

TOSHIBA

FILE No. A90-9612

SERVICE MANUAL

AIR CONDITIONER SPLIT TYPE

2 WAY CASSETTE TYPE

RAV-133TU-PE/RAV-132A-PE
RAV-163TU-PE/RAV-182A-PE

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SUMMARY

- The units referred to within this manual conform with the protection requirements of Directives 89/336/EEC Electromagnetic Compatibility and 73/23/EEC Low Voltage.
- Operating conditions of units are as follows:

OUTDOOR TEMPERATURE	-2 TO 43°C
ROOM TEMPERATURE	18 TO 32°C
ROOM HUMIDITY	LESS THAN 80%

Note 1 : Cooling Capacity is based on the following temperature conditions:
Indoor air inlet temperature 27°C DB, 19°C WB.
Outdoor air inlet temperature 35°C DB.

Note 2: For details on the Remote Controller and Control Circuits refer to Service Manual A90-9504.

1. SPECIFICATIONS

ITEM	MODEL	RAV-133TU-PE	
Cooling capacity	kW	3.6	
Power source	Phase	1	
	V	220-240	
	Hz	50	
COOLING			
Power consumption	kW	2.1	
Power factor	%	89	
Running current	A	10.3	
Starting current	A	60	
Operating noise (SPL)	Indoor unit (High, Med, Low)	dB(A)	40/36/34
	Outdoor unit	dB(A)	52
Refrigerant	Name of refrigerant		R-22
	Charge volume	kg	1.2
	Add. volume (20-30m)	g/m	35
Refrigerant control			Capillary tube
Interconnection pipe	Larger side size	mm	ø12.7 (1/2)
	Coupler style		Flare
	Smaller side size	mm	ø6.4 (1/4)
	Coupler style		Flare
	Standard length	m	7.5
	Maximum length (of one way)	*1 m	30
	Maximum height difference		
	If indoor unit higher	m	15
If outdoor unit higher	m	30	
Condensate drain pipe diameter	mm	ø25.5 (OD)	
INDOOR UNIT Model			RAV-133TU-PE
Appearance colour			Grey (zinc galvanized steel + thermal insulator)
Dimensions	Height	mm	190
	Width	mm	910
	Depth	mm	480
Net weight	kg	23	
Heat exchanger type			Finned tube
Indoor fan type			Transverse flow fan
Air volume	m ³ /h		700
Fan motor output	W		7 x 2
Air filter			Washable
OUTDOOR UNIT Model			RAV-132A-PE
Appearance colour			Bronze white (Munsell 6Y7.5/1)
Dimensions	Height	mm	740
	Width	mm	880
	Depth	mm	310
Net weight	kg	58	
Heat exchanger type			Finned tube
Outdoor fan type			Propeller fan
Air flow volume	m ³ /h		2,700
Fan motor output	W		39
Compressor	Model		PH230X3-4LS
	Output	kW	1.5
Protective device			Fuse, Crankcase heater, Overload relay
CEILING PANEL Model			RBC-U133PG(W)-PE
Appearance colour			Silky white (Munsell 2.9Y8.9/0.8)
Dimensions	Height	mm	25
	Width	mm	1050
	Depth	mm	550
Net weight	kg	4.5	
Air filter			Washable

Specifications are subject to change without notice.

* Note 1 : These mean actual length.

