HEAT CONTROLLER, INC.

SERVICE MANUAL

SMA/SMH09/12SA-0
SMA/SMH18/24SA-1
Single Zone Ductless Mini-Split Systems
A/C and Heat Pumps

Contents

1 Precaution

1.1 Safety Precaution

- **To prevent injury to the user, other people, or property damage, the following instructions must be followed.**
- **Incorrect operation due to ignoring instruction will cause harm or damage.**
- **Before servicing unit, be sure to read this service manual.**

1.2 Warning

➢ Installation

- **Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.**

  There is risk of fire or electric shock.

- **For electrical work, contact the dealer, seller, a qualified electrician, or an Authorized service center.**

  Service by unqualified individuals may damage product and there is risk of fire or electric shock.

- **Always ground the product.**

  There is risk of fire or electric shock.

- **Install the panel and the cover of control box securely.**

  There is risk of fire of electric shock.

- **Always install a dedicated circuit and breaker.**

  Improper wiring or installation may cause fire or electric shock.

- **Use the correctly rated breaker of fuse.**

  There is risk of fire or electric shock.

- **Do not modify or extend any power cable.**

  There is risk of fire or electric shock.

- **Do not install, remove, or reinstall the unit by yourself (customer).**

  There is risk of fire, electric shock, explosion, or injury.

- **Be caution when unpacking and installing the product.**

  Sharp edges could cause injury, be especially careful of the case edges and the fins on the condenser and evaporator coils.

- **For installation, always contact the dealer or an Authorized service center.**

  There is risk of fire, electric shock, explosion, or injury.

- **Do not install the product on a defective or inadequate installation stand.**

  It may cause injury, accident, or damage to the product.

- **Be sure the installation area does not deteriorate with age.**

  If the base collapses, the air conditioner could fall with it, causing property damage, product failure, and personal injury.

- **Do not let the air conditioner run for a long time when the humidity is very high and a door or window is left open.**

  Moisture may condense and wet or damage furniture.

- **Take care to ensure that power cable could not be pulled out or damaged. Install per local and national codes.**

- **Do not place anything on the power cable.**

  There is risk of fire or electric shock.

- **Do not touch or operate the product with wet hands.**

  There is risk of fire or electric shock.

- **Do not allow water to run into electric parts.**

  It may cause fire, failure of the product, or electric shock.

- **Do not store or use flammable gas or combustible near the product.**

  There is risk of fire or failure of product.

- **Do not use the product in a tightly closed space for a long time.**

  Oxygen deficiency could occur.

- **When flammable gas leaks, turn off the gas and open a window for ventilation before turning the product on.**

  Do not use the telephone or turn switches on or off.
  There is risk of explosion or fire.

- **In the event of strange sounds, or smell or smoke comes from product, turn the breaker off.**

  There is risk of electric shock or fire.

- **Stop operation and close the window in storm or hurricane.**

  There is risk of property damage, failure of product, or electric shock.

- **Do not open the inlet grill of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.**

  There is risk of physical injury, electric shock, or product failure.

- **When the product is soaked (flooded or submerged), contact an Authorized service center.**

  There is risk of fire or electric shock.

- **Be cautious that water cannot enter the product.**

  There is risk of fire, electric shock, or product damage.

- **Ventilate the product from time to time when operating it together with a stove, etc.**

  There is risk of fire or electric shock.

- **Turn the main power off when cleaning or maintaining the product.**

  There is risk of electric shock.

- **When the product is not be used for a long time, disconnect the power supply by turning off the breaker.**

  There is risk of product damage or failure, or unintended operation.

- **Take care to ensure that nobody could step on or fall onto the outdoor unit.**

  This could result in personal injury and product damage.

➢ CAUTION

- **Always check for gas (refrigerant) leakage after installation or repair of product.**

  Low refrigerant levels may cause failure of product.

- **Install the drain hose to ensure that water is drained away properly.**

  A bad connection may cause water leakage.

- **Keep units level.**

  To avoid vibration of water leakage.

- **Do not install the product where the noise or hot air from the outdoor unit could offend or otherwise affect neighbors.**

the neighborhoods.

It may cause a problem for your neighbors.

- **Use two or more people to lift and transport the product.**

Avoid personal injury.

- **Do not install the product where it will be exposed to sea wind (salt spray) directly.**

It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.

➢ Operational

- **Do not expose the skin directly to cool air for long periods of time. (Do not sit in the draft).**

This could harm to your health.

- **Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision cooling/heating system.**

There is risk of damage or loss of property.

- **Do not block the inlet or outlet of air flow.**

It may cause product failure.

- **Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.**

There is risk of fire, electric shock, or damage to the plastic parts of the product.

- **Do not touch the metal parts of the product when removing the air filter. They are very sharp.**

There is risk of personal injury.

- **Do not step on or put anything on the product. (outdoor units)**

There is risk of personal injury and failure of product.

- **Always insert the filter securely. Clean the filter every two weeks or more often if necessary.**

A dirty filter reduces the efficiency of the air conditioner and could cause product malfunction or damage.

- **Do not insert hands or other object through air inlet or outlet while the product is operated.**

There are sharp and moving parts that could cause personal injury.

- **Do not drink the water drained from the product.**

It is not sanitary could cause serious health issues.

- **Use a firm stool or ladder when cleaning or maintaining the product.**

Be careful and avoid personal injury.

- **Replace the all batteries in the remote control with new ones of the same type. Do not mix old and new batteries or different types of batteries.**

There is risk of fire or explosion.

- **Do not recharge or disassemble the batteries. Do not dispose of batteries in a fire.**

They may burn of explode.

- **If the liquid from the batteries gets onto your skin or clothes, wash it well with clean water. Do not use the remote if the batteries have leaked.**

The chemical in batteries could cause burns or other health hazards.

2 Function

➢ Indoor unit

1. Operation ON/OFF by remote controller

2. Sensing by room temperature

Room temperature sensor. Pipe temperature sensor.

3. Room temperature control

Maintain the room temperature in accordance with the setting temperature.

4. Starting temperature control

Indoor fan is delayed for 5 sec at the starting.

5. Time Delay Safety control

Restarting is for approx. 3 minutes.

6. Indoor fan speed control

High, med, low, breeze.

7. Operation indication Lamps (LED)

Light up in the LED for each operation mode.

8. Two-direction air vane

The unit will decide the louver direction according to operation mode.

9. Sleep mode auto control

The fan is turn to low speed (cooling/heating).

The unit will be turn off after seven hours.

10. Independent dehumidification

The function is usually used in rainy days in springtime or damp areas

11. Self-diag. function

The function will be operate in any operation mode.

12. Air flow Direction control

The louver can be set at the desired position or swing up and down automatically

13. Auto mode

The unit can be change by the room temperature.

14. Anti-cold function

Prevent the cold wind at the beginning of unit start.

15. Temp. Compensation

16. Defrost mode

17. Auto-restart function

18. Flexible wiring connection

19. Easy clean panel

20. Turbo(for 9K and 12K)

This function enables the unit to reach the preset temperature in the shortest time under cooling mode.

➢ Outdoor unit

1. Power relay control

The unit has 3 mins delay between continuously ON/OFF operations.

2. Low noise air flow system

Bird tail propeller fan makes the outdoor unit run more quietly

3. Hydrophilic aluminum fin

The hydrophilic fin can improve the heating efficiency at operation mode.

4. 4 way valve control

It is only operated in the heating operation mode except defrosting operation.

5. Anti-rust cabinet

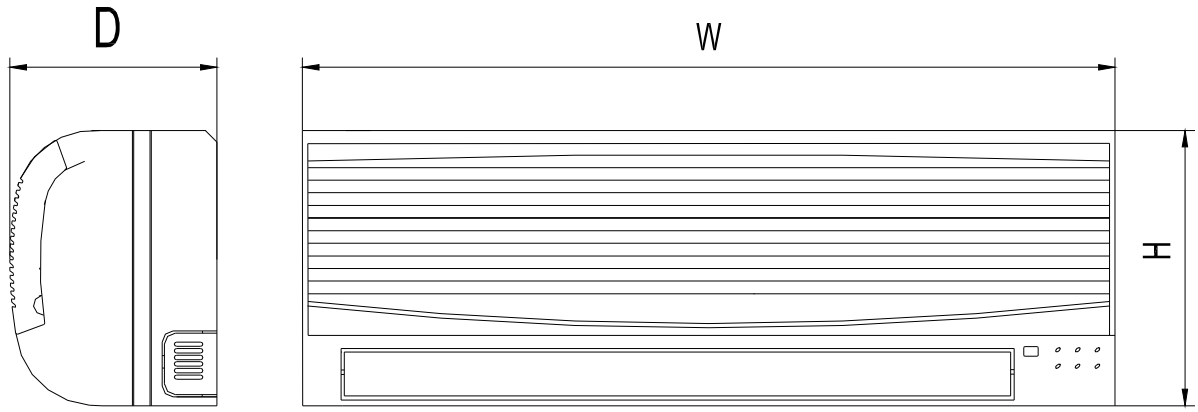
Made from electrolytic zinc steel sheet and anti-rust coated components.

6. Valve protection cover

It protects the valves and prevents water from dripping.

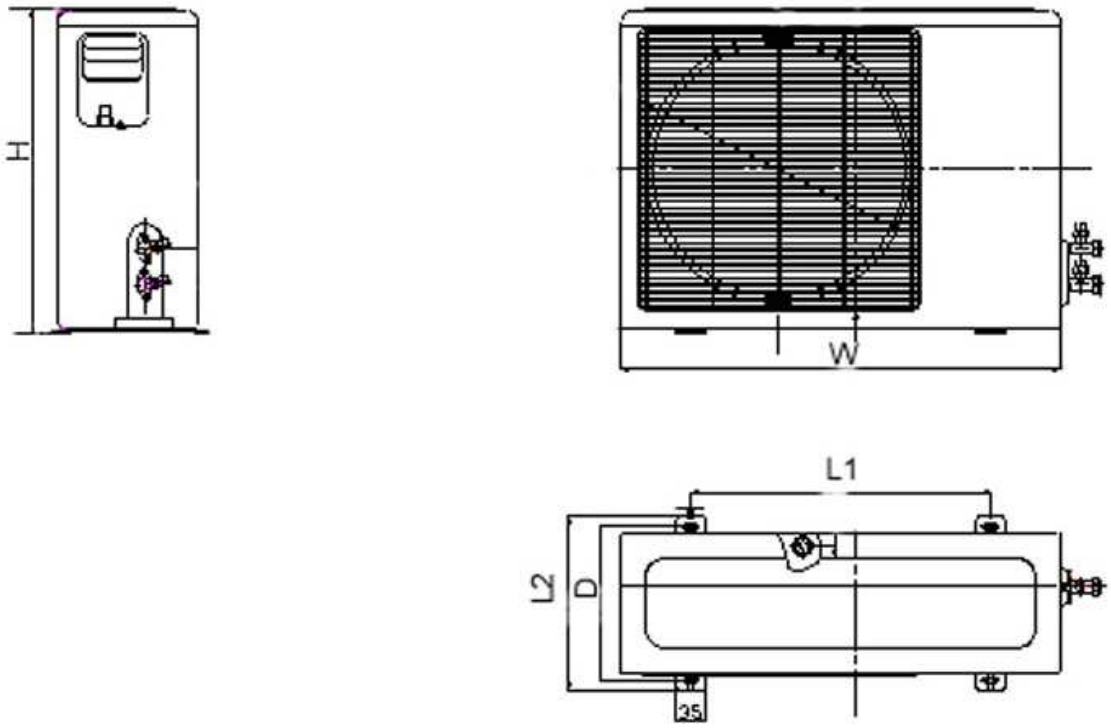
3 Dimension

Indoor unit



Dimension / Mode	W	H	D
9K	32.1	11.0	7.7
12K	35.7	11.3	9.3
18K	49.2	12.8	9.1
24K	49.2	12.8	9.1

outdoor unit



Dimension / Mode	W	H	D	L1	L2
9K	30.7	21.3	9.8	21.6	10.5
12K	29.9	23.2	11.2	20.9	11.4
18K	33.3	27.4	13.2	22.0	13.2
24K	35.2	33.9	13.0	23.2	13.1

4 Specification

Model			SMA09SA-0	SMH09SA-0
Power supply		Ph-V-Hz	1, 115V~, 60Hz	1, 115V~, 60Hz
Cooling	Capacity	Btu/h	9000	9000
	Input	W	780	900
	Rated current	A	7	8.3
	SEER	Btu/w.h	13	13
Heating	Capacity	Btu/h	/	10000
	Input	W	/	900
	Rated current	A	/	8.3
	HSPF	W/W	/	7.7
Max. current		A	11	10.2
Starting current		A	/	40
Compressor	Model		EA82X1C-1FZDU1	EA82X1C-1FZDU1
	Type		ROTARY	ROTARY
	Brand		TOSHIBA	TOSHIBA
	Capacity	Btu/h	8138	8138
	Input	W	810	810
	Rated current(RLA)	A	7.5	7.5
	Locked rotor Amp(LRA)	A	47	40
	Thermal protector		B350-135-141E	B350-135-141E
	Capacitor	uF	45μF /250VAC	45μF /250VAC
	Refrigerant oil	ml	350	350
Indoor fan motor	Model		WZDK20-38D	WZDK20-38D
	Brand		WELLING	WELLING
	Input	W	25	25
	Capacitor	uF	/	——
	Speed(hi/mi/lo)	r/min	1250/1000/800	1250/1000/800
Indoor air flow (Hi/Mi/Lo)		CFM	400/325/250	400/325/250
Indoor noise level (Hi/Mi/Lo)		dB(A)	41/35/28	41/35/28
Outdoor fan motor	Model		YDK23-6A	YDK23-6A
	Brand		BROAD OCEAN	BROAD OCEAN
	Input	W	75	75
	Capacitor	uF	6.5uF/260V	6.5uF/260V
	Speed	r/min	900	900
Outdoor air flow		CFM	1060	1060
Outdoor noise level		dB(A)	53	53
Refrigerant type R410A		oz	37.0	37.7
Design pressure		psig	650	650
Refrigerant piping	Liquid side/ Gas side	in	1/4 / 3/8	1/4 / 3/8
	Max. refrigerant pipe length	ft	33	33
	Max. difference in level	ft	16	16
Operation temp		ºF	63-86	63-86
Ambient temp		ºF	65-113	19-113
Application area		ft^2	150-225	150-225

Note:

The noise date is base on semi-anechoic chamber, during actual operation; these values are normally somewhat different than actual operating conditions.

The above design and specifications are subject to change without prior notice.

Model			SMA12SA-0	SMH12SA-0
Power supply		**Ph-V-Hz**	1, 115V~, 60Hz	1, 115V~, 60Hz
Cooling	Capacity	Btu/h	12000	12000
	Input	W	1090	1090
	Rated current	A	10	10
	SEER	Btu/w.h	13	13
Heating	Capacity	Btu/h	——	13000
	Input	W	——	1160
	Rated current	A	——	10.6
	COP	W/W	——	7.7
Max. current		A	12.6	14
Starting current		A	47	47
Compressor	Model		EA108X1C-1FZDU1	EA108X1C-1FZDU1
	Type		ROTARY	ROTARY
	Brand		TOSHIBA	TOSHIBA
	Capacity	Btu/h	10918	10918
	Input	W	1085	1085
	Rated current(RLA)	A	9.9	9.9
	Locked rotor Amp(LRA)	A	47	47
	Thermal protector		B440-135-141E	B440-135-141E
	Capacitor	uF	45 μ F /250VAC	45 μ F /250VAC
	Refrigerant oil	ml	350	350
Indoor fan motor	Model		WZDK25-38D	WZDK25-38D
	Brand		WELLING	WELLING
	Input	W	32	32
	Capacitor	uF	——	——
	Speed(hi/mi/lo)	r/min	1270/1100/1000	1270/1100/1000
Indoor air flow (Hi/Mi/Lo)		CFM	440/365/325	440/365/325
Indoor noise level (Hi/Mi/Lo)		dB(A)	45/41/38	45/41/38
Outdoor fan motor	Model		YDK23-6A	YDK23-6A
	Brand		BROAD OCEAN	BROAD OCEAN
	Input	W	75	75
	Capacitor	uF	6.5uF/260V	6.5uF/260V
	Speed	r/min	900	900
Outdoor air flow		CFM	1090	1090
Outdoor noise level		dB(A)	55	55
Refrigerant type R410A		oz	46.9	47.6
Design pressure		PSIG	650	650
Refrigerant piping	Liquid side/ Gas side	in	1/4 / 1/2	1/4 / 1/2
	Max. refrigerant pipe length	ft	33	33
	Max. difference in level	ft	16	16
Operation temp		ºF	63-86	63-86
Ambient temp		ºF	65-113	19-113
Application area		ft^2	195-280	195-280

Note:

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Model			SMA18SA-1	SMH18SA-1
Power supply		**Ph-V-Hz**	1, 208/230V~, 60Hz	1, 208/230V~, 60Hz
Cooling	Capacity	Btu/h	18000	18000
	Input	W	1560	1530
	Rated current	A	6.8	6.7
	SEER	Btu/w.h	13	13
Heating	Capacity	Btu/h	——	18000
	Input	W	——	1630
	Rated current	A	——	7.1
	HSPF	W/W	——	7.7
Max. current		A	9.2	10.2
Starting current		A	32.6	32.6
Compressor	Model		PA150X2CS-3KUU	PA150X2CS-3KUU
	Type		ROTARY	ROTARY
	Brand		TOSHIBA	TOSHIBA
	Capacity	Btu/h	15166/15354	15166/15354
	Input	W	1505/1510	1505/1510
	Rated current(RLA)	A	7.30/6.65	7.30/6.65
	Locked rotor Amp(LRA)	A	32.6	32.6
	Thermal protector		UP3RE0391-T39	UP3RE0391-T39
	Capacitor	uF	40μF /370VAC	40μF /370VAC
	Refrigerant oil	ml	750	750
Indoor fan motor	Model		YDK31-6B	YDK31-6B
	Brand		WELLING	WELLING
	Input	W	55	55
	Capacitor	uF	3	3
	Speed(hi/mi/lo)	r/min	1070/1000/960	1070/1000/960
Indoor air flow (Hi/Mi/Lo)		CFM	620/540/490	620/540/490
Indoor noise level (Hi/Mi/Lo)		dB(A)	45/43/41	45/43/41
Outdoor fan motor	Model		YDK53-6KB	YDK53-6KB
	Brand		WELLING	WELLING
	Input	W	165	165
	Capacitor	uF	3uF/450V	3uF/450V
	Speed	r/min	840	840
Outdoor air flow		CFM	1475	1475
Outdoor noise level		dB(A)	59	59
Refrigerant type R410A		oz	70.6	72.0
Design pressure		PSIG	650	650
Refrigerant piping	Liquid side/ Gas side	in	Φ1/4/Φ1/2	Φ1/4/Φ1/2
	Max. refrigerant pipe length	ft	33	33
	Max. difference in level	ft	16	16
Operation temp		℃ºF	63-86	63-86
Ambient temp		℃ºF	65-113	19-113
Application area		ft^2	325-430	325-430

Note:

The noise date is base on semi-anechoic chamber, during actual operation; these values are normally somewhat different than actual operation.

