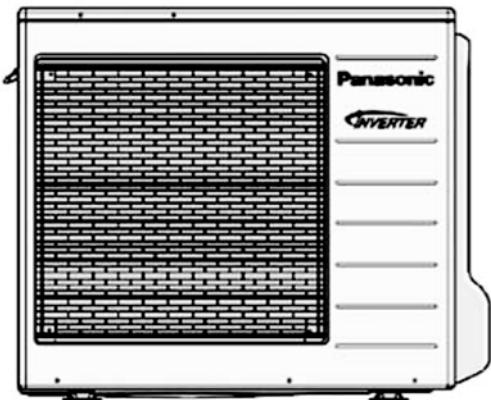
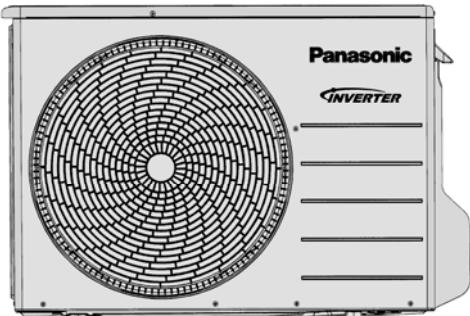


# Service Manual

Air Conditioner



## Indoor Unit

**CS-S9NKR**

**CS-S12NKR**

**CS-S18NKR**

**CS-S24NKR**

**CS-S28NKR**

## Outdoor Unit

**CU-S9NKR**

**CU-S12NKR**

**CU-S18NKR**

**CU-S24NKR**

**CU-S28NKR**

### **WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the products dealt with in this service information by anyone else could result in serious injury or death.

### **PRECAUTION OF LOW TEMPERATURE**

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

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# 1. Safety Precautions

- Read the following "SAFETY PRECAUTIONS" carefully before perform any servicing.
- Electrical work must be installed or serviced by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation or servicing due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

 <b>WARNING</b>	This indication shows the possibility of causing death or serious injury
 <b>CAUTION</b>	This indication shows the possibility of causing injury or damage to properties.

- The items to be followed are classified by the symbols:

	This symbol denotes item that is PROHIBITED from doing.
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- Carry out test run to confirm that no abnormality occurs after the servicing. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

 <b>WARNING</b>	
1. Do not modify the machine, part, material during repairing service.	
2. If wiring unit is supplied as repairing part, do not repair or connect the wire even only partial wire break. Exchange the whole wiring unit.	
3. Do not wrench the fasten terminal. Pull it out or insert it straightly.	
4. Engage dealer or specialist for installation and servicing. If installation of servicing done by the user is defective, it will cause water leakage, electrical shock or fire.	
5. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.	
6. Use the attached accessories parts and specified parts for installation and servicing. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
7. Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
8. For electrical work, follow the local national wiring standard, regulation and the installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
9. This equipment is strongly recommended to install with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case equipment breakdown or insulation breakdown.	
10. Use the specified cable 1.5 mm <sup>2</sup> (1.0 ~ 1.75HP) or 2.5mm <sup>2</sup> (2.0 ~ 2.5HP), and connect tightly for indoor/outdoor connection. Connect tightly and clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat-up or fire at the connection.	
11. Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up or fire at the connection point of terminal, fire or electrical shock.	
12. When carrying out piping connection, take care not to let air substances other than the specified refrigerant go into refrigeration cycle. Otherwise, it will cause lower capacity, abnormal high pressure in the refrigeration cycle, explosive and injury.	
13. Do not install outdoor unit near handrail of veranda. When installing air-conditioner unit at veranda of high rise building, child may climb up to outdoor unit and cross over the handrail and causing accident.	
14. This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electric shock in case equipment breakdown or insulation breakdown.	
15. Keep away from small children, the thin film may cling to nose and mouth and prevent breathing.	
16. Do not damage or use unspecified power supply cord. Otherwise it will cause fire or electric shock.	
17. Do not modify the length of the power supply cord or use extension cord, and do not share the single outlet with other electric appliances. Otherwise, it will cause fire or electric shock.	
18. In case of using existing (R22) pipes during installation of R410 models, must carry out pump down properly to collect back the refrigerant and oil before installation new unit. Thickness of copper pipes used with R410A must be more than 0.6mm. Never use copper pipes thinner than 0.6mm. It is desirable that the amount of residual oil is less than 40 mg/10m.	

19. During installation, before run the compressor, confirm the refrigerant pipes are fixed. Operation of compressor without fixing the piping, setting the valves at open condition, a burst may occur and cause injury.
20. During pump down operation, stop the compressor before remove the refrigerant piping. When remove piping while valves at open condition, burst may occur and cause injury.
21. After completion of installation or service, confirm there is no leakage or refrigerant gas. It may generate toxic gas when the refrigerant contacts with fire.
22. Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when refrigerant contacts with fire.
23. Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury. 
24. Must not use other parts except original parts describe in catalog and manual.

 <b>CAUTION</b>
1. Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire. 
2. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
3. Tighten the flare nut with torque wrench according to specified method. If the flare nut is over-tightened, after a long period, the flare may break and cause refrigerant gas leakage.
4. Do not touch outdoor unit air inlet and aluminium fin. It may cause injury. 
5. Select an installation location which is easy for maintenance.
6. Pb free solder has a higher melting point than standard solder; typically the melting point is 50°F – 70°F (30°C – 40°C) higher. Please use a high temperature solder iron. In case of the soldering iron with temperature control, please set it to 700 ± 20°F (370 ± 10°C). Pb free solder will tend to splash when heated too high (about 1100°F / 600°C).
7. Power supply connection to the air conditioner. Connect the power supply cord of the air conditioner to the mains using one of the following methods. Power supply point shall be the place where there is ease for access for the power disconnection in case of emergency. In some countries, permanent connection of this room air conditioner to the power supply is prohibited. i. Power supply connection to the receptacle using a power plug. Use an approved 15/16A (1.0 ~ 1.75HP) or 16A (2.0HP) or 20A (2.5HP) power plug with earth pin for the connection to the socket. ii. Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A (1.0 ~ 2.0HP) or 20A (2.5HP) circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.0 mm contact gap.
8. Do not release refrigerant during piping work for installation, servicing, reinstallation and during repairing a refrigerant parts. Take care of the liquid refrigerant, it may cause frostbite. 
9. Installation or servicing work: It may need two people to carry out the installation or servicing work.
10. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc. 
11. Do not sit or step on the unit, you may fall down accidentally. 
12. Do not touch the sharp aluminium fin, sharp parts may cause injury. If you are required to handle sharp parts during installation or servicing, please wear hand glove. Sharp parts may cause injury. 

## 2. Specification

Model		Indoor	CS-S9NKR						CS-S12NKR															
		Outdoor	CU-S9NKR						CU-S12NKR															
Performance Test Condition		AS						AS																
Power Supply		Phase, Hz	Single, 50						Single, 50															
		V	230			240			230			240												
			Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.										
Cooling	Capacity		kW	0.90	2.60	3.00	0.90	2.60	3.00	0.90	3.50	4.00	0.90	3.50	4.00									
			BTU/h	3070	8870	10200	3070	8870	10200	3070	11900	13600	3070	11900	13600									
			kcal/h	770	2240	2580	770	2240	2580	770	3010	3440	770	3010	3440									
	Running Current		A	-	3.0	-	-	2.9	-	-	4.1	-	-	4.0	-									
	Input Power		W	240	630	880	240	630	880	250	860	1.18k	250	860	1.18k									
	EER		W/W	3.75	4.13/3.0	3.41	3.75	4.13/3.0	3.41	3.60	4.07/3.0	3.39	3.60	4.07/3.0	3.39									
			Btu/hW	12.79	14.08	11.59	12.79	14.08	11.59	12.28	13.84	11.53	12.28	13.84	11.53									
			kcal/hW	3.21	3.56	2.93	3.21	3.56	2.93	3.08	3.50	2.92	3.08	3.50	2.92									
	Power Factor		%	-	91	-	-	91	-	-	91	-	-	90	-									
	Indoor Noise (H / L / QLo)		dB-A	37 / 26 / 21			37 / 26 / 21			38 / 28 / 21			38 / 28 / 21											
			Power Level dB	53 / 42 / 37			53 / 42 / 37			54 / 44 / 37			54 / 44 / 37											
	Outdoor Noise (H / L / QLo)		dB-A	47 / - / -			47 / - / -			48 / - / -			48 / - / -											
			Power Level dB	62 / - / -			62 / - / -			63 / - / -			63 / - / -											
Max Current (A) / Max Input Power (W)			5.7 / 1.25k						7.5 / 1.69k															
Starting Current (A)			3.0						4.1															
Compressor	Type		Hermetic Motor						Hermetic Motor															
	Motor Type		Brushless (6 poles)						Brushless (6 poles)															
	Output Power	W	650						650															
Indoor Fan	Type		Cross-flow fan						Cross-flow fan															
	Material		ASG20K1						ASG20K1															
	Motor Type		Induction (4 poles)						Induction (4 poles)															
	Input Power	W	43.9 - 48.9						43.9 - 48.9															
	Output Power	W	24						24															
	Speed	QLo	rpm	620 - 620						620 - 620														
		Lo	rpm	740 - 740						780 - 780														
		Me	rpm	890 - 890						930 - 930														
		Hi	rpm	1050 - 1050						1080 - 1080														
		SHi	rpm	1150 - 1150						1200 - 1200														
Outdoor Fan	Type		Propeller						Propeller															
	Material		PP						PP															
	Motor Type		Induction (6 poles)						Induction (6 poles)															
	Input Power	W	-						-															
	Output Power	W	24						25															
	Speed	Hi	rpm	820 - 840						830 - 850														
Moisture Removal			L/h (Pt/h)	1.6 (3.4)						2.0 (4.2)														
Indoor Airflow	Indoor Airflow	QLo	m³/min (ft³/m)	5.29 (187)						5.29 (187)														
		Lo	m³/min (ft³/m)	6.73 (238)						7.35 (260)														
		Me	m³/min (ft³/m)	8.36 (295)						9.02 (318)														
		Hi	m³/min (ft³/m)	10.1 (355) (168)						10.7 (380) (178)														
		SHi	m³/min (ft³/m)	11.26 (398)						12.04 (425)														
Outdoor Airflow		Hi	m³/min (ft³/m)	35.1 (1240)			36.0 (1270)			31.7 (1120)			32.5 (1145)											

Model		Indoor	CS-S9NKR	CS-S12NKR	
		Outdoor	CU-S9NKR	CU-S12NKR	
Refrigeration Cycle	Control Device		Capillary Tube		
	Refrigerant Oil	cm <sup>3</sup>	FV50S (320)		
	Refrigerant Type	g (oz)	R410A, 860 (30.4)		
Dimension	Height (I/D / O/D)	mm (inch)	290 (11-7/16) / 619 (24-3/8)		
	Width (I/D / O/D)	mm (inch)	870 (34-9/32) / 824 (32-15/32)		
	Depth (I/D / O/D)	mm (inch)	214 (8-7/16) / 299 (11-25/32)		
Weight	Net (I/D / O/D)	kg (lb)	9 (20) / 30 (66)		
Piping	Pipe Diameter (Liquid / Gas)	mm (inch)	6.35 (1/4) / 9.52 (3/8)		
	Standard length	m (ft)	7.5 (24.6)		
	Length range (min – max)	m (ft)	3 (9.8) ~ 15 (49.2)		
	I/D & O/D Height different	m (ft)	15 (49.2)		
	Additional Gas Amount	g/m (oz/ft)	15 (0.2)		
	Length for Additional Gas	m (ft)	7.5 (24.6)		
Drain Hose	Inner Diameter	mm	16.7		
	Length	mm	550		
Indoor Heat Exchanger	Fin Material		Aluminium (Pre coat)		
	Fin Type		Slit Fin		
	Row × Stage × FPI		2 × 15 × 21		
	Size (W × H × L)	mm	610 × 315 × 25.4		
Outdoor Heat Exchanger	Fin Material		Aluminium (Blue coated)		
	Fin Type		Slit Fin		
	Row × Stage × FPI		1 × 28 × 17		
	Size (W × H × L)	mm	12.7 × 588 × 795.8		
Air Filter	Material		Polypropelene		
	Type		One-touch		
Power Supply		Outdoor		Outdoor	
Power Supply Cord	A	-		-	
Thermostat		-		-	
Protection Device		-		-	
		DRY BULB	WET BULB	DRY BULB	WET BULB
Indoor Operation Range	Maximum	32	23	32	23
	Minimum	16	11	16	11
Outdoor Operation Range	Maximum	46	26	46	26
	Minimum	5	4	5	4

- Cooling capacities are based on indoor temperature of 27°C DRY BULB (80.6°F DRY BULB), 19.0°C WET BULB (66°F WET BULB) and outdoor air temperature of 35°C DRY BULB (95°F DRY BULB), 24°C WET BULB (75.2°F WET BULB).

Model	Indoor	CS-S18NKR									
	Outdoor	CU-S18NKR									
Performance Test Condition		AS									
Power Supply	Phase, Hz	Single, 50									
	V	230			240						
		Min.	Mid.	Max.	Min.	Mid.					
Cooling	Capacity	kW	0.90	5.00	6.00	0.90					
		BTU/h	3070	17100	20500	3070					
		kcal/h	770	4300	5160	770					
	Running Current	A	-	5.9	-	5.7					
	Input Power	W	240	1.30k	1.85k	240					
	EER	W/W	3.75	3.85/2.5	3.24	3.75					
		Btu/hW	12.79	13.15	11.08	12.79					
		kcal/hW	3.21	3.31	2.79	3.21					
	Power Factor	%	-	96	-	95					
	Indoor Noise (H / L / QLo)	dB-A	42 / 34 / 31			42 / 34 / 31					
		Power Level dB	58 / 50 / 47			58 / 50 / 47					
Outdoor Noise (H / L / QLo)	dB-A	47 / - / 42			47 / - / 42						
		Power Level dB	61 / - / 56			61 / - / 56					
Max Current (A) / Max Input Power (W)		9.5 / 2.23k									
Starting Current (A)		5.9									
Compressor	Type	Hermetic Motor									
	Motor Type	Brushless (6 poles)									
	Output Power	W	900								
Indoor Fan	Type	Cross-flow fan									
	Material	ASG30K1									
	Motor Type	Transistor (8 poles)									
	Input Power	W	94.8 - 94.8								
	Output Power	W	40								
	Speed	QLo	rpm	870 - 870							
		Lo	rpm	950 - 950							
		Me	rpm	1090 - 1090							
		Hi	rpm	1220 - 1220							
		SHi	rpm	1320 - 1320							
Outdoor Fan	Type	Propeller									
	Material	PP									
	Motor Type	Induction (6 poles)									
	Input Power	W	-								
	Output Power	W	40								
	Speed	Hi	rpm	530 - 550							
Moisture Removal		L/h (Pt/h)	2.8 (5.9)								
Indoor Airflow	QLo	m <sup>3</sup> /min (ft <sup>3</sup> /m)	10.88 (384)								
	Lo	m <sup>3</sup> /min (ft <sup>3</sup> /m)	12.07 (426)								
	Me	m <sup>3</sup> /min (ft <sup>3</sup> /m)	14.07 (497)								
	Hi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	16.0 (565) (267)								
	SHi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	17.6 (621)								
Outdoor Airflow	Hi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	39.7 (1400)			41.3 (1460)					

Model		Indoor	CS-S18NKR
		Outdoor	CU-S18NKR
Refrigeration Cycle	Control Device		Expansion Valve
	Refrigerant Oil	cm <sup>3</sup>	FV50S (450)
	Refrigerant Type	g (oz)	R410A, 1.31k (46.2)
Dimension	Height (I/D / O/D)	mm (inch)	290 (11-7/16) / 795 (31-5/16)
	Width (I/D / O/D)	mm (inch)	1070 (42-5/32) / 875 (34-15/32)
	Depth (I/D / O/D)	mm (inch)	240 (9-15/32) / 320 (12-5/8)
Weight		Net (I/D / O/D)	kg (lb) 12 (26) / 50 (110)
Piping	Pipe Diameter (Liquid / Gas)	mm (inch)	6.35 (1/4) / 12.70 (1/2)
	Standard length	m (ft)	5.0 (16.4)
	Length range (min – max)	m (ft)	3 (9.8) ~ 20 (65.6)
	I/D & O/D Height different	m (ft)	15 (49.2)
	Additional Gas Amount	g/m (oz/ft)	20 (0.2)
	Length for Additional Gas	m (ft)	10 (32.8)
Drain Hose	Inner Diameter	mm	16.7
	Length	mm	550
Indoor Heat Exchanger	Fin Material		Aluminium (Pre coat)
	Fin Type		Slit Fin
	Row × Stage × FPI		2 × 15 × 19
	Size (W × H × L)	mm	810 × 315 × 25.4
Outdoor Heat Exchanger	Fin Material		Aluminium (Blue coated)
	Fin Type		Slit Fin
	Row × Stage × FPI		2 × 36 × 17
	Size (W × H × L)	mm	25.4 × 756 × 847.9:827.9
Air Filter	Material		Polypropylene
	Type		One-touch
Power Supply		Outdoor	
Power Supply Cord		A	
Thermostat		-	
Protection Device		-	
		DRY BULB	WET BULB
Indoor Operation Range	Maximum	32	23
	Minimum	16	11
Outdoor Operation Range	Maximum	46	26
	Minimum	5	4

1. Cooling capacities are based on indoor temperature of 27°C DRY BULB (80.6°F DRY BULB), 19.0°C WET BULB (66°F WET BULB) and outdoor air temperature of 35°C DRY BULB (95°F DRY BULB), 24°C WET BULB (75.2°F WET BULB).

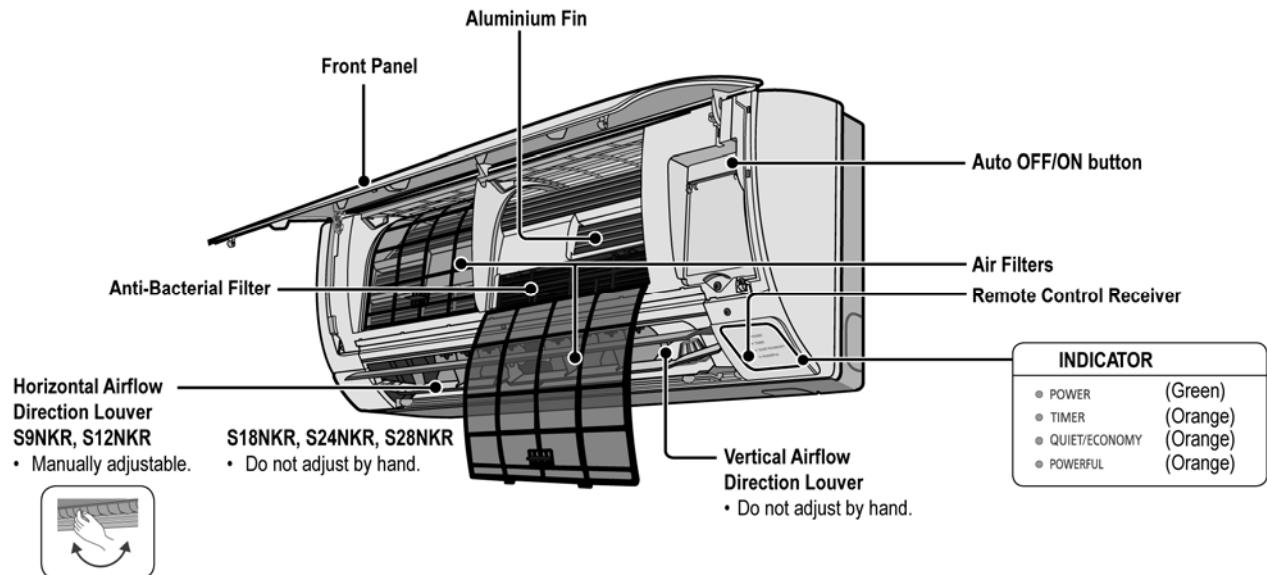
Model	Indoor	CS-S24NKR						CS-S28NKR													
	Outdoor	CU-S24NKR						CU-S28NKR													
Performance Test Condition		AS						AS													
Power Supply	Phase, Hz	Single, 50						Single, 50													
	V	230			240			230			240										
		Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.	Min.	Mid.	Max.								
Cooling	Capacity	kW	2.00	7.10	7.70	2.00	7.10	7.70	2.10	8.00	8.40	2.10	8.00	8.40							
		BTU/h	6820	24200	26300	6820	24200	26300	7160	27300	28600	7160	27300	28600							
		kcal/h	1720	6110	6620	1720	6110	6620	1810	6880	7220	1810	6880	7220							
	Running Current	A	-	9.8	-	-	9.5	-	-	11.3	-	-	11.0	-							
	Input Power	W	470	2.18k	2.40k	470	2.18k	2.40k	430	2.46k	2.60k	430	2.46k	2.60k							
	EER	W/W	4.26	3.26 / 2.0	3.21	4.26	3.26 / 2.0	3.21	4.88	3.25 / 1.5	3.23	4.88	3.25 / 1.5	3.23							
		Btu/hW	14.51	11.10	10.96	14.51	11.10	10.96	16.65	11.10	11.00	16.65	11.10	11.00							
		kcal/hW	3.66	2.80	2.76	3.66	2.80	2.76	4.21	2.80	2.78	4.21	2.80	2.78							
	Power Factor	%	-	97	-	-	96	-	-	95	-	-	93	-							
	Indoor Noise (H / L / QLo)	dB-A	47 / 38 / 35			47 / 38 / 35			50 / 38 / 35			50 / 38 / 35									
		Power Level dB	63 / 54 / 51			63 / 54 / 51			66 / 54 / 51			66 / 54 / 51									
	Outdoor Noise (H / L / QLo)	dB-A	52 / - / 47			52 / - / 47			54 / - / 49			54 / - / 49									
		Power Level dB	66 / - / 61			66 / - / 61			68 / - / 63			68 / - / 63									
Max Current (A) / Max Input Power (W)			14.4 / 3.25k						14.6 / 3.26k												
Starting Current (A)			9.8						11.3												
Compressor	Type		Hermetic Motor						Hermetic Motor												
	Motor Type		Brushless (4 poles)						Brushless (4 poles)												
	Output Power	W	1.70k						1.70k												
Indoor Fan	Type		Cross-flow fan						Cross-flow fan												
	Material		ASG30K1						ASG30K1												
	Motor Type		Transistor (8-poles)						Transistor (8-poles)												
	Input Power	W	94.8 - 94.8						94.8 - 94.8												
	Output Power	W	40						40												
	Speed	QLo	rpm	950						950											
		Lo	rpm	1050						1050											
		Me	rpm	1240						1290											
		Hi	rpm	1430						1540											
		SHi	rpm	1530						1570											
Outdoor Fan	Type		Propeller						Propeller												
	Material		PP						PP												
	Motor Type		Induction (6-poles)						DC (8-poles)												
	Input Power	W	-						-												
	Output Power	W	80						60												
	Speed	Hi	rpm	670						700											
Moisture Removal		L/h (Pt/h)	4.1 (8.7)						4.7 (9.9)												
Indoor Airflow	Indoor Airflow	QLo	m <sup>3</sup> /min (ft <sup>3</sup> /m)	11.82 (417)						11.82 (417)											
		Lo	m <sup>3</sup> /min (ft <sup>3</sup> /m)	13.28 (469)						13.28 (469)											
		Me	m <sup>3</sup> /min (ft <sup>3</sup> /m)	16.09 (568)						16.77 (592)											
		Hi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	18.4 (650) (307)						20.4 (720) (340)											
		SHi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	20.20 (713)						20.84 (736)											
Outdoor Airflow	Hi	m <sup>3</sup> /min (ft <sup>3</sup> /m)	50.2 (1770)			51.9 (1830)			53.5 (1890)			53.5 (1890)									

Model		Indoor	CS-S24NKR	CS-S28NKR	
		Outdoor	CU-S24NKR	CU-S28NKR	
Refrigeration Cycle	Control Device		Capillary Tube		
	Refrigerant Oil	cm <sup>3</sup>	FV50S (800)		
	Refrigerant Type	g (oz)	R410A, 1.58k (55.8)		
Dimension	Height (I/D / O/D)	mm (inch)	290 (11-7/16) / 795 (31-5/16)		
	Width (I/D / O/D)	mm (inch)	1070 (42-5/32) / 875 (34-15/32)		
	Depth (I/D / O/D)	mm (inch)	240 (9-15/32) / 320 (12-5/8)		
Weight	Net (I/D / O/D)	kg (lb)	12 (26) / 56 (123)		
Piping	Pipe Diameter (Liquid / Gas)	mm (inch)	6.35 (1/4) / 15.88 (5/8)		
	Standard length	m (ft)	5.0 (16.4)		
	Length range (min – max)	m (ft)	3 (9.8) ~ 30 (98.4)		
	I/D & O/D Height different	m (ft)	20 (65.6)		
	Additional Gas Amount	g/m (oz/ft)	30 (0.3)		
	Length for Additional Gas	m (ft)	10 (32.8)		
Drain Hose	Inner Diameter	mm	16.7		
	Length	mm	650		
Indoor Heat Exchanger	Fin Material		Aluminium (Pre coat)		
	Fin Type		Slit Fin		
	Row × Stage × FPI		2 × 15 × 21		
	Size (W × H × L)	mm	810 × 315 × 25.4		
Outdoor Heat Exchanger	Fin Material		Aluminium (Blue coated)		
	Fin Type		Slit Fin		
	Row × Stage × FPI		2 × 36 × 17		
	Size (W × H × L)	mm	25.4 × 756 × 905.9:885.9		
Air Filter	Material		Polypropelene		
	Type		One-touch		
Power Supply		Outdoor		Outdoor	
Power Supply Cord	A	-		-	
Thermostat		-		-	
Protection Device		-		-	
		DRY BULB	WET BULB	DRY BULB	WET BULB
Indoor Operation Range	Maximum	32	23	32	23
	Minimum	16	11	16	11
Outdoor Operation Range	Maximum	46	26	46	26
	Minimum	5	4	16	11

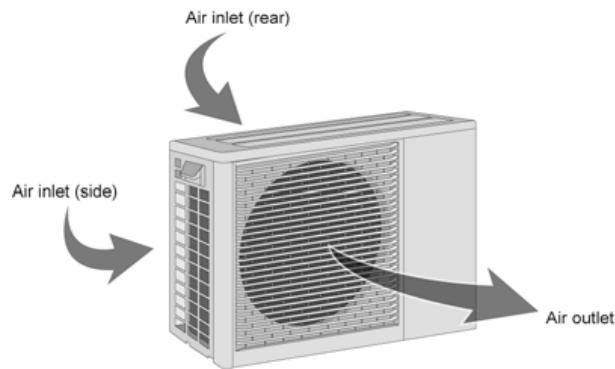
1. Cooling capacities are based on indoor temperature of 27°C DRY BULB (80.6°F DRY BULB), 19.0°C WET BULB (66°F WET BULB) and outdoor air temperature of 35°C DRY BULB (95°F DRY BULB), 24°C WET BULB (75.2°F WET BULB).

### 3. Location of Controls and Components

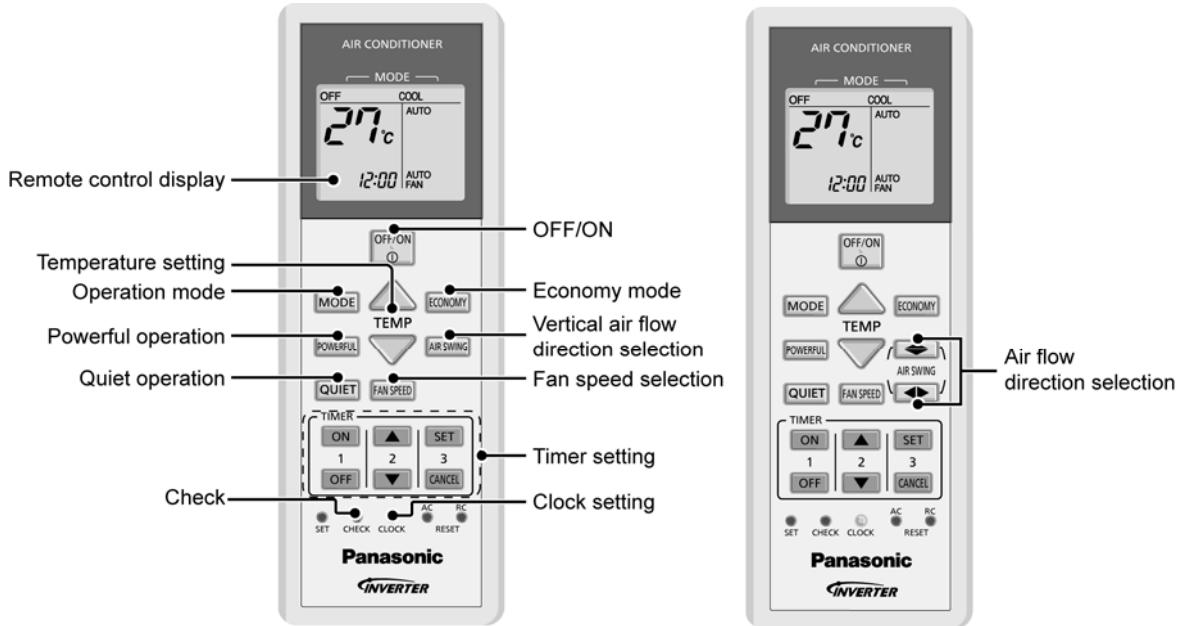
#### 3.1 Indoor Unit



#### 3.2 Outdoor Unit



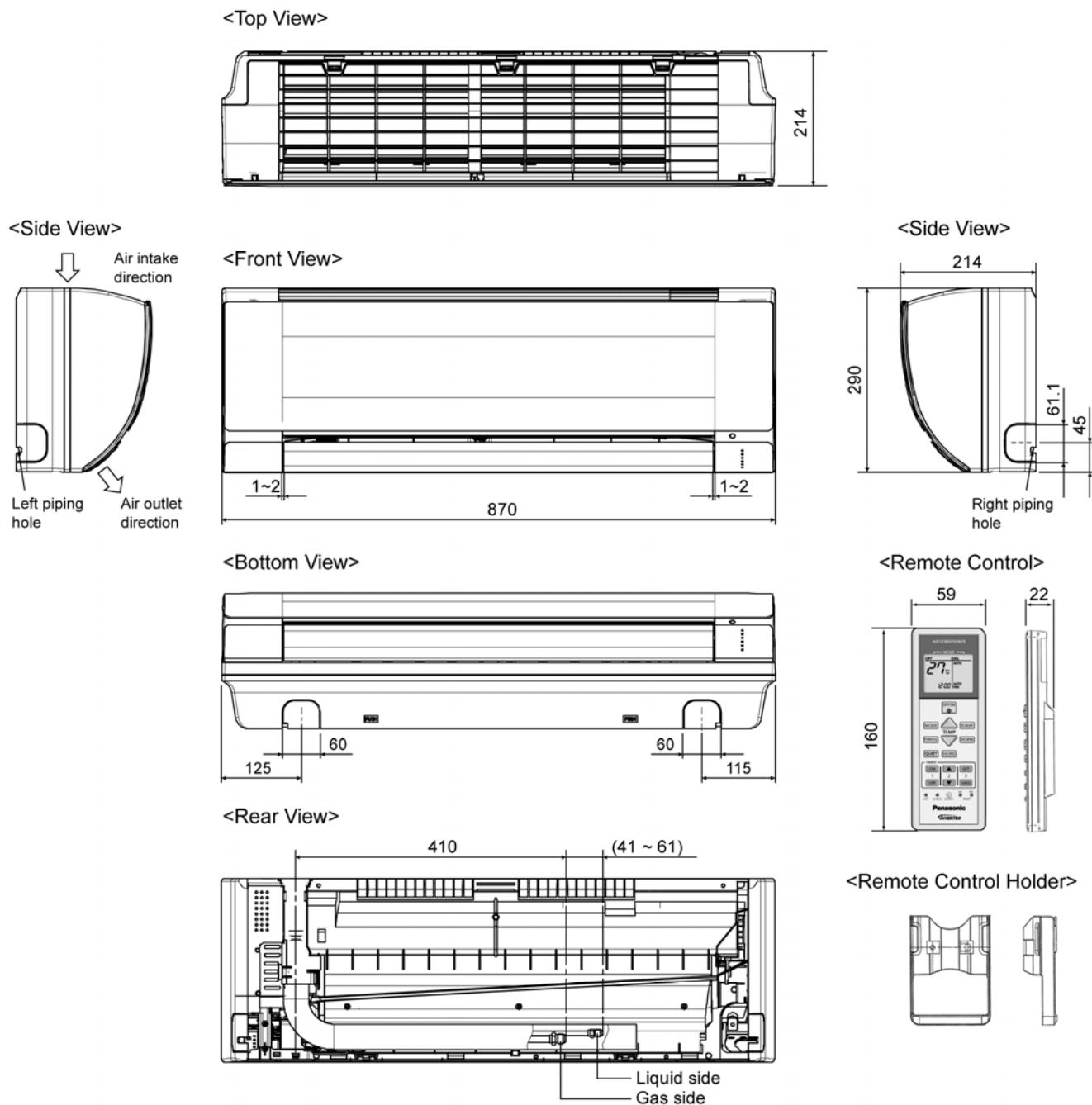
#### 3.3 Remote Control



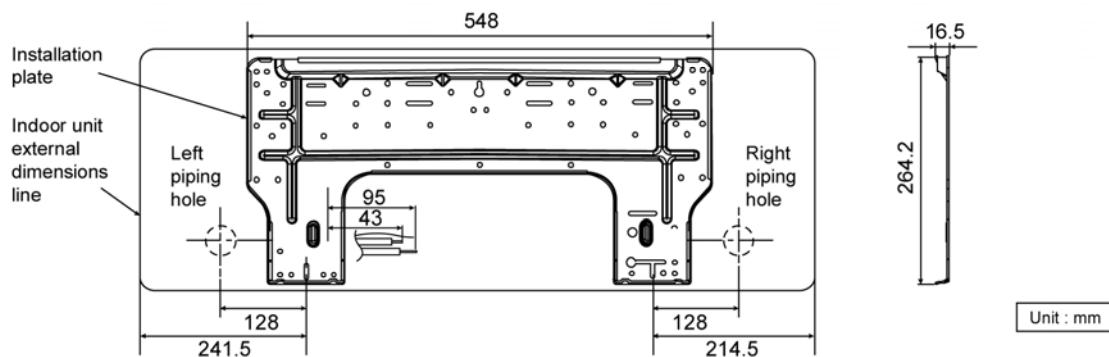
## 4. Dimensions

### 4.1 Indoor Unit

#### 4.1.1 CS-S9NKR CS-S12NKR

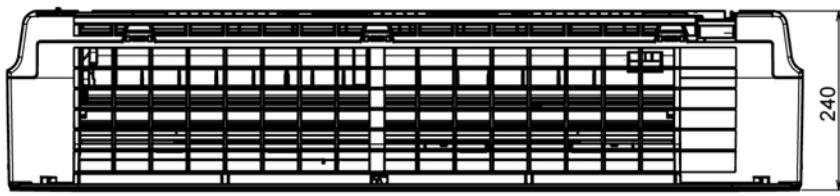


Relative position between the indoor unit and the installation plate <Front View>

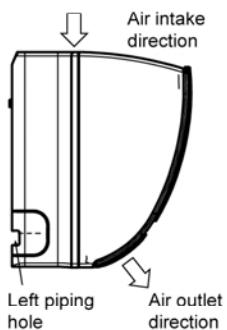


#### 4.1.2 CS-S18NKR CS-S24NKR CS-S28NKR

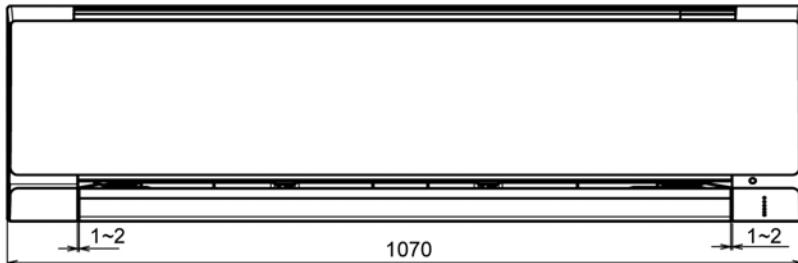
<Top View>



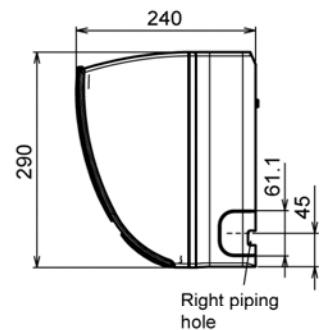
<Side View>



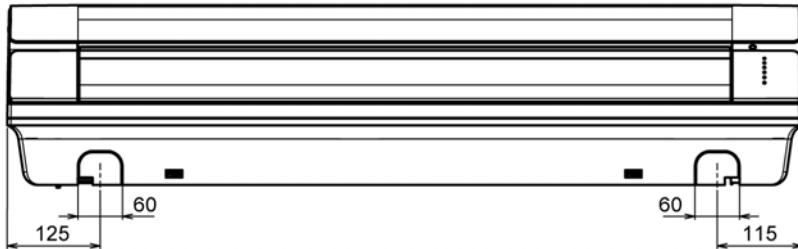
<Front View>



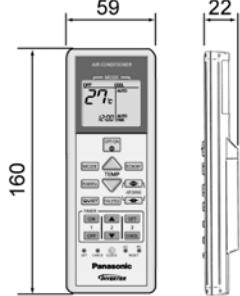
<Side View>



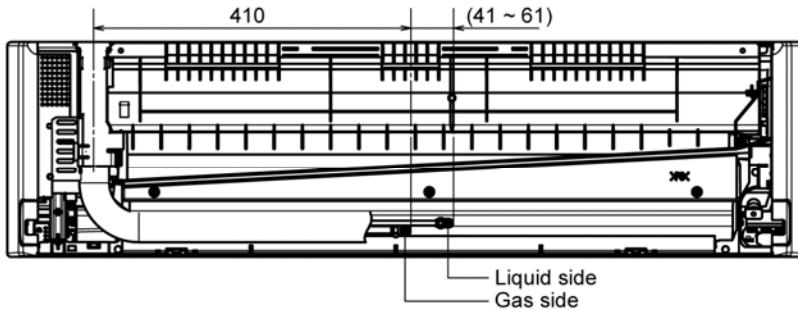
<Bottom View>



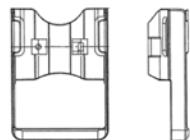
<Remote Control>



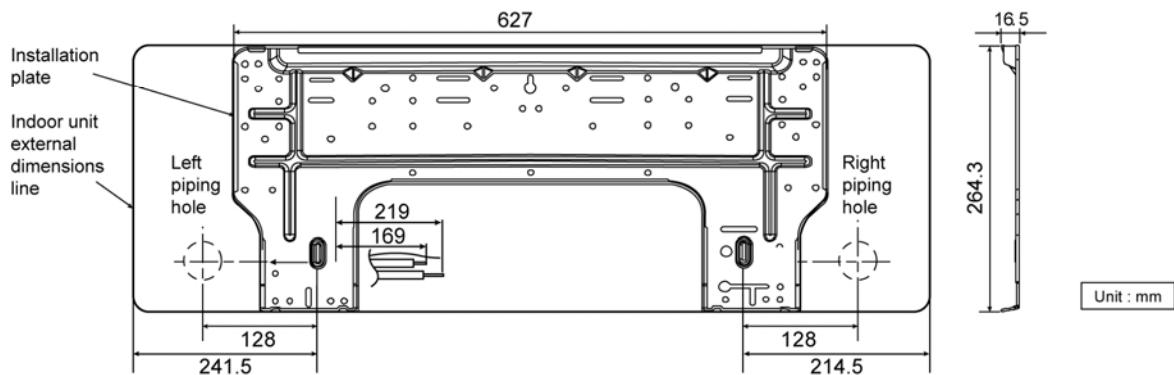
<Rear View>



<Remote Control Holder>

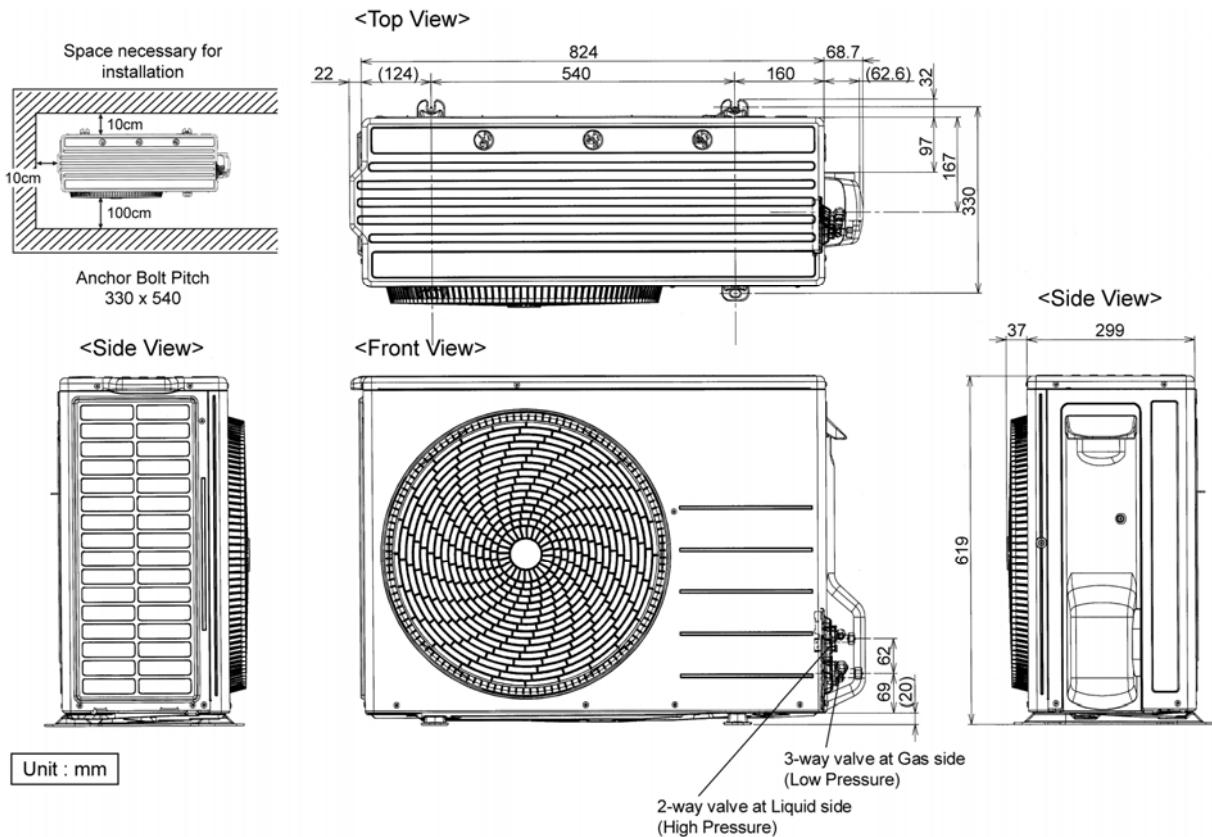


Relative position between the indoor unit and the installation plate <Front View>

