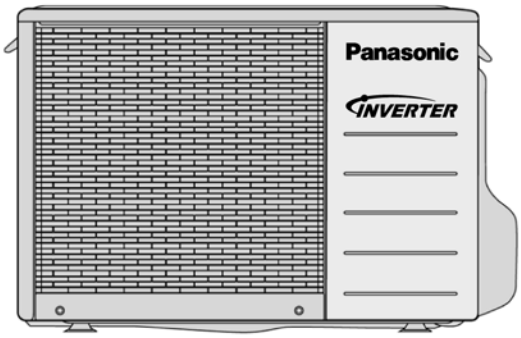
Order No. MAC0712073C2

Service Manual

Air Conditioner

CS-TE9HKE CU-TE9HKE
CS-TE12HKE CU-TE12HKE



⚠ 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 product or 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 refrigeration circuit.

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Panasonic®

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.

⚠ WARNING	This indication shows the possibility of causing death or serious injury.
⚠ CAUTION	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 PROHIBITTED from doing.

- Carry out test running 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.

⚠ WARNING
1. Engage dealer or specialist for installation and servicing. If installation or servicing done by the user is defective, it will cause water leakage, electrical shock or fire.
2. Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electric shock or fire.
3. 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.
4. 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.
5. 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.
6. 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.
7. Use the specified cable 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.
8. 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.
9. 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.
10. 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.

11. 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.
12. When connecting the piping, do not allow air or any substances other than the specified refrigerant to enter the refrigeration cycle. Otherwise, this may lower the capacity, cause abnormally high pressure in the refrigeration cycle, and possibly result in explosion and injury.
13. Do not damage or use unspecified power supply cord. Otherwise it will cause fire or electric shock.
14. 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.
15. It is desirable that the amount of residual oil is less than 40 mg/10m.
    Thickness of copper pipes used with R410A must be more than 0.6 mm. Never use copper pipes thinner than 0.6 mm.
16. 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.
17. 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.
18. Ventilate if there is refrigerant gas leakage during operation. It may cause toxic gas when refrigerant contacts with fire.

CAUTION

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 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 circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3.5 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 work: It may need two people to carry out the installation work.
10. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.

2 Specifications

2.1. CS-TE9HKE CU-TE9HKE

ITEM			UNIT	INDOOR UNIT	OUTDOOR UNIT
Performance Test Condition				EUROVENT	
COOLING	Capacity		kW	2.50 (0.80 ~ 3.00)	
			kCal/h	2150 (690 ~ 2580)	
			Btu/h	8530 (2730 ~ 10200)	
	EER		W/W	4.39 (4.57 ~ 4.11)	
			kcal/hW	3.77 (3.94 ~ 3.53)	
	Noise Level		dB-A (H/L/Q-Lo)	39/26/21	High 46
			Power level dB	50	59
HEATING	Capacity		kW	3.60 (0.80 ~ 4.60)	
			kCal/h	3100 (690 ~ 3960)	
			Btu/h	12300 (2730 ~ 1570)	
	COP		W/W	4.14 (4.85 ~ 4.00)	
			kcal/hW	3.56 (4.18 ~ 3.44)	
	Noise Level		dB-A (H/L/Q-Lo)	40/27/24	High 47
			Power level dB	51	60
Moisture Removal			l/h	1.5	
			pt/h	3.2	
Air Volume		Q-Lo	m^3/min (ft^3/min)	Cooling; 4.7 (166) Heating; 5.8 (205)	—
		Lo	m^3/min (ft^3/min)	Cooling; 5.3 (187) Heating; 6.2 (219)	—
		Me	m^3/min (ft^3/min)	Cooling; 7.2 (254) Heating; 8.4 (297)	—
		Hi	m^3/min (ft^3/min)	Cooling; 9.2 (320) Heating; 10.7 (380)	Cooling; 29.8 (1050)
Refrigeration Control Device				—	Expansion Valve
Refrigeration Oil			cm^3	—	RB68A or Freol Alpha68M (320)
Refrigerant (R410A)			g (oz)	—	970 (34.2)
Dimension		Height	mm (inch)	298 (11-3/4)	540 (21-9/32)
		Width	mm (inch)	799 (31-15/32)	780 (30-23/32)
		Depth	mm (inch)	139 (5-1/2)	289 (11-13/32)
Net Weight			kg (lbs)	8 (18)	34 (75)
Pipe Diameter		Gas	mm (inch)	9.52 (3/8)	
		Liquid	mm (inch)	6.35 (1/4)	
Standard Length			m (ft)	7.5 (24.6)	
Pipe Length Range			m (ft)	3 (9.8) ~ 15 (49.2)	
Height Difference			m (ft)	5 (16.4)	
Additional Gas Amount			g/m (oz/ft)	20 (0.2)	
Refrigeration Charge Less			m (ft)	7.5 (24.6)	
Drain Hose		Inner Diameter	mm	16	—
		Length	mm	650	—
Compressor		Type		—	Hermetic Motor
		Motor Type		—	Brushless (6-pole)
		Rated Output	W	—	700

ITEM			UNIT	INDOOR UNIT	OUTDOOR UNIT
Fan	Type			Cross-Flow Fan	Propeller Fan
	Material			ASG20K1 or ASG32K1	PP
	Motor Type			Transistor (8-pole)	Induction (6-pole)
	Input Power		W	30	—
	Output Power		W	30	25
	Fan Speed	Lo (Cool/Heat)	rpm	910 / 980	—
		Me (Cool/Heat)	rpm	1130 / 1240	—
		Hi (Cool/Heat)	rpm	1370 / 1510	770 / -
		SHi (Cool/Heat)	rpm	1430 / 1460	—
Heat Exchanger	Fin Material			Aluminium (Pre Coat)	Aluminium (Blue Coat)
	Fin Type			Slit Fin	Corrugated Fin
	Row x Stage x FPI			2.1 x 11.4 x 23	2 x 24 x 17
	Size (W x H x L)		mm	640 x 304 x 25.4	36.4 x 504 x 713 684
Air Filter	Material			Polypropelene	—
	Type			One-Touch	—

1. Cooling capacities are based on indoor temperature of 27°C D.B. (80.6°F D.B.), 19.0°C W.B. (66.2°F W.B.) and outdoor air temperature of 35°C D.B. (95°F D.B.), 24°C W.B. (75.2°F W.B.)
2. Heating capacities are based on indoor temperature of 20°C D.B. (68°F D.B.) and outdoor air temperature of 7°C D.B. (44.6°F D.B.), 6°C W.B. (42.8°F W.B.)

Item		Unit	
Power Source (Phase, Voltage, Cycle)		ø	Single
		V	230
		Hz	50
Input Power		W	Cooling; 570 (175 ~ 730) Heating; 870 (165 ~ 1.15k)
Starting Current		A	4.0
Running Current		A	Cooling; 2.6 Heating; 4.0
Maximum current		A	5.3
Power Factor		%	Cooling; 95 Heating; 95
Power factor means total figure of compressor, indoor fan motor and outdoor fan motor.			
Power Cord	Number of core		3 (1.0mm)
	Length	m (ft)	1.5 (5)
Thermostat			Electrical
Protection Device			—
Annual Consumption		kWh	285

Note

• Specifications are subject to change without notice for further improvement.

2.2. CS-TE12HKE CU-TE12HKE

ITEM				UNIT	INDOOR UNIT	OUTDOOR UNIT
Performance Test Condition					EUROVENT	
COOLING	Capacity			kW	3.50 (0.80 ~ 4.00)	
				kCal/h	3010 (690 ~ 3440)	
				Btu/h	11900 (2730 ~ 13600)	
	EER			W/W	3.68 (4.32 ~ 3.42)	
				kCal/hW	3.17 (3.73 ~ 2.94)	
	Noise Level			dB-A (H/L/Q-Lo)	42/29/26	High 48
				Power level dB	53	61
HEATING	Capacity			kW	4.20 (0.80 ~ 5.50)	
				kCal/h	3610 (690 ~ 4730)	
				Btu/h	14300 (2730 ~ 18800)	
	COP			W/W	3.96 (4.57 ~ 3.67)	
				Btu/hW	3.41 (3.94 ~ 3.15)	
	Noise Level			dB-A (H/L/Q-Lo)	42/33/30	High 50
				Power level dB	53	63
Moisture Removal				l/h	2.0	
				pt/h	4.2	
Air Volume	Q-Lo			m^3/min (ft^3/min)	Cooling; 5.4 (191) Heating; 7.3 (258)	—
	Lo			m^3/min (ft^3/min)	Cooling; 8.1 (215) Heating; 8.2 (290)	—
	Me			m^3/min (ft^3/min)	Cooling; 9.0 (318) Heating; 9.7 (342)	—
	Hi			m^3/min (ft^3/min)	Cooling; 9.9 (350) Heating; 11.2 (400)	Cooling; 31.0 (1090)
Refrigeration Control Device					—	Expansion Valve
Refrigeration Oil				cm^3	—	RB68A or Freol Alpha68M (320)
Refrigerant (R410A)				g (oz)	—	1.04k (36.7)
Dimension	Height			mm (inch)	298 (11-3/4)	540 (21-9/32)
	Width			mm (inch)	799 (31-15/32)	780 (30-23/32)
	Depth			mm (inch)	139 (5-1/2)	289 (11-13/32)
Net Weight				kg (lbs)	8 (18)	34 (75)
Pipe Diameter	Gas			mm (inch)	12.7 (1/2)	
	Liquid			mm (inch)	6.35 (1/4)	
Standard Length				m (ft)	7.5 (24.6)	
Pipe Length Range				m (ft)	3 (9.8) ~ 15 (49.2)	
Height Difference				m (ft)	5 (16.4)	
Additional Gas Amount				g/m (oz/ft)	20 (0.2)	
Refrigeration Charge Less				m (ft)	7.5 (24.6)	
Drain Hose	Inner Diameter			mm	16	—
	Length			mm	650	—
Compressor	Type				—	Hermetic Motor
	Motor Type				—	Brushless (6-pole)
	Rated Output			W	—	700
Fan	Type				Cross-Flow Fan	Propeller Fan
	Material				ASG20K1 or ASG32K1	PP
	Motor Type				Transistor (8-pole)	Induction (6-pole)
	Input Power			W	30	—
	Output Power			W	30	30
	Fan Speed		Lo (Cool/Heat)	rpm	1050 / 1200	—
			Me (Cool/Heat)	rpm	1270 / 1380	—
			Hi (Cool/Heat)	rpm	1500 / 1560	830 / -
			SHi (Cool/Heat)	rpm	1560 / 1540	—

ITEM		UNIT	INDOOR UNIT	OUTDOOR UNIT
Heat Exchanger	Fin Material		Aluminium (Pre Coat)	Aluminium (Blue Coat)
	Fin Type		Slit Fin	Corrugated Fin
	Row x Stage x FPI		2.1 x 11.4 x 23	2 x 24 x 17
	Size (W x H x L)	mm	640 x 304 x 25.4	36.4 x 504 x 713 684
Air Filter	Material		Polypropelene	—
	Type		One-Touch	—

1. Cooling capacities are based on indoor temperature of 27°C D.B. (80.6°F D.B.), 19.0°C W.B. (66.2°F W.B.) and outdoor air temperature of 35°C D.B. (95°F D.B.), 24°C W.B. (75.2°F W.B.)
2. Heating capacities are based on indoor temperature of 20°C D.B. (68°F D.B.) and outdoor air temperature of 7°C D.B. (44.6°F D.B.), 6°C W.B. (42.8°F W.B.)

Item		Unit	
Power Source (Phase, Voltage, Cycle)		ø	Single
		V	230
		Hz	50
Input Power		W	Cooling; 950 (185 ~ 1.17k) Heating; 1.06k (175 ~ 1.50k)
Starting Current		A	4.9
Running Current		A	Cooling; 4.4 Heating; 4.9
Maximum current		A	6.9
Power Factor		%	Cooling; 94 Heating; 94
Power factor means total figure of compressor, indoor fan motor and outdoor fan motor.			
Power Cord	Number of core		3 (1.0mm)
	Length	m (ft)	1.5 (5)
Thermostat			Electrical
Protection Device			—
Annual Consumption		kWh	475

Note

• Specifications are subject to change without notice for further improvement.

3 Features

- **Inverter Technology**
  - Wider output power range
  - Energy saving
  - Quick cooling
  - Quick heating
  - More precise temperature control

- **Super Alleru-buster Filter**
  - Filter inactive various harmful airborne elements including allergens and bacteria

- **Environment Protection**
  - Non-ozone depletion substances refrigerant (R410A)

- **Long Installation Piping**
  - CS/CU-TE9/12HKE, long piping up to 15 meters

- **Quality Improvement**
  - Random auto restart after power failure for safety restart operation
  - Gas leakage protection
  - Prevent compressor reverse cycle
  - Inner protector to protect compressor
  - Noise prevention during soft dry operation

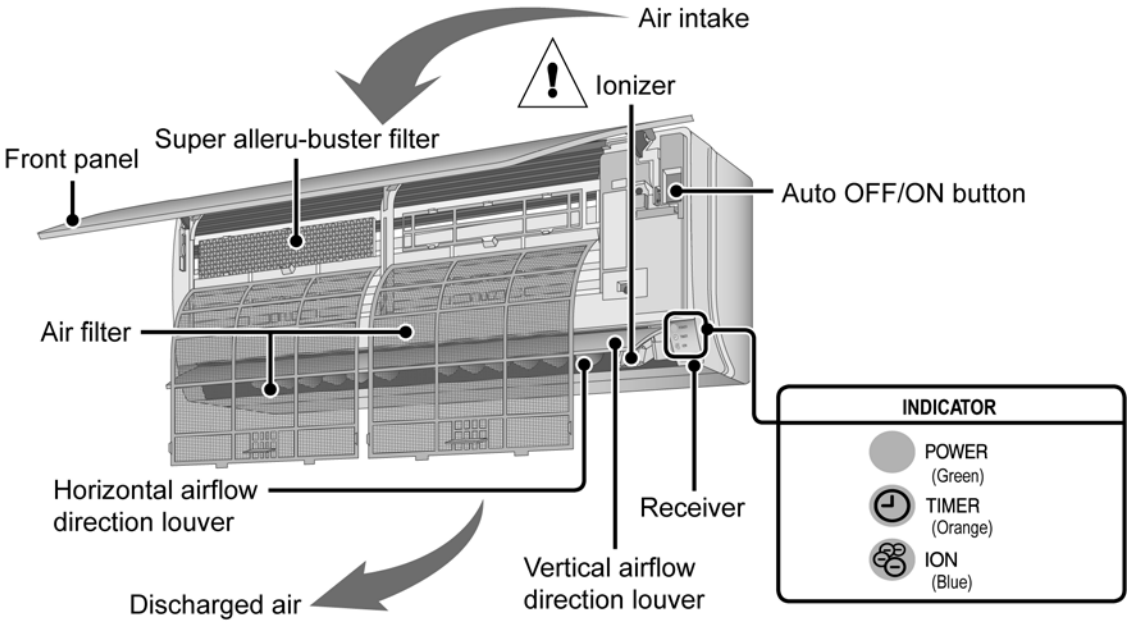
- **Operation Improvement**
  - Quiet mode to reduce the indoor unit operating sound
  - Powerful mode to reach the desired room temperature quickly
  - 24-hour timer setting