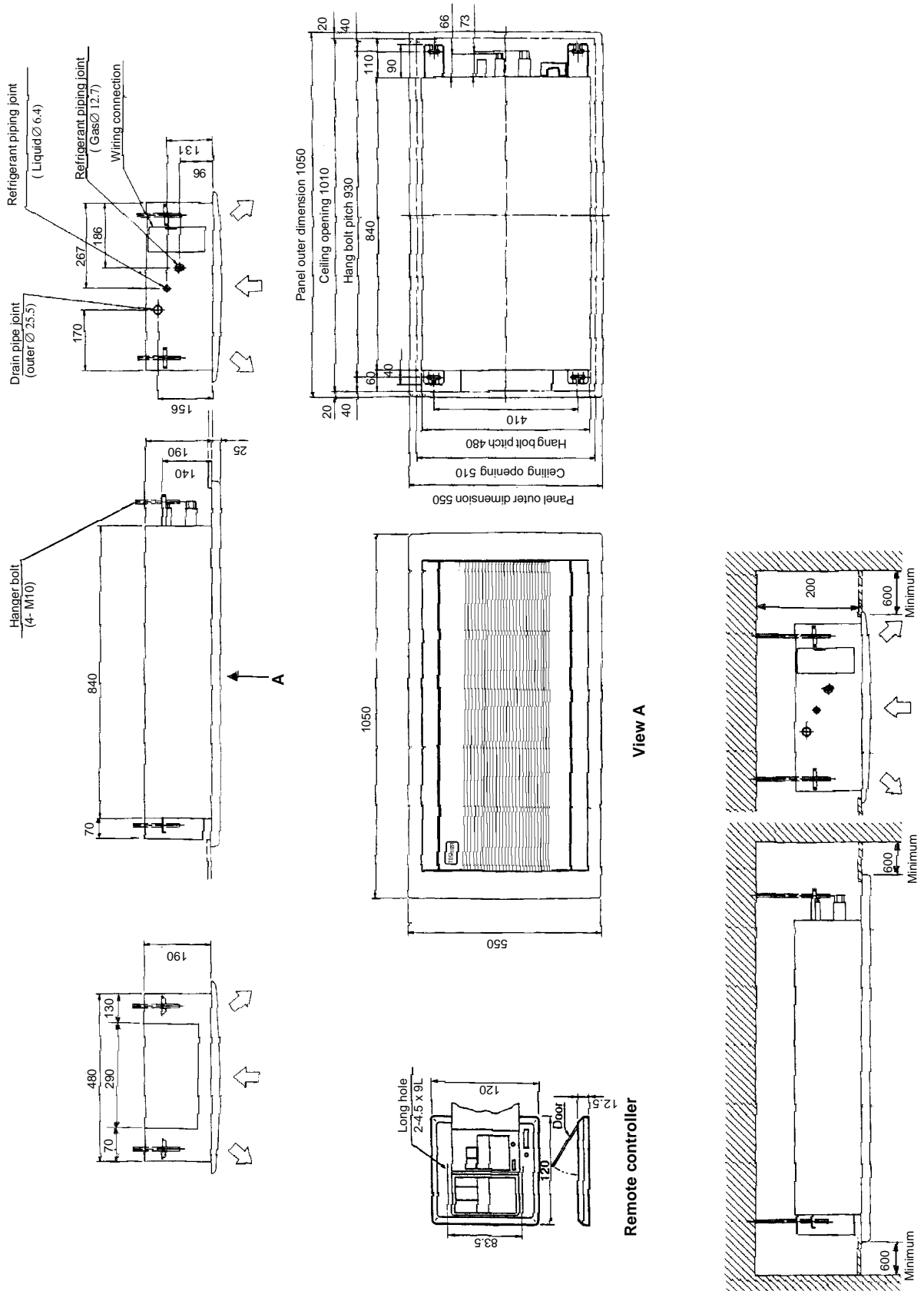
ITEM		MODEL	RAV-163TU-PE	
Cooling capacity	kW		4.5	
Power source	Phase		1	
	V		220-240	
	Hz		50	
			COOLING	
Power consumption	kW		2.3	
Power factor	%		90	
Running current	A		11.1	
Starting current	A		60	
Operating noise (SPL)	Indoor unit (high/med/low) dB (A)		41/37/35	
	Outdoor unit dB (A)		52	
Refrigerant	Name of refrigerant		R-22	
	Charge volume kg		1.45	
	Add. volume (20-30m) g/m		35	
Refrigerant control			Capillary tube	
Interconnection pipe	Larger side size mm		∅ 12.7 (1/2)	
	Coupler style		Flare	
	Smaller side size mm		∅ 6.4 (1/4)	
	Coupler style		Flare	
	Standard length m		7.5	
	Maximum length (of one way) *1 m		30	
	Maximum height difference			
	If indoor unit higher m		15	
	If outdoor unit higher m		30	
Condensate drain pipe diameter mm		∅ 25.5(OD)		
INDOOR UNIT Model			RAV-163TU-PE	
Appearance colour			Grey (zinc galvanized steel + thermal insulator)	
Dimensions	Height mm		190	
	Width mm		910	
	Depth mm		480	
Net weight kg		23		
Heat exchanger type		Finned tube		
Indoor fan type		Transverse flow fan		
Air volume m ³ /h		750		
Fan motor output W		7 x 2		
Air filter		Washable		
OUTDOOR UNIT Model			RAV-182A-PE	
Appearance colour			Bronze white (Munsell 6Y7.5/1)	
Dimensions	Height mm		740	
	Width mm		880	
	Depth mm		310	
Net weight kg		58		
Heat exchanger type		Finned tube		
Outdoor fan type		Propeller fan		
Air flow volume m ³ /h		2,700		
Fan motor output W		39		
Compressor	Model		PH250X3-4LS	
	Output kW		1.5	
Protective device		Fuse, Crankcase heater, Overload relay		
CEILING PANEL Model			RBC-U133PG(W)-PE	
Appearance colour			Silky white (Munsell 2.9Y8.9/0.8)	
Dimensions	Height mm		25	
	Width mm		1050	
	Depth mm		550	
Net weight kg		4.5		
Air filter		Washable		

Specifications are subject to change without notice.

* Note 1 : These mean actual length.

2. CONSTRUCTION VIEWS

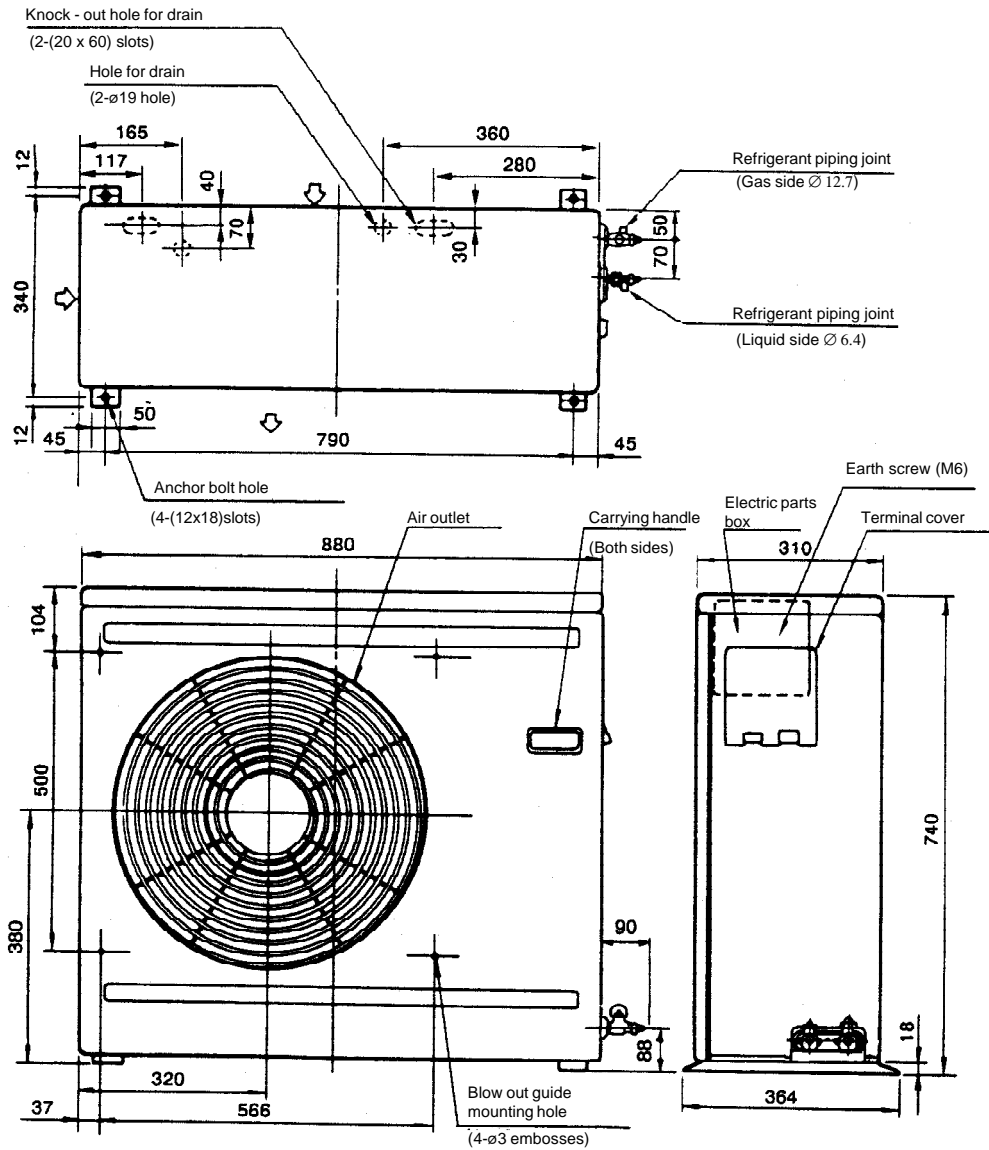
2.1 Indoor unit RAV-133TU-PE RAV-163TU-PE



