Service Manual

Inverter Ducted Split
2-5 Ton R-410A Heat Pump

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.

1 General Information

Condensing Unit

E	O	D	A	18	H	-	2436
1	2	3	4	5	6		7

Brand

E: Ecoer

Product Series

O: Outdoor Condensing Unit

Control Method

D: Non-Communicating

Power

A: 208/230V-1Ph-60Hz

SEER2

18: 18SEER2 Series

Type

H: Heat Pump C: AC only

Capacity

2436: 3Ton 4860: 5Ton

E series Air Handler

E	AH	A	T	N	-	36
1	2	3	4	5		6

Brand

E: Ecoer

Product Series

AH: Indoor Air Handler

Model Letters

A: 208/230V-1Ph-60Hz

Metering device

T: TXV

Communications

N: 24V Normal

Capacity

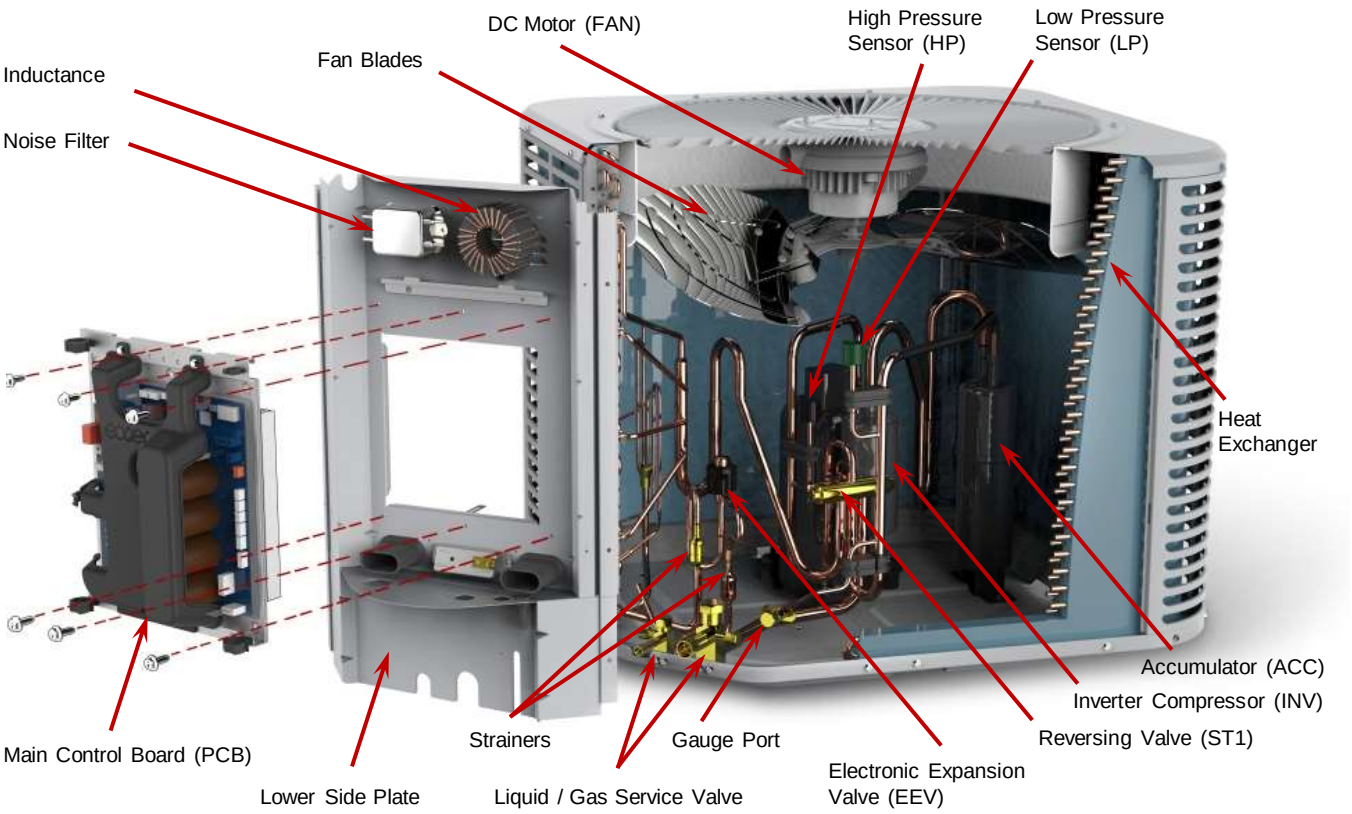
24=2Ton 36=3Ton 48=4Ton 60=5Ton

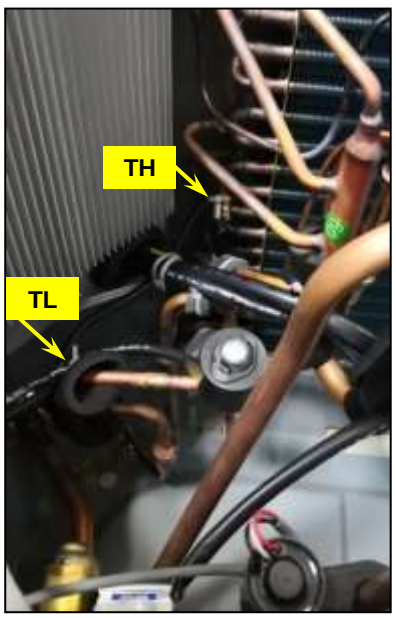
2 ESI (Ultra) Unitary System

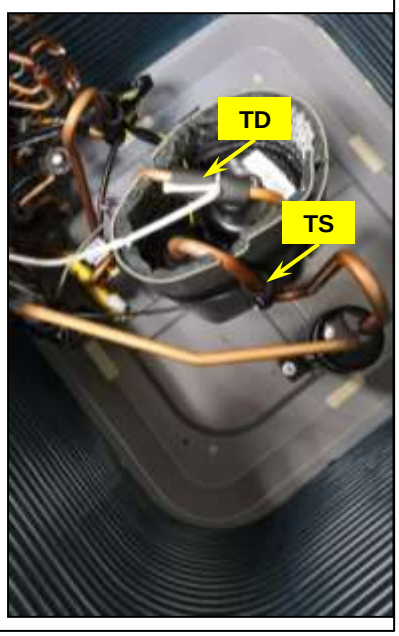
2.1 Refrigerant Circuit

2.1.1 Functional Parts Layout of Condensing Units

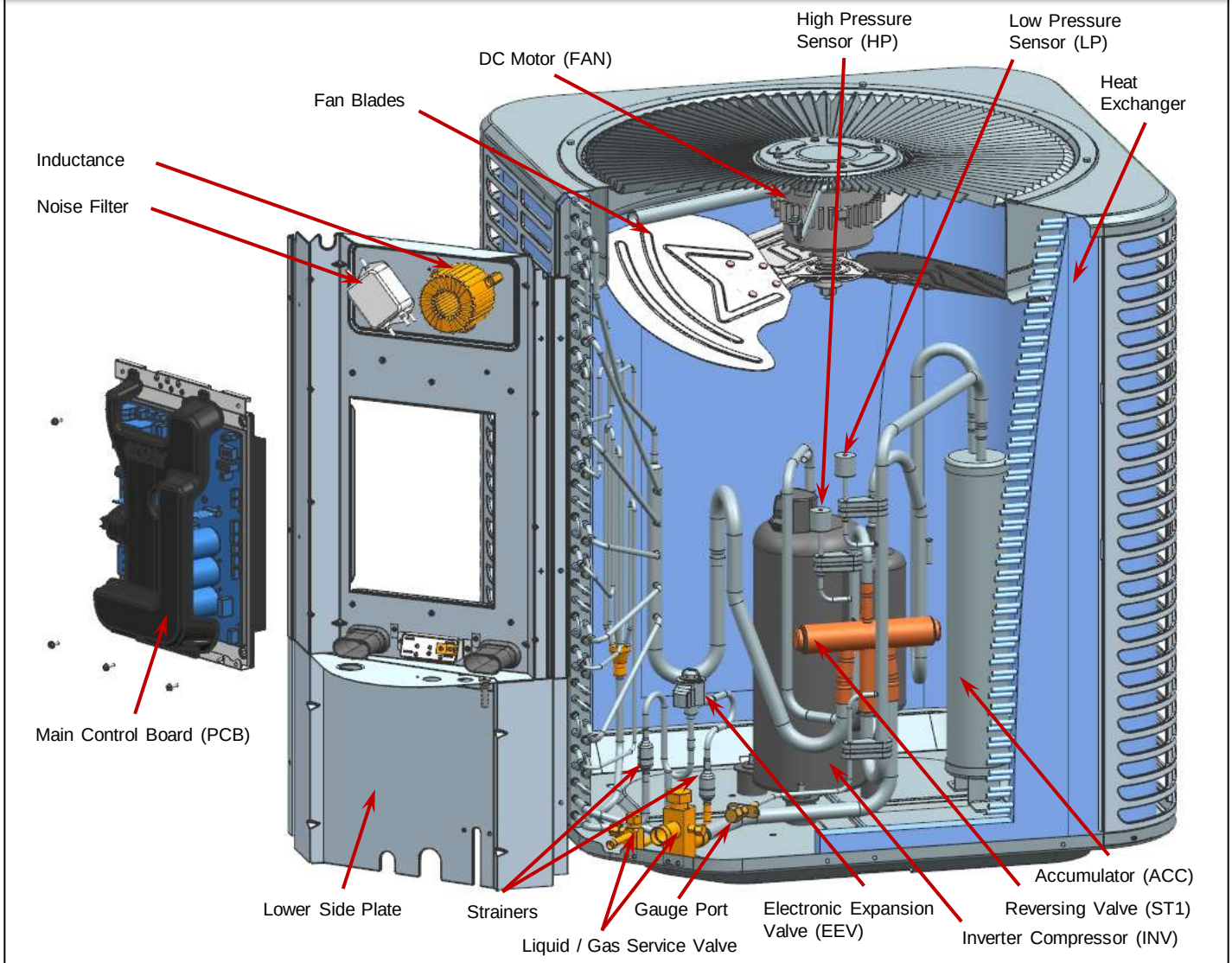
EODA18H-2436

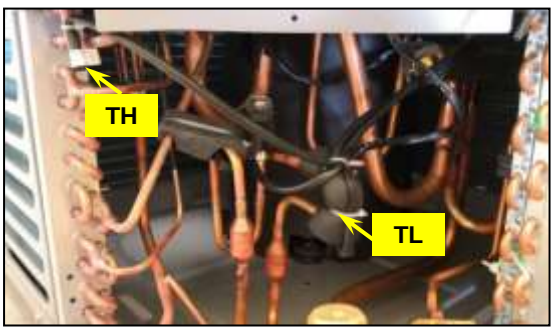


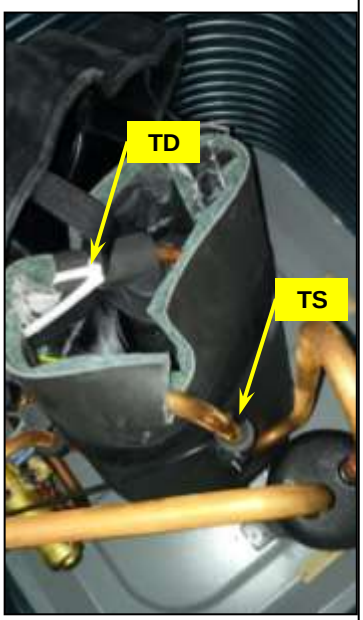




EODA18H-4860



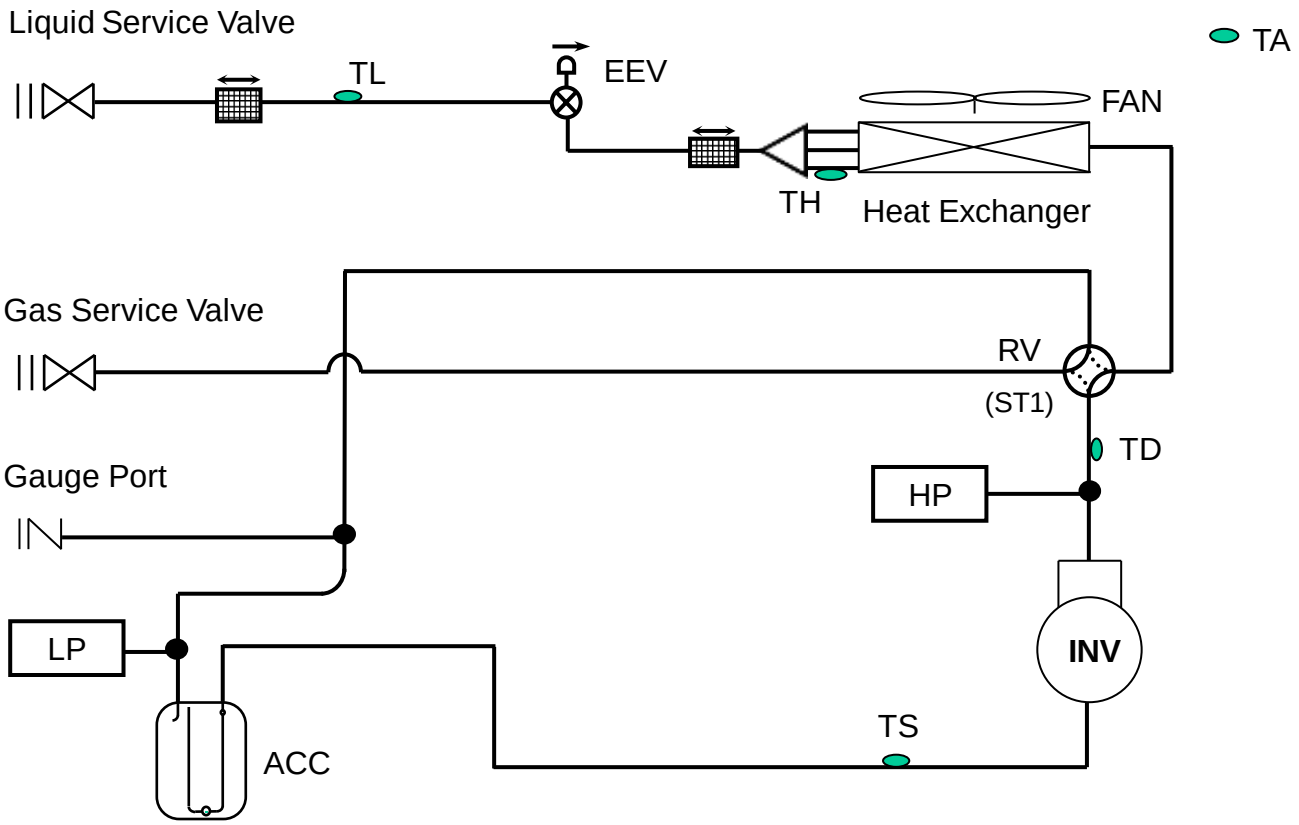




TIPS:
Remove screws to take away the lower side plate to access TH / TL sensors.

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

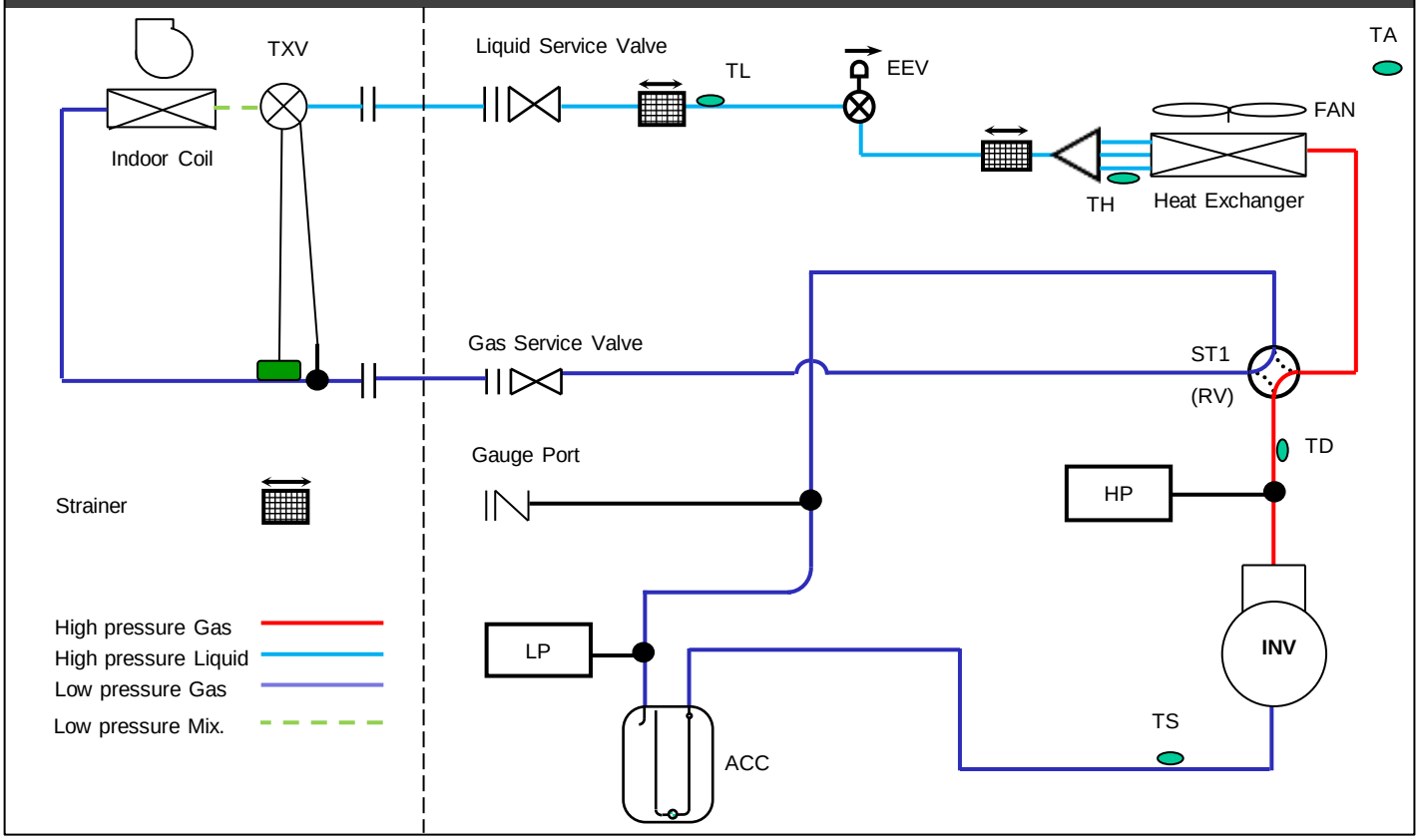
2.1.2 Major Components Functions and Refrigerant Circuits Diagram



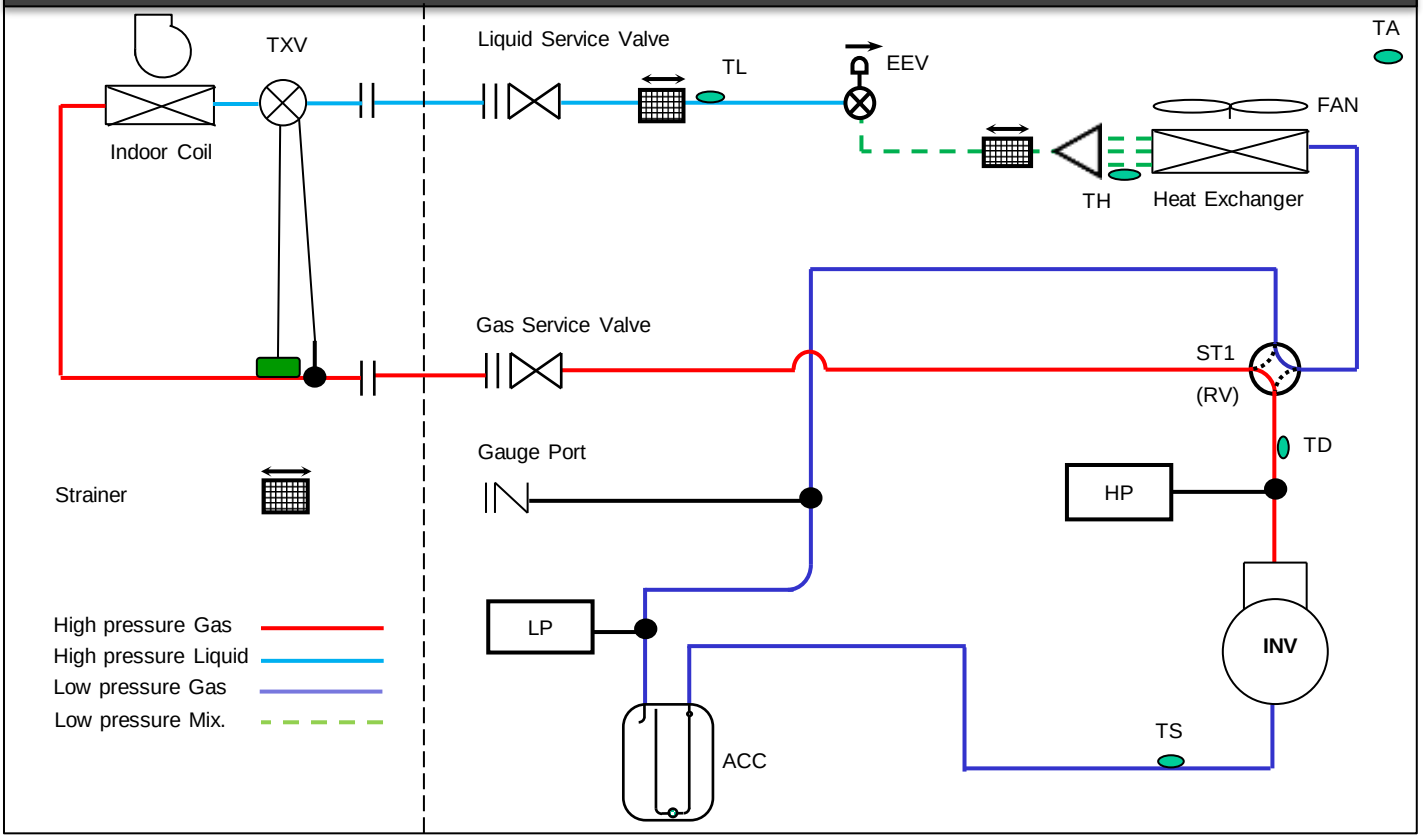
Name	Symbol	Function
Inverter compressor	INV	Adjusts refrigerant flow rate by changing the compressor speed (RPS) based on objective pressure.
DC motor	FAN	Outputs heat exchanger capacity by adjusting the motor rotation speed based on operating pressure.
Electronic expansion valve	EEV	1) Fully open in cooling mode and defrost operation. 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)

