# ESi Decades Extreme R-410A Unitary Service Manual

## Contents



All phases of this installation must comply with National, State and Local Codes.

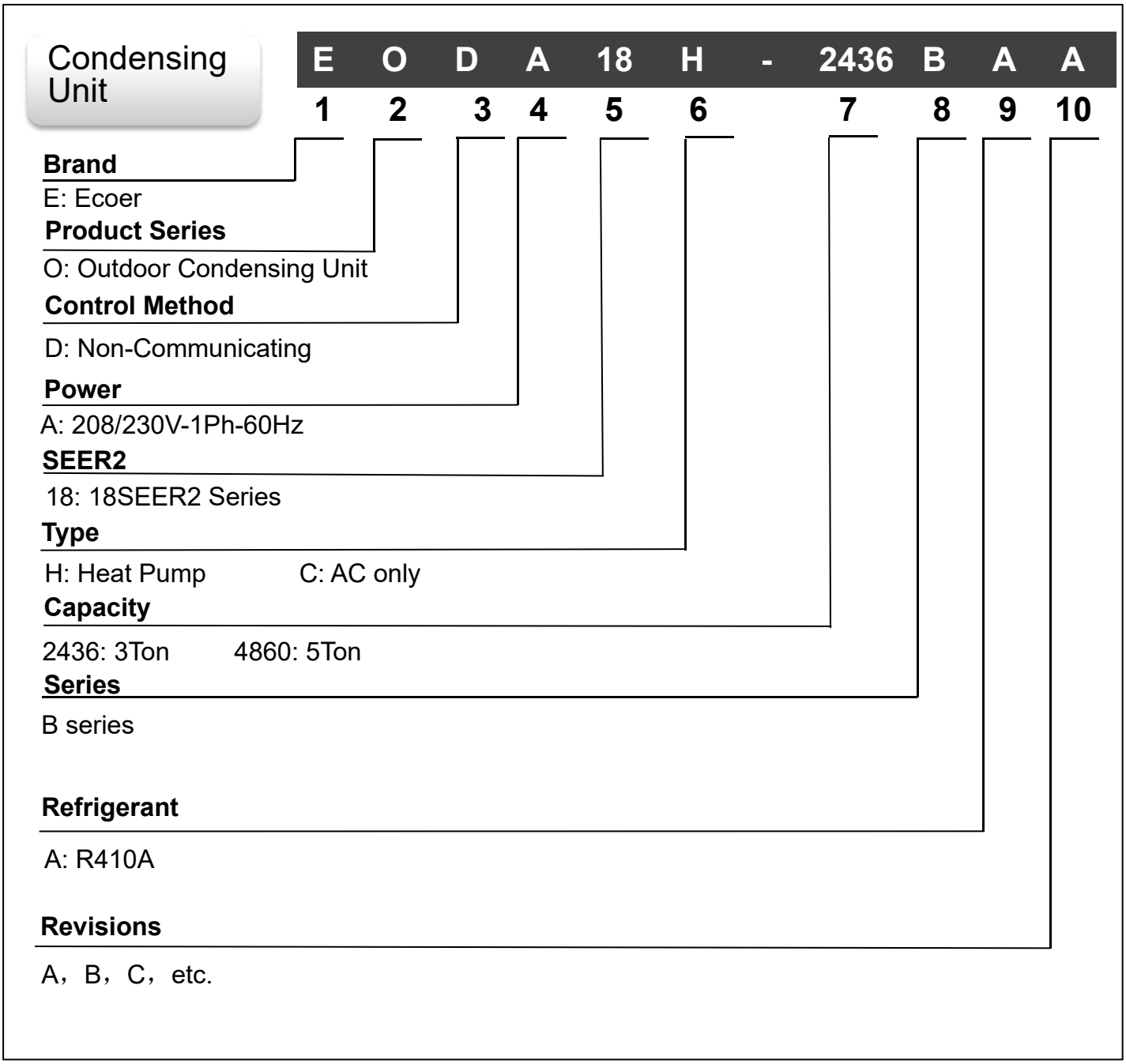
**IMPORTANT**

These instructions do not cover all variations in systems or provide for every possible contingency to be met in connection with installing and servicing. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to local distributor.

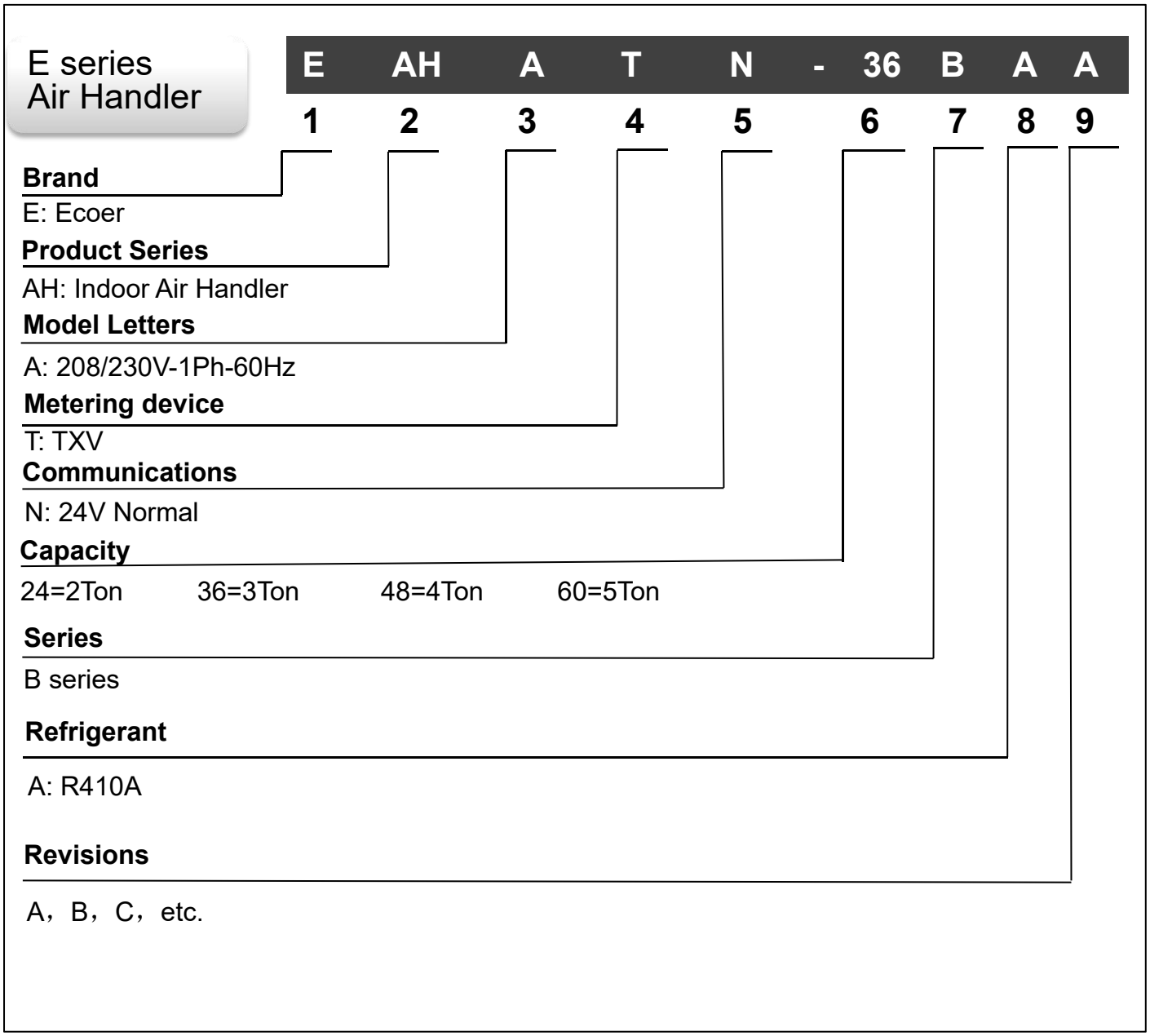
AHRI CERTIFIED® www.ahridirectory.org Unitary Small HP AHRI Standard 210/240 Certification applies only when the complete system is listed with AHRI.

C ETL LISTED US Intertek

# 1 General Information



# 1 General Information

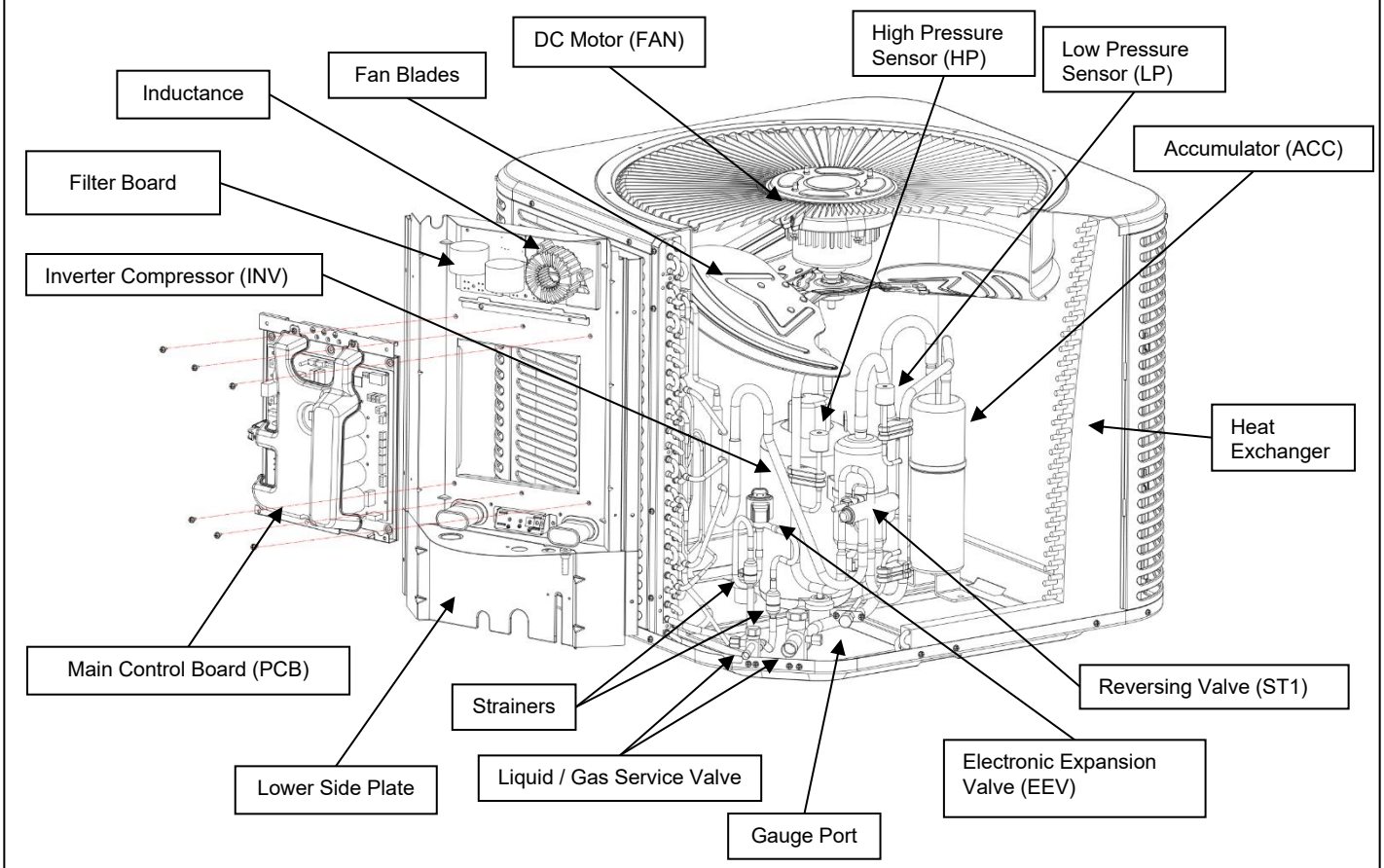


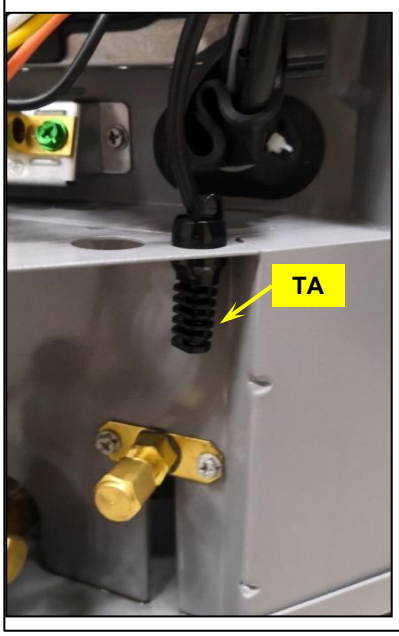
# 2 ESi Decades Extreme Unitary System

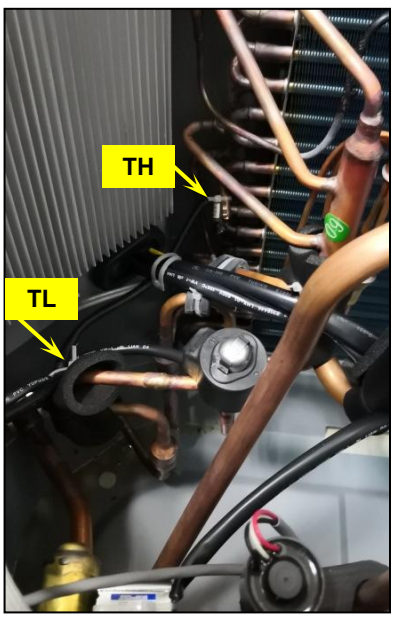
## 2.1 Refrigerant Circuit

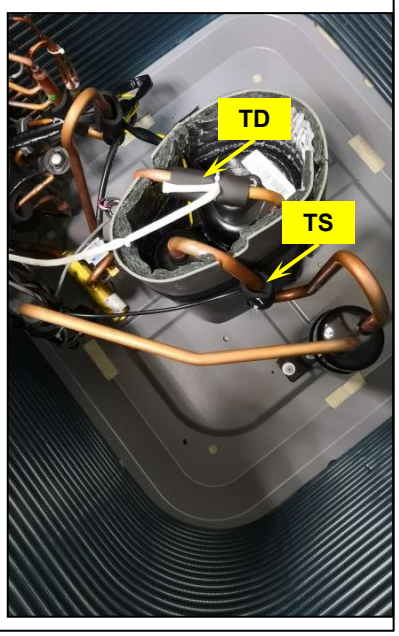
### 2.1.1 Functional Parts Layout of Condensing Units

EODA18H-2436BAA

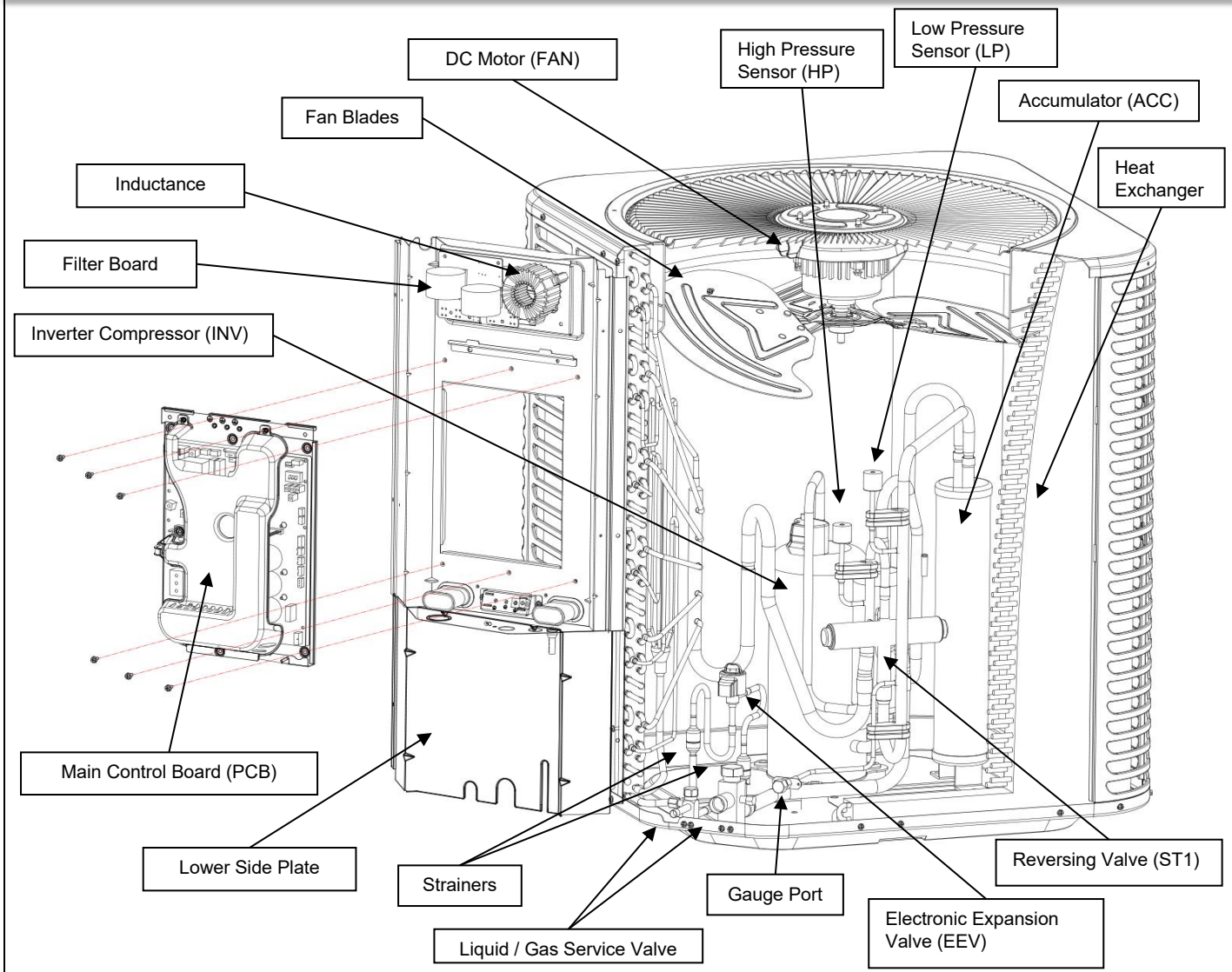


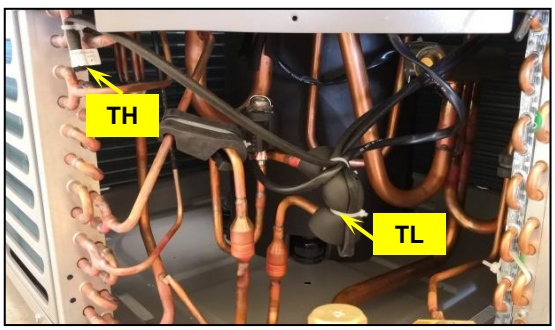



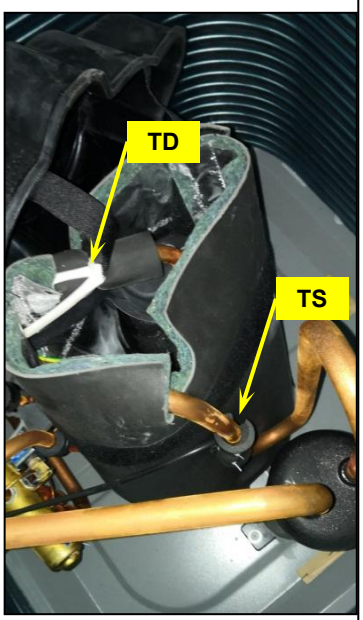



# EODA18H-4860BAA





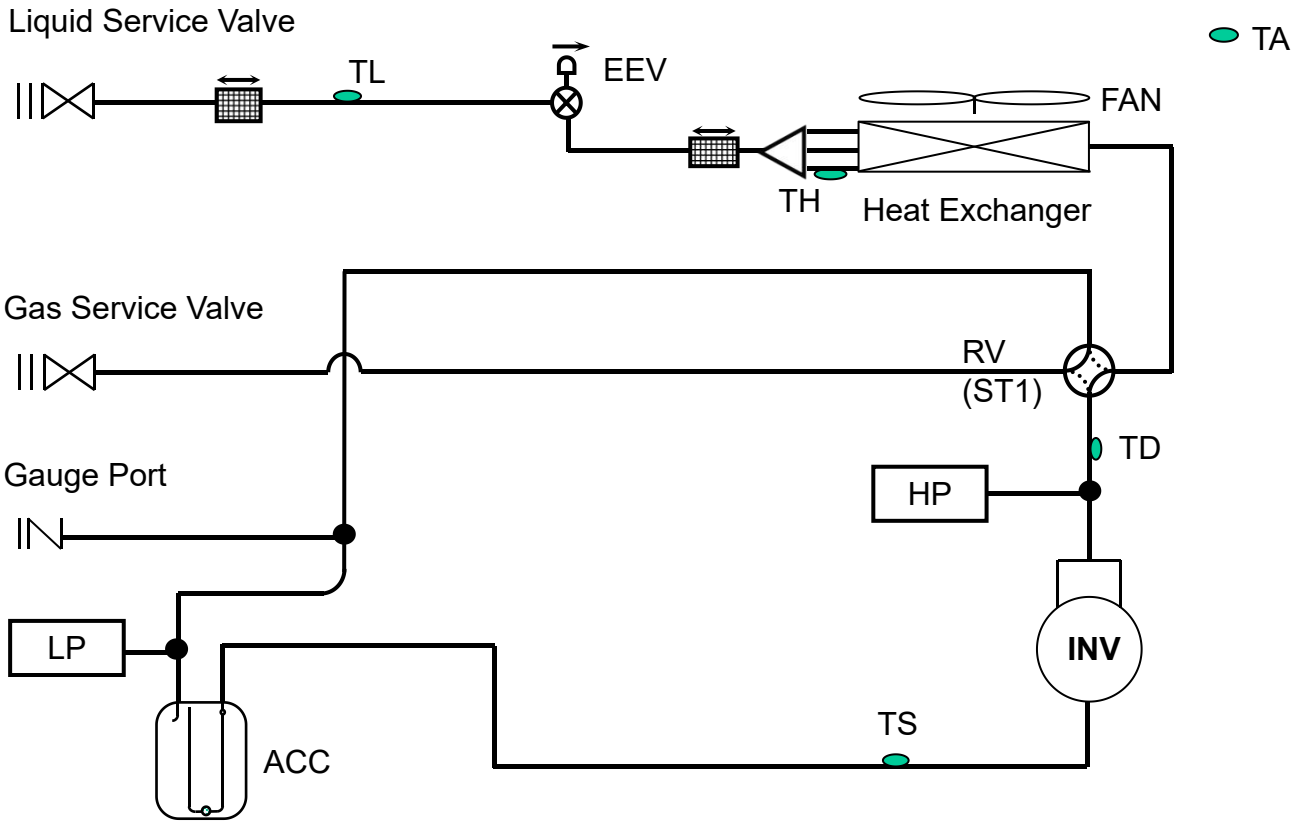



TIPS:
Remove screws to take away the lower side plate to access TH / TL sensors.

A slotted screwdriver may be required to open the plate from the condensing

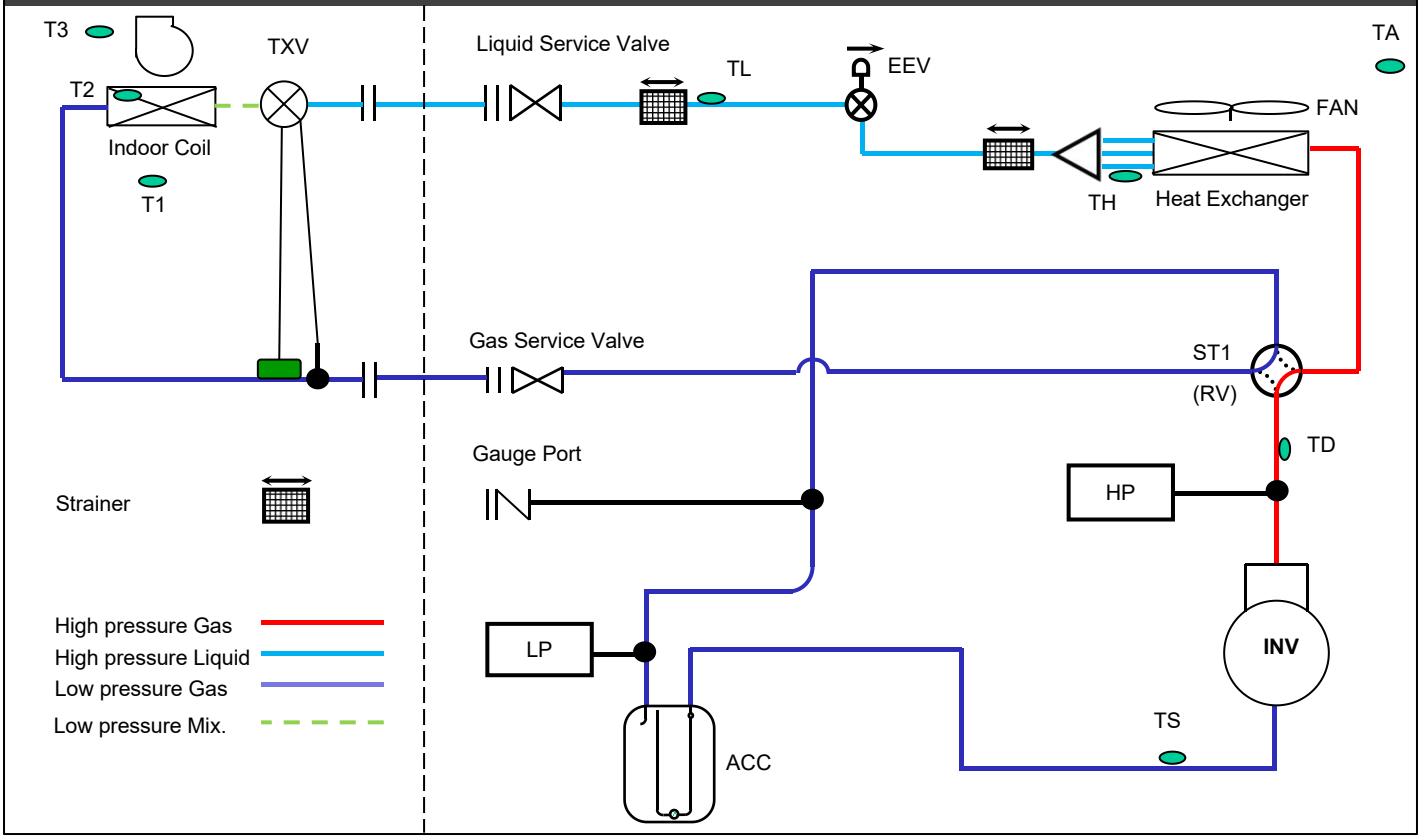
## 2.1.2 Major Components Functions and Refrigerant Circuits Diagram



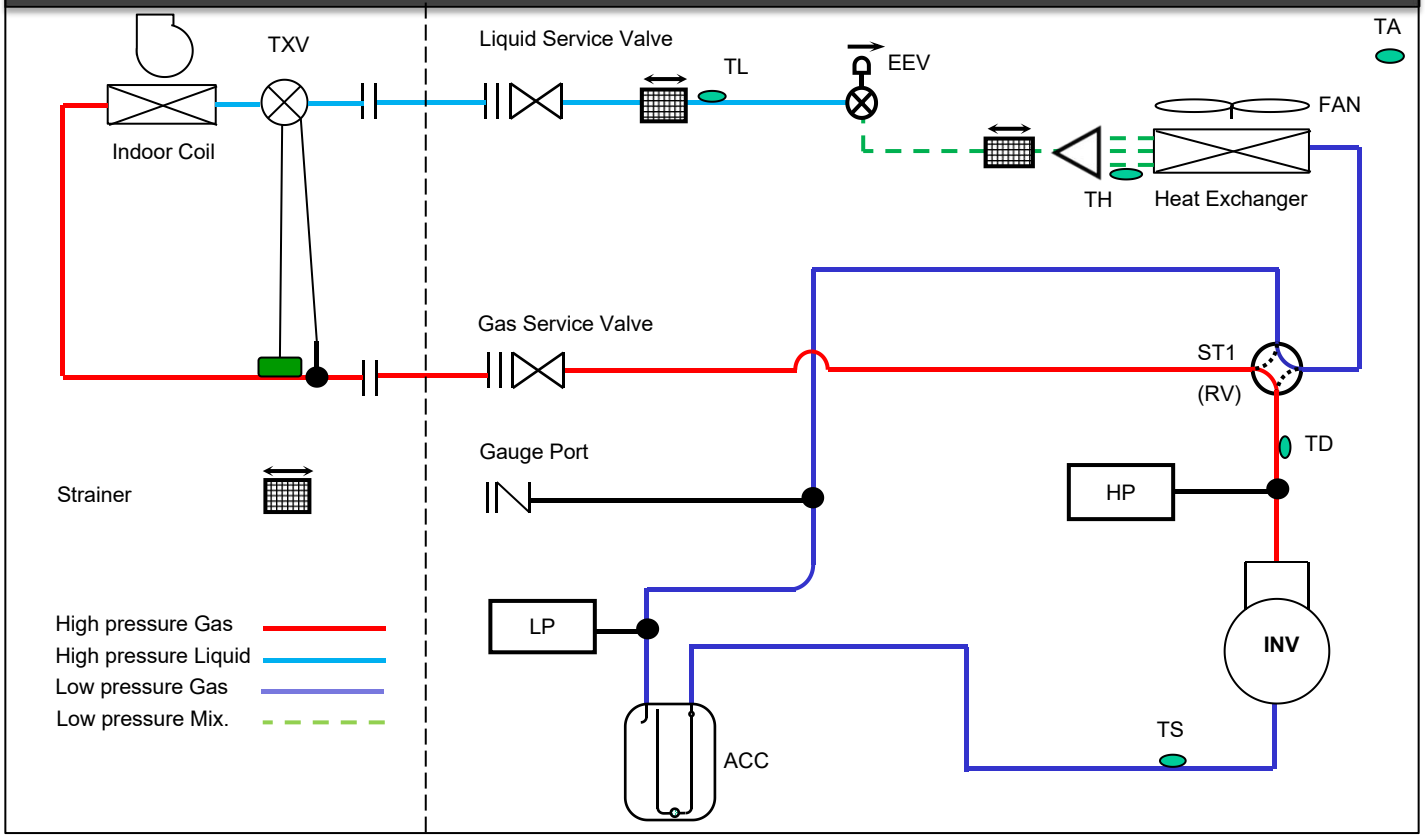

| Name | Symbol | Function |
|---|---|---|
| Inverter compressor | INV | Adjusts refrigerant flow rate by changing the compressor speed (RPS) based on objective pressure. |
| DC motor | FAN | Outputs heat exchanger capacity by adjusting the motor rotation speed based on operating pressure. |
| Electronic expansion valve | EEV | 1) Fully open in cooling mode and defrost operation.<br>2) Control compressor discharge superheat in heating mode. |
| Reversing valve | RV (ST1) | Switches the operation mode between heating and cooling (including defrost control). |
| Temperature sensor | TA | Uses to detect outdoor air temperature and control fan speed. |
| | TS | Uses to detect compressor suction temperature and calculate compressor suction superheat (SH). |
| | TD | Uses to detect compressor discharge temperature and calculate compressor discharge superheat (DSH). |
| | TH | Uses to control defrosting during heating operation. |
| | TL | Uses to detect liquid line temperature and calculate sub-cooling (SC). |
| | TF | Uses to detect heat sink temperature of inverter module. |
| High pressure sensor | HP | Uses to detect high pressure. |
| Low pressure sensor | LP | Uses to detect low pressure. |
| Accumulator | ACC | Uses to store excess refrigerant. |

# 2.1.3 Refrigerant Flow of Each Operation Mode

## Cooling Operation (including defrost operation and cooling oil return)

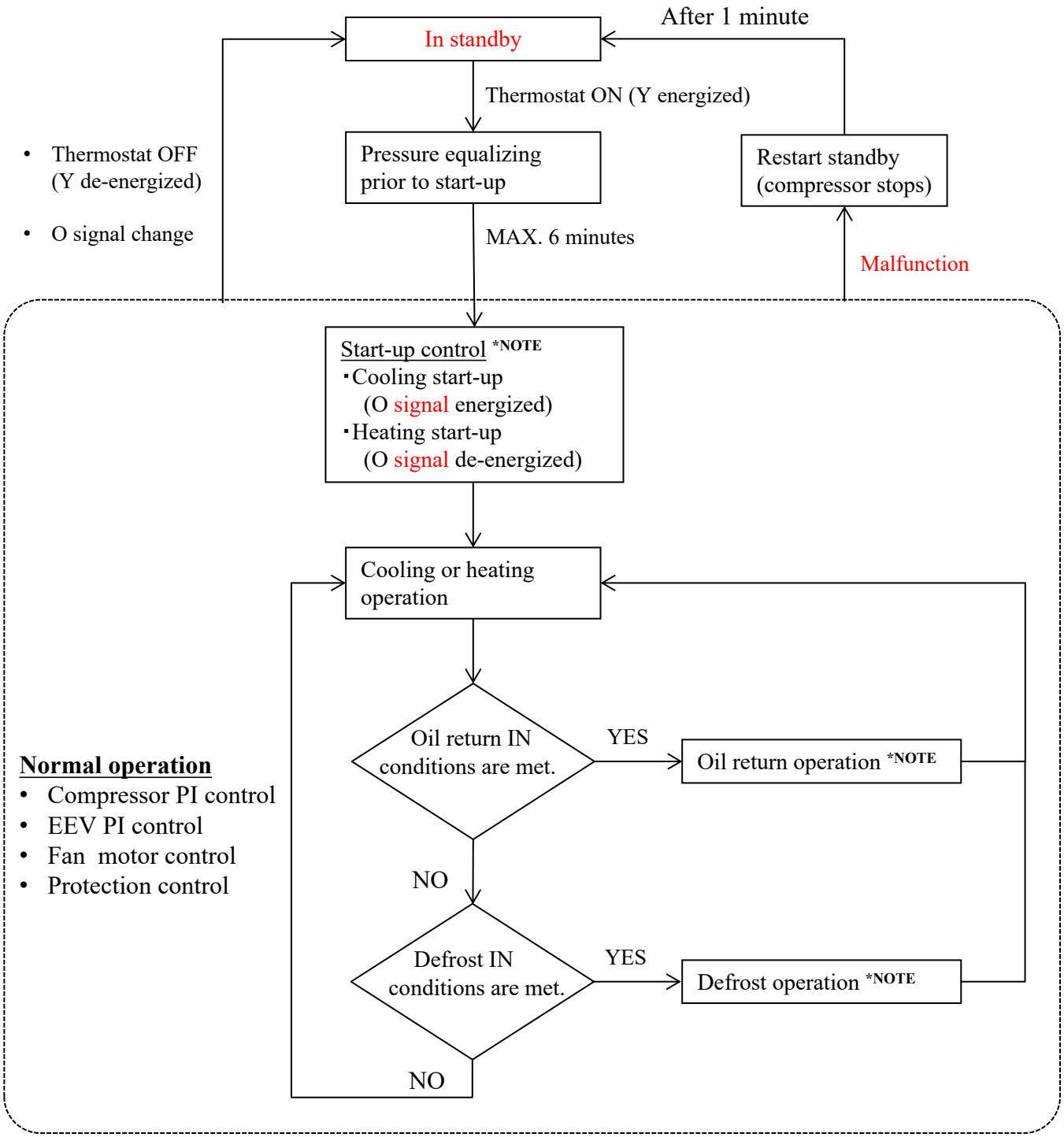



## Heating Operation (including heating oil return)



# 2.2 Function and Control

## 2.2.1 Operation Mode




NOTES: The operation may be enforced to complete under some conditions.

