



ESI (Ultra) R-410A Unitary Service Manual

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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

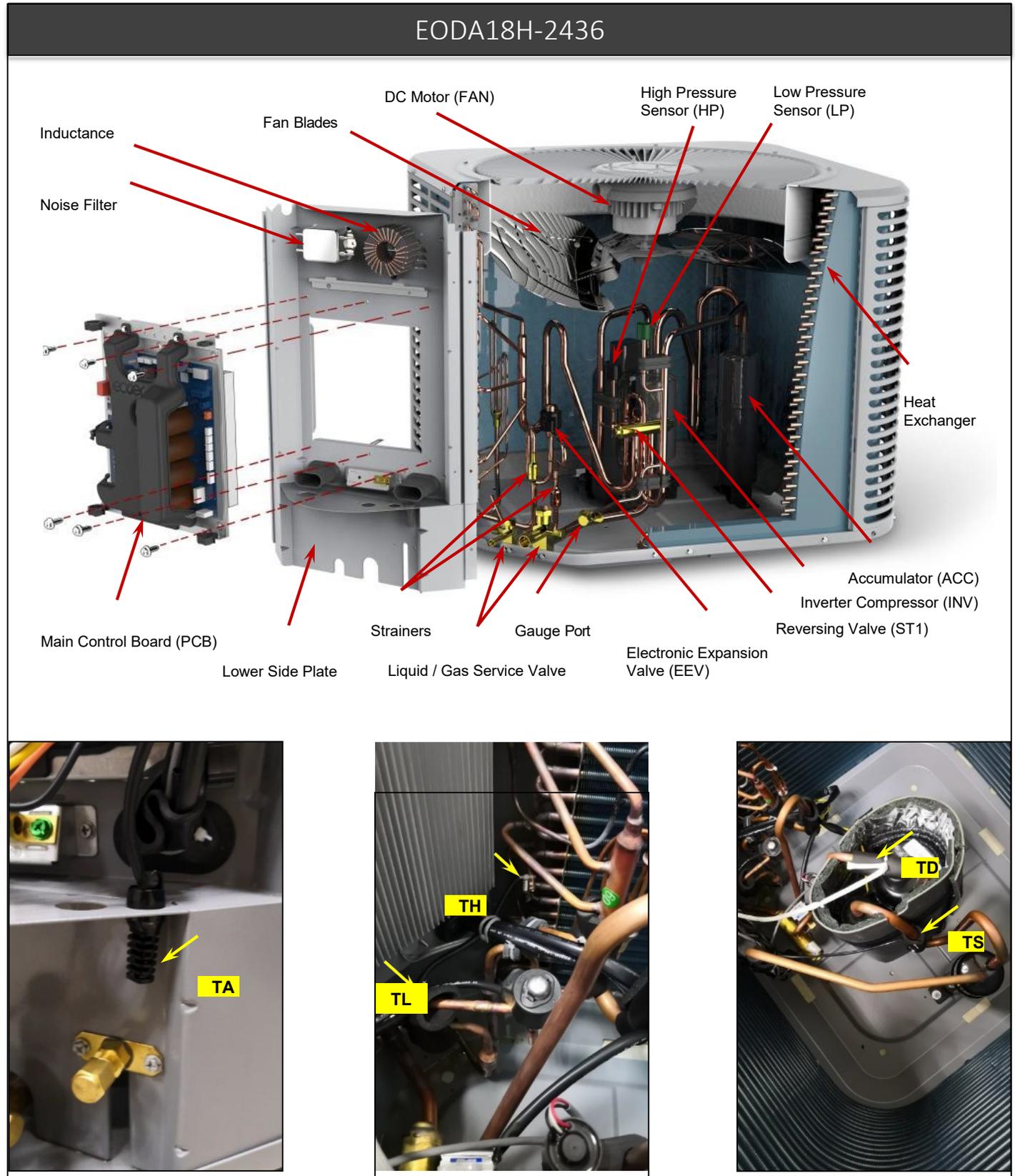
	E	OD	A	18	H	-	4860
	1	2	3	4	5		6
Condensing Unit							
Brand E: Ecoer							
Product Series OD: Outdoor Condensing Unit							
Model Letters A: 208/230V-1Ph-60Hz							
SEER 18: 18SEER Series							
Type H: Heat Pump C: AC only							
Capacity 2436: up to 3Ton 4860: up to 5Ton							

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

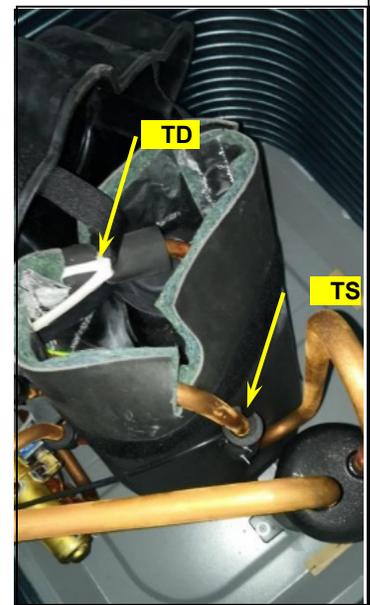
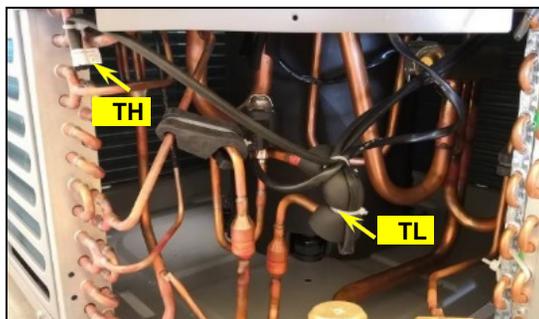
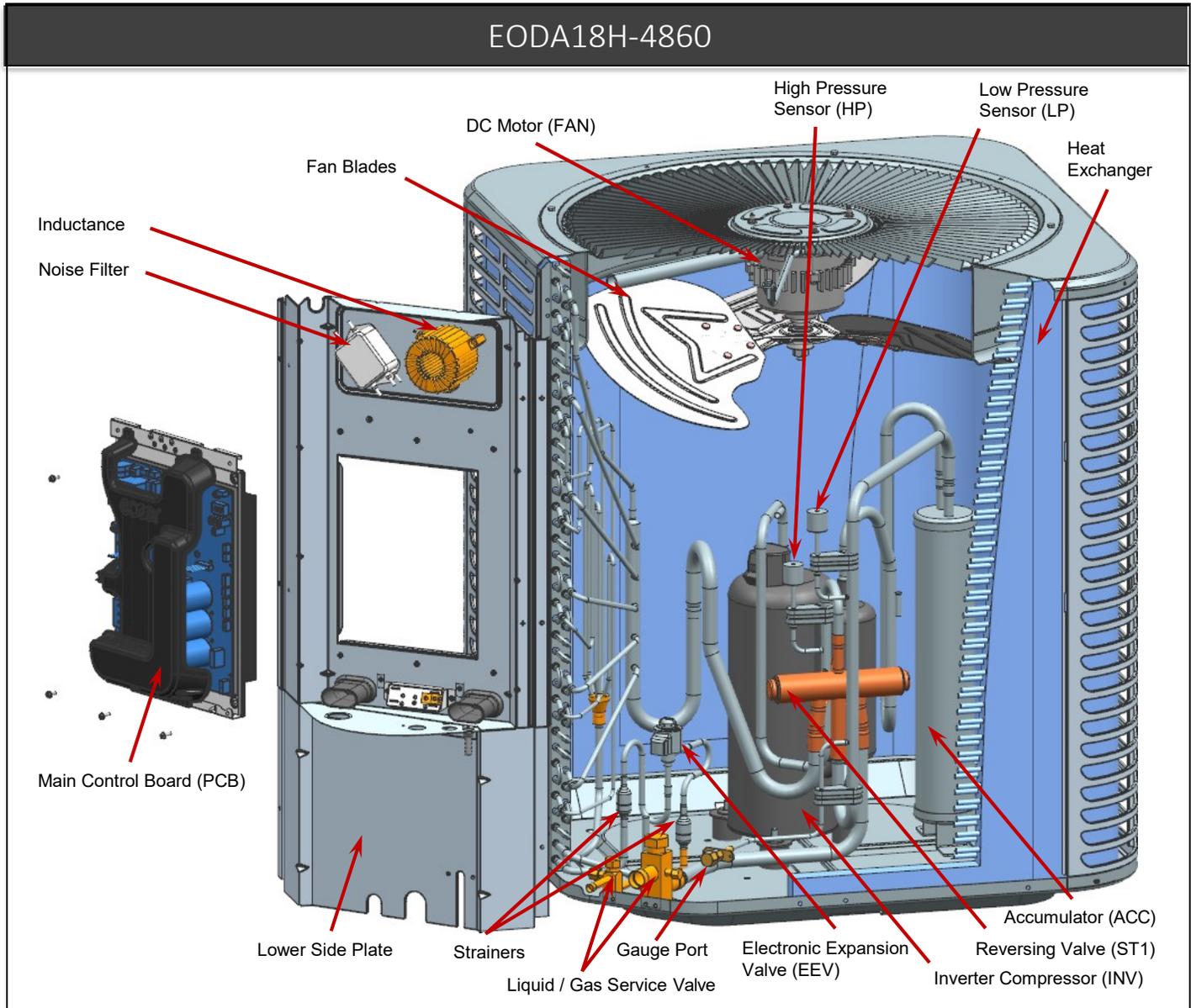
2 ESI (Ultra) Unitary System

2.1 Refrigerant Circuit

2.1.1 Functional Parts Layout of Condensing Units

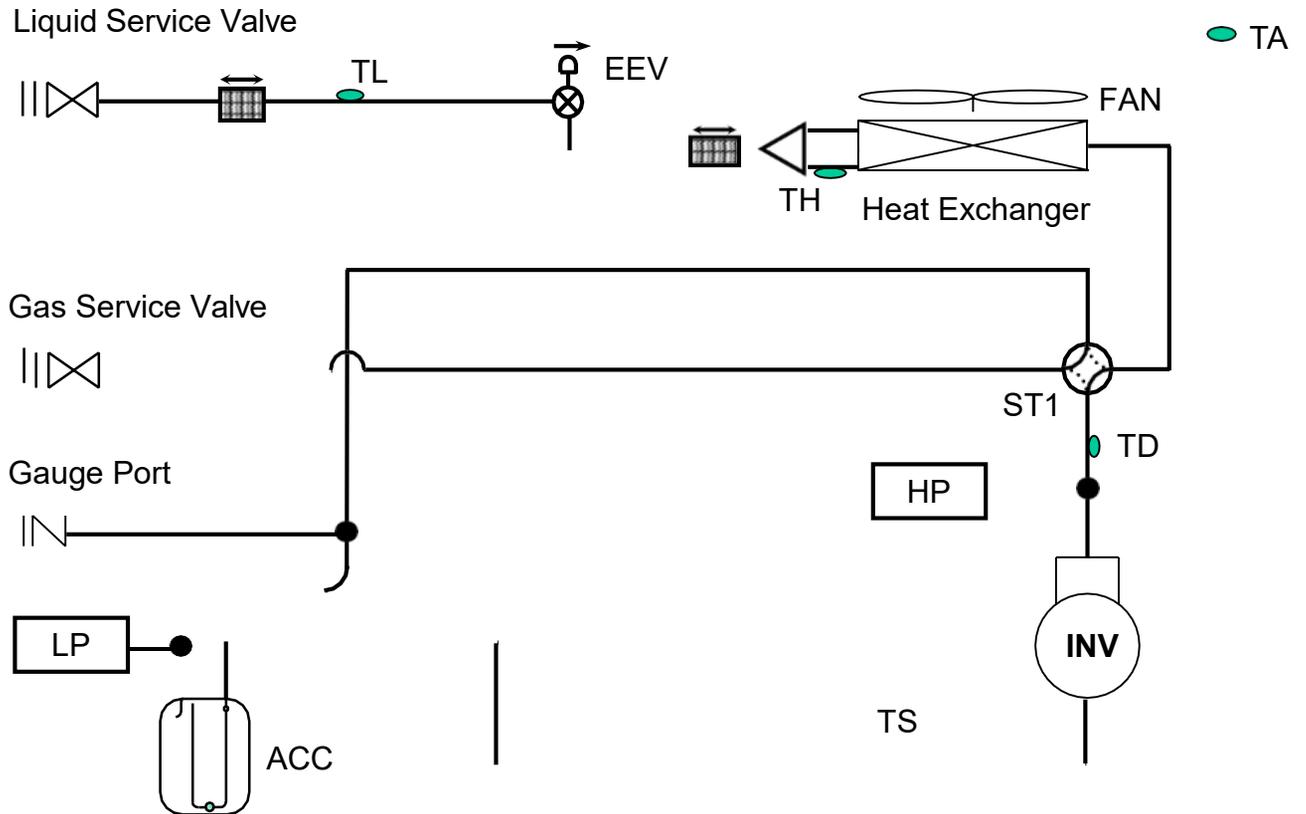


EODA18H-4860



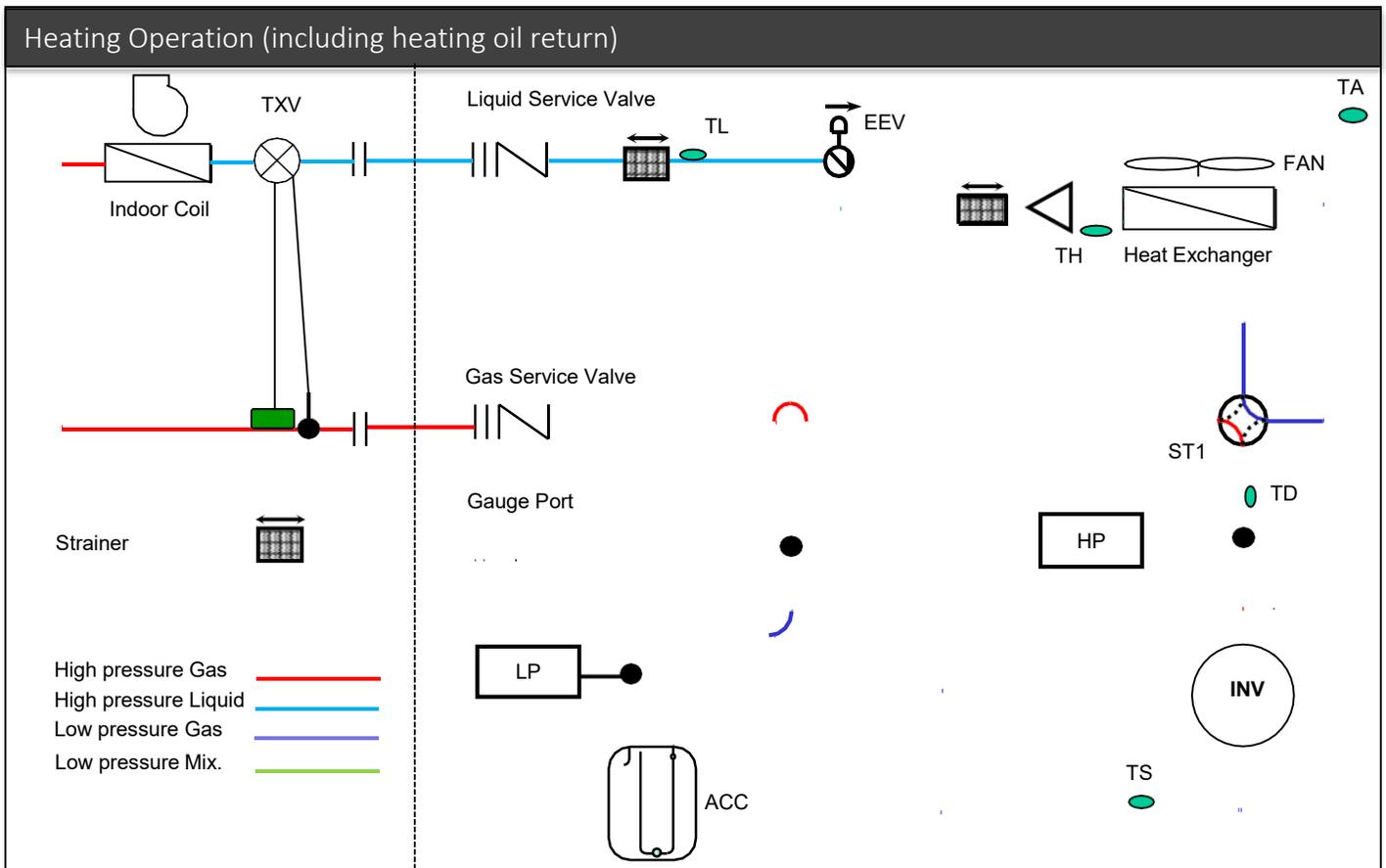
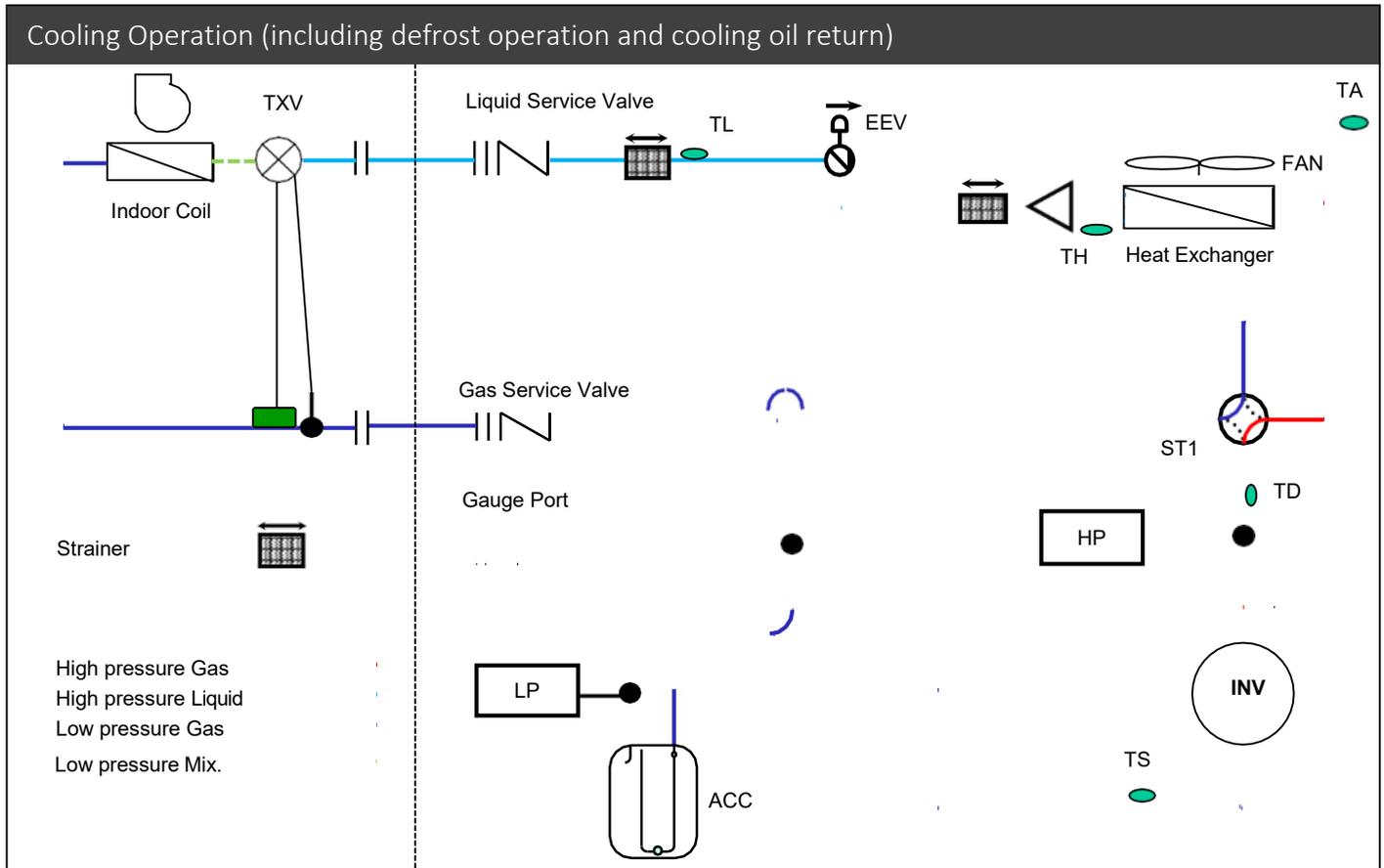
TIPS:
 Remove screws to take away the lower side plate to access TH / TL sensors.
 A slotted screwdriver may be required to open the plate from the condensing unit.

2.1.2 Major Components Functions and Refrigerant Circuits Diagram



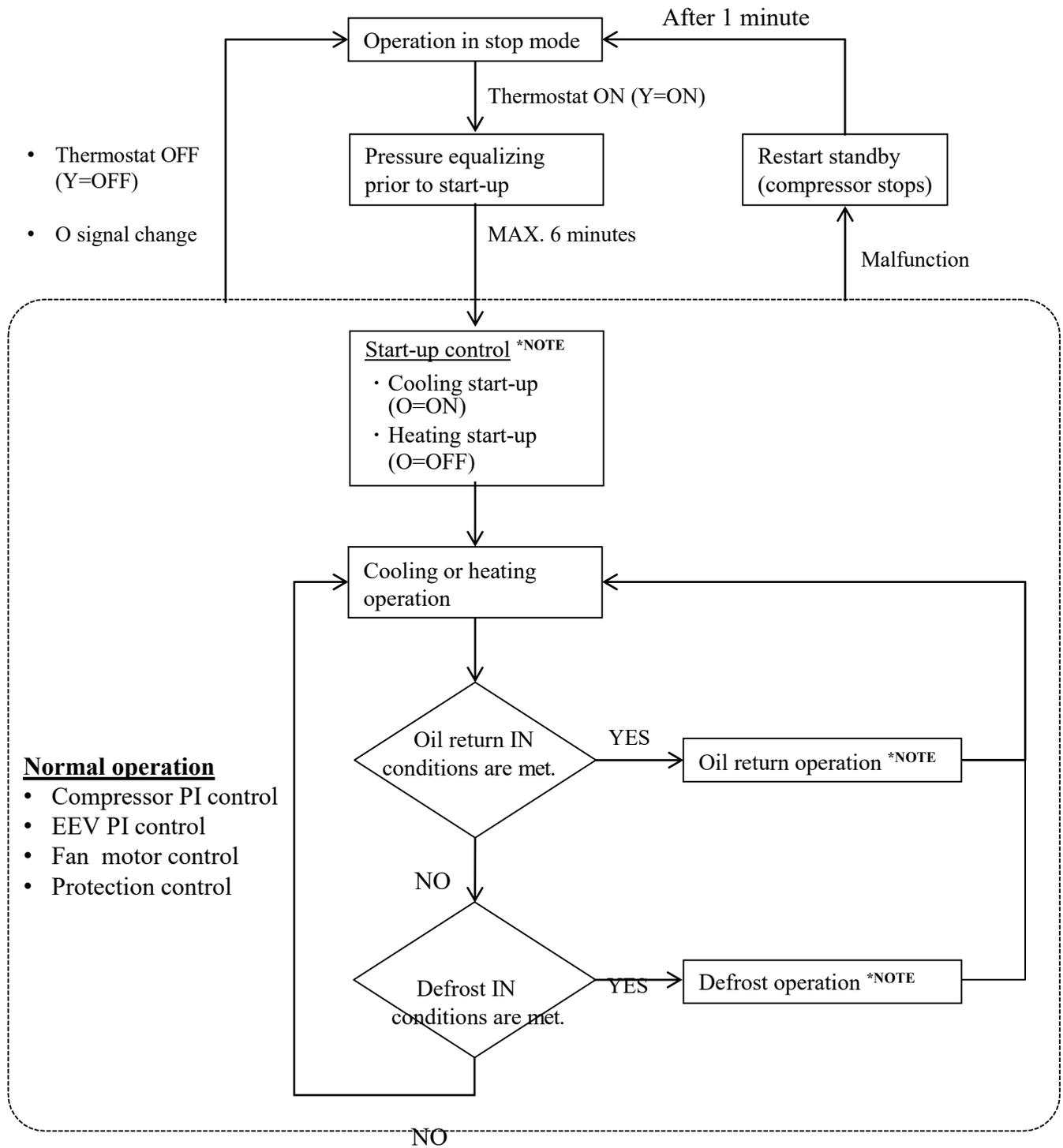
Name	Symbol	Function
Inverter compressor	INV	Adjusts refrigerant flow rate by changing the compressor speed (RPS) based on objective pressure.
DC motor	FAN	Outputs heat exchanger capacity by adjusting the motor rotation speed based on operating pressure.
Electronic expansion valve	EEV	1) Fully open during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



2.2 Function and Control

2.2.1 Operation Mode



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

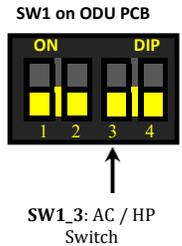
2.2.2 Basic control

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 Compressor PI control to maintain Tes*1	Apply Compressor 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	Energized (208/230Vac)
Y / O*2	Electronic expansion valve (EEV)	480pls	PI control to maintain discharge superheat (DSH)

Remarks:

- Tes: Target Te value (Varies depending on the load of space, mode choice, silent setting, etc.)
 Te: Low pressure equivalent saturation temperature (°F)
 Tcs: Target Tc value (Varies depending on the load of space, mode choice, silent setting, etc.)
 Tc: High pressure equivalent saturation temperature (°F)
- 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) 41°F < TA < 59°F, TH ≤ 30°F, Delta T = 18°F
 - b) 19°F ≤ TA ≤ 41°F, TH ≤ 30°F, Delta T = 12~18°F
 - c) TA < 19°F, TH < 9°F, accumulative compressor run time ≥ 80 minutes

TH backup running, TA < 59°F and LP ≤ 90psi, accumulative compressor run time ≥ 60 minutes
- II After “Minimum Run Time” (MRT) is achieved.
 - a) MRT is 3.5 hours when TA < 23°F
 - b) MRT is 2 hours when 23°F ≤ TA < 43°F
- III The high pressure drops below 245psi for 20 minutes when 14°F ≤ TA ≤ 28°F.
- 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°F for 60 seconds or the defrost time has exceeded 8 minutes. Defrost mode setting (n04) offers termination options for different geographical conditions.

- a) Defrost in heavy snow area will extend defrost for 60 seconds, but reduce the heating time to execute more defrost operations.
- b) Defrost in light snow area will reduce defrost for 30 seconds.

2.2.2.3 AUTO charge mode and pump down function

Actuator	AUTO charge mode OR Pump down in cooling	Pump down in heating
Compressor (INV)	2ton: 56rps →26rps 3ton: 66rps →36rps 4ton: 56rps →26rps 5ton: 66rps →36rps	2ton: 66rps →26rps 3ton: 80rps →36rps 4ton: 58rps →26rps 5ton: 70rps →36rps
Outdoor fan (FAN)	Cooling fan control	Heating fan control
Reversing valve (ST1)	De-energized	Energized (208/230Vac)
Electronic expansion valve (EEV)	480pls	PI control to maintain DSH

AUTO charge mode locks the compressor speed in cooling. The LED will display the refrigerant coefficient if both the liquid line sub-cooling (SC) and compressor suction superheat (SH) of ESI system are proper. To keep the best Ecoer Smart Inverter (ESI) systems' performance and reliability, the following requirements should be followed in cooling.



Target SC and SH in cooling

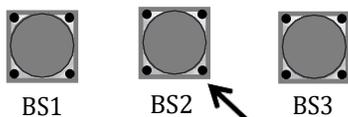
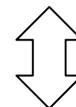


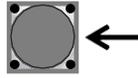
- If the LED displays "--" in AUTO charge mode for more than 20 minutes, stop charging and use a wrench to **clockwise** the TXV to ensure SH is no less than 7 ° F.
- In case that the cooling performance is terrible due to improper superheat (i.e. SH >20 ° F). Adjust the system according to
 1. Activate AUTO charge mode to fix compressor frequency(RPS) by press BS4 for 5 seconds on outdoor PCB. Run the system for 15~20 minutes and check refrigerant coefficient number from LED display or ESS Pro App, **add refrigerant until you get 0.6.**
 2. Open the front panel of the indoor unit, use a wrench to **counterclockwise the TXV until SH ≤ 20 ° F.** This will make more refrigerant flow into indoor coil for better cooling performance.

Pump down locks the compressor speed depending on the actual mode. On the thermostat, set **cooling** for refrigerant recovery to condenser **or heating** for refrigerant migration to indoor coil and line sets. Hold and press BS4 button for 5 seconds until you see blinking '7', press BS2 button in one minute to get '8'.



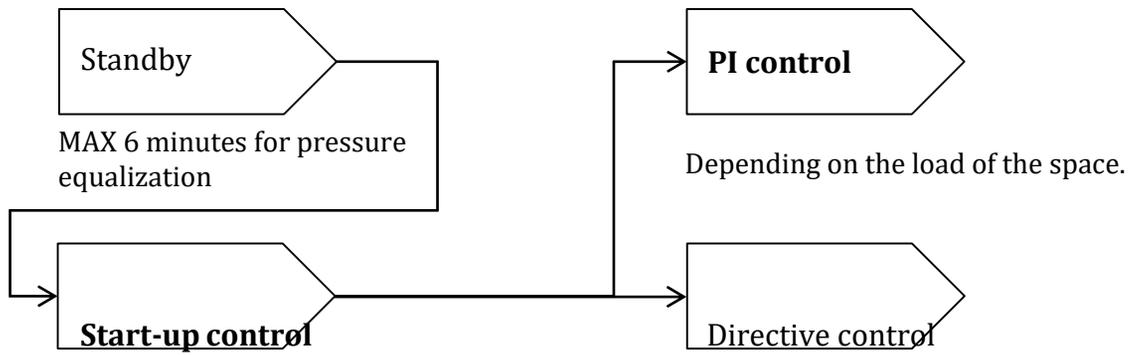
Once pump down is activated. The low pressure will be displayed on LED. ***NOTE** Low pressure protection is valid if LP <24.5psig.





