Ecoer DFi Gas Furnace Service Manual

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

IMPORTANT

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

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

Contents

1. General Information

1.1 INTRODUCTION

The 4--way multipoise Category IV condensing furnace is CSA design--certified for both direct--vent (2-pipe) and ventilated combustion air venting installations. See Fig. 2. The furnace is factory--shipped for use with natural gas. The furnace can be converted in the field for use with propane gas when a factory-supplied conversion kit is used. Refer to the propane gas conversion instructions for details.

This furnace is not approved for installation in mobile homes, recreational vehicles, or outdoors.

This furnace is designed for minimum continuous return--air temperature of 60°F (16°C) db or intermittent operation down to 55 °F (13 °C) db such as when used with a night setback thermostat. Return-air temperature must not exceed 85°F (29°C) db. Failure to follow these return-air temperature limits may result in equipment protection shutdown or affect reliability of heat exchangers, motors, and controls. See Fig. 1.

The furnace should be sized to provide 100 percent of the design heating load requirement plus any margin that occurs because of furnace model size capacity increments. None of the furnace model sizes can be used if the heating load is 20,000 BTU or lower. Use Air Conditioning Contractors of America (Manual J and S); American Society of Heating, Refrigerating, and Air-Conditioning Engineers; or other approved engineering method to calculate heating load estimates and select the furnace. Excessive oversizing of the furnace may cause the furnace and/or vent to fail prematurely,
customer discomfort and/or vent freezing.
Failure to follow these guidelines is considered faulty installation and/or misapplication of the furnace; and resulting failure, damage, or repairs may impact warranty coverage.
For accessory installation details, refer to the applicable instruction literature.

NOTE: Remove all shipping materials, loose parts bag, and literature before operating the furnace.

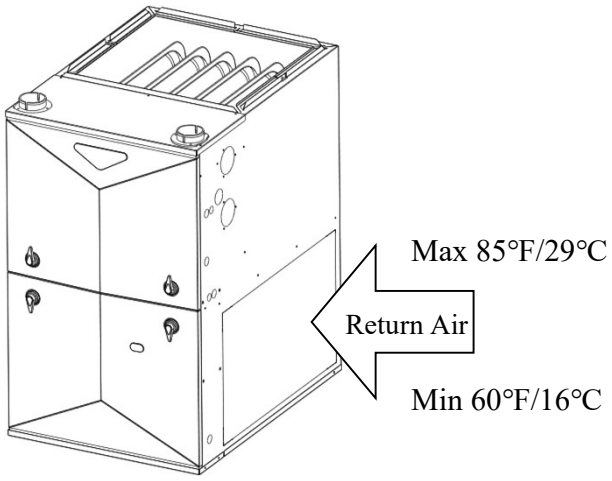


Fig. 1 - Return Air Temperature

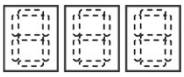
1.2 Error Code List

Code	Error
E1	Internal error
E2	Normally closed error of pressure switch
P6	LPS error
P7	MPS error
P8	HPS error
E6	LPS locked
E7	MPS locked
E8	HPS locked
E9	The INDUCER fault
EA	Ignition failure
EB	Flame loss error
PD	Primary Temp. limit switch protection
ED	Primary Temp. limit switch locked
EE	Rollout Temp. limit switch protection
F1	Pressure sensor fault
F2	Refrigerant leakage fault
F3	T1 sensor fault
F4	T1 restricted operation
E5	Blower failure fault
P3	Voltage protection
PC	Reflow Temp. limit switch protection
EC	Reflow Temp. limit switch locked
E3	Power polarity error/Ground wire error
E4	Fuse error
P1	Signal error
P2	Signal error
F5	INDUCER Comm Failure
F6	Gas Valve Comm Failure
F7	P2 high pressure alarm

2. Troubleshooting

2.1 Problems without Codes

No Display



The unit energized but the digital tube shows nothing

1.Error definition:

System Does Not Start Normally.

2.Possible causes:

- Loose connection at port on main control board
- Damaged door switch
- Damaged transformer
- Damaged main control board

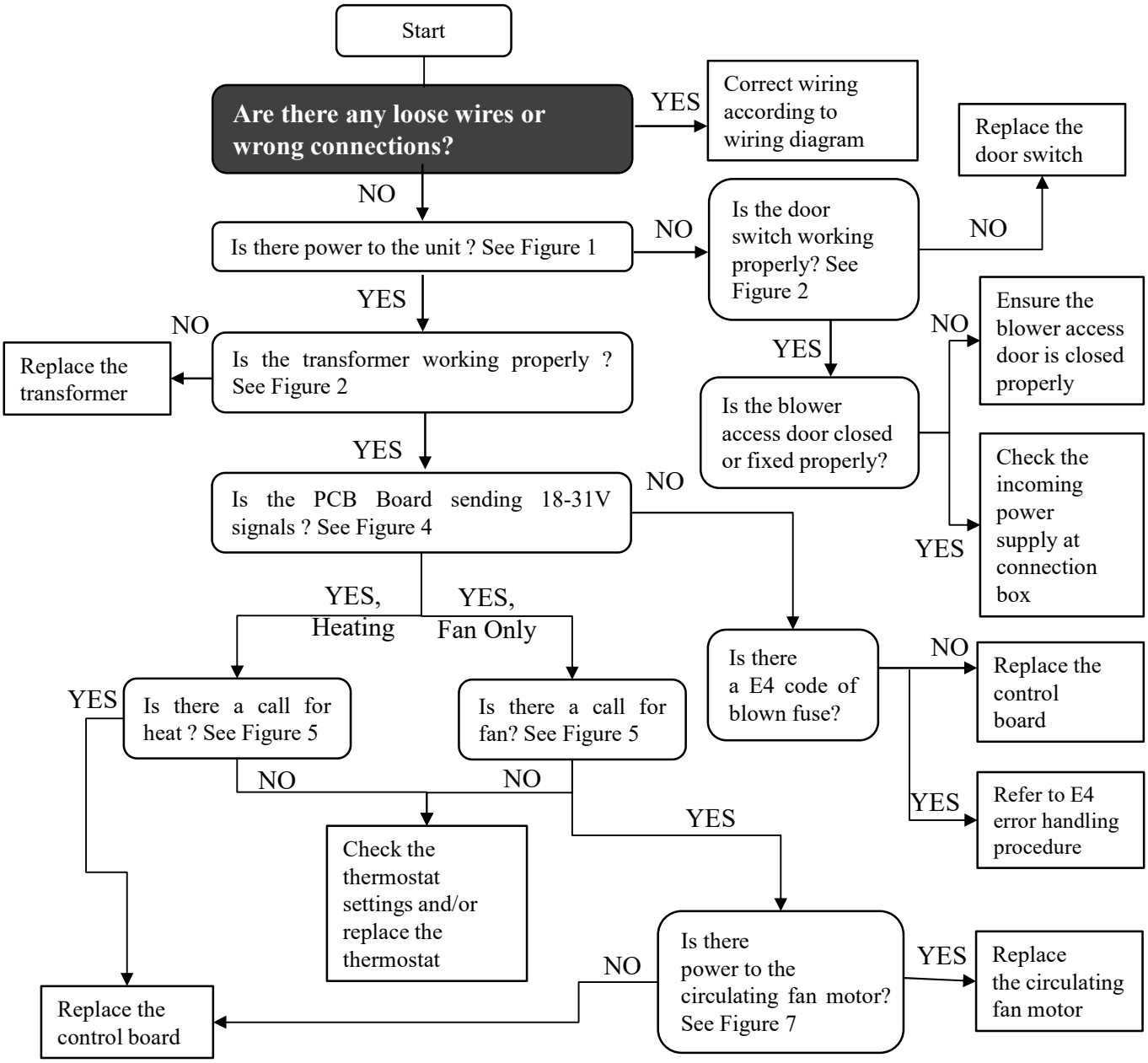
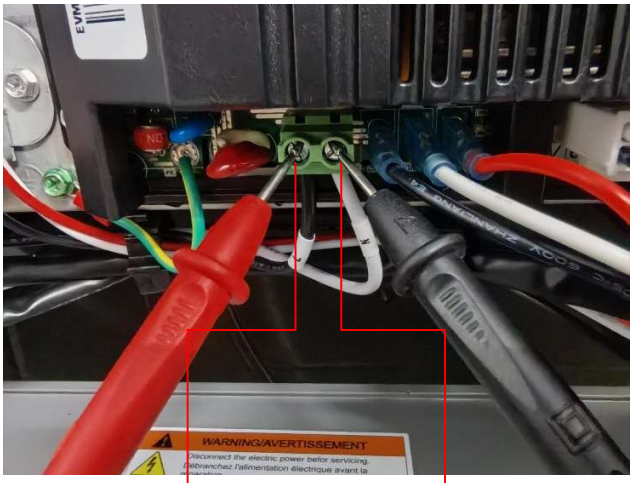
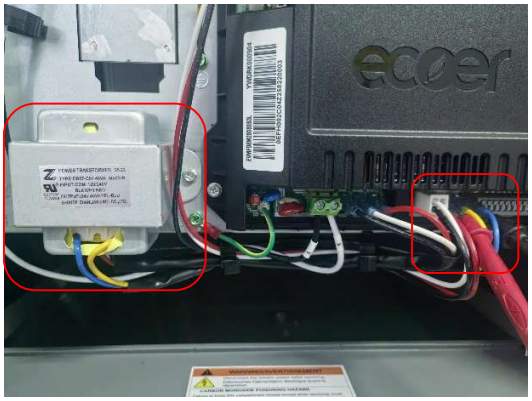


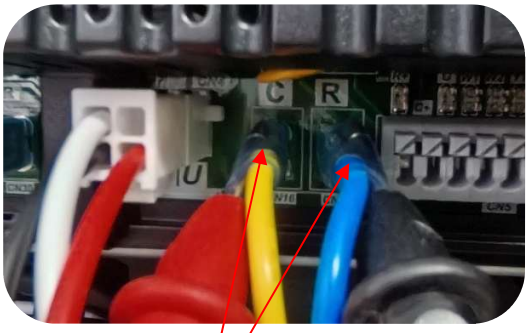
Figure 1



1. Check for 115Vac power supply between L1 and common terminal.

Figure 2





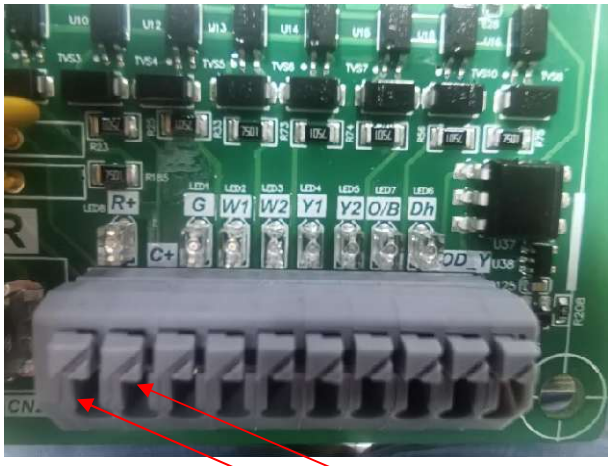
1. Check for 18-31Vac power between these 2 terminals (C and R) with multi-meter.

Figure 3

1. Power off.
2. Press in the door switch.

3. Use a multi-meter to measure the resistance. If it is 0 Ω, then the door switch is ok..

Figure 4



1. Check for 18-31Vac power between “R” & “C” terminals with multi-meter.

Figure 5

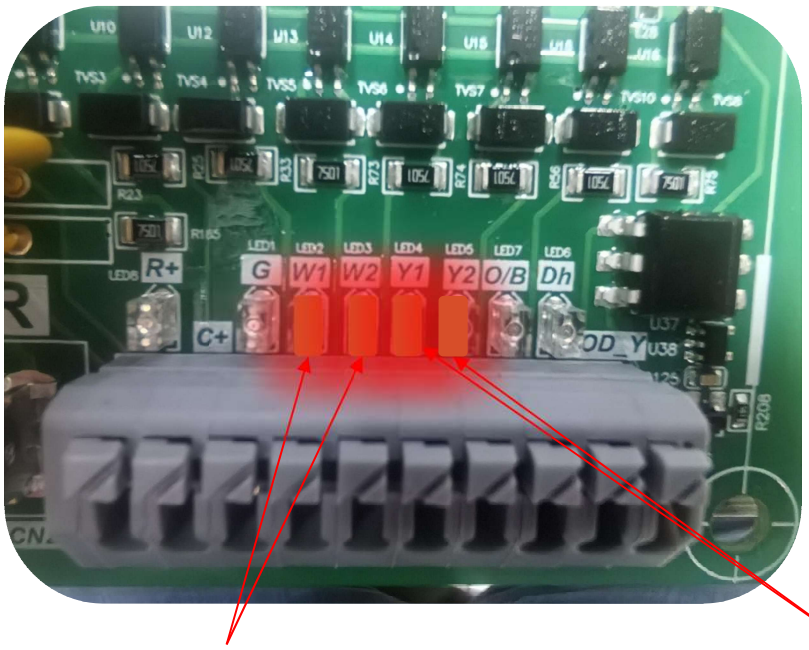
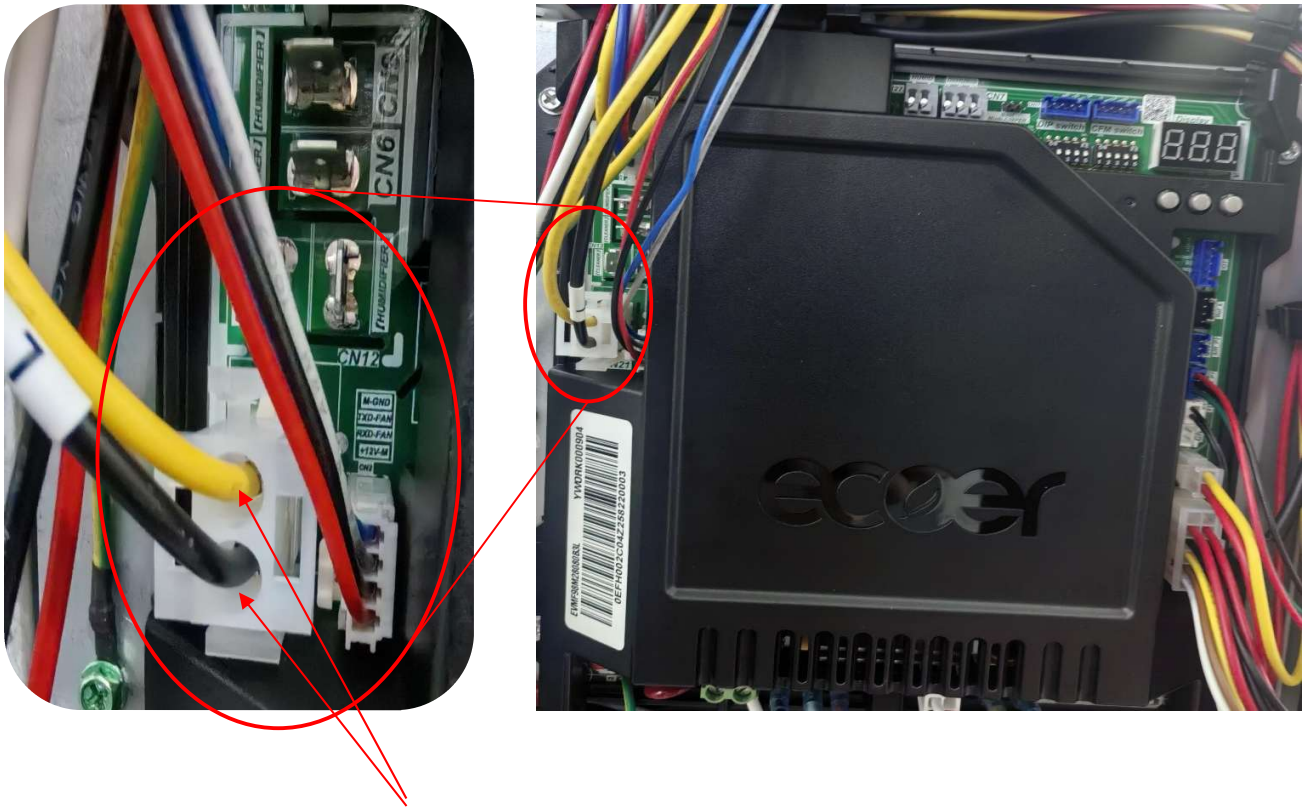


Figure 6

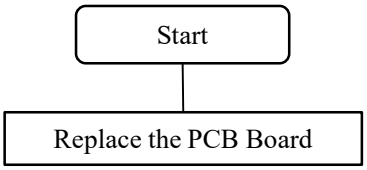


1. Check for 115Vac power supply between CIRC-L and N with multi-mete.

2.2 Code E1

1.Error definition:
Internal fault of main control board，The sensor detects a flame when there should be no flame.
2.Possible causes:

- Control program error/hardware damage.