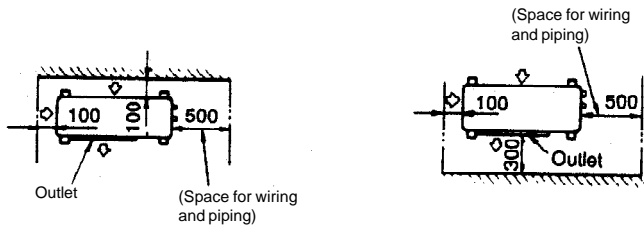
Space required for service and installation

(Unit: mm)

2.2 Outdoor unit
RAV-132A-PE
RAV-182A-PE



Space required for service



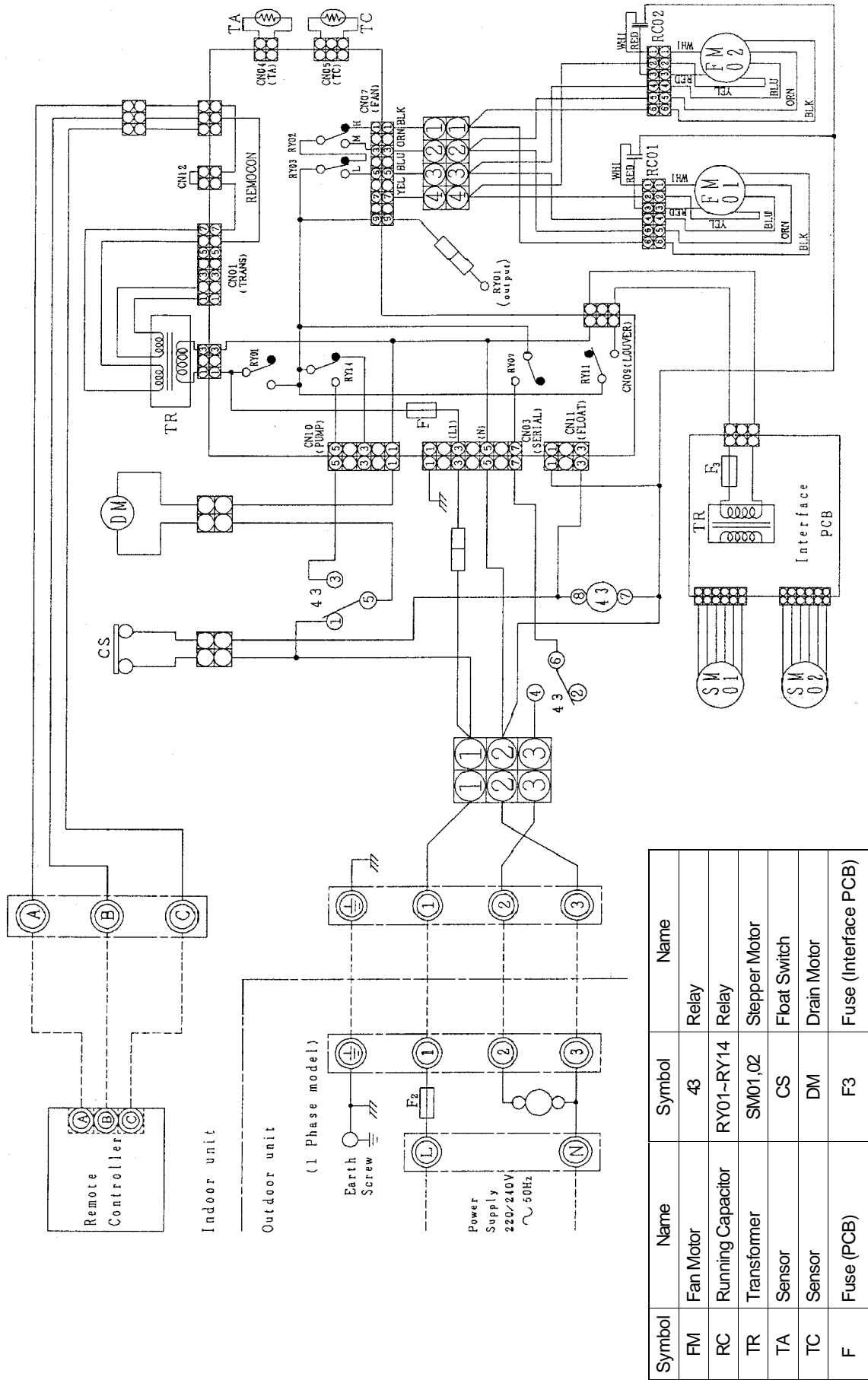
When installed with the inlet faced to the wall side

When installed with the outlet faced to the wall side

(Unit: mm)

