

SPLIT AIR CONDITIONERS

ComfortStar®

Service Manual

Gas Furnace 80% series



IMPORTANT NOTE:



Read this manual carefully before operating your new air conditioning unit. Make sure to save this manual for future reference.

Please check the applicable models, technical data, F-GAS(if any) and manufacturer information from the "Owner's Manual - Product Fiche " in the packaging of the outdoor unit.

Chapter 1 Gas Furnaces in North America

1 Product introduction and photo display

1.1 Product Introduction

North American gas furnace products are mainly divided into 96% condensing type and 80% non-condensing burn;

80% of the full series capacity is divided into 40, 60, 80, 100, 120 five capabilities, A, B, C, D four structural sizes.。

It can be combined with A coil to realize the function of turning on gas heating in winter, turning on air conditioning and external mechanism cooling in summer, and sharing gas furnace fans and air ducts for refrigeration and heating. It is the most important air conditioning combination method in civil places such as single-family villas and apartments in North America;

1.2 Picture display



1.3 Model description

Product family	Product model	Product remarks
North America 80% series gas furnaces		Borrowing the original North
	CG80-040A	American old platform structure, a new external drive DC internal motor is adopted to achieve
	CG80-060A	
	CG80-060B	
	CG80-080B	constant air volume control and meet the requirements of FER and 2023 new energy efficiency static pressure; Borrow 96% series self- made electric control board.
	CG80-080C	
	CG80-100C	
CG80-120D		

1.3.1 Combustion valve/supply fan motor description

Indicated in capital letters:

H: Two-stage/Consistent torque DC Motor

S: Single-stage/Multi-speed

E: Single-stage /DC Motor

V: Two-stage/ Consistent flow DC Motor

1.3.2 AFUE (Annual Fuel Utilization)

Expressed in Arabic numerals, 80:80%,
90:90%, 95:95%, etc.

1.3.3 Air outlet

1.3.4 Indicated in capital letters:

M: Upper air //lower outlet/horizontal outlet

U: Upper air outlet/

D: / horizontal outlet

1.3.5 Gas input calorific value (heat load).

Rated gas input heat; Expressed in Arabic numerals, unit: 103Btu/h

1.3.6 Box width size

Indicated in capital letters:

A: 14-1/2" inch

B: 17-1/2" inch

C: 21" inch

D: 24-1/2" inch

1.3.7 Combined with ACOIL maximum cold tonnage

Expressed in Arabic numerals, 3: 3ton, 4: 4ton, 5: 5ton.

1.3.8 Description of low nitrogen models

Non-low nitrogen models omitted

N: Low nitrogen model ($\leq 40\text{ng/J}$), U: ultra-low nitrogen model ($\leq 14\text{ng/J}$)

1.3.9 Power supply instructions

115V/60HZ/1Ph omitted

B: 220V/50HZ/1Ph

1.3.10 Design sequence

Use capital letters in English (A, B, C...).) indicates a customized product used to distinguish changes in the structure of the unit