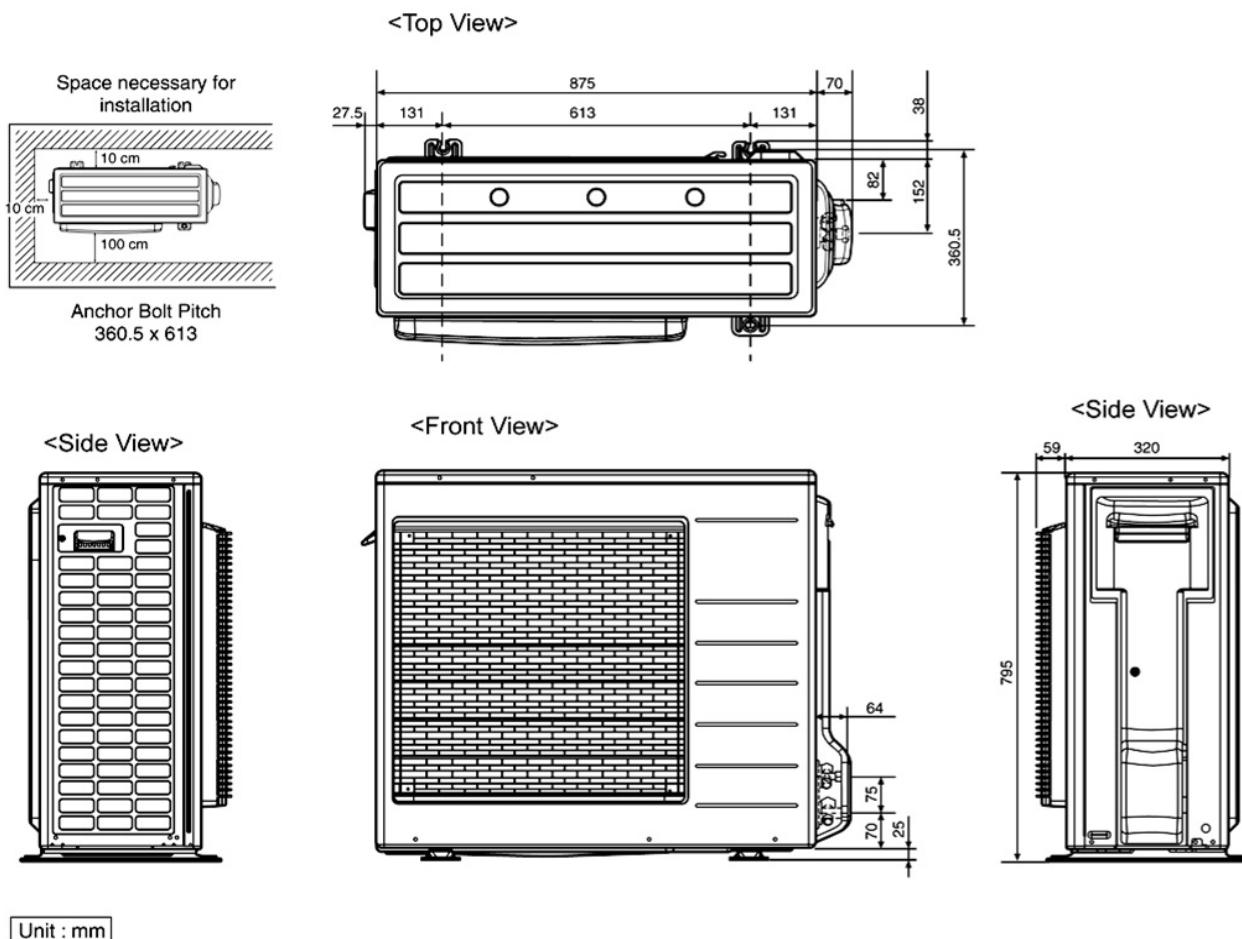


## 4.2 Outdoor Unit

### 4.2.1 CU-S9NKR CU-S12NKR

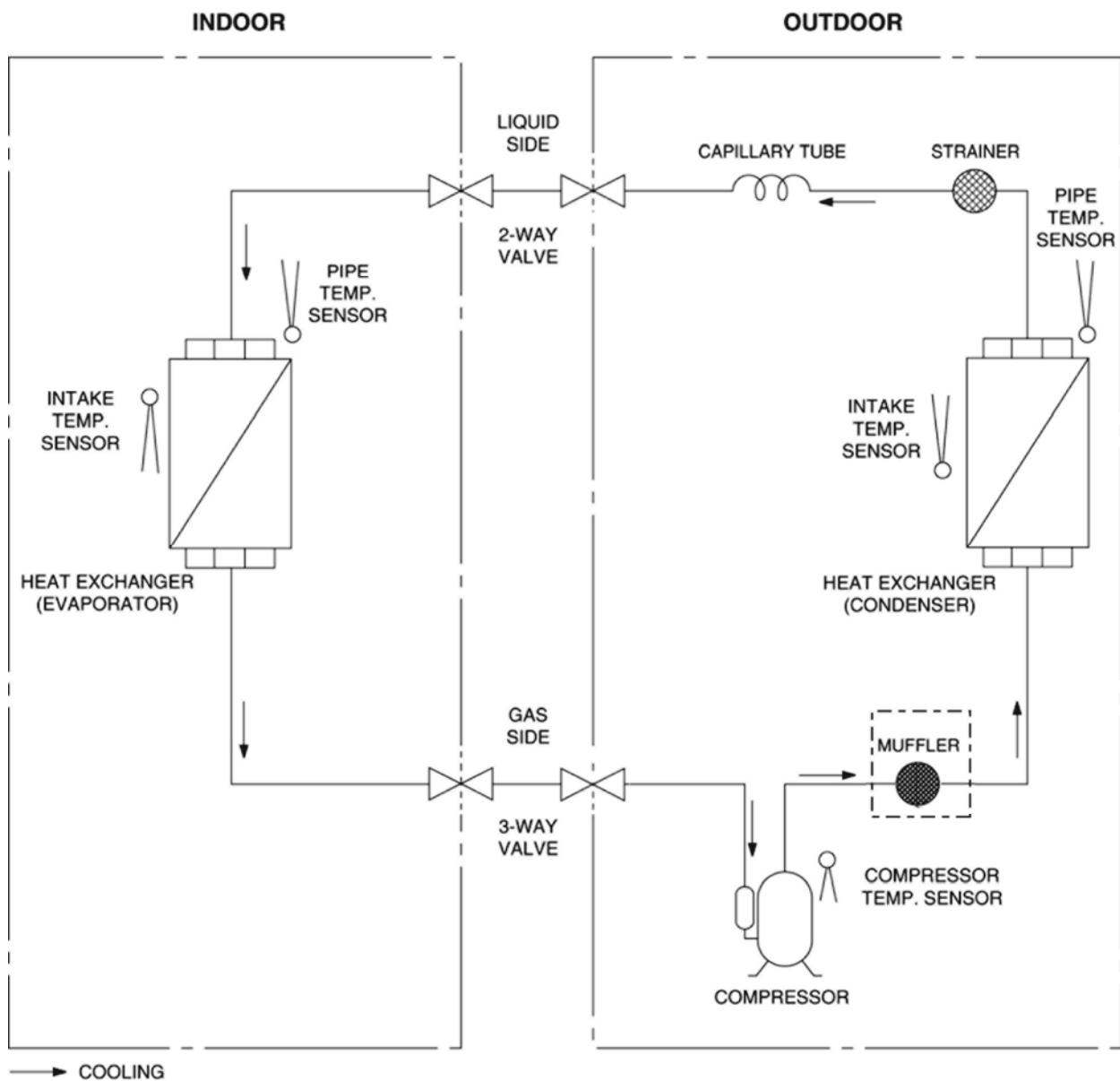


### 4.2.2 CU-S18NKR CU-S24NKR CU-S28NKR

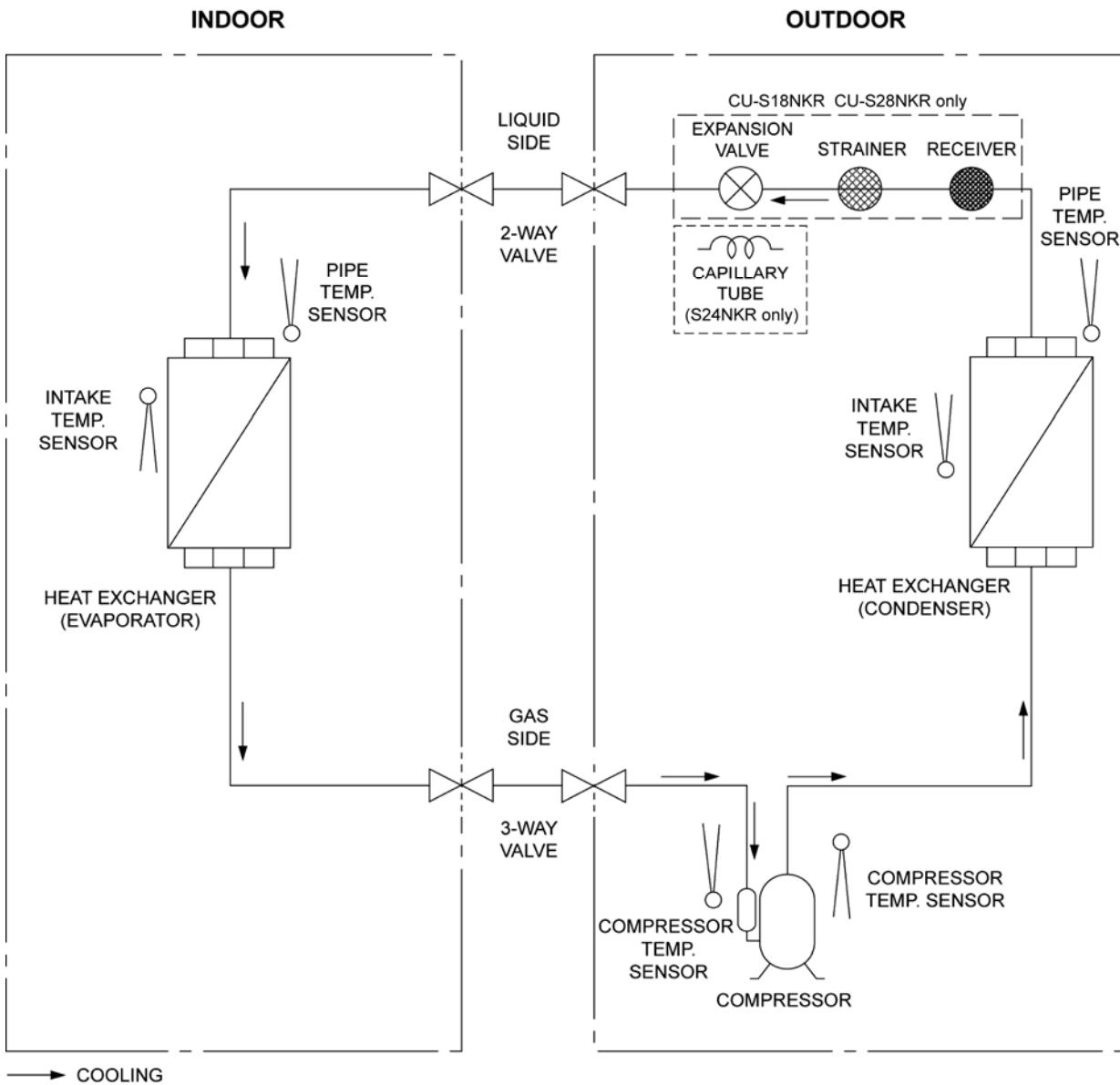


## 5. Refrigeration Cycle Diagram

### 5.1 CS-S9NKR CU-S9NKR CS-S12NKR CU-S12NKR

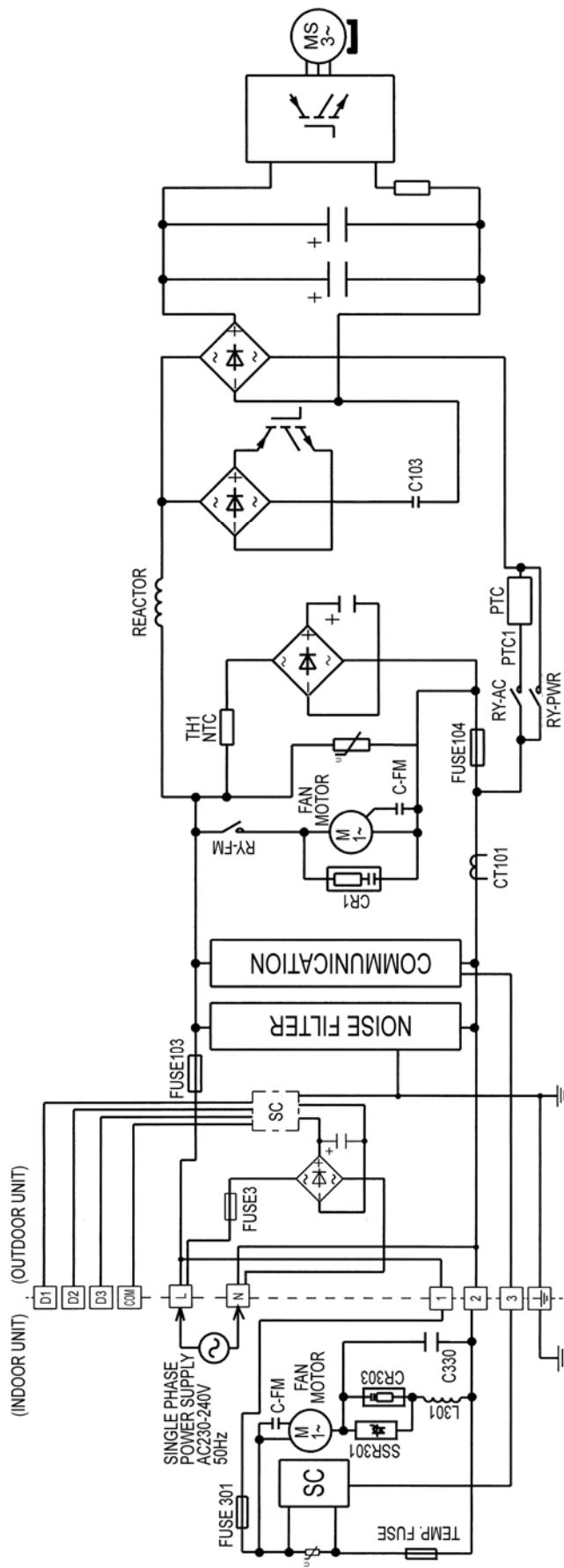


## 5.2 CS-S18NKR CU-S18NKR CS-S24NKR CU-S24NKR CS-S28NKR CU-S28NKR

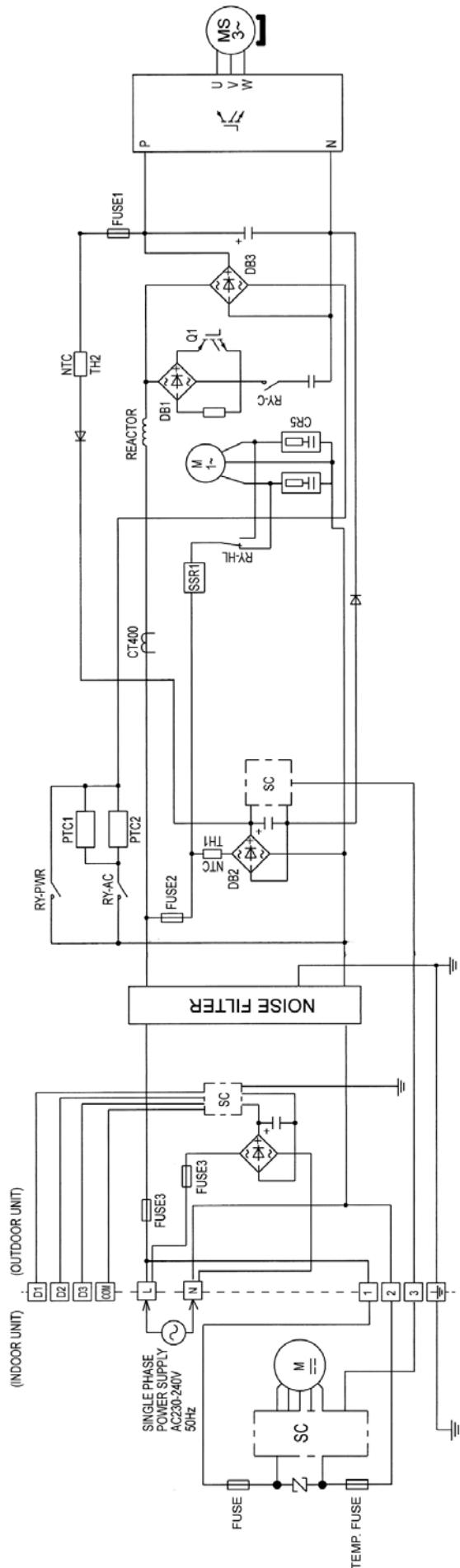


## 6. Block Diagram

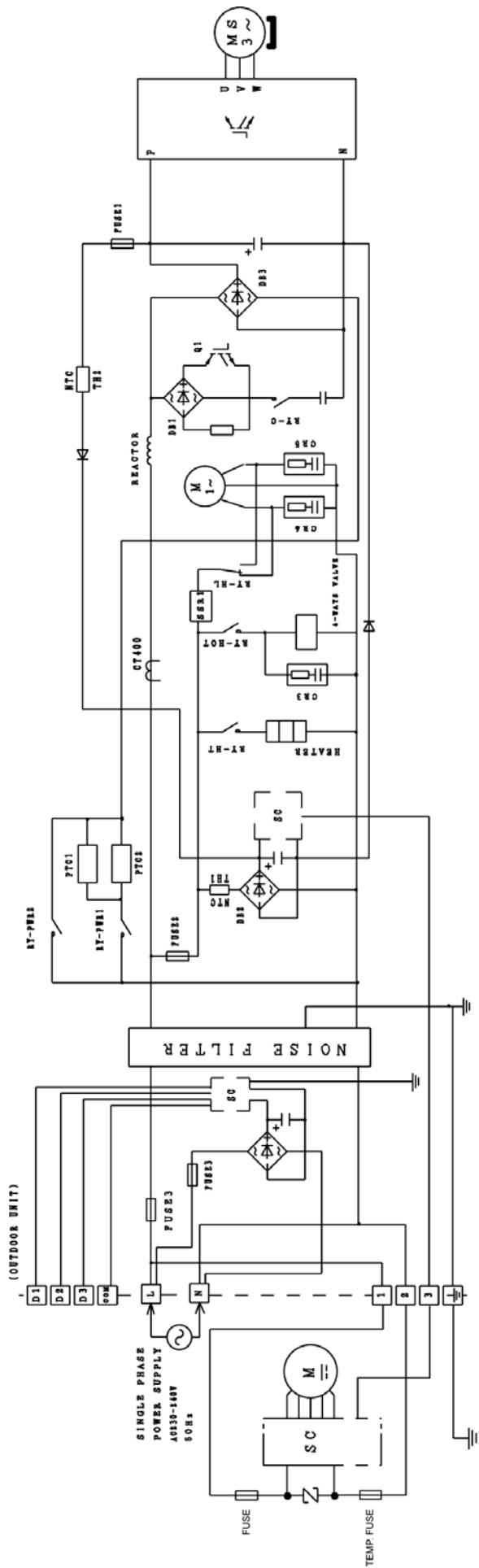
### 6.1 CS-S9NKR CU-S9NKR CS-S12NKR CU-S12NKR



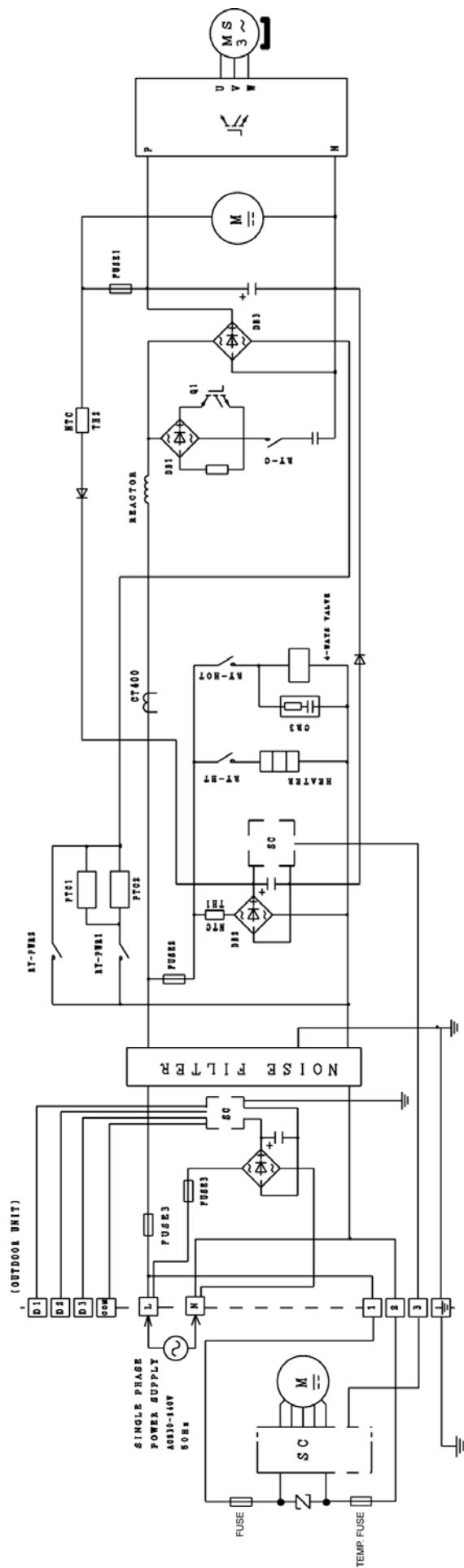
## 6.2 CS-S18NKR CU-S18NKR



## **6.3 CS-S24NKR CU-S24NKR**



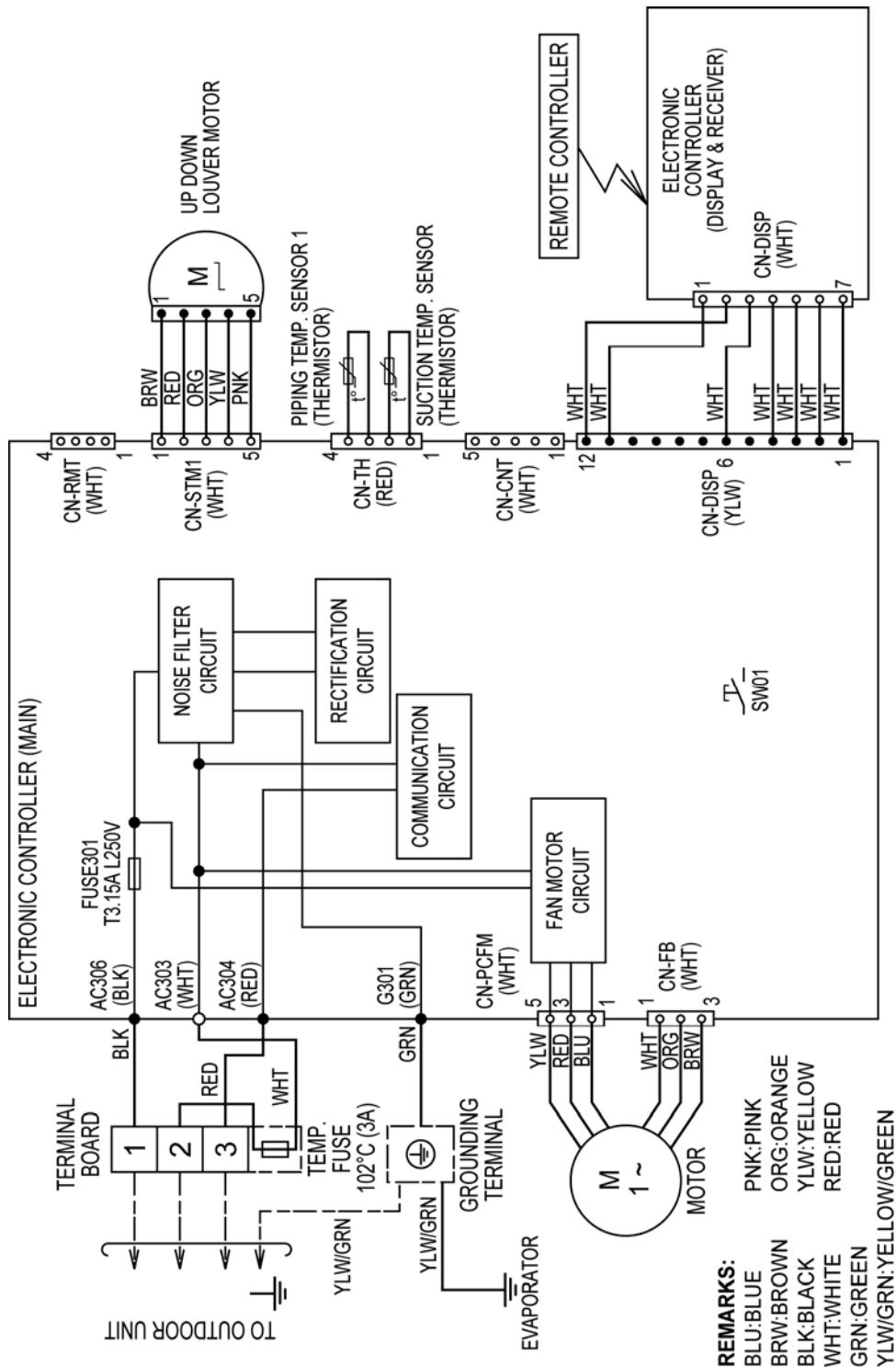
## 6.4 CS-S28NKR CU-S28NKR



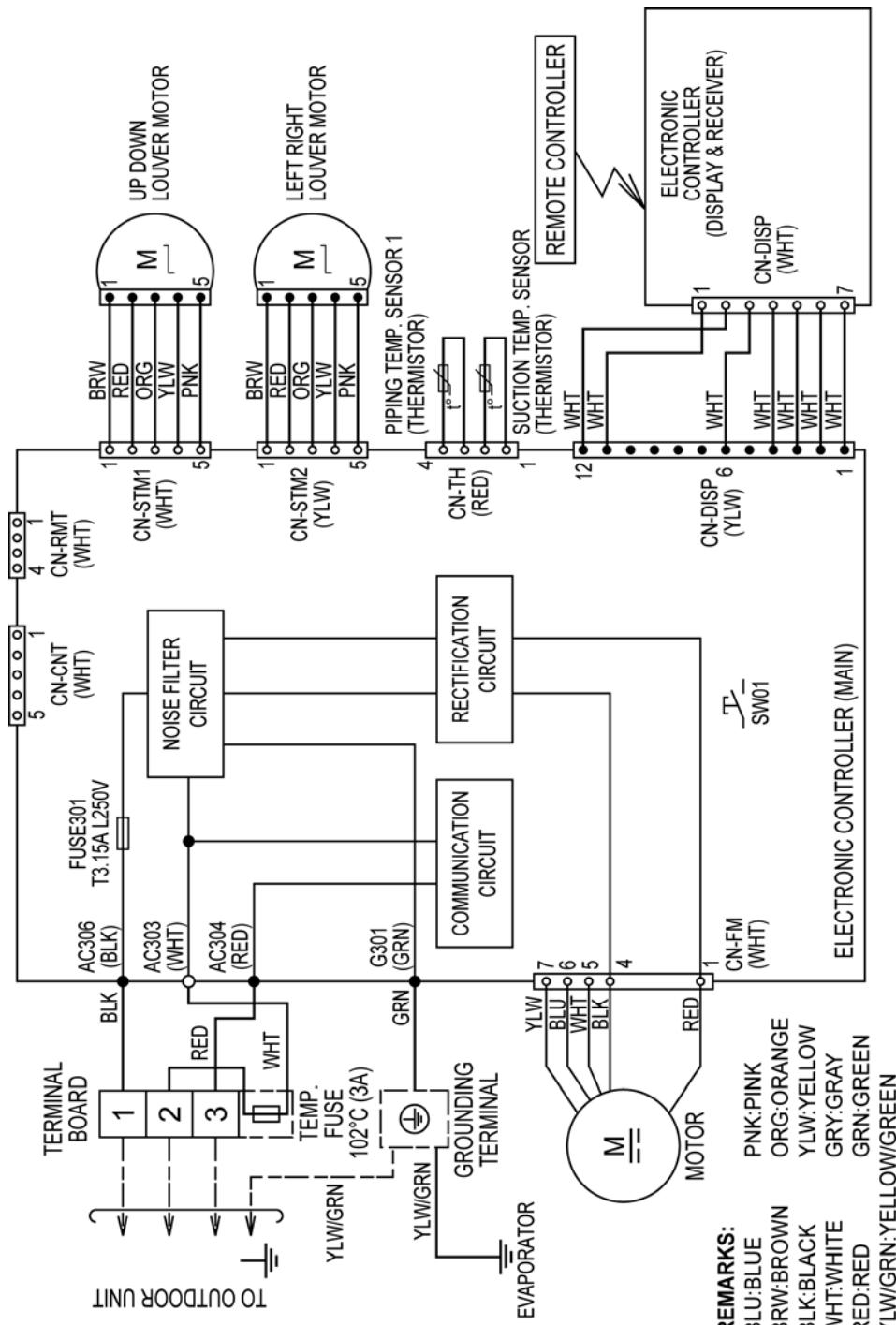
## 7. Wiring Connection Diagram

### 7.1 Indoor Unit

#### 7.1.1 CS-S9NKR CS-S12NKR

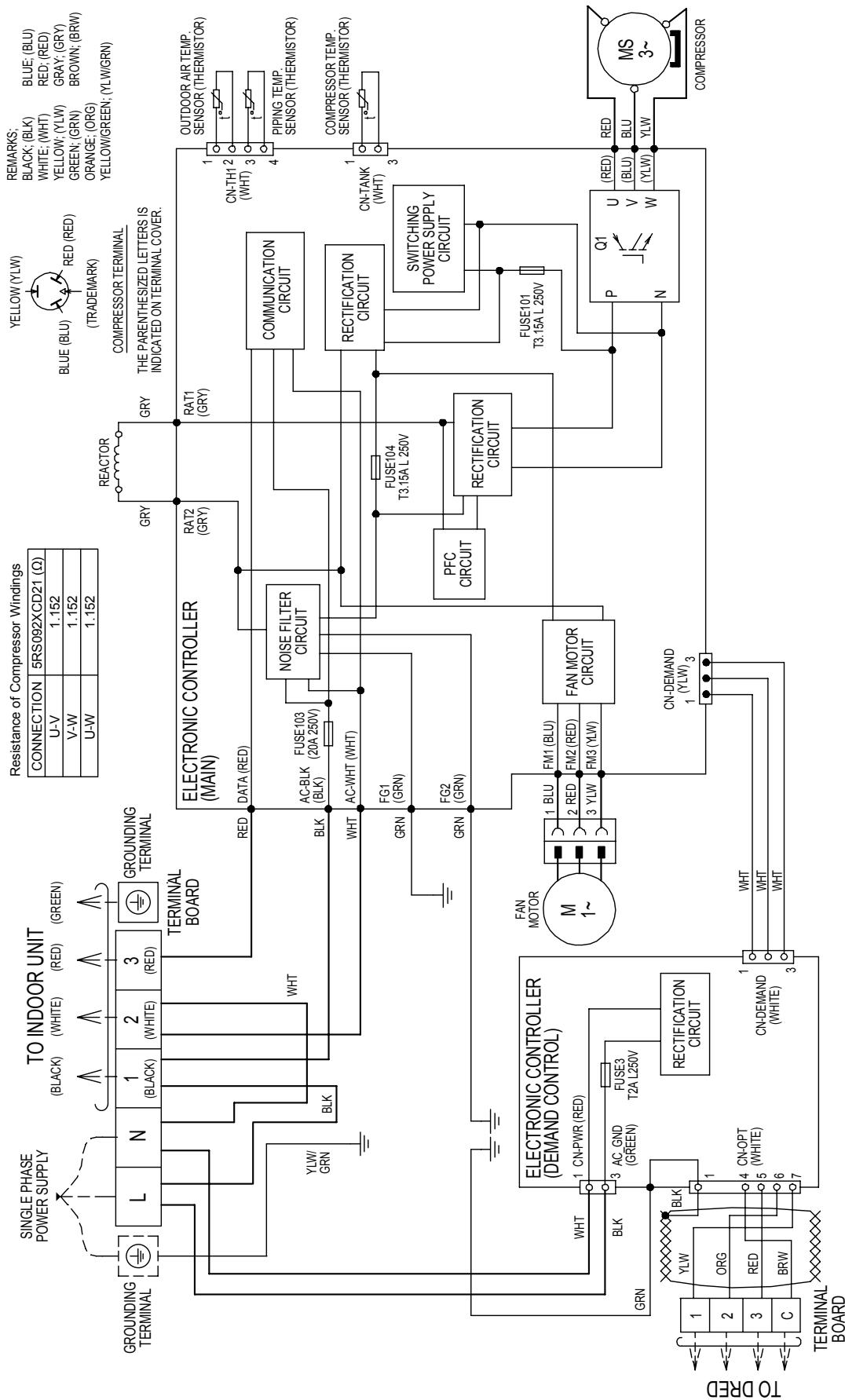


## 7.1.2 CS-S18NKR CS-S24NKR CS-S28NKR

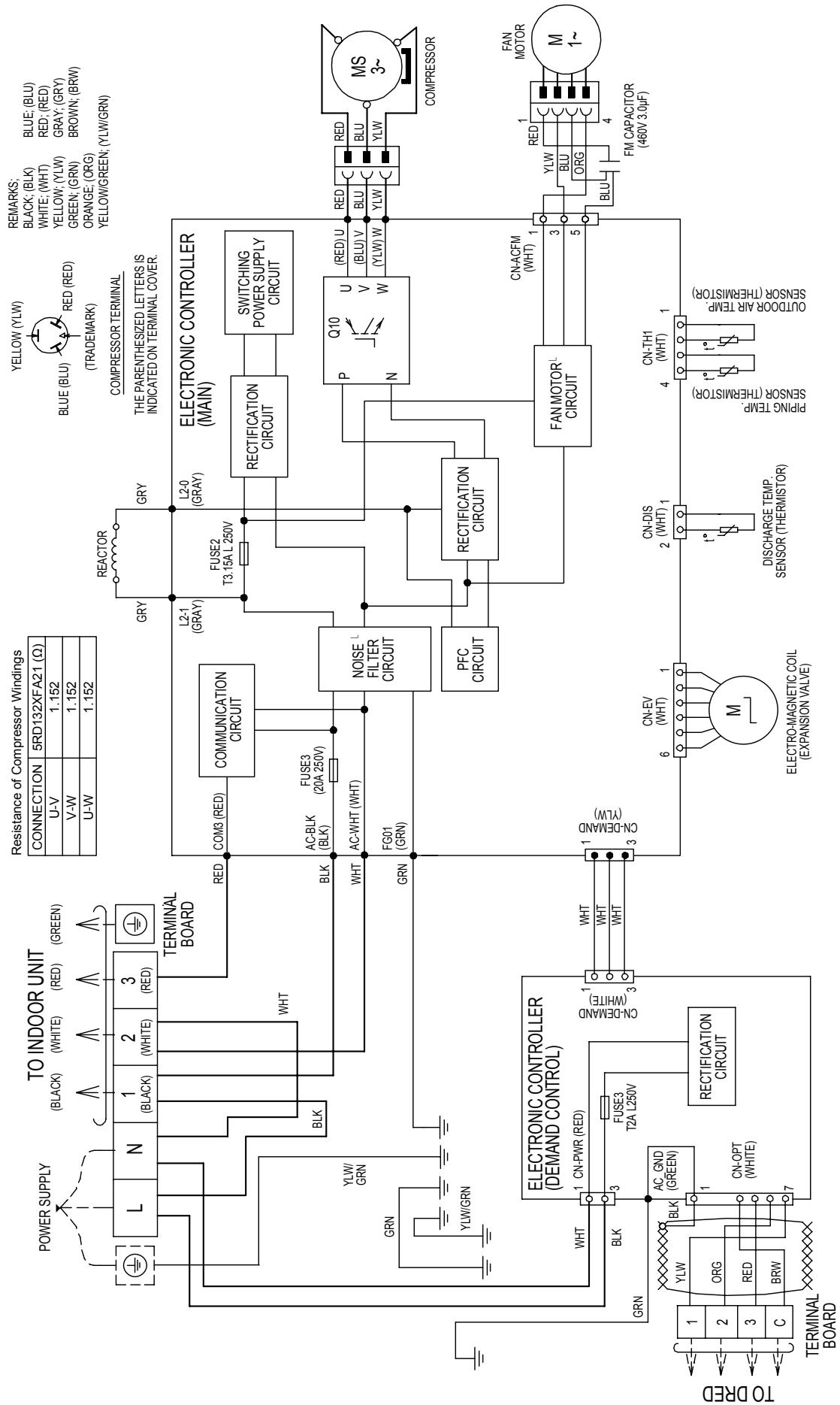


## **7.2 *Outdoor Unit***

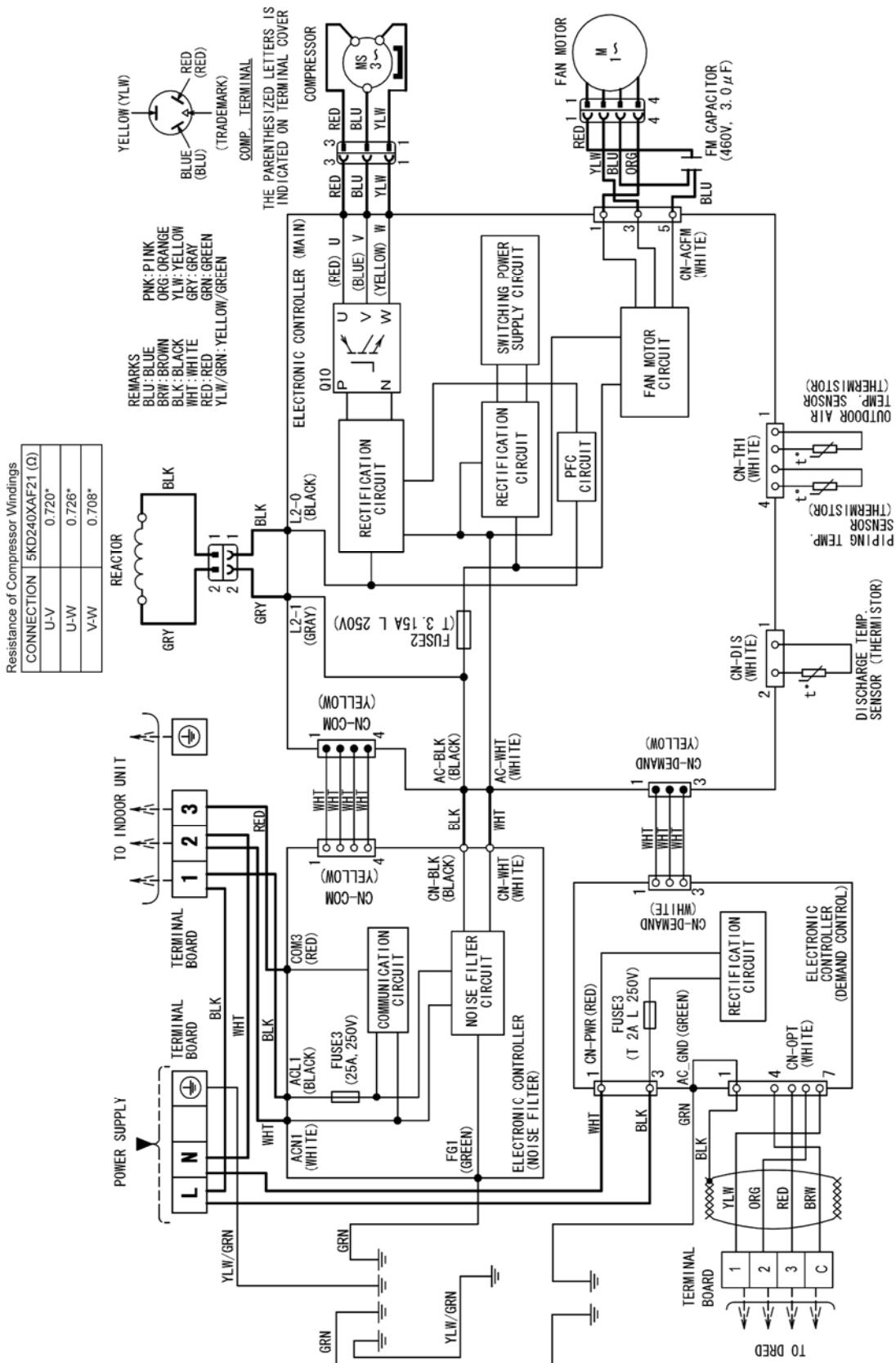
## 7.2.1 CU-S9NKR CU-S12NKR

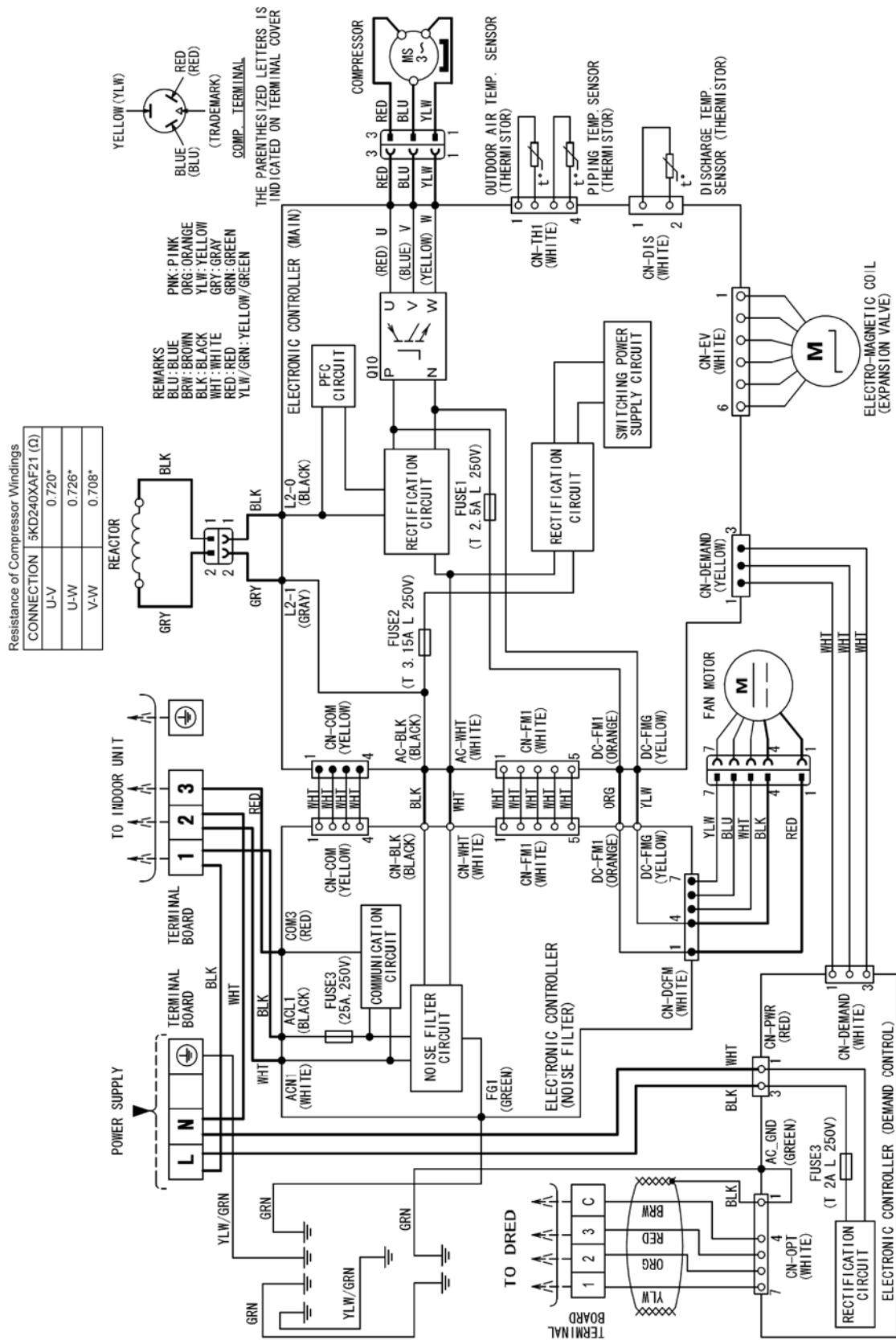


## 7.2.2 CU-S18NKR



### **7.2.3 CU-S24NKR**

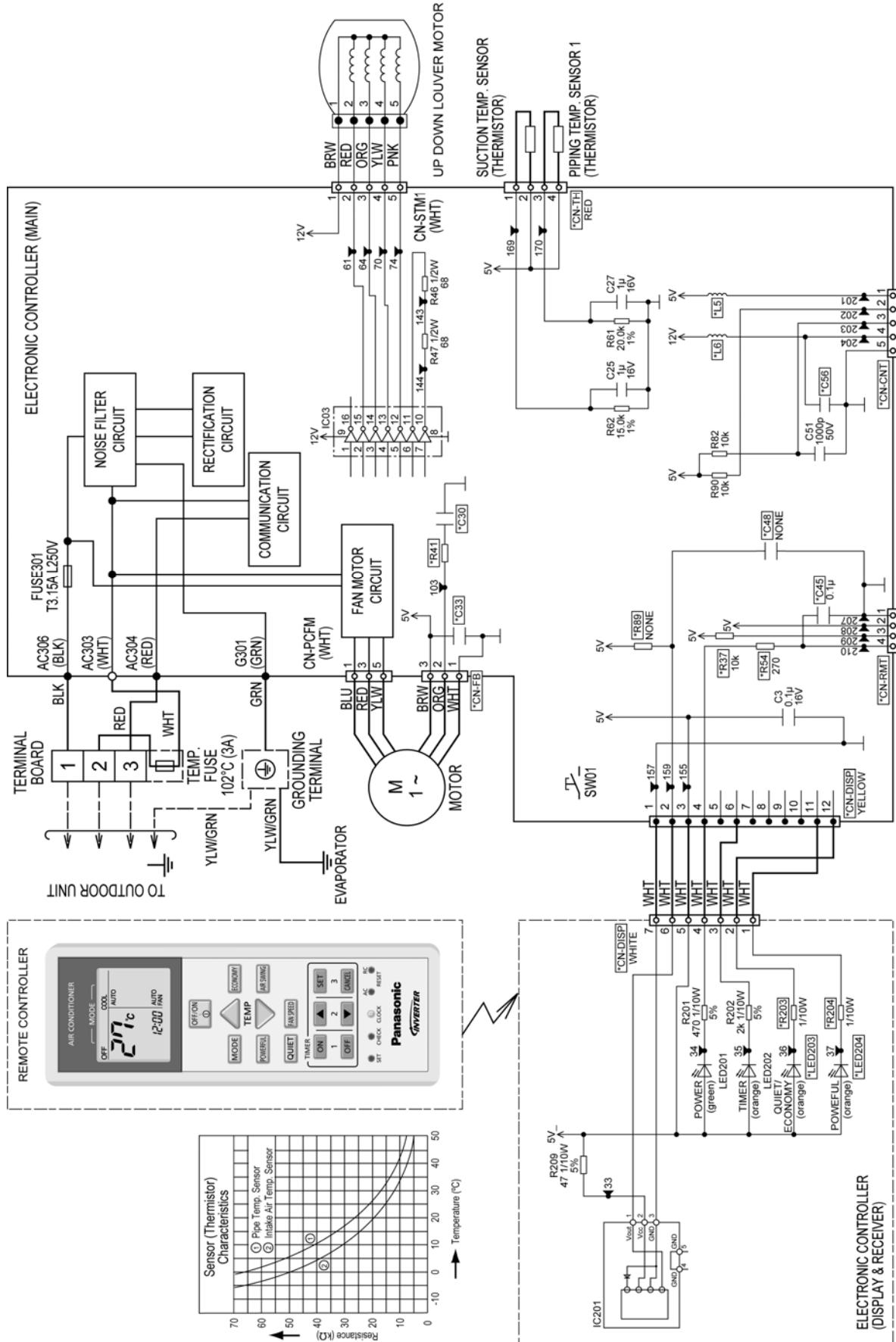




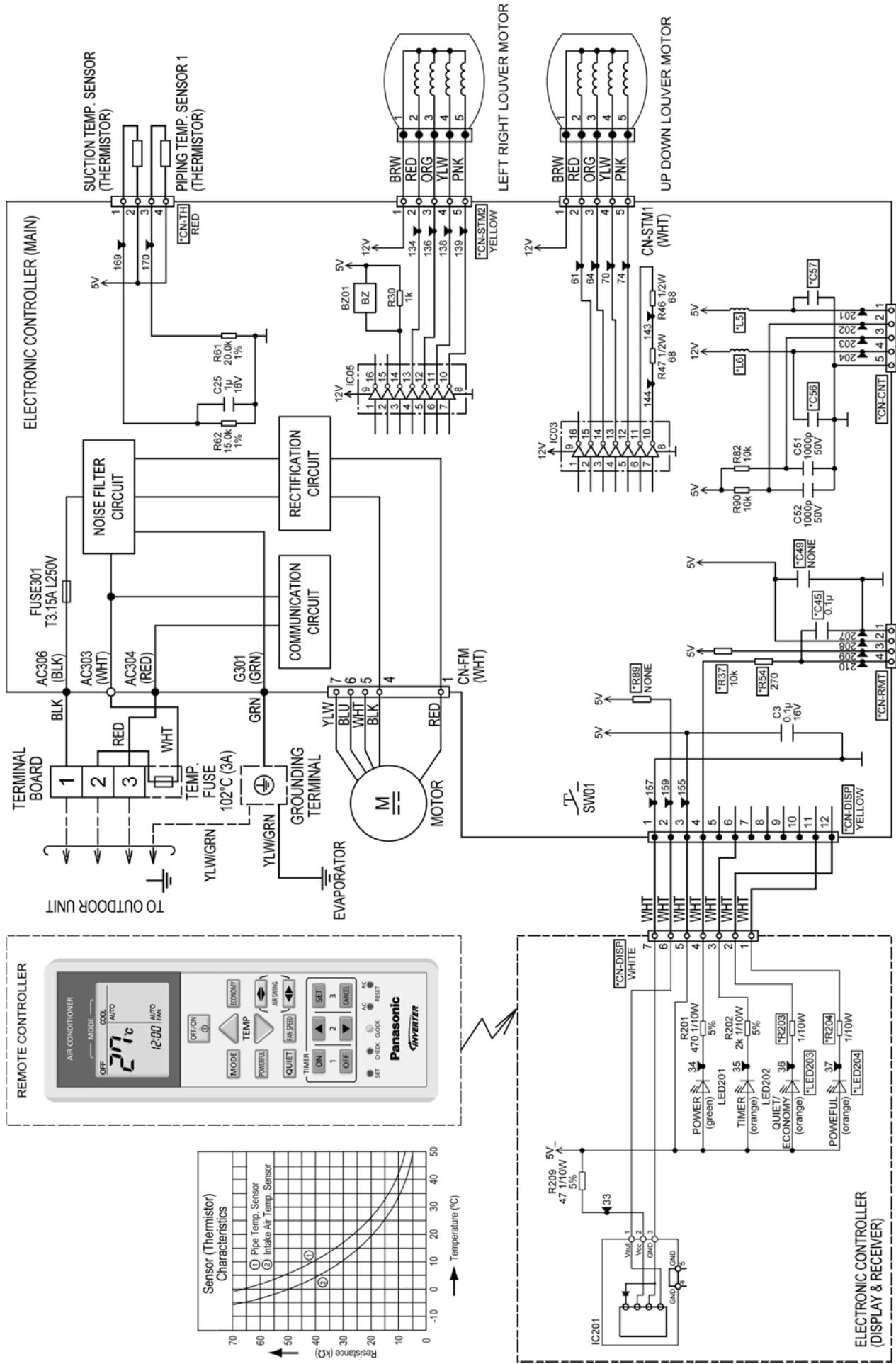
## 8. Electronic Circuit Diagram

### 8.1 Indoor Unit

#### 8.1.1 CS-S9NKR CS-S12NKR

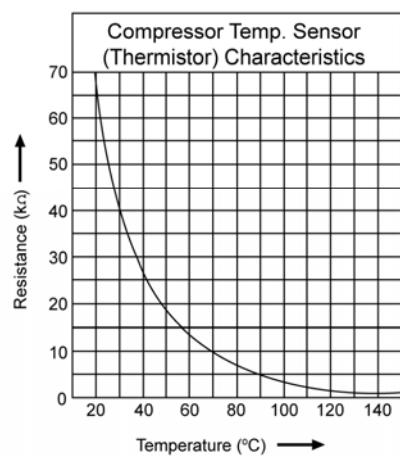
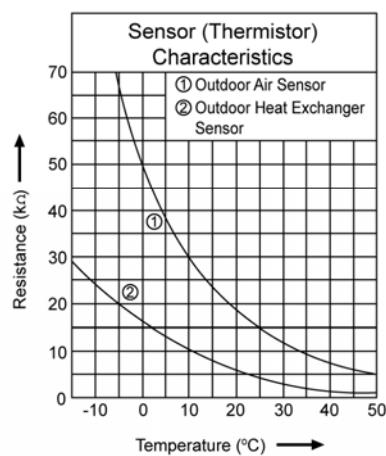
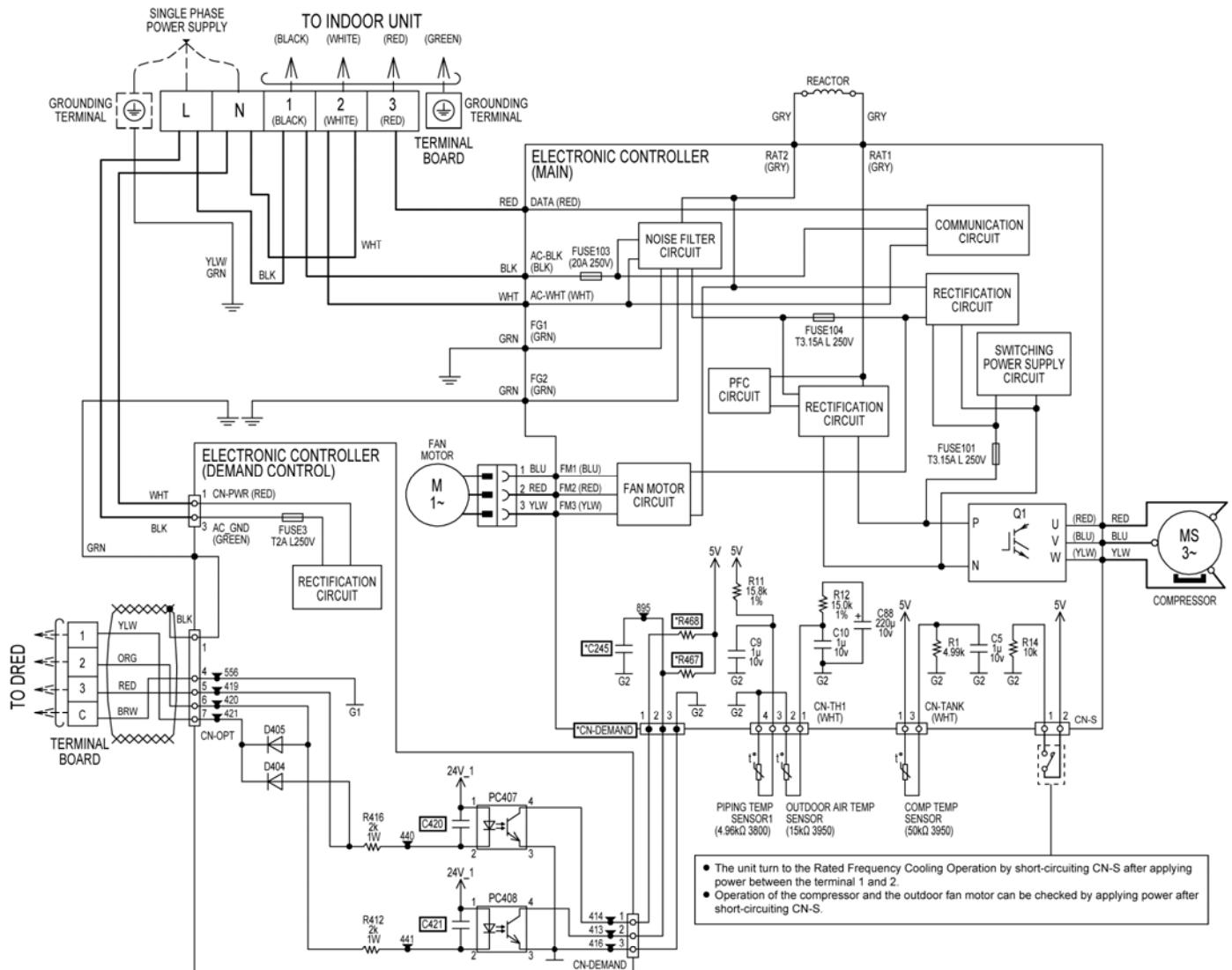


### **8.1.2 CS-S18NKR CS-S24NKR CS-S28NKR**

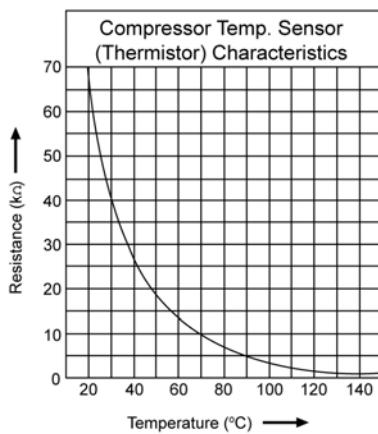
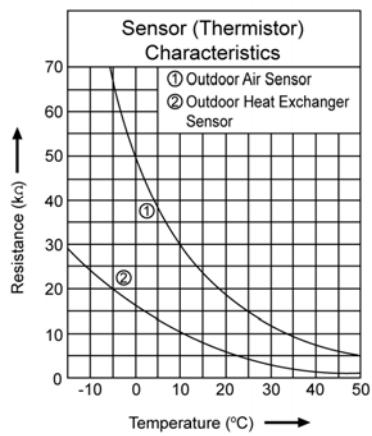
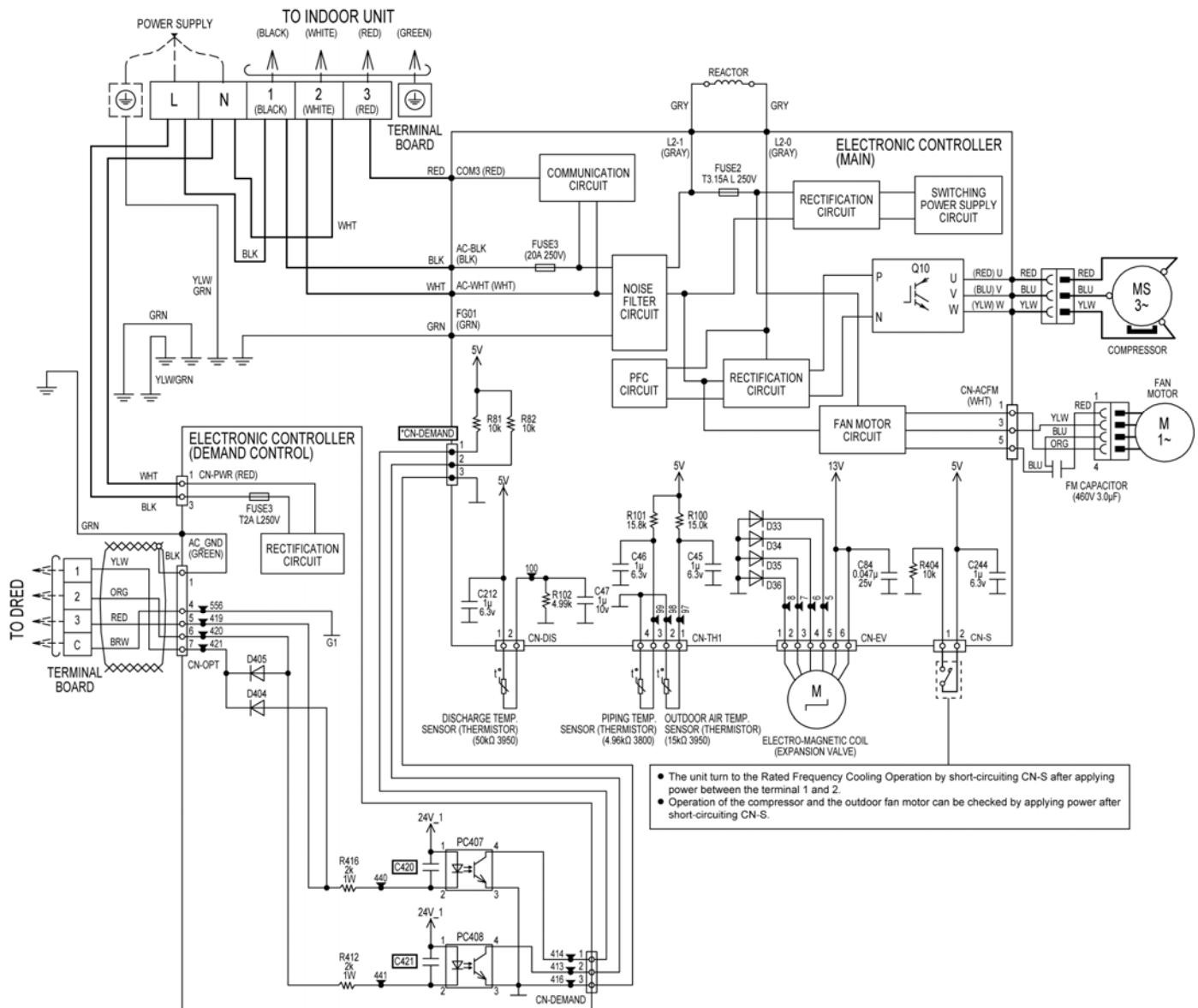