2.3 Code E2

1.Error definition:
Normally closed error of pressure switch.

2.Possible causes:

- Pressure switch stuck closed. Check switch function, verify inducer is turning off.

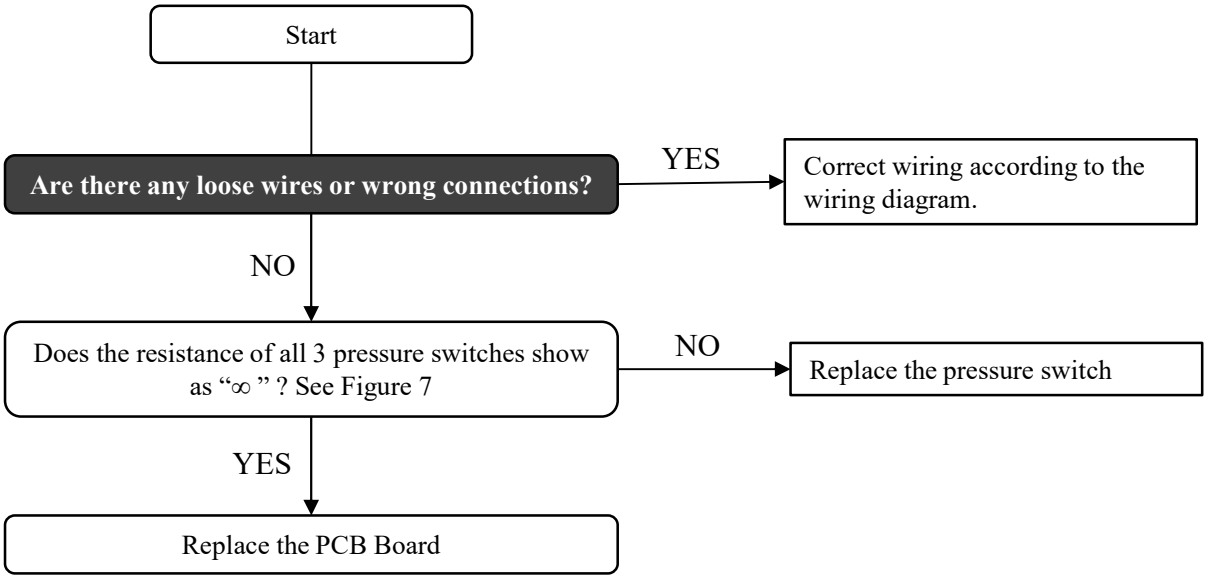
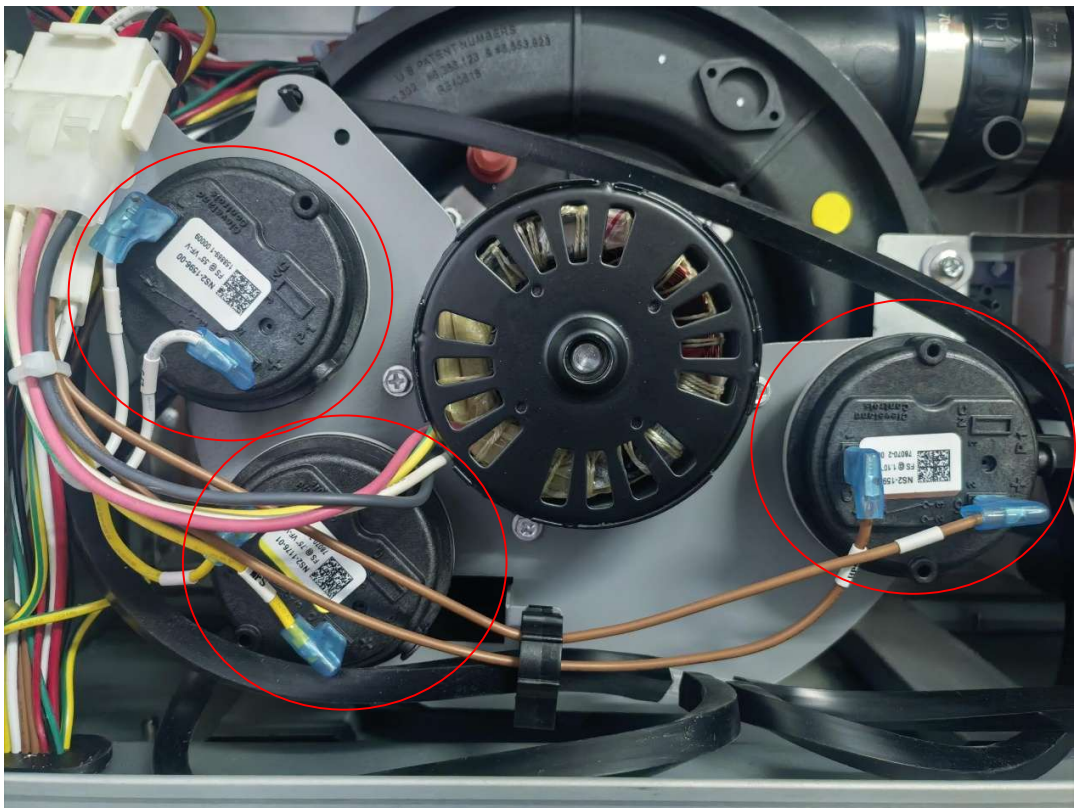
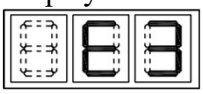


Figure 7



1. Disconnect the power supply;
2. Disconnect the pressure switch connection wire ;
3. Check for ∞ resistance between these two terminals with multi-meter.

2.4 Code E3

Display	Power polarity error/Ground wire error
	

1.Error definition:
Incorrect Polarity of L1/L2, or Ground wire not connected or poorly grounded.

2.Possible causes:
- L1/L2 reverse connection;
- Ground wire not connected or poorly grounded.

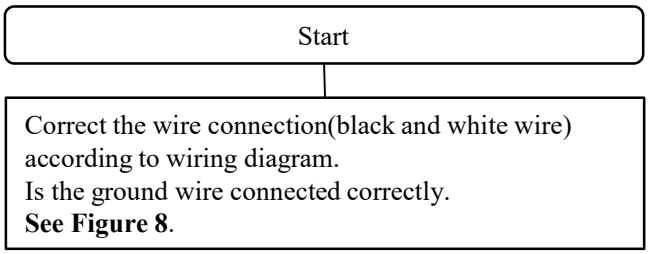
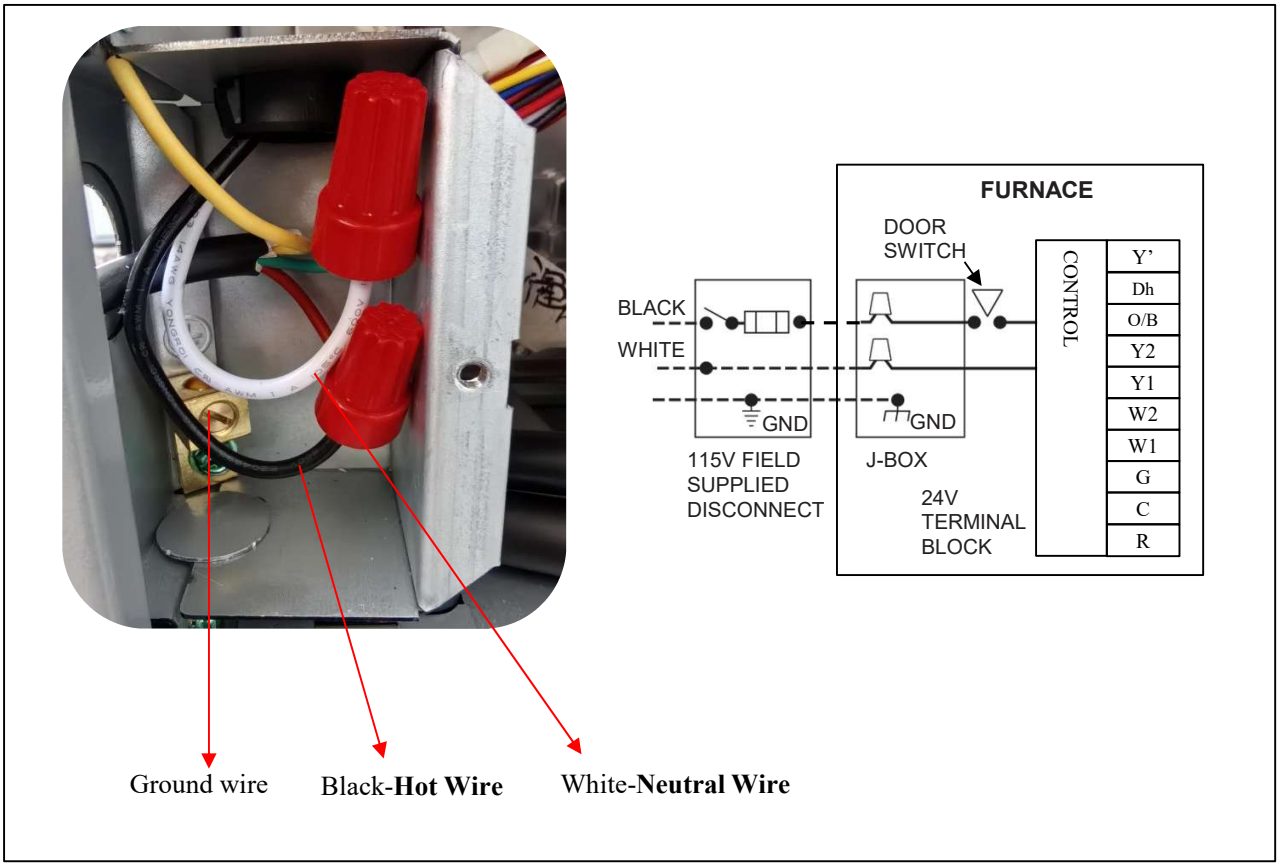


Figure 8



2.5 Code E4

Display E4 **Fuse open**

1.Error definition:

The fuse triggers disconnection

2.Possible causes:

- 24V circuit short circuit

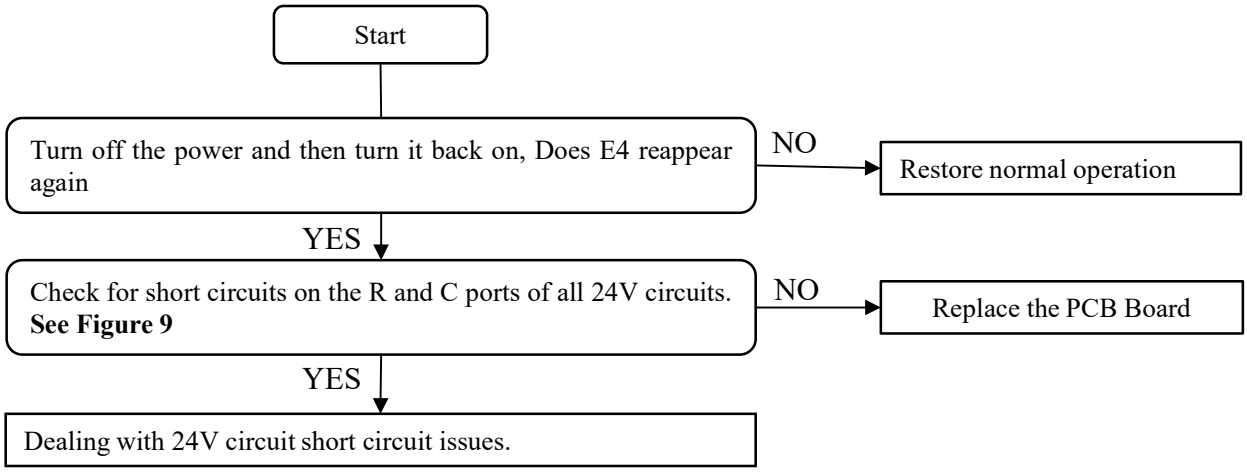
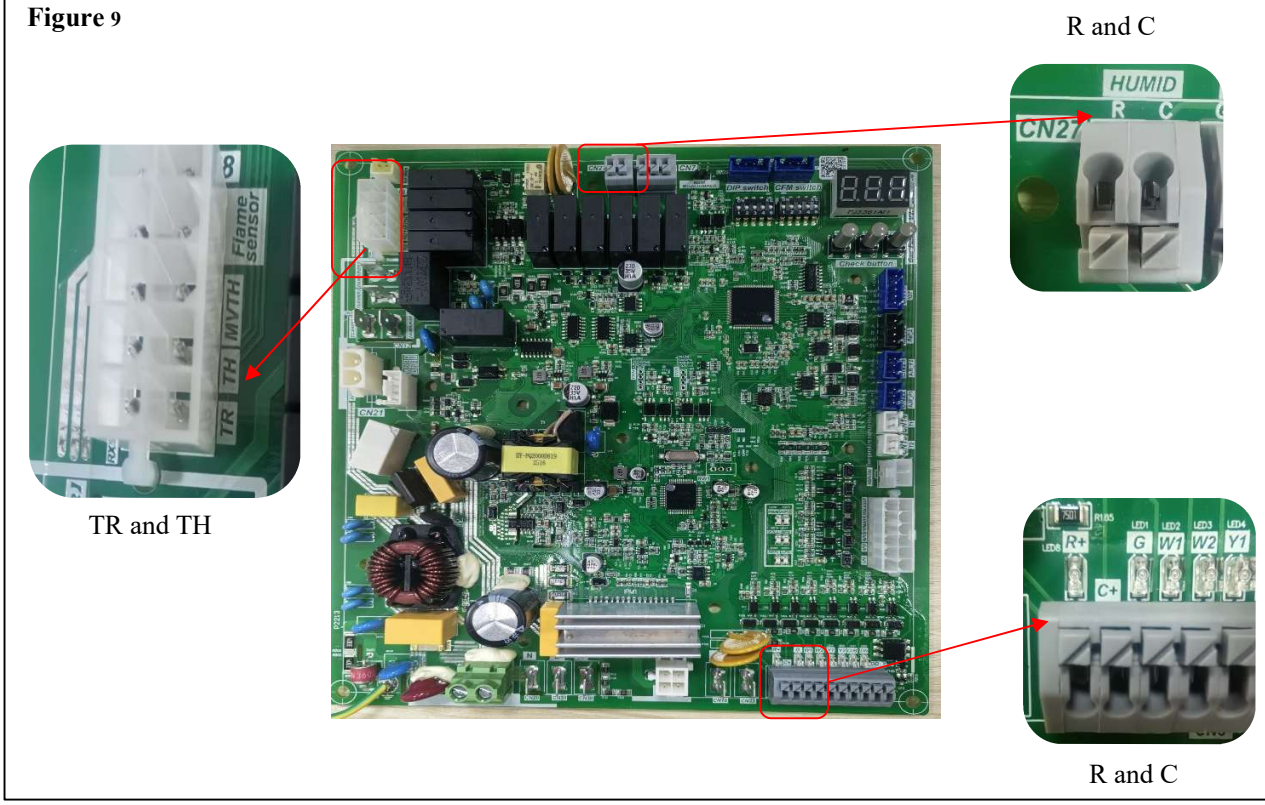
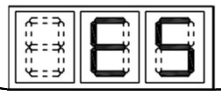


Figure 9



2.6 Code E5

Display 

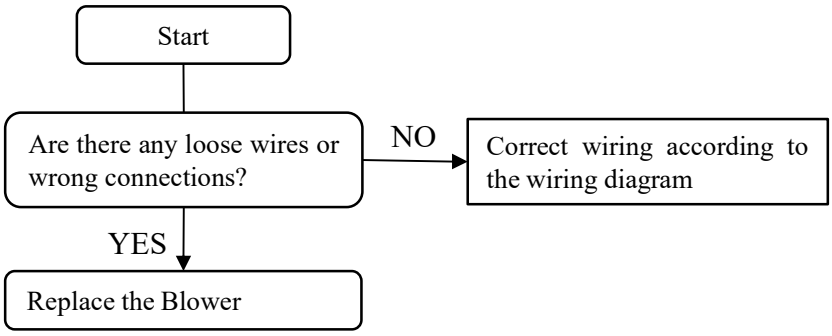
Blower failure

1.Error definition:

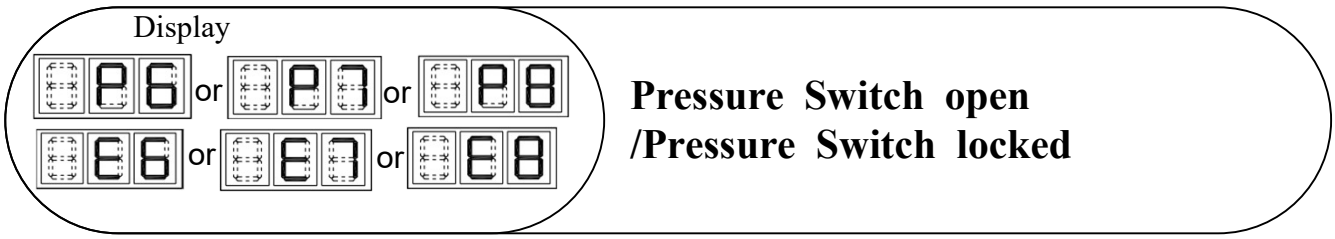
No feedback signal ≥ 10s, or blower speed < 250rpm

2.Possible causes:

- Motor wire not connected/connection error;
- Motor damage.



