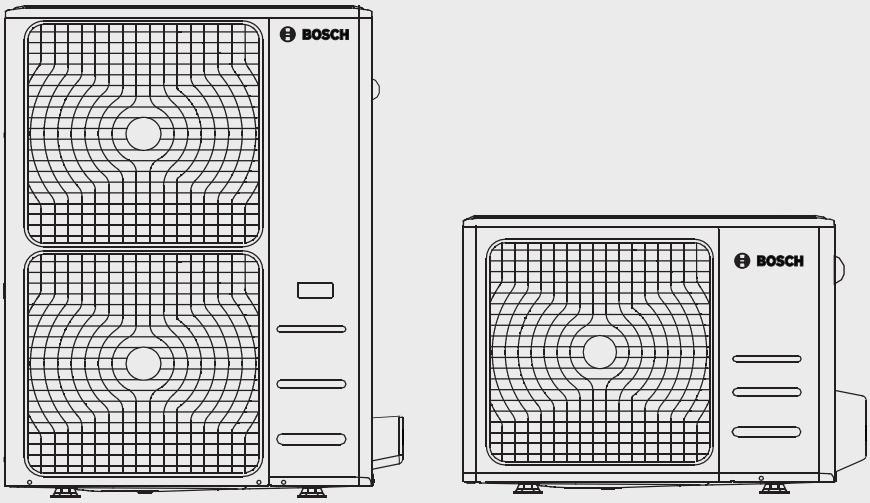
BOSCH

Service Manual

Ductless Air Conditioner / Heat Pump Multi Zone Outdoor Units

Climate 5000 Series



⚠ WARNING:

- **Installation must be performed by a licensed contractor, and per the instructions in the installation manual. Improper installation can cause water leakage, electrical shock, or fire.**
- **In North America, installation must be performed in accordance with the requirement of NEC (National Electric Code) and CEC (Canadian Electric Code) by licensed and qualified personnel only.**
- **Only contact a licensed contractor for repair or maintenance of this unit.**

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Table of Contents

1 Key to Symbols and Safety Instructions

1.1 Key to Symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

The following keywords are defined and can be used in this document:

- **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.
- **NOTICE** is used to address practices not related to personal injury.

Important information

This symbol indicates important information where there is no risk to people or property.

1.2 Safety

Please read safety precautions before installation

Incorrect installation due to ignoring instructions can cause serious damage or injury.

WARNING: ELECTRICAL HAZARD

- Do not modify the length of the power supply cord or use an extension cord to power the unit.
- Do not share the electrical outlet with other appliances. Improper or insufficient power supply can cause fire or electrical shock.

WARNING: INSTALLATION REQUIREMENTS

- Installation must be performed by a licensed contractor, and per the instructions in the installation manual. Improper installation can cause water leakage, electrical shock, or fire.
- In North America, installation must be performed in accordance with the requirement of NEC (National Electric Code) and CEC (Canadian Electric Code) by licensed and qualified personnel only.
- Only contact a licensed contractor for repair or maintenance of this unit.
- Only use the included accessories, parts, and specified parts for installation. Using non-standard parts can cause water leakage, electrical shock, fire, and can cause the unit to fail.
- Install the unit in a solid location that can support the unit's weight. If the chosen location cannot support the unit's weight, or the installation is not done properly, the unit may drop and cause serious injury and/or damage.

WARNING:

- This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

WARNING: ELECTRICAL HAZARD

- For all electrical work, follow all local and national wiring standards, regulations, and the Installation Manual. The power supply to the outdoor unit requires a service disconnect at the unit. Only use a dedicated circuit. Never share a power source connected to this system. Insufficient electrical capacity or defects in electrical work can cause electrical shock or fire.
- For all electrical work, use the specified cables. Connect cables tightly, and clamp them securely to prevent external forces from damaging the terminal. Improper electrical connections can overheat and cause fire, and may also cause shock.
- All wiring must be properly arranged to ensure that the control board cover can close properly. If the control board cover is not closed properly, it can lead to corrosion and cause the connection points on the terminal to heat up, catch fire, or cause electrical shock.
- In certain functional environments, such as kitchens, server rooms, etc., the use of specially designed air-conditioning units are highly recommended.
- If the power supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons such as a licensed electrician in order to avoid a hazard.
- The product must be properly grounded at the time of installation, or electrical shock may occur.

WARNING: FIRE HAZARD

- For units that have an auxiliary electric heater, do not install the unit within 1 meter (3 feet) of any combustible materials.
- Do not install the unit in a location that may be exposed to combustible gas leaks. If combustible gas accumulates around the unit, it may cause fire.
- Do not operate your air conditioner in a wet room such as a bathroom or laundry room. Too much exposure to water can cause electrical components to short circuit.

NOTICE: PROPERTY DAMAGE

- Install condensate drainage piping according to the instructions in this manual. Improper condensate drainage may cause water damage to your home and property.

CAUTION: CONTAINS REFRIGERANT

- This air-conditioning unit contains fluorinated gases. For specific information on the type of gas and the amount, please refer to the relevant label on the outdoor unit itself.
- Installation, service, maintenance and repair of this unit must be performed by a certified technician.
- Product removal and recycling must be performed by a certified technician.
- If the system has a leak-detection system installed, it must be checked for leaks at least every 12 months.
- When the unit is checked for leaks, proper record-keeping of all checks is required.

2 Part Names and Model Numbers

2.1 Outdoor Models

Voltage	Capacity	Max Zone	Regular Outdoor Units	Max Performance Outdoor Units
208-230V	18K	2	BMS500-AAM018-1CSXRC	BMS500-AAM018-1CSXHC
	27K	3	BMS500-AAM027-1CSXRC	BMS500-AAM027-1CSXHC
	36K	4	BMS500-AAM036-1CSXRC	BMS500-AAM036-1CSXHC
	48K	5	BMS500-AAM048-1CSXRC	BMS500-AAM048-1CSXHC

Table 1

2.2 Indoor Models

Voltage	Capacity	Wall Mounted Indoor Units	4-Way Cassette Indoor Units	Ducted Indoor Units
115V	12K	BMS500-AAS012-0AHWXC	–	–
208-230V	6K	BMS500-AAU006-1AHWXC	–	–
	9K	BMS500-AAU009-1AHWXC	BMS500-AAU009-1AHCXB	BMS500-AAU009-1AHDXB
	12K	BMS500-AAU012-1AHWXC	BMS500-AAU012-1AHCXB	BMS500-AAU012-1AHDXB
	18K	BMS500-AAU018-1AHWXC	BMS500-AAU018-1AHCXB	BMS500-AAU018-1AHDXB
	24K	BMS500-AAU024-1AHWXC	BMS500-AAU024-1AHCXC	BMS500-AAU024-1AHDXB
	30K	BMS500-AAU030-1AHWXC	–	–
	36K	BMS500-AAU036-1AHWXC	BMS500-AAU036-1AHCXC	BMS500-AAU036-1AHDXB

Table 2

For Indoor Units, please refer to Indoor Unit Service Manual.

2.3 Multizone Configurations

Capacity	2 ZONE	3 ZONE	4 ZONE	5 ZONE
18K	6+6			
	6+9			
	6+12			
	9+9			
	9+12			
	12+12			
27K	6+12	6+6+6		
	6+18	6+6+9		
	9+9	6+6+12		
	9+12	6+6+18		
	9+18	6+9+9		
	12+12	6+9+12		
	12+18	6+9+18		
	18+18	6+12+12		
		6+12+18		
		9+9+9		
		9+9+12		
		9+9+18		
		9+12+12		
		12+12+12		

Table 3

Capacity	2 ZONE	3 ZONE	4 ZONE	5 ZONE
36K	6+18	6+6+12	6+6+6+6	
	6+24	6+6+18	6+6+6+9	
	9+18	6+6+24	6+6+6+12	
	9+24	6+9+12	6+6+6+18	
	12+12	6+9+18	6+6+6+24	
	12+18	6+9+24	6+6+9+9	
	12+24	6+12+12	6+6+9+12	
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	18+24	6+12+24	6+6+9+24	
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		9+18+18	6+12+12+12	
		12+12+12	6+12+12+18	
		12+12+18	9+9+9+9	
		12+12+24	9+9+9+12	
		12+18+18	9+9+9+18	
			9+9+12+12	
			9+9+12+18	
			9+12+12+12	
			12+12+12+12	

Table 4

Capacity	2 ZONE	3 ZONE	4 ZONE	5 ZONE
48K	9+24	6+6+24	6+6+6+18	6+6+6+6+9
	9+30	6+6+30	6+6+6+24	6+6+6+6+12
	9+36	6+6+36	6+6+6+30	6+6+6+6+18
	12+24	6+9+24	6+6+6+36	6+6+6+6+24
	12+30	6+9+30	6+6+9+18	6+6+6+6+30
	12+36	6+9+36	6+6+9+24	6+6+6+6+36
	18+18	6+12+18	6+6+9+30	6+6+6+9+9
	18+24	6+12+24	6+6+9+36	6+6+6+9+12
	18+30	6+12+30	6+6+12+12	6+6+6+9+18
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		18+18+18	9+9+9+30	6+9+9+12+24
		18+18+24	9+9+9+36	6+9+9+18+18
			9+9+12+12	6+9+12+12+12
			9+9+12+18	6+9+12+12+18
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			9+12+18+18	9+9+9+12+18
			9+12+18+24	9+9+9+12+24
			12+12+12+12	9+9+12+12+12
			12+12+12+18	9+9+12+12+18
			12+12+12+24	9+12+12+12+12
			12+12+18+18	12+12+12+12+12

Table 5

3 Dimensions

3.1 Outdoor Unit

Split type outdoor unit mounting dimensions

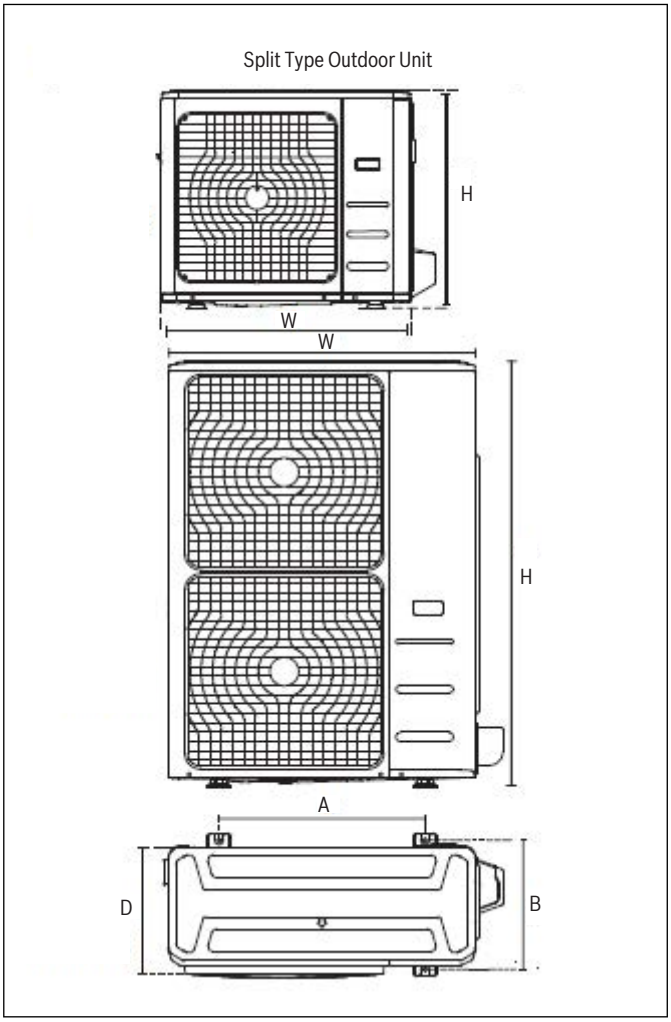


Figure 1

Outdoor Model	Outdoor Unit Dimensions mm (in.) W x H x D	Mounting Dimensions mm (in.)	
		Distance A	Distance B
BMS500-AAM018-1CSXRC	890x673x342 (35.04x26.5x13.46)	663 (26.1)	354 (13.94)
BMS500-AAM018-1CSXHC, BMS500-AAM027-1CSXRC, BMS500-AAM027-1CSXHC, BMS500-AAM036-1CSXRC	946x810x410 (37.24x31.89x16.14)	673 (26.5)	403 (15.87)
BMS500-AAM036-1CSXHC, BMS500-AAM048-1CSXRC, BMS500-AAM048-1CSXHC	952x1333x415 (37.48x52.48x16.34)	634 (24.96)	404 (15.9)

Table 6

4 Refrigerant Cycle Diagrams - Outdoor Models

4.1 For Model: 18K Multi Zone Regular System BMS500-AAM018-1CSXRC

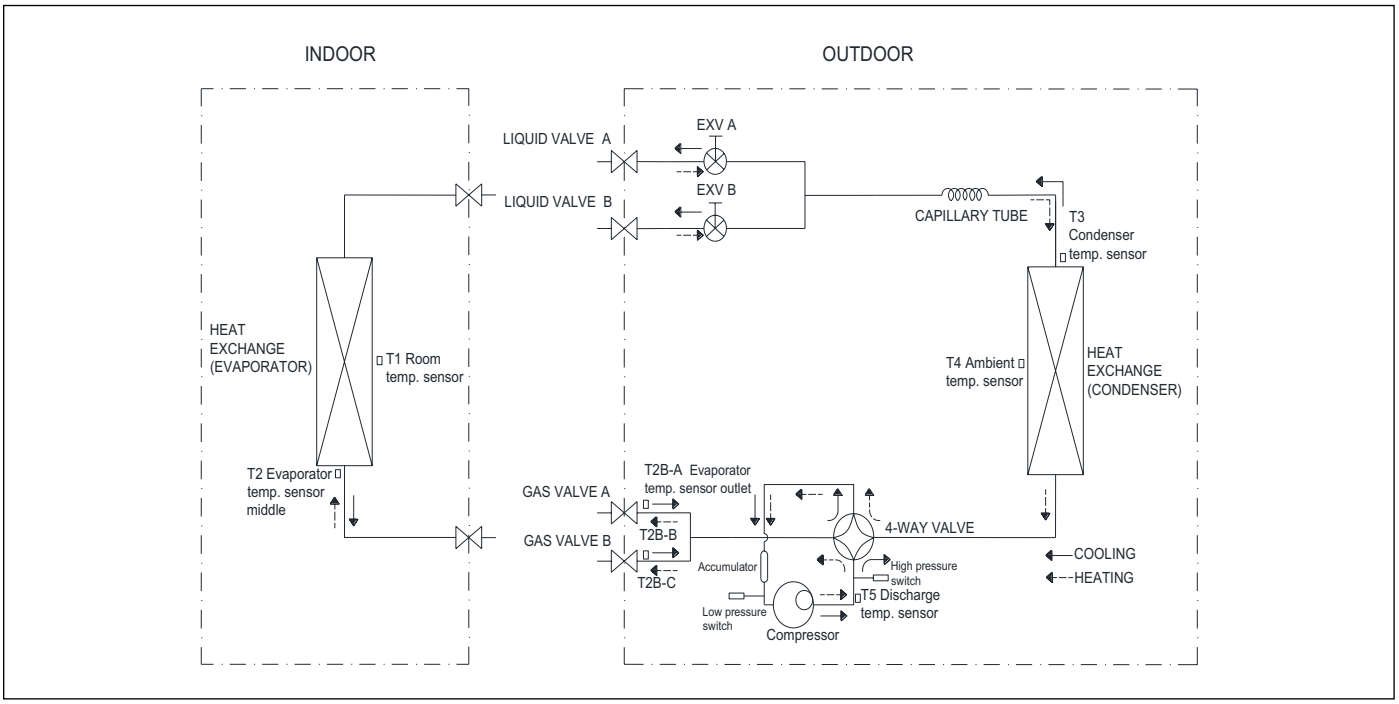


Figure 2

4.2 For Model: 18K Multi ZoneMax Performance System BMS500-AAM018-1CSXHC

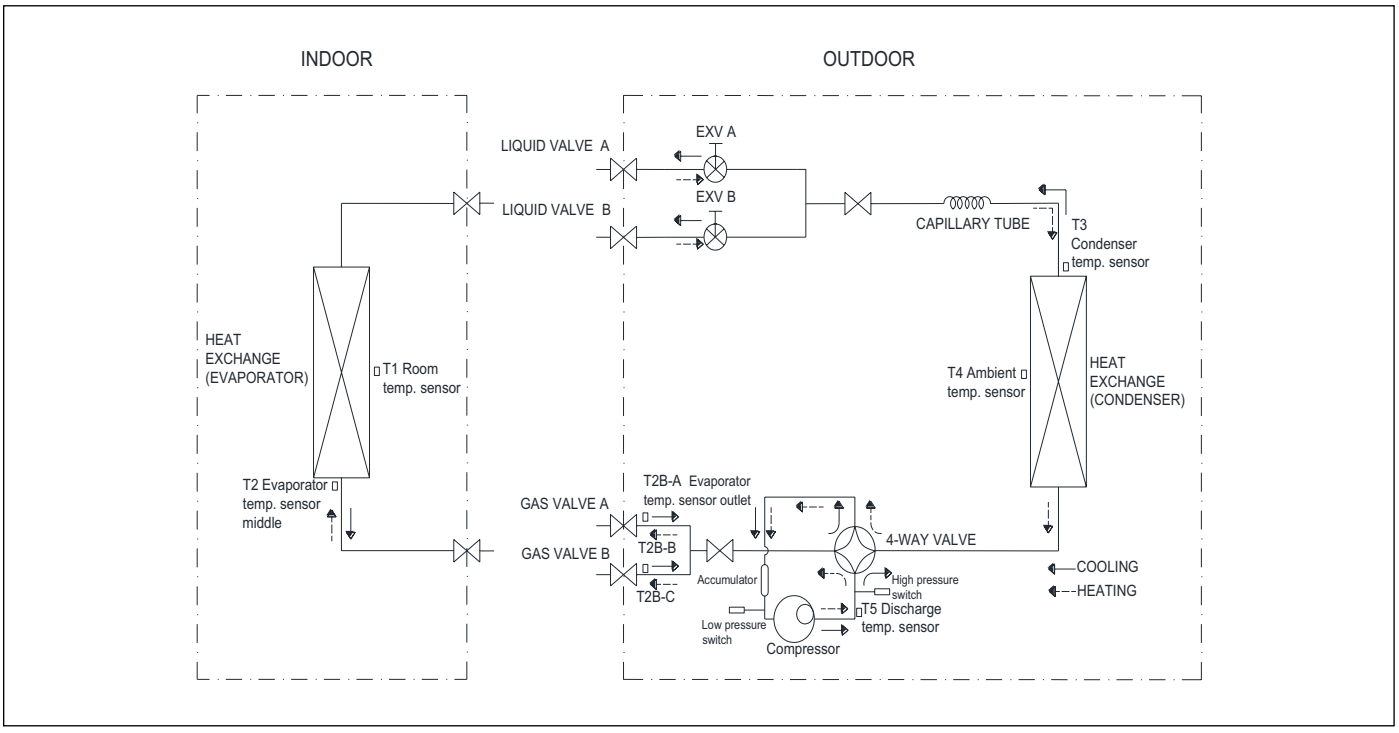


Figure 3

4.3 For Models: 27K Multi Zone Regular, 27K Multi Zone Max Performance System BMS500-AAM027-1CSXRC, BMS500-AAM027-1CSXHC

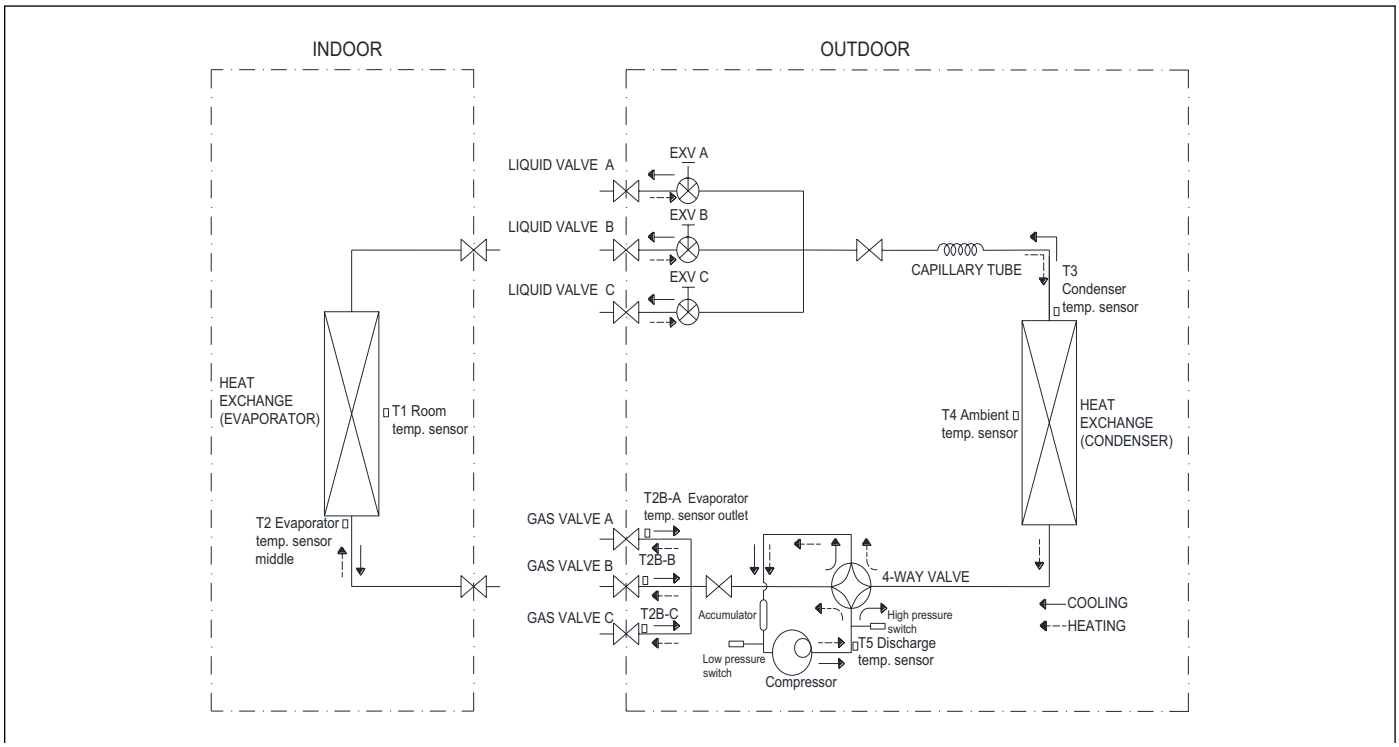


Figure 4

4.4 For Models: 36K Multi Zone Regular System BMS500-AAM036-1CSXRC

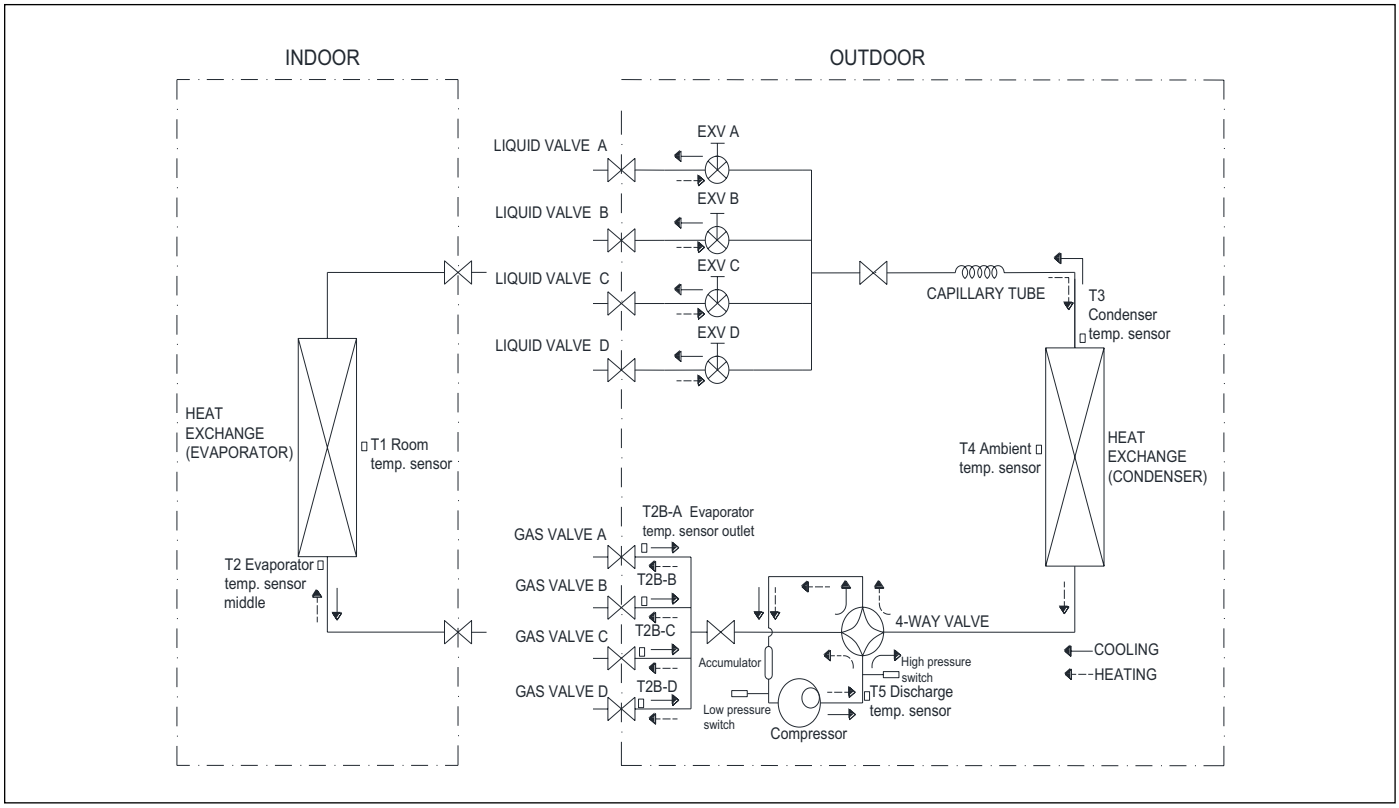


Figure 5

4.5 For Model: 36K Multi Zone Max Performance System BMS500-AAM036-1CSXHC

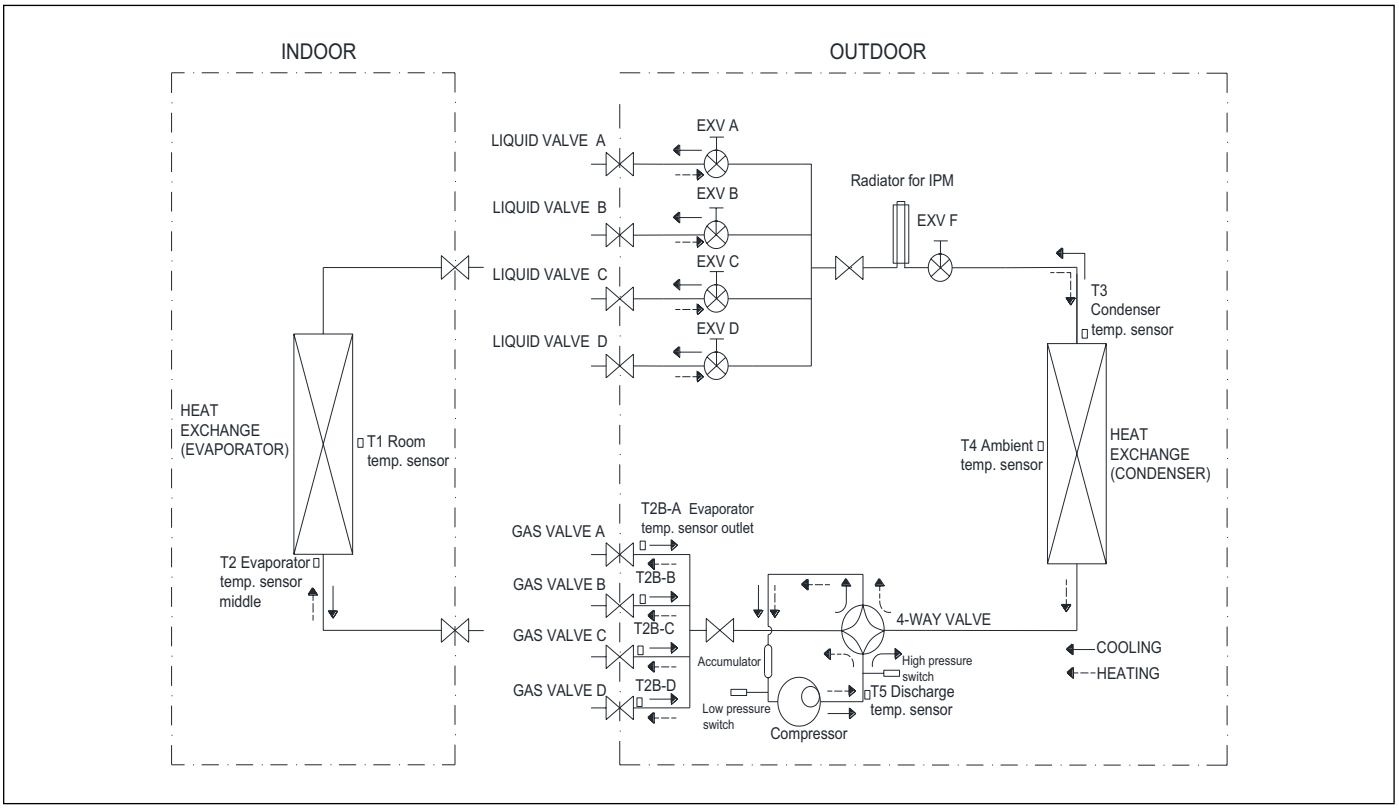


Figure 6

4.6 For Model: 48K Multi Zone Regular System BMS500-AAM048-1CSXRC

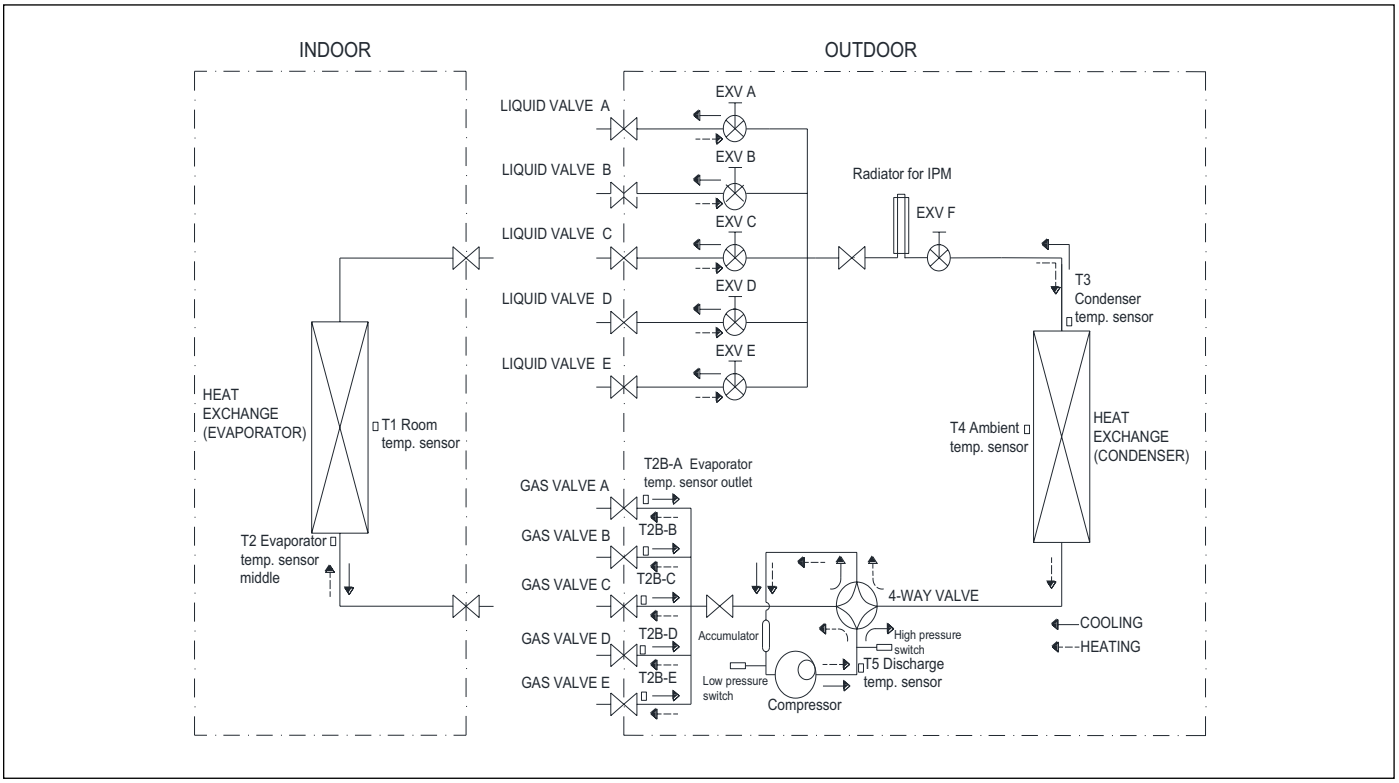


Figure 7

4.7 For Model: 48K Multi Zone Max Performance System BMS500-AAM048-1CSXHC

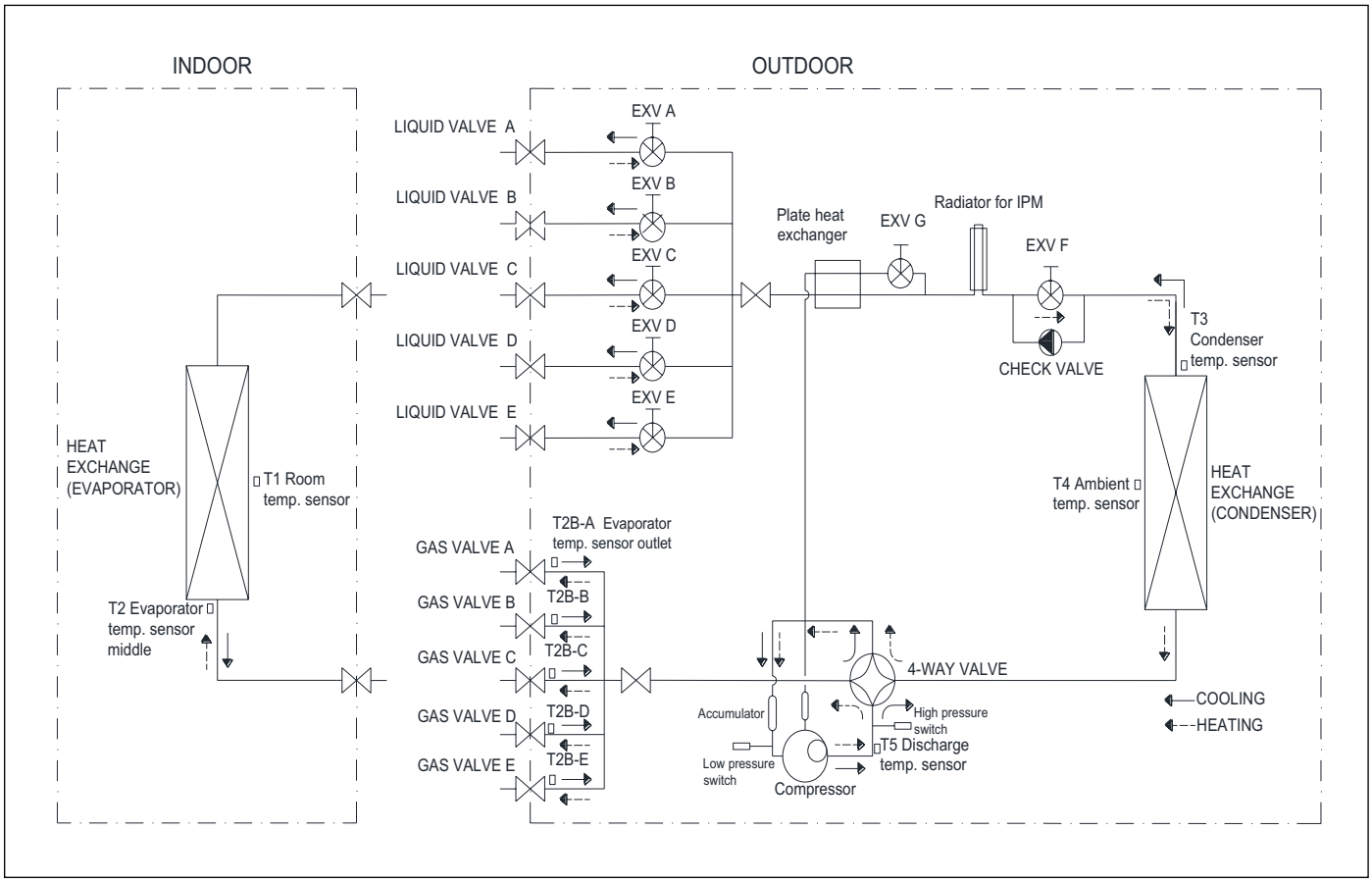
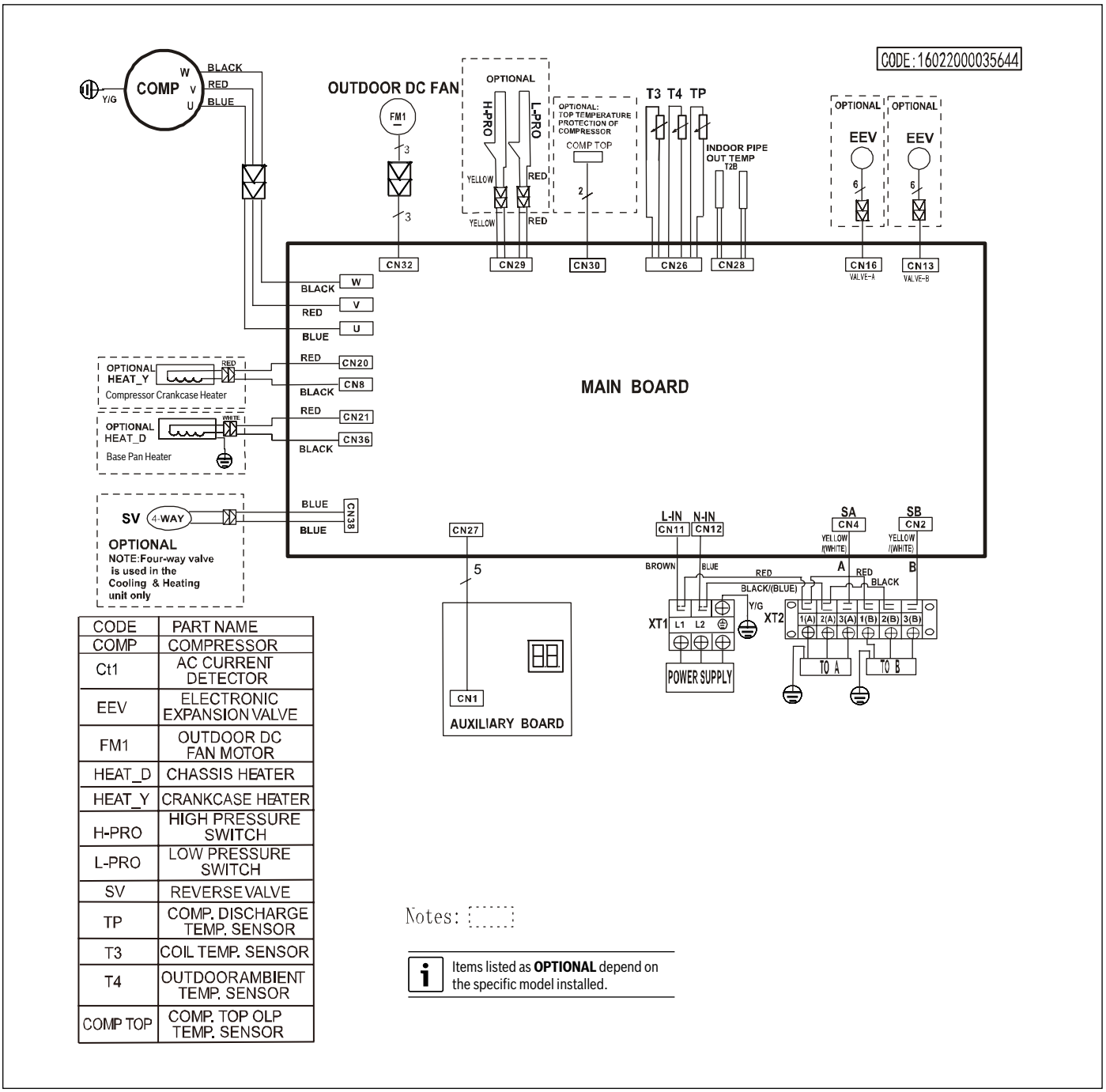


Figure 8

5 Wiring Diagrams

5.1 For Model: 18K Multi Zone Regular System BMS500-AAM018-1CSXRC



CODE	PART NAME
COMP	COMPRESSOR
Ct1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSION VALVE
FM1	OUTDOOR DC FAN MOTOR
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSE VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR

Figure 9

5.2 For Model: 18K Multi Zone Max Performance System BMS500-AAM018-1CSXHC

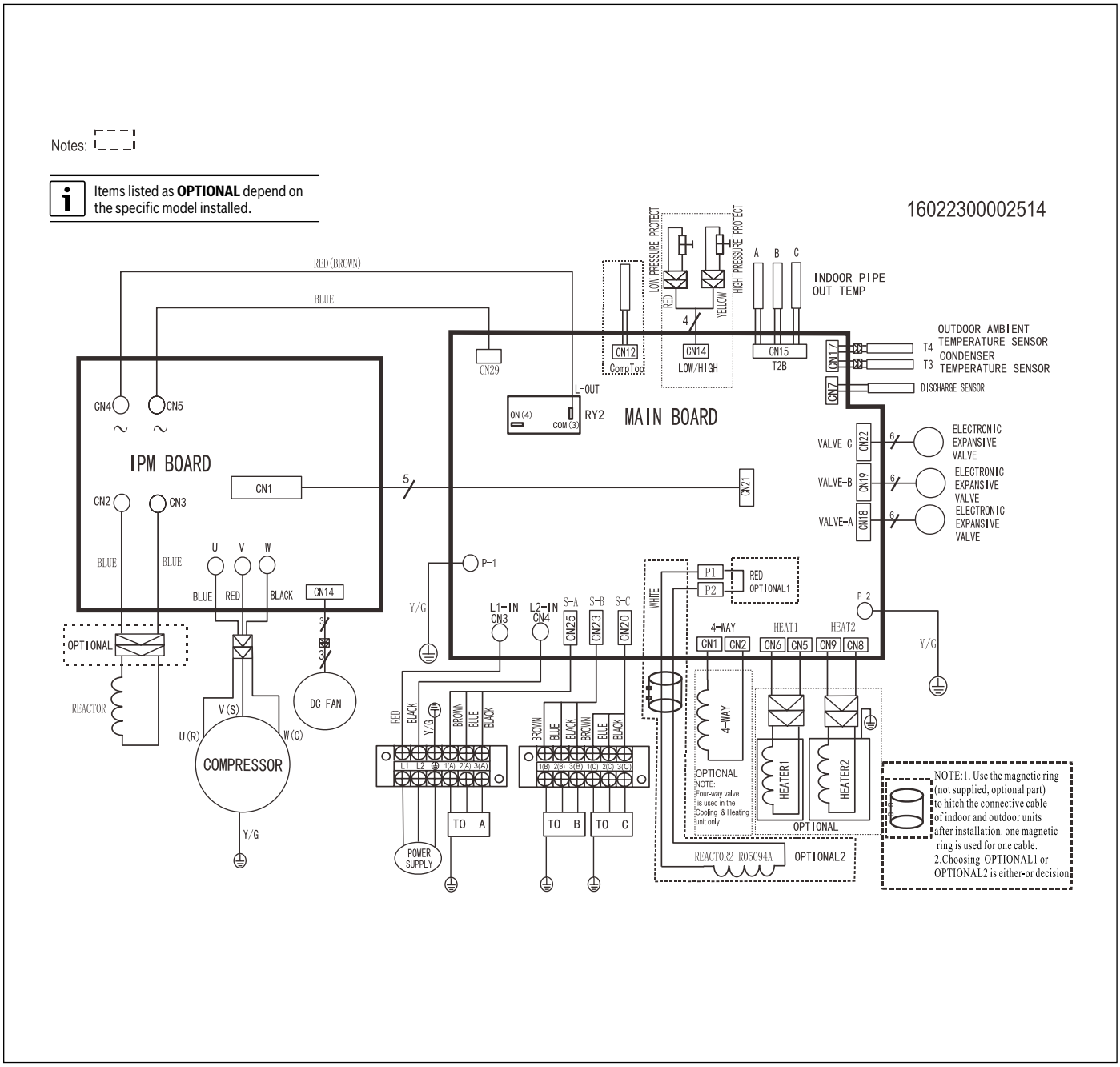


Figure 10

5.3 For Models: 27K Multi Zone Regular Heat & Max Performance System BMS500-AAM027-1CSXRC, BMS500-AAM027-1CSXHC

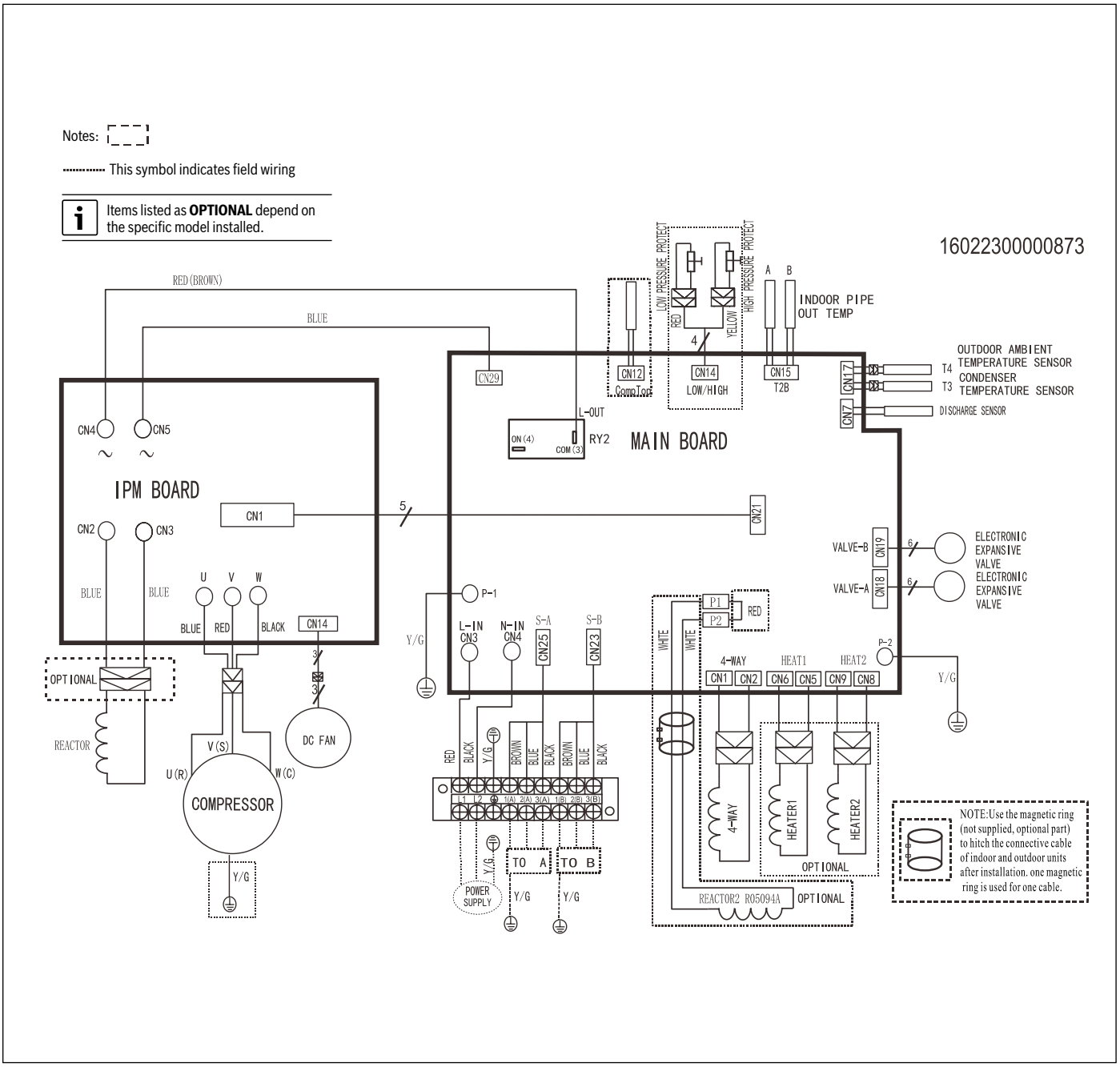


Figure 11

5.4 For Model: 36K Multi Zone Regular System BMS500-AAM036-1CSXRC

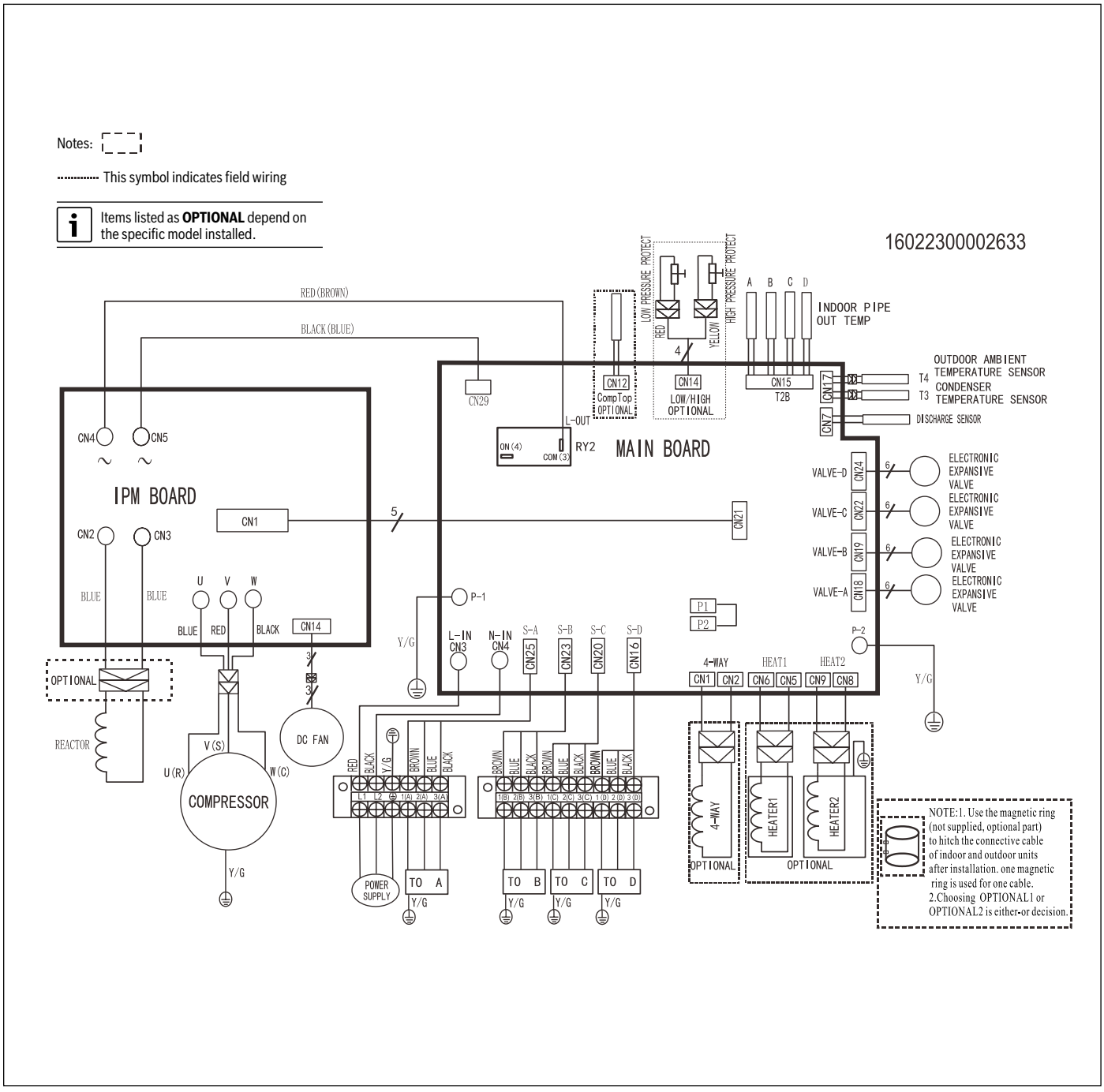
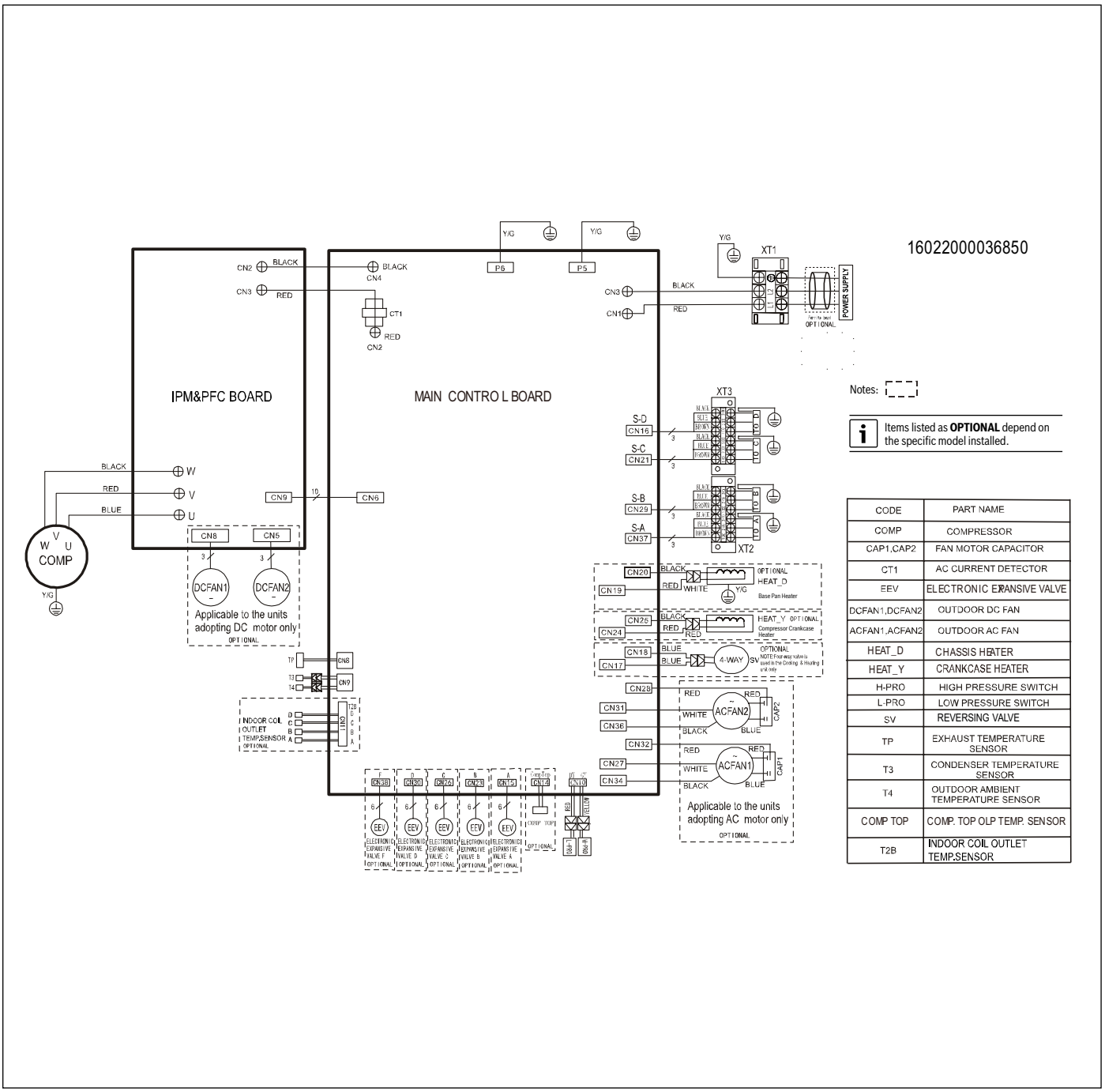


Figure 12

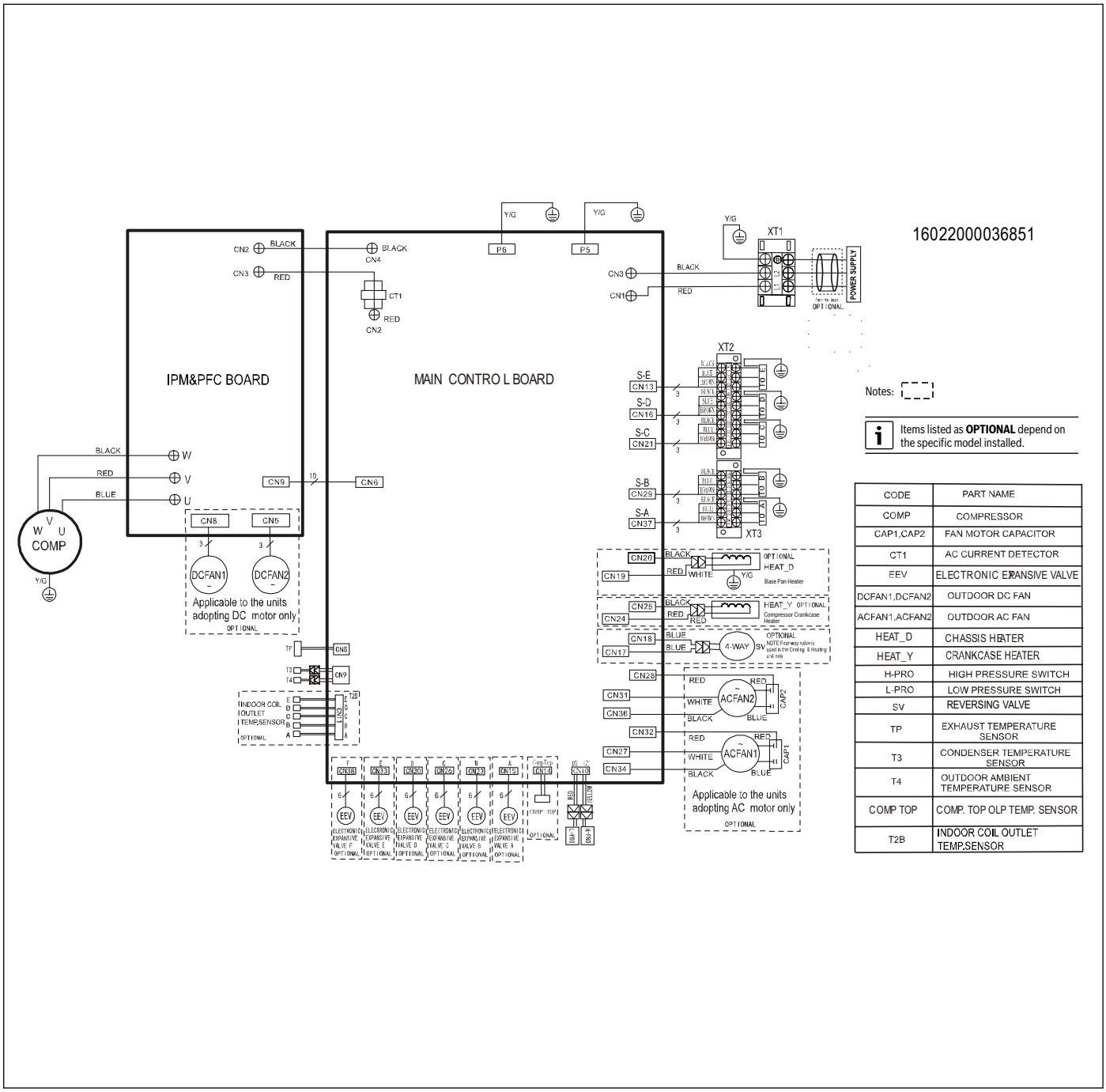
5.5 For Model: 36K Multi Zone Max Performance System BMS500-AAM036-1CSXHC



CODE	PART NAME
COMP	COMPRESSOR
CAP1,CAP2	FAN MOTOR CAPACITOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSIVE VALVE
DCFAN1,DCFAN2	OUTDOOR DC FAN
ACFAN1,ACFAN2	OUTDOOR AC FAN
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	EXHAUST TEMPERATURE SENSOR
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR
T2B	INDOOR COIL OUTLET TEMP.SENSOR

Figure 13

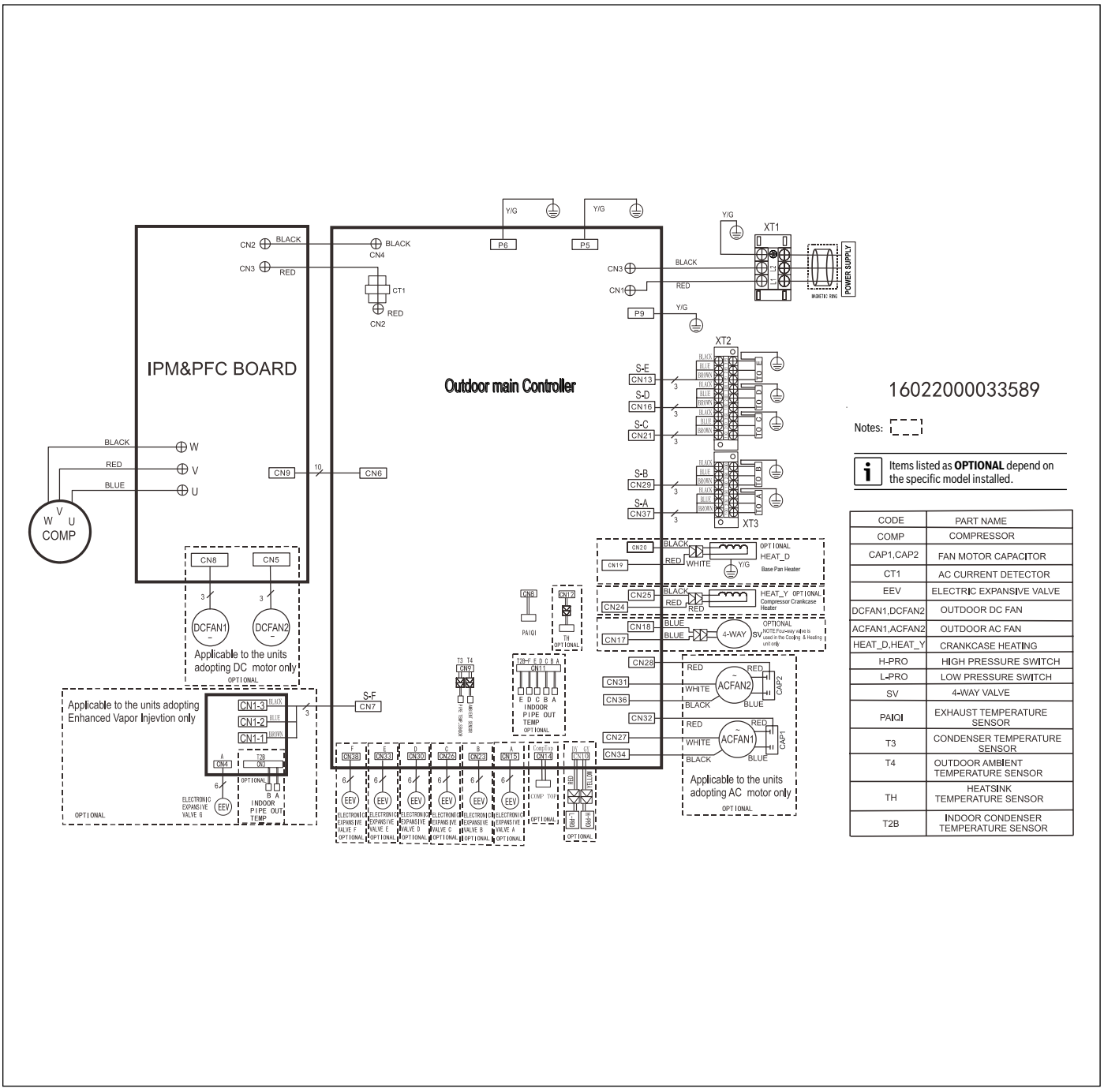
5.6 For Model: 48K Multi Zone Regular System BMS500-AAM048-1CSXRC



CODE	PART NAME
COMP	COMPRESSOR
CAP1,CAP2	FAN MOTOR CAPACITOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRONIC EXPANSIVE VALVE
DCFAN1,DCFAN2	OUTDOOR DC FAN
ACFAN1,ACFAN2	OUTDOOR AC FAN
HEAT_D	CHASSIS HEATER
HEAT_Y	CRANKCASE HEATER
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSING VALVE
TP	EXHAUST TEMPERATURE SENSOR
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
COMP TOP	COMP. TOP OLP TEMP. SENSOR
T2B	INDOOR COIL OUTLET TEMP.SENSOR

Figure 14

5.7 For Model: 48K Multi Zone Max Performance System BMS500-AAM048-1CSXHC



CODE	PART NAME
COMP	COMPRESSOR
CAP1,CAP2	FAN MOTOR CAPACITOR
CT1	AC CURRENT DETECTOR
EEV	ELECTRIC EXPANSIVE VALVE
DCFAN1,DCFAN2	OUTDOOR DC FAN
ACFAN1,ACFAN2	OUTDOOR AC FAN
HEAT_D,HEAT_Y	CRANKCASE HEATING
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	4-WAY VALVE
PAIQI	EXHAUST TEMPERATURE SENSOR
T3	CONDENSER TEMPERATURE SENSOR
T4	OUTDOOR AMBIENT TEMPERATURE SENSOR
TH	HEATSINK TEMPERATURE SENSOR
T2B	INDOOR CONDENSER TEMPERATURE SENSOR

Figure 15

6 Installation Details

6.1 Torque Requirements

Outer Diameter of Tube mm (in.)	Tightening Torque N•m (lb ft)	Max. Tightening Torque N•m (lb ft)
Ø 6.35 (Ø 0.25”)	1,500 (11lb • ft)	1,600 (11.8lb • ft)
Ø 9.52 (Ø 0.375”)	2,500 (18.4lb • ft)	2,600 (19.18lb • ft)
Ø 12.7 (Ø 0.5”)	3,500 (25.8lb • ft)	3,600 (26.55lb • ft)

Table 7

6.2 Connecting the Cables

The power cord should be selected according to the following specifications sheet.

- Cable type: SOOW type

Capacity	AWG Wire Size
18K ODU	14
27K ODU	14
36K ODU	12
48K ODU	10

Table 8

For IDU and ODU connection, use 16 AWG for all applications.

The cable sizes are determined by the maximum current indicated on the nameplate which is located on the side panel of the unit. Please refer to the nameplate before selecting the cable, fuse and switch. A means of disconnecting the power, should be within 10 feet of the outdoor unit.

6.3 Pipe Length and the Elevation

Maximum Piping Length and Height Difference

	1 drive 2	1 drive 3	1 drive 4	1 drive 5
Max. length for all rooms (m)	40 (131ft)	60 (197ft)	80 (262ft)	80 (262ft)
Max. length for one IU (m)	25 (82ft)	30 (98ft)	35 (115ft)	35 (115ft)
Max. height difference between IU and OU (m)	15 (49.2ft)	15 (49.2ft)	15 (49.2ft)	15 (49.2ft)
Max. height difference between IUs (m)	10 (33ft)	10 (33ft)	10 (33ft)	10 (33ft)

Table 9

Capacity	Pipe size	
	Liquid side (in / mm)	Gas side (in / mm)
18k	2 x 1/4" / 2 x Φ6.35	2 x 3/8" / 2 x Φ9.52
27k	3 x 1/4" / 3 x Φ6.35	3 x 3/8" / 3 x Φ9.52
36k	4 x 1/4" / 4 x Φ6.35	4 x 3/8" / 4 x Φ9.52
48k	5 x 1/4" / 5 x Φ6.35	3 x 3/8" + 2 x 1/2" 3 x Φ9.52 + 2 x Φ12.7

Table 10

Additional Refrigerant Charge

Piple Size	Additional charge for each unit length
Φ6.35 (1/4") liquid pipe	15g (0.161 oz)
Φ9.52 (3/8") liquid pipe	30g (0.322 oz)

Table 11

For indoor units piping information, check correspondence indoor unit manual.

6.4 First Time Installation

6.4.1 Air Purging with Vacuum Pump

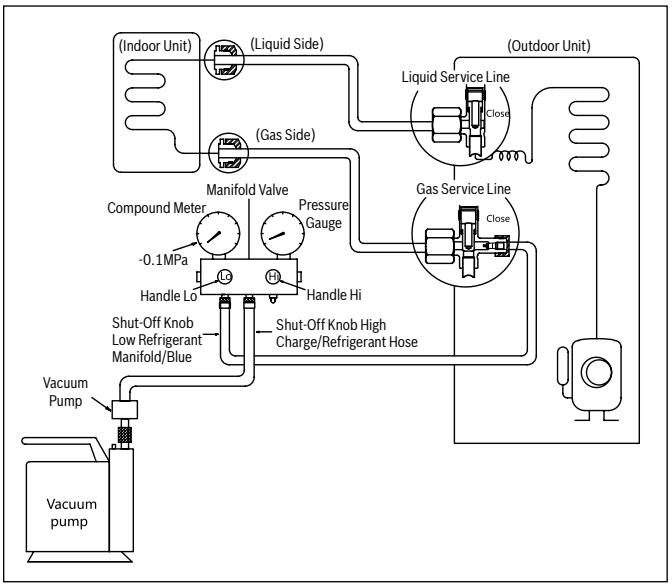


Figure 16

1. Completely tighten the flare nuts of the indoor and outdoor units, confirm that both the liquid service and gas service valves are set to the closed position.
2. Connect the refrigerant manifold; blue hose with the shut-off knob of the low side to the gas service valve port.
3. Connect the refrigerant manifold; yellow hose to the shut-off high side connection to the vacuum pump.
4. Fully open the shut-off knob low side of the manifold valve.
5. Operate the vacuum pump to evacuate.
6. Perform evacuation for 30 minutes and check whether the refrigeration low side pressure gauge indicates 350 ~500 microns. If the meter does not indicate 350 ~ 500 microns after evacuating for 30 minutes, it should be evacuated 20 minutes more. If the pressure can't hold 350 ~ 500 microns after evacuating 50 minutes, please check if there are any leakage points. Fully close the shut-off knob low side of the manifold and stop the operation of the vacuum pump. Confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).
7. Make sure the pressure display in the pressure indicator is a little higher than the atmospheric pressure. Then remove the charge hose from the gas service valve.
8. Fully open the liquid service valve and gas service valve and securely tighten the cap of the gas service valve. System is now evacuated and charged. (Ensure that the unit is charged per the defined specifications).

Gas leak check:

- Required after completion of refrigerant line set installation
- Unit service valves remain closed to isolate refrigerant into outdoor unit (condensing section)
- Line set and coil should be pressurized to at least 150 PSIG using dry Nitrogen
- Check for leaks using bubble solution at each braze joint

6.5 Adding the Refrigerant to an Existing System

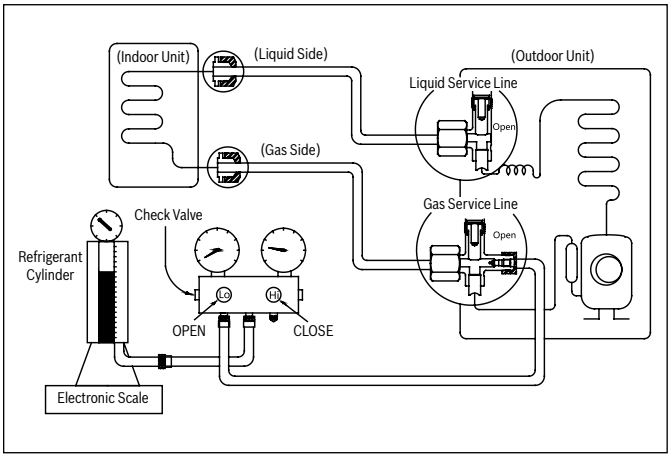


Figure 17

Procedure

1. Connect the refrigerant manifold, blue suction hose to the gas service valve's service port, open the liquid service valve and the gas service valve. Connect the refrigerant manifold, yellow hose to the valve at the top or bottom of the cylinder. If the refrigerant is R410A, ensure that cylinder is placed upside down during the charging process.
2. Purge the air from the refrigerant manifold (yellow hose). Open the valve at the top or bottom of the cylinder and press the check valve on the refrigerant manifold to purge the air.

CAUTION: CONTAINS REFRIGERANT

- Liquid refrigerant can cause frost bite. Handle with care.

3. Place the refrigerant cylinder onto the electronic scale and record the weight.
4. Operate the air conditioner in cooling mode.
5. Open the valve (low side) on the refrigerant manifold and charge the system with liquid refrigerant.
6. When the electronic scale displays the proper weight (refer to the gauge and the pressure of the low side), turn off the refrigerant low side valve and the refrigerant cylinder valve. Then turn off the unit to remove the hose from the gas service valve.
7. Replace valve stem caps on the service port. Use a torque wrench to tighten the service port cap to a torque of 18N.m. Be sure to check for gas leakage.

Recover the refrigerant as per Refrigerant Recovery and Recycling Equipment manufacturers' specification.

Refrigerant charging

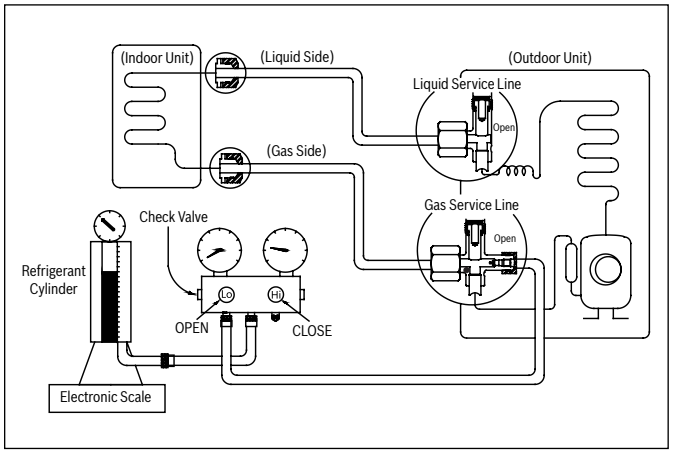


Figure 18

Procedure:

1. Connect the charge hose to the refrigerent cylinder, open the liquid and the gas service valves. Connect the charge hose which you disconnected from the vacuum pump to the valve at the top or bottom of the cylinder. If the refrigerant is R410A, make the cylinder is upside down to ensure liquid charge.
2. Purge the air from the charge hose. Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).
3. Put the charging cylinder onto the electronic scale and record the weight.
4. Open the valves (Low side) on the refrigerant manifold and charge the system with liquid refrigerant. If the system cannot be charge with the specified amount of refrigerant, or can be charged with a little at a time (approximately 150g each time) , operating the air conditioner in the cooling cycle; however, if one time is not sufficient, wait approximately 1 minute and then repeat the procedure.
5. When the electronic scale displays the proper weight, disconnect the charge hose from the gas service valve's service port immediately. If the system has been charged with liquid refrigerant while operating the air conditioner, turn off the air conditioner before disconnecting the hose.
6. Replace valve stem caps on the service port. Use a torque wrench to tighten the service port cap to a torque of 18N.m. Be sure to check for gas leakage.

For model: BMS500-AAM048-1CSXHC

For above models, there is a set of master valve, which will allow installer to vacuum and recycle the refrigerant at a faster speed. Ensure master valves are fully open prior to system operation.

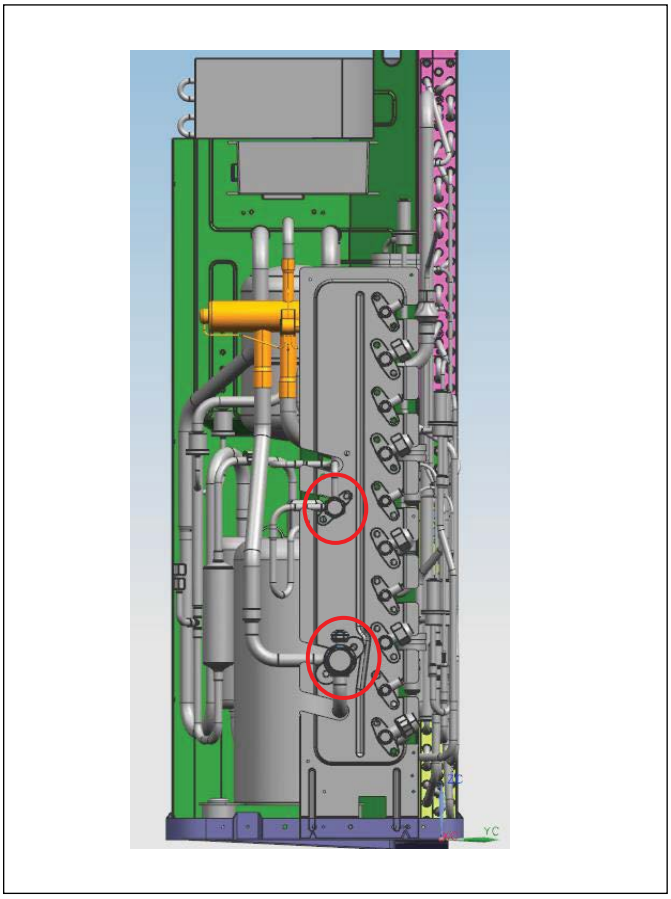


Figure 19

6.6 Collecting the Refrigerant Into the Outdoor Unit

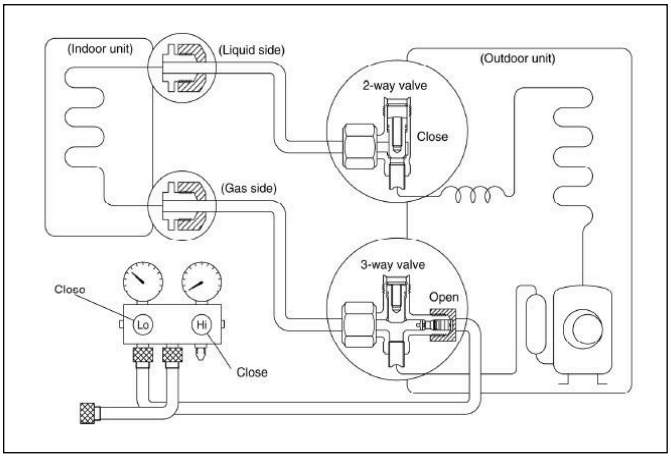


Figure 20

Procedure

1. Confirm that both the 2 way and 3 way valves are set to the opened position Remove the valve stem caps and confirm that the valve stems are in the opened position. Be sure to use a hexagonal wrench to operate the valve stems.
2. Connect the charge hose with the push pin of handle lo to the 3 way valves gas service port.
3. Air purging of the charge Open the handle Lo v alve of the manifold valve slightly to purge air from the charge hose for 5 seconds and then close it quickly.
4. Set t e 2 way valve to the close position.
5. Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 0.1MPa.
6. Set the 3 way valve to the closed position immediately. Do this quickly so that the gauge ends up indicating 0.3 to 0.5Mpa. Disconnect the charge set, and tighten the 2 way and 3 way valve's stem nuts. Use a torque wrench to tighten the 3 way valve's service port cap to a torque of 18N. Be sure to check for gas leakage.

6.7 Evacuation of the Complete Refrigeration Circuit, Indoor and Outdoor Unit.

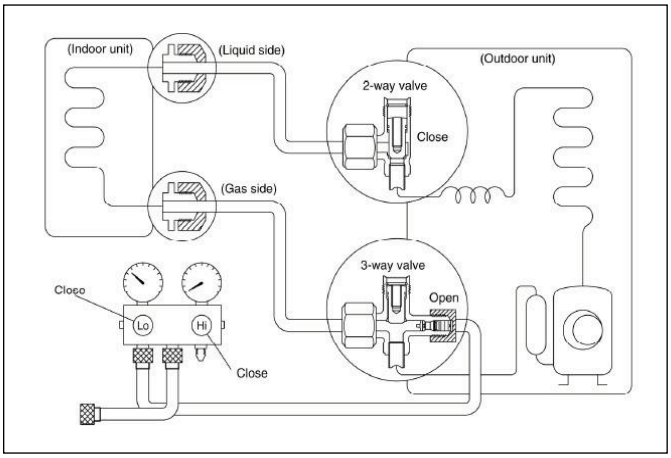


Figure 21

Procedure

1. Confirm that both the 2-way and 3-way valves are set to the opened position.
2. Connect the vacuum pump to 3 way valve's service port.
3. Evacuation for approximately one hour. Confirm that the compound meter indicates 0.1Mpa (500 M icrons / 29.9 in,hg.
4. Close the valve (Low side) on the charge set, turn off the vacuum pump, and confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).
5. Disconnect the charge hose from the vacuum pump.

6.8 Operation Characteristics

			COOL operation	HEAT operation	DRY operation
Room Temperature			63ºF - 90ºF 17ºC - 32ºC	32ºF - 86ºF 0ºC - 30ºC	50ºF - 90ºF 10ºC - 32ºC
Outdoor Temperature	Regular	BMS500-AAM018-1CSXRC BMS500-AAM027-1CSXRC BMS500-AAM036-1CSXRC BMS500-AAM048-1CSXRC	-25ºC - 50ºC -13ºF - 122ºF	-25ºC - 30ºC -13ºF - 86ºF	0ºC - 50ºC 32ºF - 122ºF
	Max Performance	BMS500-AAM018-1CSXHC BMS500-AAM027-1CSXHC BMS500-AAM036-1CSXHC BMS500-AAM048-1CSXHC	-30ºC - 50ºC -22ºF - 122ºF	-30ºC - 30ºC -22ºF - 86ºF	0ºC - 50ºC 32ºF - 122ºF

Table 12

Equation to convert Celsius to Fahrenheit

(°F) = 1.8 x (°C) + 32

NOTICE:

- If the system is used beyond the above conditions, certain safety protection features may come into operation and cause the unit to operate abnormally.

NOTICE:

- The room relative humidity should be less than 80%. If the air conditioner operates beyond this figure, the surface of the air conditioner may attract condensation. Please set the vertical air flow louver to its maximum angle (vertically to the floor), and set to HIGH fan mode.
- The optimum performance will be achieved during this operating temperature zone.

7 Electronic Functions

7.1 Abbreviation

T1: Indoor ambient temperature

T2: Middle indoor heat exchanger coil temperature

T2B: Indoor heat exchanger exhaust coil temperature (located on the outdoor unit)

T3: Outdoor heat exchanger pipe temperature

T4: Outdoor ambient temperature

T5: Compressor discharge temperature

7.2 Electric Control Working Environment

Input voltage	230V
Input power frequency	60Hz
Indoor fan standard working amp.	<1A
Outdoor fan standard working amp.	<1.5A
Four-way valve standard amp.	<1A

Table 13

7.3 Main Protection

7.3.1 Compressor Restart Delay

The compressor takes 1 minute to start up the first time. Further restarts take 3 minutes.

7.3.2 Temperature Protection of Compressor Discharge

When the discharge temperature of the compressor rises, the running frequency is limited according to the following rules:

- If 105 °C (221 °F) ≤ T5 < 110 °C (230 °F), maintain the current frequency.
- If the temperature increases and T5 ≥ 110 °C (230 °F), decrease the frequency to a lower level every 2 minutes to F1.
- If T5 ≥ 115 °C (239 °F) for 10 seconds, the compressor stops and then restart until T5 < 90 °C (194 °F).

