

TECHNICAL & SERVICE MANUAL

SANYO

KGS1411 / CG1411

FILE NO.

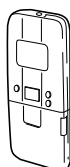
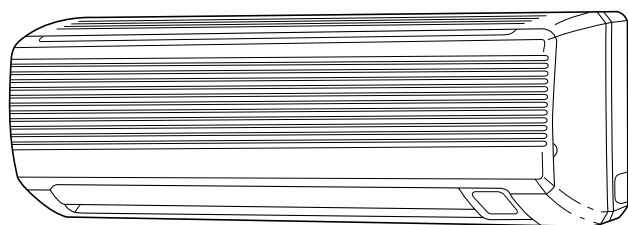
Destination: U.S.A.

GAS HEATER AIR CONDITIONER

Indoor Model No.	Product Code No.
KGS 1411	1 852 062 56

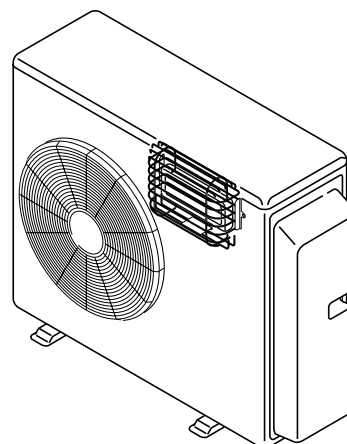
Outdoor Model No.	Product Code No.
CG 1411	1 714 734 00

Indoor Unit



KGS1411

Outdoor Unit



CG1411

REFERENCE NO. **SM700361**



IMPORTANT!

Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.



WARNING

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.



CAUTION

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

SPECIAL PRECAUTIONS

WARNING

When Wiring



ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death**.
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing...

...In a Ceiling or Wall

Make sure the ceiling/wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.

...In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

...In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

...In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

...In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing

- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

Others



CAUTION

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm upon completing installation that no refrigerant gas is leaking. If escaped gas comes in contact with a stove, gas water heater, electric room heater or other heat source, it can produce dangerously toxic gas.

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APPENDIX INSTRUCTION MANUAL

1. OPERATING RANGE

	Temperature	Indoor Air Intake Temp.	Outdoor Air Intake Temp.
Cooling	Maximum	95°F (35°C) D.B. 71°F (21.7°C) W.B.	115°F (46.1°C) D.B.
	Minimum	67°F (19.4°C) D.B. 57°F (13.9°C) W.B.	67°F (19.4°C) D.B.
Heating	Maximum	80°F (26.7°C) D.B. 67°F (19.4°C) W.B.	75°F (23.9°C) D.B. 65°F (18.3°C) W.B.
	Minimum	— D.B. — W.B.	0°F (−17.8°C) D.B. −2°F (−19°C) W.B.

2. SPECIFICATIONS

2-1. Unit Specifications

Indoor unit **KGS1411**

Outdoor unit **CG1411**

Power Source	Cooling	Heating
Electric power source	115V 60Hz	
Employed gas	—	Natural gas (LP)

Voltage Rating	Cooling	Heating
	115V	

Performance	Cooling	Heating
Capacity kW	2.58 8,800	4.1 / 2.9 / 1.8 14,000 / 9,900 / 6,150
Air circulation (High) ft ³ /min (m ³ /min)	282 (8.0)	300 (8.5)
Moisture removal (High) Pints/h	2.2	—

Electrical Rating	Cooling	Heating
Available voltage range V	104 – 126	
Running amperes A	8.2	5.9
Power input W	900	620
Power factor %	95	91
SEER BTU/W	10.0	—
Compressor locked rotor amperes A	49	

Features	
Controls / Temperature control	Microprocessor / I.C. thermostat
Control unit	Wireless remote control unit
Timer	ON / OFF 12 hours, 1-hour OFF
Fan speeds Indoor / Outdoor	3 and Auto / 1 (Hi)
Airflow direction (Indoor) Horizontal	Manual
Vertical	Auto
Air filter	Washable
Compressor	Rotary (Hermetic)
Refrigerant / Amount charged at shipment lb. (kg)	1.34 (0.61)
Refrigerant control	Capillary tube
Operation sound Indoor: Hi / Me / Lo dB-A	39 / 37 / 34
Outdoor: Hi dB-A	45
Refrigerant tubing connections	Flare
Max allowable tubing length at shipment ft. (m)	25 (7.5)
Refrigerant tubing Narrow tube inch (mm)	1/4 (6.35)
diameter Wide tube inch (mm)	3/8 (9.52)

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Remarks: Rating conditions are

Cooling: Indoor air temperature 80°F D.B. / 67°F W.B.

Outdoor air temperature 95°F D.B. / 75°F W.B.

Heating: Indoor air temperature 70°F D.B.

Outdoor air temperature 47°F D.B. / 43°F W.B.

Indoor unit **KGS1411**
Outdoor unit **CG1411**

Dimensions & Weight				Indoor Unit	Outdoor Unit
Unit dimensions	Height	inch (mm)		10-5/8 (270)	23-7/32 (590)
	Width	inch (mm)		31-11/16 (805)	28-1/2 (724)
	Depth	inch (mm)		6-31/32 (177)	11-15/32 (291)
Package dimensions	Height	inch (mm)		9-13/16 (249)	31-1/16 (789)
	Width	inch (mm)		33-21/32 (855)	25-1/32 (636)
	Depth	inch (mm)		13-5/16 (338)	14-29/32 (379)
Weight	Net	lb. (kg)		17.6 (8.0)	85.7 (39.0)
	Shipping	lb. (kg)		22.0 (10.0)	90.8 (41.0)
Shipping volume			cu.ft (m ³)	2.51 (0.071)	6.72 (0.19)

Burner		Natural gas	LP
Burner type		Ribbon burner	
Burner configuration		Slit type	

Gas Consumption				Natural gas	LP
Typical input	BTU/h (kW)	High		15,500 (4.55)	15,500 (0.719 lb./h)
		Medium		10,400 (3.05)	10,400 (0.482 lb./h)
		Low		6,150 (1.80)	6,150 (0.285 lb./h)

Governor Setting Pressure				Natural gas		LP	
P2, P1	Inches water column (kPa)	High Medium Low		P2	P1	P2	P1
				3.43 (0.853)	7.0 (1.74)	3.54 (0.883)	11.0 (2.74)
				1.61 (0.402)	"	1.61 (0.402)	"
				0.63 (0.157)	"	0.63 (0.157)	"

Gas Nozzle			Natural gas	LP
Inner diameter	ø inch (ø mm)		0.0807 (2.05)	0.0630 (1.60)
Q'ty			1	1

Safety Devices		Cooling	Heating
Re-start timer (3 minute)			○
Compressor over-load limiting			○
Circuit fuse			○
Current limit function (out of range between 0.8 – 17A)			○
Thermal fuse		—	○
Auto reset temperature limiting 221°F (105°C)		—	○
Flame rod		—	○

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Remarks: Rating conditions are
Cooling: Indoor air temperature 80°F D.B. / 67°F W.B.
Outdoor air temperature 95°F D.B. / 75°F W.B.
Heating: Indoor air temperature 70°F D.B.
Outdoor air temperature 47°F D.B. / 43°F W.B.

2-2. Major Component Specifications

2-2-1. Indoor Unit

Indoor unit **KGS1411**

Control PCB		
Part No.	Controls	POW-KGS14A, B Microprocessor
Control circuit fuse		115V
Remote Control Unit		RCS-IRS2U
Fan & Fan Motor		
Type		Cross-flow
Q'ty ... Dia. and length	inch (mm)	1 ... ø 95 / L617 (ø 3-3/4 / L24-9/32)
Fan motor model ... Q'ty		KFV4-21HIP ... 1P
Nominal output	W	15
Coil resistance (ambient temp. 68°F (20°C))	Ω	BLU – BRN: 104.9 BLU – PNK: 128.0
Safety devices	Type	X23
	Operating temp. Open °F (°C)	259 (126) ±4 (±2)
	Close	—
Run capacitor	μF	3.5
	VAC	180
Flap Motor		
Type		Stepping motor
Model		MP24GA1
Rating		DC12V
Coil resistance (ambient temp. 77°F (25°C))	Ω	WHT – BLU (respectively 4 wires): 380 ± 7%
Heat Exchanger Coil		
Coil		Aluminum plate fin / Copper tube
Rows		2
Fin pitch	inch (mm)	1/16 (1.4)
Face area	ft ² (m ²)	1.40 (0.130)

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

2-2-2. Outdoor Unit (1)

Outdoor unit **CG1411**

Control PCB		
Part No.		CG1411
Controls		Microprocessor
Control circuit fuse		115V 5A
Gas Connection		
Employed gas		Natural Gas (LP)
Gas connection		1/2 Female
Compressor		
Type		Rotary (Hermetic)
Compressor model		C-1R71H2W
Nominal output	W	700
Compressor oil ... Amount	cc	SUNISO 4GSD-T ... 370
Coil resistance (ambient temp. 68°F (20°C))	Ω	C – R: 0.879 C – S: 3.609
Safety devices	Type	External (OLR)
	Overload relay	MRA98962-9200
	Operating temp. Open °F (°C)	275 ± 9 (135 ± 5)
	Close °F (°C)	156 ± 20 (69 ± 11)
	Operating amp (ambient temp. 77°F (25°C))	Trip in 6 to 16 sec. at 34A
Run capacitor	μF	35
	VAC	330
PTC starter	Part number	912X24E400XR20-PS2A
	Resistance	Ω 47
	Max voltage	300
Crank case heater		—
Fan & Fan Motor		
Type		Propeller
Q'ty ... Dia. and length	inch. (mm)	1 ... 13-25/32 (ø 350)
Fan motor model ... Q'ty		SB6-11H1P ... 1
No. of poles ... rpm (115V, High)		6 ... 600
Nominal output	W	10
Coil resistance (ambient temp. 77°F (25°C))	Ω	BLU – BRN: 114.0 ± 7% BLU – WHT: 153.4 ± 7%
Safety devices	Type	Thermostat
	Operating temp. Open °F (°C)	266 ± 14 (130 ± 8)
	Close °F (°C)	174 ± 27 (79 ± 15) Automatic reclosing
Run capacitor	μF	5.0
	VAC	220
Heat Exchanger Coil		
Coil		Aluminum plate fin / Copper tube
Rows		1
Fin pitch	inch (mm)	1/16 (1.3)
Face area	ft ² (m ²)	2.73 (0.254)
External Finish		Acrylic baked-on enamel finish

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

2-2-2. Outdoor Unit (2)

Outdoor unit **CG1411**

Burner		
Type		Ribbon burner
Q'ty ... Material, thickness	inch (mm)	1 ... Stainless steel, 0.0157 (0.4)
Nozzle		
Q'ty ... Material		1 ... Brass
Diameter	ø inch (ø mm)	0.0807 (2.05 ± 0.05)
Fan & Fan Motor		
Type		Sirocco fan
Q'ty ... Dia. and length	inch (mm)	1 ... ø 3.346 (85) and 0.984 (25)
Fan motor model ... Q'ty		FU2-051FIMP ... 1
No. of poles ... rpm		2 ... (1,300 – 2,900)
Nominal output	W	6
Coil resistance (ambient temp. 68°F (20°C))	Ω	21.3
Safety devices	Type	Thermal fuse
	Operating temp. Open °F (°C)	293 (145)
	Close	—
Refrigerant Heater		
Case / Coil		Aluminum (collapsible forming) / Copper tube
Heat conduction face area	ft ² (m ²)	1.83 (0.17)
Heat load	× 10 ⁻³ BTU/h • ft ² (m ²)	7.65 (1.3)
Combination Gas Valve		
Type		Combination control
Model		UP13-27
Coil resistance	Valve (SV1 & SV2 for shut-off)	Ω 1600 ± 10%
	Valve (PV for control)	Ω 87 ± 10%
Igniter		
Type		Electric sparking
Model		IG-XS07-S

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

2-3. Other Component Specifications

2-3-1. Indoor Unit

Indoor unit **KGS1411**

Transformer		ATR-1581T2-U
Rating	Primary	AC 115V, 60Hz
	Secondary	13.7V, 0.5A
	Capacity	6.85VA
Coil resistance	Ω (at 77°F (25°C))	Primary (WHT – WHT): 128 ± 20% Secondary (BRN – BRN): 2.28 ± 20%
Thermal cut-off temp.		277°F (136°C)
Thermistor (Coil sensor)		DTN-TKS118B
Resistance	kΩ	32°F (0°C) 188 ± 4%
Thermistor (Room sensor)		DTN-TKS134B
Resistance	kΩ	77°F (25°C) 5.0 ± 3%

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

2-3-2. Outdoor Unit

Outdoor unit **CG1411**

Transformer (TR)		4FF4L510034000
Rating	Primary	AC 115V, 60Hz
	Secondary S1	DC 25.4V, 0.25A
	S2	DC 12.6V, 0.1A
	S3	AC 100V, 1Ma
	Capacity	5VA
Coil resistance	Ω (at 70°F (21°C))	Primary (ORG – ORG): 71.1 \pm 10% Secondary (RED – RED): 5.79 \pm 10% Secondary (BLU – BLU): 8.38 \pm 10% Secondary (YEL – YEL): 257 \pm 10%
Thermal cut-off temp.		277°F (136°C)

Power Relay (PR)		DFU24D1F
Coil rating		DC 24V
Coil resistance	Ω (at 68°F (20°C))	650 \pm 10%
Contact rating		AC 250V, 20A

Thermistor 1 (Discharge pressure)		PB3M-41E
Resistance	k Ω	122°F (50°C) 2.2 \pm 5%

Thermistor 2 (Outlet refrigerant temp.)		PB3M-41E
Resistance	k Ω	131°F (55°C) 2.2 \pm 5%

Reversing Valve		CHV-01AE (Coil), CHV-0101 (Valve)
Coil rating		AC115 – 120V, 50/60Hz, 6/5W
Coil resistance	Ω	370

ON/OFF Valve (Q'ty = 2)		NEV-MOAE (Coil), NEV-603DXF (Valve)
Coil rating		AC115 – 120V, 50/60Hz, 7W
Coil resistance	Ω	370

Check Valve 1 (See Refrigerant Diagram)		FCV-3020D
--	--	------------------

Check Valve 2 (See Refrigerant Diagram)		BCV-804DX
--	--	------------------

Auto Reset Temperature Limiting		
Model		CS-7L
Rating		AC125V, 200mA

Thermal Fuse		
Model		X25
Cut-off temp.		293°F (145°C)

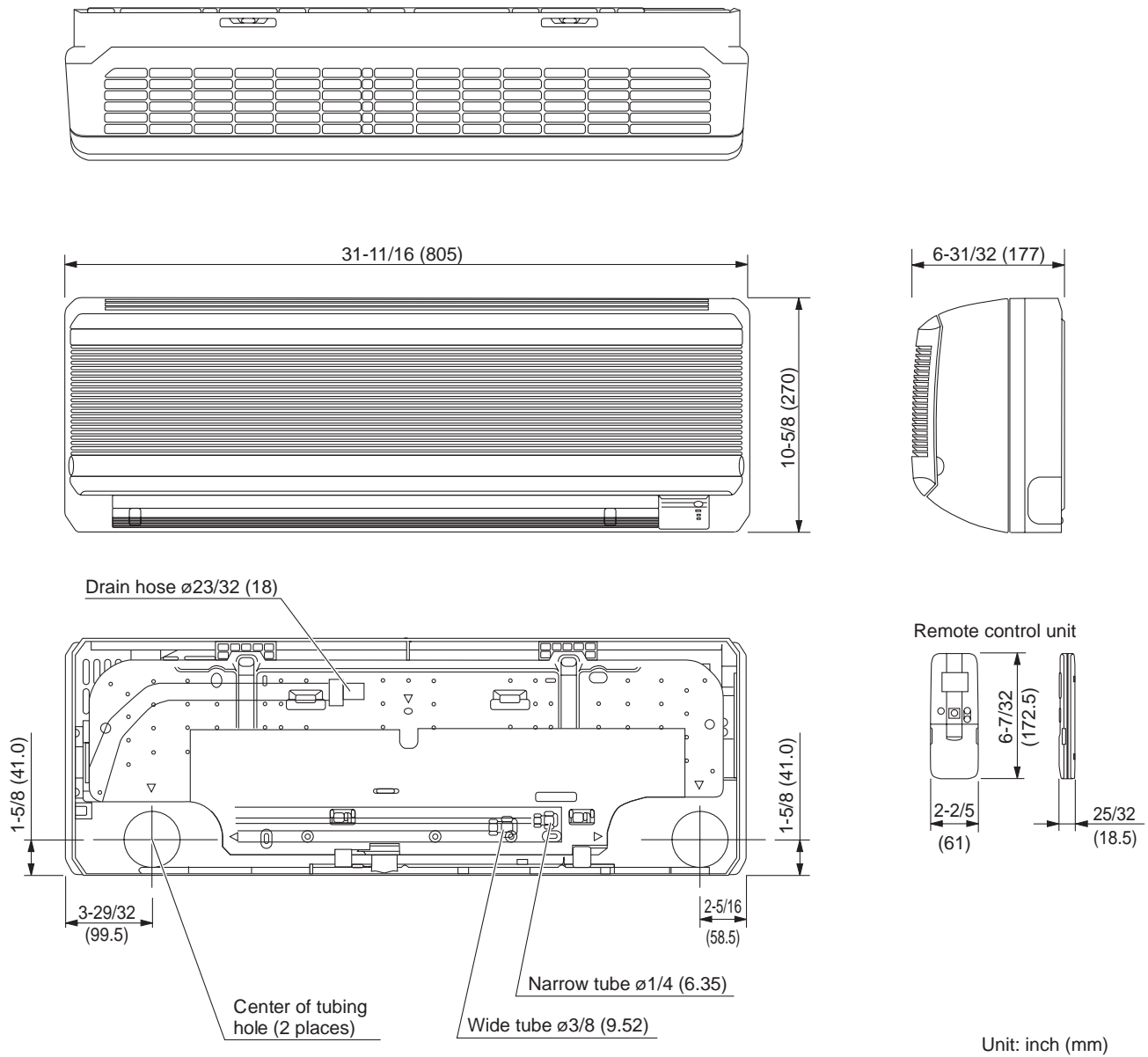
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3. DIMENSIONAL DATA

3-1. Unit

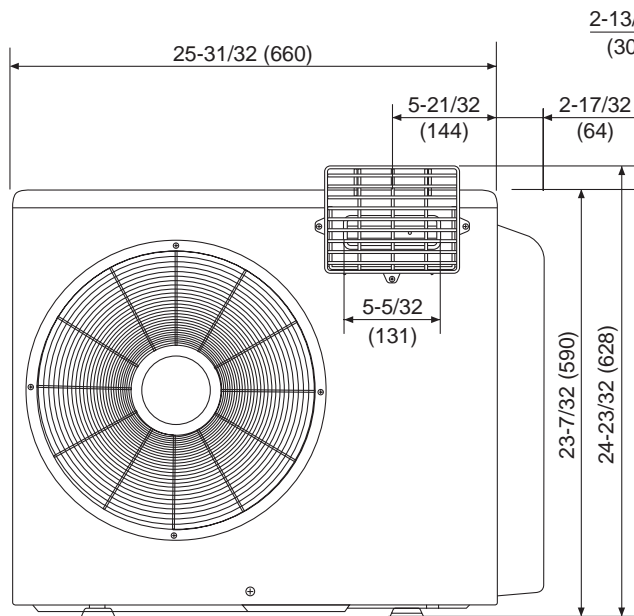
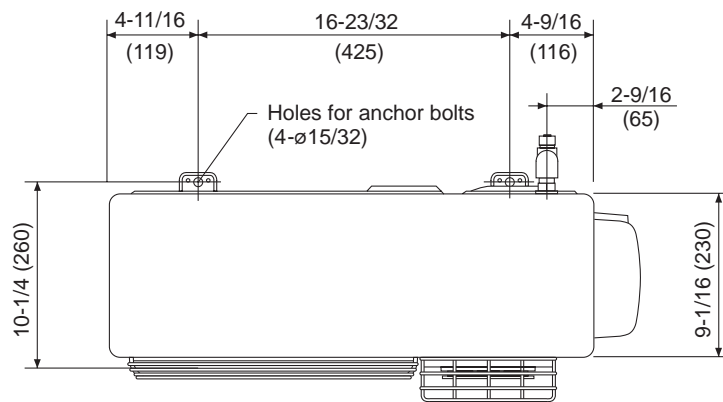
3-1-1. Indoor Unit

Indoor unit **KGS1411**

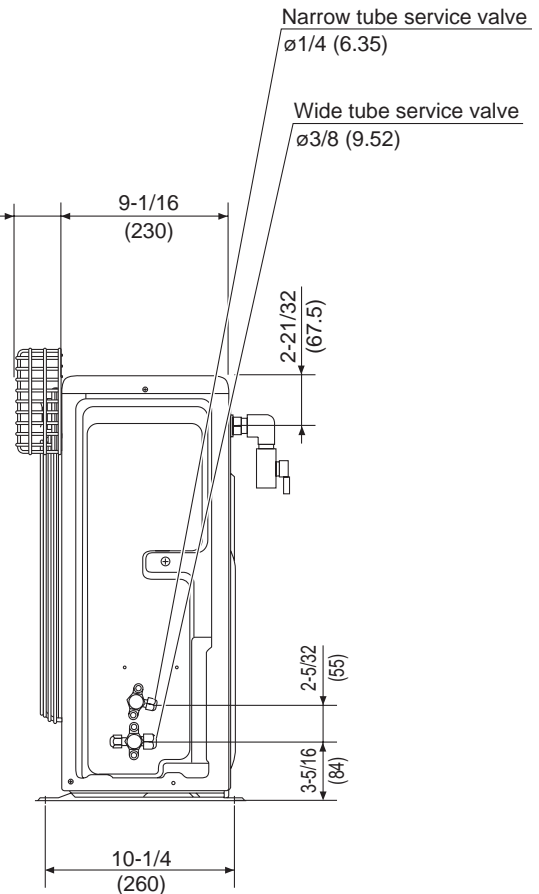


3-1-2. Outdoor Unit

Outdoor unit **CG1411**



Unit: inch (mm)



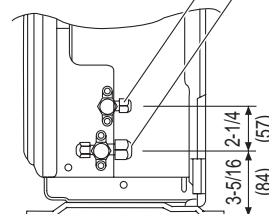
NOTE

Location of Service Valves

Service valves are located behind the side panel.
See the illustration at right.

Wide tube service valve
ø3/8 (9.52)

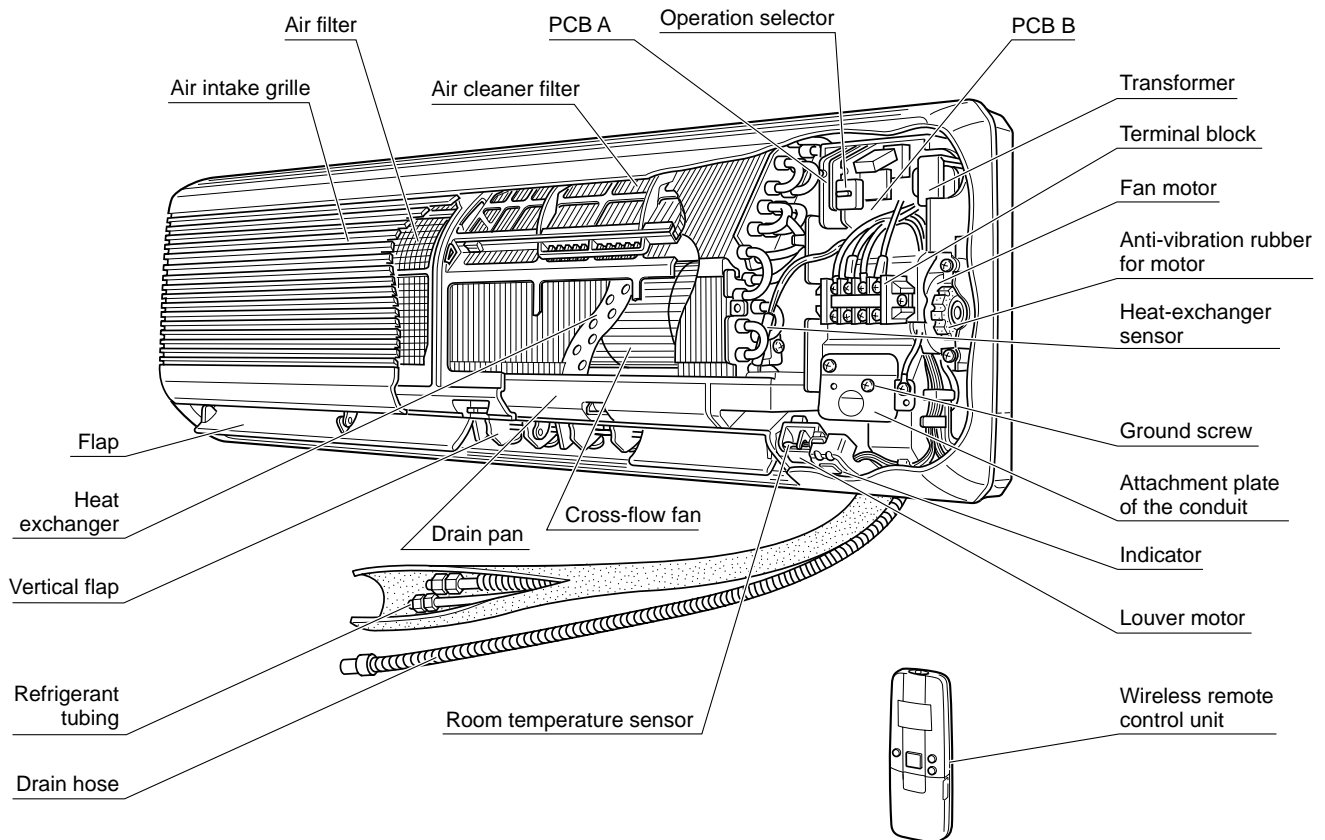
Narrow tube service valve
ø1/4 (6.35)



3-2. Internal Components

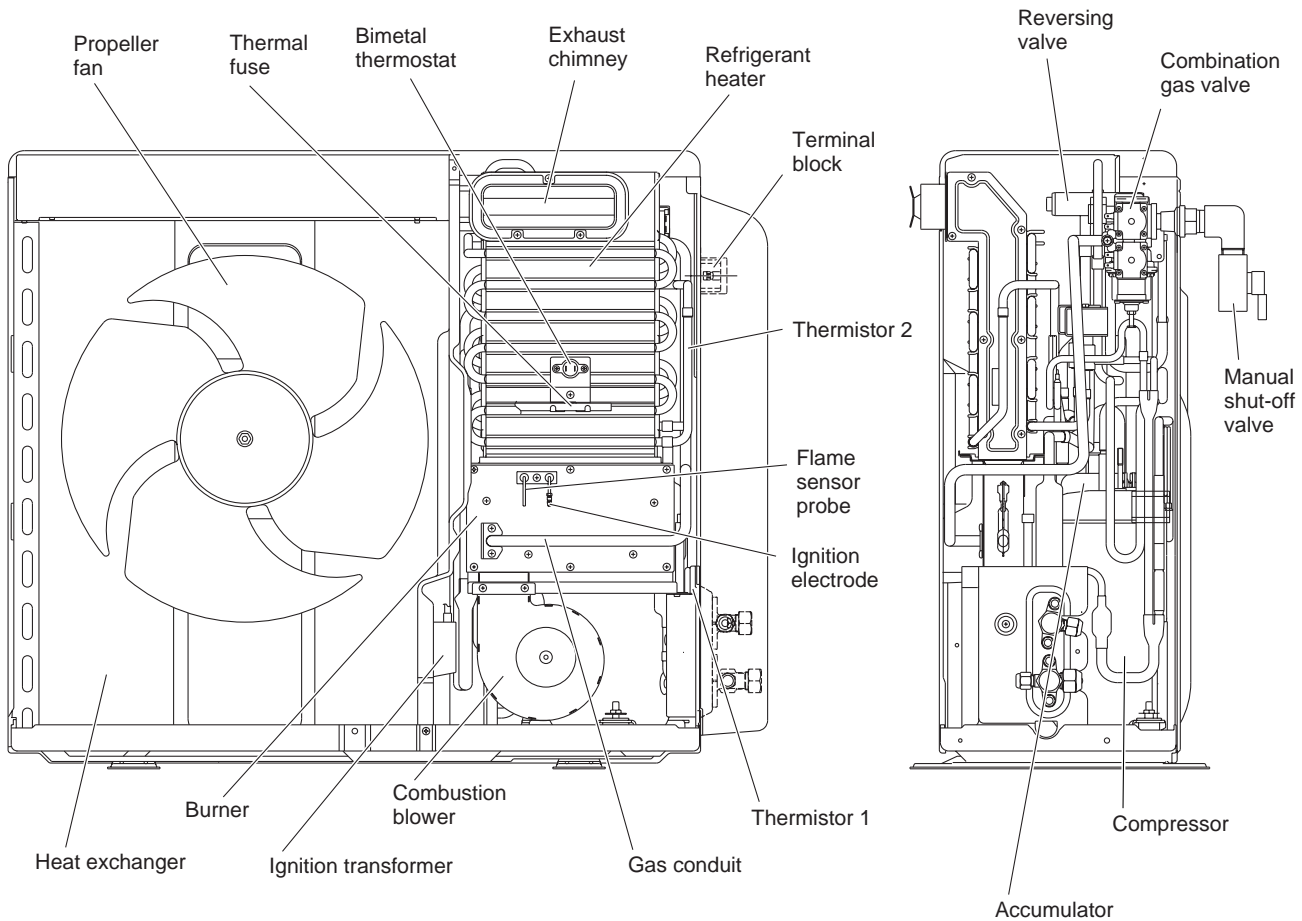
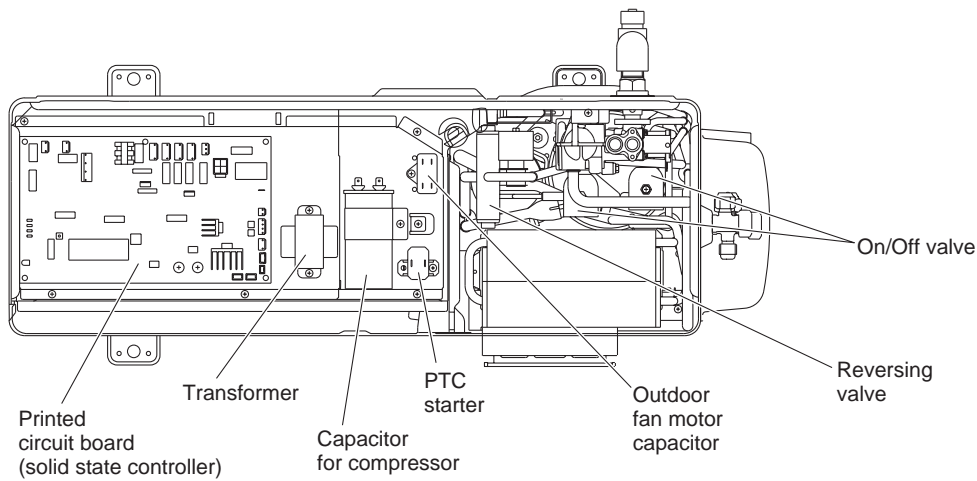
3-2-1. Indoor Unit