- **Serviceability Improvement**
  - Breakdown Self Diagnosis function

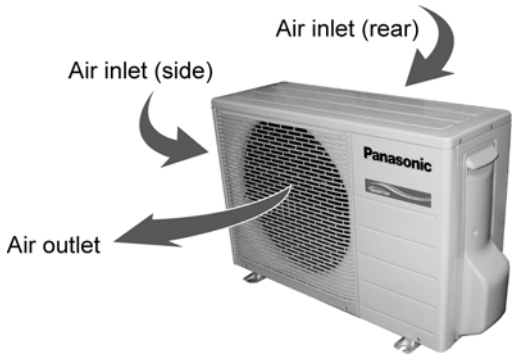
4 Location of Controls and Components

4.1. Product Overview

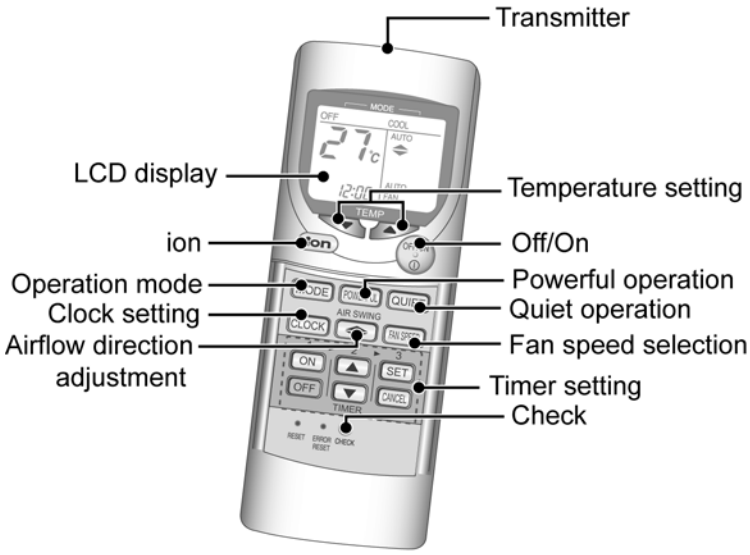
4.1.1. Indoor Unit



4.1.2. Outdoor Unit

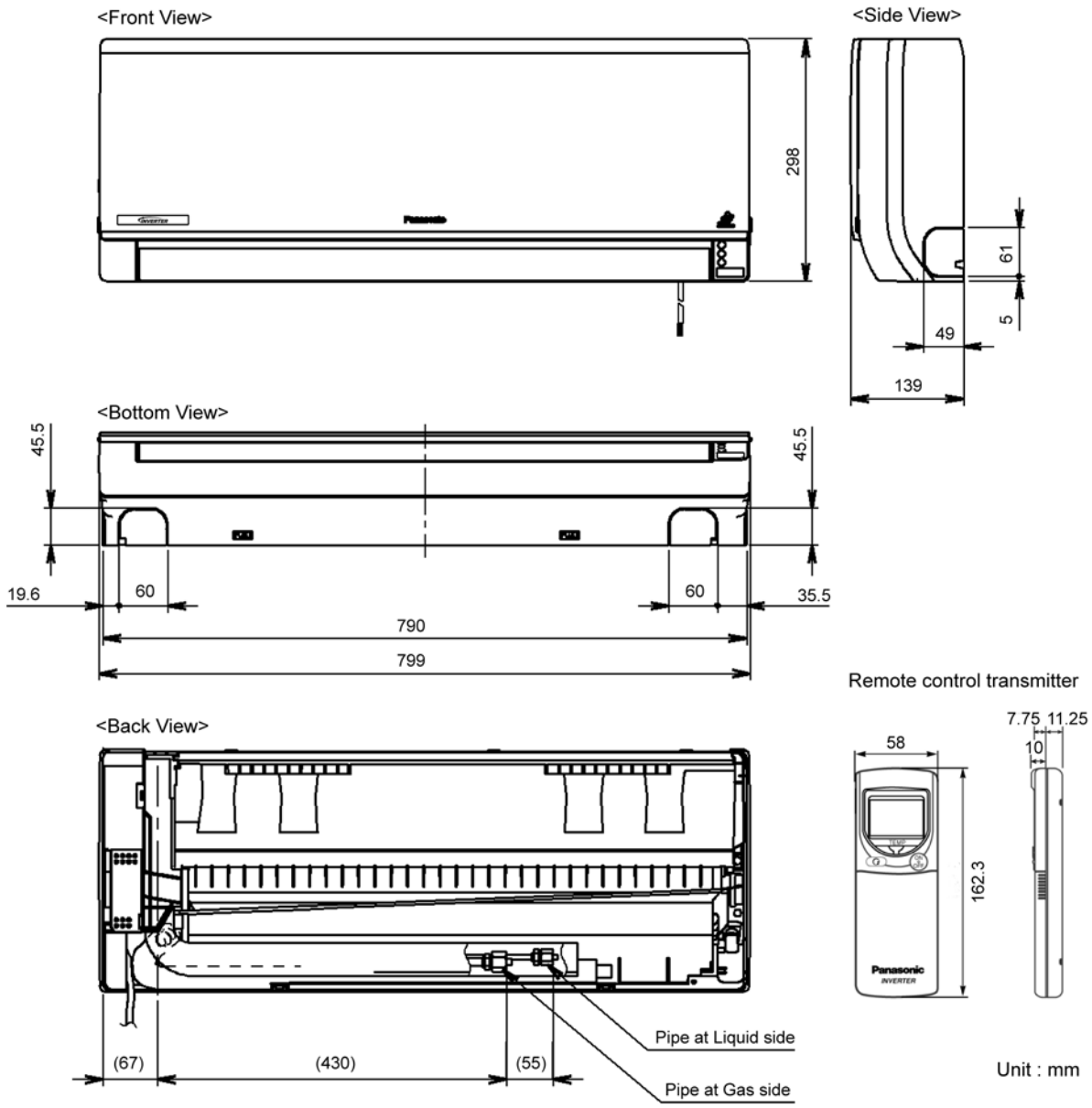


4.1.3. Remote Control

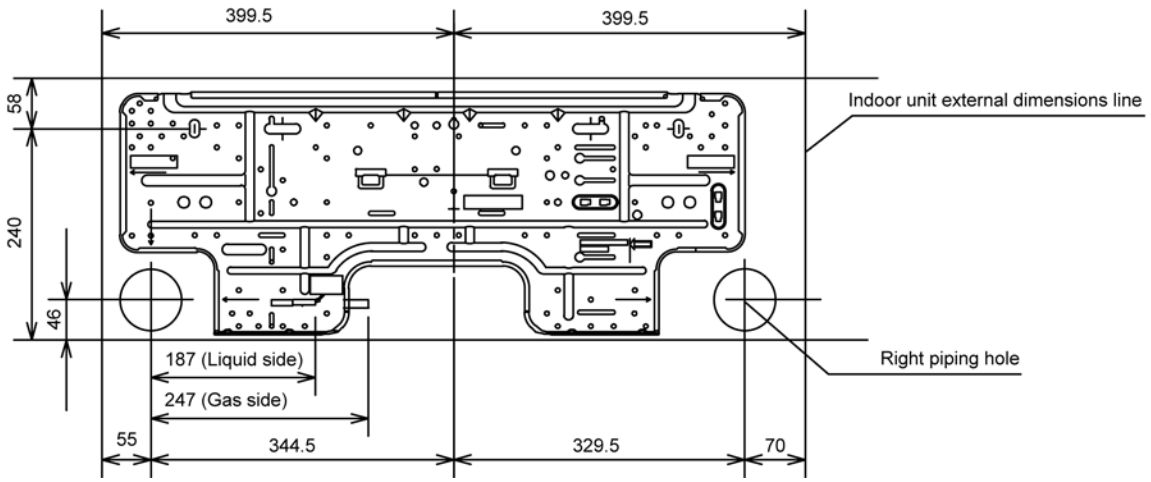


5 Dimensions

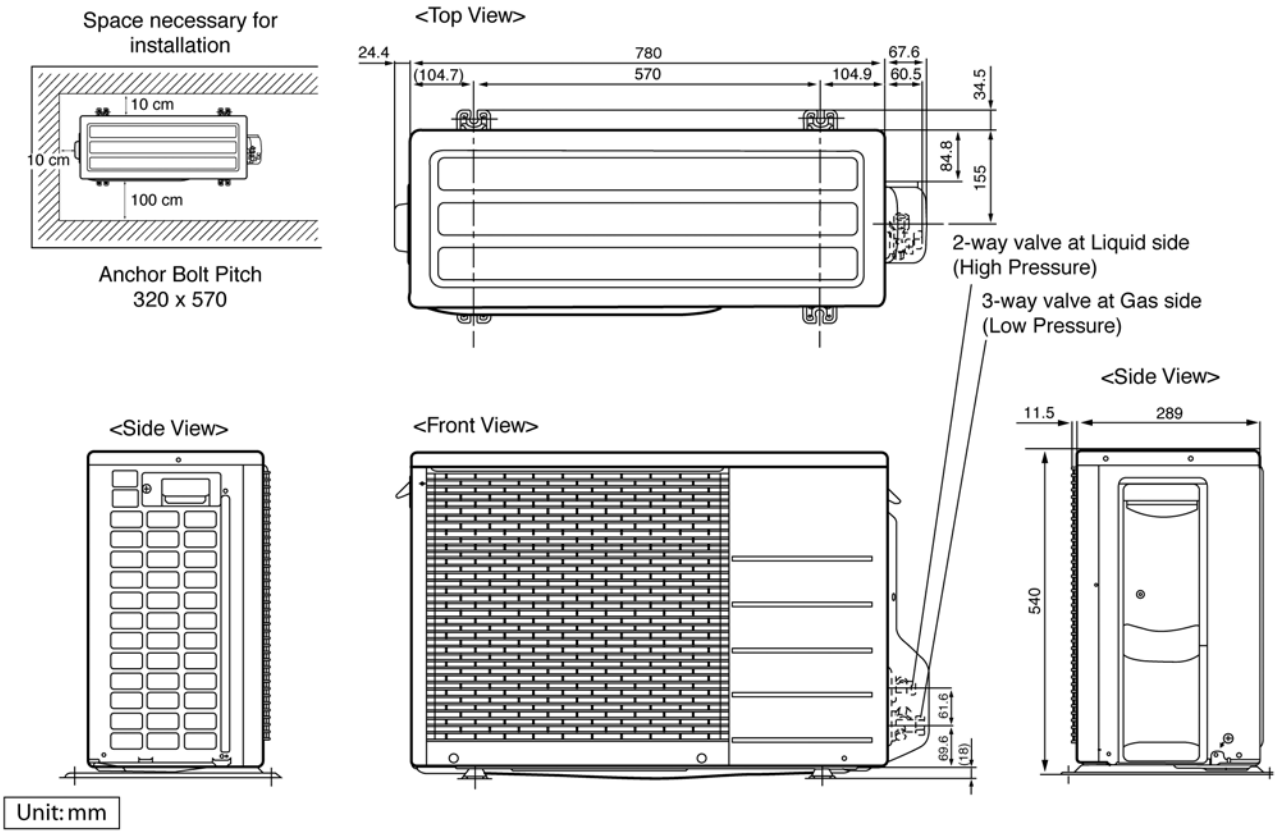
5.1. Indoor Unit



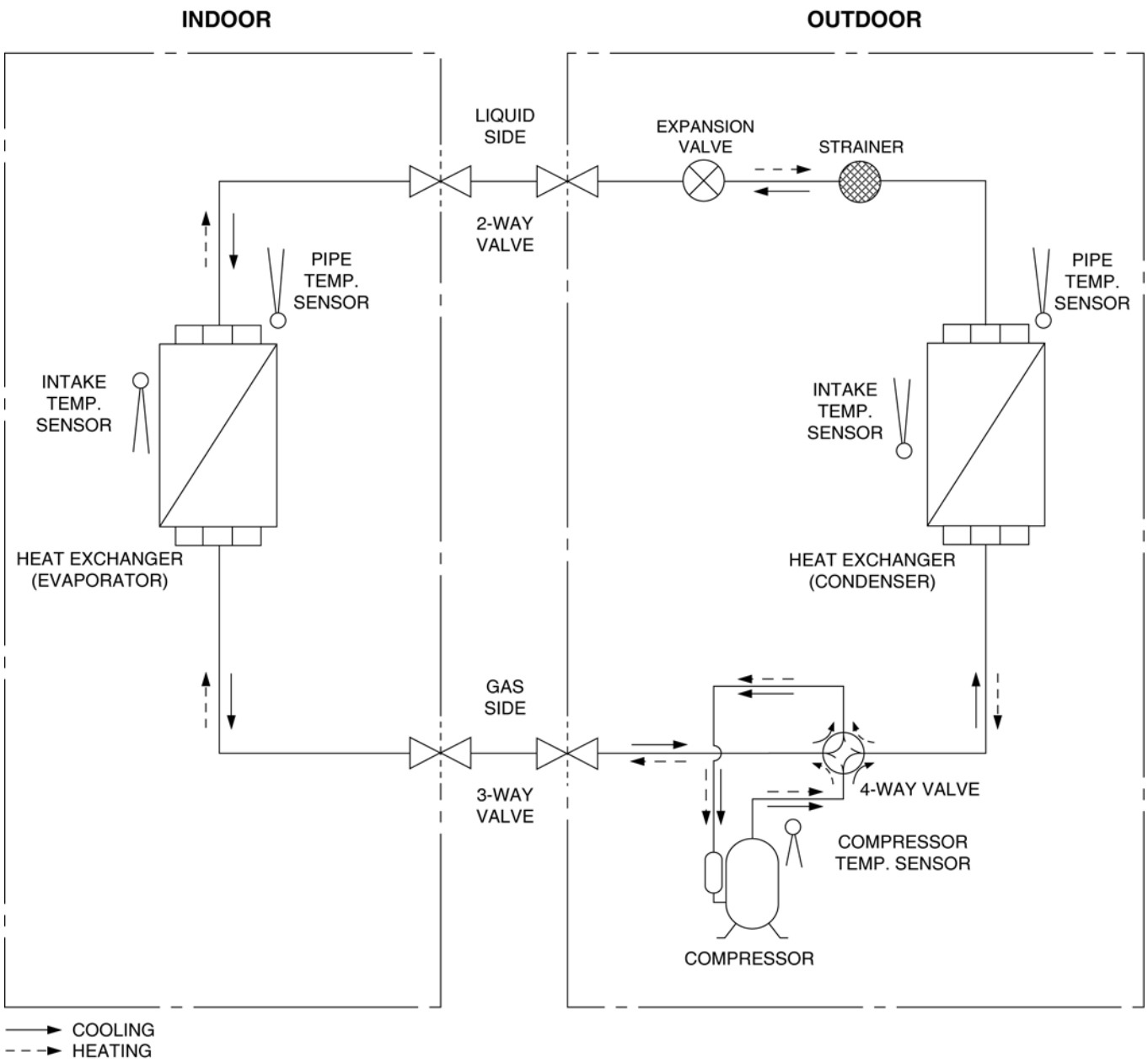
Relative position between the indoor unit and the installation plate <Front View>



