

# Service Facts

## Upflow/Downflow/Horizontal Gas-Fired, 1 and 2-Stage Induced Draft Furnaces with High Efficiency Motor

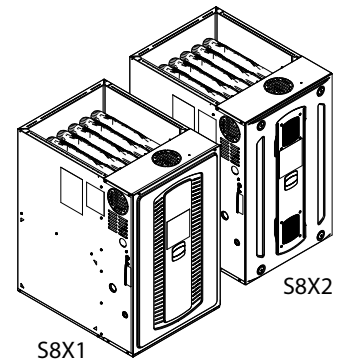
Upflow, Downflow, Horizontal Right/Left

### Single Stage

S8X1A026M2PSAA  
S8X1A040M3PSAA  
S8X1B040M2PSAA  
S8X1B060M3PSAA  
S8X1B060M4PSAA  
S8X1B080M4PSAA  
S8X1C080M5PSAA  
S8X1C100M5PSAA  
S8X1D120M5PSAA

### Two Stage

S8X2A040M3PSAA  
S8X2B060M3PSAA  
S8X2B060M4PSAA  
S8X2B080M4PSAA  
S8X2C080M5PSAA  
S8X2C100M5PSAA  
S8X2D120M5PSAA



**Note:** Models may have a "T" in the 12th digit designating they meet California less than 40 ng/J (NOx) emissions requirements.

**Note:** Graphics in this document are for representation only. Actual model may differ in appearance.

### ▲ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

# SAFETY SECTION NON-CONDENSING FURNACES

Ingersoll Rand has a policy of continuous product and product data improvement and it reserves the right to change design and specifications without notice.

**Important:** — This document pack contains a wiring diagram and service information. This is customer property and is to remain with this unit. Please return to service information pack upon completion of work.

## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD!

Failure to follow safety warnings exactly could result in a fire or explosion causing property damage, personal injury or loss of life.

— Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. — **WHAT TO DO IF YOU SMELL GAS**

- Do not try to light any appliance.
  - Do not touch any electrical switch; do not use any phone in your building.
  - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency, or the gas supplier.

## ⚠ WARNING

### EXPLOSION HAZARD!

Failure to follow this Warning could result in property damage, personal injury or death. Install a gas detecting warning device in case of a gas leak. **NOTE: The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.**

## ⚠ WARNING

### FIRE OR EXPLOSION HAZARD!

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage.

Never test for gas leaks with an open flame. Use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury, or loss of life.

## ⚠ WARNING

### ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD!

Failure to follow this Warning could result in dangerous operation, property damage, severe personal injury, or death.

Improper servicing could result in dangerous operation, property damage, severe personal injury, or death.

- Before servicing, disconnect all electrical power to furnace.
- When servicing controls, label all wires prior to disconnection. Reconnect wires correctly.
- Verify proper operation after servicing.

## ⚠ WARNING

### CARBON MONOXIDE POISONING HAZARD!

Failure to follow this Warning could result in property damage, severe personal injury, or death.

To ensure furnace is vented properly, do not replace factory supplied venting components with field fabricated parts. Fabricating parts can result in damaged vents and components allowing carbon monoxide to escape the venting system.

## ⚠ WARNING

### CARBON MONOXIDE HAZARD!

Failure to follow this Warning could result in property damage, severe personal injury, or death.

When replacing a furnace, ensure the venting system is adequate for the new furnace.

**⚠ WARNING****FIRE HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do not install the furnace directly on carpeting, tile or other combustible material other than wood flooring. For vertical downflow applications, subbase (BAYBASE205) must be used between the furnace and combustible flooring. When the downflow furnace is installed vertically with a cased coil, a subbase is not required.

**⚠ WARNING****WARNING!**

This product can expose you to chemicals including lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm.

For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**⚠ WARNING****EXPLOSION HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Propane gas is heavier than air and may collect in any low areas or confined spaces. In addition, odorant fade may make the gas undetectable except with a warning device. If the gas furnace is installed in a basement, an excavated areas or a confined space, it is strongly recommended to contact a gas supplier to install a gas detecting warning device in case of leak. The manufacturer of your furnace does not test any detectors and makes no representations regarding any brand or type of detector.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do not bypass the door switch or panel loop by any permanent means.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do not touch any components other than the Menu and Option buttons on the IFC when setting up the system or during fault code recovery.

**⚠ WARNING****FIRE OR EXPLOSION HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do NOT attempt to manually light the furnace.

**⚠ WARNING****CARBON MONOXIDE POISONING HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Follow the service and/or periodic maintenance instructions for the Furnace and venting system.

**⚠ WARNING****CARBON MONOXIDE POISONING HAZARD!**

Failure to follow this Warning could result in serious personal injury or death.

Make sure that the blower door is in place and not ajar. Dangerous fumes could escape an improperly secured door.

**⚠ WARNING****ELECTRICAL SHOCK HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Disconnect power to the unit before removing the blower door. Allow a minimum of 10 seconds for IFC power supply to discharge to 0 volts.

**⚠ WARNING****SAFETY HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

These furnaces are not approved or intended for installation in manufactured (mobile) housing, trailers, or recreational vehicles.

**⚠ WARNING**

**EXPLOSION HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

In the event that electrical, fuel, or mechanical failures occur, shut gas supply off at the manual gas valve located on the supply gas piping coming into the furnace before turning off the electrical power to the furnace. Contact the service agency designated by your dealer.

**⚠ WARNING**

**EXPLOSION HAZARD!**

Failure to follow this Warning could result in property damage, serious personal injury, or death.

Do not store combustible materials, gasoline, or other flammable vapors or liquids near the unit.

**⚠ WARNING**

**SAFETY HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do not use semi-rigid metallic gas connectors (flexible gas lines) within the furnace cabinet.

**⚠ WARNING**

**INSTALLATION WARNING — HIGH VOLTAGE MOVING PARTS!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Bodily injury can result from high voltage electrical components, fast moving fans, and combustible gas. For protection from these inherent hazards during installation and servicing, the main gas valve must be turned off and the electrical supply must be disconnected. If operating checks must be performed with the unit operating, it is the technician's responsibility to recognize these hazards and proceed safely.

**⚠ WARNING**

**SAFETY HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Do not install the filter in the return duct directly above the furnace in horizontal applications. Install the filter remotely.

**⚠ WARNING**

**SAFETY HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Turn the power to the furnace off before servicing filters to avoid contact with moving parts.

