Order No. MAC0511088C2

Service Manual

Air Conditioner

CS-E15EKEA CU-E15EKEA

CS-E18EKEA CU-E18EKEA

CS-E21EKEA CU-E21EKEA

⚠ 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 PROHIBITED 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, electrical 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. 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.	
7. 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 at connection point of terminal, fire or electrical shock.	
8. 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.	⃠
9. Thickness of copper pipes used must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm.	⃠
10. It is desirable that the amount of residual oil is less than 40 mg/10 m.	⃠
11. Do not modify the length of the power supply cord or use of the extension cord, and do not share the single outlet with other electrical appliances. Otherwise, it will cause fire or electrical shock.	⃠

⚠ CAUTION	
1. The equipment must be earthed. It may cause electrical shock if grounding is not perfect.	
2. 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.	⃠

⚠ CAUTION

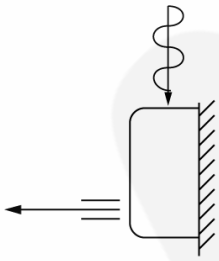
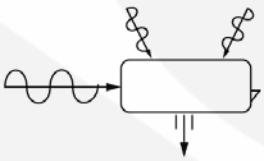
3. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.
4. Pb free solder has a higher melting point than standard solder; typically the melting point is 50 - 70°F (30 - 40°C) higher. Please use a high temperature soldering 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).

ATTENTION

1. Selection of the installation location. Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.
2. Power supply connection to the 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.
   1. Power supply connection to the receptacle using a power plug. Use an approved power plug with earth pin for the connection to the socket.
   2. 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.
3. Do not release refrigerant during piping work for installation, servicing reinstallation and during repairing a refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.
4. Installation work. It may need two people to carry out the installation work.
5. 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-E15EKEA CU-E15EKEA

			Unit	CS-E15EKEA	CU-E15EKEA
Performance Test Condition				EUROVENT	
Cooling Capacity			kW kcal/h BTU/h	4.40 (0.90 - 5.00) 3,780 (770 - 4,300) 15,000 (3,070 - 17,100)	
Heating Capacity			kW kcal/h BTU/h	5.50 (0.90 - 7.10) 4,730 (770 - 6,110) 18,800 (3,070 - 24,200)	
Moisture Removal			l/h Pint/h	2.4 (5.1)	
Power Source (Phase, Voltage, Cycle)			ø V Hz	Single 230 50	
Airflow Method			OUTLET INTAKE	SIDE VIEW 	TOP VIEW 
Air Volume	Lo		m^3/min (cfm)	Cooling; 7.4 (260) Heating; 8.8 (310)	—
	Me		m^3/min (cfm)	Cooling; 9.2 (320) Heating; 10.3 (360)	—
	Hi		m^3/min (cfm)	Cooling; 11.0 (390) Heating; 11.8 (420)	Cooling; 48.5 (1,710) Heating; 46.8 (1,650)
Noise Level			dB (A)	Cooling; High 43, Low 32 Heating; High 43, Low 35	Cooling; 46 Heating; 46
			Power level dB	Cooling; High 54 Heating; High 54	Cooling; High 59 Heating; High 59
Electrical Data	Input Power		W	Cooling; 1,370 (215 - 1,600) Heating; 1,570 (245 - 2,250)	
	Running Current		A	Cooling; 6.3 Heating; 7.1	
	EER		W/W	Cooling; 3.21 (4.19 - 3.13)	
			BTU/hW	Cooling; 10.9 (14.3 - 10.7)	
	COP		W/W	Heating; 3.50 (3.67 - 3.16)	
			BTU/hW	Heating; 12.0 (12.5 - 10.8)	
	Starting Current		A	7.3	
Piping Connection Port (Flare piping)			inch inch	G ; Half Union 1/2” L ; Half Union 1/4”	G ; 3-way valve 1/2” L ; 2-way valve 1/4”
Pipe Size (Flare piping)			inch inch	G (gas side) ; 1/2” L (liquid side) ; 1/4”	G (gas side) ; 1/2” L (liquid side) ; 1/4”
Drain Hose	Inner diameter		mm	12	—
	Length		m	0.65	—
Power Cord	Length		m	1.9	—
	Number of Core-wire			3(1.5mm^2)	—
Dimensions	Height		inch (mm)	11 - 1/32 (280)	29 - 17/32 (750)
	Width		inch (mm)	31 - 15/32 (799)	34 - 7/16 (875)
	Depth		inch (mm)	7 - 7/32 (183)	13 - 19/32 (345)
Net Weight			lb (kg)	20 (9)	106 (48)
Compressor		Type		—	Involute scroll
	Motor	Type		—	Brushless (4-pole)
	Rated	Output	W	—	700

			Unit	CS-E15EKEA	CU-E15EKEA
Air Circulation		Type		Cross-flow Fan	Propeller Fan
		Material		ASHT-18	P.P
	Motor	Type		Transistor (8-poles)	Transistor (8-poles)
		Rate Output	W	30	40
	Fan Speed	Lo (Cool/Heat)	rpm	980 / 1,160	—
		Me (Cool/Heat)	rpm	1,220 / 1,360	—
		Hi (Cool/Heat)	rpm	1,460 / 1,560	660 / 640
Heat Exchanger	Description			Evaporator	Condenser
	Tube material			Copper	Copper
	Fin material			Aluminium (Pre Coat)	Aluminium
	Fin Type			Slit Fin	Corrugated Fin
	Row / Stage			(Plate fin configuration, forced draft)	
				2 / 15	1 / 28
	FPI			21	18
	Size (W × H × L)		mm	610 × 315 × 25.4	871.7 × 711.2 × 22
Refrigerant Control Device				—	Expansion Valve
Refrigeration Oil			(c.c)	—	RB68A (360)
Refrigerant (R410A)			kg (oz)	—	1.06 (37.4)
Thermostat				Electronic Control	—
Protection Device				Electronic Control	Electronic Control
Air Filter	Material Style			P.P. Honeycomb	—

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

2.2. CS-E18EKEA CU-E18EKEA

			Unit	CS-E18EKEA	CU-E18EKEA
Performance Test Condition				EUROVENT	
Cooling Capacity			kW kcal/h BTU/h	5.30 (0.90 - 6.00) 4,560 (770 - 5,160) 18,100 (3,070 - 20,500)	
Heating Capacity			kW kcal/h BTU/h	6.60 (0.90 - 8.00) 5,680 (770 - 6,880) 22,500 (3,070 - 27,300)	
Moisture Removal			l/h Pint/h	2.9 (6.1)	
Power Source (Phase, Voltage, Cycle)			ø V Hz	Single 230 50	
Airflow Method			OUTLET INTAKE	SIDE VIEW	TOP VIEW
Air Volume	Lo		m^3/min (cfm)	Cooling; 12.3 (430) Heating; 13.0 (460)	—
	Me		m^3/min (cfm)	Cooling; 13.9 (490) Heating; 14.6 (520)	—
	Hi		m^3/min (cfm)	Cooling; 15.2 (540) Heating; 16.7 (590)	40.0 (1,410)
Noise Level			dB (A)	Cooling; High 44, Low 37 Heating; High 44, Low 37	Cooling; 47 Heating; 47
			Power level dB	Cooling; High 57 Heating; High 57	Cooling; High 60 Heating; High 60
Electrical Data	Input Power		W	Cooling; 1,650 (215 - 2,050) Heating; 1,790 (245 - 2,650)	
	Running Current		A	Cooling; 7.5 Heating; 8.1	
	EER		W/W	Cooling; 3.21 (4.19 - 2.93)	
			BTU/hW	Cooling; 11.0 (14.3 - 10.0)	
	COP		W/W	Heating; 3.69 (3.67 - 3.02)	
			BTU/hW	Heating; 12.6 (12.5 - 10.3)	
	Starting Current		A	8.3	
Piping Connection Port (Flare piping)			inch inch	G ; Half Union 1/2” L ; Half Union 1/4”	G ; 3-way valve 1/2” L ; 2-way valve 1/4”
Pipe Size (Flare piping)			inch inch	G (gas side) ; 1/2” L (liquid side) ; 1/4”	G (gas side) ; 1/2” L (liquid side) ; 1/4”
Drain Hose	Inner diameter		mm	12	—
	Length		m	0.65	—
Power Cord	Length		m	1.9	—
	Number of Core-wire			3($1.5mm^2$)	—
Dimensions	Height		inch (mm)	10 - 13/16 (275)	29 - 17/32 (750)
	Width		inch (mm)	39 - 9/32 (998)	34 - 7/16 (875)
	Depth		inch (mm)	9 - 1/16 (230)	13 - 19/32 (345)
Net Weight			lb (kg)	24 (11)	108 (49)
Compressor		Type		—	Involute scroll
	Motor	Type		—	Brushless (4-pole)
	Rated	Output	W	—	900

			Unit	CS-E18EKEA	CU-E18EKEA
Air Circulation		Type		Cross-flow Fan	Propeller Fan
		Material		ASHT-18	P.P
	Motor	Type		Transistor (8-poles)	Transistor (8-poles)
		Rate Output	W	30	40
	Fan Speed	Lo (Cool/Heat)	rpm	1,170 / 1,240	—
		Me (Cool/Heat)	rpm	1,330 / 1,395	—
		Hi (Cool/Heat)	rpm	1,450 / 1,580	660 / 640
Heat Exchanger	Description			Evaporator	Condenser
	Tube material			Copper	Copper
	Fin material			Aluminium (Pre Coat)	Aluminium
	Fin Type			Slit Fin	Corrugated Fin
	Row / Stage			(Plate fin configuration, forced draft)	
				2 / 15	2 / 34
	FPI			21	16
	Size (W × H × L)		mm	810 × 315 × 25.4	849.3 × 714 × 36.4 878
Refrigerant Control Device				—	Expansion Valve
Refrigeration Oil			(c.c)	—	RB68A (360)
Refrigerant (R410A)			kg (oz)	—	1.18 (41.7)
Thermostat				Electronic Control	—
Protection Device				Electronic Control	Electronic Control
Air Filter	Material Style			P.P. Honeycomb	—

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

2.3. CS-E21EKEA CU-E21EKEA

			Unit	CS-E21EKEA	CU-E21EKEA
Performance Test Condition				EUROVENT	
Cooling Capacity			kW kcal/h BTU/h	6.30 (0.90 - 7.10) 5,420 (770 - 6,110) 21,500 (3,070 - 24,200)	
Heating Capacity			kW kcal/h BTU/h	7.20 (0.90 - 8.50) 6,190 (770 - 7,310) 24,600 (3,070 - 29,000)	
Moisture Removal			l/h Pint/h	3.5 (7.4)	
Power Source (Phase, Voltage, Cycle)			ø V Hz	Single 230 50	
Airflow Method			OUTLET INTAKE	SIDE VIEW	TOP VIEW
Air Volume	Lo		m^3/min (cfm)	Cooling; 12.5 (440) Heating; 13.5 (480)	—
	Me		m^3/min (cfm)	Cooling; 14.4 (510) Heating; 14.9 (530)	—
	Hi		m^3/min (cfm)	Cooling; 16.2 (570) Heating; 17.3 (610)	Cooling; 42.8 (1,510) Heating; 41.5 (1,460)
Noise Level			dB (A)	Cooling; High 45, Low 37 Heating; High 45, Low 37	Cooling; 48 Heating; 49
			Power level dB	Cooling; High 58 Heating; High 58	Cooling; High 61 Heating; High 62
Electrical Data	Input Power		W	Cooling; 2,210 (215 - 2,540) Heating; 2,100 (245 - 2,750)	
	Running Current		A	Cooling; 9.9 Heating; 9.3	
	EER		W/W	Cooling; 2.85 (4.19 - 2.80)	
			BTU/hW	Cooling; 9.7 (14.3 - 9.5)	
	COP		W/W	Heating; 3.43 (3.67 - 3.09)	
			BTU/hW	Heating; 11.7 (12.5 - 10.5)	
	Starting Current		A	9.7	
Piping Connection Port (Flare piping)			inch inch	G ; Half Union 1/2” L ; Half Union 1/4”	G ; 3-way valve 1/2” L ; 2-way valve 1/4”
Pipe Size (Flare piping)			inch inch	G (gas side) ; 1/2” L (liquid side) ; 1/4”	G (gas side) ; 1/2” L (liquid side) ; 1/4”
Drain Hose	Inner diameter		mm	12	—
	Length		m	0.65	—
Power Cord	Length		m	1.9	—
	Number of Core-wire			3(1.5mm^2)	—
Dimensions	Height		inch (mm)	10 - 13/16 (275)	29 - 17/32 (750)
	Width		inch (mm)	39 - 9/32 (998)	34 - 7/16 (875)
	Depth		inch (mm)	9 - 1/16 (230)	13 - 19/32 (345)
Net Weight			lb (kg)	24 (11)	112 (51)
Compressor		Type		—	Involute scroll
	Motor	Type		—	Brushless (4-pole)
	Rated	Output	W	—	900

			Unit	CS-E21EKEA	CU-E21EKEA
Air Circulation		Type		Cross-flow Fan	Propeller Fan
		Material		ASHT-18	P.P
	Motor	Type		Transistor (8-poles)	Transistor (8-poles)
		Rate Output	W	30	40
	Fan Speed	Lo (Cool/Heat)	rpm	1,170 / 1,270	—
		Me (Cool/Heat)	rpm	1,355 / 1,400	—
		Hi (Cool/Heat)	rpm	1,520 / 1,610	700 / 680
Heat Exchanger	Description			Evaporator	Condenser
	Tube material			Copper	Copper
	Fin material			Aluminium (Pre Coat)	Aluminium
	Fin Type			Slit Fin	Corrugated Fin
	Row / Stage			(Plate fin configuration, forced draft)	
				2 / 15	2 / 34
	FPI			21	18
	Size (W × H × L)		mm	810 × 315 × 25.4	839.5 × 714 × 36.4 868
Refrigerant Control Device				—	Expansion Valve
Refrigeration Oil			(c.c)	—	RB68A (360)
Refrigerant (R410A)			kg (oz)	—	1.29 (45.5)
Thermostat				Electronic Control	—
Protection Device				Electronic Control	Electronic Control
Air Filter	Material Style			P.P. Honeycomb	—

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

3 Features

- **Product**
  - Four modes of operation selection
  - Powerful Mode operation
  - ON Timer and OFF Timer
  - Ionizer Mode Operation
  - Quiet Mode Operation
  - Automatic air swing and manual adjusted by Remote Control for horizontal and vertical airflow
  - Supersonic Air Purifying System with Super Alleru-Buster.
    Inactive various harmful airbone elements including allergens, viruses and bacteria. Generated supersonic waves enhance the ability to collect dust and dirt in the air.

- **Serviceability Improvement**
  - Removable washable Front Panel
  - Breakdown Self Diagnosis function

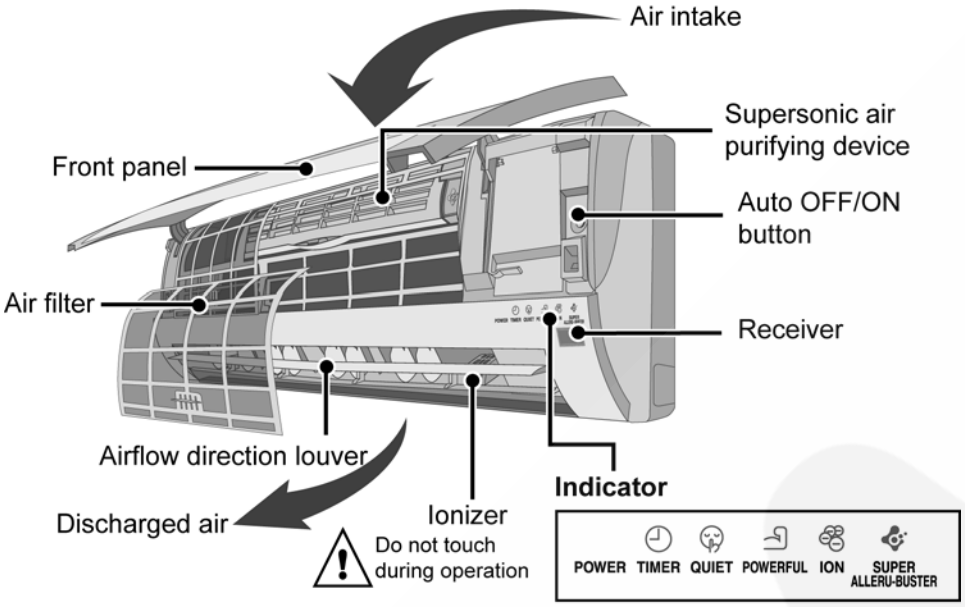
- **Environmental Protection**
  - Non-ozone depletion substances refrigerant (R410A)

- **Operation Improvement**
  - Auto restart control

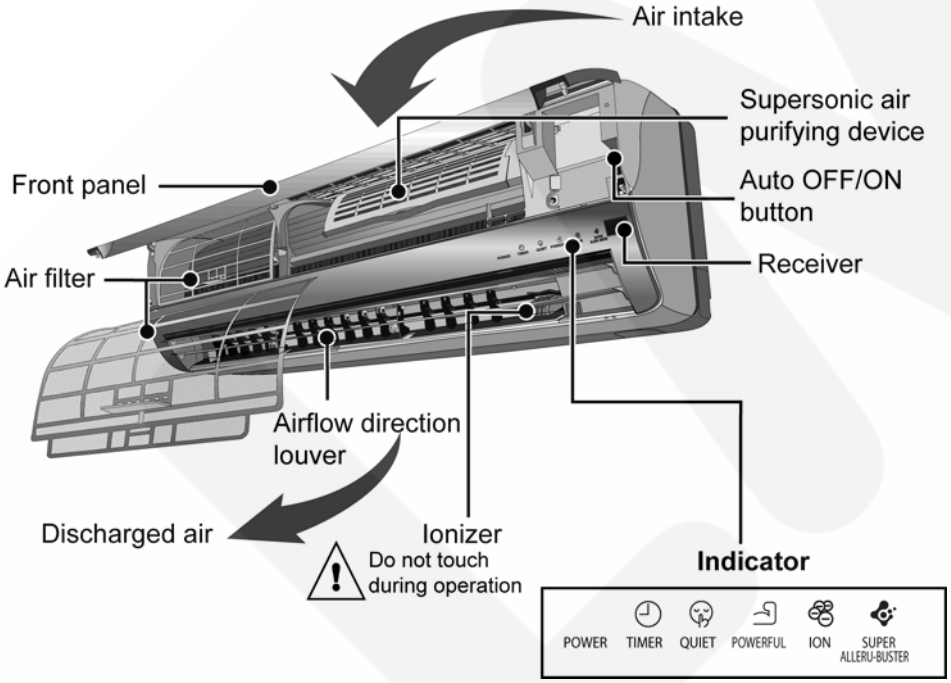
4 Location of Controls and Components

4.1. Indoor Unit

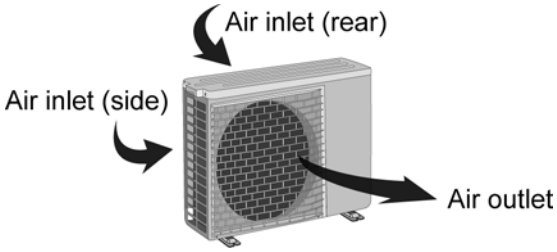
4.1.1. CS-E15EKEA



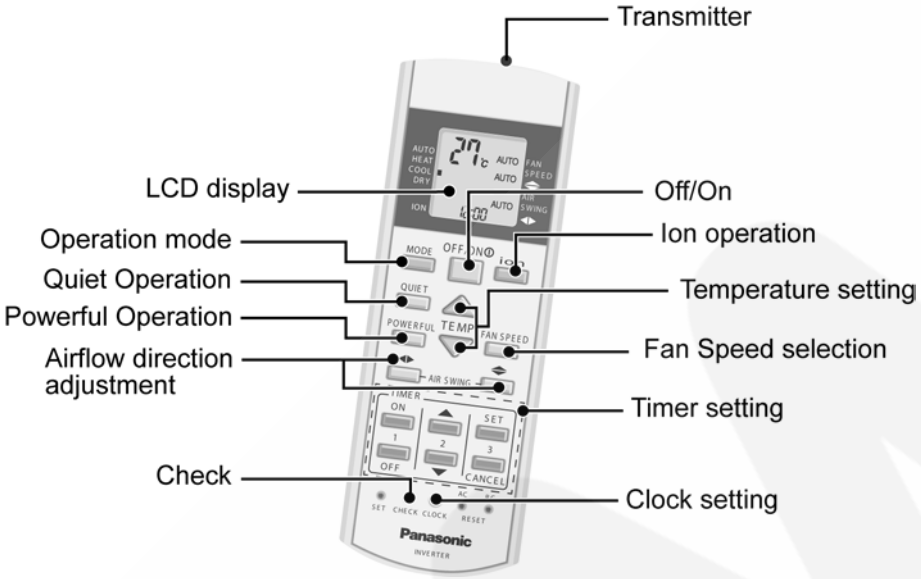
4.1.2. CS-E18EKEA CS-E21EKEA



4.2. Outdoor Unit



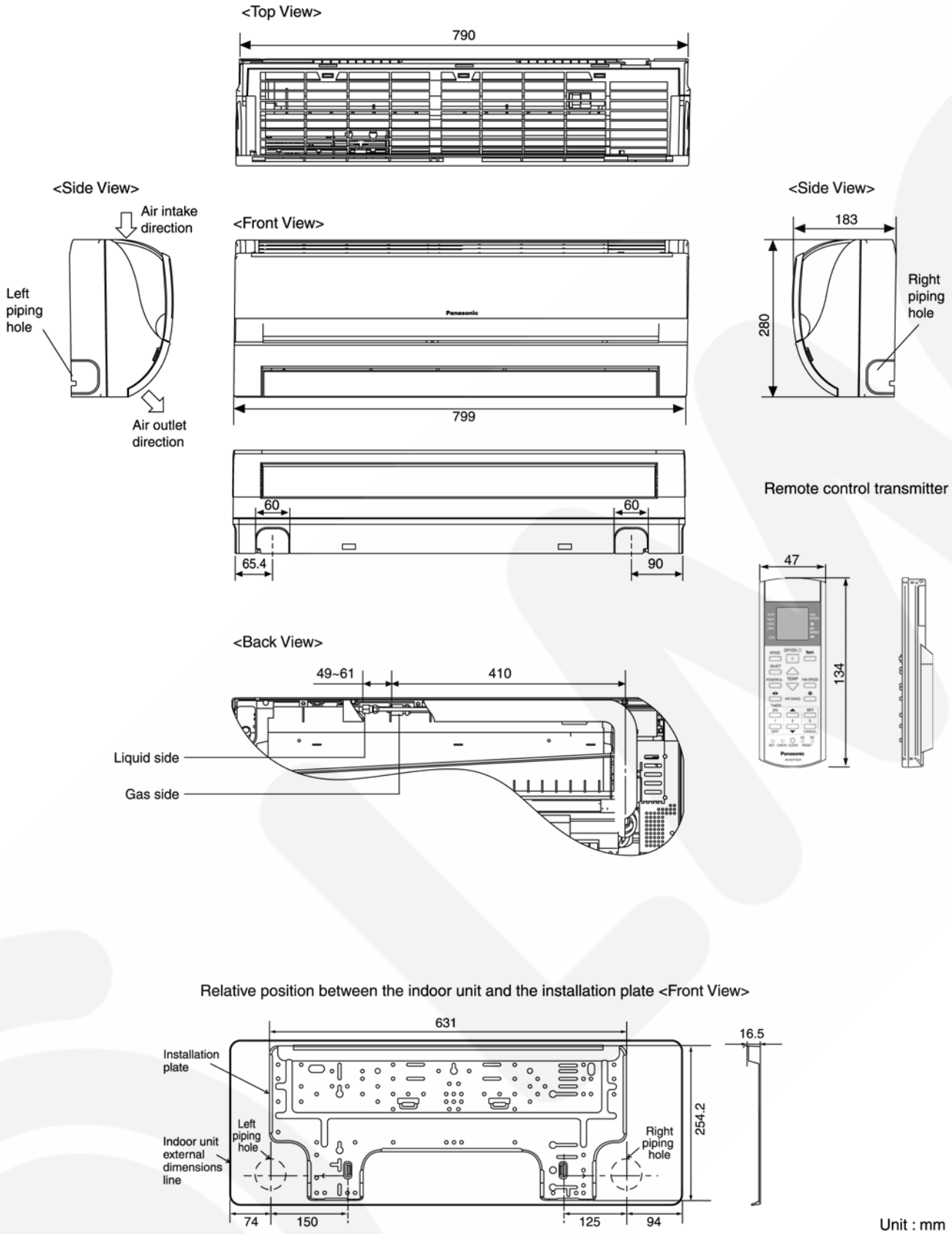
4.3. Remote Control



5 Dimensions

5.1. Indoor Unit & Remote Control

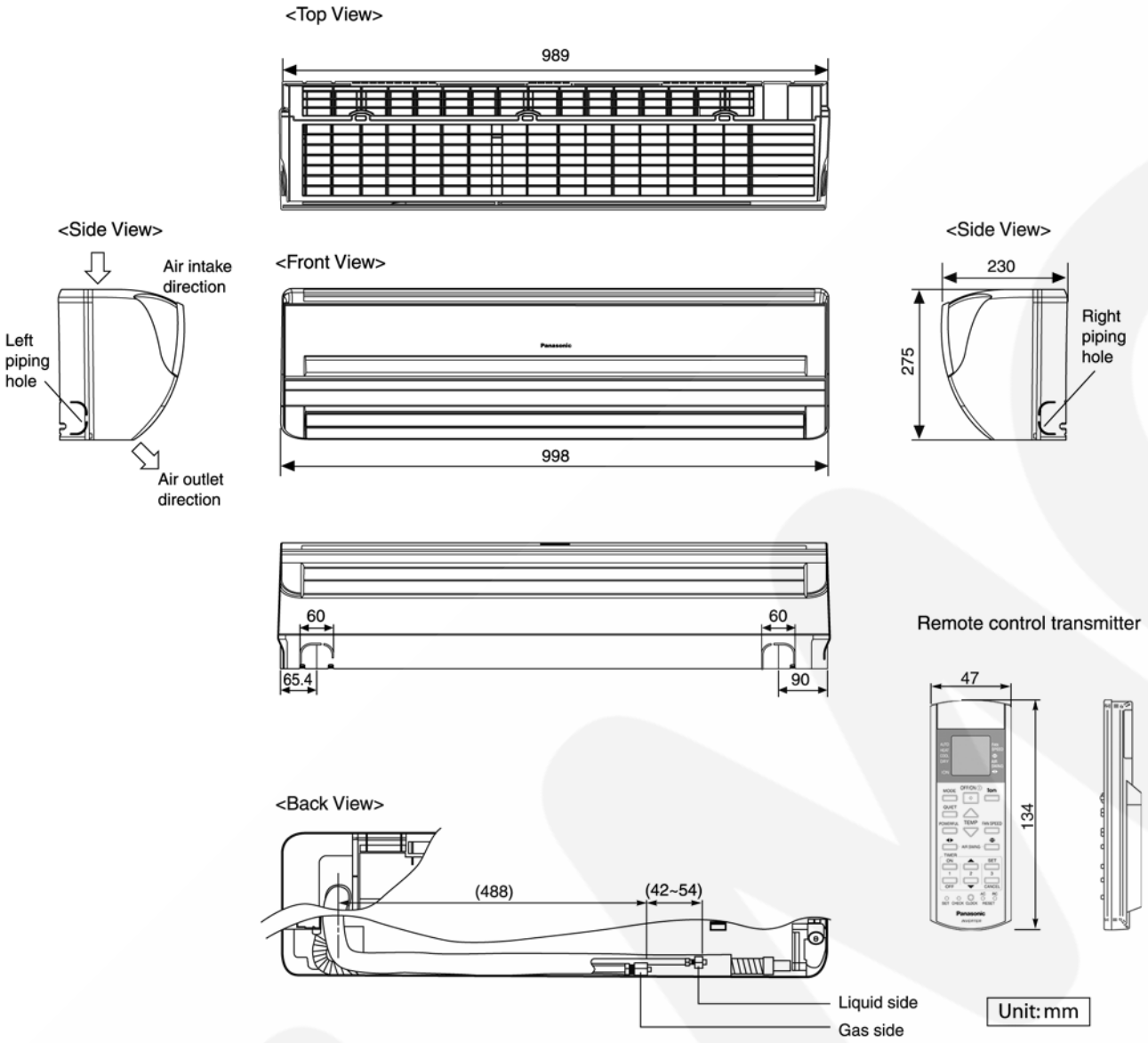
5.1.1. CS-E15EKEA



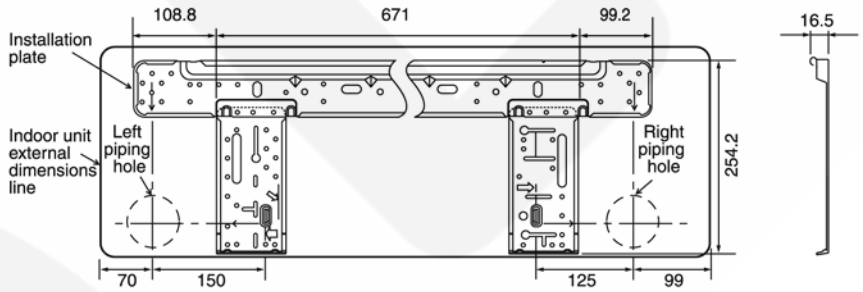
Relative position between the indoor unit and the installation plate <Front View>

Unit : mm

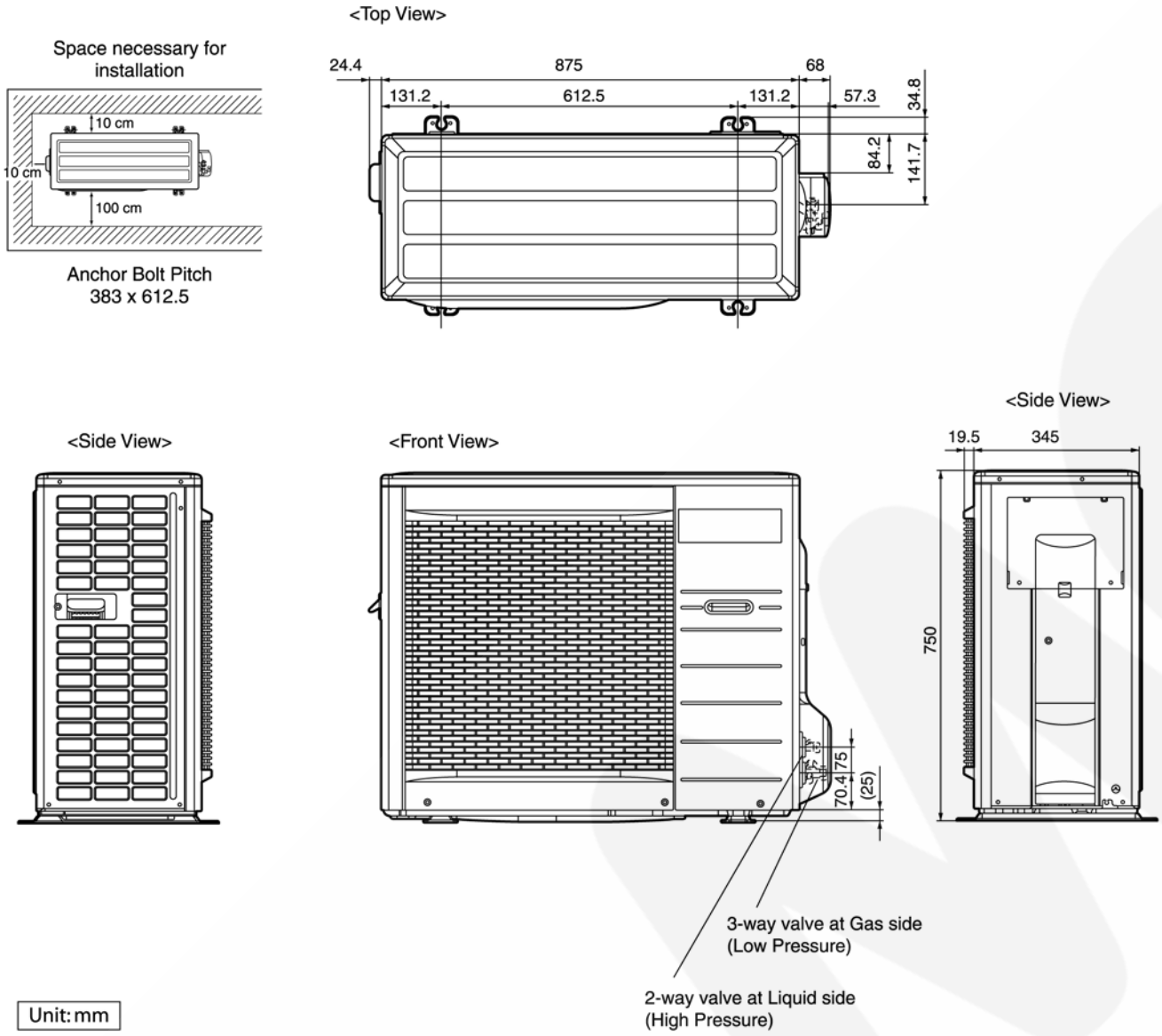
5.1.2. CS-E18EKEA CS-E21EKEA



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

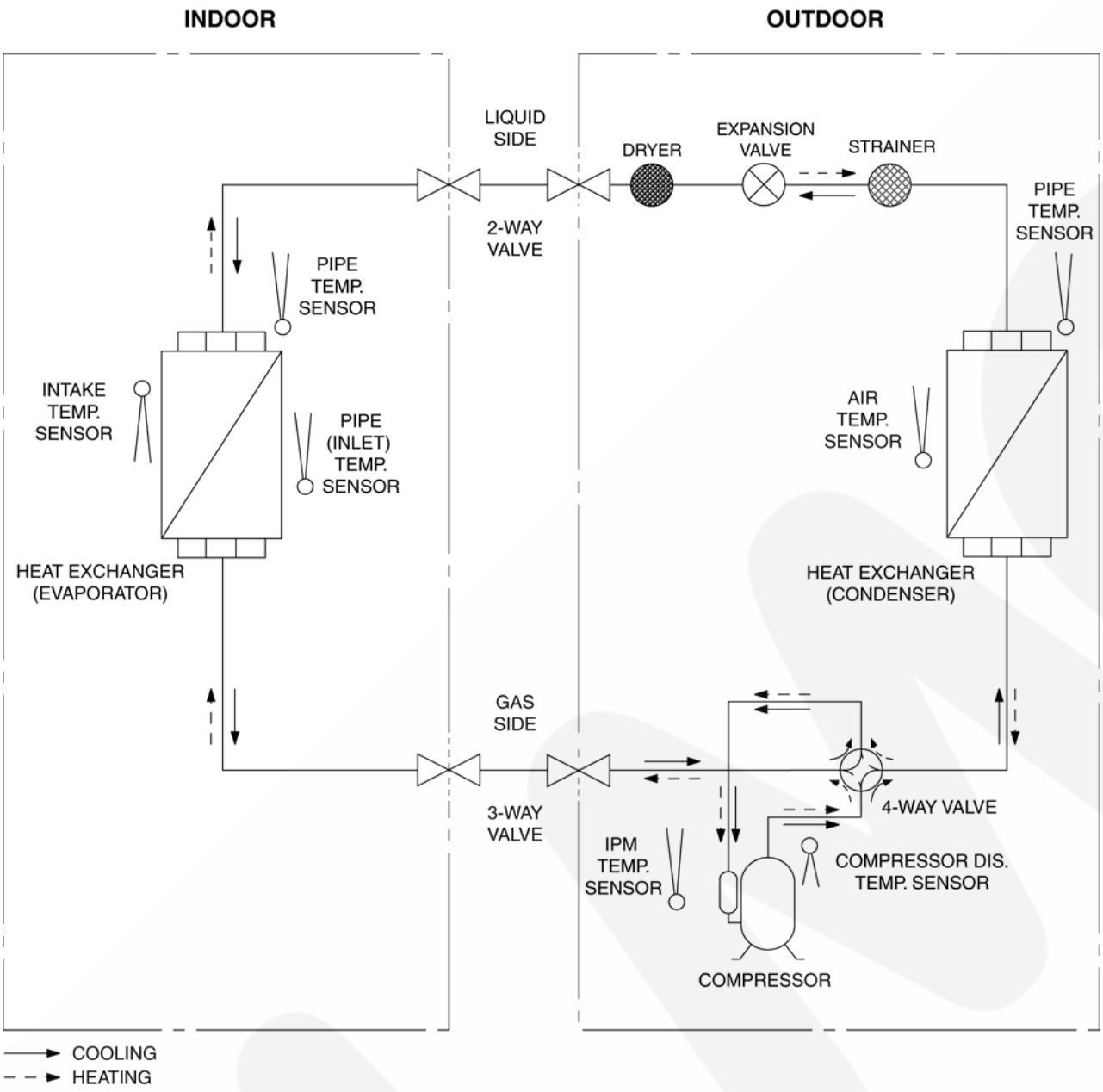


5.2. Outdoor Unit



Unit: mm

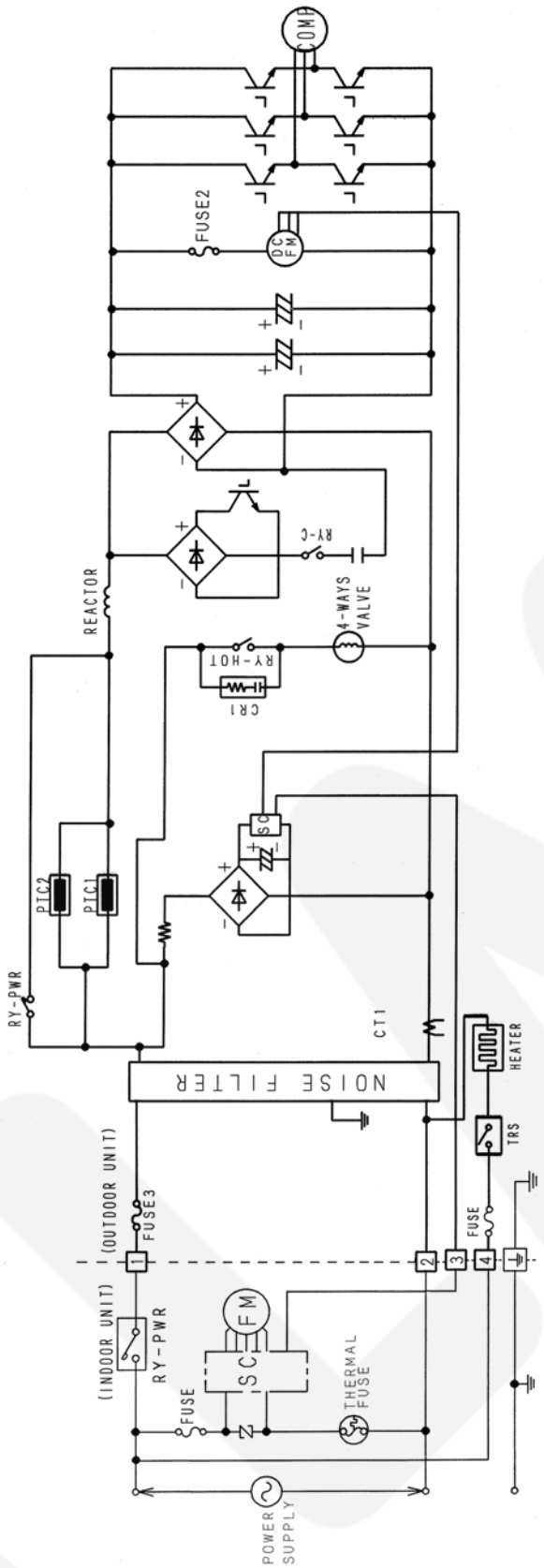
6 Refrigeration Cycle Diagram



Model	Piping size		Rated Length (m)	Common Length (m)	Max. Elevation (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid					
E15EKEA	1/2”	1/4”	7.5	7.5	5	15	20
E18EKEA, E21EKEA	1/2”	1/4”	5	10	15	20	20

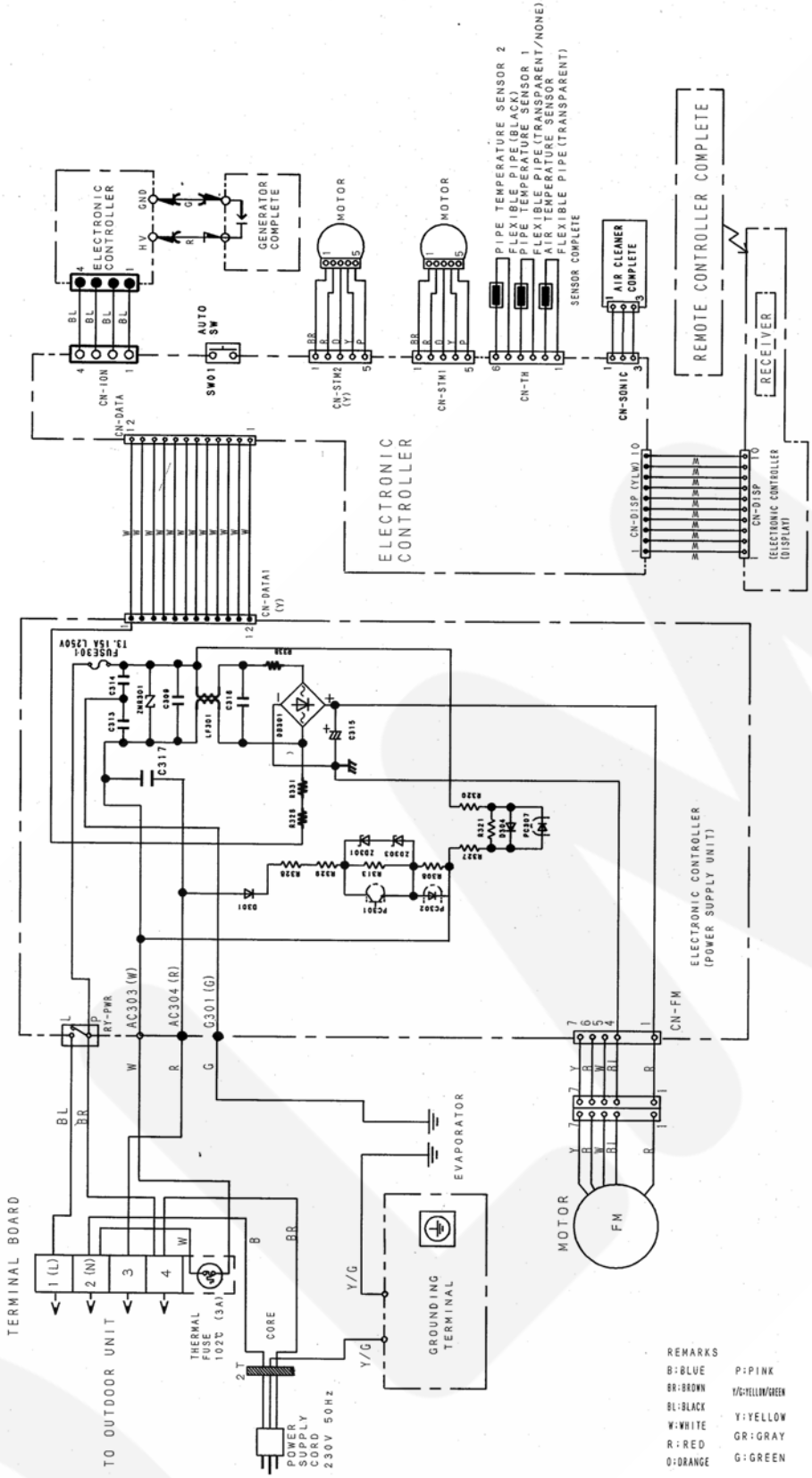
※If piping length is over common length, additional refrigerant should be added as shown in the table.