2 Exploded view of the model

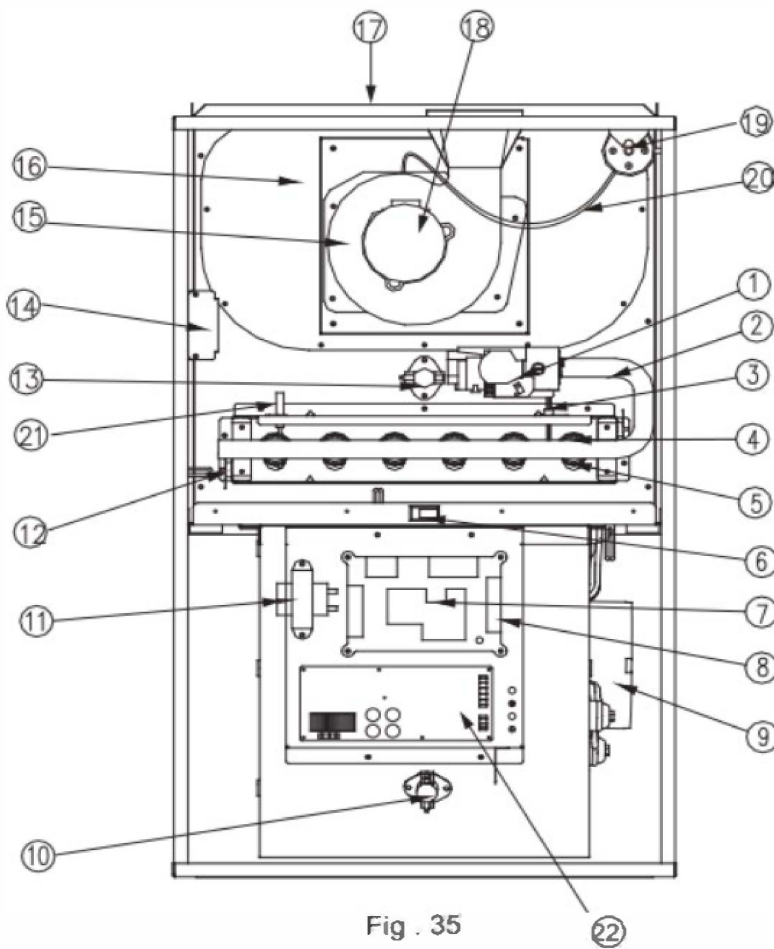
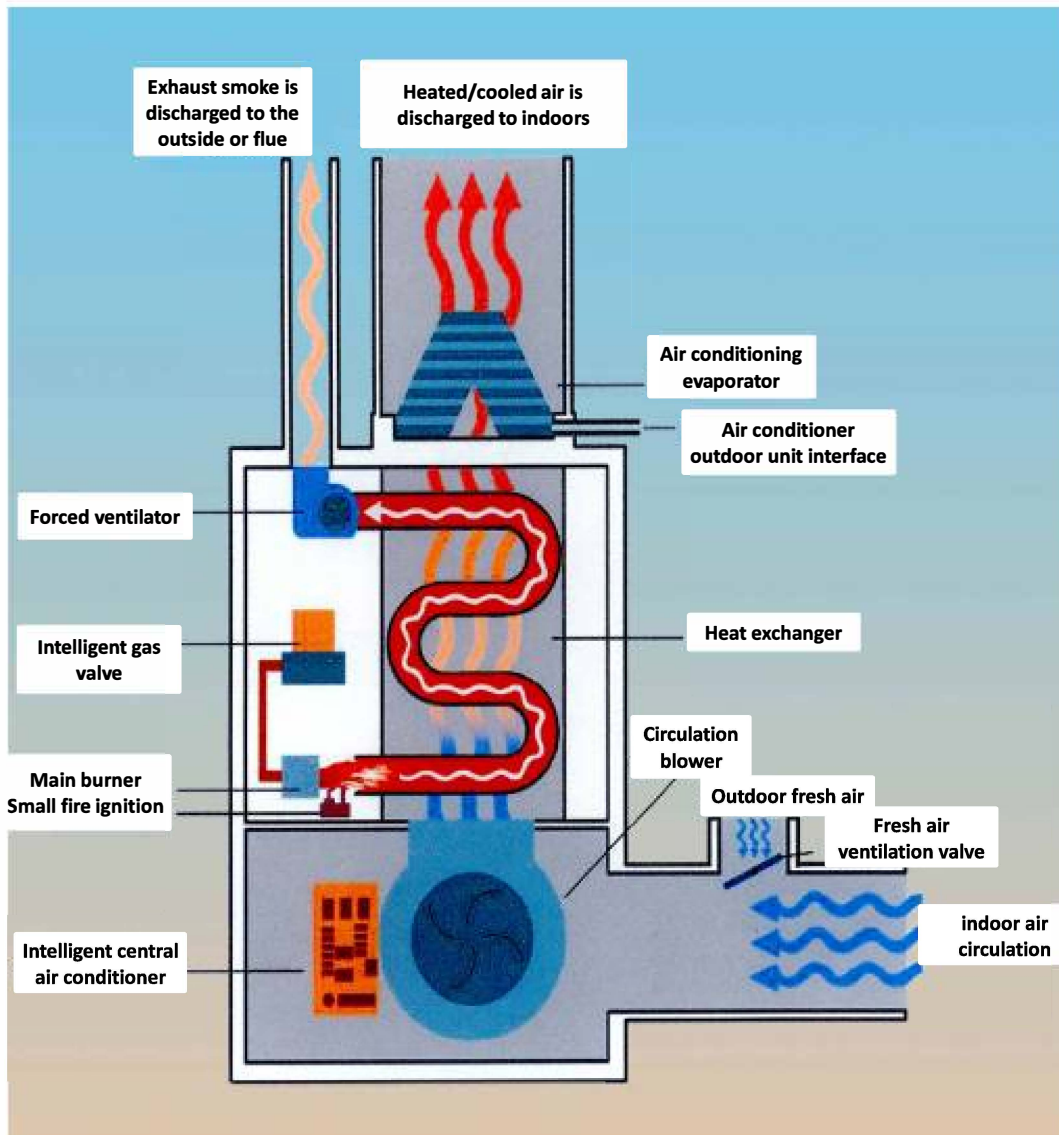


Fig . 35

1	Gas valves	12	Overflow thermostat
2	Gas pipe assembly	13	Master thermostat
3	Ignition needle	14	Junction box
4	nozzle		Smoke exhaust fan
5	burner	15	volute
6	Door switch	16	Gas collection hood
7	Main control board		Heat exchanger tube
8	24V wire remote interface	17	assembly
9	Internal motor		Smoke extraction
10	Counter flow thermostat	18	motor
11	transformer	19	Wind pressure switch
		20	Wind pressure
		21	connection pipe
		22	Flame sensor
			Fan drive module

3 System schematic diagram and description

3.2 System schematic diagram



3.3 The role of each component in the system

3.3.1 Gas valves

The gas input load is controlled by adjusting the spring screw penetration depth and adjusting the pressure after the gas valve.

3.3.2 Gas Pipe Assemblies

Deliver the gas and distribute it evenly to each copper nozzle;

3.3.3 Ignition Needle

Provide a gas ignition heat source to ignite the gas; Silicon nitride material, 115V strong electricity, reach a surface temperature of $> 700\text{ }^{\circ}\text{C}$ within 15 seconds.