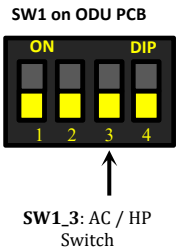
# 2.2.2 Basic control

## 2.2.2.1 Normal control

| Input Signal | Actuator | Cooling control (including cooling oil return) | Heating control (including heating oil return) |
|---|---|---|---|
| **Y** | Compressor (INV) | Apply PI control to maintain Tes*1 | Apply PI control to maintain Tcs*1 |
| **Y / O*2** | Outdoor fan (FAN) | Cooling fan control | Heating fan control |
| **O*2** | Reversing valve (ST1) | De-energized**(208/230VAC)** | **Energized (208/230VAC)** |
| **Y / O*2** | Electronic expansion valve (EEV) | 480pls | PI control to maintain discharge superheat (DSH) |

Remarks:

1. Tes: Target Te value (Varies depending on the load of space, mode choice, silent setting, etc.)
   Te: Low pressure equivalent saturation temperature
   Tcs: Target Tc value (Varies depending on the load of space, mode choice, silent setting, etc.)
   Tc: High pressure equivalent saturation temperature
2. SW1_3=OFF (factory), condensing unit uses Y/C/O (O for cooling) signal to operate heat pump.
   SW1_3=ON has been set, condensing unit uses Y/C signal to run cooling only.




## 2.2.2.2 Defrost control

This system carries out demand defrost control if any one of the following conditions satisfy.

I. The calculated temperature difference between ambient temperature (TA) and defrost temperature (TH) is called Delta T. After Delta T is achieved and continues for 5 minutes.

   a) TA is between 41℉ and 59 ℉: TH ≤ 30℉, Delta T = 18℉
   b) TA is between 19℉ and 41℉: TH ≤ 30℉, Delta T = 12~18℉
   c) TA is less than 19℉: TH < 9℉, accumulative compressor run time ≥ 80 minutes

   TH back-up running: TA < 59℉ and LP ≤ 90psi, accumulative compressor run time ≥ 60 minutes

II. After "Minimum Run Time" (MRT) is achieved.

   a) MRT is 3.5 hours if TA is less than 23℉
   b) MRT is 2 hours if TA is between 23℉ and 43℉

III. The high pressure drops below 245psi for 20 minutes if TA is between 14℉ and 28℉.

Defrost Exit:

Defrost will be terminated once defrost temperature sensor (TH) reaches 64℉ for one (1) minute or the defrost time has exceeded eight (8) minutes. Defrost mode setting (n04) offers termination options for different geographical conditions.

   a) Defrost in heavy snow area will extend defrost for one (1) minute, but reduce the heating time to execute more defrost cycles.
   b) Defrost in light snow area will reduce defrost for 30 seconds.

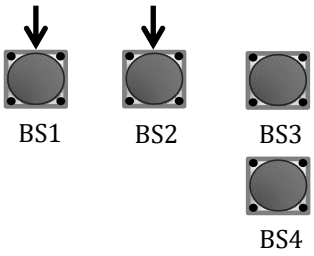
### 2.2.2.3 Manual Defrost

Manual defrosting mode can be used when verifying defrosting or forcing defrosting.

Note: After 5-10 minutes of continuous heating operation, the unit can respond to manual defrosting in time; otherwise, the unit will enter after meeting the requirements.

Enter in either way:

Hold on BS1+BS2 for 5 seconds / n08




Exit in either way:

Defrost exit automatically/Heating demand off/Power off

### 2.2.2.4 AUTO charge mode in cooling or Rated running mode

**a. Actuator and procedure**

| Actuator | AUTO charge mode OR Rated running in cooling | Rated running in heating |
|---|---|---|
| Compressor (INV) | Rated compressor speed in cooling | Rated compressor speed in heating |
| Outdoor fan (FAN) | Cooling fan control | Heating fan control |
| Reversing valve (ST1) | De-energized**(208/230Vac)** | **Energized (208/230Vac)** |
| Electronic expansion valve (EEV) | 480pls | PI control to maintain DSH |

**Step by Step procedure (A: Charging mode/B: Rated running):**

1. Setting the operating mode from thermostat.
*Note: A low(cooling)/high(heating) target temperature is recommended for continuous operation of the unit.


**Rough Target SSH in cooling**


Note: SSH are available from Spot Check(03-) by press BS3 or Ecoer Pro APP.

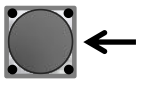
2. Run for about 15 minutes.

3. Check the SSH (only for charge mode in cooling):

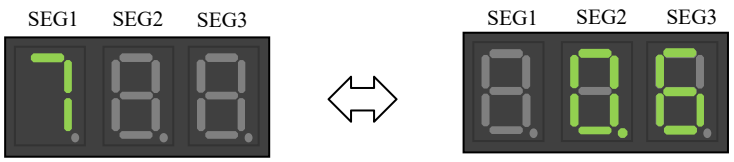
If the suction superheat is beyond 7-20°F, please use a wrench to **adjust** the TXV opening, see tips for details.

4. In the operation, setting Rated running model from OD unit.
Please Hold and press BS4 button for 5 seconds until you see blinking “7” .

*Note: Once Rated running is activated. The coefficient number (or “--”) and “7” will be displayed on LED alternately in about 1 minute.




5. Run for another 10 minutes.



| | |
|---|---|
| 6. A: Check the refrigerant coefficient:<br>Check refrigerant coefficient number from LED display or ESS Pro App, **pls see nest page for the suggestion of charging**.<br>If adjust the charging, please repeat 5.1 after 5 minutes. | 6. B: Check operating status:<br>Check the operation status as field required |

Use either way below to end :
Press BS4/shut off from thermostat/Power off/running for120 minutes.

### b. Charge confirm in Auto charge mode in cooling

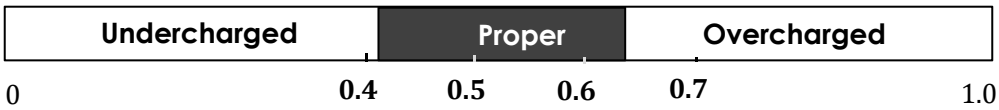
**It is the only recommended method of charging above 55°F outdoor ambient temperatures.
**It is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55°F.

Run the system for 15~20 minutes and check **refrigerant coefficient** number (here short for "X", 0 < X < 1) from the LED display. If X > 0.6, remove refrigerant; or X < 0.4, add more refrigerant. Then wait for 5 minutes to allow system pressure balanced. Check the new coefficient number to make sure you get 0.5 -- 0.6. Basically, 0.4 to 0.6 is acceptable if 7°F≤ SSH ≤ 20°F.

**When the LED displays "--" for more than 20 minutes, stop charging and adjust the TXV opening to ensure required compressor suction superheat** (Refer to the TIPS "How to adjust indoor TXV opening").

**Refrigerant coefficient**

The refrigerant coefficient is used to evaluate the refrigerant level in the ecoer system.




**Use either way below to end AUTO charge mode**

Press **BS4 once/** After 2 hours running (Automatically EXIT)/ Turn off the system at thermostat

**NOTES:**

1. This AUTO charge mode is suitable for ambient temperature between 50°F and 115°F. But for the best results, indoor temperature should be kept between 70°F and 80°F. For outdoor ambient temperature is below 50°F, use weigh-in charge method only.


a) Outdoor ambient b) Indoor ambient

Fig 13-2 Temperature limit for AUTO charge mode

2. Start-up control is enforced to complete prior to activate the AUTO charge mode. It may take 4 to 10 minutes to exit start-up control procedure and fix the compressor speed (RPS).

## 2.2.2.5 Pump down function

### b. Pump down in cooling only

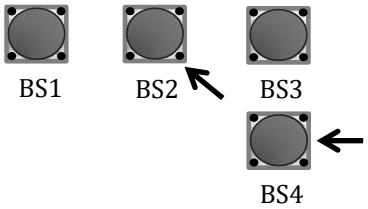
| Actuator | Pump down in cooling |
|---|---|
| Compressor (INV) | Rated compress speed to Low compressor speed |
| Outdoor fan (FAN) | Cooling fan control |
| Reversing valve (ST1) | De-energized |
| Electronic expansion valve (EEV) | 480pls |

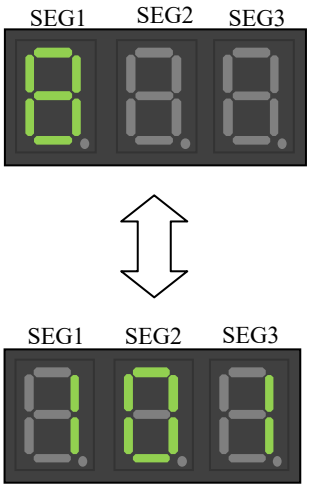
**Pump down Step by Step:**

1. Setting in cooling mode from thermostat.
   *Note: A low target temperature is recommended for continuous operation of the unit.


2. Run for about 10 minutes.

3. In cooling running, Setting Pomp down mode from OD unit.
   Please Hold and press BS4 button for 5 seconds until you see blinking '7', press BS2 button in one minute to get '8'.
   *Note: Once pump down is activated. "8" or "8" alternating with LP (PSIG) will be displayed on the LED.




4. Confirm the alternate display of "8" and LP(PSIG), close the liquid service valve, and then close service valve quickly when the suction pressure drops to 40 PSIG.

Note: The pressure protection is valid if LP < 24.5 PSIG.
Note: It is recommended to close the two service valves to half first to deal with LP protection shutdown more quickly.

5. Power off.

Use either way below to end :
Press BS4/shut off from thermostat/Power off/running for120 minutes.

### 2.2.2.6 Compressor control


Min 6 minutes for standby

Pressure differential control
MAX time (cooling) ≤ 10 minutes
MAX time (heating) ≤ 15 minutes

Depending on the load of the space.

## [Compressor RPS VS STEP]

| STEP | RPS | STEP | RPS | STEP | RPS | STEP | RPS | STEP | RPS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 10 | 30 | 19 | 48 | 28 | 66 | 37 | 84 |
| 2 | - | 11 | 32 | 20 | 50 | 29 | 68 | 38 | 86 |
| 3 | 16 | 12 | 34 | 21 | 52 | 30 | 70 | 39 | 88 |
| 4 | 18 | 13 | 36 | 22 | 54 | 31 | 72 | 40 | 90 |
| 5 | 20 | 14 | 38 | 23 | 56 | 32 | 74 | 41 | 92 |
| 6 | 22 | 15 | 40 | 24 | 58 | 33 | 76 | 42 | 94 |
| 7 | 24 | 16 | 42 | 25 | 60 | 34 | 78 | 43 | 96 |
| 8 | 26 | 17 | 44 | 26 | 62 | 35 | 80 | 44 | 98 |
| 9 | 28 | 18 | 46 | 27 | 64 | 36 | 82 | 45 | 100 |

| Outdoor Capacity | 2Ton | 3Ton | 4Ton | 5Ton |
|---|---|---|---|---|
| Cooling Max RPS | 70 | 86 | 66 | 76 |
| Heating Max RPS (Ta≥45°F) | 64 | 82 | 64 | 72 |
| Heating Max RPS (45°F>Ta≥23°F) | 80 | 94 | 80 | 86 |
| Heating Max RPS (Ta<23°F) | 90 | 108 | 86 | 92 |

### 2.2.2.7 Fan control

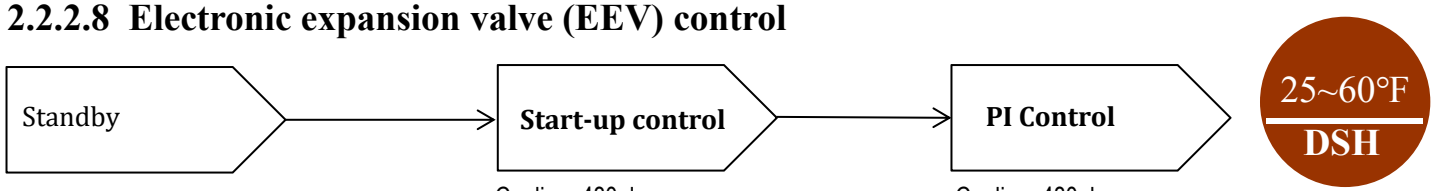

Initial Step

Cooling fan control by high pressure
Heating fan control by low pressure

## [Fan RPM VS STEP]

| Mode | STEP/RPM | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tons | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2 | 0 | 250 | 350 | 430 | 530 | 630 | 660 | 780 | 880 |
| 3 | 0 | 250 | 350 | 480 | 580 | 660 | 730 | 830 | 930 |
| 4 | 0 | 250 | 350 | 480 | 580 | 700 | 780 | 880 | 980 |
| 5 | 0 | 250 | 350 | 550 | 630 | 780 | 830 | 930 | 1030 |

### 2.2.2.8 Electronic expansion valve (EEV) control




Cooling: 360pls→480pls
Heating: 360pls→0pls

Cooling: 480pls
Heating: Temperature differential control

Cooling: 480pls
Heating: Depending on the compressor discharge superheat (**DSH**). *NOTE

**NOTE: Heating DSH should be between 25 ℉ and 60 ℉ with proper refrigerant level.**

### 2.2.2.9 Silent mode

In order to decrease the noises produced by condensing unit, the crucial noise resources should be limited. Once the silent mode has been activated by n05, n06 and n07 (refer to field setting), both the highest compressor frequency (RPS) and fan speed (RPM) are limited.

**Maximum compressor frequency**

| Cooling Max Compressor RPS | | | |
|---|---|---|---|
| Condenser Capacity | Standard Mode | Silent Mode (Level 1) | Super Silent Mode (Level 2) |
| 2Ton | 70 | 66 | 56 |
| 3Ton | 80 | 76 | 70 |
| 4Ton | 66 | 66 | 56 |
| 5Ton | 76 | 68 | 58 |

| Heating Max Compressor RPS | | | |
|---|---|---|---|
| Condenser Capacity | Standard Mode | Silent Mode (Level 1) | Super Silent Mode (Level 2) |
| 2Ton | 80 | 70 | 60 |
| 3Ton | 90 | 78 | 72 |
| 4Ton | 80 | 62 | 52 |
| 5Ton | 90 | 70 | 60 |

**Maximum fan speed**

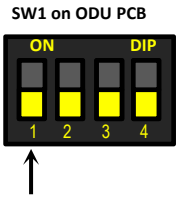
| Max Fan Speed (RPM) | | | |
|---|---|---|---|
| Condenser Capacity | Standard Mode | Silent Mode (Level 1) | Super Silent Mode (Level 2) |
| 2Ton | 880 | 640 | 530 |
| 3Ton | 930 | 730 | 580 |
| 4Ton | 980 | 780 | 580 |
| 5Ton | 1030 | 830 | 630 |

### 2.2.2.10 Snow Sensor Control

To prevent the fan of condensing unit from covering up by heavy ice. ESI equips with the snow sensor control function if the ambient temperature is no higher than 41F.
When the snow sensor control works, ODM rotate at the 3th step for 2min then shut down.

| ODU | OD Fan Tap | Heavy Snow | Standard | Light Snow |
|---|---|---|---|---|
| 2/3T | STEP3 | 30 min | 90 min | 120 min |
| 4/5T | STEP3 | | | |

| SW1 Dip switch | | Description | |
|---|---|---|---|
| NO. | Setting item | Status | Content |
| 1 | Snow Sensor Control * | ON | Disable |
| | | OFF (factory) | Enable |

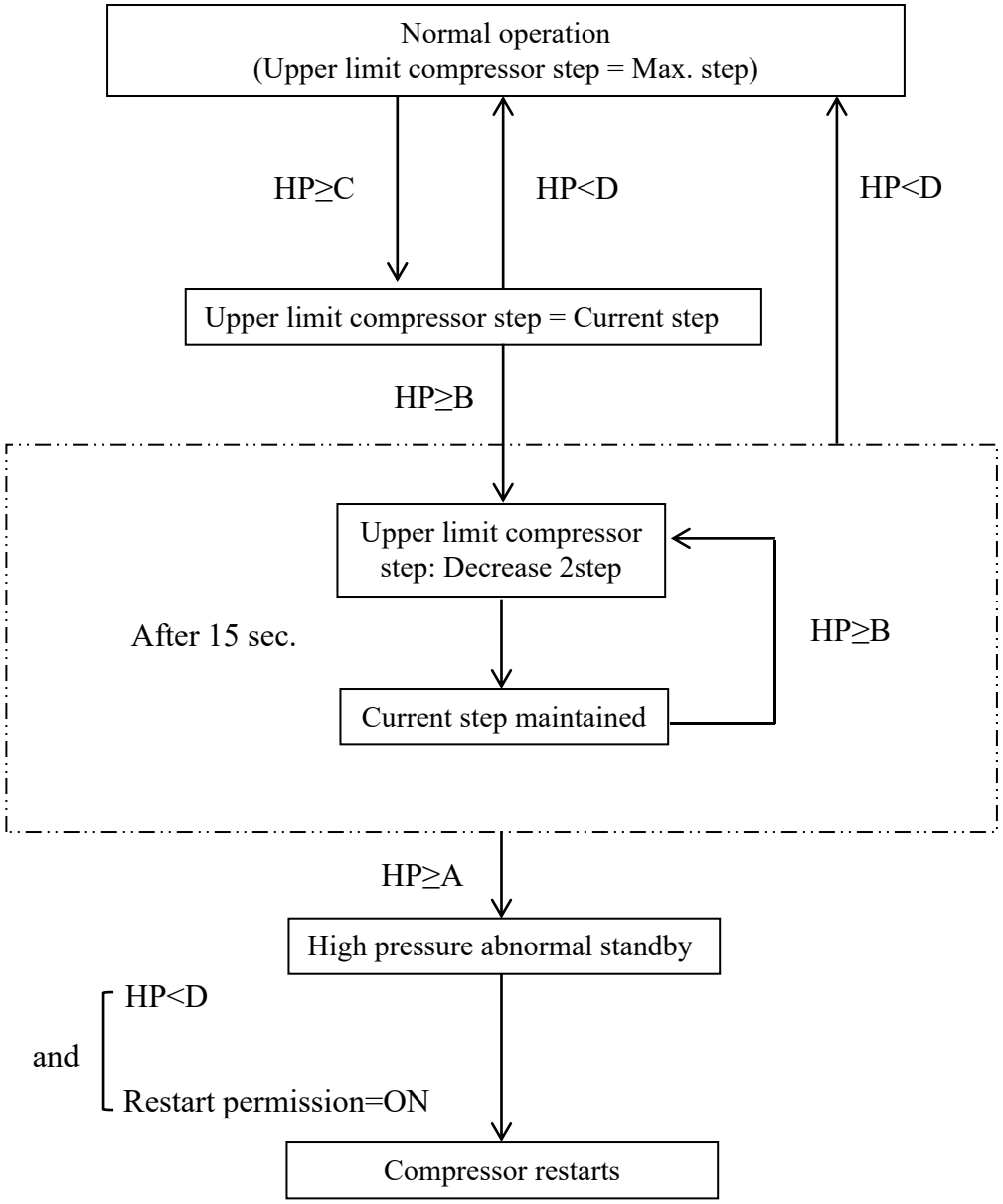



**SW1_1**:
Snow Sensor Control

# 2.2.3. Protection controls

## 2.2.3.1 High pressure protection control

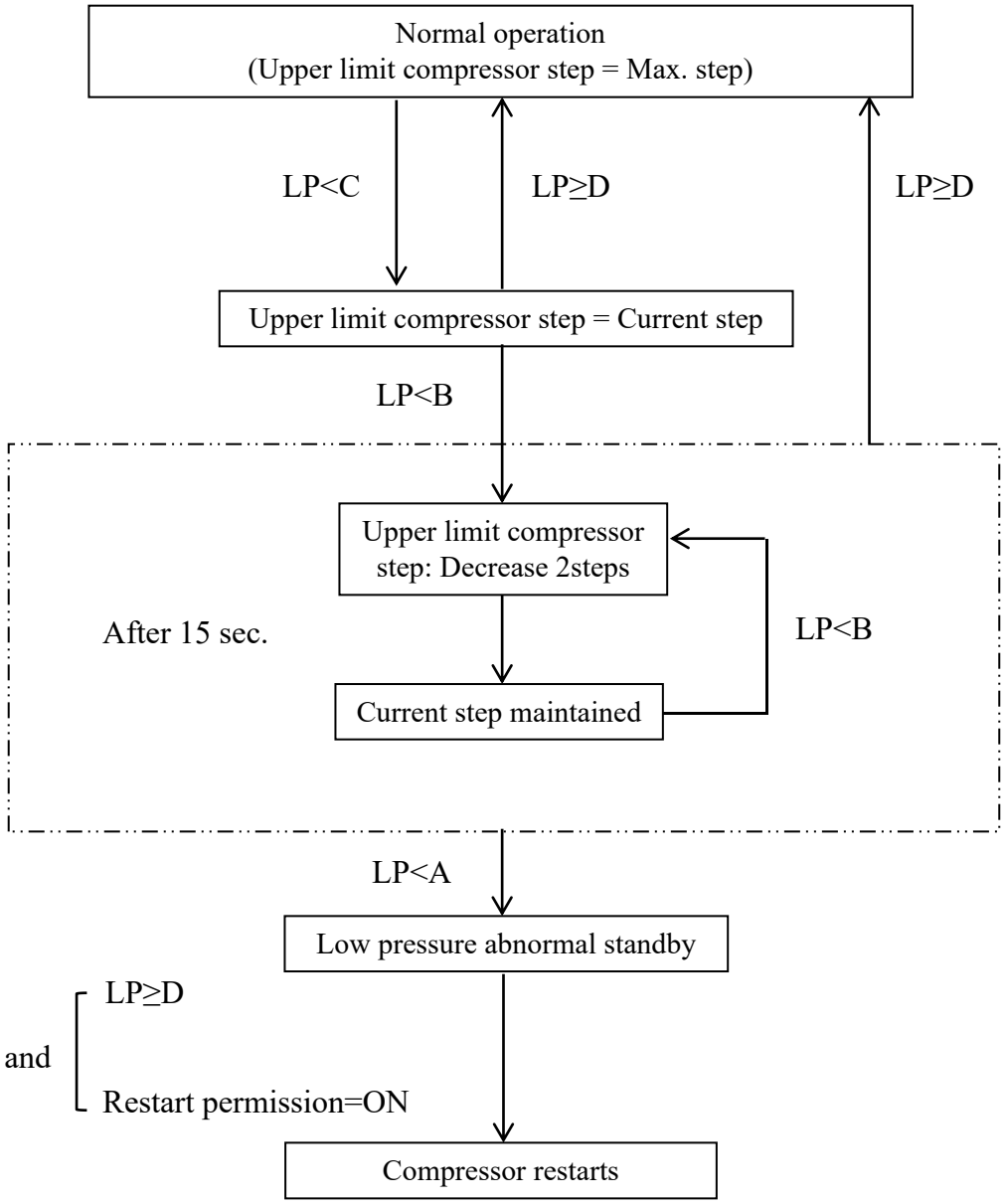
High pressure (HP) protection control is used to prevent extremely high pressures in the system and protect the compressor.




| Symbol | EODA18H-2436/4860 | |
|---|---|---|
| | Cooling | Heating |
| A | 545psig [3.8MPa] | 545psig [3.8MPa] |
| B | 493psig [3.4MPa] | 479psig [3.3MPa] |
| C | 479psig [3.3MPa] | 450psig [3.1MPa] |
| D | 464psig [3.2MPa] | 421psig [2.9MPa] |

### 2.2.3.2 Low pressure protection control in cooling mode

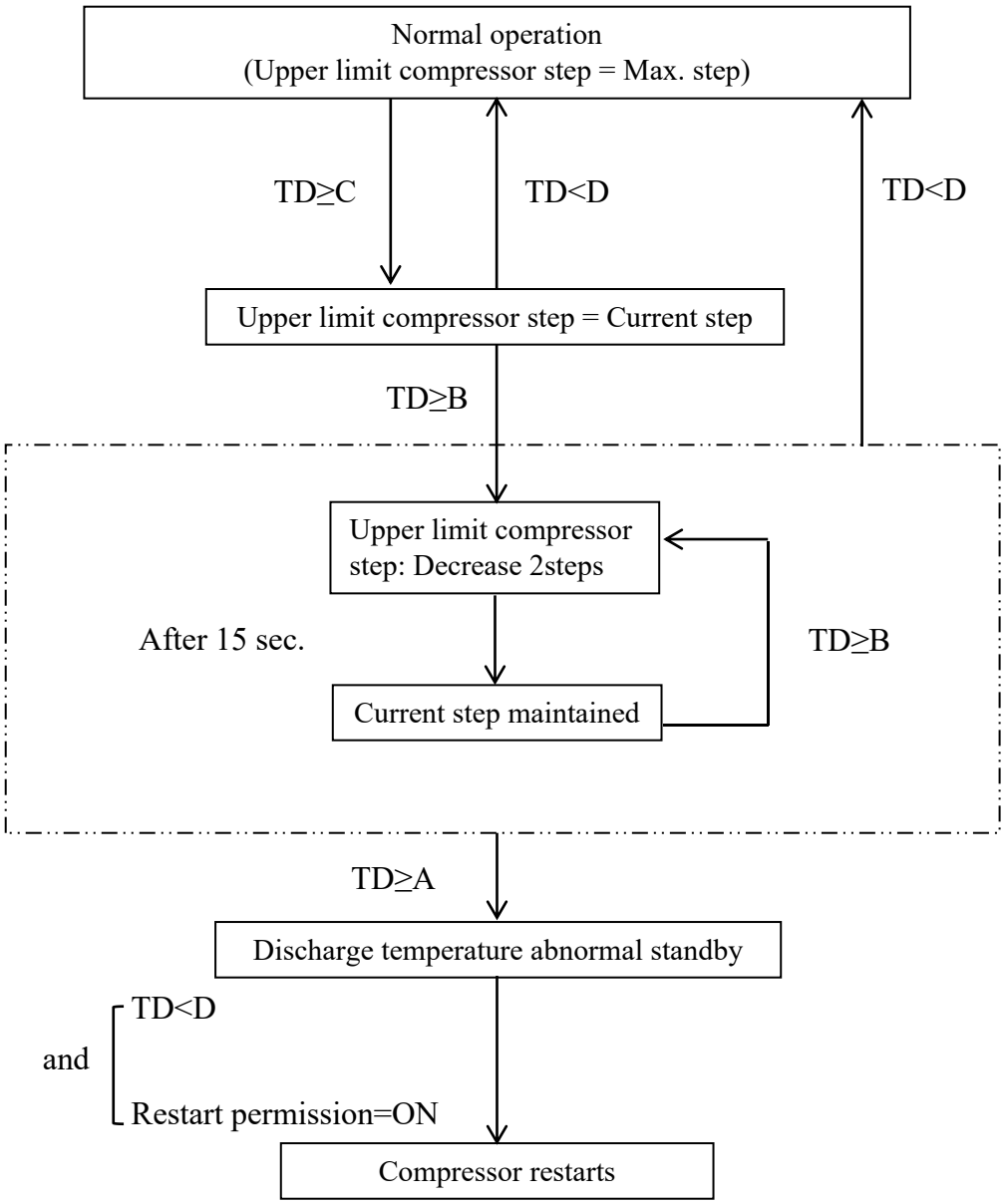
Low pressure (LP) protection control in cooling is used to protect compressor against the transient decrease of low pressure.




| Symbol | EODA18H-2436/4860 |
|---|---|
| A | 24.5psig [0.17MPa] |
| B | 43.5psig [0.30MPa] |
| C | 61.0psig [0.42MPa] |
| D | 72.5psig [0.50MPa] |