7 Block Diagram

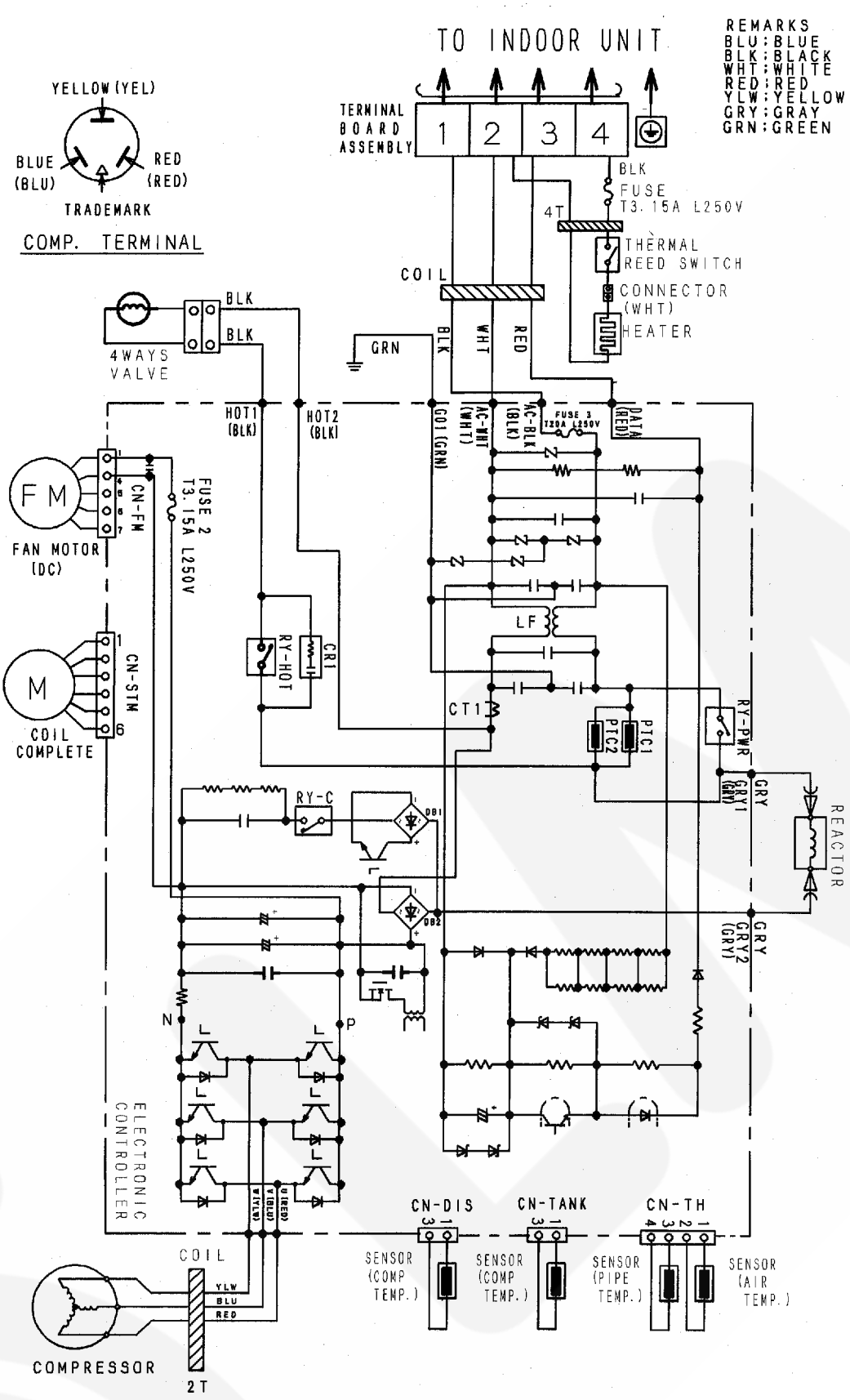


8 Wiring Connection Diagram

8.1. Indoor Unit



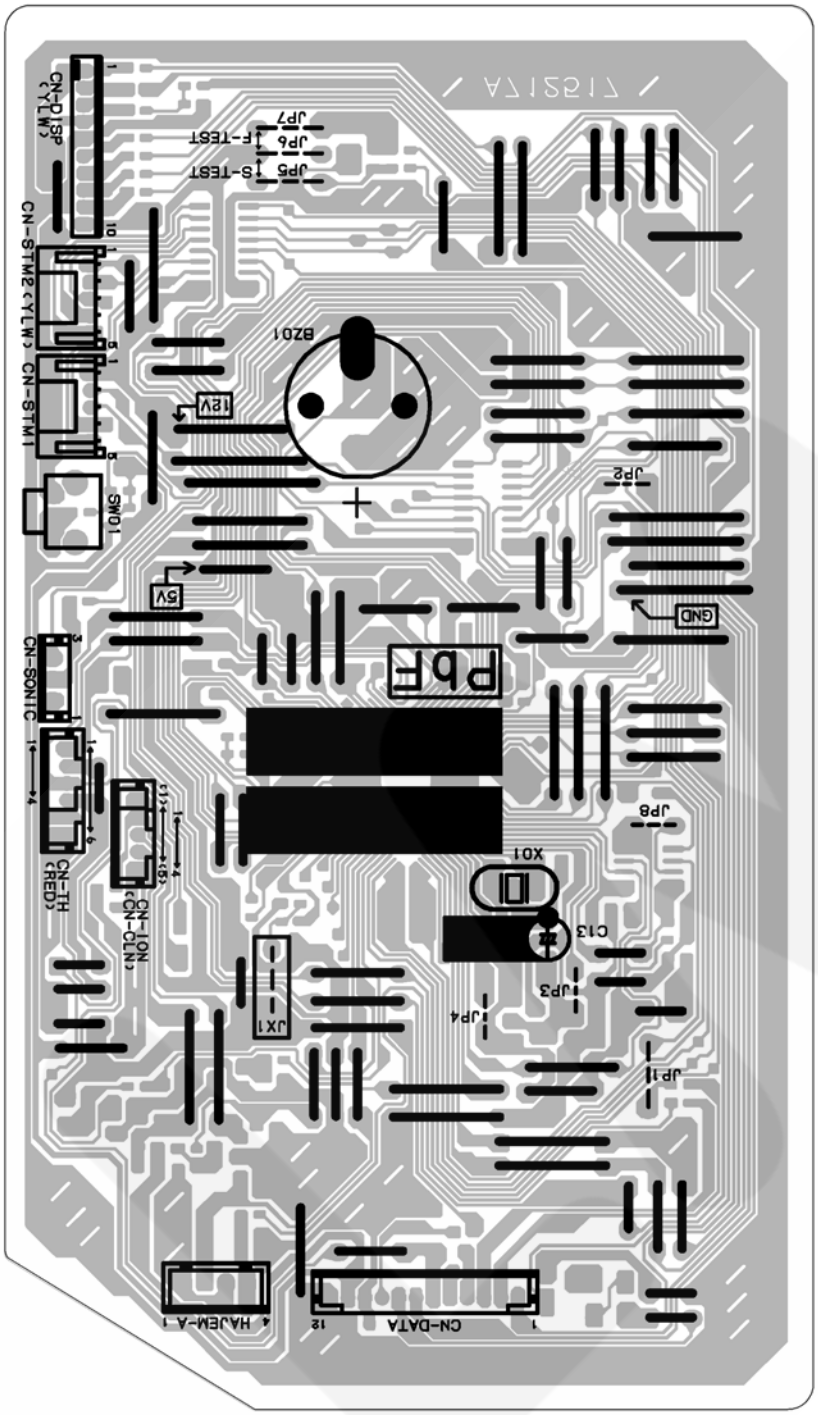
8.2. Outdoor Unit

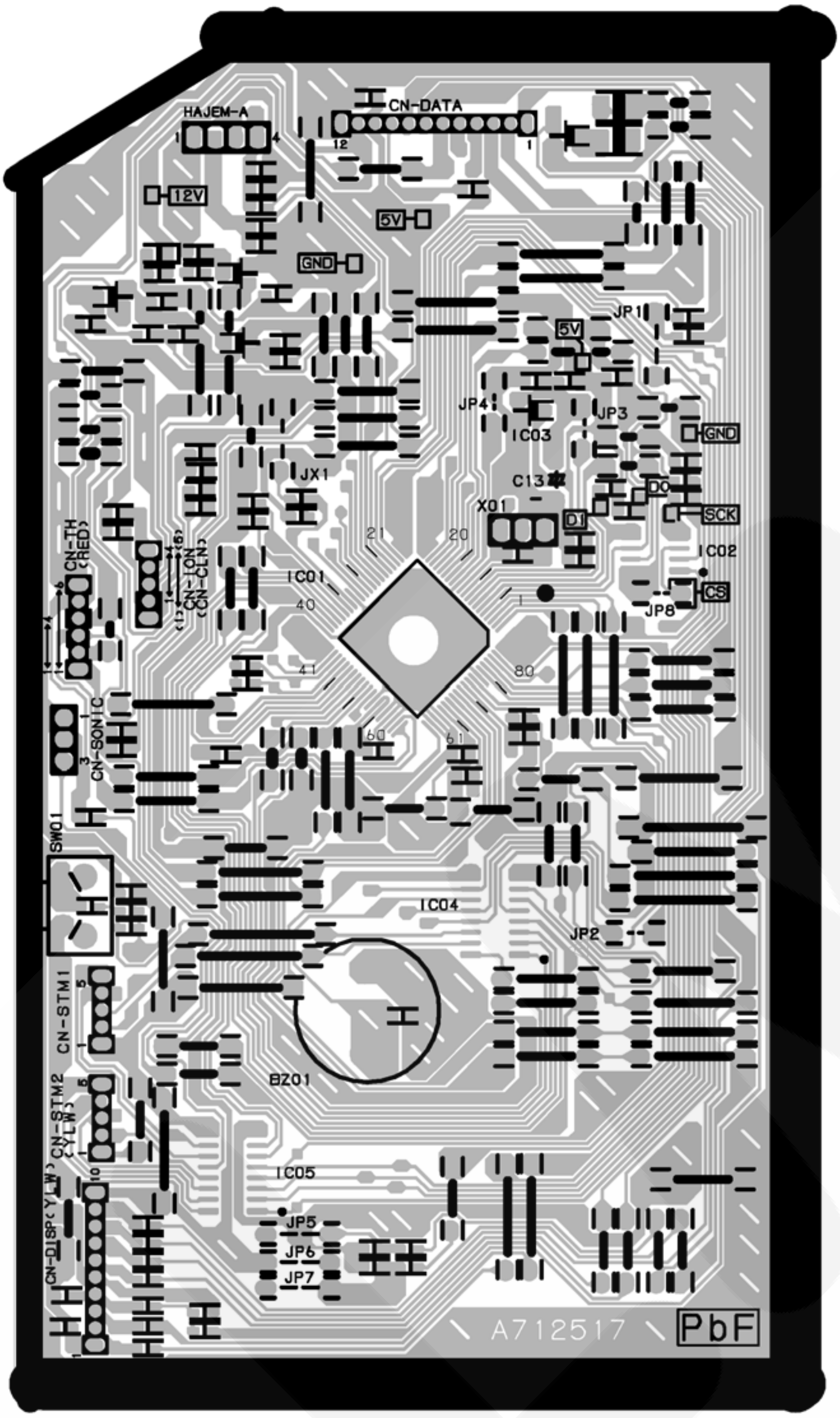


9 Printed Circuit Board

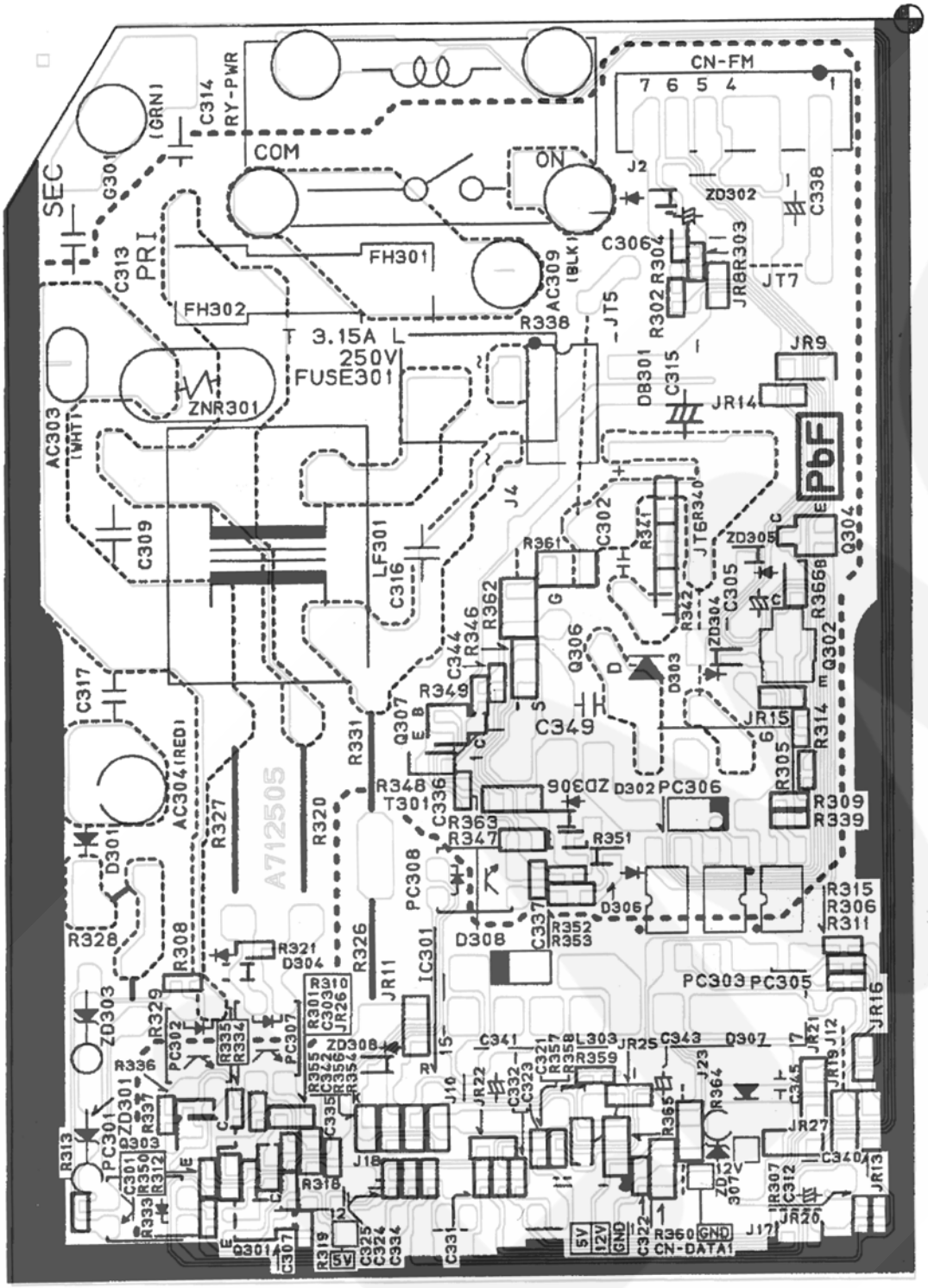
9.1. Indoor Unit

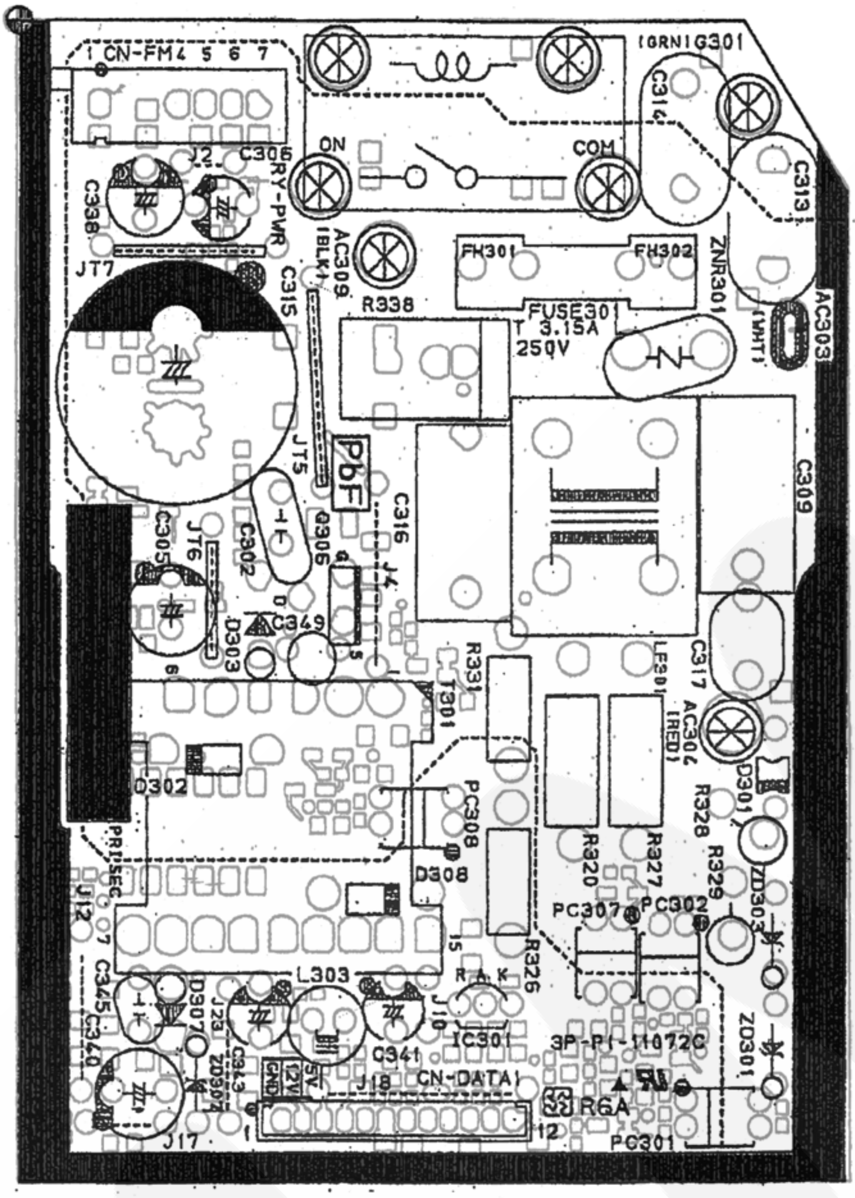
9.1.1. Main Printed Circuit Board



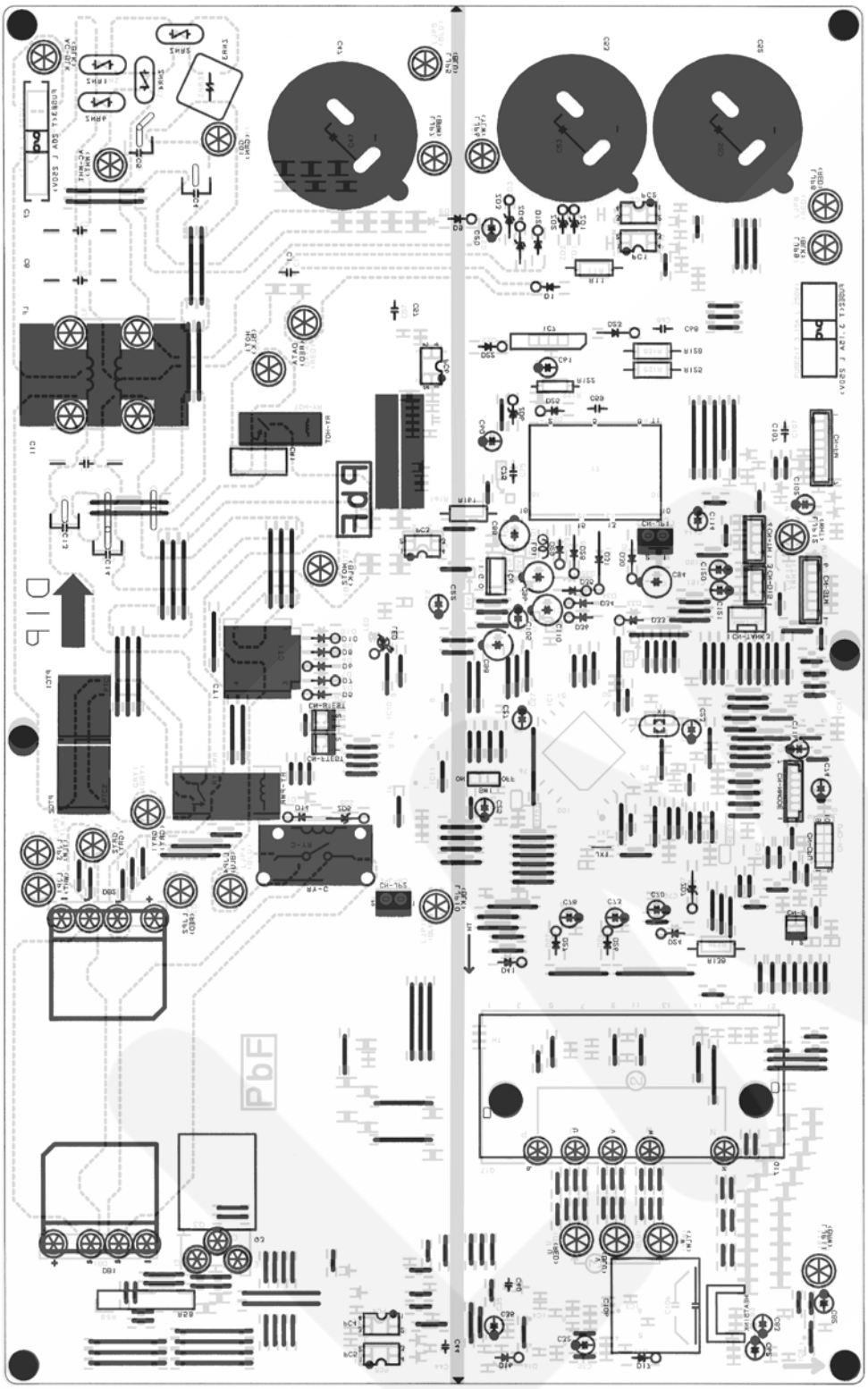

HAJEM-A
CN-DATA
12V
5V
GND
JP1
5V
JP4
JP3
IC03
GND
JX1
C13
X01
D1
SCK
IC02
CS
IC01
JP8
CN-TH (RED)
CN-ION (CN-CLN)
CN-SONIC
SW01
IC04
JP2
CN-STM1
BZ01
CN-STM2 (YLW)
CN-DISP (YLW)
IC05
JP5
JP6
JP7
A712517
PbF

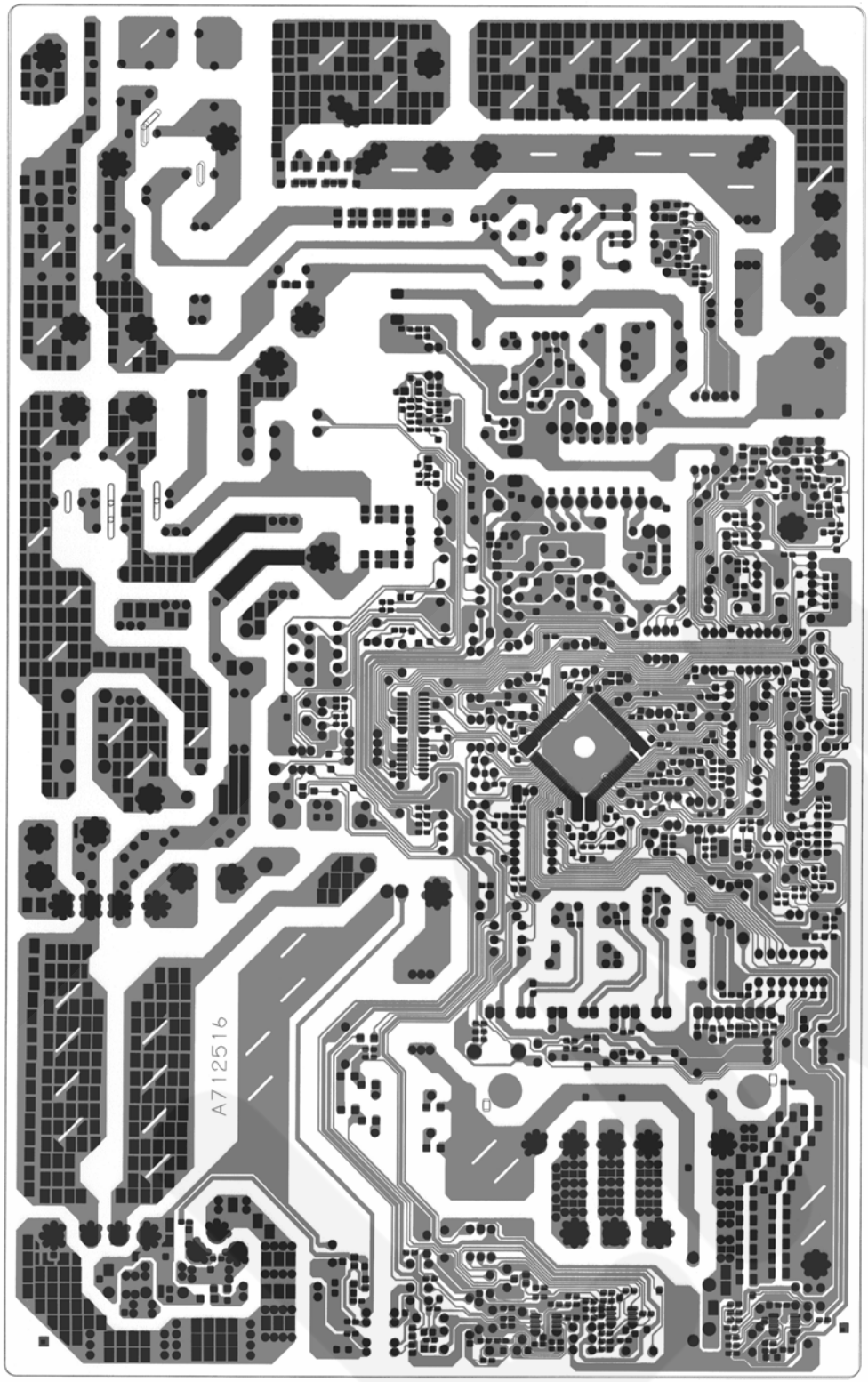
9.1.2. Power Printed Circuit Board




CN-FM
J2
C306
RY-PWR
C338
JT7
ON
COM
(GRN) G301
C314
C313
AC309
(BLK)
C315
R338
FH301
FH302
ZNR301
FUSE301
T 3.15A
250V
(WHT)
AC303
PbF
JT5
C309
C316
Q306
C305
JT6
C302
J4
C349
D303
R331
T301
LF301
C317
AC304
(RED)
D302
PC308
D301
R328
R320
R327
R329
D308
PC307
PC302
ZD303
PRI
SEC
J12
L303
R326
C345
C340
D307
J23
C343
ZD307
C341
J10
IC301
3P-PI-11072C
ZD301
GND
12V
5V
J18
CN-DATA
RGA
J17
PC301

9.2. Outdoor Unit




A712516

10 Installation Instruction

10.1. CS-E15EKEA

10.1.1. Select The Best Location

INDOOR UNIT

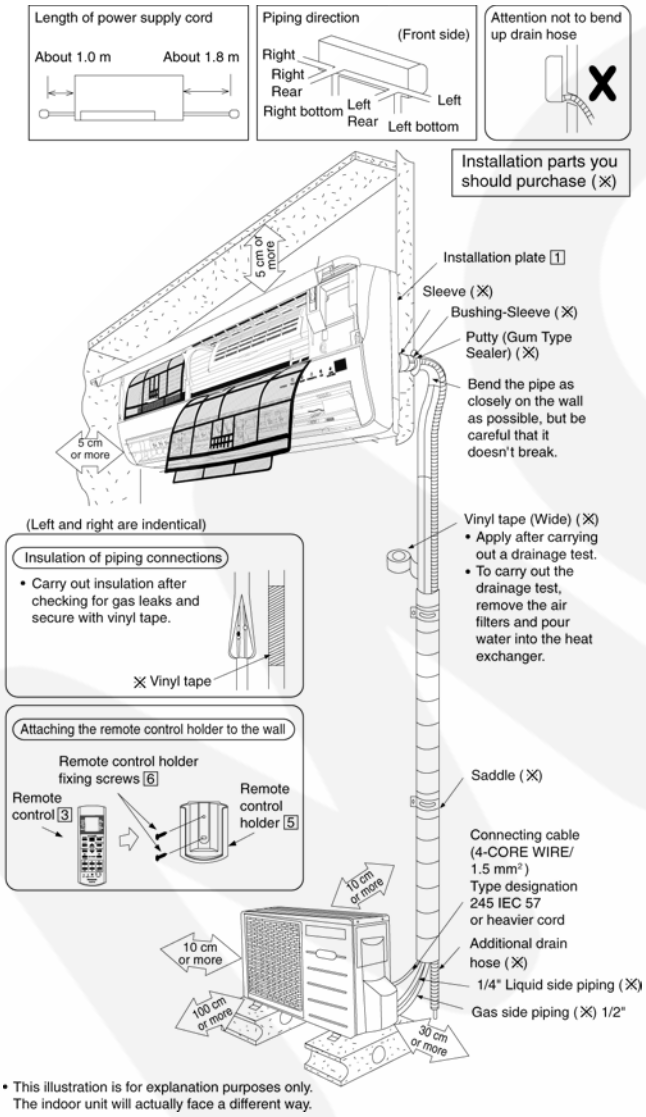
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install 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 7.5 m, additional refrigerant should be added as shown in the table.

Model	Piping size		Rated Length (m)	Max Elevation (m)	Max. piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid				
E15EK	1/2”	1/4”	7.5	5	15	20

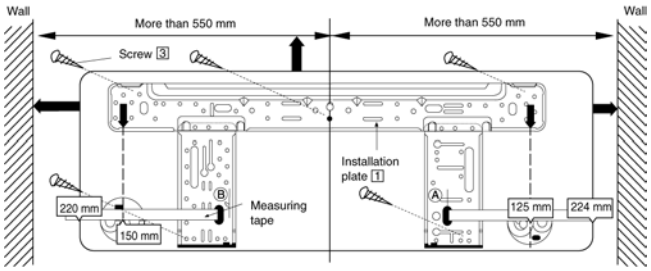
10.1.2. Indoor/Outdoor Unit Installation Diagram



10.1.3. Indoor Unit

10.1.3.1. 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 680 mm at right and 570 mm at left of the wall.
The distance from installation plate edge to ceiling should more than 73 mm.
From installation plate left edge to unit's left side is 20 mm.
From installation plate right edge to unit's right is 130 mm.

Ⓑ : For left side piping, piping connection for liquid should be about 155 mm from this line.
: For left side piping, piping connection for gas should be about 190 mm from this line.
: For left side piping, piping connection cable should be about 1100 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.

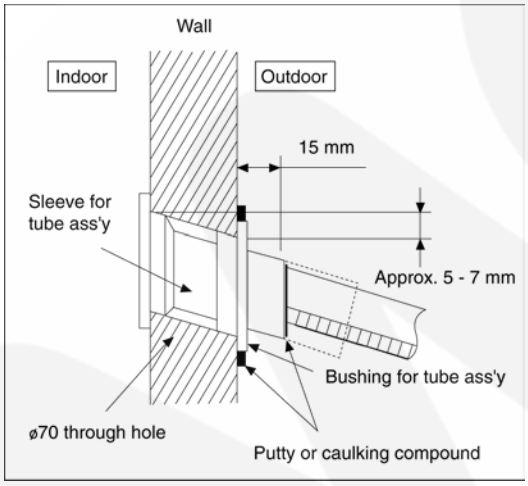
2. Drill the piping plate hole with ø70 mm hole-core drill.
   • Line according to the left and right side of the installation plate. The meeting point of the extended line is the centre of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole centre is obtained by measuring the distance namely 140 mm and 155 mm for left and right hole respectively.
   • Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

10.1.3.2. 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.



10.1.3.3. 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.)

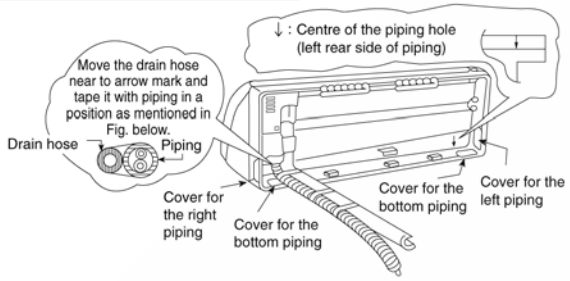
Insulate and finish the piping

↓

- 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

Pull out the piping and drain hose

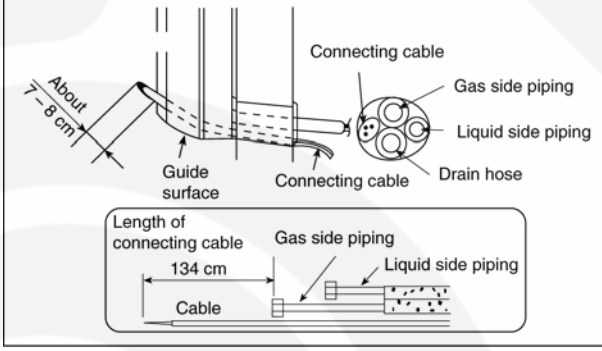


How to keep the cover

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

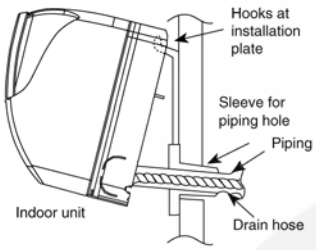
(Left, right and 2 bottom covers for piping.)

Insert the connecting cable



Install the indoor unit

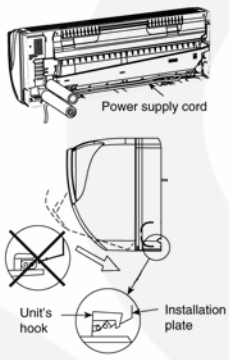
Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.



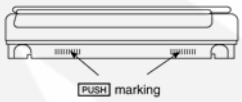
Secure the Indoor Unit

1. Power supply cord arrangement.
   Excess length of power supply cord should be arranged behind the chassis at piping keeping area as shown in the diagram without tying up in a bundle.
   Ensure that the power supply cord is not clamped in between unit's hook (2 position) and installation plate.
   Ensure that the power supply cord is not stretched between chassis back and installation plate. It may create squeak sound.
2. Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).

Warning: Do not tie up power supply cord into a bundle by band. It may generate heat and cause fire.