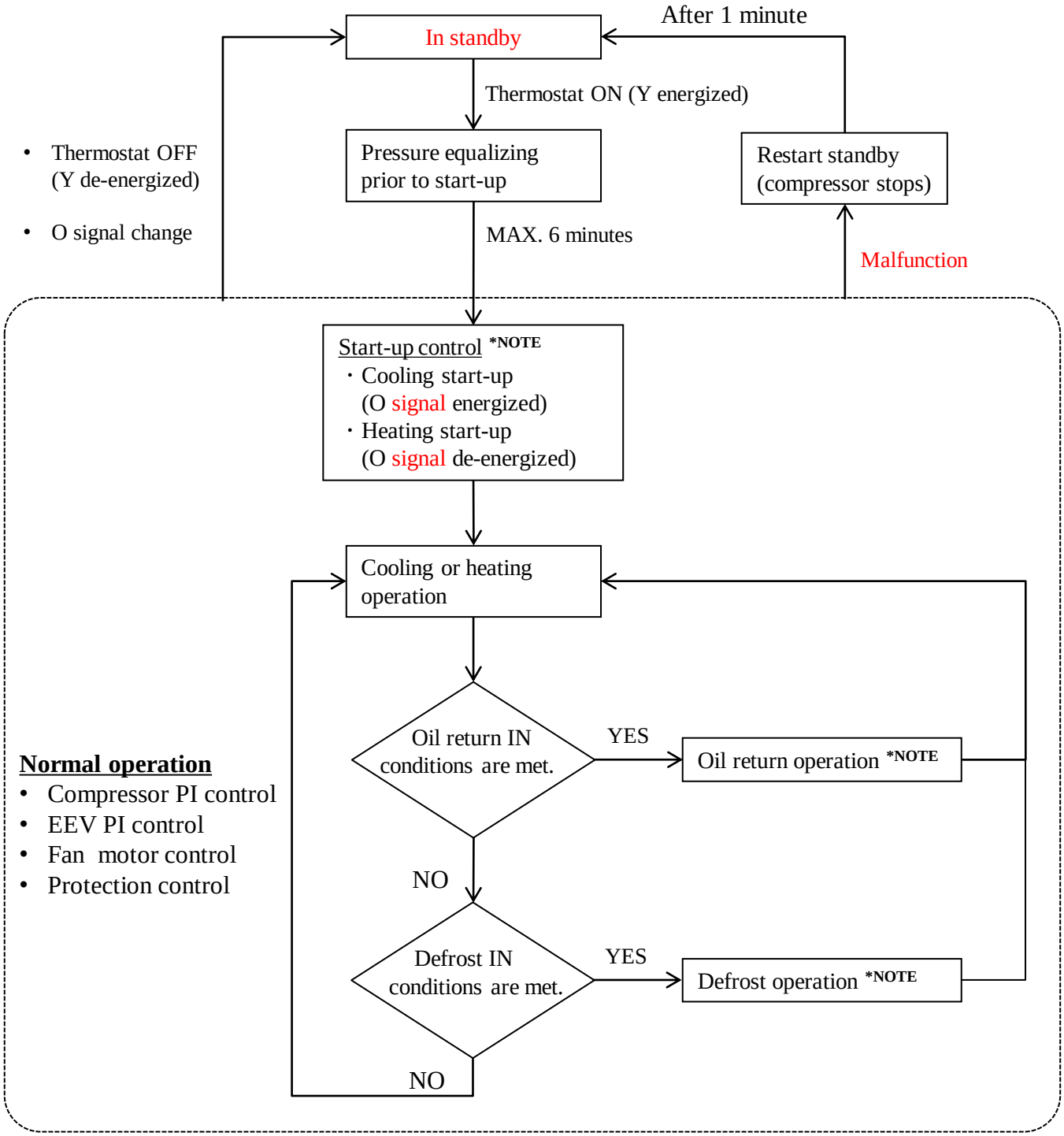


Heating Operation (including heating oil return)



2.2 Function and Control

2.2.1 Operation Mode



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

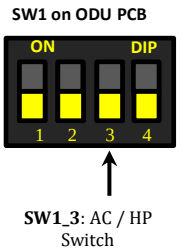
2.2.2 Basic control

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℉.

IV. Manual defrosting can be chosen from n08 setting.

   Start-up control is enforced to complete, then wait another 5 minutes to activate the defrost operation.

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 AUTO charge mode or Rated running mode

a. Actuator and procedure

Actuator	AUTO charge mode OR Rated running in cooling	Rated running in heating
Compressor (INV)	2ton: **56rps** 3ton: **66rps** 4ton: **56rps** 5ton: **66rps**	2ton: **66rps** 3ton: **80rps** 4ton: **58rps** 5ton: **70rps**
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.
2. Run for about 15 minutes.
3. Check the SSH (only for charge mode in cooling):

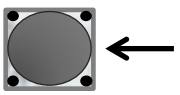
If the suction superheat is beyond 7-20℉, please use a wrench to **adjust** the TXV opening, see tips for details.

The TXV adjustment should be done at ¼ turn each time and the installer should wait 15 minutes so the system can stabilize before making any changes.

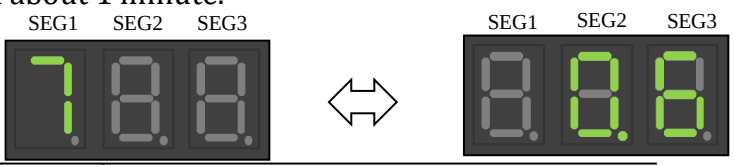
4. In the operation, setting Rated running model from OD unit.

   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:

Check refrigerant coefficient number from LED display or ESS Pro App, **pls see nest page for the suggestion of charging**.

If adjust the charging, please repeat 3 after 5 minutes.

6. B: Check operating status:

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

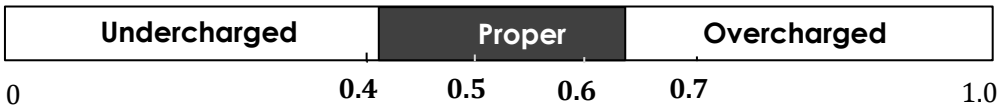
**It is the only recommended method of charging above 55℉ outdoor ambient temperatures.
**It is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55℉.

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℉ ≤ SSH ≤ 20℉.

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℉ and 115℉. But for the best results, indoor temperature should be kept between 70℉ and 80℉. For outdoor ambient temperature is below 50℉, use weigh-in charge method only.

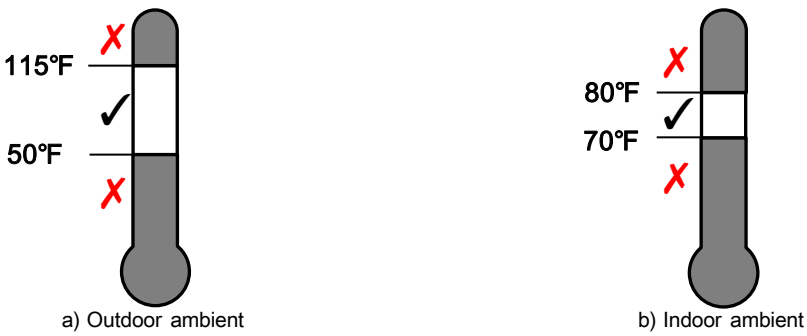


Fig 13-2 Temperature limit for AUTO charge mode

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).

2.2.2.4 Pump down function

b. Pump down in cooling only

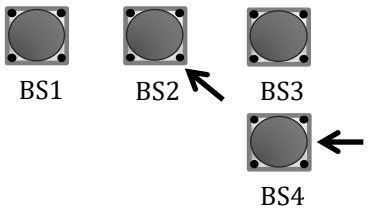
Actuator	Pump down in cooling
Compressor (INV)	2ton: →26rps 3ton: →36rps 4ton: →26rps 5ton: →36rps
Outdoor fan (FAN)	Cooling fan control
Reversing valve (ST1)	De-energized
Electronic expansion valve (EEV)	480pls

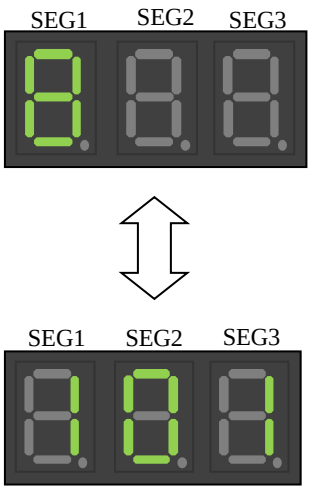
Pump down Step by Step:

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.

2.2.2.5 Compressor control

Pressure differential control
MAX time (cooling) ≤ 10 minutes
MAX time (heating) ≤ 45 minutes

Depending on the load of the space.

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

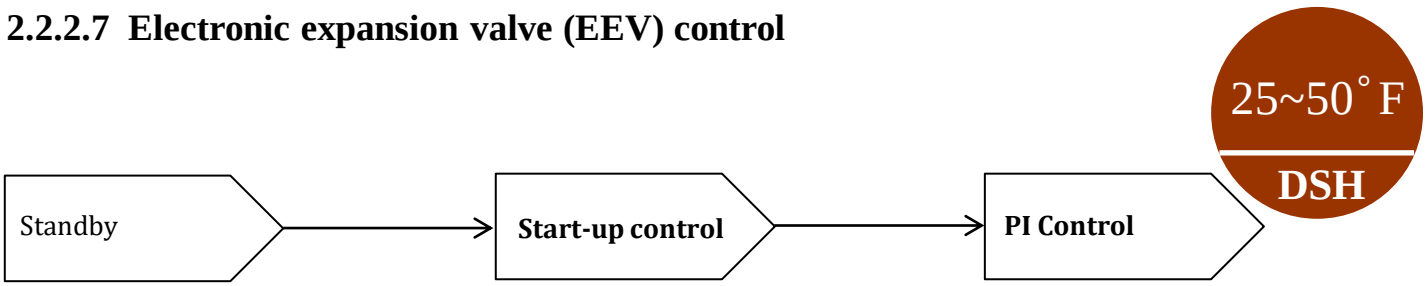
2.2.2.6 Fan control

MAX STEP

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

STEP	RPM	STEP	RPM	STEP	RPM	STEP	RPM	STEP	RPM
0	0	2	450	4	680	6	830	8	930
1	350	3	550	5	780	7	880	9	980

2.2.2.7 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 ˚ F and 50 ˚ F with proper refrigerant level.

- **Overcharged:** DSH is less than 18 ˚F with EEV opening < 72pls.
- **Undercharged:** DSH is higher than 50 ˚F with EEV opening ≥ 460pls

2.2.2.8 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.

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	830	680	550
3Ton	930	Cooling: 830 | Heating: 780	680
4Ton	880	830	780
5Ton	980	880	780

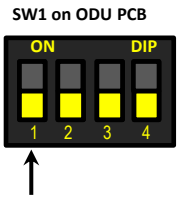
2.2.2.9 Snow Sensor Control

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

* ver203 or above support this function

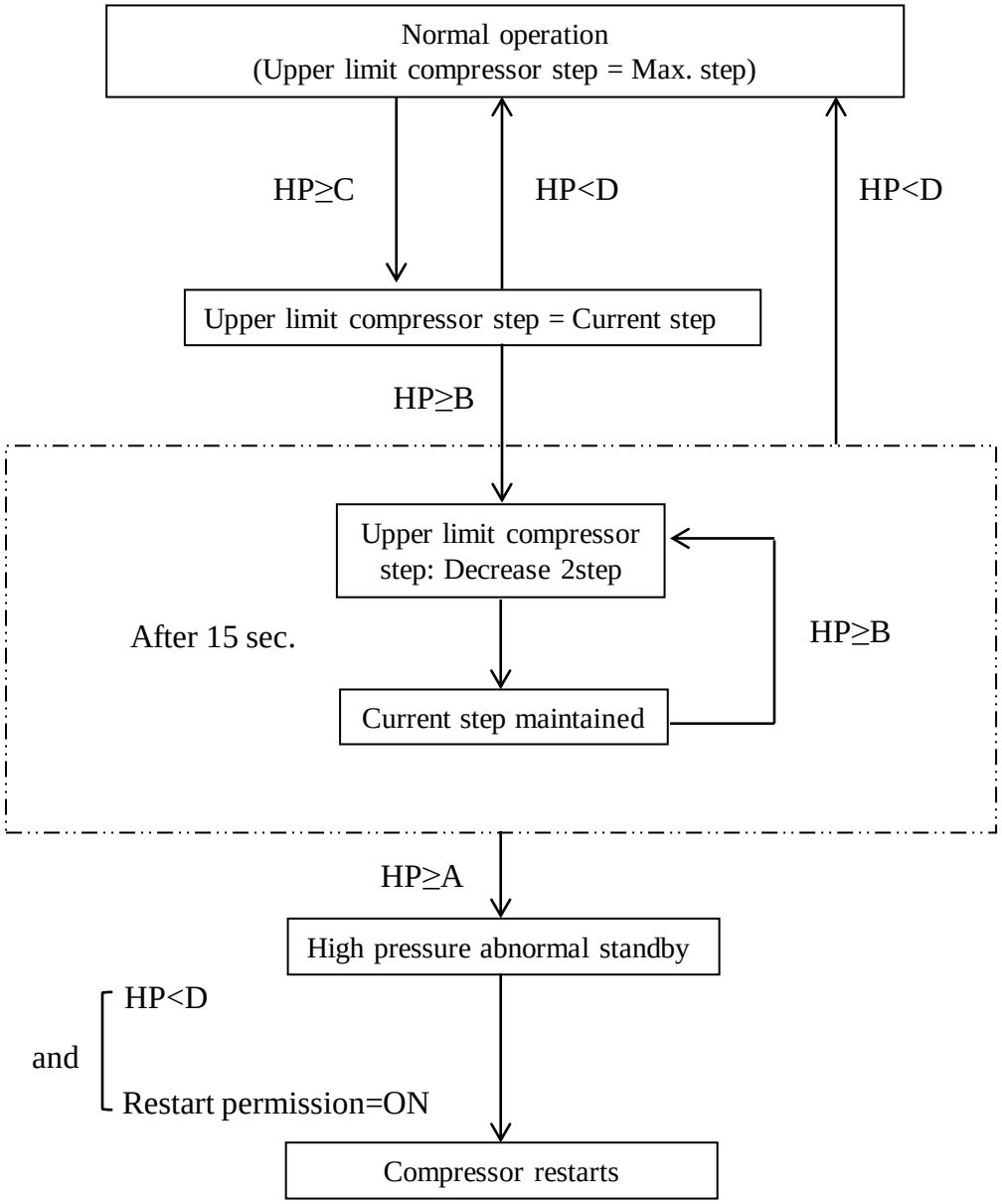


SW1_1:
Snow Sensor Control

2.2.3. Protection controls

2.2.3.1 High pressure protection control

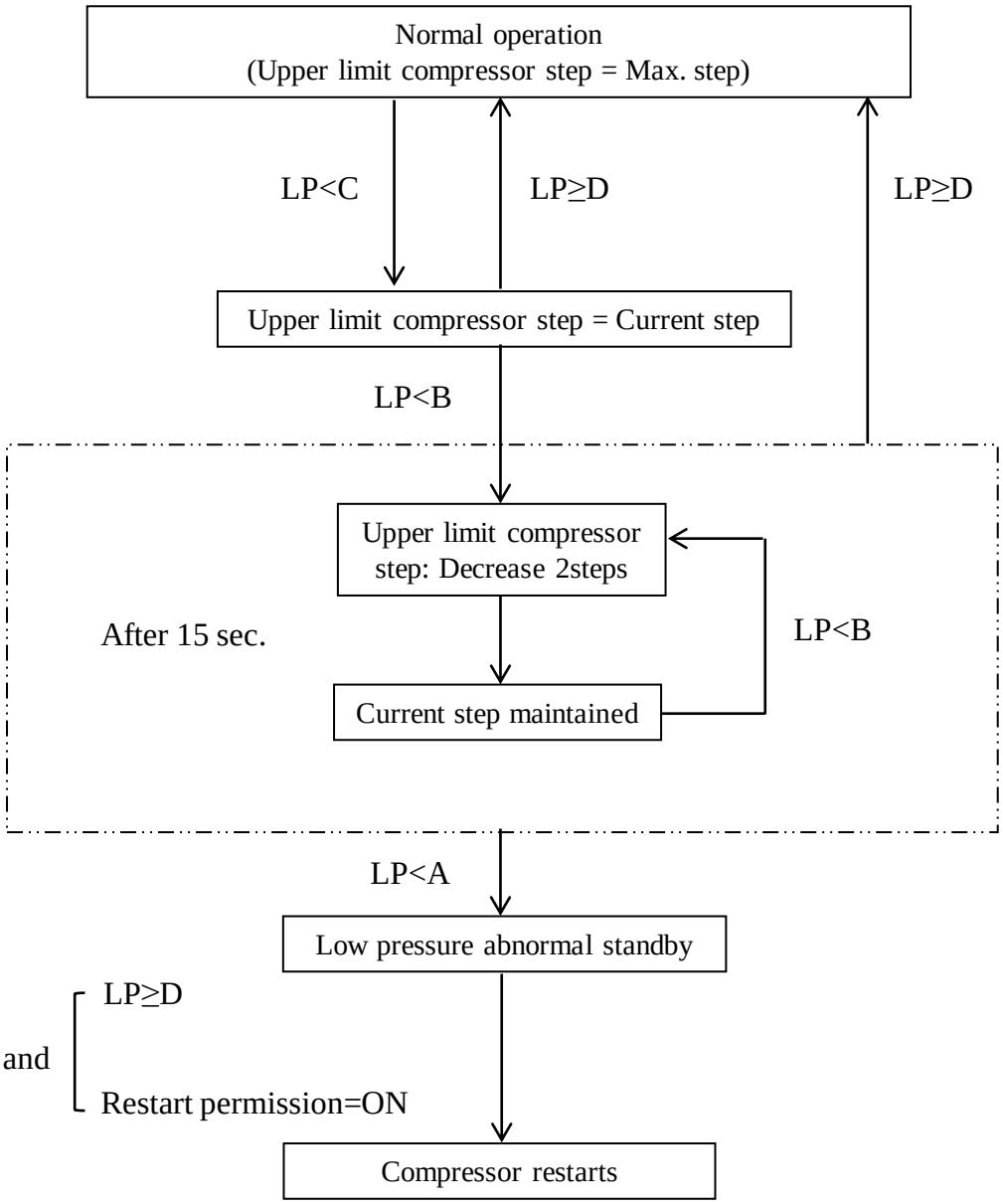
High pressure (HP) protection control is used to prevent extremely high pressures in the system and protect the compressor.



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

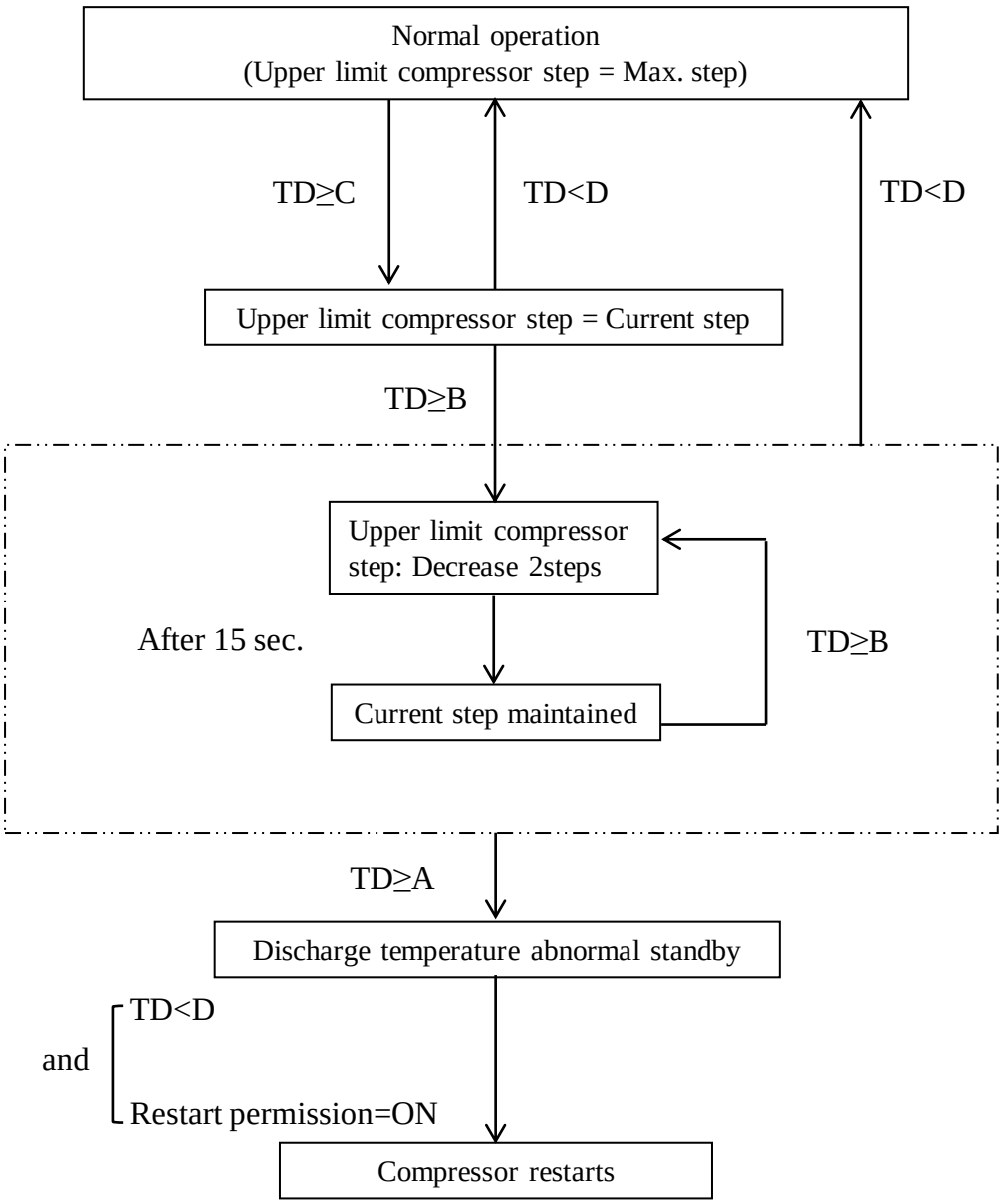
Low pressure (LP) protection control in cooling is used to protect compressor against the transient decrease of low pressure.



