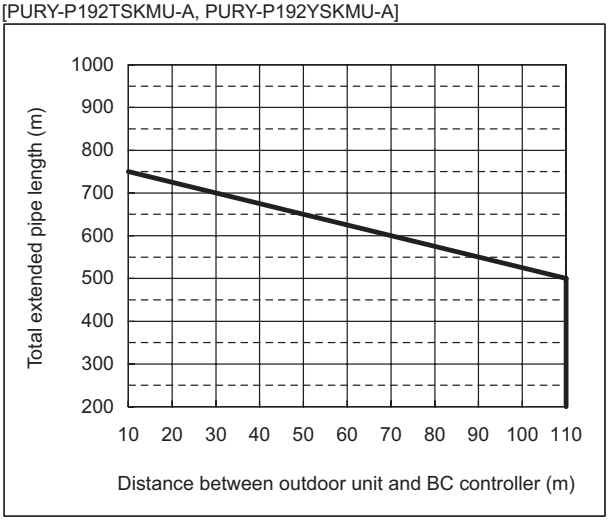
© 2015 Mitsubishi Electric US, Inc.

3-2-4. Total piping length restrictions(m)

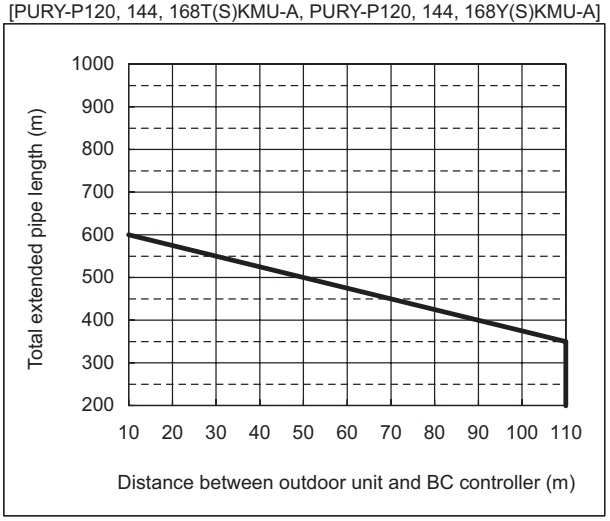
[PURY-P72, 96TKMU-A, PURY-P72, 96YKMU-A]



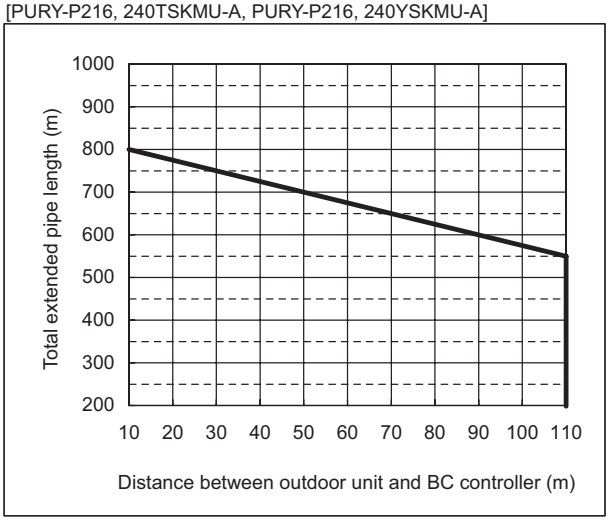
[PURY-P192TSKMU-A, PURY-P192YSKMU-A]



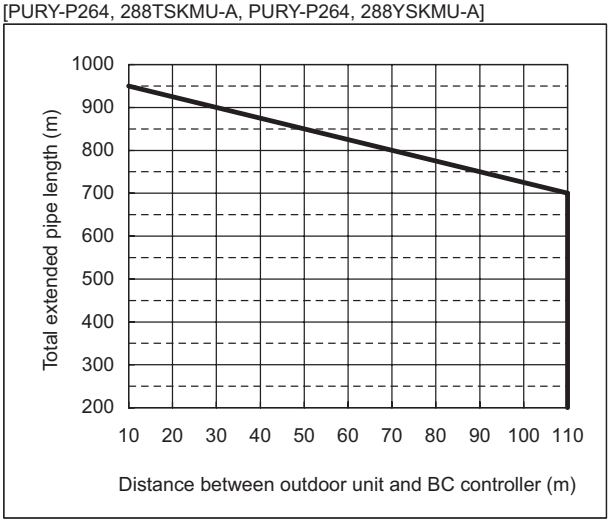
[PURY-P120, 144, 168T(S)KMU-A, PURY-P120, 144, 168Y(S)KMU-A]



[PURY-P216, 240TSKMU-A, PURY-P216, 240YSKMU-A]



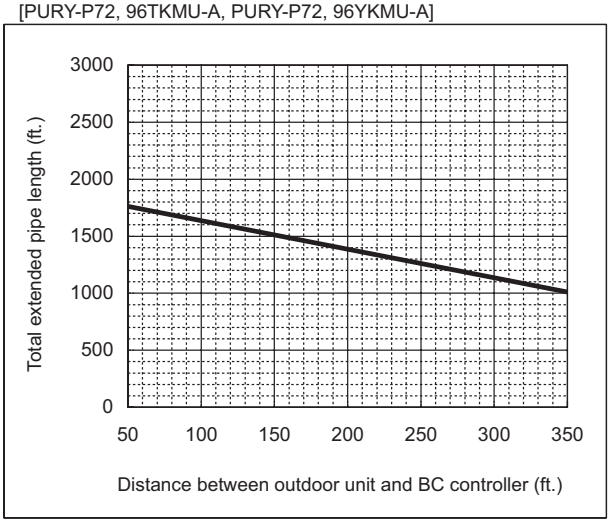
[PURY-P264, 288TSKMU-A, PURY-P264, 288YSKMU-A]



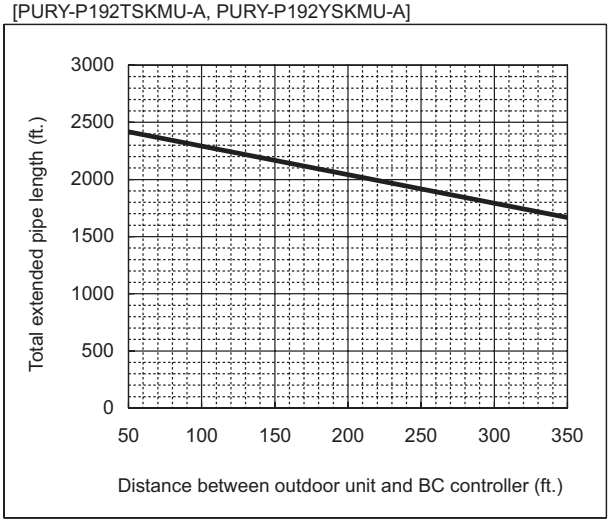
© 2015 Mitsubishi Electric US, Inc.

3-2-4. Total piping length restrictions(ft.)

