ESI (Ultra) Unitary Service Manual

Contents

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

IMPORTANT

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

1 General Information

Condensing Unit

E	OD	A	18	H	-	4860
1	2	3	4	5		6

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 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=24000BTU/h=2Ton; 36=36000BTU/h=3Ton;
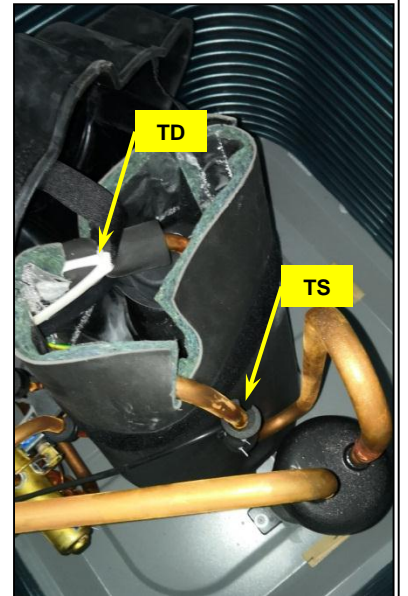
48=48000BTU/h=4Ton; 60=60000BTU/h=5Ton.

2 ESI (Ultra) Unitary System

2.1 Refrigerant Circuit

2.1.1 Functional Parts Layout of Condensing Units

EODA18H-2436
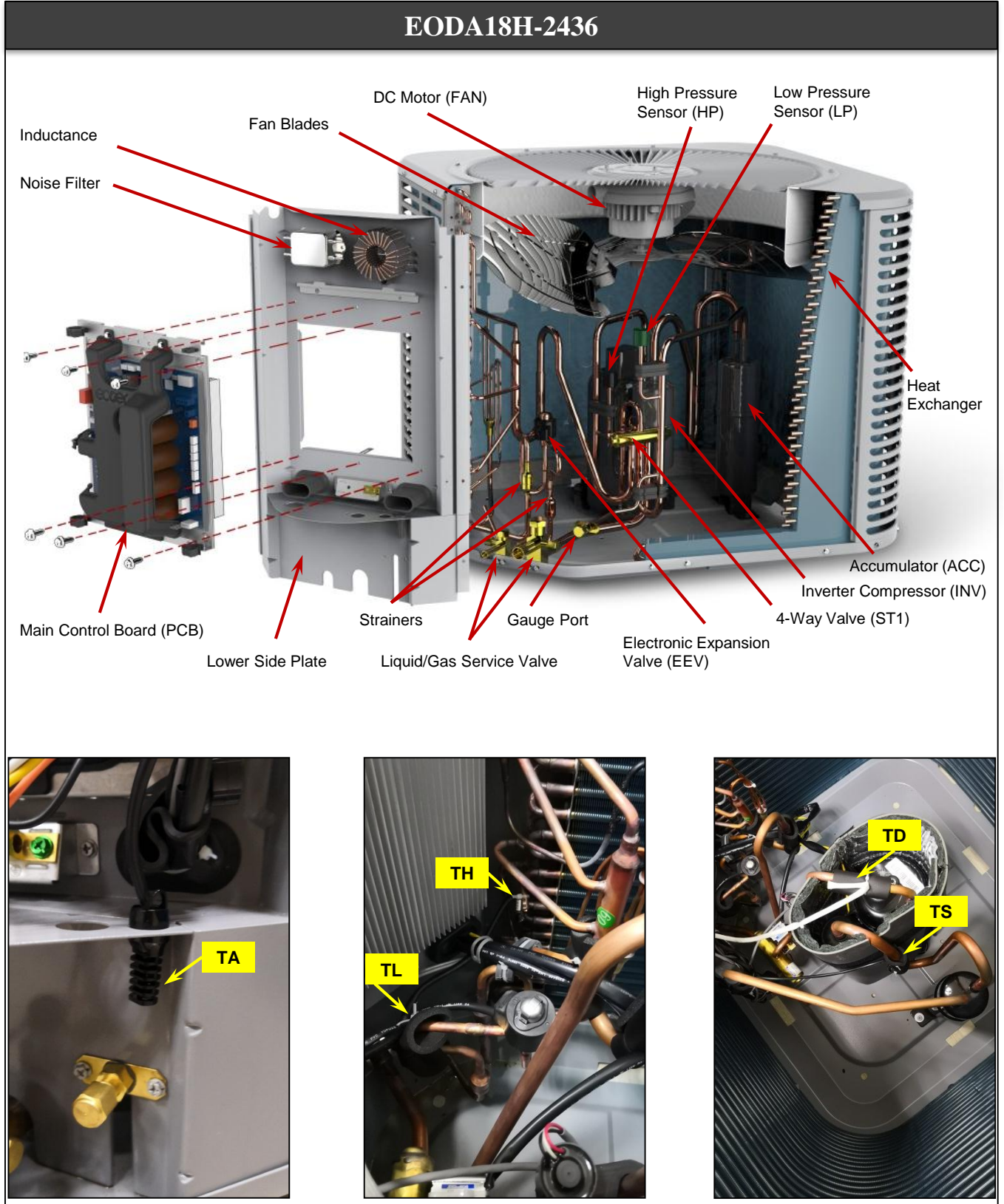
EODA18H-4860
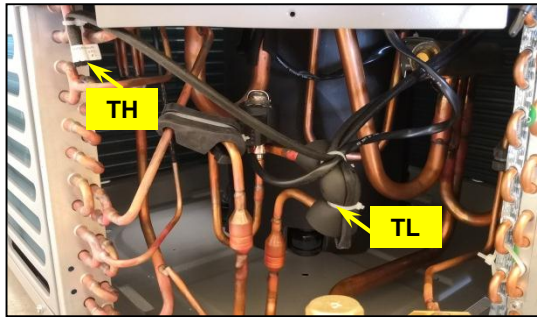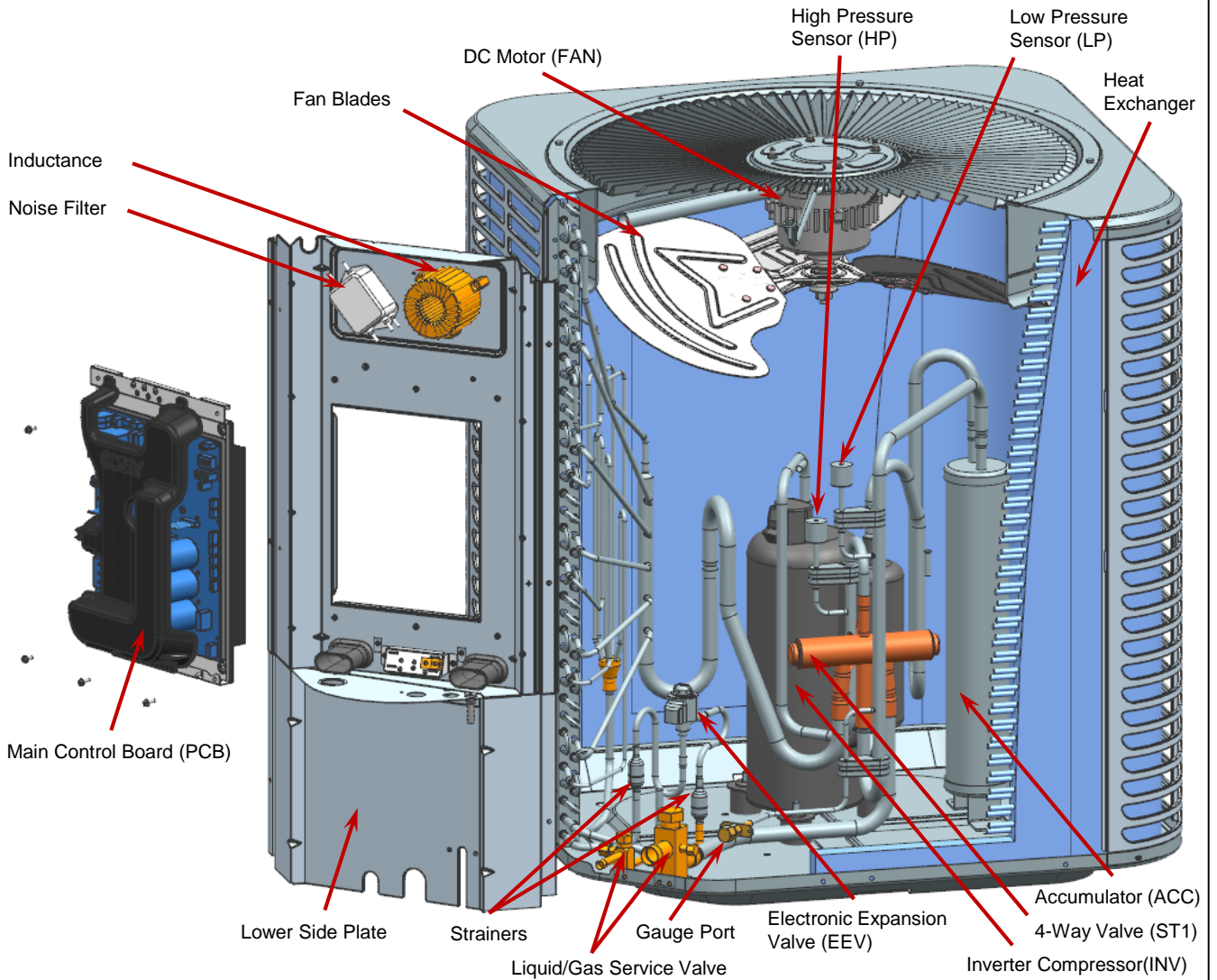
TIPS:
Remove 5 screws to take away the lower side plate to access TH/TL sensor.

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

2.1.2 Major Components Functions and Refrigerant Circuits Diagram
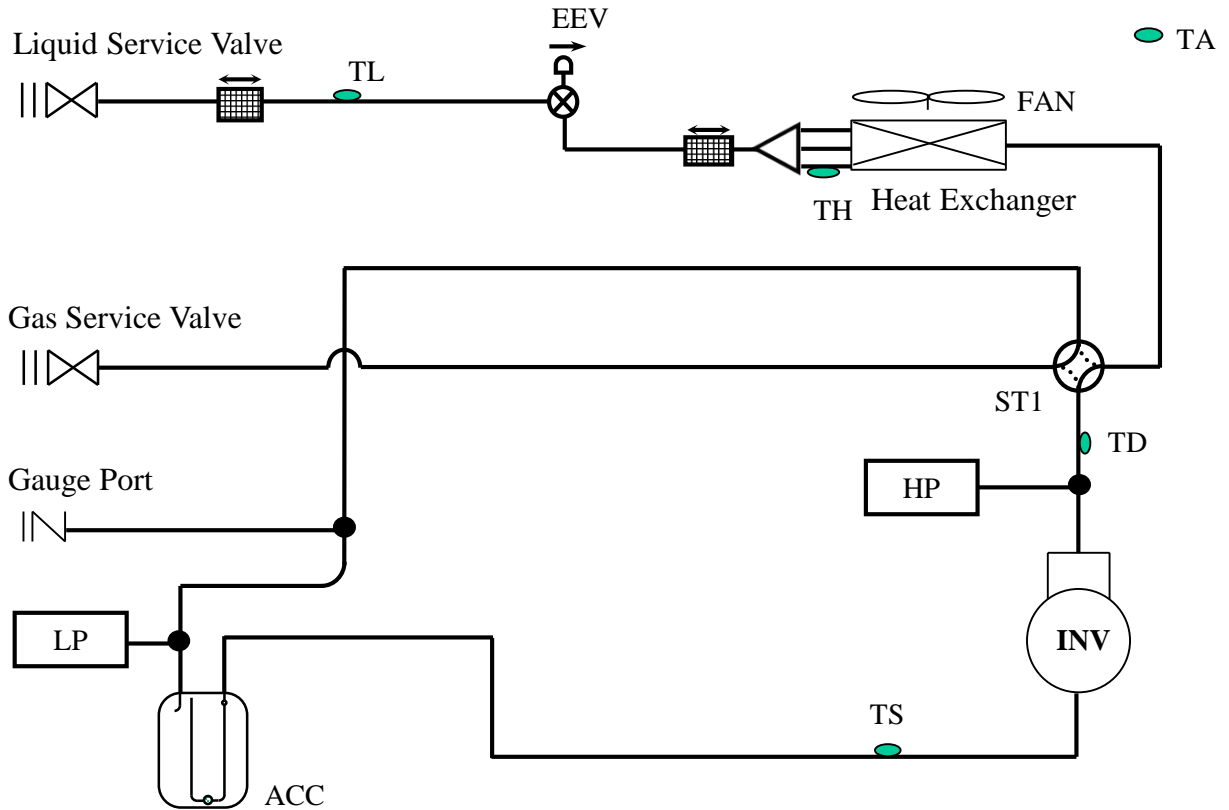
Name	Symbol	Function
Inverter compressor	INV	Adjusts refrigerant flow rate by changing the speed (RPS) based on objective pressure.
DC motor	FAN	Outputs heat exchanger capacity by adjusting the motor rotation speed based on operating pressure.
Electronic expansion valve	EEV	1) Fully open during cooling 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

Cooling Operation (including defrost operation and cooling oil return)

TXV

Liquid Service Valve   TL

EEV

TA

Heat Exchanger

FAN

TH   Heat Exchanger

Gas Service Valve

ST1

TD

Gauge Port

HP

Strainer

INV

High pressure Gas
High pressure Liquid
Low pressure Gas
Low pressure Mix.

LP

TS

ACC
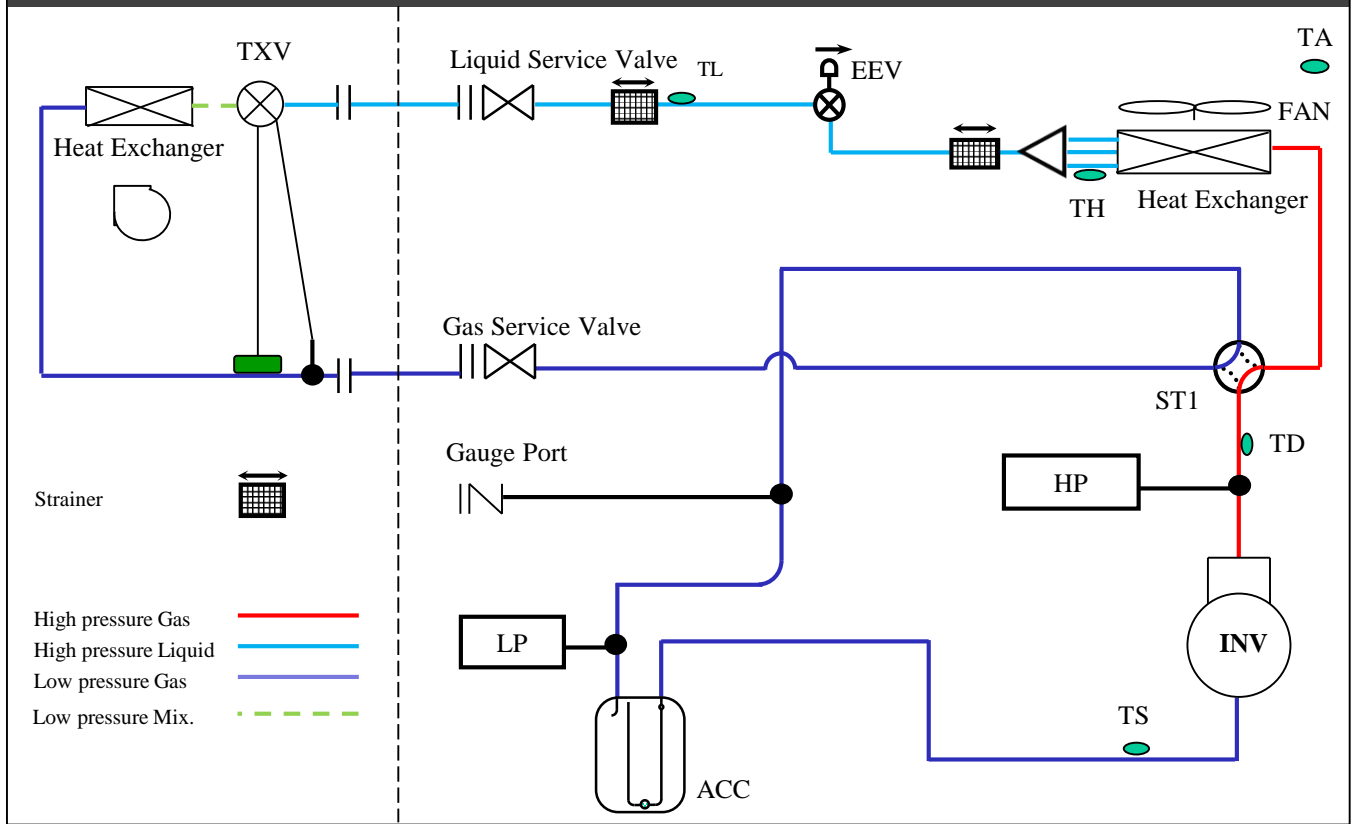
Heating Operation (including heating oil return)

TXV

Liquid Service Valve   TL

EEV

TA

Heat Exchanger

FAN

TH   Heat Exchanger

Gas Service Valve

ST1

TD

Gauge Port

HP

Strainer

INV

High pressure Gas
High pressure Liquid
Low pressure Gas
Low pressure Mix.

LP

TS

ACC
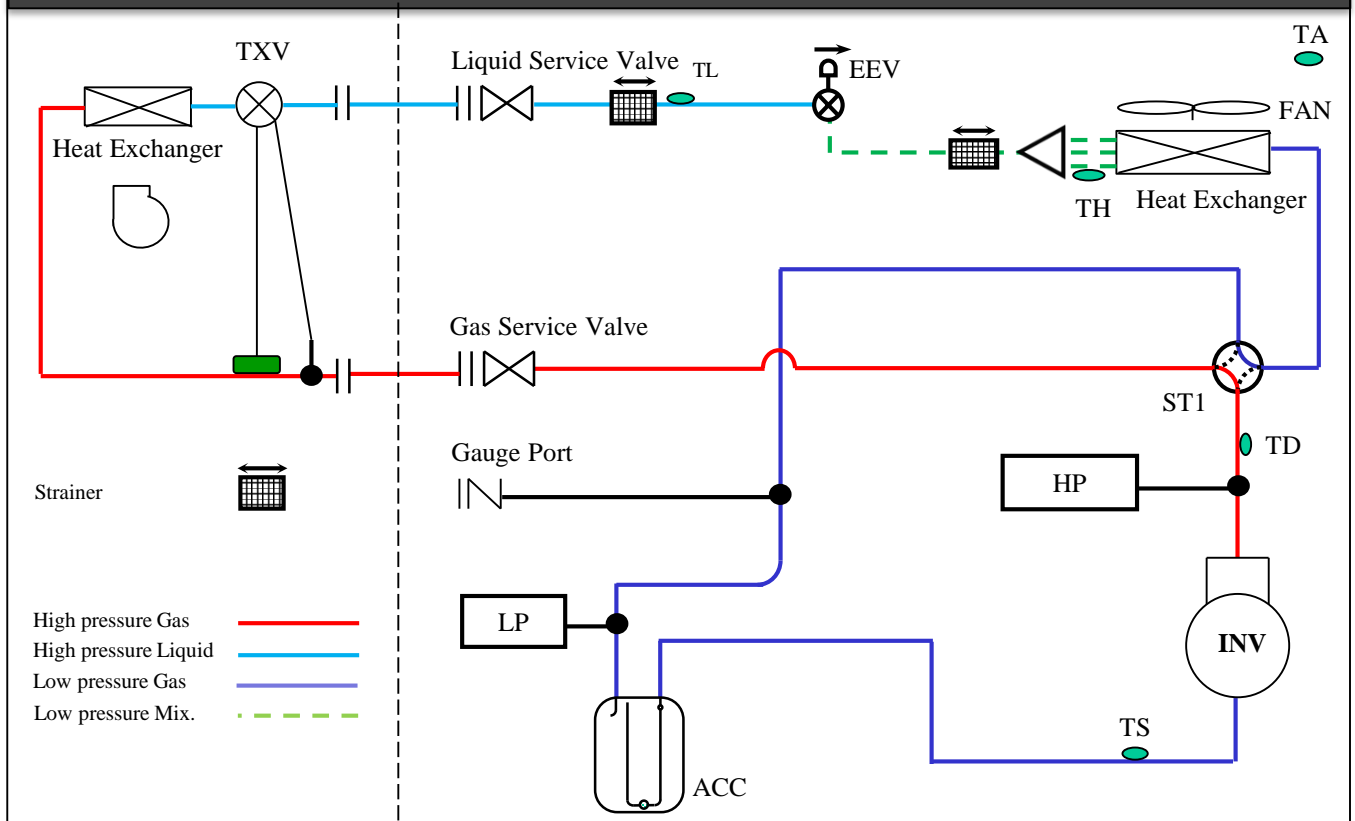
2.2 Function and Control
2.2.1 Operation Mode

After 1 minute

Operation in stop mode

Thermostat ON (Y=ON)

- Thermostat OFF (Y=OFF)

- O signal change

Pressure equalizing prior to start-up

Restart standby (compressor stops)

MAX. 6 minutes

Malfunction

Start-up control ***NOTE**
· Cooling start-up (O=ON)
· Heating start-up (O=OFF)

Cooling or heating operation

Normal operation
- Compressor PI control
- EEV PI control
- Fan motor control
- Protection control

Oil return IN conditions are met. — YES → Oil return operation ***NOTE**

NO

Defrost IN conditions are met. — YES → Defrost operation ***NOTE**

NO

Remarks:
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	Outdoor fan (FAN)	Cooling fan control	Heating fan control
O[2]	Reversing valve (ST1)	De-energized	**Energized (208/230Vac)**
Y/O	Electronic expansion valve (EEV)	480pls	PI control to maintain discharge superheat (DSH)

Remarks:
1. Tes: Target Te value (Varies depending on load of the space, mode choice, silent setting, etc.)
   Te: Low pressure equivalent saturation temperature ($^\circ$F)
   Tcs: Target Tc value (Varies depending on load of the space, mode choice, silent setting, etc.)
   Tc: High pressure equivalent saturation temperature ($^\circ$F)

2. SW1_3=OFF (factory), condensing unit uses Y/C/O (O for cooling) signal to operate heat pump function.
   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 $\leq 30^\circ$F, Delta T = 18°F
   b) 19°F $\leq$ TA $\leq 41^\circ$F, TH $\leq 30^\circ$F, Delta T = $12 \sim 18^\circ$F
   c) TA < 19°F, TH < 9°F, accumulative compressor run time $\geq$ 80 minutes

   TH backup running, TA < 59°F and LP $\leq$ 90psi, accumulative compressor run time $\geq$ 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 $\leq$ TA < 43°F
III. The high pressure drops below 245psi for 20 minutes when 14°F $\leq$ TA $\leq 28^\circ$F.
IV. Manual defrosting can be chosen from n08 setting (forced defrost).
   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) <u>Defrost in heavy snow area</u> will extend defrost for 60 seconds, but reduce the heating time to execute more defrost operations.
   b) <u>Defrost in light snow area</u> will reduce defrost for 30 seconds.

2.2.2.3 AUTO charge mode and pump down function

Actuator	AUTO charge mode 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
Electronic expansion valve (EEV)	480pls	PI control to maintain discharge superheat

AUTO charge mode locks the compressor frequency 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.

$6{\sim}18°F$ / **SC**
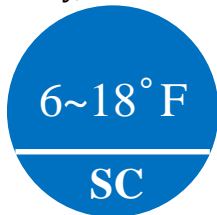
Target values in cooling mode

$7{\sim}20°F$ / **SH**

- 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. Adjust TXV opening to allow more refrigerant flow into indoor coil if SH is still larger than 20$°F$. Open the front panel of the indoor unit, then remove the TXV nut and use a wrench to **counterclockwise** the TXV until SH ≤ 20$°F$.

Pump down locks the compressor frequency in heating.
Hold and press BS4 button for 5 seconds after set heating mode from thermostat, press BS2 button in one minute to enter pump down function. The low pressure will be displayed on the LED of main control board.
*NOTE Low pressure protection is valid if LP <24.5psig.