2.7 Code P6/P7/P8/E6/E7/E8



1.Error definition:

P6- E6-Low Pressure Switch Open; E6-Low Pressure Switch Cycle Lockout;
P7- E7-Med Pressure Switch Open; E7-Med Pressure Switch Cycle Lockout;
P8- E8-High Pressure Switch Open; E8-High Pressure Switch Cycle Lockout.

2.Possible causes:

- Loose connection or wiring error
- Damaged pressure switch
- The pressure hose or pipe blocked
- Inducer damaged.

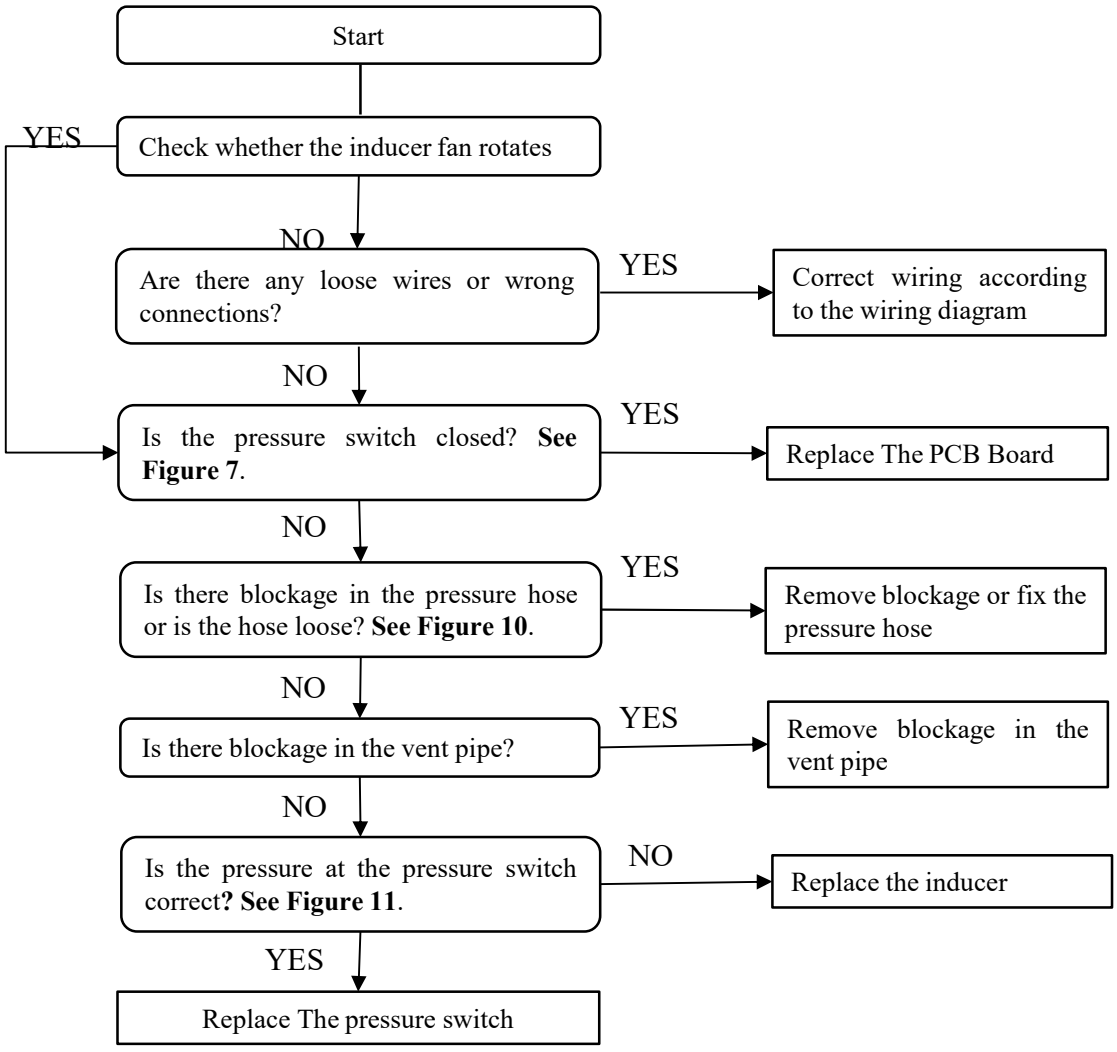
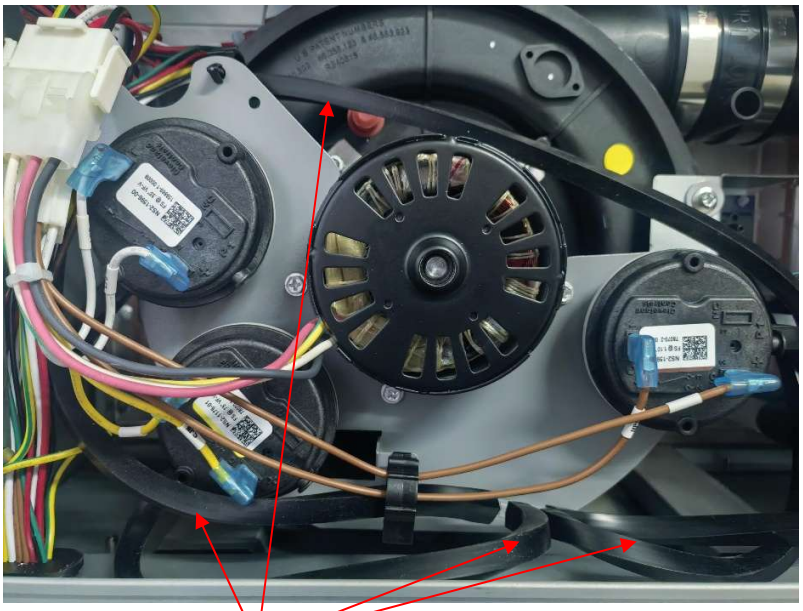


Figure 10



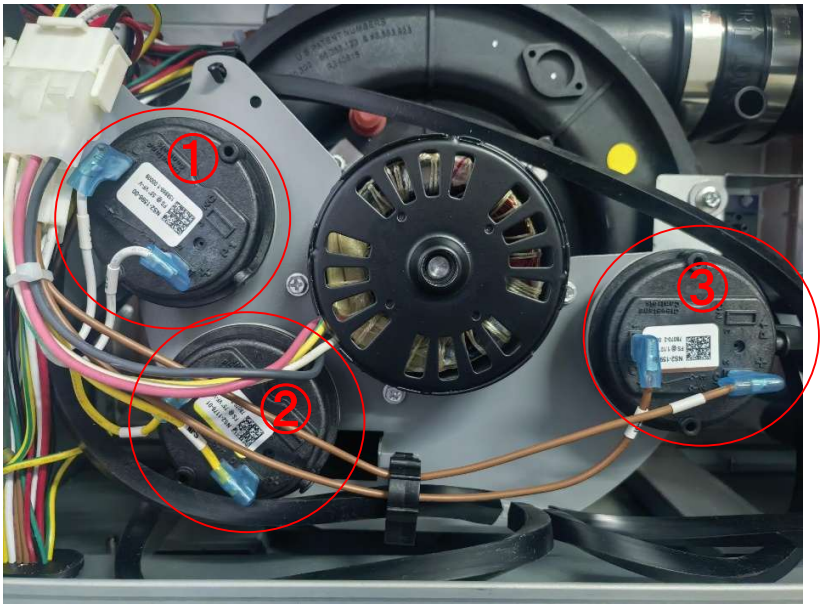
1. Check pressure hose for proper operating condition.
   Check for proper hose connections.
   Check and remove any blockages in the hose.

Figure 11

①： Low Pressure Switch-LPS

②： Med Pressure Switch-MPS

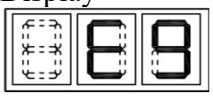
③： High Pressure Switch-HPS



Check to see if the pressure at pressure switch is correct by removing the hose and measuring with a manometer.

(1) LPS Set Point: 0.55 in. WC.
(2) MPS Set Point: 0.75 in. WC.
(2) HPS Set Point: 1.1 in. WC.

2.8 Code E9

Display 

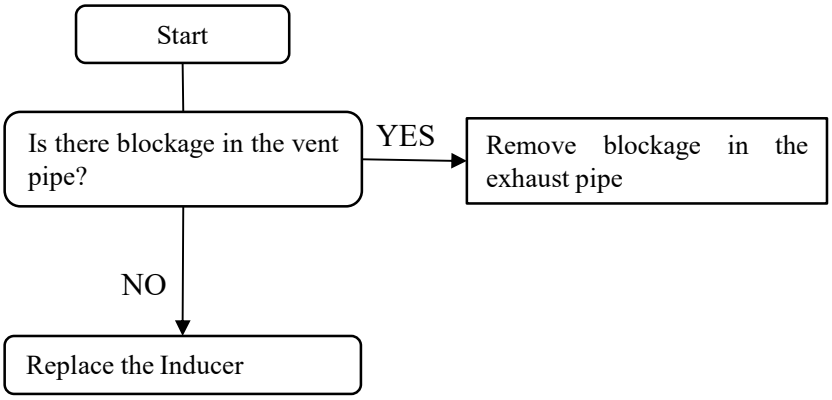
Inducer failure

1.Error definition:

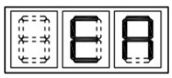
| Δ P | > 10pa (The difference between actual pressure and required pressure of inducer)， and Duration time > 5min.

2.Possible causes:

- Vent Pipe blockage/excessive pipe resistance；
- Inducer Performance Degradation or Damage.



2.9 Code EA/Eb

Display  or 

Ignition failure locked or Flame loss locked

1.Error definition:

System Lock-Out due to Failed Ignition. Or System Lock-Out due to too Many Flame Dropouts.

2.Possible causes:

- ■Loose connection at port on main control board
- ■Damaged ignitor
- ■Damaged gas valve
- ■Damaged flame sensor

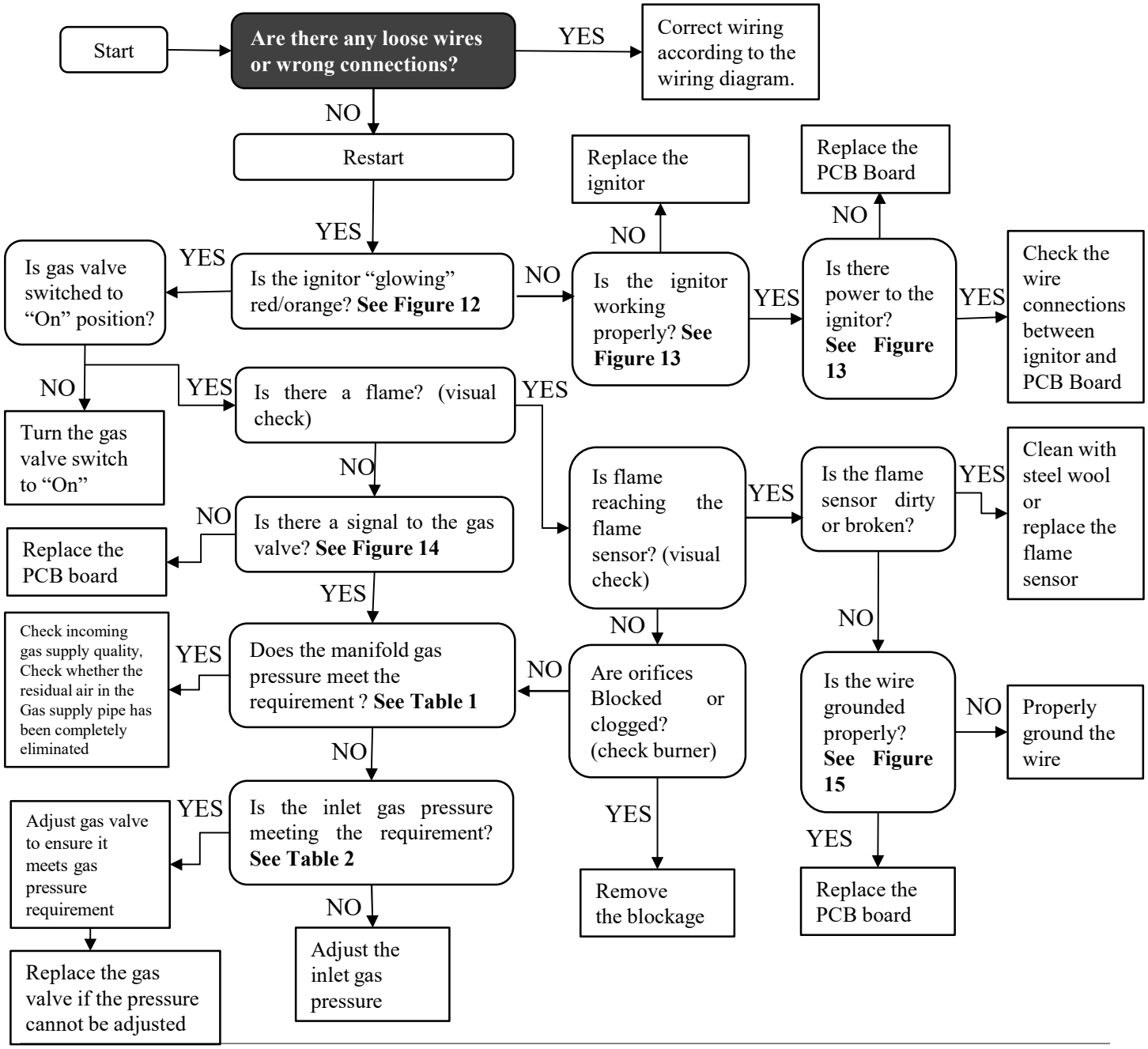
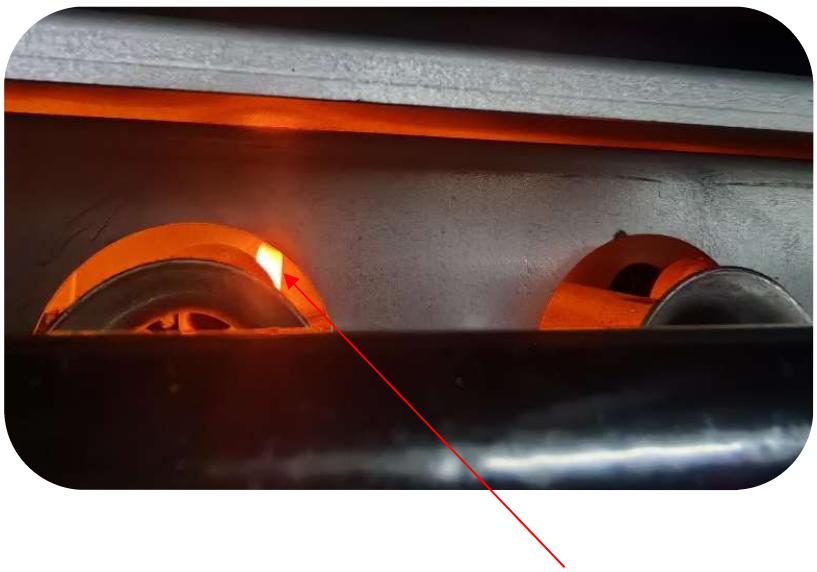
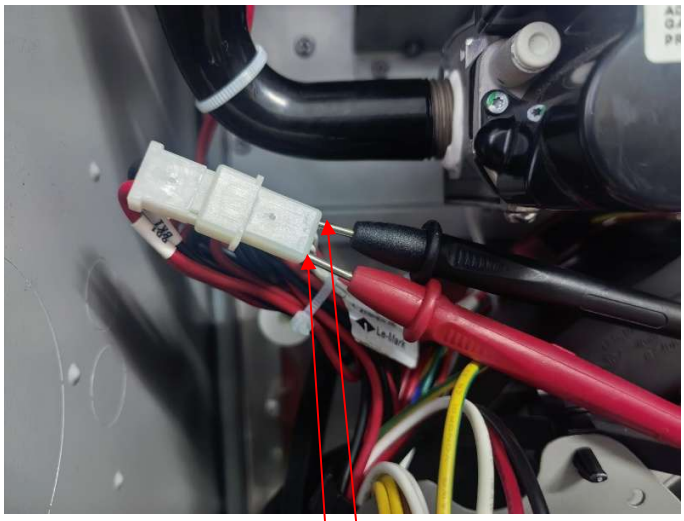