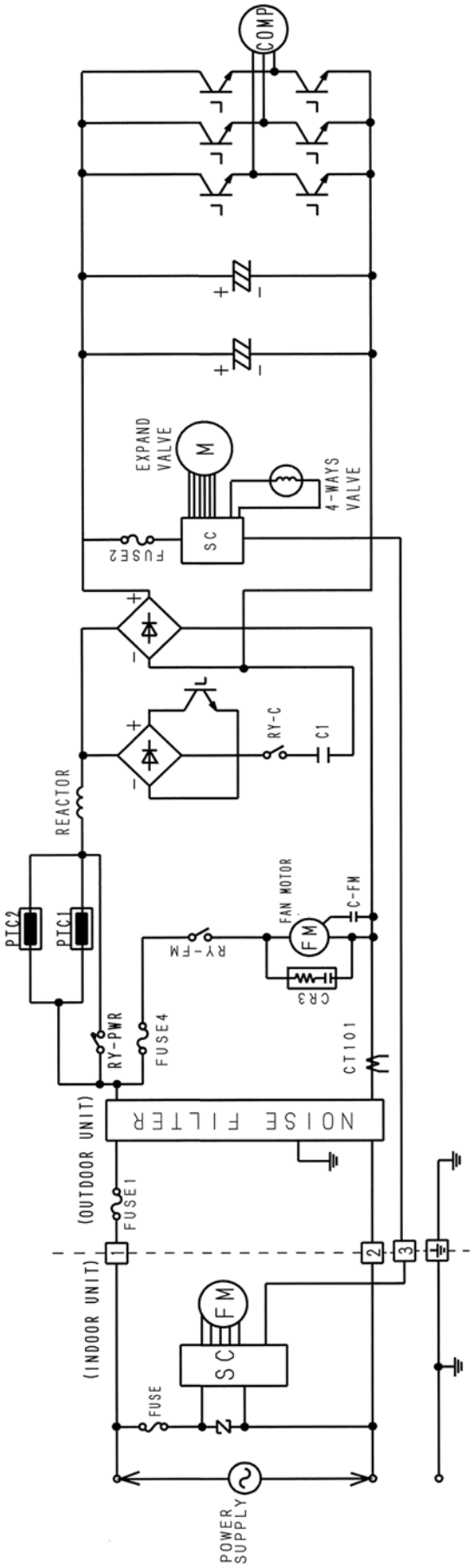
5.2. Outdoor Unit



6 Refrigeration Cycle Diagram

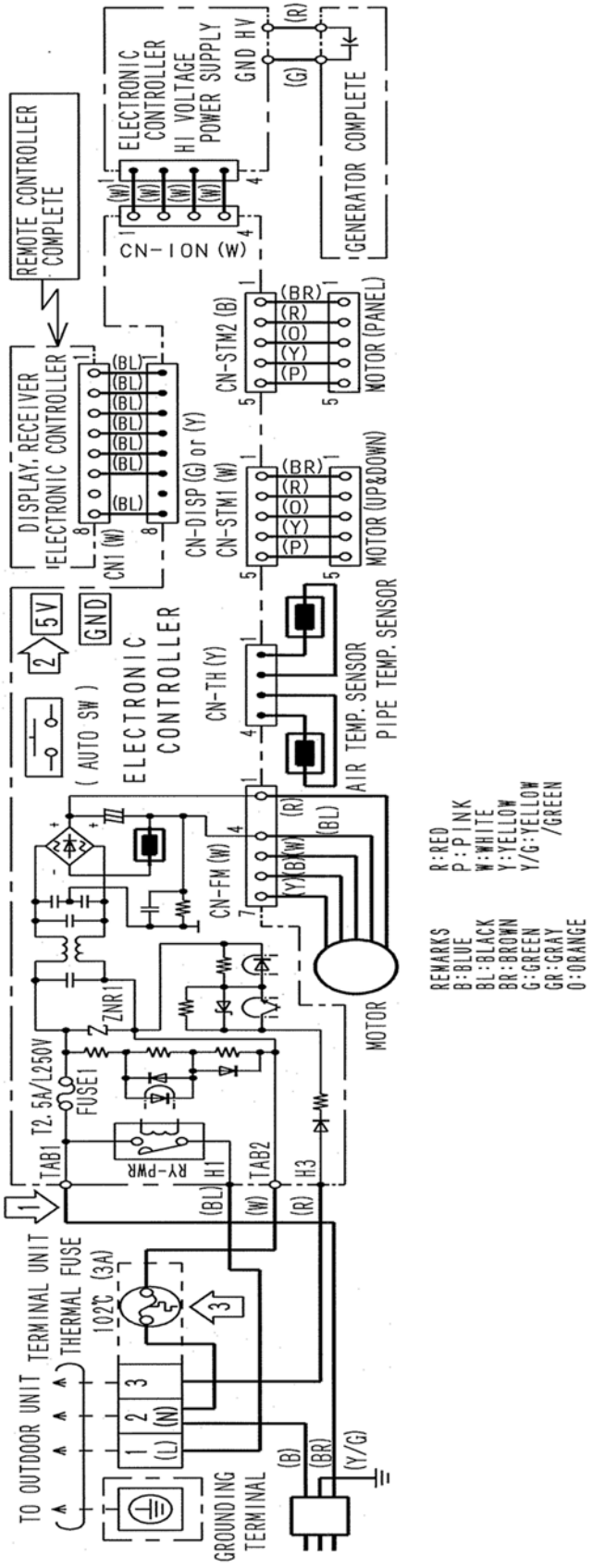


7 Block Diagram

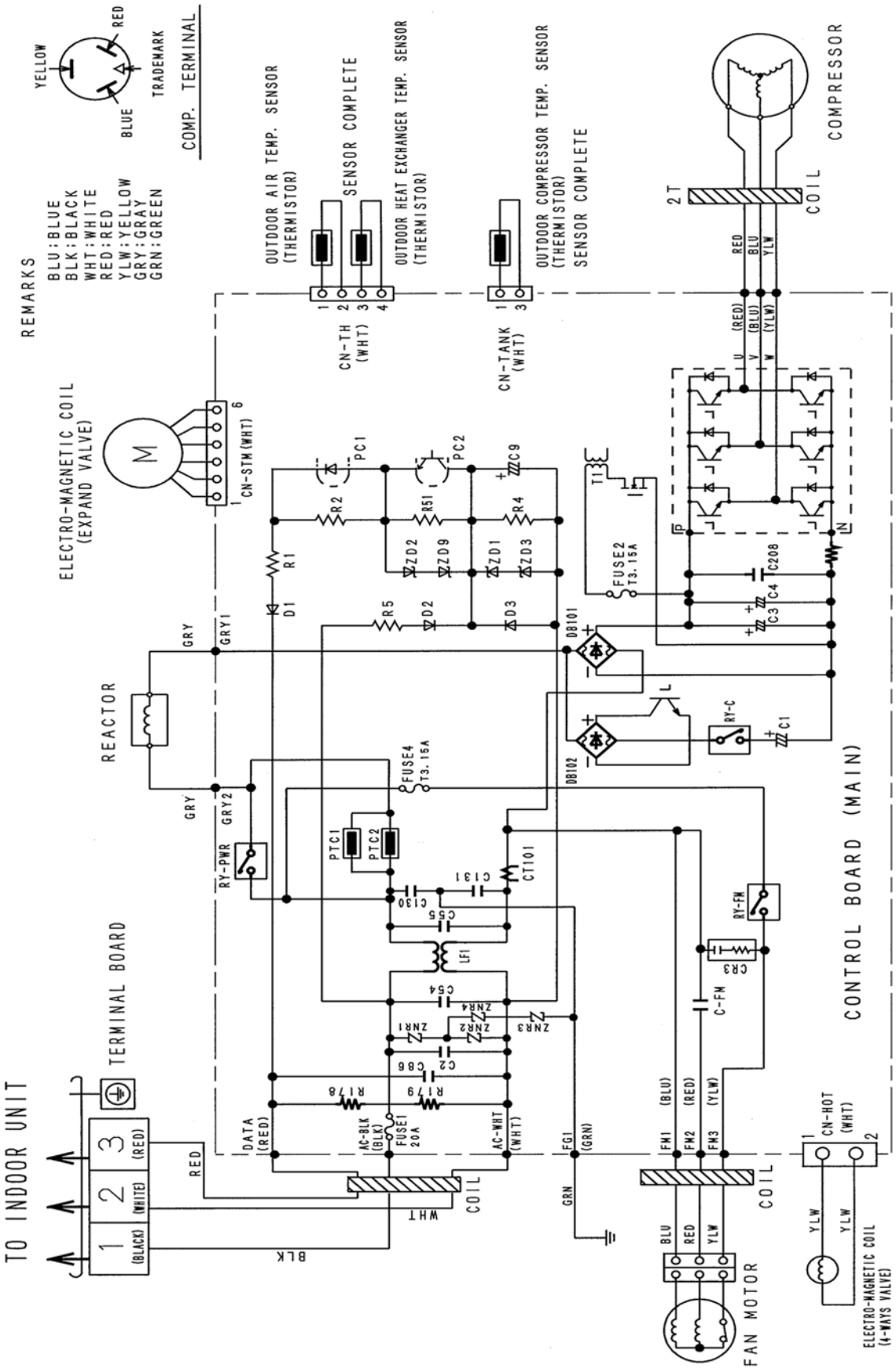


8 Wiring Connection Diagram

8.1. Indoor Unit

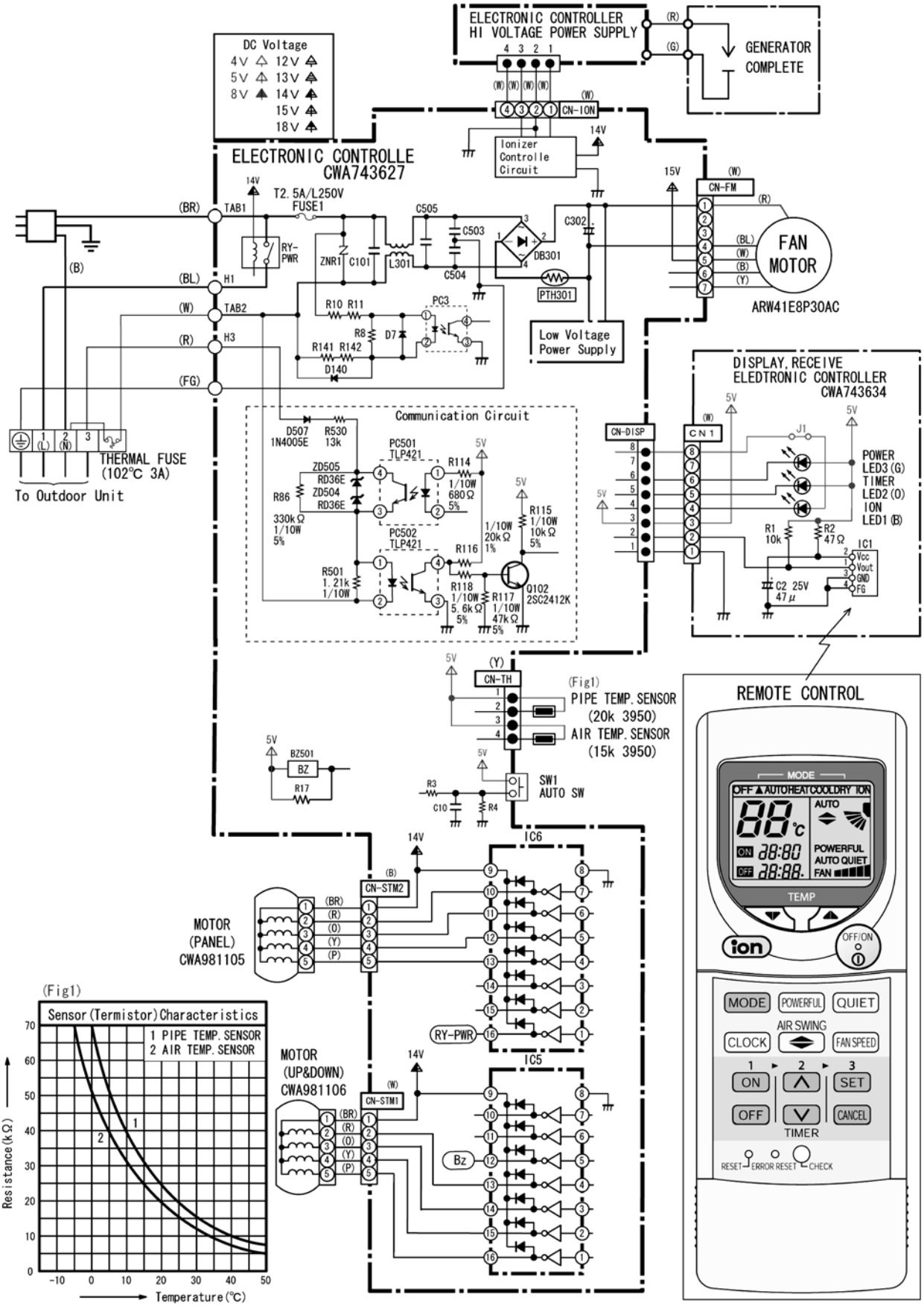


8.2. Outdoor Unit

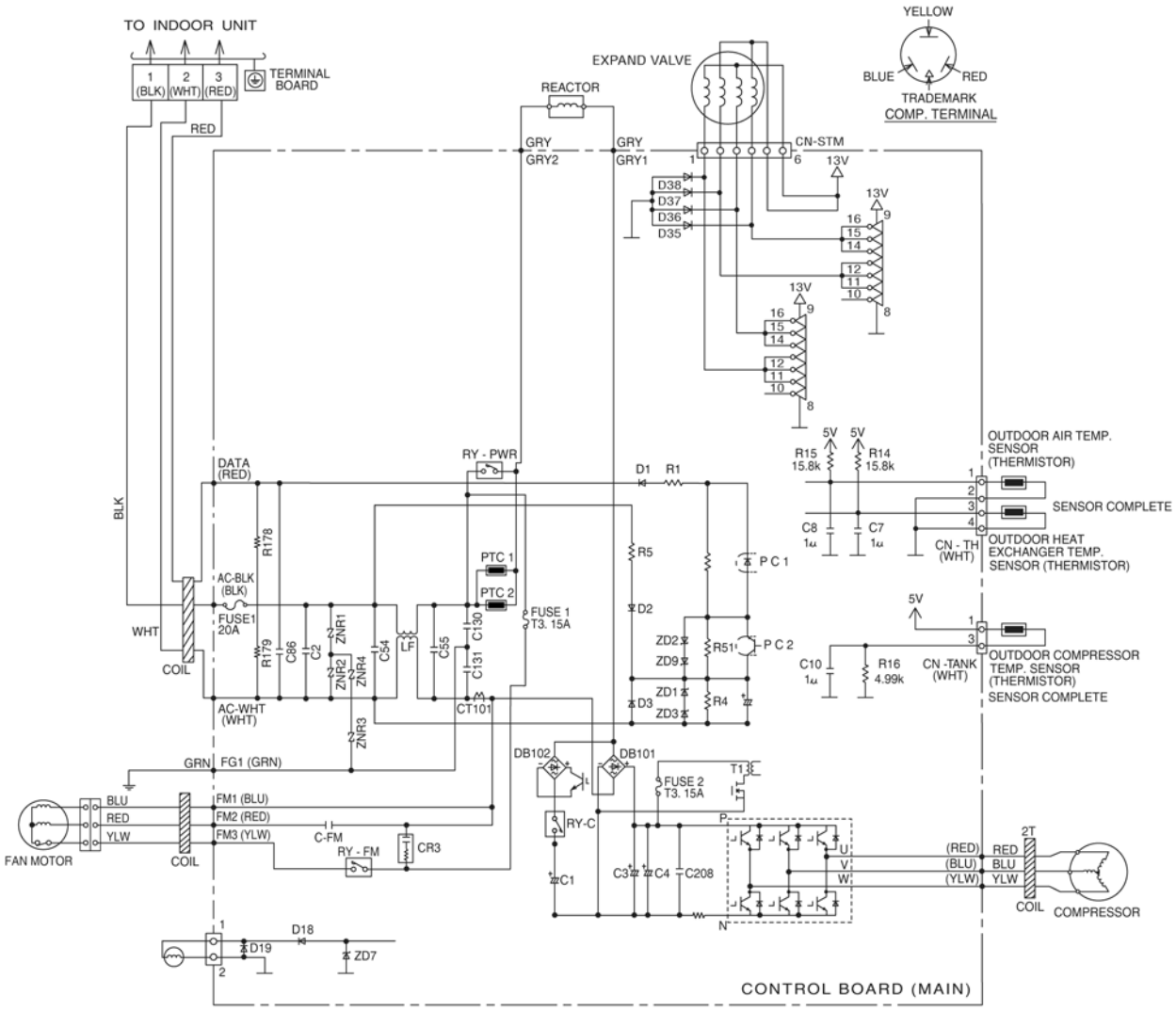


9 Electronic Circuit Diagram

9.1. Indoor Unit



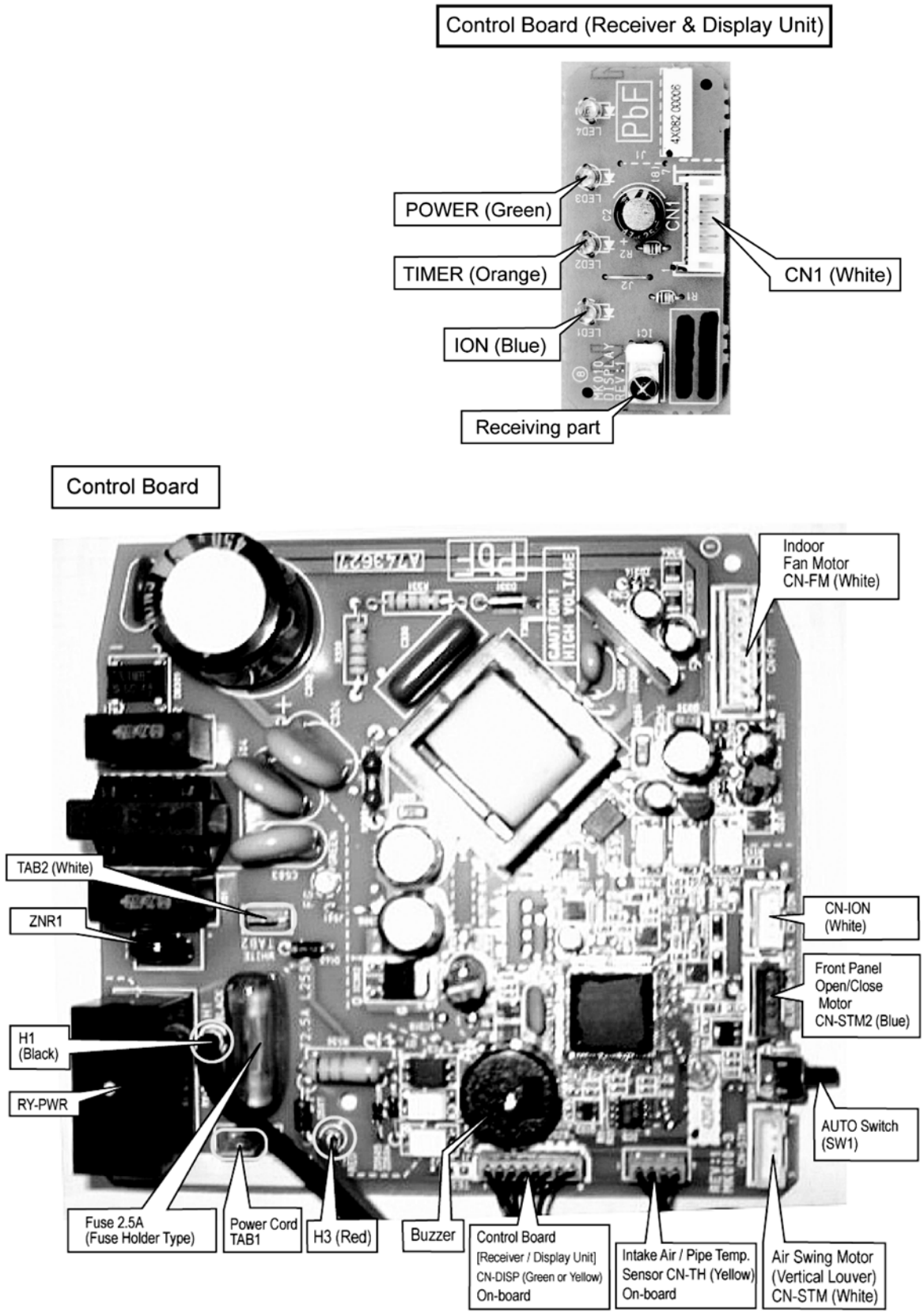
9.2. Outdoor Unit



10 Printed Circuit Board

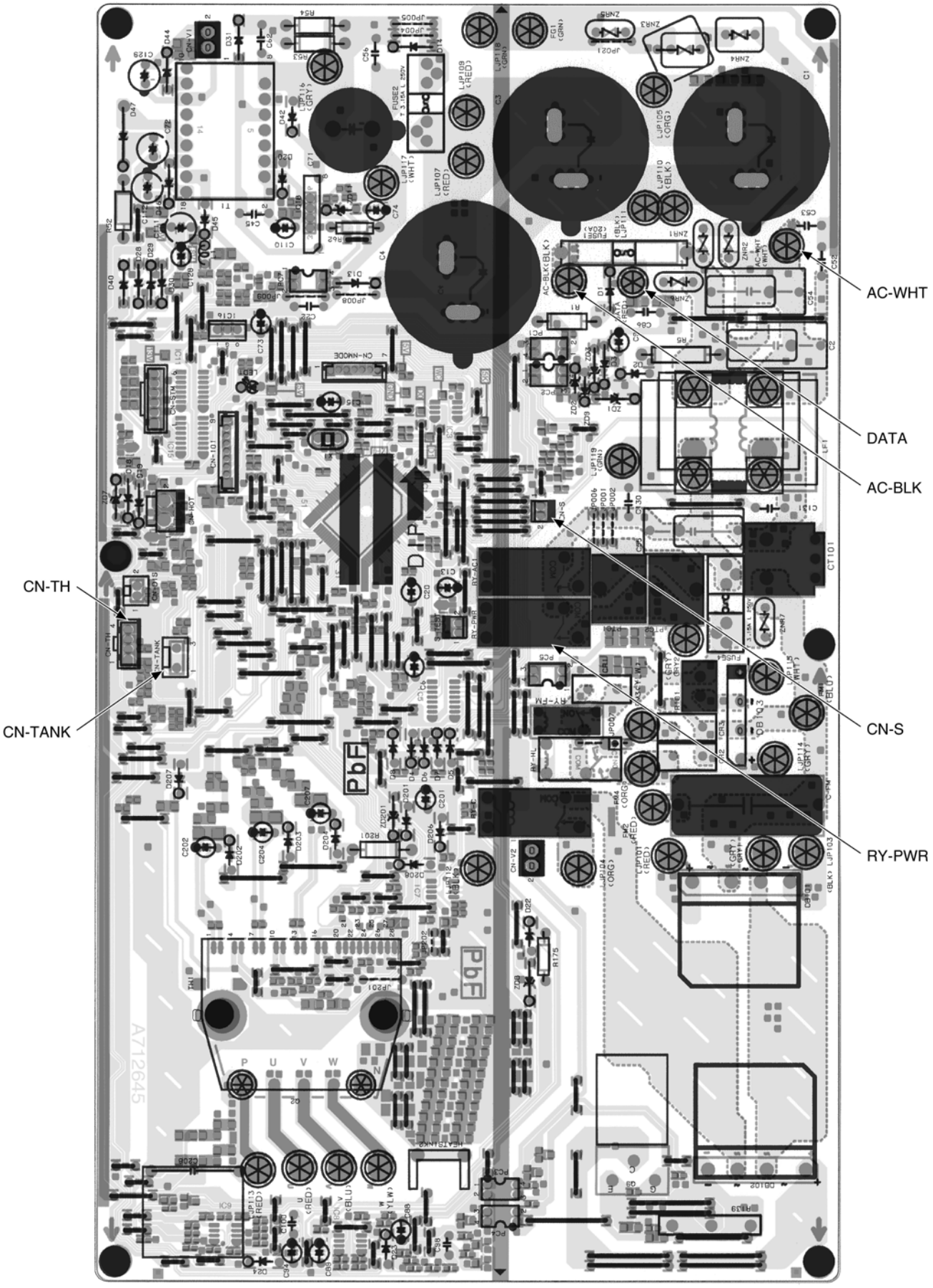
10.1. Indoor Unit

10.1.1. Printed Circuit Board



10.2. Outdoor Unit

10.2.1. Main Printed Circuit Board



11 Installation Instruction

11.1. Select The Best Location

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 2.5 m.

OUTDOOR UNIT

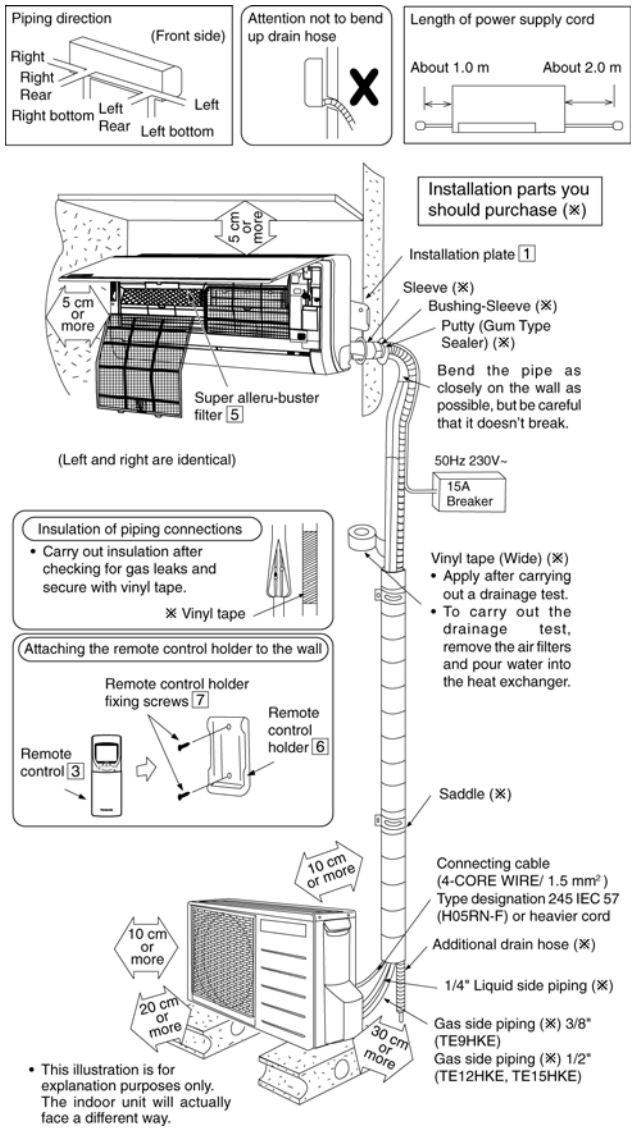
- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other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

Model	Piping size		Rated Length (m)	Max Elevation (m)	Min. Piping Length (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
TE9HKE	3/8”	1/4”	7.5	15	3	15	20
TE12HKE, TE15HKE	1/2”	1/4”	7.5	15	3	15	20

Example: For TE9HKE

If the unit is installed at 10 m distance, the quantity of additional refrigerant should be 50g ..... (10 - 7.5) m x 20 g/m = 50 g

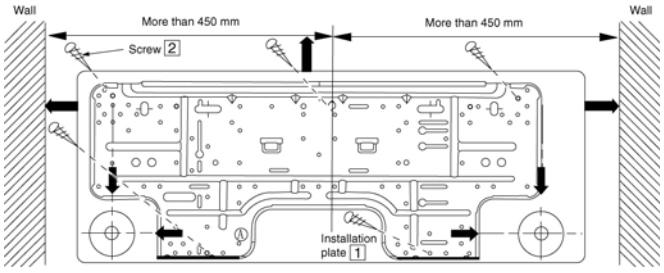
11.2. Indoor/Outdoor Unit Installation Diagram



11.3. Indoor Unit

11.3.1. HOW TO FIX INSTALLATION PLATE

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



The centre of installation plate should be at more than 450 mm at right of the wall.
The centre of installation plate should be at more than 450 mm at left of the wall.
The distance from installation plate edge to ceiling should more than 66 mm.
From installation plate left edge to unit's left side is 20 mm.
From installation plate right edge to unit's right is 70 mm.

Ⓐ : For left side piping, piping connection for liquid should be this line.
: For left side piping, piping connection for gas should be about 50 mm from this line.
: For left side piping, piping connection cable should be about 750 mm from this line.

1. Mount the installation plate on the wall with 5 screws or more.
   (If mounting the unit on the concrete wall, consider using anchor bolts.)
   • Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.

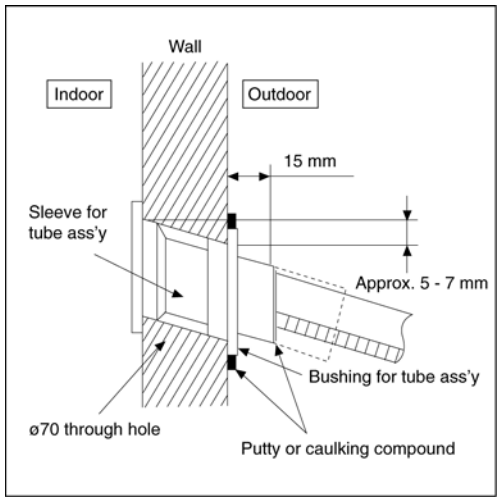
2. Drill the piping plate hole with ø70 mm hole-core drill.
   • The center of the right piping hole is at the intersection of lines extending vertically from the edge of the installation plate and horizontally from the sideways arrow on the installation plate (see figure above).
   • The center of the left piping hole is at the intersection of lines extending vertically from the downward arrow on the installation plate and horizontally from the sideways arrow on the installation plate (see figure above).
   • Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

11.3.2. TO DRILL A HOLE IN THE WALL AND INSTALL A SLEEVE OF PIPING

1. Insert the piping sleeve to the hole.
2. Fix the bushing 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 ass'y 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.



11.3.3. INDOOR UNIT INSTALLATION

1. For the right rear piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Secure the Indoor Unit
↓
Insert the connecting cable

2. For the right and right bottom piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Insert the connecting cable
↓
Secure the Indoor Unit

3. For the embedded piping

Replace the drain hose

↓

Bend the embedded piping

↓

- Use a spring bender or equivalent to bend the piping so that the piping is not crushed.

Install the Indoor Unit

↓

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".

Pull the connecting cable into Indoor Unit

↓

- The inside and outside connecting cable can be connected without removing the front grille.

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.)

Insulate and finish the piping

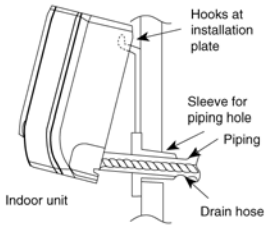
↓

- Please refer to "Piping and finishing" column of outdoor section and "Insulation of piping connections" column as mentioned in Indoor/ Outdoor Unit Installation.

Secure the Indoor Unit

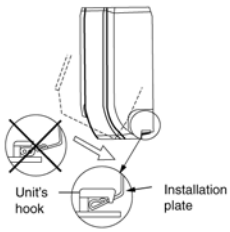
Install the indoor unit

Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.

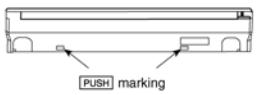


Secure the Indoor Unit

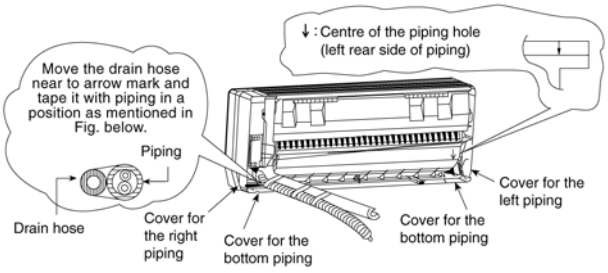
1. Tape the extra power supply cord in a bundle and keep it behind the chassis.
   - Ensure that the power supply cord is not clamped in between the unit's hook (2 positions) and installation plate.
2. Press the lower left and right side of the unit against the installation plate until hooks engages 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.



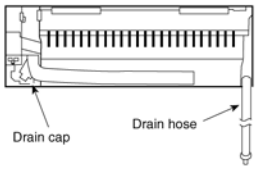
Pull out the piping and drain hose

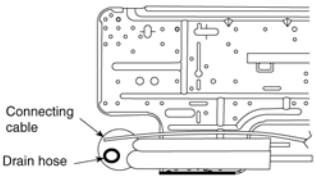


(This can be used for left rear piping and left bottom piping also.)

Exchange the drain hose and the cap

Rear view for left piping installation



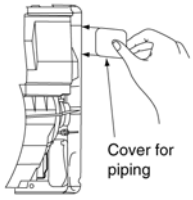


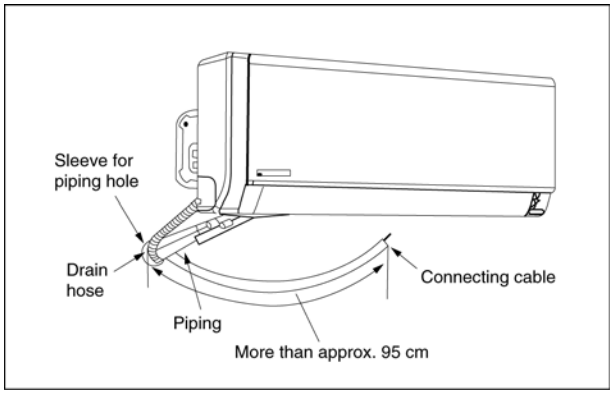
Adjust the piping slightly downwards.

How to keep the cover

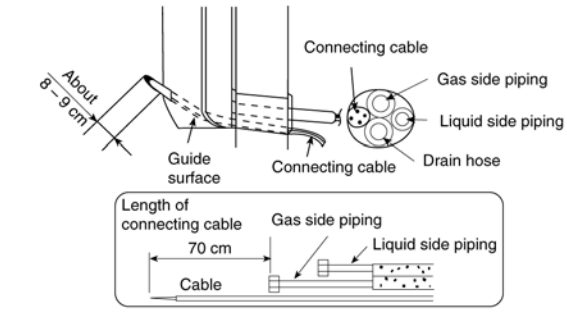
In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.

(Left, right and 2 bottom covers for piping.)

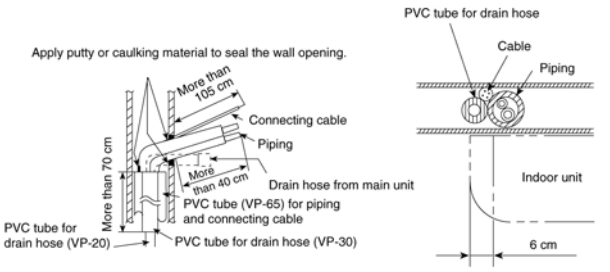




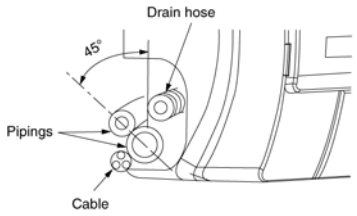
Insert the connecting cable



• 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.

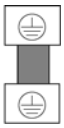


(For the right piping, follow the same procedure)

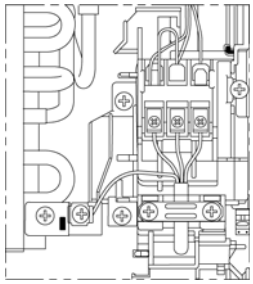
11.3.4. CONNECT THE CABLE TO THE INDOOR UNIT

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 4×1.5 mm^2 flexible cord, type designation 245 IEC 57 (H05RN-F) or heavier cord.
   - Ensure the colour of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
   - Earth lead wire shall be longer than the other lead wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

Terminals on the indoor unit	1	2	3
Colour of wires			
Terminals on the outdoor unit	1	2	3



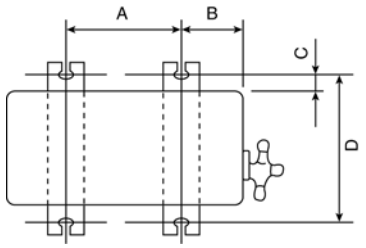
   - Secure the cable onto the control board with the holder (clamper).



11.4. Outdoor Unit

11.4.1. INSTALL THE OUTDOOR UNIT

- After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.
  1. Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut (ø10 mm).
  2. 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
TE9HKE, TE12HKE, TE15HKE	570mm	105mm	18.5mm	320mm

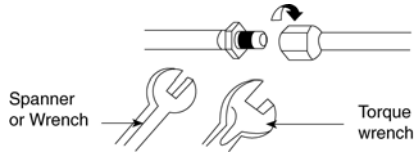
11.4.2. CONNECTING THE PIPING

Connecting The Piping To Indoor Unit

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.



Model	Piping size (Torque)	
	Gas	Liquid
TE9HKE	3/8" [42 N•m]	1/4" [18 N•m)
TE12HKE, TE15HKE	1/2" [55 N•m]	1/4" [18 N•m)
⚠ **CAUTION** Do not over tighten, over tightening cause gas leakage.		

Connecting The Piping To Outdoor Unit

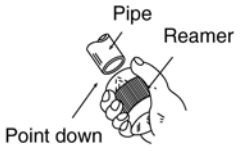
Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (locate at valve) onto the copper pipe.

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

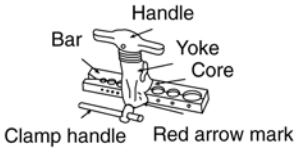
CUTTING AND FLARING THE PIPING

1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is 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.

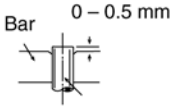
1. To cut

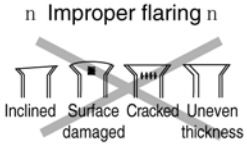


2. To remove burrs



3. To flare

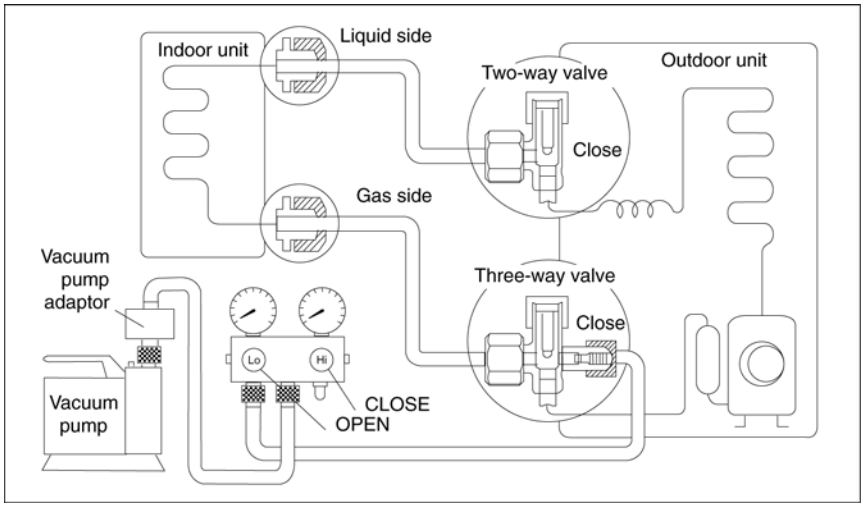




When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

11.4.3. 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.