3. WIRING DIAGRAM

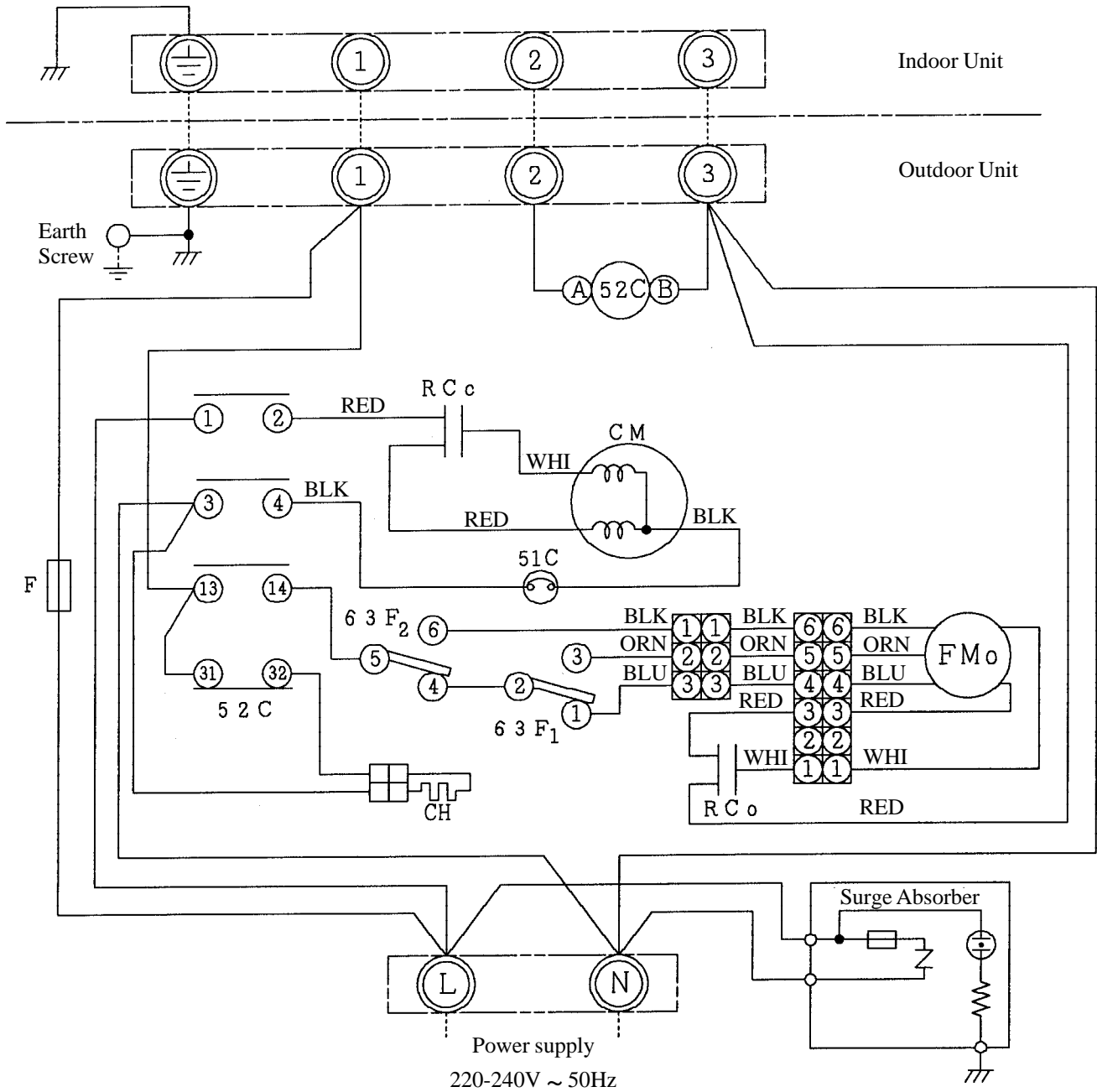
3.1 RAV-133TU-PE RAV-163TU-PE



Symbol	Name	Symbol	Name
FM	Fan Motor	4B	Relay
RC	Running Capacitor	RY01~RY14	Relay
TR	Transformer	SM01,02	Stepper Motor
TA	Sensor	CS	Float Switch
TC	Sensor	DM	Drain Motor
F	Fuse (PCB)	F3	Fuse (Interface PCB)

⊙ Shows terminal block and figures show terminal numbers.
 Broken lines show wiring at site.
 Do not operate the units with magnetic contactor pushed in.

3.2 RAV-132A-PE
RAV-182A-PE



⊙ shows terminal block and figures show terminal numbers.
Broken lines show wiring at site.

Do not operate the units with the magnetic contactor pushed in.

Symbol	Name	Symbol	Name
RCc	Running Capacitor (Comp.)	CM	Compressor
51C	Overload Relay	52C	Magnetic Contactor
63F _{1,2}	Pressure Switch (2-stage)	FMo	Fan Motor
RCo	Running Capacitor (Fan Motor)	CH	Crank Case Heater
F	Fuse (T5A)		

4. SPECIFICATION OF ELECTRICAL PARTS

4.1 RAV-133TU-PE

No.	PARTS NAME	TYPE	SPECIFICATIONS						
1	Indoor unit fan motor (x2)	PAF-230-7-4	Output (Rated) 7W, 4 pole, 1 phase, 230V, 50Hz						
2	Running capacitor for indoor fan motor (x2)	EVM45M504UF	AC 450V, 0.5 μ F						
3	Transformer (Indoor unit)	ST-9586	AC187~264V						
4	Stepper motor (x2)	MP35EA2	DC12V, 80mNm						
5	Relay	LY2F	AC 240V, 2ab						
6	Drain pump	PCD-4N230TF-7	AC230V, 0.2A						
7	Float switch	FS-085-003E	AC230V, 0.5A						
8	Sensor for room temperature		Maximum input 38mA	°C	15	20	25	30	40
				K Ω	16.1	12.6	10.0	8.0	5.2
9	Indoor unit sensor for heat-exchanger temperature.	DTN-C103J40	Maximum input 34mA	°C	-12	0	25	50	
				K Ω	62.29	32.82	10.0	3.59	

4.2 RAV-163TU-PE

No.	PARTS NAME	TYPE	SPECIFICATIONS						
1	Indoor unit fan motor (x2)	PAF-230-7-4	Output (Rated) 7W, 4 pole, 1 phase, 230V, 50Hz						
2	Running capacitor for indoor fan motor (x2)	EEP2H105HQA105	AC 500V, 1.0 μ F						
3	Transformer (Indoor unit)	ST-9586	AC187~264V						
4	Stepper motor (x2)	MP35EA2	DC12V, 80mNm						
5	Relay	LY2F	AC 240V, 2ab						
6	Drain pump	PCD-4N230TF-7	AC230V, 0.2A						
7	Float switch	FS-085-003E	AC230V, 0.5A						
8	Sensor for room temperature		Maximum input 38mA	°C	15	20	25	30	40
				K Ω	16.1	12.6	10.0	8.0	5.2
9	Indoor unit sensor for heat-exchanger temperature.	DTN-C103J40	Maximum input 34mA	°C	-12	0	25	50	
				K Ω	62.29	32.82	10.0	3.59	