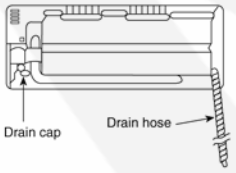
To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

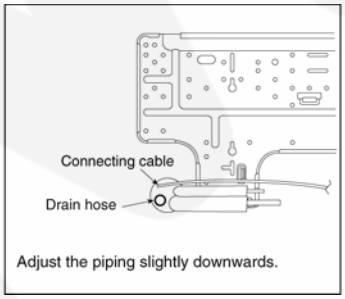


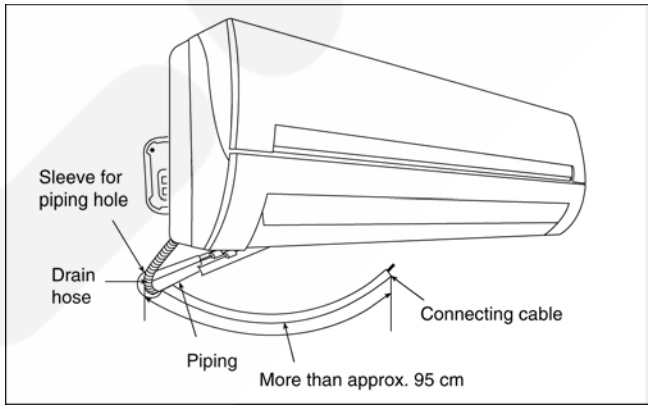
(This can be used for left rear piping & left bottom piping also.)

Exchange the drain hose and the cap

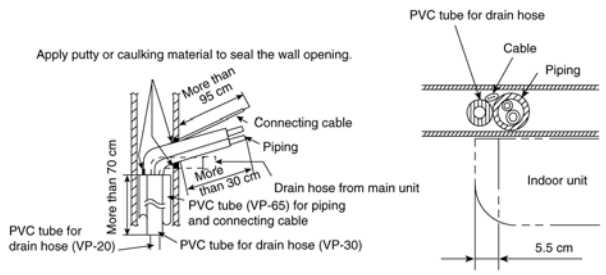
Rear view for left piping installation



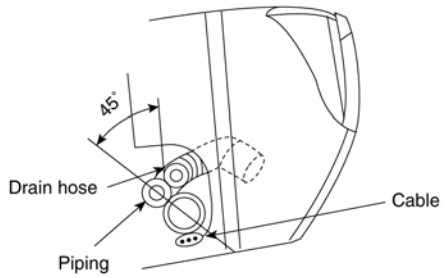




- How to pull the piping and drain hose out, in case of the embedded piping.



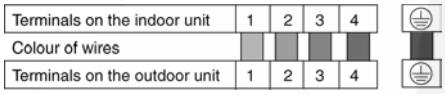
- In case of left piping how to insert the connecting cable and drain hose.



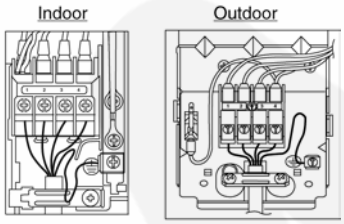
(For the right piping, follow the same procedure)

10.1.3.4. 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 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.



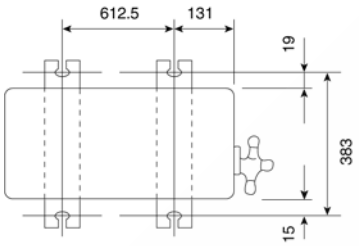
   - Secure the cable onto the control board with the holder (clamper).



10.1.4. Outdoor Unit

10.1.4.1. 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.



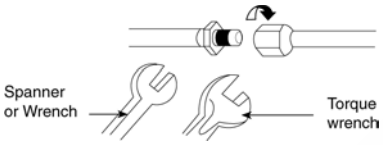
10.1.4.2. CONNECTING THE PIPING

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
E15EK	1/2" [55 N•m]	1/4" [18 N•m)

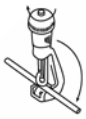
Connecting The Piping To Outdoor Unit

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.

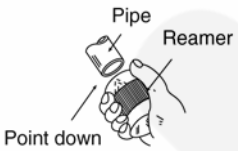
Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

CUTTING AND FLARING THE PIPING

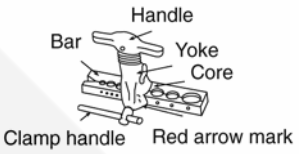
1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.
   Turn the piping end down to avoid the metal powder entering the pipe.
3. Please make flare after inserting the flare nut onto the copper pipes.



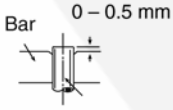
1. To cut



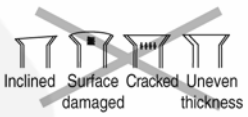
2. To remove burrs



3. To flare



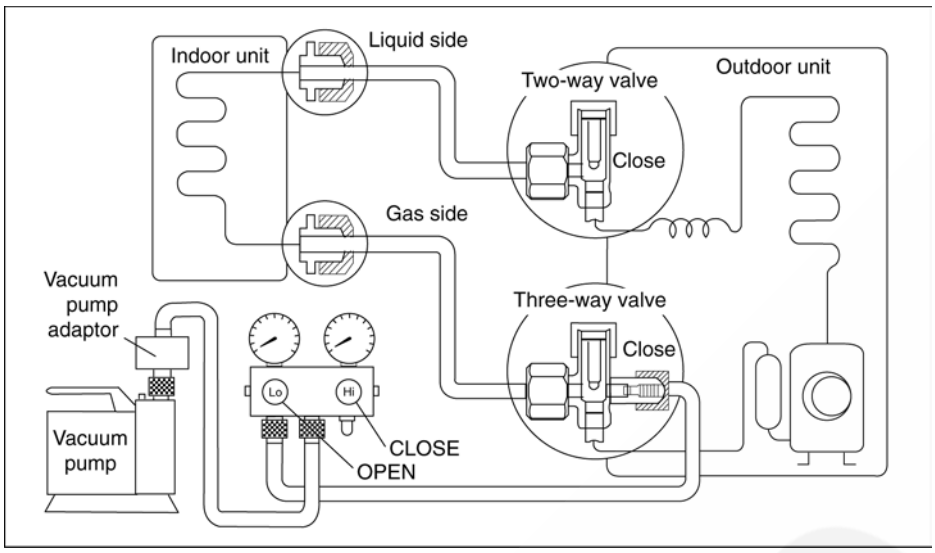
■ Improper flaring ■



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.

10.1.4.3. 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 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.

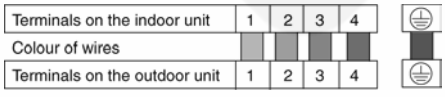
CAUTION

- 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.

10.1.4.4. CONNECT THE CABLE TO THE OUTDOOR UNIT

(FOR DETAIL REFER TO WIRING DIAGRAM AT 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 or heavier cord.



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

10.2. CS-E18EKEA CS-E21EKEA

10.2.1. Select The Best Location

INDOOR UNIT

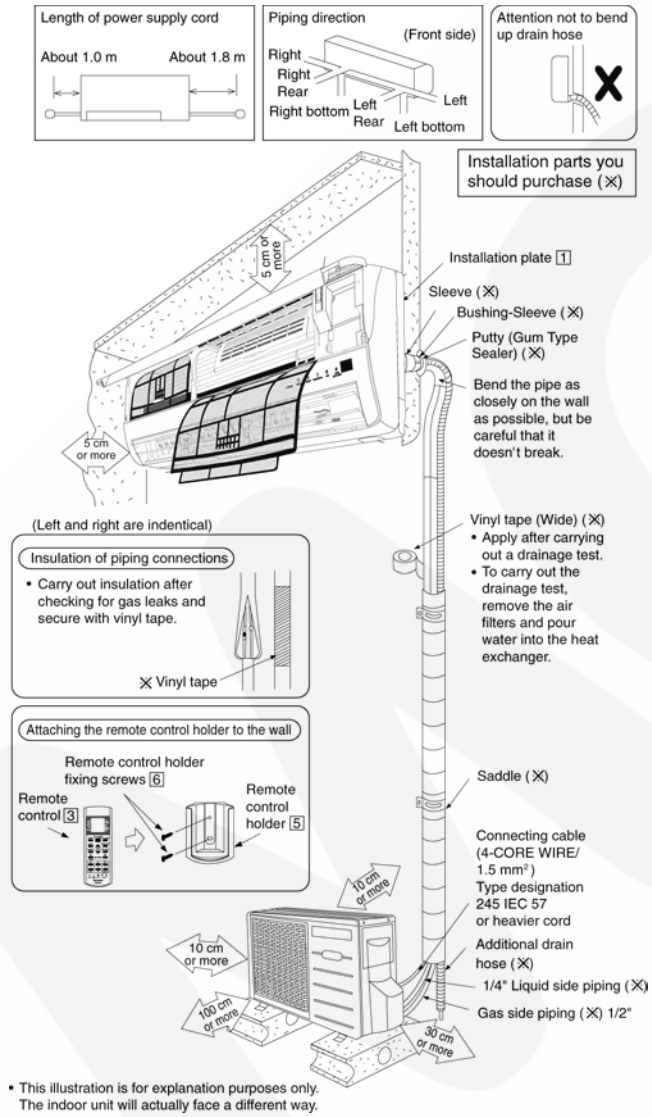
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install 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 10 m, additional refrigerant should be added as shown in the table.

Model	Piping size		Rated Length (m)	Max Elevation (m)	Max. piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid				
E18EK E21EK	1/2”	1/4”	5	15	20	20

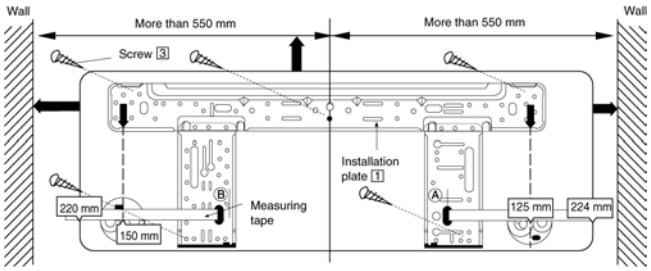
10.2.2. Indoor/Outdoor Unit Installation Diagram



10.2.3. Indoor Unit

10.2.3.1. 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 550 mm at right and left of the wall.
The distance from installation plate edge to ceiling should more than 67 mm.
From installation plate left edge to unit's left side is 47 mm.
From installation plate right edge to unit's right is 73 mm.

Ⓑ : For left side piping, piping connection for liquid should be about 126 mm from this line.
: For left side piping, piping connection for gas should be about 174 mm from this line.
: For left side piping, piping connection cable should be about 984 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.

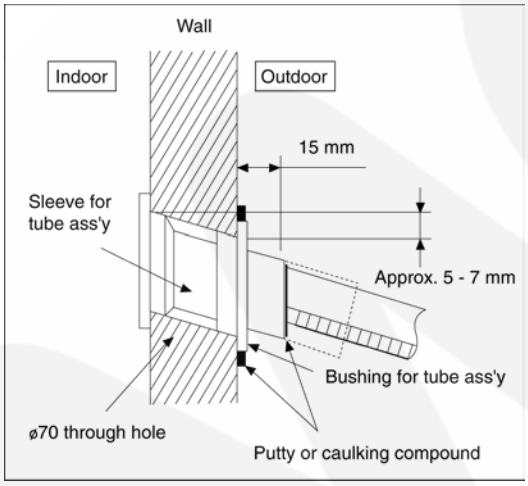
2. Drill the piping plate hole with ø70 mm hole-core drill.
   • Line according to the left and right side of the installation plate. The meeting point of the extended line is the centre of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole centre is obtained by measuring the distance namely 150 mm and 125 mm for left and right hole respectively.
   • Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

10.2.3.2. 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.



10.2.3.3. 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.)

↓

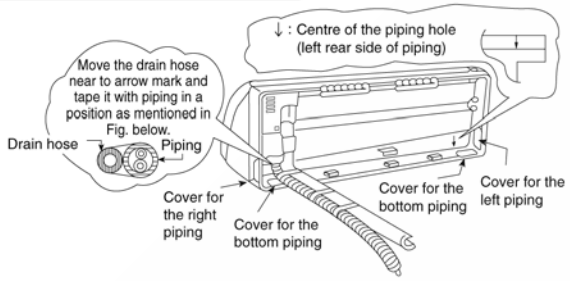
Insulate and finish the piping

- 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

Pull out the piping and drain hose

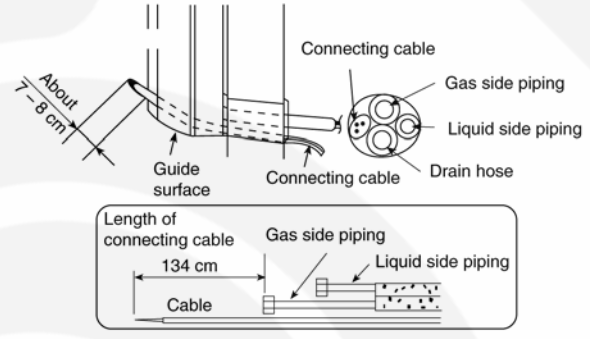


How to keep the cover

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

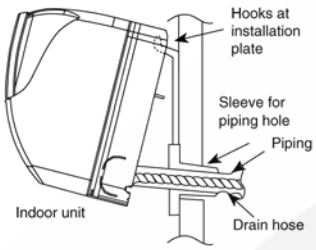
(Left, right and 2 bottom covers for piping.)

Insert the connecting cable



Install the indoor unit

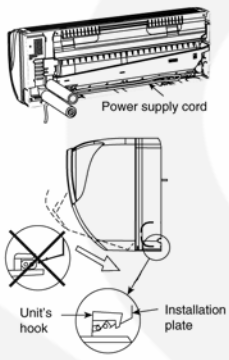
Hook the indoor unit onto the upper portion of installation plate. (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving it in left and right.



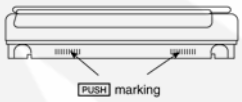
Secure the Indoor Unit

1. Power supply cord arrangement.
   Excess length of power supply cord should be arranged behind the chassis at piping keeping area as shown in the diagram without tying up in a bundle.
   Ensure that the power supply cord is not clamped in between unit's hook (2 position) and installation plate.
   Ensure that the power supply cord is not stretched between chassis back and installation plate. It may create squeak sound.
2. Press the lower left and right side of the unit against the installation plate until hooks engages with their slot (sound click).

Warning: Do not tie up power supply cord into a bundle by band. It may generate heat and cause fire.



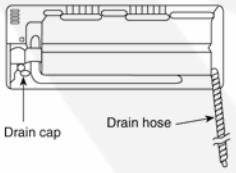
To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

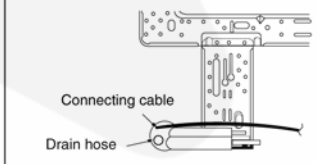


(This can be used for left rear piping & left bottom piping also.)

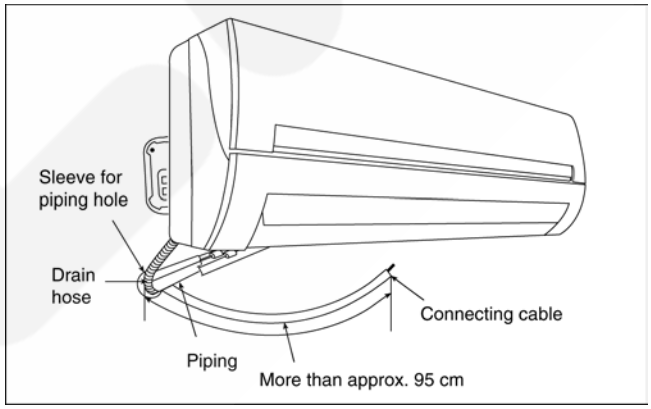
Exchange the drain hose and the cap

Rear view for left piping installation

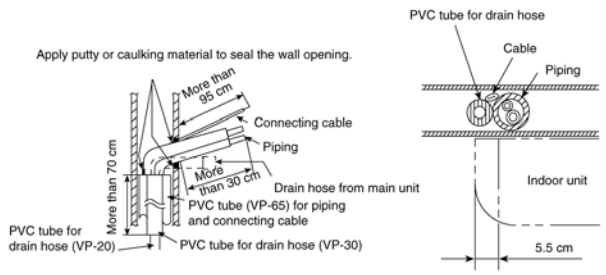




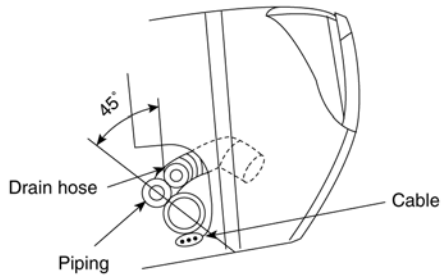
Adjust the piping slightly downwards.



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



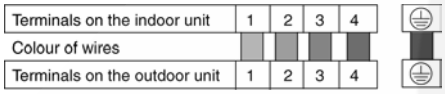
- In case of left piping how to insert the connecting cable and drain hose.



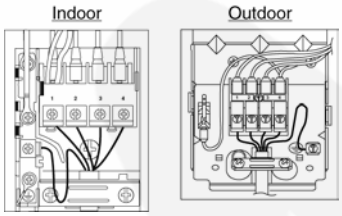
(For the right piping, follow the same procedure)

10.2.3.4. 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 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.



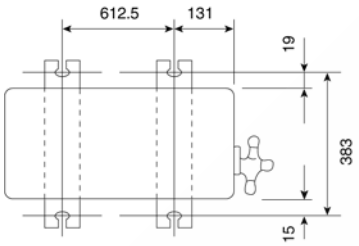
   - Secure the cable onto the control board with the holder (clamper).



10.2.4. Outdoor Unit

10.2.4.1. 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.



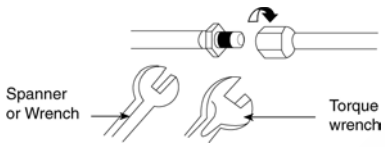
10.2.4.2. CONNECTING THE PIPING

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
E18EK, E21EK	1/2" [55 N•m]	1/4" [18 N•m)

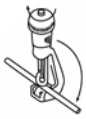
Connecting The Piping To Outdoor Unit

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.

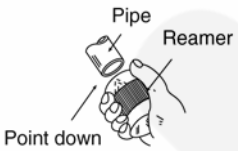
Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

CUTTING AND FLARING THE PIPING

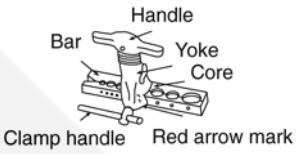
1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.
   Turn the piping end down to avoid the metal powder entering the pipe.
3. Please make flare after inserting the flare nut onto the copper pipes.



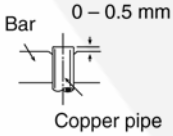
1. To cut



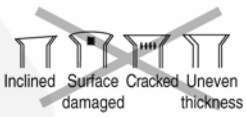
2. To remove burrs



3. To flare



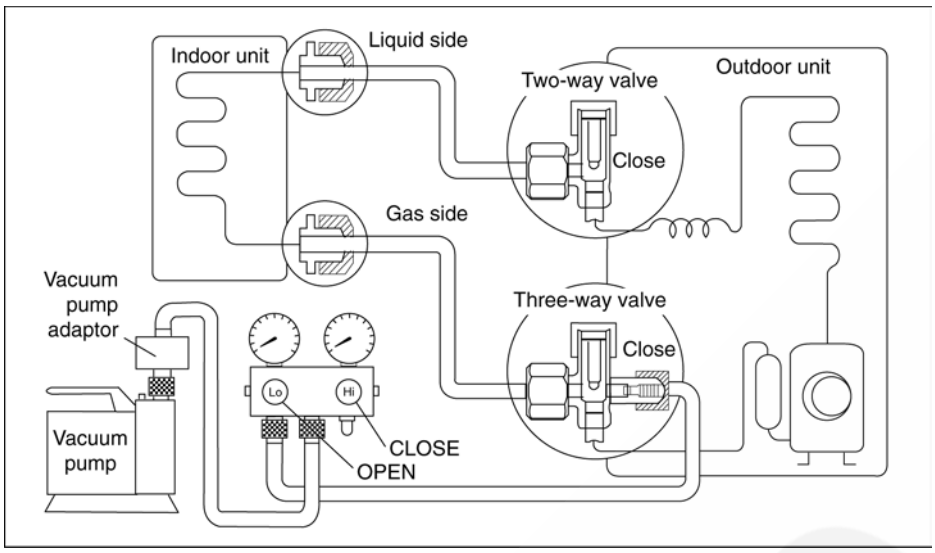
■ Improper flaring ■



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.

10.2.4.3. 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 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.

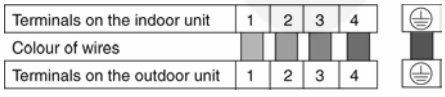
CAUTION

- 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.

10.2.4.4. CONNECT THE CABLE TO THE OUTDOOR UNIT

(FOR DETAIL REFER TO WIRING DIAGRAM AT 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 or heavier cord.



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

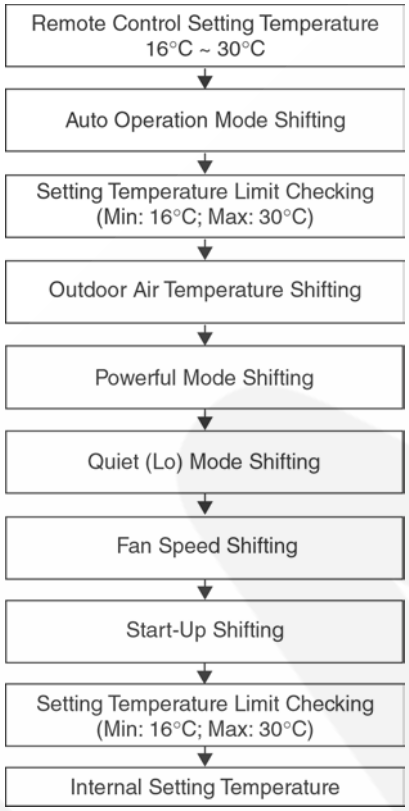
11 Operation And Function

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.



11.2. 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).

Vertical Airflow

Operation Mode	Airflow Direction		Vane Angle (°)				
			1	2	3	4	5
Heating	Auto with Heat Exchanger	A	16				
		B	50				
	Temperature	C	8				
		D	8				
	Manual		8	17	33	49	60
Cooling, Soft Dry and Ion	Auto		8 ~ 38				
	Manual		8	17	25	33	38
Mode Judgment in Auto	Auto		8				
	Manual		8	17	25	33	38

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 depends 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.

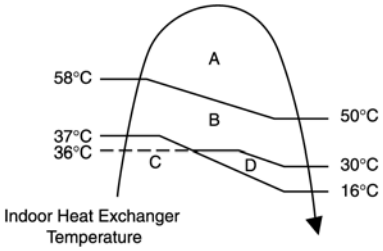


Figure 1

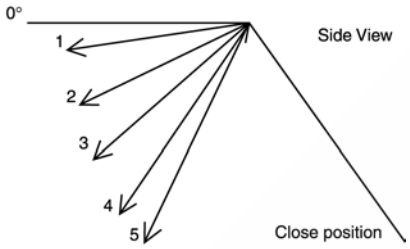


Figure 2

Horizontal Airflow

1. Automatic horizontal airflow direction can be set using remote control; the vane swings left and right within the angles as stated below. For heating mode operation, the angle of the vane depends on the indoor heat exchanger temperature as Figure 1 below.

Operation Mode		Vane Angle (°)
Heating, with heat exchanger temperature	A	68 ~ 112
	B	90
Cooling, Soft Dry and Ion		68 ~ 112

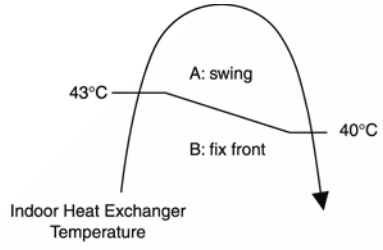


Figure 1

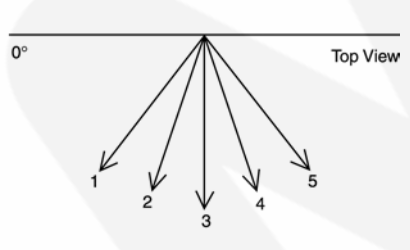


Figure 2

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	79	101	112

11.3. Quiet operation (Cooling Mode/Cooling area of Soft 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

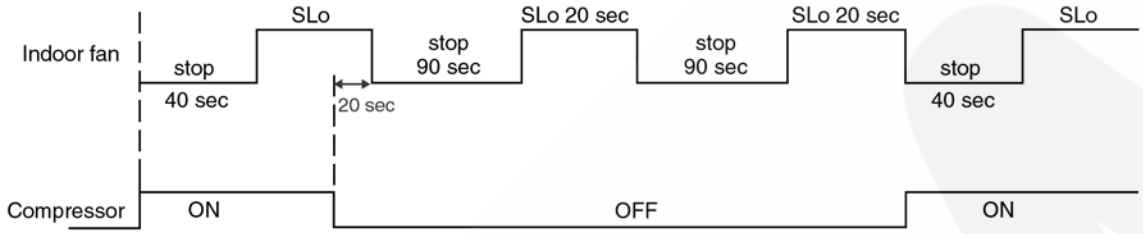
1. When one of the following conditions is satisfied, quiet operation stops:
   a. Powerful button is pressed.
   b. Stop by OFF/ON switch.
   c. Timer “off” activates.
   d. Quiet button is pressed again.
2. When quiet operation is stopped, operation is shifted to normal operation with previous setting.
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.
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

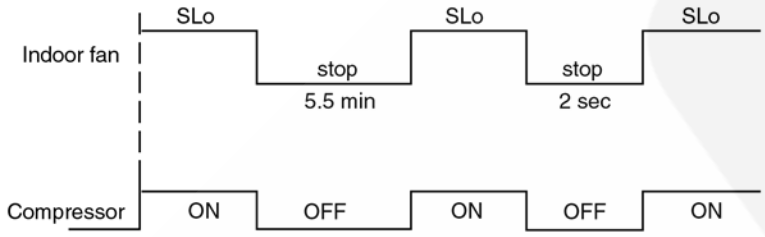
1. Fan speed is changed from normal setting to quiet setting of respective fan speed.
   This is to reduce sound of Hi, Me, Lo for 3dB.
2. Fan speed for quiet operation is -100 rpm from setting fan speed.

11.3.1. Quiet operation under Soft Dry operation (Dry area at Soft Dry Mode)

Automatic Fan Speed (Soft dry operation)



Manual Fan Speed (Soft dry operation)



11.3.2. 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, except fan only mode.
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 manual

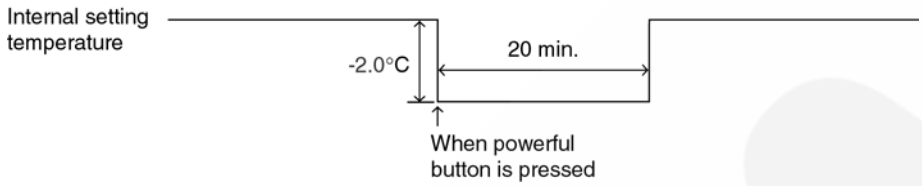
1. Fan speed is changed from normal setting to quiet setting of respective fan speed.
   This is to reduce sound of Hi, Me, Lo for 3dB.
2. Fan speed for quiet operation is -100 rpm from setting fan speed.
3. Fan Speed Auto
   - If FM ≤ Lo
     -100 rpm reduce from normal Heating Auto Fan Speed
   - If FM ≥ Lo
     maintain RPM

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

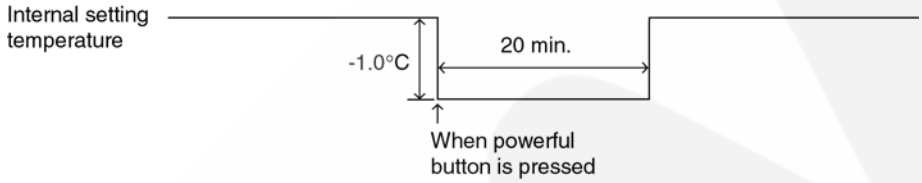
11.4. Powerful Mode Operation

When the powerful mode is selected, the internal setting temperature will shift to achieve the setting temperature quickly.

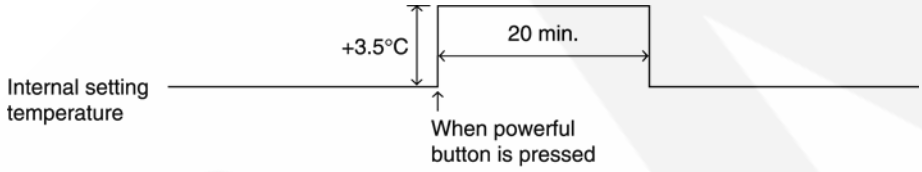
(a) Cooling Operation



(b) Soft Dry Operation



(c) Heating Operation

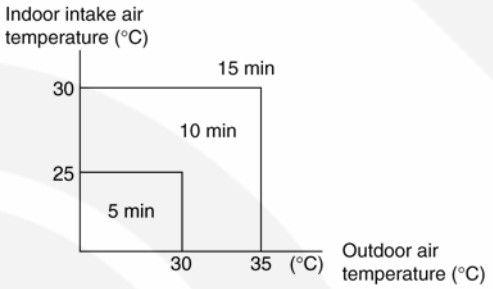


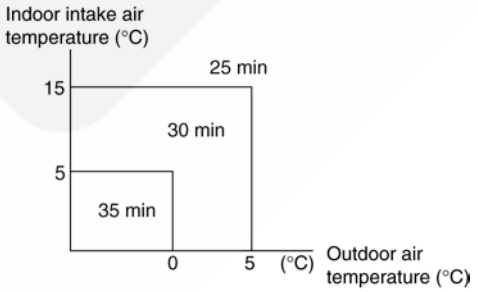
11.5. ON Timer Control

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.

Seventy 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.





11.6. OFF Timer Control

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

11.7. Auto Restart Control

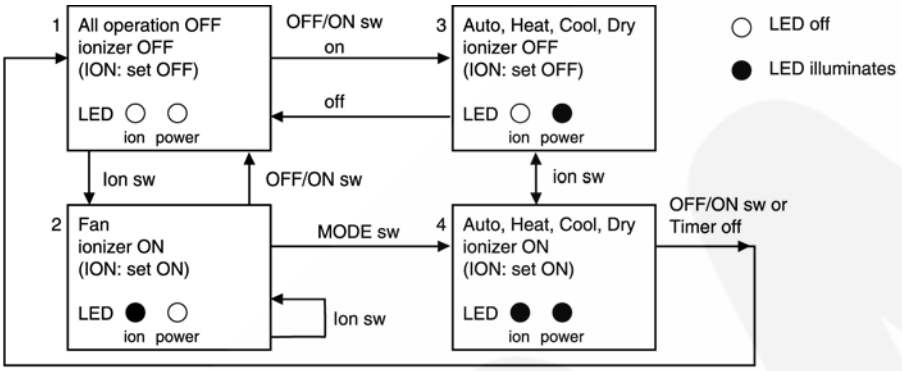
1. When the power supply is cut off during the operation of air conditioner, the compressor will re-operate within three to four minutes (there are 10 patterns between 2 minutes 58 seconds and 3 minutes 52 seconds to be selected randomly) after power supply resumes.
2. This type of control is not applicable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

11.8. Ionizer Operation

Purpose

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

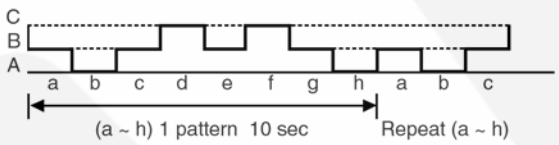
Control Condition



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. Ionising Operation Start Condition
   When air conditioner unit is in “ON” condition (Heat, Cool, Soft Dry, Auto mode) and ION operation button at remote control is pressed. Ionizer on & ION LED illuminates. (3 → 4)
   Power LED also illuminates.

2. Ionising 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 micon. After OFF, when operation is “ON” again, air conditioner operates without ionizer operation.

12 Protection Control

12.1. Protection Control For All Operations

12.1.1. Time Delay Safety Control

1. The compressor will not start for three minutes after stop of operation.
2. This control is not applicable if the power supply is cut off and on again or after 4-way valve deices condition.

12.1.2. 30 Seconds Forced Operation

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

12.1.3. Total Running Current Control

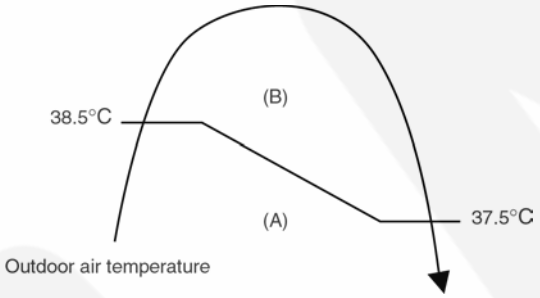
1. When the outdoor unit total running current (AC) exceeds X value, the frequency instructed for compressor operation will be decreased.

2. If the running current does not exceed X value for five seconds, the frequency instructed will be increased.

3. However, if total outdoor unit running current exceeds Y value, compressor will be stopped immediately for three minutes.

	E21EK		E18EK		E18EK	
Operation Mode	X (A)	Y (A)	X (A)	Y (A)	X (A)	Y (A)
Cooling/Soft Dry (A)	11.0	15.0	8.8	15.0	7.2	15.0
Cooling/Soft Dry (B)	9.6	15.0	7.7	15.0	6.3	15.0
Heating	11.5	17.0	10.8	17.0	8.6	17.0

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



12.1.4. 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

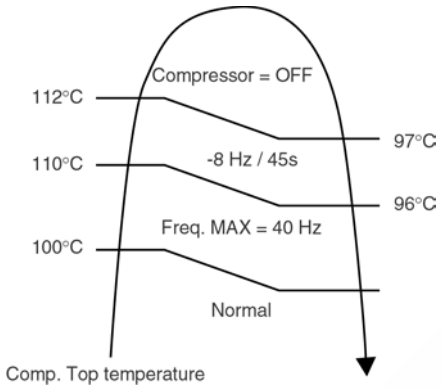
1. When electric current to IPM exceeds set value of 25.0 ± 4.0 A, the compressor will stop operate. Then, operation will restart after three minutes.

2. If the set value is exceeded again more than 30 seconds after the compressor starts, the operation will restart after two minute.

3. If the set value is 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.

12.1.5. Compressor Overheating Prevention Control

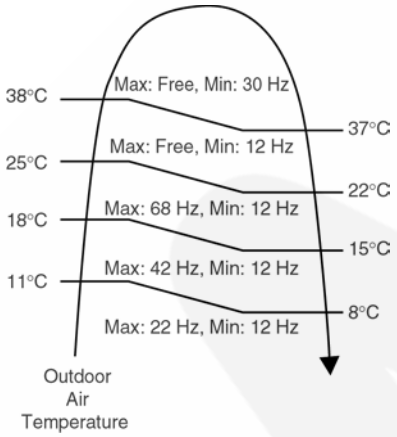
Instructed frequency for compressor operation will be regulated by compressor top temperature. The changes of frequency are as below figure.



12.2. Protection Control For Cooling & Soft Dry Operation

12.2.1. Outdoor Air Temperature Control

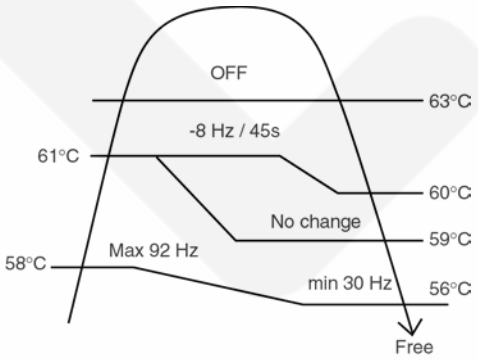
The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.



12.2.2. Cooling Overload Control

i. Pipe temperature limitation/restriction

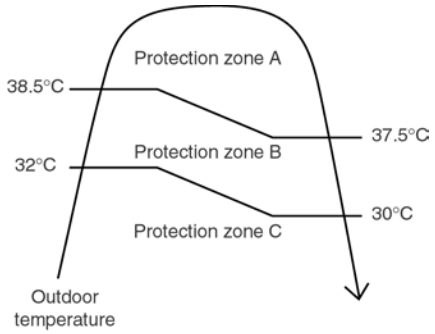
- Detects the Outdoor pipe temperature and carry out below restriction/limitation (Limit the compressor Operation frequency)
- The compressor stop if outdoor pipe temperature exceeds 63°C
- If the compressor stops 4 times in 20 minutes, Timer LED blinking (F95: outdoor high pressure rise protection)



ii. Electrical part temperature rise protection control

- To prevent electrical component temperature rise during cooling overload.
- Judgement condition is by outdoor temperature (sampled every 10s).

• Control contents:
  Outdoor fan speed (switch to zone A and B minimum fan speed).
  Outdoor total current (zone C) higher than the specified.
• Cancellation condition: When one of above is not satisfied.

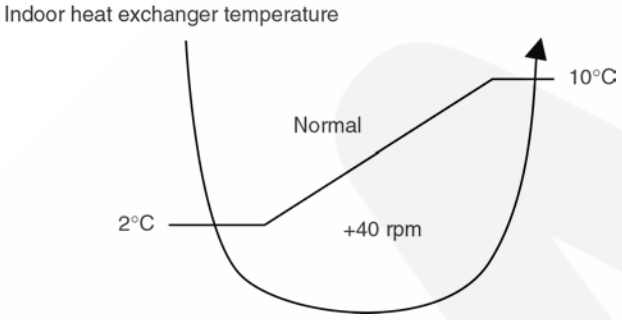


Outdoor total current

zone A	13.0 A
zone B	11.0 A
zone C	5.0 A

12.2.3. Freeze Prevention Control

1. When indoor heat exchanger temperature is lower than 2°C continuously for six minutes, compressor will stop operating.
2. Compressor will resume its operation three minutes after the indoor heat exchanger is higher than 10°C.
3. At the same time, indoor fan speed increase +40 rpm compared to its normal operation.
4. If indoor heat exchanger temperature is higher than 10°C for five minutes, the fan speed will return to its normal operation.



12.3. Protection Control For Heating Operation

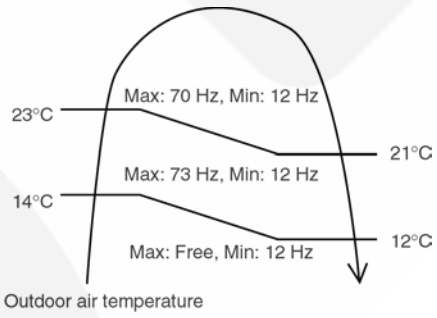
12.3.1. Intake Air Temperature Control

Compressor will operate at rated freq. or less respectively if either one of the below conditions occur:

1. When the indoor intake air temperature is above 10°C and remote control setting fan speed is lower Me-.
2. When the indoor intake air temperature is 30°C or above.

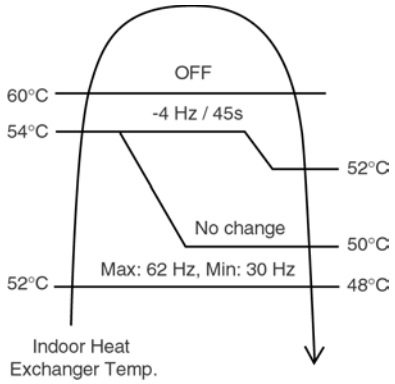
12.3.2. Outdoor Air Temperature Control

The compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the below figures. This control will begin one minute after the compressor starts.