3.3.4 Nozzles

Control gas flow: the flow rate is determined by the pressure and channel area (nozzle aperture), after the gas valve determines the gas pressure after the valve is delivered to the nozzle, the nozzle aperture determines the actual gas flow, thereby determining the gas input load;

3.3.5 Burners

The function of the burner is to fully mix the gas ejected from the nozzle with the inhaled air and evenly distribute it to the head to form a combustible - mixture to ensure that the gas is fully burned and can not produce undesirable phenomena such as separation flame and tempering.

3.3.6 Door switch

The function is to prevent electric shock and protect the safety of maintenance personnel. When the cover is opened, the door switch automatically cuts off the power supply.

3.3.7 Main Control Board

Control center of gas furnace: control the gas furnace according to the received signal demand, open the corresponding cooling/heating/air supply and other functions, and can protect the machine in time when encountering a situation.

3.3.8 24V interface

Windshield output interface;;

3.3.9 Internal motor

Provide air duct circulating air volume;

3.3.10 Countercurrent thermostats

Prevent heat backflow when the fan fails, and protect and cut off the gas in time;

3.3.11 Transformers

Convert 115V strong current into 24V weak current, and supply the low-voltage control circuit of the control board;

3.3.12 Overflow thermostat

Prevent the line body from being burned when the flame overflows, and protect it in time;

3.3.13 Main thermostat

Protection when the cavity temperature is too high to prevent insufficient air volume and excessive air temperature;

3.3.14 Junction Box

The user installs the port connecting the power cord at the site;

3.3.15 Smoke exhaust fans

3.3.16 The driving force of the sucked air required for gas combustion, and the exhaust gas after combustion is discharged outdoors;

3.3.17 Gas Gathering Hood

The function of the gas collection hood is to collect the flue gas in multiple heat exchange tubes, and then

discharge it to the outside by the smoke exhaust fan;

3.3.18 Heat exchanger tube assemblies

The heat exchanger tube is a mixture of gas and air, and then the high-temperature flue gas formed by combustion flows along the tube to transfer the heat to the wall of the heat exchanger tube, and then the tube wall transfers the heat to the air flowing outside the tube, so as to achieve the purpose of heating the air outside the tube.

3.3.19 Smoke exhaust fans

Same as 2.15

3.3.20 Wind pressure switch

The role of the wind pressure switch to monitor the pressure of the smoke exhaust fan pressure measuring port, when the negative pressure of the smoke exhaust fan is less than the set value, it indicates that the air volume of the smoke exhaust fan decreases due to the failure of the smoke exhaust fan / the blockage of the smoke pipe, etc., which will cause the risk of CO exceeding the standard due to insufficient gas combustion air, at this time the wind pressure switch protects and cuts off the gas supply, It can not be recovered until the negative pressure value of the smoke exhaust fan is higher than the set value;

3.3.21 Wind pressure connection pipe

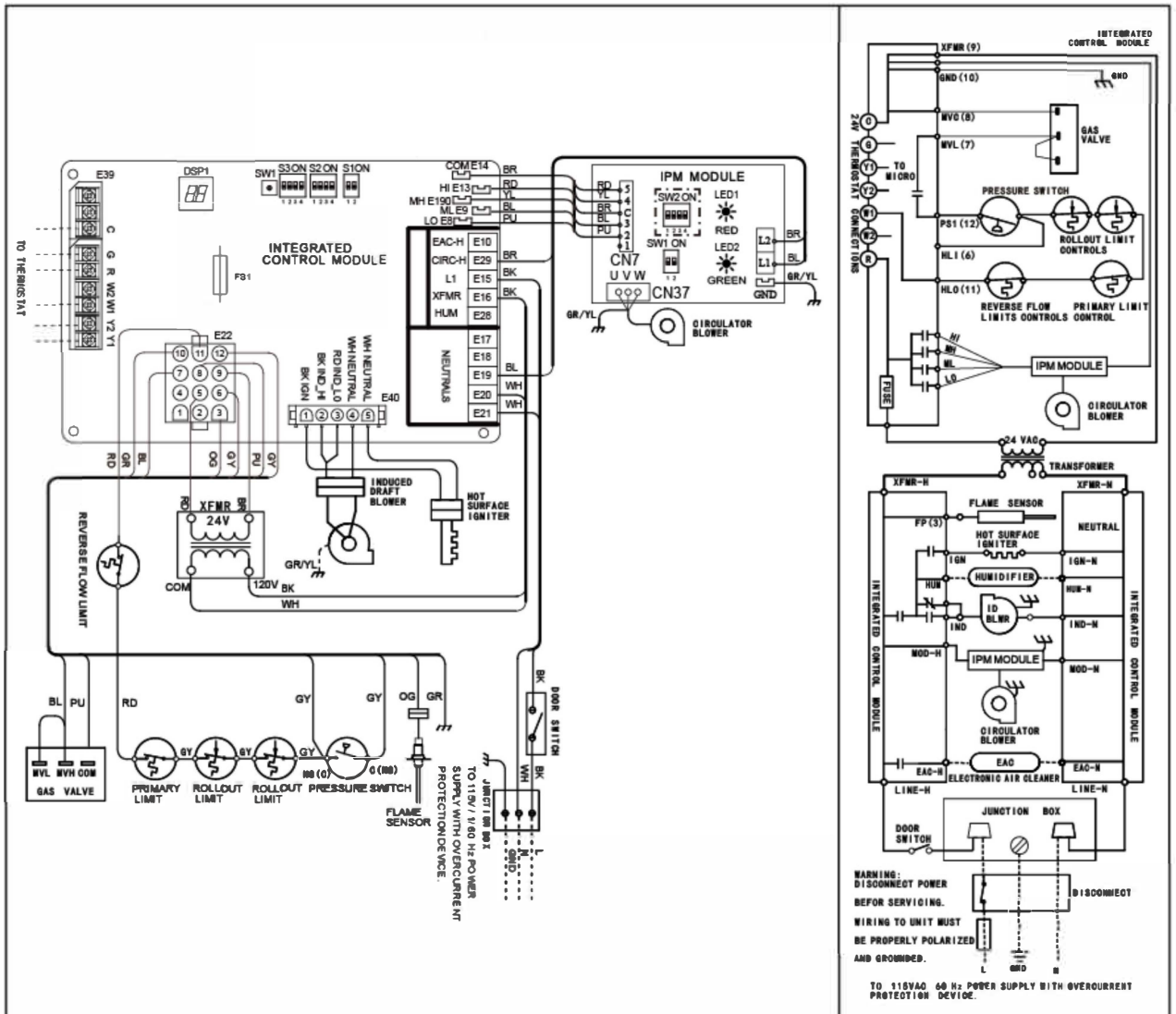
It is the silicone tube connecting the smoke exhaust fan and the wind pressure switch, the function is to transmit the pressure of the pressure measuring port of the smoke exhaust fan to the wind pressure switch, because the flue gas temperature of 80% general energy efficiency gas furnace products is higher, so this connection pipe has higher temperature resistance requirements (about 200 °C). Flame Sensors Monitor the flame, mainly to prevent ignition failure, or accidental flameout during operation, turn off the gas in time to prevent gas leakage;