## **8.2 *Outdoor Unit***

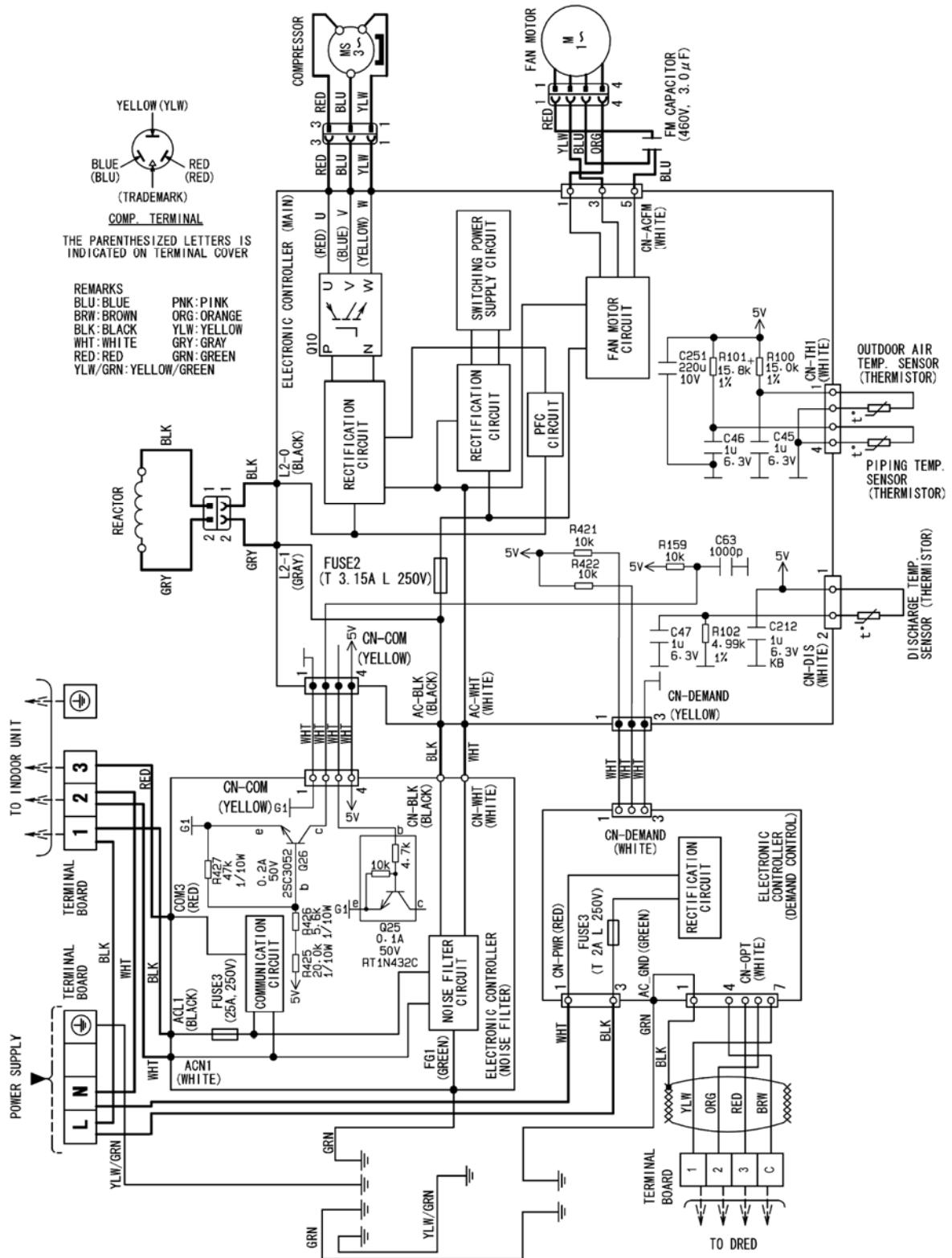
### **8.2.1 CU-S9NKR CU-S12NKR**



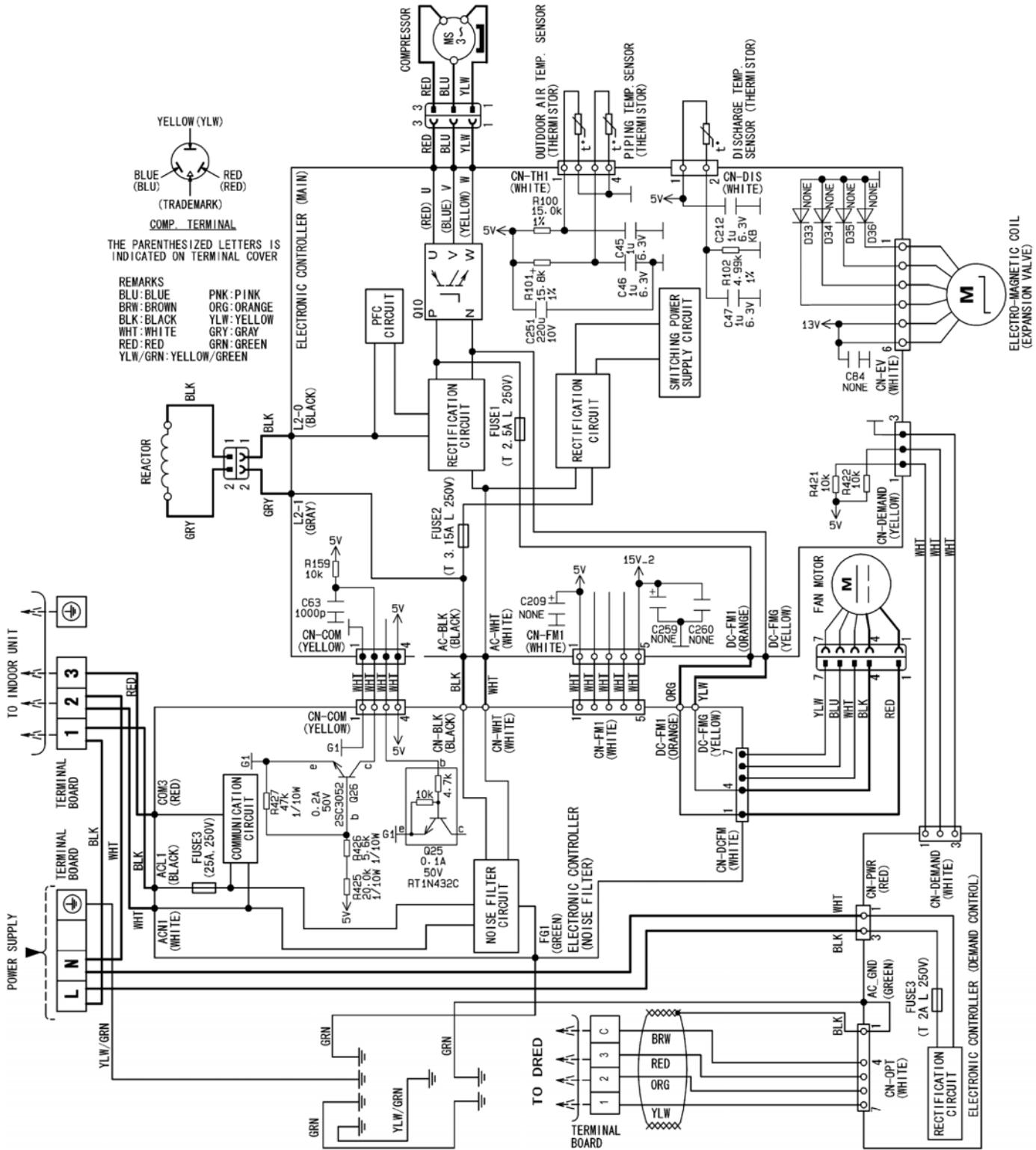
## 8.2.2 CU-S18NKR



### **8.2.3 CU-S24NKR**



## 8.2.4 CU-S28NKR

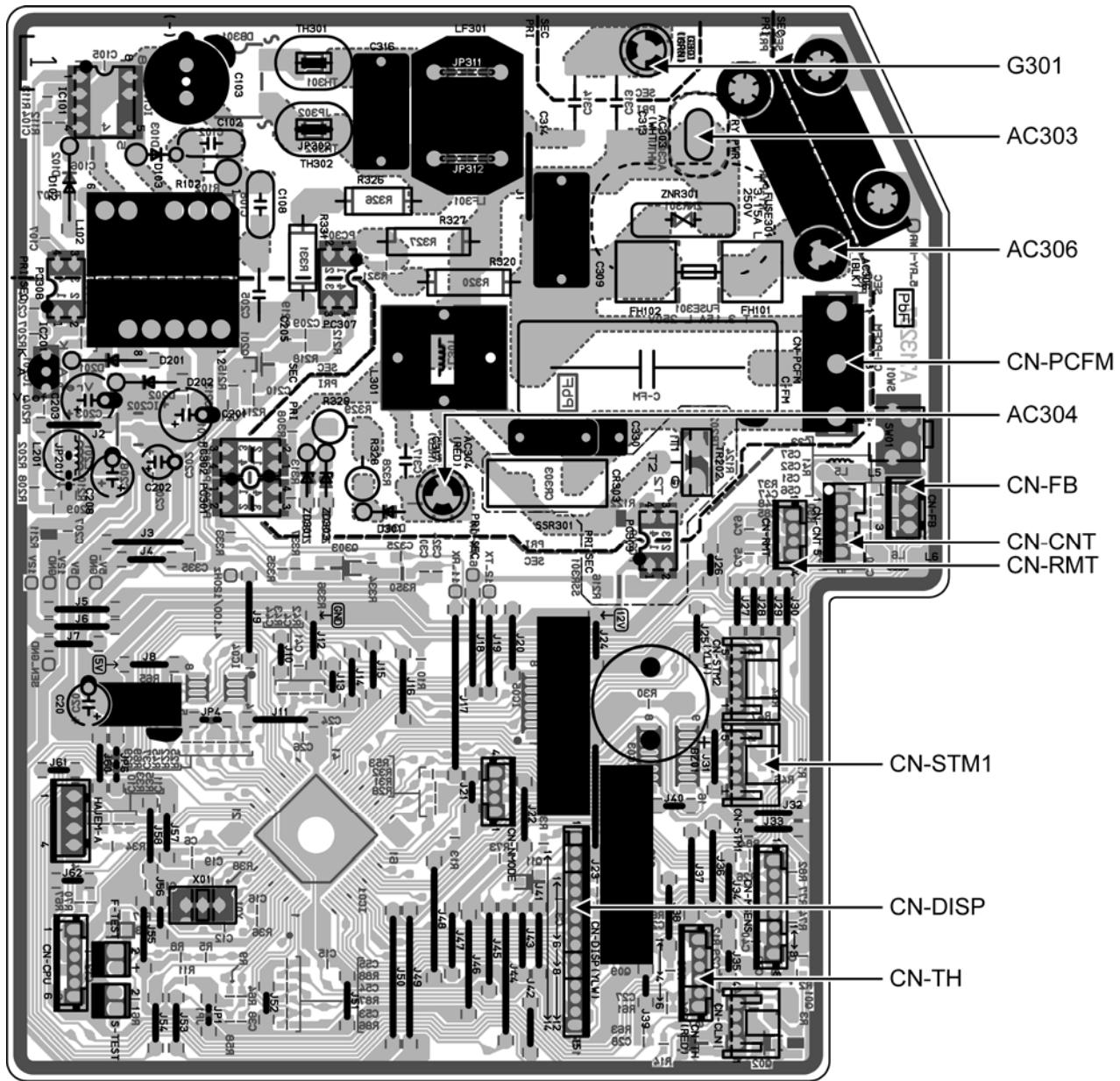


## **9. Printed Circuit Board**

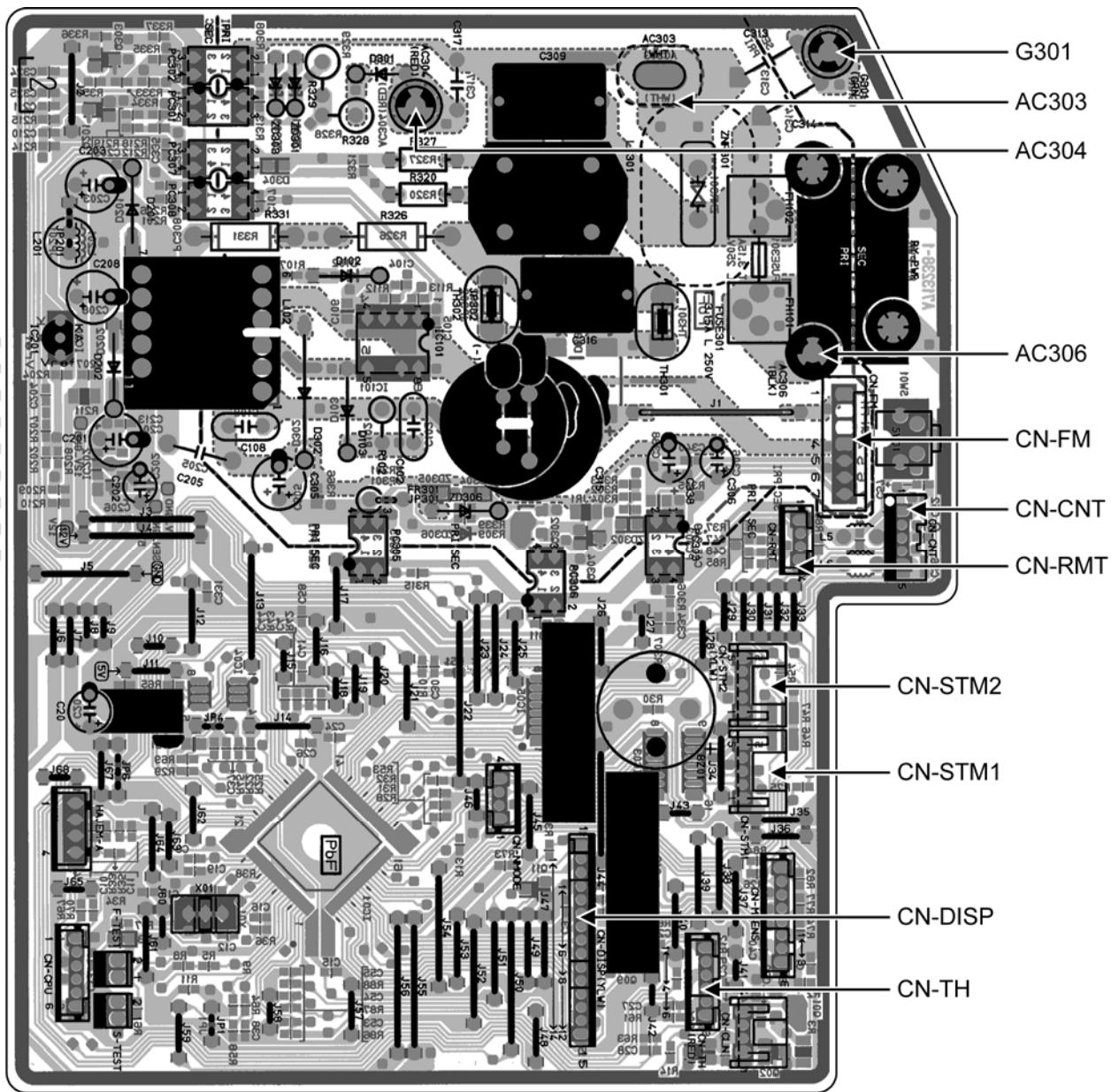
## **9.1 Indoor Unit**

### **9.1.1 Main Printed Circuit Board**

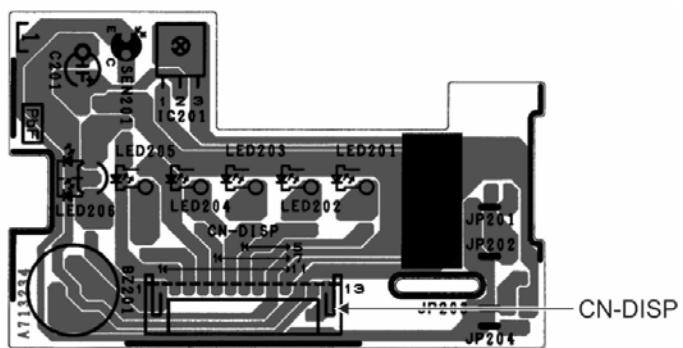
### **9.1.1.1 CS-S9NKR CS-S12NKR**



### 9.1.1.2 CS-S18NKR CS-S24NKR CS-S28NKR



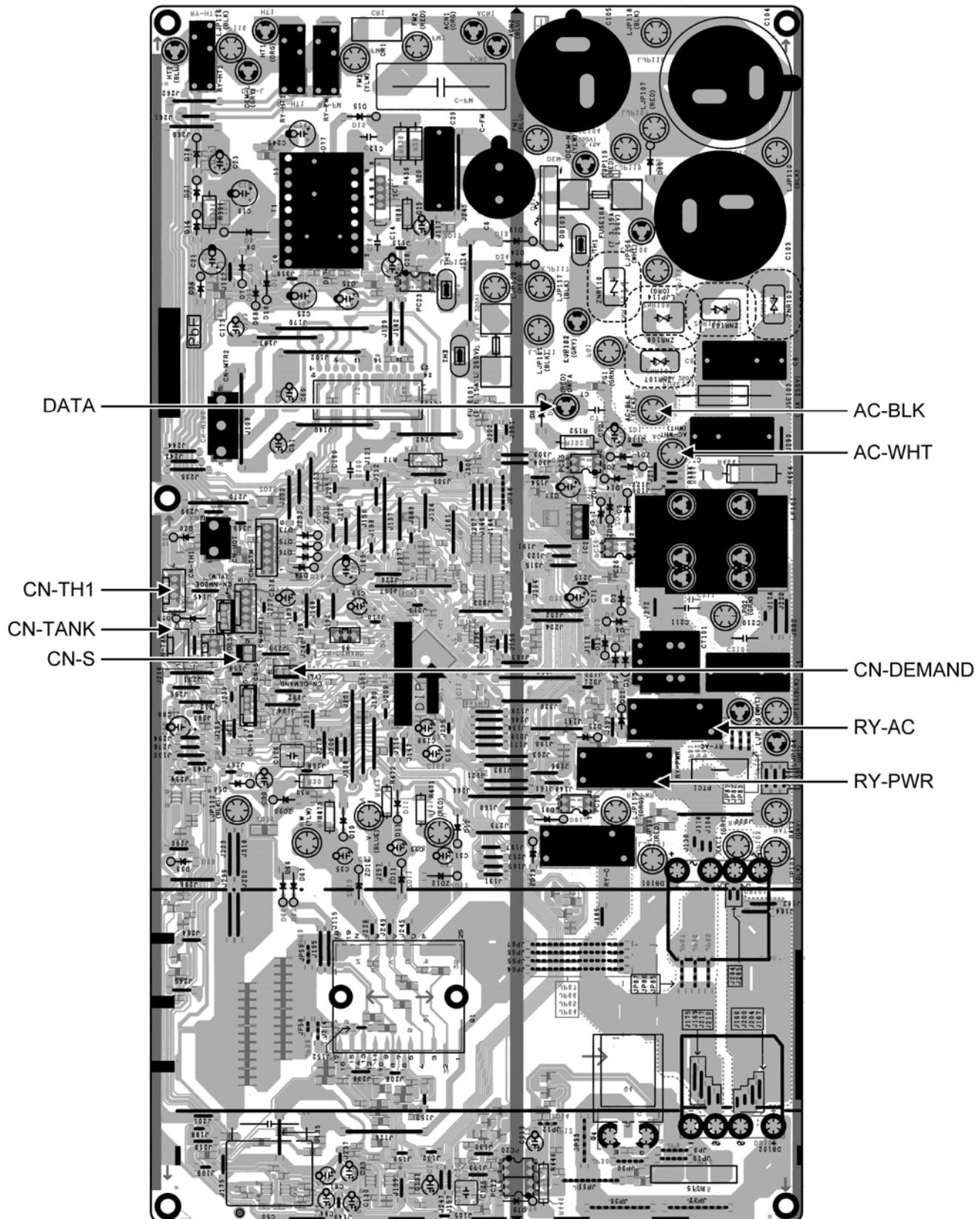
### 9.1.2 Indicator Printed Circuit Board

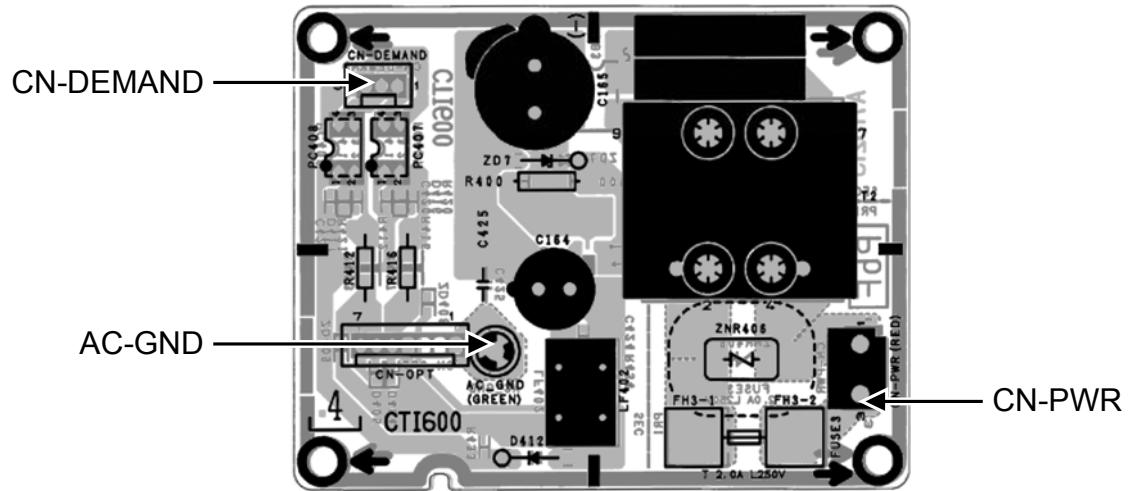


## 9.2 Outdoor Unit

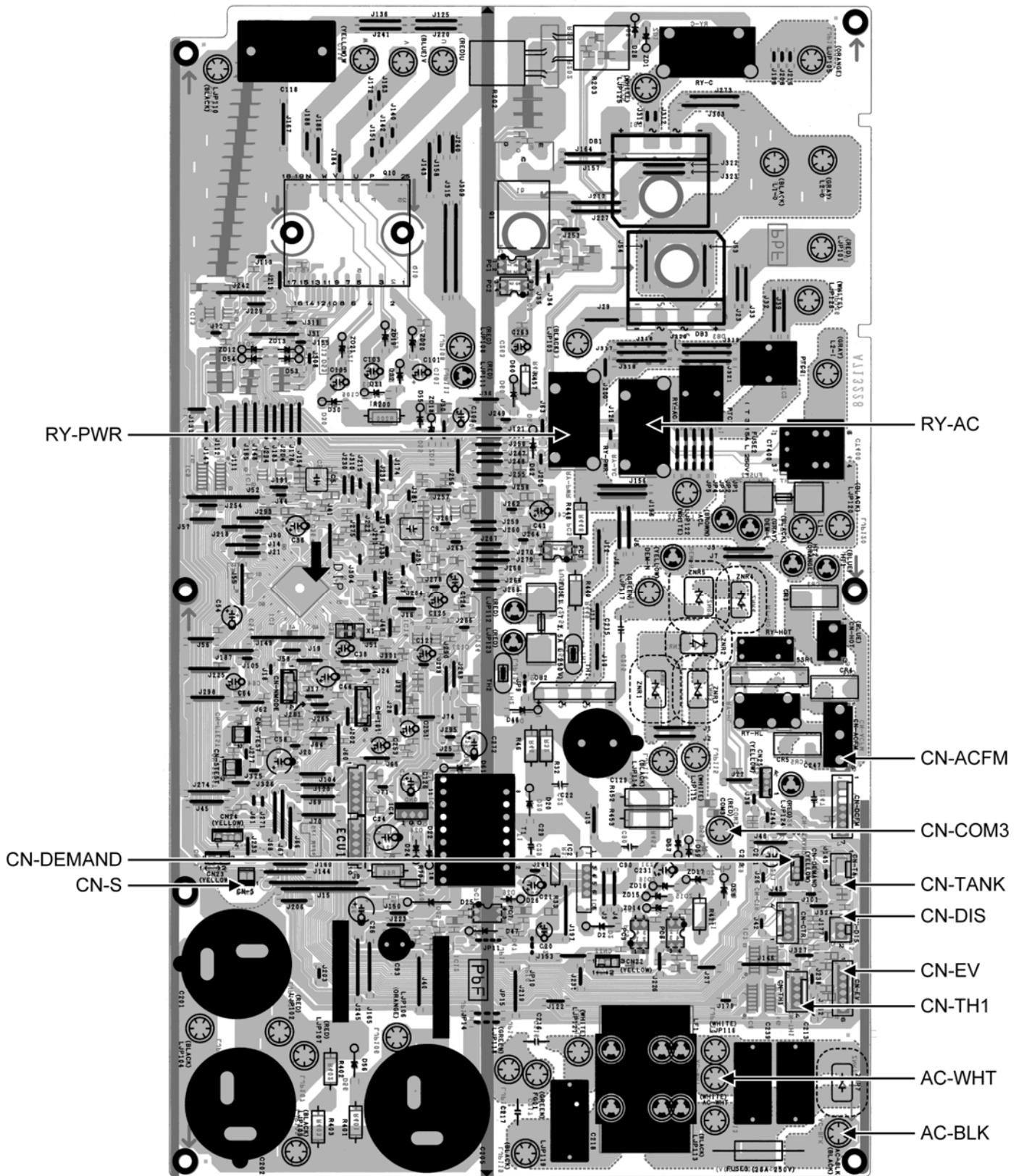
### 9.2.1 Main Printed Circuit Board

#### 9.2.1.1 CU-S9NKR CU-S12NKR

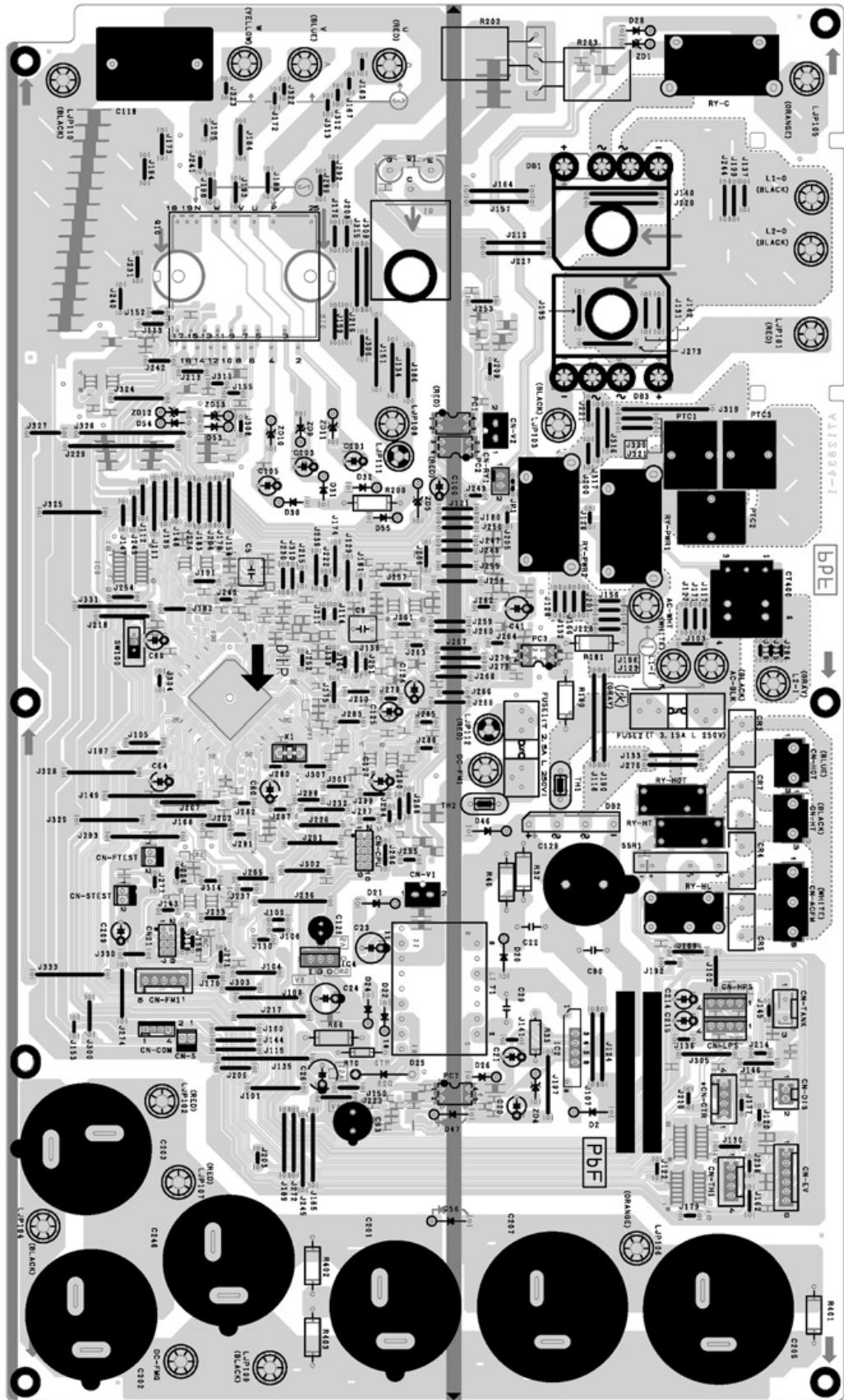




## 9.2.2 CU-S18NKR



### 9.2.3 CU-S24NKR CU-S28NKR



# 10. Installation Instruction

## 10.1 Select The Best Location

### 10.1.1 Indoor Unit

- Do not install the unit in excessive oil fume area such as kitchen, workshop and etc.
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 2.5m.

### 10.1.2 Outdoor Unit

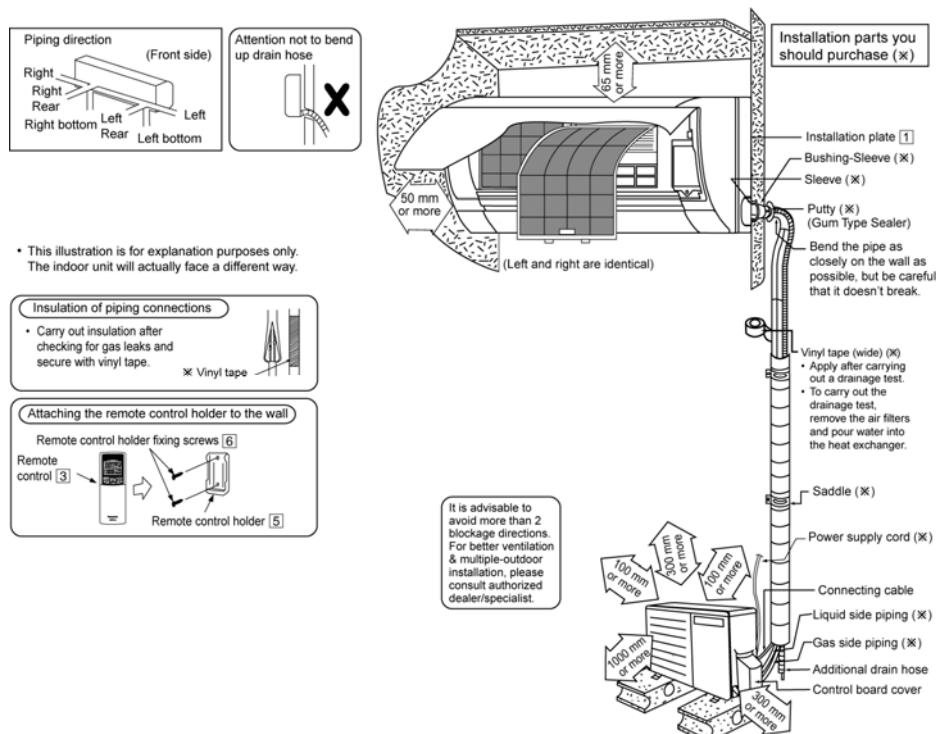
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If piping length is over the [piping length for additional gas], additional refrigerant should be added as shown in the table.

Model	Horse Power (HP)	Piping size		Std. Length (m)	Max. Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)	Piping length for add. gas (m)	
		Gas	Liquid							
S9***	1.0HP	9.52 mm (3/8")	6.35 mm (1/4")	7.5	15	3	15	15	7.5	
S12***	1.5HP	12.7 mm (1/2")			15	3	15	15	7.5	
S18***	2.0HP	15.88 mm (5/8")		5	15	3	20	20	10	
S24***	2.5HP				20	3	30	30	10	
S28***	3.0HP				20	3	30	30	10	

Example: For S9\*\*\*

If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 38 g ....  $(10-7.5) \text{ m} \times 15 \text{ g/m} = 38 \text{ g}$ .

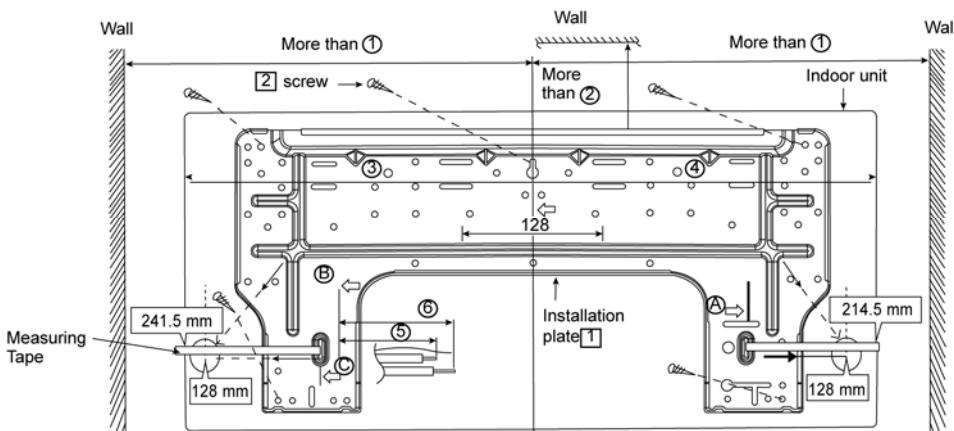
### 10.1.3 Indoor/Outdoor Unit Installation Diagram



## 10.2 Indoor Unit

### 10.2.1 How to Fix Installation Plate

The mounting wall shall be strong and solid enough to prevent it from the vibration.



Model	Dimension					
	①	②	③	④	⑤	⑥
S9***, S12***	490 mm	82 mm	439 mm	432 mm	43 mm	95 mm
S18***, S24***, S28***	590 mm	82 mm	539 mm	532 mm	169 mm	219 mm

The centre of installation plate should be at more than ① at right and left of the wall.

The distance from installation plate edge to ceiling should more than ②.

From installation plate left edge to unit's left side is ③.

From installation plate right edge to unit's right is ④.

- (B) : For left side piping, piping connection for liquid should be about ⑤ from this line.
- : For left side piping, piping connection for gas should be about ⑥ from this line.

- 1 Mount the installation plate on the wall with 5 screws or more (at least 5 screws).  
(If mounting the unit on the concrete wall, consider using anchor bolts.)
  - o Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.
- 2 Drill the piping plate hole with ø70mm hole-core drill.
  - o Line according to the left and right side of the installation plate. The meeting point of the extended line is the center of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole center is obtained by measuring the distance namely 128 mm for left and right hole respectively.
  - o Drill the piping hole at either the right or left and the hole should be slightly slanting to the outdoor side.

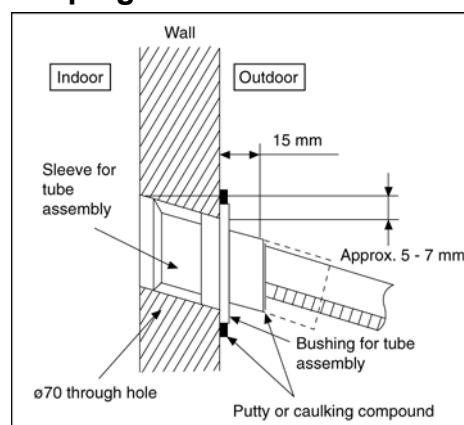
### 10.2.2 To Drill a Hole in the Wall and Install a Sleeve of Piping

- 1 Insert the piping sleeve to the hole.
- 2 Fix the busing to the sleeve.
- 3 Cut the sleeve until it extrudes about 15 mm from the wall.

#### **CAUTION**

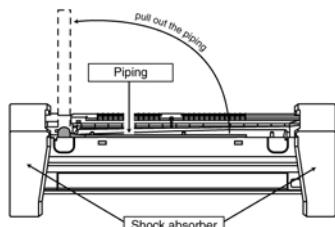
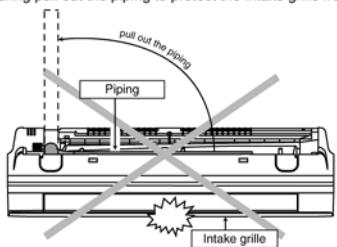
When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connecting cable.

- 4 Finish by sealing the sleeve with putty or caulking compound at the final stage.



## 10.2.3 Indoor Unit Installation

- Do not turn over the unit without its shock absorber during pull out the piping. It may cause intake grille damage.
- Use shock absorber during pull out the piping to protect the intake grille from damage.



### 10.2.3.1 For the right rear piping

- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Secure the Indoor Unit
- Step-4** Insert the connecting cable

### 10.2.3.2 For the right and right bottom piping

- Step-1** Pull out the Indoor piping
- Step-2** Install the Indoor Unit
- Step-3** Insert the connecting cable
- Step-4** Secure the Indoor Unit

### 10.2.3.3 For the embedded piping

- Step-1** Replace the drain hose
- Step-2** Bend the embedded piping
  - Use a spring bender or equivalent to bend the piping so that the piping is not crushed.
- Step-3** Pull the connecting cable into Indoor Unit
  - The inside and outside connecting cable can be connected without removing the front grille.
- Step-4** Cut and flare the embedded piping
  - When determining the dimensions of the piping, slide the unit all the way to the left on the installation plate.
  - Refer to the section "Cutting and flaring the piping".
- Step-5** Install the Indoor Unit
- Step-6** Connect the piping
  - Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)
- Step-7** Insulate and finish the piping
  - Please refer to "Piping and finishing" column of outdoor section and "Insulation of piping connection" column as mentioned in indoor/outdoor unit installation.
- Step-8** Secure the Indoor Unit

**Right Rear piping**

**How to keep the cover**

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation. (Left, right and 2 bottom covers for piping.)

**Right and Right Bottom piping**

**Install the indoor unit**

**Secure the Indoor Unit**

- Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).

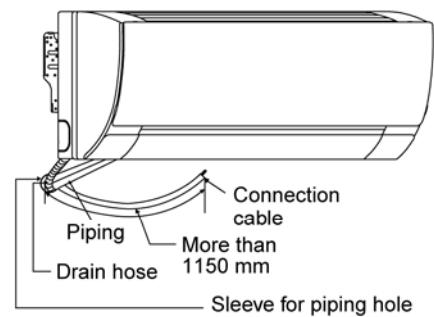
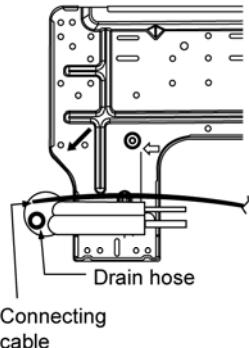
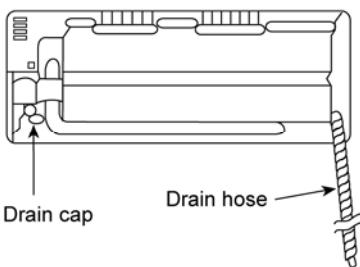
To take out the unit, push the **PUSH** marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

**Insert the connecting cable**

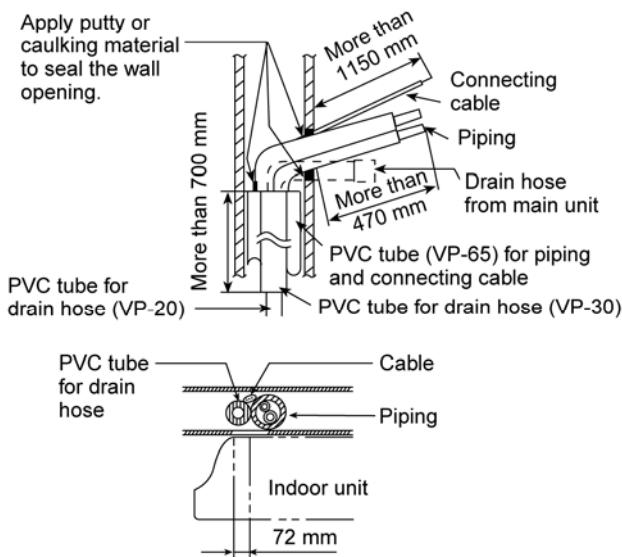
(This can be used for left rear piping and bottom piping also.)

Replace the drain hose

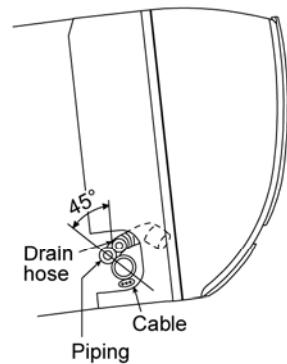
Rear view for left piping installation



- How to pull the piping and drain hose out, in case of the embedded piping.



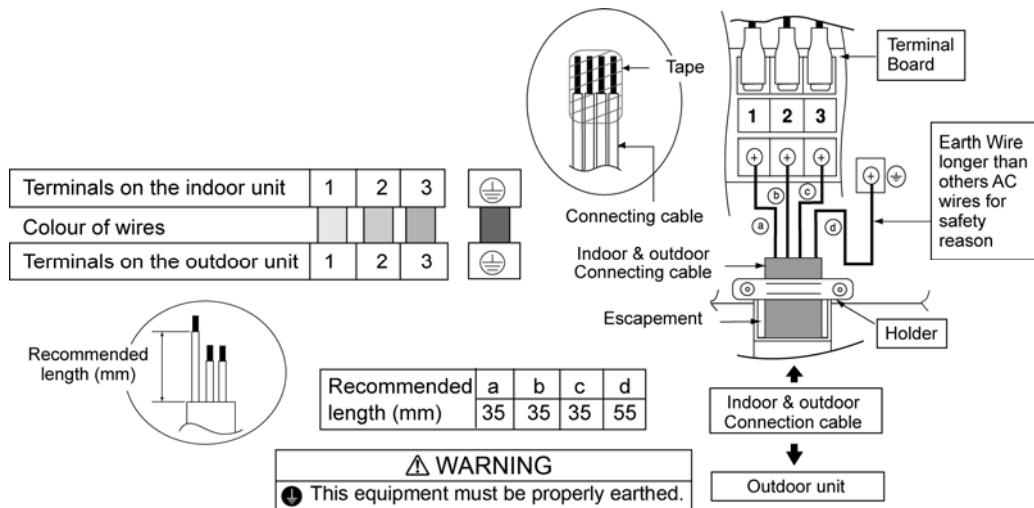
- In case of left piping how to insert the connecting cable and drain hose.



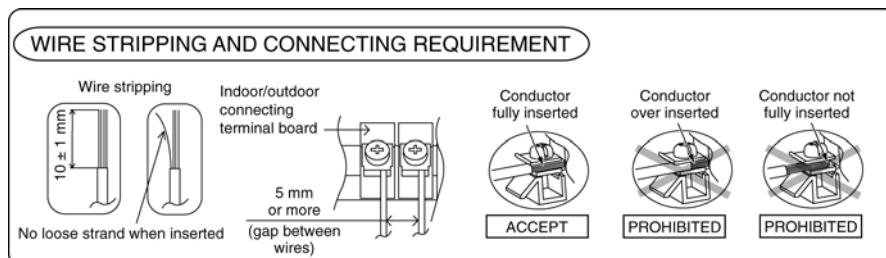
(For the right piping, follow the same procedure)

## 10.2.4 Connect the Cable to the Indoor Unit

- 1 The inside and outside connecting cable can be connected without removing the front grille.
- 2 **Connecting cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed  $4 \times 1.5 \text{ mm}^2$  flexible cord, type designation 245 IEC 57 or heavier cord.
- 3 Bind all the indoor and outdoor connecting cable with tape and route the connecting cable via the escapement.
- 4 Remove the tapes and connect the connecting cable between indoor unit and outdoor unit according to the diagram below.

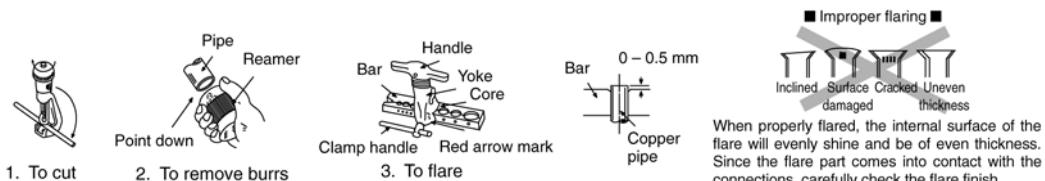


- 5 Secure the connecting cable onto the control board with the holder (clamper).
  - o Ensure the colour of wires of outdoor unit and terminal Nos. are the same to the indoor's respectively.
  - o Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.



## 10.2.4.1 Cutting and flaring the piping

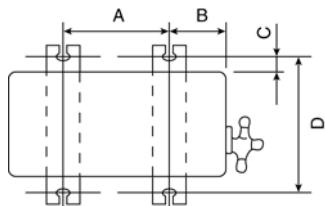
- 1 Please cut using pipe cutter and then remove the burrs.
- 2 Remove the burrs by using reamer. If burrs are not removed, gas leakage may be caused. Turn the piping end down to avoid the metal powder entering the pipe.
- 3 Please make flare after inserting the flare nut onto the copper pipes.



## 10.3 Outdoor Unit

### 10.3.1 Install the Outdoor Unit

- After selecting the best location, start installation to Indoor/Outdoor Unit Installation Diagram.
  - Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut ( $\varnothing 10\text{mm}$ ).
  - When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.



Model	A	B	C	D
S9***, S12***	540 mm	160 mm	18.5 mm	330 mm
S18***, S24***, S28***	613 mm	131 mm	16 mm	360.5 mm

### 10.3.2 Connect the Piping

#### 10.3.2.1 Connecting the piping to indoor

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe.  
(In case of using long piping)

Connect the piping

- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.

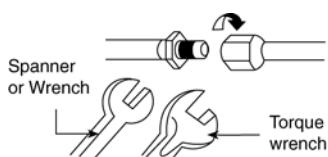
#### 10.3.2.2 Connecting the piping to outdoor

Decide piping length and then cut by using pipe cutter.  
Remove burrs from cut edge.

Make flare after inserting the flare nut (locate at valve) onto the copper pipe.

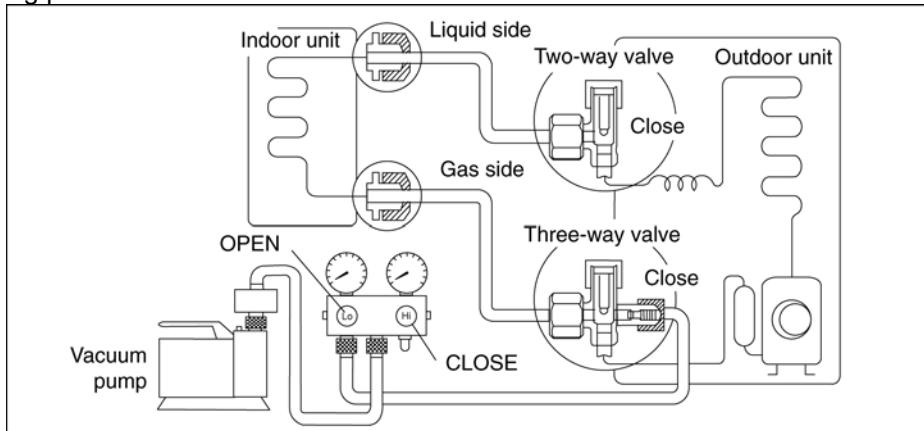
Align center of piping to valve and then tighten with torque wrench to the specified torque as stated in the table.

Do not overtighten, overtightening may cause gas leakage	
Piping size	Torque
6.35 mm (1/4")	[18 N·m (1.8 kgf.m)]
9.52 mm (3/8")	[42 N·m (4.3 kgf.m)]
12.7 mm (1/2")	[55 N·m (5.6 kgf.m)]
15.88 mm (5/8")	[65 N·m (6.6 kgf.m)]
19.05 mm (3/4")	[100 N·m (10.2 kgf.m)]



### 10.3.3 Evacuation of the equipment

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.

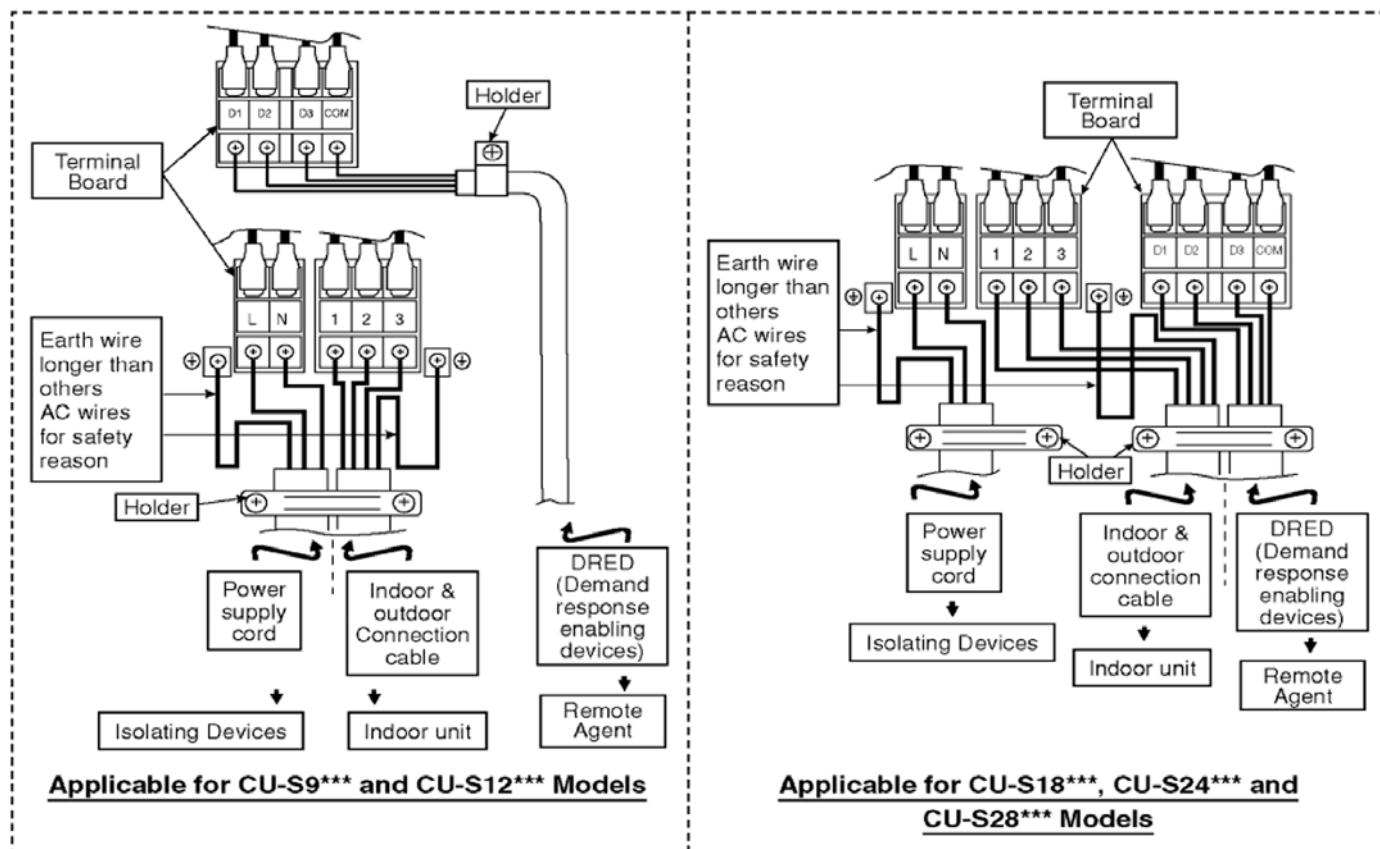
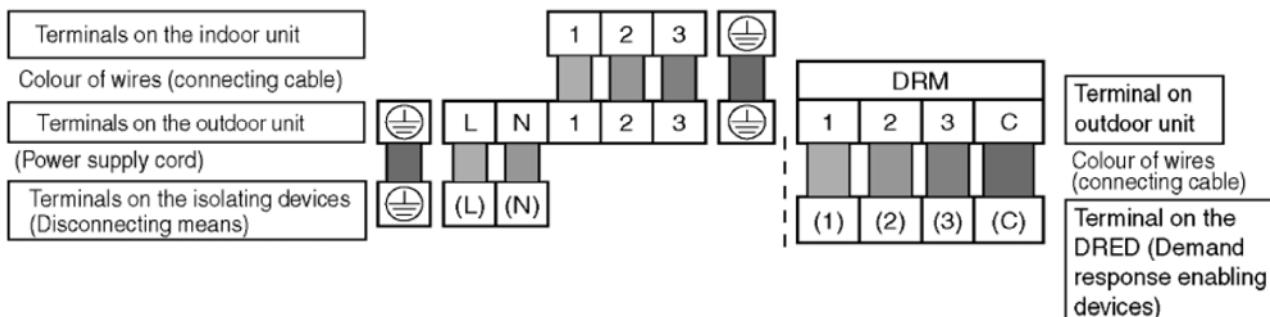


- 1 Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
  - o Be sure to connect the end of the charging hose with the push pin to the service port.
- 2 Connect the center hose of the charging set to a vacuum pump.
- 3 Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 Mpa) to -76 cmHg (-0.1Mpa). Then evacuate the air approximately ten minutes.
- 4 Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.  
Note: BE SURE TO TAKE THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.
- 5 Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
- 6 Tighten the service port caps of the 3-way valve at a torque of 18N•m with a torque wrench.
- 7 Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "OPEN" using a hexagonal wrench (4 mm).
- 8 Mount valve caps onto the 2-way valve and the 3-way valve.
  - o Be sure to check for gas leakage.

- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step ③ above take the following measure:
  - If the leak stops when the piping connections are tightened further, continue working from step ③.
  - If the leak does not stop when the connections are retightened, repair location of leak.
  - Do not release refrigerant during piping work for installation and reinstallation.
  - Take care of the liquid refrigerant, it may cause frostbite.

#### 10.3.4 Connect the Cable to the Outdoor Unit

1. Remove the control board cover from the unit by loosening the screw.
2. Cable connection to the power supply through Isolating Devices (Disconnecting means).
  - o Connect approved type polychloroprene sheathed **power supply cord**  $3 \times 1.5 \text{ mm}^2$  (1.0 ~ 1.5HP),  $3 \times 2.5 \text{ mm}^2$  (2.0 ~ 2.5HP) or  $3 \times 4.0 \text{ mm}^2$  (3.0HP) type designation 245 IEC 57 or heavier cord to the terminal board, and connect the others end of the cord to Isolating Devices (Disconnecting means).
3. **Connecting cable** between indoor unit and outdoor unit shall be approved polychloroprene sheathed  $4 \times 1.5 \text{ mm}^2$  flexible cord, type designation 245 IEC 57 or heavier cord.
4. **Connecting cable** between outdoor unit and **DRED** (Demand response enabling devices) shall be double insulation layer, polychloroprene sheathed ( $>50\text{V}$ ) with size  $4 \times (0.5 \text{ mm}^2$  to  $2.0 \text{ mm}^2$ ) cable or flexible cord, where the maximum allowable length is 30m.
5. Connect the power supply cord and connecting cable between indoor unit and outdoor unit according to the diagram below.



6. Secure the power supply cord and connecting cable onto the control board with the holder.
7. Attach the control board cover back to the original position with screw.
8. For wire stripping and connection requirement, refer to instruction ⑤ of indoor unit.



- o Note: Isolating Devices (Disconnecting means) should have minimum 3.0 mm contact gap.
- o Earth wire shall be Yellow/Green (Y/G) in colour and longer than other AC wires for safety reason.
- o Always ensure all above connections compliant with national wire rules.

### **10.3.5 Piping Insulation**

1. Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.
2. If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.