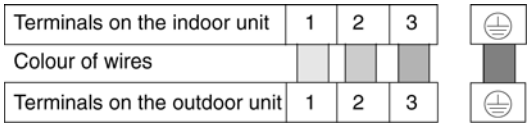
1. Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
   • Be sure to connect the end of the charging hose with the push pin to the service port.
2. Connect the center hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.
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 (-0.1 MPa). 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 FOLLOW 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 18 N•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.
   • Be sure to check for gas leakage.

CAUTION

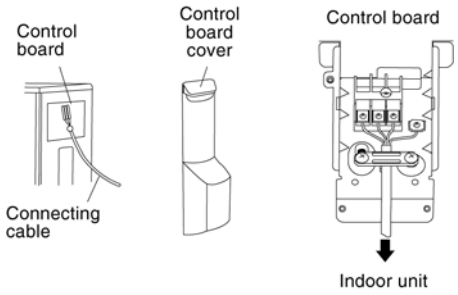
- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step ③ above take the following measure:
- If the leak stops when the piping connections are tightened further, continue working from step ③.
- If the leak does not stop when the connections are retightened, repair the location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

11.4.4. CONNECT THE CABLE TO THE OUTDOOR UNIT

1. Remove the control board cover from the unit by loosening the screw.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm^2 flexible cord, type designation 245 IEC 57 (H05RN-F) or heavier cord.



3. Secure the cable onto the control board with the holder (clamper).
4. Attach the control board cover in its original position with the screw.



11.4.5. PIPE 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.

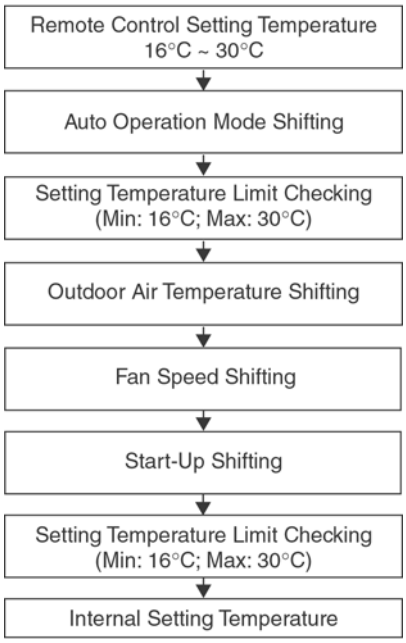
12 Operation and Control

12.1. 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.

12.1.1. 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.



12.1.2. Cooling Operation

12.1.2.1. Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -1.5°C.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point +0.5°C.

12.1.3. Soft Dry Operation

12.1.3.1. Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature < -2°C.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature > Compressor OFF point +0.5°C.

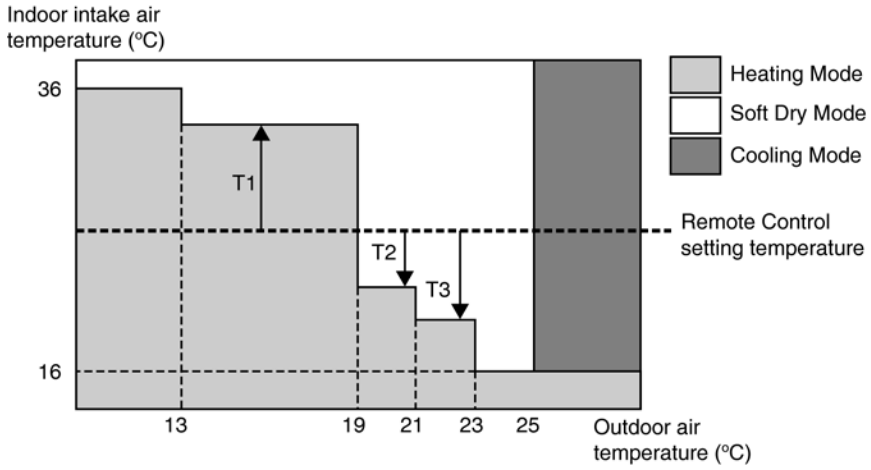
12.1.4. Heating Operation

12.1.4.1. Thermostat control

- Compressor is OFF when Intake Air Temperature - Internal Setting Temperature > +1.5°C.
- Compressor is ON after waiting for 3 minutes, if the Intake Air Temperature - Internal Setting Temperature < Compressor OFF point -0.5°C.

12.1.5. Automatic Operation

- This mode can be set using remote control and the operation is decided by remote control setting temperature, remote control operation mode, indoor intake air temperature and outdoor air temperature.
- During operation mode judgment, indoor fan motor (with speed of Lo-) and outdoor fan motor are running for 30 seconds to detect the indoor intake and outdoor air temperature. The operation mode is decided based on below chart.



Every 30 minutes, the indoor and outdoor temperature is judged. Based on remote control setting temperature, the value of T1 will increase up to 10°C, T2 will decreased by 3°C and T3 will decreased up to 8°C.
The Auto Operation Mode shifting will take place whenever operation mode changed from Cooling/Soft Dry to Heating or vice versa.

12.1.6. Indoor Fan Motor Operation

A. Basic Rotation Speed (rpm)

i. Manual Fan Speed

[Cooling, Dry]

- Fan motor's number of rotation is determined according to remote control setting.

Remote Control	O	O	O	O	O	O
Tab	Hi	Me+	Me	Me-	Lo	QLo

[Heating]

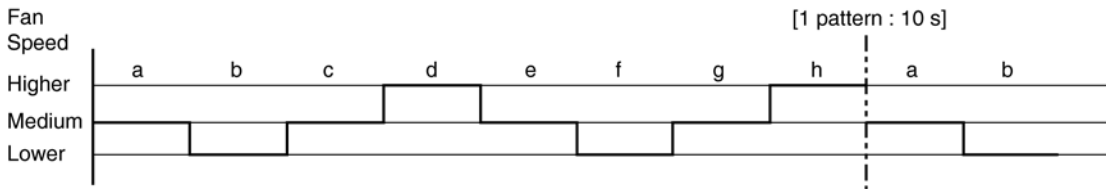
- Fan motor's number of rotation is determined according to remote control setting.

Remote Control	O	O	O	O	O	O
Tab	SHi	Me+	Me	Me-	Lo	QLo

ii. 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.



[Heating]

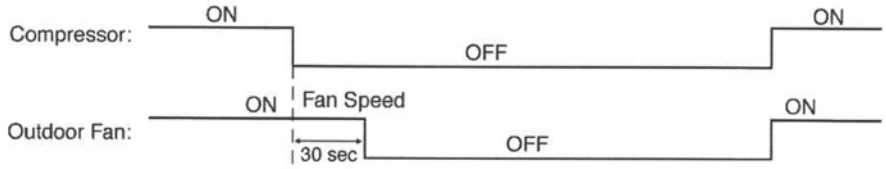
- According to indoor pipe temperature, automatic heating fan speed is determined automatically.

B. Feedback control

- Immediately after the fan motor started, feedback control is performed once every second.
- During fan motor on, if fan motor feedback ⩾ 2550 rpm or < 50 rpm continue for 10 seconds, then fan motor error counter increase, 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.

12.1.7. 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.



12.2. Airflow Direction

1. There are two types of airflow, vertical airflow (directed by horizontal vane) and horizontal airflow (directed by vertical vanes).
2. 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).

12.2.1. Vertical Airflow

Operation Mode	Airflow Direction		Vane Angle (°)				
			1	2	3	4	5
Heating	Auto with Heat Exchanger Temperature	A	28				
		B	45				
		C	28				
	Manual		4	20	35	51	66
Cooling and e-ion	Auto		12 ~ 40				
	Manual		12	19	26	33	40
Soft Dry	Auto		12				
	Manual		12	19	26	33	40

1. Automatic vertical airflow direction can be set using remote control; the vane swings up and down within the angles as stated above. For heating mode operation, the angle of the vane depands on the indoor heat exchanger temperature as Figure 1 below. When the air conditioner is stopped using remote control, the vane will shift to close position.
2. 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.

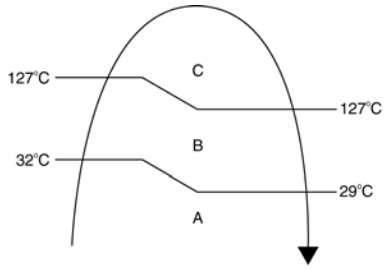


Figure 1

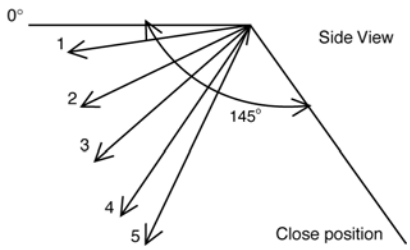


Figure 2

12.2.2. Horizontal Airflow

• The horizontal airflow direction louvers can be adjusted manually by hand.

12.3. Quiet operation (Cooling Mode/Cooling area of Dry Mode)

A. Purpose

To provide quiet cooling operation compare to normal operation.

B. Control condition

a. Quiet operation start condition

• When “quiet” button at remote control is pressed.
Quiet LED illuminates.

b. Quiet operation stop condition

1. When one of the following conditions is satisfied, quiet operation stops:
   a.Powerful button is pressed.
   b.Stop by OFF/ON switch.
   c.Timer “off” activates.
   d.Quiet button is pressed again.
2. When quiet operation is stopped, operation is shifted to normal operation with previous setting.
3. When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
4. When operation mode is changed, quiet operation is shifted to quiet operation of the new mode, except ion only operation.
5. During quiet operation, if timer “on” activates, quiet operation maintains.
6. After off, when on back, quiet operation is not memorised.

C. Control contents

1. Auto 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.
2. Manual fan speed for quiet operation is -1 step from setting fan speed.

12.3.1. Quiet operation (Heating)

A. Purpose

To provide quiet heating operation compare to normal operation.

B. Control condition

a. Quiet operation start condition

• When “quiet” button at remote control is pressed.
  Quiet LED illuminates.

b. Quiet operation stop condition

1. When one of the following conditions is satisfied, quiet operation stops:
   a. Powerful button is pressed.
   b. Stop by OFF/ON switch.
   c. Timer “off” activates.
   d. Quiet button is pressed again.
2. When quiet operation is stopped, operation is shifted to normal operation with previous setting.
3. When fan speed is changed, quiet operation is shifted to quiet operation of the new fan speed.
4. When operation mode is changed, quiet operation is shifted to quiet operation of the new mode, expected ion only operation.
5. During quiet operation, if timer “on” activates, quiet operation maintains.
6. After off, when on back, quiet operation is not memorised.

C. Control contents

a. Fan speed auto

1. Indoor FM RPM depends on pipe temp sensor of indoor heat exchanger.
   Auto 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.

b. Fan speed manual

1. Manual fan speed for quiet operation is -1 step from setting fan speed.

12.4. Powerful Mode Operation

A. Purpose

To achieve the setting temperature quickly.

B. Control Condition

a. Powerful operation start condition

When the “powerful” button at remote control is pressed, Powerful LED illuminates

b. Powerful operation stop condition

1. When one of the following conditions is satisfied, quiet operation stops:
   a. Powerful button is pressed again
   b. Quiet button is pressed
   c. Stop by OFF/ON switch
   d. Timer OFF is pressed again

2. When Powerful operation is stopped, operation is shifted to normal operation.

C. Control Contents

a. Fan speed

1. Indoor fan speed depends on indoor intake temperature and remote control setting temperature. Fan speed is changed from normal setting to Powerful setting of respective fan speed.

b. Temperature shifting

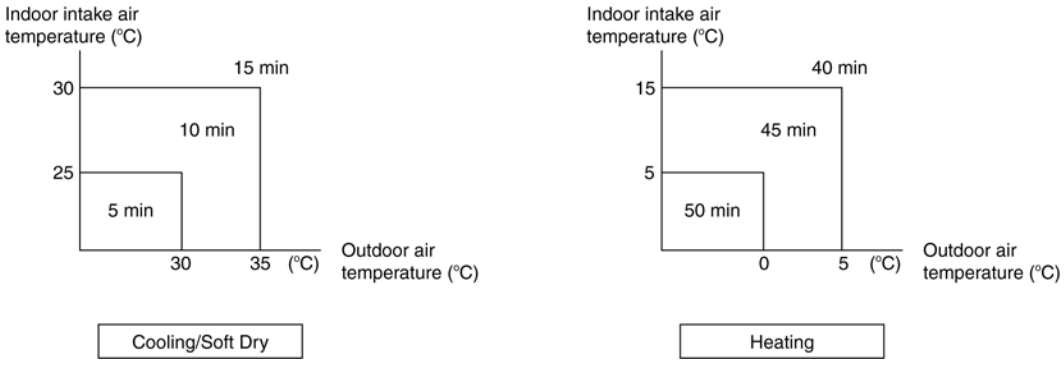
1. Internal setting temperature shift depends on indoor pipe temperature. Temperature is decreased (Cooling and Soft Dry operation) or increased (Heating operation) accordingly.

12.5. ON Timer Control

ON timer 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.

70 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 judgment, the decided operation will start operate earlier than the set time as shown below.



12.6. OFF Timer Control

OFF timer can be set using remote control, the unit with timer set will stop operate at set time.

12.7. Auto Restart Control

1. 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.

2. This type of control is not applicable during ON/OFF Timer setting.

12.8. Indication Panel

LED	POWER	TIMER	Ion
Color	Green	Orange	Blue
Light ON	Operation ON	Quiet Setting ON	Ion ON
Light OFF	Operation OFF	Quiet Setting OFF	Ion OFF

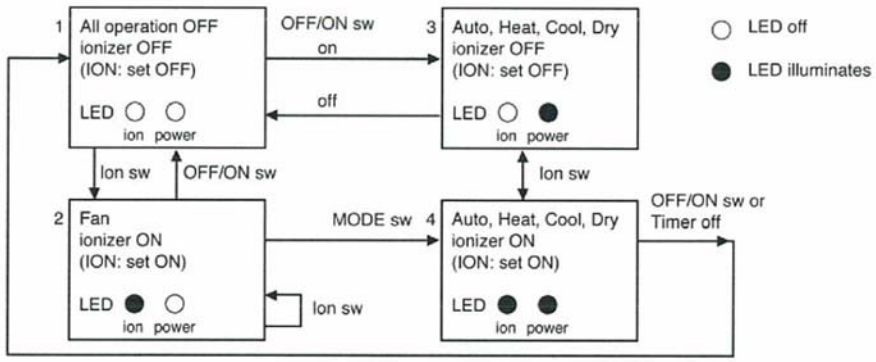
Note:

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

12.9. Ionizer Operation

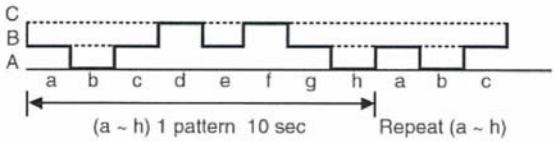
Purpose
To provide fresh air effect to users by discharging minus ion to air.

Control Condition



a. Ionizer Only Operation.
1. When air-conditioner unit is at “OFF” condition (standby) and ION operation button at remote control is pressed.
Fan & ionizer on, ION LED illuminates, but power LED maintain off. (1→2)
However, fan speed can be adjusted later by customer during this operation.

Fan speed	
Manual	Remote Control set fan speed
Auto	Repetition of 8 patterns as shown below.



Airflow direction (Horizontal Vane) control:
Follow vane direction control at cooling mode.
Horizontal vane can be changed by customer during ion only operation.

b. Operation Mode + Ionizer Operation
1. Ionizer Operation Start Condition.
When air conditioner unit is in “ON” condition (Heat, Cool, Dry, Auto mode) and ION operation button at remote control is pressed. Ionizer on & ION LED illuminates. (3→4)
Power LED also illuminates.
2. Ionizer Operation Stop Condition.
When one of the following condition is satisfied, ION operation stops.
a. Stopped by ON/OFF switch.
b. Timer OFF activates.
c. ION feedback signal shows error.
3. Ionizer operation status is not memorised by microcontroller. After OFF, when operation is “ON” again, air conditioner operates without ionizer operation.

12.9.1. Ionizer Error Detection

• There are 3 errors detect by the unit.
a. Connector Open Detection
- If the connector is pulled out during ionizer operation, ion LED blinks.
- Once the ionizer connector reconnect to the unit, ion LED stops blinking.

b. Ionizer Control Discharge Error Detection
- When ionizer generator is short circuit due to water or dust adhesion, power supplies to ionizer is stopped for 30 minutes and resume power supply after 30 minutes. If this situation happens for 24 times, ion LED blinks.
- The connector resets when the ionizer operates normally for 10 minutes or the unit switched off.

- Check and estimate the cause of short circuit, stop the unit operation once to cancel this error.

c. Ionizer Control Power Supply Error Detection
- During ionizer stopped, power is supplied to the ionizer due to indoor PCB error.
- During this error:
  - TIMER LED blinks and unit stop operation
  - Ion LED blinks
  - error code H26 is indicated
- Exchange main PCB to cancel this error.

13 Protection Control

13.1. Protection Control For All Operations

13.1.1. Time Delay Safety Control

1. The compressor starts the operation, it will not stop its operation for 30 seconds.
2. This control is not applicable if the power supply is cut off and on again or after 4-way valve deices condition.

13.1.2. 30 Seconds Forced Operation

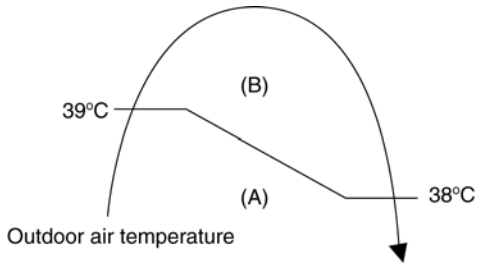
1. Once compressor starts the operation, it will not stop its operation for 30 seconds.
2. However, it can be stopped with the remote control or the Auto Switch on the indoor unit.

13.1.3. Total Running Current Control

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

Model	TE9HK		TE12HK	
Operation Mode	X (A)	Y (A)	X (A)	Y (A)
Cooling/Soft Dry (A)	4.13	15.35	6.15	15.35
Cooling/Soft Dry (B)	3.63	15.35	5.65	15.35
Heating	4.75	15.35	6.24	15.35

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



13.1.4. IPM (Power transistor) Prevention Control

A. Overheating Prevention Control

1. When the IPM temperature rises to 110°C, compressor operation will stop immediately.
2. Compressor operation restarts after three minutes the temperature decreases to 95°C.

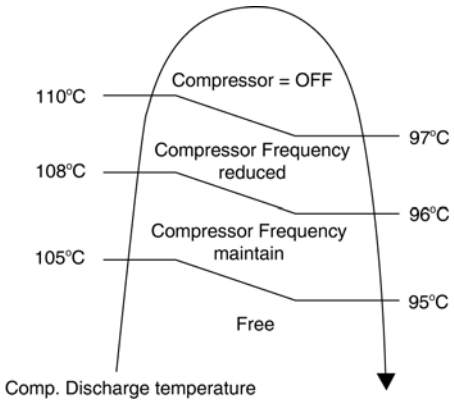
B. DC Peak Current Control

1. When electric current to IPM exceeds set value of 30.0 ± 5.0 A, the compressor will stop operate. Then, operation will restart after 3 minutes.
2. If the set value is exceeded again more than 30 seconds after the compressor starts, the operation will restart after two minutes.
3. If the set value exceeded again within 30 seconds after the compressor starts, the operation will restart after one minute. If this condition repeats continuously for seven times, all indoor and outdoor relays will be cut off.

13.1.5. Compressor Overheating Prevention Control

Instructed frequency for compressor operation will be regulated by compressor discharge temperature. The changes of frequency are as below figure.

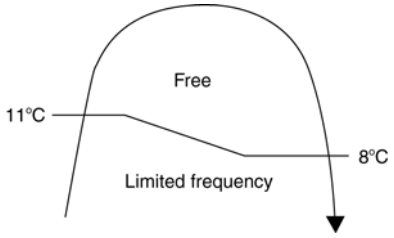
If compressor discharge temperature exceeds 110°C, compressor will stop, occurs 4 times per 20 minutes, timer LED will be blinking. (“F97” is to be confirmed.)



13.2. Protection Control For Cooling & Soft Dry Operation

13.2.1. 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.



13.2.2. Cooling Overload Control

i. Pipe temperature limitation/restriction

- 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
- If the compressor stops 4 times in 20 minutes, Timer LED blinking (F95: outdoor high pressure rise protection)

13.2.3. Dew Prevention Control

1. To prevent dew formation at indoor unit discharge area.
2. This control will be activated if:
   - Outdoor air temperature and Indoor temperature judgment by microcontroller is fulfilled.
   - When Cooling or Dry mode is operated more than 30 minutes or more.
3. This control stopped if:
   - Compressor stopped.
   - Remote control setting changed (fan speed / temperature).
   - Outdoor air temperature and indoor intake temperature changed.
4. Fan speed will be adjusted accordingly in this control.

13.2.4. Freeze Prevention Control

1. When indoor heat exchanger temperature is lower than 0°C continuously for six minutes, compressor will stop operating.
2. Compressor will resume its operation 3 minutes after the indoor heat exchanger is higher than 7°C.
3. At the same time, indoor fan speed will be higher than during its normal operation.
4. If indoor heat exchanger temperature is higher than 7°C for five minutes, the fan speed will return to its normal operation.

13.3. Protection Control For Heating Operation

13.3.1. Intake Air Temperature Control

Compressor will operate at Max frequency if below condition occur:

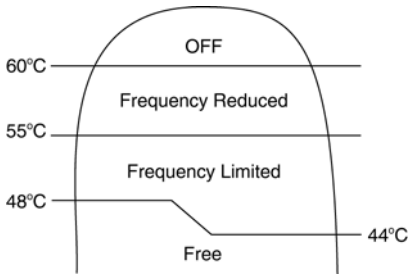
1. When the indoor intake air temperature is 30°C or above.

13.3.2. Outdoor Air Temperature Control

The maximum current value is regulated when the outdoor air temperature rises above 16°C in order to avoid compressor overloading.

13.3.3. Overload Protection Control

The compressor operating frequency is regulated in accordance to indoor heat exchanger temperature as shown in below figures.



13.3.4. Cold Draught Operation

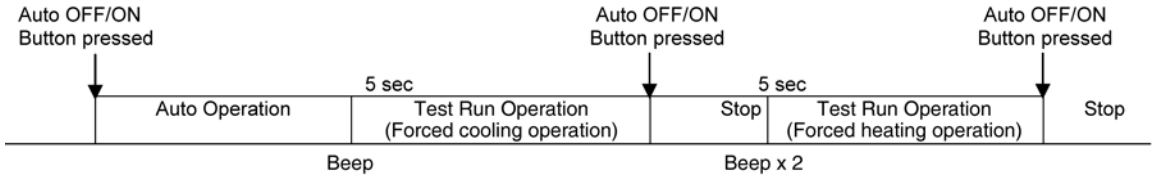
When indoor pipe temperature is low, cold draught operation start where indoor fan speed will be reduced.