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Model			SMA24SA-1	SMH24SA-1
Power supply		Ph-V-Hz	1, 208/230V~, 60Hz	1, 208/230V~, 60Hz
Cooling	Capacity	Btu/h	24000	24000
	Input	W	2000	2000
	Rated current	A	8.8	8.8
	SEER	Btu/w.h	13	13
Heating	Capacity	Btu/h	——	24000
	Input	W	——	2000
	Rated current	A	——	8.8
	HSPF	W/W	——	7.7
Max. current		A	14	14
Starting current		A	34.8 A	34.8 A
Compressor	Model		PA200X2CS-3MUU	PA200X2CS-3MUU
	Type		ROTARY	ROTARY
	Brand		TOSHIBA	TOSHIBA
	Capacity	Btu/h	19820/20130	19820/20130
	Input	W	2000/1980W	2000/1980W
	Rated current(RLA)	A	9.70/8.75A	9.70/8.75A
	Locked rotor Amp(LRA)	A	34.8 A	34.8 A
	Thermal protector		UP3SE0396-T39	UP3SE0396-T39
	Capacitor	uF	50	50
	Refrigerant oil	ml	750	750
Indoor fan motor	Model		YDK50-4B	YDK50-4B
	Brand		WELLING	WELLING
	Input	W	82/69/58	82/69/58
	Capacitor	uF	3	3
	Speed(hi/mi/lo)	r/min	1260/1100/990	1260/1100/990
Indoor air flow (Hi/Mi/Lo)		CFM	680/600/550	680/600/550
Indoor noise level (Hi/Mi/Lo)		dB(A)	47/44/42	47/44/42
Outdoor fan motor	Model		YDK100-6EB	YDK100-6EB
	Brand		WELLING	WELLING
	Input	W	160	160
	Capacitor	uF	4	4
	Speed	r/min	740	740
Outdoor air flow		CFM	1475	1475
Outdoor noise level		dB(A)	59	59
Refrigerant type R410A		oz	84.7	86.4
Design pressure		PSIG	650	650
Refrigerant piping	Liquid side/ Gas side	in	3/8/ 5/8	3/8/ 5/8
	Max. refrigerant pipe length	ft	33	33
	Max. difference in level	ft	16	16
Operation temp		ºF	63-86	63-86
Ambient temp		ºF	65-113	19-113
Application area		ft^2	430-605	430-605

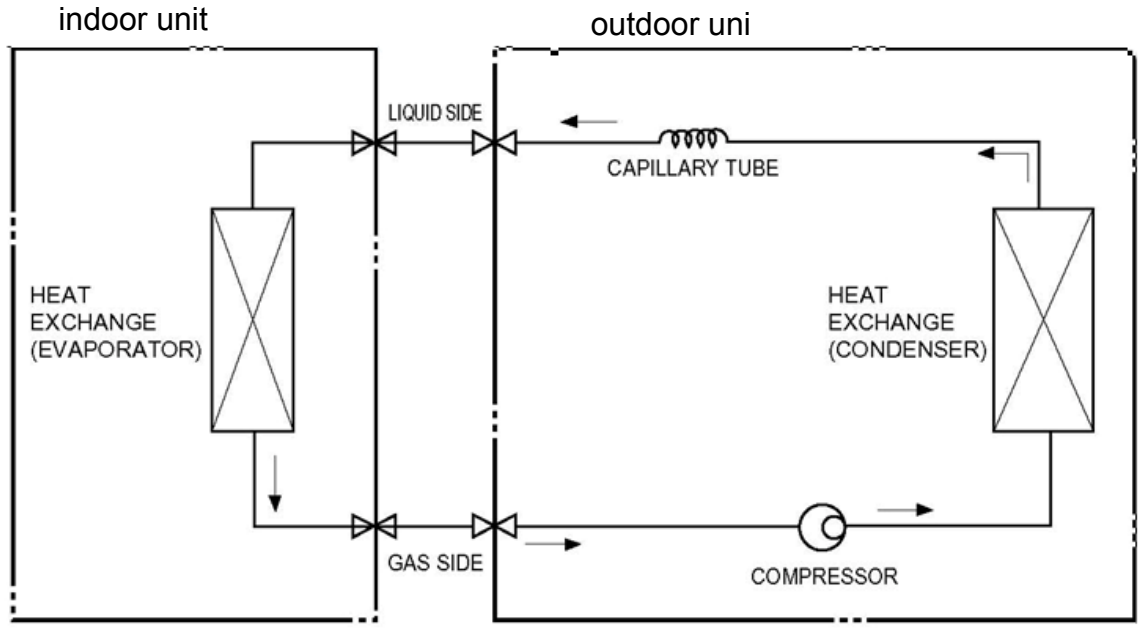
Note:

The noise date is base on semi-anechoic chamber, during actual operation; these values are normally somewhat different than actual operating condition.

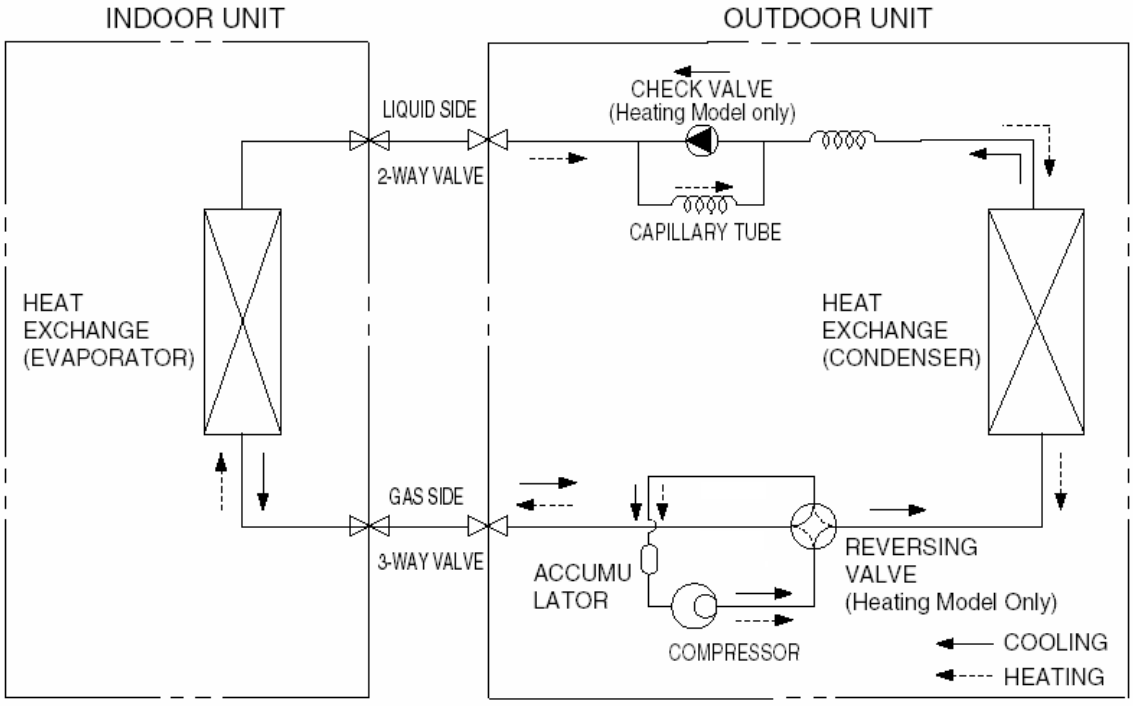
The above design and specifications are subject to change without prior notice.

5 Refrigerant cycle diagram

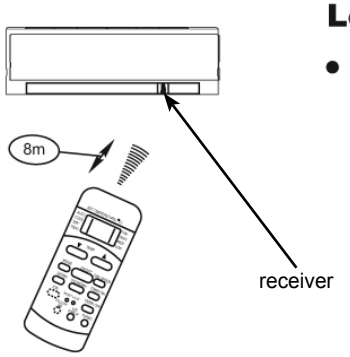
➢ Cooling only



➢ Heat pump mode



Using the Remote Controller



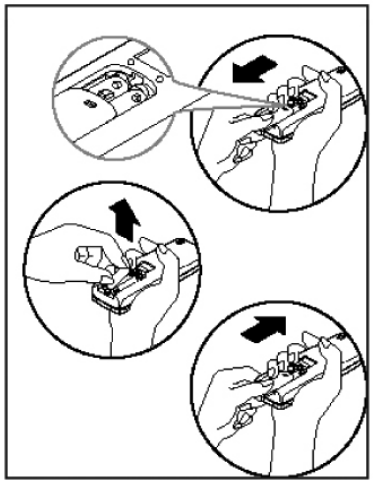
Location of the remote controller.

- Use the remote controller within a distance of 26' 3" (8 meters) from the appliance, pointing it towards the receiver. Reception is confirmed by a beep.

⚠CAUTIONS

- The air conditioner will not operate if curtains, doors or other materials block the signals from the remote controller to the indoor unit.
- Prevent any liquid from falling into the remote controller. Do not expose the remote controller to direct sunlight or heat.
- If the infrared signal receiver on the indoor unit is exposed to direct sunlight, the air conditioner may not function properly. Use curtains to prevent the sunlight from falling on the receiver.
- If other electrical appliances react to the remote controller, either move these appliances or consult your local dealer.

Replacing batteries

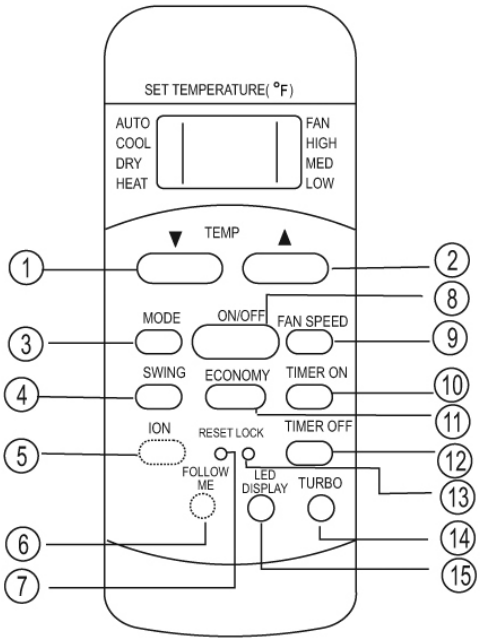


The remote controller is powered by two dry batteries (AAA 1.5V) housed in the rear housing and protected by a cover.

(1) Remove the battery cover by pressing and sliding it off.
(2) Remove the old batteries and insert the new batteries,placing the(+) and (-) ends correctly.
(3) Reattach the cover by sliding it back into position.

NOTE: When the batteries are removed, the remote controller erases all programming. After inserting new batteries, the remote controller must be reprogrammed.

Function Buttons



ION and FOLLOW buttons are optional functions.

❶ TEMP UP Button
Push this button to increase the indoor temperature setting in 2°F(1°C) increments to 88°F(30°C).

❷ TEMP DOWN Button
Push this button to decrease the indoor temperature setting in 2°F(1°C) increments to 62°F(17°C).

❸ MODE Button
Each time the button is pressed, the operation mode is selected in the sequence of the following:

AUTO → COOL → DRY → HEAT* → FAN

*__NOTE__: Heat pump models only

❹ SWING Button
Used to stop or start louver movement and set the desired up/down airflow direction.

❺ ION Button(Optional)
When push this button, the ion generator is energized and will help to remove pollen and impurities from the air.

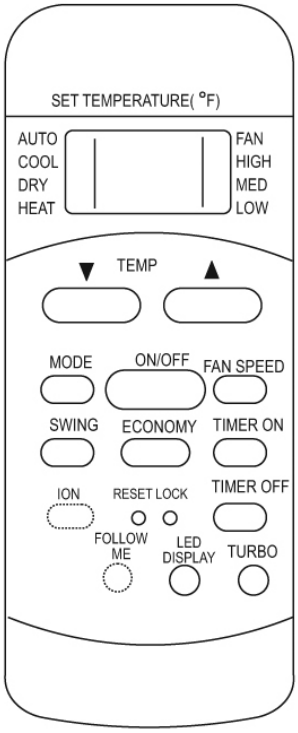
❻ FOLLOW ME Button(Optional)
Push this button to initiate the Follow Me function, the remote controller begins to detect the actual temperature at its location. The remote controller will send this signal to the air conditioner every 3 minutes interval until press the Follow Me button again. The air conditioner will beep to indicate the Follow Me feature has ended if it does not receive the signal during any 7 minute interval.

❼ RESET Button
Once the recessed RESET button is pressed, all of the current settings will be cancelled and the controller will return to the initial settings.

❽ ON/OFF Button
Operation starts when this button is pressed and stops when the button is pressed again.

❾ FAN SPEED Button
Used to select the fan speed in four steps:
Auto → Low → Med → High

Function Buttons (continued)



ION and FOLLOW buttons are optional functions.

⑩ TIMER ON Button

Press this button to activate the Auto-on time setting. Each press will increase the time setting in 30 minutes increments, up to 10 hours, then at 1 hour increments up to 24 hours. To cancel the Auto-on time setting, just press the button until the time setting is 0.0.

⑪ ECONOMY Button (Sleep Mode)

Select this function during the sleeping time. It to maintain the most comfortable temperature and save energy. This function is available on COOL, HEAT or AUTO mode only .

NOTE: *While the unit is running under Energy-saving mode, it would be cancelled if any other buttons are pressed.*

⑫ TIMER OFF Button

Press this button to activate the Auto-off time setting. Each press will increase the time setting in 30 minutes increments, up to 10 hours, then at 1 hour increments up to 24 hours. To cancel the Auto-off time setting, just press the button until the time setting is 0.0.

⑬ LOCK Button

Press this recessed button to lock all current settings. Use the LOCK mode when you want to prevent settings from being changed accidentally. Press the LOCK button again to cancel the LOCK function. A key symbol will appear on the remote controller display when the lock function is activated.

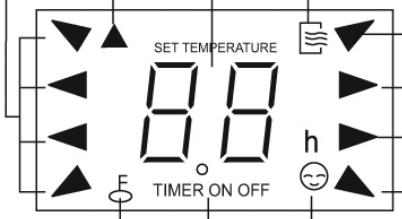
⑭ Turbo Button

Used to start or stop the speed cooling/ heating. Speed cooling/heating operates super high fan speed in cooling/heating mode.
Note: The unit system will automatically revert back to the previous settings after continue operating under speed cooling mode for about 20 minutes.

⑮ LED Display Button

Press this button to clear the display on the indoor unit, press it again to light the display .

Indicators on LCD Display



MODE display
Displays the current selected mode. Including AUTO, COOL, DRY, HEAT (cooling & heating models only) and FAN.

Transmission Indicator
This transmission indicator will light when remote controller transmits signals to the indoor unit.

Temp./Timer display
The temperature setting (from 62°F (17°C) to 88°F (30°C)) or timer setting (0~24h) will be displayed. If FAN mode is selected, there will be no display.

ON/OFF display
This indicator will be displayed when the unit is operating.

MODE display(FAN mode)

FAN SPEED display
Displays the selected fan speed: AUTO, HIGH, MED and LOW. Nothing displays when the fan speed is selected in AUTO speed. When AUTO or DRY Mode is selected, there will be no signals displayed.

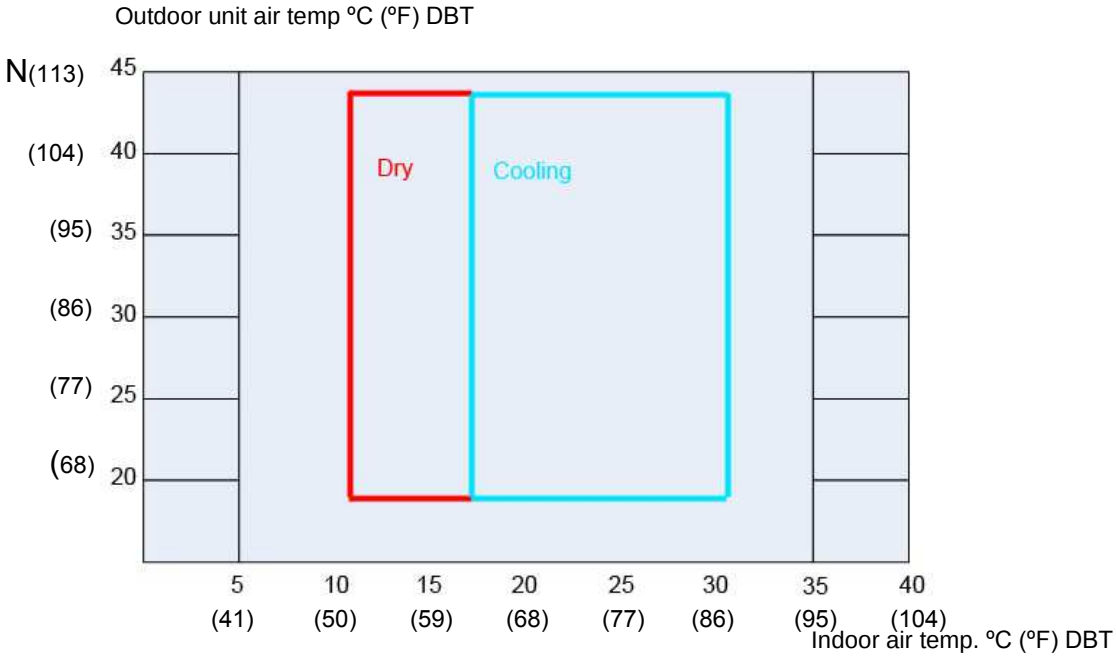
FOLLOW ME display(on some models)
When pressing FOLLOW ME button in COOL or HEAT mode, the remote sensing function is activated and this indicator displays.

TIMER display
This display area shows the settings of the TIMER. That is, if only the Auto-on time function is set, it will display TIMER ON. If only the Auto-off time function is set, it will display TIMER OFF. If both functions are set, it will display TIMER ON OFF which indicates you have chosen both the Auto-on time and Auto-off time.

LOCK Indicator
A key symbol is displayed when pushing the LOCK button. Push the LOCK button to clear display.

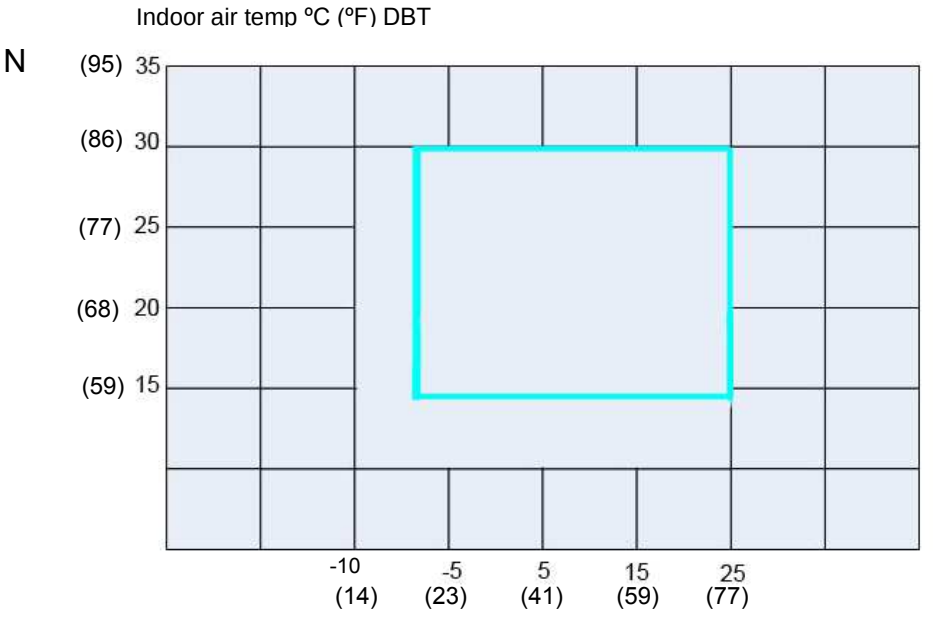
6 Operation limits

Cooling operation



Note: The chart is the result from the continuous operation under constant air temperature conditions. However, excludes the initial pull-down stage.