7.3.3 Fan Speed Malfunction

If outdoor fan speed is lower than 100RPM or higher than 2400RPM for 60 seconds or more, the unit stops and LED displays failure code.

7.3.4 Inverter Module Protection

The inverter protection module ensures that faults related to current, voltage, or temperature does not damage the inverter.

If these protections are triggered, the A/C unit stops and the LED displays the failure code.

The unit restarts 3 minutes after the protection mechanism has turned off.

7.3.5 Low Voltage Protection

If low voltage protection triggers and voltage is not restored to normal within 3 minutes, the protection remains active even after a machine restart.

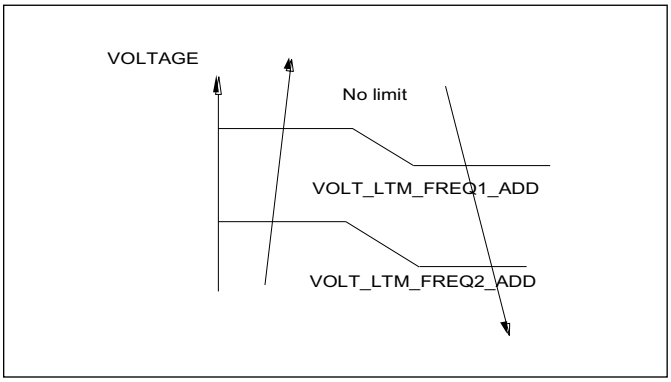


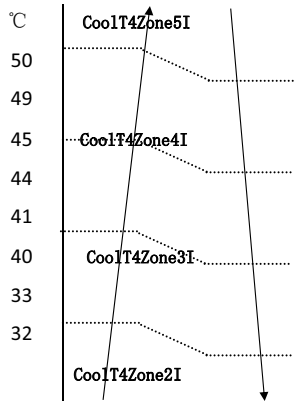
Figure 22

If low voltage protection triggers and voltage is not restored to normal within 3 minutes, the protection remains active even after a machine restart.

7.3.6 Compressor Current Limit Protection

The temperature interval for the current limit is the same as the range of the T4 frequency limit.

Cooling mode:

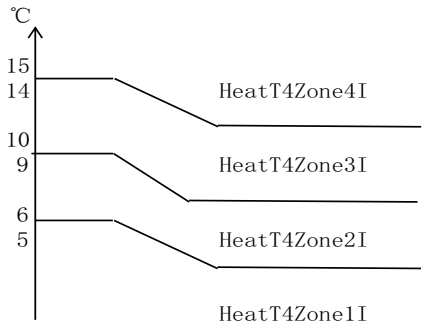


CoolReturnI	The difference between current limit and shutdown current
CoolT4Zone5I	Cooling T4≥50℃ current limit value
CoolT4Zone4I	Cooling 49＞T4≥45℃ current limit value
CoolT4Zone3I	Cooling 44＞T4≥41℃ current limit value
CoolT4Zone2I	Cooling 40 > T4≥33℃ current limit value
CoolT4Zone1I	Cooling 32＞T4℃ current limit value
CoolStopI	Cooling stop protection current value

Figure 23

Heating mode:

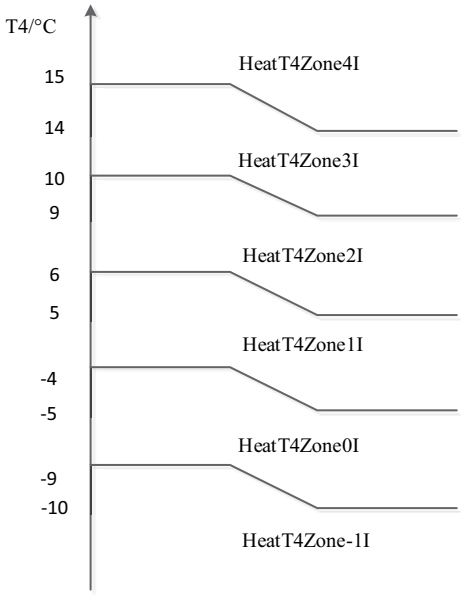
For other models:



HeatReturnI	The difference between current limit and shutdown current
HeatT4Zone4I	Heating T4≥15℃ current limit value
HeatT4Zone3I	Heating 14＞T4≥10℃ current limit value
HeatT4Zone2I	Heating 9 ＞T4≥6℃ current limit value
HeatT4Zone1I	Heating 5 ＞T4℃ current limit value
HeatStopI	Heating stop protection current

Figure 24

For Max Performance 36K and 48K, and Regular 48K Systems:



HeatReturnI	The difference between current limit and shutdown current
HeatT4Zone4I	Heating T4≥15℃ current limit value
HeatT4Zone3I	Heating 14℃＞T4≥10℃ current limit value
HeatT4Zone2I	Heating 9℃＞T4≥6℃ current limit value
HeatT4Zone1I	Heating 5℃＞T4℃ current limit value
HeatT4Zone0I	Heating -5℃＞T4≥-9℃current limit value
HeatT4Zone-1I	Heating -10℃＞T4 current limit value
HeatStopI	Heating stop protection current value

Figure 25

7.3.7 Indoor / Outdoor Units Communication Protection

If the indoor units do not receive the feedback signal from the outdoor units for 2 consecutive minutes, the unit stops. The unit displays the failure code.

7.3.8 High Condenser Coil Temp. Protection

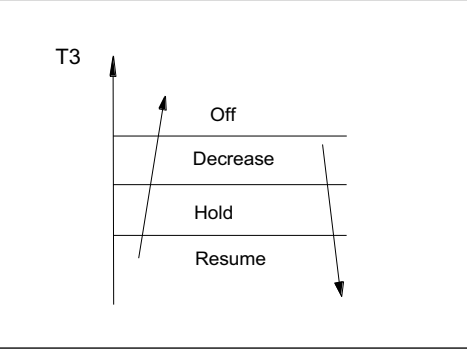


Figure 26

7.3.9 Outdoor Unit Anti-Freezing Protection

When T2<4℃ for 250seconds or T2<0℃, the indoor unit capacity demand is zero and resumes normal operation when T2>8℃ and the protection time is no less than 3 minutes.

7.3.10 Oil Return

Rules for Operation:

1. If the compressor frequency continues to be lower than the frequency set for setting time, the unit raises the frequency to the frequency set for setting time and then resumes with the former frequency.
2. The EXV continues at 300p while indoor units maintain their operation.

   If the outdoor ambient temperature is higher than the set frequency during oil return, the unit stops the oil return process.

7.2.11 Low Outdoor Ambient Temperature Protection

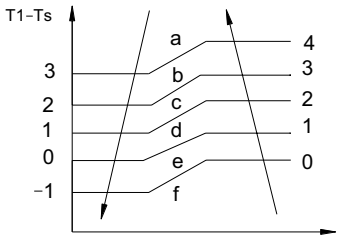
- When the compressor is off and T4 is lower than - 35℃ for 10 seconds, the unit stops and displays “LP” or “PC0L”
- When the compressor is on and T4 remains lower than -40℃ for 10 seconds, the unit stops and displays “LP” or “PC0L”
- When T4 is no lower than -32℃ for 10 seconds, the unit exits protection.

7.4 Control and Functions

7.4.1 Capacity Request Calculation

Total capacity Request=Σ(Norm code × HP) /40×modify rate+correction

Cooling Mode:



Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

Figure 27

Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Table 14

The final result is an integer.

Use the following table and final capacity request to confirm the operating frequency.

Frequency (Hz)	0	COOL_F1	COOL_F2	------	COOL_F24	COOL_F25
Amendatory capacity demand.	0	1	1	------	24	25

Table 15

The maximum running frequency is adjusted according to the outdoor ambient temperature.

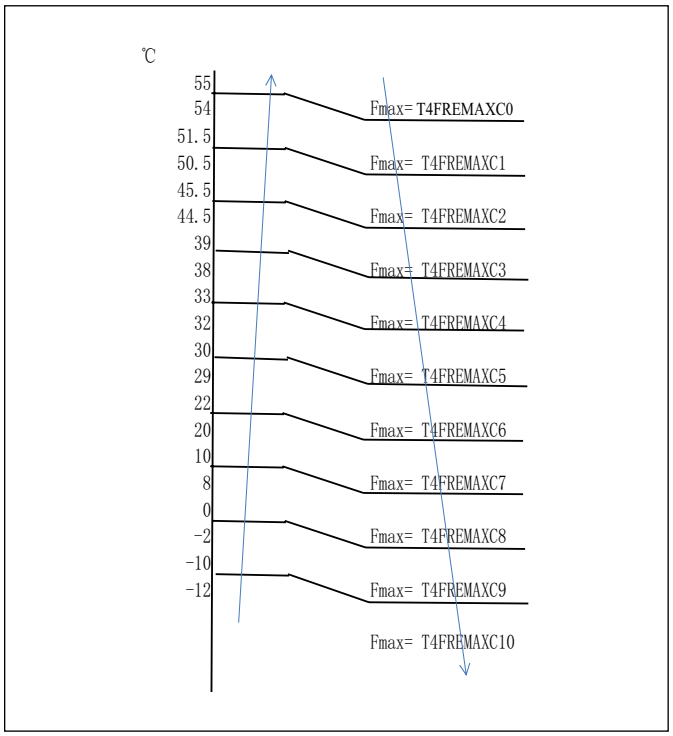
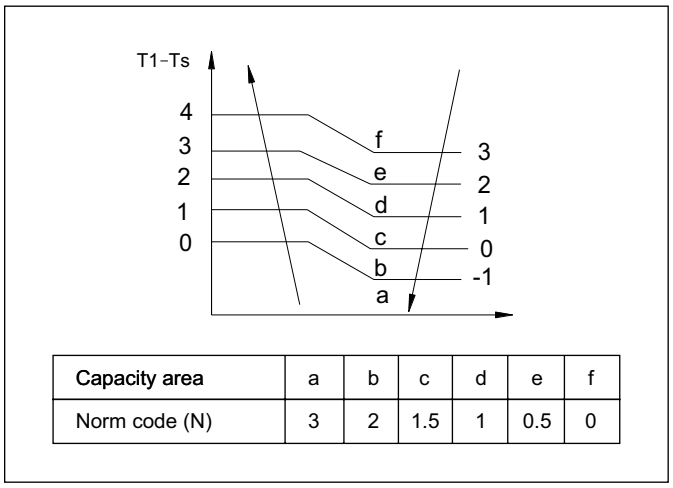


Figure 28

Heating Mode:



Capacity area	a	b	c	d	e	f
Norm code (N)	3	2	1.5	1	0.5	0

Figure 29

Model	9K	12K	18K	24K
HP	1.0	1.2	1.5	2.5

Table 16

The final result is an integer.

Then modify it according to a T2 average (correction):

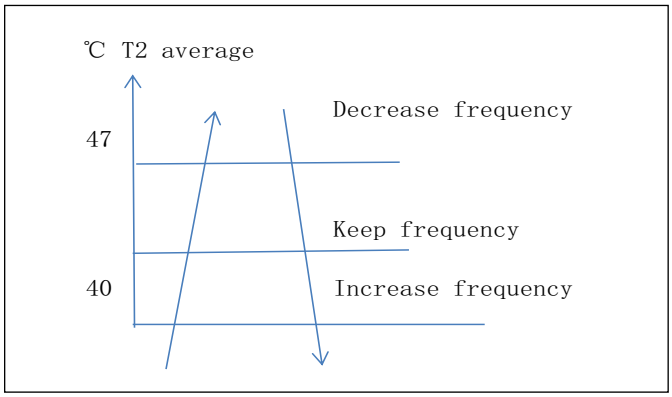


Figure 30

Use the following table and final capacity request to confirm the operating frequency.

Frequency (Hz)	0	HEAT_ F1	HEAT_ F2	--- ---	HEAT__ F24	HEAT__ F25
Amendatory capacity demand.	0	1	2	--- ---	24	25

Table 17

The maximum running frequency is adjusted according to the outdoor ambient temperature.

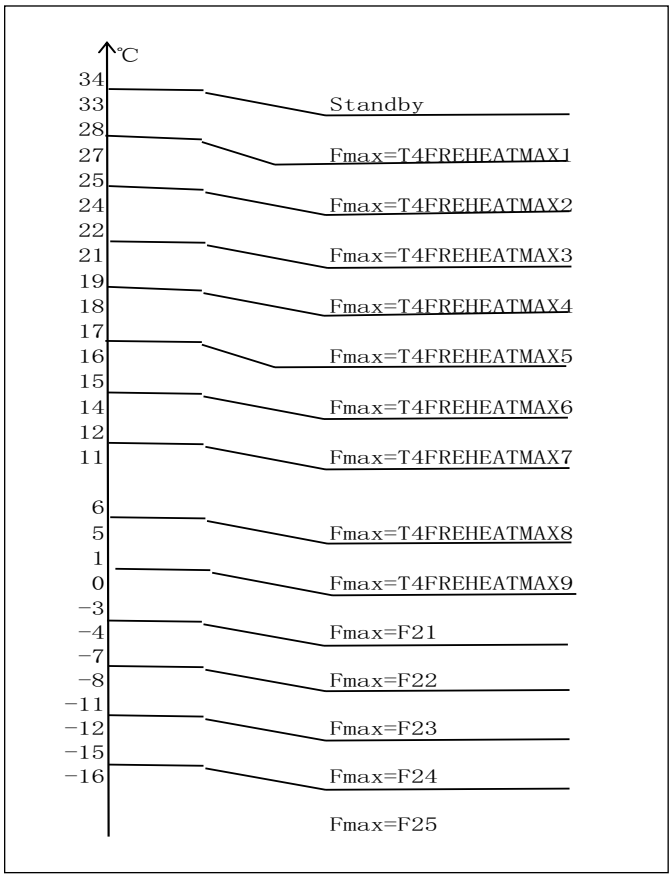


Figure 31

7.4.2 Defrost Control

Conditions for Defrosting:

After the compressor starts and enters normal operation, mark the minimum value of T3 from the 10th to 15th minute as T30.

If any one of the following conditions is satisfied, the unit enters defrost mode:

1. If the compressor's cumulative running time reaches 29 minutes and T3 < TCDI1 and T3 + T30SUBT3ONE ≤ T30.
2. If the compressor cumulative running time reaches 35 minutes and T3 < TCDI2 and T3 + T30SUBT3TWO ≤ T30.
3. If the compressor cumulative running time reaches 40 minutes and T3 < -24℃ for 3 minutes.
4. If the compressor cumulative running time reaches 120 minutes and T3 < -15℃.
5. If the air conditioner is shut down from heating mode, it will enter defrost if any of the following conditions are met (this condition can be shielded by parameters):
   a. The continuous operation time of the press exceeds 30 minutes, and T3<-7 degrees;
   b. The continuous operation time of the press is more than 30 minutes, and T30<-15 degrees;
6. For the first defrosting when the machine is turned on, after the compressor has been running for 30 minutes, when T4-T3> (0.5T4 + KDELTT_ADD) and T3 <TCDIN5_ADD, it will immediately enter the defrosting action. After performing this defrosting action once, this rule will be invalid until the next restarting operation.
7. If any one of the following conditions is satisfied, the unit enters defrosting mode,
   a. If T3 or T4 is lower than -3℃ for 30 seconds,Ts-T1 is lower than 5℃ and compressor running time is more than DEFROST_COND6_IN_TIM.
   b. If T3 or T4 is lower than -3℃ for 30 seconds and compressor running time is more than DEFROST_COND6_IN_TIM +30.

Defrost Stop Conditions

If any one of the following conditions is satisfied, defrost mode ends and the unit returns to normal heating mode:

- T3 rises above than TCDE1℃.
- T3 remains at TCDE2℃ or above for 80 seconds.
- The machine runs for 10 consecutive minutes in defrost mode.

Defrosting Action:

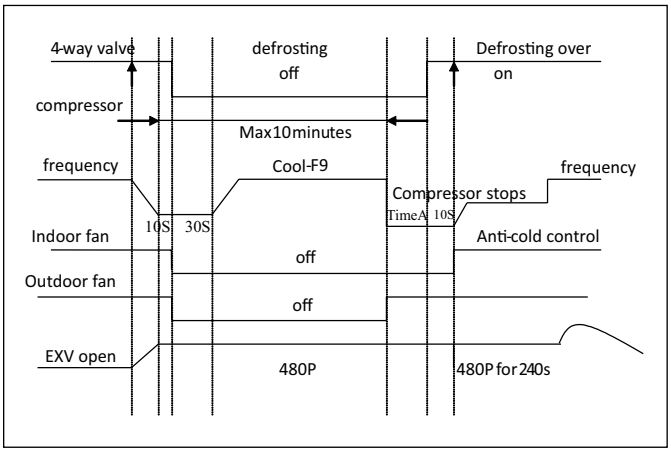


Figure 32

7.4.3 Outdoor Fan Control

7.4.3.1 Cooling Mode

Under normal operating conditions, the system chooses the running fan speed according to the ambient temperature:

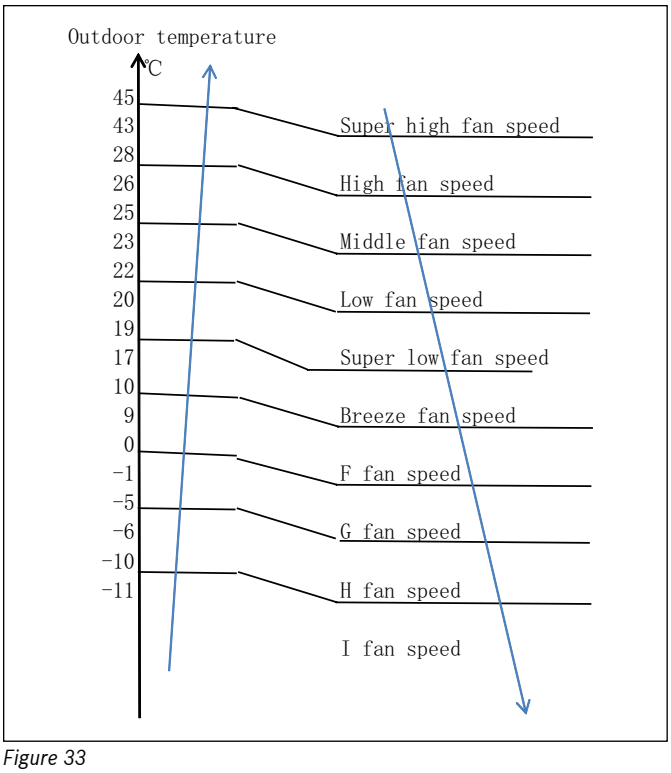


Figure 33

When low ambient cooling is in effect:

- Outdoor fan speed control logic (low ambient cooling)
- When T4 < 15 ℃ (59 ℉) and T3 < 30 ℃ (86 ℉), the unit enters into low ambient cooling mode. The outdoor fan chooses a speed according to T3.
- When T3≥38 ℃ (100.4 ℉) or when T4≥15 ℃ (59 ℉), the outdoor fan chooses a speed according to T4 again.

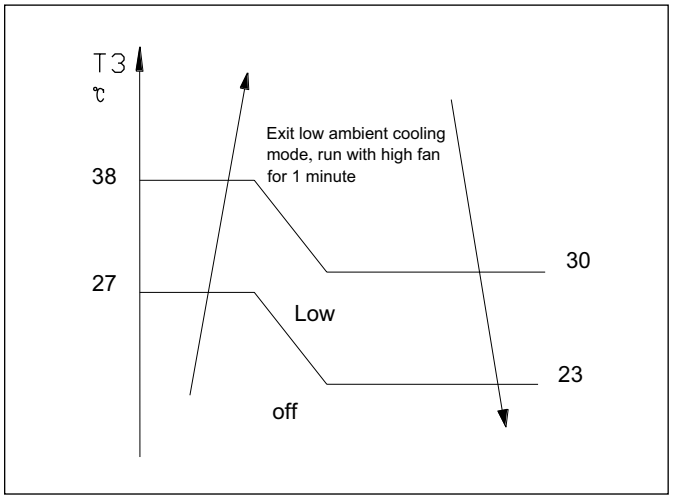


Figure 34

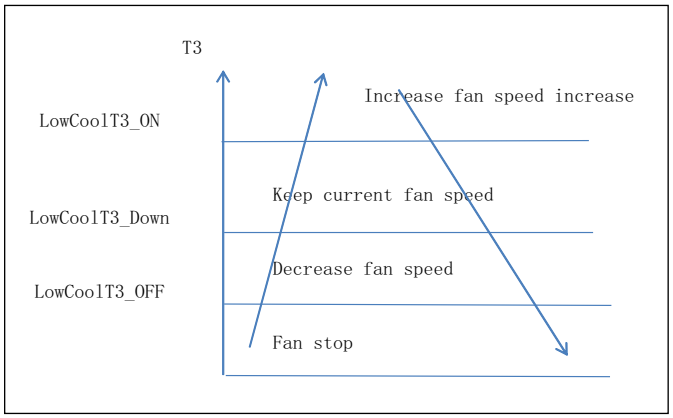


Figure 35

7.4.3.2 Heating Mode

Under normal operating conditions, the system chooses a running fan speed according to ambient temperature:

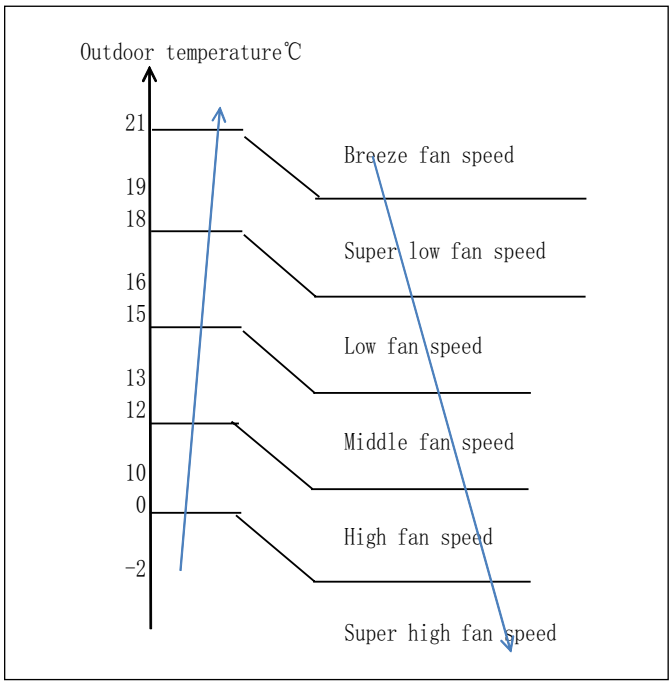


Figure 36

7.4.4 Electronic Expansion Valve (EXV)

For Max Performance 48K System:

1. After the outdoor unit is powered on again, the EXV is first closed -52OP, and then in standby mode (if the current mode is heating mode, the initial heating degree is run, otherwise the initial cooling degree is run, and the internal machine is not connected. deal with 7k unit). The main valve first opens 51OP, then opens 53OP, and then is in the standby state (if the current outdoor mode is the heating mode or the standby mode, it maintains 0P, and the cooling mode opens to the initial cooling opening). The EVI valve opens 51OP first, then 53OP, then the counter is cleared to 0P.
2. After the compressor is stopped,
   a. If the EVI valve has a valve opening action before the stop, the PMV_CLOSE_EE step is closed in the reverse direction after the stop, and then the EXV opening counter is cleared to 0P. If the EVI valve does not operate before the stop, 0P will be maintained.
   b. Reverse the valve to close the PMV_CLOSE_EE step (after closing the valve to the 0P, and then continue to run PMV_CLOSE_EE in the valve closing direction, the EXV opening counter is cleared. If the current opening is 30OP, go to the valve Run the 32OP in the closing direction to close the EXV.), then in the standby state (if the current outdoor mode is the heating mode, the initial heating opening is run, otherwise the initial cooling opening is run, and the internal machine is not connected. deal with 7k unit).
   c. Main EXV action: When the compressor is off, the main EXV keeps the opening degree when the compressor is turned off within the first 90 seconds. If it is currently heating mode, -20P, clear and keep 0P, otherwise adjust to 48OP.
4. Other EXV(except for EVI valve) cannot be operated at the same time. The action priorityorder is A-B-C-D-E-main valve. The EVI valve can be operated together with other EXV.

For other models,
Control:

1. EXV remains fully closed while the device is powering up. EXV then remains on standby with 350P open. It opens to the target angle after the compressor starts.
2. EXV closes with -40P when the compressor stops. Then it remains on standby with 350P open. It opens to the target angle after the compressor starts.
3. The action priority for the EXVs is A-B-C-D-E.
4. The compressor and outdoor fan commence operation only after EXV initializes.

7.4.4.1 Cooling Mode

The initial open angle of the EXV depends on the size of the indoor model. The adjustment range is 100-400p.

When the unit has been running for 3 minutes, the outdoor receives indoor units' capacity demand and T2B information and then calculates their average. After comparing each indoor's T2B with the average, the outdoor gives the following modification commands:

- If T2B > average, the relevant valve needs to open 16P more
- If T2B = average, the relevant valve's open range remains as is
- If T2B < average, the relevant valve needs to close 16P more

This modification is carried out every 2 minutes.

7.4.4.2 Heating Mode

The initial open angle of the EXV depends on the size of the indoor model. The adjustment range is 150 pulse - 350 pulse.

When the unit has been running for 3 minutes, the outdoor unit receives the indoor units capacity demand and T2 information and then calculates their average.

After comparing each indoor unit's T2 with the average, the outdoor gives the following modification commands:

- If T2 > average +2, the relevant valve needs to close 16P more
- If average+2 ≥ T2 ≥ average -2, relevant valve's open range remains as is
- If T2 < average -2, the relevant valve needs to open 16P more

This modification is carried out every 2 minutes.

7.4.5 Four-Way Valve Control

In heating mode, the four-way valve is opened.

In defrost mode, the four-way valve operates according to the current defrosting action.

In other modes, the four-way valve is closed.

When the unit is switched from heating to other modes, the four-way valve turns off after the compressor has been off for 2 consecutive minutes.

Failure or protection (excluding discharge temperature protection and high/low pressure protection) causes the four-way valve to immediately shut down.

7.4.6 Outdoor Unit Digital Display

A digital display is featured on the outdoor PCB. The LED displays different codes in the following situations:

- Standby: "- -."
- Compressor operation: the running frequency.
- Defrosting mode: "dF" or alternative displays between running frequency and "dF" (ach appears for 0.5s.)
- Forced cooling mode: the LED displays "FC" or alternative displays between running frequency and "FC" (each appears for 0.5s).
- Compressor pre-heating: "PH" or alternative displays between running frequency and "PH" (each appears for 0.5s.)
- Oil return process: "RO" or alternative displays between running frequency and "RO" (each appears for 0.5s.)
- Low ambient cooling mode: "LC" or alternative displays between running frequency and "LC" (each appears for 0.5s.)
- PFC module protection occurs three times within 15 minutes: "E6" or alternates between displays of running frequency and "E6" (each appears for 0.5s.)
- In protection or malfunction, the LED displays an error code or protection code. "PH", "RO", "LC", "E6" are not suitable for 18-36K regular systems and 18-27 hyper heat systems.

7.4.7 Point check function (engineering troubleshooting mode)

A check switch is included on the outdoor PCB. Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed.

Number of Presses	Display	Remark
0	Normal display	Displays running frequency, running state, or malfunction code
1	Quantity of indoor units with working connection	-
2	Outdoor unit running mode code	Off: 0,Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4. Forced defrost:A
3	Indoor unit A capacity	The capacity unit is horse power. If the indoor unit is not connected, the digital display shows the following: "—" (9K:1HP,12K:1.2HP,18K:1.5HP,24K:2.0HP)
4	Indoor unit B capacity	
5	Indoor unit C capacity	
6	Indoor unit D capacity	
7	Indoor unit E capacity	
8	Indoor unit A capacity demand code	Norm code*HP (9K: 1HP,12K: 1.2HP,18K: 1.5HP,24K:2.0HP)
9	Indoor unit B capacity demand code	
10	Indoor unit C capacity demand code	
11	Indoor unit D capacity demand code	
12	Indoor unit E capacity demand code	
13	Outdoor unit amendatory capacity demand code	
14	The frequency corresponding to the total indoor units' amendatory capacity demand	
15	The frequency after the frequency limit	
16	The frequency sending to compressor control chip	
17	Indoor unit A evaporator outlet temperature (T_2B A)	If the temperature is lower than -9 ℃, the digital display shows "-9." If the temperature is higher than 70 ℃, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "—"
18	Indoor unit A evaporator outlet temperature (T_2B B)	
19	Indoor unit A evaporator outlet temperature (T_2B C)	
20	Indoor unit A evaporator outlet temperature (T_2B D)	
21	Indoor unit A evaporator outlet temperature (T_2B E)	
22	Indoor unit A room temperature (T1A)	If the temperature is lower than 0 ℃, the digital display shows "0." If the temperature is higher than 50 ℃, the digital display shows "50." If the indoor unit is not connected, the digital display shows: "—"
23	Indoor unit A room temperature (T1B)	
24	Indoor unit A room temperature (T1C)	
25	Indoor unit A room temperature (T1D)	
26	Indoor unit A room temperature (T1E)	
27	Indoor unit A evaporator temperature (T2A)	If the temperature is lower than -9 ℃, the digital display shows "-9." If the temperature is higher than 70 ℃, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "—"
28	Indoor unit A evaporator temperature (T2B)	
29	Indoor unit A evaporator temperature (T2C)	
30	Indoor unit A evaporator temperature (T2D)	
31	Indoor unit A evaporator temperature (T2E)	
32	Condenser pipe temperature (T3)	
33	Outdoor ambient temperature (T4)	
34	Compressor discharge temperature (TP)	The display value is between 30–129 ℃. If the temperature is lower than 30 ℃, the digital display shows "30." If the temperature is higher than 99 ℃, the digital display shows single and double digits. For example, if the digital display shows "0.5", the compressor discharge temperature is 105 ℃.
35	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
36	AD value of voltage	

Table 18

Number of Presses	Display	Remark		
37	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display shows single and double digits. For example, if the digital display shows “2.0", the EXV open angle is 120×4=480p.		
38	EXV open angle for B indoor unit			
39	EXV open angle for C indoor unit			
40	EXV open angle for D indoor unit			
41	EXV open angle for E indoor unit			
42	Frequency limit symbol	Bit7	Frequency limit caused by IGBT radiator	The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by T4, T3, or the current.
		Bit6	Frequency limit caused by PFC	
		Bit5	Frequency limit caused by T4	
		Bit4	Frequency limit caused by T2	
		Bit3	Frequency limit caused by T3	
		Bit2	Frequency limit caused by T5	
		Bit1	Frequency limit caused by current	
		Bit0	Frequency limit caused by voltage	
43	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units in good connection)		
44	Outdoor unit fan motor state	Off: 0, Super high speed:1, High speed:2, Med speed: 3, Low speed: 4, Breeze:5, Super breeze: 6		
45	The last error or protection code	00 means no malfunction and protection		
46	F indoor unit capacity			
47	F indoor unit capacity demand code			
48	F indoor unit evaporator outlet temperature (T_2B F)			
49	F indoor unit room temperature (T_1 F)			
50	F indoor unit evaporator temperature (T_2 F)			
51	EXV open angle for F indoor unit			
52	Reason of stop			
53	EVI valve target angle(only for 48K Hyper Heat System)	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example, the digital display tube show “2.0”,it means the EXV open angle is 120×4=480p.)		
54	EVI valve open angle(only for 48K Hyper Heat System)			
55	EVI valve angle(only for 48K Hyper Heat System)			

Table 19

For 18K Regular System:

Number of Presses	Display	Remark
0	Normal display	Displays running frequency, running state, or malfunction code
1	Quantity of indoor units with working connection	-
2	Outdoor unit running mode code	Off: 0,Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4. Forced defrost:A
3	Indoor unit A capacity	The capacity unit is horse power. If the indoor unit is not connected, the digital display shows the following: "—" (9K:1HP,12K:1.2HP,18K:1.5HP,24K:2.0HP)
4	Indoor unit B capacity	
5	Indoor unit C capacity	
6	Indoor unit D capacity	
7	Indoor unit E capacity	
8	Indoor unit A capacity demand code	Norm code*HP (9K: 1HP,12K: 1.2HP,18K: 1.5HP,24K:2.0HP)
9	Indoor unit B capacity demand code	
10	Indoor unit C capacity demand code	
11	Indoor unit D capacity demand code	
12	Indoor unit E capacity demand code	
13	Outdoor unit amendatory capacity demand code	
14	The frequency corresponding to the total indoor units' amendatory capacity demand	
15	The frequency after the frequency limit	
16	The frequency sending to compressor control chip	
17	Indoor unit A evaporator outlet temperature (T_2B A)	If the temperature is lower than -9 ℃, the digital display shows "-9." If the temperature is higher than 70 ℃, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "—"
18	Indoor unit A evaporator outlet temperature (T_2B B)	
19	Indoor unit A evaporator outlet temperature (T_2B C)	
20	Indoor unit A evaporator outlet temperature (T_2B D)	
21	Indoor unit A evaporator outlet temperature (T_2B E)	
22	Indoor unit A room temperature (T1A)	If the temperature is lower than 0 ℃, the digital display shows "0." If the temperature is higher than 50 ℃, the digital display shows "50." If the indoor unit is not connected, the digital display shows: "—"
23	Indoor unit A room temperature (T1B)	
24	Indoor unit A room temperature (T1C)	
25	Indoor unit A room temperature (T1D)	
26	Indoor unit A room temperature (T1E)	
27	Indoor unit A evaporator temperature (T2A)	If the temperature is lower than -9 ℃, the digital display shows "-9." If the temperature is higher than 70 ℃, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "—"
28	Indoor unit A evaporator temperature (T2B)	
29	Indoor unit A evaporator temperature (T2C)	
30	Indoor unit A evaporator temperature (T2D)	
31	Indoor unit A evaporator temperature (T2E)	
32	Condenser pipe temperature (T3)	
33	Outdoor ambient temperature (T4)	
34	Compressor discharge temperature (TP)	The display value is between 30–129 ℃. If the temperature is lower than 30 ℃, the digital display shows "30." If the temperature is higher than 99 ℃, the digital display shows single and double digits. For example, if the digital display shows "0.5", the compressor discharge temperature is 105 ℃.
35	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
36	AD value of AC voltage	
37	AD value of DC voltage	

Table 20

Number of Presses	Display	Remark		
38	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display shows single and double digits. For example, if the digital display shows “2.0", the EXV open angle is 120×4=480p.		
39	EXV open angle for B indoor unit			
40	EXV open angle for C indoor unit			
41	EXV open angle for D indoor unit			
42	EXV open angle for E indoor unit			
43	MVI valve open angle			
44	EVI valve open angle			
45	Frequency limit symbol	Bit7	Reserve	The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by IPM, T3, or the current.
		Bit6	Frequency limit caused by voltage	
		Bit5	Frequency limit caused by current	
		Bit4	Reserve	
		Bit3	Frequency limit caused by IPM	
		Bit2	Frequency limit caused by T5	
		Bit1	Frequency limit caused by T3	
		Bit0	Frequency limit caused by T2	
46	T2B fault	"00:No fault,01:T2B-A fault, ,02:T2B-B fault ,03:T2B-C fault,04:T2B-D fault, 05:T2B-E fault, 06:T2B-F fault(The display priority is A-B-C-D-E-F)"		
47	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units in good connection)(The heating is the average value of T2, and the cooling is the average value of T2B)		
48	Outdoor unit fan motor state	Off: 0, Super ultra high speed:1, Super high speed:2, High speed:3, Med speed: 4, Low speed: 5, Breeze:6, Super breeze: 7		
49	Reason of stop			

8 Troubleshooting

Safety

WARNING: ELECTRICAL HAZARD

- Electricity power is still kept in capacitors even though power supply is shut off. Do not forget to discharge the electricity in capacitor.

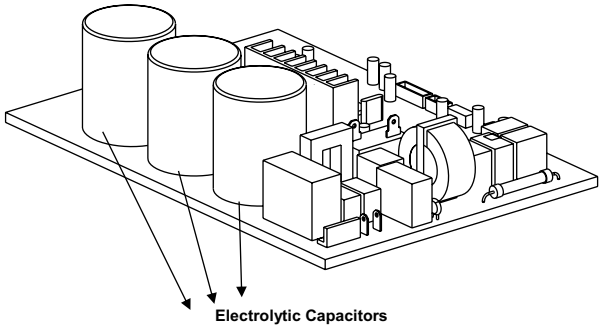


Figure 37

The value of resistance is between 1500Ω to 2000Ω.

The voltage in P3 and P4 in outdoor PCB is approximately 310V.

The voltage in P5 and P6 in outdoor PCB is approximately 310V.

8.1 Multi Zone Outdoor Unit Error Codes

NOTICE

- If below error codes appear, please turn off the system and contact an Authorized Service Provider.

Display	LED STATUS
EC 51	Outdoor EEPROM malfunction
EL 01	Indoor / outdoor units communication error
PC 40	Communication malfunction between IPM board and outdoor main board
PC 08	Outdoor overcurrent protection
PC 10	Outdoor unit low AC voltage protection
PC 11	Outdoor unit main control board DC bus high voltage protection
PC 12	Outdoor unit main control board DC bus high voltage protection /341 MCE error
PC 00	IPM module protection
PC 0F	PFC module protection
EC 71	Over current failure of outdoor DC fan motor
EC 72	Lack phase failure of outdoor DC fan motor
EC 07	Outdoor fan speed has been out of control
PC 43	Outdoor compressor lack phase protection
PC 44	Outdoor unit zero speed protection
PC 45	Outdoor unit IR chip drive failure
PC 46	Compressor speed has been out of control
PC 49	Compressor overcurrent failure
PC 30	High pressure protection (For M4OB-36HFN8-Q, M5OD-42HFN8-Q, M5OE-42HFN8-Q)
PC 31	Low pressure protection (For M4OB-36HFN8-Q, M5OD-42HFN8-Q, M5OE-42HFN8-Q)
PC 0A	High temperature protection of condenser
PC 06	Temperature protection of compressor discharge
PC 0L	Low ambient temperature protection
PC 02	Top temperature protection of compressor
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited
EC 56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited
EC 50	Open or short circuit of outdoor unit temperature sensor(T3,T4.T5)

Table 21

For Indoor Error Codes, please refer to the indoor service manual.