13.3.5. Deice Operation

When outdoor pipe temperature and outdoor temperature is low, deice operation start where indoor fan motor and outdoor fan motor stop and operation LED blinks.

14 Servicing Mode

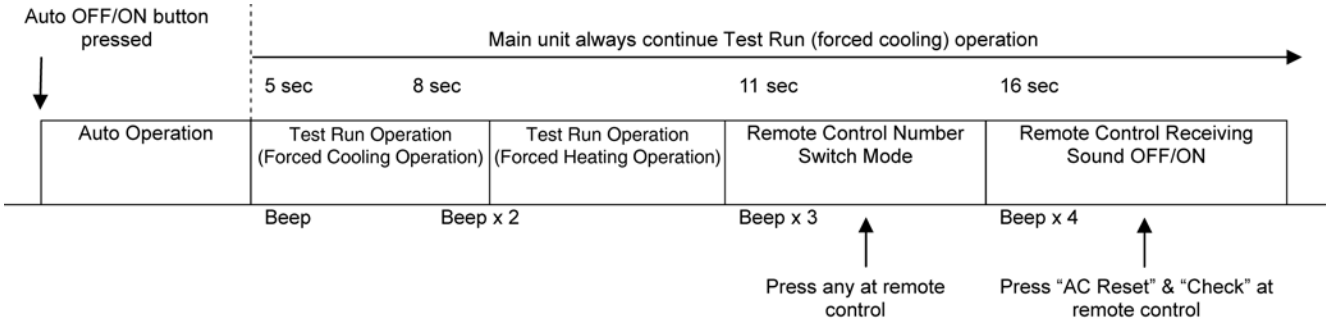
14.1. Auto OFF/ON Button



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 occur at the fifth seconds, in order to identify the starting of Test Run operation (Forced cooling operation). Within 5 minutes after Forced cooling operation start, the Auto OFF/ON button is pressed for more than 5 seconds. A 2 “beep” sounds will occur at the fifth seconds, in order to identify the starting of Forced heating 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 11th seconds to identify the Remote Control Number Switch Mode is in standby condition) and press any button at remote control to transmit and store the desired transmission code to the EEPROM.

   For transmission code selection explanation, please refer to “Select Remote Control Transmission Code”.

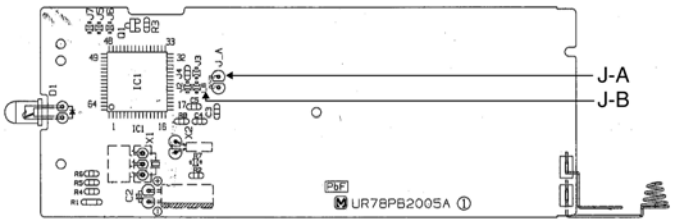
4. REMOTE CONTROL RECEIVING SOUND OFF/ON MODE
   The Remote Control Receiving Sound OFF/ON Mode will be activated if the Auto OFF/ON button is pressed continuously for more than 16 seconds (4 “beep” sounds will occur at 16th seconds to identify the Remote Control Receiving Sound Off/On Mode is in standby 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 OFF remote control receiving sound.
   - Long “beep”: Turn ON 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.

14.2. Select Remote Control Transmission Code

- There are 4 types of remote control transmission code could be selected and stored in EEPROM of indoor unit. 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 indoor units installed nearby together.
- To change remote control transmission code, short or open jumpers at the remote control printed circuit board.



Remote Control Printed Circuit Board		
Jumper A (J-A)	Jumper B (J-B)	Remote Control No.
Short	Open	A (Default)
Open	Open	B
Short	Short	C
Open	Short	D

14.3. Remote Control Button

14.3.1. SET BUTTON

• To check current remote control transmission code
  - Press for more than 10 seconds.

• To change the air quality sensor sensitivity
  - Press and release with pointer.
  - Press the Timer Decrement button to select sensitivity:
    1. Low Sensitivity
    2. Standard (Default)
    3. Hi Sensitivity
  - Confirm setting by pressing Timer Set button, a “Beep” sound will be heard. LCD returns to original display after 2 seconds.
  - LCD returns to original display if remote control does not operate for 30 seconds.

14.3.2. CLOCK BUTTON

• To change the remote control’s time format
  - Press for more than 5 seconds.

14.3.3. RESET (RC)

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

14.3.4. RESET (AC)

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

14.3.5. TIMER ▲

• To change indoor unit indicator’s LED intensity
  - Press continuously for 5 seconds.

14.3.6. TIMER ▼

• To change remote control display from Degree Celsius to Degree Fahrenheit.
  - Press continuously for 10 seconds.

15 Troubleshooting Guide

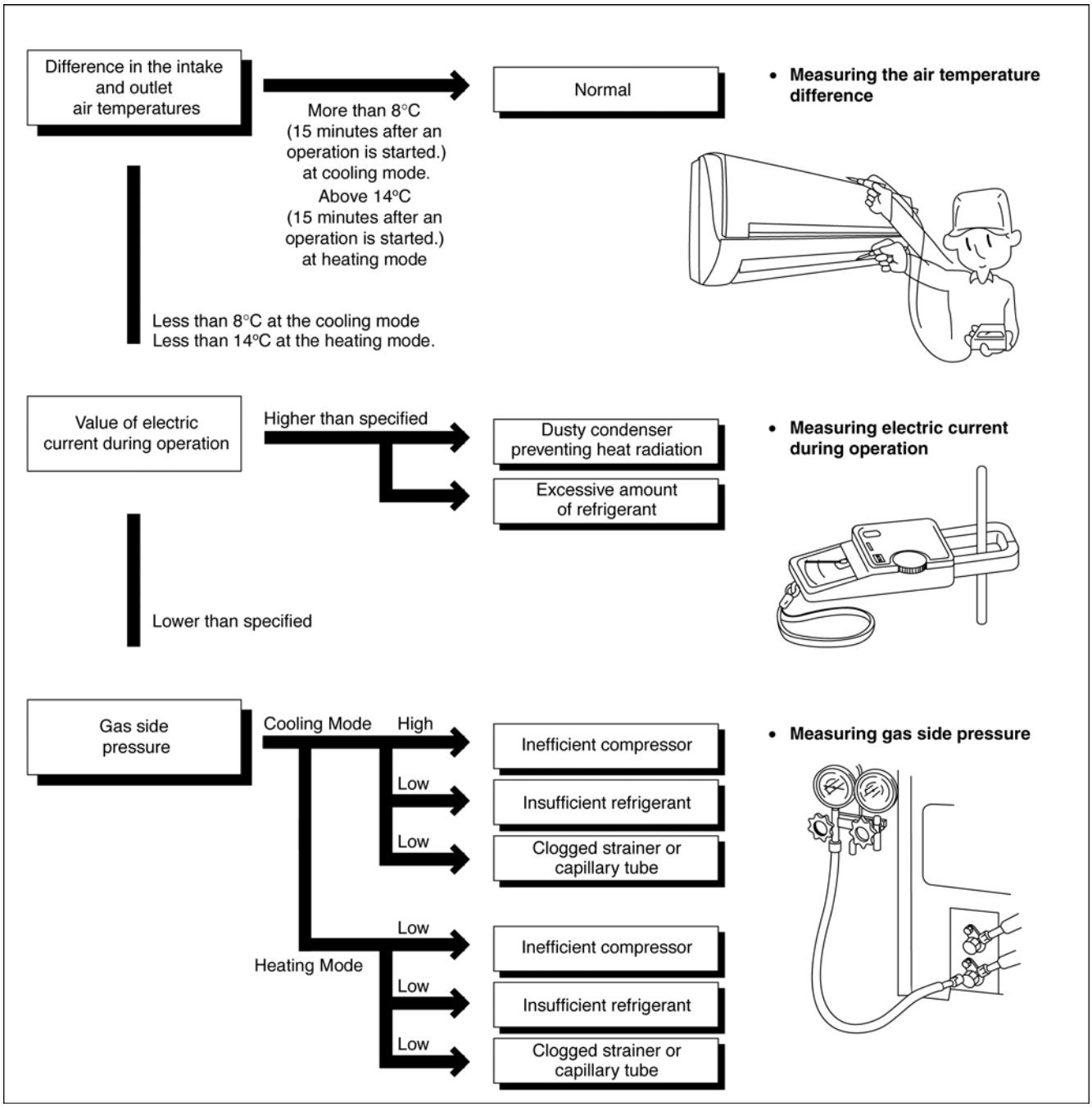
15.1. Refrigeration Cycle System

In order to diagnose malfunctions, make sure that there are no 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 on the right.

Normal Pressure and Outlet Air Temperature (Standard)

	Gas pressure MPa (kg/cm²G)	Outlet air temperature (°C)
Cooling Mode	0.9 ~ 1.2 (9 ~ 12)	12 ~ 16
Heating Mode	2.3 ~ 2.9 (23 ~ 29)	36 ~ 45

★ Condition: • Indoor fan speed; High
• Outdoor temperature 35°C at cooling mode and 7°C at heating mode.
• Compressor operates at rated frequency



15.1.1. Relationship between the condition of the air conditioner and pressure and electric current

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

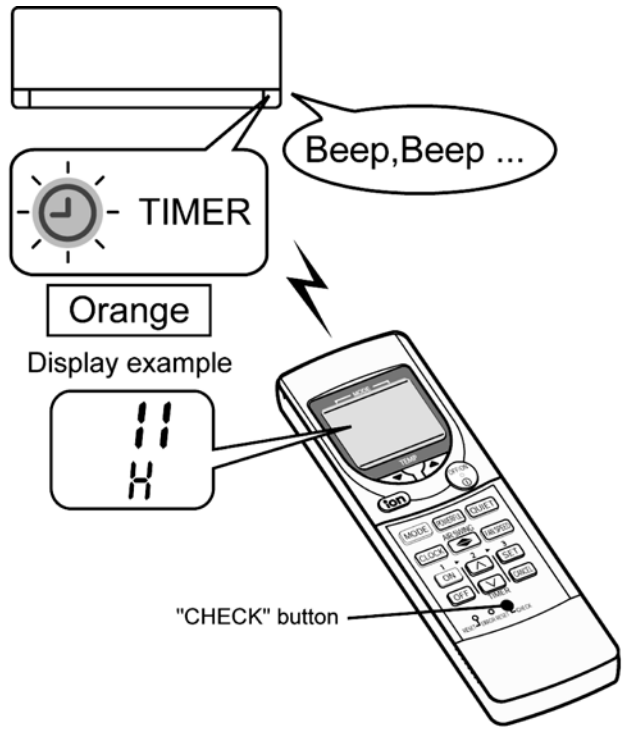
• Carry out the measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

15.2. Breakdown Self Diagnosis Function

15.2.1. Self Diagnosis Function (Three Digits Alphanumeric Code)

- Once abnormality has been detected during operation, the unit will immediately stop its operation. (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 light up again.
- In operation after breakdown repair, error code is not displayed. The last error code (abnormality) will be saved in IC memory.
- **Timer LED Blinking in Abnormal Operation:**
  1. Automatically stops the operation.
  2. Timer LED on display of the indoor unit blinks.
  3. The LED will be off if the unit is turned off or the Error RESET button on the remote controller is pressed.
- **To display memorized error (Protective operation) status:**
  1. Turn the unit on.
  2. Slide the remote controller cover down to show the operating buttons.
  3. Press the CHECK button on the remote controller for continuously 5 seconds or more to show "--" on the display.
  4. Press the "TEMP" ▲ or ▼ button on the remote controller to show "H00" on the display. Signal is transmitted to the main unit.
  5. Press the "TEMP" ▲ or ▼ button (When button is pressed, the display goes back.) repeatedly and slowly until Beep sound (about 5 seconds intermittently) is heard from main unit.
  6. Then, displayed error code matches to the error code saved in unit memory. The power LED on the main unit also lights up.

     Note: When the CHECK button is pressed continuously for 5 seconds again, or when no operation continues for 30 seconds, or when the RESET button on remote controller is pressed with a pointed object, the display is cancelled.
- **To clear memorized error (Protective operation) status after repair:**
  1. Press the AUTO button in main unit continuously for 5 seconds or more and release it. (Test run / Pump down operation: Beep sound).
  2. Press the CHECK button on remote controller for about 1 second to transmit signal to main unit. A beep sound is heard from main unit and the data is cleared..
- **Temporary Operation (Depending on breakdown status)**
  1. Press the ON/OFF button after selecting Cooling or Heating operation. (Receiving Beep sound is heard and the TIMER LED blinks.)
  2. The unit can temporarily be used until repaired.



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

15.3. Error Codes Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgement	Emergency operation	Primary location to verify
H11	Indoor / outdoor abnormal communication	> 1 min after starting operation	Indoor fan operation only	• Internal / external cable connections • Indoor / Outdoor PCB
H14	Indoor intake air temperature sensor abnormality	—	—	• Intake air temperature sensor (detective or disconnected)
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	—	• Compressor temperature sensor (detective or disconnected)
H16	Outdoor Current Transformer open circuit	—	—	• Outdoor PCB • IPM (Power transistor) module
H19	Indoor fan motor merchanism lock	—	—	• Indoor PCB • Fan motor
H23	Indoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	O (Cooling only)	• Heat exchanger temperature sensor (defective or disconnected)
H26	Ionizer abnormality	—	—	• Indoor PCB • Ionizer
H27	Outdoor air temperature sensor abnormality	Continue for 5 sec.	O	• Outdoor temperature sensor (defective or disconnected)
H28	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	O	• Outdoor heat exchanger temperature sensor (defective or disconnected)
H33	Indoor/Outdoor wrong connection	—	—	• Indoor/Outdoor supply voltage
H97	Outdoor Fan Motor lock abnormality	—	—	• Outdoor PCB • Outdoor Fan Motor
H98	Indoor high pressure protection	—	—	• Air filter dirty • Air circulation short circuit
H99	Indoor heat exchanger anti-freezing protection	—	—	• Insufficient refrigerant • Air filter dirty
F11	Cooling / Heating cycle changeover abnormality	4 times occurance within 30 minutes	—	• 4-way valve • V-coil
F91	Refrigeration cycle abnormal	2 times occurance within 20 minutes	—	• No refrigerant (3-way valve is closed)
F93	Outdoor compressor abnormal revolution	4 times occurance within 20 minutes	—	• Outdoor compressor
F95	Cool high pressure protection	4 times occurance within 20 minutes	—	• Outdoor refrigerant circuit
F96	IPM (power transistor) overheating protection	—	—	• Excess refrigerant • Improper heat radiation • IPM (Power transistor)
F97	Outdoor compressor overheating protection	4 times occurance within 10 minutes	—	• Insufficient refrigerant • Compressor
F98	Total running current protection	3 times occurance within 20 minutes	—	• Excess refrigerant • Improper heat radiation
F99	Outdoor Direct Current (DC) peak detection	7 times occurance continuously	—	• Outdoor PCB • IPM (Power transistor) • Compressor

Note:
“O” - Frequency measured and fan speed fixed.

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

16 Disassembly and Assembly Instructions

⚠ WARNING

High voltages are 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.