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

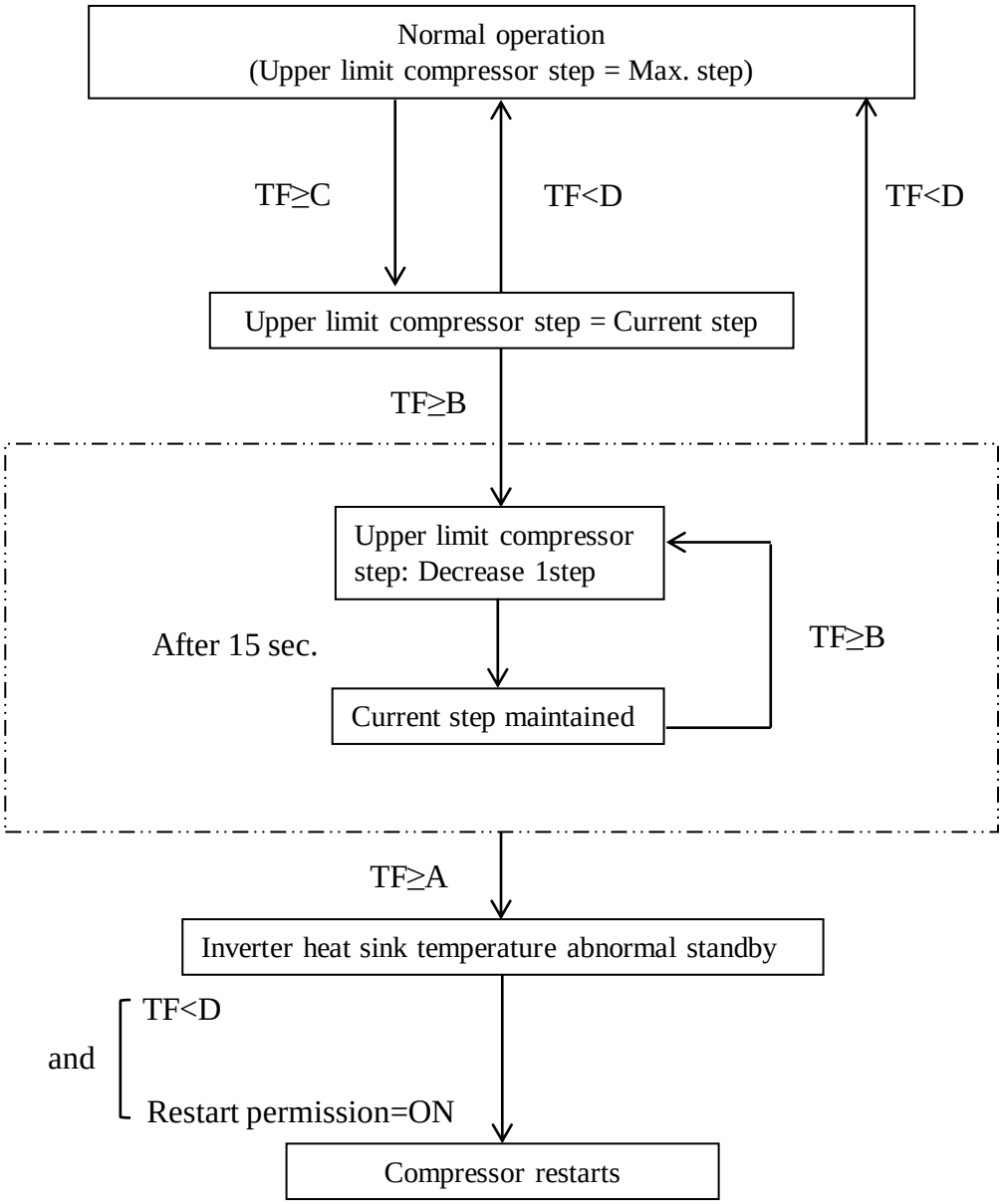
This discharge temperature (TD) protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.



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

2.2.3.4 INV Module temperature protection control

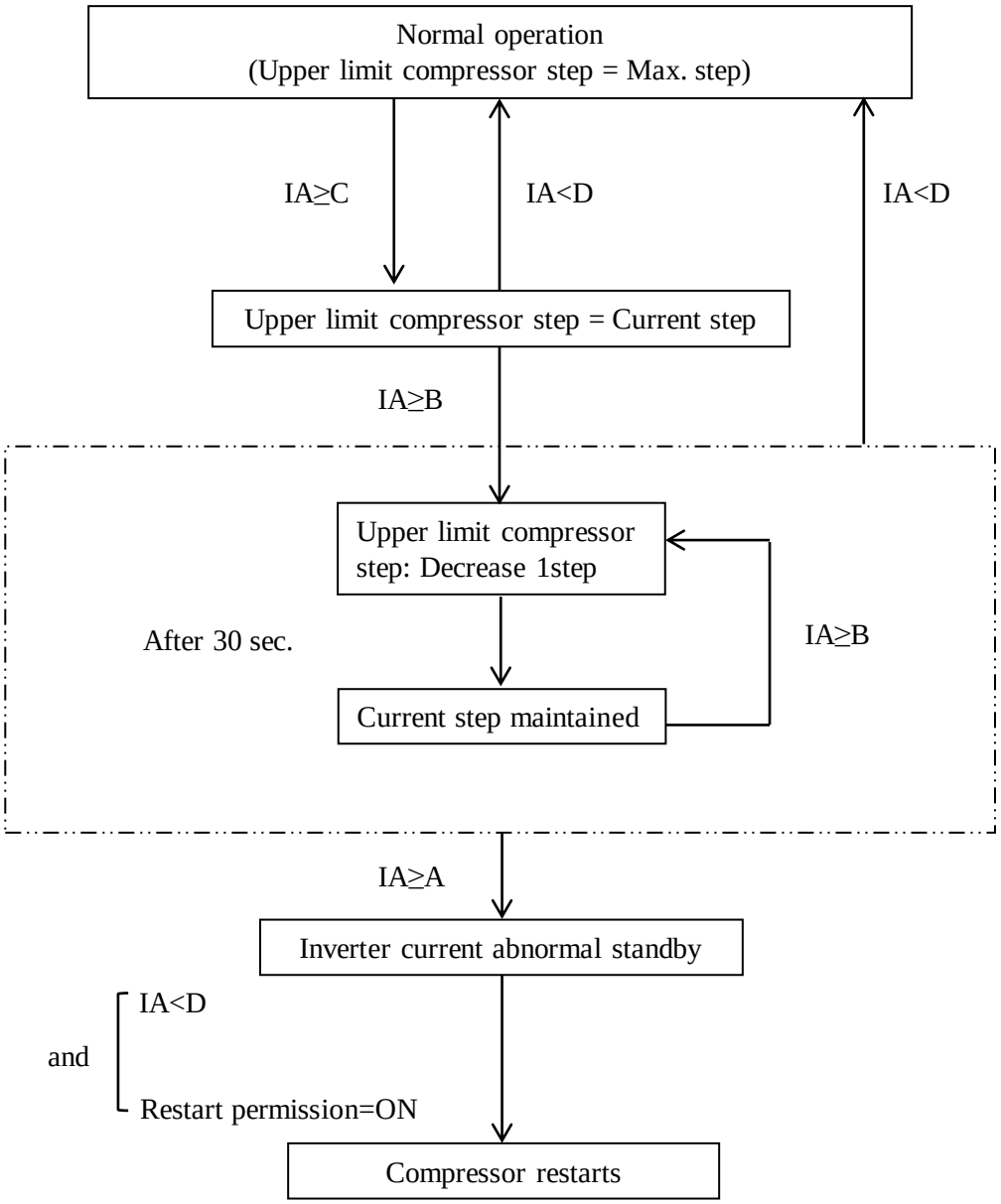
Inverter module temperature (TF) protection control is performed to prevent tripping due to an abnormal increase in temperature.



Symbol	EODA18H-2436		EODA18H-4860	
	Cooling	Heating	Cooling	Heating
A	181℉ (83°C)	181℉ (83°C)	176℉ (80°C)	167℉ (75°C)
B	174℉ (79°C)	158℉ (70°C)	158℉ (70°C)	149℉ (65°C)
C	167℉ (75°C)	153℉ (67°C)	151℉ (66°C)	142℉ (61°C)
D	162℉ (72°C)	147℉ (64°C)	145℉ (63°C)	136℉ (58°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).

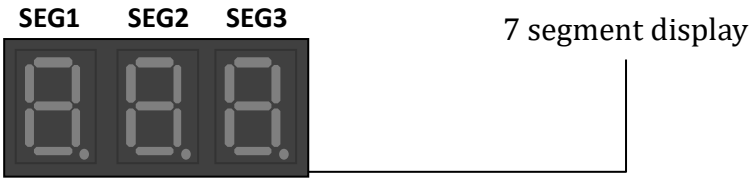


Symbol	EODA18H-2436		EODA18H-4860	
	Cooling	Heating	Cooling	Heating
A	16A	16A	20A	20A
B	9.2A	9.5A	12.1A	12.1A
C	8.6A	9.1A	11.7A	11.7A
D	8.0A	8.5A	11.2A	11.2A

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

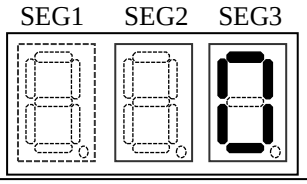
SEG3: It displays outdoor unit's operation mode.

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.

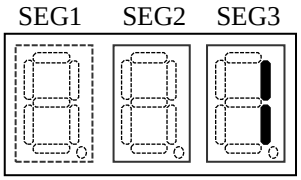
Modes list (SEG3 Display)

Stop or standby (Y signal de-energized)

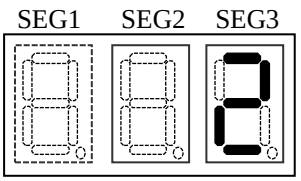


Ready to start-up (Y signal energized)

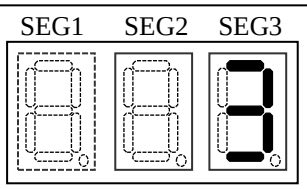
(6 to 8 minutes for pressure equalization to restart)



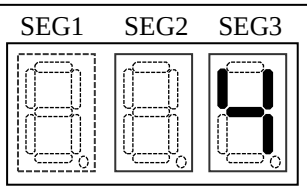
Cooling



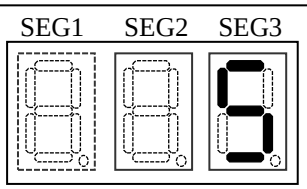
Heating



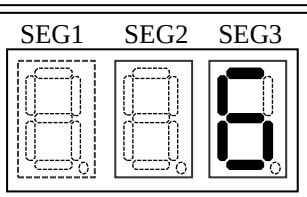
Oil return



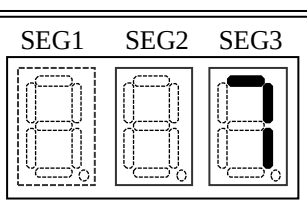
Defrost



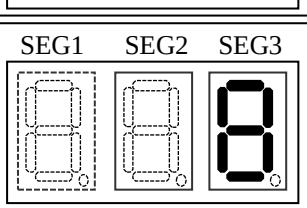
Manual defrost



AUTO charge mode in cooling



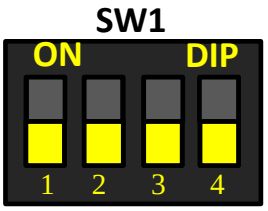
Pump down



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

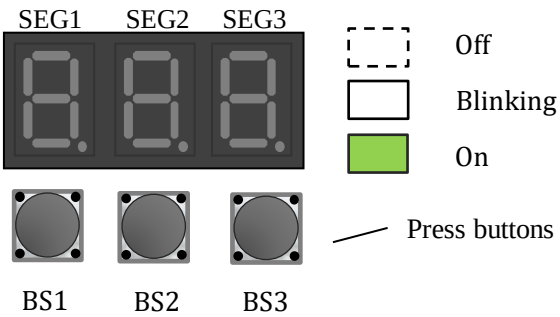


Use minor straight screwdriver to dip switch.
Must power off the unit for at least 2 minutes to activate the change.

a. ver203 or above support this function b. Remote field setting, troubleshooting, software programming etc.

2.3.3 Setting by pressing buttons

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

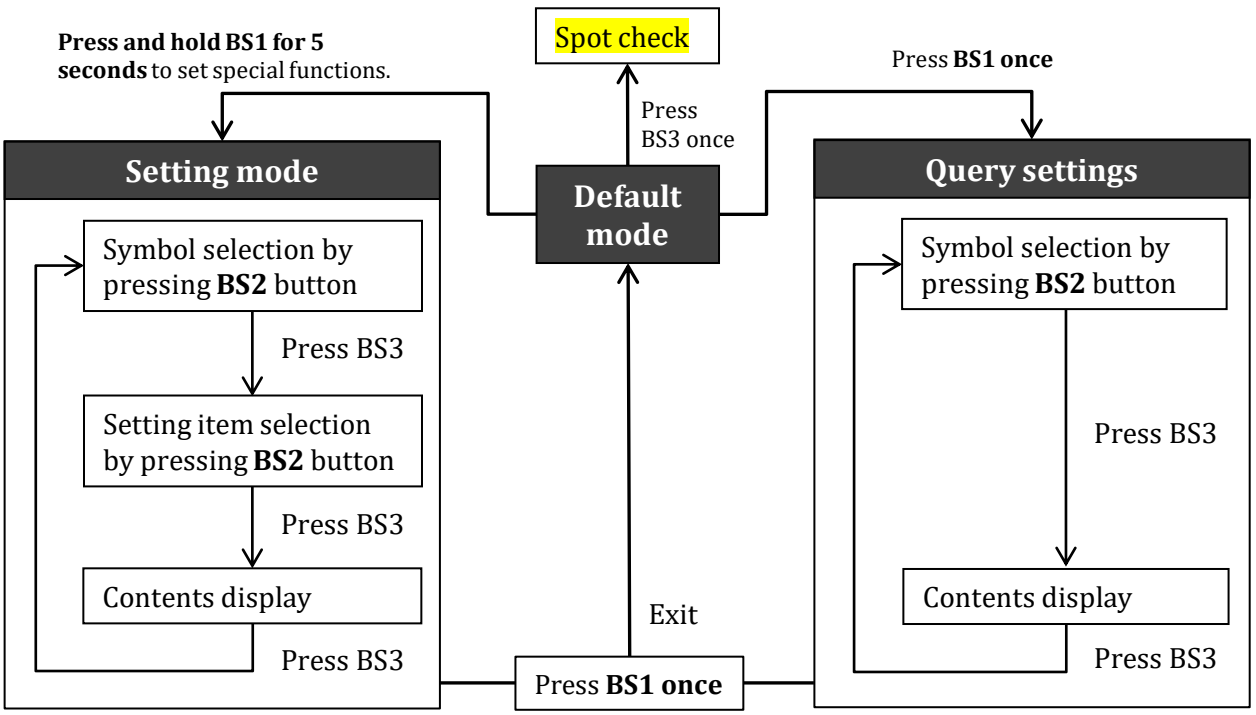


BS1: Menu or back button

BS2: UP button

BS3: Spot check and confirm button

Remarks: Press or tip any directions are valid.



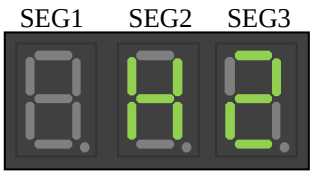
Default mode (Spot check)

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 0: Running under high pressure limit 2: Cooling mode
01-	Outdoor unit type and capacity	H3	H: heat pump C: AC only 3: 3Ton
02-	Liquid line sub-cooling	10	10℉
03-	Compressor suction superheat	18	18℉
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℉
10-	Compressor suction temp. (TS)	70	70℉
11-	Compressor discharge temp. (TD)	170	170℉
12-	Defrost sensor temp. (TH)	80	80℉
13-	Liquid line temp. (TL)	70	70℉
14-	Inverter module temp. (TF)	150	150℉
15-	Target evaporating temp. (Tes)	43	43℉
16-	Current evaporating temp. (Te)	45	45℉
17-	Target condensing temp. (Tcs)	104	104℉
18-	Current condensing temp. (Tc)	112	112℉
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

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

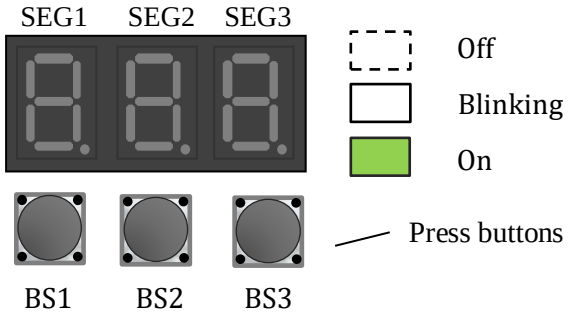
Press and hold **BS1** button for 5 seconds to enter the parameter setting interface. The latest setting will be taken as the final one. Refer to the following pages for some settings example.

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.	0	Stop heat pump when TA<-22℉
		1(factory)	Stop heat pump when TA<-3℉
		2	Stop heat pump when TA<15℉ *3
		3	Stop heat pump when TA<30℉ *3
		4	Stop heat pump when TA<40℉ *3
n02	Indoor second heater for outdoor unit outputs 24VAC at W terminal (CN5).	0(factory)	ON (Electric auxiliary heater)
		1	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.	0(factory)	TA<15℉ (24VAC output)
		1	TA<30℉ (24VAC output) *3
		2	TA<40℉ (24VAC output) *3
		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 28ºF.
2. The evaporating temperature of indoor coil can drop down to 28ºF in cooling mode, and the condensing temperature can go up to 122ºF in heating mode.
3. Contact Ecoer Service Team to update software if the units produced prior to April 1st, 2019.
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

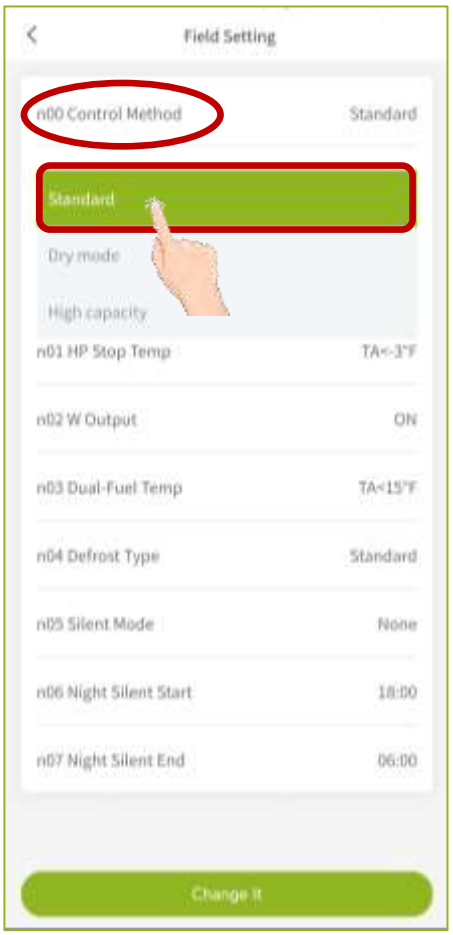


BS1: Menu or back button

BS2: UP button

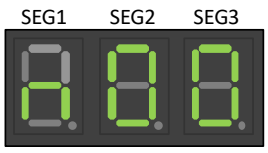
BS3: Spot check and confirm button

Remarks: Press or tip any directions are valid.



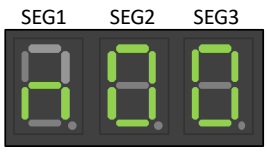
Step1

Press and hold BS1 for 5 seconds.



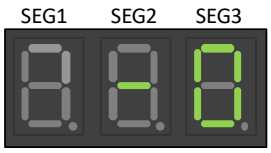
Step2

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

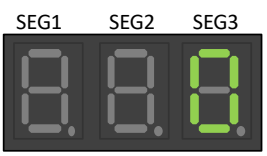
Press BS2 to change sub-item(n00 = 1).

Step5

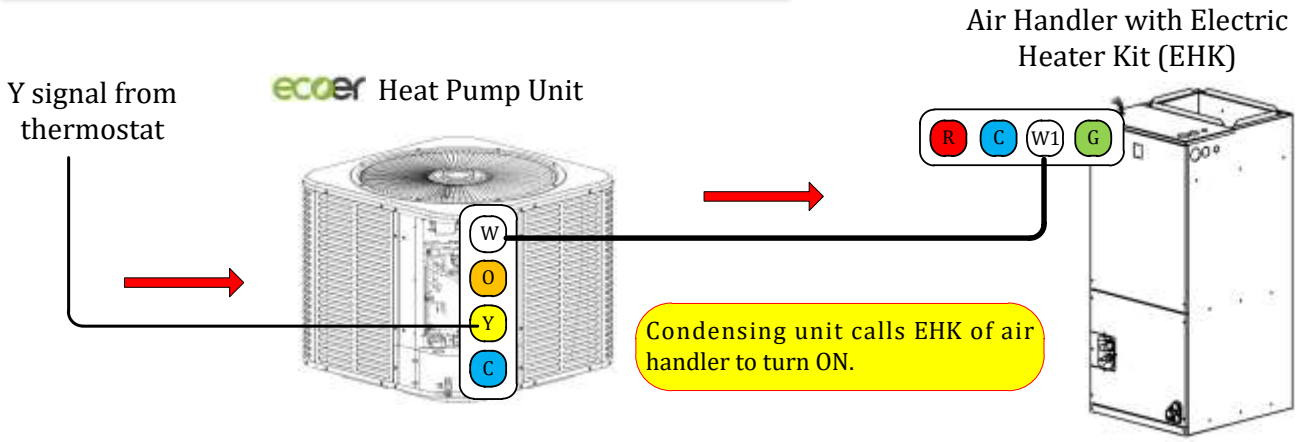
Press BS3 **twice** to save.

Step6

Press BS1 to return.



Example for n02 & n03 (Dual-heating) setting

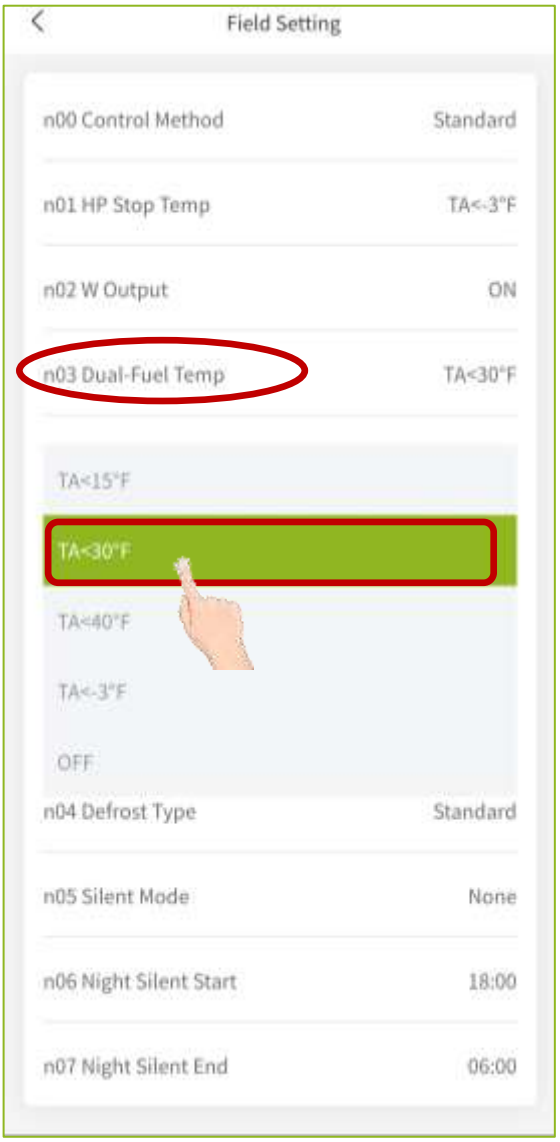


n02 Select the second heat source device type between gas furnace and electric heating.
0: ON (Electric auxiliary heater) --Factory
1: OFF(Furnace or Boiler)

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.