### 2.2.3.3 Discharge temperature protection control

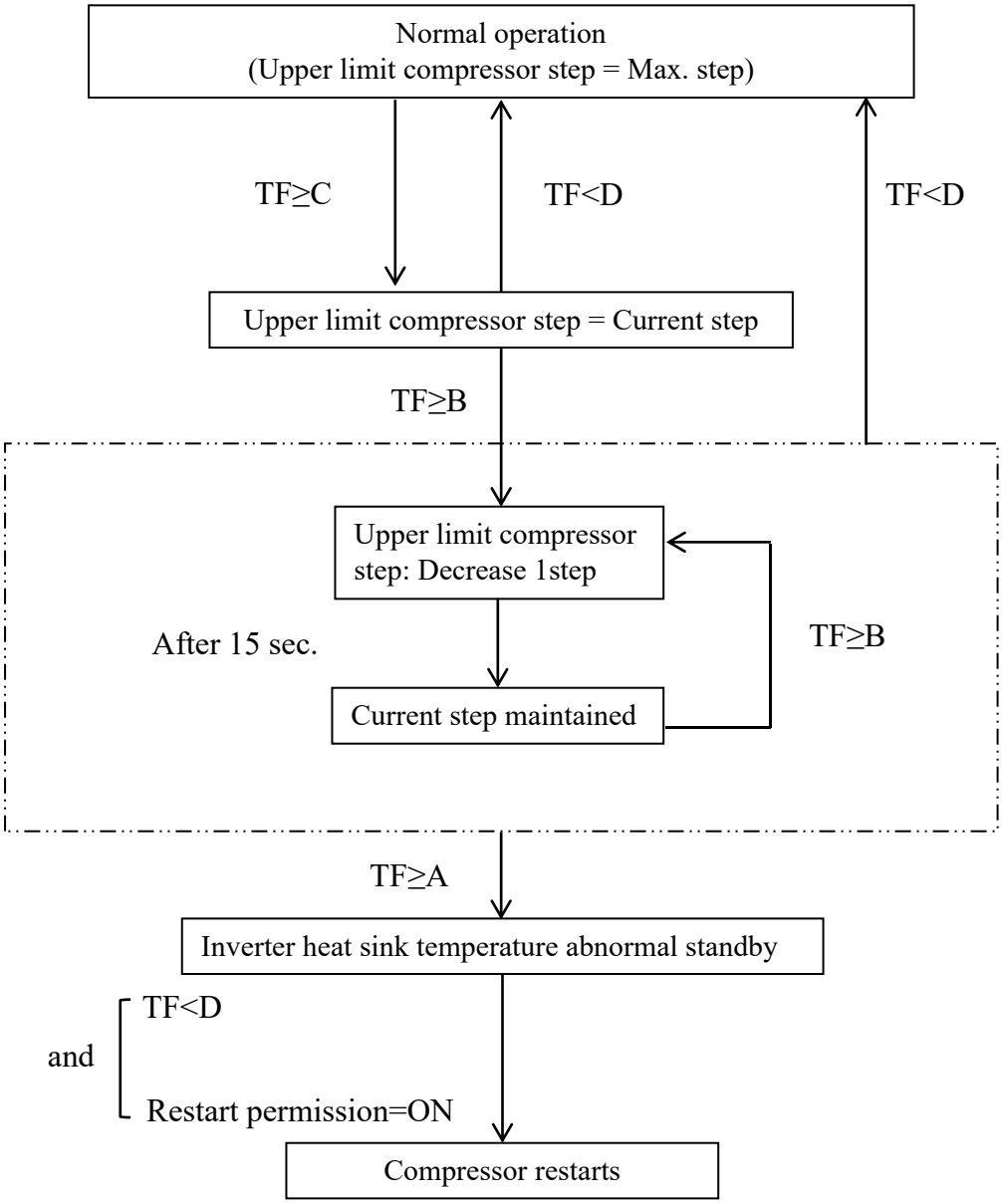
This discharge temperature (TD) protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.




| Symbol | EODA18H-2436/4860 | |
|---|---|---|
| | Cooling | Heating |
| A | 248°F (120°C) | 230°F (110°C) |
| B | 230°F (110°C) | 212°F (100°C) |
| C | 212°F (100°C) | 194°F (90°C) |
| D | 194°F (90°C) | 176°F (80°C) |

### 2.2.3.4 INV Module temperature protection control

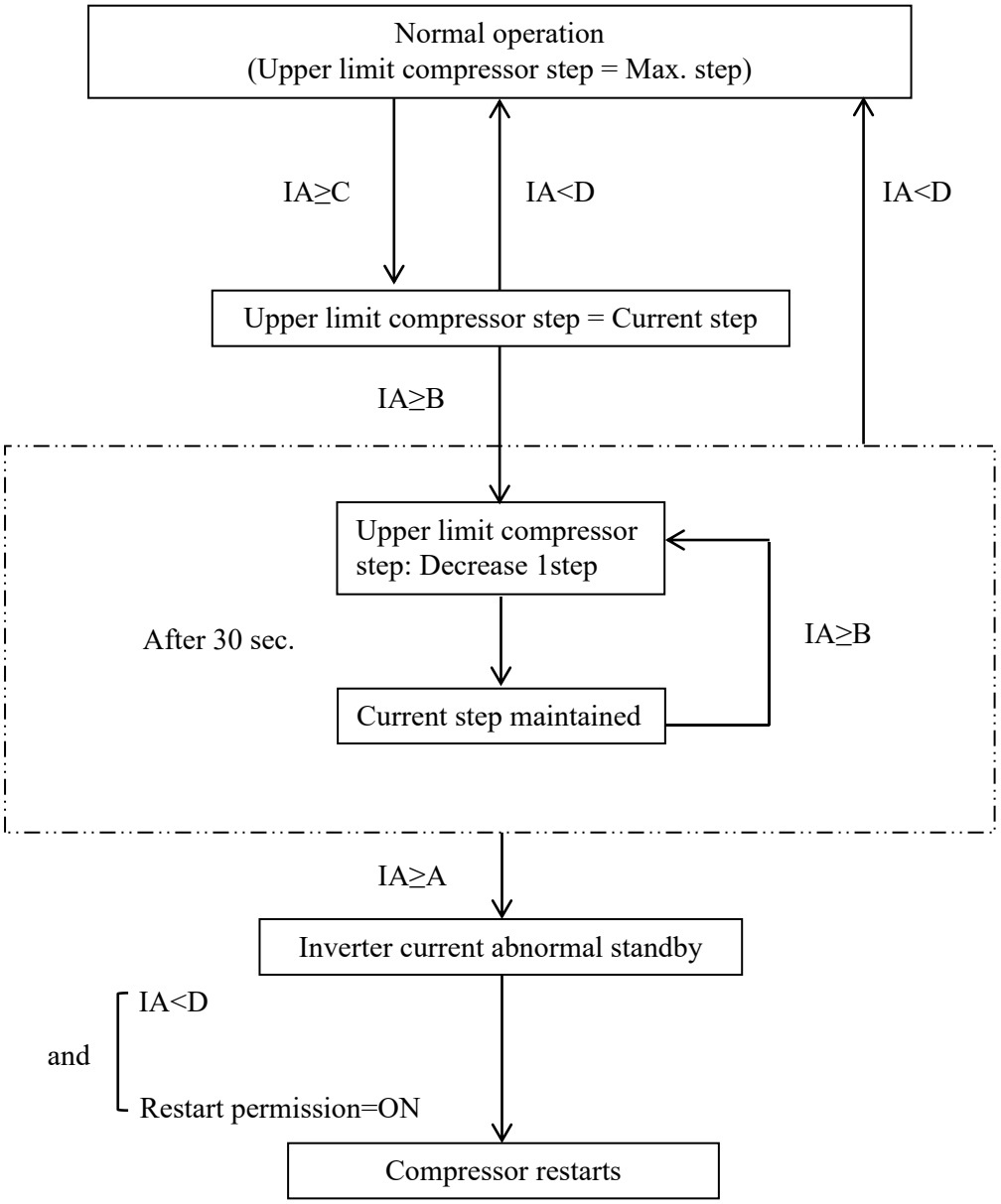
Inverter module temperature (TF) protection control is performed to prevent tripping due to an abnormal increase in temperature.




| Symbol | EODA18H-2436 | | EODA18H-4860 | |
|---|---|---|---|---|
| | Cooling | Heating | Cooling | Heating |
| A | 199°F (93°C) | 185°F (85°C) | 203°F (95°C) | 185°F (85°C) |
| B | 192°F (89°C) | 167°F (75°C) | 185°F (85°C) | 167°F (75°C) |
| C | 185°F (85°C) | 160°F (71°C) | 178°F (81°C) | 160°F (71°C) |
| D | 180°F (82°C) | 154°F (68°C) | 172°F (78°C) | 154°F (68°C) |

## 2.2.3.5 Compressor over-current protection control

This control is performed to prevent tripping due to an abnormal transient compressor current (IA).

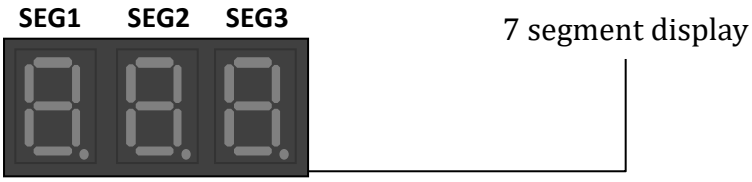



| Symbol | EODA18H-2436 | | EODA18H-4860 | |
|---|---|---|---|---|
| | Cooling | Heating | Cooling | Heating |
| A | 14A | 14A | 20A | 20A |
| B | 7.6A | 7.6A | 12.1A | 12.1A |
| C | 7.2A | 7.2A | 11.7A | 11.7A |
| D | 6.8A | 6.8A | 11.2A | 11.2A |

# 2.3 Field Setting

## 2.3.1 Default display

LED on main control board can display the operating status of outdoor unit (ODU).




**SEG1:** Normally blank, but it displays codes "0 to 9" accordingly if there is damaged sensor and command response.

| SEG1 Code | Description | Time |
|---|---|---|
| 0 | Software is updating through IoT device | About 5 min. |
| 1 | High pressure sensor (HP) fault back-up running | 7 Days |
| 2 | Low pressure sensor (LP) fault back-up running | 7 Days |
| 3 | Compressor discharge temperature sensor (TD) fault back-up running | 7 Days |
| 4 | IPM module temperature sensor (TF) fault back-up running | 7 Days |
| 5 | Ambient temperature sensor (TA) fault back-up running | 120 Days |
| 6 | Defrost sensor (TH) fault back-up running | 90 Days |
| 7 | Compressor suction temperature sensor (TS) fault back-up running | 120 Days |
| 8 | Liquid line temperature sensor (TL) fault back-up running | 120 Days |
| 9 | IoT command response | - |

**SEG2:** Normally blank, but it will display code accordingly as below if outdoor unit is running under limited condition.

| SEG2 Code | Description |
|---|---|
| 0 | Running under high pressure (HP) limit |
| 1 | Running under low pressure (LP) limit |
| 2 | Running under discharge temperature (TD) limit |
| 3 | Running under IPM module temperature (TF) limit |
| 4 | Running under compressor current limit |

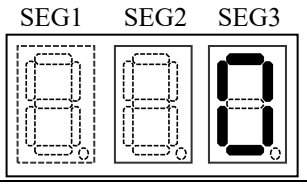
**SEG3:** It displays outdoor unit's operation mode.

| SEG3 Code | Description |
|---|---|
| 0 | Stop (Y signal de-energized) |
| 1 | Ready to start-up (Y signal energized) ***Note** |
| 2 | Cooling |
| 3 | Heating |
| 4 | Oil return |
| 5 | Defrost |
| 6 | Manual defrost |
| 7 | AUTO charge mode in cooling |
| 8 | Pump down |

Note: Compressor waits three to eight minutes to restart.

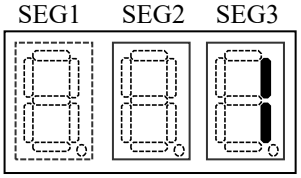
## Modes list (SEG3 Display)

**Stop or standby** (Y signal de-energized)

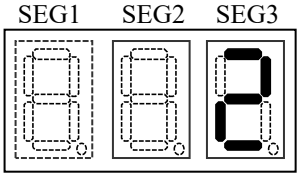



**Ready to start-up** (Y signal energized)

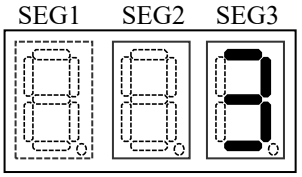
(6 to 8 minutes for pressure equalization to restart)



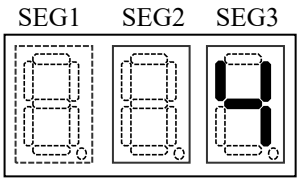

**Cooling**



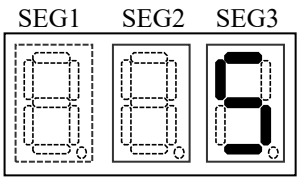

**Heating**



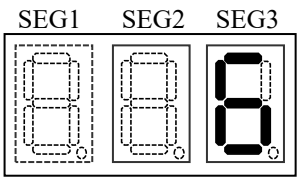

**Oil return**



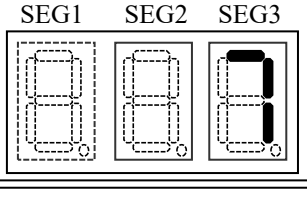

**Defrost**



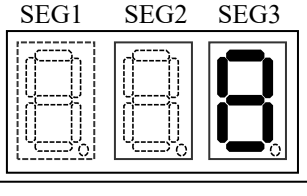

**Manual defrost**




**AUTO charge mode in cooling**



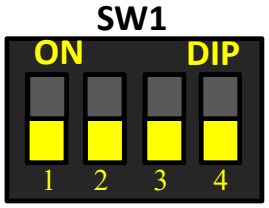

**Pump down (only cooling)**



## 2.3.2 Setting by dip switches

Condensing functions can be applied by dipping switch and pressing buttons.

| SW1 dip switch | | Description | |
|---|---|---|---|
| NO. | Setting item | Status | Content |
| 1 | Snow Sensor Control *a | ON | Disable |
| | | OFF (factory) | Enable |
| 2 | Capacity selection | ON | 2 or 4 Ton |
| | | OFF (factory) | 3 or 5 Ton |
| 3 | AC only/Heat pump selection | ON | AC only |
| | | OFF (factory) | Heat pump |
| 4 | Command *b response for IoT | ON | Disable |
| | | OFF (factory) | Enable |

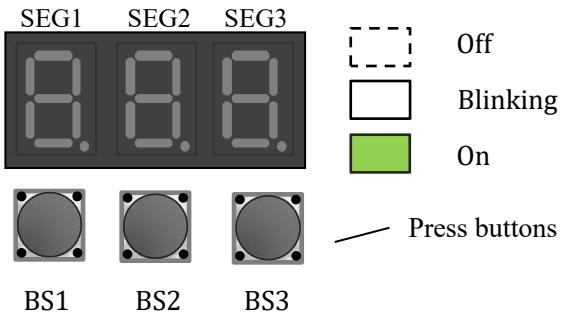



Use minor straight screwdriver to dip switch.
**Must power off the unit for at least 2 minutes to activate the change.**

* Remote field setting, troubleshooting, software updates and so on.

## 2.3.3 Setting by pressing buttons

Query and setting operations can be done by pressing buttons on main control board.

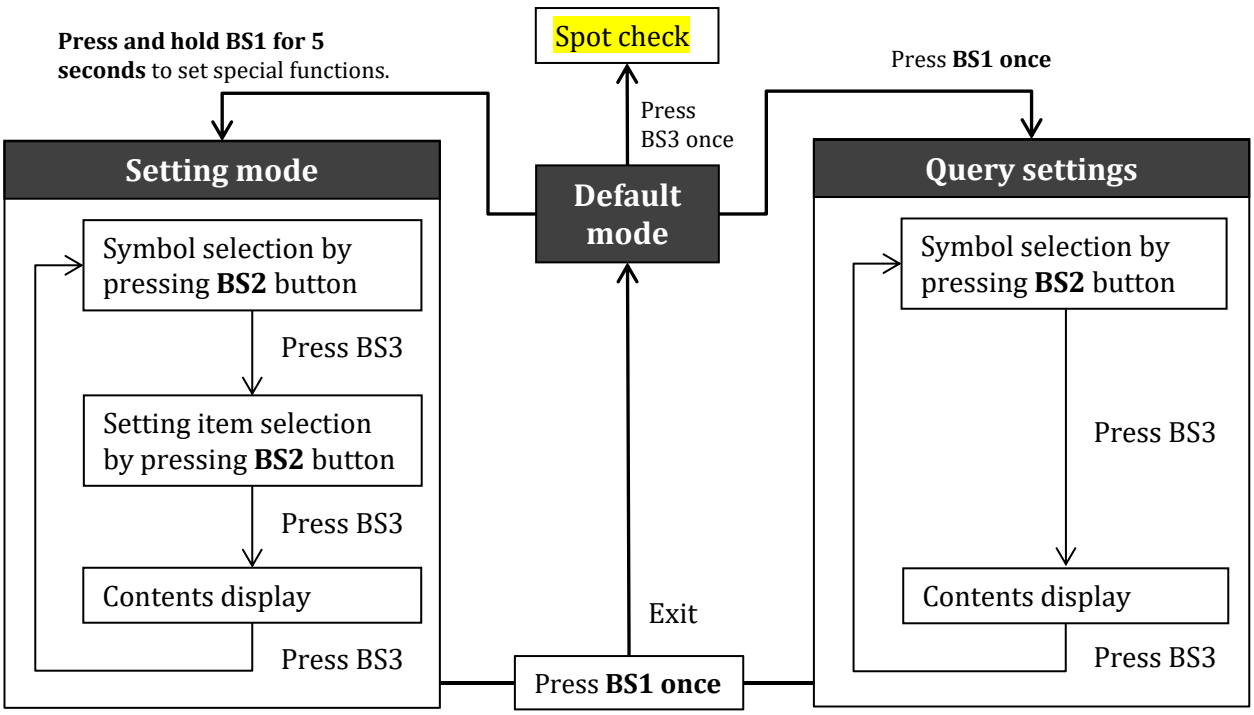



**BS1**: Menu or back button

**BS2:** UP button

**BS3:** Spot check and confirm button

**Remarks:** Press or tip any directions are valid.



## Default mode (Spot check)

System states can be showed on the 7 segments display (LED) of outdoor unit. Press **BS3** button to get code number and corresponding detailed information with an interval of one second.

Example:

Code number


Detailed information


| No. | Number content | Example | Description |
|---|---|---|---|
| Default | Refer to default display instructions | 902 | 9: Command<br>0: Running under high pressure limit<br>2: Cooling mode |
| 01- | Outdoor unit type and capacity | H3 | H: heat pump C: AC only<br>3: 3Ton |
| 02- | Liquid line sub-cooling | 10 | 10°F |
| 03- | Compressor suction superheat | 18 | 18°F |
| 04- | Compressor speed | 56 | 56RPS |
| 05- | Electronic expansion valve opening | 360 | 360pls |
| 06- | Step of fan | 8 | The 8th step |
| 07- | Low pressure (LP sensor) | 145 | 145psig |
| 08- | High pressure (HP sensor) | 350 | 350psig |
| 09- | Outdoor ambient temp. (TA) | 95 | 95°F |
| 10- | Compressor suction temp. (TS) | 70 | 70°F |
| 11- | Compressor discharge temp. (TD) | 170 | 170°F |
| 12- | Defrost sensor temp. (TH) | 80 | 80°F |
| 13- | Liquid line temp. (TL) | 70 | 70°F |
| 14- | Inverter module temp. (TF) | 150 | 150°F |
| 15- | Target evaporating temp. (Tes) | 43 | 43°F |
| 16- | Current evaporating temp. (Te) | 45 | 45°F |
| 17- | Target condensing temp. (Tcs) | 104 | 104°F |
| 18- | Current condensing temp. (Tc) | 112 | 112°F |
| 19- | Compressor DC current | 10.1 | 10.1A |
| 20- | Undercharged refrigerant signal | 1 | 0: None 1: Level 1 2: Level 2 (severe) |
| 21- | Main software version | A01 | A01 version |
| 22- | Inverter software version | b01 | b01 version |
| 23- | Current fault | E1 | Display up to 5 * codes |
| 24- | The last fault | F1 | --: None |
| 25- | Fault before the last fault | F2 | --: None |
| 26- | Product series | 2 | 2: B series |

Remark:

When multi-error codes exist at the same time, each code will be displayed one by one with an interval of one second.

## Setting mode

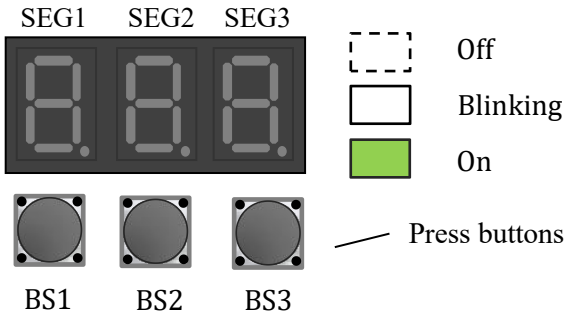
Press and hold **BS1** button for 5 seconds to enter the parameter setting interface. The latest setting will be taken as the final one. Refer to the following pages for some settings example.

| Symbol | Function | Item | Description |
|---|---|---|---|
| n00 | Mode choice | 0(factory) | Normal (Energy Saving) mode |
| | | 1 | Dry mode *1 |
| | | 2 | High capacity mode *2 |
| n01 | Forced heat pump stop when ambient temperature is lower than specified value. Switching to heat by gas furnace or boiler in cold winter. *3 | 0 | Stop heat pump when TA<-22℉ |
| | | 1(factory) | Stop heat pump when TA<-3℉ |
| | | 2 | Stop heat pump when TA<15℉ |
| | | 3 | Stop heat pump when TA<30℉ |
| | | 4 | Stop heat pump when TA<40℉ |
| n02 | Indoor second heater for outdoor unit outputs 24VAC at W terminal (CN5). *3 | 0(factory) | ON (Electric auxiliary heater) |
| | | 1(factory) | OFF (Furnace or Boiler) |
| n03 | Outdoor unit outputs 24VAC at W terminal (CN5) when ambient temperature is lower than specified value to start indoor electric auxiliary heater. *3 | 0(factory) | TA<15℉ (24VAC output) |
| | | 1 | TA<30℉ (24VAC output) |
| | | 2 | TA<40℉ (24VAC output) |
| | | 3 | TA<-3℉ (24VAC output) |
| | | 4 | OFF |
| n04 | Defrost mode setting *4 | 0 | Defrost in heavy snow area |
| | | 1(factory) | Standard mode |
| | | 2 | Defrost in light snow area |
| n05 | Silent mode setting | 0(factory) | None silent mode |
| | | 1 | Silent mode (level 1) |
| | | 2 | Super silent mode (level 2) |
| | | 3 | Night silent mode (level 1) |
| | | 4 | Night super silent mode (level 2) |
| n06 | Night silent setting- start time | 0 | 17:00 |
| | | 1(factory) | 18:00 |
| | | 2 | 19:00 |
| | | 3 | 20:00 |
| | | 4 | 21:00 |
| n07 | Night silent setting- end time | 0 | 5:00 |
| | | 1(factory) | 6:00 |
| | | 2 | 7:00 |
| | | 3 | 8:00 |
| | | 4 | 9:00 |
| n08 | Forced defrost | 0(factory) | OFF |
| | | 1 | ON *5 |

Remarks:

1. The evaporating temperature of indoor coil can drop down to 28℉ .
2. The evaporating temperature of indoor coil can drop down to 28℉ in cooling mode, and the condensing temperature can go up to 122℉ in heating mode.
3. N01/n02/n03 Settings do not affect the output 24V of W terminal during defrost.
4. Reduce about 10% heating time for heavy snow area, increase about 10% heating time for light snow area.
5. System enters defrost after the heating start-up and an extra five minutes' control.

# Example for mode choice (n00) setting

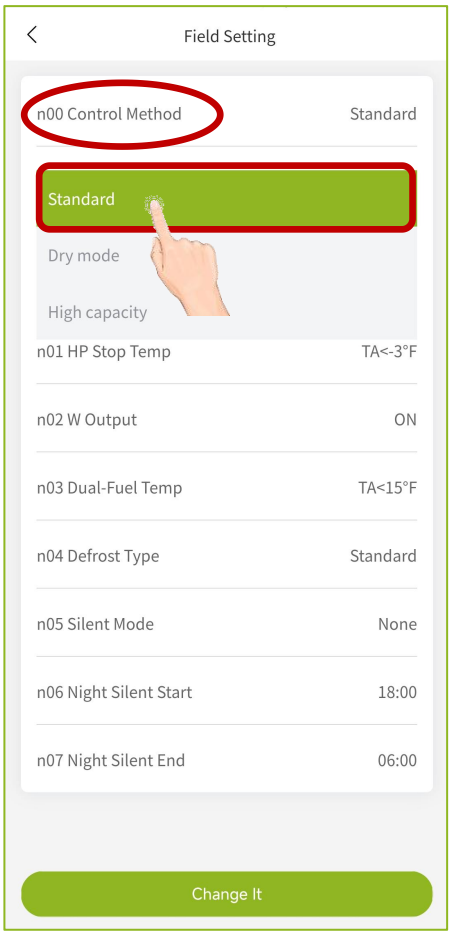



**BS1**: Menu or back button

**BS2:** UP button

**BS3:** Spot check and confirm button

**Remarks:** Press or tip any directions are valid.




**Step1**

**Press and hold BS1** for 5 seconds.


**Step2**

Press BS2 to select item (n00 for this case).


**Step3**

Press BS3 to enter sub-item setting.


**n00=0, Normal mode./ n00=1, Dry mode./ n00=2, High capacity mode.**

**Step4**

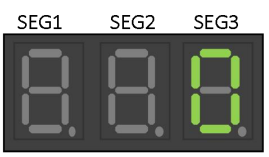
Press BS2 to change sub-item(n00 = 1).


**Step5**

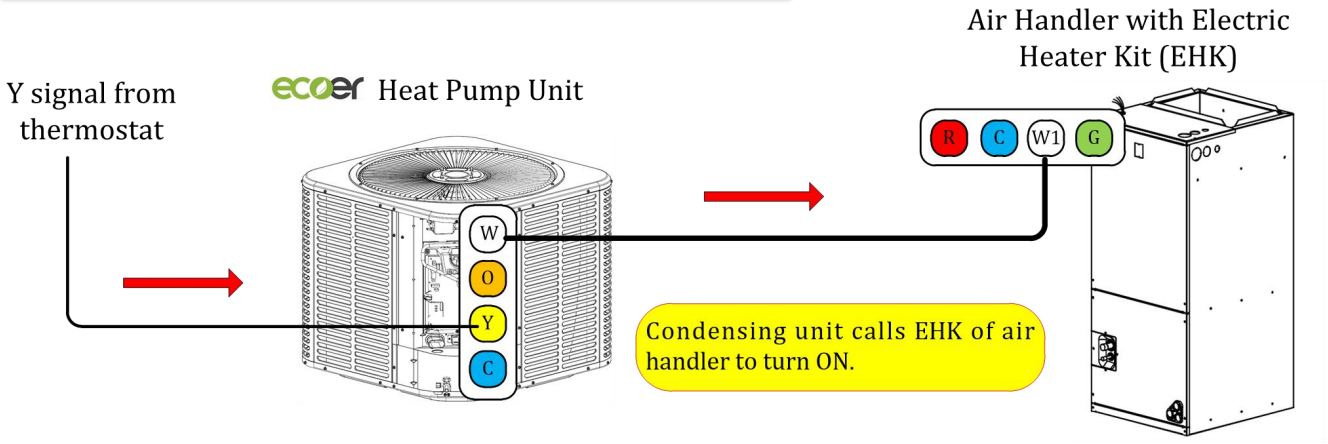
Press BS3 **twice** to save.


**Step6**

Press BS1 to return.



# Example for n02 & n03 (Dual-heating) setting

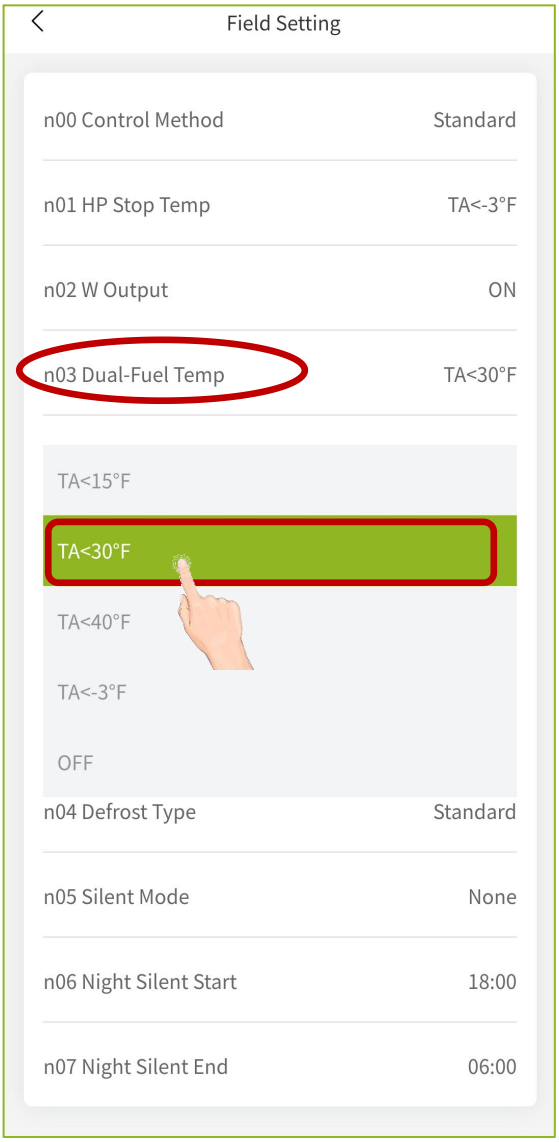



n02 Select the second heat source device type between gas furnace and electric heating.
0: ON (Electric auxiliary heater) --Factory
1: OFF(Furnace or Boiler)

n03 Outdoor W terminal outputs 24VAC once ambient temperature is lower than specific value with pretty low high pressure for backup when n02 is ON.

Only when Y signal energized with n02 set to ON.