Figure 12

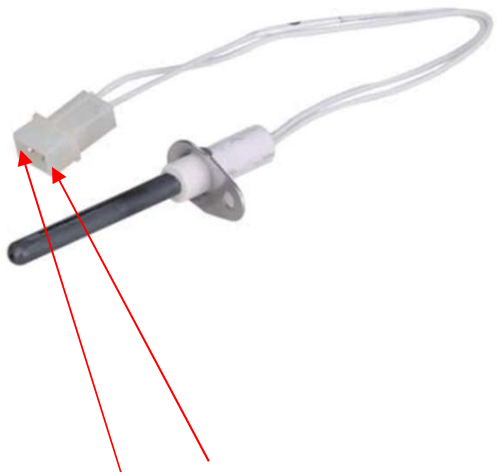


1. the ignitor “glowing” red/orange

Figure 13

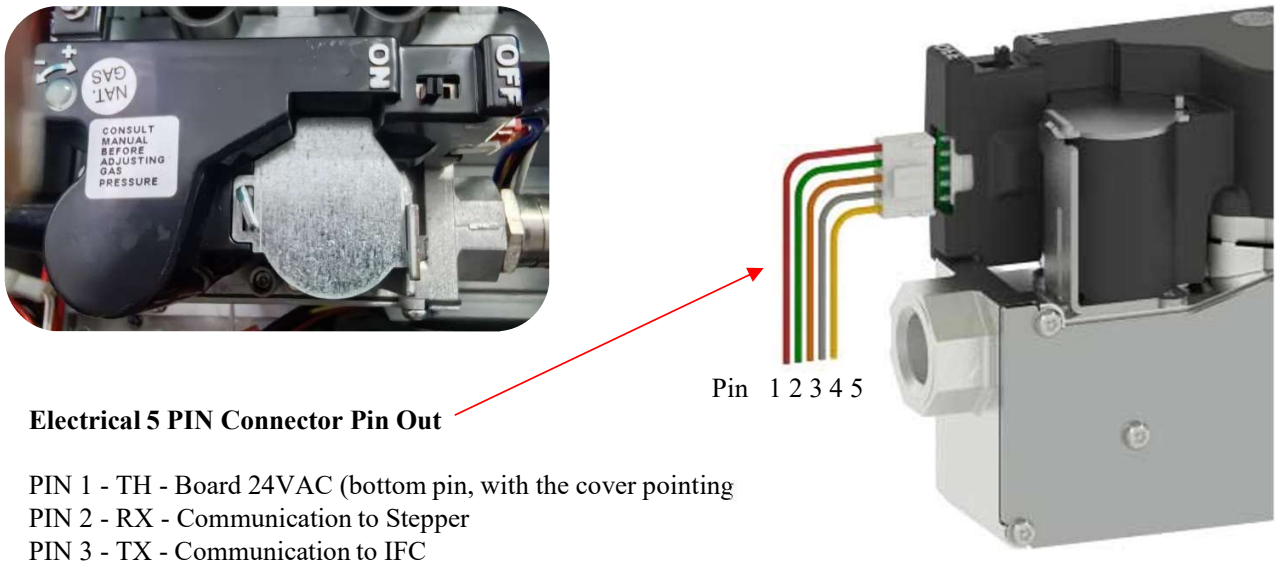


1. Check for 115V between these two terminals with multi-meter



1. Check for 9-17Ω between these two terminals with multi-meter

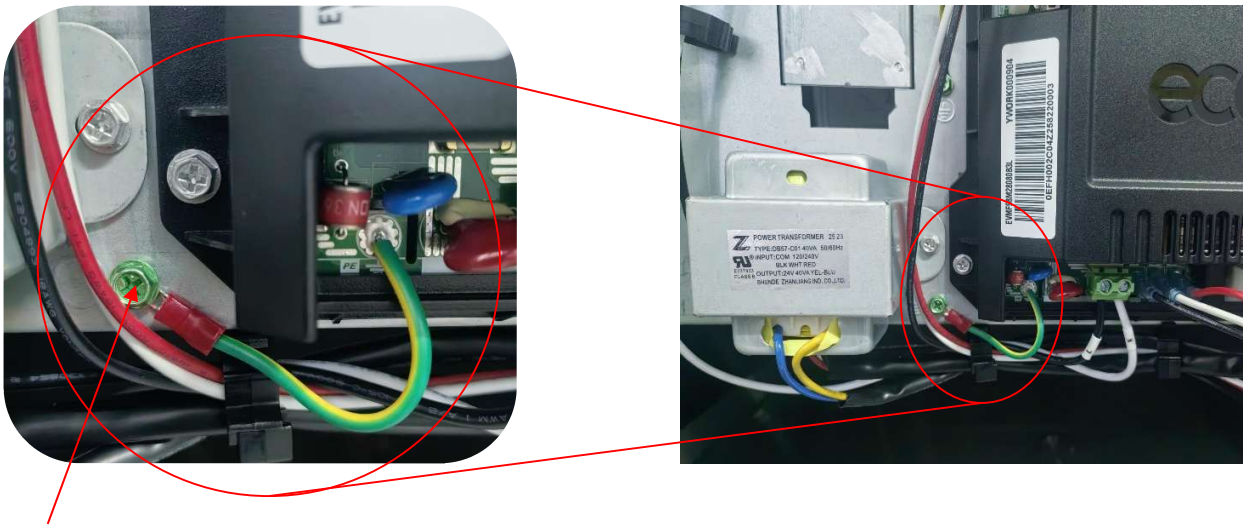
Figure 14



Electrical 5 PIN Connector Pin Out

PIN 1 - TH - Board 24VAC (bottom pin, with the cover pointing
PIN 2 - RX - Communication to Stepper
PIN 3 - TX - Communication to IFC
PIN 4 - TR – Ground
PIN 5 - TH - Main Valve 24 VAC (top pin, with the cover pointing up)

Figure 15



1. Check if the ground wire is effectively connected

Table 18 Inlet Gas Supply Pressure（Inlet pressure）

	Inlet Gas Supply Pressure	
Natural Gas	Minimum: 4.5 in. W.C.	Maximum: 10.5 in. W.C.
Propane Gas	Minimum: 11.0 in. W.C.	Maximum: 13.0 in. W.C.

Table 1 Orifice Size and Manifold Pressure (In. W.C.) for Gas Input Rate

MODEL	INPUT RATING BTUH	NUMBER OF BURNERS	ORIFICE SIZE		Manifold Pressure	
			NAT. GAS	LP GAS	NAT. GAS	LP GAS
EVMF98M28080B3L	80000	4	44#	54#	3.8	9.0
EVMF98M35100C5L	100000	5	44#	54#	3.8	9.0

Table 2 Inlet Gas Supply Pressure（Inlet pressure）

	Inlet Gas Supply Pressure	
Natural Gas	Minimum: 4.5 in. W.C.	Maximum: 10.5 in. W.C.
Propane Gas	Minimum: 11.0 in. W.C.	Maximum: 13.0 in. W.C.

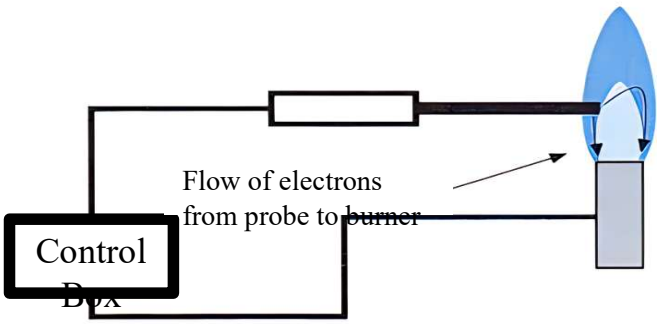
Flame rectification

Proving flame of a gas furnace is called “flame rectification”. A metal rod is mounted in the path of the flame. Theses rods are called “flame sensor” or “flame rod”. Theses are found on all Gas furnaces.

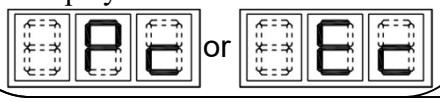
Flame rectification system is an electrical process that causes a low-level DC current to be conducted from the flame rod through the flame, and back to the furnace ground. To Check the flame rod, you must measure the flame current by using a meter that measures DC microamps in series with the flame rod.

The control board is programed to look at the strength of this current to prove flame.

A normal signal strength between 1 microamp DC and 7 microamps DC is common. If the flame current is too low, or not present, the control board will stop the ignition operation and stop the flow of gas putting the System into a lock out state. This prevents the possibility of explosion.



2.10 Code Pc or Ec

Display  **Reflow Temp. limit switch protection /locked**

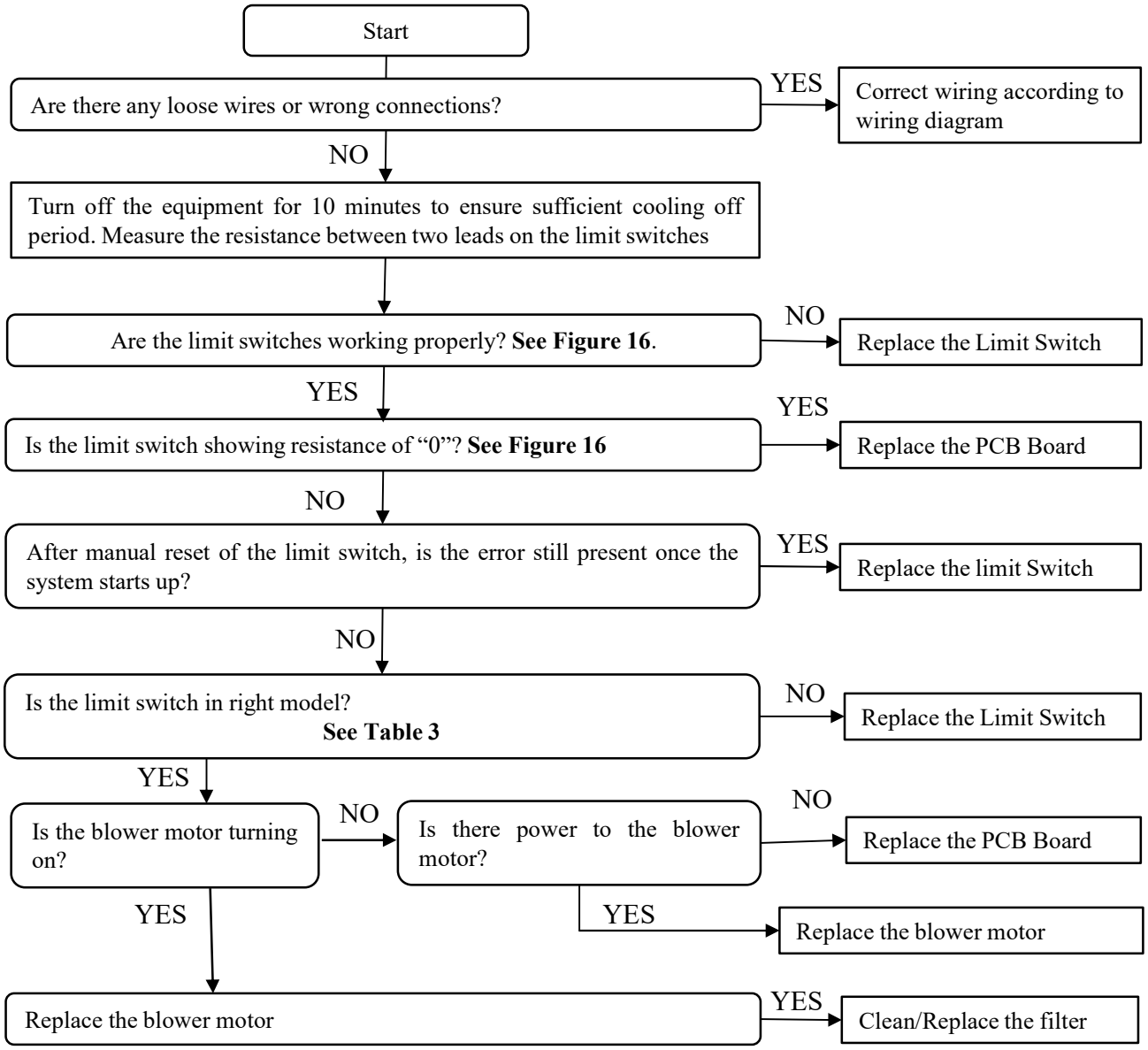
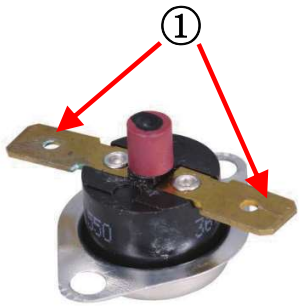


Table 19

Parts Name	Rollout Switch	Primary limit switch	Reflow temp. limit switch
off/on	300°F/-	180°F/150°F	120°F/90°F

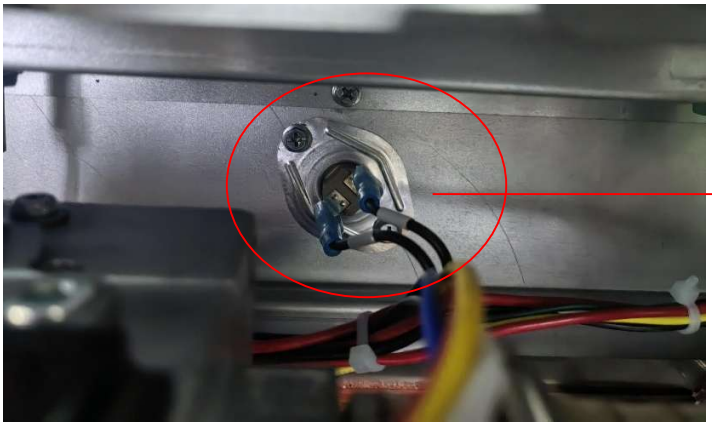
Figure 16

Two temperature switches are visible on both sides of the fan。

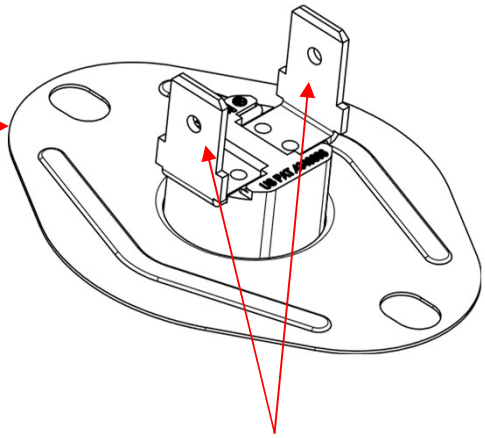


1. Turn off the power and use a multimeter to check for 0 resistance between these two terminals.

Figure 17

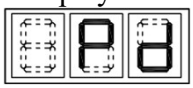
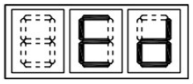