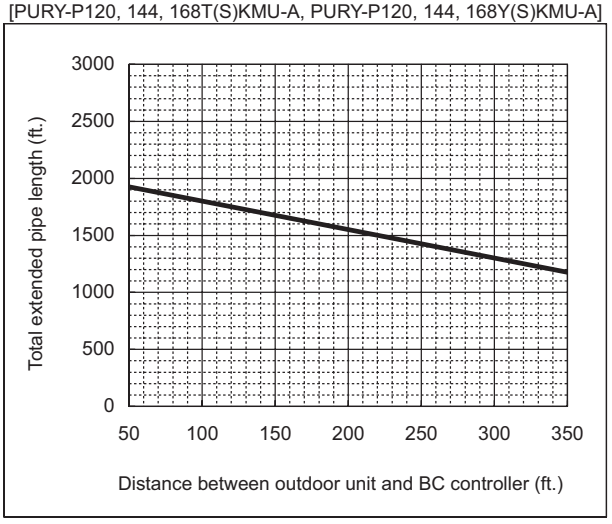
[PURY-P72, 96TKMU-A, PURY-P72, 96YKMU-A]



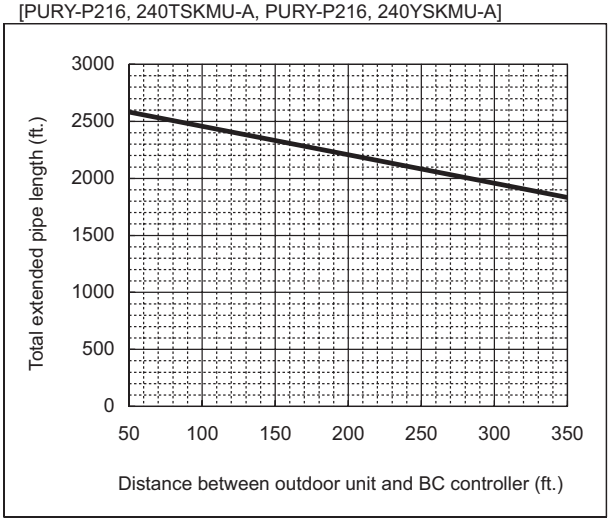
[PURY-P192TSKMU-A, PURY-P192YSKMU-A]



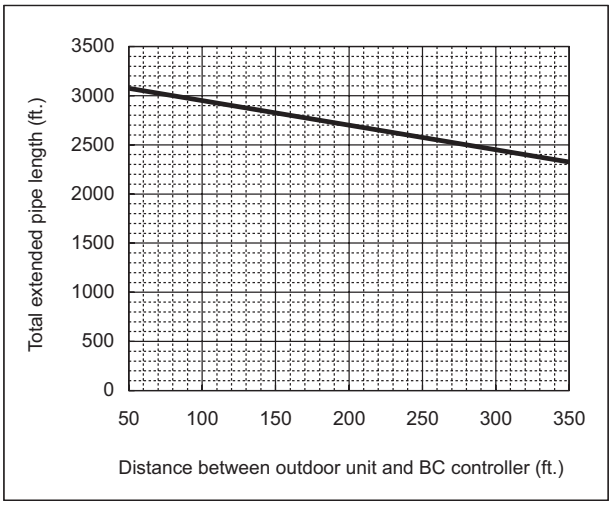
[PURY-P120, 144, 168T(S)KMU-A, PURY-P120, 144, 168Y(S)KMU-A]



[PURY-P216, 240TSKMU-A, PURY-P216, 240YSKMU-A]



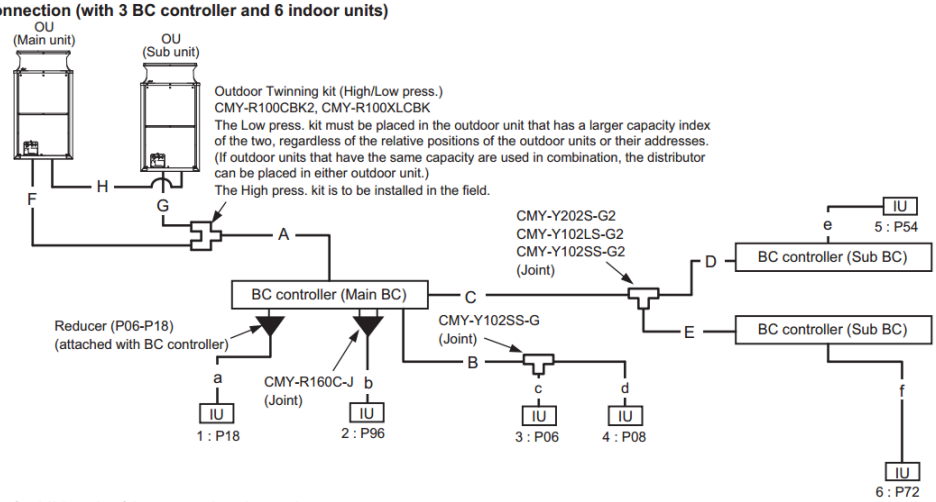
[PURY-P264, 288TSKMU-A, PURY-P264, 288YSKMU-A]



© 2015 Mitsubishi Electric US, Inc.

3-3. Refrigerant Charge Calculation

Sample connection (with 3 BC controller and 6 indoor units)



■Amount of additional refrigerant to be charged

Refrigerant for extended pipes (field piping) is not factory-charged to the outdoor unit. Add an appropriate amount of refrigerant for each pipes on site. Record the size of each high pressure pipe and liquid pipe, and the amout of refrigerant that was charged on the outdoor unit for future reference.

■Calculating the amount of additional refrigerant to be charged

The amount of refrigerant to be charged is calculated with the size of the on-site-installed high pressure pipes and liquid pipes, and their length.
Calculate the amount of refrigerant to be charged according to the formula below.
Round up the calculation result to the nearest 0.1kg[4oz]. (i.e., 16.08 kg = 16.1 kg)

<Amount of additional refrigerant to be charged>

■Calculating the amount of additional refrigerant to be charged

• When the piping length from the outdoor unit to the farthest indoor unit is 30.5 m (100 ft) or shorter

Additional refrigerant charge	=	High pressure pipe size Total length of ø 28.58mm[1-1/8 in]	+	High pressure pipe size Total length of ø 22.2mm[7/8 in]	+	High pressure pipe size Total length of ø 19.05mm[3/4 in]	+	High pressure pipe size Total length of ø 15.88mm[5/8 in]
(kg)[oz]		(m) × 0.36(kg/m) (ft) × 3.88(oz/ft)		(m) × 0.23(kg/m) (ft) × 2.48(oz/ft)		(m) × 0.16(kg/m) (ft) × 1.73(oz/ft)		(m) × 0.11(kg/m) (ft) × 1.19(oz/ft)

+	Liquid Piping size Total length of ø 15.88mm[5/8 in]	+	Liquid Piping size Total length of ø 12.7mm[1/2 in]	+	Liquid Piping size Total length of ø 9.52mm[3/8 in]	+	Liquid Piping size Total length of ø 6.35mm[1/4 in]
	(m) × 0.2(kg/m) (ft) × 2.16(oz/ft)		(m) × 0.12(kg/m) (ft) × 1.30(oz/ft)		(m) × 0.06(kg/m) (ft) × 0.65(oz/ft)		(m) ×0.024(kg/m) (ft) ×0.26(oz/ft)

+	Total Outdoor Unit Model Name	Charged amount per BC controller (Standard / Main)
	P72	3.0 kg [106 oz]
	P96	4.5 kg [160 oz]
	P120	
	P144	6.0 kg [212 oz]
	P168	
	P192	
	P216	
	P240	
	P264	
	P288	

+	BC controller (Main) HA-Type
	2.0 kg [71 oz]

+	BC controller (Sub) Total Units	BC controller (Sub) Per Unit
	1	1.0 kg [36 oz]
	2	2.0 kg [71 oz]

+	Total Capacity of Connected Indoor Units	Charged amount
	Models ~ 27	2.0 kg [71 oz]
	Models 28 ~ 54	2.5 kg [89 oz]
	Models 55 ~ 126	3.0 kg [106 oz]
	Models 127 ~ 144	3.5 kg [124 oz]
	Models 145 ~ 180	4.5 kg [159 oz]
	Models 181 ~ 234	5.0 kg [177 oz]
	Models 235 ~ 273	6.0 kg [212 oz]
	Models 274 ~ 307	8.0 kg [283 oz]
	Models 308 ~ 342	9.0 kg [318 oz]
	Models 343 ~ 411	10.0 kg [353 oz]
	Models 412 ~	12.0 kg [424 oz]

+	Total Outdoor Unit Model Name		Charged amount for outdoor unit (s)
	Single	P72	0.0 kg [0 oz]
		P96	1.0 kg [36 oz]
		P120	5.5 kg [195 oz]
		P144	5.5 kg [195 oz]
	Combination	P144	0.0 kg [0 oz]
		P168	1.0 kg [36 oz]
		P192	2.0 kg [71 oz]
		P216	6.5 kg [230 oz]
		P240	11.0 kg [389 oz]
		P264	11.0 kg [389 oz]
		P288	11.0 kg [389 oz]

© 2015 Mitsubishi Electric US, Inc.