3.3.22 Fan drive modules

The drive module of the internal fan is used in the internal motor model of the external drive, and the function is to control the operation logic of the internal fan (at this stage, the internal motor of Comfortstar's external drive is constant air volume control)

3.4 Electric control function module and wiring overview

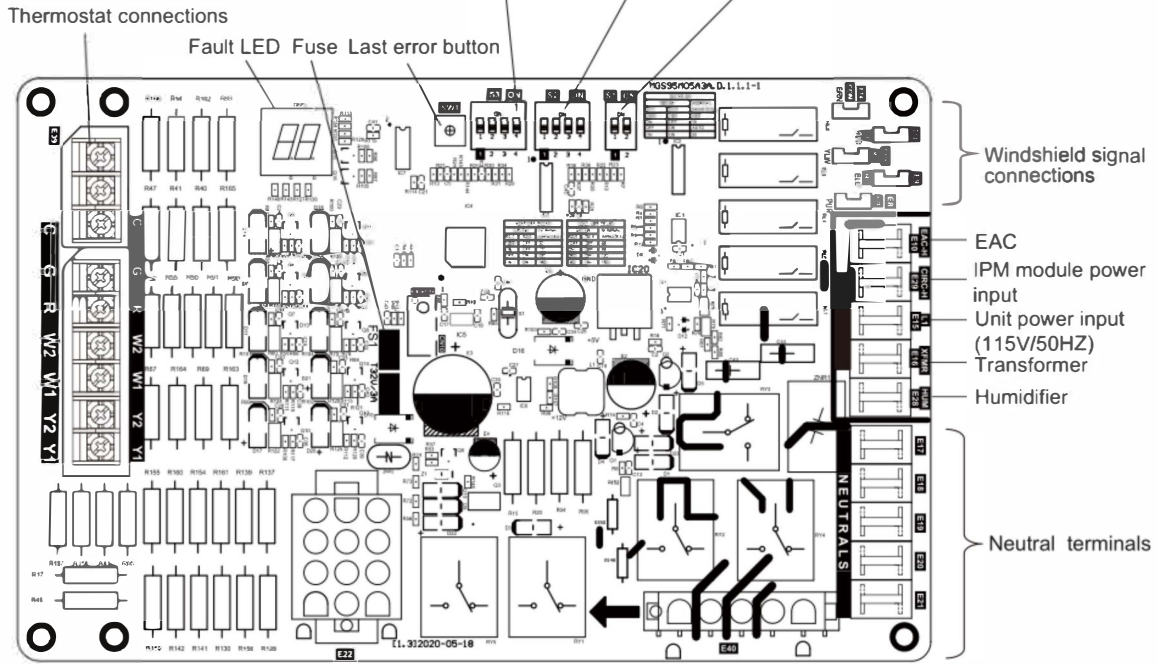
1、Wiring summary



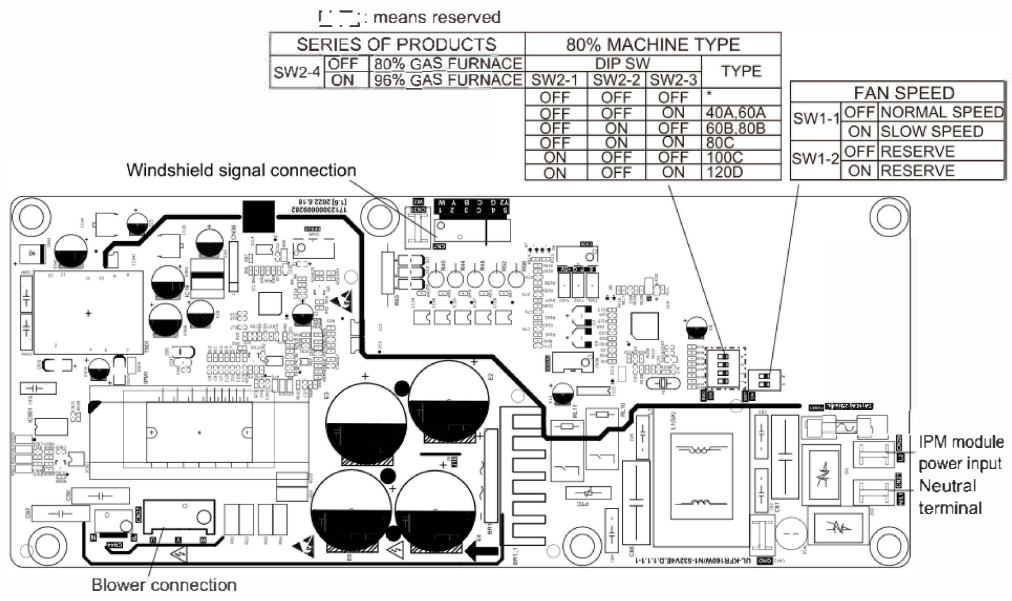
2. Dialing instructions
- 1) Main control board

80% machine windshield setting	FAN SPEED								HEAT OFF DELAY		
	DIP SW				NOMINAL SPEED				DIP SW		NOMINAL (MINUTES)
	S3-1	S3-2	S3-3	S3-4	H-heat	L-heat	H-cool	L-cool	S2-1	S2-2	
100C/120D	* OFF	ON	OFF	OFF	4	3	3	2	*OFF	OFF	90
	OFF	ON	ON	OFF	4	3	5	3	ON	OFF	120
	OFF	ON	ON	ON	5	4	4	4	OFF	ON	150
60A/80B/80C	* ON	OFF	OFF	ON	4	3	4	3	ON	ON	180
	OFF	ON	OFF	ON	5	5	5	4			
	OFF	ON	OFF	ON	4	3	4	3			
60B	* OFF	ON	ON	OFF	4	3	3	2			
	OFF	ON	ON	ON	4	3	5	3			
	OFF	ON	OFF	ON	5	4	4	4			
40A	* ON	OFF	ON	ON	4	3	4	3			
	OFF	OFF	ON	OFF	5	3	5	4			
	ON	ON	OFF	ON	4	2	3	2			

COOL OFF DELAY		W2 DELAY	
DIP SW	NOMINAL (MINUTES)	DIP SW	NOMINAL (MINUTES)
S2-3	S2-4	S1-1	S1-2
*OFF	OFF	OFF	OFF
ON	OFF	ON	OFF
OFF	ON	OFF	ON
ON	ON	ON	ON



2) Fan drive board



3. Fan Speed dialing

80% series gas furnace	FAN SPEED							
	DIP SW				NOMINAL SPEED			
	S3-1	S3-2	S3-3	S3-4	H-heat	L-heat	H-cool	L-cool
100C/120D	* OFF	ON	OFF	OFF	4	3	3	2
	● OFF	ON	ON	OFF	4	3	5	3
	OFF	ON	ON	ON	5	4	4	4
	OFF	ON	OFF	ON	4	3	4	3
60A/80B/80C	* ON	OFF	OFF	ON	5	5	5	4
	OFF	ON	OFF	ON	4	3	4	3
	OFF	ON	OFF	OFF	4	3	3	2
60B	● OFF	ON	● OFF	OFF	4	3	3	2
	* OFF	ON	ON	OFF	4	3	5	3
	OFF	ON	ON	ON	5	4	4	4
	OFF	ON	OFF	ON	4	3	4	3
40A	* ON	OFF	ON	ON	5	3	5	4
	OFF	OFF	ON	OFF	4	2	3	2
	ON	ON	OFF	ON	4	2	4	3

4 Common fault codes and processing flow