BS4

2.2.2.4 Compressor control



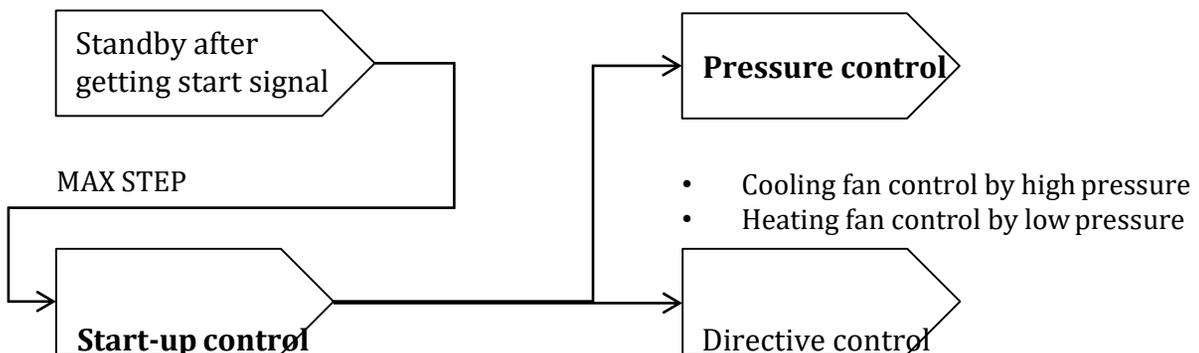
- Pressure differential control
- MAX time (cooling) ≤ 10 minutes
- MAX time (heating) ≤ 45 minutes

[Compressor RPS VS STEP]

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

Outdoor Capacity	2Ton	3Ton	4Ton	5Ton
Cooling Max RPS	70	80	66	76
Heating Max RPS	80	90	80	90

2.2.2.5 Fan control



[Fan RPM VS STEP]

STEP	RPM
0	0
1	350

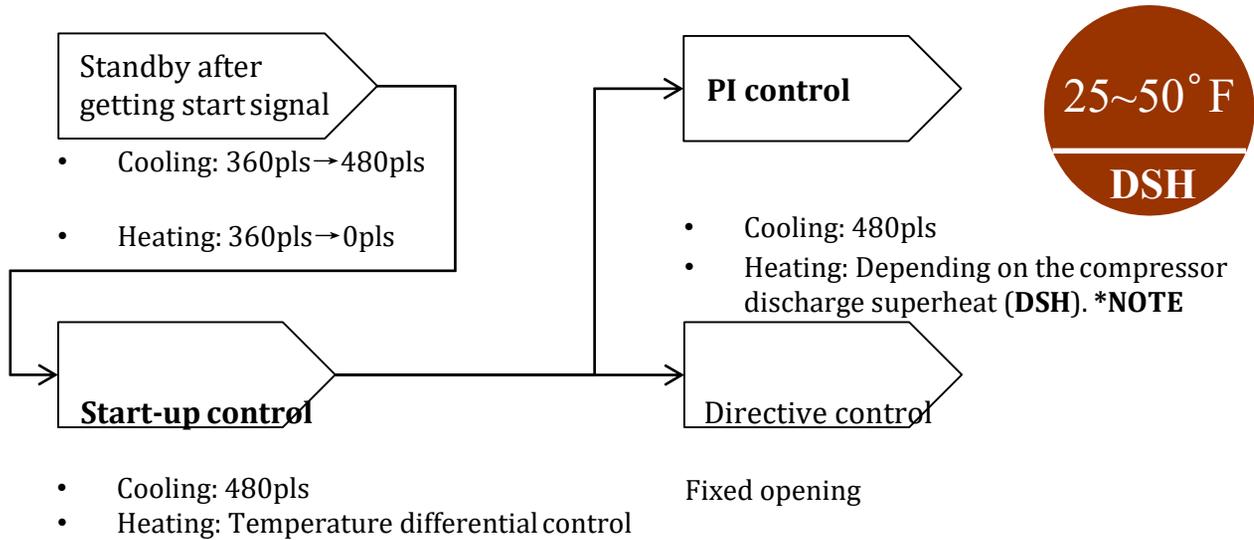
STEP	RPM
2	450
3	550

STEP	RPM
4	680
5	780

STEP	RPM
6	830
7	880

STEP	RPM
8	930
9	980

2.2.2.6 Electronic expansion valve (EEV) control



NOTE: Heating DSH should be between 25 ° F and 50 ° F with proper refrigerant level.

- **Overcharged:** DSH is smaller than 18 ° F when the EEV opening < 72pls.
- **Undercharged:** DSH is bigger than 50 ° F when the EEV opening ≥ 460pls

2.2.2.7 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 ~ 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

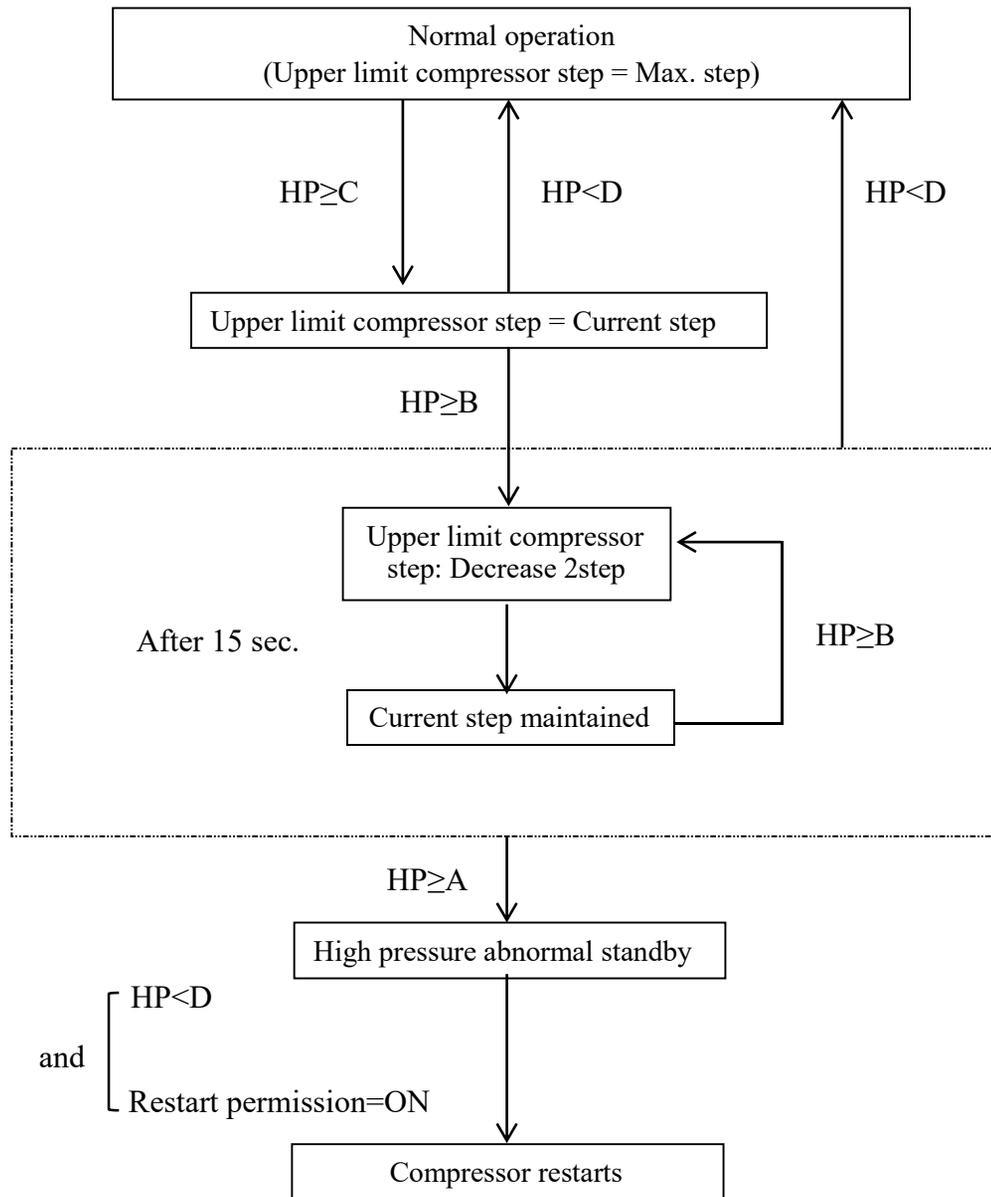
Max Fan Speed (RPM)			
Condenser Capacity	Standard Mode	Silent Mode (Level 1)	Super Silent Mode (Level 2)
2Ton	830	680	550
3Ton	930	Cooling: 830 Heating: 780	680
4Ton	880	830	780

5Ton	980	880	780
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2.2.3. Protection controls

2.2.3.1 High pressure protection control

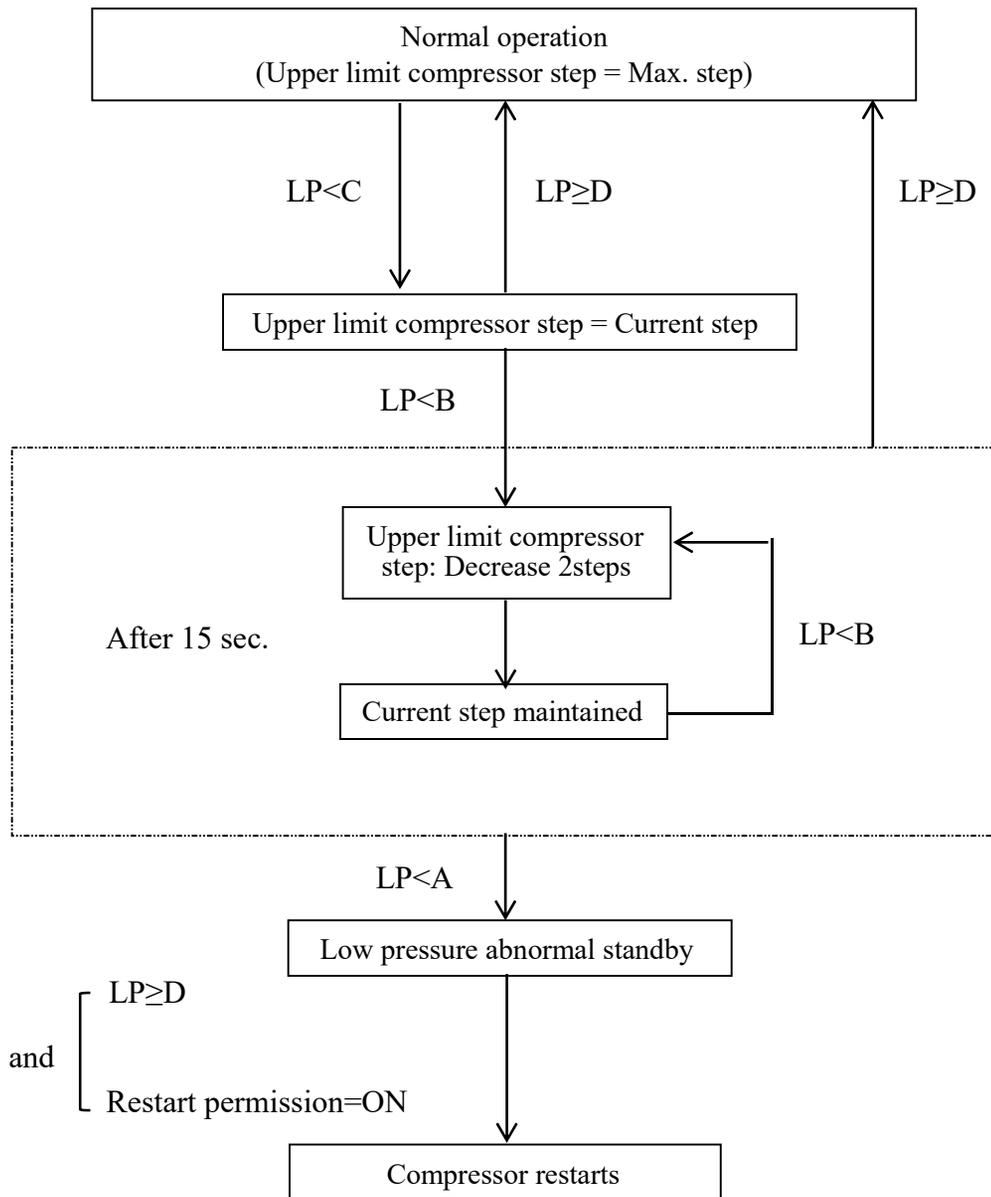
High pressure (HP) protection control is used to prevent extremely high pressures in the system and protect the compressor.



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

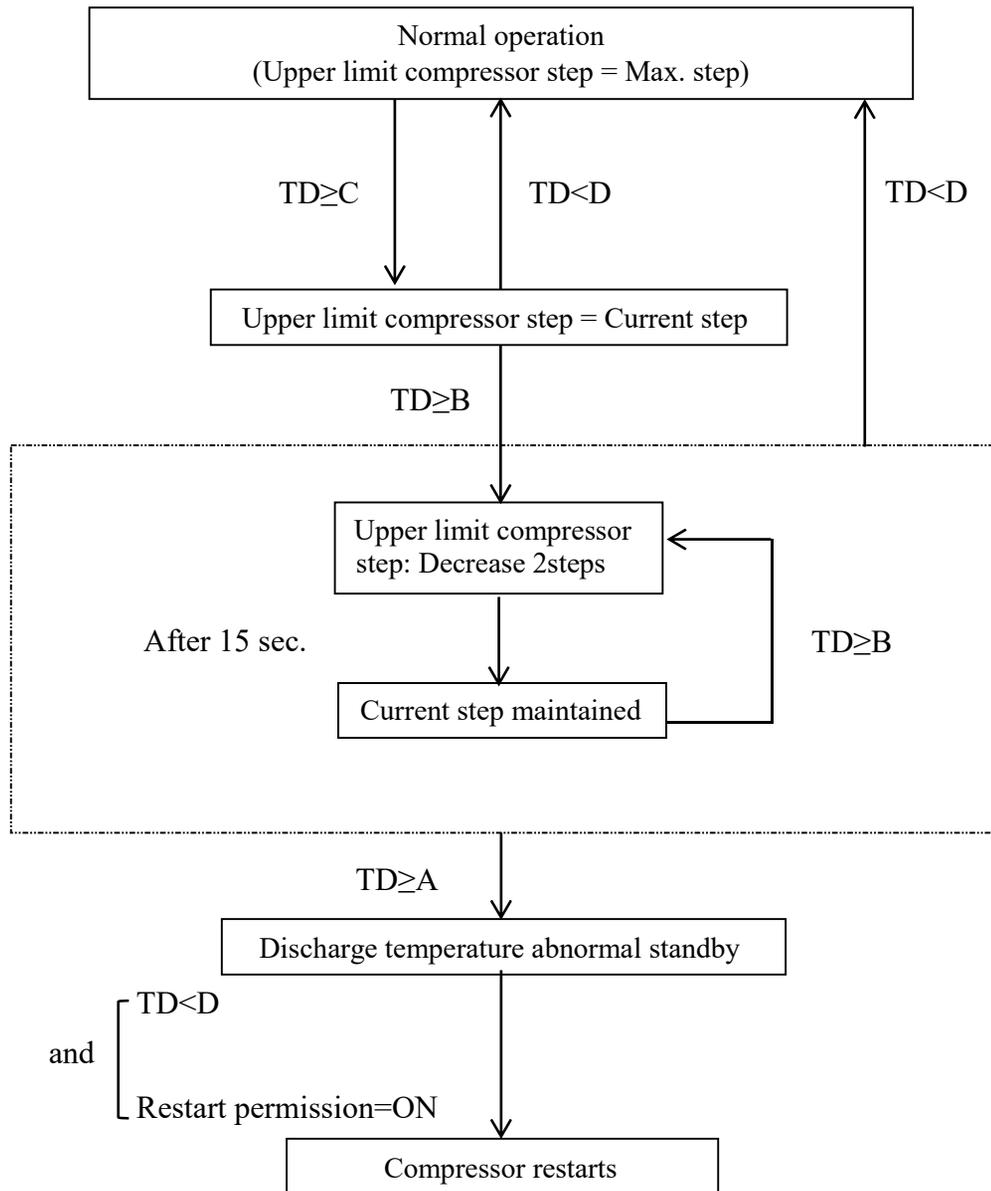
Low pressure (LP) protection control in cooling is used to protect compressor against the transient decrease of low pressure.



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

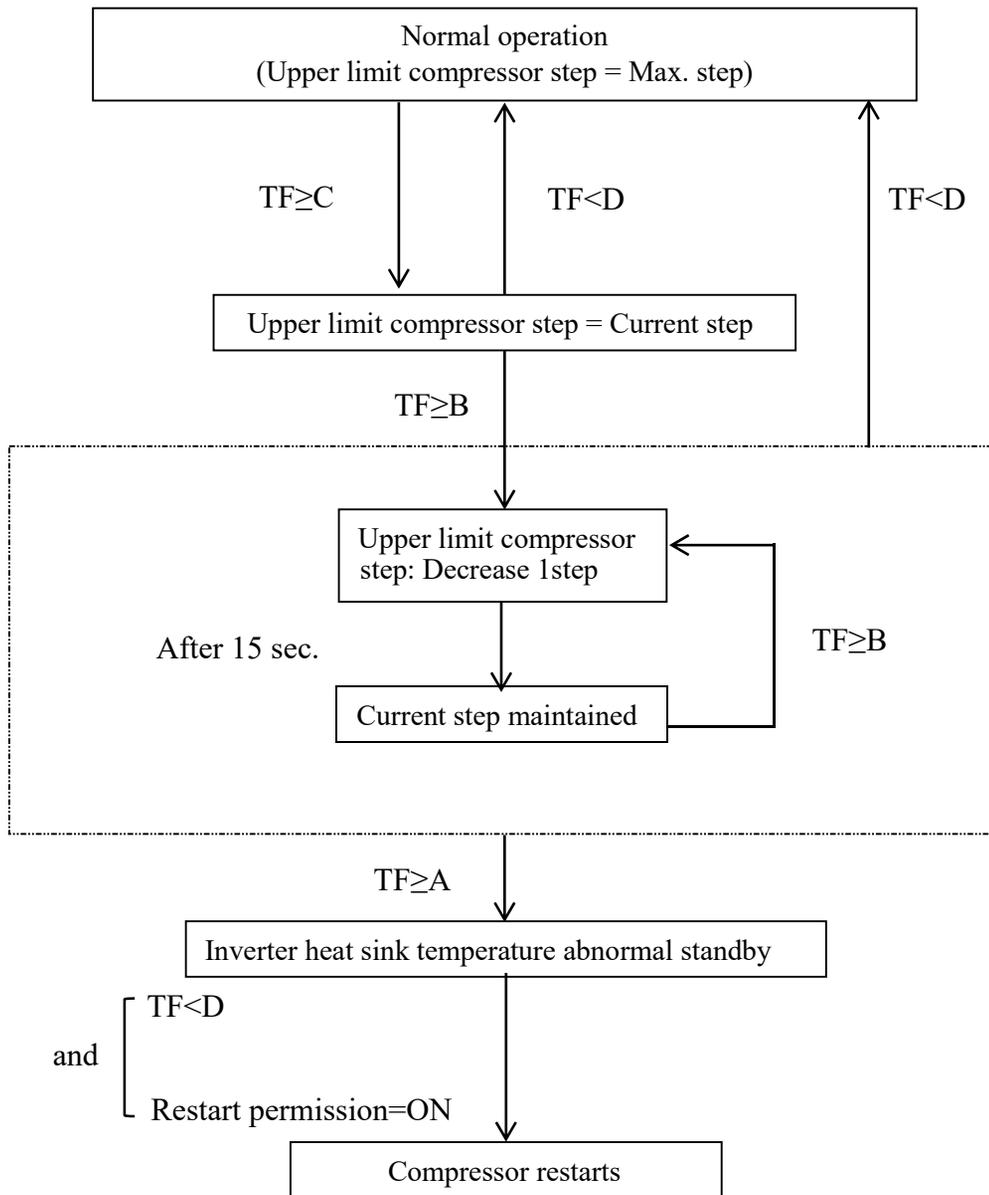
This discharge temperature (TD) protection control is used to protect the compressor internal temperature against a malfunction or transient increase of discharge pipe temperature.



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

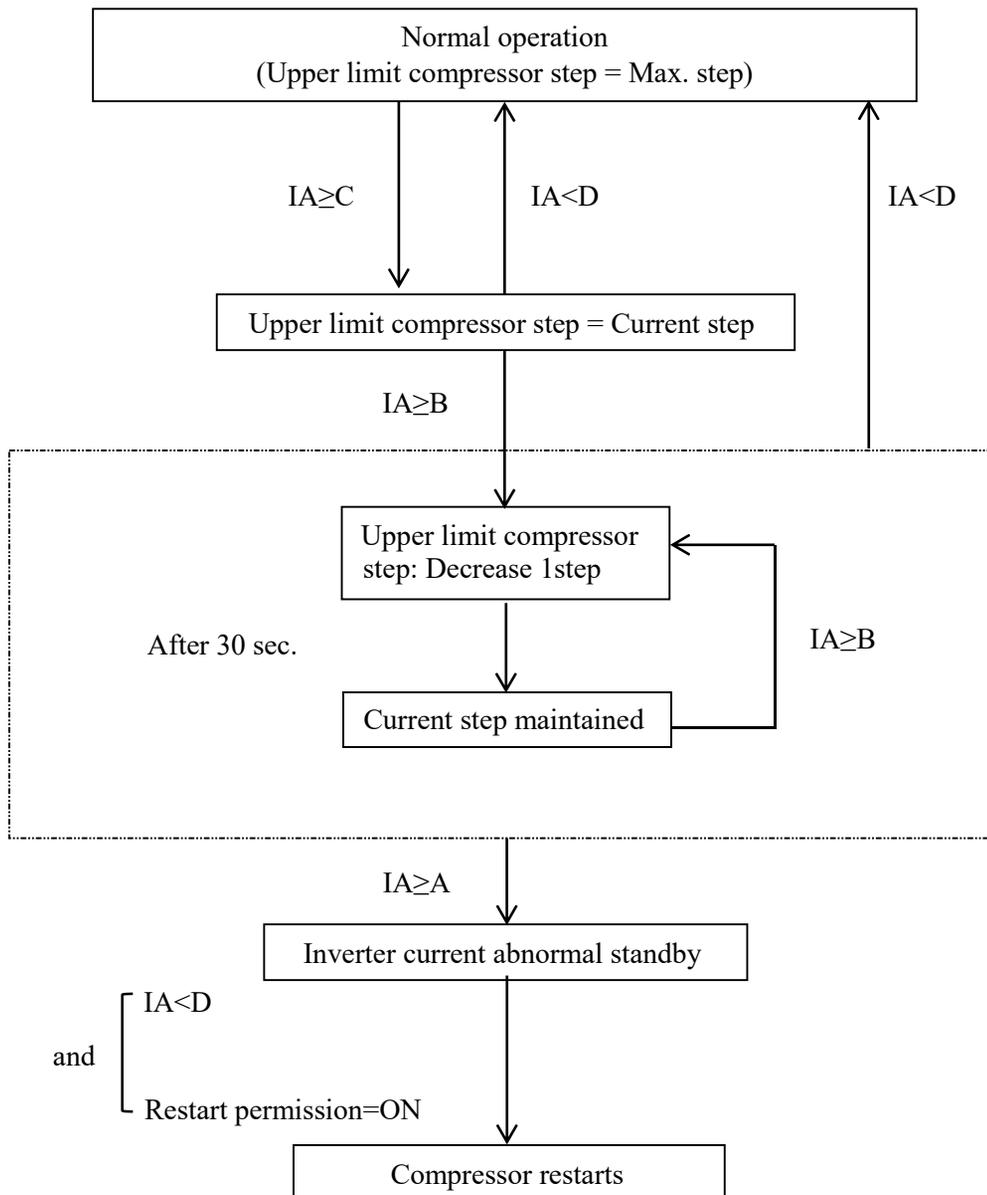
Inverter module temperature (TF) protection control is performed to prevent tripping due to an abnormal increase in temperature.



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

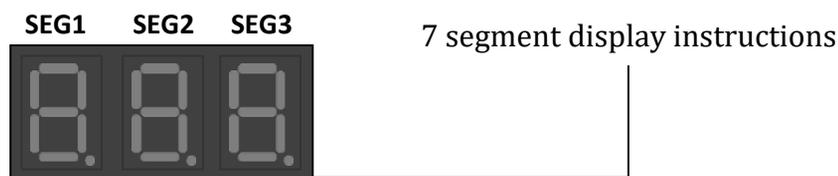


Symbol	EODA18H-2436		EODA18H-4860	
	Cooling	Heating	Cooling	Heating
A	16A	16A	20A	20A
B	9.2A	9.5A	12.1A	12.1A
C	8.6A	9.1A	11.7A	11.7A
D	8.0A	8.5A	11.2A	11.2A

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 “1~9” accordingly if there is damaged sensor and demand control requirement.

SEG1 Code	Description	Time
0	Software is updating through IoT device	About 5 min
1	High pressure sensor (HP) fault backup running	7 Days
2	Low pressure sensor (LP) fault backup running	7 Days
3	Compressor discharge temperature sensor (TD) fault backup running	7 Days
4	IPM module temperature sensor (TF) fault backup running	7 Days
5	Ambient temperature sensor (TA) fault backup running	120 Days
6	Defrost sensor (TH) fault backup running	90 Days
7	Compressor suction temperature sensor (TS) fault backup running	120 Days
8	Liquid line temperature sensor (TL) fault backup running	120 Days
9	IoT demand 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 without running signal (Y signal=OFF)
1	Ready to start-up after receiving running signal (Y signal=ON) *Note
2	Cooling mode
3	Heating mode
4	Oil return
5	Defrost
6	Manually defrost
7	AUTO charge mode in cooling
8	Pump down

Note: Compressor waits 3~6 minutes to restart.

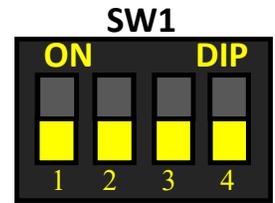
Modes list (SEG3 Display)

	SEG1	SEG2	SEG3
Stop or standby without running signal (Y=OFF)			
Wait to start-up after receiving running signal (Y=ON) (6 minutes for pressure equalization to restart)			
Cooling mode			
Heating mode			
Oil return			
Defrost			
Manually defrost			
AUTO charge mode in cooling			
Pump down			

2.3.2 Setting by dip switches

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

SW1 dip switch		Description	
NO.	Setting item	Status	Content
1	Reserved	-	-
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	Demand response to IoT	ON	No
		OFF (factory)	Yes

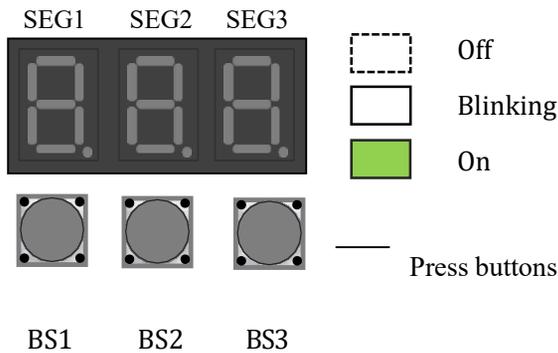


Use minor straight screwdriver to dip switch. **Power off the unit for at least two minute to activate the change.**

* Keep OFF (factory) when EODA18H-4860 matches with 2 or 3 Ton indoor unit for hyper heating.

2.3.3 Setting by pressing buttons

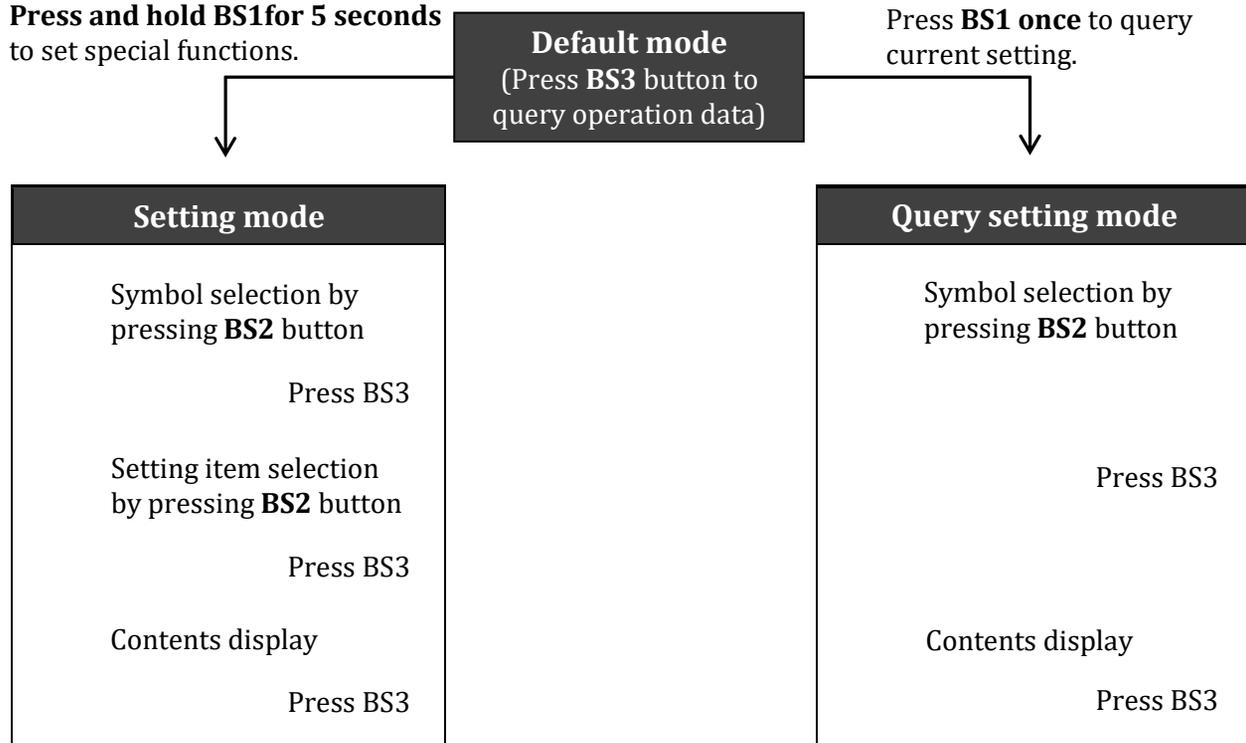
Query and setting operation can be done by pressing buttons on main control board.



- BS1:** Menu or back button
- BS2:** UP button
- BS3:** Spot check and confirm button

Remarks: Press or tip any directions are valid.

Press and hold BS1 for 5 seconds to set special functions.