• When the piping length from the outdoor unit to the farthest indoor unit is longer than 30.5 m (100 ft)

Additional refrigerant charge	=	High pressure pipe size Total length of ø 28.58mm[1-1/8 in]	+	High pressure pipe size Total length of ø 22.2mm[7/8 in]	+	High pressure pipe size Total length of ø 19.05mm[3/4 in]	+	High pressure pipe size Total length of ø 15.88mm[5/8 in]
(kg)[oz]		(m) × 0.33(kg/m) (ft) × 3.55(oz/ft)		(m) × 0.21(kg/m) (ft) × 2.26(oz/ft)		(m) × 0.14(kg/m) (ft) × 1.51(oz/ft)		(m) × 0.1(kg/m) (ft) × 1.08(oz/ft)

Liquid Piping size Total length of ø 15.88mm[5/8 in]	+	Liquid Piping size Total length of ø 12.7mm[1/2 in]	+	Liquid Piping size Total length of ø 9.52mm[3/8 in]	+	Liquid Piping size Total length of ø 6.35mm[1/4 in]
(m) × 0.18(kg/m) (ft) × 1.94(oz/ft)		(m) × 0.11(kg/m) (ft) × 1.19(oz/ft)		(m) × 0.054(kg/m) (ft) × 0.59(oz/ft)		(m) ×0.021(kg/m) (ft) ×0.23(oz/ft)

Total Outdoor Unit Model Name	Charged amount per BC controller (Standard / Main)
P72	3.0 kg [106 oz]
P96	4.5 kg [160 oz]
P120	
P144	6.0 kg [212 oz]
P168	
P192	
P216	
P240	
P264	
P288	

+

BC controller (Main) HA-Type
2.0 kg [71 oz]

+

BC controller (Sub) Total Units	BC controller (Sub) Per Unit
1	1.0 kg [36 oz]
2	2.0 kg [71 oz]

+

Total Capacity of Connected Indoor Units	Charged amount
Models ~ 27	2.0 kg [71 oz]
Models 28 ~ 54	2.5 kg [89 oz]
Models 55 ~ 126	3.0 kg [106 oz]
Models 127 ~ 144	3.5 kg [124 oz]
Models 145 ~ 180	4.5 kg [159 oz]
Models 181 ~ 234	5.0 kg [177 oz]
Models 235 ~ 273	6.0 kg [212 oz]
Models 274 ~ 307	8.0 kg [283 oz]
Models 308 ~ 342	9.0 kg [318 oz]
Models 343 ~ 411	10.0 kg [353 oz]
Models 412 ~	12.0 kg [424 oz]

Total Outdoor Unit Model Name		Charged amount for outdoor unit (s)
Single	P72	0.0 kg [0 oz]
	P96	1.0 kg [36 oz]
	P120	5.5 kg [195 oz]
	P144	5.5 kg [195 oz]
Combination	P144	0.0 kg [0 oz]
	P168	1.0 kg [36 oz]
	P192	2.0 kg [71 oz]
	P216	6.5 kg [230 oz]
	P240	11.0 kg [389 oz]
	P264	11.0 kg [389 oz]
	P288	11.0 kg [389 oz]

■Maximum refrigerant charge

The amount of refrigerant that is shown in the table below is the maximum amount to be added on site.

Total index of the outdoor units			P72 T/YKMU	P96 T/YKMU	P120 T/YKMU	P144 T/YKMU	P144 T/YKMU	P168 T/YSKMU	P192 T/YSKMU	P216 T/YSKMU	P240 T/YSKMU	P264 T/YSKMU	P288 T/YSKMU
Maximum refrigerant charge	Factory charged	kg	11.8	11.8	11.8	11.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6
	Charged on site	kg	27.2	35.5	41.0	46.7	34.9	49.4	62.7	75.4	75.4	75.4	75.4
	Total for system	kg	39.0	47.3	52.8	58.5	58.5	73.0	86.3	99.0	99.0	99.0	99.0
Maximum refrigerant charge	Factory charged	lb+oz	26lbs 1oz	26lbs 1oz	26lbs 1oz	26lbs 1oz	52lbs 1oz	52lbs 1oz	52lbs 1oz	52lbs 1oz	52lbs 1oz	52lbs 1oz	52lbs 1oz
	Charged on site	lb+oz	60lbs	78lbs 5oz	90lbs 7oz	103lbs	77lbs	108lbs 15oz	138lbs 4oz	166lbs 4oz	166lbs 4oz	166lbs 4oz	166lbs 4oz
	Total for system	lb+oz	86lbs	104lbs 5oz	116lbs 7oz	129lbs	129lbs	161lbs	190lbs 5oz	218lbs 5oz	218lbs 5oz	218lbs 5oz	218lbs 5oz

© 2015 Mitsubishi Electric US, Inc.

4-1. Installation Site Requirements

1. No direct thermal radiation to the unit.
2. No possibility of annoying the neighbors by the sound of the unit.
   Valves and refrigerant flow on the outdoor unit may generate noise.
3. Avoid the sites where strong winds blow.
4. With strength to bear the weight of the unit.
5. Drain flow from the unit is cared at heating mode.
6. Enough space for installation and service as shown at 4-2.
7. Avoid the sites where acidic solutions or chemical sprays (sulfur series) are used frequently.
8. The unit should be secure from combustible gas, oil, steam, chemical gas like acidic solution, sulfur gas and so on.

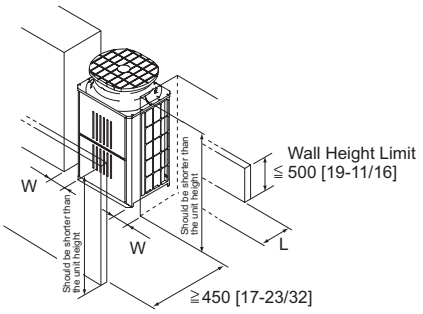
© 2015 Mitsubishi Electric US, Inc.

4-2. Installation Clearance Space

In case of single installation

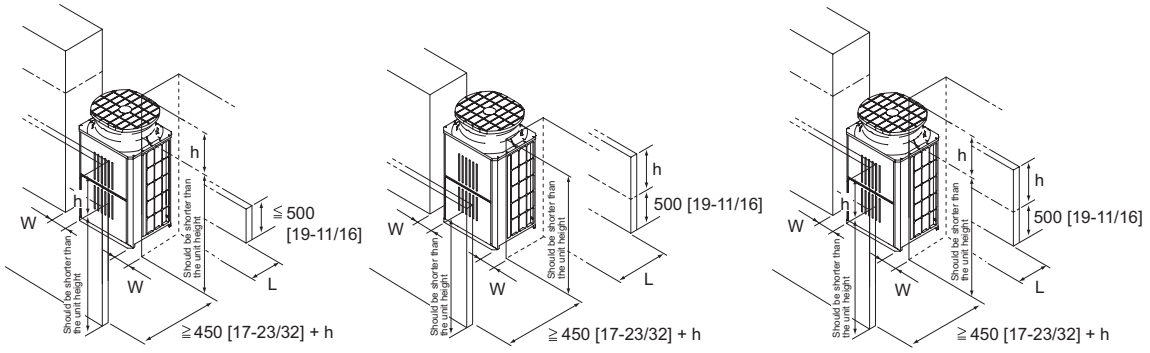
- Secure enough space around the unit as shown in the figure.
- If the wall height exceeds the height limit, widen the space labeled "L" and "W" by the amount that exceeds the limit (labeled <h> in the figure).

(1) Walls are lower than the height limit.