8.2 Quick Check by Error Codes

Cause	E0	E2	E3	E4	E5	E6	E8	P0	P1	P2	P3	P4	P5	P6
IDU PCB				●										
ODU PCB	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Display Board														
IDU Fan Motor														
ODU Fan Motor							●							●
T1 Sensor														
T2 Sensor				●										
T2B Sensor				●										
T3 Sensor				●									●	
T4 Sensor				●										
T5 Sensor				●								●		
Water Level Switch														
Condensate Pump														
Reactor														
Compressor														●
IPM Board			●											●
Over Load Protector								●	●	●	●			
PFC Module						●								
PFC Module Inductance						●								
Bridge Rectifier														
Wiring Mistake		●				●	●	●	●	●	●	●		●
Refrigerant Charge / Leak					●			●				●	●	
System Block					●			●	●	●	●		●	
Power Supply					●									

Table 22

8.3 ODU PCB & IPM

8.3.1 PCB: Multi Zone Regular 18K BMS500-AAM018-1CSXRC

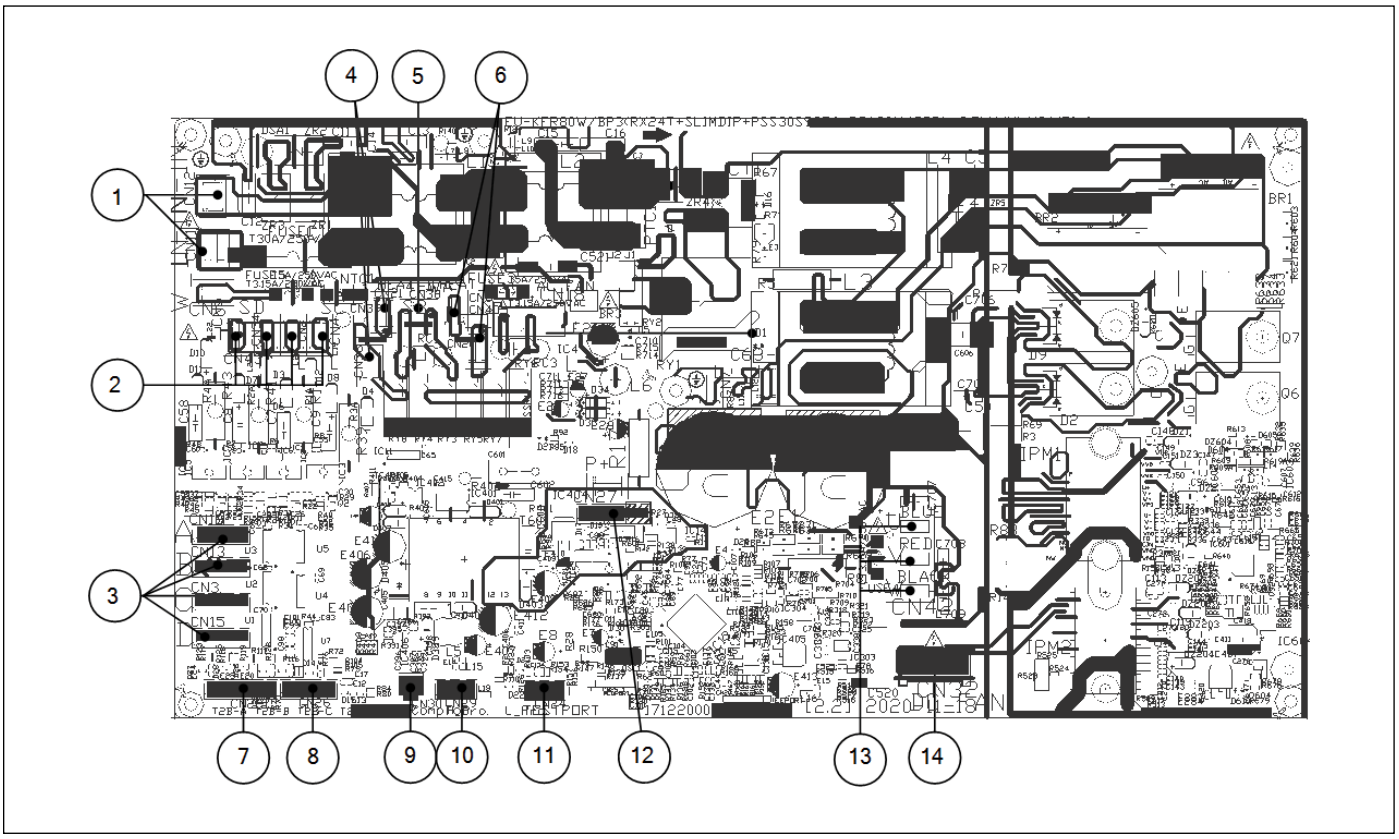


Figure 38

No.	LED STATUS	CN#	Meaning
1	Power Supply	CN11	L_in: connect to N-line (208-230V AC input)
		CN12	N_in: connect to L-line (208-230V AC input)
2	Electronic Expansion valve	CN4	connect to Electric Expansion Valve A
		CN2	connect to Electric Expansion Valve B
		CN34	connect to Electric Expansion Valve C
		CN5	connect to Electric Expansion Valve D
3	S-A	CN10	S: connect to indoor unit communication(pin1-pin2: 24VDC Pulse wave; pin2-pin3: 208-230V AC input)
	S-B	CN13	
	S-C	CN3	
	S-D	CN15	
4	HEAT_D	CN21/CN36	connect to chassis heater, 208-230V AC when is ON
5	4-way	CN38	connect to 4 way valve, 208-230V AC when is ON.
6	HEAT_Y	CN8/CN20	connect to compressor heater, 208-230V AC when is ON
7	T2B	CN28	connect to evaporator coil outlet temperature sensor T2B
8	T3 T4 TP	CN26	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
9	OLP TEMP. SENSOR	CN30	connect to compressor top temp. sensor (5VDC Pulse wave)
10	H-PRO,L-RPO	CN29	connect to high and low pressure swtich(pin1-pin2&pin3-pin4:5VDC pulse wave)
11	TESTPORT	CN24	used for testing
12	/	CN27	connect to key board CN1

Figure 39

8.3.2 PCB: Multi Zone Regular 27K, 36K & Max Performance 18K, 27K BMS500-AAM027-1CSXRC, BMS500-AAM036-1CSXRC, BMS500-AAM018-1CSXHC, BMS500-AAM027-1CSXHC

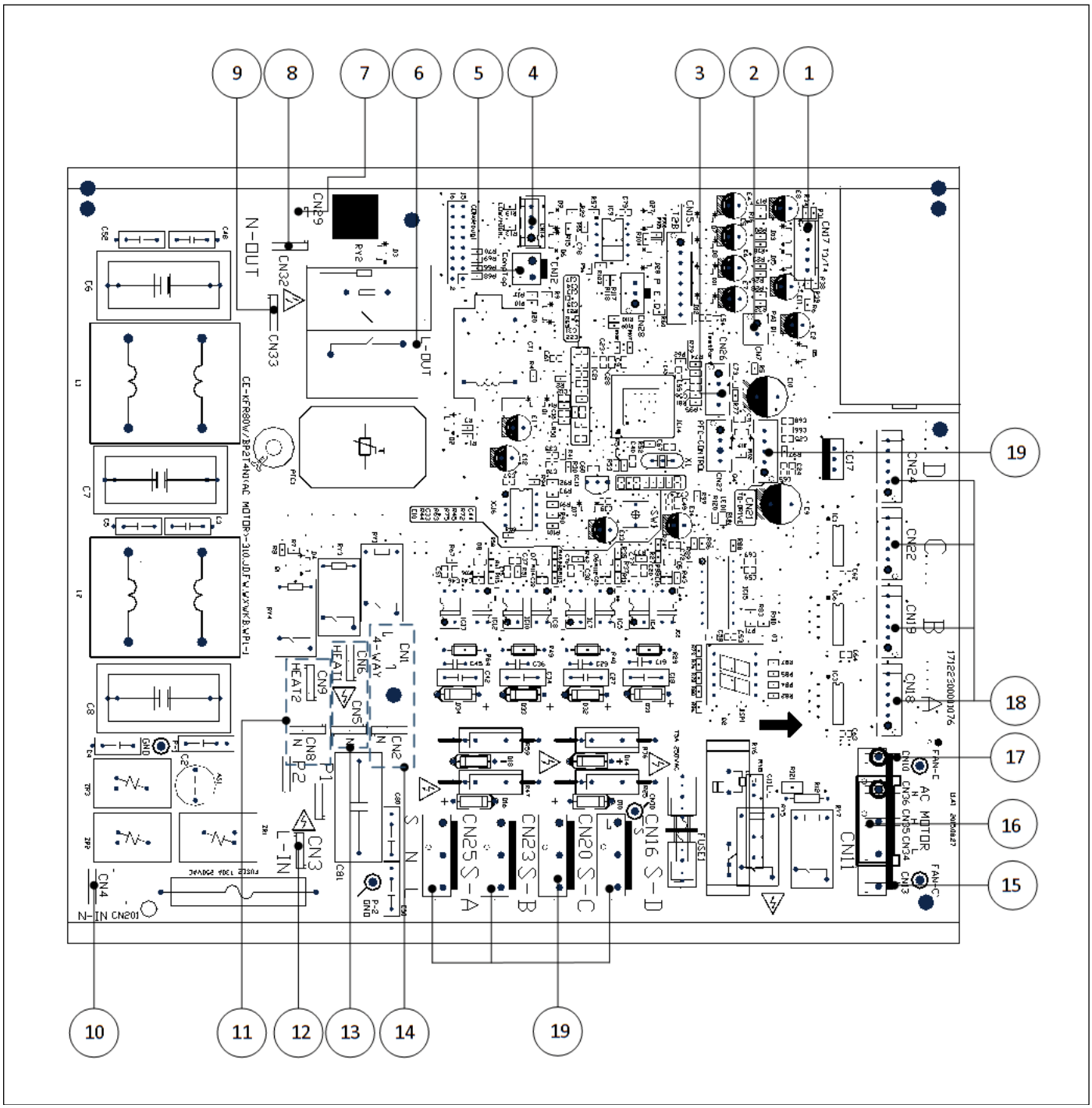


Figure 40

No.	Name	CN#	Meaning
1	T3/T4	CN17	T3: condenser temperature sensor T4: outdoor ambient temperature sensor
2	CN7	CN7	connect to discharge sensor
3	TESTPORT	CN26	connect to DR board CN1
4	LOW/HIGH	CN14	Red: low pressure protect Yellow: high pressure protect
5	Comp Top	CN12	compressor top temperature sensor
6	L-OUT	L-OUT	connect to IPM board CN4
7	N-OUT	N-OUT	connect to IPM board CN5
8	CN32	CN32	connect to DR board CN5
9	CN33	CN33	connect to DR board CN5
10	N-in	CN4	N_in: connect to N-line (208-230V AC input)
11	HEAT2	CN8/CN9	connect to chassis heater, 208-230V AC when is ON
12	L-in	CN3	L_in: connect to L-line (208-230V AC input)
13	HEAT1	CN5/CN6	connect to compressor heater, 208-230V AC when is ON
14	4-way	CN1/CN2	connect to 4 way valve, 208-230V AC when is ON.
15	Fan-C	CN13	connect to fan capacitor
16	Outdoor AC Fan	CN11	connect to outdoor AC fan
17	Fan-C	CN10	connect to fan capacitor
18	Electronic Expansion valve	CN18	connect to Electric Expansion Valve A
		CN19	connect to Electric Expansion Valve B
		CN22	connect to Electric Expansion Valve C
		CN24	connect to Electric Expansion Valve D
19	S-A	CN25	Current loop communication A, signal wire, connect to the terminal (24V DC Pulse wave)
	S-B	CN23	Current loop communication B, signal wire, connect to the terminal (24V DC Pulse wave)
	S-C	CN20	Current loop communication C, signal wire, connect to the terminal (24V DC Pulse wave)
	S-D	CN16	Current loop communication D, signal wire, connect to the terminal (24V DC Pulse wave)

Table 23

8.3.3 IPM: Multi Zone Regular 27K, 36K & Max Performance 18K, 27K BMS500-AAM027-1CSXRC, BMS500-AAM036-1CSXRC, BMS500-AAM018-1CSXHC, BMS500-AAM027-1CSXHC

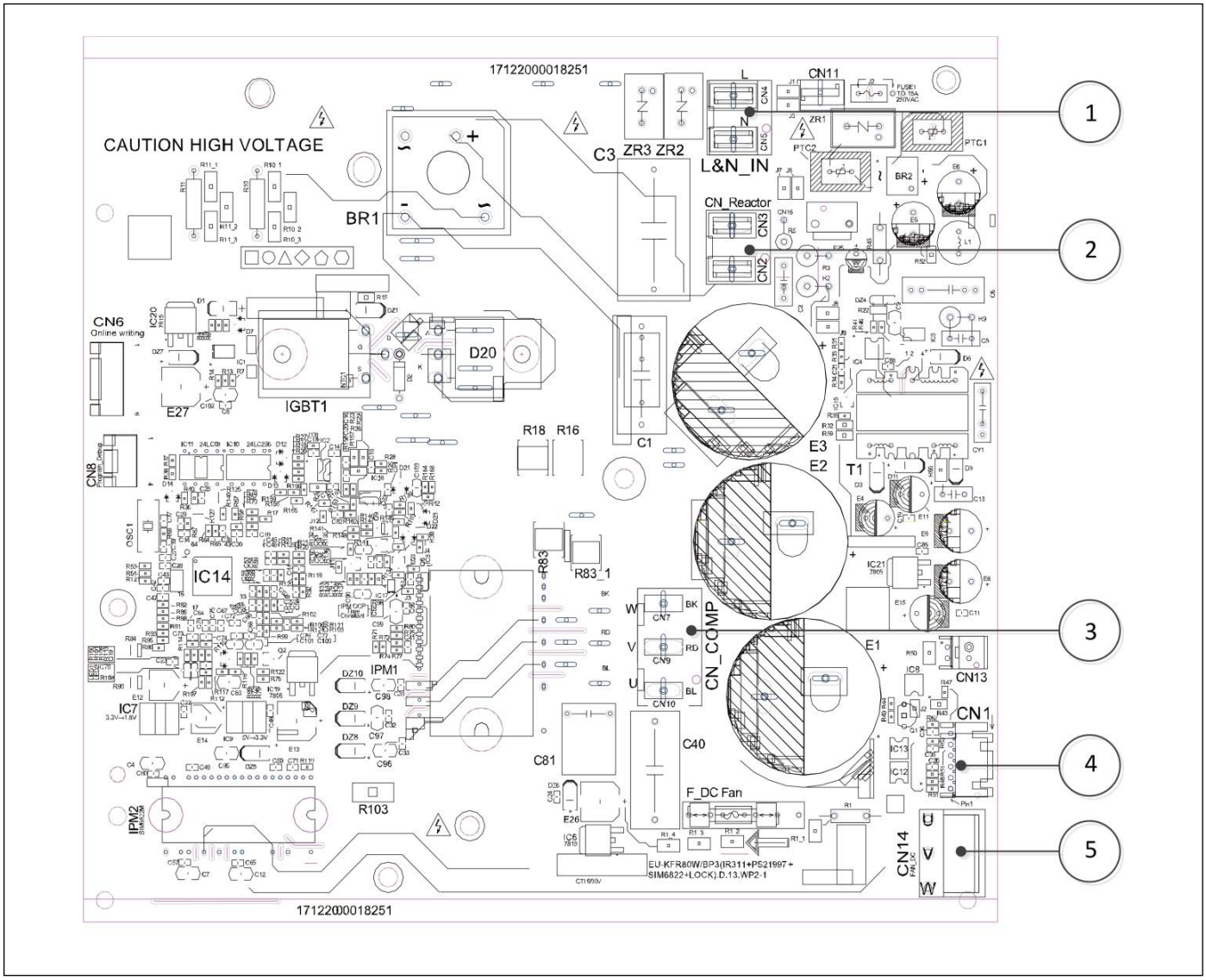


Figure 41

No.	LED STATUS	CN#	Meaning
1	CN4	CN4	connect to main board L-Out
	CN5	CN5	connect to main board N-Out
2	CN_Reactor	CN2/CN3	connect to reactor
3	CN_COMP	CN_COMP	connect to compressor
4	CN1	CN1	connect to main board CN21
5	AN_DC	CN14	connect to outdoor DC fan

Table 24

8.3.4 PCB: Multi Zone Regular 48K & Max Performance 36K, 48K BMS500-AAM048-1CSXRC, BMS500-AAM036-1CSXHC, BMS500-AAM048-1CSXHC

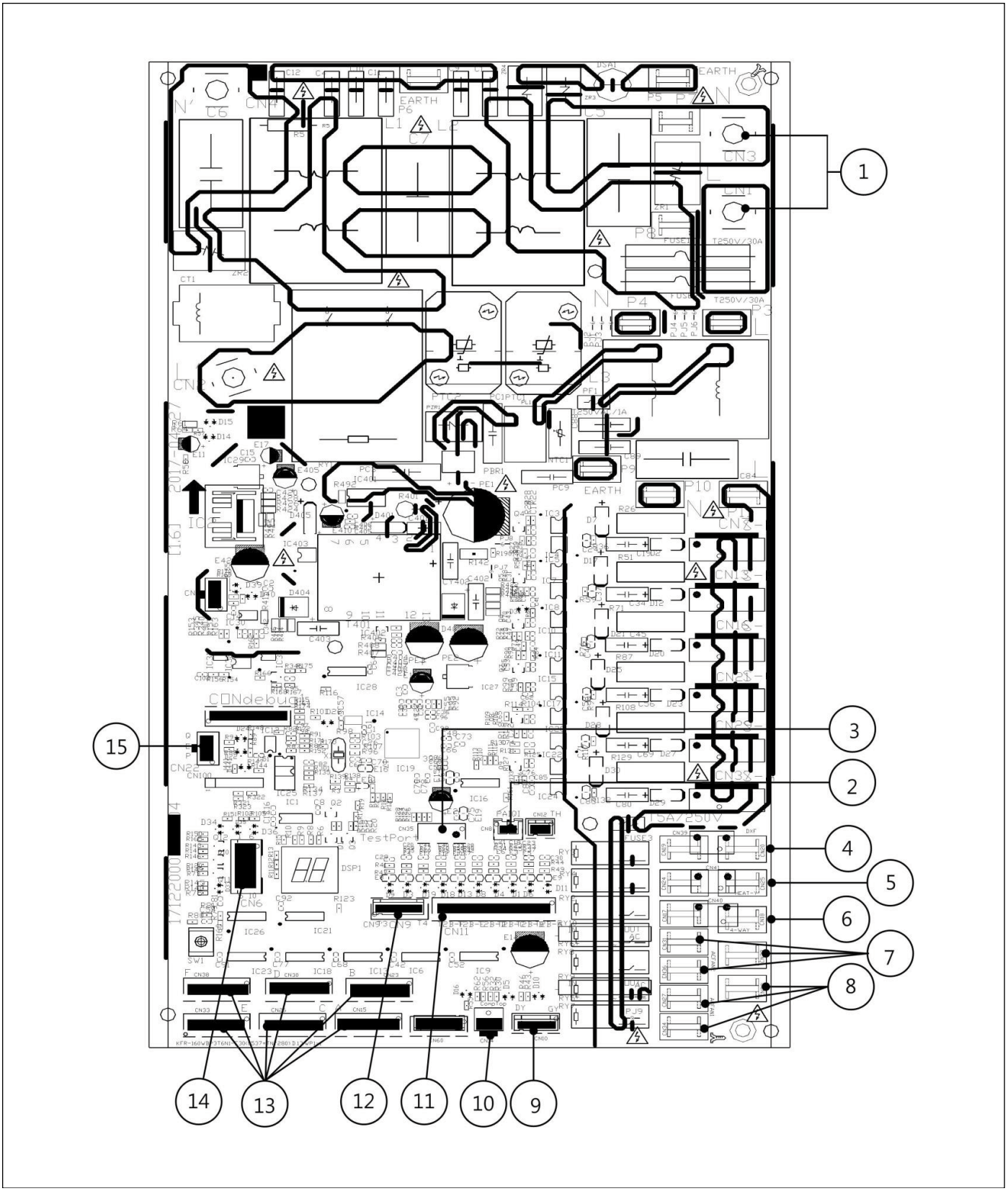


Figure 42

No.	Name	CN#	Meaning
1	Power Supply	CN1	L1_in: connect to L1-line (230V AC input)
		CN3	L2_in: connect to L2-line (230V AC input)
2	TP	CN8	Exhaust temp. sensor TP
3	TESTPORT	CN35	used for testing
4	HEAT1	CN19/CN20	connect to chassis heater, 208-230V AC when is ON
5	HEAT2	CN24/CN25	connect to compressor heater, 208-230V AC when is ON
6	4-WAY	CN17/ CN18	connect to 4 way valve, 208-230V AC when is ON.
7	AC-FAN2	CN28/ CN31/ CN36	connect to AC fan2
8	AC-FAN1	CN27/ CN32/ CN34	connect to AC fan1
9	H-PRO,L-RPO	CN10	connect to high and low pressure swtich(pin1-pin2&pin3-pin4:5VDC pulse wave)
10	OLP TEMP. SENSOR	CN14	connect to compressor top temp. sensor (5VDC Pulse wave)
11	T2B	CN11	connect to pipe temp. sensor T2B
12	T3 T4	CN9	connect to pipe temp. sensor T3, ambient temp. sensor T4
13	Electronic Expansion valve	CN15	connect to Electric Expansion Valve A
		CN23	connect to Electric Expansion Valve B
		CN26	connect to Electric Expansion Valve C
		CN30	connect to Electric Expansion Valve D
		CN33	connect to Electric Expansion Valve E
		CN38	connect to Electric Expansion Valve F
14	/	CN6	connect to IPM&PFC board CN9
15	PQE	CN22	485 communication

Table 25

8.3.5 IPM: Multi Zone Regular 48K & Max Performance 36K, 48K

BMS500-AAM048-1CSXRC, BMS500-AAM036-1CSXHC, BMS500-AAM048-1CSXHC

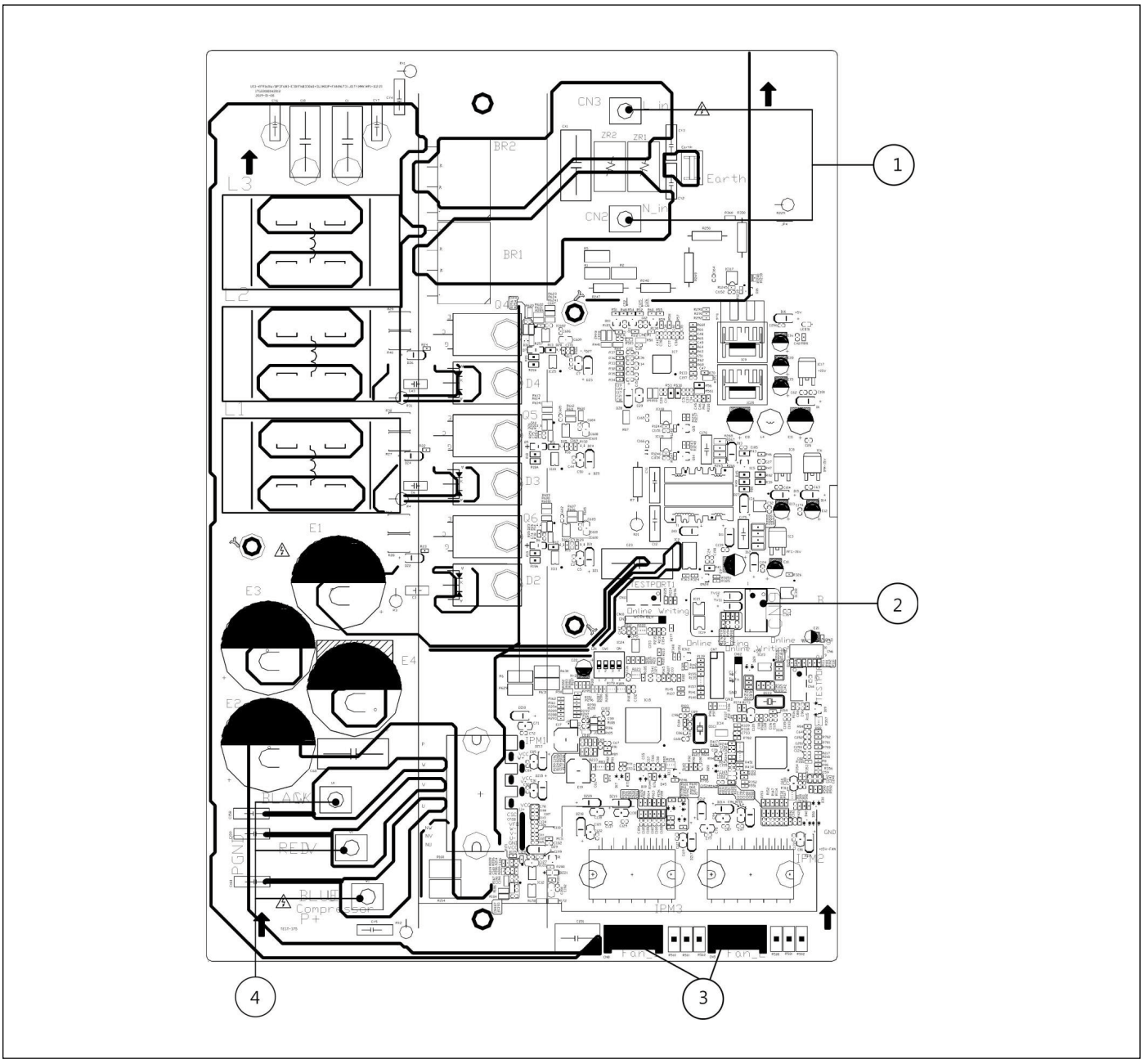


Figure 43

No.	Name	CN#	Meaning
1	Power Supply	CN3	connect to main board L-Out
		CN2	connect to main board N-Out
2	/	CN9	Connect to main PCB CN6
3	FAN_DC	FAN_1/FAN_2	connect to outdoor DC fan 1& DC fan 2
4	HEAT1	U1	Connect to compressor
	HEAT2	V1	
	4-WAY	W1	

Table 26

8.4 Outdoor Unit Display

8.4.1 Outdoor Unit Point Check Function

A check switch is included on the outdoor PCB. Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed. See Tables 17 & 18.

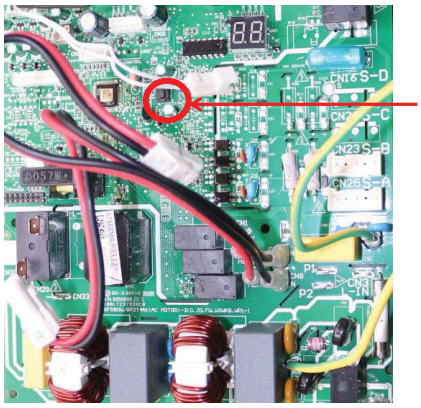


Figure 44

<table>
<tr><th>Number of Presses</th><th>Display</th><th>Remark</th></tr>
<tr><td>0</td><td>Normal display</td><td>Displays running frequency, running state, or malfunction code</td></tr>
<tr><td>1</td><td>Quantity of indoor units with working connection</td><td>Actual data<table><tr><th>Display</th><th>Number of indoor unit</th></tr><tr><td>1</td><td>1</td></tr><tr><td>2</td><td>2</td></tr><tr><td>3</td><td>3</td></tr><tr><td>4</td><td>4</td></tr><tr><td>5</td><td>5</td></tr></table></td></tr>
<tr><td>2</td><td>Outdoor unit running mode code</td><td>Off: 0, Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4. Forced Defrost: A</td></tr>
<tr><td>3</td><td>Indoor unit A capacity</td><td rowspan="5">Current capacity/horse power
If the indoor unit is not connected,
the digital display shows the following: “——”
(9K:1HP,12K:1.2HP,18K:1.5HP,24K:2.0HP)</td></tr>
<tr><td>4</td><td>Indoor unit B capacity</td></tr>
<tr><td>5</td><td>Indoor unit C capacity</td></tr>
<tr><td>6</td><td>Indoor unit D capacity</td></tr>
<tr><td>7</td><td>Indoor unit E capacity</td></tr>
<tr><td>8</td><td>Indoor unit A capacity demand code</td><td rowspan="5">Norm code*HP
(9K: 1HP,12K: 1.2HP,18K: 1.5HP,24K:2.0HP)</td></tr>
<tr><td>9</td><td>Indoor unit B capacity demand code</td></tr>
<tr><td>10</td><td>Indoor unit C capacity demand code</td></tr>
<tr><td>11</td><td>Indoor unit D capacity demand code</td></tr>
<tr><td>12</td><td>Indoor unit E capacity demand code</td></tr>
<tr><td>13</td><td>Outdoor unit amendatory capacity demand code</td><td>—</td></tr>
<tr><td>14</td><td>The frequency corresponding to the total indoor units' amendatory capacity demand</td><td>—</td></tr>
<tr><td>15</td><td>The frequency after the frequency limit</td><td></td></tr>
<tr><td>16</td><td>The frequency sent to compressor control chip</td><td></td></tr>
<tr><td>17</td><td>Indoor unit A evaporator outlet temperature (T_{2BA})</td><td rowspan="5">If the temperature is lower than -9 °C, the digital display shows “-9.”
If the temperature is higher than 70 °C, the digital display shows “70.”
If the indoor unit is not connected, the digital display shows: “—”</td></tr>
<tr><td>18</td><td>Indoor unit B evaporator outlet temperature (T_{2BB})</td></tr>
<tr><td>19</td><td>Indoor unit C evaporator outlet temperature (T_{2BC})</td></tr>
<tr><td>20</td><td>Indoor unit D evaporator outlet temperature (T_{2BD})</td></tr>
<tr><td>21</td><td>Indoor unit E evaporator outlet temperature (T_{2BE})</td></tr>
</table>

Table 27

Number of Presses	Display	Remark
22	Indoor unit A room temperature (T_1A)	If the temperature is lower than 0 ℃, the digital display shows “0.” If the temperature is higher than 50 ℃, the digital display shows “50.” If the indoor unit is not connected, the digital display shows: “—”
23	Indoor unit B room temperature (T_1B)	
24	Indoor unit C room temperature (T_1C)	
25	Indoor unit D room temperature (T_1D)	
26	Indoor unit E room temperature (T_1E)	
27	Indoor unit A evaporator temperature (T_2A)	If the temperature is lower than -9 ℃, the digital display shows “-9.” If the temperature is higher than 70 ℃, the digital display shows “70.” If the indoor unit is not connected, the digital display shows: “—”
28	Indoor unit B evaporator temperature (T_2B)	
29	Indoor unit C evaporator temperature (T_2C)	
30	Indoor unit D evaporator temperature (T_2D)	
31	Indoor unit E evaporator temperature (T_2E)	
32	Condenser pipe temperature (T3)	
33	Outdoor ambient temperature (T4)	
34	Compressor discharge temperature (TP)	The display value is between 30–129 ℃. If the temperature is lower than 30 ℃, the digital display shows “30.” If the temperature is higher than 99 ℃, the display will show a decimal point. For example, if the digital display shows “0.5", the compressor discharge temperature is 105 ℃.
35	AD value of current	The display value is a hex number. For example, the digital display tube shows “Cd”, it means AD value is 205.
36	AD value of voltage	The display value is a hex number. For example, the digital display tube shows “Cd”, it means AD value is 205.
37	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display will show a decimal point. For example, if the digital display shows “2.0", the EXV open angle is 120×4=480 pulse.
38	EXV open angle for B indoor unit	
39	EXV open angle for C indoor unit	
40	EXV open angle for D indoor unit	
41	EXV open angle for E indoor unit	
42	Frequency limit symbol	Bit7 Frequency limit caused by IGBT radiator Bit6 Frequency limit caused by PFC Bit5 Frequency limit caused by T4. Bit4 Frequency limit caused by T2. Bit3 Frequency limit caused by T3. Bit2 Frequency limit caused by T5. Bit1 Frequency limit caused by current Bit0 Frequency limit caused by voltage The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by T4, T3, or the current.
43	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units with good connection)
44	Outdoor unit fan motor state	Off: 0, High speed: 1, Med speed: 2, Low speed: 3, Breeze: 4, Super breeze: 5
45	The last error or protection code	00 means no malfunction and protection
46	F indoor unit capacity	
47	F indoor unit capacity demand code	
48	F indoor unit evaporator outlet temperature ($T_{2B}F$)	
49	F indoor unit room temperature (T_1F)	
50	F indoor unit evaporator temperature (T_2F)	
51	EXV open angle for F indoor unit	
52	Reason of stop	
53	EVI valve target angle(only for M5OG-48HFN1-M-[X])	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example, the digital display tube show “2.0”,it means the EXV open angle is 120×4=480p.)"
54	EVI valve open angle(only for M5OG- 48HFN1-M-[X])	
55	EVI valve angle(only for M5OG-48HFN1-M- [X])	

Table 28

For M2OA 18HFN1 M

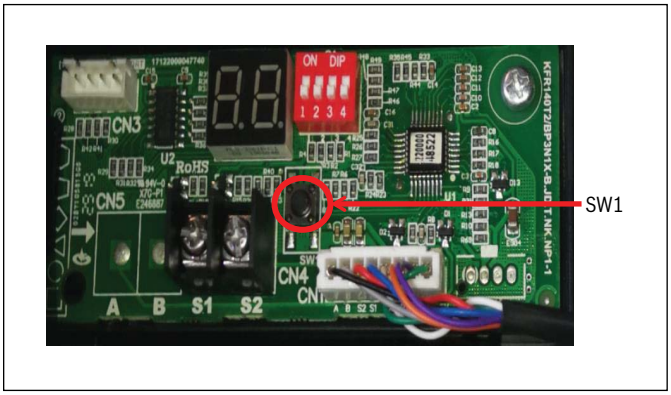


Figure 45

Number of Presses	Display	Remark
0	Normal display	Displays running frequency, running state, or malfunction code
1	Quantity of indoor units with working connection	Actual data Display: 1 → Number of indoor unit: 1 Display: 2 → Number of indoor unit: 2 Display: 3 → Number of indoor unit: 3 Display: 4 → Number of indoor unit: 4 Display: 5 → Number of indoor unit: 5
2	Outdoor unit running mode code	Off: 0, Fan only: 1, Cooling: 2, Heating: 3, Forced cooling: 4. Forced Defrost: A
3	Indoor unit A capacity	Current capacity/horse power If the indoor unit is not connected, the digital display shows the following: "——" (9K:1HP,12K:1.2HP,18K:1.5HP,24K:2.0HP)
4	Indoor unit B capacity	
5	Indoor unit C capacity	
6	Indoor unit D capacity	
7	Indoor unit E capacity	
8	Indoor unit A capacity demand code	Norm code*HP (9K: 1HP,12K: 1.2HP,18K: 1.5HP,24K:2.0HP)
9	Indoor unit B capacity demand code	
10	Indoor unit C capacity demand code	
11	Indoor unit D capacity demand code	
12	Indoor unit E capacity demand code	
13	Outdoor unit amendatory capacity demand code	—
14	The frequency corresponding to the total indoor units' amendatory capacity demand	—
15	The frequency after the frequency limit	
16	The frequency sent to compressor control chip	
17	Indoor unit A evaporator outlet temperature ($T_{2B}A$)	If the temperature is lower than -9 °C, the digital display shows "-9." If the temperature is higher than 70 °C, the digital display shows "70." If the indoor unit is not connected, the digital display shows: "—"
18	Indoor unit B evaporator outlet temperature ($T_{2B}B$)	
19	Indoor unit C evaporator outlet temperature ($T_{2B}C$)	
20	Indoor unit D evaporator outlet temperature ($T_{2B}D$)	
21	Indoor unit E evaporator outlet temperature ($T_{2B}E$)	

Table 29

Number of Presses	Display	Remark		
22	Indoor unit A room temperature (T_1A)	If the temperature is lower than 0 ℃, the digital display shows “0.” If the temperature is higher than 50 ℃, the digital display shows “50.” If the indoor unit is not connected, the digital display shows: “—”		
23	Indoor unit B room temperature (T_1B)			
24	Indoor unit C room temperature (T_1C)			
25	Indoor unit D room temperature (T_1D)			
26	Indoor unit E room temperature (T_1E)			
27	Indoor unit A evaporator temperature (T_2A)	If the temperature is lower than -9 ℃, the digital display shows “-9.” If the temperature is higher than 70 ℃, the digital display shows “70.” If the indoor unit is not connected, the digital display shows: “—”		
28	Indoor unit B evaporator temperature (T_2B)			
29	Indoor unit C evaporator temperature (T_2C)			
30	Indoor unit D evaporator temperature (T_2D)			
31	Indoor unit E evaporator temperature (T_2E)			
32	Condenser pipe temperature (T3)			
33	Outdoor ambient temperature (T4)			
34	Compressor discharge temperature (TP)	The display value is between 30–129 ℃. If the temperature is lower than 30 ℃, the digital display shows “30.” If the temperature is higher than 99 ℃, the display will show a decimal point. For example, if the digital display shows “0.5", the compressor discharge temperature is 105 ℃.		
35	AD value of current	The display value is a hex number. For example, the digital display tube shows “Cd”, it means AD value is 205.		
36	AD value of AC voltage			
37	AD value of DC voltage			
38	EXV open angle for A indoor unit	Actual data/4. If the value is higher than 99, the digital display will show a decimal point. For example, if the digital display shows “2.0", the EXV open angle is 120×4=480 pulse.		
39	EXV open angle for B indoor unit			
40	EXV open angle for C indoor unit			
41	EXV open angle for D indoor unit			
42	EXV open angle for E indoor unit			
43	MVI valve open angle			
44	EVI valve open angle			
45	Frequency limit symbol	Bit7	Reserve	The display value is a hexidecimal number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1. This means that a frequency limit may be caused by current, IPM or T3.
		Bit6	Frequency limit caused by voltage	
		Bit5	Frequency limit caused by current.	
		Bit4	Reserve.	
		Bit3	Frequency limit caused by IPM.	
		Bit2	Frequency limit caused by T5.	
		Bit1	Frequency limit caused by T3	
		Bit0	Frequency limit caused by T2	
46	T2B fault	00:No fault,01:T2B-A fault, ,02:T2B-B fault ,03:T2B-C fault,04:T2B-D fault, 05:T2B-E fault, 06:T2B-F fault(The display priority is A-B-C-D-E-F)		
47	Average value of T2	(Sum T2 value of all indoor units)/(number of indoor units in good connection)(The heating is the average value of T2, and the cooling is the average value of T2B)		
48	Outdoor unit fan motor state	Off: 0, Super ultra high speed:1, Super high speed:2, High speed:3, Med speed: 4, Low speed: 5, Breeze:6, Super breeze: 7		
49	Reason of stop			

Table 30

Outdoor Unit Digital Display

A digital display is featured on the outdoor PCB.
The LED displays different codes in the following situations:

- Standby: "- -."
- Compressor operation: the running frequency.
- Defrosting mode: "dF" or alternative displays between running frequency and "dF" (ach appears for 0.5s.)
- Forced cooling mode: the LED displays "FC" or alternative displays between running frequency and "FC" (each appears for 0.5s).
- Compressor pre-heating: "PH" or alternative displays between running frequency and "PH" (each appears for 0.5s.)
- Oil return process: "RO" or alternative displays between running frequency and "RO" (each appears for 0.5s.)
- Low ambient cooling mode: "LC" or alternative displays between running frequency and "LC" (each appears for 0.5s.)
- PFC module protection occurs three times within 15 minutes: "E6" or alternates between displays of running frequency and "E6" (each appears for 0.5s.)
- In protection or malfunction, the LED displays an error code or protection code. "PH", "RO", "LC", "E6" are not suitable for M2OA-18HFN1-M, M2OI-18HFN1-M, M3OJ-27HFN1-M, M3OI-28HFN1-M, M4OG-36HFN1-M

8.5 Diagnosis and Solution

8.6.1 EEPROM parameter error (EC 51)

Error Code	EC 51
Malfunction decision conditions	Outdoor PCB main chip does not receive feedback from EEPROM chip.
Supposed causes	▶ Incorrect installation of indoor to outdoor control wire or line voltage wiring ▶ PCB faulty

Table 31

Troubleshooting:

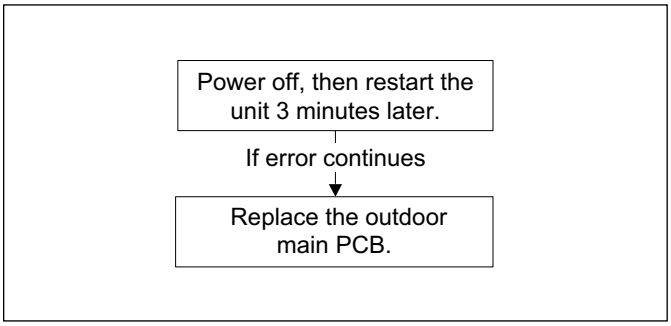


Figure 46

EEPROM: a read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. For the location of EEPROM chip, please refer to the below photos.

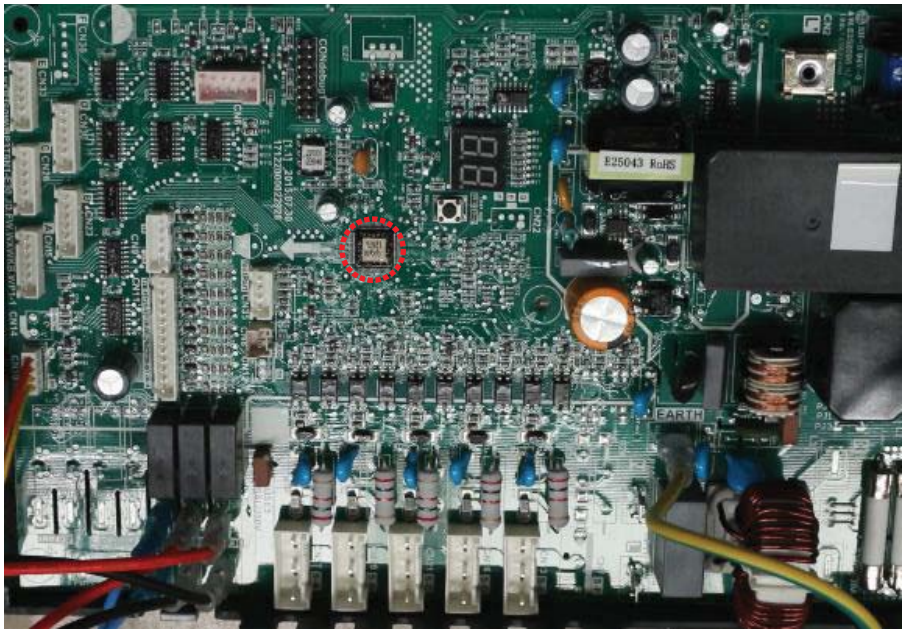


Figure 47

The photo above is for reference only, it may not be identical to the PCB shipped with your equipment.

8.6.2 Indoor / outdoor communication error (EL 01)

Error Code	EL 01
Malfunction decision conditions	Indoor unit does not receive the feedback from outdoor unit for 120 seconds or outdoor unit does not receive the feedback from any one indoor unit for 180 seconds.
Supposed causes	▶ Incorrect installation of indoor to outdoor control wire ▶ Indoor or outdoor PCB faulty

Table 32

Troubleshooting:

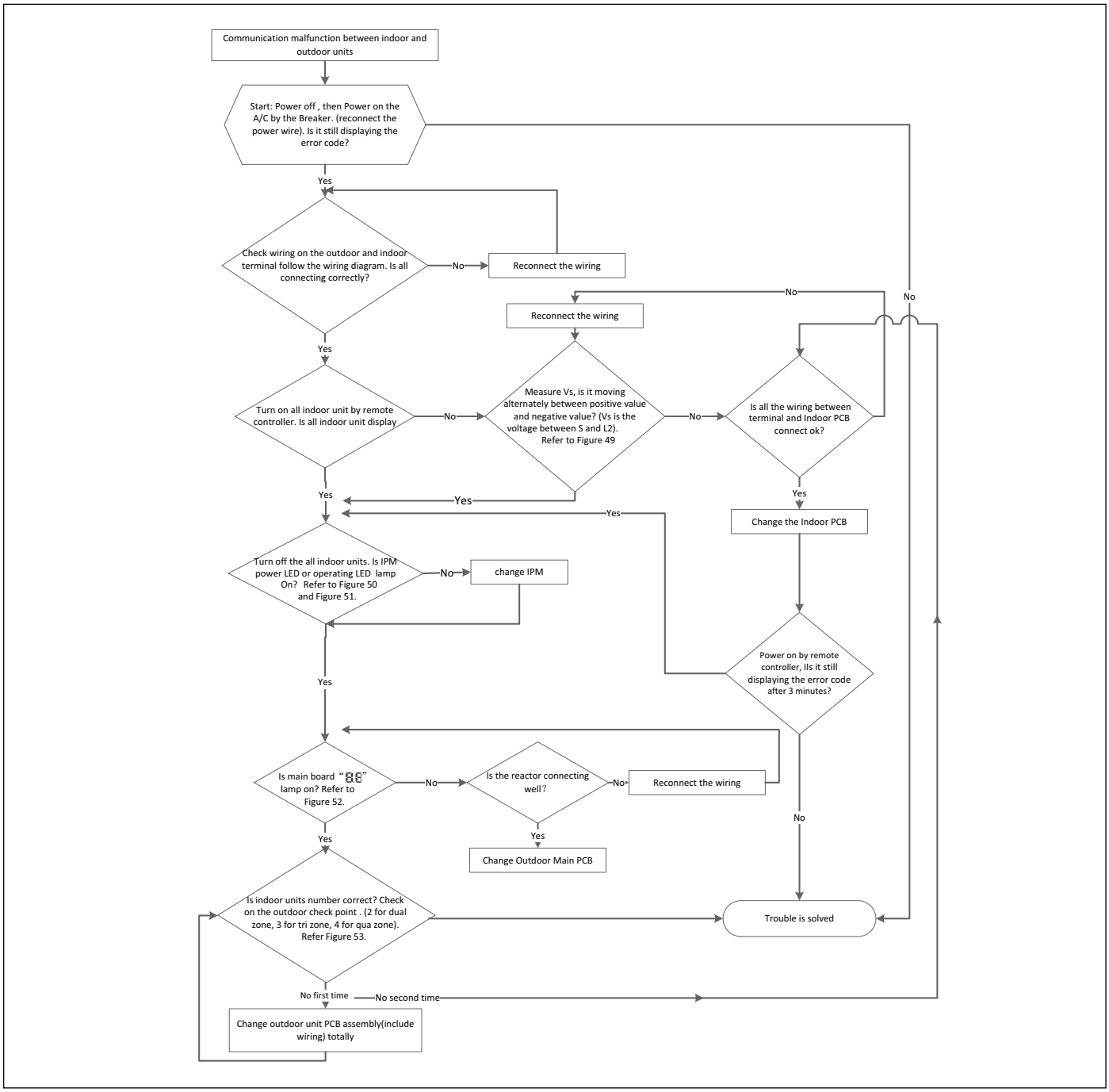


Figure 48

Note:

- Use a multimeter to test the DC voltage between 2 (old: L2) port and 3 port of outdoor unit. The red pin of multimeter connects with 2 (old: L2) port while the black pin is for 3 port. When AC is normal running, the voltage will move alternately between positive value and negative value.