**⚠ WARNING**

**CARBON MONOXIDE HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

Furnace venting into an unlined masonry chimney or concrete chimney is prohibited.

**⚠ WARNING**

**CARBON MONOXIDE HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

The chimney liner must be thoroughly inspected to insure no cracks or other potential areas for flue gas leaks are present in the liner. Liner leaks will result in early deterioration of the chimney.

**⚠ WARNING**

**SHOCK HAZARD!**

Failure to follow this Warning could result in property damage, severe personal injury, or death.

If a disconnect switch is present, it must always be locked in the open position before servicing the unit.

**⚠ WARNING**

**OVERHEATING AND EXPLOSION HAZARD!**

Failure to follow this Warning could result in property damage, personal injury or death.

Should overheating occur, or the gas supply fail to shut off, shut off the gas valve to the unit before shutting off the electrical supply.

**⚠ CAUTION**

**IMPROPER VOLTAGE CONNECTION!**

Failure to follow this Caution could result in property damage.

Do NOT connect the furnace line voltage to a GFCI protected circuit.



**⚠ CAUTION****CORROSION WARNING!**

Failure to follow this Caution could result in property damage or personal injury.  
Do not install the furnace in a corrosive or contaminated atmosphere.

**⚠ CAUTION****SHARP EDGE HAZARD!**

Failure to follow this Caution could result in property damage or personal injury.  
Be careful of sharp edges on equipment or any cuts made on sheet metal while installing or servicing.

**⚠ CAUTION****BACKUP WRENCH REQUIRED!**

Failure to follow this Caution could result in property damage or personal injury.  
Use a backup wrench on the gas valve when installing gas piping to prevent damage to the gas valve and manifold assembly.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
If complete furnace shutdown is done during the cold weather months, provisions must be taken to prevent freeze-up of all water pipes and water receptacles.

**⚠ CAUTION****FREEZE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
Whenever your house is to be vacant, arrange to have someone inspect your house for proper temperature. This is very important during freezing weather. If for any reason your furnace should fail to operate damage could result, such as frozen water pipes.

**⚠ CAUTION****IGNITION FUNCTION!**

Failure to follow this Caution may result in poor ignition characteristics.  
Maintain manifold pressure in high altitude installations.

**⚠ CAUTION****WATER DAMAGE!**

Failure to follow this Caution could result in property damage or personal injury.  
It is recommended that an external overflow drain pan be installed in all applications over a finished ceiling to prevent property damage or personal injury from leaking condensate.

**⚠ CAUTION****HOT SURFACE!**

Failure to follow this Caution could result in personal injury.  
Do NOT touch igniter. It is extremely hot.

**⚠ CAUTION****FURNACE SERVICE CAUTION!**

Failure to follow this Caution could result in property damage or personal injury.  
Label all wires prior to disconnection when servicing controls. Verify proper operation after servicing. Wiring errors can cause improper and dangerous operation.

**⚠ CAUTION****DO NOT USE AS CONSTRUCTION HEATER!**

Failure to follow this Caution could result in property damage or personal injury.  
In order to prevent shortening its service life, the Furnace should NOT be used as a "Construction Heater" during the finishing phases of construction until the requirements listed in the furnace installation guidelines of the Installer's Guide have been met. Condensate in the presence of chlorides and fluorides from paint, varnish, stains, adhesives, cleaning compounds, and cement create a corrosive condition which may cause rapid deterioration of the heat exchanger.

**⚠ CAUTION****WIRING INFORMATION!**

Failure to follow this Caution could result in property damage or personal injury.  
The integrated furnace control is polarity sensitive. The hot leg of the 120 VAC power must be connected to the BLACK field lead.

**⚠ CAUTION**

**EQUIPMENT DAMAGE!**

UV light exposure can cause the plastic blower material to deteriorate which could lead to Blower Housing Damage.

For units containing a plastic Blower Housing, Do NOT install third party Ultra-Violet Air Cleaners where the Blower Housing can be exposed to UV light.

For more information, visit [www.IRCO.com](http://www.IRCO.com) or contact your installing dealer.  
Ingersoll Rand  
800 Beaty St.  
Davidson, NC 28036

**⚠ WARNING**

**CARBON MONOXIDE POISONING HAZARD!**

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death.

**The following steps shall be followed for each appliance connected to the venting system being placed into operation, while all other appliances connected to the venting system are not in operation:**

- Inspect the venting system for proper size and horizontal pitch as required in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and these instructions. Determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
- Close all doors and windows between the space in which the appliance(s) connected to the venting system are located. Also close fireplace dampers.
- Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans such as range hoods so they are operating at maximum speed. Do not operate a summer exhaust fan.
- Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
- Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
- If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the National Fuel Gas Code, ANSI Z221.1/NFPA 54.
- After it has been determined that each appliance connected to the venting system properly vents when tested, return all doors, windows, exhaust fans, etc. to their previous condition of use.

# Product Specifications

MODEL	S8X1A026M2PSAA	S8X1A040M3PSAA	S8X1B040M2PSAA
<b>TYPE</b>	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow
<b>RATINGS</b> <sup>(a)</sup>			
Input BTUH	26,000	40,000	40,000
Capacity BTUH (ICS) <sup>(b) (c)</sup>	20,800	32,000	32,000
Temp. Rise (Min.-Max.)	25 - 55	30 - 60	30 - 60
AFUE (%) <sup>(c)</sup>	80	80	80
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT
Diameter — Width (In.)	11 X 8	11 X 8	11 X 8
No. Used	1	1	1
Speeds (No.) <sup>(d)</sup>	9	9	9
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/3	1/2	1/3
RPM	1075	1075	1075
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	4.8	6.8	4.8
<b>COMBUSTION FAN — Type</b>	Centrifugal	Centrifugal	Centrifugal
Drive — No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP — RPM	3300	3300	3300
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	1.39	1.39	1.39
<b>FILTER — Furnished?</b>	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 — 14x25 — 1 in.	1 — 14x25 — 1 in.	1 — 16x25 — 1 in.
<b>VENT PIPE DIAMETER — Min (in.)</b> <sup>(e)</sup>	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER</b>			
Type	Aluminized Steel	Aluminized Steel	Aluminized Steel
Gauge (Fired)	20	20	20
<b>ORIFICES — Main</b>			
Nat. Gas Qty. — Drill Size	2 - 51	2 - 45	2 - 45
<b>GAS VALVE</b>	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
<b>PILOT SAFETY DEVICE</b>			
Type	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS — QTY</b>	2	2	2
<b>POWER CONN. — V/Ph/Hz</b> <sup>(f)</sup>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	7.6	10.1	7.6
Max. Overcurrent Protection (Amps)	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2

<sup>(a)</sup> For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

<sup>(b)</sup> Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 — latest edition.

