

# TOSHIBA

FILE NO.SVM-04015

## SERVICE MANUAL

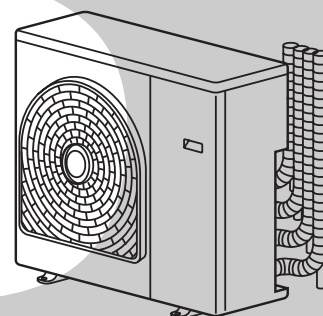
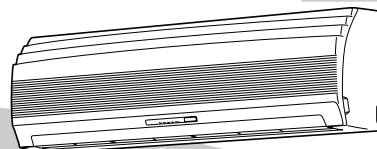
# AIR-CONDITIONER

## SPLIT TYPE

***RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3***  
***RAS-4M27YAV-E***

***RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3***  
***RAS-4M27YACV-E***

***RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3***  
***RAS-3M26YAV-E***



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# 1. SPECIFICATIONS

## 1-1. Specifications

### RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3/RAS-4M27YAV-E, RAS-3M26YAV-E

Unit model	Indoor		RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3									
	Outdoor		RAS-4M27YAV-E			RAS-3M26YAV-E						
Cooling capacity			(kW)			8.0			7.5			
Cooling capacity range			(kW)			1.4 – 9.2			1.4 – 8.9			
Heating capacity			(kW)			9.0			9.0			
Heating capacity range			(kW)			0.8 – 11.0			0.8 – 10.8			
Power supply			220/230/240V, 1Ph, 50/60Hz									
Electric characteristics	Indoor	Unit model	RAS-M10UKV-E3			RAS-M13UKV-E3			RAS-M16UKV-E3			
		Running current	(A)			0.15			0.15			
		Power consumption	(W)			30			30			
		Power factor	(%)			91/87/83			91/87/83			
	Total	Operation mode	Cooling		Heating		Cooling		Heating			
		Running current	(A)		11.60/11.09/10.63		10.44/9.98/9.57		10.44/9.98/9.57		11.83/11.31/10.84	
		Power consumption	(W)		2500		2250		2250		2550	
		Power factor	(%)		98		98		98		98	
		Starting current	(A)		11.60/11.09/10.63		11.83/11.31/10.84					
C.O.P. (Cooling/Heating)			3.20/4.00			3.33/3.53						
Operating noise	Indoor (Cooling/Heating)	Unit model	RAS-M10UKV-E3			RAS-M13UKV-E3			RAS-M16UKV-E3			
		High	dB (A)			36/39			42/42			
		Medium	dB (A)			33/35			39/39			
		Low	dB (A)			28/29			33/33			
	Outdoor (Cooling/Heating)	Unit model	RAS-4M27YAV-E			RAS-3M26YAV-E						
		Full indoor units operating	dB (A)			48/48			48/48			
Indoor unit	Unit model		RAS-M10UKV-E3			RAS-M13UKV-E3			RAS-M16UKV-E3			
	Dimension	Height	(mm)			275			275			
		Width	(mm)			790			790			
		Depth	(mm)			208			208			
	Net weight			(kg)			10			10		
	Fan motor output			(W)			19			19		
	Air flow rate (Cooling/Heating)			(m³/h)			470/520			520/560		
							600/600					
Outdoor unit	Unit model		RAS-4M27YAV-E			RAS-3M26YAV-E						
	Dimension	Height	(mm)			795			795			
		Width	(mm)			900			900			
		Depth	(mm)			320			320			
	Net weight			(kg)			65			64		
	Compressor	Motor output	(W)			2000						
		Type				Twin rotary type with DC-inverter variable speed control						
		Model				DA220A2F-20L						
	Fan motor output			(W)			60					
	Air flow rate			(m³/h)			High : 3000, Medium : 2800					
Piping connection	Type		Flare connection									
	Indoor unit	Unit model	RAS-M10UKV-E3			RAS-M13UKV-E3			RAS-M16UKV-E3			
		Liquid side	Ø6.35			Ø6.35			Ø6.35			
		Gas side	Ø9.52			Ø9.52			Ø12.7			
	Outdoor unit	Unit model	RAS-4M27YAV-E			RAS-3M26YAV-E						
		A unit liquid side/gas side	Ø6.35/Ø12.7			Ø6.35/Ø12.7						
		B unit liquid side/gas side	Ø6.35/Ø9.52			Ø6.35/Ø9.52						
		C unit liquid side/gas side	Ø6.35/Ø9.52			Ø6.35/Ø9.52						
		D unit liquid side/gas side	Ø6.35/Ø9.52			—						
	Maximum length (per unit)			(m)			25			25		
	Maximum length (total)			(m)			70			50		
	Maximum chargeless length			(m)			70			50		
Maximum height difference			(m)			15			15			
Refrigerant	Name of refrigerant		R410A									
	Weight		(kg)			2.4						
Wiring connection		Power supply		3 wires : includes earth								
		Interconnection		4 wires : includes earth								
Usable temperature range		Indoor	(°C)		21 – 32/0 – 28							
		Outdoor	(°C)		10 – 43/-10 – 21							
Accessory	Indoor unit	Installation plate				1						
		Wireless remote controller				1						
		Label				2						
		Remote controller holder				1						
		Pan head wood screw				2 (Ø3.1 x 16L)						
		Purifying filter				1						
		Deodorizing filter				1						
		Battery				2						
		Mounting screw				6 (Ø4 x 25L)						
		Installation manual				1						
		Outdoor unit	Installation manual				1					
			Owner's manual				1					

- For performance when each indoor unit is combined with other unit, refer to the separate table.
- The specifications may be subject to change without notice for purpose of improvement.

# RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3/RAS-4M27YACV-E

Unit model		Indoor		RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3			
		Outdoor		RAS-4M27YACV-E			
Cooling capacity		(kW)		8.0			
Cooling capacity range		(kW)		1.4 – 9.2			
Power supply				220/230/240V, 1Ph, 50/60Hz			
Electric characteristics	Indoor	Unit model		RAS-M10UKCV-E3	RAS-M13UKCV-E3	RAS-M16UKCV-E3	
		Running current	(A)	0.15	0.15	0.15	
		Power consumption	(W)	30	30	30	
		Power factor	(%)	91/87/83	91/87/83	91/87/83	
	Total	Running current	(A)	11.60/11.09/10.63			
		Power consumption	(W)	2500			
		Power factor	(%)	98			
		Starting current	(A)	11.60/11.09/10.63			
C.O.P.				3.20			
Operating noise	Indoor	Unit model		RAS-M10UKCV-E3	RAS-M13UKCV-E3	RAS-M16UKCV-E3	
		High	dB (A)	36	39	42	
		Medium	dB (A)	33	35	39	
		Low	B (A)	28	28	33	
	Outdoor	Unit model		RAS-4M27YACV-E			
		4 indoor units operating	dB (A)	48			
Indoor unit	Unit model			RAS-M10UKCV-E3	RAS-M13UKCV-E3	RAS-M16UKCV-E3	
	Dimension	Height	(mm)	275	275	275	
		Width	(mm)	790	790	790	
		Depth	(mm)	208	208	208	
	Net weight	(kg)		10	10	10	
	Fan motor output	(W)		19	19	19	
	Air flow rate	(m³/h)		470	520	600	
Outdoor unit	Unit model			RAS-4M27YACV-E			
	Dimension	Height	(mm)	795			
		Width	(mm)	900			
		Depth	(mm)	320			
	Net weight	(kg)		63			
	Compressor	Motor output	(W)	2000			
		Type	Twin rotary type with DC-inverter variable speed control				
		Model	DA220A2F-20L				
	Fan motor output	(W)		60			
Air flow rate	(m³/h)		High : 3000, Medium : 2800				
Piping connection	Type			Flare connection			
	Indoor unit	Unit model		RAS-M10UKCV-E3	RAS-M13UKCV-E3	RAS-M16UKCV-E3	
		Liquid side		Ø6.35	Ø6.35	Ø6.35	
		Gas side		Ø9.52	Ø9.52	Ø12.7	
	Outdoor unit	Unit model			RAS-4M27YACV-E		
		A unit liquid side/gas side	Ø6.35/Ø12.7				
		B unit liquid side/gas side	Ø6.35/Ø9.52				
		C unit liquid side/gas side	Ø6.35/Ø9.52				
		D unit liquid side/gas side	Ø6.35/Ø9.52				
	Maximum length (per unit)	(m)	25				
	Maximum length (total)	(m)	70				
	Maximum chargeless length	(m)	70				
	Maximum height difference	(m)	15				
Refrigerant	Name of refrigerant			R410A			
	Weight	(kg)	2.2				
Wiring connection		Power supply	3 wires : includes earth				
		Interconnection	4 wires : includes earth				
Usable temperature range		Indoor	(°C)	21 – 32			
		Outdoor	(°C)	10 – 43			
Accessory	Indoor unit	Installation plate	1				
		Wireless remote controller	1				
		Label	2				
		Remote controller holder	1				
		Pan head wood screw	2 (Ø3.1 x 16L)				
		Purifying filter	1				
		Deodorizing filter	1				
		Battery	2				
		Mounting screw	6 (Ø4 x 25L)				
		Installation manual	1				
		Outdoor unit	Installation manual	1			
			Owner's manual	1			

- For performance when each indoor unit is combined with other unit, refer to the separate table.
- The specifications may be subject to change without notice for purpose of improvement.

## 1-2. Specifications of Performance When Each Indoor Unit is Combined with other Unit

Outdoor Unit : RAS-4M27YAV-E

<Cooling/220V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
220	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.87 (3.68 to 4.64)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.74 (3.68 to 7.20)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.81 (3.68 to 9.28)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	7.10 (3.64 to 9.46)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.40 (3.75 to 10.30)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.76 (3.92 to 11.92)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.83 (3.98 to 12.76)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	11.13 (4.80 to 12.62)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	11.18 (4.85 to 12.71)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	11.18 (4.85 to 12.94)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	11.18 (4.85 to 12.94)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	11.27 (4.90 to 13.03)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	11.27 (4.90 to 13.03)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	11.32 (4.90 to 13.13)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	11.32 (4.90 to 13.13)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	11.32 (4.90 to 13.36)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	11.36 (4.95 to 13.45)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	11.36 (4.70 to 12.99)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	11.36 (4.75 to 13.08)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.60 (4.75 to 13.27)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.60 (4.75 to 13.27)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.60 (4.80 to 13.36)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.60 (4.80 to 13.36)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-4M27YAV-E

## <Cooling/230V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
230	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.71 (3.52 to 4.44)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.49 (3.52 to 6.88)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.47 (3.52 to 8.87)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.79 (3.48 to 9.05)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.03 (3.59 to 9.85)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.29 (3.75 to 11.40)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.31 (3.80 to 12.20)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	10.65 (4.59 to 12.07)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	10.69 (4.64 to 12.16)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.69 (4.64 to 12.38)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.69 (4.64 to 12.38)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.78 (4.69 to 12.47)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.78 (4.69 to 12.47)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.83 (4.69 to 12.56)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.83 (4.69 to 12.56)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	10.83 (4.69 to 12.78)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	10.87 (4.73 to 12.87)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	10.87 (4.49 to 12.42)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	10.87 (4.54 to 12.51)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.09 (4.54 to 12.69)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.09 (4.54 to 12.69)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.09 (4.59 to 12.78)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.09 (4.59 to 12.78)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

## Outdoor Unit : RAS-4M27YAV-E

### <Cooling/240V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
240	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.55 (3.38 to 4.26)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.26 (3.38 to 6.60)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.16 (3.38 to 8.50)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.51 (3.33 to 8.67)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	7.70 (3.44 to 9.44)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	9.86 (3.59 to 10.93)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	10.84 (3.65 to 11.69)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	10.20 (4.40 to 11.56)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	10.25 (4.44 to 11.65)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.25 (4.44 to 11.86)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.25 (4.44 to 11.86)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.33 (4.49 to 11.95)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.33 (4.49 to 11.95)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.37 (4.49 to 12.03)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.37 (4.49 to 12.03)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	10.37 (4.49 to 12.24)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	10.42 (4.54 to 12.33)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	10.42 (4.31 to 11.90)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	10.42 (4.35 to 11.99)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	10.63 (4.35 to 12.16)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	10.63 (4.35 to 12.16)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	10.63 (4.40 to 12.24)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	10.63 (4.40 to 12.24)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-4M27YAV-E

## <Heating/220V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
220	1 unit	10	—	—	—	4.0	—	—	—	4.0 (0.8 to 5.2)	1450 (300 to 1980)	6.73 (1.87 to 9.18)	48
		13	—	—	—	5.0	—	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	9.51 (1.93 to 12.76)	48
		16	—	—	—	5.5	—	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	11.13 (1.93 to 13.91)	48
	2 units	10	10	—	—	3.60	3.60	—	—	7.2 (1.5 to 10.0)	2100 (320 to 3200)	9.74 (1.94 to 14.84)	48
		13	10	—	—	4.22	3.38	—	—	7.6 (1.5 to 10.1)	2320 (320 to 3210)	10.76 (1.94 to 14.89)	48
		16	10	—	—	4.57	3.33	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	11.50 (1.94 to 14.98)	48
		13	13	—	—	3.95	3.95	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	11.50 (1.94 to 14.98)	48
		16	13	—	—	4.35	3.95	—	—	8.3 (1.5 to 10.2)	2700 (320 to 3240)	12.52 (1.94 to 15.03)	48
		16	16	—	—	4.30	4.30	—	—	8.6 (1.5 to 10.2)	2860 (320 to 3250)	13.27 (1.94 to 15.07)	48
	3 units	10	10	10	—	2.87	2.87	2.87	—	8.6 (2.0 to 10.4)	2300 (380 to 2750)	10.67 (2.16 to 12.76)	48
		13	10	10	—	3.35	2.68	2.68	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.90 (2.16 to 12.80)	48
		16	10	10	—	3.54	2.58	2.58	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.90 (2.16 to 12.80)	48
		13	13	10	—	3.11	3.11	2.49	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.90 (2.16 to 12.80)	48
		16	13	10	—	3.34	3.03	2.43	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	11.13 (2.16 to 12.89)	48
		13	13	13	—	2.93	2.93	2.93	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	11.13 (2.16 to 12.89)	48
		16	16	10	—	3.26	3.26	2.37	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	11.36 (2.16 to 12.94)	48
		16	13	13	—	3.16	2.87	2.87	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	11.36 (2.16 to 12.94)	48
		16	16	13	—	3.06	3.06	2.78	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	11.36 (2.16 to 12.94)	48
		16	16	16	—	3.00	3.00	3.00	—	9.0 (2.0 to 10.8)	2500 (380 to 2800)	11.60 (2.16 to 12.99)	48
	4 units	10	10	10	10	2.23	2.23	2.23	2.23	8.9 (2.2 to 10.8)	2100 (450 to 2810)	9.74 (2.56 to 13.03)	48
		13	10	10	10	2.62	2.09	2.09	2.09	8.9 (2.2 to 10.9)	2100 (460 to 2830)	9.74 (2.61 to 13.13)	48
		16	10	10	10	2.83	2.06	2.06	2.06	9.0 (2.2 to 10.9)	2250 (460 to 2830)	10.44 (2.61 to 13.13)	48
		13	13	10	10	2.50	2.50	2.00	2.00	9.0 (2.2 to 10.9)	2250 (470 to 2830)	10.44 (2.67 to 13.13)	48
		16	13	10	10	2.68	2.43	1.95	1.95	9.0 (2.2 to 11.0)	2250 (480 to 2850)	10.44 (2.73 to 13.22)	48
		13	13	13	10	2.37	2.37	2.37	1.89	9.0 (2.2 to 11.0)	2250 (480 to 2850)	10.44 (2.73 to 13.22)	48
		16	13	13	10	2.54	2.31	2.31	1.85	9.0 (2.2 to 11.0)	2250 (490 to 2850)	10.44 (2.78 to 13.22)	48
		13	13	13	13	2.25	2.25	2.25	2.25	9.0 (2.2 to 11.0)	2250 (490 to 2850)	10.44 (2.78 to 13.22)	48
		16	16	10	10	2.61	2.61	1.89	1.89	9.0 (2.2 to 11.0)	2250 (500 to 2850)	10.44 (2.84 to 13.22)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3



# Outdoor Unit : RAS-4M27YAV-E

<Heating/230V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
230	1 unit	10	—	—	—	4.0	—	—	—	4.0 (0.8 to 5.2)	1450 (300 to 1980)	6.43 (1.79 to 8.78)	48
		13	—	—	—	5.0	—	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	9.09 (1.85 to 12.20)	48
		16	—	—	—	5.5	—	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	10.65 (1.85 to 13.31)	48
	2 units	10	10	—	—	3.60	3.60	—	—	7.2 (1.5 to 10.0)	2100 (320 to 3200)	9.32 (1.86 to 14.20)	48
		13	10	—	—	4.22	3.38	—	—	7.6 (1.5 to 10.1)	2320 (320 to 3210)	10.29 (1.86 to 14.24)	48
		16	10	—	—	4.57	3.33	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	11.00 (1.86 to 14.33)	48
		13	13	—	—	3.95	3.95	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	11.00 (1.86 to 14.33)	48
		16	13	—	—	4.35	3.95	—	—	8.3 (1.5 to 10.2)	2700 (320 to 3240)	11.98 (1.86 to 14.37)	48
		16	16	—	—	4.30	4.30	—	—	8.6 (1.5 to 10.2)	2860 (320 to 3250)	12.69 (1.86 to 14.42)	48
	3 units	10	10	10	—	2.87	2.87	2.87	—	8.6 (2.0 to 10.4)	2300 (380 to 2750)	10.20 (2.07 to 12.20)	48
		13	10	10	—	3.35	2.68	2.68	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.43 (2.07 to 12.24)	48
		16	10	10	—	3.54	2.58	2.58	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.43 (2.07 to 12.24)	48
		13	13	10	—	3.11	3.11	2.49	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	10.43 (2.07 to 12.24)	48
		16	13	10	—	3.34	3.03	2.43	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	10.65 (2.07 to 12.33)	48
		13	13	13	—	2.93	2.93	2.93	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	10.65 (2.07 to 12.33)	48
		16	16	10	—	3.26	3.26	2.37	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.87 (2.07 to 12.38)	48
		16	13	13	—	3.16	2.87	2.87	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.87 (2.07 to 12.38)	48
		16	16	13	—	3.06	3.06	2.78	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.87 (2.07 to 12.38)	48
		16	16	16	—	3.00	3.00	3.00	—	9.0 (2.0 to 10.8)	2500 (380 to 2800)	11.09 (2.07 to 12.42)	48
	4 units	10	10	10	10	2.23	2.23	2.23	2.23	8.9 (2.2 to 10.8)	2100 (450 to 2810)	9.32 (2.45 to 12.47)	48
		13	10	10	10	2.62	2.09	2.09	2.09	8.9 (2.2 to 10.9)	2100 (460 to 2830)	9.32 (2.50 to 12.56)	48
		16	10	10	10	2.83	2.06	2.06	2.06	9.0 (2.2 to 10.9)	2250 (460 to 2830)	9.98 (2.50 to 12.56)	48
		13	13	10	10	2.50	2.50	2.00	2.00	9.0 (2.2 to 10.9)	2250 (470 to 2830)	9.98 (2.55 to 12.56)	48
		16	13	10	10	2.68	2.43	1.95	1.95	9.0 (2.2 to 11.0)	2250 (480 to 2850)	9.98 (2.61 to 12.64)	48
		13	13	13	10	2.37	2.37	2.37	1.89	9.0 (2.2 to 11.0)	2250 (480 to 2850)	9.98 (2.61 to 12.64)	48
		16	13	13	10	2.54	2.31	2.31	1.85	9.0 (2.2 to 11.0)	2250 (490 to 2850)	9.98 (2.66 to 12.64)	48
		13	13	13	13	2.25	2.25	2.25	2.25	9.0 (2.2 to 11.0)	2250 (490 to 2850)	9.98 (2.66 to 12.64)	48
		16	16	10	10	2.61	2.61	1.89	1.89	9.0 (2.2 to 11.0)	2250 (500 to 2850)	9.98 (2.72 to 12.64)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-4M27YAV-E

## <Heating/240V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
240	1 unit	10	—	—	—	4.0	—	—	—	4.0 (0.8 to 5.2)	1450 (300 to 1980)	6.16 (1.71 to 8.42)	48
		13	—	—	—	5.0	—	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	8.72 (1.77 to 11.69)	48
		16	—	—	—	5.5	—	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	10.20 (1.77 to 12.76)	48
	2 units	10	10	—	—	3.60	3.60	—	—	7.2 (1.5 to 10.0)	2100 (320 to 3200)	8.93 (1.78 to 13.61)	48
		13	10	—	—	4.22	3.38	—	—	7.6 (1.5 to 10.1)	2320 (320 to 3210)	9.86 (1.78 to 13.65)	48
		16	10	—	—	4.57	3.33	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	10.54 (1.78 to 13.73)	48
		13	13	—	—	3.95	3.95	—	—	7.9 (1.5 to 10.1)	2480 (320 to 3230)	10.54 (1.78 to 13.73)	48
		16	13	—	—	4.35	3.95	—	—	8.3 (1.5 to 10.2)	2700 (320 to 3240)	11.48 (1.78 to 13.78)	48
		16	16	—	—	4.30	4.30	—	—	8.6 (1.5 to 10.2)	2860 (320 to 3250)	12.16 (1.78 to 13.82)	48
	3 units	10	10	10	—	2.87	2.87	2.87	—	8.6 (2.0 to 10.4)	2300 (380 to 2750)	9.78 (1.98 to 11.69)	48
		13	10	10	—	3.35	2.68	2.68	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	9.99 (1.98 to 11.73)	48
		16	10	10	—	3.54	2.58	2.58	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	9.99 (1.98 to 11.73)	48
		13	13	10	—	3.11	3.11	2.49	—	8.7 (2.0 to 10.5)	2350 (380 to 2760)	9.99 (1.98 to 11.73)	48
		16	13	10	—	3.34	3.03	2.43	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	10.20 (1.98 to 11.82)	48
		13	13	13	—	2.93	2.93	2.93	—	8.8 (2.0 to 10.6)	2400 (380 to 2780)	10.20 (1.98 to 11.82)	48
		16	16	10	—	3.26	3.26	2.37	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.42 (1.98 to 11.86)	48
		16	13	13	—	3.16	2.87	2.87	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.42 (1.98 to 11.86)	48
		16	16	13	—	3.06	3.06	2.78	—	8.9 (2.0 to 10.7)	2450 (380 to 2790)	10.42 (1.98 to 11.86)	48
		16	16	16	—	3.00	3.00	3.00	—	9.0 (2.0 to 10.8)	2500 (380 to 2800)	10.63 (1.98 to 11.90)	48
	4 units	10	10	10	10	2.23	2.23	2.23	2.23	8.9 (2.2 to 10.8)	2100 (450 to 2810)	8.93 (2.34 to 11.95)	48
		13	10	10	10	2.62	2.09	2.09	2.09	8.9 (2.2 to 10.9)	2100 (460 to 2830)	8.93 (2.40 to 12.03)	48
		16	10	10	10	2.83	2.06	2.06	2.06	9.0 (2.2 to 10.9)	2250 (460 to 2830)	9.57 (2.40 to 12.03)	48
		13	13	10	10	2.50	2.50	2.00	2.00	9.0 (2.2 to 10.9)	2250 (470 to 2830)	9.57 (2.45 to 12.03)	48
		16	13	10	10	2.68	2.43	1.95	1.95	9.0 (2.2 to 11.0)	2250 (480 to 2850)	9.57 (2.50 to 12.12)	48
		13	13	13	10	2.37	2.37	2.37	1.89	9.0 (2.2 to 11.0)	2250 (480 to 2850)	9.57 (2.50 to 12.12)	48
		16	13	13	10	2.54	2.31	2.31	1.85	9.0 (2.2 to 11.0)	2250 (490 to 2850)	9.57 (2.55 to 12.12)	48
		13	13	13	13	2.25	2.25	2.25	2.25	9.0 (2.2 to 11.0)	2250 (490 to 2850)	9.57 (2.55 to 12.12)	48
		16	16	10	10	2.61	2.61	1.89	1.89	9.0 (2.2 to 11.0)	2250 (500 to 2850)	9.57 (2.60 to 12.12)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-4M27YACV-E

## <Cooling/220V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
220	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.87 (3.68 to 4.64)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.74 (3.68 to 7.20)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.81 (3.68 to 9.28)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	7.10 (3.64 to 9.46)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.40 (3.75 to 10.30)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.76 (3.92 to 11.92)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.83 (3.98 to 12.76)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	11.13 (4.80 to 12.62)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	11.18 (4.85 to 12.71)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	11.18 (4.85 to 12.94)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	11.18 (4.85 to 12.94)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	11.27 (4.90 to 13.03)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	11.27 (4.90 to 13.03)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	11.32 (4.90 to 13.13)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	11.32 (4.90 to 13.13)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	11.32 (4.90 to 13.36)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	11.36 (4.95 to 13.45)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	11.36 (4.70 to 12.99)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	11.36 (4.75 to 13.08)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.60 (4.75 to 13.27)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.60 (4.75 to 13.27)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.60 (4.80 to 13.36)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.60 (4.80 to 13.36)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.60 (4.80 to 13.45)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKCV-E3, 13 : RAS-M13UKCV-E3, 16 : RAS-M16UKCV-E3

# Outdoor Unit : RAS-4M27YACV-E

## <Cooling/230V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
230	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.71 (3.52 to 4.44)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.49 (3.52 to 6.88)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.47 (3.52 to 8.87)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.79 (3.48 to 9.05)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.03 (3.59 to 9.85)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.29 (3.75 to 11.40)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.31 (3.80 to 12.20)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	10.65 (4.59 to 12.07)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	10.69 (4.64 to 12.16)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.69 (4.64 to 12.38)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.69 (4.64 to 12.38)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.78 (4.69 to 12.47)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.78 (4.69 to 12.47)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.83 (4.69 to 12.56)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.83 (4.69 to 12.56)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	10.83 (4.69 to 12.78)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	10.87 (4.73 to 12.87)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	10.87 (4.49 to 12.42)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	10.87 (4.54 to 12.51)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.09 (4.54 to 12.69)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	11.09 (4.54 to 12.69)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.09 (4.59 to 12.78)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	11.09 (4.59 to 12.78)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	11.09 (4.59 to 12.87)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKCV-E3, 13 : RAS-M13UKCV-E3, 16 : RAS-M16UKCV-E3

# Outdoor Unit : RAS-4M27YACV-E

## <Cooling/240V>

Power supply (V)	Operating status	Indoor unit				Unit capacity (kW)				Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	D	A	B	C	D				
240	1 unit	10	—	—	—	2.7	—	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.55 (3.38 to 4.26)	48
		13	—	—	—	3.7	—	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.26 (3.38 to 6.60)	48
		16	—	—	—	4.5	—	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.16 (3.38 to 8.50)	48
	2 units	10	10	—	—	2.70	2.70	—	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.51 (3.33 to 8.67)	48
		13	10	—	—	3.41	2.49	—	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	7.70 (3.44 to 9.44)	48
		16	10	—	—	3.94	2.36	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		13	13	—	—	3.15	3.15	—	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		16	13	—	—	3.73	3.07	—	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	9.86 (3.59 to 10.93)	48
		16	16	—	—	3.60	3.60	—	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	10.84 (3.65 to 11.69)	48
	3 units	10	10	10	—	2.53	2.53	2.53	—	7.6 (3.8 to 8.2)	2400 (950 to 2720)	10.20 (4.40 to 11.56)	48
		13	10	10	—	3.13	2.28	2.28	—	7.7 (3.9 to 8.3)	2410 (960 to 2740)	10.25 (4.44 to 11.65)	48
		16	10	10	—	3.50	2.10	2.10	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.25 (4.44 to 11.86)	48
		13	13	10	—	2.82	2.82	2.06	—	7.7 (4.0 to 8.5)	2410 (960 to 2790)	10.25 (4.44 to 11.86)	48
		16	13	10	—	3.22	2.65	1.93	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.33 (4.49 to 11.95)	48
		13	13	13	—	2.60	2.60	2.60	—	7.8 (4.1 to 8.6)	2430 (970 to 2810)	10.33 (4.49 to 11.95)	48
		16	16	10	—	3.04	3.04	1.82	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.37 (4.49 to 12.03)	48
		16	13	13	—	2.99	2.46	2.46	—	7.9 (4.1 to 8.7)	2440 (970 to 2830)	10.37 (4.49 to 12.03)	48
		16	16	13	—	2.80	2.80	2.30	—	7.9 (4.2 to 8.9)	2440 (970 to 2880)	10.37 (4.49 to 12.24)	48
		16	16	16	—	2.67	2.67	2.67	—	8.0 (4.3 to 9.0)	2450 (980 to 2900)	10.42 (4.54 to 12.33)	48
	4 units	10	10	10	10	1.98	1.98	1.98	1.98	7.9 (4.0 to 8.7)	2450 (930 to 2800)	10.42 (4.31 to 11.90)	48
		13	10	10	10	2.48	1.81	1.81	1.81	7.9 (4.1 to 8.8)	2450 (940 to 2820)	10.42 (4.35 to 11.99)	48
		16	10	10	10	2.86	1.71	1.71	1.71	8.0 (4.1 to 9.0)	2500 (940 to 2860)	10.63 (4.35 to 12.16)	48
		13	13	10	10	2.31	2.31	1.69	1.69	8.0 (4.1 to 9.0)	2500 (940 to 2860)	10.63 (4.35 to 12.16)	48
		16	13	10	10	2.65	2.18	1.59	1.59	8.0 (4.2 to 9.1)	2500 (950 to 2880)	10.63 (4.40 to 12.24)	48
		13	13	13	10	2.14	2.14	2.14	1.57	8.0 (4.2 to 9.1)	2500 (950 to 2880)	10.63 (4.40 to 12.24)	48
		16	13	13	10	2.47	2.03	2.03	1.48	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48
		13	13	13	13	2.00	2.00	2.00	2.00	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48
		16	16	10	10	2.50	2.50	1.50	1.50	8.0 (4.2 to 9.2)	2500 (950 to 2900)	10.63 (4.40 to 12.33)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKCV-E3, 13 : RAS-M13UKCV-E3, 16 : RAS-M16UKCV-E3

# Outdoor Unit : RAS-3M26YAV-E

## <Cooling/220V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
220	1 unit	10	—	—	2.7	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.87 (3.68 to 4.64)	48
		13	—	—	3.7	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.74 (3.68 to 7.20)	48
		16	—	—	4.5	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.81 (3.68 to 9.28)	48
	2 units	10	10	—	2.70	2.70	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	7.10 (3.64 to 9.46)	48
		13	10	—	3.41	2.49	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.40 (3.75 to 10.30)	48
		16	10	—	3.94	2.36	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		13	13	—	3.15	3.15	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.46 (3.81 to 11.13)	48
		16	13	—	3.73	3.07	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.76 (3.92 to 11.92)	48
		16	16	—	3.60	3.60	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.83 (3.98 to 12.76)	48
	3 units	10	10	10	2.47	2.47	2.47	7.4 (3.8 to 8.2)	2230 (950 to 2720)	10.34 (4.80 to 12.62)	48
		13	10	10	3.01	2.20	2.20	7.4 (3.9 to 8.3)	2230 (950 to 2750)	10.34 (4.80 to 12.76)	48
		16	10	10	3.36	2.02	2.02	7.4 (4.0 to 8.5)	2230 (950 to 2820)	10.34 (4.80 to 13.08)	48
		13	13	10	2.71	2.71	1.98	7.4 (4.0 to 8.5)	2230 (950 to 2820)	10.34 (4.80 to 13.08)	48
		16	13	10	3.10	2.55	1.86	7.5 (4.0 to 8.6)	2250 (980 to 2850)	10.44 (4.95 to 13.22)	48
		13	13	13	2.50	2.50	2.50	7.5 (4.0 to 8.6)	2250 (980 to 2850)	10.44 (4.95 to 13.22)	48
		16	16	10	2.88	2.88	1.73	7.5 (4.1 to 8.8)	2250 (980 to 2920)	10.44 (4.95 to 13.54)	48
		16	13	13	2.84	2.33	2.33	7.5 (4.1 to 8.8)	2250 (980 to 2920)	10.44 (4.95 to 13.54)	48
		16	16	13	2.66	2.66	2.19	7.5 (4.2 to 8.9)	2250 (980 to 2950)	10.44 (4.95 to 13.68)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-3M26YAV-E

## <Cooling/230V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
230	1 unit	10	—	—	2.7	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.71 (3.52 to 4.44)	48
		13	—	—	3.7	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.49 (3.52 to 6.88)	48
		16	—	—	4.5	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.47 (3.52 to 8.87)	48
	2 units	10	10	—	2.70	2.70	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.79 (3.48 to 9.05)	48
		13	10	—	3.41	2.49	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	8.03 (3.59 to 9.85)	48
		16	10	—	3.94	2.36	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		13	13	—	3.15	3.15	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	9.05 (3.64 to 10.65)	48
		16	13	—	3.73	3.07	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	10.29 (3.75 to 11.40)	48
		16	16	—	3.60	3.60	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	11.31 (3.80 to 12.20)	48
	3 units	10	10	10	2.47	2.47	2.47	7.4 (3.8 to 8.2)	2230 (950 to 2720)	9.89 (4.59 to 12.07)	48
		13	10	10	3.01	2.20	2.20	7.4 (3.9 to 8.3)	2230 (950 to 2750)	9.89 (4.59 to 12.20)	48
		16	10	10	3.36	2.02	2.02	7.4 (4.0 to 8.5)	2230 (950 to 2820)	9.89 (4.59 to 12.51)	48
		13	13	10	2.71	2.71	1.98	7.4 (4.0 to 8.5)	2230 (950 to 2820)	9.89 (4.59 to 12.51)	48
		16	13	10	3.10	2.55	1.86	7.5 (4.0 to 8.6)	2250 (980 to 2850)	9.98 (4.73 to 12.64)	48
		13	13	13	2.50	2.50	2.50	7.5 (4.0 to 8.6)	2250 (980 to 2850)	9.98 (4.73 to 12.64)	48
		16	16	10	2.88	2.88	1.73	7.5 (4.1 to 8.8)	2250 (980 to 2920)	9.98 (4.73 to 12.95)	48
		16	13	13	2.84	2.33	2.33	7.5 (4.1 to 8.8)	2250 (980 to 2920)	9.98 (4.73 to 12.95)	48
		16	16	13	2.66	2.66	2.19	7.5 (4.2 to 8.9)	2250 (980 to 2950)	9.98 (4.73 to 13.09)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-3M26YAV-E

## <Cooling/240V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Cooling capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
240	1 unit	10	—	—	2.7	—	—	2.7 (1.4 to 3.2)	750 (640 to 950)	3.55 (3.38 to 4.26)	48
		13	—	—	3.7	—	—	3.7 (1.4 to 4.4)	1200 (640 to 1520)	5.26 (3.38 to 6.60)	48
		16	—	—	4.5	—	—	4.5 (1.4 to 5.0)	1650 (640 to 2000)	7.16 (3.38 to 8.50)	48
	2 units	10	10	—	2.70	2.70	—	5.4 (2.5 to 6.3)	1530 (640 to 2040)	6.51 (3.33 to 8.67)	48
		13	10	—	3.41	2.49	—	5.9 (2.7 to 6.6)	1810 (660 to 2220)	7.70 (3.44 to 9.44)	48
		16	10	—	3.94	2.36	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		13	13	—	3.15	3.15	—	6.3 (2.9 to 6.9)	2040 (670 to 2400)	8.67 (3.49 to 10.20)	48
		16	13	—	3.73	3.07	—	6.8 (3.0 to 7.2)	2320 (690 to 2570)	9.86 (3.59 to 10.93)	48
		16	16	—	3.60	3.60	—	7.2 (3.2 to 7.5)	2550 (700 to 2750)	10.84 (3.65 to 11.69)	48
	3 units	10	10	10	2.47	2.47	2.47	7.4 (3.8 to 8.2)	2230 (950 to 2720)	9.48 (4.40 to 11.56)	48
		13	10	10	3.01	2.20	2.20	7.4 (3.9 to 8.3)	2230 (950 to 2750)	9.48 (4.40 to 11.69)	48
		16	10	10	3.36	2.02	2.02	7.4 (4.0 to 8.5)	2230 (950 to 2820)	9.48 (4.40 to 11.99)	48
		13	13	10	2.71	2.71	1.98	7.4 (4.0 to 8.5)	2230 (950 to 2820)	9.48 (4.40 to 11.99)	48
		16	13	10	3.10	2.55	1.86	7.5 (4.0 to 8.6)	2250 (980 to 2850)	9.57 (4.54 to 12.12)	48
		13	13	13	2.50	2.50	2.50	7.5 (4.0 to 8.6)	2250 (980 to 2850)	9.57 (4.54 to 12.12)	48
		16	16	10	2.88	2.88	1.73	7.5 (4.1 to 8.8)	2250 (980 to 2920)	9.57 (4.54 to 12.41)	48
		16	13	13	2.84	2.33	2.33	7.5 (4.1 to 8.8)	2250 (980 to 2920)	9.57 (4.54 to 12.41)	48
		16	16	13	2.66	2.66	2.19	7.5 (4.2 to 8.9)	2250 (980 to 2950)	9.57 (4.54 to 12.54)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3



# Outdoor Unit : RAS-3M26YAV-E

## <Heating/220V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
220	1 unit	10	—	—	4.0	—	—	4.0 (0.8 to 5.2)	1500 (300 to 1980)	6.96 (1.87 to 9.18)	48
		13	—	—	5.0	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	9.51 (1.93 to 12.76)	48
		16	—	—	5.5	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	11.13 (1.93 to 13.91)	48
	2 units	10	10	—	3.60	3.60	—	7.2 (1.5 to 10.0)	2050 (320 to 3200)	9.51 (1.94 to 14.84)	48
		13	10	—	4.22	3.38	—	7.6 (1.5 to 10.1)	2240 (320 to 3210)	10.39 (1.94 to 14.89)	48
		16	10	—	4.57	3.33	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	11.04 (1.94 to 14.98)	48
		13	13	—	3.95	3.95	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	11.04 (1.94 to 14.98)	48
		16	13	—	4.35	3.95	—	8.3 (1.5 to 10.2)	2560 (320 to 3240)	11.87 (1.94 to 15.03)	48
		16	16	—	4.30	4.30	—	8.6 (1.5 to 10.2)	2700 (320 to 3250)	12.52 (1.94 to 15.07)	48
	3 units	10	10	10	2.87	2.87	2.87	8.6 (2.0 to 10.4)	2300 (380 to 2750)	10.67 (2.16 to 12.76)	48
		13	10	10	3.35	2.68	2.68	8.7 (2.0 to 10.5)	2360 (380 to 2760)	10.95 (2.16 to 12.80)	48
		16	10	10	3.59	2.61	2.61	8.8 (2.0 to 10.6)	2430 (380 to 2780)	11.27 (2.16 to 12.89)	48
		13	13	10	3.14	3.14	2.51	8.8 (2.0 to 10.6)	2430 (380 to 2780)	11.27 (2.16 to 12.89)	48
		16	13	10	3.34	3.03	2.43	8.8 (2.0 to 10.6)	2430 (380 to 2780)	11.27 (2.16 to 12.89)	48
		13	13	13	2.93	2.93	2.93	8.8 (2.0 to 10.6)	2430 (380 to 2780)	11.27 (2.16 to 12.89)	48
		16	16	10	3.26	3.26	2.37	8.9 (2.0 to 10.7)	2490 (380 to 2790)	11.55 (2.16 to 12.94)	48
		16	13	13	3.16	2.87	2.87	8.9 (2.0 to 10.7)	2490 (380 to 2790)	11.55 (2.16 to 12.94)	48
		16	16	13	3.09	3.09	2.81	9.0 (2.0 to 10.8)	2550 (380 to 2800)	11.83 (2.16 to 12.99)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-3M26YAV-E

## <Heating/230V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
230	1 unit	10	—	—	4.0	—	—	4.0 (0.8 to 5.2)	1500 (300 to 1980)	6.65 (1.79 to 8.78)	48
		13	—	—	5.0	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	9.09 (1.85 to 12.20)	48
		16	—	—	5.5	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	10.65 (1.85 to 13.31)	48
	2 units	10	10	—	3.60	3.60	—	7.2 (1.5 to 10.0)	2050 (320 to 3200)	9.09 (1.86 to 14.20)	48
		13	10	—	4.22	3.38	—	7.6 (1.5 to 10.1)	2240 (320 to 3210)	9.94 (1.86 to 14.24)	48
		16	10	—	4.57	3.33	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	10.56 (1.86 to 14.33)	48
		13	13	—	3.95	3.95	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	10.56 (1.86 to 14.33)	48
		16	13	—	4.35	3.95	—	8.3 (1.5 to 10.2)	2560 (320 to 3240)	11.36 (1.86 to 14.37)	48
		16	16	—	4.30	4.30	—	8.6 (1.5 to 10.2)	2700 (320 to 3250)	11.98 (1.86 to 14.42)	48
	3 units	10	10	10	2.87	2.87	2.87	8.6 (2.0 to 10.4)	2300 (380 to 2750)	10.20 (2.07 to 12.20)	48
		13	10	10	3.35	2.68	2.68	8.7 (2.0 to 10.5)	2360 (380 to 2760)	10.47 (2.07 to 12.24)	48
		16	10	10	3.59	2.61	2.61	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.78 (2.07 to 12.33)	48
		13	13	10	3.14	3.14	2.51	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.78 (2.07 to 12.33)	48
		16	13	10	3.34	3.03	2.43	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.78 (2.07 to 12.33)	48
		13	13	13	2.93	2.93	2.93	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.78 (2.07 to 12.33)	48
		16	16	10	3.26	3.26	2.37	8.9 (2.0 to 10.7)	2490 (380 to 2790)	11.05 (2.07 to 12.38)	48
		16	13	13	3.16	2.87	2.87	8.9 (2.0 to 10.7)	2490 (380 to 2790)	11.05 (2.07 to 12.38)	48
		16	16	13	3.09	3.09	2.81	9.0 (2.0 to 10.8)	2550 (380 to 2800)	11.31 (2.07 to 12.42)	48

- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

# Outdoor Unit : RAS-3M26YAV-E

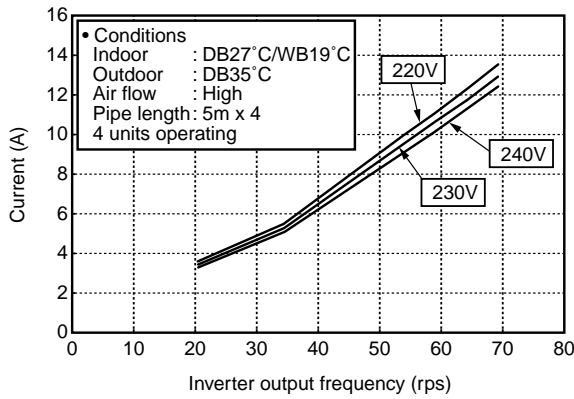
## <Heating/240V>

Power supply (V)	Operating status	Indoor unit			Unit capacity (kW)			Heating capacity (kW)	Power consumption (W)	Operating current (A)	Outdoor noise (dB)
		A	B	C	A	B	C				
240	1 unit	10	—	—	4.0	—	—	4.0 (0.8 to 5.2)	1500 (300 to 1980)	6.38 (1.71 to 8.42)	48
		13	—	—	5.0	—	—	5.0 (0.8 to 6.5)	2050 (310 to 2750)	8.72 (1.77 to 11.69)	48
		16	—	—	5.5	—	—	5.5 (0.8 to 6.9)	2400 (310 to 3000)	10.20 (1.77 to 12.76)	48
	2 units	10	10	—	3.60	3.60	—	7.2 (1.5 to 10.0)	2050 (320 to 3200)	8.72 (1.78 to 13.61)	48
		13	10	—	4.22	3.38	—	7.6 (1.5 to 10.1)	2240 (320 to 3210)	9.52 (1.78 to 13.65)	48
		16	10	—	4.57	3.33	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	10.12 (1.78 to 13.73)	48
		13	13	—	3.95	3.95	—	7.9 (1.5 to 10.1)	2380 (320 to 3230)	10.12 (1.78 to 13.73)	48
		16	13	—	4.35	3.95	—	8.3 (1.5 to 10.2)	2560 (320 to 3240)	10.88 (1.78 to 13.78)	48
		16	16	—	4.30	4.30	—	8.6 (1.5 to 10.2)	2700 (320 to 3250)	11.48 (1.78 to 13.82)	48
	3 units	10	10	10	2.87	2.87	2.87	8.6 (2.0 to 10.4)	2300 (380 to 2750)	9.78 (1.98 to 11.69)	48
		13	10	10	3.35	2.68	2.68	8.7 (2.0 to 10.5)	2360 (380 to 2760)	10.03 (1.98 to 11.73)	48
		16	10	10	3.59	2.61	2.61	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.33 (1.98 to 11.82)	48
		13	13	10	3.14	3.14	2.51	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.33 (1.98 to 11.82)	48
		16	13	10	3.34	3.03	2.43	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.33 (1.98 to 11.82)	48
		13	13	13	2.93	2.93	2.93	8.8 (2.0 to 10.6)	2430 (380 to 2780)	10.33 (1.98 to 11.82)	48
		16	16	10	3.26	3.26	2.37	8.9 (2.0 to 10.7)	2490 (380 to 2790)	10.59 (1.98 to 11.86)	48
		16	13	13	3.16	2.87	2.87	8.9 (2.0 to 10.7)	2490 (380 to 2790)	10.59 (1.98 to 11.86)	48
		16	16	13	3.09	3.09	2.81	9.0 (2.0 to 10.8)	2550 (380 to 2800)	10.84 (1.98 to 11.90)	48

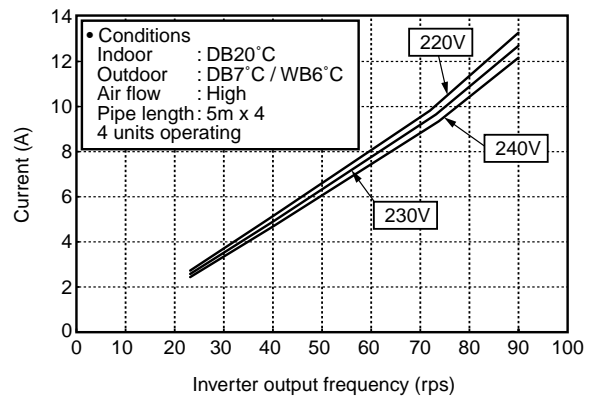
- The above specification values are those under the conditions that the indoor DB/WB=27/19°C and the outdoor DB/WB=35/—°C.
- Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

### 1-2-1. Operation Characteristic Curve

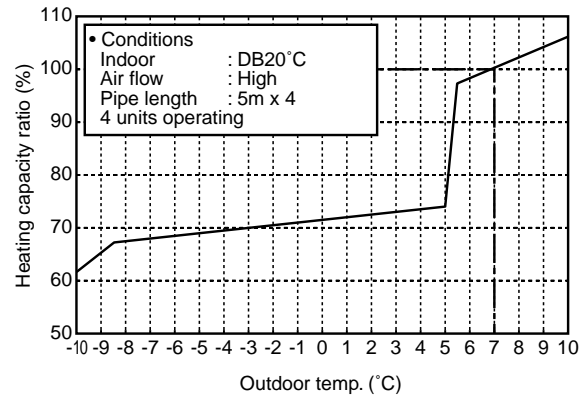
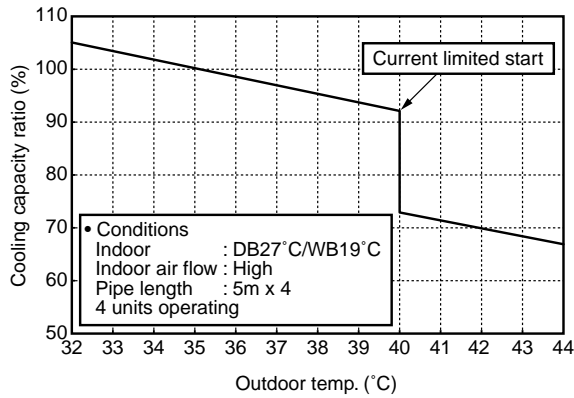
#### <Cooling>



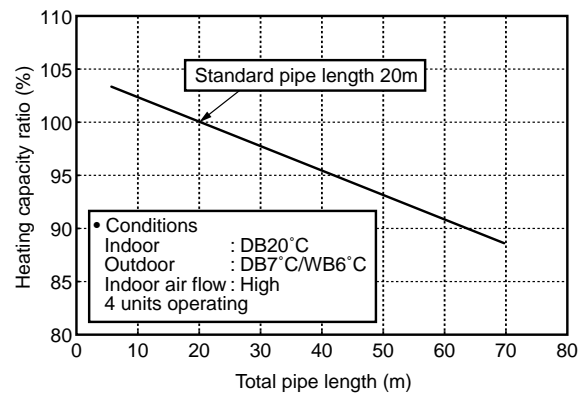
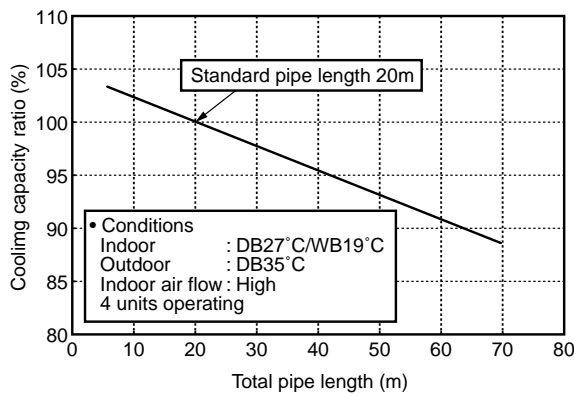
#### <Heating>



### 1-2-2. Capacity Variation Ratio According to Outdoor Temperature



### 1-2-3. Capacity Variation Ratio According to Pipe Length



### 1-3. Electrical Data

#### Outdoor Unit : RAS-4M27YAV-E

##### <Cooling>

Combination of indoor unit operation					System					Compressor		Fan motor FLA			
					Hz	Volts-Ph.	Voltage range		Power supply		MOCP (Amps)	MSC	RLA	Indoor	Outdoor
							Min.	Max.	MCA	ICF					
1 unit	10	—	—	—	50 or 60	230–1	198	264	4.48	4.48	20	3.06	3.06	0.15 x 1 = 0.15	0.5
	13	—	—	—					6.70	6.70	20	4.84	4.84	0.15 x 1 = 0.15	0.5
	16	—	—	—					9.18	9.18	20	6.82	6.82	0.15 x 1 = 0.15	0.5
2 units	10	10	—	—					8.29	8.29	20	5.99	5.99	0.15 x 2 = 0.30	0.5
	13	10	—	—					9.84	9.84	20	7.23	7.23	0.15 x 2 = 0.30	0.5
	16	10	—	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5
	13	13	—	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5
	16	13	—	—					12.66	12.66	20	9.49	9.49	0.15 x 2 = 0.30	0.5
	16	16	—	—					13.94	13.94	20	10.51	10.51	0.15 x 2 = 0.30	0.5
3 units	10	10	10	—					13.08	13.08	20	9.70	9.70	0.15 x 3 = 0.45	0.5
	13	10	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5
	16	10	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5
	13	13	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5
	16	13	10	—					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	13	13	13	—					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	16	16	10	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5
	16	13	13	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5
	16	16	13	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5
	16	16	16	—					13.35	13.35	20	9.92	9.92	0.15 x 3 = 0.45	0.5
	4 units	10	10	10					10	13.31	13.31	20	9.77	9.77	0.15 x 4 = 0.60
13		10	10	10					13.31	13.31	20	9.77	9.77	0.15 x 4 = 0.60	0.5
16		10	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
13		13	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
16		13	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
13		13	13	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
16		13	13	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
13		13	13	13					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5
16		16	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5

#### NOTE :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

MCA : Minimum Circuit Amps.

ICF : Maximum Instantaneous Current Flow (Equivalent to MCA in case of inverter air conditioner)

MOCP: Maximum Overcurrent Protection (Fuse only)

MSC : Maximum Starting Current

FLA : Full Load Amps.

RLA : Rated Load Amps. RLA under conditions on the right.

	DB	WB
Indoor temp. (°C)	27	19
Outdoor temp. (°C)	35	—

# Outdoor Unit : RAS-4M27YAV-E

## <Heating>

Combination of indoor unit operation					System					Compressor		Fan motor FLA			
					Hz	Volts-Ph.	Voltage range		Power supply		MOCP (Amps)	MSC	RLA	Indoor	Outdoor
							Min.	Max.	MCA	ICF					
1 unit	10	—	—	—	50 or 60	230–1	198	264	7.88	7.88	20	5.78	5.78	0.15 x 1 = 0.15	0.5
	13	—	—	—					11.20	11.20	20	8.44	8.44	0.15 x 1 = 0.15	0.5
	16	—	—	—					13.15	13.15	20	10.00	10.00	0.15 x 1 = 0.15	0.5
2 units	10	10	—	—					11.45	11.45	20	8.52	8.52	0.15 x 2 = 0.30	0.5
	13	10	—	—					12.66	12.66	20	9.49	9.49	0.15 x 2 = 0.30	0.5
	16	10	—	—					13.55	13.55	20	10.20	10.20	0.15 x 2 = 0.30	0.5
	13	13	—	—					13.55	13.55	20	10.20	10.20	0.15 x 2 = 0.30	0.5
	16	13	—	—					14.78	14.78	20	11.18	11.18	0.15 x 2 = 0.30	0.5
	16	16	—	—					15.66	15.66	20	11.89	11.89	0.15 x 2 = 0.30	0.5
	16	16	—	—					15.66	15.66	20	11.89	11.89	0.15 x 2 = 0.30	0.5
3 units	10	10	10	—					12.51	12.51	20	9.25	9.25	0.15 x 3 = 0.45	0.5
	13	10	10	—					12.80	12.80	20	9.48	9.48	0.15 x 3 = 0.45	0.5
	16	10	10	—					12.80	12.80	20	9.48	9.48	0.15 x 3 = 0.45	0.5
	13	13	10	—					12.80	12.80	20	9.48	9.48	0.15 x 3 = 0.45	0.5
	16	13	10	—					13.08	13.08	20	9.70	9.70	0.15 x 3 = 0.45	0.5
	13	13	13	—					13.08	13.08	20	9.70	9.70	0.15 x 3 = 0.45	0.5
	16	16	10	—					13.35	13.35	20	9.92	9.92	0.15 x 3 = 0.45	0.5
	16	13	13	—					13.35	13.35	20	9.92	9.92	0.15 x 3 = 0.45	0.5
	16	16	13	—					13.35	13.35	20	9.92	9.92	0.15 x 3 = 0.45	0.5
	16	16	16	—					13.63	13.63	20	10.14	10.14	0.15 x 3 = 0.45	0.5
	16	16	16	—					13.63	13.63	20	10.14	10.14	0.15 x 3 = 0.45	0.5
4 units	10	10	10	10					11.38	11.38	20	8.22	8.22	0.15 x 4 = 0.60	0.5
	13	10	10	10					11.38	11.38	20	8.22	8.22	0.15 x 4 = 0.60	0.5
	16	10	10	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	13	13	10	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	16	13	10	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	13	13	13	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	16	13	13	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	13	13	13	13					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	16	16	10	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5
	16	16	10	10					12.20	12.20	20	8.88	8.88	0.15 x 4 = 0.60	0.5

### NOTE :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

MCA : Minimum Circuit Amps.

ICF : Maximum Instantaneous Current Flow (Equivalent to MCA in case of inverter air conditioner)

MOCP : Maximum Overcurrent Protection (Fuse only)

MSC : Maximum Starting Current

FLA : Full Load Amps.

RLA : Rated Load Amps. RLA under conditions on the right.

	DB	WB
Indoor temp. (°C)	20	—
Outdoor temp. (°C)	7	6

# Outdoor Unit : RAS-4M27YACV-E

## <Cooling>

Combination of indoor unit operation					System						Compressor		Fan motor FLA			
					Hz	Volts-Ph.	Voltage range		Power supply		MOCP (Amps)	MSC	RLA	Indoor	Outdoor	
							Min.	Max.	MCA	ICF						
1 unit	10	—	—	—	50 or 60	230—1	198	264	4.48	4.48	20	3.06	3.06	0.15 x 1 = 0.15	0.5	
	13	—	—	—					6.70	6.70	20	4.84	4.84	0.15 x 1 = 0.15	0.5	
	16	—	—	—					9.18	9.18	20	6.82	6.82	0.15 x 1 = 0.15	0.5	
2 units	10	10	—	—					8.29	8.29	20	5.99	5.99	0.15 x 2 = 0.30	0.5	
	13	10	—	—					9.84	9.84	20	7.23	7.23	0.15 x 2 = 0.30	0.5	
	16	10	—	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5	
	13	13	—	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5	
	16	13	—	—					12.66	12.66	20	9.49	9.49	0.15 x 2 = 0.30	0.5	
	16	16	—	—					13.94	13.94	20	10.51	10.51	0.15 x 2 = 0.30	0.5	
	16	16	—	—					13.08	13.08	20	9.70	9.70	0.15 x 3 = 0.45	0.5	
3 units	13	10	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5	
	16	10	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5	
	13	13	10	—					13.13	13.13	20	9.74	9.74	0.15 x 3 = 0.45	0.5	
	16	13	10	—					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5	
	13	13	13	—					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5	
	16	16	10	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5	
	16	13	13	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5	
	16	16	13	—					13.30	13.30	20	9.88	9.88	0.15 x 3 = 0.45	0.5	
	16	16	16	—					13.35	13.35	20	9.92	9.92	0.15 x 3 = 0.45	0.5	
	4 units	10	10	10					10	13.31	13.31	20	9.77	9.77	0.15 x 4 = 0.60	0.5
		13	10	10					10	13.31	13.31	20	9.77	9.77	0.15 x 4 = 0.60	0.5
16		10	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
13		13	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
16		13	10	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
13		13	13	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
16		13	13	10					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
13		13	13	13					13.59	13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5	
16	16	10	10	13.59					13.59	20	9.99	9.99	0.15 x 4 = 0.60	0.5		

### NOTE :

Model of Indoor unit 10 : RAS-M10UKCV-E3, 13 : RAS-M13UKCV-E3, 16 : RAS-M16UKCV-E3

MCA : Minimum Circuit Amps.

ICF : Maximum Instantaneous Current Flow (Equivalent to MCA in case of inverter air conditioner)

MOCP : Maximum Overcurrent Protection (Fuse only)

MSC : Maximum Starting Current

FLA : Full Load Amps.

RLA : Rated Load Amps. RLA under conditions on the right.

	DB	WB
Indoor temp. (°C)	27	19
Outdoor temp. (°C)	35	—

# Outdoor Unit : RAS-3M26YAV-E

## <Cooling>

Combination of indoor unit operation				System						Compressor		Fan motor FLA		
				Hz	Volts-Ph.	Voltage range		Power supply		MOCP (Amps)	MSC	RLA	Indoor	Outdoor
						Min.	Max.	MCA	ICF					
1 unit	10	—	—	50 or 60	230–1	198	264	4.48	4.48	20	3.06	3.06	0.15 x 1 = 0.15	0.5
	13	—	—					6.70	6.70	20	4.84	4.84	0.15 x 1 = 0.15	0.5
	16	—	—					9.18	9.18	20	6.82	6.82	0.15 x 1 = 0.15	0.5
2 units	10	10	—					8.29	8.29	20	5.99	5.99	0.15 x 2 = 0.30	0.5
	13	10	—					9.84	9.84	20	7.23	7.23	0.15 x 2 = 0.30	0.5
	16	10	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5
	13	13	—					11.11	11.11	20	8.25	8.25	0.15 x 2 = 0.30	0.5
	16	13	—					12.66	12.66	20	9.49	9.49	0.15 x 2 = 0.30	0.5
	16	16	—					13.94	13.94	20	10.51	10.51	0.15 x 2 = 0.30	0.5
3 units	10	10	10					12.13	12.13	20	8.94	8.94	0.15 x 3 = 0.45	0.5
	13	10	10					12.13	12.13	20	8.94	8.94	0.15 x 3 = 0.45	0.5
	16	10	10					12.13	12.13	20	8.94	8.94	0.15 x 3 = 0.45	0.5
	13	13	10					12.13	12.13	20	8.94	8.94	0.15 x 3 = 0.45	0.5
	16	13	10					12.24	12.24	20	9.03	9.03	0.15 x 3 = 0.45	0.5
	13	13	13					12.24	12.24	20	9.03	9.03	0.15 x 3 = 0.45	0.5
	16	16	10					12.24	12.24	20	9.03	9.03	0.15 x 3 = 0.45	0.5
	16	13	13					12.24	12.24	20	9.03	9.03	0.15 x 3 = 0.45	0.5
	16	16	13					12.24	12.24	20	9.03	9.03	0.15 x 3 = 0.45	0.5

### NOTE :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

MCA : Minimum Circuit Amps.

ICF : Maximum Instantaneous Current Flow (Equivalent to MCA in case of inverter air conditioner)

MOCP: Maximum Overcurrent Protection (Fuse only)

MSC : Maximum Starting Current

FLA : Full Load Amps.

RLA : Rated Load Amps. RLA under conditions on the right.

	DB	WB
Indoor temp. (°C)	27	19
Outdoor temp. (°C)	35	—



# Outdoor Unit : RAS-3M26YAV-E

## <Heating>

Combination of indoor unit operation				System					Compressor		Fan motor FLA			
				Hz	Volts-Ph.	Voltage range		Power supply		MOCP (Amps)	MSC	RLA	Indoor	Outdoor
						Min.	Max.	MCA	ICF					
1 unit	10	—	—	50 or 60	230–1	198	264	8.15	8.15	20	6.00	6.00	0.15 x 1 = 0.15	0.5
	13	—	—					11.20	11.20	20	8.44	8.44	0.15 x 1 = 0.15	0.5
	16	—	—					13.15	13.15	20	10.00	10.00	0.15 x 1 = 0.15	0.5
2 units	10	10	—					11.16	11.16	20	8.29	8.29	0.15 x 2 = 0.30	0.5
	13	10	—					12.23	12.23	20	9.14	9.14	0.15 x 2 = 0.30	0.5
	16	10	—					13.00	13.00	20	9.76	9.76	0.15 x 2 = 0.30	0.5
	13	13	—					13.00	13.00	20	9.76	9.76	0.15 x 2 = 0.30	0.5
	16	13	—					14.00	14.00	20	10.56	10.56	0.15 x 2 = 0.30	0.5
	16	16	—					14.78	14.78	20	11.18	11.18	0.15 x 2 = 0.30	0.5
3 units	10	10	10					12.51	12.51	20	9.25	9.25	0.15 x 3 = 0.45	0.5
	13	10	10					12.85	12.85	20	9.52	9.52	0.15 x 3 = 0.45	0.5
	16	10	10					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	13	13	10					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	16	13	10					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	13	13	13					13.24	13.24	20	9.83	9.83	0.15 x 3 = 0.45	0.5
	16	16	10					13.58	13.58	20	10.10	10.10	0.15 x 3 = 0.45	0.5
	16	13	13					13.58	13.58	20	10.10	10.10	0.15 x 3 = 0.45	0.5
	16	16	13					13.90	13.90	20	10.36	10.36	0.15 x 3 = 0.45	0.5

### NOTE :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

MCA : Minimum Circuit Amps.

ICF : Maximum Instantaneous Current Flow (Equivalent to MCA in case of inverter air conditioner)

MOCP: Maximum Overcurrent Protection (Fuse only)

MSC : Maximum Starting Current

FLA : Full Load Amps.

RLA : Rated Load Amps. RLA under conditions on the right.

	DB	WB
Indoor temp. (°C)	20	—
Outdoor temp. (°C)	7	6

## 2. REFRIGERANT R410A

This air conditioner adopts the new refrigerant HFC (R410A) which does not damage the ozone layer.

The working pressure of the new refrigerant R410A is 1.6 times higher than conventional refrigerant (R22). The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the air conditioner using the new refrigerant during installation work or servicing time.

The next section describes the precautions for air conditioner using the new refrigerant. Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

### 2-1. Safety During Installation/Servicing

As R410A's pressure is about 1.6 times higher than that of R22, improper installation/servicing may cause a serious trouble. By using tools and materials exclusive for R410A, it is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

- (1) Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A.

If other refrigerant than R410A is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.

- (2) Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R410A.

The refrigerant name R410A is indicated on the visible place of the outdoor unit of the air conditioner using R410A as refrigerant. To prevent mischarging, the diameter of the service port differs from that of R22.

- (3) If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.  
If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
- (4) When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.

- (5) After completion of installation work, check to make sure that there is no refrigeration gas leakage.

If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.

- (6) When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.

If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.

- (7) Be sure to carry out installation or removal according to the installation manual.

Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.

- (8) Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.

Improper repair's may result in water leakage, electric shock and fire, etc.

### 2-2. Refrigerant Piping Installation

#### 2-2-1. Piping Materials and Joints Used

For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

- (1) Copper Pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using R22, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in Table 2-2-1. Never use copper pipes thinner than 0.8 mm even when it is available on the market.

**Table 2-2-1 Thicknesses of annealed copper pipes**

		Thickness (mm)	
Nominal diameter	Outer diameter (mm)	R410A	R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80

(2) Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare Joints

Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.

Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 2-2-3 to 2-2-6 below.

b) Socket Joints

Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm.

Thicknesses of socket joints are as shown in Table 2-2-2.

**Table 2-2-2 Minimum thicknesses of socket joints**

Nominal diameter	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70

## 2-2-2. Processing of Piping Materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil other than lubricating oils used in the installed air conditioner is used, and that refrigerant does not leak. When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

(1) Flare Processing Procedures and Precautions

a) Cutting the Pipe

By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing Burrs and Chips

If the flared section has chips or burrs, refrigerant leakage may occur. Carefully remove all burrs and clean the cut surface before installation.

c) Insertion of Flare Nut

d) Flare Processing

Make certain that a clamp bar and copper pipe have been cleaned.

By means of the clamp bar, perform the flare processing correctly.

Use either a flare tool for R410A or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool. When using a conventional flare tool, be sure to secure "dimension A" by using a gauge for size adjustment.

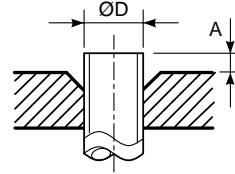


Fig. 2-2-1 Flare processing dimensions

Table 2-2-3 Dimensions related to flare processing for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
3/8	9.52	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0
1/2	12.70	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5

Table 2-2-4 Dimensions related to flare processing for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R22 clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
3/8	9.52	0.8	0 to 0.5	0.5 to 1.0	1.0 to 1.5
1/2	12.70	0.8	0 to 0.5	0.5 to 1.0	1.5 to 2.0

Table 2-2-5 Flare and flare nut dimensions for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26

Table 2-2-6 Flare and flare nut dimensions for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24

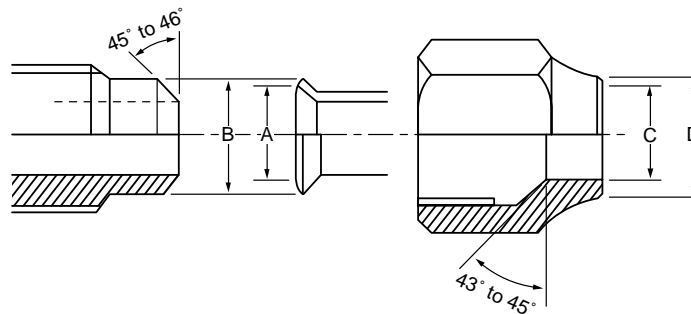


Fig. 2-2-2 Relations between flare nut and flare seal surface

(2) Flare Connecting Procedures and Precautions

- Make sure that the flare and union portions do not have any scar or dust, etc.
- Correctly align the processed flare surface with the union axis.
- Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is the same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur.

When it is strong, the flare nut may crack and may be made non-removable. When choosing the tightening torque, comply with values designated by manufacturers. Table 2-2-7 shows reference values.

**Note :**

When applying oil to the flare surface, be sure to use oil designated by the manufacturer. If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 2-2-7 Tightening torque of flare for R410A [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf•cm)	Tightening torque of torque wrenches available on the market N•m (kgf•cm)
1/4	6.35	14 to 18 (140 to 180)	16 (160), 18 (180)
3/8	9.52	33 to 42 (330 to 420)	42 (420)
1/2	12.70	50 to 62 (500 to 620)	55 (550)

## 2-3. Tools

### 2-3-1. Required Tools

The service port diameter of packed valve of the outdoor unit in the air conditioner using R410A is changed to prevent mixing of other refrigerant. To reinforce the pressure-resisting strength, flare processing dimensions and opposite side dimension of flare nut (For Ø12.7 copper pipe) of the refrigerant piping are lengthened.

The used refrigerating oil is changed, and mixing of oil may cause a trouble such as generation of sludge, clogging of capillary, etc. Accordingly, the tools to be used are classified into the following three types.

- (1) Tools exclusive for R410A (Those which cannot be used for conventional refrigerant (R22))
- (2) Tools exclusive for R410A, but can be also used for conventional refrigerant (R22)
- (3) Tools commonly used for R410A and for conventional refrigerant (R22)

The table below shows the tools exclusive for R410A and their interchangeability.

Tools exclusive for R410A (The following tools for R410A are required.)					
Tools whose specifications are changed for R410A and their interchangeability					
No.	Used tool	Usage	R410A air conditioner installation		Conventional air conditioner installation
			Existence of new equipment for R410A	Whether conventional equipment can be used	Whether new equipment can be used with conventional refrigerant
	Flare tool	Pipe flaring	Yes	* (Note 1)	
	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	* (Note 1)	* (Note 1)
	Torque wrench (For Ø12.7)	Connection of flare nut	Yes		
	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes		
	Charge hose				
	Vacuum pump adapter	Vacuum evacuating	Yes		
	Electronic balance for refrigerant charging	Refrigerant charge	Yes		
	Refrigerant cylinder	Refrigerant charge	Yes		
	Leakage detector	Gas leakage check	Yes		
	Charging cylinder	Refrigerant charge	(Note 2)		

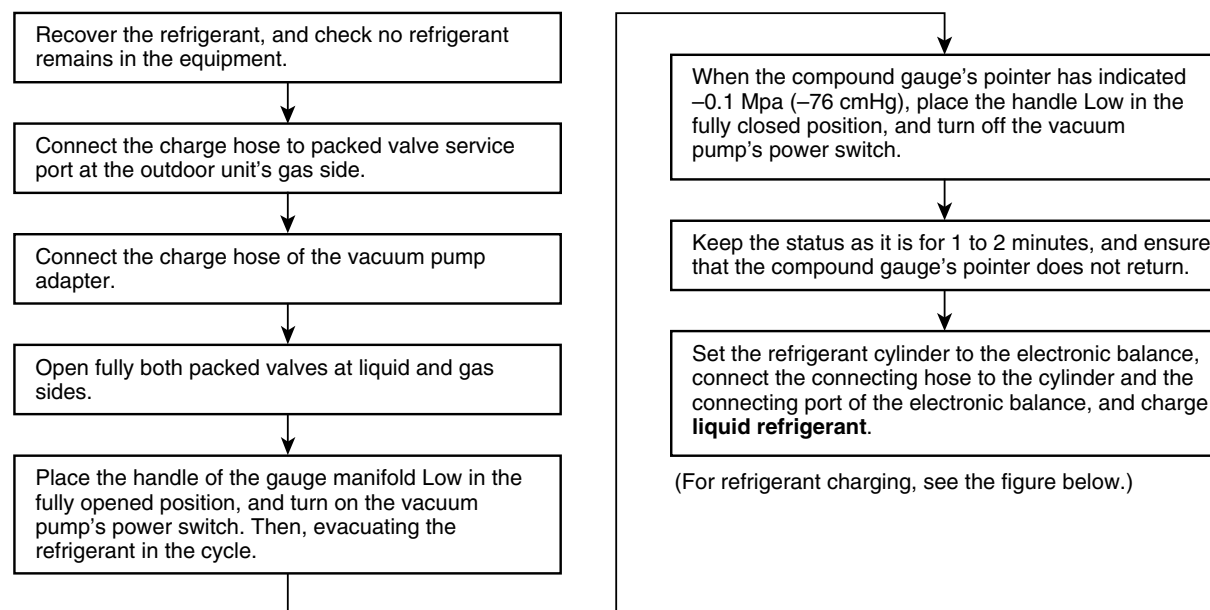
**(Note 1)** When flaring is carried out for R410A using the conventional flare tools, adjustment of projection margin is necessary. For this adjustment, a copper pipe gauge, etc. are necessary.

**(Note 2)** Charging cylinder for R410A is being currently developed.

General tools (Conventional tools can be used.)		
In addition to the above exclusive tools, the following equipments which serve also for R22 are necessary. as the general tools.		
(1) Vacuum pump	(4) Reamer	(9) Hole core drill (Ø65)
Use vacuum pump by attaching vacuum pump adapter.	(5) Pipe bender	(10) Hexagon wrench (Opposite side 4mm)
(2) Torque wrench (For Ø6.35)	(6) Level vial	(11) Tape measure
(3) Pipe cutter	(7) Screwdriver (+, -)	(12) Metal saw
	(8) Spanner or Monkey wrench	
Also prepare the following equipments for other installation method and run check.		
(1) Clamp meter	(3) Insulation resistance tester	
(2) Thermometer	(4) Electroscop	

## 2-4. Recharging of Refrigerant

When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.



- ① Never charge refrigerant exceeding the specified amount.
- ② If the specified amount of refrigerant cannot be charged, charge refrigerant **bit by bit** in COOL mode.
- ③ Do not carry out additional charging.

When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

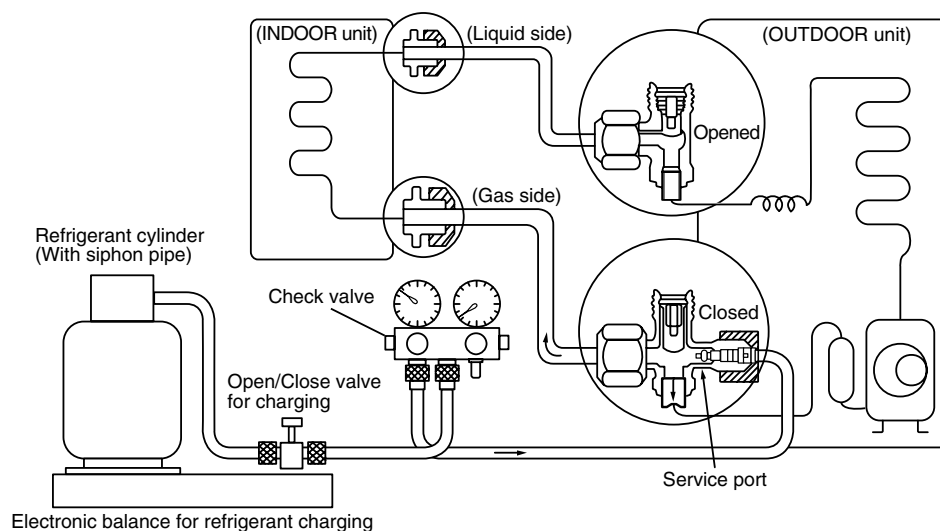
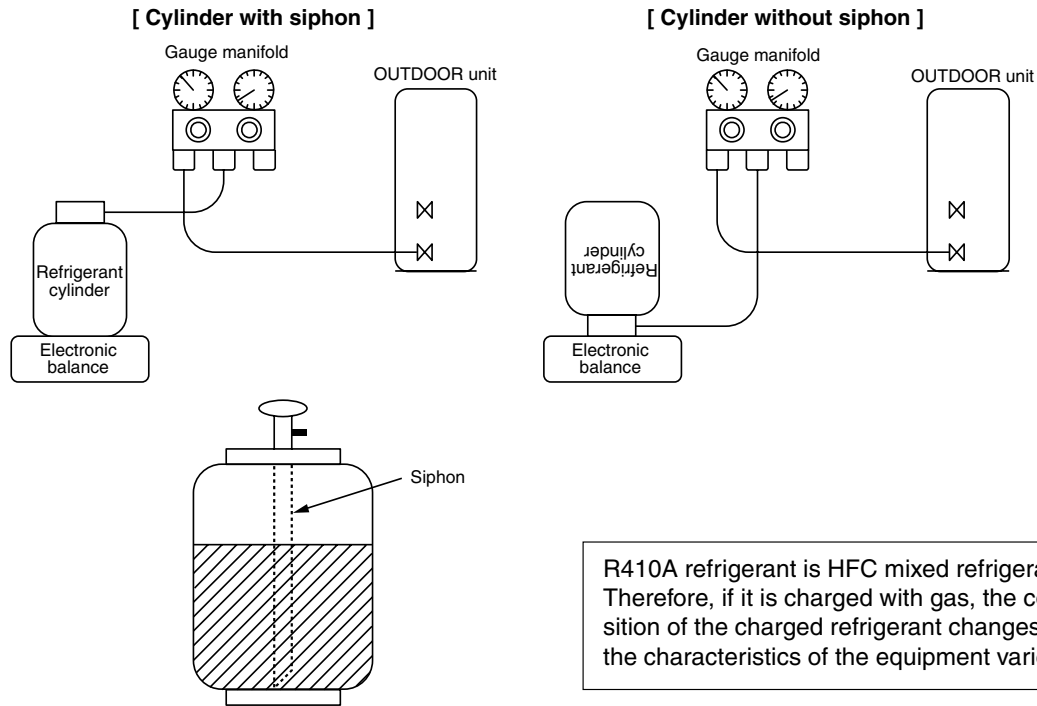


Fig. 2-4-1 Configuration of refrigerant charging

- ① Be sure to make setting so that **liquid** can be charged.
- ② When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

It is necessary for charging refrigerant under condition of liquid because R410A is mixed type of refrigerant. Accordingly, when charging refrigerant from the refrigerant cylinder to the equipment, charge it turning the cylinder upside down if cylinder is not equipped with siphon.



R410A refrigerant is HFC mixed refrigerant. Therefore, if it is charged with gas, the composition of the charged refrigerant changes and the characteristics of the equipment varies.

Fig. 2-4-2

## 2-5. Brazing of Pipes

### 2-5-1. Materials for Brazing

#### (1) Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper. It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

#### (2) Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

#### (3) Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead. Since it is weak in adhesive strength, do not use it for refrigerant pipes.

- ① Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.
- ② When performing brazing again at time of servicing, use the same type of brazing filler.

### 2-5-2. Flux

#### (1) Reason why flux is necessary

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.



## (2) Characteristics required for flux

- Activated temperature of flux coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is minimum.
- It excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

## (3) Types of flux

- Noncorrosive flux

Generally, it is a compound of borax and boric acid.

It is effective in case where the brazing temperature is higher than 800°C.

- Activated flux

Most of fluxes generally used for silver brazing are this type.

It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

## (4) Piping materials for brazing and used brazing filler/flux

Piping material	Used brazing filler	Used flux
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapor flux

- ① Do not enter flux into the refrigeration cycle.
- ② When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine.
- ③ When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).
- ④ Remove the flux after brazing.

## 2-5-3. Brazing

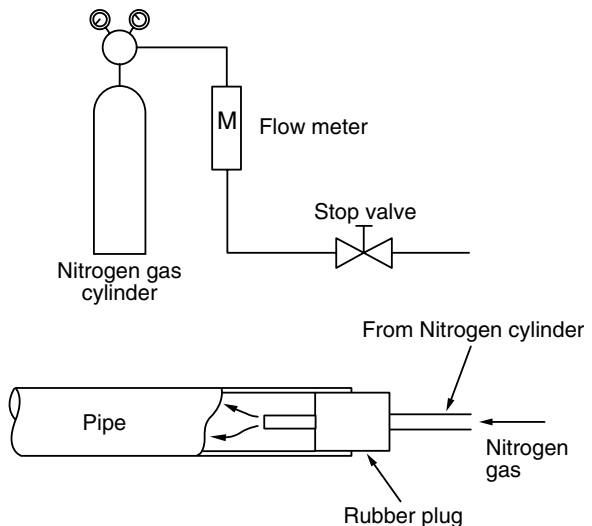
As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas (N<sub>2</sub>) flow.

**Never use gas other than Nitrogen gas.**

### (1) Brazing method to prevent oxidation

- ① Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
- ② Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
- ③ Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
- ④ When the Nitrogen gas is flowing, be sure to keep the piping end open.
- ⑤ Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m<sup>3</sup> /Hr or 0.02 MPa (0.2kgf/cm<sup>2</sup>) by means of the reducing valve.
- ⑥ After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands).
- ⑦ Remove the flux completely after brazing.