Indoor unit **KGS1411**



3-2-2. Outdoor Unit

Outdoor unit CG1411



3-3. Major Components

Outdoor unit **CG1411**

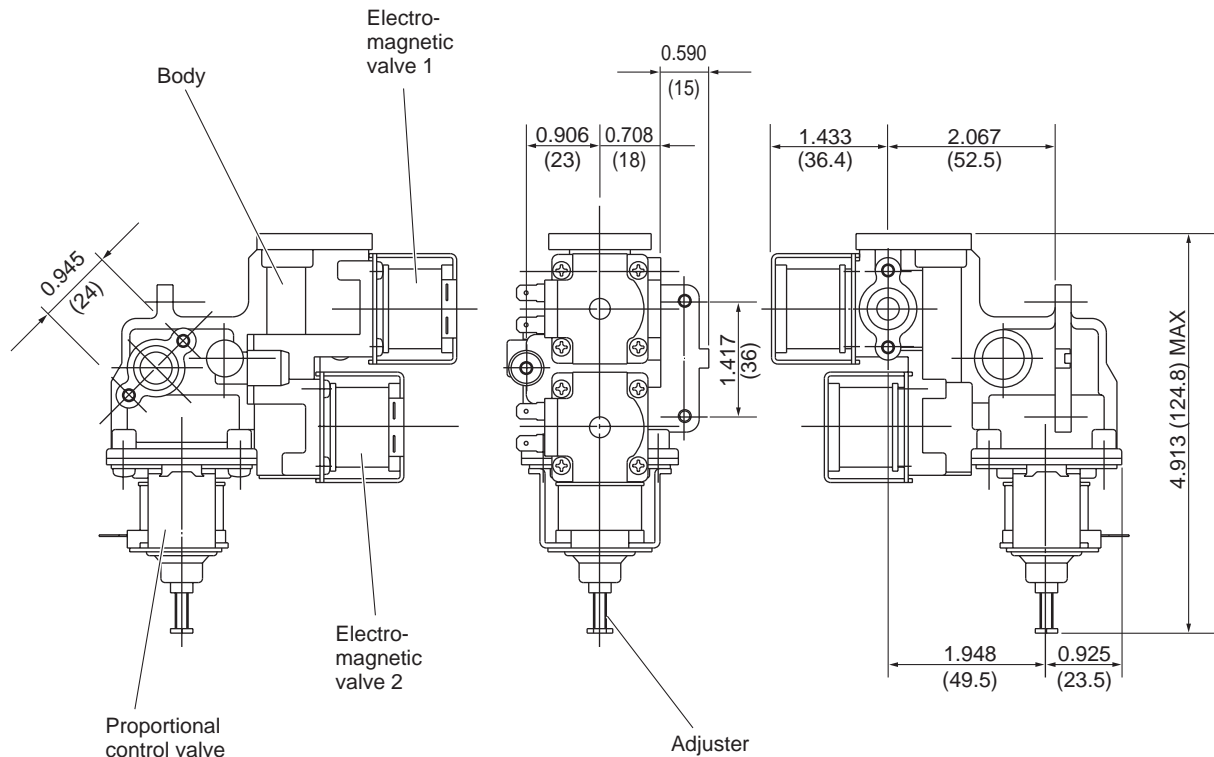
(1) Combination Gas Valve (Proportional Control Valve)

Type: Combination Gas Valve

Model: UP13-27

Material: Aluminum Die-Cast

Unit: inch (mm)



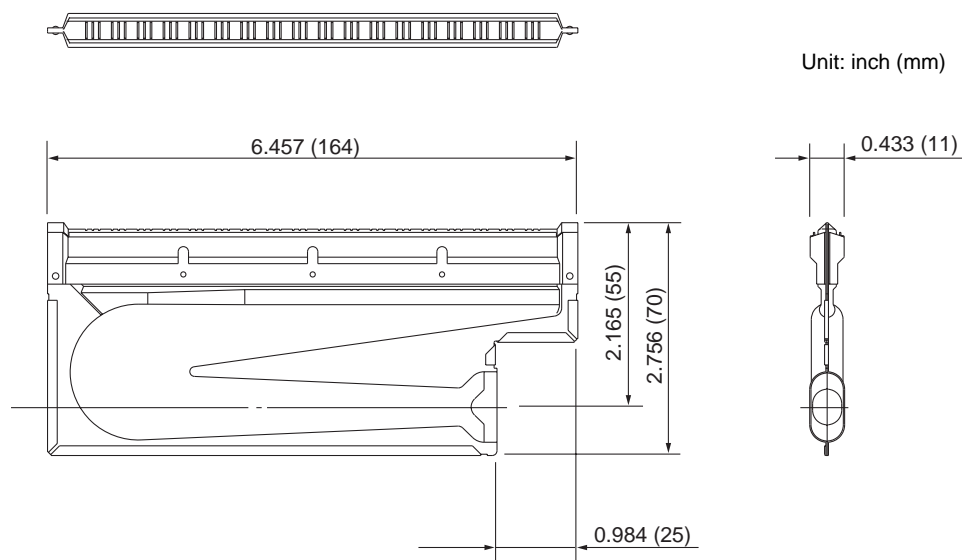
(2) Gas Nozzle

	Natural Gas	LPG
Material	Body: Aluminum Die-Cast / Nozzle: Brass	
Nozzle Dia.	0.0807 inch (2.05 mm)	0.0630 inch (1.60 mm)
Figure Unit: inch (mm)		

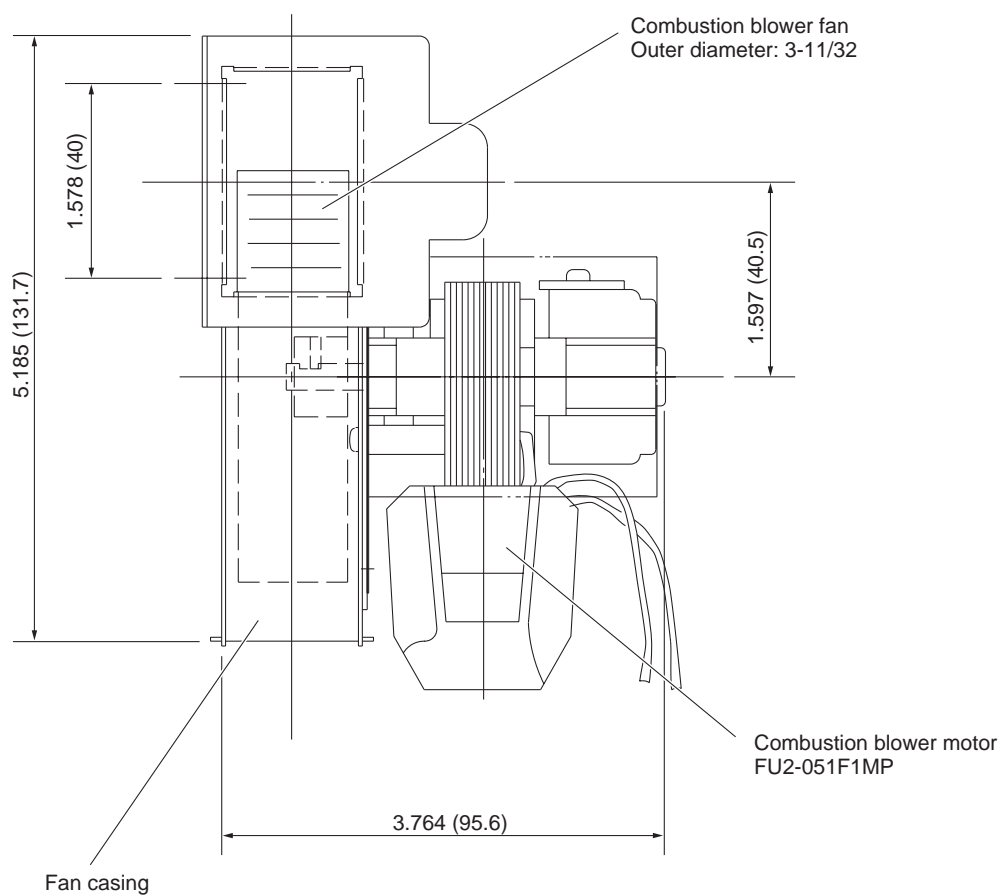
(3) Main Burner

Type: Ribbon Burner

Material: Stainless Steel, Thickness: 0.0157 inch (0.4 mm)

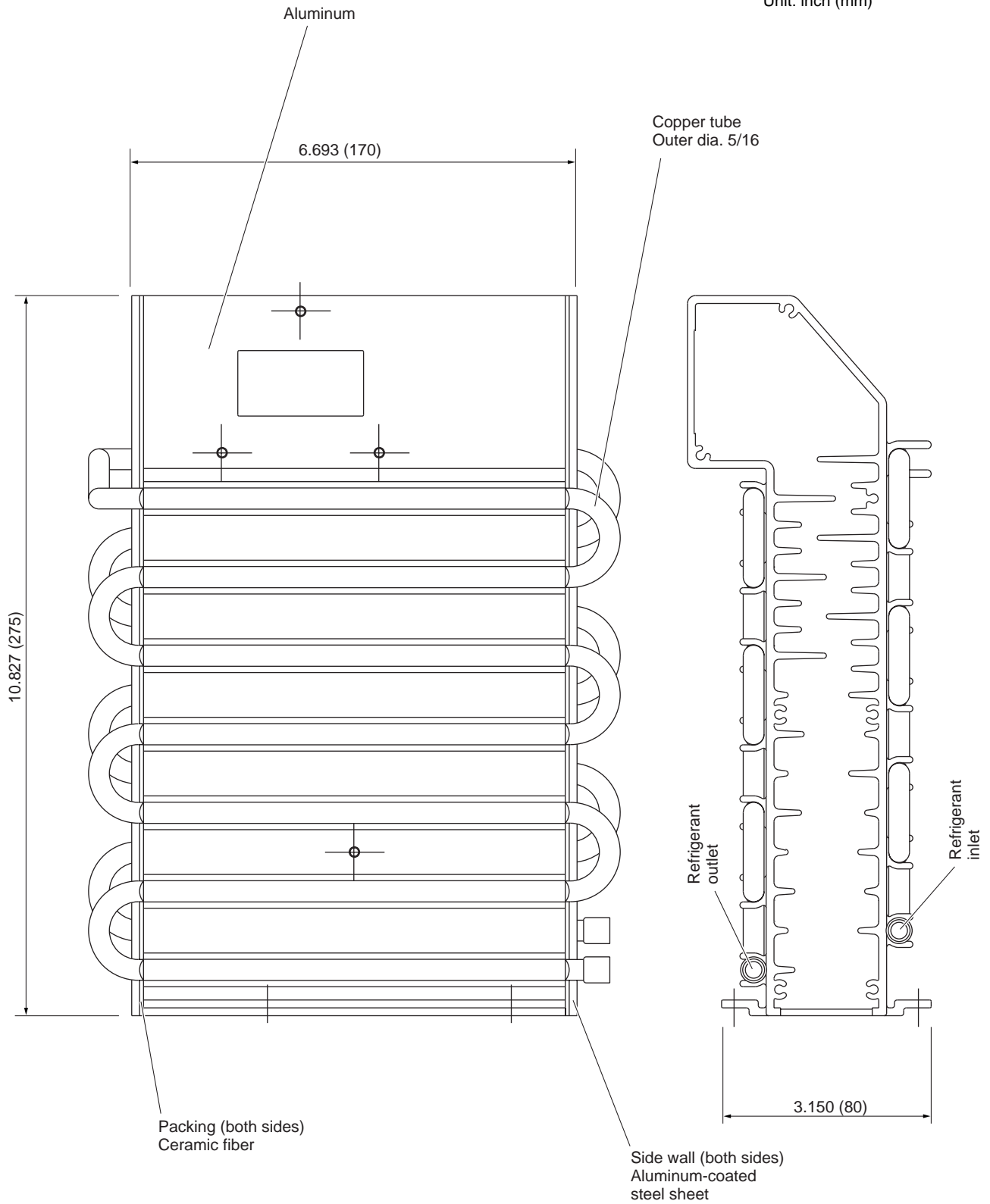


(4) Combustion Blower



(5) Refrigerant Heater

Unit: inch (mm)



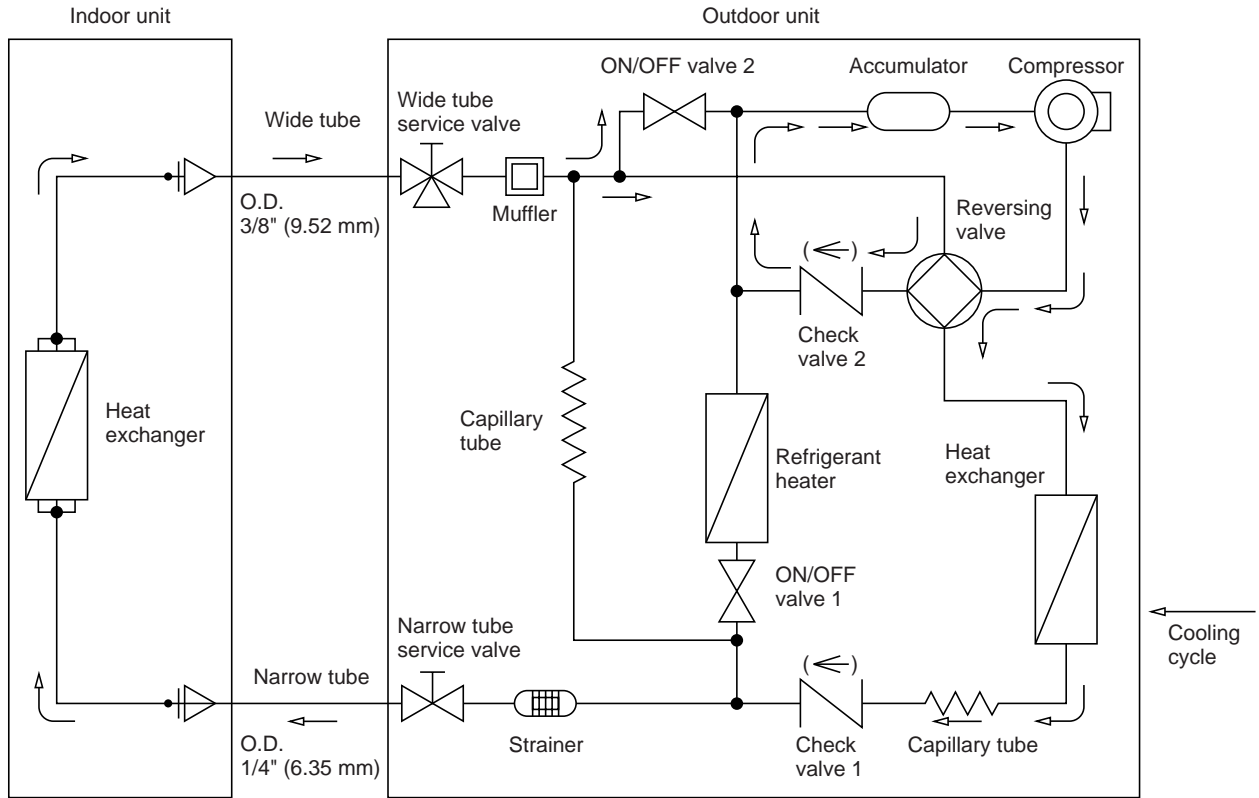
4. REFRIGERANT FLOW DIAGRAM

4-1. Refrigerant Flow Diagram

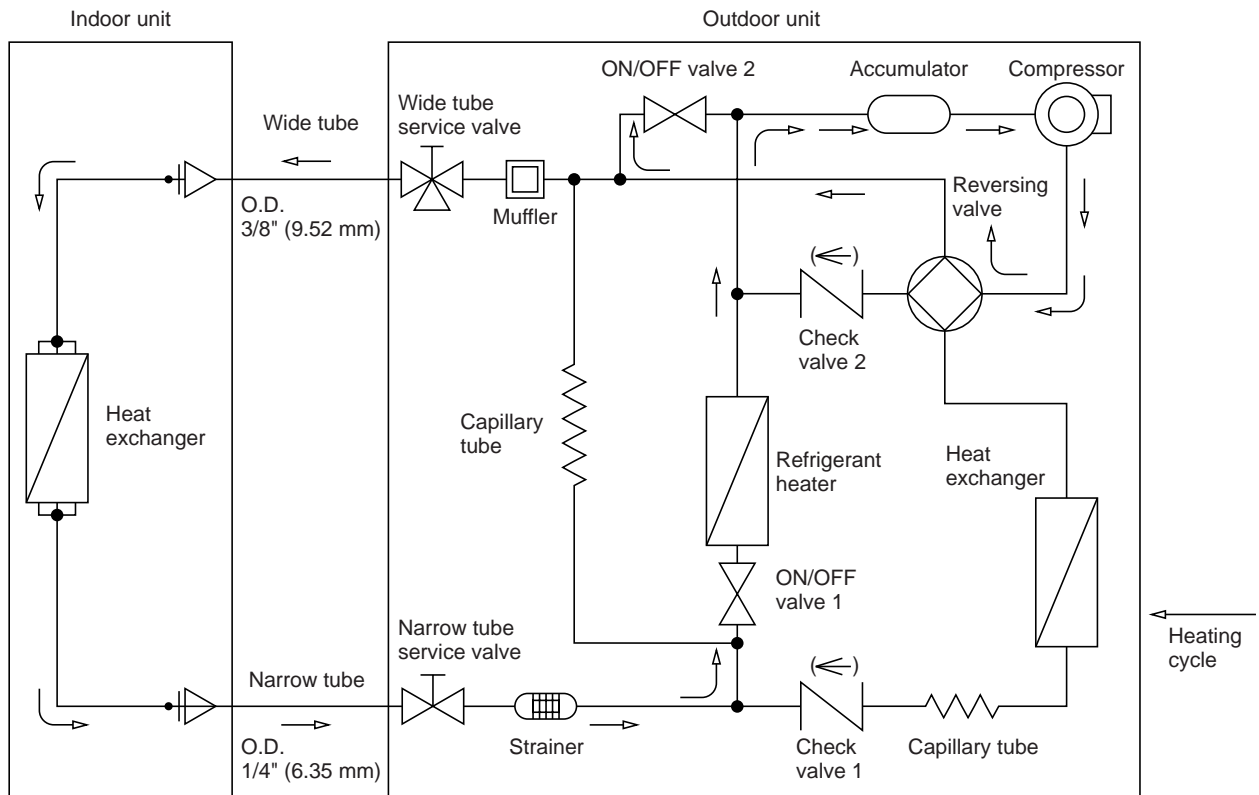
Indoor unit **KGS1411**

Outdoor unit **CG1411**

COOLING CYCLE



HEATING CYCLE



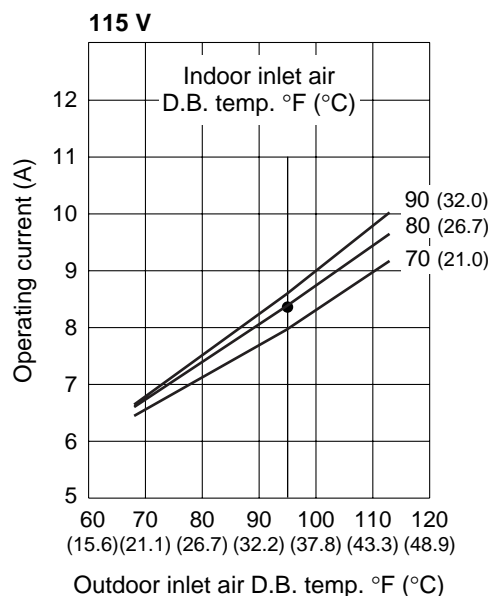
5. PERFORMANCE DATA

5-1. Performance Charts

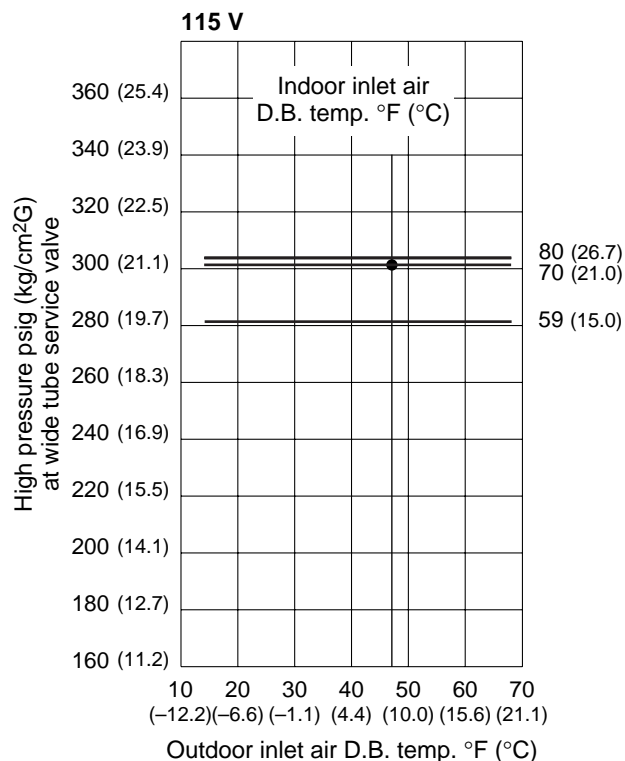
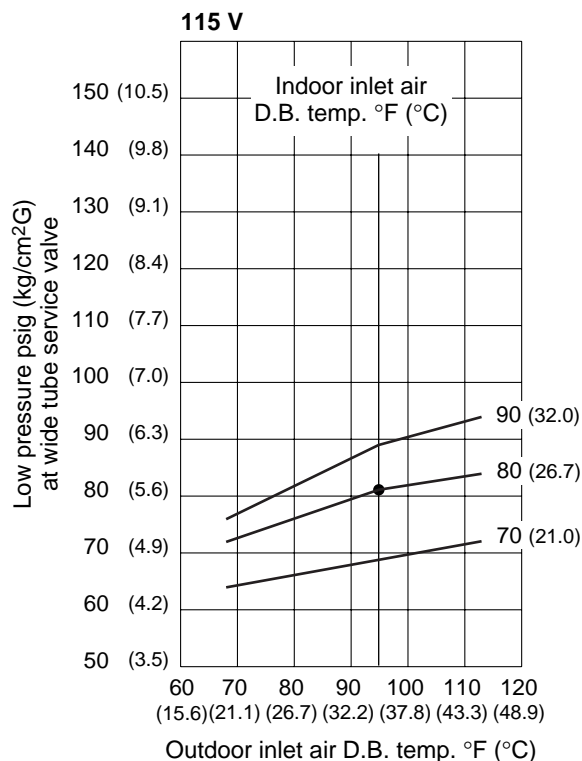
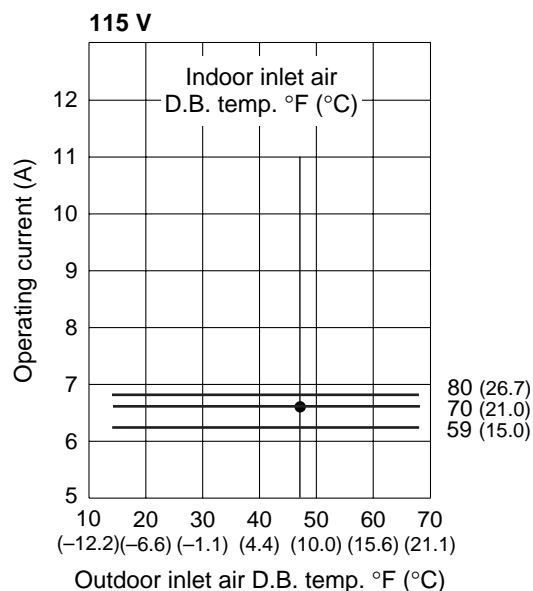
Indoor unit **KGS1411**

Outdoor unit **CG1411**

● Cooling Characteristics



● Heating Characteristics



NOTE

● ... Points of rating condition

Black dots in above charts indicate the following rating conditions.

Cooling: Indoor air temperature 80°F D.B. / 67°F W.B.

Outdoor air temperature 95°F D.B.

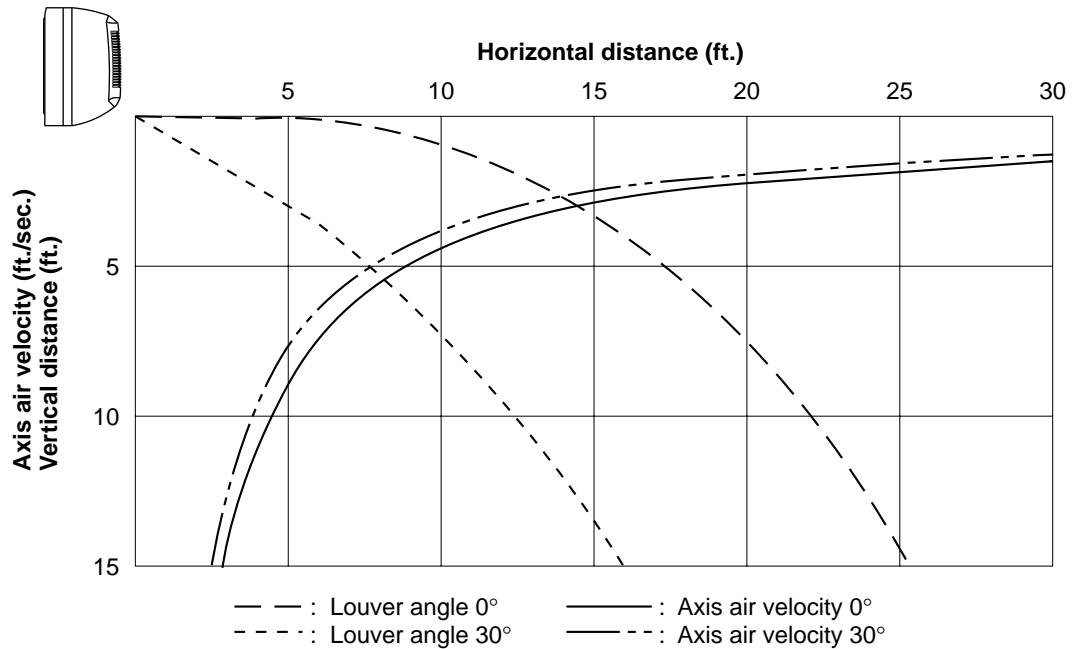
5-2. Air Throw Distance Charts

Indoor unit **KGS1411**

Cooling

Room air temp.: 80°F (27°C)

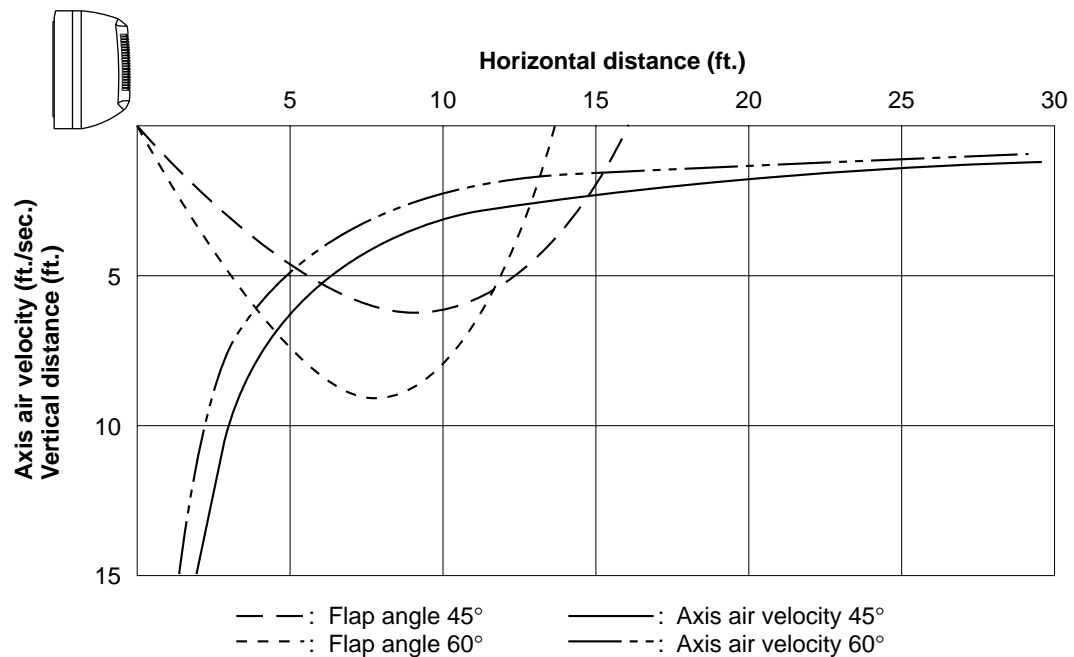
Fan speed: High



Heating

Room air temp.: 70°F (20°C)

Fan speed: High



5-3. Cooling Capacity

Indoor unit **KGS1411**

Outdoor unit **CG1411**

115V single-phase 60Hz

Rating Capacity: 9,000 BTU/h			Air Flow Rate: 282 CFM				
Evaporator		Condenser					
Ent. Temp. °F (°C)		Ambient Temp. °F (°C)					
WB	DB		75 (23.9)	85 (29.4)	95 (35.0)	105 (40.6)	115 (46.1)
59 (15.0)	72 (22.2) 76 (24.4) 80 (26.7) 84 (28.9) 88 (31.1)	TC	9,120	8,680	8,170	7,610	6,980
		CI	0.65	0.71	0.77	0.83	0.92
		SHC	6,750	6,530	6,280	6,010	5,710
		SHC	7,640	7,420	7,170	6,900	6,600
		SHC	8,570	8,350	8,100	7,610	6,980
		SHC	9,120	8,680	8,170	7,610	6,980
		SHC	9,120	8,680	8,170	7,610	6,980
63 (17.2)	72 (22.2) 76 (24.4) 80 (26.7) 84 (28.9) 88 (31.1)	TC	9,460	9,040	8,590	8,070	7,520
		CI	0.65	0.72	0.78	0.85	0.94
		SHC	5,670	5,480	5,270	5,040	4,800
		SHC	6,560	6,360	6,160	5,930	5,690
		SHC	7,490	7,290	7,090	6,860	6,620
		SHC	8,370	8,180	7,980	7,750	7,510
		SHC	9,260	9,040	8,590	8,070	7,520
67 (19.4)	72 (22.2) 76 (24.4) 80 (26.7) 84 (28.9) 88 (31.1)	TC	9,820	9,430	# 9,000	8,520	8,000
		CI	0.66	0.72	0.79	0.86	0.96
		SHC	4,580	4,420	4,240	4,050	3,840
		SHC	5,470	5,310	5,130	4,930	4,720
		SHC	6,400	6,240	6,060	5,860	5,650
		SHC	7,290	7,120	6,950	6,750	6,540
		SHC	8,180	8,010	7,830	7,640	7,430
71 (21.7)	72 (22.2) 76 (24.4) 80 (26.7) 84 (28.9) 88 (31.1)	TC	10,340	9,980	9,590	9,170	8,700
		CI	0.67	0.73	0.8	0.88	0.98
		SHC	3,500	3,360	3,220	3,060	2,890
		SHC	4,390	4,250	4,100	3,950	3,770
		SHC	5,320	5,180	5,030	4,880	4,700
		SHC	6,210	6,070	5,920	5,760	5,590
		SHC	7,090	6,960	6,810	6,650	6,480
75 (23.9)	76 (24.4) 80 (26.7) 84 (28.9) 88 (31.1)	TC	10,550	10,210	9,850	9,430	8,990
		CI	0.68	0.74	0.81	0.9	1
		SHC	3,230	3,110	2,990	2,850	2,700
		SHC	4,160	4,040	3,920	3,780	3,630
		SHC	5,050	4,930	4,810	4,660	4,520
		SHC	5,930	5,820	5,690	5,550	5,410

TC : Total cooling capacity (BTU/h)

SHC : Sensible heat capacity (BTU/h)

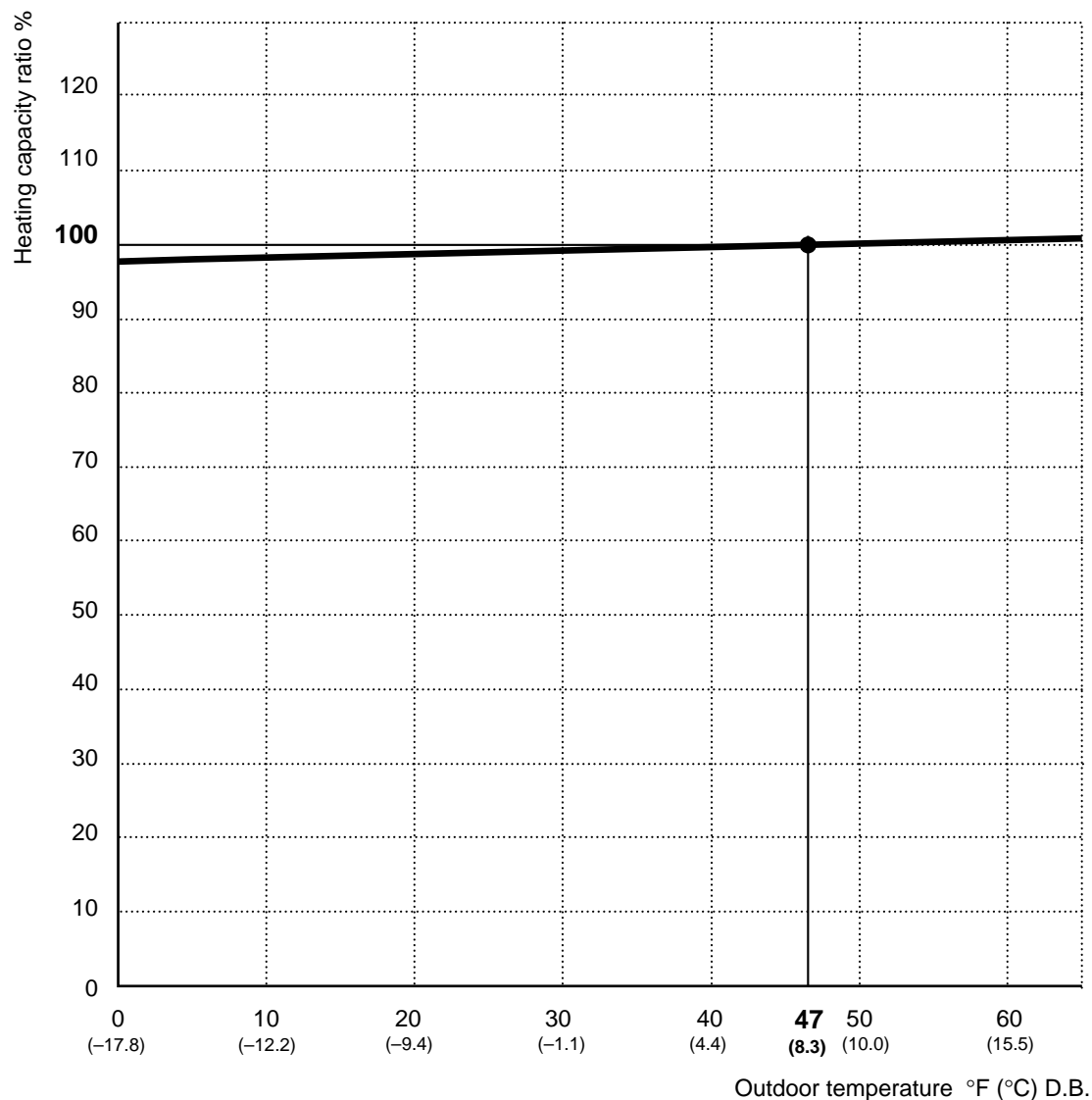
CI : Compressor input (kW)

Rating conditions (# mark) are: Outdoor ambient temperature 95°F (35°C) D.B.
Indoor unit entering air temperature 80°F (26.7°C) D.B./67°F (19.4°C) W.B.