Press **BS1** once

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:



No.	Number content	Example	Description
Default	Refer to default display instructions	902	9: Demand 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°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	0	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 *
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

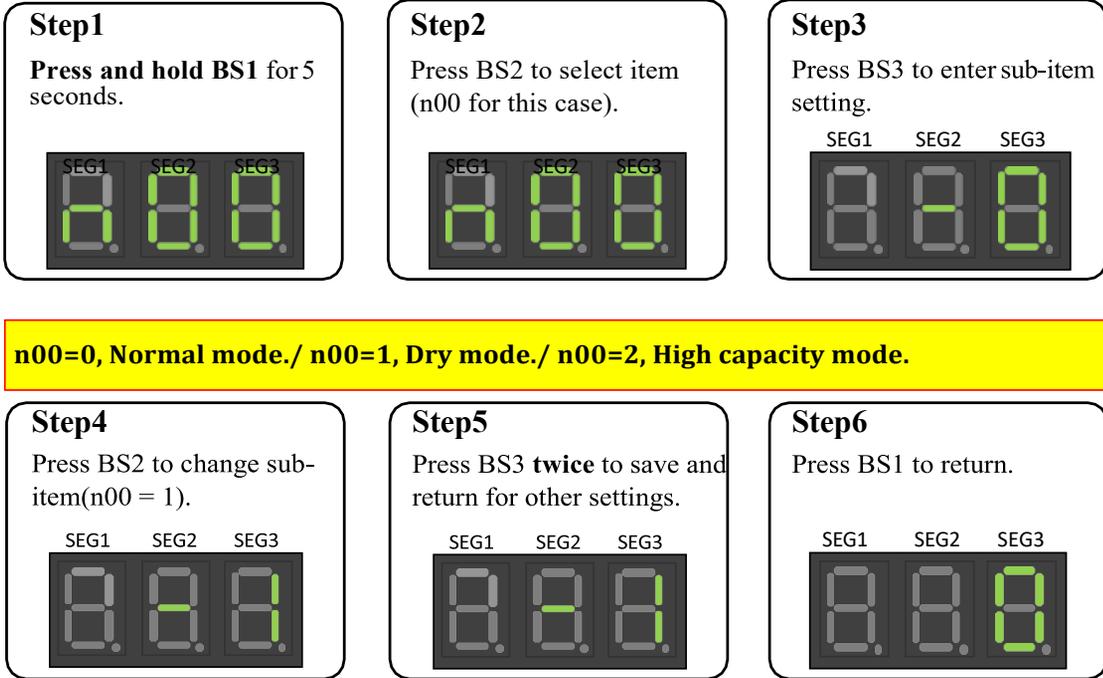
Press and hold **BS1** button for 5 seconds to enter the parameter setting interface. The latest setting will be taken as the final one. Refer to page 22-23 for some settings example.

Symbol	Function	Item	Description
n00	Mode choice	0(factory)	Normal mode
		1	Dry mode *1
		2	High capacity mode *2
n01	Forced heating stop when ambient temperature is lower than specified value. Changing to heat by boiler or gas furnace in cold winter.	0	Stop heat pump when TA<-22°F
		1(factory)	Stop heat pump when TA<-3°F
		2	Stop heat pump when TA< 5F 15°F *3
		3	Stop heat pump when TA< 10F 30°F *3
		4	Stop heat pump when TA< 15F 40°F *3
n02	Outdoor unit outputs 24VAC from W terminal (CN5) at defrost operation or forced heating stop.	0(factory)	ON (24VAC output)
		1	OFF (No 24VAC output)
n03	Outdoor unit outputs 24VAC from W terminal (CN5) when ambient temperature is lower than specified value to start indoor auxiliary heat.	0(factory)	TA<15°F (24VAC output)
		1	TA< 10F 30°F (24VAC output) *3
		2	TA< 5F 40°F (24VAC output) *3
		3	TA<-3°F (24VAC output)
		4	OFF (No 24VAC output)
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 lower down to 28°F.
2. The evaporating temperature of indoor coil can lower down to 28°F in cooling mode, and the condensing temperature can go up to 122°F in heating mode.
3. Contact Ecoer Service Team to update software online if the units produced before April, 2019.
4. Reduce 10% heating time for heavy snow area, increase 10% heating time for light snow area.
5. System enters defrost after the heating start-up and an extra five minutes' control.

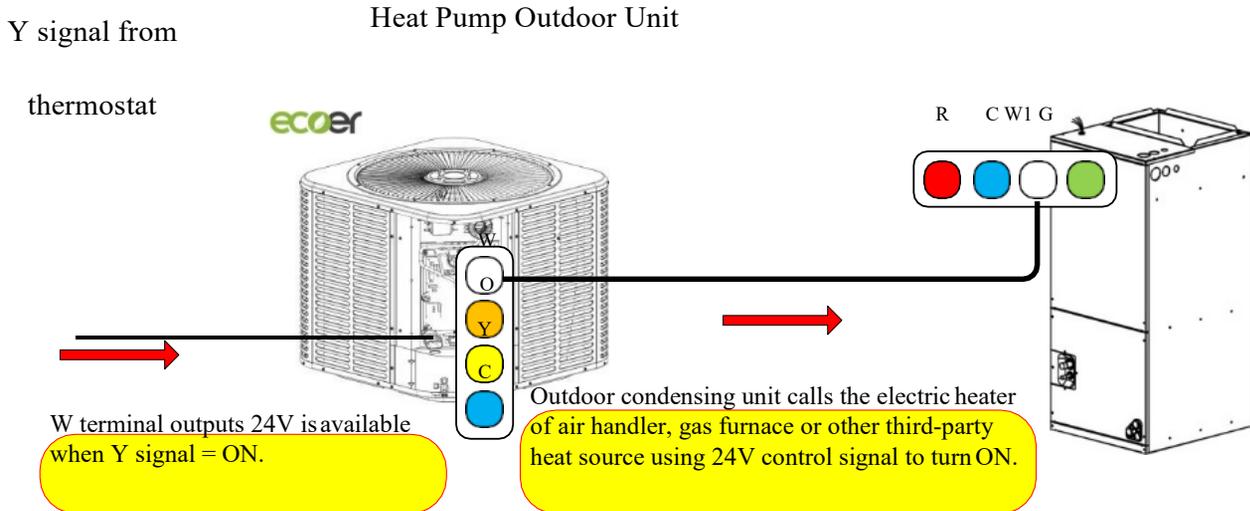
Example for mode choice (n00) setting



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

Example for n02 & n03 (Dual-heating) setting

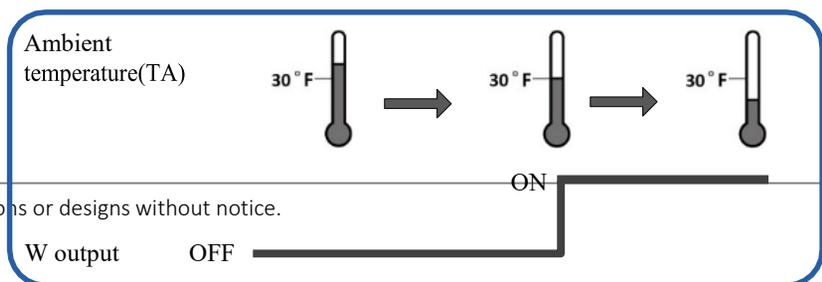
Air Handler with Electric Heater



n02 Outdoor unit W terminal outputs 24VAC at defrost operation or forced heating stop(n01).
0 (factory): ON (24V output)
 1: OFF (No 24V output)

n03 Outdoor unit W terminal outputs 24VAC once ambient temperature is lower than specific value for auxiliary heating resource to start. **(Only available when n02 = 0 and Y signal = ON).**
 0(factory): TA<15 F (°24V output)
 1: TA<30 F (°24V output)
 2: TA<40 F (°24V output)
 3: TA<-3 F (°24V output)
 4: OFF (No 24V output)

Example:
Y signal = ON



n**02 = 0, n03 = 1**

Outdoor unit W terminal outputs 24VAC
when TA < 30 F. °

Illustration for n05 ~ 07 setting

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 (Factory): none silent mode
 1: Silent mode (level 1)
 2: Super silent mode (level 2)

3: Night silent mode (level 1)
 4: Super night silent mode (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 = / n07 = /

0:00 24:00
 Normal mode

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

0:00 24:00
 Silent mode (level 1)

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

0:00 24:00
 Super silent mode (level 2)

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

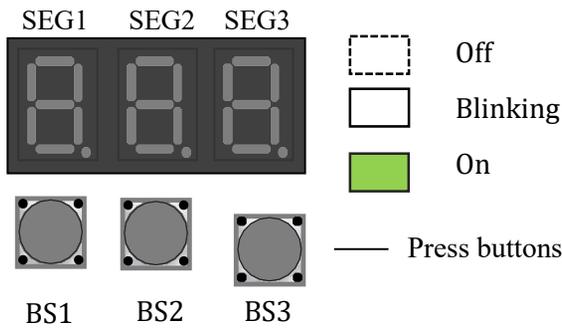
0:00 24:00
 Normal mode Silent mode (level 1) Normal mode

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

0:00 24:00
 Normal mode Super silent mode (level 2) Normal mode

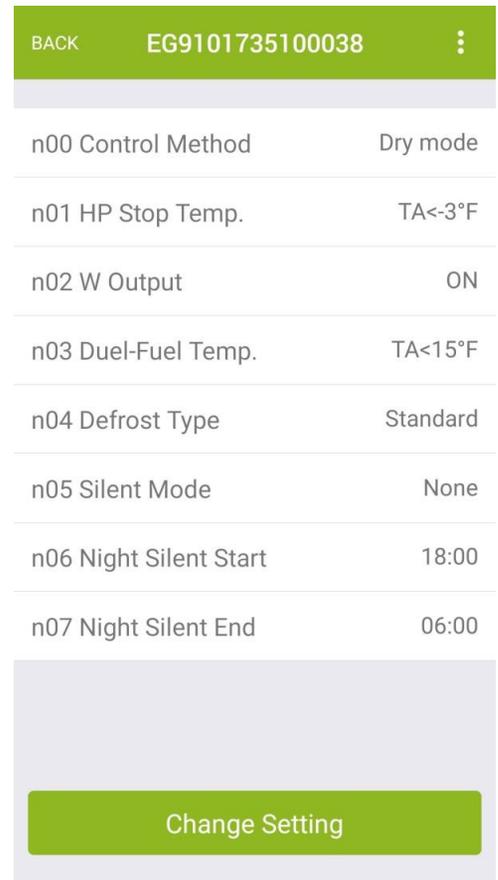
Query Setting mode

Press **BS1** button once to query the current special setting, or check it on 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 interface
for other setting check.

SEG1 SEG2 SEG3

Press BS1 to return.

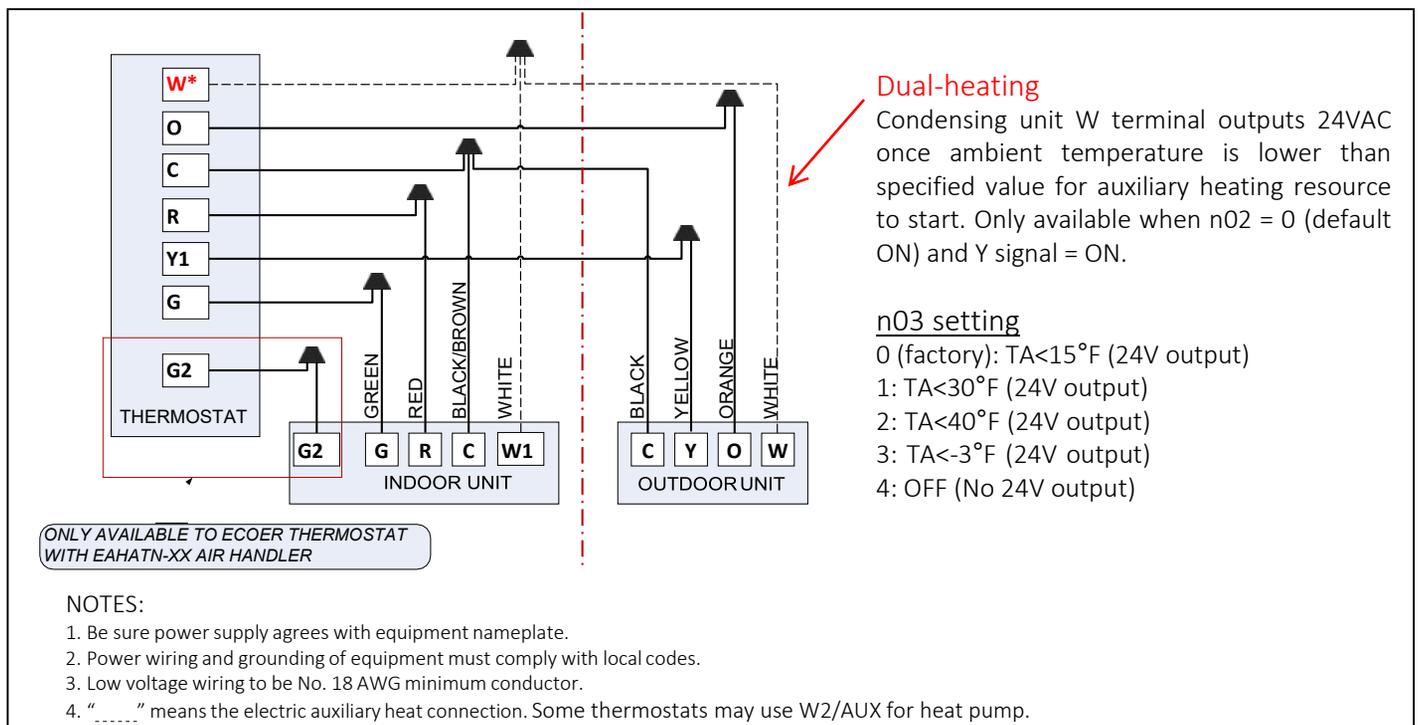
SEG1 SEG2 SEG3

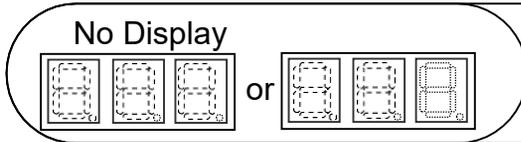
3. Troubleshooting

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	<ul style="list-style-type: none"> See the following page 	<ul style="list-style-type: none"> See the following page
System does not start-up but the digital tube shows normally	<ul style="list-style-type: none"> No 24 Vac signal from thermostat. Incompatible thermostat. 	<ul style="list-style-type: none"> Be sure Y/O/C wirings are connected correctly (See page 27~34) and the setting temperature is proper. Use other traditional 24Vac thermostats.
System operates mode reversely	<ul style="list-style-type: none"> Incorrect O/B signal selection. 	<ul style="list-style-type: none"> Choose O for cooling from thermostat.
System cannot cool well	<ul style="list-style-type: none"> Outside temperature is too high. Outside temperature is too low. Dirty air filter or blocked outlet of indoor unit. Too little refrigerant in the system. Refrigerant has been blocked in the condenser coil. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Install auxiliary heat for backup*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.





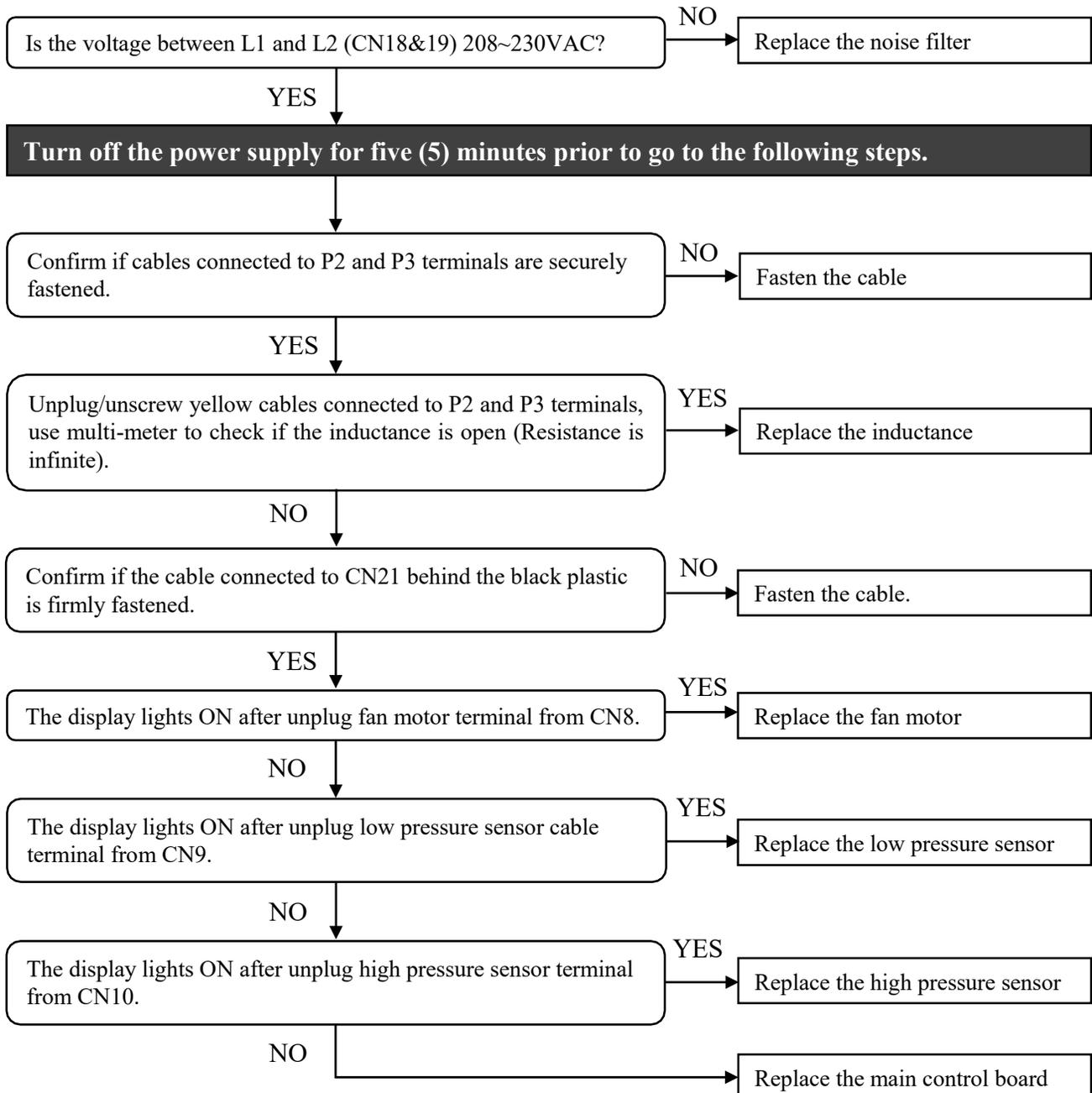
The unit energized but the digital tube shows nothing

1. Error definition:

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

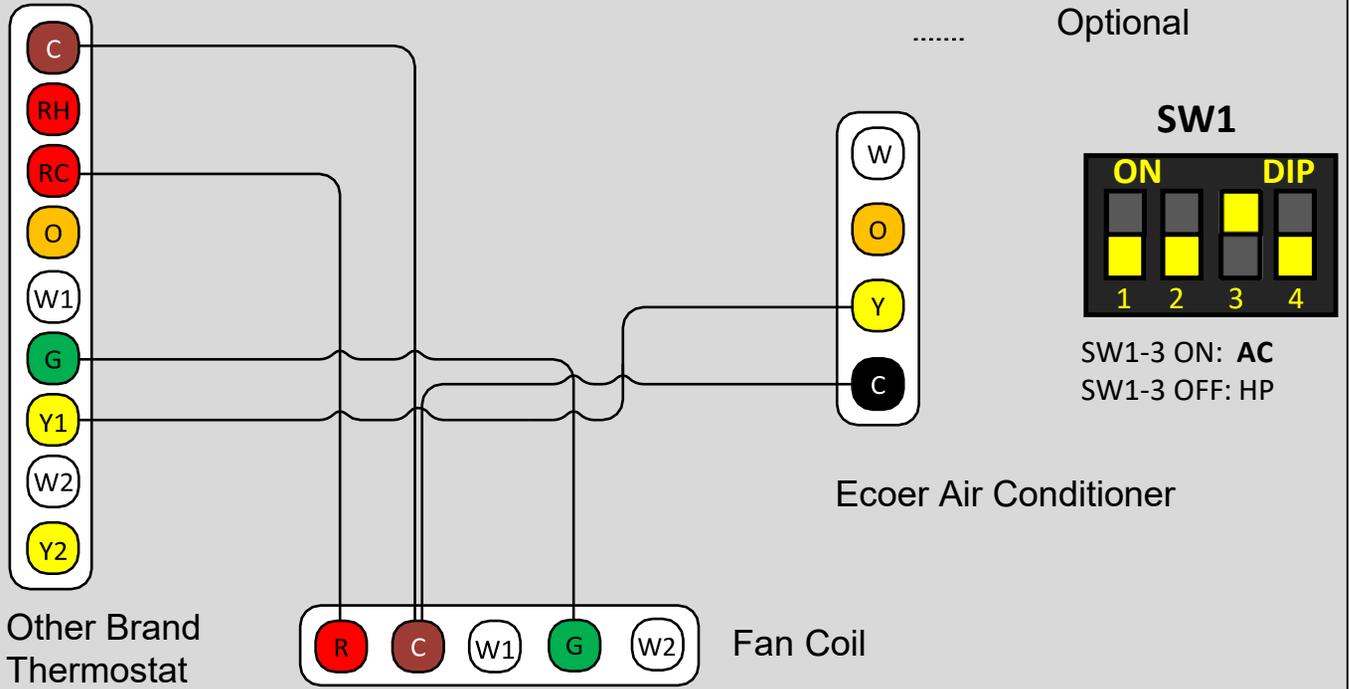
2. Possible causes:

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



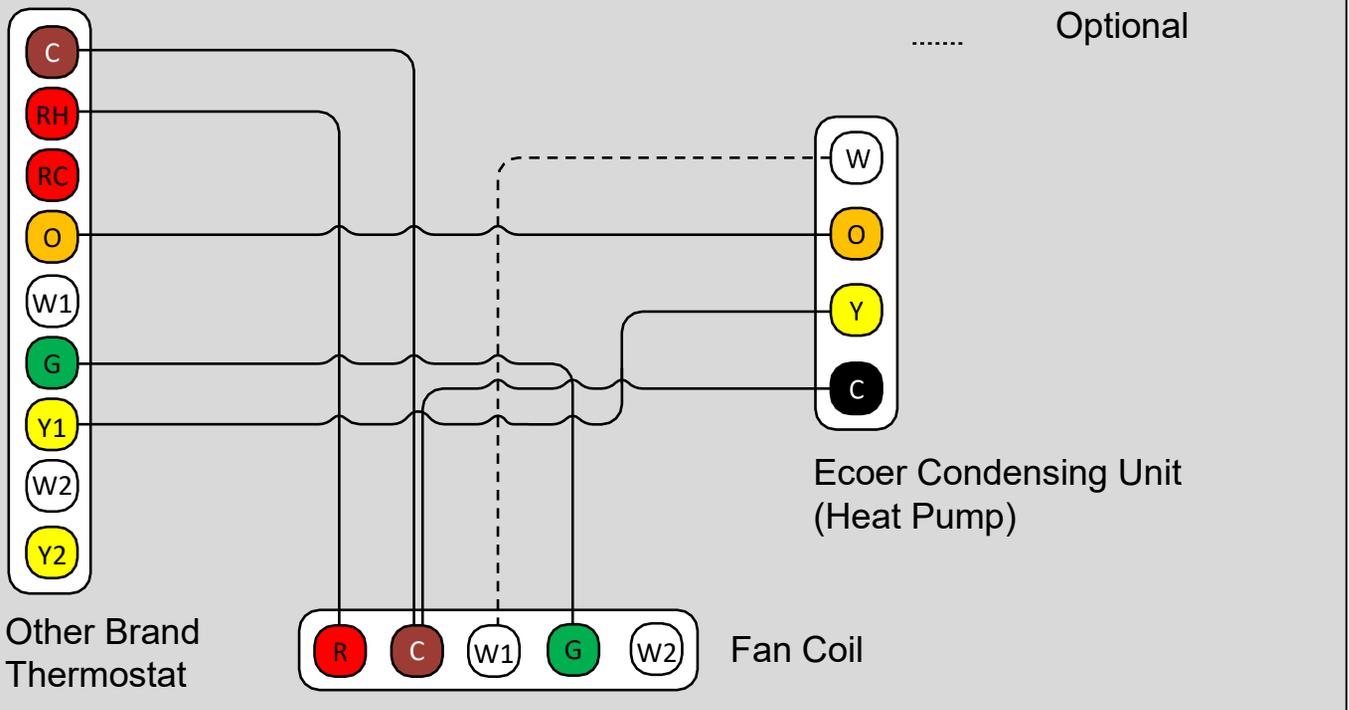
Other Brand Thermostat

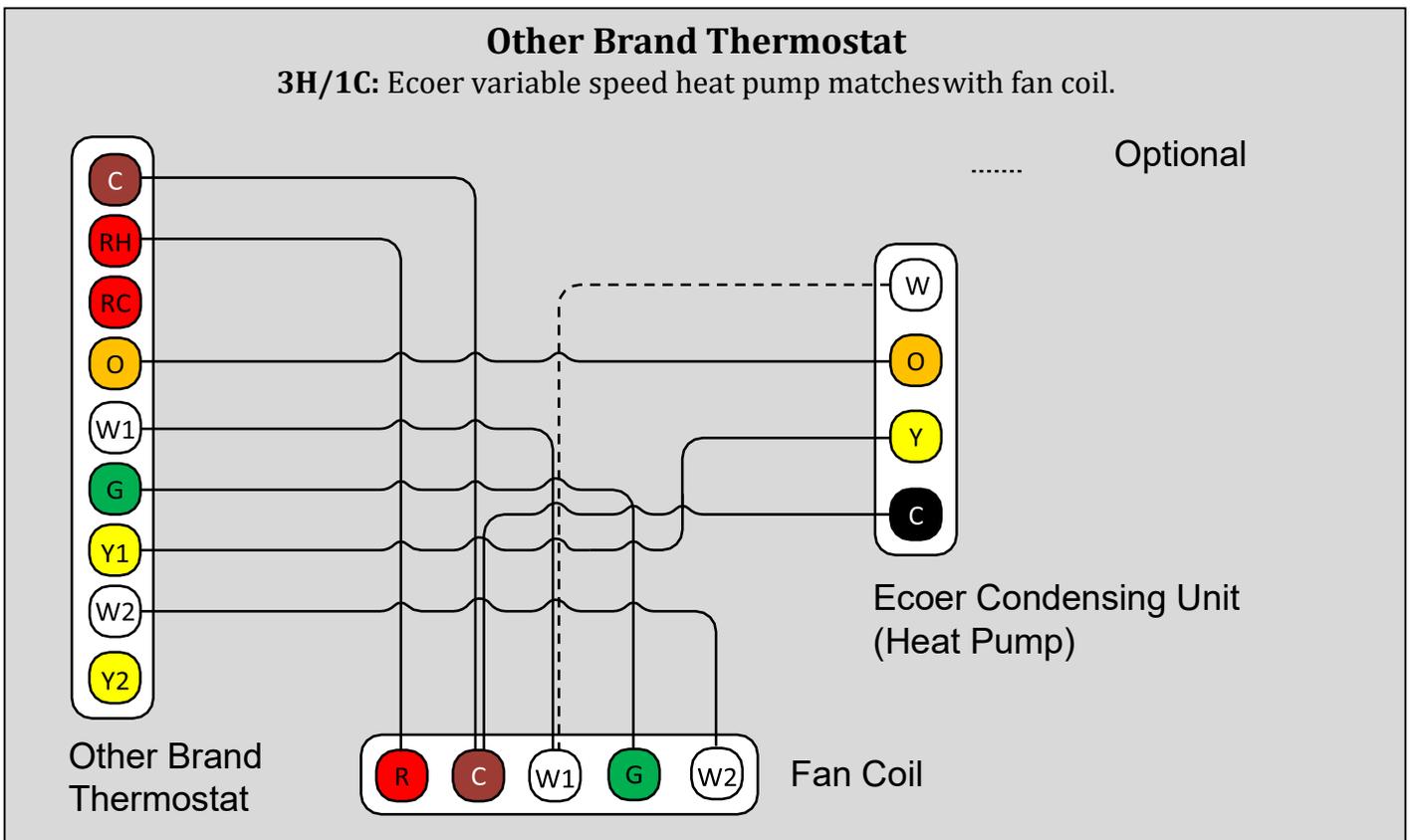
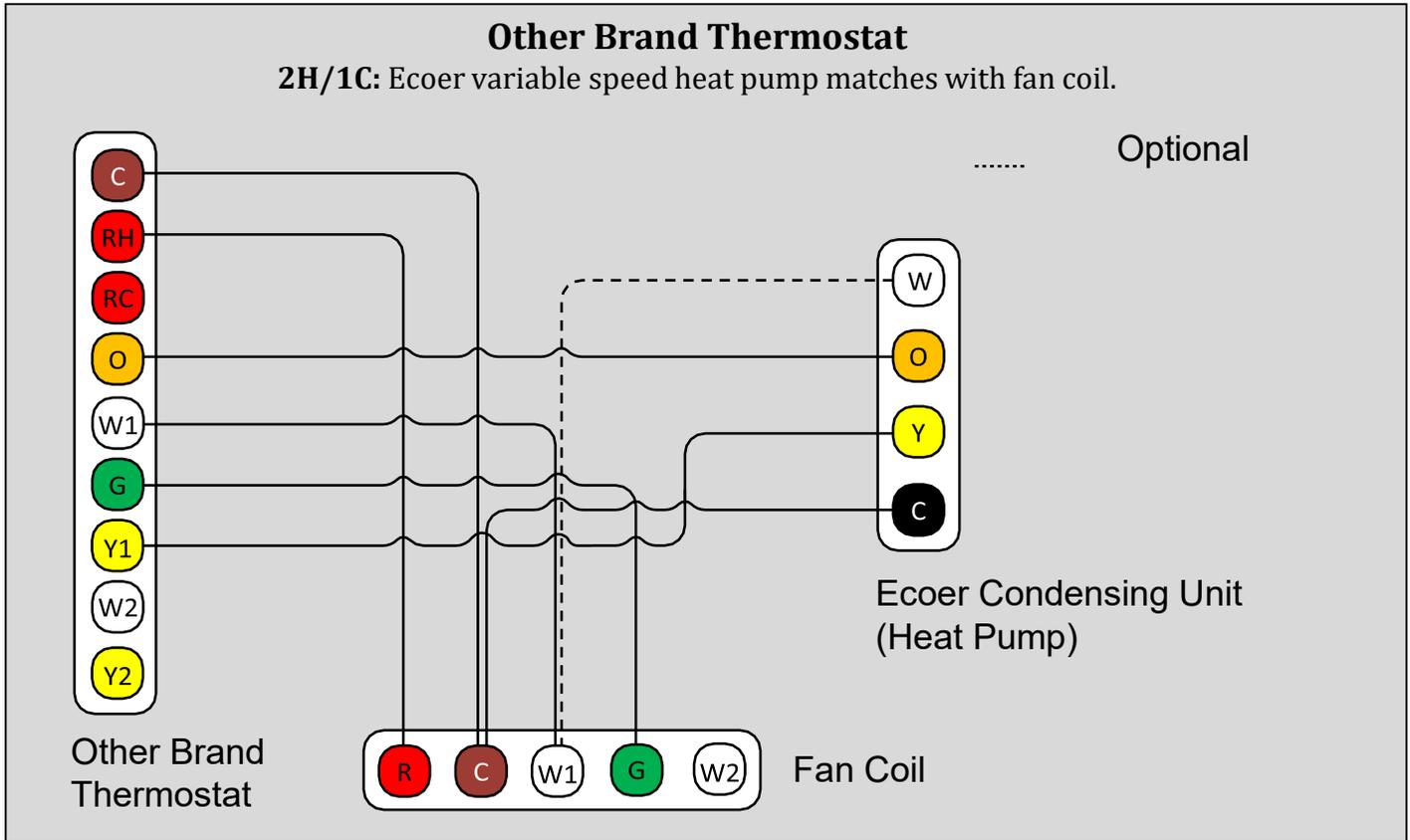
Cool Only: Ecoer variable speed air conditioner (Dip ODU SW1-3 to ON) matches with fan coil.