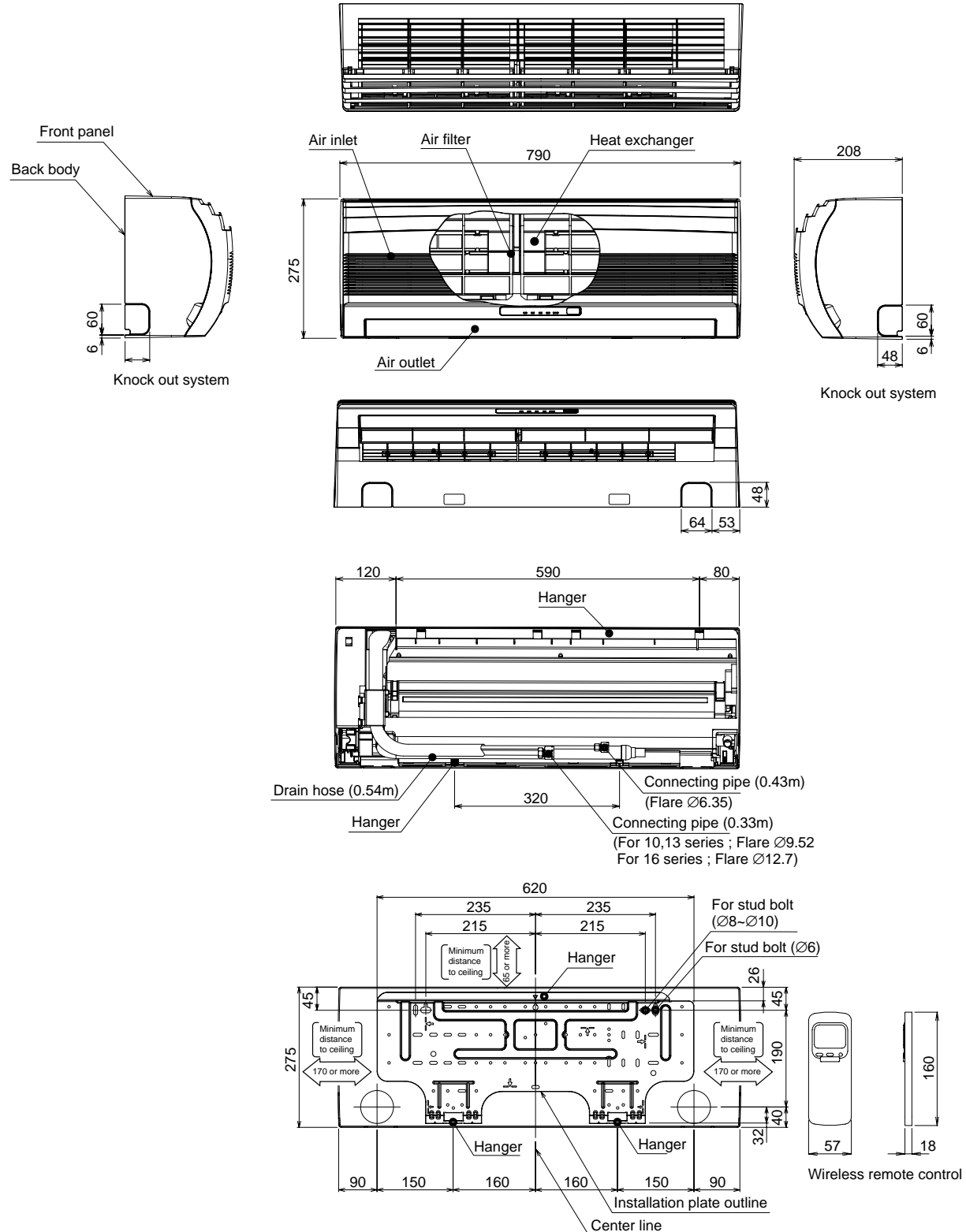
**Fig. 2-5-1 Prevention of oxidation during brazing**

### 3. CONSTRUCTION VIEWS

#### 3-1. Indoor Unit

RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3

RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3



**RAS-4M27YAV-E/RAS-4M27YACV-E/RAS-3M26YAV-E**



## 4. WIRING DIAGRAM

### 4-1. Indoor Unit

RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3

RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3

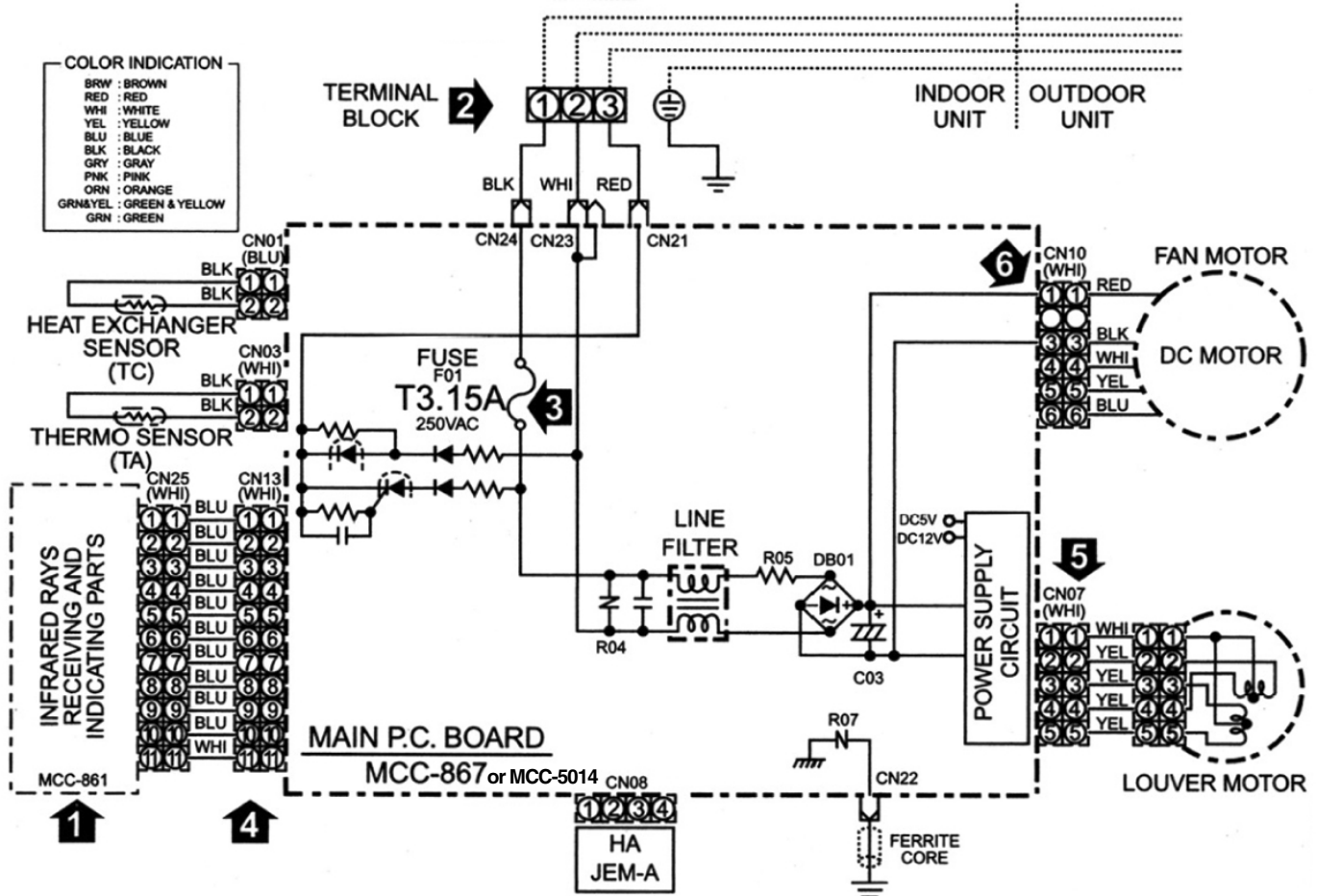


Table 4-1-1 Simple check points for diagnosing faults

Check items	Diagnosis result
<b>1</b> OPERATION INDICATOR	Check to see if the OPERATION indicator goes on and off when the main switch or breaker is turned on. (Check the primary and secondary voltage of transformer.)
<b>2</b> TERMINAL BLOCK	Check for power supply voltage between ① and ②. (Refer to the name plate.) (Check the primary and secondary voltage of transformer.) Check for fluctuate voltage between ② - ③. (DC 15 ~ 60V)
<b>3</b> FUSE 6.3A	Check to see if the fuse blows out. (Check the R04 of the varistor.)
<b>4</b> DC 5V	Check the voltage at the No.4 pin on CN13 connector of the infrared receiver. (Check the transformer and the power supply circuit of the rated voltage.)
<b>5</b> DC 12V	Check for voltage at the white lead of louver motor. (Check the transformer and the power supply circuit of the rated voltage.)
<b>6</b> DC 35V (DC310 ~ 340V)	Check the voltage at the No.1 pin on CN10 connector. (Check the DB01, R05 and C03.)

**Color Identification**

- BRW : BROWN
- RED : RED
- WHI : WHITE
- YEL : YELLOW
- BLU : BLUE
- BLK : BLACK
- GRY : GRAY
- PNK : PINK
- ORN : ORANGE
- GRN : GREEN & YEL YELLOW
- GRN : GREEN

Refer to the service data for the detailed failure diagnosis.

## 4-2. Outdoor Unit

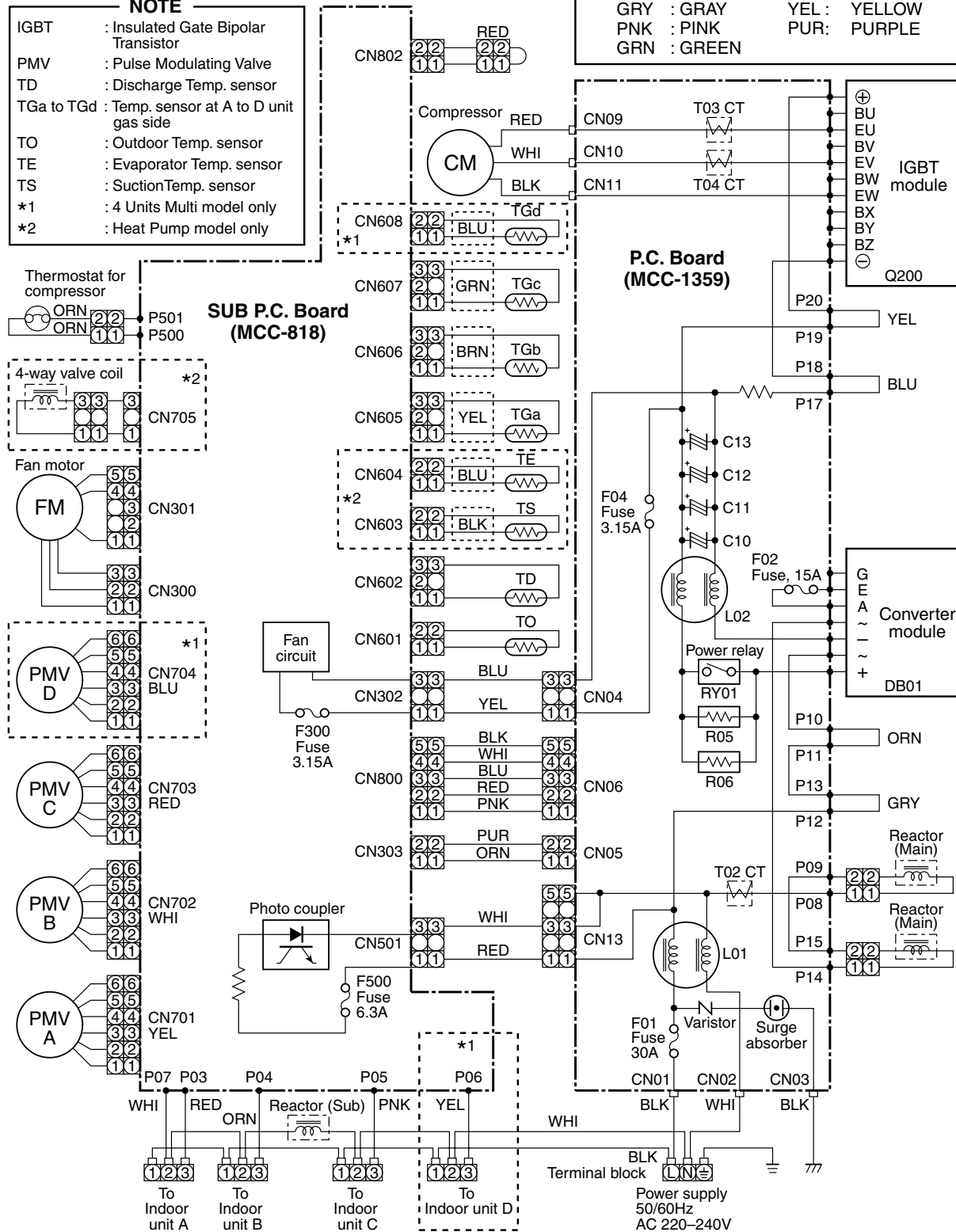
RAS-4M27YAV-E/RAS-4M27YACV-E/RAS-3M26YAV-E

### NOTE

IGBT	: Insulated Gate Bipolar Transistor
PMV	: Pulse Modulating Valve
TD	: Discharge Temp. sensor
TGa to TGd	: Temp. sensor at A to D unit gas side
TO	: Outdoor Temp. sensor
TE	: Evaporator Temp. sensor
TS	: Suction Temp. sensor
*1	: 4 Units Multi model only
*2	: Heat Pump model only

### Color Identification

BLK	: BLACK	WHI	: WHITE
BLU	: BLUE	BRN	: BROWN
RED	: RED	ORN	: ORANGE
GRY	: GRAY	YEL	: YELLOW
PNK	: PINK	PUR	: PURPLE
GRN	: GREEN		



## 5. SPECIFICATIONS OF ELECTRICAL PARTS

### 5-1. Indoor Unit

**RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3**  
**RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3**

No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	ICF-35-19-4	DC 340V, 30W
2	Thermo. sensor (TA-sensor)	( – )	10kΩ at 25°C
3	DC-DC transformer (T01)	SWT-70	DC 390V, Secondary DC 15V, 12V, 7V
4	Microcomputer	( – )	
5	Heat exchanger sensor (TC-sensor)	( – )	10kΩ at 25°C
6	Line filter (L01)	SS11V-06270	27mH, AC 0.64A
7	Diode (DB01)	D3SBA60	4A, 600V
8	Capacitor (C03)	KMH450VNSN120M25C	120μF, 450V
9	Fuse (F01)	FCU250V3.15A	T3.15A, 250V
10	Power supply IC (IC01)	STR-L472	
11	Varistor (R21, R109)	15G561K	560V
12	Resistor (R01)	RF-5TK4R7	4.7Ω, 5W
13	Louver motor	MP24GA	Output (Rated) 1W, 16 poles, 1 phase DC12V

## 5-2. Outdoor Unit

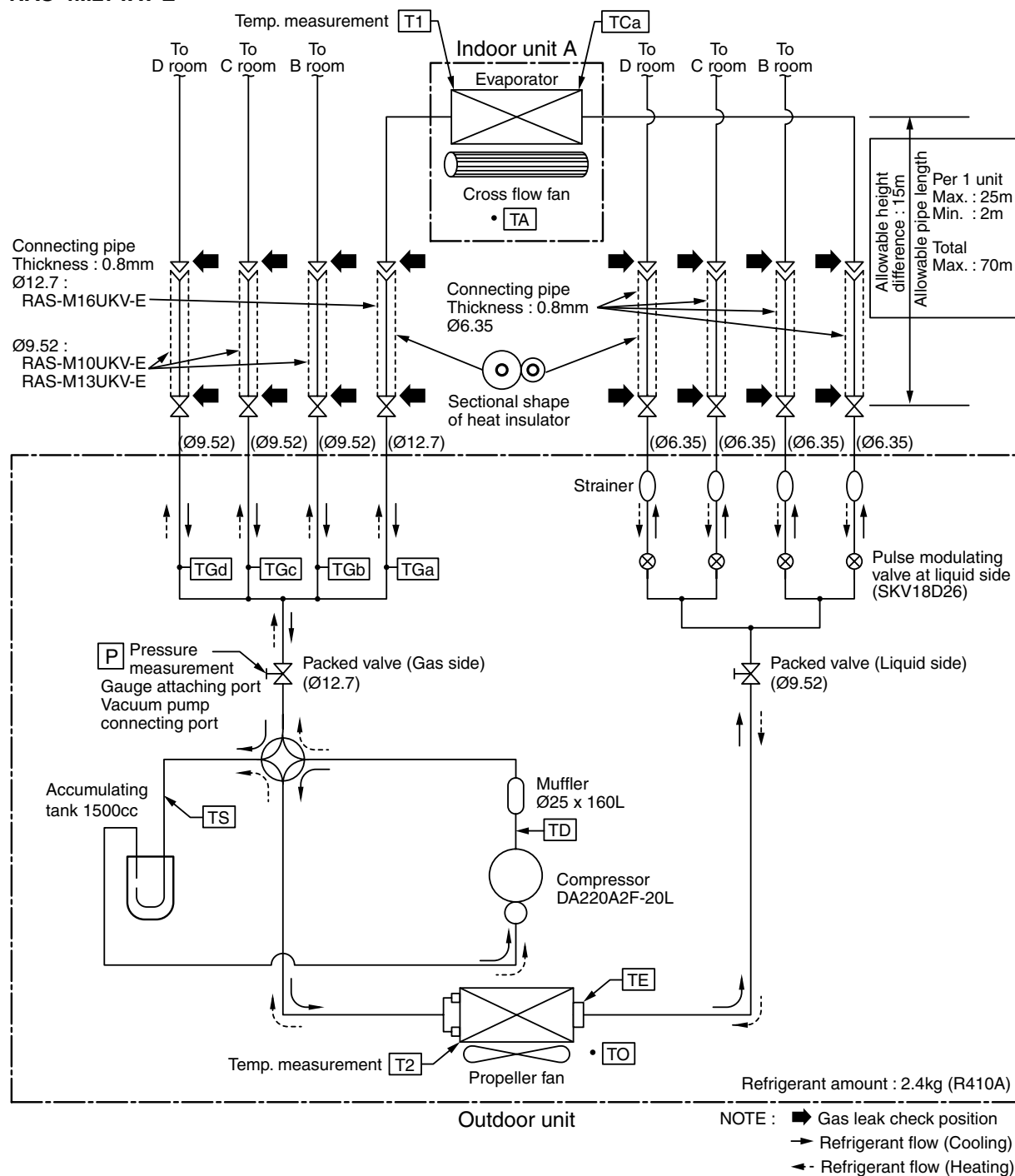
### RAS-4M27YAV-E, RAS-4M27YACV-E, RAS-3M26YAV-E

No.	Parts name	Model name	Rating
1	SC coil (Noise filter) (L01)	SC-20-01J-A	AC2 50V, 20A, 0.15mH
	SC coil (Noise filter) (L02)	SC-20-S03J	AC 250V, 20A, 0.3mH
2	DC-DC transformer	SWT-43	Primary side DC 280V Secondary side : 7.5V x 1, 13V x 1 26.5V x 3, 16V x 1, 15V x 1
3	Outside fan motor	ICF-140-60-1	DC 140V, 60W
*2	4 Relay (4-way valve)	G5N-1A	Coil : DC 12V Contact : 2A, AC250V
5	Relay (Power relay)	G4A-1A-PE	Coil : DC 12V Contact : 20A, AC250V
6	Discharge temp. sensor (TD-sensor)	(Inverter attached)	64kΩ (20°C)
7	Outside air temp. sensor (TO-sensor)	(Inverter attached)	10kΩ (25°C)
8	Temp. sensor at A room gas side (TGA-sensor)	(Inverter attached)	10kΩ (25°C)
9	Temp. sensor at B room gas side (TGB-sensor)	(Inverter attached)	10kΩ (25°C)
10	Temp. sensor at C room gas side (TGC-sensor)	(Inverter attached)	10kΩ (25°C)
*1	11 Temp. Sensor at D room gas side (TGD-sensor)	(Inverter attached)	10kΩ (25°C)
*2	12 Evaporator temp. sensor (TE-sensor)	(Inverter attached)	10kΩ (25°C)
*2	13 Suction temp. sensor (TS-sensor)	(Inverter attached)	10kΩ (25°C)
14	Terminal block (6P)	—	20A, AC 250V
15	Terminal block (3P)	—	20A, AC 250V
16	Fuse	For protection of switching power source (F04)	3.15A, AC 250V
		For protection of converter module breakage	15A, AC 250V
		For protection of inverter input overcurrent	30A, AC 250V
		For protection of switching power source (F300)	3.15A, AC 250V
		For protection of power source	6.3A, AC 250V
17	Electrolytic capacitor	LLQ2G761KHUATF	DC 400V, 760μF
18	Transistor module	6MBI40SS-060-01	600V, 40A
19	Compressor	DA220A2F-20L	3 phases, 4 poles, 2000W
20	Compressor thermo.	US622KXTMQO	OFF : 125 ± 4°C, ON : 90 ± 5°C
21	Converter module	MP7004	Diode : 600V, 20A IGBT : 600V, 40A
22	Reactor (Main)	CH-47-Z-K	L = 8mH, 16A
23	Reactor (Sub)	CH-43-Z-K	L = 10mH, 1A

**NOTE :** \*1 : 4 unit multi model only  
\*2 : Heat pump model only

## 6. REFRIGERANT CYCLE DIAGRAM

**RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3  
RAS-4M27YAV-E**

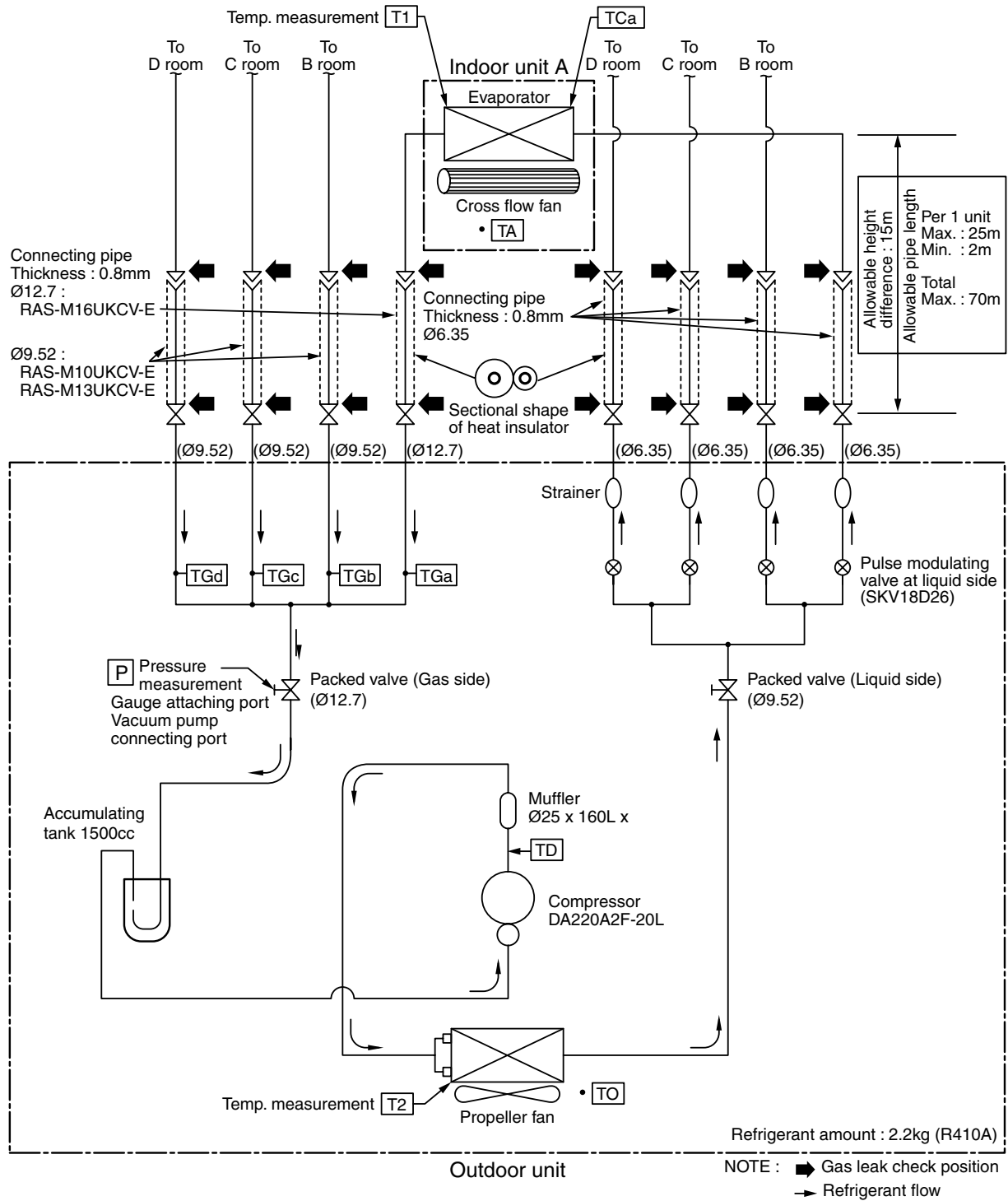


### NOTE

- The maximum pipe length of this air conditioner is 70 m. The additional charging of refrigerant is unnecessary because this conditioner is designed with charge-less specification.
- Connection of only one indoor unit is unavailable. Two or more indoor units should be connected.



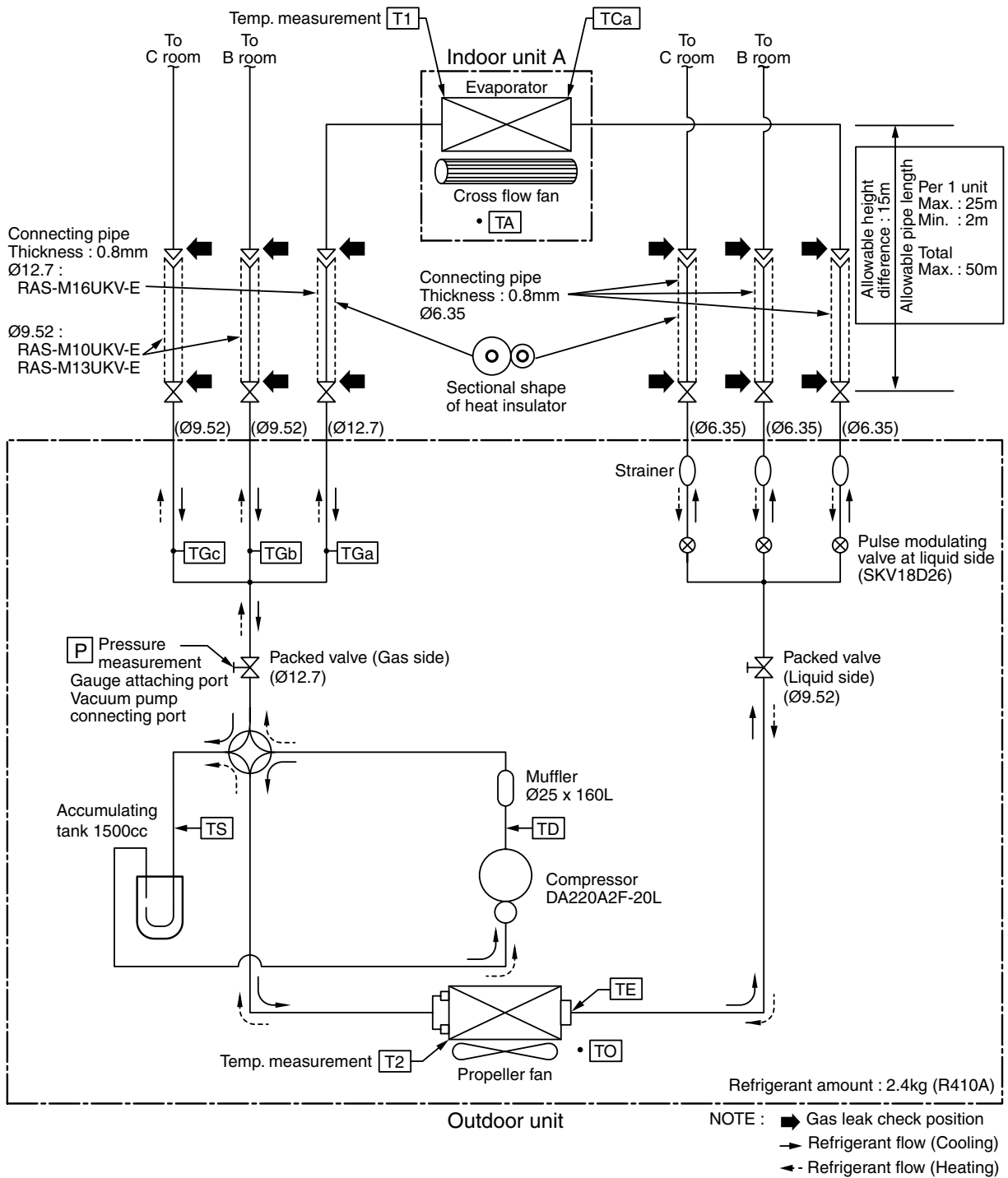
**RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3  
RAS-4M27YACV-E**



**NOTE**

- The maximum pipe length of this air conditioner is 70 m. The additional charging of refrigerant is unnecessary because this conditioner is designed with charge-less specification.

**RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3  
RAS-3M26YAV-E**



**NOTE**

- The maximum pipe length of this air conditioner is 50 m. The additional charging of refrigerant is unnecessary because this conditioner is designed with charge-less specification.
- Connection of only one indoor unit is unavailable. Two or more indoor units should be connected.

## 6-1. Operation Data

### Outdoor Unit : RAS-4M27YAV-E

#### <Cooling>

Temperature condition		No. of operating units	Operating combination (Unit)				Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan	Outdoor fan	Compressor revolution (rps)
Indoor	Outdoor		A	B	C	D		T1 (°C)	T2 (°C)			
27 / 19	35 / –	1 unit	10	–	–	–	0.8 to 1.0	9 to 11	45 to 47	High	MED	22
			13	–	–	–	0.7 to 0.9	8 to 10	46 to 48	High	MED	35
			16	–	–	–	0.6 to 0.8	7 to 9	47 to 49	High	MED	45
		2 units	10	10	–	–	0.8 to 1.0	10 to 12	47 to 49	High	MED	42
			13	10	–	–	0.8 to 1.0	10 to 12	48 to 50	High	MED	46
			16	10	–	–	0.8 to 1.0	10 to 12	49 to 51	High	MED	50
			13	13	–	–	0.8 to 1.0	10 to 12	50 to 52	High	MED	54
			16	13	–	–	0.7 to 0.9	9 to 11	51 to 53	High	MED	58
			16	16	–	–	0.7 to 0.9	9 to 11	52 to 54	High	MED	62
		3 units	10	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	13	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	13	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	13	–	0.8 to 1.0	12 to 14	51 to 53	High	MED	60
			16	16	16	–	0.8 to 1.0	12 to 14	51 to 53	High	MED	60
		4 units	10	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	13	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	13	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	13	13	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	13	13	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	62
			16	16	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	62

#### NOTES :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

#### NOTES :

- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bend.  
(Thermistor thermometer)
- (2) Connecting piping condition : 5 meters x 4 units (5m/each indoor unit)

## Outdoor Unit : RAS-4M27YAV-E

### <Heating>

Temperature condition		No. of operating units	Operating combination (Unit)				Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan	Outdoor fan	Compressor revolution (rps)
Indoor	Outdoor		A	B	C	D		T1 (°C)	T2 (°C)			
20 / -	7 / 6	1 unit	10	-	-	-	2.7 to 2.9	44 to 46	2 to 4	High	MED	41
			13	-	-	-	3.2 to 3.4	52 to 54	2 to 4	High	MED	52
			16	-	-	-	3.6 to 3.9	53 to 55	2 to 4	High	MED	56
		2 units	10	10	-	-	2.7 to 2.9	45 to 47	0 to 2	High	MED	62
			13	10	-	-	2.8 to 3.0	45 to 47	0 to 2	High	MED	64
			16	10	-	-	2.9 to 3.1	46 to 48	0 to 2	High	MED	66
			13	13	-	-	2.9 to 3.1	46 to 48	0 to 2	High	MED	67
			16	13	-	-	3.0 to 3.2	47 to 49	-1 to 1	High	MED	69
			16	16	-	-	3.1 to 3.3	48 to 50	-1 to 1	High	MED	71
		3 units	10	10	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			13	10	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			16	10	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			13	13	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	13	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			13	13	13	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	16	10	-	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	13	13	-	2.5 to 2.7	37 to 39	-2 to 0	High	MED	74
			16	16	13	-	2.5 to 2.7	37 to 39	-2 to 0	High	MED	74
			16	16	16	-	2.5 to 2.7	37 to 39	-2 to 0	High	MED	74
		4 units	10	10	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	72
			13	10	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	72
			16	10	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	73
			13	13	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	73
			16	13	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	73
			13	13	13	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	73
			16	13	13	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	74
			16	16	10	10	2.0 to 2.2	33 to 35	-2 to 0	High	MED	74

#### NOTES :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

#### NOTES :

- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bend.  
(Thermistor thermometer)
- (2) Connecting piping condition : 5 meters x 4 units (5m/each indoor unit)

# Outdoor Unit : RAS-4M27YACV-E

## <Cooling>

Temperature condition		No. of operating units	Operating combination (Unit)				Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan	Outdoor fan	Compressor revolution (rps)
Indoor	Outdoor		A	B	C	D		T1 (°C)	T2 (°C)			
27 /19	35 / –	1 unit	10	–	–	–	0.8 to 1.0	9 to 11	45 to 47	High	MED	22
			13	–	–	–	0.7 to 0.9	8 to 10	46 to 48	High	MED	35
			16	–	–	–	0.6 to 0.8	7 to 9	47 to 49	High	MED	45
		2 units	10	10	–	–	0.8 to 1.0	10 to 12	47 to 49	High	MED	42
			13	10	–	–	0.8 to 1.0	10 to 12	48 to 50	High	MED	46
			16	10	–	–	0.8 to 1.0	10 to 12	49 to 51	High	MED	50
			13	13	–	–	0.8 to 1.0	10 to 12	50 to 51	High	MED	54
			16	13	–	–	0.7 to 0.9	9 to 11	51 to 53	High	MED	58
			16	16	–	–	0.7 to 0.9	9 to 11	52 to 54	High	MED	62
		3 units	10	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	10	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	13	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	10	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	13	–	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	13	–	0.8 to 1.0	12 to 14	51 to 53	High	MED	60
			16	16	16	–	0.8 to 1.0	12 to 14	51 to 53	High	MED	60
		4 units	10	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	10	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	13	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	13	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			13	13	13	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	61
			16	13	13	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	62
			16	16	10	10	0.9 to 1.1	12 to 14	51 to 53	High	MED	62

### NOTES :

Model of Indoor unit 10 : RAS-M10UKCV-E3, 13 : RAS-M13UKCV-E3, 16 : RAS-M16UKCV-E3

### NOTES :

- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bend.  
(Thermistor thermometer)
- (2) Connecting piping condition : 5 meters x 4 units (5m/each indoor unit)

# Outdoor Unit : RAS-3M26YAV-E

## <Cooling>

Temperature condition		No. of operating units	Operating combination (Unit)			Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan	Outdoor fan	Compressor revolution (rps)
Indoor	Outdoor		A	B	C		T1 (°C)	T2 (°C)			
27 / 19	35 / -	1 unit	10	-	-	0.8 to 1.0	9 to 11	45 to 47	High	MED	22
			13	-	-	0.7 to 0.9	8 to 10	46 to 48	High	MED	35
			16	-	-	0.6 to 0.8	7 to 9	47 to 49	High	MED	45
		2 units	10	10	-	0.8 to 1.0	10 to 12	47 to 49	High	MED	42
			13	10	-	0.8 to 1.0	10 to 12	48 to 50	High	MED	46
			16	10	-	0.8 to 1.0	10 to 12	49 to 51	High	MED	50
			13	13	-	0.8 to 1.0	10 to 12	50 to 51	High	MED	54
			16	13	-	0.7 to 0.9	9 to 11	51 to 53	High	MED	58
			16	16	-	0.7 to 0.9	9 to 11	52 to 54	High	MED	62
		3 units	10	10	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	10	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	10	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			13	13	13	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	10	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	13	13	0.8 to 1.0	11 to 13	51 to 53	High	MED	60
			16	16	13	0.8 to 1.0	12 to 14	51 to 53	High	MED	60

### NOTES :

Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

### NOTES :

- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bend.  
(Thermistor thermometer)
- (2) Connecting piping condition : 5 meters x 3 units (5m/each indoor unit)

## Outdoor Unit : RAS-3M26YAV-E

### <Heating>

Temperature condition		No. of operating units	Operating combination (Unit)			Standard pressure P (MPa)	Heat exchanger pipe temp.		Indoor fan	Outdoor fan	Compressor revolution (rps)
Indoor	Outdoor		A	B	C		T1 (°C)	T2 (°C)			
27 / -	7 / 6	1 unit	10	-	-	2.6 to 2.8	44 to 46	2 to 4	High	MED	40
			13	-	-	3.3 to 3.5	52 to 54	1 to 3	High	MED	50
			16	-	-	3.5 to 3.7	55 to 57	1 to 3	High	MED	53
		2 units	10	10	-	2.7 to 2.9	45 to 47	0 to 2	High	MED	62
			13	10	-	2.8 to 3.0	45 to 47	0 to 2	High	MED	63
			16	10	-	2.9 to 3.1	46 to 48	0 to 2	High	MED	65
			13	13	-	2.9 to 3.1	46 to 48	0 to 2	High	MED	66
			16	13	-	3.1 to 3.3	47 to 49	0 to 2	High	MED	68
			16	16	-	3.3 to 3.5	50 to 52	0 to 2	High	MED	70
		3 units	10	10	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			13	10	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			16	10	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	72
			13	13	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	13	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			13	13	13	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	16	10	2.3 to 2.5	38 to 40	-1 to 1	High	MED	73
			16	13	13	2.5 to 2.7	37 to 39	-2 to 0	High	MED	74
			16	16	13	2.5 to 2.7	37 to 39	-2 to 0	High	MED	74

#### NOTES :

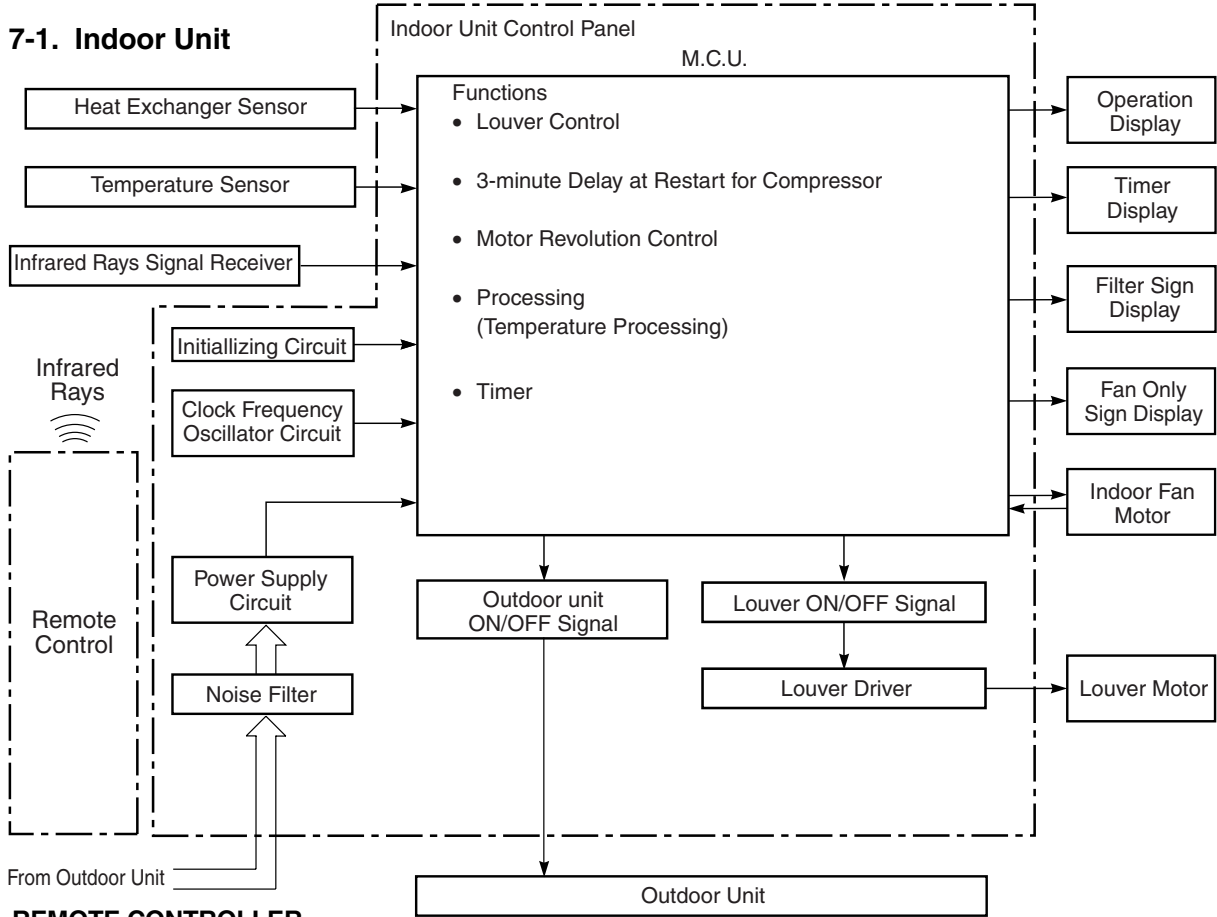
Model of Indoor unit 10 : RAS-M10UKV-E3, 13 : RAS-M13UKV-E3, 16 : RAS-M16UKV-E3

#### NOTES :

- (1) Measure surface temperature of heat exchanger pipe around center of heat exchanger path U bend.  
(Thermistor thermometer)
- (2) Connecting piping condition : 5 meters x 3 units (5m/each indoor unit)

## 7. CONTROL BLOCK DIAGRAM

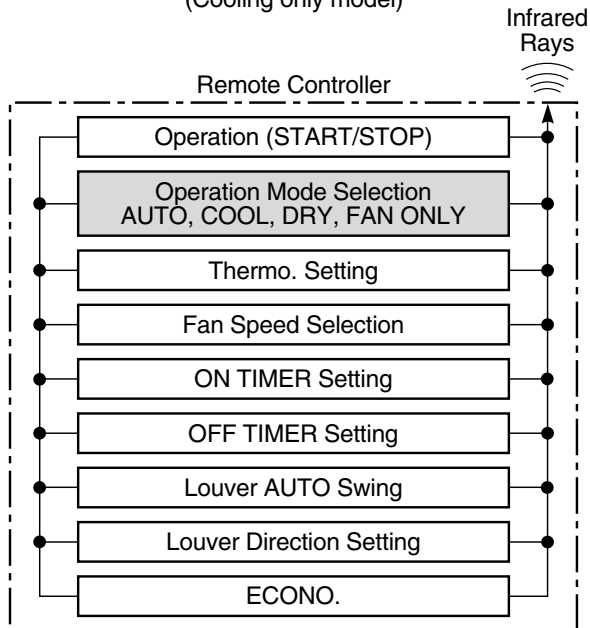
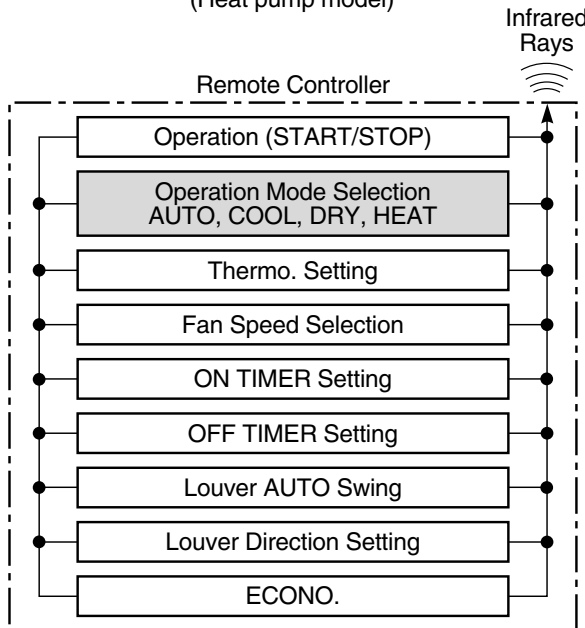
### 7-1. Indoor Unit



### REMOTE CONTROLLER

RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3  
(Heat pump model)

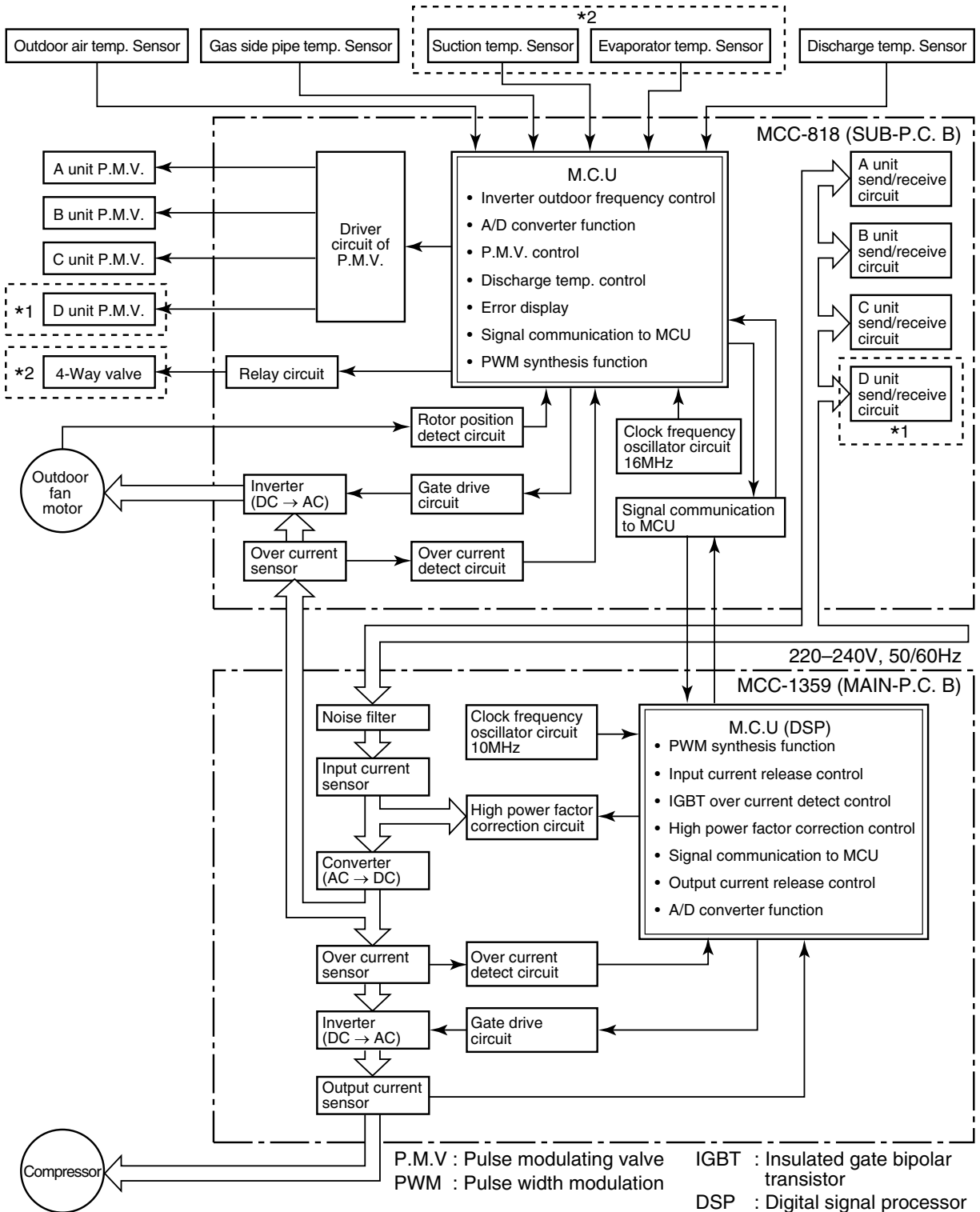
RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3  
(Cooling only model)





## 7-2. Outdoor Unit (Inverter Assembly)

RAS-4M27YAV-E, RAS-4M27YACV-E, RAS-3M26YAV-E



**NOTE :** \*1 : 4 unit multi model only    \*2 : Heat pump model only

## 8. OPERATION DESCRIPTION

### 8-1. Outline of Air Conditioner Control

This air conditioner is a capacity-variable type air conditioner, which uses DC motors for the indoor fan motors and the outdoor fan motor. And the capacity-proportional control compressor which can change the motor speed in the range from 15 to 90 rps is mounted. The DC motor drive circuit is mounted to the indoor unit. The compressor and the inverter to control fan motor are mounted to the outdoor unit. The entire air conditioner is mainly controlled by the indoor unit controller.