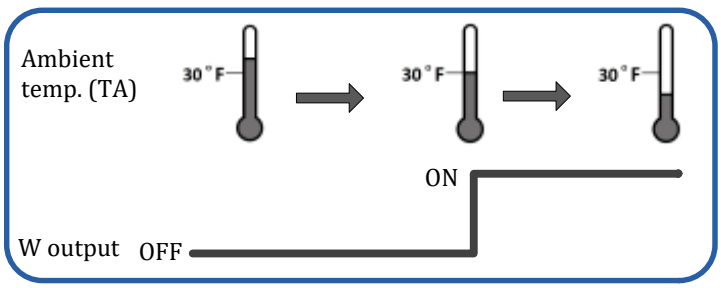
0: TA<15°F (24V output) --Factory
1: TA<30°F (24V output)
2: TA<40°F (24V output)
3: TA<-3°F (24V output)
4: OFF



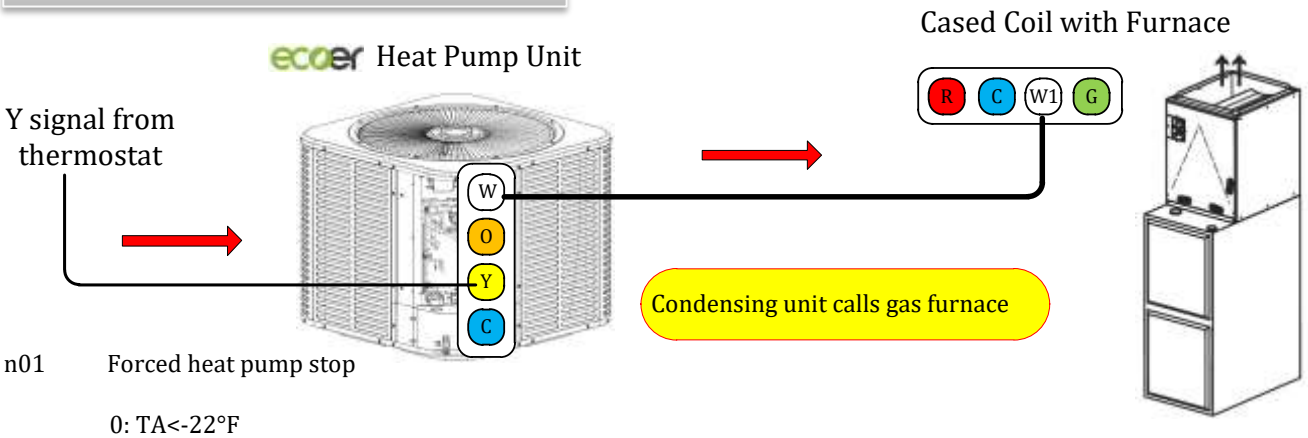
Example:

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

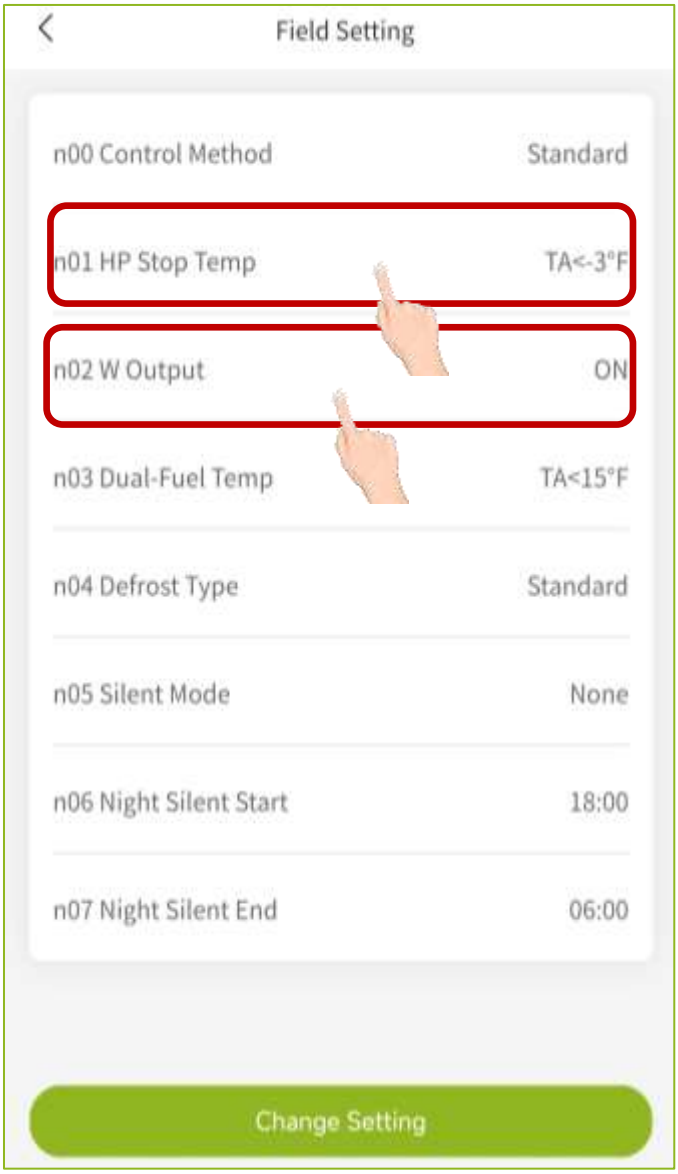
0: TA<-22°F
1: TA<-3°F (factory)
2: TA<15°F
3: TA<30°F
4: TA<40°F

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

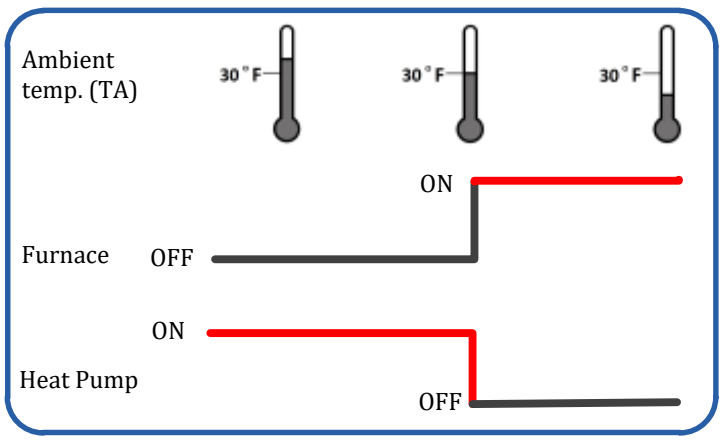


Illustration for n05 to n07 settings

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.

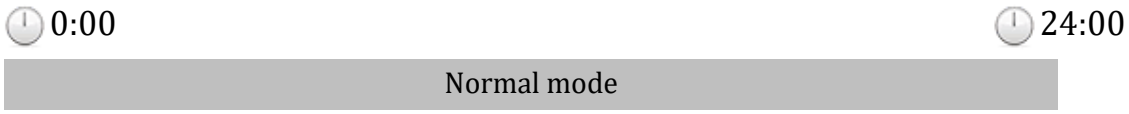
n05
Silent mode setting.

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

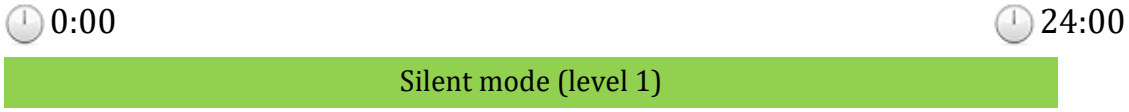
3: Night silent mode (level 1)
4: Super night silent (level 2)

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

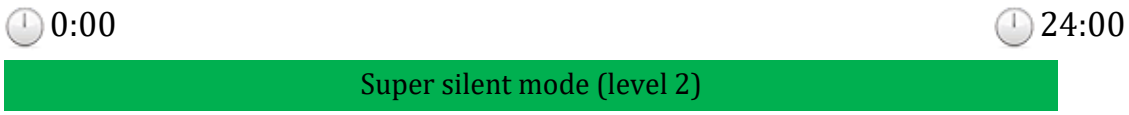
Example 1: n05 = 0 n06 = N/A n07 = N/A



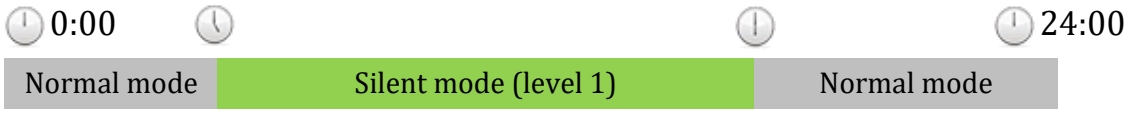
Example 2: n05 = 1 n06 = N/A n07 = N/A



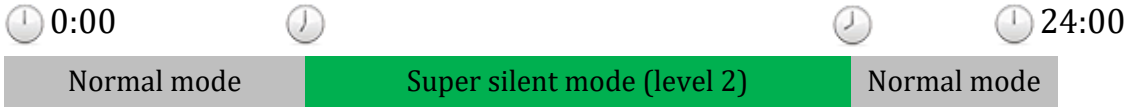
Example 3: n05 = 2 n06 = N/A n07 = N/A



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

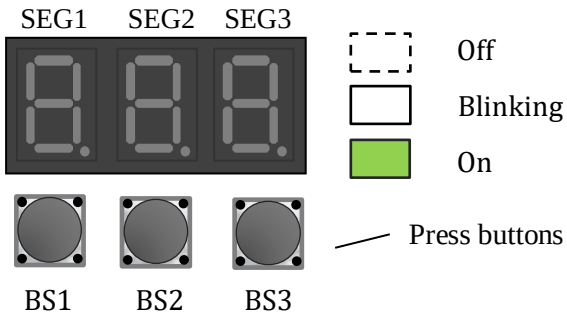


Example 5: n05 = 4 n06 =2 n07 = 3



Query Settings

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

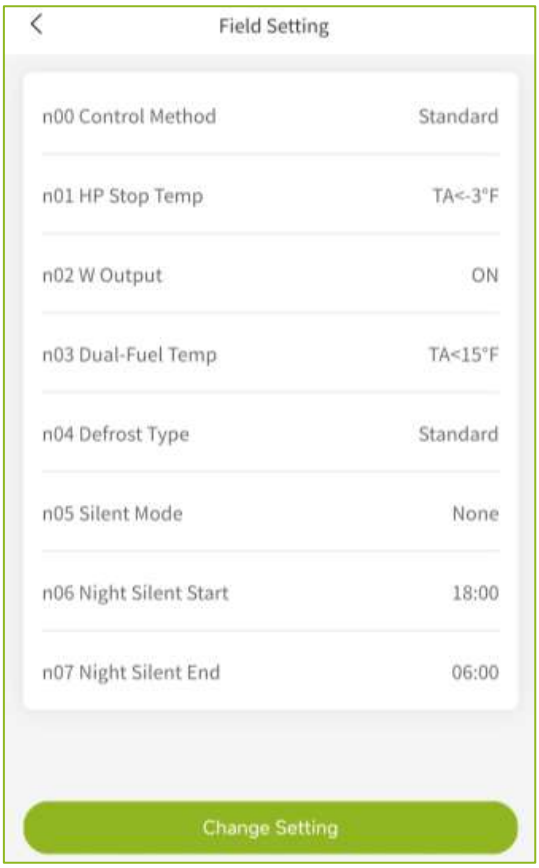


BS1: Menu or back button

BS2: UP button

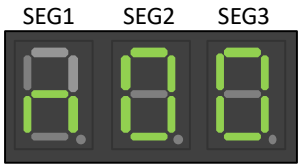
BS3: Spot check and confirm button

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.

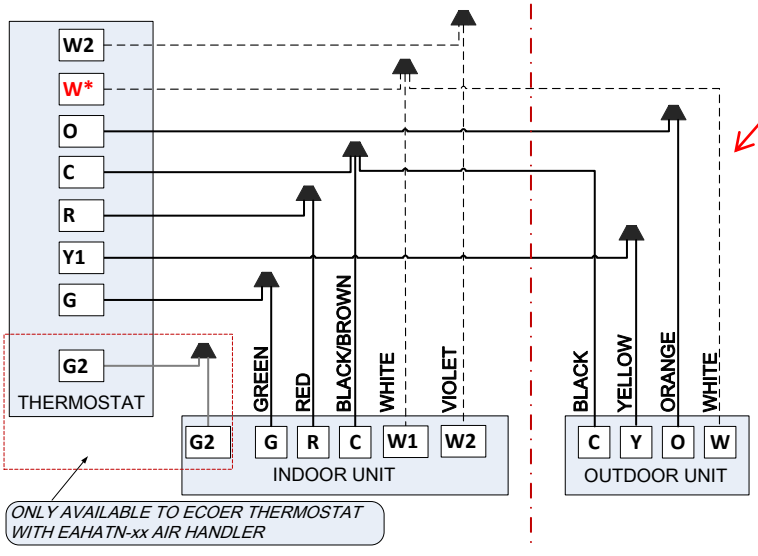
Press BS1 to return.

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 • Incompatible thermostat	• Be sure Y/O/C wirings are connected correctly and the setting temperature at thermostat is proper. • 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 • Outside temperature is too low • Dirty air filter or blocked duct • Lack of refrigerant • Refrigerant has been blocked in the condenser coil	• Normal protection control to limit RPS • Ensure the cooling loads • Replace the air filter and eliminate any obstacles • Check refrigerant amount or any leaks • 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 • The outdoor coil is dirty or has been covered by heavy snow • Dirty air filter • Micro channel (MC) coil has been used • Lack of refrigerant	• Install auxiliary heat for back-up *__Dual-heating__ is recommended • Clean the outdoor coil • Replace the air filter • No MC coils shall be used for heat pump • Check refrigerant amount or any leaks



E-aux 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.

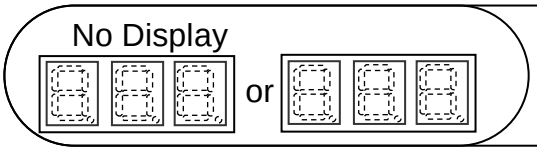
b. Work when the second heater is called because n02 setting is ON (E-Aux) and Ta < the value of n03 setting in heating.

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.



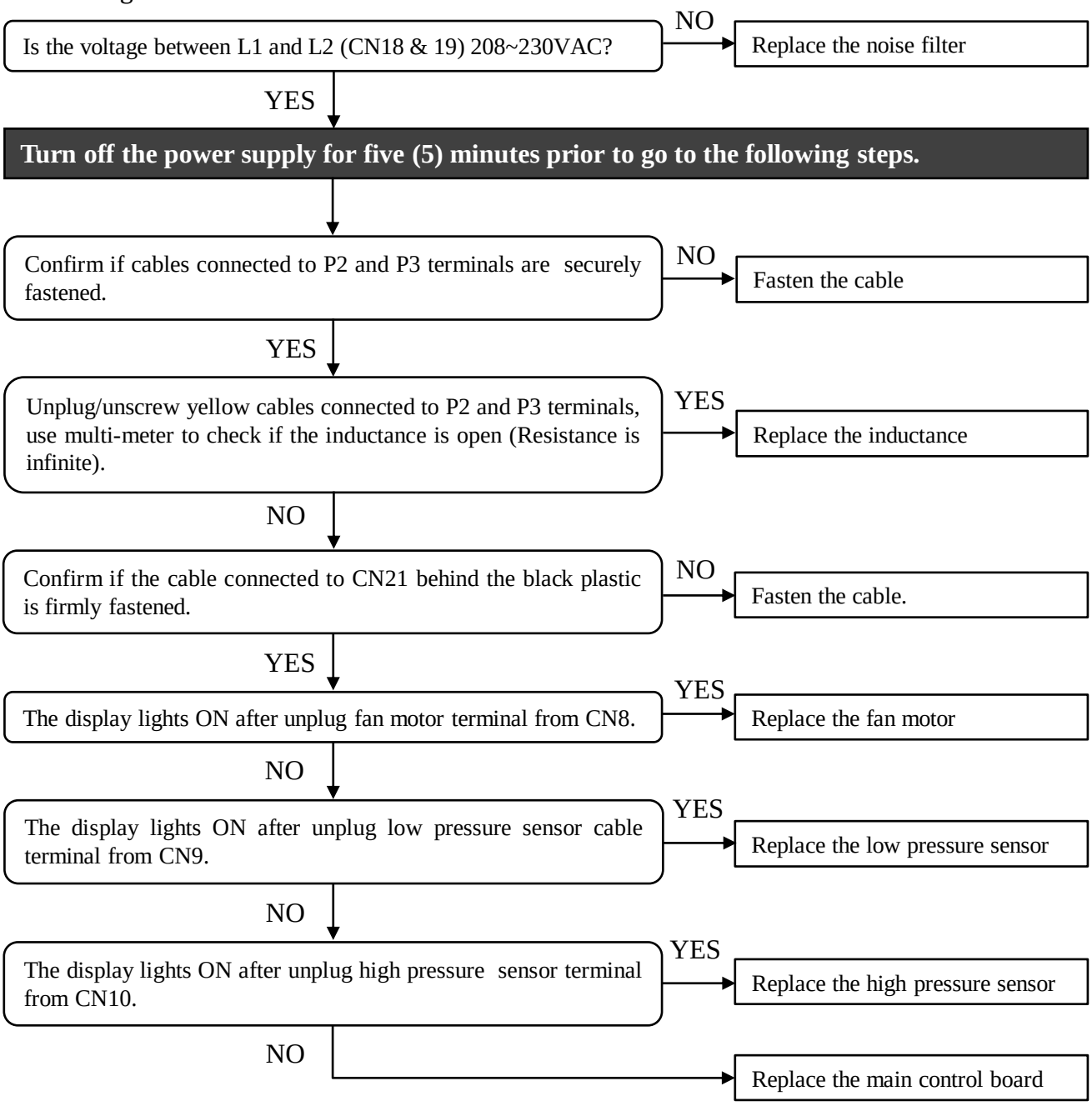
The unit energized but the digital tube shows nothing

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



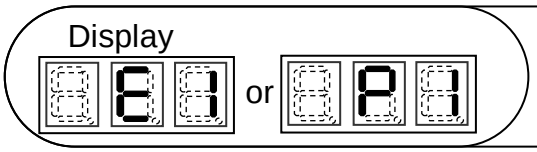
3.2 Error Codes List

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.



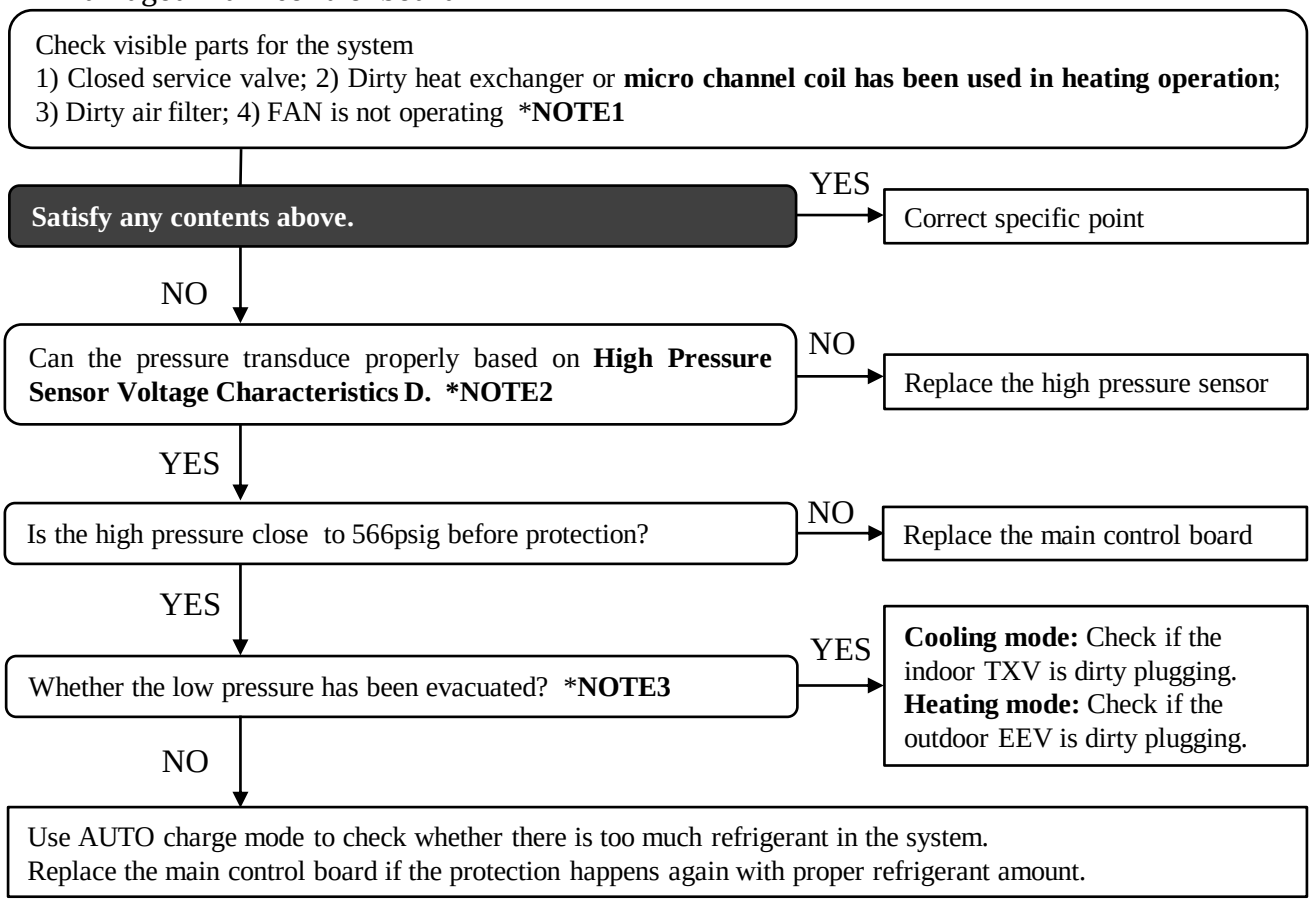
High pressure protection

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
- Dual Fuel setting is incorrect so that Furnace works with HP.
- 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 E2 or P2