12.3.3. Overload Protection Control

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

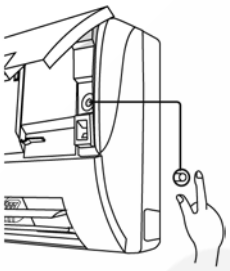


13 Servicing Mode

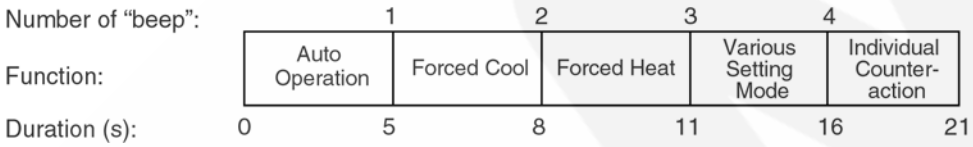
13.1. Auto Switch Operation

The below operations will be performed by pressing the “AUTO” switch.

1. AUTO OPERATION MODE
   The Auto operation will be activated immediately once the Auto Switch is pressed.
2. TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)
   The Test Run operation will be activated if the Auto Switch is pressed continuously for more than 5 sec. A “beep” sound will occur at the fifth sec., in order to identify the starting of Test Run operation.
3. REMOTE CONTROLLER RECEIVING SOUND ON/OFF
   The ON/OFF of remote controller receiving sound can be change over by pressing the following step:
   a. Release the Auto Switch after Test Run operation is activated.
   b. Then, within 20 sec., after a., press Auto Switch for more than 5 sec.
      A “beep” “beep” sound will occur at the fifth sec., then release the Auto Switch.
   c. Within 20 sec. after b., press Auto Switch again. Everytime Auto Switch is pressed (within 20 sec. interval), remote controller receiving sound status will be reversed between ON and OFF.
      Long “beep” sound indicates that remote controller receiving sound is OFF.
      Short “beep” sound indicates that remote controller receiving sound is ON.



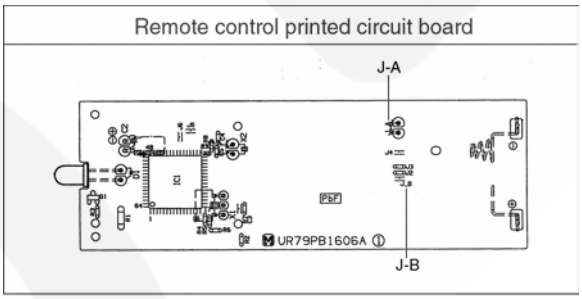
4.



   a. When the switch is pressed between 0 to 5 seconds, Auto Mode operation starts to function.
   b. When the switch is pressed between 5 to 8 seconds, the unit is forced to operate in Cooling Mode.
   c. When the switch is pressed between 8 to 11 seconds, the unit will enter forced Heating Mode standby. Press timer decrement button for 5S for the unit to operate in Heating Mode.
   d. When the switch is pressed between 11 to 16 seconds and together with the signal from remote control (timer decrement button for 5S), the unit can be changed to different controlling setting (4 type of transmission codes).
   e. When the switch is pressed between 16 to 21 seconds, either “H14” error detection selection mode or the remote control signal receiving sound can be cancelled or turned on.

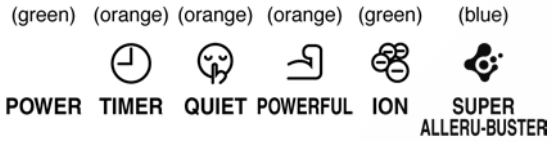
13.2. Selecting The Wireless Remote Control Transmission Code

When there are more than one indoor units installed in the same room, it is possible to set different remote control receiving signal by modifying the jumpers inside Remote Control.



	Remote control printed circuit board		Note
	J - A	J - B	
0	SHORT	OPEN	At product delivery
1	OPEN	OPEN	
2	SHORT	SHORT	
3	OPEN	SHORT	

13.3. Indication Panel



LED	POWER	TIMER	QUIET	POWERFUL	ION	ALLERGEN BUSTER
Color	Green	Orange	Orange	Orange	Green	Blue
Light ON	Operation ON	Timer Setting ON	Quiet Mode ON	Powerful Mode ON	Ion Mode ON	Operation ON
Light OFF	Operation OFF	Timer Setting OFF	Quiet Mode OFF	Powerful Mode OFF	Ion Mode OFF	Operation OFF

Note:

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

14 Troubleshooting Guide

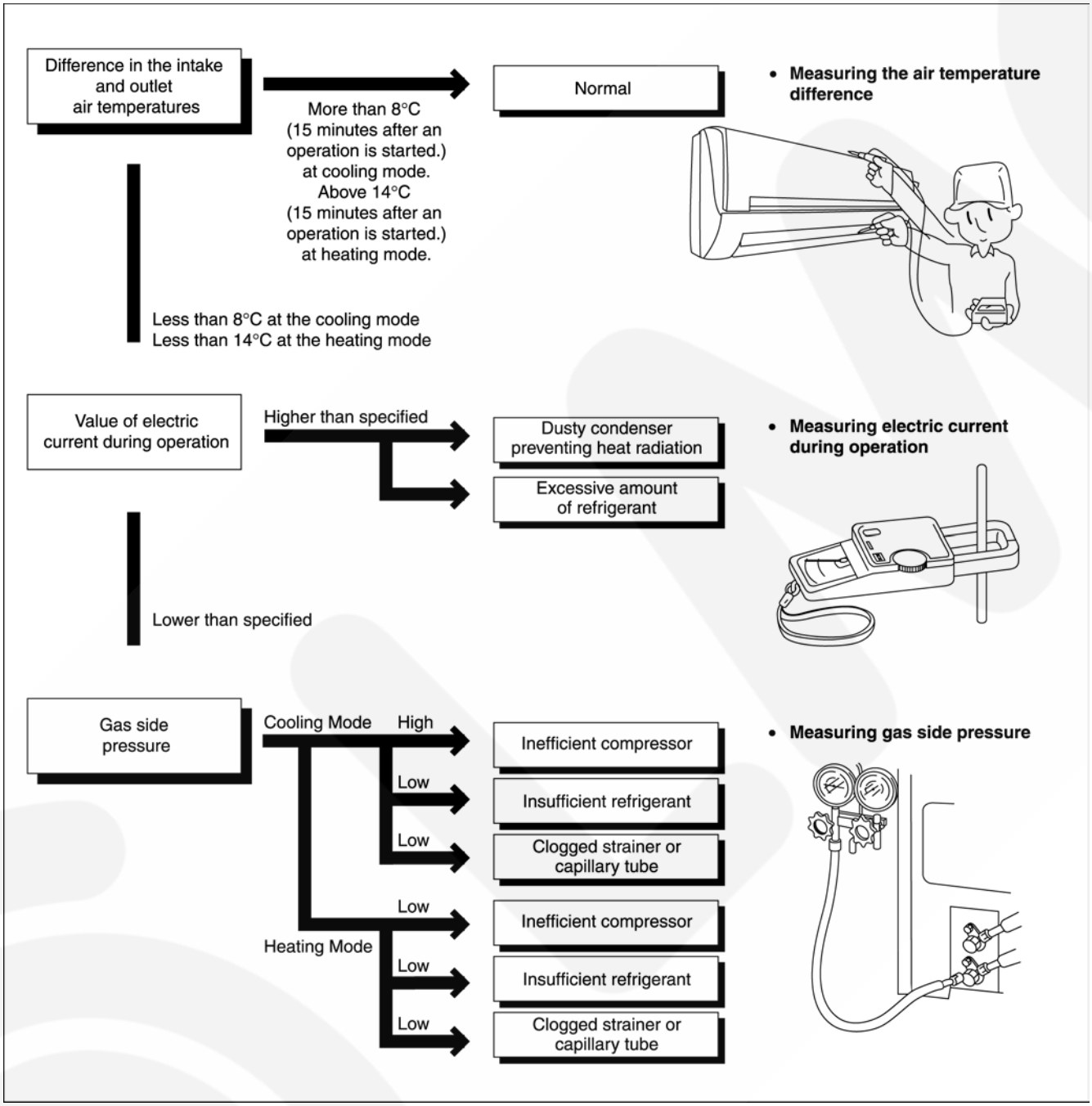
14.1. Refrigeration Cycle System

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



14.2. Relationship Between The Condition Of The Air Conditioner And Pressure And Electric Current

Condition of the air conditoner	Cooling Mode			Heating Mode		
	Low Pressure	High Pressure	Electric current during operation	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 measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

14.3. BREAKDOWN SELF DIAGNOSIS FUNCTION

14.3.1. Self Diagnosis Function (Three Digits Alphanumeric Code)

- Once abnormality has occurred during operation, the unit will stop its operation, and Timer or both Timer and ION LEDs blink. (The unit does not stop under ION abnormality.)
- 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, the Timer LED will no more blink. The last error code (abnormality) will be stored in IC memory.
- **To make a diagnosis**
  1. Timer LED or both timer and ION LEDs start to blink and the unit automatically stops the operation.
  2. Press the CHECK button on the remote controller continuously for 5 seconds.
  3. "- - " will be displayed on the remote controller display. Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
  4. Press the "TEMP" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit.
  5. Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
  6. When the latest abnormality code on the main unit and code transmitted from the remote controller 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.
  7. The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
  8. The LED will be off if the unit is turned off or the AC button on the main unit is pressed.
- **To display memorized error (Protective operation) status:**
  1. Turn power on.
  2. Press the CHECK button on the remote controller continuously for 5 seconds.
  3. "- - " will be displayed on the remote controller display. Note: Display only for "- -". (No transmitting signal, no receiving sound and no Power LED blinking.)
  4. Press the "TEMP" ▲ or ▼ button on the remote controller. The code "H00" (no abnormality) will be displayed and signal will be transmitted to the main unit. The power LED lights up. If no abnormality is stored in the memory, three beeps sound will be heard.
  5. Every press of the button (up or down) will increase abnormality numbers and transmit abnormality code signal to the main unit.
  6. When the latest abnormality code on the main unit and code transmitted from the remote controller 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.
  7. The breakdown diagnosis mode will be canceled unless pressing the CHECK button continuously for 5 seconds or operating the unit for 30 seconds.
  8. The same diagnosis can be repeated by turning power on again.

- **To clear memorized error (Protective operation) status after repair:**
  1. Turn power on.
  2. Press the AUTO button for 5 seconds (A beep receiving sound) on the main unit to operate the unit at Forced Cooling Operation mode.
  3. Press the CHECK button on the remote controller.
- **Temporary Operation (Depending on breakdown status)**
  1. Press the AUTO button (A beep receiving sound) on the main unit to operate the unit. (Remote control will become possible.)
  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	
H26	Cooling, Heating	Emergency Operation without power limit

14.4. Error Codes Table

Diagnosis display	Abnormality / Protection control	Abnormality Judgement	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	• Internal / external cable connections • Indoor / Outdoor PCB
H14	Indoor intake air temperature sensor abnormality	Continue for 5 sec.	—	• Intake air temperature sensor (defective or disconnected)
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	—	• Compressor temperature sensor (defective 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)
H24	Indoor heat exchanger temperature sensor 2 abnormality	Continue for 5 sec.	—	• Heat exchanger temperature sensor 2 (defective or disconnected)
H26	Ion 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)
H30	Discharge temperature sensor abnormality	Continue for 5 sec.	—	• Discharge temperature sensor
H33	Indoor/Outdoor wrong connection	—	—	• Indoor/Outdoor supply voltage
H38	Indoor/Outdoor mismatch (brand code)	—	—	—
H97	Outdoor Fan Motor lock abnormality	2 times occurance within 30 minutes	—	• 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
F90	PFC control	4 times occurance within 10 minutes	—	• Voltage at PFC
F91	Refrigeration cycle abnormality	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.

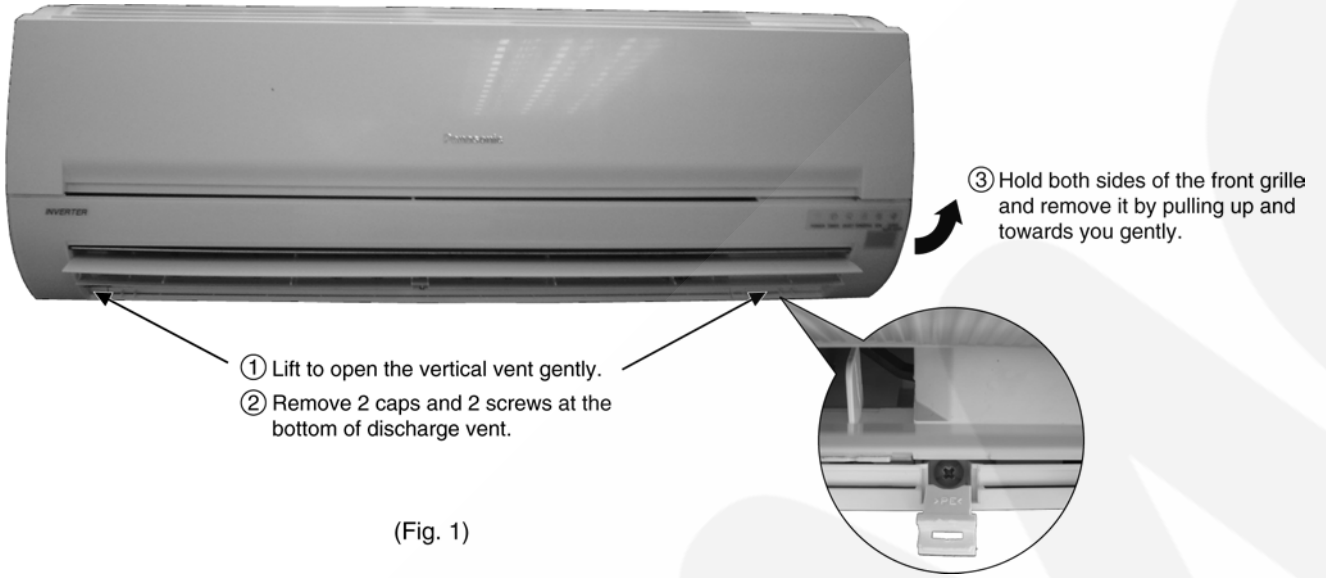
The memory data of error code is erased when the power supply is cut off, or press the Auto Switch until “beep” sound heard following by pressing the “CHECK” button at Remote Control.
Although operation forced to stop when abnormality detected, emergency operation is possible for certain errors (refer to Error Codes Table) by using Remote Control or Auto Switch at indoor unit. However, the Remote Control signal receiving sound is changed from one “beep” to four “beep” sounds.

15 Disassembly and Assembly Instructions

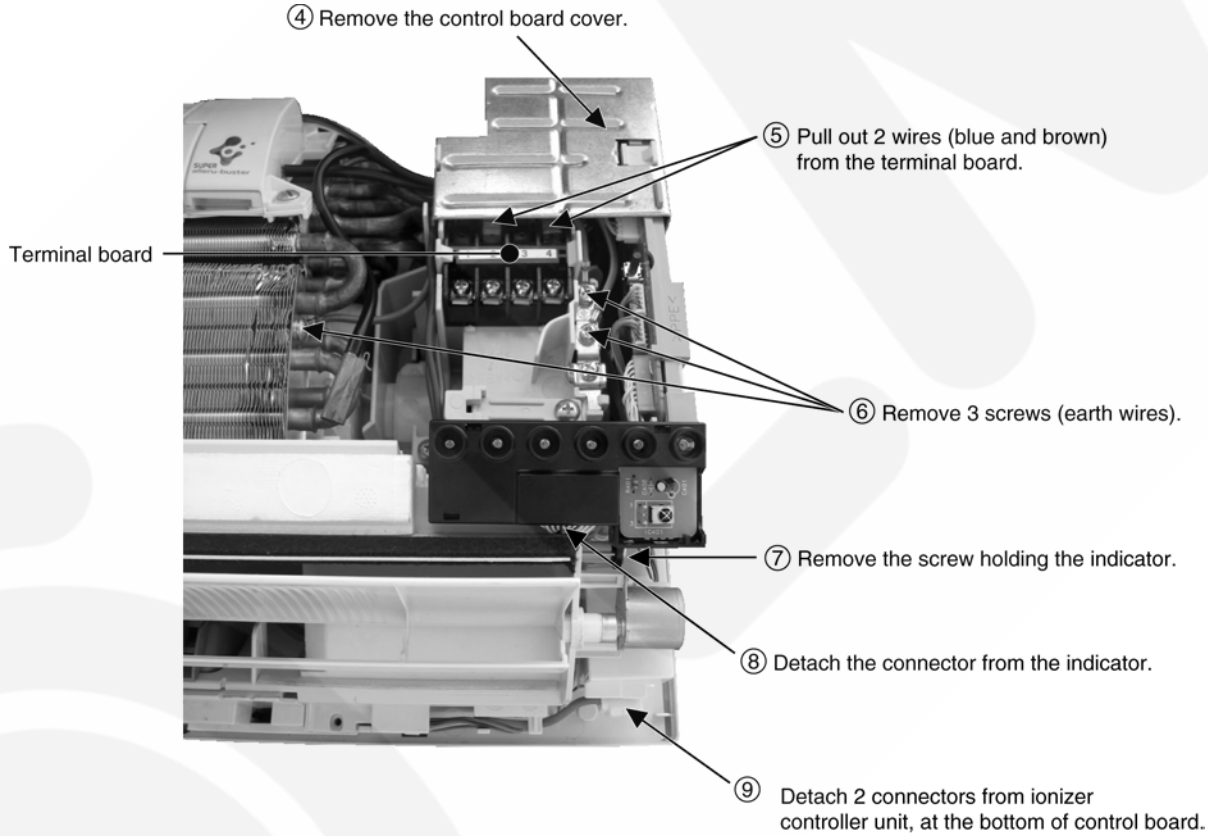
⚠ WARNING

- Caution! When handling electronic controller, be careful of electrostatic discharge.
- Be sure to return the wiring to its original position.
- There are many high voltage components within the heat sink cover so never touch the interior during operation. Wait at least two minutes after power has been turned off.

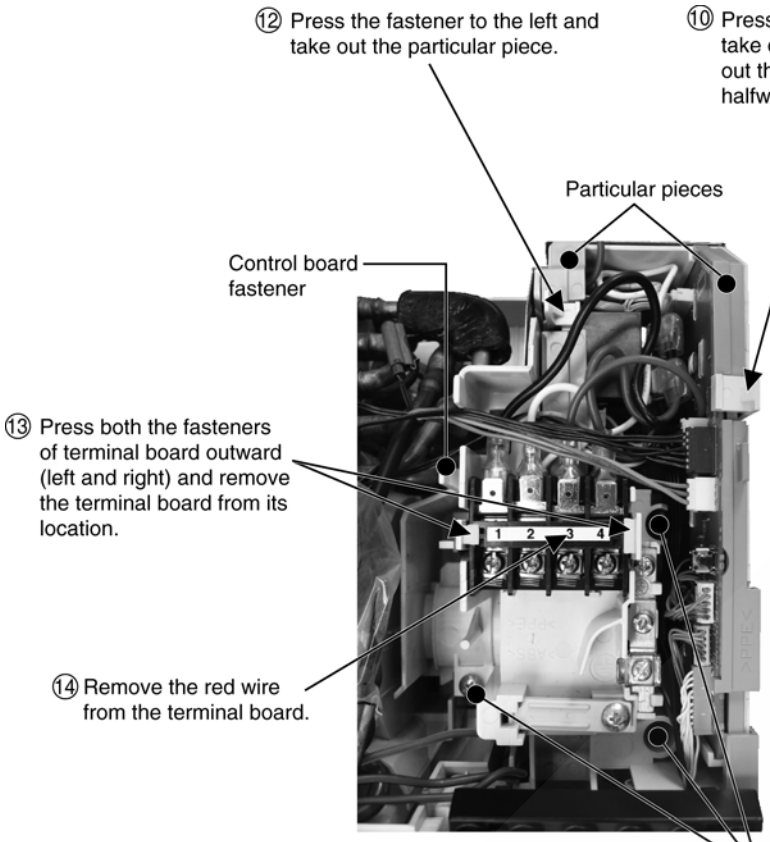
15.1. Indoor Electronic Controller and Control Board



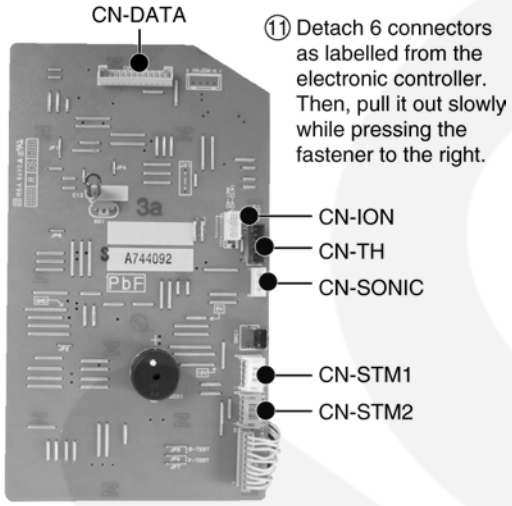
(Fig. 1)



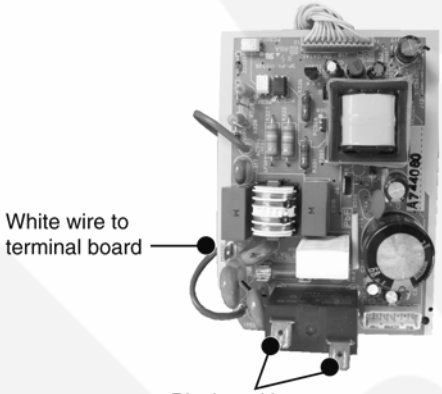
(Fig. 2)



(Fig. 3)

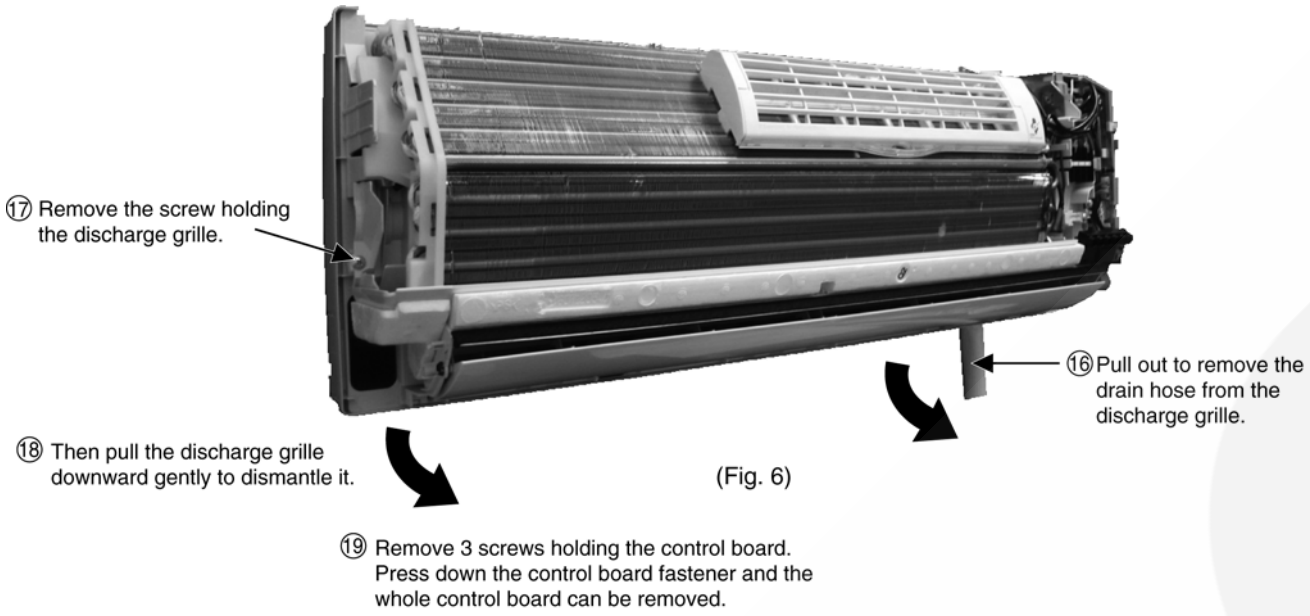


(Fig. 4)



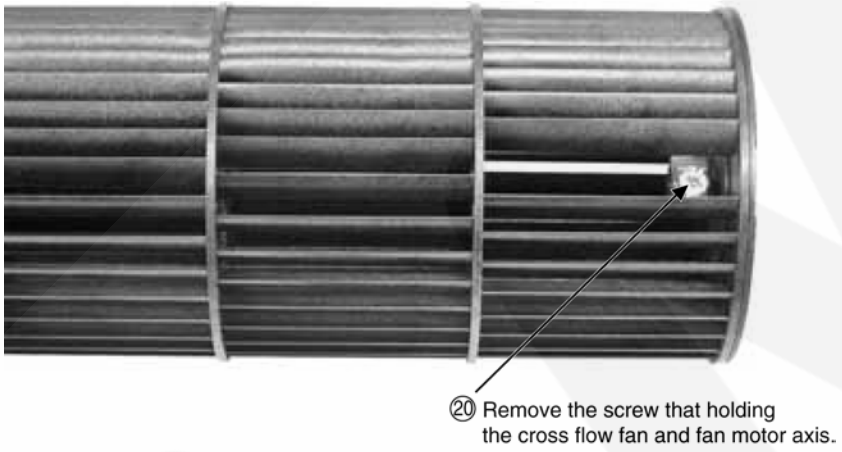
⑮ Detach 3 wires and one connector as labelled from the electronic controller. Then, pull it out slowly while pressing the fastener to the left.

(Fig. 5)

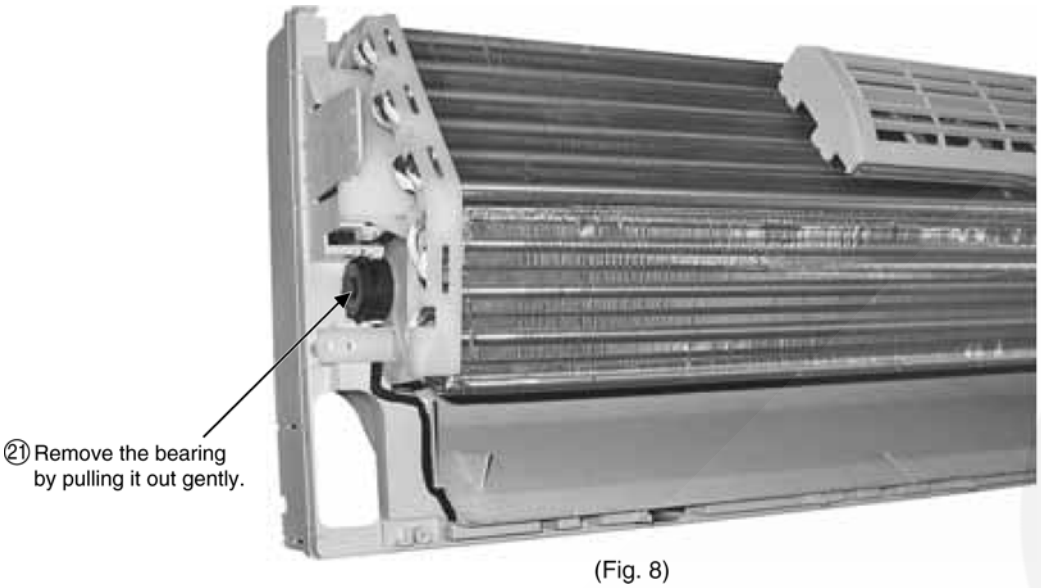


(Fig. 6)

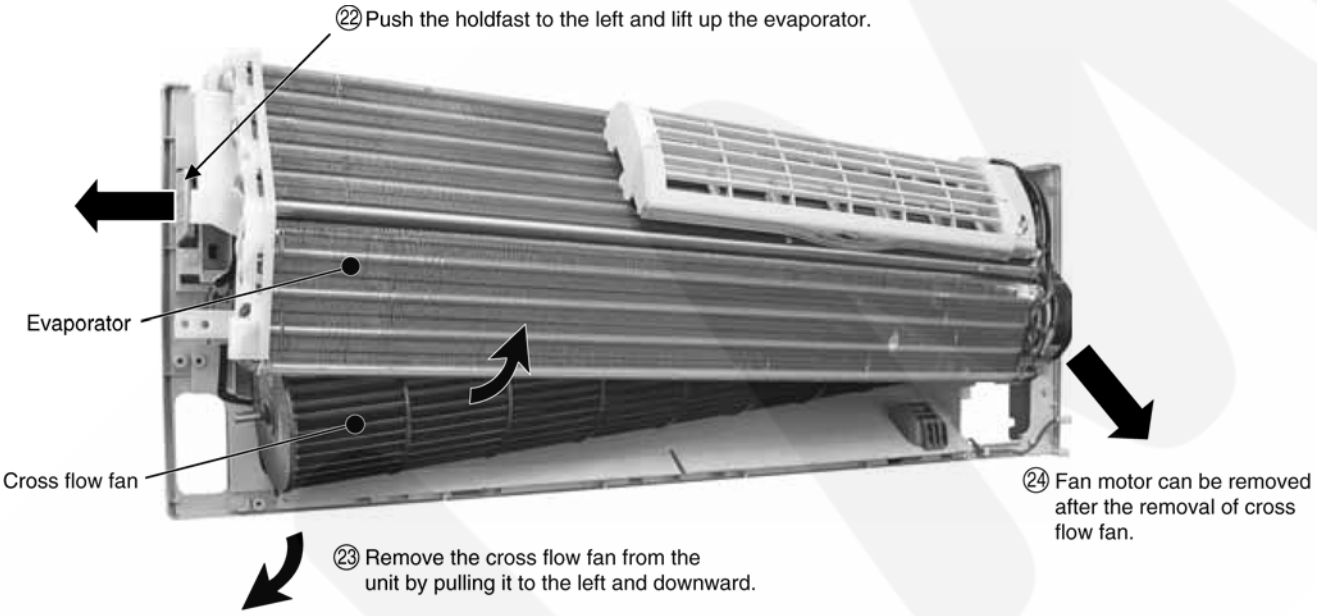
15.2. Indoor Cross Flow Fan and Fan Motor



(Fig. 7)


㉑ Remove the bearing
by pulling it out gently.

(Fig. 8)


㉒ Push the holdfast to the left and lift up the evaporator.
Evaporator
Cross flow fan
㉔ Fan motor can be removed
after the removal of cross
flow fan.
㉓ Remove the cross flow fan from the
unit by pulling it to the left and downward.

(Fig. 9)

15.3. Outdoor Electronic Controller Removal Procedure

1. Remove the top panel and front panel

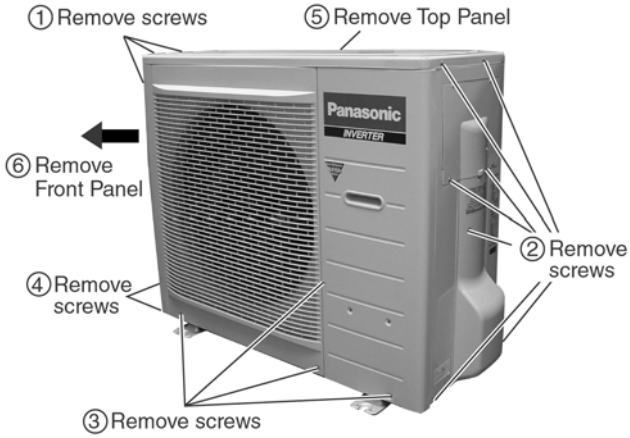


Fig. 10

2. Remove the Outdoor Electronic Controller

Fig. 11

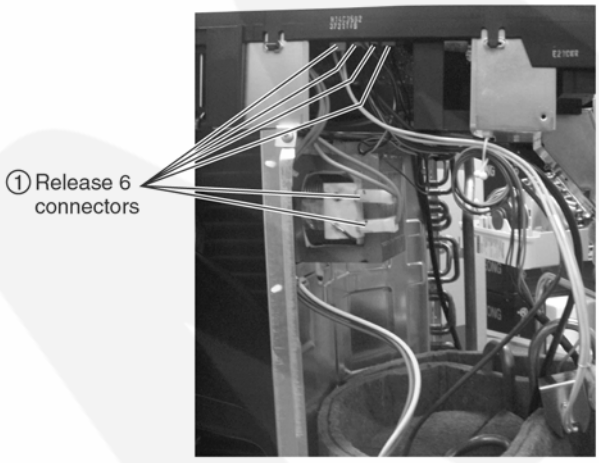
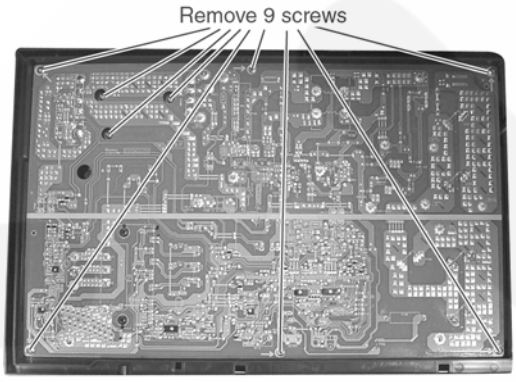


Fig. 12



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

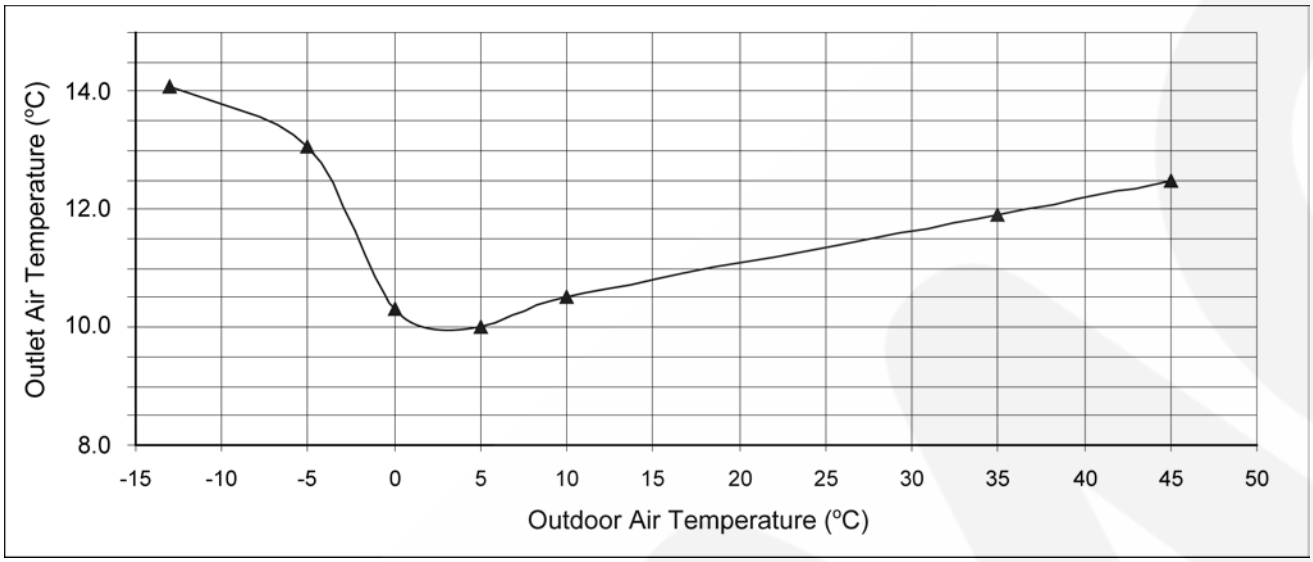
16 Technical Data

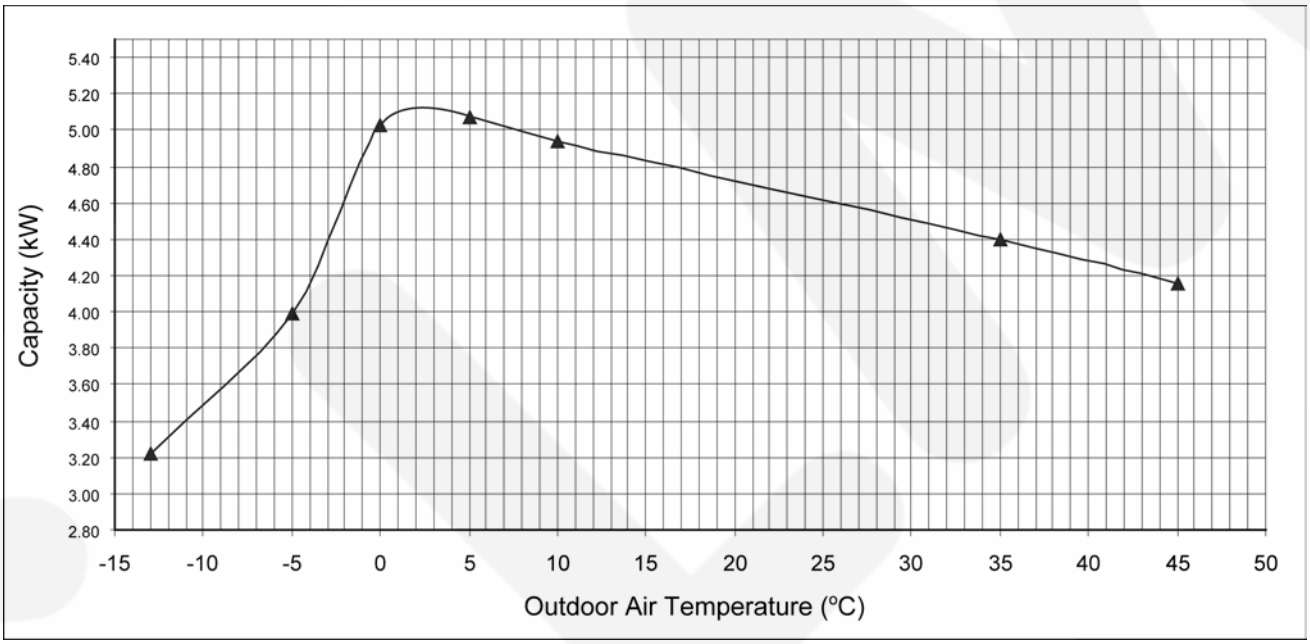
16.1. Operation Characteristics

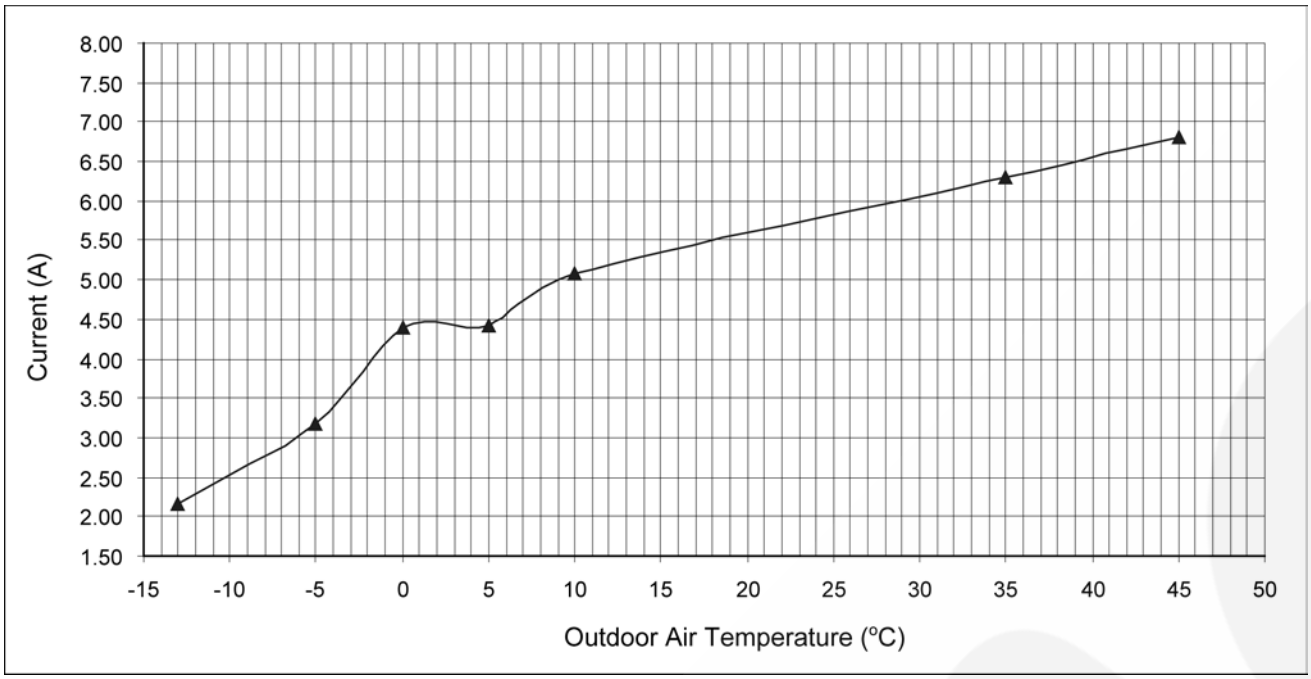
16.1.1. CS-E15EKEA CU-E15EKEA

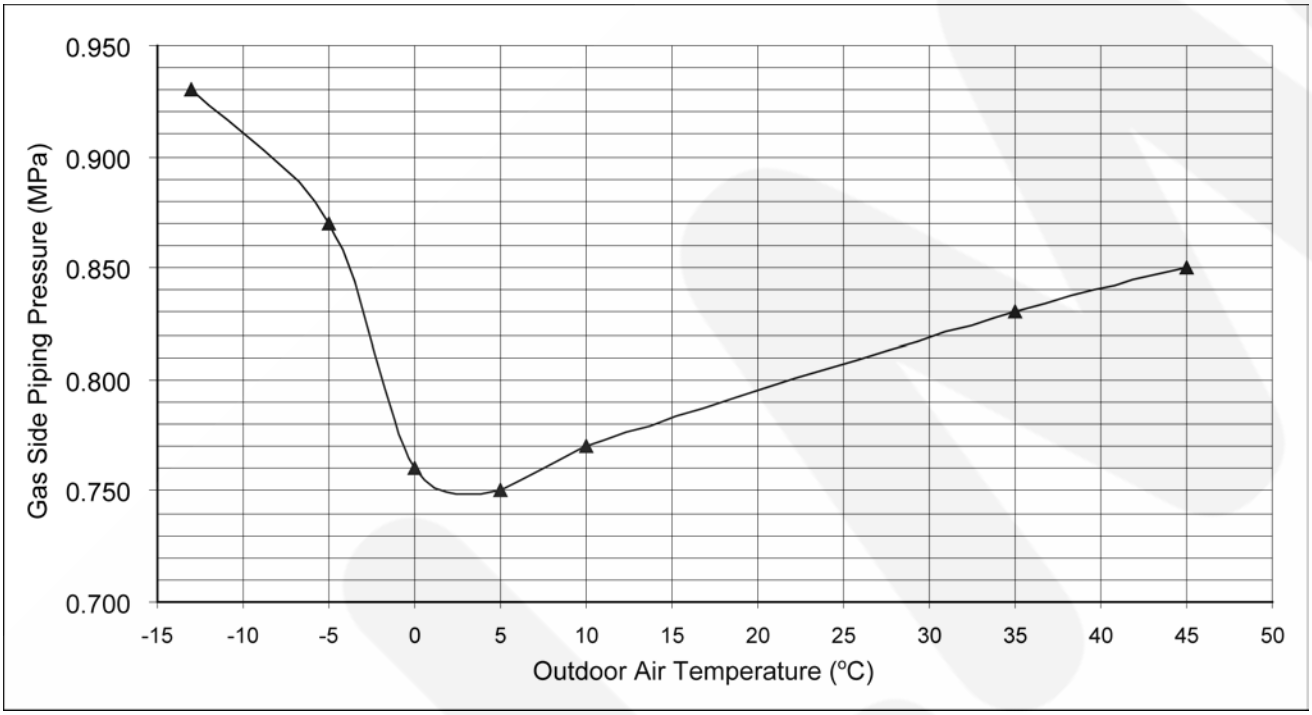
Cooling Characteristic at Different Outdoor Air Temperature