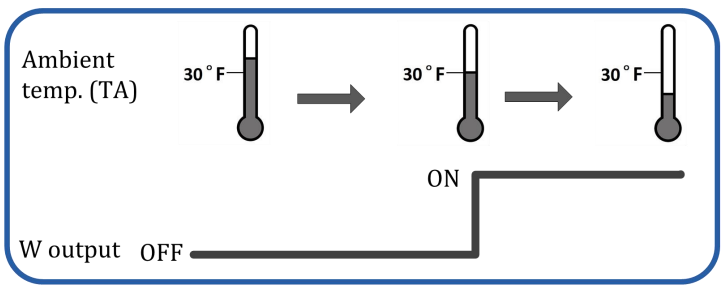
0: TA<15°F (24V output) --Factory
1: TA<30°F (24V output)
2: TA<40°F (24V output)
3: TA<-3°F (24V output)
4: OFF



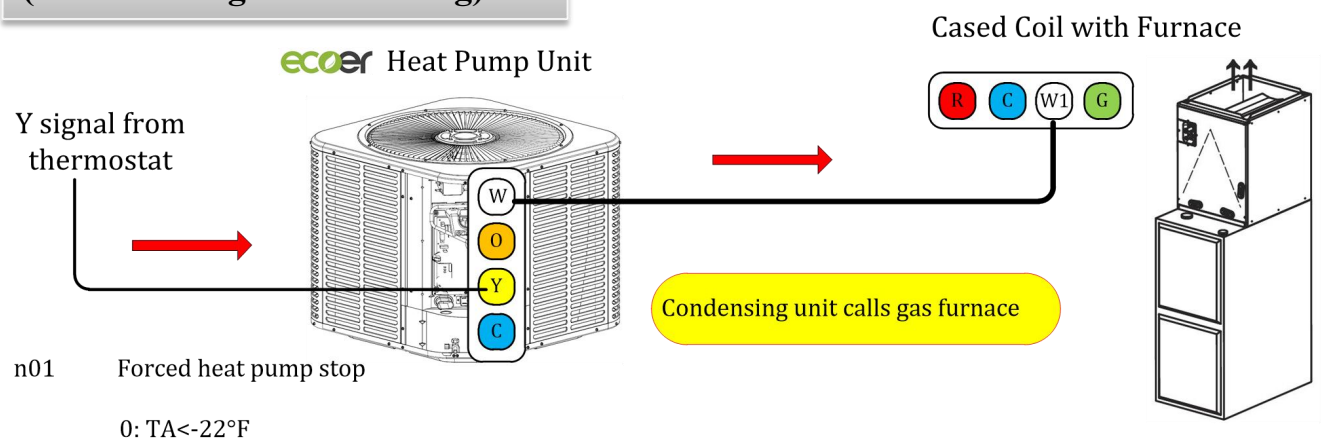

Example:

W outputs 24VAC when TA< 30°F.

n02 = 0
n03 = 1



# Example for n02 & n03 setting (AUTO change-over heating)




n01 Forced heat pump stop

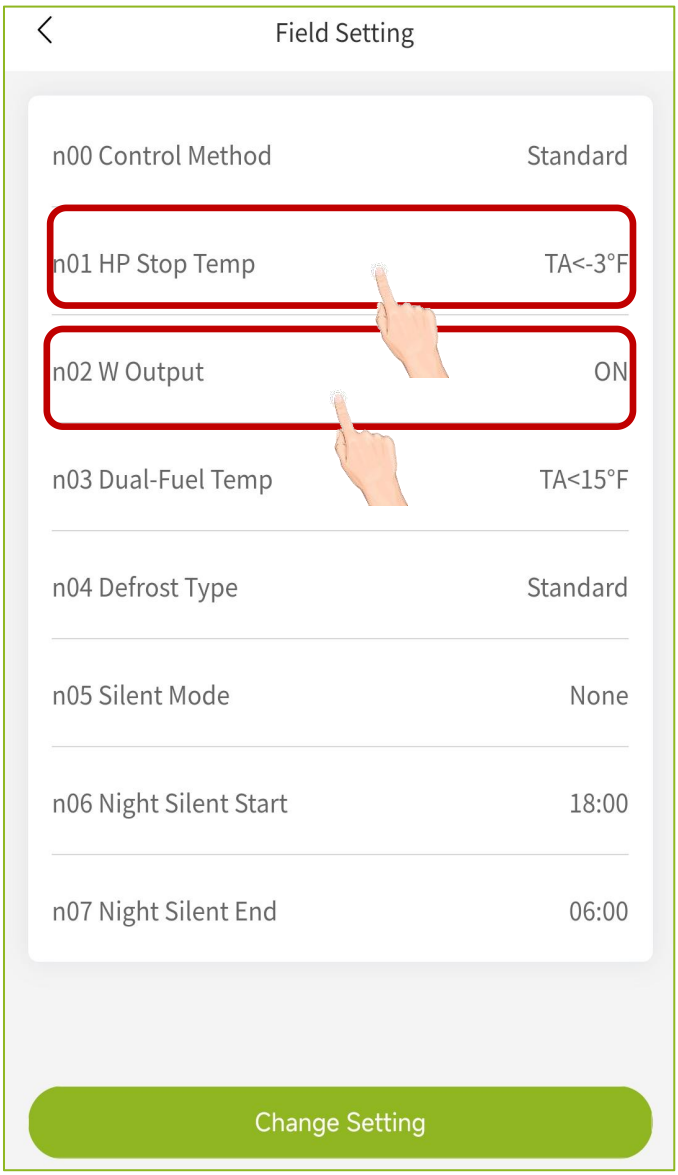
0: TA<-22°F
1: TA<-3°F (factory)
2: TA<15°F
3: TA<30°F
4: TA<40°F

n02 Outdoor W terminal outputs 24VAC at defrost control or forced heat pump stop temperature.

0: ON (Electric auxiliary heater) --Factory
1: OFF(Furnace or Boiler)--Selection

n03 Outdoor W terminal outputs 24VAC once ambient temperature is lower than specific value with pretty low high pressure.

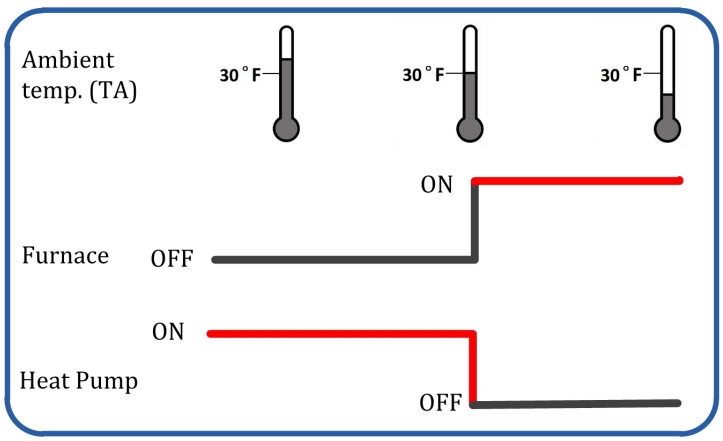
0: TA<15°F (24V output) --Factory
1: TA<30°F (24V output)
2: TA<40°F (24V output)
3: TA<-3°F (24V output)
4: OFF




Example:

Auto change-over for furnace and heat pump at TA=30 °F

n01 = 3 Y signal energized but **heat pump won't start-up**
n02 = 1 Selection
n03 = 0



## Illustration for n05 to n07 settings

Noise of silent mode is about 3 dB lower than normal mode.

Noise of super silent mode is about 6 dB lower than normal mode.

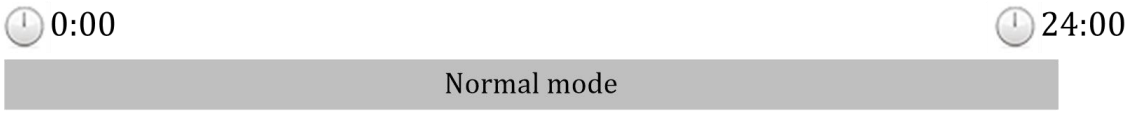
**n05**
Silent mode setting.

0: None silent mode --Factory
1: Silent mode (level 1)
2: Super silent mode (level 2)

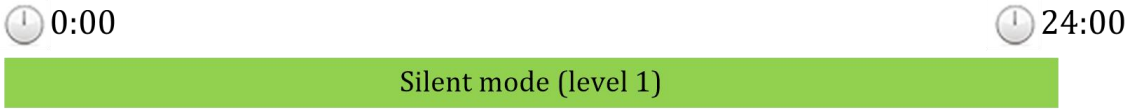
3: Night silent mode (level 1)
4: Super night silent (level 2)

| **n06** Night time setting - Start time. | **n07** Night time setting - End time. |
|---|---|
| 0: 17:00 | 0: 5:00 |
| 1: 18:00 (Factory) | 1: 6:00 (Factory) |
| 2: 19:00 | 2: 7:00 |
| 3: 20:00 | 3: 8:00 |
| 4: 21:00 | 4: 9:00 |

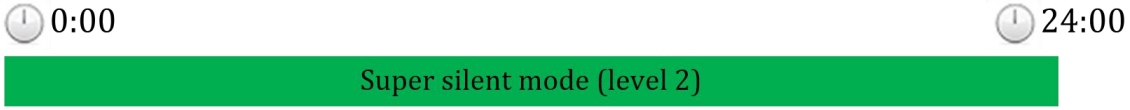
**Example 1: n05 = 0 n06 = N/A n07 = N/A**



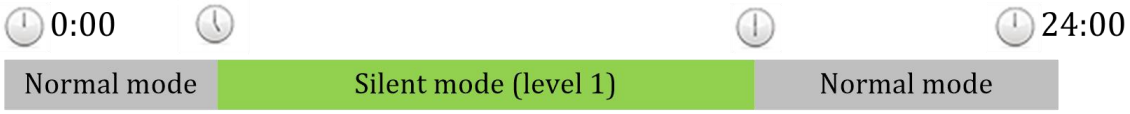

**Example 2: n05 = 1 n06 = N/A n07 = N/A**



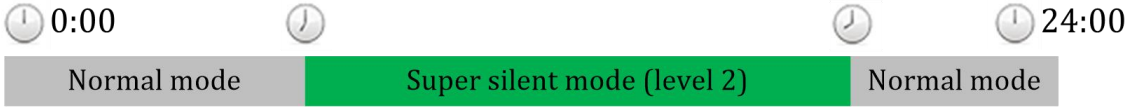

**Example 3: n05 = 2 n06 = N/A n07 = N/A**




**Example 4: n05 = 3 n06 =0 n07 = 1**

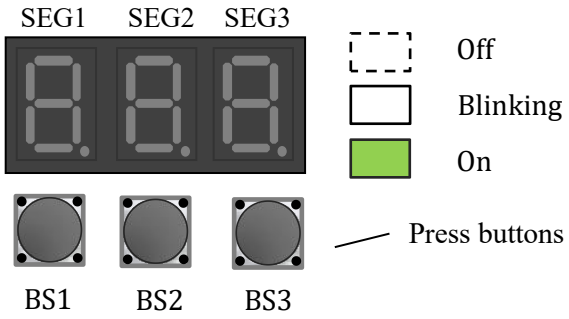



**Example 5: n05 = 4 n06 =2 n07 = 3**



## Silent mode Settings

Press **BS1** button once to query the current settings, or check it via Ecoer Smart Service Pro App.

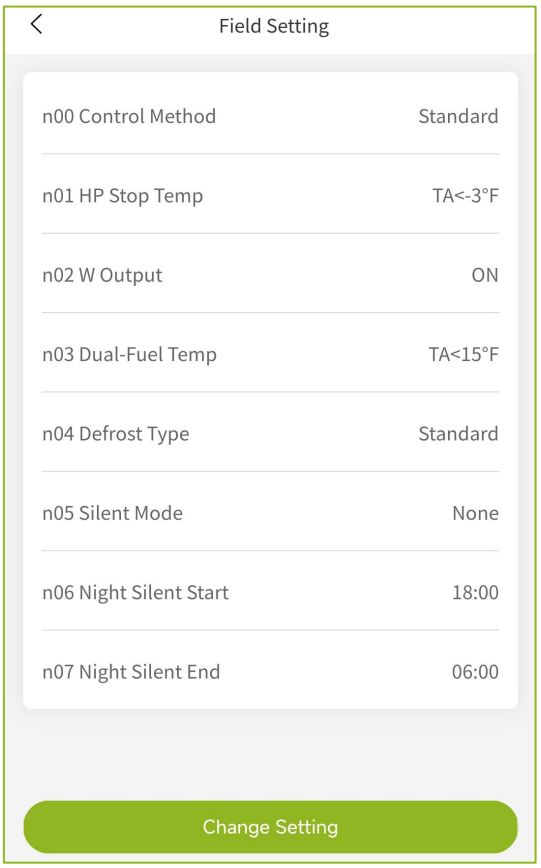



**BS1**: Menu or back button

**BS2:** UP button

**BS3:** Spot check and confirm button

**Remarks:** Press or tip any directions are valid.




### Step1

Press BS1 to enter query setting mode.


### Step2

Press BS2 to select item (n05 for this case).


### Step3

Press BS3 to check the current setting (n05 = 1).


### Step4

Press BS3 to Step 2 for other setting check.

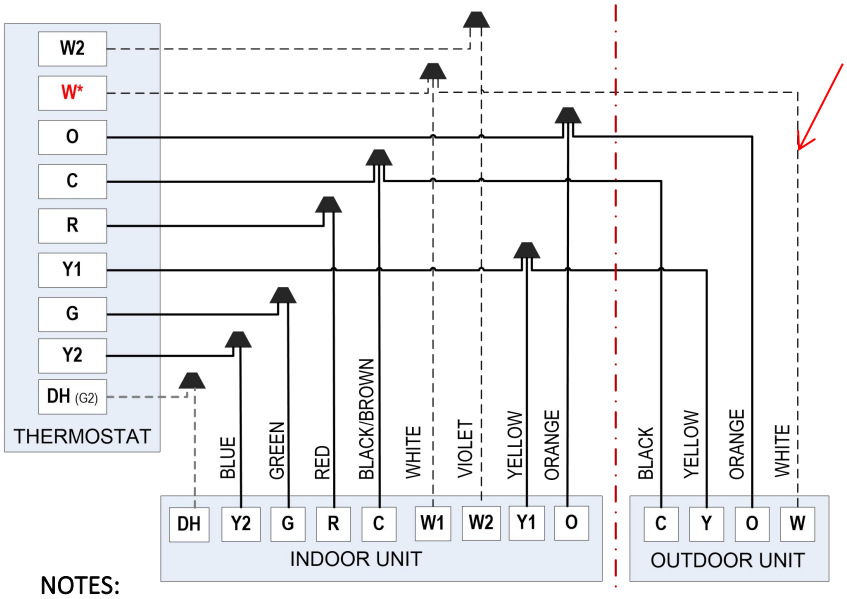

Press BS1 to return.

# 3. Troubleshooting

## 3.1 Problems without Codes

If the system does not operate properly besides any malfunctions. Check the system based on the following procedures.

| Symptoms | Possible causes | Solutions |
|---|---|---|
| The unit energized but the digital tube shows nothing | • See the following page | • See the following page |
| System does not start-up but the digital tube shows normally | • No 24 VAC for Y signal from thermostat<br>• Incompatible thermostat | • Be sure Y/O/C wirings are connected correctly and the setting temperature at thermostat is proper.<br>• Use other traditional 24VAC thermostats |
| System operates mode reversely | • Incorrect O/B signal selection | • Choose **O for cooling** at thermostat |
| System cannot cool well | • Outside temperature is too high<br>• Outside temperature is too low<br>• Dirty air filter or blocked duct<br>• Lack of refrigerant<br>• Refrigerant has been blocked in the condenser coil | • Normal protection control to limit RPS<br>• Ensure the cooling loads<br>• Replace the air filter and eliminate any obstacles<br>• Check refrigerant amount or any leaks<br>• Counterclockwise the TXV (Make sure the refrigerant coefficient is 0.6) |
| System cannot heat well | • Outside temperature is too low but no third-party heat inside<br>• The outdoor coil is dirty or has been covered by heavy snow<br>• Dirty air filter<br>• Micro channel (MC) coil has been used<br>• Lack of refrigerant | • Install auxiliary heat for back-up *__Dual-heating__ is recommended<br>• Clean the outdoor coil<br>• Replace the air filter<br>• No MC coils shall be used for heat pump<br>• Check refrigerant amount or any leaks |




**E-heater or Dual fuel**

To activate the indoor second heater.

Outdoor W terminal outputs 24Vac once the system needs it.

a. Work when the HP cannot to be started because of Ta < the value of n01 setting in heating.

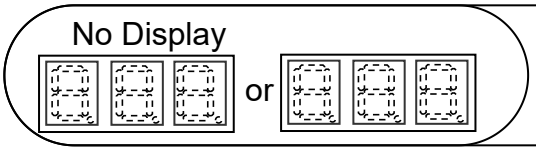
b. Work when the second heater is called because n02 setting is ON (E-heater) and Ta < the value of n03 setting in heating.

c. Work when the HP is in defrosting.

NOTES:

1. Be sure power supply agrees with equipment nameplate.
2. Power wiring and grounding of equipment must comply with local codes.
3. Low voltage wiring to be No. 18 AWG minimum conductor.
4. "- - -": means the electric auxiliary heat connection.

* Some thermostats may use W2/AUX for heat pump.



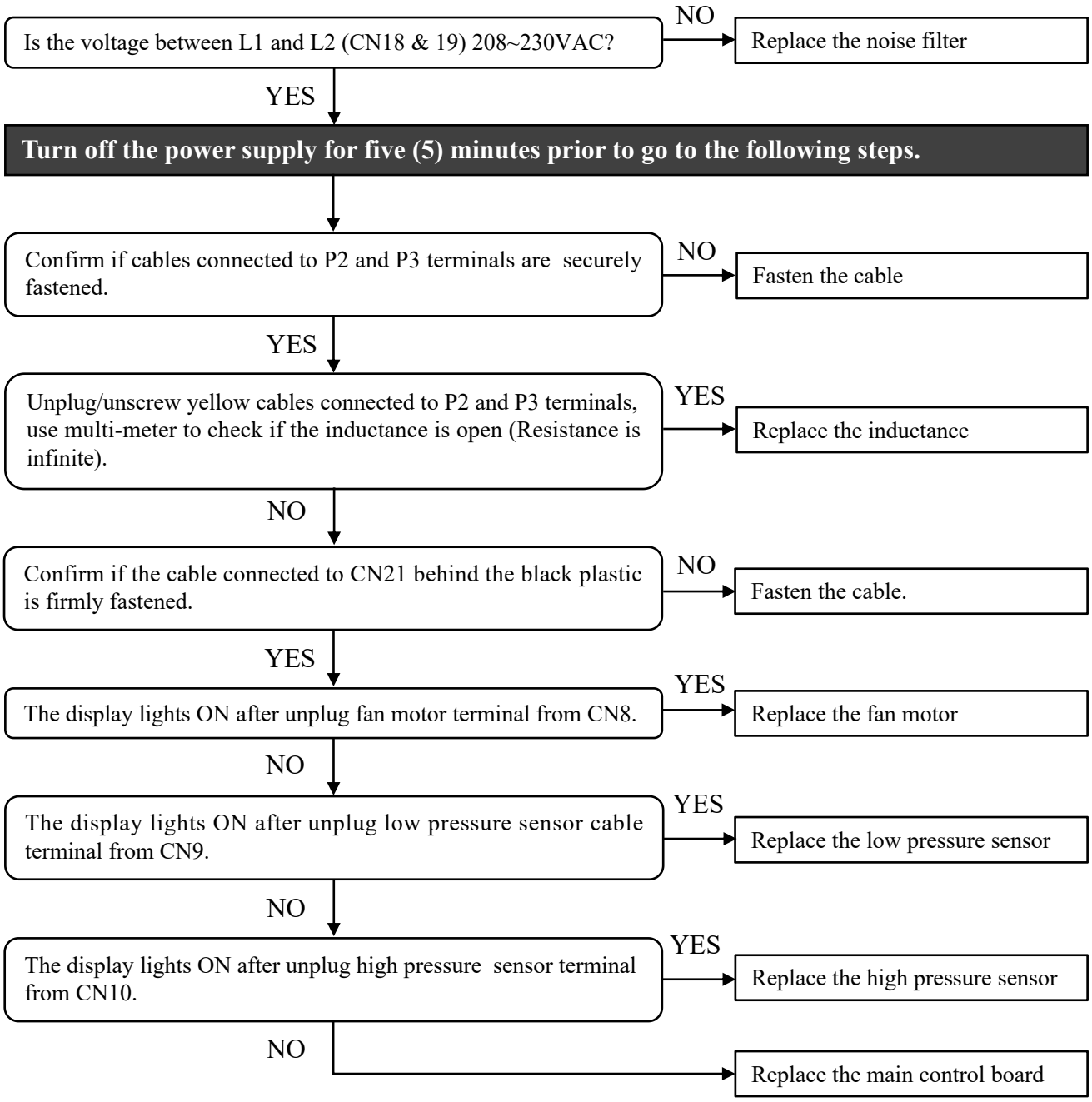

# The unit energized but the digital tube shows nothing

**1.Error definition:**

No display on main control board even though the unit has been powered ON.

**2.Possible causes:**

- Damaged noise filter
- Damaged inductance
- Loose connection at port on main control board
- Damaged pressure sensor
- Damaged fan motor
- Damaged main control board



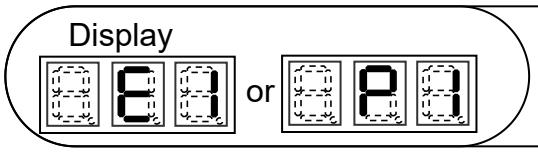
# 3.2 Error Codes List

Past error codes can be inquired by **BS3** button, and viewed on Ecoer Smart Service Pro App.

| Code | Description | Legend | Page |
|---|---|---|---|
| P1 | High pressure protection | | 32 |
| E1 | System locks up when P1 has occurred six times in 3 hours. | Cannot restart *1 | |
| P2 | Low pressure protection in cooling mode | | 33 |
| E2 | System locks up when P2 has occurred six times within 3 hours. | Cannot restart *1 | |
| P3 | Compressor discharge temperature (TD) protection | | 34 |
| E3 | System locks up when P3 has occurred six times within 3 hours. | Cannot restart *1 | |
| P4 | Compressor discharge temp. (TD) sensor is disconnected or damaged | | 35 |
| P5 | Inverter module temperature (TF) protection | | 36 |
| E5 | System locks up when P5 has occurred six times within 3 hours. | Cannot restart *1 | |
| P6 | Compressor over-current protection | | 37 |
| E6 | System locks up when P6 has occurred six times within 3 hours. | Cannot restart *1 | |
| P7 | Liquid slugging protection | | 38-39 |
| E7 | System locks up when P7 has occurred three times within 5 hours. | Cannot restart *1 | |
| P8 | Low compressor voltage protection | | 40 |
| E8 | System locks up when P8 has occurred three times within 60 minutes. | Cannot restart *1 | |
| P9 | Incorrect compressor line sequence | Cannot restart *1 | 40 |
| PA | DC fan motor over-load protection | Cannot restart *1 | 41 |
| F1 | Ambient temperature (TA) sensor fault | back-up running*2 | 42 |
| F2 | Compressor suction temperature (TS) sensor fault | back-up running*2 | 43 |
| F3 | Liquid line temperature (TL) sensor fault | back-up running*2 | 44 |
| F4 | Defrost temperature (TH) sensor fault | back-up running*2 | 45 |
| F5 | Compressor discharge temperature (TD) sensor fault | back-up running*2 | 46 |
| F6 | Inverter module temperature (TF) sensor fault | back-up running*2 | 47 |
| F7 | High pressure (HP) sensor fault | back-up running*2 | 48 |
| F8 | Low pressure (LP) sensor fault | back-up running*2 | 49 |
| E4 | Communication fault between main chip and INV drive chip | Cannot restart *1 | 50 |
| H1 | Ambient temperature limit operation in cooling mode | | 51 |
| H2 | Ambient temperature limit operation in heating mode | | |
| H3 | Abnormal switch alarm for reversing valve | Alarm | 52 |
| H4 | Defrost temperature (TH) sensor is disconnected or damaged | | 53 |
| H5 | EEPROM fault | | 54 |
| H6 | Low voltage alarm | | 54 |
| HF | Abnormal function control | Alarm | 55 |
| C0-CC | Compressor INV module protection | | 56-58 |
| E0 | System locks up when C0~CA has occurred 3 times within 60 minutes. | Cannot restart *1 | |

Remarks:

1. Disconnect power supply switch for 5 minutes to reset, then turn on power supply for the unit.
2. Unit goes to back-up running under sensors fault varies from 7 to 120 days. Allow up to two sensors back-up running at the same time.



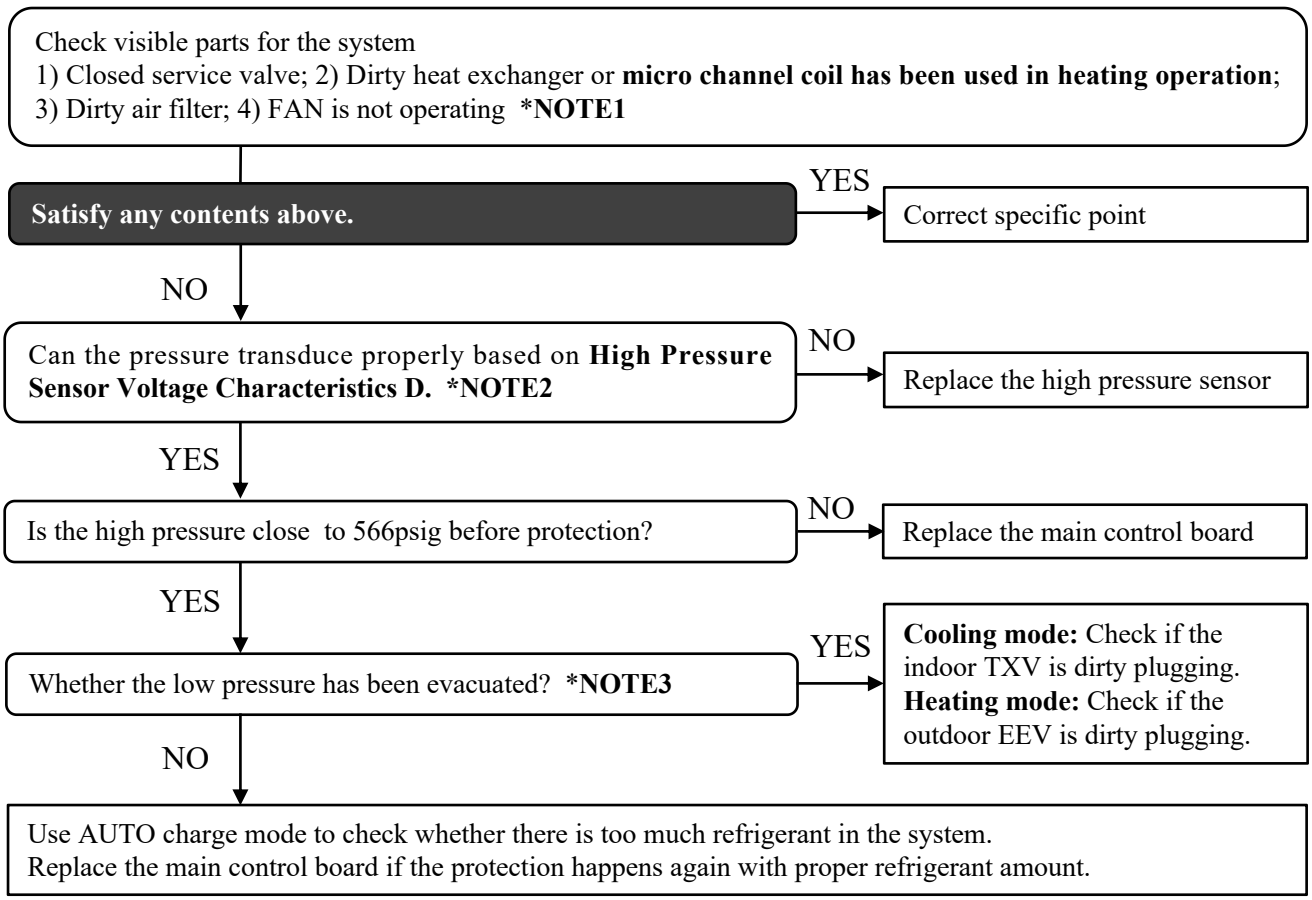

# High pressure protection

## 1.Error definition:

P1: The detected high pressure is no less than 566psig.
E1: System locks up when P1 has occurred six times within 3 hours.

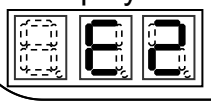
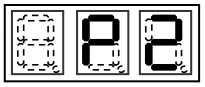
## 2.Possible causes:

- Service valves are closed
- The system has been severely over-charged
- Dirty/Clogged heat exchanger of outdoor unit in cooling mode
- Dirty indoor air filter or micro channel coil has been used for heat pump
- The refrigerant blocked in high pressure zone because of damaged TXV/EEV
- The Dual Fuel setting is incorrect, causing the furnace and heat pump to run simultaneously.
- Damaged indoor fan motor or G signal lost resulting in indoor unit FAN stops in heating
- Damaged high pressure sensor
- Damaged main control board




NOTES:

1. It's normal control if heating oil return operation is enforced to execute even though the Y signal=OFF (Indoor fan stops because there is No G signal). Or connect R and G together to judge if the fan works. Yes-> Replace the indoor PCB; No-> Replace the indoor motor.
2. Connect a pressure gauge to liquid service valve in cooling mode, gas service valve in heating mode. Compare the value difference between gauged pressure and the transduced one by high pressure sensor (spot check by BS3 button or check the data from ESS Pro App).
3. Abnormal TXV/EEV will lead to the refrigerant blockage in the high pressure side.

Display  or 

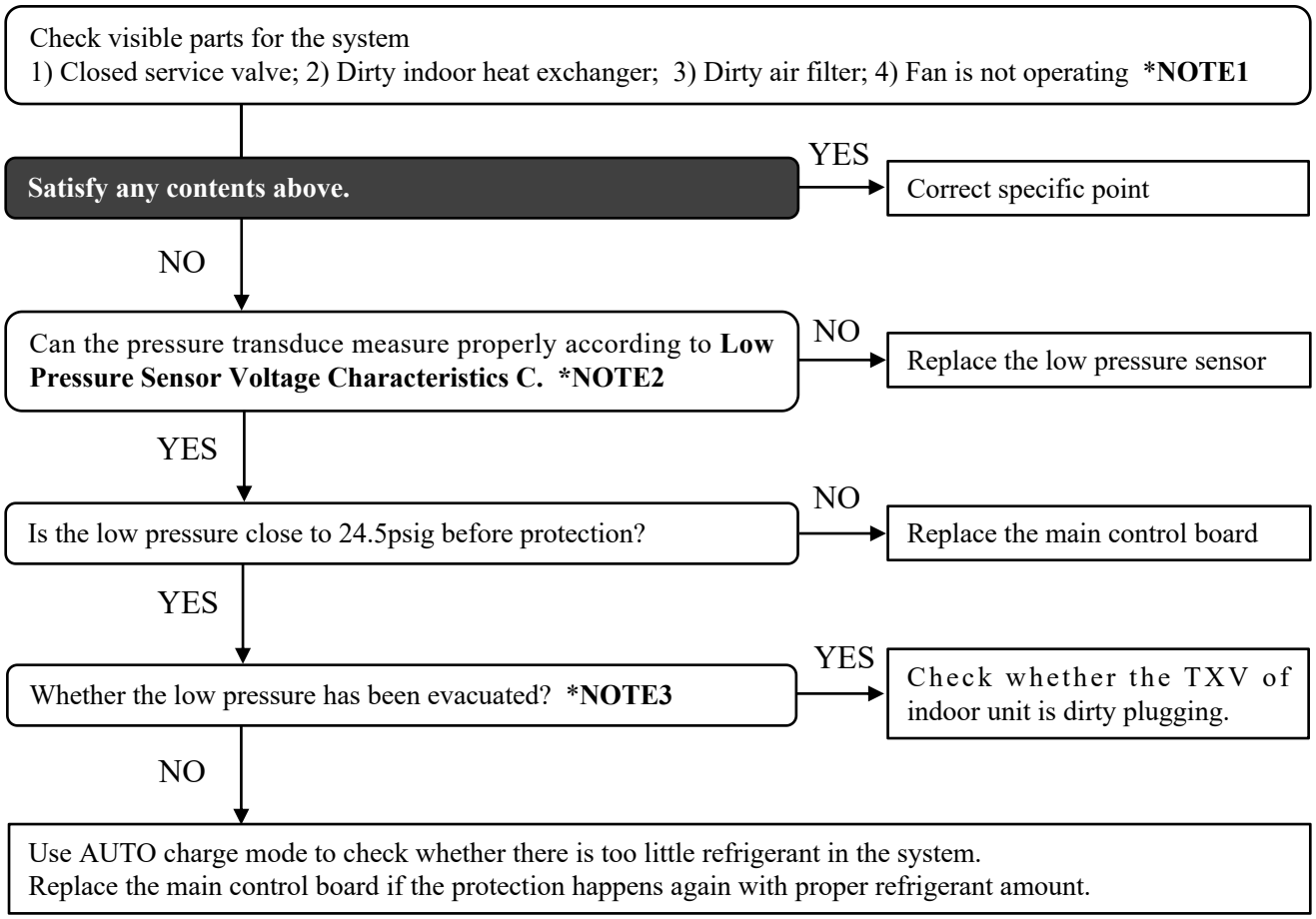
# Low pressure protection in cooling mode

## 1.Error definition:

P2: The detected low pressure in cooling mode is less than 24.5psig.
E2: System locks up when P2 has occurred six times within 3 hours.