BS1　BS2　BS3

BS4

SEG1　SEG2　SEG3

SEG1　SEG2　SEG3
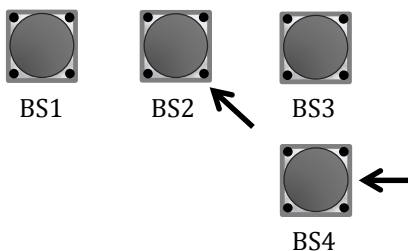
2.2.2.4 Compressor control

```
┌─────────────────────┐                          ┌─────────────────────┐
│ Standby             ╲                           │ PI control          ╲
└─────────────────────┘                          └─────────────────────┘
MAX 6 minutes for pressure                        Depending on the load of the space.
equalization
┌─────────────────────┐                          ┌─────────────────────┐
│ Start-up control    ╲                           │ Directive control   ╲
└─────────────────────┘                          └─────────────────────┘
```

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

Fixed speed
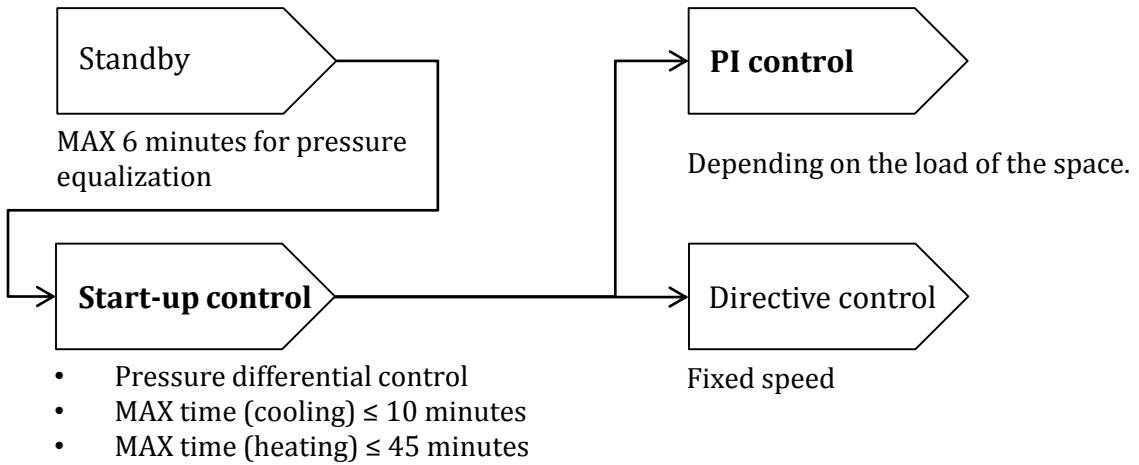
[Compressor RPS STEP]

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

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

2.2.2.5 Fan control

```
┌─────────────────────┐                          ┌─────────────────────┐
│ Standby after       ╲                           │ Pressure control    ╲
│ getting start signal │                          └─────────────────────┘
└─────────────────────┘
MAX STEP                                          - Cooling fan control by high pressure
                                                  - Heating fan control by low pressure
┌─────────────────────┐                          ┌─────────────────────┐
│ Start-up control    ╲                           │ Directive control   ╲
└─────────────────────┘                          └─────────────────────┘
```

Fixed rotation speed
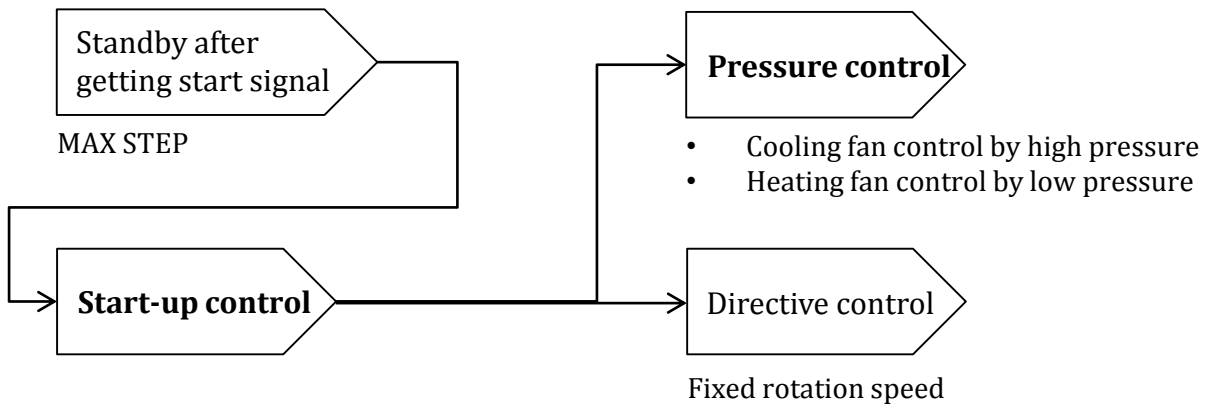
[FAN RPM STEP]

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

2.2.2.6 Electronic expansion valve(EEV) control

Standby after getting start signal

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

Start-up control

- Cooling: 480pls
- Heating: Temperature differential control

PI control

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

Directive control

Fixed opening

$$25\sim50^{\circ}\text{F}$$
DSH
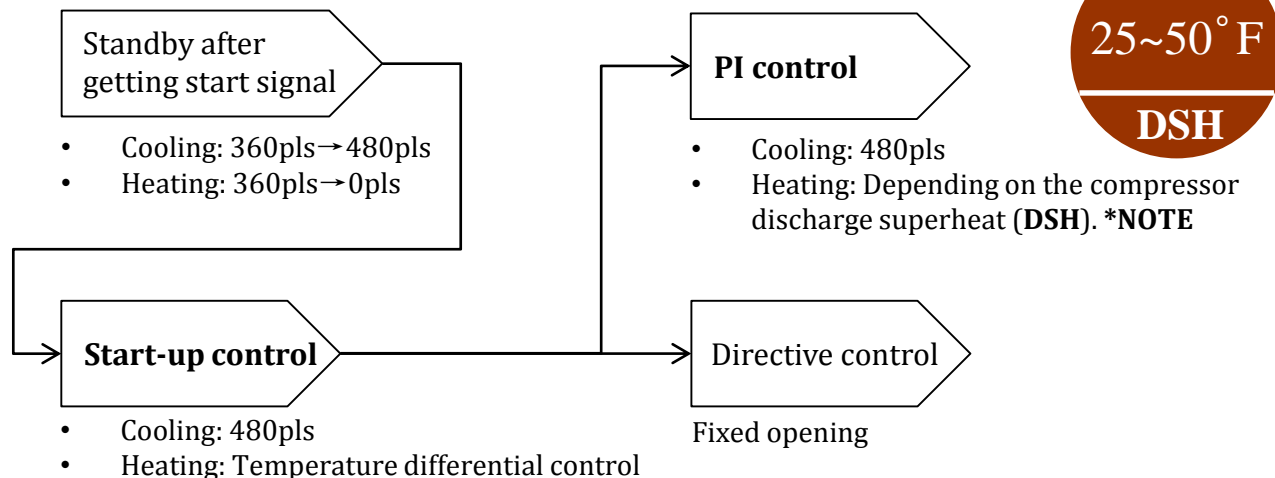
NOTE: Heating DSH should be between 25 ° F and 50 ° F with proper refrigerant charge.
- **Overcharged:** DSH is smaller than 18 ° F when the EEV opening < 72pls.
- **Undercharged:** DSH is bigger than 50 ° F when the EEV opening ≥ 460pls

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.

Max compressor frequency

Cooling Max Compressor RPS			
Condensing Unit	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			
Condensing Unit	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

Max fan speed

Max Fan Speed (RPM)			
Condensing Unit	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

2.2.3. 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.

```
                    ┌─────────────────────────────────────────┐
                    │          Normal operation                │
                    │ (Upper limit compressor step=Max.step)   │
                    └─────────────────────────────────────────┘
          HP≥C            HP<D                      HP<D

                    ┌─────────────────────────────────────┐
                    │ Upper limit compressor step=Current step │
                    └─────────────────────────────────────┘

                            HP≥B

        ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                    ┌──────────────────────┐
        │           │ Upper limit compressor│◄──┐       │
                    │  step: Decrease 2step │    │
        │           └──────────────────────┘    │       │
          After 15 sec.                       HP≥B
        │                                        │       │
                    ┌──────────────────────┐     │
        │           │ Current step maintained│───┘       │
                    └──────────────────────┘
        └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

                            HP≥A

                    ┌──────────────────────────────┐
                    │ High pressure abnormal standby │
                    └──────────────────────────────┘

        ┌ HP<D
   and  │
        └ Restart permission=ON

                    ┌──────────────────────┐
                    │   Compressor restarts  │
                    └──────────────────────┘
```
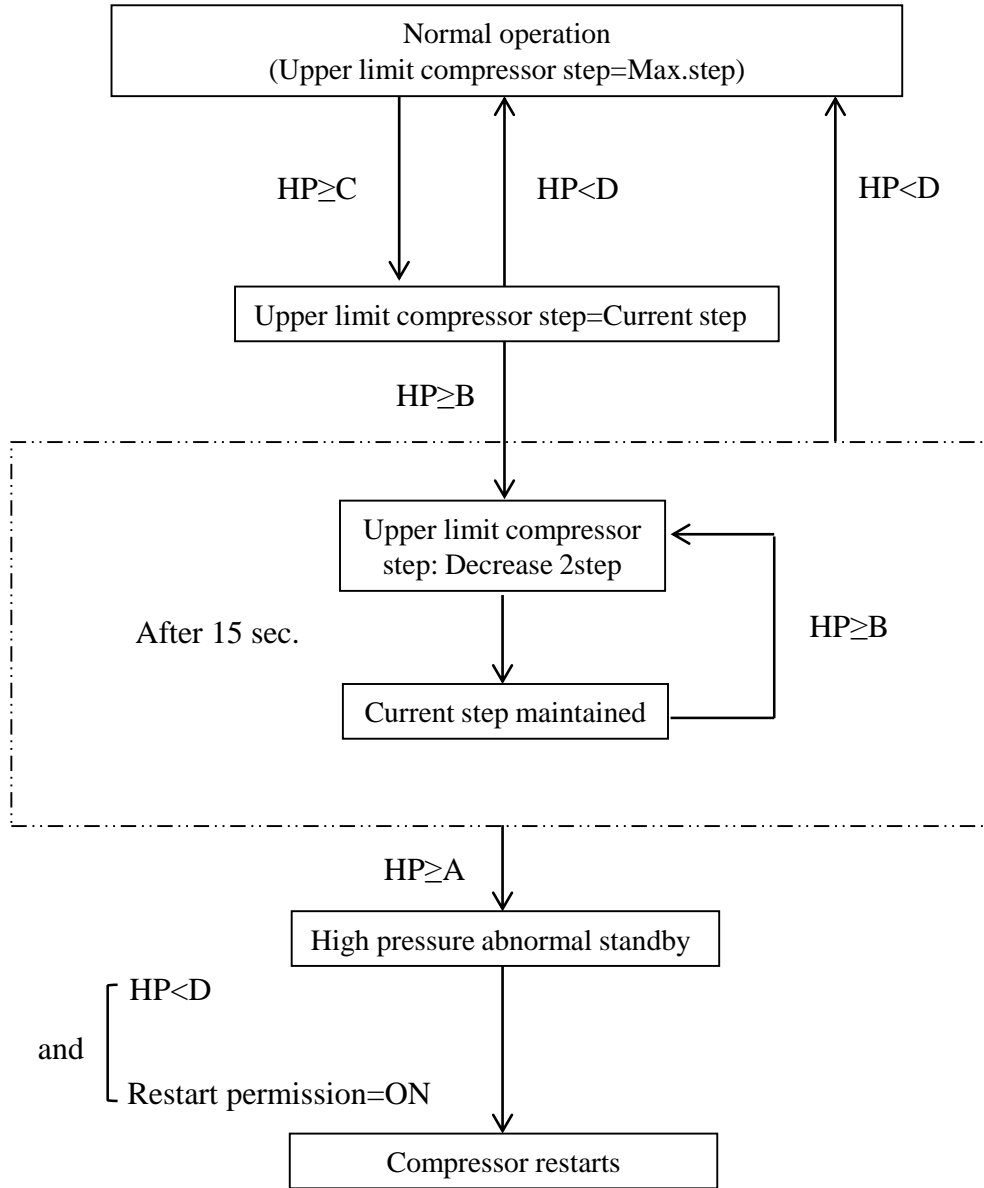
Symbol	EODA18H-2436/4860	
	Cooling	**Heating**
A	545psig [3.8MPa]	545psig [3.8MPa]
B	493psig [3.4MPa]	479psig [3.3MPa]
C	479psig [3.3MPa]	450psig [3.1MPa]
D	464psig [3.2MPa]	421psig [2.9MPa]

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.

```
┌─────────────────────────────────────────────┐
│              Normal operation                │
│   (Upper limit compressor step=Max.step)     │
└─────────────────────────────────────────────┘

      LP<C              LP≥D              LP≥D

┌─────────────────────────────────────────┐
│   Upper limit compressor step=Current step │
└─────────────────────────────────────────┘

                  LP<B

┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐

   ┌───────────────────────┐
   │  Upper limit compressor │◄───┐
   │  step: Decrease 2steps  │    │
   └───────────────────────┘    │
                                  LP<B
   After 15 sec.                  │
   ┌───────────────────────┐    │
   │  Current step maintained │────┘
   └───────────────────────┘

└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

                  LP<A

┌───────────────────────────────┐
│   Low pressure abnormal standby │
└───────────────────────────────┘

      LP≥D
  and
      Restart permission=ON

┌───────────────────────────────┐
│        Compressor restarts      │
└───────────────────────────────┘
```
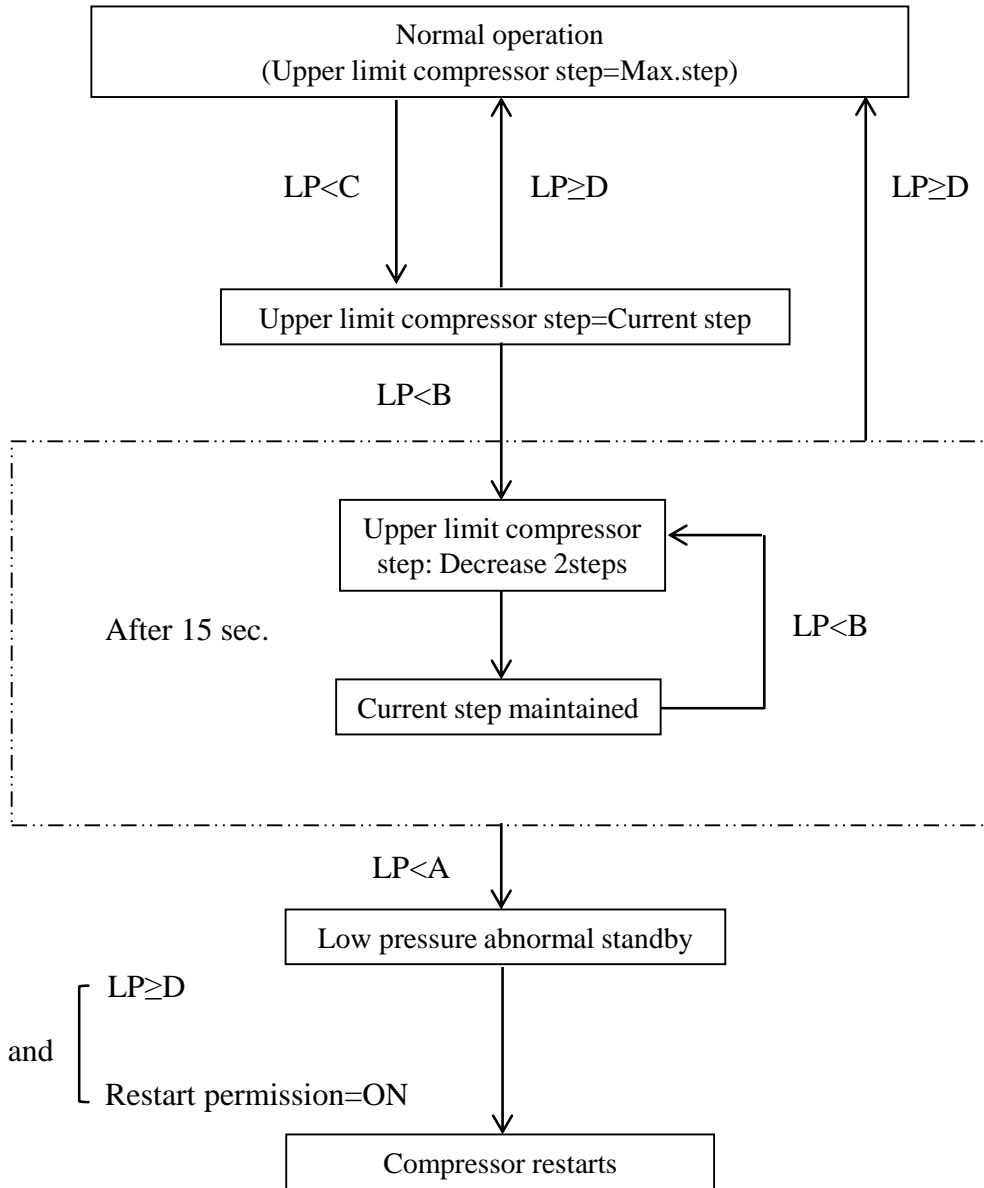
Symbol	EODA18H-2436/4860
A	24.5psig [0.17MPa]
B	43.5psig [0.30MPa]
C	61.0psig [0.42MPa]
D	72.5psig [0.50MPa]

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.

```
                    ┌────────────────────────────────────────────┐
                    │             Normal operation               │
                    │   (Upper limit compressor step=Max.step)    │
                    └────────────────────────────────────────────┘
           TD≥C              TD<D                        TD<D

                    ┌────────────────────────────────────────┐
                    │  Upper limit compressor step=Current step │
                    └────────────────────────────────────────┘

                              TD≥B

      ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                    ┌────────────────────────┐
      │             │  Upper limit compressor │                 │
                    │  step: Decrease 2steps  │
      │             └────────────────────────┘                 │
         After 15 sec.                          TD≥B
      │             ┌────────────────────────┐                 │
                    │ Current step maintained │
      │             └────────────────────────┘                 │
      └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘

                              TD≥A

                    ┌────────────────────────────────────────┐
                    │   Discharge temperature abnormal standby  │
                    └────────────────────────────────────────┘
           ┌ TD<D
      and  │
           └ Restart permission=ON
                    ┌────────────────────────┐
                    │   Compressor restarts   │
                    └────────────────────────┘
```
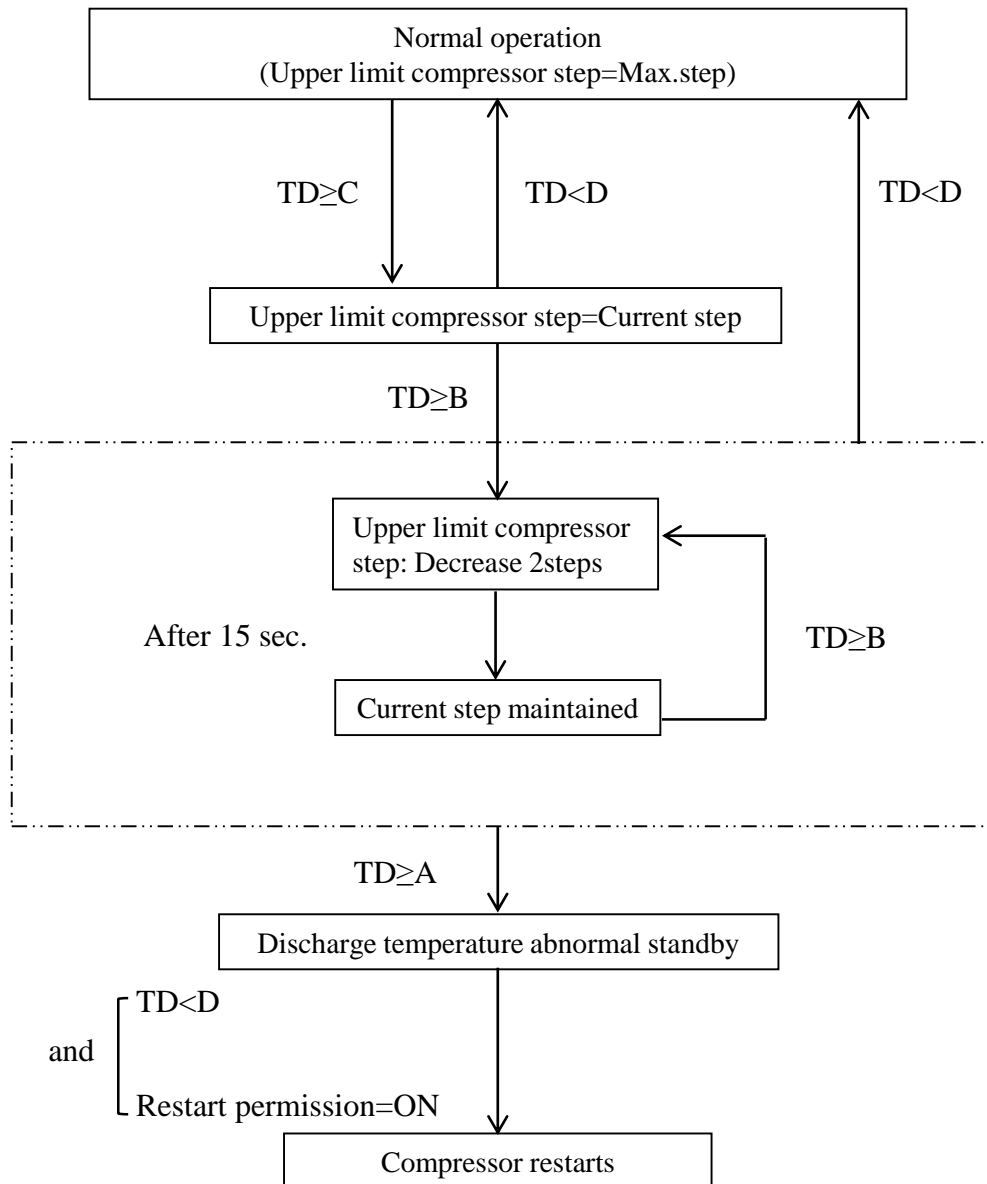
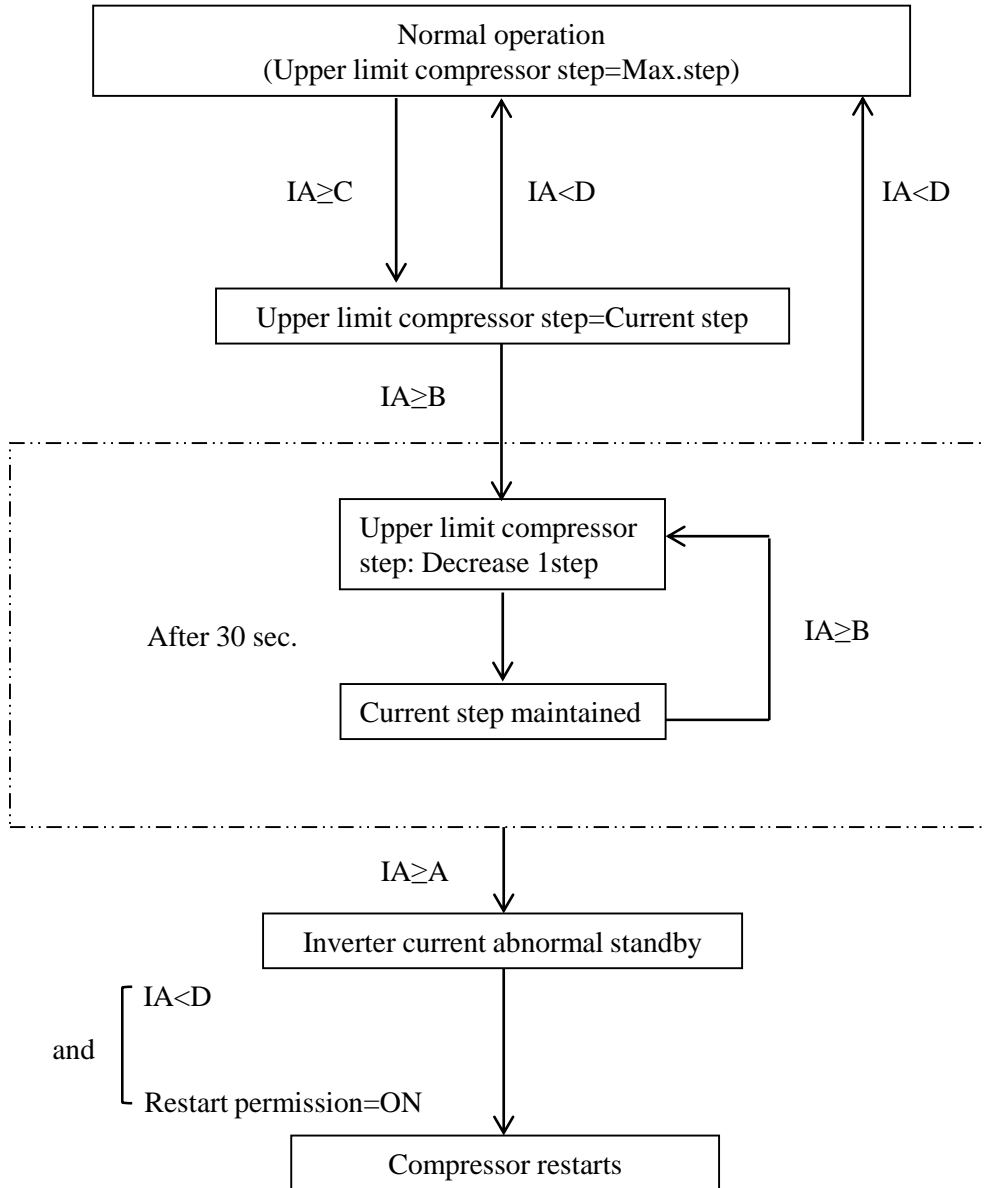| Symbol	EODA18H-2436/4860	
	Cooling	**Heating**
A	248°F (120°C)	230°F (110°C)
B	230°F (110°C)	212°F (100°C)
C	212°F (100°C)	194°F (90°C)
D	194°F (90°C)	176°F (80°C)