[Condition]
Indoor room temperature : 27/19°C
Remote control setting : Hi Fan, COOL 16°C
Compressor frequency : Rated cooling
Voltage : 230 V






Current (A)
8.00
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
Outdoor Air Temperature (°C)


Gas Side Piping Pressure (MPa)
0.950
0.900
0.850
0.800
0.750
0.700
-15
-10
-5
0
5
10
15
20
25
30
35
40
45
50
Outdoor Air Temperature (°C)

Heating Characteristic at Different Outdoor Air Temperature

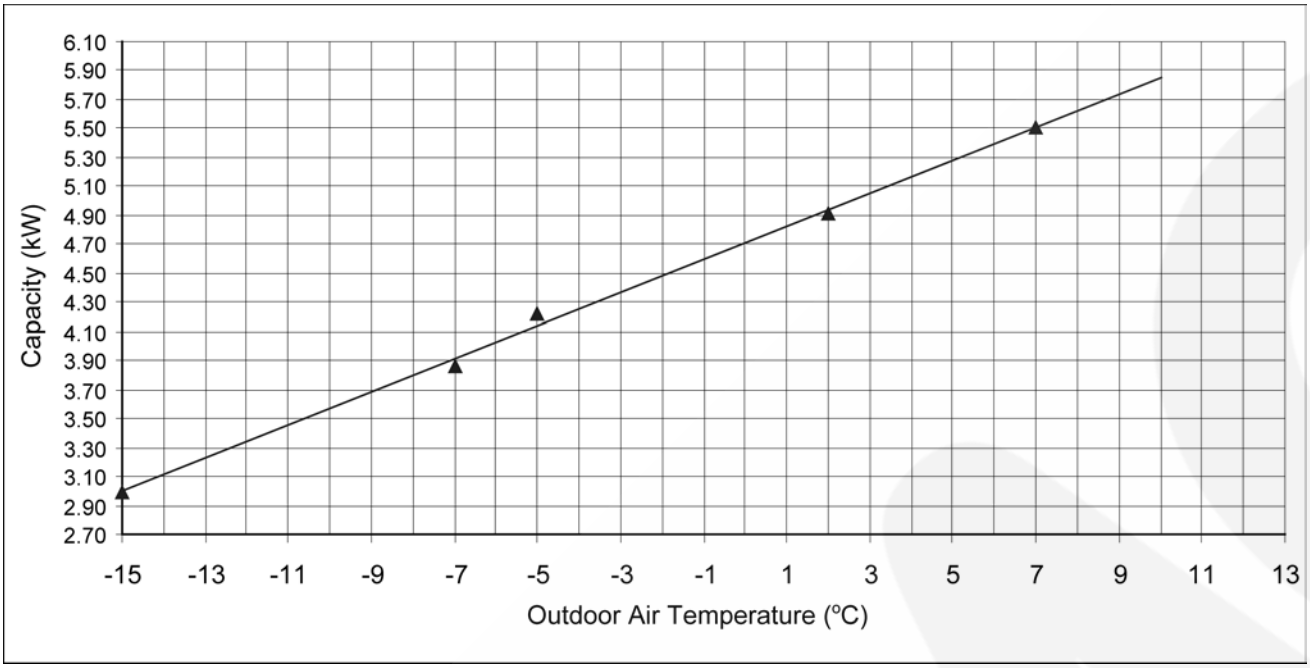
[Condition]

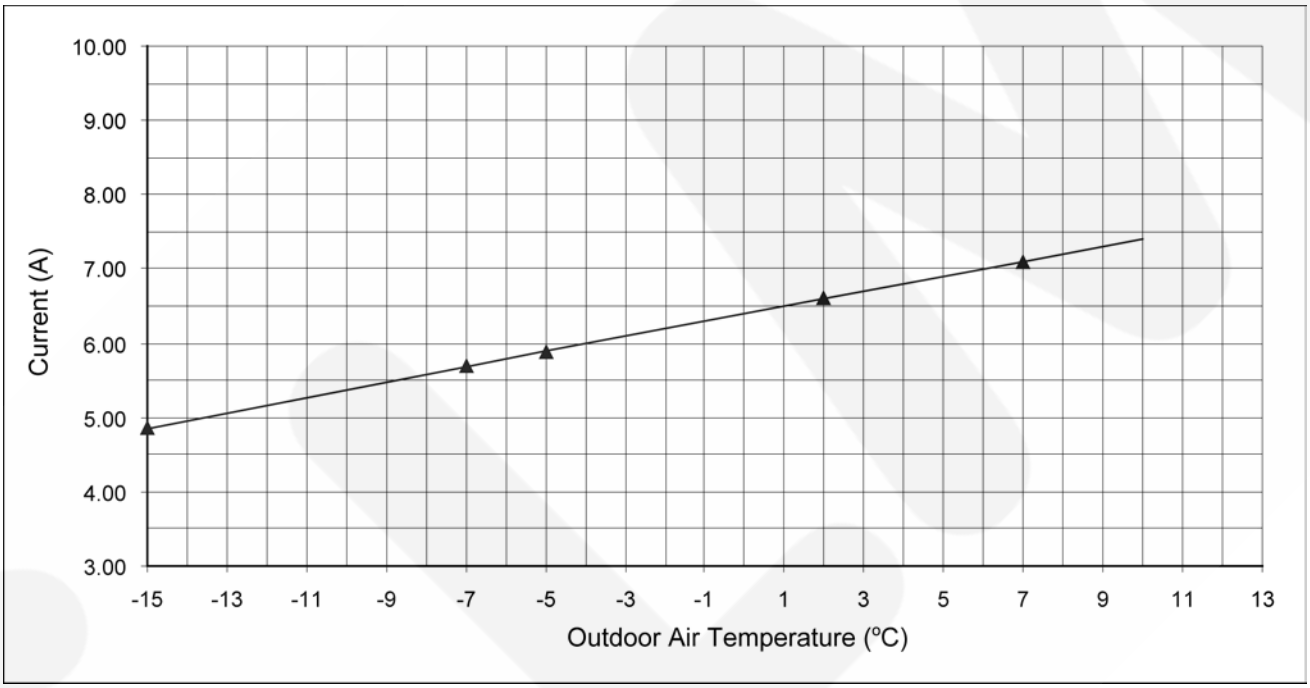
Indoor room temperature : 20°C

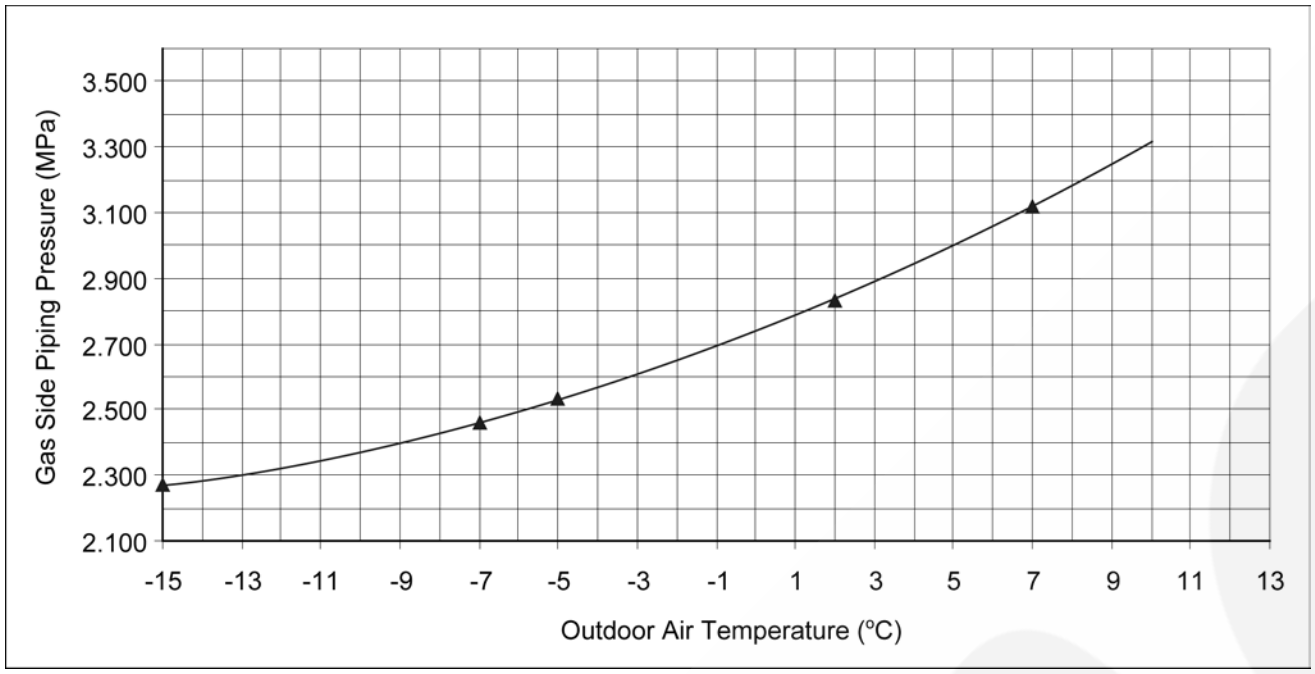
Remote control setting : Hi Fan, HEAT 30°C

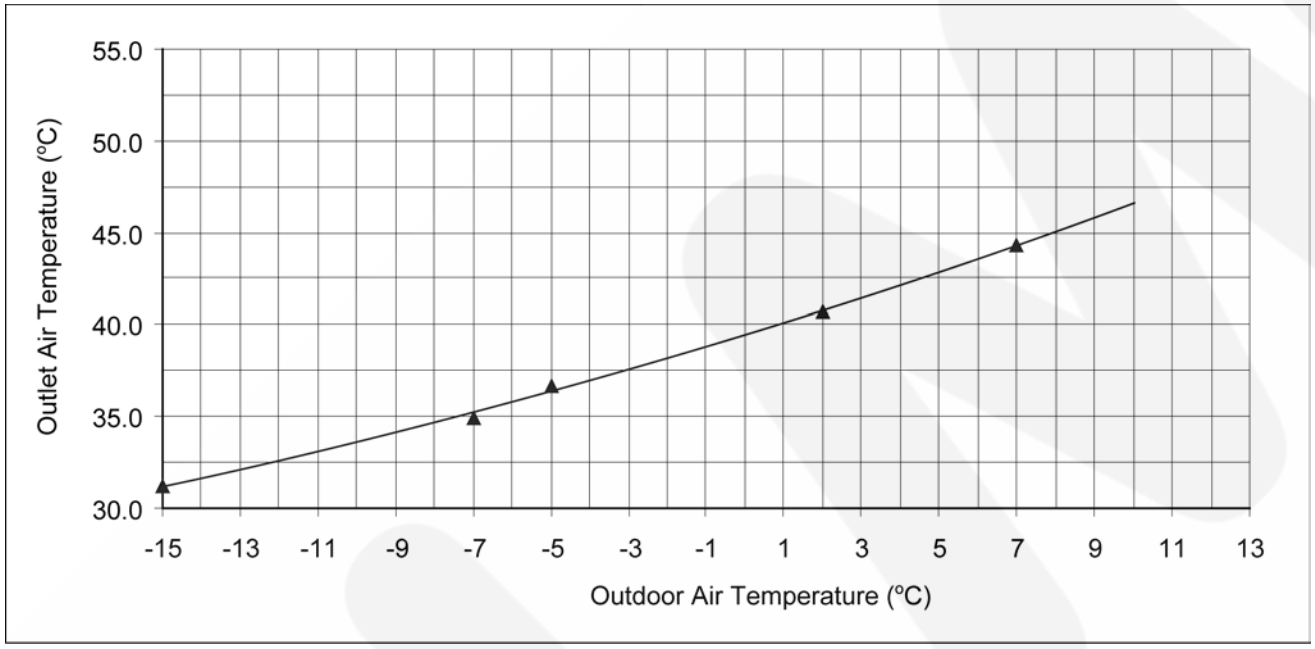
Compressor frequency : Rated heating

Voltage : 230 V






Gas Side Piping Pressure (MPa)
3.500
3.300
3.100
2.900
2.700
2.500
2.300
2.100
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)


Outlet Air Temperature (°C)
55.0
50.0
45.0
40.0
35.0
30.0
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)

Cooling Characteristic at Different Piping Length

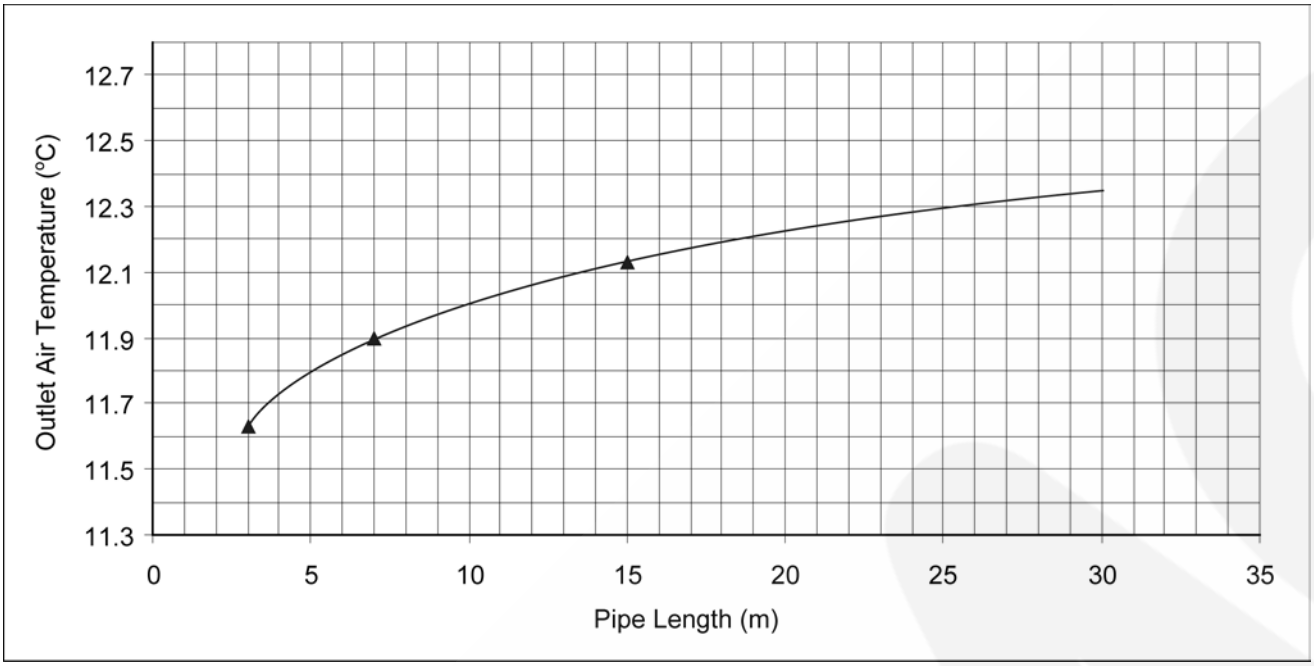
[Condition]

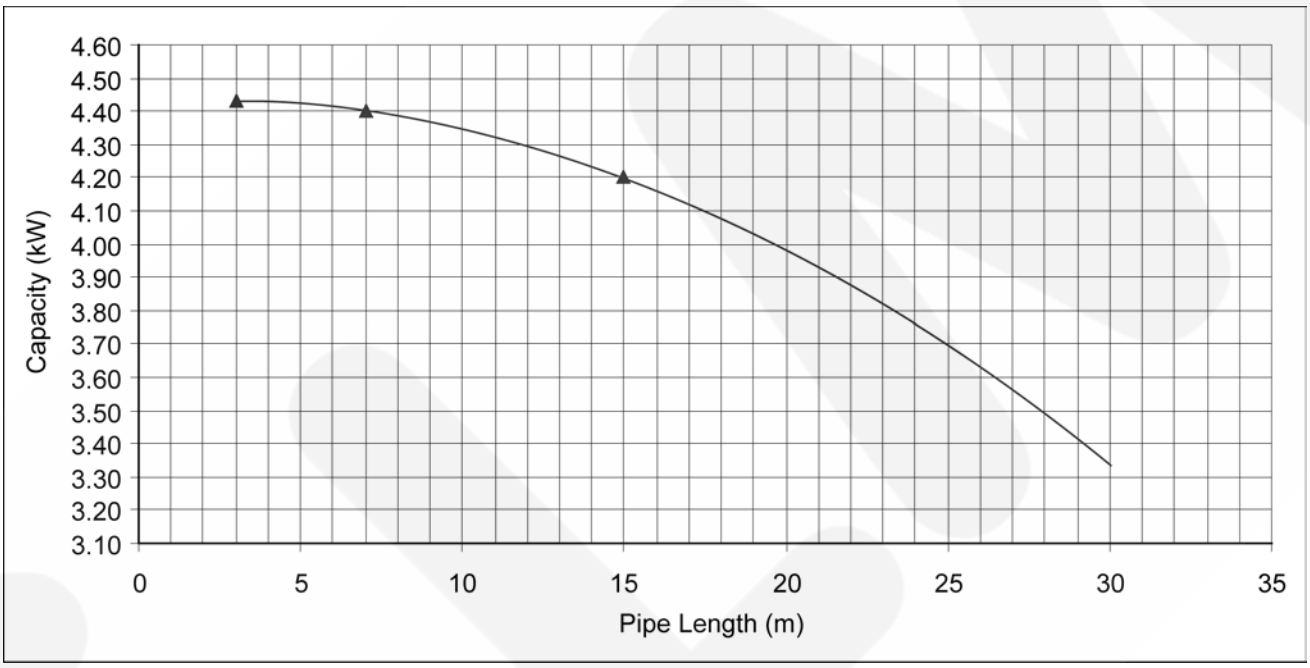
Indoor room temperature : 27/19°C

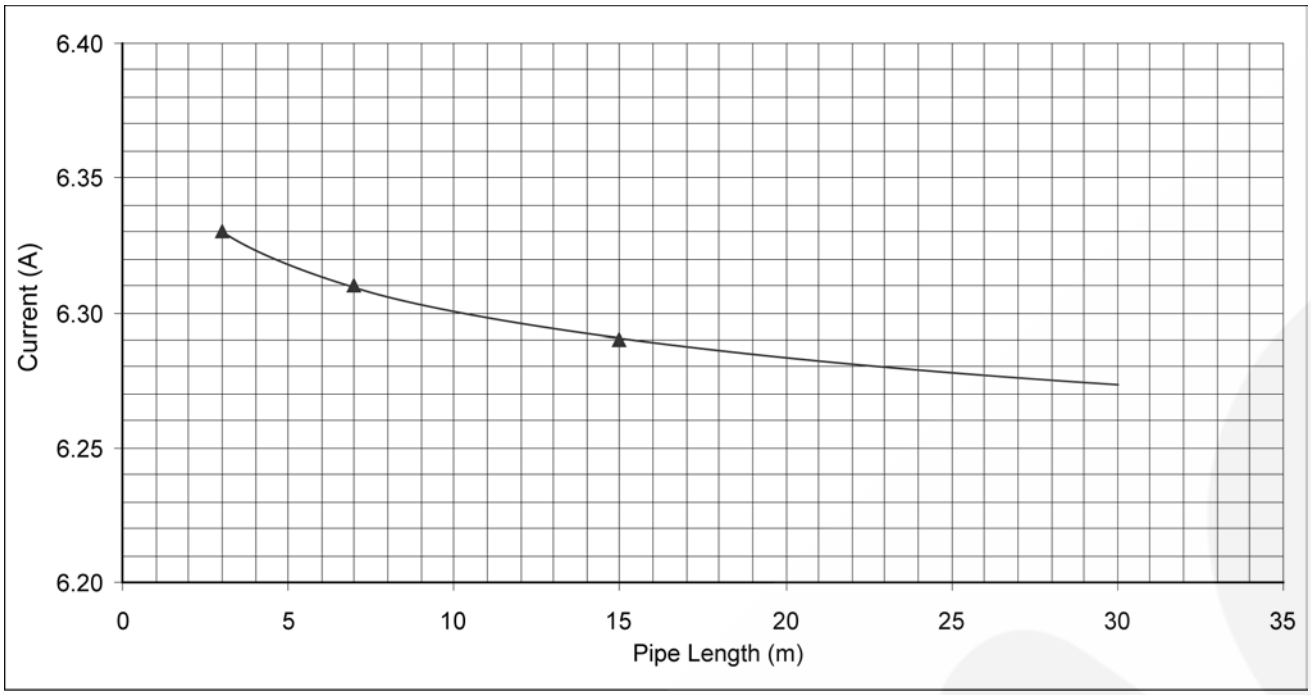
Remote control setting : Hi Fan, COOL 16°C

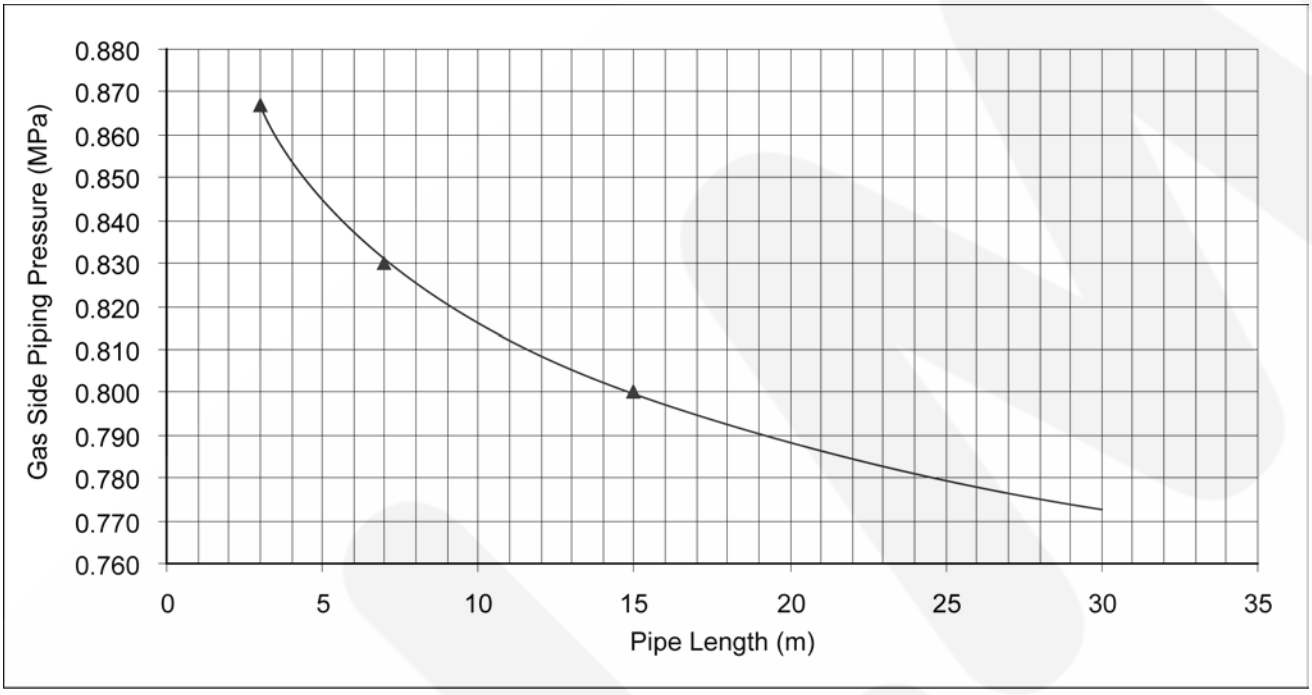
Compressor frequency : Rated cooling

Voltage : 230 V






6.40
6.35
6.30
6.25
6.20
Current (A)
0
5
10
15
20
25
30
35
Pipe Length (m)


0.880
0.870
0.860
0.850
0.840
0.830
0.820
0.810
0.800
0.790
0.780
0.770
0.760
Gas Side Piping Pressure (MPa)
0
5
10
15
20
25
30
35
Pipe Length (m)

Heating Characteristic at Different Piping Length

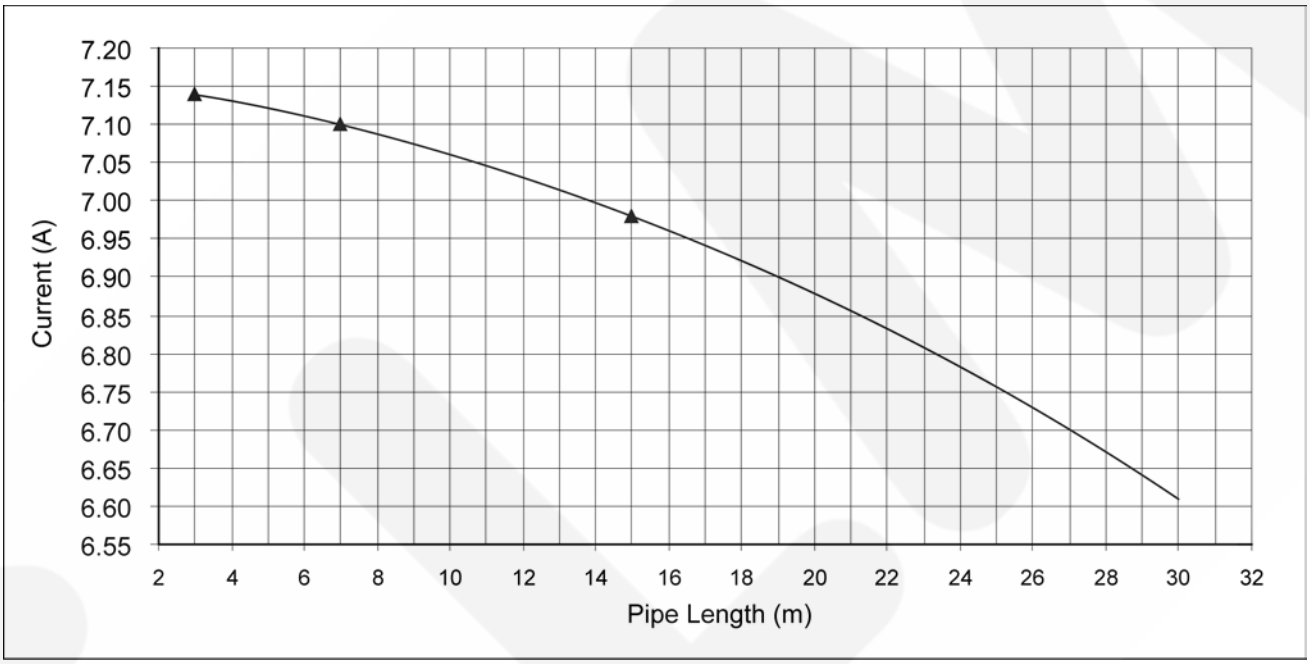
[Condition]

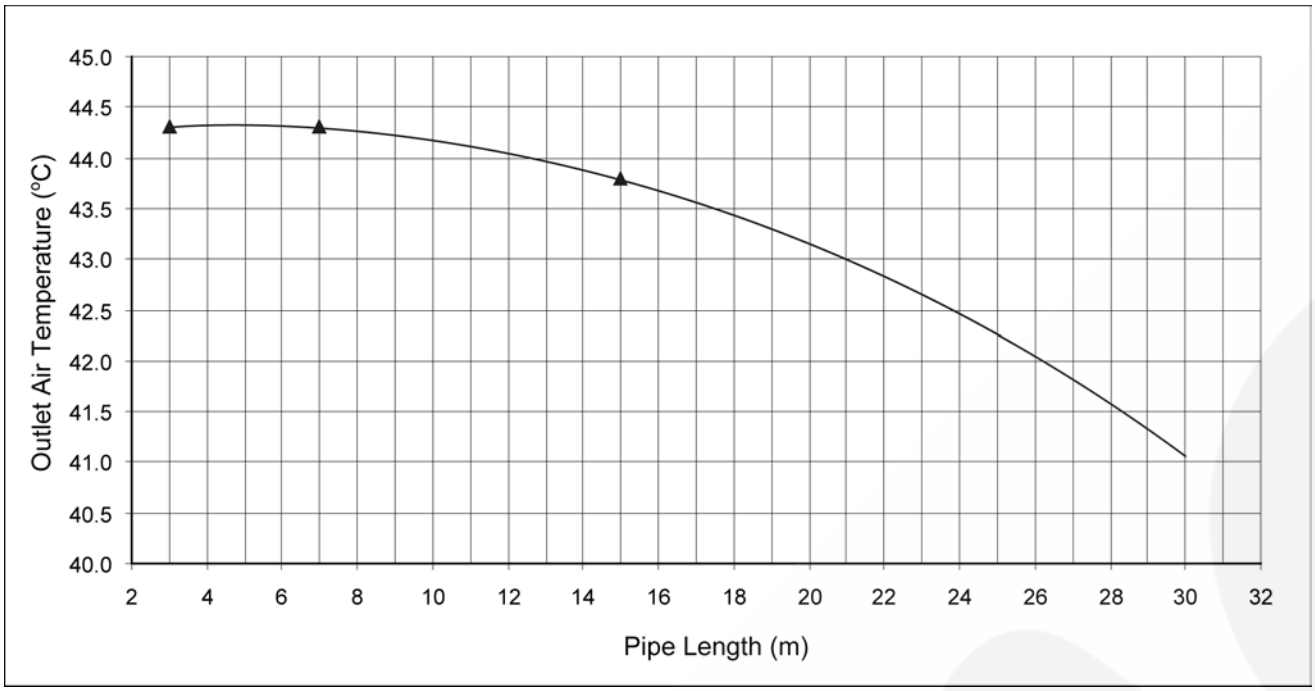
Indoor room temperature : 20°C

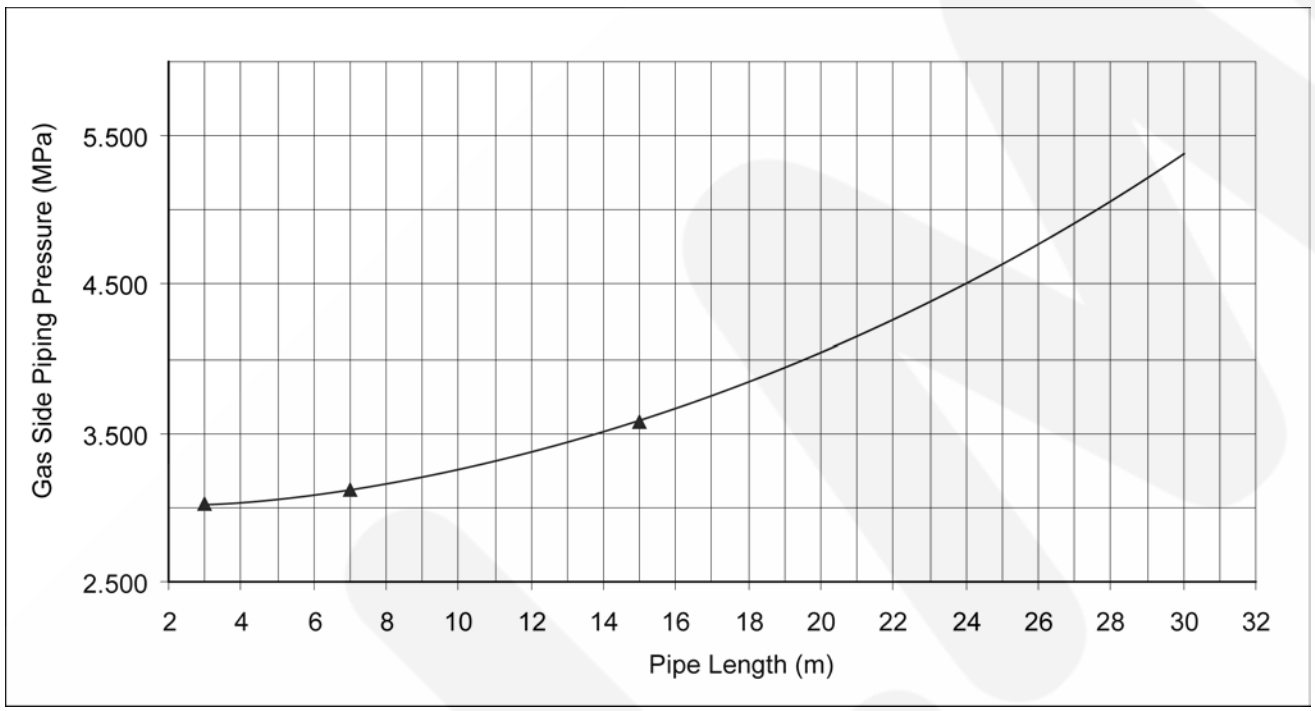
Remote control setting : Hi Fan, HEAT 30°C

Compressor frequency : Rated heating

Voltage : 230 V




Outlet Air Temperature (°C)
45.0
44.5
44.0
43.5
43.0
42.5
42.0
41.5
41.0
40.5
40.0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)


Gas Side Piping Pressure (MPa)
5.500
4.500
3.500
2.500
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)

16.1.2. CS-E18EKEA CU-E18EKEA

Cooling Characteristic at Different Outdoor Air Temperature

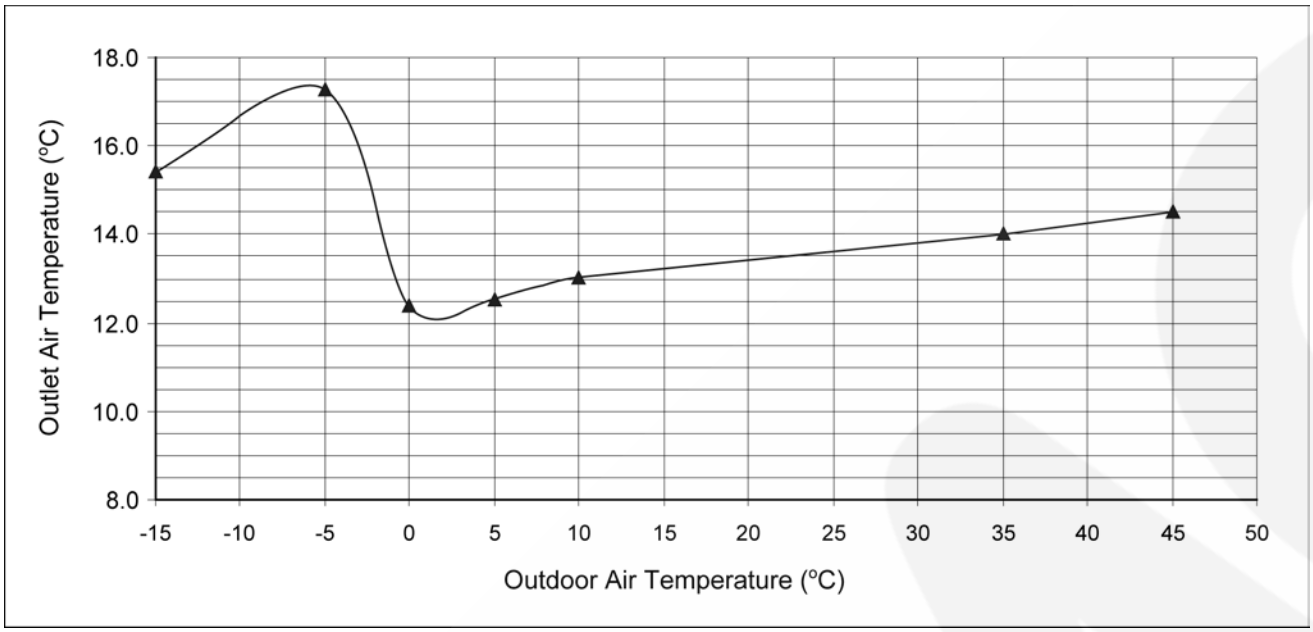
[Condition]