5-4. Heating Capacity

Indoor unit **KGS1411**

Outdoor unit **CG1411**



NOTE

- 1) ● ... Point of rating condition

Black dot in the chart indicates the following rating condition.

Indoor: 70°F (21.1°C) D.B.

Outdoor: 47°F (8.3°C) D.B. / 43°F (6.1°C) W.B.

- 2) Above characteristics indicate instantaneous operation, which does not take into account defrost operation.
- 3) Fan speed: High
- 4) Conventional heat pump type air conditioner may not generate enough heating capacity especially when the outdoor temperature falls to extremely low level. Gas heater air conditioner can operate powerfully to warm the room continuously even when the outdoor temperature becomes very low.

6. ELECTRICAL DATA

6-1. Electrical Characteristics

Indoor unit **KGS1411**

Outdoor unit **CG1411**

Cooling

			Indoor Unit	Outdoor Unit		Complete Unit
			Fan Motor	Fan Motor	Compressor	
Performance at			115V Single phase 60Hz			
Rating conditions	Running amp.	A	0.35	0.64	7.2	8.2
	Power input	kW	0.033	0.077	0.79	0.90
Full load conditions	Running amp.	A	0.35	0.64	9.0	10.0
	Power input	kW	0.033	0.077	0.99	1.10

Rating conditions: Indoor air temperature 80°F (26.7°C) D.B. / 67°F (19.4°C) W.B.

Outdoor air temperature 95°F (35°C) D.B.

Full load conditions: Indoor air temperature 95°F (35°C) D.B. / 70°F (21.2°C) W.B.

Outdoor air temperature 115°F (46.1°C) D.B.

Heating

			Indoor Unit	Outdoor Unit		Complete Unit
			Fan Motor	Fan Motor	Compressor	
Performance at			115V Single phase 60Hz			
Rating conditions	Running amp.	A	0.35	0.64	4.9	5.9
	Power input	kW	0.033	0.077	0.51	0.62
Full load conditions	Running amp.	A	0.35	0.64	5.8	6.8
	Power input	kW	0.033	0.077	0.61	0.72

Rating conditions: Indoor air temperature 70°F (21.1°C) D.B.

Outdoor air temperature 47°F (8.3°C) D.B. / 43°F (6.1°C) W.B.

Full load conditions: Indoor air temperature 80°F (26.7°C) D.B.

Outdoor air temperature 75°F (23.9°C) D.B. / 65°F (18.3°C) W.B.

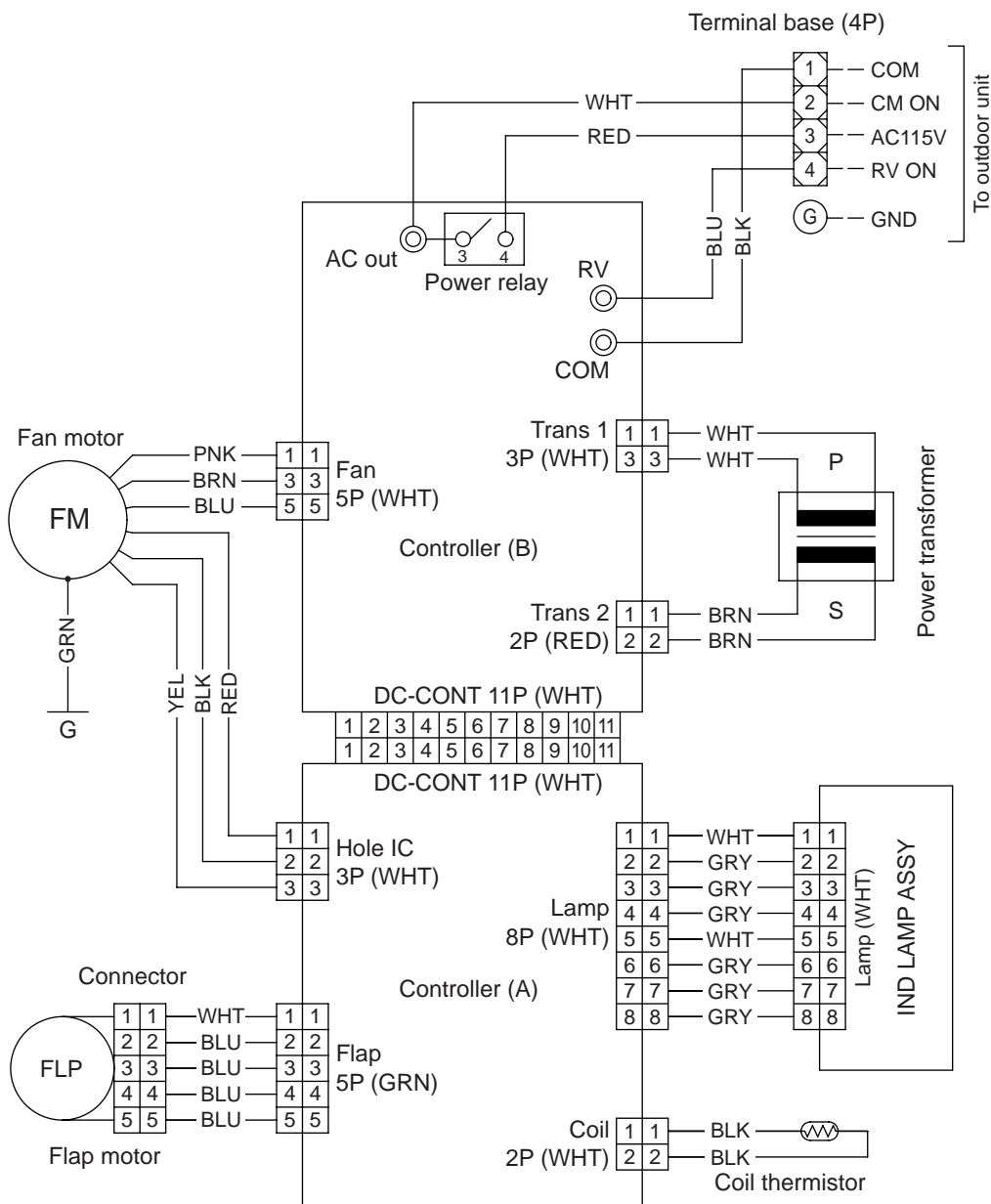
6-2. Electric Wiring Diagrams

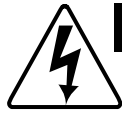
(1) Indoor unit KGS1411



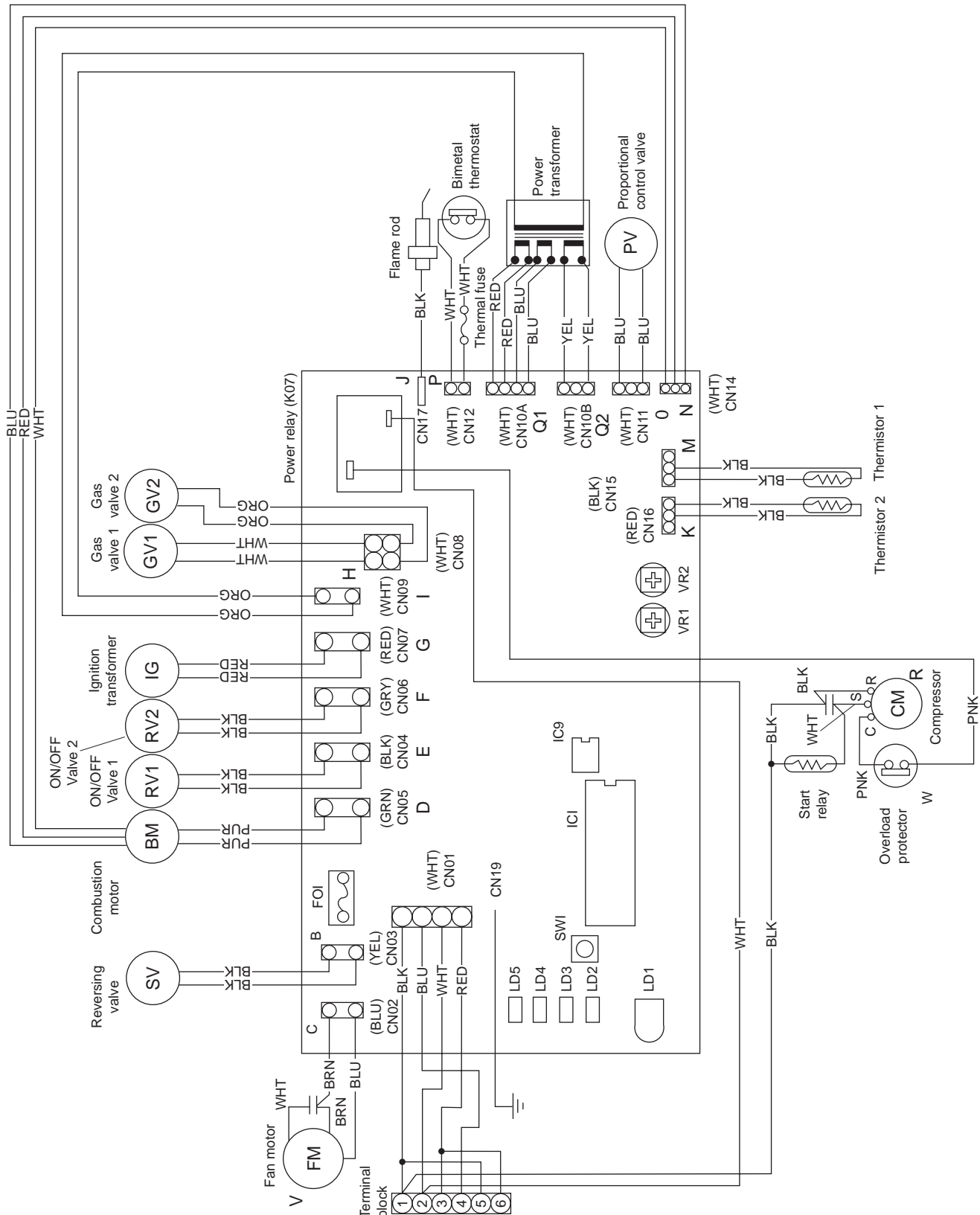
WARNING

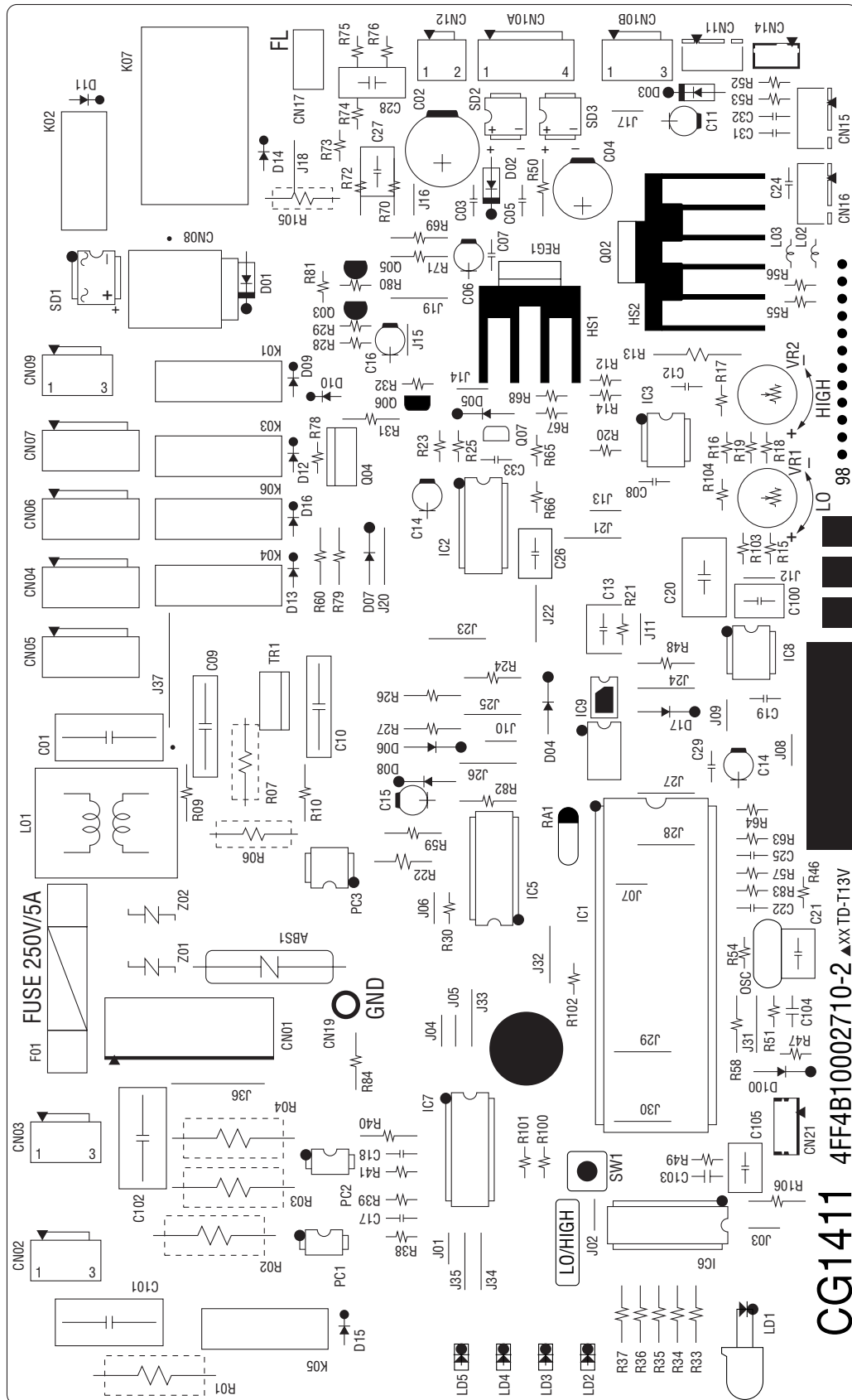
To avoid electrical shock hazard, be sure to disconnect power before checking, servicing and/or cleaning any electrical parts.



**WARNING**

To avoid electrical shock hazard, be sure to disconnect power before checking, servicing and/or cleaning any electrical parts.





7. INSTALLATION INSTRUCTIONS

7-1. Installation Site Selection

7-1-1. Indoor Unit



WARNING

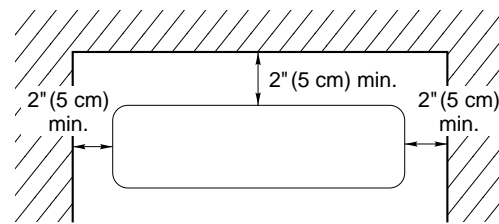
To prevent abnormal heat generation and the possibility of fire, do not place obstacles, enclosures and grilles in front of or surrounding the air conditioner in a way that may block air flow.

AVOID:

- direct sunlight.
- nearby heat sources that may affect performance of the unit.
- areas where leakage of flammable gas may be expected.
- places where large amounts of oil mist exist.

DO:

- select an appropriate position from which every corner of the room can be uniformly cooled. (High on a wall is best.)
- select a location that will hold the weight of the unit.
- select a location where tubing and drain hose have the shortest run to the outside.
- allow room for operation and maintenance as well as unrestricted air flow around the unit. (Fig. 1)
- install the unit within the maximum elevation difference (H) above the outdoor unit and within a total tubing length (L) from the outdoor unit as detailed in Table 1 and Fig. 2.



Front View

Fig. 1

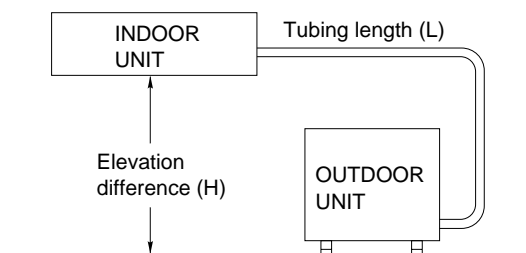


Fig. 2



CAUTION

For stable operation of the air conditioner, do not install wall-mounted type indoor units under 5 ft. (1.5 m) from floor level.

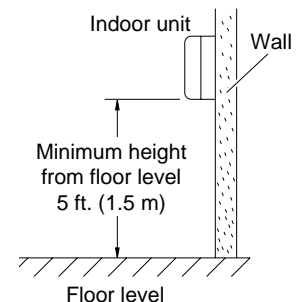


Fig. 3

Table 1

Model	Max. Allowable Tubing Length at Shipment ft. (m)	Min. Allowable Tubing Length at Shipment ft. (m)	Limit of Tubing Length (L) ft. (m)	Limit of Elevation Difference (H) ft. (m)	Required Amount of Additional Refrigerant oz./ft. (g/m)*
CG1411	25 (7.5)	13 (4)	49 (15)	23 (7)	0.27 (15)

* If total tubing length becomes 25 to 49 ft. (7.5 to 15 m) (max.), charge additional refrigerant (R22) by 0.27 oz./ft. (15 g/m). No additional compressor oil is necessary.

7-1-2. Outdoor Unit

AVOID:

- heat sources, exhaust fans, etc. (Fig. 4)
- damp, humid or uneven locations.

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated.
- allow enough room around the unit for air intake/exhaust and possible maintenance. (Fig. 5a)

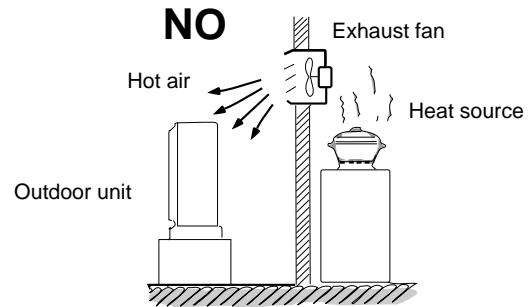


Fig. 4



CAUTION

- Install the outdoor unit above snowfall line.
- Do not place objects on or sit on the outdoor unit. Also, never block the air intake/outlet or exhaust. Distortion of the outdoor unit or incomplete combustion may result.
- Touching the air exhaust can cause a burn. Take special care for children not to touch it.
- Do not introduce foreign matter into the air intake/outlet or exhaust. Do not insert pointed objects, such as sticks.
- When the ambient temperature is dropping, a white cloud or fog may be seen blowing from the unit. This does not indicate a problem.
- The distance between any building opening* and the exhaust must be 24 in. (60 cm) or more.
- Locate the outdoor unit away from windows to avoid possible entry of exhaust gases into the building. Pay special attention to the windows of a neighboring house or building.
- If there is a window within 24 in. (60 cm) of the exhaust, make sure it is not located inside the projected exhaust area within 24 in. (60 cm) above, within 6 in. (15 cm) below, within 6 in. (15 cm) on either side, or within 6 in. (15 cm) in front of the exhaust.

* Meaning of "building opening"

Windows or doors which can be opened, but not including those which are fixed or cannot be opened.

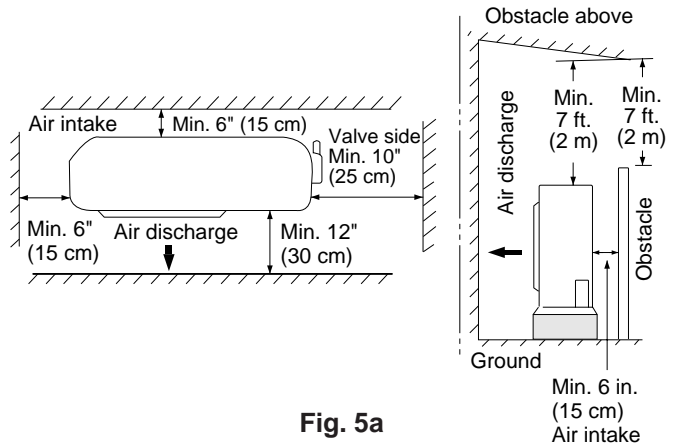


Fig. 5a

- provide a solid base (level concrete pad, concrete block, 4 in. × 16 in. (10 × 40 cm) beams or equal), a minimum of 4 in. (10 cm) above ground level to reduce humidity and protect unit against possible water damage and decreased service life (Fig. 5b).
- use lug bolts or equal to bolt down unit, reducing vibration and noise.
- use only the type of gas indicated on the nameplate. This plate is located on the right side of the outdoor unit, and should be checked before gas line connection.

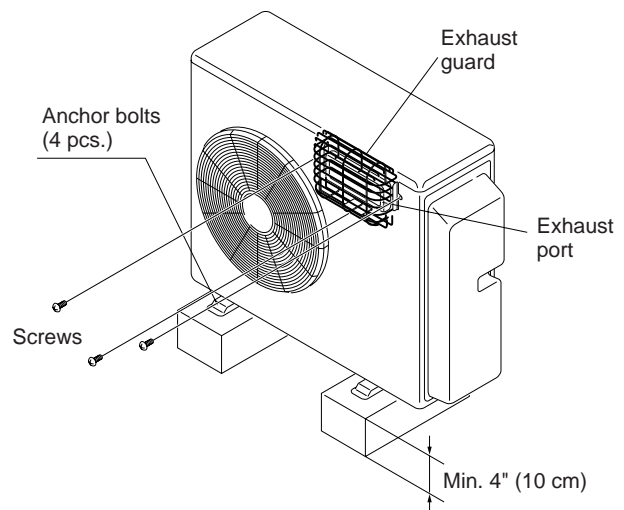


Fig. 5b

7-2. Recommended Wire Length and Diameter

Regulations on wiring diameter differ from locality to locality. For field wiring requirements, please refer to your local electrical codes. Carefully observe these regulations when carrying out the installation.

NOTE

Refer to the wiring system diagram (Fig. 6).

Refer to your local codes or in the absence of local codes with the National Electric Code: ANSI/NFPA70.



WARNING

- Be sure to comply with local codes on running wiring from the outdoor unit to the indoor unit (size of wire and wiring method, etc.).
- Each wire must be firmly connected.
- No wire should be allowed to touch refrigerant tubing, the compressor, or any moving part.



WARNING

- To avoid the risk of electric shock, each air conditioner unit must be grounded.



CAUTION

- Be sure to connect the power supply line to the outdoor unit as shown in the wiring diagram. The indoor unit draws its power from the outdoor unit.

WIRING SYSTEM DIAGRAM

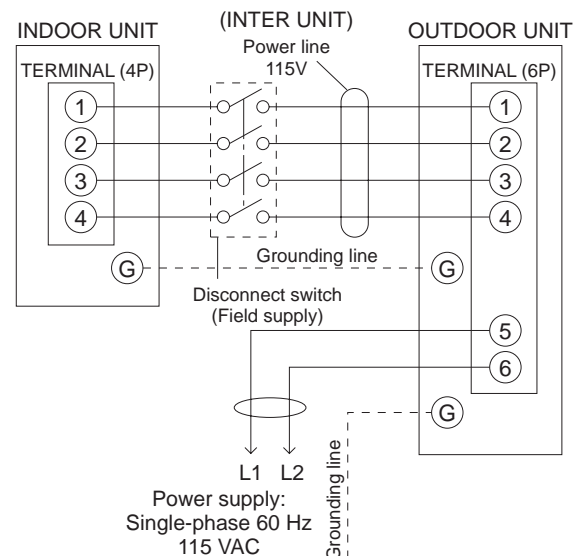


Fig. 6

7-3. Remote Control Unit Installation Position

The remote control unit can be operated from either a non-fixed position or a wall-mounted position.

To ensure that the air conditioner operates correctly, do not install the remote control unit in the following places:

- In direct sunlight
- Behind a curtain or other place where it is covered
- More than 26 ft. (8 m) away from the air conditioner
- In the path of the air conditioner's airstream
- Where it may become extremely hot or cold
- Where it may be subject to electrical or magnetic interference

7-3-1. Mounting on a Wall

a) Removable mounting

- 1) Momentarily hold the remote control unit at the desired mounting position.
- 2) Confirm that the air conditioner responds correctly when you press keys on the remote control from that position.
- 3) After confirming correct operation, use a screwdriver to screw the supplied special mounting screw into the wall. (Fig. 7)
- 4) Hang the remote control unit from the special mounting screw.

Removable mounting

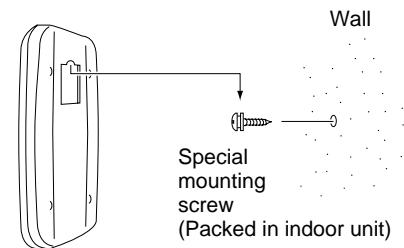


Fig. 7

b) Non-removable mounting

- 1) Momentarily hold the remote control unit at the desired mounting position.
- 2) Confirm that the air conditioner responds correctly when you press keys on the remote control from that position.
- 3) After confirming correct operation, use a screwdriver to screw the mounting screw into the wall. (Fig. 7)
- 4) Remove the remote control cover by sliding it downward.
- 5) Remove the batteries of the remote control unit.
- 6) Use a screwdriver to screw the remote control unit securing screw into the wall through the hole in the battery compartment. (Fig. 8)
- 7) Replace the batteries.
- 8) Again confirm that the remote control unit operates correctly.

Non-removable mounting

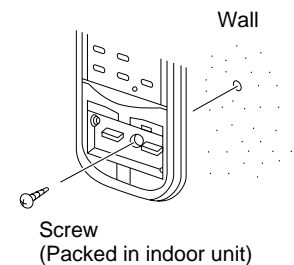


Fig. 8

8. FUNCTION

8-1. Motion Explanation

8-1-1. Heating

Heating operation begins with the refrigerant pump down cycle to move refrigerant into the heating circuit of the system. Simultaneously, gas burner ignition is initiated for a period of about 1 minute.

When the refrigerant transport period is completed, refrigerant is contained within the heating circuit tubing and retained there by the 2 check valves. The refrigerant pump down circuit condition is established by the reversing valve set to the heating position and the ON/OFF valve, V1, is closed.

Upon completion of the pump down phase, the ON/OFF valve is opened for normal heating operation.