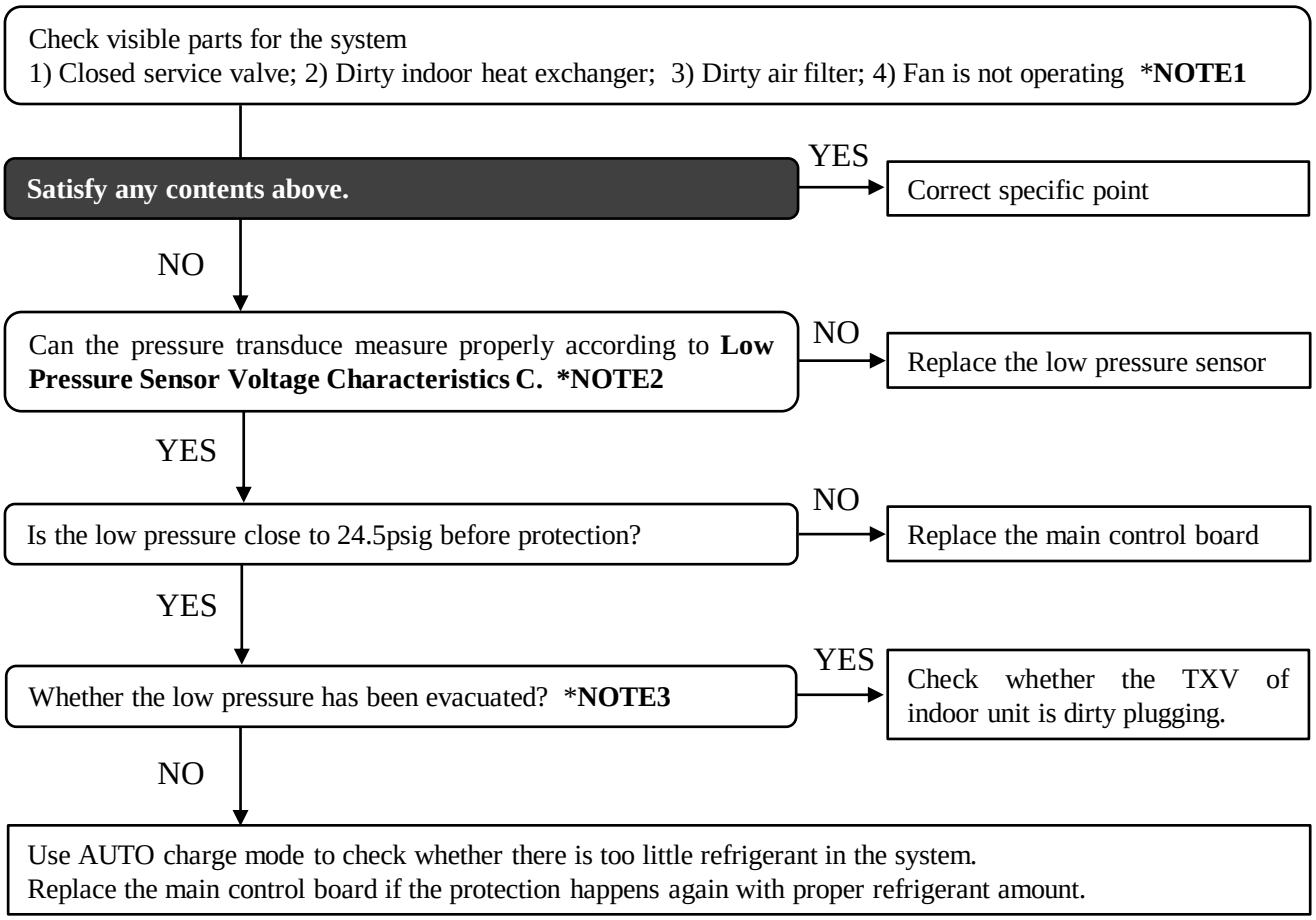
Low pressure protection in cooling mode

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℉
- Too little refrigerant in the system
- Damaged indoor R410A TXV
- G(G2) signal is lost resulting in indoor unit FAN=OFF
- 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

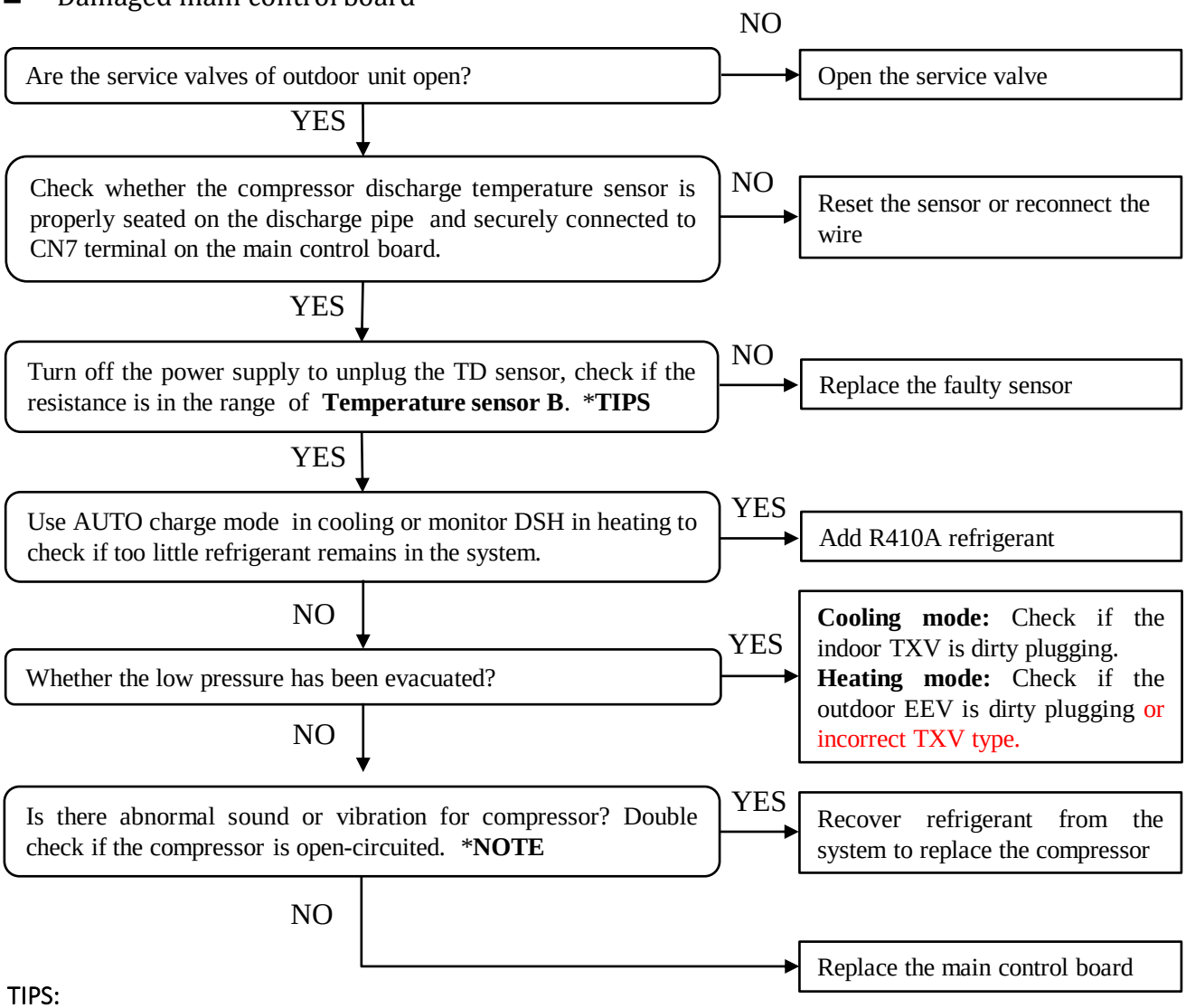
Compressor discharge temperature (TD) protection

1.Error definition:

P3: The detected discharge temperature(TD) is no less than specified value.
Cooling: 248℉ Heating: 230℉
E3: System locks up when P3 has occurred six times within 3 hours.

2.Possible causes:

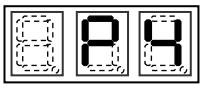
- Too little refrigerant remains in the system
- Dirty plugging of EEV or indoor TXV
- Incorrect TXV type causes high temperature in heating
- Damaged discharge temperature sensor
- Damaged main control board



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



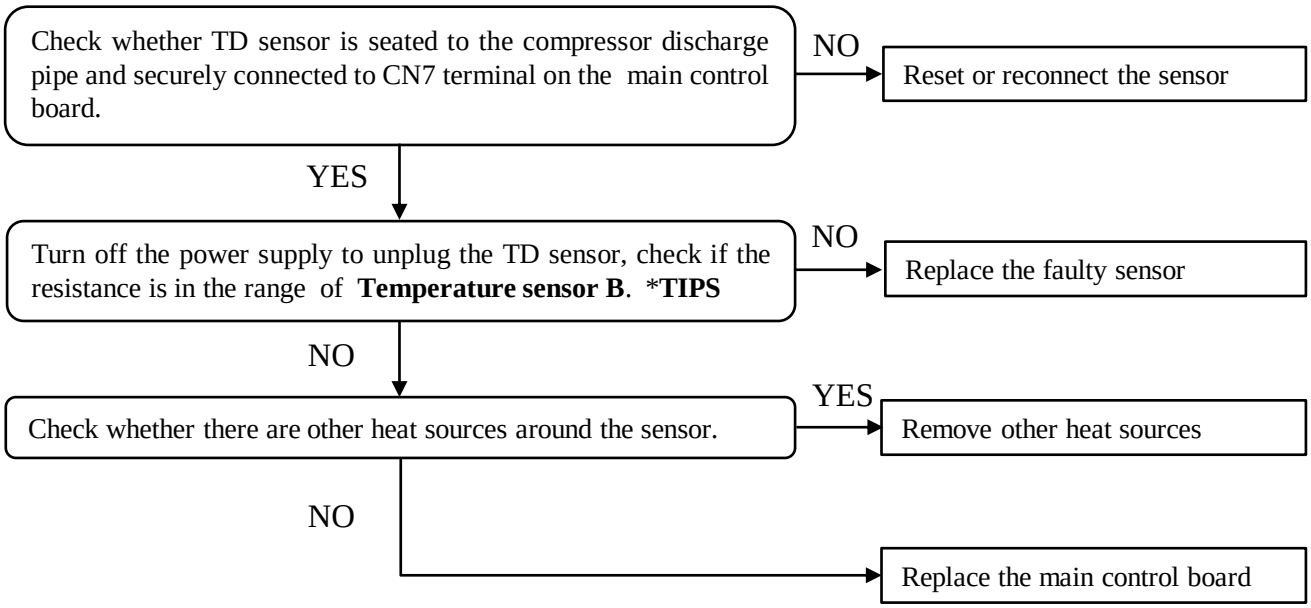
Compressor discharge temperature (TD) sensor is disconnected or damaged

1.Error definition:

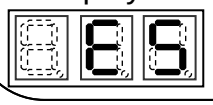
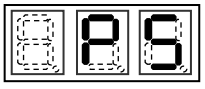
Compressor discharge temperature (TD) sensor is disconnected or damaged.
TD<Tc-9℉ for 20 minutes, Tc means the condensing temperature.

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.

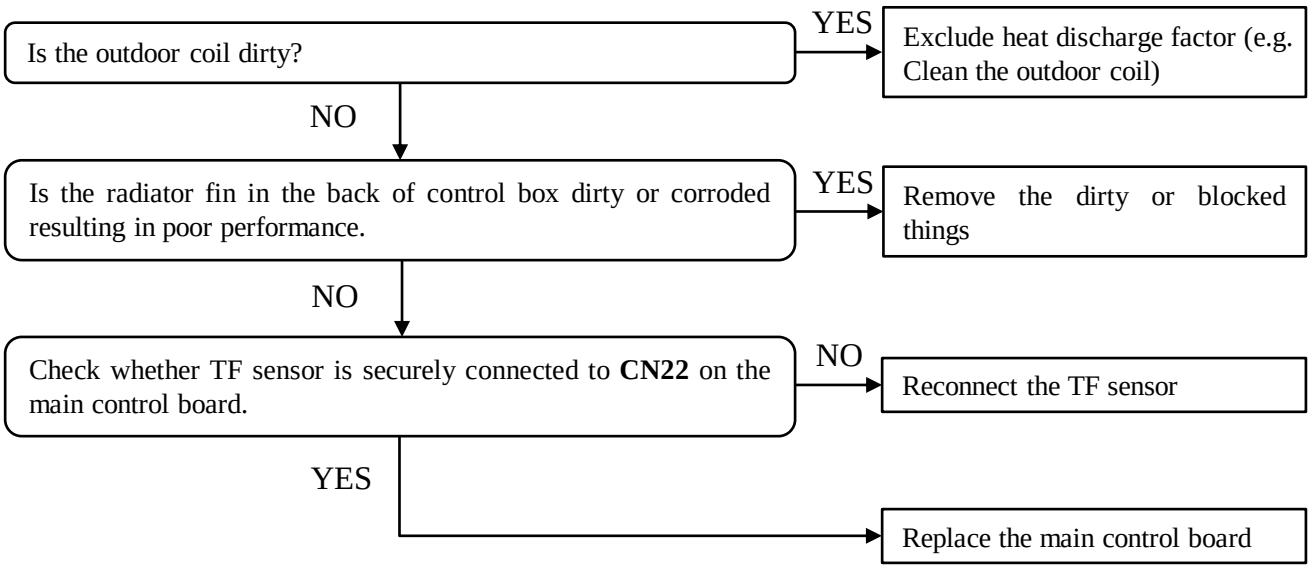
EODA18H-2436: 181℉

EODA18H-4860: 176℉ in cooling mode/ 167℉ 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 E6 or P6

Compressor over-current protection

1.Error definition:

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

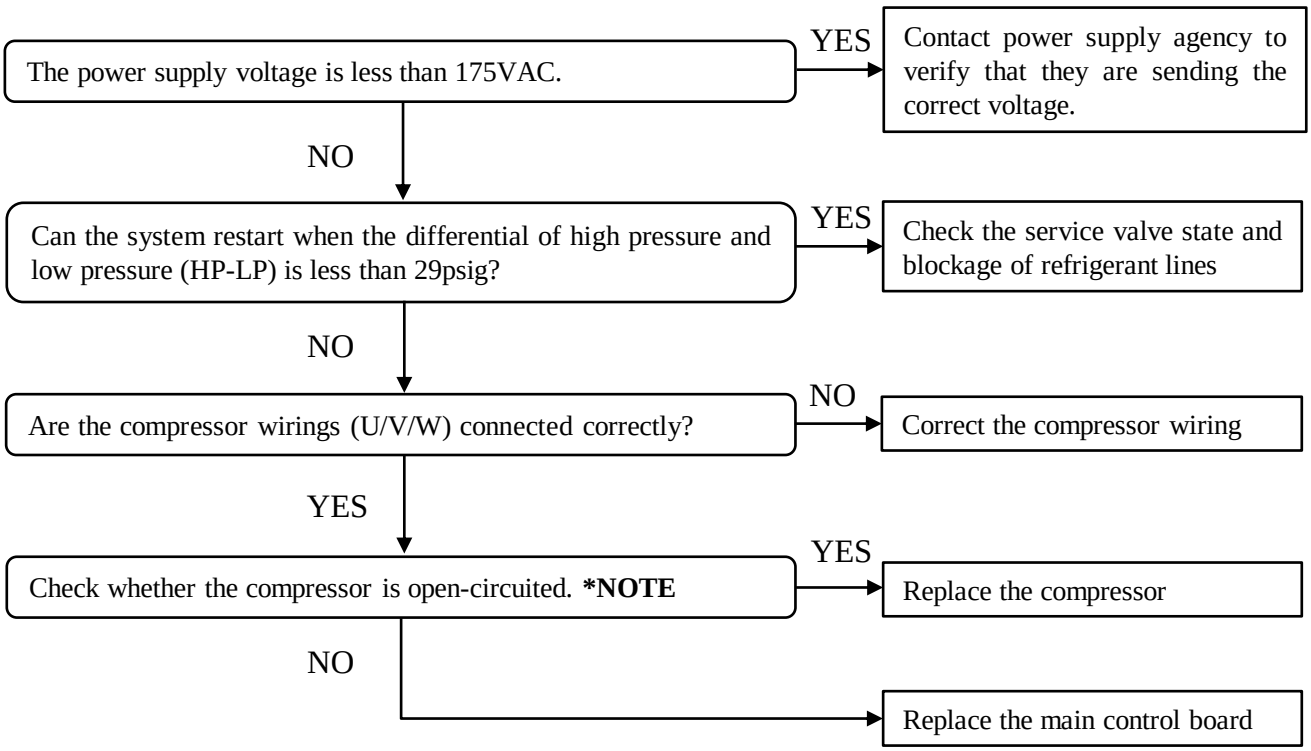
EODA18H-2436: 16A

EODA18H-4860: 20A

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

2.Possible causes:

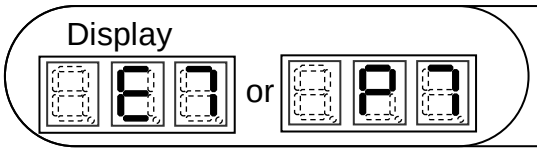
- Abnormal power supply voltage
- Too much refrigerant in the system resulting in liquid slugging at compressor
- Damaged main control board
- Indoor unit is suddenly powered off
- Damaged compressor



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.



Liquid slugging protection

1.Error definition:

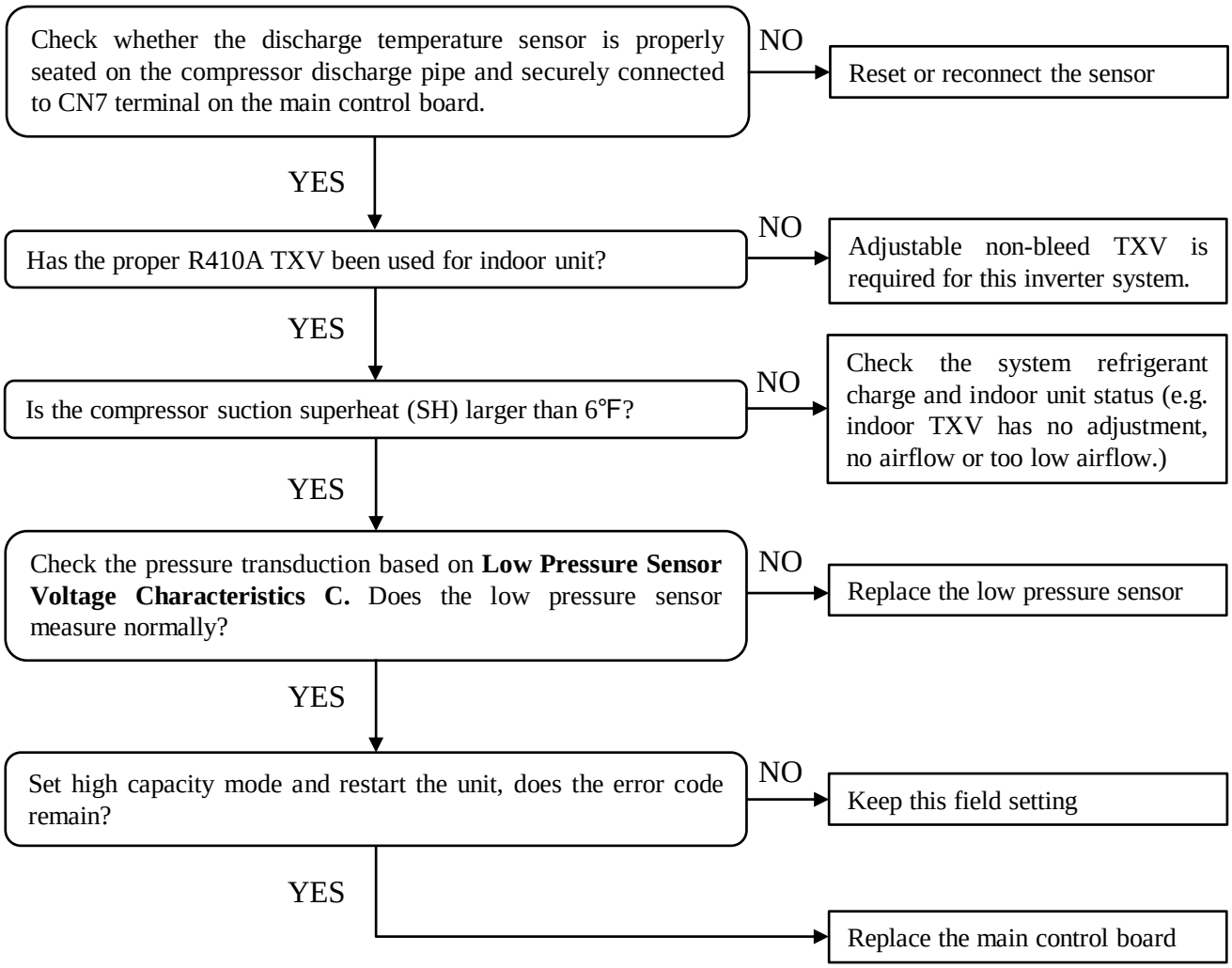
This control is to prevent compressor from damaging because of liquid slugging.
When SH<9.0℉ and compressor discharge superheat (DSH=TD-SC-TL-1.8) <14.4℉ for 20 minutes, starting to accumulate the liquid slugging time. Report P7 once it lasts for 30 minutes.
E7: System locks up when P7 has occurred three 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 P1

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 ↓

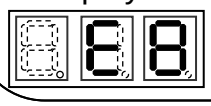
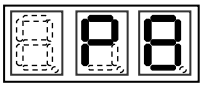
The error code remains even though setting high capacity mode.
- NO → Keep this field setting
- YES ↓

Replace the main control board

NOTE:

Heating DSH should be between 25 ° F and 50 ° 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 50 ° F when the EEV opening ≥460pls

Display  or 

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.

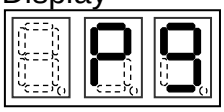
2.Possible causes:

- Abnormal power supply voltage
- Damaged main control board

Abnormal power supply voltage (e.g. less than175VAC). Check if there are any other high power consumption facilities sharing the same power supply?

YES → Contact power supply agency to verify that they are sending the correct voltage.

NO → Replace the main control board

Display 

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

Use ESS Pro App or BS3 button to check high pressure and low pressure values. Are they approximately equal in stop condition.

NO → Refer to F7/F8 code to trouble-shoot the pressure sensor

YES ↓

Are the compressor wirings (U/V/W) connected properly based on the wiring diagram?