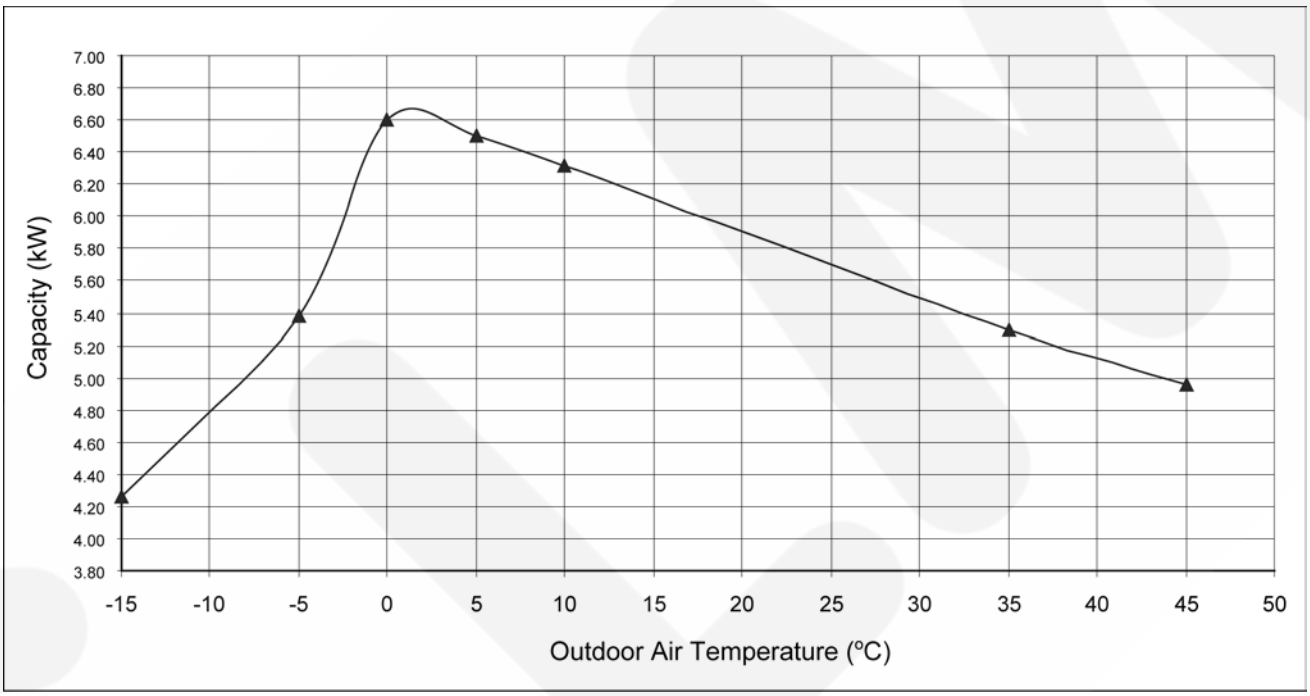
Indoor room temperature : 27/19°C

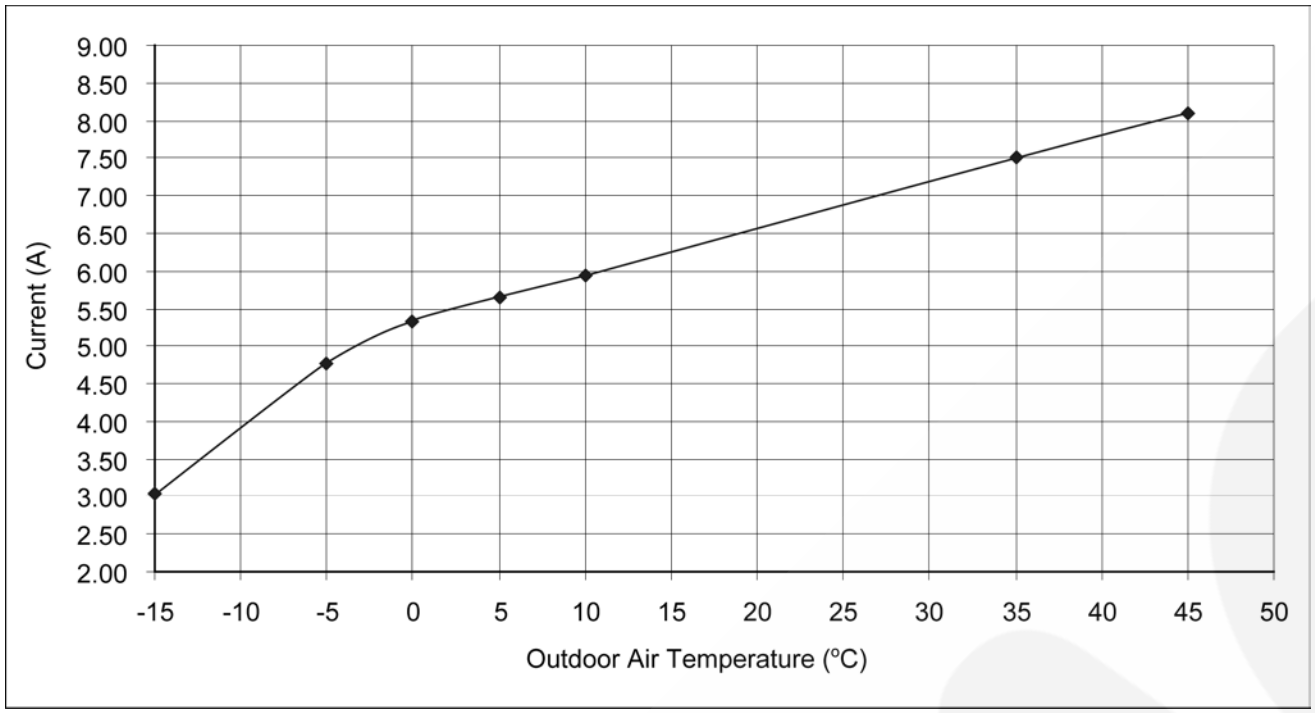
Remote control setting : Hi Fan, COOL 16°C

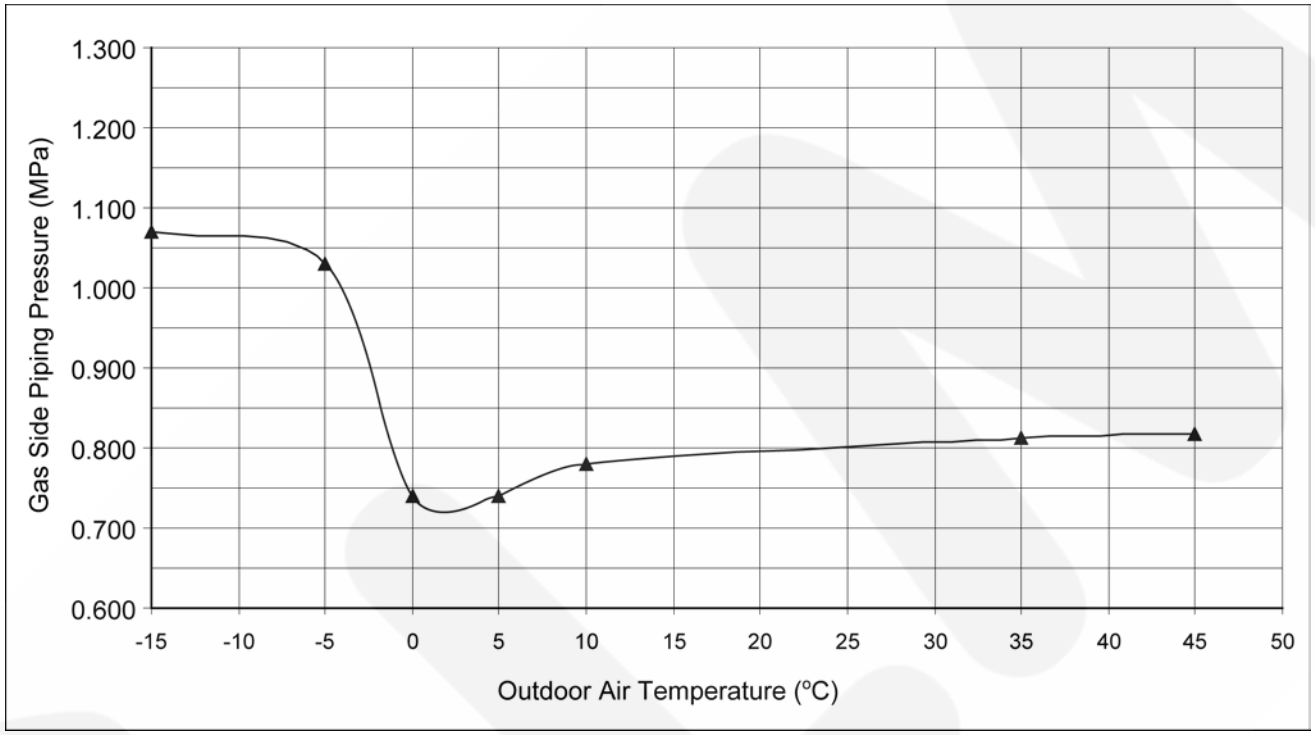
Compressor frequency : Rated cooling

Voltage : 230 V






Current (A)
9.00
8.50
8.00
7.50
7.00
6.50
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
-15 -10 -5 0 5 10 15 20 25 30 35 40 45 50
Outdoor Air Temperature (°C)


Gas Side Piping Pressure (MPa)
1.300
1.200
1.100
1.000
0.900
0.800
0.700
0.600
-15 -10 -5 0 5 10 15 20 25 30 35 40 45 50
Outdoor Air Temperature (°C)

Heating Characteristic at Different Outdoor Air Temperature

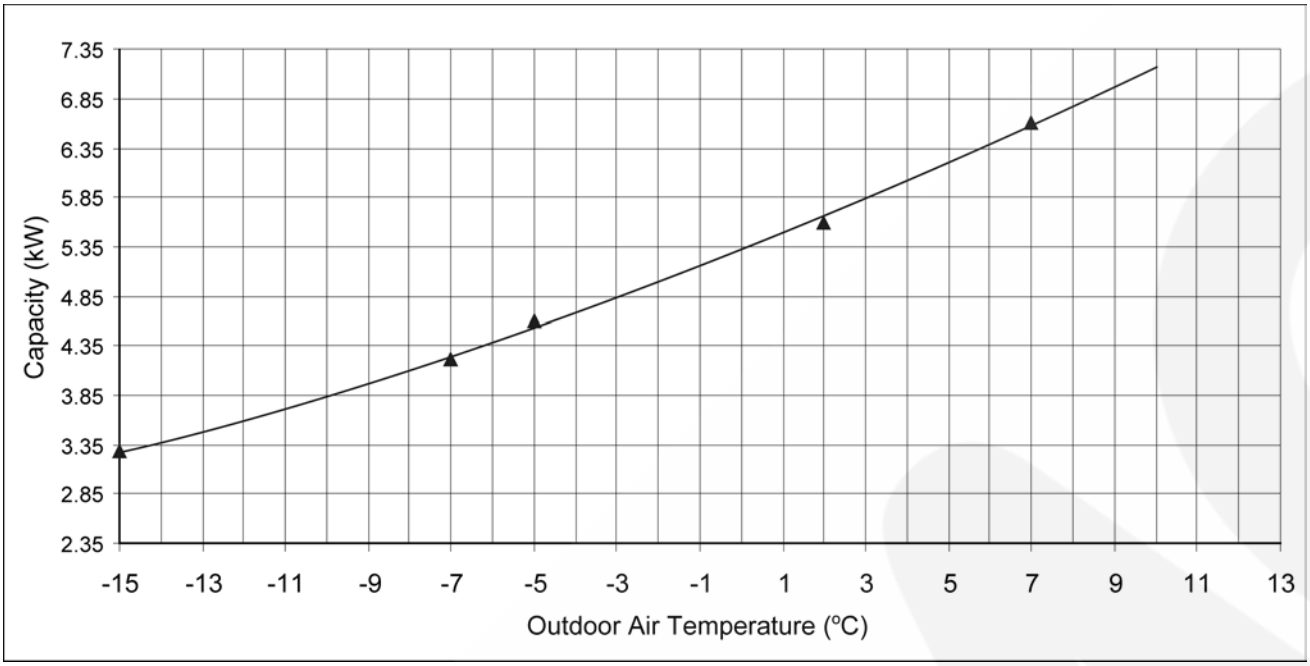
[Condition]

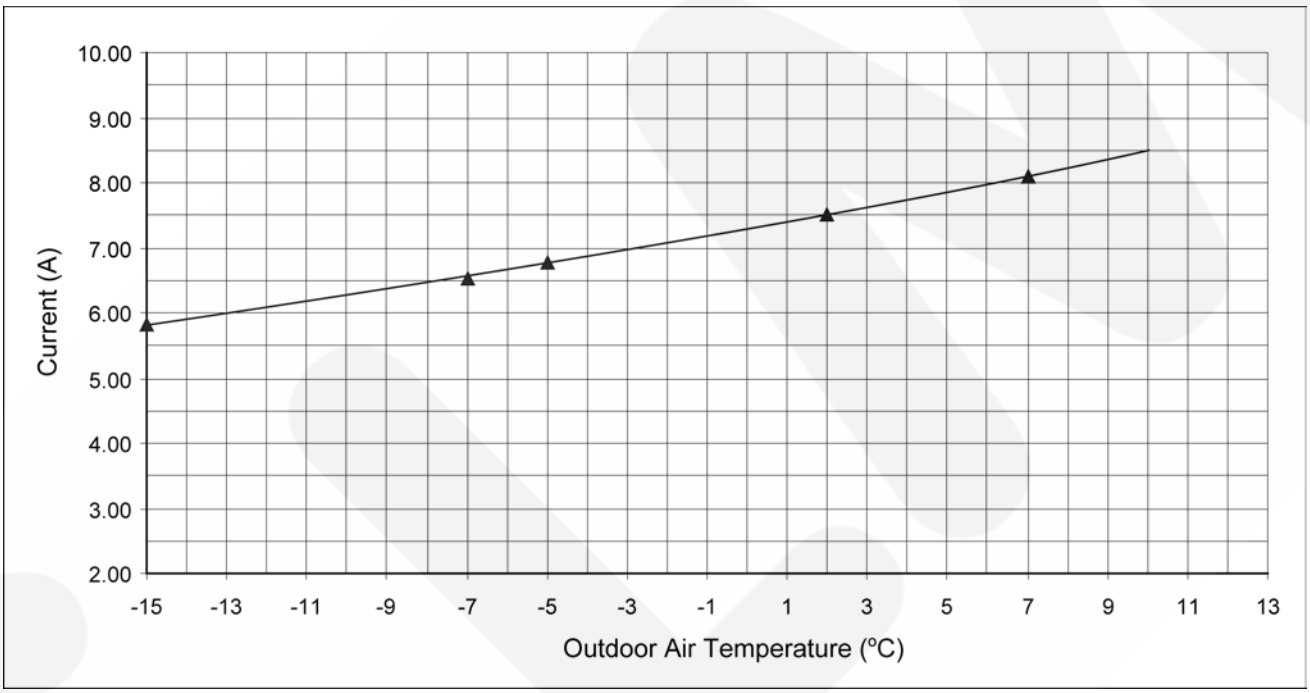
Indoor room temperature : 20°C

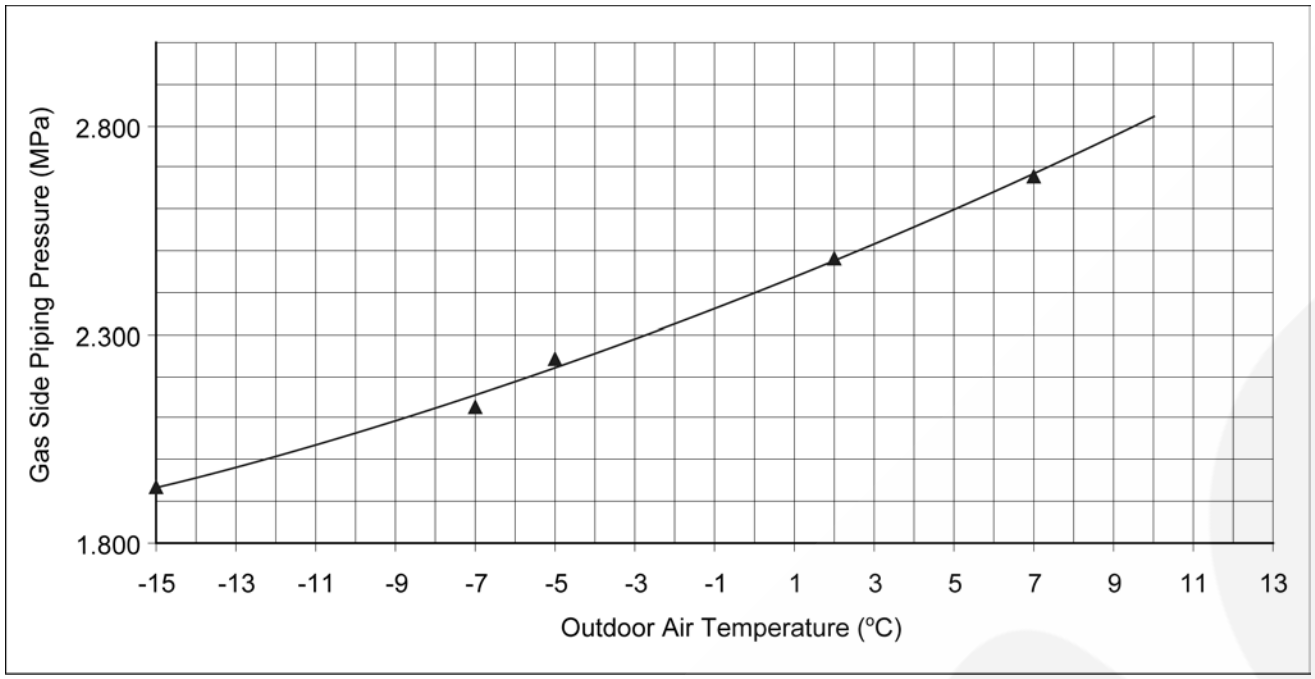
Remote control setting : Hi Fan, HEAT 30°C

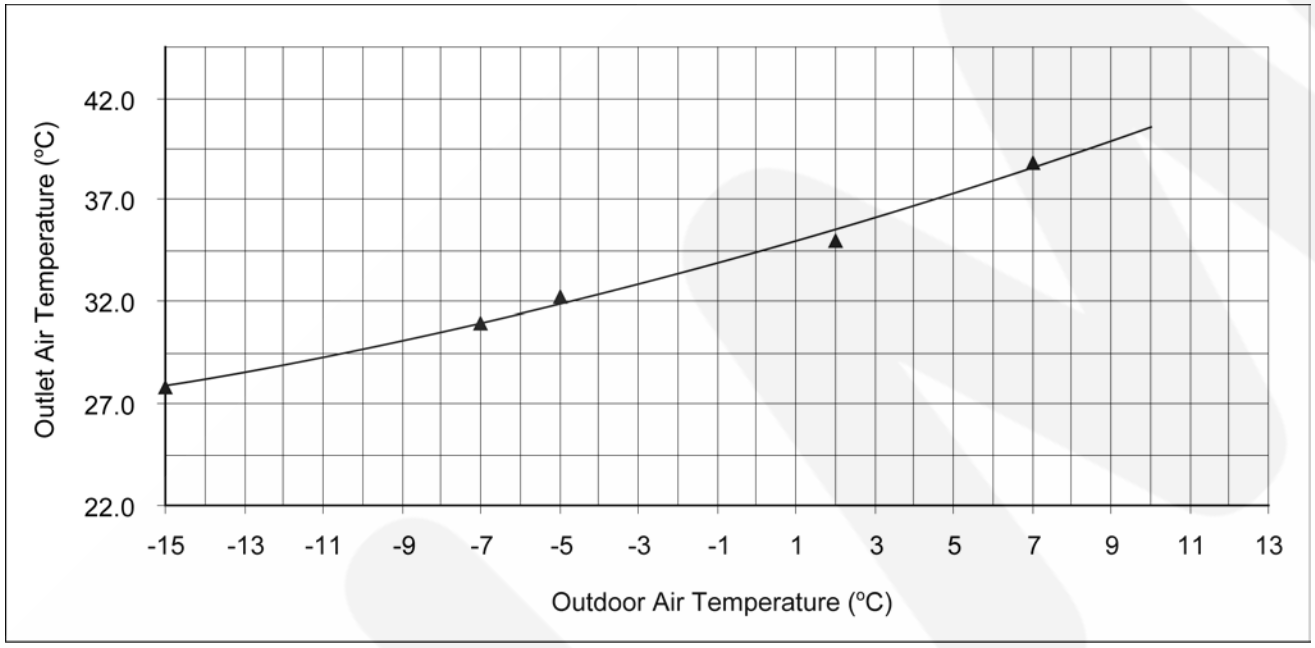
Compressor frequency : Rated heating

Voltage : 230 V






Gas Side Piping Pressure (MPa)
2.800
2.300
1.800
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)


Outlet Air Temperature (°C)
42.0
37.0
32.0
27.0
22.0
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)

Cooling Characteristic at Different Piping Length

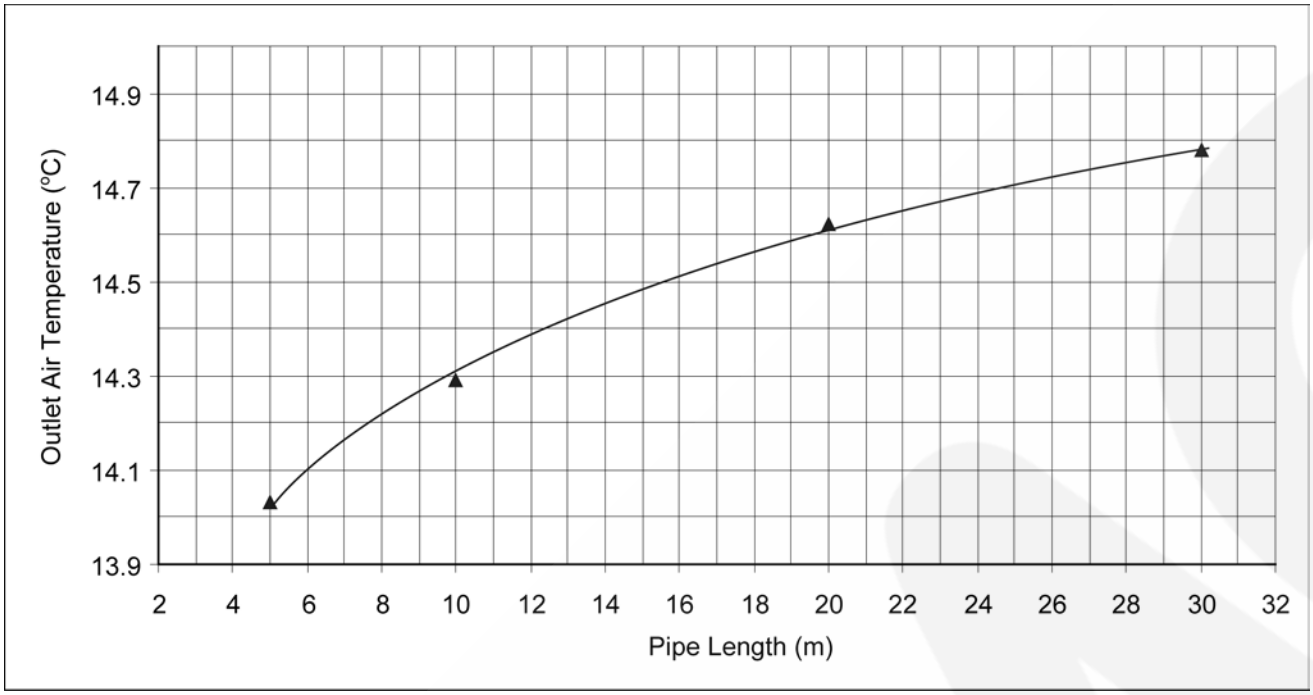
[Condition]

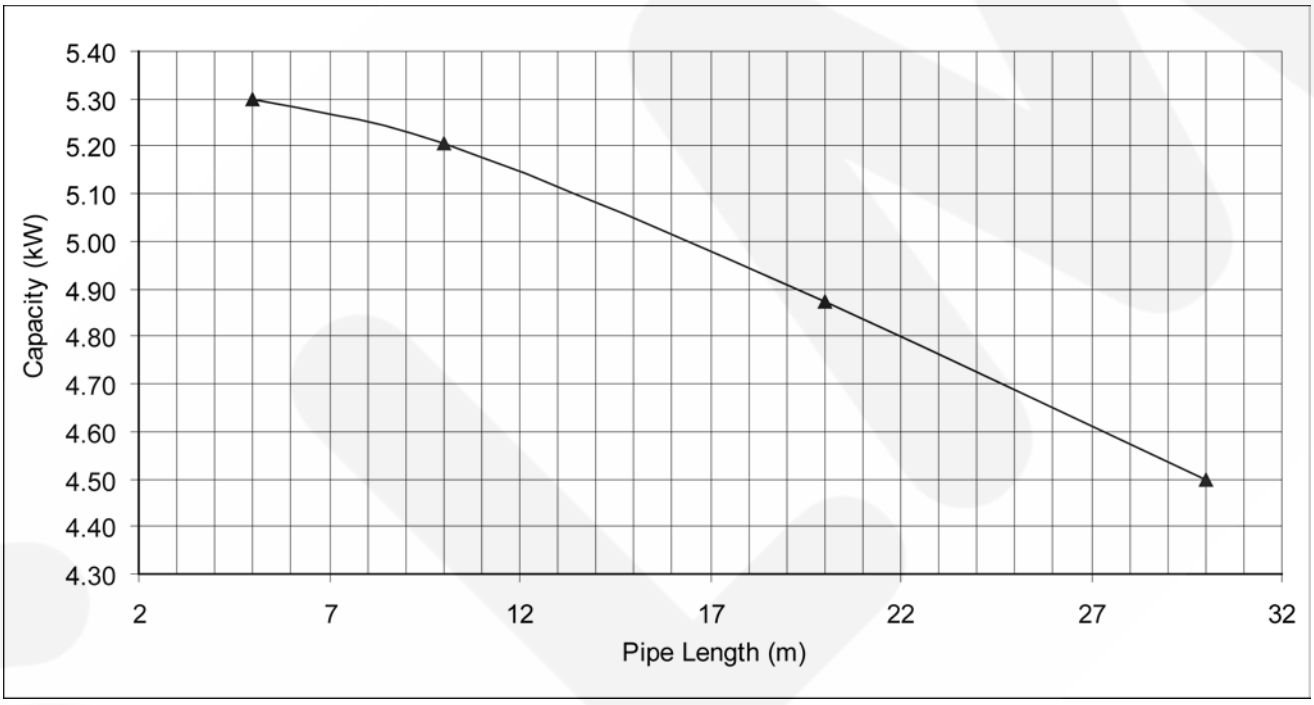
Indoor room temperature : 27/19°C

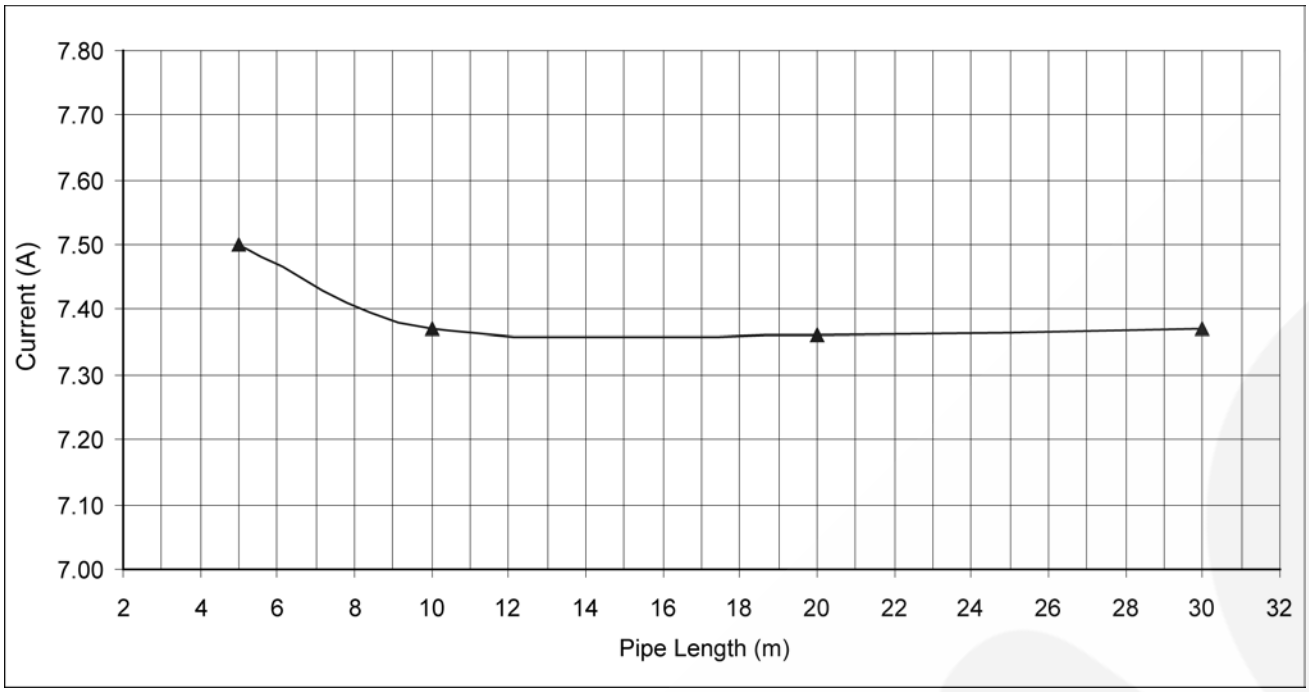
Remote control setting : Hi Fan, COOL 16°C

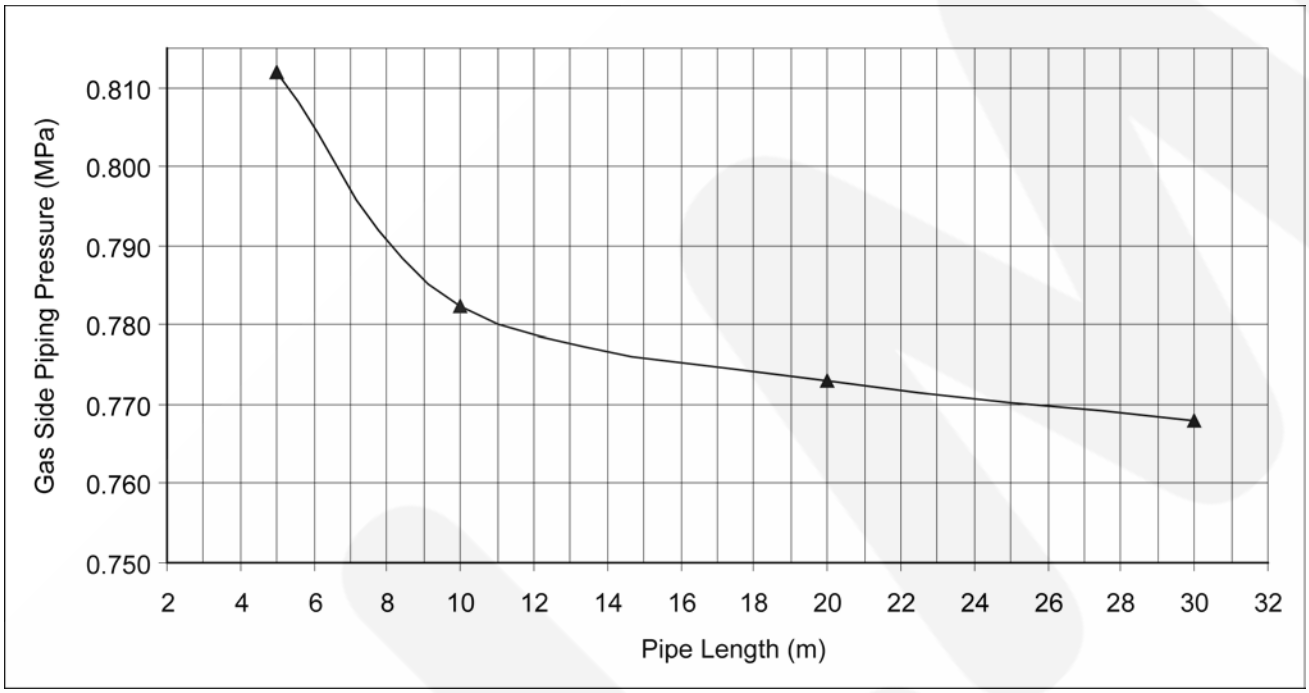
Compressor frequency : Rated cooling

Voltage : 230 V






7.80
7.70
7.60
7.50
7.40
7.30
7.20
7.10
7.00
Current (A)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)


0.810
0.800
0.790
0.780
0.770
0.760
0.750
Gas Side Piping Pressure (MPa)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)

Heating Characteristic at Different Piping Length

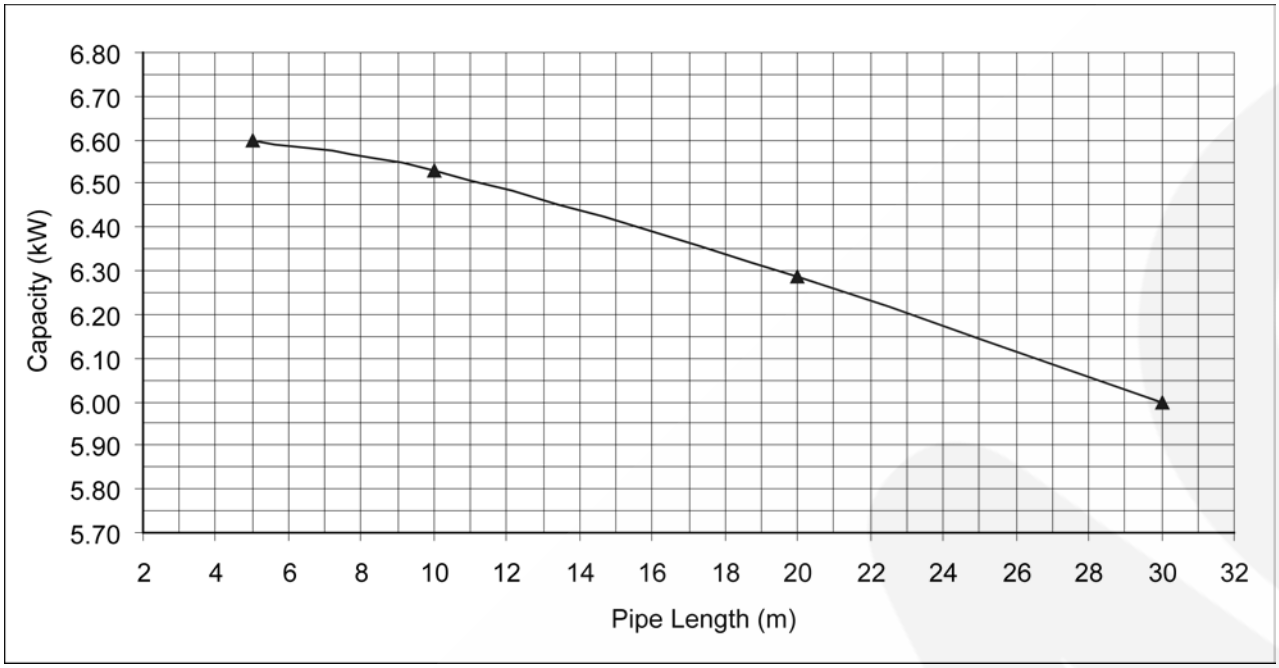
[Condition]

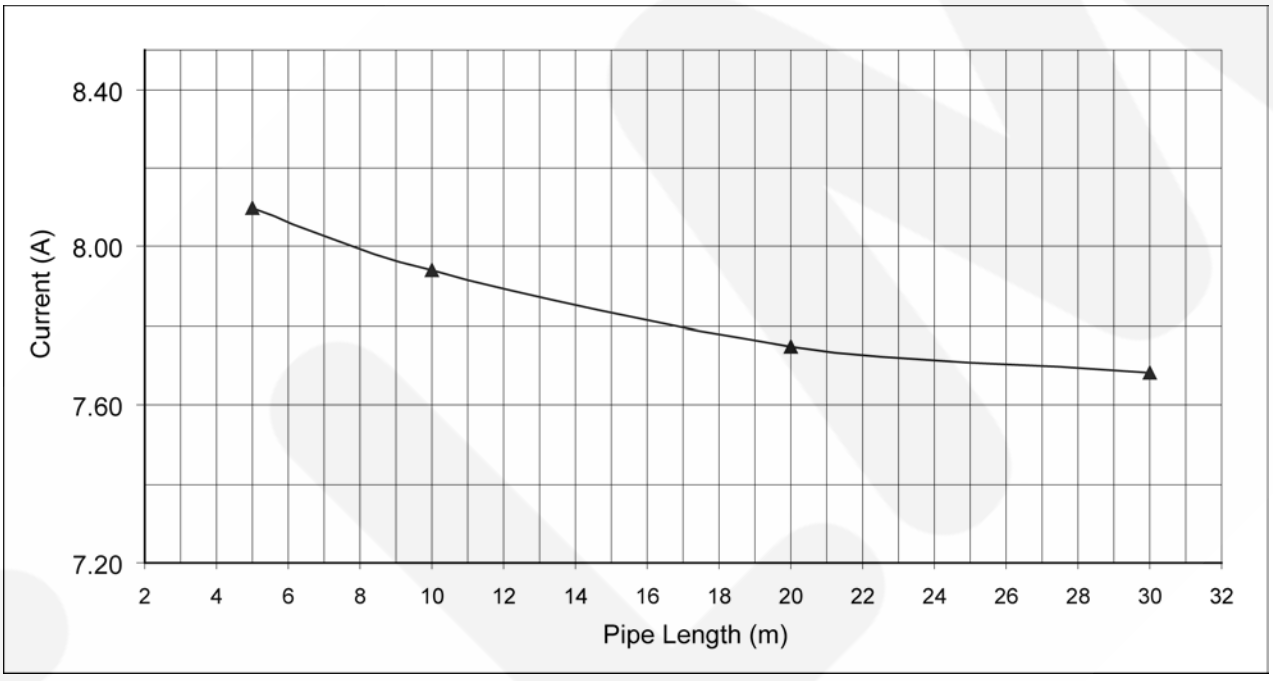
Indoor room temperature : 20°C

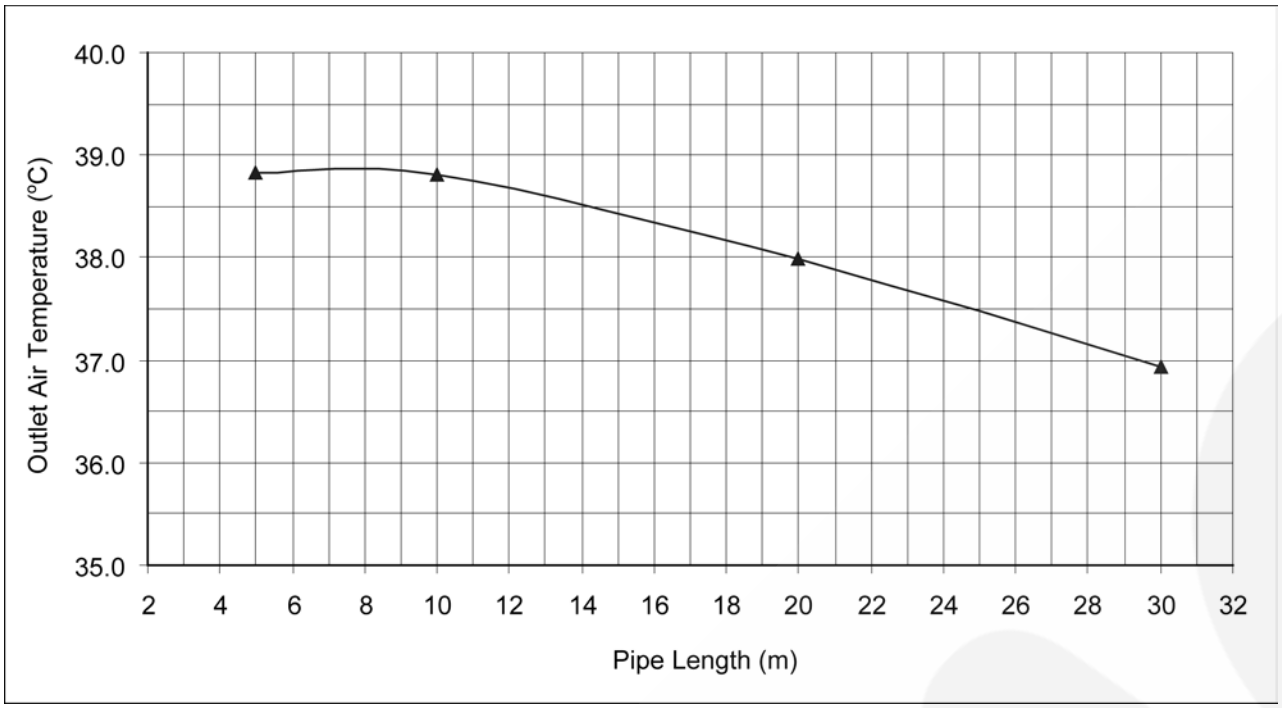
Remote control setting : Hi Fan, HEAT 30°C