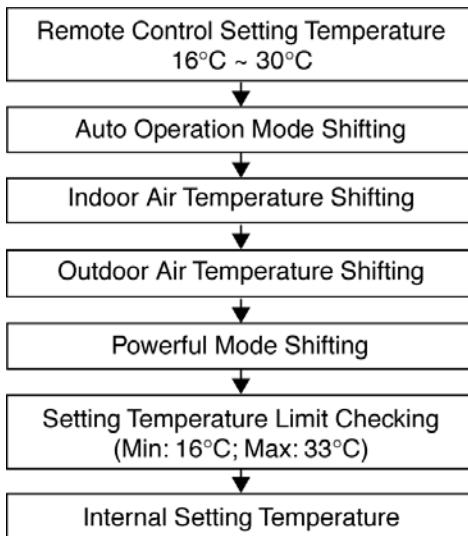
# 11. Operation Control

## 11.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal setting temperature and intake air temperature.

### 11.1.1 Internal Setting Temperature

Once the operation starts, remote control setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



### 11.1.2 Cooling Operation

#### 11.1.2.1 Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -1.5°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

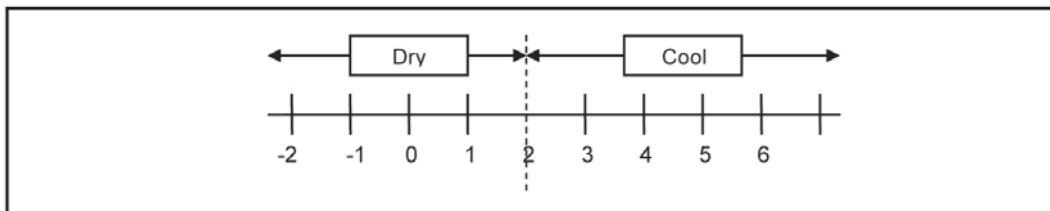
### 11.1.3 Soft Dry Operation

#### 11.1.3.1 Thermostat control

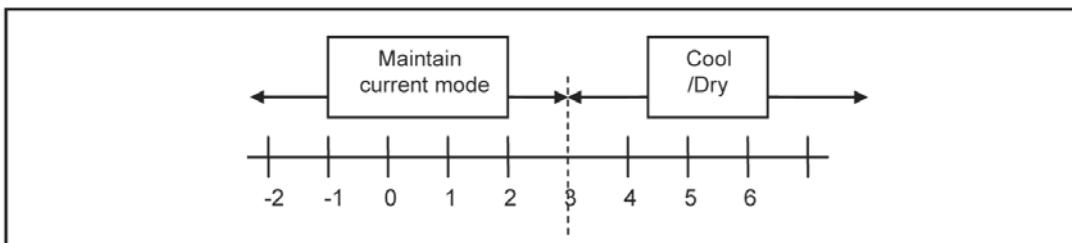
- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -2.0°C continue for 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point.

### 11.1.3.2 Automatic Operation

- This mode can be set using remote control and the operation is decided by remote control setting temperature, remote control operation mode and indoor intake air temperature.
- During operation mode judgment, indoor fan motor (with speed of Lo-) is running for 30 seconds to detect the indoor intake air temperature.
- Every 10 minutes, the indoor temperature is judged.
- For the 1st judgment
  - If indoor intake temperature - remote control setting temperature  $\geq 2^{\circ}\text{C}$ , COOL mode is decided.
  - If  $-2^{\circ}\text{C} \leq$  indoor intake temperature - remote control setting temperature  $< 2^{\circ}\text{C}$ , DRY mode is decided.



- For the 2nd judgment onwards
  - If indoor intake temperature - remote control setting temperature  $\geq 3^{\circ}\text{C}$ , if previous operate in DRY mode, then continue in DRY mode. Otherwise COOL mode is decided.
  - If  $-2^{\circ}\text{C} \leq$  indoor intake temperature - remote control setting temperature  $< 3^{\circ}\text{C}$ , maintain with previous mode.



### 11.1.3.3 Fan Operation

- Fan operation is used to circulate air in the room.
- During operation, indoor fan run continuously but outdoor fan and compressor stop.
- Temperature setting is not applicable.

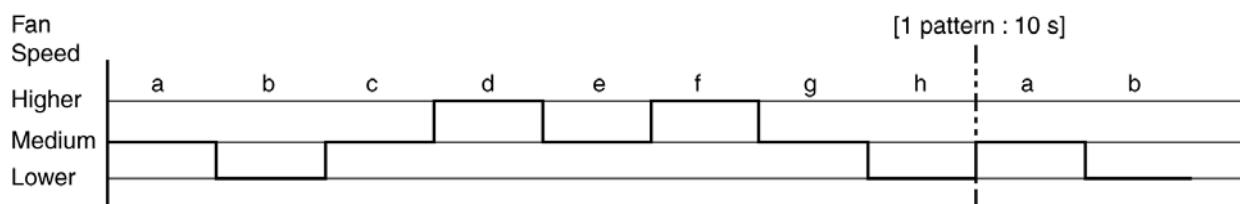
## 11.2 Indoor Fan Motor Operation

### A. Basic Rotation Speed (rpm)

- Manual Fan Speed  
[Cooling, Dry]
  - Fan motor's number of rotation is determined according to remote control setting.

Remote control	○	○	○	○	○
Tab	Hi	Me+	Me	Me-	Lo

- Auto Fan Speed  
[Cooling, Dry]
  - According to room temperature and setting temperature, indoor fan speed is determined automatically.
  - The indoor fan will operate according to pattern below.

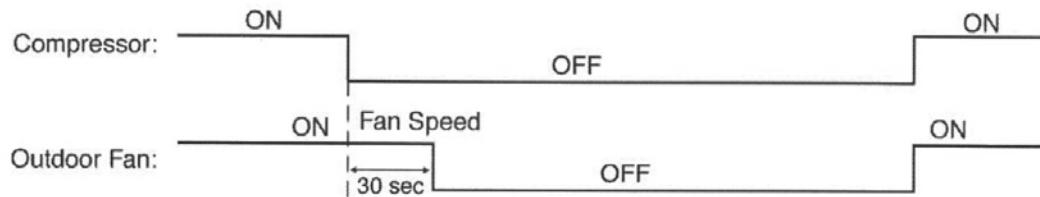


## B. Feedback control

- Immediately after the fan motor is started, feedback control is performed once every second.
- During fan motor on, if fan motor feedback  $\geq 2550$  rpm or  $< 50$  rpm continue for 10 seconds, the fan motor error counter increased, fan motor is then stop and restart. If the fan motor counter becomes 7 times, then H19 - fan motor error is detected. Operation stops and cannot on back.

## 11.3 Outdoor Fan Motor Operation

Outdoor fan motor is operated with one fan speed only. It starts when compressor starts operation and it stops 30 seconds after compressor stops operation.



## 11.4 Airflow Direction

- There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).
- Control of airflow direction can be automatic (angles of direction is determined by operation mode, heat exchanger temperature and intake air temperature) and manual (angles of direction can be adjusted using remote control).

### 11.4.1 Vertical Airflow

Operation Mode	Airflow Direction	Vane Angle ( $^{\circ}$ )				
		1	2	3	4	5
Cooling and Ion	Auto	20 ~ 45				
	Manual	20	26	32	37	45
Soft Dry	Auto	20 ~ 45				
	Manual	20	26	32	37	45

- Automatic vertical airflow direction can be set using remote control; the vane swings up and down within the angles as stated above. When the air conditioner is stopped using remote control, the vane will shift to close position.
- Manual vertical airflow direction can be set using remote control; the angles of the vane are as stated above and the positions of the vane are as Figure 2 below. When the air conditioner is stopped using remote control, the vane will shift to close position.

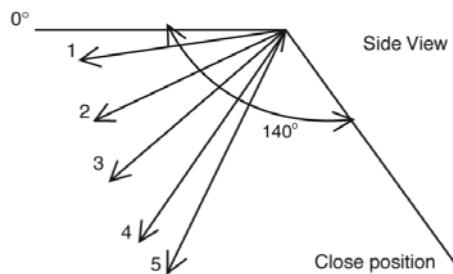


Figure 2

### 11.4.2 Horizontal Airflow

- Automatic horizontal airflow direction can be set using remote control; the vane swings left and right within the angles as stated below.

Operation Mode	Vane angle (°)
Cooling and Soft dry	68 ~ 112

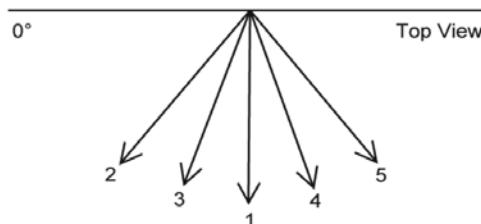


Figure 2

- Manual horizontal airflow direction can be set using remote control; the angles of the vane are as stated below and the positions of the vane are as Figure 2 above:

Pattern	1	2	3	4	5
Airflow Direction Patterns at Remote Control					
Vane Angle (°)	90	68	78	102	112

### 11.5 Quiet Operation (Cooling Mode/Cooling Area of Dry Mode)

- Purpose
  - To provide quiet cooling operation compare to normal operation.
- Control condition
  - Quiet operation start condition
    - When “QUIET” button at remote control is pressed twice.  
QUIET/ECONOMY LED illuminates (low intensity).
  - Quiet operation stop condition
    - When one of the following conditions is satisfied, quiet operation stops:
      - QUIET button is pressed again.
      - Stop by OFF/ON switch.
      - Timer “off” activates.
    - When quiet operation is stopped, operation is shifted to normal operation with previous setting.
    - When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
    - When operation mode is changed, quiet operation is shifted to quiet operation of the new mode.
    - During quiet operation, if timer “on” activates, quiet operation maintains.
    - After off, when on back, quiet operation is not memorised.
- Control contents
  - Fan speed is changed from normal setting to quiet setting of respective fan speed.  
This is to reduce sound of Hi, Me, Lo for 3dB (some models more than 3dB).
  - Fan speed for quiet operation is reduced from setting fan speed.
  - Outdoor fan speed is change to QLo (S24NKR & S28NKR).
  - Compressor frequency reduced.

## 11.6 Powerful Mode Operation

- When the powerful mode is selected, the internal setting temperature will shift lower up to 2°C (for Cooling/Soft Dry) than remote control setting temperature for 20 minutes to achieve the setting temperature quickly.
- Powerful operation stops condition
  - When one of the following condition is satisfied, powerful operation stops:
    - Quiet button is pressed.
    - Stop by OFF/ON button.
    - OFF Timer activates.
    - Powerful button is pressed again.
    - Powerful operation continue for 20 minutes.

## 11.7 Economy Mode Operation

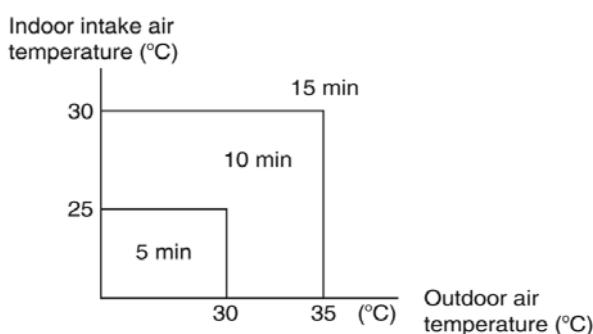
- This operation is used to reduce electrical power consumption by adjusting the set temperature.
- Economy operation starts when the Economy button is pressed during cooling or dry operation.
- During Cooling/Dry economy operation, target setting temperature will be adjusted by +2°C. Internal setting temperature limit shift to maximum 35°C (maximum 33°C + 2°C Economy shift).
- During Economy operation, all indicators includes Economy indicator will be dimmed. The brightness level is equivalent to indicator dim function.
- Powerful, Quiet and Economy could not be operated at the same time. The unit will follow the latest setting of these three operations.
- The Economy operation stops when:
  - Operation OFF.
  - Received Economy signal from remote control again.
  - Received either Powerful or Quiet operation signal from remote control.

## 11.8 Timer Control

- There are 2 sets of ON and OFF timer is available to turn the unit ON or OFF at different preset time.
- If more than one timer had been set, the upcoming timer will be displayed and will activate in sequence.

### 11.8.1 ON Timer Control

- ON timer 1 and ON timer 2 can be set using remote control, the unit with timer set will start operate earlier than the setting time. This is to provide a comfortable environment when reaching the set ON time.
- 60 minutes before the set time, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 30 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation starting time.
- From the above judgment, the decided operation will start operate earlier than the set time as shown below.



### 11.8.2 OFF Timer Control

- OFF Timer 1 and OFF Timer 2 can be set using remote control, the unit with timer set will stop at set time.

## **11.9 Auto Restart Control**

- When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes (there are 10 patterns between 2 minutes 58 seconds and 3 minutes 52 seconds to be selected randomly) after power supply resumes.
- This type of control is not applicable during ON/OFF Timer setting.
- This control can be omitted by open the circuit of JP1 at indoor unit printed circuit board.

## **11.10 Indication Panel**

LED	POWER	TIMER	QUIET/ECONOMY	POWERFUL
Color	Green	Orange	Orange	Orange
Light ON	Operation ON	Timer Setting ON	Quiet/Economy Mode ON	Powerful Mode ON
Light OFF	Operation OFF	Timer Setting OFF	Quiet/Economy Mode OFF	Powerful Mode OFF

Note:

- If POWER LED is blinking, the possible operations of the unit are Hot Start, during Deice operation, operation mode judgment, or ON timer sampling.
- If TIMER LED blinking, there is an abnormality operation occurs.

## 12. Protection Control

### 12.1 Protection Control For All Operations

#### 12.1.1 Restart Control (Time Delay Safety Control)

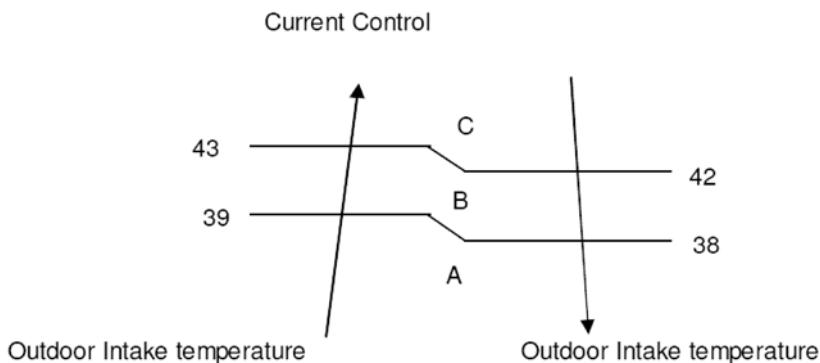
- The Compressor will not turn on within 3 minutes from the moment operation stops, although the unit is turned on again by pressing OFF/ON button at remote control within this period.
- This control is not applicable if the power supply is cut off and on again.
- This phenomenon is to balance the pressure inside the refrigerant cycle.

#### 12.1.2 Total Running Current Control

- When the outdoor unit total running current (AC) exceeds X value, the frequency instructed for compressor operation will be decreased.
- If the running current does not exceed X value for 5 seconds, the frequency instructed will be increased.
- However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for 3 minutes.

Model	S9NKR	S12NKR	S18NKR	S24NKR	S28NKR
Cooling/Soft Dry (X)	A	5.41	6.57	6.57	12.48
	B	5.03	6.13	6.13	12.48
	C	5.03	6.13	6.13	11.46
Y		15.00	15.00	15.00	19.00

- The first 30 minutes of cooling operation, (A) will be applied.

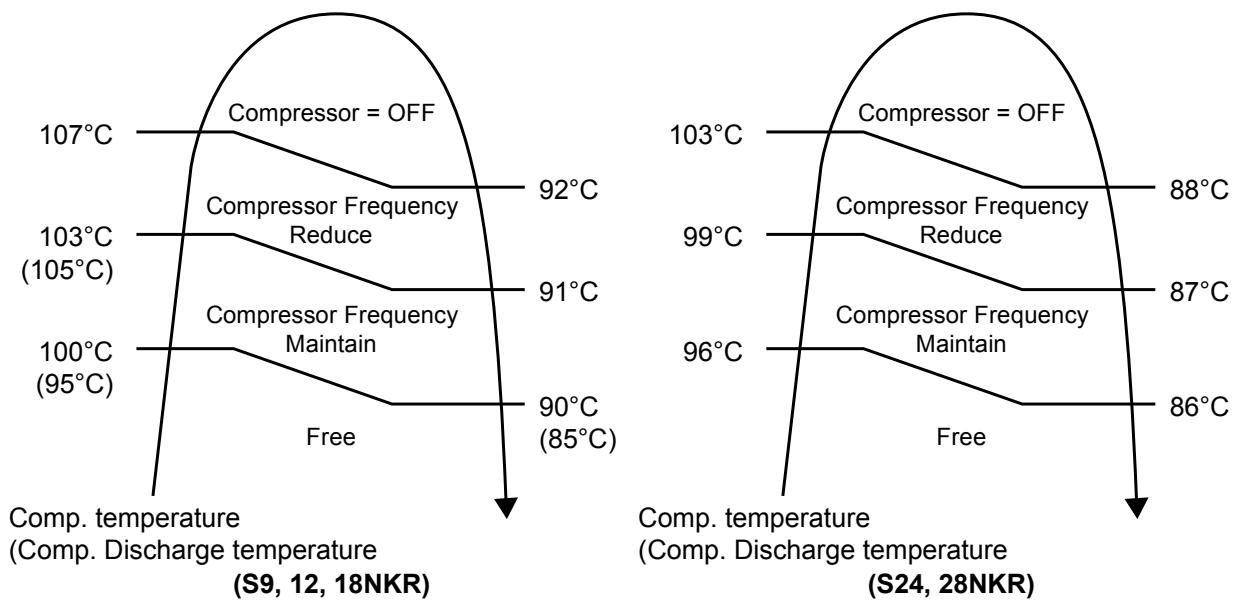


#### 12.1.3 IPM (Power Transistor) Prevention Control

- Overheating Prevention Control
  - When the IPM temperature rises to 120°C, compressor operation will stop immediately.
  - Compressor operation restarts after 3 minutes the temperature decreases to 110°C or 95°C (S24, 28NK).
  - If this condition repeats continuously 4 times within 20 minutes, timer LED will be blinking ("F96" is indicated).
- DC Peak Current Control
  - When electric current to IPM exceeds set value of 18.5A (S9, 12NK) and 30.0 ± 5.0A (S18NK, S24NK, S28NK), the compressor will stop operate. Then, operation will restart after 3 minutes.
  - If the set value is exceeded again more than 30 seconds after the compressor starts, the operation will restart after 1 minute.
  - If the set value exceeded again within 30 seconds after the compressor starts, the operation will restart after 1 minute. If this condition repeats continuously for 7 times, all indoor and outdoor relays will be cut off, timer LED will be blinking ("F99" is indicated).

#### 12.1.4 Compressor Overheating Prevention Control

- Instructed frequency for compressor operation will be regulated by compressor discharge temperature. The changes of frequency are as below.
- If compressor discharge temperature exceeds 107°C, compressor will be stopped, occurs 4 times per 20 minutes, timer LED will be blinking. ("F97" is indicated.)



#### 12.1.5 Low Pressure Prevention Control (Gas Leakage Detection)

- Control start conditions
  - For 5 minutes, the compressor continuously operates and outdoor total current is between 0.75A and 0.95A (S9, 12NK), 1.38A and 1.65A (S18NK).
  - During Cooling and Soft Dry operation:  
Indoor suction temperature – indoor piping temperature is below 4°C
- Control contents
  - Compressor stops (and restart after 3 minutes).
  - If the conditions above happen 2 times within 20 minutes, the unit will:
    - Stop operation
    - Timer LED blinks and "F91" indicated.

#### 12.1.6 Low Frequency Protection Control 1

- When the compressor operates at frequency lower than 24 Hz continued for 20 minutes, the operation frequency will be changed to 23 Hz for 2 minutes.

#### 12.1.7 Low Frequency Protection Control 2

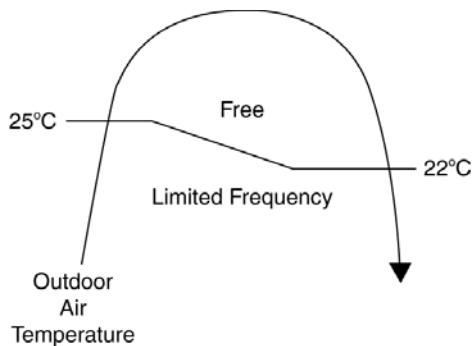
- When all below conditions comply, the compressor frequency will be changed to lower frequency.

Temperature, T, for:	Cooling / Soft Dry
Indoor intake air (°C)	T < 14 or T ≥ 30
Outdoor air (°C)	T < 13 or T ≥ 38
Indoor heat exchanger (°C)	T < 30

## 12.2 Protection Control For Cooling & Soft Dry Operation

### 12.2.1 Outdoor Air Temperature Control

- The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.
- This control will begin 1 minute after the compressor starts.
- Compressor frequency will adjust base on outdoor air temperature.
- 



### 12.2.2 Cooling Overload Control

- Detects the Outdoor pipe temperature and carry out below restriction/limitation (Limit the compressor Operation frequency).
- The compressor stops if outdoor pipe temperature exceeds 61°C (S9, 12NK), 63°C (S18NK) and 65°C (S24, 28NK).
- If the compressor stops 4 times in 20 minutes, Timer LED blinking (F95 indicated: outdoor high pressure rise protection).

### 12.2.3 Freeze Prevention Control 1

- When indoor heat exchanger temperature is lower than 0°C continuously for 6 minutes, compressor will stop operating.
- Compressor will resume its operation 3 minutes after the indoor heat exchanger is higher than 5°C.
- At the same time, indoor fan speed will be higher than during its normal operation.
- If indoor heat exchanger temperature is higher than 5°C for 5 minutes, the fan speed will return to its normal operation.

### 12.2.4 Freeze Prevention Control 2

- Control start conditions
  - During Cooling operation and soft dry operation
    - During thermo OFF condition, indoor intake temperature is less than 10°C or
    - Compressor stops for freeze prevention control
  - Either one of the conditions above occurs 5 times in 60 minutes.
- Control contents
  - Operation stops
  - Timer LED blinks and "H99" indicated

### 12.2.5 Dew Prevention Control 1

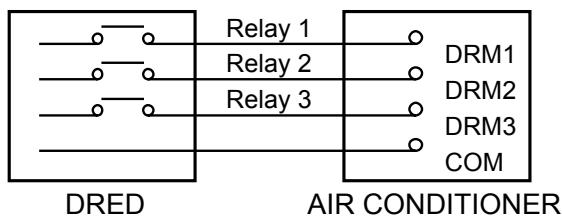
- To prevent dew formation at indoor unit discharge area.
- This control will be activated if:
  - Outdoor air temperature and Indoor pipe temperature judgment by microcontroller is fulfilled.
  - When Cooling or Dry mode is operated more than 20 minutes or more.
- This control stopped if:
  - Compressor stopped.
  - Remote control setting changed (fan speed / temperature).
  - Outdoor air temperature and indoor intake temperature changed.
- Fan speed will be adjusted accordingly in this control.

### 12.2.6 Odor Cut Control

- To reduce the odor released from the unit.
  - Start Condition
    - AUTO FAN Speed is selected during COOL or DRY operation.
    - During freeze prevention control and timer preliminary operation, this control is not applicable.
  - Control content
    - Depends on compressor conditions:
      1. Compressor OFF → Compressor ON.  
The indoor unit fan stops temporarily and then starts to blow at minimum airflow for 30 seconds.
      2. Compressor ON → Compressor OFF.  
The indoor unit fan stops for 90 seconds and then blows at minimum airflow for 20 seconds.

### 12.2.7 Demand Control

- When the air-conditioner connected to Demand Response Enabling Devices (DRED), the power consumption especially during peak hours could be controlled.



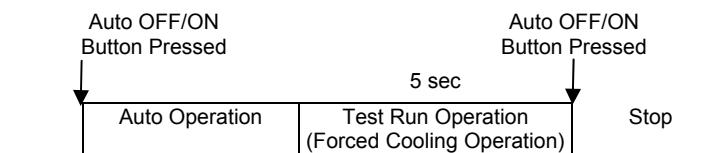
- Three Demand response modes (DRM) are available
  - DRM1 = Compressor cut off
  - DRM2 = Operate at 50% of rated input power
  - DRM3 = Operate at 75% of rated input power
- During DRM, the Power Indicator blinks (3 seconds ON and 0.5 seconds OFF) to indicate the compressor cut off status.

### 12.2.8 Pump down Operation by CN-S

- A convenience method to activate pump down operation.
- Control start condition:
  - During power standby condition, short CN-S continuously between 1 second and 10 seconds.
- Control stop condition:
  - 480 seconds after pump down operation starts.
  - CN-S is shorted again during pump down operation.

## 13. Servicing Mode

### 13.1 Auto Off/On Button



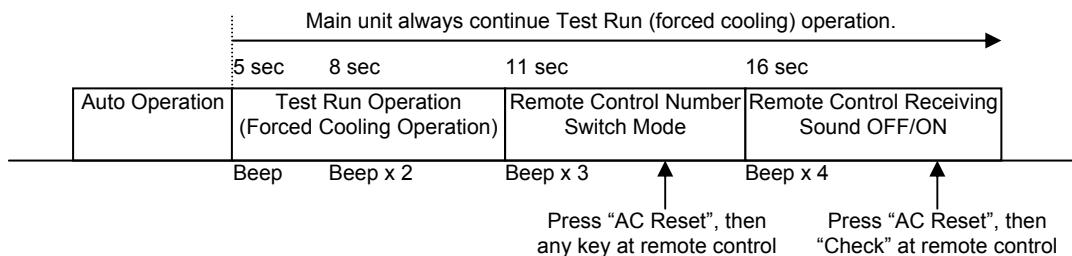
#### 1 AUTO OPERATION MODE

The Auto Operation will be activated immediately once the Auto OFF/ON button is pressed. This operation can be used to operate air conditioner with limited function if remote control is misplaced or malfunction.

#### 2 TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)

The Test Run Operation will be activated if the Auto OFF/ON button is pressed continuously for more than 5 seconds. A "beep" sound will be heard at the fifth seconds, in order to identify the starting of this operation.

The Auto OFF/ON button may be used together with remote control to set / change the advance setting of air conditioner operation.

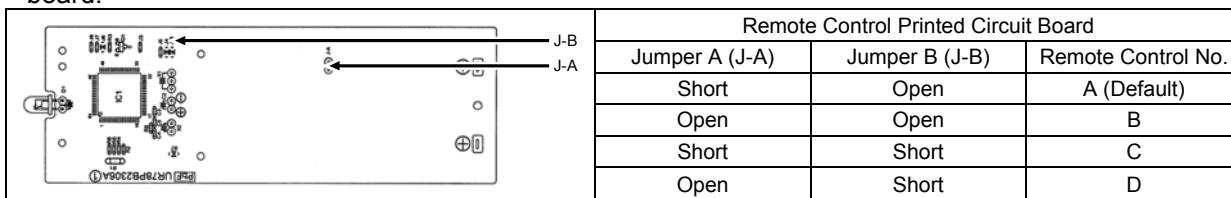


#### 3 REMOTE CONTROL NUMBER SWITCH MODE

The Remote Control Number Switch Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 11 seconds (3 "beep" sounds will occur at 11<sup>th</sup> seconds to identify the Remote Control Number Switch Mode is in standby condition), press "AC Reset" button and then press any button at remote control to transmit and store the desired transmission code to the EEPROM.

There are 4 types of remote control transmission code could be selected. The indoor unit will only operate when received signal with same transmission code from remote control. This could prevent signal interference when there are 2 or more units installed nearby together.

To change remote control transmission code, short or open jumpers at the remote control printed circuit board.



#### 4 REMOTE CONTROL RECEIVING SOUND OFF/ON MODE

The Remote Control Receiving Sound OFF/ON Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 16 seconds (4 "beep" sounds will occur at 16<sup>th</sup> seconds to identify the Remote Control Receiving Sound OFF/ON Mode is in standby condition) and press "AC Reset" button and then press "Check" button at remote control.

Press Auto OFF/ON button to toggle remote control receiving sound.

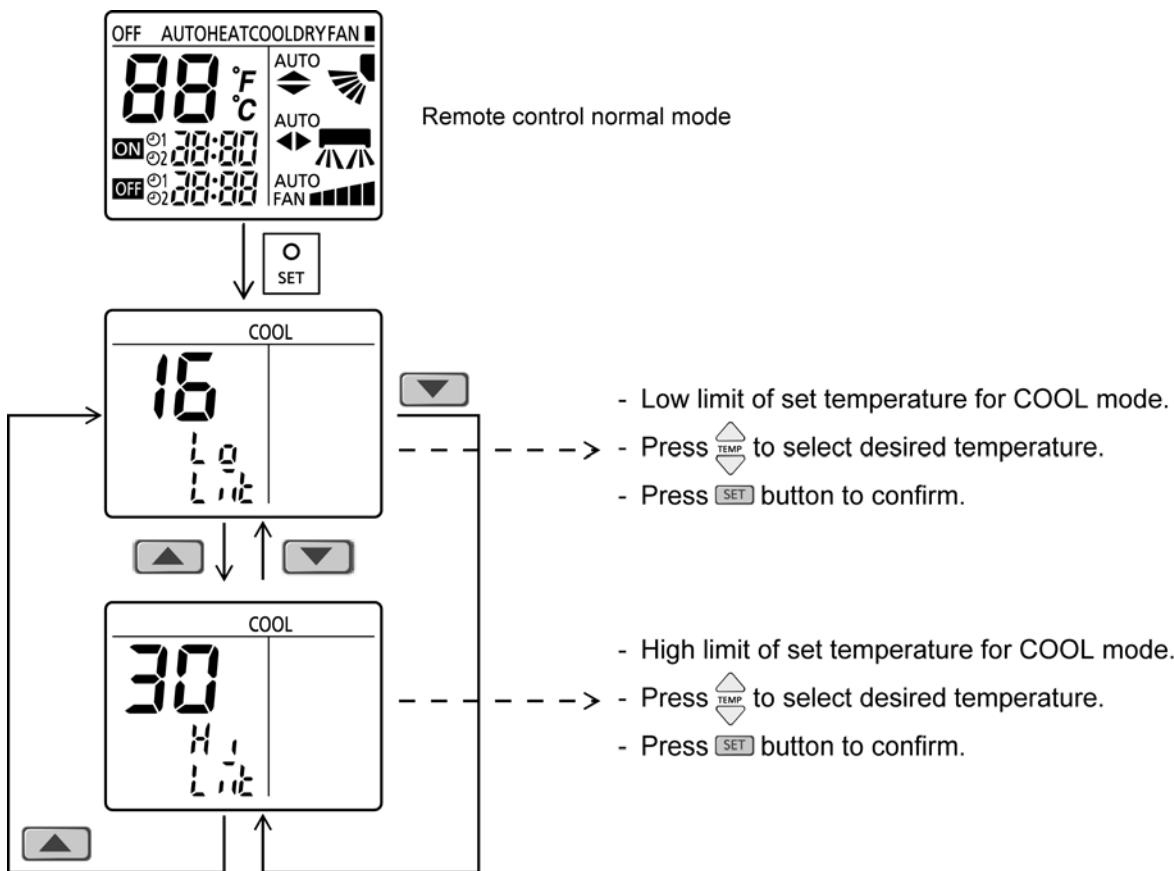
- Short "beep": Turn ON remote control receiving sound.
- Long "beep": Turn OFF remote control receiving sound.

After Auto OFF/ON button is pressed, the 20 seconds counter for Remote Control Receiving Sound OFF/ON Mode is restarted.

## 13.2 Remote Control Button

### 13.2.1 SET Button

- To limit set temperature range for COOL mode.
  - Set temperature range selection



### 13.2.2 CLOCK Button

- To change the remote control time format:
  - Press for more than 5 seconds

### 13.2.3 RESET (RC) Button

- To clear and restore the remote control setting to factory default.
  - Press once to clear the memory

### 13.2.4 RESET (AC) Button

- To restore the unit's setting to factory default.
  - Press once to restore the unit's setting

### 13.2.5 TIMER ▲

- To change indoor unit indicators' intensity:
  - Press continuously for 5 seconds.

### 13.2.6 TIMER ▼

- To change remote control display from Degree Celsius (°C) to Degree Fahrenheit (°F)
  - Press continuously for 10 seconds.

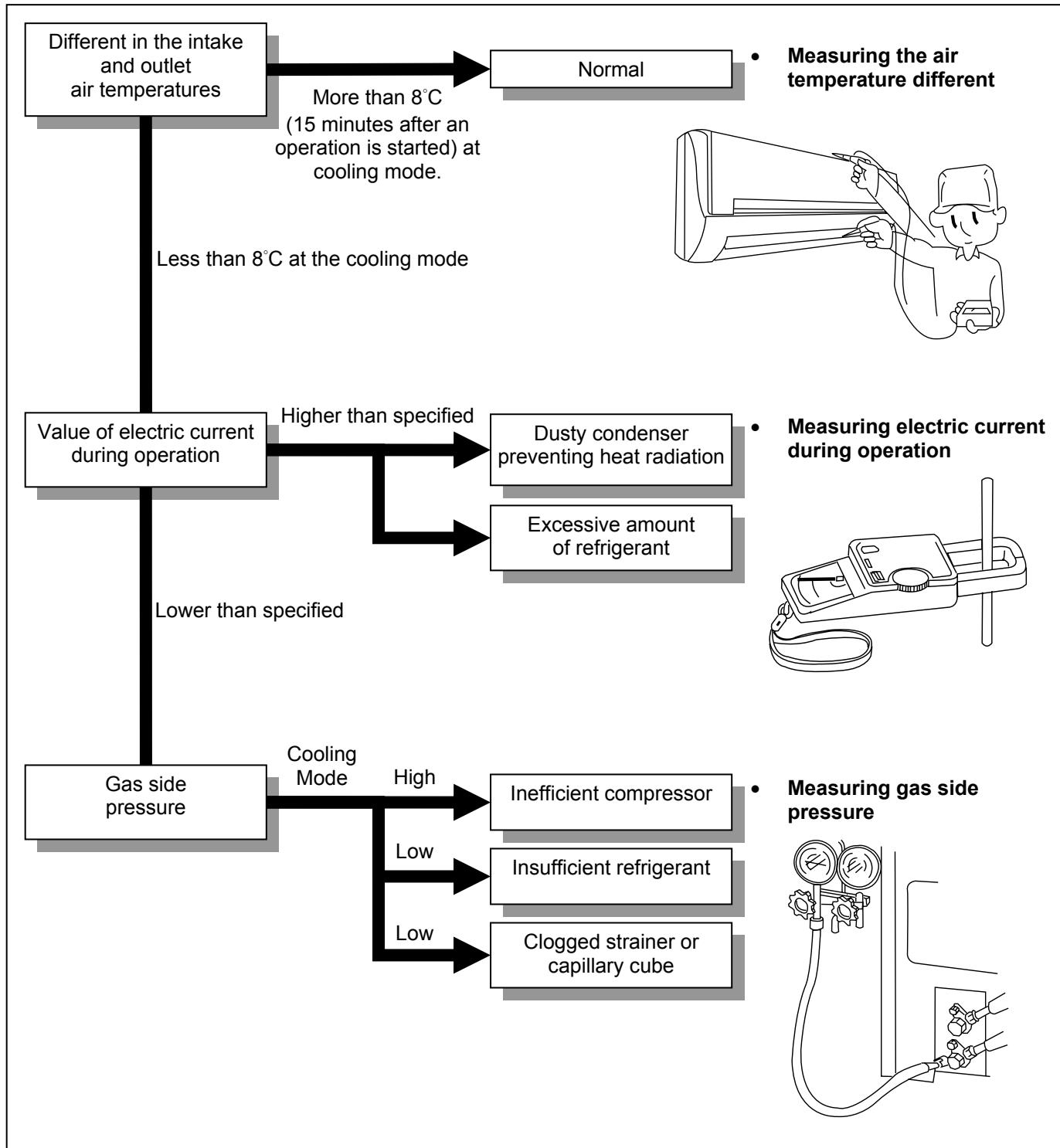
# 14. Troubleshooting Guide

## 14.1 Refrigeration Cycle System

In order to diagnose malfunctions, ensure the air conditioner is free from electrical problems before inspecting the refrigeration cycle. Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan. The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table to the right.

	Gas Pressure Mpa (kg/cm <sup>2</sup> G)	Outlet air Temperature (°C)
Cooling Mode	0.9 ~ 1.2 (9 ~ 12)	12 ~ 16

Condition: Indoor fan speed = High  
Outdoor temperature = 35°C at cooling mode.  
Compressor operate at rated frequency



#### 14.1.1 Relationship between the condition of the air conditioner and pressure and electric current

Condition of the air conditioner	Cooling Mode		
	Low Pressure	High Pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	✗	✗	✗
Clogged capillary tube or strainer	✗	✗	✗
Short circuit in the indoor unit	✗	✗	✗
Heat radiation deficiency of the outdoor unit	✗	✗	✗
Inefficient compression	✗	✗	✗

- Carry out the measurement of pressure, electric current, and temperature fifteen minutes after an operation is started.

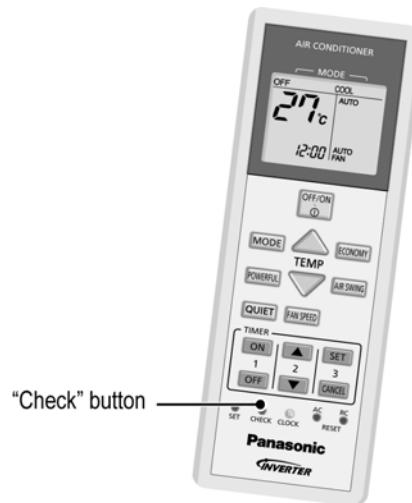
## 14.2 Breakdown Self Diagnosis Function

### 14.2.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

- Once error occurred during operation, the unit will stop its operation, and Timer LED blinks.
- Although Timer LED goes off when power supply is turned off, if the unit is operated under a breakdown condition, the LED will ON again.
- In operation after breakdown repair, the Timer LED will not blink. The last error code (abnormality) will be stored in IC memory.

### 14.2.2 To Make a Diagnosis

- Timer LED starts to blink and the unit automatically stops the operation.
- Press the CHECK button on the remote control continuously for 5 seconds.
- "--" will be displayed on the remote control display.  
Note: Display only for "--" (No signal transmission, no receiving sound and no Power LED blinking)
- Press the TIMER ▲ or ▼ button on the remote control. The code "H00" (no abnormality) will be displayed and signal will be transmit to the main unit.
- Each press of the button (▲ or ▼) will increase error code number and transmit error code signal to the main unit.
- When the latest abnormality code on the main unit and code transmitted from the remote control are matched, Power LED will light up for 30 seconds and a "beep" sound (continuously for 4 seconds) will be heard. If no codes are matched, Power LED will light up for 0.5 seconds and no sound will be heard.
- The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
- The LED will be off if the unit is turned off or the RESET button on the main unit is pressed.



### 14.2.3 To Display Memorized Error Code (Protective Operation)

- Turn power on.
- Press the CHECK button on the remote control
- will be displayed on the remote control display.  
Note: Display only for "--" (No signal transmission, no receiving sound and no Power LED blinking)
- Press the TIMER ▲ or ▼ button on the remote control. The code "H00" (no abnormality) will be displayed and signal will be transmit to the main unit.
- Each press of the button (▲ or ▼) will increase error code number and transmit error code signal to the main unit.
- When the latest abnormality code on the main unit and code transmitted from the remote control are matched, Power LED will light up for 30 seconds and a "beep" sound (continuously for 4 seconds) will be heard. If no codes are matched, Power LED will light up for 0.5 seconds and no sound will be heard.
- The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
- The same diagnosis can be repeated by turning power on again.

### 14.2.4 To Clear Memorized Error Code after Repair (Protective Operation)

- Turn power on (in standby condition).
- Press the AUTO button for 5 seconds (a "beep" sound is heard) on the main unit to operate the unit at Forced Cooling Operation Mode.
- Press the CHECK button on the remote control for about 1 second with a pointed object to transmit signal to main unit. A "beep" sound is heard, and the Error Code is cleared.

### 14.2.5 Temporary Operation (Depending On Breakdown Status)

- Press the Auto OFF/ON button on the main unit (a "beep" sound is heard) to operate the unit. (Remote control is enable again).
- The unit can be temporarily be used until repaired.

Error Code	Operation	Temporary items
H23	Cooling	
H27, H28	Cooling	Emergency Operation with limited power

### 14.3 Error Code Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgment	Emergency Operation	Primary location to verify
H00	No abnormality detected	-	Normal operation	
H11	Indoor / Outdoor abnormal communication	> 1 min after starting operation	Indoor fan operation only	<ul style="list-style-type: none"> <li>• Internal / external cable connection</li> <li>• Indoor / outdoor PCB</li> </ul>
H12	Connection capability rank abnormality	Continuously for 90 sec after power supplied	-	-
H14	Indoor intake air temperature sensor abnormality	Continue for 5 sec.	-	<ul style="list-style-type: none"> <li>• Intake air temperature sensor (defective or disconnected)</li> </ul>
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	-	<ul style="list-style-type: none"> <li>• Compressor temperature sensor (defective or disconnected)</li> </ul>
H16	Outdoor current transformer open circuit	-	-	<ul style="list-style-type: none"> <li>• Outdoor PCB</li> <li>• IPM (Power transistor) module</li> </ul>
H19	Indoor fan motor mechanism locked	7 occurrences continuously	-	<ul style="list-style-type: none"> <li>• Indoor PCB</li> <li>• Fan motor</li> </ul>
H23	Indoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	○	<ul style="list-style-type: none"> <li>• Heat exchanger temperature sensor (defective or disconnected)</li> </ul>
H25	e-ion abnormality	-	○	<ul style="list-style-type: none"> <li>• Indoor PCB</li> <li>• e-ion PCB</li> </ul>
H27	Outdoor air temperature sensor abnormality	Continue for 5 sec.	○	<ul style="list-style-type: none"> <li>• Outdoor temperature sensor (defective or disconnected)</li> </ul>
H28	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	○	<ul style="list-style-type: none"> <li>• Outdoor heat exchanger temperature sensor (defective or disconnected)</li> </ul>
H30	Discharge temperature sensor abnormality	Continue for 5 sec.		<ul style="list-style-type: none"> <li>• Outdoor discharge temperature sensor (defective or disconnected)</li> </ul>
H33	Indoor / outdoor wrong connection	-	-	<ul style="list-style-type: none"> <li>• Indoor / outdoor supply voltage</li> </ul>
H38	Indoor / outdoor mismatch (brand code)	-	-	-
H58	Gas sensor abnormality	Continue for 6 hours	○	<ul style="list-style-type: none"> <li>• Gas sensor (defective or disconnected)</li> </ul>
H59	Eco Patrol sensor abnormality	Continue for 70 sec.	○	<ul style="list-style-type: none"> <li>• Eco Patrol sensor (defective or disconnected)</li> <li>• Eco Patrol PCB</li> </ul>
H97	Outdoor fan lock abnormality	2 occurrences within 30 minutes		<ul style="list-style-type: none"> <li>• Outdoor fan motor locked</li> </ul>
H98	Indoor temperature rise abnormality	-	-	<ul style="list-style-type: none"> <li>• Air filter dirty</li> <li>• Air circulation short circuit</li> </ul>
H99	Indoor heat exchanger freeze prevention protection	-	-	<ul style="list-style-type: none"> <li>• Insufficient refrigerant</li> <li>• Air filter dirty</li> </ul>
F11	4 way valve switching failure *	4 occurrences within 30 minutes	-	<ul style="list-style-type: none"> <li>• 4-way valve</li> <li>• v-coil</li> </ul>
F90	System and compressor microcomputer communication error(for S10*** only)	2 occurrences within 5 seconds	-	<ul style="list-style-type: none"> <li>• Compressor</li> <li>• Outdoor PCB</li> </ul>
F90	Power factor correction abnormality	4 occurrences within 20 minutes	-	<ul style="list-style-type: none"> <li>• Outdoor PCB</li> </ul>
F91	Refrigerant cycle abnormal	2 occurrences within 20 minutes	-	<ul style="list-style-type: none"> <li>• No refrigerant ( 3-way valve is closed)</li> </ul>
F93	Outdoor compressor abnormal revolution	4 occurrences within 20 minutes	-	<ul style="list-style-type: none"> <li>• Outdoor compressor</li> </ul>
F95	Cooling high pressure protection	4 occurrences within 20 minutes	-	<ul style="list-style-type: none"> <li>• Outdoor refrigerant circuit</li> </ul>
F96	Intelligent power transistor overheating protection	-	-	<ul style="list-style-type: none"> <li>• Excess refrigerant</li> <li>• Improper heat radiation</li> <li>• IPM (Power transistor)</li> </ul>
F97	Compressor temperature rise protection control	4 times occurrence within 20 minutes	-	<ul style="list-style-type: none"> <li>• Insufficient refrigerant</li> <li>• Compressor</li> </ul>
F98	Total running current protection	3 times occurrence within 20 minutes	-	<ul style="list-style-type: none"> <li>• Excess refrigerant</li> <li>• Improper heat radiation</li> </ul>
F99	Outdoor direct current (DC) peak detection	7 times occurrence continuously	-	<ul style="list-style-type: none"> <li>• Outdoor PCB</li> <li>• IPM (Power transistor)</li> <li>• Compressor</li> </ul>

Note:

“○” – Frequency measured and fan speed fixed

“\*” – For cooling only model, it is the indication when indoor heat exchanger sensor or indoor air intake sensor has abnormality.

The memory data of error code is erased when the power supply is cut off, or press the Auto Switch until “beep” sound heard following by pressing the CHECK button at remote control.

Although operation forced to stop when abnormality detected, emergency operation is possible for certain errors (refer to Error Code Table) by using remote control or Auto OFF/ON button at indoor unit. However, the remote control signal receiving sound is changed from one “beep” to four “beep” sounds.

## 14.4 Troubleshooting Flowchart

### 14.4.1 H11 (Indoor/Outdoor Abnormal Communication)

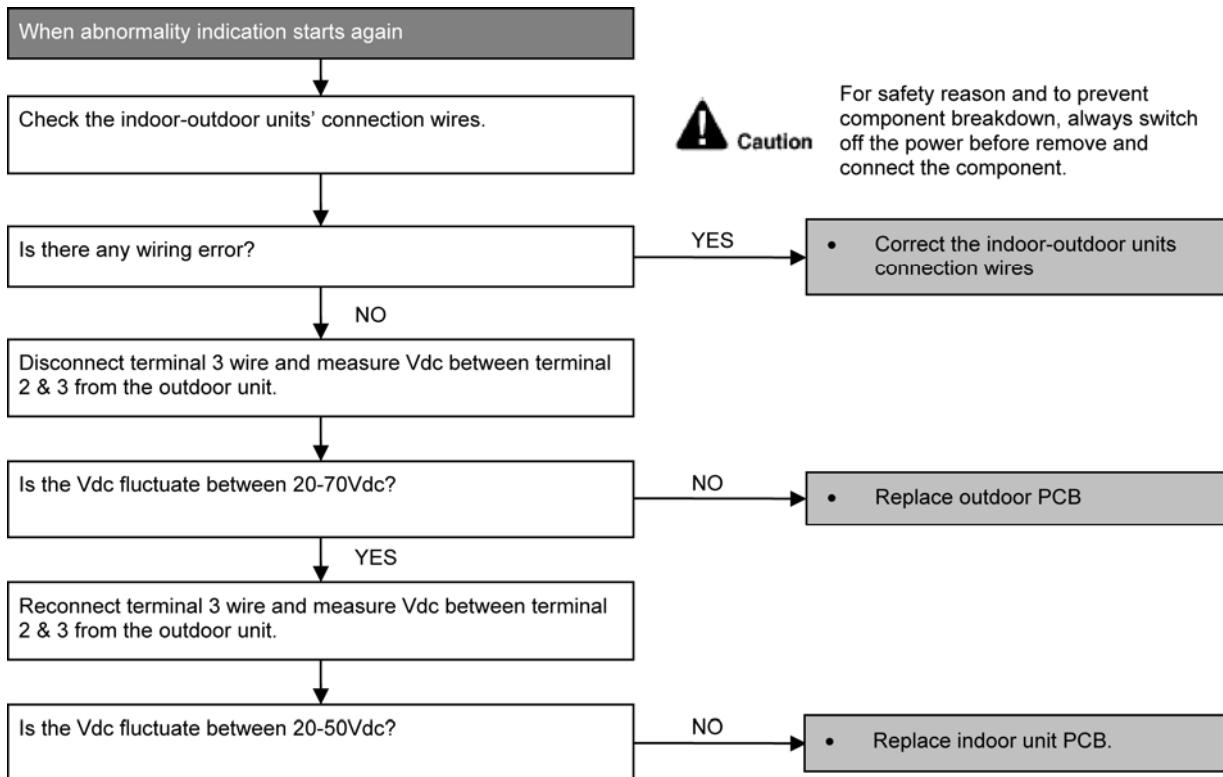
#### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

#### Malfunction Caused

- Faulty indoor unit PCB.
- Faulty outdoor unit PCB.
- Indoor unit-outdoor unit signal transmission error due to wrong wiring.
- Indoor unit-outdoor unit signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.
- Indoor unit-outdoor unit signal transmission error due to disturbed power supply waveform.

#### Troubleshooting



## 14.4.2 H12 (Indoor/Outdoor Capacity Rank Mismatched)

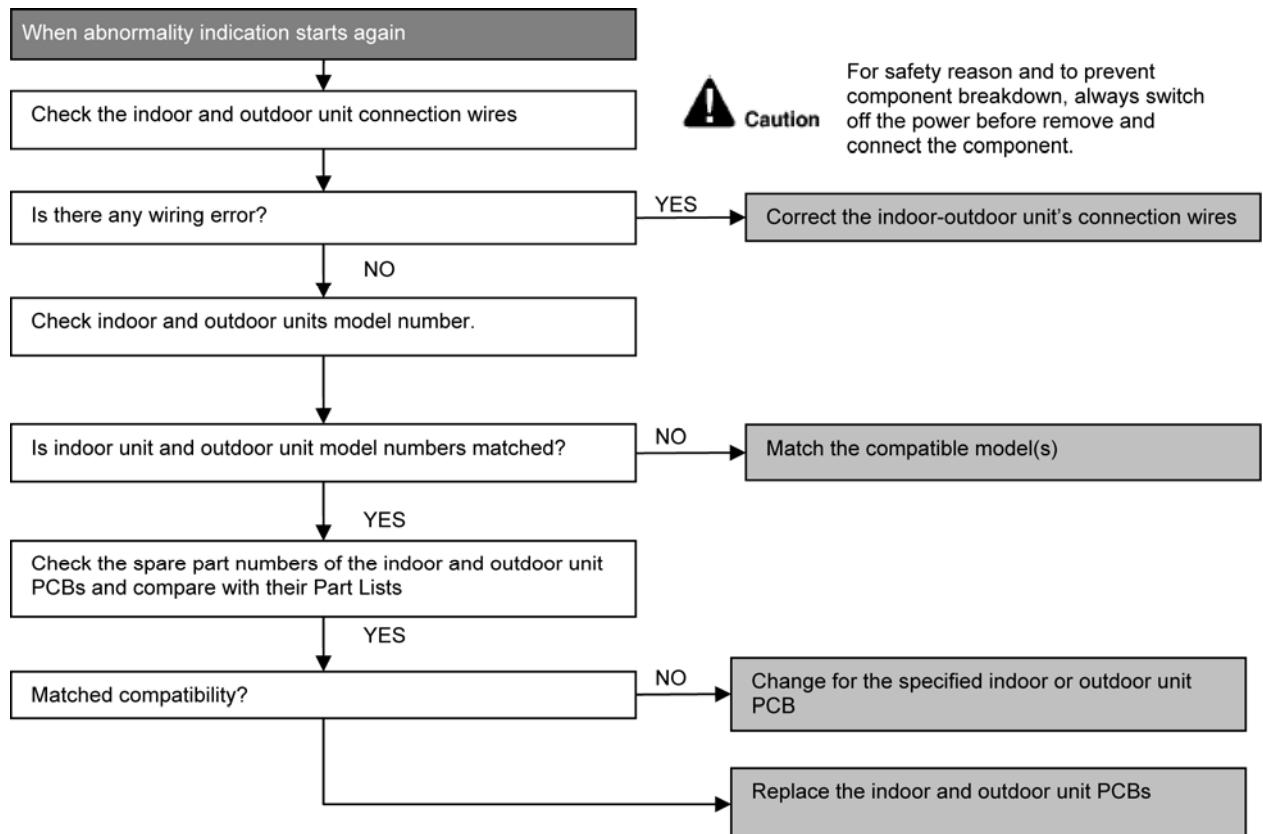
### Malfunction Decision Conditions

- During startup, error code appears when different types of indoor and outdoor units are interconnected.

### Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit or outdoor unit PCBs mounted.
- Indoor unit or outdoor unit PCBs defective.
- Indoor-outdoor unit signal transmission error due to wrong wiring.
- Indoor-outdoor unit signal transmission error due to breaking of wire 3 in the connection wires between the indoor and outdoor units.