The indoor unit controller drives the indoor fan motor based upon command sent from the remote controller, and transfers the operation command to the outdoor unit controller.

The outdoor unit controller receives operation command from the indoor unit side, and controls the outdoor fan and the pulse modulating valve.

Besides, detecting revolution position of the compressor motor, the outdoor unit controller controls speed of the compressor motor by controlling output voltage of the inverter and switching timing of the supply power (current transfer timing) so that motors drive according to the operation command.

And then, the outdoor unit controller transfers reversely the operating status information of the outdoor unit to control the indoor unit controller.

**As the compressor adopts four-pole brushless DC motor, the frequency of the supply power from inverter to compressor is two-times cycles of the actual number of revolution.**

#### (1) Role of indoor unit controller

The indoor unit controller judges the operation commands from the remote controller and assumes the following functions.

- Judgment of suction air temperature of the indoor heat exchanger by using the indoor temp. sensor.
- Temperature setting of the indoor heat exchanger by using heat exchanger sensor (Prevent-freezing control)
- Louver motor control
- Indoor fan motor operation control
- LED display control
- Transferring of operation command signal (Serial signal) to the outdoor unit
- Reception of information of operation status (Serial signal including outside temp. data) to the outdoor unit and judgment/display of error

#### (2) Role of outdoor unit controller

Receiving the operation command signal (Serial signal) from the indoor controller, the outdoor unit performs its role.

- Compressor operation control
  - Operation control of outdoor fan motor
  - P.M.V. control
- } Operations followed to judgment of serial signal from indoor side.
- Detection of inverter input current and current release operation
  - Over-current detection and prevention operation to transistor module (Compressor stop function)
  - Compressor and outdoor fan stop function when serial signal is off (when the serial signal does not reach the board assembly of outdoor control by trouble of the signal system)
  - Transferring of operation information (Serial signal) from outdoor unit to indoor unit
  - Detection of outdoor temperature and operation revolution control
  - Defrost control in heating operation (Temp. measurement by outdoor heat exchanger and control for 4-way valve and outdoor fan)

#### (3) Contents of operation command signal (Serial signal) from indoor unit controller to outdoor unit controller

The following three types of signals are sent from the indoor unit controller.

- Operation mode set on the remote controller
- Compressor revolution command signal defined by indoor temperature and set temperature (Correction along with variation of room temperature and correction of indoor heat exchanger temperature are added.)
- For these two types of signals ( [Operation mode] and [Compressor revolution] ), the outdoor unit controller monitors the input current to the inverter, and performs the followed operation within the range that current does not exceed the allowable value.
- Temperature of indoor heat exchanger by indoor heat exchanger sensor (Minimum revolution control)

- (4) Contents of operation command signal (Serial signal) from outdoor unit controller to indoor unit controller

The following signals are sent from the outdoor unit controller.

- The current operation mode
- The current compressor revolution
- Outdoor temperature
- Existence of protective circuit operation

For transferring of these signals, the indoor unit controller monitors the contents of signals, and judges existence of trouble occurrence.

Contents of judgment are described below.

- Whether distinction of the current operation status meets to the operation command signal

- Whether protective circuit operates

When no signal is received from the outdoor unit controller, it is assumed as a trouble.

### 8-1-1. Capacity Control

The cooling capacity is varied by changing compressor motor speed. The inverter changes compressor motor speed by changing AC 220–240V power to DC once, and controls capacity by changing supply power status to the compressor with transistor module (includes 6 transistors). The outline of the control is as follows : The revolution position and revolution speed of the motor are detected by detecting winding electromotive force of the compressor motor under operation, and the revolution speed is changed so that the motor drives based upon revolution speed of the operation command by changing timing (current transfer timing) to exchange inverter output voltage and supply power winding.

Detection of the revolution position for controlling is performed 12 times per 1 revolution of compressor.

The range of supply power frequency to the compressor differs according to the operation status (COOL, DRY).

**Table 8-1-1 Compressor revolution range**

Operation mode	No. of operating unit	Combination of indoor units	Compressor revolution (rps)	Operation mode	No. of operating unit	Combination of indoor units	Compressor revolution (rps)
COOL	1 unit	M10	20 to 28	HEAT	1 unit	M10	15 to 52
		M13	20 to 43			M13	15 to 63
		M16	20 to 53			M16	15 to 67
	2 units		20 to 66		2 units		15 to 90
	3 units		31 to 69		3 units		17 to 90
	4 units		31 to 69		4 units		22 to 90

: In case that any multiple indoor units are combined.

### 8-1-2. Current Release Control

The outdoor main circuit control section (Inverter assembly) detects the input current to the outdoor unit. If the current value with compressor motor speed instructed from indoor side exceeds the specified value, the outdoor main circuit control section controls compressor motor speed by reducing motor speed so that value becomes closest to the command within the limited value.

### 8-1-3. Power Factor Improvement Control

Power factor improvement control is performed mainly aiming to reduce the current on much power consumption of cooling/heating operation. Controlling starts from the time when input power has reached at a certain point. To be concrete, IGBT of the power factor improvement circuit is used, and the power factor is improved by keeping IGBT on for an arbitrary period to widen electro-angle of the input current.

#### 8-1-4. Prevent-Freezing Control

The indoor heat exchanger sensor detects refrigerant vapor temperature in COOL/DRY operation. If the temperature is below the specified value, compressor motor speed is reduced so that operation is performed in temperature below the specified value to prevent-freezing of indoor heat exchanger.

#### 8-1-5. P. M. V. (Pulse Modulating Valve)

Using P.M.V., refrigerant flow of refrigeration cycle is varied for the optimum temperature. Controlling each unit separately by four P.M.V. corresponds to difference of pipe length, fan speed, and unit temperature.

If an error occurs on cycle temperature when power source of the air conditioner has been turned on, and if start/stop times of the outdoor unit are 30 times, move the valve once until it hits on the stopper for positioning of the valve. In this case, ticktack sound may be heard.

#### 8-1-6. Louver Control

##### (1) Vertical air flow louvers

Positions of vertical air flow louvers are automatically controlled according to the operation status (AUTO, COOL, DRY, HEAT). Besides, positions of vertical air flow louvers can be arbitrarily set by pressing the [SET] button. The louver position which has been set by the [SET] button is stored in micro-computer, and the louver is automatically set at the stored position in the next operation.

##### (2) Swing

If the [AUTO] button is pressed during running operation, vertical air flow louvers start swinging. When the [AUTO] button is pressed again, swinging stops.

#### 8-1-7. Indoor Fan Control (DC Fan Motor)

The indoor fan is operated by motor speed non-step variable DC drive system motor. For flow rate, motor speed is controlled manually in three steps (LOW, MED, HIGH), and with the unit of 10 rpm from upper limit to lower limit in AUTO mode as described in Table 8-1-2. It is not selected by relay, so selecting sound does not generate.

Table 8-1-2

Operation mode	Fan mode	Remote Control	M10		M13		M16	
			Motor speed ( rpm )	Air flow rate ( m <sup>3</sup> /h )	Motor speed ( rpm )	Air flow rate ( m <sup>3</sup> /h )	Motor speed ( rpm )	Air flow rate ( m <sup>3</sup> /h )
Cooling and Fan only	H	HIGH	1190	560	1210	590	1350	670
	M +		1080	510	1130	530	1250	610
		MED+	1100	510	1130	530	1250	610
	M	MED	1000	460	1050	490	1150	550
		LOW+	960	440	990	460	1070	500
	L +		950	430	950	430	1050	490
	L	LOW	910	400	910	400	980	450
DRY	L -		850	370	850	370	920	410
	L +		950	430	950	430	1050	490
	L		910	400	910	400	980	450
	L -		850	370	850	370	920	410
	UL		720	300	750	310	920	410
Heating and Fan only	SUL		660	260	700	280	800	340
	H	HIGH	1250	610	1290	630	1370	690
	M +		1200	580	1280	620	1360	680
		MED+	1160	550	1190	560	1270	620
	M	MED	1060	500	1100	510	1180	560
		LOW+	1010	460	1030	480	1110	510
	L +		1050	490	1050	490	1150	550
	L	LOW	940	430	940	430	1020	480
	L -		930	420	930	420	1000	460

**NOTE :**

- UL : Ultra Low, SUL : Super Ultra Low

### 8-1-7. Outdoor Fan Control (DC Fan Motor)

Although the outdoor fan motor drives the outdoor fan by non-step variable system of the revolution speed, the revolution speed is restricted to three steps on the convenience of controlling.

If a strong wind is lashing outside of the room, the operation may be continued as the outdoor fan stops in order to protect the outdoor fan motor.

If a fan lock occurred due to entering of foreign matter, the air conditioner stops and an alarm is displayed.

<COOL, DRY>

Table 8-1-3

Compressor revolution (rps)			20.3	~ 50.3	~ 62.8	63.4 ~
Outdoor temp. sensor TO	TO ≥ 38°C		390 (rpm)	700 (rpm)	700 (rpm)	700 (rpm)
	TO < 38°C	1 to 2 units	390 (rpm)	640 (rpm)	640 (rpm)	700 (rpm)
		3 to 4 units	390 (rpm)	500 (rpm)	640 (rpm)	700 (rpm)
ECONO. operation	TO ≥ 38°C		390 (rpm)	640 (rpm)	640 (rpm)	640 (rpm)
	TO < 38°C		390 (rpm)	500 (rpm)	500 (rpm)	500 (rpm)
TO is abnormal			500 (rpm)	640 (rpm)	640 (rpm)	640 (rpm)

<HEAT>

Table 8-1-4

Compressor revolution (rps)		20.3	~ 33.3	~ 33.9
Outdoor temp. sensor TO	TO ≥ 5°C	390 (rpm)	640 (rpm)	640 (rpm)
	TO < 5°C	500 (rpm)	640 (rpm)	640 (rpm)
ECONO. operation	TO ≥ 5°C	390 (rpm)	500 (rpm)	500 (rpm)
	TO < 5°C	390 (rpm)	500 (rpm)	500 (rpm)
TO is abnormal		390 (rpm)	500 (rpm)	640 (rpm)

## 8-2. Description of Operation Circuit

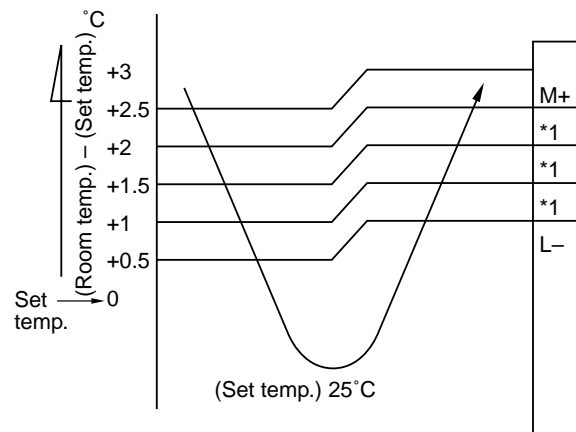
- Turning [ON] the breaker flashes the operation lamp.

This is the display of power-ON (or notification of power failure).

- When pushing [START/STOP] button of the remote controller, receive sound is issued from the main unit, and the next operations are performed together with opening the vertical air flow louvers.

### 8-2-1. Fan Only Operation (The Remote controller MODE Button is Set to the FAN ONLY Operation)

- This mode is only for the cooling only model.
- Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing [START/STOP] button.
- When the FAN button is set to the AUTO position, the indoor fan motor operates as shown in Fig. 8-2-1. When the FAN SPEED button is set to LOW, MED, or HIGH, the motor operates with a constant air flow.
- ECONO. mode cannot be set.



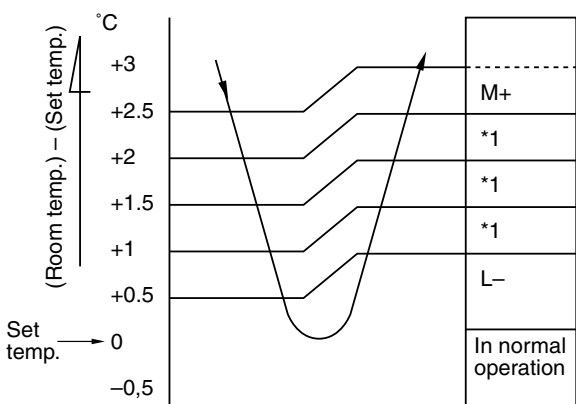
NOTE :

\*1: Calculated from difference in motor speed of M+ and L-, and controlled.

Fig. 8-2-1 Auto setting of air flow

## 8-2-2. Cooling Operation (The Remote controller MODE Button is Set to the COOL Position)

- Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing [START/STOP] button.
- A cooling operation signal is transmitted to outdoor unit.
- The indoor fan motor operates as shown in Fig.8-2-2 when FAN button is set to AUTO.
- The motor operates with a constant air flow when the FAN button is set to LOW, MED, or HIGH.
- The outdoor unit controls the outdoor fan relay R01, R02 and R03, and the compressor motor speed according to the operation command signal sent from the indoor unit.



### NOTE :

- \*1: Calculated from difference in motor speed of M+ and L-, and controlled.

Fig. 8-2-2 Setting of air flow [Air Flow AUTO]

## (1) Cooling capacity control

- The cooling capacity and room temperature are controlled by changing the compressor motor speed according to both the difference between the temperature detected by the room temperature sensor and the temperature set by TEMP button and also any change in room temperature.
- When compressor has been activated or reactivated, it operates with Max. 33 rps for 2 minutes and with Max. 57 rps from 2 to 4 minutes passed.
- When room temperature is lower than set temperature and indoor fan motor is operated at fan speed L- as shown in Fig. 8-2-2 while the outdoor unit stops.

## (2) Prevent-freezing control

If temperature of indoor heat exchanger detected by the indoor heat exchanger sensor is 5°C or lower, compressor motor speed is gradually lowered to prevent freezing of the indoor heat exchanger. If temperature is 7°C or higher, return the operation to the above item (1).

## (3) Current release control

The input current of compressor and outdoor fan motor (Precisely inverter main circuit control section) which occupy most of air conditioner input is detected by the outdoor current sensor, and compressor motor speed is gradually lowered so that current value does not exceed 11.5A if current value exceeds 11.5A. When the current value lowers to 11.0A, return the operation to the above item (1).

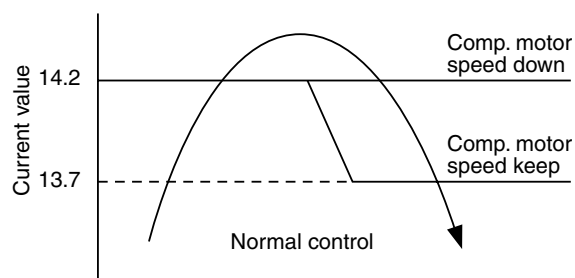


Fig. 8-2-3

## (4) Outdoor temperature release control

The outdoor temperature release is controlled by changing the current release points 14.2 and 13.7 in the above item according to temperature detected by the outdoor temperature sensor.

For example, if the outdoor temperature is 43°C, the value of current release points becomes 9.6A.

**(5) Limit for maximum compressor motor speed by indoor fan speed**

When outdoor temperature sensor detected 32°C or lower, and indoor heat exchanger sensor detected 17°C or lower, the maximum compressor motor speed is limited by the indoor fan speed.

For example, when 1 unit only operates, the compressor motor speed is limited as described in the table below.

**Table 8-2-1**

Air flow rate	M10 (rps)	M13 (rps)	M16 (rps)
HIGH	32	48	54
M+	29	42	46
MED	24	28	38
L	20	20	30
L-	20	20	30
UL	20	20	20
SUL	20	20	20

**(6) Louver control**

The vertical air flow louvers are automatically set to horizontal or cool memory position.

When temperature of indoor heat exchanger becomes 5°C or lower by the prevent-freezing control and the compressor is turned off, the vertical air flow louvers close once and then return to the position of previous time.

**(7) Discharge temperature control**

The discharge temperature of refrigerant gas from the compressor is detected by the discharge temperature sensor, and controls operating compressor motor speed.

1) Control 1 (A zone) : Normal operation zone

When TD detect value is 101°C or lower, the operation is performed with operating motor speed instructed by the serial signal.

2) Control 2 (B zone) : Slow-up zone of motor speed

When TD detect value is 101°C or higher, operating motor speed is slowly up.

3) Control 3 (C zone) : Keep zone

When TD detect value is 108°C or higher, operating motor speed is not changed if raising operation speed.

4) Control 4 (D zone) : Slow down zone of motor speed

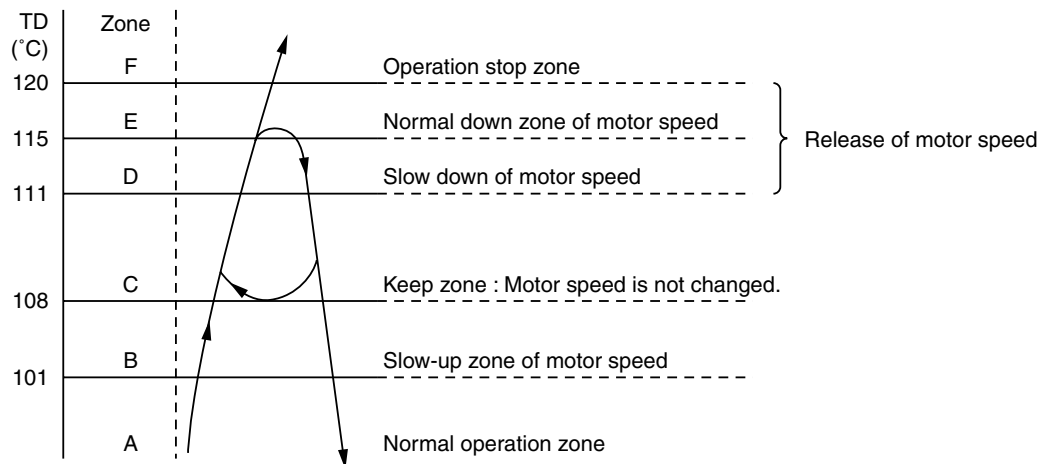
When TD detect value is 111°C or higher, operating motor speed is slowly down.

5) Control 5 (E zone) : Normal down of motor speed

When TD detect value is 115°C or higher, operating motor speed is down.

6) Control 6 (F zone) : Operation stop zone

If TD detect value exceeds 120°C during operation, stop the operation immediately. Then, restart the operation when TD detect value becomes 108°C or lower.



**Fig. 8-2-4 Compressor motor speed control**

### (8) ECONO. operation control

When the ECONO. button of the remote controller is pushed, quiet and mild operation is performed by restraining air flow and operating motor speed.

- 1) Indoor air flow is controlled between SUL and L- (Low air (-)).
- 2) Setting M10 at 20 rps, M13 at 20 rps and M16 at 20 rps as the maximum operating compressor motor speed, the minimum capacity operation range is widened every 1 hour and 2 hours have passed after ECONO. operation had started.
- 3) Maximum operating compressor motor speed lowers up to 37 rps when the ECONO. instruction is sent from even a room.

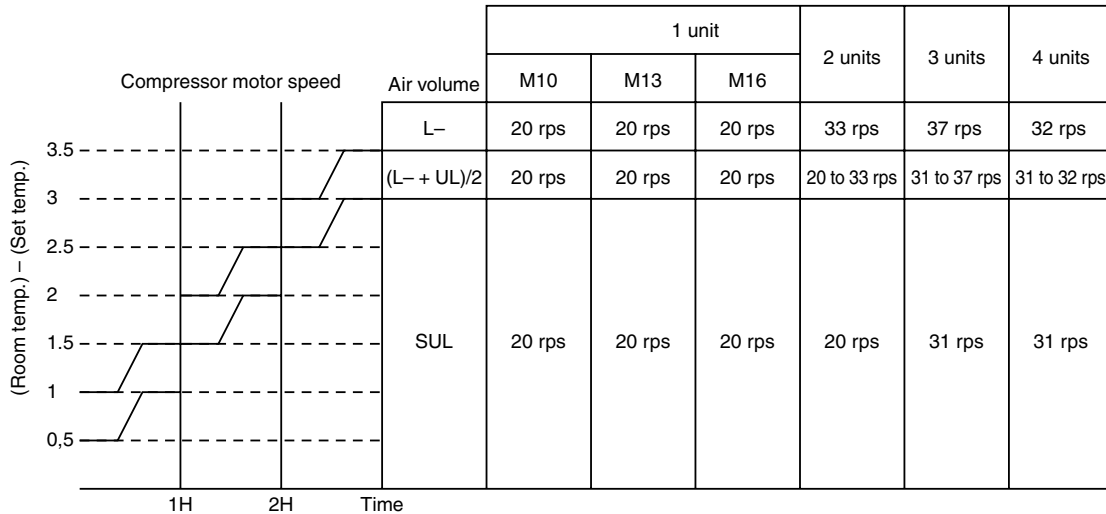
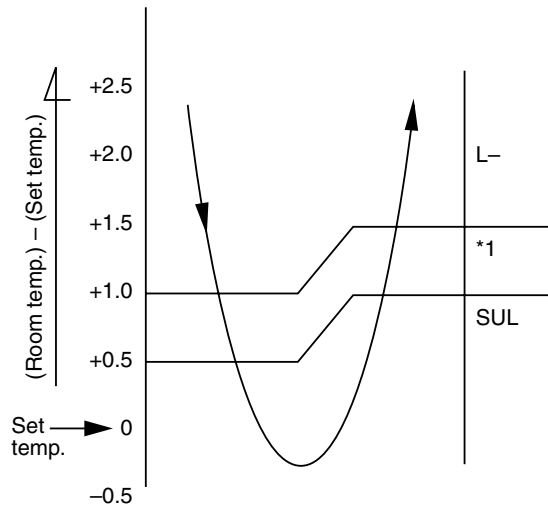


Fig. 8-2-5

### 8-2-3. DRY Operation (The Remote controller MODE Button is Set to the DRY Position)

- Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing [START/STOP] button.
- Dry operation signal is transmitted to outdoor unit.
- The Cooling operation giving priority to dehumidifying, which restrains the indoor fan speed and compressor motor speed, is performed.
- The indoor fan motor operates as shown in Fig. 8-2-6. (Fan speed is AUTO only.)
- The outdoor unit controls the outdoor fan relay R01, R02 and R03, and the compressor motor speed according to the operation command signal sent from the indoor unit.



NOTE :

\*1 : Middle motor speed between L- and SUL

Fig. 8-2-6 Setting of air flow



### (1) Dehumidifying-preferential Cooling capacity control

- The cooling capacity and room temperature are controlled by changing the compressor motor speed according to both the difference between the temperature detected by the room temperature sensor and the temperature set by TEMP button and also any change in room temperature.
- When the air conditioner operates in Dry mode, the maximum compressor motor speed is restricted.

M10 : Max. 20 rps  
M13 : Max. 20 rps  
M16 : Max. 22 rps

While multiple indoor units operate, compressor motor speed is calculated in the outdoor unit to operate.

- When room temperature is lower than set temperature, indoor fan motor is operated at fan speed SUL as shown in Fig. 8-2-6 while the outdoor unit stops.
- ECONO. mode cannot be set.
- Other controls than the above-mentioned controls are common to those of Cooling operation.

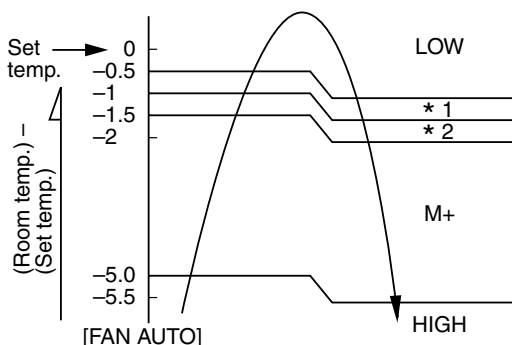
### 8-2-4. Heating Operation

Transferring of heating operation signal from indoor unit to outdoor unit starts.

The indoor fan motor operates by the room temperature when selecting "AUTO" of "FAN" as shown in Fig. 8-2-7, and operates with a set air flow when selecting "Low" to "High".

However, to prevent cold draft, revolution speed of the fan is restricted by indoor heat exchanger when air flow is AUTO (Fig. 8-2-8) and starting of FAN Manual.

#### [Basic control]



\*1, \*2 : Approximate revolution speed of M+ and L to linear according to temperature.

Fig. 8-2-7 Setting of air flow

### [Cold draft preventing control]

The upper limit of fan revolution speed is shown below.

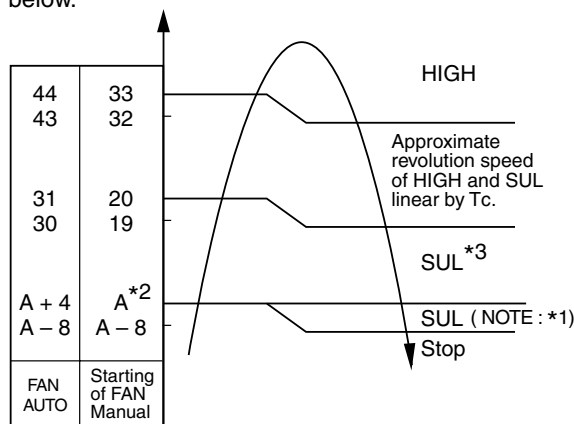


Fig. 8-2-8 Cold draft preventing control

#### NOTES :

- Stops for 2 minutes after thermostat-OFF.
- 24°C when the set temp. is 24°C or more  
Set temp. when the set temp. is below 24°C
- SUL : Super ultra low

#### [In starting and in stability]

	In starting	In stability
FAN AUTO	<ul style="list-style-type: none"> <li>Until 12 minutes passed after operation start</li> <li>When 12 to 25 minutes passed after operation start and room temp. is 3°C or lower than set temp.</li> </ul>	<ul style="list-style-type: none"> <li>When 12 to 25 minutes passed after operation start and room temp. is higher than (set temp. -3°C)</li> <li>When 25 minutes or more passed after operation start</li> </ul>
FAN Manual	<ul style="list-style-type: none"> <li>Room temp. ≤ Set temp. -4°C</li> </ul>	<ul style="list-style-type: none"> <li>Room temp. &gt; Set temp. -3,5°C</li> </ul>

The outdoor unit controls the outdoor fan based upon the operation signal sent from the indoor unit, and also controls revolution speed of the compressor motor.

The power coupler (IC20) for four-way valve is turned on, and turned off in defrost operation.

### (1) Heating capacity control

Calculate the difference between temperature detected by room temp. sensor every minute and the set temp. set on "Temp. indicator" and variation amount of room temp.

Then, obtain the correction amount of the command signal, and correct the current frequency command signal.

## (2) High-temp. release control

If temperature of the indoor heat exchanger detected by the indoor heat exchanger sensor is 55°C or higher, compressor motor speed is gradually lowered to prevent over-temp. rising of compressed pressure.

If temperature becomes below 48°C, return to above item (1).

## (3) Current release control

The input current of compressor and outdoor fan motor (Precisely inverter main circuit control section) which occupy most of air conditioner input is detected by the outdoor current sensor. The compressor motor speed is lowered gradually according to the range of TO (outside air temp.) if the input current exceeds the current value determined in each zone as shown in Fig. 8-2-9 so that the input current does not exceed the set value.

In case that the current lowered by approx. 0.3A to 0.5A than each set value, return to above item (1).

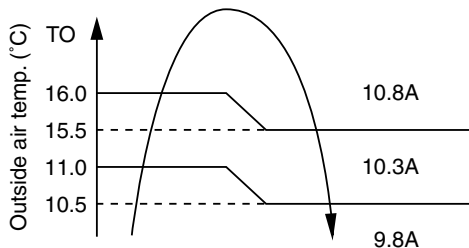


Fig. 8-2-9

## (4) Defrost control

### 1) Detection of frost

In heating operation, time duration while the compressor operates is counted, and defrost operation starts by any condition described below.

- The counted time is 28 minutes or more, and status that temperature of the outdoor heat exchanger detected by the outdoor heat exchanger is -20°C or lower continued for 3 minutes or more.
- The counted time is 28 minutes or more, and status that temperature of the outdoor heat exchanger detected by the outdoor heat exchanger is -8°C or lower and temperature lowered by 2.5 °C than the minimum value of the outdoor heat exchanger during 10 to 15-minutes count time continued for 3 minutes or more.

- The counted time is 34 minutes or more, and status that temperature of the outdoor heat exchanger detected by the outdoor heat exchanger is -5°C or lower and temperature lowered by 3.0 °C than the minimum value of the outdoor heat exchanger during 10 to 15 minutes count time continued for 3 minutes or more.
- The counted time is 4 hours or more, and status that temperature of the outdoor heat exchanger detected by the outdoor heat exchanger is 0°C or lower and temperature lowered by 1.0 °C than the minimum value of the outdoor heat exchanger during 10 to 15 minutes count time continued for 3 minutes or more.
- If the following three conditions are satisfied, defrost operation (Timer defrost) starts after heating operation for 48 minutes.

- ① Setting on remote control, HEAT (mode), HIGH (Fan), 30°C (temp.).
- ② Room temp. is 19°C to 24°C, and outside air temp. is 5°C or lower.
- ③ Defrost operation has been already performed once.

### 2) Defrost operation

Operation of the compressor is stopped once, turn off power coupler for four-way valve after 10 seconds, and then exchange the four-way valve.

After 20 seconds, restart operation of the compressor. Turn off the outdoor fan just when the compressor stopped.

If temperature of the indoor heat exchanger lowered than 38°C, stop the indoor fan.

### 3) Defrost reset

Resetting operation from defrost to heating is performed when any one of the following conditions is satisfied.

- Temperature of the outdoor heat exchanger rose to +8°C or higher.
- A status that temperature of the outdoor heat exchanger is +5°C or higher continued for 80 seconds.
- Defrost operation continued for 10 minutes.

In resetting defrost operation, the compressor stops for 50 seconds if defrost has started under condition a. to d. in item 1), but the compressor is reset to heating operation keeping operated if defrost has started under condition e. in item 1).

### (5) Louver control

The vertical air flow louvers are automatically set to heating position or heat memory position. When the compressor is turned off by high-temp. release control, the vertical air flow louvers close once and then return to the position of previous time.

### 8-2-5. Auto Operation

- (1) As shown in Fig. 8-2-10, the operation mode (COOL, DRY, HEAT) is selected according to the outside temperature when the operation has started.

The operation in Fan mode continues until an operation mode is selected.

If the room temperature is 20°C or higher when "AUTO" operation started within 2 hours after "HEAT" operation had stopped, select an operation mode after Fan operation of ultra low fan.

In AUTO operation, the set temperature of each operation can be corrected by the remote controller in the range of  $T_s = \pm 5^\circ\text{C}$ .

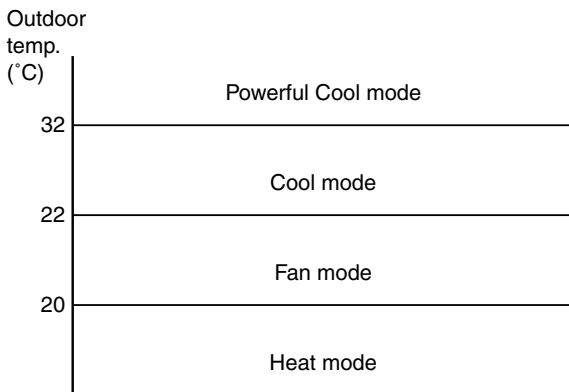


Fig. 8-2-10

- (2) After selecting the operation mode (COOL, DRY, HEAT), select an operation mode again when a status that the compressor was turned off by the room temperature or outside air temperature continues for 15 minutes.
- (3) After selecting DRY operation, a status that the room temperature is the set temp.  $-2^\circ\text{C}$  continues for 15 minutes, select an operation mode again.
- (4) Powerful Cool mode control
- When the outside temperature is above  $32^\circ\text{C}$  and indoor temperature is above  $28^\circ\text{C}$ , select Cool mode control. In Cool mode, the air flow louver directs downward. When the room temperature gains access to the set temperature, it becomes cool memory position.

### 8-3. Temporary Operation

- Temporary Auto operation, existence of Auto Restart, and Temporary Cooling operation can be set by the TEMPORARY button of the indoor controller.

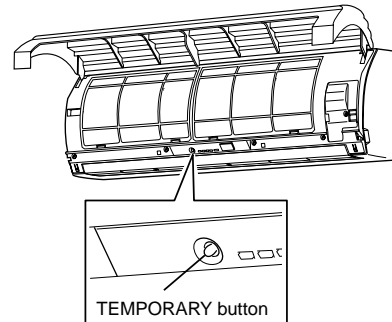


Fig. 8-3-2

TEMPORARY button	Control
OFF → ON	Temporary Auto operation start
After pushing button for 3 seconds	Auto Restart control select
After pushing button for 10 seconds	Temporary Cooling operation start

#### 8-3-1. Temporary Auto Operation

- When the TEMPORARY button is pushed, the Auto operation with set temperature fixed at  $24^\circ\text{C}$  starts. Controlling is same as that of Auto operation by the remote controller.
- When the TEMPORARY button is pushed again, the operation stops.
- During Temporary Auto operation, operation by the remote controller is accepted.
- Using the Auto Restart function, the Temporary Auto operation starts when power failure is reset.

#### 8-3-2. Temporary Cooling Operation

- When the TEMPORARY operation button keeps pushed for 10 seconds, Cooling operation of which compressor motor speed and the indoor fan speed are fixed starts.
  - Compressor motor speed : 24.5 rps
  - Indoor fan speed : Low
- When the TEMPORARY operation button is pushed again, the operation stops.
- Auto Restart function is unavailable.

## 8-4. Auto Restart Function

This unit is equipped with an Automatic restarting facility which allows the unit to restart and resume the set operating conditions in the event of a power supply shutdown without the use of the hand control.

The operation will resume without warning three minutes after the power is restored.

The Auto Restart function is set not to work on shipment from the factory, and so it is necessary to set it to function as required.

### 8-4-1. How to Set the Auto Restart

To set the Auto Restart function, proceed as follows:

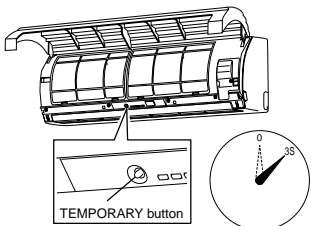
Access the TEMPORARY button located in the lower right hand corner beneath the hinged front panel of the indoor unit (please refer to section on PARTS NAME). The power supply to the unit must be on - the function will not be set if the power is off.

To enable the Auto Restart function, push the TEMPORARY button continuously for three seconds.

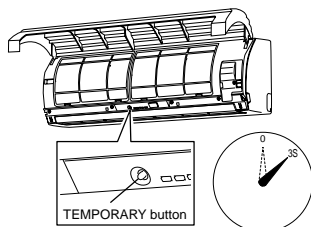
The unit will acknowledge the setting and beep three times. The system will now restart automatically.

The above Auto Restart settings can be carried out:

- When the system is stand-by (not operating)

Operation	Motion
Push the TEMPORARY button continuously more than three seconds. 	Stand-by ↓ The system starts to operate.      The green light goes on. ↓ about three seconds after The unit beeps three times.      The orange light goes on. ↓ The system is operating. If the system is not required to run at this time, push the TEMPORARY button once more or use the remote controller and the unit will stop.

- When the system is operating

Operation	Motion
Push the TEMPORARY button continuously more than three seconds. 	Operating      The green light goes on. ↓ The system stops to operate.      The green light goes off. ↓ about three seconds after The unit beeps three times. ↓ The system stops. If the system is not required to stop at this time, use the remote controller and to restart.

During subsequent operation, the orange light goes on.

- The Auto Restart function will not accept an instruction if timer operation with the remote controller is selected. (Please refer to the section on setting the timer or setting the louver.)
- During louver swing (AUTO) operation, after restart by the Auto Restart function the louver swing stops.

### 8-4-2. How to Cancel the Auto Restart

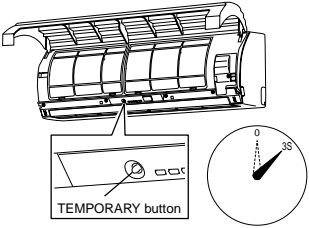
To cancel the Auto Restart function, proceed as follows:

Repeat the setting procedure: the unit will acknowledge the instruction and beep three times.

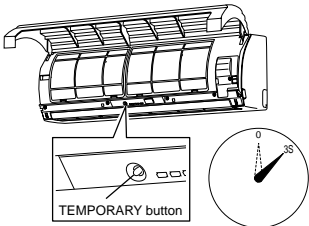
The system will now be required to manually restart with the remote controller after the main supply is turned off.

Cancellation is carried out:

- When the system is stand-by (not operating)

Operation	Motion
<p>Push the TEMPORARY button continuously more than three seconds.</p> 	<p>Stand-by ↓ The system starts to operate.      The orange light goes on. ↓ about three seconds after The unit beeps three times.      The green light goes on. ↓ The system is operating.</p> <p>If the system is not required to run at this time, push the TEMPORARY button once more or use the remote controller and the unit will stop.</p>

- When the system is operating

Operation	Motion
<p>Push the TEMPORARY button continuously more than three seconds.</p> 	<p>Operating      The orange light goes on. ↓ The system stops to operate.      The orange light goes off. ↓ about three seconds after The unit beeps three times. ↓ The system stops.</p> <p>If the system is not required to stop at this time, use the remote controller and to restart.</p>

During subsequent operation, the green light is lighting.










### 8-4-3. In Case of Power Failure during the Timer Operation




- (1) If ON-TIMER operation is reserved with setting of Auto Restart operation, it is cancelled with power failure. (The OPERATION lamp on the main unit goes on and off to inform of power failure.) In that case, try to reserve ON-TIMER operation once again.
- (2) If OFF-TIMER operation is reserved without setting of Auto Restart operation, the reservation is cancelled with power failure. (The OPERATION lamp on the main unit goes on and off to inform of power failure.) In that case, try to reserve OFF-TIMER operation. When Auto Restart operation is set, OFF-TIMER reservation is also cancelled with power failure.

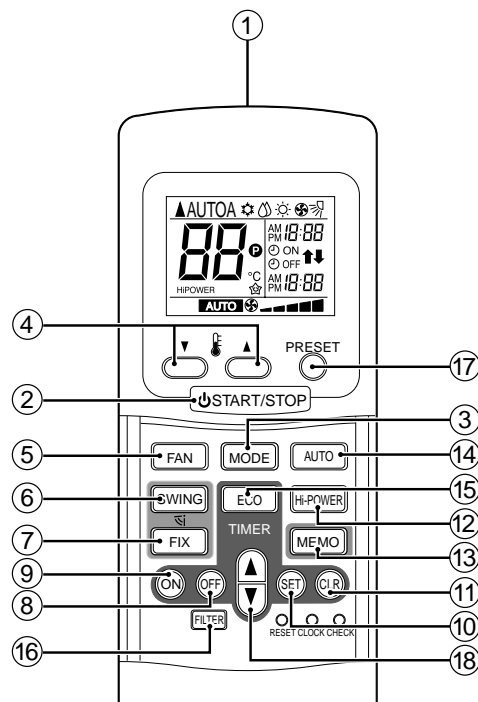
## 8-5. Remote control

### 8-5-1. Remote control and its functions

RAS-M10UKCV, RAS-M13UKCV, RAS-M16UKCV

- ① **Infrared signal emitter**  
Transmits a signal to the indoor unit.
- ② **START/STOP button**  
Press the button to start operation.  
(A receiving beep is heard.)  
Press the button again to stop operation.  
(A receiving beep is heard.)  
If no receiving sound is heard from the indoor unit, press the button twice.
- ③ **Mode select button (MODE)**  
Press this button to select a mode.  
Each time you press the button, a mode is selected in a sequence that goes from A : Auto changeover control,  : Cool,  : Dry,  : Heat,  : Fan only, and back to A.  
(A receiving beep is heard.)
- ④ **Temperature button (↑ ↓)**  
▲ .....The set temperature is increased up to 30°C.  
▼ .....The set temperature is dropped down to 17°C.  
(A receiving beep is heard.)
- ⑤ **Fan speed button (FAN)**  
Press this button to select fan speed. When you select AUTO, the fan speed is automatically adjusted according to the room temperature.  
You can also manually select the desired fan speed from among five settings.  
(LOW  , LOW+  , MED  , MED+  , HIGH  )  
(A receiving beep is heard.)
- ⑥ **Auto louver button (SWING)**  
Press this button to swing the louver.  
(A receiving beep is heard.)  
Press the FIX button to stop the louver swinging.  
(A receiving beep is heard.)
- ⑦ **Set louver button (FIX)**  
Press this button to adjust the air flow direction.  
(A receiving beep is heard.)
- ⑧ **Off timer button (OFF)**  
Press this button to set the OFF timer.
- ⑨ **On timer button (ON)**  
Press this button to set the ON timer.
- ⑩ **Reserve button (SET)**  
Press this button to reserve time settings.  
(A receiving beep is heard.)
- ⑪ **Cancel button (CLR)**  
Press this button to cancel ON timer and OFF timer. (A receiving beep is heard.)
- ⑫ **High power button (Hi POWER)**  
Press this button to start the high power operation.