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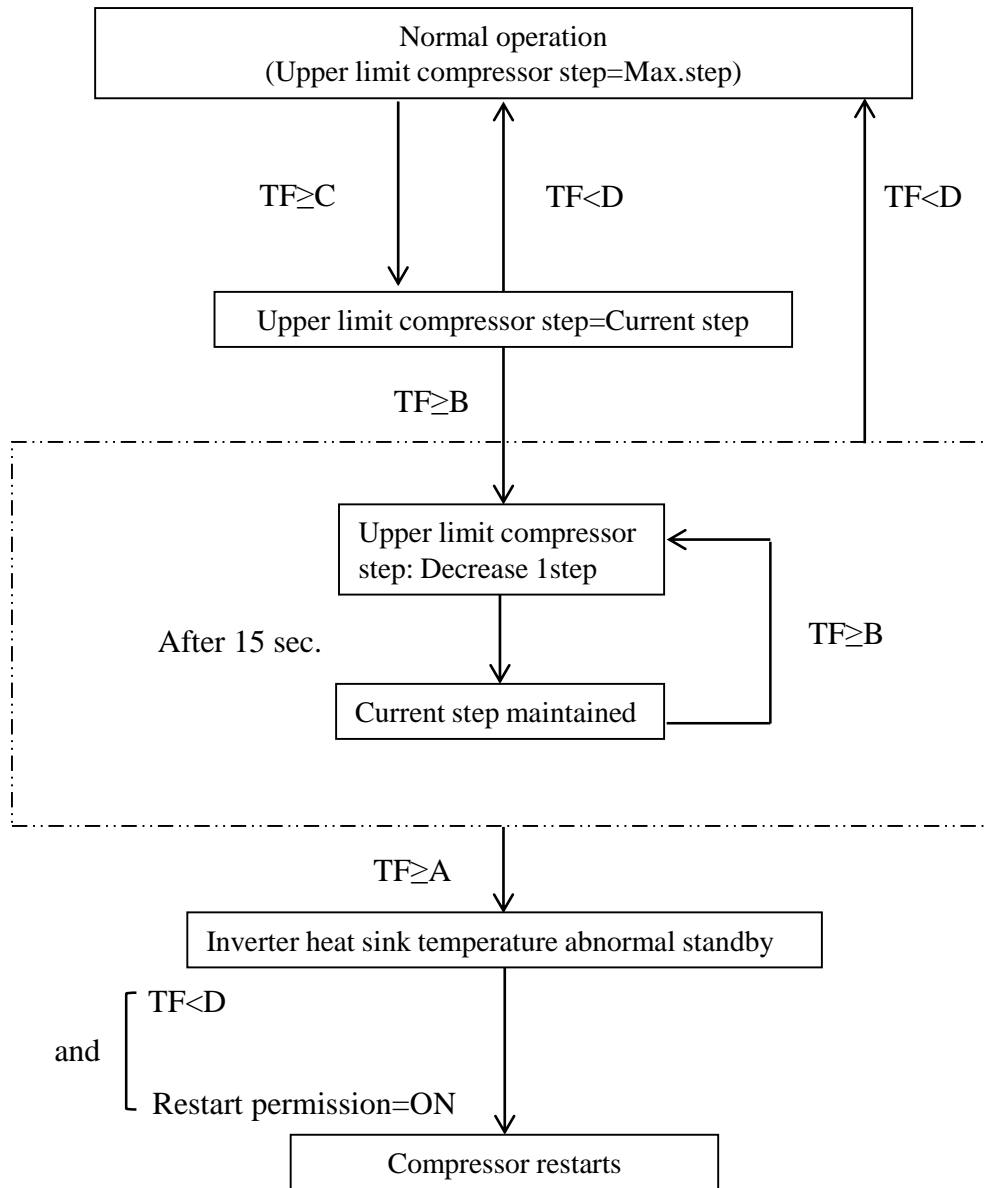
Symbol	EODA18H-2436		EODA18H-4860	
	Cooling	Heating	Cooling	Heating
A	181°F (83°C)	181°F (83°C)	176°F (80°C)	167°F (75°C)
B	174°F (79°C)	158°F (70°C)	158°F (70°C)	149°F (65°C)
C	167°F (75°C)	153°F (67°C)	151°F (66°C)	142°F (61°C)
D	162°F (72°C)	147°F (64°C)	145°F (63°C)	136°F (58°C)

2.2.3.5 Compressor over-current protection control

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

```
                        ┌──────────────────────────────────────────────┐
                        │            Normal operation                    │
                        │   (Upper limit compressor step=Max.step)       │
                        └──────────────────────────────────────────────┘

         IA≥C                    IA<D                        IA<D

                ┌────────────────────────────────────────┐
                │  Upper limit compressor step=Current step │
                └────────────────────────────────────────┘

                            IA≥B

        ┌─────────────────────────────────────────────────────────┐
        │                                                           │
        │              ┌──────────────────────────┐                │
        │              │  Upper limit compressor   │ ◄────┐         │
        │              │  step: Decrease 1step     │      │         │
        │              └──────────────────────────┘      │ IA≥B    │
        │   After 30 sec.                                 │         │
        │              ┌──────────────────────────┐      │         │
        │              │  Current step maintained  │ ─────┘         │
        │              └──────────────────────────┘                │
        └─────────────────────────────────────────────────────────┘

                            IA≥A

                ┌────────────────────────────────────────┐
                │   Inverter current abnormal standby      │
                └────────────────────────────────────────┘

         ┌ IA<D
     and │
         └ Restart permission=ON
                ┌────────────────────────────────────────┐
                │            Compressor restarts           │
                └────────────────────────────────────────┘
```

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   SEG2   SEG3   7 segment display instructions
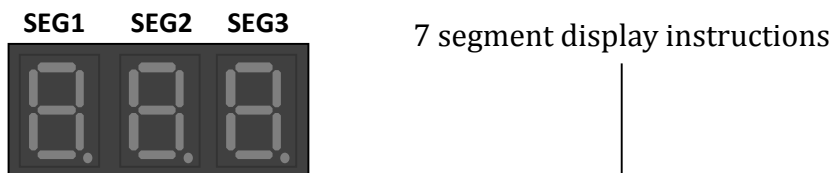
SEG1: Normally blank, but it displays codes "1~9" accordingly if there is damaged sensor and demand control requirement.

SEG1 Code	Description	Time
0	Software is updating through IoT gateway	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	Demand response	-

SEG2: Normally blank, but it will display code accordingly as below if outdoor unit is running under limited condition.
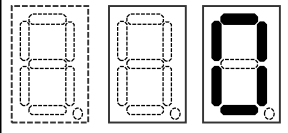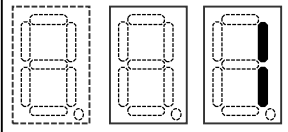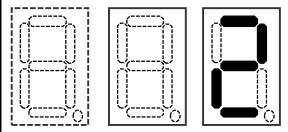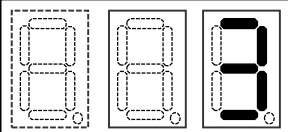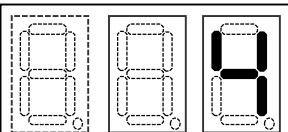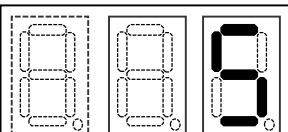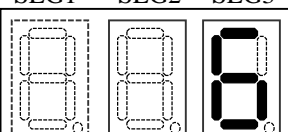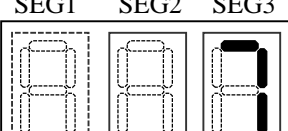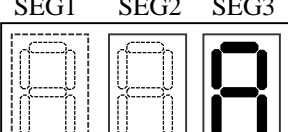
SEG2 Code	Description
0	Running under high pressure limit
1	Running under low pressure limit
2	Running under discharge temperature limit
3	Running under IPM module temperature limit
4	Running under compressor current limit

SEG3: It displays outdoor unit's operation mode.

| SEG3 Code	Description
0	Stop without running signal (Y signal=OFF)
1	Ready to start 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 assistant in cooling
8	Pump down in heating

Note: Compressor waits 3~6 minutes to restart.

Mode list (SEG3 Display)

	SEG1	SEG2	SEG3
Stop or standby without running signal (Y=OFF)			0

	SEG1	SEG2	SEG3
Wait to start after receiving running signal (Y=ON) (6 minutes for pressure equalization to restart)			1

	SEG1	SEG2	SEG3
Cooling running			2

	SEG1	SEG2	SEG3
Heating running			3

	SEG1	SEG2	SEG3
Oil return			4

	SEG1	SEG2	SEG3
Defrost			5

	SEG1	SEG2	SEG3
Manually forced defrost			6

	SEG1	SEG2	SEG3
AUTO charge assistant in cooling			7

	SEG1	SEG2	SEG3
Pump down in heating			8

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	Response for IoT command	ON	No
		OFF(factory)	Yes

SW1
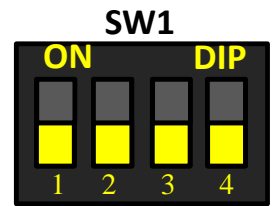
Use minor straight screwdriver to dip switch. **Power off the unit for at least two minute to activate this change.**

* Keep the default ODU's dip switch when 5 Ton matches with 2 or 3 Ton indoor unit for hyper heating.
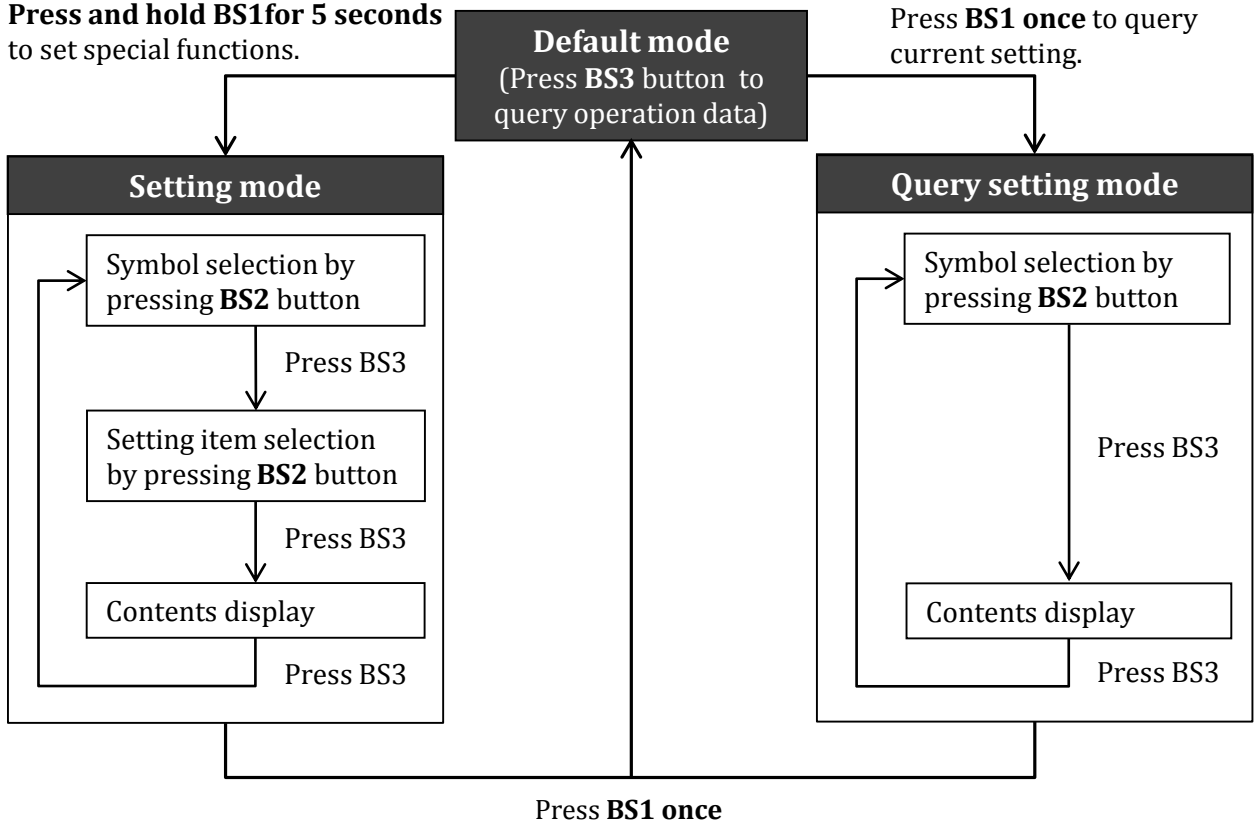
2.3.3 Setting by pressing buttons

Query and setting operation can be done by pressing buttons on main control board.
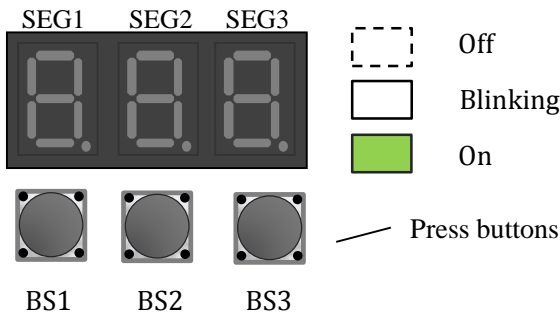
SEG1   SEG2   SEG3

- - - - Off

☐ Blinking

🟩 On

— Press buttons

BS1   BS2   BS3

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 BS1for 5 seconds to set special functions.

Default mode
(Press **BS3** button to query operation data)

Press **BS1 once** to query current setting.

Setting mode

Symbol selection by pressing **BS2** button

Press BS3

Setting item selection by pressing **BS2** button

Press BS3

Contents display

Press BS3

Query setting mode

Symbol selection by pressing **BS2** button

Press BS3

Contents display

Press BS3
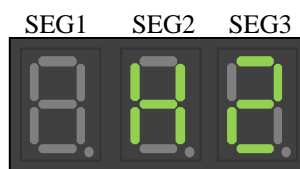
Press **BS1 once**

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: Code number   Detailed information

SEG1   SEG2   SEG3   SEG1   SEG2   SEG3
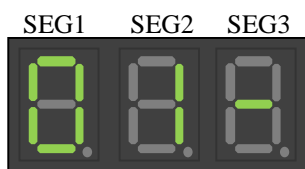
No.	Number content	Example	Description
Default	Refer to default display instructions	902	9: Demand 0: Running under high pressure limit 2: Cooling mode
01-	Outdoor unit type and capacity	H3	H: heat pump C: AC only 3: 3Ton
02-	Liquid line sub-cooling	10	10°F
03-	Compressor suction superheat	18	18°F
04-	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 specific 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 specific value to start indoor auxiliary heater.	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 ℉.
2. The evaporating temperature of indoor coil can lower down to 28 ℉ in cooling mode, and the condensing temperature can go up to 122 ℉ 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

Step1

Press and hold BS1 for 5 seconds.

SEG1   SEG2   SEG3

Step2

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

SEG1   SEG2   SEG3

Step3
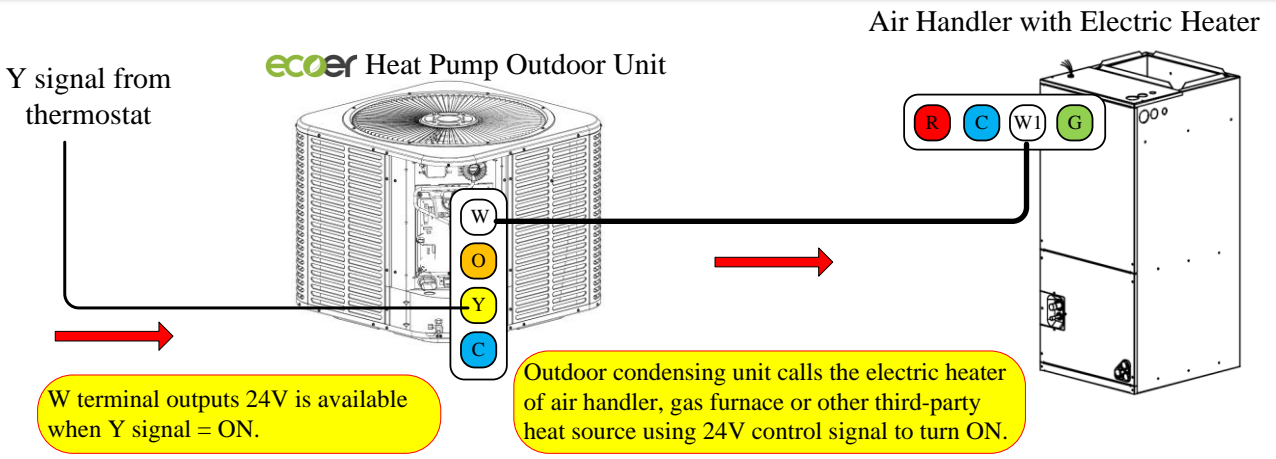
Press BS3 to enter sub-item setting.

SEG1   SEG2   SEG3

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

Step4

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

SEG1   SEG2   SEG3

Step5

Press BS3 **twice** to save and return for other settings.

SEG1   SEG2   SEG3

Step6

Press BS1 to return.

SEG1   SEG2   SEG3

Example for n02 & n03(Dual-heating) setting

Air Handler with Electric Heater

Y signal from thermostat

ecoer Heat Pump Outdoor Unit

R   C   W1   G

W

O

Y

C

W terminal outputs 24V is available when Y signal = ON.

Outdoor condensing unit calls the electric heater of air handler, gas furnace or other third-party heat source using 24V control signal to turn ON.

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 ℉ (24V output)
          1: TA<30 ℉ (24V output)
          2: TA<40 ℉ (24V output)
          3: TA<-3 ℉ (24V output)
          4: OFF (No 24V output)

Example:
          Y signal = ON
          n02 = 0, n03 = 1
Outdoor unit W terminal outputs 24VAC when TA< 30 ℉.

Ambient temperature(TA)

30°F   30°F   30°F

ON

W output   OFF
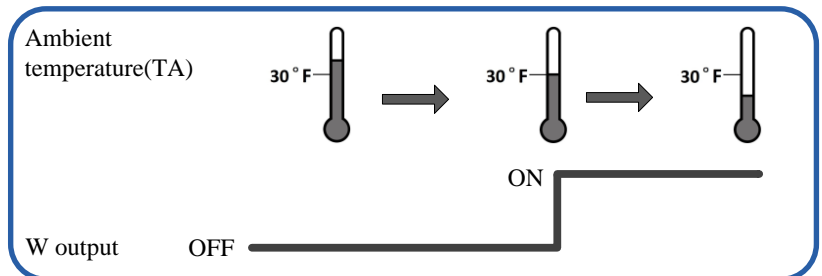
Illustration for n05~07 setting

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	**n07**
Night time setting - Start time.	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 from Ecoer Smart Service Pro App.
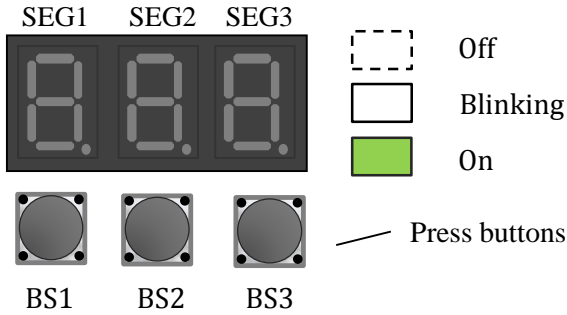
SEG1   SEG2   SEG3

Off
Blinking
On

Press buttons

BS1   BS2   BS3

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.
SEG1   SEG2   SEG3

Step2
Press BS2 to select item (n05 for this case).
SEG1   SEG2   SEG3

Step3
Press BS3 to check the current setting (n05 = 1).
SEG1   SEG2   SEG3

Step4
Press BS3 to Step 2 interface for other setting check.
SEG1   SEG2   SEG3

Press BS1 to return.
SEG1   SEG2   SEG3
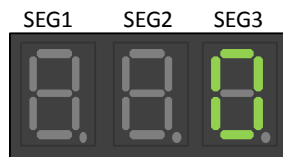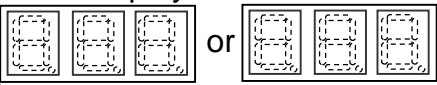
3. Trouble shooting
3.1 Problems without codes

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

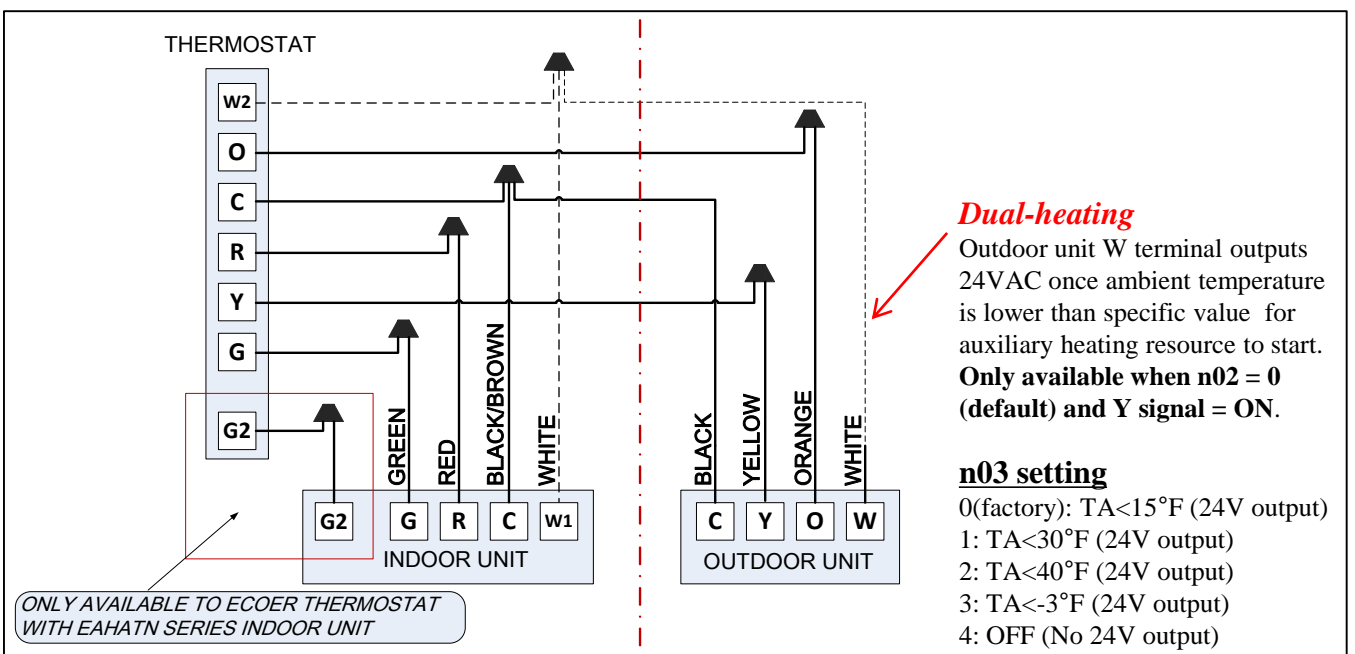| Symptoms	Possible causes	Solutions
The unit energized but the digital tube shows nothing	• See the following page	• See the following page
System does not start-up but the digital tube shows normally	• No 24 VAC signal from thermostat. • Incompatible thermostat.	• Be sure Y/O/C wirings are connected correctly (See page 27~31) and the setting temperature is proper. • Use another 24 volts common thermostat.
System operates mode reversely	• Incorrect O/B signal selection.	• Choose **O for cooling** from thermostat.
System cannot cool well	• 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. • Too big comp. suction superheat.	• 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 heater inside. • The outdoor coil is dirty or has been covered by heavy snow. • Dirty air filter. • Micro channel coil has been used in heating • Lack of refrigerant.	• Install auxiliary heater for backup ***Dual-heating** is recommended. • Clean the outdoor coil. • Replace the air filter. • No micro channel coils shall be used for heat pump. • Check refrigerant amount or any leaks.