NO → Correct U/V/W wirings

YES ↓

Cooling: Has the **non-bleed TXV** been used for indoor unit?

Heating: No liquid slugging protection in the last week?

NO → **Cooling:** Use non-bleed TXV

Heating: Refer to P7/E7 code to troubleshoot the EEV opening

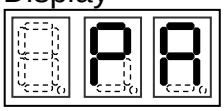
YES ↓

Turn off the power supply for five minutes then turn on again to restart the system. Does the fault remain?

NO → Back to normal

YES → Replace the main control board

Display



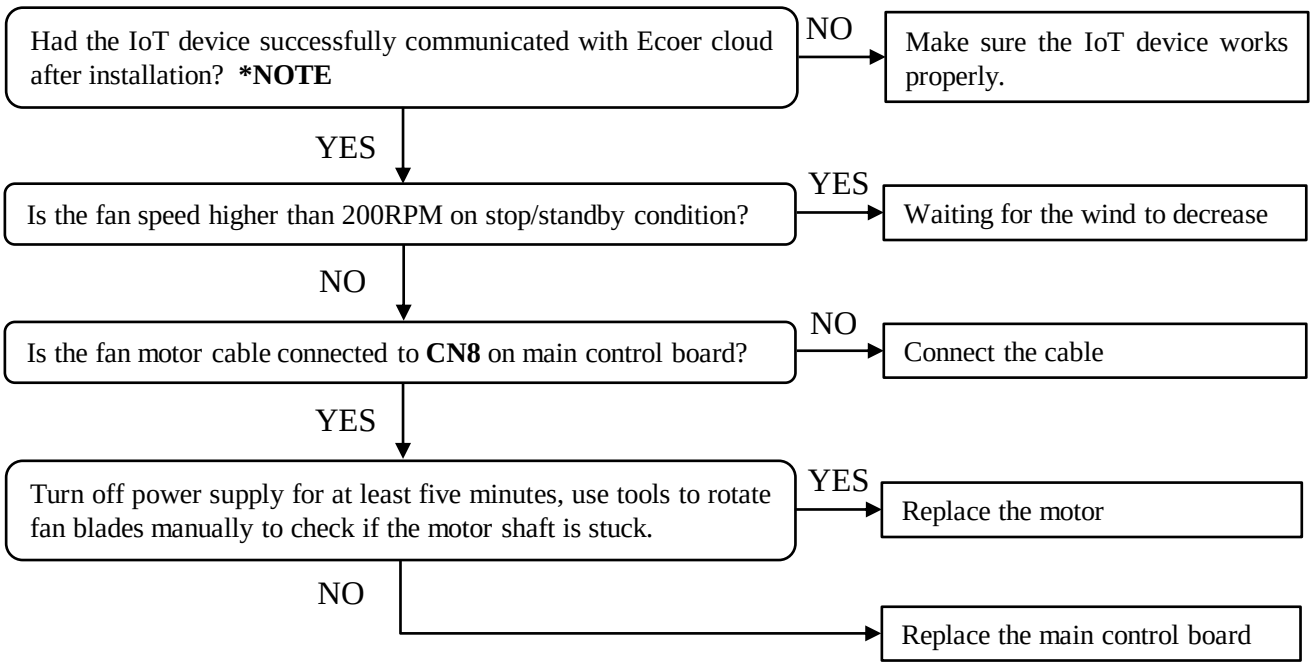
DC fan motor over-load protection

1.Error definition:

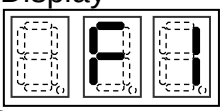
- The fan rotation speed is less than 240RPM if it has the running signal.
- The rotation speed difference between the detected value and target one is over 200RPM for 3 minutes.

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 

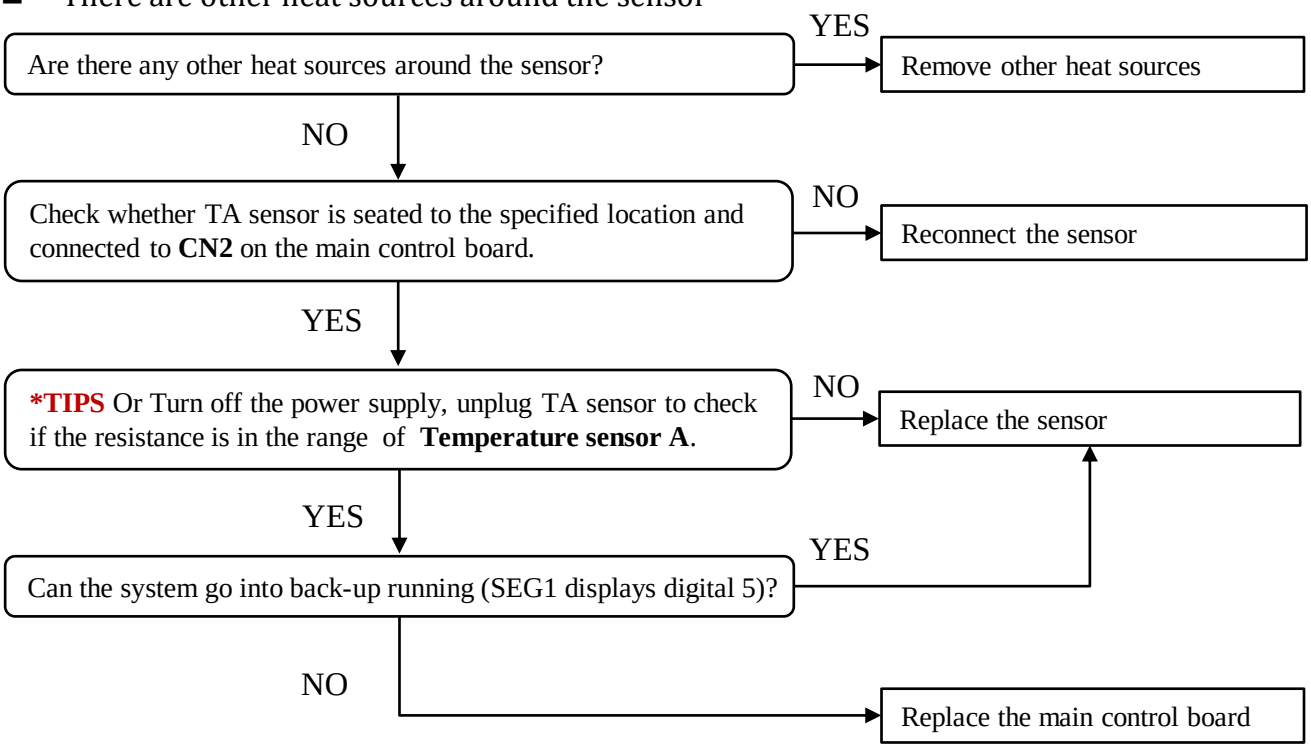
Ambient temperature (TA) sensor fault

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.

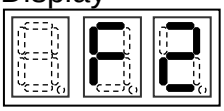
How to take out the protection cover for TA sensor?

STEP1. Press the button

STEP2. Push down the protection cover

STEP3. Take out the protection cover

Display



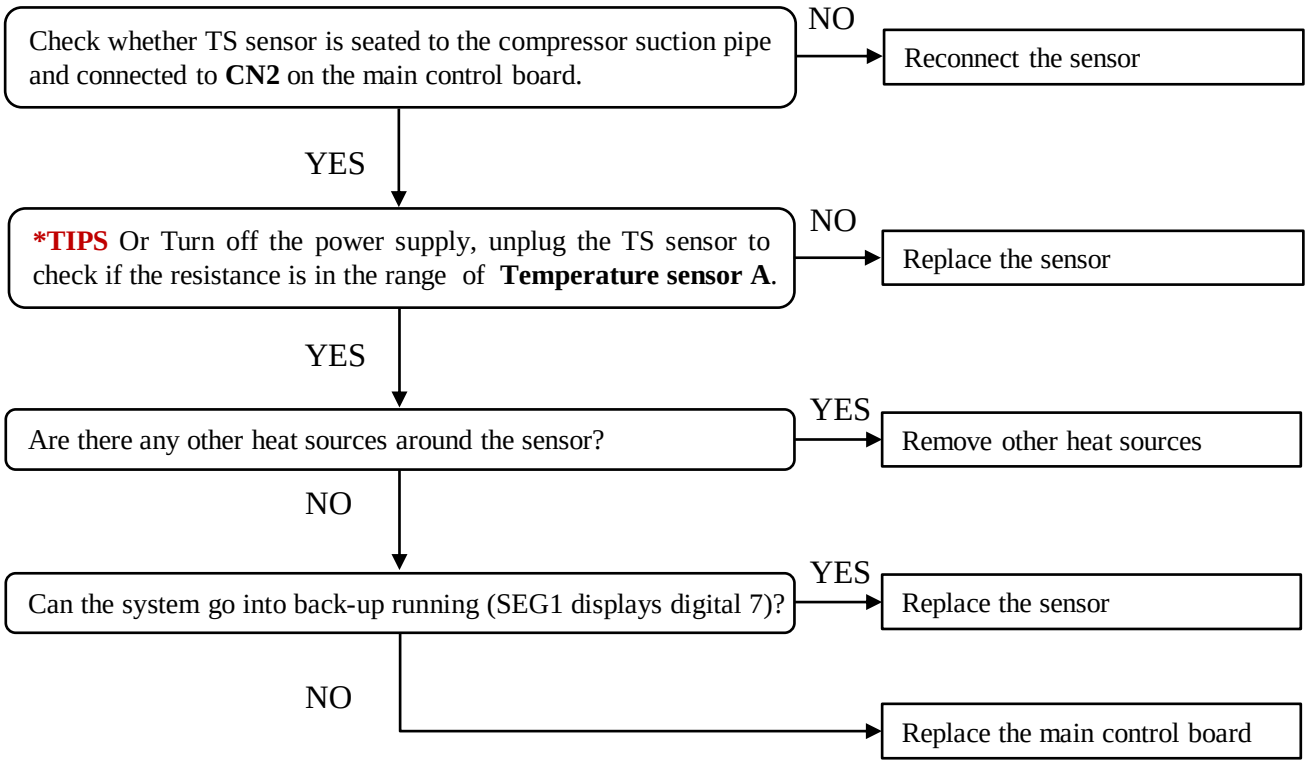
Compressor suction temperature (TS) sensor fault

1.Error definition:

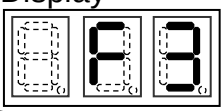
The suction temperature (TS) sensor is short circuit or open circuit.

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 

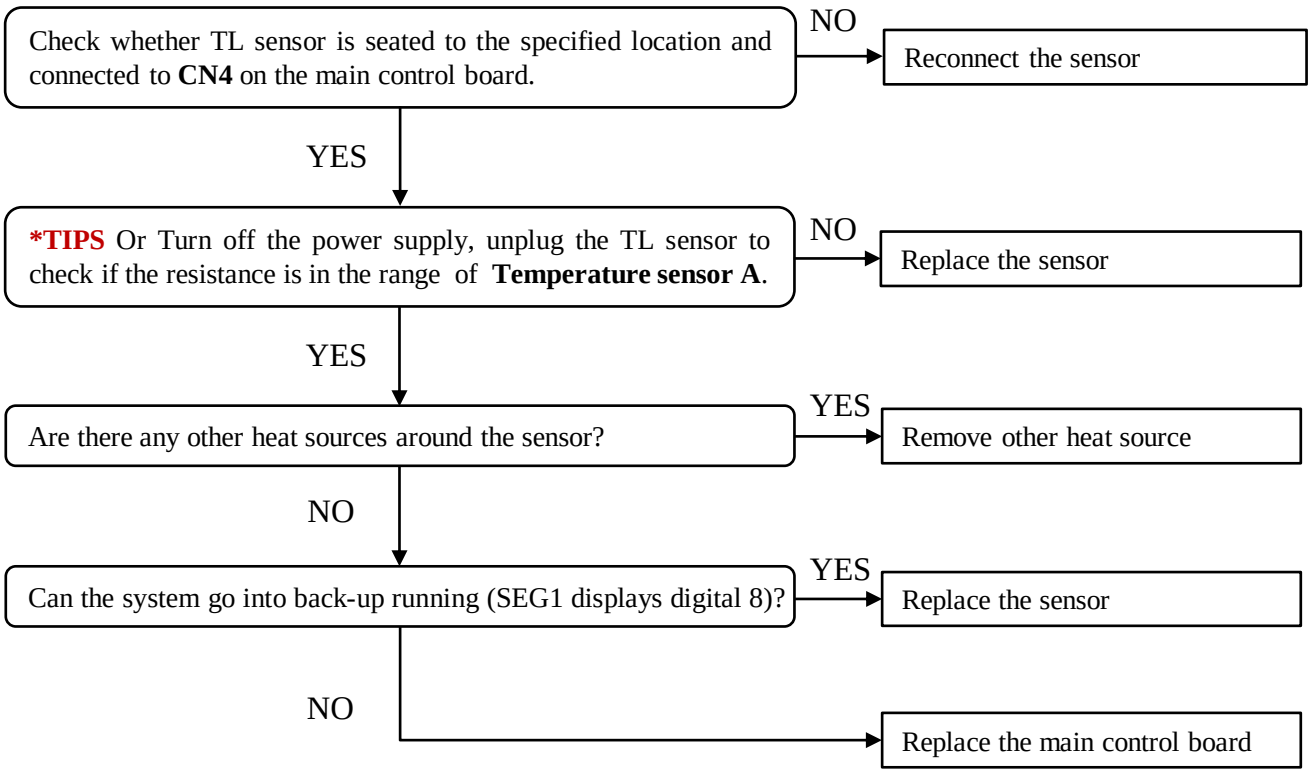
Liquid line temperature (TL) sensor fault

1.Error definition:

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

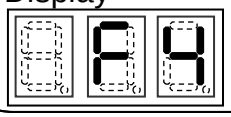
2.Possible causes:

- 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



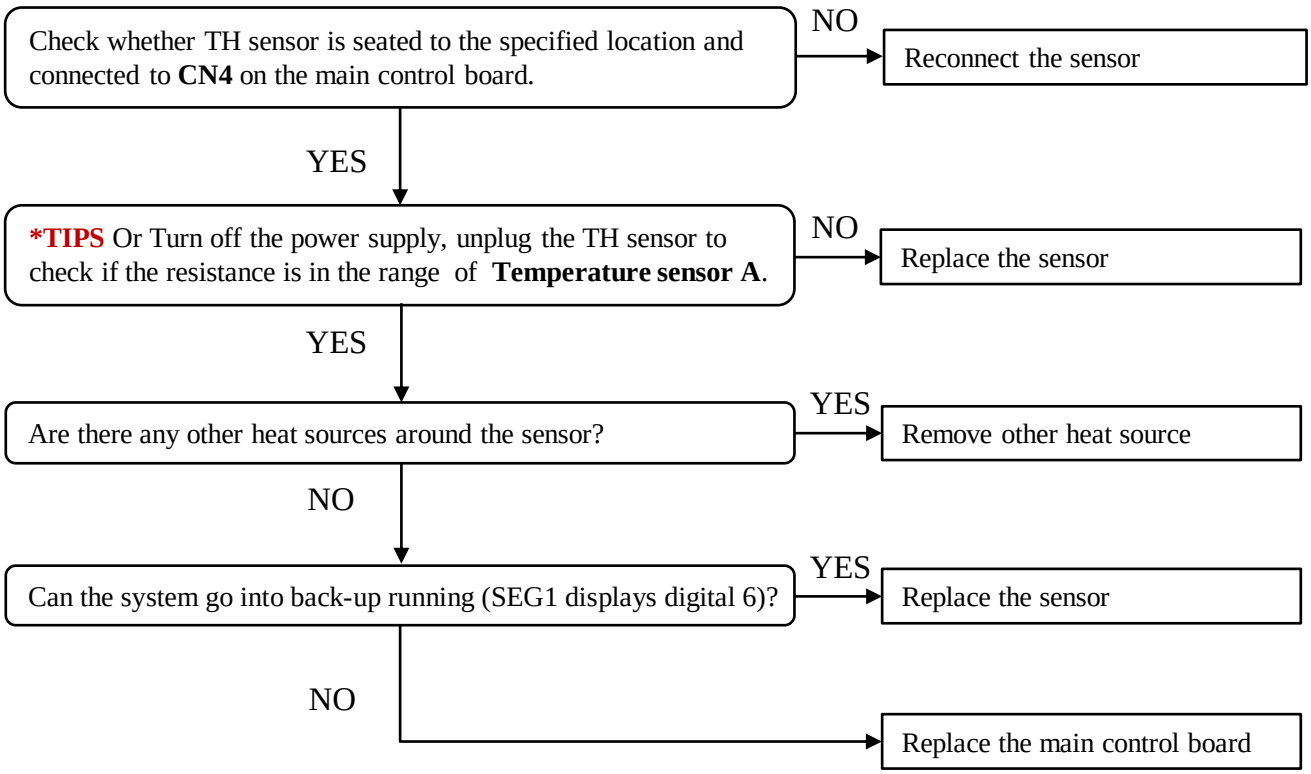
Defrost temperature (TH) sensor fault

1.Error definition:

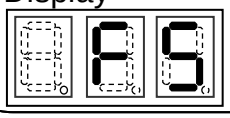
The defrost temperature (TH) sensor is short circuit or open circuit.

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 

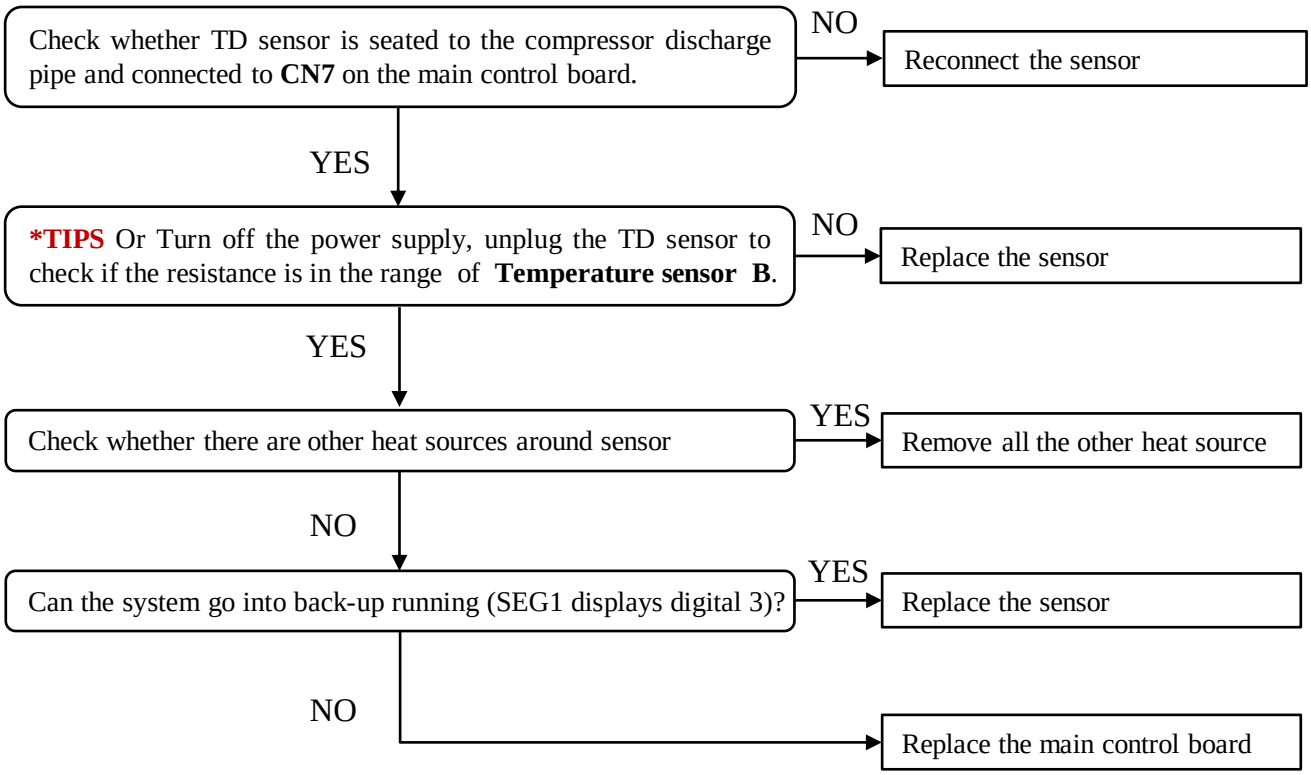
Compressor discharge temperature (TD) sensor fault

1.Error definition:

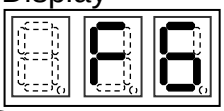
The discharge temperature (TD) sensor is short circuit or open circuit.

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 

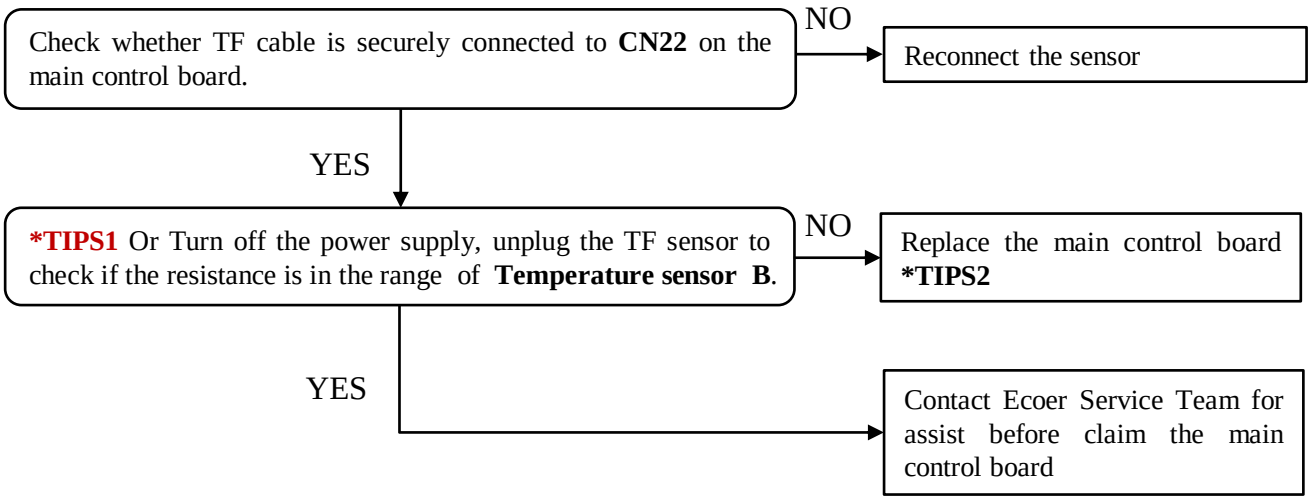
Inverter module temperature (TF) sensor fault

1.Error definition:

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

2.Possible causes:

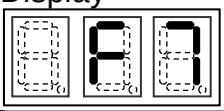
- Damaged main control board
- Loose connection at port on main control board
- Temperature sensor failure(PCB2.0 built-in Tf sensor)
- There are other heat sources around the sensor



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

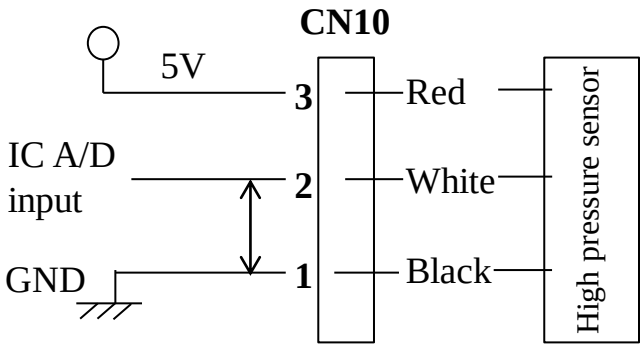


High pressure (HP) sensor fault

1.Error definition and method to check:

The high pressure sensor is open or shorted.