Heating operation

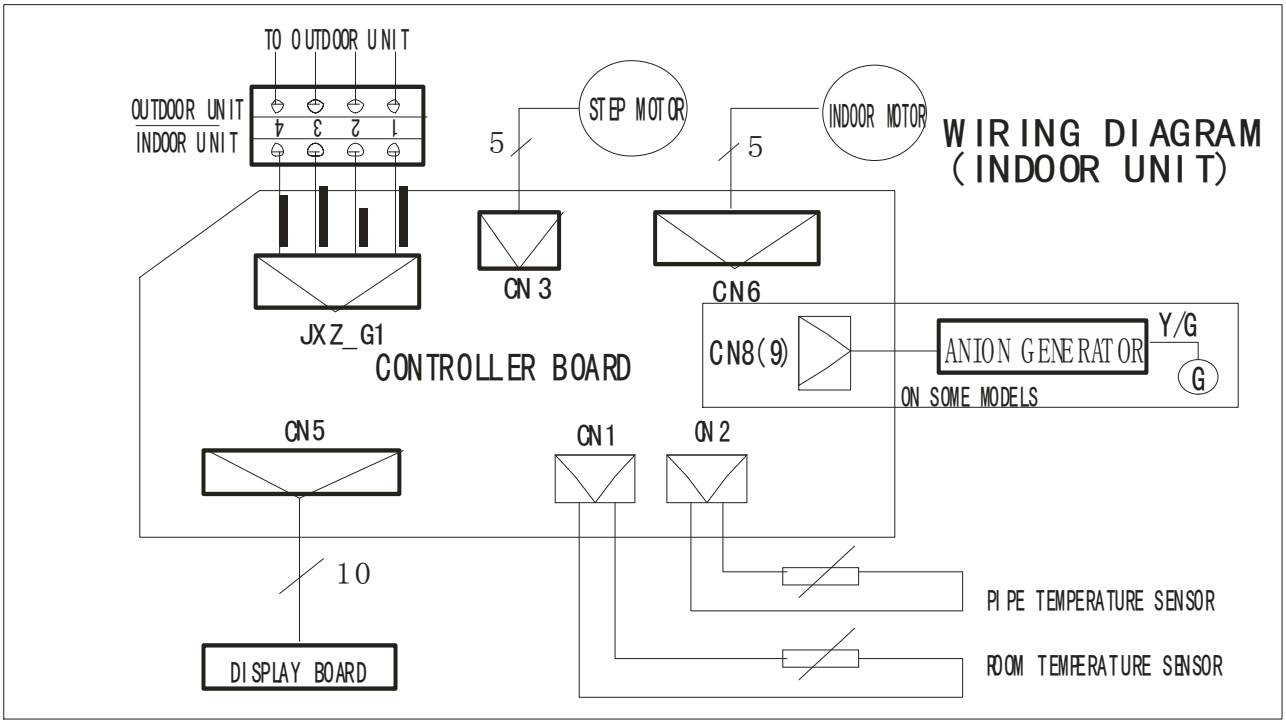


Note: The chart is the result from the continuous operation under constant air temperature conditions. However, excludes the initial pull-down stage.

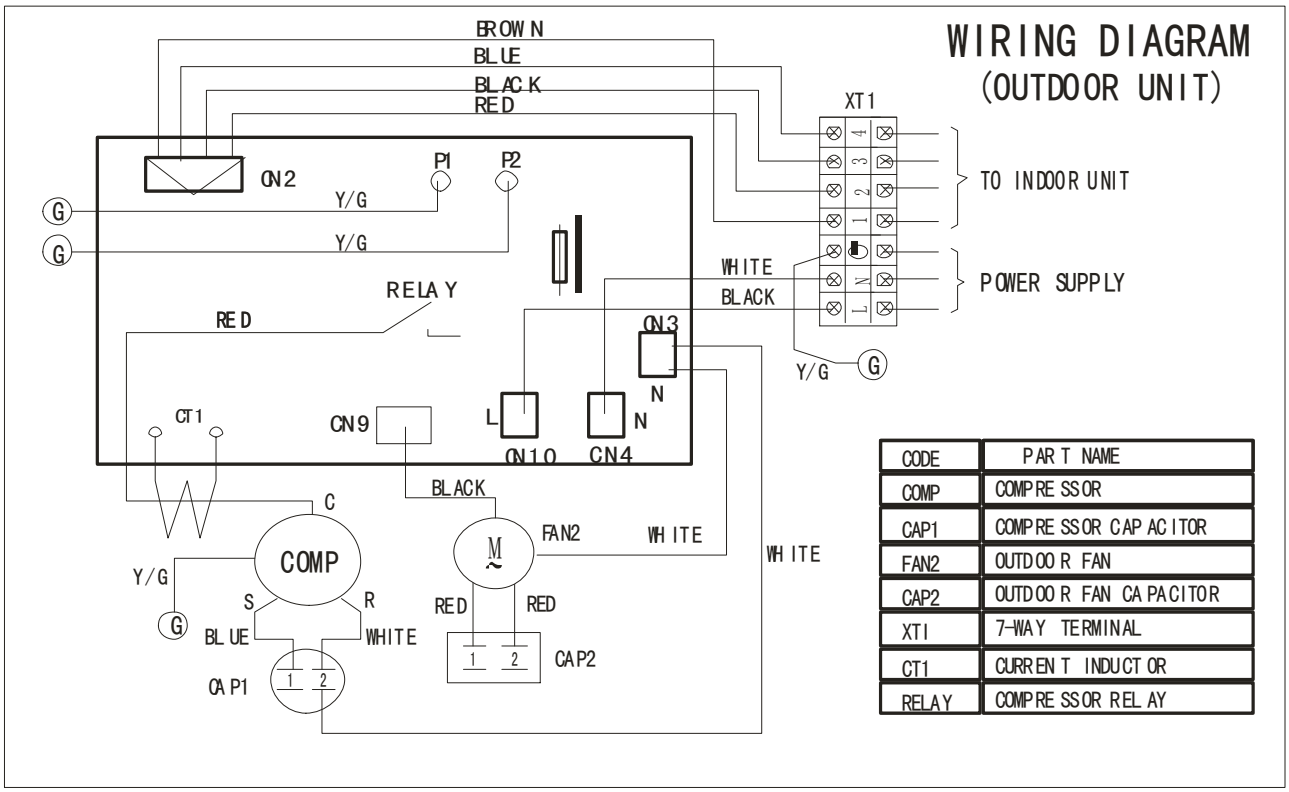
7 Wiring diagram

SMA09SA-0

Indoor unit:

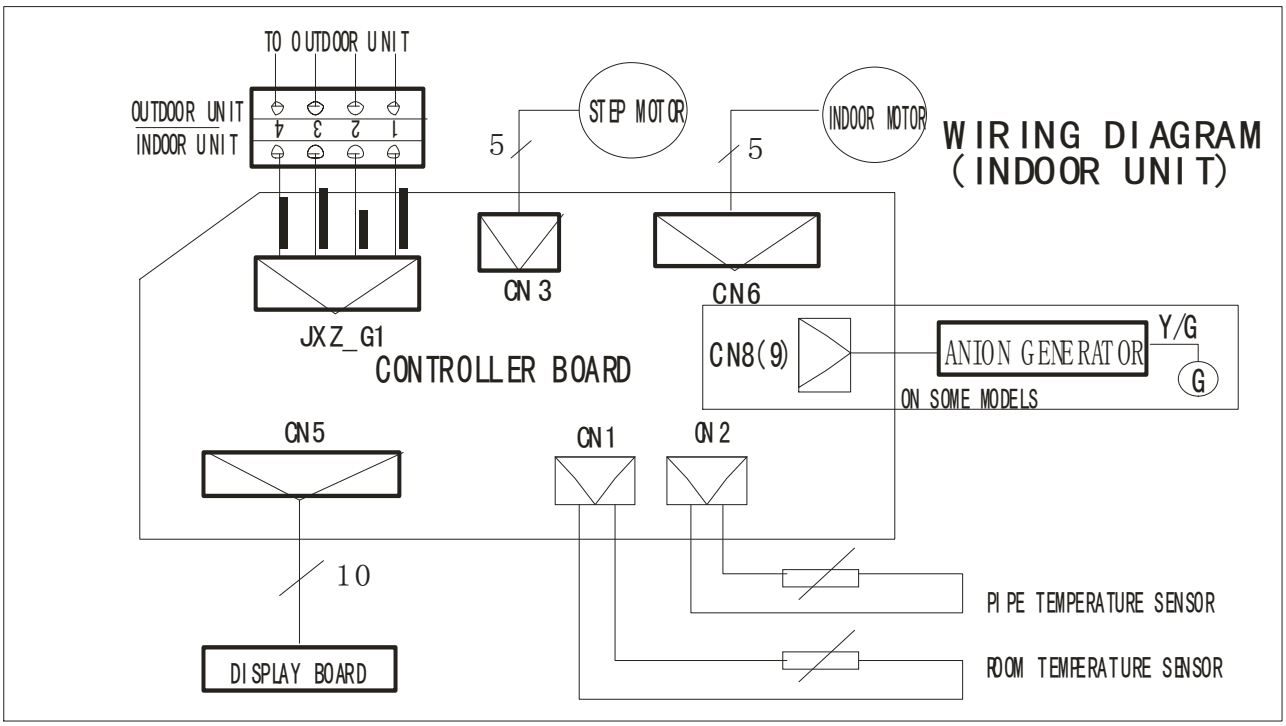


outdoor unit:

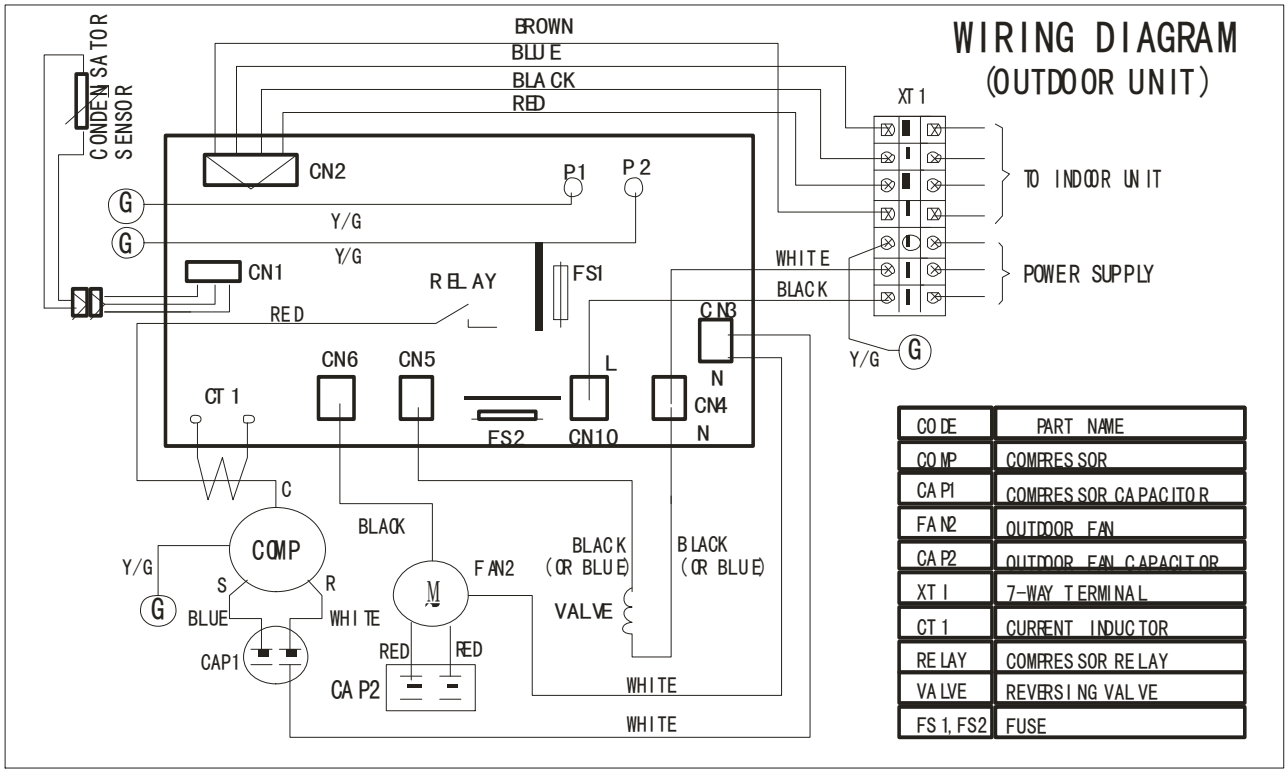


SMH09SA-0

Indoor unit:

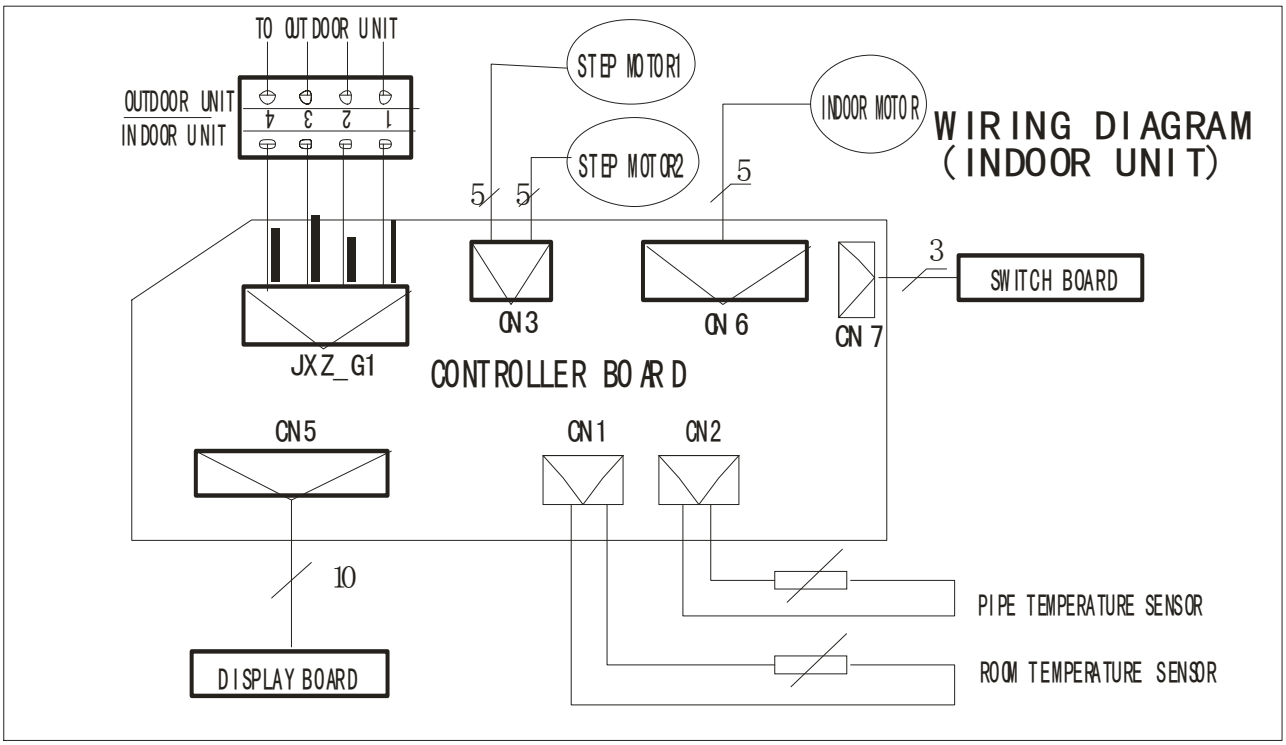


outdoor unit:

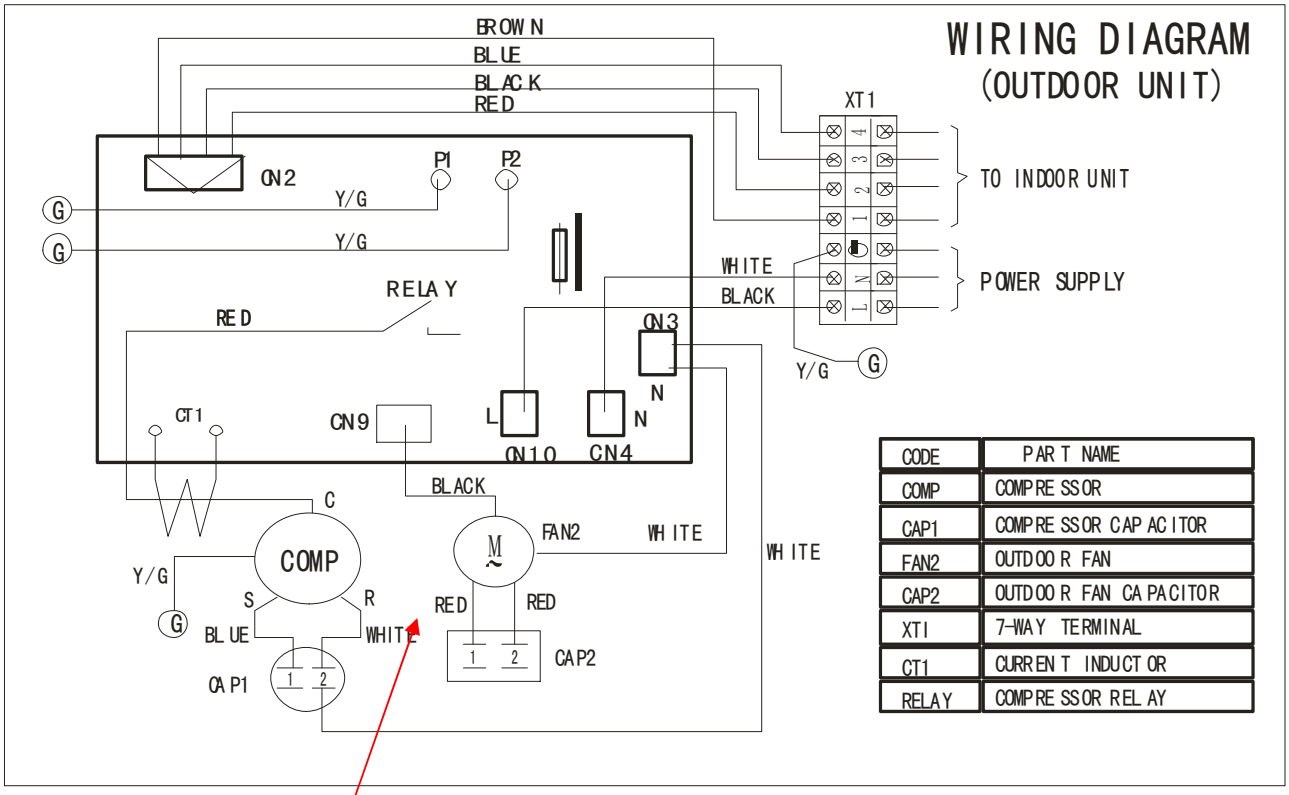


SMA12SA-0

Indoor unit:



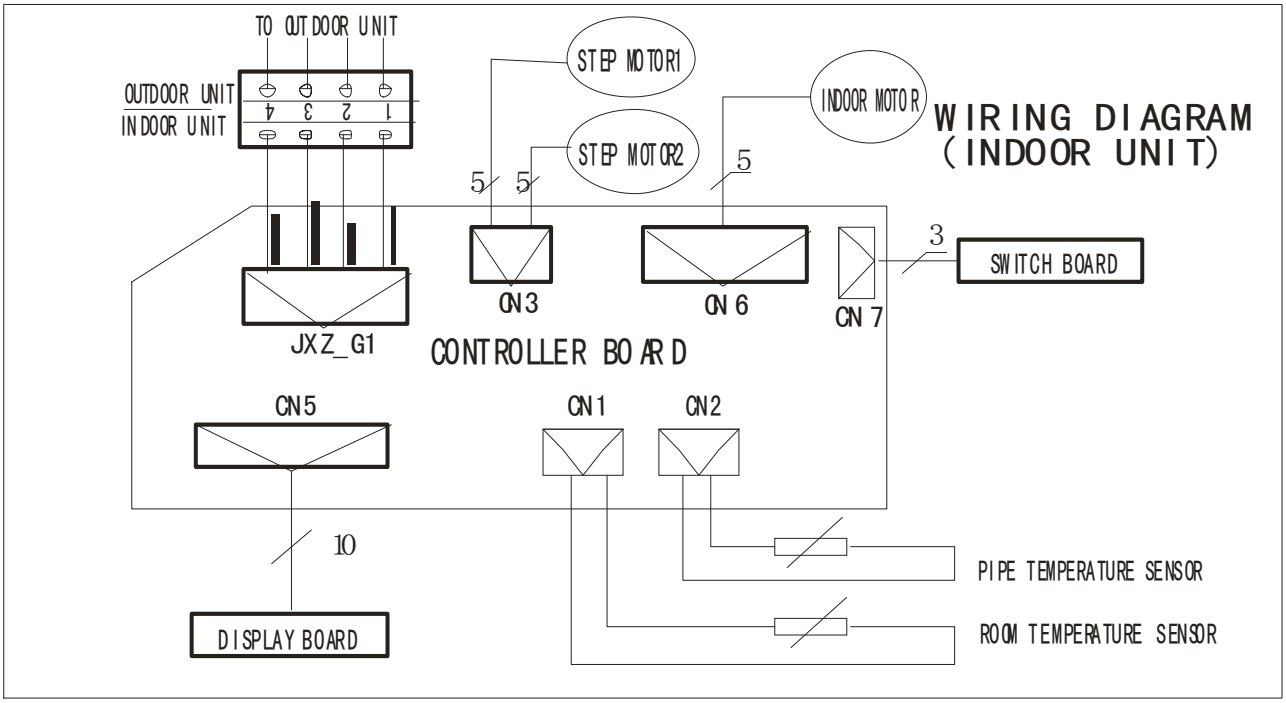
outdoor unit:



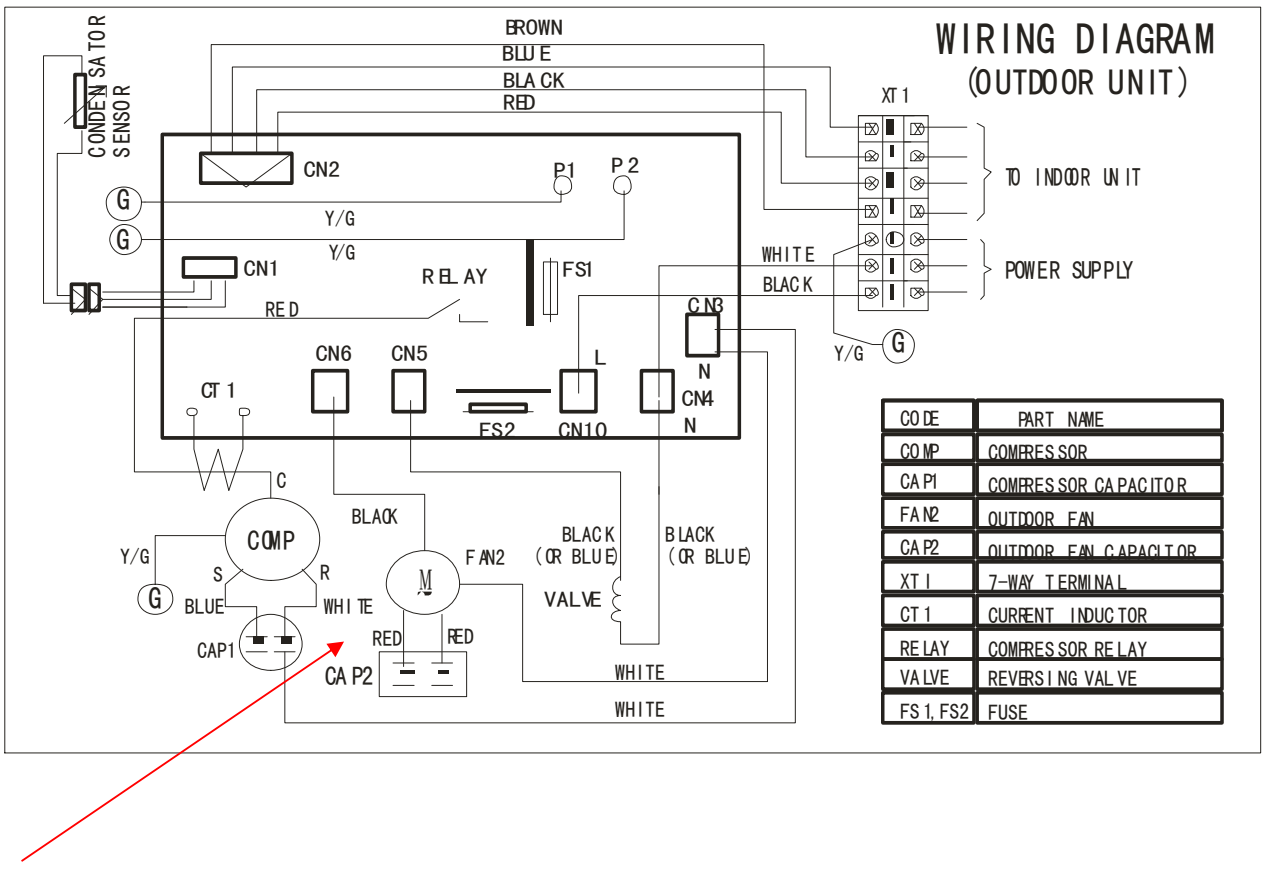
Note：This wire is BLUE in the outdoor unit using 208-230V power supply.

SMH12SA-0

Indoor unit:



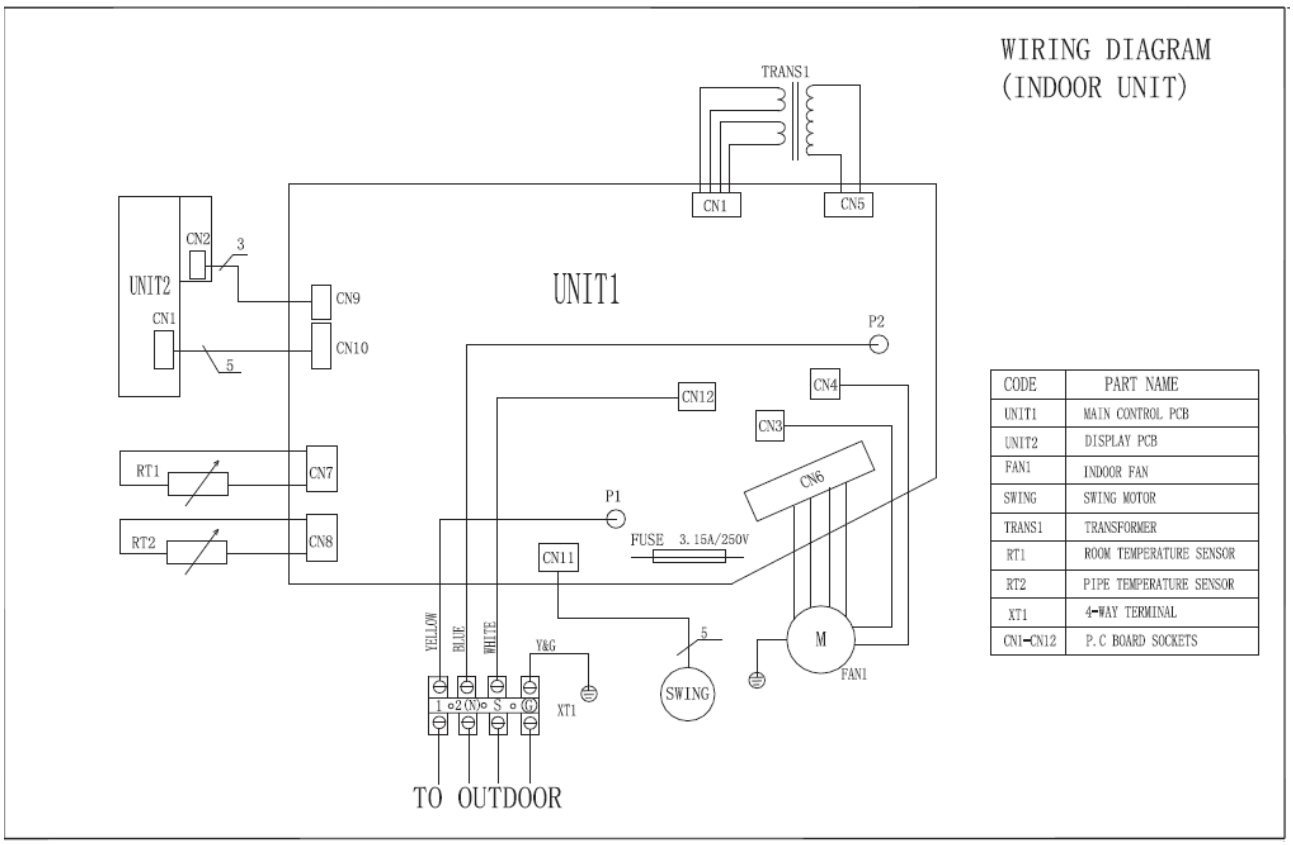
outdoor unit:



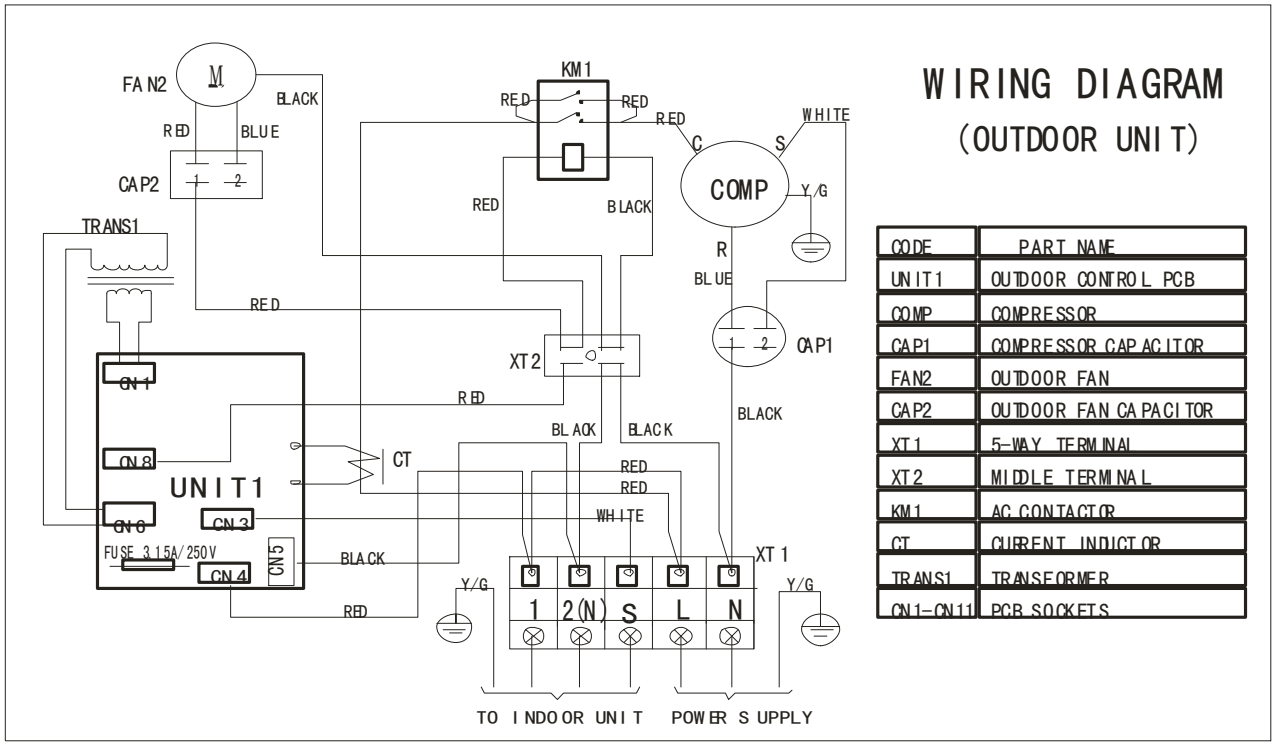
Note：This wire is BLUE in the outdoor unit using 208-230V power supply.

SMA18SA-1, SMA24SA-1

Indoor unit:

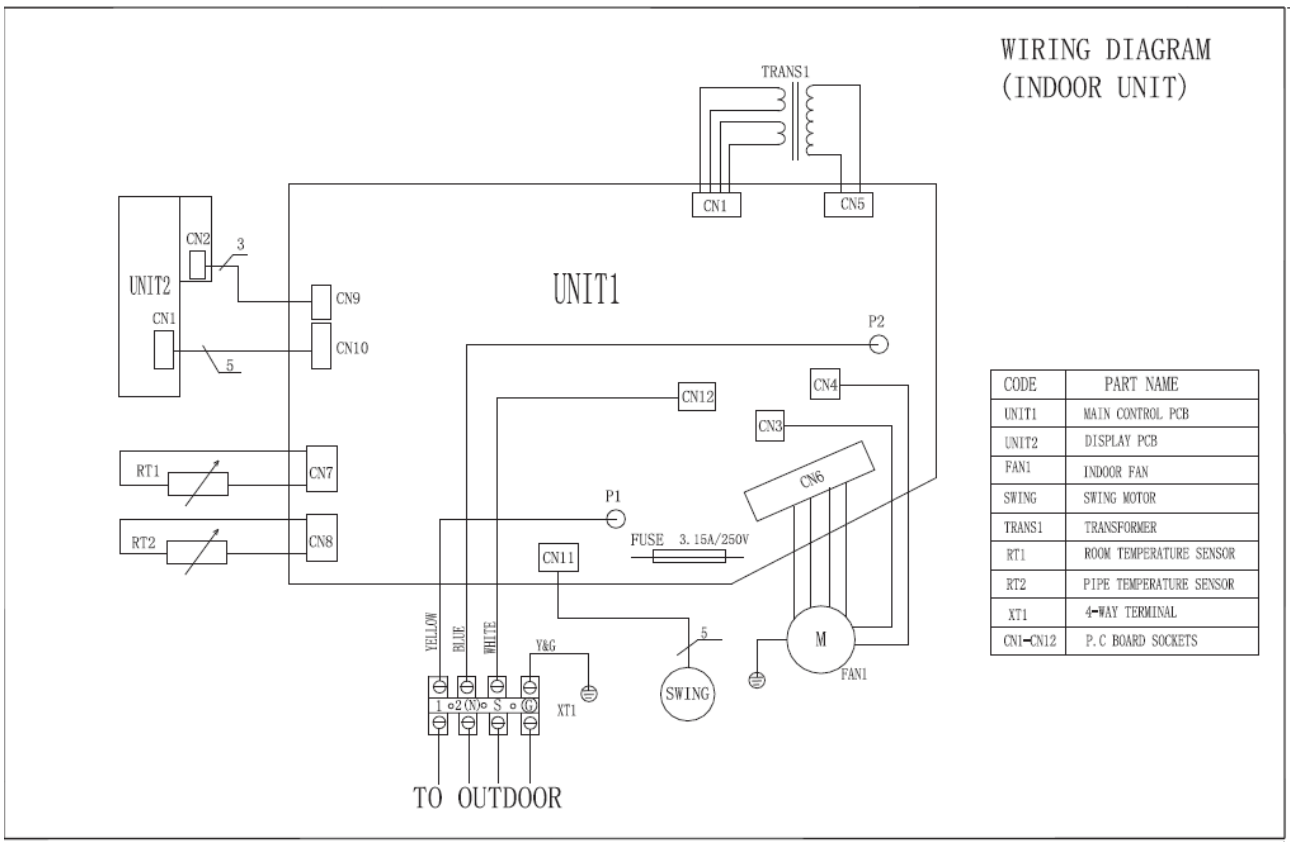


Outdoor unit

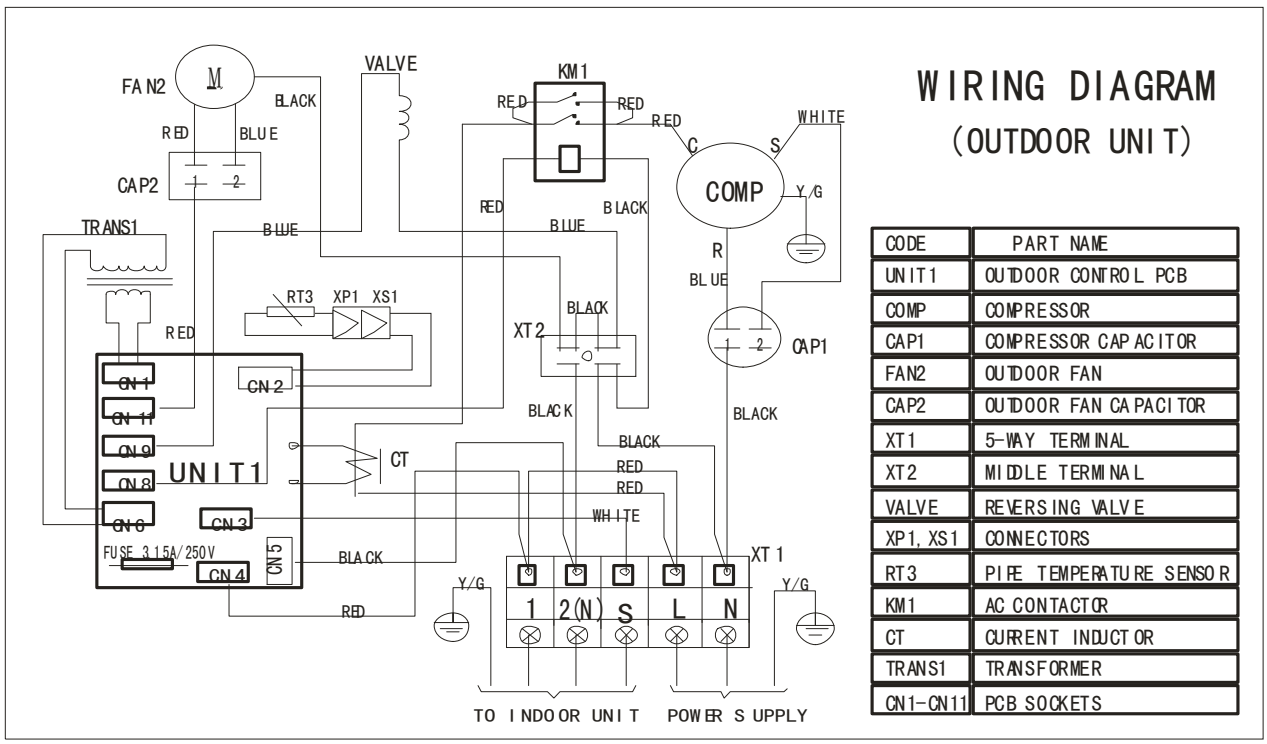


SMH18SA-1, SMH24SA-1

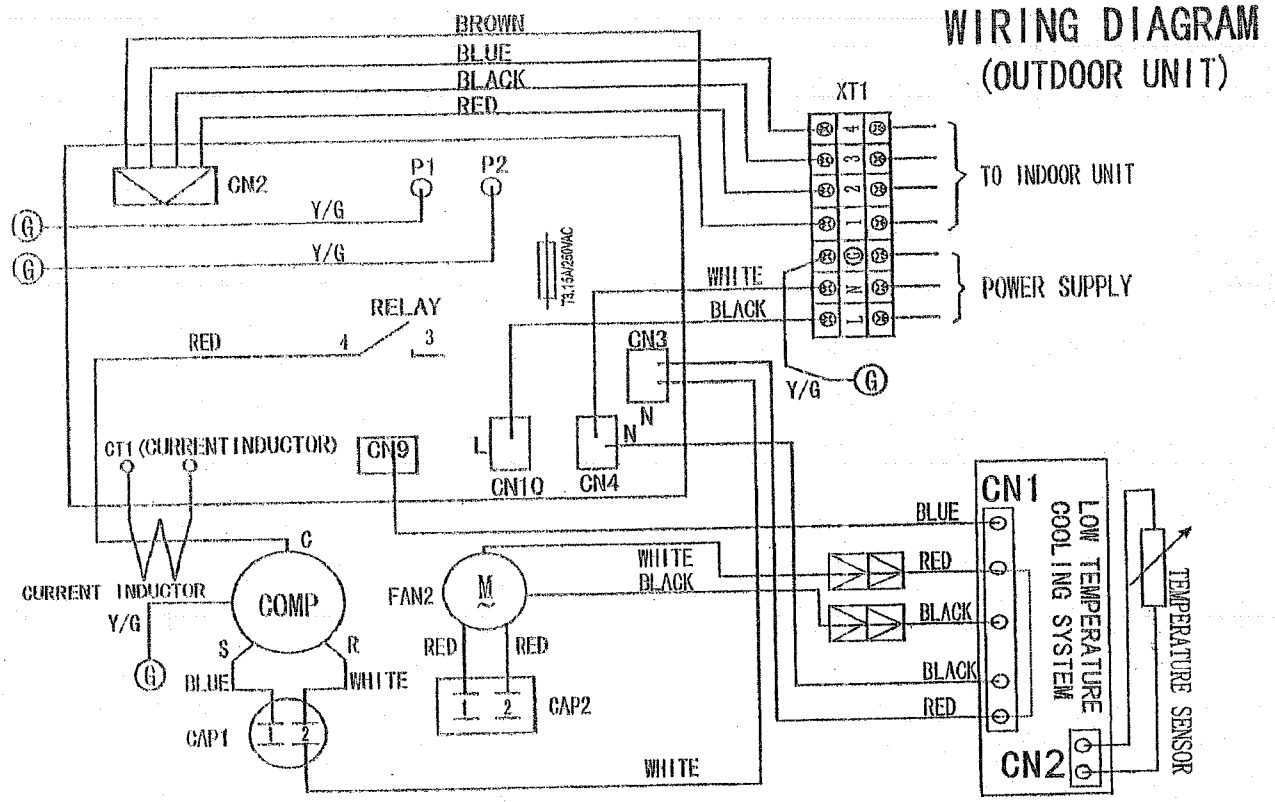
Indoor unit:



Outdoor unit



A-SMA 12S LOW AMBIENT



Low Ambient Operation and Crank Case Heater Feature:

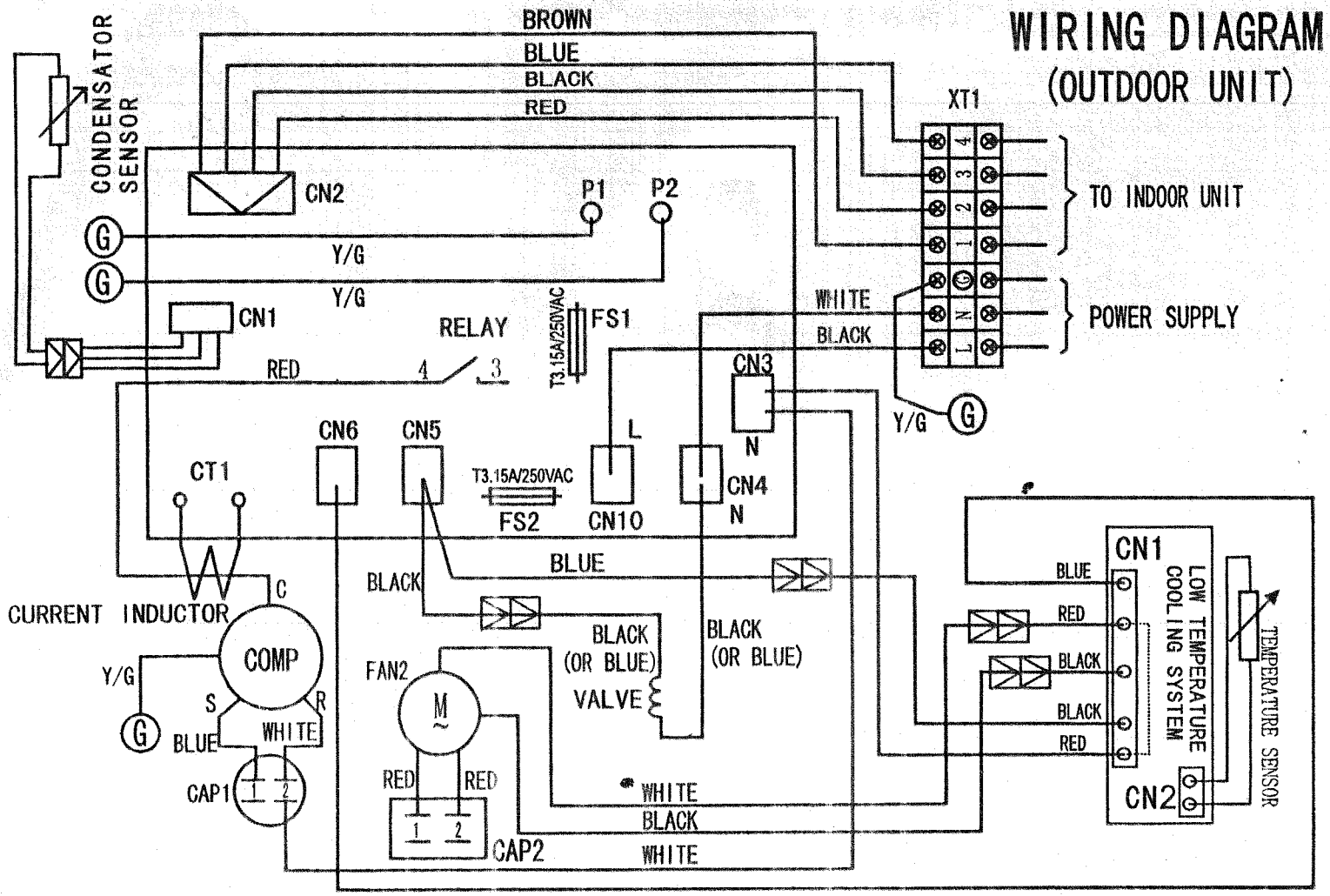
When cooling is needed year round, including when outdoor temperatures are apt to fall below freezing, our S Series ductless mini-split systems will continue to work, as they come with factory installed low ambient controls. The low ambient feature works by regulating the head pressure by varying the amount of air flow through the condenser, which helps to prevent evaporator freeze ups and low pressure problems due to low ambient outdoor temperatures. Low ambient operation is a great feature for temperature/humidity sensitive environments or applications such as server/computer rooms, supermarkets, restaurants, or cooling tower fans.

Additionally, a crank case heater is required and factory installed, as it is needed for use with the low ambient controls. The crank case heater minimizes liquid refrigerant migration to the compressor when the compressor is not operating and helps to keep the compressor oil warm enough so that it remains fluid to prevent slugging. Crank case heaters also assist to greatly reduce heat loss to ambient air. Together, the lower ambient feature combined with the factory installed crank case heater, will not only allow the air conditioner to cool year round, but will also prevent compressor failure in low ambient conditions

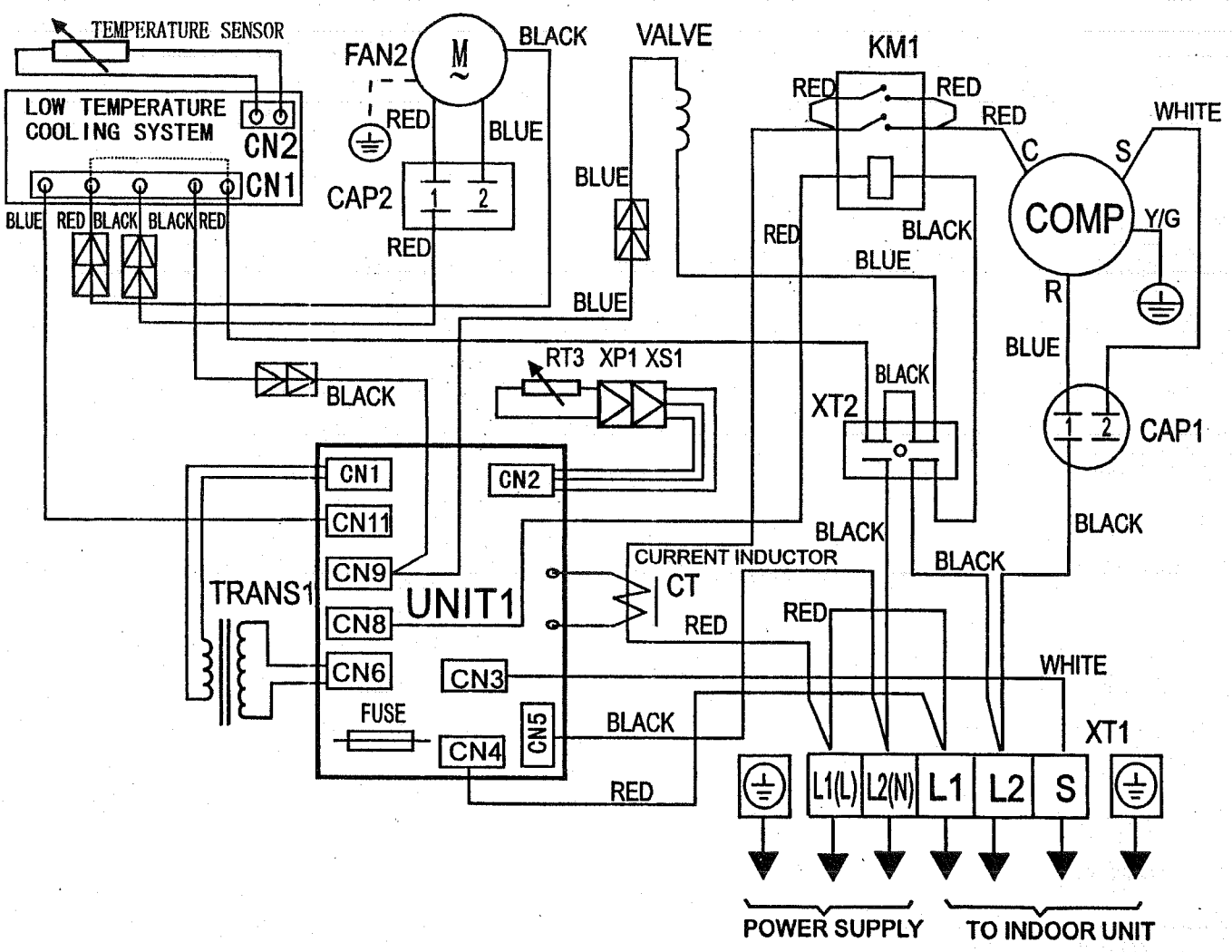
The temperature sensor is mounted in a well on a copper turn bend close to the bottom of the condensor sensing the condensor temperature

SMH 09/12

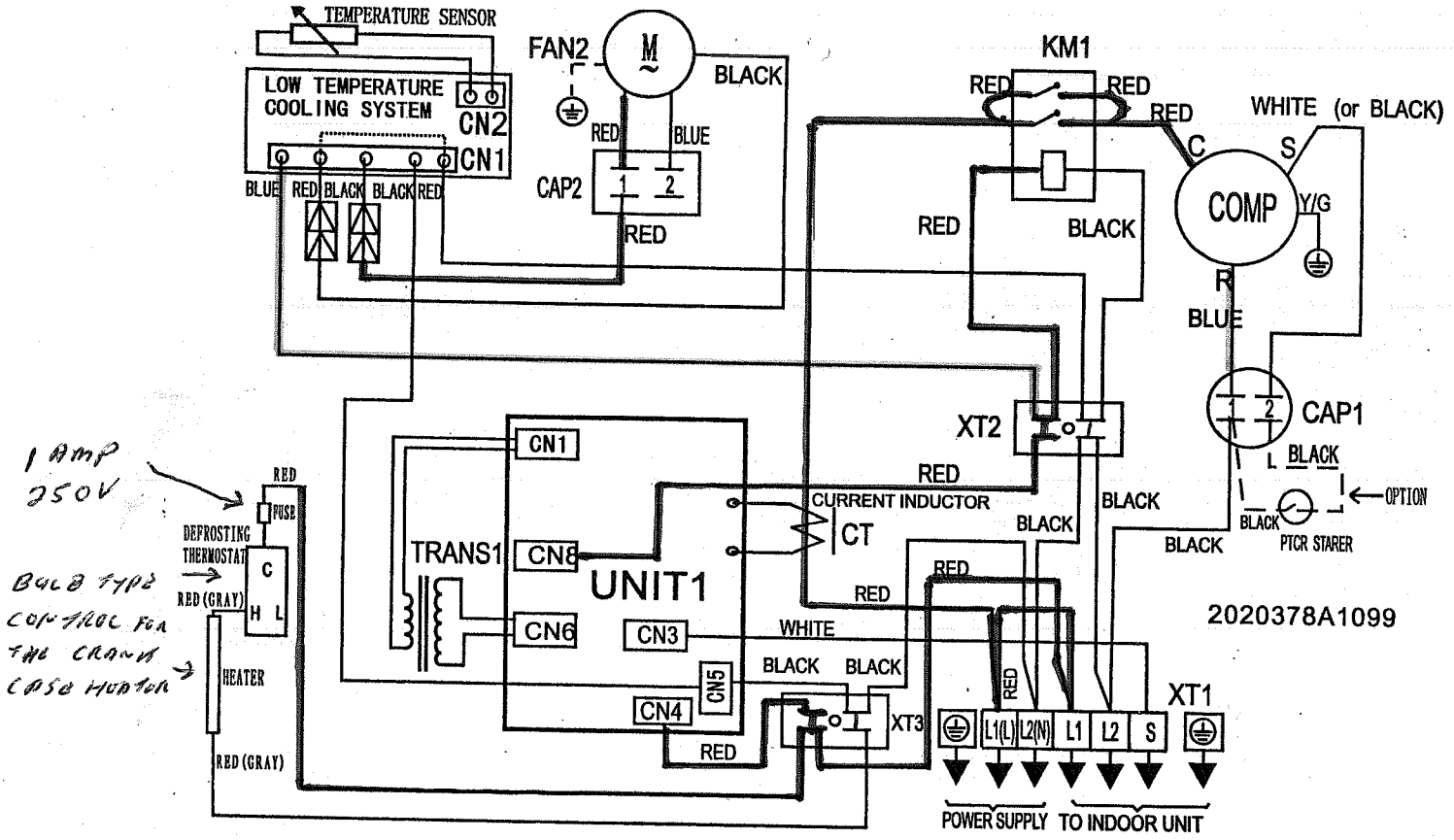
WIRING DIAGRAM
(OUTDOOR UNIT)



SMH 18/24 SC


TEMPERATURE SENSOR
LOW TEMPERATURE COOLING SYSTEM
CN2
CN1
BLUE
RED
BLACK
BLACK
RED
FAN2
M
BLACK
RED
BLUE
CAP2
1
2
RED
VALVE
BLUE
BLUE
KM1
RED
RED
RED
WHITE
C
S
COMP
Y/G
R
RED
BLACK
BLUE
BLUE
BLACK
RT3
XP1
XS1
XT2
BLACK
CAP1
CN1
CN11
CN9
CN8
CN6
CN2
CN3
CN4
CN5
UNIT1
TRANS1
FUSE
CURRENT INDUCTOR
CT
RED
BLACK
BLACK
BLACK
BLACK
RED
WHITE
XT1
L1(L)
L2(N)
L1
L2
S
POWER SUPPLY
TO INDOOR UNIT

SMA18-24SC



BULB TYPE CONTROL FOR THE CRANK CASE HEATER

8 Installation details

8.1 Wrench torque sheet for installation

Outside diameter		Torque
mm	inch	lb-ft
φ6.35	1/4	13
φ9.52	3/8	30
φ12.7	1/2	40
φ15.88	5/8	48
φ19.05	3/4	48

8.2 Connecting the cables

The power connection cable to be made based on the min. circuit ampacity (MCA) on the unit rating label.

8.3 Pipe length and the elevation

Capacity	Pipe size		Standard length	Max.	Max.	Additional
			ft	Elevation	Elevation	refrigerant
Btu/h	GAS	LIQUID		B (ft)	A (ft)	(oz/ft)
7k~12K	3/8'' (φ9.52)	1/4'' (φ6.35)	16	16	33	.3
	1/2'' (φ12.7)	1/4'' (φ6.35)	16	16	33	.3
16K~28K	1/2'' (φ12.7)	1/4'' (φ6.35)	16	26	50	.3
	5/8'' (φ15.88)	1/4'' (φ6.35)	16	33	65	.3
	5/8'' (φ15.88)	3/8'' (φ9.52)	16	33	65	.7
30K~36K	5/8'' (φ15.88)	3/8'' (φ9.52)	16	50	65	.7
	3/4'' (φ19.05)	3/8'' (φ9.52)	16	50	100	.7

9 Electronic function

9.1 Electronic control working environment

Input voltage: 175~253V or 100~130V, depending on model
Input power frequency: 60Hz
Ambient temperature: 19°F to 110°F(heat pump), 64°F to 110°F(cooling only)
Indoor fan normal working amp is less than 1A
Outdoor fan normal working amp is less than 1.5A
Four-way valve normal working amp is less than 1A
Swing motor: DC12V
Compressor: single-phase power supply. Its normal working amp is less than 15A

9.2 Symbols and their meaning

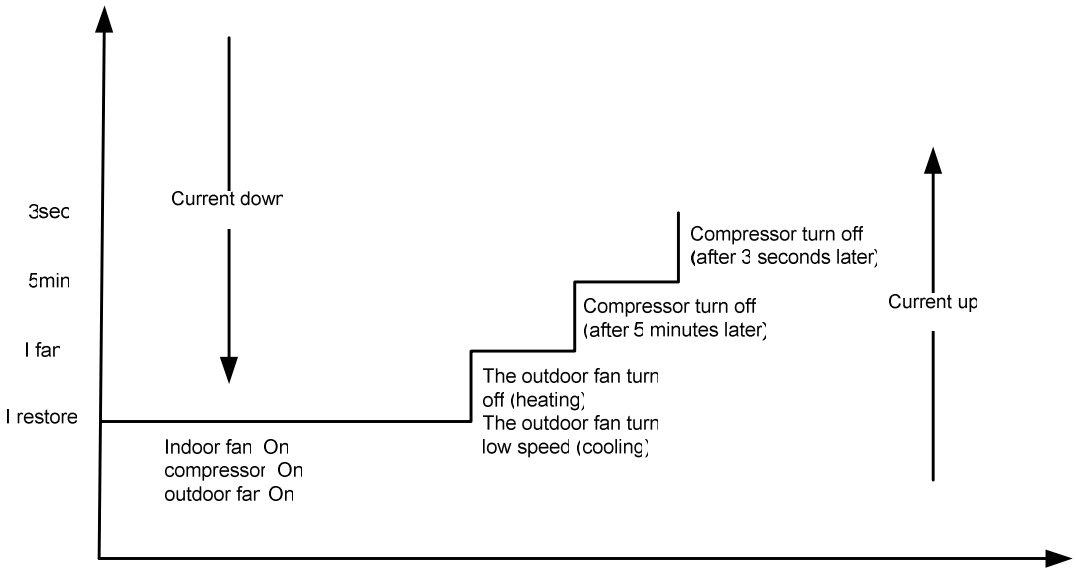
T1: Indoor ambient temperature
T2: Indoor evaporator temperature
T3: Outdoor condenser temperature.
TS: Setting temperature through the remote controller
TE1: Anti-cold wind, from Fan Off to Breeze temperature
TE2: Anti-cold wind, from Breeze to Setting Fan Speed temperature
TE3: Anti-cold wind, from Setting Fan Speed to Breeze temperature
TE4: Anti-cold wind, from Breeze to Fan Off temperature
TE5: Evaporator low temperature protection entering temperature
TE6: Evaporator low temperature protection restoring temperature
TE7: Evaporator high temperature protection, compressor off temperature
TE8: Evaporator high temperature protection, fan off temperature
TE9: Evaporator high temperature protection, restoring temperature
TE10: Condenser high temperature protection, compressor off temperature.
TE11: Condenser high temperature protection, restoring temperature.
TE14: The indoor restoring temperature when the compressor is off on the heating mode.
TE16: The indoor evaporator temperature after the defrost action, fan on temperature.
TC1: Outdoor condenser sensor temperature for the defrost condition 1.
TC2: Condenser sensor temperature after defrost.
TC3: Outdoor condenser sensor temperature for the defrost condition 2.