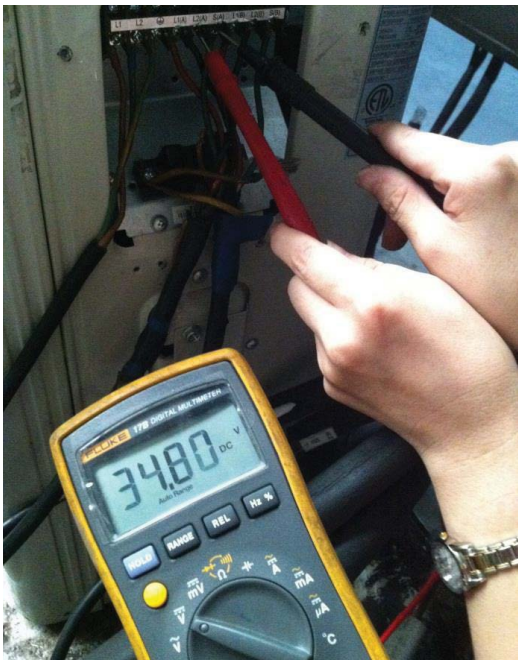


Figure 49

IPM board (18K & 27K Models):

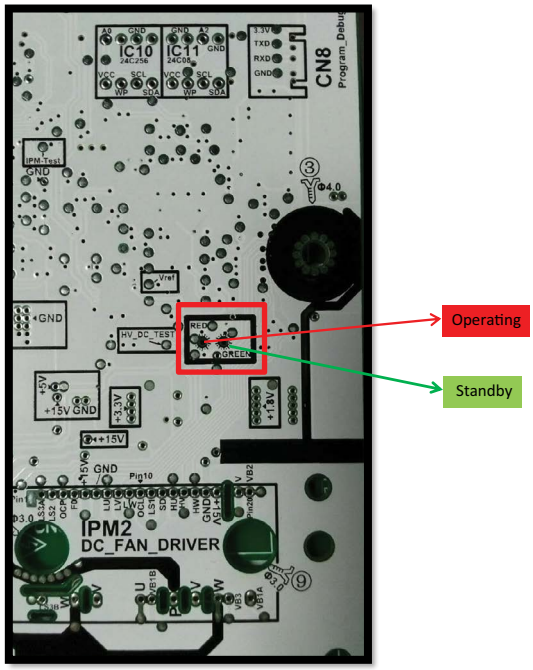


Figure 50

IPM board - Regular: 36K & 48K Models / Max Performance: 27K & 36K Models

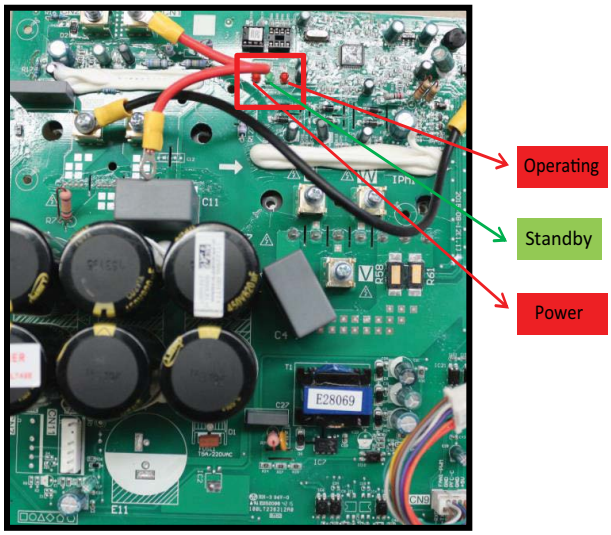


Figure 51

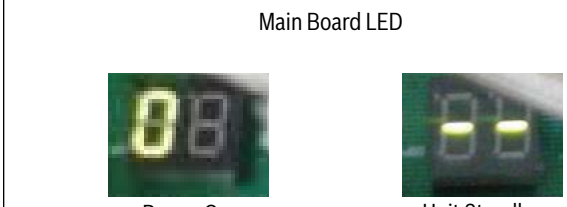


Figure 52

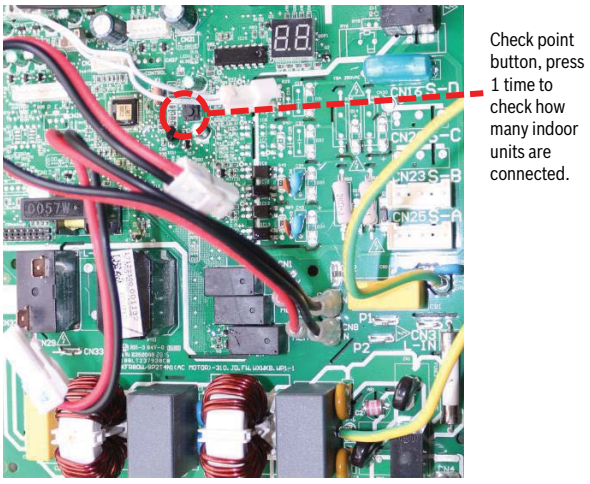


Figure 53

8.6.3 IPM board and outdoor main control board communication error (PC 40)

Error Code	PC 40
Malfunction decision conditions	PCB main chip does not receive feedback from IPM module for 60 seconds.
Supposed causes	▶ Improper / Incorrect Wiring ▶ Outdoor PCB faulty

Table 33

Troubleshooting:

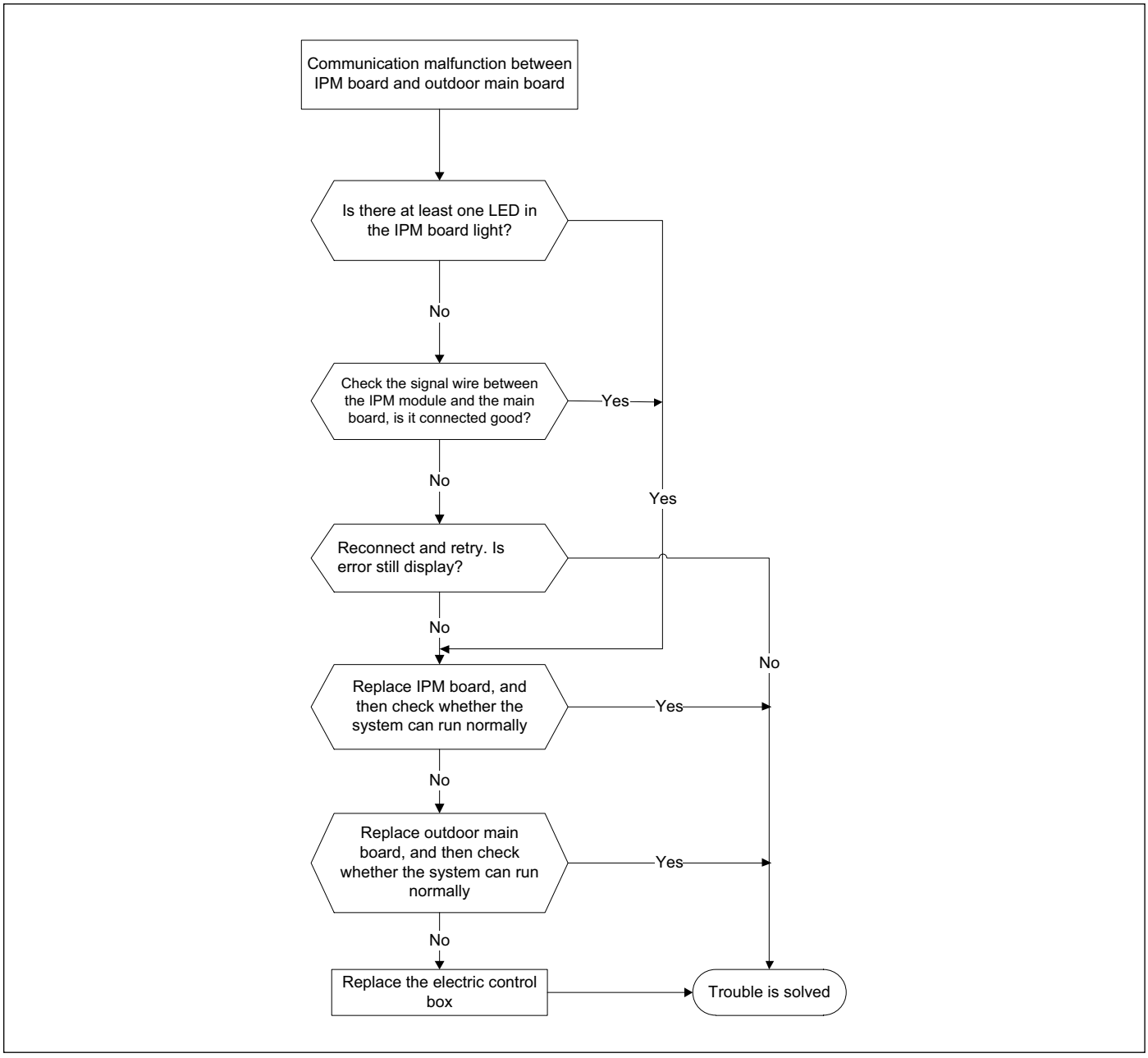


Figure 54

Note:

- Use a multimeter to test the DC voltage between black pin and white pin of signal wire. The normal value should be around 5V.

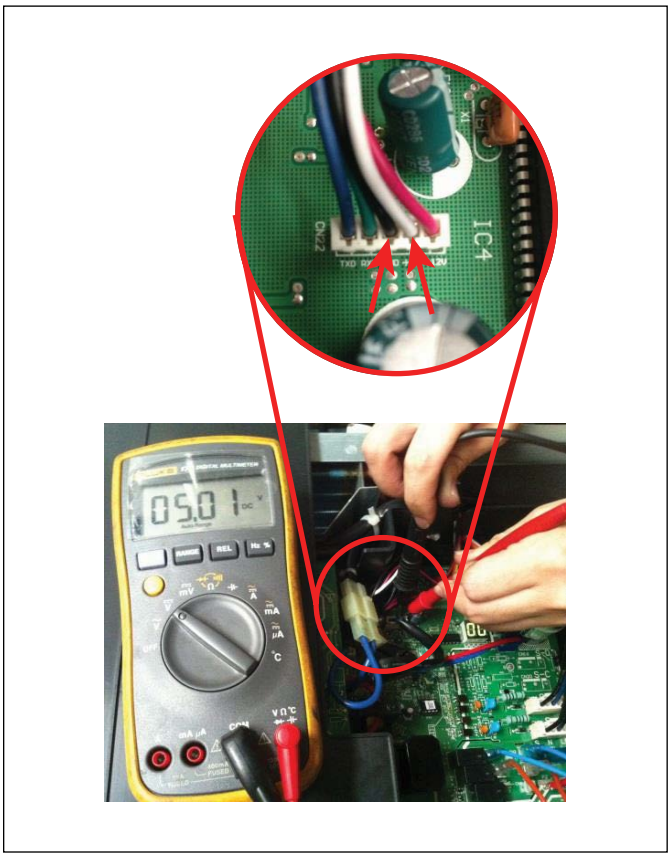


Figure 55

- Use a multimeter to test the DC voltage between black pin and red pin of signal wire. The normal value should be approximately 12V.

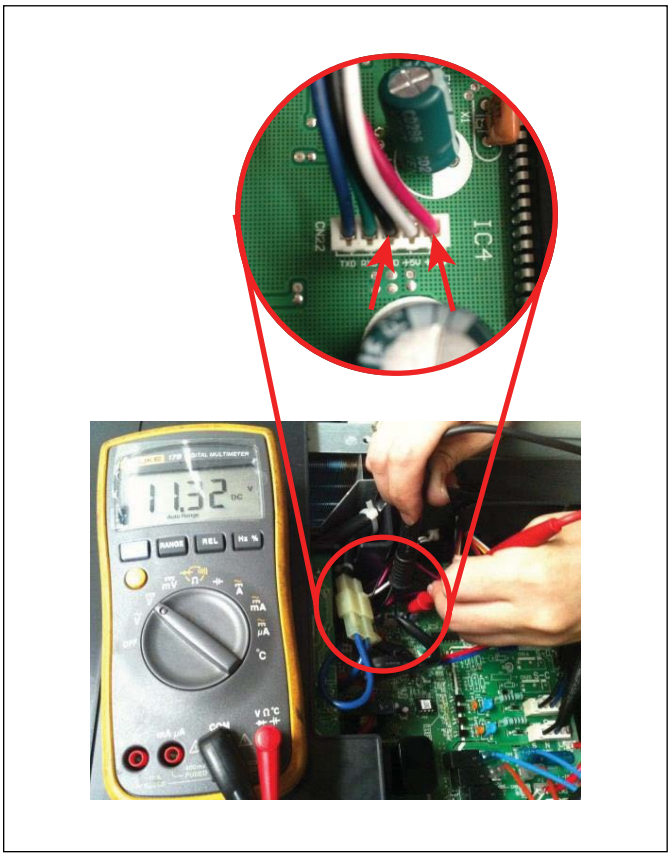


Figure 56

8.6.4 Outdoor temperature sensor (coil sensor T3,ambient sensor T4, Compressor discharge sensor T5 indoor coil outlet pipe sensor T2B) malfunction) (EC 52/EC 53/EC 54/EC 56/EC 50)

Error Code	EC 52/EC 53/EC 54/EC 56/EC 50
Malfunction decision conditions	If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED will display the failure.
Supposed causes	▶ Improper / Incorrect Wiring ▶ Sensor faulty ▶ Indoor / Outdoor PCB faulty

Table 34

Troubleshooting:

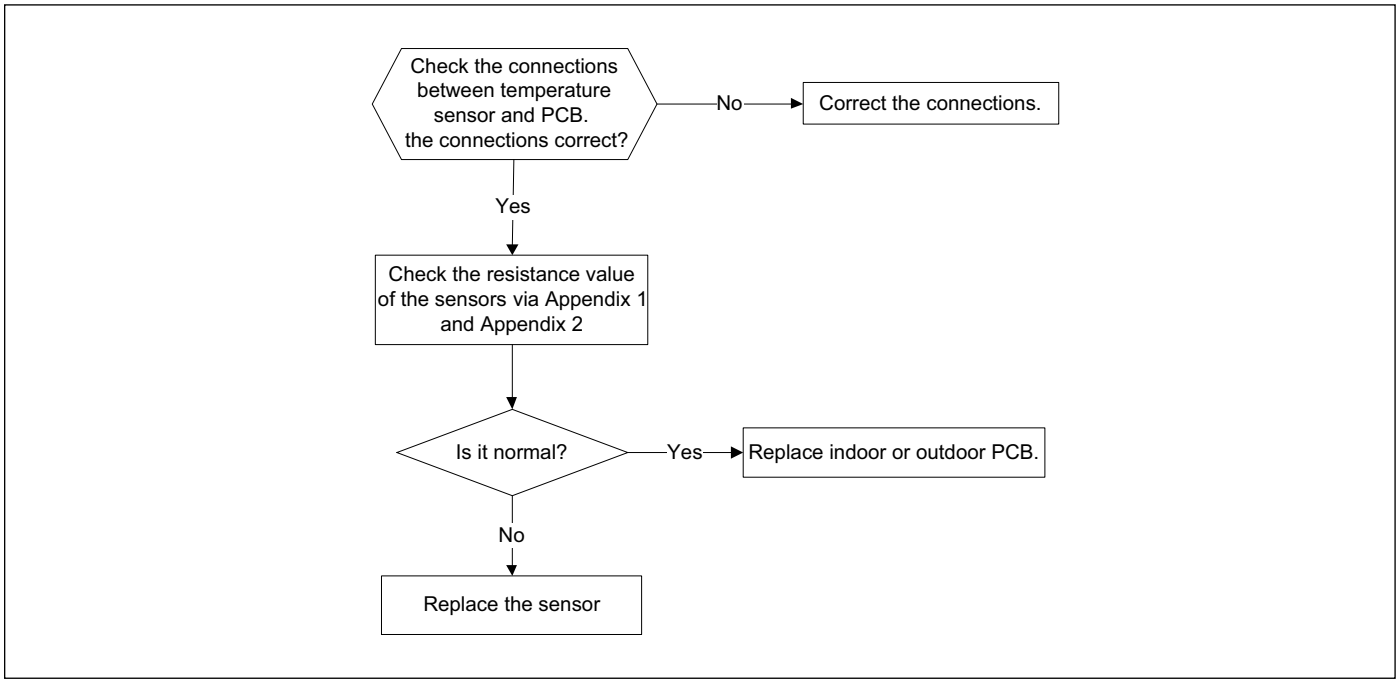


Figure 57

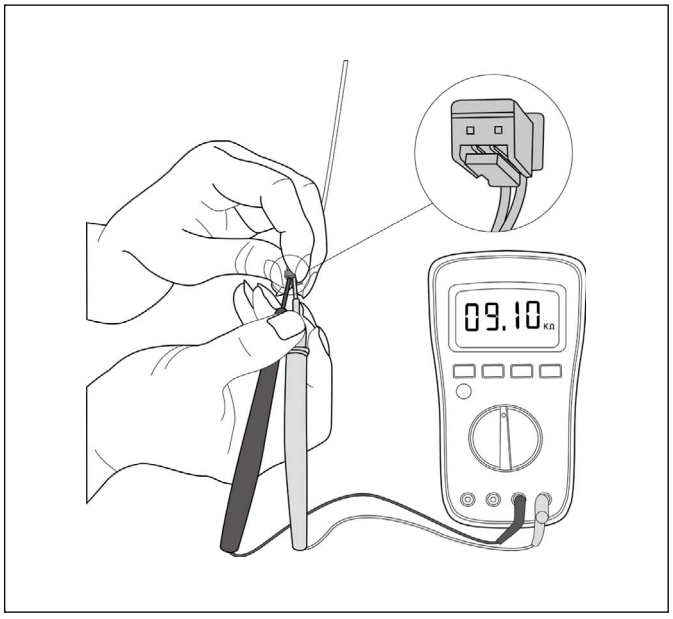


Figure 58

- ▶ Outdoor room temperature sensor T4 is in open circuit or has short circuited(EC 53)
- ▶ Compressor discharge temperature sensor T5 is in open circuit or has short circuited(EC 54)
- ▶ Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited(EC 56)

8.6.5 Over-voltage or under-voltage protection (PC 10/PC 11/PC 12)

Error Code	PC 10/PC 11/PC 12
Malfunction decision conditions	An abnormal voltage rise or drop is detected by checking the specified voltage detection circuit.
Supposed causes	► Power supply problems ► System problems, such as leakage or blockage ► Outdoor PCB faulty

Table 35

Troubleshooting:

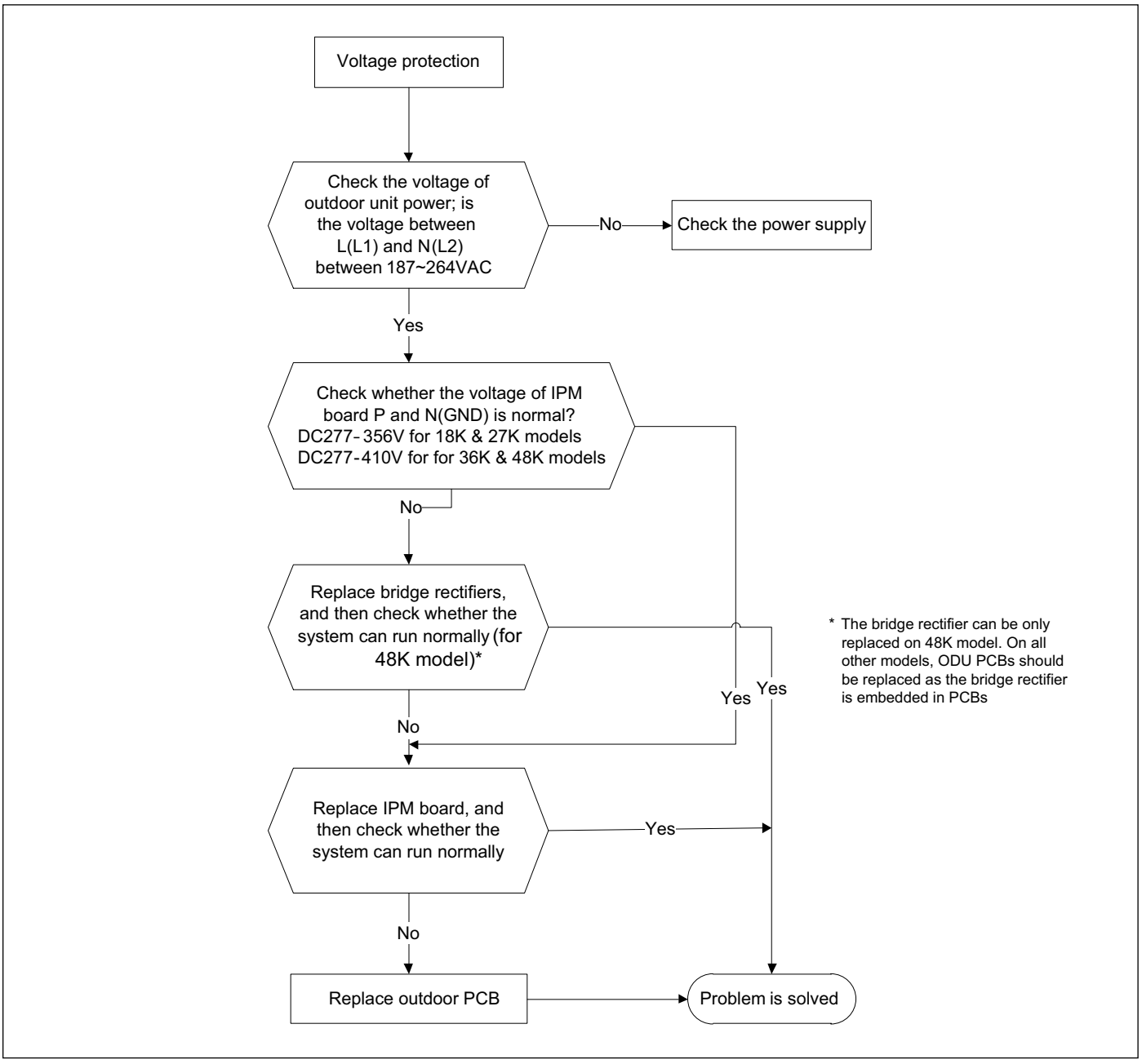


Figure 59

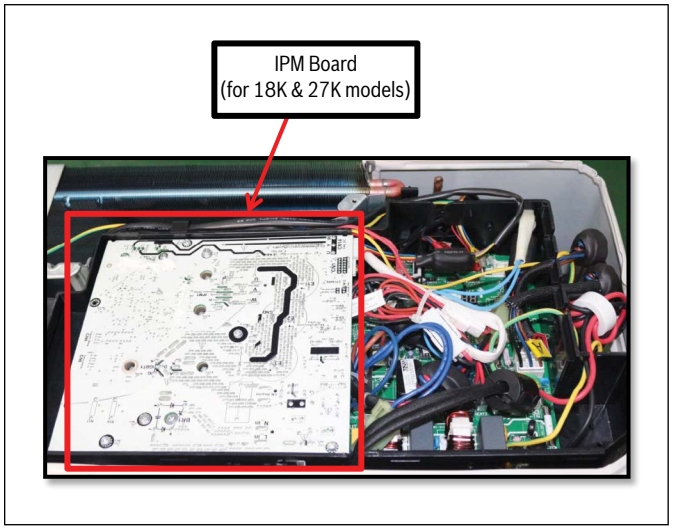


Figure 60

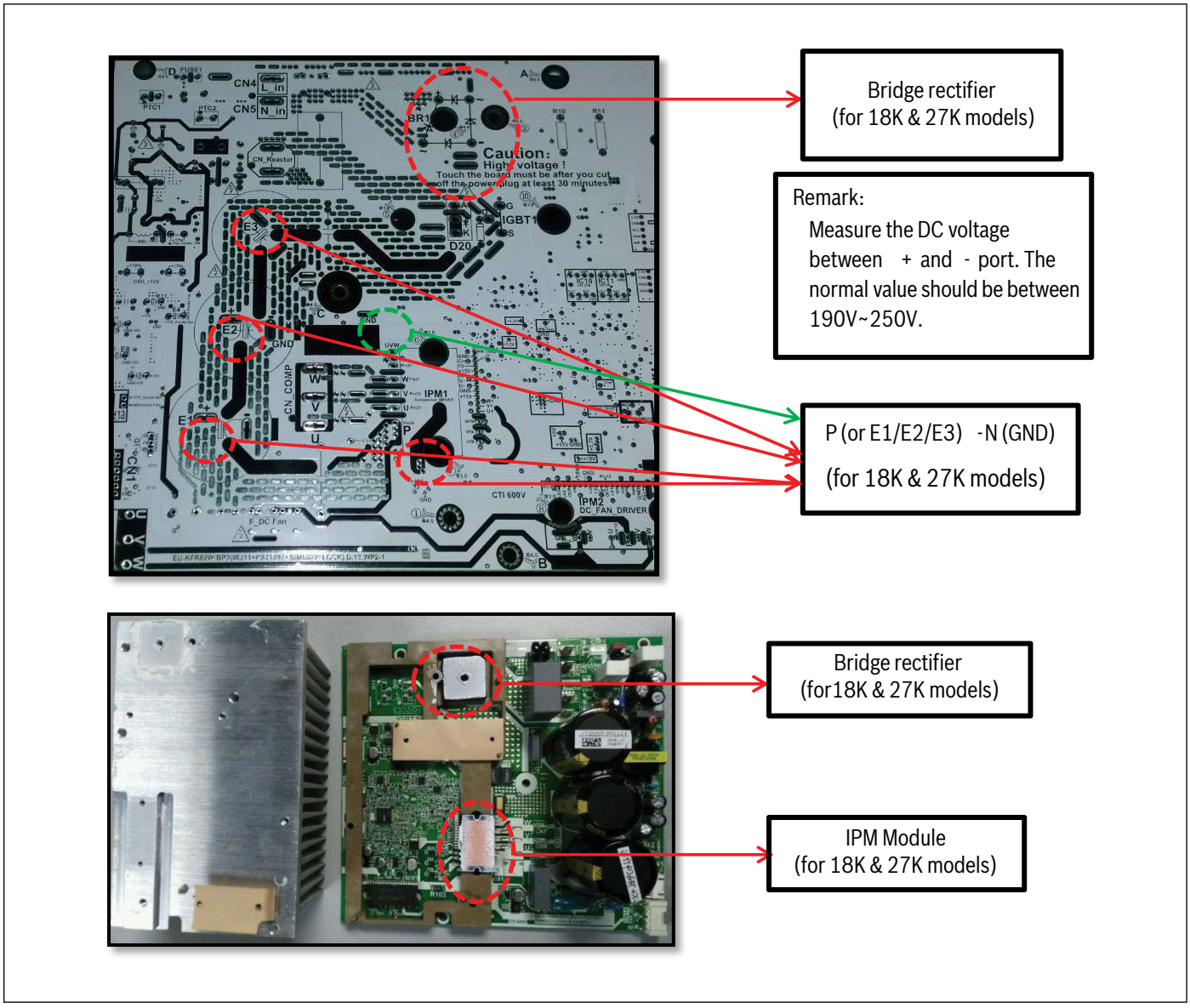


Figure 61

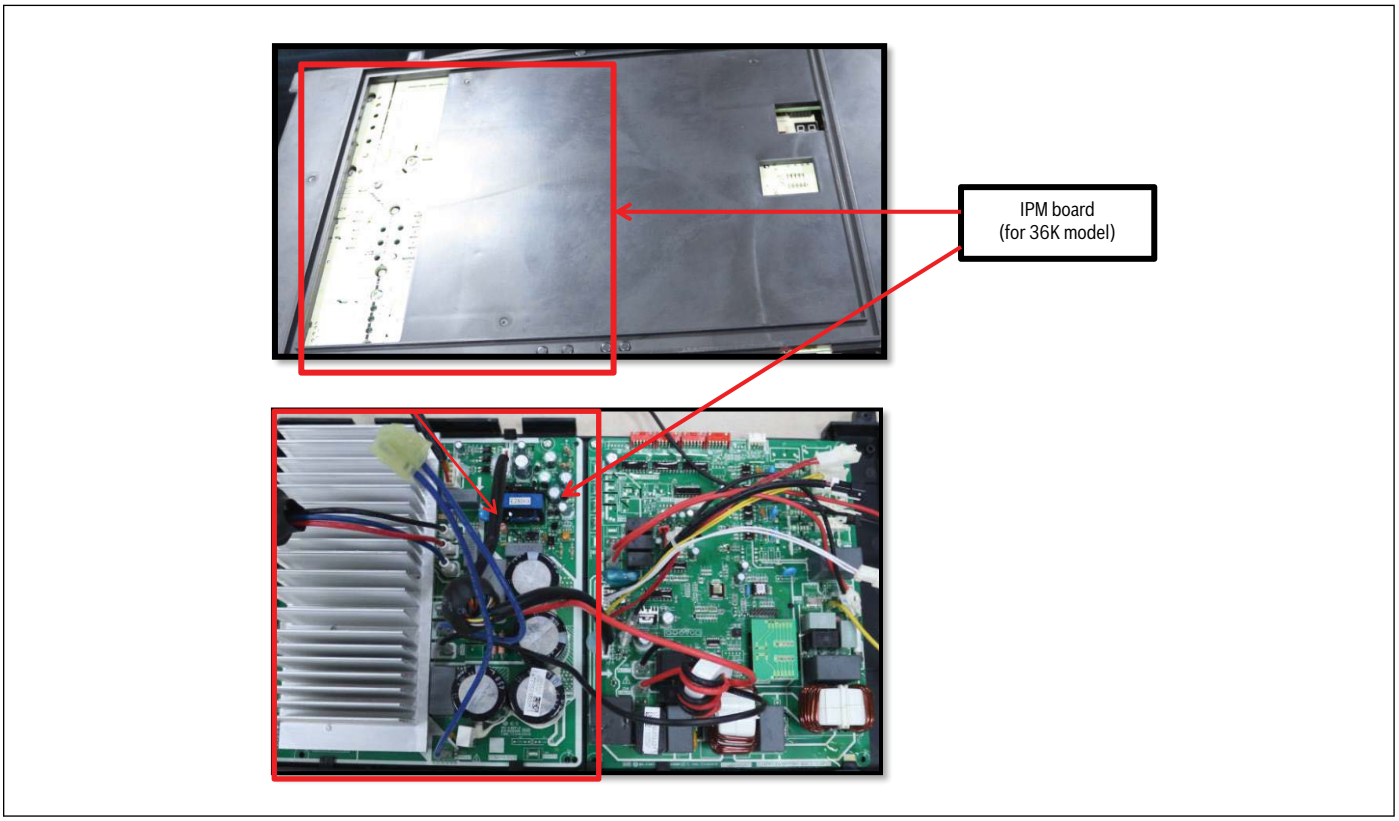
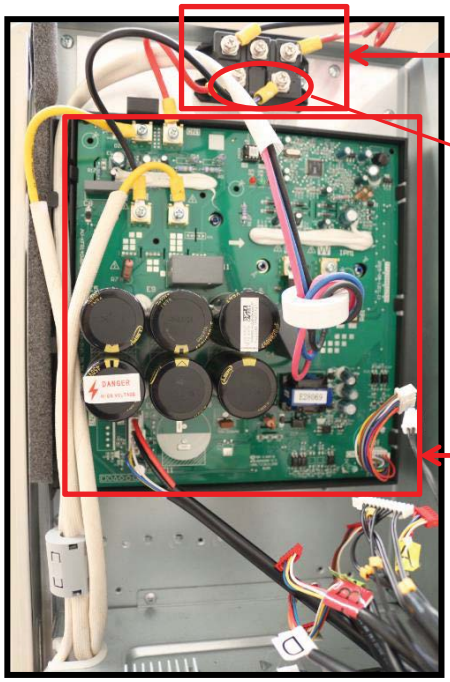


Figure 62



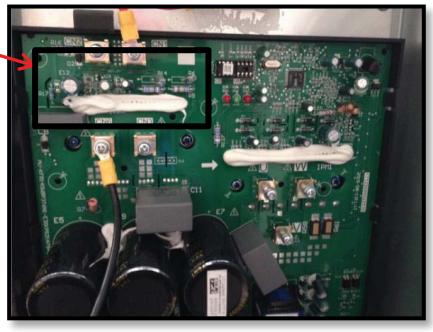
Bridge rectifier
(for 48K model)

Remark:

Measure the DC voltage between + and - port. The normal value should be between 190V~250V.

IPM board
(for 48K model)

IPM Module
(for 48K model only)



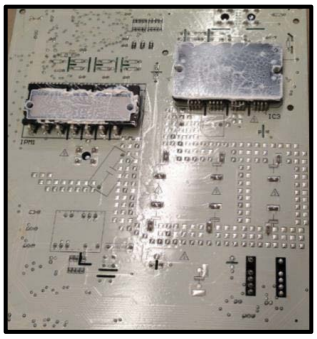


Figure 63

8.6.6 PFC module protection error (PC 0F)

Error Code	PC 0F
Malfunction decision conditions	When the voltage signal that PFC sends to main control board is abnormal, the display LED will show "E6" and AC will turn off.
Supposed causes	► Improper / Incorrect Wiring ► Outdoor PCB faulty ► PFC module inductance faulty ► PFC module faulty

Table 36

Troubleshooting:

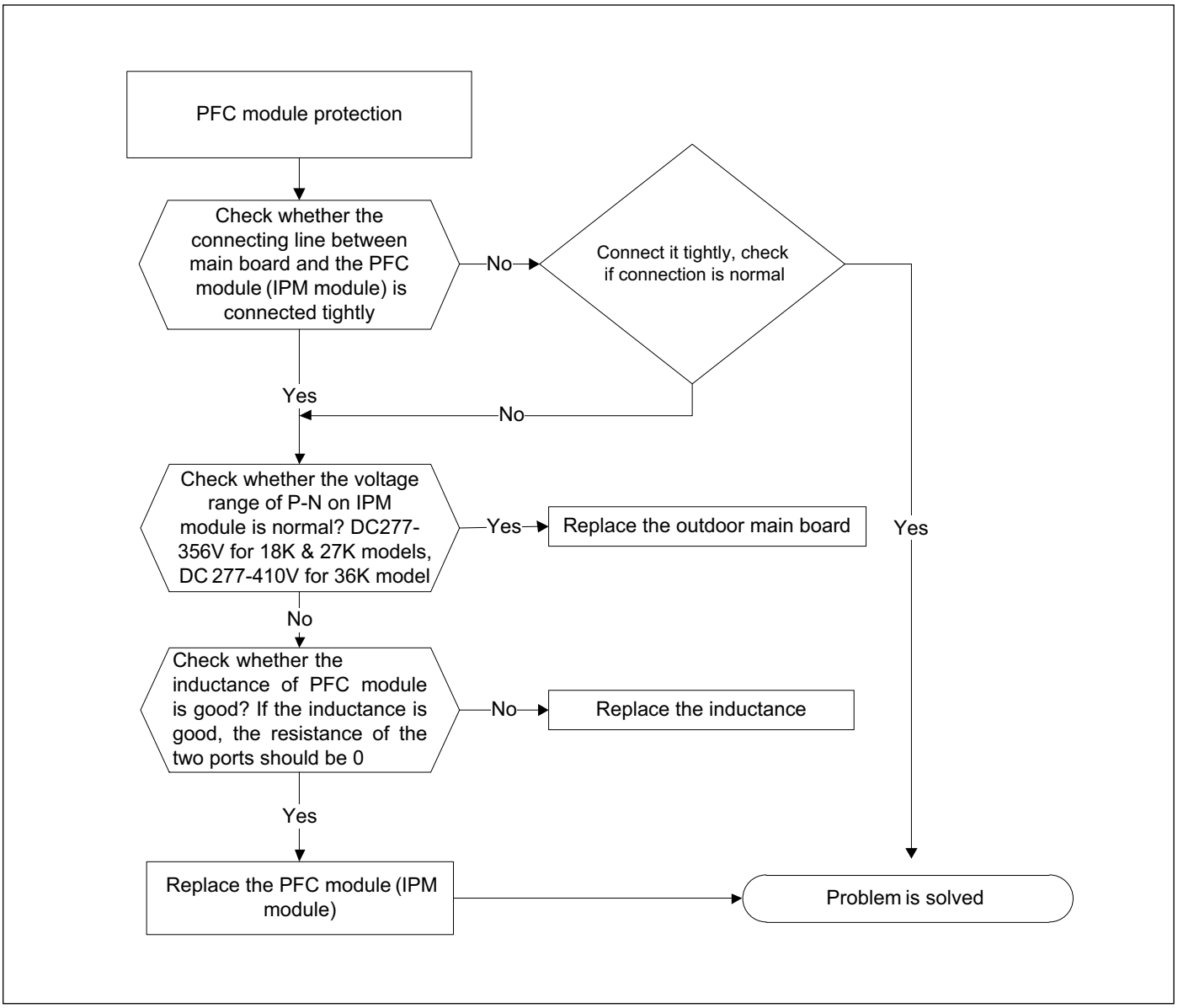


Figure 64

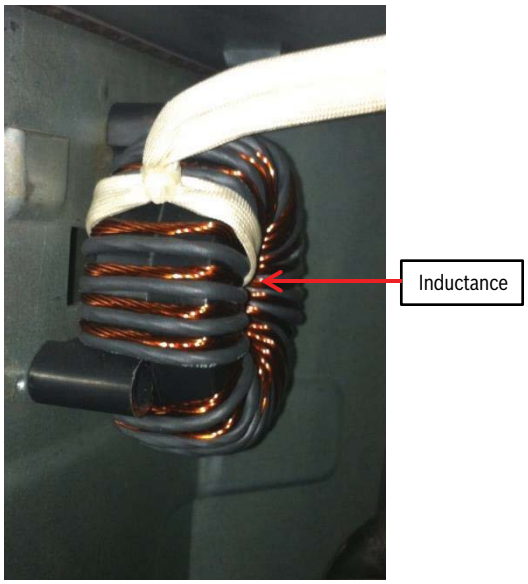


Figure 65

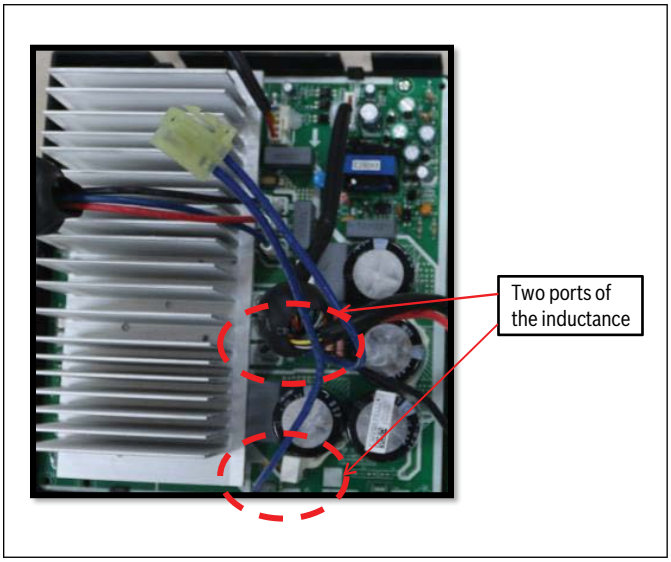


Figure 66

8.6.7 Outdoor fan speed malfunction (EC 07) Over current failure of outdoor DC fan motor (EC 71)

Error Code	EC 07/ EC 71
Malfunction decision conditions	When outdoor fan speed keeps too low (300RPM) or too high(2400RPM) for certain time, the unit will stop and the LED will display the failure.
Supposed causes	► Improper / Incorrect Wiring ► Faulty Fan assembly ► Faulty Fan motor ► Outdoor PCB faulty

Table 37

Troubleshooting:

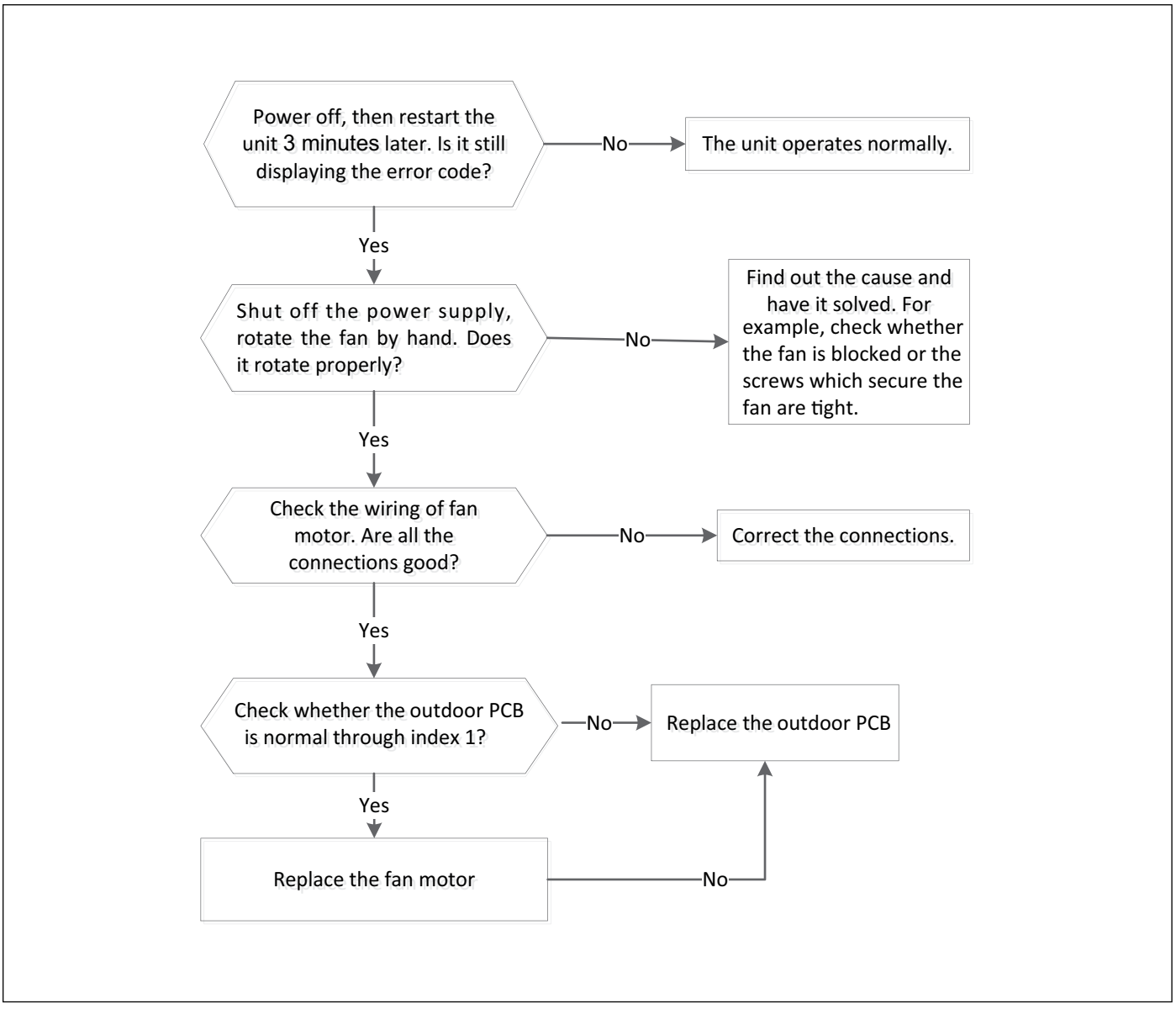


Figure 67

Index 1:

1. DC fan motor(control chip is inside fan motor)

Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin3-pin4 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must have problems and need to be replaced.