### Troubleshooting



### 14.4.3 H14 (Indoor Intake Air Temperature Sensor Abnormality)

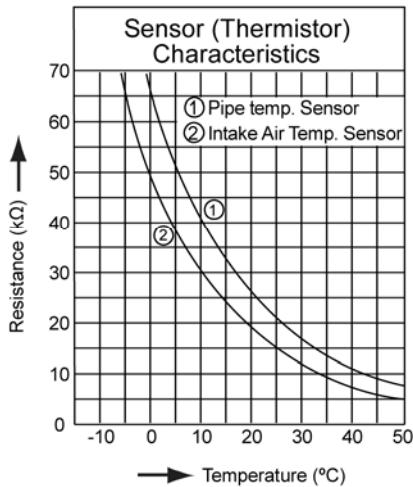
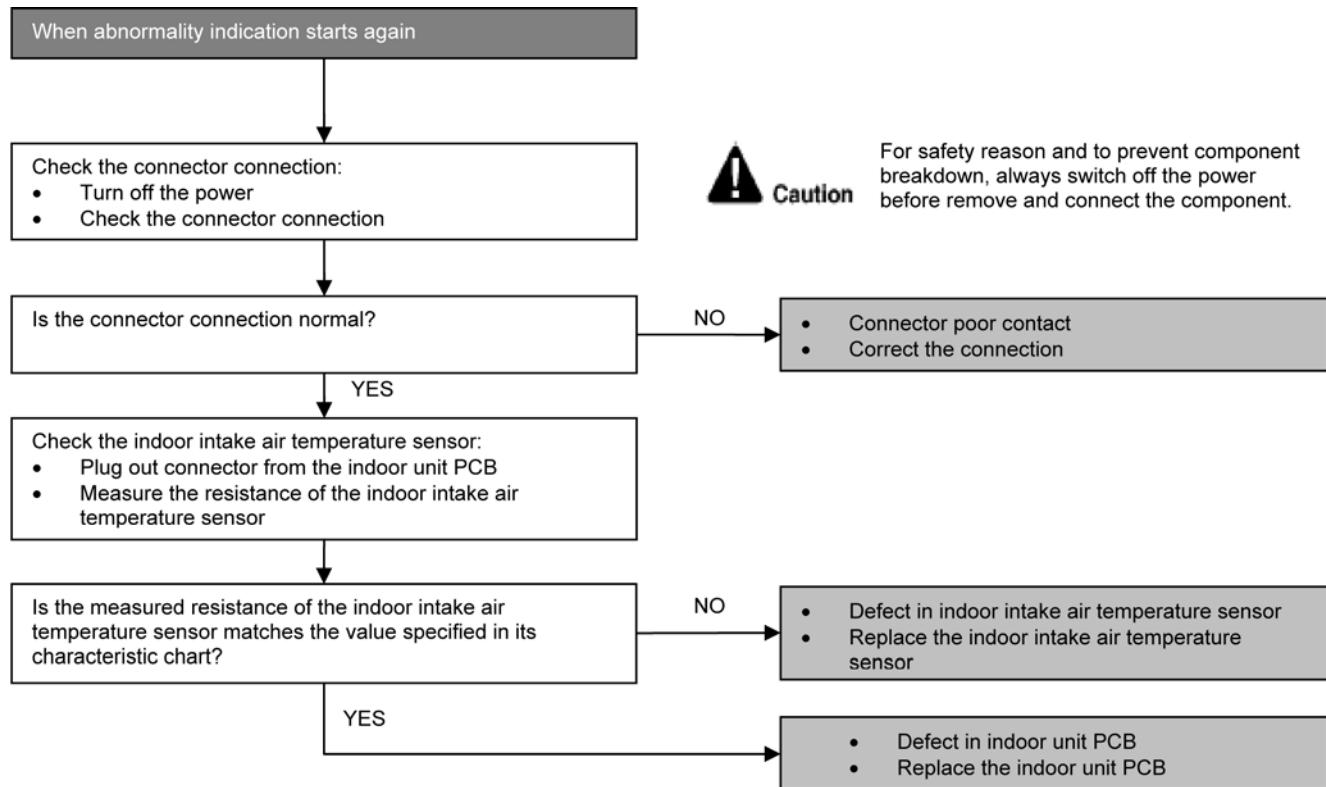
#### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the indoor intake air temperature sensor are used to determine sensor errors.

#### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

#### Troubleshooting



#### 14.4.4 H15 (Compressor Temperature Sensor Abnormality)

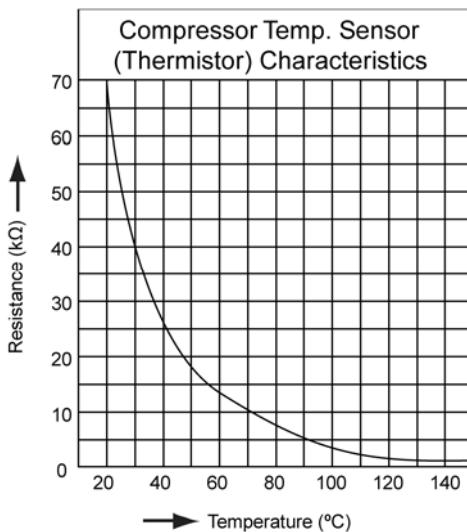
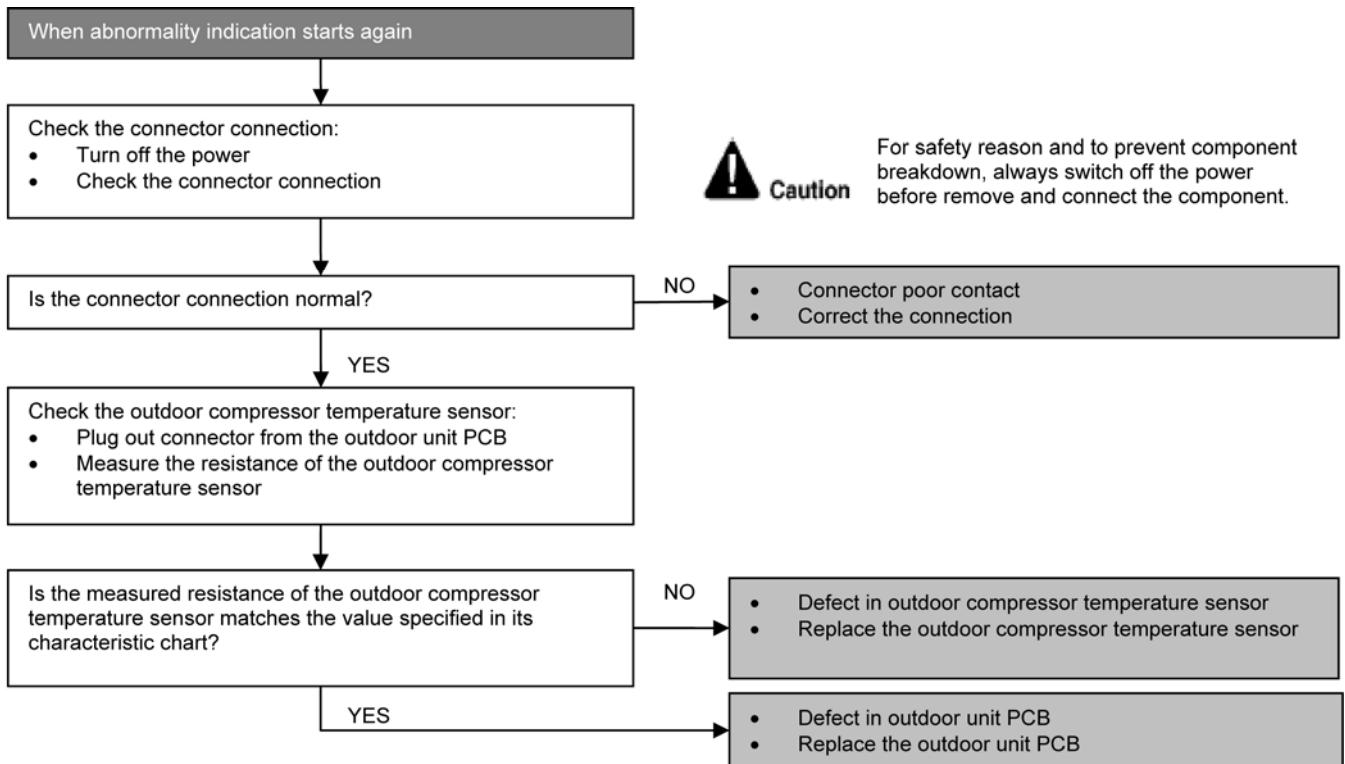
##### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor compressor temperature sensor are used to determine sensor errors.

##### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

##### Troubleshooting



#### 14.4.5 H16 (Outdoor Current Transformer Open Circuit)

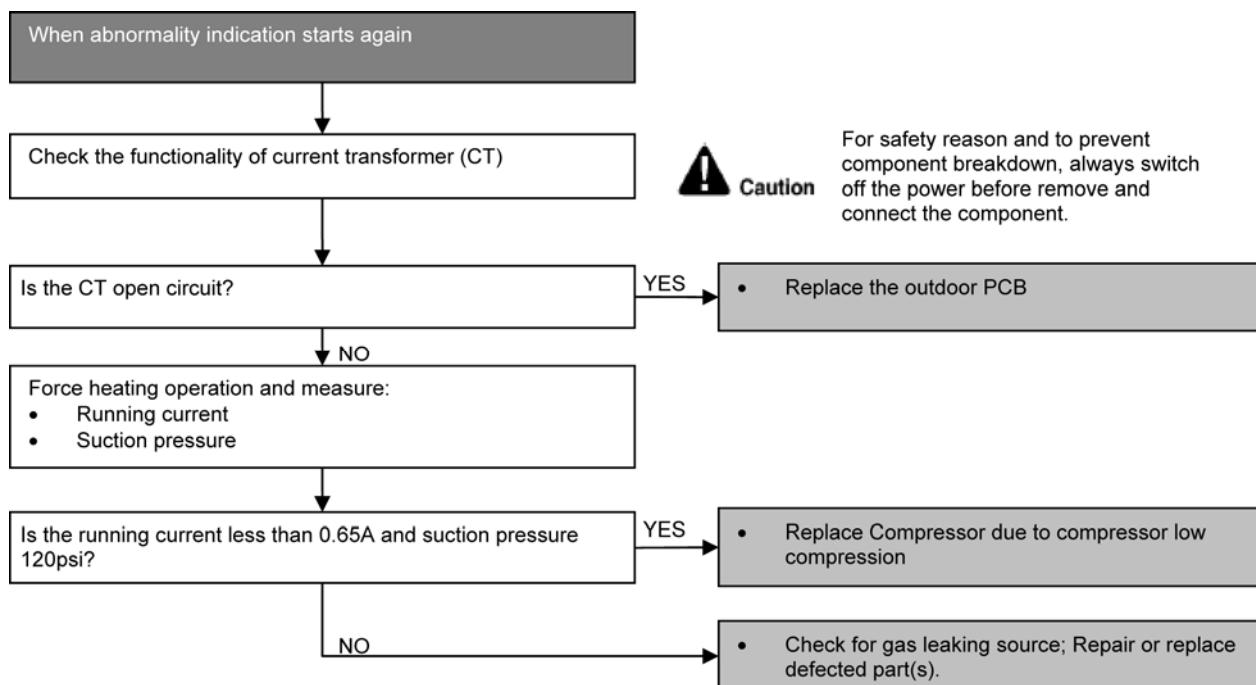
##### Malfunction Decision Conditions

- A current transformer (CT) is detected by checking the compressor running frequency ( $\geq$  rated frequency) and CT detected input current (less than 1.14A) for continuously 20 seconds.

##### Malfunction Caused

- CT defective
- Outdoor PCB defective
- Compressor defective (low compression)

##### Troubleshooting



#### 14.4.6 H19 (Indoor Fan Motor – DC Motor Mechanism Locked)

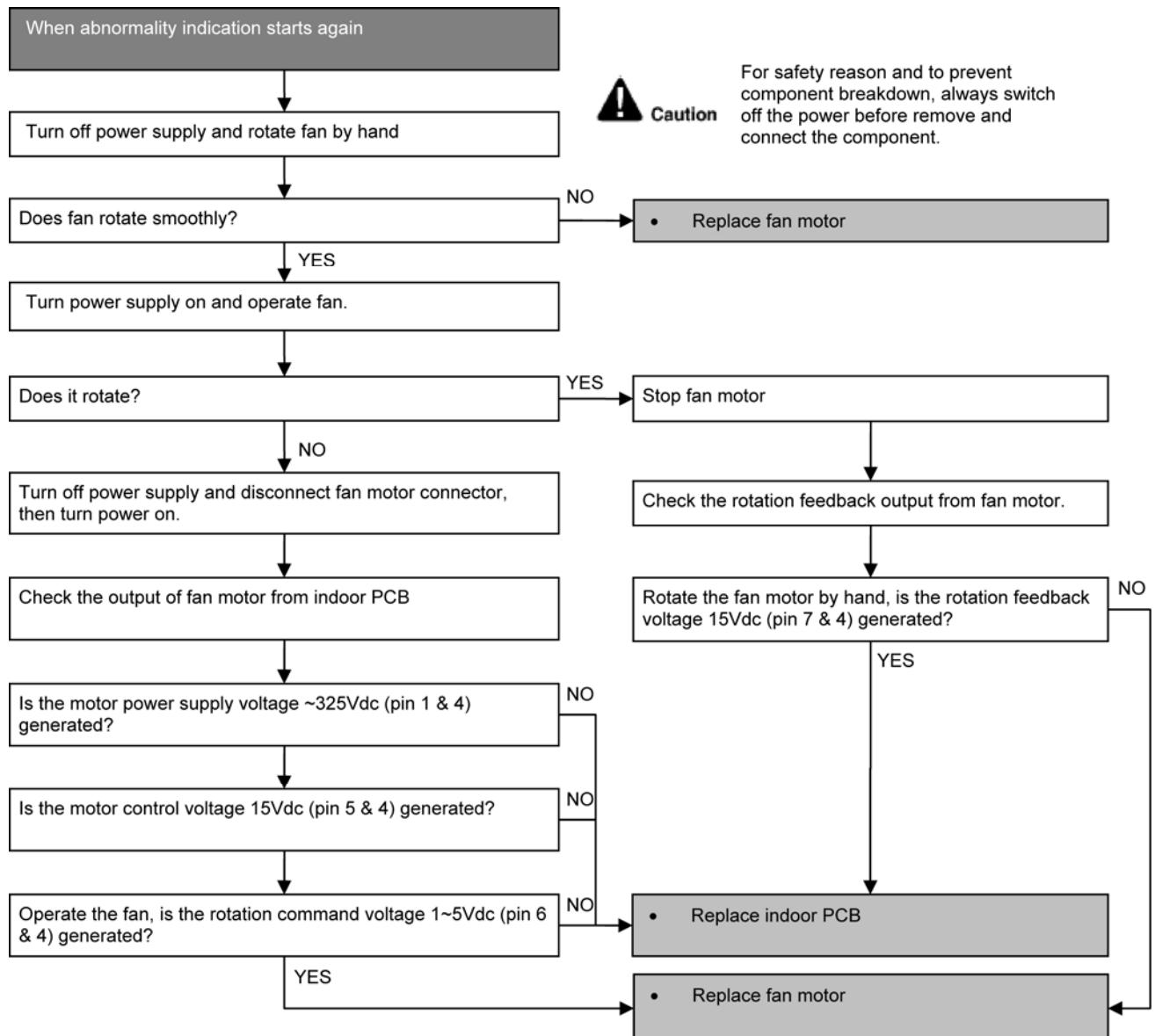
##### Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor (feedback of rotation > 2550rpm or < 50rpm)

##### Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty indoor unit PCB.

##### Troubleshooting



#### 14.4.7 H23 (Indoor Pipe Temperature Sensor Abnormality)

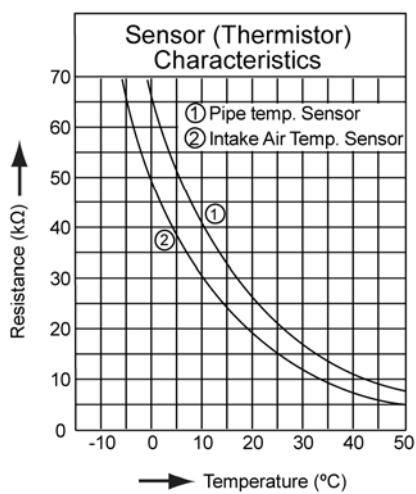
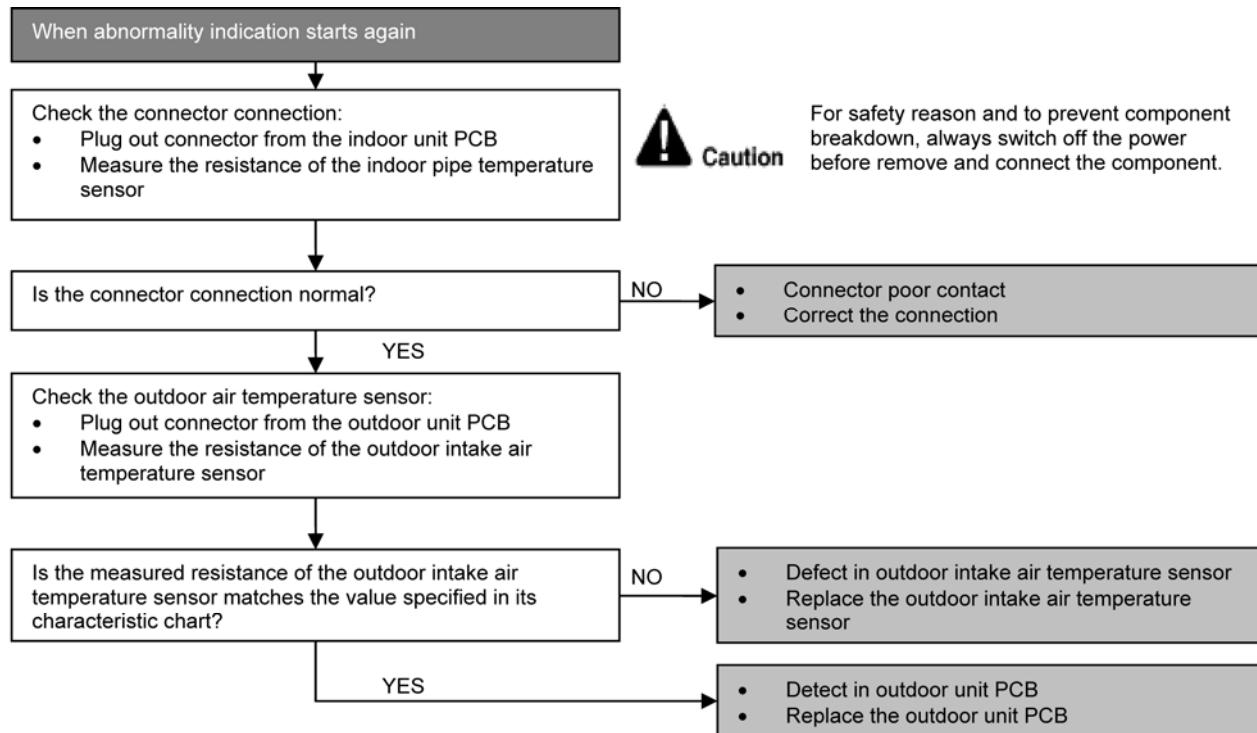
##### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the indoor heat exchanger temperature sensor are used to determine sensor errors.

##### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

##### Troubleshooting



#### 14.4.8 H25 (e-ion Air Purifying System Abnormal)

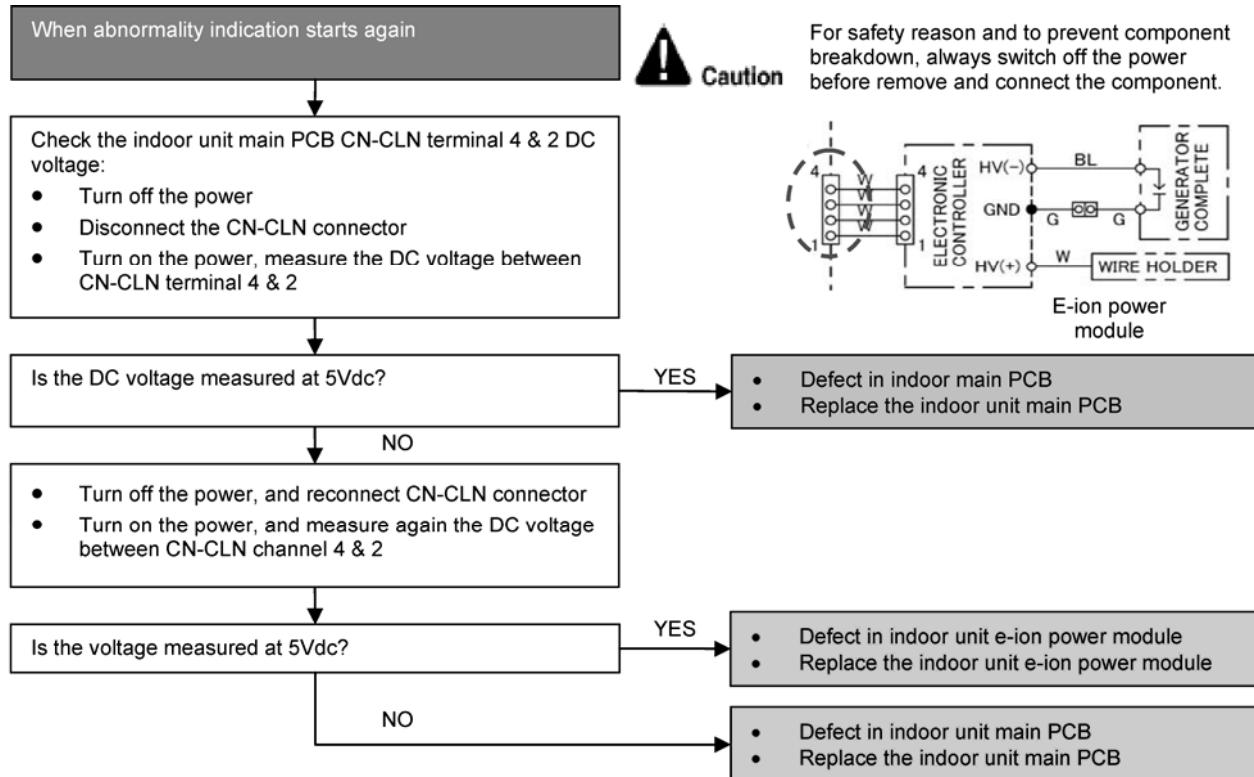
##### Malfunction Decision Conditions

- During standby of cooling and heating operation, e-ion breakdown occurs and air conditioner stops operation.

##### Malfunction Caused

- Faulty indoor main PCB.
- Faulty indoor e-ion power module.

##### Troubleshooting



#### 14.4.9 H27 (Outdoor Air Temperature Sensor Abnormality)

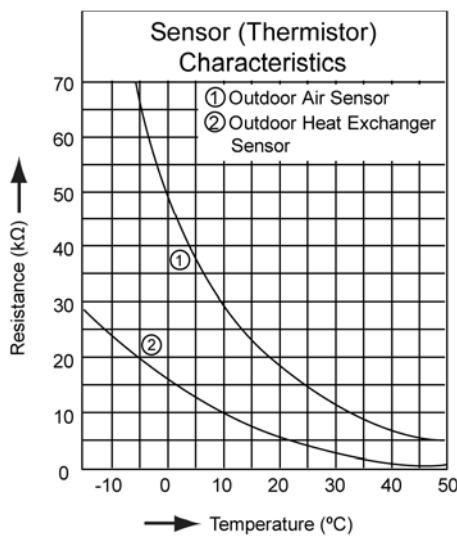
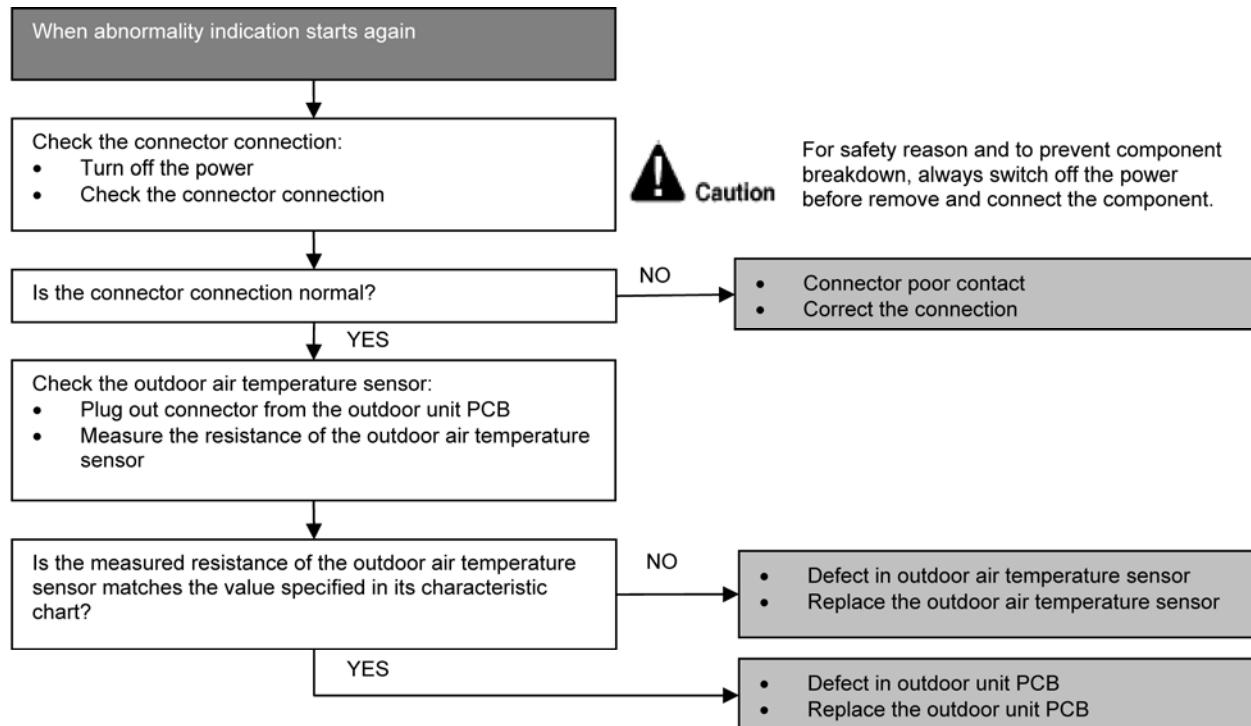
##### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor errors.

##### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

##### Troubleshooting



## 14.4.10 H28 (Outdoor Pipe Temperature Sensor Abnormality)

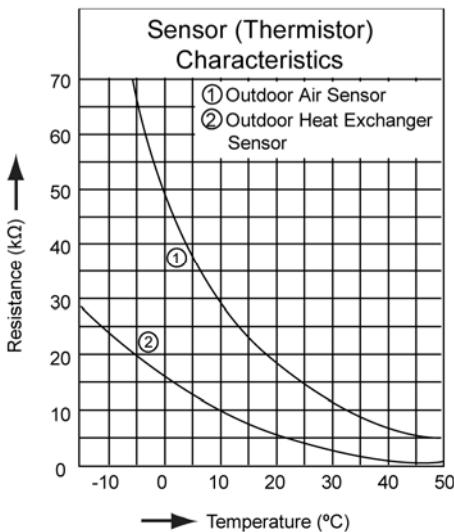
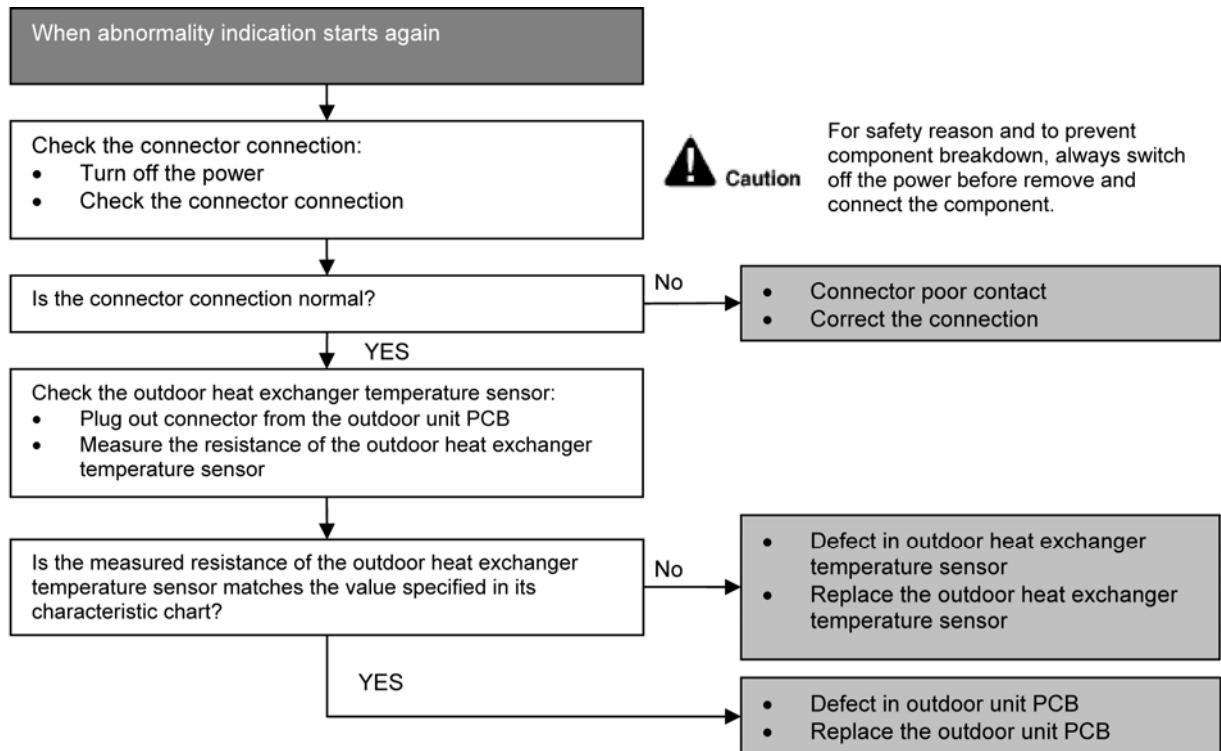
### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor errors.

### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

### Troubleshooting



#### 14.4.11 H30 (Compressor Discharge Temperature Sensor Abnormality)

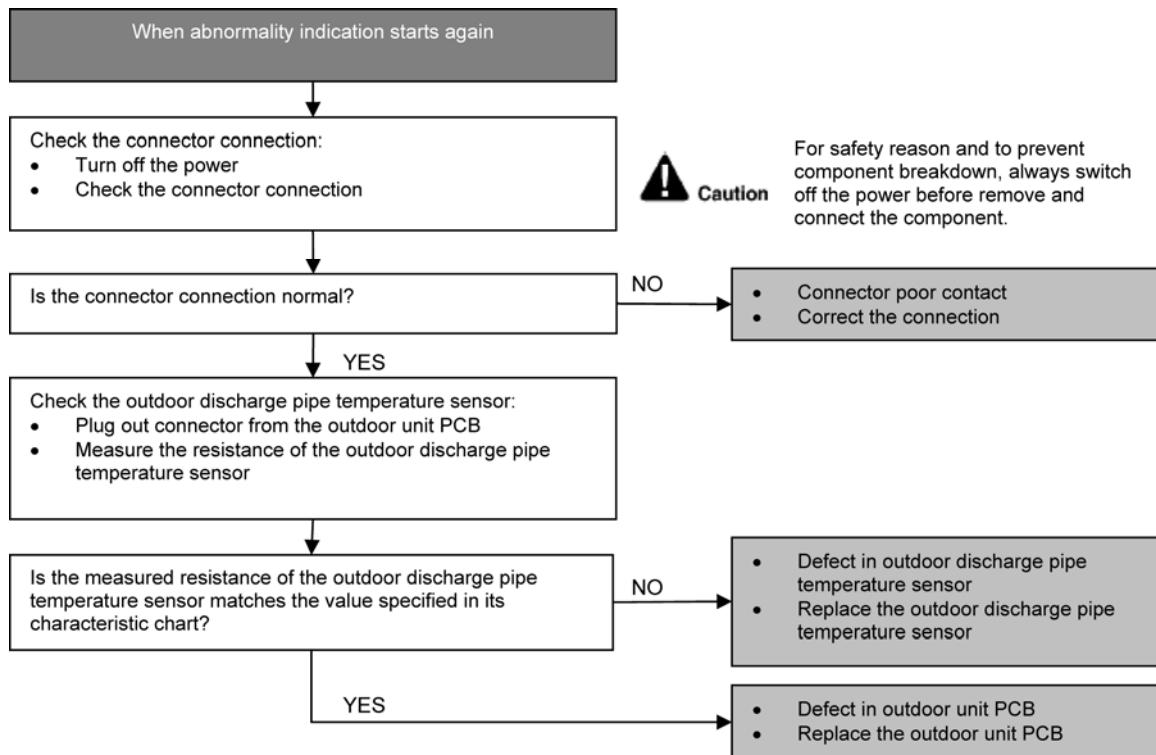
##### Malfunction Decision Conditions

- During startup and operation of cooling and heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor errors.

##### Malfunction Caused

- Faulty connector connection.
- Faulty sensor.
- Faulty PCB.

##### Troubleshooting



#### 14.4.12 H33 (Unspecified Voltage between Indoor and Outdoor)

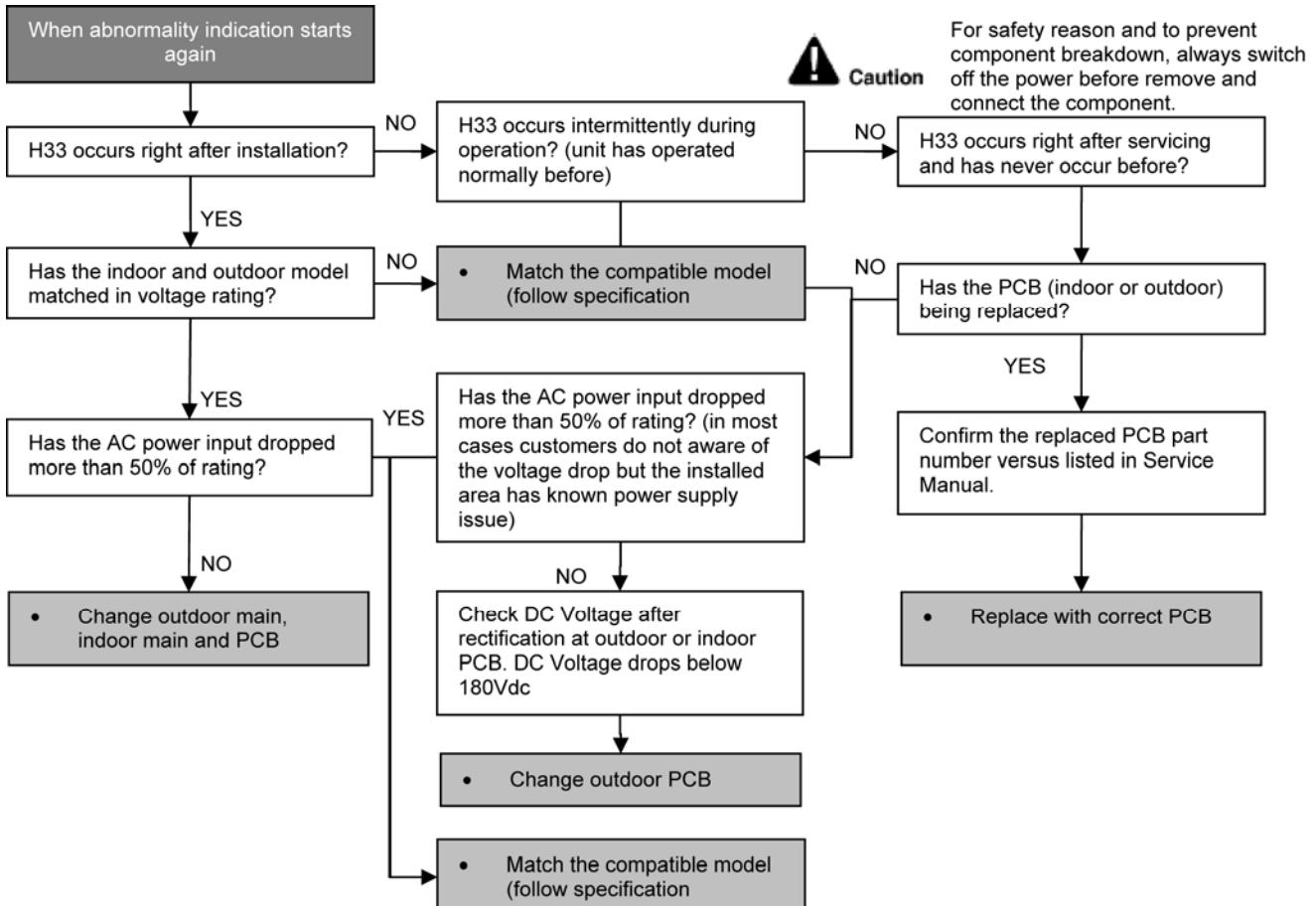
##### Malfunction Decision Conditions

- The supply power is detected for its requirement by the indoor/outdoor transmission.

##### Malfunction Caused

- Wrong models interconnected.
- Wrong indoor unit and outdoor unit PCBs used.
- Indoor unit or outdoor unit PCB defective.

##### Troubleshooting



#### 14.4.13 H58 (Patrol Sensor Abnormality)

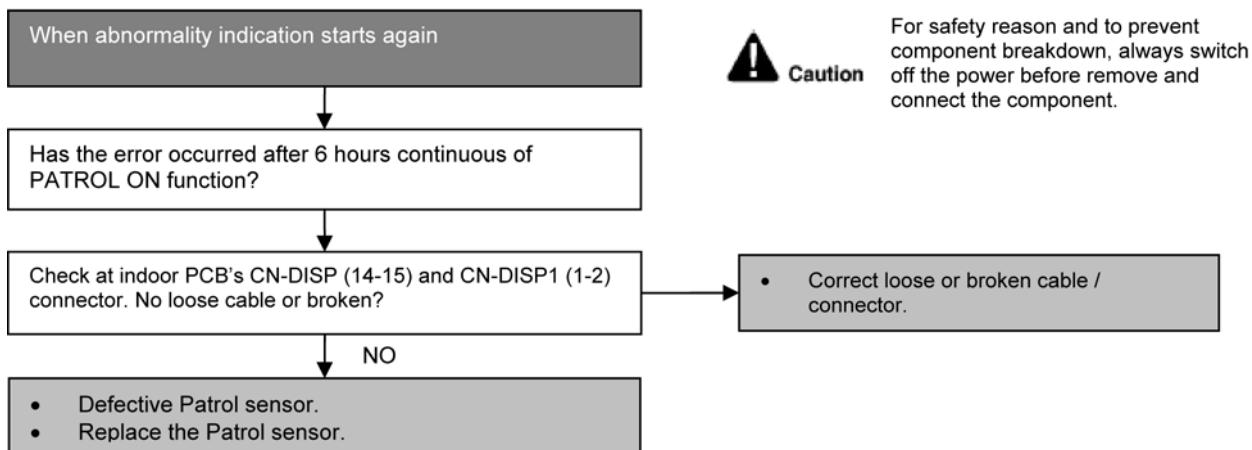
##### Malfunction Decision Conditions

- If Patrol sensor feedback is 0V or 5V continuous for 6 hours.
- Error will display only when the Patrol operation is ON.

##### Malfunction Caused

- Faulty connector connection.
- Faulty Patrol sensor.

##### Troubleshooting



**Caution**  
For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

#### 14.4.14 H97 (Outdoor Fan Motor – DC Motor Mechanism Locked)

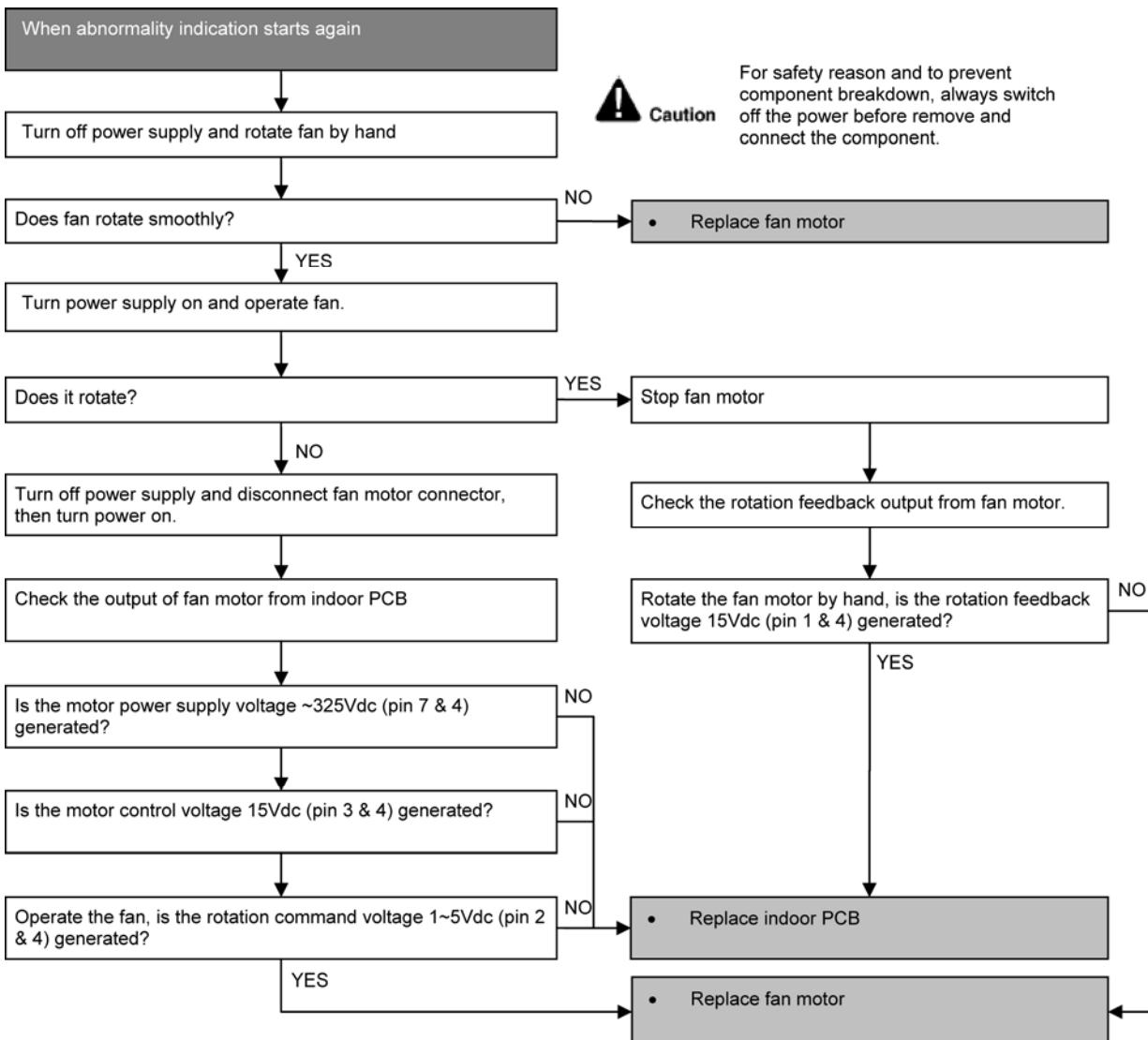
##### Malfunction Decision Conditions

- The rotation speed detected by the Hall IC during fan motor operation is used to determine abnormal fan motor.

##### Malfunction Caused

- Operation stops due to short circuit inside the fan motor winding.
- Operation stops due to breaking of wire inside the fan motor.
- Operation stops due to breaking of fan motor lead wires.
- Operation stops due to Hall IC malfunction.
- Operation error due to faulty outdoor unit PCB.

##### Troubleshooting



#### 14.4.15 H98 (Indoor High Pressure Protection)

Error Code will not display (no Timer LED blinking) but store in EEPROM

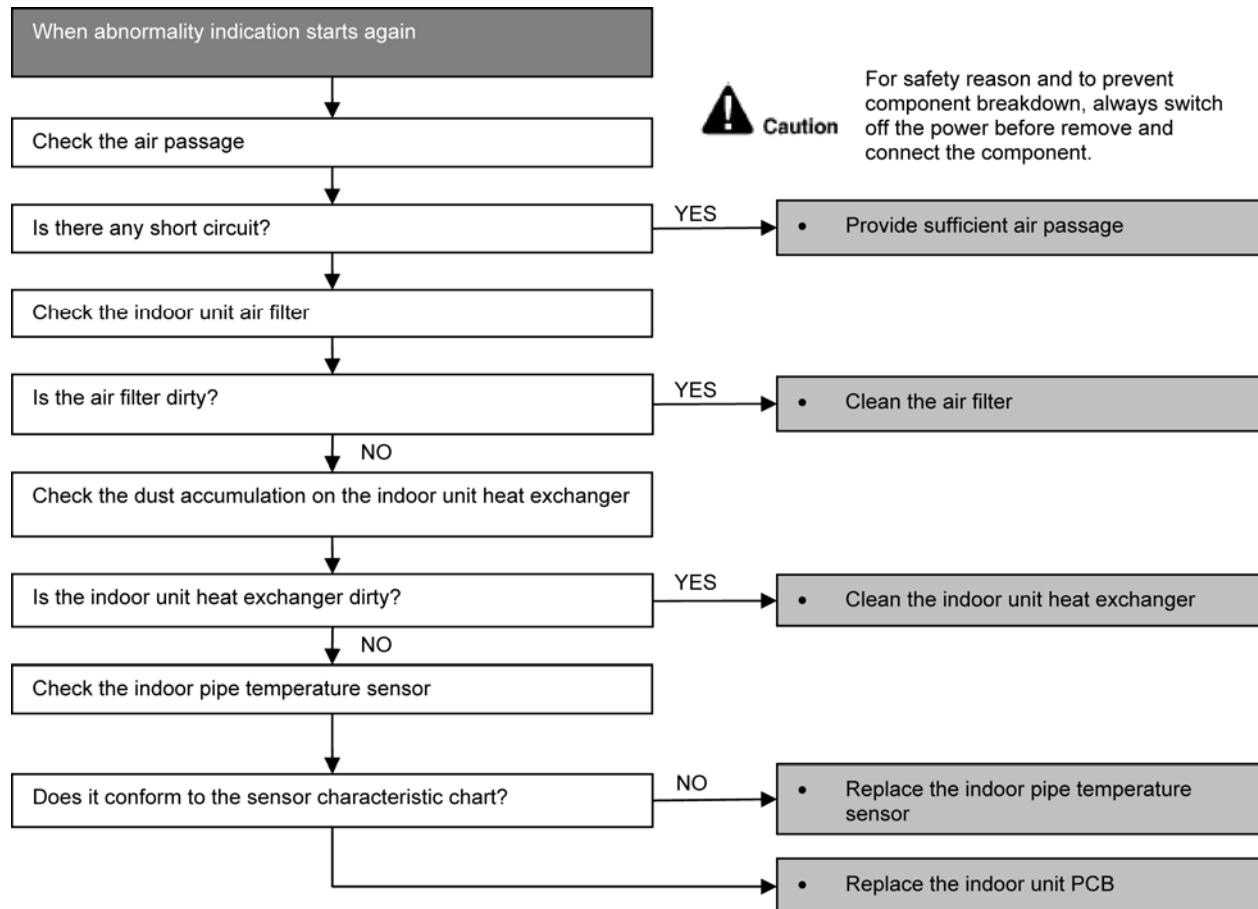
##### Malfunction Decision Conditions

- During heating operation, the temperature detected by the indoor pipe temperature sensor is above 60°C.

##### Malfunction Caused

- Clogged air filter of the indoor unit
- Dust accumulation on the indoor unit heat exchanger
- Air short circuit
- Detection error due to faulty indoor pipe temperature sensor
- Detection error due to faulty indoor unit PCB

##### Troubleshooting



#### 14.4.16 H99 (Indoor Freeze Prevention Protection: Cooling or Soft Dry)

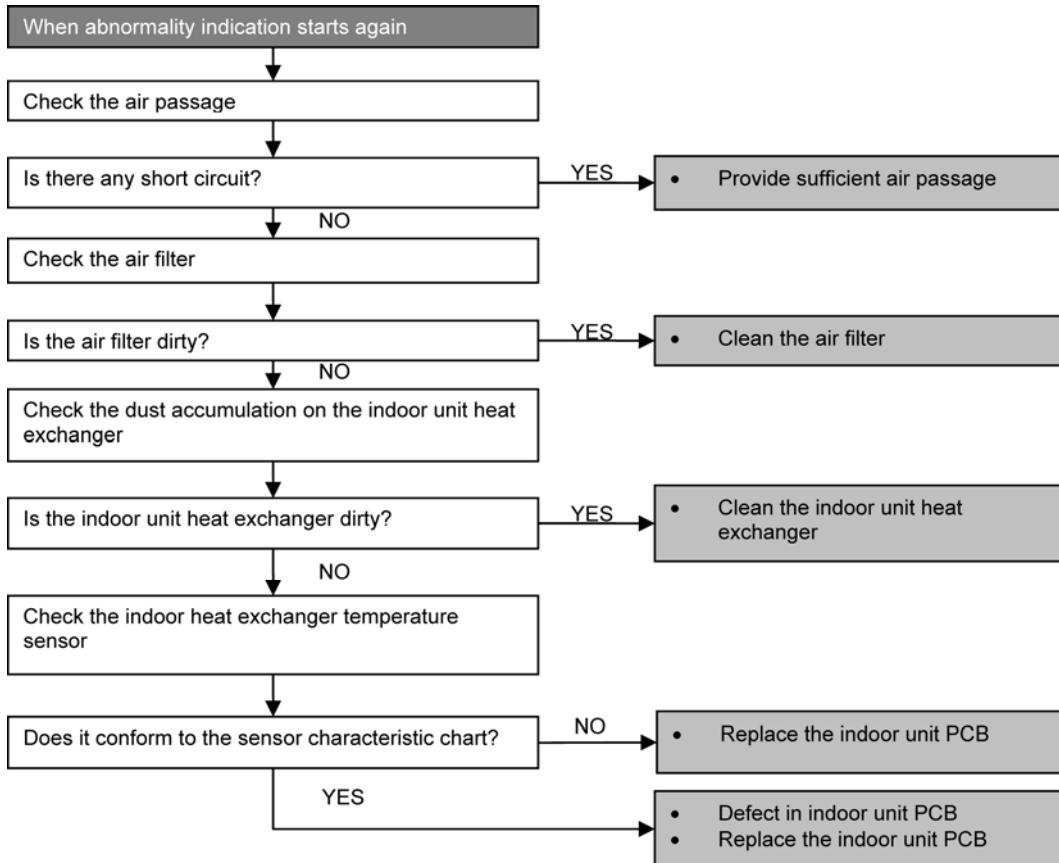
##### Malfunction Decision Conditions

- Freeze prevention control takes place (when indoor pipe temperature is lower than 2°C)

##### Malfunction Caused

- Clogged air filter of the indoor unit
- Dust accumulation on the indoor unit heat exchanger
- Air short circuit
- Detection error due to faulty indoor pipe temperature sensor
- Detection error due to faulty indoor unit PCB

##### Troubleshooting



#### 14.4.17 F11 (Indoor Pipe Temperature Sensor Abnormality)

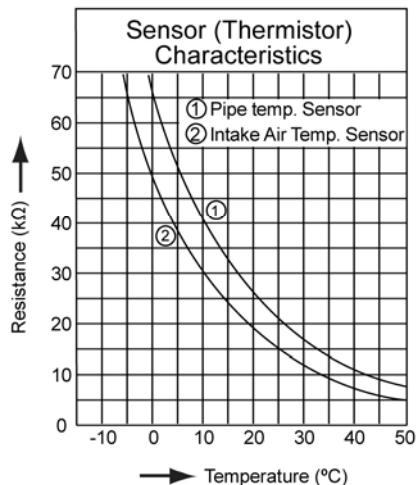
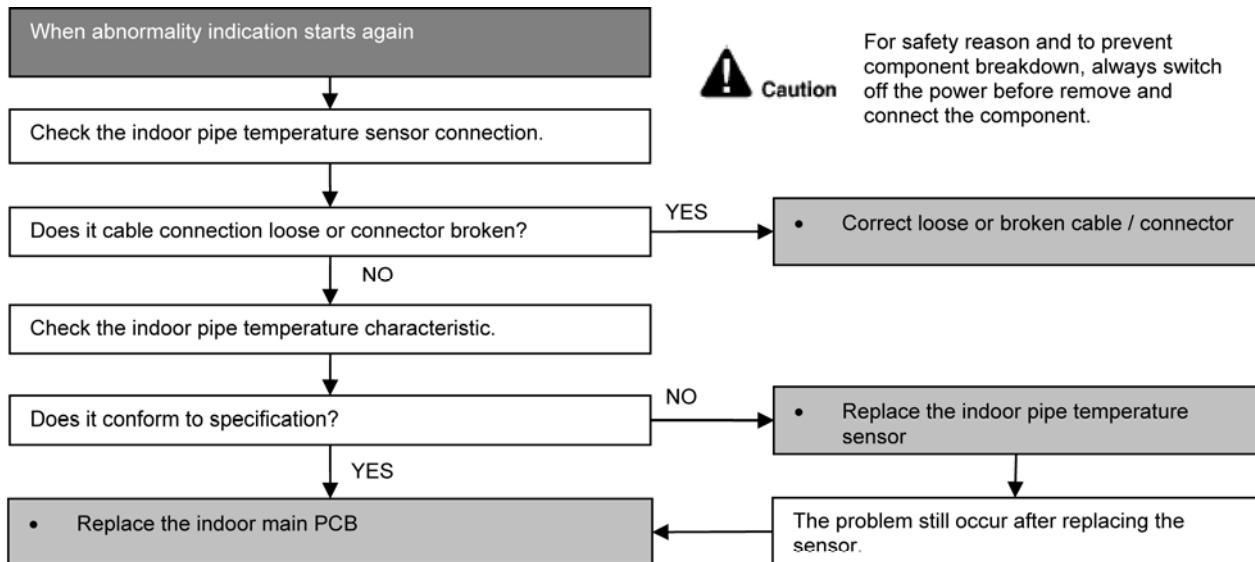
##### Malfunction Decision Conditions

- When cooling operation, when indoor pipe temperature or indoor heat exchanger temperature sensor is above 45°C.

##### Malfunction Caused

- Faulty connector connection.
- Faulty indoor pipe temperature sensor.
- Faulty indoor main PCB.