Other Brand Thermostat

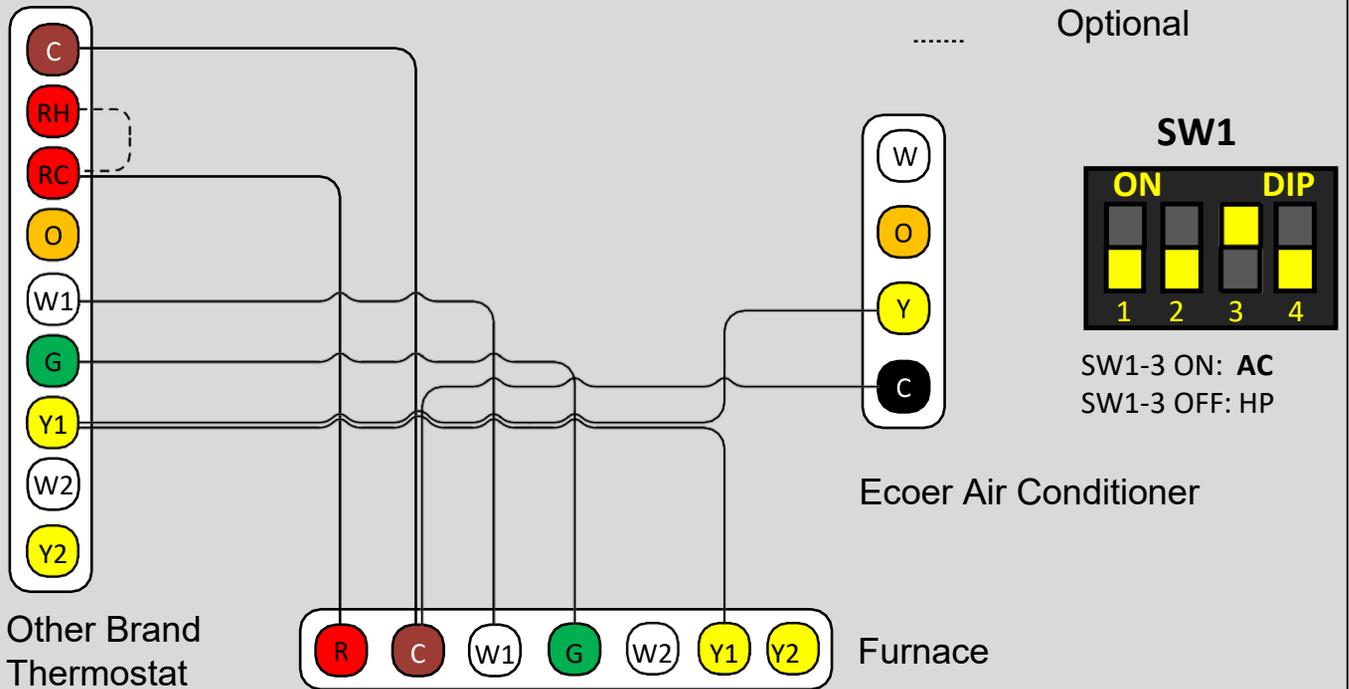
1H/1C: Ecoer variable speed heat pump matches with fan coil.





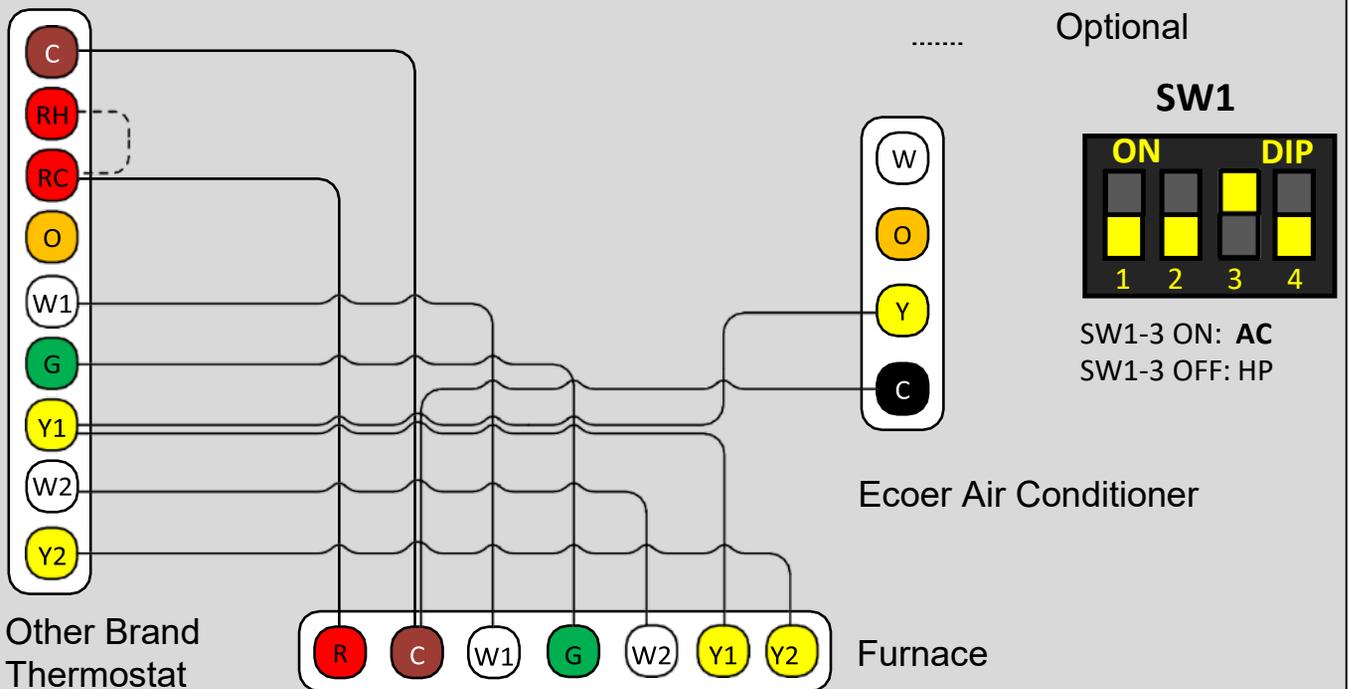
Other Brand Thermostat

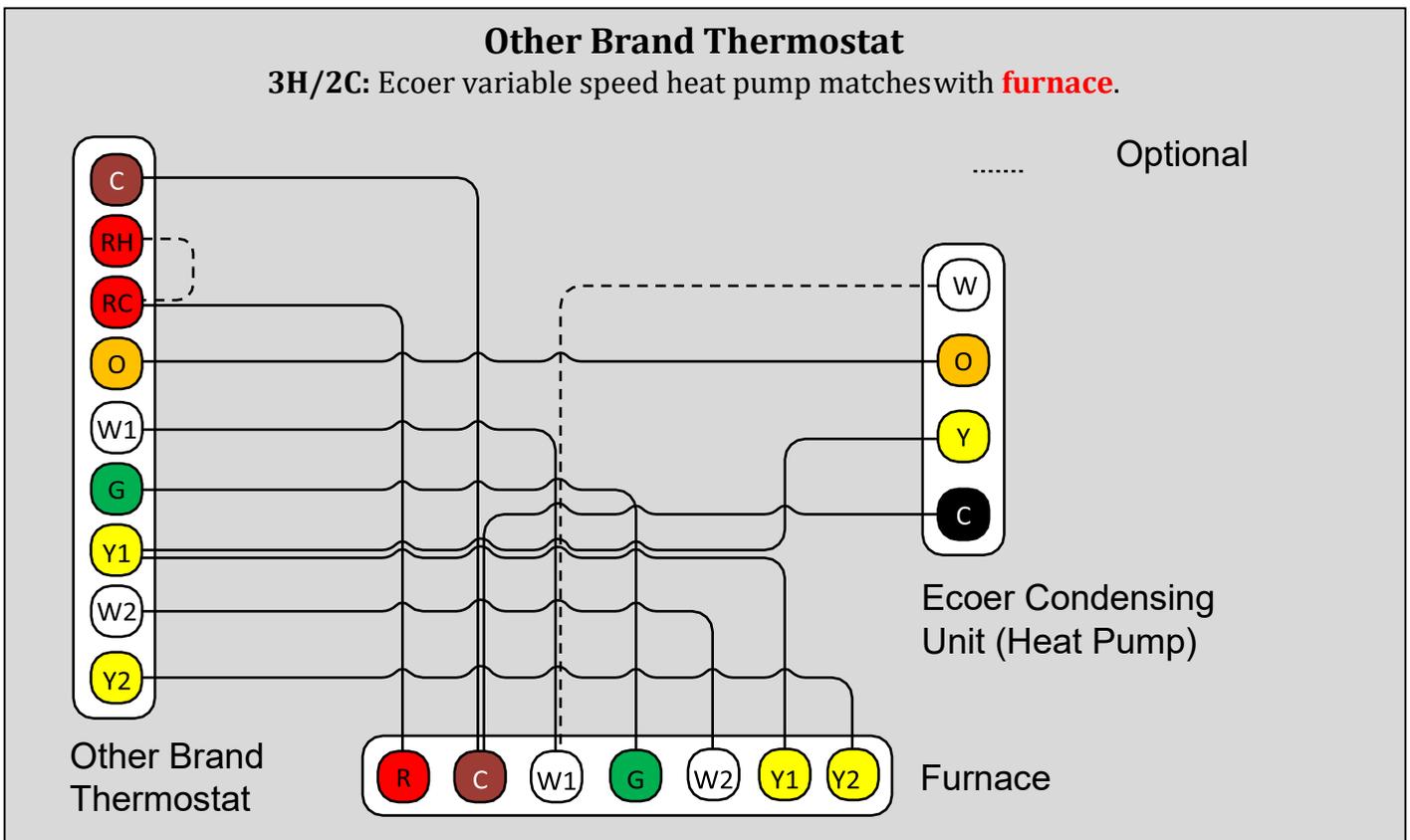
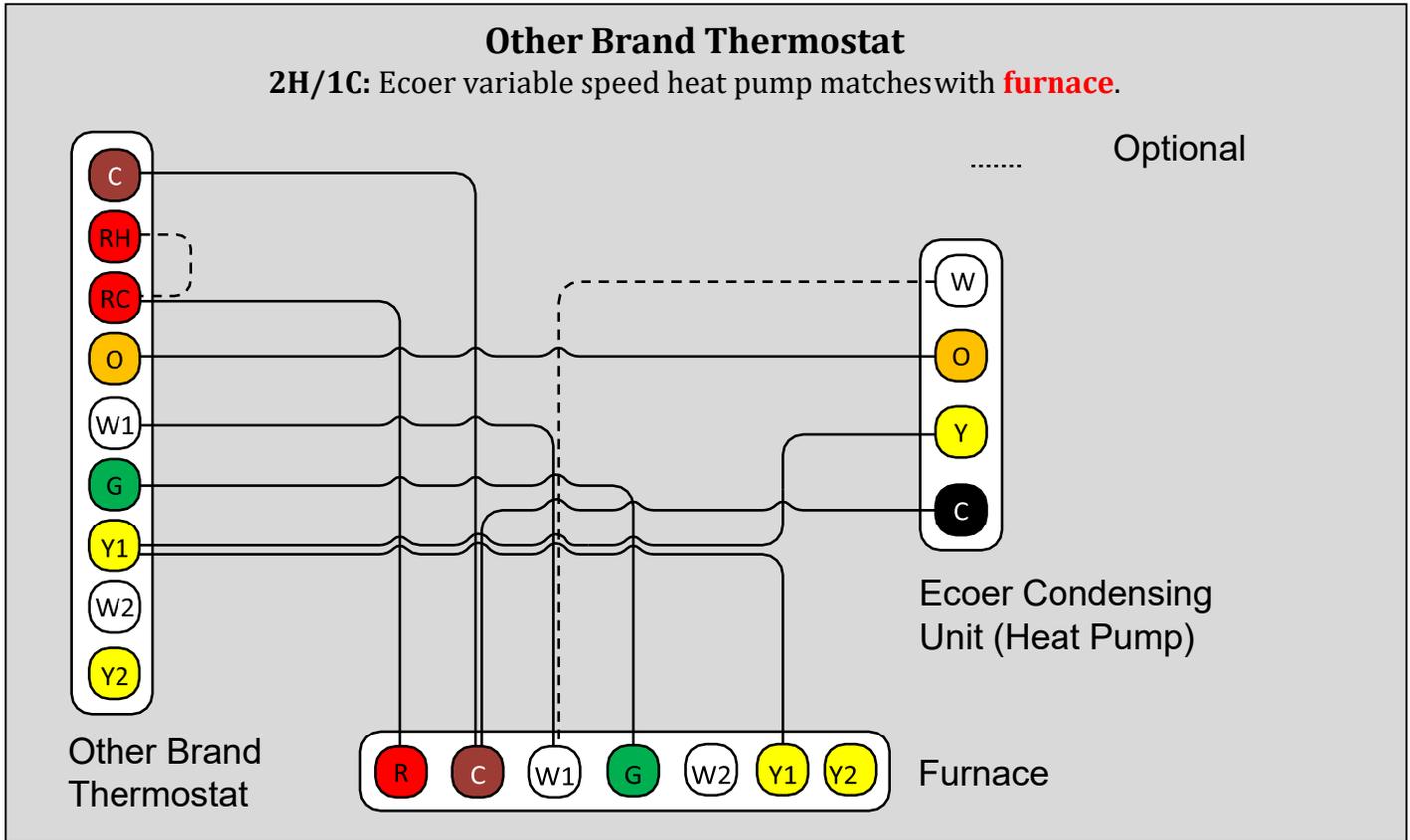
1H/1C: Ecoer variable speed air conditioner (Dip ODU SW1-3 to ON) matches with **furnace** and coil.



Other Brand Thermostat

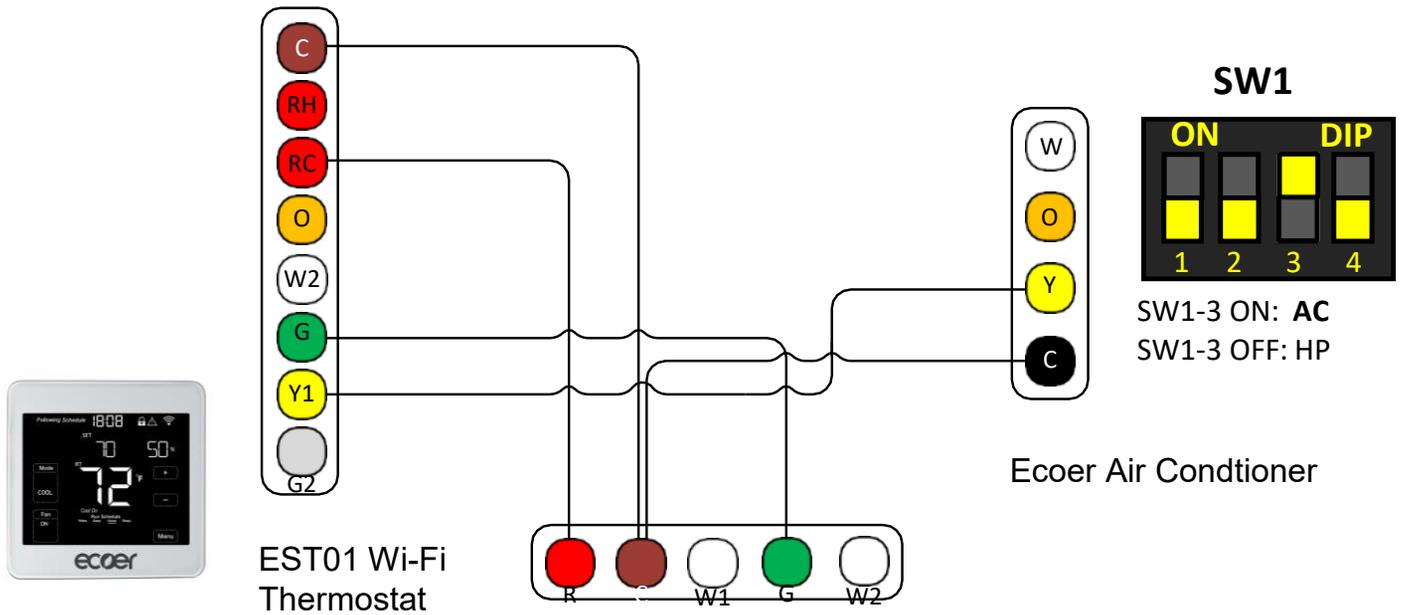
2H/2C: Ecoer variable speed air conditioner (Dip ODU SW1-3 to ON) matches with **furnace** and coil.





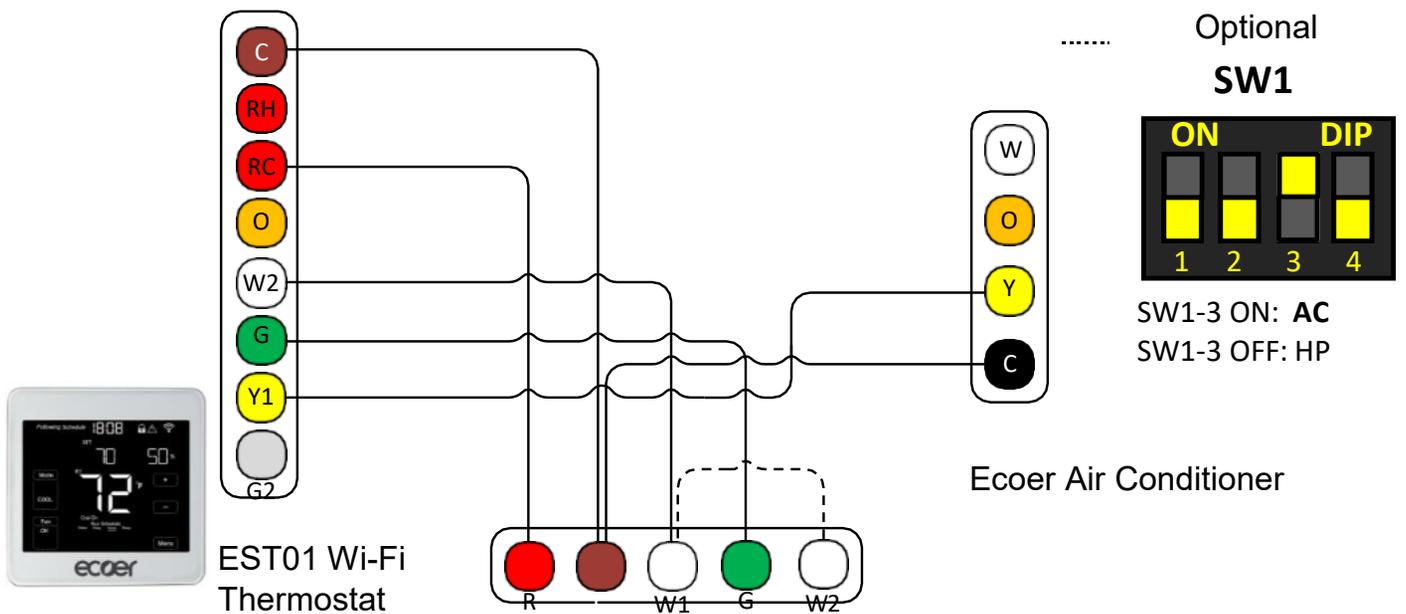
Ecoer Thermostat (EST01) Type 0 Cool only

Ecoer variable speed air conditioner matches with fan coil.



Ecoer Thermostat (EST01) Type 2 Cool Only + W2 output 1H/1C

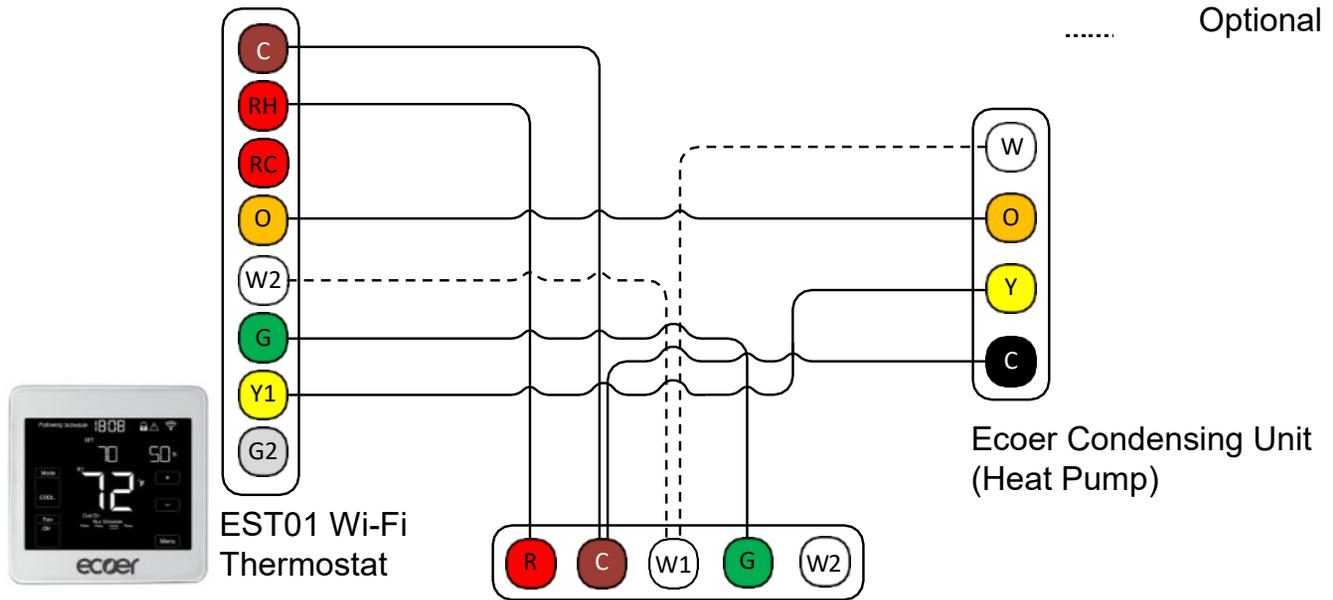
Ecoer variable speed air conditioner matches with gas or oil furnace.



Furnace

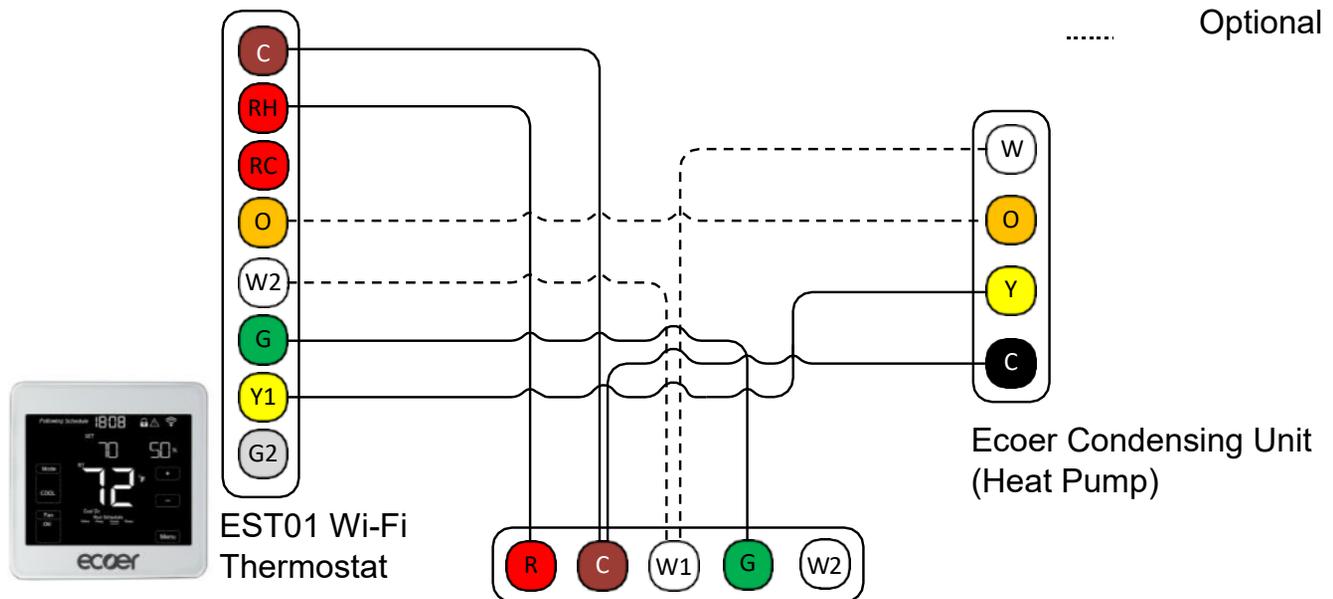
Ecoer Thermostat (EST01) Type 6 1H/1C with constant indoor fan speed

Ecoer variable speed heat pump (Require O Signal input) matches with fan coil.



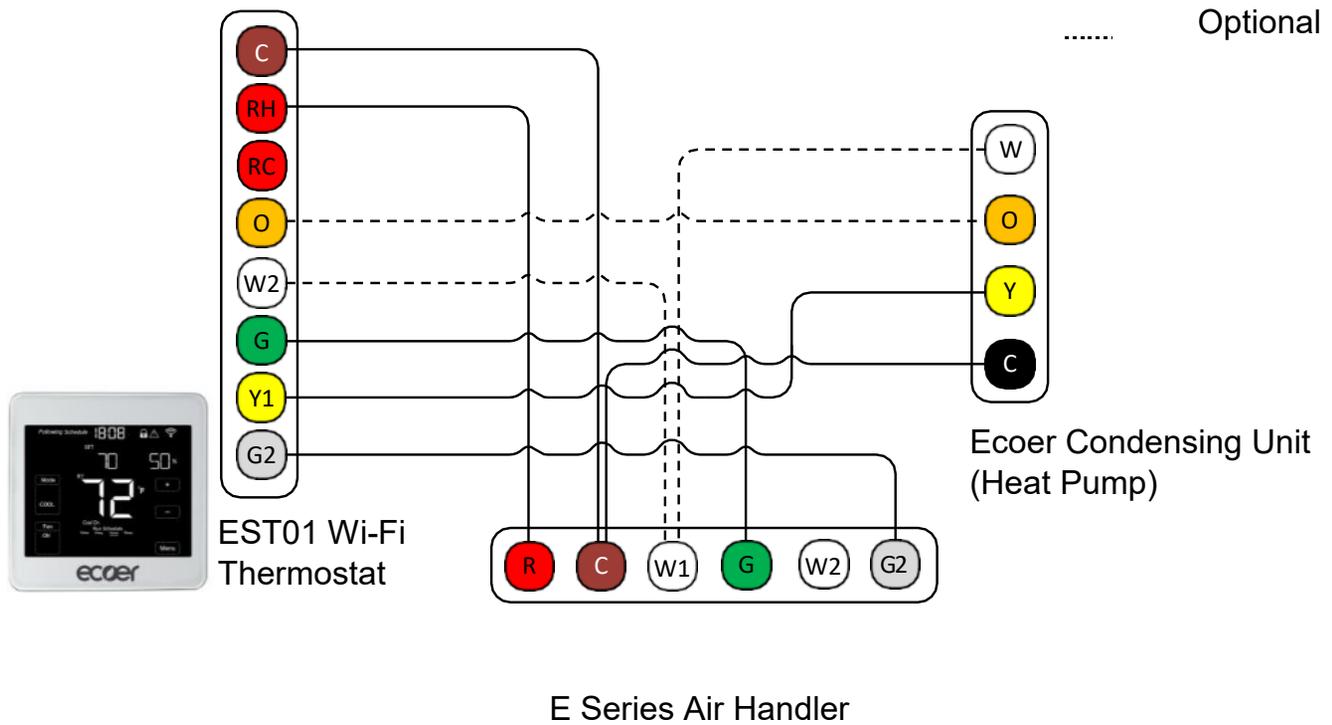
Ecoer Thermostat (EST01) Type 8 1H/1C with constant indoor fan speed

Ecoer variable speed heat pump matches with fan coil.

