

### Ductless Multi-Split Heat Pump

#### Outdoor

2U20EH2VHA  
3U24EH2VHA  
4U36EH2VHA

#### Indoor

##### Wall Mount - Highwall

AW07EH2VHA  
AW09EH2VHA  
AW12EH2VHA  
AW18EH2VHA  
AW07LC2VHB  
AW09LC2VHB  
AW12LC2VHB  
AW18LC2VHB  
AW24LP2VHA

##### 2'x2' Compact Cassette

AB09SC2VHA  
AB12SC2VHA  
AB18SC2VHA

##### 3'x3' Large Cassette

AL24LP2VHA

##### Slim Duct

AD07SL2VHB  
AD09SL2VHB  
AD12SL2VHB  
AD18SL2VHB

##### Mid-Static Ducted

USYM09UCDSA  
USYM12UCDSA  
USYM18UCDSA  
USYM24UCDSA

##### Medium Static Ducted

AM24LP2VHA

##### Console

USYF09UCDWA  
USYF12UCDWA  
USYF18UCDWA



Design may vary by model number.

L'aspect peut varier selon le numéro de modèle.

El diseño puede variar según el número de model.



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## RECORD KEEPING

Thank you for purchasing this Haier product. This installation manual will help you get the best performance from your new heat pump.

For future reference, record the model and serial number located on the label on the side of your air conditioner/heat pump, and the date of purchase.

Staple your proof of purchase to this manual to aid in obtaining warranty service if needed.

To register your new Haier Duct Free system go to <http://www.haierductless.com/product-registration> and input the model/serial number information on this page. To receive a 10-year compressor and parts warranty, registration is required within 60 days of installation.

Model number \_\_\_\_\_

Serial number \_\_\_\_\_

Date of purchase \_\_\_\_\_



# IMPORTANT SAFETY INFORMATION

- Read these Safety Precautions carefully to ensure correct installation.
- This manual classifies the precautions by **WARNING** and **CAUTION**.
- Follow all precautions below. They are all important for ensuring safety and preventing property/equipment damage.

## **▲WARNING**

Failure to follow any of **WARNING** is likely to result in grave consequences such as death or serious injury.

## **▲CAUTION**

Failure to follow any of **CAUTION** may, in some cases, result in grave consequences.

- The following safety symbols are used throughout this manual:



Observe this instruction



Establish an earth connection



Never attempt

- After completing installation, test the unit to check for installation errors. Give the user adequate instructions concerning the use and cleaning of the unit according to the Operation Manual.
- Please read this manual before using the heat pump.
- Keep this user manual for future reference.
- Before troubleshooting or servicing equipment, review equipment installation guides and confirm ALL installation requirements & specifications have been met. Including, but not limited to: wiring, clearance, ducting (where applicable), power, and line set requirements. Correct any installation issues before continuing.

## **▲WARNING**

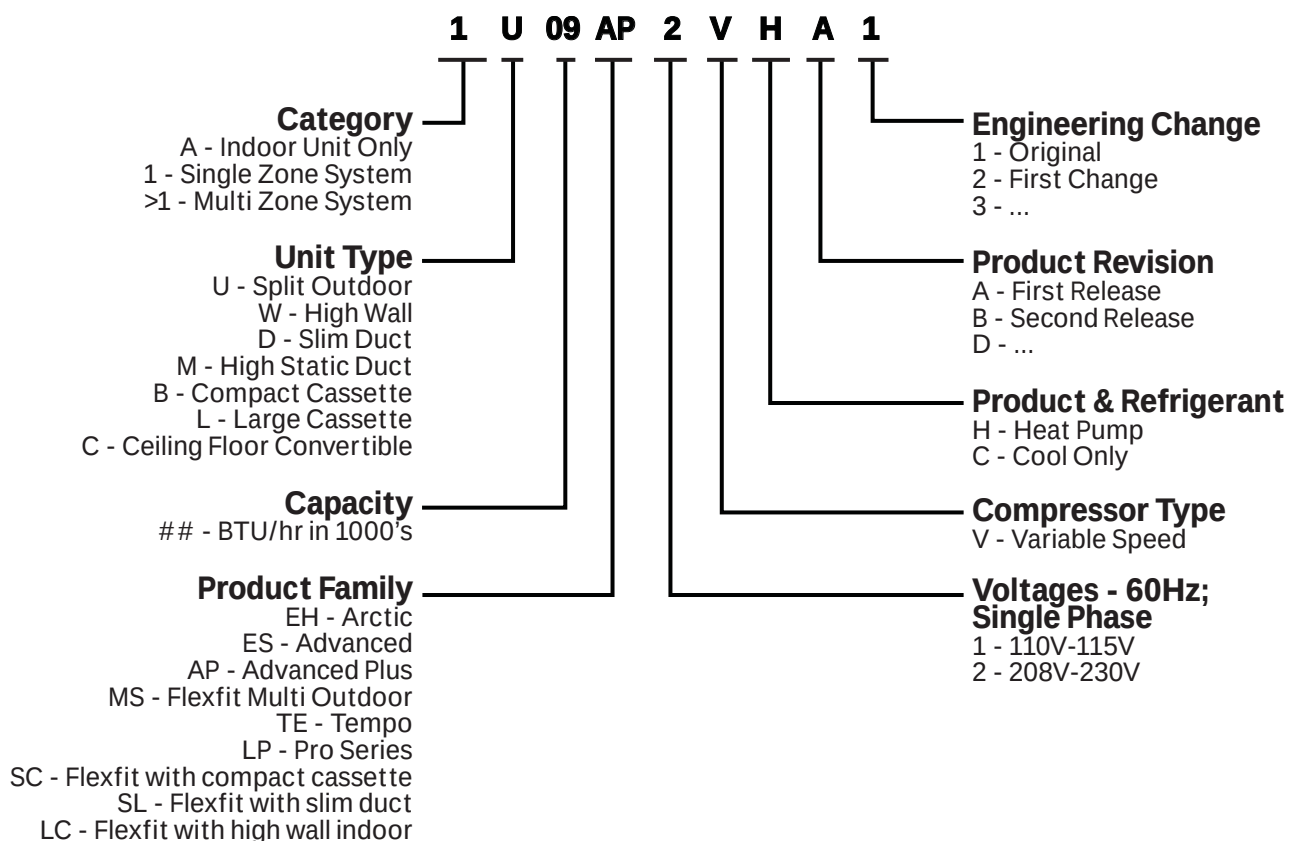
- Installation should be performed by the dealer or another professional. Improper installation may cause water leakage, electrical shock, or fire.
- Install the heat pump according to the instructions given in this manual. Incomplete installation may cause water leakage, electrical shock, or fire.
- Use only the supplied or specified installation parts. Use of other parts may cause the unit to come loose, water leakage, electrical shock, or fire.
- Install the heat pump on a solid base that can support the unit's weight. An inadequate base or incomplete installation may cause injury in the event the unit falls off the base.
- Electrical work should be carried out in accordance with the installation manual and national/local electrical wiring codes and rules of practice. Insufficient capacity or incomplete electrical work may cause electrical shock or fire.
- Use a dedicated power circuit. Never use a power supply shared by another appliance.
- For wiring, use a cable long enough to cover the entire distance with no splices. Do not use an extension cord. Do not put other loads on the power supply, use a dedicated power circuit. (Failure to do so may cause abnormal heat, electric shock or fire.)
- Use only the specified wire types for electrical connections between the indoor and outdoor units. Firmly clamp the interconnecting wires so they receive no external stresses. Incomplete connections or clamping may cause terminal overheating or fire.
- After completing interconnecting and supply wiring connections, shape the cables so that they do not put undue force on the electrical covers or panels. Install covers over the wires. Incomplete cover installation may cause terminal overheating, electrical shock, or fire.
- If any refrigerant has leaked out during the installation work, ventilate the room. (The refrigerant produces a toxic gas if exposed to flame.)
- After all installation is complete, check for and repair any system refrigerant leaks. (The refrigerant produces a toxic gas if exposed to flames.)
- When installing or relocating the system, keep the refrigerant circuit free from substances other than the specified refrigerant (R410A), such as air. (The presence of air or other foreign substance in the refrigerant circuit causes an abnormal pressure rise or rupture, resulting in injury.)
- During pump-down, stop the compressor before removing the refrigerant piping. If the compressor is still running, and the stop valve is open during pump-down, air will be sucked into the system while the compressor is running. This will cause abnormal pressure and noncondensables added to the system.
- Be sure to establish a ground. Do not ground the unit to a utility pipe, arrester, or telephone earth. An complete earth may cause electrical shock, or fire. A high surge current from lightning or other sources may cause damage to the heat pump.

# IMPORTANT SAFETY INFORMATION

## ⚠ CAUTION

- Do not install the heat pump in a place where there is danger of exposure to flammable gas. If the gas builds up around the unit, it may catch fire.
- Install drain piping according to the instructions of this manual. Inadequate piping may cause flooding.
- Tighten the flare nut according to the specified torque using a torque wrench. If the flare nut is overtightened, the flare nut may eventually crack and cause refrigerant leakage.
- Provide adequate measures to prevent the outdoor unit from being used as a shelter by rodents. Rodents making contact with electrical parts can cause malfunctions, smoke or fire. Please instruct the customer to keep the area around the unit clean.

## Model Identification Nomenclature



## Serial Number (Date of Manufacture)

**ZR000057G**

The first two digits in the serial number designate the month of manufacture. The first letter represents the month and the second corresponds to the year.

| Month of Manufacture |          |
|----------------------|----------|
| A - Jan              | M - July |
| D - Feb              | R - Aug  |
| F - Mar              | S - Sept |
| G - Apr              | T - Oct  |
| H - May              | V - Nov  |
| L - June             | Z - Dec  |

| Year of Manufacture |          |
|---------------------|----------|
| A - 2025            | M - 2019 |
| D - 2026            | R - 2020 |
| F - 2027            | S - 2021 |
| G - 2028            | T - 2022 |
| H - 2017            | V - 2023 |
| L - 2018            | Z - 2024 |

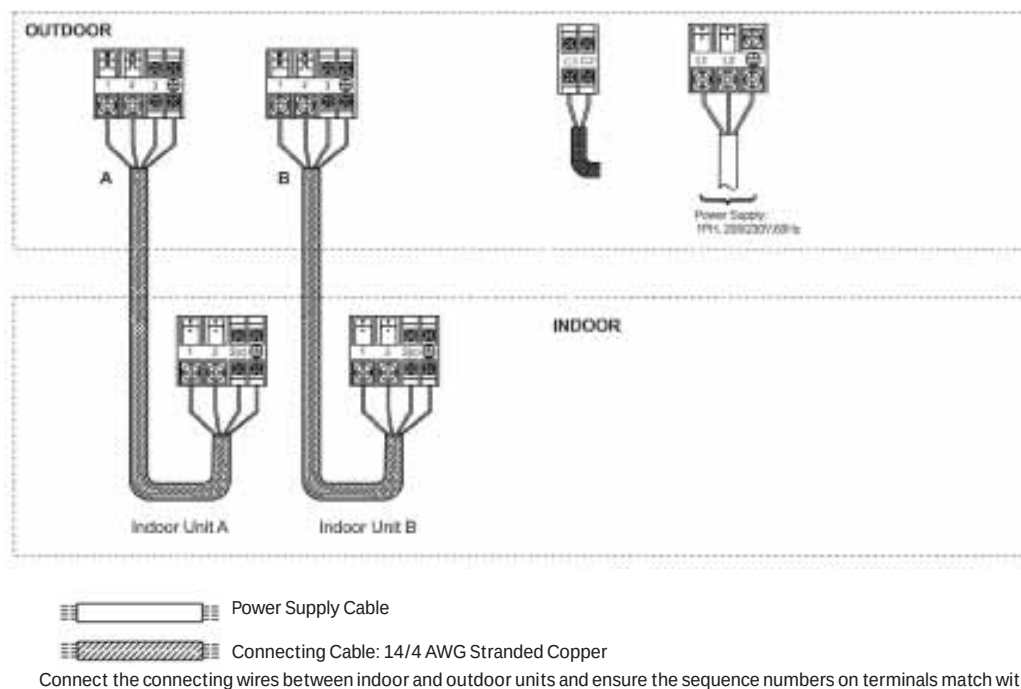
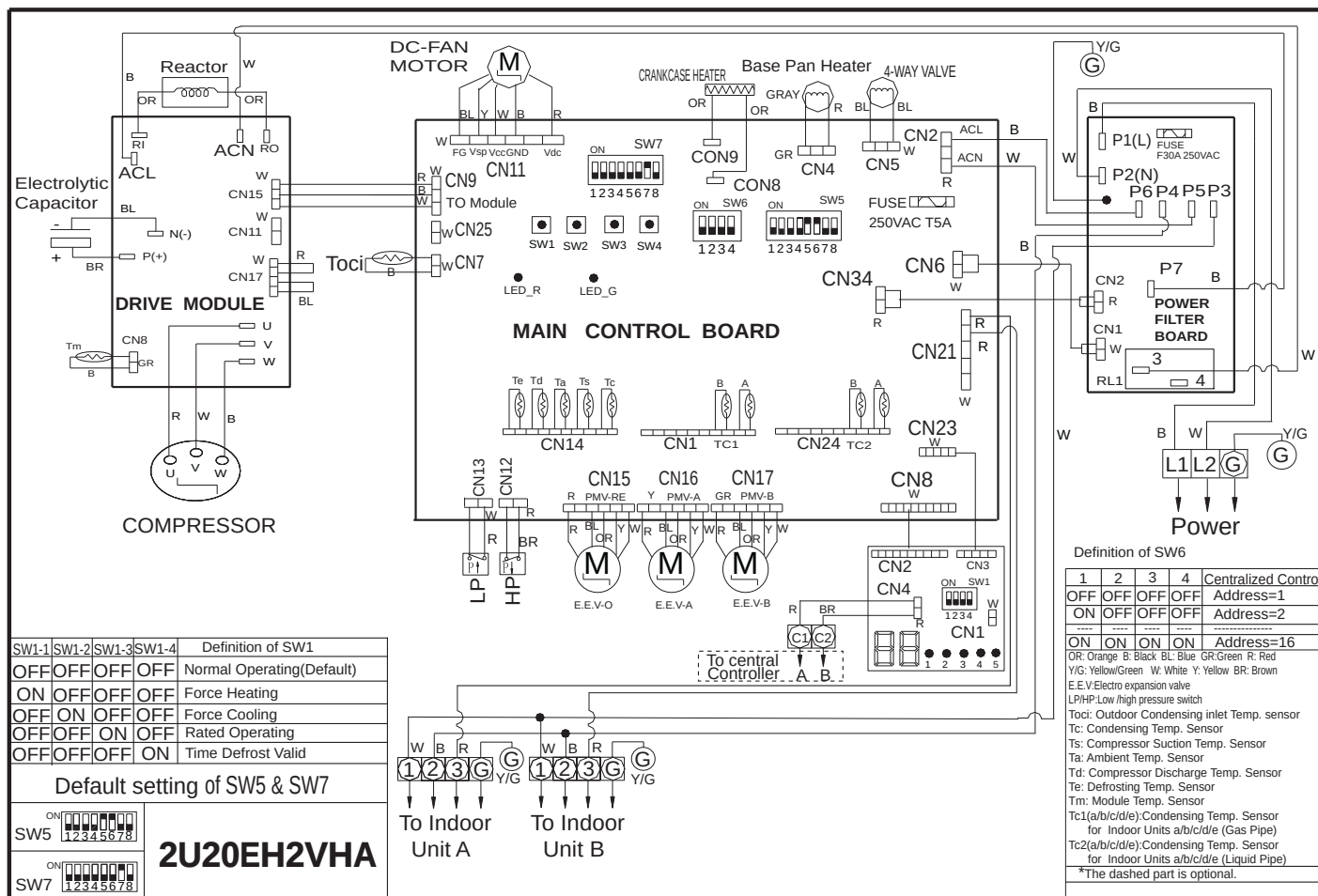
# OUTDOOR TECHNICAL OVERVIEW



**2U20EH2VHA**  
**3U24EH2VHA**  
**4U36EH2VHA**

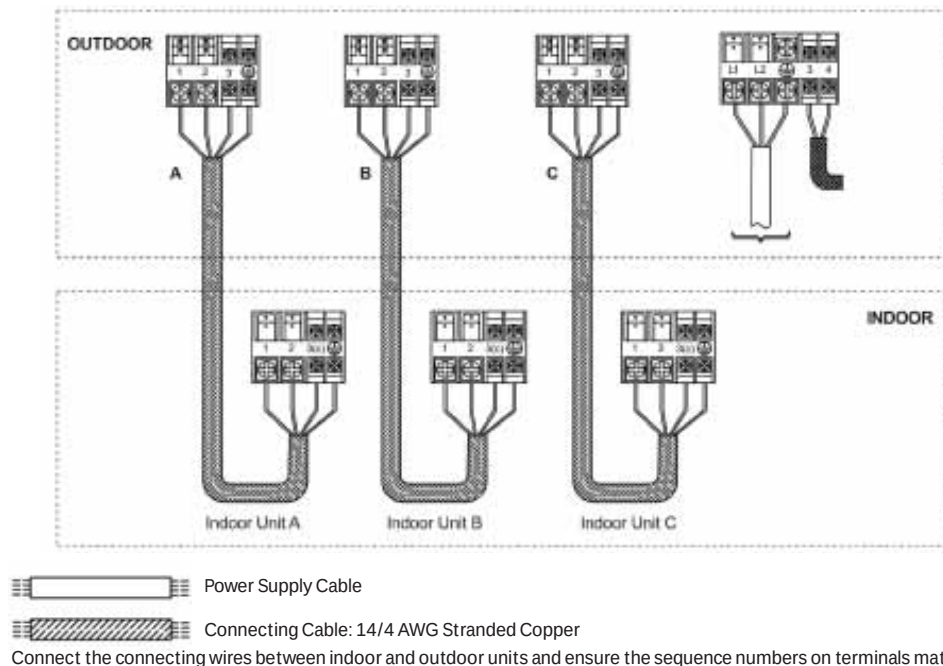
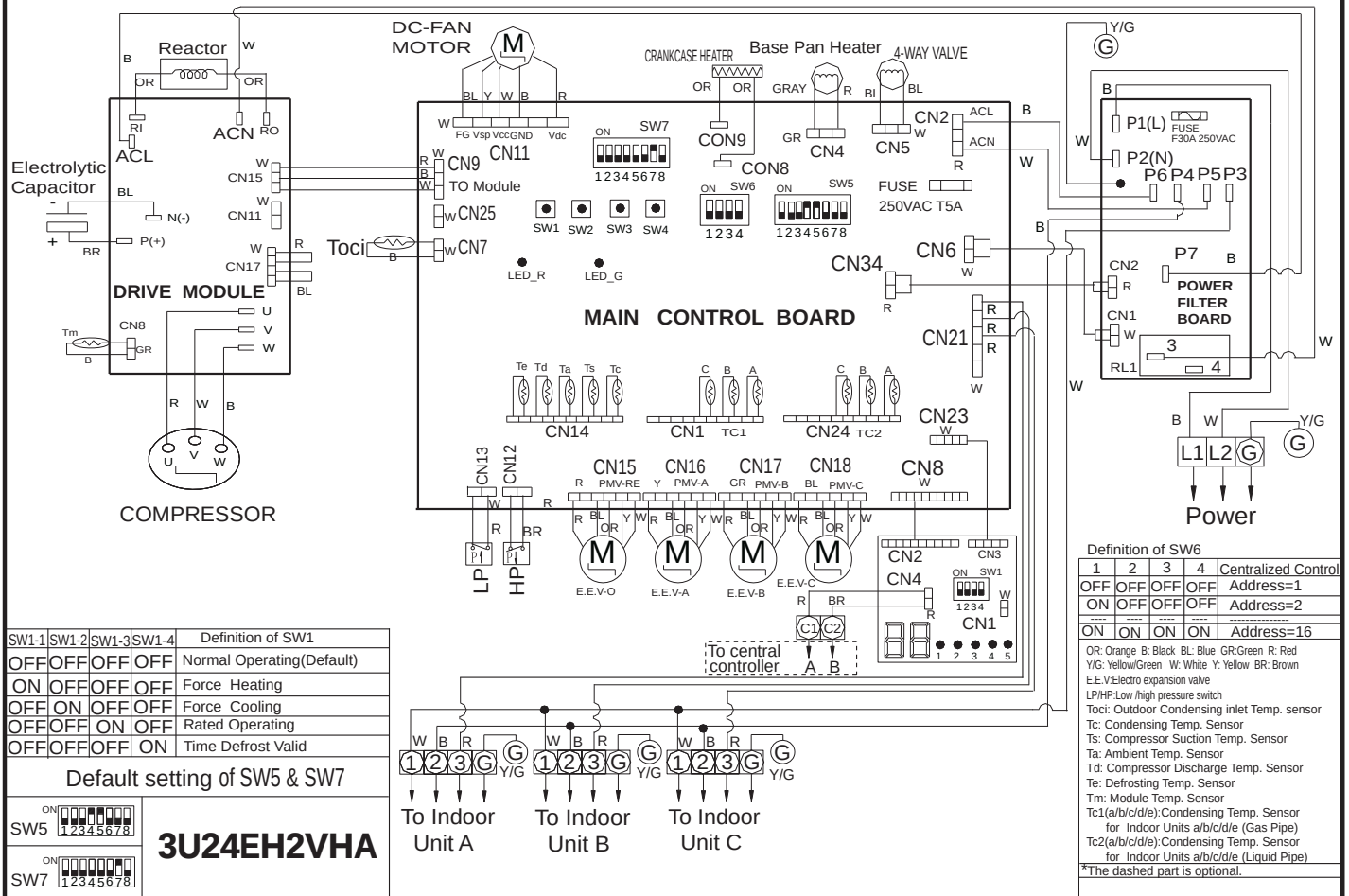
# OUTDOOR TECHNICAL OVERVIEW

## WIRING DIAGRAM - 2U20EH2VHA



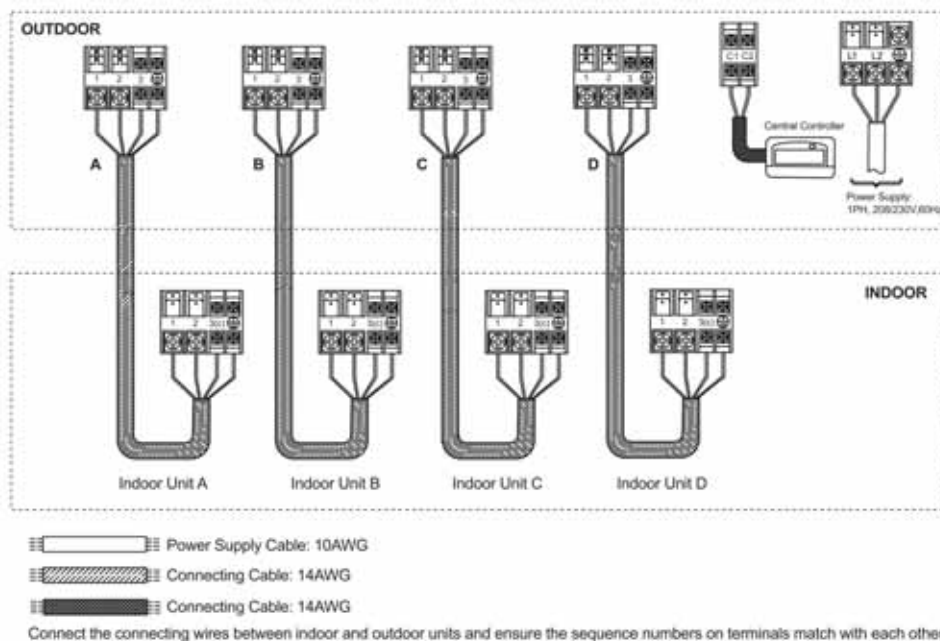
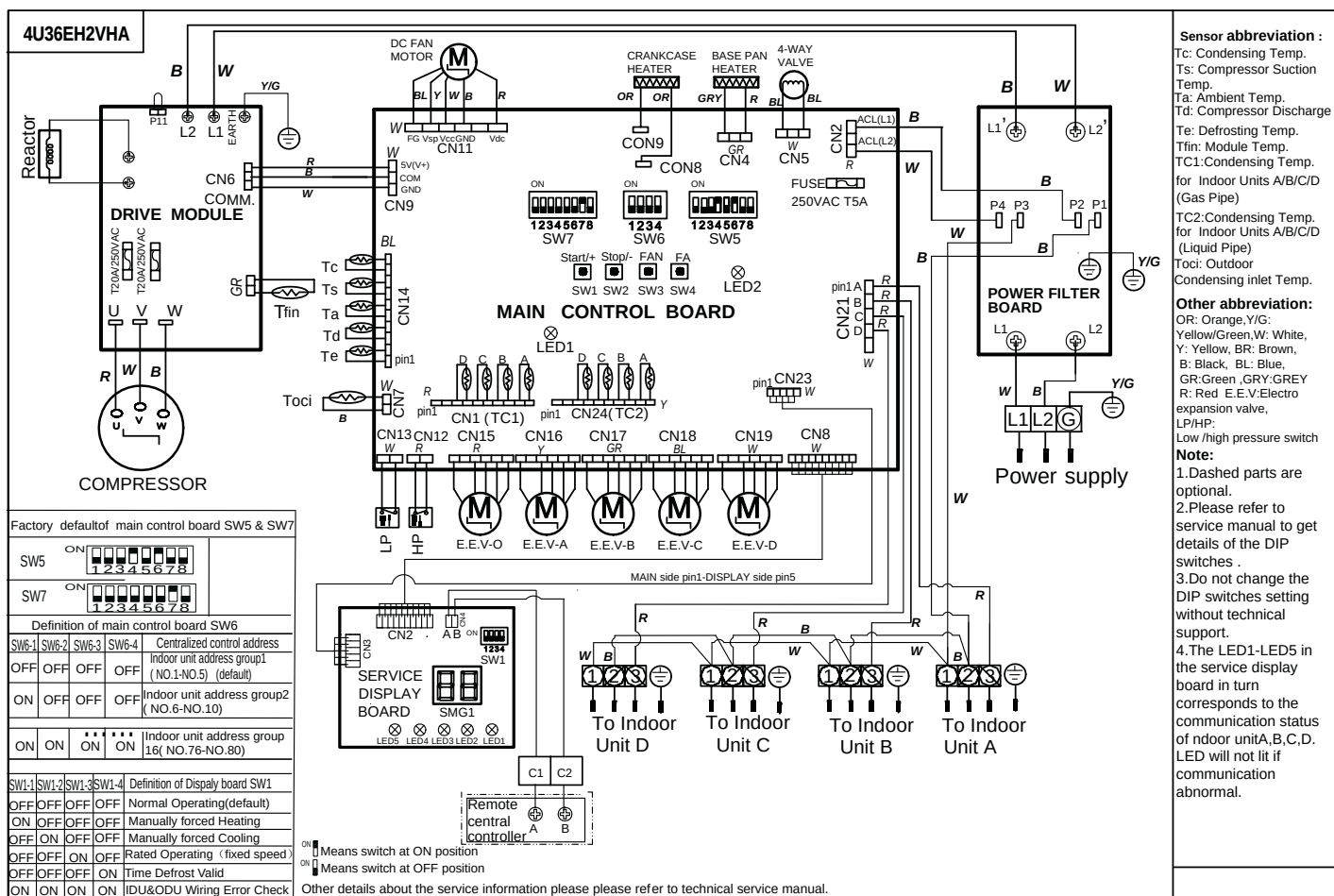
# OUTDOOR TECHNICAL OVERVIEW

## WIRING DIAGRAM - 3U24EH2VHA



# OUTDOOR TECHNICAL OVERVIEW

## WIRING DIAGRAM - 4U36EH2VHA



# OUTDOOR TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS

### WJ26X25053 - Outdoor Power Control Board DIP Switch Settings



#### SW5 DIP Switch Settings

| Description                                               | SW5-1 | SW5-2 | SW5-3 | SW5-4 | SW5-5 | SW5-6 | SW5-7 | SW5-8 |
|-----------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Heat pump                                                 | OFF*  | ----  | ----  | ----  | ----  | ----  | ----  | ----  |
| Cooling only                                              | ON    | ----  | ----  | ----  | ----  | ----  | ----  | ----  |
| Defrost temp. selection (used for mild weather defrost)   | ----  | OFF*  | ----  | ----  | ----  | ----  | ----  | ----  |
| Defrost temp. selection (used for severe weather defrost) | ----  | ON    | ----  | ----  | ----  | ----  | ----  | ----  |
| Power input restrict invalid                              | ----  | ----  | OFF*  | ----  | ----  | ----  | ----  | ----  |
| Power input restrict valid                                | ----  | ----  | ON    | ----  | ----  | ----  | ----  | ----  |
| 2U20EH2VHA                                                | ----  | ----  | ----  | OFF   | ON    | ON    | ----  | ----  |
| 3U24EH2VHA                                                | ----  | ----  | ----  | ON    | ON    | OFF   | ----  | ----  |
| Factory use only                                          | ----  | ----  | ----  | ----  | ----  | ----  | OFF*  | ----  |
| Factory use only                                          | ----  | ----  | ----  | ----  | ----  | ----  | ON    | ----  |
| Quiet operation valid                                     | ----  | ----  | ----  | ----  | ----  | ----  | ----  | OFF*  |
| Quiet operation invalid                                   | ----  | ----  | ----  | ----  | ----  | ----  | ----  | ON    |

#### \* FACTORY DEFAULT SETTING

##### Note:

1. Power input restrict selection: OFF-invalid; ON-valid( $\leq 3500W$ )
2. Quiet operation: If OFF, the outdoor unit will calculate and obtain the average ambient temperature of the unit within the last 24 hours,  $Tao\_average\_24$ . Then compare the current ambient temperature with the ambient temperature average  $Tao\_average\_24$ , and combine it with the previous ambient temperature trend to determine whether it can enter Quiet operation (low compressor speed and low O.D. fan speed).

# OUTDOOR TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS (cont)

### SW6 DIP Switch Settings

Outdoor central control address settings

| Outdoor Central Control Address | SW6-1 | SW6-2 | SW6-3 | SW6-4 |
|---------------------------------|-------|-------|-------|-------|
| 0                               | OFF   | OFF   | OFF   | OFF   |
| 1                               | OFF   | OFF   | OFF   | ON    |
| 2                               | OFF   | OFF   | ON    | OFF   |
| 3                               | OFF   | OFF   | ON    | ON    |
| 4                               | OFF   | ON    | OFF   | OFF   |
| 5                               | OFF   | ON    | OFF   | ON    |
| 6                               | OFF   | ON    | ON    | OFF   |
| 7                               | OFF   | ON    | ON    | ON    |
| 8                               | ON    | OFF   | OFF   | OFF   |
| 9                               | ON    | OFF   | OFF   | ON    |
| 10                              | ON    | OFF   | ON    | OFF   |
| 11                              | ON    | OFF   | ON    | ON    |
| 12                              | ON    | ON    | OFF   | OFF   |
| 13                              | ON    | ON    | OFF   | ON    |
| 14                              | ON    | ON    | ON    | OFF   |
| 15                              | ON    | ON    | ON    | ON    |

### SW7 DIP Switch Settings

| Description                                        | SW7-1 | SW7-2 | SW7-3 | SW7-4 | SW7-5 | SW7-6 | SW7-7 | SW7-8 |
|----------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| USA energy efficiency test mode for High Wall unit | OFF*  | OFF*  | ----  | ----  | ----  | ----  | ----  | ----  |
| USA energy efficiency test mode for Duct unit      | ON    | OFF   | ----  | ----  | ----  | ----  | ----  | ----  |
| Reserved                                           | ----  |       | OFF*  | ----  | ----  | ----  | ----  | ----  |
| Reserved                                           | ----  | ----  | ----  | OFF*  | ----  | ----  | ----  | ----  |
| Reserved                                           | ----  | ----  | ----  | ----  | OFF*  | ----  | ----  | ----  |
| Reserved                                           | ----  | ----  | ----  | ----  | ----  | OFF*  | ----  | ----  |
| North American region                              | ----  | ----  | ----  | ----  | ----  | ----  | ON*   | ----  |
| Non-North American region                          | ----  | ----  | ----  | ----  | ----  | ----  | OFF   | ----  |
| Quiet operation valid                              | ----  | ----  | ----  | ----  | ----  | ----  | ----  | OFF*  |

\* FACTORY DEFAULT SETTING

# OUTDOOR TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS (cont)

WJ26X25054 - Service Monitor Board DIP Switch Settings

SW1 DIP Switch Settings



| Definition                                                                                                                                                                                    | SW1-1 | SW1-2 | SW1-3 | SW1-4 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|
| Factory default                                                                                                                                                                               | OFF   | OFF   | OFF   | OFF   |
| Forced heating                                                                                                                                                                                | ON    | OFF   | OFF   | OFF   |
| Forced cooling                                                                                                                                                                                | OFF   | ON    | OFF   | OFF   |
| Rated operation                                                                                                                                                                               | OFF   | OFF   | ON    | OFF   |
| Time defrost valid: Defrost initiates if needed when the compressor has been on for 10 minutes continuously and 50 minutes cumulative. Termination conditions are the same as demand defrost. | OFF   | OFF   | OFF   | ON    |
| Wiring check active                                                                                                                                                                           | ON    | ON    | ON    | ON    |

# OUTDOOR TECHNICAL OVERVIEW

## Special Functions – Temperature Compensation

This function allows you the capability to adjust the temperature compensation offset of any indoor unit. The adjusted value is programmed into the EEPROM.

| Series          | IDU         | IDU PCB part number |            | Controls Needed |             |                  | Guide Reference |
|-----------------|-------------|---------------------|------------|-----------------|-------------|------------------|-----------------|
|                 |             | Haier               | GEA        | Controller      | IR Receiver | Wired Controller |                 |
| 3X3 Cassette    | AL24LP2VHA  | 0151800208          | WJ26X23559 | YR-HBS01        | \           | Unplug           | Chart 1         |
| 3X3 Cassette    | AL36LP2VHA  | 0151800208          | WJ26X23559 | YR-HBS01        | \           | Unplug           | Chart 1         |
| 3X3 Cassette    | AL48LP2VHA  | 0151800208          | WJ26X23559 | YR-HBS01        | \           | Unplug           | Chart 1         |
| 2X2 Cassette    | AB09SC2VH*  | 0151800208A         | WJ26X23785 | YR-HBS01        | \           | Unplug           | Chart 3         |
| 2X2 Cassette    | AB12SC2VH*  | 0151800208A         | WJ26X23785 | YR-HBS01        | \           | Unplug           | Chart 3         |
| 2X2 Cassette    | AB18SC2VH*  | 0151800208A         | WJ26X23785 | YR-HBS01        | \           | Unplug           | Chart 3         |
| Pro Duct        | AM24LP2VHA  | 0151800267          | WJ26X23580 | YR-HBS01        | RE-02(CN21) | Unplug           | Chart 2         |
| Pro Duct        | AM36LP2VHA  | 0151800106E         | WJ26X23585 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Pro Duct        | AM48LP2VHA  | 0151800106E         | WJ26X23586 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Mid-Static Duct | USYM09UCDSA | 0151800580          | WJ26X27175 | YR-HG           | RE-02(CN29) | Unplug           | Chart 4         |
| Mid-Static Duct | USYM12UCDSA | 0151800580          | WJ26X27175 | YR-HG           | RE-02(CN29) | Unplug           | Chart 4         |
| Mid-Static Duct | USYM18UCDSA | 0151800580          | WJ26X27175 | YR-HG           | RE-02(CN29) | Unplug           | Chart 4         |
| Mid-Static Duct | USYM24UCDSA | 0151800580          | WJ26X27175 | YR-HG           | RE-02(CN29) | Unplug           | Chart 4         |
| Slim Duct       | AD07SL2VH*  | 0151800175A         | WJ26X23178 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Slim Duct       | AD09SL2VH*  | 0151800175A         | WJ26X23178 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Slim Duct       | AD12SL2VH*  | 0151800175A         | WJ26X23178 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Slim Duct       | AD18SL2VH*  | 0151800175A         | WJ26X23178 | YR-HBS01        | RE-02(CN29) | Unplug           | Chart 2         |
| Highwall        | AW07EH2VHA  | A0011001066         | WJ26X25213 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW09EH2VHA  | A0011001066         | WJ26X25213 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW12EH2VHA  | A0011001066         | WJ26X25213 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW18EH2VHA  | A0011007590         | WJ26X25413 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW07LC2VHB  | A0011800281CA       | WJ26X23928 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW09LC2VHB  | A0011800281CA       | WJ26X23928 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW12LC2VHB  | A0011800281CA       | WJ26X23928 | YR-HG           | \           | \                | Chart 4         |
| Highwall        | AW18LC2VHB  | A0011800281FA       | WJ26X23929 | YR-HG           | \           | \                | Chart 4         |
| Console         | USYF09UCDWA | 0151800579          | WJ26X27223 | YR-HG           | \           | \                | Chart 4         |
| Console         | USYF12UCDWA | 0151800579          | WJ26X27223 | YR-HG           | \           | \                | Chart 4         |
| Console         | USYF18UCDWA | 0151800579          | WJ26X27223 | YR-HG           | \           | \                | Chart 4         |

### Chart 1

1. Install the grille assembly and connect the power cable
2. Unplug the wired controller
3. Connect power to the unit
4. Press the **ON/OFF** button on the remote control (HBS-01).
5. (Ignore this step if the display temperature is already °C.) Press **MENU/OF** button to switch the display temperature to °C, then press **CONFIRM**.
6. Open the front cover of the remote controller, and press the **LIGHT** button 12 times in 7 seconds.
7. The panel will beep 4 times and display an "A".
8. Press the **LIGHT** button once to confirm. The display will read "A0".
9. Press the button **TEMP.** ↑ or **TEMP.** ↓ until the display shows "A5".
10. Press the **LIGHT** button once to confirm. The display will read "0b".
11. Press the button **TEMP.** ↑ or **TEMP.** ↓ to scroll through the listed Codes. Each code is associated with a corresponding compensation value (see table below). For example, if you want make the temperature invalid, scroll it to 0F.
12. Press the **LIGHT** button once to confirm. The display will read "A5".
13. Press the **ON/OFF** button on the remote control to save the changes.

| Code                  | 0  | 1  | 2  | 3  | 4  | 5  | 6 | 7 | 8 | 9 | 0A | 0b | 0C | 0d | 0E | 0F |
|-----------------------|----|----|----|----|----|----|---|---|---|---|----|----|----|----|----|----|
| Compensation Value °C | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5  | 4  | 3  | 2  | 1  | 0  |

# OUTDOOR TECHNICAL OVERVIEW

## Special Functions – Temperature Compensation (cont)

### Chart 2

1. Remove power to the unit and unplug the wired controller from the indoor unit PCB.
2. Connect the infrared remote signal receiver to indoor unit PCB.  
0151800106E = socket CN29  
0151800267 = socket CN21
3. Apply power to the unit.
4. Press the **ON/OFF** button on the remote control (HBS-01).
5. (Ignore this step if the display temperature is already °C.) Press **MENU/OF** button to switch the display temperature to °C, then press **CONFIRM**.
6. Set the remote controller for HEAT mode operation, and set the temperature to 24°C.
7. Aim the controller at the infrared signal receiver, and press the **SLEEP** button 7 times within 5 seconds. The remote signal receiver will beep 2 times. The beeps indicates the set temperature compensation modification is available.
8. Aim the controller at the infrared signal receiver and adjust the temperature to X°C, then set the unit to OFF by pressing the controller's **ON/OFF** button. The remote signal receiver will beep 4 times. The beep indicates the set temperature compensation has been set successfully. Note: X-24 is the compensation value. If X is set to 24, compensation is canceled (0). If X = 25, compensation is 1°C. If X = 26, compensation is 2°C. If X = 22, compensation is -2°C, and so on.
9. To disable temperature compensation (0), set X to 24
10. Remove power and connect the wired controller.
11. Set the unit to OFF by pressing the button **ON/OFF** button. The setting will be in effect with the next ON time. This setting will be saved in the EEPROM.

### Chart 3

1. Remove power to the unit and unplug the wired controller from the indoor unit PCB.
2. Apply power to the unit.
3. Press the **ON/OFF** button on the remote control (HBS-01).
4. (Ignore this step if the display temperature is already °C.) Press **MENU/OF** button to switch the display temperature to °C, then press **CONFIRM**.
5. Set the remote controller for HEAT mode operation, and set the temperature to 24°C.
6. Aim the controller at the infrared signal receiver, and press the **SLEEP** button 7 times within 5 seconds. The remote signal receiver will beep 2 times. The beeps indicates the set temperature compensation modification is available.
7. Aim the controller at the infrared signal receiver and adjust the temperature to X°C, then set the unit to OFF by pressing the controller's **ON/OFF** button. The remote signal receiver will beep 4 times. The beep indicates the set temperature compensation has been set successfully. Note: X-24 is the compensation value. If X is set to 24, compensation is canceled (0). If X = 25, compensation is 1°C. If X = 26, compensation is 2°C. If X = 22, compensation is -2°C, and so on.
8. Remove power and connect the wired controller.
9. Set the unit to OFF by pressing the button **ON/OFF** button. The setting will be in effect with the next ON time. This setting will be saved in the EEPROM.

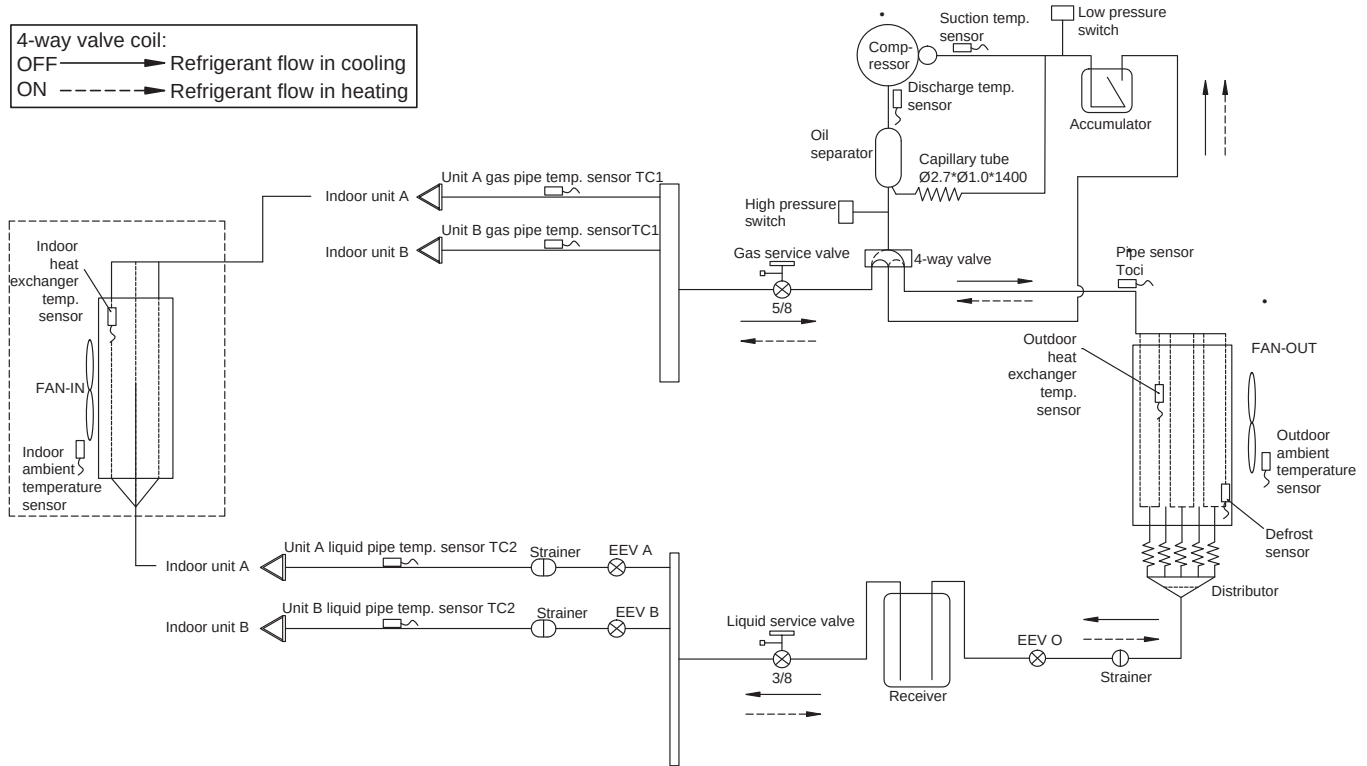
### Chart 4

1. Apply power to the unit.
2. Set to Cooling Mode or Heating Mode
3. Set the temperature to 24°C.
4. Press the **SLEEP** button 7 times within 5 seconds. Indoor PCB will Beep 2 times to confirm.
5. 24°C will be the starting/reference point for the Temperature Compensation. Temperature Compensation can be adjusted from -8°C to +6°C. Example: if you want to set the Temperature Compensation value by 4°C, then set the temperature to 28°C.
6. Once the desired value has been selected, turn OFF the unit via the YR-HG controller to save the compensation settings.

## REFRIGERATION DIAGRAMS

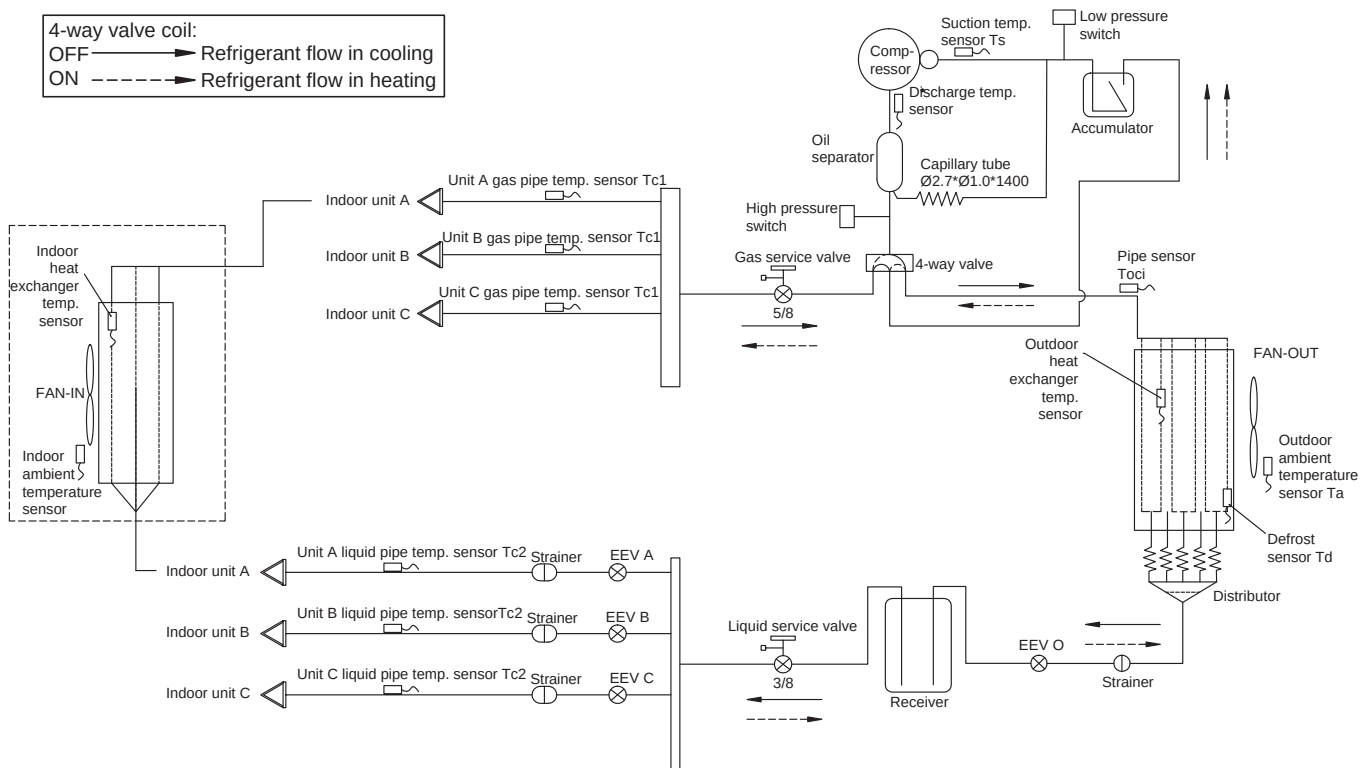
### 2U20EH2VHA

4-way valve coil:  
 OFF → Refrigerant flow in cooling  
 ON → Refrigerant flow in heating



### 3U24EH2VHA

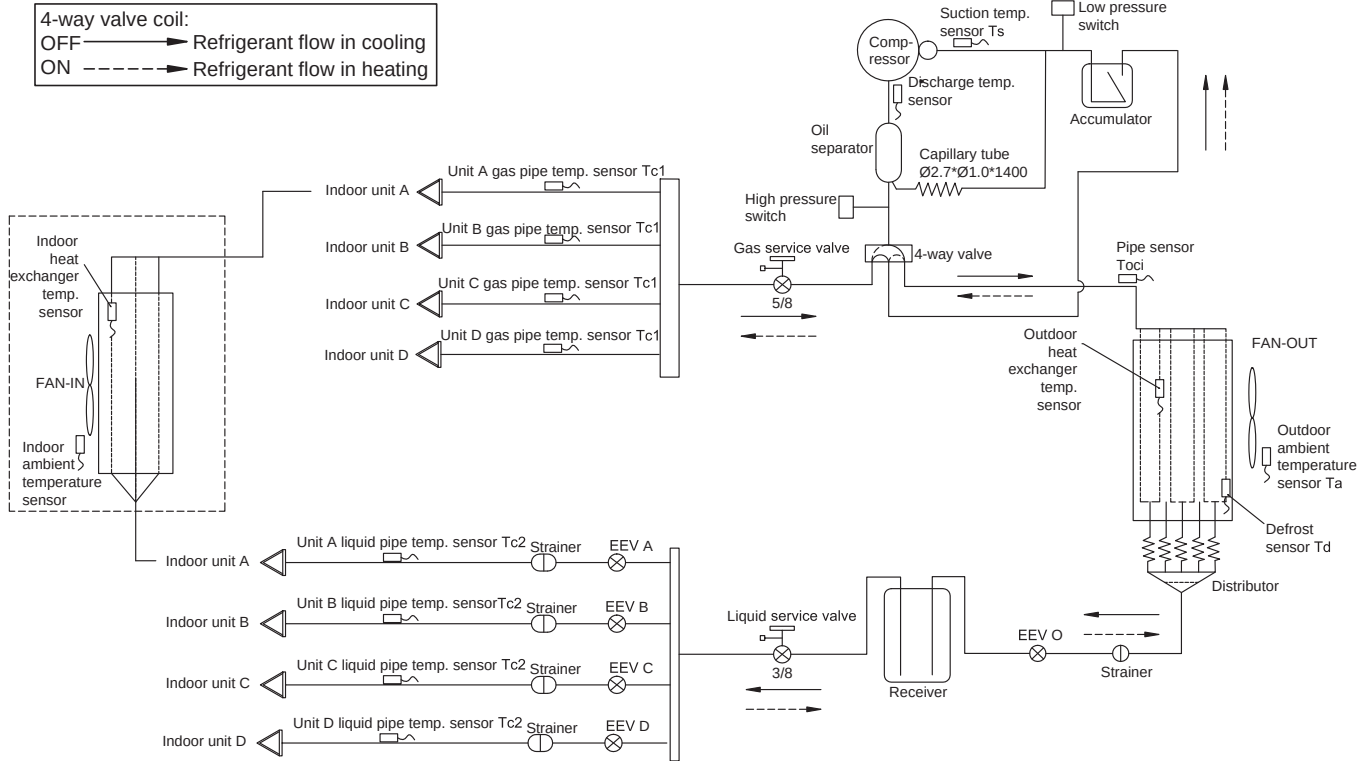
4-way valve coil:  
 OFF → Refrigerant flow in cooling  
 ON → Refrigerant flow in heating



# OUTDOOR TECHNICAL OVERVIEW

## REFRIGERATION DIAGRAMS

### 4U36EH2VHA



# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

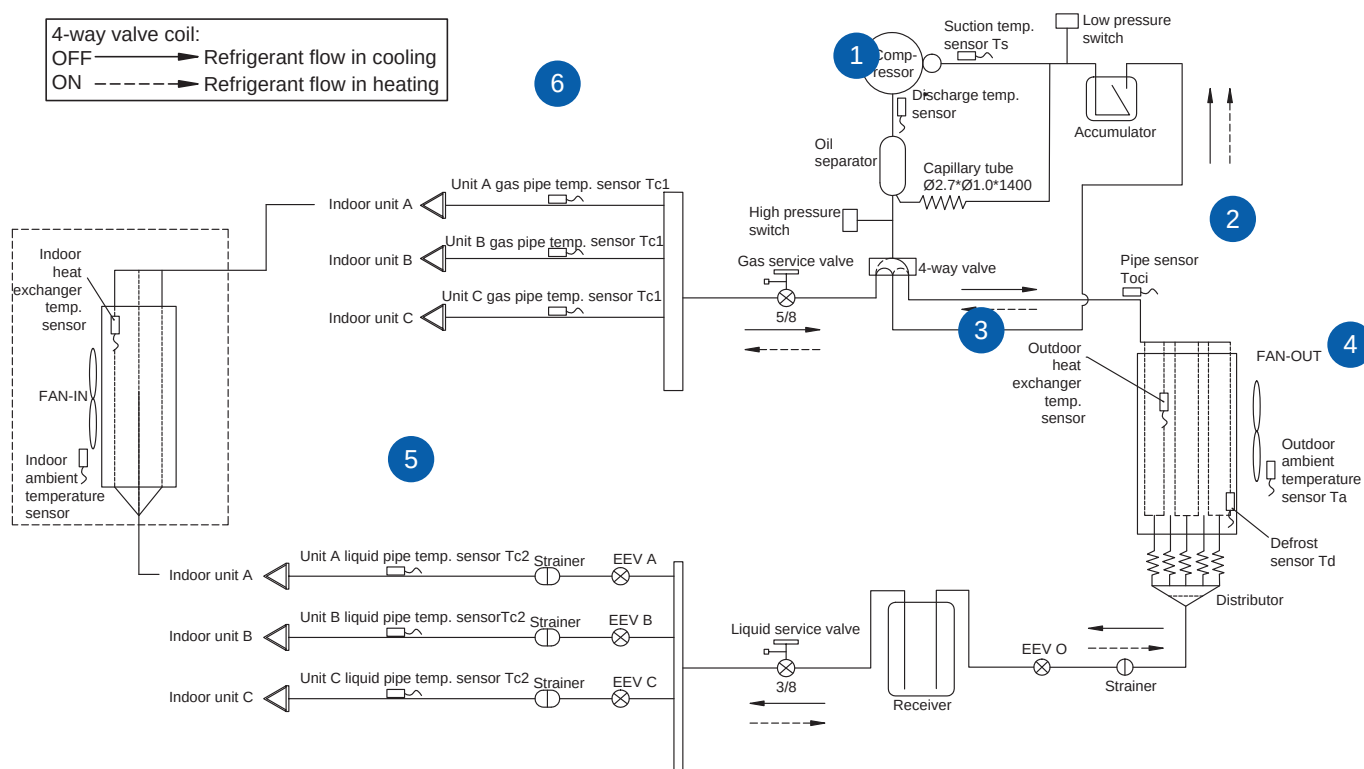
### Cooling Mode Sequence of Operation

On a call for cooling, the indoor unit will send the room temperature and set-point requirement to the outdoor unit PCB via the data signal wire path. The data travels from the indoor unit to the outdoor unit via the wire located on terminal 3/C. The indoor louvers will open and the indoor fan motor will start.