9.3 Function

Remote receiving
Testing and forced running
Position set for indoor unit wind vane
LED displaying and alarm
On or off Timer
Protection for the compressor
Current protection
High temperature protection of indoor heat exchanger at heating mode
Auto defrosting and heating recovery at heating mode
Anti cold air at heating mode

9.4 Protection

9.4.1 3 minutes delay at restart for compressor.
9.4.2 Sensor protection at open circuit and breaking disconnection
9.4.3 Fan Speed is out of control. When Indoor Fan Speed is too high(higher than High Fan+300RPM)or too low(lower than 400RPM), the unit stops and LED displays failure information and can't returns to normal operation automatically.
9.4.4 Cross Zero signal error warning. If there is no Cross Zero signal in 4 minutes, the unit stops and LED displays failure information and can't return to normal operation automatically.
9.4.5 The current protection of the compressor



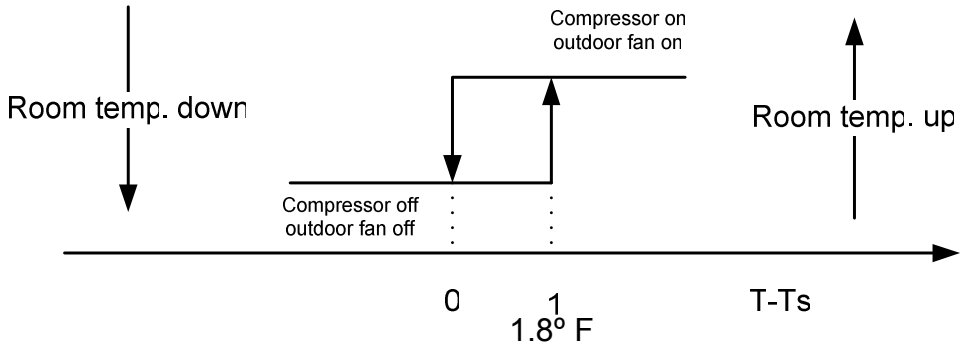
If compressor turns off for continuously 4 times due to current protection in 5 minutes from Compressor On, the unit stops and LCD displays failure information and can't returns to normal operation automatically.

9.5 Fan only mode

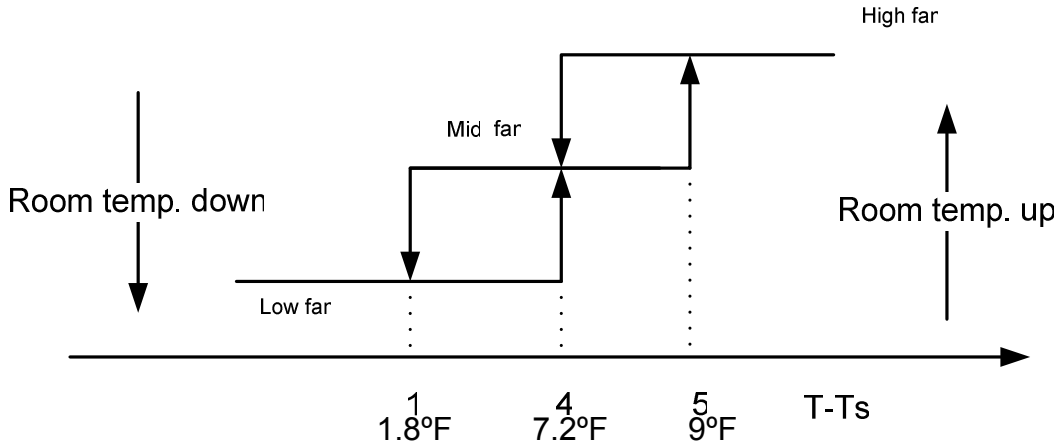
Fan speed is high/mid/low/ Auto

9.6 Cooling mode

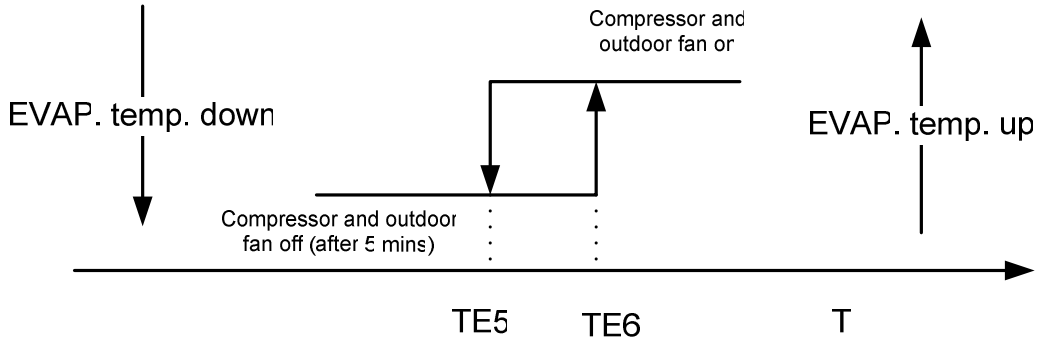
The 4-way valve is closed at cooling mode.
The action of the compressor and the outdoor fan:(T=indoor temperature)



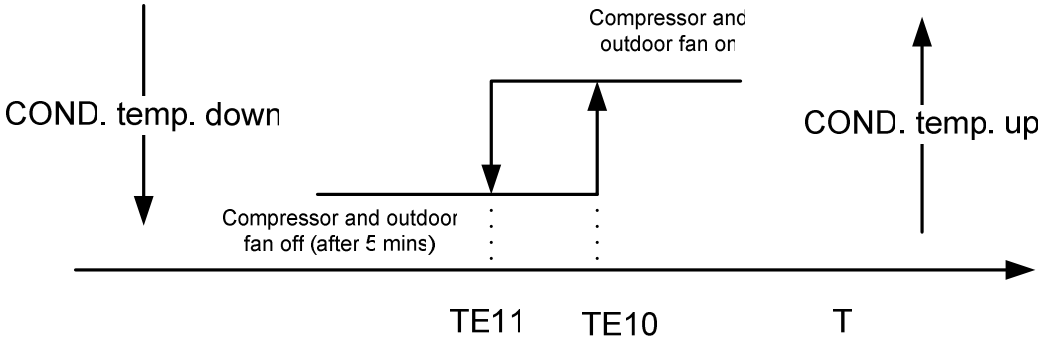
Auto fan at cooling mode:



Anti-freezing control to indoor evaporator at cooling mode (T: evaporator temp.)



Condenser high temperature protection (only for heat pump)



9.7 Dehumidifying mode

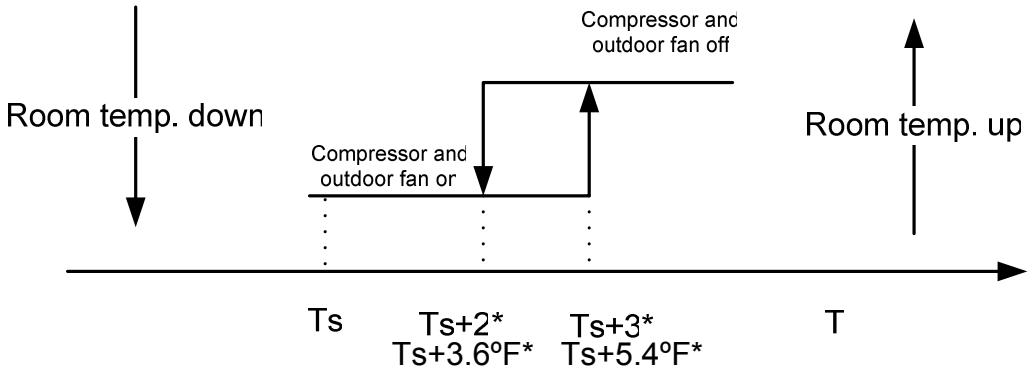
Indoor fan speed at low speed.
Protection is same as cooling mode.

9.8 Heating mode

9.8.1 Generally, the 4-way valve is open in heating mode, but it is closed in defrosting mode. 4-way valve must delay 2 minutes compared with compressor if the compressor changed into non-heating mode or turned off. 4-way valve doesn't delay in dehumidifying mode.

9.8.2 Generally, the outdoor fan is turned off with the on-off action of compressor in heating mode, except for the defrosting mode or the end of defrost.

9.8.3 Action of compressor and outdoor fan motor at heating mode: compressor must run for 7 minutes after starting and then judge temperature. Meanwhile other protections are still valid.

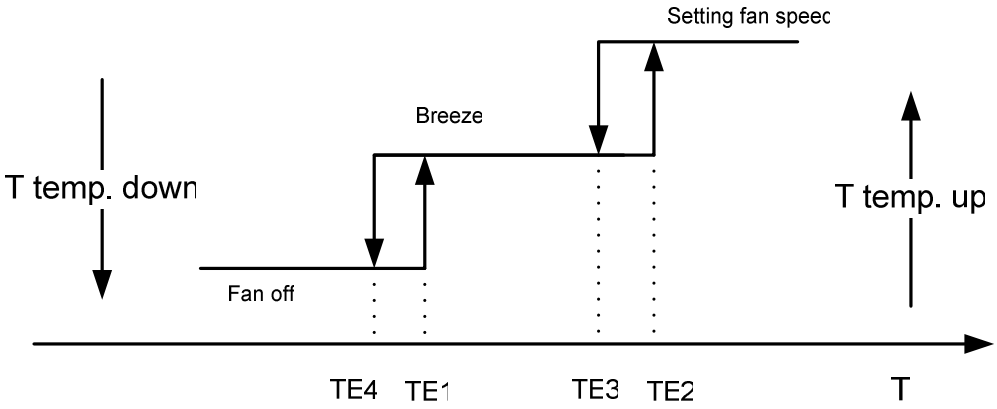


*** This parameter can be changed from 0 to 3ºC** (0 to 5.4ºF).

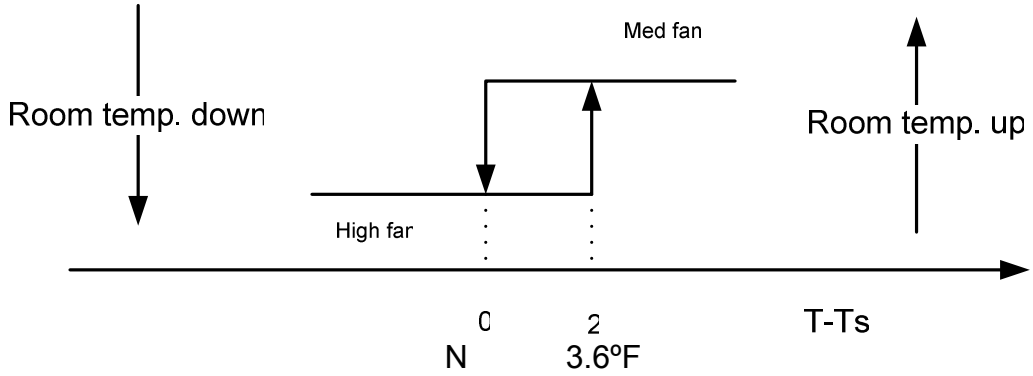
9.8.4 Indoor Fan actions at heating mode

Indoor Fan can be set at HIGH/MID/LOW/AUTO by using a remote controller, but Anti-cold wind function prevails.

9.8.5 Anti-cold wind control function at heating mode (T=indoor exchanger temp.)

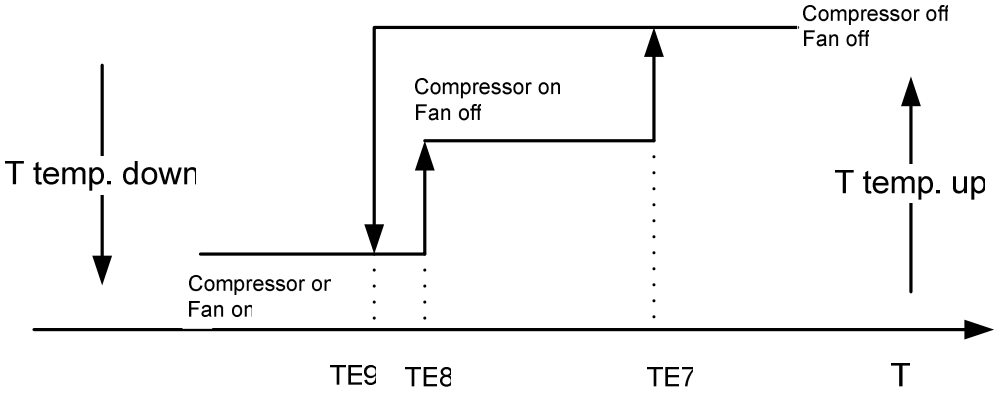


9.8.6 Auto wind at heating mode (T=indoor temp.)



9.8.7 Indoor evaporator high-temperature protection at heating mode

(T=indoor exchanger temp.)



The louver opens to Standard Angle ANGLHEAT when power is on for the first time

9.9 Defrosting mode(available for heating mode)

9.9.1 Defrosting condition:

Defrost starts when either of the following 1&2:

1. T3 lower than 32ºF for more than 40 minutes, and during this period T3 is lower than 27ºF for 3 minutes.

2. Time from the end of last defrost where the compressor was running add up to 90 minutes.

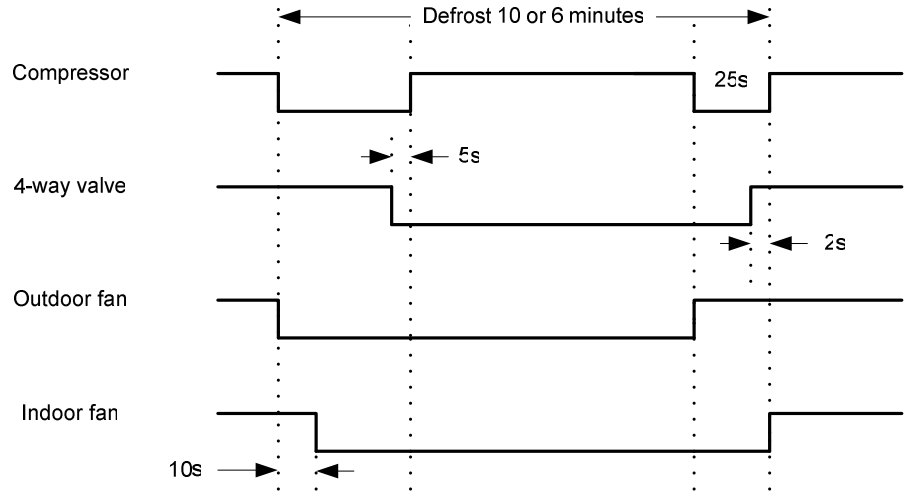
9.9.2 Conditions of defrost ending:

Defrosting ends when either of the following:

The defrost cycle reaches 10 minutes.

T3 is greater than 68º F.

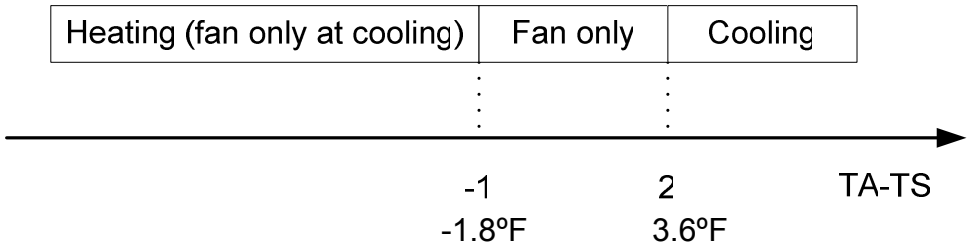
9.9.3 Defrosting Actions



Remark: when the evaporator pipe temperature sensor more than TE16, the indoor fan start to run.

9.10 Auto mode

9.10.1 The air conditioner automatically selects one of the following operation modes: cooling, heating or fan only according to the temperature difference between room temperature (TA) and set temperature (TS).



9.10.2 The indoor fan blows automatically in corresponding selected mode;

9.10.3 The rpm of indoor fan should be per the selected operation mode;

9.10.4 One mode should be carried out for at least 15 minutes once selected. If the compressor cannot start for 15 minutes, reselect the operation mode according to the room temp. and set temp., or reselect when the set temp. varies

9.11 Forced cooling function

9.11.1 Select forced cooling function with the forced cooling button or the switch

9.11.2 The compressor is unconditionally turned on. After 30 minutes cooling operation the fan

mode is set to low and the A/C operates at the DRY mode with a set temp. of 75ºF (24℃).

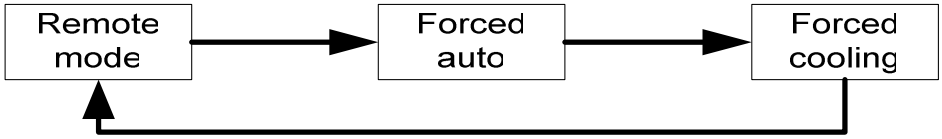
9.11.3 All protections of remote control cooling are available at forced cooling operation

9.11.4 Forced Auto function

Select forced auto function with the forced auto button or the switch.

In forced auto status the A/C operates at remote control mode with a set temp. of 75ºF (24℃).

Manual operation is controlled by touching buttons and divided into force cooling and forced auto mode. It transfer between these two modes by pressing the buttons, the cycling order of the button press is as below:

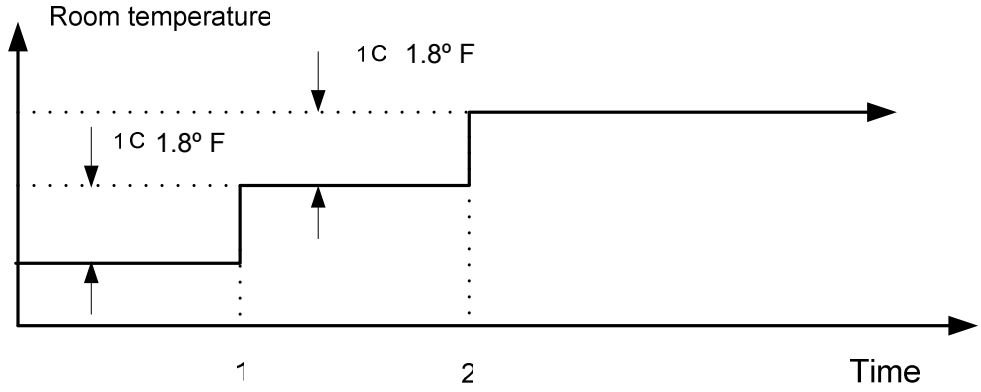


9.12 Sleep mode(Economic mode)

9.12.1 The sleep function is available at cooling, heating or auto mode

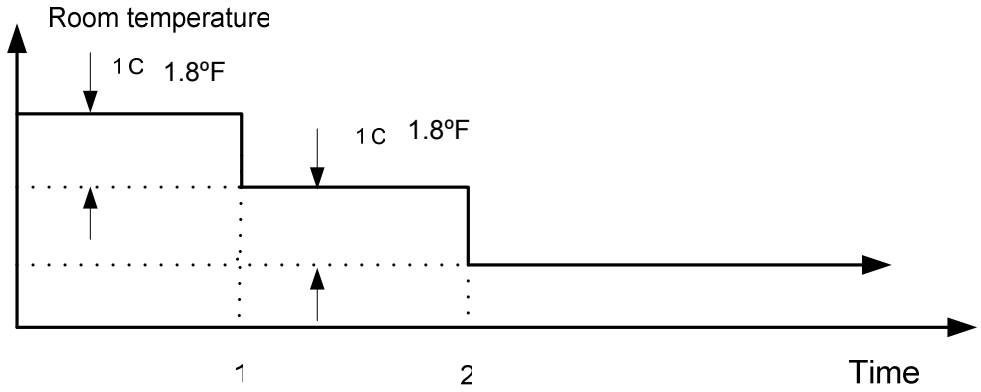
9.12.2 Cooling:

The set temperature rise 1.8ºF (1℃)per hour. Two hours later, the set temperature will maintain as a constant and the fan speed is kept at low speed.