##### Troubleshooting



#### 14.4.18 F90 (Power Factor Correction Protection)

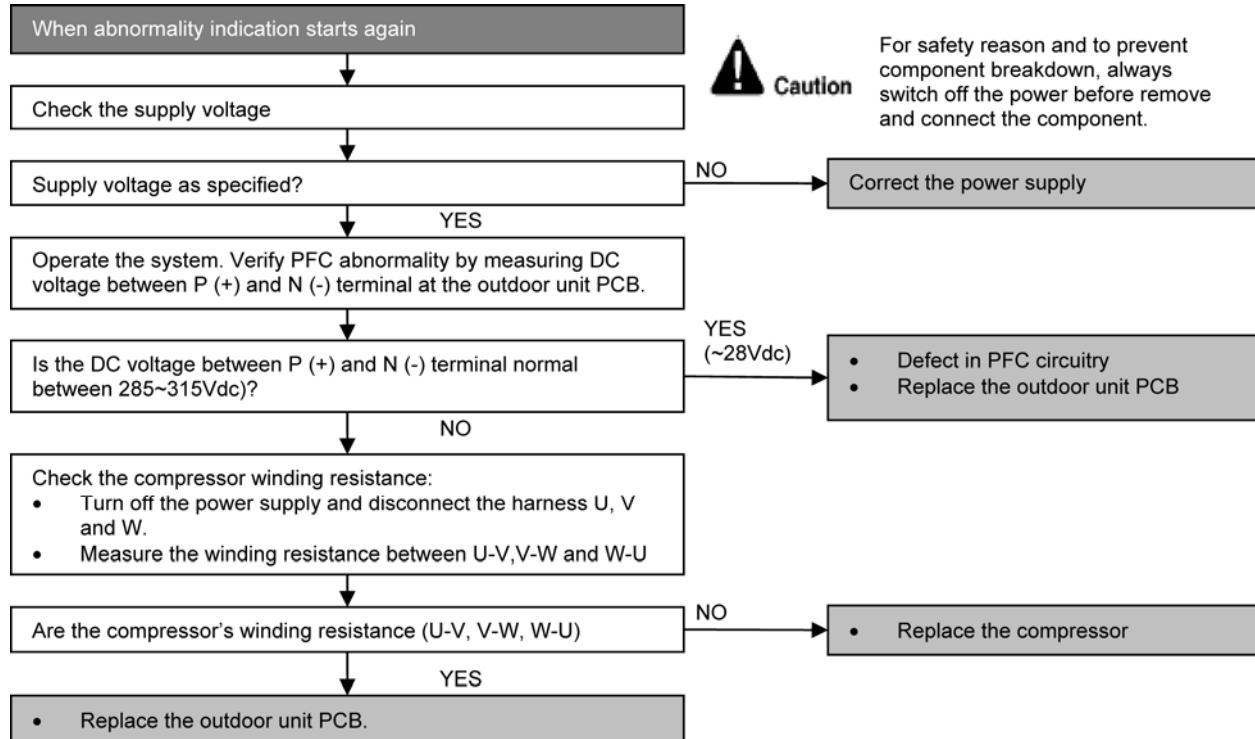
##### Malfunction Decision Conditions

- During startup and operation of cooling and heating, when Power Factor Correction (PFC) protection circuitry at the outdoor unit main PCB senses abnormal high DC voltage level.

##### Malfunction Caused

- DC voltage peak due to power supply surge.
- DC voltage peak due to compressor windings not uniform.
- Faulty outdoor PCB.

##### Troubleshooting



#### 14.4.19 F91 (Refrigeration Cycle Abnormality)

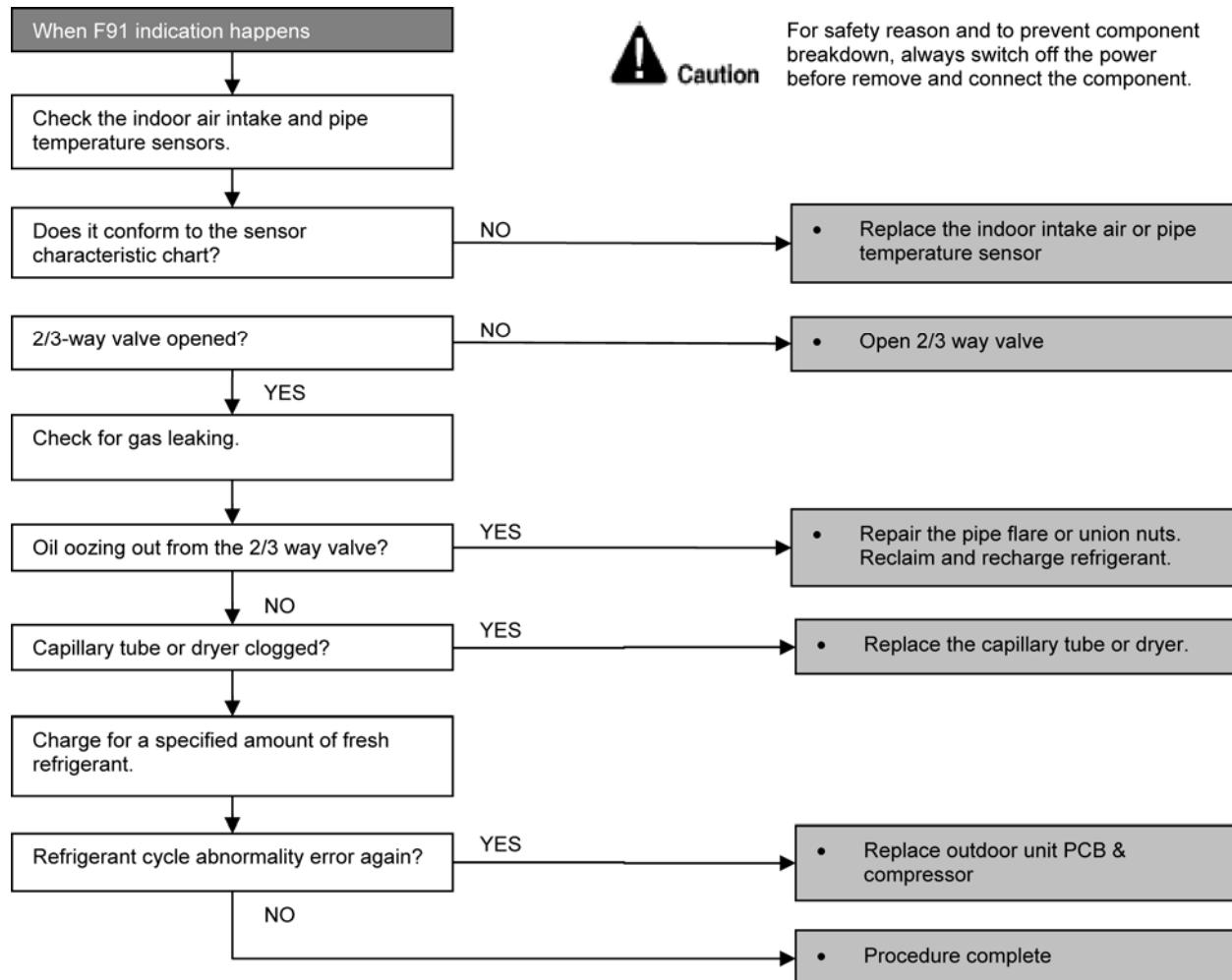
##### Malfunction Decision Conditions

- During cooling, compressor frequency = Fcmax.
- During cooling and heating operation, running current:  $0.65A < I < 1.65A$ .
- During cooling, indoor intake - indoor pipe  $< 4^{\circ}C$ .

##### Malfunction Caused

- Refrigerant shortage (refrigerant leakage)
- Poor compression performance of compressor.
- 2/3 way valve closed.
- Detection error due to faulty indoor intake air or indoor pipe temperature sensors.

##### Troubleshooting



## 14.4.20 F93 (Compressor Rotation Failure)

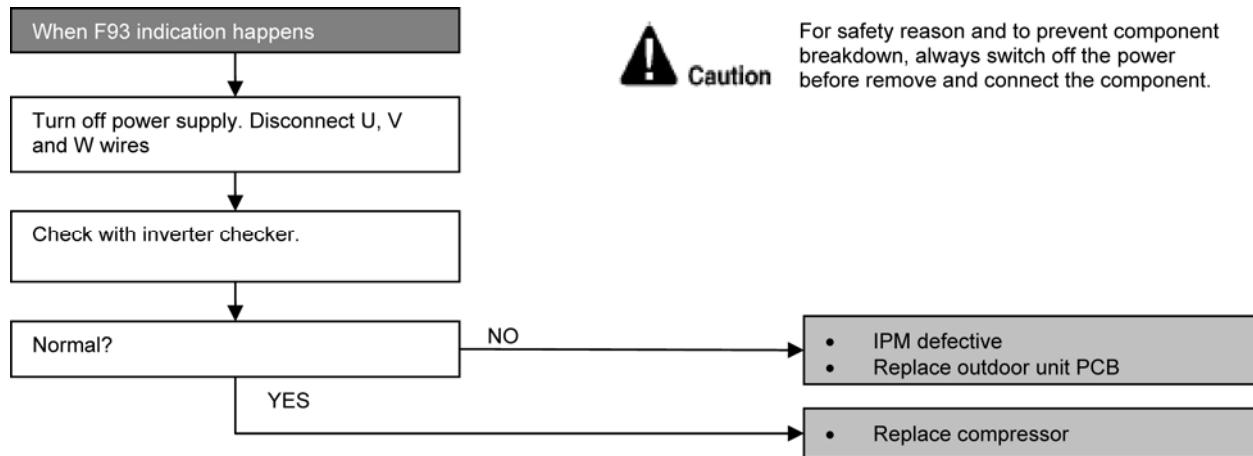
### Malfunction Decision Conditions

A compressor rotation failure is detected by checking the compressor running condition through the position detection circuit.

### Malfunction Caused

- Compressor terminal disconnect
- Outdoor PCB malfunction

### Troubleshooting



## 14.4.21 F95 (Cooling High Pressure Abnormality)

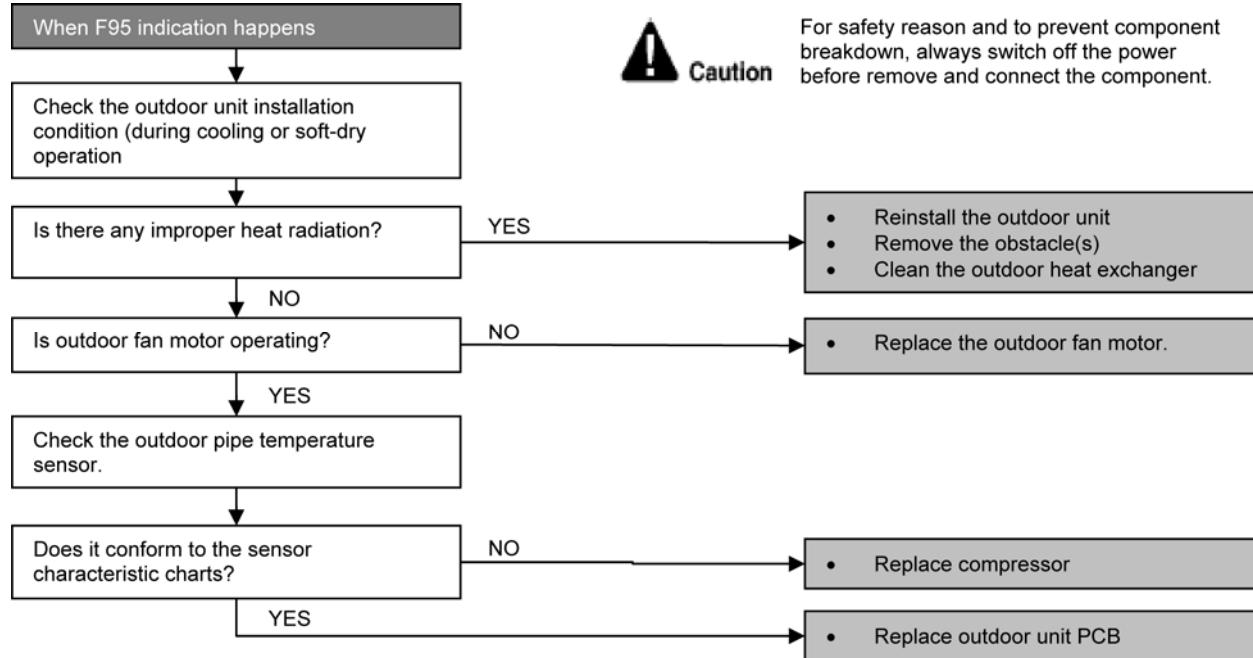
### Malfunction Decision Conditions

During operation of cooling, when outdoor unit heat exchanger high temperature data (61°C) is detected by the outdoor pipe temperature sensor.

### Malfunction Caused

- Outdoor pipe temperature rise due to short circuit of hot discharge air flow.
- Outdoor pipe temperature rise due to defective of outdoor fan motor.
- Outdoor pipe temperature rise due to defective outdoor pipe temperature sensor.
- Outdoor pipe temperature rise due to defective outdoor unit PCB.

### Troubleshooting



## 14.4.22 F96 (IPM Overheating)

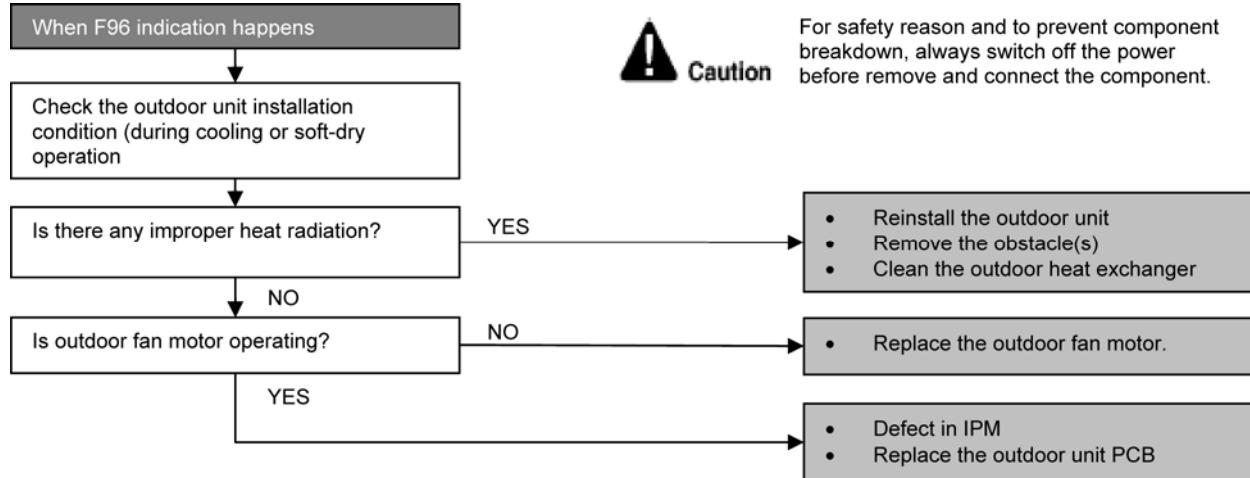
### Malfunction Decision Conditions

During operating of cooling and heating, when IPM temperature data (100°C) is detected by the IPM temperature sensor.

### Malfunction Caused

- IPM overheats due to short circuit of hot discharge air flow.
- IPM overheats due to defective of outdoor fan motor.
- IPM overheats due to defective of internal circuitry of IPM.
- IPM overheats due to defective IPM temperature sensor.

### Troubleshooting



## 14.4.23 F97 (Compressor Overheating)

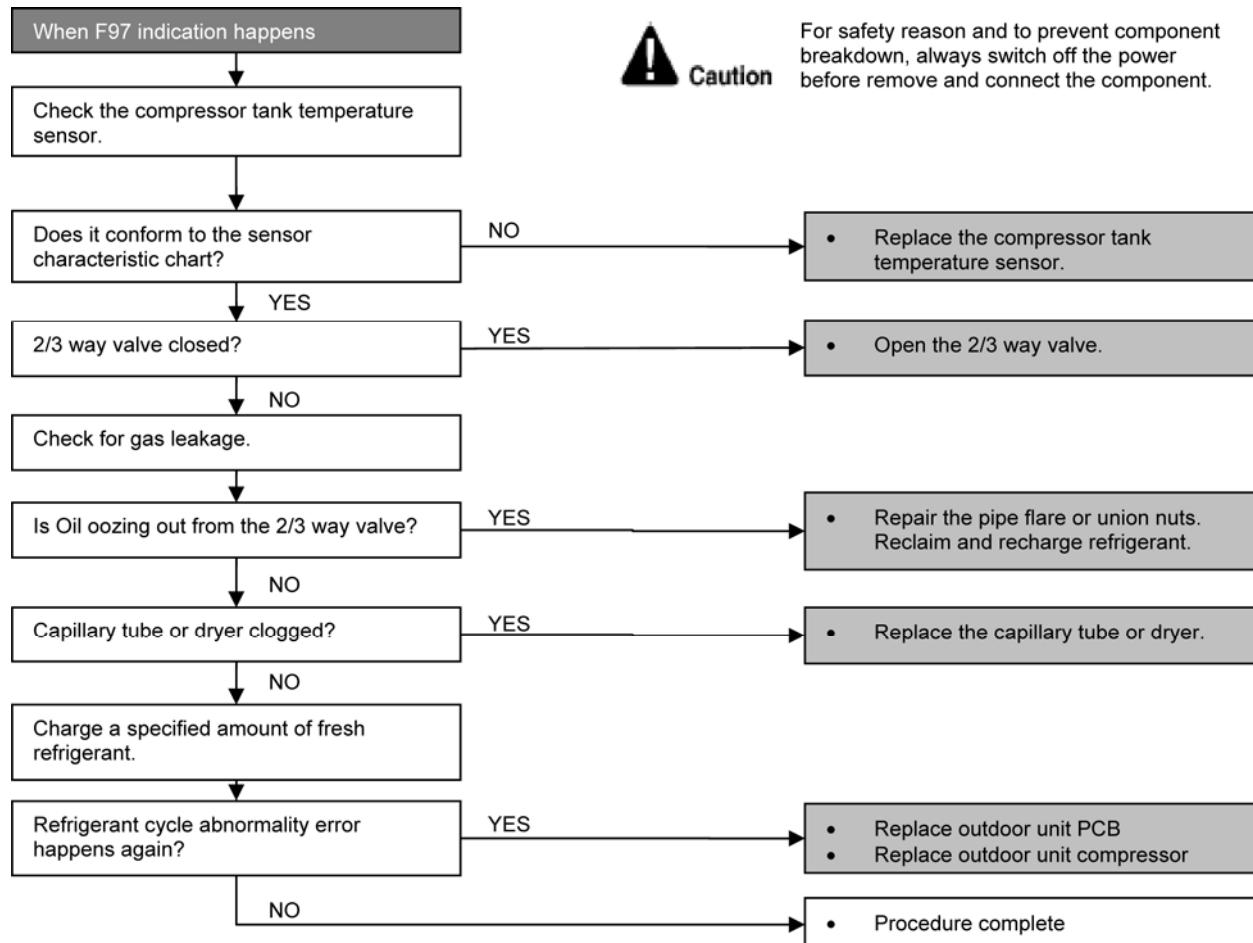
### Malfunction Decision Conditions

During operation of cooling and heating, when compressor tank temperature data (112°C) is detected by the compressor tank temperature sensor.

### Malfunction Caused

- Refrigerant shortage (refrigerant leakage).
- 2/3 way valve closed.
- Detection error due to faulty compressor tank temperature sensor.

### Troubleshooting



#### 14.4.24 F98 (Input Over Current Detection)

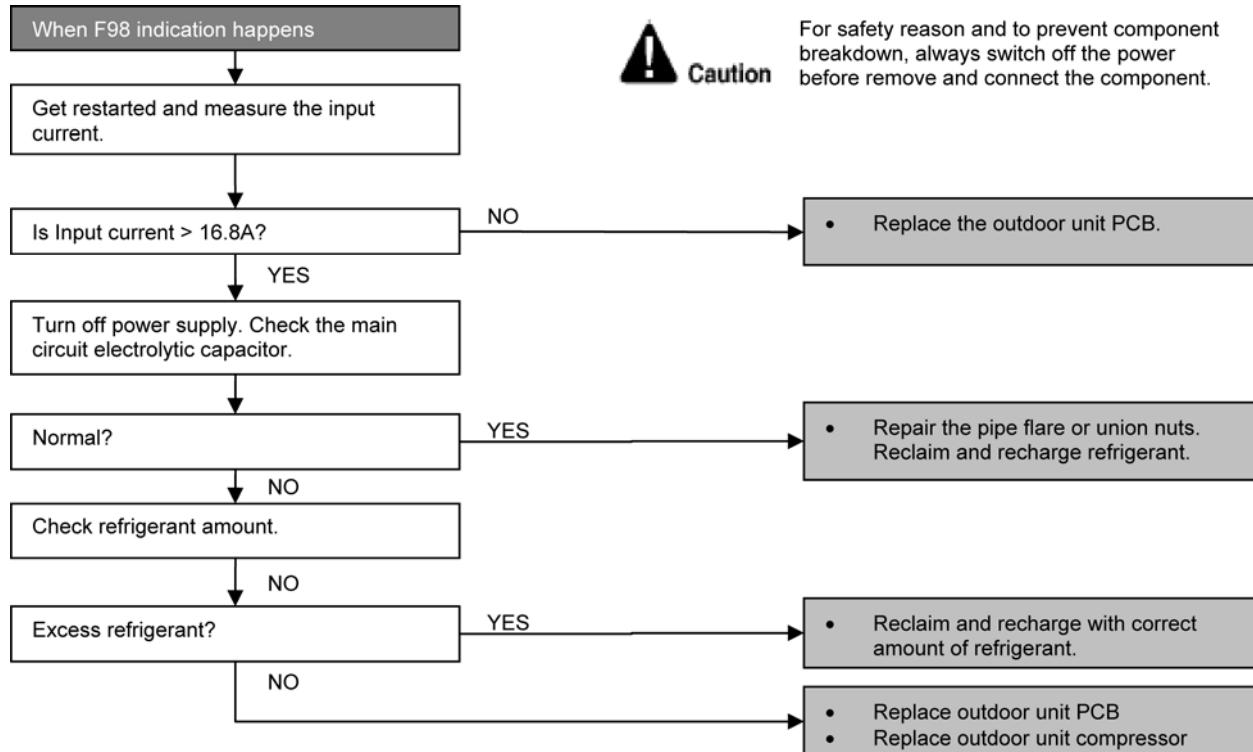
##### Malfunction Decision Conditions

During cooling and heating operation, when an input over-current (16.8A) is detected by checking the input current value being detected by current transformer (CT) with the compressor running.

##### Malfunction Caused

- Over-current due to compressor failure.
- Over-current due to defective outdoor unit PCB.
- Over-current due to defective inverter main circuit electrolytic capacitor.
- Over-current due to excessive refrigerant.

##### Troubleshooting



## 14.4.25 F99 (Output Over Current Detection)

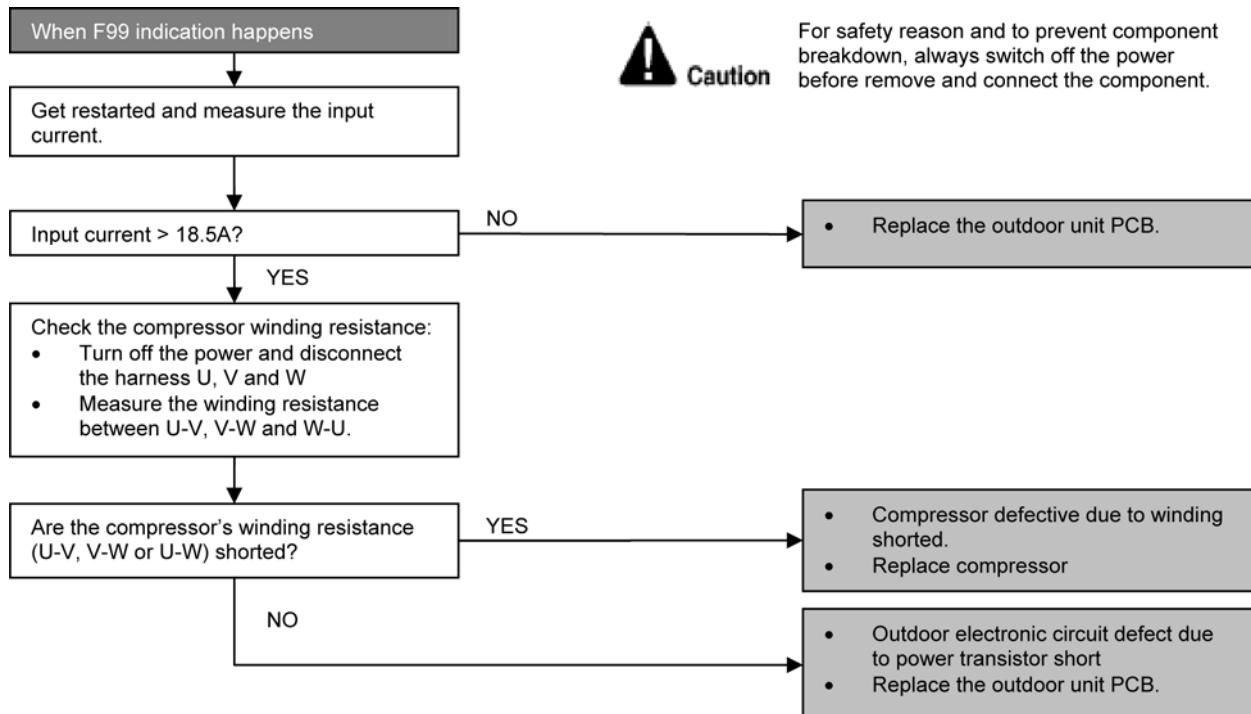
### Malfunction Decision Conditions

During operation of cooling and heating, when an output over-current (18.5A) is detected by checking the current that flows in the inverter DC peak sensing circuitry.

### Malfunction Caused

- DC peak due to compressor failure.
- DC peak due to defective power transistor(s).
- DC peak due to defective outdoor unit PCB.

### Troubleshooting



- Checking the power transistor
- Never touch any live parts for at least 10 minutes after turning off the circuit breaker.
- If unavoidable necessary to touch a live part, make sure the power transistor's supply voltage is below 50V using the tester.
- For the UVW, make measurement at the Faston terminal on the board of the relay connector.

Tester's negative terminal	Power transistor (+)	UVW	Power transistor (-)	UVW
Tester's positive terminal	UVW	Power transistor (+)	UVW	Power transistor (-)
Normal resistance	Several kΩ to several MΩ			
Abnormal resistance	0 or ∞			

## 15. Disassembly and Assembly Instructions

### WARNING

High Voltage is generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

### 15.1 CS-S9NKR CS-S12NKR

#### 15.1.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

##### 15.1.1.1 To remove front grille

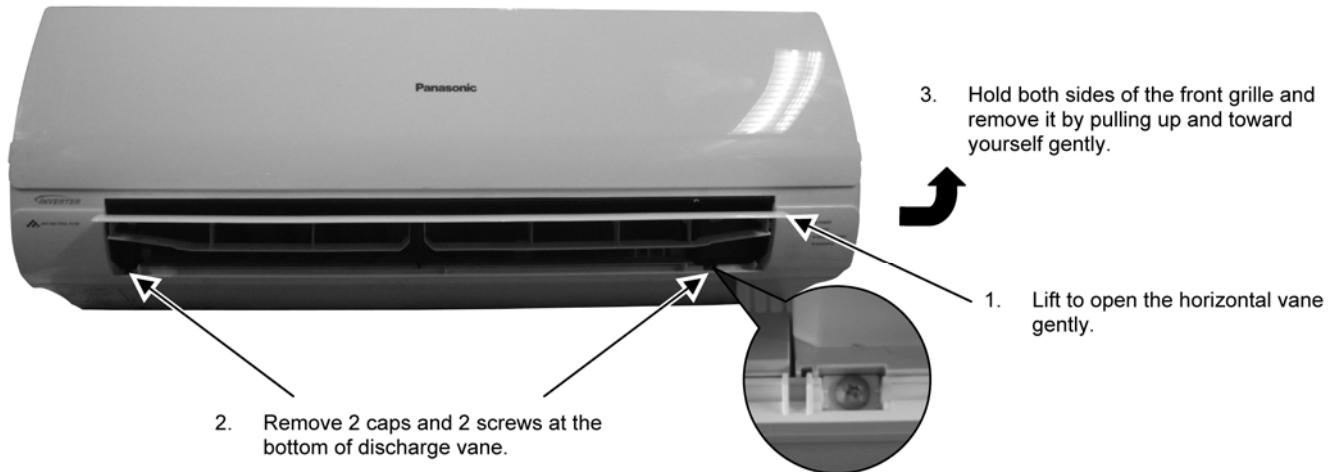


Figure 1

##### 15.1.1.2 To remove main electronic controller

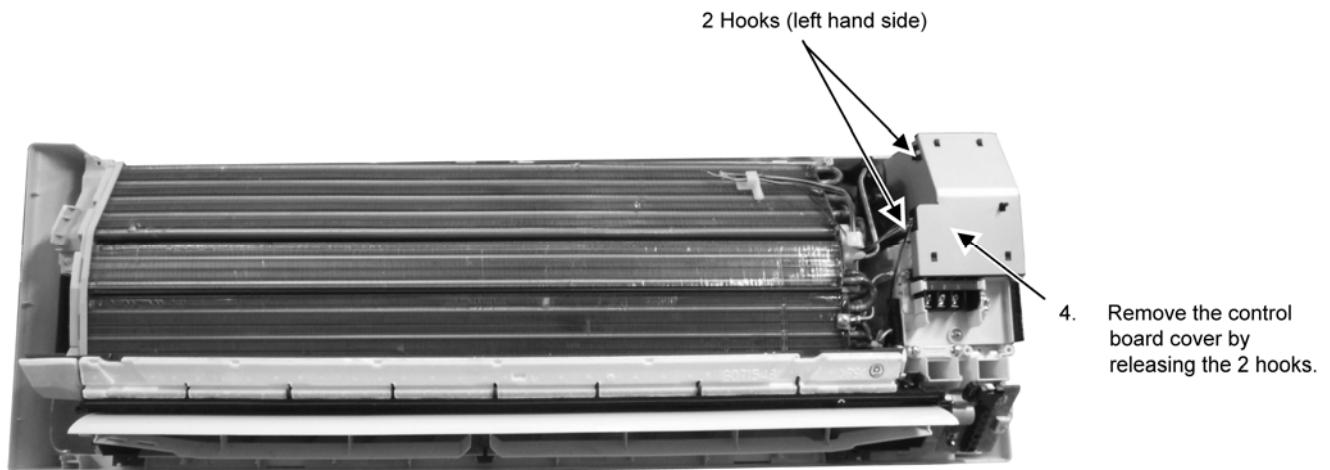


Figure 2

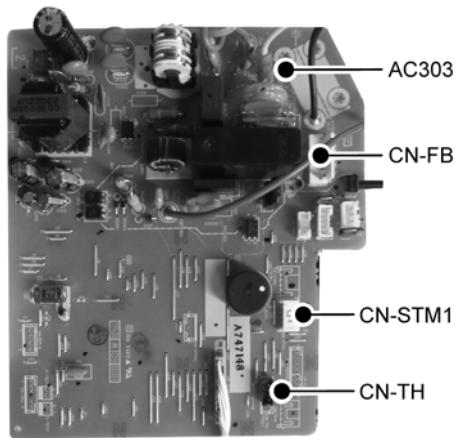
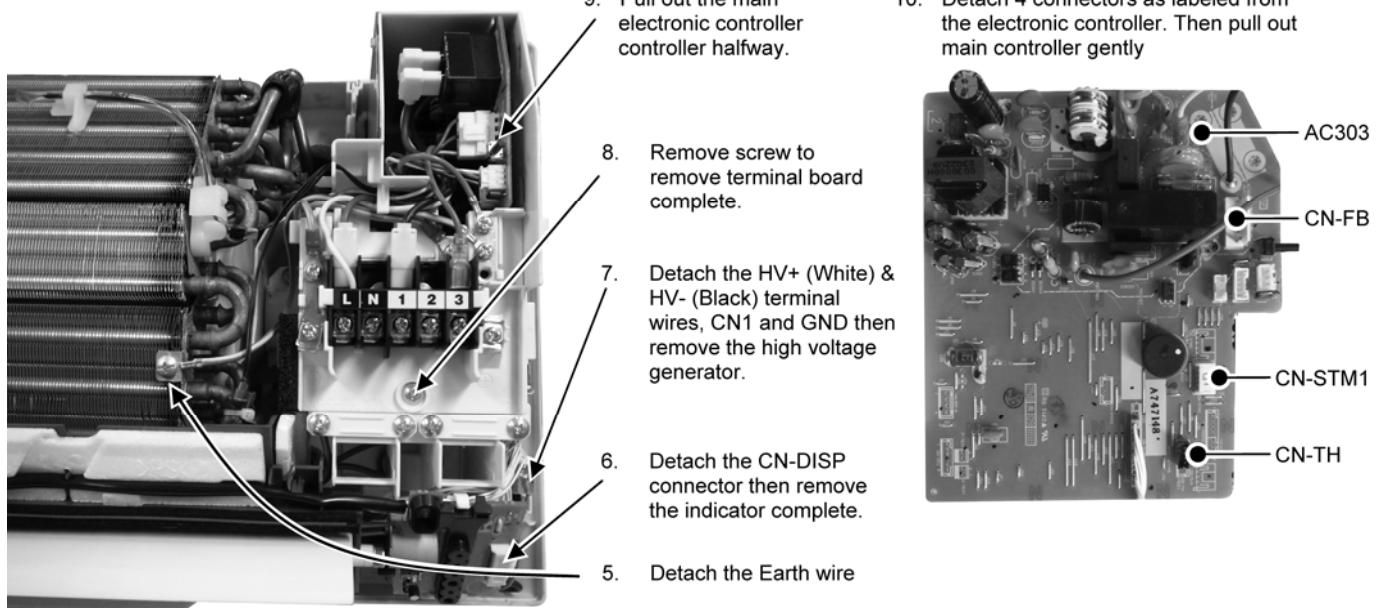