4.1 Table of common failure codes

type	content	code	remark
normal	Standby mode	--	idle
run	Primary heating (low heat)	H1	1st heat
run	Secondary heating (high fire)	H2	2nd heat
run	Air supply mode	CF	continuous fan
run	Primary refrigeration	C1	1st cooling
run	Secondary refrigeration	C2	2nd cooling
fault	When the exhaust fan is turned off, the wind pressure switch 1st-stage is detected for a long shutdown	E1	Shorted Pressure Switch
fault	When the smoke exhaust fan is running, the 1 st -stage air pressure switch is normally open	E2	Open Pressure Switch
fault	When the smoke exhaust fan is turned on in high gear, the 2 nd -stage air pressure switch is normally open	E3	Open Pressure Switch
fault	Wind pressure switch cyclic lock (not recovered for more than 5 minutes)	E4	Open Pressure Switch locked

type	content	code	remark
fault	The thermostat switch is open/flame spills	E5	Open Thermal Limit, Rollout Switch
fault	The thermostat switch is open/flame spilling lasts for more than 5 minutes	E6	Open Thermal Limit, Rollout Switch
fault	External locking (more than 4 failed ignitions)	E7	Ignition failure locked
fault	External locking (flame detected and lost more than the re-ignition limit (5))	E8	Flame loss locked
fault	No gas valve was opened to detect a flame signal	FE	gas value relay stuck closed
fault	The flame is low and the flame sensor induces a small current but still operates	FL	flame low
fault	The power supplies are polarized in reverse	Pr	power reversed
fault	The fuse is disconnected	Fo	fuse open
fault	The electronic control board fails	bE	board error
fault	Incorrect signal combination	nL	Signal error

4.2 Fault code handling

Display Code:

The E1 smoke exhaust fan detects a long closure of the wind pressure switch 1st-stage when it is off.