4.3 RAV-132A-PE

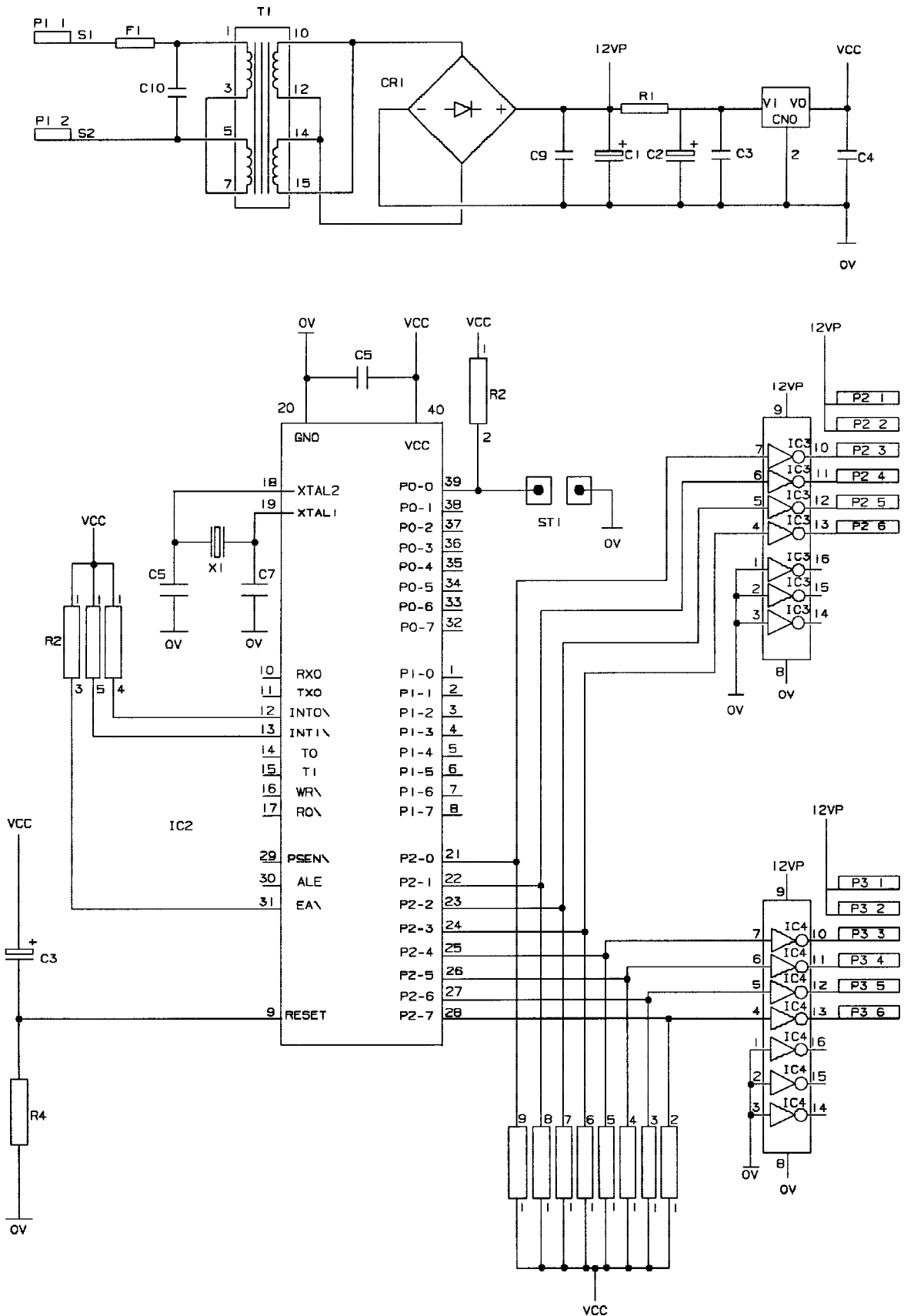
No.	PARTS NAME	TYPE	SPECIFICATIONS
1	Compressor	PH230X3-4LS	Output (Rated) 1.5kW, 2 pole, 220/240V, 1 phase, 50Hz
2	Outdoor unit fan motor	SMF-230-39N-3	Output (Rated) 39W, 6 pole, 230V, 1 phase, 50Hz
3	Running capacitor for outdoor fan motor	EEP2G405HQA114	AC400V, 4 μ F
4	Magnetic contactor	FMCA-1S	AC 230V, 50W
5	Pressure switch (2stage)	STB-X602	Tripping pressure 19kg/cm ² G, 21kg/cm ² G Resetting pressure 13kg/cm ² G, 15kg/cm ² G
6	Crankcase heater		AC240V, 28W
7	Fuse		T5A
8	Running capacitor for compressor	MT-44MP456W	AC440V, 45 μ F
9	Overload relay	OL-177GM15	AC240V, Tripping temp: 165° C, Resetting temp: 80° C

4.4 RAV-182A-PE

No.	PARTS NAME	TYPE	SPECIFICATIONS
1	Compressor	PH250X3-4LS	Output (Rated) 1.5kW, 2 pole, 220/240V, 1 phase, 50Hz
2	Outdoor unit fan motor	SMF-230-39N-3	Output (Rated) 39W, 6 pole, 230V, 1 phase, 50Hz
3	Running capacitor for outdoor fan motor	EEP2G405HQA114	AC400V, 4 μ F
4	Magnetic contactor	FMCA-1S	AC 230V, 50Hz
5	Pressure switch (2stage)	STB-X602	Tripping pressure 19kg/cm ² G, 21kg/cm ² G Resetting pressure 13kg/cm ² G, 15kg/cm ² G
6	Crankcase heater		AC240V, 28W
7	Fuse		T5A
8	Running capacitor for compressor	MT-44MP456W	AC440V, 45 μ F
9	Overload relay	OL-177GM15	AC240V, Tripping temp: 165° C, Resetting temp: 80° C