Dual-heating

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 (default) and Y signal = ON**.

n03 setting
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)

ONLY AVAILABLE TO ECOER THERMOSTAT WITH EAHATN SERIES INDOOR UNIT

No Display

or

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

| Is the voltage between L1 and L2 (CN18&19) 208~230VAC? | NO → | Replace the noise filter |

YES ↓

Turn off the power supply for five (5) minutes prior to go to the following steps.

↓

| Confirm if cables connected to P2 and P3 terminals are securely fastened. | NO → | Fasten the cable |

YES ↓

| Unplug/unscrew yellow cables connected to P2 and P3 terminals, use multi-meter to check if the inductance is open (Resistance is infinite). | YES → | Replace the inductance |

NO ↓

| Confirm if the cable connected to CN21 behind the black plastic is firmly fastened. | NO → | Fasten the cable. |

YES ↓

| The display lights ON after unplug fan motor terminal from CN8. | YES → | Replace the fan motor |

NO ↓

| The display lights ON after unplug low pressure sensor cable terminal from CN9. | YES → | Replace the low pressure sensor |

NO ↓

| The display lights ON after unplug high pressure sensor terminal from CN10. | YES → | Replace the high pressure sensor |

NO ↓

Replace the main control board

Ecoer Variable Speed Heat Pump Matches with Air Handler and Electric Heater

R 24 Volt +
C Common
G Fan Operation
Y Air Conditioning (Heating or Cooling)
O Mode Switch (Energize in Cooling)

W2 Aux / Emergency Heat (Thermostat)
W1 Heat with Fan Linkage (Air Handler)
W Output to Thermostat (Outdoor Unit)

----------- Optional

Third Brand Thermostat

Air Handler with Electric Heater

R C W2 G Y O

ecoer Heat Pump Outdoor Unit

R C W1 G

W
O
Y
C

Control Wire Size: 18 AWG
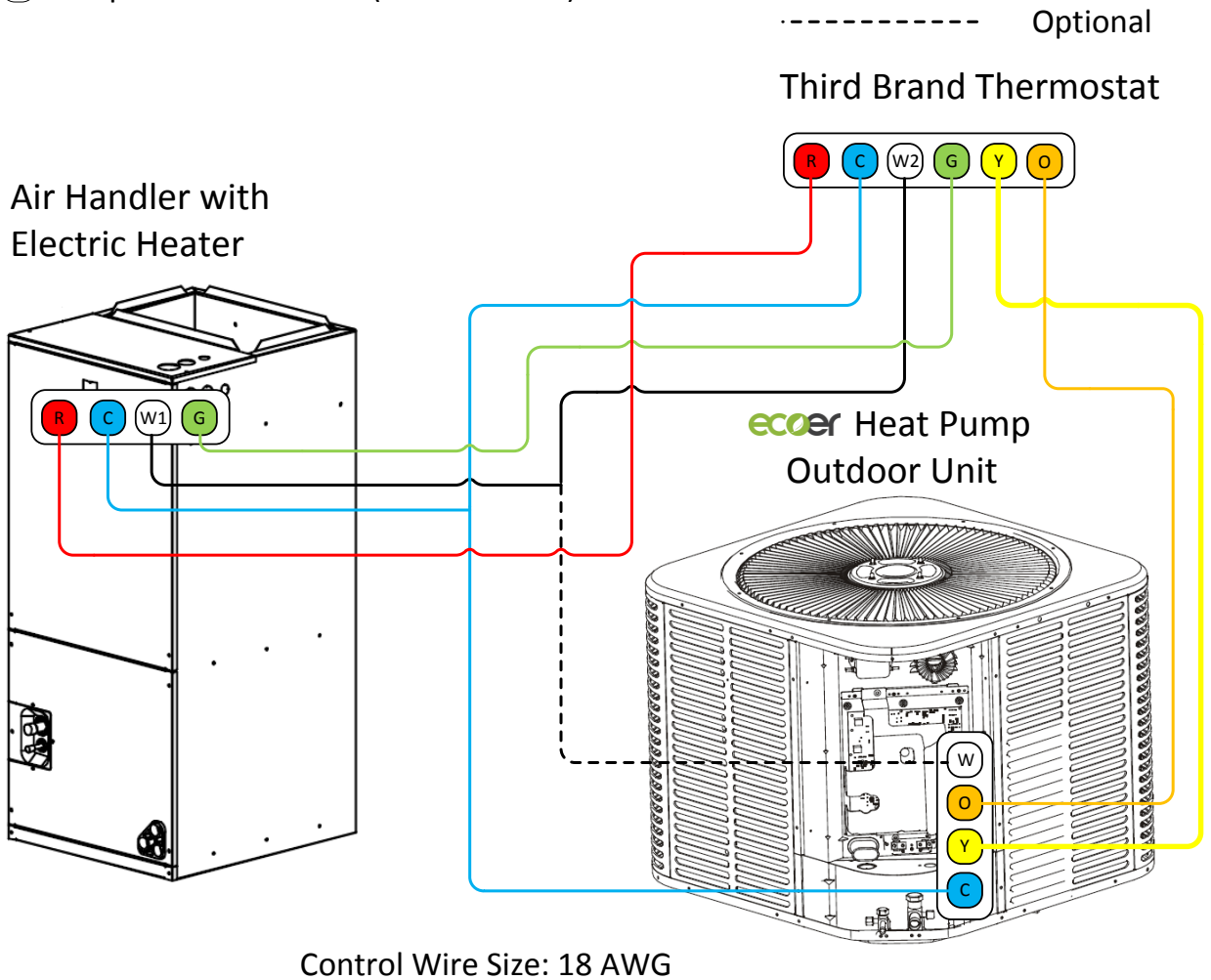
Refer to installation guides of actual thermostat or equipment to verify the control wiring.

Ecoer Variable Speed Air Conditioner (Cooling Only) Matches with Air Handler

R 24 Volt +
C Common
G Fan Operation
Y Air Conditioning (Heating or Cooling)
O Mode Switch (Energize in Cooling)

W2 Aux / Emergency Heat (Thermostat)
W1 Heat with Fan Linkage (Air Handler)
W Output to Thermostat (Outdoor Unit)

Third Brand Thermostat

Air Handler

SW1-3 ON: Cooling Only
SW1-3 OFF: Heat Pump

ecoer Cooling Only
Outdoor Unit
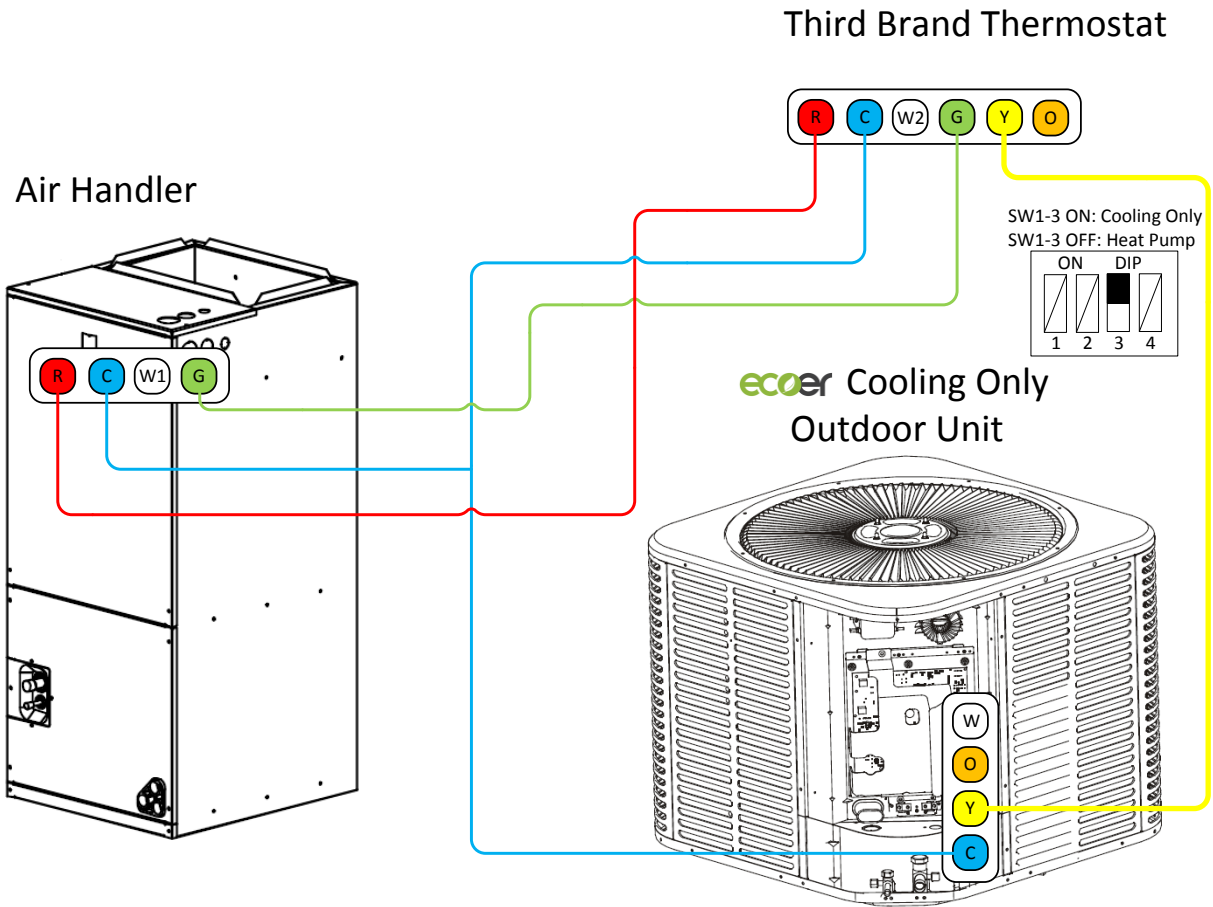
Control Wire Size: 18 AWG

Refer to installation guides of actual thermostat or equipment to verify the control wiring.

Ecoer Variable Speed Heat Pump Matches with Air Handler (Ecoer Thermostat)

(R) 24 Volt +

(C) Common

(G) Fan Operation

(G2) Fan Operation (Dehumidification Mode)

(Y) Air Conditioning (Heating or Cooling)

(O) Mode Switch (Energize in Cooling)

(W2) Aux / Emergency Heat (Thermostat)

(W1) Heat with Fan Linkage (Air Handler)

(W) Output to Thermostat (Outdoor Unit)

- - - - - - - - - - - Optional

ecoer Thermostat

Other brand Air handler

ecoer Heat Pump Outdoor Unit

Wall
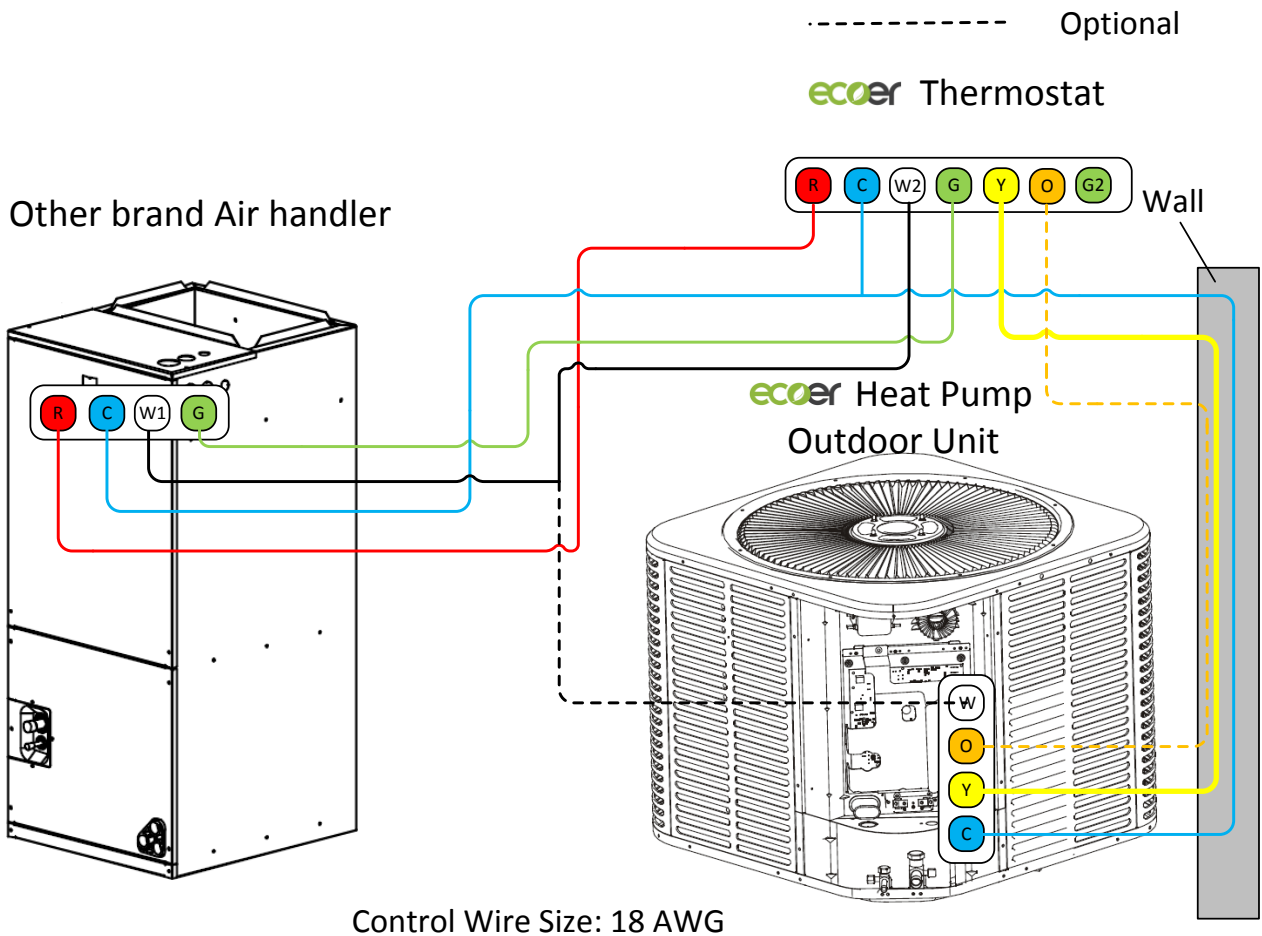
Control Wire Size: 18 AWG

Ecoer provides a unique solution to achieve heat pump function without O signal.

Refer to installation guides of actual thermostat or equipment to verify the control wiring.

Ecoer Variable Speed Heat Pump Matches with EAHATN Air Handler and Electric Heater (Ecoer Thermostat)

R 24 Volt +

C Common

G Fan Operation

G2 Fan Operation (Dehumidification Mode)

Y Air Conditioning (Heating or Cooling)

O Mode Switch (Energize in Cooling)

W2 Aux / Emergency Heat (Thermostat)

W1 Heat with Fan Linkage (Air Handler)

W Output to Thermostat (Outdoor Unit)

Control Wire Size: 18 AWG

Ecoer provides an unique solution to achieve heat pump function without O signal.

Refer to installation guides of actual thermostat or equipment to verify the control wiring.

Ecoer Variable Speed Heat Pump Matches with Cased Coil and Furnace (Ecoer Thermostat)

(R) 24 Volt +
(C) Common
(G) Fan Operation
(G2) Fan Operation (Dehumidification Mode)
(Y) Air Conditioning (Heating or Cooling)
(O) Mode Switch (Energize in Cooling)

(W2) Aux / Emergency Heat (Thermostat)
(W1) Heat with Fan Linkage (Air Handler)
(W) Output to Thermostat (Outdoor Unit)

Cased Coil with Furnace

Optional

ecoer Thermostat

Wall

ecoer Heat Pump
Outdoor Unit

Control Wire Size: 18 AWG
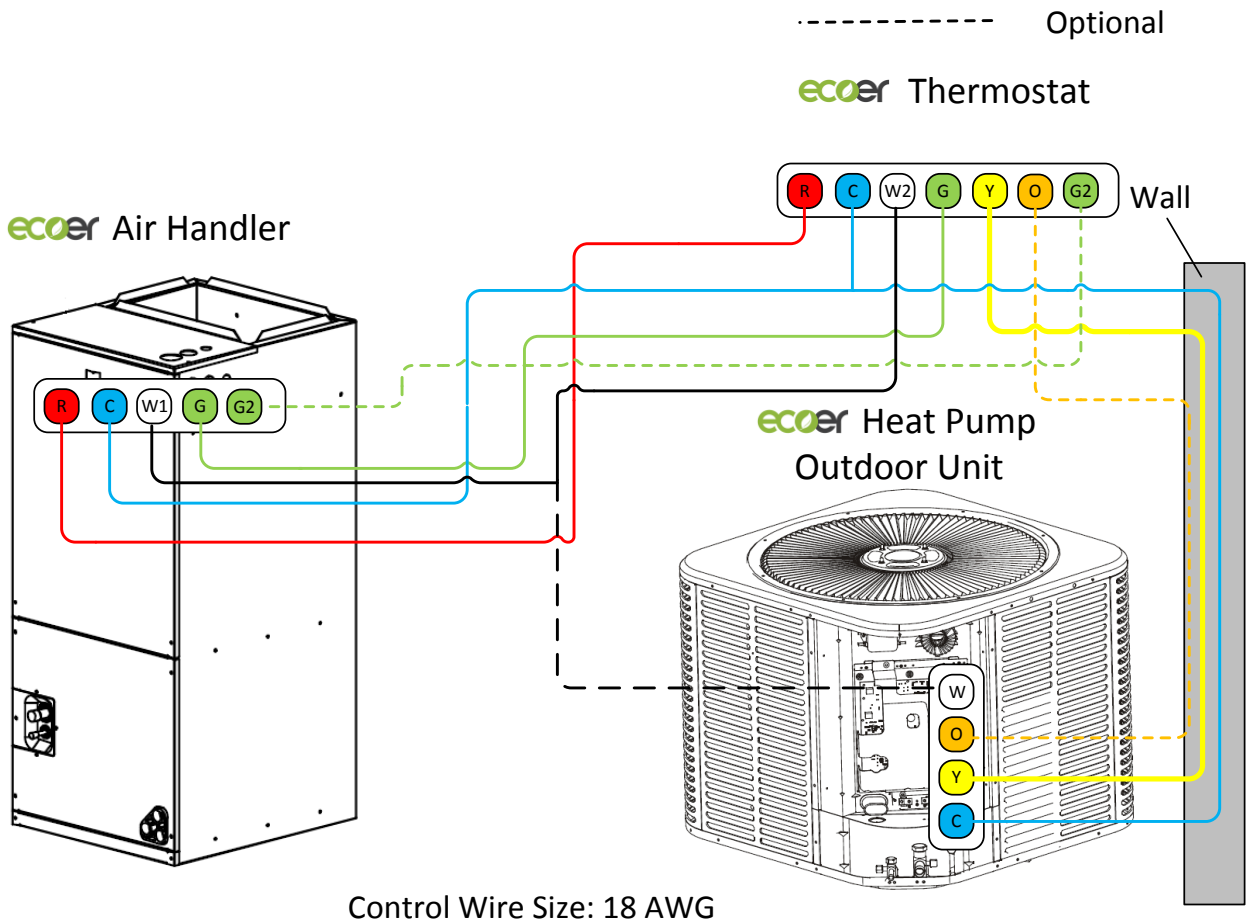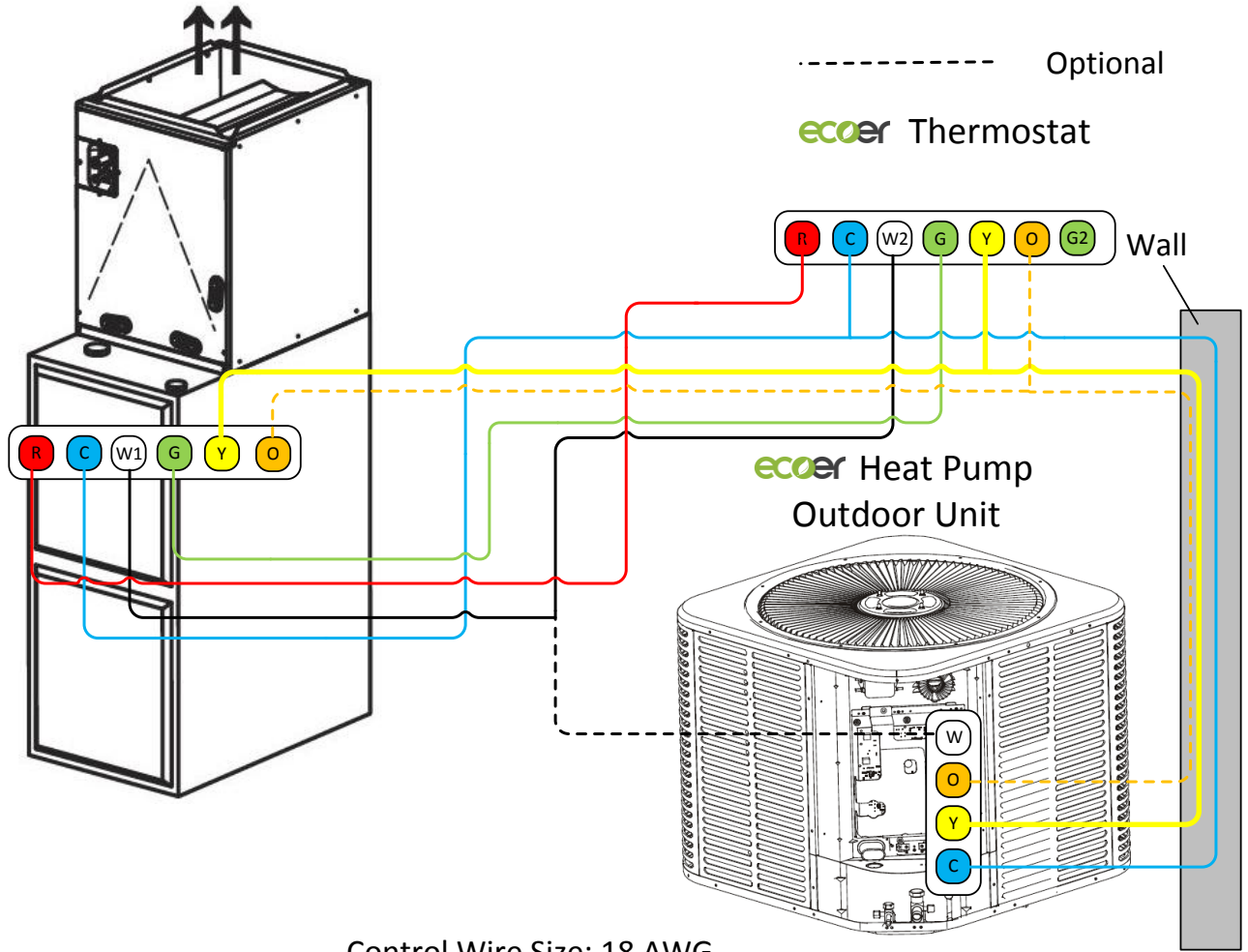
Ecoer provides an unique solution to achieve heat pump function without O signal.

Refer to installation guides of actual thermostat or equipment to verify the control wiring.

3.2 Error codes List

Past error codes can be spot checked by BS3 button, and seen from Ecoer Smart Service Pro App.