1. Primary Temp. limit switch locations.



2. Turn off the power and use a multimeter to check for 0 resistance between these two terminals.

2.11 Code Pd or Ed

Display  or 

Primary Temp. limit switch protection /locked

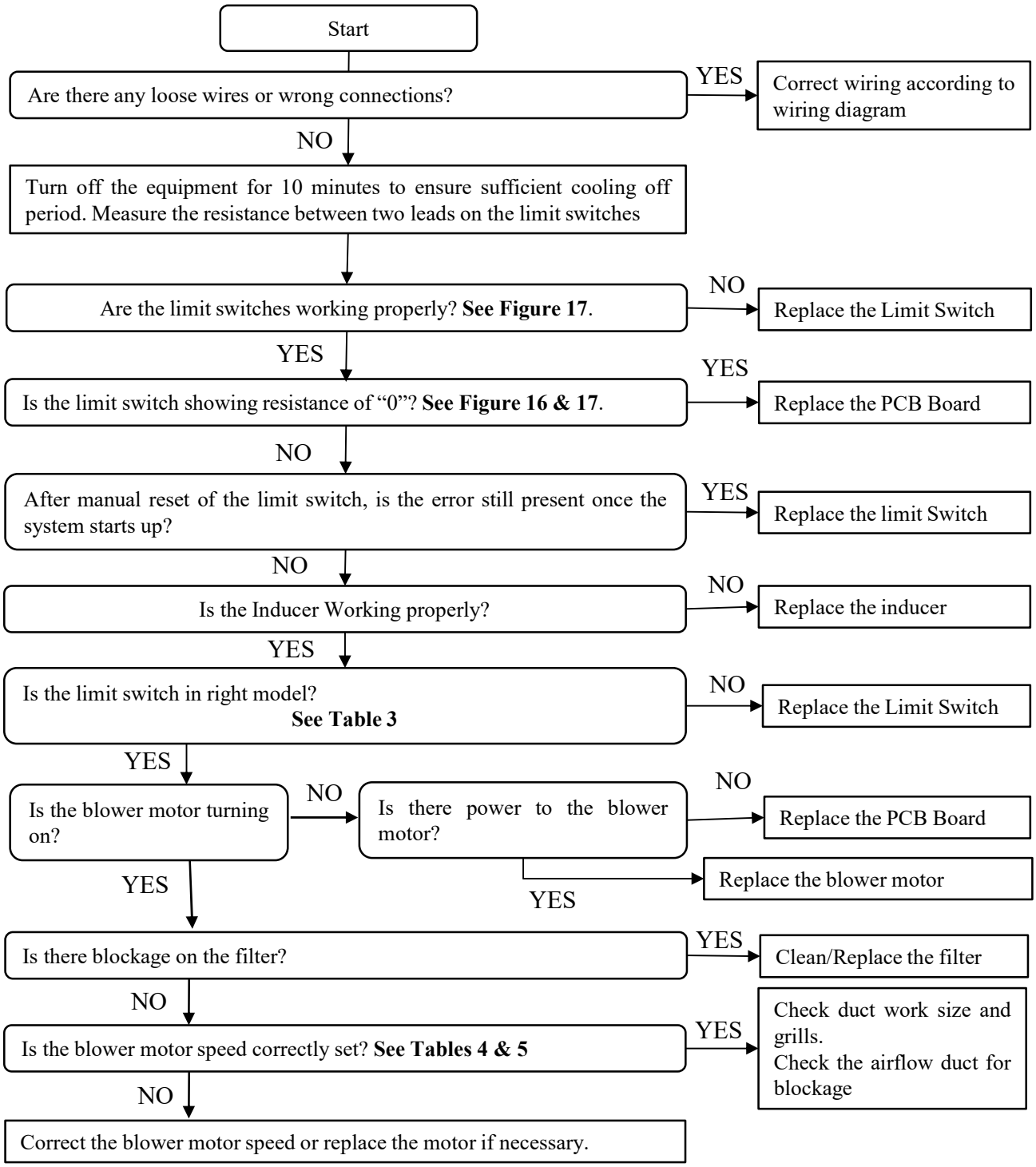


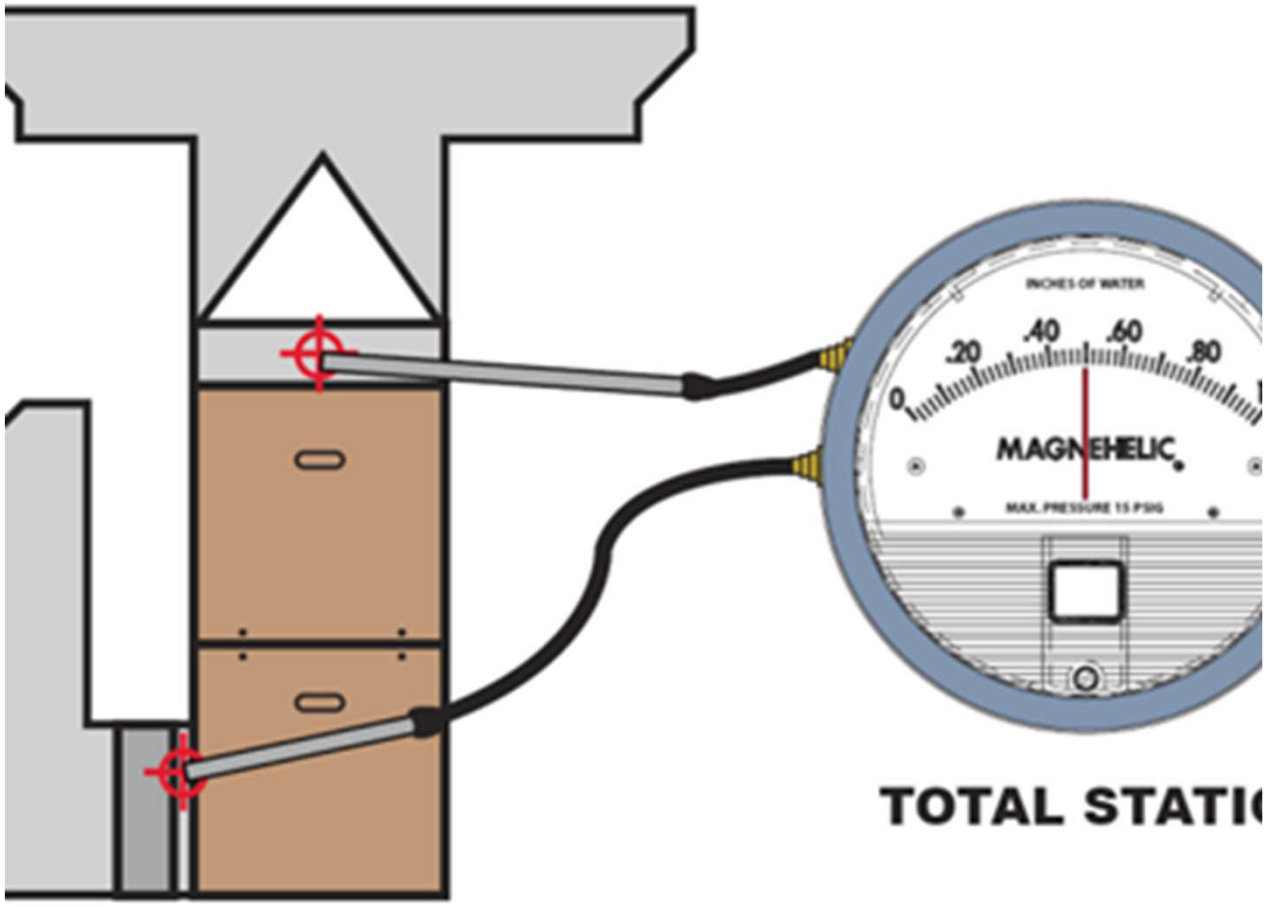
Table 4 – Heating Air Delivery -- CFM (Bottom Return Without Filter)

Model	Speed		External Static Pressure (ESP)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
80B	Maximum Heat	CFM	1298	1295	1300	1300	1305	1304	1301	1309	1209	-
		Temp Rise	51.5	51.6	51.4	51.4	51.2	51.3	51.4	51.1	55.3	-
	Intermediate Heat	CFM	994	998	1001	1002	1005	1004	1010	1008	1013	1015
		Temp Rise	47.1	46.9	46.8	46.7	46.6	46.6	46.3	46.4	46.2	46.1
	Minimum Heat	CFM	651	652	650	649	651	648	654	653	655	658
		Temp Rise	35.9	35.9	36.0	36.1	35.9	36.1	35.8	35.8	35.7	35.6
100C	Maximum Heat	CFM	1501	1495	1500	1498	1502	1501	1495	1503	1505	1510
		Temp Rise	55.7	55.9	55.7	55.8	55.6	55.7	55.9	55.6	55.5	55.3
	Intermediate Heat	CFM	1152	1157	1155	1157	1157	1153	1155	1153	1161	1158
		Temp Rise	50.8	50.6	50.6	50.6	50.6	50.7	50.6	50.7	50.4	50.5
	Minimum Heat	CFM	745	749	750	746	750	751	753	751	755	762
		Temp Rise	39.3	39.1	39.0	39.2	39.0	38.9	38.8	38.9	38.7	38.4

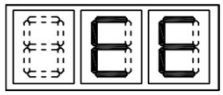
Table 5 – Cooling Air Delivery -- CFM (Bottom Return Without Filter)

Unit Size	CF Switch Settings			External Static Pressure (ESP)									
	SW2-1	SW2-2	SW2-3	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Cabinet B/A	ON	OFF	OFF	548	549	546	548	550	546	550	547	550	549
	ON	OFF	ON	640	642	641	645	650	644	644	648	650	648
	ON	ON	OFF	743	745	744	748	750	747	748	756	750	751
	ON	ON	ON	842	844	843	848	850	847	848	857	850	851
	OFF	OFF	OFF	941	942	947	944	950	944	945	947	950	941
	*OFF	OFF	ON	1041	1042	1047	1043	1050	1043	1044	1047	1050	1041
	OFF	ON	OFF	1119	1119	1125	1121	1120	1121	1122	1125	1120	1081
	OFF	ON	ON	1190	1191	1197	1193	1200	1193	1194	1197	1200	1142
Cabinet C/D	ON	OFF	OFF	994	997	997	995	1000	995	996	995	1000	996
	ON	OFF	ON	1099	1095	1097	1100	1100	1099	1095	1102	1100	1101
	ON	ON	OFF	1199	1195	1197	1200	1200	1199	1195	1202	1200	1201
	ON	ON	ON	1299	1294	1297	1300	1300	1299	1294	1302	1300	1301
	OFF	OFF	OFF	1399	1394	1397	1400	1400	1399	1394	1403	1400	1401
	*OFF	OFF	ON	1499	1494	1496	1500	1500	1499	1494	1503	1500	1501
	OFF	ON	OFF	1602	1596	1599	1603	1600	1602	1596	1599	1600	1604
	OFF	ON	ON	1699	1693	1696	1700	1700	1699	1693	1703	1700	1701

Static pressure test indicator diagram



2.12 Code EE

Display 

Rollout Temp. limit switch protection

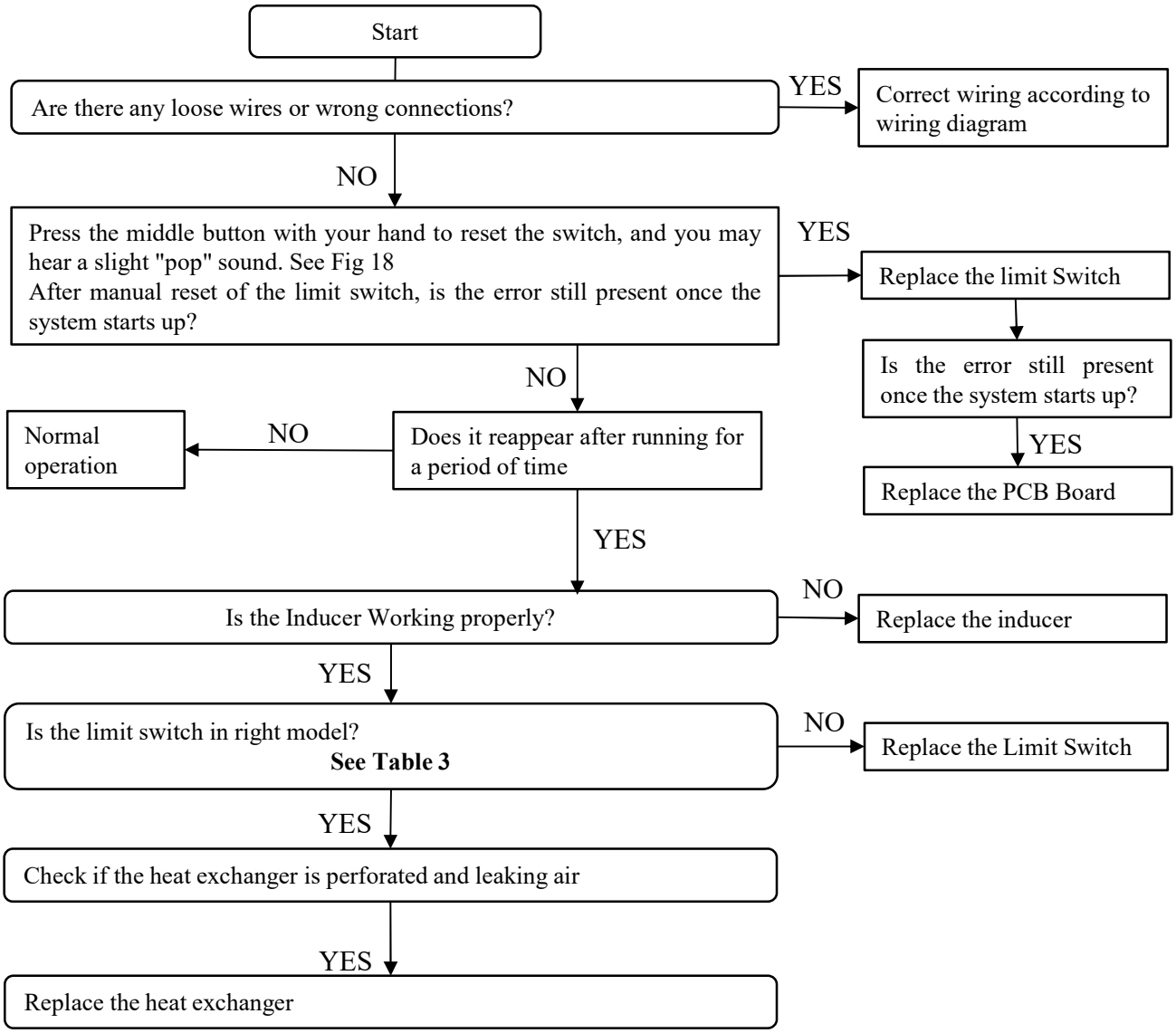
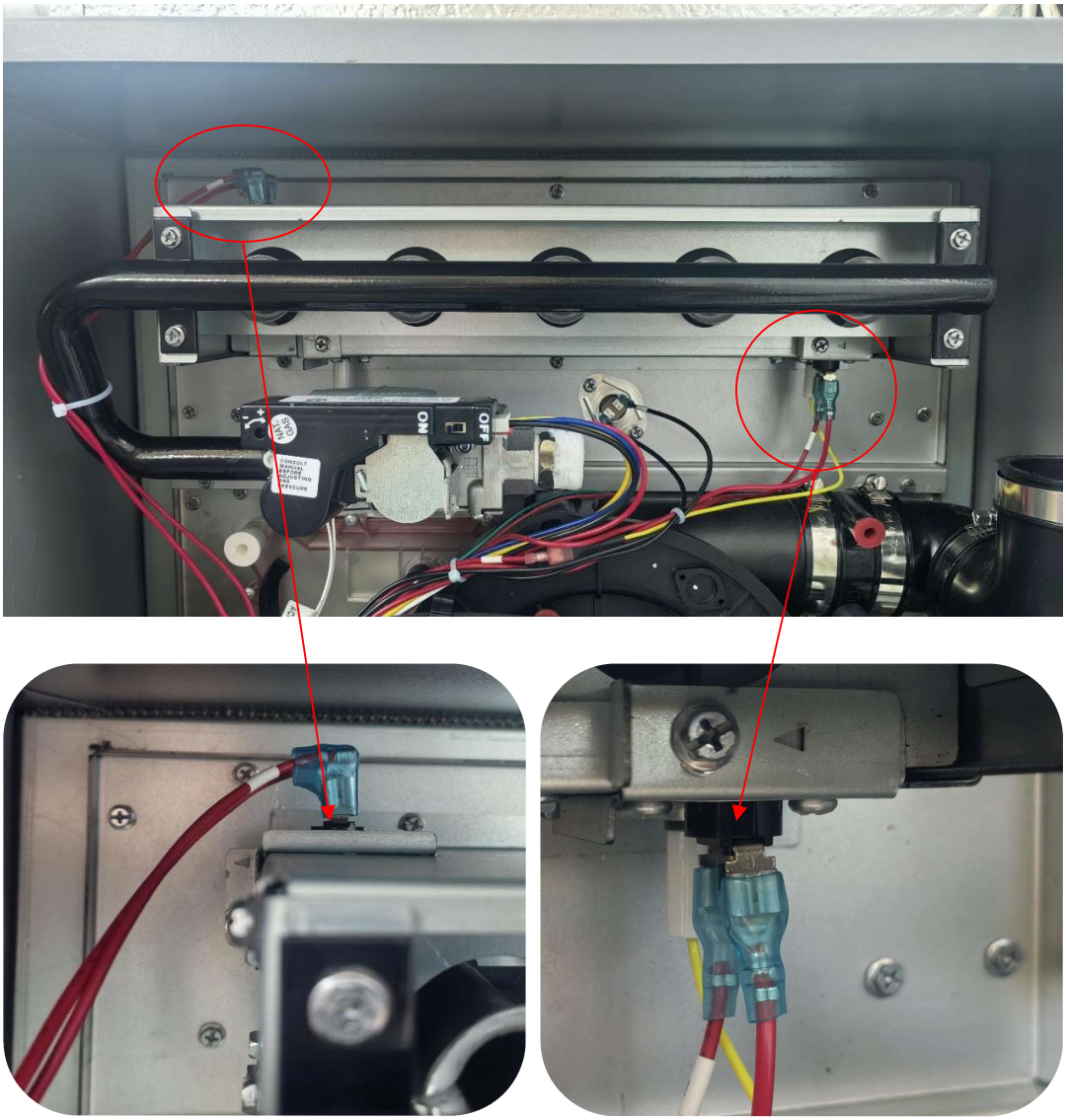