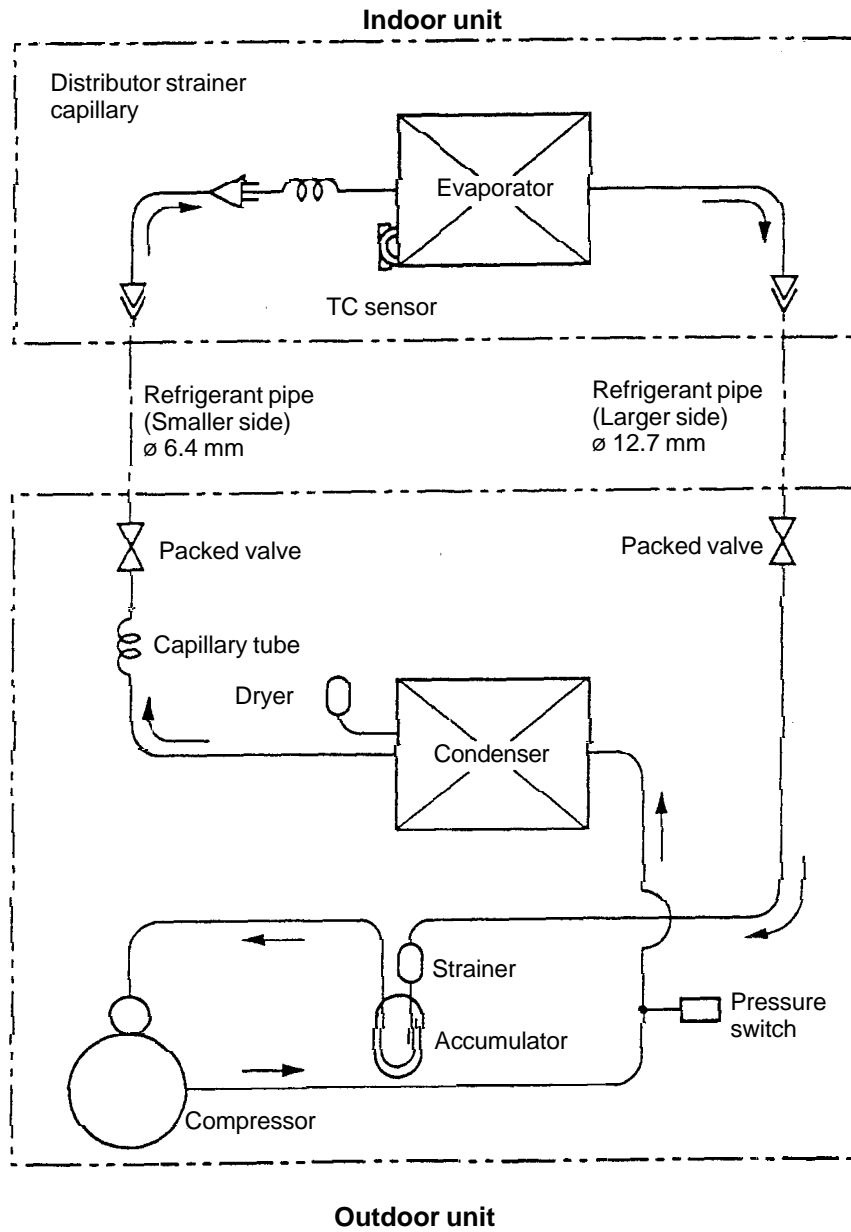
5. INTERFACE PCB FOR LOUVER OPERATION

An additional PCB, referred to as the Interface PCB, is fitted to this unit to operate the dc stepper motors, which drive the louvers. The power supply to the interface PCB is via relay RY11 on the indoor PCB.



6. REFRIGERANT PIPING DIAGRAM

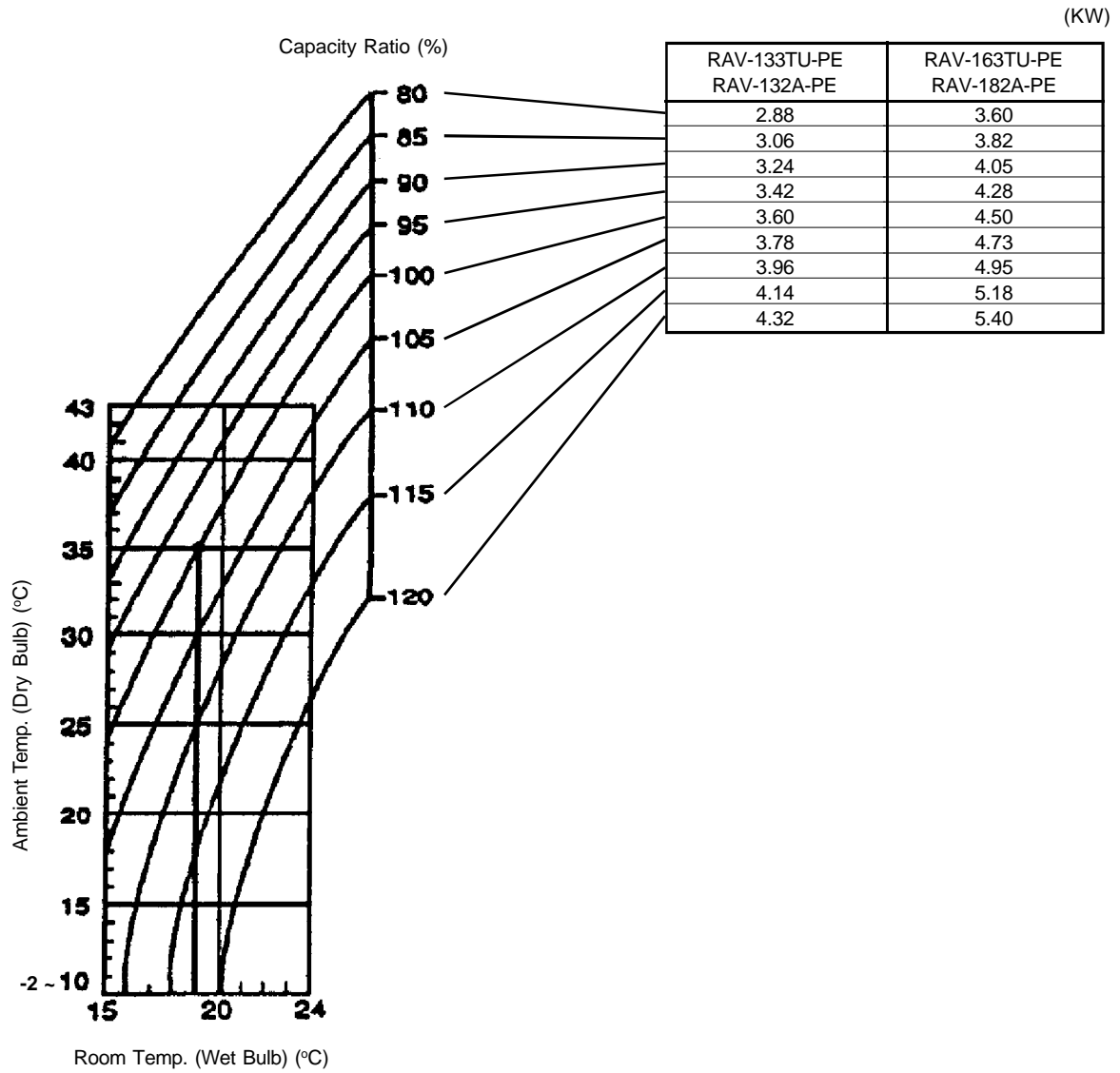
6.1 Indoor unit RAV-133TU-PE RAV-163TU-PE	Outdoor unit RAV-132A-PE RAV-182A-PE
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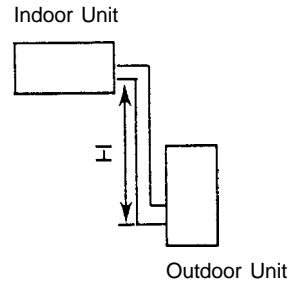
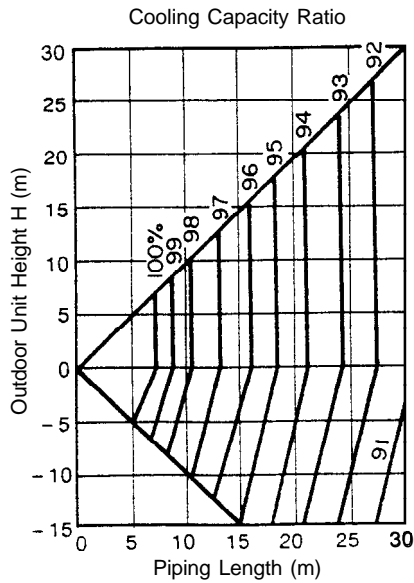
Indoor Unit		Outdoor Unit	
Model	Capillary	Model	Capillary
RAV-133TU-PE	IDø2.2 x 200L x 2P	RAV-132A-PE	IDø2.4 x 500L x 1P
RAV-163TU-PE	IDø1.7 x 300L x 2P	RAV-182A-PE	IDø2.4 x 600L x 1P