Figure 3

Figure 4

#### 15.1.1.3 To remove discharge grille

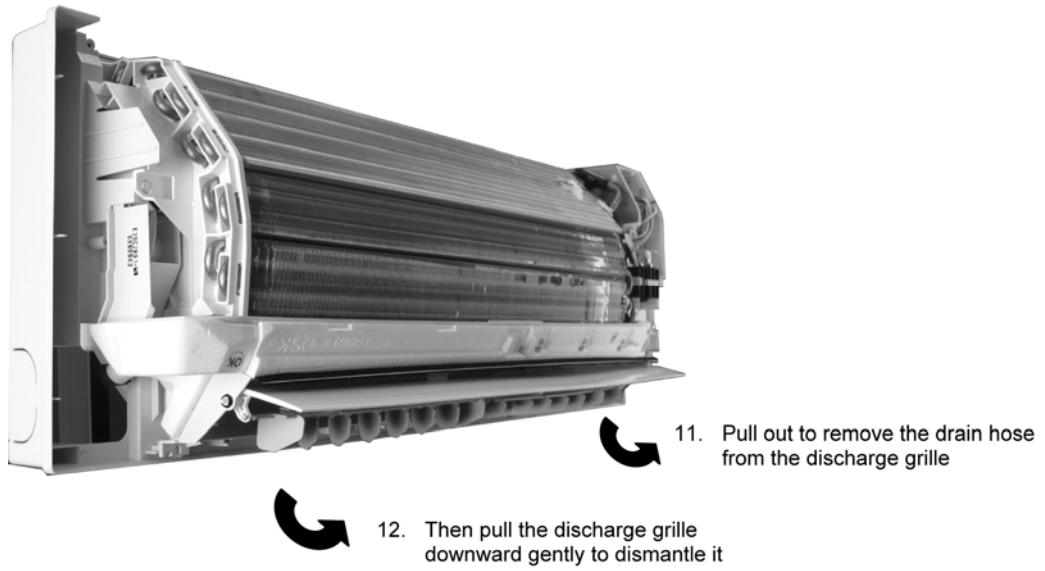


Figure 5

#### **15.1.1.4 To remove control board**

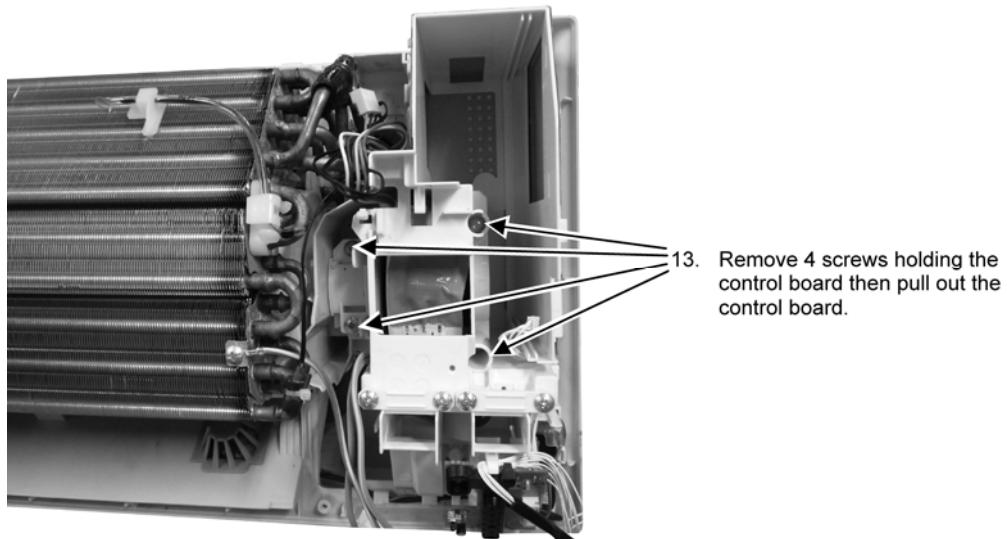


Figure 6

#### **15.1.1.5 To remove cross flow fan and indoor fan motor**

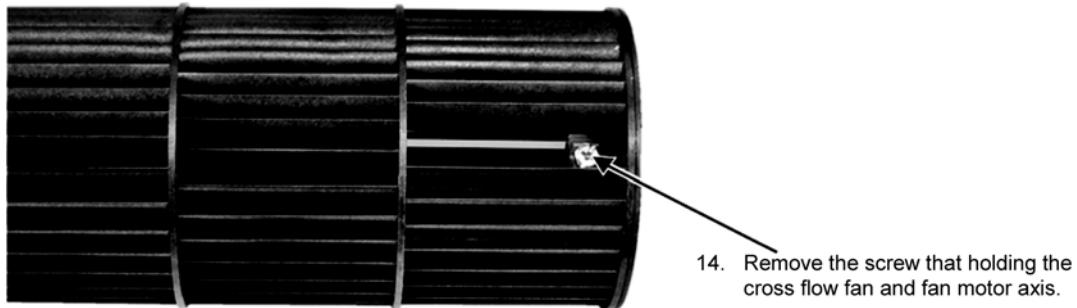


Figure 7

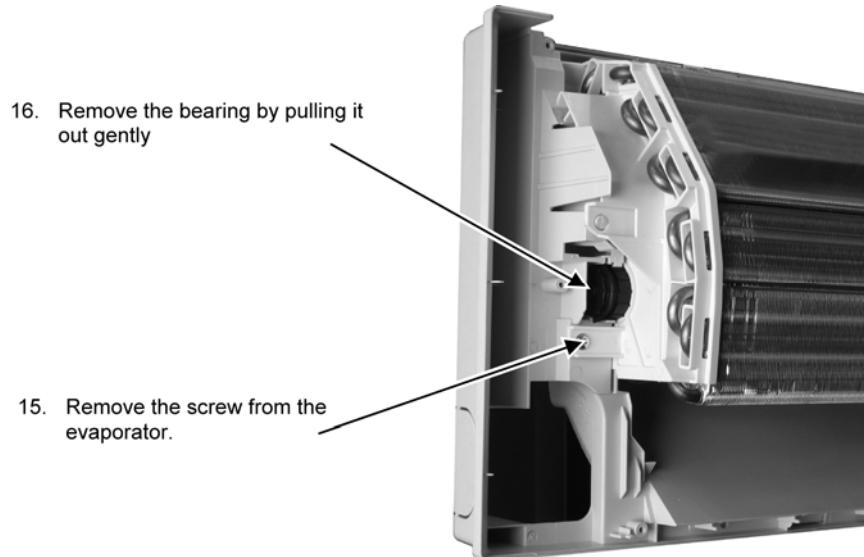


Figure 8

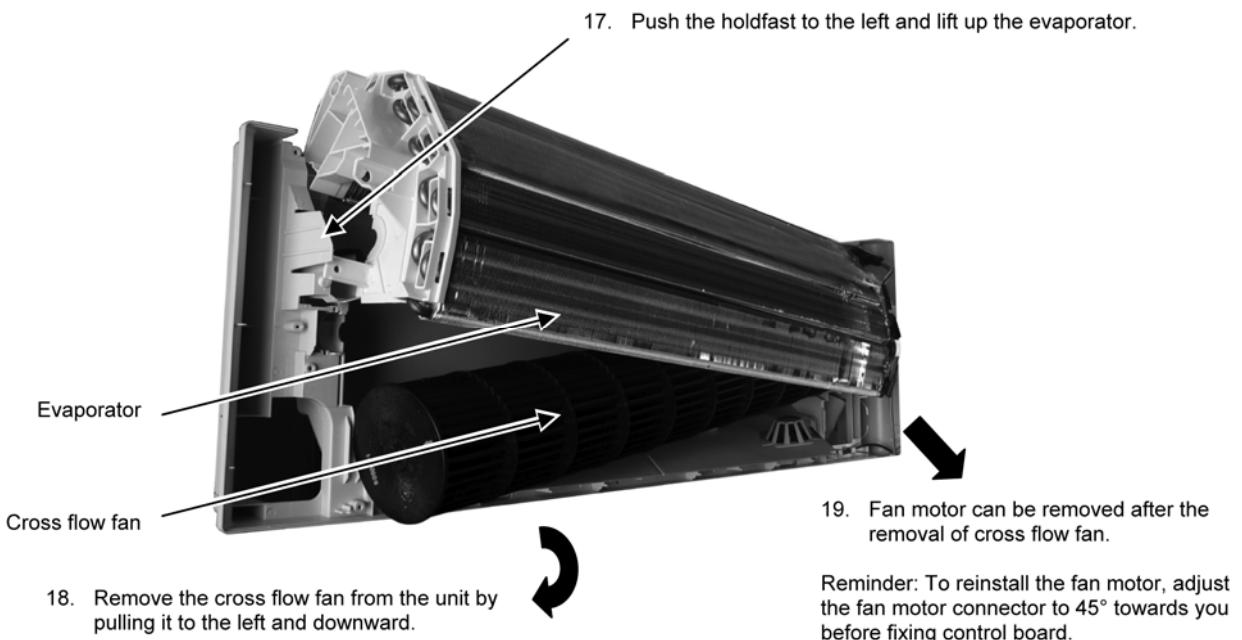


Figure 9

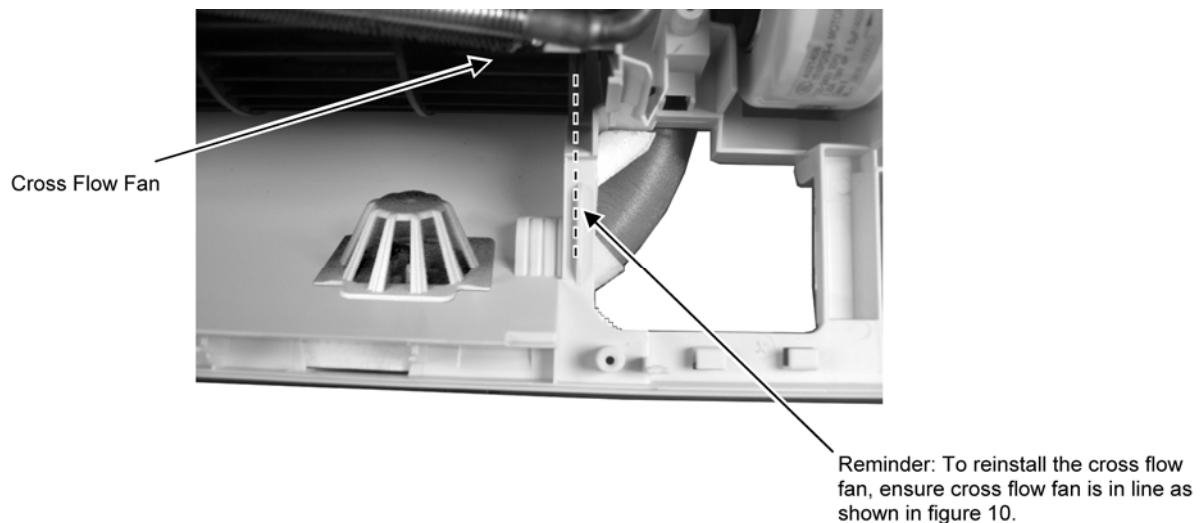


Figure 10

## 15.2 CS-S18NKR CS-S24NKR CS-S28NKR

### 15.2.1 Indoor Electronic Controllers, Cross Flow Fan and Indoor Fan Motor Removal Procedures

#### 15.2.1.1 To remove front grille

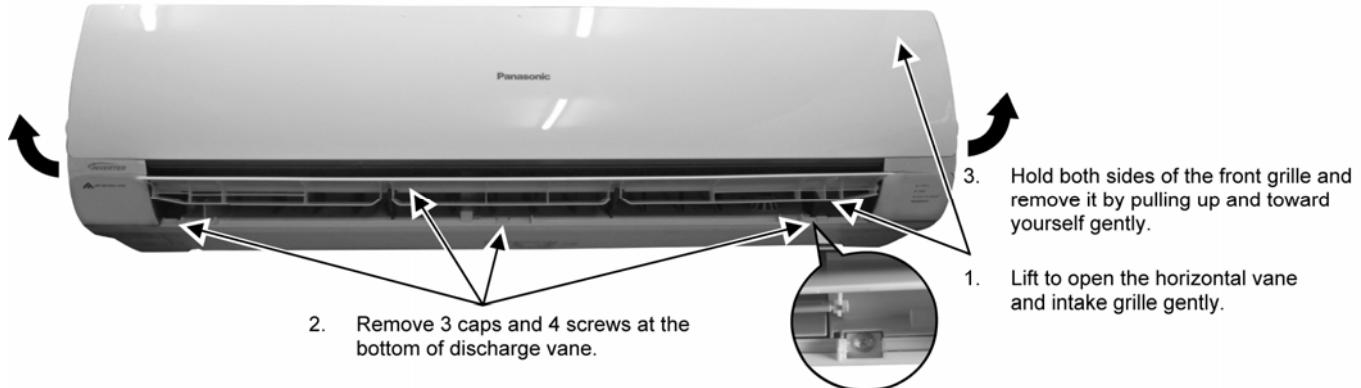


Figure 11

#### 15.2.1.2 To remove horizontal vane

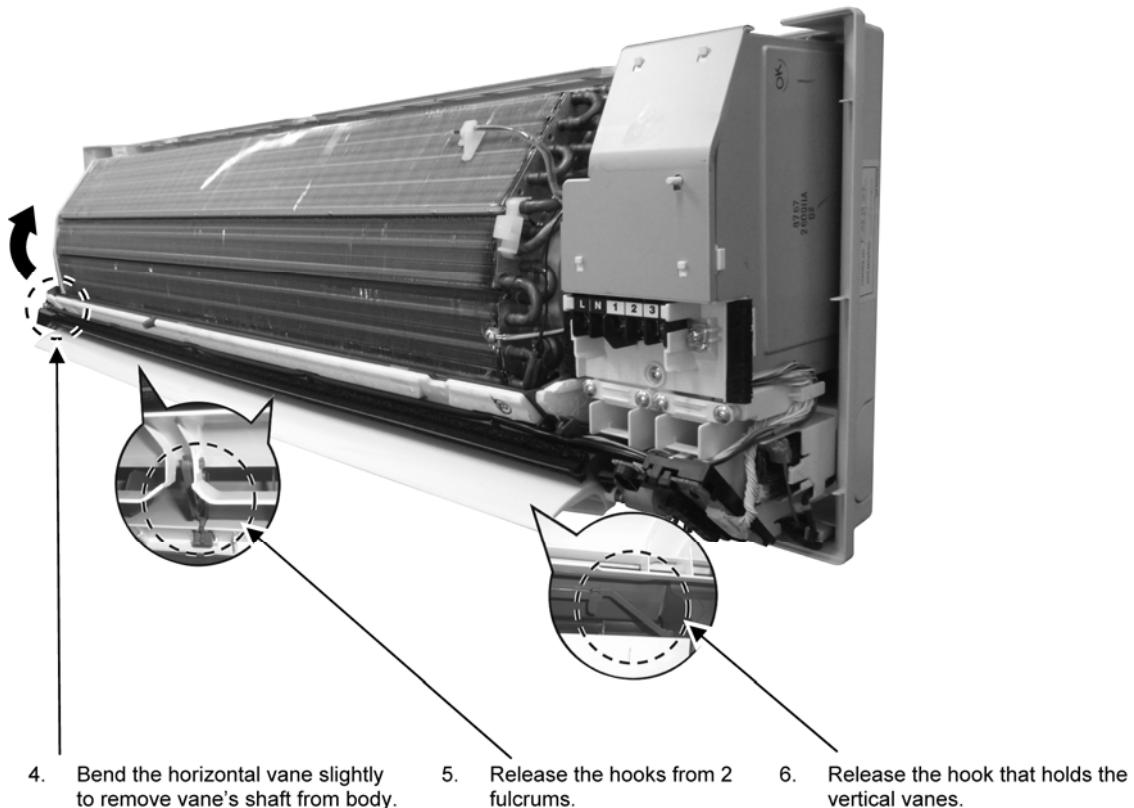


Figure 12

### 15.2.1.3 To remove main electronic controller

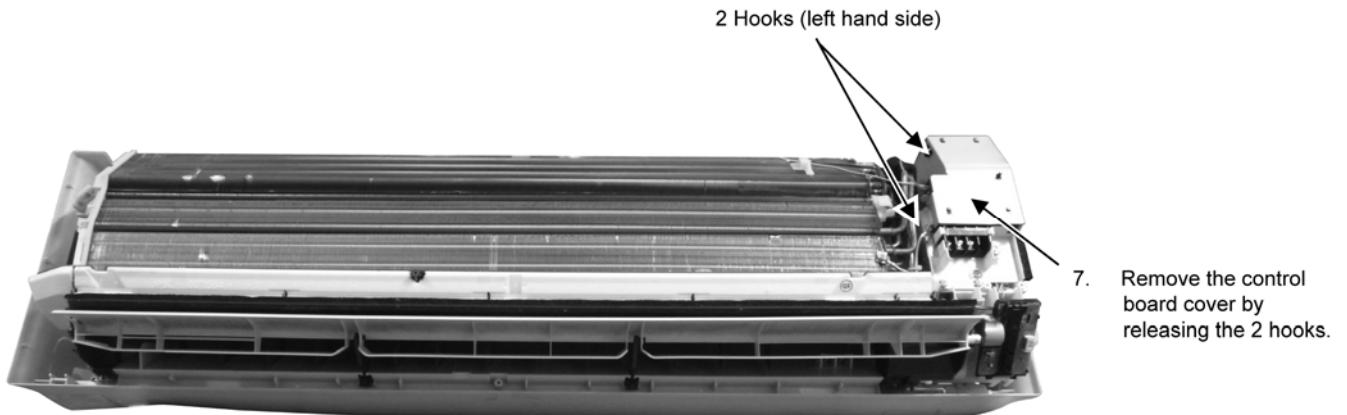


Figure 13

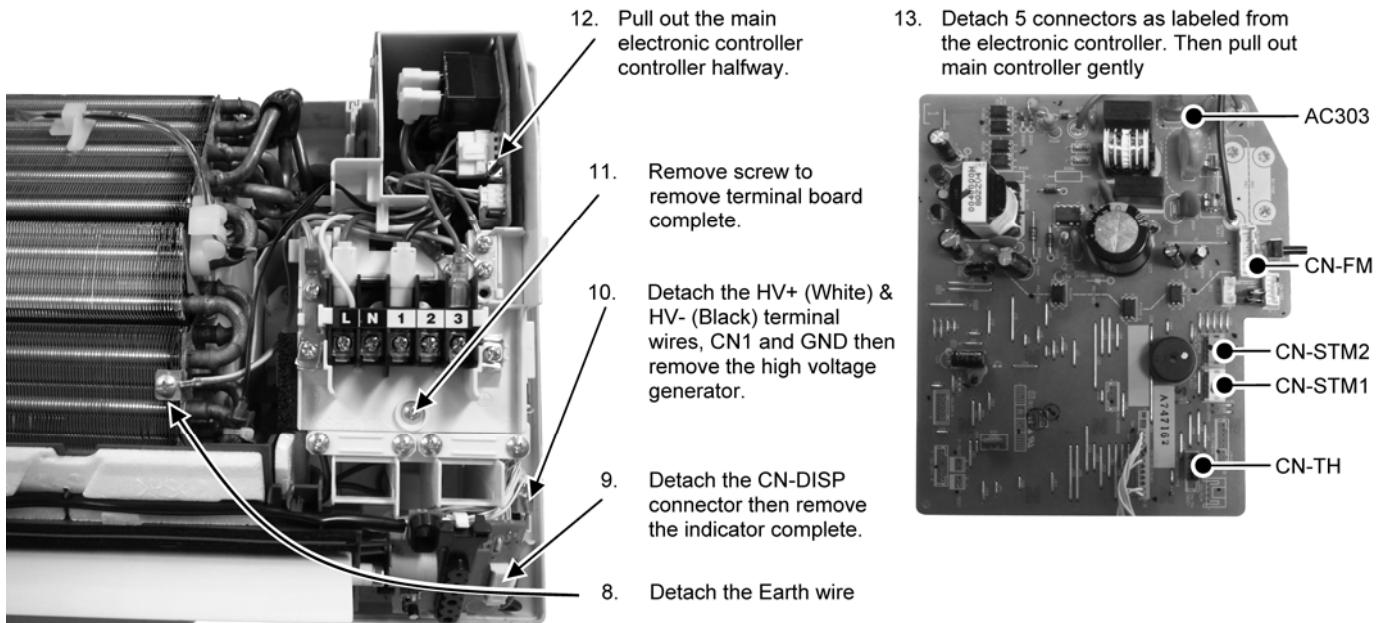


Figure 14

Figure 15

### 15.2.1.4 To remove discharge grille

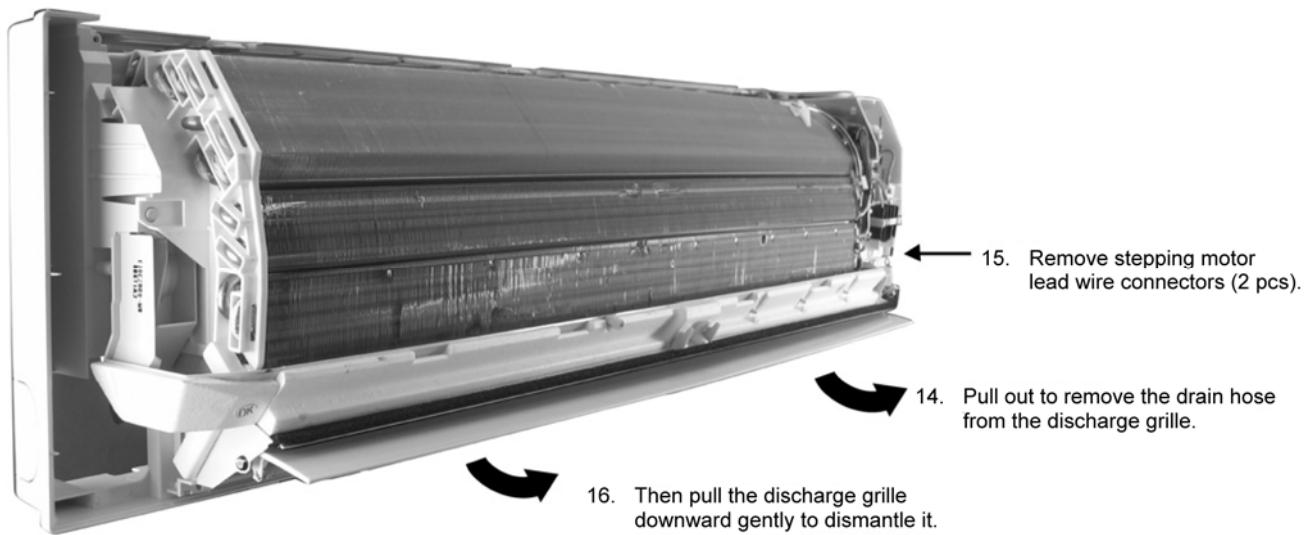


Figure 16

#### **15.2.1.5 To remove control board**

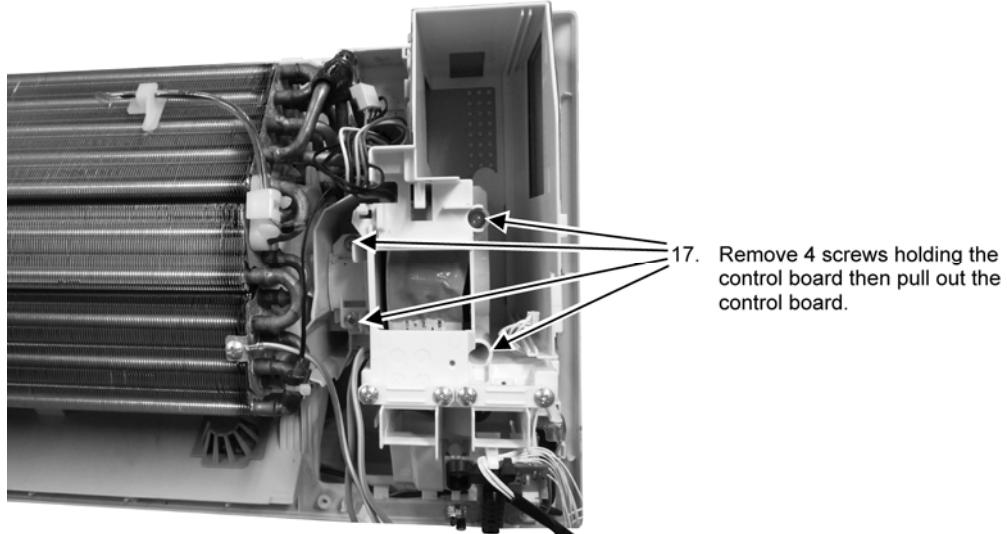


Figure 17

#### **15.2.1.6 To remove cross flow fan and indoor fan motor**

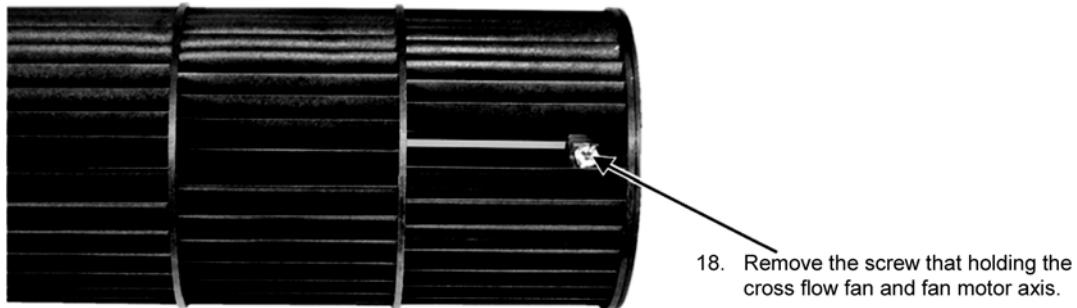


Figure 18

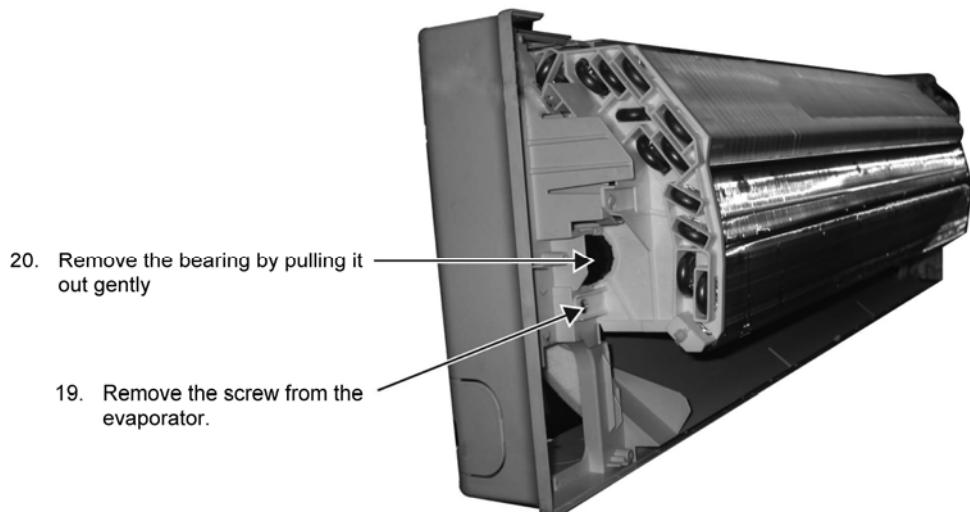


Figure 19

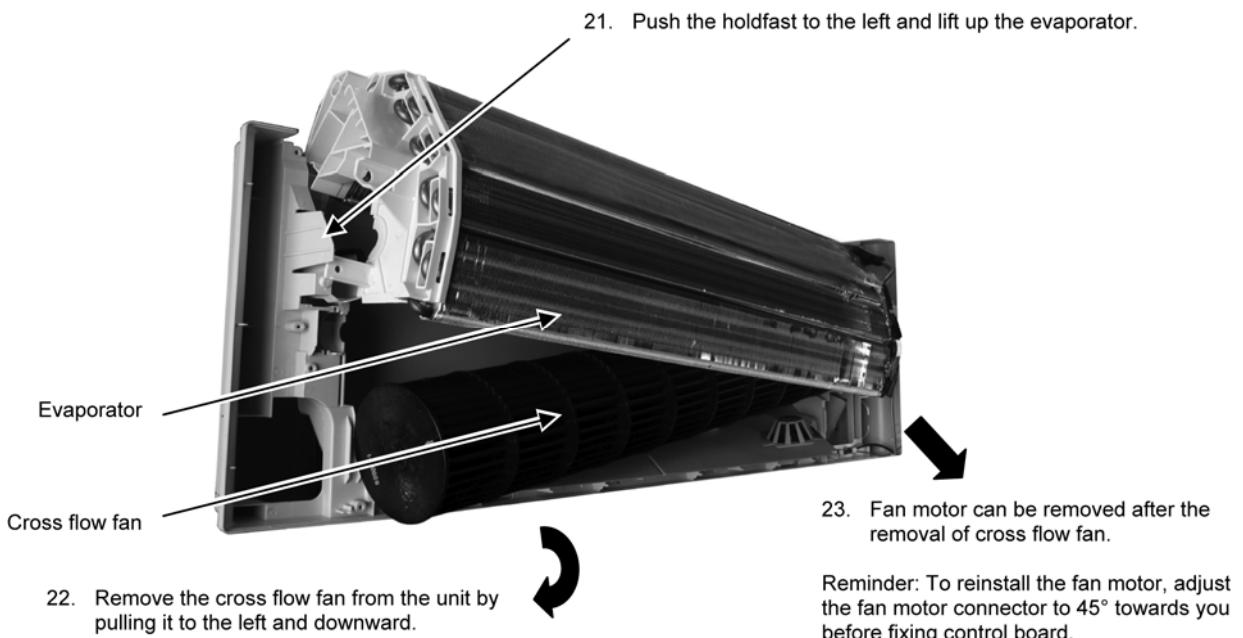


Figure 20

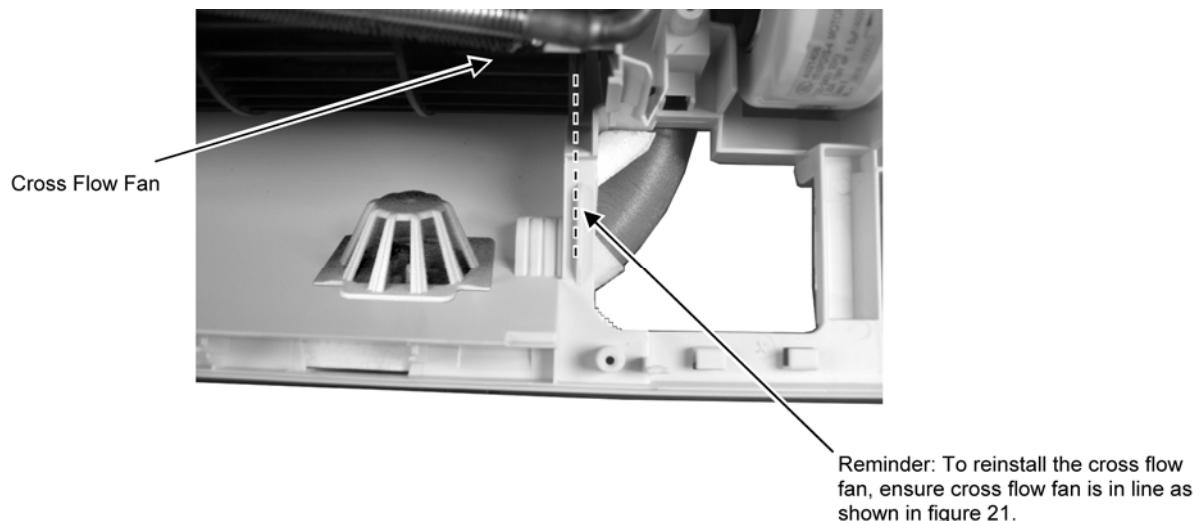
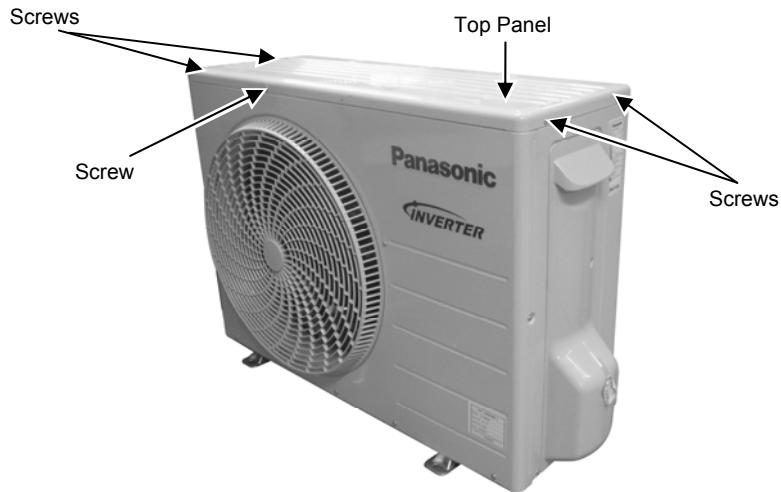


Figure 21

## **15.3 Outdoor Electronic Controller Removal Procedures**

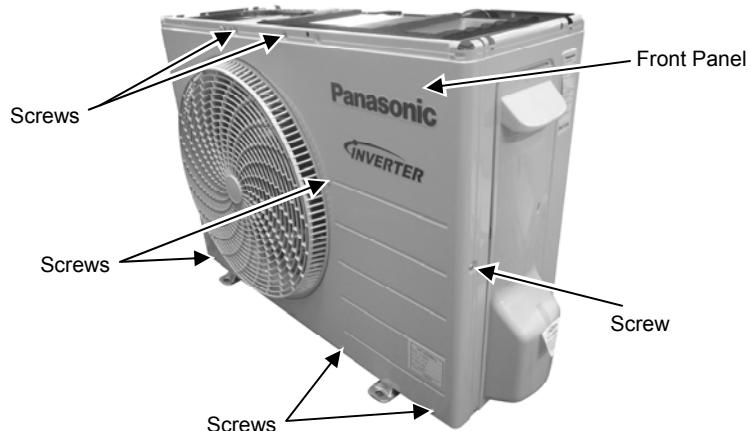
### **15.3.1 CU-S9NKR CU-S12NKR**

1. Remove 5 screws of the Top Panel.



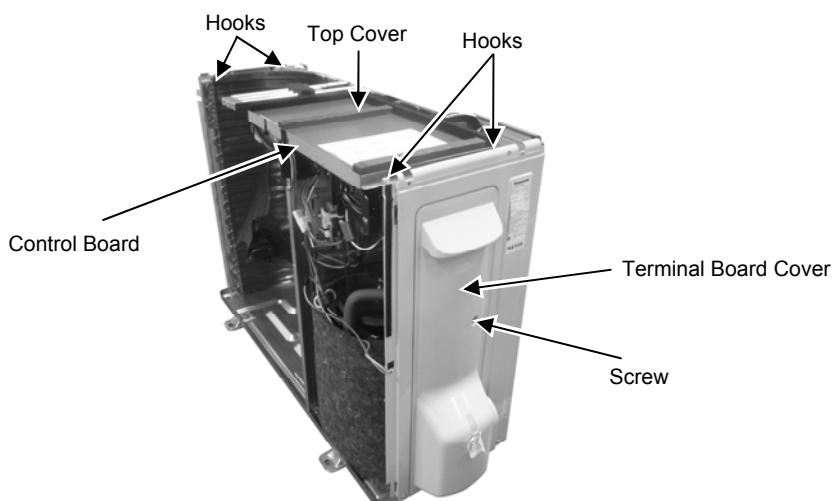
**Figure 1**

2. Remove the 8 screws of the Front Panel.

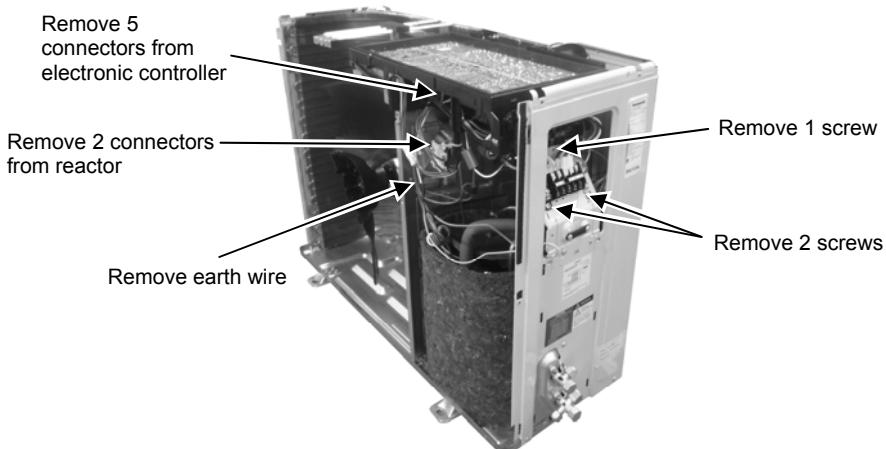


**Figure 2**

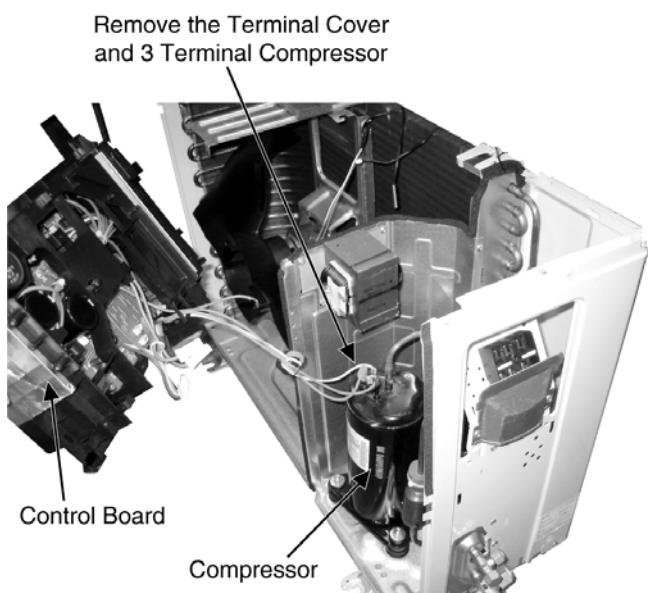
3. Remove the screw of the Terminal Board Cover.
4. Remove the Top Cover of the Control Board by 4 hooks.



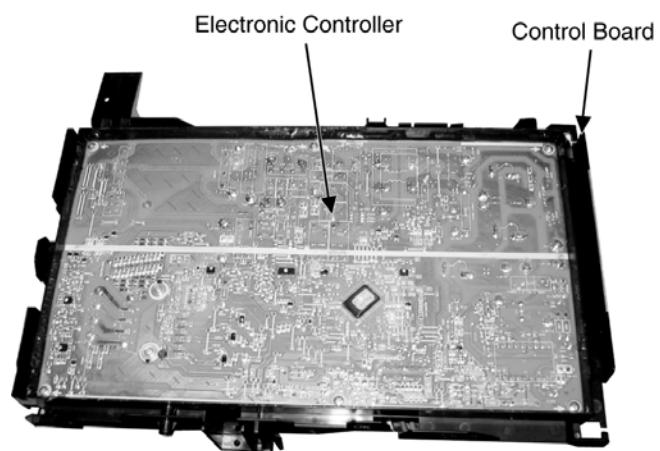
**Figure 3**



**Figure 4**



**Figure 5**

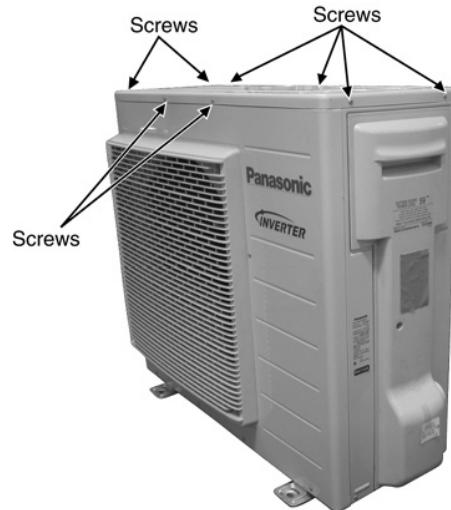


**Figure 6**

## **15.4 Outdoor Electronic Controller Removal Procedures**

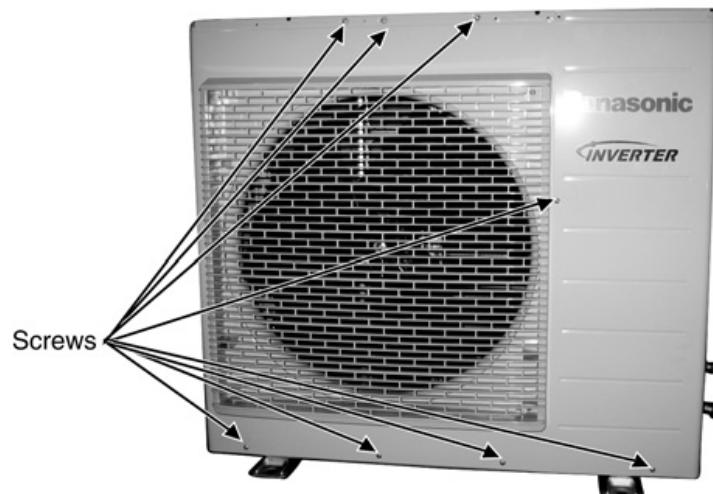
### **15.4.1 CU-S18NKR CU-S24NKR CU-S28NKR**

1. Remove 8 screws of the Top Panel.



**Figure 1**

2. Remove the 8 screws of the Front Panel.



**Figure 2**

3. Remove the Top Cover of the Electronic Controller.

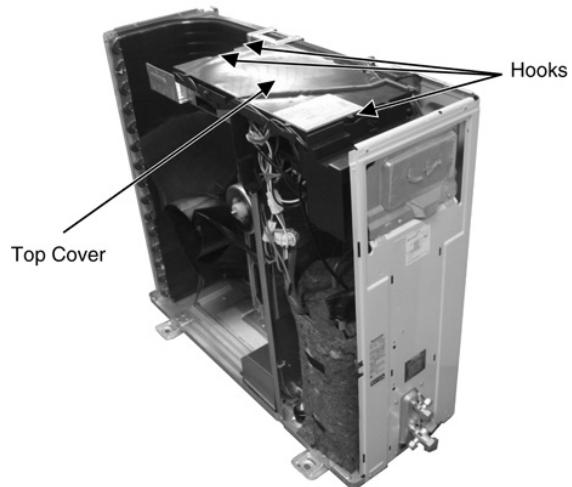


Figure 3

4. Remove the control board.

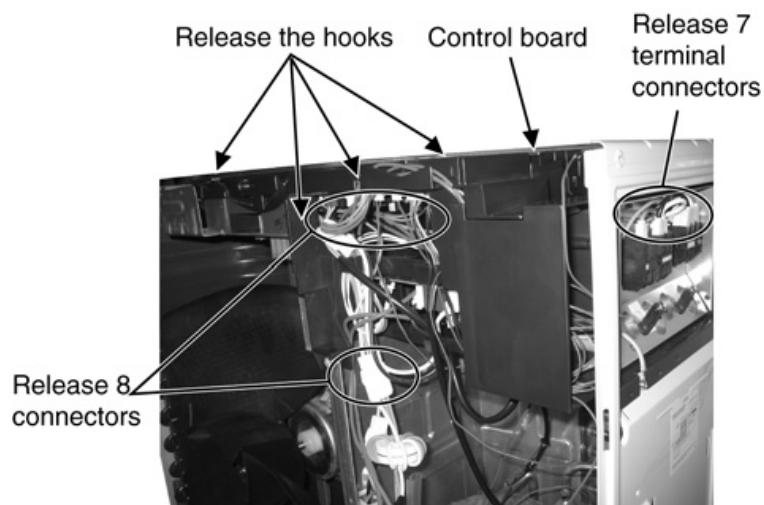


Figure 4

5. Remove the 6 screws of the Electronic Controller.

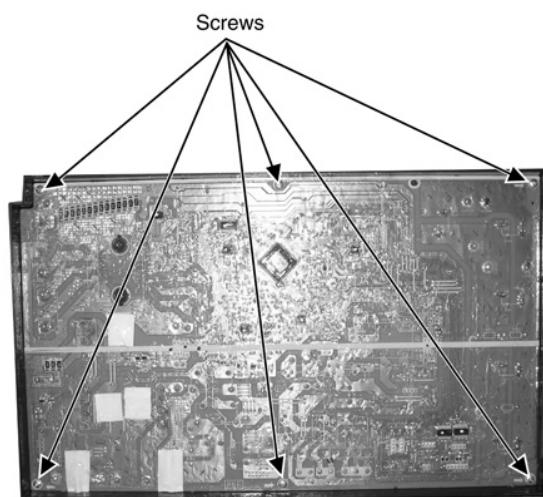


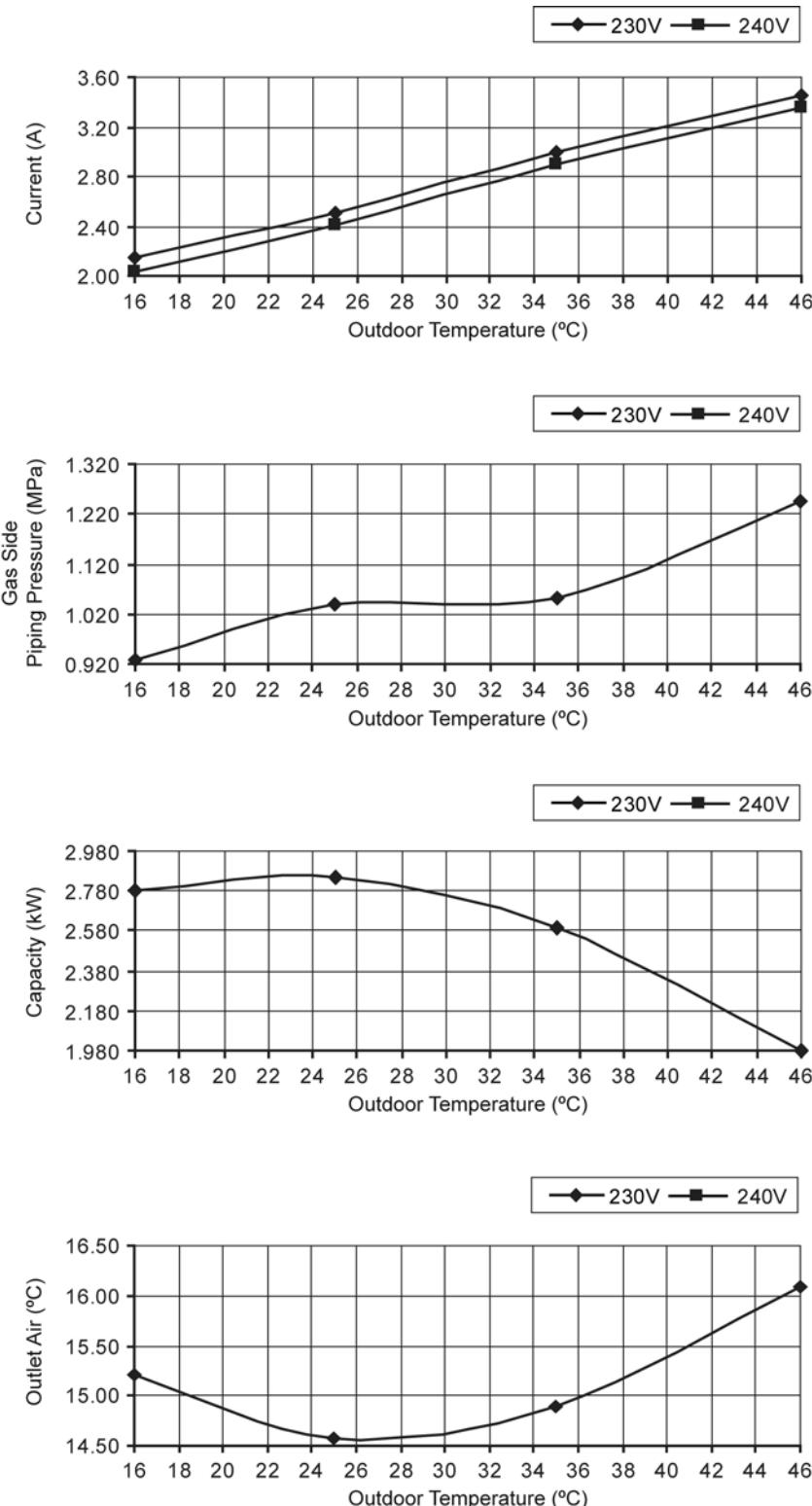
Figure 5

## 16. Technical Data

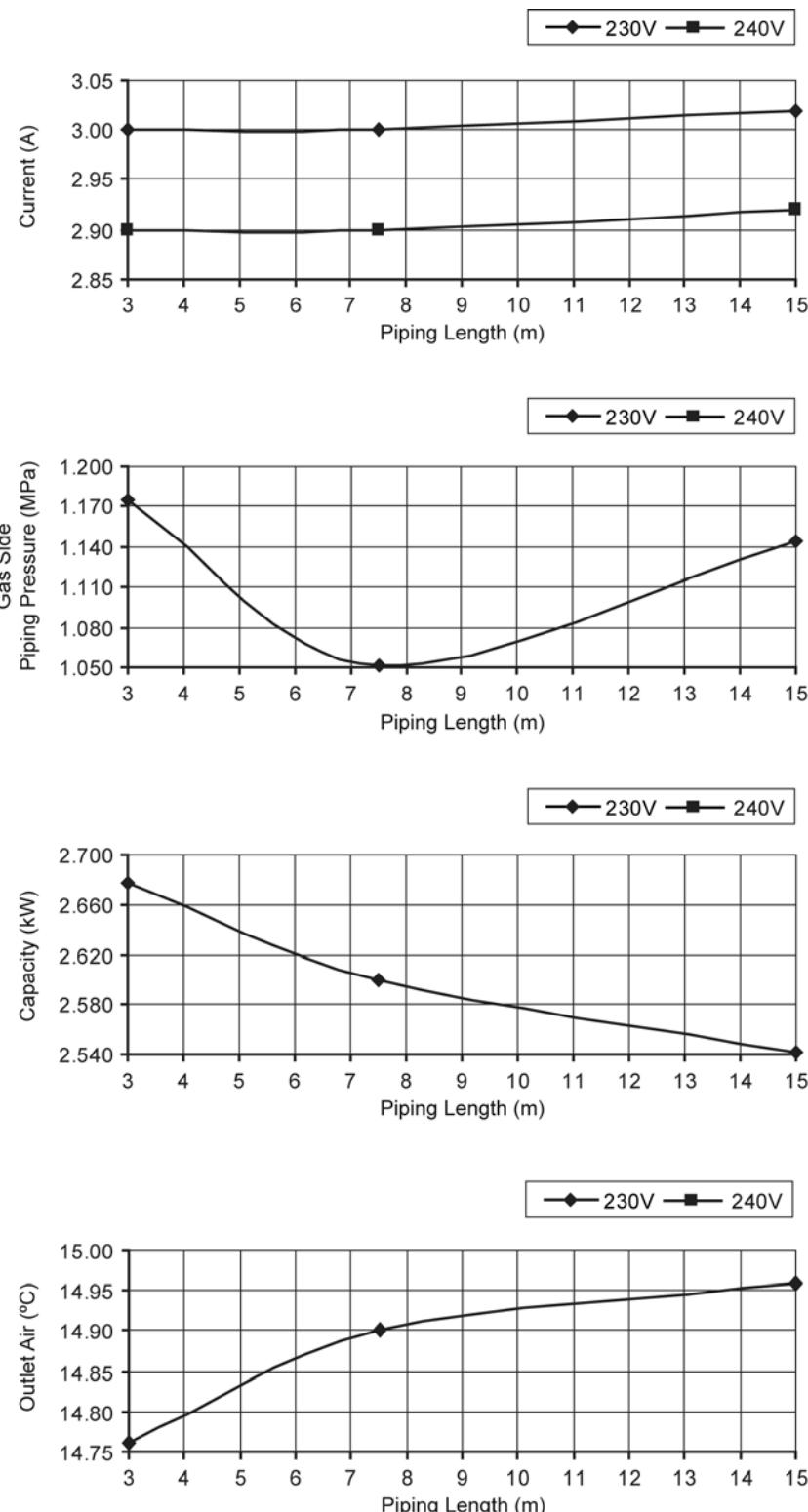
### 16.1 Operation Characteristics

#### 16.1.1 CS-S9NKR CU-S9NKR

- Cooling Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Piping length: 7.5m
  - Compressor Freq: Fc

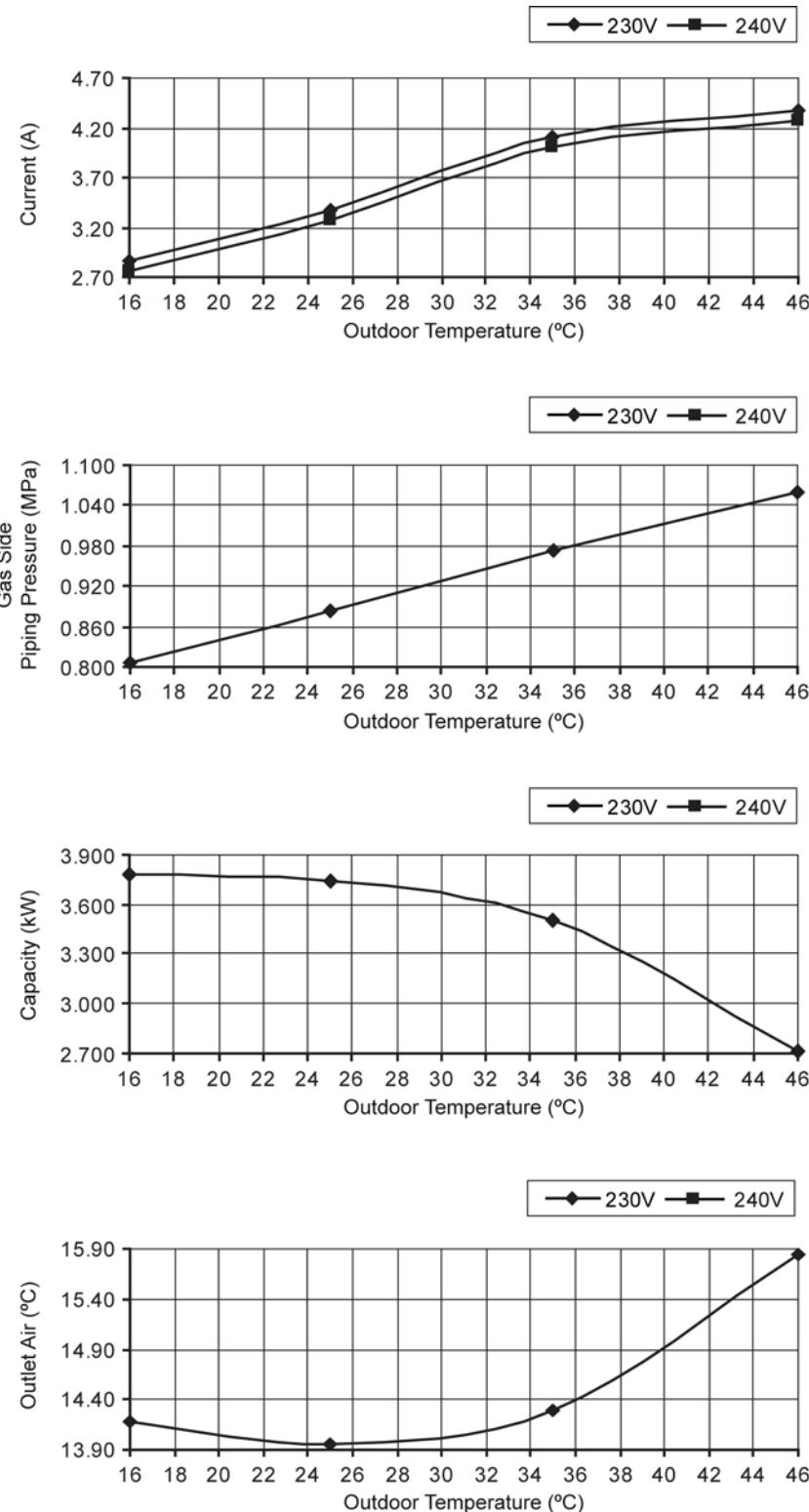


- Piping Length Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 35°C (DBT)
  - Compressor Freq: Fc

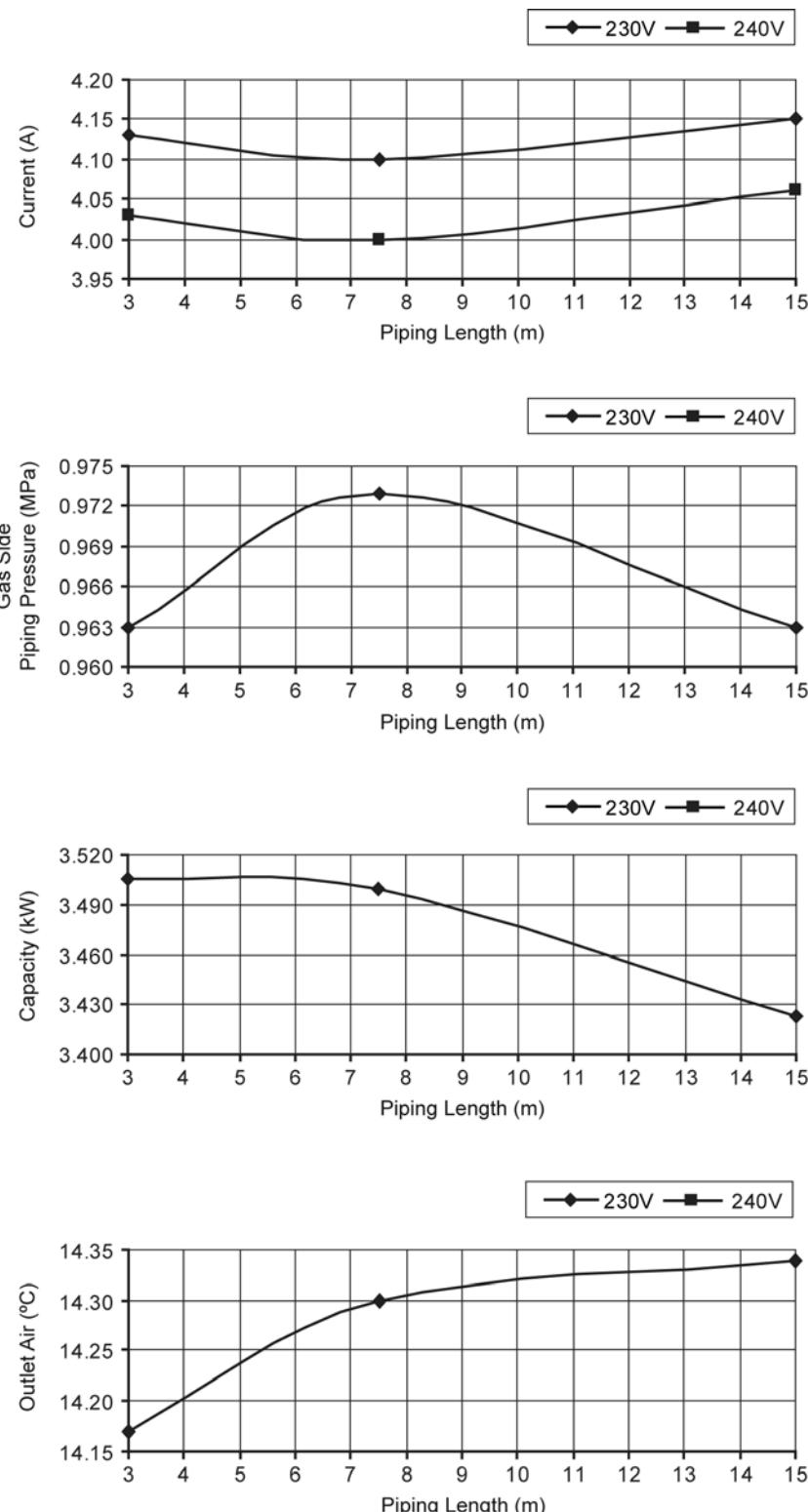


### 16.1.2 CS-S12NKR CU-S12NKR

- Cooling Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Piping length: 7.5m
  - Compressor Freq: Fc

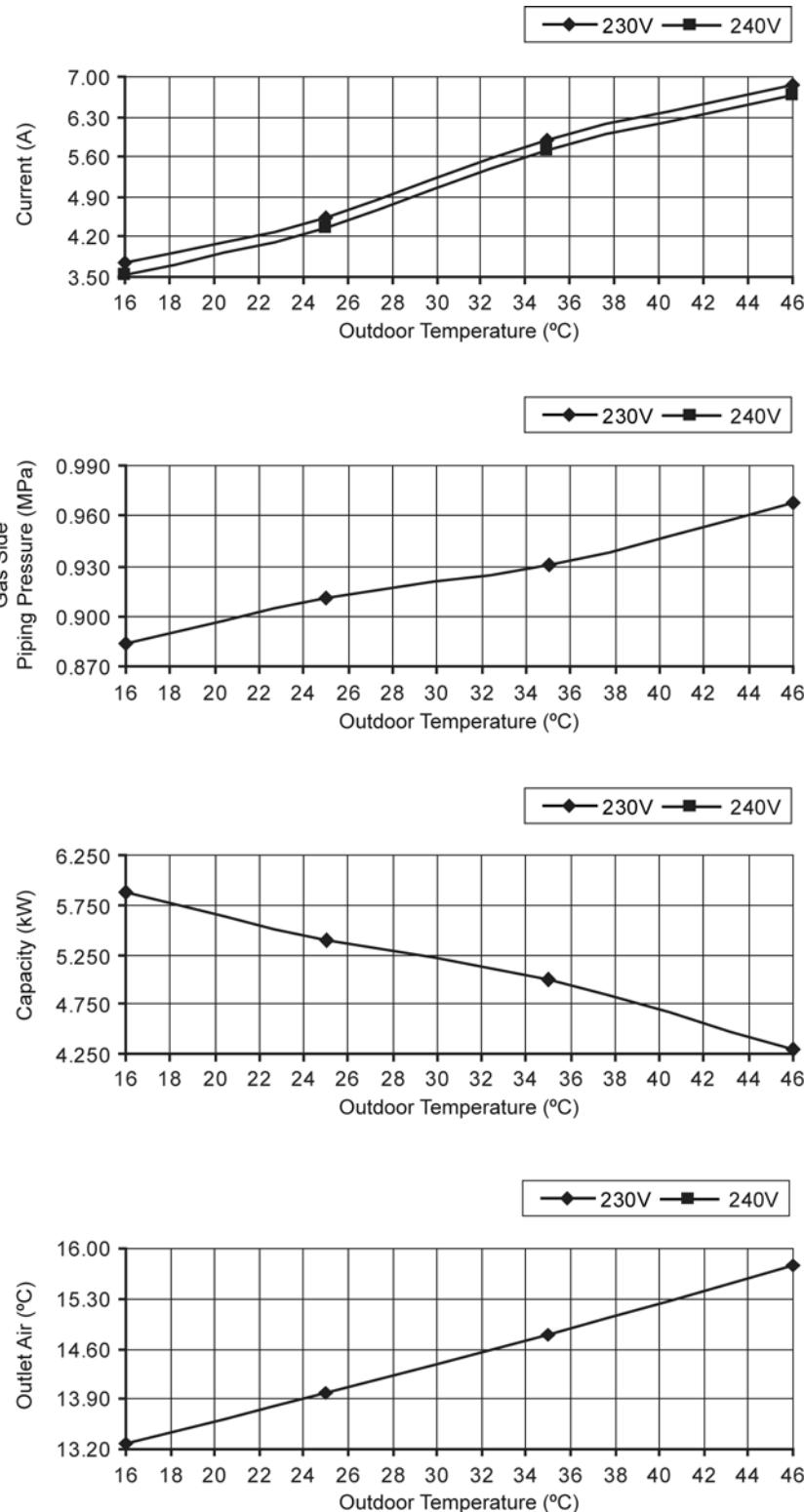


- Piping Length Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 35°C (DBT)
  - Compressor Freq: Fc

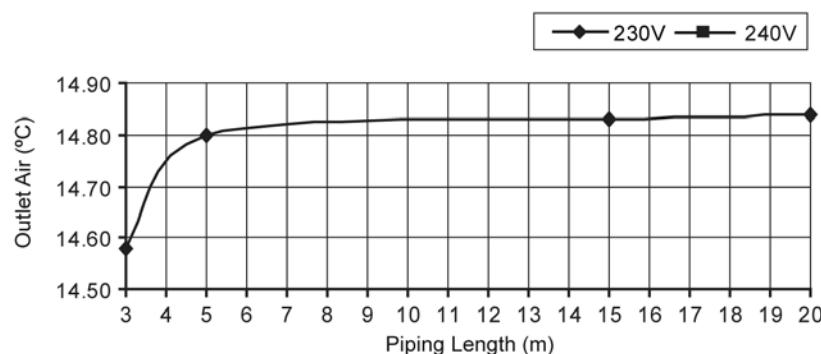
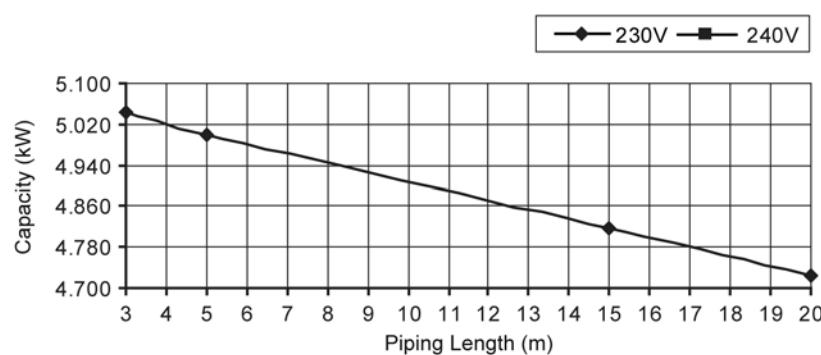
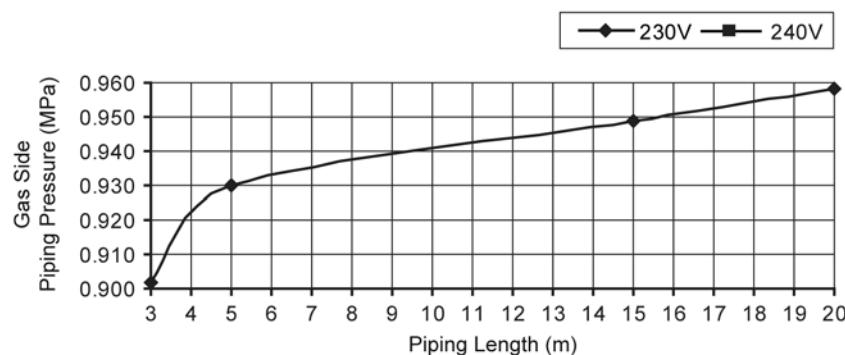
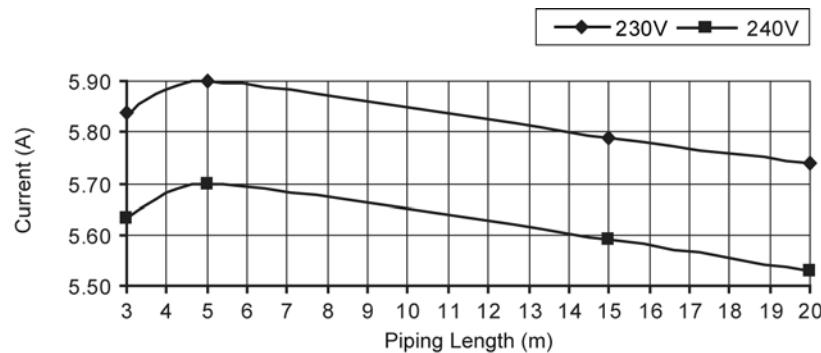


### 16.1.3 CS-S18NKR CU-S18NKR

- Cooling Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Piping length: 5.0m
  - Compressor Freq: Fc

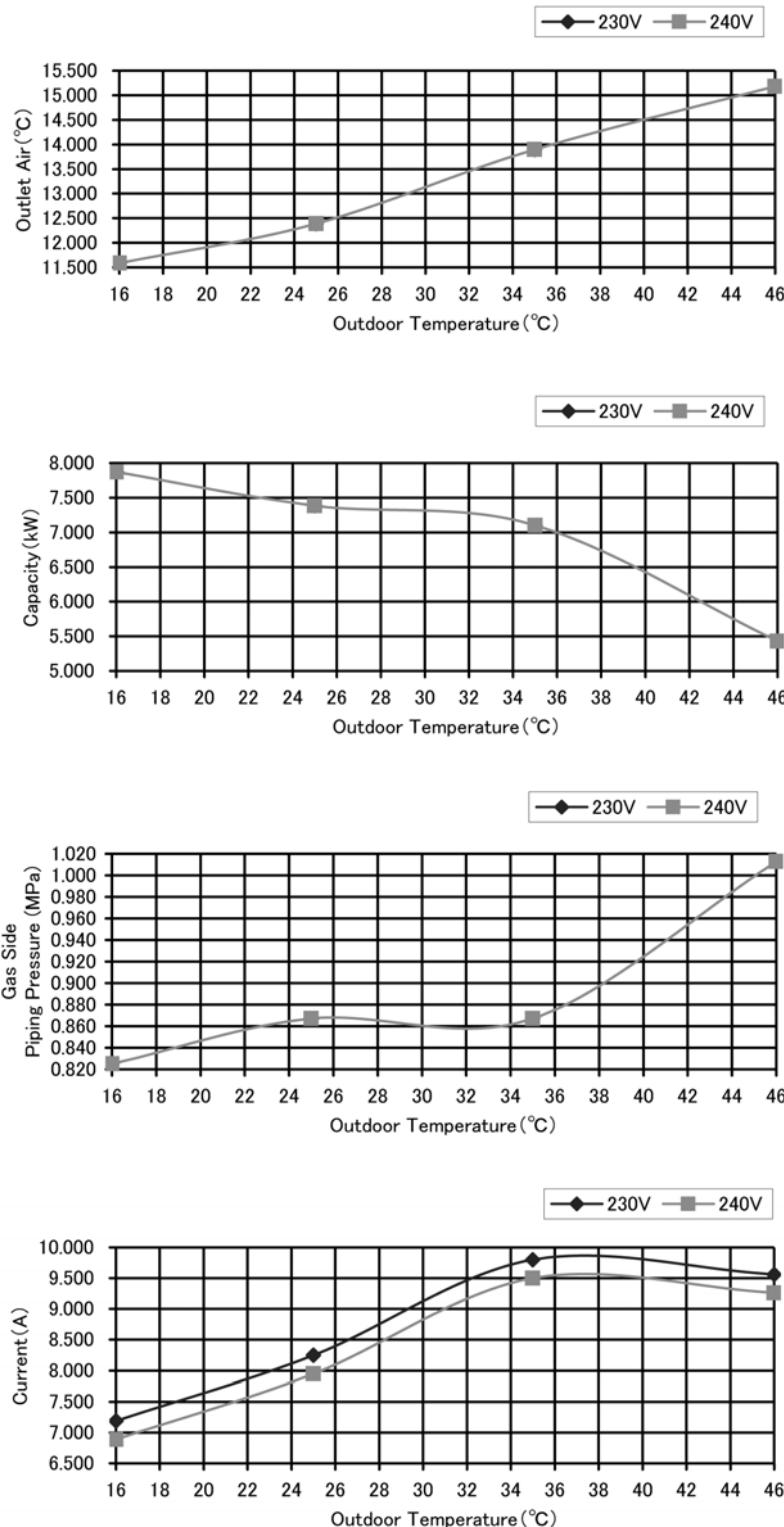


- Piping Length Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 35°C (DBT)
  - Compressor Freq: Fc

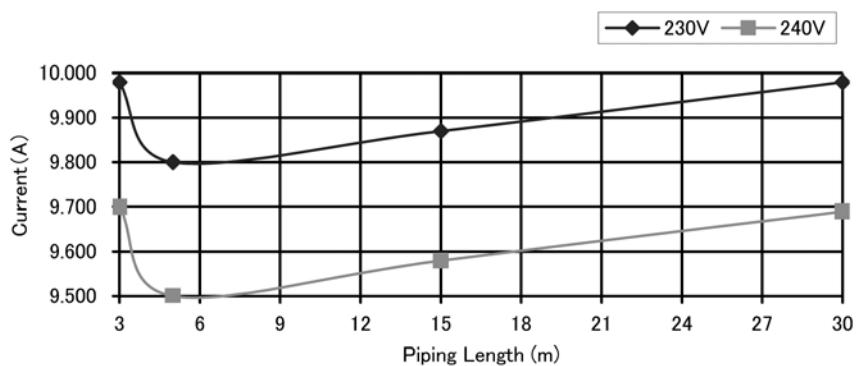
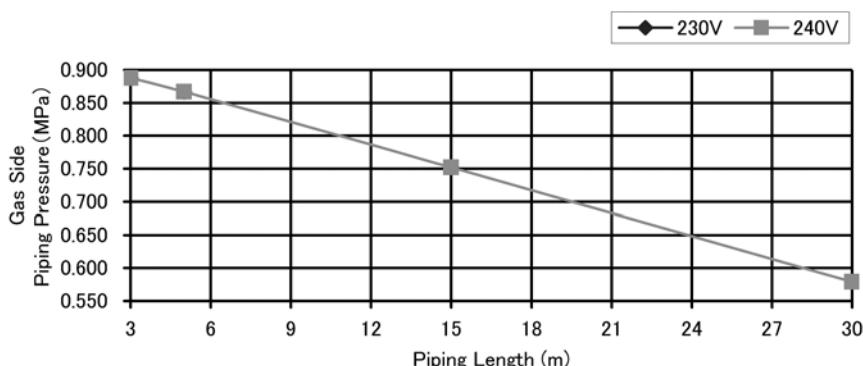
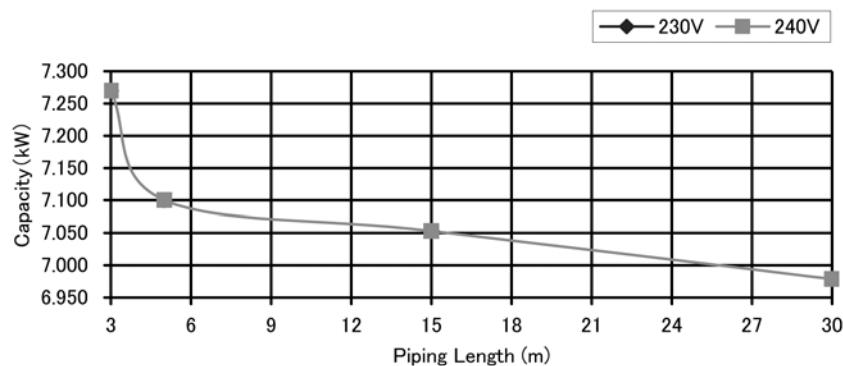
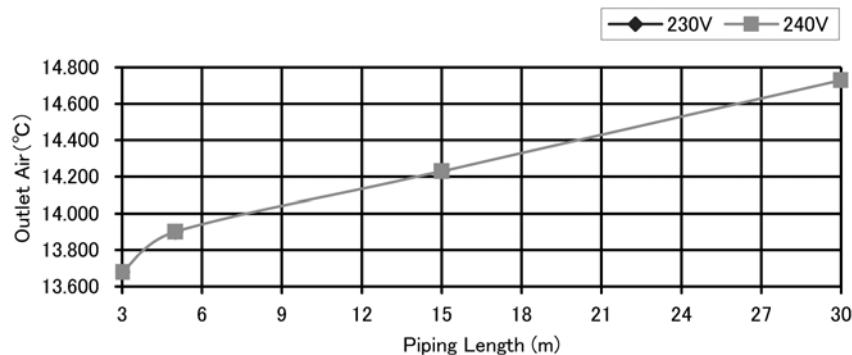