- ⑬ **Memory button (MEMO)**  
Press this button to stand by memorizing the settings.  
Press the button again for more than 4 seconds to memorize the setting indicated on the remote control and  mark is indicated.
- ⑭ **Automatic operation button (AUTO)**  
Press this button to operate the air conditioner automatically.  
(A receiving beep is heard.)
- ⑮ **ECO timer button (ECO)**  
Press this button to start the ECO timer (OFF timer) operation.  
You can select the OFF timer time from among four settings (1,3,5 or 9 hours).
- ⑯ **FILTER button**  
Press this button to turn off the filter cleaning lamp on the indoor unit.  
Press this button after cleaning the air filter.
- ⑰ **PRESET button**  
Press this button to operate the air conditioner according to settings memorized by the MEMO button.
- ⑱ **TIMER button**  
Use this button to change the clock, ON timer, and OFF timer times.  
To forward the time, press the "TIMER  " button.  
To set back the time, press the "TIMER  " button.



## 8-5-2. Names and functions of indications on remote control

### Display

All indications, except for clock time indication, are indicated by pressing the START/STOP button.

#### ① Transmission mark

This transmission mark (▲) indicates when the remote control transmits signals to the indoor unit.

#### ② Mode display

Indicates the current operation mode.

(AUTO : Automatic control, A : Auto changeover control, ❄ : Cool, ☀ : Dry, 🔥 : Heat, 🌀 : Fan only)

#### ③ Temperature display

Indicates the temperature setting (17°C to 30°C).

When you set the operating mode to 🌀 : Fan only, no temperature setting is indicated.

#### ④ Louver operation display

Indicates the louver positioning and operation.

Five selectable positions - ▽, ▹, ▸, ▹, ▽ Automatic - ▹ Swing 🌀

#### ⑤ FAN speed display

Indicates the selected fan speed. AUTO or one of five fan speed levels (LOW ▬, LOW+ ▬▬, MED ▬▬▬, MED+ ▬▬▬▬, HIGH ▬▬▬▬▬) can be indicated.

Indicates AUTO when the operating mode is either AUTO or ☀ : Dry.

#### ⑥ TIMER and clock time display

The time set for timer operation or clock time is indicated.

The present time is always indicated except for TIMER operation.

#### ⑦ Hi POWER display

Indicates when the Hi POWER operation starts.

Press the Hi POWER button to start and press it again to stop the operation.

#### ⑧ Ⓜ (MEMORY) display

Flashes for 4 seconds when the MEMO button is pressed during operation.

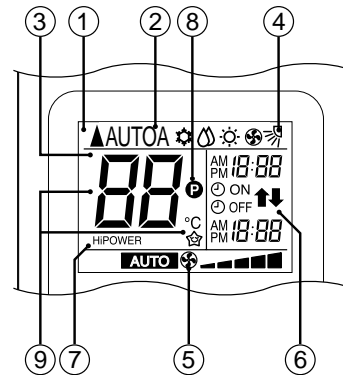
Ⓜ mark is indicated when keeping the button depressed for more than 4 seconds while the mark is flashing.

Press another button to turn off the mark.

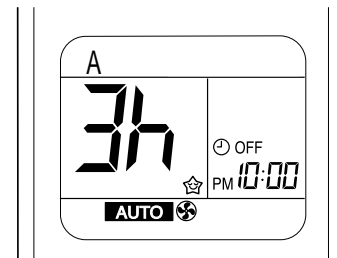
#### ⑨ ECO TIMER display

Indicates when the ECO TIMER is in operation.

Each time you press the ECO button, the display changes in the sequence of 1,3,5 or 9h.



- In the illustration, all indications are indicated for explanation. During operation, only the relevant indications will be indicated on the remote control.





## 9. INSTALLATION PROCEDURE

### 9-1. Safety Cautions

#### For general public use

Power supply cord of parts of appliance for Outdoor use shall be more than polychloroprene sheathed flexible cord (design H07RN-F), or cord designation 245IEC66. (1.5 mm<sup>2</sup> or more)

#### CAUTION

##### New Refrigerant Air Conditioner Installation


- **THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT (R-410A) WHICH DOES NOT DESTROY OZONE LAYER.**

R-410A refrigerant is apt to be affected by impurity such as water, oxidizing membrane, and oils because pressure of R-410A refrigerant is approx. 1.6 times of refrigerant R-22. Accompanied with adoption of the new refrigerant, refrigerating machine oil has been also changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating machine oil does not enter into the refrigerating cycle or new-refrigerant air conditioner.

To prevent mix-in of refrigerant or refrigerating machine oil, the sizes of connecting sections of charging port of the main unit or installation tools are different from those for the conventional refrigerant. Accordingly, the exclusive tools are required for the new refrigerant (R-410A) as shown below. For connecting pipes, use new and clean piping materials with high pressure-tight force, which were made for R-410A only, so that water or dust does not enter. Moreover, do not use the existing piping because there are problems about pressure-tight force and inner impurity in the existing piping.

#### CAUTION

##### TO DISCONNECT THE APPLIANCE FROM THE MAIN POWER SUPPLY.

This appliance must be connected to the main power supply by means of a circuit breaker or a switch with a contact separation of at least 3 mm. **The installation fuse (25A D type ) must be used for the power supply line of this air conditioner. (RAS-13UKV-E only)**

#### DANGER

- FOR USE BY QUALIFIED PERSONS ONLY.
- TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING ANY ELECTRICAL WORK. MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
- CONNECT THE CONNECTING CABLE CORRECTLY. IF THE CONNECTING CABLE IS CONNECTED BY WRONG WAY, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THE EARTH WIRE IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT OVERHEATING THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR-CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTINGLY CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS.
- IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSES GENERATION OF POISONOUS GAS.

#### WARNING

- Never modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.
- Do not install in a place which cannot bear the weight of the unit.  
Personal injury and property damage can result if the unit falls.
- Before doing the electrical work, attach an approved plug to the power supply cord.  
And, make sure the equipment to be earthed.
- Appliance shall be installed in accordance with national wiring regulations.  
If you detect any damage, do not install the unit. Contact your Toshiba dealer immediately.

#### CAUTION

- Exposure of unit to water or other moisture before installation will result in an electrical short.  
Do not store in a wet basement or expose to rain or water.
- After unpacking the unit, examine it carefully for possible damage.
- Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise and discharged air might disturb neighbors.
- To avoid personal injury, be careful when handling parts with sharp edges.
- Please read this installation manual carefully before installing the unit. It contains further important instructions for proper installation.




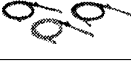





### 9-1-1. Installation/Service Tools

#### Changes in the product and components

In the case of an air condition using R-410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3 way valve) has been changed. (1/2 UNF 20 threads per inch)

- In order to increase the pressure resisting strength of the refrigerant piping, flare processing diameter and size of opposite side of flare nuts has been changed. (for copper pipes with nominal dimensions 1/2 and 5/8)

#### New tools for R-410A

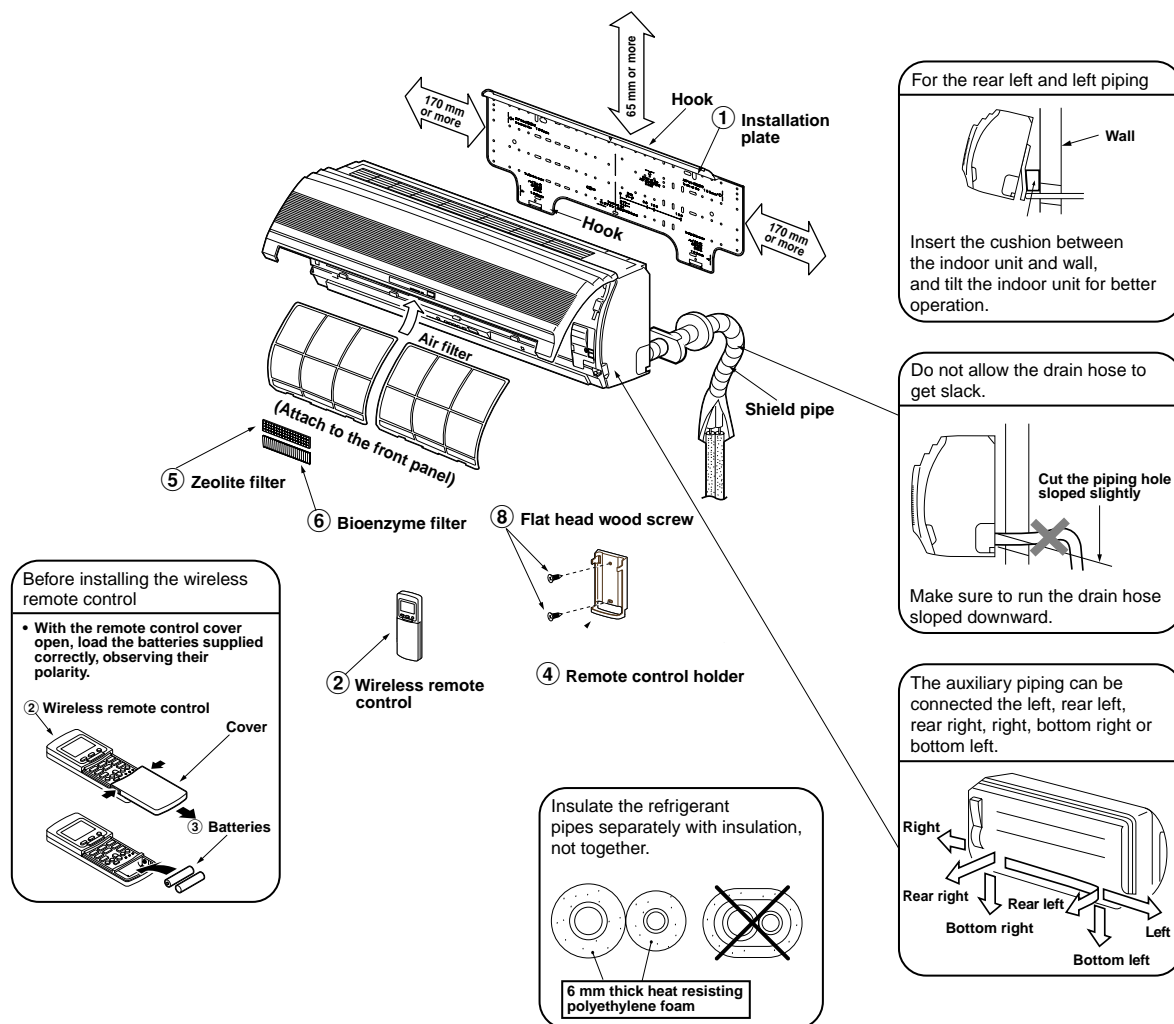
New tools for R-410A	Applicable to R-22 model	Changes
Gauge manifold	×	 As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×	 In order to increase pressure resisting strength, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○	 As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of charging cylinder, as air bubbles occur.
Torque wrench (nominal diam. 1/2, 5/8)	×	 The size of opposite sides of flare nuts have been increased. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○	 By increasing the clamp bar's receiving hole, strength of spring in the tool has been improved.
Gauge for projection adjustment	—	Used when flare is made by using conventional flare tool.
Vacuum pump adapter	○	 Connected to conventional vacuum pump. It is necessary to use an adapter to prevent vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports-one for conventional refrigerant (7/16 UNF 20 threads per inch) and one for R410A. If the vacuum pump oil (mineral) mixes with R-410A a sludge may occur and damage the equipment.
Gas leakage detector	×	 Exclusive for HFC refrigerant.

- Incidentally, the "refrigerant cylinder" comes with the refrigerant designation (R-410A) and protector coating in the U.S's ARI specified rose color (ARI color code: PMS 507).
- Also, the "charge port and packing for refrigerant cylinder" require 1/2 UNF 20 threads per inch corresponding to the charge hose's port size.




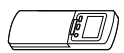





## 9-2. Indoor unit

RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3

RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3



### 9-2-1. Accessory and Installation Parts

Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)
①	 Installation plate x 1	④	 Remote control holder x 1	⑦	 Mounting screw $\varnothing 4 \times 25 \ell \times 6$
②	 Wireless remote control x 1	⑤	 Zeolite filter x 1	⑧	 Flat head wood screw $\varnothing 3.1 \times 16 \ell \times 2$
③	 Battery x 2	⑥	 Bioenzyme filter x 1	⑨	 B Label x 1

#### Others

Name
Owner's manual
Installation manual

This model is not equipped with an extension drain hose.

#### Option :

For the extension drain hose, use an optionally available RB-821SW or commercially available one.

### 9-2-2. Installation Place

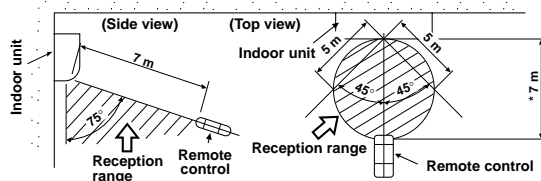
- A place which provides the spaces around the indoor unit as shown in the above diagram.
  - A place where there is no obstacle near the air inlet and outlet.
  - A place which allows easy installation of the piping to the outdoor unit.
  - A place which allows the front panel to be opened.
  - The indoor unit shall be installed as top of the indoor unit comes to at least 2m height.
- Also it must be avoided to put anything on the top of the indoor unit.

#### CAUTION

- Direct sunlight to the indoor unit wireless receiver should be avoided.
- The microprocessor in the indoor unit should not be too close to r-f noise sources.  
(For details, see the owner's manual.)

### Remote controller

- A place where there are no obstacles such as a curtain that may block the signal from the indoor unit.
- Do not install the remote control in a place exposed to direct sunlight or close to a heating source, such as a stove.
- Keep the remote control at least 1 m apart from the nearest TV set or stereo equipment. (This is necessary to prevent image disturbances or noise interference.)
- The location of the remote control should be determined as shown below.



\* : Axial distance  
Fig. 9-2-1

### 9-2-3. Cutting a Hole and Mounting Installation Plate

#### Cutting a Hole

When install the refrigerant pipes from the rear.

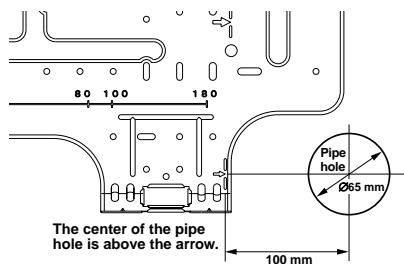


Fig. 9-2-2

1. After determining the pipe hole position on the mounting plate (➡) drill the pipe hole (Ø65 mm) at a slight downward slant to the outdoor side.

#### NOTE

- When drilling a wall that contains a metal lath, wire lath or metal plate, be sure to use a pipe hole brim ring sold separately.

### Mounting the Installation Plate

For installation of the indoor unit, use the paper pattern on the back.

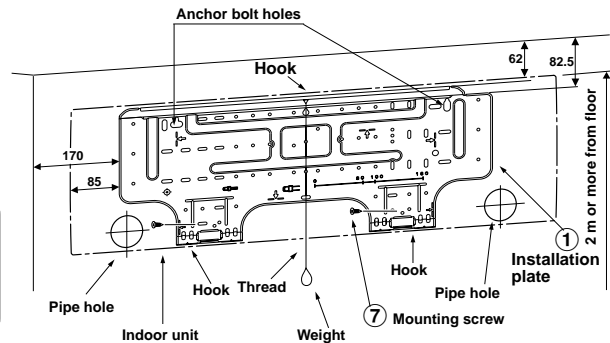


Fig. 9-2-3

### When the installation plate is directly mounted on the wall

1. Securely fit the installation plate onto the wall by screwing it in the upper and lower parts to hook up the indoor unit.
2. To mount the installation plate on a concrete wall with anchor bolts, utilize the anchor bolt holes as illustrated in the above figure.
3. Install the installation plate horizontally in the wall.

#### CAUTION

When installing the installation plate with a mounting screw, do not use the anchor bolt hole. Otherwise the unit may fall down and result in personal injury and property damage.

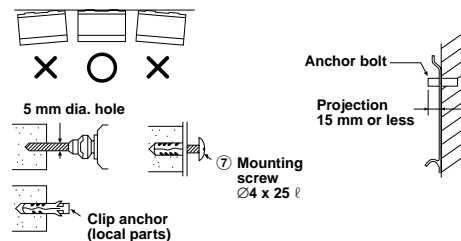


Fig. 9-2-4

#### CAUTION

Failure to firmly install the unit may result in personal injury and property damage if the unit falls.

- In case of block, brick, concrete or similar type walls, make 5 mm dia. holes in the wall.
- Insert clip anchors for appropriate ⑦ mounting screws.

#### NOTE

- Install the installation plate using 4 to 6 pieces of mounting screw securing four corners with screws.

### 9-2-4. Electrical Work

1. The supply voltage must be the same as the rated voltage of the air conditioner.
2. Prepare the power source for exclusive use with the air conditioner.

#### NOTE

- Wire type : More than H07RN-F or 245IEC66 (1.0 mm<sup>2</sup> or more)

### CAUTION

- This appliance can be connected to the mains in either of the following two ways.
  - Connection to fixed wiring :  
A switch or circuit breaker which disconnects all poles and has a contact separation of at least 3 mm must be incorporated in the fixed wiring. An approved circuit breaker or switches must be used.
  - Connection with power supply plug :  
Attach power supply plug with power cord and plug it into wall outlet. An approved power supply cord and plug must be used.

### NOTE

- Perform wiring works so as to allow a generous wiring capacity.

## 9-2-5. Wiring Connection

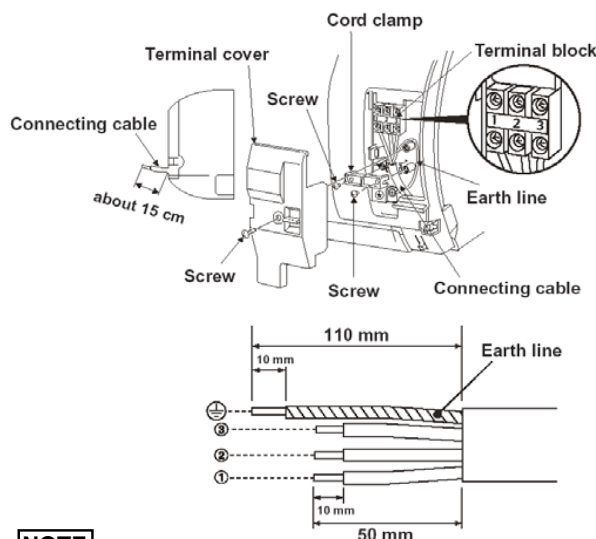
### How to connect the connecting cable

Wiring of the connecting cable can be carried out without removing the front panel.

- Remove the air inlet grille.  
Open the air inlet grille upward and pull it toward you.
- Remove the terminal cover and cord clamp.
- Insert the connecting cable (according to the local cords) into the pipe hole on the wall.
- Take out the connecting cable through the cable slot on the rear panel so that it protrudes about 15 cm from the front.
- Insert the connecting cable fully into the terminal block and secure it tightly with screws.
- Tightening torque :1.2 N·m (0.12 kgf·m)
- Secure the connecting cable with the cord clamp.
- Fix the terminal cover, rear plate bushing and air inlet grille on the indoor unit.

### CAUTION

- Be sure to refer to the wiring system diagram labeled inside the front panel.
- Check local electrical cords and also any specific wiring instructions or limitations.



### NOTE

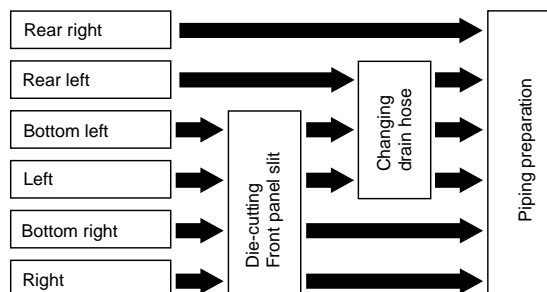
- Use stranded wire only.
- Wire type : H07RN-F or more.

Fig. 9-2-5

## 9-2-6 Piping and Drain Hose Installation

### Piping and Drain Hose Forming

- \* Since dewing results in a machine trouble, make sure to insulate both the connecting pipes. (Use polyethylene foam as insulating material.)



### 1. Die-cutting Front panel slit

Cut out the slit on the left or right side of the front panel for the left or right connection and the slit on the bottom left or right side of the front panel for the bottom left or right connection with a pair of nippers.

### 2. Changing drain hose

For left connection, left-bottom connection and rear-left connection's piping, it is necessary to change the drain hose and drain cap.

### How to remove the Drain Cap

Clip drain cap by needle-nose plier, and pull out.

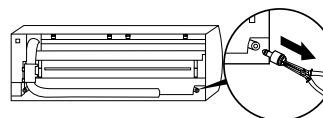


Fig. 9-2-6

### How to install the Drain Hose

Firmly insert drain hose connecting part until hitting on a heat insulator.

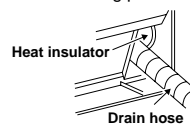


Fig. 9-2-7

### How to fix the Drains Cap

1) Insert hexagonal wrench (4 mm) in a center head.

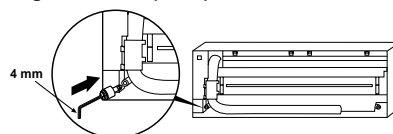


Fig. 9-2-8

2) Firmly insert drains cap.

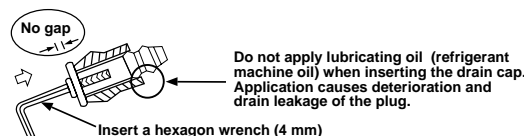


Fig. 9-2-9

### CAUTION

Firmly insert the drain hose and drain cap; otherwise, water may leak.

### In case of right or left piping

- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

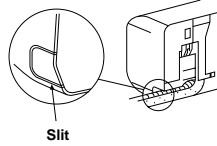


Fig. 9-2-10

### In case of bottom right or bottom left piping

- After scribing slits of the front panel with a knife or a making-off pin, cut them with a pair of nippers or an equivalent tool.

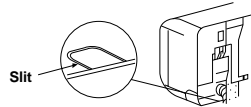


Fig. 9-2-11

### Left-hand connection with piping

Bend the connecting pipe so that it is laid within 43 mm above the wall surface. If the connecting pipe is laid exceeding 43 mm above the wall surface, the indoor unit may unstably be set on the wall. When bending the connecting pipe, make sure to use a spring bender so as not to crush the pipe.

**Bend the connection pipe within a radius of 30 mm (Ø6.35) 40 mm (Ø9.52).**

To connect the pipe after installation of the unit (figure)

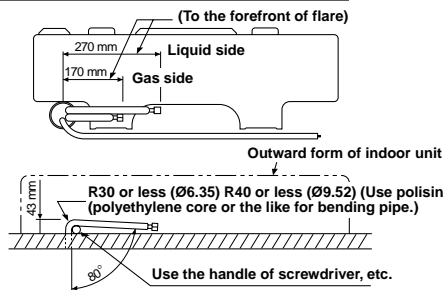


Fig. 9-2-12

### NOTE

If the pipe is bent incorrectly, the indoor unit may unstably be set on the wall.

After passing the connecting pipe through the pipe hole, connect the connecting pipe to the auxiliary pipes and wrap the facing tape around them.

### CAUTION

- Bind the auxiliary pipes (two) and connecting cable with facing tape tightly. In case of leftward piping and rear-leftward piping, bind the auxiliary pipes (two) only with facing tape.

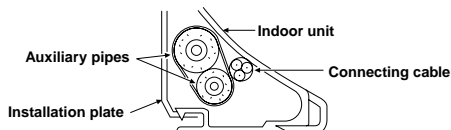


Fig. 9-2-13

- Carefully arrange pipes so that any pipe does not stick out of the rear plate of the indoor unit.
- Carefully connect the auxiliary pipes and connecting pipes to each other and cut off the insulating tape wound on the connecting pipe to avoid double-taping at the joint, moreover, seal the joint with the vinyl tape, etc.
- Since dewing results in a machine trouble, make sure to insulate both the connecting pipes. (Use polyethylene foam as insulating material.)
- When bending a pipe, carefully do it not to crush it.

### 9-2-6 Indoor Unit Fixing

- Pass the pipe through the hole in the wall, and hook the indoor unit on the installation plate at the upper hooks.
- Swing the indoor unit to right and left to confirm that it is firmly hooked up on the installation plate.
- While pressing the indoor unit onto the wall, hook it at the lower part on the installation plate. Pull the indoor unit toward you to confirm that it is firmly hooked up on the installation plate.



Fig. 9-2-14

- For detaching the indoor unit from the installation plate pull the indoor unit toward you while pushing its bottom up at the specified parts.

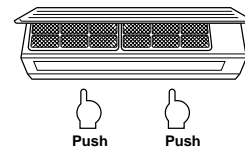


Fig. 9-2-15

### 9-2-7 Drainage

- Run the drain hose sloped downwards.

### NOTE

- Hole should be made at a slight downward slant on the outdoor side.

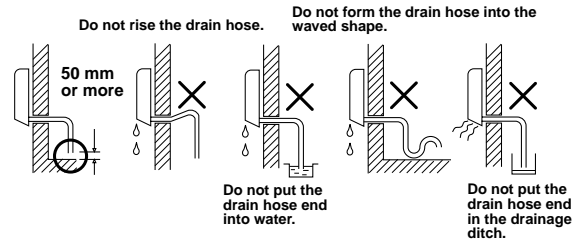


Fig. 9-2-16

- Put water in the drain pan and make sure that the water is drained out of doors.
- When connecting extension drain hose, insulate the connecting part of extension drain hose with shield pipe.

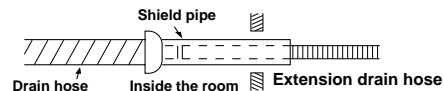


Fig. 9-2-17

### CAUTION

Arrange the drain pipe for proper drainage from the unit. Improper drainage can result in dew-dropping.

This air conditioner has the structure designed to drain water collected from dew, which forms on the back of the indoor unit, to the drain pan. Therefore, do not store the power cord and other parts at a height above the drain guide.

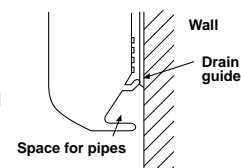


Fig. 9-2-18

### 9-2-8. Setting of Remote Controller Selector Switch

When two indoor units are installed in the separated rooms, there is no need to change the select switches.

#### Remote Controller Selector Switch

- When two indoor units are installed in the same room or adjacent two rooms, if operating a unit, two units may receive the remote controller signal simultaneously and operate. In this case, the operation can be preserved by setting either one indoor unit and remote controller to B setting (Both are set to A setting in factory shipment).
- The remote control signal is not received when the settings of indoor unit and remote controller are different.
- There is no relation between A setting/B setting and A room/B room when connecting the piping and cables.

#### 1. Setting of remote controller switch at the indoor unit side

##### How to remove the front cabinet

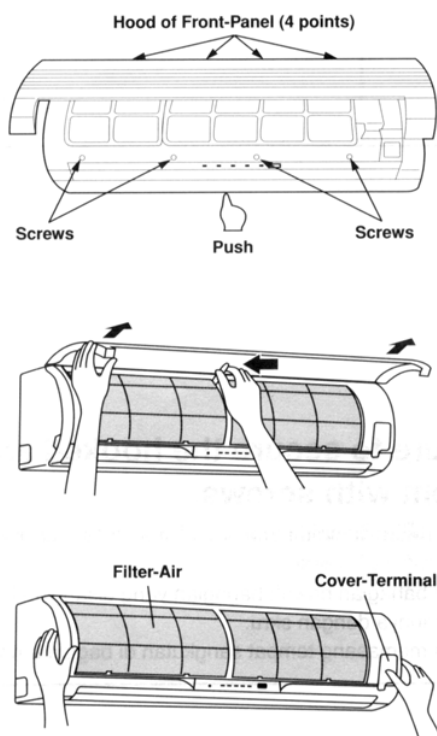


Fig. 9-2-19

- (1) Stop the operation of the air conditioner and turn off its main power supply.
- (2) Pull the air inlet grille toward you to open it and remove the air inlet grille.
- (3) First open the horizontal louver and then remove the front panel from the back body by pulling it toward you.

#### Position of Remote Control Selector Switch

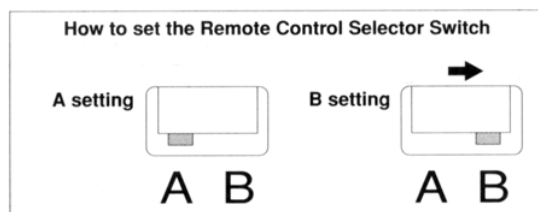
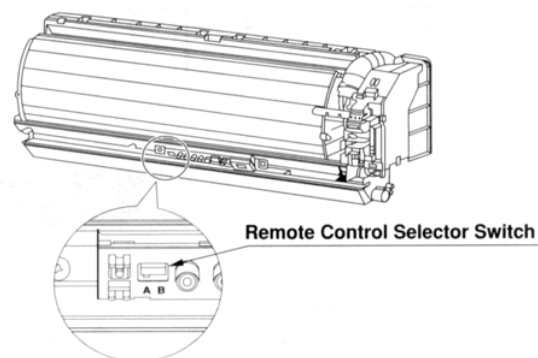


Fig. 9-2-20

#### How to mount the front panel

Push the front panel back in and make sure all hook are locked.

#### Adhesion of B label (When setting to [B])

Be sure to affix the B label on the front panel same as the below figure.

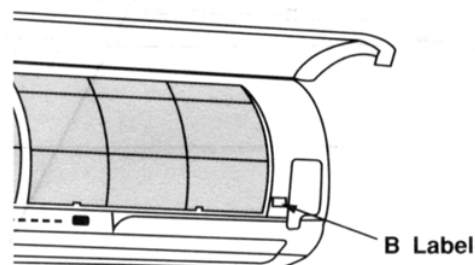


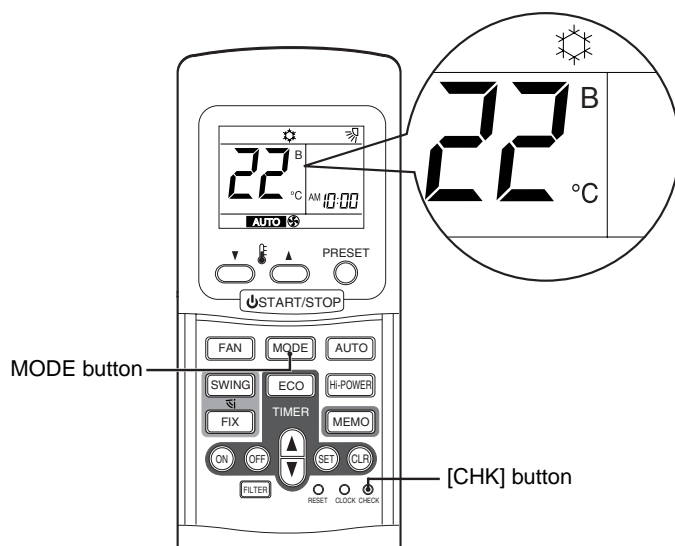
Fig. 9-2-21

## 2. Setting of remote controller selector at the remote controller side

[B] of the remote controller is displayed with liquid crystal only when it is set to [B].  
There is no display of [A].

- Enter the batter.
- Push the [CHK] button by something with thin edge. ([00] is displayed.)
- If [MODE] button is pushed while pushing [CHK] button, the small [B] is displayed at the right of the setting temperature indication section.
- \* To reset [A] setting, push the [MODE] button again while pushing the [CHK] button.

## 3. Confirm the indoor unit can operate with the changed setting of the remote controller.

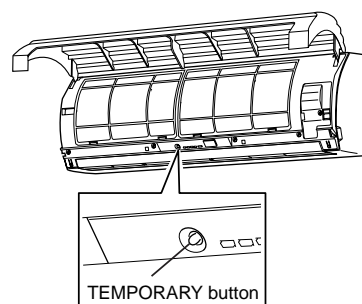


\* The above remote controller is one for cooling only model.

## 9-2-9. Check and Test Operation

- ☐ 1. Check the unit is firmly hooked up on the installation plate.
- ☐ 2. Check the connecting pipes tightened securely.  
Confirm that there is no gas leakage.
- ☐ 3. Confirm that all connecting cables are secured and correct.
- ☐ 4. Check the pipes insulation.
- ☐ 5. Check the drainage.
- ☐ 6. Connection of the grounding wire.
- ☐ 7. To switch the TEST RUN (COOL) mode, turn the switch on.

To switch the TEST RUN (COOL) mode, press TEMPORARY button for 10 sec.  
(The beeper will make a short beep.)



**Fig. 9-2-23**

- ☐ 8. Operate the unit at cooling operation mode for fifteen minutes or more.  
Measure the temperature of the intake and discharge air. Ensure the difference between the intake temperature and the discharge one is more, than 8°C.

### **NOTE:** Three-minutes protection feature

A protection feature prevents the air conditioner from being activated for about 3 minutes when it is restarted immediately after operation or when the power switch is turned on.

- ☐ 9. Check the remote controller operation.




When finished the check and test operation, make sure to return to REMOTE CONTROLLER.  
(Push the temporary switch with once again.)

- ☐ 10. Explain to the customer on the correct usage of air conditioner simple layman's terms.



## 9-3. Outdoor Unit

### 9-3-1. Accessory and Installation Parts

①	 Owner's manual x 1
②	 Outdoor unit installation manual x 1
③	 Specifications x 1

### 9-3-2. Refrigerant Piping

- Piping kit used for the conventional refrigerant cannot be used.
- **Use copper pipe with 0.8 mm or more thickness.**
- Flare nut and flare works are also different from those of the conventional refrigerant. Take out the flare nut attached to the main unit of the air conditioner, and use it.

### 9-3-3. Installation Place

- A place which provides the spaces around the outdoor unit.
- A place where the operation noise and discharged air do not disturb your neighbors.
- A place which is not exposed to a strong wind.
- A place which does not block a passage.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- There must be sufficient spaces for carrying the unit into and out of the site.
- A place where the drain water does not raise any problem.

### CAUTION

1. Install the outdoor unit without anything blocking the air discharging.
2. When the outdoor unit is installed in a place exposed always to a strong wind like a coast or on a high story of a building, secure the normal fan operation using a duct or a wind shield.
3. Specially in windy area, install the unit to prevent the admission of wind.

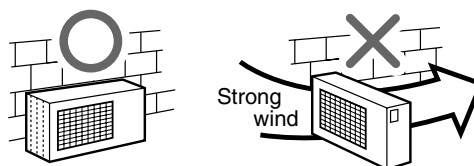


Fig. 9-3-1

4. Installation in the following places may result in trouble. Do not install the unit in such places.
  - A place full of machine oil.
  - A place full of sulfide gas.
  - A place where high-frequency waves are likely to be generated as from audio equipment, welders, and medical equipment.

### 9-3-4. Optional Installation Parts (Local Supply)

	Parts name	Q'ty
A	Refrigerant piping Liquid side : Ø6.35 mm Gas side : Ø9.52 mm or Ø12.7 mm	Each one
B	Pipe insulating material (polyethylene foam, 6 mm thick)	1
C	Putty, PVC tapes	Each one

### 9-3-5. Optional Installation Parts (Separate Sold)

Parts name	
RB-M43RE	Reducer (Ø12.7 → Ø9.52)
RB-M34EE	Expander (Ø9.52 → Ø12.7)



### 9-3-6. Refrigerant Piping Connection

#### CAUTION

#### KEEP IMPORTANT 4 POINTS FOR PIPING WORK

1. Take away dust and moisture.  
(Inside of the connecting pipes)
2. Tight connection (between pipes and unit)
3. Evacuate the air in the connecting pipes using VACUUM PUMP.
4. Check gas leak. (connected points)

#### Flaring

1. Cut the pipe with a pipe cutter.

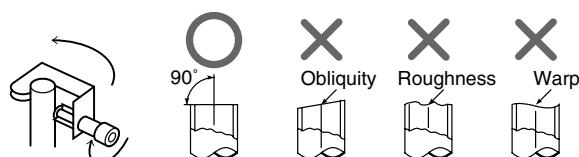


Fig. 9-3-2

2. Insert a flare nut into the pipe, and flare the pipe.

As the flaring sizes of R410A differ from those of refrigerant R22, the flare tools newly manufactured for R410A are recommended.

However, the conventional tools can be used by adjusting projection margin of the copper pipe.

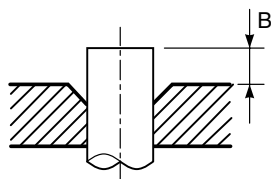


Fig. 9-3-3

#### • Projection margin in flaring : B (Unit : mm)

Rigid (Clutch type)

Outer dia. of copper pipe	R410A tool used		Conventional tool used	
	R410A	R22	R410A	R22
6.35	0 to 0.5	(Same as left)	1.0 to 1.5	0.5 to 1.0
9.52	0 to 0.5	(Same as left)	1.0 to 1.5	0.5 to 1.0
12.7	0 to 0.5	(Same as left)	1.0 to 1.5	0.5 to 1.0

Imperial (Wing nut type)

Outer dia. of copper pipe	R410A	R22
6.35	1.5 to 2.0	1.0 to 1.5
9.52	1.5 to 2.0	1.0 to 1.5
12.7	2.0 to 2.5	1.5 to 2.0

#### • Flaring size : A (Unit : mm)

Outer dia. of copper pipe	A <sup>+0</sup> / <sub>-0.4</sub>	
	R410A	R22
6.35	9.1	9.0
9.52	13.2	13.0
12.7	16.6	16.2

- \* In the case of flaring for R410A with the conventional flare tool, pull out it approx. 0.5 mm more than that for R22 to adjust to the specified flare size.  
The copper pipe gauge is useful for adjusting projection margin size.

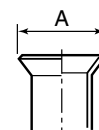
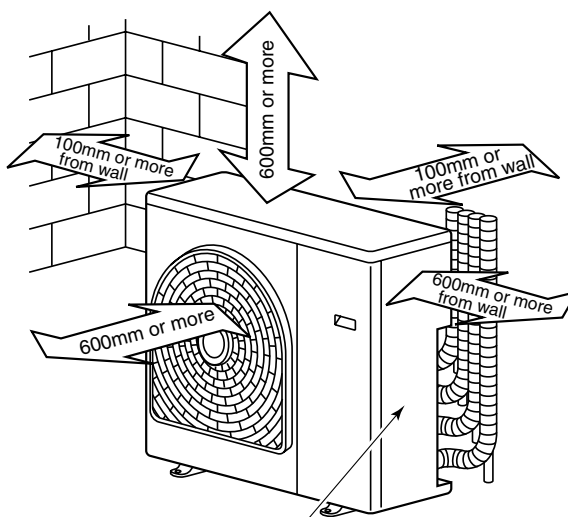


Fig. 9-3-4

### 9-3-7. Installation

**NOTE :** For installation, at least 3 dimensions should be kept free from obstacles (walls).



As shown in the figure, hang power cord and connecting cable downward, and take out it along piping connection port.

Fig. 9-3-5

#### Fixing bolt arrangement of outdoor unit

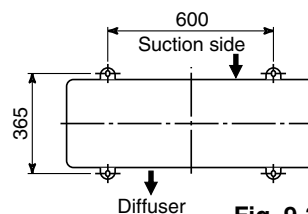


Fig. 9-3-6

- Secure the outdoor unit with the fixing bolts and nuts if the unit is likely to be exposed to a strong wind.
- Use Ø8 mm or Ø10 mm anchor bolts and nuts.

- Piping connections to the outdoor unit should be arranged in the sequence A, B, C, D starting from the bottom.  
(For each piping connection, the gas pipe is on the bottom and the liquid pipe is on the top.)
- When multiple indoor units are to be connected to the outdoor unit, make the ends of the pipes and wires from each indoor unit to ensure that they will be connected to the outdoor unit correctly.  
(Problems caused by indoor units being connected to the outdoor unit incorrectly are very common in multiple-unit installations.)
- The length and height difference of the connecting pipes between the indoor and outdoor units must be within the ranges indicated below.

- Total piping length :  
4 units (A + B + C + D) Multi,  
Non. Additional refrigerant ..... 70 m  
3 units (A + B + C) Multi,  
Non. Additional refrigerant ..... 50 m
- Minimum piping length :  
A or B or C or D = 2 m or more
- Maximum indoor piping length :  
A or B or C or D = 25 m or less
- Maximum piping height difference :  
A or B or C or D = 15 m or less
- Maximum piping/height  
difference between 2 units  
= 15 m or less

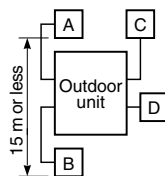


Fig. 9-3-7

- Connect 2 or more indoor units for heat pump.
- If the outdoor unit is to be mounted on a wall, make sure that the platform supporting it is sufficiently strong. The platform should be designed and manufactured to maintain its strength over a long period of time, and sufficient consideration should be given to ensuring that the outdoor unit will not fall.
- When the outdoor unit is to be mounted high on a wall, take particular care to ensure that parts do not fall installer is protected.
- When doing installation work on level ground, it is usual to wiring and piping connections to the indoor units. And/then make to the outdoor unit. However if outdoor work is difficult it is possible instead to make changes to the procedure. For example by making adjustments to the wiring and piping length on the inside (rather than the outside).