16.1. Disassembly of Indoor Unit

16.1.1. Removal of the Front Panel and Front Grille.

Figure 1

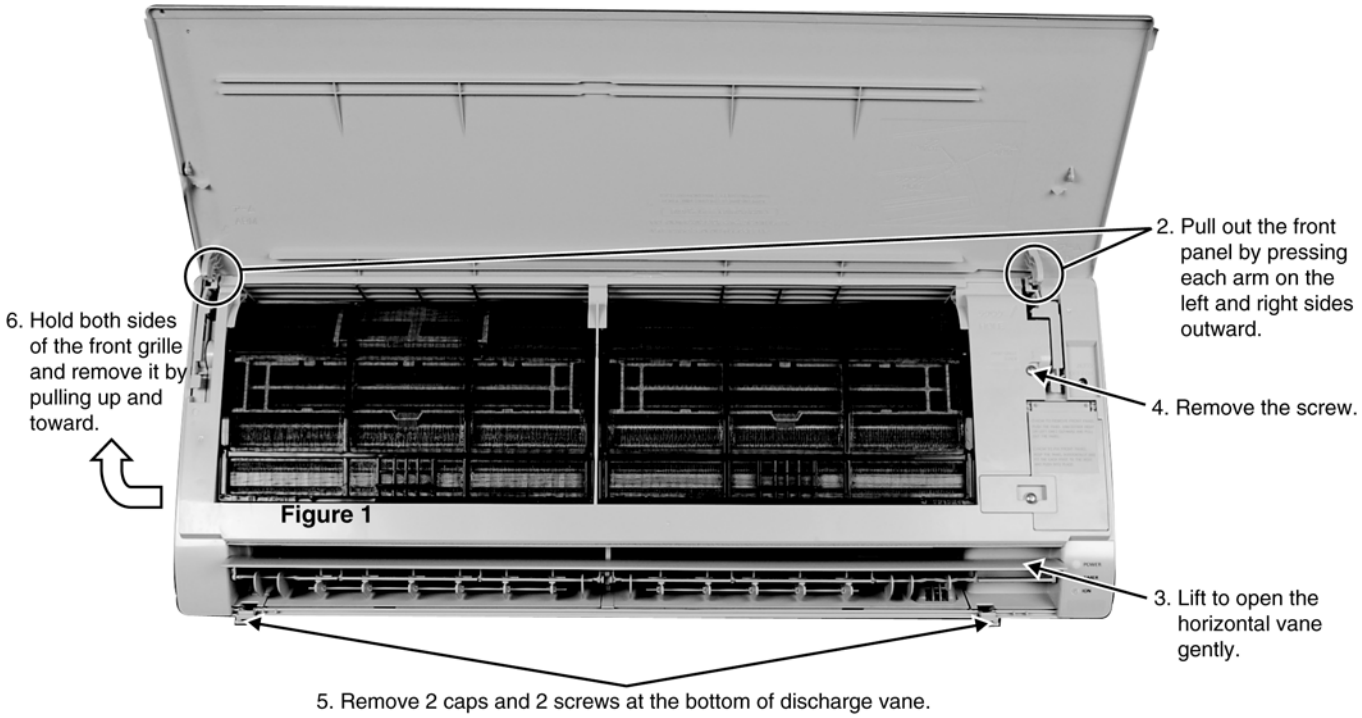


Figure 1

Figure 2

16.1.2. Removal of Electronic Controller

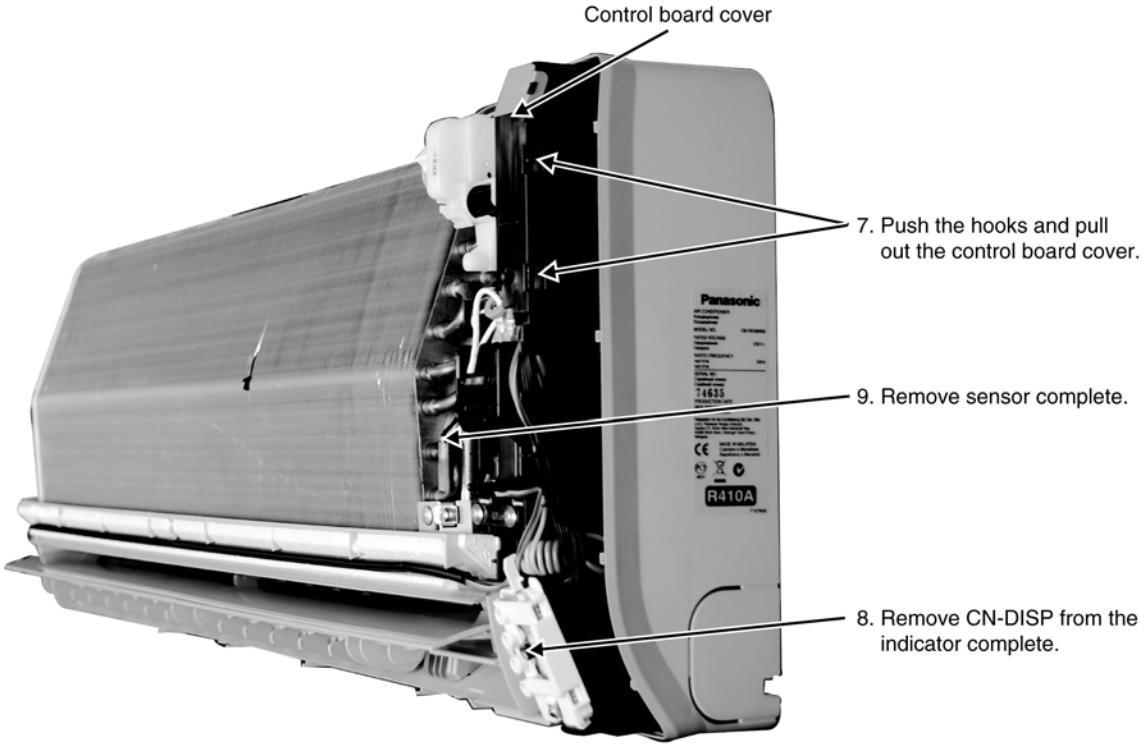


Figure 3

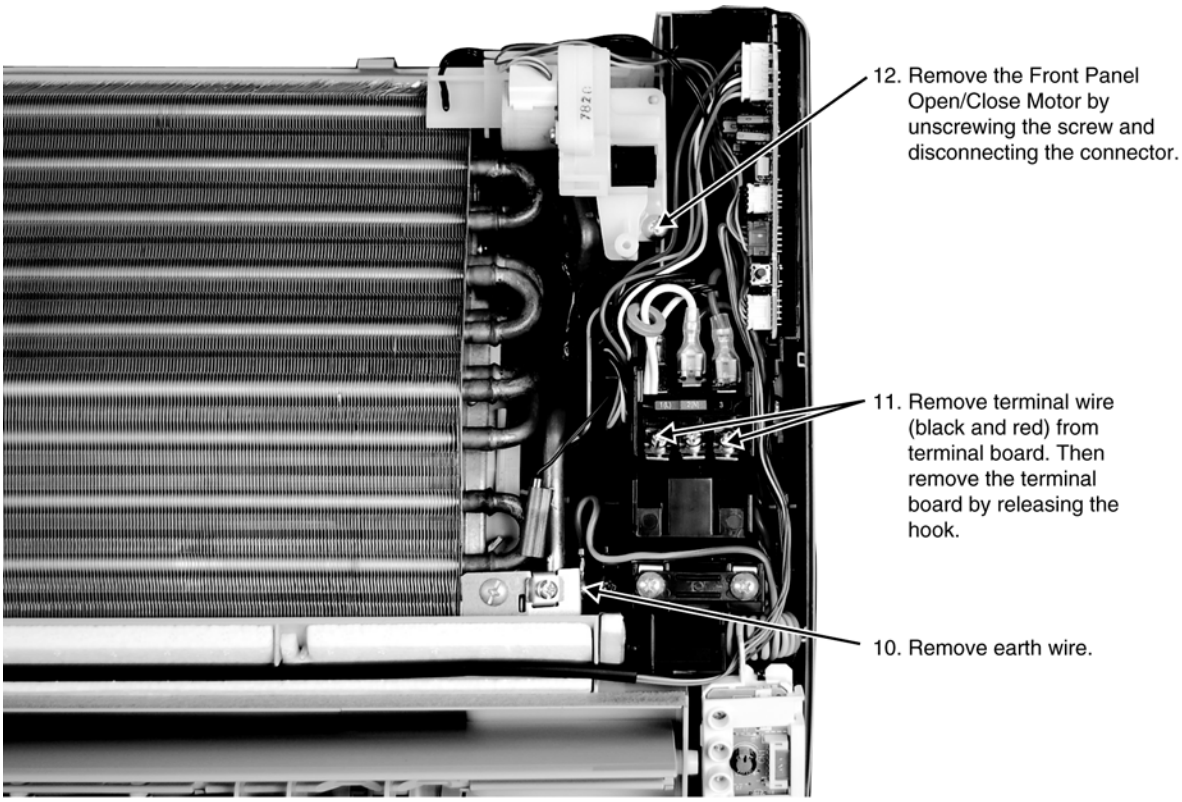


Figure 4

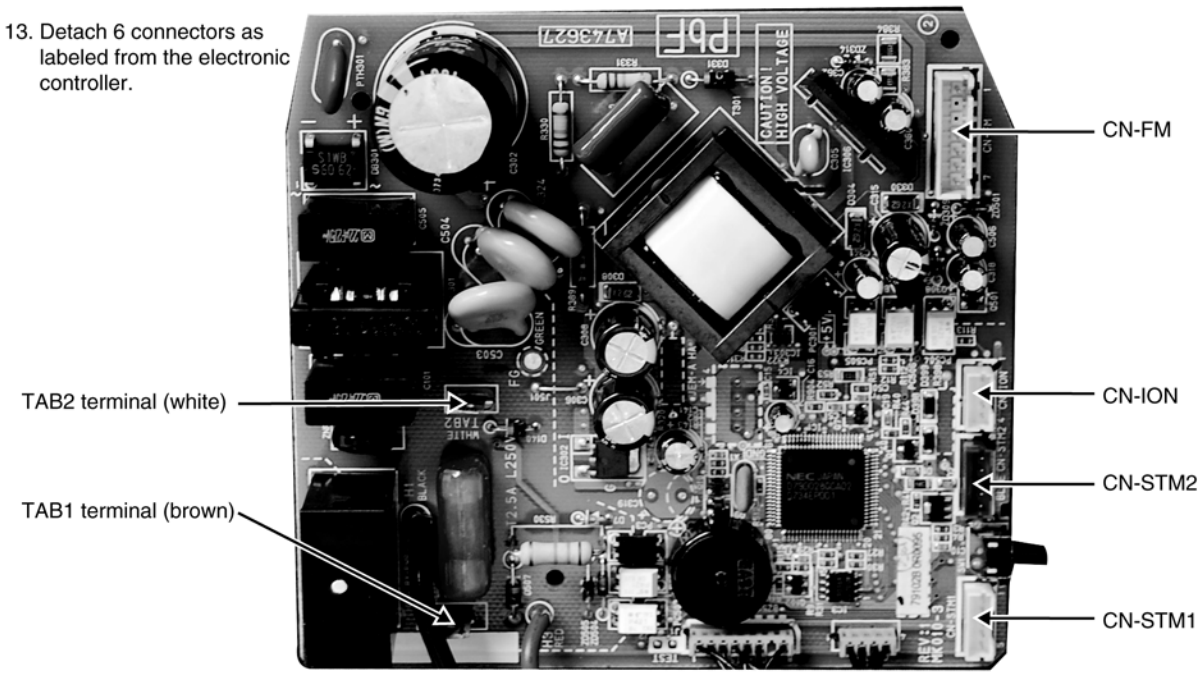


Figure 5

16.1.3. Removal of Control Board

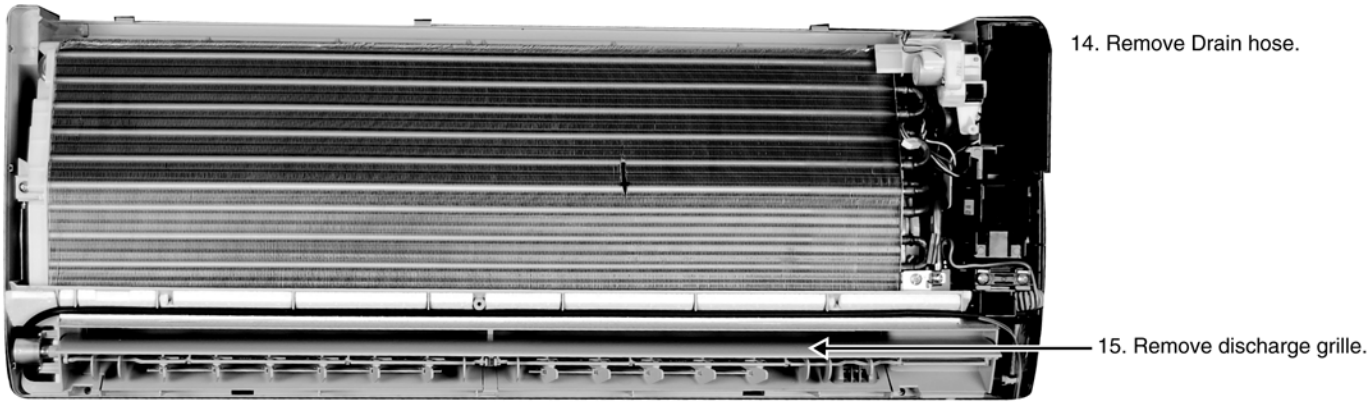
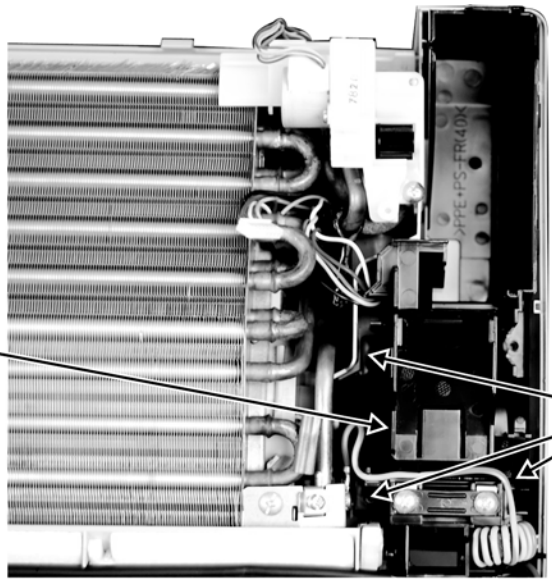


Figure 6



17. Press the hook on the left side of control board, then pull out the control board.

16. Remove 3 screws from control board.

Figure 7

16.1.4. Removal of Fan Motor and Cross-Flow Fan

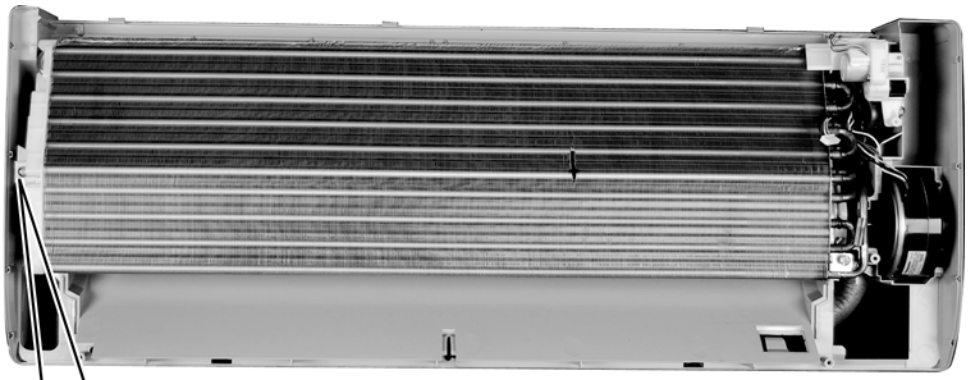
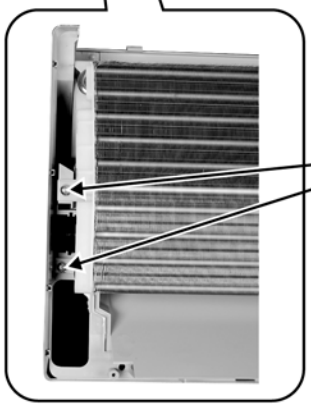


Figure 8



18. Release 2 screws on the left side of evaporator.

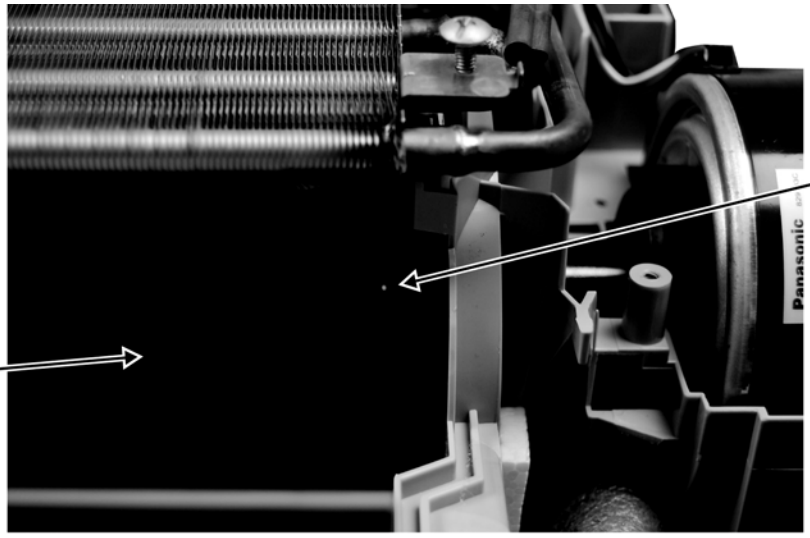


Figure 9

20. Pull out the Cross-Flow Fan by holding up the left side of the heat exchanger.

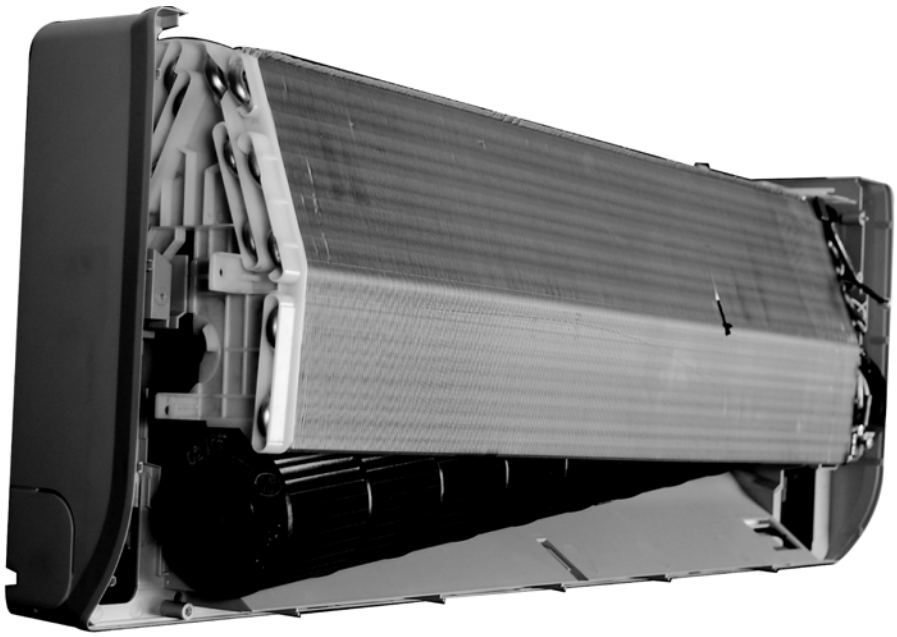


Figure 10

16.2. Outdoor Electronic Controller Removal Procedure

⚠ Caution! When handling electronic controller, be careful of electrostatic discharge.

1. Remove the 3 screws of the Top Panel.

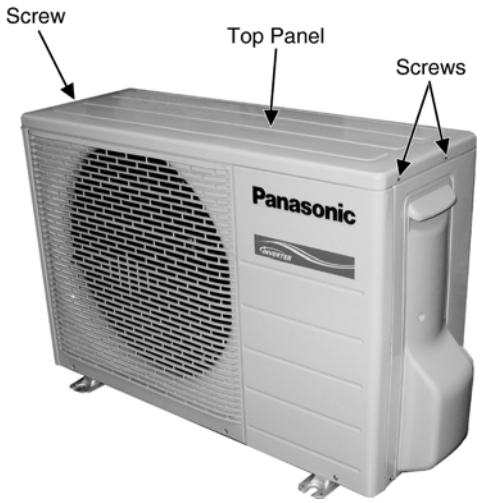


Fig. 1

2. Remove the 6 screws of the Front Panel.

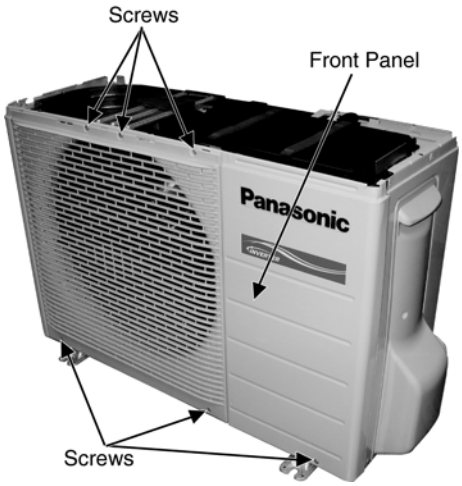


Fig. 2

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

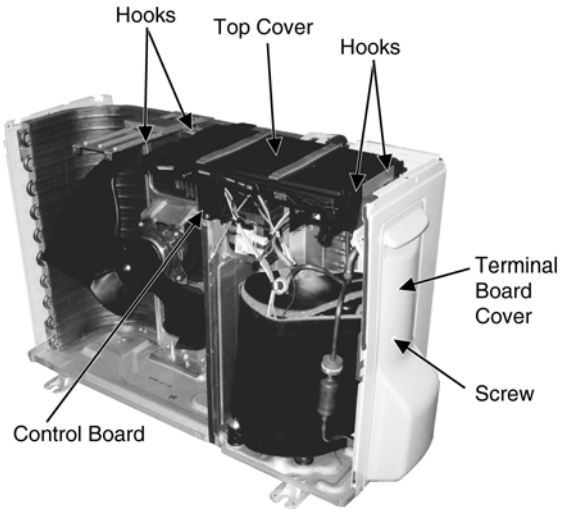


Fig. 3

5. Remove the Control Board as follows:

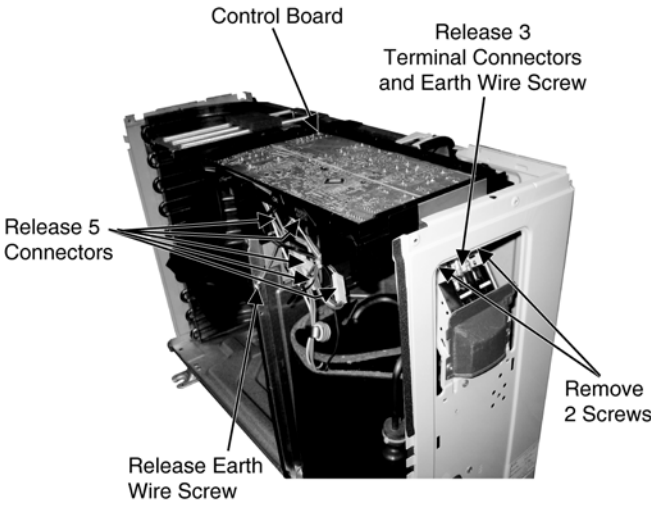


Fig. 4

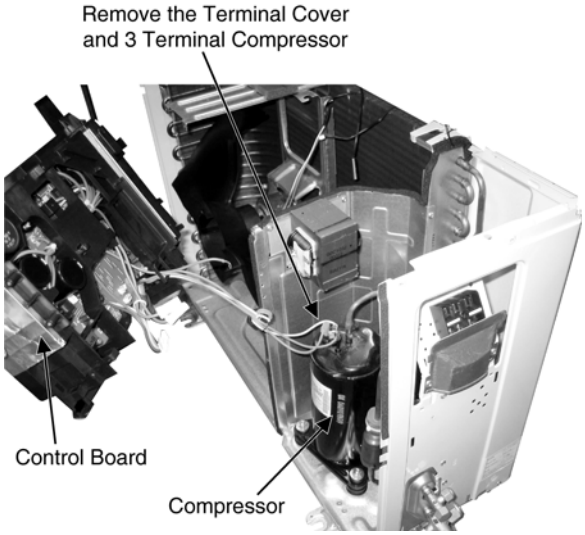


Fig. 5

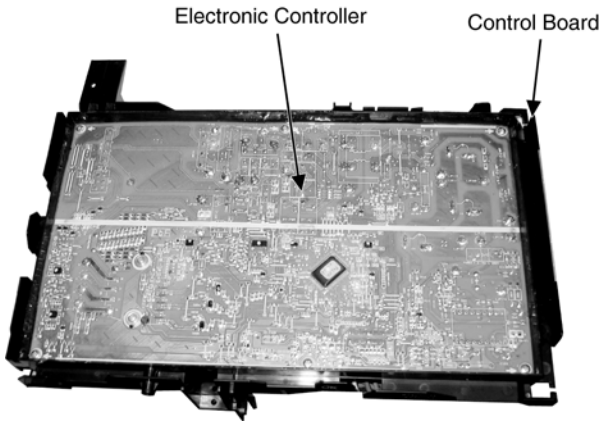


Fig. 6

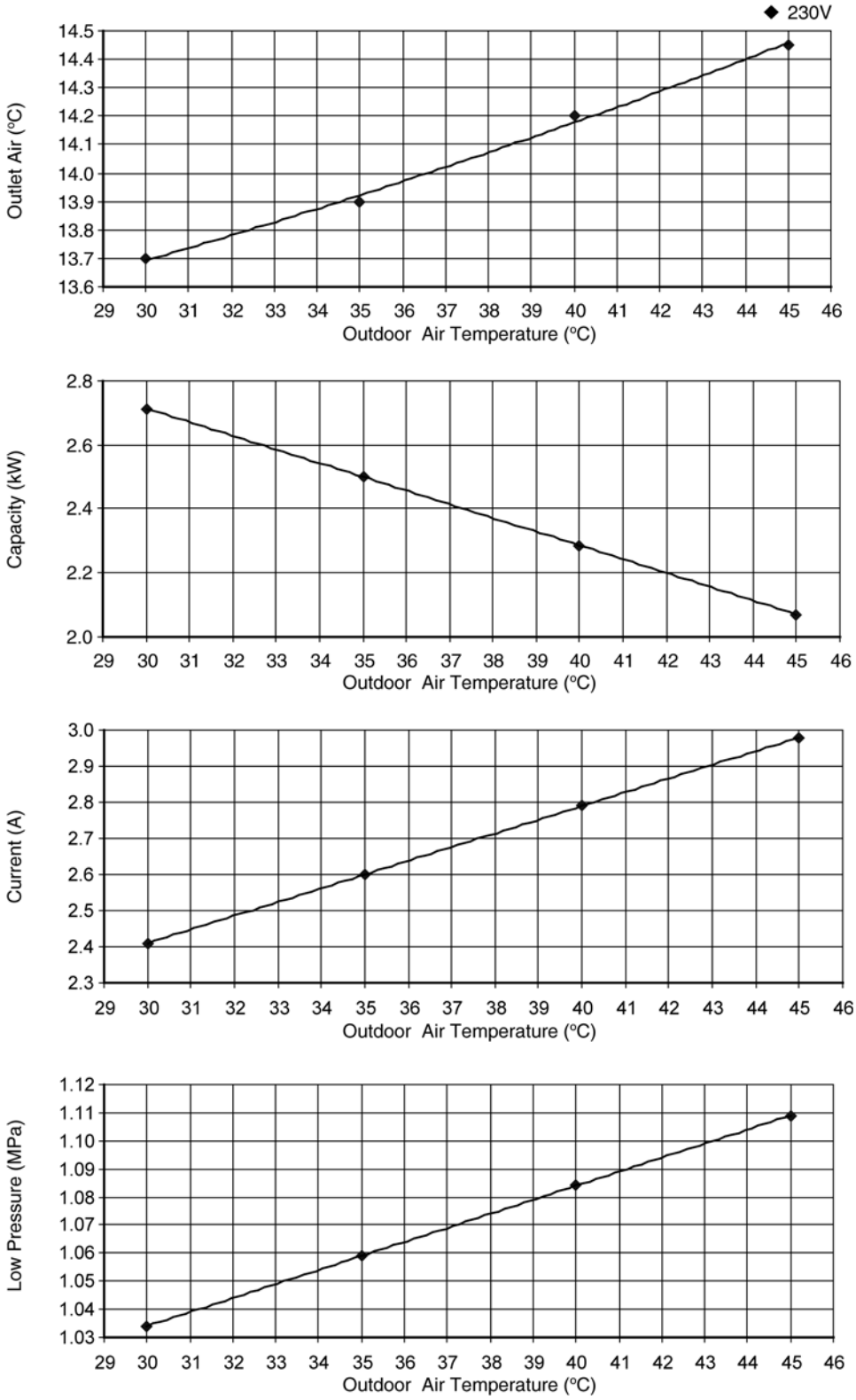
17 Technical Data

17.1. Operation Characteristics

17.1.1. CS-TE9HKE CU-TE9HKE

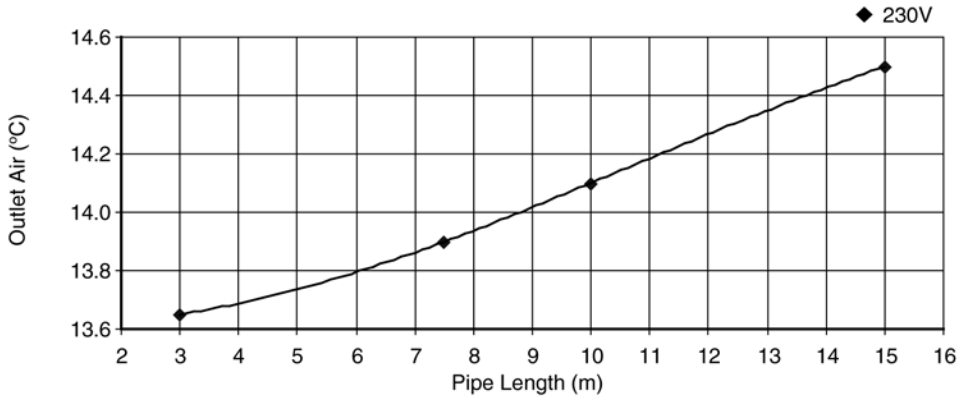
• Cooling Characteristic

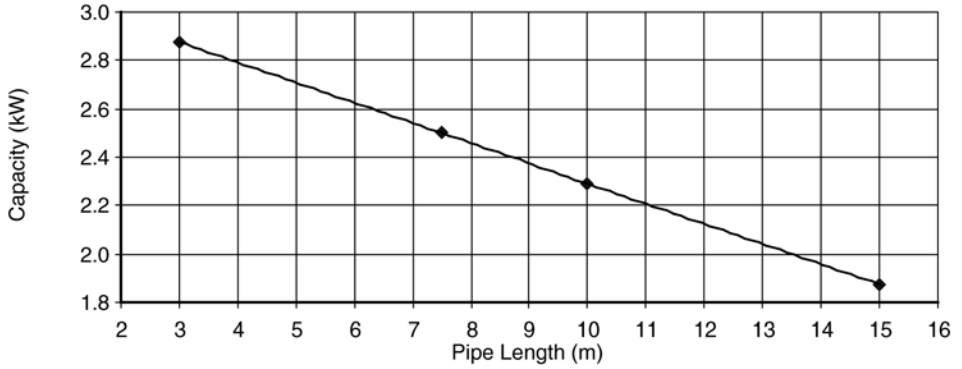
[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Piping length: 7.5 m