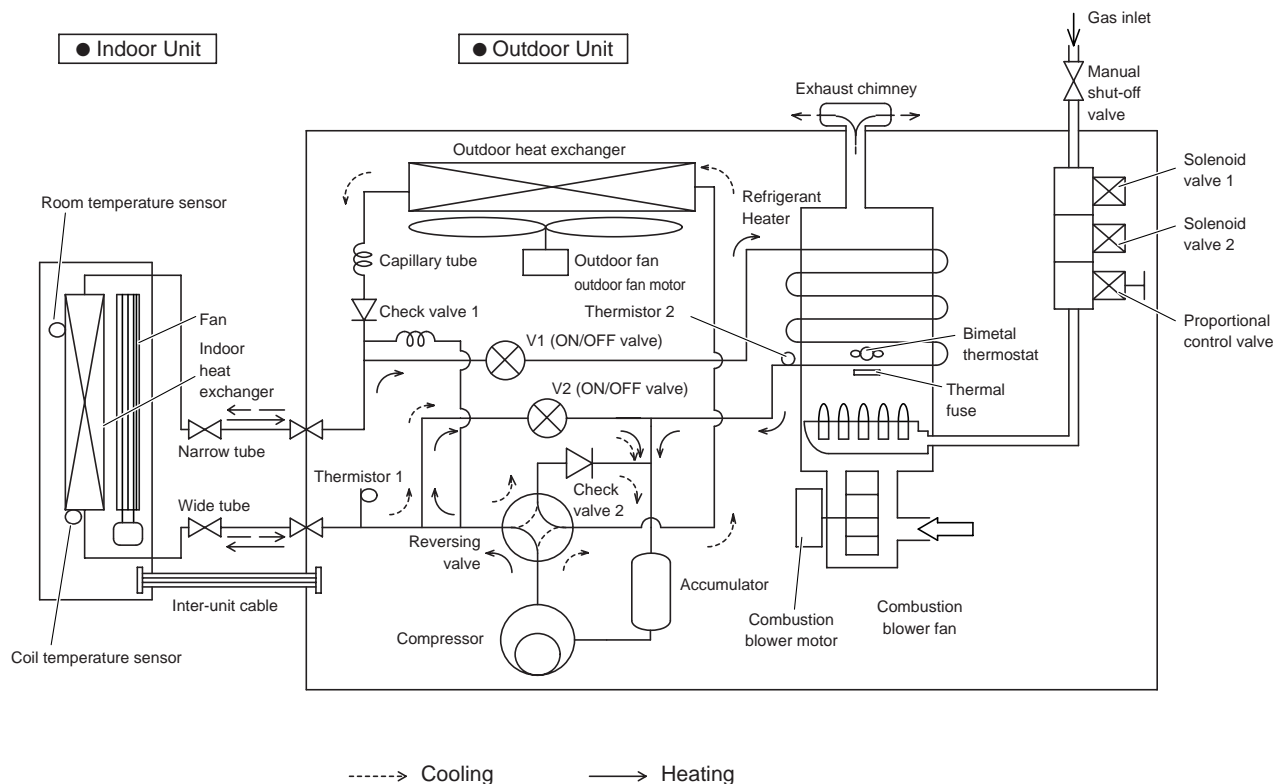
Cooling heat transfer tubing in the outdoor section is blocked from refrigerant flow by check valves during the heating cycle.

Heating circuit refrigerant tubing is in contact with the exterior wall of the aluminum heat exchanger above the gas burner. Heated refrigerant is circulated from the outdoor heat exchanger tubing to the indoor heat transfer tubing by operation of the compressor. Controls maintain refrigerant temperature to a point above the saturation temperature and so the temperature is circulated as a gas.

Refrigerant flow is through the ON/OFF valve, V2, under stable conditions to provide for low power operation. Low power operation is initiated (V2 opens) when thermistor-1 senses the temperature of equalization at 263 psig (18.5 kg/cm²).

8-1-2. Cooling

Identical to operation for a typical ductless split air conditioner (heat pump).



8-1-3. Combustion Control

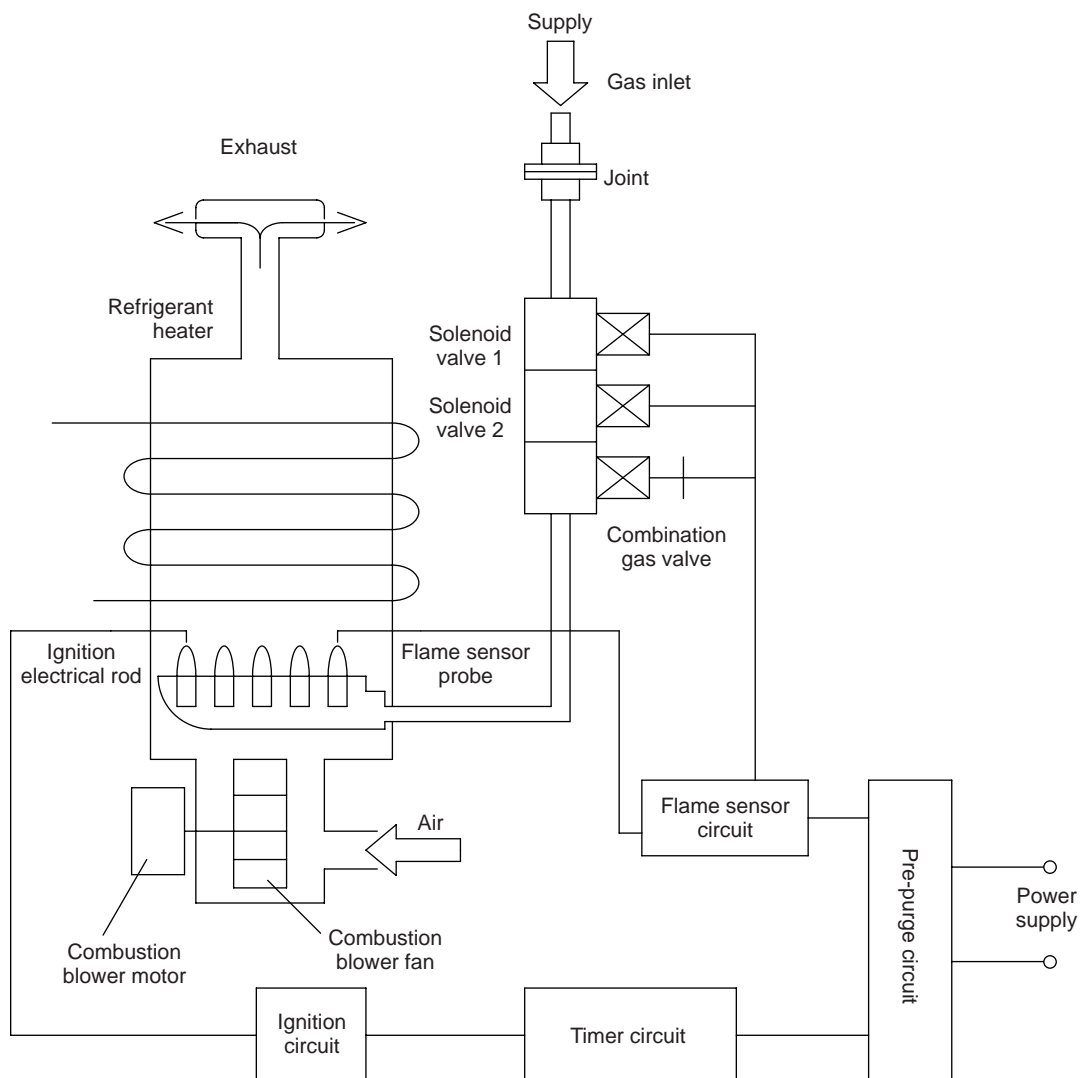
(1) Combustion

Combustion air is supplied into the burner for 20 seconds prior to ignition. The variable speed combustion air blower motor speed is sensed and controlled. After this pre-purge is completed, spark ignition is provided at the burner. Burner condition is monitored continuously during the burning period.

(2) Safety Controls

Following safety devices function to control the gas solenoid valve to shut off

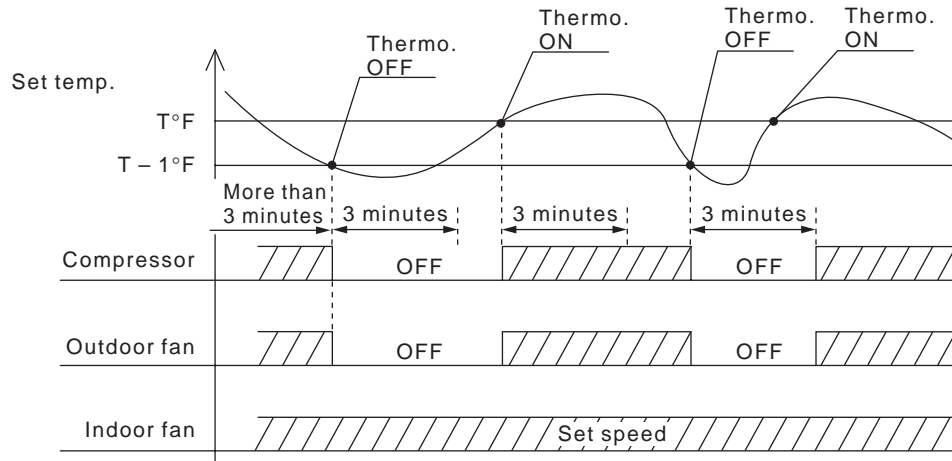
- Flame Detection Circuit: Stops gas flow with flame sensor circuit
- Bimetal Thermostat: Stops gas flow with bimetal thermostat at 221°F (105°C)
- Thermal Fuse: Stops gas flow with thermal fuse at 302°F (150°C) — replaceable fuse
- Fuse-Control Circuit: Protected by internal 3A and 5A device



8-2. Cooling

8-2-1. Room Temperature Control

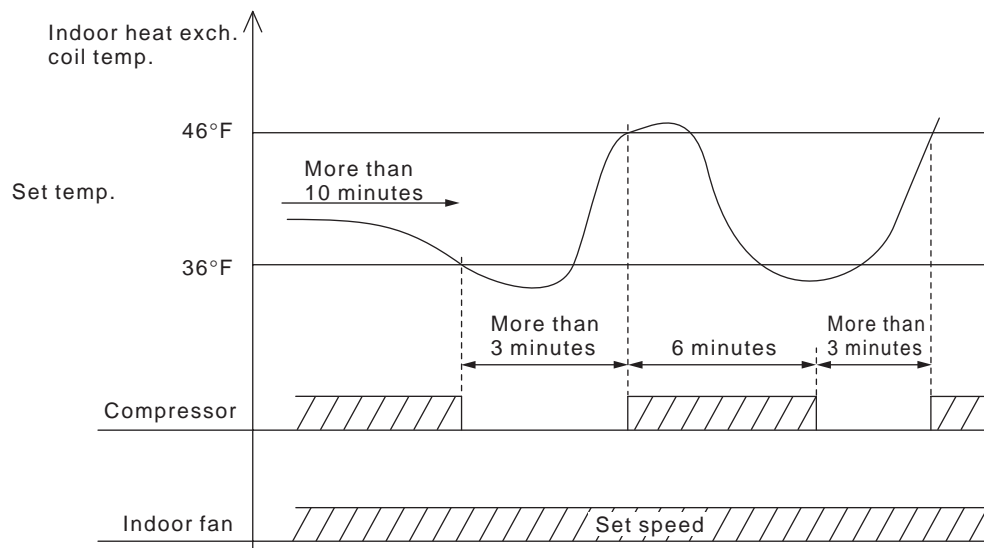
- Room temperature control is obtained by cycling the compressor ON and OFF under control of the room temperature sensor in the indoor unit.
- All information is transmitted every 3 minutes by the remote control unit to the controller in the indoor unit.



- The control circuit will not attempt to turn the compressor ON until the compressor has been OFF for at least 3 minutes. To protect the compressor from stalling out when trying to start against the high side refrigerant pressure, the control circuit has a built-in automatic time delay to allow the internal pressure to equalize.
- As a protective measure, the control circuit switches the compressor OFF after 3 minutes or more of compressor operation.
- Thermo. ON: When the room temperature is above $T^{\circ}\text{F}$ ($T^{\circ}\text{F}$ is set temperature).
Compressor → ON
- Thermo. OFF: When the room temperature is equal to or below set temperature $T - 1^{\circ}\text{F}$.
Compressor → OFF

8-2-2. Freeze Prevention (Cooling)

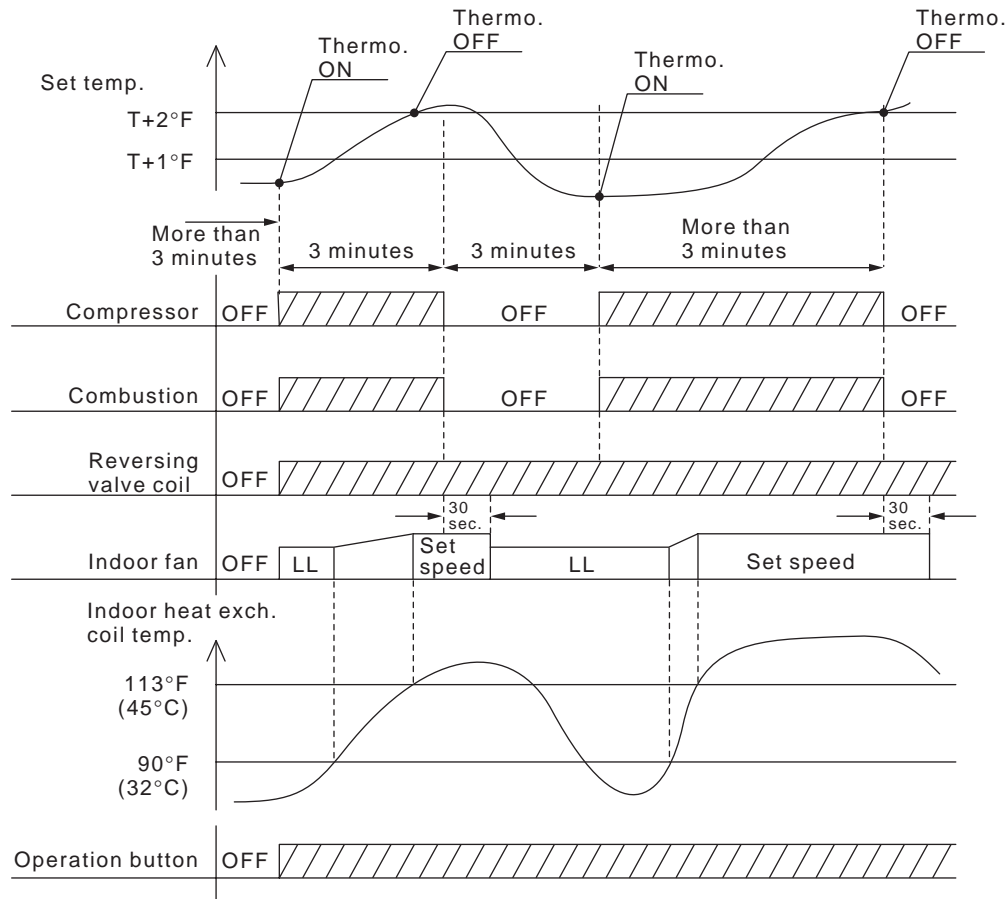
- This function prevents freezing of the indoor heat exchange coil.
- When the compressor has been running for 6 minutes or more and the temperature of the indoor heat exchange coil falls below 36°F (2.4°C), the control circuit stops the compressor for at least 6 minutes. The compressor does not start again until the temperature rises above 46°F (8°C) or 6 minutes have elapsed.



8-3. Heating

8-3-1. Room Temperature Control

- Room temperature control is obtained by cycling the compressor ON and OFF under control of the room temperature sensor in the indoor unit.
- All information is transmitted every 3 minutes by the remote control unit to the controller in the indoor unit.



- The control circuit will not attempt to turn the compressor ON until the compressor has been OFF for at least 3 minutes. To protect the compressor from stalling out when trying to start against the high side refrigerant pressure, the control circuit has a built-in automatic time delay to allow the internal pressure to equalize.
- As a protective measure, the control circuit switches the compressor OFF after 3 minutes or more of compressor operation.
- Thermo. ON: When the room temperature is below $T + 1^{\circ}\text{F}$ ($T^{\circ}\text{F}$ is set temperature).
Compressor \rightarrow ON
- Thermo. OFF: When the room temperature is equal to or below set temperature $T + 2^{\circ}\text{F}$.
Compressor \rightarrow OFF

8-3-2. Refrigerant Control

(1) Thermistor 1

1) Initial check:

Must be able to confirm temperature increase of 2°F (1°C) within approximately 1 minute.

Objectives: 1. To detect error in switching reversing valve

2. To detect disconnection of Thermistor 1

2) Limit on amount of combustion at low temperature:

When starting up at low temperature, this function prevents rapid increase in temperature of refrigerant.

1. Minimum combustion at 50°F (10°C) or below

2. Limits combustion up to 70% of the maximum rated power at 95°F (35°C) or below

3) Bypass valve operation:

Opens the bypass valve at 117°F (47°C) and reduces power consumption.

4) Limit on amount of combustion at high load:

- Limits amount of combustion at 144°F (62°C)

Resets when temperature decreases to 140°F (60°C).

- Stops combustion at 149°F (65°C)

Resets when the temperature decreases to 131°F (55°C). (Compressor continuously operates.)

Error stop occurs after combustion stops eight times. (Operation lamp on indoor unit blinks.)

(2) Thermistor 2

1) Limit on amount of combustion:

Limits combustion when temperature exceeds 131°F (55°C). The range is proportionally controlled between the minimum and maximum temperatures.

2) Combustion stop:

Stops combustion when temperature exceeds 185°F (85°C).

Error stop occurs after combustion is interrupted (stops) eight times. (Operation lamp on indoor unit blinks.)

3) Detection of bypass valve operation

Must be able confirm temperature increases 5°F (3°C) within approximately 1 minute.

8-3-3. Combustion Saving Function

After Thermo. OFF occurs, shifts to Continuous Combustion Mode, Save Mode 1, or Save Mode 2, according to the load inside the room.

<Normal Combustion Mode>

Performs combustion which is proportionally controlled by setting the maximum amount of gas equivalent to the amount of rated combustion.

<Save Mode 1>

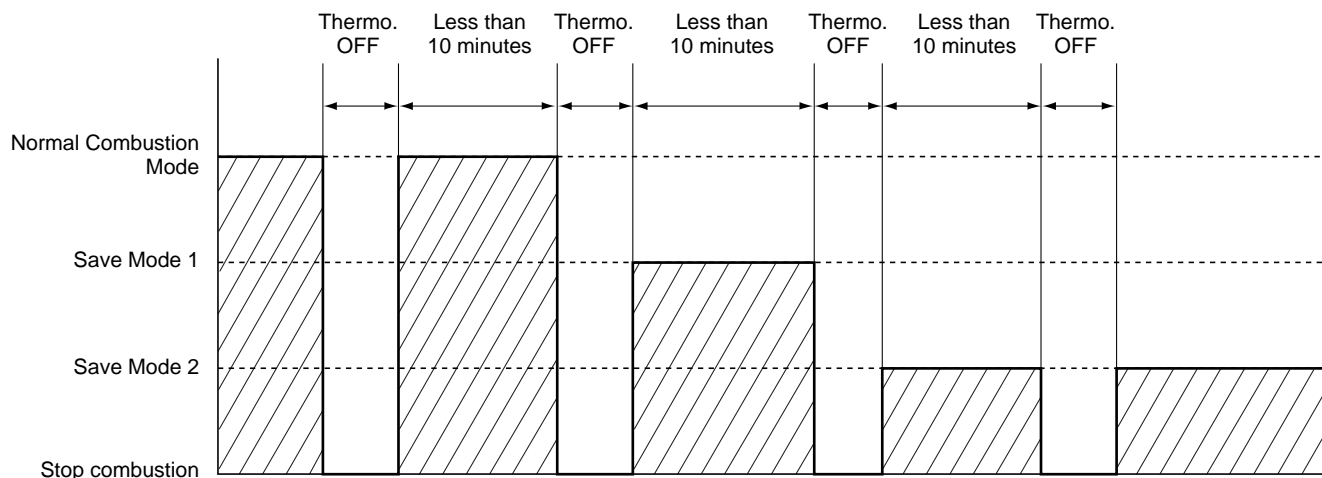
Performs combustion which is proportionally controlled by setting the maximum amount of gas to about 70% of the rated amount of combustion.

<Save Mode 2>

Performs continuous combustion by setting the amount of gas equivalent to the minimum amount of combustion.

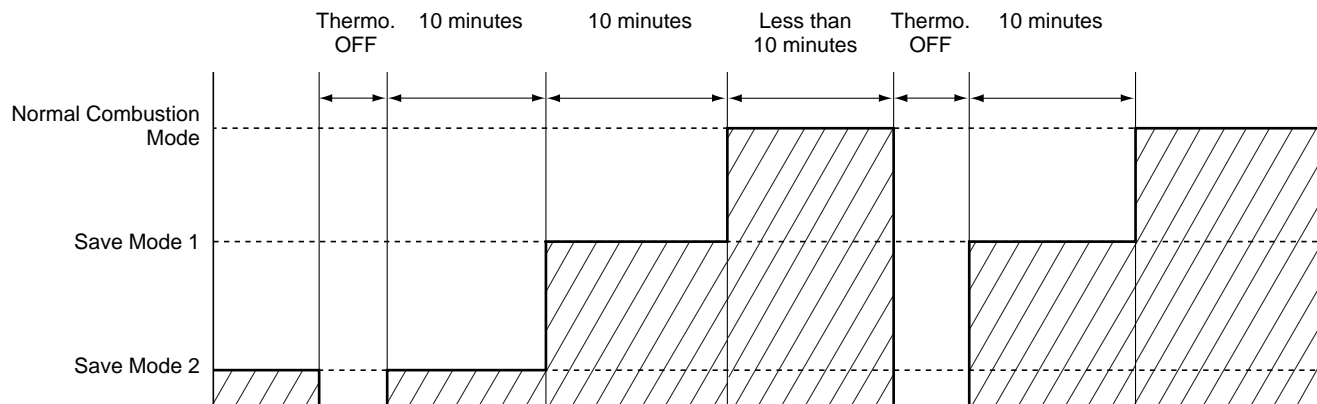
(1) Save Function

If Thermo. ON lasts less than 10 minutes under Normal Combustion Mode subsequent to Thermo. OFF, Save Mode 1 is automatically selected for the following Thermo. ON, and then Save Mode 2 is selected if Save Mode 1 lasts less than 10 minutes.



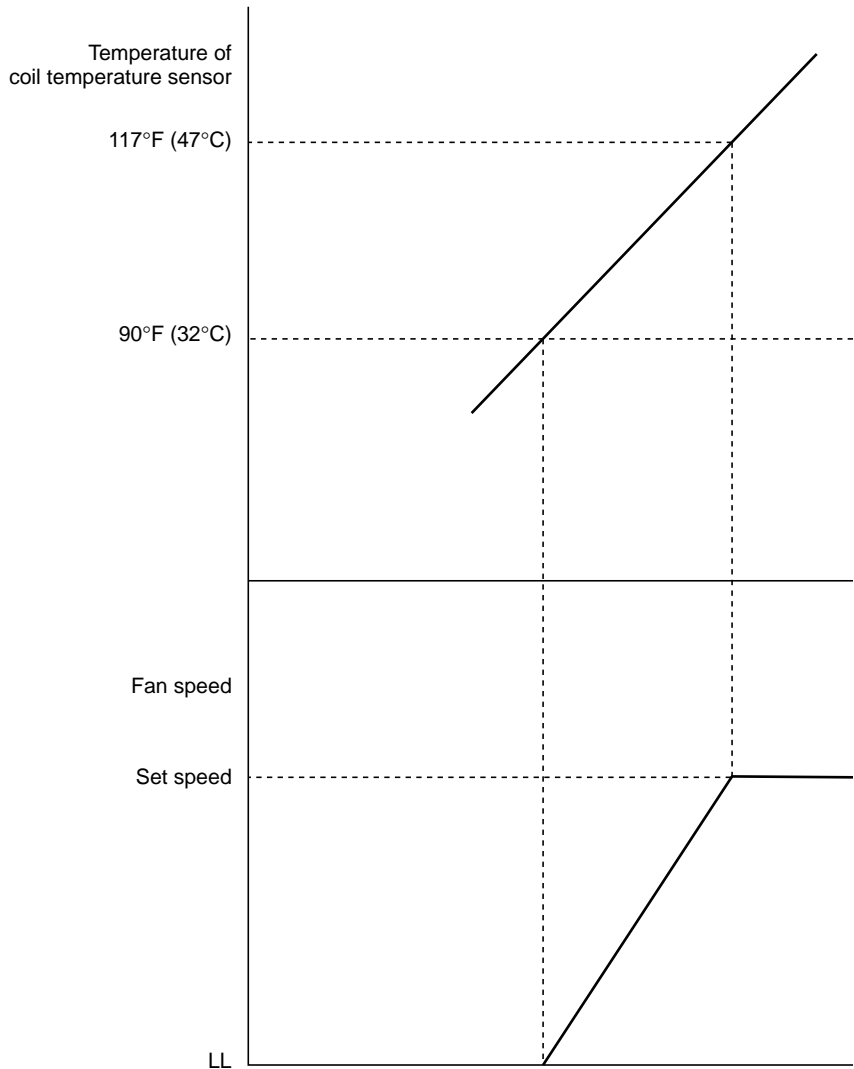
(2) Reset Function

When combustion in Save Mode 1 continues past 10 minutes, it goes back to Normal Combustion Mode (Save Mode 2 to Save Mode 1). However, if Thermo. OFF occurs again within 10 minutes under Normal Combustion Mode, Save Mode 1 is selected at the next Thermo. ON (Save Mode 1 to Save Mode 2).



8-3-4. Cold Draft Prevention Function (During Heating Operation)

This function prevents a cold draft from being released at the beginning of Heating Operation or during operation of the room temperature thermo.



Change in Fan Speed

- When Heating Operation is started with the temperature of the heat exchanger less than 90°F (32°C):
- Until the temperature of the heat exchanger goes over 117°F (47°C), fan speed varies according to the

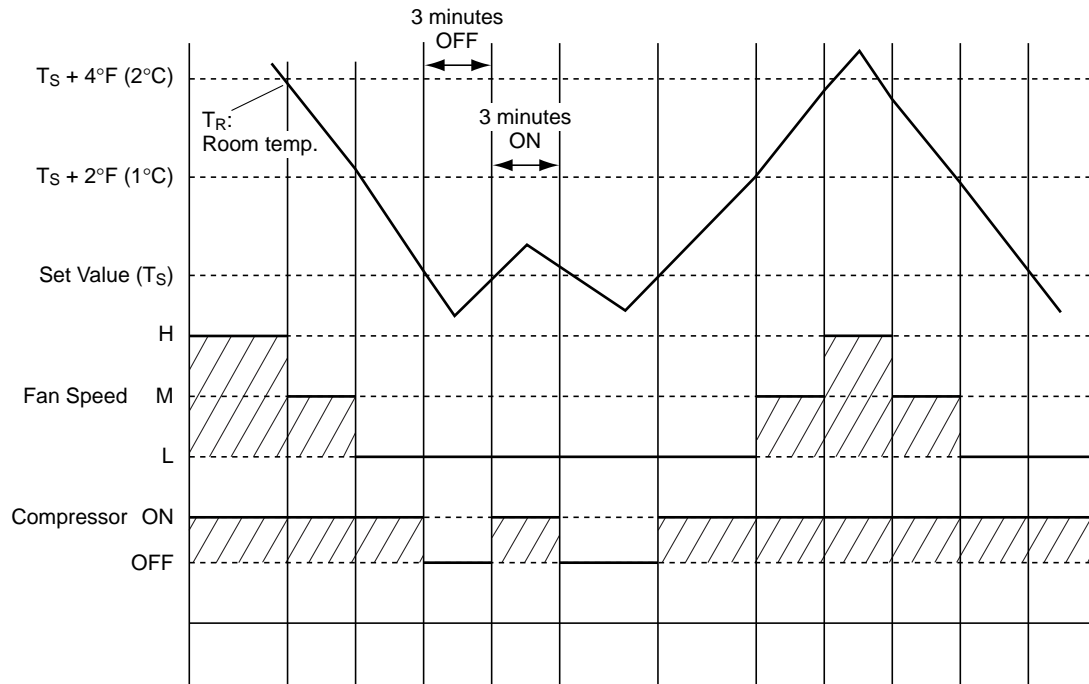
Temperature of heat exchanger	Less than 90°F (32°C)	90 – 117°F (32 – 47°C)	Over 117°F (47°C)
Fan speed	LL	LL – Set speed	Set speed

temperature of the heat exchanger.

- Once the temperature of the heat exchanger rises over 117°F (47°C), cold draft prevention function is released.

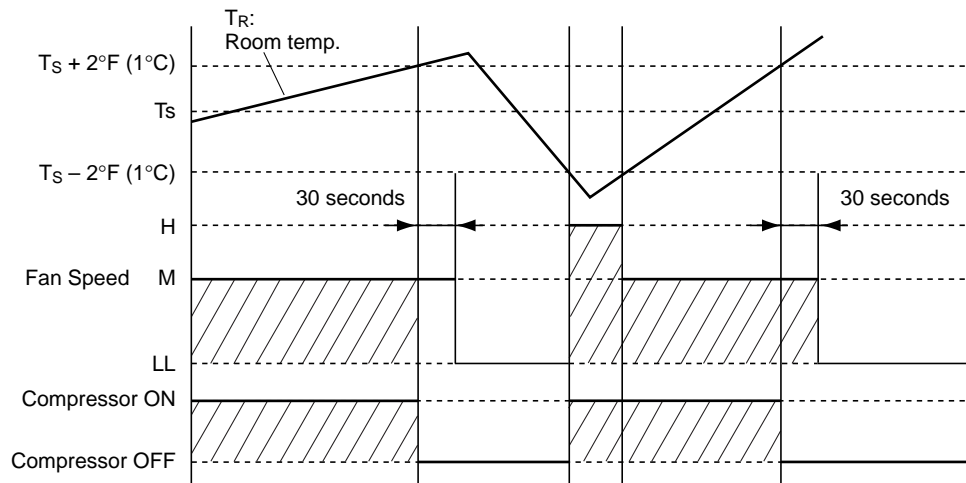
8-4. Fan Speed Control

During Cooling Operation Automatic fan speed



* For 3 minutes after power ON, the compressor does not turn on.

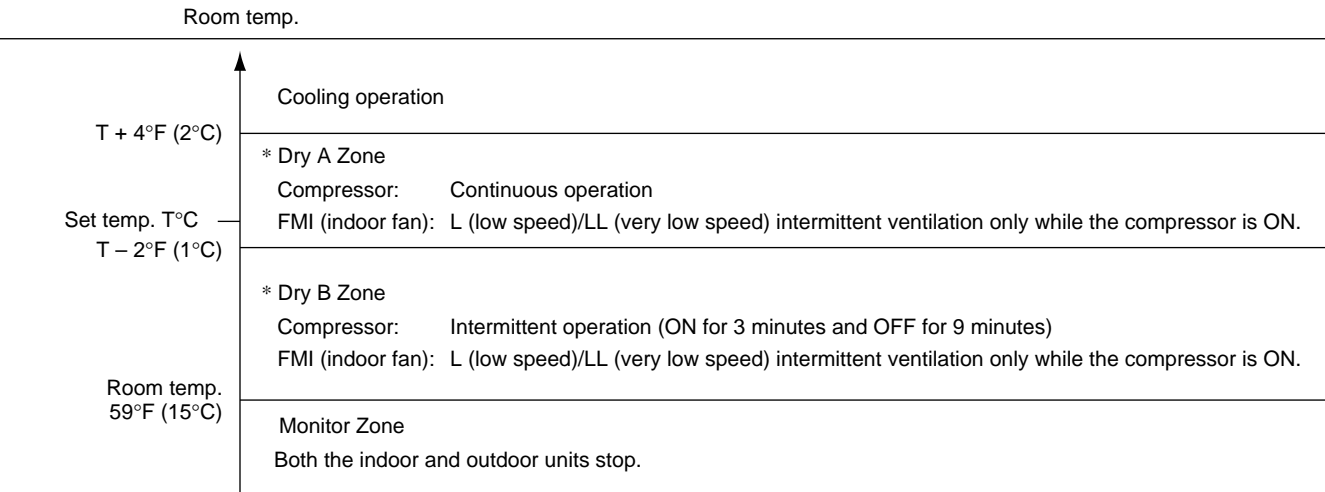
During Heating Operation Automatic fan speed



* For 30 seconds after the compressor is turned OFF, the previous fan speed is maintained.

8-5. Dry Operation (Dehumidification)

- Dry operation uses the ability of the cooling cycle to remove moisture from the air, but by running at low level to dehumidify without greatly reducing the room temperature. The air conditioner repeats the cycle of turning ON and OFF automatically as shown in the chart below according to the room temperature.