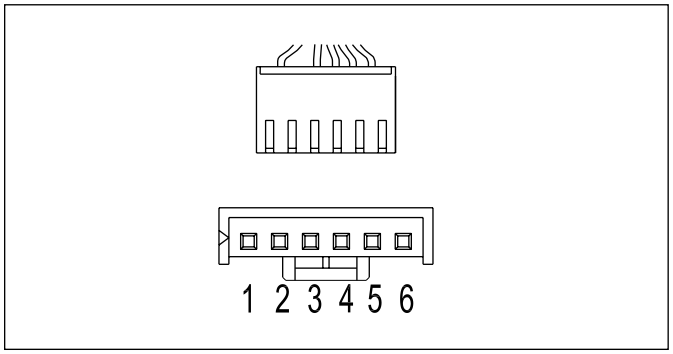


Figure 68

DC motor voltage input and output

NO.	Color	Signal	Voltage
1	Red	Vs/Vm	200~380V
2	---	---	---
3	Black	GND	0V
4	White	Vcc	13.5~16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5~16.5V

Table 38

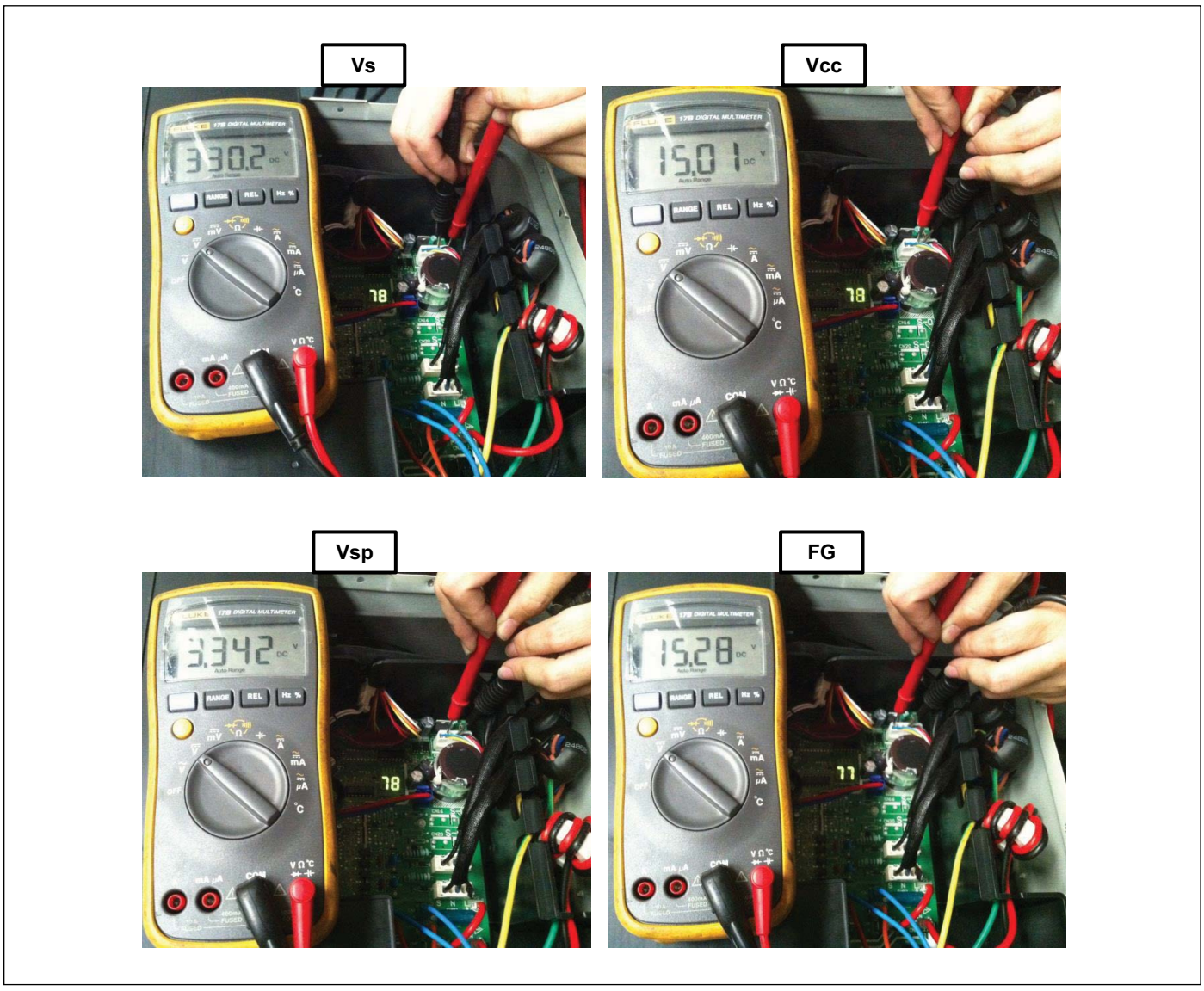


Figure 69

2. DC Fan Motor (control chip is in PCB)

Release the UVW connector. Measure the resistance of U-V, U-W, and V-W. If the resistances are not equal to each other, the fan motor may be experiencing problems and need to be replaced. Otherwise, the PCB must has problems and need to be replaced.

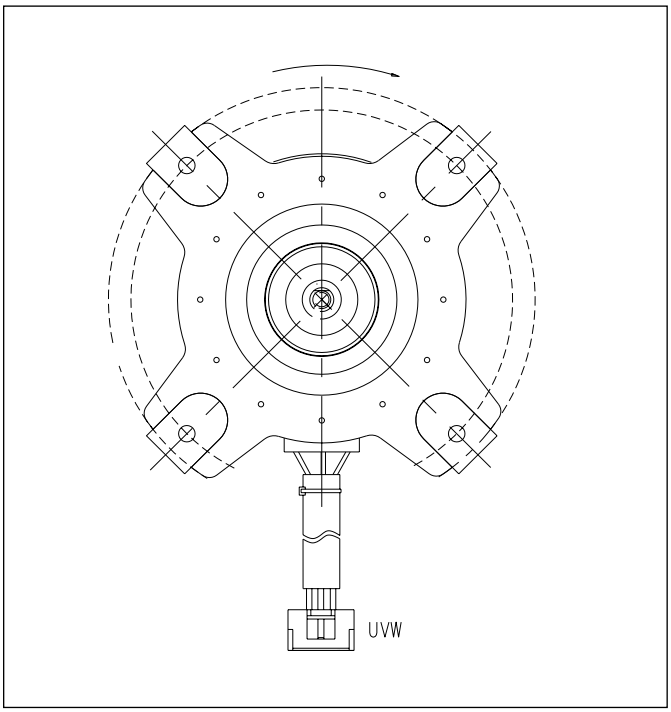


Figure 70

8.6.8 High pressure protection (PC 30)

Error Code	PC 30
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	▶ Improper / Incorrect Wiring ▶ Over load protector faulty ▶ System blockage ▶ Outdoor PCB faulty

Table 39

Troubleshooting:

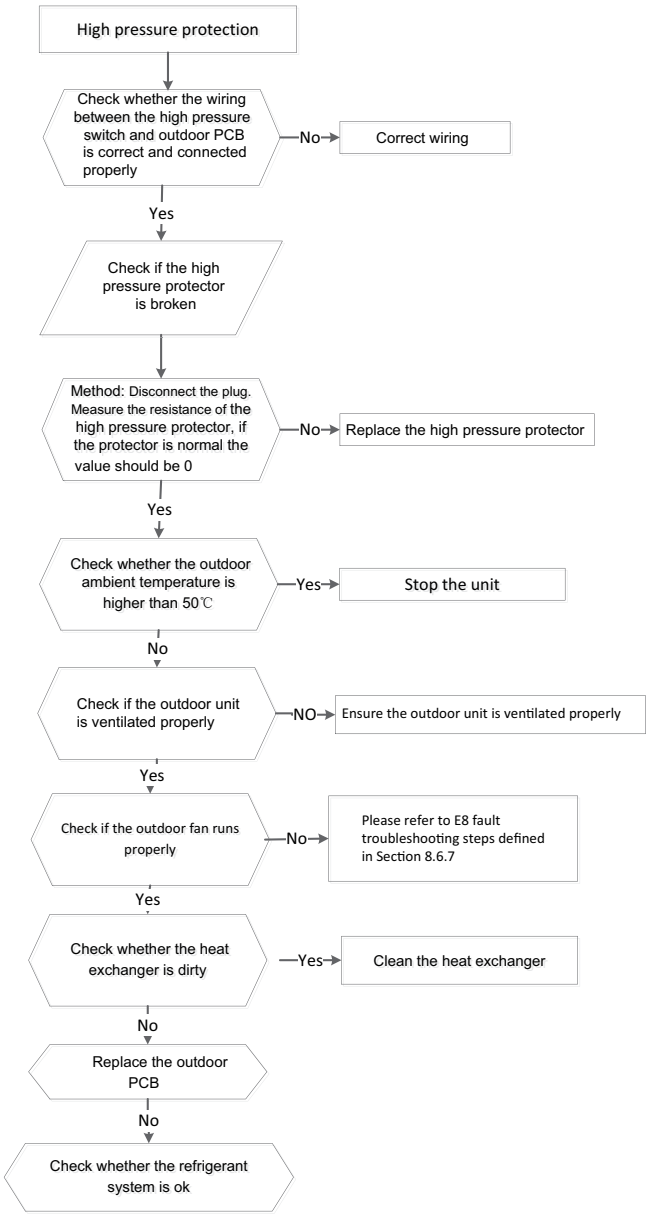
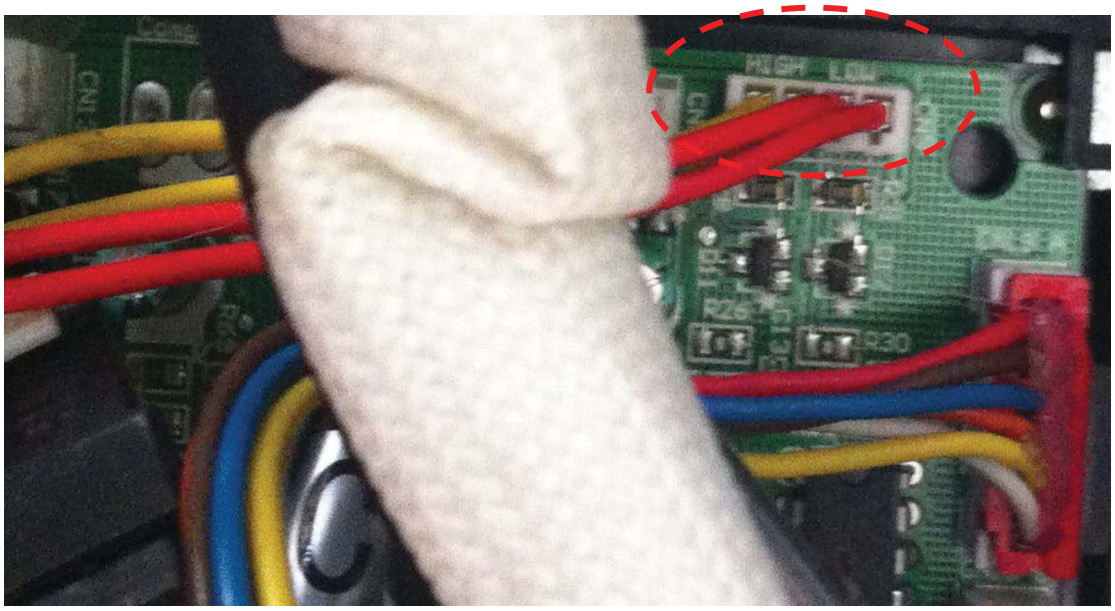


Figure 71



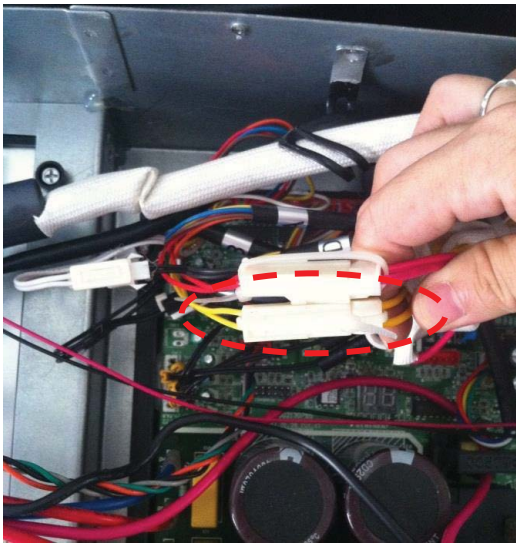


Figure 72

8.6.9 Low pressure protection (PC 31)

Error Code	PC 31
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	▶ Improper / Incorrect Wiring ▶ Over load protector faulty ▶ System blockage ▶ Outdoor PCB faulty

Table 40

Troubleshooting:

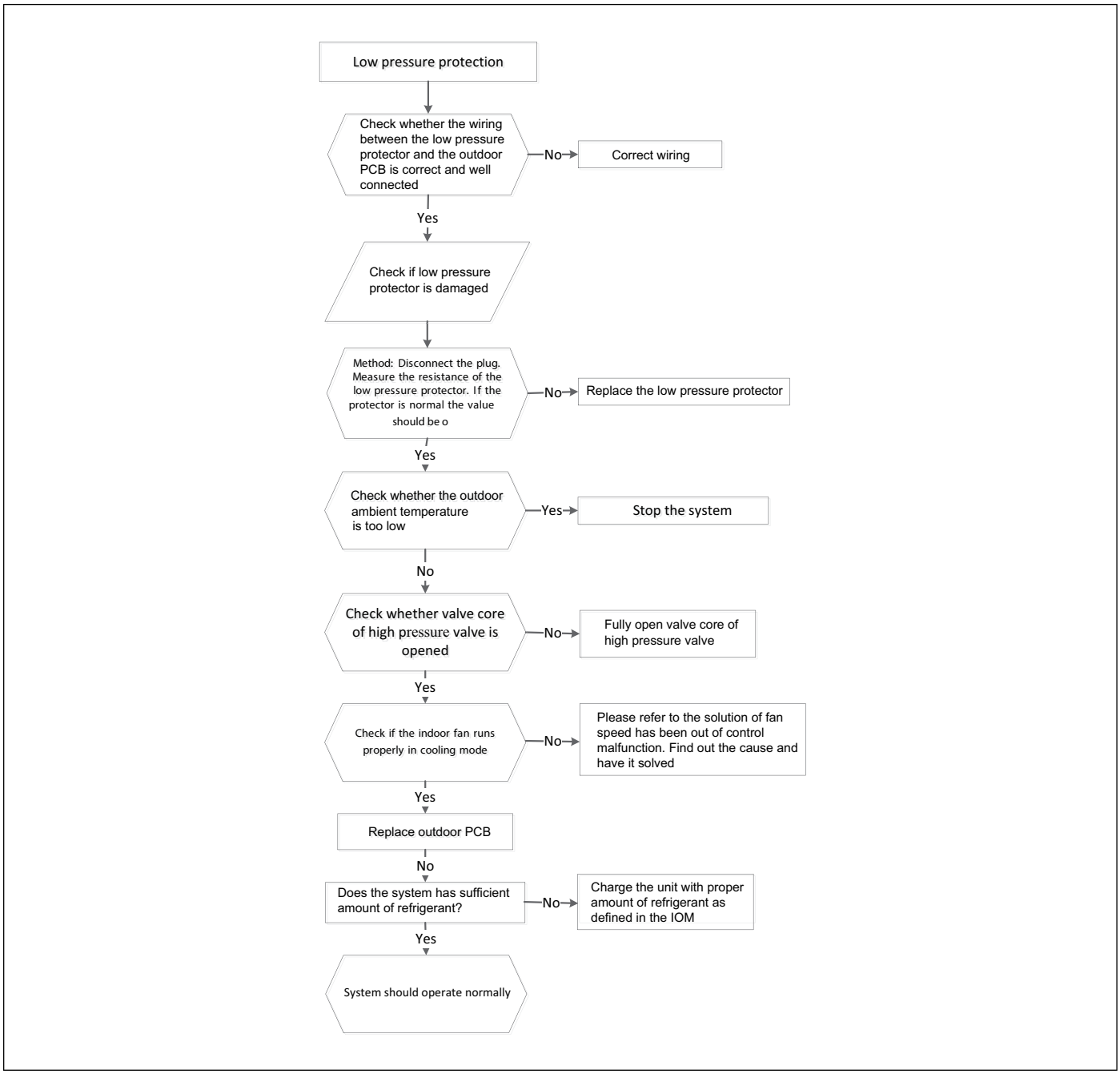
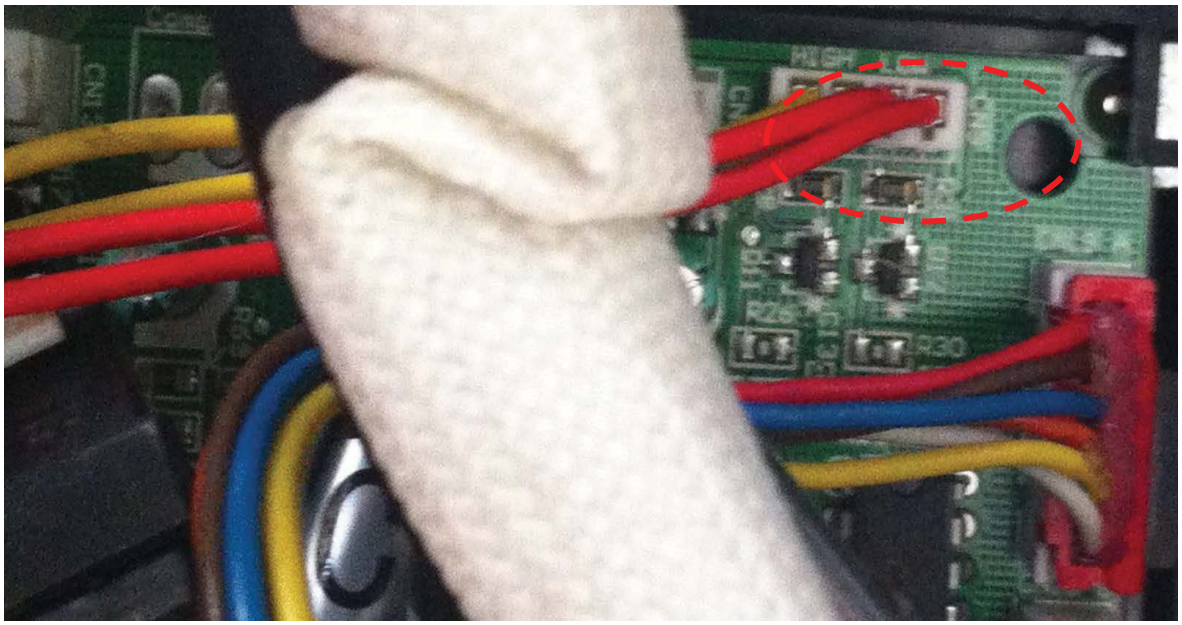


Figure 73



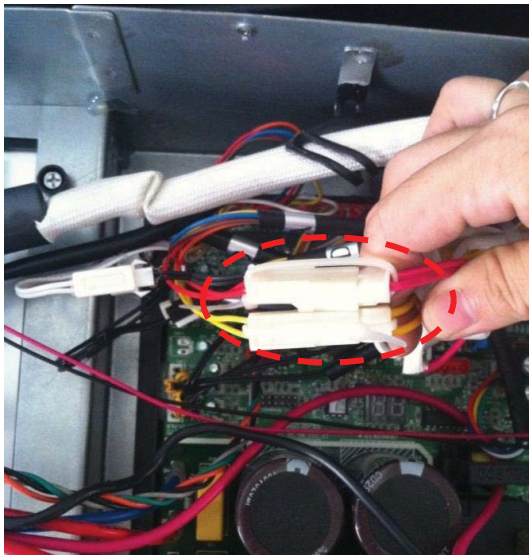


Figure 74

8.6.10 Current overload protection (PC 08) Outdoor unit zero speed protection (PC 44) Compressor speed has been out of control (PC 46)Compressor overcurrent failure (PC 49)

Error Code	PC 08/PC 44/PC 46/PC 49
Malfunction decision conditions	If the outdoor current exceeds the current limit value, the LED will display the failure.
Supposed causes	▶ Improper / Incorrect Wiring ▶ Over load protector faulty ▶ System blockage ▶ Outdoor PCB faulty

Table 41

Troubleshooting:

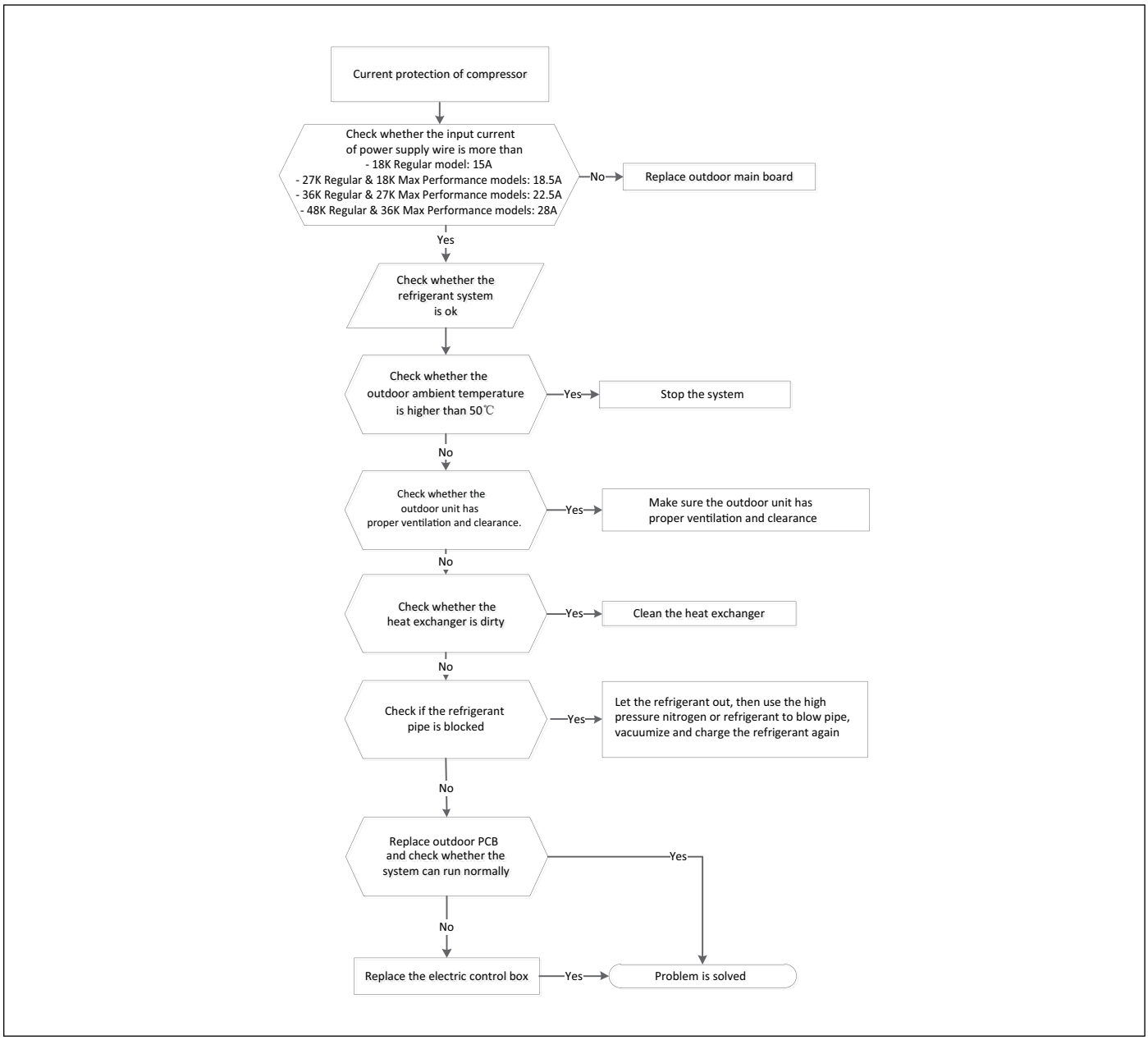


Figure 75


HIOKI 3282
6.53
DIGITAL CLAMP ON HITESTER
600V
CAT IV
COM
TEMP
HIOKI 3282
6.61
DIGITAL CLAMP ON HITESTER
600V
CAT IV
COM
TEMP

Figure 76

8.6.11 Temperature protection of compressor discharge (PC 06)

Error Code	PC 06
Malfunction decision conditions	When the compressor discharge temperature(T5) is more than 115℃ for 10 seconds, the compressor will stop and restart when T5 is less than 90℃.
Supposed causes	▶ Improper / Incorrect Wiring ▶ System refrigerant leakage ▶ Discharge temperature (T5) sensor faulty ▶ Outdoor PCB faulty

Table 42

Troubleshooting:

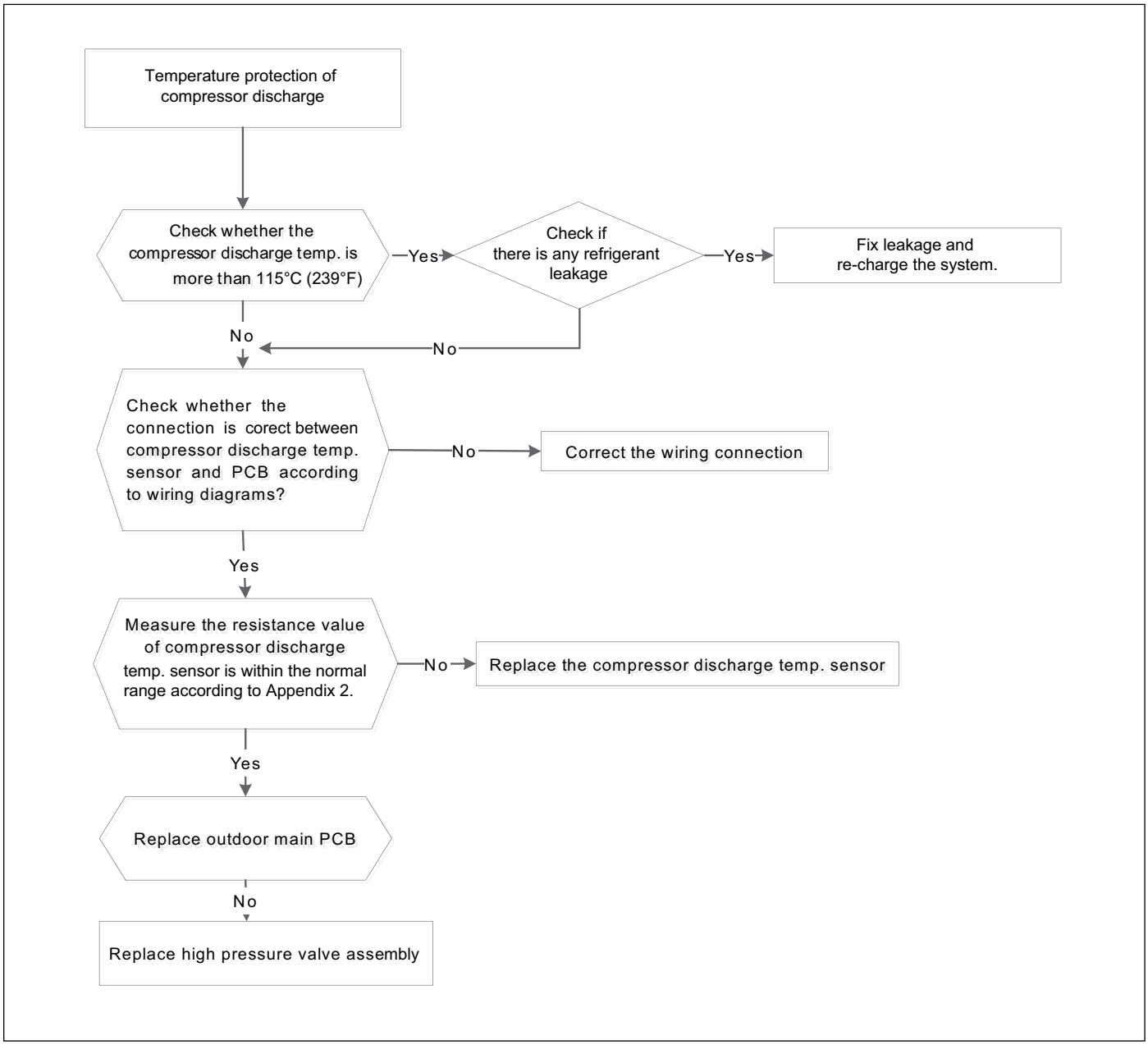


Figure 77

8.6.12 High temperature protection of condenser (PC 0A)

Error Code	PC 0A
Malfunction decision conditions	When the outdoor pipe temperature is more than 65°C, the system will stop. The system will operate again when outdoor pipe temperature is less than 52°C.
Supposed causes	► Condenser temperature sensor (T3) faulty ► Dirty heat exchanger ► System leakage or blockage

Table 43

Troubleshooting:

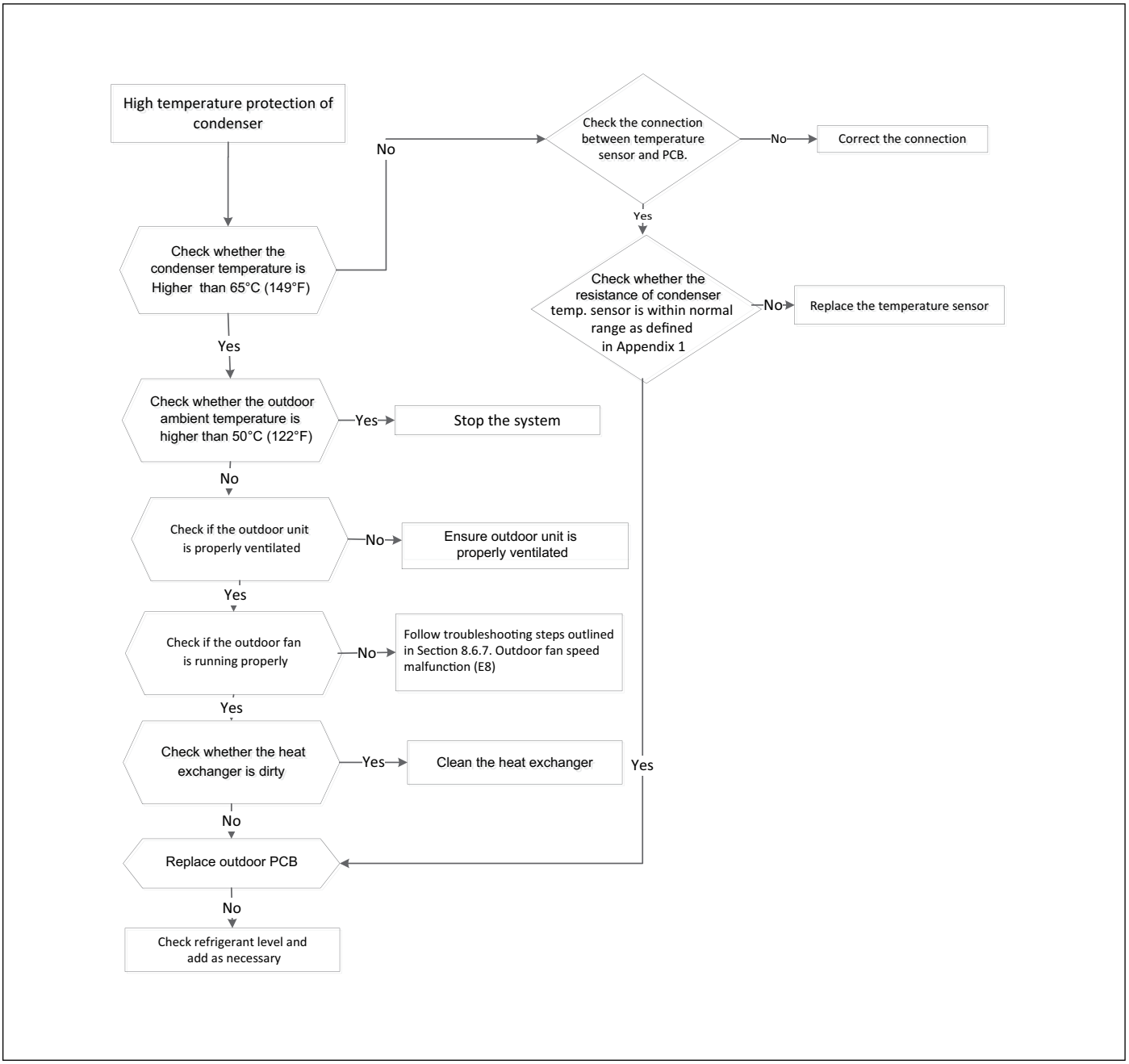


Figure 78

8.6.13 Inverter module (IPM) malfunction (P6)

Error Code	PC 00
Malfunction decision conditions	When the voltage signal that IPM send to compressor drive chip is abnormal, the display LED will show "P6" and AC will turn off.
Supposed causes	▶ Improper / Incorrect Wiring ▶ IPM malfunction ▶ Outdoor fan assembly faulty ▶ Compressor malfunction ▶ Outdoor PCB faulty

Table 44

Troubleshooting:

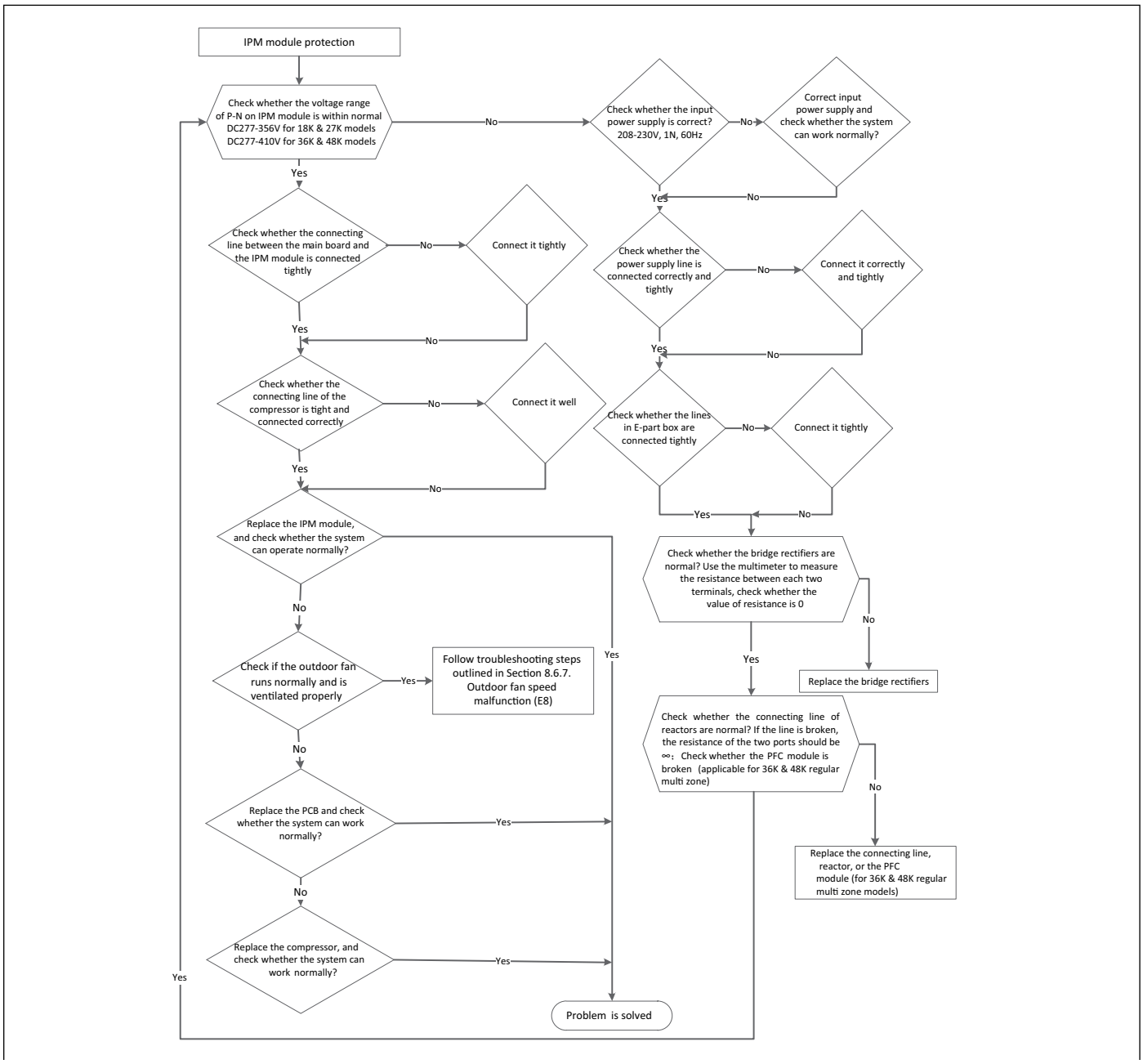


Figure 79

8.6.14 High temperature protection of compressor top (PC 02)

Error Code	PC 02
Malfunction decision conditions	If the sampling voltage is not 5V, the LED will display the failure.
Supposed causes	► Improper / Incorrect Wiring ► Over load protector faulty ► System leakage or blockage ► Outdoor PCB faulty

Table 45

Troubleshooting:

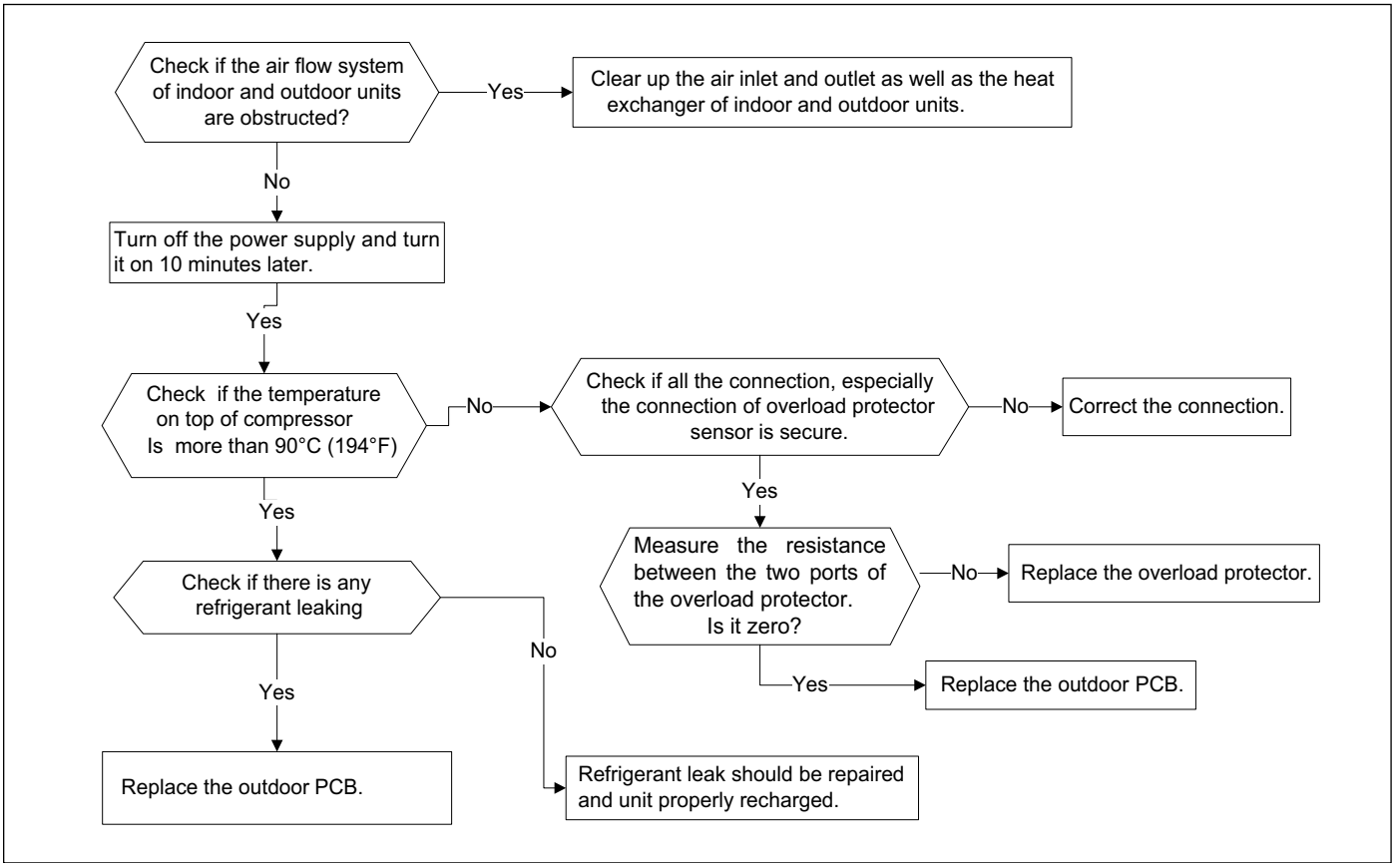


Figure 80

8.6.15 Lack phase failure of outdoor DC fan motor (EC 72)

Troubleshooting:

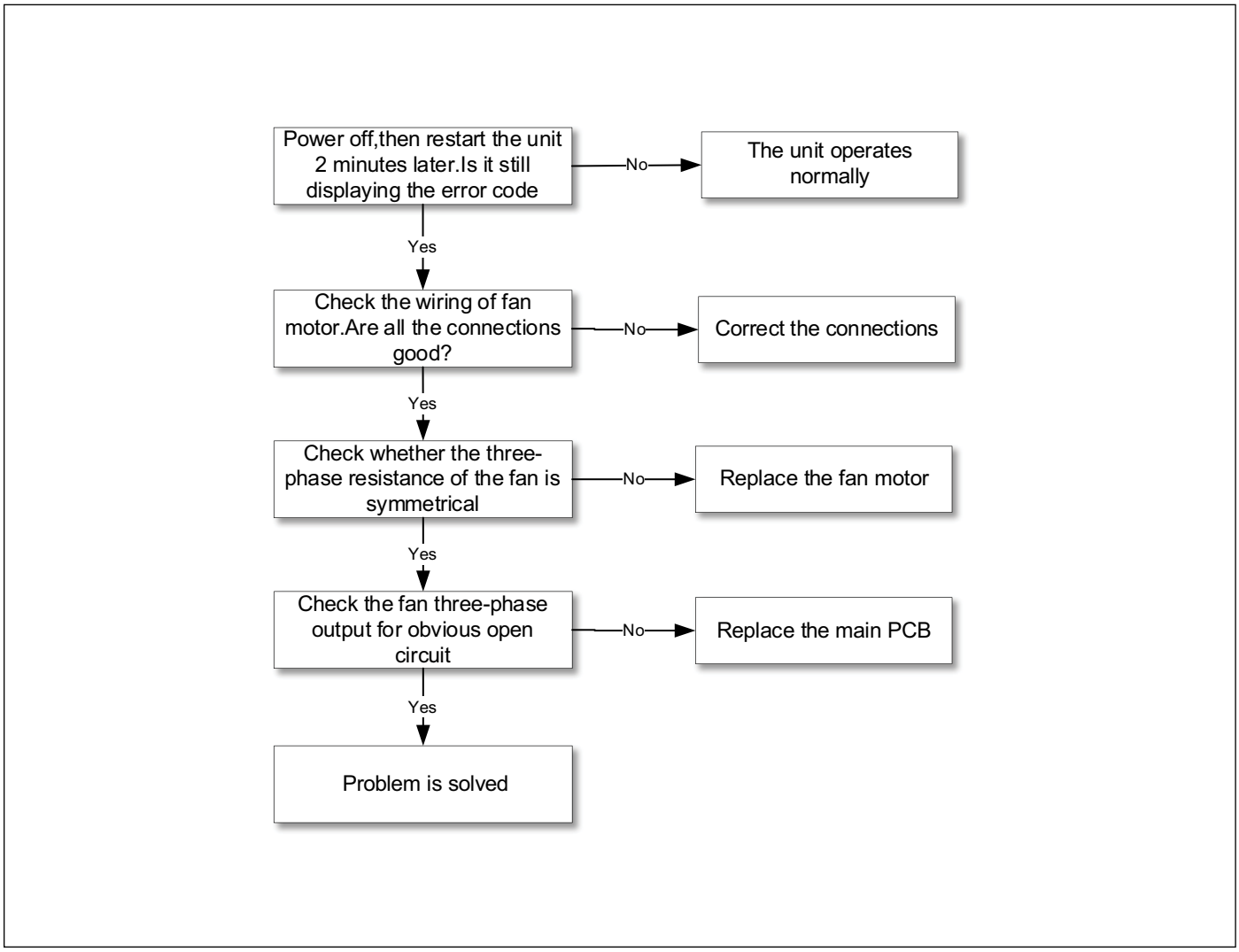


Figure 81

8.6.16 Outdoor compressor lack phase protection (PC 43)

Troubleshooting:

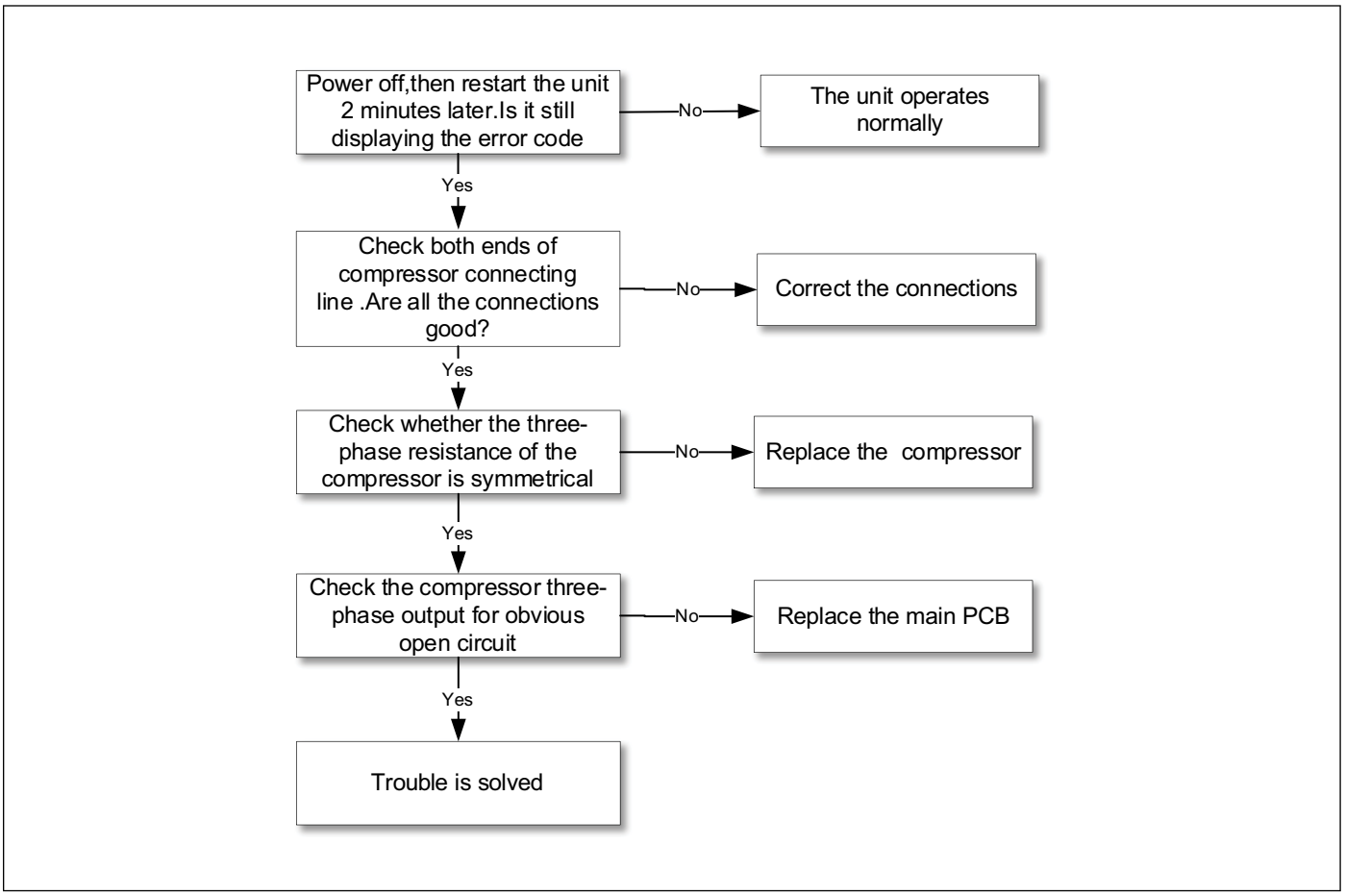


Figure 82

8.6.17 Outdoor unit IR chip drive failure (PC 45)

Troubleshooting:

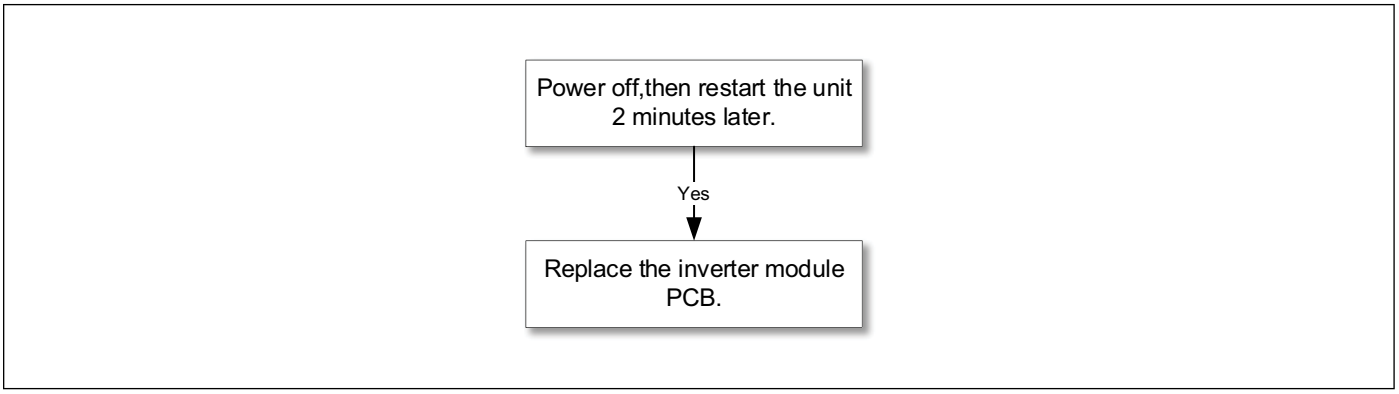


Figure 83

8.6.18 Communication malfunction between adapter board and outdoor main control board (ODU Ed)

Error Code	ODU Ed
Malfunction decision conditions	If outdoor PCB does not receive feedback from adapter board.
Supposed causes	▶ Wiring mistake ▶ Faulty PCB

Table 46

Troubleshooting:

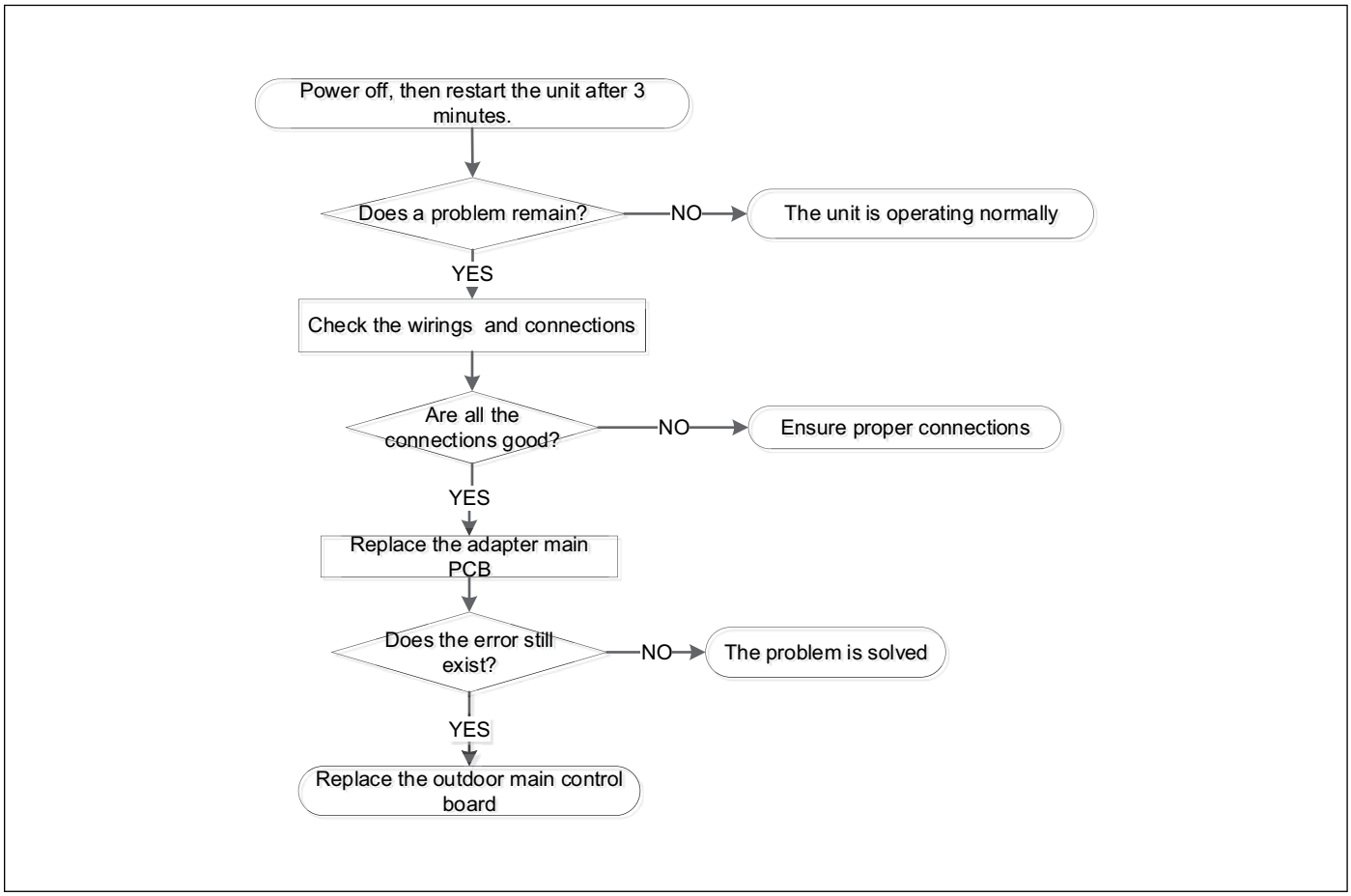


Figure 84

8.6.15 Main Parts Check

1. Temperature sensor check

WARNING: ELECTRICAL HAZARD

- Be sure to turn off all power supplies or disconnect all wires to avoid electric shock.
- Operate after compressor and coil have returned to normal temperature to avoid injury.

- Disconnect the temperature sensor from PCB.
- Measure the resistance value of the sensor using a multi-meter.
- Check corresponding temperature sensor resistance value table (Appendix 1).

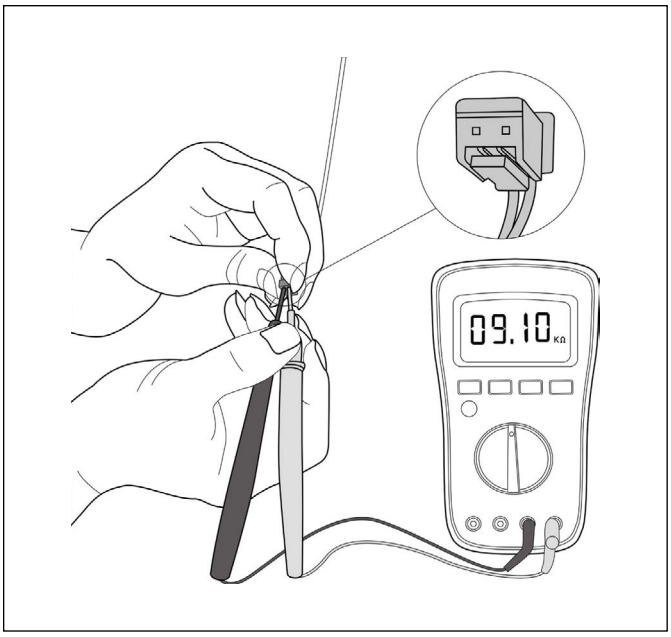


Figure 85

The picture and the value are only for reference, actual condition and specific value may vary.

Temperature sensors:

- Room temp.(T1) sensor,
- Indoor coil temp.(T2) sensor,
- Outdoor coil temp.(T3) sensor,
- Outdoor ambient temp.(T4) sensor,
- Compressor discharge temp.(T5) sensor.

Appendix 1 Resistance to Temperature value table for resistive sensors:
T1,T2,T3,T4 (°C/°F/K Ohm)

℃	℉	K Ohm	℃	℉	K Ohm	℃	℉	K Ohm	℃	℉	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231

Table 47

Appendix 2 Resistance to Discharge Temperature value table: T5 (°C/°F/K Ohm)

℃	℉	K Ohm	℃	℉	K Ohm	℃	℉	K Ohm	℃	℉	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

Table 48

2. Compressor check

Measure the resistance value of each winding by using the tester.

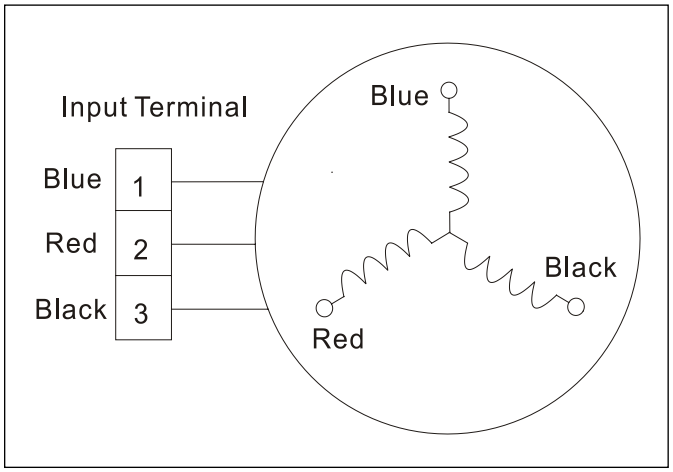


Figure 86

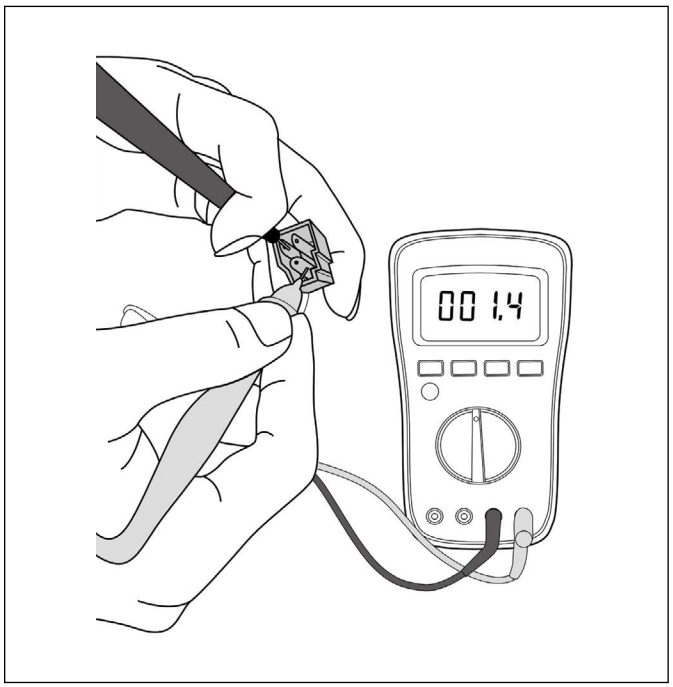


Figure 87

Position	Resistance Value per Compressor Model			
	18K Regular	27K Regular 18K Max Performance	36K Regular 27K Max Performance	48K Regular 36K Max Performance
Blue - Red	1.72Ω	0.75Ω	0.65Ω	0.37Ω
Blue - Black				
Red - Black				

Table 49

3. IPM continuity check

WARNING: ELECTRICAL HAZARD

- Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before trouble shooting.

Turn off the power, let the large capacity electrolytic capacitors discharge completely, then dismount the IPM. Use a digital tester to measure the resistance between P and UVWN; UVW and N.

Digital tester		Normal resistance value	Digital tester		Normal resistance value
(+)Red	(-)Black		(+)Red	(-)Black	
P	N	∞ (Several MΩ)	U	N	∞ (Several MΩ)
	U		V		
	V		W		
	W		(+)Red		

Table 50

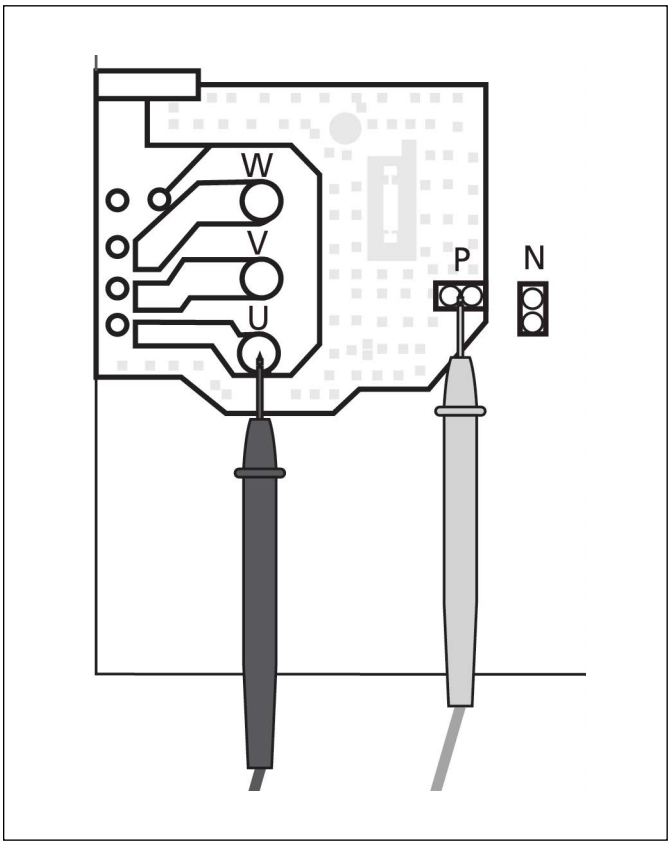


Figure 88

4. Four - Way Valve

Step 1. Power on, use a digital tester to measure the voltage. When the unit operates in cooling mode, value should be 0V. When the unit operates in heating mode, the value should be approximately 230VAC.

If the value of the voltage is not in the range, the PCB may have problems and need to be replaced.

Figure 89

Step 2. Turn off the power, use a digital tester to measure the resistance. The value should be between 1.8~2.5 KΩ.

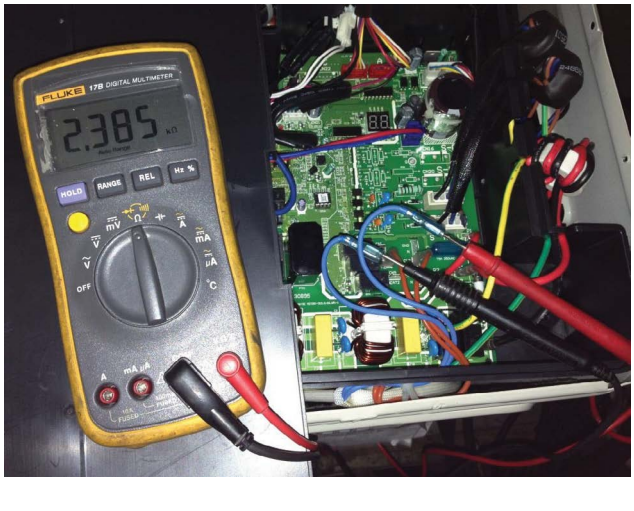


Figure 90

5. EXV check

Step 1. Disconnect EXV connectors from PCB

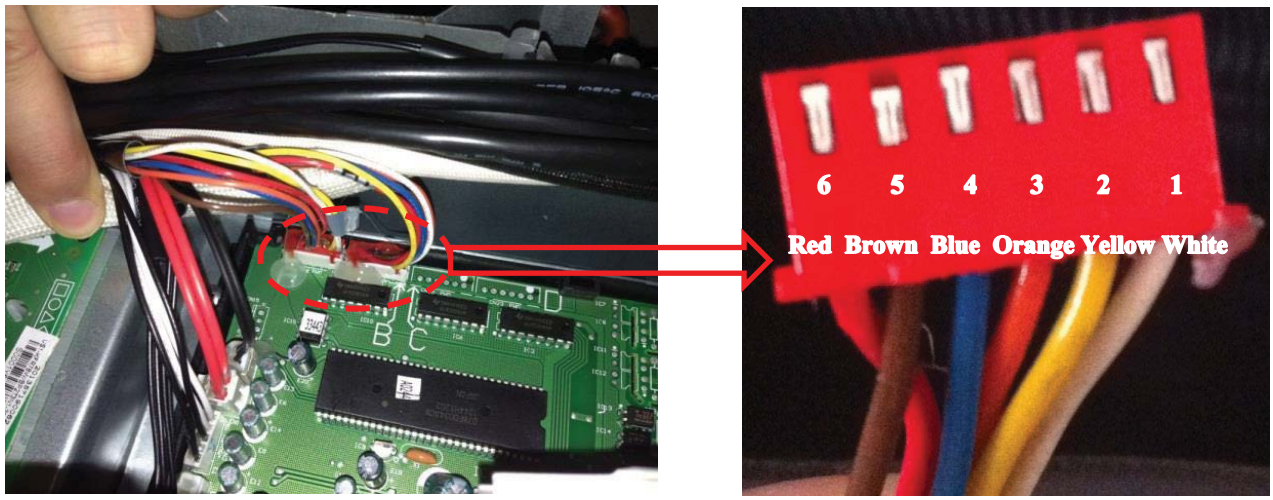


Figure 91

Step 2. Check the resistance value on EXV coil

Color of lead wire	Normal Value
Red- Blue	Approximately 50Ω
Red - Yellow	
Brown-Orange	
Brown-White	

Table 51

9 Disassembly Guide

Pictures are provided as a reference only. Each unit will be different depending on the your model number.

9.1 Outdoor Unit - BMS500-AAM018-1CSXRC

9.1.1 Removing the panel plates

1. Stop operation of the system and turn "OFF" the power at the disconnect.
2. Remove the big handle (3 screws).

Figure 92

3. Remove the top cover (3 screws).

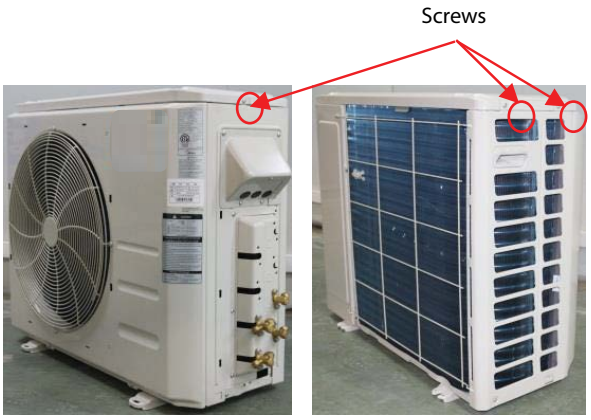


Figure 93

4. Remove the front panel (7 screws).

Figure 94

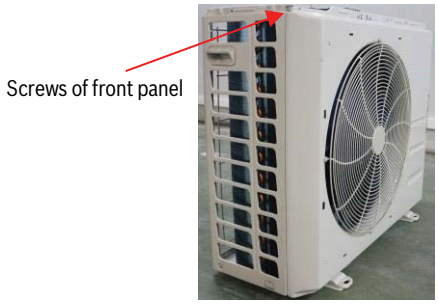


Figure 95

5. Remove the screws of water collector, and remove the water collector. (3 screws)

Figure 96

6. Remove the right side panel (2 screws from terminal block and 9 screws from right side panel).

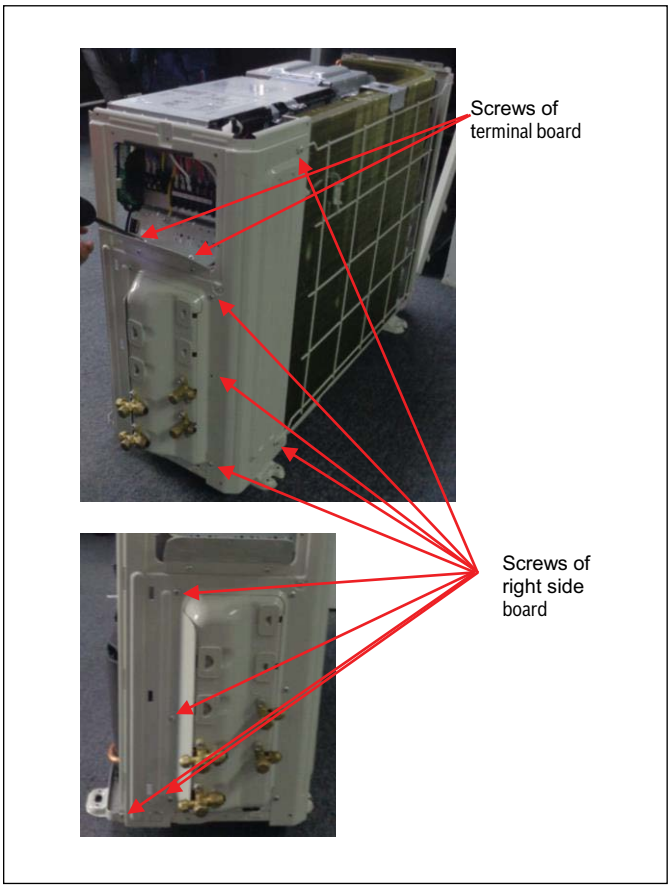


Figure 97

9.1.2 Removing the fan assembly

1. Stop operation of the system and turn “OFF” the power at the disconnect.
2. Remove the top cover, right side panel and front panel following Section 9.1.1.
3. Remove the hex nut that is fixing the fan.

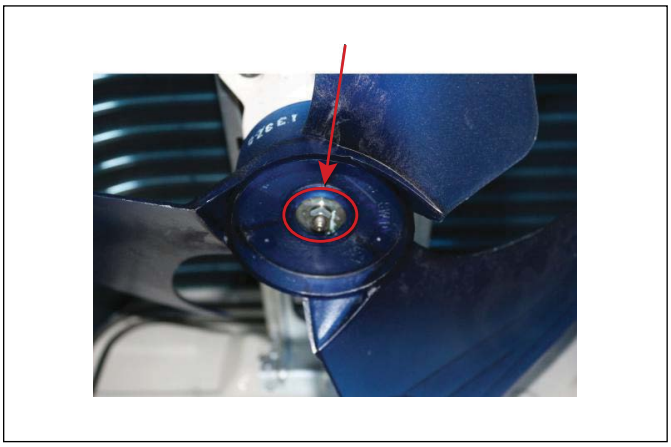


Figure 98

4. Remove the fan.
5. Remove the four fixing screws of the fan motor, then remove the fan motor.

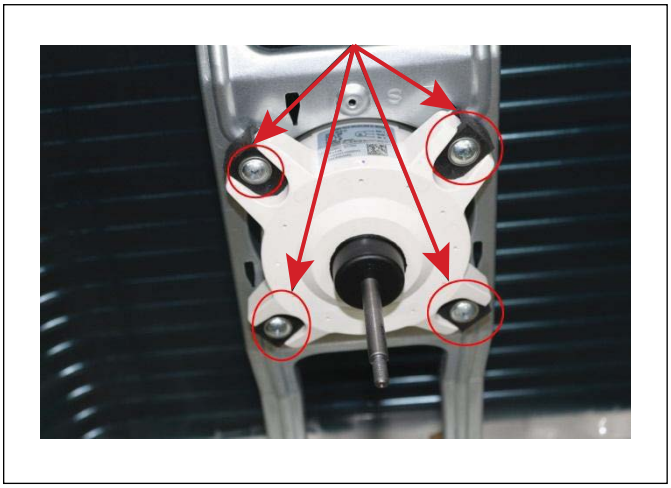


Figure 99

9.1.3 Removing the electrical parts

1. Follow steps outlined in Section 9.1.1.
2. Remove 5 screws of the cover of electrical control box cover and remove it.

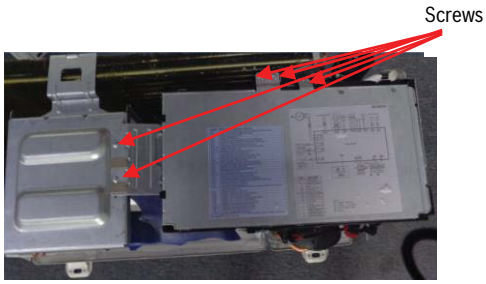


Figure 100

3. Cut the ribbon by a shear and disconnect the 4-way valve connector CN38(2p,blue).

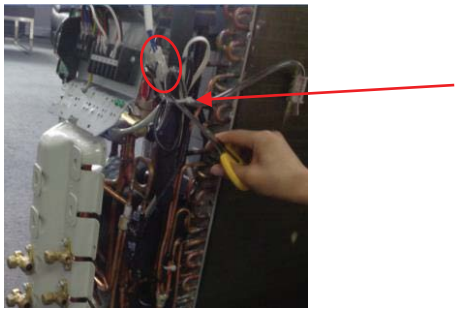


Figure 101

4. Turn over the main board.
5. Remove the electronic installing box subassembly (4 hooks).

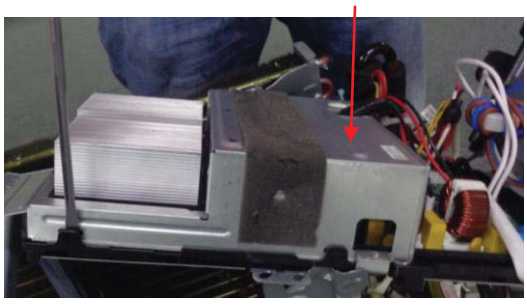


Figure 102

6. Remove the support of electronic control box.

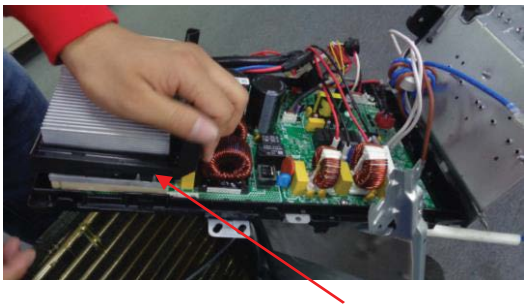


Figure 103

7. Disconnect the connectors and wires connected from PCB and other parts.

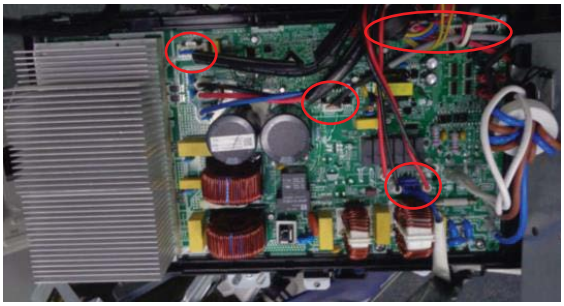


Figure 104

8. Disconnect the grounding wire (yellow-green) after removing the big handle and the right-rear panel.

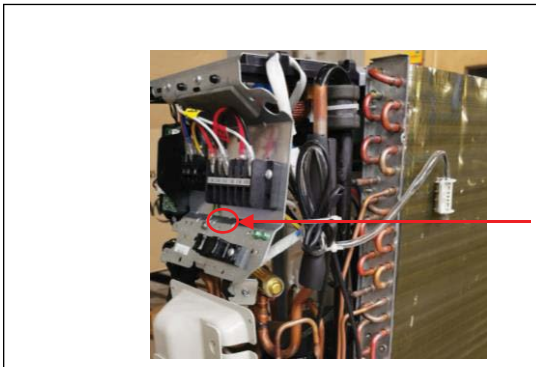


Figure 105

9. Remove the PCB board.

9.1.4 Removing the compressor

1. Follow steps outlined in Sections 9.1.1, 9.1.2, 9.1.3.
2. Remove the electrical control box cover and extract refrigerant from the refrigerant circuit.
3. Remove the sound insulation material and crankcase heating cable.
4. Remove terminal cover of compressor, and disconnect wires of crankcase electric heater and compressor from the terminal.
5. Remove the discharge pipe and suction pipe with a burner

Figure 106

6. Remove the hex nuts and washers fixing the compressor on bottom plate.

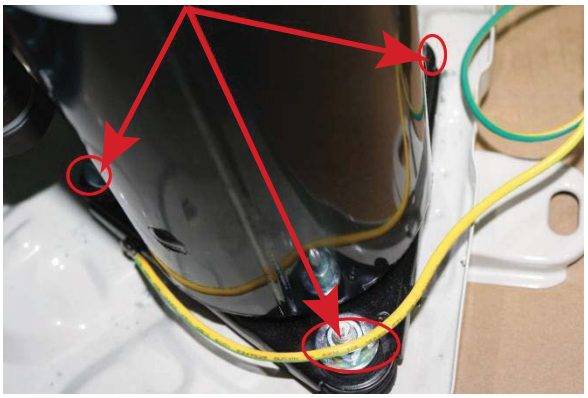


Figure 107

7. Lift the compressor from the base pan assembly.

9.1.5 Removing the 4-way valve

1. Follow steps outlined in Sections 9.1.1 & 9.1.2.
2. Extract refrigerant gas and remove electrical parts by following previous step.
3. Remove fixing screw of the coil, and remove the coil.
4. Detach the welded parts of 4-way valve and pipe.

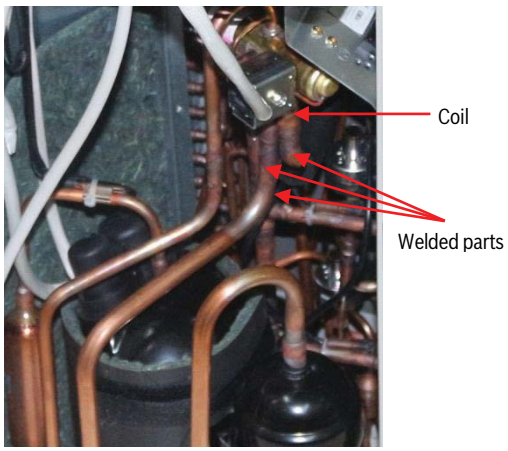


Figure 108

9.1.6 Removing the expansion valve

1. Follow steps outlined in Sections 9.1.1, 9.1.2 & 9.1.3.
2. Remove the coils & detach the welded parts of expansion valves and pipes.