<sup>(c)</sup> Based on U.S. government standard tests.

<sup>(d)</sup> 9 Speed constant torque ECM blower motor.

<sup>(e)</sup> Refer to the Installer's Guide.

<sup>(f)</sup> The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

## Product Specifications

MODEL	S8X1B060M3PSAA	S8X1B060M4PSAA	S8X1B080M4PSAA
<b>TYPE</b>	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow
<b>RATINGS</b> <sup>(a)</sup>			
Input BTUH	60,000	60,000	80,000
Capacity BTUH (ICS) <sup>(b) (c)</sup>	48,000	48,000	64,000
Temp. Rise (Min.-Max.)	30 - 60	30 - 60	30 - 60
AFUE (%)	80	80	80
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT
Diameter — Width (In.)	11 X 8	11 X 8	11 X 8
No. Used	1	1	1
Speeds (No.) <sup>(d)</sup>	9	9	9
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/2	3/4	3/4
RPM	1075	1075	1075
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	6.8	8.4	8.4
<b>COMBUSTION FAN — Type</b>	Centrifugal	Centrifugal	Centrifugal
Drive — No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP — RPM	3300	3300	3300
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	1.39	1.39	1.39
<b>FILTER — Furnished?</b>	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 — 16x25 — 1 in.	1 — 16x25 — 1 in.	1 — 16x25 — 1 in.
<b>VENT PIPE DIAMETER — Min (in.)</b> <sup>(e)</sup>	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER</b>			
Type	Aluminized Steel	Aluminized Steel	Aluminized Steel
Gauge (Fired)	20	20	20
<b>ORIFICES — Main</b>			
Nat. Gas Qty. — Drill Size	3 - 45	3 - 45	4 - 45
<b>GAS VALVE</b>	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
<b>PILOT SAFETY DEVICE</b>			
Type	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS — QTY</b>	3	3	4
<b>POWER CONN. — V/Ph/Hz</b> <sup>(f)</sup>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	10.1	12.1	12.1
Max. Overcurrent Protection (Amps)	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2

<sup>(a)</sup> For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

<sup>(b)</sup> Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 — latest edition.

<sup>(c)</sup> Based on U.S. government standard tests.

<sup>(d)</sup> 9 Speed constant torque ECM blower motor.

<sup>(e)</sup> Refer to the Installer's Guide.

<sup>(f)</sup> The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

MODEL	S8X1C080M5PSAA	S8X1C100M5PSAA	S8X1D120M5PSAA
<b>TYPE</b>	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow
<b>RATINGS (a)</b>			
Input BTUH	80,000	100,000	120,000
Capacity BTUH (ICS) (b) (c)	64,000	80,000	96,000
Temp. Rise (Min.-Max.)	30 - 60	30 - 60	30 - 60
AFUE (%) (c)	80	80	80
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT
Diameter — Width (In.)	11 X 11	11 X 11	11 X 11
No. Used	1	1	1
Speeds (No.) (d)	9	9	9
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1	1	1
RPM	1075	1075	1075
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	10.9	10.9	10.9
<b>COMBUSTION FAN — Type</b>	Centrifugal	Centrifugal	Centrifugal
Drive — No. Speeds	Direct - 1	Direct - 1	Direct - 1
Motor HP — RPM	3300	3300	3300
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	0.30	0.30	0.34
<b>FILTER — Furnished?</b>	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 — 20x25 — 1 in.	1 — 20x25 — 1 in.	1 — 24x25 — 1 in.
<b>VENT PIPE DIAMETER — Min (in.)</b> (e)	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER</b>			
Type	Aluminized Steel	Aluminized Steel	Aluminized Steel
Gauge (Fired)	20	20	20
<b>ORIFICES — Main</b>			
Nat. Gas Qty. — Drill Size	4 - 45	5 - 45	6 - 45
<b>GAS VALVE</b>	Redundant - Single Stage	Redundant - Single Stage	Redundant - Single Stage
<b>PILOT SAFETY DEVICE</b>			
Type	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS — QTY</b>	4	5	6
<b>POWER CONN. — V/Ph/Hz (f)</b>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	14.1	14.1	14.1
Max. Overcurrent Protection (Amps)	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2

(a) For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

(b) Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 — latest edition.

(c) Based on U.S. government standard tests.

(d) 9 Speed constant torque ECM blower motor.

(e) Refer to the Installer's Guide.

(f) The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

## Product Specifications

MODEL	S8X2A040M3PSAA	S8X2B060M3PSAA	S8X2B060M4PSAA
<b>TYPE</b>	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow
<b>RATINGS</b> <sup>(a)</sup>			
1st Stage Input BTUH	26,000	39,000	39,000
1st Stage Capacity BTUH (ICS)	20,800	31,200	31,200
2nd Stage Input BTUH	40,000	60,000	60,000
2nd Stage Capacity BTUH (ICS) <sup>(b)(c)</sup>	32,000	48,000	48,000
1st Stage Temp. Rise (Min.-Max.)	20 — 50	20 — 50	20 — 50
2nd Stage Temp. Rise (Min.-Max.)	25 — 55	30 — 60	30 — 60
AFUE (%)	80	80	80
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT
Diameter — Width (In.)	11 X 8	11 X 8	11 X 8
No. Used	1	1	1
Speeds (No.) <sup>(d)</sup>	9	9	9
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	1/2	1/2	3/4
RPM	1075	1075	1075
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	4.8	6.8	8.4
<b>COMBUSTION FAN — Type</b>	Centrifugal	Centrifugal	Centrifugal
Drive — No. Speeds	Direct - 2	Direct - 2	Direct - 2
Motor HP — RPM	3300 / 2600	3300 / 2600	3300 / 2600
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	0.66	0.66	0.66
<b>FILTER — Furnished?</b>	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 — 14x25 — 1 in.	1 — 16x25 — 1 in.	1 — 16x25 — 1 in.
<b>VENT PIPE DIAMETER — Min (in.)</b> <sup>(e)</sup>	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER</b>			
Type	Aluminized Steel	Aluminized Steel	Aluminized Steel
Gauge (Fired)	20	20	20
<b>ORIFICES — Main</b>			
Nat. Gas Qty. — Drill Size	2 - 45	3 - 45	3 - 45
<b>GAS VALVE</b>	Redundant - Two Stage	Redundant - Two Stage	Redundant - Two Stage
<b>PILOT SAFETY DEVICE TYPE</b>	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS — Qty</b>	2	3	3
<b>POWER CONN. — V/Ph/Hz</b> <sup>(f)</sup>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	6.8	9.3	11.3
Max. Overcurrent Protection (Amps)	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2

<sup>(a)</sup> For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

<sup>(b)</sup> Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 — latest edition.