7. PERFORMANCE CHARACTER

7.1 Cooling capacity



7.2 Cooling capacity
RAV-133TU-PE / RAV-132A-PE
RAV-163TU-PE / RAV-182A-PE



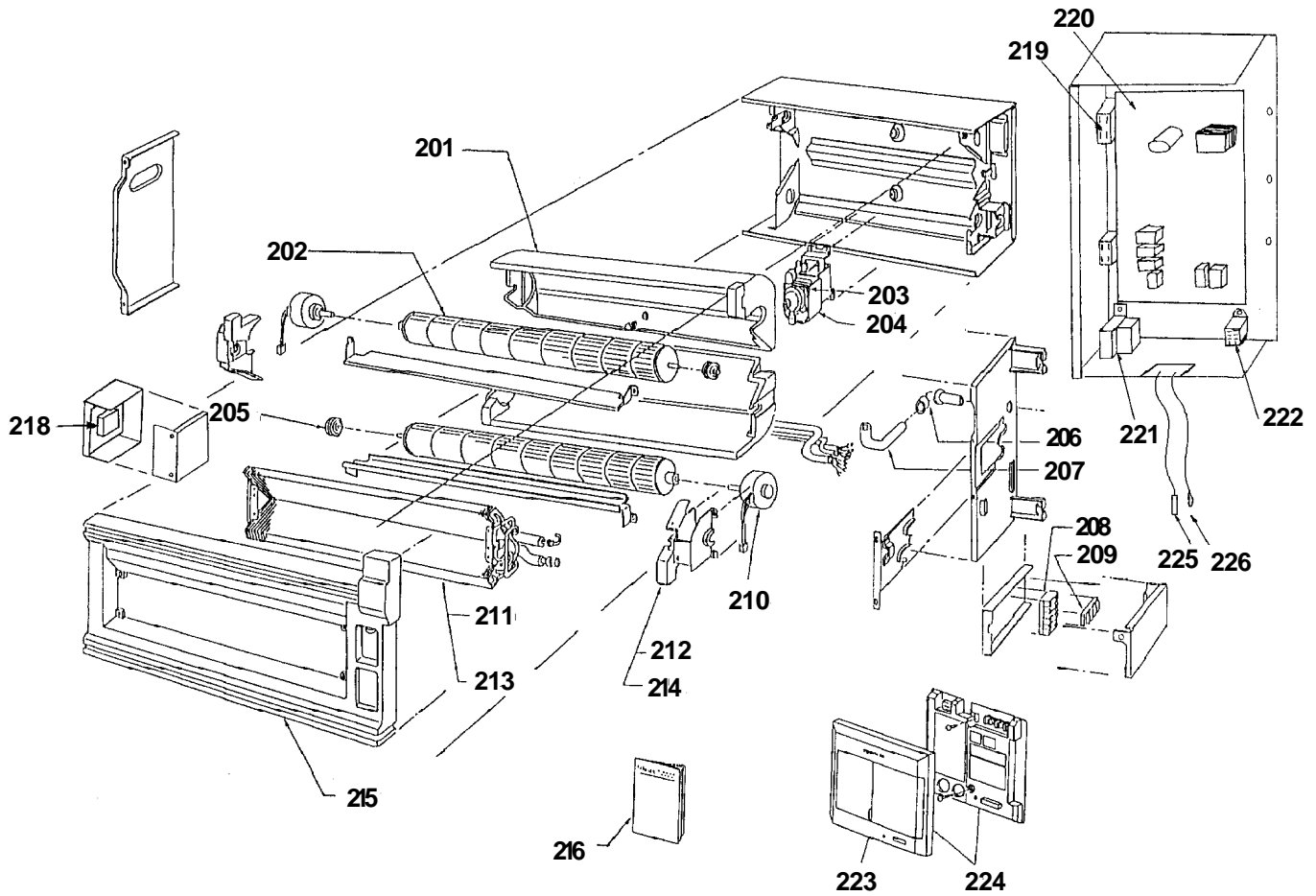
7.3 Piping length/additional refrigerant volume