#### How to remove the side panel

- Remove 3 screws of the side panel.
- Pull the side panel downward.

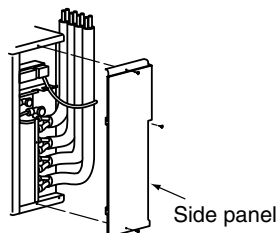


Fig. 9-3-8

#### Tightening connection

Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with a spanner and torque wrench as shown in the figure.

#### CAUTION

- Do not apply excess torque. Otherwise, the nut may crack depending on the conditions.

(Unit : N·m)

Outer dia. of copper pipe	Tightening torque
Ø6.35 mm	14 to 18 (1.4 to 1.8 kgf·m)
Ø9.52 mm	33 to 42 (3.3 to 4.2 kgf·m)
Ø12.7 mm	50 to 62 (5.0 to 6.2 kgf·m)

#### Tightening torque of flare pipe connections

Pressure of R410A becomes higher than that of R22. (Approx. 1.6 times) Therefore, using a torque wrench, tighten firmly the flare pipe connecting sections which connect the indoor and outdoor units up to the specified tightening torque. Incorrect connections may cause not only a gas leakage, but also a trouble of the refrigeration cycle.

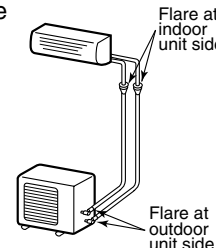


Fig. 9-3-9

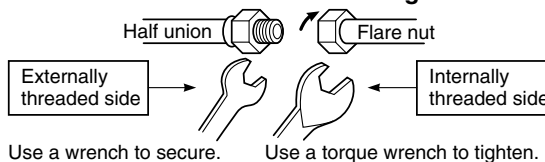


Fig. 9-3-10

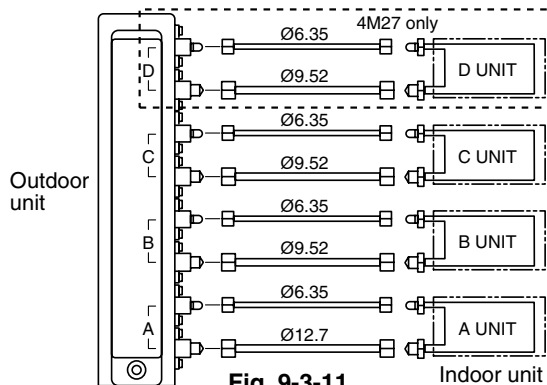


Fig. 9-3-11

	Connectable capacity class				Total
	A	B	C	D	
3M26	10, 13 (with reducer)	16 (with expander)	16 (with expander)	—	45
	16	10, 13	10, 13	—	
4M27	10, 13 (with reducer)	16 (with expander)	16 (with expander)	16 (with expander)	52
	16	10, 13	10, 13	10, 13	

### 9-3-8. Evacuating

After the piping has been connected to all indoor unit(s), you can perform the air purge together at once.

#### AIR PURGE

Evacuate the air in the connecting pipes and in the indoor unit using vacuum pump.

Do not use the refrigerant in the outdoor unit.

For details, see the manual of vacuum pump.

#### Use a vacuum pump

Be sure to use a vacuum pump with counter-flow prevention function so that inside oil of the pump does not flow backward into pipes of the air conditioner when the pump stops.

(If inside oil of the vacuum pump enters into the air conditioner which adopts R410A, a trouble of the refrigeration cycle may be caused.)

1. Connect the charge hose from the manifold valve to the service port of the gas side packed valve.
2. Connect the charge hose to the port of vacuum pump.
3. Open fully the low pressure side handle of the gauge manifold valve.
4. Operate the vacuum pump to start for evacuating.

Perform evacuating for about 35 minutes if the piping length is total 70 meters. (25 minutes for total 50 meters) (assuming a pump capacity of 27 liters per minute.)

Then confirm that the compound pressure gauge reading is  $-101 \text{ kPa}$  ( $-76 \text{ cmHg}$ ).

5. Close the low pressure side valve handle of gauge manifold.
6. Open fully the valve stem of the packed valves (both sides of Gas and Liquid).
7. Remove the charging hose from the service port.
8. Securely tighten the caps on the packed valves.

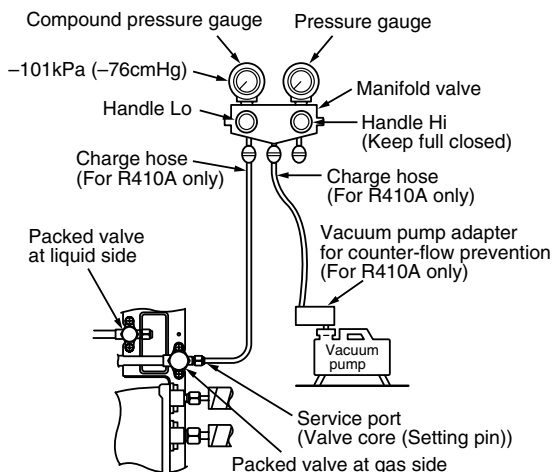


Fig. 9-3-12

#### Packed valve handling precautions

- Open the valve stem all the way out ; do not try to open it beyond the stopper.
- Securely tighten the valve stem cap in torque is as follows :

Gas side (Ø12,7 mm)	50 to 62 N•m (5.0 to 6.2 kgf•m)
Gas side (Ø9,52 mm)	33 to 42 N•m (3.3 to 4.2 kgf•m)
Liquid side (Ø6,35 mm)	14 to 18 N•m (1.4 to 1.8 kgf•m)
Service port	14 to 18 N•m (1.4 to 1.8 kgf•m)

Hexagonal wrench is required.

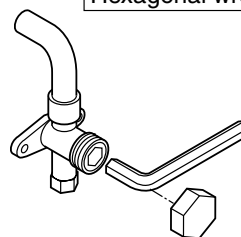


Fig. 9-3-13

### 9-3-9. Electrical Work

For the air conditioner that has no power cord, connect a power cord to it as mentioned below.

Model	3 Units Multi	4 Units Multi	
	3M26YAV-E	4M27YAV-E	4M27YACV-E
Power supply	220 – 240 V Single phase 50/60 Hz		
Maximum running current	14.6 A	14.6 A	14.2 A
Installation fuse rating	25 A		
Power cord	H07 RN-F or 245 IEC 66 (2.5 mm <sup>2</sup> or more)		

#### How to wire

1. Connect the connecting cable to the terminal as identified with their respective matched numbers on the terminal block of indoor and outdoor unit. H07 RN-F or 245 IEC 66 (1.0 mm<sup>2</sup> or more)
2. When connecting the connecting cable to the outdoor unit terminal, prevent water coming in the outdoor unit.
3. Insulate the unused cords (conductors) stripped the sheath of connecting cable with PVC tape. Process them so that they do not touch any electrical or metal parts.
4. For inter-unit wiring, do not use a cut wire jointed to another on the way.

Use wires long enough to cover the entire length.

### 3 units (A + B + C) Multi

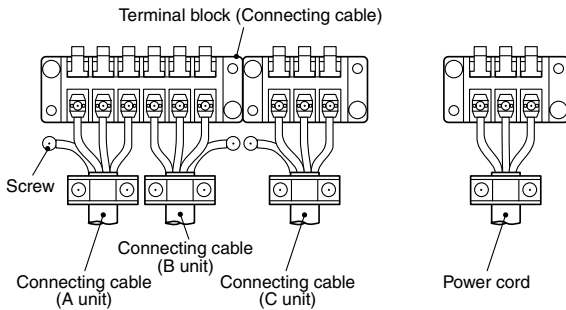


Fig. 9-3-14

### 4 units (A + B + C + D) Multi

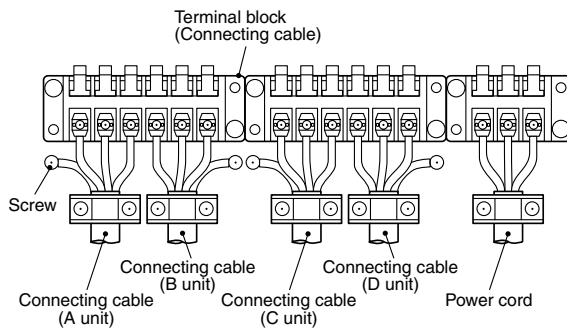


Fig. 9-3-15

#### CAUTION

- Wrong wiring connection may cause some electrical parts burn out.
- Be sure to use the cord clamps specified positions with attached to the product.
- Do not damage or scratch the conductive core and inner insulator of power and inter-connecting cables when peeling them.
- Be sure to comply with local cords on running the wire from outdoor unit to indoor unit (size of wire and wiring method etc.)
- Use the power cord and Inter-connecting cable with specified thickness, specified type, and protective devices specified.

#### Stripping length power cord and connecting cable

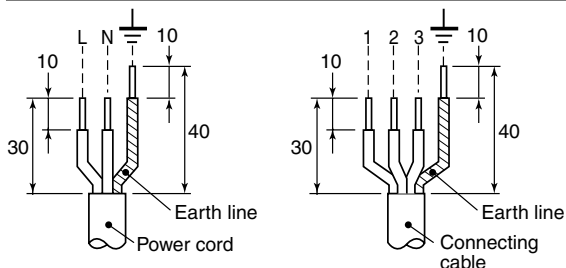


Fig. 9-3-16

### 9-3-10. Check and Test Operation

For R410A, use the leak detector exclusively manufactured for HFC refrigerant (R410A, R134a, etc.).

- The conventional leak detector for HCFC refrigerant (R22, etc.) cannot be used because its sensitivity for HFC refrigerant lowers to approx. 1/40.
- Pressure of R410A becomes approx. 1.6 times of that of R22. If installation work is incompletely finished, a gas leakage may occur in the cases such as pressure rise during operation. Therefore, be sure to test the piping connections for leaking.

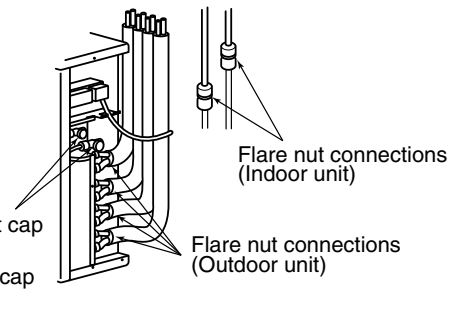


Fig. 9-3-17

- Check the flare nut connections, valve stem cap connections and service port cap connections for gas leak with a leak detector or soap water.

#### CAUTION

- Use a circuit breaker of a type that is not tripped by shock waves.
- If incorrect/incomplete wiring is carried out, it will cause an electrical fire or smoke.
- Prepare the power supply for exclusive use with the air conditioner.
- This product can be connected to the mains.

Connection to fixed wiring :

A switch or circuit breaker which disconnects all poles and has a contact separation of at least 3 mm must be incorporate in the fixed wiring.

An approved short circuit breaker or switches must be used.

- (A breaker having a sensitivity of approximately 0.1 second or less and a capacity of approximately 30 mA is usually used.)

### 9-3-11. Miswiring (Mispiping) Check

Make sure that the wiring and piping for each room have the same alphabetical codes (A, B, C, D).

Connect and secure the power cord.

Use the power cord/cables with thickness, type and protective devices specified in this manual.

Insulate the unused cords (conductors) with PVC tape.

1. Turn on the power breaker.
2. Open side panel of the outdoor unit.
3. Set the all indoor units to COOL mode.
  - It is unnecessary to set the temperature.
  - Miswiring check can not be executed when outdoor air temperature is 5°C or less.
4. Start the check.
  - Disconnect the miswiring check connector (color : Red) from P.C. board of inverter.

5. During check (Check time 3 to 20 minutes).
  - When an error describes in the table below occurred check operation stops and error code is displayed on LED.
6. After check, the result of check is displayed on LED.
  - The Comp. stop when miswiring (mispiping) error occurred.
  - Confirm the contents of table below.
  - Turn off the power breaker.
  - Correct miswiring/mispiping.
  - Execute the check operation again.
  - Automatically return to the normal operation when it is normal.
7. Return to normal operation.
  - To return to the normal operation during check operation or after miswiring (mispiping) error is determined, connect the miswiring check connector.

#### Miswiring (mispiping) check by LED Indication

- For this outdoor unit, the self-miswiring (mispiping) check is possible by using five LEDs (1 Yellow + 4 Red).

\* LEDs (D800 to D804) locate on the sub-control board underneath of the inverter.

LED	D800	D801	D802	D803	D804	Description
	●	●	●	●	●	Normal operation (no error)
During check			●	●	●	Checking A unit
		●		●	●	Checking B unit
		●	●		●	Checking C unit
	*1	●	●	●		Checking D unit
Result of judgement		✖	●	●	●	Crush/Clog of Pipe A
		●	✖	●	●	Crush/Clog of Pipe B
		●	●	✖	●	Crush/Clog of Pipe C
	*1	●	●	●	✖	Crush/Clog of Pipe D
		✖	✖	●	●	Miswiring/Mispiping or Crush/Clog of Pipe A, B
		✖	●	✖	●	Miswiring/Mispiping or Crush/Clog of Pipe A, C
	*1	✖	●	●	✖	Miswiring/Mispiping or Crush/Clog of Pipe A, D
		●	✖	✖	●	Miswiring/Mispiping or Crush/Clog of Pipe B, C
	*1	●	✖	●	✖	Miswiring/Mispiping or Crush/Clog of Pipe B, D
	*1	●	●	✖	✖	Miswiring/Mispiping or Crush/Clog of Pipe C, D
		✖	✖	✖	●	A, B, C Miswiring/Mispiping
		✖	✖	●	✖	A, B, D Miswiring/Mispiping
		✖	●	✖	✖	A, C, D Miswiring/Mispiping
		●	✖	✖	✖	B, C, D Miswiring/Mispiping
		✖	✖	✖	✖	A, B, C, D Miswiring/Mispiping packed valve keeps closed

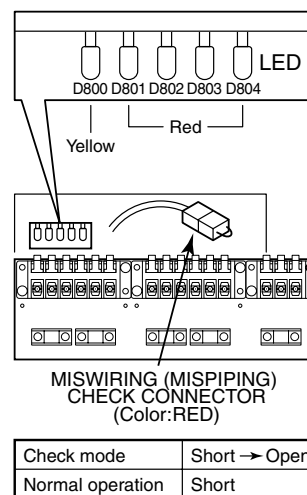


Fig. 9-3-18

LED : Light Emitting Diode

✖ : LED ON

● : LED OFF

⬜ : LED FLASH

\*1 : 4 units Multi model only

## Useful Functions

## Self-Diagnosis by LED Indication

- For this outdoor unit, the self-diagnosis is possible by using five LEDs (1 Yellow + 4 Red).
- ★ LEDs (D800 to D804) are provided on P.C. board of the inverter.

LED indication					Indoor alarm code	Contents
D800	D801	D802	D803	D804		
●	●	●	●	●	None	Normal running
●	□	●	●	●	14	IGBT short circuit, Compressor motor rare short
□	□	●	●	●	16	Trouble on position detecting circuit
●	●	□	●	●	17	Trouble on current detecting circuit
*2	□	●	□	●	18	Outdoor heat exchanger temp. sensor (TE) fault
*2	●	●	□	●	18	Suction temp. sensor (TS) fault
●	□	□	●	●	19	Discharge temp. sensor (TD) fault
□	□	□	●	●	1A	Trouble on outdoor fan motor
●	●	●	□	●	1B	Outdoor temp. sensor (TO) fault
□	●	□	●	●	1C	Trouble on compressor system
□	□	□	□	●	1C	Temp. sensor (TGa) fault at A room gas side
□	●	●	●	□	1C	Temp. sensor (TGb) fault at B room gas side
□	□	●	●	□	1C	Temp. sensor (TGc) fault at C room gas side
*1	●	●	●	□	1C	Temp. sensor (TGd) fault at D room gas side
●	□	□	●	□	1C	Gas leakage, TS sensor out of place, PMV, sensor fault
□	□	□	●	□	1C	TE sensor out of place, indoor heat exchanger sensor (TC) out of place, PMV, sensor fault
●	●	●	□	□	1C	Miswiring at indoor or outdoor, Gas leakage, TS, TC sensor out of place, PMV, sensor fault
□	□	●	□	□	1C	Communication trouble between MCU
□	●	●	□	●	1D	Compressor lock
●	□	●	□	●	1E	Trouble on discharge temp, Gas leakage
□	□	●	□	●	1F	Compressor break down

- If a trouble occurs, LED goes on according to the contents of trouble as shown in the left table.
- When two or more troubles occur, LEDs go on cyclically (alternately).
- Usually, LEDs (Red) go off.

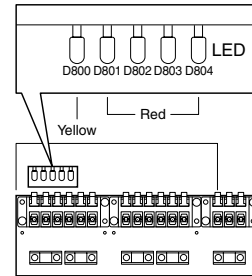


Fig. 9-3-19

IGBT : Insulated Gate Bipolar Transistor

PMV : Pulse Modulating Valve

LED : Light Emitting Diode

□ : LED ON

● : LED OFF

\*1 : 4 units Multi model only

\*2 : Heat pump model only



## 10. HOW TO DIAGNOSE THE TROUBLE

The pulse modulating circuits are mounted to both indoor and outdoor units. Therefore, diagnose troubles according to the trouble diagnosis procedure as described below. (Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.)

Table 10-1

No.	Troubleshooting Procedure	Page
1	First Confirmation	80
2	Primary Judgment	80
3	Judgment by Flashing LED of Indoor Unit	81
4	Self-Diagnosis by Remote Controller (Check Code)	82
5	Judgment of Trouble by Every Symptom	85
6	Trouble Diagnosis by Outdoor LED	91
7	How to Diagnose Trouble in Outdoor Unit	92
8	How to Check Simply the Main Parts	93
9	How to Simply Judge Whether Outdoor Fan Motor is Good or Bad	99

### NOTE :

A large-capacity electrolytic capacitor is used in the outdoor unit controller (inverter). Therefore, if the power supply is turned off, charge (charging voltage DC280V) remains and discharging takes a lot of time. After turning off the power source, if touching the charging section before discharging, an electrical shock may be caused. Discharge the electrolytic capacitor completely by using soldering iron, etc.

### < Discharging method >

- (1) Remove the inverter cover (plating) by opening four mounting claws.
- (2) As shown below, connect the discharge resistance (approx. 100Ω/40W) or plug of the soldering iron to voltage between + – terminals of the C13 ("CAUTION HIGH VOLTAGE 320V" is indicated.) electrolytic capacitor (760μF/400V) on P.C. board, and then perform discharging.

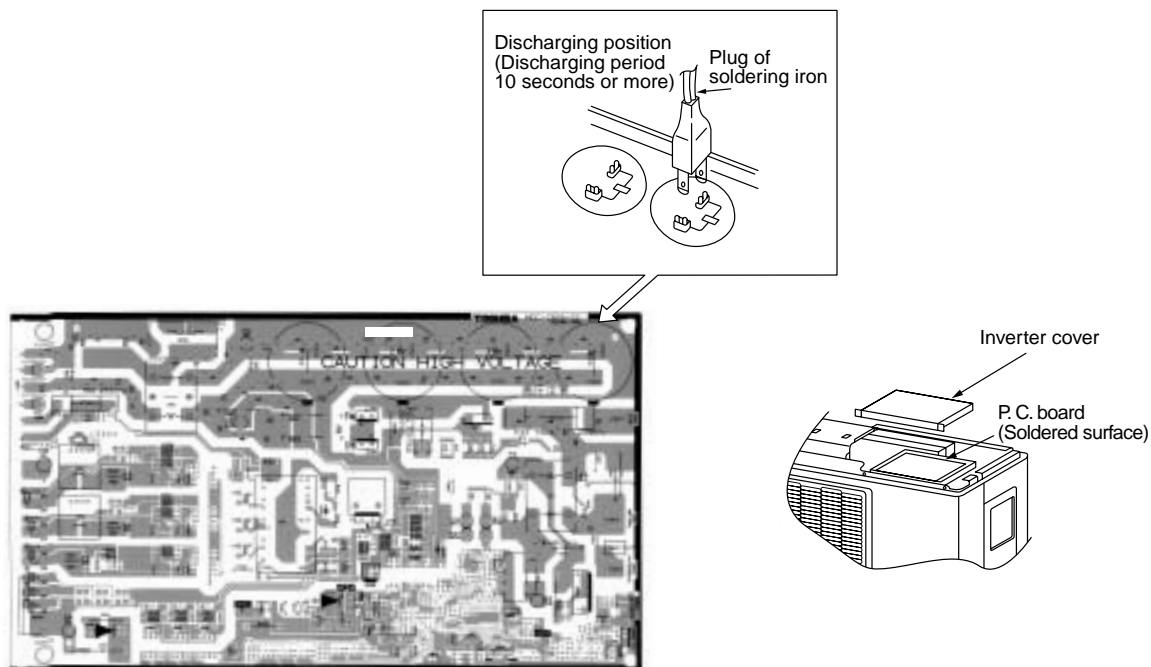


Fig. 11-1

## 10-1. First Confirmation

### 10-1-1. Confirmation of Power Supply

Confirm that the power breaker operates (ON) normally.

### 10-1-2. Confirmation of Power Voltage

Confirm that power voltage is AC 220–240V  $\pm$  10%. If power voltage is not in this range, the unit may not operate normally.

### 10-1-3. Operation Which is not a Trouble (Program Operation)

For controlling the air conditioner, the program operations are built in the microcomputer as described in the following table. If a claim is made for running operation, check whether or not it meets to the contents in the following table. When it does, we inform you that it is not trouble of equipment, but it is indispensable for controlling and maintaining of air conditioner.

Table 10-1-1

No.	Operation of air conditioner	Description
1	When power breaker is turned "ON", the operation lamp (Green) of the indoor unit flashes.	The OPERATION lamp of the indoor unit flashes when power source is turned on. If "START/STOP" button is operated once, flashing stops. (Flashes also in power failure)
2	Compressor may not operate even if the room temperature is within range of compressor-ON.	The compressor does not operate while compressor restart delay timer (3-minutes timer) operates. The same phenomenon is found after power source has been turned on because 3-minutes timer operates.
3	In DRY and ECONO. mode, FAN (air flow) display does not change even though FAN (air flow select) button is operated.	The air flow indication is fixed to [AUTO].
4	Increasing of compressor motor speed stops approx. 30 seconds after operation started, and then compressor motor speed increases again approx. 30 seconds after.	For smooth operation of the compressor, the compressor motor speed is restricted to Max. 33 rps for 2 minutes and Max. 57 rps for 2 minutes to 4 minutes, respectively after the operation has started.
5	The set value of the remote control should be below the room temperature.	If the set value is above the room temperature, Cooling operation is not performed. And check whether battery of the remote control is consumed or not.

## 10-2. Primary Judgment

To diagnose the troubles, use the following methods.

- (1) Judgment by flashing LED of indoor unit
- (2) Self-diagnosis by service check remote controller
- (3) Judgment of trouble by every symptom

Firstly use the method (1) for diagnosis. Then, use the method (2) or (3) to diagnose the details of troubles.

For any trouble occurred at the outdoor unit side, detailed diagnosis is possible by 5-serial LED on the inverter P.C. board.



### 10-3. Judgment by Flashing LED of Indoor Unit

While the indoor unit monitors the operation status of the air conditioner, if the protective circuit operates, the contents of self-diagnosis are displayed with block on the indoor unit indication section.

Table 10-3-1

	Lamps	Self-diagnosis
A	OPERATION lamp is blinking. (1Hz)	Power failure (when the power supply is turning on)
B	OPERATION lamp is blinking. (5Hz)	Thermo sensor (TA) short or break
C	OPERATION lamp is blinking. (5Hz)	Heat exchanger sensor (TC) short or break
D	OPERATION lamp is blinking. (5Hz)	Indoor fan motor lock or failure
E	OPERATION lamp is blinking. (5Hz)	Indoor P.C. board failure
F	OPERATION and TIMER lamps are blinking. (5Hz)	Wrong wiring of connecting cable
G	OPERATION, TIMER and FAN ONLY lamps are blinking.	<ul style="list-style-type: none"><li>• Gas shortage or other refrigerant cycle trouble</li><li>• Heat exchanger sensor open, break or short</li><li>• Overload relay or thermostat trouble of compressor</li></ul>
H	OPERATION, TIMER and FAN ONLY lamps are blinking.	Cycle failure

#### NOTES:

- (1) The contents of items B and C and a part of item E are displayed when air conditioner operates.
- (2) When item B and C, and item B and a part of item E occur concurrently, priority is given to the block of item B.
- (3) The check codes can be confirmed on the remote controller for servicing.
- (4) When connecting the changing kit, first-push priority control is executed. The secondary operation lamp continues flashing. For details, refer to the section 10. Changing Kit.

## 10-4. Self-Diagnosis by Remote Control (Check Code)

- (1) If the lamps are indicated as shown B to H in Table 11-3-1, exchanger the self-diagnosis by the remote control.
- (2) When the remote control is set to the service mode, the indoor controller diagnoses the operation condition and indicate the information of the self-diagnosis on the display of the remote control with the check codes. If a fault is detected, all lamps on the indoor unit will blink at 5Hz and it will beep for 10 seconds (Pi, Pi, Pi...). The timer lamp usually blinks (5Hz) during the self-diagnosis.

### 10-4-1. How to use remote control in service mode

(1) Press [CHECK] button with a tip of pencil to set the remote control to the service mode.

- "00" is indicated on the display of the remote control.
- The timer lamp on the indoor unit blinks continuously. (5 times per 1 sec.)

(2) Press [TIMER ▲] button.

If there is no fault with a code, the indoor unit will beep once (Pi) and the display of the remote control will change as follows:

→ 00 → 01 → 02 ... 1d → 1E → 22

- Check the unit with all 35 check codes (00 to 22). as shown in Table 10-4-1.
- Press [TIMER ▼] button to change the check code backwards.

If there is a fault, the indoor unit will beep for 10 seconds (Pi, Pi, Pi...). Note the check code on the display of the remote control.

- 2-digits alphanumeric will be indicated on the display.
- All lamps on the indoor unit will blink. (5 times per 1 sec.)

(3) Press [CLR] button. After service finish for clear service code in memory.

- "7F" is indicated on the display of the remote control.

(4) Press [START/STOP] button to release the service mode.

- The display of the remote control returns to as it was before service mode was engaged.

• Alphanumeric characters are used for the check code.

S is 5.	b is 6.
H is A.	B is B.
C is C.	D is D.

## 10-4-2. Caution at Servicing

- (1) After servicing, push the START/STOP button to return to the normal mode.
- (2) After servicing by the check code, turn off breaker of the power supply, and turn on breaker of the power supply again so that memory in the microcomputer returns the initial status. However, the check codes are not deleted even if the power supply is turned off because they are stored in the fixed memory.

Table 10-4-1

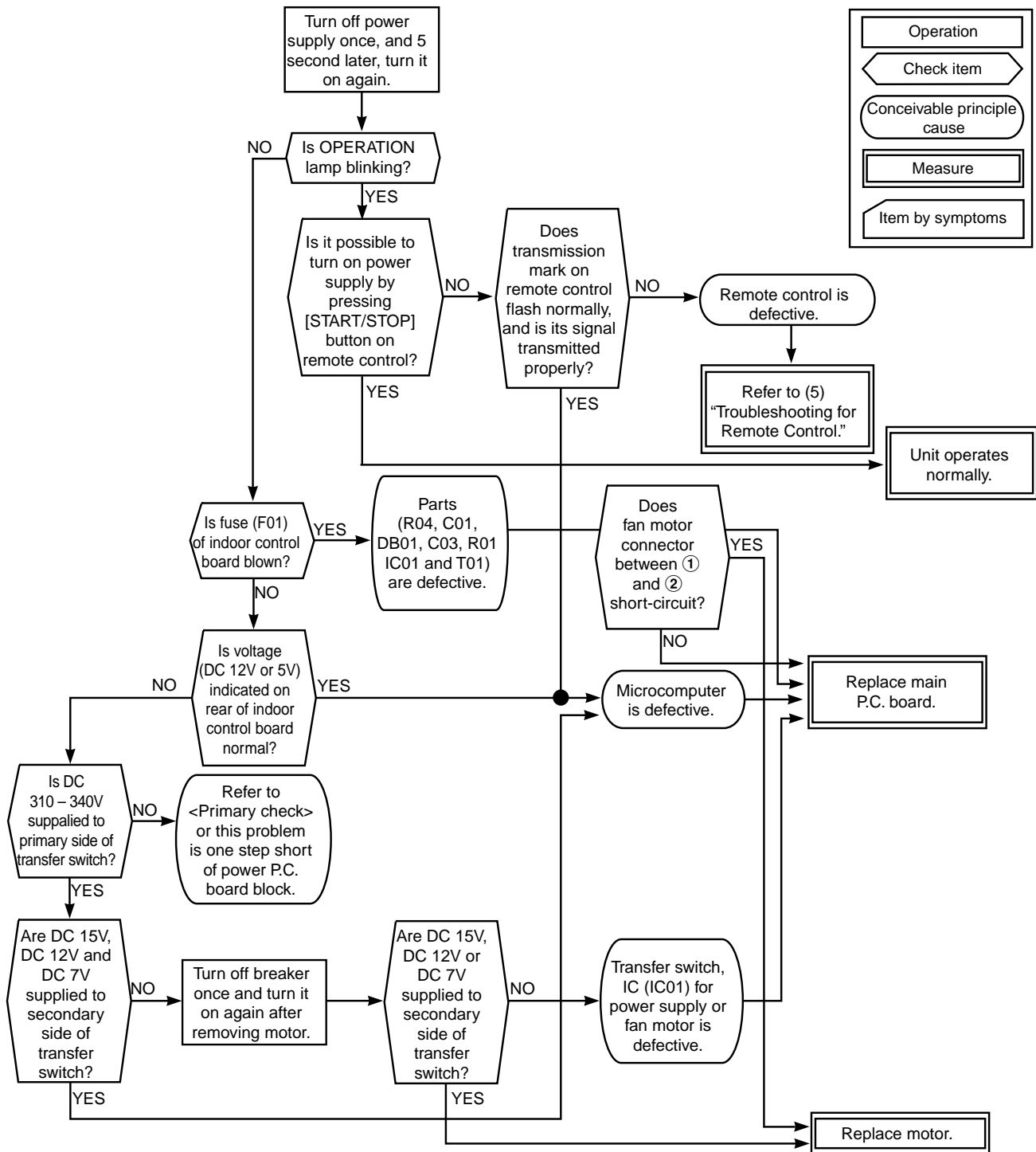
Block distinction		Operation of diagnosis function				Judgment and action
Check code	Block	Check code	Cause of operation	Air conditioner status	Condition	
00	Indoor P.C. board etc.	01	Short-circuit or disconnection of the room temperature sensor (TA sensor).	Operation continues.	Displayed when error is detected.	1. Check the room temp. sensor. 2. When the room temp. sensor is normal, check P.C. board.
		02	Coming-off, disconnection, short-circuit, or migration of heat exchanger sensor (TC sensor)	Operation continues.	Displayed when error is detected.	1. Check heat exchanger sensor. 2. When heat exchanger sensor is normal, check P.C. board.
		11	Lock of indoor fan or trouble on the indoor fan circuit	All off	Displayed when error is detected.	1. Check P.C. board. 2. When P.C. board is normal, check the motor.
	Not displayed	12	Trouble on other indoor P.C. boards	Operation continues.	Displayed when error is detected.	Replace P.C. board.
01	Connecting cable and serial signal	04	Return serial signal is not sent to indoor side from operation started. (1) Defective wiring of connecting cable (2) Operation of compressor thermo. Gas shortage Gas leak	Operation continues.	Flashes when trouble is detected on Return serial signal, and normal status when signal is reset.	1. When the outdoor unit never operate: (1) Check connecting cable, and correct if defective wiring. (2) Check 25A ( or 30A) fuse (F01) of outdoor main P.C. board. (3) Check 3.15A fuse (F04) of outdoor main P.C. board. 2. To display [Other] block during operation, check compressor thermo. operation and supply gas (check gas leak also). 3. Unit operates normally during check. If Return serial signal does not stop between indoor terminal board 2 and 3, replace inverter P.C. board. If signal stops between indoor terminal board 2 and 3, replace indoor P.C. board.
		05	Operation command signal is not sent to outdoor side.	Operation continues.	Flashes when trouble is detected on Operation command signal, and normal status when signal is reset.	If Operation command signal does not stop between indoor terminal board 2 and 3, replace inverter P.C. board. If signal stops between indoor terminal board 2 and 3, replace indoor P.C. board.

Block distinction		Operation of diagnosis function				Judgment and action
Check code	Block	Check code	Cause of operation	Air conditioner status	Remarks	
02	Outdoor P.C. board	14	Inverter over-current protective circuit operates. (Short time)	All off	Displayed when error is detected.	Even if trying operation again, all operations stop immediately. : Replace P.C. board.
		16	Position-detect circuit error or short-circuit between windings of compressor	All off	Displayed when error is detected.	1. Even if connecting lead wire of compressor is removed, position-detect circuit error occurred. : Replace P.C. board. 2. Measure resistance between wires of compressor, and perform short-circuit. : Replace compressor.
		17	Current-detect circuit error	All off	Displayed when error is detected.	Even if trying operation again, all operations stop immediately. : Replace P.C. board.
		18	Being out of place, disconnection or short-circuit of outdoor temp. sensor	All off	Displayed when error is detected.	Check 5-serial LED. 1. Check P.C. board.
		19	Disconnection or short-circuit of discharge temp. sensor	All off	Displayed when error is detected.	1. Check discharge temp. sensor (TD). 2. Check P.C. board.
		1A	Outdoor fan drive system error	All off	Displayed when error is detected.	Position-detect error, over-current protective operation of outdoor fan drive system, fan lock, etc. : Replace P.C. board or fan motor.
	Not displayed	1b	Outdoor temp. sensor error	Operation continues.	—	1. Check outdoor temp. sensor (TO). 2. Check P.C. board.
	Outdoor P.C. board	1C	Compressor drive output error, Compressor error (lock, missing, etc.), Break down	All off	Displayed when error is detected.	Check 5-serial LED. When 20 seconds passed after start-up, position-detect circuit error occurred. : Replace compressor.
			Error exclusive for multiple type	All off	Displayed when error is detected.	Check 5-serial LED. 1. Miswiring of connecting wire of A/B/C/D rooms in indoor/outdoor units 2. Check gas leakage. 3. Check disconnection of sensor. 4. Electronic control valve error
03	Others (including compressor)	1d	Compressor does not rotate. (Current protective circuit does not operate when a specified time passed after compressor had been activated.)	All off	Displayed when error is detected.	1. Trouble on compressor 2. Trouble on wiring of compressor (Missed phase)
		1E	Discharge temp. exceeded 120°C.	All off	Displayed when error is detected.	1. Check discharge temp. sensor (TD). 2. Degassing 3. Trouble on P.M.V.
		1F	Break down of compressor	All off	Displayed when error is detected.	1. Check power voltage. (220–240 V ±10%) 2. Overload operation of refrigeration cycle Check installation condition (Short-circuit of outdoor diffuser).

## 10-5. Judgement of Trouble by Every Symptom

### 10-5-1. Indoor unit (Including remote controller)

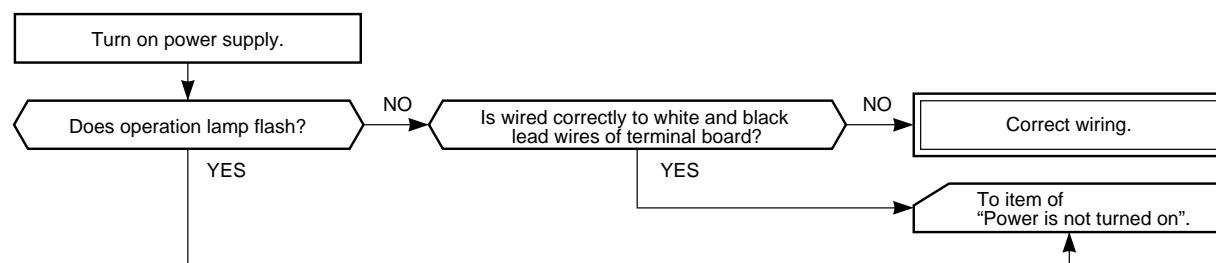
#### (1) Power is not turned on (Does not operate entirely)



- Be sure to disconnect the motor connector CN10 after shut off the power supply, or it will be a cause of damage of the motor.

**(2) Power is not turned on though Indoor P.C. board is replaced**

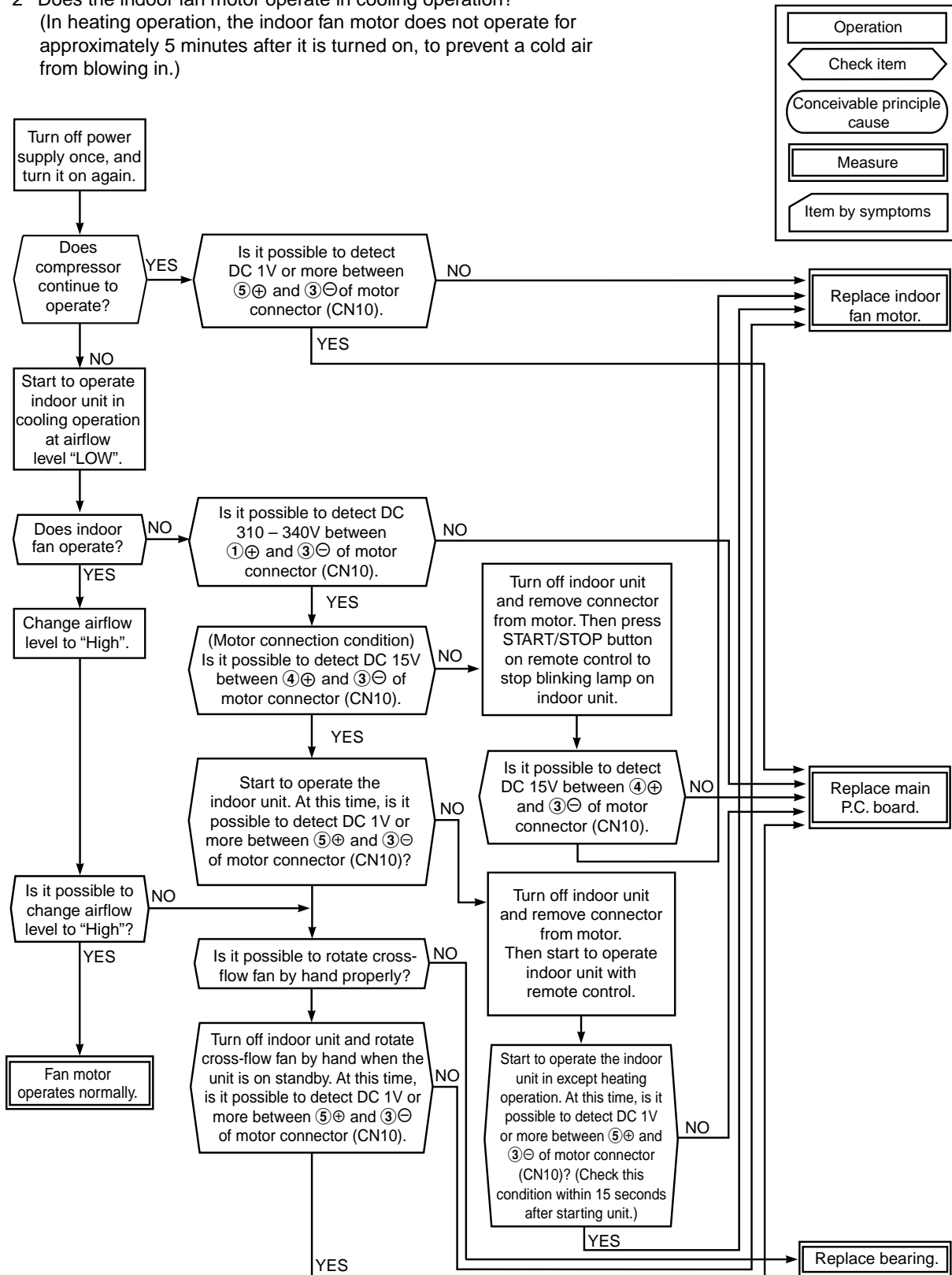
**<Confirmation procedure>**



### (3) Only indoor fan motor does not operate.

#### <Preliminary check>

- 1 Is it possible to detect the power supply voltage (200 – 240V) between ① and ② on the terminal block?
- 2 Does the indoor fan motor operate in cooling operation?  
(In heating operation, the indoor fan motor does not operate for approximately 5 minutes after it is turned on, to prevent a cold air from blowing in.)



#### (4) Indoor fan motor starts rotating by turning on power supply alone

##### <Cause>

The IC is built in the indoor fan motor. Therefore the P.C. board is also mounted to the inside of the motor.

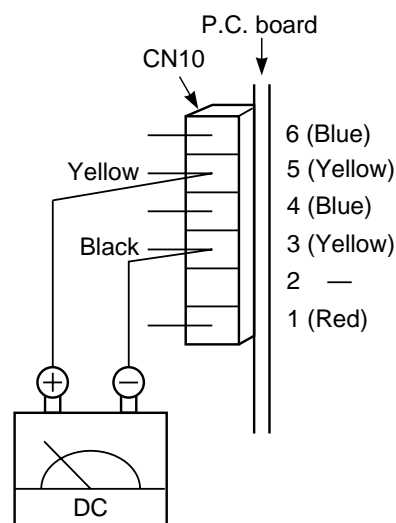
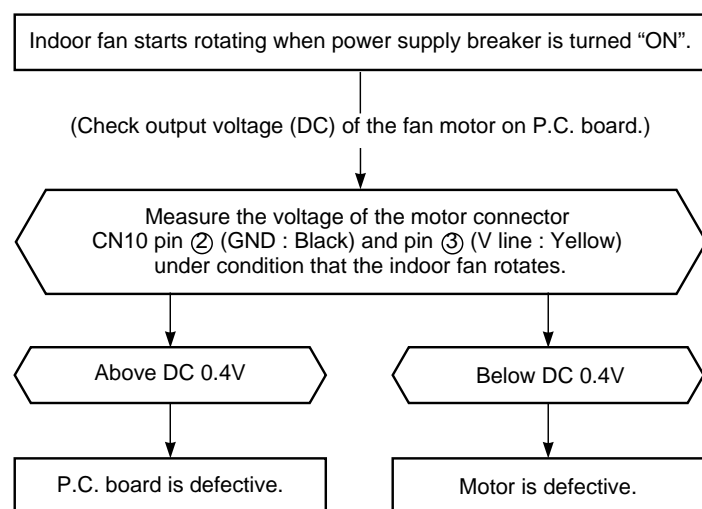
If the P.C. board is soldered imperfectly or the IC is defective, the fan motor may automatically rotate by turning on power supply.