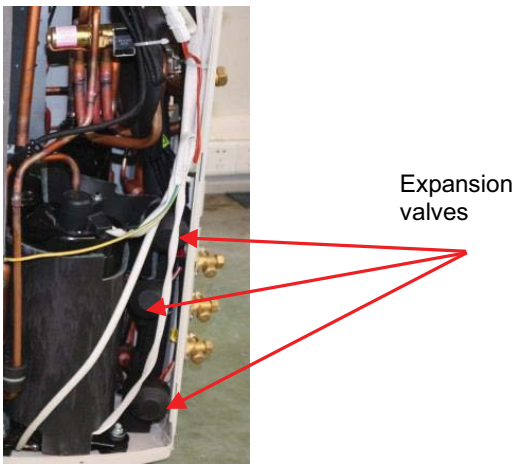


Figure 109

9.2 Outdoor Unit - BMS500-AAM027-1CSXRC, BMS500-AAM018-1CSXHC, BMS500-AAM027-1CSXHC

9.2.1 Removing the panel plate

1. Stop operation of the system and turn “OFF” the power at the disconnect.
2. Remove the big handle (4 screws).

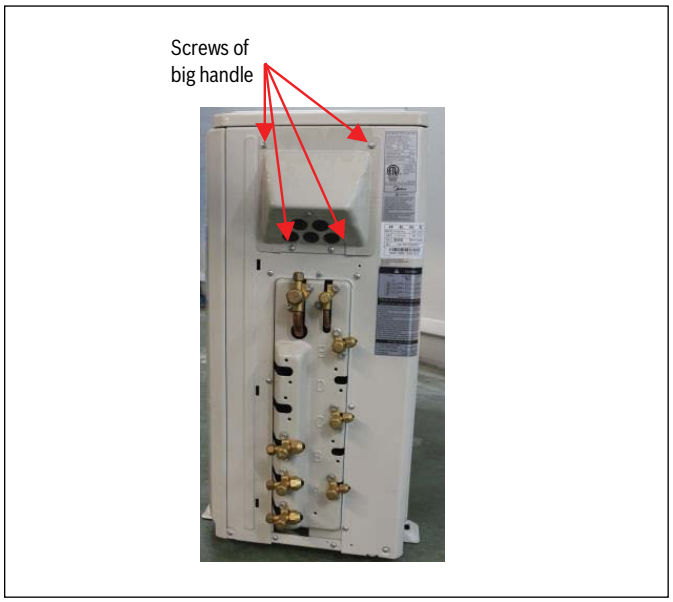


Figure 110

3. Remove the top cover (4 screws).

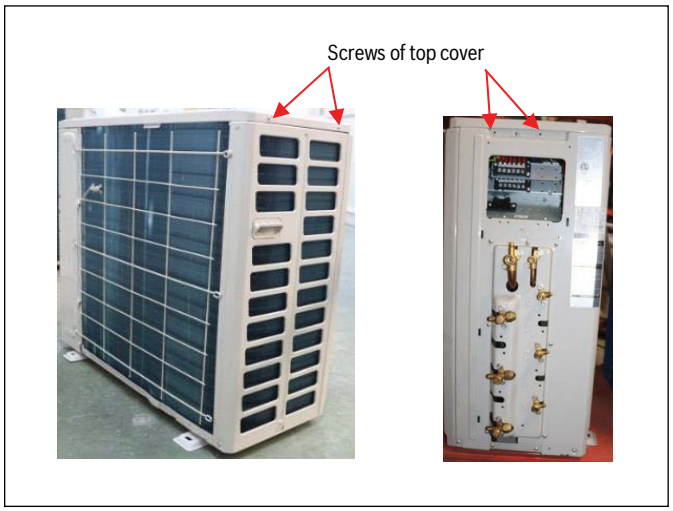


Figure 111

4. Remove the right side panel (1 screw).

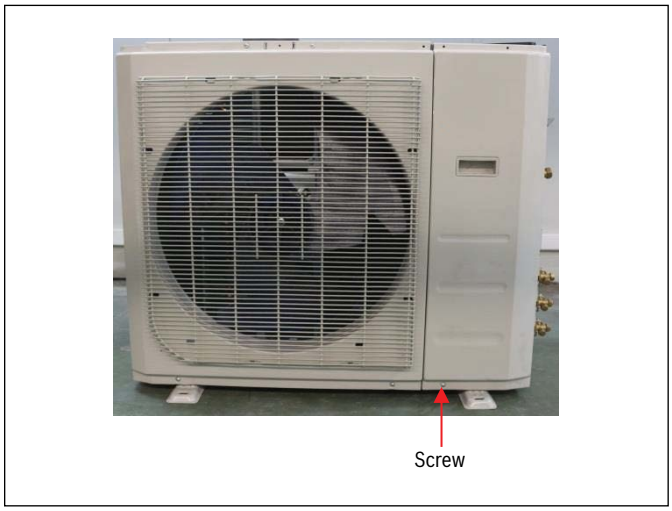


Figure 112

5. Remove the front panel (8 screws).

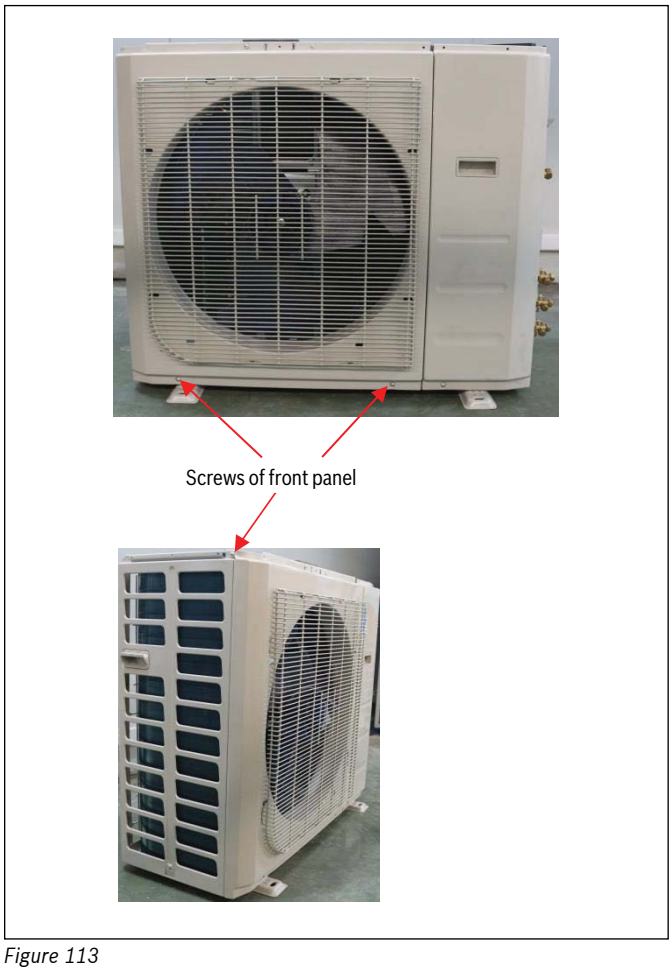


Figure 113

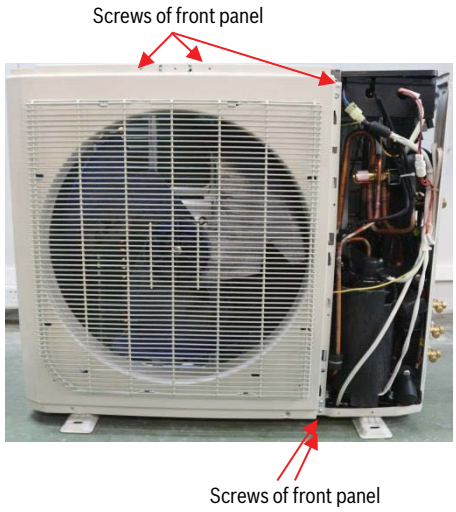


Figure 114

6. Remove the right & rear panel (15 screws).

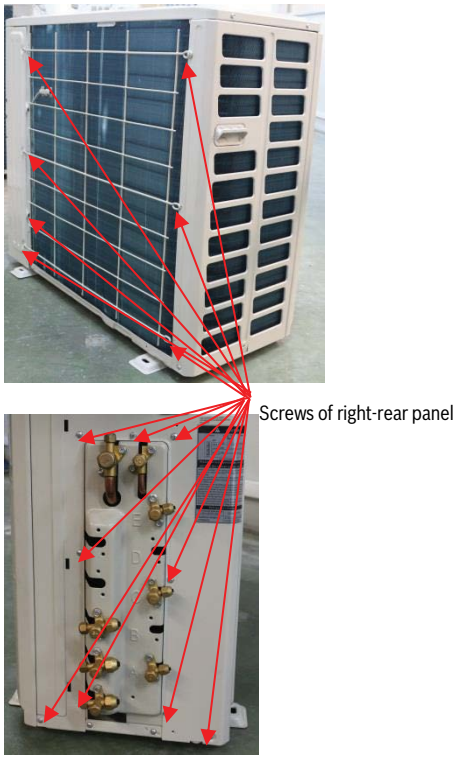


Figure 115

7. Remove the terminal board (2 screws).

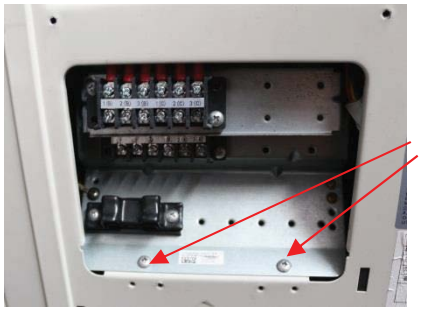


Figure 116

9.2.2 Removing the fan assembly

1. Follow steps outlined in Section 9.2.1.
2. Remove the hex nut fixing the fan, and then remove the fan.

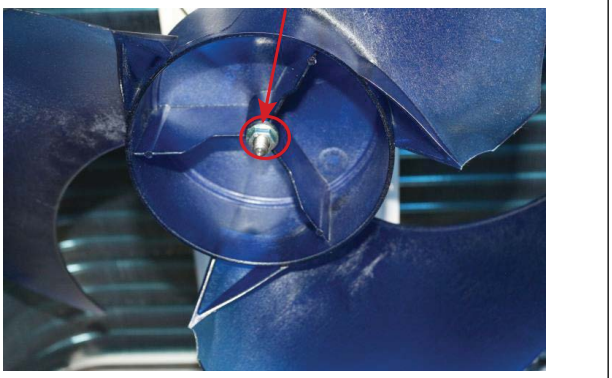


Figure 117

3. Remove the cover of electrical control box cover.

Figure 118

4. Disconnect the fan motor connector CN14 from the IPM board.

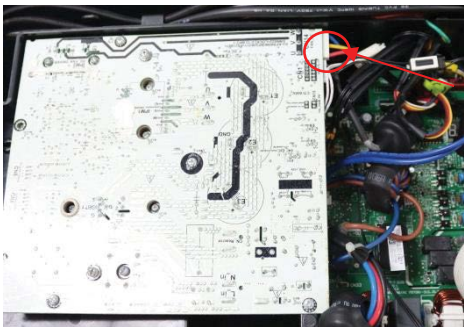


Figure 119

5. Remove the four fixing screws of the fan motor. Then remove the fan motor.

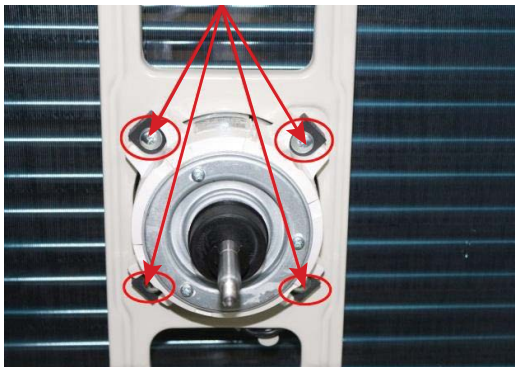


Figure 120

9.2.3 Removing the electrical parts

1. Follow steps outlined in Section 9.2.1 & 9.2.2.
2. Remove the screws of the IPM board (4 screws).

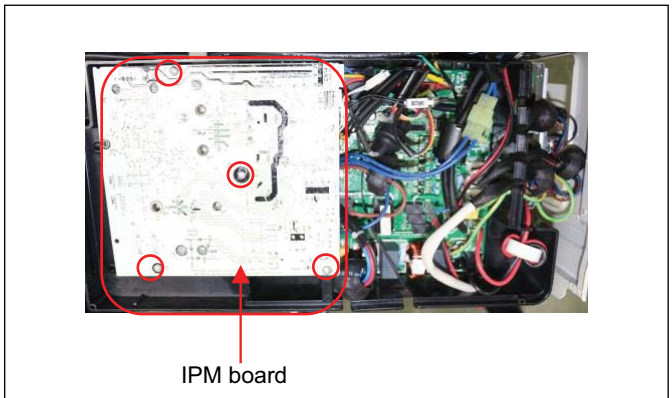


Figure 121

3. Disconnect the connector to reactor from PCB.

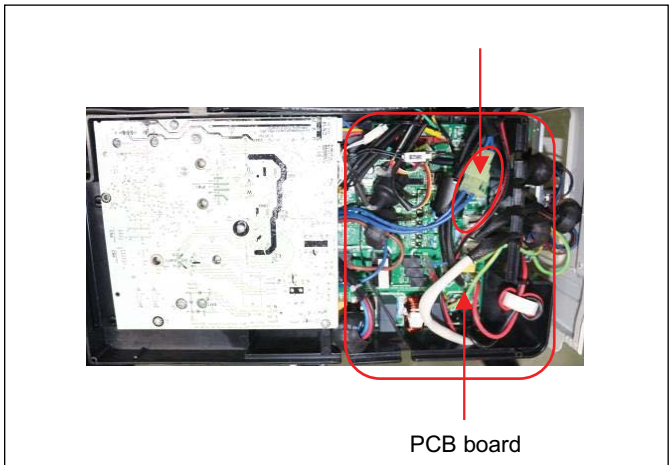


Figure 122

4. Disconnect the compressor wire.

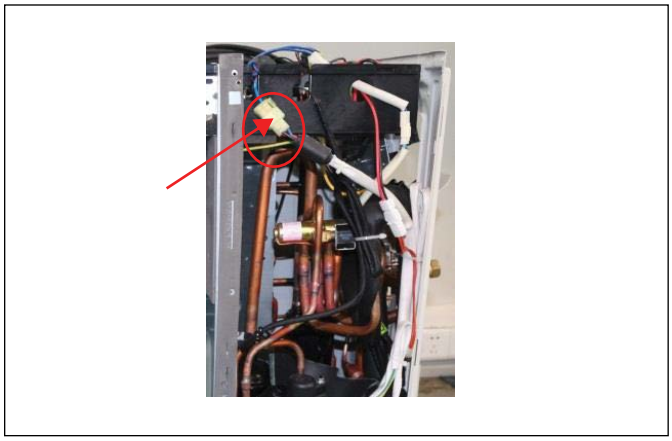


Figure 123

5. Disconnect wires between IPM board and PCB as shown below.

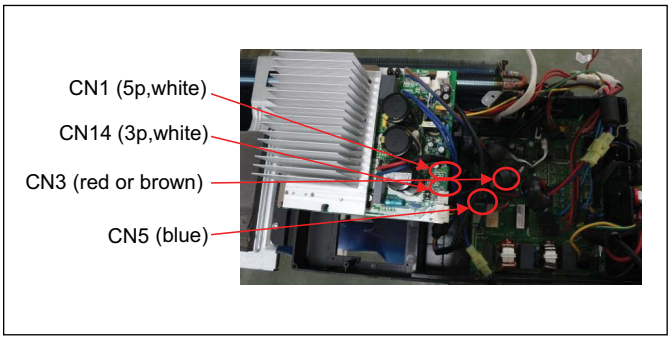


Figure 124

6. Remove the IPM board.

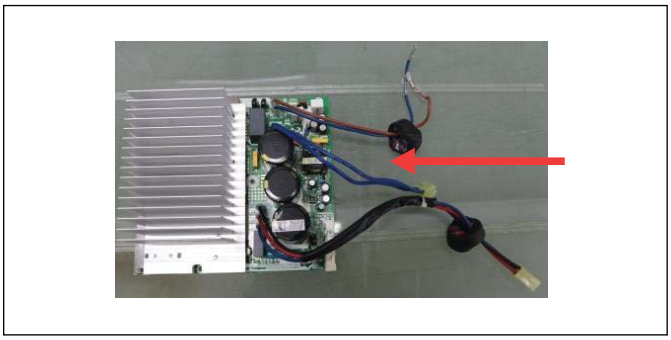


Figure 125

7. Disconnect the connectors and wires connected the PCB from other parts.

Connectors:

- CN17: T3/T4 Temperature sensor (2p/2p,white)
- CN7: Discharge temperature sensor (2p,white)
- CN15:T2B-A,B,C temperature sensor (2p/2p/2p,white)
- CN18/CN19/CN22: Electronic expansion valve A,B,C (6p/6p/6p,red/red/red)
- CN25/CN23/CN20: S-A,S-B,S-C (3p/3p/3p,white/white/white)

Wires:

- CN1/CN2: 4-way valve (blue-blue)
- CN5/CN6: Crankcase heating cable (red-red)
- CN3:L1-IN (red)
- CN4:L2-IN (black)

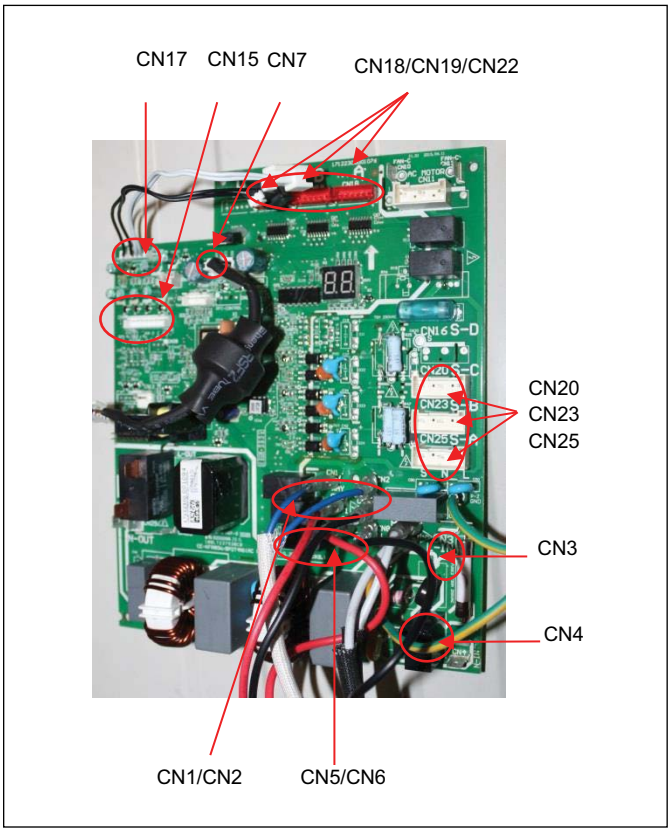


Figure 126

8. Disconnect the grounding wire (yellow-green).

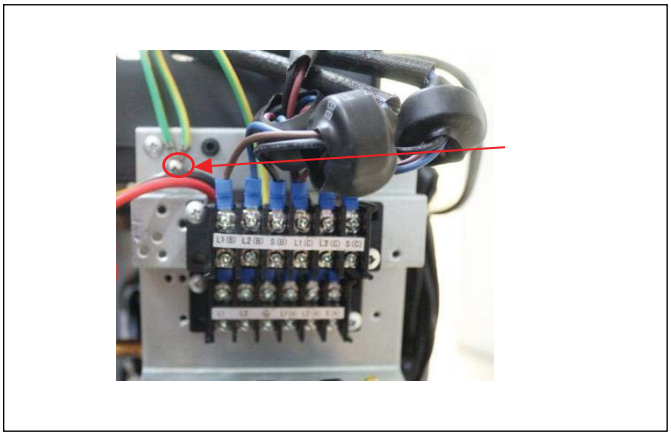


Figure 127

9. Remove PCB.

9.2.4 Removing the compressor

1. Follow steps outlined in Sections 9.2.1, 9.2.2 & 9.2.3.
2. Recover refrigerant from the refrigerant circuit.
3. Remove the sound insulation material and crankcase heating cable.
4. Remove terminal cover of compressor and disconnect wires of compressor thermo and compressor from the terminal.
5. Apply heat and remove discharge and suction pipes.

Figure 128

6. Remove the hex nuts and washers fixing the compressor on bottom plate.

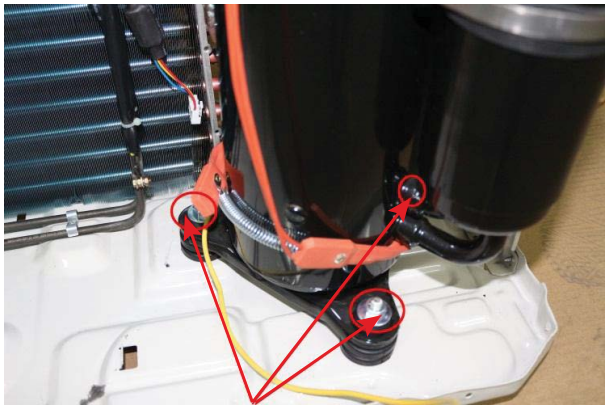


Figure 129

7. Lift the compressor from the base pan assembly.

9.2.5 Removing the reactor

1. Follow steps outlined in Sections 9.2.1 & 9.2.2.
2. Disconnect the connection between the reactor and IPM board.
3. Remove the cover of inductance (2 screws).

Figure 130

4. Disconnect two pieces of wires connected from the cover of inductance.
5. Remove the reactor (4 screws).

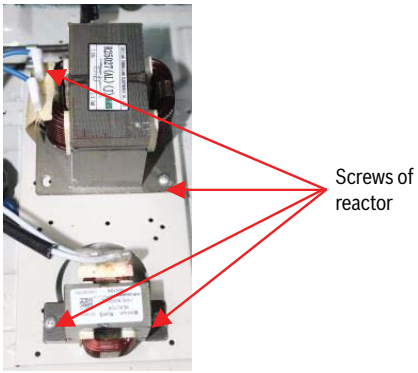


Figure 131

9.2.6 Removing the 4-way valve

1. Follow steps outlined in Sections 9.2.1 & 9.2.2.
2. Extract refrigerant gas.
3. Remove the electrical parts from Section 9.2.3.
4. Remove fixing screw of the coil and remove the coil (1 screw).

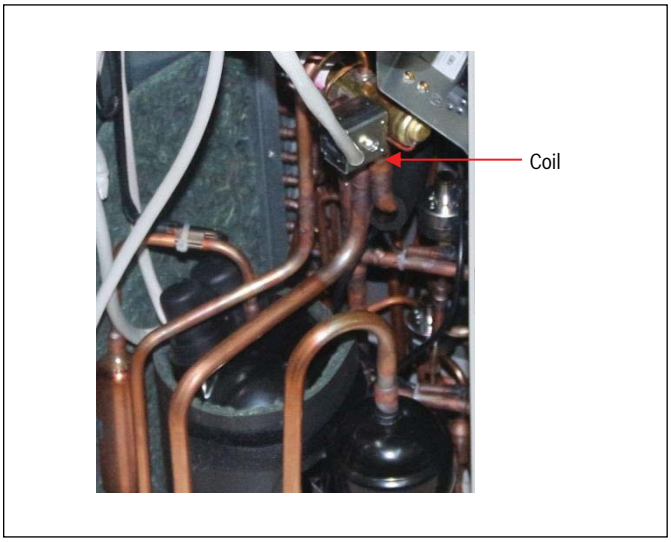


Figure 132

5. Detach the welded parts of 4-way valve and pipe.

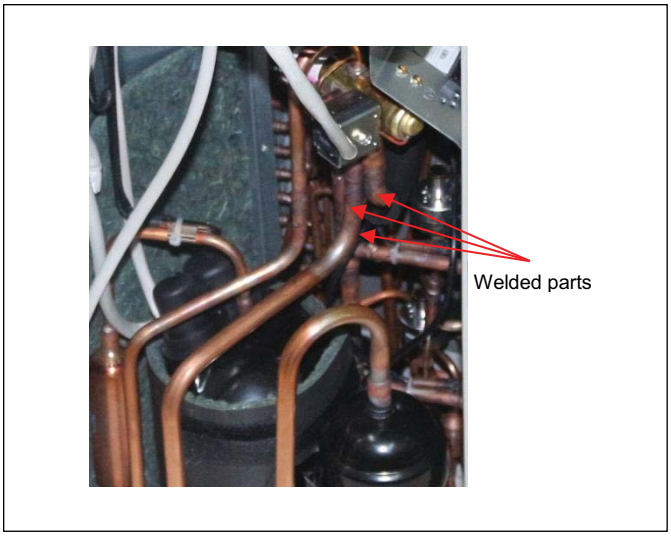


Figure 133

9.2.7 Removing the expansion valve

1. Follow steps outlined in Section Sections 9.2.1, 9.2.2, 9.2.3 and evacuate the refrigerant from the unit.
2. Remove the coils and detach the welded parts of expansion valves & pipes.

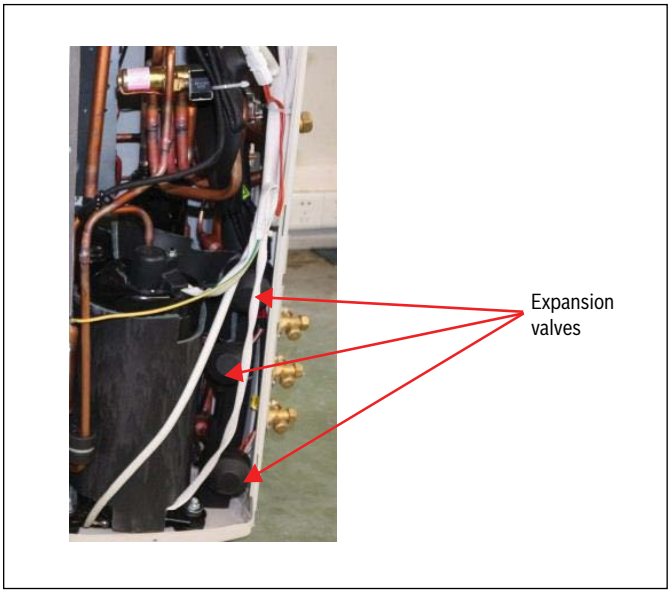


Figure 134

9.3 Outdoor Unit - BMS500-AAM036-1CSXHC, BMS500-AAM048-1CSXRC, BMS500-AAM048-1CSXHC

9.3.1 Removing the fan assembly

1. Stop operation of the system and turn “OFF” the power at the disconnect.
2. Remove the air outlet grille (8 screws).

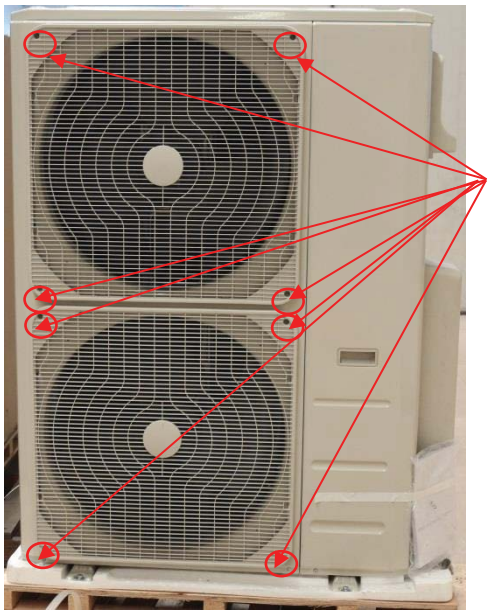


Figure 135

3. Remove the nut fixing the fan, and remove the fan.

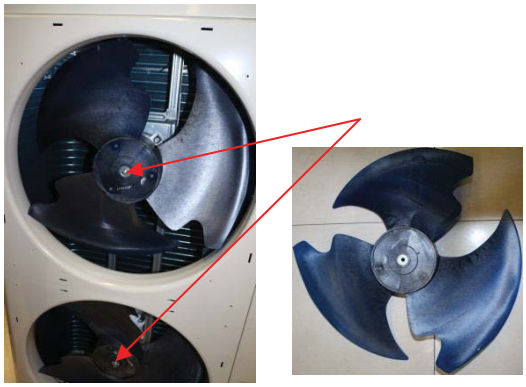


Figure 136

4. Remove the top cover (4 screws).

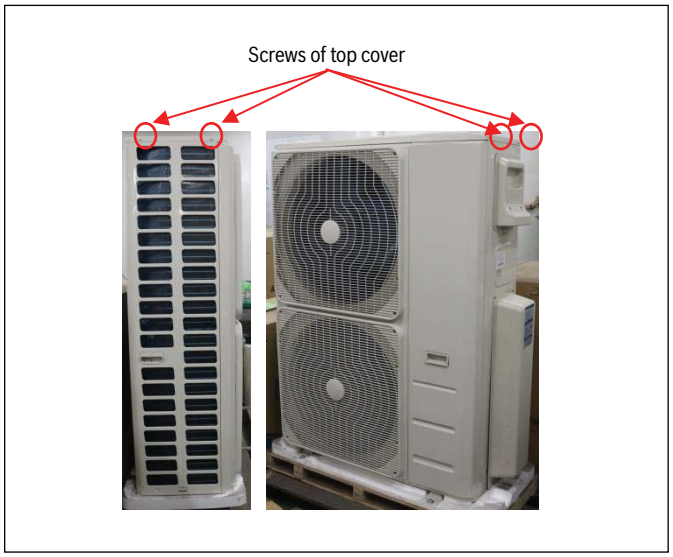


Figure 137

5. Remove the front side panel (1 screw).

Figure 138

6. Disconnect the fan motor connectors FAN1 (3p, white) and FAN2 (3p, white) from DC motor driver board.

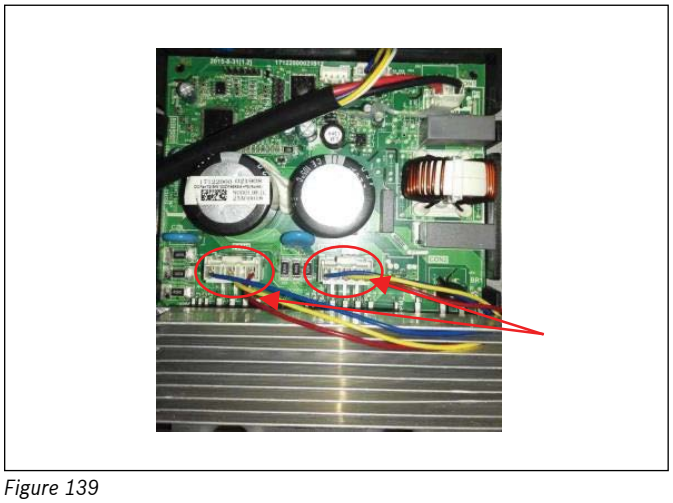


Figure 139

7. Remove the four fixing screws of the fan motor. Then remove the fan motor.

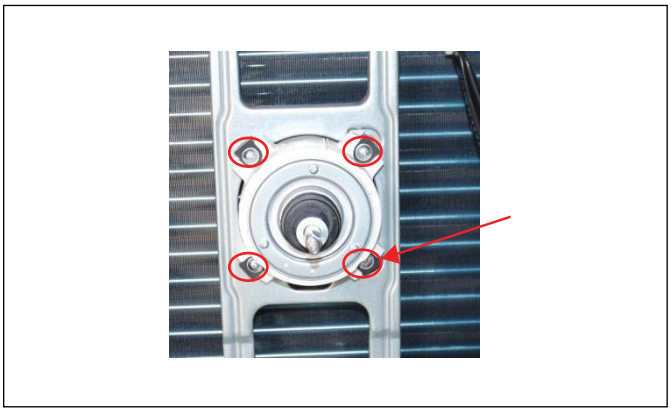


Figure 140

9.3.2 Removing the panel plate

1. Stop operation of the air conditioner and turn “OFF” the power breaker.
2. Remove the big handle and water collector (4 screws).

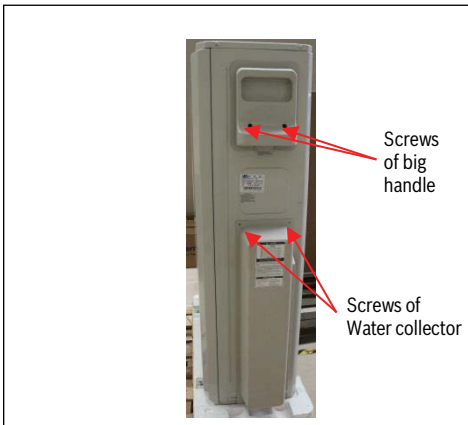


Figure 141

3. Remove side and rear panel (17 screws).

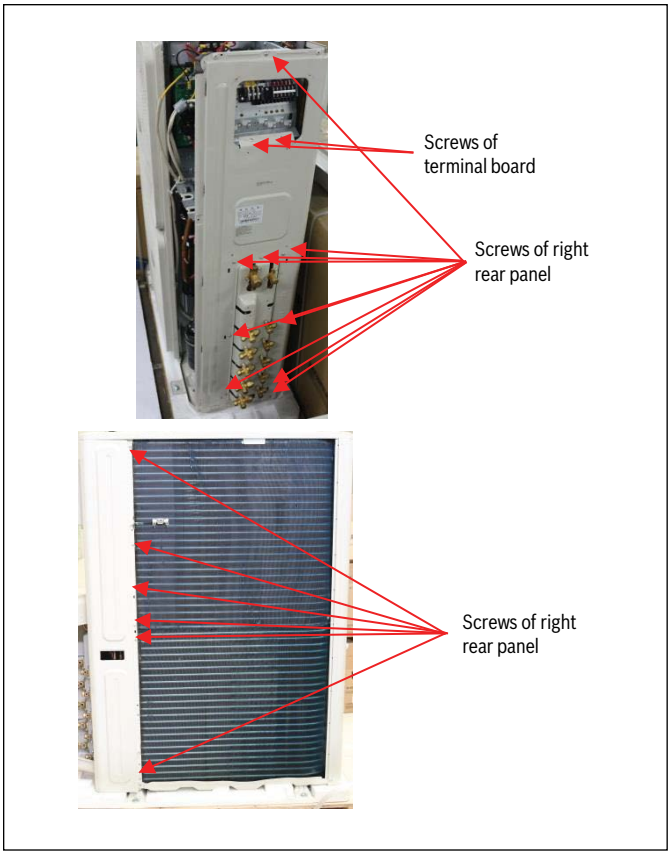


Figure 142

9.3.3 Removing the electrical parts

1. Follow steps outlined in Section 9.4.2.

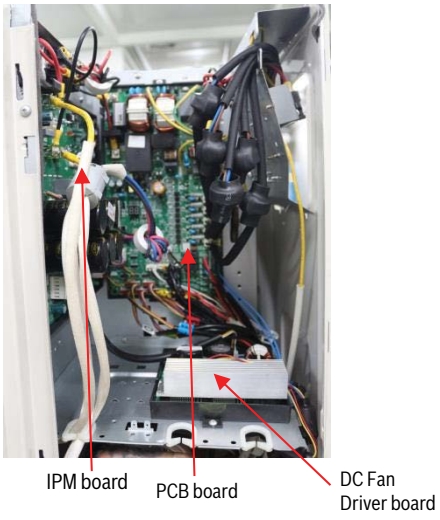


Figure 143

2. Disconnect the fan motor connector (5p, white) from the IPM board.

Figure 144

3. Disconnect following connection wires and connectors from the IPM board.
   - CN1, CN2, CN3, CN6, CN9 and U, V, W

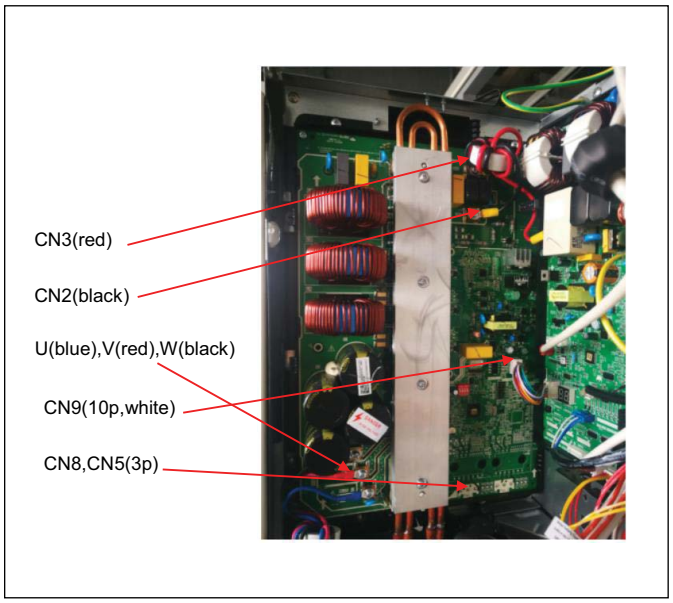


Figure 145

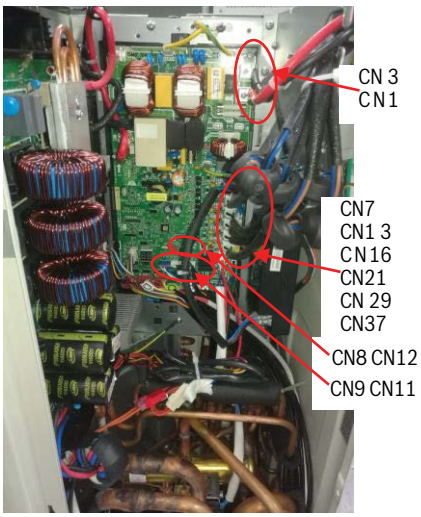
4. Remove the 4 screws and unfix the 4 hooks and then remove the IPM module board.
5. Disconnect the connectors and wires connected from the PCB.

Connectors:

- CN8: Discharge temperature sensor (2p, white)
- CN12: Heat sink temperature sensor (2p, red)
- CN9: T3/T4 temperature sensor (2p/2p, white)
- CN11: T2B-A, B, C, D, E temperature sensor (2p/2p/2p/2p/2p, white)
- CN15/CN23/CN26/CN30/CN33: Electronic expansion valve (6p/6p/6p/6p/6p, red)
- CN37/CN29/CN21/CN16/CN13/CN7: S-A, S-B,S-C,S-D,S-E (3p/3p/3p/3p/3p, white)
- CN10: High and low pressure switch (2p/2p, white)

Wires:

- CN17/CN18: 4-way valve (blue-blue)
- CN19/CN20: Connected to crankcase
- heating cable (black-red)
- CN24/CN25: Electric heater of
- chassis (orange-orange)
- CN1: L-IN (red)
- CN3: N-IN (black)



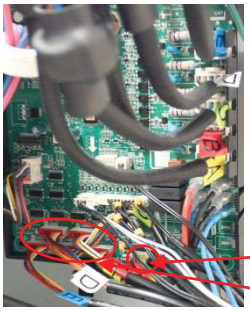


Figure 146

6. Disconnect the ground wire (yellow-green) after removing the big handle.

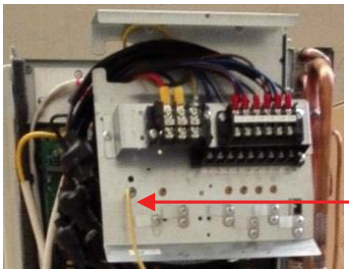


Figure 147

7. Remove the 4 screws and unfix the 6 hooks and then remove the main control board.

Figure 148

8. Remove the 2 screws and then remove the adapter board assy.

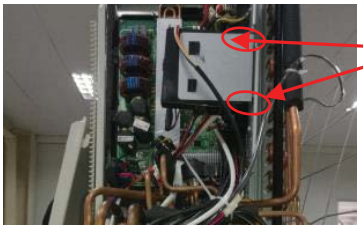


Figure 149

Figure 150

9.3.4 Removing the compressor

1. Follow steps outlined in Section 9.4.2.
2. Recover refrigerant from the refrigerant circuit.
3. Remove the sound insulation material and crankcase heating cable.
4. Remove terminal cover of compressor, and disconnect wires of crankcase electric heater and compressor from the terminal.
5. Remove the discharge pipe and suction pipe with a burner.

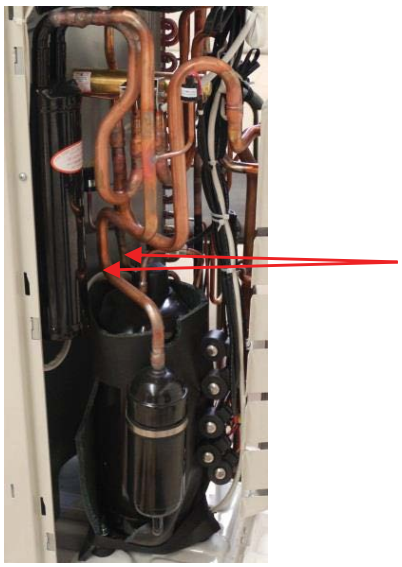


Figure 151

6. Remove the hex nuts and washers fixing the compressor on bottom plate.

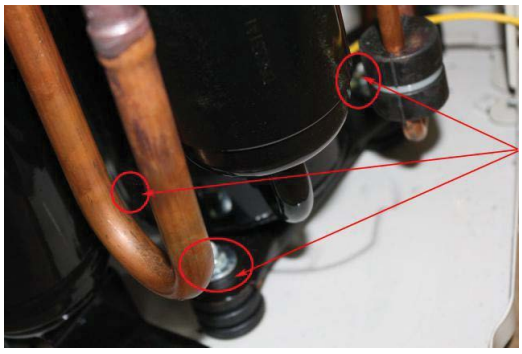


Figure 152

7. Lift the compressor from the base pan assembly.

9.3.5 Removing the 4-way valve

1. Follow steps outlined in Sections 9.4.2 & 9.4.3.
2. Recover refrigerant from the refrigerant circuit.
3. Remove the coil (1 screw) and detach the welded parts of 4-way valve & pipe.

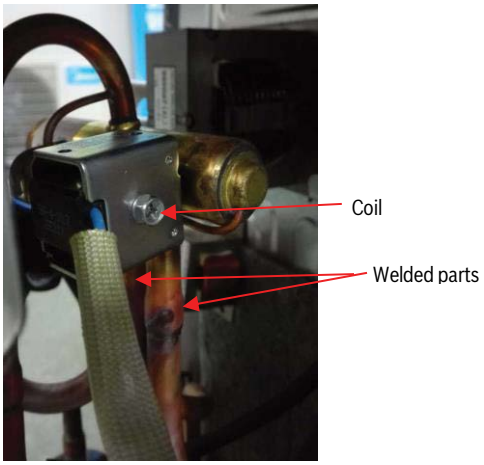


Figure 153

9.3.6 Removing the expansion valve

1. Follow steps outlined in Sections 9.4.2 & 9.4.3.
2. Remove the coil.
3. Detach the welded parts of expansion valves and pipes.

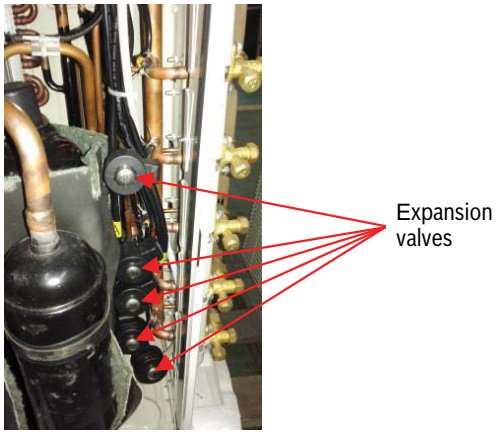


Figure 154

Online Help Resources

Alternatively, please visit our Service & Support webpage to find FAQs, videos, service bulletins, and more; www.boschheatingcooling.com/service or use your cellphone to scan the code below.

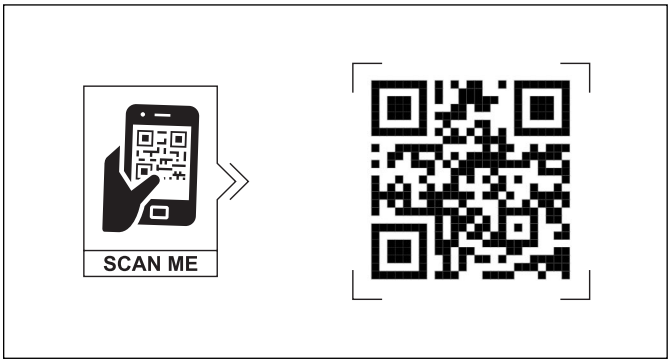


Figure 155

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