9.12.3 Heating:

The set temperature decreases 1.8ºF (1 ℃)per hour. Two hours later, th e set temperature will maintain as a constant and the air circulation is kept at low speed (Anti-cold function takes precedence.)



9.12.4 Auto:

After an hour running under economic mode, the set temp will rise 1.8ºF (1℃,), if it is under cooling mode; the set temp will decrease 1.8ºF. If it is in the heating mode, the set temp will increase a similar amount.

9.13 Auto restart function

In case of a sudden power failure, this function automatically sets the unit to previous settings before the power failure when power returns

9.14 Turbo mode

9.14.1 For 9K and 12K type only

9.14.2 Under cooling mode (except Force Cooling mode), the indoor fan motor will run in High speed when it receives the signal from remoter controller.

9.14.3 The turbo mode will cancel and indoor fan motor will get back to the preset speed when one of following conditions occur:

a. mode changed

b. changed to Force Cooling mode;

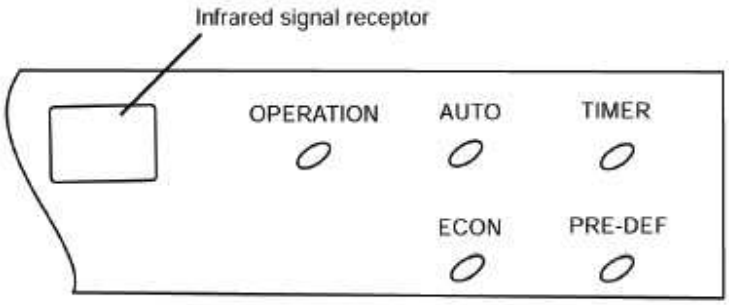
c. unit is turned off

9.14.4 Sleep mode is not available in this mode.

10 Troubleshooting

10.1 Display board

For 9K model



Operation

The indicator flashes once every second after power is on and illuminates when the air conditioner is in operation.

Timer indicator:

The indicator illuminates then TIMER is set ON.

PRE-DEF. indicator (For cooling & heating mode only)

The air conditioner starts defrosting automatically if outdoor unit frosts in heating operating.

At this time, PRE-DEF. indicator illuminates.

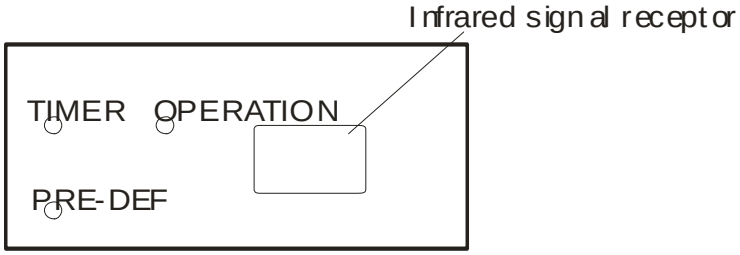
Auto indicator:

This indicator flashes when the air conditioner is in AUTO operation.

ECON indicator

This indicator illuminates while the air conditioner is in economic operation.

For 12K model



Operation

The indicator flashes once every second after power is on and illuminates when the air conditioner is in operation.

Timer indicator:

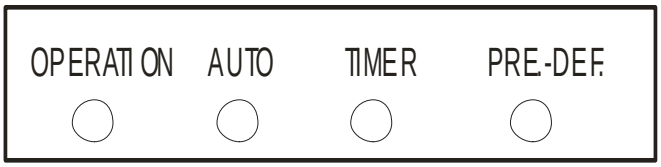
The indicator illuminates then TIMER is set ON.

PRE-DEF. indicator (For cooling & heating mode only)

The air conditioner starts defrosting automatically if outdoor unit frosts in heating operating.

At this time, PRE-DEF. indicator illuminates.

For 18 K and 24K model:



Operation

The indicator flashes once every second after power is on and illuminates when the air conditioner is in operation.

Timer indicator:

The indicator illuminates then TIMER is set ON.

PRE-DEF. indicator (Just for cooling & heating mode and for cooling only type it's FAN ONLY)

The air conditioner starts defrosting automatically if outdoor unit frosts in heating operating.

At this time, PRE-DEF. indicator illuminates.

For cooling only type, when the unit works in fan only mode, the FAN ONLY indicator illuminates.

Auto indicator:

This indicator flashes when the air conditioner is in AUTO operation.

10.2 Troubleshooting

For 9K and 12K :

Failure phenomenon	Operation lamp	Timer lamp	
Indoor fan speed has been out of control for over 1 minute	☆	X	
Indoor room temp. or evaporator sensor is open circuit or short circuit	☆	On	
Over current protection of the compressor occurs 4 times	X	☆	
EEROM error	On	☆	
Indoor unit communication error	☆	☆	illuminate simultaneously
Outdoor condenser temperature sensor is open circuit or short circuit	☆	☆	illuminate alternately

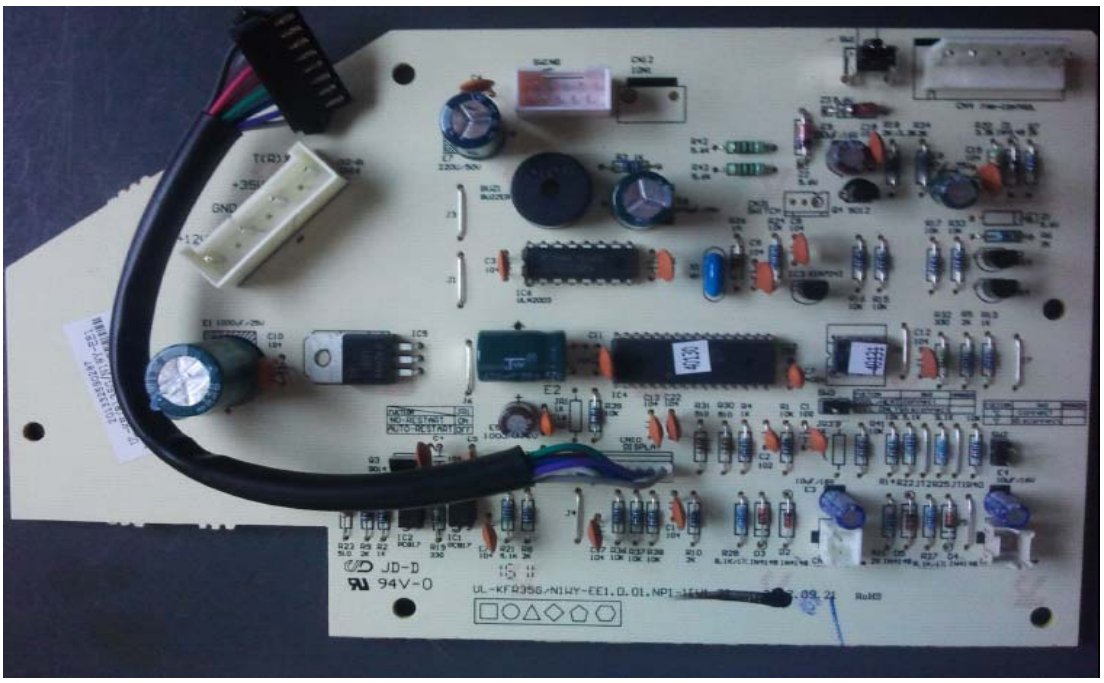
✕ OFF

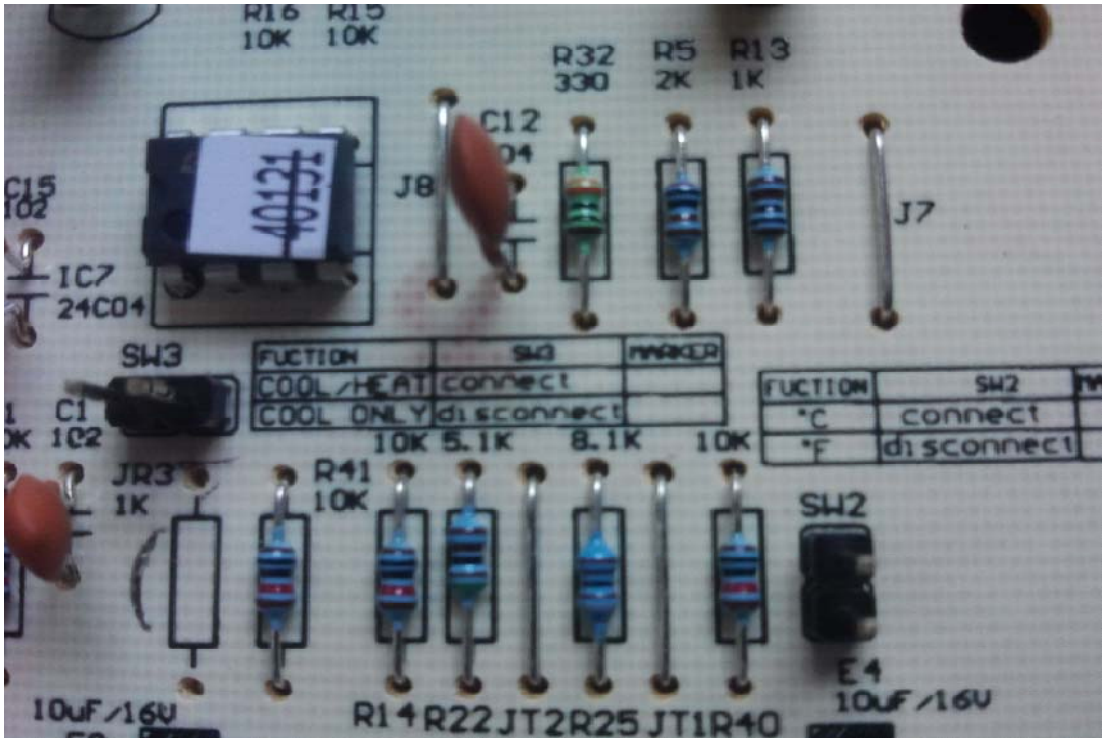
☆ Flash at 5Hz

For 18K and 24K:

Failure phenomenon	Operation lamp	Timer lamp	Defrosting lamp	Auto lamp
Over current protection of the compressor occurs 4 times	☆	☆	☆	☆
Indoor room temp. sensor is open circuit or short circuit	X	☆	X	X
Temp. sensor on indoor evaporator is open circuit or short circuit	☆	X	X	X
Temp. sensor on outdoor condenser is open circuit or short circuit (without for cooling only models)	X	X	☆	X
Outdoor unit protects(outdoor temp sensor, phase order etc)	X	X	☆	☆
EEROM error	X	☆	X	☆
Indoor unit communication error	X	X	X	☆

SMH12SB /SMH12SC INDOOR PCB





SW3 JUMPER MUST BE INSTALLED FOR HEATING OPERATION

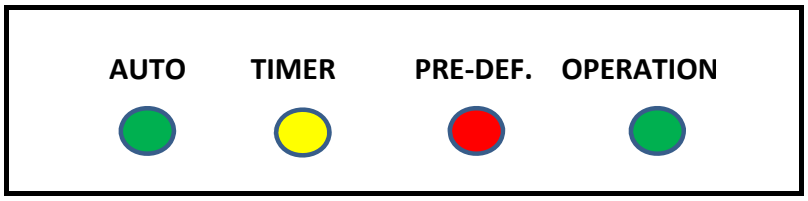
SMA /SMH 18 -24 DIAGNOSTICS

	Operation LED	Timer LED	Defrost LED	auto LED	Outdoor LED (RED)
over current protection of the compressor occurs 4 times	☆	☆	☆	☆	☆
Indoor room thermister is open or shorted	X	☆	X	X	☆
Indoor evaporator thermister is open or shorted	☆	X	X	X	☆
Outdoor condenser temperature thermister is open or shorted	X	X	☆	X	☆
(without for cooling only models)					
outdoor unit protects (outdoor temp thermister,phase order ect.)	X	X	☆	☆	☆
EEROM error	X	☆	X	☆	☆
Indoor unit communication error	X	X	X	☆	☆
no voltage outdoor transformer	X	X	X	☆	OFF
UNPLUGGED (S) WIRE **(LOCK OUT 3-5 MINUTES)**	X	X	X	☆	☆

Outdoor led should be solid RED for normal operation

☆ **Flash at 5Hz** **X OFF**

SMA-SMH-18-24 SA



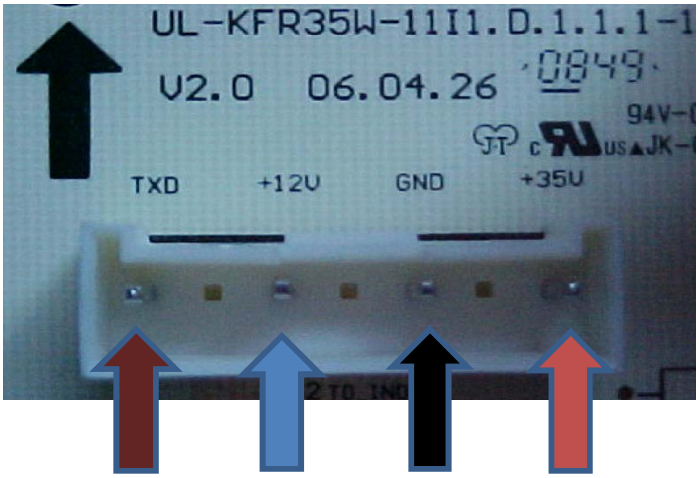
SMA-SMH 18-24 SB

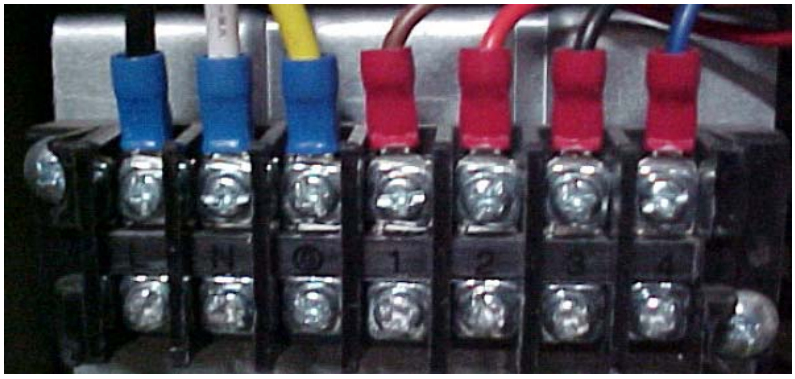
Outdoor Unit Diagnostic

Flashes	Failure Mode
5	Communication Failure
2	Condensor Temperature Sensor
1	Other Indoor Failure

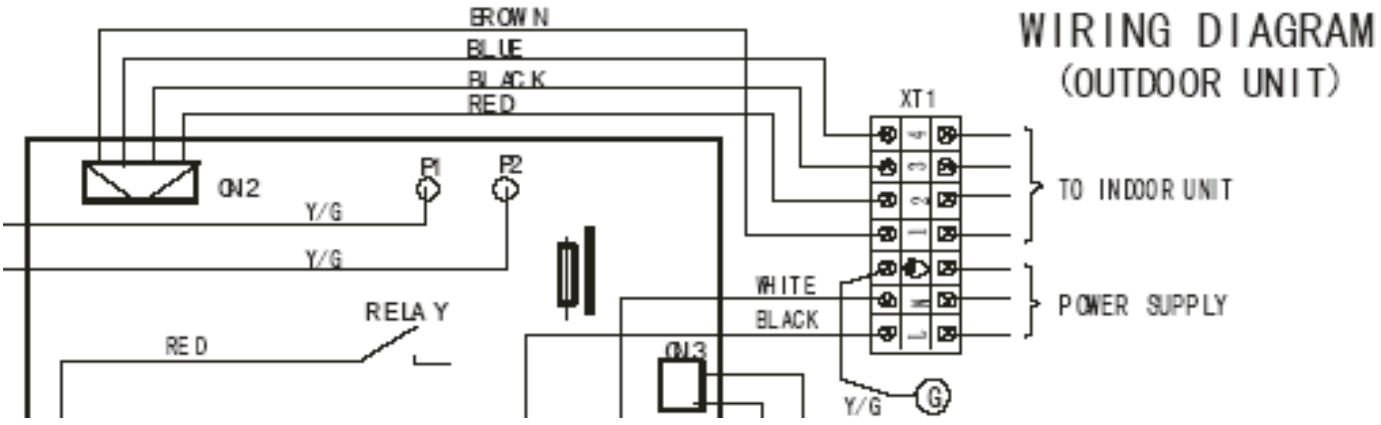
OVER CURRENT - CHECK VOLTAGE - LOW VOLTAGE - HIGH AMPS
VOLTAGE SHOULD BE BETWEEN 175 - 253 V OLTS
OUTDOOR UNIT PROTECTS - CHECK POWER SUPPLY
COULD BE THE OUTDOOR PCB OR THE COMPRESSOR ON LOCKED ROTOR
COMMUNICATION ERROR - **L1 & 2N REVERSED** from the indoor to the outdoor
AUTO (GREEN LED) FLASHES AT THE EVAP. & (RED LED) FLASHES FIVE
TIMES IN THE OUTDOOR UNIT. IT TAKES 2-3 MINUTES FOR THE
UNIT TO REACT AND START FLASHING
WHEN THE POWER IS APPLIED TO THE OUTDOOR UNIT THE RED LED
TURNS SOLID RED IF THE (S) WIRE IS DISCONECTED OR ANY FAULTS WITH THE
EVAPORATOR THE RED LED FROM THE OUTDOOR UNIT FLASHES FIVE TIMES
OUTDOOR UNIT TRANSFORMER VOLTAGE 230 TO 12 V AC
VOLTAGE FROM 2(N) TO (S) TO THE EVAPORATOR 12 VOLT DC
NO 12 VOLTAGE FROM THE TRANSFORMER 2(N) TO (S) YOU GET 32 V DC
FROM 2(N) TO (S) AND THE AUTO GREEN LED FLASHES AFTER 2-3 MINITES
THE OUTPUT VOLTAGE WILL VARY DEPENDING ON THE INCOMING VOLTAGE

SMA/SMH09/12SC

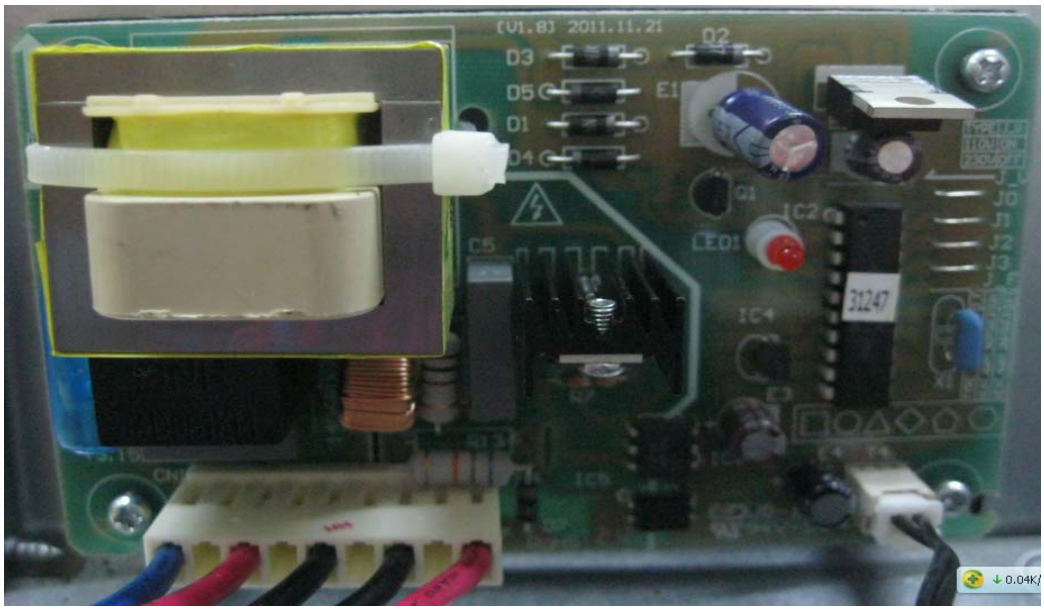




Check Voltage black to red -35 volts - motor voltage / black to blue -12 volts -control voltage
Low Voltage Disconect the plug on the pcb recheck the voltage if the volts are within specs and when you plug it back in it's low then it is an evaporator problem
If nothing comes on disconect the red wire if it's the motor the condensor will come on
Always check that the numbers and the wire colours are correct on field and factory wiring



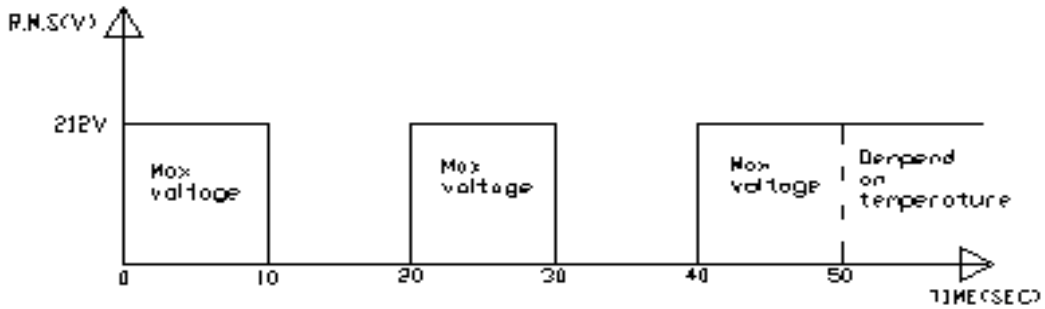
LOW AMBIENT CONTROL



JUMPERS

1.NO.	connect＝0, disconnect＝1				Condenser temp.（℃）	Jumper number
	J3	J2	J1	J0		
1	0	0	0	0	10-30	0
2	0	0	0	1	11-31	1
3	0	0	1	0	12-32	2
4	0	0	1	1	13-33	3
5	0	1	0	0	14-34	4
6	0	1	0	1	15-35	5
7	0	1	1	0	16-36	6
8	0	1	1	1	17-37	7
9	1	0	0	0	18-38	8
10	1	0	0	1	19-39	9
11	1	0	1	0	20-40	10
12	1	0	1	1	21-41	11
13	1	1	0	0	22-42	12
14	1	1	0	1	23-43	13
15	1	1	1	0	24-44	14
16	1	1	1	1	25-45	15

For the unit with low ambient kit (solo PCB as above picture), in cooling mode, the outdoor fan will operation at max voltage 2 times, then operation depends on the condenser pipe temperature. The pipe temperature lower, the fan speed will be lower. For example, when the temperature is less than 10 ℃, the fan stop. When the temperature is more than 30 ℃, the fan will operating in full speed. The fan speed will be different depends on the JUMPERS selected.