The outdoor unit will energize the EEVs that are controlling refrigerant flow to the calling indoor units. The position of the EEVs will be set to an initial position based upon the outdoor air temperature.

The 4-way valve is de-energized. After a 3-minute time delay, the outdoor fan motor will be energized. Shortly after the outdoor fan motor turns on, the compressor will start in low frequency. The operating frequency of the compressor will be displayed on the Service Monitor Board.

The refrigerant in the system will begin to flow, and the compressor will discharge hot gas into the oil separator. Oil will be trapped in the separator and returned to the suction inlet of the compressor via the 7 millary tube assembly low pressure path.



# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### Cooling Mode Sequence of Operation (cont)

#### 1 Temperature Sensor Td

The temperature of the compressor discharge hot gas will be monitored by the Discharge Temperature Sensor. If the sensor reads too hot or cool, the frequency/status of the operation will be adjusted accordingly.

The hot gas will leave the oil separator and enter the 4-way valve, which directs the hot gas to the outdoor coil. The refrigerant will condense in the outdoor coil and be subcooled. The refrigerant is now in a liquid state.

#### 2 Temperature Sensor Toci

The temperature of the hot gas leaving the 4-way valve will be monitored by the Toci Temperature Sensor. This temperature should be near the temperature of the compressor discharge gas temperature. If it is not, there is a problem with the 4-way valve. The PCB will detect the temperature difference and generate an Error Code.

#### 3 Temperature Sensor Tc

This sensor monitors the temperature of the outdoor coil during condensing operation. If abnormal condensing temperature is detected, the outdoor fan motor speed or compressor frequency may be adjusted.

#### 4 Temperature Sensor Ta

The outdoor air temperature will be monitored by the PCB. If the outdoor air temperature rises or falls, the speed of the outdoor fan may be changed.

#### 5 Temperature Sensor Tc2

The Liquid Pipe Sensor will monitor the temperature of the refrigerant leaving the EEV.

The low pressure low temperature refrigerant will enter the mixed phase liquid line and travel to the indoor unit. Heat from the indoor air passing across the evaporator coil will transfer to the cold refrigerant, sending cool air into the space and changing the liquid refrigerant into a cool vapor. The cold vapor will travel down the vapor line and return to the outdoor unit via a path through the gas stop valve.

#### 6 Temperature Sensor Tc1

The Gas Pipe Sensor will monitor the temperature of the gas pipe to calculate the difference between Liquid Pipe Temperature and Gas Pipe Temperature. If a change in EEV port opening size is needed, the EEV will make a small adjustment.

The vaporized refrigerant enters the 4-way valve and travels to the vapor line accumulator. The accumulator will trap any liquid refrigerant if present to prevent it from entering the compressor.

The vapor will exit the accumulator and enter the compressor. This cycle will repeat until the demand for cooling ends.

#### 7 Temperature Sensor Ts

The temperature of the suction gas entering the compressor is monitored by the Suction Temperature Sensor. Before stopping operation, the EEV may open to feed more refrigerant or close to warm up the line.

The demand becomes less as the indoor temperature drops toward the desired temperature, so the compressor will reduce speed. When the set temperature is reached, the compressor and outdoor fan will shut off. The circulating fan of each indoor unit continues to run.

### Heating Mode Sequence of Operation

On a call for heating, the indoor unit will send the room temperature and set-point requirement to the outdoor unit PCB via the data signal wire path. The data travels from the indoor unit to the outdoor unit via the wire located on terminal 3/C. The indoor unit louvers will open. The fan will not start until the coil has warmed sufficiently to avoid cold drafts.

EEVs serving indoor circuits will step to the standard opening. The outdoor EEV opens to a position based upon the outdoor air temperature.

The 4-way valve will energize and the outdoor fan will start. The compressor starts at a slow speed and will increase based upon demand. The indoor fan starts after the indoor coil is warm enough to avoid circulating cool air.

With the compressor operating, refrigerant will begin to flow throughout the refrigeration circuit.

The operating frequency of the compressor will be displayed on the Service Monitor Board.

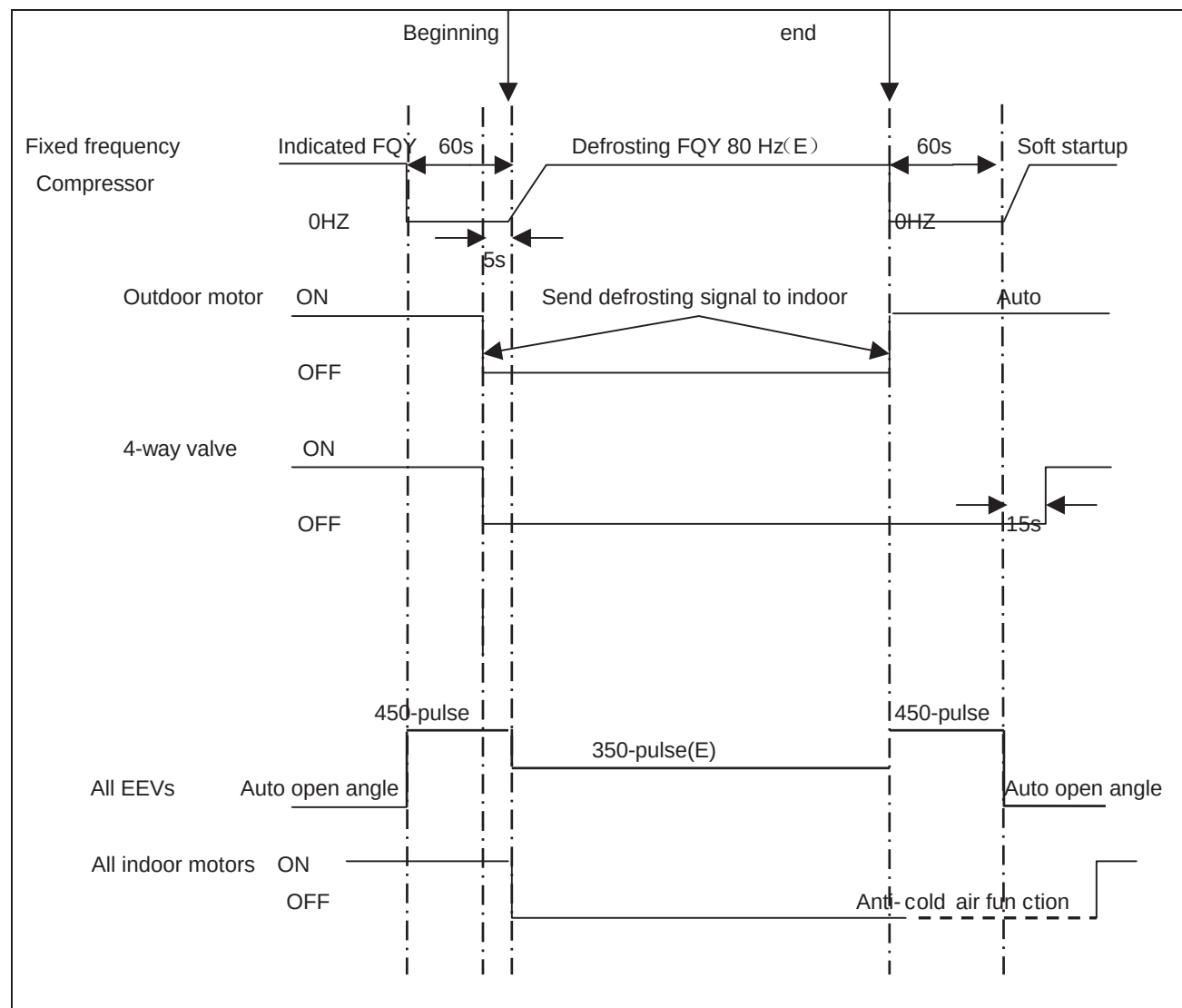
When the compressor starts, hot gas will flow into the oil separator. Oil will be trapped in the separator and returned to the suction inlet of the compressor via the capillary tube assembly low pressure path.

# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### Defrost Cycle Sequence of Operation

Multi:



# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### Electronic Expansion Valve (EEV) Control

Electronic characteristics

|                 |            |
|-----------------|------------|
| Max. open angle | 480 pulses |
| Driving speed   | PPS        |

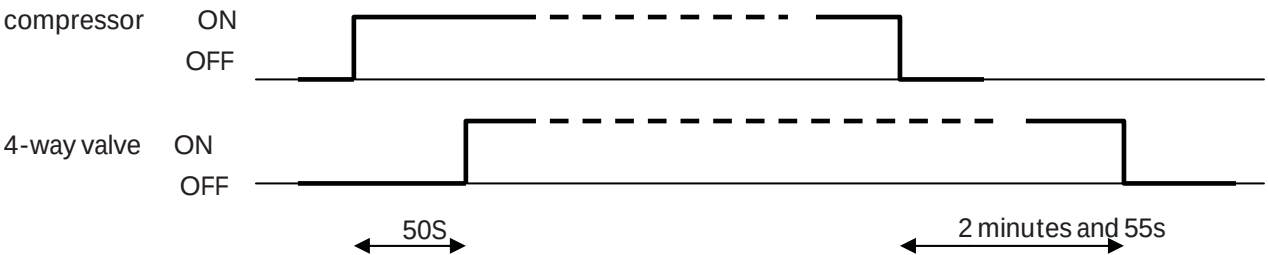
Open angle limitation of EEV

|           | Unit stop | Max. open angle | Thermostat OFF | Min. open angle |
|-----------|-----------|-----------------|----------------|-----------------|
| Cool/ dry | 5 pulses  | 480 pulses      | 5 pulses       | 80 pulses       |
| Heat      | 5 pulses  | 480 pulses      | 50 pulses      | 80 pulses       |

The EEV routinely opens and closes to maintain the compressor discharge temperature within an acceptable range.

### 4-Way Valve Heating Control

When the compressor starts in the heating mode, there is a 1-minute delay before power is applied to the 4-way valve to switch the flow of hot refrigerant to the indoor coil. When the call for heat is satisfied and the compressor shuts off, a 3-minute delay will occur before the 4-way valve is powered down and switches back to the at-rest (cooling) position.



If the 4-way valve does not switch into the heating mode, after 15 minutes of compressor run time and the indoor coil temperature is below 41°F/5°C, the compressor will stop and the unit will display a 17-flash error code on the outdoor PCB.

### Compressor Sump Heater

The sump (crankcase) heater keeps refrigerant at a higher temperature than the coldest part of the system. This prevents refrigerant from mixing with the compressor oil and also dries condensed refrigerant inside the sump. The sump heater will be energized when the ambient temperature is below 81°F/27°C and will be off when the ambient is 90°F/32°C.

|                                            | Heater OFF | Heater ON*min |
|--------------------------------------------|------------|---------------|
| Ta>50°F(10°C) OR Td>=68°F(20°C)            | 0          | 0             |
| 41°F(5 °C)<Ta ≤50°F(10°C)and Td<68°F(20°C) | 50%*60min  | 50%*60min     |
| 32°F(0°C)<Ta ≤41°F(5 °C)and Td<68°F(20°C)  | 33%*60min  | 66%*60min     |
| 32°F(0°C)>=Ta and Td<68°F(20°C)            | 0          | 100%*60min    |

# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### Defrost Control

In the heating mode and along with the ambient sensor, the defrost sensor monitors the temperature of the outdoor coil to determine if defrost is needed. If the compressor has been running for 10 minutes continuously and for 45 minutes overall, the difference between the ambient sensor ( $T_a$ ) and the defrost sensor ( $T_e$ ) will be checked. The system will initiate the defrost cycle if the following conditions can be met for 5 continuous minutes:

$$T_e \leq C \times T_a - A$$

$T_e$ : Defrost temperature sensor

$T_a$ : Ambient temperature

C: 0.80 if  $T_a < 32^\circ\text{F}/0^\circ\text{C}$ , 0.60 if  $T_a \geq 32^\circ\text{F}/0^\circ\text{C}$

A: 8, moderate climate (factory setting). 6, severe climate (alternate setting)

### End Defrosting:

If the defrost sensor ( $T_e$ ) detects the temperature of the outdoor coil is above  $44^\circ\text{F}(7^\circ\text{C})$  for 60 seconds or is above  $54^\circ\text{F}(12^\circ\text{C})$  for 30 seconds, the defrost cycle will terminate. If these temperatures cannot be reached, the defrost cycle will automatically terminate in 10 minutes.

### Timed Defrost Option:

When the outdoor ambient temperature sensor detects  $T_a$  is less than  $32^\circ\text{F}(0^\circ\text{C})$

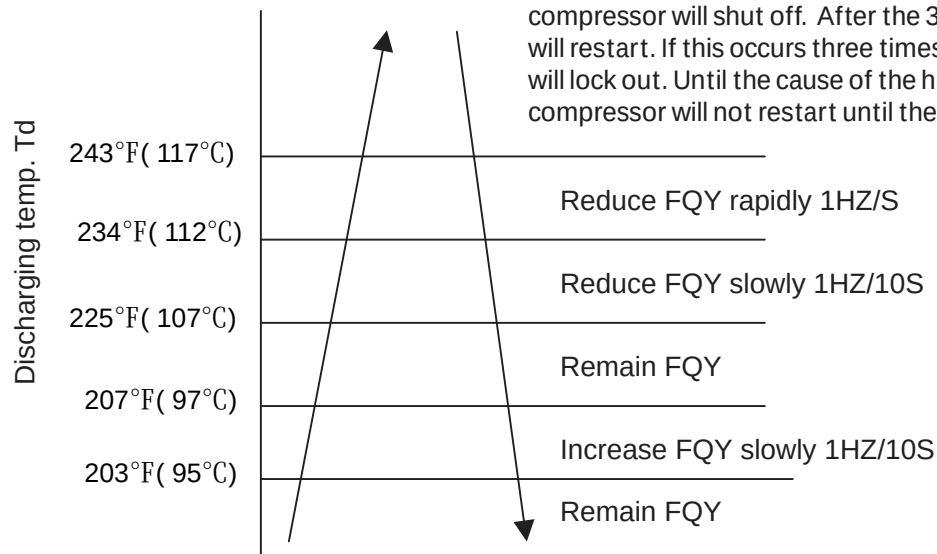
In heating mode, compressor runs continuously for 60 minutes or for 240 minutes in all

When the above conditions are met, the system will defrost. Defrosting frequency is 68 HZ, with a defrosting time of 8 minutes.

### Discharge Sensor Protection

If the discharge temperature is higher than normal, the compressor will slow down to lower the temperature.

Multi:



If the discharge temperature sensor reaches  $243^\circ\text{F}$  for 10 seconds, the compressor will shut off. After the 3-minute time delay, the compressor will restart. If this occurs three times in a 60-minute period, the compressor will lock out. Until the cause of the high temperature is discovered, the compressor will not restart until the power is interrupted then restored.

### Base Pan Heater Control Logic

When the compressor starts in the heating mode, the following conditions will apply:

| Outdoor Temperature                                                           | Pan Heater           |
|-------------------------------------------------------------------------------|----------------------|
| $>37^\circ\text{F}(3^\circ\text{C})$                                          | OFF                  |
| $28^\circ\text{F}(-2^\circ\text{C})$ to $34^\circ\text{F}(1^\circ\text{C})$   | OFF 20min. ON 10min. |
| $10^\circ\text{F}(-12^\circ\text{C})$ to $25^\circ\text{F}(-4^\circ\text{C})$ | OFF 15min. ON 15min. |
| $<10^\circ\text{F}(-12^\circ\text{C})$                                        | ON                   |

### Troubleshooting the Base Pan Heater Error:

#### Step 1:

Check the pan heater for an open circuit or short circuit. Unplug the connector from main control PCB. Test the resistance between the two pins of the pan heater connector. It should be  $0.28-0.379\text{K}\Omega$ . If out of range, change the pan heater. If normal go step 2.

#### Step 2:

Check the main control board pan heater output port. Unplug the connector from main control PCB. Run the ODU with manually forced heating (Set the display board SW 1-1 as ON). Test the voltage between the two heater output pins, it should be 208-230Vac.

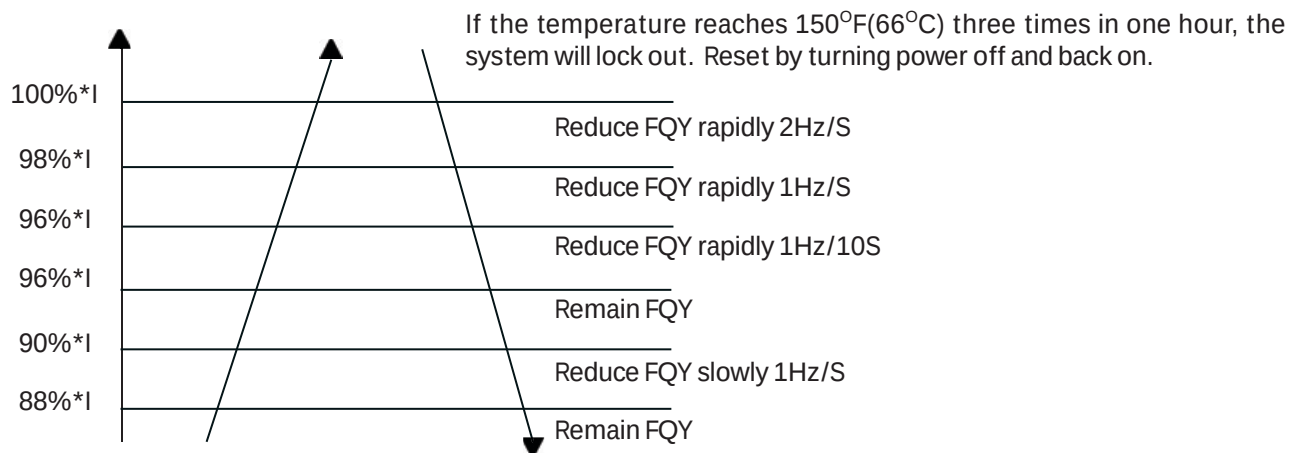
# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### High Current Protection

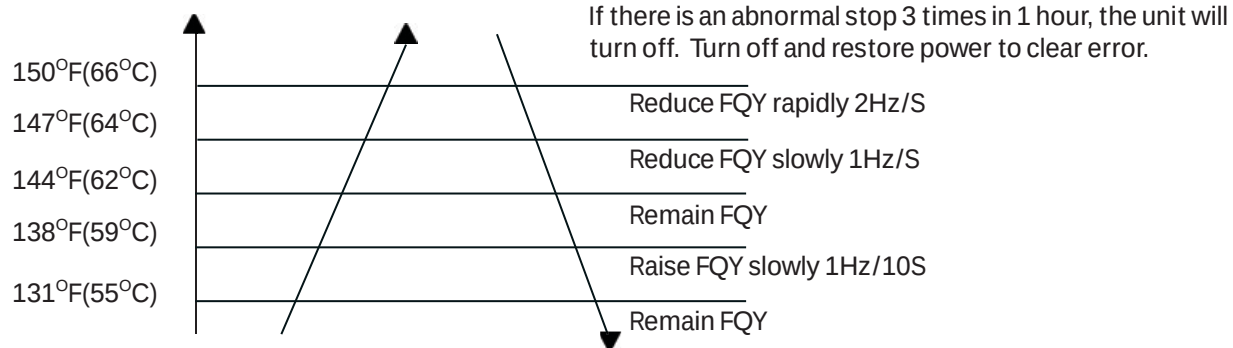
The below table is the outdoor unit protection current and compressor current.

| Model      | Maximum current (I) | Compressor current (CT) |
|------------|---------------------|-------------------------|
| 2U20EH2VHA | 12.5A               | 10A                     |
| 3U24EH2VHA | 13.5                | 14A                     |
| 4U36EH2VHA | ???                 | ???                     |



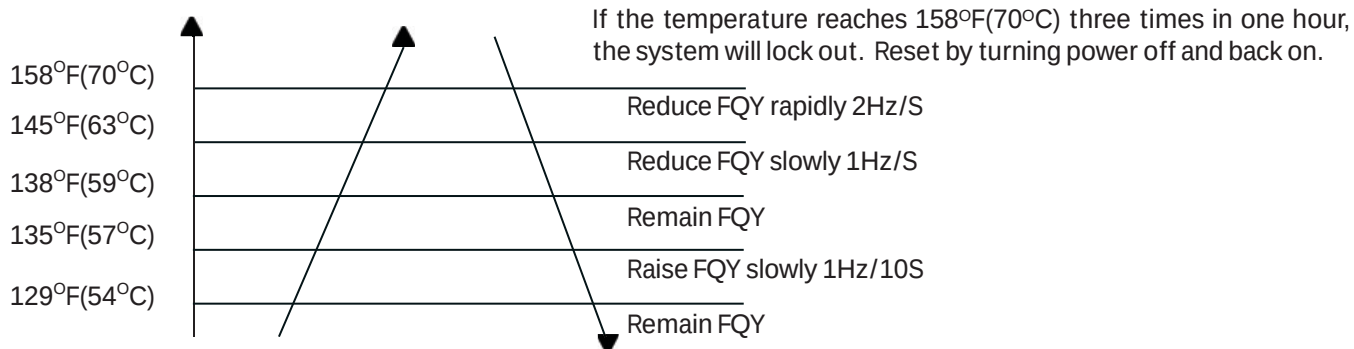
### High Pressure Protection in Cooling

Tc--cooling



### High Pressure Protection In Heating

Tc--heating



# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

### Low Pressure Protection

With the compressor running, if the low pressure switch opens for 1 minute, the compressor will stop.

If this condition occurs 3 times in an hour, the compressor will lock out and a low pressure error code will be displayed at the indoor unit.

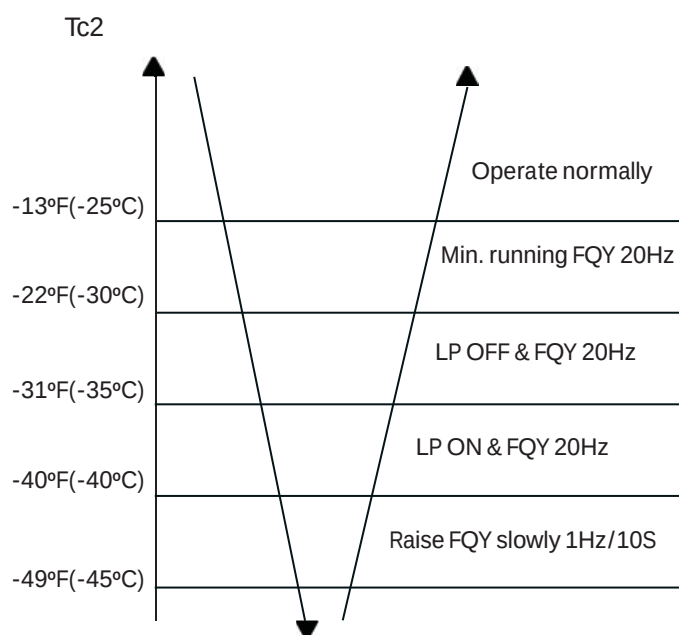
If the compressor is not running and the switch opens for 30 seconds, a low pressure error code will be displayed.

The low pressure switch does not stop compressor operation or signal an error code during the following conditions:

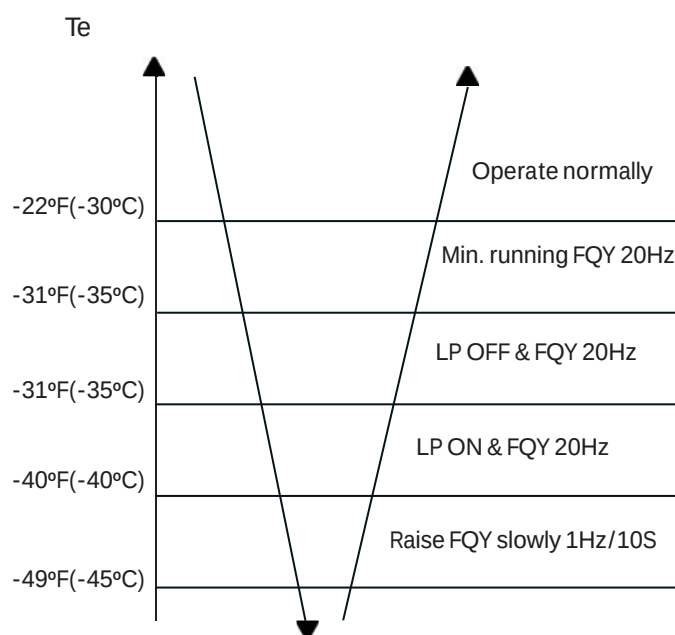
- The first 8 minutes of run time when the compressor starts a new cycle
- During defrost
- When the ambient temperature is below 32°F/0°C
- Following the termination of an oil return cycle

When any of the above 4 conditions are present, low pressure protection is provided by the coil temperature sensors in both heating (Te) and cooling (Tc2) modes.

### Low Pressure Protection in Cooling Mode:



### Low Pressure Protection in Heating Mode:



# OUTDOOR TECHNICAL OVERVIEW

## OPERATIONS

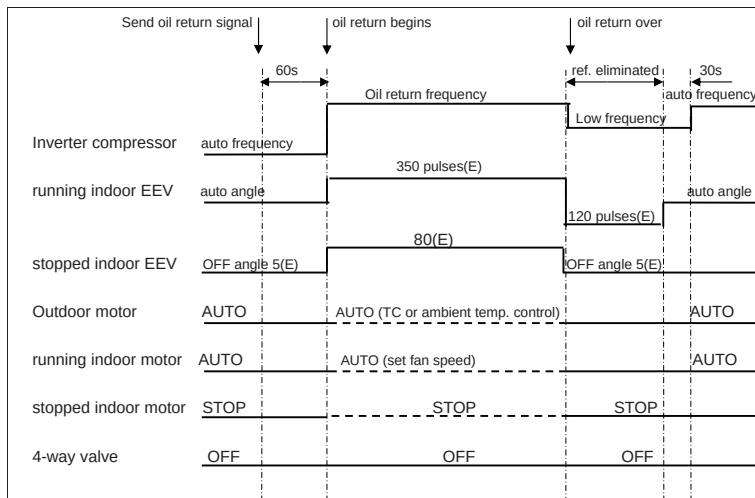
### Oil Return Cycle

When the compressor is operating at low load conditions, or the operating frequency has been below 70Hz continuously for 4 hours, the system will enter the oil return cycle. This ensures that oil which may be trapped within the system at low loads will return to the compressor crankcase.

If a 4-hour low speed run time has occurred, the oil return procedure initiates by automatically ramping up the compressor speed to at least 85Hz for a pre-set time, up to a 9-minute maximum. The higher speed will wick hiding oil into the now faster-moving refrigerant and deposit it in the compressor crankcase. To avoid occupant discomfort when the oil return cycle is active, the indoor fan shuts off.

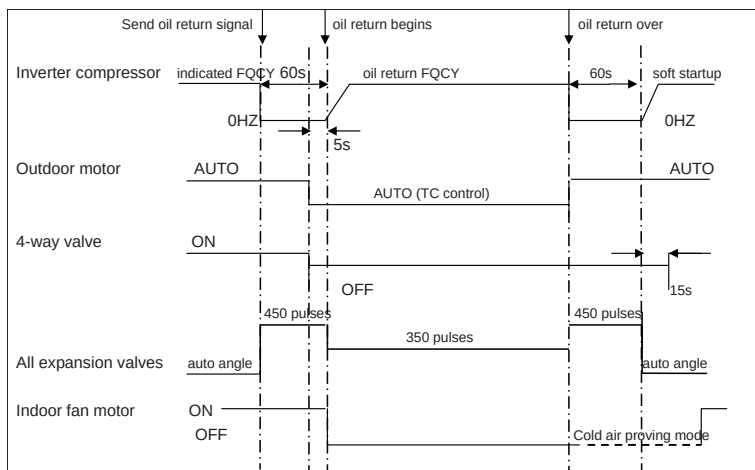
Should an error code result in a system shutdown, the oil return cycle timing will resume when the error cleared.

### Oil Return in Cooling Mode:



OR [ & 1 minute later after oil return is over  
Td - Tc > 86°F (30 °C)  
Ts - Tc2AVE > 86°F (30 °C)  
Tc2AVE < -31°F (-35 °C) ] code has been  
Max. 10 minutes

### Oil Return in Heating Mode:



OR [ Max. 9 minutes (E)  
OR [ Td - Tc < 68°F (20 °C) for 30s continuously(5 minutes later, begin to count)  
Ts - Tc2AVE < 59°F (15 °C) for 30s continuously(5 minutes later, begin to count)  
Running for min. 5 minutes ] ]

# OUTDOOR TECHNICAL OVERVIEW

## SPECIAL FUNCTIONS

### Auto Restart

When this is enabled, the following functions will automatically resumes after a power loss:

- ON/OFF State, Mode of Operation, Fan Speed, Temperature Setpoint, Louver Swing settings.
- If there was a timer set or the system was in Sleep mode, they will be canceled upon restart.

### Wired Controller:

- Auto Restart is Enabled by Default

### Wireless Controller:

- Enable: Press the **Sleep** button 10 times within 5 seconds. You will hear 4 beeps as confirmation.
- Disable: Press the **Sleep** button 10 times within 5 seconds. You will hear 2 beeps as confirmation.

### Forced Defrost

This will force the unit to run a Defrost Cycle.

### Wireless Controller:

- Set the unit to HEAT, 30°C and High fan speed. Press the **Sleep** button 6 times within 5 seconds.
- You will hear 3 beeps as a confirmation.

### Indoor Temperature Display (Highwall Only)

This function will allow you to set the display to show either the Ambient temperature or the setpoint:

- Press the **Light** button 10 times within 5 seconds.

### Enhanced Defrost

#### Enable Enhanced Defrost via YR-HG Controller:

1. Set to HEAT mode
2. Set to 30C/86F
3. Set High fan speed
4. Press "**Temperature +**" button 10 times within 5 seconds
5. Unit will beep 7 times to confirm

#### Disable Enhance Defrost:

6. Repeat steps 1-5. Unit will beep 5 times to confirm

# OUTDOOR TECHNICAL OVERVIEW

## ERROR CODES

| LED Error Code | Diagnosis                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------|
| 1              | Outdoor EEPROM failure                                                                                 |
| 2              | IPM overcurrent or short circuit                                                                       |
| 4              | Communication failure between the IPM and outdoor PCB                                                  |
| 5              | Module operated overload (compressor overload protection)                                              |
| 6              | Module low or high voltage                                                                             |
| 8              | Overheat protection for discharge temperature                                                          |
| 9              | Malfunction of the DC fan motor                                                                        |
| 10             | Malfunction of defrost temperature sensor                                                              |
| 11             | Suction temperature sensor failure                                                                     |
| 12             | Ambient temperature sensor failure                                                                     |
| 13             | Discharge temperature sensor failure                                                                   |
| 15             | Communication failure between the indoor & outdoor unit                                                |
| 16             | Lack of refrigerant or discharging                                                                     |
| 17             | 4-way valve switching failure                                                                          |
| 18             | Loss of synchronism detection                                                                          |
| 20             | Indoor thermal overload                                                                                |
| 21             | Indoor unit overload protection, heating mode only.                                                    |
| 21             | Indoor coil frosted                                                                                    |
| 23             | Module thermal overload                                                                                |
| 24             | Compressor start failure, over-current                                                                 |
| 25             | Phase current protection (IPM)                                                                         |
| 26             | MCU reset                                                                                              |
| 27             | Module current detect circuit malfunction                                                              |
| 28             | Liquid pipe sensor failure: Circuit A                                                                  |
| 29             | Liquid pipe sensor failure: Circuit B                                                                  |
| 30             | Liquid pipe sensor failure: Circuit C                                                                  |
| 31             | Liquid pipe sensor failure: Circuit D                                                                  |
| 32             | Gas pipe sensor failure: Circuit A                                                                     |
| 33             | Gas pipe sensor failure: Circuit B                                                                     |
| 34             | Gas pipe sensor failure: Circuit C                                                                     |
| 35             | Gas pipe sensor failure: Circuit D                                                                     |
| 36             | Gas pipe sensor failure: Circuit E                                                                     |
| 38             | Malfunction of module temperature sensor momentary power failure detection                             |
| 39             | Malfunction of condensing temperature sensor                                                           |
| 40             | Liquid pipe sensor failure: Circuit E                                                                  |
| 41             | Toci temperature sensor failure                                                                        |
| 42             | High Pressure switch open                                                                              |
| 43             | Low Pressure switch open                                                                               |
| 44             | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor. |
| 45             | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor. |
| L0             | OAT less than -22°F (-30°C)                                                                            |

### Precautions For Adding Refrigerant

1. This system must use refrigerant R410A.
2. Add refrigerant 0.20 oz/ft per meter when the total piping length exceeds the standard value.
3. The total liquid piping length must be less than the max value.

| Outdoor Unit | Std. Value | Max Value  |
|--------------|------------|------------|
| 2U20EH2VHA   | 30m/100ft. | 50m/164ft. |
| 3U24EH2VHA   | 30m/100ft. | 60m/197ft. |
| 4U36EH2VHA   | 40m/131ft. | 70m/230ft. |

### Notes:

1. No addressing is necessary. All indoor wiring connections must match the outdoor connections, or a communication failure will result.
2. Set SW5-8 to ON for Quiet Operation if desired. Maximum capacity may be slightly reduced.
3. Do not change any switch settings unless directed to do so.

\* PCB: Printed Circuit Board

\* IPM: Inverter Power Module

\* EEV: Electronic Expansion Valve

# OUTDOOR TECHNICAL OVERVIEW

## OUTDOOR UNIT ERROR CODES

When the system generates an error code, it will be displayed on the Service Monitor Board, the number of flashes on the PCB, and also on the indoor unit display panel.

### Temperature Sensor Error Codes

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open or shorted, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances located in the tables.

There are 16 potential Error Codes that can be generated by the PCB to indicate a failure of an outdoor unit temperature sensor.

#### **Error Code 10**

This code indicates an electrical failure of the sensor that is used to sense the temperature of the outdoor coil during defrost. This sensor is connected to the PCB via a connection at Plug CN-14.

#### **Error Code 11**

This code indicates an electrical failure of the sensor that is used to sense the temperature of the suction gas that enters the compressor. The sensor is connected to the PCB via two wires at Plug CN-14.

#### **Error Code 12**

This code indicates an electrical failure of the sensor that is used to sense the temperature of the outdoor air. The sensor is connected to the PCB via two wires at Plug CN-14.

#### **Error Code 13**

This code indicates an electrical failure of the sensor that is used to sense the temperature of the compressor hot gas discharge line. The sensor is connected to the PCB via two wires at Plug CN-14.

#### **Error Code 28-36**

These codes indicate a failure of either a Liquid or Gas Temperature Sensor that is part of either the A, B, C, or D indoor unit EEV circuit. Refer to the outdoor unit Error Code Decal for specific identification of the malfunctioning temperature sensor. These sensors connect to the PCB at connection plugs near the center of the circuit board. (Note that if the sensor has failed, and there is an unused port on the unit available, the sensor from the unused port can be used to temporarily fix the problem.)

#### **Error Code 38**

This code indicates a potential failure of the IPM temperature sensor. This sensor connects to the IPM via Plug CN-8. This sensor is mounted near the heat sink.

#### **Error Code 39**

This code indicates an electrical failure of the sensor that is used to sense the condensing temperature of the outdoor coil. The sensor is connected to the PCB via two wires at Plug CN-14.

#### **Error Code 41**

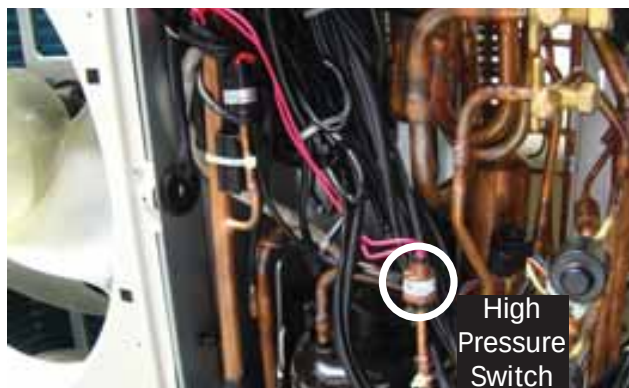
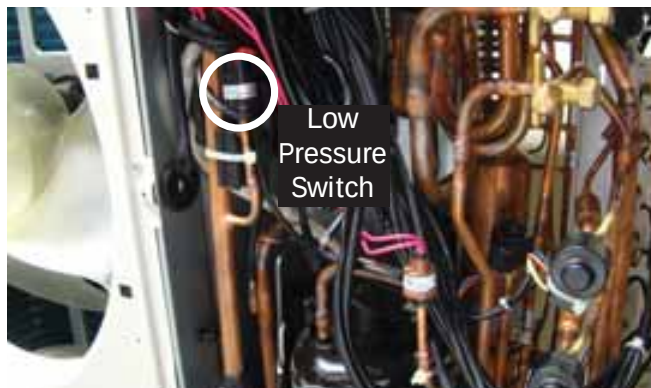
This code indicates an electrical failure of the sensor that is used to sense the temperature of the compressor hot gas discharge line. The sensor is connected to the PCB via two wires at Plug CN-14.

# OUTDOOR TECHNICAL OVERVIEW

## OUTDOOR UNIT ERROR CODES

### Pressure-Related Error Codes

To protect the compressor, the PCB has a low pressure switch connection at CN13, and a high pressure switch connection at CN12.



### Error Code 42 & 43

The low pressure switch will generate an Error Code 43 if open. An open high pressure switch will show an Error Code 42.

#### Testing Procedure

If the system generates either of these two codes, check the continuity of the switch to ensure it is not open or shorted. High or low pressures are usually related to dirt in the coils, dirt in the air filter, or incorrect refrigerant charge.

There are no pressure ports that can be accessed to measure low pressure in heat mode nor high pressure in cool mode. If the system trips on one of these errors, it will be necessary to remove the refrigerant and re-charge to confirm low or high charge is not causing the problem.

### Error Code 44

The system is operating at excessive refrigerant pressure. If the system is a new installation, it is likely that the charge is too high. Note the Weight Method is the ONLY way to charge this system.

#### Typical Causes of High Pressure in Cooling Mode:

- Overcharge
- Dirty outdoor coil
- Restriction

#### Typical Causes of High Pressure in Heating Mode:

- Overcharge
- Undersized refrigerant lines or excessive length
- Restriction

**Note:** If the refrigerant pressures are correct, yet the system does not close the error reporting pressure switch, replace the defective pressure switch.

### Error Code 45

This code is indicating that system pressure is too low.

#### Typical Causes of Low Pressure in Cooling Mode:

- Lack of charge
- Low Heat on Indoor coil
- Restrictions, air flow, or dirt
- Low indoor load

#### Typical Causes of Low Pressure in Heating Mode:

- Cold outdoor air
- Lack of charge
- Restriction

## Communication Error Code

### Error Code 15

Data travels between the units on the terminal block connections 3/C and 1. A correct connection for each unit is indicated by a solid green LED on the Service Monitor Board. If an LED is flashing or not on, make sure the 14/4 stranded copper communication cable connections are tight and on the correct terminals. Additionally, ensure there are no splices in the 3/C wire, and that the PCB connections at CN21 are in good order. An incomplete or inadequate ground can easily be an issue.

# OUTDOOR TECHNICAL OVERVIEW

## OUTDOOR UNIT ERROR CODES

### Error Codes Caused by Abnormal Refrigerant Circuit Conditions

#### ● Error Code 8

This code indicates the temperature of the compressor hot gas is too high. This error occurs after the PCB has attempted to correct high temperature by reducing the compressor speed, adjusting the fan speed, or opening the EEV. Causes of this type of condition are typically a lack of refrigerant in the system, excessive heat in the conditioned space, or a restriction in the refrigeration circuit.

#### ● Error Code 16

This error code indicates the system may lack refrigerant. Recover and check the system charge.

### Outdoor Error Code Related to Indoor Unit

#### ● Error Code 21

This code indicates the indoor coil has frosted. This condition can be due to a lack of heat in the conditioned space, operating the indoor unit at excessively cold air temperature, a blockage of air flow to the indoor unit, or an issue with the indoor fan motor. This condition will cause the system to enter an anti-freezing cycle.

### Error Code Related to the PCB

#### ● Error Code 1

The EEPROM of the PCB cannot read or write data. Replace the PCB.

### Error Code Related to the IPM

#### ● Error Code 2

The IPM has either failed or has detected excessive current. Before replacing the IPM, check these potential causes of high current:

- Overcharge
- Dirty outdoor coil
- Hot conditioned space
- High temperature or excessive load
- Refrigeration circuit restriction
- Seized compressor
- Faulty wiring or wiring connections

#### ● Error Code 4

This code indicates the IPM is not communicating with the PCB. Check the wiring and the connections CN9 on the PCB and CN15 on the IPM. If the connections are good, yet the boards do not communicate and the code will not clear, check for correct voltage at the IPM CN15 connection. If the communication voltage is correct and the high voltage input is present, replace the IPM. If the communication voltage is not correct, replace the PCB.

#### ● Error Code 5

The IPM is protecting the compressor from overload, which can be caused by low building power supply, restrictions, a non-condensable in the system, a plugged coil, an excessive load, or a refrigerant overcharge.

#### ● Error Code 6

This code indicates the operating voltage of the system is either too high or too low. Check line voltage for proper limits. The line voltage supplied to the outdoor unit should be no lower than 187VAC when the compressor starts. The running voltage should be no lower than 197VAC. The incoming line voltage to the outdoor unit should never be higher than 253VAC. If improper voltage is present, check the supply voltage circuit from the building for correct wire size and good connections. If the voltage is still outside operating limits, contact the power company to have the service corrected.

If the line voltage from the power company is correct, check the output voltage of the Power Filter. This voltage connects to the IPM at terminals ACL and ACN. If the voltage is not within specifications shown above, replace the PFB.

#### ● Error Code 18

There is a loss of synchronization among the U, V, and W compressor windings during frequency changes as they slow down or speed up the compressor.

#### Possible causes include:

- Unstable power supply
- Internal compressor fault
- IPM fault
- Compressor terminal wiring incorrect
- Poor wiring condition
- Loose compressor wiring connection

# OUTDOOR TECHNICAL OVERVIEW

## OUTDOOR UNIT ERROR CODES

### Error Codes Related to the IPM (cont)

#### **Error Code 23**

This code indicates an IPM thermal overload. This error was generated by a temperature sensor located in the IPM heat sink. Causes of overheating are typically overcharge of refrigerant, excessively plugged coil, sensor open or shorted, or a non-condensable in system.

#### **Error Code 26**

Module reset indicates possible PCB power anomalies. This usually occurs when low line voltage conditions are present.

#### **Error Code 27**

The IPM has detected that the compressor current is too high.

##### **Possible Causes:**

- Overcharge
- Dirty outdoor coil
- Hot conditioned space temperature or high load
- Refrigeration circuit restriction
- Seized compressor
- Defective IPM

### Error Code Related to Compressor, Outdoor Fan & 4-Way Valve

#### **Error Code 9**

This code indicates the outdoor fan motor is not running. The fault is detected very quickly by the PCB. The system will shut off and display this error code. If this error occurs, refer to the outdoor fan motor test procedure.

#### **Error Code 17**

This error code indicates that the 4-way valve is not directing hot gas to the proper coil. Refer to the 4-way valve testing procedure.

#### **Error Code 24**

This error code indicates the compressor failed to start when a call for operation occurred. Refer to the compressor testing procedure.

# OUTDOOR TECHNICAL OVERVIEW

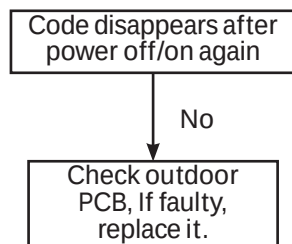
## FLOWCHARTS

### [1] Outdoor EEPROM Malfunction

EEPROM communication error; EEPROM data check error (model ID, checksum, etc.); EEPROM data logic error (wider data range, wrong order, etc.)

#### Possible causes:

- EEPROM is bad
- Loose EEPROM wiring

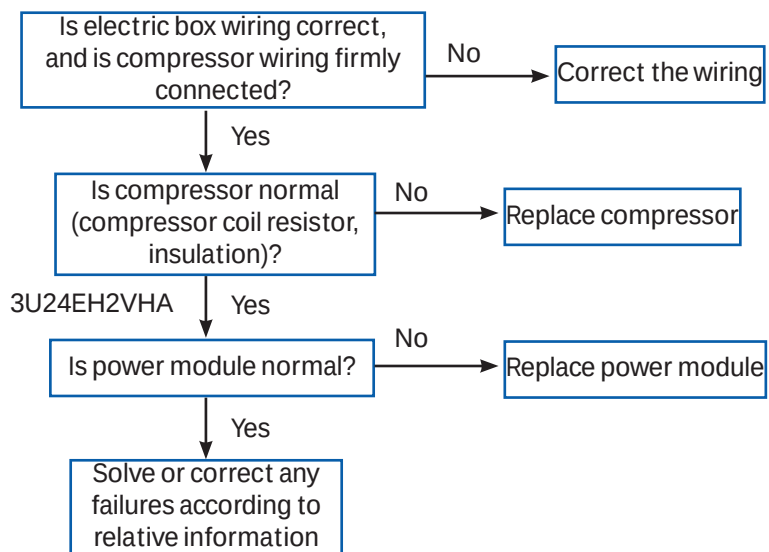


### [2] Outdoor IPM over current or short circuit

Input over current detected by PIM's hardware.

#### Possible causes:

- The IPM is bad
- Loose compressor wire
- The compressor is bad



# OUTDOOR TECHNICAL OVERVIEW

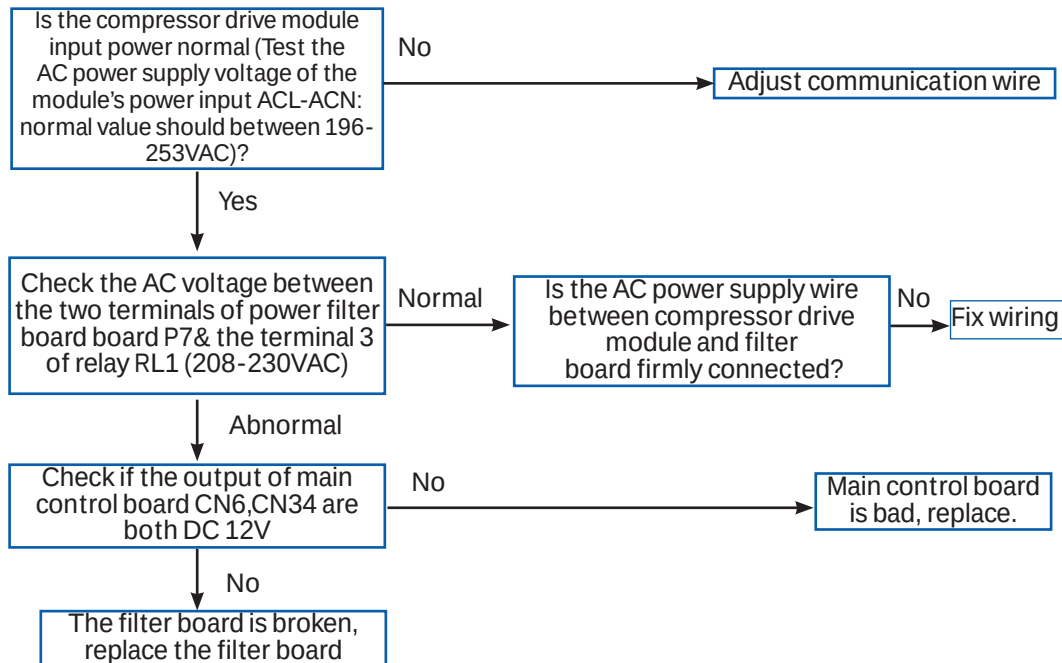
## FLOWCHARTS

### [4] Communication abnormal between PCB and IPM

Control board can not communicate with the compressor driver module for over 4 minutes

#### Possible causes:

- The communication wire is bad
- The PCB is bad
- The power module is bad

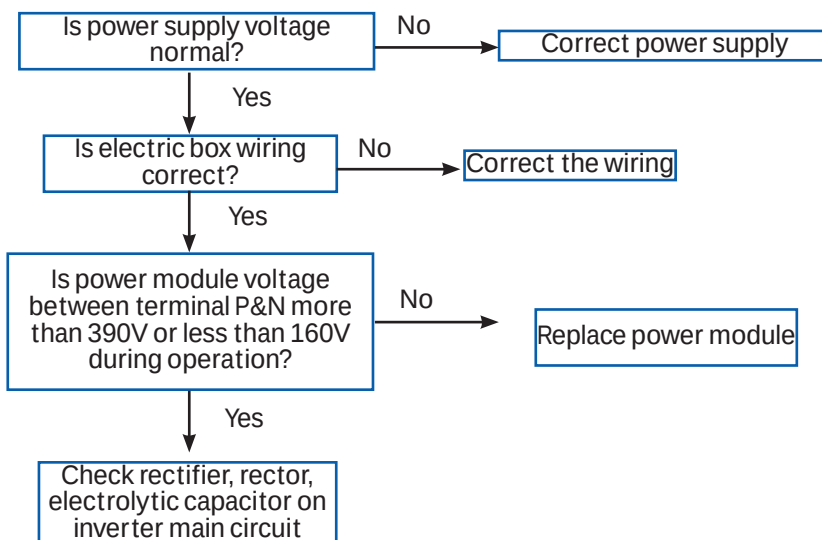


### [6] DC voltage or AC voltage high

Driver module AC power supply voltage over 280VAC, or driver module DC-BUS voltage over 390VDC.

#### Possible causes:

- The power supply is abnormal
- Incorrect wiring
- Power module is bad



# OUTDOOR TECHNICAL OVERVIEW

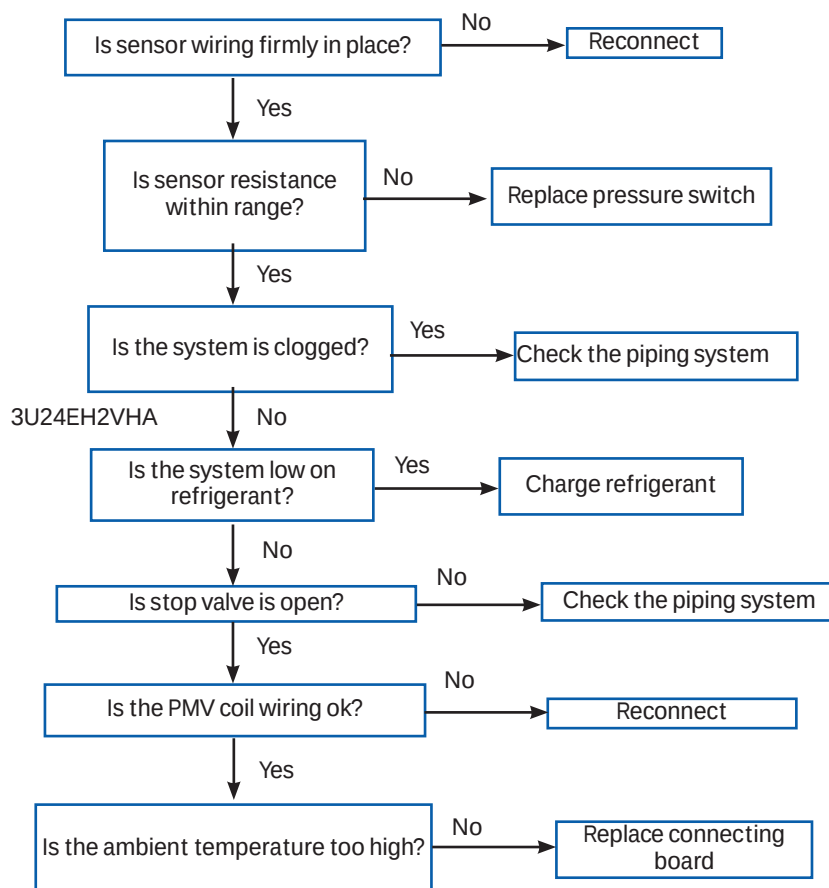
## FLOWCHARTS

### [8] Discharge temperature too high protection

Compressor discharge temperature over 115°C. Error clears within 3 minutes if temperature lowers below 115°C. Error status lock if it occurs 3 times in 1 hour.