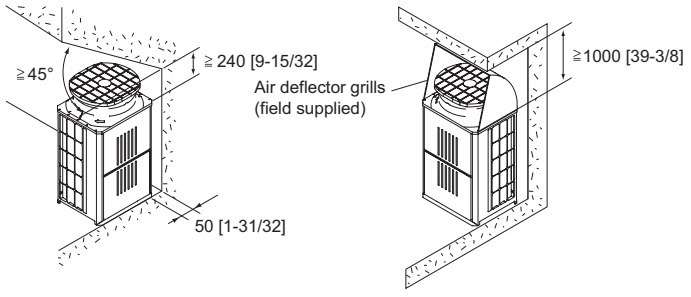
Condition	L	W
Minimum space behind the unit	≧100 [3-15/16]	≧ 50 [1-31/32]
Minimum space on both sides of the unit	≧300 [11-13/16]	≧ 15 [19/32]

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



Condition	L	W
Minimum space behind the unit	≧ 100 [3-15/16] + h	≧50 [1-31/32] + h
Minimum space on both sides of the unit	≧ 300 [11-13/16] + h	≧15 [19/32] + h

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



(Unit : mm [in.])

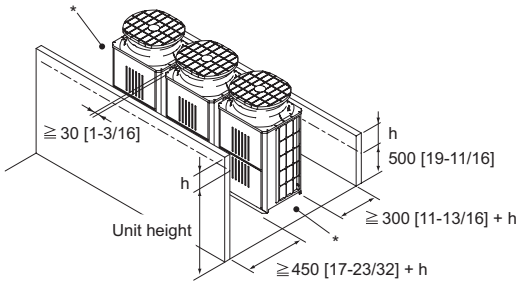
© 2015 Mitsubishi Electric US, Inc.

In case of collective installation and continuous installation

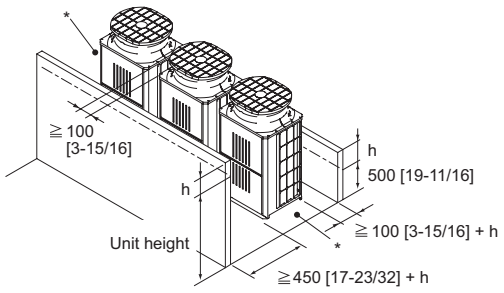
- When multiple units are installed adjacent to each other, secure enough space to allow for air circulation and passageways between groups of units as shown in the figures.
  * Leave both sides of each group of units open.
- As with single installation, if the wall height exceeds the height limit, widen the space in the front and the back of a given group of units by the amount that exceeds the limit (labeled <h> in the figure).
- If there is a wall at both the front and the rear of the unit, install up to six units (three units : P120, 144) consecutively in the side direction and provide a space of 1000mm or more as inlet space/passage space for each six units (three units : P120, 144).

(1) Side-by-side installation

<The space on both sides of a given group of units is minimum.>

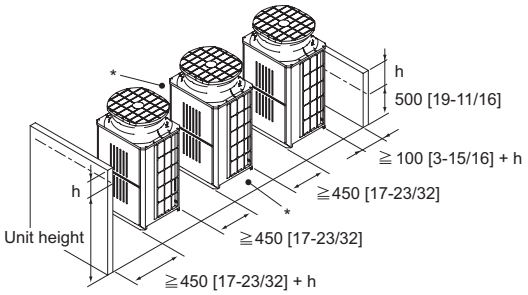


<The space on both sides of a given group of units is minimum.>

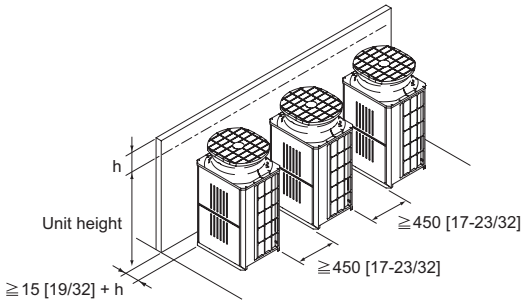


(2) Face-to-face installation

<There are walls in the front and the back of a given group of units.>

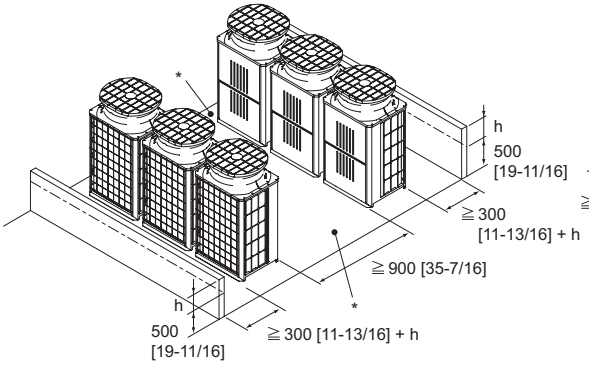


<There is a wall on one side.>

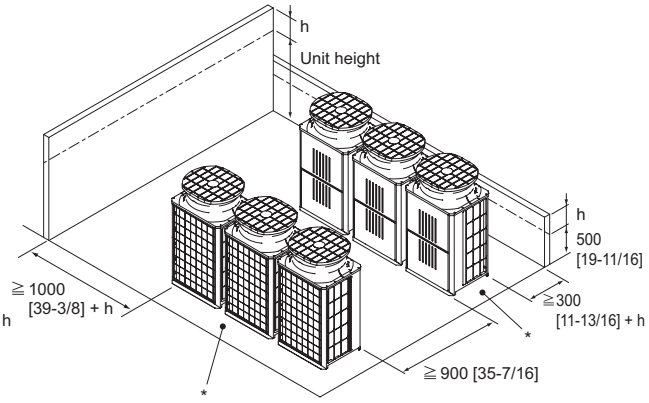


(3) Combination of face-to-face and side-by-side installations

<There are walls in the front and the back of a given group of units.>



<There is a wall on one side and either the front or the back of a given group of unit.>



(Unit : mm [in.])

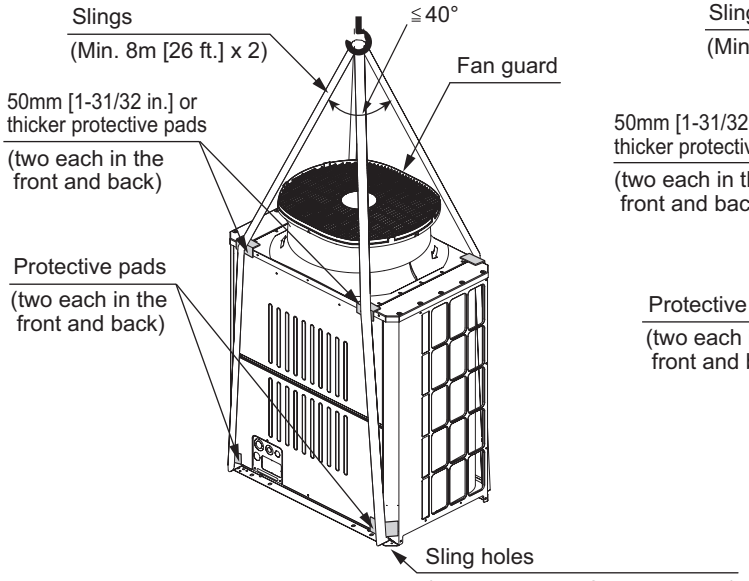
© 2015 Mitsubishi Electric US, Inc.