Error Code	Description	Legend	Page
P1	High pressure protection		33
E1	System locks up when P1 has occurred six times in 3 hours.	Cannot restart *1	
P2	Low pressure protection in cooling mode		34
E2	System locks up when P2 has occurred six times within 3 hours.	Cannot restart *1	
P3	Compressor discharge temperature (TD) protection		35
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		36
P5	Inverter module temperature (TF) protection		37
E5	System locks up when P5 has occurred six times within 3 hours.	Cannot restart *1	
P6	Compressor over-current protection		38
E6	System locks up when P6 has occurred six times within 3 hours.	Cannot restart *1	
P7	Liquid slugging protection		39-40
E7	System locks up when P7 has occurred three times within 5 hours.	Cannot restart *1	
P8	Low compressor voltage protection		41
E8	System locks up when P8 has occurred three times within 60 minutes.	Cannot restart *1	
P9	Incorrect compressor line sequence	Cannot restart *1	41
PA	DC fan motor over-load protection	Cannot restart *1	42
F1	Ambient temperature (TA) sensor fault	Backup running*2	43
F2	Compressor suction temperature (TS) sensor fault	Backup running*2	44
F3	Liquid line temperature (TL) sensor fault	Backup running*2	45
F4	Defrost temperature (TH) sensor fault	Backup running*2	46
F5	Compressor discharge temperature (TD) sensor fault	Backup running*2	47
F6	Inverter module temperature (TF) sensor fault	Backup running*2	48
F7	High pressure (HP) sensor fault	Backup running*2	49
F8	Low pressure (LP) sensor fault	Backup running*2	50
E4	Communication fault between main chip and INV drive chip	Cannot restart *1	51
H1	Ambient temperature limit operation in cooling mode		52
H2	Ambient temperature limit operation in heating mode		
H3	Abnormal switch alarm for 4-way valve	Just show alarm	53
H4	Defrost temperature (TH) sensor is disconnected or damaged		54
H5	EEPROM fault		55
H6	Low voltage alarm		55
HF	Abnormal function control	Alarm	55
C0-CC	Compressor INV module protection		56-57
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 system.
2. System 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   **E1** or **P1**   # 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

Check visible parts for the system
1) Closed service valve; 2) Dirty heat exchanger or **micro channel coil has been used in heating operation**;
3) Dirty air filter; 4) FAN is not operating ***NOTE1**

Satisfy any contents above. —YES→ Correct specific point

NO ↓

Can the pressure transduce properly based on **High Pressure Sensor Voltage Characteristics D. *NOTE2** —NO→ Replace the high pressure sensor

YES ↓

Is the high pressure close to 566psig before protection? —NO→ Replace the main control board

YES ↓

Whether the low pressure has been evacuated? ***NOTE3** —YES→ **Cooling mode:** Check if the indoor TXV is dirty plugging. **Heating mode:** Check if the outdoor EEV is dirty plugging.

NO ↓

Use AUTO charge mode to check whether there is too much refrigerant in the system.
Replace the main control board if the protection happens again with proper refrigerant amount.

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		Low pressure protection in cooling mode
E2 or P2		
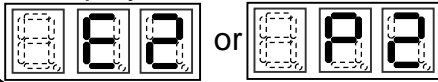
1.Error definition:

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

Check visible parts for the system
1) Closed service valve; 2) Dirty indoor heat exchanger; 3) Dirty air filter; 4) Fan is not operating ***NOTE1**

Satisfy any contents above. → YES → Correct specific point

NO

Can the pressure transduce measure properly according to **Low Pressure Sensor Voltage Characteristics C. *NOTE2** → NO → Replace the low pressure sensor

YES

Is the low pressure close to 24.5psig before protection? → NO → Replace the main control board

YES

Whether the low pressure has been evacuated? ***NOTE3** → YES → Check whether the TXV of indoor unit is dirty plugging.

NO

Use AUTO charge mode to check whether there is too little refrigerant in the system.
Replace the main control board if the protection happens again with proper refrigerant amount.

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
$\boxed{E3}$ or $\boxed{P3}$

Compressor discharge temperature(TD) protection

1.Error definition:

P3: The detected discharge temperature(TD) is no less than specific 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

```
Are the service valves of outdoor unit open? ──NO──> Open the service valve
        │ YES
        ▼
Check whether the compressor discharge temperature sensor is
properly seated on the discharge pipe and securely connected to ──NO──> Reset the sensor or reconnect the wire
CN7 terminal on the main control board.
        │ YES
        ▼
Turn off the power supply to unplug the TD sensor, check if the
resistance is in the range of Temperature sensor B. *TIPS ──NO──> Replace the faulty sensor
        │ YES
        ▼
Use AUTO charge mode in cooling or monitor DSH in heating
to check if too little refrigerant remains in the system. ──YES──> Add R410A refrigerant
        │ NO
        ▼
Whether the low pressure has been evacuated? ──YES──> Cooling mode: Check if the indoor TXV is dirty plugging. Heating mode: Check if the outdoor EEV is dirty plugging.
        │ NO
        ▼
Is there abnormal sound or vibration for compressor? Double
check if the compressor is open-circuited. *NOTE ──YES──> Recover refrigerant from the system to replace the compressor
        │ NO
        ▼
                          Replace the main control board
```

TIPS:

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

NOTE: Normal resistance for compressor

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

Display

```
P4
```
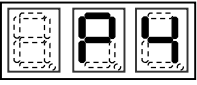
Compressor discharge temperature(TD) sensor is disconnected or damaged

1.Error definition:

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

2.Possible causes:

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

| Check whether TD sensor is seated to the compressor discharge pipe and securely connected to CN7 terminal on the main control board. | NO → | Reset or reconnect the sensor |

YES ↓

| Turn off the power supply to unplug the TD sensor, check if the resistance is in the range of **Temperature sensor B**. *TIPS | NO → | Replace the faulty sensor |

NO ↓

| Check whether there are other heat sources around the sensor. | YES → | Remove other heat sources |

NO ↓

| | | Replace the main control board |

TIPS:

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

Display	
E5 or **P5**	**Inverter module temperature(TF) protection**

1.Error definition:

P5: The detected value of module temperature (TF) is no less than specific 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
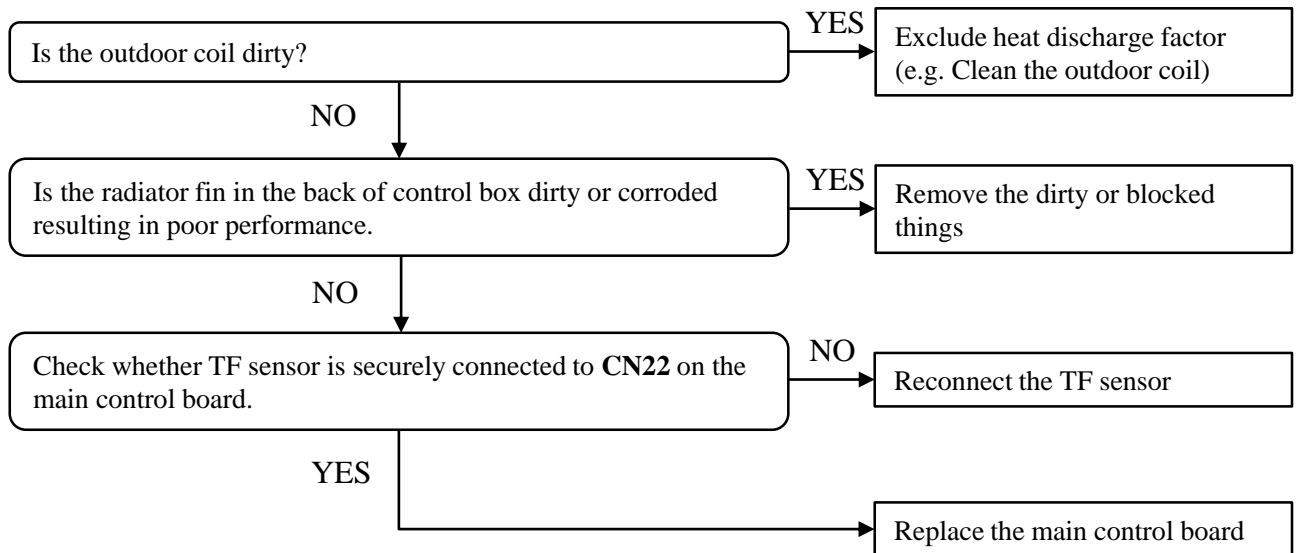
Is the outdoor coil dirty? —YES→ Exclude heat discharge factor (e.g. Clean the outdoor coil)

NO ↓

Is the radiator fin in the back of control box dirty or corroded resulting in poor performance. —YES→ Remove the dirty or blocked things

NO ↓

Check whether TF sensor is securely connected to **CN22** on the main control board. —NO→ Reconnect the TF sensor

YES ↓

Replace the 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.
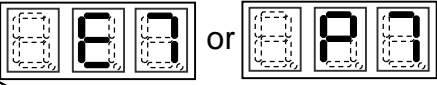
2.Possible causes:

- 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
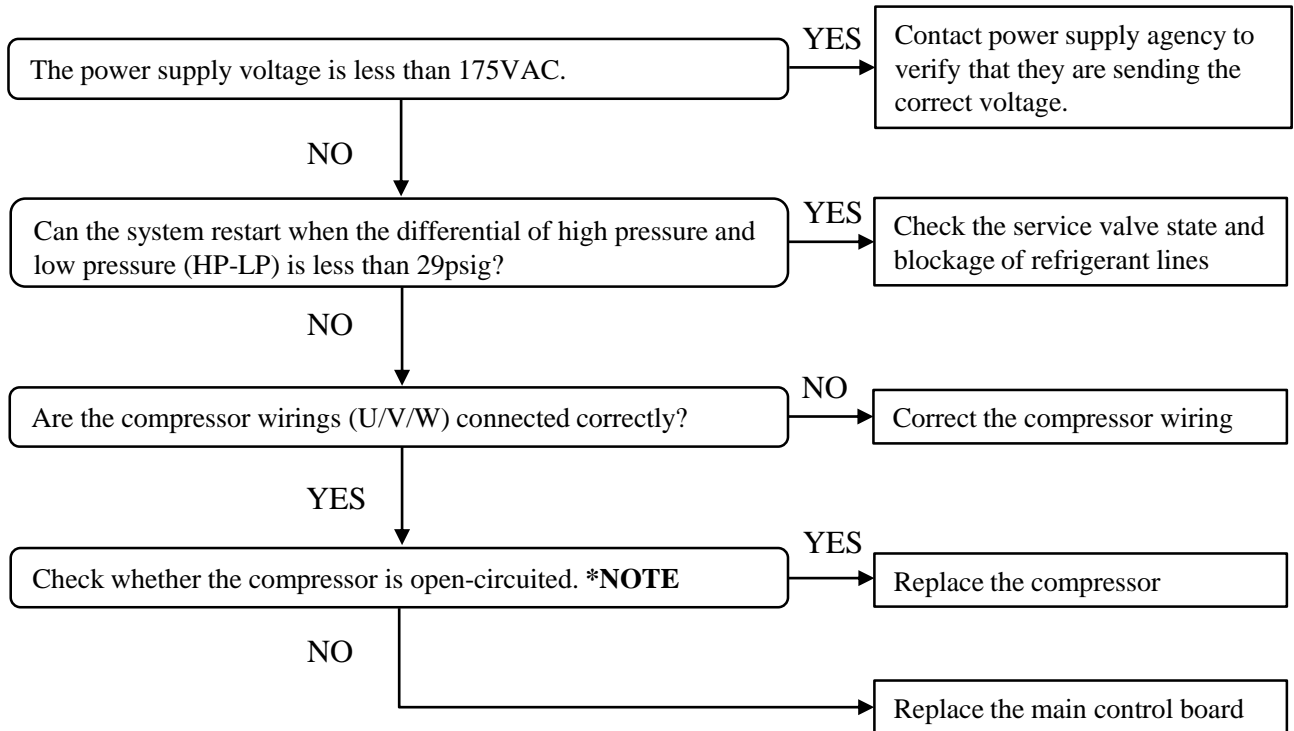
The power supply voltage is less than 175VAC.	→ YES →	Contact power supply agency to verify that they are sending the correct voltage.

NO ↓

Can the system restart when the differential of high pressure and low pressure (HP-LP) is less than 29psig?	→ YES →	Check the service valve state and blockage of refrigerant lines

NO ↓

Are the compressor wirings (U/V/W) connected correctly?	→ NO →	Correct the compressor wiring

YES ↓

Check whether the compressor is open-circuited. ***NOTE**	→ YES →	Replace the compressor

NO ↓

Replace the main control board

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.
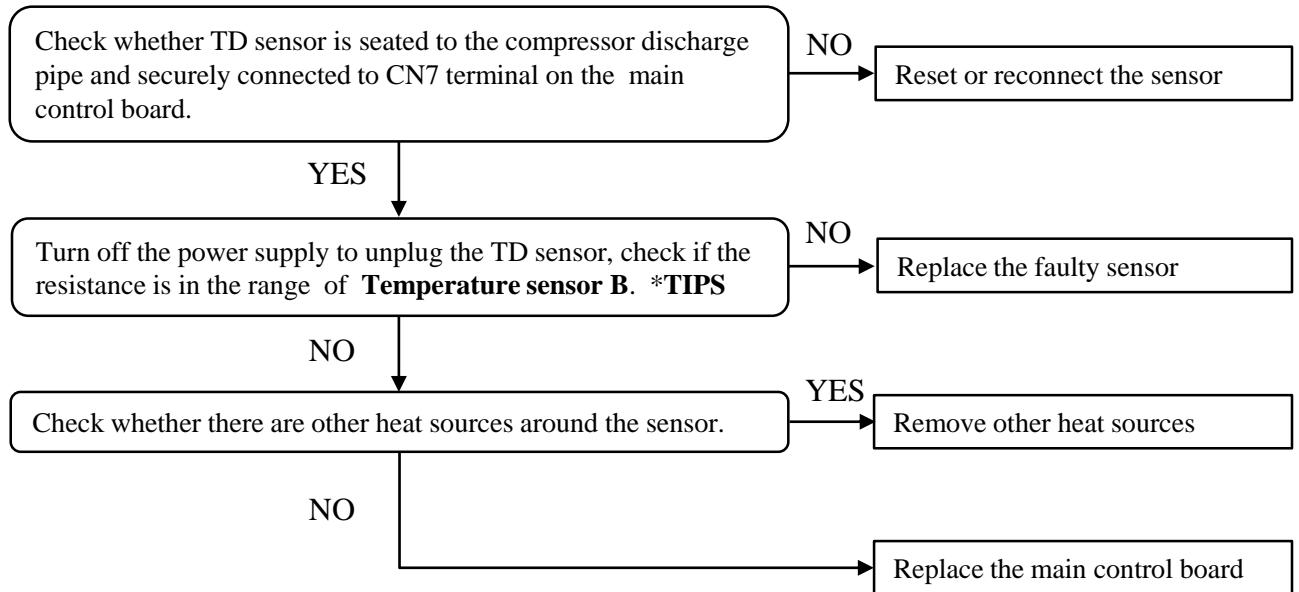
Display
```
 E 7  or  P 7
```

Liquid slugging protection

1.Error definition:

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

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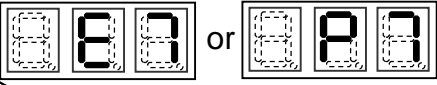
- Damaged or improper TXV for indoor unit in cooling mode
- Damaged discharge temperature (TD) sensor
- Overcharged refrigerant
- Damaged EEV of outdoor unit in heating mode
- Damaged main control board

Cooling mode

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

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 ↓

Has the proper R410A TXV been used for indoor unit?	**NO** → Adjustable non-bleed TXV is required for this inverter system.

YES ↓

Is the compressor suction superheat (SH) larger than 6°F?	**NO** → Check the system refrigerant charge and indoor unit status (e.g. indoor TXV has no adjustment, no airflow or too low airflow.)

YES ↓

Check the pressure transduction based on **Low Pressure Sensor Voltage Characteristics C.** Does the low pressure sensor measure normally?	**NO** → Replace the low pressure sensor

YES ↓

Set high capacity mode and restart the unit, does the error code remain?	**NO** → Keep this field setting

YES ↓

→ Replace the main control board

Display

```
┌─┐┌─┐  or  ┌─┐┌─┐
│8││7│      │P││7│
└─┘└─┘      └─┘└─┘
```

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 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

25~50°F

DSH

```
Display
┌──────────┐
│ E 8  or  P 8 │
└──────────┘
```

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
┌──────────┐
│   P 9    │
└──────────┘
```
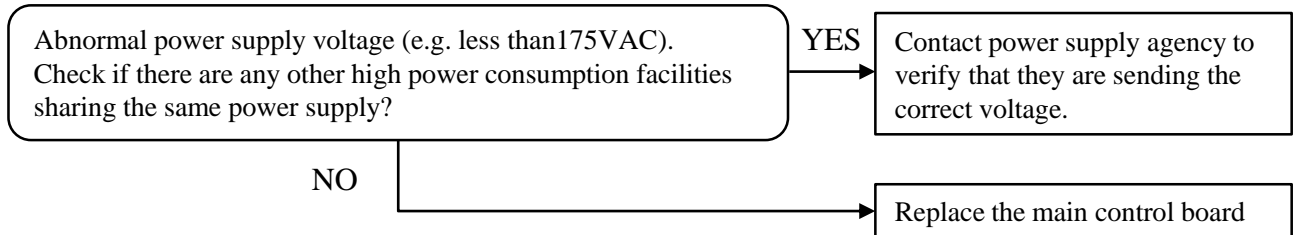
Incorrect compressor line sequence

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 trouble shoot 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

| Had the IoT gateway successfully communicated with Ecoer cloud after installation? ***NOTE** | NO → | Make sure the IoT gateway works properly. |

YES ↓

| Is the fan speed higher than 200RPM on stop/standby condition? | YES → | Waiting for the wind to decrease |

NO ↓

| Is the fan motor cable connected to **CN8** on main control board? | NO → | Connect the cable |

YES ↓

| Turn off power supply for at least five minutes, use tools to rotate fan blades manually to check if the motor shaft is stuck. | YES → | Replace the motor |

NO ↓

Replace the main control board

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

LEDs

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

```
Are there any other heat sources around the sensor?  ──YES──►  Remove other heat sources
                    │
                    NO
                    ▼
Check whether TA sensor is seated to the specified location and  ──NO──►  Reconnect the sensor
connected to CN2 on the main control board.
                    │
                    YES
                    ▼
Turn off the power supply, unplug TA sensor to check if the  ──NO──►  Replace the sensor *TIPS
resistance is in the range of Temperature sensor A. *TIPS
                    │
                    YES
                    ▼
Can the system go into backup running (SEG1 displays digital 5)?  ──YES──►  Replace the sensor *TIPS
                    │
                    NO
                    ▼
                                                      Replace the main control board
```

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?

STEP1. Press the button

STEP2. Push down the protection cover

STEP3. Take out the protection cover

Display

```
  ┌─┐ ┌─┐
  ╎ ╎ │ │
  └─┘ └─┘
```
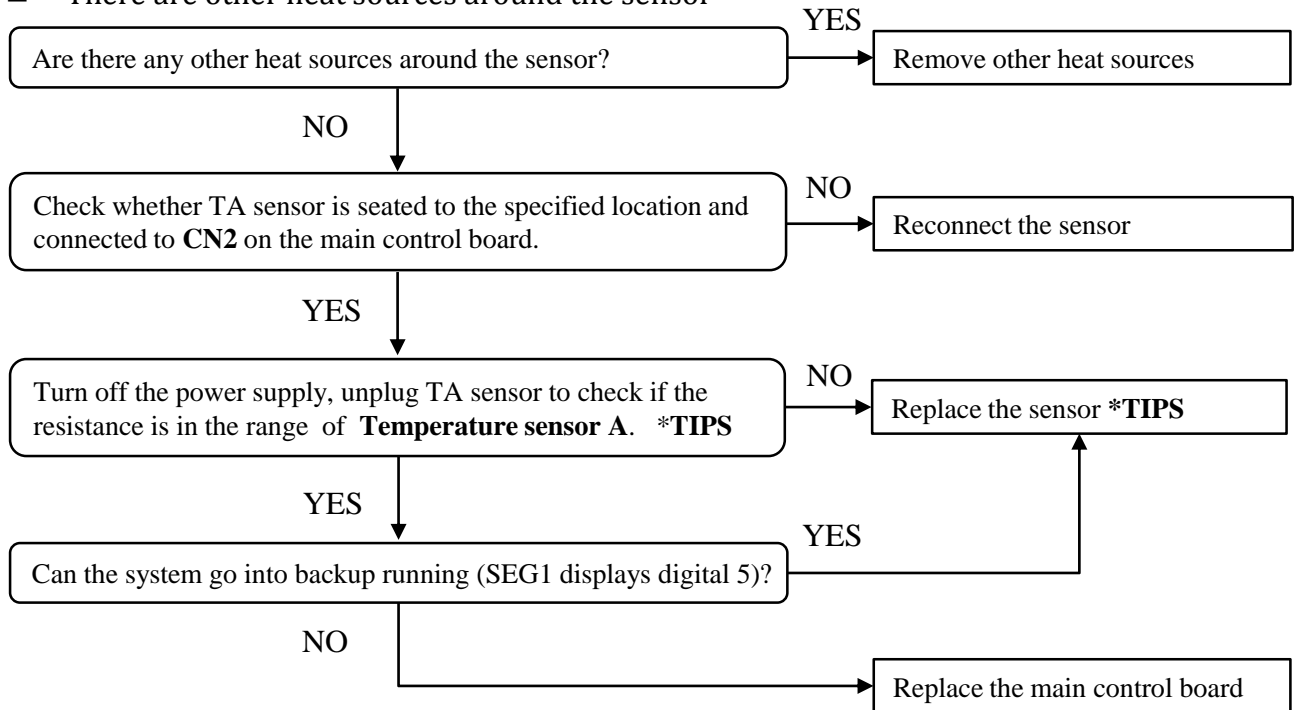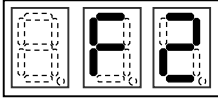
Compressor suction temperature(TS) sensor fault

1.Error definition:
The suction temperature(TS) sensor is short circuit or open circuit.
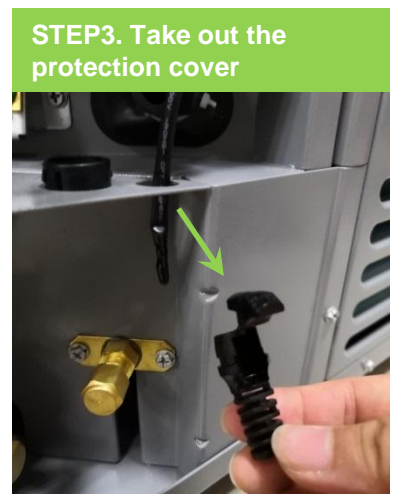
2.Possible causes:
- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor(TS)
- There are other heat sources around the sensor