Figure 18



Press this button to restore

2.13 Code F1

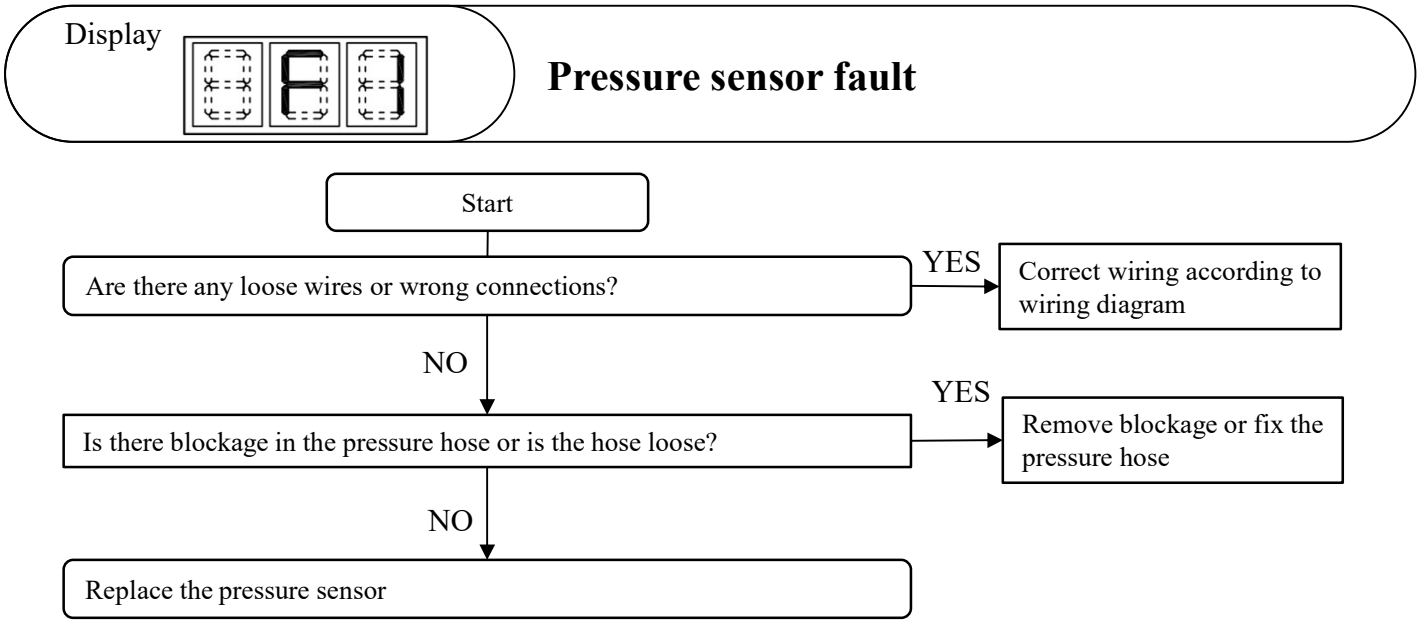
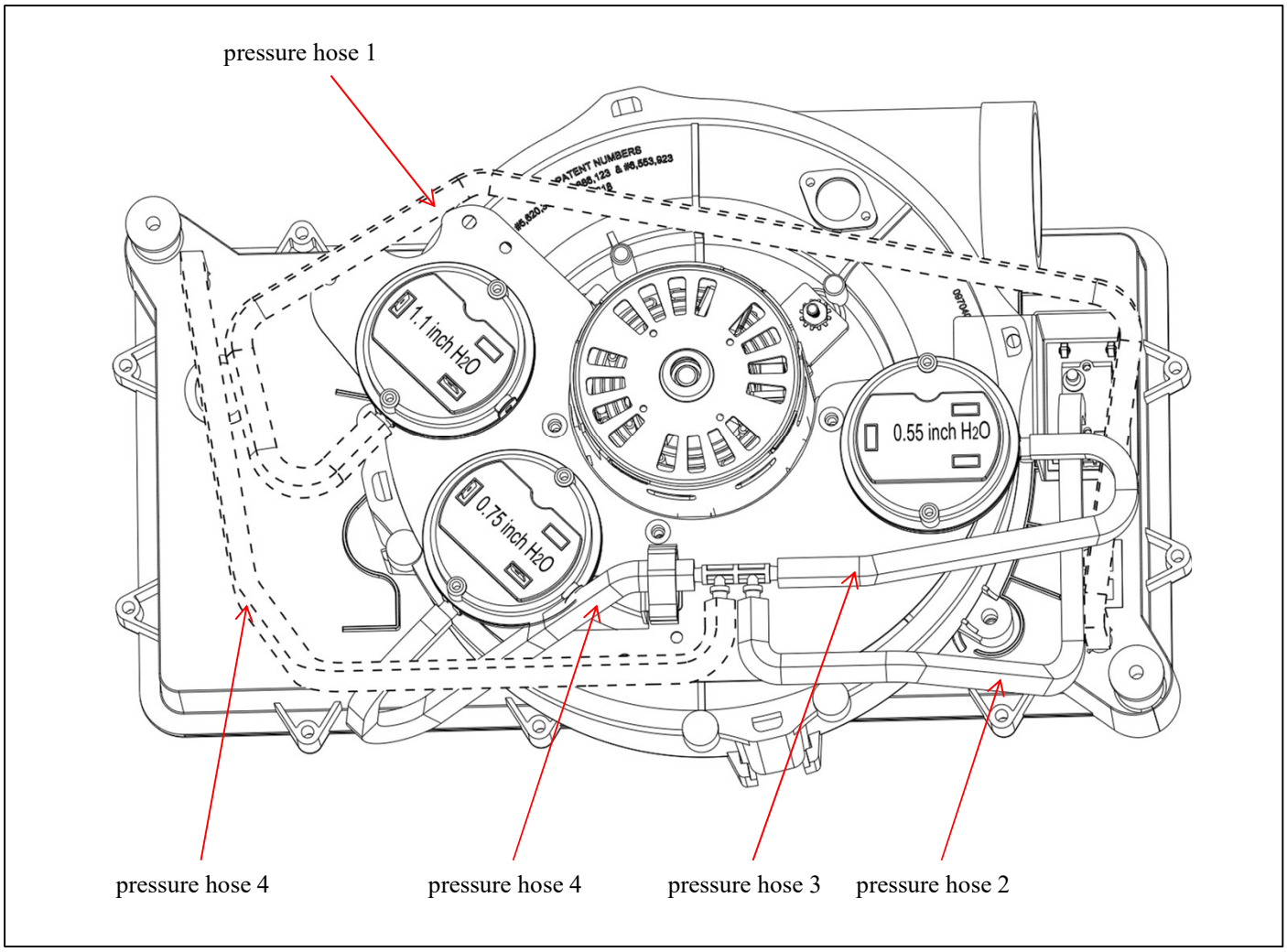
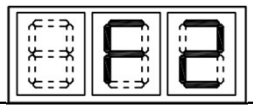


Figure 19



2.14 Code F2

Display 

Refrigerant leakage fault

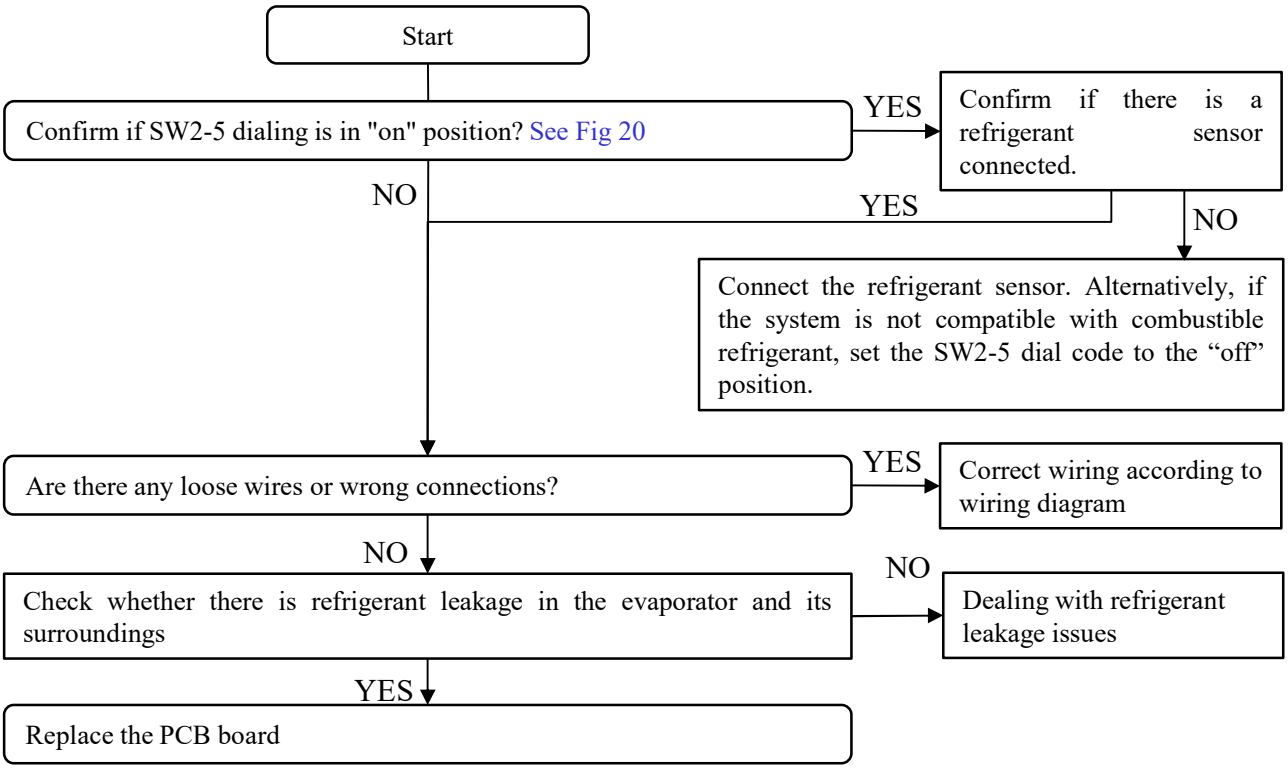
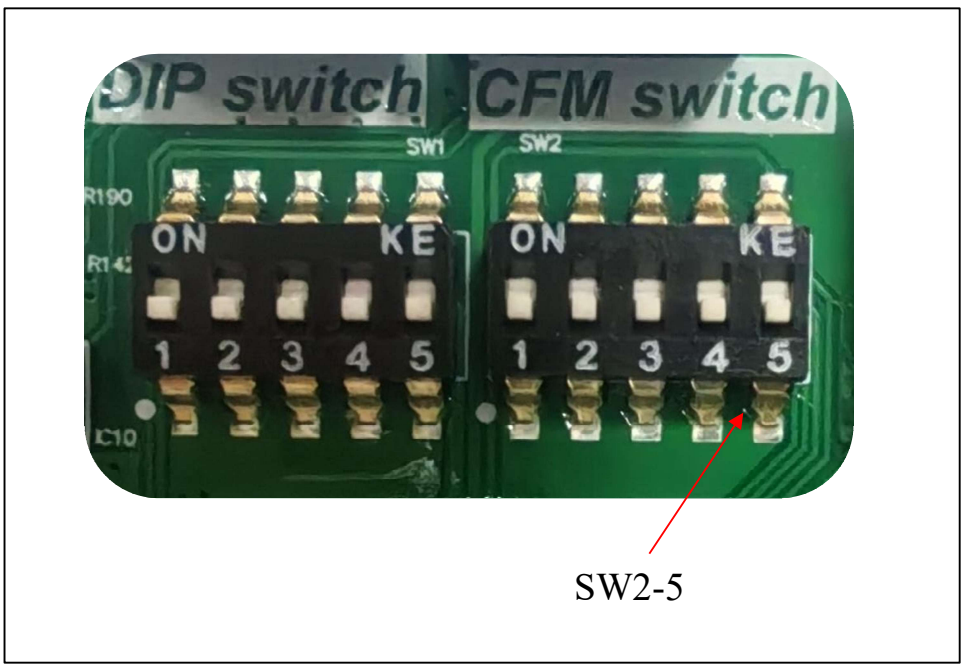
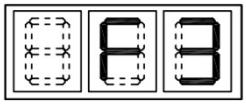


Figure 20



2.15 Code F3

Display 

T1 sensor fault

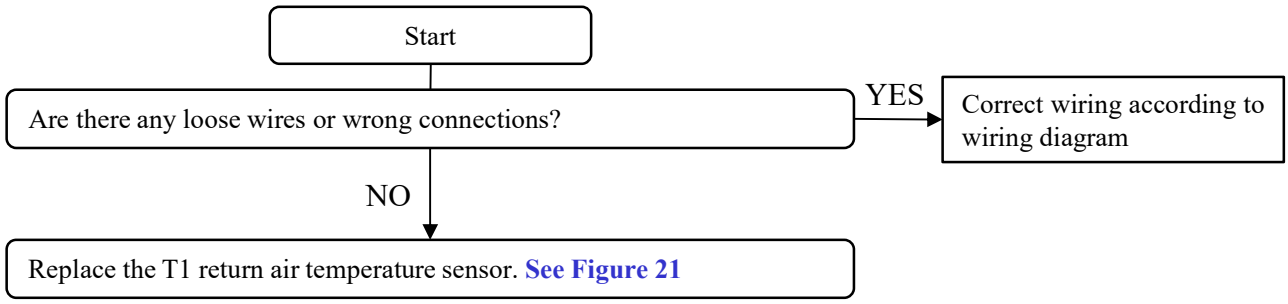
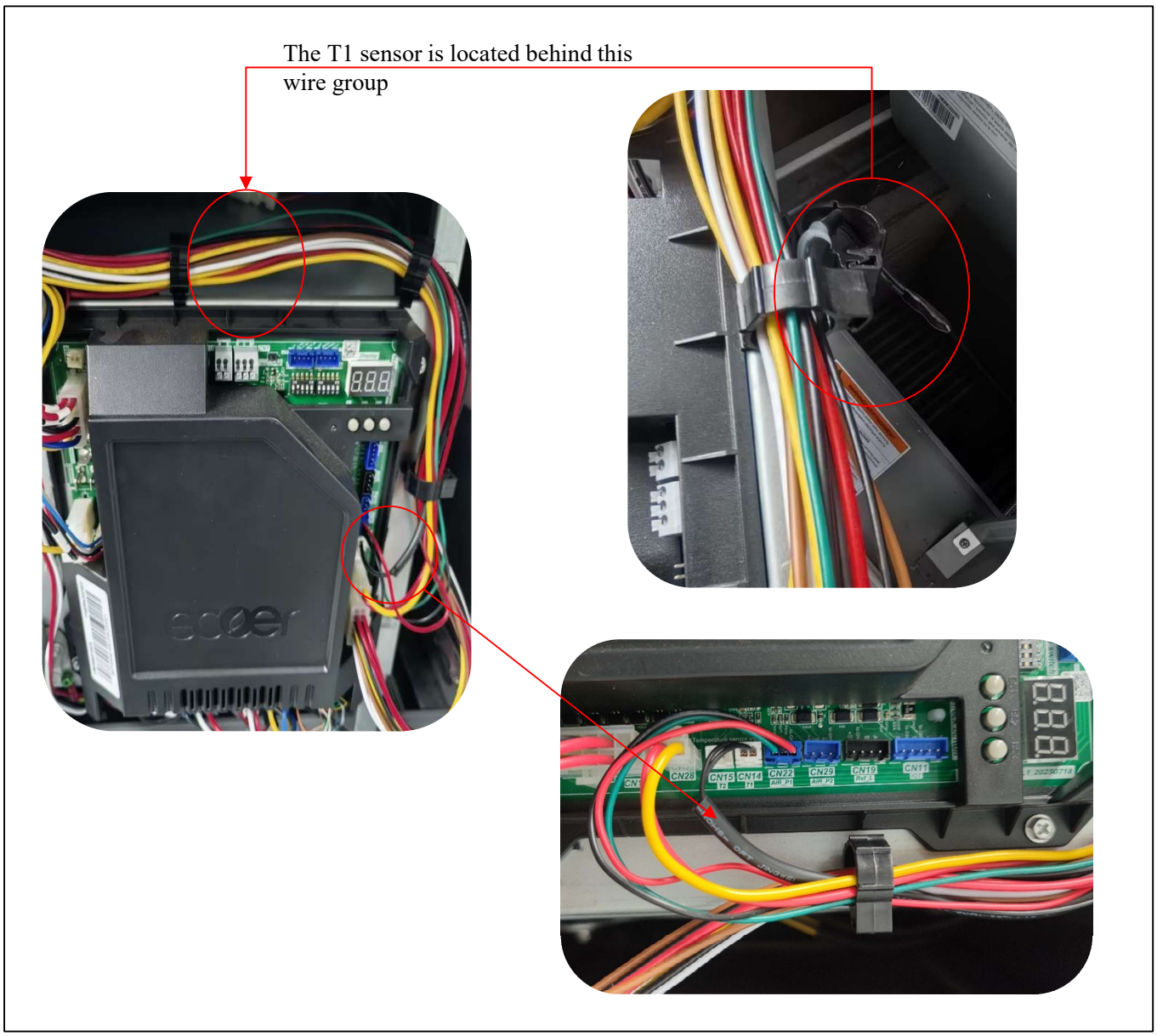
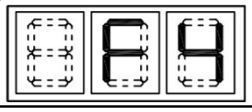