NOTE

- Intermittent ventilation occurs by switching the indoor fan speed between L ↔ LL.
- Dry operation does not occur when the room temperature is under 59°F (15°C), which is the Monitor Zone.
- When the compressor stops, the indoor fan stops as well.

8-6. Automatic Operation

(1) Normal

Room temperature at start of operation T_R °F (°C)	Temperature set automatically °F (°C)	Operation mode
$88 (30) \leq T_R$	82 (27)	Cooling
$84 (24) \leq T_R < 88 (30)$	80 (26)	
$80 (26) \leq T_R < 84 (28)$	78 (25)	
$72 (22) \leq T_R < 80 (26)$	76 (24)	Dry
$T_R < 72 (22)$	76 (24)	Heating

- Set temperature can be shifted $\pm 4^\circ\text{F}$ (2°C), in 2°F (1°C) steps.
- If operation commences again within 2 hours of the previous operation, the previous setting is applied.

(2) Changing fan speed “Automatic”

Fan speed is automatically selected by the temperature difference between the room temperature (T_R) and set temperature (T_S).

During Cooling Operation

Room temperature (T_R) and set temperature (T_S)	Fan speed
$T_R \geq T_S + 4^\circ\text{F}$ (2°C)	H / High
$T_S + 4^\circ\text{F}$ (2°C) $> T_R \geq T_S + 2^\circ\text{F}$ (1°C)	M / Medium
$T_S + 2^\circ\text{F}$ (1°C) $\geq T_R \geq T_S$	L / Low
$T_S > T_R$ (Thermo. OFF)	L / Low

During Heating Operation

Room temperature (T_R) and set temperature (T_S)	Fan speed
$T_R \leq T_S$	H / High
$T_S < T_R < T_S + 2^\circ\text{F}$ (1°C)	M / Medium
$T_S + 2^\circ\text{F}$ (1°C) $\leq T_R$ (Thermo. OFF)	LL / Very Low

8-7. Freeze Prevention

When the evaporation temperature drops to less than the temperatures stated below during Cooling or Dry Operation, the operation of the outdoor unit is automatically stopped to prevent the heat exchanger from freezing up.

(1) Cooling / Dry Cooling Zone: Dry A Zone

< Conditions of freeze prevention operation >

- a. Temperature of heat exchanger is less than 36°F (2.4°C)
- b. During Cooling or Dry Operation
- c. More than 6 minutes pass after start of operation

When the conditions of a, b, and c are met

< Conditions of Reset >

When temperature of heat exchanger rises to 46°F (8°C) or more.

(2) Dry B Zone

< Conditions of freeze prevention operation >

- a. Temperature of heat exchanger is less than 36°F (2.4°C)
- b. During Dry Operation

When both conditions a and b are met

< Conditions of Reset >

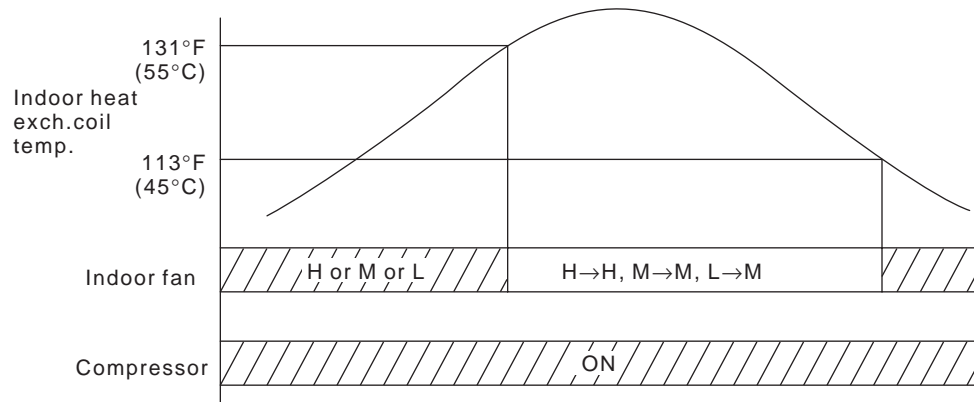
When temperature of heat exchanger rises to 46°F (8°C) or more.

* During freeze prevention operation, the indoor fan stops (Dry B Zone only).

8-8. Overload Prevention (Heating)

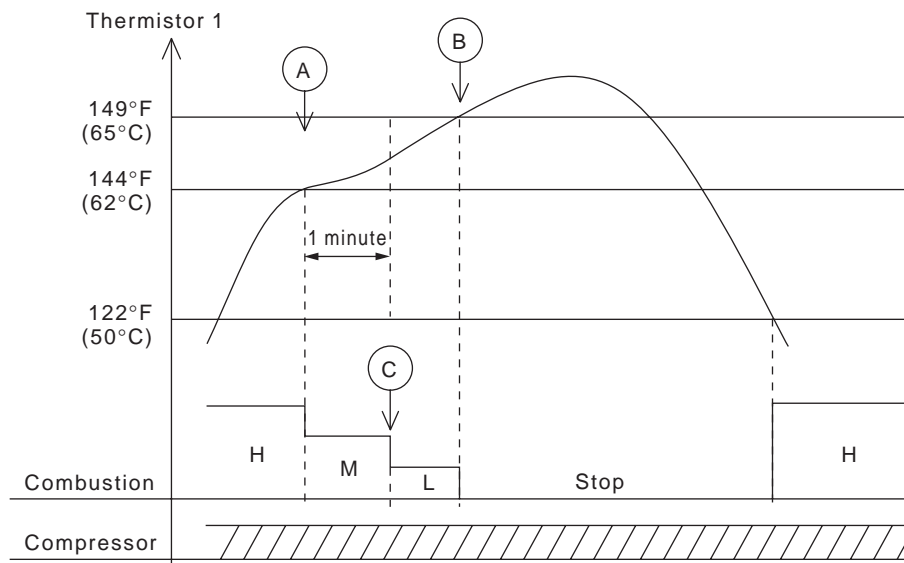
8-8-1. Indoor Unit

- This function prevents overheating of the indoor heat exchange coil.
- When the temperature of the indoor heat exchange coil rises above 131°F (55°C), and if the indoor fan is L (low speed), then the fan speed changes from L (low speed) to M (medium speed).

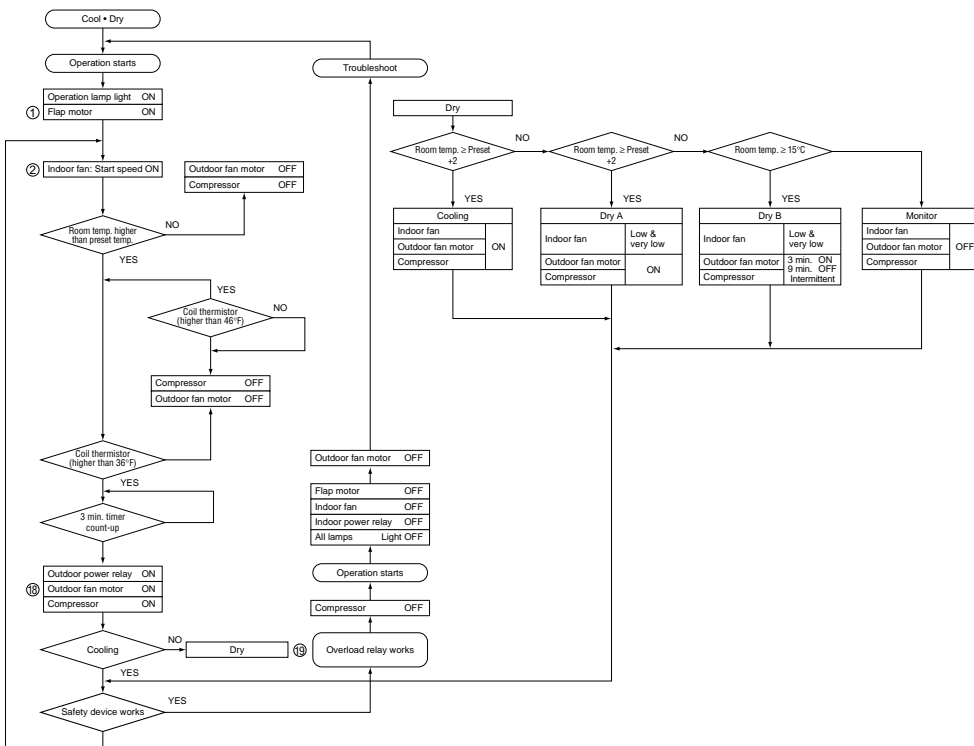


8-8-2. Outdoor Unit

- Unless the temperature of Thermistor 1 drops to 144°F (62 °C) or less from the point A within 1 minute, The burner is set to M (point C.)
- Reset is activated when the temperature of Thermistor 1 drops to 122°F (50°C) or less, with the burner being set to H.
- High-load protection for the outdoor unit is operated independently from the high-load protection for the indoor unit.



9-1-1. Starting Flowchart



Operation lamp	Light OFF
Compressor	OFF
Indoor fan	OFF
Outdoor fan	OFF

```

graph TD
    Start([Cooling operation]) --> Cooling[Cooling]
    Cooling --> Temp{Intake-outlet temp. lower than 14 to 18°F}
    Temp -- NO --> Normal[Normal]
    Temp -- YES --> Current{Current 8.5A}
    Current -- NO --> Obstruct[Obstruct heat exchanger]
    Current -- YES --> Overcharge[Over-charge of refrigerant]
    Overcharge --> Pressure{Pressure at service port 86 to 122psi}
    Pressure -- NO --> Compressor[Compressor failure]
    Pressure -- YES --> Shortage[Refrigerant shortage  
Capillary tube blockage]
    Shortage --> Troubleshoot[Troubleshoot]
    Compressor --> Troubleshoot
    Obstruct --> Troubleshoot
    Normal --> Troubleshoot
  
```

The flowchart for troubleshooting the cooling operation starts with a box labeled "Cooling operation" which leads to a box labeled "Cooling". From "Cooling", the flow enters a decision diamond: "Intake-outlet temp. lower than 14 to 18°F". If the answer is "NO", the flow goes to a box labeled "Normal". If the answer is "YES", the flow enters another decision diamond: "Current 8.5A". If the answer is "NO", the flow goes to a box labeled "Obstruct heat exchanger". If the answer is "YES", the flow goes to a box labeled "Over-charge of refrigerant". From "Over-charge of refrigerant", the flow enters a third decision diamond: "Pressure at service port 86 to 122psi". If the answer is "NO", the flow goes to a box labeled "Compressor failure". If the answer is "YES", the flow goes to a box labeled "Refrigerant shortage" and "Capillary tube blockage". From "Refrigerant shortage" and "Capillary tube blockage", the flow goes to a box labeled "Troubleshoot". From "Compressor failure", the flow also goes to "Troubleshoot". From "Obstruct heat exchanger", the flow goes to "Troubleshoot". Finally, from "Normal", the flow goes to "Troubleshoot".

```

graph TD
    A[ON timer] --> B[Cool Dry Heat]
    B --> C[Remote control unit OFF timer set]
    C --> D{Timer passes}
    D -- YES --> E[Timer lamp Light OFF  
Operation lamp Light OFF]
    E --> F[Cool Stop dry Heat]
    D -- NO --> G[Timer lamp Light ON]
    G --> H{Timer passes}
    H -- YES --> I[Timer lamp Light OFF]
    H -- NO --> G
  
```

9-2-1. Starting Flowchart



10. PROCEDURE FOR DISMANTLING THE UNIT

10-1. Procedure for Dismantling the Indoor Unit

(1) How to remove grille

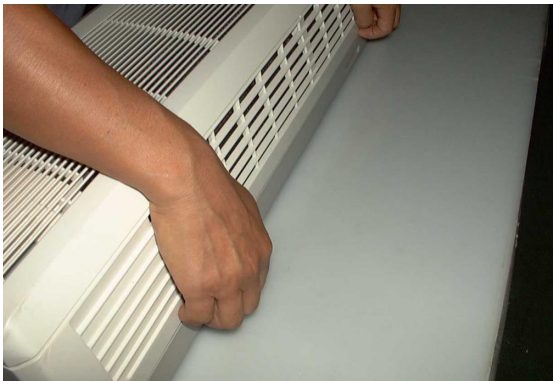
- ① Close the flap (upper airflow adjustment plate) and open the screw covers. Then remove the screws (2).



- ② Remove the fixing tabs (3) at the bottom of decorative grille.

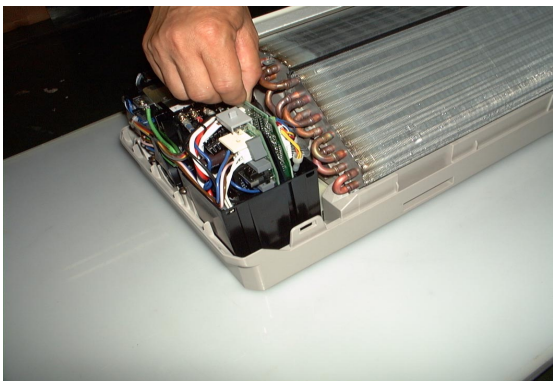


- ③ Detach the attachment tabs (2) at the top of the grille by lifting the grille.



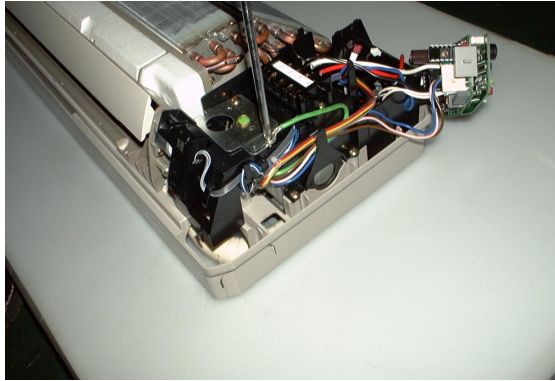
(2) How to remove PCBs

Detach all the wire connectors on PCB A and B in the electrical component box, and remove the tabs holding the PCBs. Detach the PCBs A and B from the top.

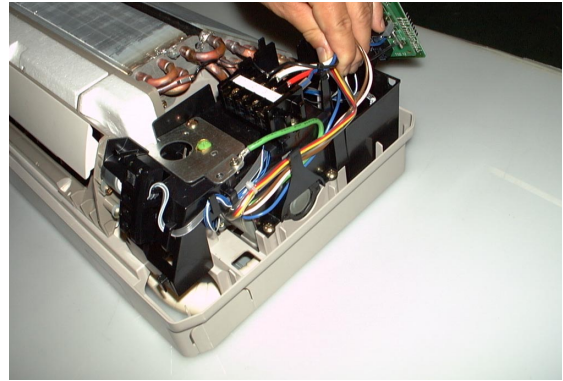


(3) How to remove electrical component box

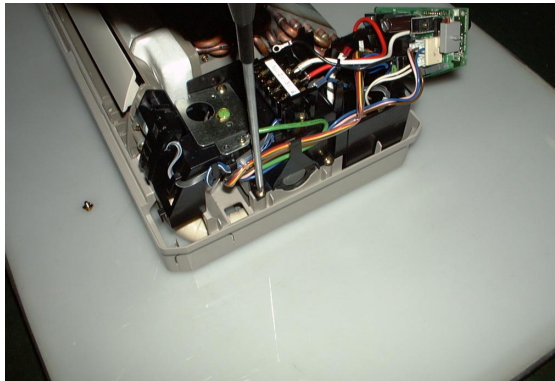
① Remove the screw for ground screw (green, 1).



② Remove the connectors for sensor, fan motor and flap motor, which are connected to the electrical component box.



③ Remove the screws (3) attaching the electrical component box, and remove the box from the frame by pressing the tabs at the back of the box.



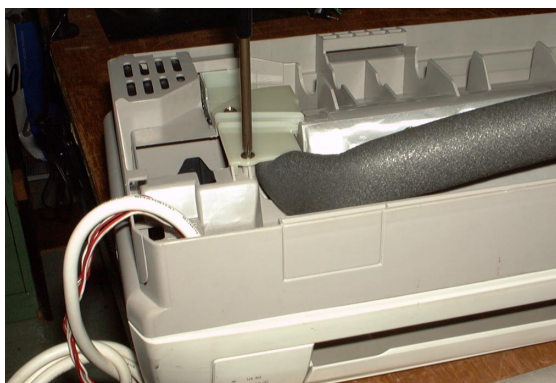
(4) How to remove drain pan

Remove the screw (1) attaching the drain pan and remove it upward by pressing the tabs (one each for right and left) hooked to the frame.



(5) How to detach heat exchanger

- ① Remove the screws (2) attaching the metal clip of the tube. Extend the supplementary tubing at the back of the unit.

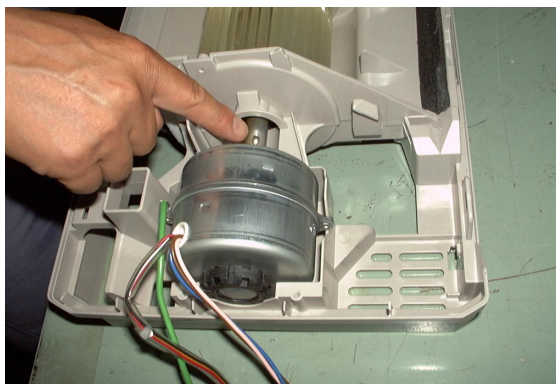


- ② Remove the screws (3) attaching the heat exchanger. Remove the tabs holding the resin boss at the top right of the heat exchanger, and then pull the heat exchanger off from the frame.



(6) How to detach fan and fan motor

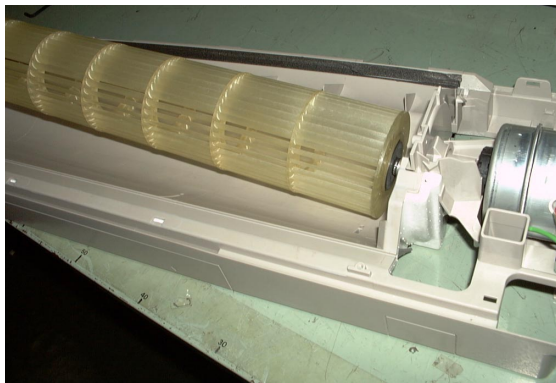
- ① Loosen the hexagonal screw in the fan boss which attaches the fan.



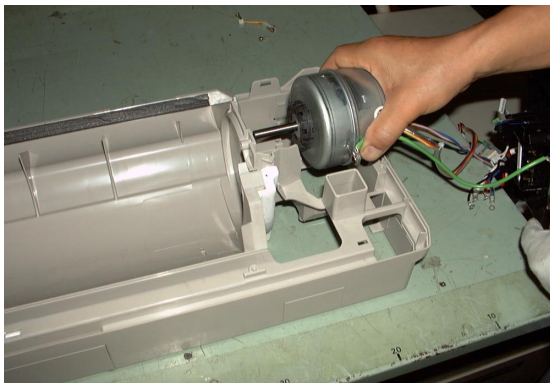
- ② Remove the screw (1) for the fan bearing cover.



- ③ Pull out the fan boss from the fan motor shaft, and then pull out the fan to the left.



- ④ Remove the fan motor by picking it up.



10-2. Procedure for Dismantling the Outdoor Unit

(1) How to remove the external panels

- ① Remove the screws (2) of the top panel and the screws (5) of the front panel.
- ② Remove the screw (1) of the side cover, the screws (3) of the terminal block cover, and the screws (2) of the terminal block.



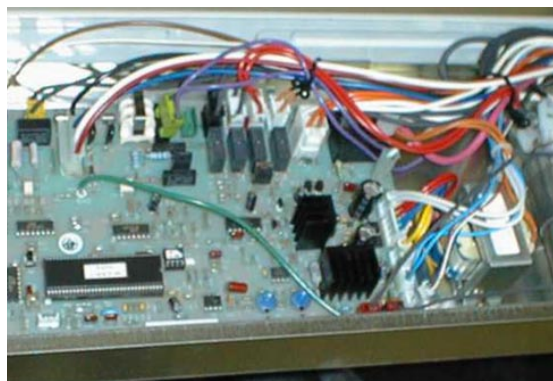
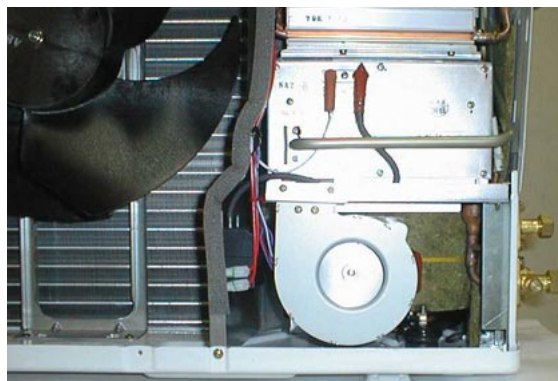
(2) How to detach the rear panel

- ① Remove the front panel and unscrew the screws (9) attaching the rear panel, and detach the manual shut-off valve.



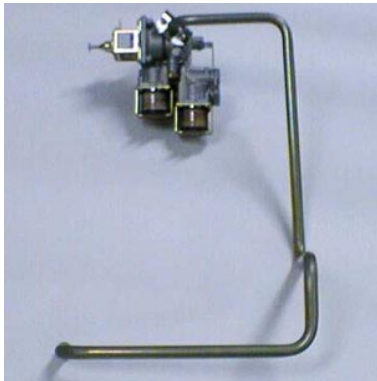
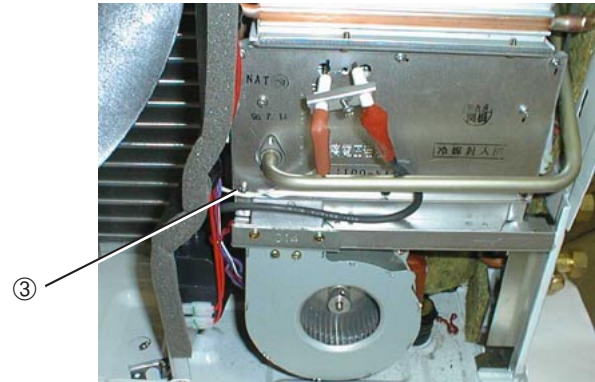
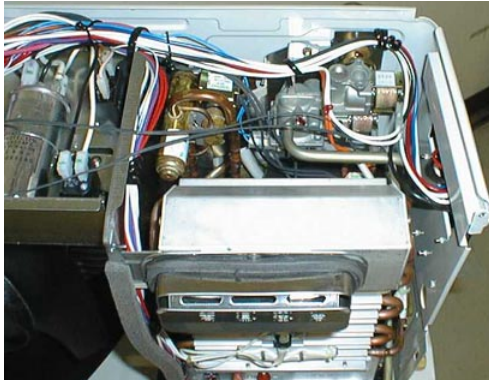
(3) How to detach the combustion blower

- ① Remove the screws (2) attaching the blower.
- ② Detach CN5 and CN14 on outdoor unit PCB.



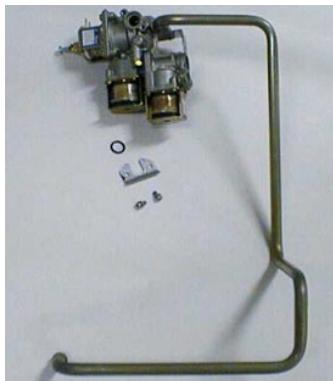
(4) How to detach combination valve and gas conduit

- ① Remove the screw (1) for the attachment plate of the combination valve in back of the main unit.
- ② Detach the 2 connectors (CN11 for proportional valve and CN08 for solenoid valve).
- ③ Remove the screws (2) attaching the gas conduit in front of the combustion chamber, and take off the combination valve with gas conduit.



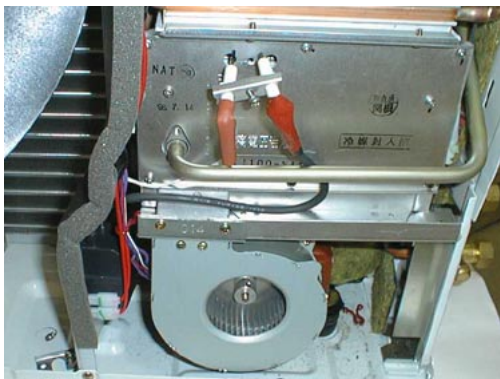
(5) How to detach combination valve

- ① Remove the attachment screws, and dismantle as shown below.



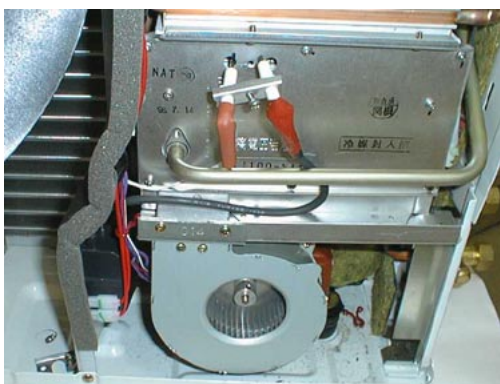
(6) How to detach ignition probe and flame sensor electrode

- ① Detach the connector of the ignition probe.
- ② Remove connector CN17 from outdoor unit PCB.
- ③ Remove the screw (1) for the attaching metal clip and remove the ignition probe and flame sensor electrode. (Flame sensor electrode is replaced together with the wires connected.)



(7) How to detach burner unit

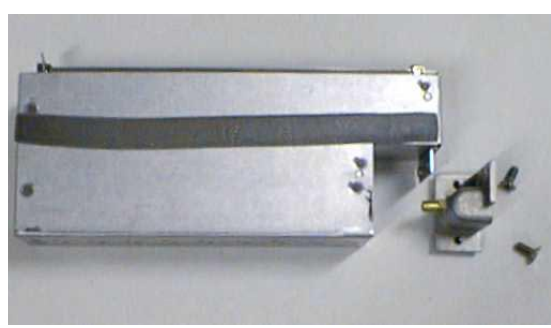
- ① Remove the attachment screws (6) and pull the burner unit to the front. (When reattaching the burner unit, replace the center screw first.)



(Rear view)

(8) How to detach gas nozzle

- ① Remove burner unit.
- ② Remove the screws (2) attaching the nozzle.



11. POINTS TO DIAGNOSE

11-1. Indoor Unit Alarm Signal

Alarm Signal	Error Meaning	Operation	Information
Power Lamp Flashing	Misconnection of inter-unit wiring	Heating • Cooling • Dry	Connect correctly
	Room temp. thermistor is defective	Heating • Cooling • Dry	Normal: 9 – 11 kΩ at 50°F 4 – 6 kΩ at 77°F
	Heat exch. thermistor is defective	Heating • Cooling • Dry	Normal: 100 – 120 kΩ at 50°F 50 – 60 kΩ at 77°F
	Fan motor is defective	Heating • Cooling • Dry	Alarm signal appears in 1 min.
	Amp. current is high	Heating • Cooling • Dry	More than 17 amp.
	Amp. current is low	Heating • Cooling • Dry	Less than 0.8 amp.
	Heat exch. thermistor detects high temp	Heating	More than 154°F (68°C)

11-2. Manifold Pressure

Outdoor Unit	Fuel	Inlet Pressure W.C. (kPa)	Manifold Pressure W.C. (kPa)		
			Low LD4, 5 Flashing	High LD2, 3 Flashing	Lighting (10 sec.) (verification)
CG1411	Natural gas	7.0 (1.74)	0.63 (0.157)	3.43 (0.853)	2.32 (0.579)

- To set manifold pressure there are 2 settings – low pressure and high pressure.
- Use SW1 to move to the 2 modes used to adjust the two pressures.
 - Press SW1 1 time for low pressure.
 - Press SW1 2 times for high pressure.
 - Press SW1 3 times for normal operation.
- Use VR1 to set the low, lighting pressure and VR2 to set the high pressure.
- Step 1: Set low pressure
 1. Press SW1 and hold until LEDs 4 and 5 flash.
 2. Adjust the low pressure with VR1 to 0.63 inches of water column.
- Step 2: Set high pressure
 1. Press SW1 again and LEDs 1 and 2 will flash.
 2. Adjust pressure with VR2 to 3.43 inches of water column.
- Step 3: Set lighting pressure

Lighting pressure will be set automatically from Step 1 and Step 2.

NOTE

Check these settings 2 or 3 times to insure all are correct then reset until no LEDs flash.

11-3. Checking Electrical Components

11-3-1. Components

Flow No.	Measurement Target		(Normal) Upper: Volt, Amp. (Normal) Lower: Resistance	Remarks
	CO. No.	Wire Color		
①	T	WHT – BLU	DC 1 – 12 (Pulse) 300 – 450 Ω	Flap motor
②	S	BLU – BRN	AC 100 – 130 V 30 – 60 Ω	Indoor fan motor
		RED – BLU	DC 1 – 12V More than 3000 Pulse/min.	
③	Z	1WHT – GRY2	50°F (10°C) 9.0 – 11.0 kΩ 68°F (20°C) 5.5 – 7.0 kΩ 86°F (30°C) 3.5 – 4.5 kΩ	Indoor room temperature sensor
④	U	3BLK – BLK4	50°F (10°C) 100 – 120 kΩ 68°F (20°C) 50 – 60 kΩ	Indoor coil temperature sensor
⑤	B	BLK – BLK	AC 100 – 130 V 300 – 400 Ω	Reversing valve
⑥	R	BLK – WHT WHT – PNK BLK – PNK	1 – 5 Ω	Compressor
⑦	Terminal block	WHT	3 – 5 A	Ampere current
⑧	KM	BLK – BLK	68°F (20°C) 9.8 – 10.8 kΩ 86°F (30°C) 6.8 – 7.3 kΩ 140°F (60°C) 2.4 – 2.6 kΩ	Outdoor thermistor 1, 2
⑨	D	PUR – PUR	AC 30 – 115 V 10 – 30 Ω	Combustion blower motor
	N	RED – BLU	DC 1 – 5 V More than 1000 Pulse/min.	Combustion blower motor fan speed sensor
⑩	O	BLU – BLU	DC 5 – 24 V 40 – 160 Ω	Proportional control valve
⑪	J	BLK – Ground	AC 100 – 130 V More than DC 1 μA	Flame sensor probe
⑫	P	YEL – YEL	Not more than DC 1 V Not more than 1 Ω	Thermal fuse bimetal thermostat
⑬	I	WHT – WHT	DC 90 – 120 V 1 – 2.5 kΩ	Gas valve 1
⑭	I	ORG – ORG	DC 90 – 120 V 1 – 2.5 kΩ	Gas valve 2
⑮	G	RED – RED	AC 100 – 130 V	Ignition transformer
⑯	E	BLK – BLK	AC 100 – 130 V 300 – 500 Ω	ON/OFF valve 1
⑰	F	BLK – BLK	AC 100 – 130 V 300 – 500 Ω	ON/OFF valve 2
⑱	C	WHT – BLU	AC 100 – 130 V	Outdoor fan motor
	V	WHT – BRN WHT – PNK	70 – 150 Ω 300 – 500 Ω	
⑲	W	PNK – PNK	Not more than AC 1 V Not more than 1 Ω	Overload relay

Operation	Outdoor Unit Voltage at Terminal Block		
	① – ②	① – ③	① – ④
Cooling • Dry	100 – 130 V	100 – 130 V	0 V
Heating	100 – 130 V	100 – 130 V	100 – 130 V
OFF	0 V	100 – 130 V	0 V

11-3-2. Indoor Unit

Indoor Unit		
Transformer Voltage • Coil Resistance		
Measurement Target		(Normal) Upper: Voltage
CN	Wire Color	(Normal) Lower: Resistance
Y1	WHT – WHT	AC 100 – 130 V 45 – 100 Ω
Y2	BRN – BRN	AC 12 – 18 V 0.5 – 4 Ω

11-3-3. Outdoor Unit

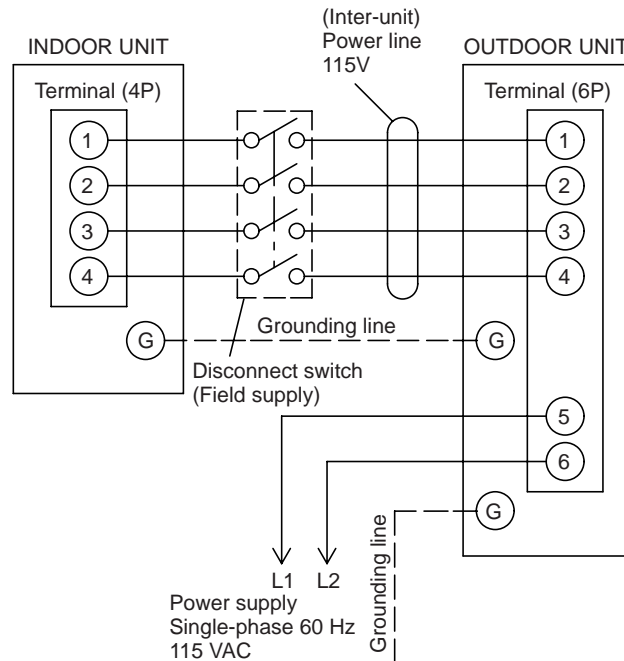
Outdoor Unit		
Transformer Voltage • Coil Resistance		
Measurement Target		(Normal) Upper: Voltage
CN	Wire Color	(Normal) Lower: Resistance
H	ORG – ORG	AC 100 – 130 V 50 – 100 Ω
Q2	YEL – YEL	AC 100 – 130 V 0.5 – 4 Ω
Q1	RED – RED	AC 20 – 30 V 1 – 10 Ω
Q1	BLU – BLU	AC 10 – 15 V 5 – 15 Ω

12. TROUBLESHOOTING

12-1. Check Before and After Troubleshooting

12-1-1. Check Power Supply Wiring

- Check that power supply wires are correctly connected to Terminals L and N on the terminal plate in the outdoor unit.