## 2.Possible causes:

- Service valves are closed
- Dirty air filter or indoor heat exchanger
- Outside temperature is lower than 40°F
- Too little refrigerant in the system
- Damaged indoor R410A TXV
- Damaged low pressure sensor
- Damaged main control board




NOTES:

1. It's normal control if cooling oil return operation is enforced to execute even though the Y signal=OFF (Indoor fan stops because there is No G/G2 signal). Or connect R and G (G2) together to judge if the fan works. Yes-> Replace the indoor PCB; No-> Replace the indoor motor.
2. Connect a pressure gauge to gauge port, compare the difference between the gauged pressure and the transduced one by low pressure sensor (spot check by BS3 button or check the data from ESS Pro App).
3. Abnormal TXV will lead to the refrigerant blockage in the high pressure side.

Display E3 or P3

# Compressor discharge temperature (TD) protection

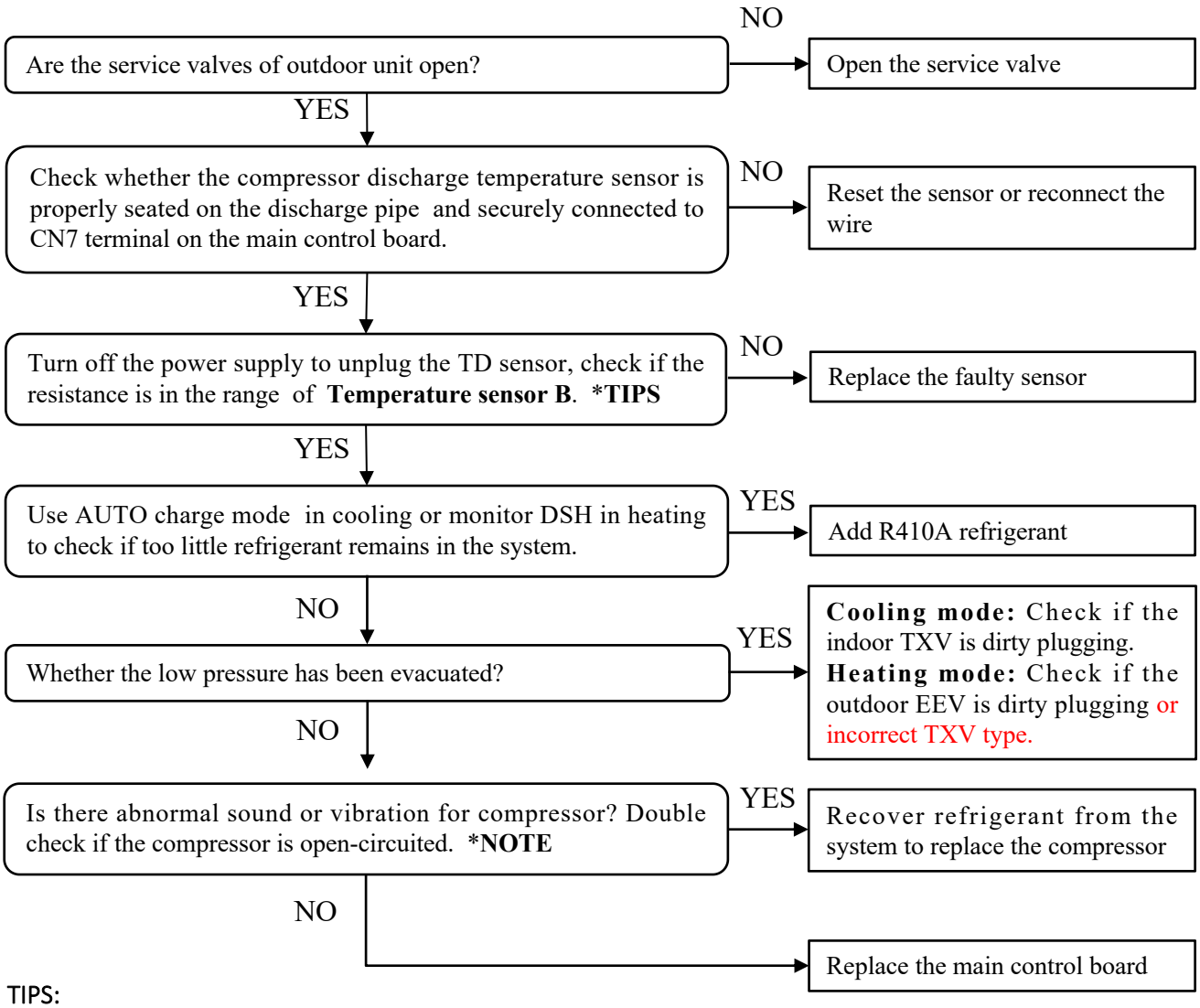
## 1.Error definition:

P3: The detected discharge temperature(TD) is no less than specified value.
Cooling: 248°F Heating: 230°F

E3: System locks up when P3 has occurred six times within 3 hours.

## 2.Possible causes:

- Too little refrigerant remains in the system
- Dirty plugging of EEV or indoor TXV
- Incorrect TXV type causes high temperature in heating
- Damaged discharge temperature sensor
- Damaged main control board




TIPS:

Technically measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

NOTE: Normal resistance for compressor

3-phase resistance (UV, UW, VW) for compressor is less than 5Ω.

The insulation resistance (any phase to Ground) for compressor is greater than 100KΩ.

Display P4

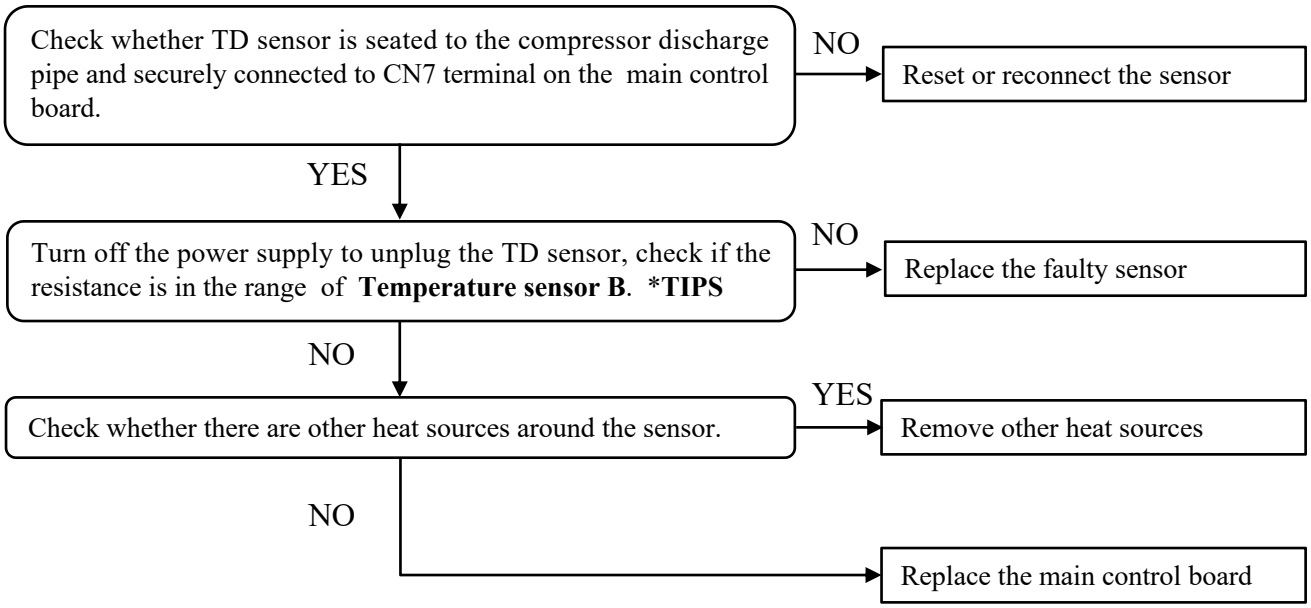
# Compressor discharge temperature (TD) sensor is disconnected or damaged

## 1.Error definition:

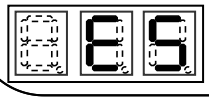
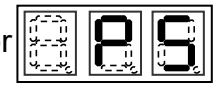
Compressor discharge temperature (TD) sensor is disconnected or damaged.
TD<Tc-9°F for 20 minutes, Tc means the condensing temperature.

## 2.Possible causes:

- Discharge temperature (TD) sensor is disconnected or damaged
- Loose connection to CN7 terminal on main control board
- Damaged main control board
- There are other heat sources around the sensor




TIPS:
Technically measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

Display  or 

# Inverter module temperature (TF) protection

**1.Error definition:**

P5: The detected value of module temperature (TF) is no less than specified value.

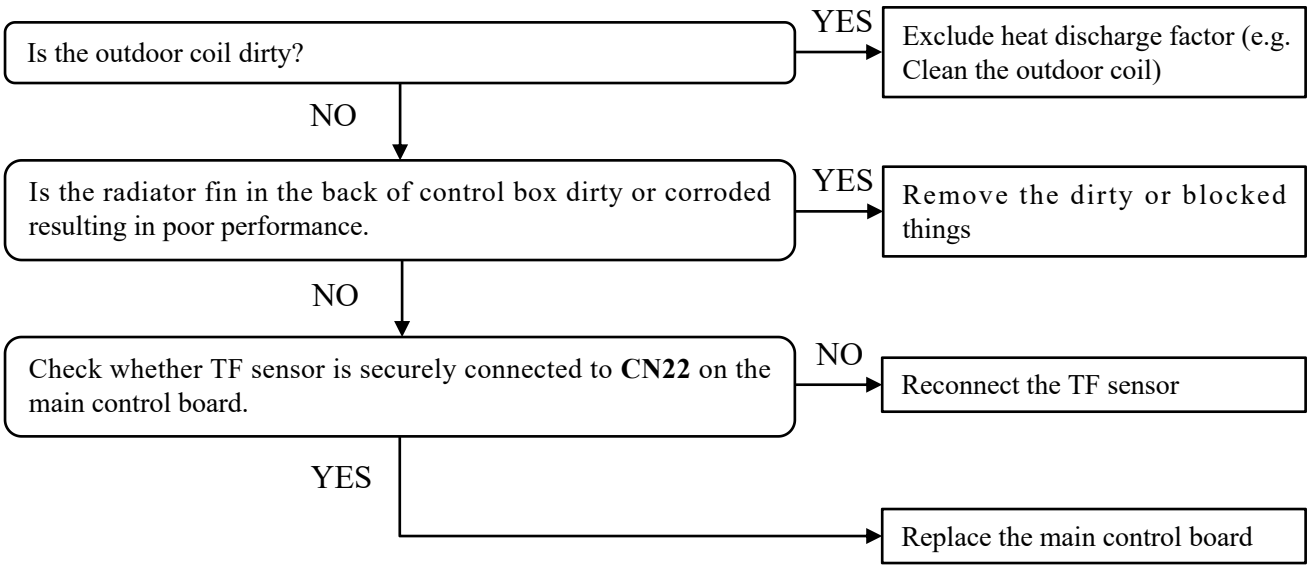
**EODA18H-2436B:** 199°F in cooling mode/ 185°F in heating mode

**EODA18H-4860B:** 203°F in cooling mode/ 185°F in heating mode

E5: System locks up when P5 has occurred six times within 3 hours.

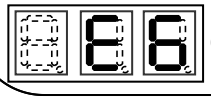
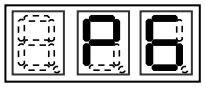
**2.Possible causes:**

- Clogged fin of radiator resulting in poor heat transfer
- Dirty and blocked outdoor heat exchanger
- Damaged TF sensor(PCB2.0 built-in TF sensor)
- Misjudgment caused by resistance drift of TF sensor
- Damaged main control board




TIPS:

Technically measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

Display  or 

# Compressor over-current protection

**1.Error definition:**

P6: The detected compressor current is over the maximum allowed value.

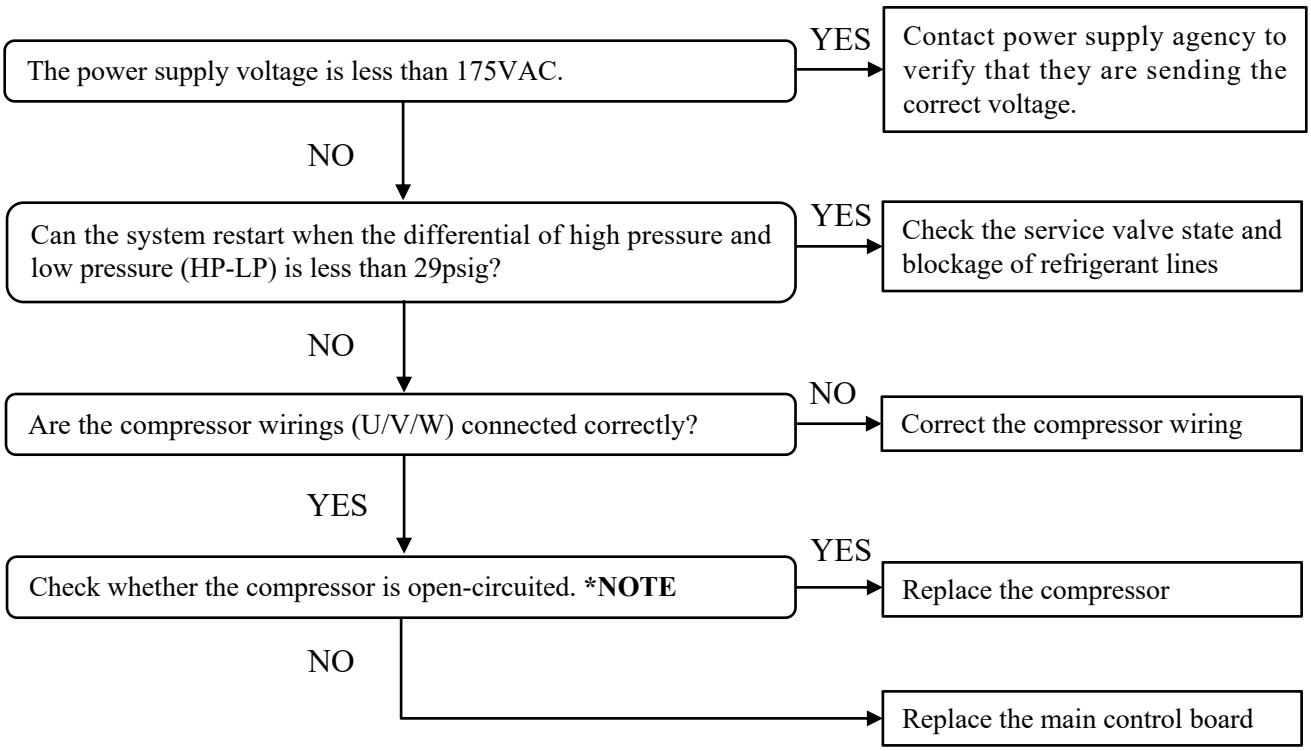
**EODA18H-2436B:** 14A

**EODA18H-4860B:** 20A

E6: System locks up when P6 has occurred six times within 3 hours.

**2.Possible causes:**

- Abnormal power supply voltage
- Too much refrigerant in the system resulting in liquid slugging at compressor
- Damaged main control board
- Indoor unit is suddenly powered off
- Damaged compressor




NOTE: Normal resistance for compressor

3-phase resistance (UV, UW, VW) for compressor is less than 5Ω.

The insulation resistance (any phase to Ground) for compressor is greater than 100KΩ.

Display E07 or P07

# Liquid slugging protection

**1.Error definition:**

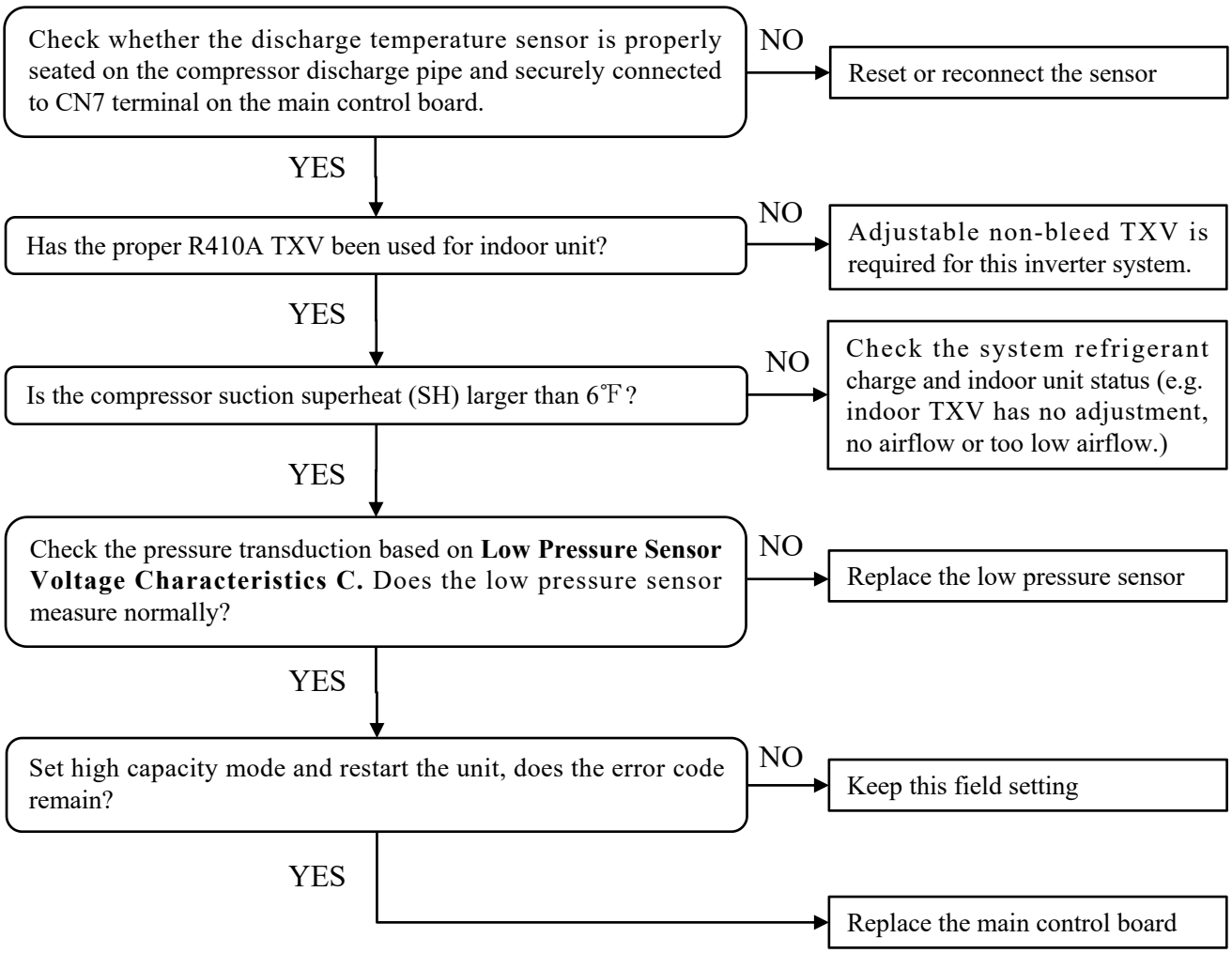
This control is to prevent compressor from damaging because of liquid slugging.
When SH<9.0°F and compressor discharge superheat (DSH=TD-SC-TL-1.8) <14.4°F for 20 minutes, starting to accumulate the liquid slugging time. Report P7 once it lasts for 30 minutes.
E7: System locks up when P7 has occurred three times in 5 hours.

**2.Possible causes:**

- Damaged or improper TXV for indoor unit in cooling mode
- Abnormal low frequency heating operation
- Overcharged refrigerant
- Damaged discharge temperature (TD) sensor
- Damaged EEV of outdoor unit in heating mode
- Damaged main control board

**Cooling mode**

Connect a pressure gauge at the gas service valve to calculate suction line superheat.



Display E0 or P0

# Liquid slugging protection

## Heating mode

Connect a pressure gauge to liquid service valve, compare the gauged pressure with the transduced one by high pressure sensor.

Check whether the heating operation is abnormal, high pressure is high and very low compressor frequency, which is caused by such as incorrect Dual Fuel Settings and filter blockage etc.
- YES → Correct abnormal state
- NO ↓

Check whether the discharge temperature sensor is properly seated on the compressor discharge pipe and securely connected to CN7 terminal on the main control board.
- NO → Reset or reconnect the sensor
- YES ↓

Does the EEV cable securely connected to CN13 terminal.
- NO → Reconnect the cable
- YES ↓

Check the pressure transduction based on **High Pressure Sensor Voltage Characteristics D**. Is the value of high pressure sensor detected close to the gauged one?
- NO → Replace the high pressure sensor
- YES ↓

Hold and press BS4 button for 5 seconds, press BS2 button in one minute. SEG 1 displays a flashing 8 to **pump down** the refrigerant from outdoor unit to indoor unit. The low pressure(LP) cannot be pumped down resulting in too low SH.
- YES → Replace the EEV coil to repeat pump down. Change the EEV body if it fails again.
- NO ↓

Check the compressor discharge superheat (DSH) ***NOTE** to judge if there is too much refrigerant in the system.
- YES → Recover refrigerant
- NO ↓

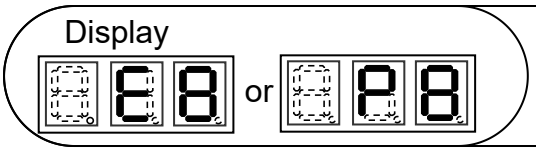
The error code remains even though setting high capacity mode.
- NO → Keep this field setting
- YES ↓

Replace the main control board

NOTE:

Heating DSH should be between 25 ° F and 60 ° F with proper refrigerant charge in normal control.


**Overcharged:** DSH is smaller than 18 ° F when the EEV opening < 72pls.
**Undercharged:** DSH is bigger than 60 ° F when the EEV opening ≥460pls




## Low compressor voltage protection

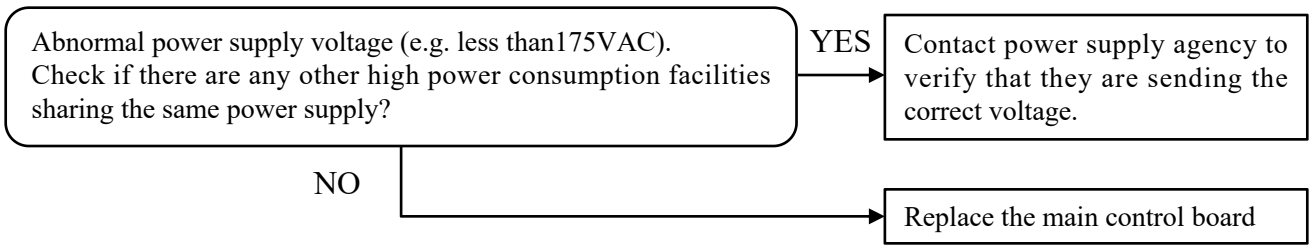
**1.Error definition:**

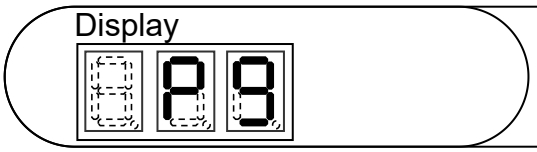
P8: The detected compressor voltage by main chip is less than 310VDC.

E8: System locks up when P8 has occurred three times in 60 minutes.

**2.Possible causes:**

- Abnormal power supply voltage
- Damaged main control board



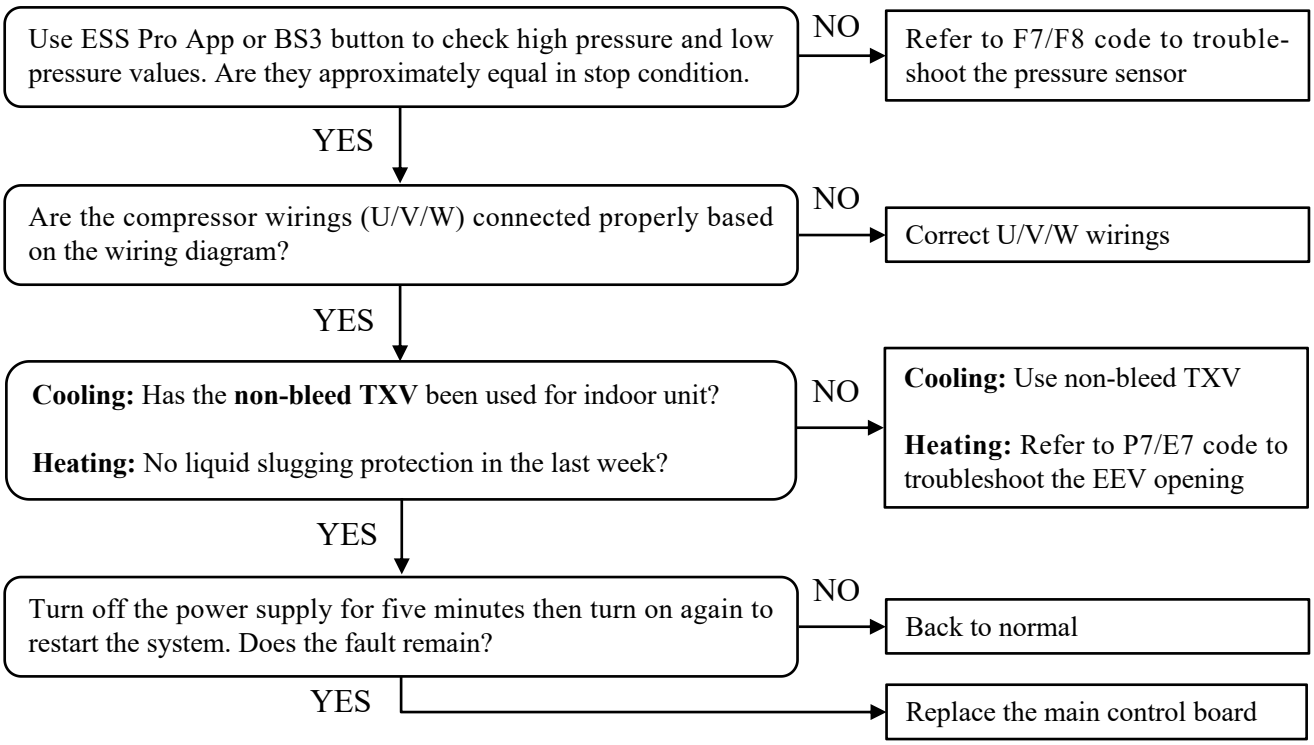

## Incorrect compressor line sequence

**1.Error definition:**

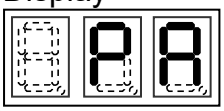
The detected compressor line sequence is incorrect for it's difficult to build pressure difference.

**2.Possible causes:**

- Damaged pressure sensor
- Incorrect U/V/W connections between main control board and compressor terminals
- Damaged EEV or indoor TXV
- Damaged main control board



Display



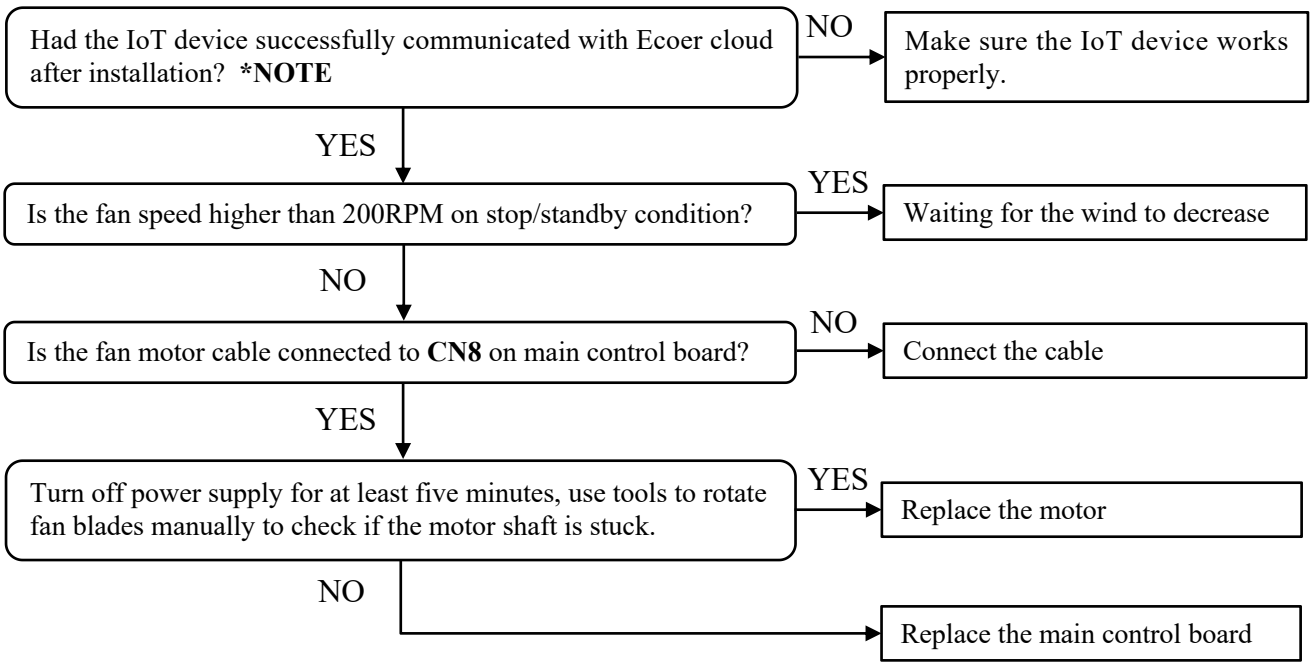
# DC fan motor over-load protection

## 1.Error definition:

- The fan rotation speed is less than 240RPM if it has the running signal.
- The rotation speed difference between the detected value and target one is over 200RPM for 3 minutes.

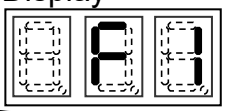
## 2.Possible causes:

- Damaged main control board
- Malfunction of fan motor
- The unit is undergoing hurricane
- Disconnected wiring between fan motor and main control board




NOTE: The normal working state of IoT device should be blue LED (No.1) is blinking with other LEDs are off.