#### Possible causes:

- The sensor is bad or fixed bad
- The system is clogged
- The systems lack of refrigerant
- The valve opening is wrong

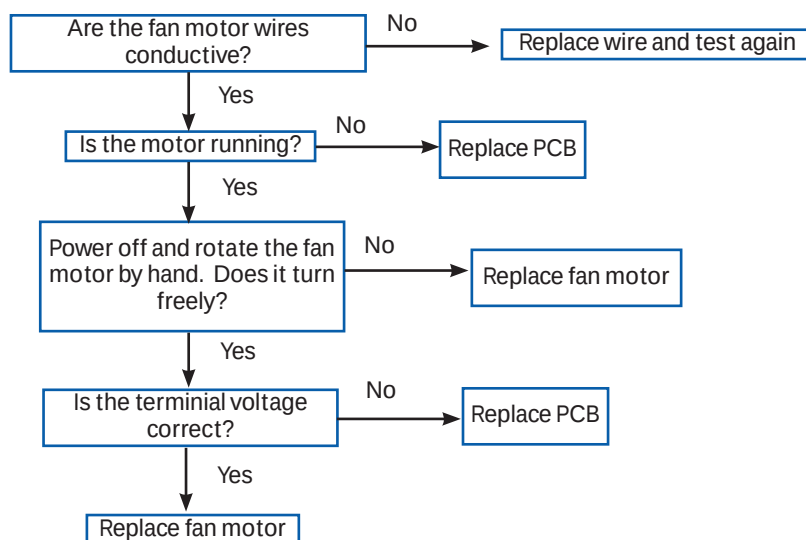


### [9] DC fan motor fault

DC fan motor damaged, not connected, or related circuit broken. Error status confirms and locks if occurs 3 times within 30 minutes.

#### Possible causes:

- Loose motor wiring
- The motor is bad
- The PCB is bad



# OUTDOOR TECHNICAL OVERVIEW

## FLOWCHARTS

### [10] Outdoor defrosting temp. sensor Te abnormal

### [11] Suction temp. sensor Ts abnormal

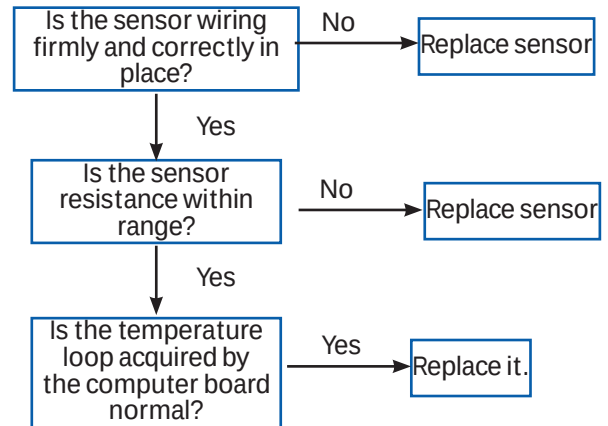
### [12] Outdoor ambient temp. sensor Ta abnormal

### [13] Discharging temp. sensor Td abnormal

Sensor temperature has been detected below or higher than expected, or the sensor has been detected as a shorted or open circuit. (for expected temperature, refer to part failure code)

#### Possible causes:

- Bad sensor connection
- The sensor is bad
- Sensor resistance drift
- The temperature acquired by PCB is not accurate

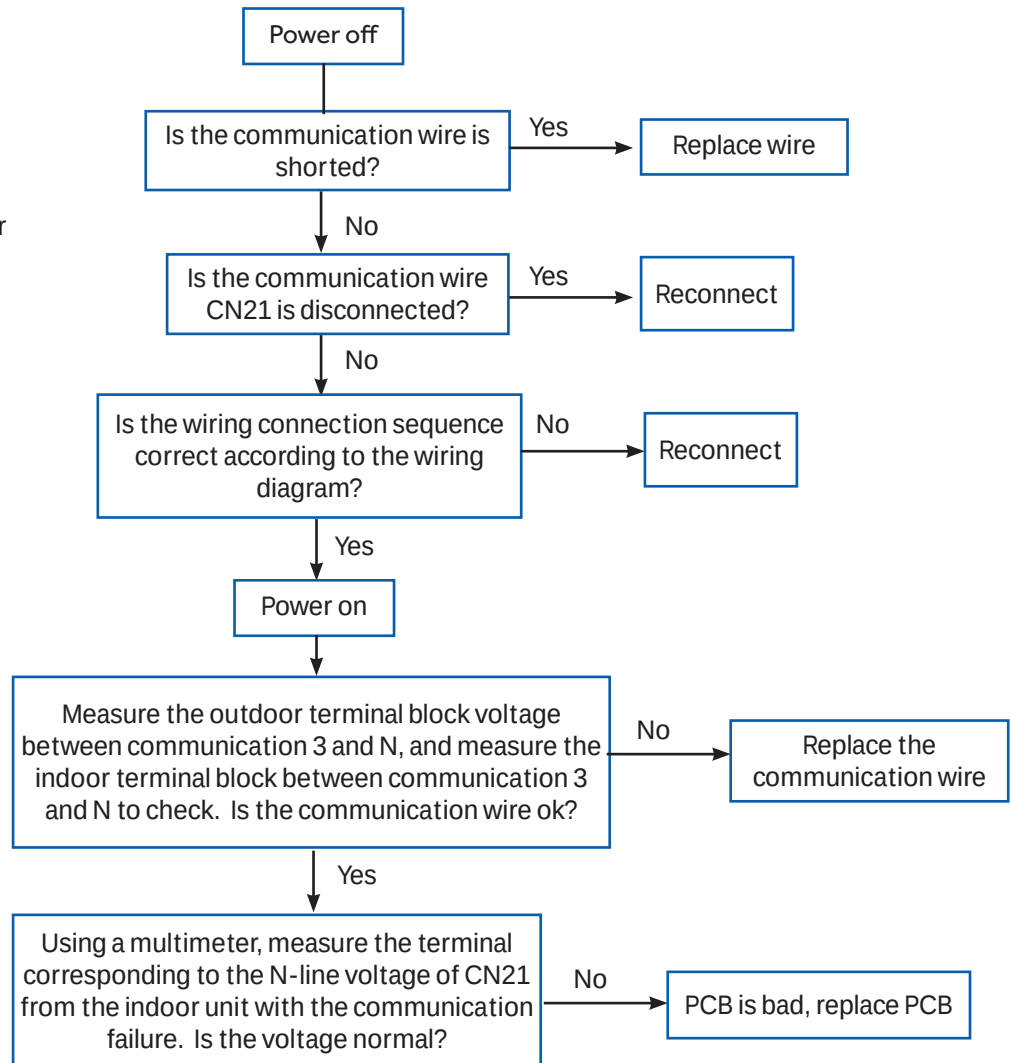


### [15] Communication abnormal between indoor unit and outdoor unit

Outdoor unit control board cannot communicate with the indoor unit control board for over 4 minutes

#### Possible causes:

- Bad communication wiring
- The PCB is bad



# OUTDOOR TECHNICAL OVERVIEW

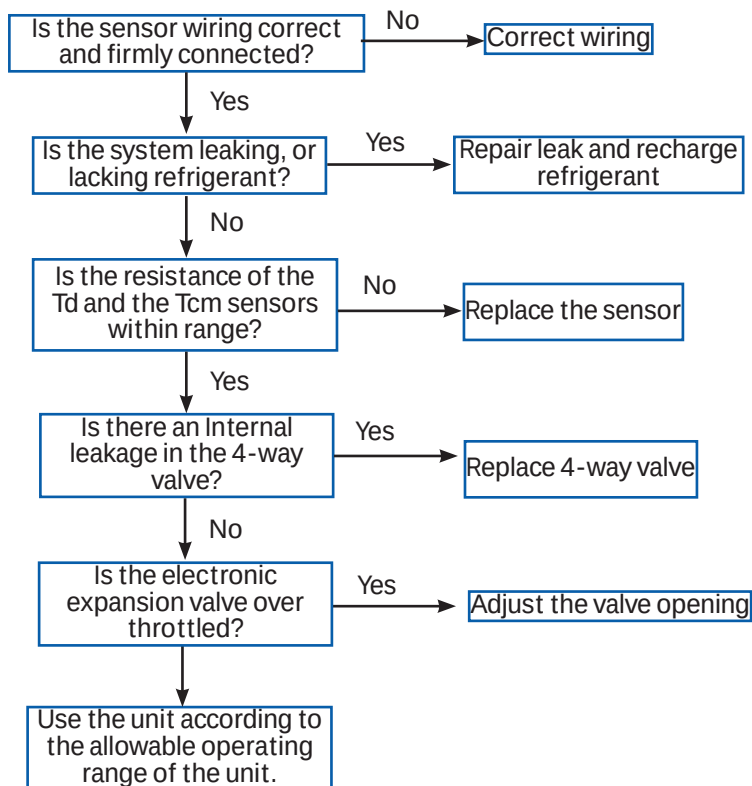
## FLOWCHARTS

### [16] Lack of refrigerant or discharging pipe blocked

Discharge & suction temperature  $T_d - T_s \geq 80^\circ\text{C}$  10 minutes after compressor start. Error status locks if it occurs 3 times in 1 hour.

#### Possible causes:

- Wrong sensor connection
- Lack of refrigerant
- The sensor is bad
- The 4-way valve is bad
- The electronic expansion valve is bad
- Out of the operating range

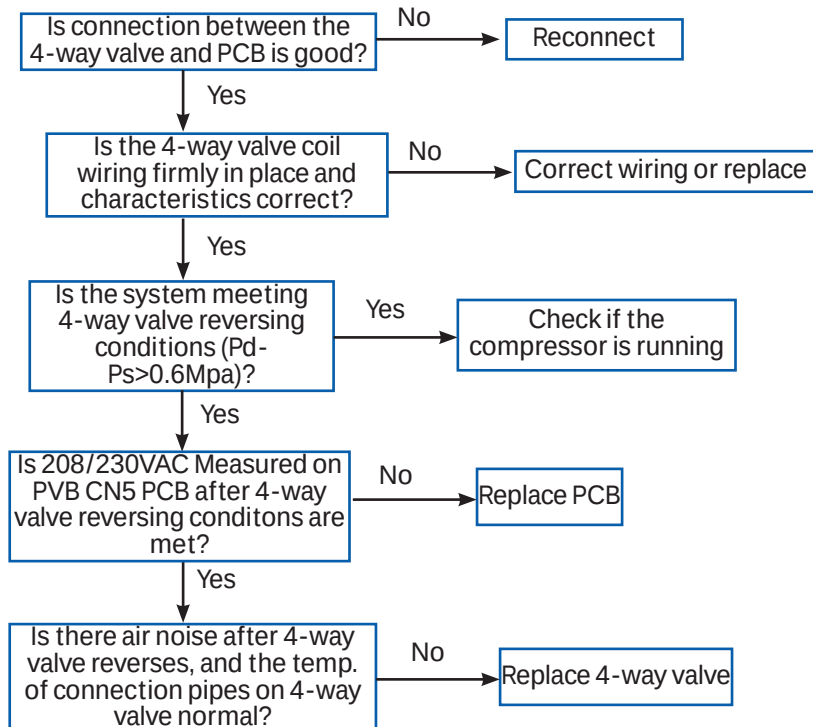


### [17] 4-way valve reversing failure

Indoor pipe & indoor ambient temperature  $T_m - T_{ai} \geq 5^\circ\text{C}$  10 minutes after compressor started. Error status locks if it occurs 3 times in 1 hour

#### Possible causes:

- The 4-way valve is bad
- The PCB is bad
- The 4-way valve coil connection is bad
- The system pressure difference is too small



# OUTDOOR TECHNICAL OVERVIEW

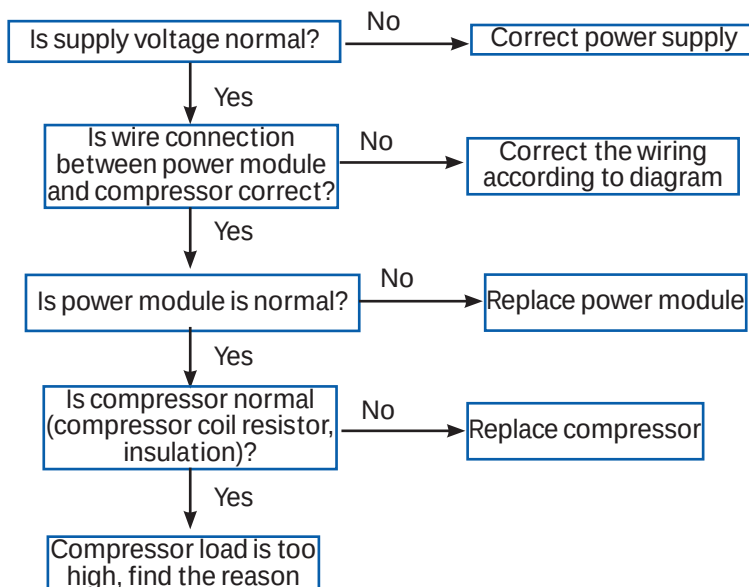
## FLOWCHARTS

### [18] Compressor motor desynchronizing

Motor desynchronizing occurred. Caused by overload, load sharply fluctuating, abnormal compressor current sensor circuit, or one of the inverter gate drive signals is missing.

#### Possible causes:

- The power supply is abnormal
- Incorrect compressor wiring
- The power module is bad
- The compressor is bad
- The system is overload

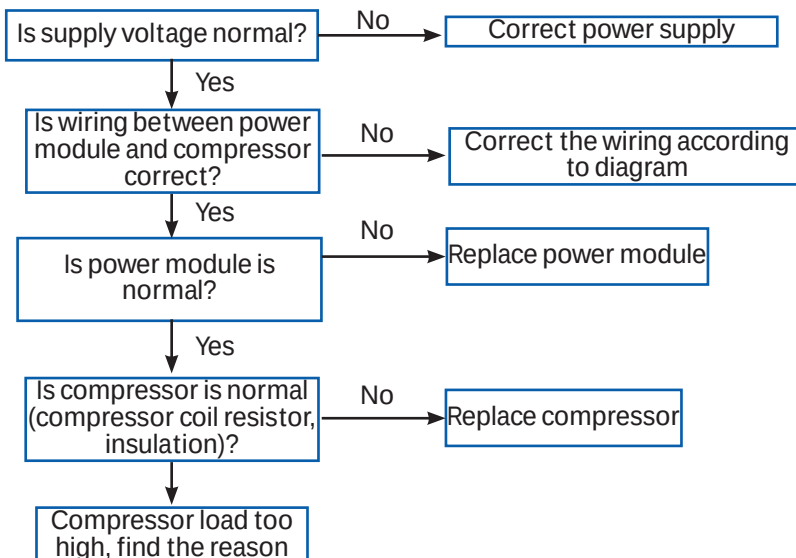


### [24] Compressor startup failure

Compressor start failure has been detected by driver module.

#### Possible causes:

- The power supply is abnormal
- Incorrect compressor wiring
- The power module is bad
- The compressor is bad
- System overload

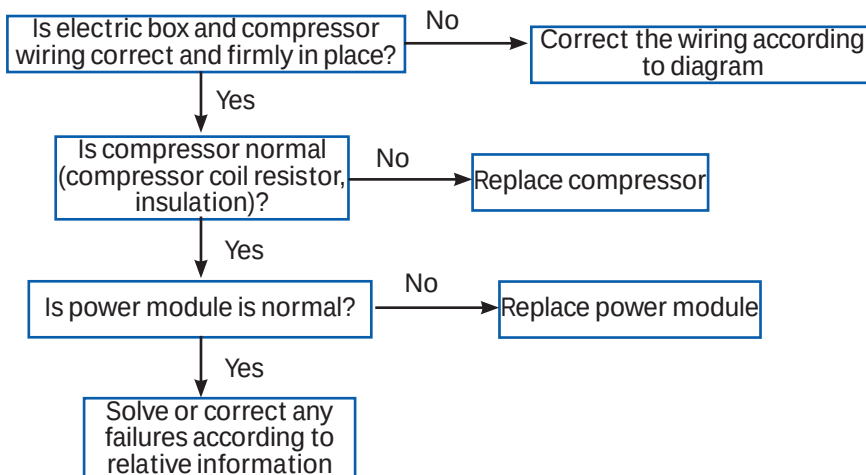


### [25] Input overcurrent of the drive module

Compressor drive module input current higher than 32A (double fan model), or 27A (single fan). Locks if it occurs 3 times in 1 hour.

#### Possible causes:

- Incorrect compressor wiring
- The power module is bad
- The compressor is bad



# OUTDOOR TECHNICAL OVERVIEW

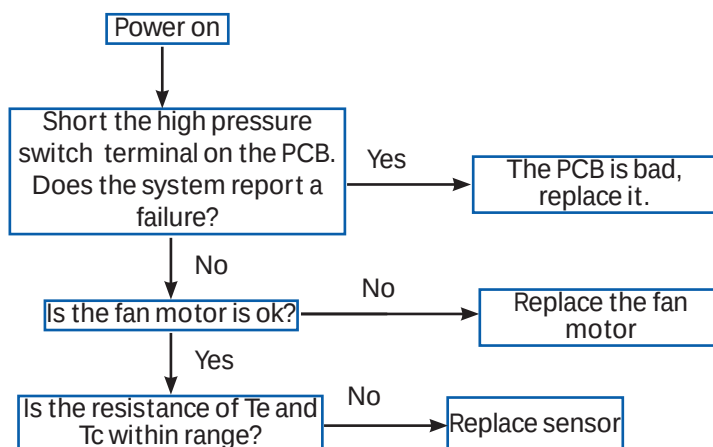
## FLOWCHARTS

### [42] Open high pressure switch

High pressure switch: Switch circuit has been detected open for 30 seconds (after 3 minute of compressor run time). Error locks if it occurs 3 times in 1 hour.

#### Possible causes:

- Incorrect pressure switch wiring
- Abnormal system pressure
- System is clogged
- Incorrect refrigerant charge
- Bad valve
- Pressure switch is bad
- PCB is bad

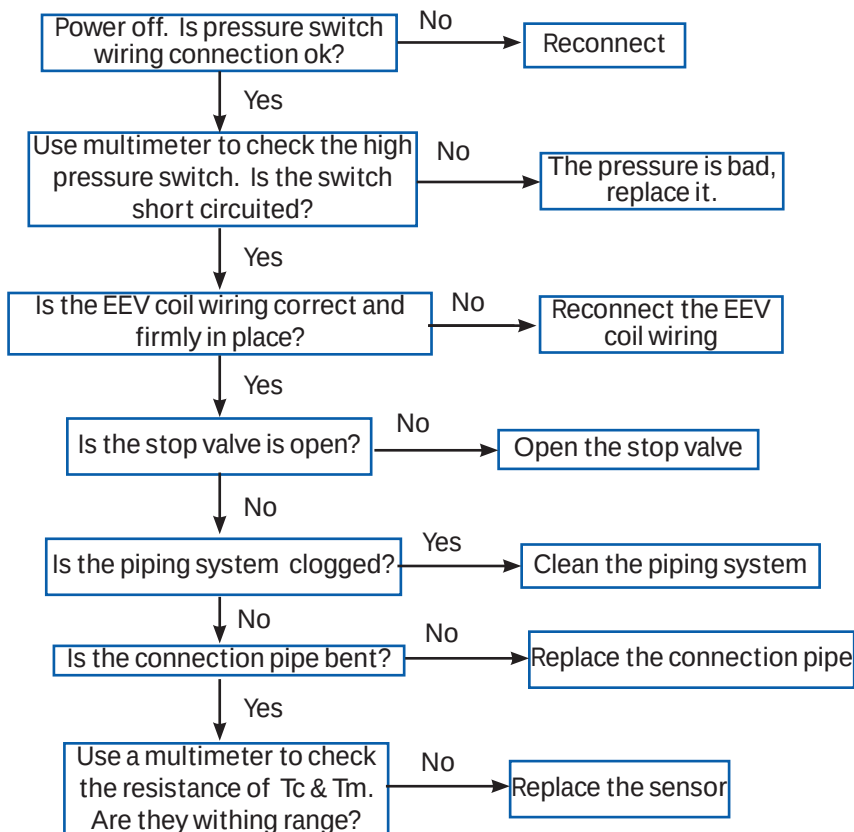


### [43] Open low pressure switch

Low pressure switch: Switch has been detected open for 60 seconds (after 3 minute of compressor run time) or open for 30 seconds during standby.

#### Possible causes:

- Incorrect pressure switch wiring
- Abnormal system pressure
- System is clogged
- Incorrect refrigerant charge
- Bad valve
- Pressure switch is bad
- PCB is bad



# OUTDOOR TECHNICAL OVERVIEW

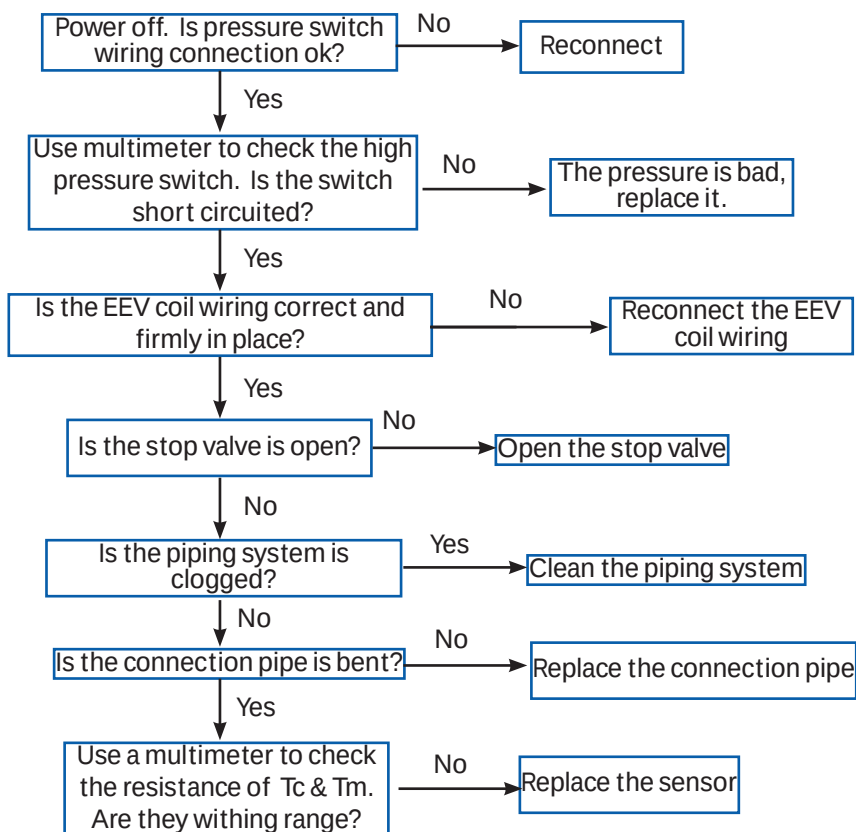
## FLOWCHARTS

### [44] Compressor motor desynchronizing

Motor desynchronizing occurred. Caused by overload, load sharply fluctuating, abnormal compressor current sensor circuit, or one of the inverter gate drive signals is missing.

#### Possible causes:

- The power supply is abnormal
- Incorrect compressor wiring
- The power module is bad
- The compressor is bad
- The system is overload

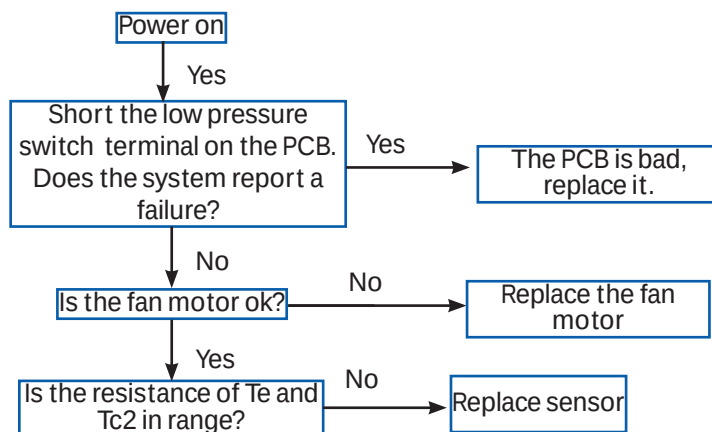


### [45] Low pressure detected in system

The minimum temperature value of indoor pipe Tm and outdoor Ts is lower than -45 °C during cooling mode, or minimum temperature value of outdoor Tc and outdoor Te is lower than -45 °C.

#### Possible causes:

- Low pressure sensor detection value is incorrect
- Low refrigerant charge
- System air leakage
- Blocked low pressure or liquid line piping
- The outdoor unit cannot be turned on normally due to failure to open outdoor heat exchanger electronic expansion valve when heating.
- The operation environment is beyond the allowed range.



# OUTDOOR TECHNICAL OVERVIEW

## COMPONENTS

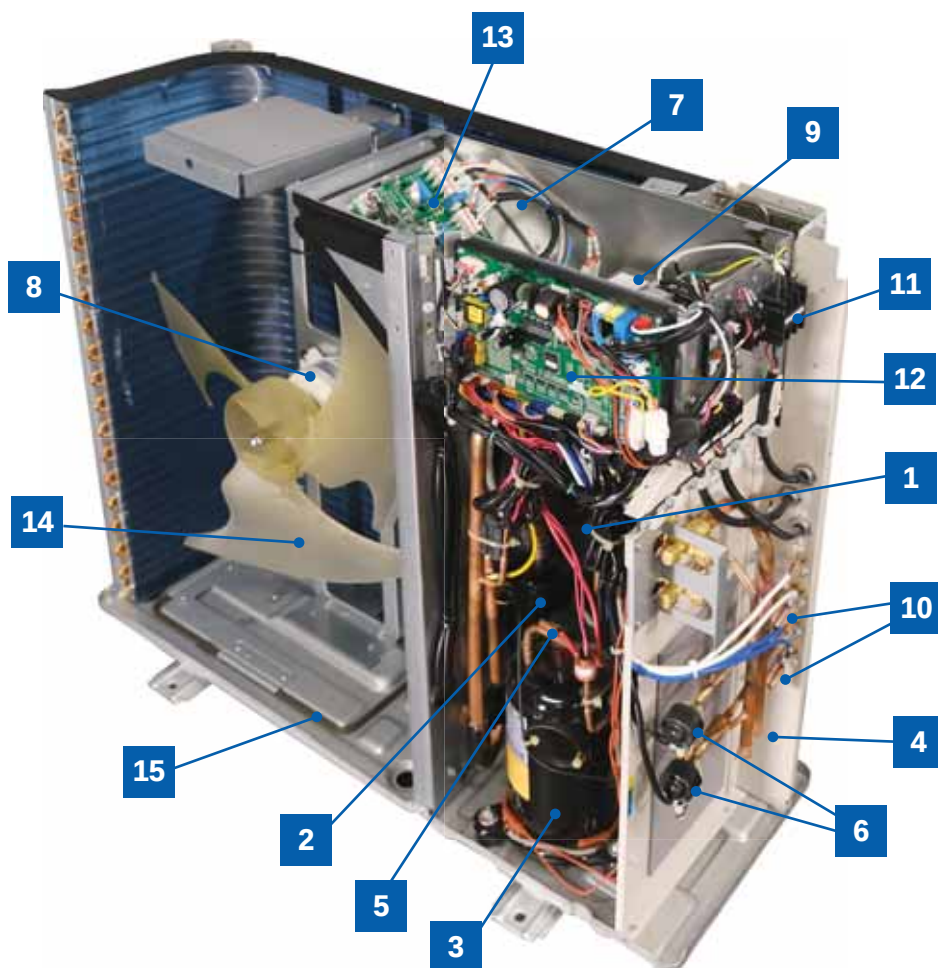
The outdoor unit features a variable speed, rotary type compressor that delivers refrigerant flow to up to 4 individual indoor units. The system uses R-410A refrigerant mixed with PVE oil, and is 208/230 VAC, 60 Hz, single phase.

Compatible indoor units are High wall, Cassette, Ducted, and Console with remote control, cassette with either remote or wired control, and ducted with wired control only.

The indoor units will maintain individualized room temperatures as set on each controller, provided all units are in the same mode. If the first unit to be turned on is set to the heating mode, all units will heat. If the first unit to be turned on is set to the cooling mode, all units will cool.

### Component Overview

- 1** 4-Way Valve
- 2** Accumulator
- 3** Compressor
- 4** Defrost Temperature Sensor
- 5** Discharge Temperature Sensor
- 6** Electronic Expansion Valves
- 7** Outdoor Ambient Temperature Sensor
- 8** Outdoor Fan Motor
- 9** Power Factor Reactor
- 10** Suction Line Temperature Sensors
- 11** Terminal Block
- 12** Main Control Board
- 13** Module Control Board
- 14** Fan Blade
- 15** Base Pan Heater



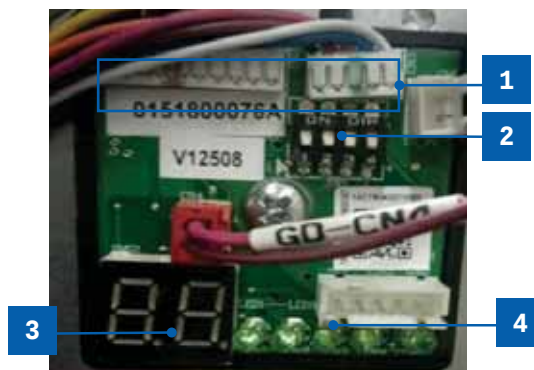
# OUTDOOR TECHNICAL OVERVIEW

## COMPONENTS

### Service Monitor Board (SMB)

The SMB has important features including operational DIP switches, error code display, compressor speed, and diagnostic capabilities.

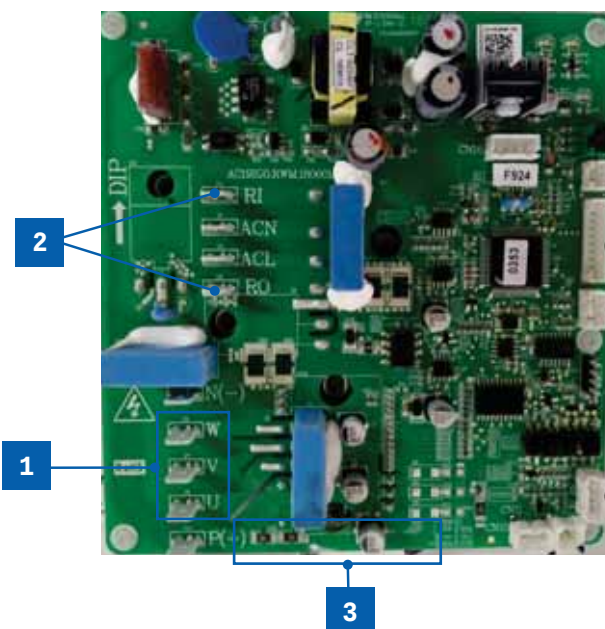
- 1 The SMB is connected to the PCB via connections CN-2 and CN-3.
- 2 The SW1 DIP switches are OFF (default position for normal operation).
- 3 The digital display will indicate operating frequency of the compressor when no error code is present, or will flash an error code if present.
- 4 A solid green LED indicates that the A, B, C, D or E unit is successfully communicating with the outdoor unit.



### Inverter Power Module (IPM)

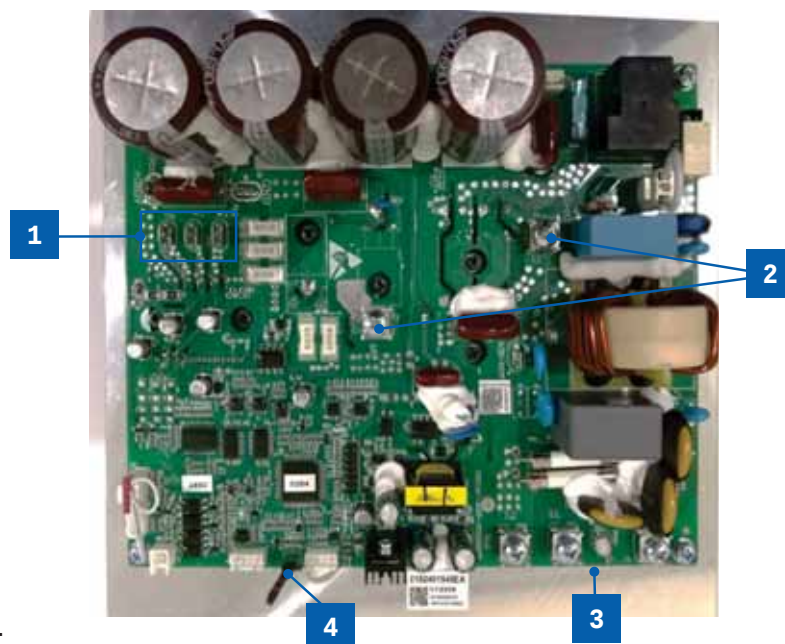
#### 2U & 3U

- 1 The Inverter Power Module generates 3-phase VDC power to operate the variable speed compressor. The compressor is connected to the IPM via terminals U, V and W.
- 2 A Reactor Coil is connected to the IPM at terminals RI and RO. The Reactor Coil will filter electrical noise generated at high frequency operation that could cause damage to the compressor windings.
- 3 IPM generates a large amount of heat during operation. This heat is transferred to a heat sink behind the board, then mixed with the outdoor air. The Tm temperature sensor protects the IPM from excessive temperatures.



#### 4U

- 1 The Inverter Power Module generates 3-phase variable VDC power(60V-230V) to operate the variable speed compressor. The compressor is connected to the IPM via terminals U, V and W.
- 2 A Reactor Coil is connected to the IPM at terminals LI and LO. The Reactor (spec is 5mH, 25A/5mH); the reactor is one part of the PFC (power factor chopper circuit). Its main function is to boost the DC bus voltage with the PFC switches IGBT. The PFC circuit will improve the power factor and reduce electromagnetic noise caused by harmonics.
- 3 IPM generates a large amount of heat during operation. This heat is transferred to a heat sink behind the board, then mixed with the outdoor air.
- 4 The Tfin temperature sensor is used to protect the IPM from excessive temperatures.



# OUTDOOR TECHNICAL OVERVIEW

## COMPONENTS

### PCB

The PCB is connected via communication cables to the Inverter Power Module, Filter Board, and the Service Monitor Board.

- 
- 1** Voltage to operate the PCB is provided by the Power Filter Board on terminals ACN and ACL.
  - 2** When power is present, the Green LED will light.
  - 3** The communication cables to the PCB from the Power Filter Board connect to CN6 and CN34.
  - 4** The Service Monitor Board connects to plugs CN-23 and CN-8. When these cables are connected to the Service Monitor Board, the SMB digital display should be illuminated.
  - 5** Plug CN-21 connects the data path between each indoor unit and the PCB. The connections from this plug terminate at the Number 3/C terminal at the indoor unit voltage connection terminal strips.
  - 6** The Outdoor Fan Motor is a DC voltage, variable speed type that connects to the PCB at terminal Plug CN-11.
  - 7** The 4-Way Valve is energized by line voltage from a connection via Plug CN-5. This valve is energized in HEAT MODE.
  - 8** The Crankcase Heater is energized via a connection at terminals CON-9 and CON-8 on the PCB.
  - 9** The EEV coils for the outdoor unit and each indoor unit are connected at terminals CN-15 through CN-18. These EEV coils include the connection for the HEAT MODE EEV coil.
  - 10** There are a set of temperature sensors that monitor the temperature of the refrigerant entering and leaving each circuit. These sensors are mounted in a group near the center of the circuit board.
  - 11** There are system temperature sensors that monitor refrigerant line temperature and outdoor air temperatures. These sensors plug into the PCB via Plugs CN-14, CN-1, CN-7, and CN-24.
  - 12** The system has two refrigerant pressure switches, a Low Pressure Switch and a High Pressure Switch. These switches are connected to the PCB via Plugs CN-12(HP) and CN-13(LP).
  - 13** There are three sets of DIP switches. SW5 and SW7 affect the operational parameters of the unit. Refer to the wiring diagram for the correct settings. SW6 positions are changed only when a Central Controller is used.
  - 14** There are 4 surface mounted buttons located next to SW-5 and SW-6. These buttons are for factory use only.
  - 15** The PCB has a Green LED and a Red LED. When power is present, the Red LED is on. When two or three indoor units are connected, the Green LED is on.
  - 16** T5A 250V rated ceramic fuse is located on the PCB. This fuse will open if excessive current occurs or if a power surge is present. This fuse is field replaceable.
  - 17** Base pan heater connection (150W).

# OUTDOOR TECHNICAL OVERVIEW

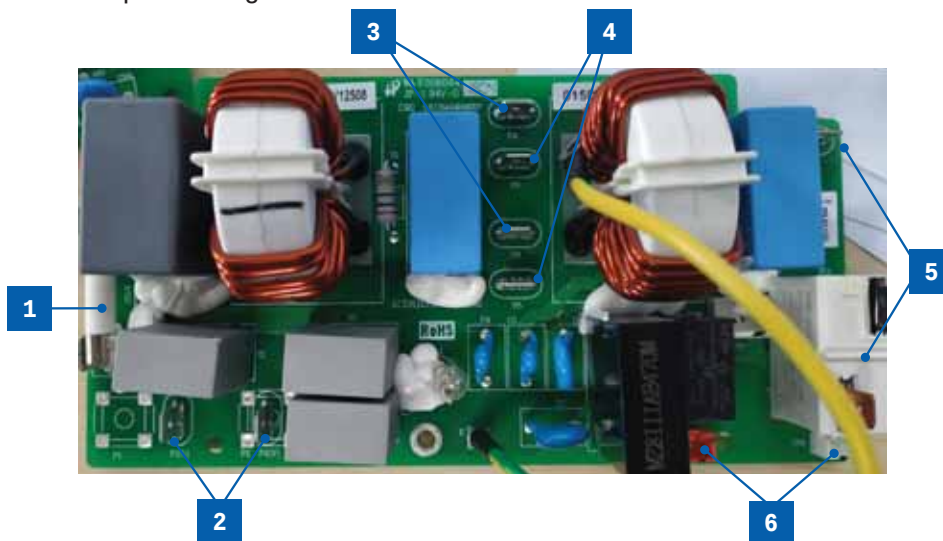
## COMPONENTS

### Power Filter Board (PFB)

#### 2U & 3U

The purpose of the PFB is to filter out potential electrical noise before it reaches the outdoor unit electronic circuits. All voltage to operate the outdoor unit circuits must pass through the PFB.

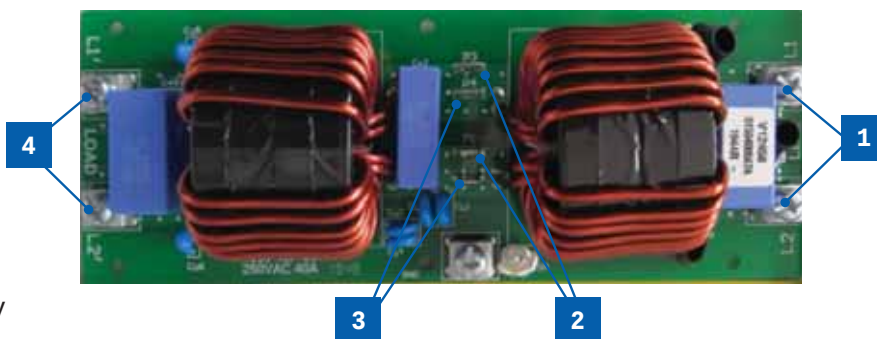
- 1** A replaceable, 30A, 250V rated ceramic fuse protects the outdoor unit electronics. The fuse will open if a power surge or internal short in the outdoor unit has occurred.
- 2** The PFB receives line voltage at terminals P1 and P2 from the outdoor unit high voltage terminal block 1/N and 2/L.
- 3** The voltage that powers the indoor units connects to terminals P3 and P4.
- 4** The PCB receives power to operate via connections at terminals P5 and P6.
- 5** The IPM receives power via connections at terminals P7 and terminal 3.



- 6** There is a communication plug labeled CN-1 on the PFB. This plug connects from the PFB to the PCB. If this cable is disconnected or loose, the system will generate a Code 6 module low or high voltage error. This error will not be displayed in memory on the indoor unit wired controller. CN-1 and CN-2 connect to the PCB at terminals CN-6 and CN-34. CN-6 is the low stand-by power connection. When power has been turned off at the controller for 5 minutes, CN-6 will remove the 12 VDC signal and open relay RL-1 on the PFB. This saves energy by shutting off power to the IPM. The capacitors must have current flow before the compressor can start. CN-34 is the capacitor charging circuit. When the capacitors are fully charged, the circuit opens to stop the charging process via the RL-2 relay. The voltage between the two pins of CN-1 and the two pins of CN-2 is 12 VDC.

#### 4U

- 1** L1 & L2 is the input port of Filter Board, they will provide 208/230Vac, 60Hz power to the whole unit group(outdoor unit & indoor unit), as is shown in the wiring diagram, these two terminal connect to the OUD main power supply terminal block.
- 2** P1 & P3 is the one of the first stage filtered output of the Filter Board, they will provide 208/230Vac, 60Hz power to all the indoor units which connect to the outdoor unit. As is shown in the wiring diagram, these two terminals connect to one of the IDU & OUD connection terminal block.
- 3** P2 & P4 is the other one of the first stage filtered output of the Filter Board, they will provide 208/230Vac, 60Hz power to the main control board. As is shown in the wiring diagram, these two terminals connect to the ODU main control board CN2.
- 4** L1 & L2 is the 2nd stage filtered output of the Filter Board, they will provide 208/230Vac, 60Hz power to the compressor drive module (inverter board). As is shown in the wiring diagram, these two terminals compressor drive module's power input L1 & L2.



# OUTDOOR TECHNICAL OVERVIEW

## TESTING

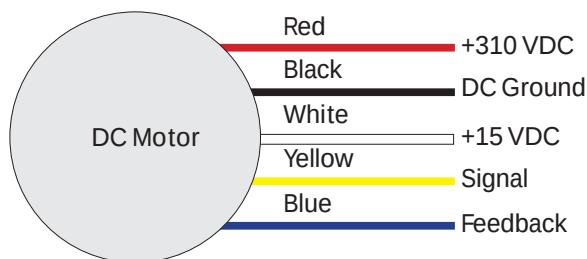
### Outdoor Fan Motor

Check that the wiring and plug connections are in good condition.

If the outdoor unit fan motor does not run, or the Service Monitor Board indicates an error code of 09, check the following voltages at the motor connector on the outdoor unit PCB. Set the meter to read DC volts with a minimum voltage range of 350 volts. All voltage values are approximate. Initiate forced cooling.

1. DC voltage between the Red and Black wire connections should read 310 ~ 334 VDC. This is the main voltage for powering the fan motor.
2. DC voltage between the White and Black wire connections should read 15VDC. This is the voltage for powering the electronic circuit of the fan motor.
3. DC voltage between the Yellow and Black wire connections should read 4VDC. The voltage will read 0VDC when the fan is not being called to operate. This is the control voltage for regulating the speed of the fan motor.
4. DC voltage between the Blue and Black wire connections should read 8VDC. The voltage will read 14VDC when the fan is not being called to operate. (This is the feedback voltage to the PCB for determining the speed of the fan motor).

If the outdoor fan initially runs, increases speed then stops, and the Service Monitor



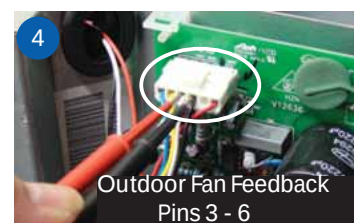
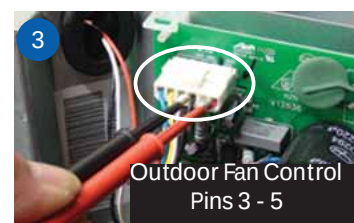
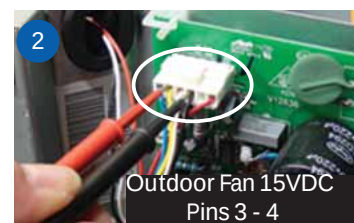
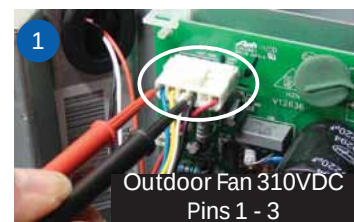
Board indicates an error code of 09, the feedback circuit is not functioning. Check that the wiring and plug connections are in good condition.

### Temperature Sensor

The temperature sensors are negative coefficient thermistors, in which resistance decreases as temperature rises. Should the sensors fail, the PCB will generate an appropriate error code.

#### To check the calibration of the sensors:

1. Shut off power to the outdoor unit.
2. Disconnect the sensor at the circuit board plug.
3. Measure the temperature of the air surrounding the sensor.
4. Measure the electrical resistance of the sensor using needle probes. Do not force standard probes into the sensor plug.
5. Compare the measured resistance of the sensor against the resistance/temperature specifications (See chart in reference section)
6. If the sensor resistance is outside of the specification tolerances shown on the resistance/temperature table, replace the sensor.



# OUTDOOR TECHNICAL OVERVIEW

## TESTING

### 4-Way Valve

The 4-way valve will control the direction of hot gas discharge via an internal slide assembly. The valve has a line voltage solenoid that is energized in heat mode. The solenoid will direct the internal slide to send the hot gas to the indoor coil. During cooling mode de-energized operation, the internal slide will direct compressor hot gas to the outdoor coil.

4-way valves may have a failure of the electrical solenoid that prevents the valve from shifting, or they may become stuck due to debris lodging inside the valve body. If the valve fails to direct the hot gas in the proper direction, temperature sensors within the outdoor unit will detect the problem and generate an error code.

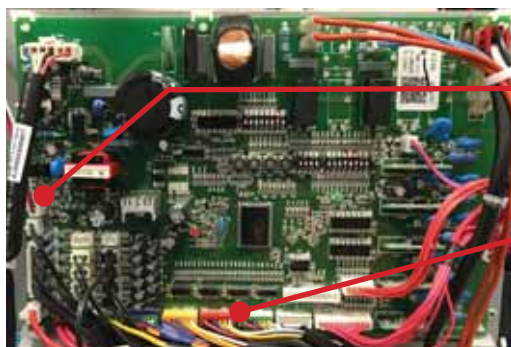


**If the valve fails to shift the hot gas to the proper coil, or it only partially shifts, perform the following:**

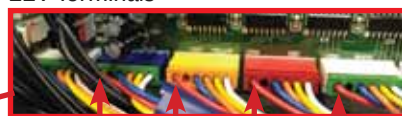
1. Check for correct refrigerant charge, and that all other operating parameters have been met.
2. In the heating mode, the solenoid will shift after a short time delay. Check for line voltage to the solenoid coil.
3. If the valve has voltage but fails to shift the hot gas to the indoor coil, shut the system down and unplug the 4-way valve from the PCB plug.
4. Use an ohmmeter to check continuity through the solenoid coil. The coil resistance should be 2.1k Ohms. If a winding shows open or shorted, the solenoid coil will have to be replaced.
5. If the coil resistance is within the tolerance, use a magnet along the valve body to determine the location of the piston. If one end of the piston is against the end of the valve body, it is stuck and the valve must be replaced.
6. Partial shifting of the valve can be detected by measuring the temperature of the suction gas where it enters the reversing valve and then comparing that temperature to the temperature of the suction gas exiting the 4-way valve. There should be no more than a 13°F difference. Excessive temperature rise through the suction gas path is an indication of a stuck piston. If the piston will not become free by switching from heating to cooling several times, a slight tapping on the valve body, or by using a powerful magnet, the valve will require replacement.

### Electronic Expansion Valve (EEV)

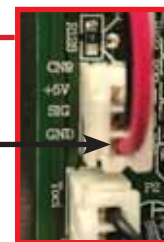
1. Check to see if the Electronic expansion valve (EEV) connector is correctly and firmly inserted in the PCB.
2. Turn the power off and back on again,
3. Check to see whether the EEV have a reposition sound. This sound will start after approx 2 min. If the EEV doesn't have noise, please disconnect the connector and check the resistance (refer to resistance tables below).
4. If the resistance is OK, The PCB may be at fault.



EEV Terminals



12VDC



EEV (6-pin, 5 wire)

|        | White | Yellow | Orange | Blue | X | Red  |
|--------|-------|--------|--------|------|---|------|
| White  | -     | 92 Ω   | 92 Ω   | 92 Ω | - | 46 Ω |
| Yellow | -     | -      | 92 Ω   | 92 Ω | - | 46 Ω |
| Orange | -     | -      | -      | 92 Ω | - | 46 Ω |
| Blue   | -     | -      | -      | -    | - | 46 Ω |
| X      | -     | -      | -      | -    | - | -    |
| Red    | -     | -      | -      | -    | - | -    |

EEV (6-pin, 6 wire)

|        | White | Yellow | Orange | Blue | Brown | Red  |
|--------|-------|--------|--------|------|-------|------|
| White  | -     | OL     | 92 Ω   | OL   | 46 Ω  | OL   |
| Yellow | -     | -      | OL     | 92 Ω | OL    | 46 Ω |
| Orange | -     | -      | -      | OL   | 46 Ω  | OL   |
| Blue   | -     | -      | -      | -    | OL    | 46 Ω |
| Brown  | -     | -      | -      | -    | -     | OL   |
| Red    | -     | -      | -      | -    | -     | -    |

# OUTDOOR TECHNICAL OVERVIEW

## TESTING

### Variable Speed Compressor

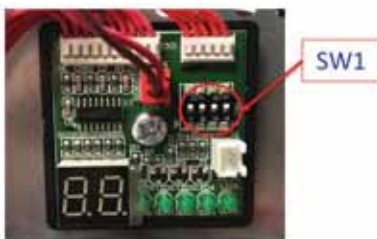
1. Begin by turning off power at the equipment disconnect switch. Adequate time must be given for capacitors on the circuit board to discharge. Wait a minimum of 12 minutes before handling the circuitry.
2. Locate the Inverter control module (IPM). The IPM is connected to the main circuit board by a wire harnesses, and has the compressor connections mounted on it.
3. Set your test meter to AC volts and test for voltage at the three compressor connections. Voltage should be zero before proceeding.
4. Remove the three compressor connections making note of the terminal letter and the wire colors.
5. Set your ohm meter to the lowest resistance setting that is available. Test all three connections terminals using the following sequence:
  - U terminal to V terminal
  - U terminal to W terminal
  - V terminal to W terminal

All three resistance values should match the specification table below. Compressor windings are deemed bad if they are greater than 7% out of specification. Readings taken at the wire IPM module that are outside of factory tolerances require steps 6 through 9.

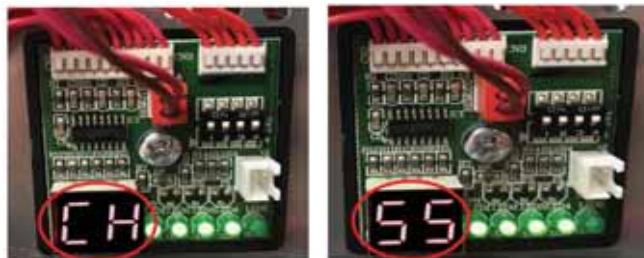
6. Remove the compressor blanket and set it aside. Remove the terminal block cover to expose the connections at the compressor terminals. Inspect for any visual damage. Remove all three wires from the terminals making note of the wire color and the terminal identifier.
7. Repeat process outlined in step 5. Repair or replace the wires if the compressor windings check properly.
8. Check each terminal to ground (suction line connection at compressor) to check for grounded windings if the resistance values are not correct.
9. Replace the compressor if the winding measurements are greater than 7% out of specification.

### Wiring Error Check

1. Disconnect power to the outdoor unit.
2. Set Dip Switches SW1-1, SW1-2, SW1-3 & SW1-4 to the ON position. These dip switches are located on the Service Monitor Board.
3. Turn ON power to the outdoor unit.



4. All indoor fans will be set to HIGH fan speed.
5. EEV for Circuit A will open. All other EEV's will close.
6. After a 3 minute delay, the Compressor will start and ramp up to 55HZ.
7. The digital display will alternately display "CH" and "Compressor Frequency (HZ)" at 5 second intervals



8. The system will circulate refrigerant through Circuit A for approximately 10 minutes.
9. Afterwards, Circuit A's EEV will close and Circuit B's EVV will open.
10. This process will be repeated for each indoor unit that is connected.
11. Once all indoor units have been checked, the digital display will display either "EC" or "0". "EC" indicates a communication error between the outdoor and indoor unit. The LED(s) will be flashing, indicating which circuit has the fault.



12. Once the wiring is corrected, re-run this test to confirm everything is functional.
13. "0" indicates that all wiring is correct.
14. If all wiring is correct, the LED's remain solid lit.
15. Once the test is complete, make sure to change the dip switches back to the OFF position, and set each indoor unit to preferred set points.