##### <Confirmation procedure>

- (1) Remove the front panel.(Remove 4 screws.)
- (2) Remove cover of the fan motor lead wires.
- (3) Check DC voltage with CN10 connector while the fan rotating.

##### NOTE :

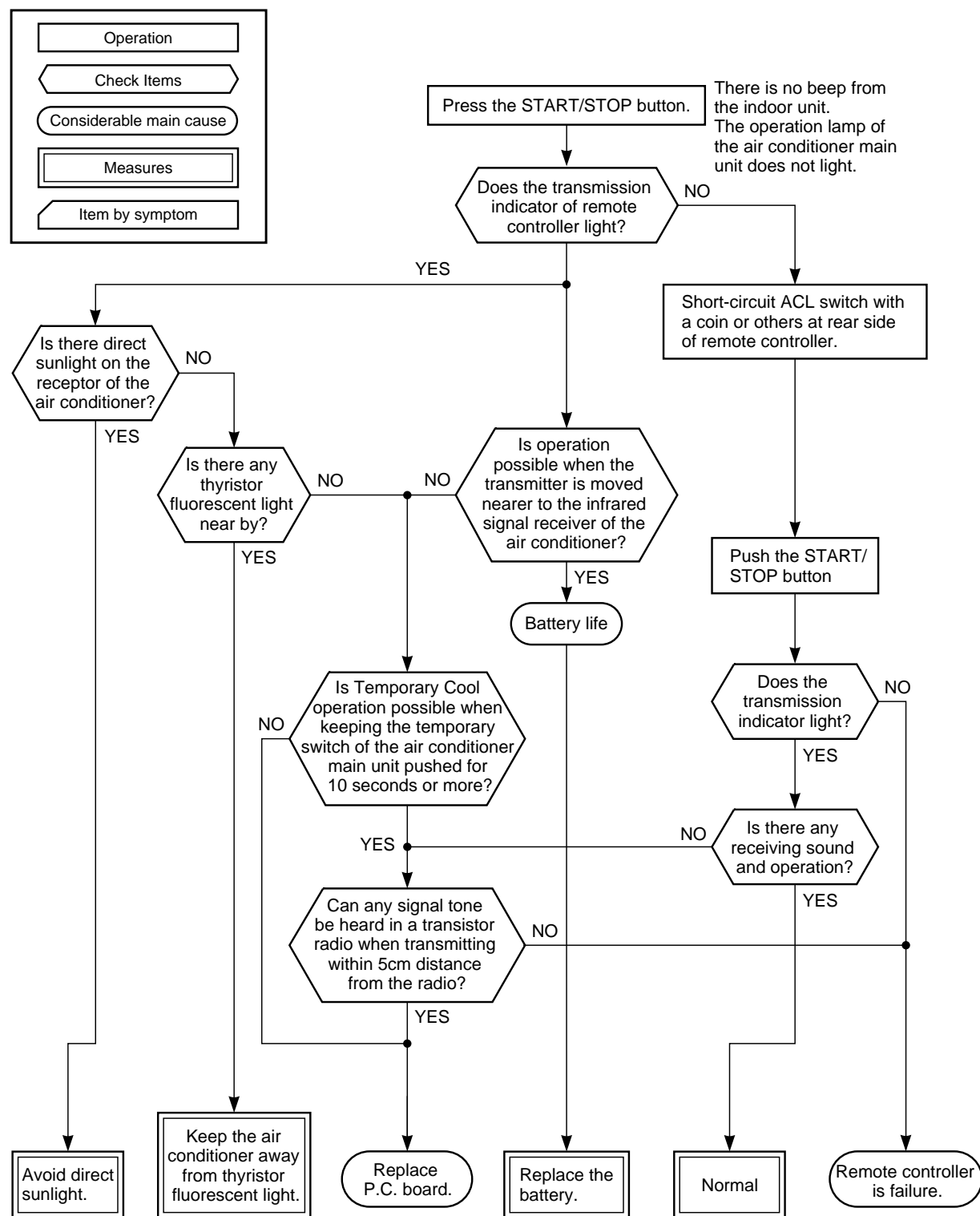
- Do not disconnect the connector while the fan rotates.
- Use a thin tester rod.





## (5) How to examine whether remote controller is good or bad

- Does setting (A/B) of the remote controller selection match with that indoor unit?



## 10-5-2. Wiring Failure (Interconnecting and Serial Signal Wire)

### (1) Outdoor unit does not operate

- 1) Is the voltage between ② and ③ of the indoor terminal block varied?

Confirm that transmission from indoor to outdoor is correctly performed based upon the following diagram.

#### NOTE:

- Measurement should be performed 2 minutes and 30 seconds after starting of the operation.
- Be sure to prepare a diode for judgment.

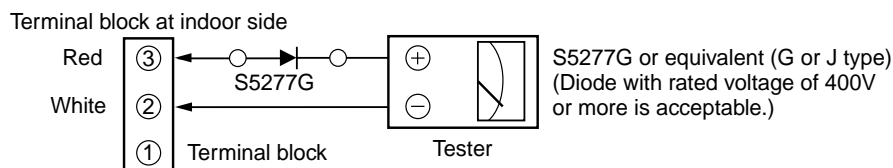


Fig. 11-5-1

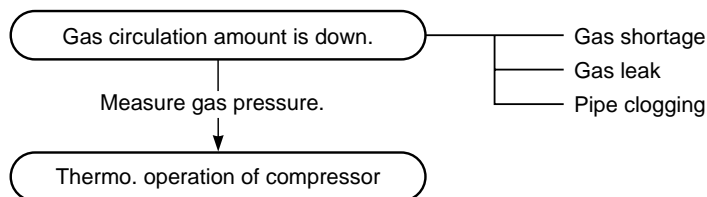
Normal time : Voltage swings between DC15 and 60V.

Abnormal time : Voltage does not vary.

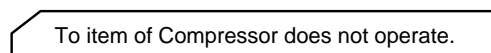
### (2) Outdoor unit stops in a little while after operation started

<Check procedure> Select phenomena described below.

- (1) The outdoor unit stops 10 to 20 minutes after operation started, and 10 minutes or more are required to restart the unit.



- (2) If the unit stops once, it does not operate until the power will be turned on again.



- (3) The outdoor unit stops 10 minutes to 1 hour after operation started, and an alarm is displayed. (Discharge temp. error check code 03, 1E)

Gas leak

P.M.V. is defective.

Miswiring of connecting wires of indoor/outdoor units

Clogging of pipe and coming-off of TG, TC sensors

## 10-6. Trouble Diagnosis by Outdoor LED

For the outdoor unit, the self-diagnosis is possible by LED (Yel) and four LEDs (Red).

- LED (Yel) (D800) and LEDs (Red) (D801 to D804) are provided on the sub-control board under surface of the inverter, and as shown below, they are checked from the wiring port when removing the wiring cover.

1. If a trouble occurs, LED (Red or Yel) goes on according to the trouble as described in the table below.
2. When two or more troubles occur, LEDs go on cyclically.
3. Usually, LEDs (Red or Yel) go off.

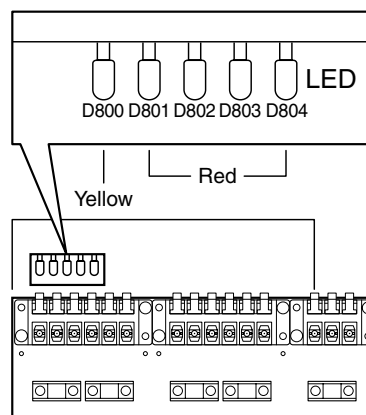


Fig. 10-6-1

: LED ON, ● : LED OFF

IGBT : Insulated Gate Bipolar Transistor, P.M.V. : Pulse Modulating Valve

LED display					Indoor check code	Description
D800	D801	D802	D803	D804		
					—	During normal operation
					14	IGBT short circuit, compressor motor rare short
					16	Position-detect circuit error
					17	Current-detect circuit error
					1C	Compressor system error
					19	Discharge temp. sensor (TD) error
					1A	Outdoor fan error
					1B	Outside temp. sensor (TO) error
					1D	Compressor lock
					1E	Discharge temp. sensor error, gas leakage
					1F	Compressor break down
*4					18	Suction temp. sensor (TS) error
*4					18	Evaporator temp. sensor (TE) error
*2					1C	A room gas side temp. sensor (TGa) error
*2					1C	B room gas side temp. sensor (TGb) error
*2					1C	C room gas side temp. sensor (TGc) error
*2, *3					1C	D room gas side temp. sensor (TGd) error
*1					1C	Gas leakage, P.M.V. sensor error
*1					1C	Indoor heat exchanger sensor (TC) disconnection, P.M.V. sensor error
					1C	Indoor/outdoor miswiring, gas leakage, TC sensor disconnection, P.M.V. sensor error
					1C	Communication error between MCU

\*1 : Back-up operation is performed without block display of the indoor unit.

\*2 : Operated normally when the air conditioners in other rooms are driven.

\*3 : 4 units Multi model only

\*4 : Heat pump model only

## 10-7. How to Diagnose Trouble in Outdoor Unit

### 10-7-1. Summarized Inner Diagnosis of Inverter Assembly

Diagnosis/Process flowchart	Item	Contents	Summary
<pre> graph TD     Start([Remove connector of compressor.]) --&gt; F01{Check 30A fuse (Part No.F01).}     F01 -- NG --&gt; ReplaceFuse[Replace fuse.]     ReplaceFuse --&gt; CheckCap1{{Check electrolytic capacitor, diode block, etc.}}     F01 -- OK --&gt; CheckCap2{{Check terminal voltage of electrolytic capacitor.}}     CheckCap1 --&gt; CheckCap2     CheckCap2 -- NG --&gt; CheckCap3{{Check electrolytic capacitor, diode block, etc.}}     CheckCap2 -- OK --&gt; Fan{Does outdoor fan rotate?}     Fan -- NO --&gt; LED{Does LED on control board flash or go on?}     Fan -- YES --&gt; LED     LED -- YES --&gt; Measure1[760μF:400WV x 4]     LED -- NO --&gt; Resistor{{Remove connector CN300 of outdoor fan motor, and using a tester, check resistance value between every phases at motor side.}}     Resistor -- NG --&gt; ReplaceMotor[Replace outdoor fan motor.]     Resistor -- OK --&gt; Measure2[Is not winding between ① - ②, ② - ③, or ① - ③ opened or short-circuited?  Is not frame grounded with ①, ②, or ③?]     Measure1 --&gt; A((A))     Measure2 --&gt; B((B))     Measure2 --&gt; C((C)) </pre>	Preparation	Turn "OFF" the power breaker, and remove 3P connector which connects inverter and compressor.	
	Check	<ul style="list-style-type: none"> <li>Check whether 30A fuse on the control board assembly is blown or not. (F01)</li> </ul>	<p>If fuse was blown, be sure to check the electrolytic capacitor and diode block. (DB01)</p> <ul style="list-style-type: none"> <li>Connect discharge resistance (approx. 100Ω/40W) or soldering iron (plug) between +, - terminals of the electrolytic capacitor (760μF) of C13 (with printed CAUTION HIGH VOLTAGE) on P.C. board.</li> </ul> <p>Discharging position (Discharging period 10 seconds or more)</p>
	Operation	Turn on power breaker, and operate the air conditioner in COOL mode by short-circuit of the timer.	OK if 760μF → DC280V
	Measurement	Measure terminal voltage of the electrolytic capacity.	Remove CN300 while pushing the part indicated by an arrow.
	Check	After operation, turn off the power breaker after 2 minutes 20 seconds passed, and discharge the electrolytic capacity by soldering iron. Check voltage between motor phases.	
	Stop		
	Check		
	Measurement	<ul style="list-style-type: none"> <li>Is not winding between ① - ②, ② - ③, or ① - ③ opened or short-circuited?</li> <li>Is not frame grounded with ①, ②, or ③?</li> </ul>	<p>→ Resistance between phases should be approx. 25 to 55Ω.</p> <p>→ Should be 10MΩ or more.</p>

Diagnosis/Process flowchart	Item	Contents	Summary
<pre> graph TD     A((A)) --&gt; A1{{Check fan motor position detect signal.}}     B((B)) --&gt; B1{{Check winding of compressor.}}     C((C)) --&gt; C1{{Check compressor winding resistance.}}          A1 -- NG --&gt; A1R[Replace outdoor fan motor.]     A1 -- OK --&gt; A1CB[Replace control board assembly.]          B1 -- NG --&gt; B1R[Replace compressor.]     B1 -- OK --&gt; A1CB          C1 -- NG --&gt; C1R[Replace compressor.]     C1 -- OK --&gt; C1CB[Replace control board.]          A1CB --&gt; C1CB     B1R --&gt; C1CB     C1R --&gt; C1CB   </pre>	<p>Check</p> <p>Operation</p> <p>Check</p>	<p>Check winding resistance between phases of compressor, and resistance between outdoor frames by using a tester.</p> <ul style="list-style-type: none"> <li>• Is not grounded.</li> <li>• Is not short-circuited between windings.</li> <li>• Winding is not opened.</li> </ul> <p>Remove connector CN300 of the outdoor fan motor, turn on the power breaker, and perform the operation. (Stops though activation is prompted.)</p> <p>Check operation within 2 minutes 20 seconds after activation stopped.</p> <p><b>&lt;Output check of fan motor position detect signal&gt;</b> While connecting connector 5P (CN301) for position detection, using a tester, measure voltage between ① – ⑤. Between ⑤ – ④ : 5V</p>	<p>→ OK if 10MΩ or more</p> <p>→ OK if 0.2Ω (under 20°C) (Check by a digital tester.)</p> <p>a) One or two of three voltages should be 5V, and others should be 0V. (When all are 0V or 5V, it is not accepted.)</p> <p>b) When rotating the fan slowly with hands, the voltage between pins should move from 0V to 5V. (Check it with an analog tester.)</p>

## 10-8. How to Check Simply the Main Parts

### 10-8-1. How to Check the P.C. Board (Indoor Unit)

#### (1) Operating precautions

- 1) When removing the front panel or the P.C. board, be sure to shut off the power supply breaker.
- 2) When removing the P.C. board, hold the edge of the P.C. board and do not apply force to the parts.
- 3) When connecting or disconnecting the connectors on the P.C. board, hold the whole housing. Do not pull at the lead wire.

#### (2) Inspection procedures

- 1) When a P.C. board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P.C. board.

- 2) The P.C. board consists of the following 2 parts

##### a. Main P.C. board part :

DC power supply circuit (5V, 12V, 35V), Indoor fan motor control circuit, CPU and peripheral circuits, buzzer, and Driving circuit of top/bottom louvers

##### b. Indication unit of infrared ray receiving Infrared ray receiving circuit, LED :

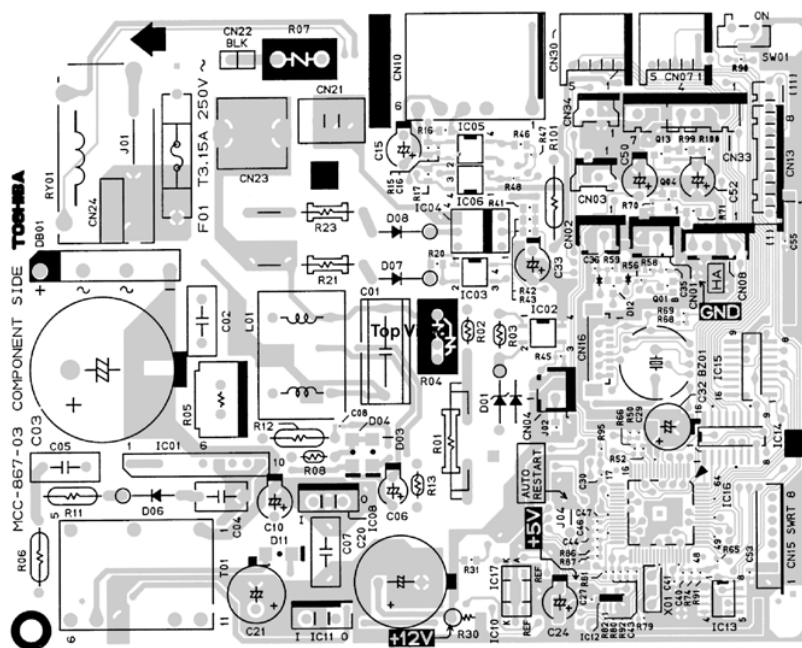
To check defect of the P.C. board, follow the procedure described below.

### (3) Check procedures

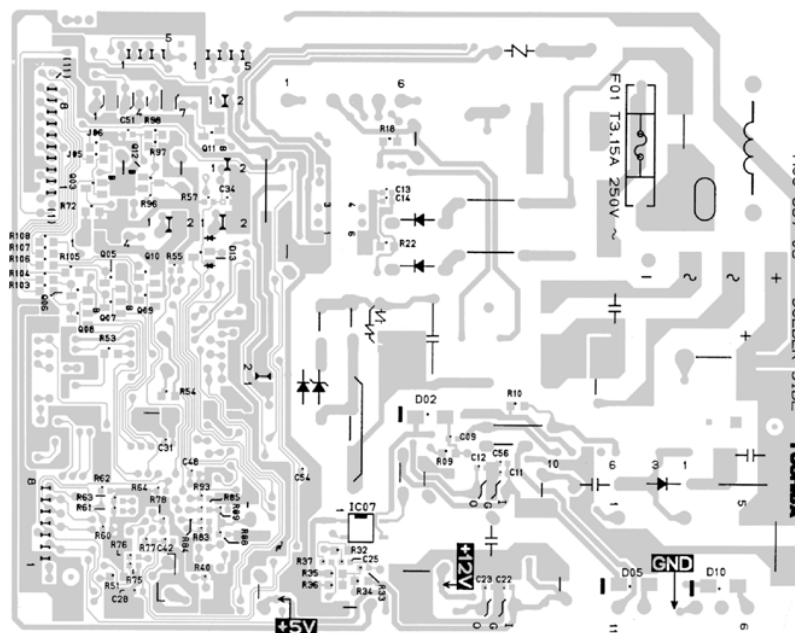
Table 10-8-1

No.	Procedure	Check point (Symptom)	Causes
1	Shut off the power supply and remove the P.C. board assembly from the electronic parts base.  Remove the connecting cable from the terminal block.	1. Is the fuse blown?	1. * Application of shock voltage. * Overload by short-circuit of the parts.
2	Remove the connector for the motor, and turn the power on.  If the OPERATION lamp flashes (0.5 sec. : ON, 0.5 sec. : OFF) when the power turning on, the checking points described as 1-3 of right column are not necessary to perform.	Voltage check 1. Between <span style="border: 1px solid black; padding: 0 2px;">TP1</span> and <span style="border: 1px solid black; padding: 0 2px;">TP2</span> (220–240V AC) 2. Between + and - of C02 (310 to 340V DC) 3. Between <span style="border: 1px solid black; padding: 0 2px;">35V</span> and <span style="border: 1px solid black; padding: 0 2px;">GND</span> 4. Between <span style="border: 1px solid black; padding: 0 2px;">12V</span> and <span style="border: 1px solid black; padding: 0 2px;">GND</span> 5. Between <span style="border: 1px solid black; padding: 0 2px;">5 V</span> and <span style="border: 1px solid black; padding: 0 2px;">GND</span>	1. * AC power cord is defective. * Poor contact of the terminal plate. * Miss wiring of the power relay. 2. * Capacitor (C01, C15) is defective. * Line filter (L01) is defective. * Resistor (R01) is defective. * Diode (DB01) is defective. 3. IC01, IC02, T01 are defective. 4. IC01, IC02, T01, F03 are defective. 5. IC01, IC02, T01, F02, Q29, IC03 are defective.
3	Start the operation with the system which the time of the restart delay timer is shortened.	1. All indicators light for 3 sec. 2. Indicators do not indicate normally after approximate 3 sec.	} Defective indicator, or poor housing assembly. (CN13)
4	Make the operation status by pressing once the START/STOP button.  1. The time of the restart delay timer is shortened. 2. Cool operation 3. Air volume [AUTO] 4. Make the setting temperature lower enough than room temperature. 5. Continuous operation.	1. Compressor does not operate. 2. OPERATION lamp flashes.	1. The temperature of the indoor heat exchanger is abnormally low. 2. Poor contact of the heat exchanger sensor. (The connector is disconnected.) (CN01) 3. Heat exchanger sensor, main P.C. board are defective. 4. Main P.C. board is defective.
5	Turn the power on after connecting the motor connector.  Start the operation with the following condition. 1. Operation [Cooling] 2. Airflow [High fan] 3. Continuous operation	1. The voltage of DC 35V is not measured between the red and black of the motor terminals. 2. Motor does not rotate. (The key operation is accepted.) 3. The motor rotates, but it vibrates too much.	1. Indoor fan motor is defective. (Protecting operation on the P.C. board.) 2. Poor contact of the motor connector. 3. P.C. board is defective.

## 10-8-2. P.C. Board Layout

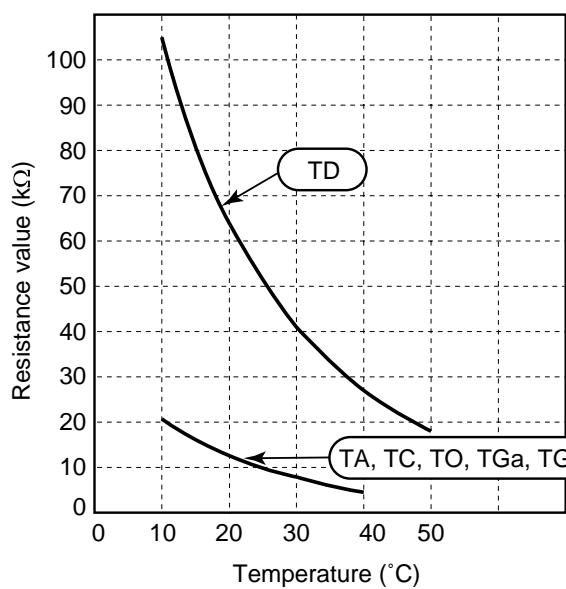


<Top View>



<Bottom View>

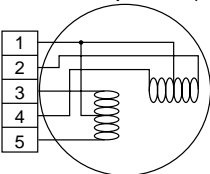
# <Sensor characteristic table>



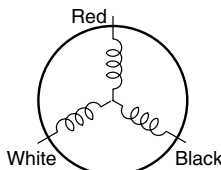
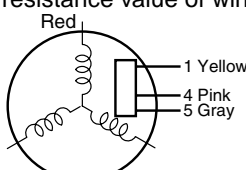
TD : Discharge temp. sensor  
 TA : Room temp. sensor  
 TC : Heat exchanger temp. sensor  
 TO : Outdoor temp. sensor  
 TGa : Gas side temp. sensor  
 TGb : Gas side temp. sensor  
 TGc : Gas side temp. sensor  
 TGd : Gas side temp. sensor



### 10-8-3. Indoor Unit (Other Parts)

No.	Part name	Checking procedure												
1	Room temp. (TA) sensor Heat exchanger (TC) sensor	<div>Disconnect the connector and measure the resistance value with tester. (Normal temp.)</div> <table><tr><th><div>Temperature</div><div>Sensor</div></th><th>10°C</th><th>20°C</th><th>25°C</th><th>30°C</th><th>40°C</th></tr><tr><td>TA, TC (kΩ)</td><td>20.7</td><td>12.6</td><td>10.0</td><td>7.9</td><td>4.5</td></tr></table>	<div>Temperature</div> <div>Sensor</div>	10°C	20°C	25°C	30°C	40°C	TA, TC (kΩ)	20.7	12.6	10.0	7.9	4.5
<div>Temperature</div> <div>Sensor</div>	10°C	20°C	25°C	30°C	40°C									
TA, TC (kΩ)	20.7	12.6	10.0	7.9	4.5									
2	Remote controller	To item of How to judge whether remote control is good or bad of the Judgment of trouble by symptom.												
3	Louver motor MP-24GA	<div>Measure the resistance value of each winding coil by using the tester. (Under normal temp. 25°C)</div> <div><div><div>White</div><div>Yellow</div><div>Yellow</div><div>Yellow</div><div>Yellow</div></div><div><div>1</div><div>2</div><div>3</div><div>4</div><div>5</div></div></div> <table><tr><th>Position</th><th>Resistance value</th></tr><tr><td>1 to 4</td><td rowspan="4">130 ± 10 Ω</td></tr><tr><td>1 to 6</td></tr><tr><td>2 to 3</td></tr><tr><td>2 to 5</td></tr></table>	Position	Resistance value	1 to 4	130 ± 10 Ω	1 to 6	2 to 3	2 to 5					
Position	Resistance value													
1 to 4	130 ± 10 Ω													
1 to 6														
2 to 3														
2 to 5														
4	Indoor fan motor	Since judgment of DC motor is difficult on the single motor, refer to 10-5-1. (3).												

### 10-8-4. Outdoor Unit

No.	Part name	Checking procedure																								
1	Compressor (Model : DA220A2F-20L)	<p>Measure the resistance value of each winding by using the tester.</p> <div><table><tr><th>Position</th><th>Resistance value</th></tr><tr><td>Red - White</td><td>0.2 ± 0.01 Ω</td></tr><tr><td>White - Black</td><td>0.2 ± 0.01 Ω</td></tr><tr><td>Black - Red</td><td>0.2 ± 0.01 Ω</td></tr></table><p>Under 20°C</p></div>	Position	Resistance value	Red - White	0.2 ± 0.01 Ω	White - Black	0.2 ± 0.01 Ω	Black - Red	0.2 ± 0.01 Ω																
Position	Resistance value																									
Red - White	0.2 ± 0.01 Ω																									
White - Black	0.2 ± 0.01 Ω																									
Black - Red	0.2 ± 0.01 Ω																									
2	Outdoor fan motor (Model : ICF-140-60-1)	<p>Measure the resistance value of winding by using the tester.</p> <div><table><tr><th>Position</th><th>Resistance value</th></tr><tr><td>Yellow- Pink</td><td>5 to 20 kΩ</td></tr></table><p>For details, refer to Section 10-9.</p></div>	Position	Resistance value	Yellow- Pink	5 to 20 kΩ																				
Position	Resistance value																									
Yellow- Pink	5 to 20 kΩ																									
3	Compressor thermo. Bimetal type (Model : US622KXTMQO)	Check conduction by using the tester.																								
4	Outdoor temperature sensor (TO), pipe temperature sensor (TGa, TGb, TGc, TGd), discharge temperature sensor (TD), suction temperature sensor (TS), evaporator temperature sensor (TE),	<p>Disconnect the connector, and measure resistance value with the tester. (Normal temperature)</p> <table><tr><th>Sensor</th><th>10°C</th><th>20°C</th><th>25°C</th><th>40°C</th><th>50°C</th></tr><tr><td>TD (kΩ)</td><td>105</td><td>64</td><td>51</td><td>27</td><td>18</td></tr><tr><td>TO, TE, TS (kΩ)</td><td>20.6</td><td>12.6</td><td>10.0</td><td>5.1</td><td>3.4</td></tr><tr><td>TGa, TGb, TGc, TGd (kΩ)</td><td>20.0</td><td>12.5</td><td>10.0</td><td>5.3</td><td>3.6</td></tr></table>	Sensor	10°C	20°C	25°C	40°C	50°C	TD (kΩ)	105	64	51	27	18	TO, TE, TS (kΩ)	20.6	12.6	10.0	5.1	3.4	TGa, TGb, TGc, TGd (kΩ)	20.0	12.5	10.0	5.3	3.6
Sensor	10°C	20°C	25°C	40°C	50°C																					
TD (kΩ)	105	64	51	27	18																					
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TGa, TGb, TGc, TGd (kΩ)	20.0	12.5	10.0	5.3	3.6																					

### 10-8-5. Checking Method for Each Part

No.	Part name	Checking procedure
1	Electrolytic capacitor (For raising pressure, smoothing)	<div><div><div><div><div>1. Turn OFF the power supply breaker.</div><div>2. Discharge all four capacitors completely.</div><div>3. Check that safety valve at the bottom of capacitor is not broken.</div><div>4. Check that vessel is not swollen or exploded.</div><div>5. Check that electrolytic liquid does not blow off.</div><div>6. Check that the normal charging characteristics are shown in continuity test by the tester.</div></div></div><div><div><div>Heat sink IGBT side</div><div><div><div>C10</div><div>C11</div><div>C12</div><div>C13</div></div><div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div>MCC-1359 Soldered surface</div></div></div></div><div><div><div>Case that product is good</div><div>Pointer swings once, and returns slowly. When performing test once again under another polarity, the pointer should return.</div></div></div></div></div><div>C12, C13, C14, C15 → 500μF/400V</div></div></div></div></div>
2	Converter module	<div><div><div><div><div>1. Turn OFF the power supply breaker.</div><div>2. Discharge all four capacitors completely.</div><div>3. Check that the normal rectification characteristics are shown in continuity test by the tester.</div></div></div><div><div><div><div><div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div></div><div><div><div><div></div><div></div><div></div><div></div></div></div><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## 10-9. How to Simply Judge Whether Outdoor Fan Motor is Good or Bad

### 1. Symptom

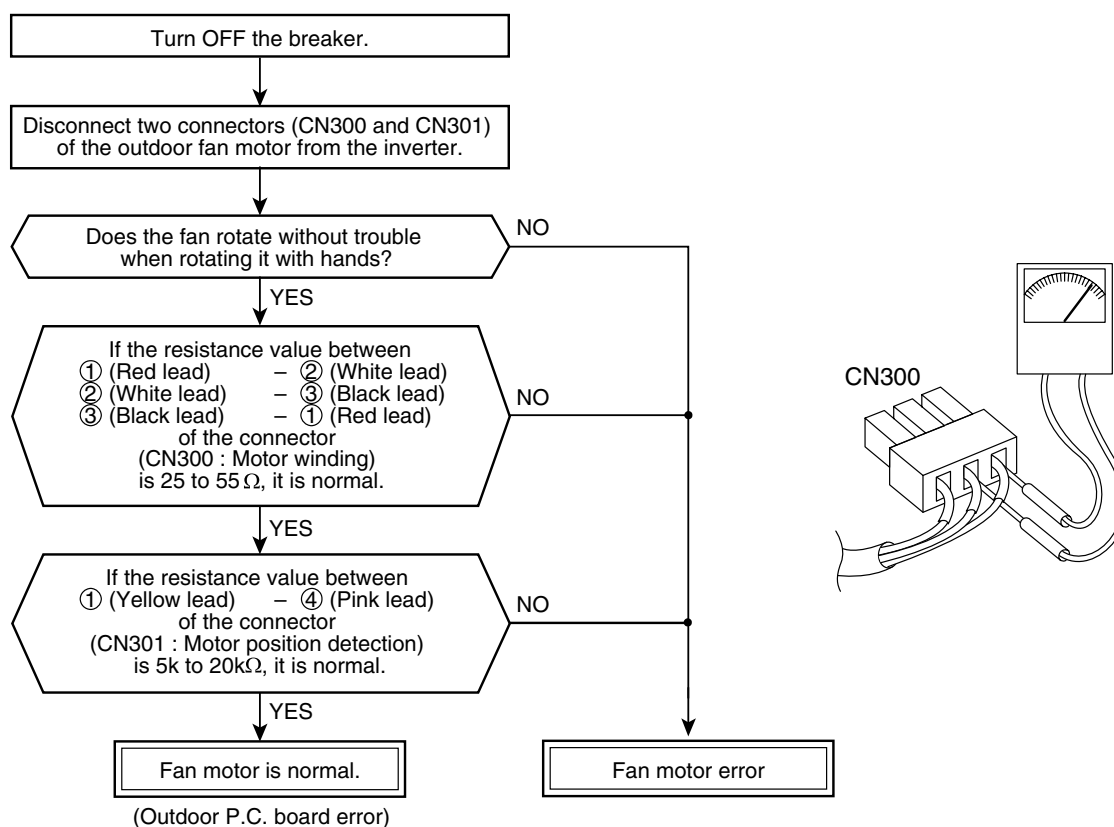
- Outdoor fan motor does not rotate.
  - Outdoor fan motor stops within several tens seconds though it started rotating.
  - Outdoor fan motor rotates or does not rotate according to the position where the fan stopped., etc.
- Remote control check code "02 : Outdoor block, 1A : Outdoor fan drive system error"

### 2. Cause

The following causes are considered when the outdoor fan motor does not normally rotate.

- 1) Mechanical lock of the outdoor fan motor
  - 2) Winding error of the outdoor fan motor
  - 3) Position-detect circuit error inside of the outdoor fan motor
- or
- 4) Motor drive circuit error of the outdoor P.C. board

### 3. How to simply judge whether outdoor fan motor is good or bad



#### NOTE :



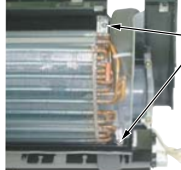
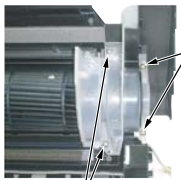

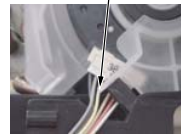
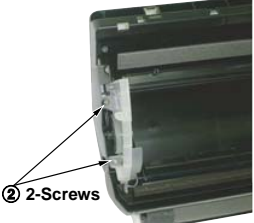
However, GND circuit error inside of the motor may be accepted in some cases when the above check is performed.

When the fan motor does not become normal even if P.C. board is replaced, replace the outdoor fan motor.

## 11. HOW TO REPLACE THE MAIN PARTS

### 11-1. Indoor Unit

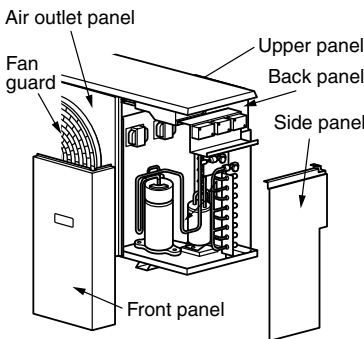
No.	Part name	Procedures	Remarks
①	Front panel	<p>How to remove the front panel</p> <ol style="list-style-type: none"> <li>1) Stop operation of the air conditioner and turn off its main power supply.</li> <li>2) Pull the air inlet grille toward you to open it and remove the air inlet grille. Then remove the 4 screws fixing the front panel.</li> <li>3) First open the horizontal louver, and then remove the front panel from the back body by pulling it toward you.</li> </ol> <p>How to mount the front panel</p> <p>Push the front panel back in and make sure all hooks are locked.</p>	
②	Electrical part	<p>How to remove the electrical part.</p> <ol style="list-style-type: none"> <li>1) Remove the front panel with procedure ①.</li> <li>2) Remove the screw holding the electrical part cover.</li> <li>3) Remove the drain guide.</li> <li>4) Disconnect the 2 connectors (3P) for the fan motor and the connector (5P) for the louver motor from the P.C. board assembly.</li> <li>5) Pull out the TC sensor from the sensor holder.</li> <li>6) Remove the screw for the ground connection, remove the screw for the electrical part box and remove the screw from the LED unit. Then remove the LED unit and the electrical part box from the main unit.</li> </ol> <p>How to mount the electrical part.</p> <ol style="list-style-type: none"> <li>1) To put back the electrical part box, lock it to the upper hook of the back body.</li> <li>2) Tighten the screw on the electrical part box.</li> <li>3) Connect the 3 connectors and arrange the wiring same as original condition and then tighten the screw from the LED unit to the back body.</li> <li>4) Attach the TC sensor to the holder.</li> <li>5) Tighten the screw for the ground connection.</li> <li>6) Assemble the drain guide (the TC sensor wire should be covered by the drain guide).</li> <li>7) Tighten the screw on the electrical part cover.</li> </ol>	
③	Horizontal louver	<ol style="list-style-type: none"> <li>1) Remove the front panel and the electrical part following procedure ②.</li> <li>2) Remove the center shaft of the horizontal louver from the back body.</li> <li>3) Remove the left shaft from the back body.</li> <li>4) Remove the horizontal louver from the back body.</li> </ol>	

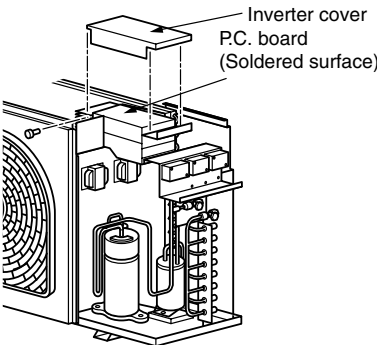
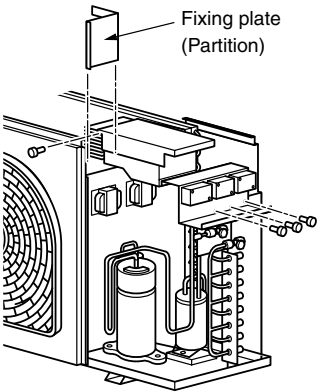
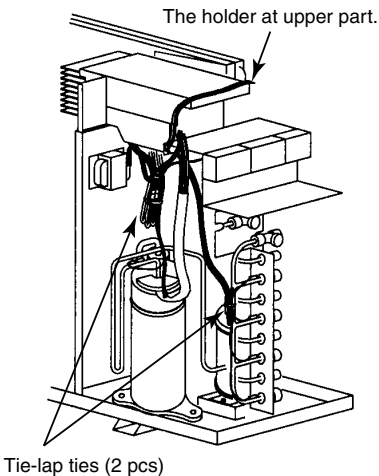
No.	Part name	Procedures	Remarks
④	Heat exchanger	<ol style="list-style-type: none"> <li>1) Remove the front panel, electrical part and the horizontal louver following procedure ③.</li> <li>2) Remove the pipe holder at the rear side of main unit.</li> <li>3) Remove the 2 screws on the heat exchanger at the base bearing.</li> <li>4) Remove the 2 screws on the heat exchanger at the 2 fixed plates (upper and lower) from the back body, and then pull out the upper side of the heat exchanger slowly.</li> </ol>	 <p>② Pipe holder</p>  <p>③ 2-Screws</p>  <p>④ 2-Screws</p>
⑤	Cross flow fan	<ol style="list-style-type: none"> <li>1) Remove the front panel, electrical part, horizontal louver and the heat exchanger following procedure ④.</li> <li>2) Remove the 2 screws on the band motor (L) and remove the 2 screws on the band motor (R) and then remove the cross flow fan.</li> <li>3) Loosen the set screw of the cross flow fan then separate the fan and the fan motor.</li> </ol> <p><b>Notice</b>  To assemble cross flow fan and fan motor to the unit, please turn the fan motor unit the center of its terminal meets the lowest point of band motor (R) (point A).  Fix the cross flow fan with the set screw at the position where the gap between the back body and the right surface of the cross flow fan is 4 mm.</p>	 <p>② 2-Screws (R)</p> <p>② 2-Screws (L)</p> <p>5 mm</p>  <p>③ Set screws</p> <p>Middle of the fan motor terminal</p> 
⑥	Base bearing	<ol style="list-style-type: none"> <li>1) Remove the front panel, electrical part, horizontal louver, heat exchanger and the cross flow fan following procedure ⑤.</li> <li>2) Remove the 2 screws fixing the base bearing.</li> <li>3) Remove the bearing from the base bearing. If the housing protrudes from the base bearing, put the housing in position and attach the bearing to the base bearing.</li> </ol>	 <p>② 2-Screws</p>

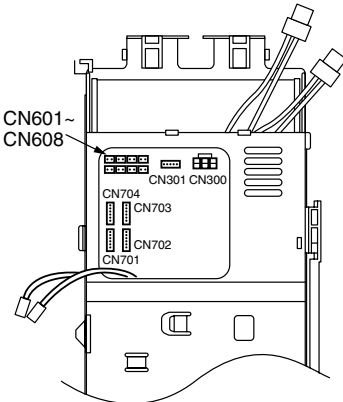
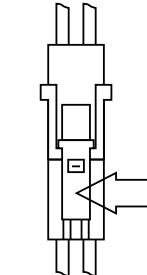
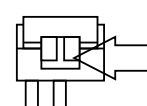
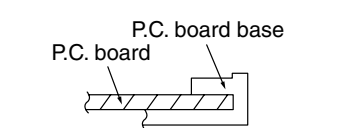
## 11-2. Microcomputer

No.	Part name	Procedure	Remarks
①	Common procedure	1) Turn the power supply off to stop the operation of air-conditioner. 2) Remove the front panel. <ul style="list-style-type: none"> <li>Remove the two fixing screws. (Ø4 x 14ℓ)</li> </ul> 3) Remove the electrical part base.	Replace the thermal fuse, terminal block, microcomputer ass'y and the P.C. board ass'y.