12-1-2. Check Inter-Unit Wiring

- Check that inter-unit wiring is correctly connected to the outdoor unit from the indoor unit.

12-1-3. Check Power Supply

- Check that voltage is in specified range ($\pm 10\%$ of the rating).
- Check that power is being supplied.

12-1-4. Check Lead Wires and Connectors in Indoor and Outdoor Units

- Check that coating of wires is not damaged.
- Check that lead wires and connectors are firmly connected.
- Check that wiring is correct.

12-2. When the Air Conditioner Does Not Work at All (Both Indoor and Outdoor Units) — Operation Lamp Does Not Light

12-2-1. Malfunction in Power Supply

- ① Check if operation selector of the indoor unit is set to ON. If it is not, set the switch to ON.
- ② Check if the circuit breaker is disengaged or if electricity is not being supplied properly.

Normal	AC 104 – 126 V
--------	----------------

* Use a circuit tester (set to AC range).

In case of abnormality → Check power source

No abnormalities, proceed to 12-2-2.

12-2-2. Abnormalities in Power Transformer

- ① Check voltage on the secondary core side.

Measure voltage 2P connector of TRANS 2 (without disconnecting connectors).

Normal	TRANS 2	BRN – BRN	AC 12 – 18 V
--------	---------	-----------	--------------

* Use a circuit tester (set to AC range).

Caution: Care should be taken that the tips of the tester rods do not touch each other since the circuit is electrically charged.

In case of abnormality → Replace the power transformer.

12-3. Operation Lamp Blinks (It Keeps Blinking after 3 Minutes Following Start of Operation)

If the operation lamp continues to blink more than 3 minutes, check for the following possible causes in this order:

- (1) Incorrect Wiring of Inter-unit Wiring (connector No. 1 – 4)
- (2) Thermistor Abnormality (Indoor Unit Only)
- (3) Protective Circuit of Outdoor (Burner) Unit Operated (during heating operation only)
- (4) CT Detection
- (5) Indoor Fan is Defective
- (6) Power Circuit Wiring Error
- (7) Outdoor Unit Power Supply Failure
- (8) Outdoor Unit Power Transformer Defective
- (9) Outdoor Unit Compressor Motor Overload Relay Has Operated
- (10) Outdoor Unit Compressor Motor Defective

12-3-1. Incorrect Wiring of Inter-unit Wiring

If the blinking of the operation lamp occurs upon initial operation following installation work, incorrect wiring of inter-unit cable between indoor and outdoor units is likely. Correctly rewire the inter-unit cable.

Caution: Be sure to turn off the circuit breaker switch before carrying out the wiring work.

12-3-2. Thermistor Abnormality (Indoor Unit Only)

Check open / short circuit at the coil thermistor and room thermistor (between 1 and 2 of the lamp 8P) on the PCB of the indoor unit (but only when the room temperature is 14 to 113°F).

12-3-3. Protective Circuit of Outdoor (Burner) Unit Operated

Check the following according to the failure display. Check items listed in 12-6. Heating Operation Not Possible.

○ light off

● light on

No.	Caused by (outdoor unit)	LED lamps 2 3 4 5	Meaning
—	Normal	○ ○ ○ ○	Normal operation
—	Defective in IC chip (E ² PROM)	○ ○ ○ ●	Cannot read IC chip data or missing IC chip on outside PCB
—	Defective Gas Valves	○ ○ ● ○	Detects abnormality in Gas Valve Circuit at initial checking
A	Detective Thermistor 1	○ ○ ● ●	Open or Short of Thermistor 1
B	Detective Thermistor 2	○ ● ○ ○	Open or Short of Thermistor 2
C	Limit switch	○ ● ○ ●	Thermal fuse or Bimetal Thermostat tripped
D	Flame current circuit	○ ● ● ○	Defective abnormal in Flame Current Circuit
E	Lighting failure	○ ● ● ●	Couldn't establish flame
F	Lost flame	● ○ ○ ○	Flame Sensor Circuit detects lost flame and could not establish the flame
G	Incorrect combustion motor speed	● ○ ○ ●	Incorrect combustion motor speed
H	Over-time period in retry	● ○ ● ○	Thermistor 1 or Thermistor 2 temperature did not go down in set period
I	Over number of times in retry	● ○ ● ●	Combustion stopped by Thermistor 1 or Thermistor 2 more than set number
J	Bypass Valve (V2) not open	● ● ○ ○	Bypass Valve failure or drop-out of Thermistor 2
—	Reversing Valve not working	● ● ○ ●	Reversing Valve failure, drop-out of Thermistor 2, or shortage of refrigerant

Note: Refer to 12-8. Failure Display on Outdoor Unit and Correction Method.

12-3-4. CT Detection (Refer to 12-3-9 and 12-3-10.)

- (1) Compressor abnormality
- (2) Compressor over-load relay engaged

12-3-5. Indoor Fan is Defective

- ① Check if the indoor fan is locked up.

Turn fan gently by hand.

When fan does not turn easily → Replace fan motor

No abnormalities, proceed to check ②.

- ② Check if motor circuit is defective.

Set temperature by remote controller so that air conditioner operates under Thermo. OFF in either cooling or heating operation, then start operation.

Check if it operates without the operation lamp blinking for more than 3 minutes.

In case of abnormality (operation lamp starts blinking after about 1 minute) → Proceed to check ③.

No abnormalities, proceed to check ③.

- ③ Check indoor unit PCB.

Measure voltage between 1 – 2 of 3P connector (Hole IC) on indoor unit PCB.

Caution: Care should be taken that the tips of the tester rods do not touch each other since the circuit is electrically charged.

Normal	Connector No.	Voltage
	Between 1 – 2	DC 3 – 7 V

* Use a circuit tester (set to DC range).

In case of abnormality → Replace indoor unit PCB.

No abnormalities, proceed to check ④.

- ④ Disconnect FAN 5P connector on indoor unit PCB and measure resistance between cables.

Normal	Color	Resistance
	BLU – BRN	94 – 116 Ω
	BLU – PNK	115 – 141 Ω

In case of abnormality → Replace the indoor fan motor.

No abnormalities, replace indoor unit PCB.

12-3-6. Power Circuit Wiring Error

Check wiring of power circuit.

Set temperature by remote controller so air conditioner operates under Thermo. ON in cooling operation, then start operation.

Check if compressor motor operates for more than 10 seconds.

It does not operate at all → Proceed to check 12-3-7 and 12-3-8.
Stops operation in about 3 seconds → Proceed to check 12-3-9.

No abnormalities, proceed to check 12-4.

12-3-7. Outdoor Unit Power Supply Failure

Measure voltage between Terminals 5 – 6 on terminal block of outdoor unit.

Set temperature by remote controller so conditioner operates under Thermo. ON in either cooling or heating operation, then start operation. Then measure voltage between Terminals 1 – 2 on terminal block of outdoor unit.

Caution: It is not possible to measure while 3-minute restart timer is in operation.

Normal	AC 104 – 126 V
--------	----------------

* Use a circuit tester (set to AC range).

In case of abnormality → Check connection of inter-unit cable. No abnormalities, replace indoor unit PCB.
--

No abnormalities, proceed to check 12-3-8.
--

12-3-8. Outdoor Unit Power Transformer Defective

① Check voltage of power transformer.

Measure voltage of 4P connector (CN10A), 3P connector (CN10B) and 2P connector (CN09) of indoor unit PCB (without disconnecting connectors).

Normal	4P, CN10A	RED – RED	20 – 30 V
		BLU – BLU	10 – 15 V
	3P, CN10B	YEL – YEL	85 – 115 V
	CN09	ORG – ORG	104 – 126 V

* Use a circuit tester (set to AC range).

Caution: Care should be taken that the tips of the tester rods do not touch each other since the circuit is electrically charged.

In case of abnormality → Replace power transformer.

No abnormalities, replace outdoor unit PCB.

12-3-9. Outdoor Unit Compressor Motor Overload Relay Has Operated

Caution: Carry out this check only after cutting power at the mains or disconnecting unit from the power supply.

① Check temperature overload relay for continuity.

Normal	1 Ω or less
--------	-------------

* Use a circuit tester (set to Ω range).

In case of abnormality → Check it again after more than 30 minutes (wait for it to cool down). If the result is the same, replace the temperature overload relay.

No abnormalities, check wiring to overload relay.

12-3-10. Outdoor Unit Compressor Motor Defective

- ① Check if compressor motor is locked up.

Set temperature by remote controller so air conditioner operates under Thermo. ON in cooling operation, then start operation.

Check if compressor operates.

In case of abnormality → Stops in 2 to 5 seconds. Humming of compressor motor can be heard.
After auto restart by 3-minute timer, same thing happens. If this condition continues, replace the compressor motor.

No abnormalities, proceed to check ②.

- ② Measure resistance of compressor motor.

Disconnect each wire from the top of the compressor and measure resistance of each phase.

Normal	Phase	Resistance
	R – S	1 – 5 Ω
	S – C	1 – 5 Ω
	C – R	1 – 5 Ω

* Use a circuit tester (set to Ω range).

Caution: Carry out this check only after cutting power at the mains or disconnecting unit from the power supply.

In case of abnormality → Replace compressor.

12-4. Outdoor Unit Fan Does Not Work

12-4-1. Outdoor Unit Fan Motor Defective

- ① Check if outdoor unit fan is locked up.

Turn fan gently by hand.

When fan does not turn easily → Replace fan motor.

No abnormalities, proceed to check ②.

- ② Measure resistance between each wire.

Normal	Color	Resistance
	BLU – BRN	70 – 150 Ω
	BLU – PNK	300 – 500 Ω

* Use a circuit tester (set to Ω range).

In case of abnormality → Replace fan motor.

No abnormalities, check continuity of each wire (PNK, BRN and BLU).

12-5. Flap Motor Does Not Work

12-5-1. Louver Motor Defective

- ① Set to cooling operation with flap to oscillate (movie) using remote controller and measure voltage applied to the louver motor at FLAP terminal of 5P connector.

Normal	Color	Output Voltage
	WHT and each BLU wire	DC 1 – 12 V (pulse)

* Use a circuit tester (set to DC range).

In case of abnormality → Replace indoor unit PCB.

No abnormalities, proceed to check ②.

- ② Disconnect FLAP of 5P connector for louver motor and measure resistance.

Normal	Color	Resistance
	WHT and each BLU wire	300 – 450 Ω

* Use a circuit tester (set to Ω range).

In case of abnormality → Replace louver motor.

No abnormalities, check if there is physical or mechanical interference to louver movement.

12-6. Heating Operation Not Possible

12-6-1. Thermistor 1 Defective

Failure Display on Outdoor Unit PCB: ○ ○ ● ●

Check Thermistor 1 (CN15).

- ① Disconnect Thermistor 1 connector (3P, BLK) from outdoor unit PCB, and measure resistance on Thermistor 1 side.

Normal	Temperature	Resistance
	68°F (20°C)	6.0 – 7.1 kΩ
	86°F (30°C)	4.0 – 5.0 kΩ
	140°F (60°C)	1.5 – 1.7 kΩ

In case of abnormality → Replace Thermistor 1.

12-6-2. Thermistor 2 Defective

Failure Display on Outdoor Unit PCB: ○ ● ○ ○

Check Thermistor 2 (CN16).

- ① Remove Thermistor 2 connector (3P, RED) from the outdoor unit PCB, and measure resistance on the Thermistor 2 side.

Normal	Temperature	Resistance
	68°F (20°C)	6.0 – 7.1 kΩ
	86°F (30°C)	4.0 – 5.0 kΩ
	140°F (60°C)	1.5 – 1.7 kΩ

In case of abnormality → Replace Thermistor 2.

12-6-3. Safety Device Operated

Failure Display on Outdoor Unit PCB: ○ ● ○ ●

Check safety device.

- ① Disconnect safety device connector (CN12, 2P, WHT) from outdoor unit PCB, and measure resistance on the safety device.

Normal	1 Ω or less
--------	--------------------

* Use a circuit tester (set to Ω range).

In case of abnormality → Replace temperature fuse or temperature limiting switch.

12-6-4. Erroneous Flame Detection

Failure Display on Outdoor Unit PCB: ○ ● ● ○

Check flame sensor probe.

- ① Measure voltage of alternative current between flame rod connector (1P, CN17) and ground.

Normal	AC 104 – 126 V
--------	----------------

* Use a circuit tester (set to AC range).

In case of abnormality → Replace outdoor unit PCB.
--

- ② Remove flame rod connector, and measure direct current between connector and PCB.

Normal	DC 1 μ A or less
--------	----------------------

* Use a circuit tester (set to DC range).

In case of abnormality → Replace outdoor PCB.

Caution: The flame rod retains electromotive force immediately after combustion ceases, therefore measurement should be made while the equipment is cool.

12-6-5. Ignition Failure

Failure Display on Outdoor Unit PCB: ○ ● ● ●

1) Check ignition transformer.

- ① Check if ignition wires are disconnected or have voltage leak.

- ② Measure AC voltage between the connectors (CN07) to the ignition electrode.

Normal	AC 104 – 126 V
--------	----------------

* Use a circuit tester (set to AC range).

In case of abnormality → Replace outdoor unit PCB.
--

If voltage is normal but sparking noise cannot be heard, replace the ignition electrode.

Caution: If the ignition wires are disconnected, connect them by pushing them in firmly.

2) Check gas valve (GV1).

- ① Measure DC voltage at the connector (CN08) of electromagnetic valve (under heating operation, during combustion).

Normal	WHT – WHT DC 90 – 120 V
--------	-------------------------

* Use a circuit tester (set to DC range).

In case of abnormality → Replace outdoor unit PCB.
--

- ② Disconnect heating gas valve (GV1, CN08) connector, and measure resistance at connector.

Normal	WHT – WHT 1 – 2.5 kΩ	* Use a circuit tester (set to Ω range).
--------	----------------------	--

In case of abnormality → Replace heating electromagnetic valve.

- 3) Check electromagnetic valve (GV2) of the combination gas valve.

- ① Measure DC voltage at electromagnetic valve connector (CN08) (under heating operation, during combustion).

Normal	ORG – ORG DC 90 – 120 V	* Use a circuit tester (set to DC range).
--------	-------------------------	---

In case of abnormality → Replace outdoor unit PCB.
--

- ② Disconnect heating electromagnetic valve connector (CN08), and measure resistance at connector.

Normal	ORG – ORG 1 – 2.5 kΩ	* Use a circuit tester (set to Ω range).
--------	----------------------	--

In case of abnormality → Replace heating electromagnetic valve.

- 4) Check proportional control valve (PV).

- ① Measure DC voltage at proportional valve connector (CN11) (under heating operation, during combustion).

Normal	BLU – BLU DC 5 – 30 V	* Use a circuit tester (set to DC range).
--------	-----------------------	---

In case of abnormality → Replace outdoor unit PCB.
--

- 5) Check flame rod.

- ① Check if flame rod connector (CN17, 1P) is connected properly.

- ② Measure AC voltage between flame rod connector and ground.

Normal	AC 104 – 126 V	* Use a circuit tester (set to AC range).
--------	----------------	---

In case of abnormality → Replace flame rod.

- ③ Disconnect flame rod connector (CN17) and measure direct current at connector.

Normal	DC 2μA or more	* Use a circuit tester (set to DC range).
--------	----------------	---

In case of abnormality → Replace flame rod.

12-6-6. Erroneous Flame-Out Condition

Failure Display on Outdoor Unit PCB: ● ○ ○ ○

- ① Check in same manner as “Failure Display ○ ● ● ●.”

12-6-7. Combustion Blower Motor Abnormal Revolution

Failure Display on Outdoor Unit PCB: ● ○ ○ ●

Check combustion blower motor.

- ① Measure AC voltage at blower motor connector (CN05) (under heating operation, during combustion).

Normal	PUR – PUR AC 30 – 115 V	* Use a circuit tester (set to AC range).
--------	-------------------------	---

In case of abnormality → Replace outdoor unit PCB.

- ② Disconnect combustion blower motor connector, and measure resistance at connector.

Normal	PUR – PUR 10 – 30 Ω	* Use a circuit tester (set to Ω range).
--------	---------------------	--

In case of abnormality → Replace combustion blower motor.

12-6-8. ON/OFF Valve Failure

Failure Display on Outdoor Unit PCB: ● ● ○ ○

Check ON/OFF valve coil (CN06).

- ① Measure AC voltage at the ON/OFF valve coil connector (under heating operation, during combustion).

Normal	BLK – BLK AC 104 – 126 V	* Use a circuit tester (set to AC range).
--------	--------------------------	---

In case of abnormality → Replace outdoor unit PCB.

- ② Disconnect ON/OFF valve connector and measure resistance at connector.

Normal	BLK – BLK 300 – 500 Ω	* Use a circuit tester (set to Ω range).
--------	-----------------------	--

In case of abnormality → Replace ON/OFF valve coil.

12-6-9. Reversing Valve Failure

Failure Display on Outdoor Unit PCB: ● ● ○ ●

Check reversing valve coil.

- ① Measure AC voltage at reversing valve coil connector (CN03) (under heating operation, during combustion).

Normal	BLK – BLK AC 104 – 125 V	* Use a circuit tester (set to AC range).
--------	--------------------------	---

In case of abnormality → Replace outdoor unit PCB.

- ② Disconnect reversing valve coil connector and measure resistance at connector.

Normal	BLK – BLK 300 – 500 Ω	* Use a circuit tester (set to Ω range).
--------	-----------------------	--

In case of abnormality → Replace reversing valve coil.

Caution: Reversing valve failure can be displayed when there is a shortage of refrigerant. Therefore if the above check shows normal, check the amount of refrigerant.

12-7. Reset Method When Error Occurs During Heating Operation

Wait for 4 minutes or more after the power is on, and then press the operation button on the remote control unit.

12-8. Failure Display on Outdoor Unit and Correction Method

No.	Caused by (outdoor unit)	LED lamps 2 3 4 5	Meaning	Error Detected	Points to Diagnose	Correction Methods
—	Normal	○ ○ ○ ○	Normal operation	—	—	—
—	Defect in IC chip (E ² PROM)	○ ○ ○ ●	Can not read IC chip data or missing IC chip on outside PCB	Gas switching IC (EEP-ROM) data was not read properly by microcomputer upon power-on	● Confirm proper insertion of gas switching IC, then reset power supply	① Replace gas switching IC chip ② Replace outdoor unit PCB
—	Defective Gas Valves	○ ○ ● ○	Detect abnormality in Gas Valve Circuit at initial checking	Electricity applied to GV1 / GV2 while gas valve is closed	● Measure voltage of GV1 (WHT – WHT of I) and GV2 (ORG – ORG of I) (normal value: DC0V)	① Replace outdoor unit PCB
A	Defective Thermistor 1	○ ○ ● ●	Open or Short of Thermistor 1	Open / short circuit of Thermistor 1	● Measure resistance of Thermistor 1 (BLK – BLK of M.) (normal value: 6.6±0.5 kΩ at 68°F (20°C))	① Check / modify Connector CN 15 (M) ② Replace Thermistor 1 ③ Replace outdoor unit PCB
B	Defective Thermistor 2	○ ● ○ ○	Open or Short of Thermistor 2	Open / short circuit of Thermistor 2	● Measure resistance of Thermistor 2 (BLK – BLK of K.) (normal value: 6.6±0.5 kΩ at 68°F (20°C))	① Check / modify connector CN 16 (K) ② Replace Thermistor 2 ③ Replace outdoor unit PCB
C	Limit switch	○ ● ○ ●	Thermal fuse or Bimetal Thermostat tripped	Temperature fuse / temperature limiting switch operated	● Check continuity of temperature fuse and temperature limiting switch (YEL – YEL of P) (normal value: 1Ω or less)	① Check / modify connector CN12 (P) ② Replace thermal fuse ③ Replace bimetal thermostat
D	Flame Current Circuit	○ ● ● ○	Abnormality in Flame Current Circuit	Flame current detected while combination gas valve is closed	● Measure electric current between BLK of flame rod and CN17(J) on the PCB (normal value: 0 μA, combination gas valve closed)	① Replace flame sensor probe (CN17) ② Replace outdoor unit PCB
E	Lighting failure	○ ● ● ●	Could not establish flame	Fail to ignite by ignition operation (including retry)	● Measure electric current between BLK of flame rod and CN17(J) on the PCB (normal value: 3 μA or more at ignition) ● Check positioning of ignition plug, flame rod and burner (normal: electric discharge gap approx. 4mm) ● Confirm sparking noise at the igniter	① Check / modify connector CN17 (J) ② Check / modify connector CN7 (G) ③ Replace ignition electrode ④ Check / modify insertion of wire on secondary side of ignition transformer ⑤ Replace flame rod ⑥ Replace ignition transformer ⑦ Replace outdoor unit PCB or power transformer
F	Lost flame	● ○ ○ ○	Flame Sensor Circuit detects lost flame and could not establish the flame	Extinction after flame detection, and does not re-try (burning after re-try, yet extinguishes within 4 minutes)	As above	As above
G	Incorrect combustion motor speed	● ○ ○ ●	Incorrect combustion motor speed	Inadequate revolution speed ① At ignition: Does not reach 500rpm within 20 seconds Reaches 500rpm within 20 seconds yet does not reach prescribed revolutions (approx. 1,850rpm) within 60 seconds ② Less than 500rpm (other than ignition)	● Check revolution of combustion blower fan ● Measure voltage of combustion blower motor (PLE – PLE of D) (normal value: AC 30 – 115 V)	① Check / modify connector CN5 (D) ② Check / modify connector CN14 (N) ③ Replace combustion blower fan motor set ④ Replace outdoor unit PCB
H	Over-time period in retry	● ○ ● ○	Thermistor 1 or Thermistor 2 temperature did not go down during set period	Thermistor 1 and/or Thermistor 2 do not cool down to normal temperature within 10 minutes after being heated up to a specified temperature (gas is cut off when overheating)	● Check for refrigerant leaks (pressure in wide tube while cooling operation: approx. 85.0 PSIG (6 kgf/cm ²))	① Repair refrigerant tubes (connections, etc.) (leaks) ② Charge additional refrigerant (leaks) ③ Replace units
I	Over number of times in retry	● ○ ● ●	Combustion stopped by Thermistor 1 or Thermistor 2 more than set number	Fourth overheating is detected. Retry is performed up to 3 times when Thermistor 1 and / or Thermistor 2 cool down to normal temperature within 10 minutes	As above	As above
J	Bypass Valve (V2) not open	● ● ○ ○	Bypass Valve failure or drop-out of Thermistor 2	Thermistor 2 does not detect temperature increase (approx. xx°F (2°C)) within 30 seconds after ON/OFF valve (RV2) is ON	● Check position of Thermistor 2. ● Measure voltage at ON/OFF valve (RV2) (BLK – BLK of F) (normal value: AC 104 – 126 V, ON)	① Confirm / modify position of Thermistor 2 ② Confirm / modify connector CN6 (F) ③ Replace ON/OFF valve 2 (coil) ④ Replace outdoor unit PCB ⑤ Replace units
—	Reversing Valve not working	● ● ○ ●	Reversing Valve failure, drop-out of Thermistor 2, or shortage of refrigerant	Thermistor 1 fails to detect temperature increase (approx. xx°F (1°C)) within 30 seconds after ON/OFF valve (V1) is open at ignition operation	● Check for refrigerant leakage ● Check position of Thermistor 1 ● Measure voltage at reversing valve (BLK – BLK of B) (normal value: AC 104 – 126 V, ON)	① Repair refrigerant tubes (connections, etc.) (leaks) ② Charge additional refrigerant (leaks) ③ Check / modify position of Thermistor 1 ④ Check / modify connector CN03 (B) ⑤ Replace reversing valve (coil) ⑥ Replace outdoor unit PCB

Note: Failure display remains even after power reset following repairs. The display is overridden upon operation of compressor when heating operation is carried out for a second time after the repair.

13. SPECIAL PRECAUTIONS WHEN SERVICING THE UNIT

Important!

For your personal safety, be sure to read and understand the following precautions before servicing.



WARNING

Injuries can occur from burns or inhalation of toxic gas if servicing is performed while refrigerant remains in the refrigeration circuit. This servicing includes disassembling brazed tubing connections and removing any refrigeration parts or components.

- To avoid risk of injury when servicing the outdoor unit (for instance, when replacing the compressor or repairing a refrigerant leak), follow the procedure below for the refrigerant circuits of the outdoor unit.

PROCEDURE

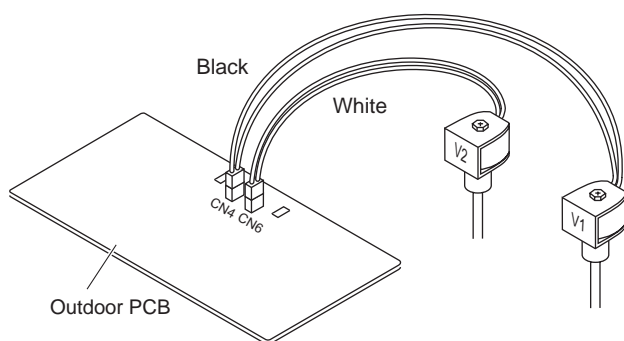
13-1. BLK/WHT Connector Attachment for Servicing

- 13-1-1.** Confirm mains power is switched OFF, then, detach the connectors (BLK and WHT) for the electromagnetic valves, SV1 and SV2, from the terminals CN4 and CN6 on the PCB.
- 13-1-2.** Connect the special connector (field supply) and the connector (BLK and WHT). Following this, re-apply power at 115V and open the electromagnetic valves, SV1 and SV2.
- 13-1-3.** Provide a disconnect switch to the special connector.
- 13-1-4.** Turn the disconnect switch ON to supply power (single-phase, 115V) to the special connector. This makes it possible to force open 2 solenoid valves (SV1 and SV2) in the refrigeration circuit outdoor unit. (Fig. 3)

Important!

The procedures given in “13-2” to “13-5” below must be carried out with the 2 solenoid valves SV1 and SV2 open.

- Condition at shipping and operation



- Condition at servicing

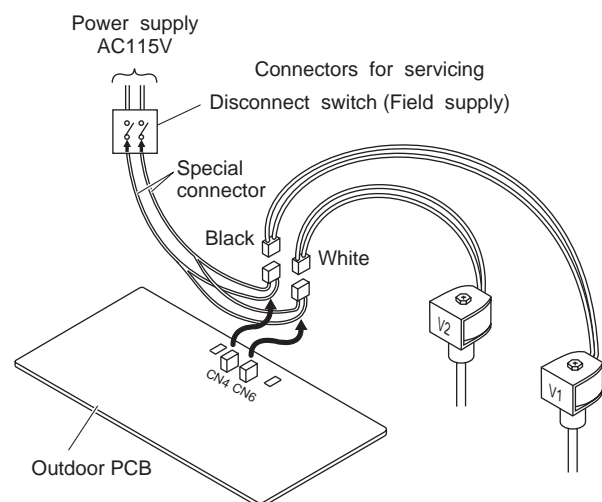


Fig. 1

13-2. Refrigerant Recovery

13-2-1. Open service valve to recover refrigerant into refrigerant recovery unit.



CAUTION

Refrigerant released into the air contributes to destruction of our planet's ozone layer. You should always use the refrigerant recovery unit to help protect the environment.

13-3. Service on Outdoor Unit

13-3-1. After making sure that the refrigerant in the circuit has been completely discharged, perform required servicing, such as replacing the compressor or repairing refrigerant leaks.

13-3-2. Before going on to the next step, leak test all joints where welding has been done.

NOTE

Nitrogen gas is best when pressurizing the system for a leak test. However, if it is necessary to instead test with refrigerant gas, be sure to recover all gas into the refrigerant recovery unit after completing the leak test.

13-4. Evacuation Using Vacuum Pump

13-4-1. Using a hex wrench, set the valve stems of the narrow and wide tube service valves as indicated in the table below.

Service Valve	Valve Position
Narrow	Position – a –
Wide	

NOTE

Refer to Service Valve Construction shown in Fig. 3.

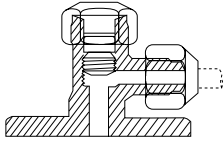
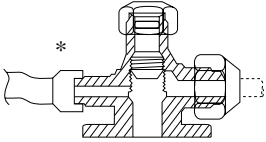
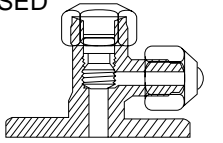
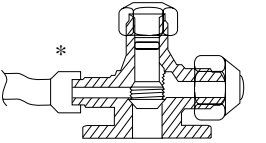
Action	Narrow Tube Service Valve (2-Way)	Wide Tube Service Valve (3-way)
Position – a –	Fully OPEN 	
Position – b –	CLOSED 	

Fig. 3

* Hose

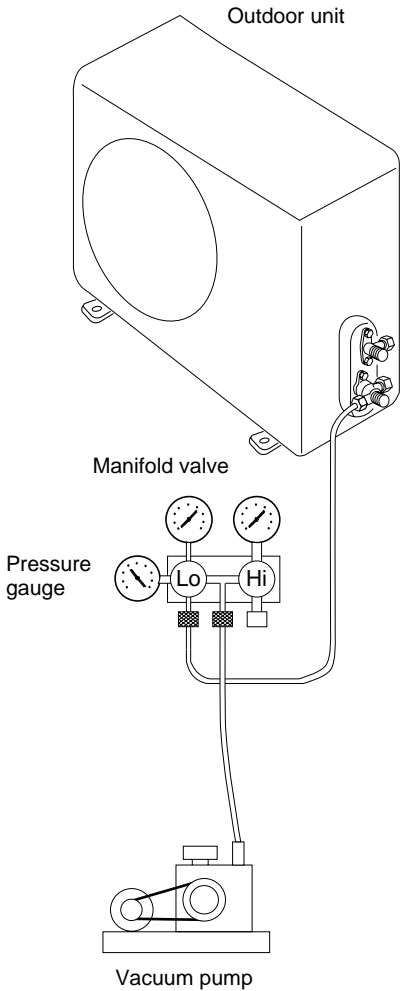


Fig. 2

- 13-4-2.** Connect the vacuum pump and a manifold valve as shown Fig. 1. Confirm that all connections are correctly made.