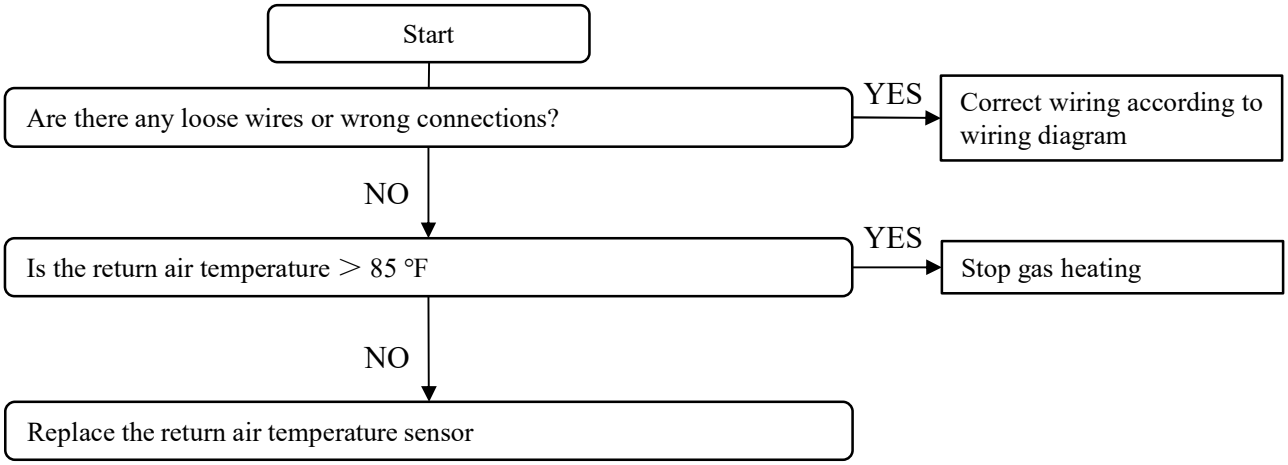
Figure 21



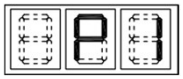
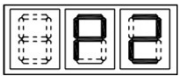
2.16 Code F4

Display 

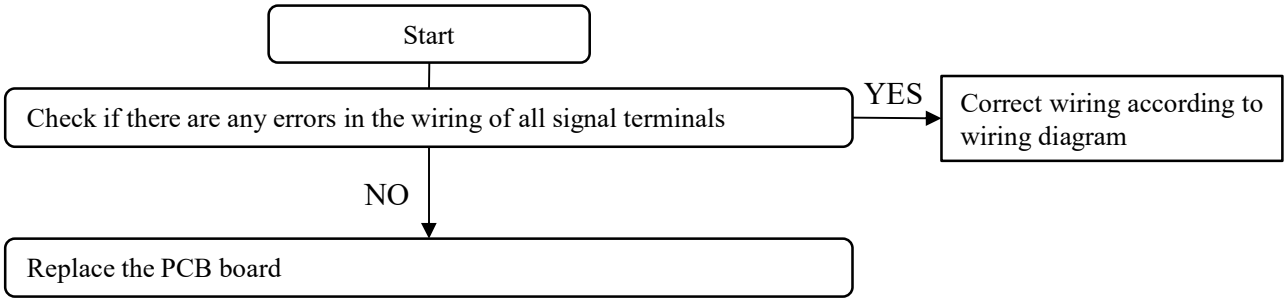
T1 restricted operation



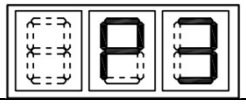
2.17 Code P1/P2

Display  or 

Signal error / W and Y conflict



2.18 Code P3

Display 

Voltage protection

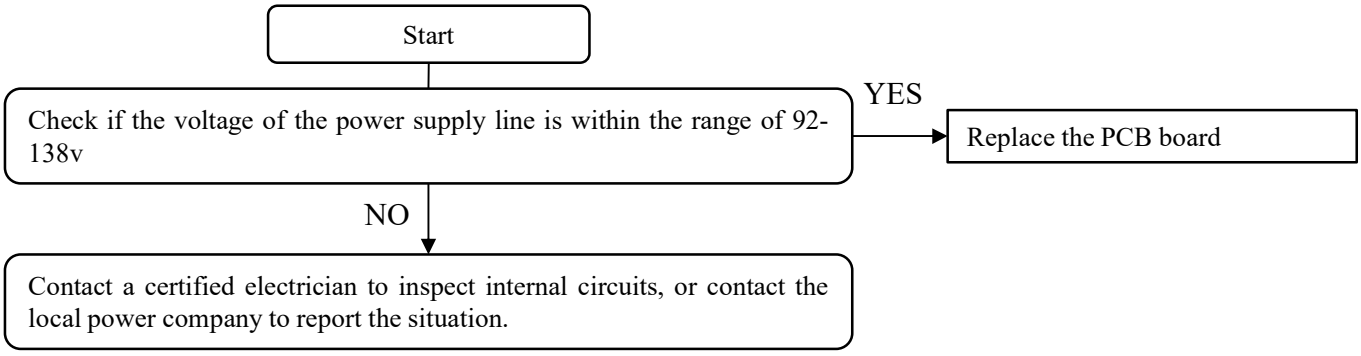
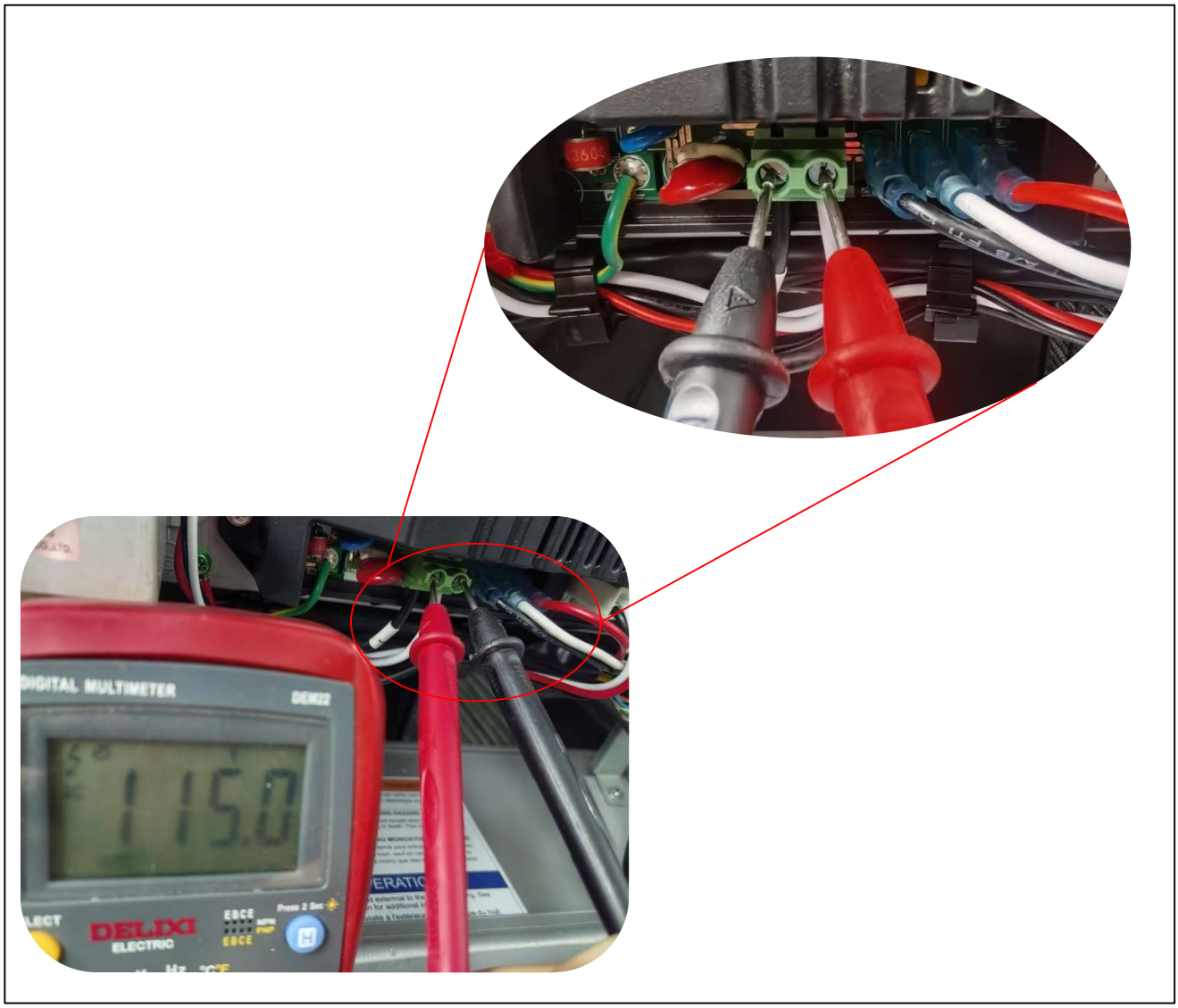
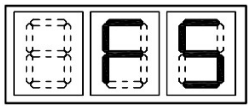