```
┌──────────────────────────────────────────────┐   NO
│ Check whether TS sensor is seated to the       │ ───────▶ ┌──────────────────────┐
│ compressor suction pipe and connected to CN2   │          │ Reconnect the sensor  │
│ on the main control board.                     │          └──────────────────────┘
└──────────────────────────────────────────────┘
              │ YES
              ▼
┌──────────────────────────────────────────────┐   NO
│ Turn off the power supply, unplug the TS        │ ───────▶ ┌──────────────────────┐
│ sensor to check if the resistance is in the    │          │ Replace the sensor    │
│ range of Temperature sensor A. *NOTE            │          └──────────────────────┘
└──────────────────────────────────────────────┘
              │ YES
              ▼
┌──────────────────────────────────────────────┐   YES
│ Are there any other heat sources around the     │ ───────▶ ┌──────────────────────────┐
│ sensor?                                          │          │ Remove other heat sources │
└──────────────────────────────────────────────┘          └──────────────────────────┘
              │ NO
              ▼
┌──────────────────────────────────────────────┐   YES
│ Can the system go into backup running (SEG1      │ ───────▶ ┌──────────────────────┐
│ displays digital 7)?                             │          │ Replace the sensor    │
└──────────────────────────────────────────────┘          └──────────────────────┘
              │ NO
              └──────────────────────────▶ ┌──────────────────────────────┐
                                           │ Replace the main control board │
                                           └──────────────────────────────┘
```

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.
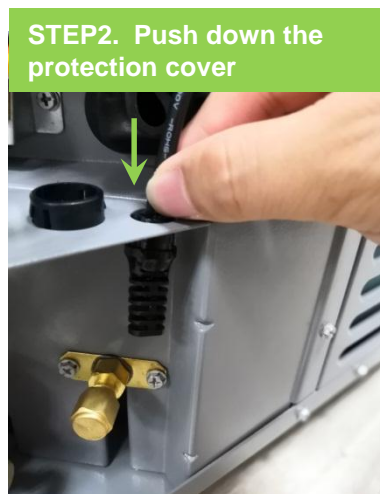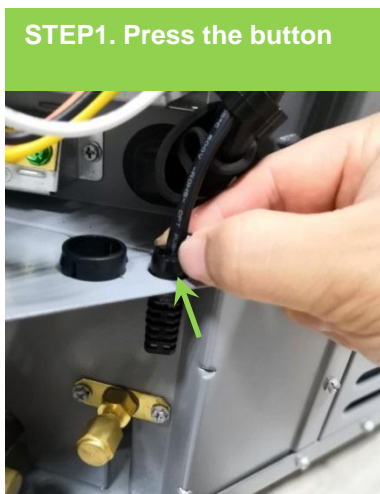
2.Possible causes:
- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor
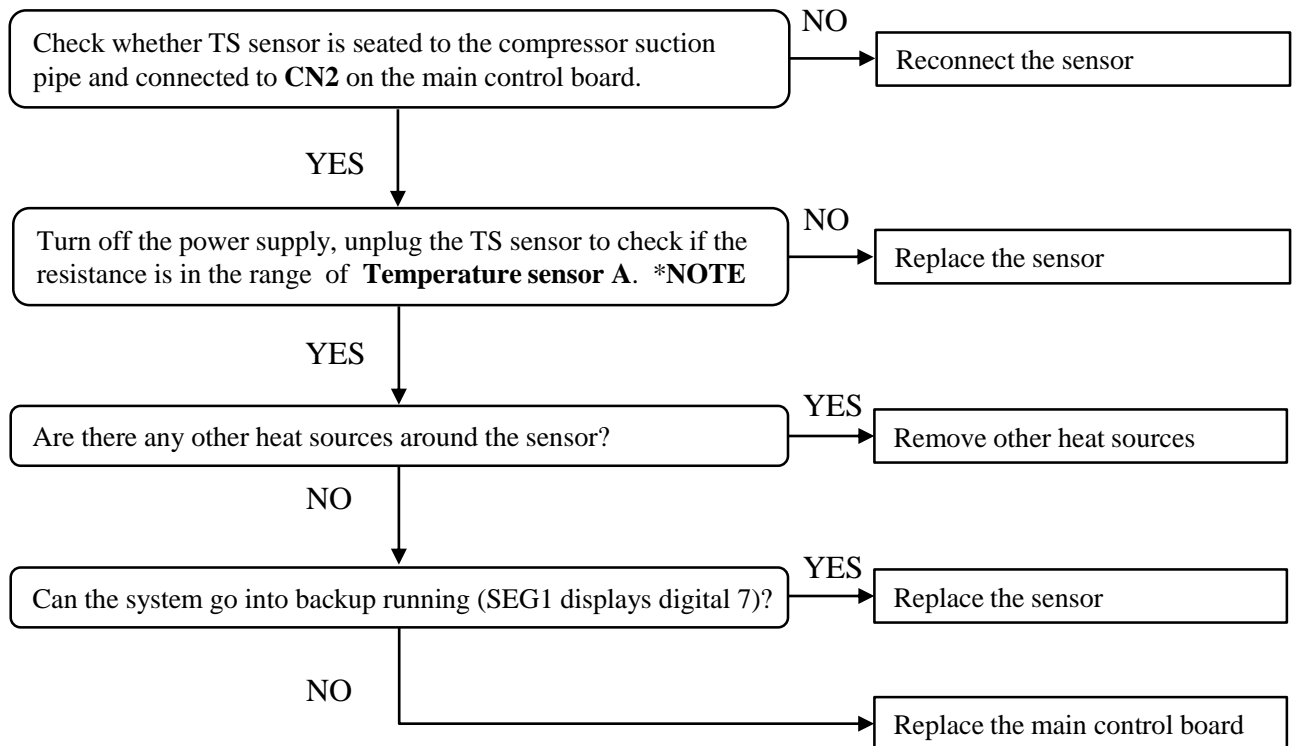- There are other heat sources around the sensor

Check whether TL sensor is seated to the specified location and connected to **CN4** on the main control board.	NO →	Reconnect the sensor

YES ↓

Turn off the power supply, unplug the TL sensor to check if the resistance is in the range of **Temperature sensor A**. ***NOTE**	NO →	Replace the sensor

YES ↓

Are there any other heat sources around the sensor?	YES →	Remove other heat source

NO ↓

Can the system go into backup running (SEG1 displays digital 8)?	YES →	Replace the sensor

NO ↓

→ Replace the main control board

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:
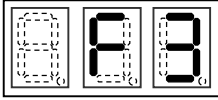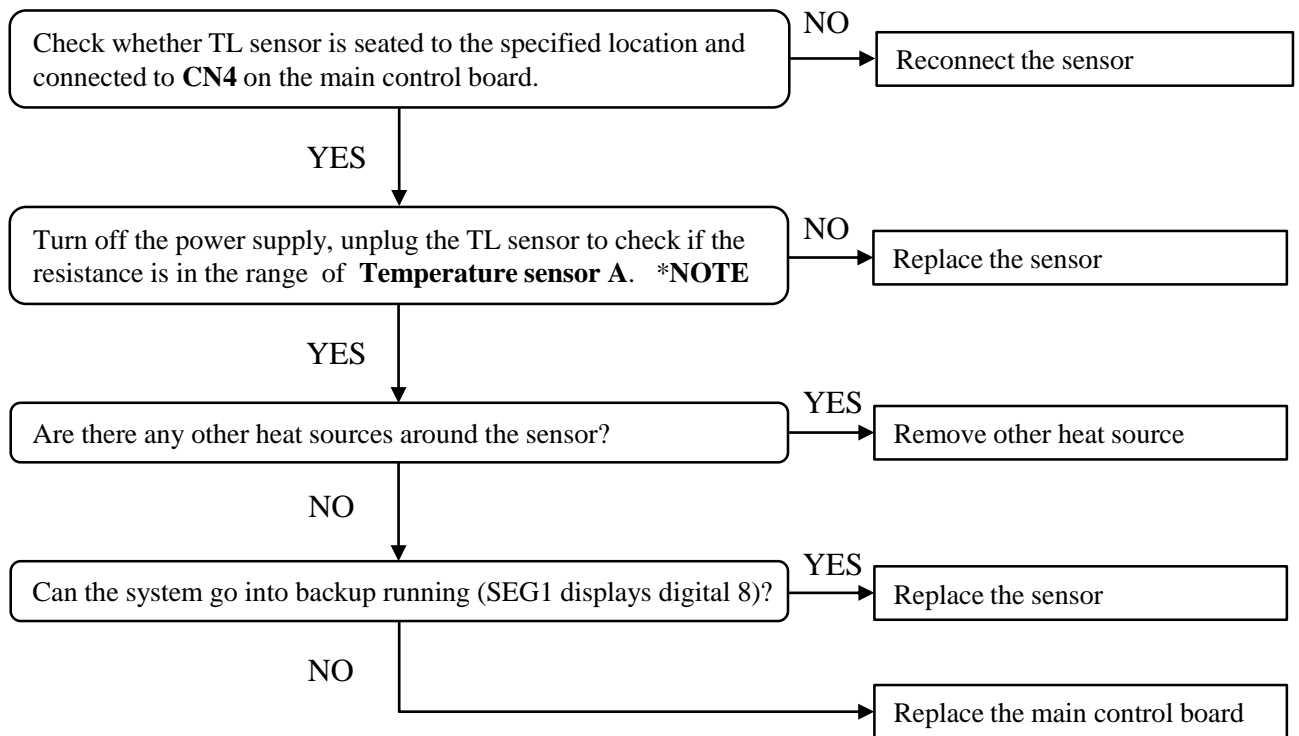The defrost temperature(TH) sensor is short circuit or open circuit.
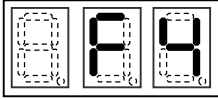
2.Possible causes:
- Damaged main control board
- Loose connection at port on main control board
- Damaged temperature sensor
- There are other heat sources around the sensor

Check whether TH sensor is seated to the specified location and connected to **CN4** on the main control board.	**NO** → Reconnect the sensor

YES ↓

Turn off the power supply, unplug the TH sensor to check if the resistance is in the range of **Temperature sensor A**. *NOTE	**NO** → Replace the sensor

YES ↓

Are there any other heat sources around the sensor?	**YES** → Remove other heat source

NO ↓

Can the system go into backup running (SEG1 displays digital 6)?	**YES** → Replace the sensor

NO ↓

→ Replace the main control board

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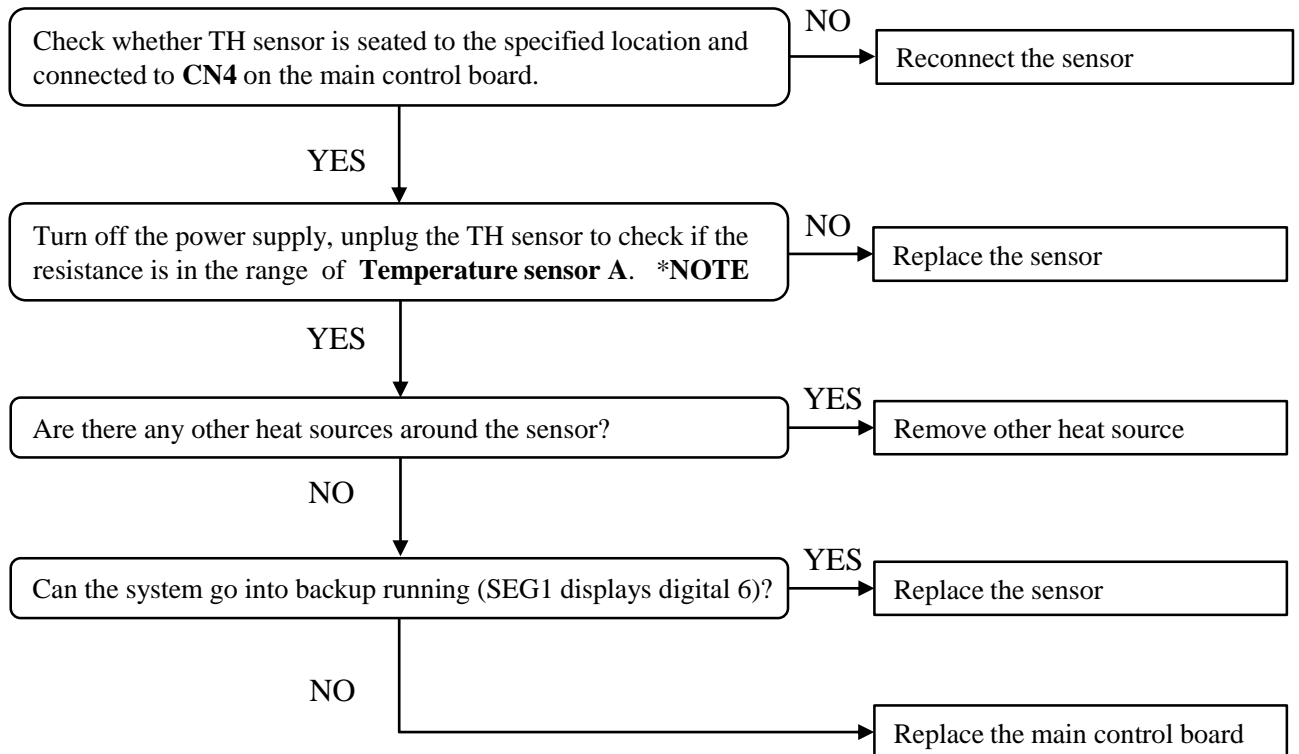

Display

Compressor discharge temperature(TD) sensor fault

1.Error definition:
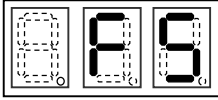The discharge temperature(TD) sensor is short circuit or open circuit.

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

Check whether TD sensor is seated to the compressor discharge pipe and connected to **CN7** on the main control board.	NO → Reconnect the sensor

YES ↓

Turn off the power supply, unplug the TD sensor to check if the resistance is in the range of **Temperature sensor B**. *NOTE	NO → Replace the sensor

YES ↓

Check whether there are other heat sources around sensor	YES → Remove all the other heat source

NO ↓

Can the system go into backup running (SEG1 displays digital 3)?	YES → Replace the sensor

NO ↓

Replace the main control board

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

Display

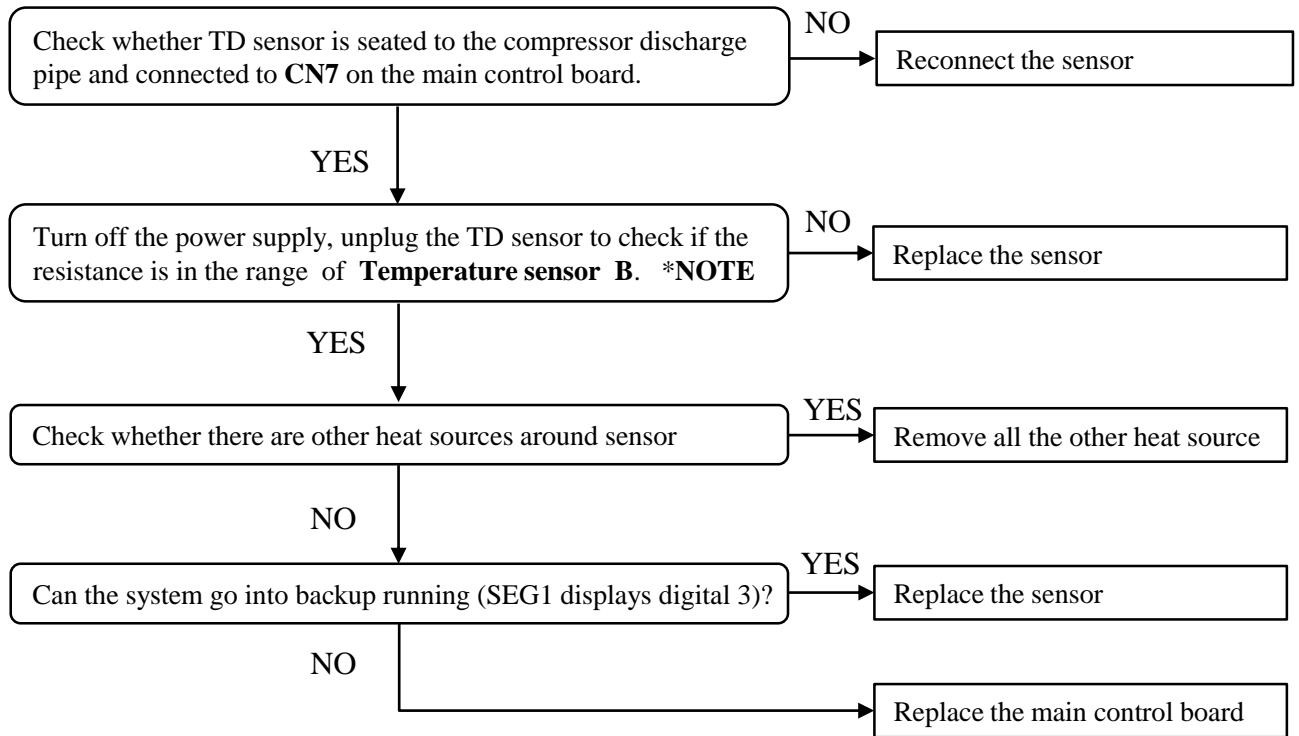**Inverter module temperature(TF) sensor fault**

1.Error definition:
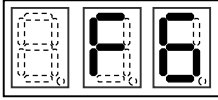The module temperature(TF) sensor is short circuit or open circuit.

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

Check whether TF cable is securely connected to **CN22** on the main control board.

NO → Reconnect the sensor

YES

Turn off the power supply, unplug the TF sensor to check if the resistance is in the range of **Temperature sensor B**. *NOTE1

NO → Replace the sensor ***NOTE2**

YES

Contact Ecoer Service Team for assist before claim the main control board
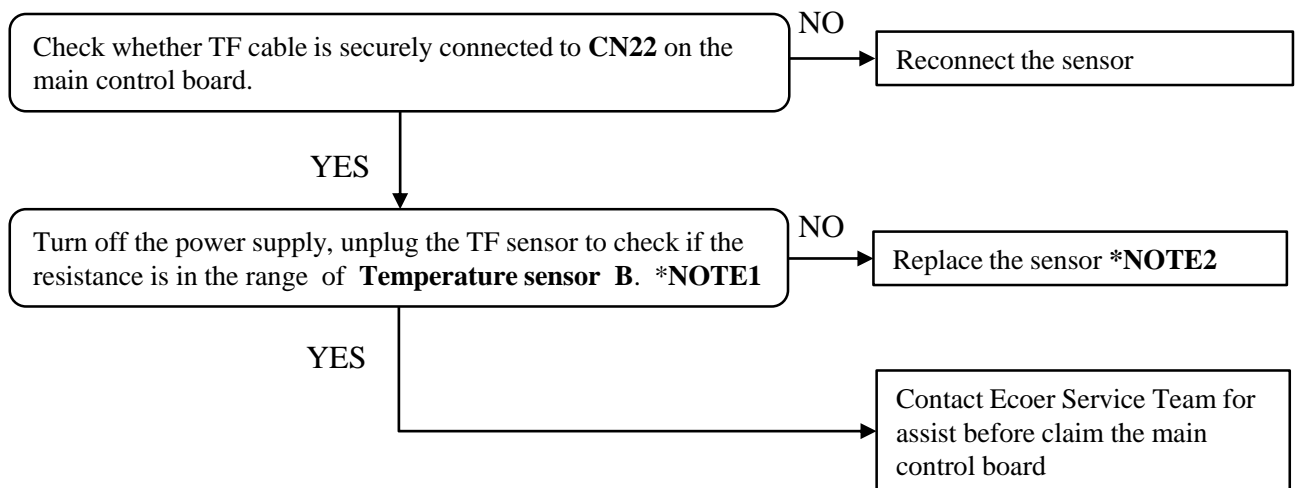
NOTES:
1. Measure the DC voltage of the temperature sensor also works when outdoor unit powers on.
2. TF senor has been laid inside the assembly control box with silicon gel contacting the radiator. It's required to replace the main control board in this case.
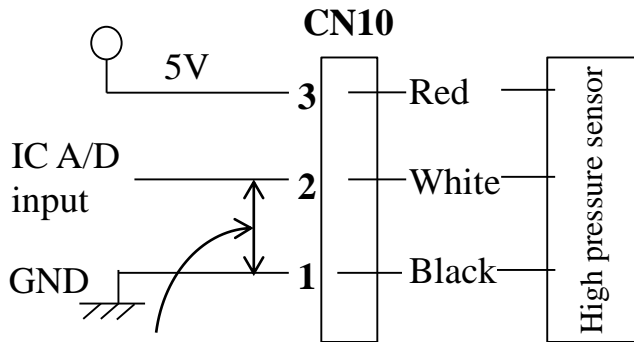
Display

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.

CN10

5V — **3** — Red — High pressure sensor

IC A/D input — **2** — White —

GND — **1** — Black —

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

Check if the high pressure sensor(HP) connected to **CN10** on the main control board? → NO → Reconnect the sensor

YES

Are the service valves fully opened? → NO → Open the service valves

YES

Low pressure at gauge port to malfunction is close to 24.5 psig. → YES → Check any refrigerant blockage or shortage.

NO

Can the pressure transduce properly based on **High Pressure Sensor Voltage Characteristics D. *NOTE** → NO → Replace the high pressure sensor

YES

Can the system go into backup running (SEG1 displays digital 1)? → YES → Replace the high pressure sensor

NO

Replace the main control board

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:
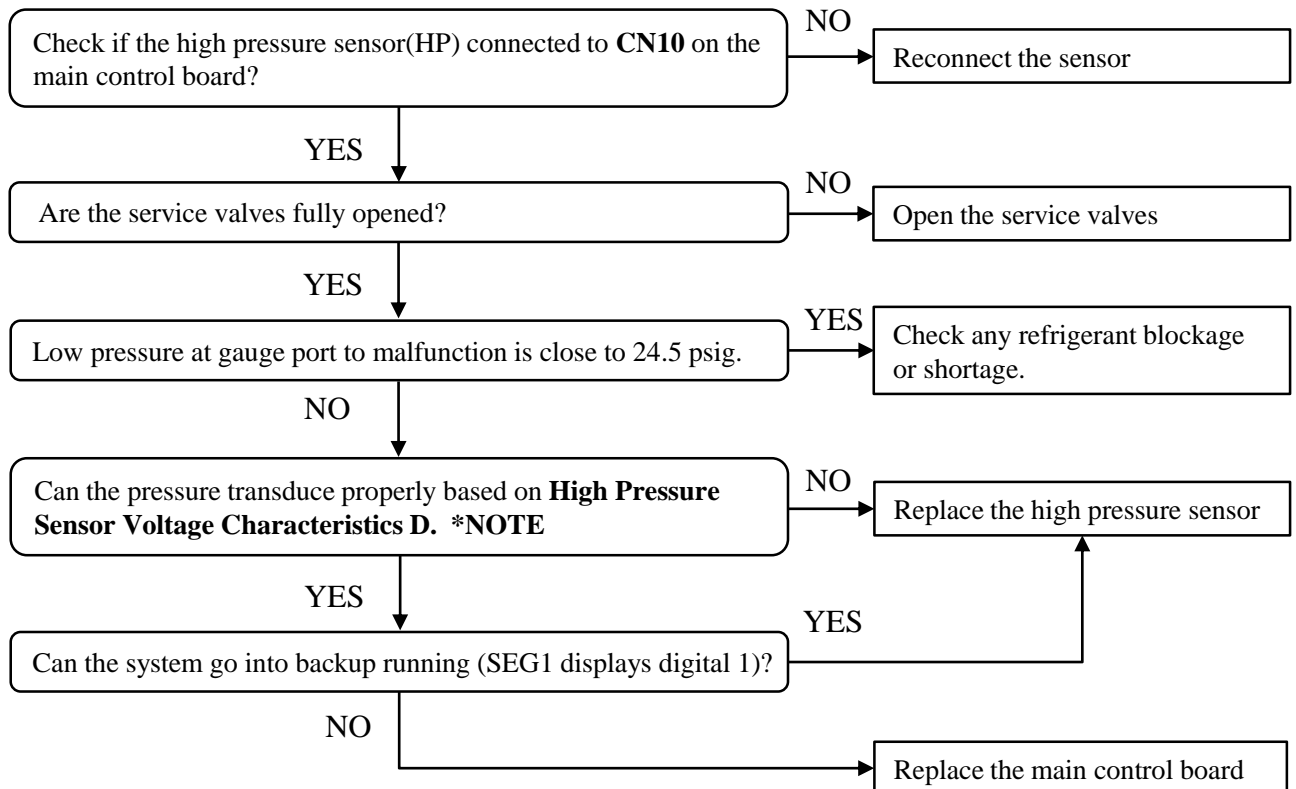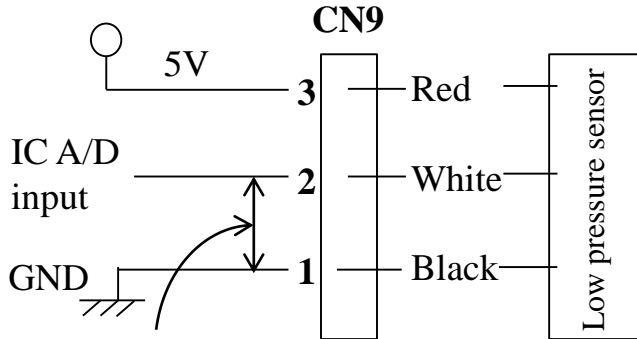
The low pressure sensor is open or shorted.

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
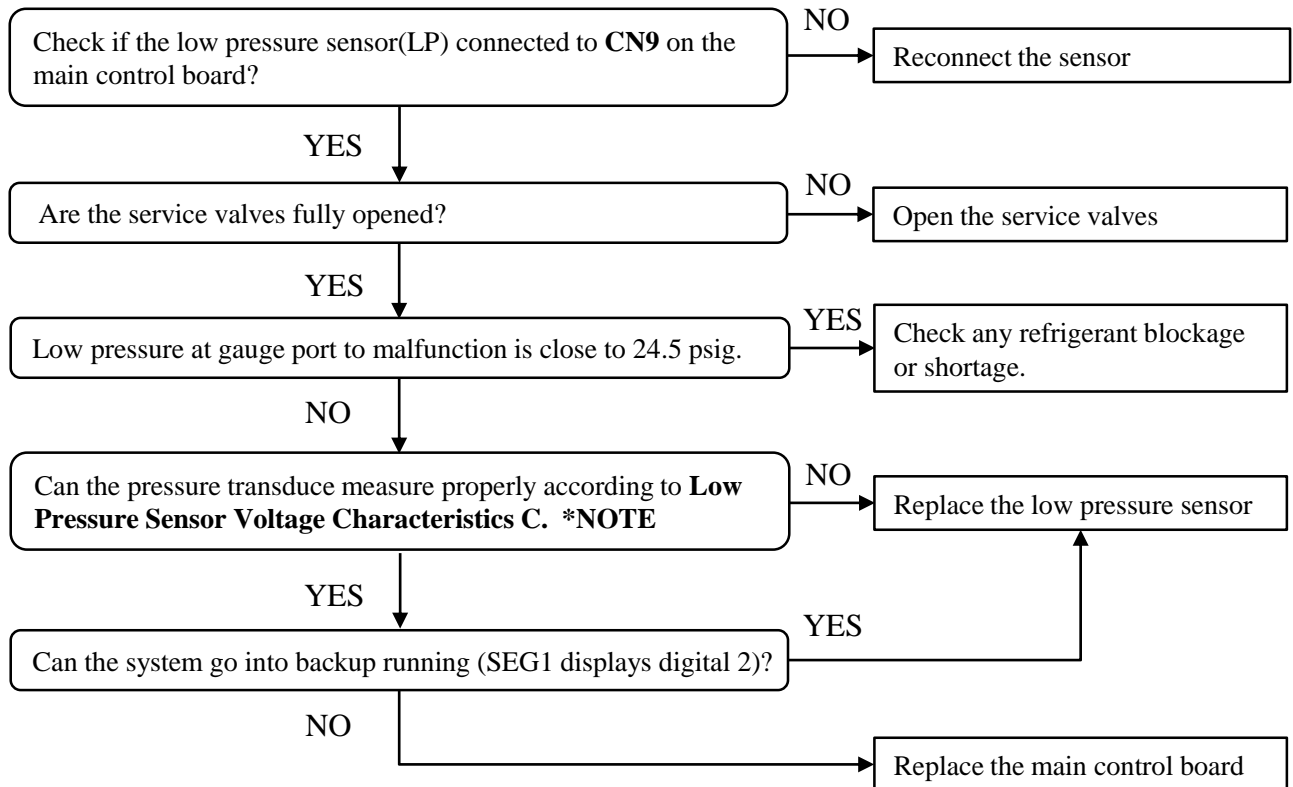
Check if the low pressure sensor(LP) connected to **CN9** on the main control board?	NO → Reconnect the sensor
↓ YES	
Are the service valves fully opened?	NO → Open the service valves
↓ YES	
Low pressure at gauge port to malfunction is close to 24.5 psig.	YES → Check any refrigerant blockage or shortage.
↓ NO	
Can the pressure transduce measure properly according to **Low Pressure Sensor Voltage Characteristics C. *NOTE**	NO → Replace the low pressure sensor
↓ YES	
Can the system go into backup running (SEG1 displays digital 2)?	YES → Replace the low pressure sensor
↓ NO	
	→ Replace the main control board

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).

CN21
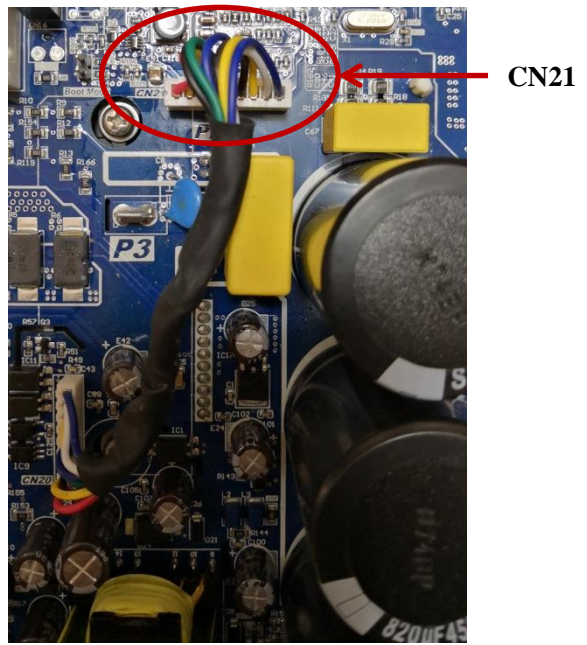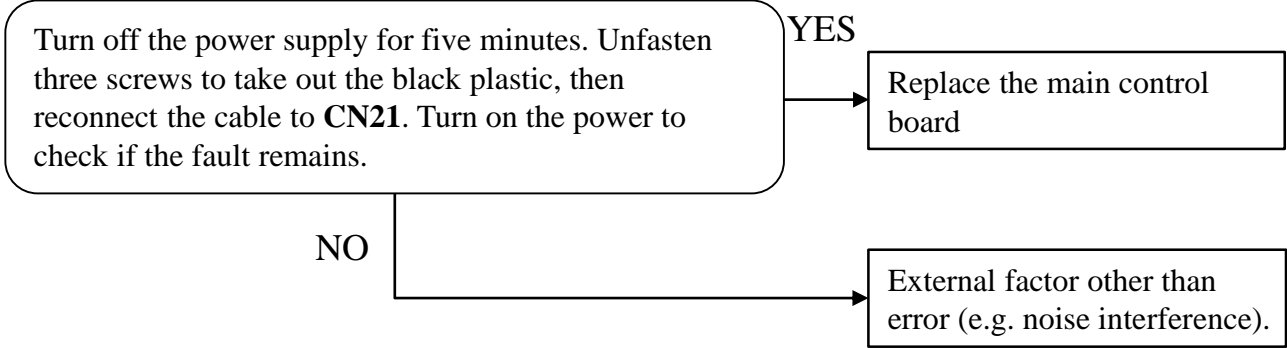
Display

◻️ **H1** or ◻️ **H2**   **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 $\geq 140°F$

H2: The detected ambient temperature is absolutely prohibited for heating.
     $TA \geq 86°F$ 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.

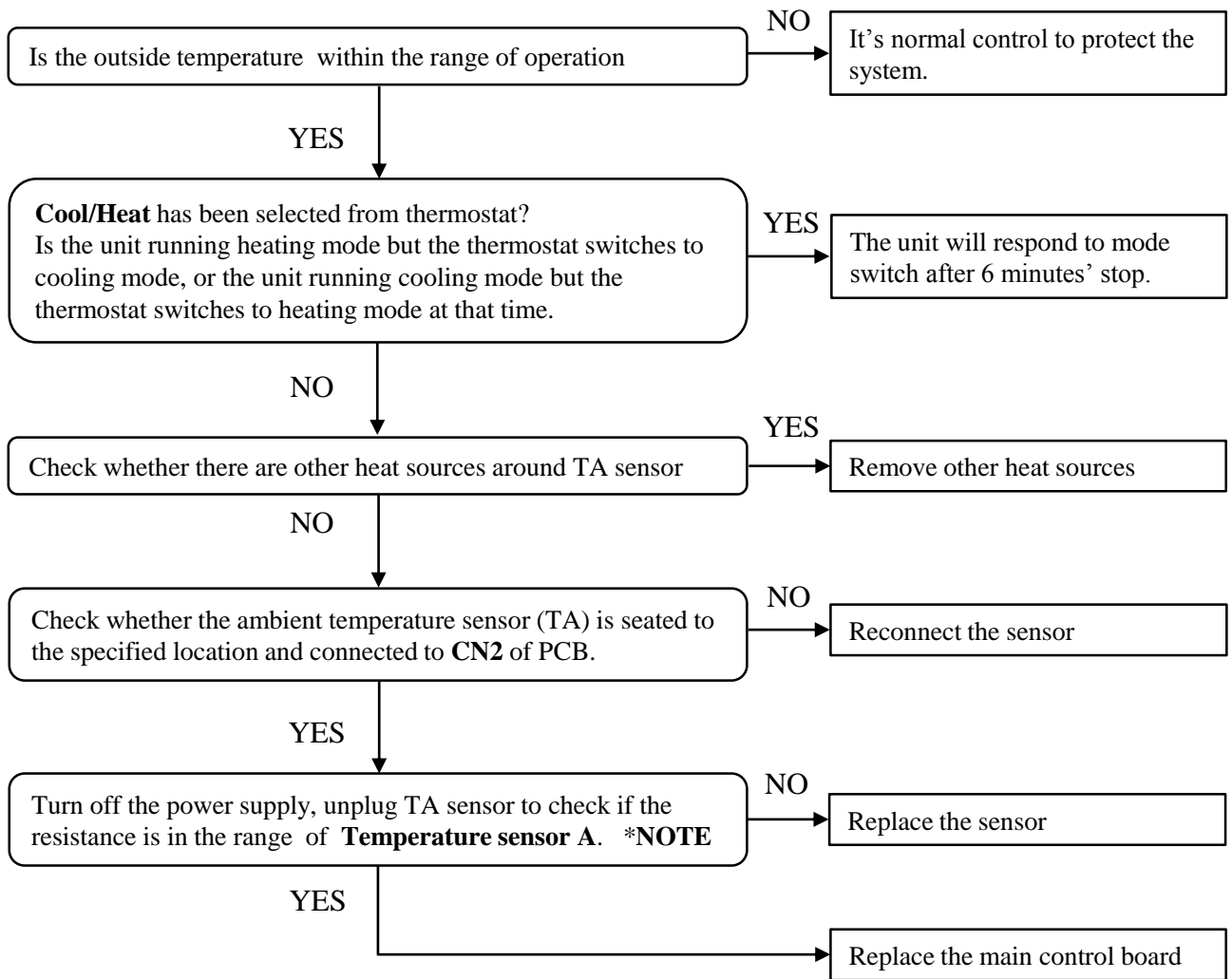|		
Is the outside temperature within the range of operation	NO →	It's normal control to protect the system.

YES ↓