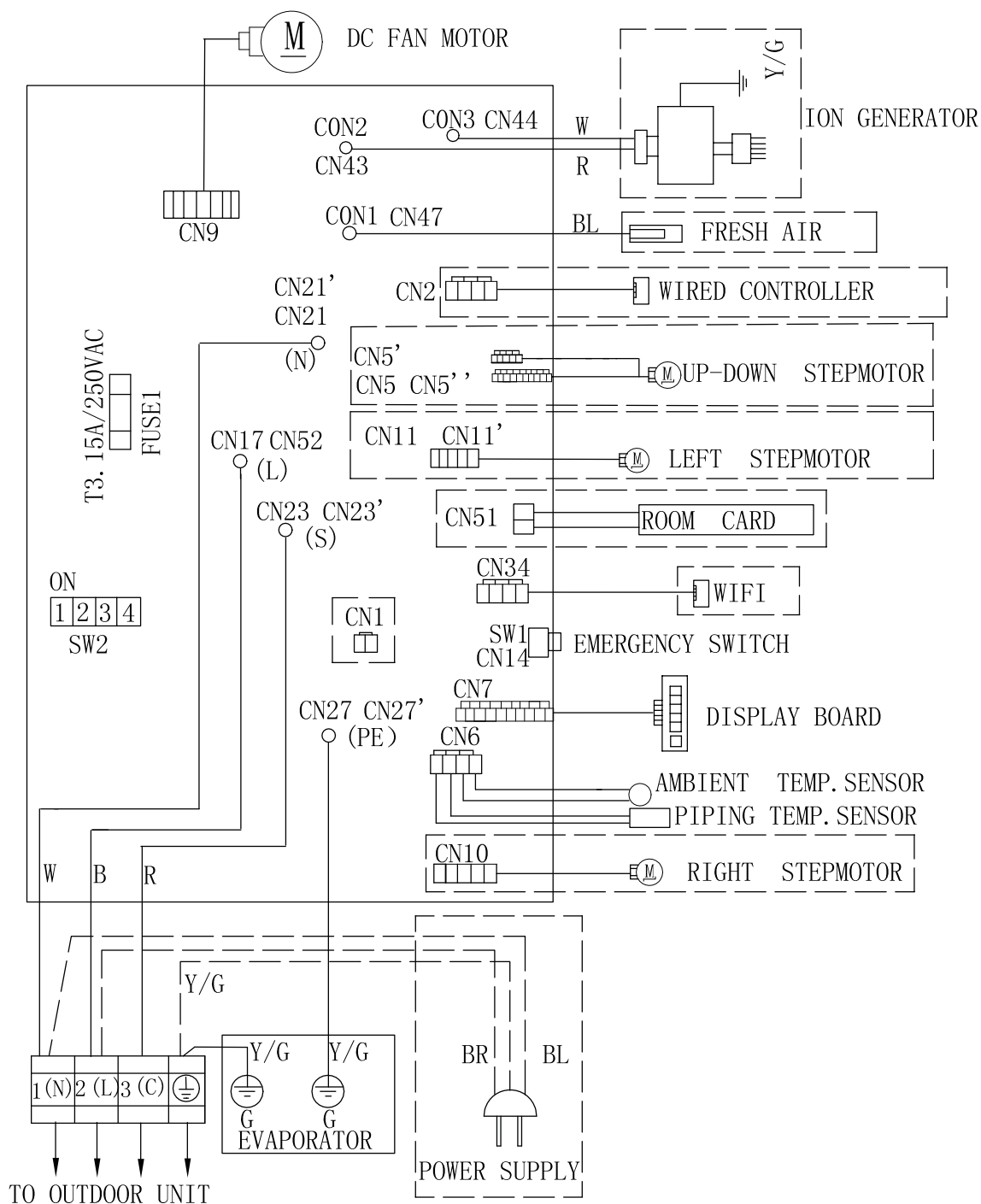
# WALL MOUNT TECHNICAL OVERVIEW



- AW07EH2VHA
- AW09EH2VHA
- AW12EH2VHA
- AW18EH2VHA
- AW07LC2VHB
- AW09LC2VHB
- AW12LC2VHB
- AW18LC2VHB
- AW24LP2VHA

# WALL MOUNT TECHNICAL OVERVIEW

## INDOOR UNIT WIRING DIAGRAM



### NOTES:

1. The dotted parts are optional.
2. The two pins of CN51 should be shorted, when the second channel (RC) of SW2 is selected.

R: RED

W: WHITE

Y: YELLOW

Y/G: YELLOW/GREEN

B: BLACK

BL: BLUE

BR: BROWN

# WALL MOUNT TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor Display | Outdoor LED | Diagnosis                                                 |
|----------------|-------------|-----------------------------------------------------------|
| F12            | 1           | Outdoor EEPROM failure                                    |
| F1             | 2           | IPM overcurrent or short circuit                          |
| F22            | /           | Outdoor alternating current, over current protection      |
| F3             | 4           | Communication failure between the IPM and outdoor PCB     |
| F20*           | 5           | Module operated overload (compressor overload protection) |
| F19*           | 6           | Module low or high voltage                                |
| F27            | /           | Compressor current sampling circuit fault                 |
| F4             | 8           | Overheat protection for discharge temperature             |
| F8*            | 9           | Malfunction of the DC fan motor                           |
| F21            | 10          | Malfunction of defrost temperature sensor                 |
| F7             | 11          | Suction temperature sensor failure                        |
| F6             | 12          | Ambient temperature sensor failure                        |
| F25            | 13          | Discharge temperature sensor failure                      |
| F30*           | /           | High outdoor suction temperature                          |
| E7             | 15          | Communication failure between the indoor & outdoor unit   |
| F13*           | 16          | Lack of refrigerant or discharging                        |
| F14*           | 17          | 4-way valve switching failure                             |
| F11            | 18          | Loss of synchronism detection                             |
| F28            | /           | Position detection circuit fault of compressor            |
| F15*           | /           | Terminal block temp too high                              |
| E9             | 20          | Indoor thermal overload                                   |
| E9*            | 21          | Indoor unit overload protection, heating mode only.       |
| E5             | 21          | Indoor coil frosted                                       |
| E5*            | /           | Indoor anti-frosting protection                           |
| F5*            | 23          | Module thermal overload                                   |
| F2*            | 24          | Compressor start failure, over-current                    |
| F23*           | 25          | Phase current protection (IPM)                            |
| F9             | 26          | MCU reset                                                 |

\* Hidden Indoor error code. LED1 will flash outdoors, but no error will appear on Indoor Unit display. To view error code on indoor display, press and hold the **EMERGENCY** button for 15 seconds.

# WALL MOUNT TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor Display | Outdoor LED | Diagnosis                                                                                              |
|----------------|-------------|--------------------------------------------------------------------------------------------------------|
| F24            | 27          | Module current detect circuit malfunction                                                              |
| F10            | 28          | Liquid pipe sensor failure: Circuit A                                                                  |
| F16            | 29          | Liquid pipe sensor failure: Circuit B                                                                  |
| F17            | 30          | Liquid pipe sensor failure: Circuit C                                                                  |
| F18            | 31          | Liquid pipe sensor failure: Circuit D                                                                  |
| F29            | 32          | Gas pipe sensor failure: Circuit A                                                                     |
| F30            | 33          | Gas pipe sensor failure: Circuit B                                                                     |
| F31            | 34          | Gas pipe sensor failure: Circuit C                                                                     |
| F32            | 35          | Gas pipe sensor failure: Circuit D                                                                     |
| F26            | 36          | Gas pipe sensor failure: Circuit E                                                                     |
| F34            | /           | Outdoor pipe temperature protection in cooling mode                                                    |
| F35            | 38          | Malfunction of module temperature sensor momentary power failure detection                             |
| F36            | 39          | Malfunction of condensing temperature sensor                                                           |
| F33            | 40          | Liquid pipe sensor failure: Circuit E                                                                  |
| F38            | 41          | Toci temperature sensor failure                                                                        |
| F39            | 42          | High Pressure switch open                                                                              |
| F40            | 43          | Low Pressure switch open                                                                               |
| F41            | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor. |
| F42            | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor. |
| F43            | /           | Incorrect match between indoor & outdoor                                                               |
| E1             | /           | Indoor ambient temperature sensor failure                                                              |
| E2             | /           | Indoor coil temperature sensor failure                                                                 |
| E4             | /           | Indoor PCB EEPROM failure                                                                              |
| E14*           | /           | Indoor fan motor malfunction                                                                           |

\* Hidden Indoor error code. LED1 will flash outdoors, but no error will appear on Indoor Unit display. To view error code on indoor display, press and hold the **EMERGENCY** button for 15 seconds.

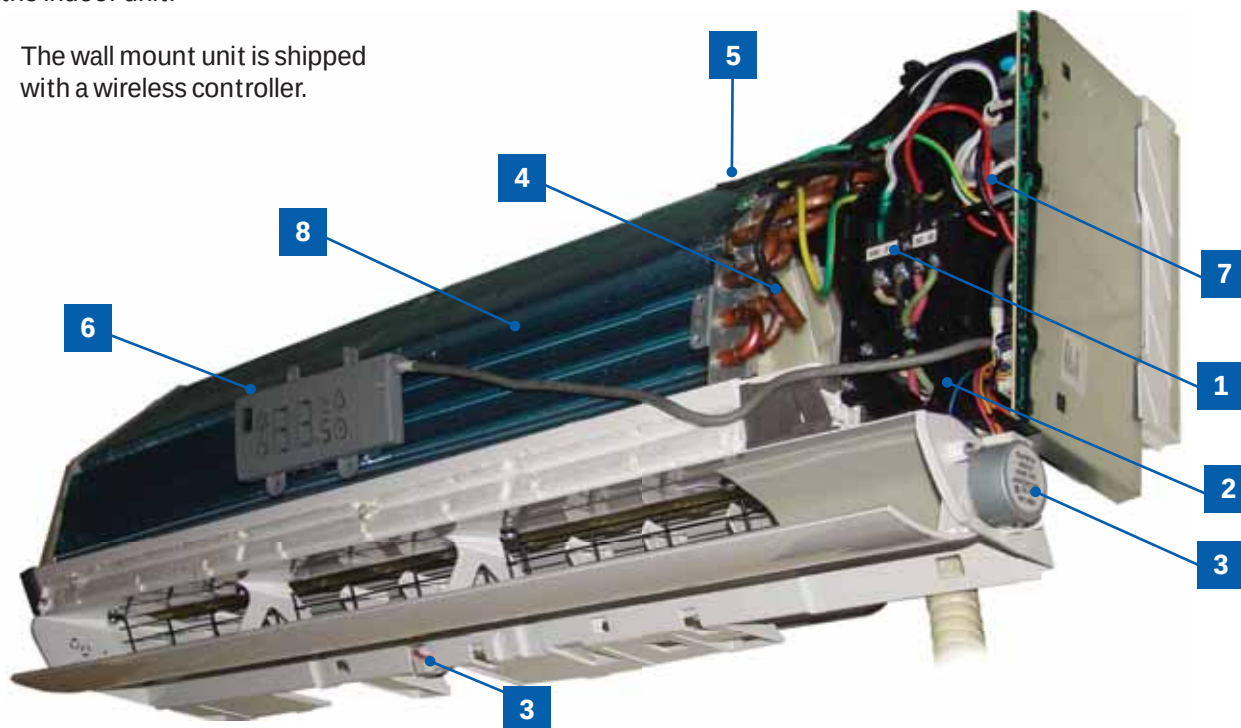
# WALL MOUNT TECHNICAL OVERVIEW

## COMPONENTS

The wall mounted units act as evaporator coils during cooling mode and condenser coils during heating mode. These units have gravity condensate drain systems. If a condensate pump is needed, it must be field provided and mounted external to the indoor unit.



The wall mount unit is shipped with a wireless controller.



### 1 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires: 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

### 2 Blower Assembly

The blower assembly consists of a plastic blower wheel that is connected to a variable speed indoor blower motor. A set screw holds the blower wheel to the blower motor.

The indoor blower motor is a DC Fan Motor that is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 5 wires connected to pins 1, 4, 5, 6 and 7. Pin 1 should have 310 VDC. Pin 4 is ground. Pin 5 +15VDC. Pin 6 is the feedback signal. Pin 7 is the speed control.

During normal operation, the indoor control board will energize the indoor blower motor and request proper speed. The indoor blower motor will control the speed via a command at the Pin 7 speed control. Proper fan speed is verified by the indoor control board via the

voltage level at the feedback signal on Pin 6. Should the feedback signal not be present during a call for indoor blower, the indoor control board will indicate a Malfunction Code E14.

### 3 Louver Stepper Motors

Separate motors located in the indoor unit control the operation of the motorized louvers. All of the louver motors are controlled via commands received from the remote control. The blower motor is controlled by both the remote control and by commands from the outdoor unit ECU.

### 4 Pipe Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 5 Ambient Temperature Sensor

The ambient air sensor senses the temperature of the air being drawn into the wall mounted unit from the conditioned space. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

# WALL MOUNT TECHNICAL OVERVIEW

## COMPONENTS

### 6 Display

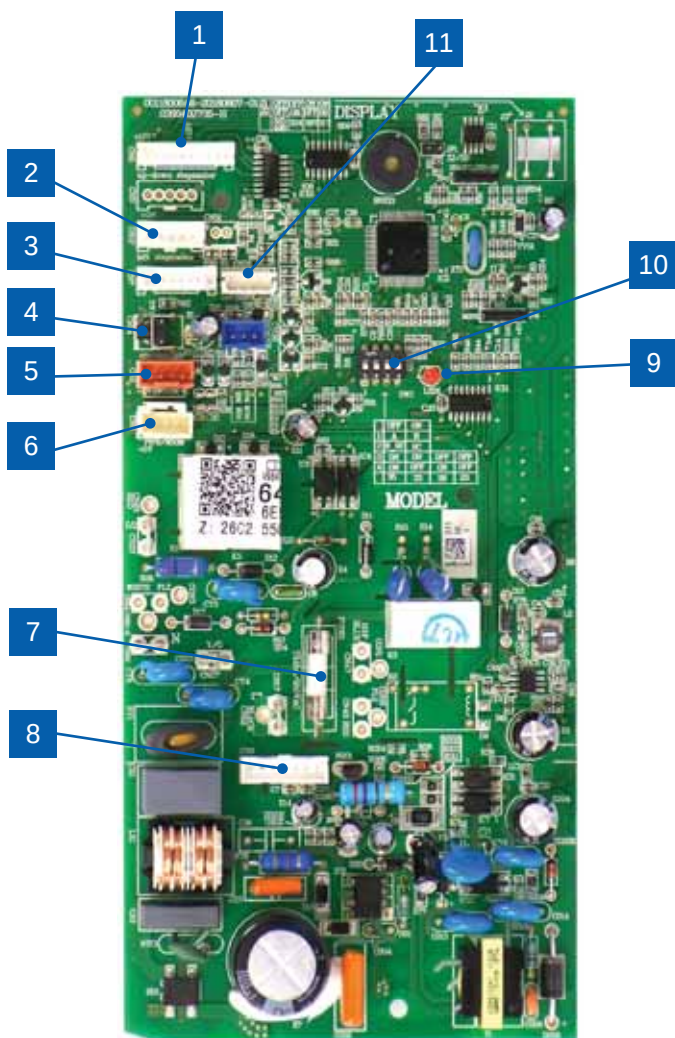
The indoor unit has a display that communicates system mode, room temperature and diagnostic code information. The diagnostic code information shown on the indoor unit will NOT be the same code that is displayed on the outdoor unit. When servicing a diagnostic error, compare the indoor unit code to the outdoor unit code to make diagnostic decisions. Codes that relate to outdoor unit problems should use the outdoor unit display information as priority.

### 7 Control Board

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

### 8 Evaporator Coil

## Indoor Wall Mount Unit Circuit Board



1 Up/Down Stepper Motor

2 Left Stepper Motor

3 Display Board

4 Emergency Switch

5 Wired Controller

6 Temperature Sensors

7 15A/250VAC Fuse

8 DC Fan Motor

9 LED

10 DIP Switch Bank SW2

11 WiFi

The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3.

The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU. The connections on the indoor board are shown here in the schematic drawing.

# WALL MOUNT TECHNICAL OVERVIEW

## COMPONENTS

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections. When power is present at the indoor board, the RED LED on the circuit board will blink a 2 flash code.

The control board has a replaceable 3.15A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected to the control board. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

The receiver/display unit that is mounted to the front cover of the indoor unit plugs into the control board.

There are two to three motors connected to the control board that control the movement of the louvers right, left and up/down. Some units will use one motor to operate the right and left movement function.

The blower motor is connected to the circuit board.

There is an Emergency Run switch on the edge of the indoor board that will put the system into Auto Mode should the remote control break or be lost. When this switch is pressed and held for 5 seconds, the indoor unit display will beep twice and the system will enter TEST MODE.



# WALL MOUNT TECHNICAL OVERVIEW

## TESTING

### Accessing Components/Removing Cover

1. To access components for service, first disconnect power to the outdoor unit. This will de-energize the indoor unit.
2. Lift the front cover by prying on the two indented finger holds at each end of the indoor unit.



3. Remove the three Phillips head screws located near the bottom of the indoor unit. These screws are located directly below the bottom of the air filter.



4. Remove the filters.



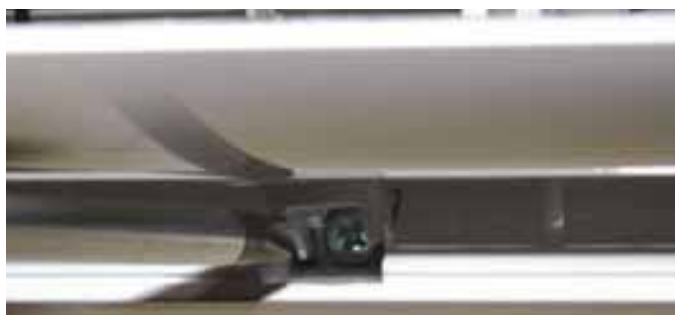
5. Manually open the louver.



6. Open the 3 caps that cover the screws located behind the bottom of the louver. These caps flip up.



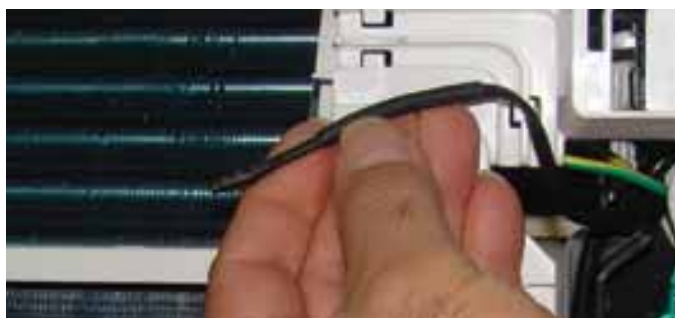
7. Remove the three screws located behind the caps.



8. Remove the two screws that hold the digital display to the front cover. The display can hang free.



9. Release the air temperature sensor from the clip that holds it.



10. Pull upward on the top of the indoor unit cover to free it from the four retaining clips. The cover will pivot downward. The cover should now pull away from the indoor unit.

# WALL MOUNT TECHNICAL OVERVIEW

## TESTING

### Indoor Fan Motor Voltage Check

#### If The Indoor Fan Motor Does Not Run:

1. Remove the front cover and access the circuit board fan motor connection.
2. Reset power and turn the remote control fan command to Fan On mode.

#### Motor Test:

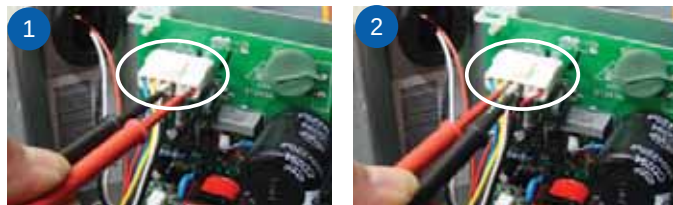
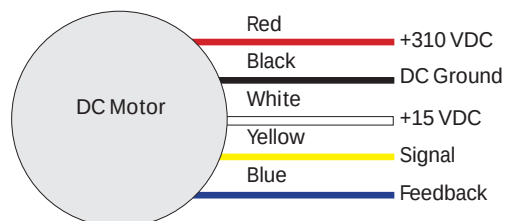
1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.

#### Replacing the Blower Motor

1. Disconnect the power.
2. With the indoor unit cover removed, remove the two screws on the left plastic evaporator coil bracket.



3. Remove the cover from the electrical box on the right side of the indoor unit.



4. Remove the two screws that hold the electrical box in place.



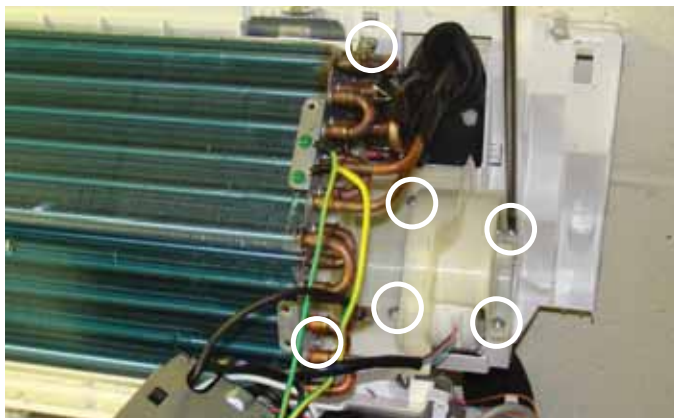
5. Lift and swing the electrical box out of the way.



# WALL MOUNT TECHNICAL OVERVIEW

## TESTING

**6.** Remove 6 screws that hold the motor bracket and evaporator coil.



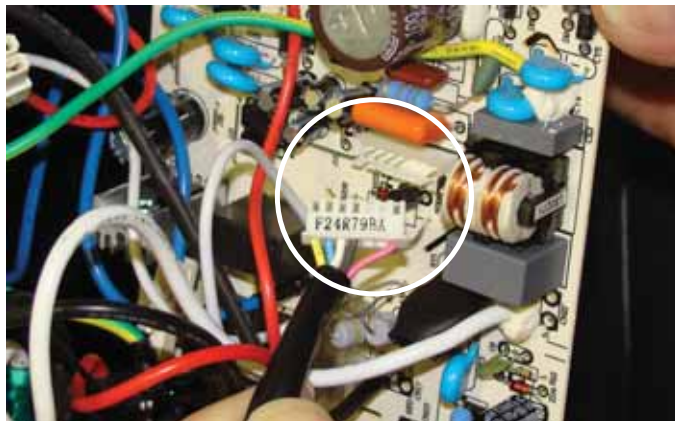
**7.** Lift the evaporator coil and remove the motor bracket.



**8.** Loosen the motor shaft set screw. Phillips head screw.



**9.** Unplug the motor from the circuit board.



**10.** Lift and slide the motor away from the blower wheel.



**11.** Remove the two black anti vibration mounts from the defective motor and place them on the new motor.



**12.** Install new motor in reverse order.

# WALL MOUNT TECHNICAL OVERVIEW

## TESTING

### Testing Temperature Sensors

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

**To test the electrical condition of a temperature sensor perform the following:**

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.
3. Use an ohmmeter to test the electrical resistance of the sensor.
4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (See chart in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)

### Testing Louver Motors

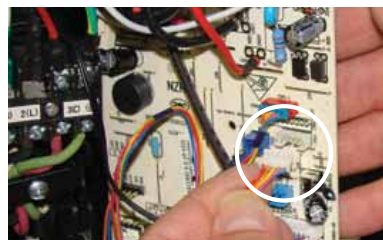
If the louver does not operate with command from the remote control, either the indoor board is bad, or the louver motor

is defective. It is more likely the motor is defective than the board. (Make sure the louver assembly is not binding and keeping the vanes from moving.)

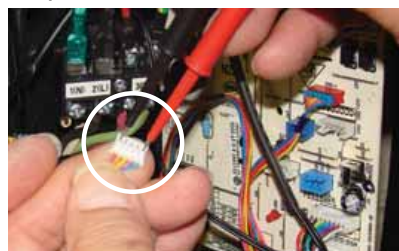
1. Remove power from the unit and remove the indoor unit cover.
2. Access the circuit board.



3. Identify on the schematic drawing the inoperable louver motor and disconnect the plug from the circuit board. (The up down louver motor is located on the right side of the indoor unit. The left right louver motor is located bottom center.)



4. Use an Ohmmeter to test the electrical continuity of the louver motor windings. The proper resistance for each winding can be found in this table. If the motor winding resistance is erratic or shows open, the motor is defective. Replace the motor.



5. If the motor checks out good, replace the indoor control board.

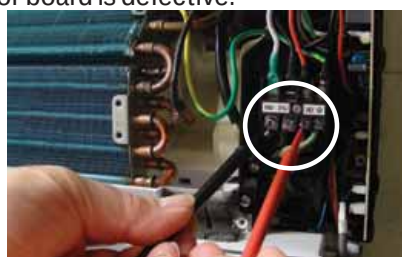
### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should be no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.
2. C and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.



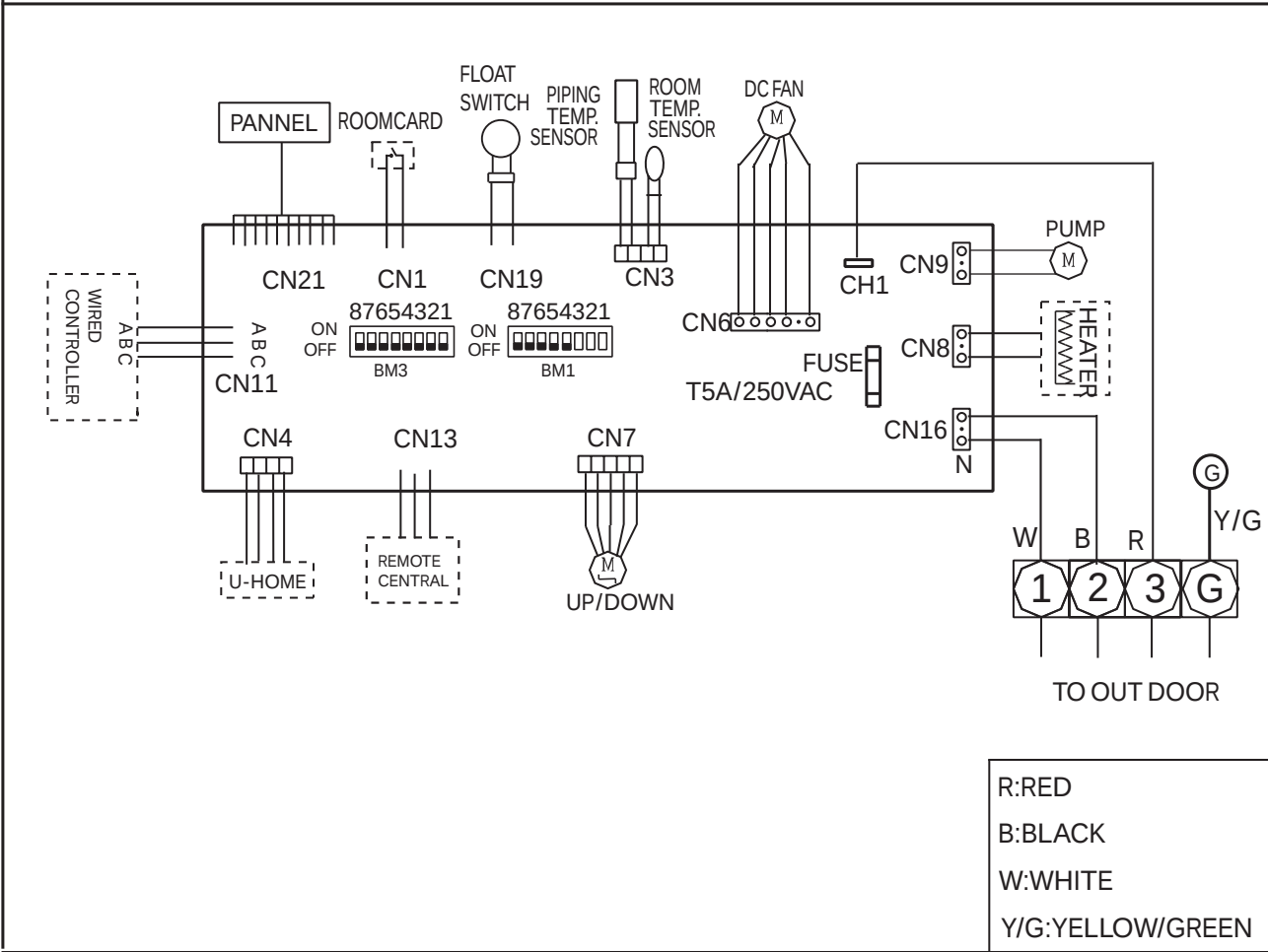
## COMPACT CASSETTE TECHNICAL OVERVIEW



**AB09SC2VHA**  
**AB12SC2VHA**  
**AB18SC2VHA**

# COMPACT CASSETTE TECHNICAL OVERVIEW

## WIRING DIAGRAM & DIP SWITCH SETTINGS



### Cassette Unit DIP Switch Settings

| BM1-1 | BM1-2 | BM1-3 | BM1-4 | BM1-5 | BM1-6 | BM1-7 | BM1-8 | Description                 |
|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------------|
| OFF   | OFF   | OFF   | —     | —     | —     | —     | —     | Unit Capacity: 9,000        |
| ON    | OFF   | OFF   | —     | —     | —     | —     | —     | Unit Capacity: 12,000       |
| OFF   | ON    | OFF   | —     | —     | —     | —     | —     | Unit Capacity:18,000        |
| —     | —     | —     | OFF   | —     | —     | —     | —     | Room Card Invalid (Default) |
| —     | —     | —     | ON    | —     | —     | —     | —     | Room Card Valid             |
| —     | —     | —     | —     | OFF   | —     | —     | —     | Heat Pump (Default)         |
| —     | —     | —     | —     | ON    | —     | —     | —     | Cooling Only                |
| —     | —     | —     | —     | —     | OFF   | OFF   | OFF   | Cassette (American)         |

# COMPACT CASSETTE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED5 | Indoor LED1 | Outdoor LED | Diagnosis                                                 |
|-------------|-------------|-------------|-----------------------------------------------------------|
| 2           | 1           | 1           | Outdoor EEPROM failure                                    |
| 2           | 2           | 2           | IPM overcurrent or short circuit                          |
| 2           | 3           | /           | Outdoor alternating current, over current protection      |
| 2           | 4           | 4           | Communication failure between the IPM and outdoor PCB     |
| 2           | 5           | 5           | Module operated overload (compressor overload protection) |
| 2           | 6           | 6           | Module low or high voltage                                |
| 2           | 7           | /           | Compressor current sampling circuit fault                 |
| 2           | 8           | 8           | Overheat protection for discharge temperature             |
| 2           | 9           | 9           | Malfunction of the DC fan motor                           |
| 3           | 0           | 10          | Malfunction of defrost temperature sensor                 |
| 3           | 1           | 11          | Suction temperature sensor failure                        |
| 3           | 2           | 12          | Ambient temperature sensor failure                        |
| 3           | 3           | 13          | Discharge temperature sensor failure                      |
| 3           | 4           | /           | High outdoor suction temperature                          |
| 3           | 5           | 15          | Communication failure between the indoor & outdoor unit   |
| 3           | 6           | 16          | Lack of refrigerant or discharging                        |
| 3           | 7           | 17          | 4-way valve switching failure                             |
| 3           | 8           | 18          | Loss of synchronism detection                             |
| 3           | 9           | /           | Position detection circuit fault of compressor            |
| 4           | 0           | /           | Terminal block temp too high                              |
| 4           | 0           | 20          | Indoor thermal overload                                   |
| 4           | 1           | 21          | Indoor unit overload protection, heating mode only.       |
| 4           | 1           | 21          | Indoor coil frosted                                       |
| 4           | 2           | /           | Indoor anti-frosting protection                           |
| 4           | 3           | 23          | Module thermal overload                                   |
| 4           | 4           | 24          | Compressor start failure, over-current                    |
| 4           | 5           | 25          | Phase current protection (IPM)                            |
| 4           | 6           | 26          | MCU reset                                                 |
| 4           | 7           | 27          | Module current detect circuit malfunction                 |
| 4           | 8           | 28          | Liquid pipe sensor failure: Circuit A                     |
| 4           | 9           | 29          | Liquid pipe sensor failure: Circuit B                     |

# COMPACT CASSETTE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

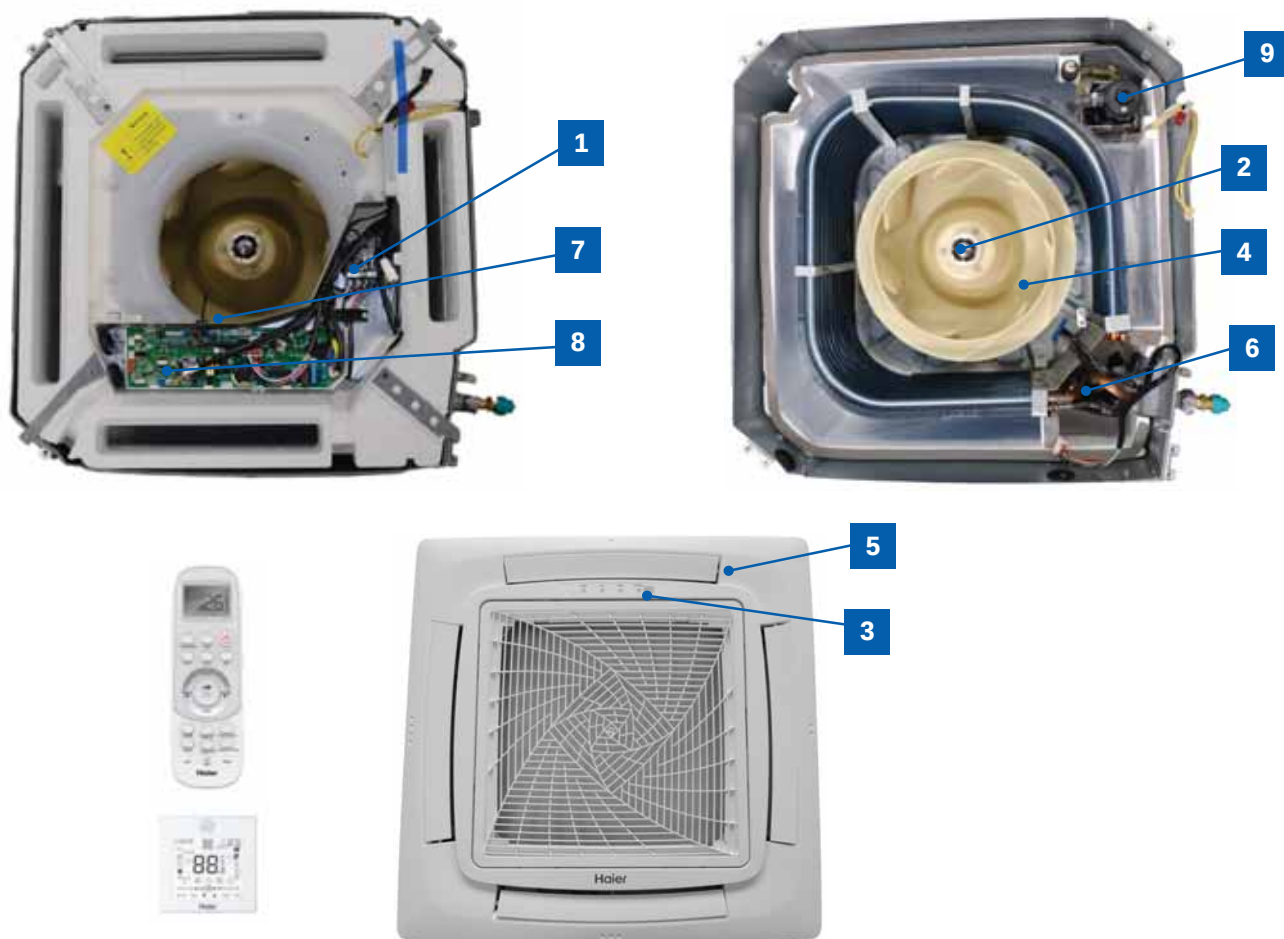
| Indoor LED5 | Indoor LED1 | Outdoor LED | Diagnosis                                                                                             |
|-------------|-------------|-------------|-------------------------------------------------------------------------------------------------------|
| 5           | 0           | 30          | Liquid pipe sensor failure: Circuit C                                                                 |
| 5           | 1           | 31          | Liquid pipe sensor failure: Circuit D                                                                 |
| 5           | 2           | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| 5           | 3           | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| 5           | 4           | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| 5           | 5           | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| 5           | 6           | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| 5           | 7           | /           | Outdoor pipe temperature protection in cooling mode                                                   |
| 5           | 8           | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| 5           | 9           | 39          | Malfunction of condensing temperature sensor                                                          |
| 6           | 0           | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| 6           | 1           | 41          | Toci temperature sensor failure                                                                       |
| 6           | 2           | 42          | High Pressure switch open                                                                             |
| 6           | 3           | 43          | Low Pressure switch open                                                                              |
| 6           | 4           | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| 6           | 5           | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| 6           | 6           | /           | Incorrect match between indoor & outdoor                                                              |
| 0           | 1           | /           | Indoor ambient temperature sensor failure                                                             |
| 0           | 2           | /           | Indoor coil temperature sensor failure                                                                |
| 0           | 4           | /           | Indoor PCB EEPROM failure                                                                             |
| 0           | 7           | /           | Communication fault between the indoor and outdoor unit                                               |
| 0           | 8           | /           | Communication fault between the controller and Indoor unit                                            |
| 0           | 12          | /           | Drain system malfunction                                                                              |
| 0           | 13          | /           | Zero cross signal detected wrong                                                                      |
| 0           | 14          | /           | Indoor fan motor malfunction                                                                          |

# COMPACT CASSETTE TECHNICAL OVERVIEW

## COMPONENTS

The indoor cassette type units act as evaporator coils during cooling mode and condenser coils during heating mode. These units have a built in condensate pump with an associated condensate level switch. The condensate pump is capable of lifting water out of the indoor unit. If high water lift is needed, the water from the cassette pump should be pumped into a field supplied condensate pump with high lift power.

Cassette type indoor units can be operated with a wired controller or a remote control.



### 1 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires, 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

### 2 Motor Blower

The indoor unit features a multi speed blower motor that will change speed to match the capacity demand from the outdoor unit. Separate motors located in the indoor unit control the operation of the motorized louvers. All of the louver motors are controlled via commands received from the remote control. The blower motor is controlled by both the remote control and by commands from the outdoor unit ECU.

### 3 Display

The indoor unit has a display that communicates system mode. The indoor unit does not display temperatures or diagnostic codes. When a wired controller is used, this information is displayed on the wired controller. It is recommended to use a wired controller with the cassette unit.

When servicing a diagnostic error, ALWAYS refer to the outdoor unit code to make diagnostic decisions.

# COMPACT CASSETTE TECHNICAL OVERVIEW

## COMPONENTS

### 4 The Blower Assembly

The blower assembly consists of a plastic blower wheel that is connected to a PSC indoor blower motor. A set screw holds the blower wheel to the blower motor.

The indoor blower motor is a Multi Speed Fan Motor that is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 4 wires connected to pins common, low, medium and high speeds. During normal operation, the indoor control board will energize the indoor blower motor and request proper speed. The motor has a run capacitor that is located in the Cassette unit's control box. The run capacitor connects to the motor via two orange wires. This capacitor is field replaceable.

### 5 Louver Motors

The louver motors are stepper type motors that move the louvers up/down. The motors are controlled by pulsed voltage that cannot be measured. If the louver does not move when it should, check for a bind in the louvers.

### 6 Piping Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 7 Ambient Temperature Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

Both sensors are negative temperature coefficient type that reduce electrical resistance as temperature rises.

### 8 Control Board

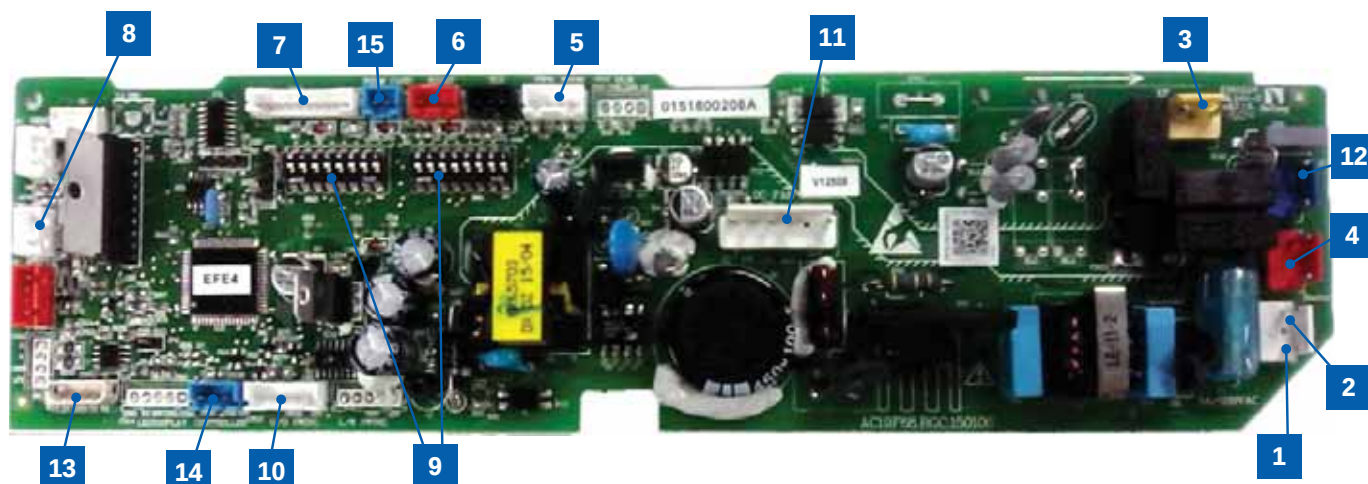
The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

### 9 Condensate Pump & Float Switch

1. If in **COOL** or **DRY** mode: Compressor running (Thermal ON), then condensate pump is energized.
  - When compressor stops (Thermal OFF), condensate pump runs for an additional 5 minutes.
2. If in **COOL** or **DRY** modes and compressor is running (Thermal ON) and the float switch opens for 5 minutes.
  - Compressor will stop, the pump will continue to run
  - If the float switch does not close, error code will display and pump continues to run
  - If the float switch does close, the pump will continue to run for 5 additional minutes.
3. During standby (Thermal OFF, In COOL/DRY modes or in HEAT and FAN modes and float switch opens for 2 seconds, the condensate pump is energized.
  - If the float switch closes, the pump will run an additional 5 minutes
  - If the float does not close, the pump continues to run and error code is displayed.

# COMPACT CASSETTE TECHNICAL OVERVIEW

## COMPONENTS



- |                                     |                              |                               |
|-------------------------------------|------------------------------|-------------------------------|
| <b>1</b> N Terminal                 | <b>6</b> CN19 Float Switch   | <b>11</b> CN6 Fan Motor       |
| <b>2</b> L Terminal                 | <b>7</b> CN21 Louver Panel   | <b>12</b> CN9 Condensate Pump |
| <b>3</b> Communication Terminal     | <b>8</b> CN11 Wired Remote   | <b>13</b> CN4 U-HOME          |
| <b>4</b> 3.15A 250V Fuse            | <b>9</b> DIP Switches        | <b>14</b> CN13 Remote Central |
| <b>5</b> CN3 Pipe/Room Temp Sensors | <b>10</b> CN35 Stepper Motor | <b>15</b> CN1 Room Card       |

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3. The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU.

The connections on the indoor board are shown here in the schematic drawing.

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections to CH- 3 and CH-4 on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections.

When power is present at the indoor board, the Display Power Indicator will be lit.

The control board has a replaceable 3.15A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected at Plug CN-13. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

The receiver/display unit that is mounted to the front cover of the indoor unit plugs into the circuit board via a connection at Plug CN-29.

There is one motor that controls the movement of the louvers. The motor connects to the circuit board at Plug CN-14. The motor is located in the over of the louver assembly.

The blower/fan motor is connected to the circuit board at plug CN-11.

The Cassette unit has a built in condensate pump. The pump is connected to the circuit board on Plug CN-9. The pump is energized whenever the Float Switch indicates that water needs to be pumped from the cassette. The float switch connects onto the circuit board via Plug CN-18.

# COMPACT CASSETTE TECHNICAL OVERVIEW

## TESTING

### Accessing the Blower Motor and Condensate Pump

1. Disconnect power to the outdoor unit.
2. Remove the louver assembly.



3. Disconnect the main power wire to the indoor unit.
4. Unplug the condensate pump and float switch from wiring harness.
5. Unplug fan motor from wiring harness.
6. Remove ground wire from ground screw on electrical box. Remove electrical box.
7. Remove 5 screws holding foam condensate pan bottom in place.



8. Slide condensate pan from cassette.

### Removing Fan Motor

1. Remove holding nut from fan blade.



2. Fan blade will slide off motor shaft.
3. Remove Phillips head screw holding cover plate over motor wiring leads.
4. Remove 3 nuts that hold fan motor in place.



5. Fan motor will come loose.

### Removing Condensate Pump

1. Remove screws holding condensate pump and float switch in position.
2. Disconnect condensate hose from condensate pump.
3. Remove assembly.



# COMPACT CASSETTE TECHNICAL OVERVIEW

## TESTING

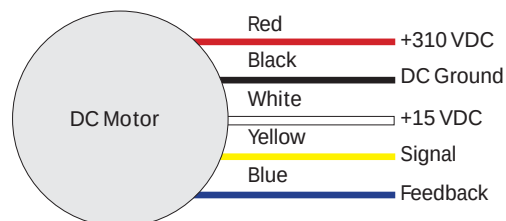
### Indoor Fan Motor Test Procedure

**If the indoor fan motor does not run:**

1. Disconnect power to the system.
2. Remove the return air cover and access the circuit board connection.
3. Reset power and turn the remote control fan command to Fan On mode.

#### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.



### Testing Temperature Sensors

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

**To test the electrical condition of a temperature sensor perform the following:**

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.
3. Use an ohmmeter to test the electrical resistance of the sensor.
4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (See chart in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)



# COMPACT CASSETTE TECHNICAL OVERVIEW

## TESTING

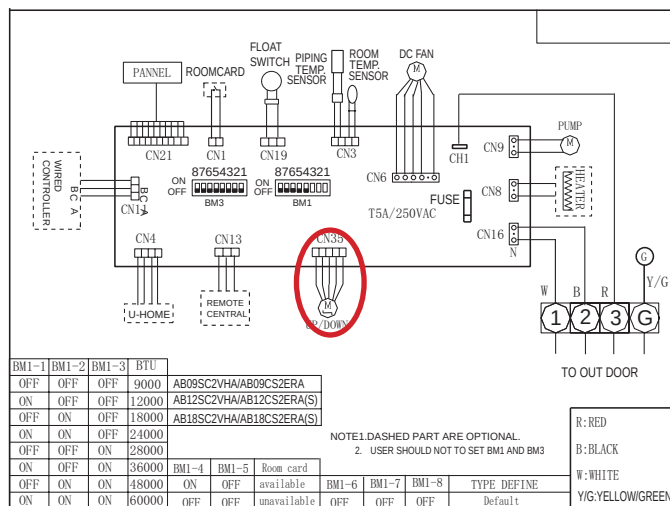
### Testing Louver Motors

If the louver does not operate with command from the remote control, either the indoor board is bad, or the louver motor is defective. It is more likely the motor is defective than the board. (Make sure the louver assembly is not binding and keeping the vanes from moving.)

1. Remove power from the unit and remove the indoor unit cover.
2. Access the circuit board.



3. Identify the inoperable louver motor on the schematic drawing below and disconnect the plug from the circuit board.



4. Use an Ohmmeter to test the electrical continuity of the louver motor windings. The proper resistance for each winding can be found in this table. If the motor winding resistance is erratic or shows open, the motor is defective. Replace the motor.



5. If the motor checks out good, replace the indoor control board.

### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit. Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.



2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

# COMPACT CASSETTE TECHNICAL OVERVIEW

## TESTING

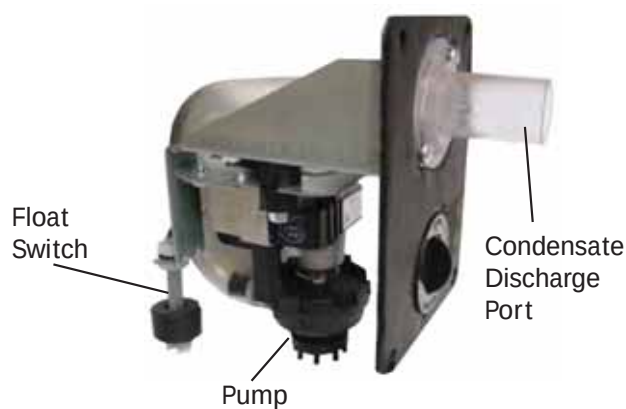
### Test Condensate Pump and Associated Float Switch

If the internal condensate pump does not operate, the pump may be bad or the float switch may be defective. Perform the following test:

1. Access the electrical control box.
2. Unplug the float switch from the circuit board.
3. The pump should start.
4. If the pump does not start, check for voltage at the pump connector on the board. There should be 230 Volts AC to the pump. If there is not, the circuit board is defective. If there is proper voltage to the pump, either the pump or associated pump wiring is defective.