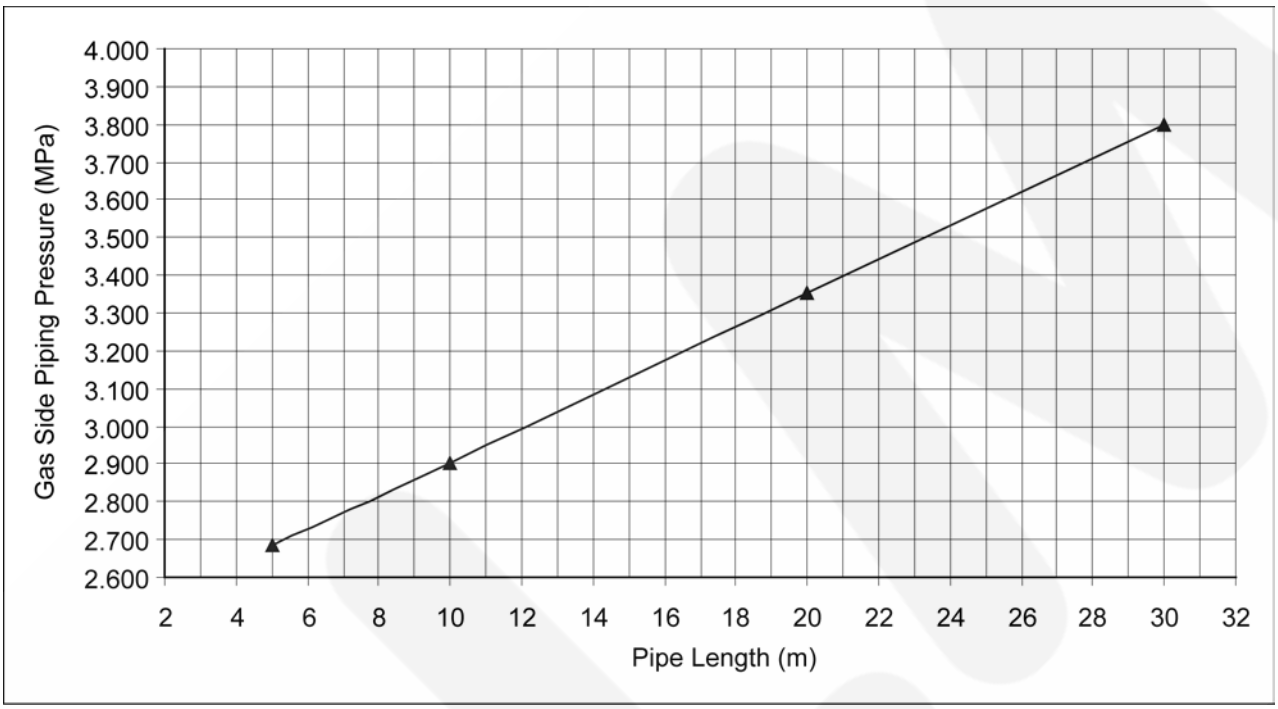
Compressor frequency : Rated heating

Voltage : 230 V






Outlet Air Temperature (°C)
40.0
39.0
38.0
37.0
36.0
35.0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
Pipe Length (m)


Gas Side Piping Pressure (MPa)
4.000
3.900
3.800
3.700
3.600
3.500
3.400
3.300
3.200
3.100
3.000
2.900
2.800
2.700
2.600
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
Pipe Length (m)

16.1.3. CS-E21EKEA CU-E21EKEA

Cooling Characteristic at Different Outdoor Air Temperature

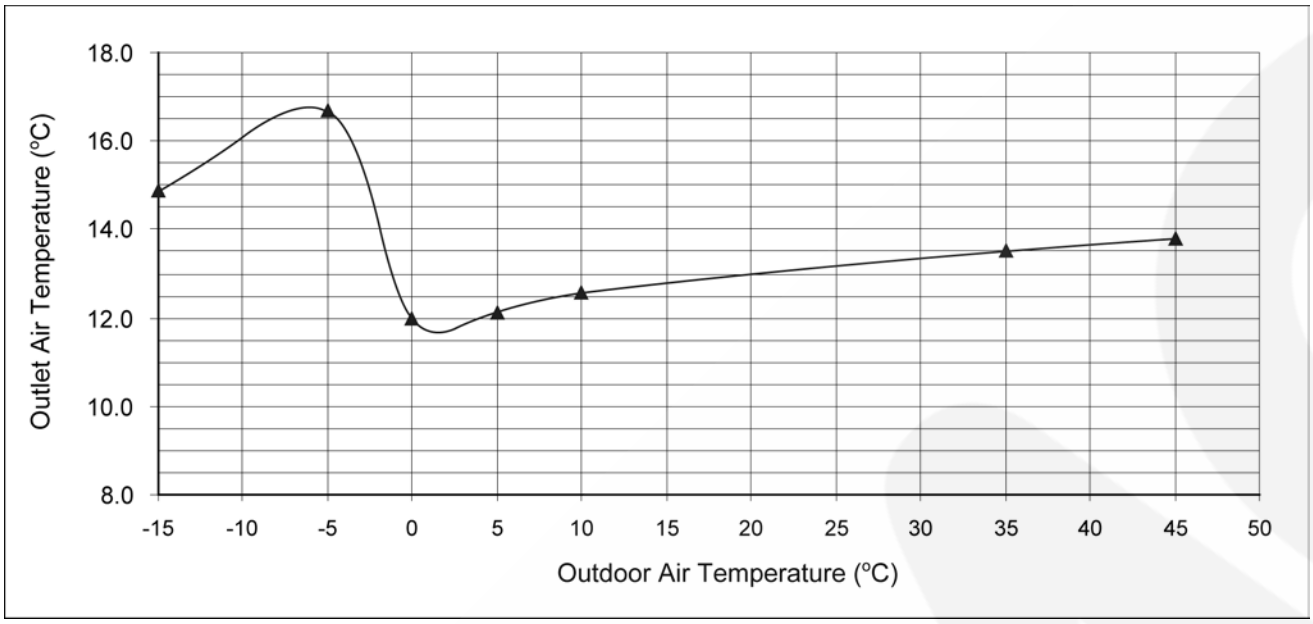
[Condition]

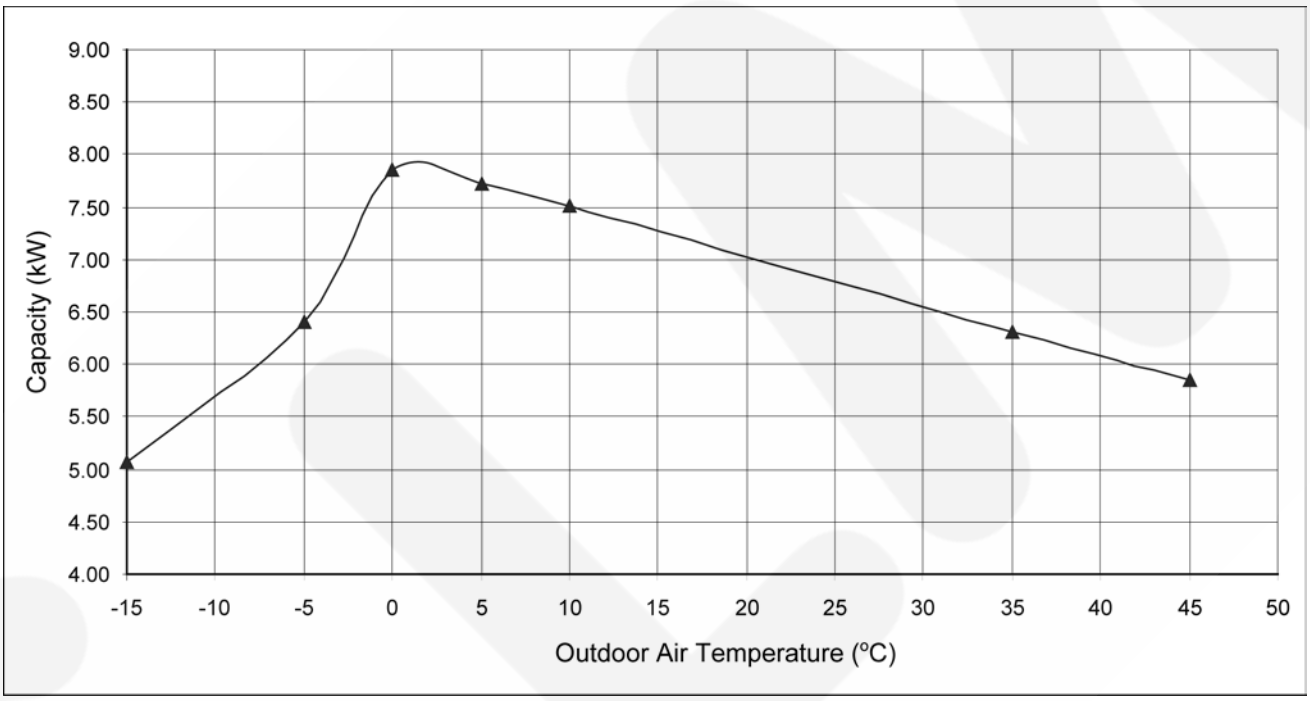
Indoor room temperature : 27/19°C

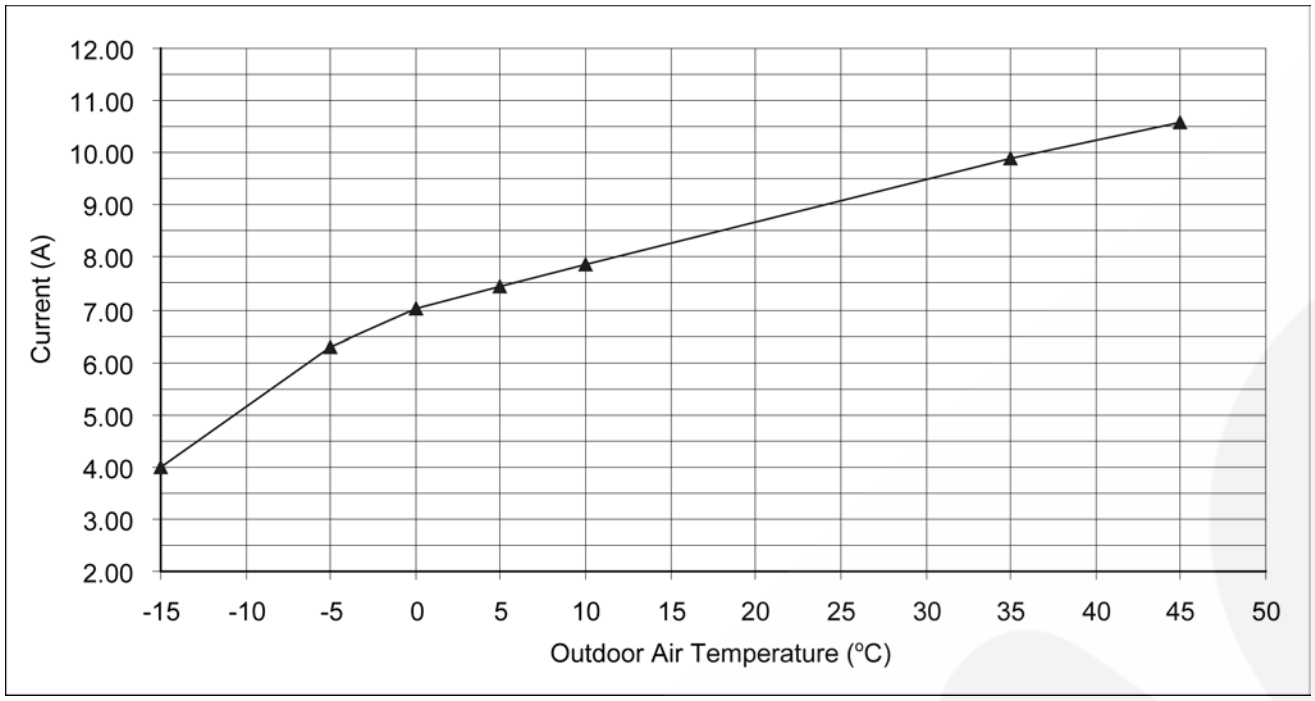
Remote control setting : Hi Fan, COOL 16°C

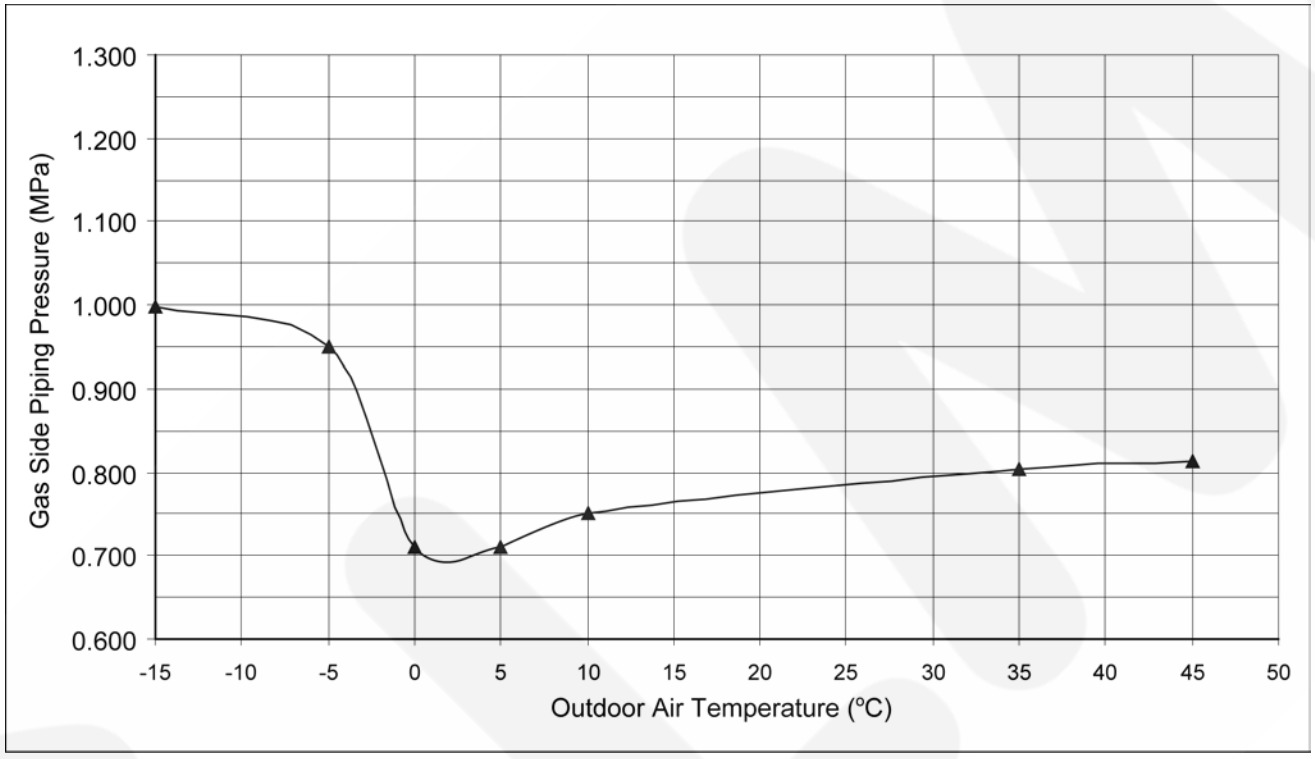
Compressor frequency : Rated cooling

Voltage : 230 V






12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
Current (A)
-15 -10 -5 0 5 10 15 20 25 30 35 40 45 50
Outdoor Air Temperature (°C)


1.300
1.200
1.100
1.000
0.900
0.800
0.700
0.600
Gas Side Piping Pressure (MPa)
-15 -10 -5 0 5 10 15 20 25 30 35 40 45 50
Outdoor Air Temperature (°C)

Heating Characteristic at Different Outdoor Air Temperature

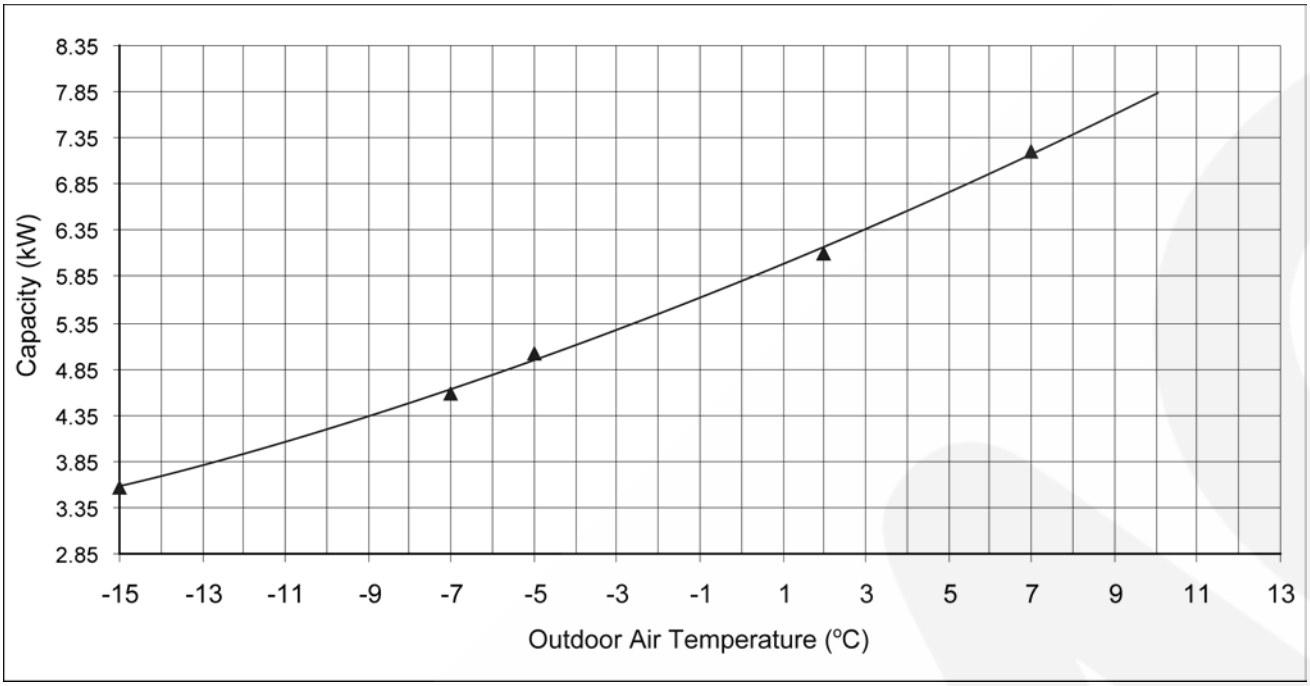
[Condition]

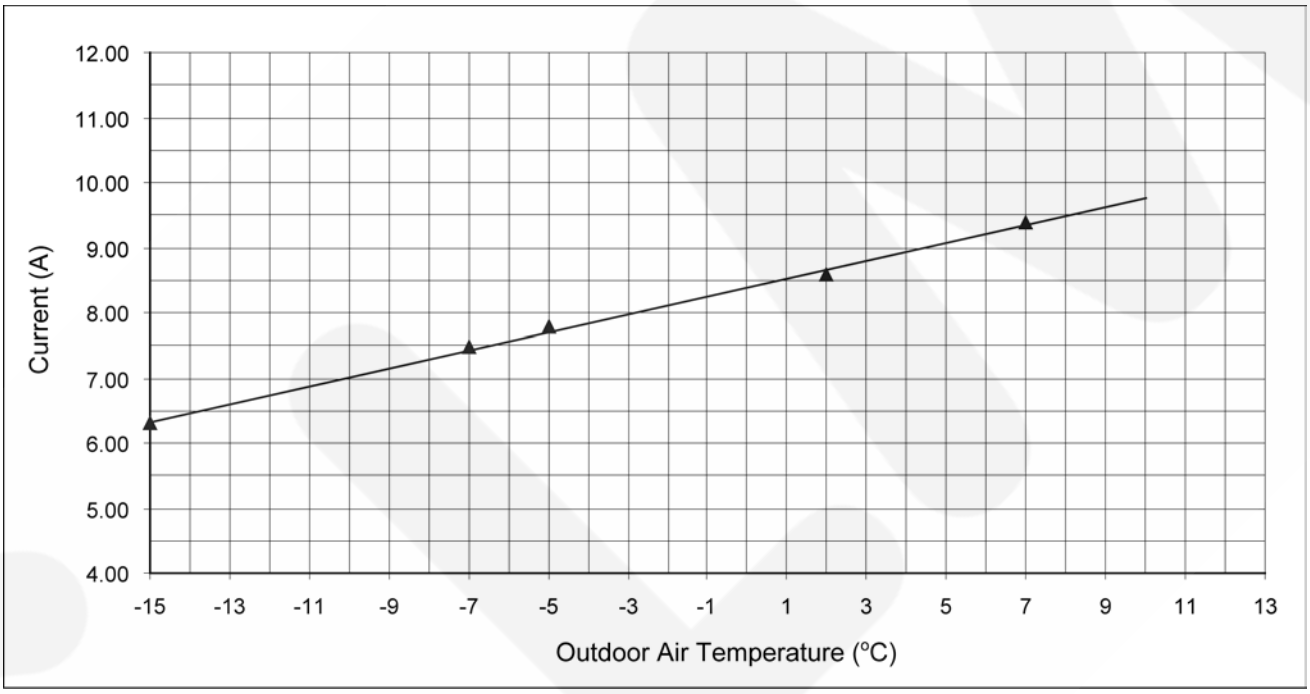
Indoor room temperature : 20°C

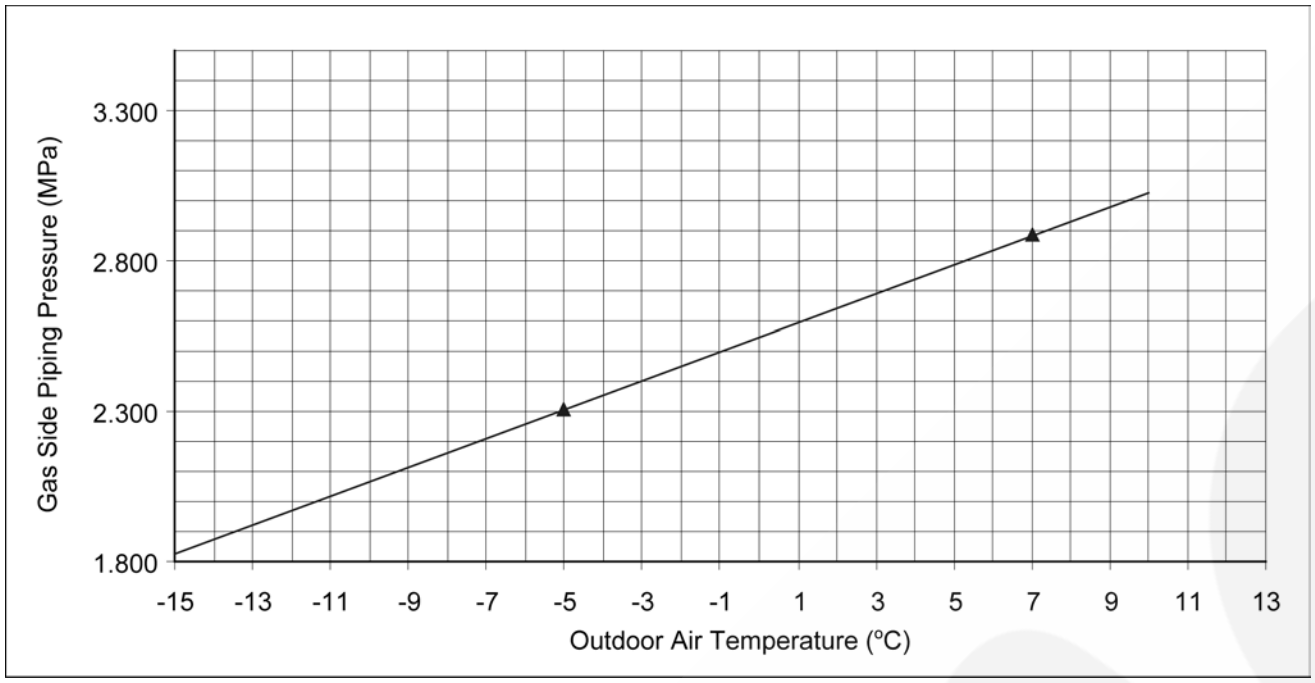
Remote control setting : Hi Fan, HEAT 30°C

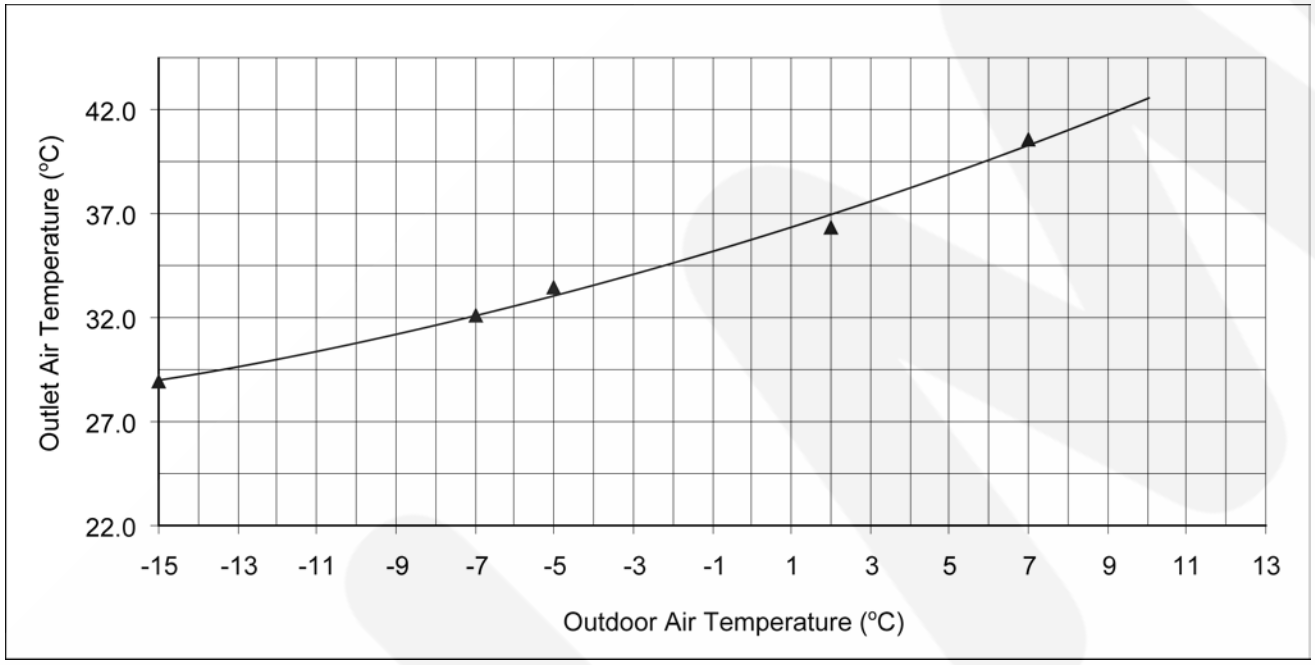
Compressor frequency : Rated heating

Voltage : 230 V






Gas Side Piping Pressure (MPa)
3.300
2.800
2.300
1.800
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)


Outlet Air Temperature (°C)
42.0
37.0
32.0
27.0
22.0
-15 -13 -11 -9 -7 -5 -3 -1 1 3 5 7 9 11 13
Outdoor Air Temperature (°C)

Cooling Characteristic at Different Piping Length

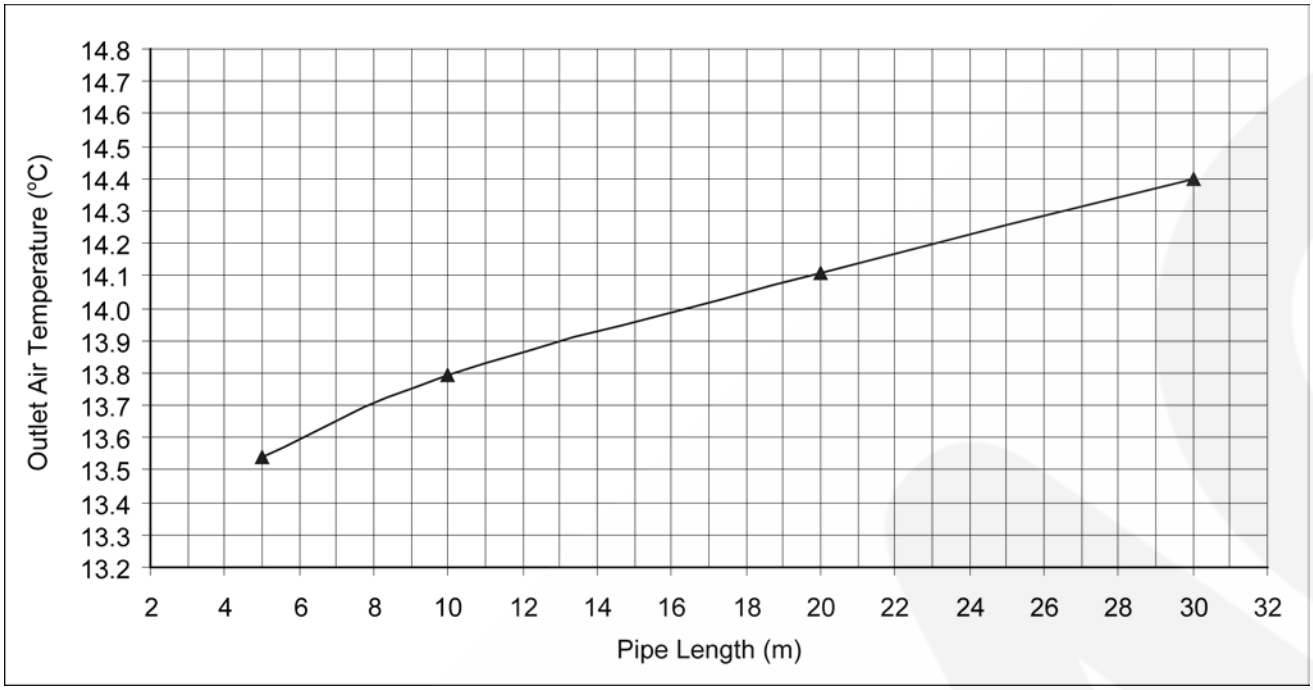
[Condition]

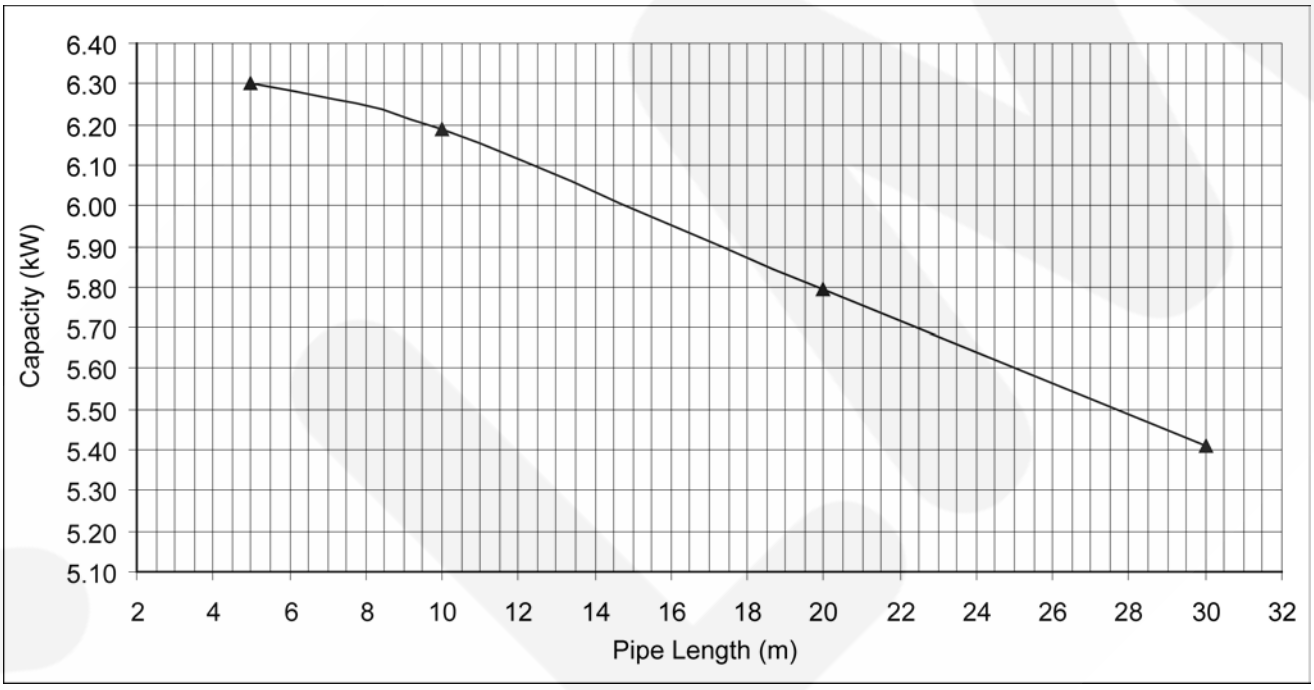
Indoor room temperature : 27/19°C

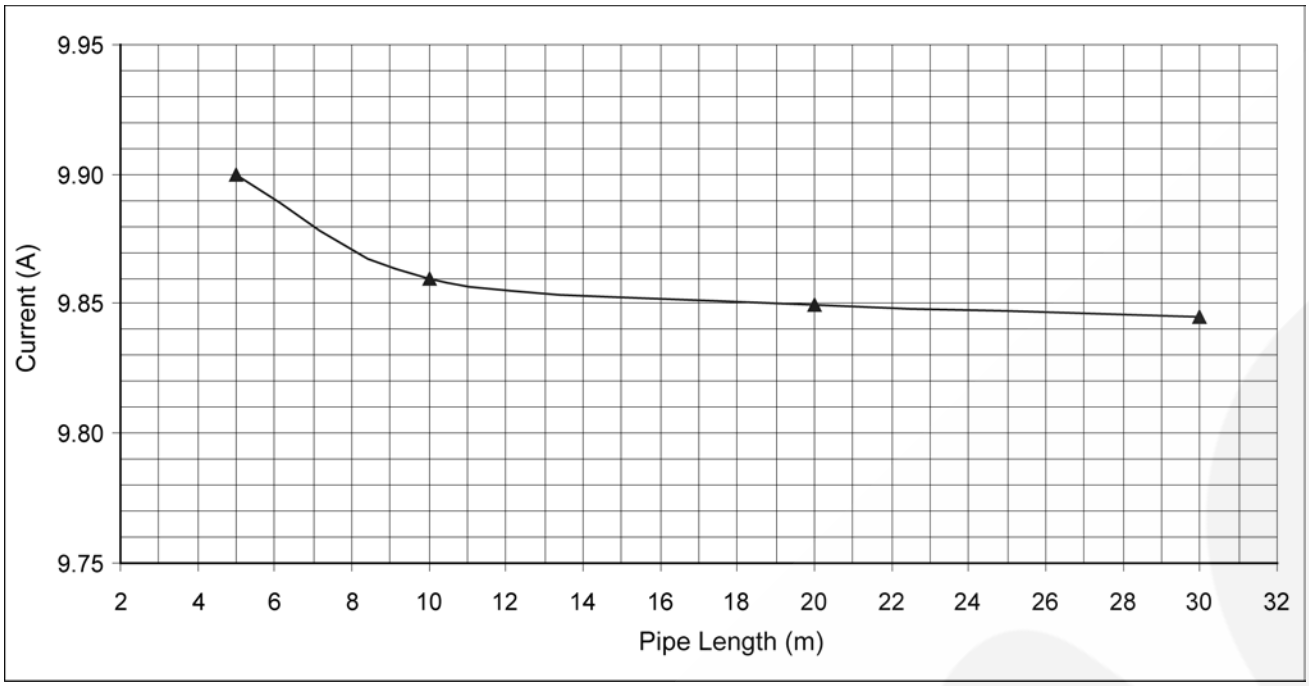
Remote control setting : Hi Fan, COOL 16°C