➤ Cause of failure::

- 1) Incorrect wiring
- 2) The wind pressure switch is damaged
- 3) The electric control board itself is damaged

Processing flow:



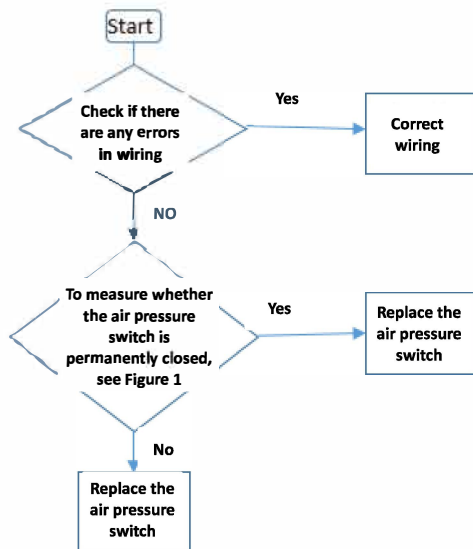


Figure 1

Display Code:

When the E2 smoke exhaust fan is running, the 1st-stage air pressure switch is normally open

The E3 smoke exhaust fan is normally open when the 2nd-stage air pressure switch is normally open when the high air gear is turned on

The E4 wind switch cycles locked (not recovered for more than 5 minutes).

➤ **Cause of failure::**

- 1) Incorrect wiring
- 2) The wind pressure switch is damaged
- 3) The connection hose is damaged or not connected / the pressure measuring port of the smoke exhaust fan is blocked, and the pressure cannot be transmitted to the air pressure switch
- 4) The smoke pipe is blocked
- 5) The exhaust fan motor is damaged
- 6) The electric control board is damaged.

Processing flow:

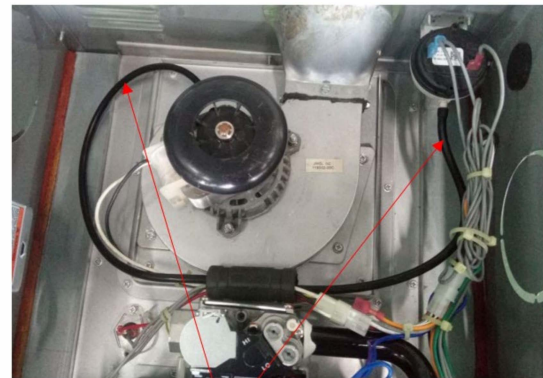
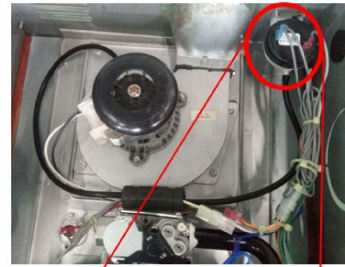
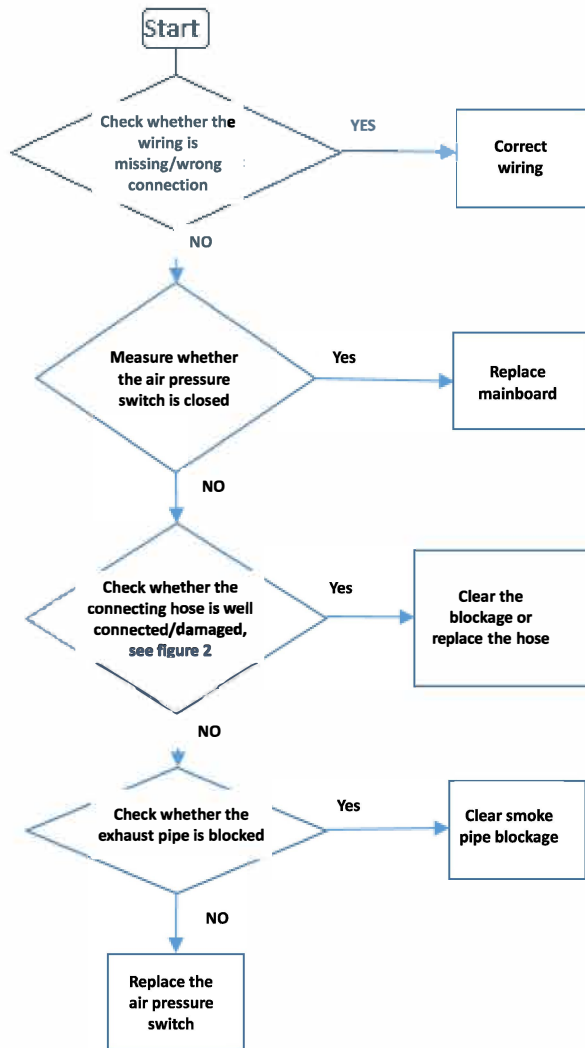