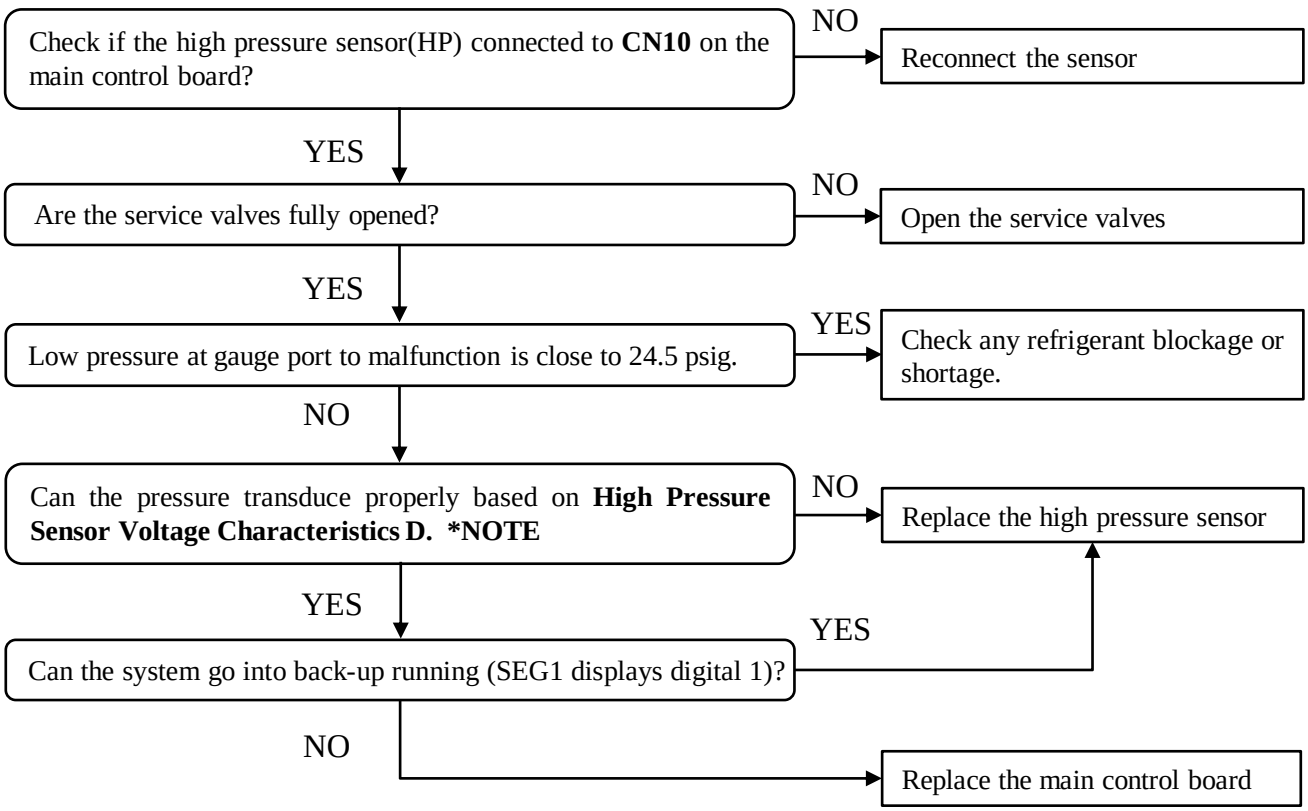
The voltage between CN10 pin(1) and (2) is not in the range 0.59~4.76VDC.



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).

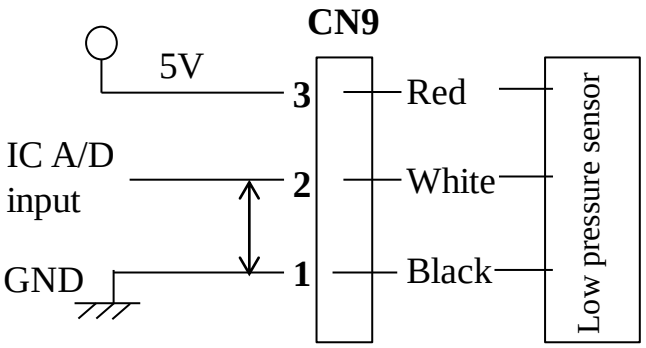
Display E F 8

Low pressure (LP) sensor fault

1.Error definition and method to check:

The low pressure sensor is open or shorted.

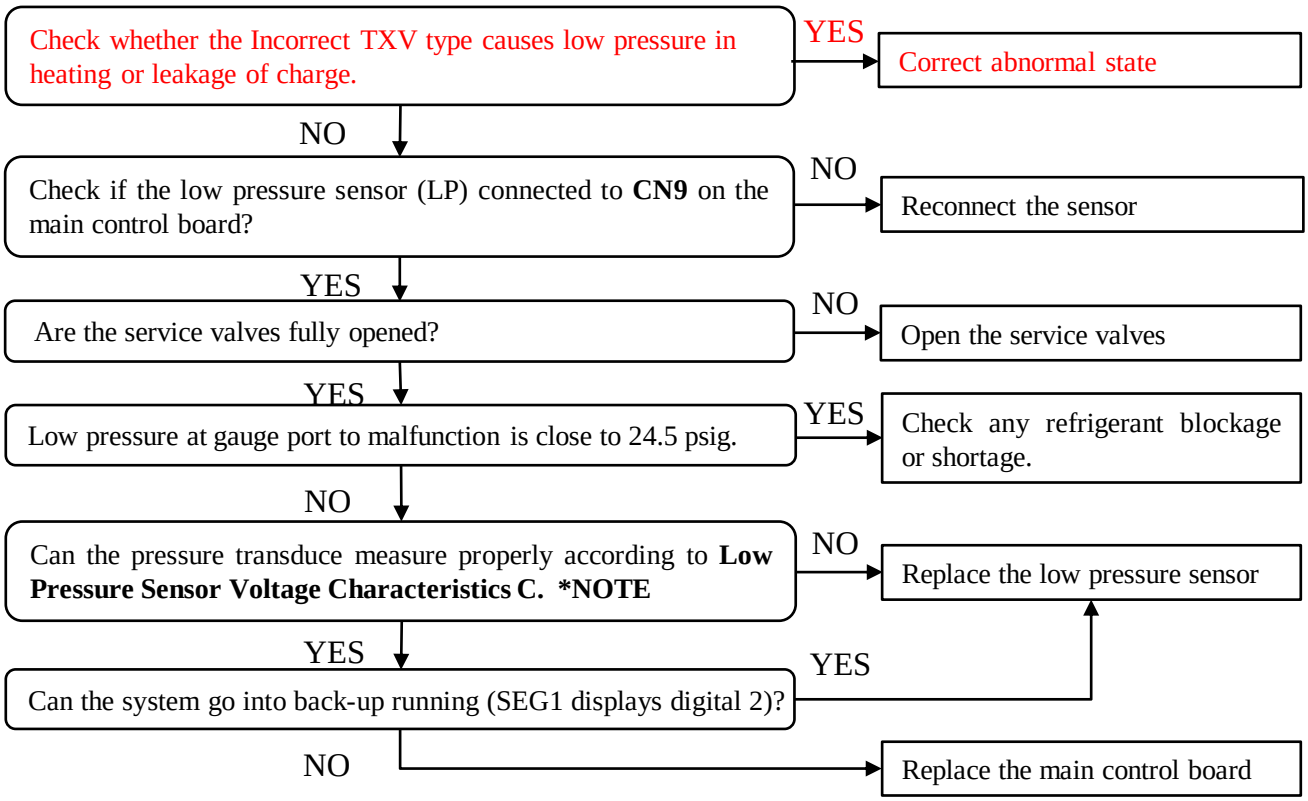
The voltage between CN9 pin(1) and (2) is not in the range 0.70~4.50VDC.



Measure DC voltage within these pins

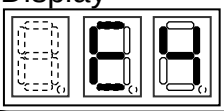
2.Possible causes:

- 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.

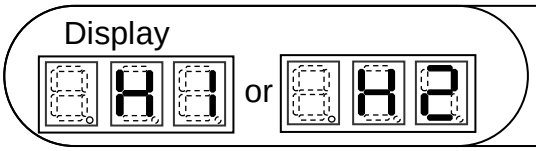
2.Possible causes:

- Loose connection at CN21 terminal
- Damaged main control board

Turn off the power supply for five minutes. Unfasten three screws to take out the black plastic, then reconnect the cable to **CN21**. Turn on the power to check if the fault remains.

YES → Replace the main control board

NO → External factor other than error (e.g. noise interference).



Ambient temperature limit operation

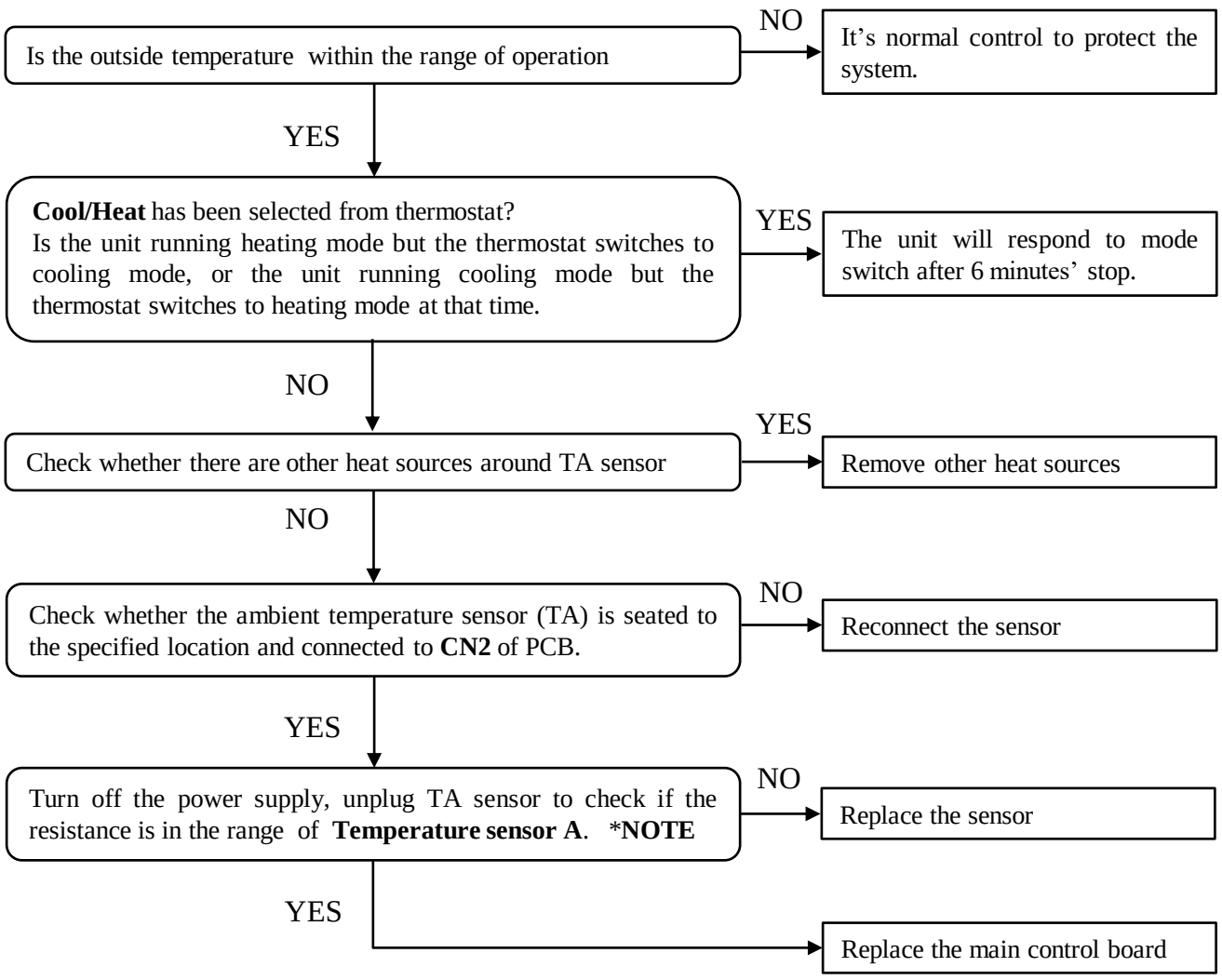
1.Error definition and method to check:

H1: The detected ambient temperature is absolutely prohibited for cooling.
TA<32℉ or ≥140℉

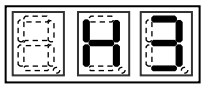
H2: The detected ambient temperature is absolutely prohibited for heating.
TA ≥ 86℉ or TA< forced heating stop temperature set by n01

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



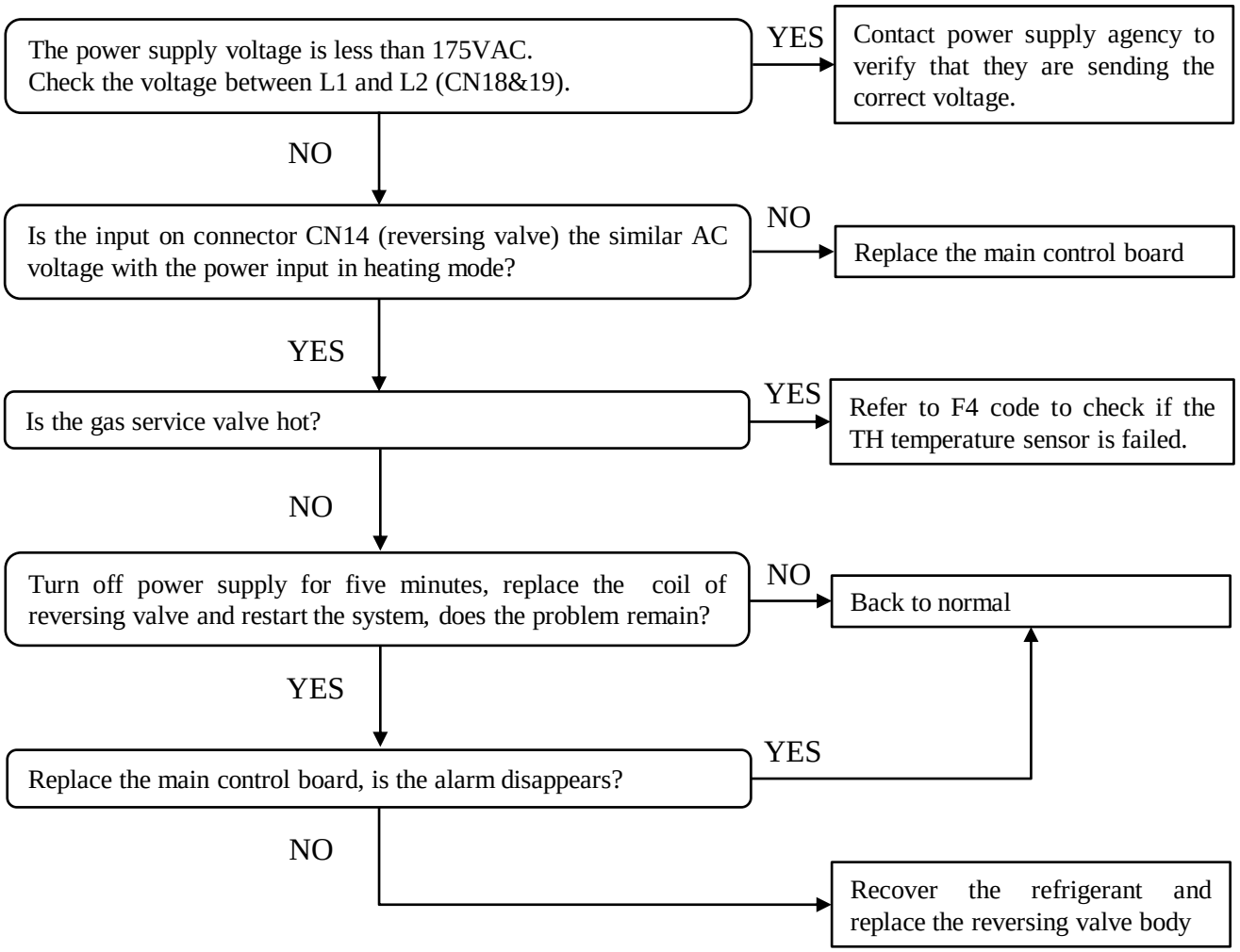
Abnormal switch alarm for reversing valve

1.Error definition:

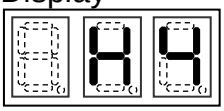
4-way (reversing) valve switches incompletely after defrost operation or from cooling mode.
Report H3 alarm if TH ≥ TL+10.8℉ and TH ≥ TA+5.4℉.

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



Display



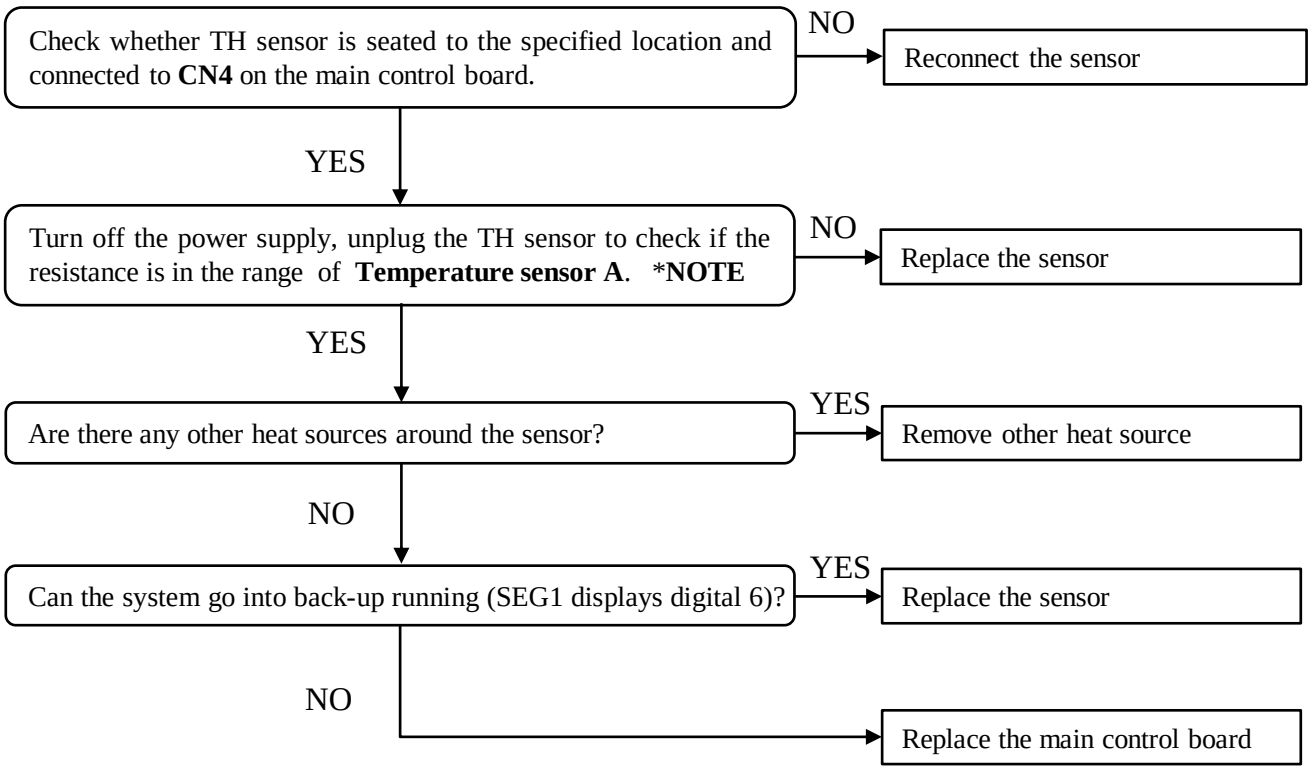
Defrost temperature (TH) sensor is disconnected or damaged

1.Error definition:

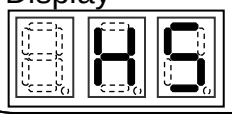
The defrost temperature (TH) sensor is short circuit or open circuit.

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 

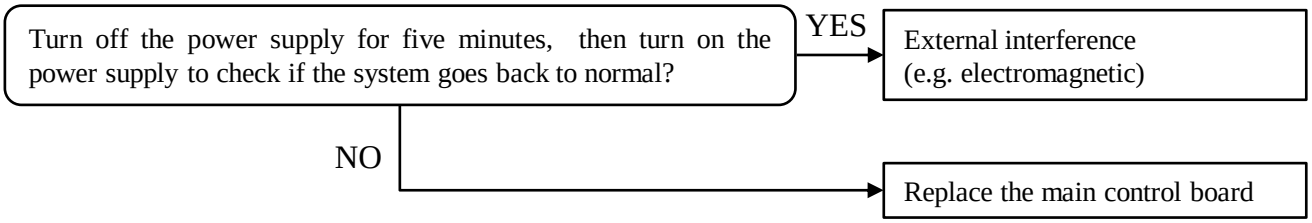
EEPROM fault

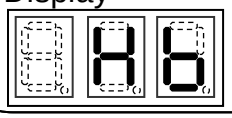
1.Error definition:

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 

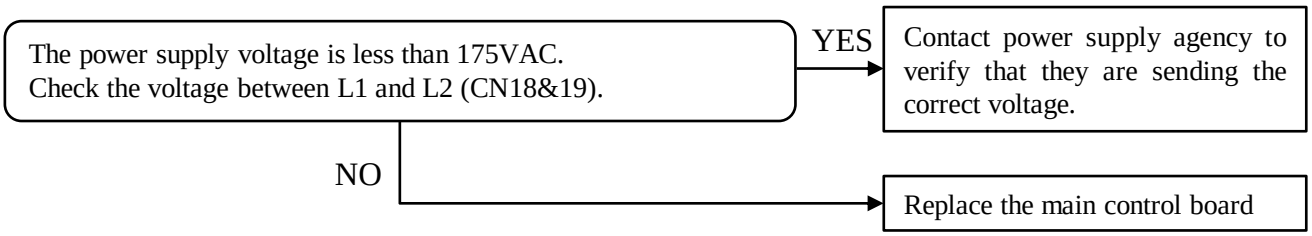
Low voltage alarm

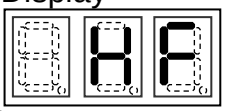
1.Error definition:

Power supply voltage is less than 175VAC.