#### 16.1.4 CS-S24NKR CU-S24NKR

- Cooling Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Piping length: 5.0m
  - Compressor Freq: Fc

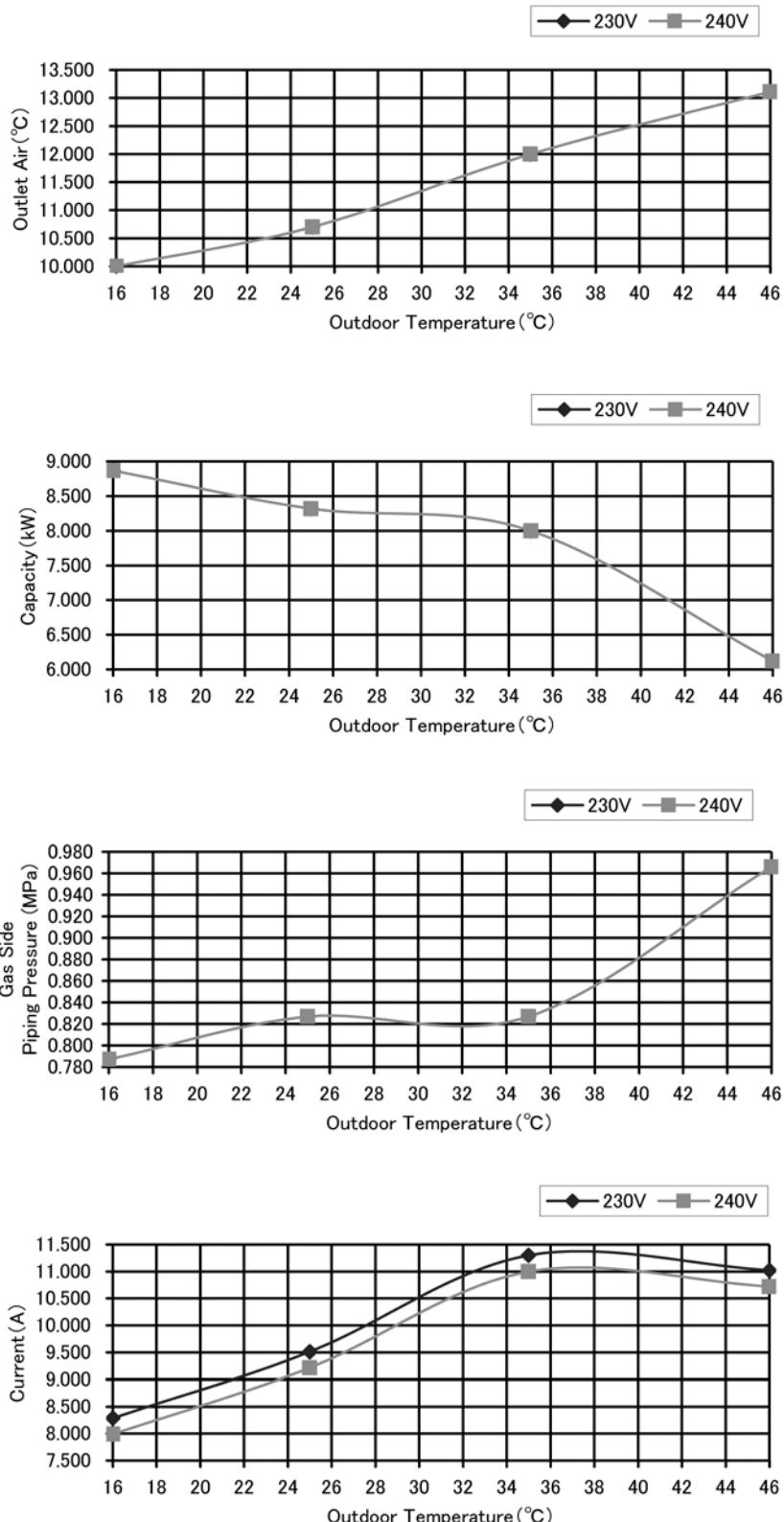


- Piping Length Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 35°C (DBT)
  - Compressor Freq: Fc

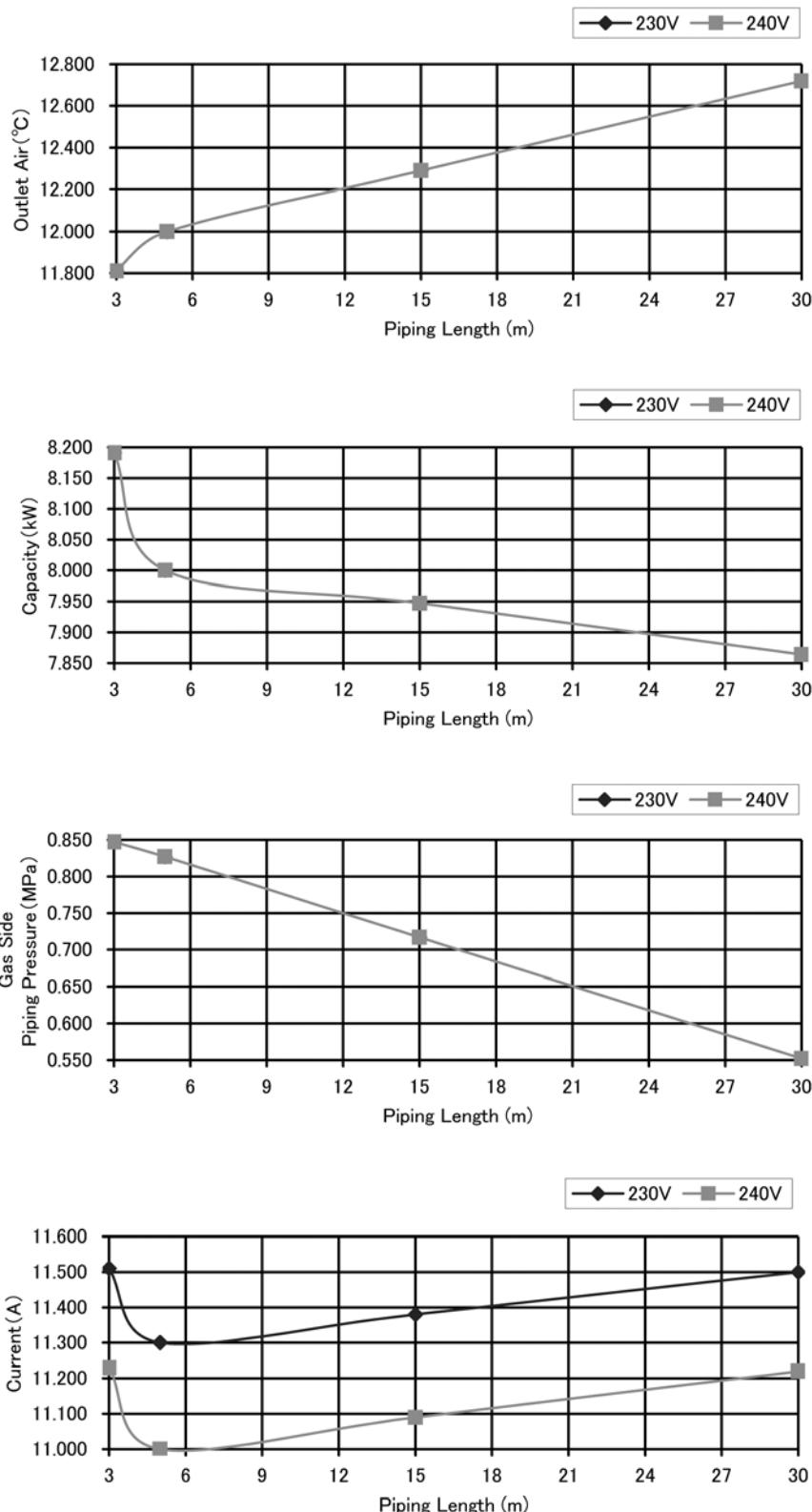


### 16.1.5 CS-S28NKR CU-S28NKR

- Cooling Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Piping length: 5.0m
  - Compressor Freq: Fc



- Piping Length Characteristic
  - Room temperature: 27°C (DBT), 19°C (WBT)
  - Operation condition: High fan speed
  - Outdoor temperature: 35°C (DBT)
  - Compressor Freq: Fc



## 16.2 Sensible Capacity Chart

- CS-S9NKR CU-S9NKR

CU-S9NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	20			25			30			32		
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	2.52	2.35	0.49	2.55	2.27	0.53	2.47	2.24	0.58	2.42	2.22	0.60
54.1	16	22	2.67	2.31	0.49	2.67	2.23	0.53	2.58	2.21	0.58	2.52	2.20	0.60
50.0	17	24	2.76	2.34	0.49	2.75	2.27	0.54	2.67	2.25	0.58	2.61	2.25	0.60
50.9	18	25	2.78	2.40	0.49	2.78	2.33	0.54	2.70	2.31	0.58	2.64	2.30	0.60
47.1	19	27	2.84	2.51	0.49	2.84	2.44	0.54	2.76	2.41	0.58	2.71	2.41	0.60
50.1	22	30	3.02	2.41	0.50	3.02	2.35	0.55	2.94	2.34	0.59	2.88	2.33	0.61
51.9	24	32	3.13	2.34	0.50	3.14	2.29	0.55	3.06	2.27	0.59	3.01	2.27	0.61

CU-S9NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)									
	EWB	EDB	35			40			46			
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	
51.8	14	20	2.32	2.17	0.62	2.08	2.08	0.67	1.49	1.49	0.72	
54.1	16	22	2.44	2.15	0.62	2.19	2.07	0.67	1.73	1.73	0.73	
50.0	17	24	2.54	2.19	0.63	2.29	2.12	0.67	1.73	1.73	0.73	
50.9	18	25	2.56	2.25	0.63	2.31	2.18	0.67	1.83	1.83	0.73	
47.1	19	27	2.60	2.36	0.63	2.36	2.30	0.68	1.98	1.98	0.73	
50.1	22	30	2.80	2.30	0.64	2.54	2.23	0.68	2.34	2.19	0.73	
51.9	24	32	2.92	2.23	0.64	2.65	2.17	0.68	2.12	2.12	0.74	

TC – Total Cooling Capacity (kW)

SHC – Sensible Heat Capacity (kW)

IP – Input Power (kW)

- CS-S12NKR CU-S12NKR

CU-S12NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	20			25			30			32		
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	3.34	2.88	0.66	3.35	2.78	0.73	3.27	2.74	0.79	3.23	2.73	0.81
54.1	16	22	3.54	2.83	0.67	3.50	2.74	0.73	3.42	2.71	0.79	3.36	2.70	0.82
50.0	17	24	3.66	2.87	0.67	3.62	2.78	0.73	3.53	2.76	0.80	3.48	2.75	0.82
50.9	18	25	3.69	2.94	0.67	3.66	2.85	0.73	3.57	2.83	0.80	3.52	2.82	0.82
47.1	19	27	3.77	3.07	0.67	3.74	2.99	0.74	3.66	2.96	0.80	3.61	2.95	0.82
50.1	22	30	4.00	2.95	0.68	3.97	2.89	0.74	3.89	2.86	0.80	3.84	2.86	0.83
51.9	24	32	4.15	2.87	0.68	4.13	2.80	0.75	4.06	2.78	0.81	4.00	2.78	0.83

CU-S12NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)									
	EWB	EDB	35			40			46			
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	
51.8	14	20	3.12	2.67	0.85	2.84	2.57	0.91	2.01	2.01	0.99	
54.1	16	22	3.28	2.63	0.85	2.99	2.54	0.92	2.33	2.33	0.99	
50.0	17	24	3.41	2.69	0.85	3.12	2.59	0.92	2.33	2.33	0.99	
50.9	18	25	3.44	2.76	0.86	3.16	2.67	0.92	2.46	2.46	0.99	
47.1	19	27	3.50	2.89	0.86	3.23	2.82	0.93	2.71	2.71	1.00	
50.1	22	30	3.77	2.82	0.87	3.46	2.73	0.93	3.15	2.69	1.00	
51.9	24	32	3.93	2.74	0.87	3.62	2.67	0.93	2.85	2.62	1.01	

TC – Total Cooling Capacity (kW)

SHC – Sensible Heat Capacity (kW)

IP – Input Power (kW)

• CS-S18NKR CU-S18NKR

CU-S18NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	20			25			30			32		
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	4.99	4.01	1.00	4.83	3.88	1.10	4.66	3.82	1.19	4.59	3.80	1.23
54.1	16	22	5.29	3.94	1.01	5.06	3.81	1.10	4.86	3.78	1.20	4.78	3.76	1.24
50.0	17	24	5.46	3.99	1.02	5.22	3.87	1.11	5.03	3.84	1.21	4.94	3.83	1.25
50.9	18	25	5.52	4.09	1.02	5.28	3.97	1.11	5.09	3.94	1.21	5.00	3.93	1.25
47.1	19	27	5.63	4.28	1.02	5.40	4.17	1.11	5.21	4.12	1.20	5.13	4.11	1.24
50.1	22	30	5.98	4.11	1.03	5.73	4.02	1.13	5.54	3.99	1.22	5.46	3.98	1.25
51.9	24	32	6.21	4.00	1.03	5.96	3.90	1.13	5.78	3.88	1.22	5.70	3.87	1.26

CU-S18NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	35			40			46					
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	4.46	3.71	1.28	4.17	3.57	1.38	2.87	2.87	1.49			
54.1	16	22	4.69	3.66	1.29	4.40	3.53	1.39	3.33	3.33	1.50			
50.0	17	24	4.88	3.74	1.29	4.59	3.61	1.39	3.33	3.33	1.50			
50.9	18	25	4.92	3.84	1.29	4.64	3.72	1.39	3.52	3.52	1.50			
47.1	19	27	5.00	4.03	1.30	4.74	3.93	1.40	4.29	3.85	1.51			
50.1	22	30	5.39	3.93	1.31	5.09	3.80	1.40	4.50	3.75	1.51			
51.9	24	32	5.62	3.81	1.32	5.32	3.71	1.41	4.08	3.65	1.52			

TC – Total Cooling Capacity (kW)

SHC – Sensible Heat Capacity (kW)

IP – Input Power (kW)

• CS-S24NKR CU-S24NKR

CU-S24NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	20			25			30			32		
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	6.70	5.47	1.69	6.61	5.29	1.84	6.52	5.22	2.00	6.48	5.18	2.06
54.1	16	22	7.09	5.39	1.69	6.92	5.20	1.85	6.81	5.15	2.01	6.75	5.14	2.07
50.0	17	24	7.33	5.45	1.70	7.15	5.28	1.86	7.04	5.25	2.02	6.98	5.23	2.09
50.9	18	25	7.41	5.58	1.70	7.22	5.42	1.86	7.12	5.38	2.02	7.06	5.36	2.09
47.1	19	27	7.55	5.84	1.70	7.38	5.69	1.87	7.29	5.63	2.02	7.23	5.61	2.08
50.1	22	30	8.02	5.62	1.72	7.85	5.48	1.89	7.76	5.45	2.04	7.71	5.43	2.10
51.9	24	32	8.32	5.46	1.73	8.15	5.33	1.90	8.09	5.29	2.05	8.04	5.28	2.11

CU-S24NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	35			40			46					
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	6.33	5.07	2.15	5.82	4.88	2.32	4.08	4.08	2.50			
54.1	16	22	6.65	5.00	2.16	6.14	4.82	2.33	4.73	4.72	2.52			
50.0	17	24	6.92	5.11	2.17	6.41	4.93	2.33	4.73	4.73	2.52			
50.9	18	25	6.99	5.24	2.17	6.49	5.08	2.33	5.00	4.97	2.52			
47.1	19	27	7.10	5.50	2.18	6.62	5.36	2.35	5.43	5.25	2.53			
50.1	22	30	7.65	5.36	2.20	7.11	5.19	2.35	6.39	5.11	2.54			
51.9	24	32	7.97	5.20	2.21	7.43	5.07	2.36	5.79	4.98	2.55			

TC – Total Cooling Capacity (kW)

SHC – Sensible Heat Capacity (kW)

IP – Input Power (kW)

- CS-S28NKR CU-S28NKR

CU-S28NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	20			25			30			32		
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	7.54	5.91	1.90	7.45	5.72	2.08	7.35	5.63	2.25	7.30	5.60	2.32
54.1	16	22	7.99	5.82	1.91	7.79	5.62	2.09	7.67	5.57	2.27	7.60	5.55	2.34
50.0	17	24	8.26	5.89	1.92	8.06	5.70	2.09	7.94	5.67	2.28	7.86	5.65	2.36
50.9	18	25	8.34	6.03	1.92	8.14	5.85	2.10	8.02	5.81	2.28	7.95	5.79	2.36
47.1	19	27	8.51	6.31	1.92	8.32	6.14	2.11	8.22	6.08	2.28	8.15	6.05	2.35
50.1	22	30	9.04	6.07	1.94	8.84	5.92	2.13	8.74	5.88	2.30	8.69	5.86	2.37
51.9	24	32	9.38	5.90	1.95	9.18	5.75	2.14	9.11	5.72	2.31	9.06	5.70	2.38

CU-S28NKR	INDOOR		OUTDOOR TEMPERATURE (°C DB)											
	EWB	EDB	35			40			46					
%RH	°C	°C	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI	TC	SHC	PI
51.8	14	20	7.13	5.47	2.43	6.56	5.27	2.61	4.60	4.60	2.82			
54.1	16	22	7.50	5.40	2.44	6.92	5.21	2.62	5.33	5.10	2.84			
50.0	17	24	7.80	5.51	2.45	7.22	5.32	2.63	5.33	5.23	2.84			
50.9	18	25	7.87	5.66	2.45	7.31	5.48	2.63	5.63	5.36	2.84			
47.1	19	27	8.00	5.94	2.46	7.46	5.79	2.65	6.12	5.68	2.86			
50.1	22	30	8.62	5.79	2.48	8.01	5.61	2.66	7.19	5.52	2.87			
51.9	24	32	8.98	5.62	2.49	8.37	5.47	2.67	6.52	5.38	2.88			

TC – Total Cooling Capacity (kW)

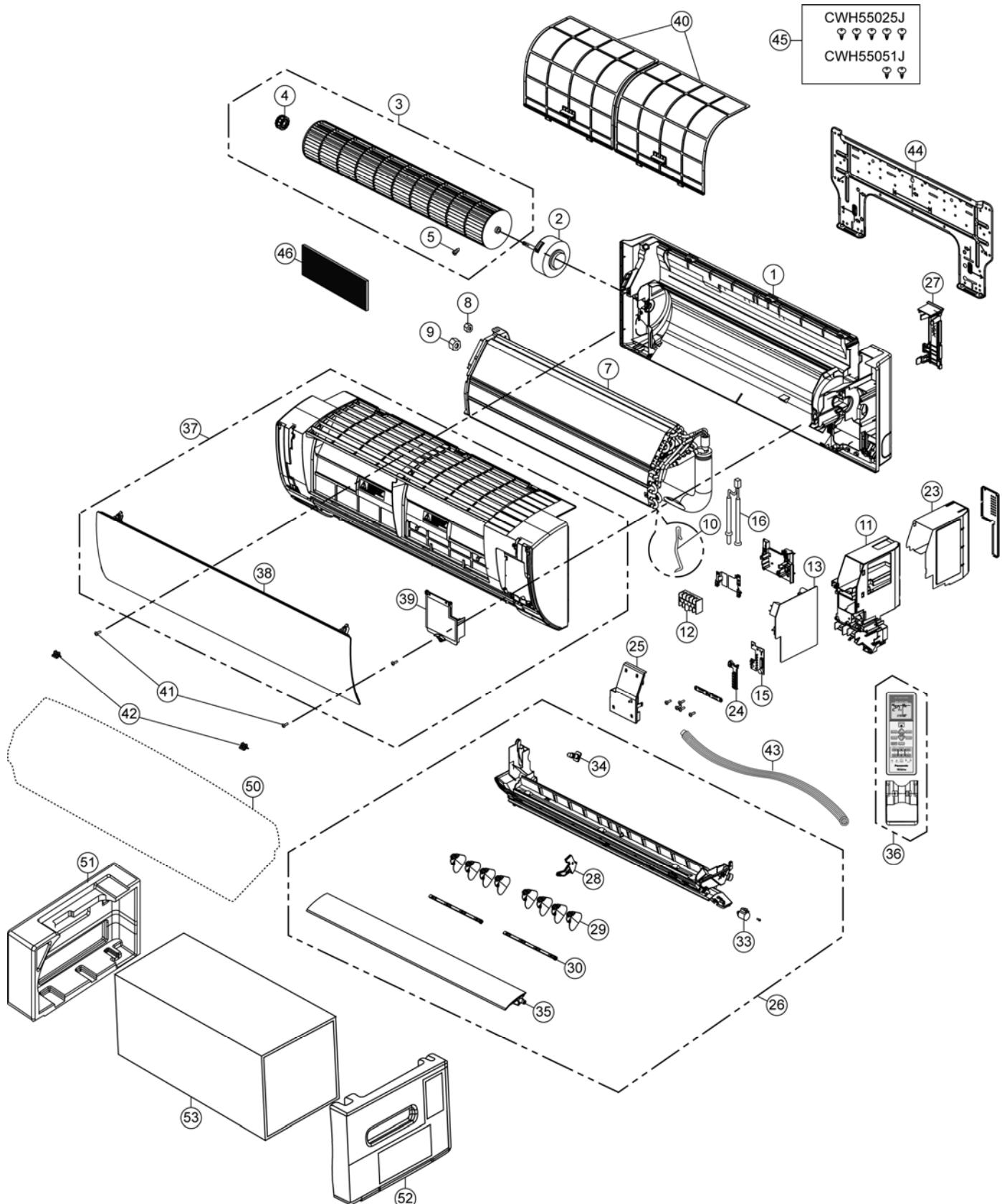
SHC – Sensible Heat Capacity (kW)

IP – Input Power (kW)

## 17. Exploded View and Replacement Parts List

### 17.1 Indoor Unit

#### 17.1.1 CS-S9NKR CS-S12NKR



##### Note

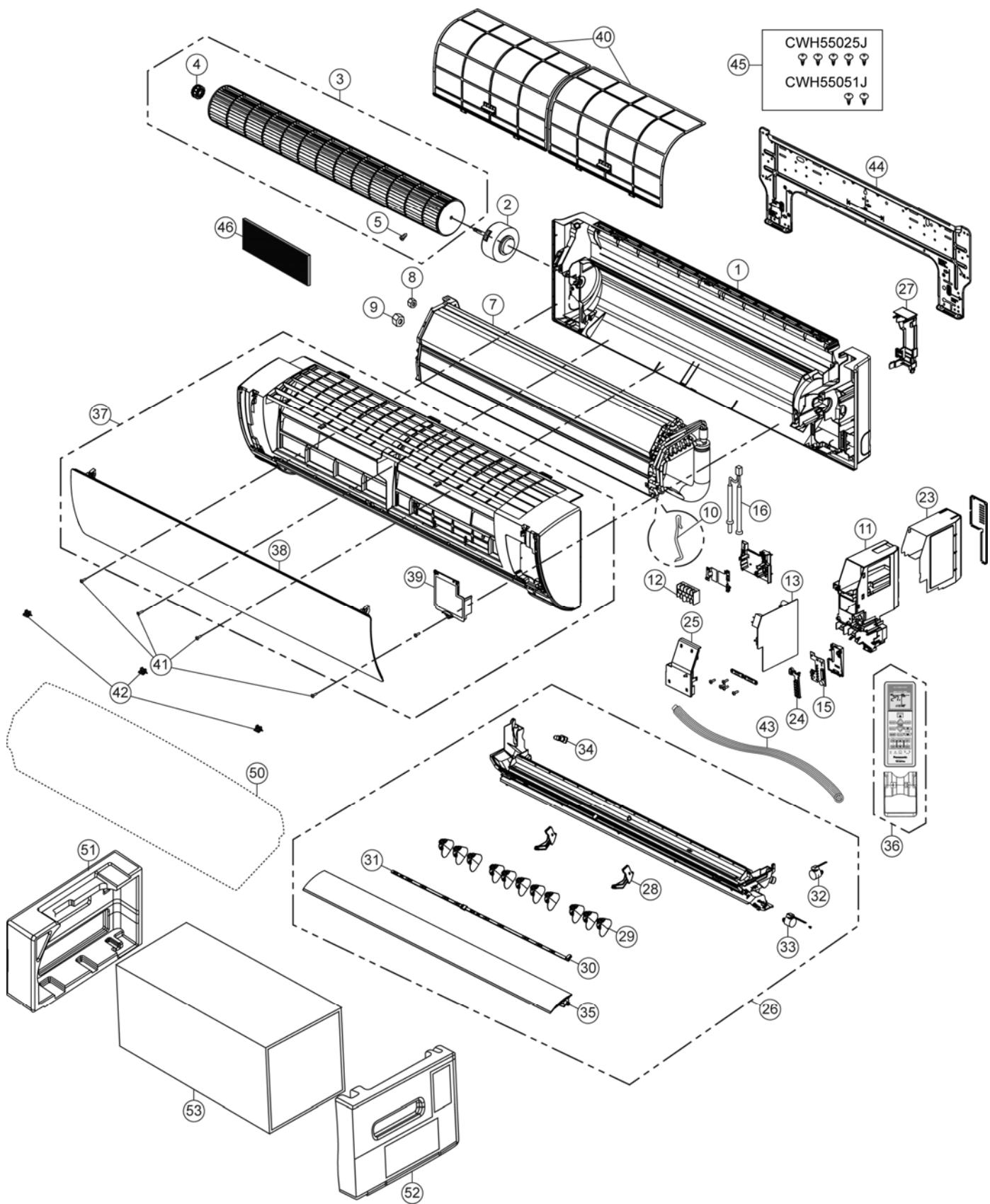
The above exploded view is for the purpose of parts disassembly and replacement.  
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-S9NKR	CS-S12NKR	REMARK
1	CHASSY COMPLETE	1	CWD50C1653	←	
2	FAN MOTOR	1	CWA921409	←	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1076	←	
4	BEARING ASS'Y	1	CWH64K1006	←	
5	SCREW - CROSS FLOW FAN	1	CWH551146	←	
7	EVAPORATOR	1	CWB30C3629	CWB30C3628	
8	FLARE NUT (LIQUID)	1	CWT251030	←	
9	FLARE NUT (GAS)	1	CWT251031	CWT251032	
10	HOLDER SENSOR	1	CWH32143	←	
11	CONTROL BOARD CASING	1	CWH102449	←	
12	TERMINAL BOARD COMPLETE	1	CWA28C2357	←	O
13	ELECTRONIC CONTROLLER - MAIN	1	CWA73C7000	CWA73C7001	O
15	ELECTRONIC CO. - INDICATOR & RECEIVER	1	CWA747149	←	O
16	SENSOR COMPLETE	1	CWA50C2122	←	O
23	CONTROL BOARD TOP COVER	1	CWH131467	←	
24	INDICATOR HOLDER	1	CWD933406	←	
25	CONTROL BOARD FRONT COVER	1	CWH13C1247	←	
26	DISCHARGE GRILLE COMPLETE	1	CWE20C3236	←	
27	BACK COVER CHASSIS	1	CWD933233	←	
28	FULCRUM	1	CWH621131	←	
29	VERTICAL VANE	8	CWE241374	←	
30	CONNECTING BAR	2	CWE261251	←	
33	AIR SWING MOTOR	1	CWA981264	←	O
34	CAP - DRAIN TRAY	1	CWH521096	←	
35	HORIZONTAL VANE	1	CWE24C1385	←	
36	REMOTE CONTROL COMPLETE	1	CWA75C4145	←	O
37	FRONT GRILLE COMPLETE	1	CWE11C5449	←	O
38	INTAKE GRILLE COMPLETE	1	CWE22C1723	←	
39	GRILLE DOOR	1	CWE14C1090	←	
40	AIR FILTER	2	CWD001279	←	
41	SCREW - FRONT GRILLE	3	XTT4+16CFJ	←	
42	CAP - FRONT GRILLE	2	CWH521227	←	
43	DRAIN HOSE	1	CWH851174	←	
44	INSTALLATION PLATE	1	CWH361134	←	
45	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	
46	AIR PURIFYING FILTER	1	CWD00C1280	←	
50	BAG	1	CWG861497	←	
51	SHOCK ABSORBER (LEFT)	1	CWG713386	←	
52	SHOCK ABSORBER (RIGHT)	1	CWG713387	←	
53	C.C.CASE	1	CWG567355	←	

(Note)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

### 17.1.2 CS-S18NKR CS-S24NKR CS-S28NKR



#### Note

The above exploded view is for the purpose of parts disassembly and replacement.  
The non-numbered parts are not kept as standard service parts.

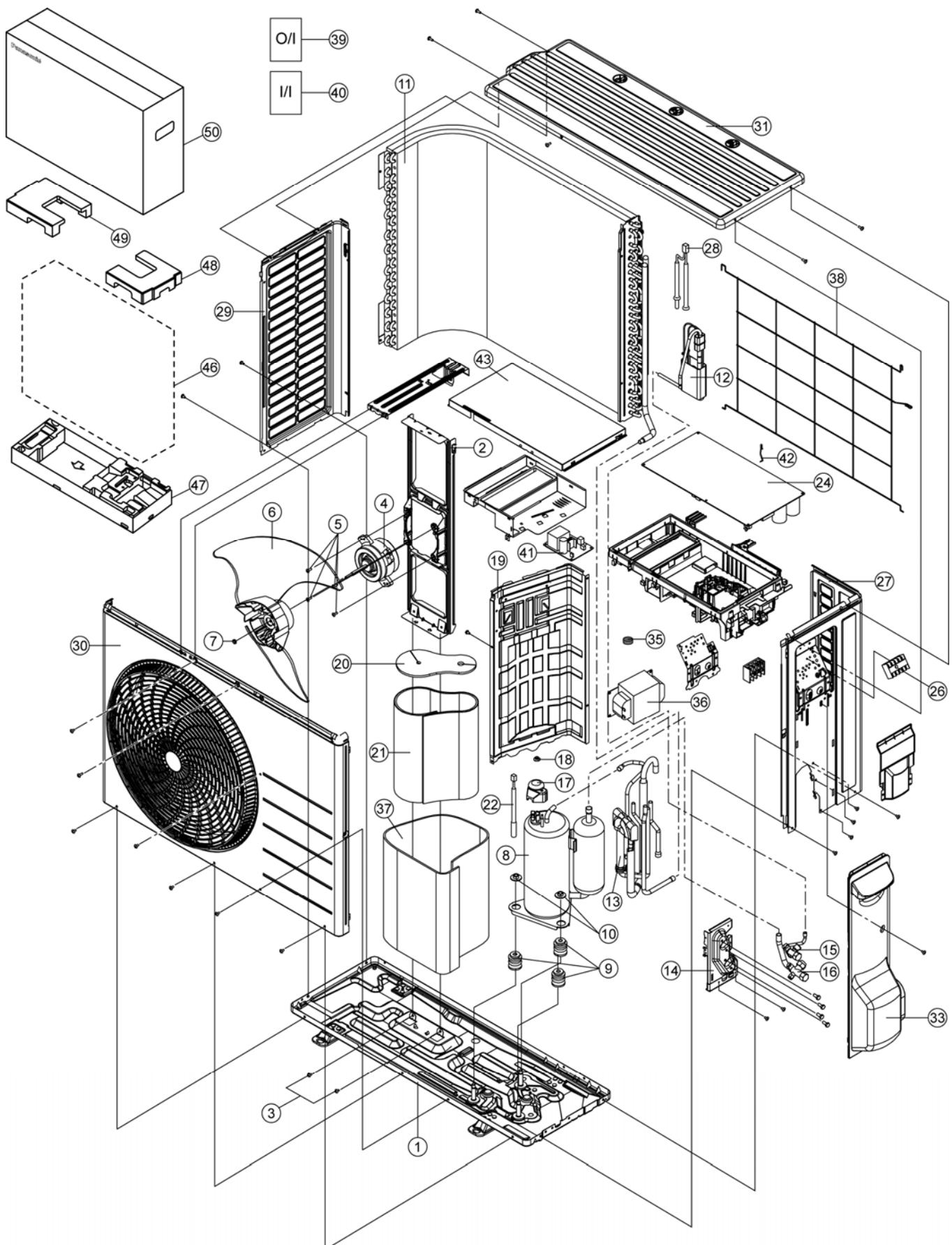
REF NO.	PART NAME & DESCRIPTION	QTY.	CS-S18NKR	CS-S24NKR	CS-S28NKR	REMARK
1	CHASSY COMPLETE	1	CWD50C1654	←	←	
2	FAN MOTOR	1	ARW7627AC	←	←	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1077	←	←	
4	BEARING ASS'Y	1	CWH64K1006	←	←	
5	SCREW - CROSS FLOW FAN	1	CWH551146	←	←	
7	EVAPORATOR	1	CWB30C3605	CWB30C3767	CWB30C3772	
8	FLARE NUT (LIQUID)	1	CWT251030	←	←	
9	FLARE NUT (GAS)	1	CWT251032	CWT251033	←	
10	HOLDER SENSOR	1	CWH32143	←	←	
11	CONTROL BOARD CASING	1	CWH102449	←	←	
12	TERMINAL BOARD COMPLETE	1	CWA28C2357	←	←	O
13	ELECTRONIC CONTROLLER - MAIN	1	CWA73C6940	CWA73C6944	CWA73C6947	O
15	ELECTRONIC CO. - INDICATOR & RECEIVER	1	CWA747149	←	←	O
16	SENSOR COMPLETE	1	CWA50C2122	CWA50C2782	←	O
23	CONTROL BOARD TOP COVER	1	CWH131467	←	←	
24	INDICATOR HOLDER	1	CWD933406	←	←	
25	CONTROL BOARD FRONT COVER	1	CWH13C1247	←	←	
26	DISCHARGE GRILLE COMPLETE	1	CWE20C3242	←	←	
27	BACK COVER CHASSIS	1	CWD933031	←	←	
28	FULCRUM	2	CWH621138	←	←	
29	VERTICAL VANE	11	CWE241374	←	←	
30	CONNECTING BAR (RIGHT)	1	CWE261257	←	←	
31	CONNECTING BAR (LEFT)	1	CWE261258	←	←	
32	AIR SWING MOTOR	1	CWA98K1018	←	←	O
33	AIR SWING MOTOR	1	CWA981241	←	←	O
34	CAP - DRAIN TRAY	1	CWH521096	←	←	
35	HORIZONTAL VANE	1	CWE24C1392	←	←	
36	REMOTE CONTROL COMPLETE	1	CWA75C4147	←	←	O
37	FRONT GRILLE COMPLETE	1	CWE11C5447	CWE11C5448	←	O
38	INTAKE GRILLE COMPLETE	1	CWE22C1728	←	←	
39	GRILLE DOOR	1	CWE14C1090	←	←	
40	AIR FILTER	2	CWD001283	←	←	
41	SCREW - FRONT GRILLE	3	XTT4+16CFJ	←	←	
42	CAP - FRONT GRILLE	3	CWH521227	←	←	
43	DRAIN HOSE	1	CWH851173	←	←	
44	INSTALLATION PLATE	1	CWH361098	←	←	
45	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C1705	←	←	
46	AIR PURIFYING FILTER	1	CWD00C1280	←	←	
50	BAG	1	CWG861498	←	←	
51	SHOCK ABSORBER (LEFT)	1	CWG713402	←	←	
52	SHOCK ABSORBER (RIGHT)	1	CWG713403	←	←	
53	C.C.CASE	1	CWG567455	←	←	

(Note)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

## 17.2 Outdoor Unit

### 17.2.1 CU-S9NKR CU-S12NKR



#### Note

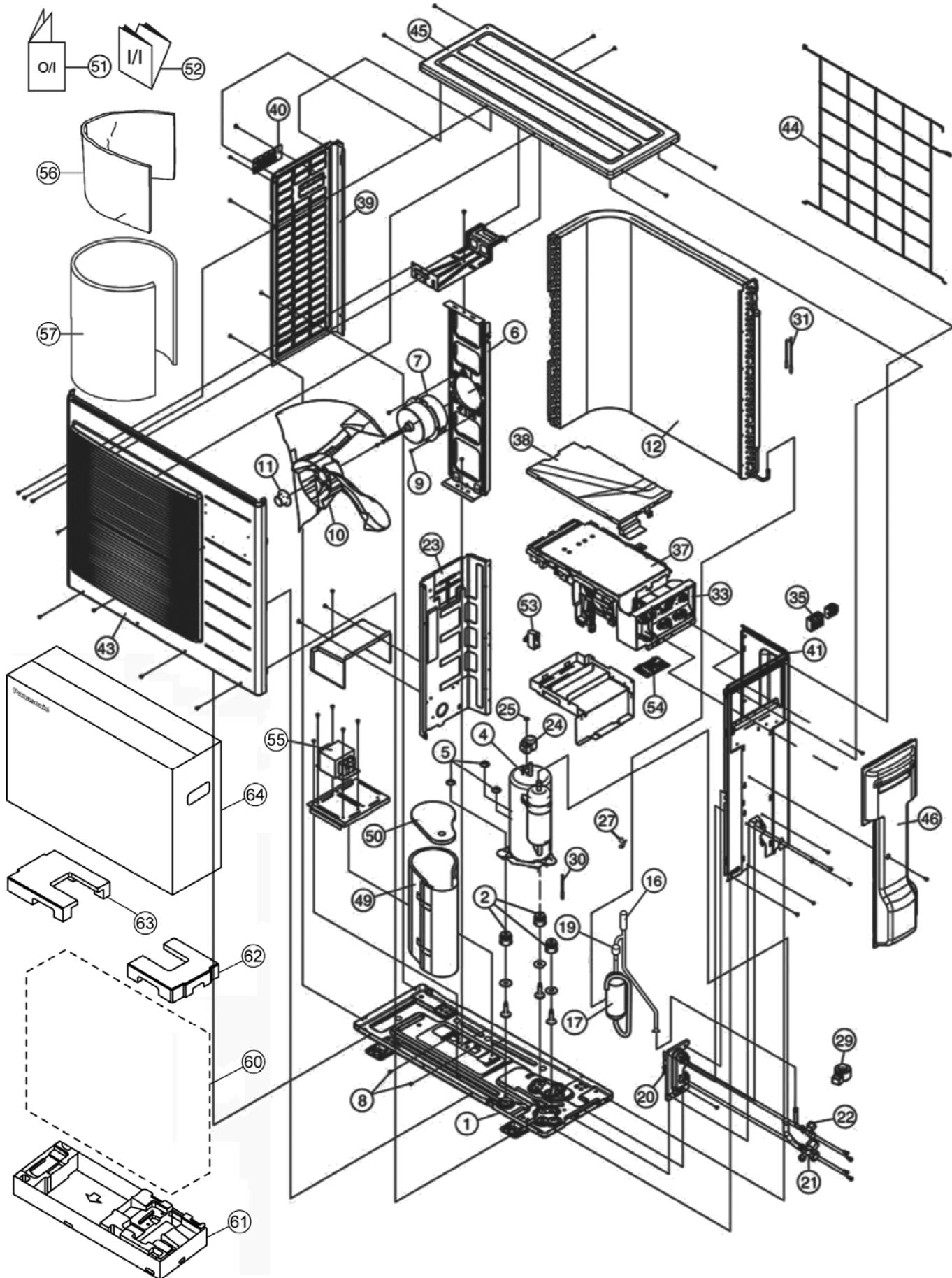
The above exploded view is for the purpose of parts disassembly and replacement.  
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-S9NKR	CU-S12NKR	REMARK
1	BASE PAN ASS'Y	1	CWD52K1283	←	
2	FAN MOTOR BRACKET	1	CWD541167	←	
3	SCREW - FAN MOTOR BRACKET	2	CWH551217	←	
4	FAN MOTOR	1	CWA951789	CWA951791	O
5	SCREW - FAN MOTOR MOUNT	4	CWH55406J	←	
6	PROPELLER FAN ASS'Y	1	CWH03K1066	←	
7	NUT - PROPELLER FAN	1	CWH56053J	←	
8	COMPRESSOR	1	5RS092XCD21	←	O
9	ANTI - VIBRATION BUSHING	3	CWH50077	←	
10	NUT - COMPRESSOR MOUNT	3	CWH56000J	←	
11	CONDENSER COMPLETE	1	CWB32C3638	CWB32C3221	
12	CAPILLARY TUBE ASSY	1	CWB15K1389	CWB15K1390	
13	DISCHARGE MUFFLER	1	CWB121010	←	
14	HOLDER - COUPLING	1	CWH351233	←	
15	2 WAYS VALVE (LIQUID)	1	CWB021564	←	O
16	3 WAYS VALVE (GAS)	1	CWB011374	CWB011663	O
17	TERMINAL COVER	1	CWH171039A	←	
18	NUT - TERMINAL COVER	1	CWH7080300J	←	
19	SOUND PROOF BOARD	1	CWH151274	←	
20	SOUND PROOF MATERIAL	1	CWG302434	←	
21	SOUND PROOF MATERIAL	1	CWG302428	←	
22	SENSOR CO. - COMP TEMP	1	CWA50C2830	←	O
24	ELECTRONIC CONTROLLER - MAIN	1	CWA73C7005R	CWA73C7006R	O
26	TERMINAL BOARD ASSY	1	CWA28K1110J	←	O
27	CABINET SIDE PLATE (R)	1	CWE04C1296	←	
28	SENSOR CO. - AIR AND COND TEMP	1	CWA50C2825	←	O
29	CABINET SIDE PLATE (L)	1	CWE041579A	←	
30	CABINET FRONT PLATE ASSY	1	CWE06C1360	←	
31	CABINET TOP PLATE	1	CWE031148A	←	
33	CONTROL BOARD COVER (R)	1	CWH13C1253	←	
35	STRAINER	-	-	CWB11025	
36	REACTOR	1	G0C193J00002	G0C103J00013	
37	SOUND PROOF MATERIAL	1	CWG302429	←	
38	WIRE NET	1	CWD041166A	←	
39	OPERATING INSTRUCTION	1	CWF568750	←	
40	INSTALLATION INSTRUCTION	1	CWF615545	←	
41	ELECTRONIC CONT. - NOISE FILTER	1	CWA746558	←	O
42	HOLDER SENSOR	1	CWH32143	←	
43	CONTROL BOARD COVER (TOP)	1	CWH131473	←	
46	BAG	1	CWG861078	←	
47	BASE BOARD-COMPLETE	1	CWG62C1144	←	
48	SHOCK ABSORBER (RIGHT)	1	CWG713415	←	
49	SHOCK ABSORBER (LEFT)	1	CWG713416	←	
50	C.C.CASE	1	CWG566848	←	

(Note)

- All parts are supplied from PAPAMY, Malaysia (Vendor Code: 00029488).
- "O" marked parts are recommended to be kept in stock.

## 17.2.2 CU-S18NKR

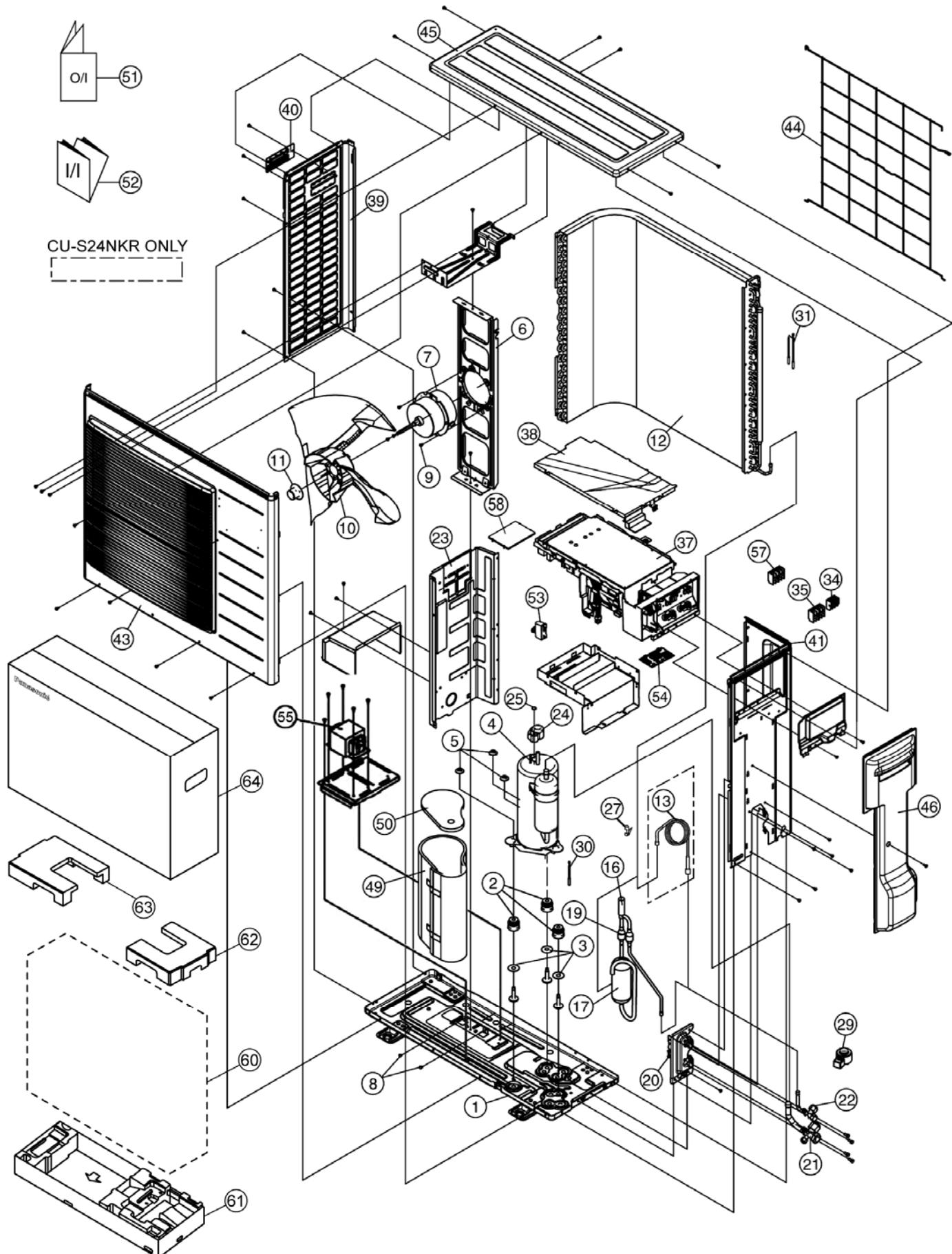


REF. NO.	DESCRIPTION & NAME	QTY.	CU-S18NKR	REMARK
1	BASE PAN ASS'Y	1	CWD52K1292	
2	ANTI - VIBRATION BUSHING	3	CWH50077	
4	COMPRESSOR	1	5RD132XFA21	O
5	NUT - COMPRESSOR MOUNT	3	CWH56000J	
6	FAN MOTOR BRACKET	1	CWD541126	
7	FAN MOTOR	1	CWA951620	O
8	SCREW - FAN MOTOR BRACKET	3	CWH551217	
9	SCREW - FAN MOTOR MOUNT	3	CWH551040J	
10	PROPELLER FAN ASS'Y	1	CWH001019	
11	NUT - PROPELLER FAN	1	CWH561092	
12	CONDENSER COMPLETE	1	CWB32C3231	
16	EXPANSION VALVE	1	CWB051016J	
17	RECEIVER	1	CWB14011	
19	STRAINER	1	CWB11094	
20	HOLDER - COUPLING	1	CWH351227	
21	3 WAYS VALVE (GAS)	1	CWB011670	O
22	2 WAYS VALVE (LIQUID)	1	CWB021454	O
23	SOUND PROOF BOARD	1	CWH151198	
24	TERMINAL COVER	1	CWH171039A	
25	NUT - TERMINAL COVER	1	CWH7080300J	
27	HOLDER SENSOR	1	CWH711010	
29	V-COIL COMPLETE	1	CWA43C2257	
30	SENSOR CO. - COMP TEMP	1	CWA50C2656	O
31	SENSOR CO. - AIR AND COND TEMP	1	CWA50C2517	O
35	TERMINAL BOARD ASSY	1	CWA28K1110J	O
37	ELECTRONIC CONTROLLER - MAIN	1	CWA73C6929R	O
38	CONTROL BOARD COVER (TOP)	1	CWH131333	
39	CABINET SIDE PLATE (L)	1	CWE041317A	
40	HANDLE	1	CWE161010	
41	CABINET SIDE PLATE (R)	1	CWE041318A	
43	CABINET FRONT PLATE ASSY	1	CWE06K1084	
44	WIRE NET	1	CWD041128A	
45	CABINET TOP PLATE	1	CWE031083A	
46	CONTROL BOARD COVER (R)	1	CWH13C1185	
49	SOUND PROOF MATERIAL	1	CWG302629	
50	SOUND PROOF MATERIAL	1	CWG302656	
51	OPERATING INSTRUCTION	1	CWF568750	
52	INSTALLATION INSTRUCTION	1	CWF615545	
53	CAPACITOR - FM	1	DS461305QP-A	O
54	ELECTRONIC CONTROLLER	1	CWH14C8772	O
55	REACTOR	1	G0C153J00007	
56	SOUND PROOF MATERIAL	1	CWG302521	
57	SOUND PROOF MATERIAL	1	CWG302766	
60	BAG	1	CWG861154	
61	BASE BOARD - COMPLETE	1	CWG62C1082	
62	SHOCK ABSORBER (RIGHT)	1	CWG712879	
63	SHOCK ABSORBER (LEFT)	1	CWG712880	
64	C.C.CASE	1	CWG565614	

(Note)

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### 17.2.3 CU-S24NKR CU-S28NKR



REF. NO.	PART NAME & DESCRIPTION	QTY.	CU-S24NKR	CU-S28NKR	REMARK
1	BASE PAN ASS'Y	1	CWD52K1230	←	
2	ANTI - VIBRATION BUSHING	3	CWH50055	←	
3	PACKING	3	CWB81043	←	
4	COMPRESSOR	1	5KD240XAF21	←	O
5	NUT - COMPRESSOR MOUNT	3	CWH561049	←	
6	FAN MOTOR BRACKET	1	CWD541126	CWD541127	
7	FAN MOTOR	1	CWA951671	EHDS80C60AC	O
8	SCREW - FAN MOTOR BRACKET	3	CWH551217	←	
9	SCREW - FAN MOTOR MOUNT	3/4	CWH551040J	CWH551323	
10	PROPELLER FAN ASS'Y	1	CWH001019	CWH00K1006	
11	NUT - PROPELLER FAN	1	CWH561092	←	
12	CONDENSER COMPLETE	1	CWB32C3508	CWB32C3303	
13	CAPILLARY TUBE ASSY	1	CWB15K1349	-	
16	EXPANSION VALVE	1	-	CWB051018J	
17	RECEIVER	1	-	CWB14017	
19	STRAINER	1	-	CWB111032	
20	HOLDER - COUPLING	1	CWH351228	←	
21	3 WAYS VALVE (GAS)	1	CWB011363	←	O
22	2 WAYS VALVE (LIQUID)	1	CWB021464	←	O
23	SOUND PROOF BOARD	1	CWH151277	←	
24	TERMINAL COVER	1	CWH171039A	←	
25	NUT - TERMINAL COVER	1	CWH7080300J	←	
27	HOLDER SENSOR	1	CWH711010	←	
29	V-COIL COMPLETE	1	-	CWA43C2258	
30	SENSOR CO. - COMP TEMP	1	CWA50C2656	←	O
31	SENSOR CO. - AIR AND COND TEMP	1	CWA50C2517	←	O
34	TERMINAL BOARD ASSY	1	CWA28K1076J	←	O
35	TERMINAL BOARD ASSY	1	CWA28K1162	←	O
37	ELECTRONIC CONTROLLER - MAIN	1	CWA73C6933R	CWA73C6936R	O
38	CONTROL BOARD COVER (TOP)	1	CWH131333	←	
39	CABINET SIDE PLATE (L)	1	CWE041317A	←	
40	HANDLE	1	CWE161010	←	
41	CABINET SIDE PLATE (R)	1	CWE041319A	←	
43	CABINET FRONT PLATE ASSY	1	CWE06K1063	←	
44	WIRE NET	1	CWD041128A	←	
45	CABINET TOP PLATE	1	CWE031083A	←	
46	CONTROL BOARD COVER (R)	1	CWH13C1185	←	
49	SOUND PROOF MATERIAL	1	CWG302245	←	
50	SOUND PROOF MATERIAL	1	CWG302246	←	
51	OPERATING INSTRUCTION	1	CWF568750	←	
52	INSTALLATION INSTRUCTION	1	CWF615545	←	
53	CAPACITOR - FM	1	DS461305QP-A	-	O
54	ELECTRONIC CONT. - NOISE FILTER	1	CWA746924	CWA746773	O
55	REACTOR	1	G0C452J00002	←	
57	TERMINAL BOARD ASSY	1	CWA28K1281	←	O
58	ELECTRONIC CONTROLLER	1	CWH14C8772	←	O
60	BAG	1	CWG861154	←	
61	BASE BOARD - COMPLETE	1	CWG62C1081	←	
62	SHOCK ABSORBER (RIGHT)	1	CWG712879	←	
63	SHOCK ABSORBER (LEFT)	1	CWG712880	←	
64	C.C.CASE	1	CWG565546	←	

(Note)

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