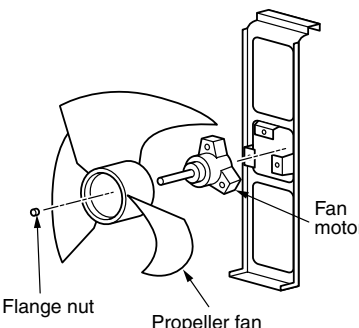
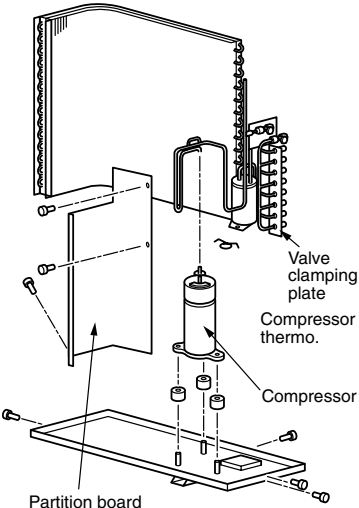
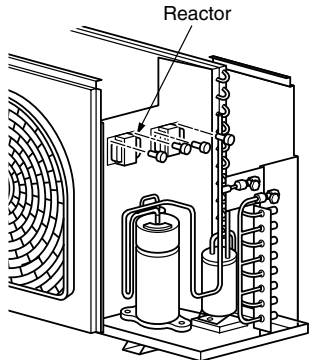
## 11-3. Outdoor Unit

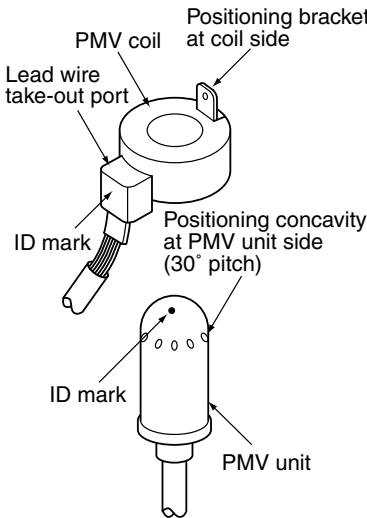
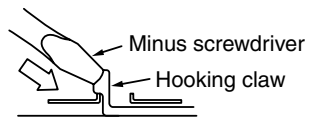
No.	Part name	Procedure	Remarks
①	Common procedure	<b>1. Detachment</b> 1) Stop operation of the air conditioner, and turn "OFF" the power breaker. 2) Remove the side panel. (Ø4 x 10ℓ 3 pcs.) 3) Remove the cord clamp. (Ø4 x 22ℓ 5 x 2=10 pcs.) Disconnect the connecting cables and power cord from the terminals. 4) Remove the upper panel. (Ø4 x 10ℓ 6 pcs) 5) Remove the front panel. (Ø4 x 10ℓ 3 pcs.) 6) Remove the back panel. (Ø4 x 10ℓ 6 pcs) 7) Remove the air outlet panel. (Ø4 x 10ℓ 8 pcs)	

No.	Part name	Procedure	Remarks
②	Inverter assembly	<p><b>1. Detachment</b></p> <p>1) Perform work from item 1) to 5) of ①.</p> <p>2) Remove screw (ST1T Ø4 x 10ℓ 1 pc.) of the upper left part of the inverter cover.</p> <ul style="list-style-type: none"> <li>• If removing the inverter cover in this condition, P.C. board can be checked.</li> <li>• If there is no space in the upper part of the upper cabinet, perform work from 6) to 7) of ① and remove the partition fixing plate (ST1T Ø4 x 10ℓ 1 pc.).</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Be careful to check the inverter because high-voltage circuit is incorporated in it.</b></p> </div> <p>3) Perform discharging by connecting the discharging resistance (approx. 100Ω 40W) or plug of soldering iron to ⊕, ⊖ terminals of the C15 (printed "CAUTION HIGH VOLTAGE" is attached.) electrolytic capacitor (760μF) on P.C. board.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>Be careful to discharge the capacitor because the electrolytic capacitor cannot naturally discharge and voltage remains according to trouble type in some cases.</b></p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>NOTE :</b>  <b>This capacitor is one with mass capacity. Therefore, it is dangerous that a large spark generates if short-circuiting between ⊕, ⊖ polarity with screwdriver, etc. for discharging.</b></p> </div> <p>4) Remove screw (Ø4 x 10ℓ 2 pcs.) fixing the valve clamping plate/the inverter box, and fixing the back panel/the inverter box.</p> <p>5) Remove various lead wires from the holder at upper part of the inverter box and cut 2 tie-lap ties binding each lead wires :</p> <p>6) Pull the inverter box upward.</p> <p>7) Disconnect connectors of various lead wires.</p>	  

No.	Part name	Procedure	Remarks
③	Control board assembly	<p>1) Disconnect lead wires and connectors connected from the control board assembly to other parts.</p> <p>1. Lead wires</p> <ul style="list-style-type: none"> <li>• Connection with terminal block : 10 wires (Red, Orange, Pink, Yellow, Two black wires, Four white wires)</li> <li>• Connection with compressor : Remove the fastons (3 places).</li> <li>• Connection with reactor : Remove the connector from P08, 09 (2P, White) and P12, P13 (2P, Gray).</li> <li>• Connection with 4-way valve : Remove the connector (3P).</li> <li>• Connection with case thermo. : Remove the connector (2P).</li> </ul> <p>2. Connectors</p> <ul style="list-style-type: none"> <li>• Sub-control board assembly side  CN300 : Outdoor fan (3P, White)  CN301 : Outdoor fan position detection (5P, White)  CN601 : TO sensor (2P, White)  CN602 : TD sensor (3P, White)  CN603 : TS sensor (2P, Black)  CN604 : TE sensor (2P, White)  CN605 : TGa sensor (3P, Yellow)  CN606 : TGb sensor (3P, White)  CN607 : TGc sensor (3P, Green)  CN608 : TGd sensor (3P, Blue)  CN701 : A room pulse modulating valve (6P, Yellow)  CN702 : B room pulse modulating valve (6P, White)  CN703 : C room pulse modulating valve (6P, Red)  CN704 : D room pulse modulating valve (6P, Blue)</li> </ul> <p>2) Disconnect cable connecting the main control board assembly side and sub-control board assembly.</p> <ul style="list-style-type: none"> <li>• Main control board assembly side  CN06 : Connecting cable (5P, White)</li> <li>• Sub.-control board assembly side  CN800 : Connecting cable (5P, Red)</li> </ul> <p>3) Remove the control board assembly from P.C. board base.</p> <p>1. Main control board assembly side</p> <ul style="list-style-type: none"> <li>• Remove two claws of P.C. board base, and remove upward the heat sink by hands.</li> <li>• Remove three screws fixing the heat sink and main control board assembly side, and replace the board with a new one.</li> </ul> <p>2. Sub- control board assembly side</p> <ul style="list-style-type: none"> <li>• Remove P.C. board base from the inverter box.</li> <li>• Remove three claws of P.C. board base, and replace the board with a new one.</li> </ul>	 <p>CN300, CN302, CN303, CN501, CN604, CN606, CN701, CN702, CN703, CN704, 4-way valve connector, case thermo. connector at the sub-control board assembly side are connectors with locks. Therefore, remove the connector while pushing the part indicated by an arrow.</p>    <p>P.C. board base P.C. board</p> <p>When mounting a new board, check that the board is correctly set in the groove of base holder of P.C. board base.</p>

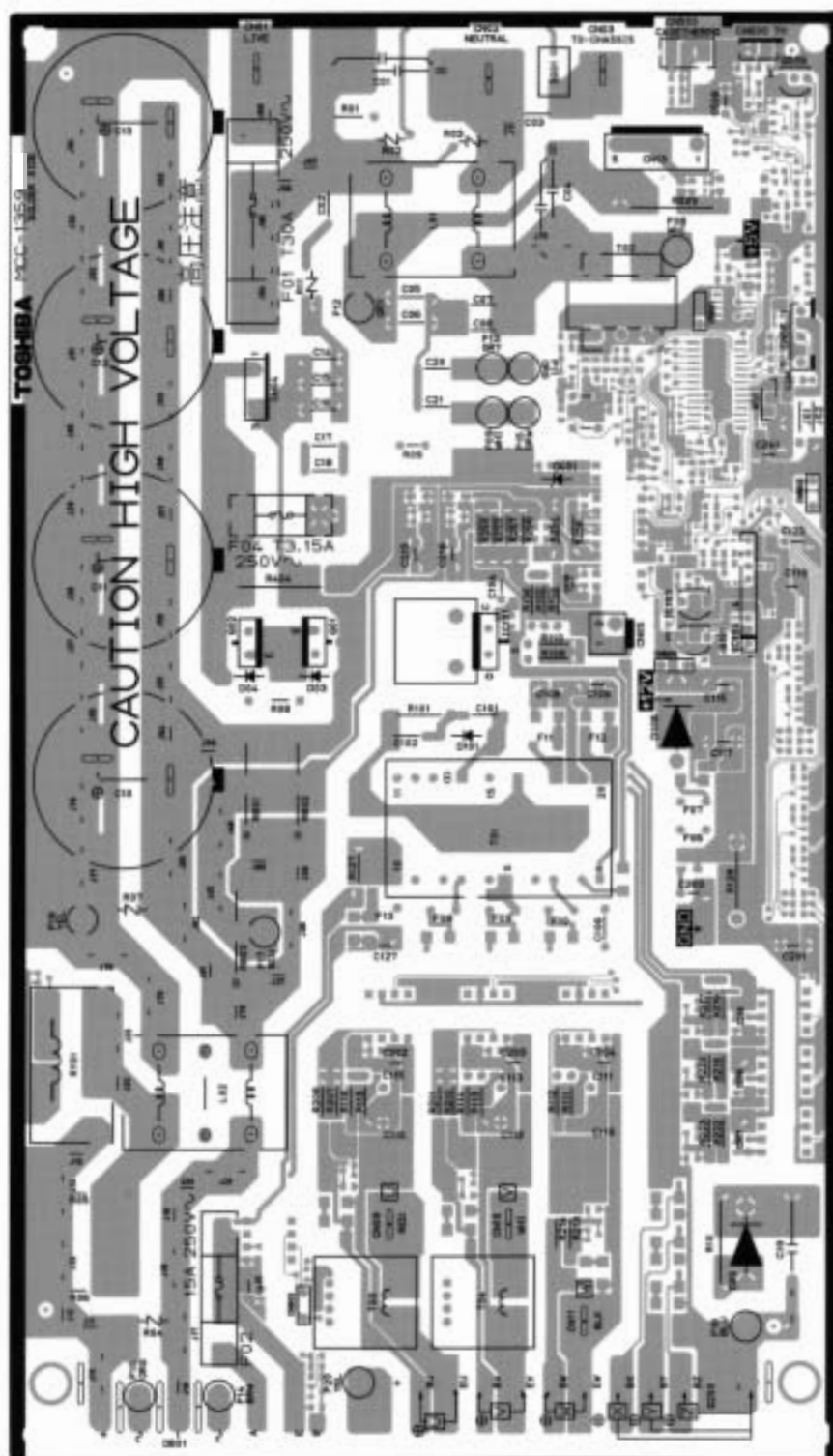


No.	Part name	Procedure	Remarks
④	Fan motor	<ol style="list-style-type: none"> <li>1) Perform work from item 1) to 5), 7) of ①.</li> <li>2) Remove the flange nut fixing the fan motor and the propeller fan. <ul style="list-style-type: none"> <li>• Flange nut is loosened by turning clockwise. (To tighten the flange nut, turn counterclock-wise.)</li> </ul> </li> <li>3) Remove the propeller fan.</li> <li>4) Disconnect the connector for fan motor from the inverter.</li> <li>5) Remove the fixing screws (3 pcs.), while holding by hands so that the fan motor does not fall.</li> </ol>	
⑤	Compressor	<ol style="list-style-type: none"> <li>1) Perform work of item ①, ② and ④.</li> <li>2) Evacuate refrigerant gas.</li> <li>3) Remove the partition board. (Take care that the reactor and the partition fixing plate remain.) (Ø4 x 10ℓ 3 pcs.)</li> <li>4) Remove the sound-insulation materials.</li> <li>5) Remove terminal cover of the compressor, and disconnect lead wires of the compressor and the compressor thermo. assembly from the terminal.</li> <li>6) Remove pipes connected to the compressor with a burner.</li> <li>7) Remove the fixing screws of the bottom plate and heat exchanger. (Ø4 x 10ℓ 2 pcs.)</li> <li>8) Remove the fixing screws of the bottom plate and valve clamping plate (Ø4 x 10ℓ 2 pcs.), the accumulator fixing plate and the accumulator (Ø4 x 10ℓ 2 pcs.).</li> <li>9) Pull upward the refrigeration cycle.</li> <li>10) Remove nut fixing the compressor on the bottom plate.</li> </ol>	
⑥	Reactor	<ol style="list-style-type: none"> <li>1) Perform work from item 1) to 5) of ① and ②.</li> <li>2) Remove screws fixing the reactor. (Ø4 x 10ℓ 2 pcs. for one reactor. One outdoor unit has two reactors on the partition.)</li> </ol>	

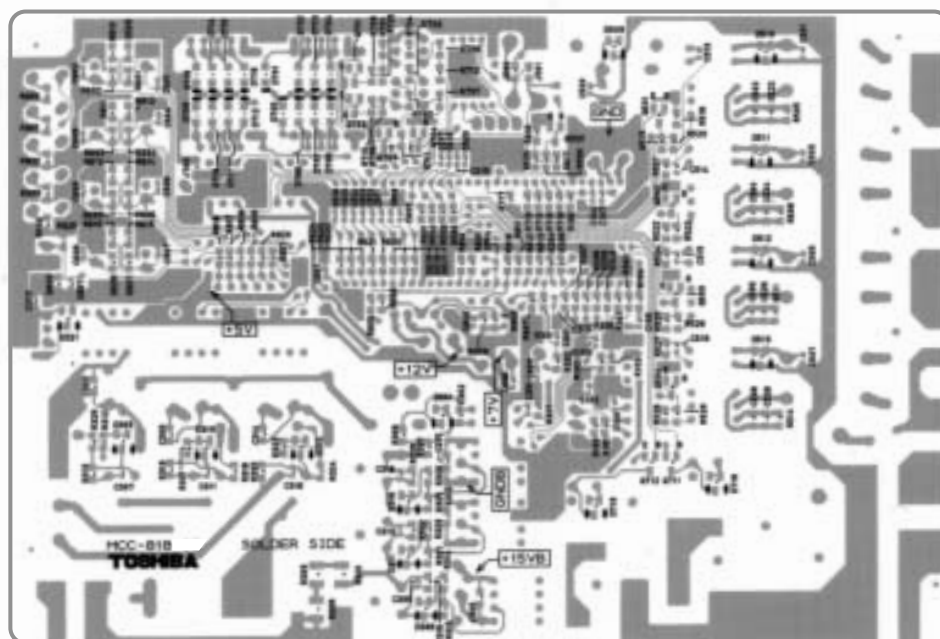
No.	Part name	Procedure	Remarks
⑦	Pulse modulating valve coil	<p><b>1. Detachment</b></p> <p>1) Perform work of item ① and ②.</p> <p>2) Release the coil from the notch by turning it, and remove coil from the pulse modulating valve.</p> <p><b>2. Attachment</b></p> <p>1) Put the coil deep into the bottom position.</p> <p>2) Fix the coil firmly by turning it to the notch position.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>The pulse modulating valve has A, B, C and D room side.</b>  <b>After mounting it, check that coil at B room side (Nothing is marked on the pulse modulating valve.) is connected to CN702.</b></p> <p><b>Check that coil at C room side (Red marking is marked on the pulse modulating valve.) is connected to CN703. Check that coil at D room side (Blue marking is marked on the pulse modulating valve) is connected to CN704 of the control board assembly respectively.</b></p> </div>	 <p><b>Mounting Method of Pulse Motor Valve (PMV) Coil</b></p> <p>Set the positioning bracket on the PMV coil to a concavity at PMV unit side and fix PMV coil. In this time, match color of ID mark at the coil side with that of ID mark at the PMV unit side. Make sure also that pipes do not deform when inserting and fixing the coil.</p>
⑧	Fan guard	<p><b>1. Detachment</b></p> <p>1) Perform work of item ①.</p> <p>2) Remove the front cabinet, and put it down so that fan guard side directs downward.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Perform work on a corrugated cardboard, cloth, etc. to prevent flaw to the product.</b></p> </div> <p>3) Remove the hooking claws by pushing minus screwdriver according to the arrow mark in the right figure, and remove the fan guard.</p> <p><b>2. Attachment</b></p> <p>1) Insert claw of the fan guard in the hole of the air outlet panel. Push the hooking claws (5 positions) by hands and fix the claws.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>After all the attaching works are completed, check that all the hooking claws are fixed to the specified positions.</b></p> </div>	

No.	Part name	Procedure	Remarks																												
⑨	<p>Replacement of temperature sensor for servicing only</p> <p>Common service parts of sensor TO, TS, TE, TGa, TGb, TGc, TGd (without TD)</p>	<ol style="list-style-type: none"> <li>1) Cut the sensor 100 mm longer than old one.</li> <li>2) Cut the protective tube after pulling out it (200 mm).</li> <li>3) Move the protective tube toward the thermal sensor side and tear the tip of lead wire in two then strip the covering part.</li> <li>4) Pass the stripped part through the thermal constringent tube.</li> <li>5) Cut the old sensor 100 mm length on the connector side, and recycle that connector.</li> <li>6) Tear the lead wire in two on the connector side and strip the covering part.</li> <li>7) Twist the leads on the connector and sensor sides, and solder them.</li> <li>8) Move the thermal constringent tubes toward the soldered parts and heat them with the dryer and constring them.</li> <li>9) Wind the attached color tape round the both terminals of the protective tube when colored protective tube is used.</li> <li>10) Fix the sensor again.</li> </ol> <p><b>NOTES :</b></p> <ol style="list-style-type: none"> <li>1) Store the joint part of the sensor and the connector in the electric parts box.</li> <li>2) Never joint them near the thermal sensor part. Otherwise it would cause insulation inferiority because of dew drops.</li> <li>3) When replacing the sensor using the colored protective tube, wind the color tape matching the color of that tube.</li> </ol>	<p>Thermal sensor part Connector Cutting here 100</p> <p>200 Cutting here</p> <p>Thermal constringent tube</p> <p>Cutting here 100</p> <p>15 70 Soldered part</p> <p>Dryer</p> <p>Winding the color tape</p>																												
	<p>These are parts for servicing sensors.</p> <p>Please check that the accessories shown in the right table are packed.</p>	<table border="1"> <thead> <tr> <th></th><th>Parts name</th><th>Q'ty</th><th>Remarks</th></tr> </thead> <tbody> <tr> <td>1</td><td>Sensor</td><td>1</td><td>Length : 3m</td></tr> <tr> <td>2</td><td>Sensor Spring (A)</td><td>1</td><td>For spare</td></tr> <tr> <td>3</td><td>Sensor Spring (B)</td><td>1</td><td>For spare</td></tr> <tr> <td>4</td><td>Thermal constringent tube</td><td>3</td><td>Including one spare</td></tr> <tr> <td>5</td><td>Color tape</td><td>1</td><td>9 colors</td></tr> <tr> <td>6</td><td>Terminal</td><td>3</td><td></td></tr> </tbody> </table>		Parts name	Q'ty	Remarks	1	Sensor	1	Length : 3m	2	Sensor Spring (A)	1	For spare	3	Sensor Spring (B)	1	For spare	4	Thermal constringent tube	3	Including one spare	5	Color tape	1	9 colors	6	Terminal	3		
	Parts name	Q'ty	Remarks																												
1	Sensor	1	Length : 3m																												
2	Sensor Spring (A)	1	For spare																												
3	Sensor Spring (B)	1	For spare																												
4	Thermal constringent tube	3	Including one spare																												
5	Color tape	1	9 colors																												
6	Terminal	3																													

<MCC-1359>



<MCC-818>

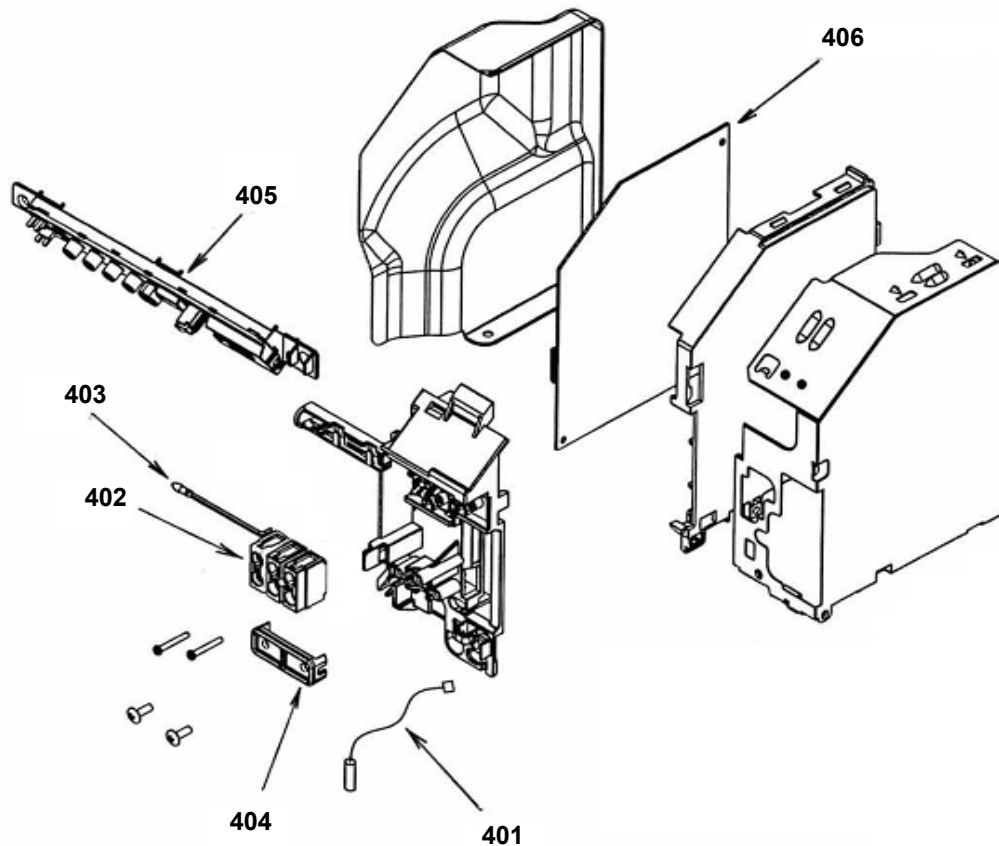


## 12. EXPLODED VIEWS AND PARTS LIST

### 12-1. Indoor Unit (1)

RAS-M10UKV-E3, RAS-M13UKV-E3, RAS-M16UKV-E3

RAS-M10UKCV-E3, RAS-M13UKCV-E3, RAS-M16UKCV-E3

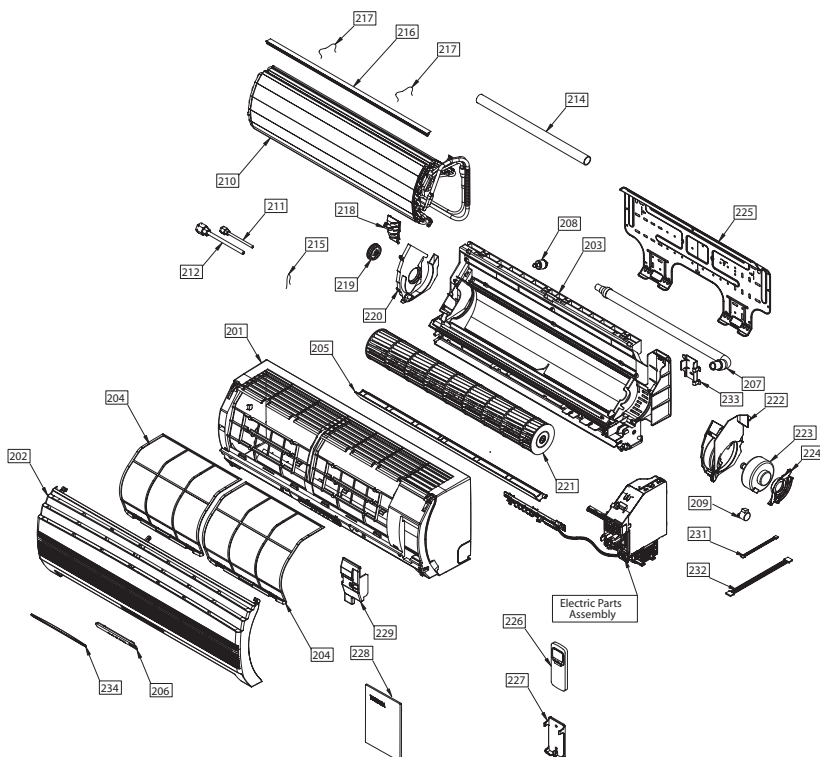


Location No.	Part No.	Description
401	43T69319	Temperature Sensor TC, 10kΩ, 25°C
402	43T60002	Terminal Block, 3P, AC 300V, 20A
403	43T69320	Temperature Sensor TC, 10kΩ, 25°C
404	43T62003	Cord Clamp
405	43T69079	P.C. Board Ass'y, WRS-LED

Location No.	Part No.	Description
406	43T69330	P.C. Board Ass'y, MCC-867 (RAS-M10UKV-E3)
406	43T69331	P.C. Board Ass'y, MCC-867 (RAS-M13UKV-E3)
406	43T69332	P.C. Board Ass'y, MCC-867 (RAS-M16UKV-E3)
406	43T69333	P.C. Board Ass'y, MCC-867 (RAS-M10UKCV-E3)
406	43T69334	P.C. Board Ass'y, MCC-867 (RAS-M13UKCV-E3)
406	43T69335	P.C. Board Ass'y, MCC-867 (RAS-M16UKCV-E3)

## Indoor Unit

**RAS-M10UKV-E3,  
RAS-M13UKV-E3,  
RAS-M16UKV-E3,  
RAS-M10UKCV-E3,  
RAS-M13UKCV-E3,  
RAS-M16UKCV-E3**



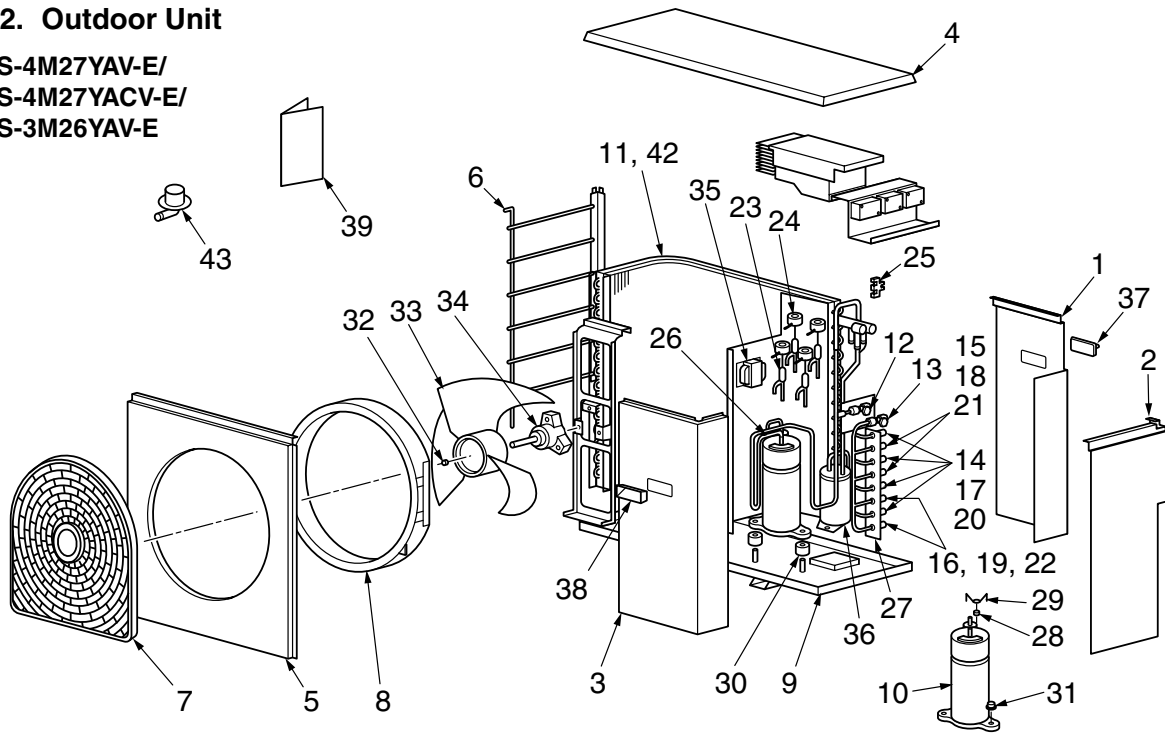
Location No.	Part No.	Description
201	43T00391	Front Panel Assy
202	43T09326	Inlet Grille Assy
203	43T03302	Back body Assy
204	43T80301	Air Filter
205	43T09328	Horizontal Louver
206	43T08392	LED Panel Assy (For RAS-M10,13,16UKV-E3)
206	43T08393	LED Panel Assy (For RAS-M10,13,16UKCV-E3)
207	43T70002	Drain Hose
208	43T79301	Cap Drain
209	43T21321	Motor Stepping
210	43T44341	Refrigeration Cycle Assy (For RAS-M10,13UKV-E3UKCV-E3)
210	43T44342	Refrigeration Cycle Assy (For RAS-M16UKV-E3UKCV-E3)
211	43T47006	Pipe Delivery
212	43T47016	Pipe Suction (For RAS-M16UKV-E3UKCV-E3)
212	43T47305	Pipe Suction (For RAS-M10,13UKV-E3UKCV-E3)
214	43T11301	Pipe Shield (For RAS-M10,13UKV-E3UKCV-E3)
214	43T11302	Pipe Shield (For RAS-M16UKV-E3UKCV-E3)
215	43T19302	Holder Sensor
216	43T49302	Plate Of Eva Seal

Location No.	Part No.	Description
217	43T49006	Holder For Plate
218	43T79302	Guide Drain
219	43T22002	Asm M Bearing
220	43T39301	Base Bearing
221	43T20302	Fan Cross Flow
222	43T39302	Band Motor-L
223	43T21327	Motor Fan
224	43T39303	Band Motor-R
225	43T82301	Plate Installation
226	43T69310	Wireless Remocon (For RAS-M10,13,16UKCV-E3)
226	43T69327	Wireless Remocon (For RAS-M10,13,16UKV-E3)
227	43T83003	Holder Remote Controller
228	43T85425	Owner's Manual
228	43T85426	Owner's Manual
228	43T85457	Owner's Manual
229	43T62302	Terminal Cover
231	43T60317	Cord Motor Louver
232	43T60316	Cord Motor Fan
233	43T07303	Holder Pipe
234	43T01303	Mark



## 12.2. Outdoor Unit

RAS-4M27YAV-E/  
RAS-4M27YACV-E/  
RAS-3M26YAV-E



Location No.	Part No.	Description
1	43005481	Cabinet, Back, Ass'y
2	43005490	Cabinet, Side, Ass'y
3	43005480	Cabinet, Front, Ass'y
4	43005491	Panel, Upper
5	43050406	Cabinet, Air Outlet
6	43005489	Guard, Fin
7	43191630	Guard, Fan
8	43122065	Bell Mouth, Plastic
9	43005482	Base Ass'y
10	43041772	Compressor Ass'y DA220A2F-20L
11	43043659	Condenser Ass'y (4M27YACV-E)
12	43046402	Valve, Packed, 9.52 DIA
13	43046403	Valve, Packed, 12.7 DIA
14	43047648	Socket, 6.35 DIA
15	43047647	Socket, 9.52 DIA
16	43047646	Socket, 12.7 DIA
17	43147196	Bonnet, 1/4 IN, 6.4 CU
18	43047401	Bonnet, 3/8 IN, 9.52 CU
19	43147195	Bonnet, 1/2 IN
20	43047545	Nut, Flare, 1/4 IN
21	43047546	Nut, Flare 3/8 IN
22	43194038	Nut, Flare 1/2 IN

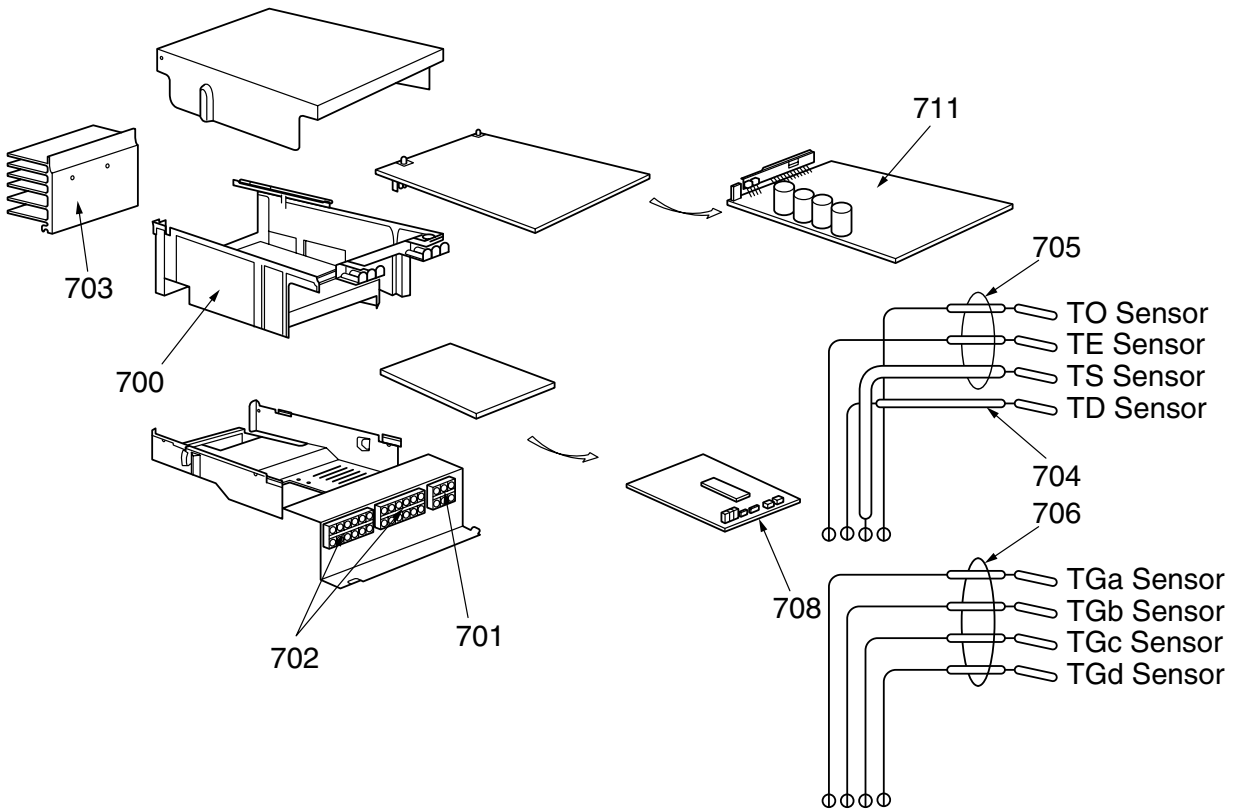
Location No.	Part No.	Description
23	43046385	Valve, Pulse, Modulating, SKV-18D26
24	43046404	Coil, PMV, DKV-MOZS770B0
25	43049740	Holder, Sensor
26	43019822	Holder, Sensor, SUS
27	43019904	Holder, Sensor, SUS
28	43050298	Thermostat, Bimetal, CS-7 125
29	43063195	Holder, Thermostat, Bimetal
30	43049739	Cushion, Rubber
31	43097204	Nut
32	43197156	Nut, Flange
33	43120198	Fan, Propeller, PB493
34	43121677	Motor, Fan, DC, ICF-140-60-1
35	43058266	Reactor, CH-47-Z-K
36	43048066	Accumulator Ass'y
37	4301V021	Hanger
38	43119390	Hanger
39	4308N369	Manual
40	43046344	Valve, 4-Way, CHV-0213
41	43046348	Coil, Solenoid, VHV-01AI501A1
42	43043663	Condensor Ass'y
43	43032441	Nipple, Drain

**No. 24 Coil, P.M.V :** For standardization of the servicing parts, one type only is provided.  
Therefore, color of the connector may be different in replacement work.



### 12.3. P.C. Board Layout

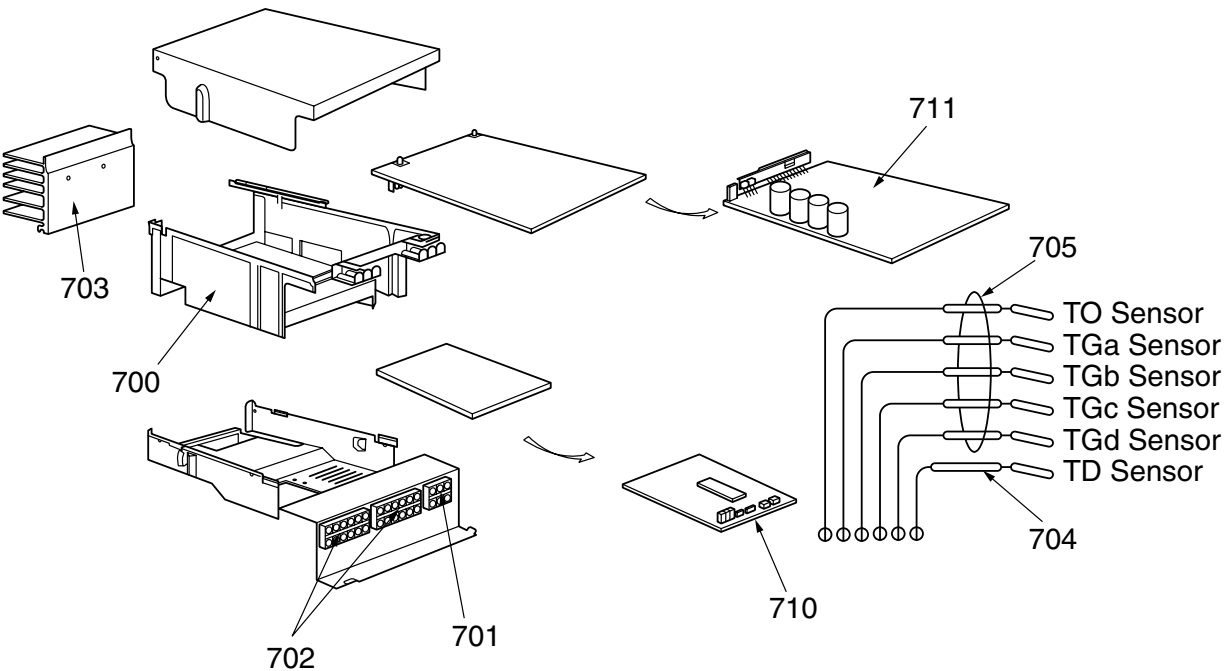
#### RAS-4M27YAV-E



Location No.	Part No.	Description
700	43162042	Base, P.C. Board, ABS
701	4306A060	Terminal Block, 3P
702	43160469	Terminal Block, 6P AC 250V, 20A
703	43063318	Heatsink
704	43050334	Sensor, TD (F4)

Location No.	Part No.	Description
705	43050382	Sensor, TC (F6)
706	43050398	Sensor, TG (F4)
708	4306S267	P.C. Board Ass'y, MCC-818 (4M27YAV-E)
711	4306V009	P.C. Board Ass'y, IPDU MCC-1359

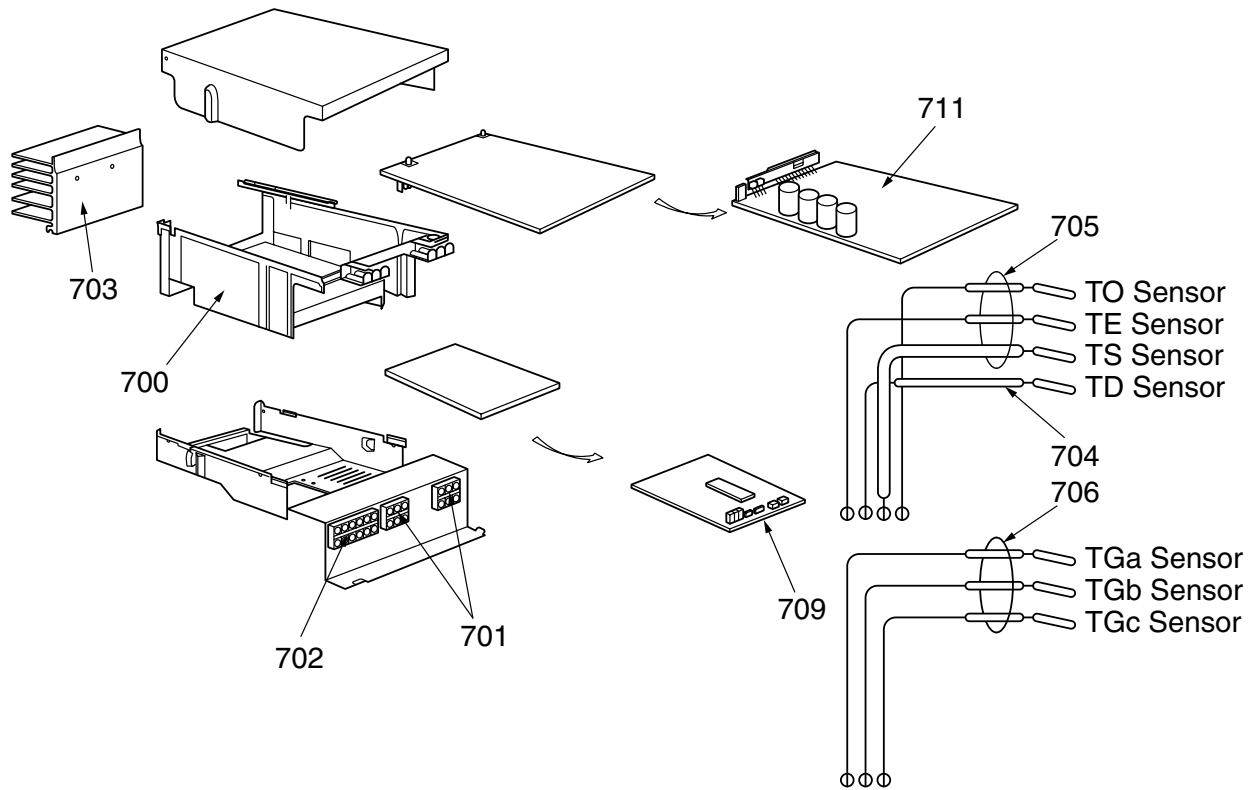
**RAS-4M27YACV-E**



Location No.	Part No.	Description
700	43162042	Base, P.C. Board, ABS
701	4306A060	Terminal Block, 3P
702	43160469	Terminal Block, 6P AC 250V, 20A
703	43063318	Heatsink
704	43050334	Sensor, TD (F4)

Location No.	Part No.	Description
705	43050382	Sensor, TC (F6)
710	4306S269	P.C. Board Ass'y, MCC-818 (4M27YACV-E)
711	4306V009	P.C. Board Ass'y, IPDU MCC-1359

# RAS-3M26YAV-E



Location No.	Part No.	Description
700	43162042	Base, P.C. Board, ABS
701	4306A060	Terminal Block, 3P
702	43160469	Terminal Block, 6P AC 250V, 20A
703	43063318	Heatsink
704	43050334	Sensor, TD (F4)

Location No.	Part No.	Description
705	43050382	Sensor, TC (F6)
706	43050398	Sensor, TG (F4)
709	4306S268	P.C. Board Ass'y, MCC-818 (3M26YAV-E)
711	4306V009	P.C. Board Ass'y, IPDU MCC-1359

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