5. When installing, the condensate discharge port at the top of the water pump must be connected with drain pipe.



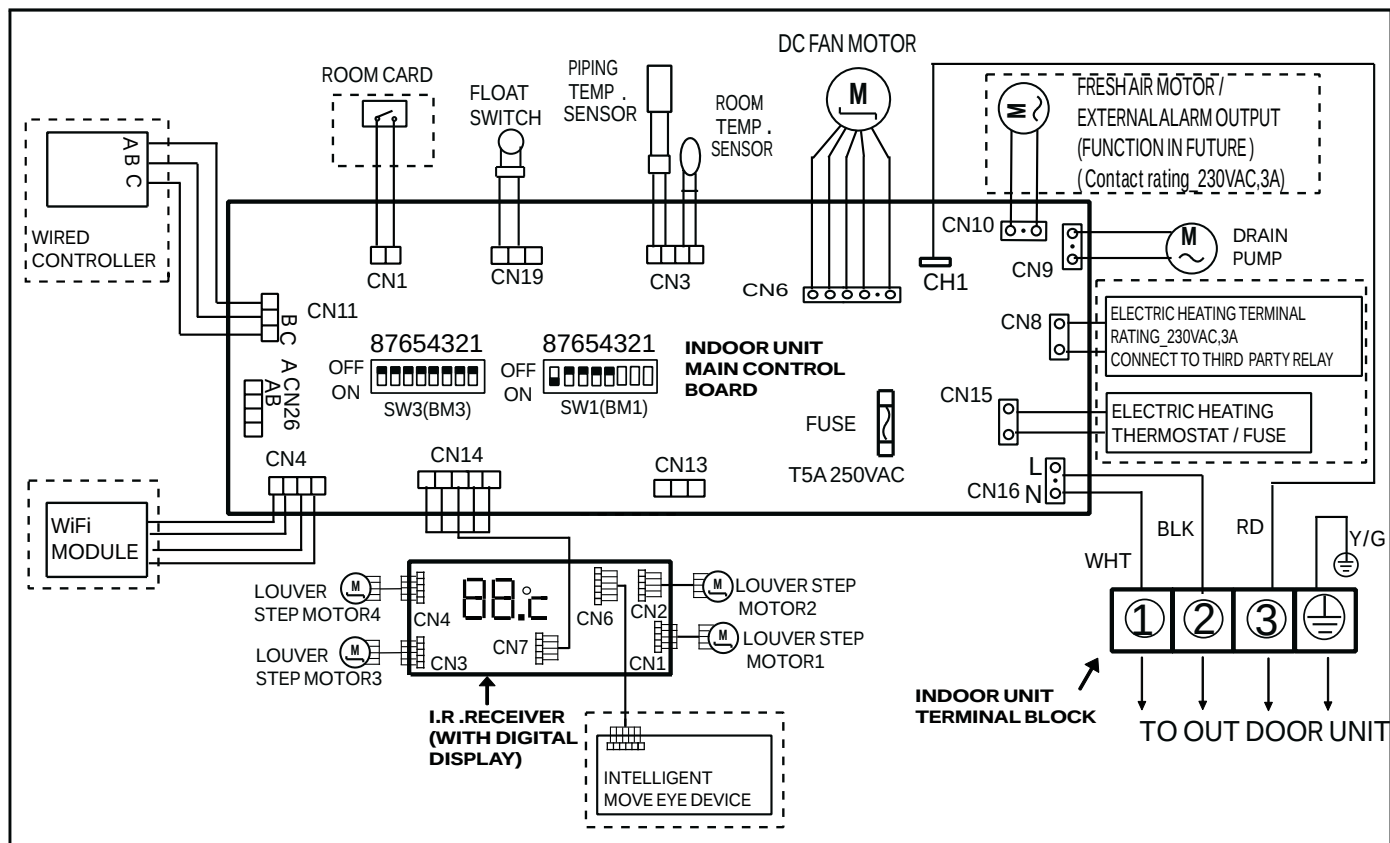
# LARGE CASSETTE TECHNICAL OVERVIEW



AL24LP2VHA

# LARGE CASSETTE TECHNICAL OVERVIEW

## WIRING DIAGRAM



### NOTE:

1. DASHED PARTS ARE OPTIONAL.
2. USER SHOULD NOT CHANGE THE DIP SWITCH SW1 SW3 WITHOUT GUIDENCE.
3. SW3-5->SW3-8 ARE USED FOR WIRED CONTROLLER ADDRESS SELECT. SW3-1->SW3-4 ARE RESERVED.

| SW1-1 | SW1-2 | SW1-3 | CAPACITY (BTU/H) |
|-------|-------|-------|------------------|
| ON    | ON    | OFF   | 24,000           |
| ON    | OFF   | ON    | 36,000           |
| ON    | ON    | ON    | 42,000           |
| ON    | ON    | ON    | 48,000           |

| SW1-4 | ROOM CARD   | SW1-5 | COOL HEAT |
|-------|-------------|-------|-----------|
| ON    | AVAILABLE   | ON    | COOL ONLY |
| OFF   | UNAVAILABLE | OFF   | HEAT PUMP |

| SW1-6 | SW1-7 | SW1-8 | TYPE DEFINE     |
|-------|-------|-------|-----------------|
| OFF   | OFF   | OFF   | CASSETTE (SLIM) |

Y/G: YELLOW/GREEN

RD: RED

WT: WHITE

BLK: BLACK

I.R. RECEIVER: INFRARED REMOTE RECEIVER

TEMP: TEMPERATURE

# LARGE CASSETTE TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS

### BM1 DIP Switch Settings

| Description                | Capacity |       |       | Room Card | Running Mode | Unit Type |       |       |
|----------------------------|----------|-------|-------|-----------|--------------|-----------|-------|-------|
|                            | SW1-1    | SW1-2 | SW1-3 | SW1-4     | SW1-5        | SW1-6     | SW1-7 | SW1-8 |
| Capacity: 24kBTU(7.1kW)    | ON       | ON    | OFF   | ---       | ---          | ---       | ---   | ---   |
| Capacity: 30kBTU(9.0kW)    | OFF      | OFF   | ON    | ---       | ---          | ---       | ---   | ---   |
| Capacity: 35kBTU(10.5kW)   | ON       | OFF   | ON    | ---       | ---          | ---       | ---   | ---   |
| Capacity: 42kBTU(12.5kW)   | OFF      | ON    | ON    | ---       | ---          | ---       | ---   | ---   |
| Capacity: 48kBTU(14.0kW_   | ON       | ON    | ON    | ---       | ---          | ---       | ---   | ---   |
| Room card invalid(default) | ---      | ---   | ---   | OFF       | ---          | ---       | ---   | ---   |
| Room card valid            | ---      | ---   | ---   | ON        | ---          | ---       | ---   | ---   |
| Heat pump(default)         | ---      | ---   | ---   | ---       | OFF          | ---       | ---   | ---   |
| Cooling only               | ---      | ---   | ---   | ---       | ON           | ---       | ---   | ---   |
| High performance cassette  | ---      | ---   | ---   | ---       | ---          | OFF       | OFF   | ON    |

### Wired Controller Communication Address

| Indoor unit Address<br>(Indoor unit address for one wired controller<br>control more than one unit) | BM3-5 | BM3-6 | BM3-7 | BM3-8 |
|-----------------------------------------------------------------------------------------------------|-------|-------|-------|-------|
| 0 (main)                                                                                            | OFF   | OFF   | OFF   | OFF   |
| 1 (sub)                                                                                             | OFF   | OFF   | OFF   | ON    |
| 2 (sub)                                                                                             | OFF   | OFF   | ON    | OFF   |
| 3 (sub)                                                                                             | OFF   | OFF   | ON    | ON    |
| 4 (sub)                                                                                             | OFF   | ON    | OFF   | OFF   |
| 5 (sub)                                                                                             | OFF   | ON    | OFF   | ON    |
| 6 (sub)                                                                                             | OFF   | ON    | ON    | OFF   |
| 7 (sub)                                                                                             | OFF   | ON    | ON    | ON    |
| 8 (sub)                                                                                             | ON    | OFF   | OFF   | OFF   |
| 9 (sub)                                                                                             | ON    | OFF   | OFF   | ON    |
| 10 (sub)                                                                                            | ON    | OFF   | ON    | OFF   |
| 11 (sub)                                                                                            | ON    | OFF   | ON    | ON    |
| 12 (sub)                                                                                            | ON    | ON    | OFF   | OFF   |
| 13 (sub)                                                                                            | ON    | ON    | OFF   | ON    |
| 14 (sub)                                                                                            | ON    | ON    | ON    | OFF   |
| 15 (sub)                                                                                            | ON    | ON    | ON    | ON    |

# LARGE CASSETTE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED1 | Panel Display | Outdoor LED | Diagnosis                                                 |
|-------------|-------------|---------------|-------------|-----------------------------------------------------------|
| 2           | 1           | 15            | 1           | Outdoor EEPROM failure                                    |
| 2           | 2           | 16            | 2           | IPM overcurrent or short circuit                          |
| 2           | 3           | 17            | /           | Compressor over current during deceleration               |
| 2           | 4           | 18            | 4           | Communication failure between the IPM and outdoor PCB     |
| 2           | 5           | 19            | 5           | Module operated overload (compressor overload protection) |
| 2           | 6           | 1A            | 6           | Module low or high voltage                                |
| 2           | 7           | 1B            | /           | Compressor current sampling circuit fault                 |
| 2           | 8           | 1C            | 8           | Overheat protection for discharge temperature             |
| 2           | 9           | 1D            | 9           | Malfunction of the DC fan motor                           |
| 3           | 0           | 1E            | 10          | Malfunction of defrost temperature sensor                 |
| 3           | 1           | 1F            | 11          | Suction temperature sensor failure                        |
| 3           | 2           | 20            | 12          | Ambient temperature sensor failure                        |
| 3           | 3           | 21            | 13          | Discharge temperature sensor failure                      |
| 3           | 4           | 22            | /           | PFC circuit loop voltage                                  |
| 3           | 5           | 23            | 15          | Communication failure between the indoor & outdoor unit   |
| 3           | 6           | 24            | 16          | Lack of refrigerant or discharging                        |
| 3           | 7           | 25            | 17          | 4-way valve switching failure                             |
| 3           | 8           | 26            | 18          | Loss of synchronism detection                             |
| 3           | 9           | 27            | /           | Low DC or AC voltage                                      |
| 4           | 0           | 28            | 20          | Indoor thermal overload                                   |
| 4           | 1           | 29            | 21          | Indoor coil frosted                                       |
| 4           | 2           | 2A            | /           | PFC circuit loop overcurrent                              |
| 4           | 3           | 2B            | 23          | Module thermal overload                                   |
| 4           | 4           | 2C            | 24          | Compressor start failure, over-current                    |
| 4           | 5           | 2D            | 25          | Phase current protection (IPM)                            |
| 4           | 6           | 2E            | 26          | MCU reset                                                 |
| 4           | 7           | 2F            | 27          | Module current detect circuit malfunction                 |
| 4           | 8           | 30            | 28          | Liquid pipe sensor failure: Circuit A                     |
| 4           | 9           | 31            | 29          | Liquid pipe sensor failure: Circuit B                     |

# LARGE CASSETTE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED1 | Panel Display | Outdoor LED | Diagnosis                                                                                             |
|-------------|-------------|---------------|-------------|-------------------------------------------------------------------------------------------------------|
| 5           | 0           | 32            | 30          | Liquid pipe sensor failure: Circuit C                                                                 |
| 5           | 1           | 33            | 31          | Liquid pipe sensor failure: Circuit D                                                                 |
| 5           | 2           | 34            | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| 5           | 3           | 35            | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| 5           | 4           | 36            | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| 5           | 5           | 37            | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| 5           | 6           | 38            | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| 5           | 7           | 39            | /           | Compressor overcurrent detected by IPM                                                                |
| 5           | 8           | 3A            | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| 5           | 9           | 3B            | 39          | Malfunction of condensing temperature sensor                                                          |
| 6           | 0           | 3C            | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| 6           | 1           | 3D            | 41          | Toci temperature sensor failure                                                                       |
| 6           | 2           | 3E            | 42          | High Pressure switch open                                                                             |
| 6           | 3           | 3F            | 43          | Low Pressure switch open                                                                              |
| 6           | 4           | 40            | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| 6           | 5           | 41            | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| 0           | 1           | 01            | /           | Indoor ambient temperature sensor failure                                                             |
| 0           | 2           | 02            | /           | Indoor coil temperature sensor failure                                                                |
| 0           | 4           | 04            | /           | Indoor PCB EEPROM failure                                                                             |
| 0           | 7           | 07            | /           | Communication fault between the indoor and outdoor unit                                               |
| 0           | 8           | 08            | /           | Communication fault between the controller and Indoor unit                                            |
| 0           | 12          | 0C            | /           | Drain system malfunction                                                                              |
| 0           | 13          | 0D            | /           | Zero cross signal detected wrong                                                                      |
| 0           | 14          | 0E            | /           | Indoor fan motor malfunction                                                                          |

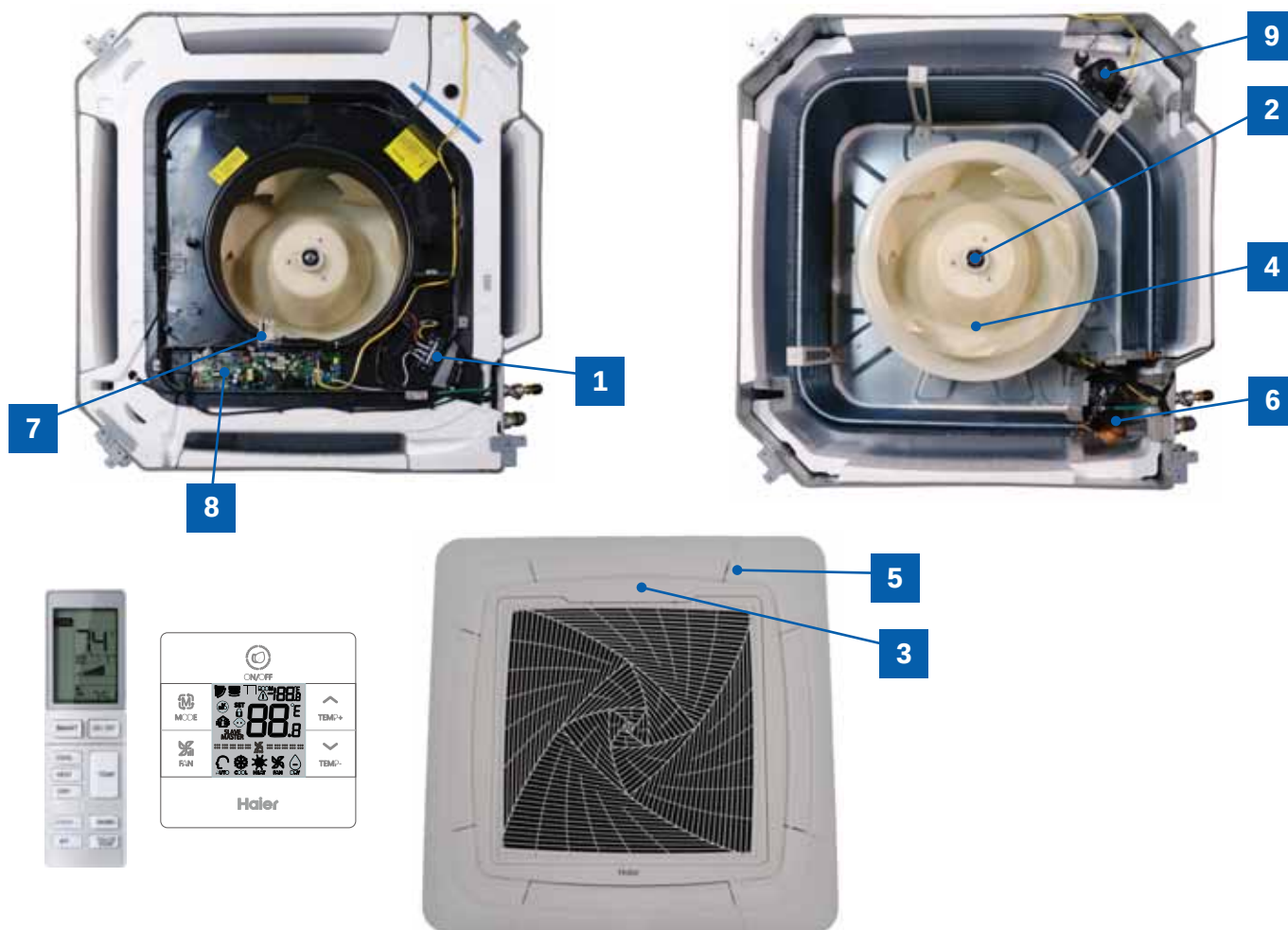
# LARGE CASSETTE TECHNICAL OVERVIEW

## COMPONENTS

The indoor cassette type units act as evaporator coils during cooling mode and condenser coils during heating mode. These units have a built in condensate pump with an associated condensate level switch. The condensate pump is capable of lifting water out of the indoor unit. If high water lift is needed, the water from the cassette pump should be pumped into a field supplied condensate pump with high lift power.

Cassette type indoor units can be operated with a wired controller or a remote control.

### Component Overview



#### 1 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires, 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

#### 2 Motor Blower

The indoor unit features a multi speed blower motor that will change speed to match the capacity demand from the outdoor unit. Separate motors located in the indoor unit control the operation of the motorized louvers. All of the louver motors are controlled via commands received from the remote control. The blower motor is controlled by both the remote control and by commands from the outdoor unit ECU.

# LARGE CASSETTE TECHNICAL OVERVIEW

## COMPONENTS

### 3 Display

The indoor unit has a display that communicates system mode. The indoor unit does not display temperatures or diagnostic codes. When a wired controller is used, this information is displayed on the wired controller. It is recommended to use a wired controller with the cassette unit.

When servicing a diagnostic error, ALWAYS refer to the outdoor unit code to make diagnostic decisions.

### 4 The Blower Assembly

The blower assembly consists of a plastic blower wheel that is connected to a PSC indoor blower motor. A set screw holds the blower wheel to the blower motor.

The indoor blower motor is a Multi Speed Fan Motor that is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 4 wires connected to pins common, low, medium and high speeds.

During normal operation, the indoor control board will energize the indoor blower motor and request proper speed. The motor has a run capacitor that is located in the Cassette unit's control box. The run capacitor connects to the motor via two orange wires. This capacitor is field replaceable.

### 5 Louver Motors

The louver motors are stepper type motors that move the louvers up/down. The motors are controlled by pulsed voltage that cannot be measured. If the louver does not move when it should, check for a bind in the louvers.

### 6 Piping Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 7 Ambient Temperature Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

Both sensors are negative temperature coefficient type that reduce electrical resistance as temperature rises.

### 8 Control Board

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

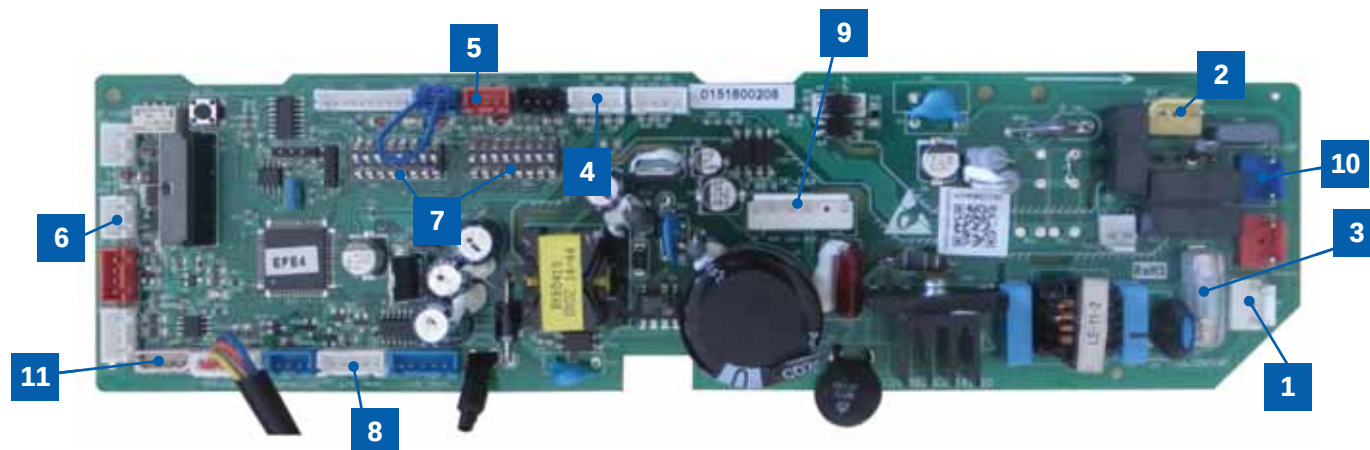
### 9 Condensate Pump & Float Switch

1. If in COOL or DRY mode: Compressor running (Thermal ON), then condensate pump is energized.
  - When compressor stops (Thermal OFF), condensate pump runs for an additional 5 minutes.
2. If in COOL or DRY modes and compressor is running (Thermal ON) and the float switch opens for 5 minutes.
  - Compressor will stop, the pump will continue to run.
  - If the float switch does not close, error code will display and pump continues to run.
  - If the float switch does close, the pump will continue to run for 5 additional minutes.
3. During standby (Thermal OFF) in COOL/DRY modes or in HEAT and FAN modes and float switch opens for 2 seconds, the condensate pump is energized.
  - If the float switch closes, the pump will run for an additional 5 minutes.
  - If the float switch does not close, the pump continues to run and error code is displayed.

# LARGE CASSETTE TECHNICAL OVERVIEW

## COMPONENTS

### Cassette Unit Indoor Circuit Board



- |                                     |                             |                                 |
|-------------------------------------|-----------------------------|---------------------------------|
| <b>1</b> Power                      | <b>5</b> CN19 Float Switch  | <b>9</b> CN6 Fan Motor          |
| <b>2</b> Communication Terminal     | <b>6</b> CN11 Wired Remote  | <b>10</b> CN9 Condensate Pump   |
| <b>3</b> 3.15A 250V Fuse            | <b>7</b> DIP Switches       | <b>11</b> CN14 Panel Connection |
| <b>4</b> CN3 Pipe/Room Temp Sensors | <b>8</b> CN36 Stepper Motor |                                 |

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3. The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU.

The connections on the indoor board are shown here in the schematic drawing.

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections to CH- 3 and CH-4 on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections. When power is present at the indoor board, the Display

Power Indicator will be lit.

The control board has a replaceable 3.15A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected at Plug CN-13. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

The receiver/display unit that is mounted to the front cover of the indoor unit plugs into the circuit board via a connection at Plug CN-29.

There is one motor that controls the movement of the louvers. The motor connects to the circuit board at Plug CN-14. The motor is located in the over of the louver assembly.

The blower/fan motor is connected to the circuit board at plug CN-11.

The Cassette unit has a built in condensate pump. The pump is connected to the circuit board on Plug CN-9. The pump is energized whenever the Float Switch indicates that water needs to be pumped from the cassette. The float switch connects onto the circuit board via Plug CN-18.

# LARGE CASSETTE TECHNICAL OVERVIEW

## TESTING

### Accessing the Blower Motor and Condensate Pump

1. Disconnect power to the outdoor unit.
2. Remove the louver assembly.



3. Disconnect the main power wire to the indoor unit.
4. Unplug the condensate pump and float switch from wiring harness.
5. Unplug fan motor from wiring harness.
6. Remove the float switch, piping temperature sensor, fan motor, and wired controller (if present) control board wire connections. Disconnect plug to the coil sensor.
7. Remove screws holding the control box.



8. Remove screws holding the air inlet cover.
9. Drain the condensate water from the pan by removing drain plug.
10. Remove the screws holding on the condensate pan

### Removing Fan Motor

1. Remove holding nut from fan blade.



2. Fan blade will slide off motor shaft.
3. Remove Phillips head screw holding cover plate over motor wiring leads.
4. Remove 3 nuts that hold fan motor in place.



5. Fan motor will come loose.

### Removing Condensate Pump

1. Remove screws holding condensate pump and float switch in position.
2. Disconnect condensate hose from condensate pump.
3. Remove assembly.



# LARGE CASSETTE TECHNICAL OVERVIEW

## TESTING

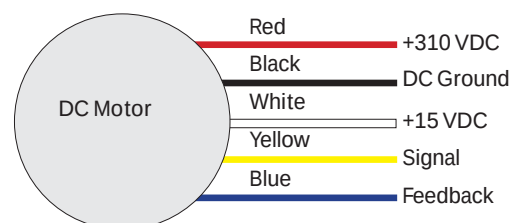
### Indoor Fan Motor Test Procedure

**If the indoor fan motor does not run:**

1. Disconnect power to the system.
2. Remove the return air cover and access the circuit board fan motor connection.
3. Reset power and turn the remote control fan command to Fan On mode.

### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.



### Testing Temperature Sensors

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

**To test the electrical condition of a temperature sensor perform the following:**

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.
3. Use an ohmmeter to test the electrical resistance of the sensor.
4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (See chart in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)



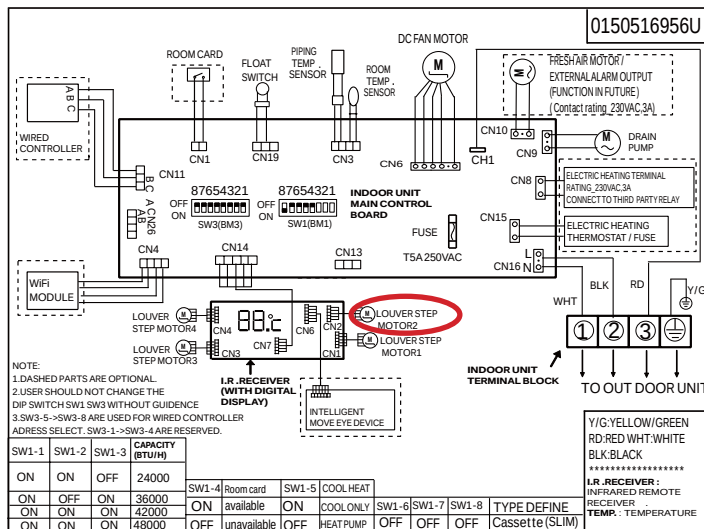
# LARGE CASSETTE TECHNICAL OVERVIEW

## TESTING

### Testing Louver Motors

If the louver does not operate with command from the remote control, either the indoor board is bad, or the louver motor is defective. It is more likely the motor is defective than the board. (Make sure the louver assembly is not binding and keeping the vanes from moving.)

1. Remove power from the unit and remove the indoor unit cover.
2. Access the circuit board.
3. Identify the inoperable louver motor on the schematic drawing below and disconnect the plug from the circuit board.



4. Use an Ohmmeter to test the electrical continuity of the louver motor windings. The proper resistance for each winding can be found in this table. If the motor winding resistance is erratic or shows open, the motor is defective. Replace the motor.



5. If the motor checks out good, replace the indoor control board.

### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.



2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

# LARGE CASSETTE TECHNICAL OVERVIEW

## TESTING

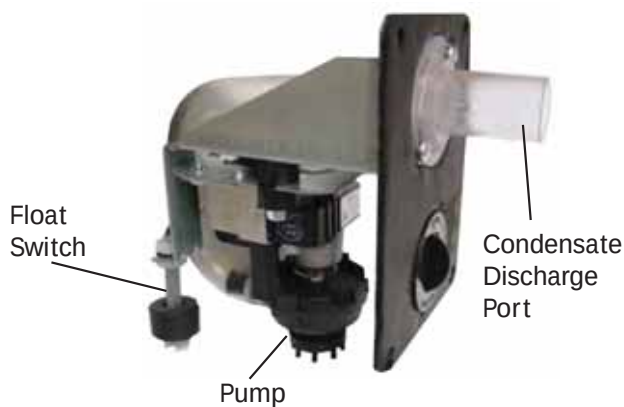
### Test Condensate Pump and Float Switch

If the internal condensate pump does not operate, the pump may be bad or the float switch may be defective. Perform the following test:

1. Access the electrical control box.
2. Unplug the float switch from the circuit board.
3. The pump should start.
4. If the pump does not start, check for voltage at the pump connector on the board. There should be 230 Volts AC to the pump. If there is not, the circuit board is defective. If there is proper voltage to the pump, either the pump or associated pump wiring is defective.



5. When installing, the condensate discharge port at the top of the water pump must be connected with drain pipe



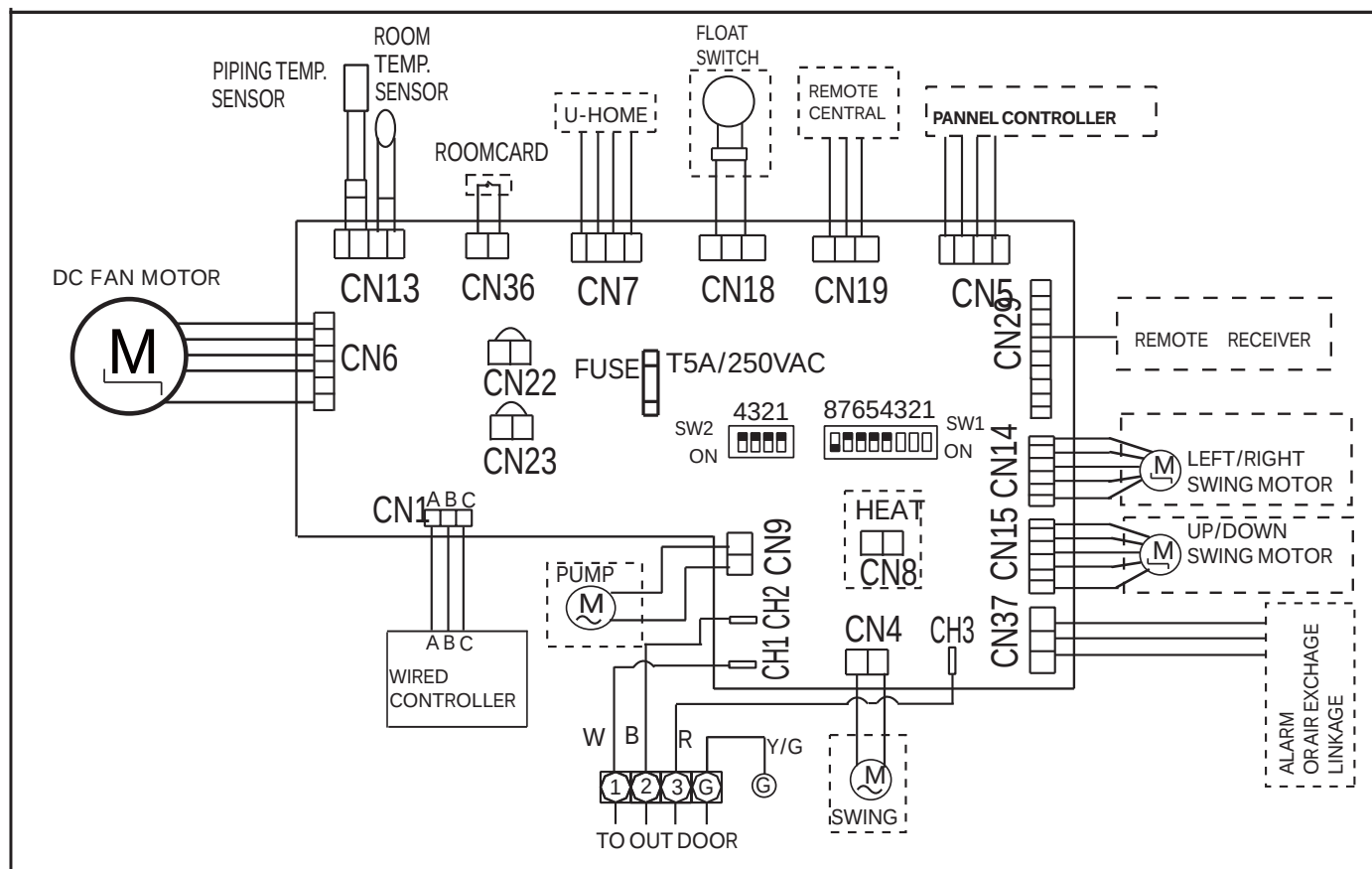
## SLIM DUCT TECHNICAL OVERVIEW



**AD07SL2VHB**  
**AD09SL2VHB**  
**AD12SL2VHB**  
**AD18SL2VHB**

# SLIM DUCT TECHNICAL OVERVIEW

## WIRING DIAGRAM & DIP SWITCH SETTINGS



### NOTES:

1. Dashed parts are optional
2. User should not to set SW1 and SW2 without guidance.
3. The bridge (CN22 CN23) on sub units PCB should be cut off when one wired controller control more than one unit.

| SW1-1 | SW1-2 | SW1-3 | BTU    |
|-------|-------|-------|--------|
| OFF   | OFF   | OFF   | 60,000 |
| ON    | OFF   | OFF   | 9,000  |
| ON    | OFF   | OFF   | 7,000  |
| OFF   | ON    | OFF   | 12,000 |
| ON    | ON    | OFF   | 48,000 |
| OFF   | OFF   | ON    | 18,000 |
| ON    | OFF   | ON    | 24,000 |
| OFF   | ON    | ON    | 28,000 |
| ON    | ON    | ON    | 36,000 |

| SW1-4 | SW1-5 | Hydrostatic Selection | SW1-7 | SW1-8 | Type Define          |
|-------|-------|-----------------------|-------|-------|----------------------|
| OFF   | OFF   | 0 Pa                  | OFF   | OFF   | Slim Duct            |
| OFF   | ON    | 10 Pa                 | OFF   | ON    | Slim Duct (Americas) |
| ON    | OFF   | 20 Pa                 | ON    | OFF   | Middle Pressure Duct |
| ON    | ON    | 40 Pa                 | ON    | ON    | Convertible          |

| SW1-6 | Room Card   |
|-------|-------------|
| OFF   | Unavailable |
| ON    | Available   |

R : RED  
 B : BLACK  
 W : WHITE  
 Y/G : YELLOW/GREEN

# SLIM DUCT TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                 |
|-------------|-------------|-------------|-----------------------------------------------------------|
| 2           | 1           | 1           | Outdoor EEPROM failure                                    |
| 2           | 2           | 2           | IPM overcurrent or short circuit                          |
| 2           | 3           | /           | Compressor over current during deceleration               |
| 2           | 4           | 4           | Communication failure between the IPM and outdoor PCB     |
| 2           | 5           | 5           | Module operated overload (compressor overload protection) |
| 2           | 6           | 6           | Module low or high voltage                                |
| 2           | 7           | /           | Compressor current sampling circuit fault                 |
| 2           | 8           | 8           | Overheat protection for discharge temperature             |
| 2           | 9           | 9           | Malfunction of the DC fan motor                           |
| 3           | 0           | 10          | Malfunction of defrost temperature sensor                 |
| 3           | 1           | 11          | Suction temperature sensor failure                        |
| 3           | 2           | 12          | Ambient temperature sensor failure                        |
| 3           | 3           | 13          | Discharge temperature sensor failure                      |
| 3           | 4           | /           | PFC circuit loop voltage                                  |
| 3           | 5           | 15          | Communication failure between the indoor & outdoor unit   |
| 3           | 6           | 16          | Lack of refrigerant or discharging                        |
| 3           | 7           | 17          | 4-way valve switching failure                             |
| 3           | 8           | 18          | Loss of synchronism detection                             |
| 3           | 9           | /           | Low DC or AC voltage                                      |
| 4           | 0           | 20          | Indoor thermal overload                                   |
| 4           | 1           | 21          | Indoor coil frosted                                       |
| 4           | 2           | /           | PFC circuit loop overcurrent                              |
| 4           | 3           | 23          | Module thermal overload                                   |
| 4           | 4           | 24          | Compressor start failure, over-current                    |
| 4           | 5           | 25          | Phase current protection (IPM)                            |
| 4           | 6           | 26          | MCU reset                                                 |
| 4           | 7           | 27          | Module current detect circuit malfunction                 |
| 4           | 8           | 28          | Liquid pipe sensor failure: Circuit A                     |
| 4           | 9           | 29          | Liquid pipe sensor failure: Circuit B                     |

# SLIM DUCT TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                                                             |
|-------------|-------------|-------------|-------------------------------------------------------------------------------------------------------|
| 5           | 0           | 30          | Liquid pipe sensor failure: Circuit C                                                                 |
| 5           | 1           | 31          | Liquid pipe sensor failure: Circuit D                                                                 |
| 5           | 2           | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| 5           | 3           | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| 5           | 4           | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| 5           | 5           | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| 5           | 6           | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| 5           | 7           | /           | Compressor overcurrent detected by IPM                                                                |
| 5           | 8           | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| 5           | 9           | 39          | Malfunction of condensing temperature sensor                                                          |
| 6           | 0           | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| 6           | 1           | 41          | Toci temperature sensor failure                                                                       |
| 6           | 2           | 42          | High Pressure switch open                                                                             |
| 6           | 3           | 43          | Low Pressure switch open                                                                              |
| 6           | 4           | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| 6           | 5           | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| 0           | 1           | /           | Indoor ambient temperature sensor failure                                                             |
| 0           | 2           | /           | Indoor coil temperature sensor failure                                                                |
| 0           | 4           | /           | Indoor PCB EEPROM failure                                                                             |
| 0           | 7           | /           | Communication fault between the indoor and outdoor unit                                               |
| 0           | 8           | /           | Communication fault between the controller and Indoor unit                                            |
| 0           | 17          | /           | DC voltage of the fan motor driver too high or too low                                                |
| 0           | 18          | /           | Fan motor driver over 95°F (35°C)                                                                     |
| 0           | 19          | /           | Indoor fan motor out of step                                                                          |
| 0           | 12          | /           | Drain system malfunction                                                                              |
| 0           | 13          | /           | Zero cross signal detected wrong                                                                      |
| 0           | 14          | /           | Indoor fan motor malfunction                                                                          |
| 0           | 15          | /           | Indoor fan motor overcurrent                                                                          |

# SLIM DUCT TECHNICAL OVERVIEW

## COMPONENTS

The Slim Duct Indoor Unit will act as evaporator coils during cooling mode and condenser coils during heating mode. This unit can operate with a motorized supply air louver or it can have a LIMITED amount of ducting added to the unit's return and supply air duct connection flanges. The return air ducting can be connected to the end of the cabinet or the bottom blank off plate can be removed for bottom return configuration.

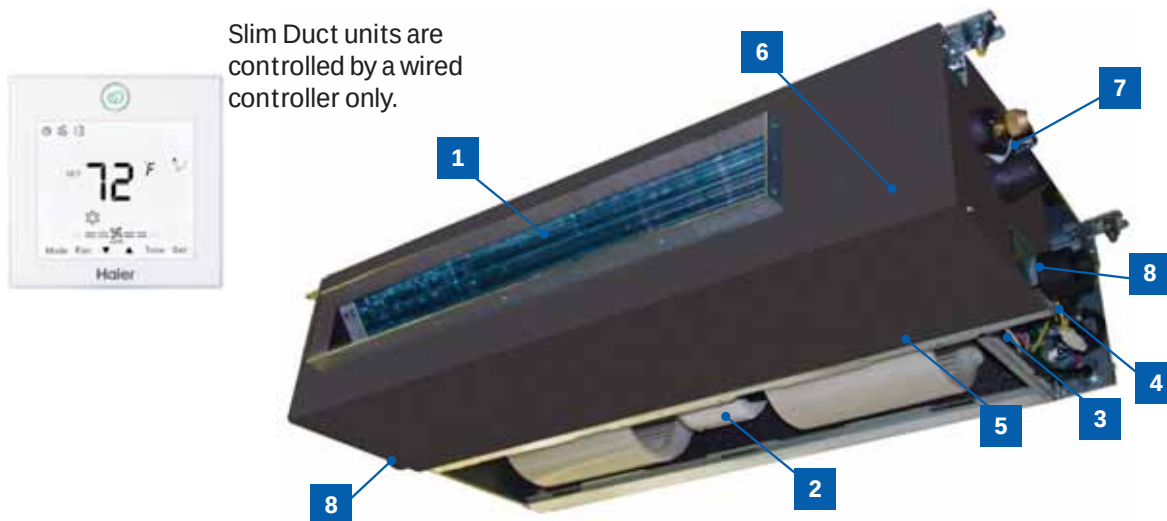
DIP Switches on the unit's circuit board configure the fan power to match the ducting configuration.

These units have a built in condensate pump with an associated condensate level switch. The condensate pump is capable of lifting water out of the indoor unit. If high water lift is needed, the water from the cassette pump should be pumped into a field supplied condensate pump with high lift power.

The layout of the system is very straightforward and components are easily accessed should service be required. The blower assembly and room air temperature sensor is accessed at the rear of the evaporator coil, and the piping temperature sensor is located under the top cover. The condensate pump and float switch are accessed under the removable panel next to the electrical control box.

The wired controller can be configured to sense room air temperature. There is no option for use with remote control.

All operating status and information is displayed on the wired controller. The Slim Duct unit does not have a display.



Slim Duct units are controlled by a wired controller only.

### 1 Evaporator Coil

### 2 Blower Assembly

The indoor unit features a DC variable speed dual shaft blower motor that will change speed to match the capacity demand from the outdoor unit. The motor is a dual shaft type that powers two individual blower assemblies.

The blower assembly consists of 2 plastic blowers. A set screw holds each blower wheel to the blower motor.

The indoor blower motor is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 5 wires connected to pins that deliver line voltage, speed, and feedback information.

During normal operation, the indoor control board will energize the indoor blower motor and request

proper speed. Fan power should be set using the DIP Switches SW1 settings.

### 3 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires, 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

### 4 Control Board

Located under the electrical control box cover.

### 5 Ambient Temperature Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

# SLIM DUCT TECHNICAL OVERVIEW

## COMPONENTS

### 6 Piping Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 7 Condensate Pump

The Slim Duct unit has a built in condensate pump. The pump is connected to the circuit board. The pump is energized whenever the Float Switch indicates that water needs to be pumped from the cassette. The float switch connects onto the circuit board.

The float switch and pump are located behind the removable insulated cover next to the electrical control box. The pump is hermetically sealed and requires no maintenance. The float switch is a normally closed switch, that opens as water rises. The float switch requires no maintenance.

### 8 Gravity Drain Ports

The indoor unit has the option for either gravity drain systems or the use of an internal condensate pump with float switch. The pump is capable of minimal lift. If high lift is required, the water from the Slim Duct unit should be pumped to a field supplied condensate pump that is capable of high lift.

### Accessory Louver Motors (not shown)

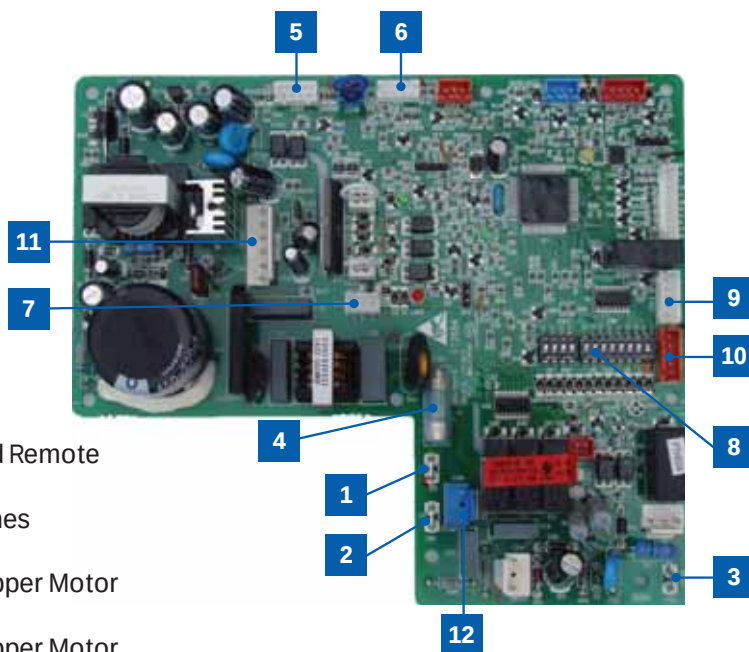
Separate motors located in the accessory supply air louver control the operation of the motorized louvers. The louver motors are stepper type motors that move the louvers up/down. The motors are controlled by pulsed voltage that cannot be measured. If the louver does not move when it should, check for a bind in the louvers.

All of the louver motors are controlled via commands received from the remote control.



### Indoor Unit Circuit Board

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.



1 L Terminal

2 N Terminal

3 Communication Terminal

4 5A 250V Fuse

5 CN13 Sensors

6 CN18 Float Switch

7 CN1 Wired Remote

8 DIP Switches

9 CN14 Stepper Motor

10 CN15 Stepper Motor

11 CN6 Fan Motor

12 CN9 Condensate Pump

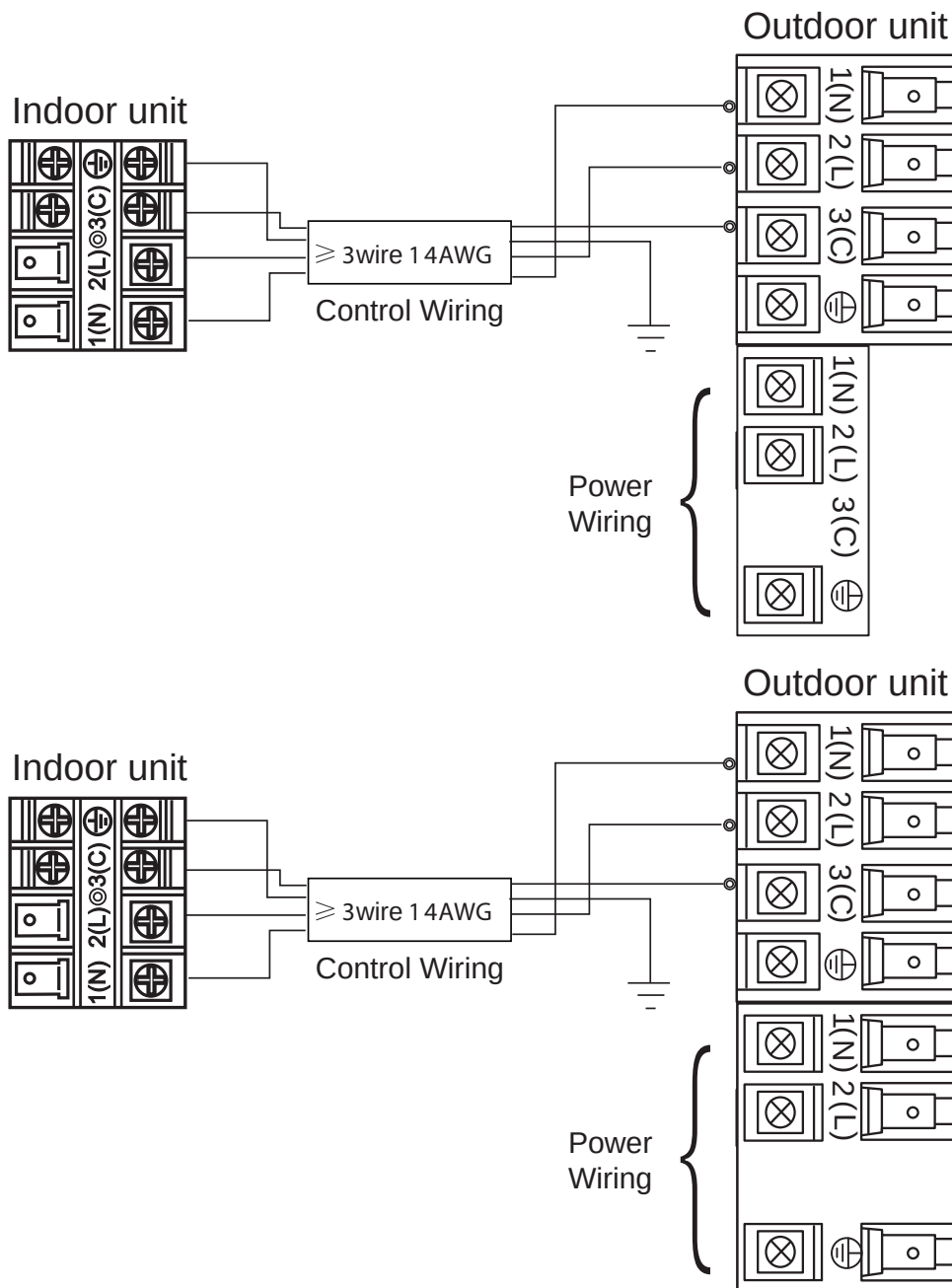
# SLIM DUCT TECHNICAL OVERVIEW

## COMPONENTS

The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3. The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections to CH- 1 and CH-2 on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections. When power is present at the indoor board, the wired controller will be energized.

The connections on the indoor board are shown here in the schematic drawing.



# SLIM DUCT TECHNICAL OVERVIEW

## COMPONENTS

This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU.

The control board has a replaceable 5A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected at Plug CN-13. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

There 3 motors that control the directional movement of the accessory louver. The motor connects to the circuit board at Plug CN-14, CN-15 and CN-16. The motors are located in the louver assembly.

The blower motor is connected to the circuit board at plug CN-6.

### SW1 DIP Switches

There are two sets of DIP switches on the Circuit Board. SW3 is for factory use only. SW1 is used to set the configuration of the indoor unit operation. The first three switches SW1-1, SW1-2 and SW1-3 select the indoor unit capacity.

Air Delivery Power is set with DIP Switches SW1-4 and SW1-5. The settings are shown in Hydrostatic Selection of 0Pa, up to 30Pa. SW1-7 and SW1-8 define the unit type. The conversions are as follows:

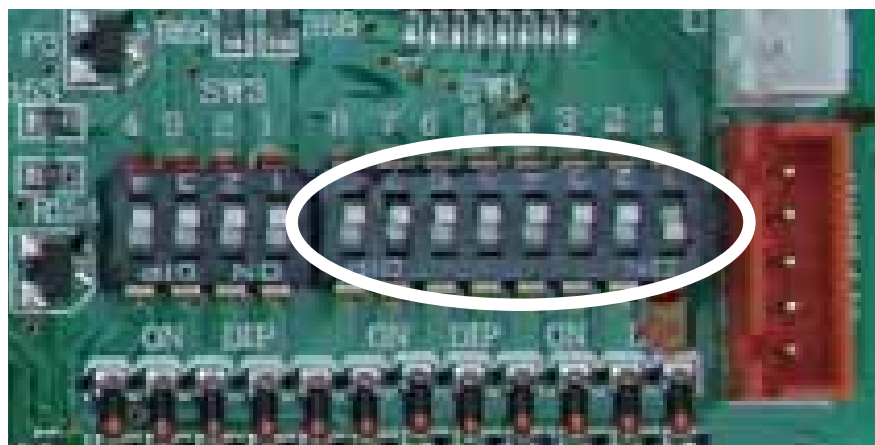
0Pa=0"w.c.

10Pa= .04"w.c.

20Pa=.08"w.c.

30Pa=.12"w.c.

- Recommended settings are for motorized Louver set to 10Pa.
- Ducting limited to a total of .12"w.c. External Static set to 30Pa.



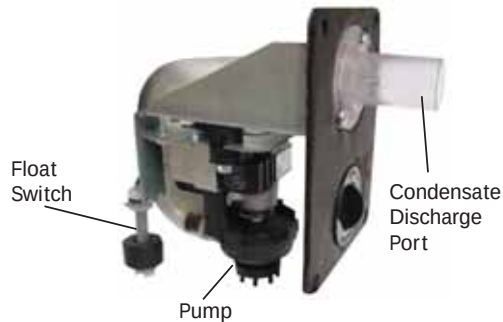
# SLIM DUCT TECHNICAL OVERVIEW

## TESTING

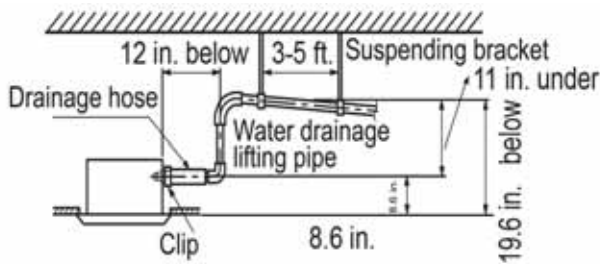
### Test Condensate Pump and Float Switch

The unit has a built-in condensate pump and water level safety switch. There are also two optional ports for gravity drainage. The condensate pump is rated to lift water up to 27 9/16" from the point of discharge.

The unit comes with a grey connection hose with clamp. This hose is connected to the High ESP Duct unit condensate discharge hose port. The other end of the hose is sized to accept 3/4 inch PVC piping.



Recommended condensate piping configurations are shown here:



If the internal condensate pump does not operate, the pump may be bad or the float switch may be defective. Perform the following test:

1. Access the electrical control box.
2. Unplug the float switch from the circuit board.



3. The pump should start.
4. If the pump does not start, check for voltage at the control board pump connection. There should be 230 Volts AC to the pump. If there is not, the circuit board is defective. If there is proper voltage to the pump, either the pump or associated pump wiring is defective.



### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should be no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.



2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

# SLIM DUCT TECHNICAL OVERVIEW

## TESTING

### Testing Temperature Sensors

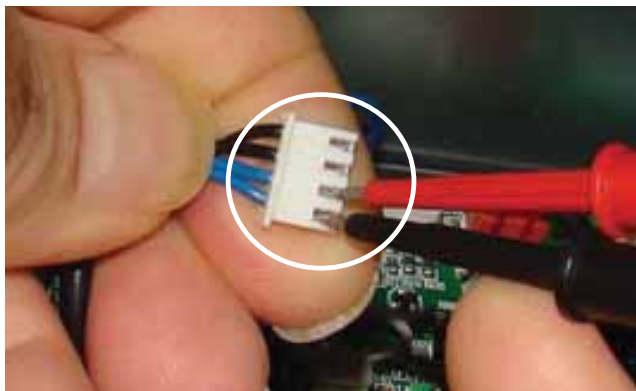
The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.



3. Use an ohmmeter to test the electrical resistance of the sensor.



4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (refer to charts in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)

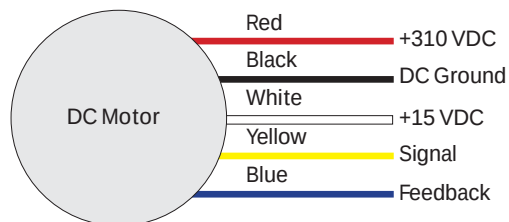
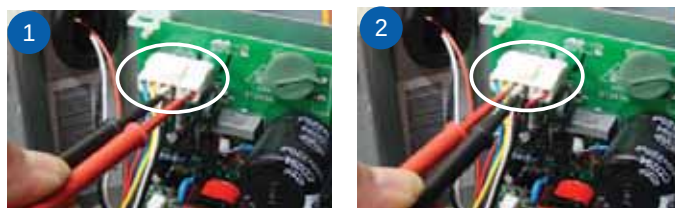
### Indoor Fan Motor Voltage Check

#### If The Indoor Fan Motor Does Not Run:

1. Remove the front cover and access the fan motor circuit board connection.
2. Reset power and turn the remote control fan command to Fan On mode.

#### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.



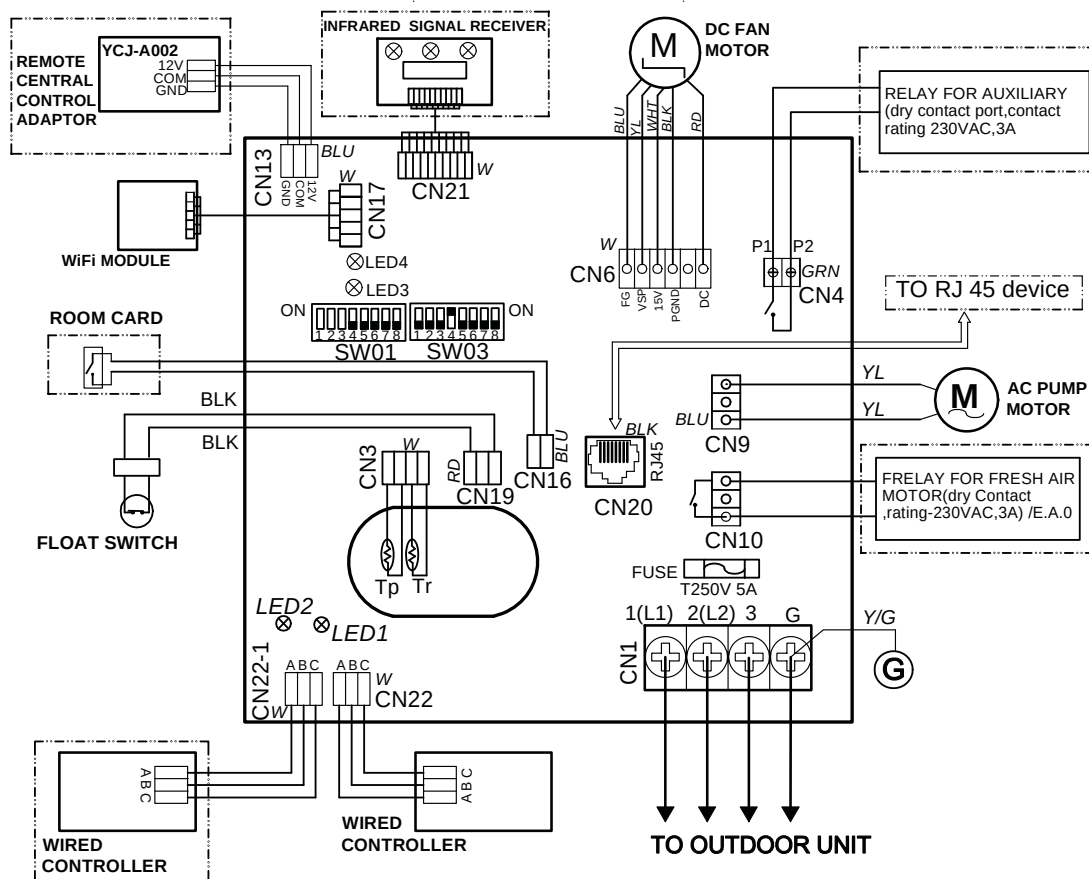
# MID-STATIC DUCTED TECHNICAL OVERVIEW



USYM09UCDSA  
 USYM12UCDSA  
 USYM18UCDSA  
 USYM24UCDSA

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## WIRING DIAGRAM



| MODEL        | SW1-1 | SW1-2 | SW1-3 | SW1-4 | SW1-5 | SW1-6 | SW1-7 | SW1-8 |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|
| USYM09UCDSA1 | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |
| USYM12UCDSA1 | ON    | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |
| USYM18UCDSA1 | OFF   | ON    | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |
| USYM24UCDSA1 | ON    | ON    | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |
| MODEL        | SW3-1 | SW3-2 | SW3-3 | SW3-4 | SW3-5 | SW3-6 | SW3-7 | SW3-8 |
| USYM09UCDSA1 | OFF   | OFF   | OFF   | ON    | OFF   | OFF   | OFF   | OFF   |
| USYM12UCDSA1 | OFF   | OFF   | OFF   | ON    | OFF   | OFF   | OFF   | OFF   |
| USYM18UCDSA1 | OFF   | OFF   | OFF   | ON    | OFF   | OFF   | OFF   | OFF   |
| USYM24UCDSA1 | OFF   | OFF   | OFF   | ON    | OFF   | OFF   | OFF   | OFF   |

Factory default setting of the DIP switches.