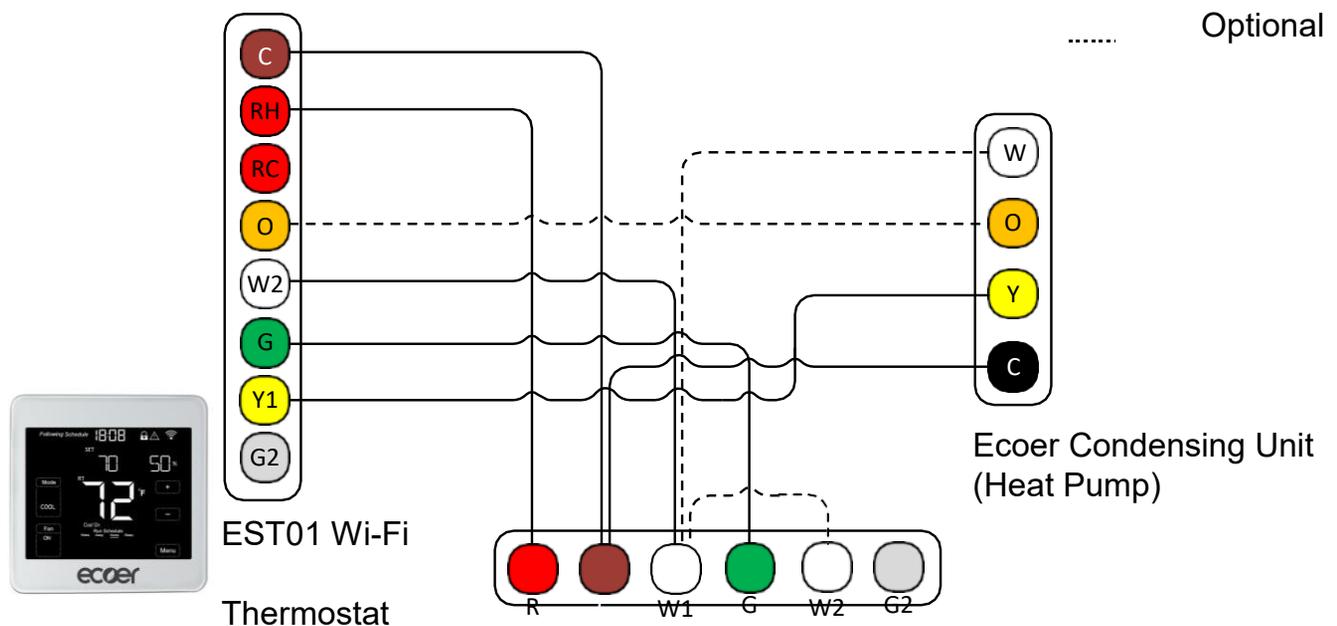


G Series Air Handler or Other Brand Fan Coil

Ecoer Thermostat (EST01) Type 9 1H/2C with two-stage fan control (G/G2) in cooling
 Ecoer variable speed heat pump matches with E Series air handler

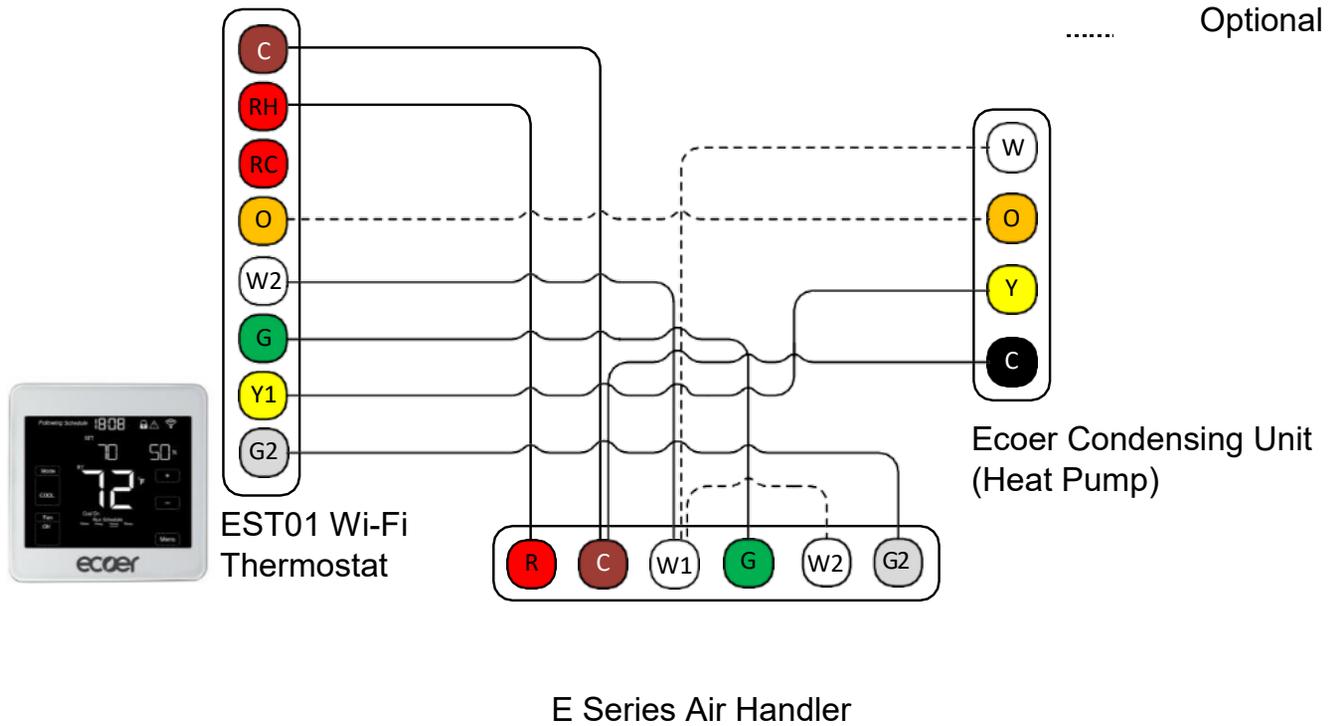


Ecoer Thermostat (EST01) Type 10 2H/1C with constant indoor fan speed (Factory default)
 Ecoer variable speed heat pump matches with fan coil for 2 stage heating

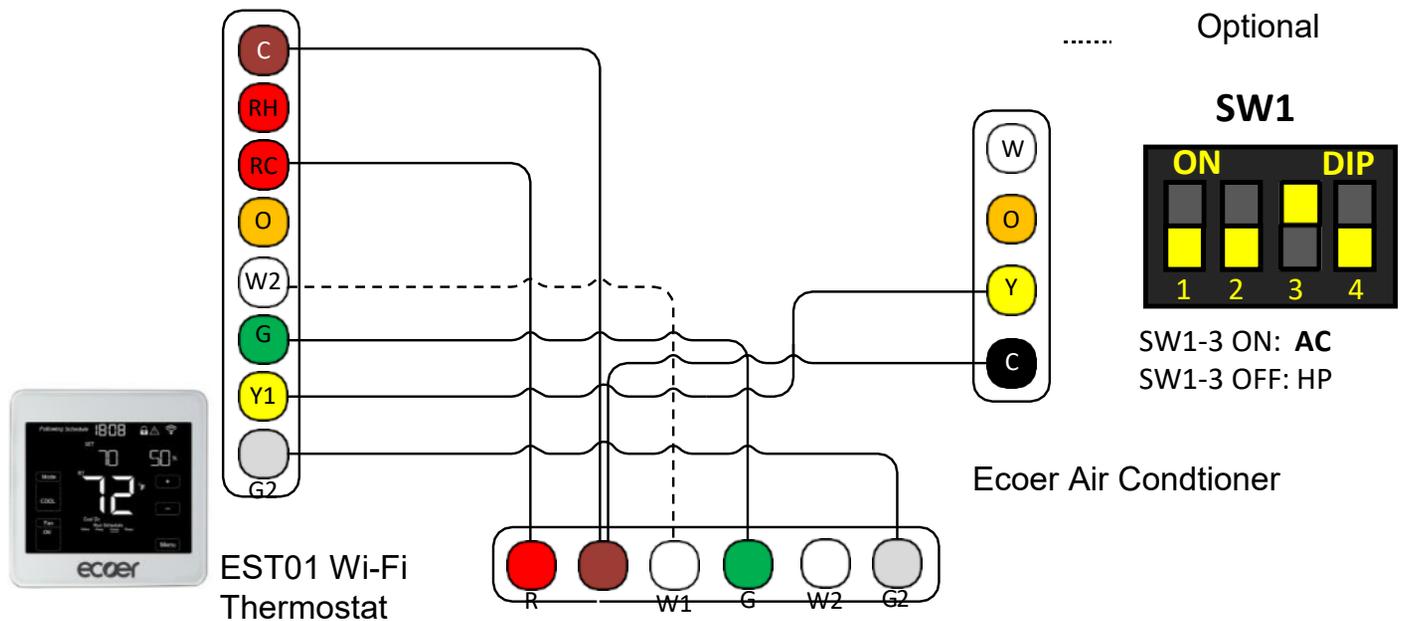


G Series Air Handler or Other Brand Fan Coil

Ecoer Thermostat (EST01) Type 11 2H/2C with two-stage fan control (G/G2) in cooling
 Ecoer variable speed heat pump matches with **E series air handler** and electric heat (Duel-fuel).



Ecoer Thermostat (EST01) Type 12/13 Cool only with two-stage fan control (G/G2)
 Ecoer variable speed Air Conditioner matches with **E Series air handler - Type 12**
 (and electric heat - **Type 13** Wiring between EST01 W2 to Air Handler W1 must be connected!)



E Series Air Handler

3.2 Error Codes List

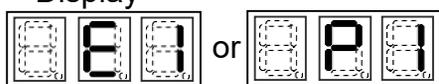
Past error codes can be inquired by **BS3** button, and viewed on Ecoer Smart Service Pro App.

Code	Description	Legend	Page
P1	High pressure protection		36
E1	System locks up when P1 has occurred six times in 3 hours.	Cannot restart *1	
P2	Low pressure protection in cooling mode		37
E2	System locks up when P2 has occurred six times within 3 hours.	Cannot restart *1	
P3	Compressor discharge temperature (TD) protection		38
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		39
P5	Inverter module temperature (TF) protection		40
E5	System locks up when P5 has occurred six times within 3 hours.	Cannot restart *1	
P6	Compressor over-current protection		41
E6	System locks up when P6 has occurred six times within 3 hours.	Cannot restart *1	
P7	Liquid slugging protection		42-43
E7	System locks up when P7 has occurred three times within 5 hours.	Cannot restart *1	
P8	Low compressor voltage protection		44
E8	System locks up when P8 has occurred three times within 60 minutes.	Cannot restart *1	
P9	Incorrect compressor line sequence	Cannot restart *1	44
PA	DC fan motor over-load protection	Cannot restart *1	45
F1	Ambient temperature (TA) sensor fault	Backup running*2	46
F2	Compressor suction temperature (TS) sensor fault	Backup running*2	47
F3	Liquid line temperature (TL) sensor fault	Backup running*2	48
F4	Defrost temperature (TH) sensor fault	Backup running*2	49
F5	Compressor discharge temperature (TD) sensor fault	Backup running*2	50
F6	Inverter module temperature (TF) sensor fault	Backup running*2	51
F7	High pressure (HP) sensor fault	Backup running*2	52
F8	Low pressure (LP) sensor fault	Backup running*2	53
E4	Communication fault between main chip and INV drive chip	Cannot restart *1	54
H1	Ambient temperature limit operation in cooling mode		55
H2	Ambient temperature limit operation in heating mode		
H3	Abnormal switch alarm for reversing valve	Just show alarm	56
H4	Defrost temperature (TH) sensor is disconnected or damaged		57
H5	EEPROM fault		58
H6	Low voltage alarm		58
HF	Abnormal function control	Alarm	58
C0-CC	Compressor INV module protection		59-60
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 backup running under sensors fault varies from 7 to 120 days. Allow up to two sensors backup running at the same time.

Display



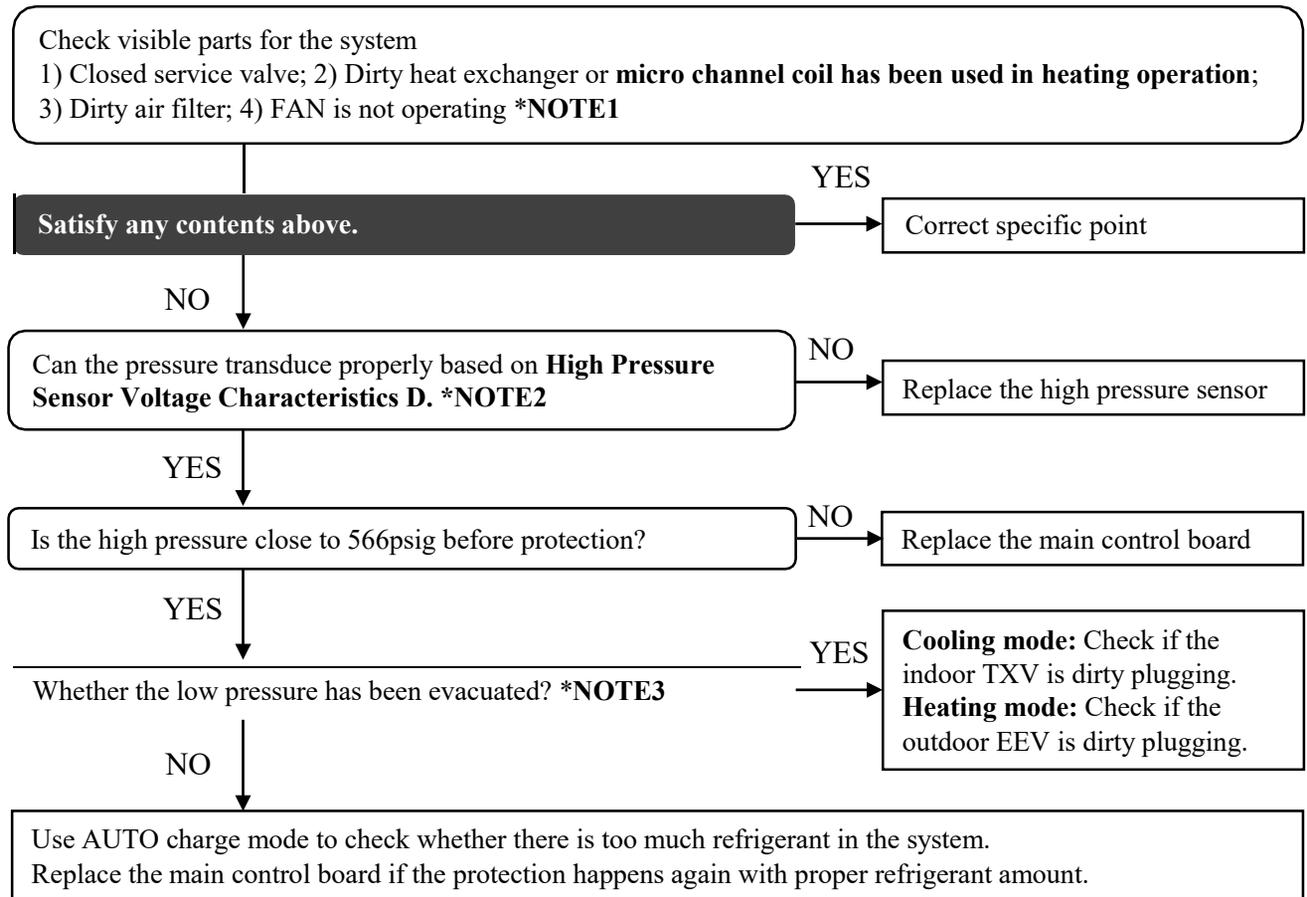
High pressure protection

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:

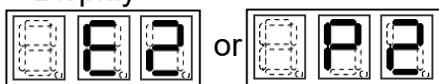
- Service valves are closed
- The system has been severely over-charged
- Dirty/Clogged heat exchanger of outdoor unit in cooling mode
- Dirty indoor air filter or micro channel coil has been used for heat pump
- The refrigerant blocked in high pressure zone because of damaged TXV/EEV
- Damaged indoor 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 ProApp).
3. Abnormal TXV/EEV will lead to the refrigerant blockage in the high pressure side.

Display



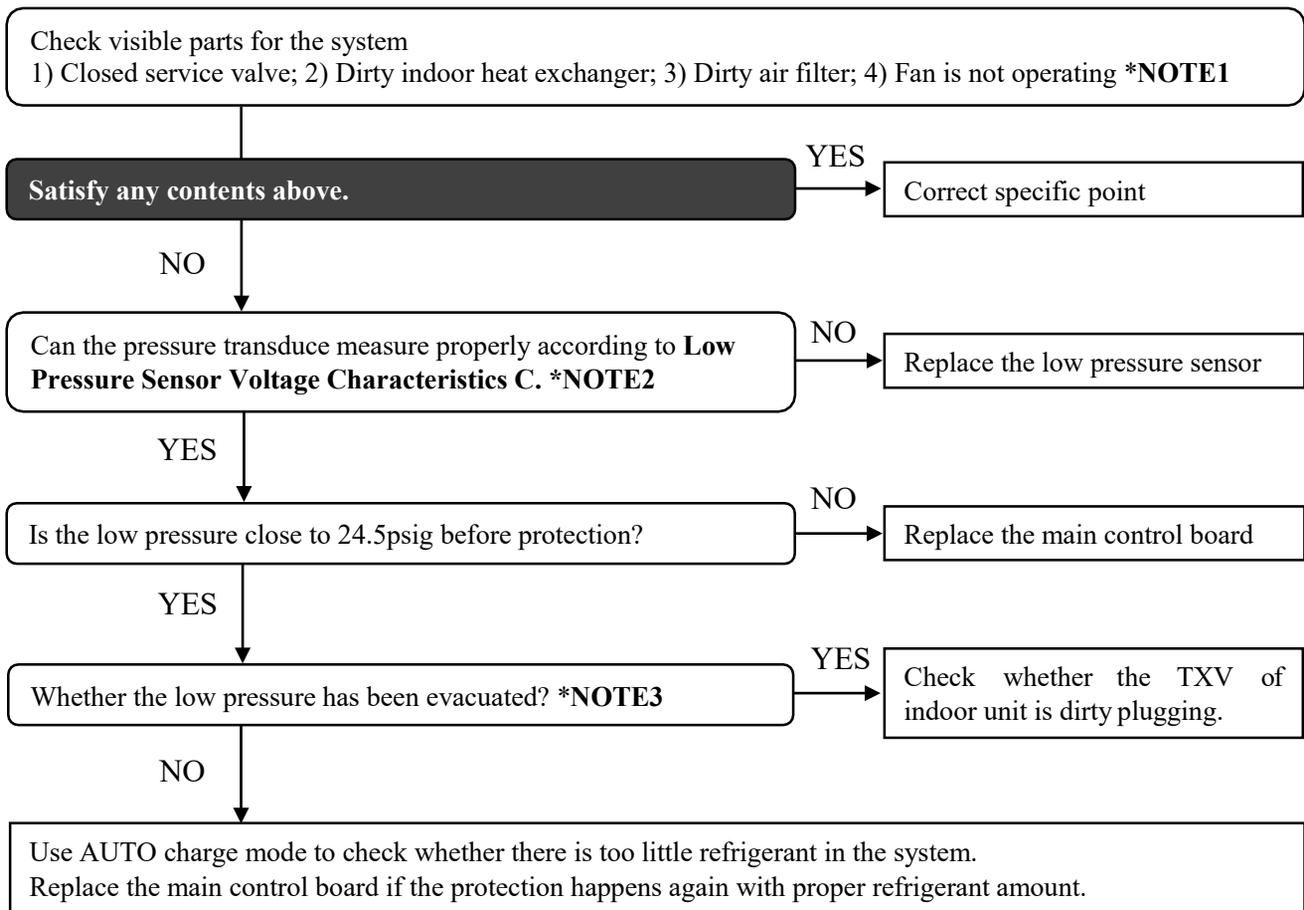
Low pressure protection in cooling mode

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:

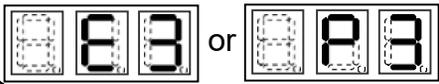
- Service valves are closed
- Dirty air filter or indoor heat exchanger
- Outside temperature is lower than 40°F
- Too little refrigerant in the system
- Damaged indoor R410A TXV
- G(G2) signal is lost resulting in indoor unit FAN=OFF
- Damaged low pressure sensor
- Damaged main control board



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



Compressor discharge temperature (TD) protection

1. Error definition:

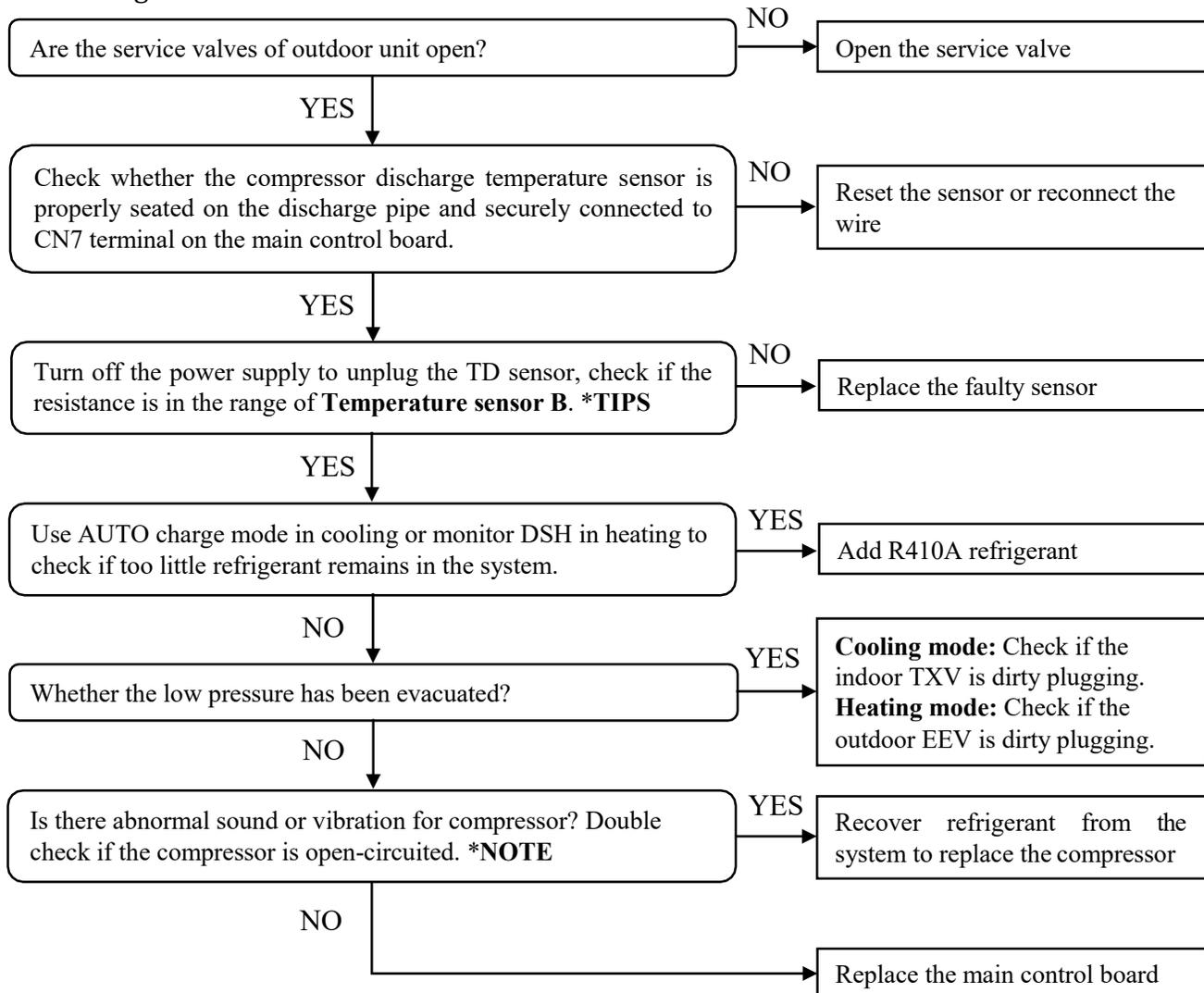
P3: The detected discharge temperature(TD) is no less than specified value.

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
- Damaged discharge temperature sensor
- Damaged main control board



TIPS:

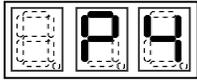
Technically measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

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



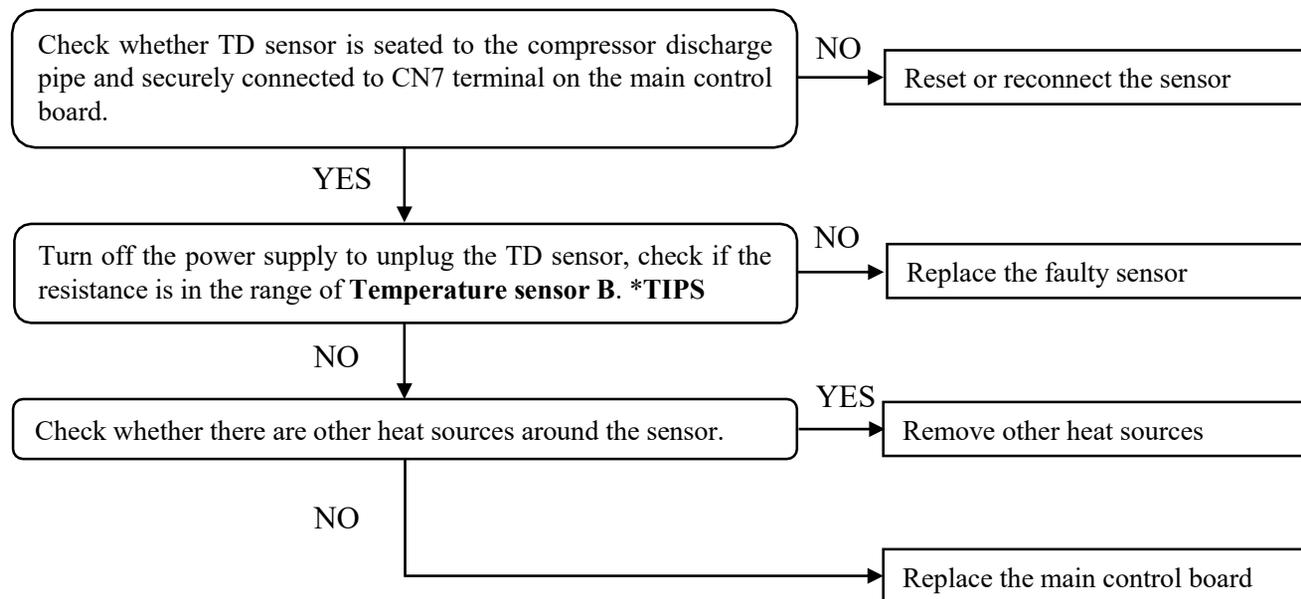
Compressor discharge temperature (TD) sensor is disconnected or damaged

1. Error definition:

Compressor discharge temperature (TD) sensor is disconnected or damaged.
 $TD < T_c - 9^{\circ}\text{F}$ for 20 minutes, T_c means the condensing temperature.

2. Possible causes:

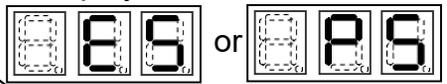
- Discharge temperature (TD) sensor is disconnected or damaged
- Loose connection to CN7 terminal on main control board
- Damaged main control board
- There are other heat sources around the sensor



TIPS:

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

Display



Inverter module temperature (TF) protection

1. Error definition:

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

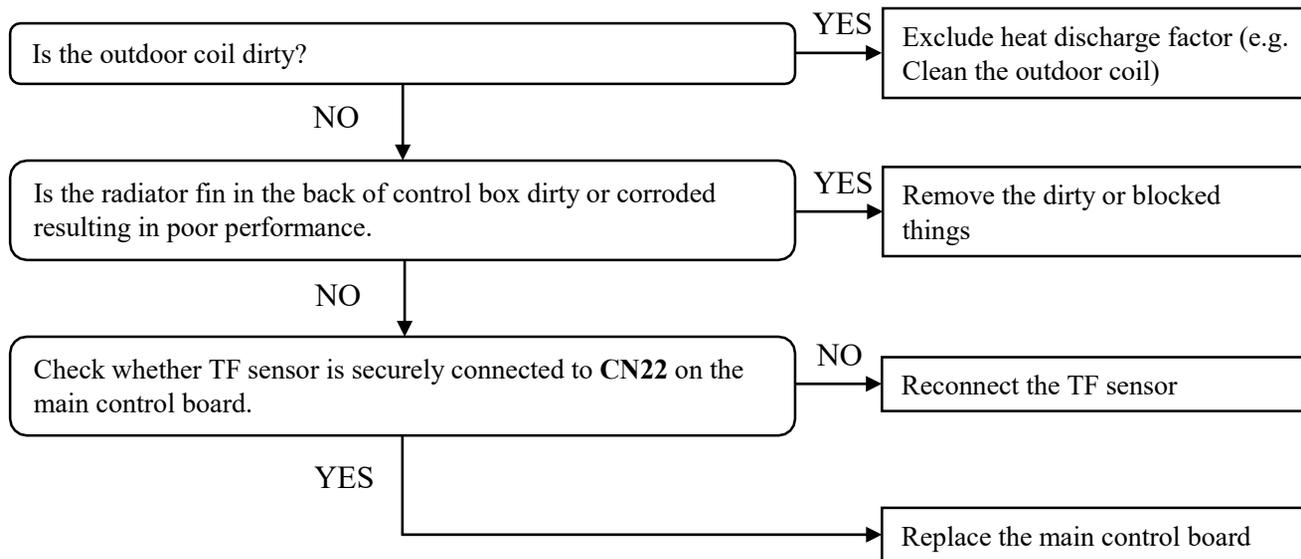
EODA18H-2436: 181°F

EODA18H-4860: 176°F in cooling mode/ 167°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
- 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

Compressor over-current protection

1. Error definition:

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

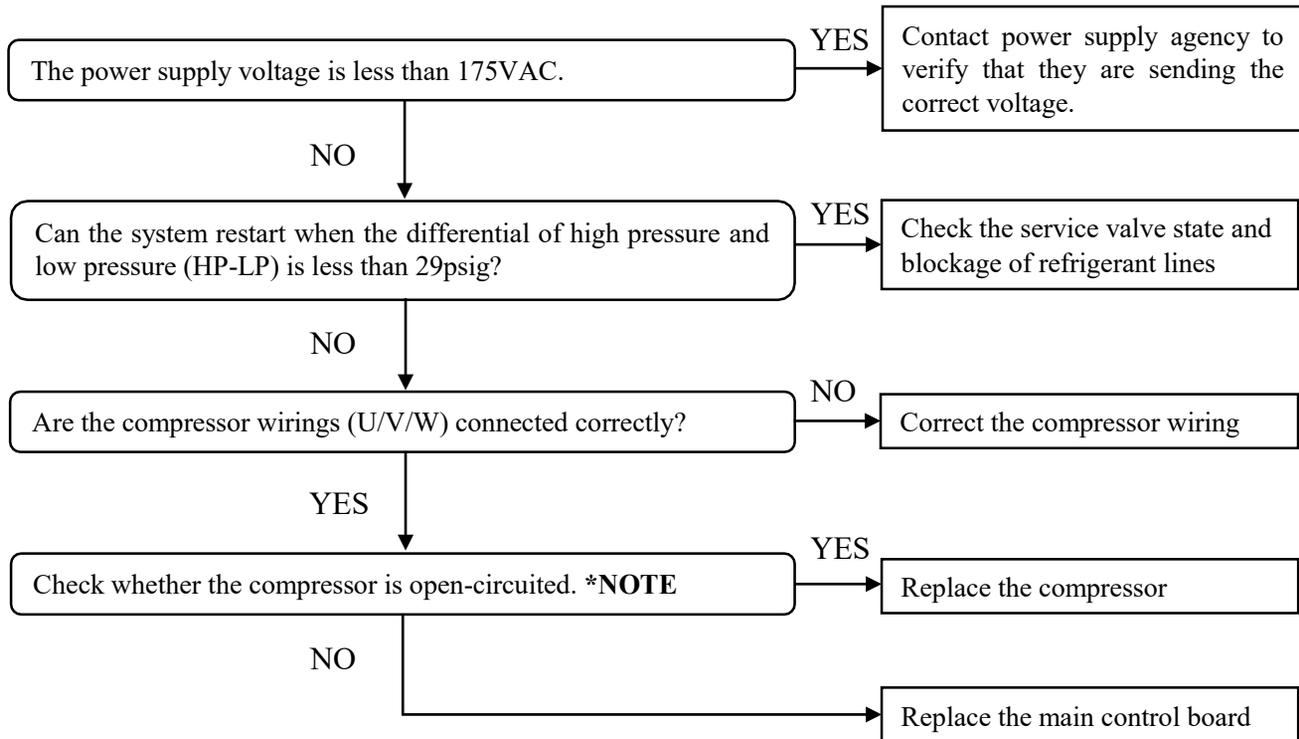
EODA18H-2436: 16A

EODA18H-4860: 20A

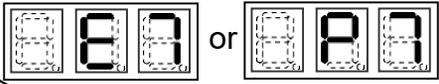
E6: System locks up when P6 has occurred six times within 3 hours.