2.Possible causes:

- Abnormal power supply voltage
- Damaged main control board



Display 

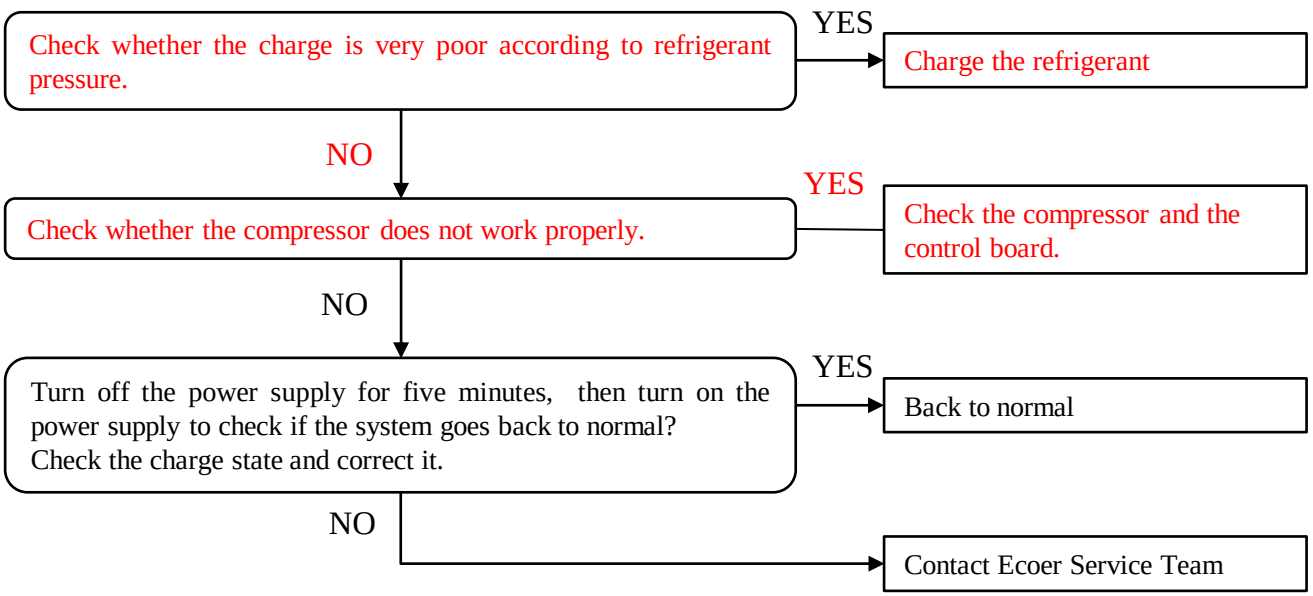
Abnormal function control

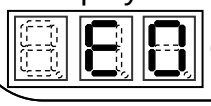
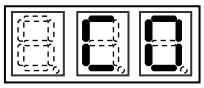
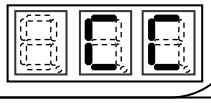
1.Error definition:

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

2.Possible causes:

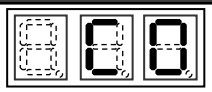
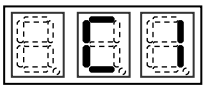
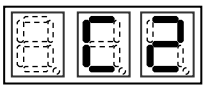
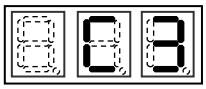
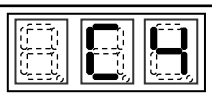
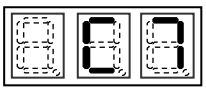
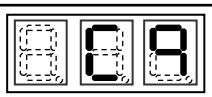
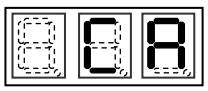
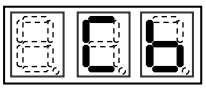
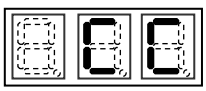
- Very poor charge
- The compressor does not work properly
- Abnormal signal input from thermostat



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

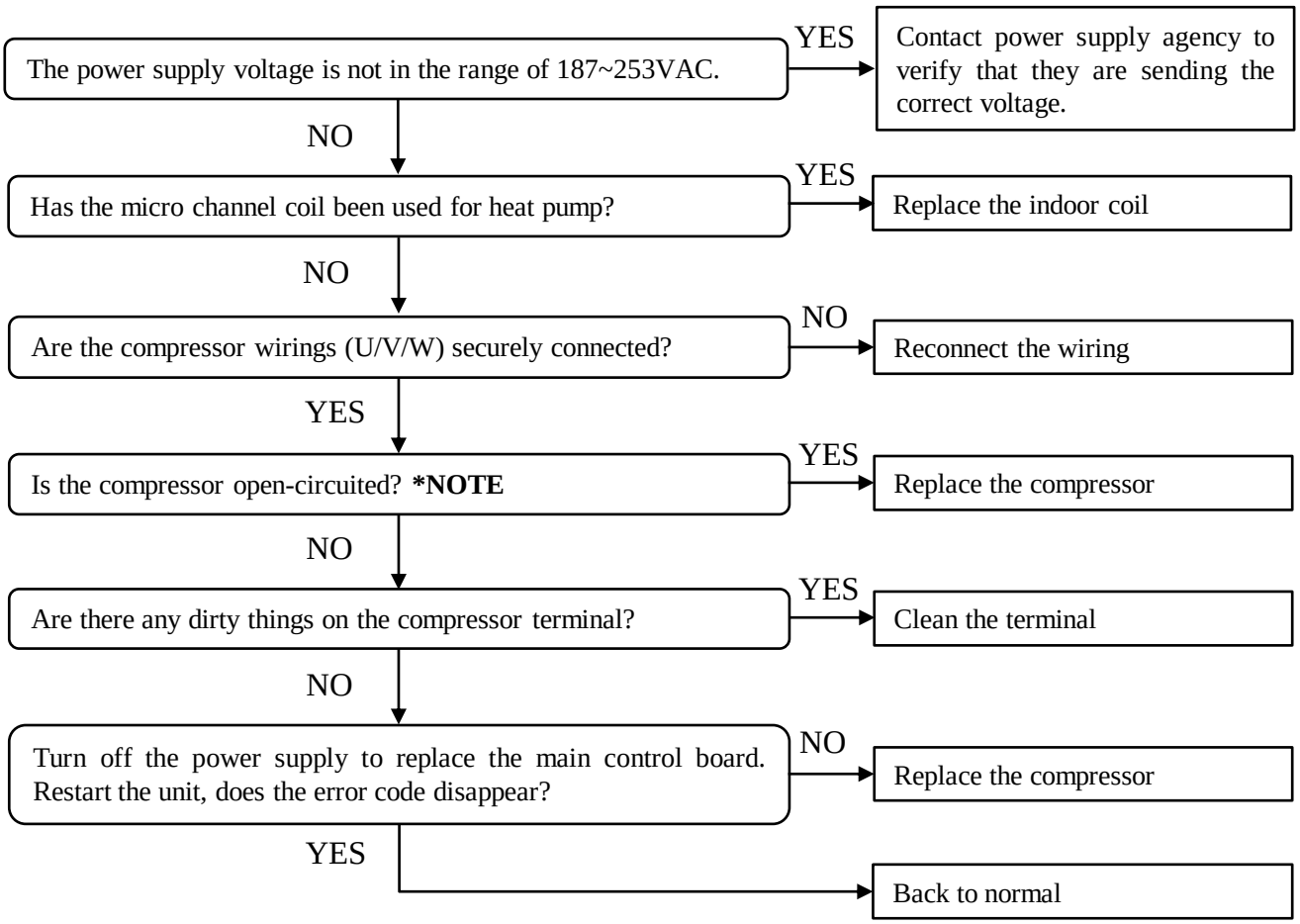
E0: System locks up when C0~CA has occurred three times in 60 minutes.

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 C00 ~ C06

Compressor INV module protection



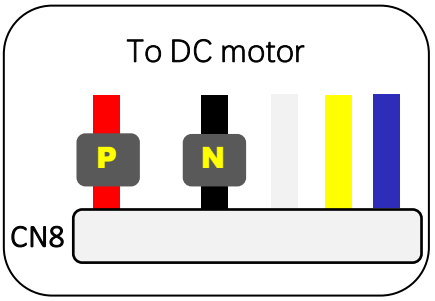
NOTE: Normal resistance for compressor

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 tap 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?

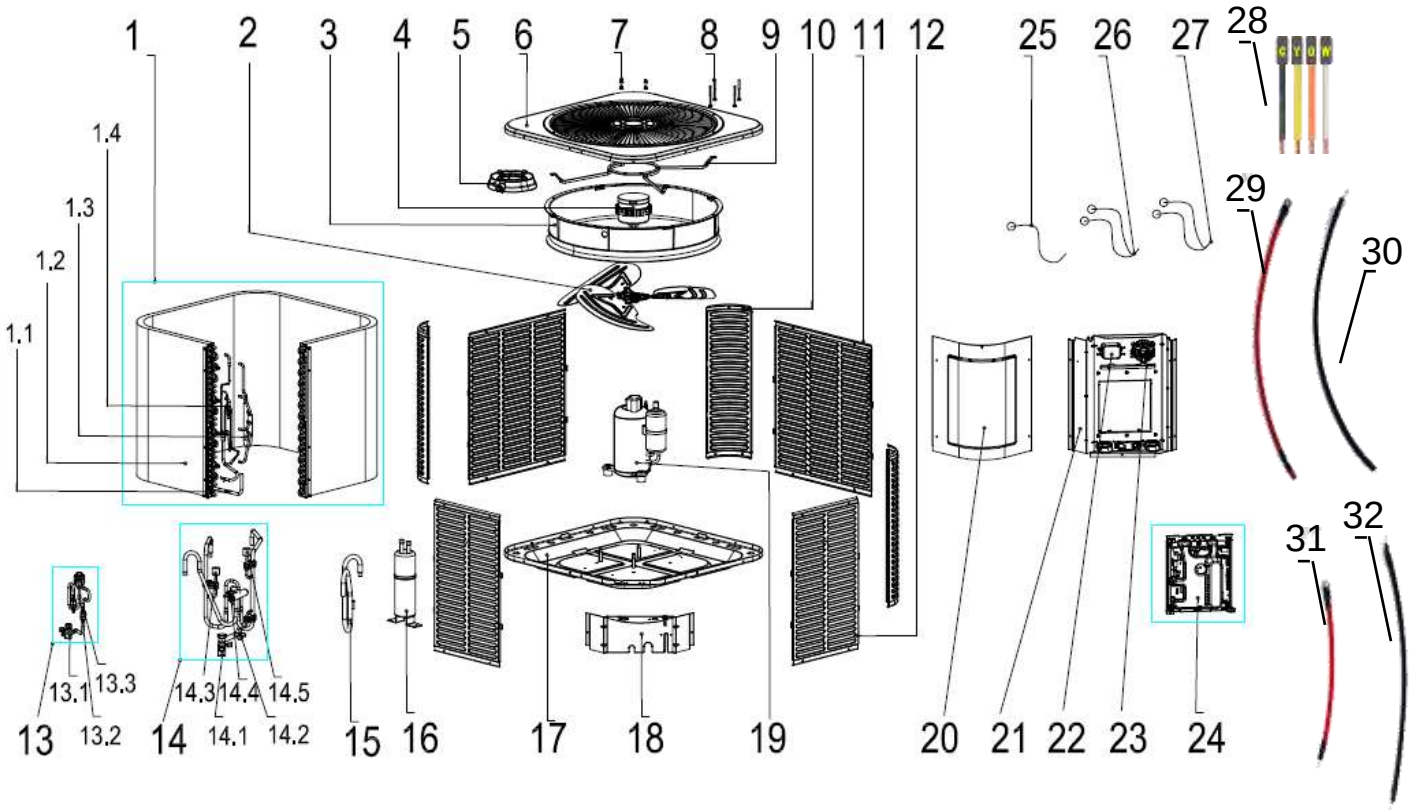
RED Probe '+' electrode	BLACK Probe '-' electrode	VOLTAGE
U	P	0.4±0.1 VDC
V	P	0.4±0.1 VDC
W	P	0.4±0.1 VDC
N	U	0.4±0.1 VDC
N	V	0.4±0.1 VDC
N	W	0.4±0.1 VDC

NO → INV module is damaged

YES

INV module works properly

4 Parts List



Model	Part Number
EODA18H-2436	F522900002
EODA18H-4860	F523100003

#	Part Name	Quantity	Parts number		Remark
			2436	4860	
1	Condenser ass'y	1	EAC231235269	EAC231235477	
1.1	Condenser connection pipe ass'y	1	EAC231235268		
1.2	Condenser	1	EAC231235270	EAC231235271	
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
			2436	4860	
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	EAC231235157	EAC231235779	
13.3	EEV solenoid coil	1	EAC3120290034		
14	Reversing valve ass'y	1	EAC231235265	EAC231235155	
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	EAC231235077	EAC231235078	Valve body
			EAC231235079		Valve coil
14.5	Low pressure sensor	1	EAC231235158		Green color
15	Suction pipe ass'y	1	EAC231235421	EAC231235149	
16	Refrigerant accumulator	1	EAC231236288	EAC231236289	
17	Chassis Parts	1	EAC230803293		
18	Lower side plate	1	EAC230803138	EAC230803139	
19	Compressor	1	EAC231235530	EAC231235532	
20	Upper cover plate	1	EAC230803313	EAC230803309	
21	Electrically controlled mounting board	1	EAC230803312	EAC230803310	
22	Noise filter (EMI)	1	EAC230904159		
23	PFC inductor	1	EAC230904160	EAC230904161	
24	Motherboard component	1	EAC230904156	EAC230904157	
25	Discharge Temp. sensor	1	EAC3160130008A		TD temperature sensor
26	Pipe Temp. sensor ass'y	1	EAC230901018		TL temperature sensor TH temperature sensor
27	Temp. sensor ass'y	1	EAC230901233		TS temperature sensor 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		Two metal lugs
32	Power cable connecting EMI and PCB CN18 (BLACK)	1	EAC230904304		Two metal lugs

5 Appendix

5.1 Sensor Characteristic

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

Temp. (°C)	Temp. (°F)	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. (°F)	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

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
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

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
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

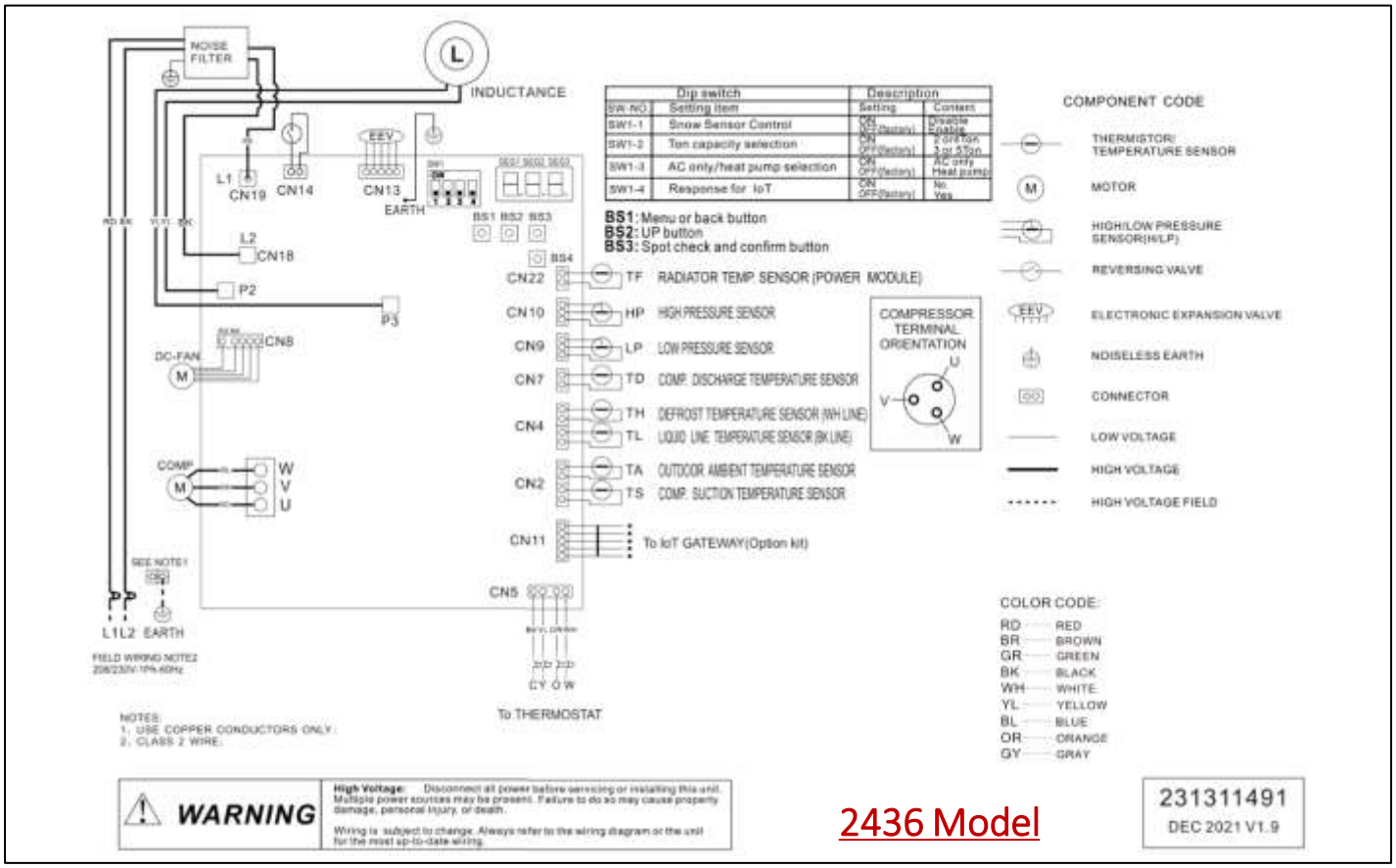
Low pressure (MPa)	Low pressure (psig)	Resistance (KΩ)	Output voltage(V)
0.68	98.6	13.61	1.86
0.70	102	13.15	1.90
0.73	106	12.50	1.96
0.76	110	11.89	2.02
0.78	113	11.50	2.06
0.81	117	10.95	2.12
0.84	122	10.43	2.18
0.87	126	9.93	2.24
0.90	131	9.46	2.30
0.93	135	9.02	2.36
0.96	139	8.59	2.42
0.99	144	8.19	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

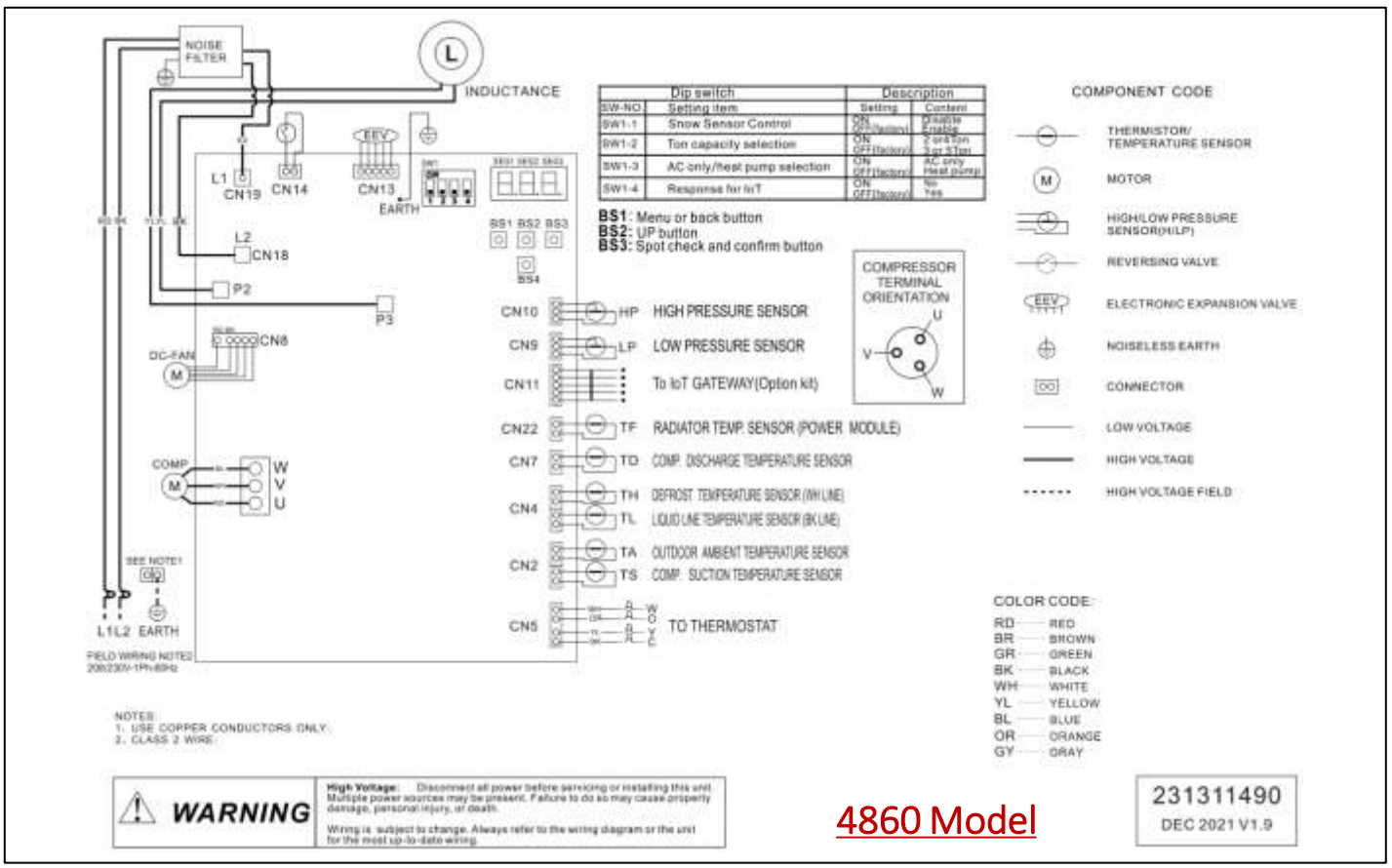
High Pressure Sensor Voltage Characteristics D*

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





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