### NOTES:

1. Dashed parts are optional
2. Please refer to service manual to get details of the DIP switches definition.
3. Do not change the DIP switches setting without technical support.
4. Get details from trouble shooting list about LED indication.
5. Abbreviation: RD-red, W-white, BLK-black, BLU-blue, GRN-green, YL-yellow, Y/G-yellow/green, E.A.O-external alarm output, TR-indoor unit ambient (room) temperature sensor, TP-indoor unit pipe (coil) temperature sensor.
6. The port CN4 & CN10 are dry contact output port for particular use, do not connect other device without technical person support.

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS

### SW1 DIP Switch Settings

| Description                  | SW1-1 | SW1-2 | SW1-3 | SW1-4 | SW1-5 | SW1-6 | SW1-7 | SW1-8 |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Capacity: 9000btu/h          | OFF   | OFF   | OFF   | ---   | ---   | ---   | ---   | ---   |
| Capacity: 12000btu/h         | ON    | OFF   | OFF   | ---   | ---   | ---   | ---   | ---   |
| Capacity: 18000btu/h         | OFF   | ON    | OFF   | ---   | ---   | ---   | ---   | ---   |
| Capacity: 24000btu/h         | ON    | ON    | OFF   | ---   | ---   | ---   | ---   | ---   |
| Room card invalid            | ---   | ---   | ---   | OFF*  | ---   | ---   | ---   | ---   |
| Room card valid              | ---   | ---   | ---   | ON    | ---   | ---   | ---   | ---   |
| Heat pump                    | ---   | ---   | ---   | ---   | OFF*  | ---   | ---   | ---   |
| Cooling only                 | ---   | ---   | ---   | ---   | ON    | ---   | ---   | ---   |
| Fresh air valid              | ---   | ---   | ---   | ---   | ---   | OFF*  | ---   | ---   |
| External alarm output        | ---   | ---   | ---   | ---   | ---   | ON    | ---   | ---   |
| Without filter clean warning | ---   | ---   | ---   | ---   | ---   | ---   | OFF*  | ---   |
| With filter clean warning    | ---   | ---   | ---   | ---   | ---   | ---   | ON    | ---   |
| North America area           | ---   | ---   | ---   | ---   | ---   | ---   | ---   | OFF*  |
| Non-North America area       | ---   | ---   | ---   | ---   | ---   | ---   | ---   | ON    |

\* Factory Default Setting

### SW3 DIP Switch Settings

| Description                                                                   | SW3-1 | SW3-2 | SW3-3 | SW3-4 |
|-------------------------------------------------------------------------------|-------|-------|-------|-------|
| Special fresh air (Canadian ventilation mode, Canada particular Area) invalid | OFF*  | ---   | ---   | ---   |
| Special fresh air (Canadian ventilation mode, Canada particular Area) valid   | ON    | ---   | ---   | ---   |
| Console/MESP Duct                                                             | ---   | OFF*  | ---   | ---   |
| Cassette (Reserved)                                                           | ---   | ON    | ---   | ---   |
| Auxiliary heater invalid                                                      | ---   | ---   | OFF*  | ---   |
| Auxiliary heater valid                                                        | ---   | ---   | ON    | ---   |
| ESP grade 0-4 level                                                           | ---   | ---   | ---   | OFF   |
| ESP grade 0-10 level                                                          | ---   | ---   | ---   | ON*   |

\* Factory Default Setting

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                 |
|-------------|-------------|-------------|-----------------------------------------------------------|
| 2           | 1           | 1           | Outdoor EEPROM failure                                    |
| 2           | 2           | 2           | IPM overcurrent or short circuit                          |
| 2           | 3           | /           | Compressor over current during deceleration               |
| 2           | 4           | 4           | Communication failure between the IPM and outdoor PCB     |
| 2           | 5           | 5           | Module operated overload (compressor overload protection) |
| 2           | 6           | 6           | Module low or high voltage                                |
| 2           | 7           | /           | Compressor current sampling circuit fault                 |
| 2           | 8           | 8           | Overheat protection for discharge temperature             |
| 2           | 9           | 9           | Malfunction of the DC fan motor                           |
| 3           | 0           | 10          | Malfunction of defrost temperature sensor                 |
| 3           | 1           | 11          | Suction temperature sensor failure                        |
| 3           | 2           | 12          | Ambient temperature sensor failure                        |
| 3           | 3           | 13          | Discharge temperature sensor failure                      |
| 3           | 4           | /           | PFC circuit loop voltage                                  |
| 3           | 5           | 15          | Communication failure between the indoor & outdoor unit   |
| 3           | 6           | 16          | Lack of refrigerant or discharging                        |
| 3           | 7           | 17          | 4-way valve switching failure                             |
| 3           | 8           | 18          | Loss of synchronism detection                             |
| 3           | 9           | /           | Low DC or AC voltage                                      |
| 4           | 0           | 20          | Indoor thermal overload                                   |
| 4           | 1           | 21          | Indoor coil frosted                                       |
| 4           | 2           | /           | PFC circuit loop overcurrent                              |
| 4           | 3           | 23          | Module thermal overload                                   |
| 4           | 4           | 24          | Compressor start failure, over-current                    |
| 4           | 5           | 25          | Phase current protection (IPM)                            |
| 4           | 6           | 26          | MCU reset                                                 |
| 4           | 7           | 27          | Module current detect circuit malfunction                 |
| 4           | 8           | 28          | Liquid pipe sensor failure: Circuit A                     |
| 4           | 9           | 29          | Liquid pipe sensor failure: Circuit B                     |

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                                                             |
|-------------|-------------|-------------|-------------------------------------------------------------------------------------------------------|
| 5           | 0           | 30          | Liquid pipe sensor failure: Circuit C                                                                 |
| 5           | 1           | 31          | Liquid pipe sensor failure: Circuit D                                                                 |
| 5           | 2           | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| 5           | 3           | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| 5           | 4           | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| 5           | 5           | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| 5           | 6           | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| 5           | 7           | /           | Compressor overcurrent detected by IPM                                                                |
| 5           | 8           | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| 5           | 9           | 39          | Malfunction of condensing temperature sensor                                                          |
| 6           | 0           | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| 6           | 1           | 41          | Toci temperature sensor failure                                                                       |
| 6           | 2           | 42          | High Pressure switch open                                                                             |
| 6           | 3           | 43          | Low Pressure switch open                                                                              |
| 6           | 4           | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| 6           | 5           | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| 0           | 1           | /           | Indoor ambient temperature sensor failure                                                             |
| 0           | 2           | /           | Indoor coil temperature sensor failure                                                                |
| 0           | 4           | /           | Indoor PCB EEPROM failure                                                                             |
| 0           | 7           | /           | Communication fault between the indoor and outdoor unit                                               |
| 0           | 8           | /           | Communication fault between the controller and Indoor unit                                            |
| 0           | 12          | /           | Drain system malfunction                                                                              |
| 0           | 13          | /           | Zero cross signal detected wrong                                                                      |
| 0           | 14          | /           | Indoor fan motor malfunction                                                                          |

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## COMPONENTS

The Mid-Static Ducted Indoor Unit will act as evaporator coils during cooling mode and condenser coils during heating mode. This unit can operate with a motorized supply air louver or it can have a LIMITED amount of ducting added to the unit's return and supply air duct connection flanges. The return air ducting can be connected to the end of the cabinet or the bottom blank off plate can be removed for bottom return configuration.

DIP Switches on the unit's circuit board configure the fan power to match the ducting configuration.

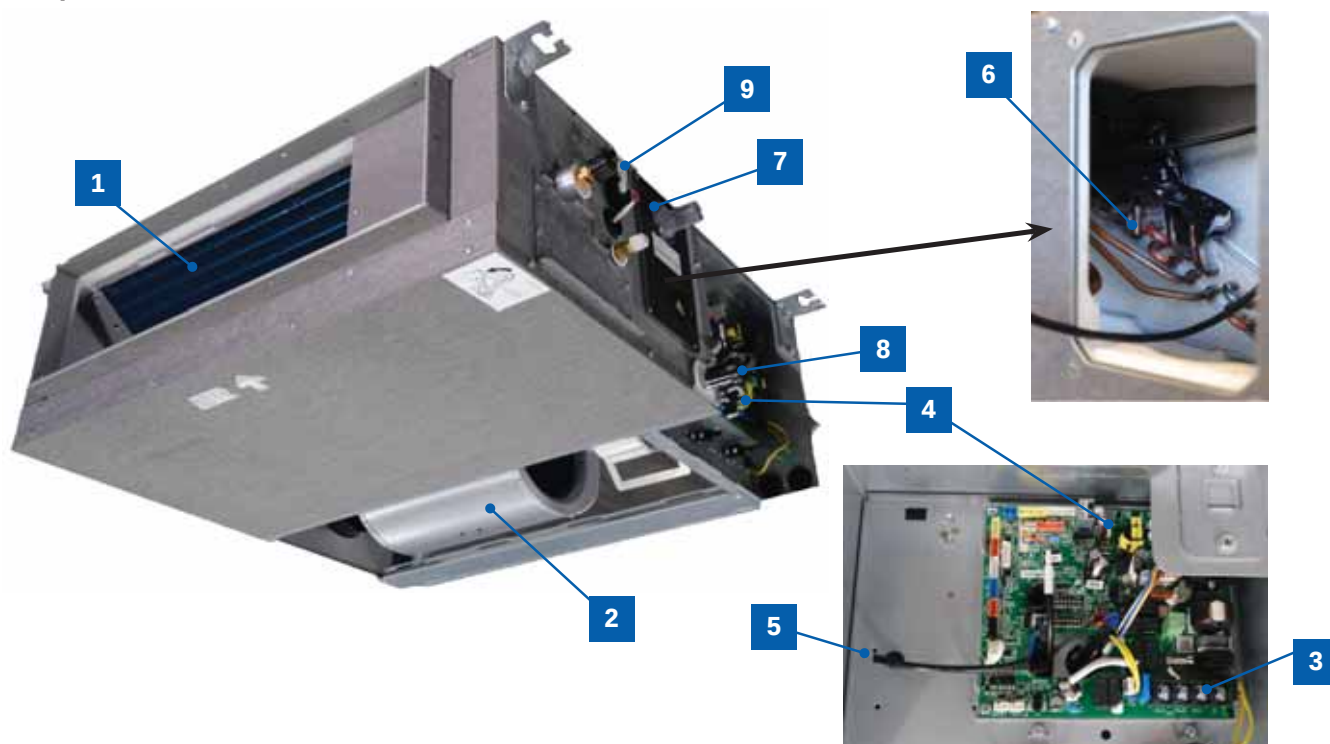
These units have a built in condensate pump with an associated condensate level switch. The condensate pump is capable of lifting water out of the indoor unit. If high water lift is needed, the water from the cassette pump should be pumped into a field supplied condensate pump with high lift power.

The layout of the system is very straightforward and components are easily accessed should service be required. The blower assembly and room air temperature sensor is accessed at the rear of the evaporator coil, and the piping temperature sensor is located under the top cover. The condensate pump and float switch are accessed under the removable panel next to the electrical control box.

The wired controller can be configured to sense room air temperature. There is no option for use with remote control.

All operating status and information is displayed on the wired controller. The Mid-Static Ducted unit does not have a display.

### Component Overview



#### 1 Evaporator Coil

#### 2 Blower Assembly

The indoor unit features a DC variable speed dual shaft blower motor that will change speed to match the capacity demand from the outdoor unit. The motor is a dual shaft type that powers two individual blower assemblies.

The blower assembly consists of 2 plastic blowers. A set screw holds each blower wheel to the blower motor.

The indoor blower motor is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 5 wires connected to pins that deliver line voltage, speed, and feedback information.

During normal operation, the indoor control board will energize the indoor blower motor and request proper speed. Fan power should be set using the DIP Switches SW1 settings.

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## COMPONENTS

### 3 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires, 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

### 4 Control Board

Located under the electrical control box cover.

### 5 Ambient Temperature Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

### 6 Piping Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 7 Condensate Pump

The Mid-Static Ducted unit has a built in condensate pump. The pump is connected to the circuit board. The pump is energized whenever the Float Switch indicates that water needs to be pumped from the cassette. The float switch connects onto the circuit board.

The float switch and pump are located behind the removable insulated cover next to the electrical control box. The pump is hermetically sealed and requires no maintenance. The float switch is a normally closed switch, that opens as water rises. The float switch requires no maintenance.

### 8 Gravity Drain Ports

The indoor unit has the option for either gravity drain systems or the use of an internal condensate pump with float switch. The pump is capable of minimal lift. If high lift is required, the water from the Mid-Static Ducted unit should be pumped to a field supplied condensate pump that is capable of high lift.

#### WiFi

The unit comes shipped with a WiFi module that provides control via a smartphone app.

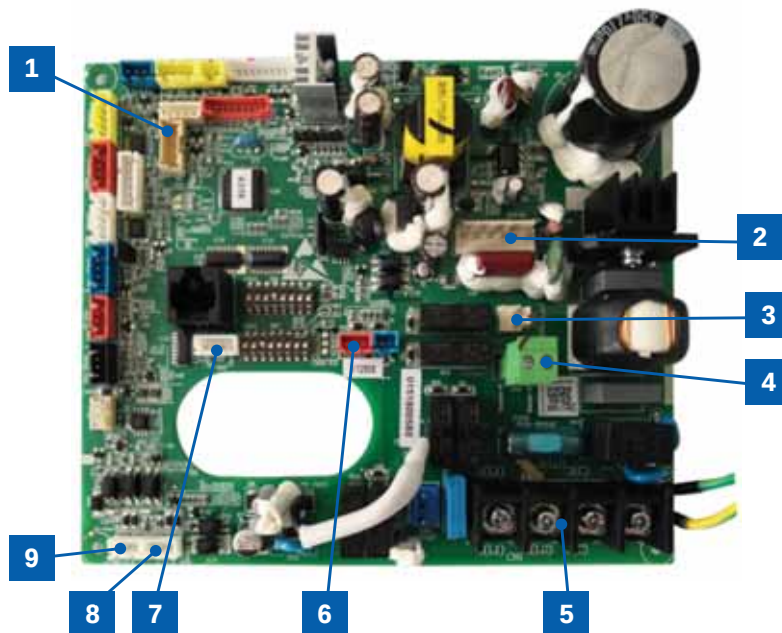
# MID-STATIC DUCTED TECHNICAL OVERVIEW

## COMPONENTS

### Indoor Unit Circuit Board

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

- 1 CN17-GEA3 wifi module socket
- 2 CN6-DC fan motor socket
- 3 CN10-Fresh air link/E.A.O socket
- 4 CN-4-Frelay for auxiliary heater link (Dry contact, rating-230VAC ,3A)
- 5 CN1- Power terminal block
- 6 CN19-Float switch socket
- 7 CN3-Temperature sensor socket (Tr:ROOM SENSOR, Tp:PIPE SENSOR)
- 8 CN22-1-Wired controller socket2
- 9 CN22-Wired controller socket1



The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3. The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections to CH- 1 and CH-2 on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections. When power is present at the indoor board, the wired controller will be energized.

The connections on the indoor board are shown here in the schematic drawing.

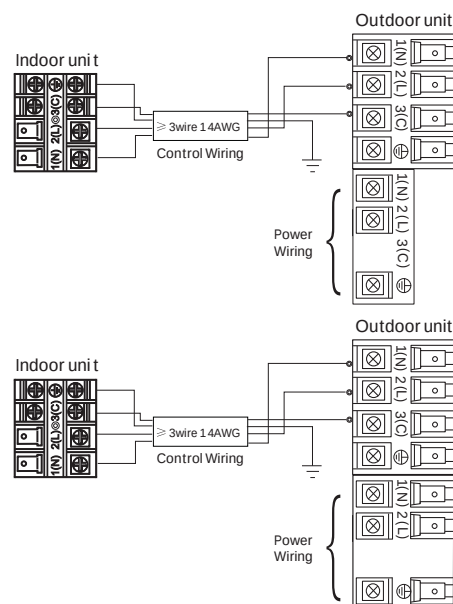
This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU.

The control board has a replaceable 5A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected at Plug CN-13. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

There 3 motors that control the directional movement of the accessory louver. The motor connects to the circuit board at Plug CN-14, CN-15 and CN-16. The motors are located in the louver assembly.

The blower motor is connected to the circuit board at plug CN-6.



# MID-STATIC DUCTED TECHNICAL OVERVIEW

## COMPONENTS

### Fresh Air Function

When there is fresh air signal received by the Indoor Unit PCB (the fresh air signal can be sent by infrared remote controller or wired controller), the Normal fresh air function is valid.

When a call for Fresh Air is received, via the wireless or wired controller, the unit will enable the standard fresh air function.

This function can be activated at any mode except defrost mode. When the IDU been turned off by controller, the fresh air function is invalid. This function can be activated in any mode, except for defrost mode. When the Indoor Unit has been turned off via the controller, the fresh air function will be disabled.

#### Call for Fresh Air is Received:

##### In Cooling / Dehumidification mode:

The fresh air output will maintain a 20 minutes ON, 20 minutes OFF cycle after the compressor starts.

This cycle will be active until one of the following occurs:

- Fresh air function is canceled via the controller (wired controller or wireless remote controller)
- Indoor unit has been via the controller
- The compressor stops.

##### In Fan Only mode:

The fresh air output will maintain a 20 minutes ON, 20 minutes OFF cycle.

This cycle will be active until one of the following occurs:

- Fresh air function is canceled via the controller (wired controller or wireless remote controller)
- Indoor unit has been via the controller

### In Heating mode

The fresh air output will maintain a 20 minutes ON, 20 minutes OFF cycle after the compressor starts.

This cycle will be active until one of the following occurs:

- Fresh air function is canceled via the controller (wired controller or wireless remote controller)
- Indoor unit has been via the controller
- The compressor stops.
- The system enters into Defrost Cycle.

### Special Fresh Air Function (Canadian Ventilation Mode - Mid Static Ducted Only)

Special fresh air function (Canadian ventilation mode) is valid when DIP switch SW3\_1 is set to the ON position, and invalid when DIP switch SW3\_1 is set to OFF position.

When this function is enabled and the Indoor Unit is ON, the the unit will proceed Continuous Fresh Air, keeping the Indoor Fan Motor energized even if the compressor is stopped or the IDU reaches it's real setpoint temperature (real setpoint=customer set point + compensation point).

#### Notes:

- During an active Call, the fan motor speed will be whatever setting the customer has set it to. Once the Call is satisfied, the fan motor speed will be set to a special Low setting that corresponds to the ESP setting.
- During a Defrost Cycle, the indoor fan is disabled, along with the Fresh Air Function

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## TESTING

### Test Condensate Pump and Associated Float Switch

If the internal condensate pump does not operate, the pump may be bad or the float switch may be defective. Perform the following test:

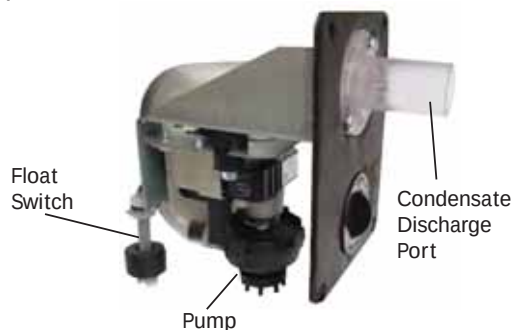
1. Access the electrical control box.
2. Unplug the float switch from the circuit board.



3. The pump should start.
4. If the pump does not start, check for voltage at the pump control board connection. There should be 230 Volts AC to the pump. If there is not, the circuit board is defective. If there is proper voltage to the pump, either the pump or associated pump wiring is defective.



5. When installing, the condensate discharge port at the top of the water pump must be connected with drain pipe.



### Testing Temperature Sensors

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.



3. Use an ohmmeter to test the electrical resistance of the sensor.



4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (refer to charts in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)

# MID-STATIC DUCTED TECHNICAL OVERVIEW

## TESTING

### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should be no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.



2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

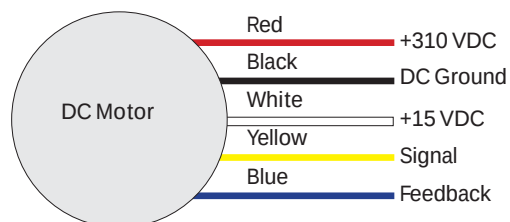
### Indoor Fan Motor Voltage Check

#### If The Indoor Fan Motor Does Not Run:

1. Remove the front cover and access the fan motor circuit board connection.
2. Reset power and turn the remote control fan command to Fan On mode.

#### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.

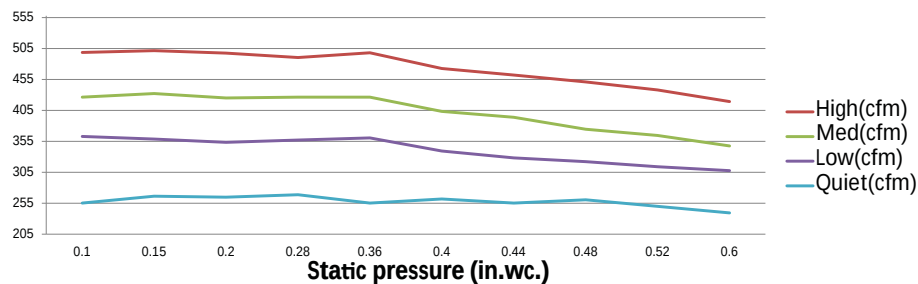


# MID-STATIC DUCTED TECHNICAL OVERVIEW

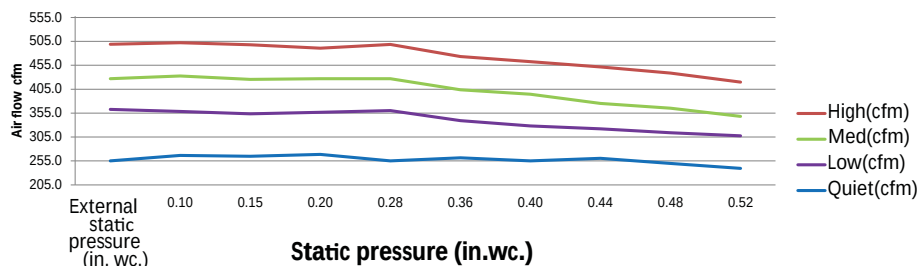
## TESTING

### Static Pressure Charts

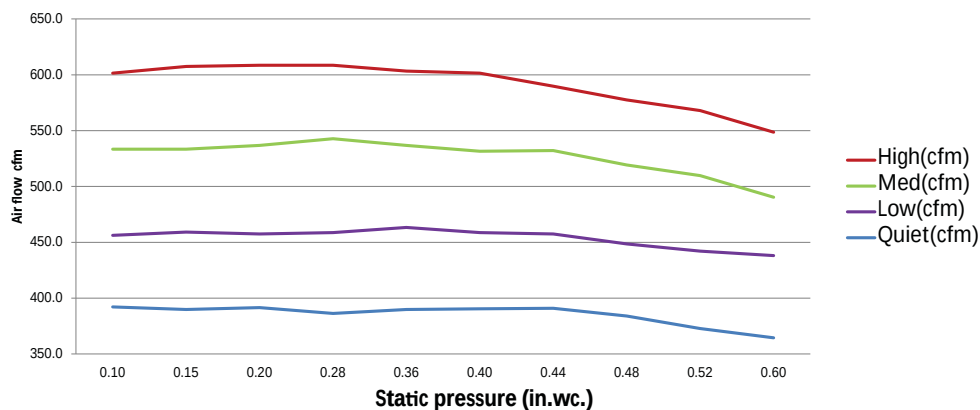
#### USYM09UCDSA



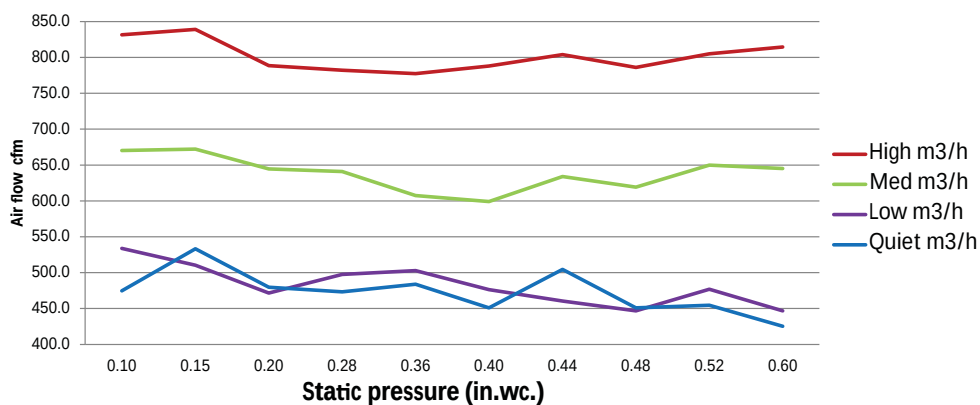
#### USYM12UCDSA



#### USYM18UCDSA



#### USYM24UCDSA



# MID-STATIC DUCTED TECHNICAL OVERVIEW

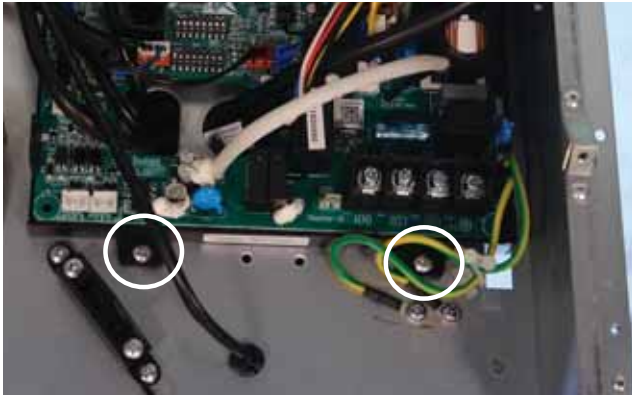
## TESTING

### Board Replacement

1. Remove the ambient sensor.

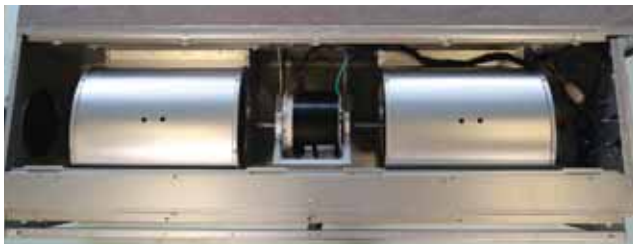


2. Unplug all connectors from the board.
3. Remove the 2 board mounting screws and remove the board.



### Removing the Condensate Pump

1. Remove the air inlet cover.



2. Unplug the pump motor and float switch wires from within the air inlet



3. Remove the 4 screws holding the pump in place.



4. Tilt the pump out from the top and pull out



5. Pull wires through rubber grommets and remove pump assembly

# MID-STATIC DUCTED TECHNICAL OVERVIEW

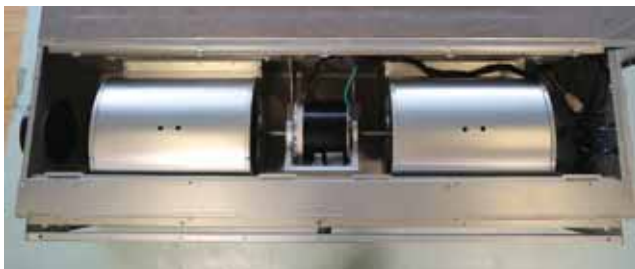
## TESTING

### Removing Fan Motor

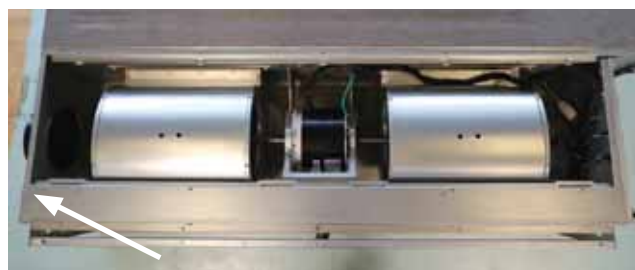
1. Remove control board cover.
2. Unplug motor wires.



3. Feed motor wires into the air inlet box
4. Remove the air box cover.



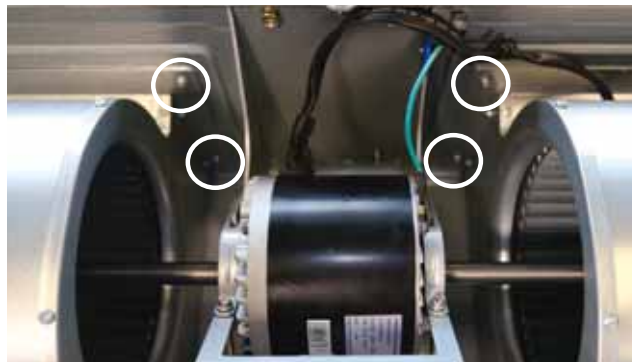
5. Remove the corner bracket.



6. Remove the ground screw and free the motor wire harness.



7. Remove the screws holding the blower housing to the unit, 4 on each housing.



8. Support the motor (2 people may be required at this time). Loosen the 2 screws of the motor mount bracket and remove full assembly
9. Using a long 4mm hex wrench, loosen the set screws from the blower wheel and remove from motor shaft.



### Replacing WiFi Module

1. Unplug existing WiFi module.



2. Insert new WiFi module.
3. Replace the wifi passcode sticker.
4. Pair the unit to account.

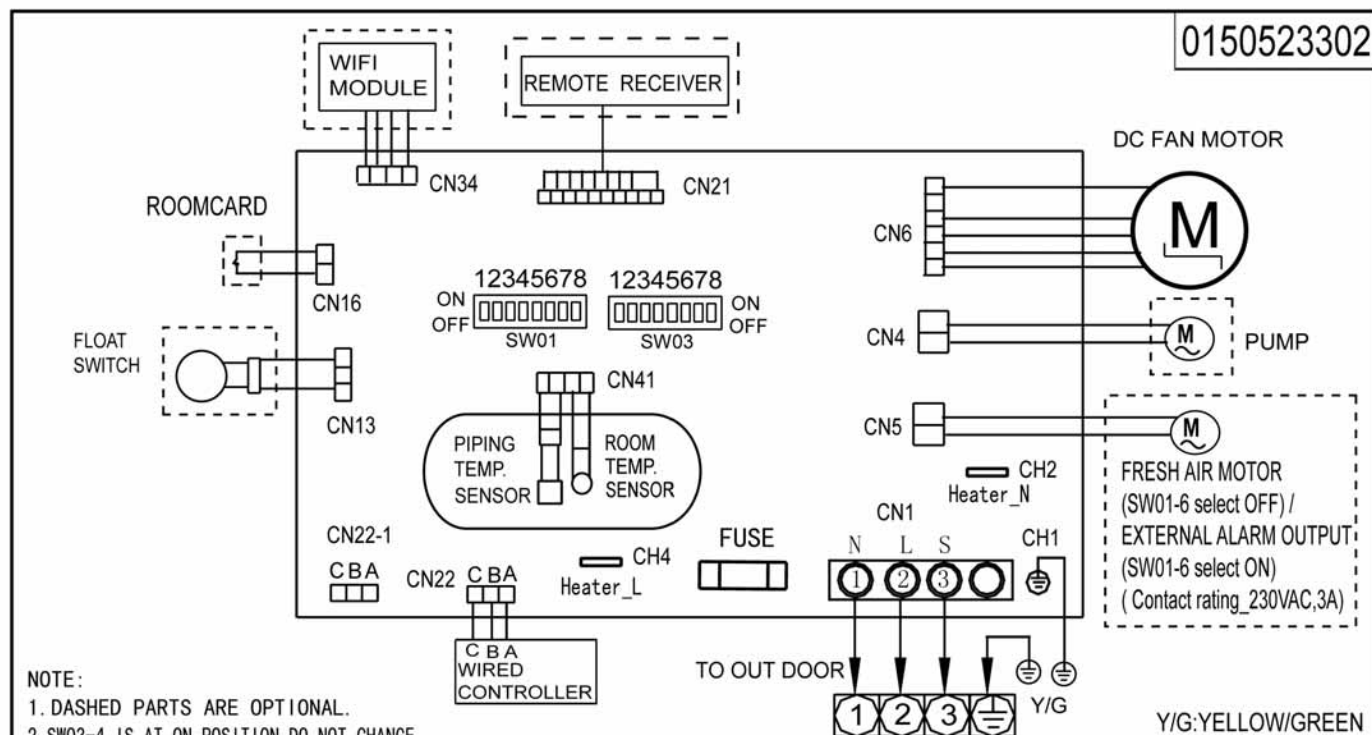
# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW



**AM24LP2VHA**

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## WIRING DIAGRAM



| SW03-1 | SW03-2 | SW03-3 | SW03-4 | SW03-5 | SW03-6 | SW03-7 | SW03-8 | FOR ALL DUCTED MODEL |
|--------|--------|--------|--------|--------|--------|--------|--------|----------------------|
| OFF    | OFF    | OFF    | ON     | OFF    | OFF    | OFF    | OFF    | MODEL                |
| SW01-1 | SW01-2 | SW01-3 | SW01-4 | SW01-5 | SW01-6 | SW01-7 | SW01-8 | AD71S2SM1FA          |
| ON     | ON     | OFF    | OFF    | OFF    | OFF    | OFF    | OFF    | AM24LP2VHA           |
| ON     | ON     | OFF    | OFF    | OFF    | OFF    | OFF    | ON     | ADH071M3ERG          |
| OFF    | ON     | OFF    | OFF    | OFF    | OFF    | OFF    | ON     | AD50S2SM1FA          |

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## DIP SWITCH SETTINGS

| Description                           | SW1-1 | SW1-2 | SW1-3 | SW1-4 | SW1-5 | SW1-6 | SW1-7 | SW1-8 |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| AM24LP2VHA                            | ON    | ON    | OFF   | ---   | ---   | ---   | ---   | ---   |
| Room card invalid(default)            | ---   | ---   | ---   | OFF   | ---   | ---   | ---   | ---   |
| Room card valid                       | ---   | ---   | ---   | ON    | ---   | ---   | ---   | ---   |
| Cool and heat(default)                | ---   | ---   | ---   | ---   | OFF   | ---   | ---   | ---   |
| Cool only                             | ---   | ---   | ---   | ---   | ON    | ---   | ---   | ---   |
| External alarm output(default)        | ---   | ---   | ---   | ---   | ---   | OFF   | ---   | ---   |
| Fresh air                             | ---   | ---   | ---   | ---   | ---   | ON    | ---   | ---   |
| Without filter clean remind (default) | ---   | ---   | ---   | ---   | ---   | ---   | OFF   | ---   |
| With filter clean remind              | ---   | ---   | ---   | ---   | ---   | ---   | ON    | ---   |
| ESP DUCT ( USA)                       | ---   | ---   | ---   | ---   | ---   | ---   | OFF   | 0     |
| EU. & Australia                       | ---   | ---   | ---   | ---   | ---   | ---   | ---   | ON    |

## Wired Controller Communication Address

| Indoor unit Address (Indoor unit address for one wired controller control more than one unit) | SW3-5 | SW3-6 | SW3-7 | SW3-8 |
|-----------------------------------------------------------------------------------------------|-------|-------|-------|-------|
| 0 (main)                                                                                      | OFF   | OFF   | OFF   | OFF   |
| 1 (sub)                                                                                       | OFF   | OFF   | OFF   | ON    |
| 2 (sub)                                                                                       | OFF   | OFF   | ON    | OFF   |
| 3 (sub)                                                                                       | OFF   | OFF   | ON    | ON    |
| 4 (sub)                                                                                       | OFF   | ON    | OFF   | OFF   |
| 5 (sub)                                                                                       | OFF   | ON    | OFF   | ON    |
| 6 (sub)                                                                                       | OFF   | ON    | ON    | OFF   |
| 7 (sub)                                                                                       | OFF   | ON    | ON    | ON    |
| 8 (sub)                                                                                       | ON    | OFF   | OFF   | OFF   |
| 9 (sub)                                                                                       | ON    | OFF   | OFF   | ON    |
| 10 (sub)                                                                                      | ON    | OFF   | ON    | OFF   |
| 11 (sub)                                                                                      | ON    | OFF   | ON    | ON    |
| 12 (sub)                                                                                      | ON    | ON    | OFF   | OFF   |
| 13 (sub)                                                                                      | ON    | ON    | OFF   | ON    |
| 14 (sub)                                                                                      | ON    | ON    | ON    | OFF   |
| 15 (sub)                                                                                      | ON    | ON    | ON    | ON    |

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                 |
|-------------|-------------|-------------|-----------------------------------------------------------|
| 2           | 1           | 1           | Outdoor EEPROM failure                                    |
| 2           | 2           | 2           | IPM overcurrent or short circuit                          |
| 2           | 3           | /           | Compressor over current during deceleration               |
| 2           | 4           | 4           | Communication failure between the IPM and outdoor PCB     |
| 2           | 5           | 5           | Module operated overload (compressor overload protection) |
| 2           | 6           | 6           | Module low or high voltage                                |
| 2           | 7           | /           | Compressor current sampling circuit fault                 |
| 2           | 8           | 8           | Overheat protection for discharge temperature             |
| 2           | 9           | 9           | Malfunction of the DC fan motor                           |
| 3           | 0           | 10          | Malfunction of defrost temperature sensor                 |
| 3           | 1           | 11          | Suction temperature sensor failure                        |
| 3           | 2           | 12          | Ambient temperature sensor failure                        |
| 3           | 3           | 13          | Discharge temperature sensor failure                      |
| 3           | 4           | /           | PFC circuit loop voltage                                  |
| 3           | 5           | 15          | Communication failure between the indoor & outdoor unit   |
| 3           | 6           | 16          | Lack of refrigerant or discharging                        |
| 3           | 7           | 17          | 4-way valve switching failure                             |
| 3           | 8           | 18          | Loss of synchronism detection                             |
| 3           | 9           | /           | Low DC or AC voltage                                      |
| 4           | 0           | 20          | Indoor thermal overload                                   |
| 4           | 1           | 21          | Indoor coil frosted                                       |
| 4           | 2           | /           | PFC circuit loop overcurrent                              |
| 4           | 3           | 23          | Module thermal overload                                   |
| 4           | 4           | 24          | Compressor start failure, over-current                    |
| 4           | 5           | 25          | Phase current protection (IPM)                            |
| 4           | 6           | 26          | MCU reset                                                 |
| 4           | 7           | 27          | Module current detect circuit malfunction                 |
| 4           | 8           | 28          | Liquid pipe sensor failure: Circuit A                     |
| 4           | 9           | 29          | Liquid pipe sensor failure: Circuit B                     |

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor LED4 | Indoor LED3 | Outdoor LED | Diagnosis                                                                                             |
|-------------|-------------|-------------|-------------------------------------------------------------------------------------------------------|
| 5           | 0           | 30          | Liquid pipe sensor failure: Circuit C                                                                 |
| 5           | 1           | 31          | Liquid pipe sensor failure: Circuit D                                                                 |
| 5           | 2           | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| 5           | 3           | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| 5           | 4           | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| 5           | 5           | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| 5           | 6           | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| 5           | 7           | /           | Compressor overcurrent detected by IPM                                                                |
| 5           | 8           | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| 5           | 9           | 39          | Malfunction of condensing temperature sensor                                                          |
| 6           | 0           | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| 6           | 1           | 41          | Toci temperature sensor failure                                                                       |
| 6           | 2           | 42          | High Pressure switch open                                                                             |
| 6           | 3           | 43          | Low Pressure switch open                                                                              |
| 6           | 4           | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| 6           | 5           | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| 0           | 1           | /           | Indoor ambient temperature sensor failure                                                             |
| 0           | 2           | /           | Indoor coil temperature sensor failure                                                                |
| 0           | 4           | /           | Indoor PCB EEPROM failure                                                                             |
| 0           | 7           | /           | Communication fault between the indoor and outdoor unit                                               |
| 0           | 8           | /           | Communication fault between the controller and Indoor unit                                            |
| 0           | 17          | /           | DC voltage of the fan motor driver too high or too low                                                |
| 0           | 18          | /           | Fan motor driver over 95°F (35°C)                                                                     |
| 0           | 19          | /           | Indoor fan motor out of step                                                                          |
| 0           | 12          | /           | Drain system malfunction                                                                              |
| 0           | 13          | /           | Zero cross signal detected wrong                                                                      |
| 0           | 14          | /           | Indoor fan motor malfunction                                                                          |
| 0           | 15          | /           | Indoor fan motor overcurrent                                                                          |

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## COMPONENTS

The Medium Static Ducted Indoor Unit will act as evaporator coils during cooling mode and condenser coils during heating mode. This unit can operate with a motorized supply air louver or it can have a LIMITED amount of ducting added to the unit's return and supply air duct connection flanges. The return air ducting can be connected to the end of the cabinet or the bottom blank off plate can be removed for bottom return configuration.

DIP Switches on the unit's circuit board configure the fan power to match the ducting configuration.

These units have a built in condensate pump with an associated condensate level switch. The condensate pump is capable of lifting water out of the indoor unit. If high water lift is needed, the water from the cassette pump should be pumped into a field supplied condensate pump with high lift power.

The layout of the system is very straightforward and components are easily accessed should service be required.

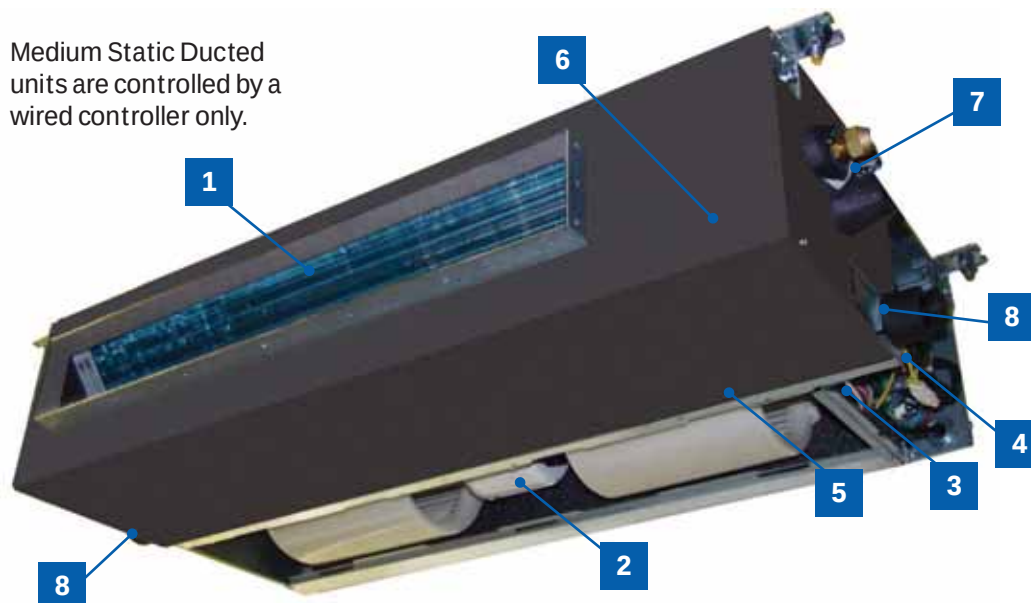
The blower assembly and room air temperature sensor is accessed at the rear of the evaporator coil, and the piping temperature sensor is located under the top cover. The condensate pump and float switch are accessed under the removable panel next to the electrical control box.

The wired controller can be configured to sense room air temperature. There is no option for use with remote control. All operating status and information is displayed on the wired controller. The Medium Static Ducted unit does not have a display.

### Component Overview



Medium Static Ducted units are controlled by a wired controller only.



#### 1 Evaporator Coil

#### 2 Blower Assembly

The indoor unit features a DC variable speed dual shaft blower motor that will change speed to match the capacity demand from the outdoor unit. The motor is a dual shaft type that powers two individual blower assemblies.

The blower assembly consists of 2 plastic blowers. A set screw holds each blower wheel to the blower motor. The indoor blower motor is connected to the indoor unit control board. The wiring from the motor to indoor board consists of 5 wires connected to pins that deliver line voltage, speed, and feedback information. During normal operation, the indoor control board will energize the indoor blower motor and request proper speed. Fan power should be set using the DIP Switches SW1 settings.

#### 3 Terminal Block

Power to operate the indoor unit comes from the electrical line voltage terminal block at the outdoor unit. The wiring includes 4 wires, 1, 2, 3 and ground. Wires 1 and 3 complete the data path. These wires should always be 14 gauge AWG Stranded type wire. Splices in wires 1 or 3 may cause communication errors.

#### 4 Control Board

Located under the electrical control box cover.

#### 5 Ambient Temperature Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## COMPONENTS

### 6 Piping Temperature Sensor

The Piping Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 7 Condensate Pump

The Medium Static Ducted unit has a built in condensate pump. The pump is connected to the circuit board. The pump is energized whenever the Float Switch indicates that water needs to be pumped from the cassette. The float switch connects onto the circuit board.

The float switch and pump are located behind the removable insulated cover next to the electrical control box. The pump is hermetically sealed and requires no maintenance. The float switch is a normally closed switch, that opens as water rises. The float switch requires no maintenance.

1. If in **COOL** or **DRY** mode: compressor running (Thermal **ON**), then condensate pump is energized.
  - When compressor stops (Thermal **OFF**), condensate pump runs for 5 additional minutes.
2. If in **COOL** or **DRY** modes and compressor is running (Thermal **ON**) and the float switch opens for 5 minutes.
  - Compressor will stop, the pump will continue to run
  - If the float switch does not close, error code will display and pump continues to run
  - If the float switch does close, the pump will continue to run for 5 additional minutes.
3. During standby (Thermal **OFF**) in **COOL/DRY** modes or in **HEAT** and **FAN** modes and float switch opens for 2 seconds, the condensate pump is energized.
  - If the float switch closes, the pump will run for an additional 5 minutes
  - If the float does not close, the pump continues to run and error code is displayed.

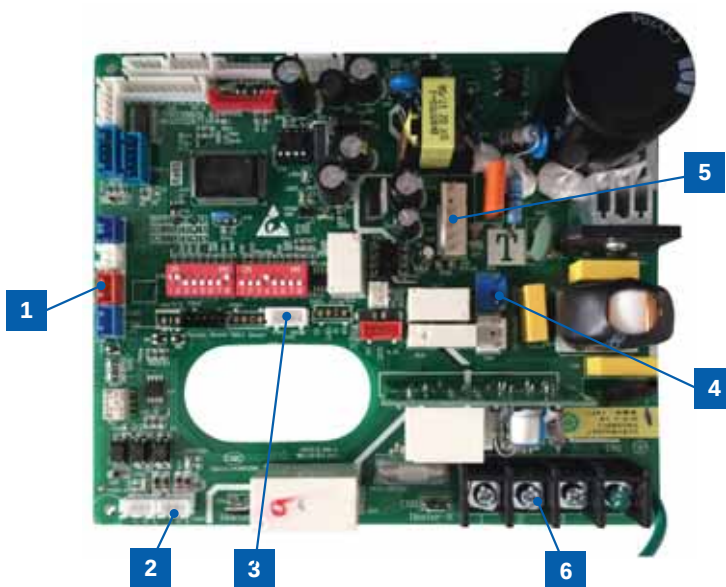
### 8 Gravity Drain Ports

The indoor unit has the option for either gravity drain systems or the use of an internal condensate pump with float switch. The pump is capable of minimal lift. If high lift is required, the water from the Medium Static Ducted unit should be pumped to a field supplied condensate pump that is capable of high lift.

### Indoor Unit Circuit Board

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

- 1 CN13 Float switch
- 2 CN22 Wired controller
- 3 CN41 Ambient and Coil sensors
- 4 CN4 Condensate pump
- 5 CN6 Blower motor
- 6 Terminal Block



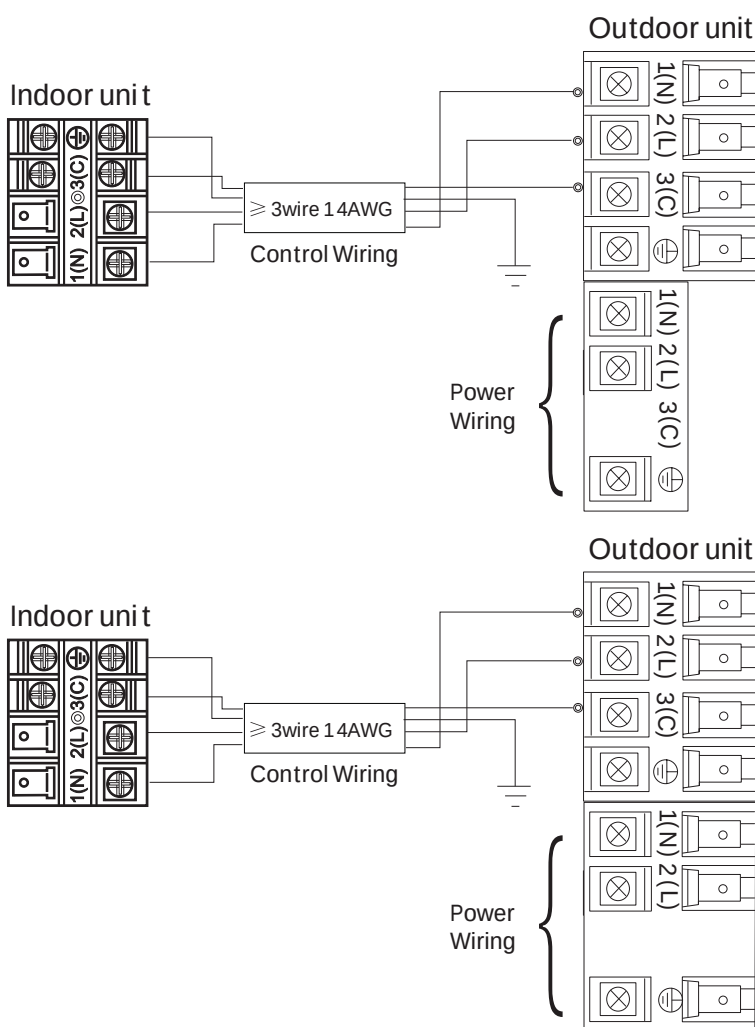
# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## COMPONENTS

The Indoor Unit Circuit Board communicates with the outdoor unit ECU via a connection at Terminal Block screw 3. The data pulse that sends the communication information can be measured with a voltmeter placed to DCV range. From the ground connection at the Terminal Block to the Number 3 screw connection, the voltage should pulse up and down when data is being transmitted.

Line voltage to power the indoor unit comes in on Terminal Block connections 1 and 2. Power connects from these terminal connections to CH- 1 and CH-2 on the circuit board. If the board does not respond to commands and has no display, check for line voltage at these connections. When power is present at the indoor board, the wired controller will be energized. The connections on the indoor board are shown here in the schematic drawing.

This control board has control over the fan louver movement, manual fan blower control, indoor coil temperature and



indoor air temperature sensing functions. All operational decisions are controlled by the OUTDOOR UNIT ECU.

The control board has a replaceable 5A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit temperature sensors are connected at Plug CN-13. When testing the calibration of these sensors, the wires can be released from the plug by pressing on the tension tab on the side of the plug.

There 3 motors that control the directional movement of the accessory louver. The motor connects to the circuit board at Plug CN-14, CN-15 and CN-16. The motors are located in the louver assembly.

The blower motor is connected to the circuit board at plug CN-6.

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

## TESTING

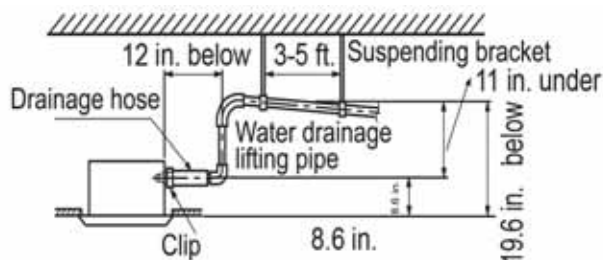
### Test Condensate Pump and Float Switch

The unit has a built-in condensate pump and water level safety switch. There are also two optional ports for gravity drainage. The condensate pump is rated to lift water up to 27  $\frac{1}{16}$ " from the point of discharge.

The unit comes with a grey connection hose with clamp. This hose is connected to the High ESP Duct unit condensate discharge hose port. The other end of the hose is sized to accept  $\frac{3}{4}$  inch PVC piping.

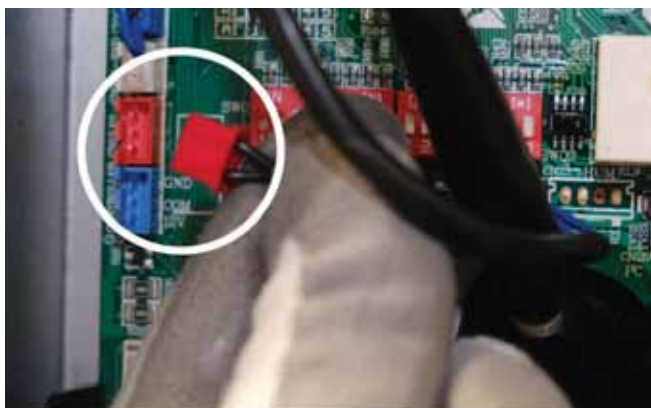


Recommended condensate piping configurations are shown here:



If the internal condensate pump does not operate, the pump may be bad or the float switch may be defective. Perform the following test:

1. Access the electrical control box.
2. Unplug the float switch from the circuit board.



3. The pump should start.
4. If the pump does not start, check for voltage at the pump control board connection. There should be 230 Volts AC to the pump. If there is not, the circuit board is defective. If there is proper voltage to the pump, either the pump or associated pump wiring is defective.



### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.