NOTE

In order to withstand negative suction pressure during evacuation, the manifold valve should be equipped with a Hi/Lo compound gauge with a minimum scale reading of –76 cmHg.

- 13-4-3.** Install (first by hand-tightening, then securely with a wrench) flare nuts and bonnets at service valves in the refrigeration circuit where evacuation will take place. This process is highly important to completely evacuate the system.
- 13-4-4.** Check that the BLK/WHT connector is properly attached. (Fig. 1)
- 13-4-5.** Turn the disconnect switch ON (if it has been OFF) to open the 2 solenoid valves (SV1 and SV2). (Fig. 2)
- 13-4-6.** With both the “Lo” and “Hi” knobs of the manifold valve open, run the vacuum pump. The operation time varies with the capacity of the pump. (Run the pump at least 30 minutes.) Evacuation is successful if the vacuum gauge reading remains at –75 cmHg or more for at least 10 seconds after closing both the “Lo” and “Hi” knobs of the manifold valve.
- 13-4-7.** With the vacuum pump still running, turn both the narrow and wide service valves all the way in to close the valves (position – b – in Fig. 3). Then stop the pump.
- 13-4-8.** After removing the vacuum hoses from the service valves, replace the flare nuts and bonnets on the valves. The refrigerant circuit is now ready for charging.

13-5. Refrigerant Charging

- 13-5-1.** After evacuation is completed, charge the circuit with the proper amount of refrigerant.

NOTE

The proper amount of refrigerant is specified on the nameplate of the outdoor unit and in Section “2-1. Unit Specifications” in the service manual.

- 13-5-2.** Use a hose to connect the narrow tube service valve to the liquid port of the charging cylinder. (Fig. 4)
- 13-5-3.** Purge air from the hose. Do this by opening the charging cylinder valve, then slightly loosening the connection to the narrow tube service valve. Wait a few moments, then retighten the connection.
- 13-5-4.** With a hex wrench, open the service valve little by little to let liquid refrigerant enter the circuit. (Fig. 4)

NOTE

Write down the gradation levels on the charging cylinder before and after the charging. This allows you to calculate the charging volume.

$$\text{Charging volume} = \text{Gradation level before charging} - \text{Gradation level after charging}$$

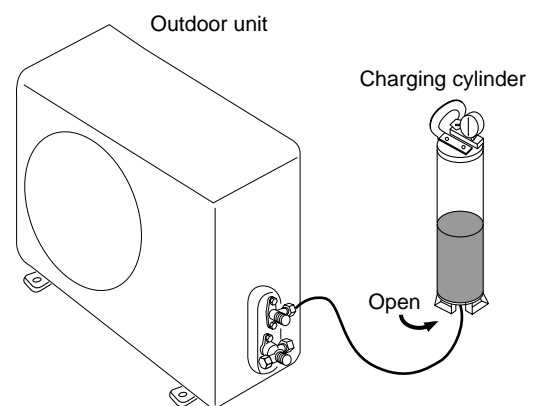


Fig. 4

13-5-5. If it is not possible to completely charge the unit with the proper amount of refrigerant, you can do an additional charging after installing the units. At that time, refrigerant should be recharged in the liquid state a little at a time using the wide tube service port, and the air conditioner should be operating in COOLING mode during the entire charging process.

NOTE

Charging the unit with a large amount of refrigerant at once may damage the compressor. Always charge the unit at a constant charging rate of about 0.2 lb (100 g).

13-6. Reattaching BLK/WHT Connectors for Operation

13-6-1. Turn off the power source.

13-6-2. Connect the BLK/WHT connectors to each other as in the original state.



CAUTION

Remember to reattach the BLK/WHT connectors in their original position. Otherwise, the system will not operate correctly and damage may occur.

KGS 1411 + CG1411

For Your Safety Read Before Operation

WARNING:

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance is supplied natural gas for heat source into outdoor section.
Read the following safety information before operation and/or maintenance is performed.
- B. This appliance does not have a pilot light. It is equipped with an ignition device which automatically lights the burner.
Do not try to light the burner by hand.
- C. **BEFORE OPERATING:** Smell around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliances.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone.
Follow the gas supplier's instructions.
 - If you reach your gas supplier, call the fire department.
- D. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try again call a qualified service technician. Attempting to repair the appliance may result in a fire or explosion.
 - E. Do not use this appliance if any part is underwater. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been underwater.

Operating Instruction

1. **STOP!** Read the safety information above in this manual.
2. Manual Shutoff valve shall be turned off when heating is not operating.
3. Turn off the electric power supply when the manual shutoff valve is turned on. Wait five minutes, and then smell for gas, including near the floor.
If you smell gas, **STOP!** Follow "C" in the safety information above on this manual.
If you don't smell gas, go to the operating instructions.

Installation Instruction

The installation must conform with local codes or, in the absence of local code, with the National Fuel Gas Code:

ANSI Z223.1/NFPA 54
and National Electric Code:
ANSI/NFPA 70.

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Product Information

If you have problems or questions concerning your Air Conditioner, you will need the following information. Model and serial numbers are on the nameplate on the bottom of the cabinet.

Model No. _____ Serial No. _____

Date of purchase _____

Dealer's address _____

Phone number _____

Alert Symbols

The following symbols used in this manual, alert you to potentially dangerous conditions to users, service personnel or the appliance:



WARNING

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.



CAUTION

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

Features

This air conditioner is equipped with cooling, drying and heating functions. This air conditioner is a refrigerant heating type unit which uses combustion gas to heat the outdoor coil refrigerant during heating operation. Details on these functions are provided below; refer to these descriptions when using the air conditioner.

- **Microprocessor Controlled Operation**

The interior compartment of the remote control unit contains several features to facilitate automatic operation, each logically displayed for easy use.

- **Simple One-touch Wireless Remote Control**

The remote control unit has several features to facilitate automatic operation.

- **12-Hour ON or OFF Timer**

This timer can be set to automatically turn the unit on or off at any time within a 12 hour period.

- **1-Hour OFF Timer**

This timer can be set to automatically turn off the unit at any time after one hour.

- **Night Setback**

Pressing this button changes the setting of the room temperature thermostat, allowing you to set the temperature at whatever level that you find comfortable.

- **Automatic and 3-step Fan Speed**

Auto/High/Medium/Low

- **Air Sweep Control**

This function moves a flap up and down in the air outlet, directing air in a sweeping motion around the room and providing comfort in every corner.

- **Automatic Switching between Cooling and Heating**

This unit automatically selects cooling operation, heating operation or drying operation according to the difference between the room temperature and the temperature setting when operation starts.

- **Automatic Restart Function for Power Failure**

Even when power failure occurs, preset programmed operation can be reactivated once power resumes.

- **Anti-Mold Filter**

This unit is equipped with an anti-mold filter that inhibits the growth of mold and bacteria.

- **Optional Air Clean Filter**

An air filter that uses activated charcoal to eliminate unpleasant odors and clean the air is available (sold separately).

Installation Location

- We recommend that this air conditioner be installed properly by qualified installation technicians in accordance with the Installation Instructions provided with the unit.



WARNING

- The outdoor unit has been designed for outdoor use. It should never be used inside. This could result in incomplete combustion and is extremely dangerous.
- Use only the gas types indicated on the name plate. This plate is located on the right side of the outdoor unit and should be checked before connecting the gas line.
- Before installation, check that the voltage of the electric supply in your home or office is the same as the voltage shown on the nameplate.

EG



WARNING

- Do not install this air conditioner where there are fumes or flammable gases, or in an extremely humid space such as a greenhouse.
- Do not install the air conditioner where excessively high heat-generating objects are placed.

Avoid: To protect the air conditioner from heavy corrosion, avoid installing the outdoor unit where salty sea water can splash directly onto it or in sulphurous air near a spa.

Electrical Requirements

1. All wiring must conform to the local electrical codes. Consult your dealer or a qualified electrician for details.
2. Each unit must be properly grounded with a ground (or earth) wire or through the supply wiring.
3. Wiring must be done by a qualified electrician.

Safety Instructions

- Read this Instruction Manual carefully before using this air conditioner. If you still have any difficulties or problems, consult your dealer for help.
- This air conditioner is designed to give you comfortable room conditions. Use this only for its intended purpose as described in this Instruction Manual.



WARNING

- Never use or store gasoline or other flammable vapor or liquid near the air conditioner — it is very dangerous.
- This air conditioner has no ventilator for intaking fresh air from outdoors. You must open doors or windows frequently when you use gas or oil heating appliances in the same room, which consume a lot of oxygen from the air. Otherwise there is a risk of suffocation in an extreme case.



CAUTION

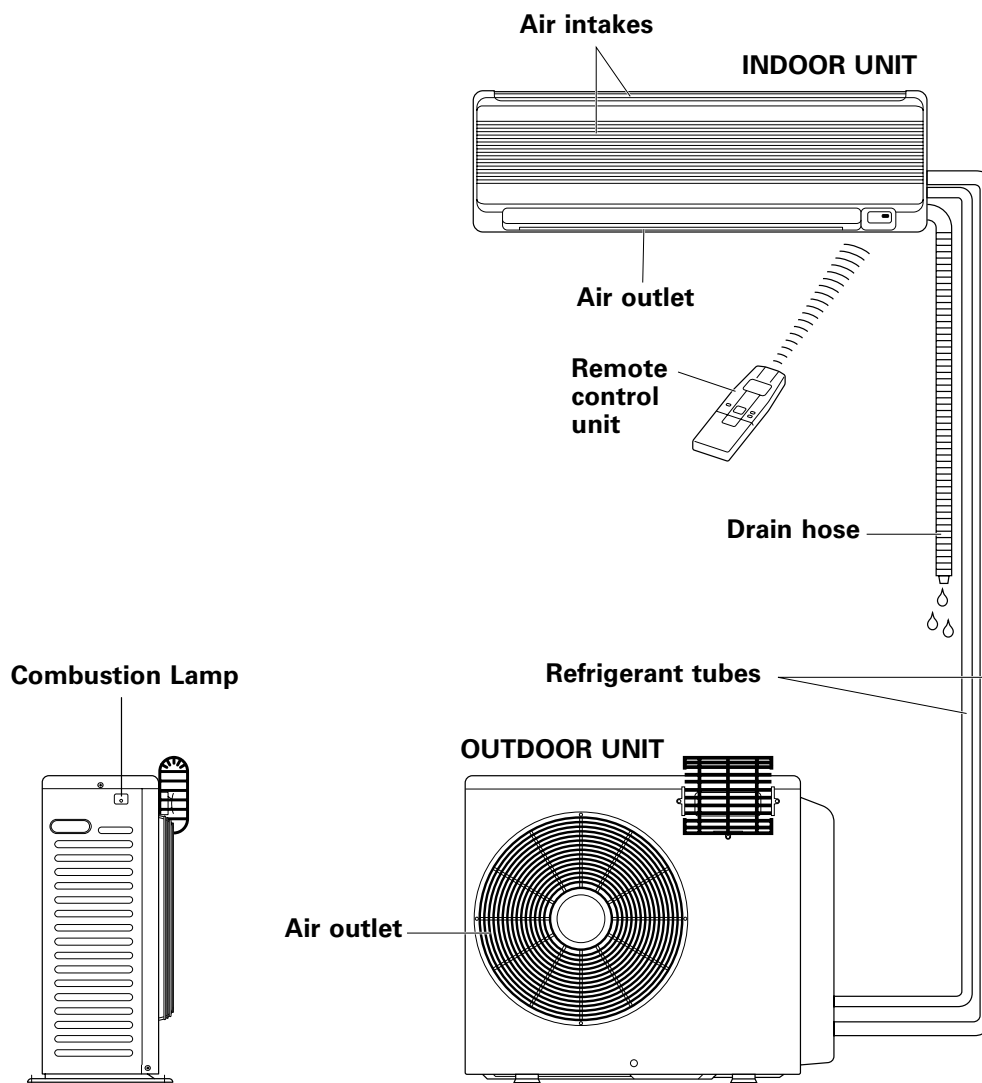
- Do not turn the air conditioner on and off from the power mains switch. Use the ON/OFF operation button.
- Do not stick anything into the air outlet of the outdoor unit. This is dangerous because the fan is rotating at high speed.
- Do not let children play with the air conditioner.
- Do not cool or heat the room too much if babies or invalids are present.



WARNING

- Use only AGA or CGA certified natural gas for this unit. If L.G. gas is to be used, be sure to first consult with your installer or local dealer.
- If the designated gas is not used, proper combustion may not take place. This could result in an accident and personal injury.

Names of Parts



NOTE

This illustration is based on the external appearance of a standard model. Consequently, the shape may differ from that of the air conditioner you have selected.

This air conditioner consists of an indoor unit and an outdoor unit. You can control the air conditioner with the remote control unit.

Air Intakes	Air from the room is drawn into these sections and passes through air filters which remove dust.
Air Outlet	Air is blown out of the air conditioner through the air outlet.
Remote Control Unit	The wireless remote control unit controls power on/off, operation mode selection, temperature, fan speed, timer setting, and air sweeping.
Refrigerant Tubes	The indoor and outdoor units are connected by copper tubes through which refrigerant gas flows.
Drain Hose	Moisture in the room condenses and drains off through this hose.
Outdoor (Condensing) Unit	The outdoor unit contains the compressor, fan motor, heat exchanger coil, gas combustion components (combustion burner, fan, fan motor, heat exchanger) and other electrical components.
Combustion Lamp	The combustion lamp indicates the burner status. It turns on during operation and flashes when something is wrong.

Unit Display and Operation Selector

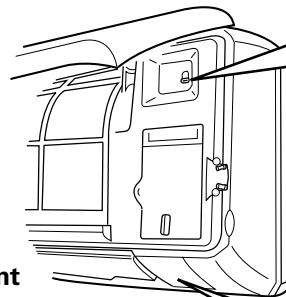


IMPORTANT

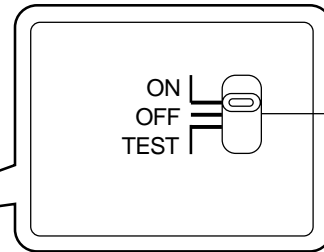
Avoid using radio equipment such as mobile phones near (within 1 m of) the indoor unit. Some radio equipment may cause the unit to malfunction.

If the trouble occurs, disconnect power and restart the air conditioner after a few minutes.

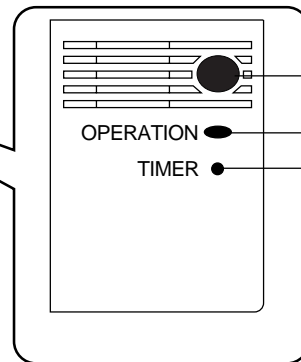
INDOOR UNIT



Operation selector





Remote control receiver

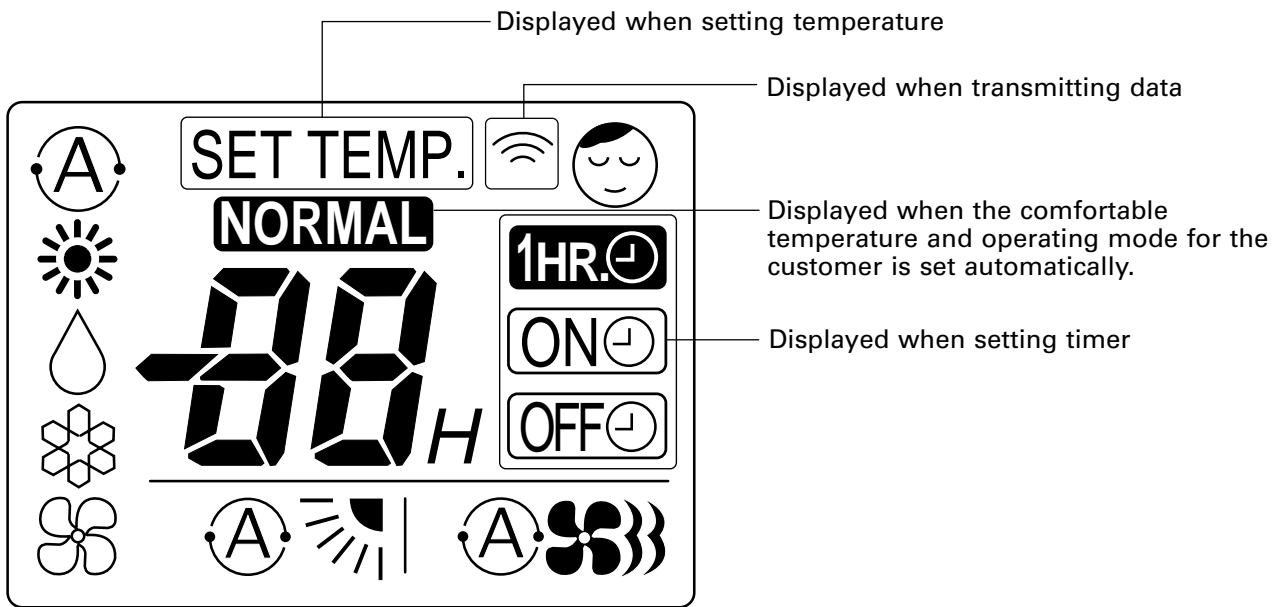


OPERATION lamp

TIMER lamp

REMOTE CONTROL receiver	This section picks up infrared signals from the remote control unit (transmitter).
Operation selector ON position	This position is for operating the air conditioner with the wireless remote control unit. Set the selector normally in this position.
OFF position	Switch the selector to the OFF position if you are not going to use the air conditioner for a few days or longer.
 WARNING	The OFF position does not disconnect the power. Use the main power switch to turn off power completely.
TEST position	This position is used only when servicing the air conditioner. <ul style="list-style-type: none"> • To operate in the TEST position, first select DRY, COOL, or HEAT mode with the selector in the ON position, and then switch the selector to the TEST position. However, the air conditioner will not operate when set to the TEST position if it has been stopped by setting to the OFF position. • During TEST mode, the OPERATION lamp and timer lamp flash, and remote control operation does not work.
 CAUTION	Do not set at the TEST position for normal operation.
OPERATION lamp	This lamp lights when the system is in the continuous DRY, COOL, FAN and HEAT mode.
TIMER lamp	This lamp lights when the system is being controlled by the timer.

Remote Control Unit (Display)



EG

Symbols

(1) Operation mode

AUTO.....	
HEAT.....	
MILD DRY.....	
COOL.....	
FAN.....	

(2) Fan speed

AUTO.....	
HIGH.....	
MEDIUM.....	
LOW.....	

(3) Temperature setting 60 – 88 °F

When set to 82 °F
Current temperature
indication



(4) Timer

12-hour ON Timer.....	
12-hour OFF Timer.....	
1-hour OFF Timer.....	

(5) NIGHT SETBACK.....



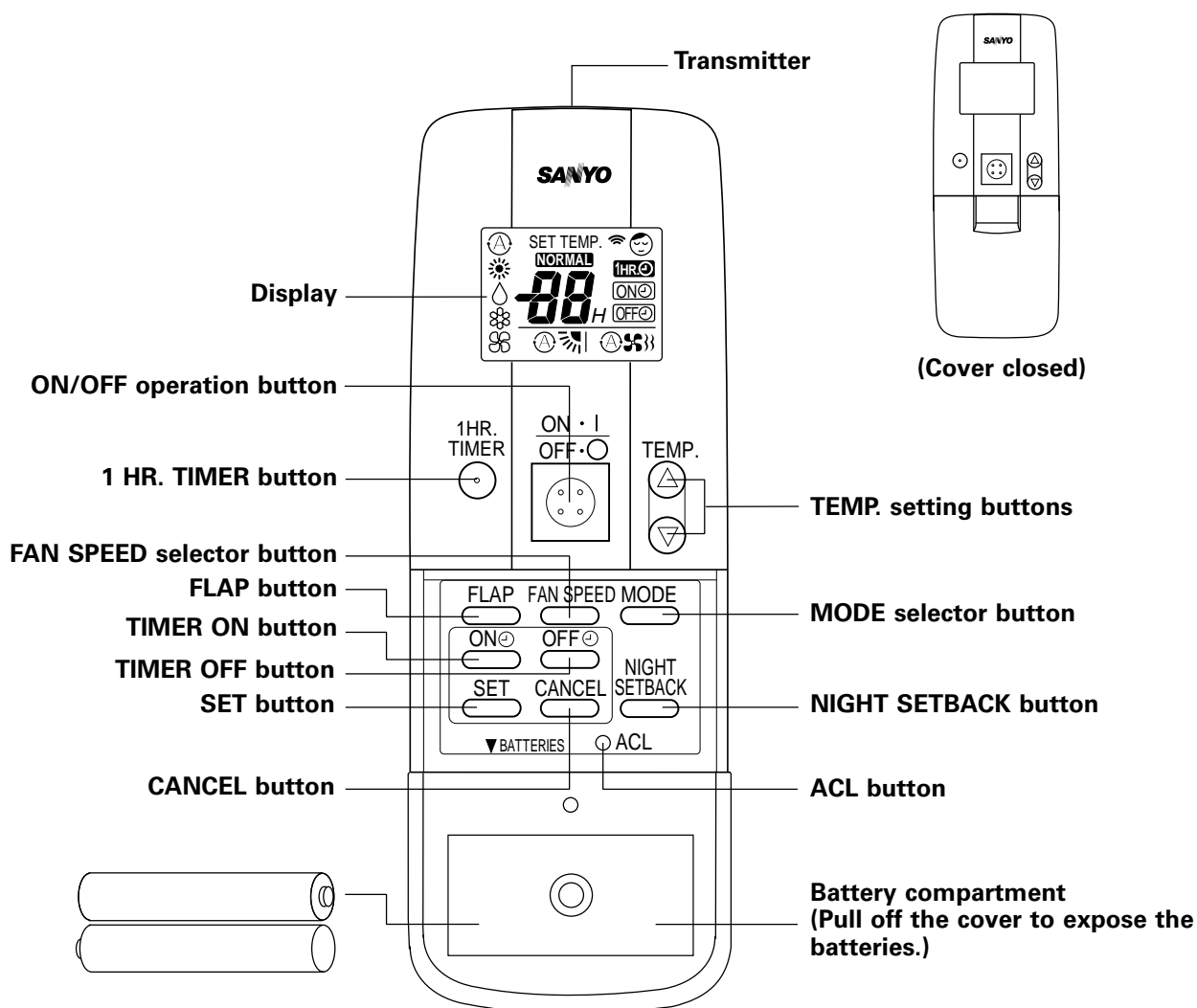
(6) Confirmation of transmission



(7) Flap







AUTO.....	
Angle indication	
Sweep indication.....	

Remote Control Unit


















NOTE

The illustration above pictures the remote control unit after the cover has been lowered and removed.

Transmitter	When you press the buttons on the remote control unit, the  mark appears in the display and the setting changes are transmitted to the receiver in the air conditioner.
Display	Information on the operating status is displayed while the remote control unit is switched on. If the unit is turned off, only the mode that was set previously is still displayed.
NIGHT SETBACK button	For details, see "Night Setback Mode". When you press this button in the DRY, COOL or HEAT mode, the  mark appears in the display, and the remote control unit automatically adjusts the set temperature to save energy.
TEMP. setting buttons	Press the  button to increase the temperature setting. Press the  button to reduce the temperature setting.
ON/OFF operation button	This button is for turning the air conditioner on and off.
TIMER ON button	 : The air conditioner starts at the set time.
TIMER OFF button	 : The air conditioner stops at the set time.

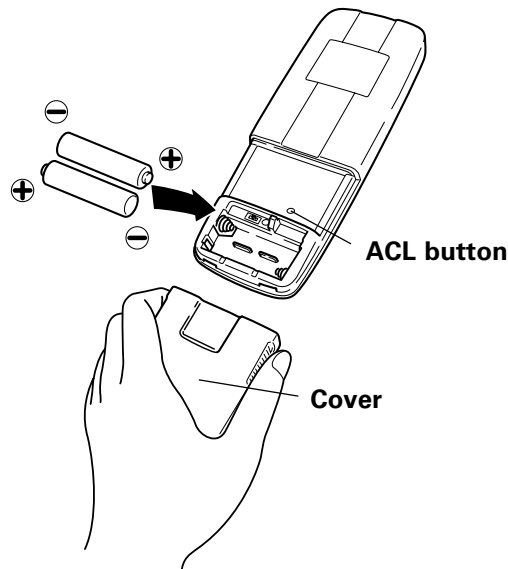
Remote Control Unit (continued)

MODE selector button Green or red (AUTO) Red (HEAT) Orange (DRY) Green (COOL) Green (FAN)	<p>Use this button to select the AUTO, DRY, COOL or FAN mode.</p> <p> : When this setting is selected, the air conditioner calculates the difference between the thermostat setting and the room temperature and automatically switches to the "COOL" or "HEAT" mode as appropriate.</p> <p> : The air conditioner makes the room warmer.</p> <p> : The air conditioner reduces the humidity in the room.</p> <p> : The air conditioner makes the room cooler.</p> <p> : The air conditioner works only as a circulation fan.</p>
FLAP button <div>NOTE</div>	<p>Press this button either to select to set the airflow direction to one of the six possible positions manually, or to select the sweep function, which moves the flap up and down automatically.</p> <p> : The airflow direction is set automatically.</p> <p> : The airflow direction can be set manually. (six positions)</p> <p> : The flap moves up and down automatically.</p> <p>To switch to the sweep function () when in the manual () mode, hold down the FLAP button.</p>
FAN SPEED selector button	<p> : The air conditioner automatically decides the fan speed.</p> <p> : High fan speed</p> <p> : Medium fan speed</p> <p> : Low fan speed</p>
1 HR. TIMER button (1-hour off timer)	<p> : When you press this button, regardless of whether the unit is operating or stopped, the unit operates for one hour and then shuts down.</p>
ACL button (All clear)	<p>Puts the remote control unit into pre-operation status. Always press this button after replacing the batteries.</p>
SET button	<p>After using the TIMER ON button or TIMER OFF button to set the timer, press this button to activate the new setting.</p>
CANCEL button	<p>Press this button to cancel the current timer setting.</p>

EG

Using the Remote Control Unit

How to Install Batteries



1. Slide the cover in the direction indicated by the arrow and remove it.
2. Install two AAA alkaline batteries. Make sure the batteries point in the direction marked in the battery compartment.
3. Use a thin object such as the tip of a pen to press the ACL button.

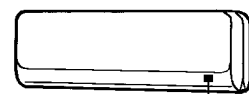
NOTE

- The batteries last about six months, depending on how much you use the remote control unit. Replace the batteries when the remote control unit's display fails to light, or when the remote control cannot be used to change the air conditioner's settings.
- Use two fresh leak-proof type-AAA alkaline batteries.
- In replacing batteries, follow the instructions as mentioned in the sub-section "How to Install Batteries".
- If you do not use the remote control unit more than 1 month, take out the batteries.

How to Use the Remote Control Unit

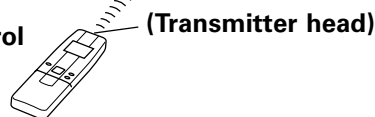
When using the remote control unit, always point the unit's transmitter head directly at the air conditioner's receiver.

Air conditioner
(Indoor unit)



Receiver

Remote control
unit



(Transmitter head)

Remote Control Unit Installation Position

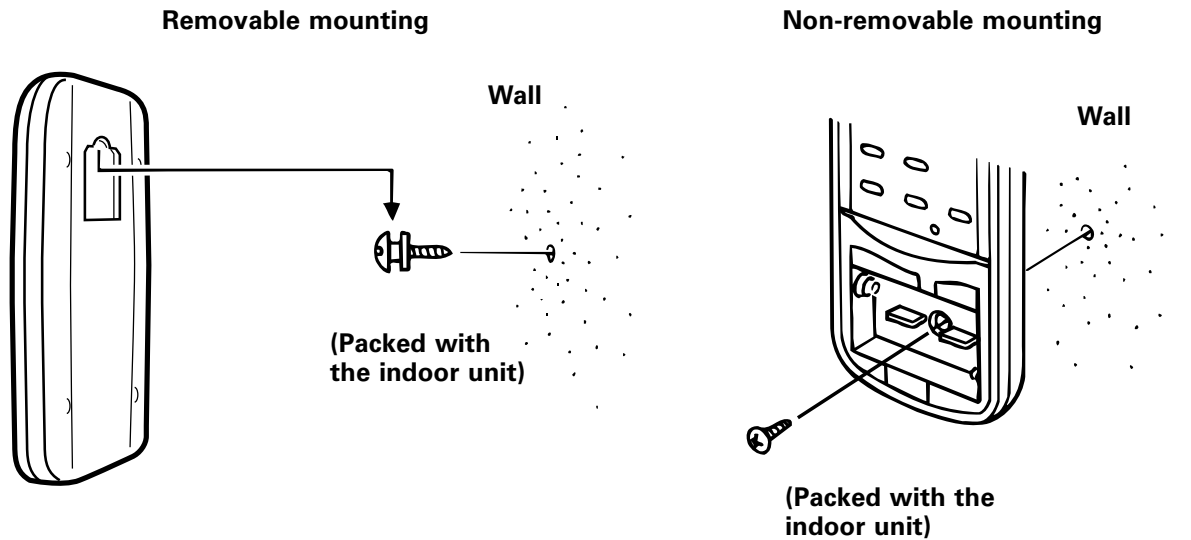
The remote control unit may be operated either from a non-fixed position or from a wall-mounted position. To ensure that the air conditioner operates correctly, DO NOT install the remote control unit in the following places:

DO NOT

- In direct sunlight
- Behind a curtain or other places where it is covered
- More than 26 feet (8 m) away from the air conditioner
- In the path of the air conditioner's airstream
- Where it may become extremely hot or cold
- Where it may be subject to electrical or magnetic noise
- Where there is an obstacle between the remote control unit and air conditioner (since a check signal is sent from the remote control unit every 3 minutes)

Using the Remote Control Unit (continued)

Mounting the Remote Control Unit



EG

Mounting on a wall

A. Removable mounting

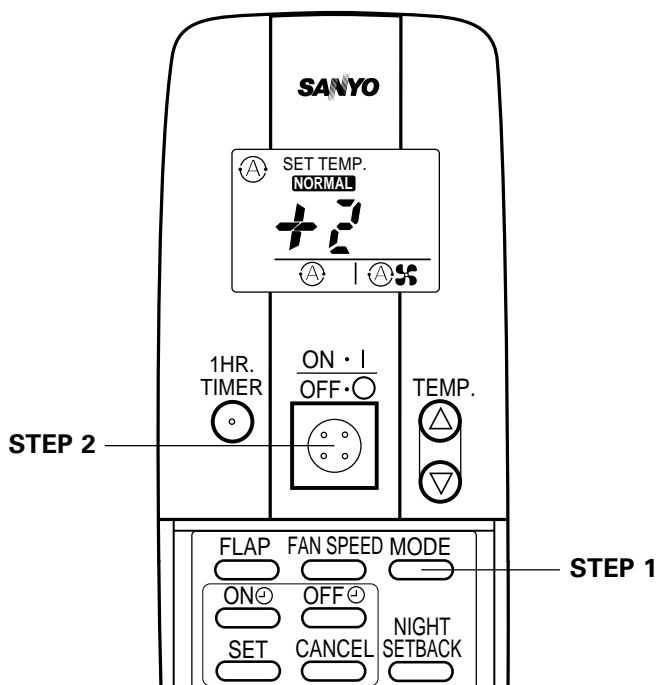
- 1) Momentarily hold the remote control unit at the desired mounting position.
- 2) Confirm that the air conditioner responds correctly when you press keys on the remote control from that position.
- 3) After confirming correct operation, use a screwdriver to screw the mounting screw into the wall.
- 4) Hang the remote control unit from the mounting screw.