Display



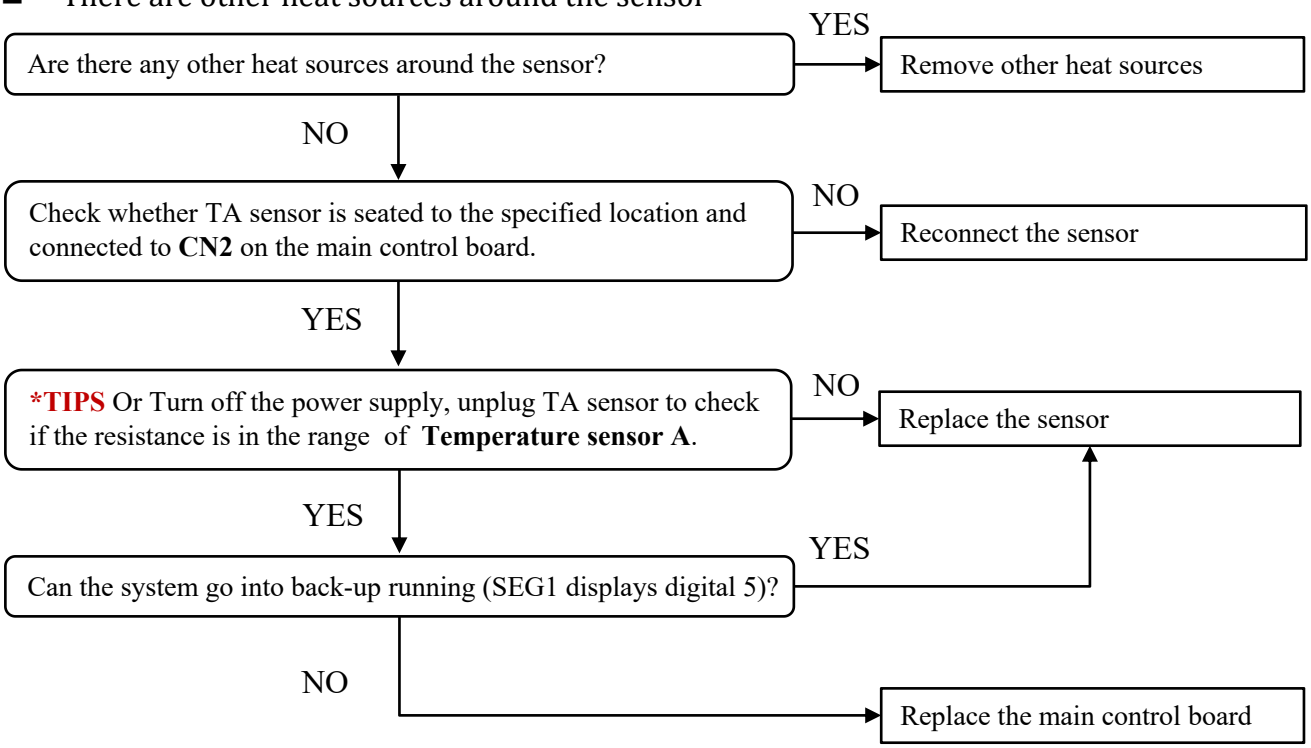
# Ambient temperature (TA) sensor fault

## 1.Error definition:

The outside temperature (TA) sensor is short circuit or open circuit.

## 2.Possible causes:

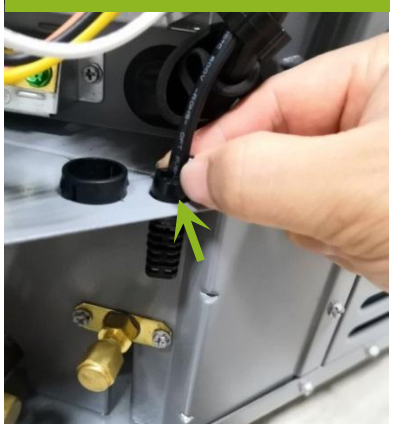
- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor
- There are other heat sources around the sensor




TIPS: Measure the DC voltage of the temperature sensor when outdoor unit powers on.

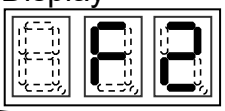
How to take out the protection cover for TA sensor?

STEP1. Press the button



STEP2. Push down the protection cover

STEP3. Take out the protection cover

Display 

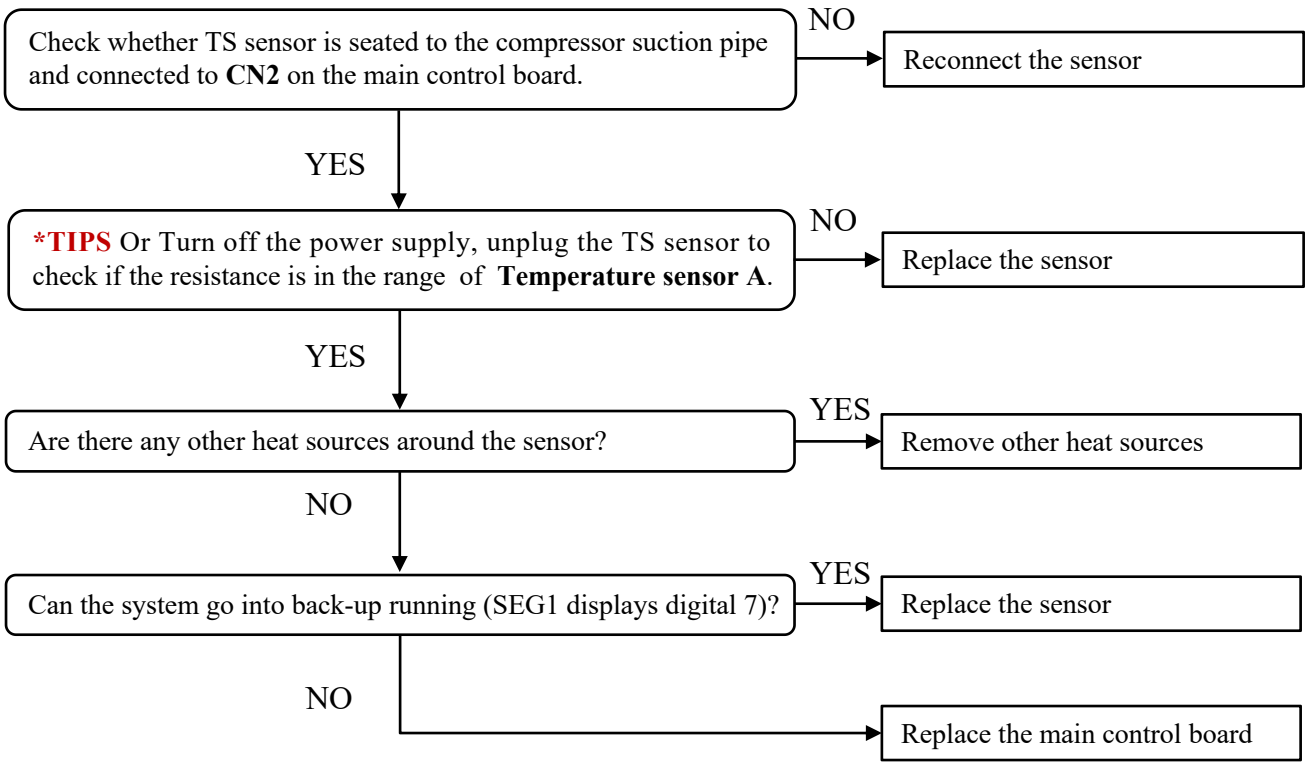
# Compressor suction temperature (TS) sensor fault

**1.Error definition:**

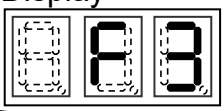
The suction temperature (TS) sensor is short circuit or open circuit.

**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor (TS)
- There are other heat sources around the sensor




TIPS: Measure the DC voltage of the temperature sensor when outdoor unit powers on.

Display 

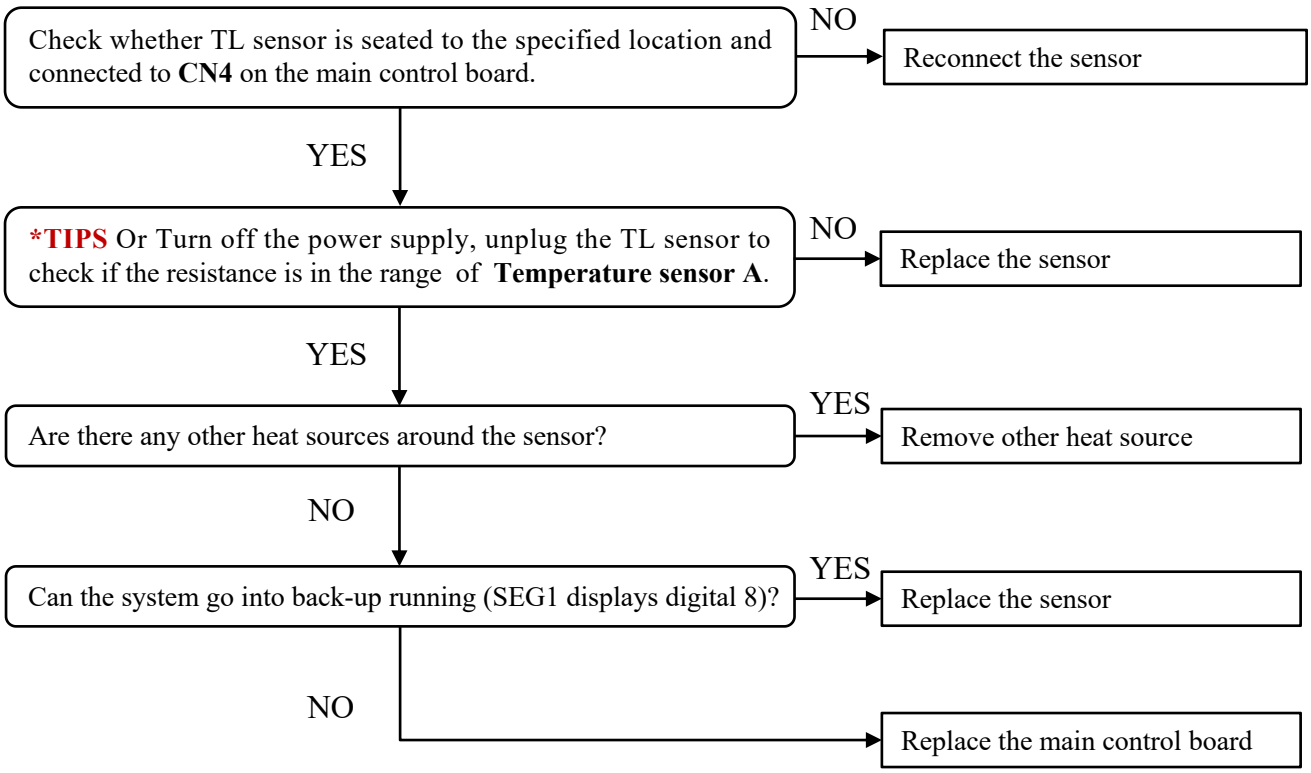
# Liquid line temperature (TL) sensor fault

**1.Error definition:**

The liquid temperature (TL) sensor is short circuit or open circuit.

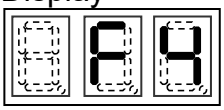
**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor
- There are other heat sources around the sensor




TIPS: Measure the DC voltage of the temperature sensor when outdoor unit powers on.

Display



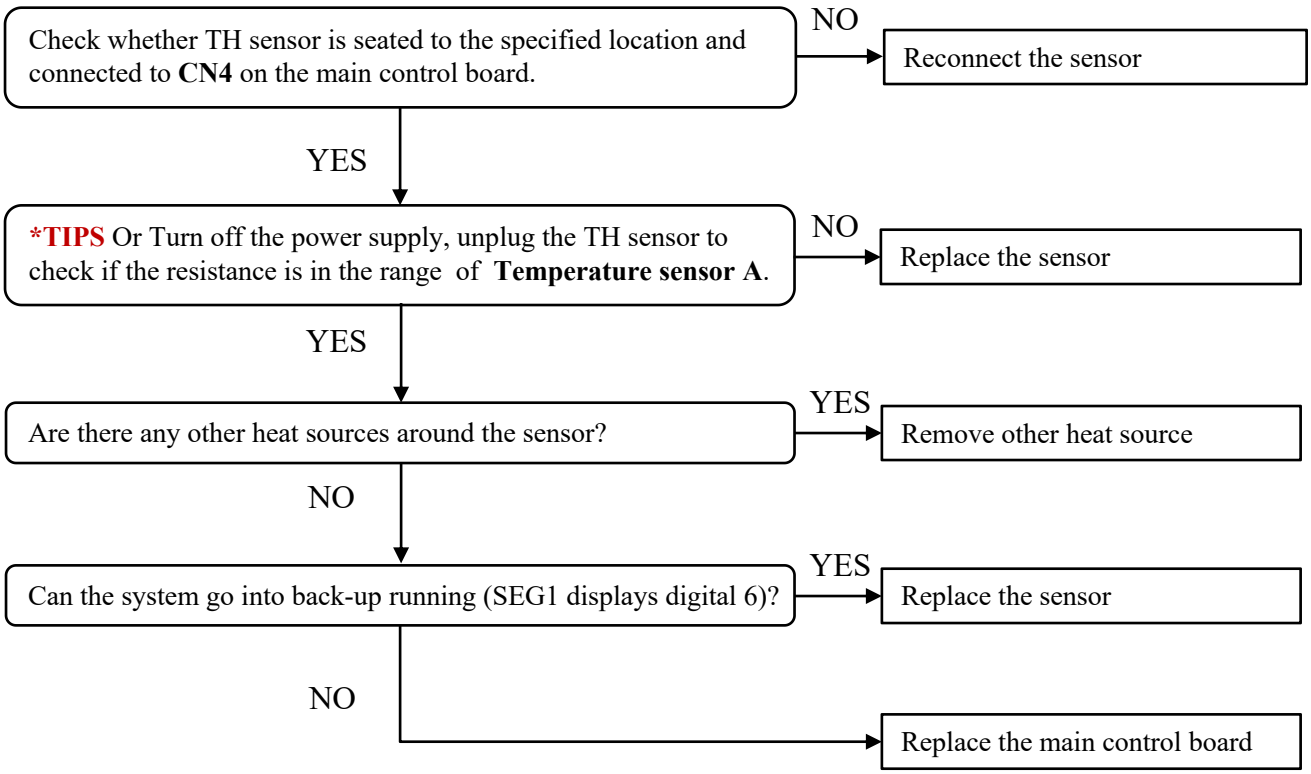
# Defrost temperature (TH) sensor fault

**1.Error definition:**

The defrost temperature (TH) sensor is short circuit or open circuit.

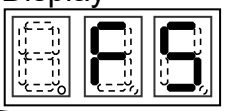
**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor
- There are other heat sources around the sensor




TIPS: Measure the DC voltage of the temperature sensor when outdoor unit powers on.

Display



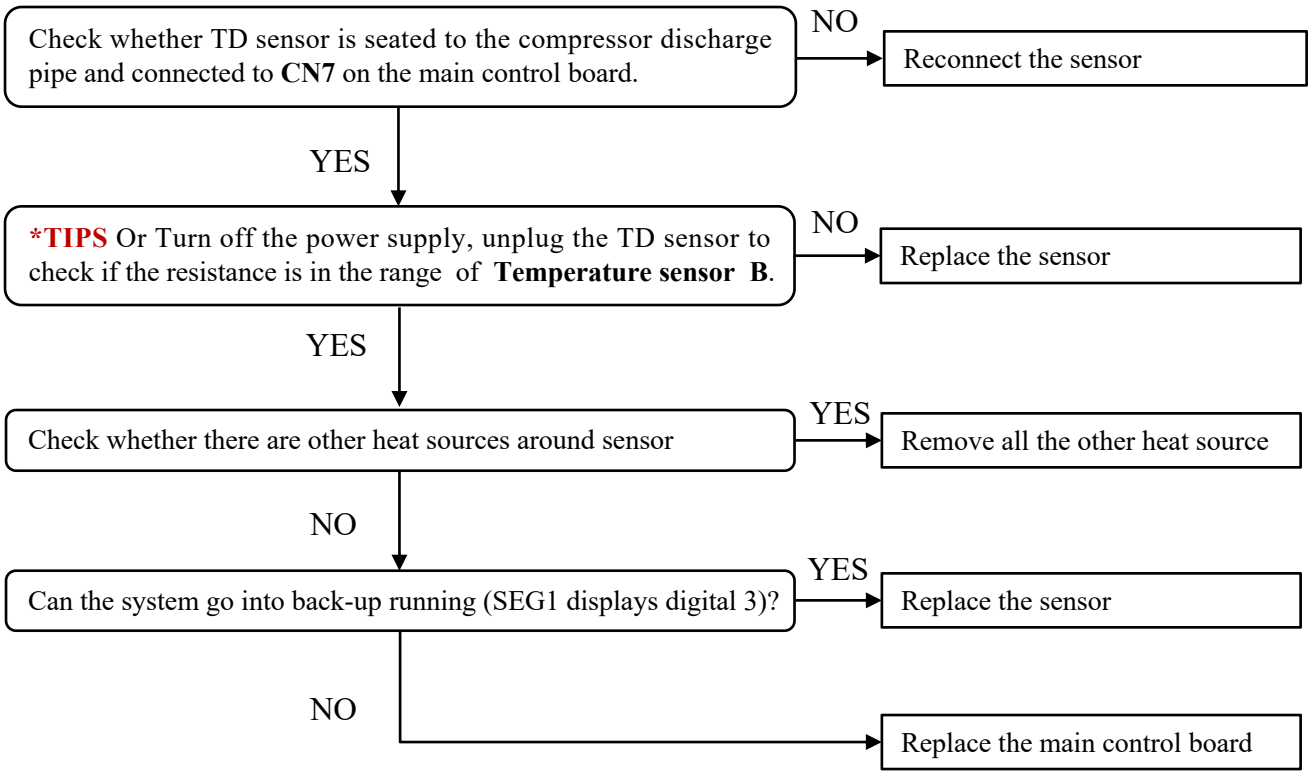
# Compressor discharge temperature (TD) sensor fault

**1.Error definition:**

The discharge temperature (TD) sensor is short circuit or open circuit.

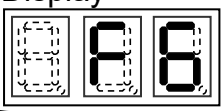
**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Temperature sensor failure
- There are other heat sources around the sensor




TIPS: Measure the DC voltage of the temperature sensor when outdoor unit powers on.

Display



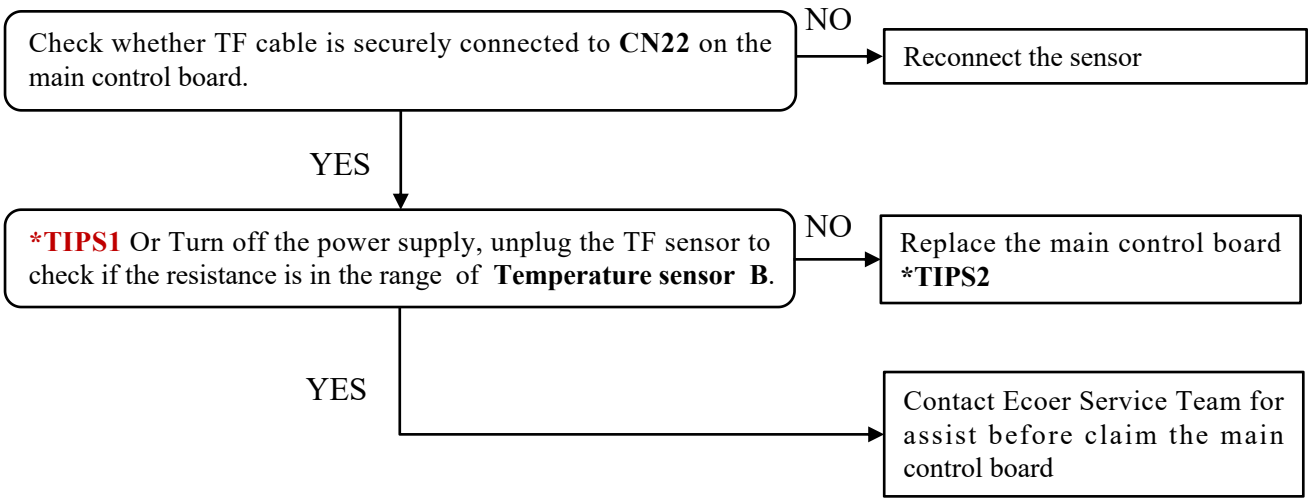
# Inverter module temperature (TF) sensor fault

## 1.Error definition:

The module temperature(TF) sensor is short circuit or open circuit.

## 2.Possible causes:

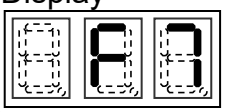
- Damaged main control board
- Loose connection at port on main control board
- Temperature sensor failure(PCB2.0 built-in TF sensor)
- There are other heat sources around the sensor




TIPS:

1. Measure the DC voltage of the temperature sensor when outdoor unit powers on.
2. TF senor has been laid inside the assembly control box with silicon gel contacting the radiator. It's required to replace the main control board in this case.

Display

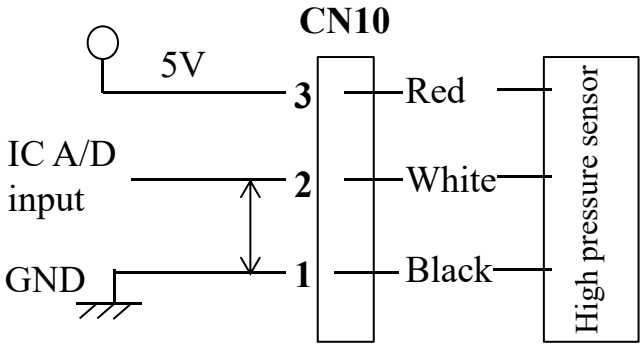


# High pressure (HP) sensor fault

**1.Error definition and method to check:**

The high pressure sensor is open or shorted.

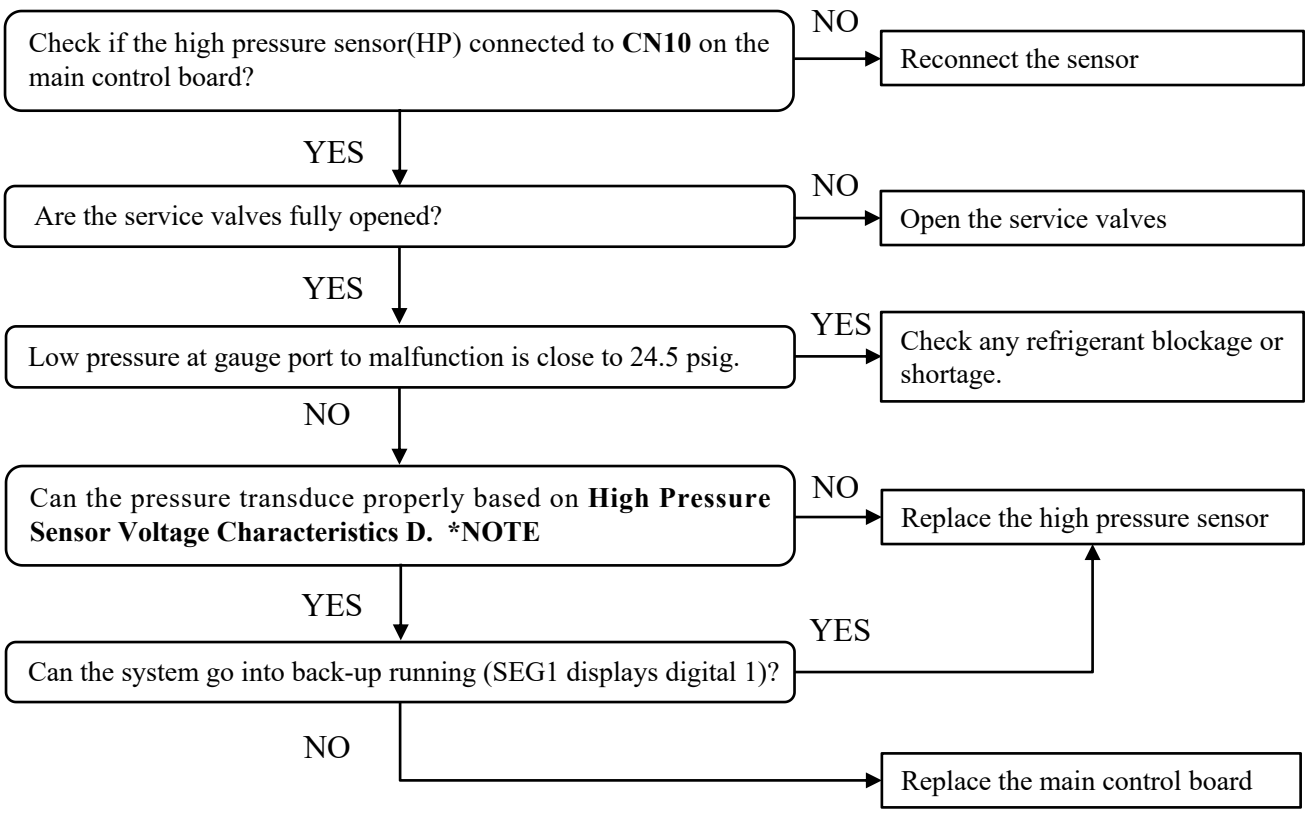
The voltage between CN10 pin(1) and (2) is not in the range 0.59~4.76VDC.




Measure DC voltage within these pins

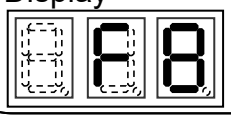
**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Damaged high pressure sensor
- Too little refrigerant remains in the system




NOTE: Connect a pressure gauge to liquid service valve in cooling mode, gas service valve in heating mode. Compare the value difference between gauged pressure and the transduced one by high pressure sensor (spot check by BS3 button or check the data from ESS Pro App).

Display

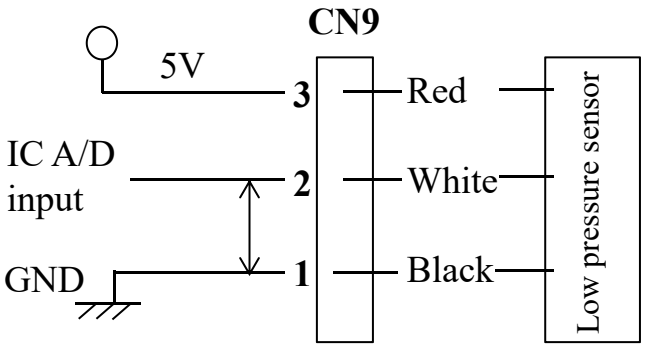


# Low pressure (LP) sensor fault

**1.Error definition and method to check:**

The low pressure sensor is open or shorted.

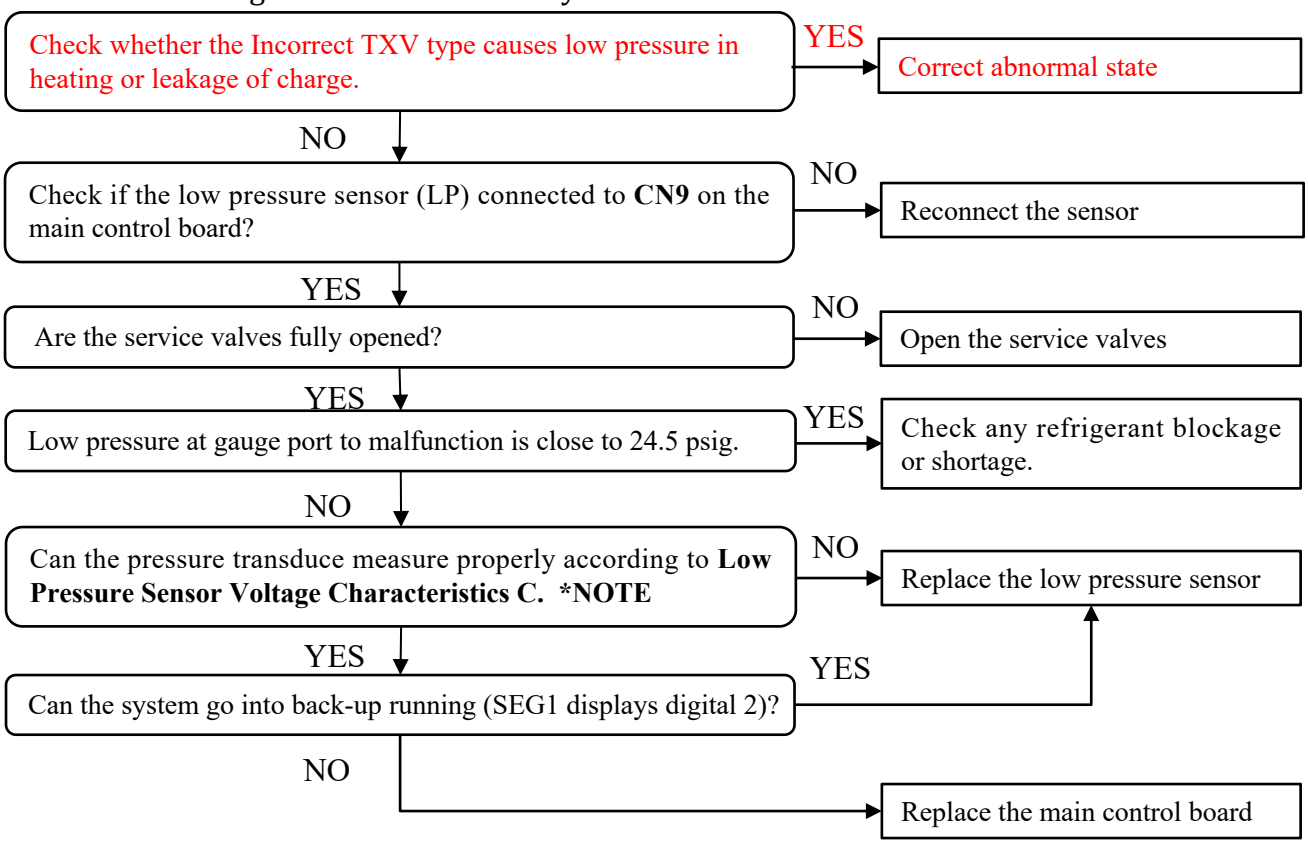
The voltage between CN9 pin(1) and (2) is not in the range 0.70~4.50VDC.




Measure DC voltage within these pins

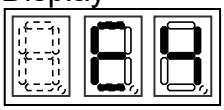
**2.Possible causes:**

- Damaged main control board
- Loose connection at port on main control board
- Incorrect TXV type causes high temperature in heating
- Damaged low pressure sensor
- Too little refrigerant remains in the system




NOTE: Connect a pressure gauge to gauge port, compare the difference between the gauged pressure and the transduced one by low pressure sensor (spot check by BS3 button or check the data from ESS Pro App).

Display



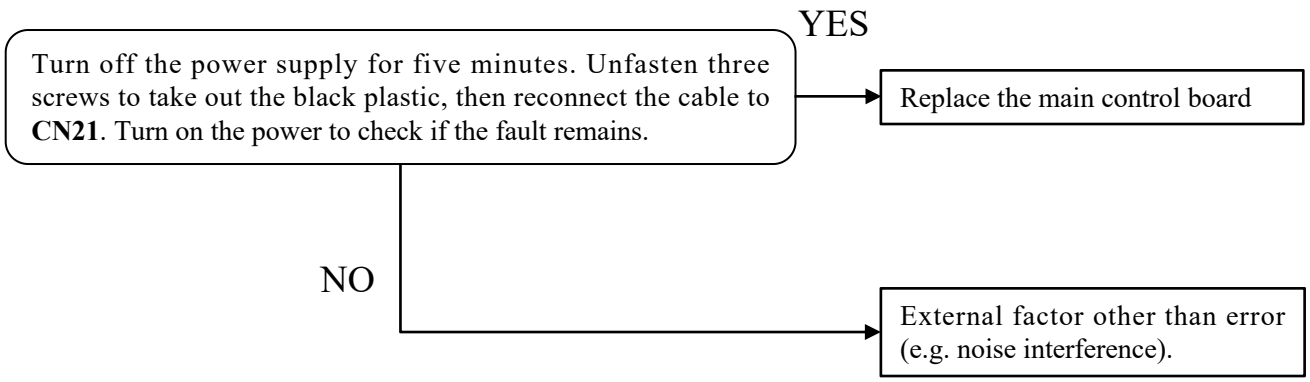
# Communication fault between main chip and INV drive chip

## 1.Error definition and method to check:

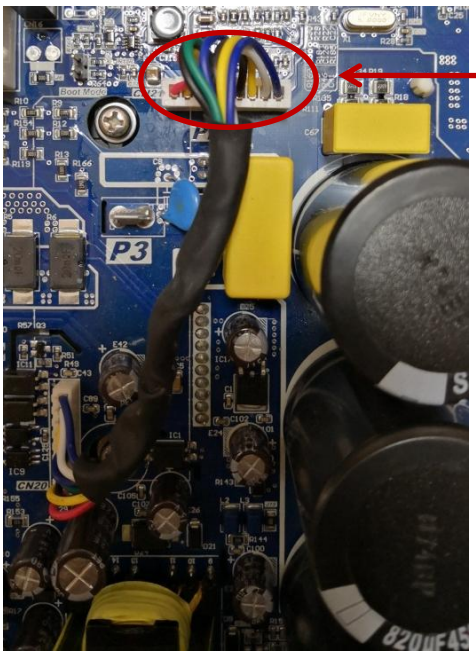
Communication fault between the main control chip and inverter chip.