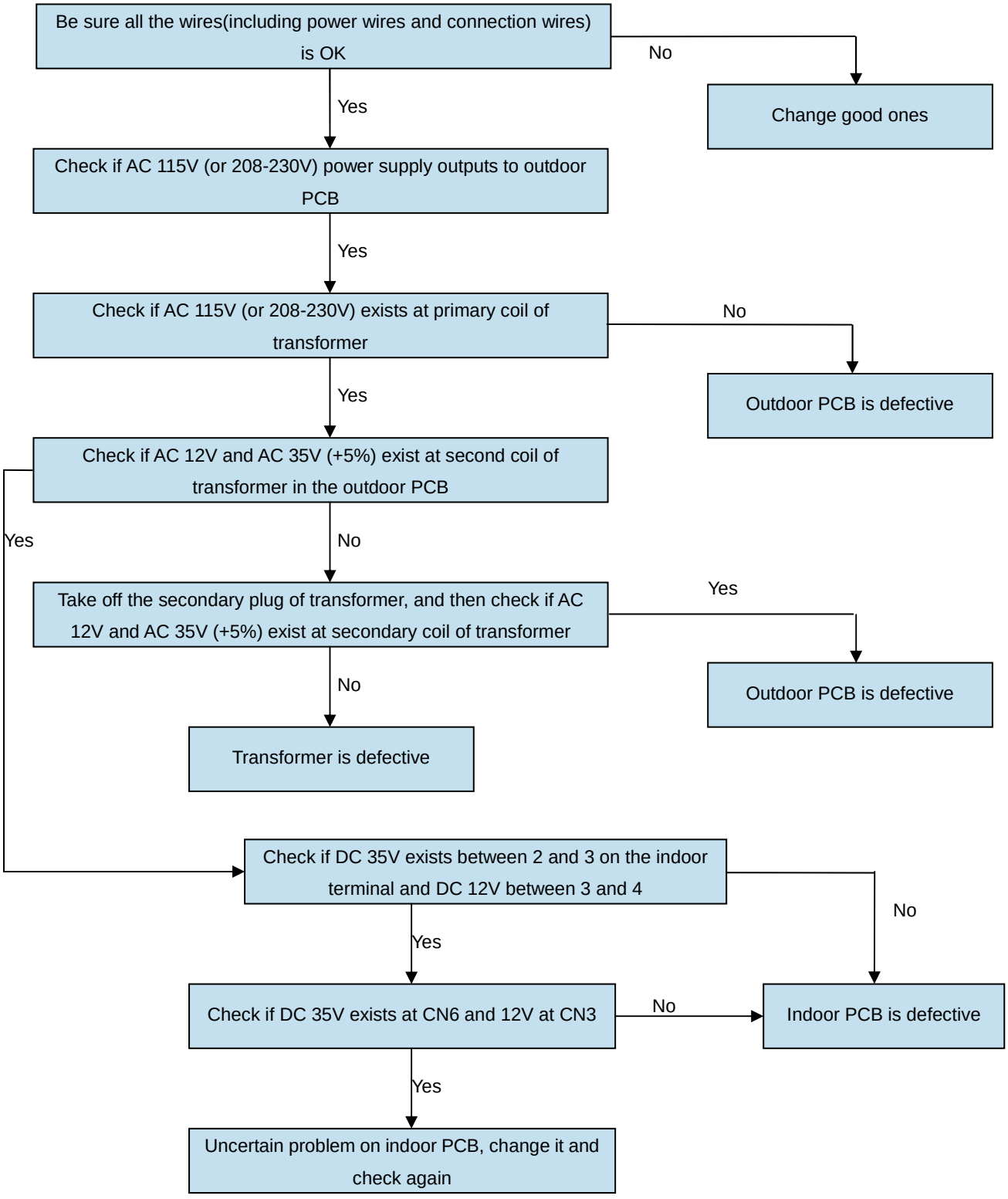
■1 First start operation

MODEL	VOLT	PART NUMBER
SMA / SMH 09-12	115	203319900481
SMA / SMH 18-24	240	203319900480

10.3 Diagnostic chart

After energizing, no indicator is lighted and the air conditioner can’t be operated.

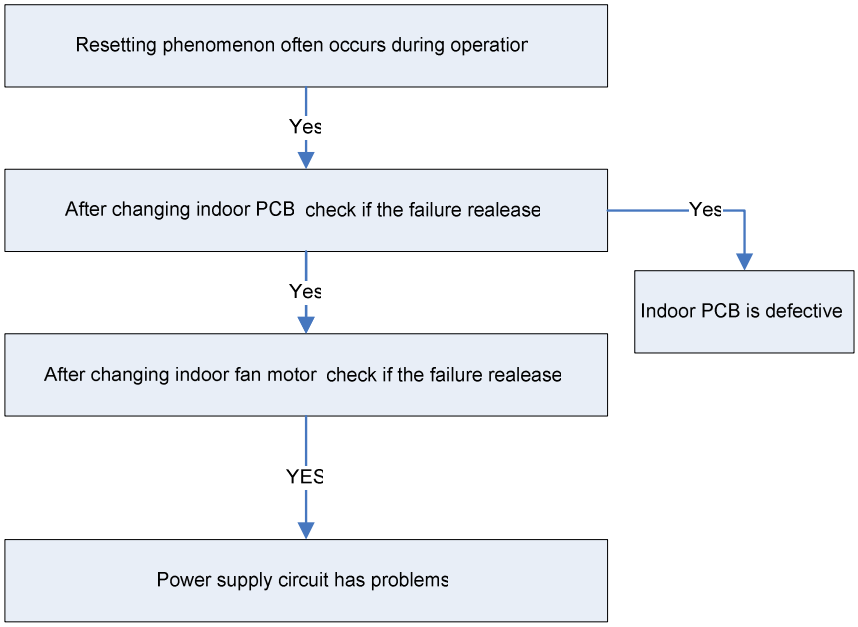
See chart on following page.


Be sure all the wires(including power wires and connection wires) is OK
No
Change good ones
Yes
Check if AC 115V (or 208-230V) power supply outputs to outdoor PCB
Yes
Check if AC 115V (or 208-230V) exists at primary coil of transformer
No
Outdoor PCB is defective
Yes
Check if AC 12V and AC 35V (+5%) exist at second coil of transformer in the outdoor PCB
Yes
No
Take off the secondary plug of transformer, and then check if AC 12V and AC 35V (+5%) exist at secondary coil of transformer
Yes
Outdoor PCB is defective
No
Transformer is defective
Check if DC 35V exists between 2 and 3 on the indoor terminal and DC 12V between 3 and 4
No
Yes
Check if DC 35V exists at CN6 and 12V at CN3
No
Indoor PCB is defective
Yes
Uncertain problem on indoor PCB, change it and check again

10.4 Resetting phenomenon often occurs during operation.

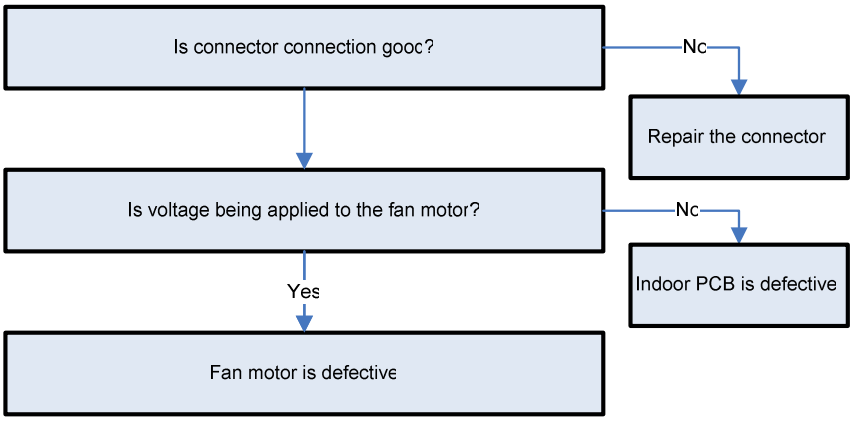
(That is automatically entering to the status when power is on.)

The reason is that the instantaneous voltage of main chip is less than 4.5V. Check according to the following procedure:



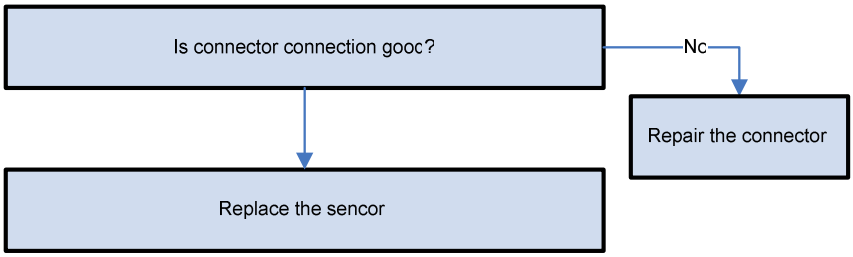
10.5 Indoor fan speed out of control .

Just for 9K and 12K type when indoor fan speed has been out of control for over 1 minute

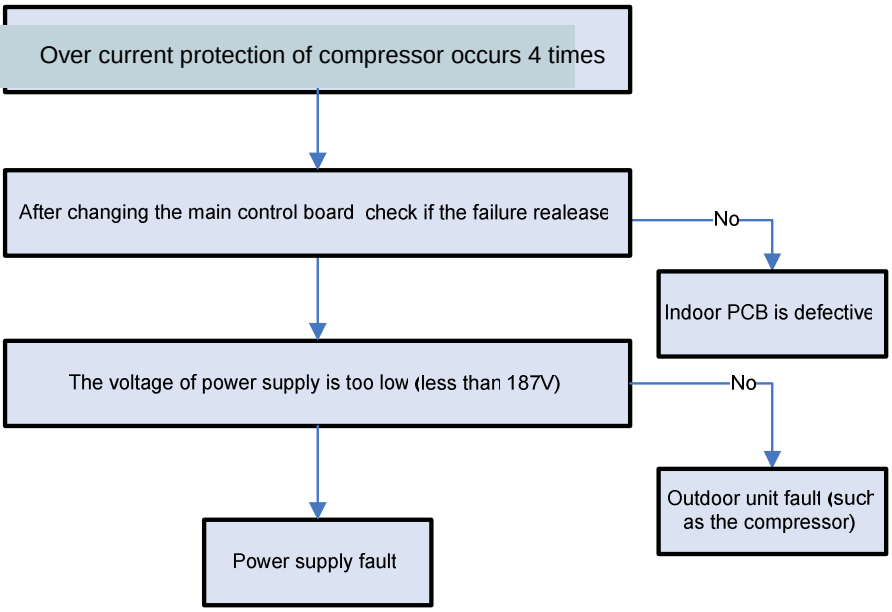


10.6 Temperature sensor error.

Including the indoor room, indoor evaporator and outdoor condenser temperature sensor.



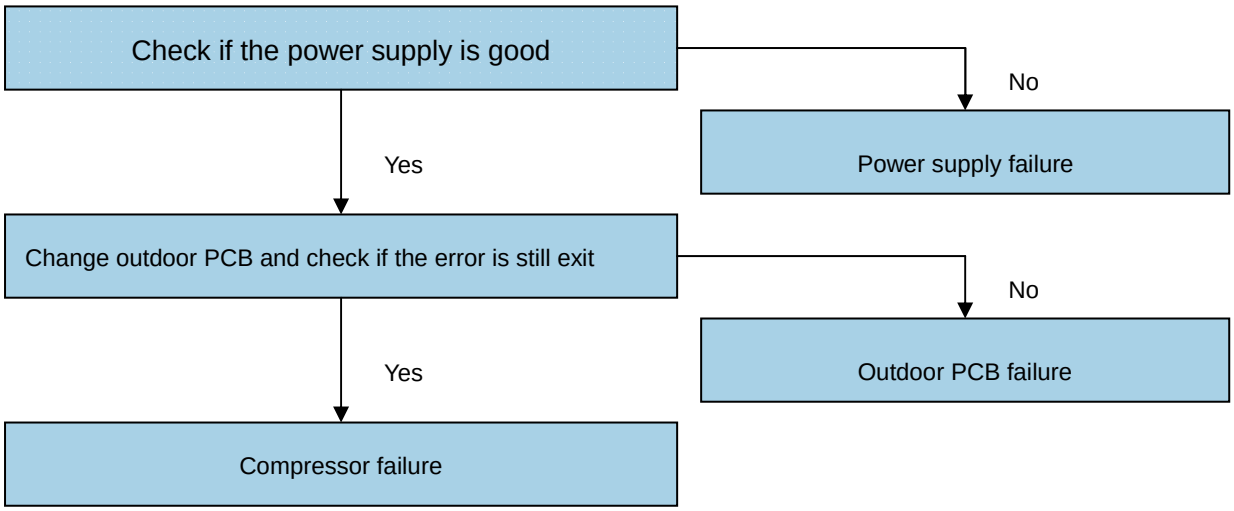
10.7 Over current protection of the compressor occurs 4 times



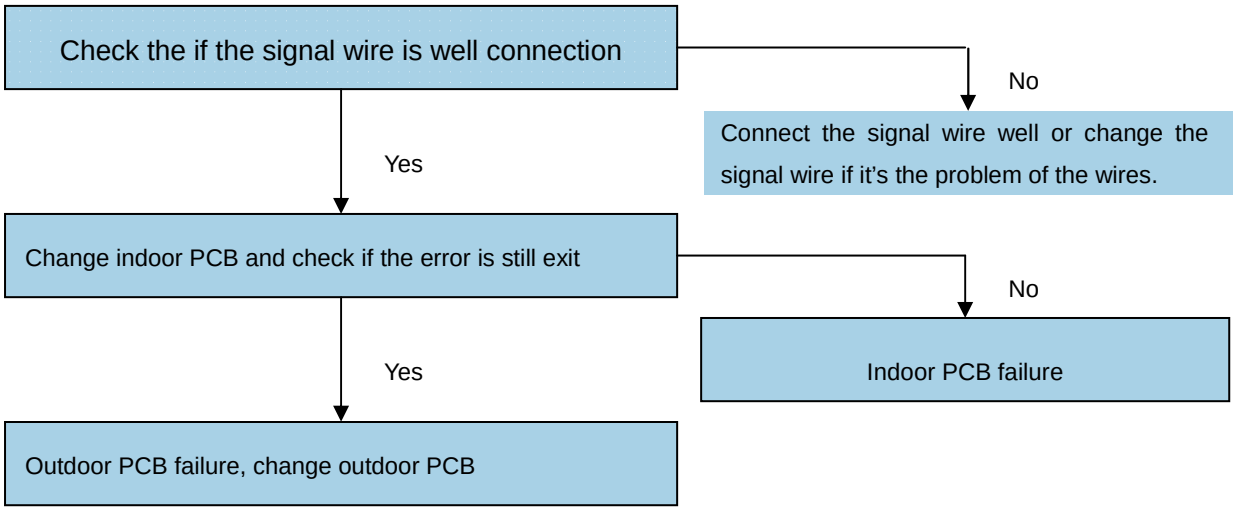
10.8 EEROM error

EEROM error, indoor PCB is defective.

10.9 Outdoor unit protects



10.10 Indoor unit communication error.



11 Temperature Sensor

Temp. °F	Temp. °C	Resistance KΩ	Temp. °F	Temp. °C	Resistance KΩ	Temp. °F	Temp. °C	Resistance KΩ
14	-10	62.3	63	17	14.6	111	44	4.4
16	-9	58.7	64	18	13.9	113	45	4.2
18	8	56.1	66	19	13.3	115	46	4.0
19	-7	52.2	68	20	12.6	117	47	3.9
21	-6	49.3	70	21	12.1	118	48	3.8
23	-5	46.6	72	22	11.5	120	49	3.6
25	-4	44.0	73	23	11.0	122	50	3.5
27	-3	41.6	75	24	10.5	124	51	3.3
28	-2	39.8	77	25	10.0	126	52	3.2
30	-1	37.2	79	26	9.6	127	53	3.1
32	0	35.2	81	27	9.1	129	54	3.0
34	1	33.3	82	28	8.7	131	55	2.8
36	2	31.6	84	29	8.3	133	56	2.7
37	3	30.0	86	30	8.0	135	57	2.6
39	4	28.3	88	31	7.6	136	58	2.5
41	5	26.9	90	32	7.3	138	59	2.4
43	6	25.5	91	33	7.0	140	60	2.4
45	7	24.2	93	34	6.7	142	61	2.3
46	8	22.6	95	35	6.4	144	62	2.2
48	9	21.8	97	36	6.1	145	63	2.1
50	10	20.7	99	37	5.9	147	64	2.0
52	11	19.7	100	38	5.6	149	65	2.0
54	12	18.7	102	39	5.4	151	66	1.9
55	13	17.8	104	40	5.2	153	67	1.8
57	14	16.9	106	41	5.0	154	68	1.8
59	15	16.1	108	42	4.8	156	69	1.7
61	16	15.3	109	43	4.6	158	70	1.6

Design, material, performance data and components subject to change without notice.

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