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<sup>(d)</sup> 9 Speed constant torque ECM blower motor.

<sup>(e)</sup> Refer to the Installer's Guide.

<sup>(f)</sup> The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.



MODEL	S8X2B080M4PSAA	S8X2C080M5PSAA	S8X2C100M5PSAA	S8X2D120M5PSAA
<b>TYPE</b>	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow	Upflow / Horizontal / Downflow
<b>RATINGS</b> <sup>(a)</sup>				
1st Stage Input BTUH	52,000	52,000	65,000	84,000
1st Stage Capacity BTUH (ICS)	41,600	41,600	52,000	67,200
2nd Stage Input BTUH	80,000	80,000	100,000	120,000
2nd Stage Capacity BTUH (ICS) <sup>(b)(c)</sup>	64,000	64,000	80,000	96,000
1st Stage Temp. Rise (Min.-Max.)	30 – 60	30 – 60	30 – 60	25 – 55
2nd Stage Temp. Rise (Min.-Max.)	30 – 60	30 – 60	30 – 60	30 – 60
AFUE (%)	80	80	80	80
<b>BLOWER DRIVE</b>	DIRECT	DIRECT	DIRECT	DIRECT
Diameter – Width (In.)	11 X 8	11 X 11	11 X 11	11 X 11
No. Used	1	1	1	1
Speeds (No.) <sup>(d)</sup>	9	9	9	9
CFM vs. in. w.g.	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table	See Fan Performance Table
Motor HP	3/4	1	1	1
RPM	1075	1075	1075	1075
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	8.4	8.4	10.9	10.9
<b>COMBUSTION FAN – Type</b>	Centrifugal	Centrifugal	Centrifugal	Centrifugal
Drive – No. Speeds	Direct - 2	Direct - 2	Direct - 2	Direct - 2
Motor HP – RPM	3300 / 2600	3300 / 2600	3300 / 2600	3300 / 2600
Volts/Ph/Hz	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
FLA	0.66	0.66	0.66	0.66
<b>FILTER – Furnished?</b>	No	No	No	No
Type recommended	High Velocity	High Velocity	High Velocity	High Velocity
High Vel. (No.-Size-Thk.)	1 – 16x25 – 1 in.	1 – 16x25 – 1 in.	1 – 20x25 – 1 in.	1 – 24x25 – 1 in.
<b>VENT PIPE DIAMETER – Min (in.)</b> <sup>(e)</sup>	4 Round	4 Round	4 Round	4 Round
<b>HEAT EXCHANGER</b>				
Type	Aluminized Steel	Aluminized Steel	Aluminized Steel	Aluminized Steel
Gauge (Fired)	20	20	20	20
<b>ORIFICES – Main</b>				
Nat. Gas Qty. – Drill Size	4 - 45	4 - 45	5 - 45	6 - 45
<b>GAS VALVE</b>	Redundant - Two Stage	Redundant - Two Stage	Redundant - Two Stage	Redundant - Two Stage
<b>PILOT SAFETY DEVICE TYPE</b>	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter	120 V SiNi Igniter
<b>BURNERS – (QTY)</b>	4	4	5	6
<b>POWER CONN. – V/Ph/Hz</b> <sup>(f)</sup>	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60	120 / 1 / 60
Ampacity (Amps)	11.3	11.3	14.4	14.4
Max. Overcurrent Protection (Amps)	15	15	15	15
<b>PIPE CONN. SIZE (in.)</b>	1/2	1/2	1/2	1/2

(a) For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level.

(b) Central Furnace heating designs are certified to ANSI Z21.47 / CSA 2.3 – latest edition.

(c) Based on U.S. government standard tests.

(d) 9 Speed constant torque ECM blower motor.

(e) Refer to the Installer's Guide.

(f) The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

# Sequence of Operation S8X1/S8X2

**Note:** The seven-segment LED readout is based on thermostat input. For the S8X2, during simultaneous call for W1 and W2, the seven-segment LED will read "Ht2", although the IFC will process the call for 1<sup>st</sup> stage heat first.

## EAC and HUM Timing

- EAC relay closes approximately 2 seconds after the blower starts.
- EAC relay opens when the blower motor stops.
- HUM relay closes on any heating call (HP/Gas) approximately 1 second after the blower motor starts.
- HUM relay opens when any heating call (HP/Gas) is removed.

## 1<sup>st</sup> Stage Gas Heating

1. R – W1 contacts close on the thermostat sending 24VAC to the W1 low voltage terminal of the IFC. Technician should read 24VAC from W1 to B/C. The seven segment LED will read: .
  - Ht = S8X1
  - Ht l = S8X2
2. The IFC performs a self-check routine and then confirms:
  - a. Flame roll-out switches (FRS) 1 & 2, main thermal limit (TCO), and any reverse air flow (RAF) switches are closed by sending 24VAC out the HLO terminal and monitoring the HLI input.
  - b. Pressure switch 1 (PS1) and pressure switch 2 (PS2–S8X2 only) are opened by sending 24VAC out the HLO terminal, through the limit switches, and monitoring the PS1 (3) and PS2 (7) inputs.

**Note:** If a thermal limit is open, 24VAC will not be present at either pressure switch.
3. After steps a & b are confirmed, the inducer relay is closed, energizing the inducer motor.
4. As the inducer ramps up, PS1 will close.

**Note:** S8X2 units will start the inducer motor on high speed for approximately 6 seconds, then switch to low speed. If PS1 does not close within 60 seconds, the control will report a E3. l error and increase the inducer to high speed in an attempt to close PS1.

5. When PS1 closes, the ignitor relay on the IFC will close. The ignitor is energized. The ignitor warm up is approximately 17 seconds.
6. After the ignitor warm up, the 1<sup>st</sup> stage gas valve relay is closed, which energizes the 1<sup>st</sup> stage gas valve solenoid to allow ignition.

7. The first burner will ignite, and flame will crossover to the remaining burners establishing current to the flame sensor. Flame sensing must be established within 4 seconds.