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.

Display  **Liquid slugging protection**

1. Error definition:

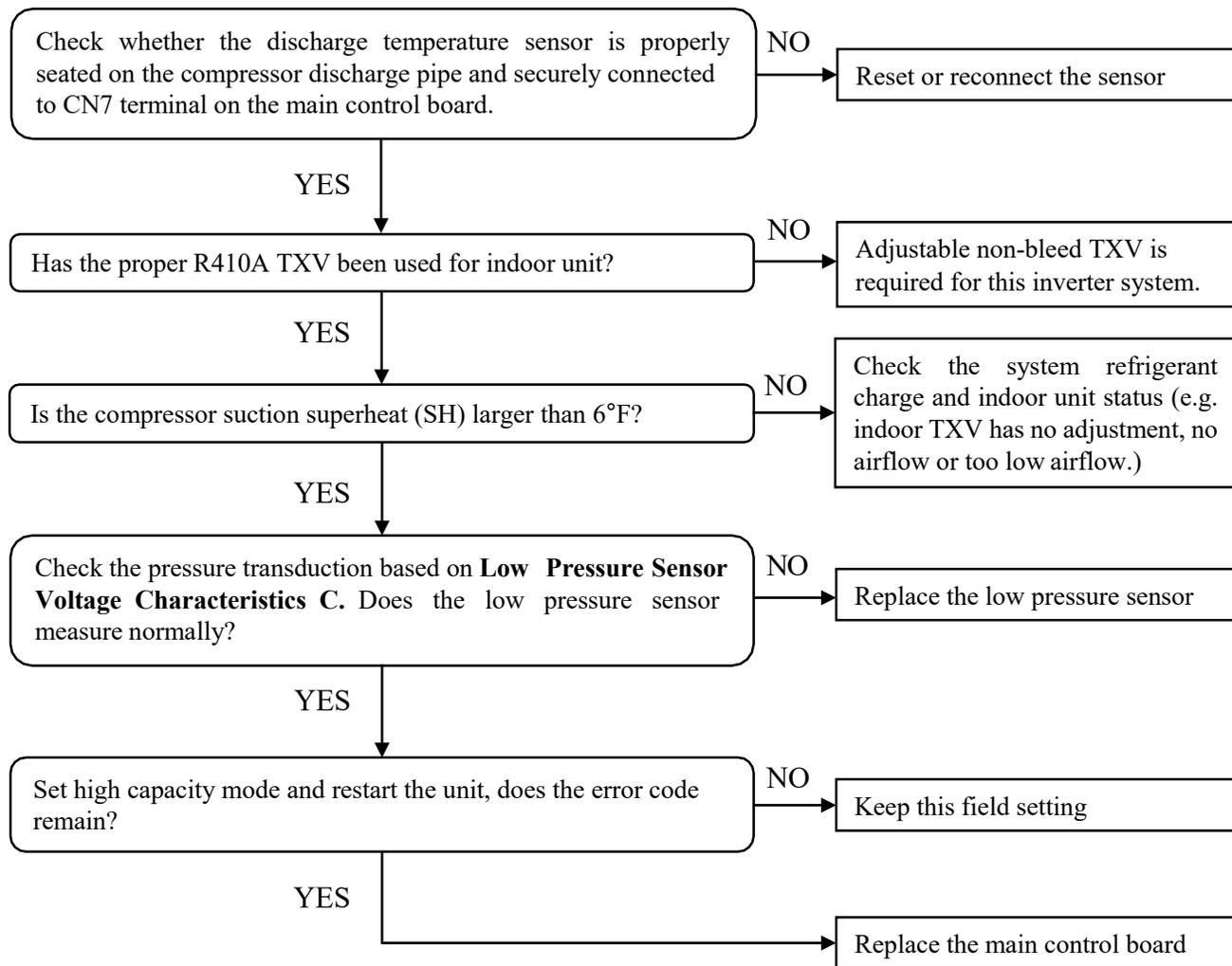
This control is to prevent compressor from damaging because of liquid slugging. When $SH < 9.0^{\circ}F$ and compressor discharge superheat ($DSH = TD - SC - TL - 1.8$) $< 14.4^{\circ}F$ for 20 minutes, starting to accumulate the liquid slugging time. Report P7 once it lasts for 30 minutes. E7: System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

2. Possible causes:

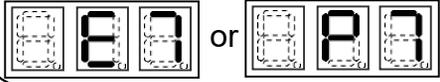
- Damaged or improper TXV for indoor unit in cooling mode
- Damaged discharge temperature (TD) sensor
- Overcharged refrigerant
- Damaged EEV of outdoor unit in heating mode
- Damaged main control board

Cooling mode

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



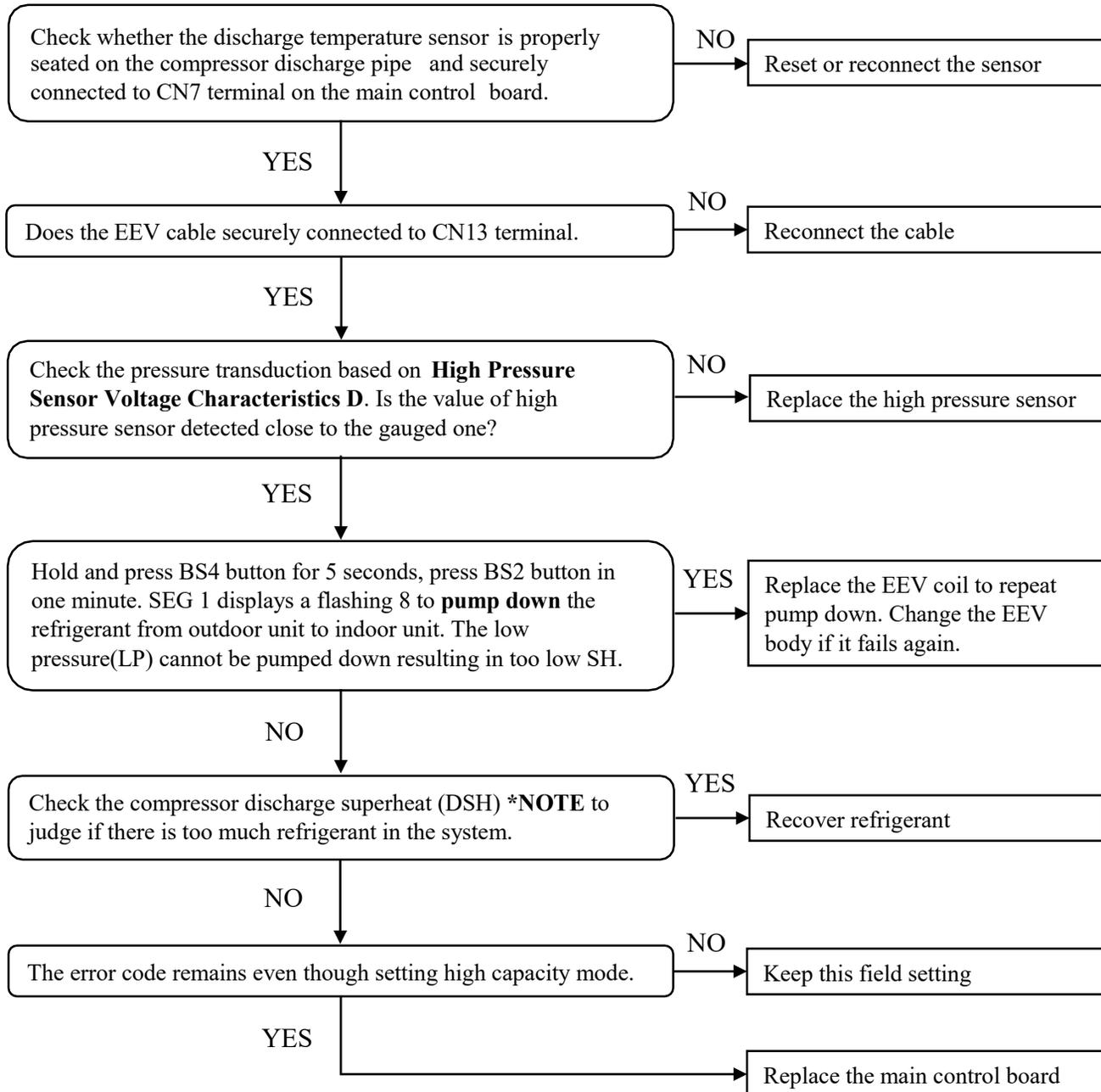
Display



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.



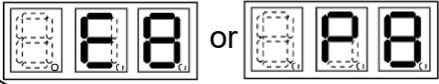
NOTE:

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  **Low compressor voltage protection**

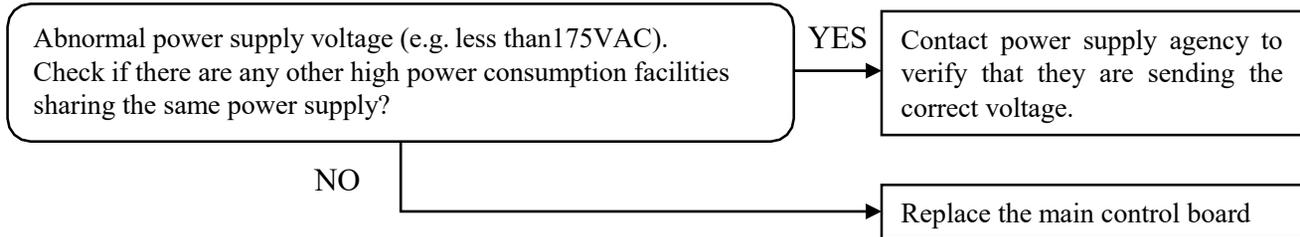
1. Error definition:

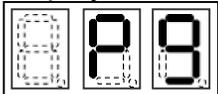
P8: The detected compressor voltage by main chip is less than 310VDC.

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

2. Possible causes:

- Abnormal power supply voltage
- Damaged main control board



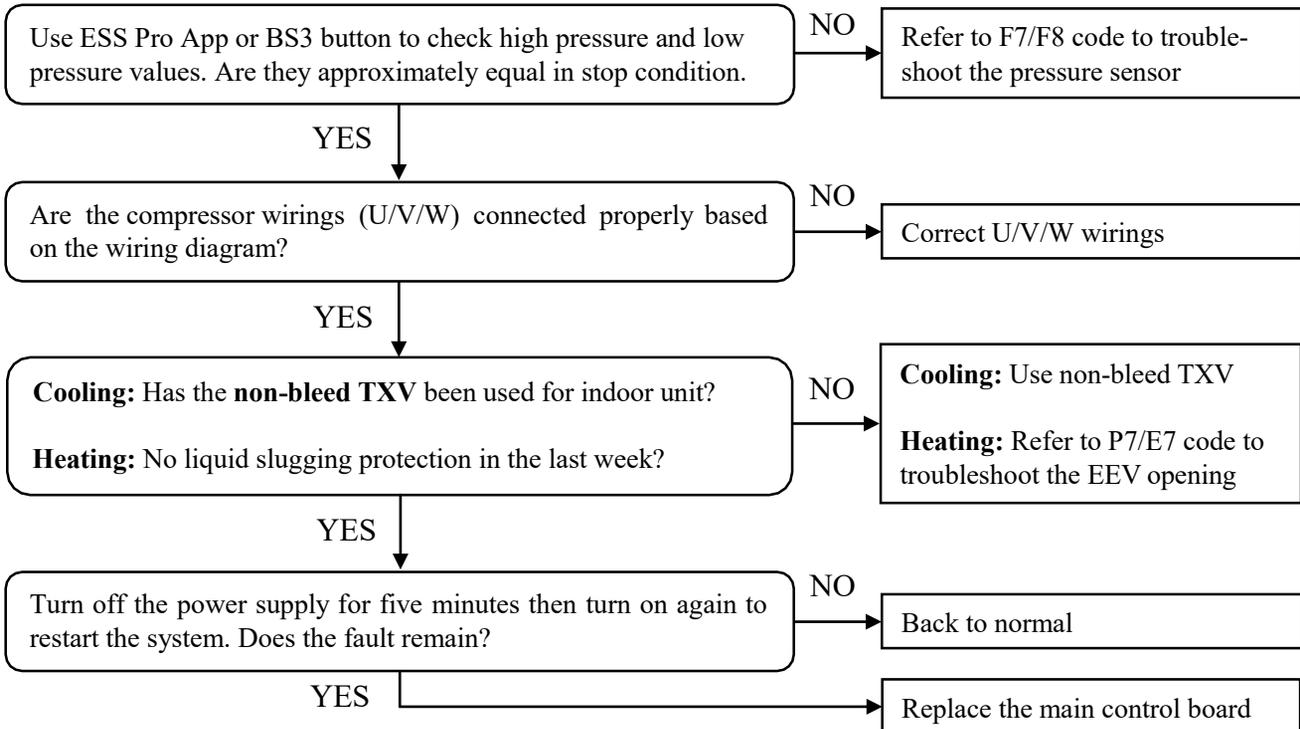
Display  **Incorrect compressor line sequence**

1. Error definition:

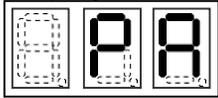
The detected compressor line sequence is incorrect for it's difficult to build pressure difference.

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



Display



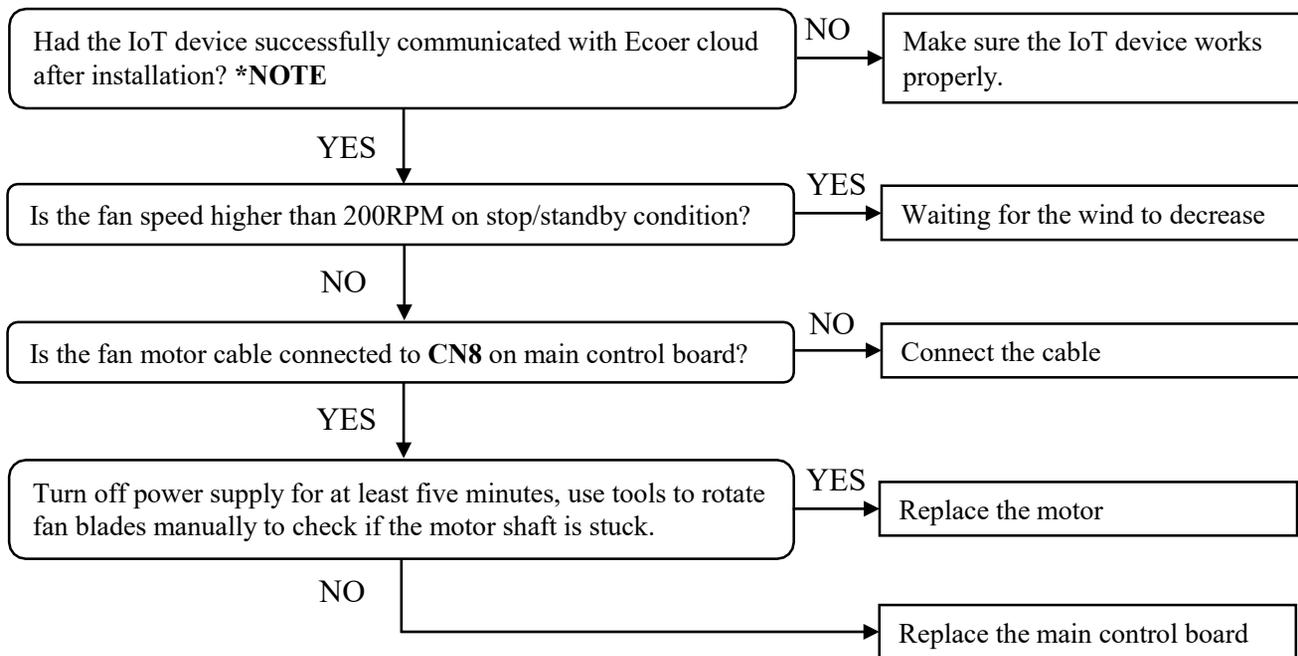
DC fan motor over-load protection

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:

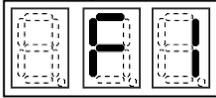
- Damaged main control board
- Malfunction of fan motor
- The unit is undergoing hurricane
- Disconnected wiring between fan motor and main control board



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



Display



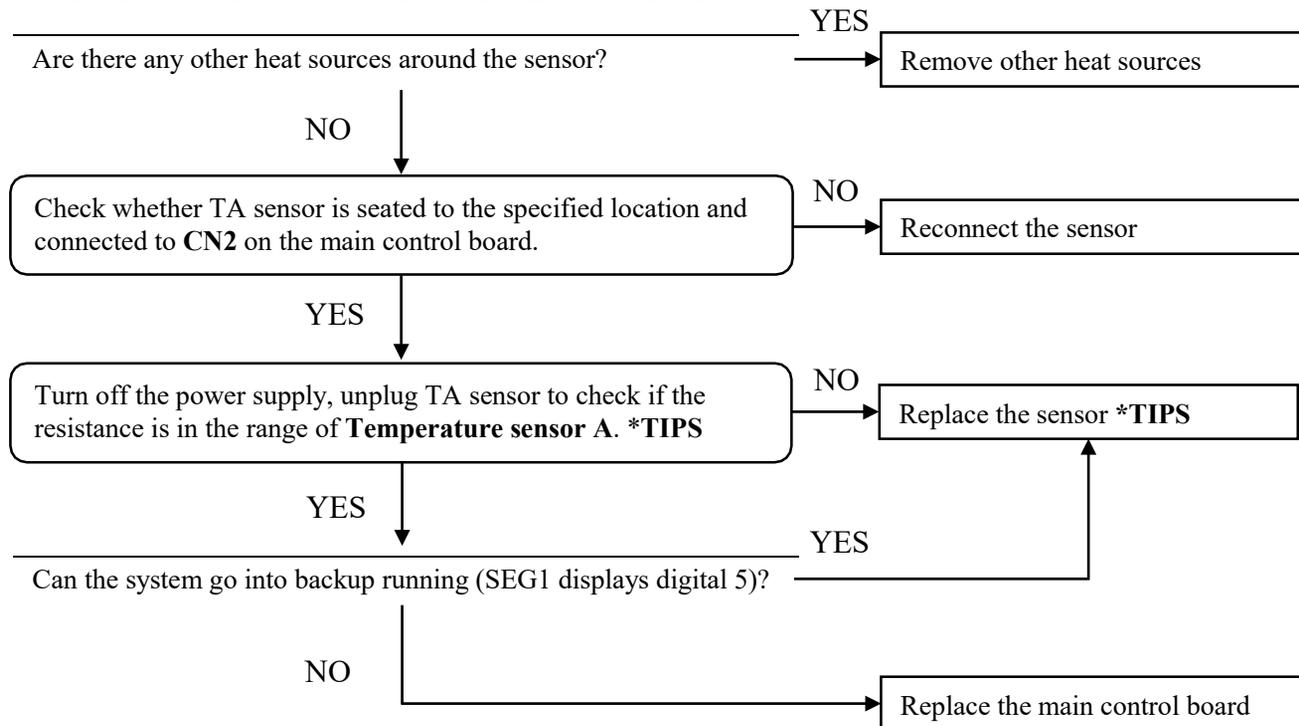
Ambient temperature (TA) sensor fault

1. Error definition:

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

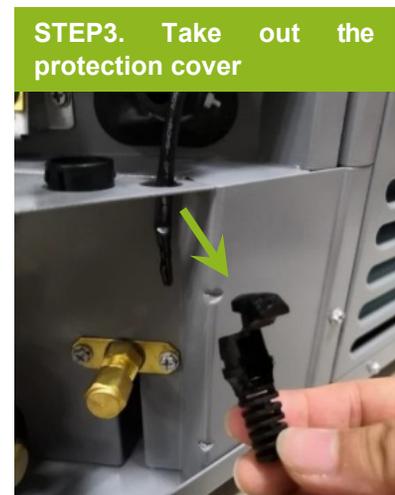
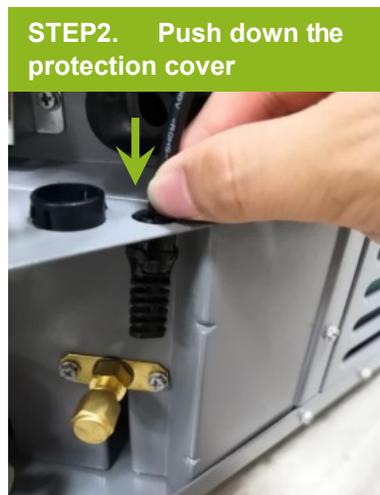
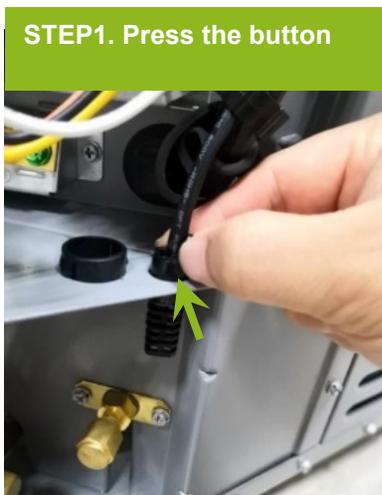
2. Possible causes:

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

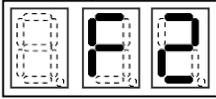


TIPS: Measure the DC voltage of the temperature sensor also works when outdoor unit powers on.

How to take out the protection cover for TA sensor?



Display



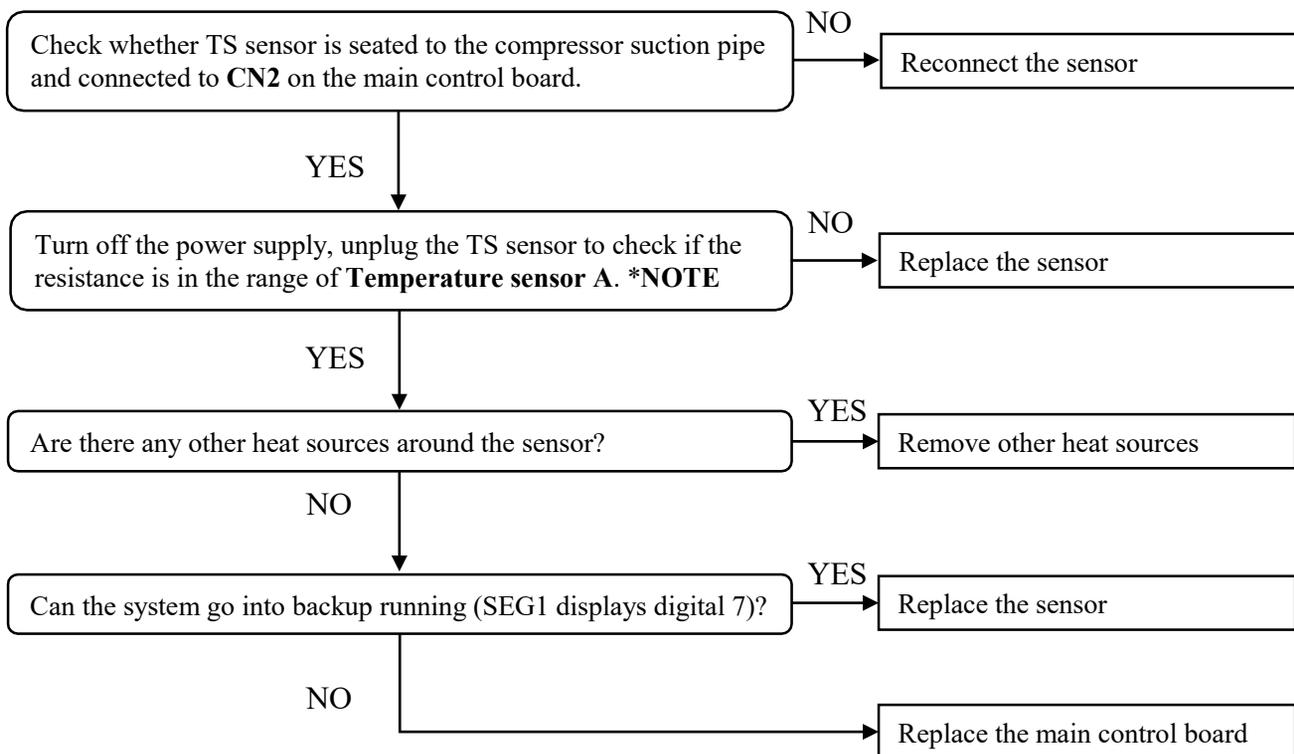
Compressor suction temperature (TS) sensor fault

1. Error definition:

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

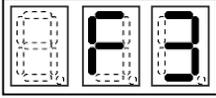
2. Possible causes:

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



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

Display



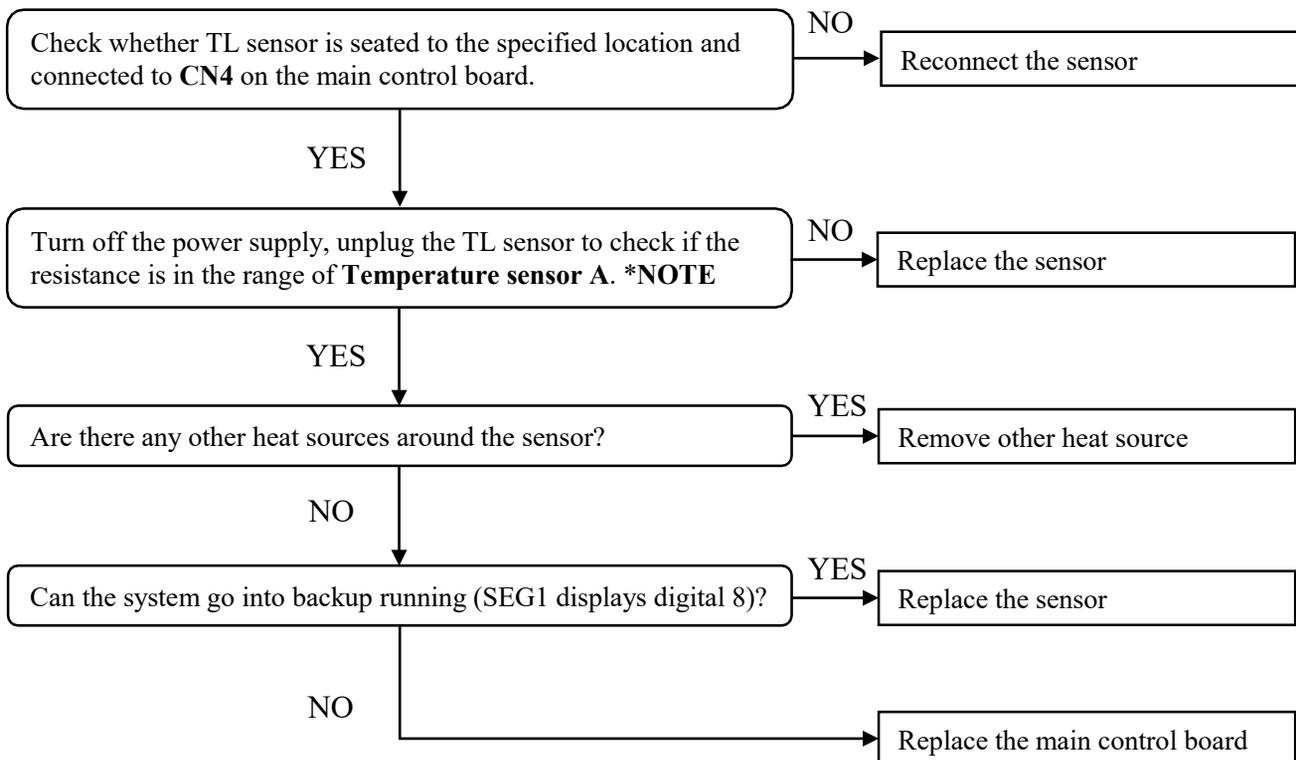
Liquid line temperature (TL) sensor fault

1. Error definition:

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

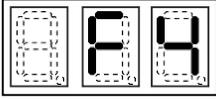
2. Possible causes:

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



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

Display



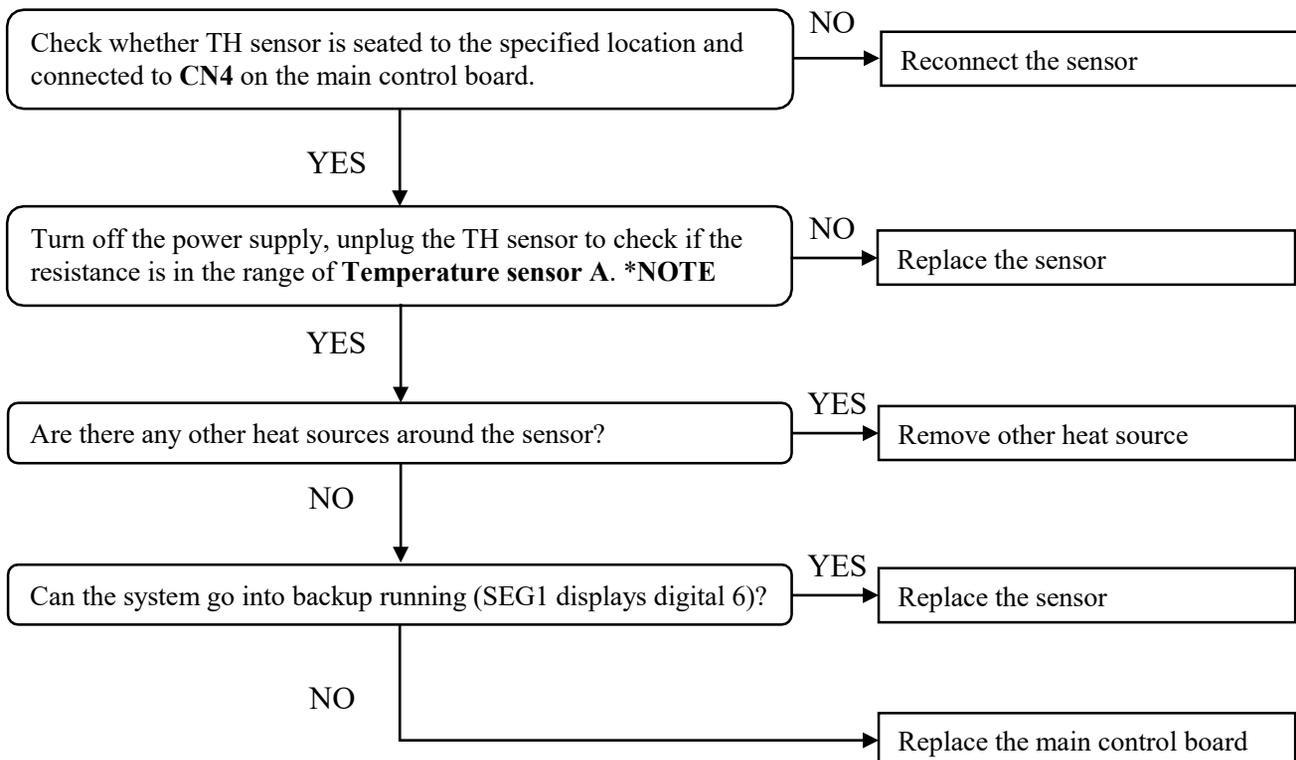
Defrost temperature (TH) sensor fault

1. Error definition:

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

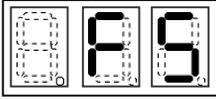
2. Possible causes:

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



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

Display



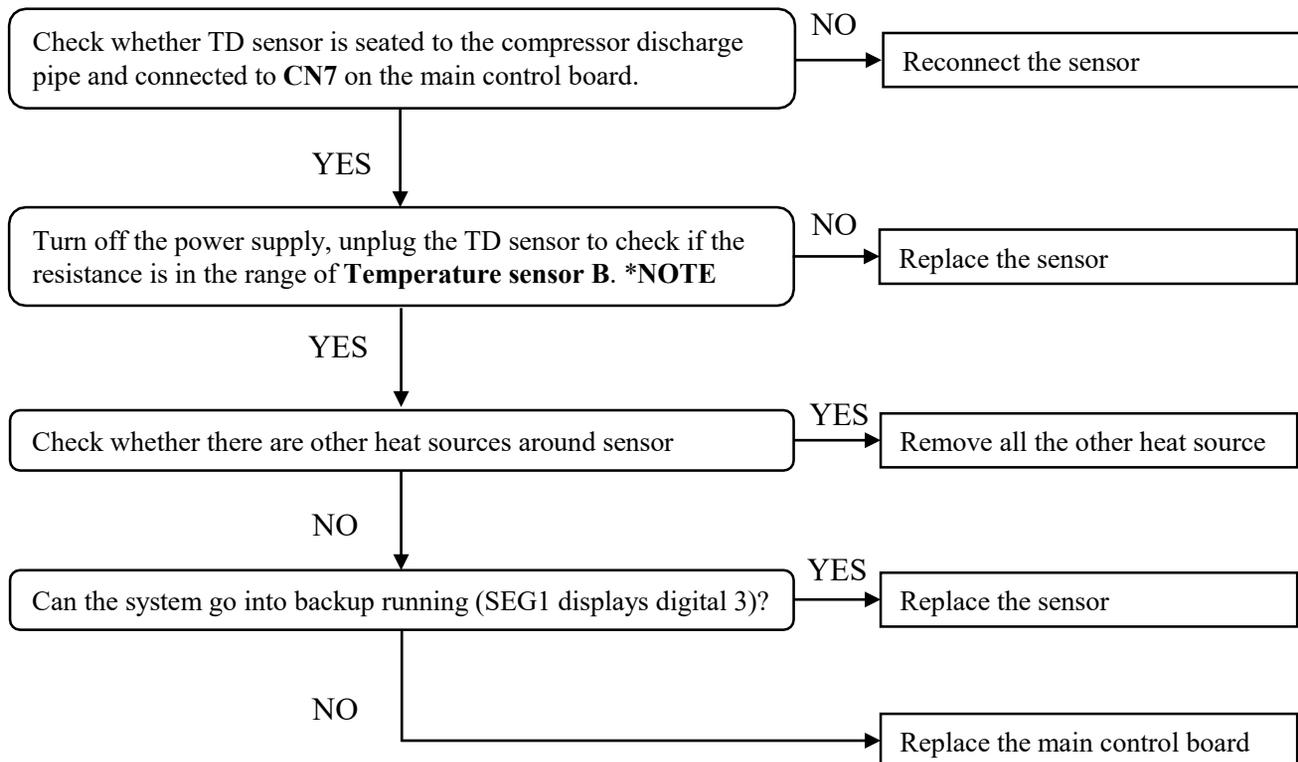
Compressor discharge temperature (TD) sensor fault

1. Error definition:

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

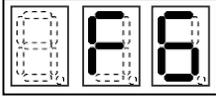
2. Possible causes:

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



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

Display



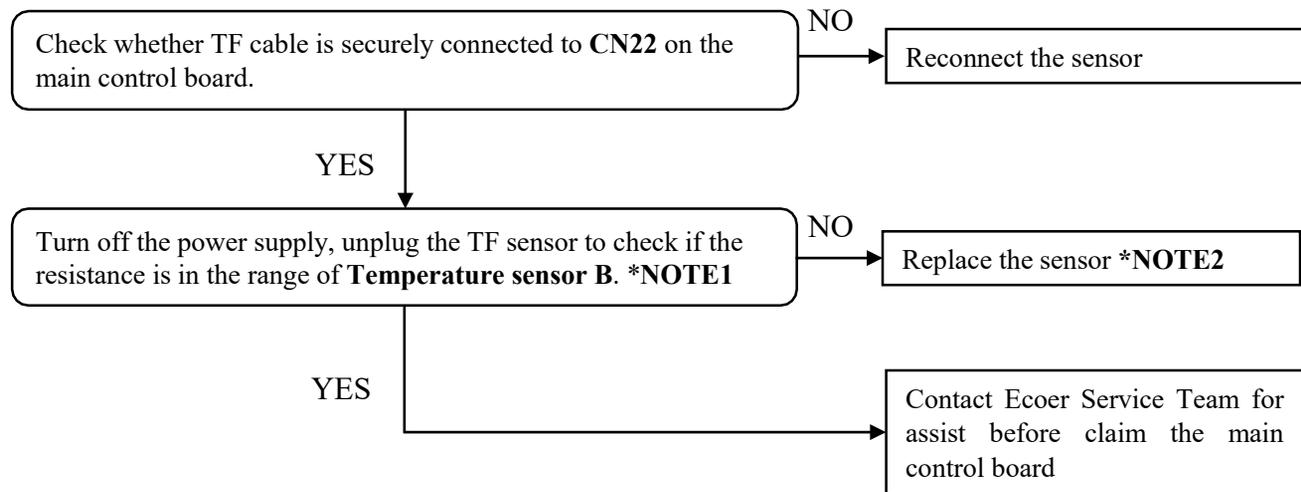
Inverter module temperature (TF) sensor fault

1. Error definition:

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

2. Possible causes:

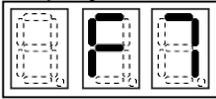
- Damaged main control board
- Loose connection at port on main control board.
- Temperature sensor failure
- There are other heat sources around the sensor



NOTES:

1. Measure the DC voltage of the temperature sensor also works when outdoor unit powers on.
2. TF sensor 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

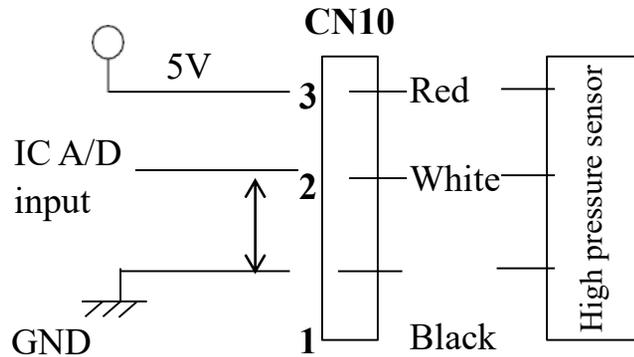


High pressure (HP) sensor fault

1. Error definition and method to check:

The high pressure sensor is open or shorted.

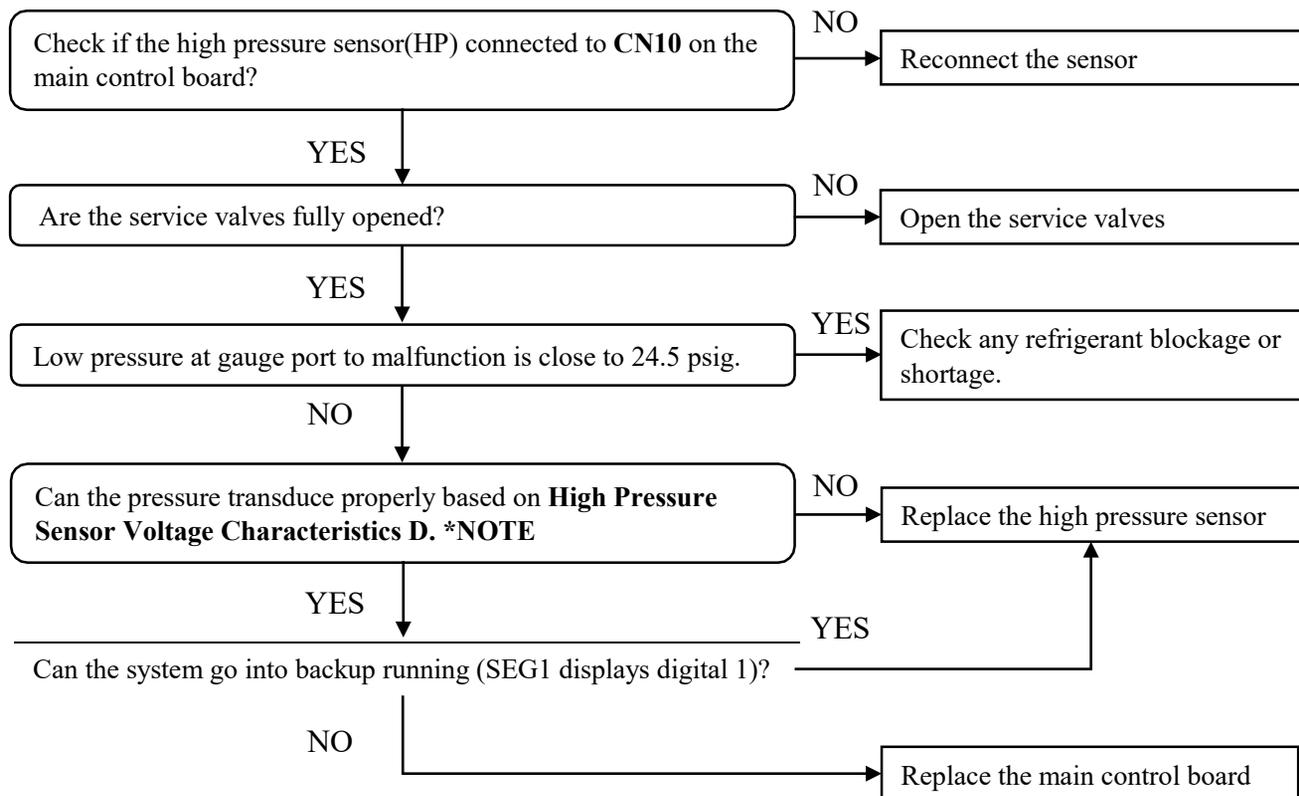
The voltage between CN10 pin(1) and (2) is not in the range 0.59~4.76VDC.



Measure DC voltage within these pins

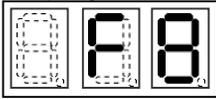
2. Possible causes:

- 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

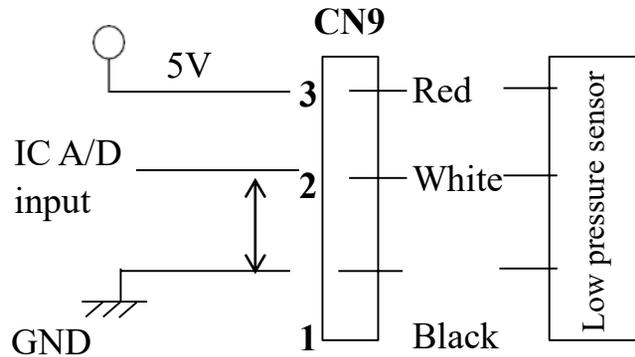


Low pressure (LP) sensor fault

1. Error definition and method to check:

The low pressure sensor is open or shorted.

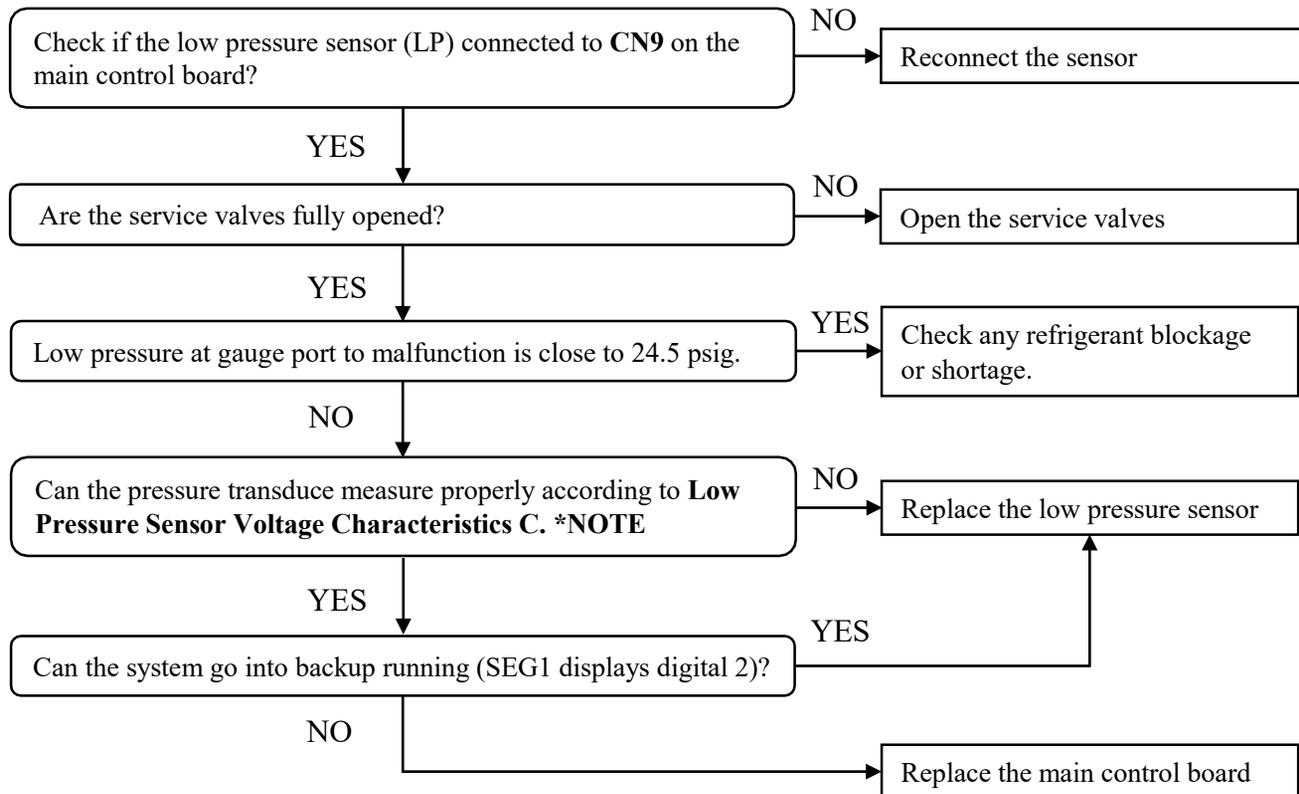
The voltage between CN9 pin(1) and (2) is not in the range 0.70~4.50VDC.



Measure DC voltage within these pins

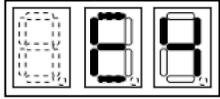
2. Possible causes:

- Damaged main control board
- Loose connection at port on main control board
- 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



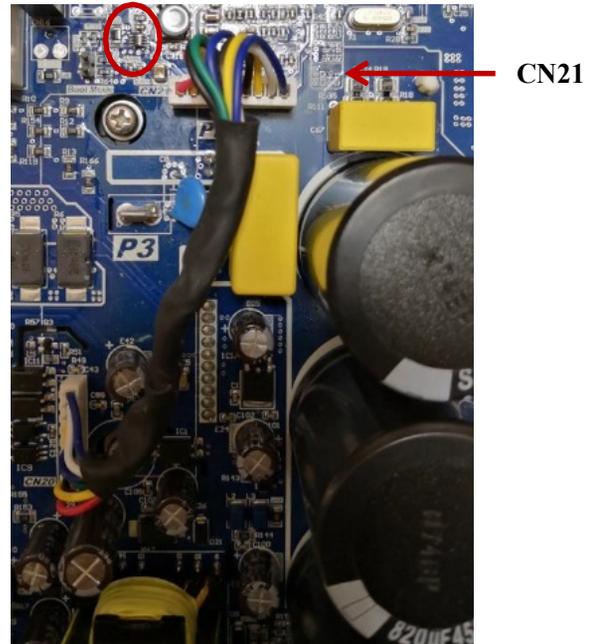
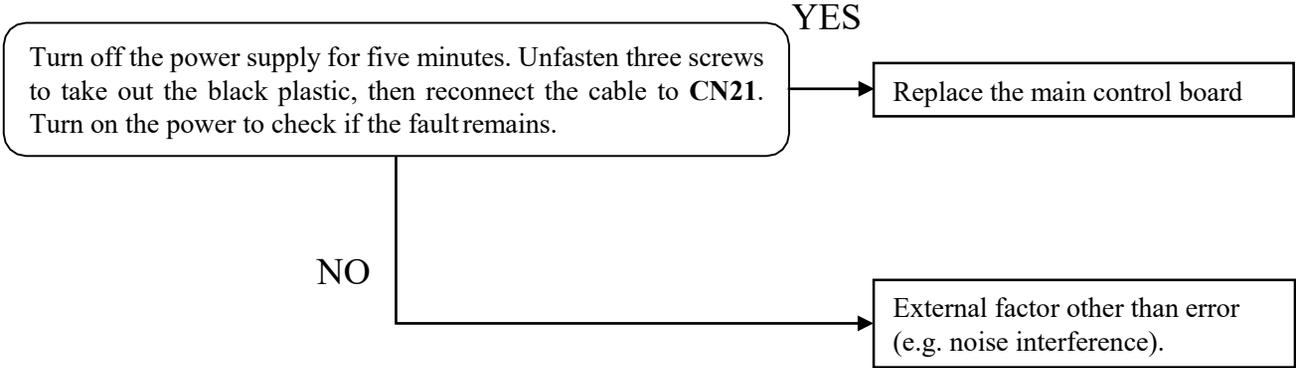
Communication fault between main chip and INV drive chip

1. Error definition and method to check:

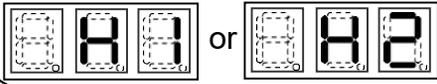
Communication fault between the main control chip and inverter chip.

2. Possible causes:

- Loose connection at CN21 terminal
- Damaged main control board



Display



Ambient temperature limit operation

1. Error definition and method to check:

H1: The detected ambient temperature is absolutely prohibited for cooling.

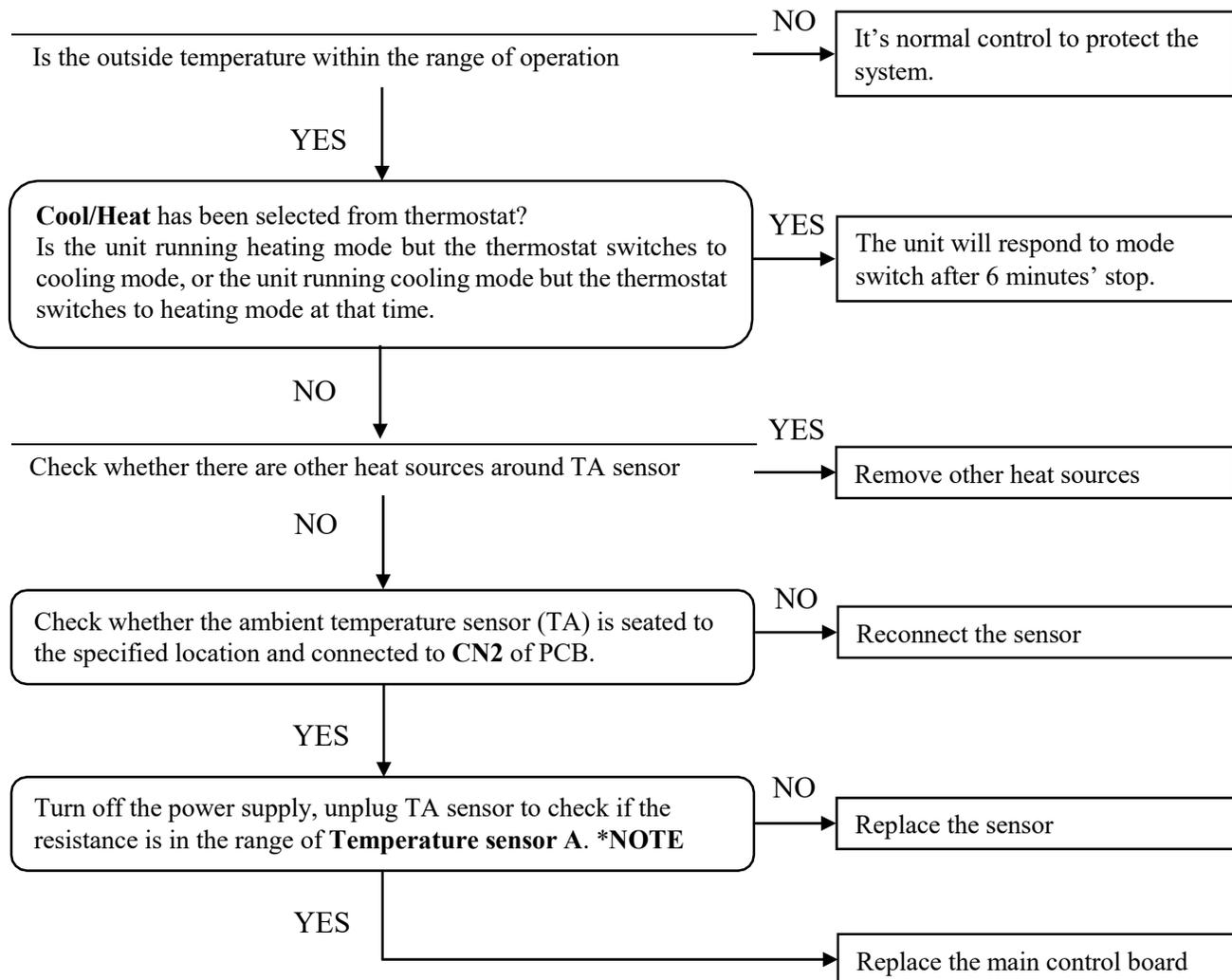
TA < 32°F or ≥ 140°F

H2: The detected ambient temperature is absolutely prohibited for heating.

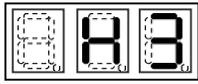
TA ≥ 86°F or TA < forced heating stop temperature set by n01

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



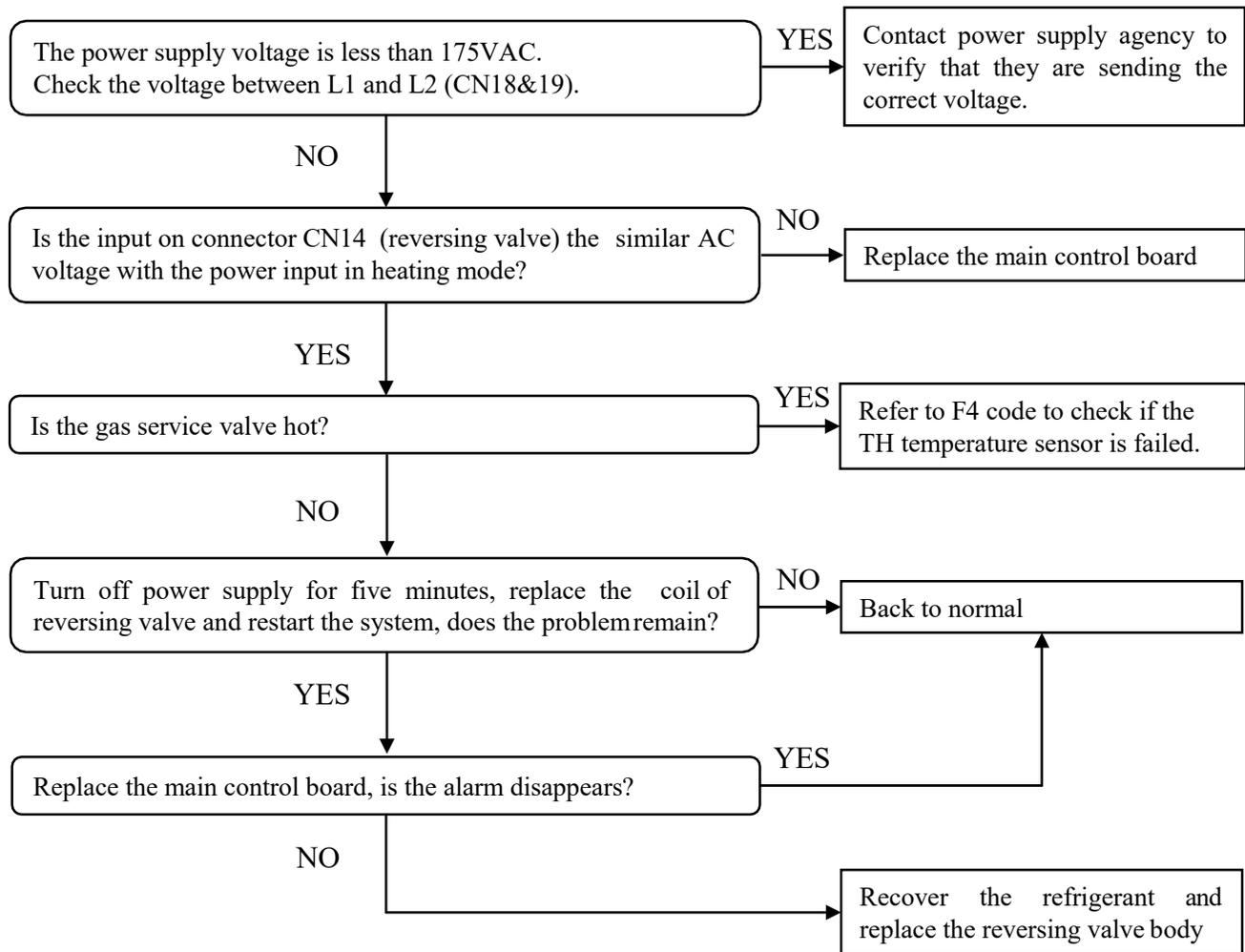
Abnormal switch alarm for reversing valve

1. Error definition:

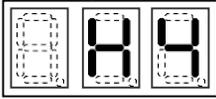
4-way (reversing) valve switches incompletely after defrost operation or from cooling mode. Report H3 alarm if $TH \geq TL + 10.8^{\circ}F$ and $TH \geq TA + 5.4^{\circ}F$.