Cool/Heat has been selected from thermostat? Is the unit running heating mode but the thermostat switches to cooling mode, or the unit running cooling mode but the thermostat switches to heating mode at that time.	YES →	The unit will respond to mode switch after 6 minutes' stop.

NO ↓

Check whether there are other heat sources around TA sensor	YES →	Remove other heat sources

NO ↓

Check whether the ambient temperature sensor (TA) is seated to the specified location and connected to **CN2** of PCB.	NO →	Reconnect the sensor

YES ↓

Turn off the power supply, unplug TA sensor to check if the resistance is in the range of **Temperature sensor A**. *NOTE	NO →	Replace the sensor

YES ↓

Replace the main control board

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Display

H3

Abnormal switch alarm for 4-way valve

1.Error definition:

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

2.Possible causes:

- Damaged 4-way valve(coil or body)
- Damaged main control board
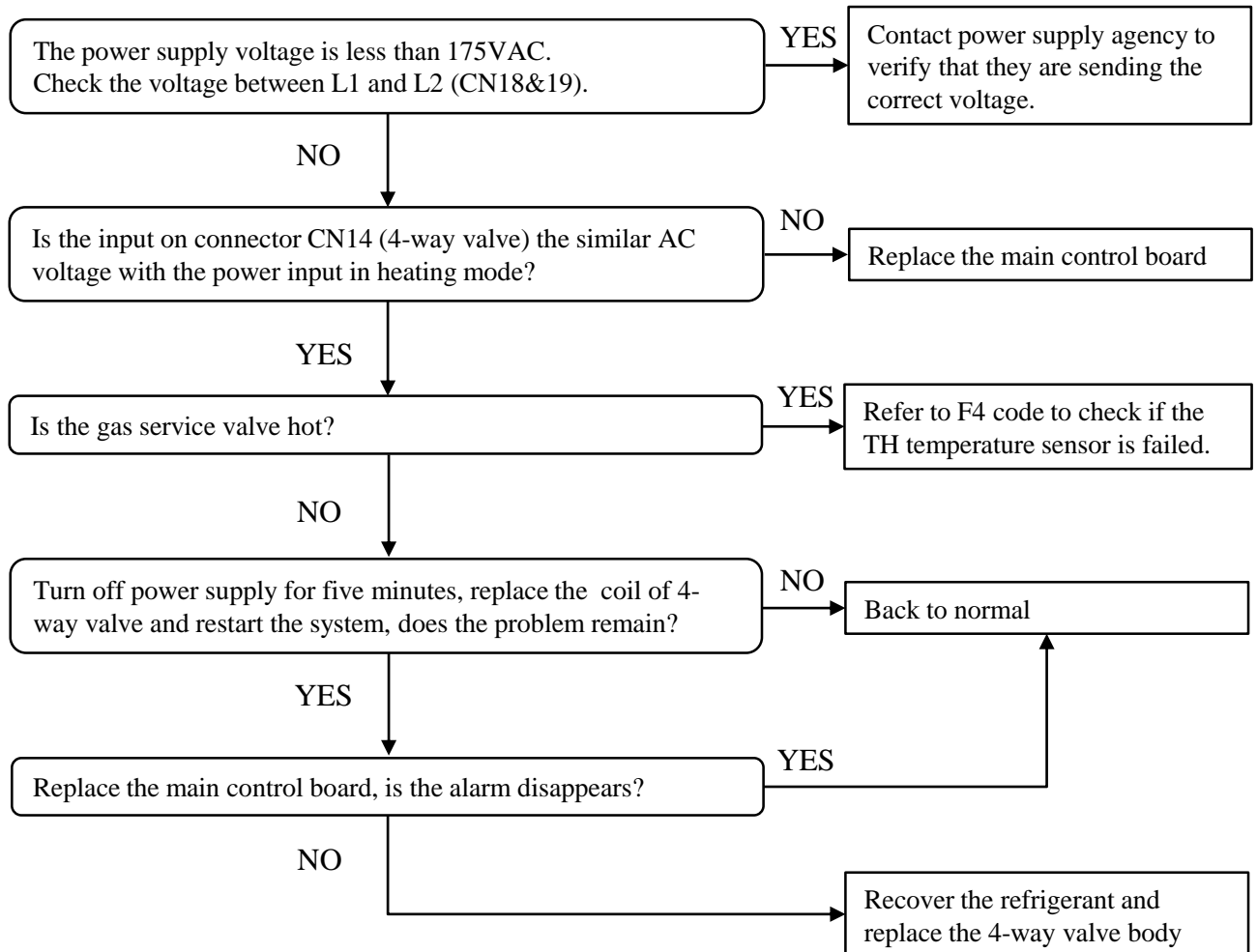- Abnormal voltage of power supply
- Temperature sensor(TH) failure
- Reversed location between TH and TL

| The power supply voltage is less than 175VAC. Check the voltage between L1 and L2 (CN18&19). | YES → | Contact power supply agency to verify that they are sending the correct voltage. |

NO ↓

| Is the input on connector CN14 (4-way valve) the similar AC voltage with the power input in heating mode? | NO → | Replace the main control board |

YES ↓

| Is the gas service valve hot? | YES → | Refer to F4 code to check if the TH temperature sensor is failed. |

NO ↓

| Turn off power supply for five minutes, replace the coil of 4-way valve and restart the system, does the problem remain? | NO → | Back to normal |

YES ↓

| Replace the main control board, is the alarm disappears? | YES → |

NO ↓

| | Recover the refrigerant and replace the 4-way valve body |

Display

Defrost temperature(TH) sensor is disconnected or damaged

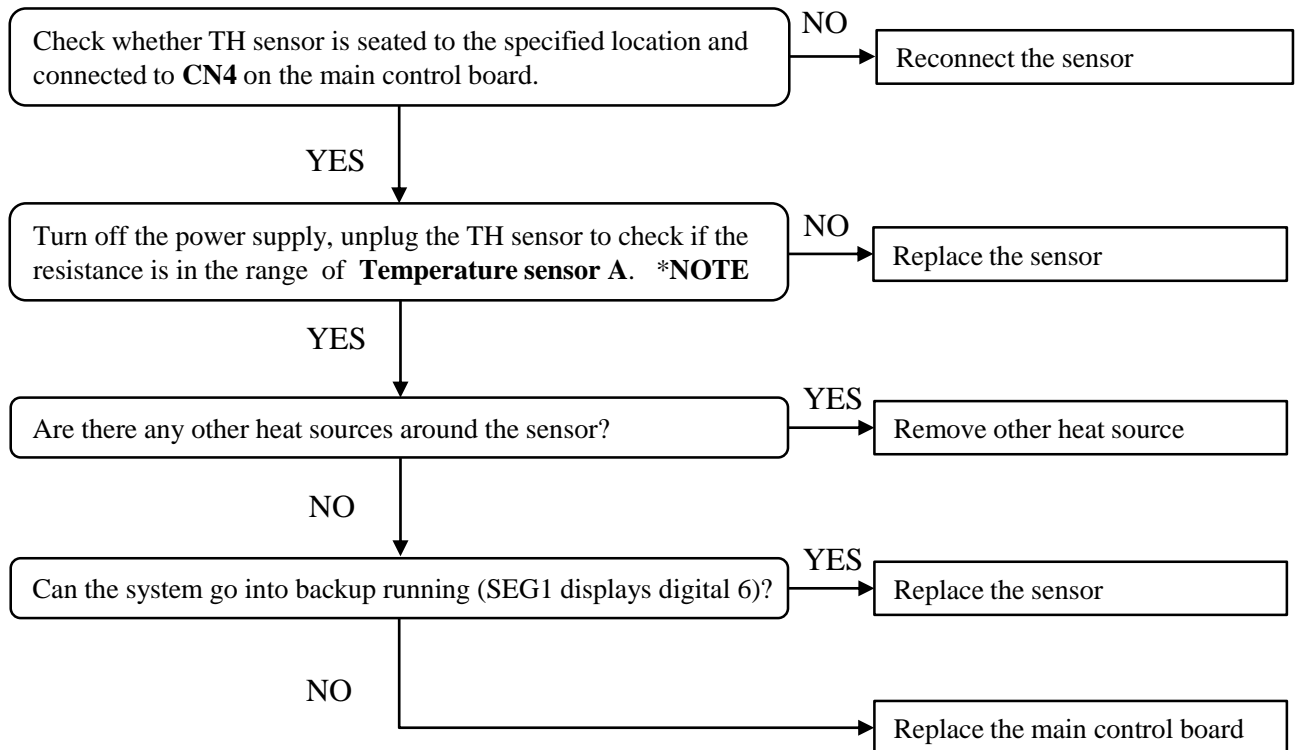### 1.Error definition:

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

Check whether TH sensor is seated to the specified location and connected to **CN4** on the main control board. —— NO → Reconnect the sensor

YES

Turn off the power supply, unplug the TH sensor to check if the resistance is in the range of **Temperature sensor A**. ***NOTE** —— NO → Replace the sensor

YES

Are there any other heat sources around the sensor? —— YES → Remove other heat source

NO

Can the system go into backup running (SEG1 displays digital 6)? —— YES → Replace the sensor

NO → Replace the main control board

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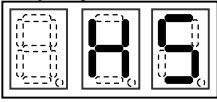
Display

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
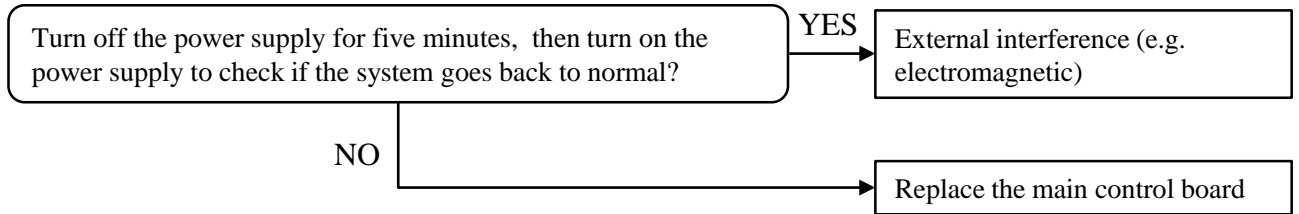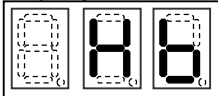
| Turn off the power supply for five minutes, then turn on the power supply to check if the system goes back to normal? | YES → | External interference (e.g. electromagnetic) |

NO →

| Replace the 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

| The power supply voltage is less than 175VAC. Check the voltage between L1 and L2 (CN18&19). | YES → | Contact power supply agency to verify that they are sending the correct voltage. |

NO →

| Replace the main control board |
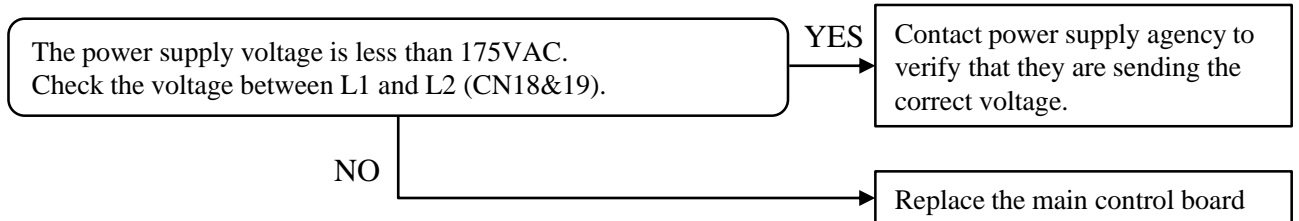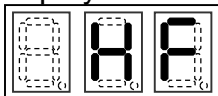
Display

Abnormal function control

1.Error definition:

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

2.Possible causes:

■ Abnormal signal input from thermostat

| Turn off the power supply for five minutes, then turn on the power supply to check if the system goes back to normal? | YES → | Back to normal |

NO →

| Contact Ecoer Service Team |

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Display | or ~ | **Compressor INV module protection**
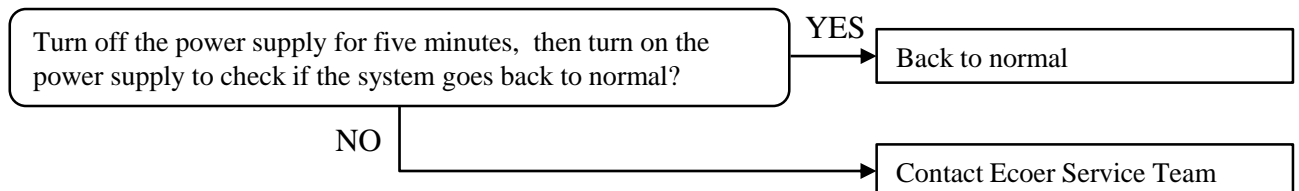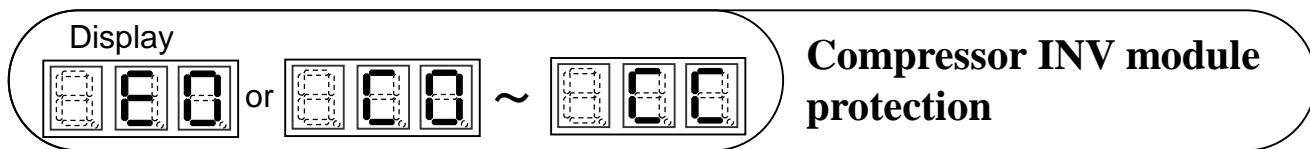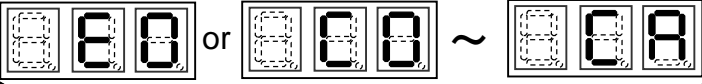
1.Error definition:

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

Display ⌷ **E0** or ⌷ **C0** ~ ⌷ **CA**

Compressor INV module protection

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

NO ↓

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

NO ↓

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

YES ↓

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

NO ↓

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

NO ↓

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

YES ↓

→ Back to normal

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

4 Parts List
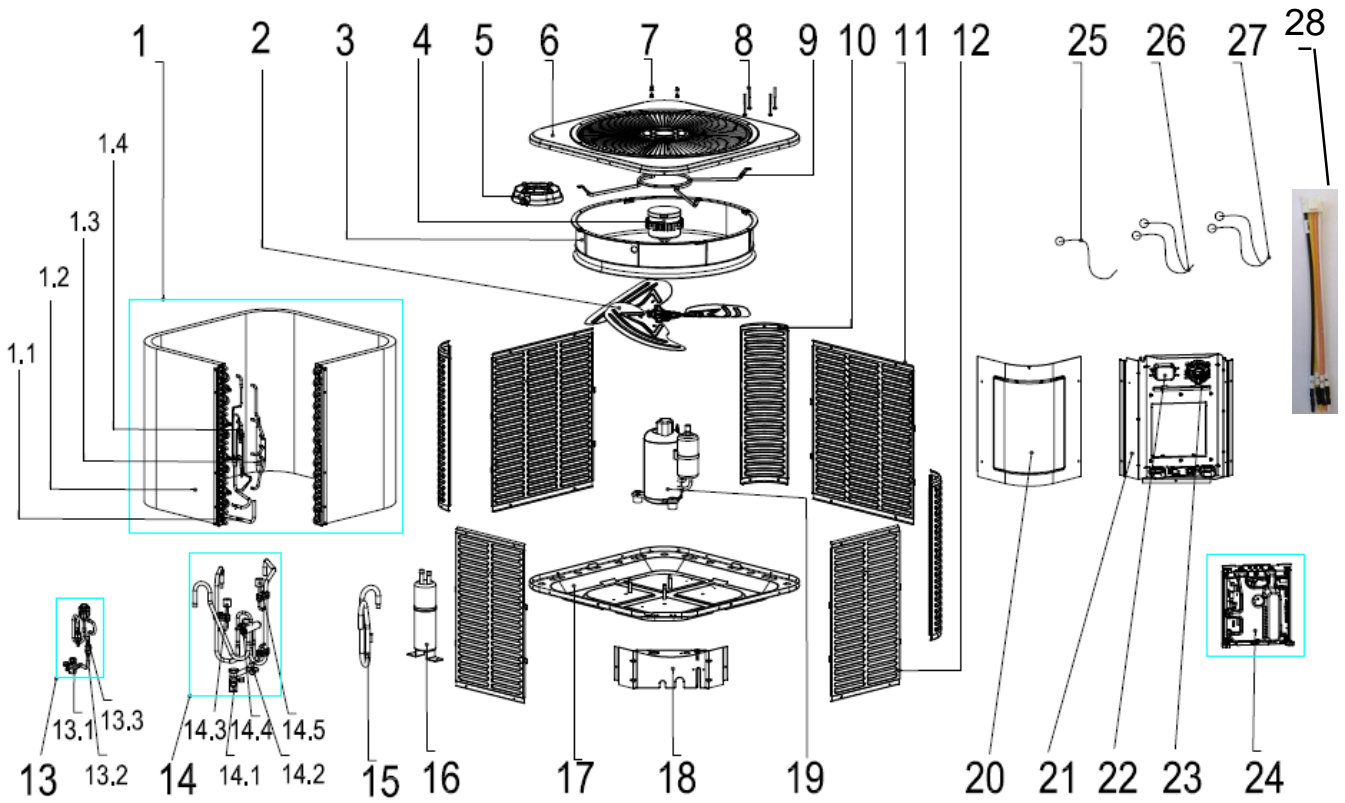
#	Part Name	Quantity	Parts number		Remark
			2436	4860	
1	Condenser ass'y	1	231235269	231235477	
1.1	Condenser connection pipe ass'y	1	231235268		
1.2	Condenser	1	231235270	231235271	
1.3	Condenser outlet pipe ass'y	1	231235085	231235153	
1.4	Condenser inlet pipe ass'y	1	231235084	231235154	
2	Fan	1	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		
7	Cap nut	4	230803110		
8	Electrical installation bolt	4	230803111		
9	Roof support frame	1	230801628		
10	Supporting board	3	230801590B	230801609B	

#	Part Name	Quantity	Parts number 2436	Parts number 4860	Remark
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	4-way 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 (black)	1	231235159		
14.4	4-way valve	1	231235077 231235079	231235078 231235079	231235077-valve body 231235078-valve body 231235079-valve coil
14.5	Low pressure sensor (green)	1	231235158		
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)	Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)	Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
-20	-4	104.86	0.53	22	71.6	11.49	2.10	64	147.2	2.02	3.00
-19	-2.2	98.84	0.56	23	73.4	10.97	2.13	65	149	1.95	3.01
-18	-0.4	93.21	0.58	24	75.2	10.47	2.17	66	150.8	1.88	3.02
-17	1.4	87.93	0.61	25	77	10.00	2.20	67	152.6	1.81	3.03
-16	3.2	82.98	0.64	26	78.8	9.55	2.23	68	154.4	1.75	3.04
-15	5	78.33	0.67	27	80.6	9.13	2.27	69	156.2	1.68	3.04
-14	6.8	73.97	0.70	28	82.4	8.73	2.30	70	158	1.63	3.05
-13	8.6	69.88	0.73	29	84.2	8.35	2.33	71	159.8	1.57	3.06
-12	10.4	66.03	0.77	30	86	7.98	2.36	72	161.6	1.51	3.07
-11	12.2	62.42	0.80	31	87.8	7.64	2.39	73	163.4	1.46	3.08
-10	14	59.02	0.84	32	89.6	7.31	2.42	74	165.2	1.41	3.08
-9	15.8	55.82	0.87	33	91.4	6.99	2.44	75	167	1.36	3.09
-8	17.6	52.81	0.91	34	93.2	6.70	2.47	76	168.8	1.31	3.10
-7	19.4	49.98	0.94	35	95	6.41	2.50	77	170.6	1.27	3.10
-6	21.2	47.32	0.98	36	96.8	6.14	2.52	78	172.4	1.23	3.11
-5	23	44.81	1.02	37	98.6	5.89	2.55	79	174.2	1.19	3.12
-4	24.8	42.45	1.06	38	100.4	5.64	2.57	80	176	1.15	3.12
-3	26.6	40.22	1.10	39	102.2	5.41	2.60	81	177.8	1.11	3.13
-2	28.4	38.12	1.14	40	104	5.19	2.62	82	179.6	1.07	3.13
-1	30.2	36.15	1.18	41	105.8	4.97	2.64	83	181.4	1.03	3.14
0	32	34.28	1.22	42	107.6	4.77	2.66	84	183.2	1.00	3.14
1	33.8	32.52	1.26	43	109.4	4.58	2.69	85	185	0.97	3.15
2	35.6	30.86	1.30	44	111.2	4.39	2.71	86	186.8	0.94	3.15
3	37.4	29.29	1.34	45	113	4.22	2.73	87	188.6	0.91	3.16
4	39.2	27.81	1.38	46	114.8	4.05	2.74	88	190.4	0.88	3.16
5	41	26.42	1.42	47	116.6	3.89	2.76	89	192.2	0.85	3.17
6	42.8	25.10	1.46	48	118.4	3.74	2.78	90	194	0.82	3.17
7	44.6	23.85	1.51	49	120.2	3.59	2.80	91	195.8	0.80	3.17
8	46.4	22.67	1.55	50	122	3.45	2.81	92	197.6	0.77	3.18
9	48.2	21.56	1.59	51	123.8	3.32	2.83	93	199.4	0.75	3.18
10	50	20.50	1.63	52	125.6	3.19	2.85	94	201.2	0.72	3.18
11	51.8	19.51	1.67	53	127.4	3.07	2.86	95	203	0.70	3.19
12	53.6	18.56	1.71	54	129.2	2.95	2.88	96	204.8	0.68	3.19
13	55.4	17.67	1.75	55	131	2.84	2.89	97	206.6	0.66	3.19
14	57.2	16.83	1.79	56	132.8	2.73	2.90	98	208.4	0.64	3.20
15	59	16.03	1.83	57	134.6	2.63	2.92	99	210.2	0.62	3.20
16	60.8	15.27	1.87	58	136.4	2.53	2.93	100	212	0.60	3.20
17	62.6	14.55	1.91	59	138.2	2.44	2.94	101	213.8	0.59	3.21
18	64.4	13.87	1.95	60	140	2.35	2.95	102	215.6	0.57	3.21
19	66.2	13.23	1.99	61	141.8	2.26	2.96	103	217.4	0.55	3.21
20	68	12.62	2.02	62	143.6	2.18	2.98	104	219.2	0.54	3.21