**Note:** There are two flame sense pads located on the IFC marked as "FP". To measure the flame current, use a VOM set to DC volts. 1VDC = 1 micro-amp. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3 VDC).

8. Once the flame sense has been established, a timer on the IFC starts and the indoor blower will energize at 1<sup>st</sup> stage speed after the blower "Heat On Delay" has completed. The seven-segment LED for example will alternately read:
  - Ht = Gas heating = S8X1
  - Ht l = Gas heating, stage 1 = S8X2
  - tP3= Tap 3
9. When the temperature raises enough to satisfy the thermostat setting, contacts R-W1 will open.
10. The gas valve relay will open, closing the gas valve. The inducer will continue to run for approximately 5 seconds to remove any combustion byproducts from inside the furnace.
11. The indoor blower continues to run to remove heat from the heat exchangers. The "blower off" time is field adjustable through the IFC menu setup option. The seven-segment LED will read "i dL" = Idle, no thermostat demand.

## 2<sup>nd</sup> Stage Gas Heating (S8X2 Only)

1. See sequence of operation for 1<sup>st</sup> stage gas heating operation above (steps 1–7)

**Note:** 2<sup>nd</sup> stage heating cannot operate without 1<sup>st</sup> stage operation.

2. R-W2 contacts close on the thermostat sending 24VAC from to the W2 low voltage terminal of the IFC. Technician should read 24VAC from W2 to B/C. The seven-segment LED will read Ht2.
3. The IFC checks to ensure that PS2 is open, and then energizes the 2<sup>nd</sup> stage inducer relay. The inducer is energized on high speed, and the second stage gas valve relay on the IFC closes, energizing second stage gas valve. The indoor blower motor will ramp up to the 2<sup>nd</sup> stage gas heating speed. The seven-segment LED for example will alternately read:
  - Ht2 = Gas heating = stage 2
  - tP5= Tap 5
4. The IFC monitors PS2 for closure and if PS2 does not close within 45 seconds, a PS2 open error will be declared and the furnace will operate in 1<sup>st</sup> stage. If PS2 closes, 2<sup>nd</sup> stage gas heating will continue until the thermostat R-W2 contacts open.

**Note:** If PS2 does not close within the 45 seconds, the IFC will wait 10 minutes and repeat steps 3 & 4. If on the third attempt during the same heating call, PS2 does not close within the 45 second proving time, the unit will run in 1<sup>st</sup> stage until the thermostat R-W2 contacts open.

5. When the temperature raises enough to satisfy the thermostat setting, contacts R-W2 will open, the 2<sup>nd</sup> stage gas valve will close, the indoor blower motor will ramp down to 1<sup>st</sup> stage, and the unit will continue to run until R-W1 contacts open.
6. When the temperature raises enough to satisfy the thermostat setting, contacts R-W1 will open.
7. The gas valve relay will open, closing the gas valve. The inducer will continue to run for approximately 5 seconds to remove any combustion byproducts from inside the furnace.
8. The indoor blower continues to run to remove heat from the heat exchangers. This blower off time is field adjustable through the IFC menu setup option. The seven-segment LED will read *ldL* = Idle, no thermostat demand.

### Single Stage Cooling

1. R-Y1-G contacts on the thermostat close sending 24VAC to the Y1 and G low voltage terminals on the IFC. Technician should read 24VAC between Y1-B/C and between G-B/C.

**Note:** For S8X2 units, the factory supplied Y1-O jumper must remain in place for proper seven-segment LED readout, and furnace operation. If removed, the seven-segment LED will read "HP 1".

2. 24VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the cooling airflow. The seven-segment LED for example will alternately read:
  - *LL 1* = Cooling, Stage 1 (S8X2)
  - *LP 1* = Cooling, Stage 1 (S8X1)
  - *LP3* = Tap 3
4. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y-G will open.
5. The OD unit shuts off and the indoor blower shuts off, unless a blower "Cool Off Delay" has been enabled in the IFC setup menu options. The seven-segment LED will read "*ldL*" = Idle, no thermostat demand.

### Two Stage Cooling

1. See sequence of operation for Single stage cooling operation above (steps 1–3)
2. R-Y2 contact on the thermostat close sending 24VAC to Y2 low voltage terminal on the IFC. Technician should read 24VAC between Y2 and B/C.
3. 24VAC is sent to the OD unit via thermostat wiring.
4. The indoor airflow ramps to 2<sup>nd</sup> stage airflow. The seven-segment LED for example will read:

- *LL 2* = Cooling, Stage 2 (S8X2)
  - *LP 2* = Cooling, Stage 2 (S8X1)
  - *LP7* = Tap 7
5. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y1-Y2-G will open.
  6. The OD unit shuts off and the indoor blower shuts off, unless a blower "Cool Off Delay" has been enabled in the IFC setup menu options. The seven-segment LED will read *ldL* = Idle, no thermostat demand.

### Single Stage Heat Pump

1. R-Y1-G contacts on the thermostat close sending 24VAC to the Y1 and G low voltage terminals on the IFC. Technician should read 24VAC between Y1-B/C and between G-B/C.

**Note:** For S8X2 units, the factory supplied Y1-O jumper must be removed for proper seven-segment LED readout and furnace operation. If left in place, the seven-segment LED will read *LL 1*

2. 24 VAC is sent to the OD unit via thermostat wiring.
3. The indoor blower ramps to the cooling airflow. The seven-segment LED for example will alternately read:
  - *HP 1* = Cooling, Stage 1 (S8X2)
  - *LP 1* = Cooling, Stage 1 (S8X1)
  - *LP3* = Tap 3
4. When the temperature is lowered enough to satisfy the thermostat setting, contacts R-Y-G will open.
5. The OD unit shuts off and the indoor blower shuts off, unless a "Cool Off Delay" has been enabled in the IFC setup menu options. The seven-segment LED will read *ldL* = Idle, no thermostat demand.

### Two Stage Heat Pump

1. See sequence of operation for single stage cooling operations above (steps 1–3).
2. R-Y2 contact on the thermostat close sending 24VAC to Y2 low voltage terminal on the IFC. Technician should read 24VAC between Y2 and B/C.
3. 24VAC is sent to the OD unit via thermostat wiring.
4. The indoor airflow ramps to 2<sup>nd</sup> stage airflow. The seven-segment LED for example will read:
  - *HP 2* = Cooling, Stage 2 (S8X2)
  - *LP 2* = Cooling, Stage 2 (S8X1)
  - *LP7* = Tap 7
5. When the temperature is raised enough to satisfy the thermostat setting, contacts R-Y1-Y2-G will open.
6. The OD unit shuts off and the indoor blower shuts off, unless a "Blower Off Delay" has been enabled in the IFC setup menu options. The seven-segment LED will read *ldL* = Idle, no thermostat demand.