2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.
3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

# MEDIUM STATIC DUCTED (PRO SERIES) TECHNICAL OVERVIEW

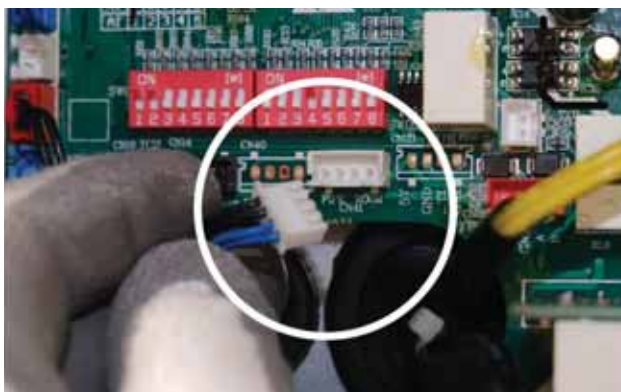
## TESTING

### Testing Temperature Sensors

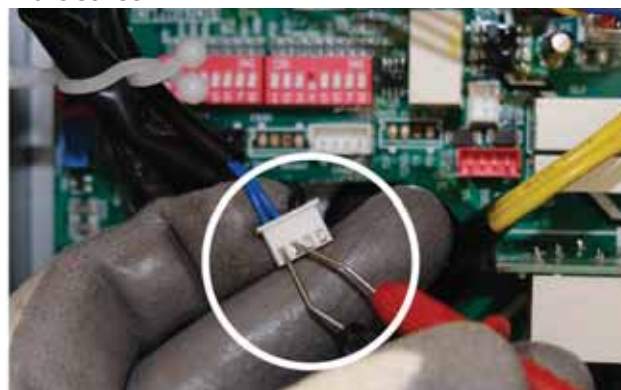
The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plugs tension tab.



3. Use an ohmmeter to test the electrical resistance of the sensor.



4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (refer to charts in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)

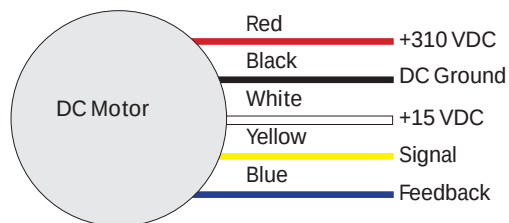
### Indoor Fan Motor Voltage Check

#### If The Indoor Fan Motor Does Not Run:

1. Remove the front cover and access the fan motor circuit board connection.
2. Reset power and turn the remote control fan command to Fan On mode.

#### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.



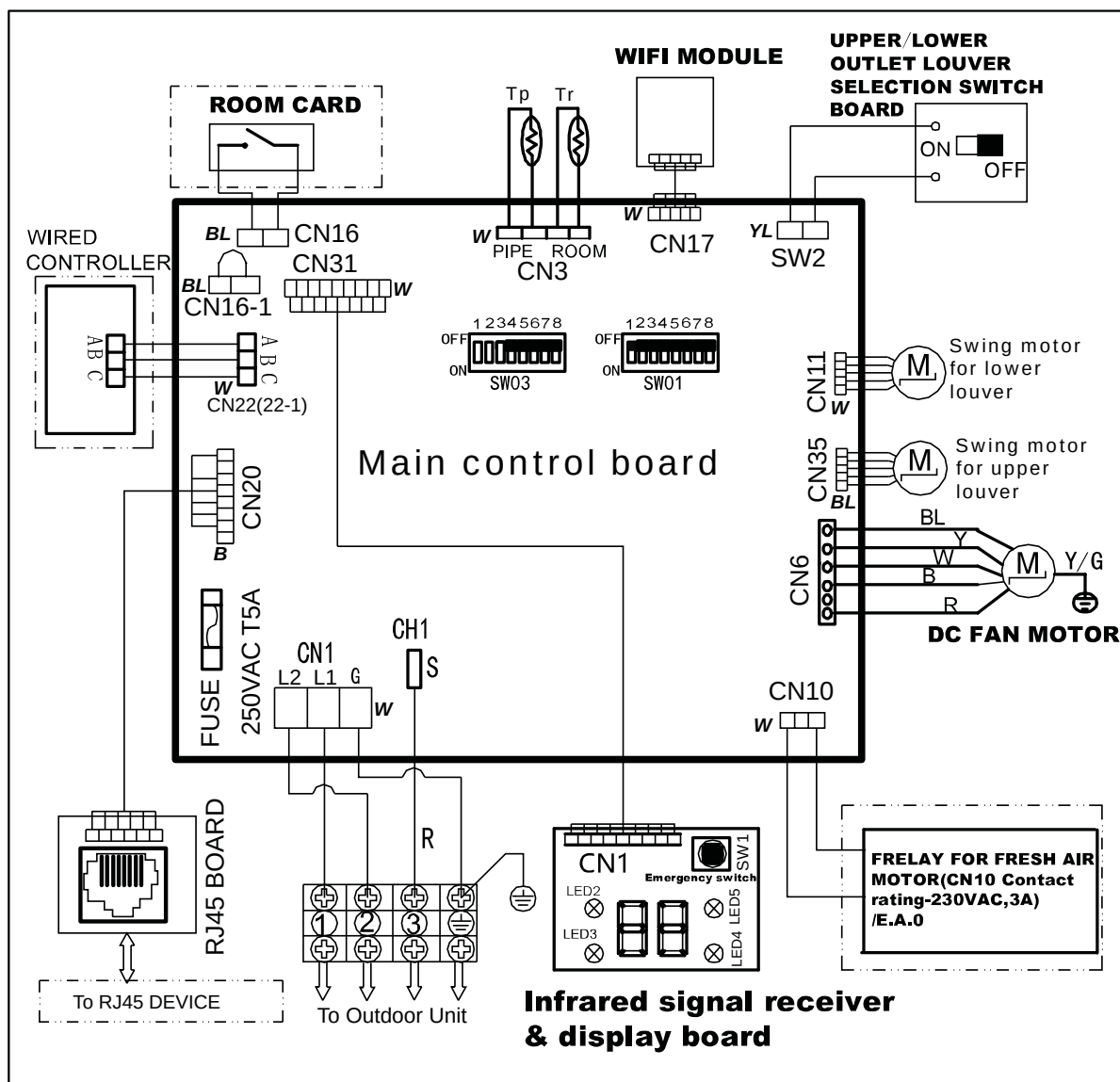
## CONSOLE TECHNICAL OVERVIEW



**USYF09UCDWA**  
**USYF12UCDWA**  
**USYF18UCDWA**

# CONSOLE TECHNICAL OVERVIEW

## WIRING DIAGRAM / DIP SWITCH SETTINGS



DIP switches factory default setting

| SW3-1 | SW3-2 | SW3-3 | SW3-4 | SW3-5 | SW3-6 | SW3-7 | SW3-8 | All Console Default |
|-------|-------|-------|-------|-------|-------|-------|-------|---------------------|
| OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   |                     |
| SW1-1 | SW1-2 | SW1-3 | SW1-4 | SW1-5 | SW1-6 | SW1-7 | SW1-8 | MODEL               |
| OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | USYF09UCDWA1        |
| ON    | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | USYF12UCDWA1        |
| OFF   | ON    | OFF   | OFF   | OFF   | OFF   | OFF   | OFF   | USYF18UCDWA1        |

### NOTES:

1. Dashed parts are optional.
2. Please refer to the technical service manual for detailed explanations of DIP switches.
3. Do not change the DIP switches setting without technical support.
4. Abbreviations: R-red, B-black, BL-blue, W-white, Y/G-yellow/green, TEMP-temperature, E.A.O.-external alarm output, Tr-indoor unit room temperature sensor, Tp-indoor unit pipe temperature sensor (coil temperature sensor).

# CONSOLE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor Display | Outdoor LED | Diagnosis                                                 |
|----------------|-------------|-----------------------------------------------------------|
| F12            | 1           | Outdoor EEPROM failure                                    |
| F1             | 2           | IPM overcurrent or short circuit                          |
| F22            | /           | Outdoor alternating current, over current protection      |
| F3             | 4           | Communication failure between the IPM and outdoor PCB     |
| F20*           | 5           | Module operated overload (compressor overload protection) |
| F19*           | 6           | Module low or high voltage                                |
| F27            | /           | Compressor current sampling circuit fault                 |
| F4             | 8           | Overheat protection for discharge temperature             |
| F8*            | 9           | Malfunction of the DC fan motor                           |
| F21            | 10          | Malfunction of defrost temperature sensor                 |
| F7             | 11          | Suction temperature sensor failure                        |
| F6             | 12          | Ambient temperature sensor failure                        |
| F25            | 13          | Discharge temperature sensor failure                      |
| F30*           | /           | High outdoor suction temperature                          |
| E7             | 15          | Communication failure between the indoor & outdoor unit   |
| F13*           | 16          | Lack of refrigerant or discharging                        |
| F14*           | 17          | 4-way valve switching failure                             |
| F11            | 18          | Loss of synchronism detection                             |
| F28            | /           | Position detection circuit fault of compressor            |
| F15*           | /           | Terminal block temp too high                              |
| F5*            | 23          | Module thermal overload                                   |
| F2*            | 24          | Compressor start failure, over-current                    |
| F23            | 25          | Phase current protection (IPM)                            |
| F9             | 26          | MCU reset                                                 |
| F24            | 27          | Module current detect circuit malfunction                 |
| F10            | 28          | Liquid pipe sensor failure: Circuit A                     |
| F16            | 29          | Liquid pipe sensor failure: Circuit B                     |
| F17            | 30          | Liquid pipe sensor failure: Circuit C                     |
| F18            | 31          | Liquid pipe sensor failure: Circuit D                     |

\* Hidden indoor error code. LED1 will flash outdoors, but no error will appear on indoor unit display. To view error code on indoor display, press and hold the Emergency button for 15 seconds.

# CONSOLE TECHNICAL OVERVIEW

## ERROR CODES

The error codes that are displayed on the indoor units may vary from the outdoor unit codes. The information communicated by the error code will be the SAME for both indoor and outdoor units even though the numbers may differ.

| Indoor Display | Outdoor LED | Diagnosis                                                                                             |
|----------------|-------------|-------------------------------------------------------------------------------------------------------|
| F29            | 32          | Gas pipe sensor failure: Circuit A                                                                    |
| F30            | 33          | Gas pipe sensor failure: Circuit B                                                                    |
| F31            | 34          | Gas pipe sensor failure: Circuit C                                                                    |
| F32            | 35          | Gas pipe sensor failure: Circuit D                                                                    |
| F26            | 36          | Gas pipe sensor failure: Circuit E                                                                    |
| F34            | /           | Outdoor pipe temperature protection in cooling mode                                                   |
| F35            | 38          | Malfunction of module temperature sensor momentary power failure detection                            |
| F36            | 39          | Malfunction of condensing temperature sensor                                                          |
| F33            | 40          | Liquid pipe sensor failure: Circuit E                                                                 |
| F38            | 41          | Toci temperature sensor failure                                                                       |
| F39            | 42          | High Pressure switch open                                                                             |
| F40            | 43          | Low Pressure switch open                                                                              |
| F41            | 44          | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor |
| F42            | 45          | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor |
| F43            | /           | Incorrect match between indoor & outdoor                                                              |
| E1             | /           | Indoor ambient temperature sensor failure                                                             |
| E2             | /           | Indoor coil temperature sensor failure                                                                |
| E4             | /           | Indoor PCB EEPROM failure                                                                             |
| E8             | /           | Communication fault between the controller and Indoor unit                                            |
| E12            | /           | Drain system malfunction                                                                              |
| E13 / C1       | /           | Zero cross signal detected wrong                                                                      |
| E14            | /           | Indoor fan motor malfunction                                                                          |

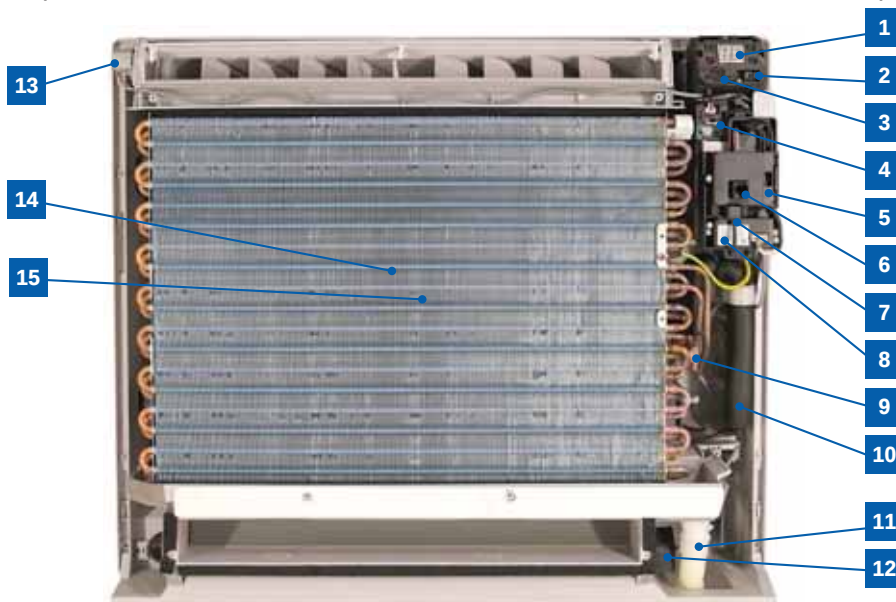
\* Hidden indoor error code. LED1 will flash outdoors, but no error will appear on indoor unit display. To view error code on indoor display, press and hold the Emergency button for 15 seconds.

# CONSOLE TECHNICAL OVERVIEW

## COMPONENTS

The indoor console unit functions as an evaporator coil during cooling mode, and as a condensing coil during heat mode. Condensate is collected by a drain pan below the coil and condensate is drained directly to the outdoor or to a secondary condensate pump via the provided condensate drain line.

Console units may be operated with either a wired remote control or the wireless remote control provided with the unit.



### 1 Display

The indoor unit display communicates system mode, but does not display temperatures or diagnostic codes. This information is indicated on the wired or wireless control.

When servicing a diagnostic error always refer to the outdoor unit code.

### 2 IR Receiver

### 3 Power Switch

### 4 Lower Damper Control

### 5 Control Board Box

### 6 Diagnostic Port

### 7 Ambient Sensor

The Ambient Temperature Sensor senses room temperature. This sensor provides room temperature information to the ECU for calculation of inverter capacity and temperature control.

### 8 WiFi Module

### 9 Coil Sensor

The Coil Temperature Sensor senses indoor coil temperature in the cooling mode and in the heating mode. This sensor is used for Anti Freezing and Anti Cold Blow cycles. The sensor also provides critical temperature information to the ECU that may be used in frequency adjustments.

### 10 Flare Connections

### 11 Condensate Drain

### 12 Lower Damper Motor

### 13 Upper Louver Motor

The louver motor is a stepper type motor that moves the louver left/right. The motor is controlled by a pulsed voltage that cannot be measured. If the louver does not move when it should, check for a bind in the louvers.

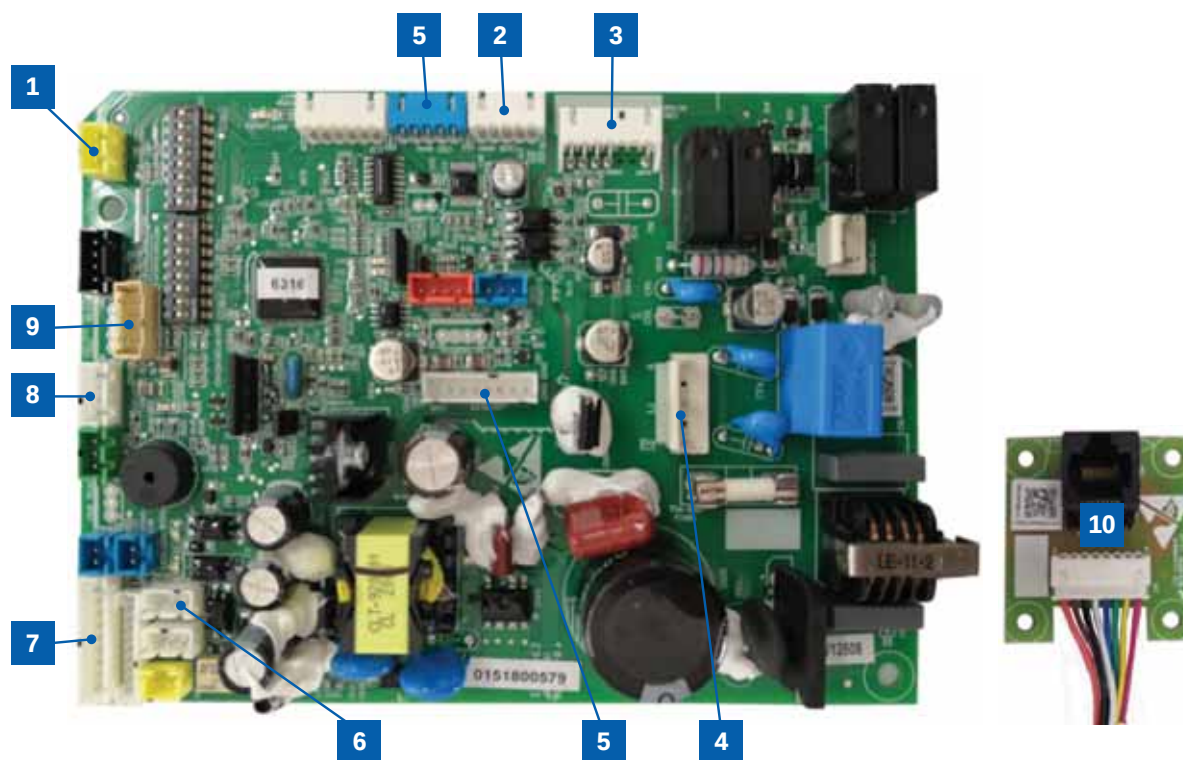
### 14 Blower Fan (behind coil)

### 15 Blower Motor (behind coil)

The indoor unit features a multi-speed blower motor that will change speed to match the capacity demand from the outdoor unit. The blower motor is controlled by both the remote control and by commands from the outdoor unit ECU

# CONSOLE TECHNICAL OVERVIEW

## COMPONENTS



- |          |                                 |           |                                                                 |
|----------|---------------------------------|-----------|-----------------------------------------------------------------|
| <b>1</b> | SW2-Damper switch               | <b>7</b>  | CN31- Display                                                   |
| <b>2</b> | CN35- Lower damper motor        | <b>8</b>  | CN3-Temperature sensor socket (Tr: ROOM SENSOR, Tp:PIPE SENSOR) |
| <b>3</b> | CN6-DC fan motor                | <b>9</b>  | CN17-WiFi module                                                |
| <b>4</b> | Power supply                    | <b>10</b> | RJ45 adapter board                                              |
| <b>5</b> | CN20-Diagnostic port            |           |                                                                 |
| <b>6</b> | CN22- Optional wired controller |           |                                                                 |

The indoor unit circuit board controls the switching functions of the indoor unit. All control decisions are made by the outdoor unit ECU. The indoor board has some limited diagnostic capability which will be covered in this manual.

The indoor unit Circuit Board communicates with the outdoor unit ECU via a connection at terminal block screw 3. The data pulse that sends the communication information can be measured with a voltmeter set to DC voltage range. From the ground connection at the terminal block to the number 3 screw, voltage should pulse up and down when data is transmitted.

Line voltage to power the indoor unit is made on terminal block connections 1 and 2. Power connects from these terminal connections to CH-3 and CH-4 on the circuit board. If the board does not respond to command and has no display, check for line voltage at these connections. When power is present at the indoor board, the Display Power Indicator will be lit. The control board has a replaceable 3.15A 250V fuse that protects against excessive current. If power is present at the board but the board does not work, check for continuity through the fuse. Replace if the fuse is open.

The indoor unit sensors are connected at plug CN-13. When testing the calibration of these sensors the wires can be released from the plug by pressing the tension tab on the side of the plug.

The receiver/display unit, mounted on the front cover of the indoor unit plugs connects to the circuit board at location CN-29.

The blower/fan motor connection is located at plug CN-11.

# CONSOLE TECHNICAL OVERVIEW

## TESTING

### Removing the Filter Cover & Filter

1. Slide the side latches up to unlock the cover and pull forward about an inch then lift up.



2. The filter is very flexible and can be grabbed at any location and removed.

### Front Cover Removal

1. Remove the 4 screws that are at the corners of the air intake opening. Gently open the horizontal louver. Lift up the top edge of the front cover and then pull forward.



### Control Box Removal

1. Remove the screw from the right side of the box cover.



2. Lift up the panel that contains the diagnostic port, wifi module and ambient sensor. And remove the box cover.

3. Unplug the three connectors for the fan motor, upper louver and bottom damper.



4. Remove the ground screw.



5. Remove the mounting screw for the box.



6. The box can now be removed.

### Board Replacement

1. Follow the instructions for removing the control box.
2. Remove the cover screw from the bottom of the box, then remove cover.



# CONSOLE TECHNICAL OVERVIEW

## TESTING

3. Take note of connection location and carefully remove each connector.
4. Remove the 2 screws mounting the board in the box. They in diagonal corners from each other.



## Upper Louver Removal

1. Remove the filter cover and front cover.
2. Locate and remove the two screws mounting the upper louver assembly to the case. They are on either end of the assembly.

## Lower Damper Assembly Removal

1. Remove the filter cover and front cover.
2. Disconnect the condensate drain.
3. Locate and remove the two screws mounting the damper assembly to the case.
4. Pull on the right end of the assembly and rotate the bottom of the assembly outward.

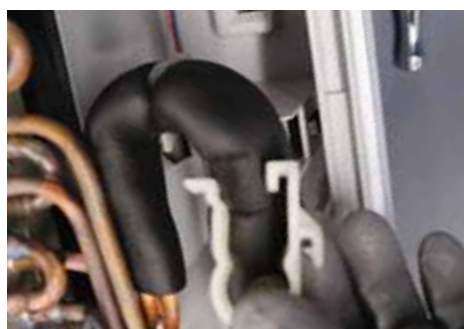
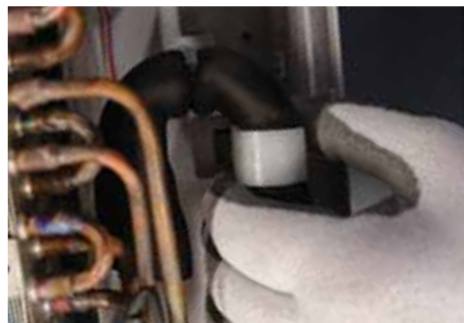


**Note:** When re-installing the damper assembly, first place the front edge of the condensate drain pan into place then rotate the bottom of the assembly into position.



## Replace Fan Motor

1. Remove filter cover, front panel, control box, upper louver and bottom damper.
2. Remove the white plastic strap that hold the line set in place on the right side of the unit.



3. Locate the locking tabs on the left side of the evaporator and press them inward and pull the coil forward to remove.



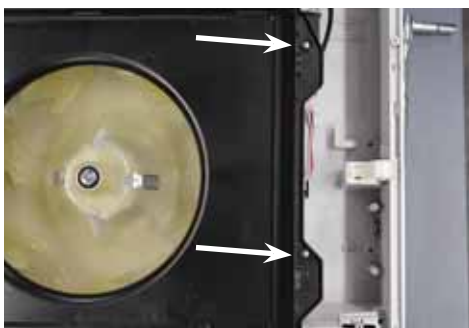
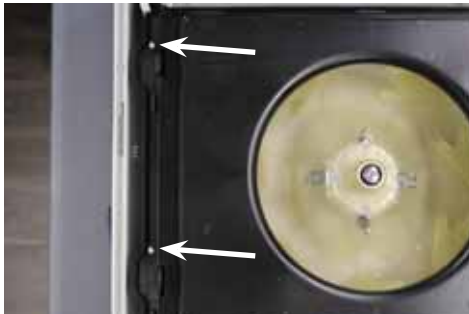
**IMPORTANT:** Great care should be taken to when performing this step. Excessively moving the lineset that connects to the flare can cause a refrigerant leak.

4. Slide the coil to the right to. The coil can now be gently pulled away from the case. Only move the coil far enough to access the four screws holding on the fan inlet faring.

# CONSOLE TECHNICAL OVERVIEW

## TESTING

5. Remove the four screws holding on the fan inlet faring.



6. Remove the wire cover from the back of the case.



7. Remove the motor bracket.



**NOTE:** when replacing the motor, the wires must exit from the bottom of the motor to prevent water from entering the motor.

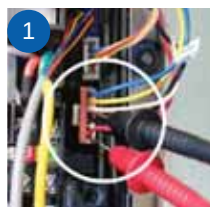
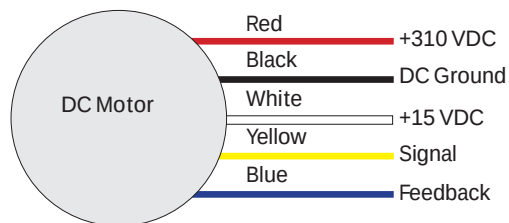
## Indoor Fan Motor Test Procedure

### If the indoor fan motor does not run:

1. Disconnect power to the system.
2. Remove the return air cover and access the fan motor circuit board connection.
3. Reset power and turn the remote control fan command to Fan On mode.

### Motor Test:

1. If the motor doesn't run, check for 310VDC between Pins 1 and 3. If it is not present, the indoor board is bad. If voltage is present, continue on.
2. Check the voltage between Pins 3 and 4. The voltage should be +15VDC. If it is not present, the board is bad. If voltage is present, continue on.
3. Check for voltage between Pins 3 and 6. If no DC voltage is present, the board is bad. If voltage is present, change the motor.



## TESTING

### Testing Temperature Sensors

The easiest problems to solve will involve codes that are related to potential failure of temperature sensors. Common problems may include loose connections, open electrically, and out of calibration. Checking the condition of the sensors requires a temperature probe and an ohmmeter.

The Reference Section of this manual contains temperature resistance tables that can be used to check the calibration of the sensors. The measured resistance must be within the tolerances printed on the top of the tables.

**To test the electrical condition of a temperature sensor perform the following:**

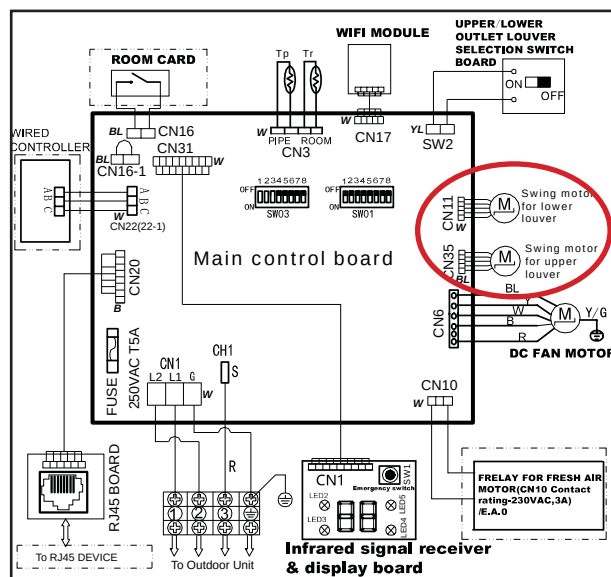
1. Confirm the sensor is firmly attached to the circuit board connection plug.
2. Remove the sensor wires from the connection plug by releasing holding tension on the plug's tension tab.
3. Use an ohmmeter to test the electrical resistance of the sensor.
4. Measure the air temperature near the sensor and compare the required resistance against measured resistance. (See chart in reference section) If the sensor is within calibration, the sensor is good. If the sensor is out of calibration, replace the sensor. (Tube Sensors should be removed from socket and exposed to air temperature during test.)



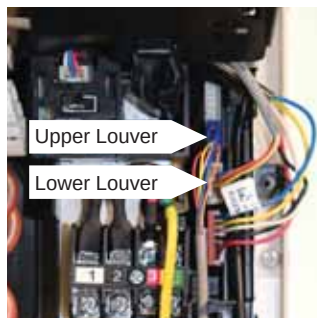
### Testing Louver Motors

If the louver does not operate with command from the remote control, either the indoor board is bad, or the louver motor is defective. It is more likely the motor is defective than the board. (Make sure the louver assembly is not binding and keeping the vanes from moving.)

1. Remove power from the unit and remove the indoor unit cover.
2. Access the circuit board.
3. Identify the inoperable louver motor on the schematic drawing below and disconnect the plug from the circuit board.



4. Use an Ohmmeter to test the electrical continuity of the louver motor windings. The proper resistance for each winding should be  $292\Omega$  from red wire (common) to any other wire.. If the motor winding resistance is erratic or shows open, the motor is defective. Replace the motor.



5. If the motor checks out good, replace the indoor control board.

# CONSOLE TECHNICAL OVERVIEW

## TESTING

### Testing Communication Circuit

If an Error E7 occurs, perform the following test to determine if the indoor control board is functioning properly to send data to the outdoor unit.

Perform this test with the unit powered and all wiring connected between indoor and outdoor unit.

Make sure all wiring between the indoor and outdoor unit are correct. There should no splices between the indoor and outdoor unit wiring connecting terminals 1 or 3. Make sure wiring is correct, before performing this test.

1. Measure the DC voltage between terminals 1 and 3 on the indoor terminal block.
2. The voltage should fluctuate between 8VDC and 23VDC. The fluctuating signal indicates a good communication path.



3. If the voltage does not fluctuate, and the wiring is good, the indoor board is defective.

### Replacing WiFi Module

1. Unplug existing WiFi module.
2. Insert new WiFi module.
3. Replace the wifi passcode sticker.
4. Pair the unit to account.

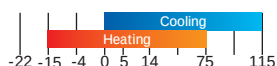
# SPECIFICATIONS

## OUTDOOR UNITS

Compressor Type:  
DC Inverter Driven Rotary

Voltage/Cycle/Phase:  
208-230/60/1

Operating Range (°F):



2 Zones



3 Zones



4 Zones



|                           |                                                            | 2U20EH2VHA                | 3U24EH2VHA                | 4U36EH2VHA                |
|---------------------------|------------------------------------------------------------|---------------------------|---------------------------|---------------------------|
| <b>Cooling Non-Ducted</b> | Rated Capacity Btu/hr                                      | 18,100                    | 22,000                    | 34,000                    |
|                           | Capacity Range Btu/hr                                      | 7000-20000                | 6000-23600                | 6000-38000                |
|                           | Rated Power Input W                                        | 1448                      | 1760                      | 2,740                     |
|                           | SEER/ EER                                                  | 17/12.5                   | 18.5/12.5                 | 20 /12.5                  |
| <b>Cooling Ducted</b>     | Rated Capacity Btu/hr                                      | 18,100                    | 21,000                    | 34,400                    |
|                           | Capacity Range Btu/hr                                      | 6000-19000                | 6000-22300                | 6000-37000                |
|                           | Rated Power Input W                                        | 1724                      | 2000                      | 2,740                     |
|                           | SEER/EER                                                   | 15/10.5                   | 15/10.5                   | 17.00 /10.00              |
| <b>Heating Non-Ducted</b> | Rated Heating Capacity 47°F Btu/hr                         | 20,000                    | 24,000                    | 36,000                    |
|                           | Heating Capacity Range Btu/hr                              | 8000-23000                | 8000-30600                | 8000-39000                |
|                           | Rated Power Input W                                        | 1504                      | 1572                      | 2,710                     |
|                           | HSPF                                                       | 10.5                      | 10.5                      | 10.5                      |
|                           | COP @ 5°F                                                  | 2.0                       | 2.0                       | 2.0                       |
|                           | Max. Heating Capacity 5°F Btu/hr                           | 23000                     | 24000                     | 36,000                    |
|                           | Max. Heating Capacity -15°F Btu/hr                         | 17000                     | 18000                     | 25,000                    |
| <b>Heating Ducted</b>     | Rated Heating Capacity 47°F Btu/hr                         | 20,000                    | 22,000                    | 35,000                    |
|                           | Heating Capacity Range Btu/hr                              | 8000-21000                | 8000-28600                | 8000-39000                |
|                           | Rated Power Input W                                        | 2255                      | 2230                      | 2710                      |
|                           | COP/ COP @ 5°F                                             | 2.94/1.9                  | 3/1.9                     | 2.64/1.9                  |
|                           | HSPF                                                       | 9.6                       | 9.3                       | 10.5                      |
|                           | Max. Heating Capacity 5°F Btu/hr                           | 19000                     | 20000                     | 35,000                    |
|                           | Max. Heating Capacity -15°F Btu/hr                         | 15000                     | 16000                     | 25,200                    |
| <b>Power Supply</b>       | Voltage, Cycle, Phase V/Hz/-                               | 208-230/60/1              | 208-230/60/1              | 208-230/60/1              |
|                           | Wire Size between ID and OD                                | 14/4 AWG Stranded         | 14/4 AWG Stranded         | 14/4 AWG Stranded         |
|                           | Compressor Type                                            | DC Inverter Driven Rotary | DC Inverter Driven Rotary | DC Inverter Driven Rotary |
|                           | Maximum Fuse Size A                                        | 25                        | 25                        | 40                        |
|                           | Minimum Circuit Amp A                                      | 15                        | 16                        | 30                        |
| <b>Outdoor Unit</b>       | Outdoor Fan Speed RPM                                      | 300-900                   | 300-900                   | 300-900                   |
|                           | Outdoor Noise Level dB                                     | 56                        | 56                        | 55                        |
|                           | Dimension: Height in (mm)                                  | 33.1(840)                 | 33.1(840)                 | 38.0 (965)                |
|                           | Dimension: Width in (mm)                                   | 37.3(948)                 | 37.3(948)                 | 37.4(950)                 |
|                           | Dimension: Depth in (mm)                                   | 13.4(340)                 | 13.4(340)                 | 14.6(370)                 |
|                           | Weight (Ship/Net)- lbs (kg)                                | 202.3/185.6 (91.7/84.2)   | 205.9/189.5 (93.4/85.9)   | 241/221 (109.7/100.6)     |
|                           | Connectable Indoor unit quantity                           | 2                         | 2 or 3                    | 2 3 or 4                  |
| <b>Refrigerant Lines</b>  | Connections                                                | Flare                     | Flare                     | Flare                     |
|                           | Liquid O.D. in                                             | 1/4 1/4                   | 1/4 1/4 1/4               | 1/4 1/4 1/4               |
|                           | Suction O.D. in                                            | 3/8 3/8                   | 3/8 3/8 1/2               | 3/8 3/8 3/8 1/2           |
|                           | Factory Charge Oz                                          | 99                        | 99                        | 113                       |
|                           | Maximum Line Length Ft / m                                 | 164/50                    | 196/60                    | 230/70                    |
|                           | Maximum Height Ft / m                                      | 50/15                     | 50/15                     | 50/15                     |
|                           | Maximum Line Length for each individual indoor unit Ft / m | 82/25                     | 82/25                     | 82/25                     |

# SPECIFICATIONS

## HIGHWALL INDOOR

|                                     |  |  |  |  |
|-------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                     | AW07EH2VHA                                                                        | AW09EH2VHA                                                                        | AW12EH2VHA                                                                         | AW18EH2VHA                                                                          |
| Rated Cooling Capacity Btu/hr       | 7,000                                                                             | 9,000                                                                             | 12,000                                                                             | 19,000                                                                              |
| Rated Heating Capacity Btu/hr       | 10,000                                                                            | 12,000                                                                            | 16,500                                                                             | 20,400                                                                              |
| Voltage, Cycle, Phase V/Hz/-        | 208-230/60/1                                                                      | 208-230/60/1                                                                      | 208-230/60/1                                                                       | 208-230/60/1                                                                        |
| Airflow CFM (Turbo/H/M/L/Quiet)     | 420/360/300/240/180                                                               | 470/410/350/290/230                                                               | 440/410/380/311/260                                                                | 710/650/560/440/410                                                                 |
| Indoor Sound dB (Turbo/H/M/L/Quiet) | 42/39/37/28/23                                                                    | 42/39/37/28/23                                                                    | 42/39/37/28/23                                                                     | 49/47/42/36/34                                                                      |
| Dimension: H x W x D in (mm)        | 12 1/4 x 35 3/8 x 8 1/4 (310 x 900 x 210)                                         | 12 1/4 x 35 3/8 x 8 1/4 (310 x 900 x 210)                                         | 12 1/4 x 35 3/8 x 8 1/4 (310 x 900 x 210)                                          | 14 3/8 x 43 7/8 x 9 5/8 (336 x 1115 x 243)                                          |
| Weight (Ship/Net)- lbs (kg)         | 30.9/25.3 (14/11.5)                                                               | 30.9/25.3 (14/11.5)                                                               | 30.9/25.3 (14/11.5)                                                                | 45.4/37.5 (20.6/17)                                                                 |
| Liquid /Suction O.D. in             | 1/4 3/8                                                                           | 1/4 3/8                                                                           | 1/4 3/8                                                                            | 1/4 1/2                                                                             |

|                                     |  |  |  |  |  |
|-------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                     | AW07LC2VH(-)                                                                      | AW09LC2VH(-)                                                                      | AW12LC2VH(-)                                                                       | AW18LC2VH(-)                                                                        | AW24LP2VH(-)                                                                        |
| Rated Cooling Capacity Btu/hr       | 7,000                                                                             | 9,000                                                                             | 12,000                                                                             | 18,000                                                                              | 22,000                                                                              |
| Rated Heating Capacity Btu/hr       | 8,000                                                                             | 10,000                                                                            | 13,000                                                                             | 19,000                                                                              | 24,000                                                                              |
| Voltage, Cycle, Phase V/Hz/-        | 208-230/60/1                                                                      | 208-230/60/1                                                                      | 208-230/60/1                                                                       | 208-230/60/1                                                                        | 208-230/60/1                                                                        |
| Airflow CFM (Turbo/H/M/L/Quiet)     | 410/350/295/235/205                                                               | 410/350/295/235/205                                                               | 440/380/320/265/215                                                                | 636/530/483/430/383                                                                 | 710/650/560/440/410                                                                 |
| Indoor Sound dB (Turbo/H/M/L/Quiet) | 43/38/33/26/22                                                                    | 43/38/33/26/22                                                                    | 44/39/34/27/23                                                                     | 48/45/40/35/30                                                                      | 49/47/42/36/34                                                                      |
| Dimension: H x W x D in (mm)        | 11 x 33 5/8 x 8 1/16 (280 x 855 x 204)                                            | 11 x 33 5/8 x 8 1/16 (280 x 855 x 204)                                            | 11 x 33 5/8 x 8 1/16 (280 x 855 x 204)                                             | 12 3/4 x 39 1/4 x 9 1/4 (332 x 997 x 235)                                           | 13 1/4 x 43 7/8 x 9 9/16 (336 x 1115 x 243)                                         |
| Weight (Ship/Net)- lbs (kg)         | 26.8/22 (12.2/10)                                                                 | 26.8/22 (12.2/10)                                                                 | 26.8/22 (12.2/10)                                                                  | 35.3/28.6 (16/13)                                                                   | 45.4/37.5 (20.6/17)                                                                 |
| Liquid /Suction O.D. in             | 1/4 3/8                                                                           | 1/4 3/8                                                                           | 1/4 3/8                                                                            | 1/4 1/2                                                                             | 3/8 5/8                                                                             |

## DUCTED INDOOR

|                                       |  |  |  |  |  |
|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                       | AD07SL2VH(-)                                                                        | AD09SL2VH(-)                                                                        | AD12SL2VH(-)                                                                         | AD18SL2VH(-)                                                                          | AM24LP2VH(-)                                                                          |
| Rated Cooling Capacity Btu/hr         | 7,000                                                                               | 9,000                                                                               | 12,000                                                                               | 18,000                                                                                | 24000                                                                                 |
| Rated Heating Capacity Btu/hr         | 8,000                                                                               | 10,000                                                                              | 13,000                                                                               | 19,000                                                                                | 27000                                                                                 |
| Voltage, Cycle, Phase V/Hz/-          | 208-230/60/1                                                                        | 208-230/60/1                                                                        | 208-230/60/1                                                                         | 208-230/60/1                                                                          | 208-230/60/1                                                                          |
| Airflow CFM (Turbo/H/M/L/Quiet)       | 353/312/270/230/188                                                                 | 353/312/270/230/188                                                                 | 400/353/282/247/218                                                                  | 540/500/447/365/306                                                                   | 845/670/530/470                                                                       |
| Max. Ext. Static Pressure in.W.G (Pa) | 0.16 (40)                                                                           | 0.16 (40)                                                                           | 0.16 (40)                                                                            | 0.16 (40)                                                                             | 0.6 (150)                                                                             |
| Indoor Sound dB (Turbo/H/M/L/Quiet)   | 35/33/29/26/21                                                                      | 35/33/29/26/22                                                                      | 38/35/29/26/23                                                                       | 31/29/23/29/25                                                                        | 38/35/32/29                                                                           |
| Dimension: HxWxD in (mm)              | 7 5/16 x 33 7/16 x 16 9/16 (185x850x420)                                            | 7 5/16 x 33 7/16 x 16 9/16 (185x850x420)                                            | 7 5/16 x 33 7/16 x 16 9/16 (185x850x420)                                             | 7 5/16 x 46 1/16 x 16 9/16 (185x1170x420)                                             | 9 7/8 x 37 5/8 x 25 3/4 (250x957x655)                                                 |
| Weight (Ship/Net)- lbs (kg)           | 47.2/36.8 (21.4/16.7)                                                               | 47.2/36.8 (21.4/16.7)                                                               | 47.2/36.8 (21.4/16.7)                                                                | 61.8/48.5 (28/22)                                                                     | 68.8/81.1 (31.2/36.8)                                                                 |
| Liquid / Suction O.D. in              | 1/4 3/8                                                                             | 1/4 3/8                                                                             | 1/4 3/8                                                                              | 1/4 1/2                                                                               | 3/8 5/8                                                                               |
| Drainpipe Size O.D. in                | 1 1/4                                                                               | 1 1/4                                                                               | 1 1/4                                                                                | 1 1/4                                                                                 | 1 1/4                                                                                 |
| Condensate Pump                       | Standard                                                                            | Standard                                                                            | Standard                                                                             | Standard                                                                              | Standard                                                                              |
| Max. Drain-Lift height in(mm)         | 27 9/16 (700)                                                                       | 27 9/16 (700)                                                                       | 27 9/16 (700)                                                                        | 27 9/16 (700)                                                                         | 27 9/16 (700)                                                                         |

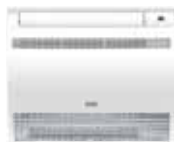
# SPECIFICATIONS

## CASSETTE INDOOR



|                                     | AB09SC2VH(-)                               | AB12SC2VH(-)                               | AB18SC2VH(-)                               | AL24LP2VH(-)                              |
|-------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|-------------------------------------------|
| Rated Cooling Capacity Btu/hr       | 9,000                                      | 12,000                                     | 18,000                                     | 24200                                     |
| Rated Heating Capacity Btu/hr       | 10,000                                     | 13,000                                     | 19,000                                     | 27300                                     |
| Voltage, Cycle, Phase V/Hz/ -       | 208-230/60/1                               | 208-230/60/1                               | 208-230/60/1                               | 208-230/60/1                              |
| Airflow CFM (Turbo/H/M/L/Quiet)     | 410/365/305/265/205                        | 410/365/305/265/205                        | 470/410/365/295/252                        | 740/630/480/400                           |
| Indoor Sound dB (Turbo/H/M/L/Quiet) | 42/40/36/32/25                             | 42/40/36/32/25                             | 45/42/40/36/32                             | 38/35/32/29                               |
| Grille Model                        | PB-700KB                                   | PB-700KB                                   | PB-700KB                                   | PB-950KB                                  |
| Chassis Dimension: HxWxD in (mm)    | 10 1/4 x 22 7/16 x 2 3/8 (260 x 570 x 570) | 10 1/4 x 22 7/16 x 2 3/8 (260 x 570 x 570) | 10 1/4 x 22 7/16 x 2 3/8 (260 x 570 x 570) | 9 5/8 x 33 1/8 x 33 1/8 (246 x 840 x 840) |
| Grille Dimension: HxWxD in (mm)     | 2 3/8 x 27 9/16 x 27 9/16 (60 x 700 x 700) | 2 3/8 x 27 9/16 x 27 9/16 (60 x 700 x 700) | 2 3/8 x 27 9/16 x 27 9/16 (60 x 700 x 700) | 2 x 3 1/8 x 3 1/8 (50 x 950 x 950)        |
| Weight (Ship/Net)- lbs (kg)         | 46.3/37.5 (21/17)                          | 46.3/37.5 (21/17)                          | 46.3/37.5 (21/17)                          | 68.4/79.4 (31/36)                         |
| Liquid / Suction O.D. in            | 1/4 3/8                                    | 1/4 3/8                                    | 1/4 1/2                                    | 3/8 5/8                                   |
| Drainpipe Size O.D. in              | 1 1/4                                      | 1 1/4                                      | 1 1/4                                      | 1                                         |
| Condensate Pump                     | Standard                                   | Standard                                   | Standard                                   | Standard                                  |
| Max. Drain-Lift height in(mm)       | 27 9/16 (700)                              | 27 9/16 (700)                              | 27 9/16 (700)                              | 47 1/4 (1200)                             |

## CONSOLE INDOOR



|                                                   | USYF09UCDWA                 | USYF12UCDWA         | USYF18UCDWA         |
|---------------------------------------------------|-----------------------------|---------------------|---------------------|
| Rated Cooling Capacity Btu/hr                     | 9,000                       | 12,000              | 15,000              |
| Rated Heating Capacity Btu/hr                     | 10,000                      | 13,000              | 18,000              |
| Voltage, Cycle, Phase V/Hz/ -                     | 208-230/60/1                | 208-230/60/1        | 208-230/60/1        |
| Airflow (Turbo/High/Med/Low/Quiet) CFM            | 264/235/205/176/147         | 294/264/205/176/147 | 341/311/282/252/223 |
| Indoor Sound Level dB (Turbo/High/Med/Low/ Quiet) | 40/32/25/20                 | 42/34/26/21         | 46/37/33/28         |
| Chassis Dimension: HxWxD in (mm)                  | 23.6/27.5/8.3 (600/700/210) |                     |                     |
| Weight (Ship/Net)- lbs (kg)                       | 36/40 (16.5/18.5)           |                     |                     |
| Liquid / Suction O.D. in                          | 1/4 3/8                     | 1/4 3/8             | 1/4 1/2             |
| Drainpipe Size O.D. in                            | 1 1/4                       | 1 1/4               | 1 1/4               |

## MID-STATIC DUCTED INDOOR



|                                                  | USYM09UCDSA                | USYM12UCDSA                | USYM18UCDSA                 | USYM24UCDSA                 |
|--------------------------------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|
| Rated Cooling Capacity Btu/hr                    | 9,000                      | 12,000                     | 18,000                      | 24000                       |
| Rated Heating Capacity Btu/hr                    | 10,000                     | 13,000                     | 19,000                      | 25000                       |
| Voltage, Cycle, Phase V/Hz/ -                    | 208-230/60/1               | 208-230/60/1               | 208-230/60/1                | 208-230/60/1                |
| Airflow (Turbo/High/Med/Low/Quiet) CFM           | 494/423/352/264            | 494/423/352/264            | 635/529/458/388             | 845/670/530/470             |
| Max. External Static Pressure in.W.G (Pa)        | 0.6 (150)                  | 0.6 (150)                  | 0.6 (150)                   | 0.6 (150)                   |
| Indoor Sound Level dB (Turbo/High/Med/Low/Quiet) | 35/32/29/26                | 35/32/29/26                | 37/34/32/29                 | 39/36/33/30                 |
| Chassis Dimension: HxWxD in (mm)                 | 27.5/27.5/9.7(700/700/248) | 27.5/27.5/9.7(700/700/248) | 43.3/27.5/9.7(1100/700/248) | 43.3/27.5/9.7(1100/700/248) |
| Weight (Ship/Net)- lbs (kg)                      | 57/66(26/30)               | 57/66(26/30)               | 70/77 (32/35)               | 70/77 (32/35)               |
| Liquid / Suction O.D. in                         | 1/4 3/8                    | 1/4 3/8                    | 1/4 1/2                     | 3/8 5/8                     |
| Drainpipe Size O.D. in                           | 1 1/4                      | 1 1/4                      | 1 1/4                       | 1 1/4                       |
| Condensate Pump                                  | Standard                   | Standard                   | Standard                    | Standard                    |
| Max. Drain-Lift height in(mm)                    | 39(1000)                   | 39(1000)                   | 39(1000)                    | 39(1000)                    |

# LIMITED WARRANTY

For the product models listed on Attachment 1 (the “Product”), this Standard Limited Warranty is provided to the Original Owner of the Product:

| For The Period Of:                                                      | Haier Will Replace:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 year limited parts warranty<br>From the date of the original purchase | This limited warranty cover all defects in workmanship or material for the mechanical and electrical parts contained in the Product (“Defective Parts”) for a period of 5 years from the Date of Purchase. Haier will provide new or refurbished parts, or a replacement for all or part of the unit, at its sole discretion, to your licensed HVAC technician installer. This warranty also covers all defects in workmanship or material for the unit controller for a period of 1 year. The remote controller is covered by 1-year accessory warranty. The ductless system is covered by standard warranty. Haier will provide a new or refurbished controller, at its sole discretion. |
| 7 year compressor warranty from the date of the original purchase       | The compressor contained in this product is warrantied for a period of 7 years from the Date of Purchase. Haier will provide a new or refurbished compressor, or a replacement for all or part of the unit, at its sole discretion, to your licensed HVAC technician installer.                                                                                                                                                                                                                                                                                                                                                                                                            |

## WHAT IS THE DATE OF PURCHASE

The “Date of Purchase” is the date that the original installation is complete and all product start-up procedures have been properly completed and verified by the installer’s invoice. If the installation date cannot be verified, then the Date of Purchase will be sixty (60) days after the manufacture date, as determined by the Product’s serial number. You should keep and be able to provide your original sales receipt from the installer as proof of the Date of Purchase. In new construction, the Date of Purchase will be the date the owner purchased the residence from the builder.

## WHO IS COVERED

Owner occupied: The “Original Owner” of this product, which means the original owner (and his or her spouse) of the residence where the Product was originally installed. Subject to the law of the state or province where the Product is installed, this warranty is not transferable to subsequent owners or if the product is moved to a different residence after the initial installation. Non-owner occupied: This limited warranty is provided for product 1) installed in a) single family or multi-family non-owner occupied residential buildings, or b) non-industrial commercial applications, (such as office buildings, retail establishments, hotels/motels) where the product is not subjected to an atmosphere with corrosives or high levels of particulates (such as soot, aerosols, fumes, grease), and 2) if the product is maintained annually by a licensed HVAC technician (proof of annual maintenance is required). The “Original Owner” of the product, means the original owner of the building where the product was originally installed. For new construction, the purchaser of the building from the builder will also be considered an original owner. This warranty is not transferable to subsequent owners or if the product is moved to a different location after the initial installation.

## HOW CAN YOU GET SERVICE

Contact your licensed HVAC technician installer. All installation and service must be performed by a licensed HVAC technician. Failure to use a licensed HVAC technician for installation of this Product voids all warranty on this Product..

## THIS WARRANTY DOES NOT COVER

- Damage from improper installation.
- Damage in shipping.
- Defects other than from manufacturing (i.e., workmanship or materials).
- Damage from misuse, abuse, accident, alteration, lack of proper care and/or regular maintenance, or incorrect electrical voltage or current.
- Damage resulting from floods, fires, wind, lightning, accidents or similar conditions.
- Damage from installation or other services performed by other than a licensed HVAC technician.
- Labor and related services for repair or installation of the Product.
- A Product purchased from an online retailer.
- Damage as a result of subjecting Product to an atmosphere with corrosives or high levels of particulates (such as soot, aerosols, fumes, grease).
- A Product sold and/or installed outside of the 50 United States, the District of Columbia, or Canada.
- Batteries for the controller and other accessories provided with the Product for installation (e.g., plastic hose).
- Normal maintenance, such as cleaning of coils, cleaning filters, and lubrication.
- For Product installed in non-owner occupied applications, Product that has not been maintained annually by a licensed HVAC technician (proof required).

Staple your receipt here. Proof of the original purchase date is needed to obtain service under the warranty.

# LIMITED WARRANTY

## 10 YEAR STANDARD REGISTERED LIMITED WARRANTY

All “Indoor and Outdoor Products,” identified in Attachment 1, registered by the installer or the Original Owner within 60 days of the Date of Purchase shall receive a Standard Registered Limited Warranty, which shall be identical to the Standard Base Warranty, except that the Limited Parts Warranty shall be for a term of 10 Years and the Limited Compressor Warranty shall be for a term of 10 years. All Product not registered within 60 days of the Date of Purchase shall be subject to the Standard Base Warranty. Some states and provinces do not allow warranty terms to be subject to registration; in those states and provinces the longer terms for Limited Parts Warranty and the Limited Compressor Warranty apply.

**THIS LIMITED WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

The remedy provided in this warranty is exclusive and is granted in lieu of all other remedies. This warranty does not cover incidental or consequential damages. Some states and provinces do not allow the exclusion of incidental or consequential damages, so this limitation may not apply to you. Some states and provinces do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary by state and province. This warranty covers units within the 50 United States, the District of Columbia and Canada. This warranty is provided by GE Appliances a Haier company, Louisville, KY 40225.