Model	Piping length less than (m)	20	Additional amount of refrigerant at installation site (kg)					Recharge quantity (kg)						
			25	30	35	40	45	50	5	10	15	20	25	30
RAV 133TU-PE / RAV-132A-PE	Filled at factory		0.15	0.35					0.95	1.05	1.10	1.20	1.35	1.55
RAV163TU-PE / RAV-182A-PE	Filled at factory		0.15	0.35					1.20	1.30	1.35	1.45	1.60	1.80

- The amount of refrigerant put into the outdoor unit at the factory is equivalent to that which fills up 20m length of refrigerant pipe.
- If the length of refrigerant pipe is 20m or less, addition of refrigerant at the installation site is unnecessary. If the length of the pipe exceeds 20m, add the refrigerant R-22.
- Overcharge or undercharge of refrigerant in the outdoor unit will cause malfunction of the compressor. The prescribed amount of the replenishment of the refrigerant is shown in the table above. The permissible amount of refrigerant is the prescribed amount $\pm 50g$.

8. EXPLODED VIEWS AND PARTS LIST

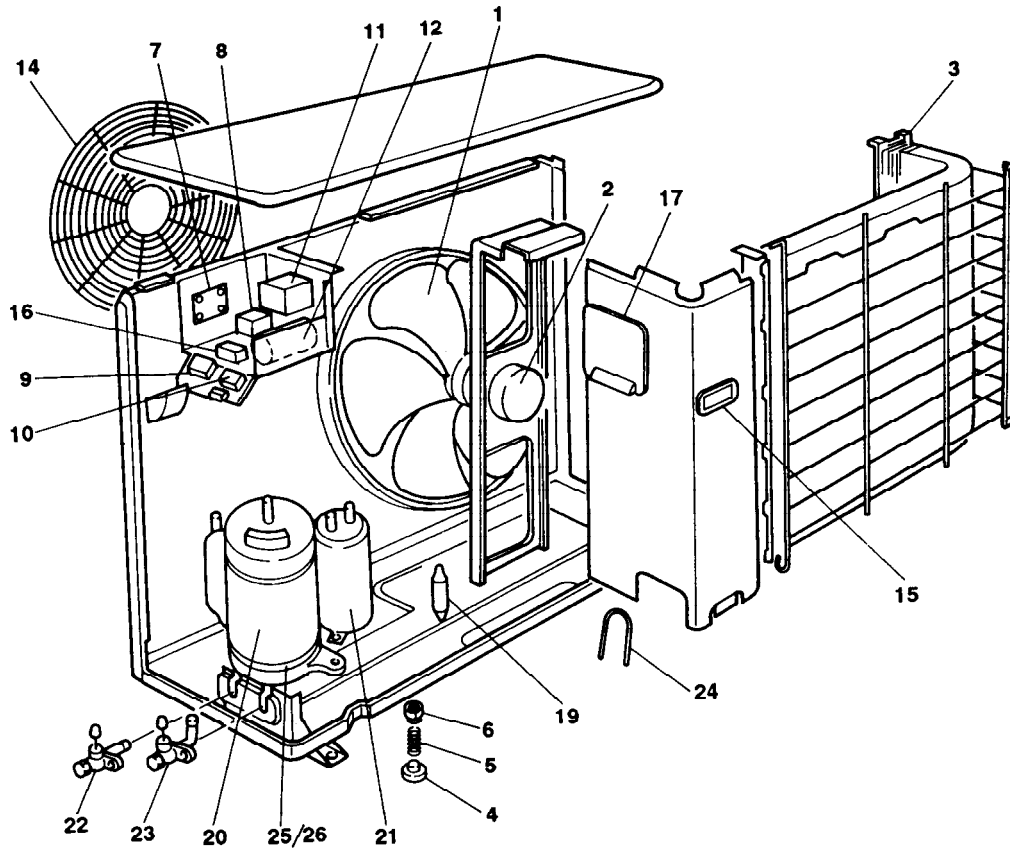
8.1 Indoor unit RAV-133TU-PE RAV-163TU-PE



Location No	Part No	Description
201	43A22001	Casing Assembly
202	43020288	Fan
203	43151217	Float Switch
204	43A70003	Pump Assembly
205	43020253	Bearing
206	43071019	Drain Connection
207	43070164	Drain Hose
208	43A60002	3 P Terminal
209	43A60001	4 P Terminal
210	43A21014	Fan Motor
211	43019604	Sensor Fix Plate
212	43A22002	Casing Outlet
213	43A44010	Heat Exchanger (RAV-133TU-PE)
213	43A44012	Heat Exchanger (RAV-163TU-PE)

Location No	Part No	Description
214	43039240	Canoe Clip
215	43A72001	Drain Pan
216	43A88004	Manual
218	43A69008	Interface PC Board
219	37555721	Capacitor, Metal Film (RAV-133TU-PE)
219	43155100	Capacitor, Metal Film (RAV-163TU-PE)
220	43A69005	PC Board
221	43A58002	Transformer
222	43154141	Relay
223	43A62001	Cover, Remote Controller
224	43A69009	Remote Controller
225	43A50002	Sensor (TC)
226	43150118	Sensor (TA)

8.3 Outdoor Unit
RAV-132A-PE
RAV-182A-PE



Location No.	Part No.	Description
1	43120156	Fan, Propeller
2	43A21012	Motor, Fan
3	43143642	Condenser
4	43049132	Base, Spring, B
5	43149198	Spring, Buffer
6	43149212	Base, Spring, A
7	43169584	Surge Absorber
8	43A49002	Pressure Switch, 2-stage
9	43A60003	Terminal, 2P
10	43A60001	Terminal, 4P
11	43152334	Magnetic Contactor
12	43155115	Capacitor, Plastic Film
14	43A19001	Guard, Fan
15	43119368	Hanger

Location No.	Part No.	Description
16	43155080	Capacitor, Plastic Film
17	43162027	Cover, Electric Parts
19	43145098	Dryer
20	43041837	Compressor PH230X3-4LS (RAV132A-PE)
20	43041845	Compressor PH250X3-4LS (RAV-182A-PE)
21	43148105	Accumulator
22	43146454	Packed Valve, 1/4 IN
23	43146406	Packed Valve, 1/2 IN
24	43A47013	Capillary Tube (RAV132A-PE)
24	43146430	Capillary Tube (RAV182A-PE)
25	43157167	Heater, Crankcase
26	43193043	Spring

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