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



Display



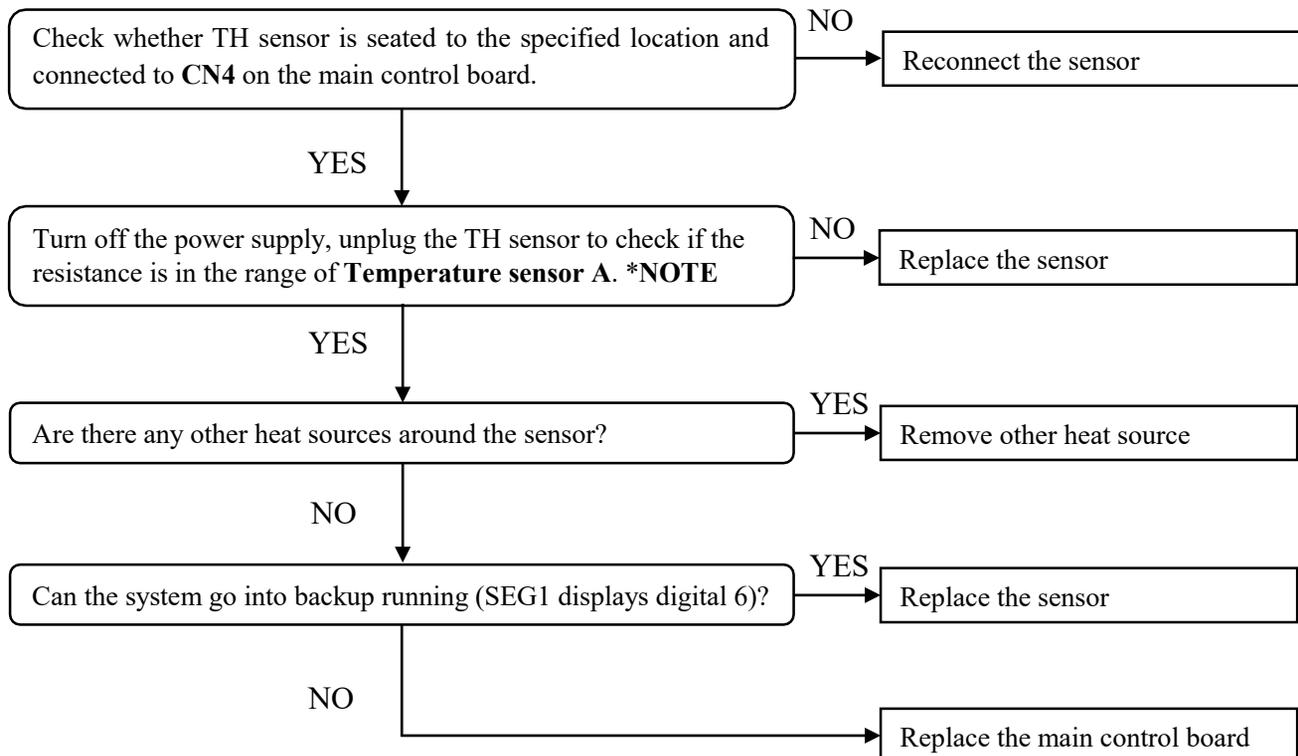
Defrost temperature (TH) sensor is disconnected or damaged

1. Error definition:

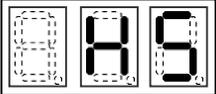
The defrost temperature (TH) sensor is short circuit or open circuit.

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.

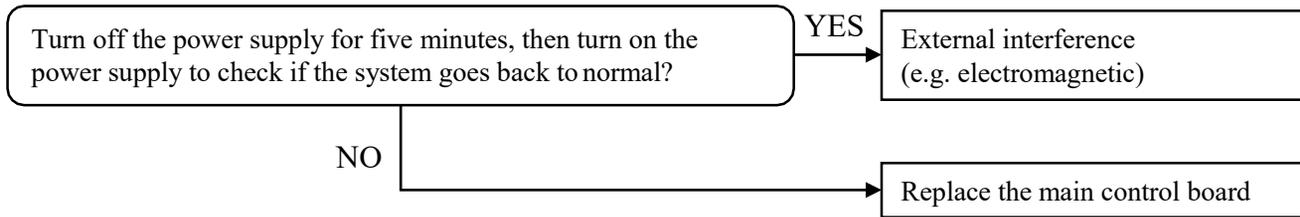
Display  **EEPROM fault**

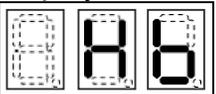
1. Error definition:

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



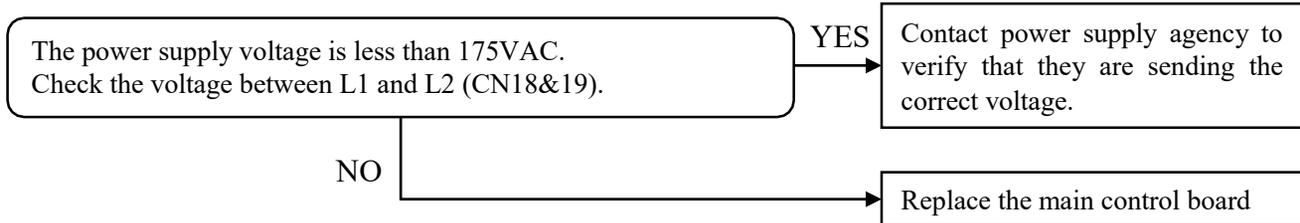
Display  **Low voltage alarm**

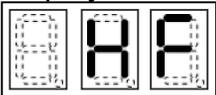
1. Error definition:

Power supply voltage is less than 175VAC.

2. Possible causes:

- Abnormal power supply voltage
- Damaged main control board



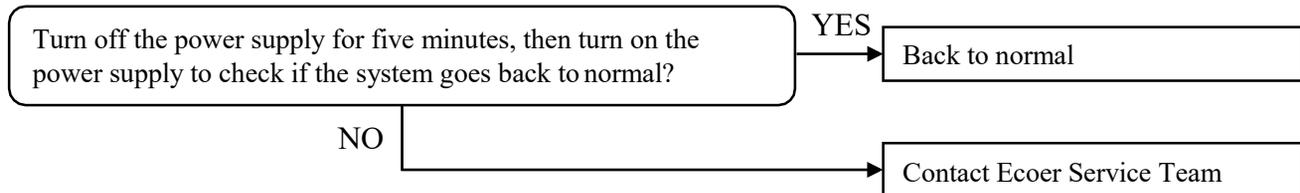
Display  **Abnormal function control**

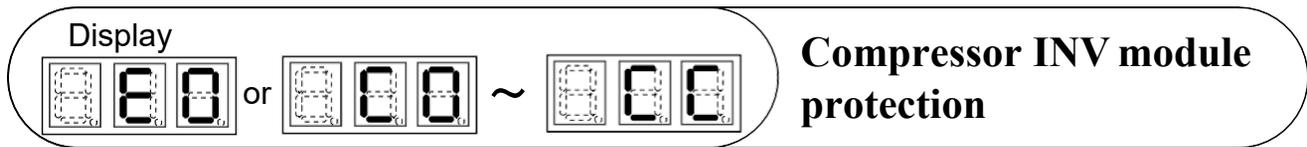
1. Error definition:

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

2. Possible causes:

- Abnormal signal input from thermostat





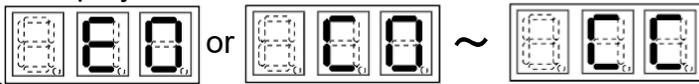
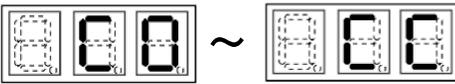
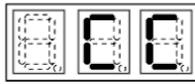
1. Error definition:

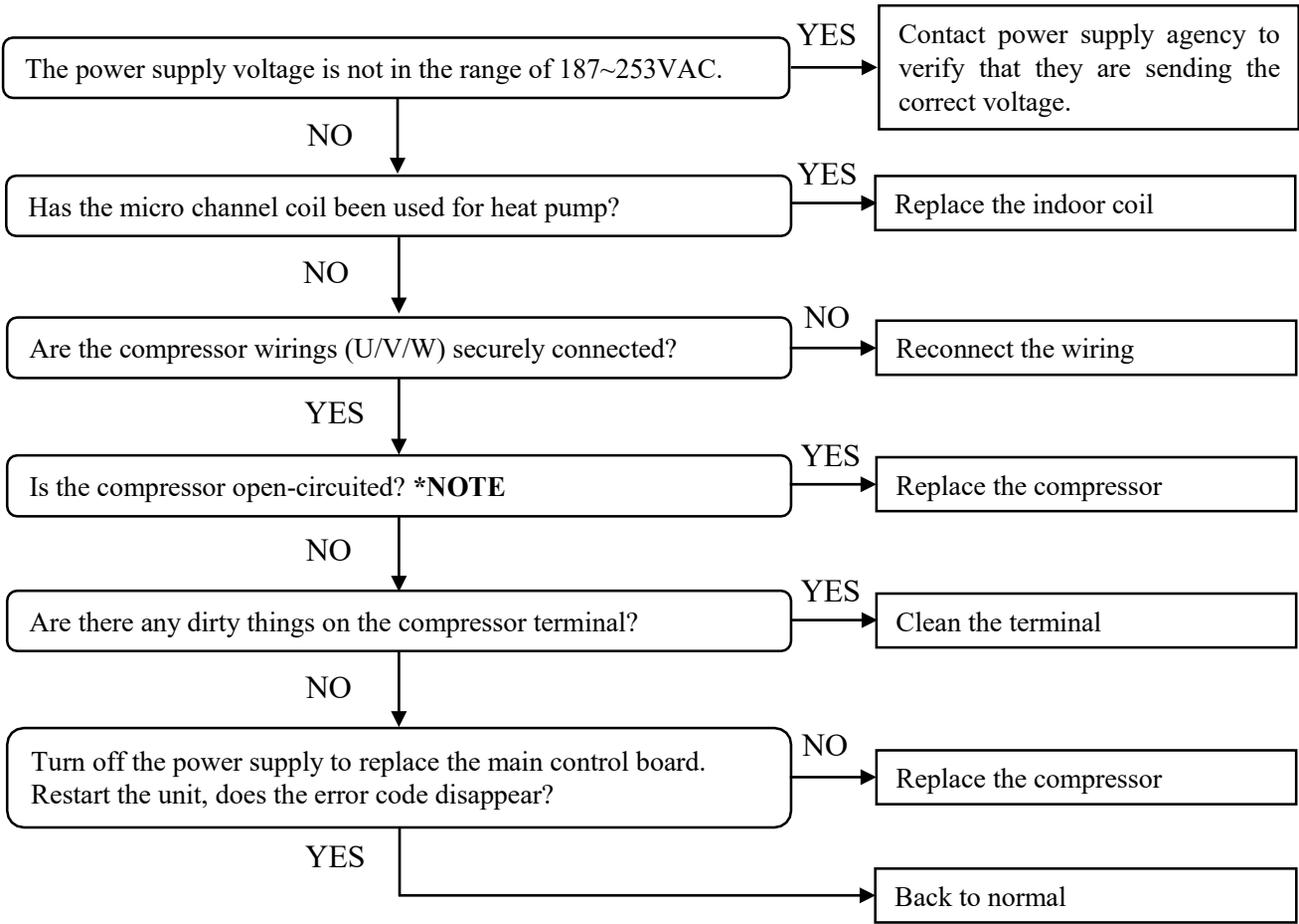
Code	LED Display	Definition
C0		Critical over-voltage fault
C1		DC bus over-voltage protection
C2		DC bus under-voltage protection
C3		Over-current protection
C4		Zero speed fault
C7		Compressor speed inconsistent fault
C9		Compressor speed difference between given transient variation and actual operation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

Display  or  ~  **Compressor INV module protection**



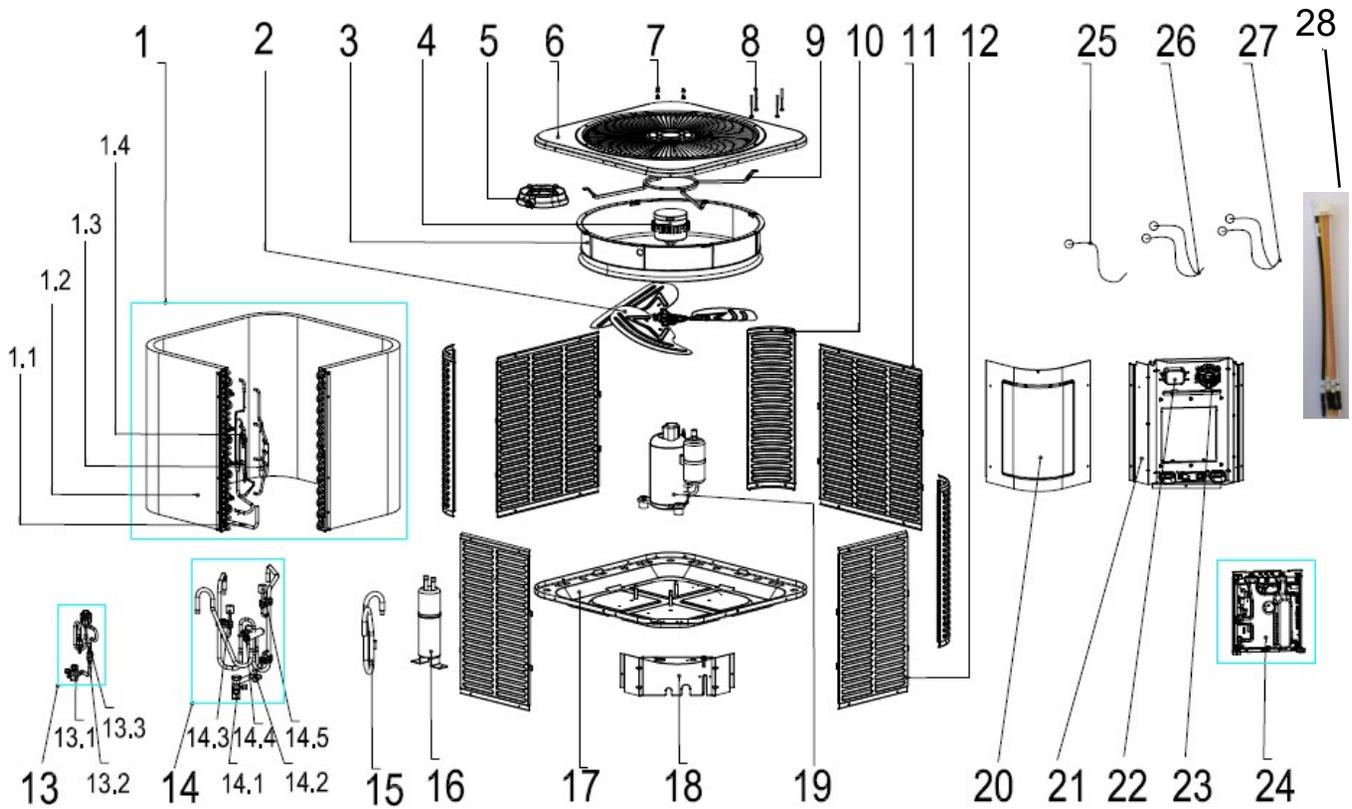
NOTE: Normal resistance for compressor

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.



4 Parts List



Model	Part Number
EODA18H-2436	F522900000
EODA18H-4860	F523100000

#	Part Name	Quantity	Parts number		Remark
			2436	4860	
1	Condenser ass'y	1	231235269	231235477	
1.1	Condenser connection pipe ass'y	1	231235268		
1.2	Condenser	1	231235270	231235271	
1.3	Condenser outlet pipe ass'y	1	231235085	231235153	
1.4	Condenser inlet pipe ass'y	1	231235084	231235154	
2	Fan	1	230801635		
3	Guide ring	1	230700850		
4	Brushless DC Motor	1	230904010		
5	Motor installation board ass'y	1	230803381		
6	Top cover ass'y	1	230803291		

#	Part Name	Quantity	Parts number		Remark
			2436	4860	
7	Cap nut	4	230803110		
8	Electrical installation bolt	4	230803111		
9	Roof support frame	1	230801628		
10	Supporting board	3	230801590B	230801609B	
11	Side board ass'y	2	230803142	230802064A	
12	Side board ass'y	2	230803143	230802065A	
13	High-pressure valve ass'y	1	231235131	231235854	
13.1	Liquid block valve	1	231231469		
13.2	Electronic expansion valve (EEV)	1	231235157	231235779	
13.3	EEV solenoid coil	1	3120290034		
14	reversing valve ass'y	1	231235265	231235155	
14.1	Gas block valve	1	231231468	3120130060	
14.2	Pipe joint ass'y	1	231235472	231235471	
14.3	High pressure sensor	1	231235159		Black color
14.4	reversing valve	1	231235077 231235079	231235078 231235079	231235077-valve body 231235078-valve body 231235079-valve coil
14.5	Low pressure sensor	1	231235158		Green color
15	Suction pipe ass'y	1	231235421	231235149	
16	Refrigerant accumulator	1	231236288	231236289	
17	Chassis Parts	1	230803293		
18	Lower side plate	1	230803138	230803139	
19	Compressor	1	231235530	231235532	
20	Upper cover plate	1	230803313	230803309	
21	Electrically controlled mounting board	1	230803312	230803310	
22	Noise filter	1	230904159		
23	PFC inductor	1	230904160	230904161	
24	Motherboard component	1	230904156	230904157	
25	Discharge Temp. sensor	1	3160130008A		TD temperature sensor
26	Pipe Temp. sensor ass'y	1	230901018		TL temperature sensor TH temperature sensor
27	Temp. sensor ass'y	1	230901233		TS temperature sensor TA temperature sensor
28	Thermostat wiring connector	1	230904254		To thermostat

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	0.53
-19	-2.2	98.84	0.56
-18	-0.4	93.21	0.58
-17	1.4	87.93	0.61
-16	3.2	82.98	0.64
-15	5	78.33	0.67
-14	6.8	73.97	0.70
-13	8.6	69.88	0.73
-12	10.4	66.03	0.77
-11	12.2	62.42	0.80
-10	14	59.02	0.84
-9	15.8	55.82	0.87
-8	17.6	52.81	0.91
-7	19.4	49.98	0.94
-6	21.2	47.32	0.98
-5	23	44.81	1.02
-4	24.8	42.45	1.06
-3	26.6	40.22	1.10
-2	28.4	38.12	1.14
-1	30.2	36.15	1.18
0	32	34.28	1.22
1	33.8	32.52	1.26
2	35.6	30.86	1.30
3	37.4	29.29	1.34
4	39.2	27.81	1.38
5	41	26.42	1.42
6	42.8	25.10	1.46
7	44.6	23.85	1.51
8	46.4	22.67	1.55
9	48.2	21.56	1.59
10	50	20.50	1.63
11	51.8	19.51	1.67
12	53.6	18.56	1.71
13	55.4	17.67	1.75
14	57.2	16.83	1.79
15	59	16.03	1.83
16	60.8	15.27	1.87
17	62.6	14.55	1.91
18	64.4	13.87	1.95
19	66.2	13.23	1.99
20	68	12.62	2.02
21	69.8	12.04	2.06

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
22	71.6	11.49	2.10
23	73.4	10.97	2.13
24	75.2	10.47	2.17
25	77	10.00	2.20
26	78.8	9.55	2.23
27	80.6	9.13	2.27
28	82.4	8.73	2.30
29	84.2	8.35	2.33
30	86	7.98	2.36
31	87.8	7.64	2.39
32	89.6	7.31	2.42
33	91.4	6.99	2.44
34	93.2	6.70	2.47
35	95	6.41	2.50
36	96.8	6.14	2.52
37	98.6	5.89	2.55
38	100.4	5.64	2.57
39	102.2	5.41	2.60
40	104	5.19	2.62
41	105.8	4.97	2.64
42	107.6	4.77	2.66
43	109.4	4.58	2.69
44	111.2	4.39	2.71
45	113	4.22	2.73
46	114.8	4.05	2.74
47	116.6	3.89	2.76
48	118.4	3.74	2.78
49	120.2	3.59	2.80
50	122	3.45	2.81
51	123.8	3.32	2.83
52	125.6	3.19	2.85
53	127.4	3.07	2.86
54	129.2	2.95	2.88
55	131	2.84	2.89
56	132.8	2.73	2.90
57	134.6	2.63	2.92
58	136.4	2.53	2.93
59	138.2	2.44	2.94
60	140	2.35	2.95
61	141.8	2.26	2.96
62	143.6	2.18	2.98
63	145.4	2.10	2.99

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
64	147.2	2.02	3.00
65	149	1.95	3.01
66	150.8	1.88	3.02
67	152.6	1.81	3.03
68	154.4	1.75	3.04
69	156.2	1.68	3.04
70	158	1.63	3.05
71	159.8	1.57	3.06
72	161.6	1.51	3.07
73	163.4	1.46	3.08
74	165.2	1.41	3.08
75	167	1.36	3.09
76	168.8	1.31	3.10
77	170.6	1.27	3.10
78	172.4	1.23	3.11
79	174.2	1.19	3.12
80	176	1.15	3.12
81	177.8	1.11	3.13
82	179.6	1.07	3.13
83	181.4	1.03	3.14
84	183.2	1.00	3.14
85	185	0.97	3.15
86	186.8	0.94	3.15
87	188.6	0.91	3.16
88	190.4	0.88	3.16
89	192.2	0.85	3.17
90	194	0.82	3.17
91	195.8	0.80	3.17
92	197.6	0.77	3.18
93	199.4	0.75	3.18
94	201.2	0.72	3.18
95	203	0.70	3.19
96	204.8	0.68	3.19
97	206.6	0.66	3.19
98	208.4	0.64	3.20
99	210.2	0.62	3.20
100	212	0.60	3.20
101	213.8	0.59	3.21
102	215.6	0.57	3.21
103	217.4	0.55	3.21
104	219.2	0.54	3.21
105	221	0.52	3.22

Remarks:

Above table shows the average resistance corresponding to the temperature.

Resistance tolerance is $\pm 6\%$.

Temperature sensor B* (TF, TD)

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
-20	-4	517.84	0.27
-19	-2.2	489.93	0.29
-18	-0.4	463.65	0.30
-17	1.4	438.89	0.32
-16	3.2	415.57	0.34
-15	5	393.59	0.35
-14	6.8	372.87	0.37
-13	8.6	353.34	0.39
-12	10.4	334.92	0.41
-11	12.2	317.55	0.43
-10	14	301.16	0.45
-9	15.8	285.70	0.47
-8	17.6	271.10	0.49
-7	19.4	257.33	0.51
-6	21.2	244.32	0.53
-5	23	232.03	0.56
-4	24.8	220.42	0.58
-3	26.6	209.45	0.60
-2	28.4	199.08	0.63
-1	30.2	189.27	0.66
0	32	180.00	0.68
1	33.8	171.23	0.71
2	35.6	162.93	0.74
3	37.4	155.07	0.77
4	39.2	147.63	0.80
5	41	140.59	0.83
6	42.8	133.92	0.86
7	44.6	127.60	0.89
8	46.4	121.60	0.92
9	48.2	115.93	0.95
10	50	110.54	0.98
11	51.8	105.43	1.02
12	53.6	100.59	1.05
13	55.4	95.99	1.08
14	57.2	91.62	1.12
15	59	87.48	1.15
16	60.8	83.54	1.19
17	62.6	79.80	1.22
18	64.4	76.25	1.26
19	66.2	72.87	1.29
20	68	69.66	1.33
21	69.8	66.61	1.37
22	71.6	63.70	1.40
23	73.4	60.94	1.44
24	75.2	58.31	1.47
25	77	55.81	1.51
26	78.8	53.42	1.54
27	80.6	51.15	1.58
28	82.4	48.99	1.62
29	84.2	46.93	1.65
30	86	44.97	1.69

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
31	87.8	43.10	1.72
32	89.6	41.31	1.76
33	91.4	39.61	1.79
34	93.2	37.99	1.82
35	95	36.44	1.86
36	96.8	34.96	1.89
37	98.6	33.55	1.93
38	100.4	32.21	1.96
39	102.2	30.92	1.99
40	104	29.69	2.02
41	105.8	28.52	2.05
42	107.6	27.40	2.08
43	109.4	26.32	2.12
44	111.2	25.30	2.15
45	113	24.32	2.17
46	114.8	23.38	2.20
47	116.6	22.49	2.23
48	118.4	21.63	2.26
49	120.2	20.81	2.29
50	122	20.02	2.31
51	123.8	19.27	2.34
52	125.6	18.55	2.37
53	127.4	17.86	2.39
54	129.2	17.20	2.42
55	131	16.57	2.44
56	132.8	15.96	2.46
57	134.6	15.38	2.49
58	136.4	14.82	2.51
59	138.2	14.29	2.53
60	140	13.77	2.55
61	141.8	13.28	2.57
62	143.6	12.81	2.59
63	145.4	12.36	2.61
64	147.2	11.92	2.63
65	149	11.51	2.65
66	150.8	11.11	2.67
67	152.6	10.72	2.69
68	154.4	10.35	2.70
69	156.2	10.00	2.72
70	158	9.66	2.74
71	159.8	9.33	2.75
72	161.6	9.01	2.77
73	163.4	8.71	2.78
74	165.2	8.42	2.80
75	167	8.14	2.81
76	168.8	7.87	2.83
77	170.6	7.61	2.84
77	170.6	7.36	2.85
78	172.4	7.12	2.87
79	174.2	6.89	2.88
80	176	6.86	2.88

Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
81	177.8	6.67	2.89
82	179.6	6.46	2.90
83	181.4	6.25	2.91
84	183.2	6.05	2.92
85	185	5.86	2.93
86	186.8	5.68	2.94
87	188.6	5.50	2.95
88	190.4	5.33	2.96
89	192.2	5.16	2.97
90	194	5.00	2.98
91	195.8	4.85	2.99
92	197.6	4.70	3.00
93	199.4	4.55	3.01
94	201.2	4.42	3.02
95	203	4.28	3.02
96	204.8	4.15	3.03
97	206.6	4.03	3.04
98	208.4	3.91	3.05
99	210.2	3.79	3.05
100	212	3.68	3.06
101	213.8	3.57	3.07
102	215.6	3.46	3.07
103	217.4	3.36	3.08
104	219.2	3.26	3.09
105	221	3.17	3.09
106	222.8	3.09	3.10
107	224.6	3.00	3.10
108	226.4	2.92	3.11
109	228.2	2.84	3.11
110	230	2.76	3.12
111	231.8	2.68	3.12
112	233.6	2.60	3.13
113	235.4	2.53	3.13
114	237.2	2.46	3.14
115	239	2.39	3.14
116	240.8	2.33	3.14
117	242.6	2.26	3.15
118	244.4	2.20	3.15
119	246.2	2.14	3.16
120	248	2.08	3.16
121	249.8	2.03	3.16
122	251.6	1.97	3.17
123	253.4	1.92	3.17
124	255.2	1.87	3.17
125	257	1.82	3.18
126	258.8	1.77	3.18
127	260.6	1.72	3.18
128	262.4	1.68	3.19
129	264.2	1.63	3.19
130	266	1.59	3.19

Remarks:

Above table shows the average resistance corresponding to the temperature.

Resistance tolerance is $\pm 12\%$.

Low Pressure Sensor Voltage Characteristics C*

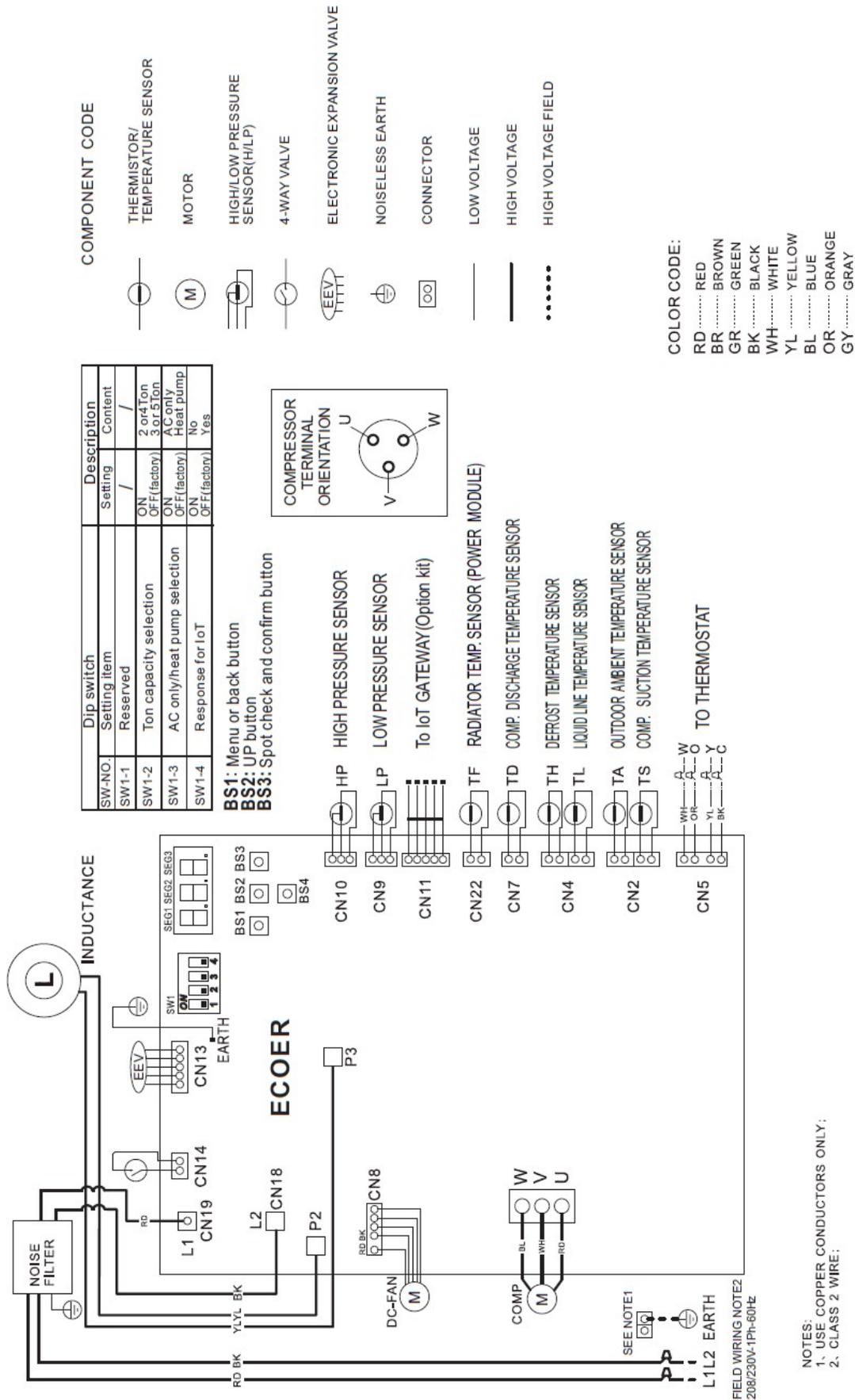
Low pressure (MPa)	Low pressure (psig)	Resistance (KΩ)	Output voltage(V)
0.10	14.5	49.51	0.70
0.11	16	47.91	0.72
0.12	17.4	46.40	0.74
0.13	18.9	44.97	0.76
0.14	20.3	43.61	0.78
0.15	21.8	42.32	0.80
0.16	23.2	41.09	0.82
0.17	24.7	39.92	0.84
0.18	26.1	38.80	0.86
0.19	27.6	37.74	0.88
0.21	30.5	35.74	0.92
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



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EODA18H-4860

High Voltage: Disconnect all power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury, or death. Wiring is subject to change. Always refer to the wiring diagram or the unit for the most up-to-date wiring.

WARNING

- NOTES:**
1. USE COPPER CONDUCTORS ONLY.
 2. CLASS 2 WIRE.

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