# Periodic Servicing Requirements

1. GENERAL INSPECTION – *Examine the furnace installation annually for the following items:*
  - a. All flue product carrying areas external to the Furnace (i.e. chimney, vent connector) are clear and free of obstruction. A vent screen in the end of the Vent (flue) Pipe must be inspected for blockage annually, if applicable.
  - b. The vent connector is in place, slopes upward and is physically sound without holes or excessive corrosion.
  - c. The return air duct connection(s) is physically sound, is sealed to the Furnace and terminates outside the space containing the Furnace.
  - d. The physical support of the Furnace should be sound without sagging, cracks, gaps, etc., around the base so as to provide a seal between the support and the base.
2. FILTERS – Filters should be cleaned or replaced (with high velocity filters only), monthly and more frequently during high use times of the year such as midsummer or midwinter.
3. BLOWERS – The Blower size and speed determine the air volume delivered by the Furnace. The Blower motor bearings are factory lubricated and under normal operating conditions do not require servicing. Annual cleaning of the Blower wheel and housing is recommended for maximum air output, and this must be performed only by a qualified servicer or service agency.
4. IGNITER – This unit has a special hot surface direct ignition device that automatically lights the burners. Please note that it is very fragile and should be handled with care. ! CAUTION Do NOT touch igniter. It is extremely hot.
5. BURNER – Gas burners do not normally require scheduled servicing, however, accumulation of foreign material may cause a yellowing flame or delayed ignition. Either condition indicates that a service call is required. For best operation, burners must be cleaned annually using brushes and vacuum cleaner. Turn off gas and electric power supply. To clean burners, remove burner bottom plate (2 screws) and bottom burner bracket (2 screws). Twist burner towards slot, lift, and push forward away from orifice. Remove burners.

Alternate method — Remove manifold assembly, bottom burner plate, and bottom burner bracket. Remove burners.

**Note:** Be careful NOT to break igniter when removing burners.

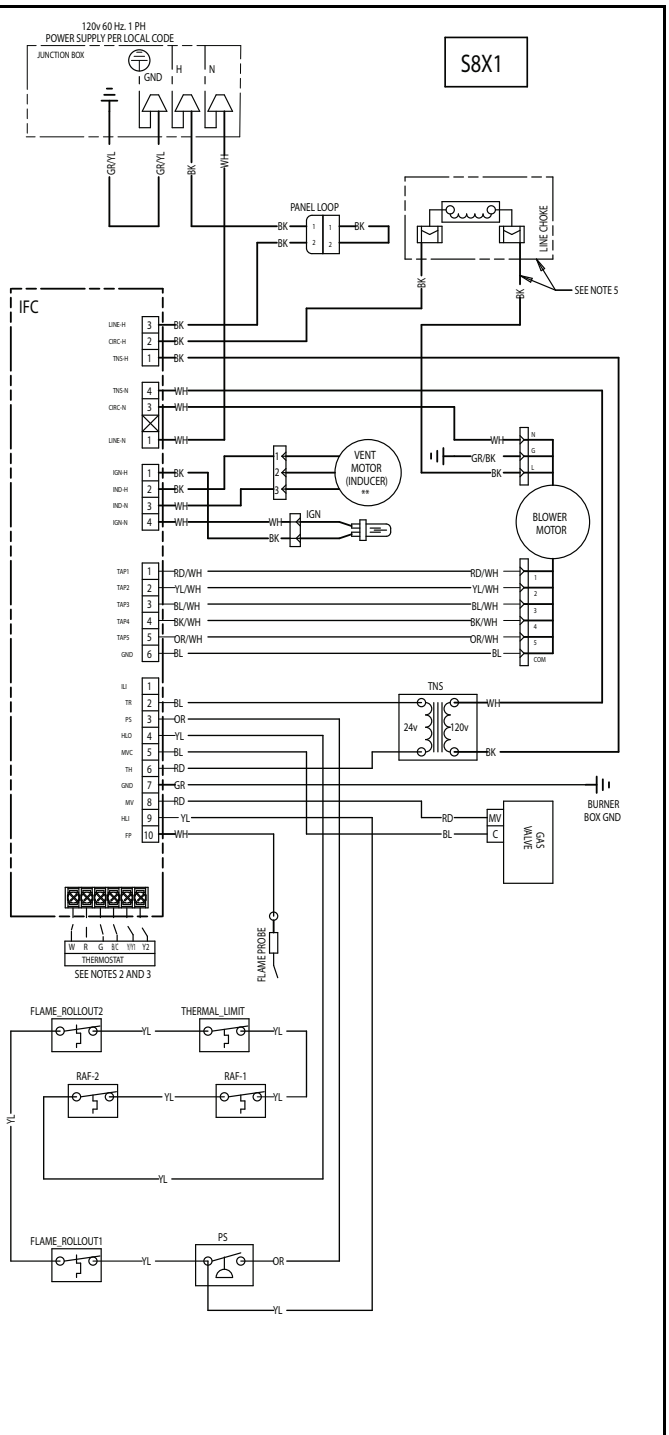
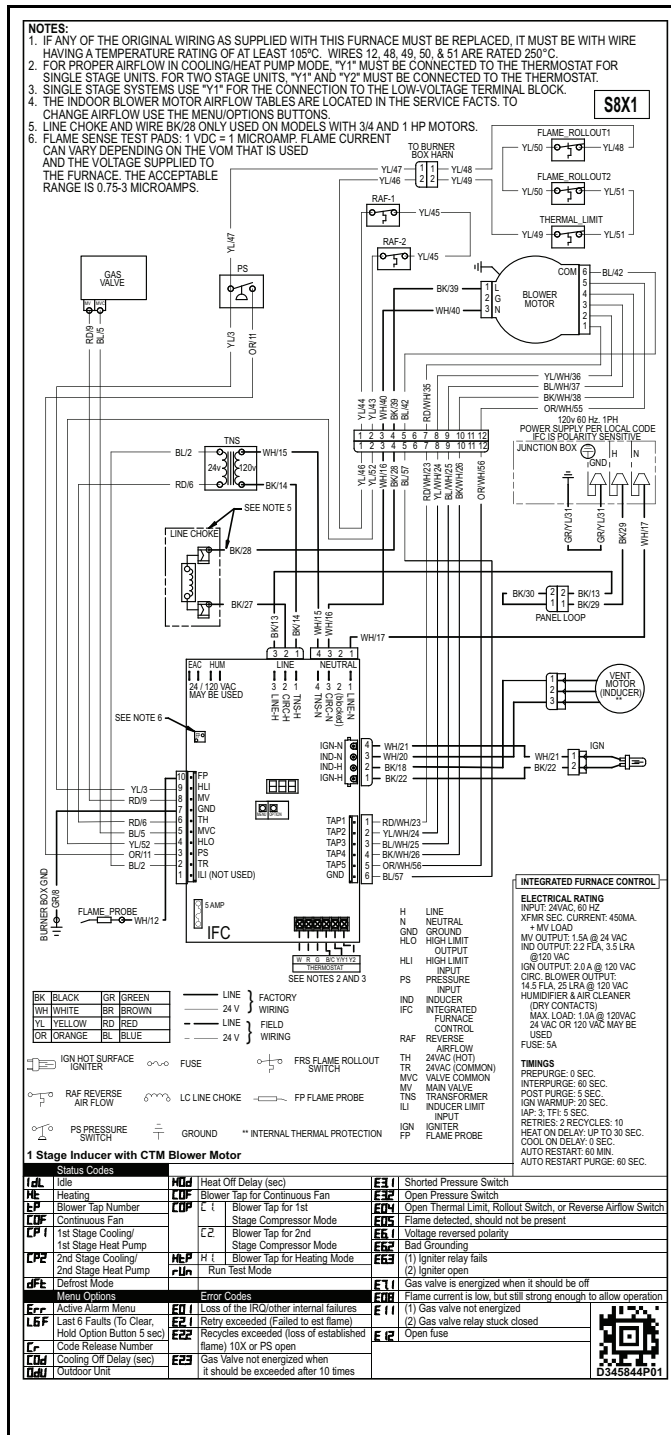
Clean burners with brush and/ or vacuum cleaner. Reassemble parts by reversal of the above procedure.