图2

Displayed code:

E5 thermostat switch open/flame spill

E6 thermostat switch open/flame spillage lasts more than 5 minutes

➤ **Cause of failure:**

- 1) Incorrect wiring
- 2) The thermostat is damaged

Processing flow:

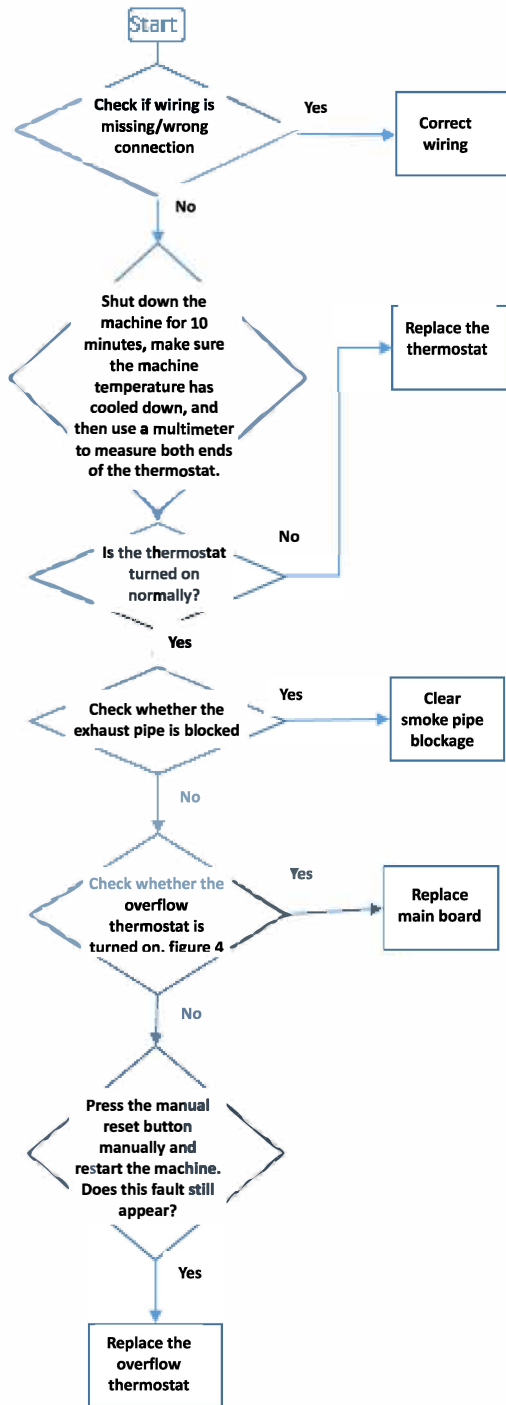
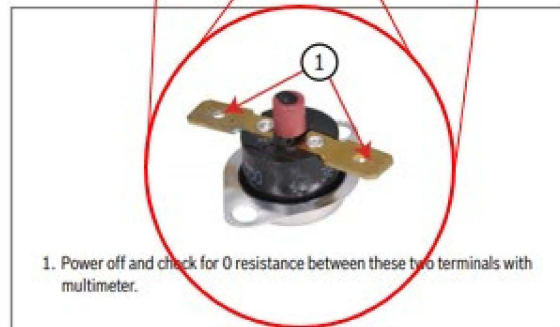
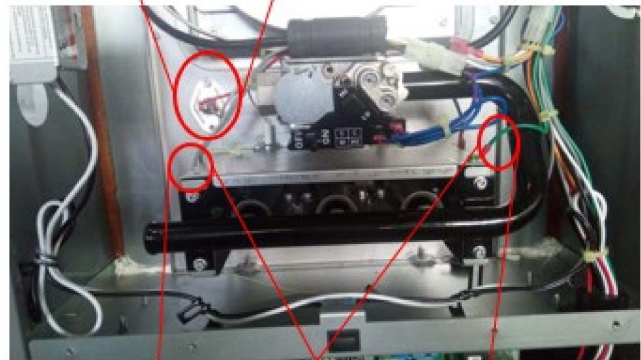


Figure 3



Display Code:

E7 External locking (more than 4 failed ignitions).

E8 External Lock (flame is detected and lost more than the limit number of re-ignitions (5)).

Cause of failure:

- 1) The wiring between the flame sensor and the main control board is virtual connection/the line body is broken;
- 2) The ground wire is not grounded;

3) The supply pressure / gas valve adjustment pressure is not correct, resulting in no fire at the point

Processing flow:

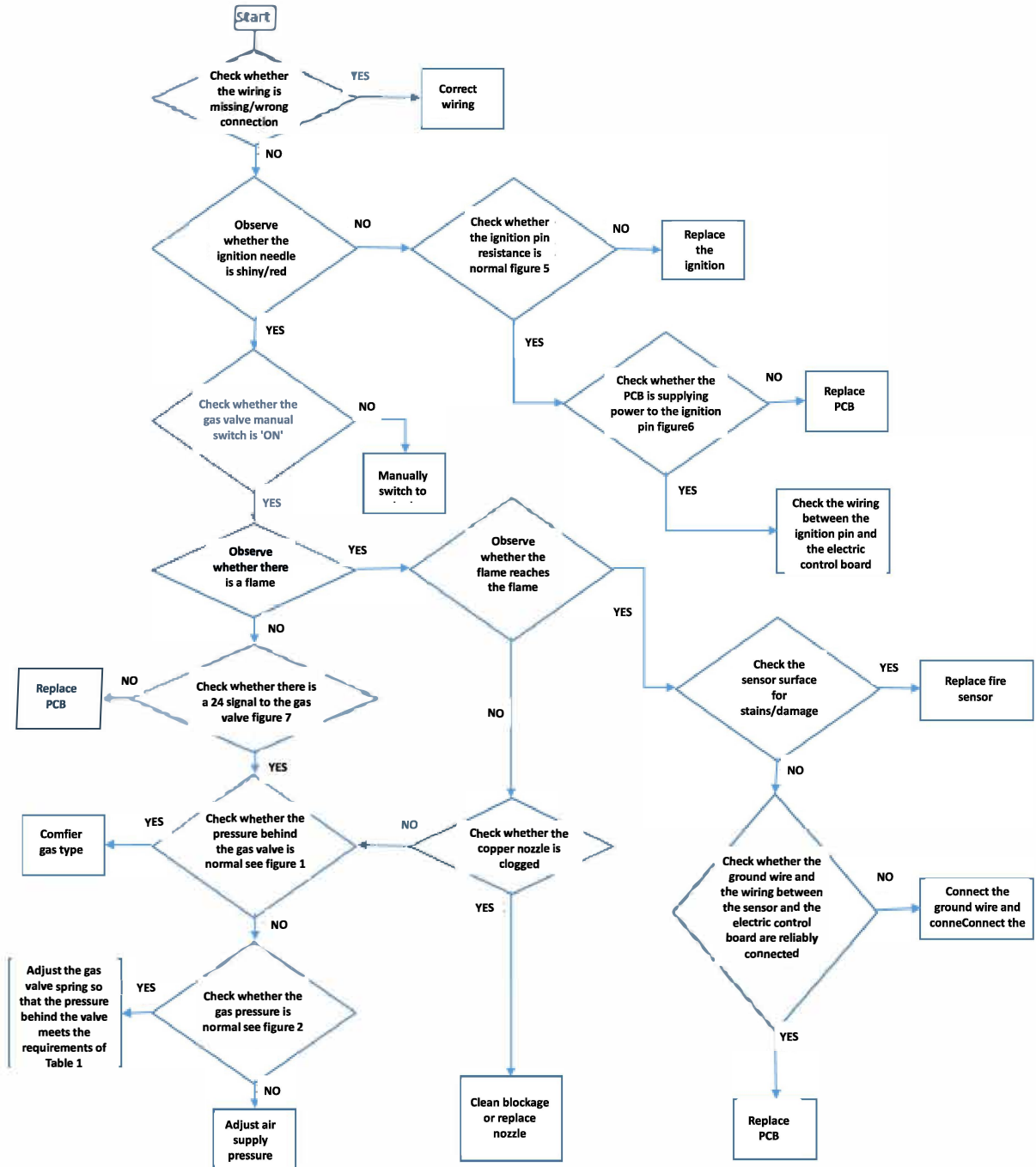


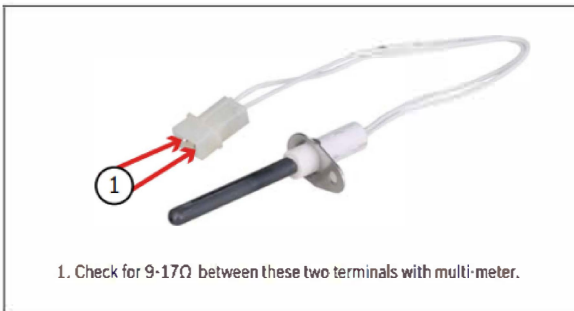
Table 1

Manifold Gas Pressure		
Input Rating KBTU/H	Natural Gas	Propane Gas
40A	3.0" W.C.	10.5 W.C.
60A	3.5" W.C.	10" W.C.
60B	3.5" W.C.	10" W.C.
80B	3.8" W.C.	10" W.C.
80C	3.8" W.C.	10" W.C.
100C	3.8" W.C.	10" W.C.
120D	3.8" W.C.	10.5" W.C.

Table 2

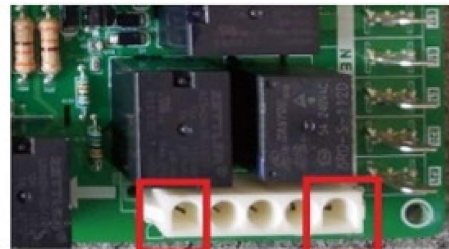
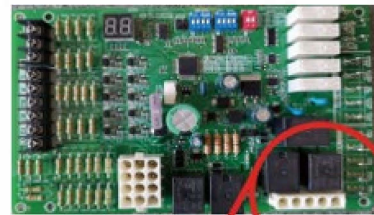
	Inlet Gas Supply Pressure	
Natural Gas	Minimum: 4.5 in. W.C.	Maximum: 10.5 in. W.C.
Propane Gas	Minimum: 11.0 in. W.C.	Maximum: 13.0 in. W.C.

Table 2 Inlet Gas Supply Pressure



Use a multi-meter to measure whether the ignition pin resistance is between 9-17Ω

Figure 5



Use a multi-meter to measure whether there is 115V voltage

Figure 6