4-3. Piping Direction

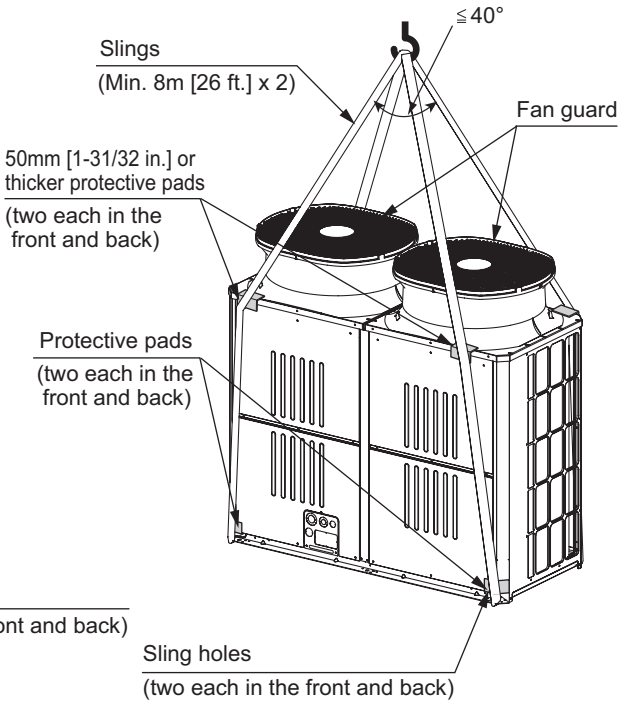
4-3-1. Lifting method

· When lifting the unit with ropes, run the ropes under the unit and use the lifting hole.
· Support the unit at four points with two ropes, and avoid giving mechanical shock.
· Suspension rope angle must be 40° or less, so as to avoid compressing fan guard.
· Use two ropes, each at least 8m [26 ft.] in length
· Use ropes strong enough to support the weight of the unit.
· Always suspend the unit from four corners. (It is dangerous to suspend a unit from two corners and must not be attempted.)
· Use protective pads to keep the ropes from scratching the panels on the unit.
· Use a 50mm [1-31/32 in.] or thicker cardboard or cloth as a protective pad on the top of the unit to prevent contact between the fan guard and slings.

① P72, 96



② P120, 144



⚠ CAUTION

Exercise caution when transporting products.

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

© 2015 Mitsubishi Electric US, Inc.

4-3-2. Installation

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

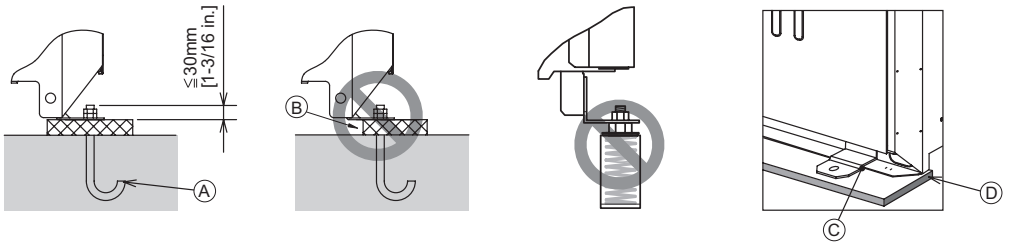
Ⓐ : M10 anchor bolt procured at the site.
Ⓑ : Corner is not seated.
Ⓒ : Fixing bracket for hole-in anchor bolt (3 locations to fix with screws).
Ⓓ : Anti-vibration rubber
Install it so that the rubber covers the entire width of the unit leg.

⚠WARNING

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

⚠WARNING

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



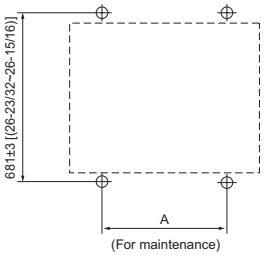
Take into consideration the durability of the base, water drainage route (Drain water is discharged from outdoor units during operation.), piping route, and wiring route when performing foundation work.

© 2015 Mitsubishi Electric US, Inc.

4-3-3. Anchor bolt positions

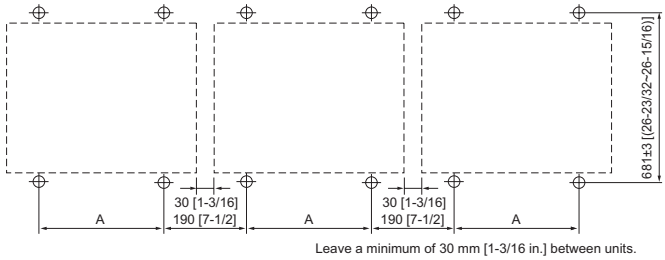
<P72, P96>

• Individual installation



• Collective installation

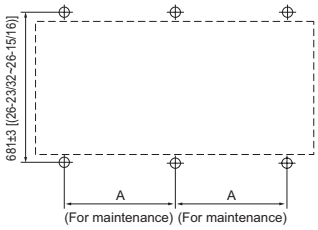
(Unit : mm [in.])



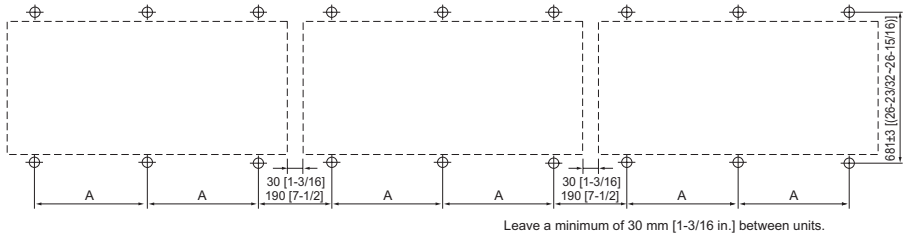
Leave a minimum of 30 mm [1-3/16 in.] between units.

<P120, P144>

• Individual installation



• Collective installation



Leave a minimum of 30 mm [1-3/16 in.] between units.

PURY	P72, 96	P120, 144
A	1060±2 [41-3/4(41-21/32~41-13/16)]	795±2 [31-5/16(31-1/4~31-13/32)]

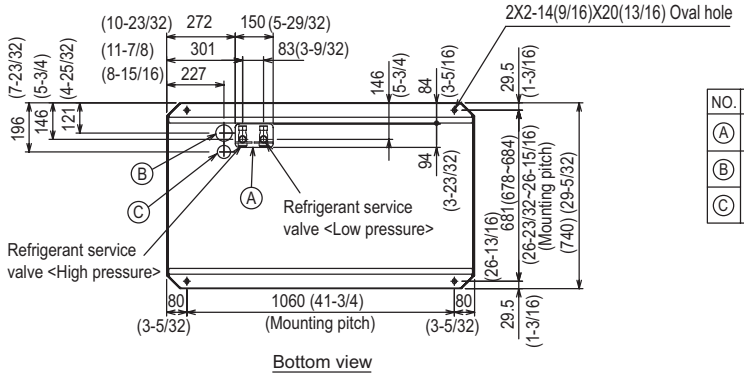
© 2015 Mitsubishi Electric US, Inc.

4-3-4. Installation

When the pipes and/or cables are routed at the bottom of the unit, make sure that the through hole at the base of the unit does not get blocked with the installation base.
When the pipes are routed at the bottom of the unit, the base should be at least 100 mm [3-15/16 in.] in height.

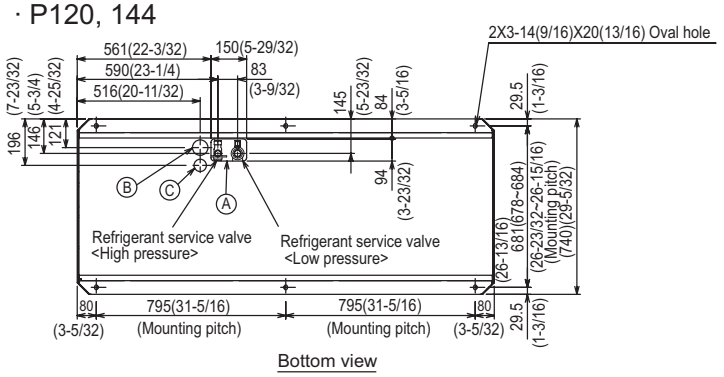
· P72, 96

(Unit : mm [in.])