**Note:** Natural gas units should not have any yellow tipped flames. This condition indicates that a service call is required. For best operation, burners must be cleaned annually using brushes and vacuum cleaner

**Note:** On Propane units, due to variations in BTU content and altitude, servicing may be required at shorter intervals.

6. HEAT EXCHANGER/ FLUE PIPE – These items must be inspected for signs of corrosion, and/ or deterioration at the beginning of each heating season by a qualified service technician and cleaned annually for best operation. To clean flue gas passages, follow recommendations below:
  - a. Turn off gas and electric power supply.
  - b. Inspect flue pipe exterior for cracks, leaks, holes or leaky joints. Some discoloration of PVC pipe is normal.
  - c. Remove door from Furnace.
  - d. Inspect around insulation covering flue collector box. Inspect induced draft Blower connections from recuperative cell and to the flue pipe connection.
  - e. Remove burners. (See 5. Burner)
  - f. Use a mirror and flashlight to inspect interior of Heat Exchanger, be careful not to damage the Igniter, Flame Sensor or other components.
  - g. If any corrosion is present, the Heat Exchanger should be cleaned by a qualified service technician.
  - h. After inspection is complete replace burners and Furnace door.
  - i. Restore gas supply. Check for leaks using a soap solution. Restore electrical supply. Check unit for normal operation.
7. COOLING COIL CONDENSATE DRAIN - If a cooling coil is installed with the Furnace, condensate drains should be checked and cleaned periodically to assure that condensate can drain freely from coil to drain. If condensate cannot drain freely water damage could occur. (See Condensate Drain in Installer's Guide.)