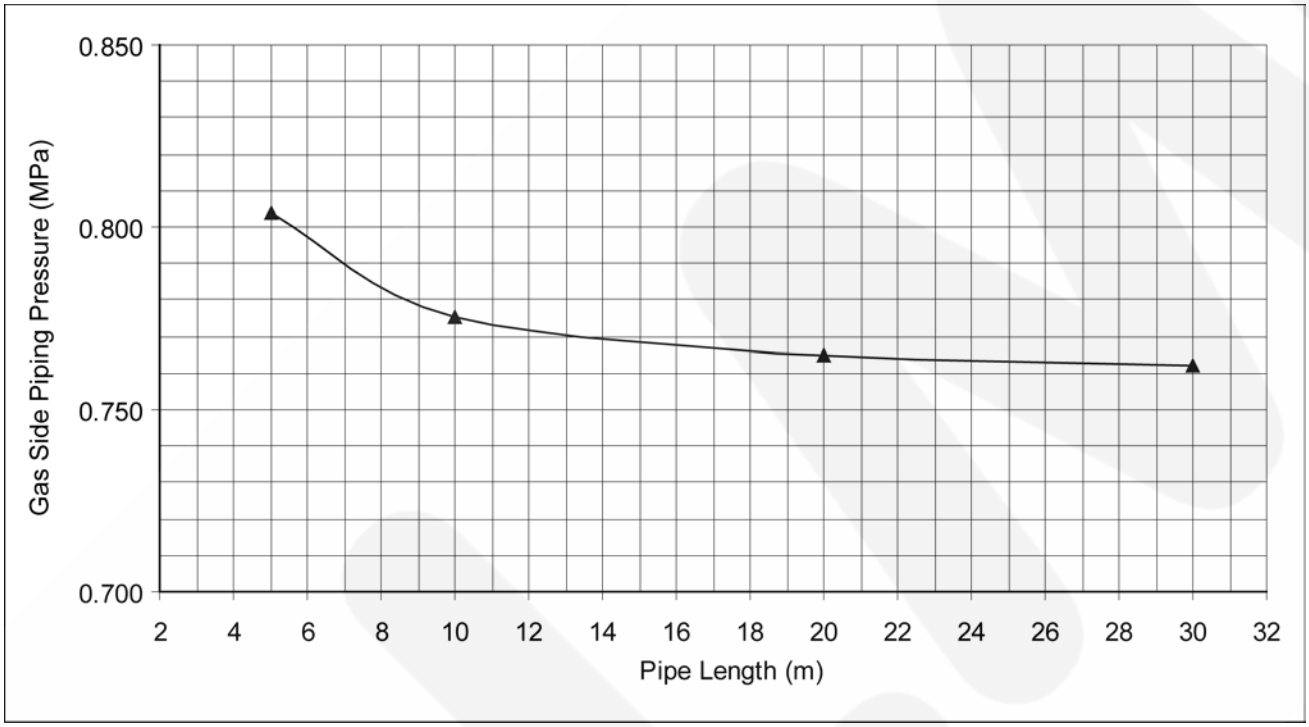
Compressor frequency : Rated cooling

Voltage : 230 V






9.95
9.90
9.85
9.80
9.75
Current (A)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)


0.850
0.800
0.750
0.700
Gas Side Piping Pressure (MPa)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
Pipe Length (m)

Heating Characteristic at Different Piping Length

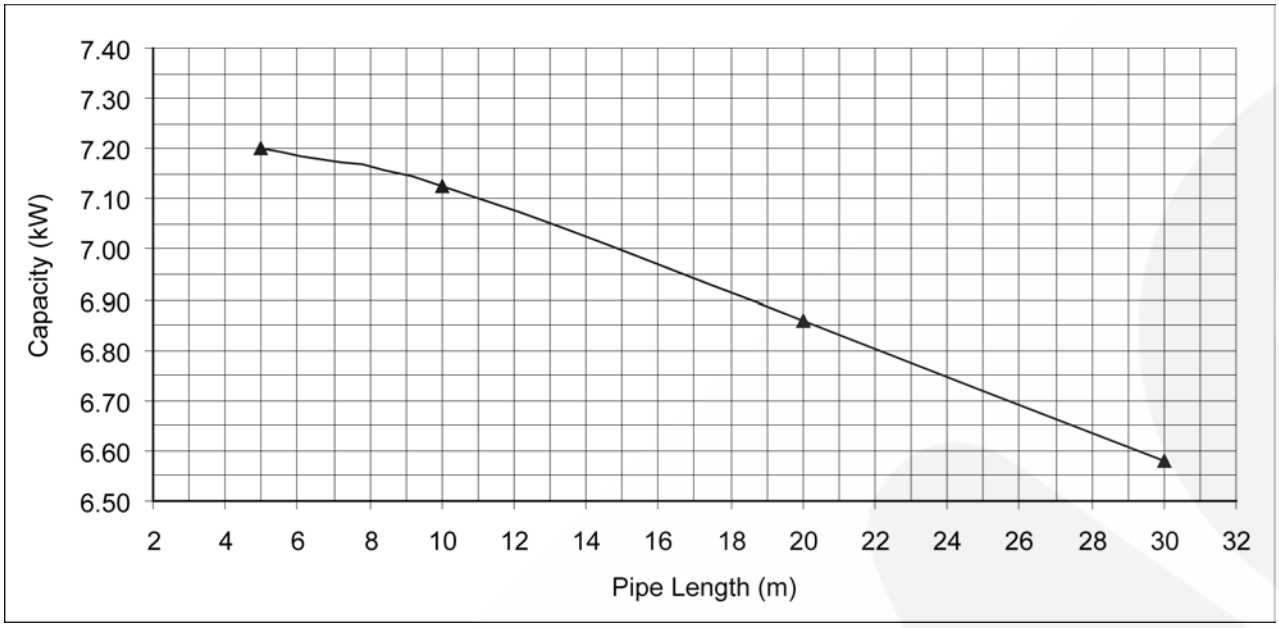
[Condition]

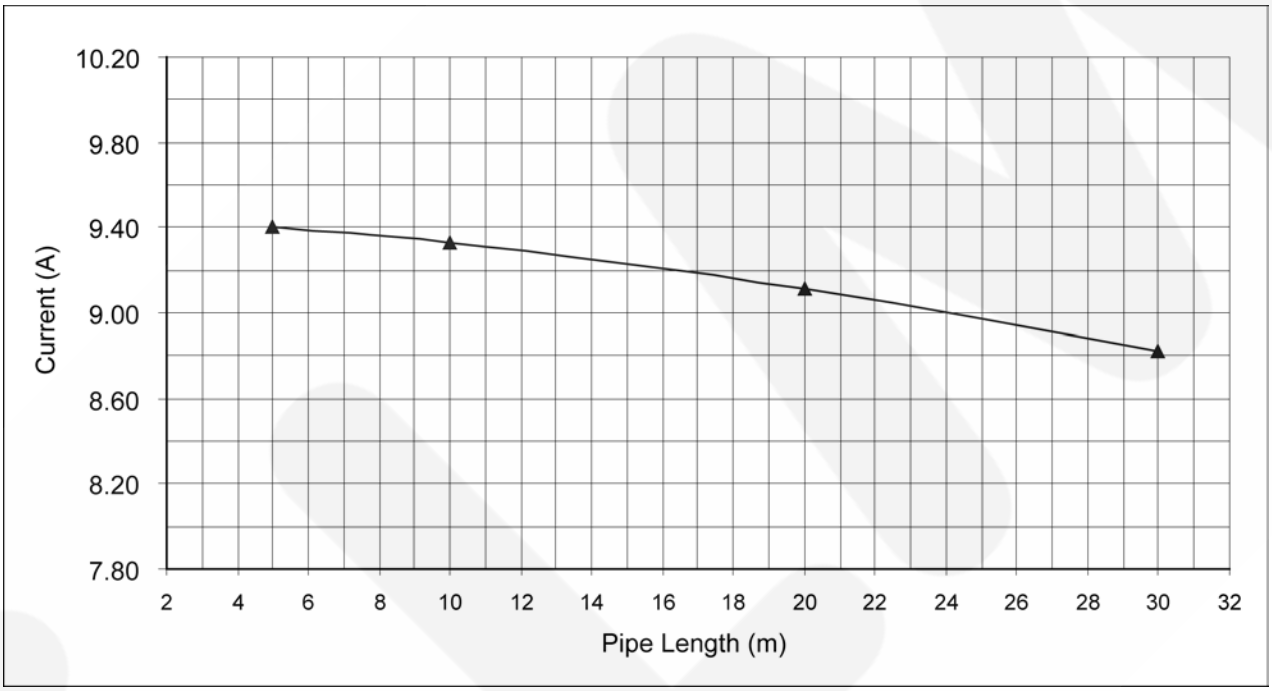
Indoor room temperature : 20°C

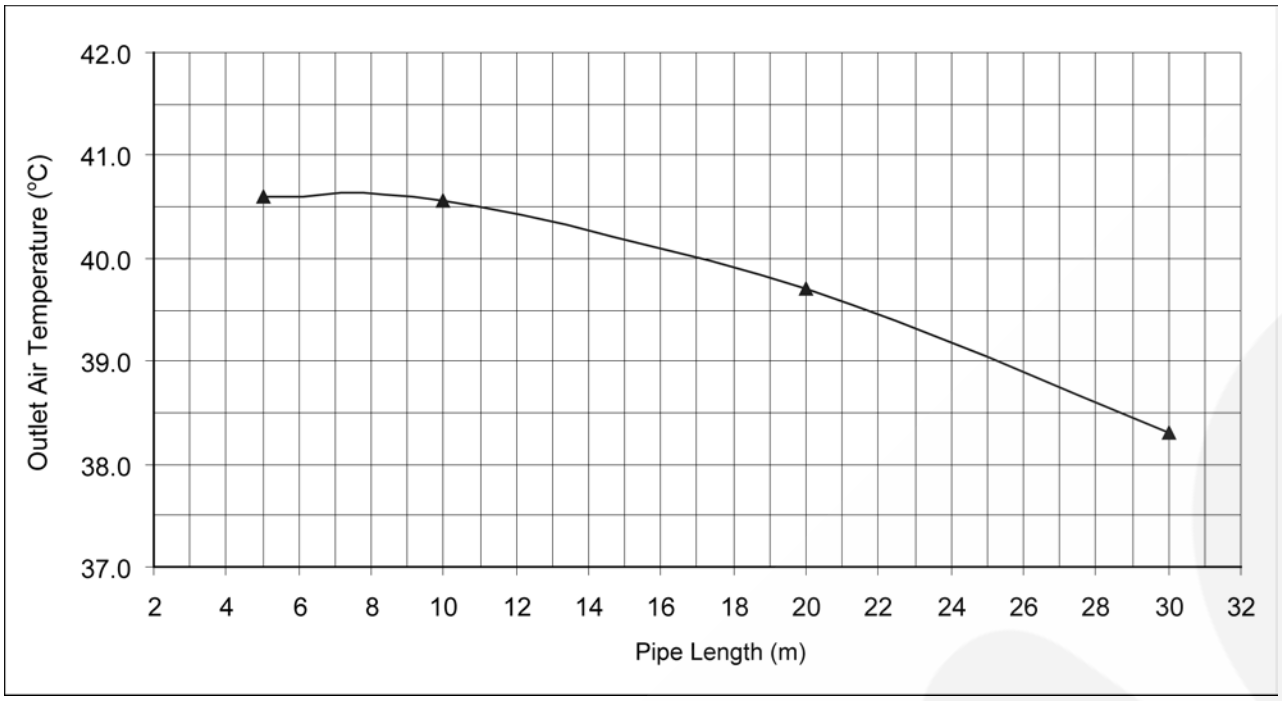
Remote control setting : Hi Fan, HEAT 30°C

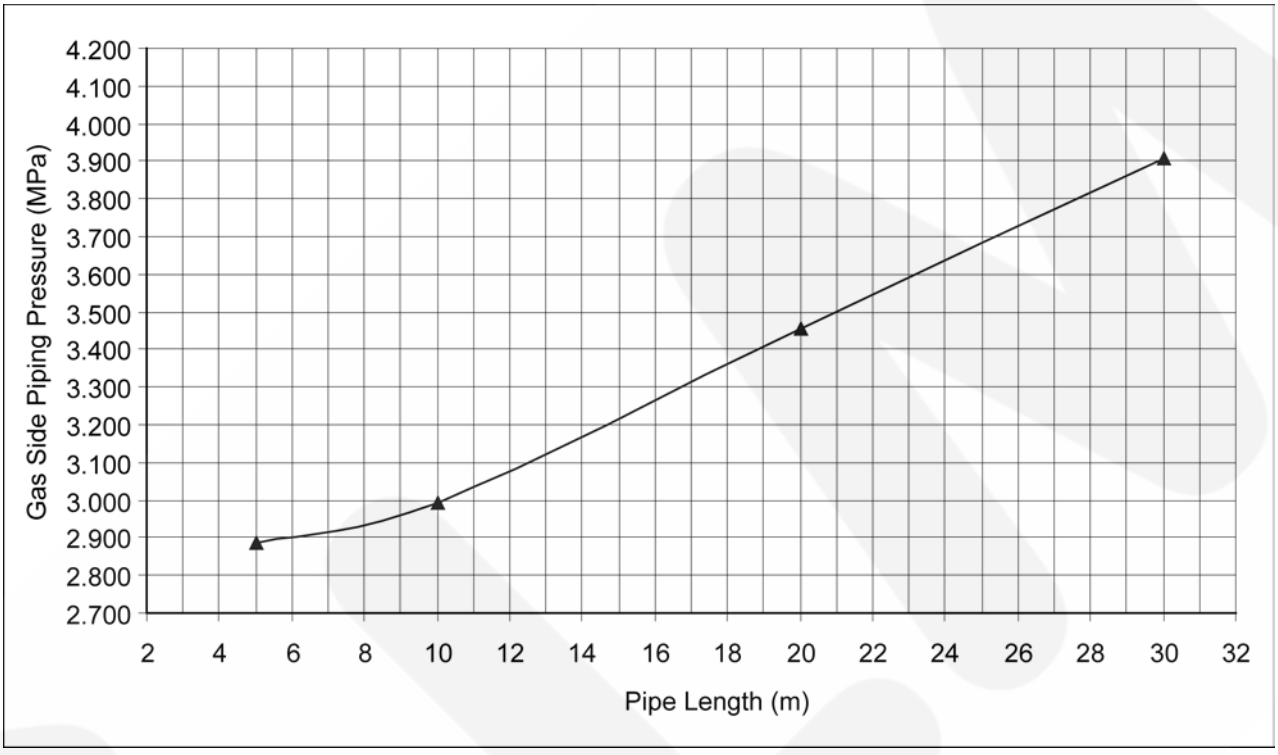
Compressor frequency : Rated heating

Voltage : 230 V






Outlet Air Temperature (°C)
42.0
41.0
40.0
39.0
38.0
37.0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
Pipe Length (m)


Gas Side Piping Pressure (MPa)
4.200
4.100
4.000
3.900
3.800
3.700
3.600
3.500
3.400
3.300
3.200
3.100
3.000
2.900
2.800
2.700
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32
Pipe Length (m)

16.2. Sensible Capacity Chart

● **CS-E15EKEA CU-E15EKEA**

Indoor wet bulb temp.	Outdoor Temp. (°C)											
	30			35			40			46		
	TC	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**
17.0°C	4.36	3.31	1.25	4.08	3.17	1.35	3.79	3.05	1.44	3.45	2.90	1.56
19.0°C				4.40		1.37						
19.5°C	4.79	3.46	1.28	4.48	3.33	1.38	4.17	3.20	1.47	3.79	3.05	1.59
22.0°C	5.22	3.59	1.30	4.88	3.45	1.40	4.54	3.33	1.50	4.13	3.18	1.62

● **CS-E18EKEA CU-E18EKEA**

Indoor wet bulb temp.	Outdoor Temp. (°C)											
	30			35			40			46		
	TC	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**
17.0°C	5.26	3.99	1.51	4.91	3.82	1.63	4.57	3.67	1.74	4.16	3.49	1.88
19.0°C				5.30		1.65						
19.5°C	5.77	4.17	1.54	5.40	4.01	1.66	5.02	3.86	1.77	4.56	3.67	1.91
22.0°C	6.29	4.33	1.57	5.88	4.16	1.69	5.47	4.01	1.80	4.97	3.83	1.95

● **CS-E21EKEA CU-E21EKEA**

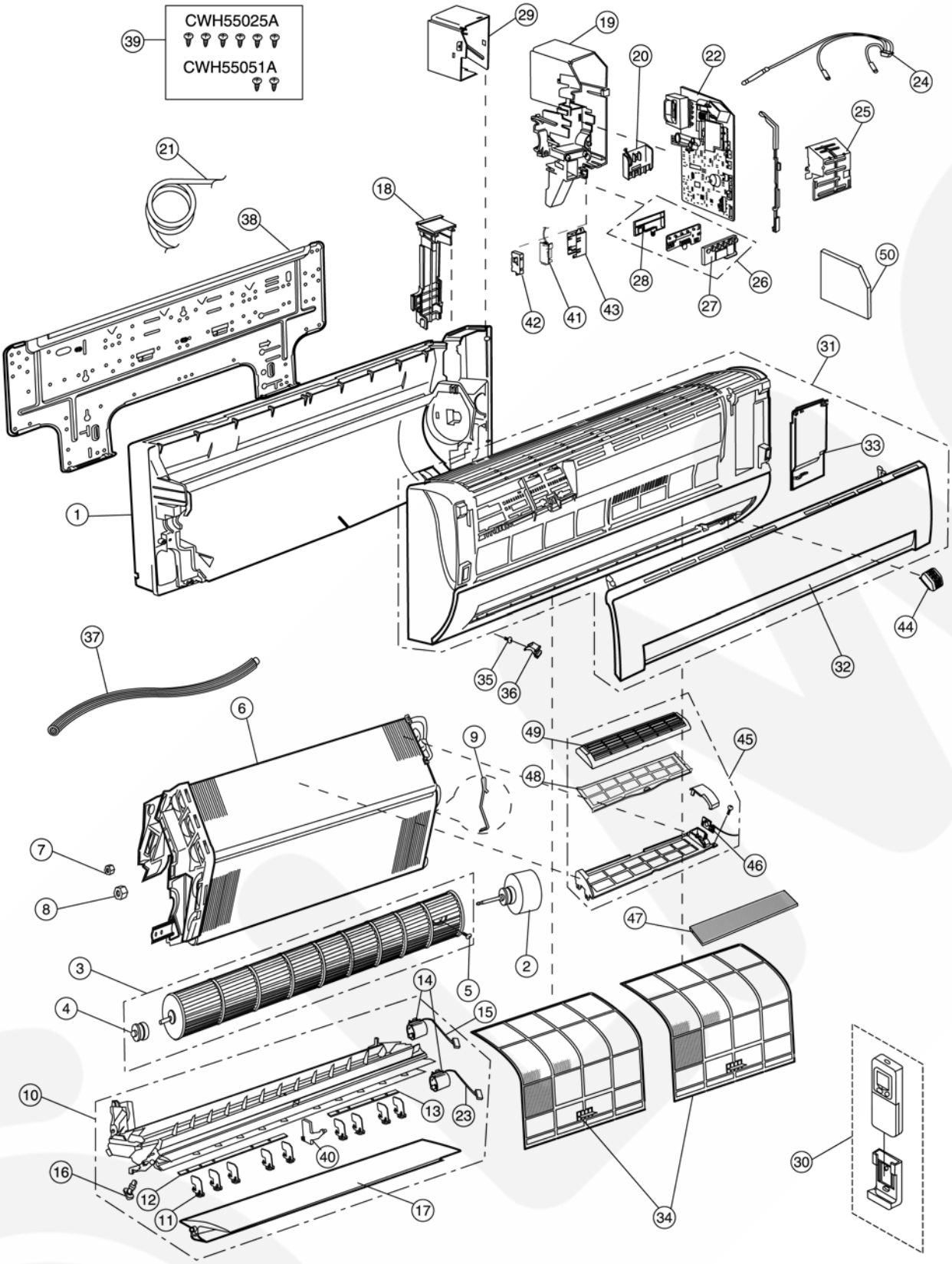
Indoor wet bulb temp.	Outdoor Temp. (°C)											
	30			35			40			46		
	TC	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**	**TC**	**SHC**	**IP**
17.0°C	6.25	4.74	2.02	5.84	4.54	2.18	5.43	4.37	2.33	4.94	4.15	2.51
19.0°C				6.30		2.21						
19.5°C	6.86	4.96	2.06	6.41	4.77	2.22	5.97	4.59	2.37	5.42	4.37	2.56
22.0°C	7.48	5.14	2.10	6.99	4.95	2.26	6.50	4.77	2.42	5.91	4.55	2.61

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

Indoor 27°C/19°C
Outdoor 35°C/24°C

17 Exploded View and Replacement Parts List

17.1. CS-E15EKEA



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.

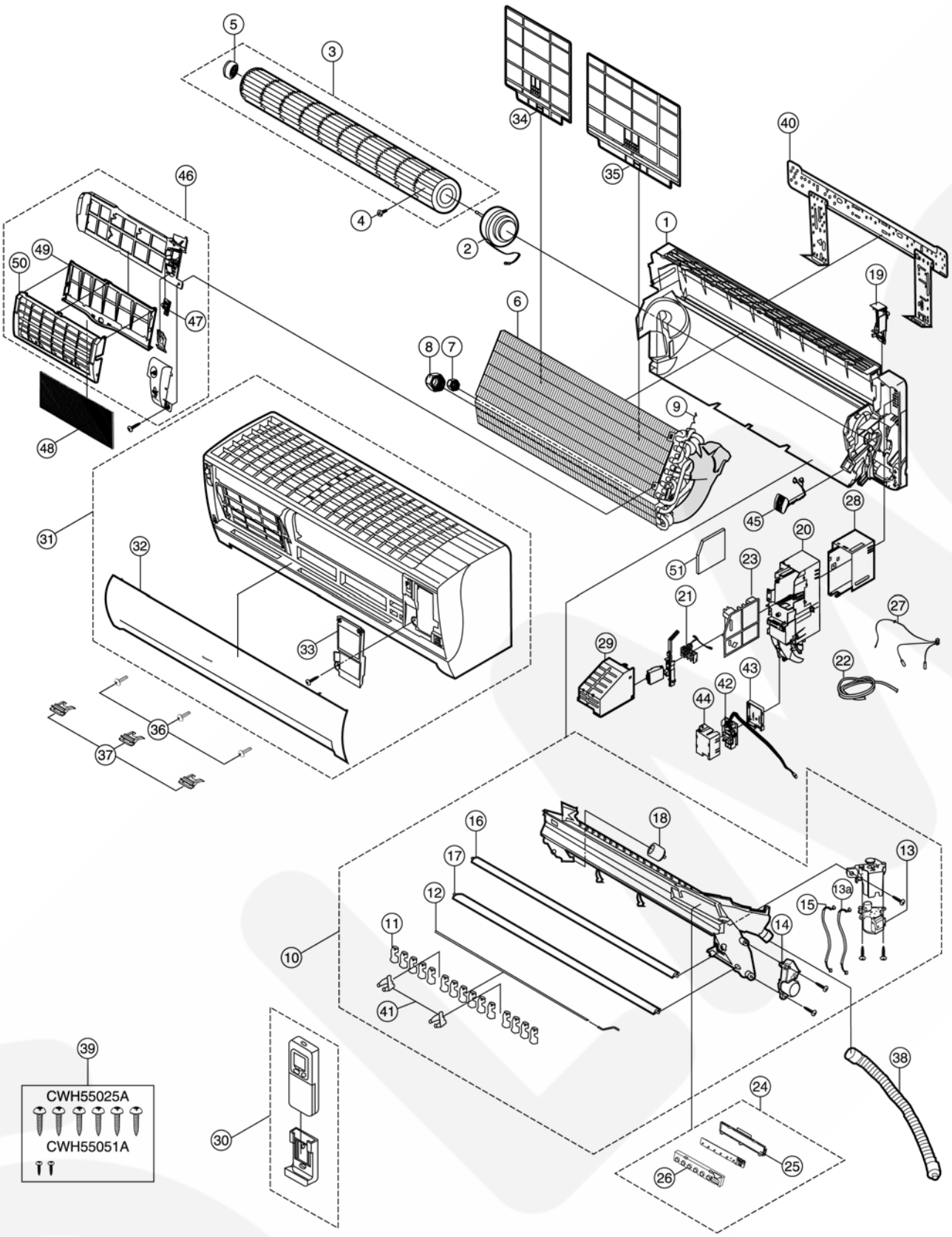
<Model: CS-E15EKEA>

REF NO.	PART NAME & DESCRIPTION	QTY.	CS-E15EKEA	REMARKS
1	CHASSY COMPLETE	1	CWD50C1431	
2	FAN MOTOR	1	CWA981149J	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1045	
4	BEARING ASS'Y	1	CWH64K007	
5	SCREW - CROSS FLOW FAN	1	CWH551146	
6	EVAPORATOR	1	CWB30C1833	
7	FLARE NUT	1	CWT251030 (1/4")	
8	FLARE NUT	1	CWT251032 (1/2")	
9	HOLDER SENSOR	1	CWH32143	
10	DISCHARGE GRILLE COMPLETE	1	CWE20C2343	
11	VERTICAL VANE	9	CWE241150	
12	CONNECTING BAR	1	CWE261072	
13	CONNECTING BAR	1	CWE261065	
14	AIR SWING MOTOR	2	CWA98260+MJ	O
15	LEAD WIRE - AIR SWING MOTOR	1	CWA67C3849	
16	CAP - DRAIN TRAY	1	CWH521096	
17	HORIZONTAL VANE	1	CWE24C1155	
18	BACK COVER CHASSIS	1	CWD932454	
19	CONTROL BOARD CASING	1	CWH102289	
20	TERMINAL BOARD COMPLETE	1	CWA28C2069	O
21	POWER SUPPLY CORD	1	CWA20C2478	
22	ELECTRONIC CONTROLLER - MAIN	1	CWA73C2016	O
23	LEAD WIRE - AIR SWING MOTOR	1	CWA67C3977	O
24	SENSOR COMPLETE	1	CWA50C2321	O
25	CONTROL BOARD FRONT COVER	1	CWH13C1120	
26	INDICATOR COMPLETE	1	CWE39C1126	O
27	INDICATOR HOLDER	1	CWD932429	
28	INDICATOR HOLDER	1	CWD932430	
29	CONTROL BOARD TOP COVER	1	CWH131207	
30	REMOTE CONTROL COMPLETE	1	CWA75C2807	O
31	FRONT GRILLE COMPLETE	1	CWE11C3138	O
32	INTAKE GRILLE	1	CWE22C1154	
33	GRILLE DOOR	1	CWE141073	
34	AIR FILTER	2	CWD001144	
35	SCREW - FRONT GRILLE	2	XTT4+16CFJ	
36	CAP - FRONT GRILLE	2	CWH521109	
37	DRAIN HOSE	1	CWH851063	
38	INSTALLATION PLATE	1	CWH361067	
39	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C067	
40	FULCRUM	1	CWH621046	
41	ELECTRONIC CONTROLLER - IONIZER	1	CWA743675	O
42	CASING - IONIZER	1	CWD932464	
43	CASING - IONIZER	1	CWD932431	
44	ION GENERATOR	1	CWH94C0001	
45	SUPERSONIC AIR PURIFYING DEVICE	1	CWH91C1013	
46	ELECTRONIC CONTROLLER SUPERSONIC	1	CWA743874	O
47	SUPER ALLERU BUSTER FILTER	1	CWD00C1133	
48	FRAME FR AIR FILTER SUPERSONIC	1	CWD011027	
49	FRAME FR AIR FILTER SUPERSONIC	1	CWD011026	
50	ELECTRONIC CONTROLLER - POWER	1	CWA744060	O

(Note)

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

17.2. CS-E18EKEA CS-E21EKEA



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.

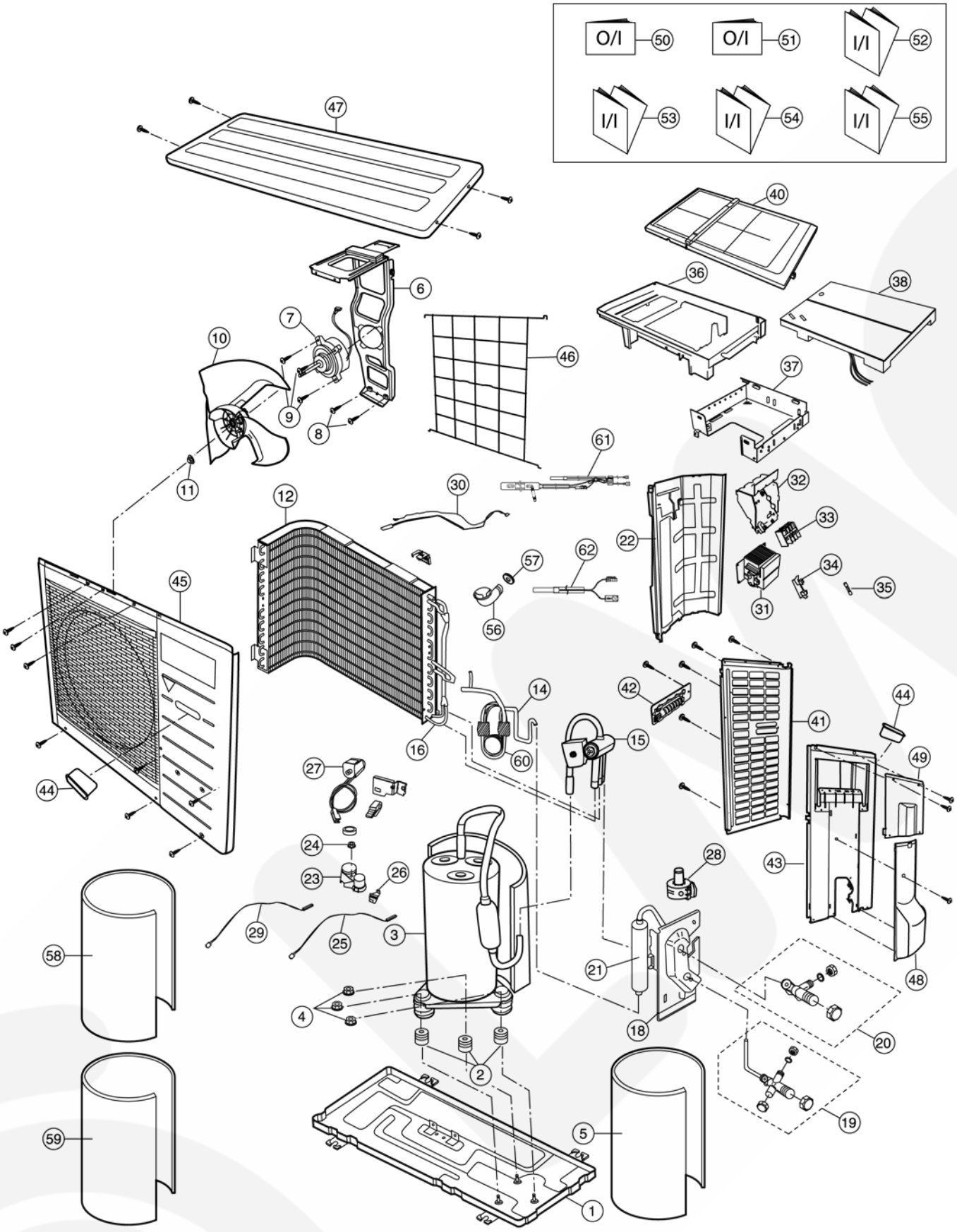
<Model: CS-E18EKEA / CS-E21EKEA>

REF NO.	PART NAME & DESCRIPTION	QTY.	CS-E18EKEA	CS-E21EKEA	REMARKS
1	CHASSY COMPLETE	1	CWD50C1382	←	
2	FAN MOTOR	1	CWA981149J	←	O
3	CROSS FLOW FAN COMPLETE	1	CWH02C1010	←	
4	SCREW - CROSS FLOW FAN	1	CWH551146	←	
5	BEARING ASS'Y	1	CWH64K007	←	
6	EVAPORATOR	1	CWB30C1859	CWB30C1860	
7	FLARE NUT	1	CWT251030 (1/4")	←	
8	FLARE NUT	1	CWT251032 (1/2")	←	
9	HOLDER SENSOR	1	CWH32143	←	
10	DISCHARGE GRILLE COMPLETE	1	CWE20C2441	←	
11	VERTICAL VANE	15	CWE241088	←	
12	CONNECTING BAR	1	CWE261025	←	
13	AIR SWING MOTOR	1	CWA98260+MJ	←	O
13a	LEAD WIRE - AIR SWING MOTOR	1	CWA67C3849	←	
14	AIR SWING MOTOR	1	CWA98K1008	←	O
15	LEAD WIRE - AIR SWING MOTOR	1	CWA67C3731	←	
16	HORIZONTAL VANE	1	CWE241152A	←	
17	HORIZONTAL VANE	1	CWE241153A	←	
18	CAP - DRAIN TRAY	1	CWH52C1001	←	
19	BACK COVER CHASSIS	1	CWD932162B	←	
20	CONTROL BOARD CASING	1	CWH102291	←	
21	TERMINAL BOARD COMPLETE	1	CWA28C2120J	←	O
22	POWER SUPPLY CORD	1	CWA20C2493	←	O
23	ELECTRONIC CONTROLLER - MAIN	1	CWA73C2017	CWA73C2018	O
24	INDICATOR COMPLETE	1	CWE39C1116	←	O
25	INDICATOR HOLDER	1	CWD932435	←	
26	INDICATOR HOLDER	1	CWD932436	←	
27	SENSOR COMPLETE	1	CWA50C2322	←	O
28	CONTROL BOARD TOP COVER	1	CWH131209	←	
29	CONTROL BOARD FRONT COVER	1	CWH131210	←	
30	REMOTE CONTROL COMPLETE	1	CWA75C2807	←	O
31	FRONT GRILLE COMPLETE	1	CWE11C3160	←	O
32	INTAKE GRILLE COMPLETE	1	CWE22C1159	←	O
33	GRILLE DOOR	1	CWE141076	←	
34	AIR FILTER (L)	1	CWD001137	←	
35	AIR FILTER (R)	1	CWD001138	←	
36	SCREW - FRONT GRILLE	3	XTT4+16CFJ	←	
37	CAP - FRONT GRILLE	3	CWH521062A	←	
38	DRAIN HOSE	1	CWH851063	←	
39	BAG COMPLETE - INSTALLATION SCREW	1	CWH82C067	←	
40	INSTALLATION PLATE	1	CWH36K1007	←	
41	FULCRUM	2	CWH621047	←	
42	ELECTRONIC CONTROLLER - IONIZER	1	CWA743675	←	O
43	CASING - IONIZER	1	CWD932464	←	
44	CASING - IONIZER	1	CWD932527	←	
45	ION GENERATOR	1	CWH94C0001	←	
46	SUPERSONIC AIR PURIFYING DEVICE	1	CWH91C1013	←	
47	ELECTRONIC CONTROLLER SUPERSONIC	1	CWA743874	←	O
48	SUPER ALLERU BUSTER FILTER	1	CWD00C1133	←	
49	FRAME FR AIR FILTER SUPERSONIC	1	CWD011027	←	
50	FRAME FR AIR FILTER SUPERSONIC	1	CWD011026	←	
51	ELECTRONIC CONTROLLER - POWER	1	CWA744060	←	O

(Note)

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

17.3. CU-E15EKEA CU-E18EKEA CU-E21EKEA



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.

<Model: CU-E15EKEA / CU-E18EKEA / CU-E21EKEA>

REF. NO.	DESCRIPTION & NAME	QTY.	CU-E15EKEA	CU-E18EKEA	CU-E21EKEA	REMARKS
1	CHASSY ASS'Y	1	CWD50K2085	←	←	
2	ANTI-VIBRATION BUSHING	3	CWH50077	←	←	
3	COMPRESSOR	1	5CS130XAD04	←	←	O
4	NUT-COMPRESSOR MOUNT	3	CWH56000J	←	←	
5	SOUND PROOF MATERIAL	1	CWG302302	←	←	
6	FAN MOTOR BRACKET	1	CWD541084	CWD541054	←	
7	FAN MOTOR	1	CWA981166J	←	←	O
8	SCREW - FAN MOTOR BRACKET	2	CWH551060J	←	←	
9	SCREW - FAN MOTOR MOUNT	3	CWH551106J	←	←	
10	PROPELLER FAN ASSY	1	CWH03K1016	←	←	
11	NUT - PROPELLER FAN	1	CWH56053J	←	←	
12	CONDENSER	1	CWB32C1583	CWB32C1527	CWB32C1526	
14	TUBE ASS'Y COMPLETE (CAP TUBE/EXP.VALVE)	1	CWT023679	←	←	O
15	4 WAYS VALVE	1	CWB001057	←	CWB001026J	
16	STRAINER	1	CWB11094	←	←	
18	HOLDER - COUPLING	1	CWH351056	←	←	
19	3 WAYS VALVE (GAS)	1	CWB011338	←	←	O
20	2 WAYS VALVE (LIQUID)	1	CWB021292	←	←	O
21	OIL SEPARATER ASS'Y	1	-	-	CWB16K1016	O
22	SOUND PROOF BOARD	1	CWH151050	←	←	
23	TERMINAL COVER	1	CWH171001	←	←	
24	NUT-TERMINAL COVER	1	CWH7080300J	←	←	
25	SENSOR COMPLETE (COMP. TOP)	1	CWA50C2185	←	←	
26	HOLDER SENSOR	1	CWH321010	←	←	
27	V-COIL COMPLETE (4-WAYS VALVE)	1	CWA43C2168J	←	←	
28	V-COIL COMPLETE (EXPAND VALVE)	1	CWA43C2141J	←	←	
29	SENSOR COMPLETE (COMP. DISC.)	1	CWA50C2180	←	←	
30	SENSOR COMPLETE	1	CWA50C2181	←	←	
31	REACTOR	1	CWA421069	←	←	
32	CONTROL BOARD CASING (SIDE)	1	CWH102273	←	←	
33	TERMINAL BOARD ASSY	1	CWA28K1021J	←	←	
34	FUSE HOLDERS	1	K3GB1BH00005	←	←	
35	FUSE	1	XBA2C31TR0	←	←	
36	CONTROL BOARD CASING (TOP)	1	CWH102204	←	←	
37	CONTROL BOARD CASING (BOTTOM)	1	CWH102282	←	←	
38	ELECTRONIC CONTROLLER - MAIN	1	CWA73C2106R	CWA73C2107R	CWA73C2108R	O
40	CONTROL BOARD COVER (TOP)	1	CWH131167	←	←	
41	CABINET SIDE PLATE (LEFT)	1	CWE041082A	←	←	
42	HANDLE	1	CWE161010	←	←	
43	CABINET SIDE PLATE (RIGHT)	1	CWE041158A	←	←	
44	HANDLE	2	CWE16000E	←	←	
45	CABINET FRONT PLATE CO.	1	CWE06K1043	←	←	
46	WIRE NET	1	CWD041041A	←	←	
47	CABINET TOP PLATE	1	CWE031031A	←	←	
48	CONTROL BOARD COVER (BOTTOM)	1	CWH131168	←	←	
49	CONTROL BOARD COVER (TOP)	1	CWH131169A	←	←	
50	OPERATING INSTRUCTION	1	CWF565136	CWF565138	←	
51	OPERATING INSTRUCTION	1	CWF565137	CWF565139	←	
52	INSTALLATION INSTRUCTION	1	CWF612921	CWF612925	←	
53	INSTALLATION INSTRUCTION	1	CWF612922	CWF612926	←	
54	INSTALLATION INSTRUCTION	1	CWF612923	CWF612927	←	
55	INSTALLATION INSTRUCTION	1	CWF612924	CWF612928	←	

REF. NO.	DESCRIPTION & NAME	QTY.	CU-E15EKEA	CU-E18EKEA	CU-E21EKEA	REMARKS
56	DRAIN HOSE	1	CWH5850080	←	←	
57	PACKING	1	CWB81012	←	←	
58	SOUND PROOF MATERIAL	1	CWG302290	CWG302270	←	
59	SOUND PROOF MATERIAL	1	CWG302301	CWG302300	←	
60	TUBE ASS'Y (CAP. TUBE)	1	-	-	CWT022997	
61	HEATER COMPLETE	1	CWA34C1005	←	←	
62	OVER HEAT PROTECTOR COMPLETE	1	CWA14C1011	←	←	

(Note)

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- "O" marked parts are recommended to be kept in stock.