21	69.8	12.04	2.06	63	145.4	2.10	2.99	105	221	0.52	3.22

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)	Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)	Temp. (°C)	Temp. (°F)	Resistance (KΩ)	Voltage (V)
-20	-4	517.84	0.27	31	87.8	43.10	1.72	81	177.8	6.67	2.89
-19	-2.2	489.93	0.29	32	89.6	41.31	1.76	82	179.6	6.46	2.90
-18	-0.4	463.65	0.30	33	91.4	39.61	1.79	83	181.4	6.25	2.91
-17	1.4	438.89	0.32	34	93.2	37.99	1.82	84	183.2	6.05	2.92
-16	3.2	415.57	0.34	35	95	36.44	1.86	85	185	5.86	2.93
-15	5	393.59	0.35	36	96.8	34.96	1.89	86	186.8	5.68	2.94
-14	6.8	372.87	0.37	37	98.6	33.55	1.93	87	188.6	5.50	2.95
-13	8.6	353.34	0.39	38	100.4	32.21	1.96	88	190.4	5.33	2.96
-12	10.4	334.92	0.41	39	102.2	30.92	1.99	89	192.2	5.16	2.97
-11	12.2	317.55	0.43	40	104	29.69	2.02	90	194	5.00	2.98
-10	14	301.16	0.45	41	105.8	28.52	2.05	91	195.8	4.85	2.99
-9	15.8	285.70	0.47	42	107.6	27.40	2.08	92	197.6	4.70	3.00
-8	17.6	271.10	0.49	43	109.4	26.32	2.12	93	199.4	4.55	3.01
-7	19.4	257.33	0.51	44	111.2	25.30	2.15	94	201.2	4.42	3.02
-6	21.2	244.32	0.53	45	113	24.32	2.17	95	203	4.28	3.02
-5	23	232.03	0.56	46	114.8	23.38	2.20	96	204.8	4.15	3.03
-4	24.8	220.42	0.58	47	116.6	22.49	2.23	97	206.6	4.03	3.04
-3	26.6	209.45	0.60	48	118.4	21.63	2.26	98	208.4	3.91	3.05
-2	28.4	199.08	0.63	49	120.2	20.81	2.29	99	210.2	3.79	3.05
-1	30.2	189.27	0.66	50	122	20.02	2.31	100	212	3.68	3.06
0	32	180.00	0.68	51	123.8	19.27	2.34	101	213.8	3.57	3.07
1	33.8	171.23	0.71	52	125.6	18.55	2.37	102	215.6	3.46	3.07
2	35.6	162.93	0.74	53	127.4	17.86	2.39	103	217.4	3.36	3.08
3	37.4	155.07	0.77	54	129.2	17.20	2.42	104	219.2	3.26	3.09
4	39.2	147.63	0.80	55	131	16.57	2.44	105	221	3.17	3.09
5	41	140.59	0.83	56	132.8	15.96	2.46	106	222.8	3.09	3.10
6	42.8	133.92	0.86	57	134.6	15.38	2.49	107	224.6	3.00	3.10
7	44.6	127.60	0.89	58	136.4	14.82	2.51	108	226.4	2.92	3.11
8	46.4	121.60	0.92	59	138.2	14.29	2.53	109	228.2	2.84	3.11
9	48.2	115.93	0.95	60	140	13.77	2.55	110	230	2.76	3.12
10	50	110.54	0.98	61	141.8	13.28	2.57	111	231.8	2.68	3.12
11	51.8	105.43	1.02	62	143.6	12.81	2.59	112	233.6	2.60	3.13
12	53.6	100.59	1.05	63	145.4	12.36	2.61	113	235.4	2.53	3.13
13	55.4	95.99	1.08	64	147.2	11.92	2.63	114	237.2	2.46	3.14
14	57.2	91.62	1.12	65	149	11.51	2.65	115	239	2.39	3.14
15	59	87.48	1.15	66	150.8	11.11	2.67	116	240.8	2.33	3.14
16	60.8	83.54	1.19	67	152.6	10.72	2.69	117	242.6	2.26	3.15
17	62.6	79.80	1.22	68	154.4	10.35	2.70	118	244.4	2.20	3.15
18	64.4	76.25	1.26	69	156.2	10.00	2.72	119	246.2	2.14	3.16
19	66.2	72.87	1.29	70	158	9.66	2.74	120	248	2.08	3.16
20	68	69.66	1.33	71	159.8	9.33	2.75	121	249.8	2.03	3.16
21	69.8	66.61	1.37	72	161.6	9.01	2.77	122	251.6	1.97	3.17
22	71.6	63.70	1.40	73	163.4	8.71	2.78	123	253.4	1.92	3.17
23	73.4	60.94	1.44	74	165.2	8.42	2.80	124	255.2	1.87	3.17
24	75.2	58.31	1.47	75	167	8.14	2.81	125	257	1.82	3.18
25	77	55.81	1.51	76	168.8	7.87	2.83	126	258.8	1.77	3.18
26	78.8	53.42	1.54	77	170.6	7.61	2.84	127	260.6	1.72	3.18
27	80.6	51.15	1.58	77	170.6	7.36	2.85	128	262.4	1.68	3.19
28	82.4	48.99	1.62	78	172.4	7.12	2.87	129	264.2	1.63	3.19
29	84.2	46.93	1.65	79	174.2	6.89	2.88	130	266	1.59	3.19
30	86	44.97	1.69	80	176	6.86	2.88				

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)	Low pressure (MPa)	Low pressure (psig)	Resistance (KΩ)	Output voltage(V)
0.10	14.5	49.51	0.70	0.68	98.6	13.61	1.86
0.11	16	47.91	0.72	0.70	102	13.15	1.90
0.12	17.4	46.40	0.74	0.73	106	12.50	1.96
0.13	18.9	44.97	0.76	0.76	110	11.89	2.02
0.14	20.3	43.61	0.78	0.78	113	11.50	2.06
0.15	21.8	42.32	0.80	0.81	117	10.95	2.12
0.16	23.2	41.09	0.82	0.84	122	10.43	2.18
0.17	24.7	39.92	0.84	0.87	126	9.93	2.24
0.18	26.1	38.80	0.86	0.90	131	9.46	2.30
0.19	27.6	37.74	0.88	0.93	135	9.02	2.36
0.21	30.5	35.74	0.92	0.96	139	8.59	2.42
0.22	31.9	34.81	0.94	0.99	144	8.19	2.48
0.23	33.4	33.92	0.96	1.02	148	7.81	2.54
0.24	34.8	33.06	0.98	1.06	154	7.32	2.62
0.26	37.7	31.45	1.02	1.09	158	6.98	2.68
0.27	39.2	30.69	1.04	1.13	164	6.54	2.76
0.29	42.1	29.25	1.08	1.16	168	6.23	2.82
0.30	43.5	28.58	1.10	1.20	174	5.84	2.90
0.32	46.4	27.29	1.14	1.24	180	5.46	2.98
0.33	47.9	26.68	1.16	1.27	184	5.20	3.04
0.35	50.8	25.52	1.20	1.31	190	4.86	3.12
0.37	53.7	24.44	1.24	1.35	196	4.53	3.20
0.38	55.1	23.92	1.26	1.39	202	4.23	3.28
0.40	58	22.94	1.30	1.43	207	3.93	3.36
0.42	60.9	22.01	1.34	1.48	215	3.59	3.46
0.44	63.8	21.14	1.38	1.52	220	3.32	3.54
0.46	66.7	20.32	1.42	1.56	226	3.07	3.62
0.48	69.6	19.54	1.46	1.61	233	2.77	3.72
0.50	72.5	18.81	1.50	1.65	239	2.55	3.80
0.52	75.4	18.11	1.54	1.70	247	2.27	3.90
0.54	78.3	17.45	1.58	1.75	254	2.02	4.00
0.56	81.2	16.82	1.62	1.80	261	1.77	4.10
0.58	84.1	16.22	1.66	1.85	268	1.54	4.20
0.61	88.5	15.37	1.72	1.90	276	1.31	4.30
0.63	91.4	14.84	1.76	1.95	283	1.10	4.40
0.65	94.3	14.33	1.80	2.00	290	0.90	4.50

     07.2019

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

EODA18H-2436

231311491

AUG 2018 V1.5

COMPONENT CODE

Symbol	Description
	THERMISTOR/ TEMPERATURE SENSOR
M	MOTOR
	HIGH/LOW PRESSURE SENSOR(H/LP)
	4-WAY VALVE
EEV	ELECTRONIC EXPANSION VALVE
	NOISELESS EARTH
	CONNECTOR
	LOW VOLTAGE
	HIGH VOLTAGE
	HIGH VOLTAGE FIELD

COLOR CODE:

RD -------- RED
BR -------- BROWN
GR -------- GREEN
BK -------- BLACK
WH -------- WHITE
YL -------- YELLOW
BL -------- BLUE
OR -------- ORANGE
GY -------- GRAY

Dip switch

SW-NO.	Setting item	Description	
		Setting	Content
SW1-1	Reserved	/	/
SW1-2	Ton capacity selection	ON	2 or 4 Ton
		OFF(factory)	3 or 5 Ton
SW1-3	AC only/heat pump selection	ON	AC only
		OFF(factory)	Heat pump
SW1-4	Response for IoT	ON	Yes
		OFF(factory)	No

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

COMPRESSOR TERMINAL ORIENTATION

TF   RADIATOR TEMP. SENSOR (POWER MODULE)
HP   HIGH PRESSURE SENSOR
LP   LOW PRESSURE SENSOR
TD   COMP. DISCHARGE TEMPERATURE SENSOR
TH   DEFROST TEMPERATURE SENSOR
TL   LIQUID LINE TEMPERATURE SENSOR
TA   OUTDOOR AMBIENT TEMPERATURE SENSOR
TS   COMP. SUCTION TEMPERATURE SENSOR

To IoT GATEWAY(Option kit)

To THERMOSTAT

CN22
CN10
CN9
CN7
CN4
CN2
CN11
CN5
BS4
BS1 BS2 BS3
SEG1 SEG2 SEG3
SW1

ECOER

INDUCTANCE
NOISE FILTER
EARTH
EEV
CN13
CN14
CN19
CN18
L1 L2
P2
P3
CN8
DC-FAN
COMP
W V U

BK YL OR WH
C Y O W

EARTH
L1 L2 EARTH

FIELD WIRING NOTE2
208/230V-1Ph-60Hz

SEE NOTE1

NOTES:
1. USE COPPER CONDUCTORS ONLY;
2. CLASS 2 WIRE;

⚠ WARNING

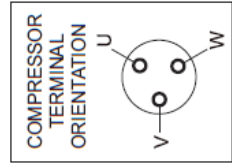# EODA18H-4860

231311490
AUG 2018 V1.5

COMPONENT CODE

THERMISTOR/ TEMPERATURE SENSOR

MOTOR

HIGH/LOW PRESSURE SENSOR(H/LP)

4-WAY VALVE

ELECTRONIC EXPANSION VALVE

NOISELESS EARTH

CONNECTOR

LOW VOLTAGE

HIGH VOLTAGE

HIGH VOLTAGE FIELD

COLOR CODE:

RD ······ RED
BR ······ BROWN
GR ······ GREEN
BK ······ BLACK
WH ······ WHITE
YL ······ YELLOW
BL ······ BLUE
OR ······ ORANGE
GY ······ GRAY

Dip switch

SW-NO.	Setting item	Setting	Content
SW1-1	Reserved	/	/
SW1-2	Ton capacity selection	ON OFF(factory)	2 or4Ton 3 or 5Ton
SW1-3	AC only/heat pump selection	ON OFF(factory)	AC only Heat pump
SW1-4	Response for IoT	ON OFF(factory)	No Yes

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

COMPRESSOR TERMINAL ORIENTATION

U
V
W

HP HIGH PRESSURE SENSOR
LP LOW PRESSURE SENSOR
To IoT GATEWAY(Option kit)
TF RADIATOR TEMP. SENSOR (POWER MODULE)
TD COMP. DISCHARGE TEMPERATURE SENSOR
TH DEFROST TEMPERATURE SENSOR
TL LIQUID LINE TEMPERATURE SENSOR
TA OUTDOOR AMBIENT TEMPERATURE SENSOR
TS COMP. SUCTION TEMPERATURE SENSOR

TO THERMOSTAT
WH — A — W
OR — A — O
YL — A — Y
BK — A — C

CN10
CN9
CN11
CN22
CN7
CN4
CN2
CN5

SEG1 SEG2 SEG3
BS1 BS2 BS3
BS4

SW1
ON
1 2 3 4

INDUCTANCE
L

EEV
CN13
EARTH

ECOER

CN14
CN19
CN18
L2
P2
P3

CN8
DC-FAN
M

COMP
W V U
M
BL WH RD

NOISE FILTER

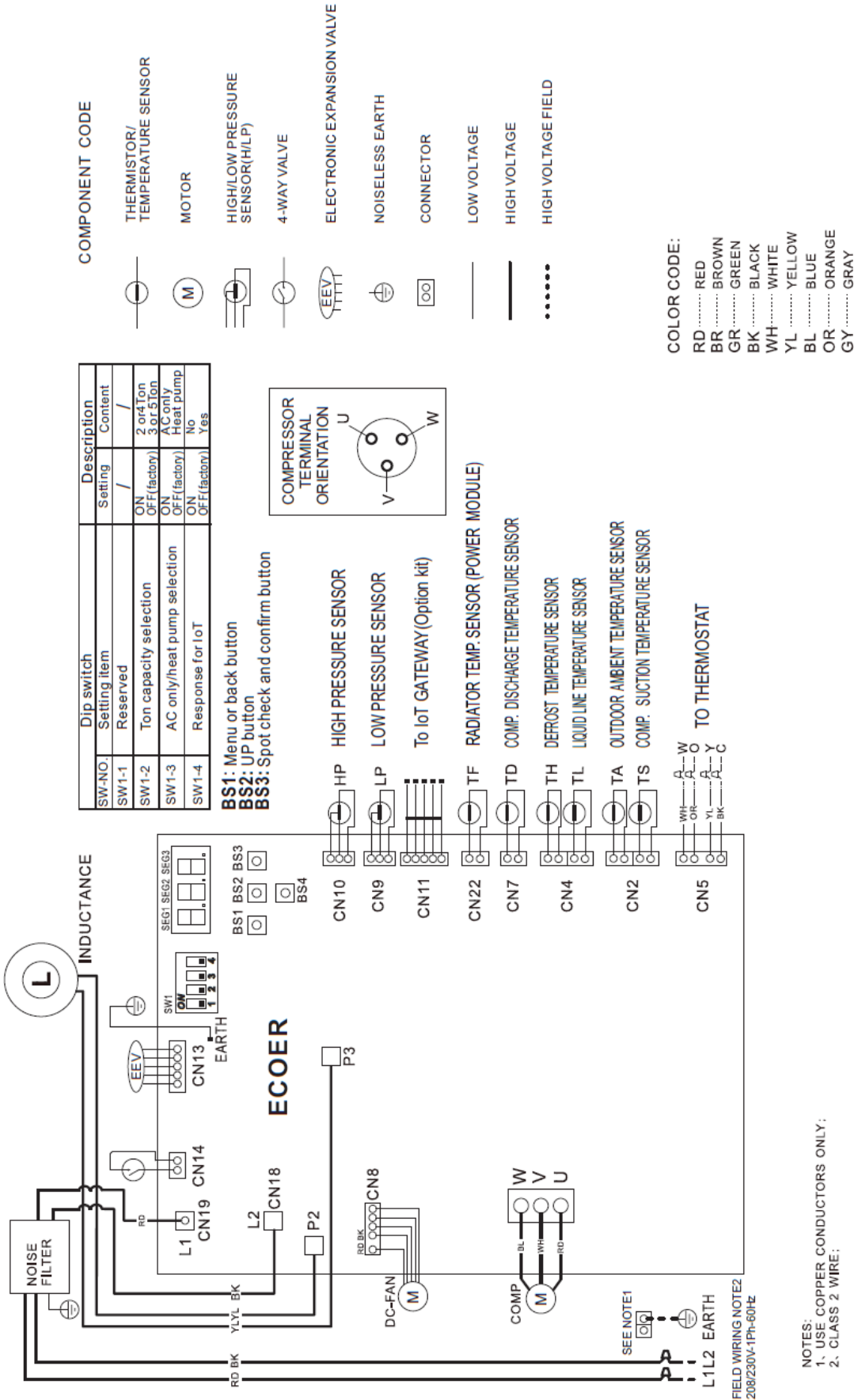L1
RD
BK
YL YL

SEE NOTE1
L1 L2 EARTH

FIELD WIRING NOTE2
208/230V-1Ph-60Hz

NOTES:
1. USE COPPER CONDUCTORS ONLY;
2. CLASS 2 WIRE;

⚠ **WARNING**

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.

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