B. Non-removable mounting

- 1) Momentarily hold the remote control unit at the desired mounting position.
- 2) Confirm that the air conditioner responds correctly when you press keys on the remote control from that position.
- 3) After confirming correct operation, use a screwdriver to screw the mounting screw into the wall.
- 4) Remove the batteries of the remote control unit.
- 5) Use a screwdriver to screw the remote control unit securing screw into the wall through the hole in the battery compartment.
- 6) Replace the batteries.
- 7) Again confirm that the remote control unit operates correctly.

Operation with the Remote Control Unit

1. Automatic Operation



NOTE

Check that the circuit breaker on the power panel is turned on and that the operation selector of the indoor unit is in the ON position.

Once the A mode is selected and the unit is preset by following the steps below, you can have the air conditioner automatically bring the room to the desired temperature simply by pressing the ON/OFF operation button.

STEP 1	Press the MODE selector to select A .
STEP 2	Press the ON/OFF operation button.

To stop the air conditioner, press the ON/OFF operation button again.

NOTE

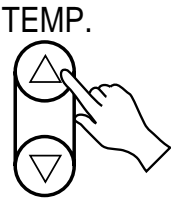
- To change the temperature setting, press the temperature setting buttons and change the setting to the desired temperature.
- The temperature setting changes by two degrees each time one of the TEMP. buttons is pressed. The temperature setting may be changed within a range of ± 8 °F of the standard temperature. (The air conditioner remembers the new temperature setting even when it is turned off.)

Operation with the Remote Control Unit (continued)

Press TEMP. to change the temperature setting.

To raise the temperature setting

To lower the temperature setting

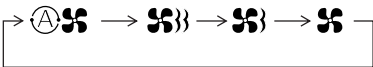


EG

- The type of operation and the temperature setting will differ depending on the ambient temperature when operation starts, as follows:

Ambient temperature when operation starts	Operation type	Temperature setting	Operation lamp
88 °F or higher	Cooling	82 °F	Green
84 °F – less than 88 °F		80 °F	
80 °F – less than 84 °F		78 °F	
72 °F – less than 80 °F	Dry	76 °F	Orange
Less than 72 °F	Heating	76 °F	Red

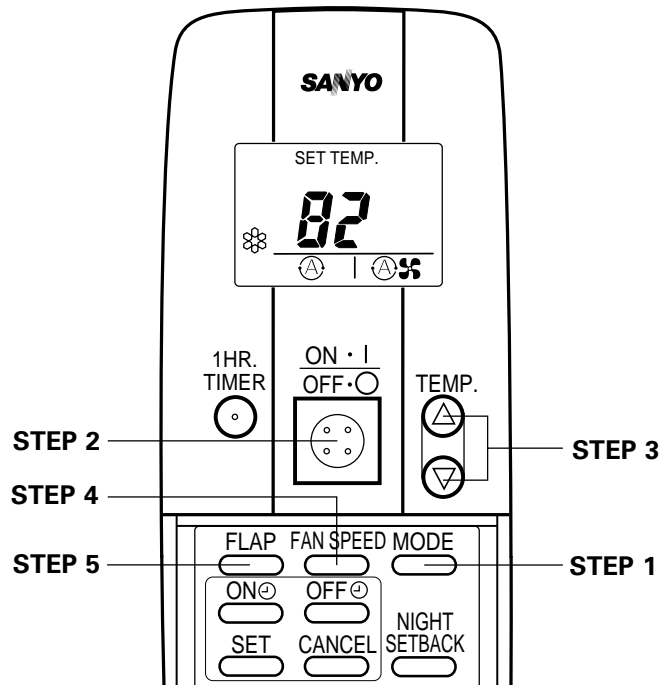
- The operation mode (cooling, heating, dry) does not change automatically during operation.
- Although the fan speed is set automatically, you can change the fan speed by pressing the FAN SPEED selector button.



To stop the air conditioner, press the ON/OFF operation button again.

Operation with the Remote Control Unit (continued)

2. Manual Operation



NOTE

Check that the circuit breaker on the power panel is turned on and that the operation selector of the indoor unit is in the ON position.

If the automatic operation settings of the unit do not meet your needs, press the setting buttons as described below and change the settings as desired.

STEP 1	Press the MODE selector button and select the desired mode. For heating operation → For dehumidifying operation → For cooling operation → For circulating operation →
STEP 2	To start the air conditioner, press the ON/OFF operation button.
STEP 3	Press the TEMP. setting buttons to change the temperature setting to the desired temperature. Adjustable temperature range: 88 °F max. 60 °F min.
NOTE	The temperature setting changes by one degree each time the button is pressed. It is not possible to change the temperature setting when the unit is operating in the fan mode. (The air conditioner remembers the new temperature setting even when it is turned off.)
STEP 4	Press the FLAP button and set the airflow direction as desired. (Refer to "Adjusting the Airflow Direction" on page 23.)

To stop the air conditioner, press the ON/OFF operation button again.

Operation with the Remote Control Unit (continued)


NOTE

- Choose the best position in the room for the remote control unit, which also acts as the sensor for room comfort and transmits the operating instructions. Once you've found this best position, always keep the remote control unit there.
- This appliance has a built-in 3-minute time delay circuit to ensure reliable operation. When the operation button is pressed, the compressor will start running within three minutes. In the event of power failure, the unit will stop. When the power is restored, the unit will restart automatically after three minutes.

3. Adjusting the Fan Speed

A. Automatic

Simply set the FAN SPEED selector button to the  position.

A microcomputer in the air conditioner automatically controls the fan speed when the  mode is selected. When the air conditioner starts operating, the difference between the room temperature and the set temperature is detected by the microcomputer which then automatically switches the fan speed to the most suitable level.

EG

Cooling and DRY mode:

When difference between room temperature and set temperature is	FAN SPEED
4 °F and over	High
Between 4 °F and 2 °F	Medium
Below 2 °F	Low




Heating mode:

When difference between room temperature and set temperature is	FAN SPEED
2 °F and over	High
Below 2 °F	Medium

NOTE

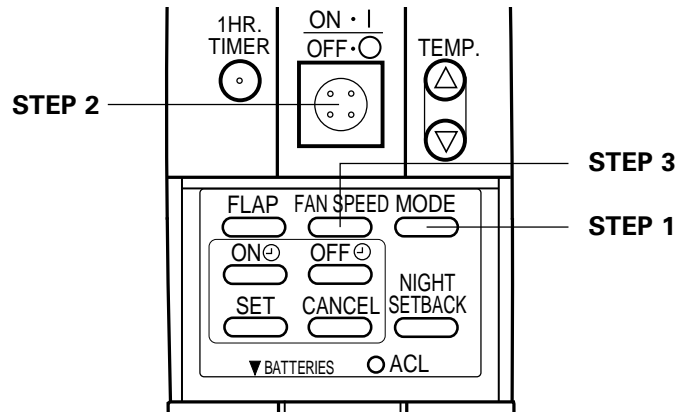
The above table assumes that the sensor on the remote control is being used. Actual operation may differ slightly from the operation described in the table.

B. Manual

If you want to adjust fan speed manually during operation, just set the FAN SPEED selector as desired. [ ,  , or ]

Operation with the Remote Control Unit (continued)

4. Fan Only



If you want to circulate air without any temperature control, follow these steps:

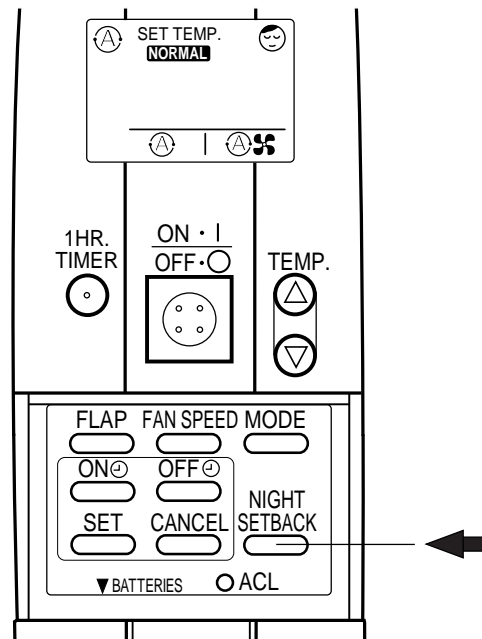
STEP 1: Press the **MODE** selector button to switch to the fan mode (⌘).

STEP 2: Press the **ON/OFF** operation button.

STEP 3: Press the **FAN SPEED** selector button to select the fan speed of your choice (⌘, ⌘, ⌘ or ⌘).

If the fan speed is set to auto (⌘), the fan speed switches to low.

5. Night Setback Mode



The Night Setback Mode is used for saving energy.

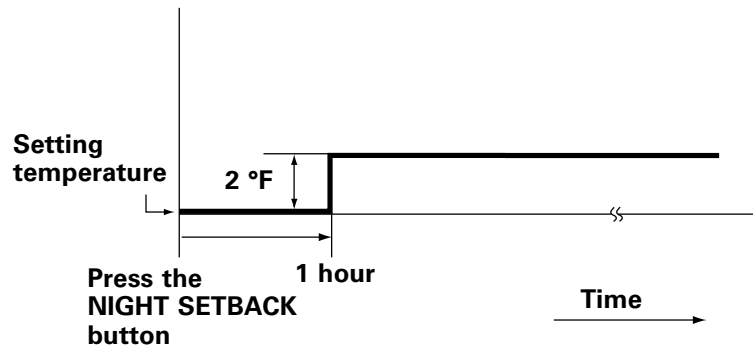
Press the **NIGHT SETBACK** button while the air conditioner is operating. The **⌘** mark appears in the display.

To cancel the night setback function, press the **NIGHT SETBACK** button again.

Operation with the Remote Control Unit (continued)

A. In Cooling and DRY Mode: (☼ and ☹)

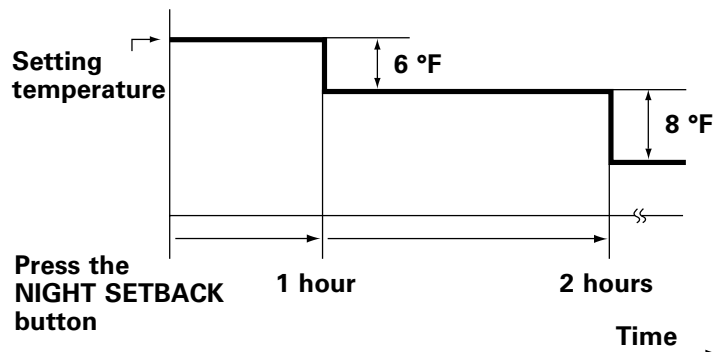
When the night setback mode is selected, the air conditioner automatically raises the temperature setting 2 °F when 1 hour have passed after the selection was made, and then another 2 °F after another 1 hour have passed, regardless of the indoor temperature when night setback was selected. This enables you to save energy without sacrificing comfort. This function is convenient when gentle cooling is needed.



EG

B. In Heating Mode: (☼)

When the night setback mode is selected, the air conditioner automatically lowers the temperature setting 6 °F when 1 hour have passed after the selection was made, and then another 8 °F after another 2 hours have passed, regardless of the indoor temperature when night setback was selected. This enables you to save energy without sacrificing comfort. This function is convenient when gentle heating is needed.



Special Remarks

"DRY" (△) Operation

How it works?

- Once the room temperature reaches the level that was set, the unit repeats the cycle of turning on and off automatically.
- During DRY operation, the fan speed is automatically set to LOW or VERY LOW; the fan speed then switches back and forth between LOW (for 20 seconds) and VERY LOW (for 10 seconds).
- "DRY" operation is not possible if the indoor temperature is 59 °F or less.

Heating (☀) Operation

Heating performance

- This air conditioner is a refrigerant heating type unit which uses combustion gas to heat the refrigerant heater during heating operation. The heating capacity is unaffected depending on the outdoor temperature. However, if sufficient heat cannot be obtained with this air conditioner, use another heating appliance in conjunction with it.

Power failure during operation

- In the event of power failure, the unit will stop. When the power is turned on again, the unit restarts within three minutes.

Clicking Sound

Clicking sound is heard from the air conditioner

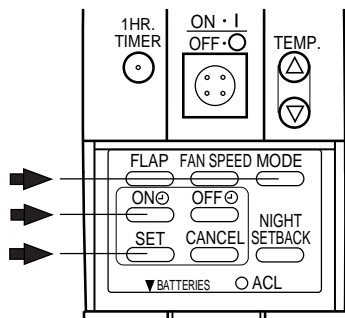
- In heating or cooling operation, any plastic parts may expand or shrink due to a sudden temperature change. In this event, a clicking sound may occur. This is normal, and the sound will soon disappear.

Remote Control Unit

- The remote control unit sends the setting condition to the air conditioner regularly at three minute intervals.

Using the 12-Hour ON and OFF Timer

1. TIMER ON mode (Example)



After the length of time set for **TIMER ON** elapses, the unit begins operating.

The display depicted at left indicates that the air conditioner will begin operating in three hours.

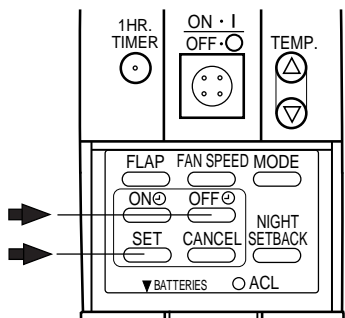
Setting procedure:

STEP 1	Press the MODE selector button and select the desired operation mode. (See "Operation with the Remote Control Unit," page 14.)
STEP 2	Press the TIMER ON button. (For example, to set the timer to turn on the air conditioner after three hours have elapsed, press the TIMER ON button three times.) The time can be set to from one to twelve hours, in one hour steps. <div>→ 1 → 2 → 3.....12 →</div>
STEP 3	Press the SET button.

- The display changes immediately to its status previous to timer setting, but the **ON** indication remains.
- To check the status of the timer while it is counting down, press the **SET** button.

Cancellation procedure: Press the **CANCEL** button.

2. TIMER OFF mode (Example)



After the length of time set for **TIMER OFF** elapses, the unit stops operating.

The display depicted at left indicates that the air conditioner will stop operating in five hours.

Setting procedure:

STEP 1	Press the TIMER OFF button. (For example, to set the timer to turn off the air conditioner after five hours have elapsed, press the TIMER OFF button five times.) The time can be set to from one to twelve hours, in one hour steps. <div>→ 1 → 2 → 3.....12 →</div>
STEP 2	Press the SET button.

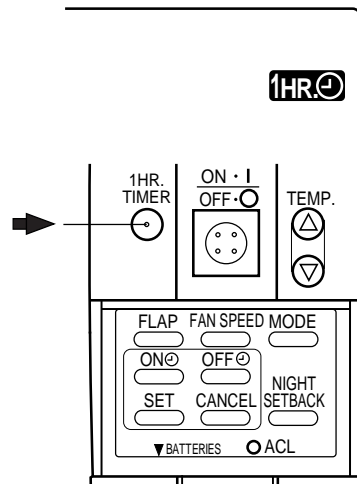
- The display changes immediately to its status previous to timer setting, but the **OFF** indication remains.
- To check the status of the timer while it is counting down, press the **SET** button.

Cancellation procedure: Press the **CANCEL** button.

EG

Using the 1-Hour OFF Timer

1. 1-Hour OFF Timer



NOTE

This function causes the unit to operate for one hour and then stop, regardless of whether the unit is on or off when the button is pressed. The **1HR.** indicator in the display indicates that this function is operating.

Setting procedure:

Regardless of whether the unit is operating or stopped, press the 1 HR. TIMER button.

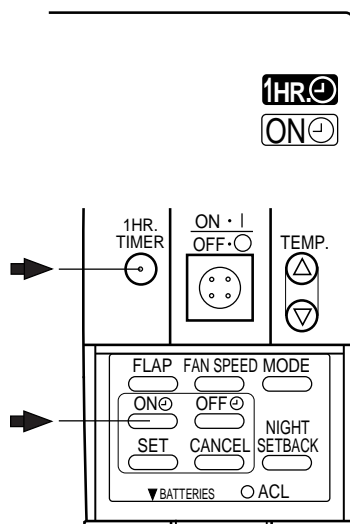
1HR. appears in the display.

Cancellation procedure:

Press the ON/OFF operation button to turn the unit off, wait for the unit to stop operating, and then press the ON/OFF operation button again. The 1-Hour Timer function is now cancelled and the unit operates normally.

- If, while the 1-Hour Timer function is operating, the 1 HR. TIMER button is pressed once to cancel the function and then again, the unit continues to operate for one hour from that point in time and then stops.
- If the 1 HR. TIMER button is pressed while the TIMER OFF function is operating, the OFF Timer is cancelled and the unit stops operating one hour later.

2. Combining the 1-Hour OFF Timer and 12-Hour ON Timer

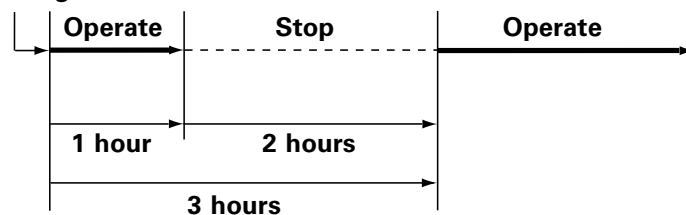


NOTE

By combining the 1-Hour OFF Timer and 12-Hour ON Timer, it is possible to have the unit operate for just one hour from the present time, and then have it switch on again later at a time specified by you.

(Example) Having the unit operate for just one hour from the present time, and then switch on again three hours from the present time.

Timer setting



Setting procedure:

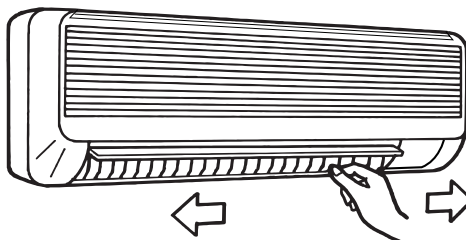
STEP 1	Press the 1 HR. TIMER button.
STEP 2	Press the TIMER ON button and use the SET button to set the unit to turn on three hours later.

- **Set the 1-Hour OFF Timer and the 12-Hour ON Timer simultaneously.** Unless you set the 1-Hour OFF Timer and the 12-Hour ON Timer at the same time, the 1-Hour OFF Timer may operate for one hour or more.

Adjusting the Airflow Direction

1. Horizontal

The horizontal airflow can be adjusted by moving the vertical vanes with your hands to the left or right.

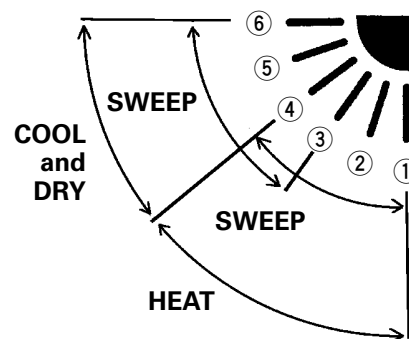
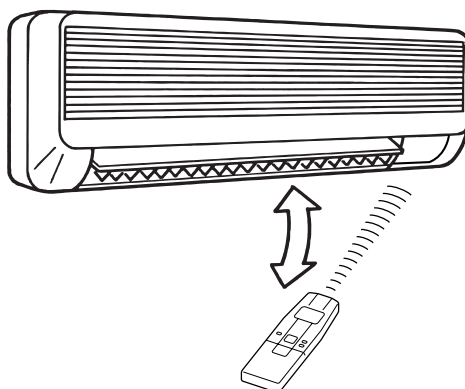
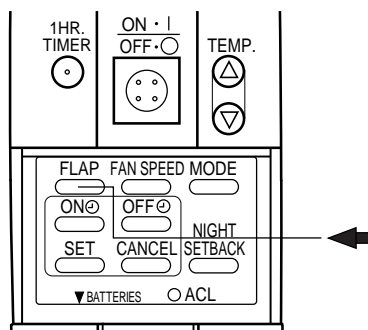


CAUTION

When the humidity is high, the vertical vanes should be in the front position during the cooling or dehumidifying operation. If the vertical vanes are positioned all of the way to the right or left, condensation may begin to form around the air vent and drip down.

2. Vertical

The vertical airflow can be adjusted by moving the flap with the remote control unit. Do not move the flap with your hands. Confirm that the remote control unit has been turned on. Use the FLAP button to set either the sweep function or one of the six airflow direction settings. (The maximum capacity is obtained at the position at ④.)



A. Sweep function



The flap starts moving up and down to deliver air over the sweep range.

B. Setting the airflow manually



Referring to the above illustration, use the FLAP button to set the airflow direction within the range used during the heating, cooling, or dehumidifying operation.

NOTE

- The flap automatically closes when the unit is off.
- During the heating operation, the fan speed will be very low and the flap will be in the horizontal position (position ⑥) until the air being blown out of the unit begins to warm. Once the air warms up, the flap position and fan speed change to the settings specified with the remote control.

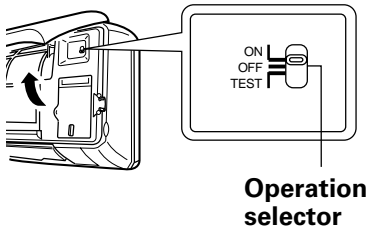


CAUTION

- Use the FLAP button on the remote control to adjust the position of the flap. If you move the flap by hand, the flap position according to the remote control and the actual flap position may no longer match. If this should happen, shut off the unit, wait for the flap to close, and then turn on the unit again; the flap position will now be normal again.
- Do not have the flap pointed down during cooling operation. Condensation may begin to form around the air vent and drip down.

Operation without the Remote Control Unit

INDOOR UNIT



If you have lost the remote control unit or it has trouble, follow the steps below.

1. When the air conditioner is not running
If you want to turn on the air conditioner, switch the operation selector to the OFF position, and then to the ON position.

NOTE

The set temperature and fan speed are automatically set at the last selection before stopping.

2. When the air conditioner is running
If you want to turn off the air conditioner, switch the operation selector to the OFF position.

Care and Cleaning



WARNING

1. For safety, be sure to turn the air conditioner off and also to disconnect the power before cleaning.
2. Do not pour water on the indoor unit to clean it. This will damage the internal components and cause an electric shock hazard.

Casing and Grille (Indoor Unit)

Clean the casing and grille of the indoor unit with a vacuum cleaner brush, or wipe them with a clean, soft cloth.

If these parts are stained, use a clean cloth moistened with a mild liquid detergent. When cleaning the grille, be careful not to force the vanes out of place.



CAUTION

1. Never use solvents, or harsh chemicals when cleaning the indoor unit. Do not wipe the plastic casing using very hot water.
2. Some metal edges and the fins are sharp and may cause injury if handled improperly; be especially careful when you clean these parts.
3. The internal coil and other components of the outdoor unit must be cleaned every year. Consult your dealer or service center.

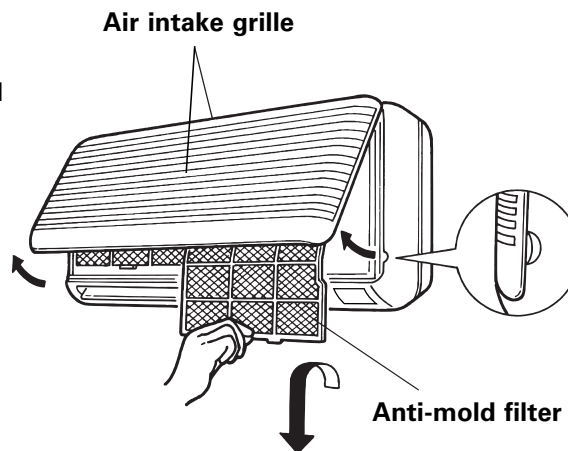
Care and Cleaning (continued)

Anti-mold filter

The anti-mold filter behind the air intake grille should be checked and cleaned at least once every two weeks.

How to remove the anti-mold filter

1. Grasp both ends of the air intake grille and pull it out and up.
2. Push the anti-mold filter up slightly, and then pull it down.



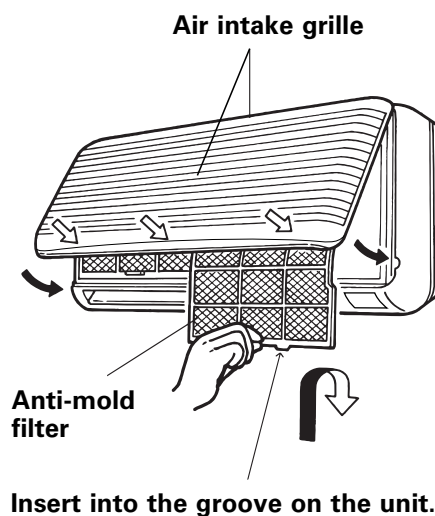
EG

Cleaning

Use a vacuum cleaner to remove light dust. If there is sticky dust on the filter, wash the filter in lukewarm, soapy water, rinse it in clean water and dry it.

How to replace the anti-mold filter

1. With the "FRONT" mark facing you, slide the anti-mold filter up into the unit and then lower the handle into the groove on the unit.
2. After installing the anti-mold filter, press the locations marked by the arrows (↓) and close the air intake grille.



Care and Cleaning (continued)

Air cleaning filter (not provided)

The air cleaning filter removes dust and dirt from the air, and reduces odors and smoke from tobacco.

NOTE

The air cleaning filter is not provided with the air conditioner and must be purchased separately. The first time that you buy the air clean filter, it is necessary to get the **STK-ARF4B-50** model with frame. When changing the filter subsequently, it is only necessary to replace the filter itself (model **STK-F4B-50**).



WARNING

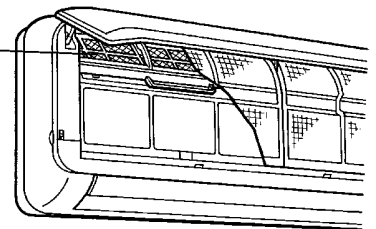
The air cleaning filter cannot remove harmful gases or vapors nor ventilate air in the room. You must open doors or windows frequently when you use gas or oil heating appliances. Otherwise there is a risk of suffocation in extreme cases.

How to install the air cleaning filter

The air cleaning filter needs to be installed behind the anti-mold filter.

1. Remove the anti-mold filter.
2. Install the air cleaning filter in the position shown in the diagram, with the “前面” symbols (meaning “FRONT”) facing the front.
3. Reinstall the anti-mold filter.

Air
clean
filter



Cleaning the main unit and remote control unit

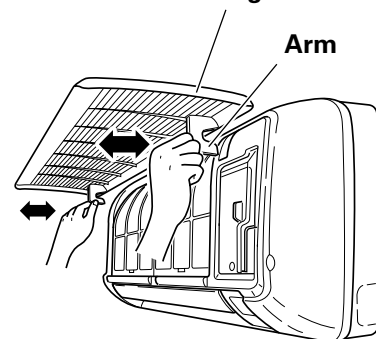
- Wipe clean using a soft, dry cloth.
- To remove stubborn dirt, moisten a cloth in warm water no hotter than 104 °F, wring thoroughly, and then wipe.
- The air intake grille can be removed in order to wash it with water.

Removing and remounting the air intake grille

- With the air intake grille open all the way, grip both arms with your hands and pull toward you to remove. To remount, hold the air intake grille roughly horizontal and push it in until the arm shafts fit into the indentations in the main unit, then fit the grille into place.

Air intake grille

Arm



CAUTION

When using a footstool or the like, be careful not to let it tip over.

Washing the grille with water

- Clean the grille gently using a soft sponge, or the like. Then wipe away any remaining moisture.
- Neutral detergent may be used to remove stubborn dirt. Then rinse thoroughly with water and wipe away any remaining moisture.

Troubleshooting

If your air conditioner does not work properly, first check the following points before requesting service. If it still does not work properly, contact your dealer or service center.

Trouble	Possible Cause	Remedy
Air conditioner does not run at all.	1. Power failure. 2. Leakage circuit breaker tripped. 3. Line voltage is too low. 4. Operation button is OFF. 5. Batteries in remote control unit have run down.	1. Restore power. 2. Contact service center. 3. Consult your electrician or dealer. 4. Press the button again. 5. Replace batteries.
OPERATION lamp flashes and air conditioner does not operate.	Trouble in wiring system.	Contact service center.
Compressor runs but soon stops.	Obstruction in front of condenser coil.	Remove obstruction.
Poor cooling (or heating) performance.	1. Dirty or clogged air filter. 2. Heat source or many people in room. 3. Doors and/or windows are open. 4. Obstacle near air intake or air discharge port. 5. Thermostat is set too high for cooling (or too low for heating). 6. (Outdoor temperature is too low.)	1. Clean air filter to improve airflow. 2. Eliminate heat source if possible. 3. Shut them to keep the heat (or cold) out. 4. Remove it to ensure good airflow. 5. Set the temperature lower (or higher). 6. (Consult your dealer or try to use a back-up heater.)
Clicking sound is heard from the air conditioner.	In heating or cooling operation, any plastic parts may expand or shrink due to a sudden temperature change. In this event, a clicking sound may occur.	This is normal, and the sound will soon disappear.
OPERATION lamp lights but outdoor unit will not run.	1. The use of portable telephones near the air conditioner may cause disturbance to its normal operation.	1. Turn off the power then restart the air conditioner after 1 minute. 2. Consult your dealer.

EG

Tips for Energy Saving

- Do not**
- **Block the air intake and outlet of the unit. If they are obstructed, the unit will not work well, and may be damaged.**
 - Let direct sunlight into the room. Use sunshades, blinds or curtains. If the walls and ceiling of the room are warmed by the sun, it will take longer to cool the room.
- Do**
- Always try to keep the air filter clean. (Refer to "Care and Cleaning".) A clogged filter will impair the performance of the unit.
 - To prevent conditioned air from escaping, keep windows, doors and any other openings closed.

Operating Range

The air conditioner is operable within the temperature ranges as listed below:

	Temperature	Indoor Air Intake Temp.	Outdoor Air Intake Temp.
COOLING	Maximum	95 °F DB/71 °F WB	115 °F DB
	Minimum	67 °F DB/57 °F WB	67 °F DB
HEATING	Maximum	80 °F DB/67 °F WB	75 °F DB/65 °F WB
	Minimum	— DB/— WB	0 °F DB/–2 °F WB

For Parts or Service Contact
SANYO FISHER SERVICE CORPORATION
A DIVISION OF SANYO LOGISTICS CORPORATION
1411 West 190th Street, Suite 800, Gardena, CA 90248 U.S.A.
50 Beth Neilson Drive, Toronto, Ontario, M4H 1M6, CANADA