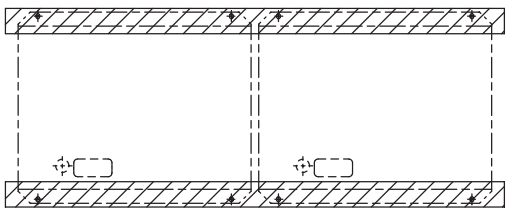


NO.	Usage		Specifications
Ⓐ	For pipes	Bottom through hole	150 × 94 Knockout hole (5-29/32) (3-23/32)
Ⓑ	For wires	Bottom through hole	Ø65 Knockout hole (2-9/16)
Ⓒ		Bottom through hole	Ø52 Knockout hole (2-1/16)

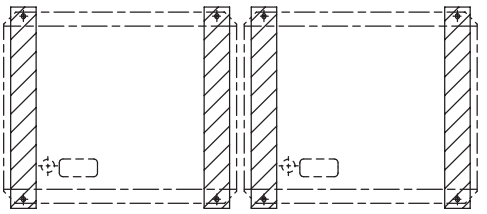
· P120, 144



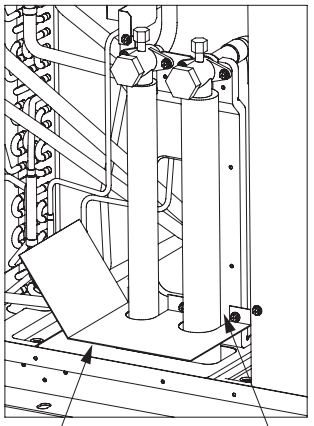
Installation base parallel to the unit's front panel



Installation base perpendicular to the unit's front panel



4-3-5. Refrigerant pipe routing



The gaps around the edges of through holes for pipes and wires on the unit allow water or mice to enter the unit and damage its parts. Close these gaps with filler plates.

This unit allows two types of pipe routing:
- Bottom piping
- Front piping

⚠ CAUTION

To prevent small animals, water and snow from entering the unit and damage its parts, close the gap around the edges of through holes for pipes and wires with filler plates.

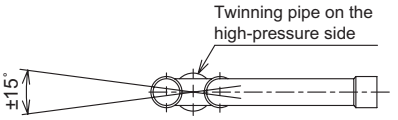
※ The figure above shows a unit on which a low-pressure twinning pipe kit is not installed.

© 2015 Mitsubishi Electric US, Inc.

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

- The tilt angle of the twinning pipe
  The tilt angle of the twinning pipe must be within ±15˚ with the horizontal plane.
  Tilting the twinning pipe more than specified will cause damage to the unit.
- The length of the straight part of the pipe before the branching (high-pressure side)
  For the twinning kit, always use the accessory piping parts.
  The length of the straight part of pipe connected in front of the twinning pipe must be 500 mm [19-11/16 in.] or longer.
  (Connect the field piping so that the length of the straight part of pipe connected in front of the twinning pipe can be 500 mm [19-11/16 in.] or longer.)
  If the length is less than 500 mm [19-11/16 in.], it will cause damage to the unit.

Note. Refer to the figure below for the installation position of the twinning pipe.

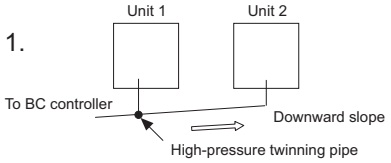


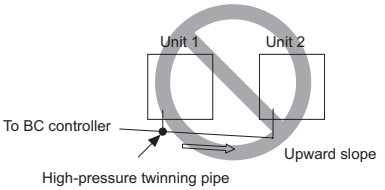
Inclination tolerance of the twinning pipe is ±15˚ relative to the horizontal plane.

- Precautions for outdoor unit combinations

  - Install the piping so that oil will not accumulate in the stopped outdoor unit. (high pressure side only)

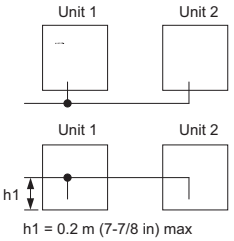
1.

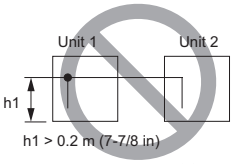




The NG example shows that oil accumulates because the units are installed on a reverse gradient while unit 1 is in operation, and unit 2 is stopped.

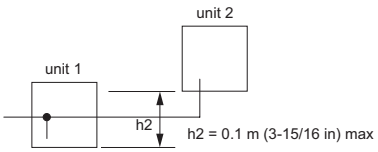
2.

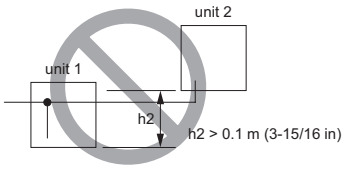




The NG example shows that oil accumulates into unit 1 while unit 2 is in operation, and unit 1 is stopped. Vertical pipe height (h) should be 0.2 m (7-7/8 in) or below.

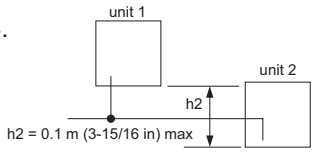
3.

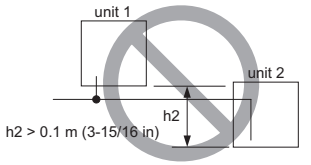




The NG example shows that oil accumulates into unit 1 while unit 2 is in operation, and unit 1 is stopped. Vertical pipe height (h) should be 0.2 m (7-7/8 in) or below.

4.



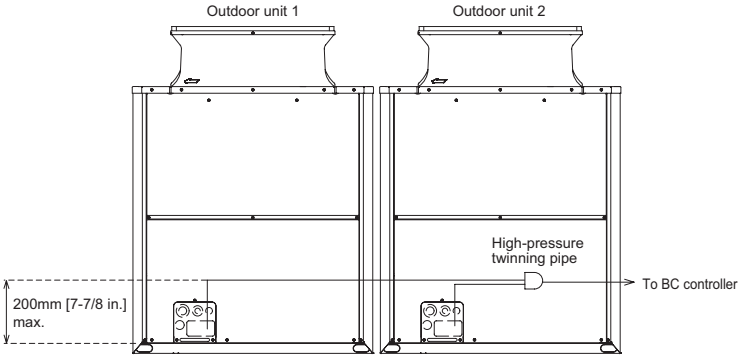


The NG example shows that oil accumulates into unit 2 while unit 1 is in operation, and unit 2 is stopped. Vertical pipe height (h) should be 0.2 m (7-7/8 in) or below.

⚠ Caution:

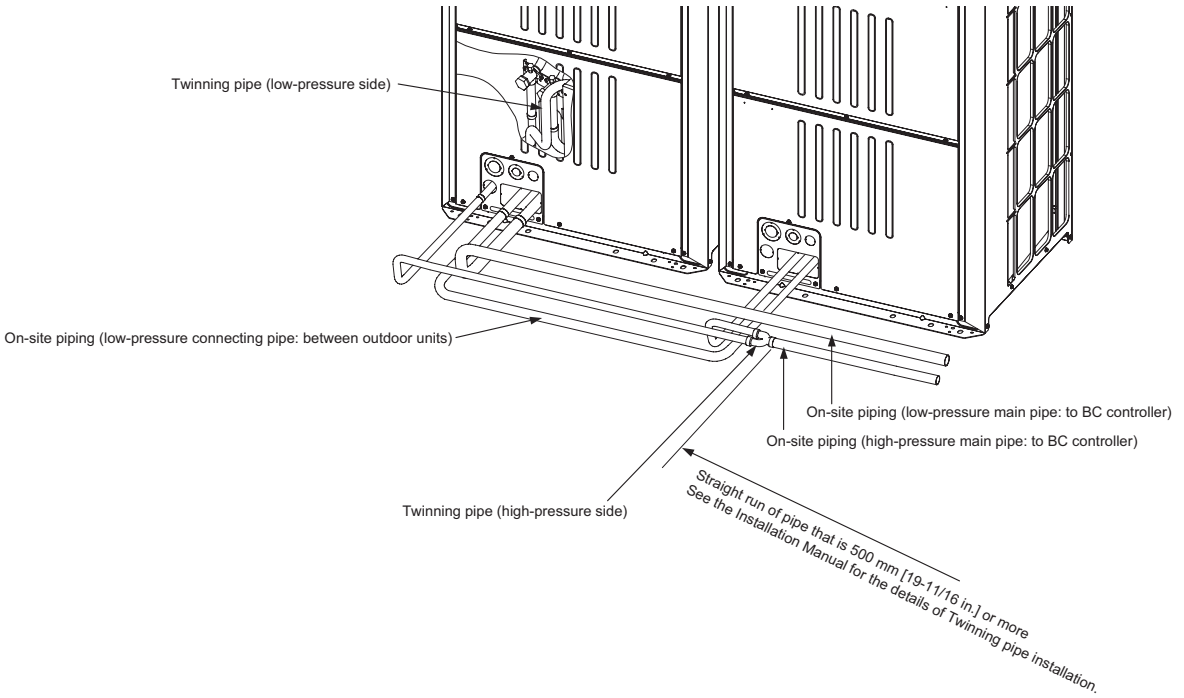
- **Do not install traps to prevent oil backflow and compressor start-up failure.**
- **Do not install solenoid valves to prevent oil backflow and compressor start-up failure.**
- **Do not install a sight glass because it may show improper refrigerant flow.**
  If a sight glass is installed, inexperienced technicians that use the glass may overcharge the refrigerant.

© 2015 Mitsubishi Electric US, Inc.



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

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



© 2015 Mitsubishi Electric US, Inc.

4-4. Weather Countermeasures

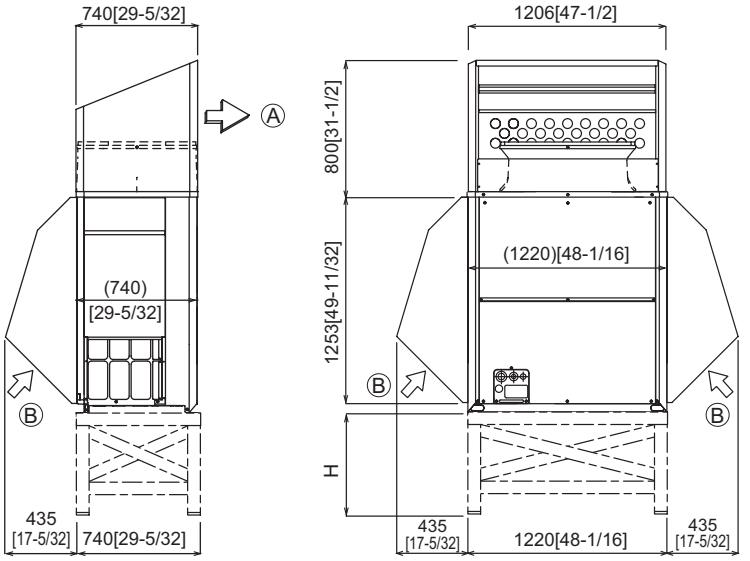
In cold and/or snowy areas, sufficient countermeasures to wind and snow damages should be taken for operating unit in normal and good condition in winter time. Surround the units with snow nets or fences to protect them from snow. Even in the other areas, full consideration is required for installation of unit in order to prevent abnormal operations caused by wind or snow. **When rain and snow directly fall on unit in the case of air-conditioning operations in 10 or less degrees centigrade outdoor air (50 or less degrees fahrenheit outdoor air) , mount inlet and outlet ducts on unit to ensure stable operations.**

Countermeasure to snow and wind:

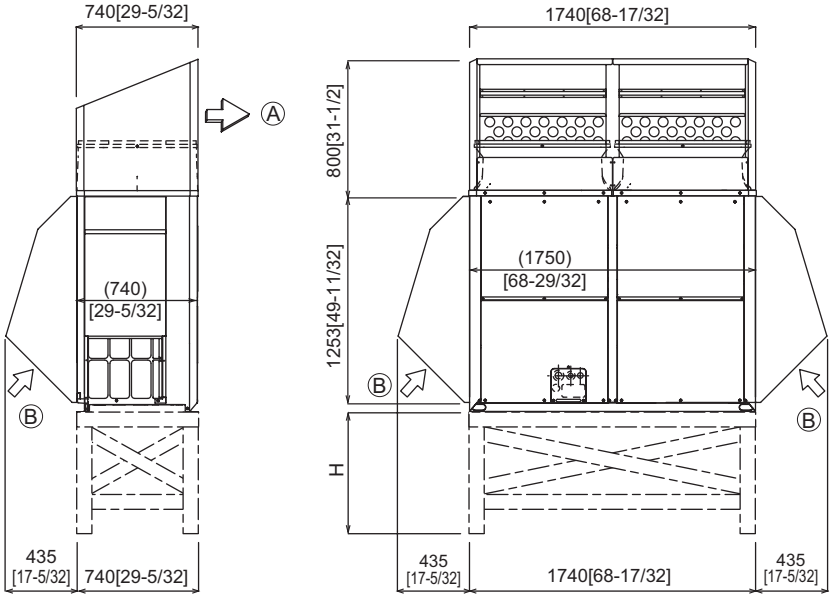
To prevent the outdoor unit from wind and snow damage in cold and snowy area, the snow hood shown below is recommended.

*Do not use a snow hood made of stainless steel, which may cause the unit to rust. If the use of a stainless snow hood is the only option, contact the sales office before installing it.

• Snow hood



<Side view> <Front view>



<Side view> <Front view>

Ⓐ Outlet Ⓑ Inlet

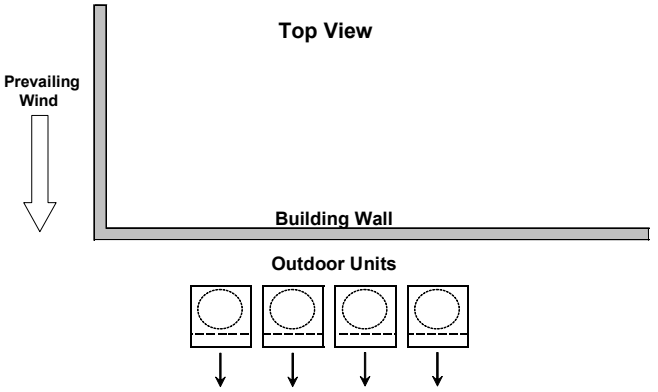
(Unit : mm[in.])

© 2015 Mitsubishi Electric US, Inc.

4-5. Low Ambient Kit Application Guidelines

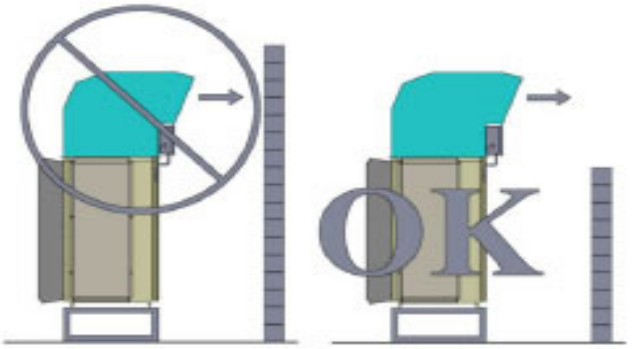
General Unit Placement and Clearances

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



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

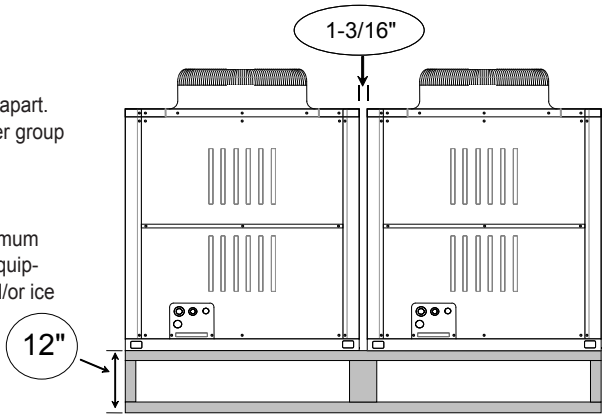
Note:
If the unit is located in an area with continuous high winds, the unit may require additional bracing. Contact your distributor for assistance.