## ATTACHMENT 1

The “Product” is defined as Haier brand Ductless Split Units. The “Product” contains 2 sub-categories of goods: “Indoor and Outdoor Products” and “Selected Installation Products,” which are further defined below: “Indoor and Outdoor Products” can further be identified by the following model number descriptions: 1U\*, 2U\*, 3U\*, 4U\*, AB\*, AD\*, AL\*, AM\*, AW\*, AF\*, MVA\* MVH\* “Selected Installation Products,” identified by the following model number descriptions: PB-\* FQG-\*, AH1-\* , MS1-\* and MS3-\*

# MATCHING TABLES

## 2U18MS2VHB / 2U20EH2VHA

|                 | Combinations |             | Total Capacity | Required Adapter |
|-----------------|--------------|-------------|----------------|------------------|
|                 | Port B       | Port A      |                |                  |
|                 | 1/4" x 3/8"  | 1/4" x 3/8" |                |                  |
| <b>Two Zone</b> | 7            | 7           | 14K            | -                |
|                 | 9            | 7           | 16K            | -                |
|                 | 9            | 9           | 18K            | -                |
|                 | 12           | 7           | 19K            | -                |
|                 | 12           | 9           | 21K            | -                |
|                 | 12           | 12          | 24K            | -                |

## 3U24MS2VHB / 3U24EH2VHA

|                   | Combinations                       |             |             | Total Capacity | Required Adapter |    |
|-------------------|------------------------------------|-------------|-------------|----------------|------------------|----|
|                   | Port C                             | Port B      | Port A      |                | MS               | EH |
|                   | MS: 1/4" x 3/8"<br>EH: 1/4" x 1/2" | 1/4" x 3/8" | 1/4" x 3/8" |                |                  |    |
| <b>Two Zone</b>   | 7                                  | 7           | ---         | 14K            | -                | E  |
|                   | 9                                  | 7           | ---         | 16K            | -                | E  |
|                   | 9                                  | 9           | ---         | 18K            | -                | E  |
|                   | 12                                 | 7           | ---         | 19K            | -                | E  |
|                   | 12                                 | 9           | ---         | 21K            | -                | E  |
|                   | 12                                 | 12          | ---         | 24K            | -                | E  |
|                   | 18                                 | 7           | ---         | 25K            | D                | -  |
|                   | 18                                 | 9           | ---         | 27K            | D                | -  |
|                   | 18                                 | 12          | ---         | 30K            | D                | -  |
| <b>Three Zone</b> | 7                                  | 7           | 7           | 21K            | -                | E  |
|                   | 9                                  | 7           | 7           | 23K            | -                | E  |
|                   | 9                                  | 9           | 7           | 25K            | -                | E  |
|                   | 12                                 | 7           | 7           | 26K            | -                | E  |
|                   | 9                                  | 9           | 9           | 27K            | -                | E  |
|                   | 12                                 | 9           | 7           | 28K            | -                | E  |
|                   | 12                                 | 9           | 9           | 30K            | -                | E  |
|                   | 12                                 | 12          | 7           | 31K*           | -                | E  |
|                   | 18                                 | 7           | 7           | 32K*           | D                | -  |
|                   | 12                                 | 12          | 9           | 33K*           | -                | E  |

\*ALL INDOOR UNITS MUST BE FLEXFIT.

### Adapters

|   | GEA Part #                                 |
|---|--------------------------------------------|
| A | 1/4" to 3/8" (Liquid line for ports C & D) |
| B | 3/8" to 5/8" (Vapor line for port C)       |
| C | 1/2" to 5/8" (Vapor line for port D)       |
| D | 3/8" to 1/2" (Vapor line for port C)       |
| E | 1/2" to 3/8" (Vapor line for port C OR D)  |

## 4U36MS2VHB / 4U36EH2VHA

|                   | Combinations |             |             |             | Total Capacity | Required Adapter |        |
|-------------------|--------------|-------------|-------------|-------------|----------------|------------------|--------|
|                   | Port D       | Port C      | Port B      | Port A      |                | MS               | EH     |
|                   | 1/4" x 1/2"  | 1/4" x 3/8" | 1/4" x 3/8" | 1/4" x 3/8" |                |                  |        |
| <b>Two Zone</b>   | 18           | 9           | ---         | ---         | 27K            | -                | -      |
|                   | 18           | 12          | ---         | ---         | 30K            | -                | -      |
|                   | 24           | 7           | ---         | ---         | 31K            | C                | A      |
|                   | 24           | 9           | ---         | ---         | 33K            | C                | A      |
|                   | 24           | 12          | ---         | ---         | 36K            | C                | A      |
|                   | 18           | 18          | ---         | ---         | 36K            | D                | -      |
|                   | 18           | 24          | ---         | ---         | 42K            | A                | B      |
|                   |              |             |             |             |                | B                | B      |
|                   | 24           | 24          | ---         | ---         | 48K*           | C                | A (x2) |
|                   |              |             |             |             |                |                  |        |
| <b>Three Zone</b> | 9            | 9           | 9           | ---         | 27K            | E                | -      |
|                   | 12           | 9           | 7           | ---         | 28K            | E                | -      |
|                   | 12           | 9           | 9           | ---         | 30K            | E                | -      |
|                   | 12           | 12          | 7           | ---         | 31K            | E                | -      |
|                   | 18           | 7           | 7           | ---         | 32K            | -                | -      |
|                   | 12           | 12          | 9           | ---         | 33K            | E                | -      |
|                   | 18           | 9           | 7           | ---         | 34K            | -                | -      |
|                   | 18           | 9           | 9           | ---         | 36K            | -                | -      |
|                   | 12           | 12          | 12          | ---         | 36K            | E                | -      |
|                   | 18           | 12          | 7           | ---         | 37K            | -                | -      |
|                   | 24           | 7           | 7           | ---         | 38K            | C                | A      |
|                   | 18           | 12          | 9           | ---         | 39K            | -                | -      |
|                   | 24           | 9           | 7           | ---         | 40K            | C                | A      |
|                   | 24           | 9           | 9           | ---         | 42K            | C                | A      |
|                   | 18           | 12          | 12          | ---         | 42K            | -                | -      |
|                   | 24           | 12          | 7           | ---         | 43K            | C                | A      |
|                   | 24           | 12          | 9           | ---         | 45K            | C                | A      |
|                   | 18           | 18          | 12          | ---         | 48K*           | D                | -      |
|                   | 24           | 12          | 12          | ---         | 48K*           | C                | A      |
|                   |              |             |             |             |                |                  |        |
| <b>Four Zone</b>  | 7            | 7           | 7           | 7           | 28K            | E                | -      |
|                   | 9            | 7           | 7           | 7           | 30K            | E                | -      |
|                   | 9            | 9           | 7           | 7           | 32K            | E                | -      |
|                   | 12           | 7           | 7           | 7           | 33K            | E                | -      |
|                   | 9            | 9           | 9           | 7           | 34K            | E                | -      |
|                   | 12           | 9           | 7           | 7           | 35K            | E                | -      |
|                   | 9            | 9           | 9           | 9           | 36K            | E                | -      |
|                   | 12           | 9           | 9           | 7           | 37K            | E                | -      |
|                   | 12           | 12          | 7           | 7           | 38K            | E                | -      |
|                   | 12           | 9           | 9           | 9           | 39K            | E                | -      |
|                   | 18           | 7           | 7           | 7           | 39K            | -                | -      |
|                   | 12           | 12          | 9           | 7           | 40K            | E                | -      |
|                   | 18           | 9           | 7           | 7           | 41K            | -                | -      |
|                   | 12           | 12          | 9           | 9           | 42K            | E                | -      |
|                   | 12           | 12          | 12          | 7           | 43K            | E                | -      |
|                   | 18           | 9           | 9           | 7           | 43K            | -                | -      |
|                   | 18           | 12          | 7           | 7           | 44K            | -                | -      |
|                   | 24           | 7           | 7           | 7           | 45K            | C                | A      |
|                   | 12           | 12          | 12          | 9           | 45K            | E                | -      |
|                   | 24           | 9           | 7           | 7           | 47K*           | C                | A      |
|                   | 12           | 12          | 12          | 12          | 48K*           | E                | -      |
|                   | 18           | 12          | 9           | 9           | 48K*           | -                | -      |

\*ALL INDOOR UNITS MUST BE FLEXFIT.

# NOTES

# MASTER ERROR CODE CHART

|                                      |                                      |                                      |                                                           | HIGHWALL        | CONSOLE         | COMPACT CASSETTE                    |                          |
|--------------------------------------|--------------------------------------|--------------------------------------|-----------------------------------------------------------|-----------------|-----------------|-------------------------------------|--------------------------|
| Outdoor Pro-Series LED Display (CAC) | Outdoor Multi-Zone LED Display (CAC) | Outdoor Single-Zone LED1 Flash (RAC) | FAULT DESCRIPTION                                         | Digital Display | Digital Display | Panel LED Flash or ID PCB LED Flash |                          |
|                                      |                                      |                                      |                                                           |                 |                 | Yellow Timer LED (PCB LED5)         | Green Run LED (PCB LED1) |
| 1                                    | 1                                    | 1                                    | Outdoor EEPROM failure                                    | F12             | F12             | 2                                   | 1                        |
| 2                                    | 2                                    | 2                                    | IPM overcurrent or short circuit                          | F1              | F1              | 2                                   | 2                        |
| /                                    | /                                    | 3                                    | Outdoor alternating current, over current protection      | F22             | F22             | 2                                   | 3                        |
| 3                                    | /                                    | /                                    | Compressor overcurrent during deceleration                | /               | /               | /                                   | /                        |
| 4                                    | 4                                    | 4                                    | Communication failure between the IPM and outdoor PCB     | F3              | F3              | 2                                   | 4                        |
| 5                                    | 5                                    | 5                                    | Module operated overload (compressor overload protection) | F20*            | F20*            | 2                                   | 5                        |
| 6                                    | 6                                    | 6                                    | Module low or high voltage                                | F19*            | F19*            | 2                                   | 6                        |
| 7                                    | /                                    | 7                                    | Compressor current sampling circuit fault                 | F27             | F27             | 2                                   | 7                        |
| 8                                    | 8                                    | 8                                    | Overheat protection for discharge temperature             | F4              | F4              | 2                                   | 8                        |
| 9                                    | 9                                    | 9                                    | Malfunction of the DC fan motor                           | F8*             | F8*             | 2                                   | 9                        |
| 10                                   | 10                                   | 10                                   | Malfunction of defrost temperature sensor                 | F21             | F21             | 3                                   | 0                        |
| 11                                   | 11                                   | 11                                   | Suction temperature sensor failure                        | F7              | F7              | 3                                   | 1                        |
| 12                                   | 12                                   | 12                                   | Ambient temperature sensor failure                        | F6              | F6              | 3                                   | 2                        |
| 13                                   | 13                                   | 13                                   | Discharge temperature sensor failure                      | F25             | F25             | 3                                   | 3                        |
| /                                    | /                                    | 14                                   | High outdoor suction temperature                          | F30*            | F30*            | 3                                   | 4                        |
| 14                                   | /                                    | /                                    | PFC circuit loop voltage                                  | /               | /               | /                                   | /                        |
| 15                                   | 15                                   | 15                                   | Communication failure between the indoor & outdoor unit   | E7              | E7              | 3                                   | 5                        |
| 16                                   | 16                                   | 16                                   | Lack of refrigerant or discharging                        | F13*            | F13*            | 3                                   | 6                        |
| 17                                   | 17                                   | 17                                   | 4-way valve switching failure                             | F14*            | F14*            | 3                                   | 7                        |
| 18                                   | 18                                   | 18                                   | Loss of synchronism detection                             | F11             | F11             | 3                                   | 8                        |
| /                                    | /                                    | 19                                   | Position detection circuit fault of compressor            | F28             | F28             | 3                                   | 9                        |
| 19                                   | /                                    | /                                    | Low DC or AC voltage                                      | /               | /               | /                                   | /                        |
| /                                    | /                                    | 20                                   | Terminal block temp too high                              | F15*            | F15*            | 4                                   | 0                        |
| 20                                   | 20                                   | /                                    | Indoor thermal overload                                   | E9              | /               | 4                                   | 0                        |
| /                                    | 21                                   | 21                                   | Indoor unit overload protection, heating mode only.       | E9*             | /               | 4                                   | 1                        |
| /                                    | 21                                   | /                                    | Indoor coil frosted                                       | E5              | /               | 4                                   | 1                        |
| /                                    | /                                    | 22                                   | Indoor anti-frosting protection                           | E5*             | /               | 4                                   | 2                        |
| 22                                   | /                                    | /                                    | PFC circuit loop overcurrent                              | /               | /               | /                                   | /                        |
| /                                    | /                                    | 23                                   | Indoor coil temperature (abnormal reading)                | /               | /               | /                                   | /                        |
| 23                                   | 23                                   | /                                    | Module thermal overload                                   | F5*             | F5*             | 4                                   | 3                        |
| 24                                   | 24                                   | 24                                   | Compressor start failure, over-current                    | F2*             | F2*             | 4                                   | 4                        |
| 25                                   | 25                                   | 25                                   | Phase current protection (IPM)                            | F23*            | F23             | 4                                   | 5                        |
| /                                    | 26                                   | /                                    | MCU reset                                                 | F9              | F9              | 4                                   | 6                        |
| 26                                   | /                                    | /                                    | IPM power supply phase loss (3-phase)                     | /               | /               |                                     |                          |
| 27                                   | 27                                   | 27                                   | Module current detect circuit malfunction                 | F24             | F24             | 4                                   | 7                        |
| 28                                   | /                                    | /                                    | Wiring error: Compressor to IPM                           | /               | /               | /                                   | /                        |

\* Hidden indoor error code. LED1 will flash outdoors, but no error will appear on indoor unit display.  
To view error code on indoor display, press and hold the Emergency button for 15 seconds.

# MASTER ERROR CODE CHART

| LARGE CASSETTE                      |                          |                         | DUCTED        |              |                       |      |               |              | WIRED CONTROLLER |         |
|-------------------------------------|--------------------------|-------------------------|---------------|--------------|-----------------------|------|---------------|--------------|------------------|---------|
| Panel LED Flash or ID PCB LED Flash |                          | Panel Display (PB*****) | HIGH STATIC   |              | MID-STATIC DUCT (MSP) |      | SLIM DUCT     |              | YRE-17A QACT17A  | YRE-16B |
| Yellow Timer LED (PCB LED4)         | Green Run LED (PCB LED1) |                         | LED4 (Yellow) | LED3 (Green) | LED4                  | LED3 | LED4 (Yellow) | LED3 (Green) |                  |         |
| 2                                   | 1                        | 15                      | 2             | 1            | 2                     | 1    | 2             | 1            | 15               | 21      |
| 2                                   | 2                        | 16                      | 2             | 2            | 2                     | 2    | 2             | 2            | 16               | 22      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 17               | 23      |
| 2                                   | 3                        | 17                      | 2             | 3            | 2                     | 3    | 2             | 3            | 17               | 23      |
| 2                                   | 4                        | 18                      | 2             | 4            | 2                     | 4    | 2             | 4            | 18               | 24      |
| 2                                   | 5                        | 19                      | 2             | 5            | 2                     | 5    | 2             | 5            | 19               | 25      |
| 2                                   | 6                        | 1A                      | 2             | 6            | 2                     | 6    | 2             | 6            | 1A               | 26      |
| 2                                   | 7                        | 1B                      | 2             | 7            | 2                     | 7    | 2             | 7            | 1B               | 27      |
| 2                                   | 8                        | 1C                      | 2             | 8            | 2                     | 8    | 2             | 8            | 1C               | 28      |
| 2                                   | 9                        | 1D                      | 2             | 9            | 2                     | 9    | 2             | 9            | 1D               | 29      |
| 3                                   | 0                        | 1E                      | 3             | 0            | 3                     | 0    | 3             | 0            | 1E               | 30      |
| 3                                   | 1                        | 1F                      | 3             | 1            | 3                     | 1    | 3             | 1            | 1F               | 31      |
| 3                                   | 2                        | 20                      | 3             | 2            | 3                     | 2    | 3             | 2            | 20               | 32      |
| 3                                   | 3                        | 21                      | 3             | 3            | 3                     | 3    | 3             | 3            | 21               | 33      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 22               | 34      |
| 3                                   | 4                        | 22                      | 3             | 4            | 3                     | 4    | 3             | 4            | 22               | 34      |
| 3                                   | 5                        | 23                      | 3             | 5            | 3                     | 5    | 3             | 5            | 23               | 35      |
| 3                                   | 6                        | 24                      | 3             | 6            | 3                     | 6    | 3             | 6            | 24               | 36      |
| 3                                   | 7                        | 25                      | 3             | 7            | 3                     | 7    | 3             | 7            | 25               | 37      |
| 3                                   | 8                        | 26                      | 3             | 8            | 3                     | 8    | 3             | 8            | 26               | 38      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 27               | 39      |
| 3                                   | 9                        | 27                      | 3             | 9            | 3                     | 9    | 3             | 9            | 27               | 39      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 28               | 40      |
| 4                                   | 0                        | 28                      | 4             | 0            | 4                     | 0    | 4             | 0            | 28               | 40      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 29               | 41      |
| 4                                   | 1                        | 29                      | 4             | 1            | 4                     | 1    | 4             | 1            | 29               | 41      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | 2A               | 42      |
| 4                                   | 2                        | 2A                      | 4             | 2            | 4                     | 2    | 4             | 2            | 2A               | 42      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | /                | /       |
| 4                                   | 3                        | 2B                      | 4             | 3            | 4                     | 3    | 4             | 3            | 2B               | 43      |
| 4                                   | 4                        | 2C                      | 4             | 4            | 4                     | 4    | 4             | 4            | 2C               | 44      |
| 4                                   | 5                        | 2D                      | 4             | 5            | 4                     | 5    | 4             | 5            | 2D               | 45      |
| 4                                   | 6                        | 2E                      | 4             | 6            | 4                     | 6    | 4             | 6            | 2E               | 46      |
| /                                   | /                        | /                       |               |              |                       |      |               |              | 2F               | 47      |
| 4                                   | 7                        | 2F                      | 4             | 7            | 4                     | 7    | 4             | 7            | 2F               | 47      |
| /                                   | /                        | /                       | /             | /            | /                     | /    | /             | /            | /                | /       |

# MASTER ERROR CODE CHART

|                                      |                                      |                                      |                                                                                                        | HIGHWALL        | CONSOLE         | COMPACT CASSETTE                    |                          |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------|-----------------|-------------------------------------|--------------------------|
| Outdoor Pro-Series LED Display (CAC) | Outdoor Multi-Zone LED Display (CAC) | Outdoor Single-Zone LED1 Flash (RAC) | FAULT DESCRIPTION                                                                                      | Digital Display | Digital Display | Panel LED Flash or ID PCB LED Flash |                          |
|                                      |                                      |                                      |                                                                                                        |                 |                 | Yellow Timer LED (PCB LED5)         | Green Run LED (PCB LED1) |
| /                                    | /                                    | 28                                   | Low refrigerant flow. Lockout.                                                                         | /               | /               | /                                   | /                        |
| /                                    | 28                                   | /                                    | Liquid pipe sensor failure: Circuit A                                                                  | F10             | F10             | 4                                   | 8                        |
| /                                    | 29                                   | /                                    | Liquid pipe sensor failure: Circuit B                                                                  | F16             | F16             | 4                                   | 9                        |
| /                                    | 30                                   | /                                    | Liquid pipe sensor failure: Circuit C                                                                  | F17             | F17             | 5                                   | 0                        |
| /                                    | 31                                   | /                                    | Liquid pipe sensor failure: Circuit D                                                                  | F18             | F18             | 5                                   | 1                        |
| /                                    | 32                                   | /                                    | Gas pipe sensor failure: Circuit A                                                                     | F29             | F29             | 5                                   | 2                        |
| /                                    | 33                                   | /                                    | Gas pipe sensor failure: Circuit B                                                                     | F30             | F30             | 5                                   | 3                        |
| /                                    | 34                                   | /                                    | Gas pipe sensor failure: Circuit C                                                                     | F31             | F31             | 5                                   | 4                        |
| /                                    | 35                                   | /                                    | Gas pipe sensor failure: Circuit D                                                                     | F32             | F32             | 5                                   | 5                        |
| /                                    | 36                                   | /                                    | Gas pipe sensor failure: Circuit E                                                                     | F26             | F26             | 5                                   | 6                        |
| /                                    | /                                    | 37                                   | Outdoor pipe temperature protection in cooling mode                                                    | F34             | F34             | 5                                   | 7                        |
| 37                                   | /                                    | /                                    | Compressor overcurrent detected by IPM                                                                 | /               | /               | /                                   | /                        |
| 38                                   | 38                                   | /                                    | Malfunction of module temperature sensor momentary power failure detection                             | F35             | F35             | 5                                   | 8                        |
| 39                                   | 39                                   | 39                                   | Malfunction of condensing temperature sensor                                                           | F36             | F36             | 5                                   | 9                        |
| /                                    | 40                                   | /                                    | Liquid pipe sensor failure - Circuit E                                                                 | F33             | F33             | 6                                   | 0                        |
| /                                    | 41                                   | /                                    | Toci temperature sensor failure                                                                        | F38             | F38             | 6                                   | 1                        |
| 42                                   | 42                                   | /                                    | High Pressure switch open                                                                              | F39             | F39             | 6                                   | 2                        |
| 43                                   | 43                                   | /                                    | Low Pressure switch open                                                                               | F40             | F40             | 6                                   | 3                        |
| 44                                   | 44                                   | /                                    | System high pressure protection: Overcharged, high condensing temperature or malfunction of fan motor. | F41             | F41             | 6                                   | 4                        |
| 45                                   | 45                                   | /                                    | System low pressure protection: Undercharged, low defrosting temperature, or malfunction of fan motor. | F42             | F42             | 6                                   | 5                        |
| /                                    | /                                    | 46                                   | Incorrect match between indoor & outdoor                                                               | F43             | F43             | 6                                   | 6                        |
| /                                    | L0                                   | /                                    | OAT less than -22°F (-30°C)                                                                            | /               | /               | /                                   | /                        |
| /                                    | /                                    | /                                    | Indoor ambient temperature sensor failure                                                              | E1              | E1              | 0                                   | 1                        |
| /                                    | /                                    | /                                    | Indoor coil temperature sensor failure                                                                 | E2              | E2              | 0                                   | 2                        |
| /                                    | /                                    | /                                    | Indoor PCB EEPROM failure                                                                              | E4              | E4              | 0                                   | 4                        |
| /                                    | /                                    | /                                    | Communication fault between the indoor and outdoor unit                                                | /               | /               | 0                                   | 7                        |
| /                                    | /                                    | /                                    | Communication fault between the controller and Indoor unit                                             | /               | E8              | 0                                   | 8                        |
| /                                    | /                                    | /                                    | DC voltage of the fan motor driver too high or too low                                                 | /               | /               | /                                   | /                        |
| /                                    | /                                    | /                                    | Fan motor driver over 95°F (35°C)                                                                      | /               | /               | /                                   | /                        |
| /                                    | /                                    | /                                    | Indoor fan motor out of step                                                                           | /               | /               | /                                   | /                        |
| /                                    | /                                    | /                                    | Drain system malfunction                                                                               | /               | E12             | 0                                   | 12                       |
| /                                    | /                                    | /                                    | Zero cross signal detected wrong                                                                       | /               | E13 / C1        | 0                                   | 13                       |
| /                                    | /                                    | /                                    | Indoor fan motor malfunction                                                                           | E14*            | E14             | 0                                   | 14                       |
| /                                    | /                                    | /                                    | Indoor fan motor overcurrent                                                                           | /               | /               | /                                   | /                        |

\* Hidden indoor error code. LED1 will flash outdoors, but no error will appear on indoor unit display. To view error code on indoor display, press and hold the Emergency button for 15 seconds.

# MASTER ERROR CODE CHART

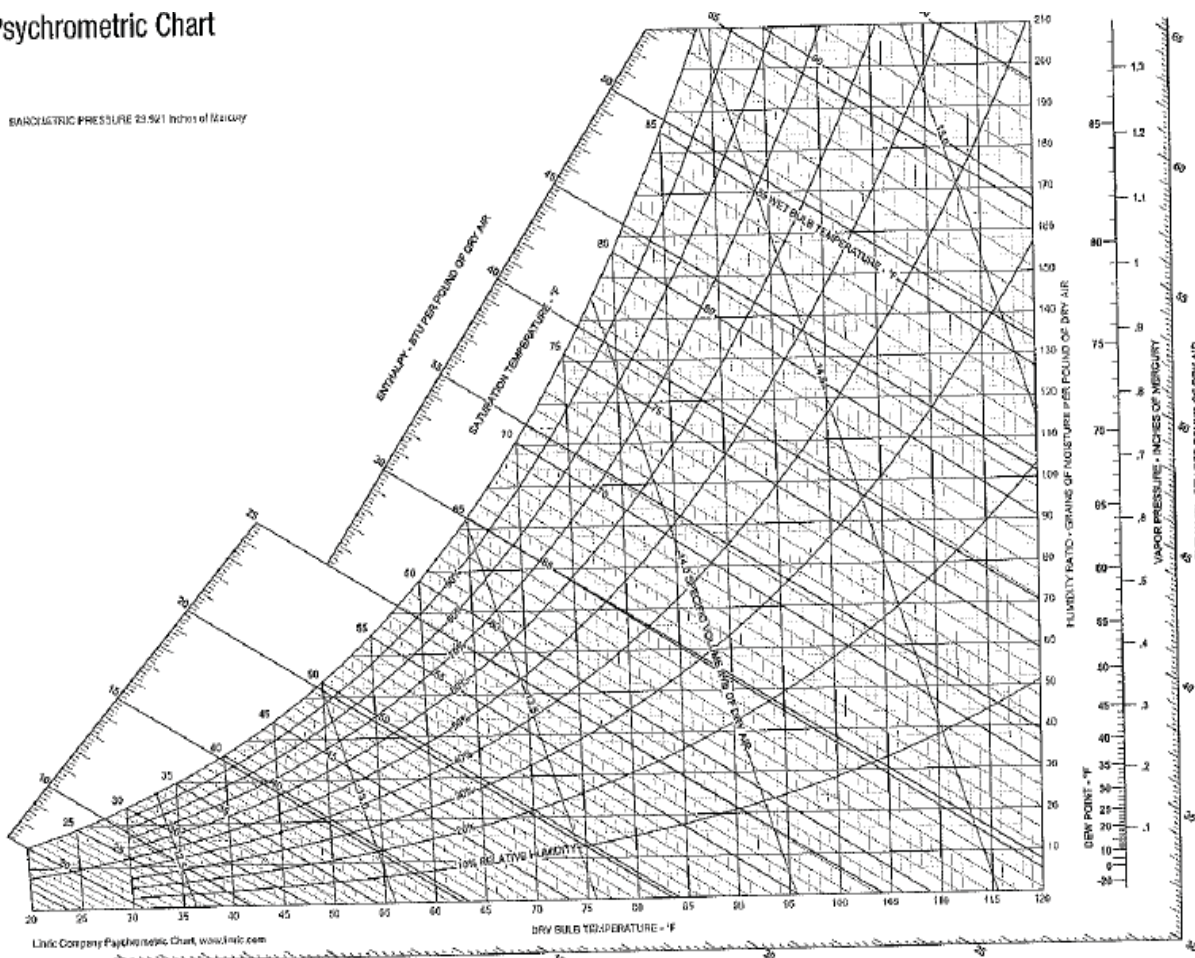
| LARGE CASSETTE                         |                             |                               | DUCTED           |                 |                          |      |                  |                 | WIRED CONTROLLER                               |         |
|----------------------------------------|-----------------------------|-------------------------------|------------------|-----------------|--------------------------|------|------------------|-----------------|------------------------------------------------|---------|
| Panel LED Flash or<br>ID PCB LED Flash |                             | Panel<br>Display<br>(PB*****) | HIGH STATIC      |                 | MID-STATIC<br>DUCT (MSP) |      | SLIM DUCT        |                 | YRE-17A<br>QACT17A                             | YRE-16B |
| Yellow Timer<br>LED (PCB<br>LED4)      | Green Run LED<br>(PCB LED1) |                               | LED4<br>(Yellow) | LED3<br>(Green) | LED4                     | LED3 | LED4<br>(Yellow) | LED3<br>(Green) |                                                |         |
| /                                      | /                           | /                             | /                | /               | /                        | /    | /                | /               | /                                              | /       |
| 4                                      | 8                           | 30                            | 4                | 8               | 4                        | 8    | 4                | 8               | 30                                             | 48      |
| 4                                      | 9                           | 31                            | 4                | 9               | 4                        | 9    | 4                | 9               | 31                                             | 49      |
| 5                                      | 0                           | 32                            | 5                | 0               | 5                        | 0    | 5                | 0               | 32                                             | 50      |
| 5                                      | 1                           | 33                            | 5                | 1               | 5                        | 1    | 5                | 1               | 33                                             | 51      |
| 5                                      | 2                           | 34                            | 5                | 2               | 5                        | 2    | 5                | 2               | 34                                             | 52      |
| 5                                      | 3                           | 35                            | 5                | 3               | 5                        | 3    | 5                | 3               | 35                                             | 53      |
| 5                                      | 4                           | 36                            | 5                | 4               | 5                        | 4    | 5                | 4               | 36                                             | 54      |
| 5                                      | 5                           | 37                            | 5                | 5               | 5                        | 5    | 5                | 5               | 37                                             | 55      |
| 5                                      | 6                           | 38                            | 5                | 6               | 5                        | 6    | 5                | 6               | 38                                             | 56      |
| /                                      | /                           | /                             | /                | /               | /                        | /    | /                | /               | 39                                             | 57      |
| 5                                      | 7                           | 39                            | 5                | 7               | 5                        | 7    | 5                | 7               | 39                                             | 57      |
| 5                                      | 8                           | 3A                            | 5                | 8               | 5                        | 8    | 5                | 8               | 3A                                             | 58      |
| 5                                      | 9                           | 3B                            | 5                | 9               | 5                        | 9    | 5                | 9               | 3B                                             | 59      |
| 6                                      | 0                           | 3C                            | 6                | 0               | 6                        | 0    | 6                | 0               | 3C                                             | 60      |
| 6                                      | 1                           | 3D                            | 6                | 1               | 6                        | 1    | 6                | 1               | 3D                                             | 61      |
| 6                                      | 2                           | 3E                            | 6                | 2               | 6                        | 2    | 6                | 2               | 3E                                             | 62      |
| 6                                      | 3                           | 3F                            | 6                | 3               | 6                        | 3    | 6                | 3               | 3F                                             | 63      |
| 6                                      | 4                           | 40                            | 6                | 4               | 6                        | 4    | 6                | 4               | 40                                             | 64      |
| 6                                      | 5                           | 41                            | 6                | 5               | 6                        | 5    | 6                | 5               | 41                                             | 65      |
| /                                      | /                           | /                             | /                | /               | /                        | /    | /                | /               | 42                                             | 66      |
| /                                      | /                           | /                             | /                | /               | /                        | /    | /                | /               | /                                              | /       |
| 0                                      | 1                           | 01                            | 0                | 1               | 0                        | 1    | 0                | 1               | 01                                             | 01      |
| 0                                      | 2                           | 02                            | 0                | 2               | 0                        | 2    | 0                | 2               | 02                                             | 02      |
| 0                                      | 4                           | 04                            | 0                | 4               | 0                        | 4    | 0                | 4               | 04                                             | 04      |
| 0                                      | 7                           | 07                            | 0                | 7               | 0                        | 7    | 0                | 7               | 07                                             | 07      |
| 0                                      | 8                           | 08                            | 0                | 8               | 0                        | 8    | 0                | 8               | Flashing 07 (YR-E17) /<br>Flashing ! (QACT17A) | /       |
| /                                      | /                           | /                             | 0                | 17              | /                        | /    | 0                | 17              | 11                                             | 17      |
| /                                      | /                           | /                             | 0                | 18              | /                        | /    | 0                | 18              | 12                                             | 18      |
| /                                      | /                           | /                             | 0                | 19              | /                        | /    | 0                | 19              | 13                                             | 19      |
| 0                                      | 12                          | 0C                            | 0                | 12              | 0                        | 12   | 0                | 12              | 0C                                             | 12      |
| 0                                      | 13                          | 0D                            | 0                | 13              | 0                        | 13   | 0                | 13              | 0D                                             | 13      |
| 0                                      | 14                          | 0E                            | 0                | 14              | 0                        | 14   | 0                | 14              | 0E                                             | 14      |
| /                                      | /                           | /                             | 0                | 15              | /                        | /    | 0                | 15              | 0F                                             | 15      |

# FORMULAS & EQUATIONS

## PSYCHROMETRIC CHART

### Psychrometric Chart

BAROMETRIC PRESSURE 29.921 inches of Mercury



#### Total Cooling Equation: Cooling BTUs = CFM x Δh x 4.5

- CFM=The fan CFM (Airflow in Cubic Feet per Minute) plotted on the fan tables, or measured at several points in the system. (Found in our submittals).
- Δh = (H1-H2) The enthalpy change through the system (we get this number by converting wet bulb readings).
  - H1 = Entering air enthalpy (Btu/lbm dry air)
  - H2 = Leaving air enthalpy (Btu/lbm dry air) 0.59°C
- 4.5 = the cooling BTU multiplier at sea level, or .075-lbs. of air per CFM x 60 (minutes in an hour). This factor will also change at higher altitudes. BTU multipliers will also change due to extreme air temperatures.

#### Total Heat Equation: BTU/H = CFM x ΔT x 1.08

- CFM=The fan CFM (Airflow in Cubic Feet per Minute) plotted on the fan tables, or measured at several points in the system. (Found in our submittals).
- ΔT = the dry bulb temperature change through the system
- 1.08 = the heating BTU multiplier at sea level, or .075-lbs. of air per CFM x .24 (the specific heat air) x 60 (minutes in an hour). This factor will also change at higher altitudes.

#### Conversions:

$1^{\circ}\text{F} = 0.56^{\circ}\text{C}$ ,  $1^{\circ}\text{C} = 1.8^{\circ}\text{F}$ ,  $^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32$ ,  
 $^{\circ}\text{C} = (^{\circ}\text{F} - 32) / 1.8$ ,  $\text{BTU/h} = \text{Watts} \times 3.412 = \text{kWh} \times 3412$   
 $1 \text{ HP} = 745.7 \text{ Watts} = 0.7457 \text{ kW}$ ,  $1 \text{ kW} = 1.3 \text{ HP}$   
 $\text{COP} = \text{EER} / 3.412$ ,  $\text{EER} = 12 / \text{kW/ton}$   
 $\text{EER} = \text{COP} \times 3.412$ ,  $1 \text{ sq. ft} = 0.0929 \text{ sq. m}$

#### TEST FOR CORRECT SYSTEM AIRFLOW: COOLING ONLY

|                    |      | INDOOR DRY BULB °F          |      |      |      |      |      |      |      |
|--------------------|------|-----------------------------|------|------|------|------|------|------|------|
|                    |      | 70°F                        | 72°F | 74°F | 76°F | 78°F | 80°F | 82°F | 84°F |
| INDOOR WET BULB °F | 58°F | 51                          | 52   | 53   | 54   | 55   | 56   | 57   | 58   |
|                    | 52°F | 52                          | 53   | 54   | 55   | 56   | 57   | 58   | 59   |
|                    | 62°F | 53                          | 55   | 55   | 56   | 57   | 58   | 59   | 60   |
|                    | 64°F | 55                          | 56   | 57   | 57   | 58   | 59   | 60   | 61   |
|                    | 66°F | 56                          | 57   | 58   | 59   | 60   | 61   | 62   | 63   |
|                    | 68°F | 58                          | 59   | 60   | 61   | 62   | 63   | 64   | 64   |
|                    | 70°F | 60                          | 61   | 62   | 63   | 64   | 65   | 66   | 66   |
|                    | 72°F |                             | 63   | 64   | 65   | 66   | 67   | 68   | 69   |
|                    | 74°F |                             |      | 65   | 67   | 68   | 69   | 70   | 70   |
|                    | 76°F |                             |      |      |      |      | 71   | 72   | 72   |
|                    |      | REQUIRED SUPPLY AIR TEMP °F |      |      |      |      |      |      |      |

# RESISTANCE CHART

| °F    | °C  | Normal (KΩ)    |                |                |
|-------|-----|----------------|----------------|----------------|
|       |     | 10K<br>SENSORS | 23K<br>SENSORS | 50K<br>SENSORS |
| -22   | -30 | 147.95         | 513.115        | 12061.74       |
| -20.2 | -29 | 139.56         | 478.894        | 11267.87       |
| -18.4 | -28 | 131.70         | 447.408        | 10531.37       |
| -16.6 | -27 | 124.34         | 418.379        | 9847.72        |
| -14.8 | -26 | 117.44         | 391.564        | 9212.81        |
| -13   | -25 | 110.96         | 366.751        | 8622.85        |
| -11.2 | -24 | 104.89         | 343.754        | 8074.38        |
| -9.4  | -23 | 99.19          | 322.407        | 7564.22        |
| -7.6  | -22 | 93.83          | 302.567        | 7089.47        |
| -5.8  | -21 | 88.80          | 284.105        | 6647.45        |
| -4    | -20 | 84.07          | 266.905        | 6235.71        |
| -2.2  | -19 | 79.62          | 250.866        | 5851.99        |
| -0.4  | -18 | 75.44          | 235.895        | 5494.21        |
| 1.4   | -17 | 71.50          | 221.911        | 5160.46        |
| 3.2   | -16 | 67.79          | 208.838        | 4849.00        |
| 5     | -15 | 64.30          | 196.609        | 4558.19        |
| 6.8   | -14 | 61.01          | 185.163        | 4286.55        |
| 8.6   | -13 | 57.91          | 174.443        | 4032.71        |
| 10.4  | -12 | 54.99          | 164.399        | 3795.39        |
| 12.2  | -11 | 52.23          | 154.983        | 3573.43        |
| 14    | -10 | 49.62          | 146.153        | 3365.73        |
| 15.8  | -9  | 47.17          | 137.87         | 3171.31        |
| 17.6  | -8  | 44.85          | 130.096        | 2989.25        |
| 19.4  | -7  | 42.65          | 122.799        | 2818.67        |
| 21.2  | -6  | 40.58          | 115.946        | 2658.81        |
| 23    | -5  | 38.62          | 109.51         | 2508.91        |
| 24.8  | -4  | 36.77          | 103.462        | 2368.32        |
| 26.6  | -3  | 35.01          | 97.779         | 2236.39        |
| 28.4  | -2  | 33.36          | 92.437         | 2112.55        |
| 30.2  | -1  | 31.78          | 87.415         | 1996.25        |
| 32    | 0   | 30.30          | 82.691         | 1887.00        |
| 33.8  | 1   | 28.89          | 78.248         | 1784.33        |
| 35.6  | 2   | 27.55          | 74.067         | 1687.81        |
| 37.4  | 3   | 26.29          | 70.133         | 1597.04        |
| 39.2  | 4   | 25.09          | 66.43          | 1511.65        |
| 41    | 5   | 23.95          | 62.943         | 1431.28        |
| 42.8  | 6   | 22.87          | 59.659         | 1355.62        |
| 44.6  | 7   | 21.84          | 56.566         | 1284.36        |
| 46.4  | 8   | 20.87          | 53.651         | 1217.23        |
| 48.2  | 9   | 19.94          | 50.904         | 1153.96        |
| 50    | 10  | 19.06          | 48.314         | 1094.32        |
| 51.8  | 11  | 18.23          | 45.872         | 1038.07        |
| 53.6  | 12  | 17.43          | 43.569         | 985.01         |
| 55.4  | 13  | 16.68          | 41.395         | 934.94         |
| 57.2  | 14  | 15.96          | 39.343         | 887.68         |
| 59    | 15  | 15.28          | 37.406         | 843.05         |
| 60.8  | 16  | 14.63          | 35.577         | 800.89         |
| 62.6  | 17  | 14.01          | 33.848         | 761.06         |
| 64.4  | 18  | 13.42          | 32.215         | 723.41         |
| 66.2  | 19  | 12.86          | 30.671         | 687.82         |
| 68    | 20  | 12.32          | 29.21          | 654.16         |
| 69.8  | 21  | 11.81          | 27.828         | 622.32         |
| 71.6  | 22  | 11.33          | 26.521         | 592.18         |
| 73.4  | 23  | 10.86          | 25.283         | 563.66         |
| 75.2  | 24  | 10.42          | 24.111         | 536.65         |
| 77    | 25  | 10.00          | 23             | 511.08         |
| 78.8  | 26  | 9.60           | 21.947         | 486.94         |
| 80.6  | 27  | 9.21           | 20.949         | 464.05         |

| °F    | °C | Normal (KΩ)    |                |                |
|-------|----|----------------|----------------|----------------|
|       |    | 10K<br>SENSORS | 23K<br>SENSORS | 50K<br>SENSORS |
| 82.4  | 28 | 8.85           | 20.003         | 442.35         |
| 84.2  | 29 | 8.50           | 19.104         | 421.77         |
| 86    | 30 | 8.16           | 18.252         | 402.24         |
| 87.8  | 31 | 7.84           | 17.442         | 383.72         |
| 89.6  | 32 | 7.54           | 16.674         | 366.13         |
| 91.4  | 33 | 7.25           | 15.943         | 349.43         |
| 93.2  | 34 | 6.97           | 15.249         | 333.58         |
| 95    | 35 | 6.70           | 14.588         | 318.52         |
| 96.8  | 36 | 6.45           | 13.96          | 304.22         |
| 98.6  | 37 | 6.20           | 13.362         | 290.62         |
| 100.4 | 38 | 5.97           | 12.794         | 277.70         |
| 102.2 | 39 | 5.75           | 12.252         | 265.41         |
| 104   | 40 | 5.53           | 11.736         | 253.73         |
| 105.8 | 41 | 5.33           | 11.244         | 242.62         |
| 107.6 | 42 | 5.13           | 10.776         | 232.04         |
| 109.4 | 43 | 4.94           | 10.329         | 221.98         |
| 111.2 | 44 | 4.76           | 9.904          | 212.41         |
| 113   | 45 | 4.59           | 9.497          | 203.29         |
| 114.8 | 46 | 4.43           | 9.11           | 194.61         |
| 116.6 | 47 | 4.27           | 8.74           | 186.34         |
| 118.4 | 48 | 4.11           | 8.387          | 178.46         |
| 120.2 | 49 | 3.97           | 8.05           | 170.95         |
| 122   | 50 | 3.83           | 7.728          | 163.80         |
| 123.8 | 51 | 3.69           | 7.421          | 156.97         |
| 125.6 | 52 | 3.57           | 7.127          | 150.47         |
| 127.4 | 53 | 3.44           | 6.846          | 144.26         |
| 129.2 | 54 | 3.32           |                | 138.35         |
| 131   | 55 | 3.21           |                | 132.70         |
| 132.8 | 56 | 3.10           |                | 127.31         |
| 134.6 | 57 | 2.99           |                | 122.16         |
| 136.4 | 58 | 2.89           |                | 117.25         |
| 138.2 | 59 | 2.79           |                | 112.56         |
| 140   | 60 | 2.70           |                | 108.08         |
| 141.8 | 61 | 2.61           |                | 103.80         |
| 143.6 | 62 | 2.52           |                | 99.70          |
| 145.4 | 63 | 2.44           |                | 95.79          |
| 147.2 | 64 | 2.36           |                | 92.06          |
| 149   | 65 | 2.28           |                | 88.48          |
| 150.8 | 66 | 2.21           |                | 85.06          |
| 152.6 | 67 | 2.14           |                | 81.79          |
| 154.4 | 68 | 2.07           |                | 78.66          |
| 156.2 | 69 | 2.00           |                | 75.67          |
| 158   | 70 | 1.94           |                | 72.80          |
| 159.8 | 71 | 1.88           |                | 70.06          |
| 161.6 | 72 | 1.82           |                | 67.43          |
| 163.4 | 73 | 1.76           |                | 64.91          |
| 165.2 | 74 | 1.71           |                | 62.50          |
| 167   | 75 | 1.65           |                | 60.19          |
| 168.8 | 76 | 1.60           |                | 57.98          |
| 170.6 | 77 | 1.55           |                | 55.86          |
| 172.4 | 78 | 1.51           |                | 53.82          |
| 174.2 | 79 | 1.46           |                | 51.87          |
| 176   | 80 | 1.41           |                | 50.00          |
| 177.8 | 81 | 1.37           |                | 48.21          |
| 179.6 | 82 | 1.33           |                | 46.48          |
| 181.4 | 83 | 1.29           |                | 44.83          |
| 183.2 | 84 | 1.25           |                | 43.25          |
| 185   | 85 | 1.22           |                | 41.72          |
| 186.8 | 86 | 1.18           |                | 40.26          |

| °F    | °C  | Normal (KΩ)    |                |                |
|-------|-----|----------------|----------------|----------------|
|       |     | 10K<br>SENSORS | 23K<br>SENSORS | 50K<br>SENSORS |
| 188.6 | 87  | 1.14           |                | 38.85          |
| 190.4 | 88  | 1.11           |                | 37.50          |
| 192.2 | 89  | 1.08           |                | 36.21          |
| 194   | 90  | 1.05           |                | 34.96          |
| 195.8 | 91  | 1.02           |                | 33.77          |
| 197.6 | 92  | 0.99           |                | 32.62          |
| 199.4 | 93  | 0.96           |                | 31.51          |
| 201.2 | 94  | 0.93           |                | 30.45          |
| 203   | 95  | 0.91           |                | 29.42          |
| 204.8 | 96  | 0.88           |                | 28.44          |
| 206.6 | 97  | 0.86           |                | 27.50          |
| 208.4 | 98  | 0.83           |                | 26.59          |
| 210.2 | 99  | 0.81           |                | 25.71          |
| 212   | 100 | 0.79           |                | 24.87          |
| 213.8 | 101 | 0.76           |                | 24.06          |
| 215.6 | 102 | 0.74           |                | 23.28          |
| 217.4 | 103 | 0.72           |                | 22.52          |
| 219.2 | 104 | 0.70           |                | 21.80          |
| 221   | 105 | 0.68           |                | 21.10          |
| 222.8 | 106 | 0.67           |                | 20.43          |
| 224.6 | 107 | 0.65           |                | 19.78          |
| 226.4 | 108 | 0.63           |                | 19.16          |
| 228.2 | 109 | 0.61           |                | 18.56          |
| 230   | 110 | 0.60           |                | 17.98          |
| 231.8 | 111 | 0.58           |                | 17.42          |
| 233.6 | 112 | 0.57           |                | 16.88          |
| 235.4 | 113 | 0.55           |                | 16.36          |
| 237.2 | 114 | 0.54           |                | 15.85          |
| 239   | 115 | 0.52           |                | 15.37          |
| 240.8 | 116 | 0.51           |                | 14.90          |
| 242.6 | 117 | 0.50           |                | 14.45          |
| 244.4 | 118 | 0.48           |                | 14.01          |
| 246.2 | 119 | 0.47           |                | 13.59          |
| 248   | 120 | 0.46           |                | 13.19          |
| 249.8 | 121 |                |                | 12.80          |
| 251.6 | 122 |                |                | 12.42          |
| 253.4 | 123 |                |                | 12.05          |
| 255.2 | 124 |                |                | 11.70          |
| 257   | 125 |                |                | 11.35          |
| 258.8 | 126 |                |                | 11.02          |
| 260.6 | 127 |                |                | 10.70          |
| 262.4 | 128 |                |                | 10.40          |
| 264.2 | 129 |                |                | 10.10          |
| 266   | 130 |                |                | 9.81           |
| 267.8 | 131 |                |                | 9.53           |
| 269.6 | 132 |                |                | 9.26           |
| 271.4 | 133 |                |                | 9.00           |
| 273.2 | 134 |                |                | 8.74           |
| 275   | 135 |                |                | 8.50           |
| 276.8 | 136 |                |                | 8.26           |
| 278.6 | 137 |                |                | 8.03           |
| 280.4 | 138 |                |                | 7.81           |
| 282.2 | 139 |                |                | 7.60           |
| 284   | 140 |                |                | 7.39           |

# SENSOR DEFINITIONS

| Abbr. | Definition                              | Type |
|-------|-----------------------------------------|------|
| tAo   | Temperature of outdoor ambient          | 10K  |
| tc    | Temperature of outdoor condenser        | 10K  |
| td    | Temperature of outdoor discharge        | 50K  |
| tE    | Temperature of outdoor defrost          | 10K  |
| tS    | Temperature of outdoor suction          | 10K  |
| tdr   | Temperature of compressor driver module | 10K  |
| ldr   | Current of the compressor               | 10K  |

| Abbr. | Definition                                             | Type |
|-------|--------------------------------------------------------|------|
| tAI   | Temperature of indoor ambient                          | 10K  |
| TCI   | Temperature of indoor condenser                        | 10K  |
| Toci  | Hot Gas Leaving the 4-Way Valve                        | 10K  |
| Tc2   | EEV Liquid Sensor                                      | 10K  |
| Tc1   | EEV Gas Sensor                                         | 10K  |
| Tm    | Module Temp Sensor                                     | 10K  |
| TAI   | Temperature of indoor ambient (9K/12K Tempo & All CAC) | 23K  |

10K Sensors: Ambient (all except ducted, cassette, and 9K-12K Tempo) suction, gas, defrost, and pipe sensors.

23K Sensors: Ambient sensors for ducted, cassette, and 9K-12K Tempo

50K Sensors: Discharge sensors

# RESISTANCE VALUES

## Highwall Horizontal Louver Motor

|        | Orange | Yellow  | Pink    | Blue    | Grey   |
|--------|--------|---------|---------|---------|--------|
| Red    | 193 Ω  | 189.5 Ω | 185.4 Ω | 191.5 Ω | -      |
| Orange | -      | 381.6 Ω | 377.4 Ω | 383.3 Ω | 47 Ω   |
| Yellow | -      | -       | 373.9 Ω | 379.9 Ω | -      |
| Pink   | -      | -       | -       | 375.8 Ω | 46.8 Ω |
| Blue   | -      | -       | -       | -       | -      |
| Grey   | -      | -       | -       | -       | -      |

## Highwall Vertical Louver Motor

|        | Yellow | Orange | Blue   | Red    | Grey   |
|--------|--------|--------|--------|--------|--------|
| White  | -      | 92.6 Ω | -      | 47 Ω   | -      |
| Yellow | -      | -      | 93.1 Ω | -      | 47 Ω   |
| Orange | -      | -      | -      | 46.5 Ω | -      |
| Blue   | -      | -      | -      | -      | 46.8 Ω |
| Red    | -      | -      | -      | -      | -      |
| Grey   | -      | -      | -      | -      | -      |

## Highwall Horizontal Louver Motor (FlexFit)

|        | Blue | Violet | Yellow | Orange | Red   |
|--------|------|--------|--------|--------|-------|
| Blue   | -    | 393 Ω  | 394 Ω  | 395 Ω  | 196 Ω |
| Violet | -    | -      | 396 Ω  | 397 Ω  | 198 Ω |
| Yellow | -    | -      | -      | 398 Ω  | 199 Ω |
| Orange | -    | -      | -      | -      | 200 Ω |
| Red    | -    | -      | -      | -      | -     |

## Highwall Vertical Louver Motor (FlexFit)

|        | Blue | Violet | Yellow | Orange | Red   |
|--------|------|--------|--------|--------|-------|
| Blue   | -    | 383 Ω  | 388 Ω  | 390 Ω  | 195 Ω |
| Violet | -    | -      | 381 Ω  | 385 Ω  | 189 Ω |
| Yellow | -    | -      | -      | 388 Ω  | 193 Ω |
| Orange | -    | -      | -      | -      | 196 Ω |
| Red    | -    | -      | -      | -      | -     |

## Ducted Horizontal & Vertical Louver Motors

|        | Red   |
|--------|-------|
| Blue   | 200 Ω |
| Violet | 200 Ω |
| Yellow | 200 Ω |
| Orange | 200 Ω |

## Cassette Louver Motor

|        | Red   |
|--------|-------|
| Orange | 200 Ω |
| Yellow | 200 Ω |
| Blue   | 200 Ω |
| Violet | 200 Ω |

## EEV (6-pin, 5 wire)

|        | White | Yellow | Orange | Blue | X | Red  |
|--------|-------|--------|--------|------|---|------|
| White  | -     | 92 Ω   | 92 Ω   | 92 Ω | - | 46 Ω |
| Yellow | -     | -      | 92 Ω   | 92 Ω | - | 46 Ω |
| Orange | -     | -      | -      | 92 Ω | - | 46 Ω |
| Blue   | -     | -      | -      | -    | - | 46 Ω |
| X      | -     | -      | -      | -    | - | -    |
| Red    | -     | -      | -      | -    | - | -    |

## EEV (6-pin, 6 wire)

|        | White | Yellow | Orange | Blue | Brown | Red  |
|--------|-------|--------|--------|------|-------|------|
| White  | -     | OL     | 92 Ω   | OL   | 46 Ω  | OL   |
| Yellow | -     | -      | OL     | 92 Ω | OL    | 46 Ω |
| Orange | -     | -      | -      | OL   | 46 Ω  | OL   |
| Blue   | -     | -      | -      | -    | OL    | 46 Ω |
| Brown  | -     | -      | -      | -    | -     | OL   |
| Red    | -     | -      | -      | -    | -     | -    |

# COMPONENT RATINGS

## 4-Way Valve

| Ohms | VAC     |
|------|---------|
| 2.1K | 208-230 |

## Basepan Heater

| Ohms           | VAC     |
|----------------|---------|
| 0.28K - 0.379K | 208-230 |

## Fan Motors

| VDC Outputs to DC Fan Motor (VDC) |           |             |            |
|-----------------------------------|-----------|-------------|------------|
| PIN #                             | RED Probe | Black Probe | Value      |
| 6                                 | Vdc       | GND         | 300~380VDC |
| 5                                 | Blank     | Blank       | Blank      |
| 4                                 | GND       | GND         | GND        |
| 3                                 | Vcc       | GND         | 15 ±1.5VDC |
| 2                                 | Vsp       | GND         | 2~6.5VDC   |
| 1                                 | FG        | GND         | 2~9VDC     |

| DC Fan Motor Resistance Values (Ω) |           |             |        |
|------------------------------------|-----------|-------------|--------|
| PIN #                              | RED Probe | Black Probe | Value  |
| 6                                  | Vdc       | GND         | ≥1MΩ   |
| 5                                  | Blank     | Blank       | Blank  |
| 4                                  | GND       | GND         | GND    |
| 3                                  | Vcc       | GND         | ≥1MΩ   |
| 2                                  | Vsp       | GND         | ≥135KΩ |
| 1                                  | FG        | GND         | ≥1MΩ   |

| DC Fan Motor Pin Identification |        |       |                             |
|---------------------------------|--------|-------|-----------------------------|
| PIN #                           | Color  | Abbr. | Definition                  |
| 1                               | Blue   | FG    | Revolution Pulse Output     |
| 2                               | Yellow | Vsp   | Speed Control Voltage Input |
| 3                               | White  | Vcc   | Control Power Voltage Input |
| 4                               | Black  | GND   | Ground                      |
| 5                               | Blank  | Blank | Blank                       |
| 6                               | Red    | Vdc   | Motor Driver Voltage Input  |