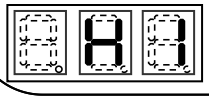
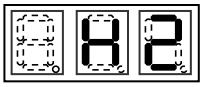
## 2.Possible causes:

- Loose connection at CN21 terminal
- Damaged main control board







Display  or 

# Ambient temperature limit operation

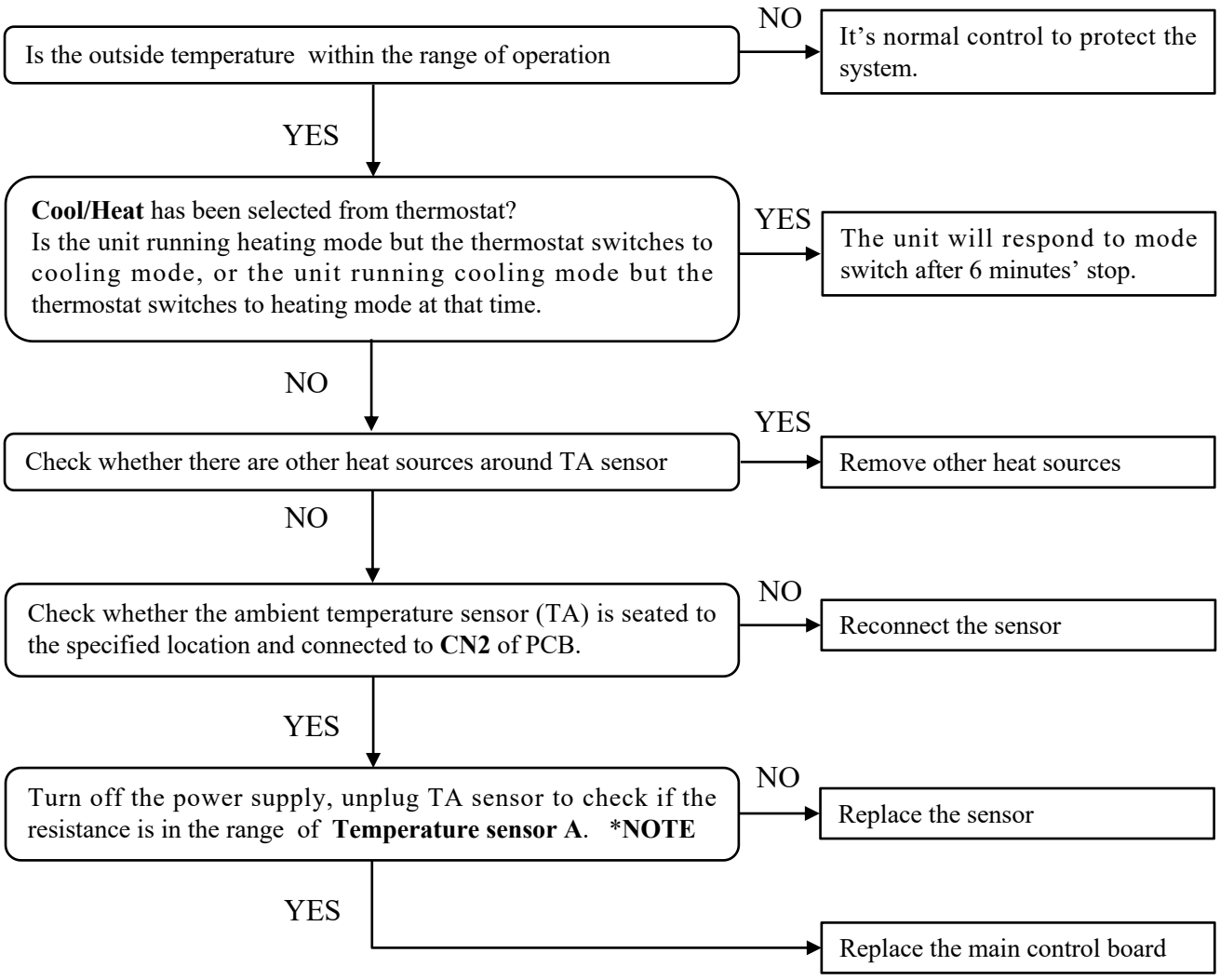
**1.Error definition and method to check:**

H1: The detected ambient temperature is absolutely prohibited for cooling.
TA<20°F or ≥140°F

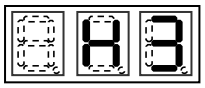
H2: The detected ambient temperature is absolutely prohibited for heating.
TA ≥ 86°F or TA< forced heating stop temperature set by n01

**2.Possible causes:**

- The ambient temperature exceeds the set range of operation.
- The system is running previous mode
- Damaged ambient temperature sensor (TA)
- Damaged main control board.



Display



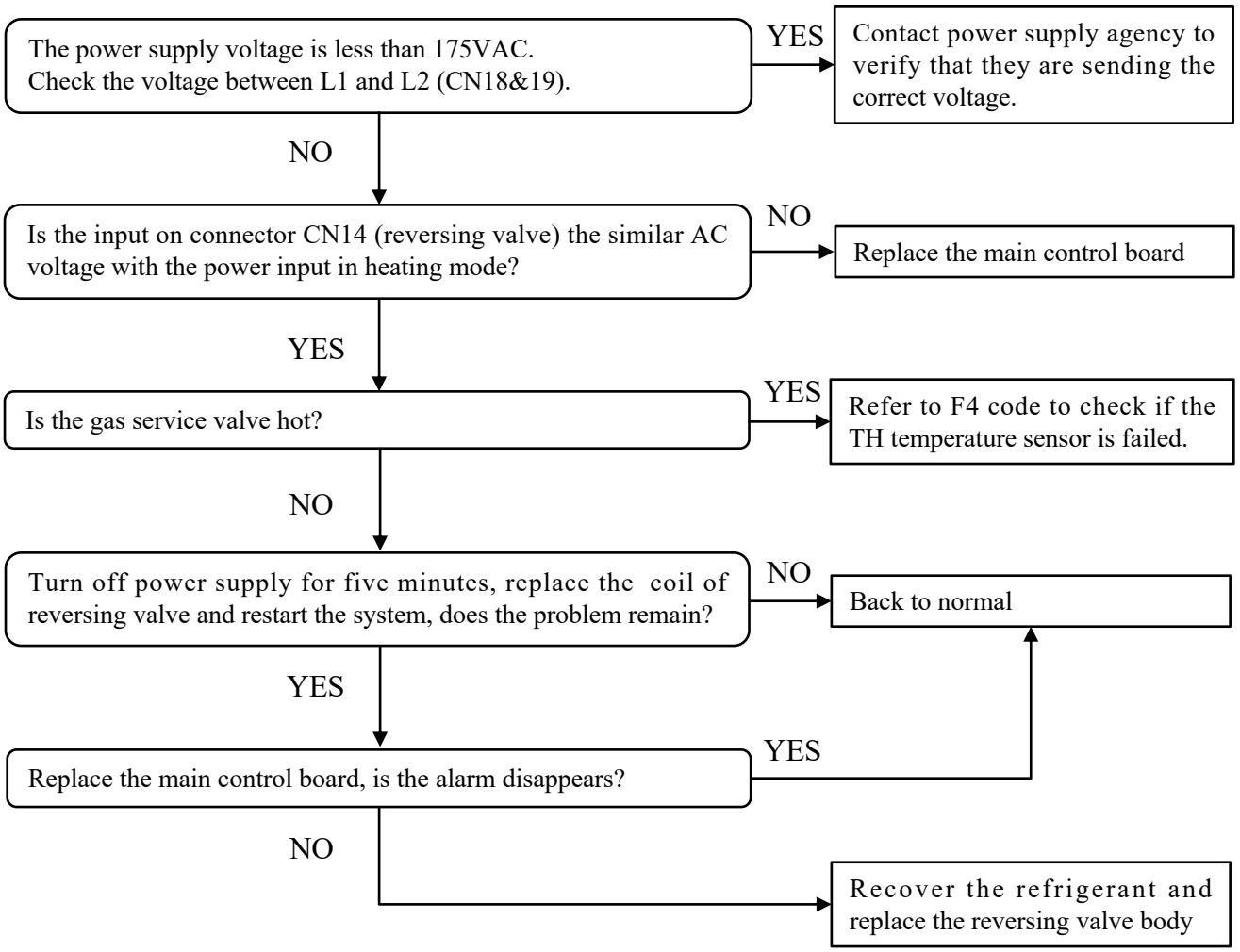
# Abnormal switch alarm for reversing valve

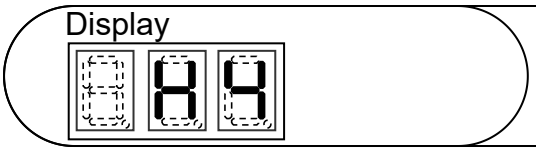
**1.Error definition:**

4-way (reversing) valve switches incompletely after defrost operation or from cooling mode.
Report H3 alarm if TH ≥ TL+10.8°F and TH ≥ TA+5.4°F.

**2.Possible causes:**

- Damaged reversing valve(coil or body)
- Damaged main control board
- Abnormal voltage of power supply
- Temperature sensor(TH) failure
- Reversed location between TH and TL





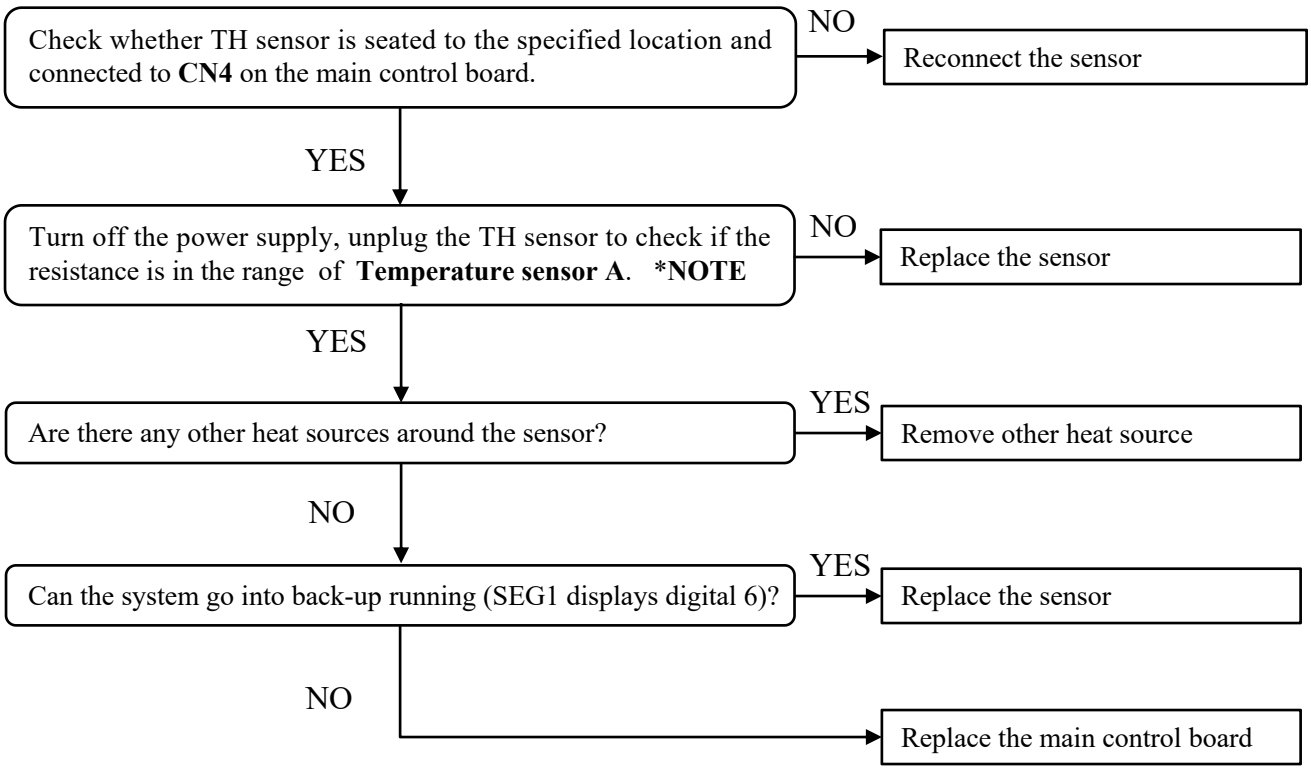

# Defrost temperature (TH) sensor is disconnected or damaged

**1.Error definition:**

The defrost temperature (TH) sensor is short circuit or open circuit.

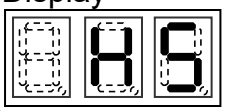
**2.Possible causes:**

- Damaged main control board
- The defrost temperature sensor is wrongly seated
- Temperature sensor failure
- There are other heat sources around the sensor




NOTE: Measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

Display



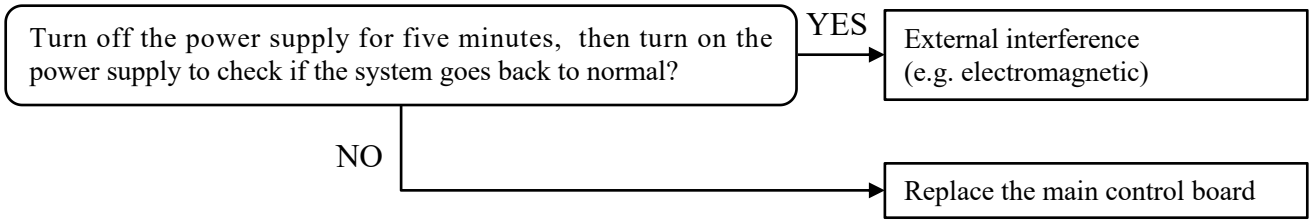
## EEPROM fault

**1.Error definition:**

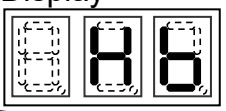
Data cannot be correctly received from the EEPROM to main chip.
EEPROM, a type of memory component, remembers contents even though power off.

**2.Possible causes:**

- Damaged main control board




Display



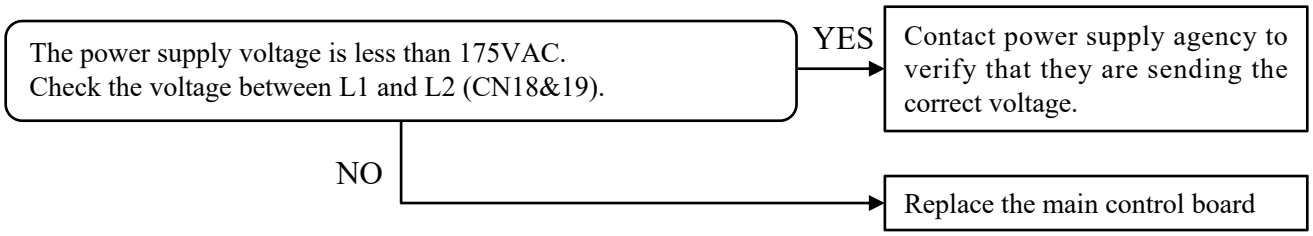
## Low voltage alarm

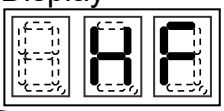
**1.Error definition:**

Power supply voltage is less than 175VAC.

**2.Possible causes:**

- Abnormal power supply voltage
- Damaged main control board



Display 

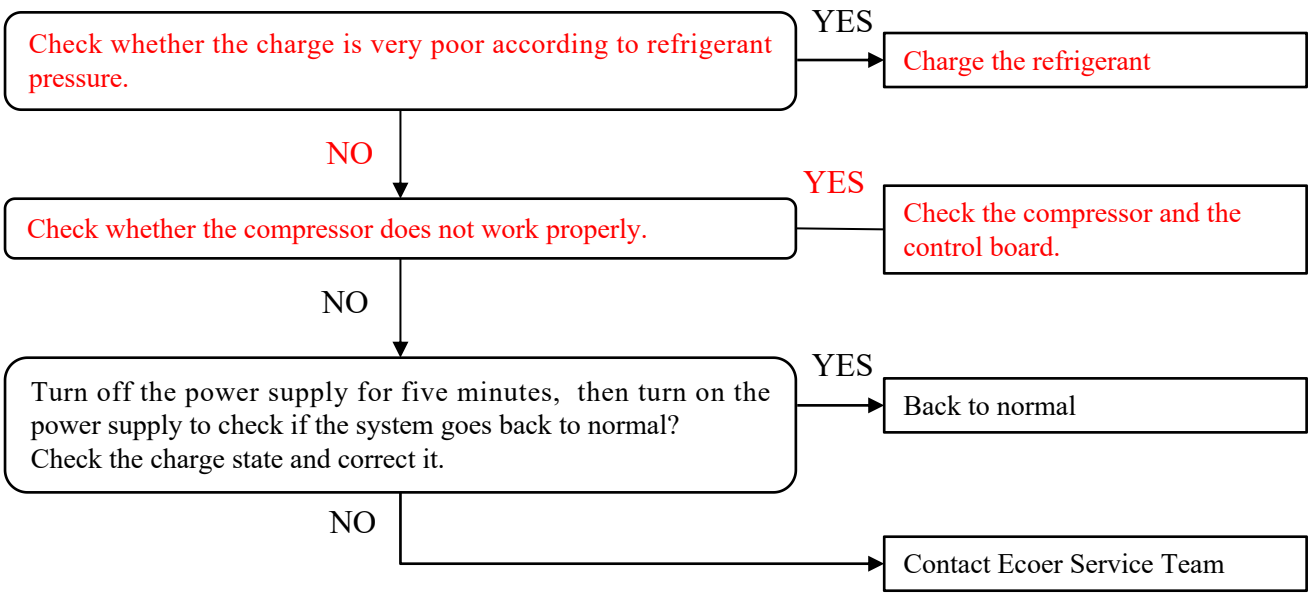
# Abnormal function control

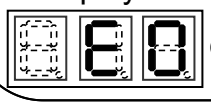
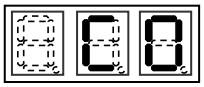
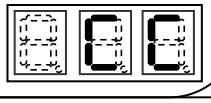
**1.Error definition:**

Cannot exit special control (start-up, oil return or defrost)

**2.Possible causes:**

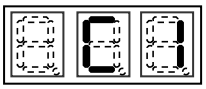
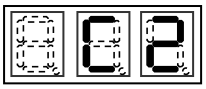
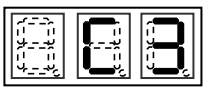
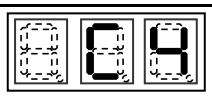
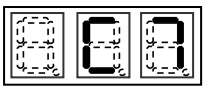
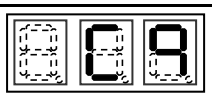
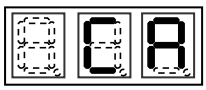
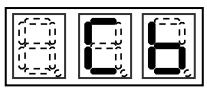
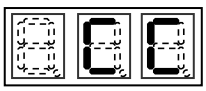
- Very poor charge
- The compressor does not work properly
- Abnormal signal input from thermostat



Display  or  ~ 

## Compressor INV module protection

### 1.Error definition:

| Code | LED Display | Definition |
|---|---|---|
| C0 |  | Critical over-voltage fault |
| C1 |  | DC bus over-voltage protection |
| C2 |  | DC bus under-voltage protection |
| C3 |  | Over-current protection |
| C4 |  | Zero speed fault |
| C7 |  | Compressor speed inconsistent fault |
| C9 |  | Compressor speed difference between given transient variation and actual operation |
| CA |  | AC over-voltage protection |
| CB |  | AC under-voltage protection |
| CC |  | PFC error |

E0: System locks up when C0~CA has occurred three times in 60 minutes.

### 2.Possible causes:

- Abnormal power supply voltage
- Power supply disconnected (C2/C7/C9 or C2/C3/C7 report at the same time)
- Dirty compressor terminal or damaged compressor
- Damaged main control board
- Micro channel coil has been used for heat pump
- Compressor terminal or wire is loose.

Display E0 or C0 ~ CC

# Compressor INV module protection

The power supply voltage is not in the range of 187~253VAC. — YES → Contact power supply agency to verify that they are sending the correct voltage.

NO ↓

Has the micro channel coil been used for heat pump? — YES → Replace the indoor coil

NO ↓

Are the compressor wirings (U/V/W) securely connected? — NO → Reconnect the wiring

YES ↓

Is the compressor open-circuited? ***NOTE** — YES → Replace the compressor

NO ↓

Are there any dirty things on the compressor terminal? — YES → Clean the terminal

NO ↓

Turn off the power supply to replace the main control board. Restart the unit, does the error code disappear? — NO → Replace the compressor

YES ↓

Back to normal

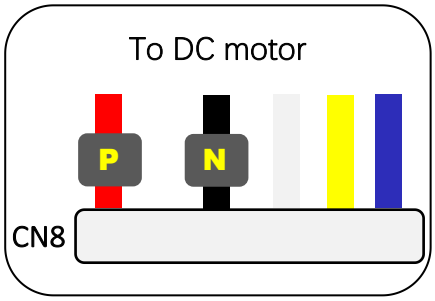
**NOTE:** Normal resistance for compressor

3-phase resistance (UV, UW, VW) for compressor is less than 5Ω.
The insulation resistance (any phase to Ground) for compressor is greater than 100KΩ.

## How to diagnose the INV module is damaged or not

Turn off the power supply for five (5) minutes prior to do the diagnosis.

**Disconnect the compressor wiring from the main control board.**




Are the resistances between P (Red wiring in CN8) and U/V/W, N (Black wiring in CN8) and U/V/W over 100KΩ ? i.e.

$R_{P-U}$ > 100KΩ | $R_{P-V}$ > 100KΩ | $R_{P-W}$ > 100KΩ

$R_{N-U}$ > 100KΩ | $R_{N-V}$ > 100KΩ | $R_{N-W}$ > 100KΩ

NO → INV module is damaged

YES

Use diode ap to measure the voltage between U/V/W and P (Red wiring in CN8), N (Black wiring in CN8) and U/V/W.

Are the voltages normal?

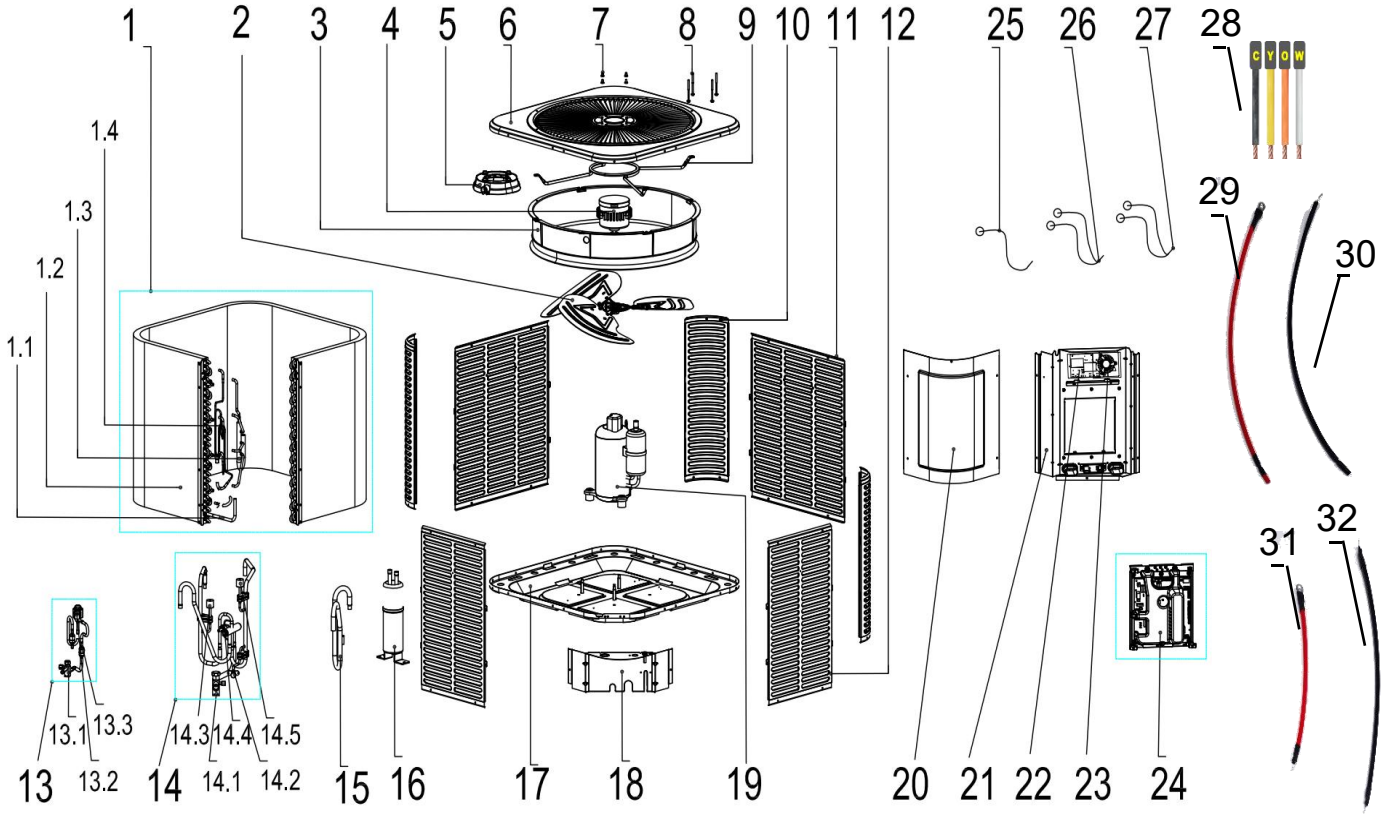
| RED Probe '+' electrode | BLACK Probe '-' electrode | VOLTAGE |
|---|---|---|
| U | P | 0.4±0.1 VDC |
| V | P | 0.4±0.1 VDC |
| W | P | 0.4±0.1 VDC |
| N | U | 0.4±0.1 VDC |
| N | V | 0.4±0.1 VDC |
| N | W | 0.4±0.1 VDC |

NO → INV module is damaged

YES

INV module works properly

# 4 Parts list




| # | Part Name | Quantity | Parts number | |
|---|---|---|---|---|
| | | | 2436BAA | 4860BAA |
| 1 | Condenser ass'y | 1 | EAC92011-007897 | EAC92011-007898 |
| 1.1 | Condenser connection pipe ass'y | 1 | EAC231235268 | |
| 1.2 | Condenser | 1 | EAC92011-007895 | EAC92011-007896 |
| 1.3 | Condenser outlet pipe ass'y | 1 | EAC231235085 | EAC231235153 |
| 1.4 | Condenser inlet pipe ass'y | 1 | EAC231235084 | EAC231235154 |
| 2 | Fan | 1 | EAC230801635 | |
| 3 | Guide ring | 1 | EAC230700850 | |
| 4 | Brushless DC Motor | 1 | EAC230904010 | |
| 5 | Motor installation board ass'y | 1 | EAC230803381 | |
| 6 | Top cover ass'y | 1 | EAC230803291 | |
| 7 | Cap nut | 4 | EAC230803110 | |
| 8 | Electrical installation bolt | 4 | EAC230803111 | |

| # | Part Name | Quantity | Parts number | | Remark |
|---|---|---|---|---|---|
| | | | 2436BAA | 4860BAA | |
| 9 | Roof support frame | 1 | EAC230801628 | | |
| 10 | Supporting board | 3 | EAC230801590B | EAC230801609B | |
| 11 | Side board ass'y | 2 | EAC230803142 | EAC230802064A | |
| 12 | Side board ass'y | 2 | EAC230803143 | EAC230802065A | |
| 13 | High-pressure valve ass'y | 1 | EAC231235131 | EAC231235854 | |
| 13.1 | Liquid block valve | 1 | EAC231231469 | | |
| 13.2 | Electronic expansion valve (EEV) | 1 | EAC92008-000319 | EAC231235157 | |
| 13.3 | EEV solenoid coil | 1 | EAC3120290034 | | |
| 14 | Reversing valve ass'y | 1 | EAC92007-011809 | EAC92007-011812 | |
| 14.1 | Gas block valve | 1 | EAC231231468 | EAC3120130060 | |
| 14.2 | Pipe joint ass'y | 1 | EAC231235472 | EAC231235471 | |
| 14.3 | High pressure sensor | 1 | EAC231235159 | | Black color |
| 14.4 | Reversing valve | 1 | EAC231235078<br>EAC231235079 | | EAC231235078-valve body<br>EAC231235079-valve coil |
| 14.5 | Low pressure sensor | 1 | EAC231235158 | | Green color |
| 15 | Suction pipe ass'y | 1 | EAC92007-011803 | EAC92007-010022 | |
| 16 | Refrigerant accumulator | 1 | EAC92003-000182 | EAC92003-000183 | |
| 17 | Chassis Parts | 1 | EAC230803293 | | |
| 18 | Lower side plate | 1 | EAC230803138 | EAC230803139 | |
| 19 | Compressor | 1 | EAC92014-000860 | EAC231235532 | |
| 20 | Upper cover plate | 1 | EAC230803313 | EAC230803309 | |
| 21 | Electrically controlled mounting board | 1 | EAC230803312 | EAC230803310 | |
| 22 | Noise filter assy' (EMI) | 1 | EAC2313000005 | EAC2313000006 | |
| 23 | PFC inductor | 1 | EAC230904160 | EAC230904161 | |
| 24 | Motherboard component | 1 | EAC230904158 | EAC230904159 | |
| 25 | Discharge Temp. sensor | 1 | EAC3160130008A | | TD temperature sensor |
| 26 | Pipe Temp. sensor ass'y | 1 | EAC230901018 | | TL temperature sensor<br>TH temperature sensor |
| 27 | Temp. sensor ass'y | 1 | EAC230901233 | | TS temperature sensor<br>TA temperature sensor |
| 28 | Thermostat wiring connector | 1 | EAC230904254 | | To thermostat |
| 29 | Power cable (RED) | 1 | EAC230904301 | | |
| 30 | Power cable (BLACK) | 1 | EAC230904302 | | |
| 31 | Power cable connecting EMI and PCB CN19 (RED) | 1 | EAC230904303 | | |
| 32 | Power cable connecting EMI and PCB CN18 (BLACK) | 1 | EAC230904304 | | |