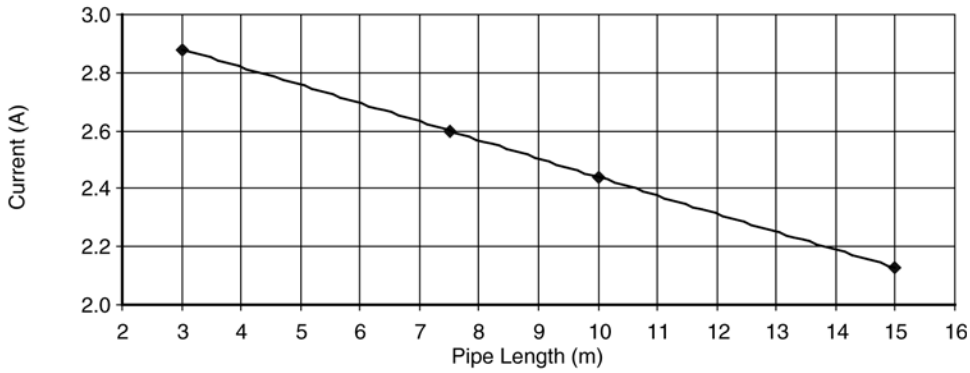


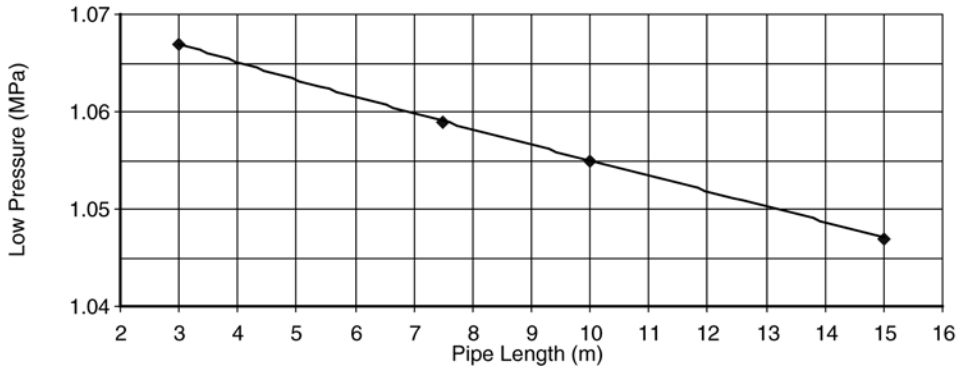
• Piping Length Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24°C



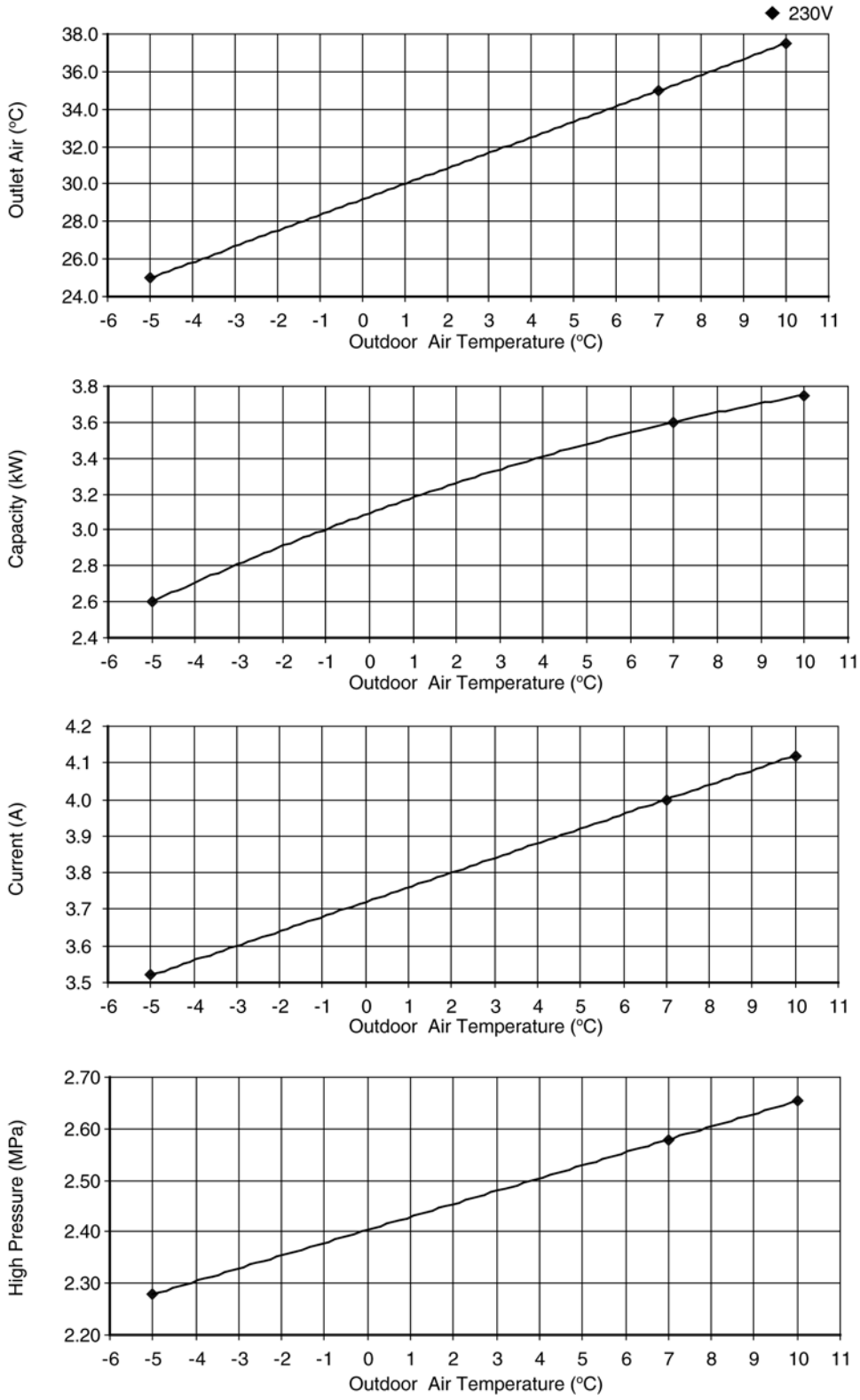






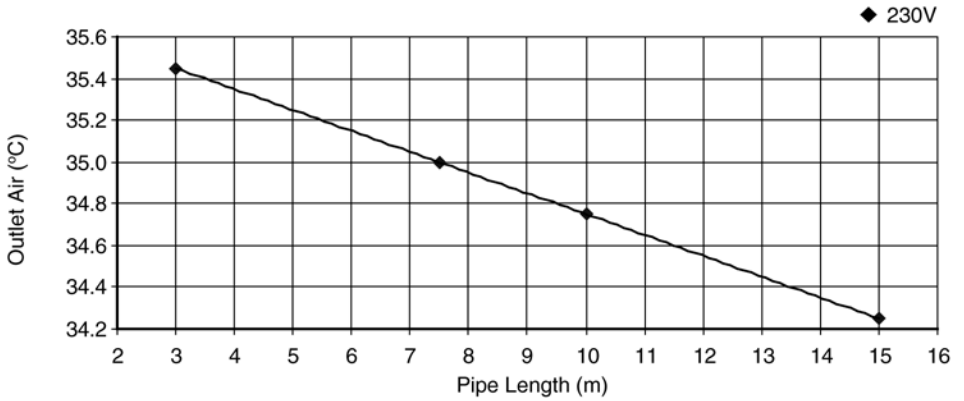
• Heating Characteristic

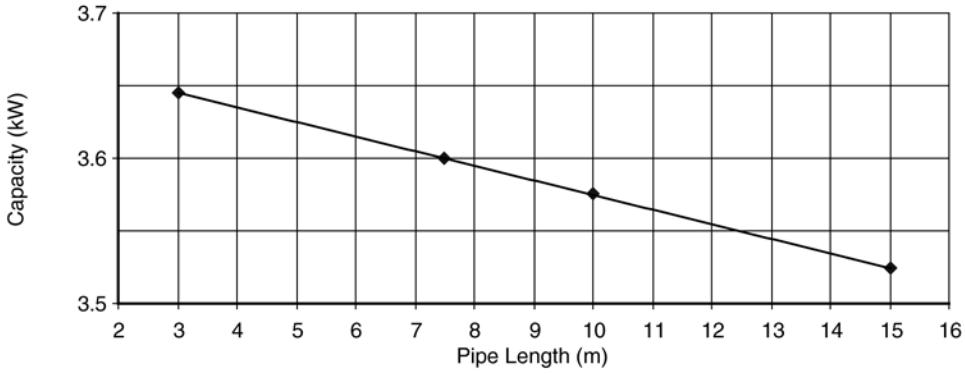
[Condition] Room temperature: 20/-°C
Operation condition: High fan speed (Rated Frequency)
Piping length: 7.5 m

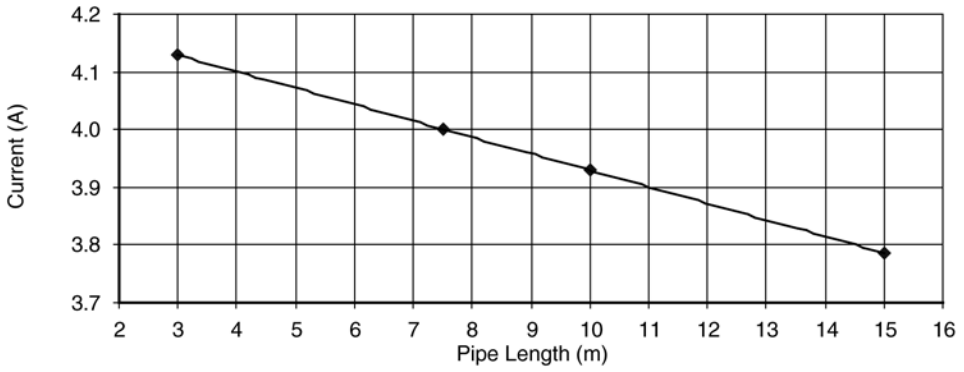


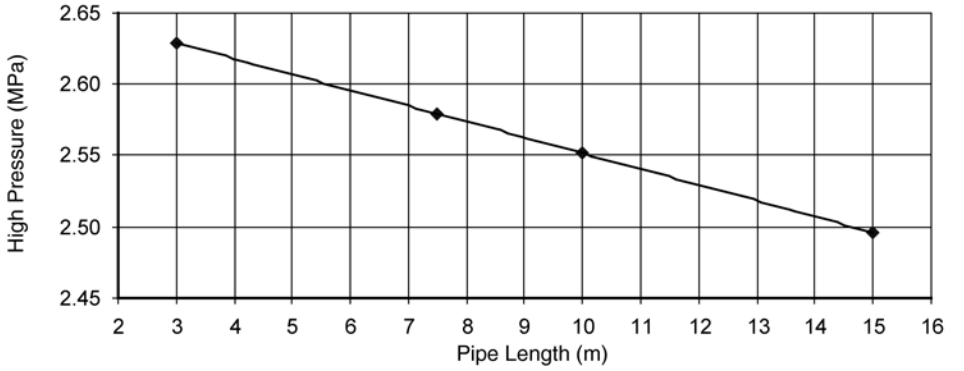
• Piping Length Characteristic

[Condition] Room temperature: 20/-ºC
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24ºC





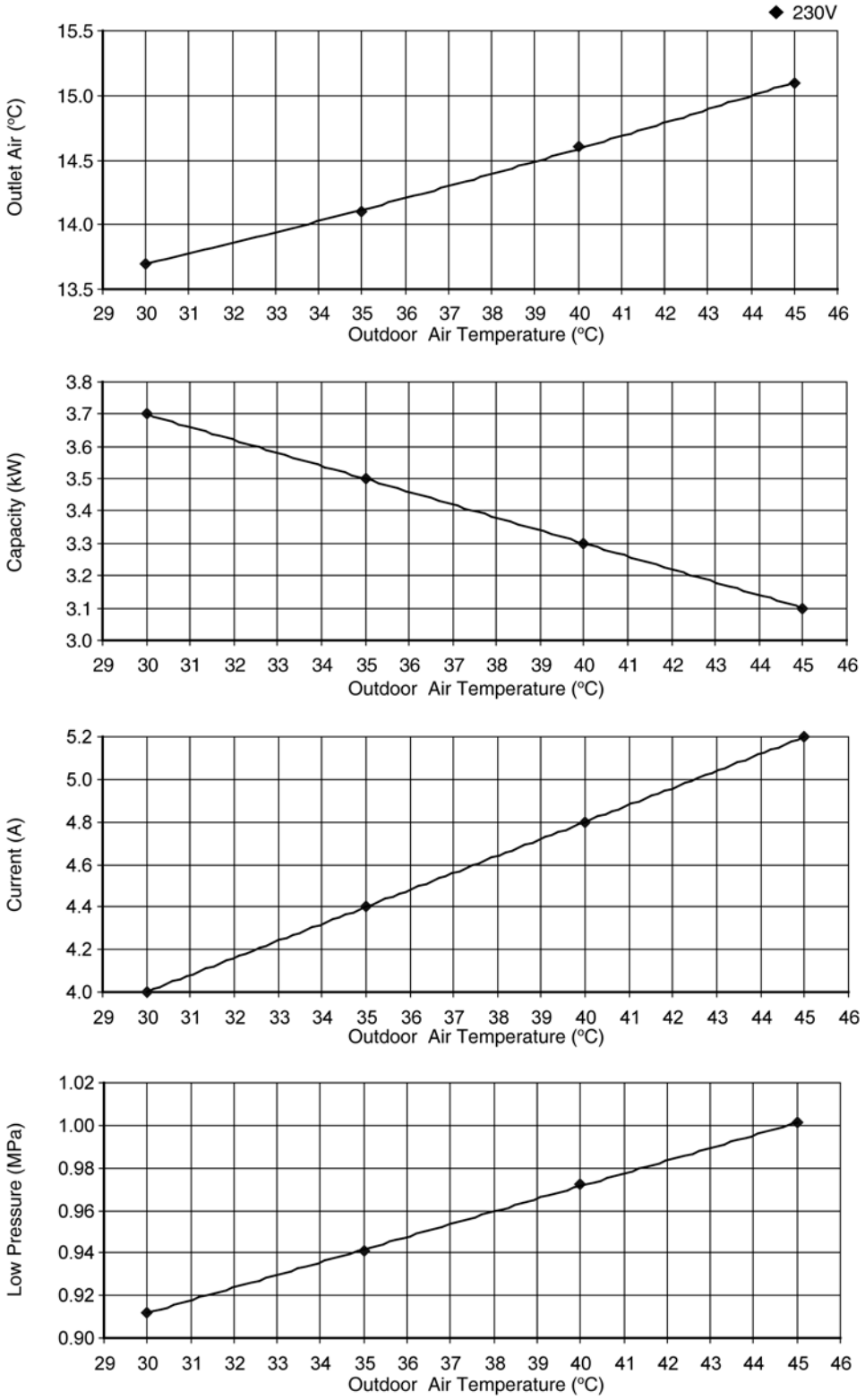




17.1.2. CS-TE12HKE CU-TE12HKE

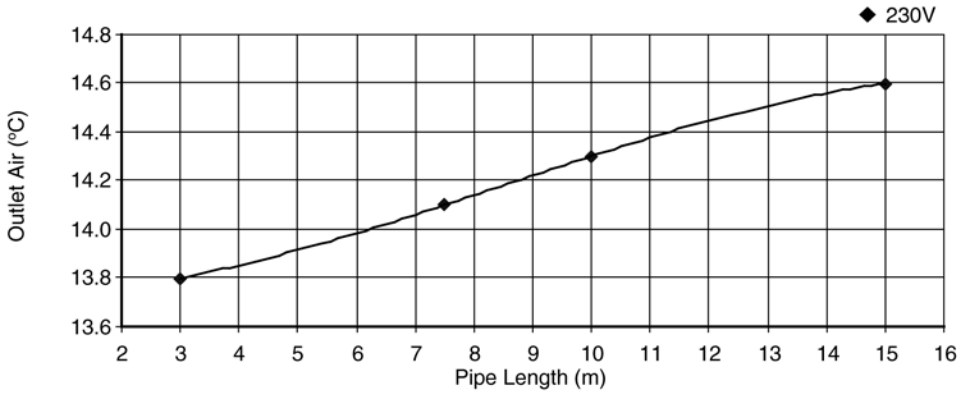
• Cooling Characteristic

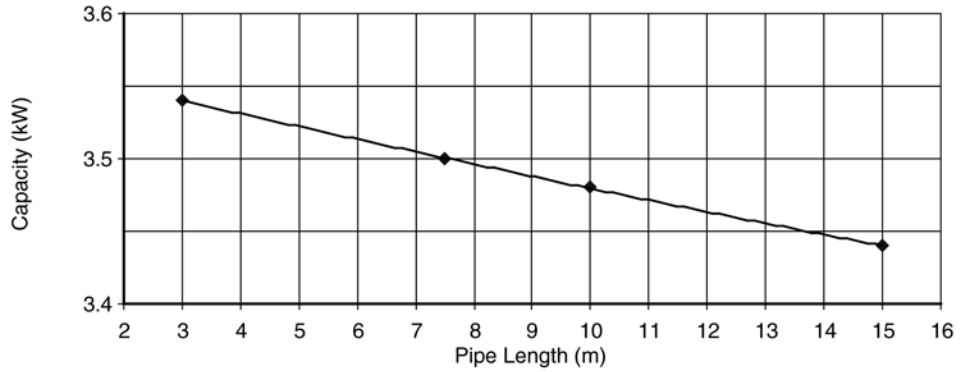
[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Piping length: 7.5 m

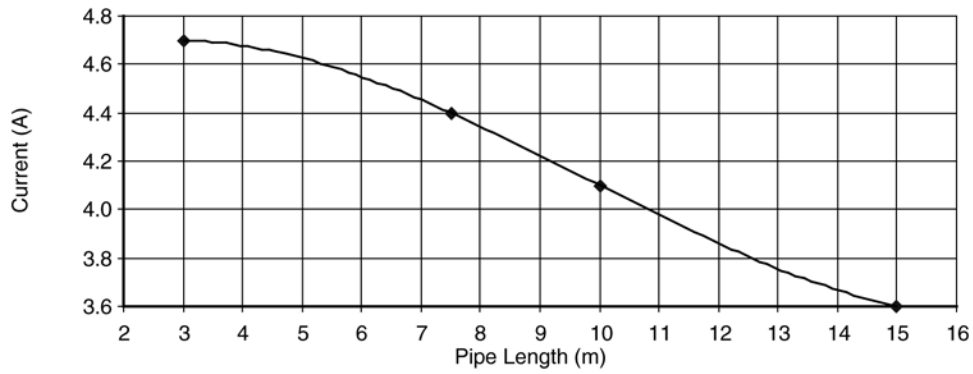


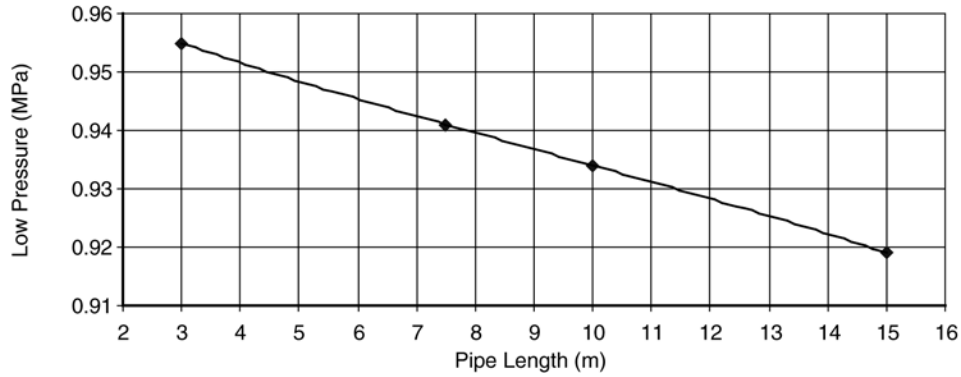
• Piping Length Characteristic

[Condition] Room temperature: 27/19°C
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24°C



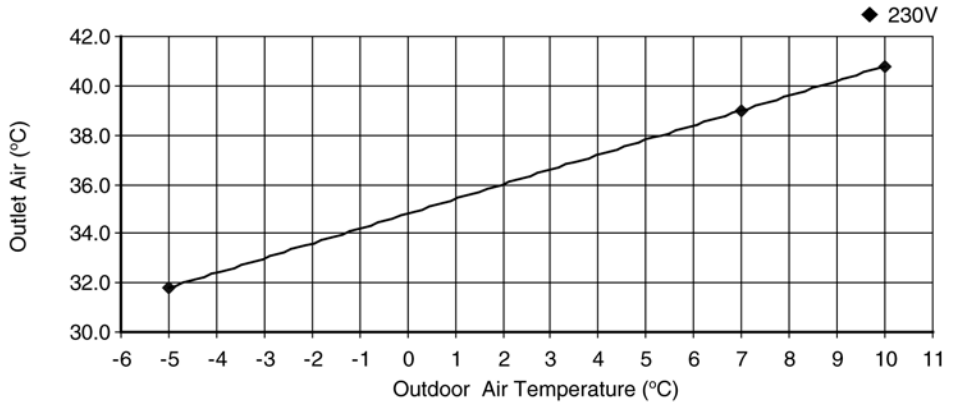


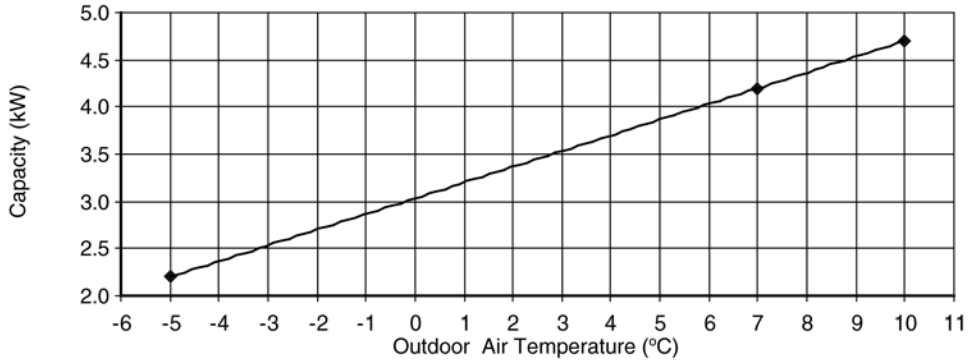


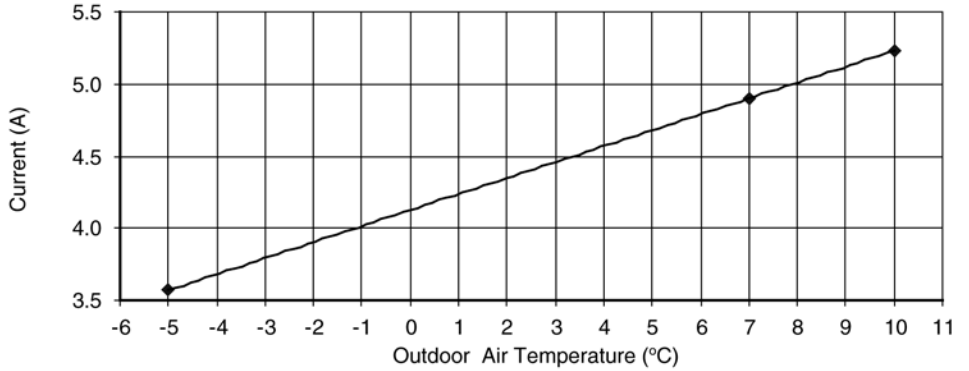


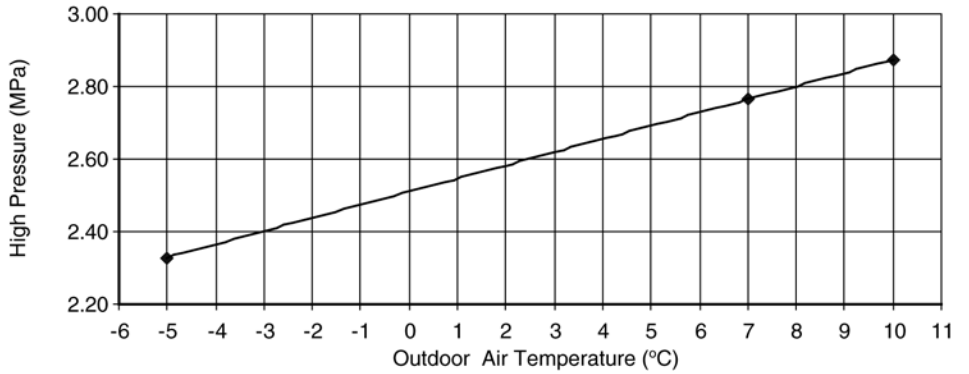
• Heating Characteristic

[Condition] Room temperature: 20/-°C
Operation condition: High fan speed (Rated Frequency)
Piping length: 7.5 m