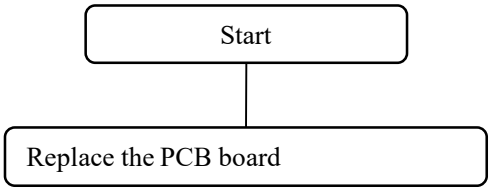
Figure 22



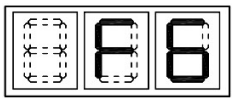
2.19 Code F5

Display 

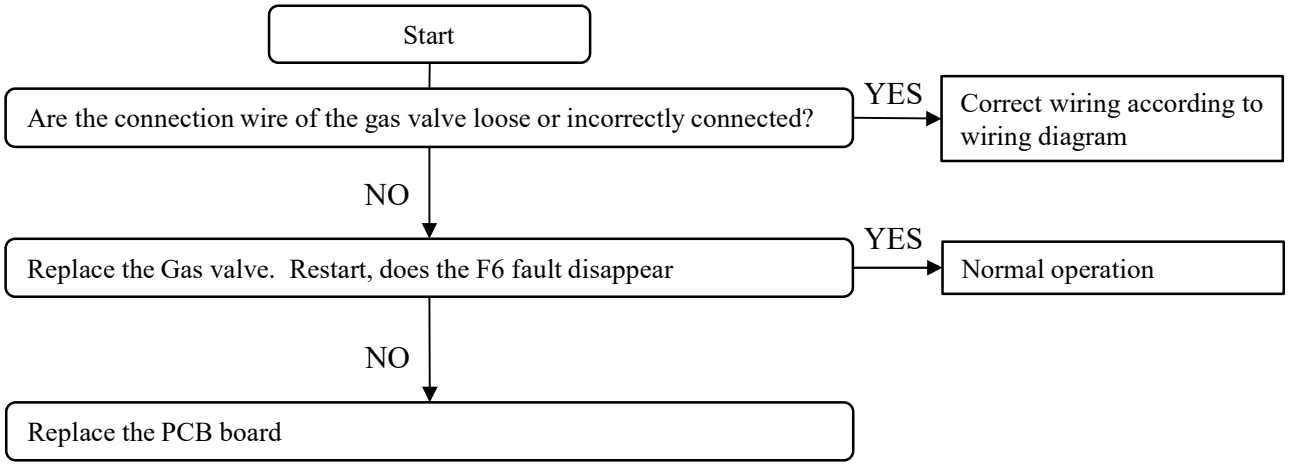
INDUCER Comm Failure



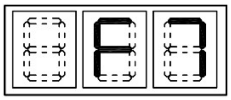
2.20 Code F6

Display 

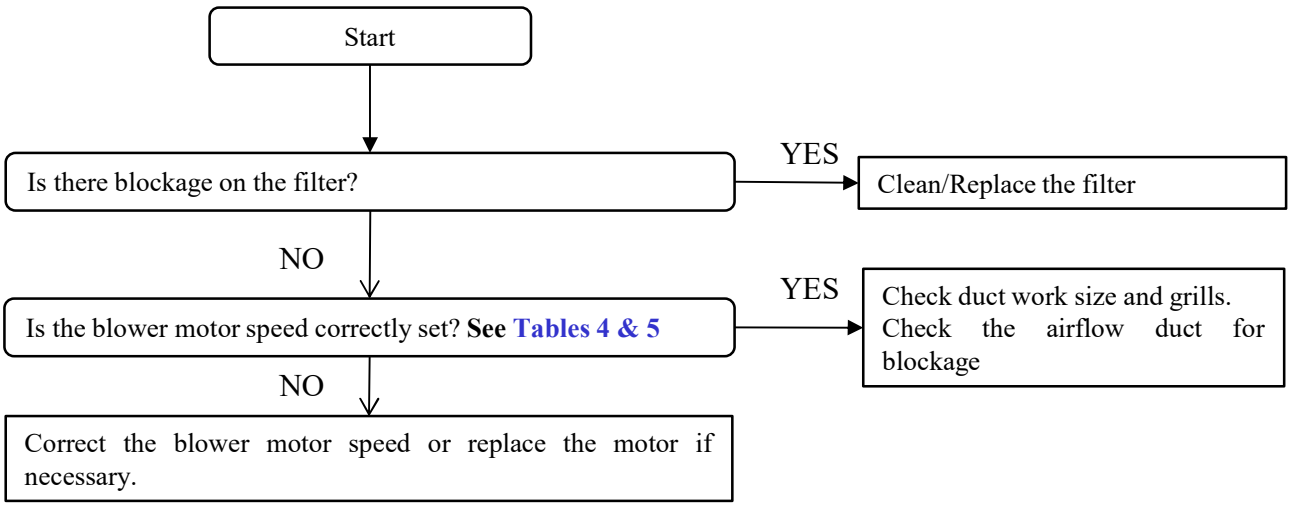
Gas Valve Comm Failure



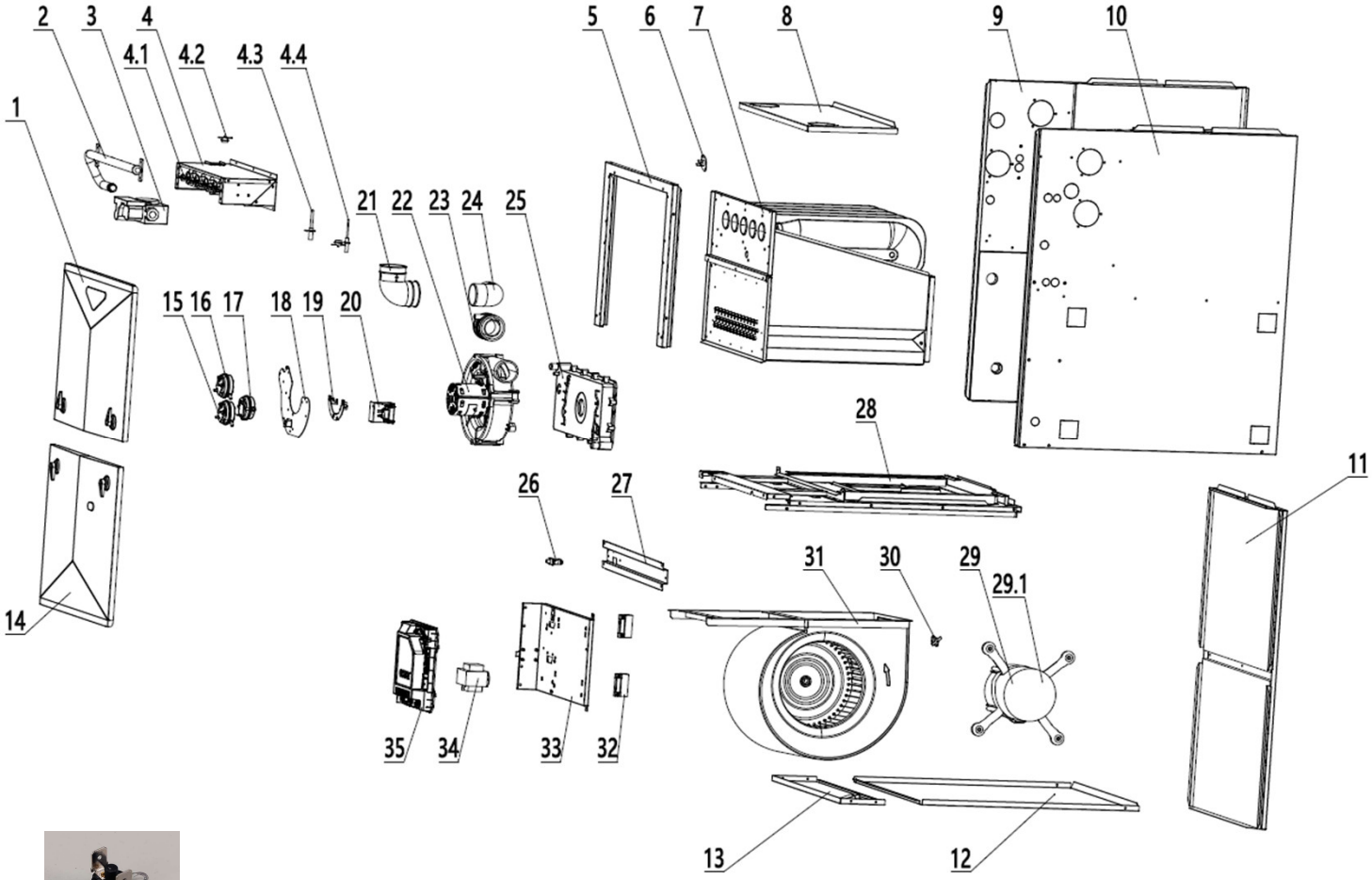
2.21 Code F7

Display 

Air duct high pressure alarm



3. Part List



4.2

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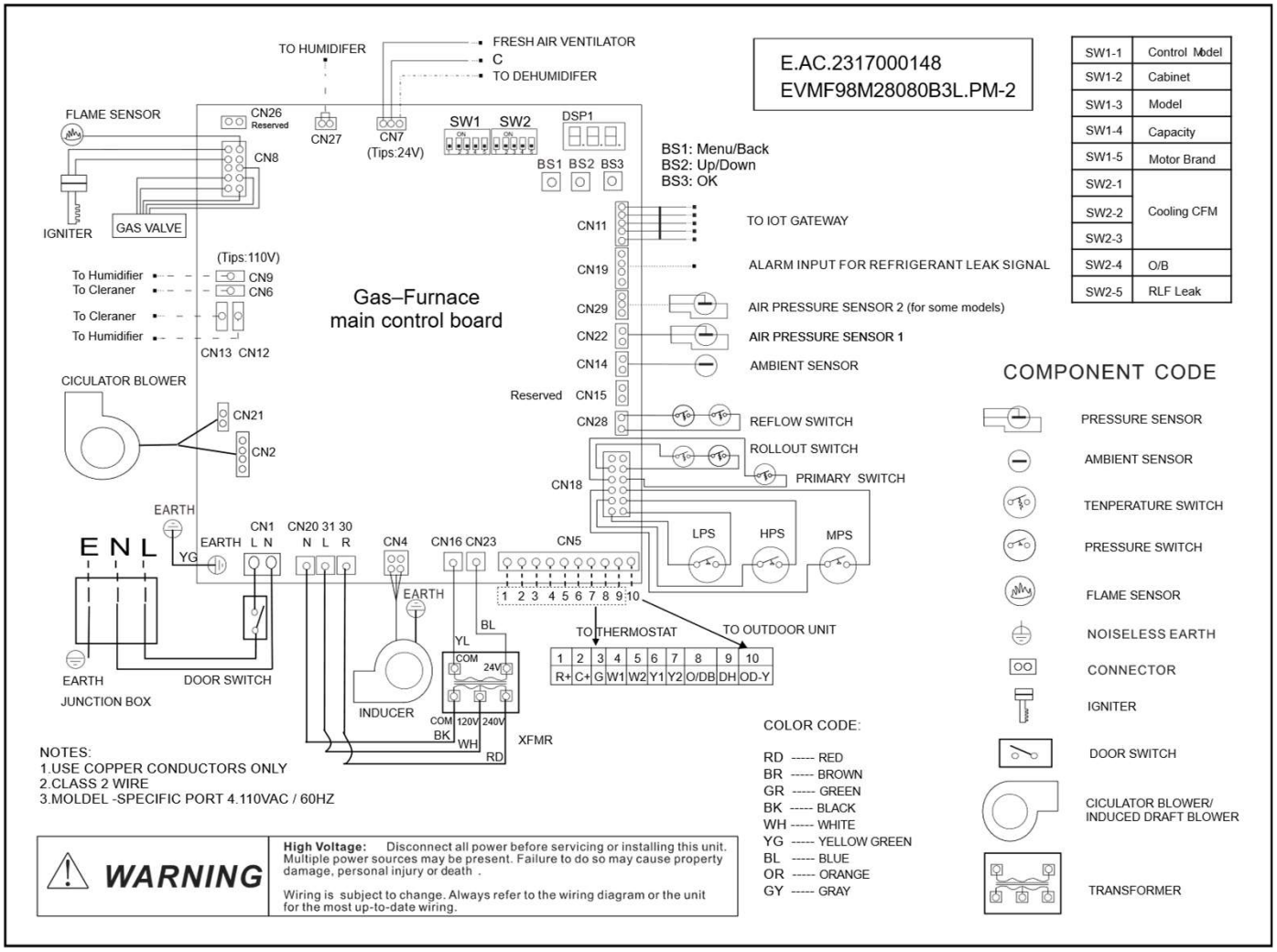
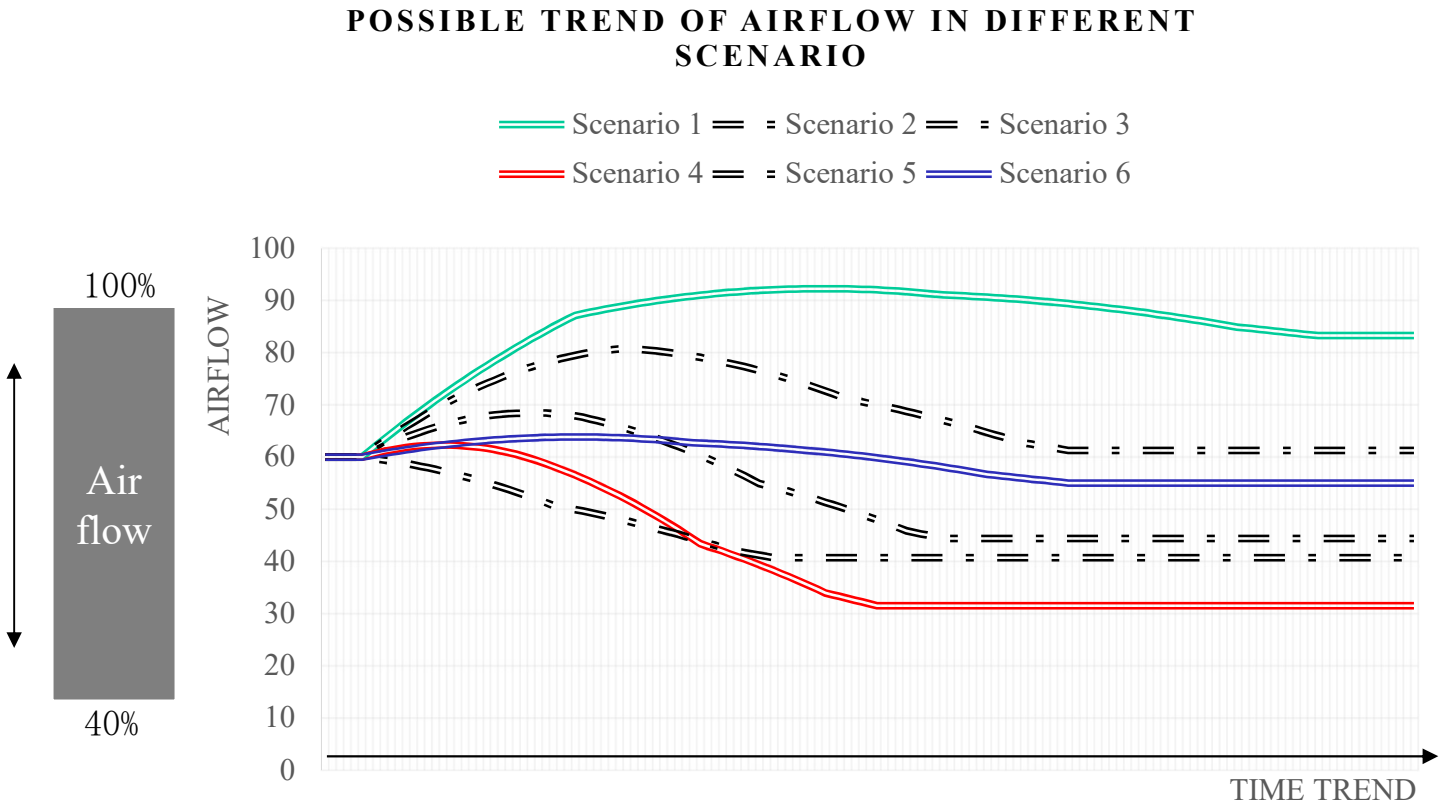
No.	Part Name	EVMF98M28080B3L		EVMF98M35100C5L	
		Quantity	BOM code	Quantity	BOM code
1	Front panel (Upper)	1	E.AC.2308400063	1	E.AC.2308400104
2	Gas pipe assembly (44#)	1	E.AC.2322100005	1	E.AC.2322100011
3	Gas valve	1	E.AC.2309100051	1	E.AC.2309100051
4	Burner assembly	1	E.AC.2308400015	1	E.AC.2308400078
4.1	Burner	4	E.AC.2322100003	5	E.AC.2322100003
4.2	Flame Rollout (300F)	2	E.AC.2309100054	2	E.AC.2309100054
4.3	Igniter	1	E.AC.2309100052	1	E.AC.2309100052
4.4	Flame sensor	1	E.AC.2309100053	1	E.AC.2309100053
5	Heat exchanger mounting frame	1	E.AC.2308400014	1	E.AC.2308400077
6	Outlet High Temperature Limit Switch (180°F)	1	E.AC.2309100048	1	E.AC.2309100048
7	Heat exchanger assembly	1	E.AC.2308400001	1	E.AC.2308400071
8	Top panel	1	E.AC.2308400060	1	E.AC.2308400099
9	Left panel	1	E.AC.2308400050	1	E.AC.2308400050
10	Right panel	1	E.AC.2308400053	1	E.AC.2308400053
11	Back panel	1	E.AC.2308400056	1	E.AC.2308400097
12	Bottom return plate	1	E.AC.2308400062	1	E.AC.2308400103
13	Bottom support plate	1	E.AC.2308400061	1	E.AC.2308400100
14	Front panel (Lower)	1	E.AC.2308400067	1	E.AC.2308400108
15	Pressure switch (Low) 0.55	1	E.AC.2309100046	1	E.AC.2309100046
16	Pressure switch (Middle) 0.75	1	E.AC.2309100047	1	E.AC.2309100047
17	Pressure switch (High) 1.1	1	E.AC.2309100045	1	E.AC.2309100045
18	Pressure switch mounting plate	1	E.AC.2308400026	1	E.AC.2308400026
19	Pressure switch mounting bracket	1	E.AC.2308400024	1	E.AC.2308400024
20	Pressure switch assembly	1	E.AC.2308400159	1	E.AC.2308400159
21	Inducer Elbow (flexible)	1	E.AC.2307100023	1	E.AC.2307100023
22	Inducer	1	E.AC.2323100011	1	E.AC.2323100011
23	Inducer elbow (rigid)	1	E.AC.2307100022	1	E.AC.2307100022
24	Inducer flexible connector	1	E.AC.2307100021	1	E.AC.2307100021
25	Drain box	1	E.AC.2307100019	1	E.AC.2307100019
26	Door switch	1	E.AC.2309100050	1	E.AC.2309100050
27	Panel mounting bracket	1	E.AC.2308400041	1	E.AC.2308400093
28	Blower partition panel	1	E.AC.2308400029	1	E.AC.2308400084
29	Motor assembly	1	E.AC.2323100009	1	E.AC.2323100010
29.1	Constant air volume motor	1	E.AC.2323100006	1	E.AC.2323100007
30	Reflow High Temperature Limit Switch (120°F)	2	E.AC.2309100049	2	E.AC.2309100049
31	Centrifugal fan	1	E.AC.2308400095	1	E.AC.2308400095
32	Hinge	2	E.AC.2322100007	2	E.AC.2322100007
33	Main control board mounting plate	1	E.AC.2308400047	1	E.AC.2308400047
34	Transformer	1	E.TFR.020004	1	E.TFR.020004
35	Main control board assembly	1	E.AC.2314100009	1	E.AC.2314100009
36	Accessory kit	1	E.AC.2313100013	1	E.AC.2313100013
37	Drain pipe-φ16	1	E.AC.2321100049	1	E.AC.2321100049
38	Drain pipe-φ14	2	E.AC.2321100050	2	E.AC.2321100050
39	Wire harness	1	E.CAB.000003	1	E.CAB.000003
40	Reverse flow thermal switch connect wire	1	E.CAB.030003	1	E.CAB.030003
41	Reverse flow switch connect wire	1	E.CAB.030004	1	E.CAB.030004
42	T1 temperature sensor	1	E.AC.2309100026	1	E.AC.2309100026
43	Motor wiring harness	1	E.CAB.040005	1	E.CAB.040005
44	Reflow High Temperature Limit Switch wire	1	E.CAB.030005	1	E.CAB.030005
45	Door switch power cable	1	E.CAB.001002	1	E.CAB.001002

Wiring Diagram



Gas Valve Adjustment Instructions

The gas valve will automatically adjust based on the air flow rate and temperature difference △T. The adjustment method shows a positive correlation trend with the aforementioned air flow adjustment. Below are 3 typical scenario examples.



Scenario 1

When the actual temperature significantly deviates from the set temperature, the airflow will automatically increase to reach the target temperature. **The opening degree of the gas valve will also increase simultaneously.**

Scenario 4

When the actual temperature reaches and significantly exceeds the set temperature, the airflow will automatically reduce to a lower level to maintain an appropriate temperature differential. **The opening degree of the gas valve will also decrease simultaneously.**

Scenario 6

When the actual temperature is close to the set temperature, the airflow will maintain at an appropriate level to preserve the temperature difference**. The opening degree of the gas valve will remain unchanged.**

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