# 5 Appendix

## 5.1 Sensor Characteristic

### Temperature sensor A* (TS, TH, TA, TL)

| Temp. (° C) | Temp. (℉) | Resistance (KΩ) | Voltage (V) |
|---|---|---|---|
| -20 | -4 | 104.86 | 2.77 |
| -19 | -2.2 | 98.84 | 2.74 |
| -18 | -0.4 | 93.21 | 2.72 |
| -17 | 1.4 | 87.93 | 2.69 |
| -16 | 3.2 | 82.98 | 2.66 |
| -15 | 5 | 78.33 | 2.63 |
| -14 | 6.8 | 73.97 | 2.6 |
| -13 | 8.6 | 69.88 | 2.57 |
| -12 | 10.4 | 66.03 | 2.53 |
| -11 | 12.2 | 62.42 | 2.5 |
| -10 | 14 | 59.02 | 2.46 |
| -9 | 15.8 | 55.82 | 2.43 |
| -8 | 17.6 | 52.81 | 2.39 |
| -7 | 19.4 | 49.98 | 2.36 |
| -6 | 21.2 | 47.32 | 2.32 |
| -5 | 23 | 44.81 | 2.28 |
| -4 | 24.8 | 42.45 | 2.24 |
| -3 | 26.6 | 40.22 | 2.2 |
| -2 | 28.4 | 38.12 | 2.16 |
| -1 | 30.2 | 36.15 | 2.12 |
| 0 | 32 | 34.28 | 2.08 |
| 1 | 33.8 | 32.52 | 2.04 |
| 2 | 35.6 | 30.86 | 2 |
| 3 | 37.4 | 29.29 | 1.96 |
| 4 | 39.2 | 27.81 | 1.92 |
| 5 | 41 | 26.42 | 1.88 |
| 6 | 42.8 | 25.10 | 1.84 |
| 7 | 44.6 | 23.85 | 1.79 |
| 8 | 46.4 | 22.67 | 1.75 |
| 9 | 48.2 | 21.56 | 1.71 |
| 10 | 50 | 20.50 | 1.67 |
| 11 | 51.8 | 19.51 | 1.63 |
| 12 | 53.6 | 18.56 | 1.59 |
| 13 | 55.4 | 17.67 | 1.55 |
| 14 | 57.2 | 16.83 | 1.51 |
| 15 | 59 | 16.03 | 1.47 |
| 16 | 60.8 | 15.27 | 1.43 |
| 17 | 62.6 | 14.55 | 1.39 |
| 18 | 64.4 | 13.87 | 1.35 |
| 19 | 66.2 | 13.23 | 1.31 |
| 20 | 68 | 12.62 | 1.28 |
| 21 | 69.8 | 12.04 | 1.24 |
| 22 | 71.6 | 11.49 | 1.2 |
| 23 | 73.4 | 10.97 | 1.17 |
| 24 | 75.2 | 10.47 | 1.13 |
| 25 | 77 | 10.00 | 1.1 |
| 26 | 78.8 | 9.55 | 1.07 |
| 27 | 80.6 | 9.13 | 1.03 |
| 28 | 82.4 | 8.73 | 1 |
| 29 | 84.2 | 8.35 | 0.97 |
| 30 | 86 | 7.98 | 0.94 |
| 31 | 87.8 | 7.64 | 0.91 |
| 32 | 89.6 | 7.31 | 0.88 |
| 33 | 91.4 | 6.99 | 0.86 |
| 34 | 93.2 | 6.70 | 0.83 |
| 35 | 95 | 6.41 | 0.8 |
| 36 | 96.8 | 6.14 | 0.78 |
| 37 | 98.6 | 5.89 | 0.75 |
| 38 | 100.4 | 5.64 | 0.73 |
| 39 | 102.2 | 5.41 | 0.7 |
| 40 | 104 | 5.19 | 0.68 |
| 41 | 105.8 | 4.97 | 0.66 |
| 42 | 107.6 | 4.77 | 0.64 |
| 43 | 109.4 | 4.58 | 0.61 |
| 44 | 111.2 | 4.39 | 0.59 |
| 45 | 113 | 4.22 | 0.57 |
| 46 | 114.8 | 4.05 | 0.56 |
| 47 | 116.6 | 3.89 | 0.54 |
| 48 | 118.4 | 3.74 | 0.52 |
| 49 | 120.2 | 3.59 | 0.5 |
| 50 | 122 | 3.45 | 0.49 |
| 51 | 123.8 | 3.32 | 0.47 |
| 52 | 125.6 | 3.19 | 0.45 |
| 53 | 127.4 | 3.07 | 0.44 |
| 54 | 129.2 | 2.95 | 0.42 |
| 55 | 131 | 2.84 | 0.41 |
| 56 | 132.8 | 2.73 | 0.4 |
| 57 | 134.6 | 2.63 | 0.38 |
| 58 | 136.4 | 2.53 | 0.37 |
| 59 | 138.2 | 2.44 | 0.36 |
| 60 | 140 | 2.35 | 0.35 |
| 61 | 141.8 | 2.26 | 0.34 |
| 62 | 143.6 | 2.18 | 0.32 |
| 63 | 145.4 | 2.10 | 0.31 |
| 64 | 147.2 | 2.02 | 0.3 |
| 65 | 149 | 1.95 | 0.29 |
| 66 | 150.8 | 1.88 | 0.28 |
| 67 | 152.6 | 1.81 | 0.27 |
| 68 | 154.4 | 1.75 | 0.26 |
| 69 | 156.2 | 1.68 | 0.26 |
| 70 | 158 | 1.63 | 0.25 |
| 71 | 159.8 | 1.57 | 0.24 |
| 72 | 161.6 | 1.51 | 0.23 |
| 73 | 163.4 | 1.46 | 0.22 |
| 74 | 165.2 | 1.41 | 0.22 |
| 75 | 167 | 1.36 | 0.21 |
| 76 | 168.8 | 1.31 | 0.2 |
| 77 | 170.6 | 1.27 | 0.2 |
| 78 | 172.4 | 1.23 | 0.19 |
| 79 | 174.2 | 1.19 | 0.18 |
| 80 | 176 | 1.15 | 0.18 |
| 81 | 177.8 | 1.11 | 0.17 |
| 82 | 179.6 | 1.07 | 0.17 |
| 83 | 181.4 | 1.03 | 0.16 |
| 84 | 183.2 | 1.00 | 0.16 |
| 85 | 185 | 0.97 | 0.15 |
| 86 | 186.8 | 0.94 | 0.15 |
| 87 | 188.6 | 0.91 | 0.14 |
| 88 | 190.4 | 0.88 | 0.14 |
| 89 | 192.2 | 0.85 | 0.13 |
| 90 | 194 | 0.82 | 0.13 |
| 91 | 195.8 | 0.80 | 0.13 |
| 92 | 197.6 | 0.77 | 0.12 |
| 93 | 199.4 | 0.75 | 0.12 |
| 94 | 201.2 | 0.72 | 0.12 |
| 95 | 203 | 0.70 | 0.11 |
| 96 | 204.8 | 0.68 | 0.11 |
| 97 | 206.6 | 0.66 | 0.11 |
| 98 | 208.4 | 0.64 | 0.1 |
| 99 | 210.2 | 0.62 | 0.1 |
| 100 | 212 | 0.60 | 0.1 |
| 101 | 213.8 | 0.59 | 0.09 |
| 102 | 215.6 | 0.57 | 0.09 |
| 103 | 217.4 | 0.55 | 0.09 |
| 104 | 219.2 | 0.54 | 0.09 |
| 105 | 221 | 0.52 | 0.08 |

Remarks:

Above table shows the average resistance corresponding to the temperature.

Resistance tolerance is ±6%.

# Temperature sensor B* (TF, TD)

| Temp. (° C) | Temp. (℉) | Resistance (KΩ) | Voltage (V) |
|---|---|---|---|
| -20 | -4 | 517.84 | 3.03 |
| -19 | -2.2 | 489.93 | 3.01 |
| -18 | -0.4 | 463.65 | 3 |
| -17 | 1.4 | 438.89 | 2.98 |
| -16 | 3.2 | 415.57 | 2.96 |
| -15 | 5 | 393.59 | 2.95 |
| -14 | 6.8 | 372.87 | 2.93 |
| -13 | 8.6 | 353.34 | 2.91 |
| -12 | 10.4 | 334.92 | 2.89 |
| -11 | 12.2 | 317.55 | 2.87 |
| -10 | 14 | 301.16 | 2.85 |
| -9 | 15.8 | 285.70 | 2.83 |
| -8 | 17.6 | 271.10 | 2.81 |
| -7 | 19.4 | 257.33 | 2.79 |
| -6 | 21.2 | 244.32 | 2.77 |
| -5 | 23 | 232.03 | 2.74 |
| -4 | 24.8 | 220.42 | 2.72 |
| -3 | 26.6 | 209.45 | 2.7 |
| -2 | 28.4 | 199.08 | 2.67 |
| -1 | 30.2 | 189.27 | 2.64 |
| 0 | 32 | 180.00 | 2.62 |
| 1 | 33.8 | 171.23 | 2.59 |
| 2 | 35.6 | 162.93 | 2.56 |
| 3 | 37.4 | 155.07 | 2.53 |
| 4 | 39.2 | 147.63 | 2.5 |
| 5 | 41 | 140.59 | 2.47 |
| 6 | 42.8 | 133.92 | 2.44 |
| 7 | 44.6 | 127.60 | 2.41 |
| 8 | 46.4 | 121.60 | 2.38 |
| 9 | 48.2 | 115.93 | 2.35 |
| 10 | 50 | 110.54 | 2.32 |
| 11 | 51.8 | 105.43 | 2.28 |
| 12 | 53.6 | 100.59 | 2.25 |
| 13 | 55.4 | 95.99 | 2.22 |
| 14 | 57.2 | 91.62 | 2.18 |
| 15 | 59 | 87.48 | 2.15 |
| 16 | 60.8 | 83.54 | 2.11 |
| 17 | 62.6 | 79.80 | 2.08 |
| 18 | 64.4 | 76.25 | 2.04 |
| 19 | 66.2 | 72.87 | 2.01 |
| 20 | 68 | 69.66 | 1.97 |
| 21 | 69.8 | 66.61 | 1.93 |
| 22 | 71.6 | 63.70 | 1.9 |
| 23 | 73.4 | 60.94 | 1.86 |
| 24 | 75.2 | 58.31 | 1.83 |
| 25 | 77 | 55.81 | 1.79 |
| 26 | 78.8 | 53.42 | 1.76 |
| 27 | 80.6 | 51.15 | 1.72 |
| 28 | 82.4 | 48.99 | 1.68 |
| 29 | 84.2 | 46.93 | 1.65 |
| 30 | 86 | 44.97 | 1.61 |
| 31 | 87.8 | 43.10 | 1.58 |
| 32 | 89.6 | 41.31 | 1.54 |
| 33 | 91.4 | 39.61 | 1.51 |
| 34 | 93.2 | 37.99 | 1.48 |
| 35 | 95 | 36.44 | 1.44 |
| 36 | 96.8 | 34.96 | 1.41 |
| 37 | 98.6 | 33.55 | 1.37 |
| 38 | 100.4 | 32.21 | 1.34 |
| 39 | 102.2 | 30.92 | 1.31 |
| 40 | 104 | 29.69 | 1.28 |
| 41 | 105.8 | 28.52 | 1.25 |
| 42 | 107.6 | 27.40 | 1.22 |
| 43 | 109.4 | 26.32 | 1.18 |
| 44 | 111.2 | 25.30 | 1.15 |
| 45 | 113 | 24.32 | 1.13 |
| 46 | 114.8 | 23.38 | 1.1 |
| 47 | 116.6 | 22.49 | 1.07 |
| 48 | 118.4 | 21.63 | 1.04 |
| 49 | 120.2 | 20.81 | 1.01 |
| 50 | 122 | 20.02 | 0.99 |
| 51 | 123.8 | 19.27 | 0.96 |
| 52 | 125.6 | 18.55 | 0.93 |
| 53 | 127.4 | 17.86 | 0.91 |
| 54 | 129.2 | 17.20 | 0.88 |
| 55 | 131 | 16.57 | 0.86 |
| 56 | 132.8 | 15.96 | 0.84 |
| 57 | 134.6 | 15.38 | 0.81 |
| 58 | 136.4 | 14.82 | 0.79 |
| 59 | 138.2 | 14.29 | 0.77 |
| 60 | 140 | 13.77 | 0.75 |
| 61 | 141.8 | 13.28 | 0.73 |
| 62 | 143.6 | 12.81 | 0.71 |
| 63 | 145.4 | 12.36 | 0.69 |
| 64 | 147.2 | 11.92 | 0.67 |
| 65 | 149 | 11.51 | 0.65 |
| 66 | 150.8 | 11.11 | 0.63 |
| 67 | 152.6 | 10.72 | 0.61 |
| 68 | 154.4 | 10.35 | 0.6 |
| 69 | 156.2 | 10.00 | 0.58 |
| 70 | 158 | 9.66 | 0.56 |
| 71 | 159.8 | 9.33 | 0.55 |
| 72 | 161.6 | 9.01 | 0.53 |
| 73 | 163.4 | 8.71 | 0.52 |
| 74 | 165.2 | 8.42 | 0.5 |
| 75 | 167 | 8.14 | 0.49 |
| 76 | 168.8 | 7.87 | 0.47 |
| 77 | 170.6 | 7.61 | 0.46 |
| 77 | 170.6 | 7.36 | 0.45 |
| 78 | 172.4 | 7.12 | 0.43 |
| 79 | 174.2 | 6.89 | 0.42 |
| 80 | 176 | 6.86 | 0.42 |
| 81 | 177.8 | 6.67 | 0.41 |
| 82 | 179.6 | 6.46 | 0.4 |
| 83 | 181.4 | 6.25 | 0.39 |
| 84 | 183.2 | 6.05 | 0.38 |
| 85 | 185 | 5.86 | 0.37 |
| 86 | 186.8 | 5.68 | 0.36 |
| 87 | 188.6 | 5.50 | 0.35 |
| 88 | 190.4 | 5.33 | 0.34 |
| 89 | 192.2 | 5.16 | 0.33 |
| 90 | 194 | 5.00 | 0.32 |
| 91 | 195.8 | 4.85 | 0.31 |
| 92 | 197.6 | 4.70 | 0.3 |
| 93 | 199.4 | 4.55 | 0.29 |
| 94 | 201.2 | 4.42 | 0.28 |
| 95 | 203 | 4.28 | 0.28 |
| 96 | 204.8 | 4.15 | 0.27 |
| 97 | 206.6 | 4.03 | 0.26 |
| 98 | 208.4 | 3.91 | 0.25 |
| 99 | 210.2 | 3.79 | 0.25 |
| 100 | 212 | 3.68 | 0.24 |
| 101 | 213.8 | 3.57 | 0.23 |
| 102 | 215.6 | 3.46 | 0.23 |
| 103 | 217.4 | 3.36 | 0.22 |
| 104 | 219.2 | 3.26 | 0.21 |
| 105 | 221 | 3.17 | 0.21 |
| 106 | 222.8 | 3.09 | 0.2 |
| 107 | 224.6 | 3.00 | 0.2 |
| 108 | 226.4 | 2.92 | 0.19 |
| 109 | 228.2 | 2.84 | 0.19 |
| 110 | 230 | 2.76 | 0.18 |
| 111 | 231.8 | 2.68 | 0.18 |
| 112 | 233.6 | 2.60 | 0.17 |
| 113 | 235.4 | 2.53 | 0.17 |
| 114 | 237.2 | 2.46 | 0.16 |
| 115 | 239 | 2.39 | 0.16 |
| 116 | 240.8 | 2.33 | 0.16 |
| 117 | 242.6 | 2.26 | 0.15 |
| 118 | 244.4 | 2.20 | 0.15 |
| 119 | 246.2 | 2.14 | 0.14 |
| 120 | 248 | 2.08 | 0.14 |
| 121 | 249.8 | 2.03 | 0.14 |
| 122 | 251.6 | 1.97 | 0.13 |
| 123 | 253.4 | 1.92 | 0.13 |
| 124 | 255.2 | 1.87 | 0.13 |
| 125 | 257 | 1.82 | 0.12 |
| 126 | 258.8 | 1.77 | 0.12 |
| 127 | 260.6 | 1.72 | 0.12 |
| 128 | 262.4 | 1.68 | 0.11 |
| 129 | 264.2 | 1.63 | 0.11 |
| 130 | 266 | 1.59 | 0.11 |

**Remarks:**

Above table shows the average resistance corresponding to the temperature.

Resistance tolerance is ±12%.

# Low Pressure Sensor Voltage Characteristics C*

| Low pressure (MPa) | Low pressure (psig) | Resistance (KΩ) | Output voltage(V) |
|---|---|---|---|
| 0.10 | 14.5 | 49.51 | 0.70 |
| 0.11 | 16 | 47.91 | 0.72 |
| 0.12 | 17.4 | 46.40 | 0.74 |
| 0.13 | 18.9 | 44.97 | 0.76 |
| 0.14 | 20.3 | 43.61 | 0.78 |
| 0.15 | 21.8 | 42.32 | 0.80 |
| 0.16 | 23.2 | 41.09 | 0.82 |
| 0.17 | 24.7 | 39.92 | 0.84 |
| 0.18 | 26.1 | 38.80 | 0.86 |
| 0.19 | 27.6 | 37.74 | 0.88 |
| 0.21 | 30.5 | 35.74 | 0.92 |
| 0.22 | 31.9 | 34.81 | 0.94 |
| 0.23 | 33.4 | 33.92 | 0.96 |
| 0.24 | 34.8 | 33.06 | 0.98 |
| 0.26 | 37.7 | 31.45 | 1.02 |
| 0.27 | 39.2 | 30.69 | 1.04 |
| 0.29 | 42.1 | 29.25 | 1.08 |
| 0.30 | 43.5 | 28.58 | 1.10 |
| 0.32 | 46.4 | 27.29 | 1.14 |
| 0.33 | 47.9 | 26.68 | 1.16 |
| 0.35 | 50.8 | 25.52 | 1.20 |
| 0.37 | 53.7 | 24.44 | 1.24 |
| 0.38 | 55.1 | 23.92 | 1.26 |
| 0.40 | 58 | 22.94 | 1.30 |
| 0.42 | 60.9 | 22.01 | 1.34 |
| 0.44 | 63.8 | 21.14 | 1.38 |
| 0.46 | 66.7 | 20.32 | 1.42 |
| 0.48 | 69.6 | 19.54 | 1.46 |
| 0.50 | 72.5 | 18.81 | 1.50 |
| 0.52 | 75.4 | 18.11 | 1.54 |
| 0.54 | 78.3 | 17.45 | 1.58 |
| 0.56 | 81.2 | 16.82 | 1.62 |
| 0.58 | 84.1 | 16.22 | 1.66 |
| 0.61 | 88.5 | 15.37 | 1.72 |
| 0.63 | 91.4 | 14.84 | 1.76 |
| 0.65 | 94.3 | 14.33 | 1.80 |

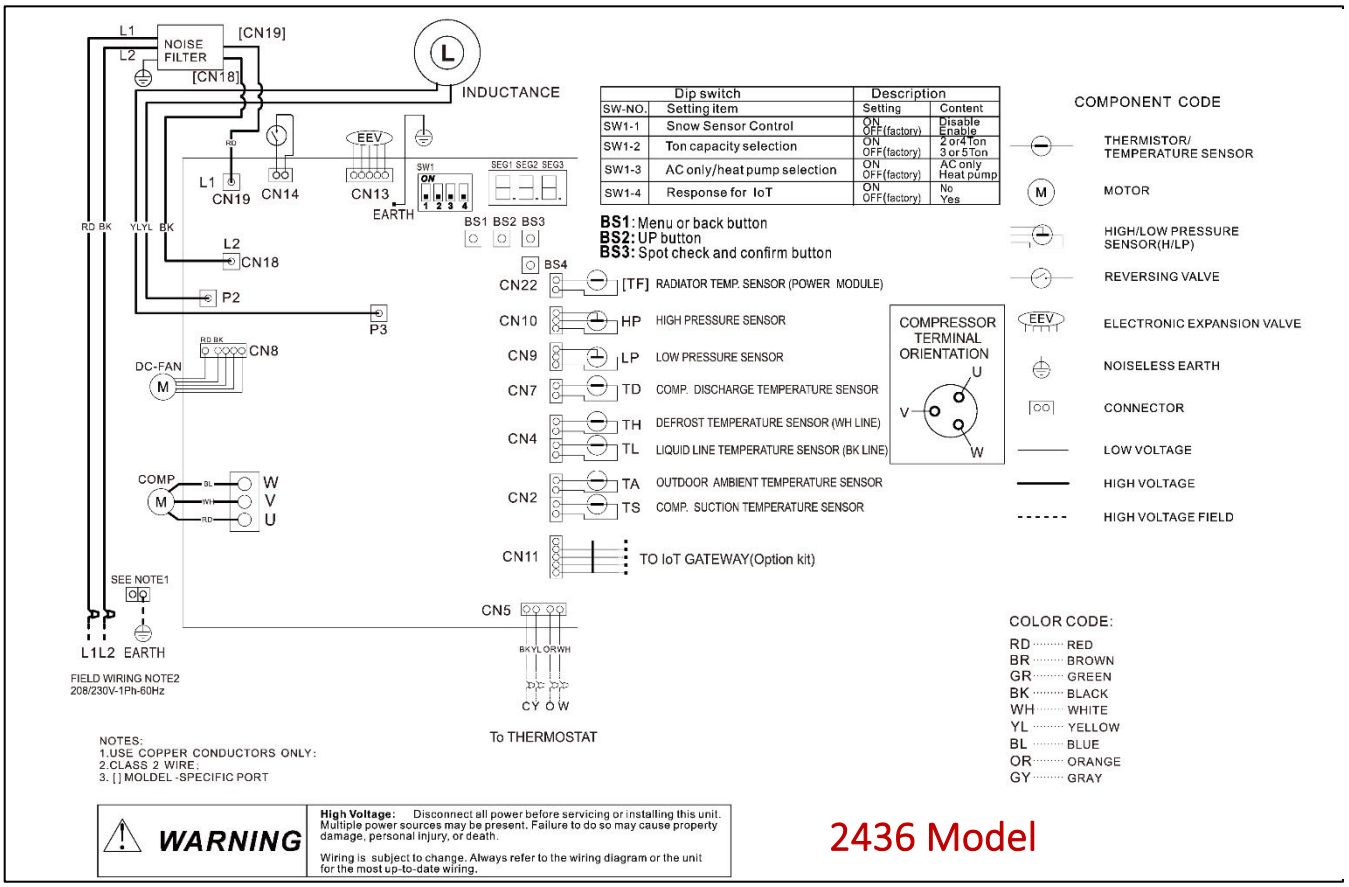
| Low pressure (MPa) | Low pressure (psig) | Resistance (KΩ) | Output voltage(V) |
|---|---|---|---|
| 0.68 | 98.6 | 13.61 | 1.86 |
| 0.70 | 102 | 13.15 | 1.90 |
| 0.73 | 106 | 12.50 | 1.96 |
| 0.76 | 110 | 11.89 | 2.02 |
| 0.78 | 113 | 11.50 | 2.06 |
| 0.81 | 117 | 10.95 | 2.12 |
| 0.84 | 122 | 10.43 | 2.18 |
| 0.87 | 126 | 9.93 | 2.24 |
| 0.90 | 131 | 9.46 | 2.30 |
| 0.93 | 135 | 9.02 | 2.36 |
| 0.96 | 139 | 8.59 | 2.42 |
| 0.99 | 144 | 8.19 | 2.48 |
| 1.02 | 148 | 7.81 | 2.54 |
| 1.06 | 154 | 7.32 | 2.62 |
| 1.09 | 158 | 6.98 | 2.68 |
| 1.13 | 164 | 6.54 | 2.76 |
| 1.16 | 168 | 6.23 | 2.82 |
| 1.20 | 174 | 5.84 | 2.90 |
| 1.24 | 180 | 5.46 | 2.98 |
| 1.27 | 184 | 5.20 | 3.04 |
| 1.31 | 190 | 4.86 | 3.12 |
| 1.35 | 196 | 4.53 | 3.20 |
| 1.39 | 202 | 4.23 | 3.28 |
| 1.43 | 207 | 3.93 | 3.36 |
| 1.48 | 215 | 3.59 | 3.46 |
| 1.52 | 220 | 3.32 | 3.54 |
| 1.56 | 226 | 3.07 | 3.62 |
| 1.61 | 233 | 2.77 | 3.72 |
| 1.65 | 239 | 2.55 | 3.80 |
| 1.70 | 247 | 2.27 | 3.90 |
| 1.75 | 254 | 2.02 | 4.00 |
| 1.80 | 261 | 1.77 | 4.10 |
| 1.85 | 268 | 1.54 | 4.20 |
| 1.90 | 276 | 1.31 | 4.30 |
| 1.95 | 283 | 1.10 | 4.40 |
| 2.00 | 290 | 0.90 | 4.50 |

# High Pressure Sensor Voltage Characteristics D*

| High pressure (MPa) | High pressure (psig) | Resistance (KΩ) | Output voltage(V) |
|---|---|---|---|
| 0.1 | 14.5 | 60.60 | 0.59 |
| 0.2 | 29 | 51.74 | 0.67 |
| 0.3 | 43.5 | 44.90 | 0.76 |
| 0.4 | 58 | 39.47 | 0.85 |
| 0.5 | 72.5 | 35.05 | 0.93 |
| 0.6 | 87 | 31.38 | 1.02 |
| 0.7 | 101.5 | 28.29 | 1.11 |
| 0.8 | 116 | 25.64 | 1.20 |
| 0.9 | 130.5 | 23.36 | 1.28 |
| 1.0 | 145 | 21.36 | 1.37 |
| 1.1 | 159.5 | 19.61 | 1.46 |
| 1.2 | 174 | 18.05 | 1.54 |
| 1.3 | 188.5 | 16.66 | 1.63 |
| 1.4 | 203 | 15.41 | 1.72 |
| 1.5 | 217.5 | 14.27 | 1.80 |
| 1.6 | 232 | 13.25 | 1.89 |
| 1.7 | 246.5 | 12.31 | 1.98 |
| 1.8 | 261 | 11.45 | 2.07 |
| 1.9 | 275.5 | 10.66 | 2.15 |
| 2.0 | 290 | 9.94 | 2.24 |
| 2.1 | 304.5 | 9.26 | 2.33 |
| 2.2 | 319 | 8.64 | 2.41 |
| 2.3 | 333.5 | 8.06 | 2.50 |
| 2.4 | 348 | 7.52 | 2.59 |
| 2.5 | 362.5 | 7.01 | 2.67 |
| 2.6 | 377 | 6.54 | 2.76 |
| 2.7 | 391.5 | 6.09 | 2.85 |
| 2.8 | 406 | 5.67 | 2.93 |
| 2.9 | 420.5 | 5.28 | 3.02 |
| 3.0 | 435 | 4.90 | 3.11 |

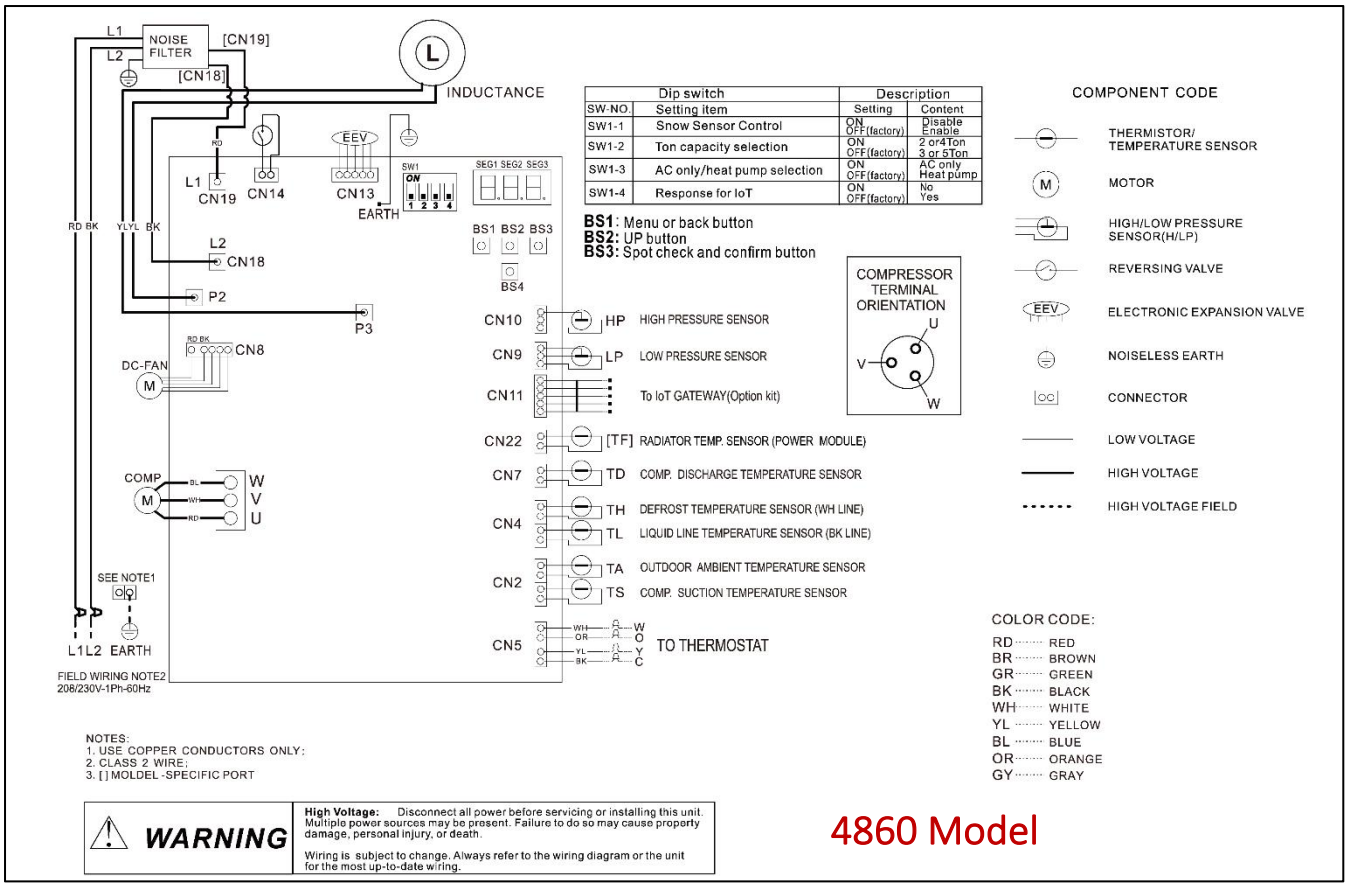
| High pressure (MPa) | High pressure (psig) | Resistance (KΩ) | Output voltage(V) |
|---|---|---|---|
| 3.1 | 449.5 | 4.55 | 3.20 |
| 3.2 | 464 | 4.22 | 3.28 |
| 3.3 | 478.5 | 3.90 | 3.37 |
| 3.4 | 493 | 3.60 | 3.46 |
| 3.5 | 507.5 | 3.31 | 3.54 |
| 3.6 | 522 | 3.04 | 3.63 |
| 3.7 | 536.5 | 2.78 | 3.72 |
| 3.8 | 551 | 2.53 | 3.80 |
| 3.9 | 565.5 | 2.30 | 3.89 |
| 4.0 | 580 | 2.07 | 3.98 |
| 4.1 | 594.5 | 1.85 | 4.07 |
| 4.2 | 609 | 1.65 | 4.15 |
| 4.3 | 623.5 | 1.45 | 4.24 |
| 4.4 | 638 | 1.26 | 4.33 |
| 4.5 | 652.5 | 1.07 | 4.41 |
| 4.6 | 667 | 0.90 | 4.50 |
| 4.7 | 681.5 | 0.73 | 4.59 |
| 4.8 | 696 | 0.56 | 4.67 |
| 4.9 | 710.5 | 0.40 | 4.76 |

# 5.2 Wiring Diagram




| Dip switch | | Description | |
|---|---|---|---|
| SW-NO. | Setting item | Setting | Content |
| SW1-1 | Snow Sensor Control | ON<br>OFF(factory) | Disable<br>Enable |
| SW1-2 | Ton capacity selection | ON<br>OFF(factory) | 2 or 4 Ton<br>3 or 5Ton |
| SW1-3 | AC only/heat pump selection | ON<br>OFF(factory) | AC only<br>Heat pump |
| SW1-4 | Response for IoT | ON<br>OFF(factory) | No<br>Yes |

2436 Model




| Dip switch | | Description | |
|---|---|---|---|
| SW-NO. | Setting item | Setting | Content |
| SW1-1 | Snow Sensor Control | ON<br>OFF(factory) | Disable<br>Enable |
| SW1-2 | Ton capacity selection | ON<br>OFF(factory) | 2 or 4 Ton<br>3 or 5Ton |
| SW1-3 | AC only/heat pump selection | ON<br>OFF(factory) | AC only<br>Heat pump |
| SW1-4 | Response for IoT | ON<br>OFF(factory) | No<br>Yes |

4860 Model

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