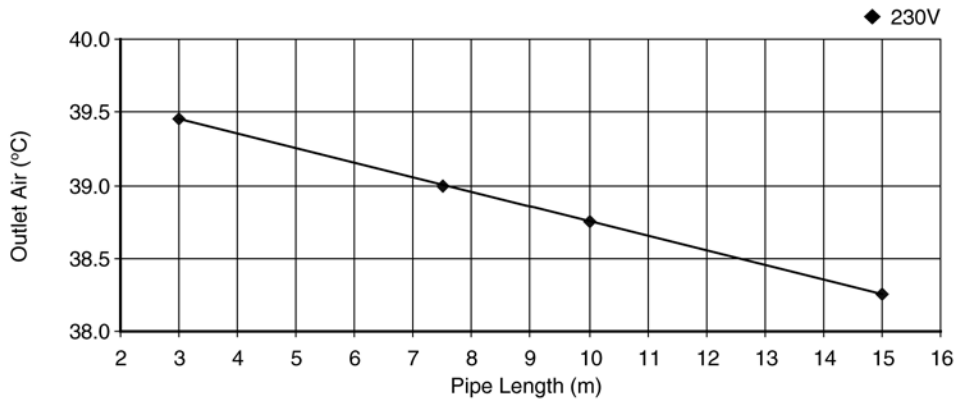


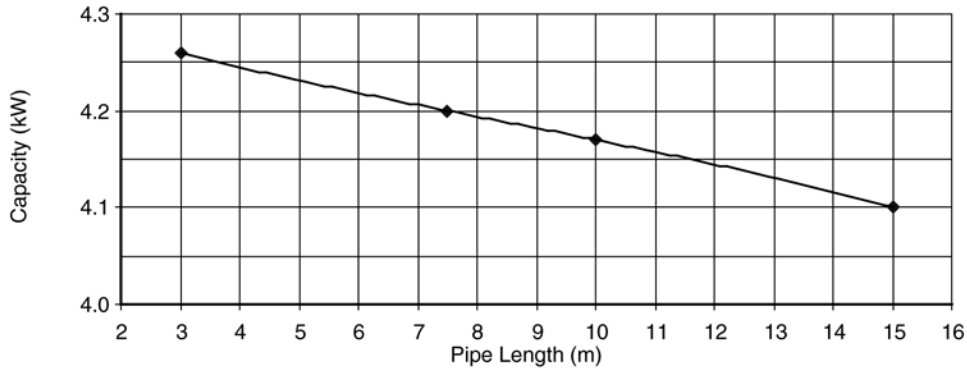


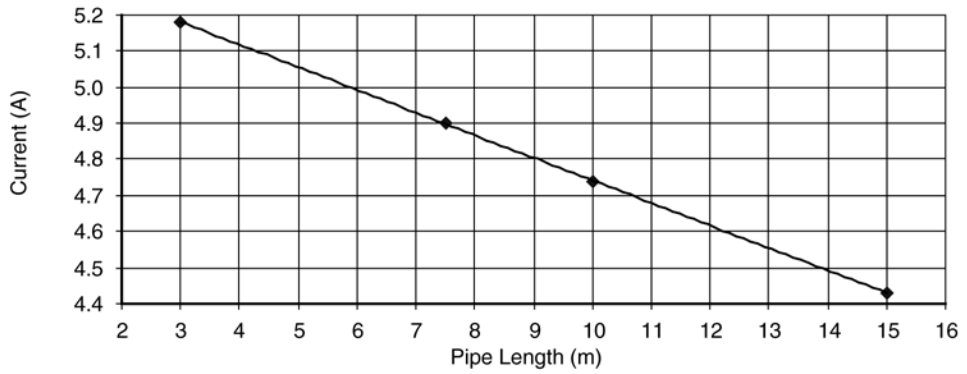


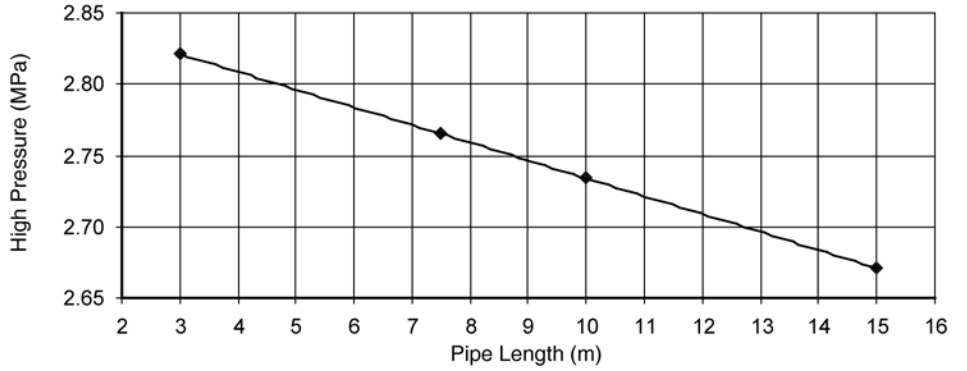
• Piping Length Characteristic

[Condition] Room temperature: 20/-ºC
Operation condition: High fan speed (Rated Frequency)
Outdoor temperature: 35/24ºC









17.2. Sensible Capacity Chart

● **CS-TE9HKE CU-TE9HKE**

230V	Outdoor Temp. (°C)											
Indoor wet bulb temp.	30			35			40			46		
	TC	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**
17.0°C	2.48	1.88	0.52	2.32	1.80	0.56	2.16	1.73	0.60	1.96	1.65	065
19.0°C				2.50		0.57						
19.5°C	2.72	1.97	0.53	2.55	1.89	0.57	2.37	1.82	0.61	2.15	1.73	0.66
22.0°C	2.97	2.04	0.54	2.77	1.96	0.58	2.58	1.89	0.62	2.35	1.81	0.67

● **CS-TE12HKE CU-TE12HKE**

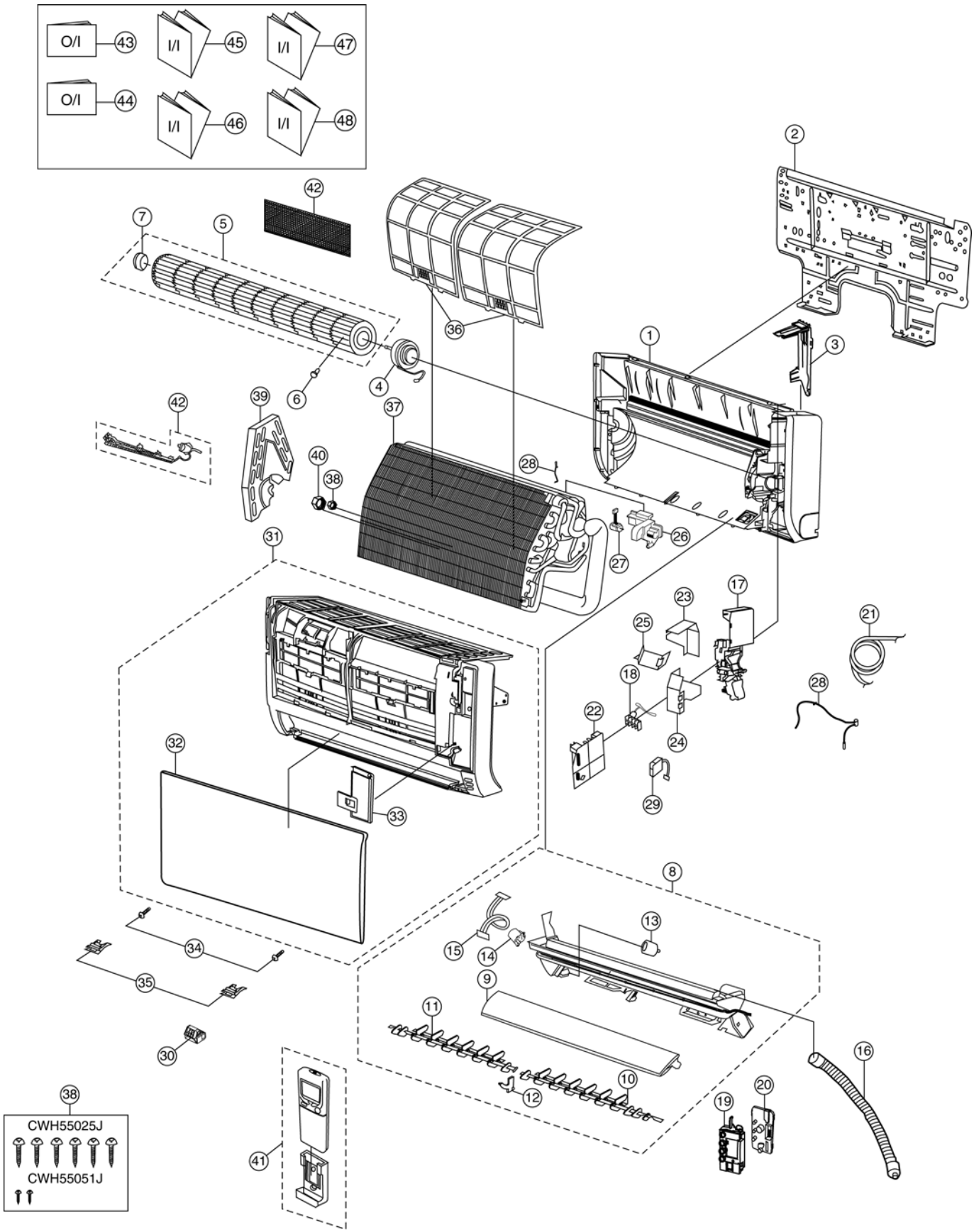
230V	Outdoor Temp. (°C)											
Indoor wet bulb temp.	30			35			40			46		
	TC	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**
17.0°C	3.47	2.63	0.87	3.24	2.52	0.94	3.02	2.43	1.00	2.74	2.30	1.08
19.0°C				3.50		0.95						
19.5°C	3.81	2.76	0.89	3.56	2.65	0.95	3.31	2.55	1.02	3.01	2.43	1.10
22.0°C	4.15	2.86	0.90	3.88	2.75	0.97	3.61	2.65	1.04	3.28	2.53	1.12

TC - Total Cooling Capacity (kW)
SHC - Sensible Heat Capacity (kW)
IP - Input Power (kW)

Indoor 27°C/19°C
Outdoor 35°C/24°C

18 Exploded View and Replacement Parts List

18.1. Indoor Unit



Note

The above exploded view is for the purpose of parts disassembly and replacement.

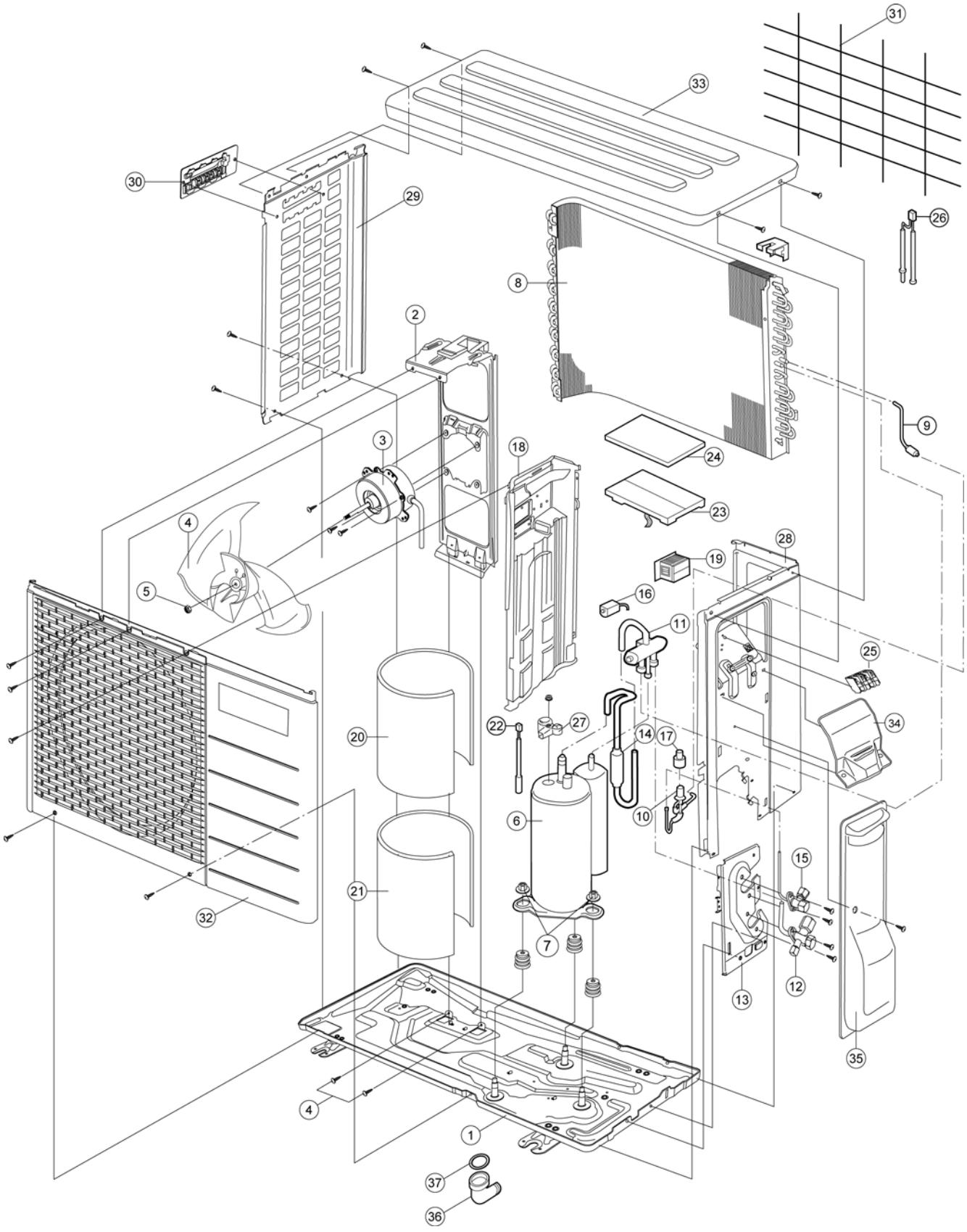
The non-numbered parts are not kept as standard service parts.

REF. NO.	PART NAME & DESCRIPTION	QTY.	CS-TE9HKE	CS-TE12HKE	REMARKS
1	CHASSY COMPLETE	1	CWD50C1558	←	
2	INSTALLATION PLATE	1	CWH361074	←	
3	BACK COVER CHASSIS	1	CWD911465A	←	
4	FAN MOTOR	1	ARW41E8P30AC	←	O
5	CROSS FLOW FAN COMPLETE	1	CWH02K1029	←	O
6	SCREW - CROSS FLOW FAN	1	CWH551146	←	
7	BEARING ASS'Y	1	CWH64K1005	←	
8	DISCHARGE GRILLE COMPLETE	1	CWE20C2754	←	
9	HORIZONTAL VANE	1	CWE24C1115	←	
10	HORIZONTAL VANE COMPLETE (R)	1	CWE24C1221	←	O
11	HORIZONTAL VANE COMPLETE (L)	1	CWE24C1222	←	O
12	FULCRUM	1	CWH621050A	←	
13	CAP (DRAIN CAP)	1	CWH521091	←	
14	AIR SWING MOTOR	1	CWA981106J	←	O
15	LEADWIRE FOR AIR SWING MOTOR	1	CWA67C5265	←	
16	DRAIN HOSE	1	CWH851110	←	
17	CONTROL BOARD CASING	1	CWH102280	←	
18	TERMINAL BOARD COMPLETE	1	CWA28C2233	←	O
19	DISPLAY PCB HOLDER	1	CWD932475	←	
20	ELECTRONIC CONTROLLER - RECEIVER, INDICATOR	1	CWA743634	←	O
21	POWER SUPPLY CORD	1	CWA20C2679	←	
22	ELECTRONIC CONTROLLER - MAIN	1	CWA73C3235	←	O
23	CONTROL COVER (LOWER)	1	CWH131229	←	
24	CONTROL COVER (PLASTIC PLATE - UPPER)	1	CWH131232	←	
25	CONTROL COVER (STEEL PLATE - UPPER)	1	CWH131230	←	
26	GEAR (FRONT PANEL OPEN/CLOSE MOTOR)	1	CWH68C1023	←	
27	FRONT PANEL OPEN/CLOSE MOTOR	1	L6JAEDJH0001	←	
28	SENSOR HOLDER (PIPE TEMP)	1	CWH32137	←	
29	ELECTRONIC CONTROLLER - IONIZER	1	CWA73C1791	←	O
30	ION GENERATOR	1	CWH94C0005	←	
31	FRONT GRILLE COMPLETE	1	CWE11C3959	←	
32	INTAKE GRILLE	1	CWE22C1450	←	
33	GRILLE DOOR	1	CWE141087C	←	
34	SCREW FRONT GRILLE	2	XTT4 + 16CFJ	←	
35	CAP	2	CWH521025E	←	
36	AIR FILTER	1	CWD001149	←	
37	EVAPORATOR COMPLETE (WITH PIPE)	1	CWB30C1608	CWB30C1706	O
38	FLARE NUT (1/4")	1	CWT25086	←	
39	EVAPORATOR HOLDER	1	CWD661048	←	
40	FLARE NUT (3/8") (1/2")	1	CWT251031	CWT251032	
41	REMOTE CONTROL COMPLETE	1	CWA75C3196	←	O
42	SUPER ALLERU BUSTER FILTER	1	CWD00C1263	←	
43	OPERATION INSTRUCTION	1	CWF565931	←	
44	OPERATION INSTRUCTION	1	CWF565932	←	
45	INSTALLATION INSTRUCTION	1	CWF613411	←	
46	INSTALLATION INSTRUCTION	1	CWF613412	←	
47	INSTALLATION INSTRUCTION	1	CWF613413	←	
48	INSTALLATION INSTRUCTION	1	CWF613414	←	

(NOTE)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 061).
- "O" marked parts are recommended to be kept in stock.

18.2. Outdoor Unit



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-TE9HKE	CU-TE12HKE	REMARKS
1	CHASSY ASSY	1	CWD50K2073	←	
2	FAN MOTOR BRACKET	1	CWD541030	←	
3	FAN MOTOR, AC 25W SINGLE	1	CWA951553	CWA951542	O
4	PROPELLER FAN ASSY	1	CWH03K1010	←	
5	NUT - PROPELLER FAN	1	CWH56053J	←	
6	COMPRESSOR	1	5RS102XBC01	←	O
7	NUT - COMPRESSOR MOUNT	3	CWH56000J	←	
8	CONDENSOR CO.	1	CWB32C1827	CWB32C1741	O
9	STRAINER	1	CWB11094	←	
10	TUBE ASSY (EXP.VALVE)	1	CWT01C4434	←	
11	4-WAYS VALVE	1	CWB001037J	←	O
12	3-WAYS VALVE (GAS)	1	CWB011374	CWB011367	O
13	HOLDER COUPLING	1	CWH351023	←	
14	DISCHARGE MUFFLER	1	CWB121010	←	
15	2-WAYS VALVE (LIQUID)	1	CWB021301	←	O
16	V-COIL COMPLETE	1	CWA43C2143J	←	O
17	V-COIL COMPLETE FOR EXP.VALVE	1	CWA43C2058J	←	O
18	SOUND PROOF BOARD	1	CWH151172	←	
19	REACTOR	1	G0C193J00003	G0C193J00004	O
20	SOUND PROOF MATERIAL	1	CWG302293	←	
21	SOUND PROOF MATERIAL	1	CWG302292	←	
22	SENSOR - COMPLETE	1	CWA50C2205	←	
23	ELECTRONIC CONTROLLER-MAIN	1	CWA73C3139R	CWA73C3140R	O
24	CONTROL BOARD COVER (TOP-PCB)	1	CWH131264	←	
25	TERMINAL BOARD ASSY	1	CWA28K1036J	←	
26	SENSOR COMPLETE	1	CWA50C2391	←	O
27	TERMINAL COVER	1	CWH171039A	←	
28	CABINET SIDE PLATE-COMPLETE	1	CWE04C1159	←	
29	CABINET SIDE PLATE (L)	1	CWE041248A	←	
30	HANDLE	1	CWE161010	←	
31	WIRE NET	1	CWD041111A	←	
32	CABINET FRONT PLATE CO.	1	CWE06C1039	←	
33	CABINET TOP PLATE	1	CWE031014A	←	
34	PLATE - C.B.COVER	1	CWH131301	←	
35	CONTROL BOARD COVER COMP.	1	CWH13C1064	←	
36	L.TUBE	1	CWH5850080	←	
37	PACKING - L.TUBE	1	CWB81012	←	

(NOTE)

- All parts are supplied from PHAAM, Malaysia (Vendor Code: 061).
- “O” marked parts are recommended to be kept in stock.