Equipment Supports

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

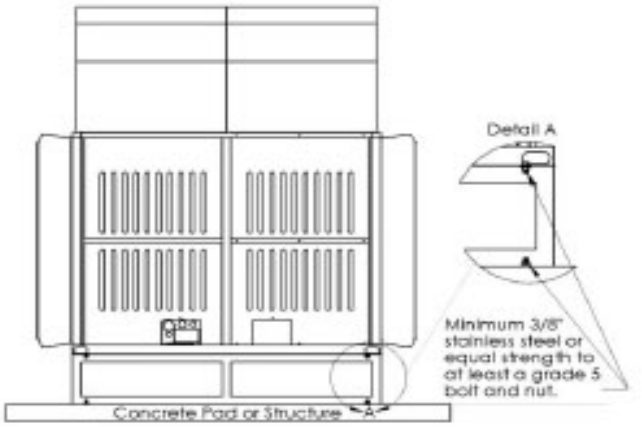
Note:
The equipment supports must elevate the unit at least 12" above the maximum expected snow depth or 12" above the ground, whichever is higher. The equipment supports must be an open construction to minimize snow drifting and/or ice formation during defrost.



© 2015 Mitsubishi Electric US, Inc.

4. OUTDOOR INSTALLATION

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



Additional Rooftop Mounting Guidelines

The preferred mounting location for the outdoor units with a low ambient kit is on the ground. However, if this is not possible follow all additional installation guidelines when rooftop mounting. If you have any questions, please consult your distributor.

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

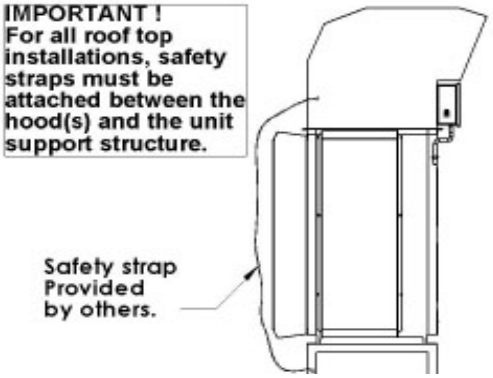
Outdoor units should be located in an area protected from prevailing winds.
Hood discharge should be directed away from or perpendicular to the prevailing winds. Never toward prevailing winds.

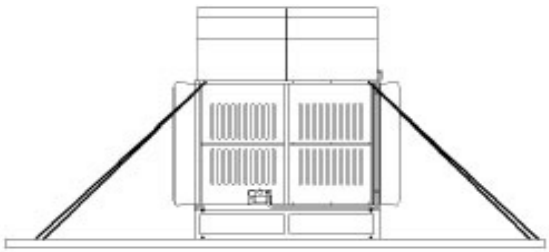
When using the low ambient components, add an additional 7" to the standard mounting clearances.

Note:
For all roof top installations, safety straps must be attached between the hood(s) and the equipment support structure. Straps should be a minimum 3/16" vinyl coated cable.

Straps must be attached to the hood where they will not interfere with the movement of the dampers. Attachment to both the hood and mounting structure is to be with a bolt through connection using a bolt ¼" or larger in diameter.

The outdoor unit and equipment support should be firmly attached to the structure. Or, if the equipment support is the type that does not attach to the structure, refer to the equipment support manufacturer's guidelines for proper size and construction.





© 2015 Mitsubishi Electric US, Inc.

5-1. General precautions

5-1-1. Usage

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

5-1-2. Installation environment

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

5-1-3. Backup system

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

5-1-4. Unit characteristics

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

5-1-5. Relevant equipment

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

© 2015 Mitsubishi Electric US, Inc.

5-1-6. Unit installation

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

5-1-7. Optional accessories

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

5-1-8. Operation/Maintenance

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

5-2. Precautions for Indoor unit

5-2-1. Operating environment

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

5-2-2. Unit characteristics

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

5-2-3. Unit installation

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

© 2015 Mitsubishi Electric US, Inc.

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

5-3-1. Usage

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

5-3-2. Unit characteristics

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

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

5-4-1. Installation environment

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

5-4-2. Unit characteristics

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

5-4-3. Relevant equipment

- Provide grounding in accordance with the local regulations.

© 2015 Mitsubishi Electric US, Inc.

5-5. Precautions for Control-related items

5-5-1. Product specification

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

5-5-2. Installation environment

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

© 2015 Mitsubishi Electric US, Inc.

6. STANDARD AND SEACOAST (BS) PROTECTION TREATMENT

6-1. R2-Series

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

Application Guide

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

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

For optimum performance, follow the cautions listed below.

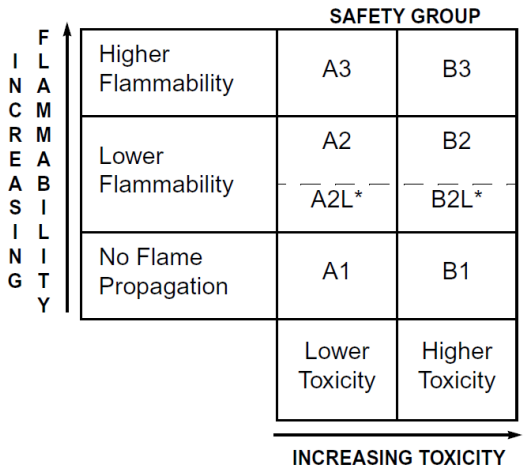
1. Avoid installing the unit in a location that is subjected to direct sea winds.
2. Do not attach a sunshade to the unit. Let the rain wash away any salt residue that may adhere to the unit.
3. Unit should be installed following instructions for proper operation and to ensure optimum water drainage.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

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

© 2015 Mitsubishi Electric US, Inc.

7-1. Refrigerant Leakage Considerations

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



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

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

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

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

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

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

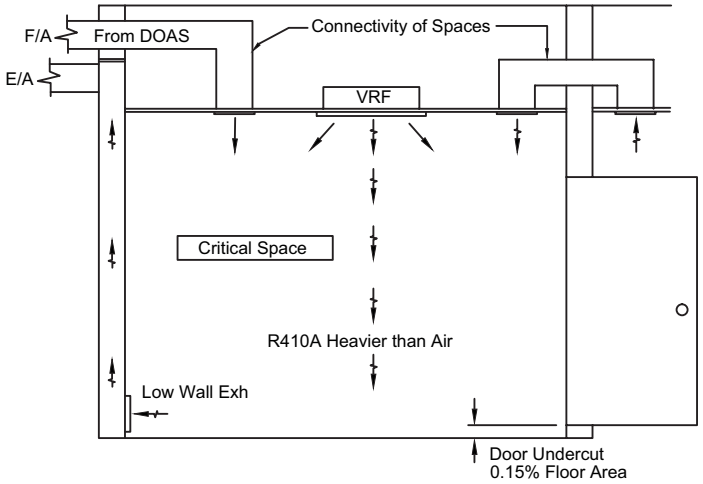
If a particular space, per this calculation, exceeds the concentration limit of 26 lbs/Mcf, the volume must be increased through connectivity to maintain the leakage concentration level below the threashold.

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

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

© 2015 Mitsubishi Electric US, Inc.

Counter Measure Example for Critical Space Volumes
Creating Connectivity of Spaces



© 2015 Mitsubishi Electric US, Inc.

© 2015 Mitsubishi Electric US, Inc.