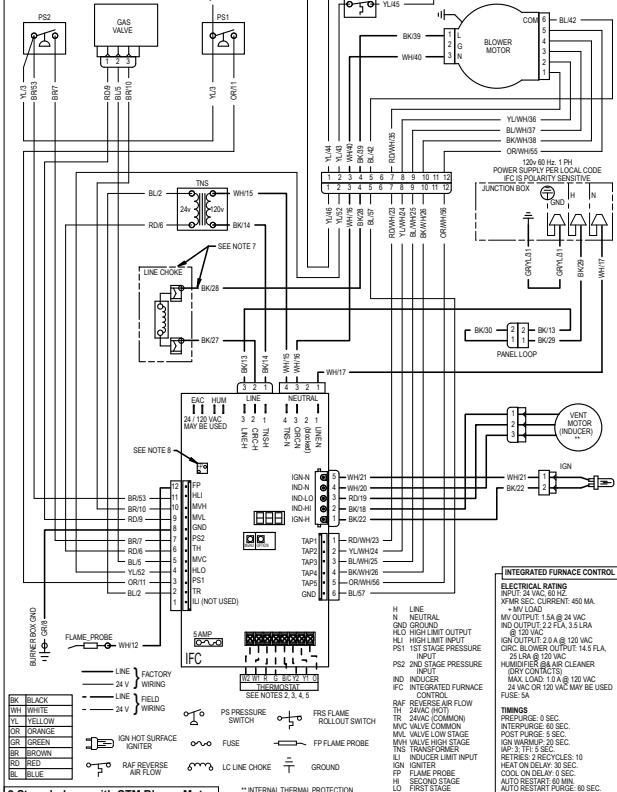
# Wiring Diagrams



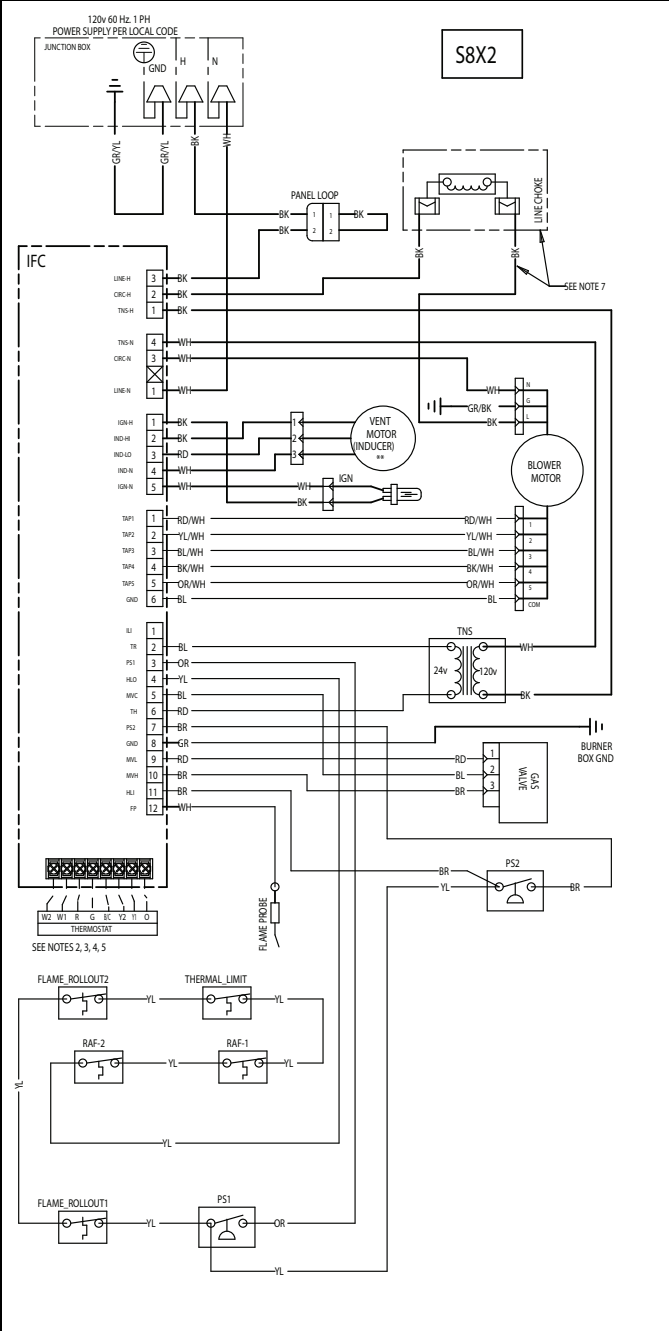
# Wiring Diagrams

## NOTES:

- IF ANY OF THE ORIGINAL WIRING AS SUPPLIED WITH THIS FURNACE MUST BE REPLACED, IT MUST BE WITH WIRE HAVING A TEMPERATURE RATING OF AT LEAST 105°C. WIRES 12, 48, 50, & 51 ARE RATED 250°C.
- FOR PROPER AIRFLOW IN COOLING/HEAT PUMP MODE, "Y1" MUST BE CONNECTED TO THE THERMOSTAT FOR SINGLE STAGE UNITS. FOR TWO STAGE UNITS, "Y1" AND "Y2" MUST BE CONNECTED TO THE THERMOSTAT.
- FOR SINGLE STAGE THERMOSTATS, JUMPER "W1" AND "W2" TERMINALS. SECOND STAGE HEATING WILL BE ENERGIZED ONCE THE INTER-STAGE DELAY HAS EXPIRED. "HT2" WILL BE SHOWN ON SEVEN SEGMENT DISPLAY AT ALL TIMES.
- FOR HEAT PUMP SYSTEMS, "Y1" AND "Y2" TERMINALS MUST BE CONNECTED TO THE ROOM THERMOSTAT. FOR TWO STAGE UNITS, "Y1", "Y2", AND "O" TERMINALS MUST ALL BE CONNECTED TO THE ROOM THERMOSTAT.
- FOR TWO STAGE SYSTEMS, USE "Y1" FOR LOW SPEED AND "Y2" FOR HIGH SPEED CONNECTION TO THE LOW-VOLTAGE TERMINAL BLOCK. SINGLE STAGE SYSTEMS USE "Y1" FOR THE CONNECTION TO THE LOW-VOLTAGE TERMINAL BLOCK.
- THE INDOOR BLOWER MOTOR AIRFLOW TABLES ARE LOCATED IN THE SERVICE FACTS. TO CHANGE AIRFLOW USE THE MENU/OPTIONS BUTTONS.
- LINE CHOKES AND WIRE BK28 ONLY USED ON MODELS WITH 3/4 AND 1 HP MOTORS.
- FLAME SENSE TEST PADS:
- 1 VDC = 1 MICROAMP. FLAME CURRENT CAN VARY DEPENDING ON THE VOM THAT IS USED AND THE VOLTAGE SUPPLIED TO THE FURNACE. THE ACCEPTABLE RANGE IS 0.75-3 MICROAMPS.



2 Stage Inducer with CTM Blower Motor	
<b>Sts</b>	Inter-Stage Delay (sec)
<b>1d1</b>	Blower Tap for Continuous Fan
<b>1d2</b>	Blower Tap for 1st Stage Compressor Mode
<b>1d3</b>	Blower Tap for 2nd Stage Compressor Mode
<b>1d4</b>	Blower Tap for 1st Stage Heating
<b>1d5</b>	Blower Tap for 2nd Stage Heating
<b>1d6</b>	Run test Mode
<b>1d7</b>	Loss of the RC/other internal failures
<b>1d8</b>	Retry exceeded (Failed to est flame)
<b>1d9</b>	Recycles exceeded (loss of established flame) or 10x PS1 open
<b>1d10</b>	1st Stage Gas Valve not energized when it should be exceeded after 10 times
<b>1d11</b>	Shorted Pressure Switch, 1st Stage
<b>1d12</b>	Open Pressure Switch, 1st Stage
<b>1d13</b>	Shorted Pressure Switch, 2nd Stage
<b>1d14</b>	Open Pressure Switch, 2nd Stage
<b>1d15</b>	Open Thermal Limit, Rollout Switch, or Reverse Airflow Switch
<b>1d16</b>	Flame detected, should not be present
<b>1d17</b>	Voltage reversed polarity
<b>1d18</b>	Bad Grounding
<b>1d19</b>	(1) Igniter relay fails
<b>1d20</b>	(2) Igniter open
<b>1d21</b>	1st stage gas valve (MVL) is energized when it should be off
<b>1d22</b>	Flame current is low, but still strong enough to allow operation.
<b>1d23</b>	Open Inducer Limit Switch or Condensate Switch
<b>1d24</b>	(1) 1st stage gas valve not energized when it should be
<b>1d25</b>	(2) 1st stage gas valve relay stuck closed
<b>1d26</b>	(3) 2nd stage gas valve relay stuck closed
<b>1d27</b>	(4) 2nd stage gas valve energized when it should not be
<b>1d28</b>	(5) 2nd stage gas valve not energized when it should be
<b>1d29</b>	Open fuse





# Airflow tables

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1A026M2PSAA</b>	1	559	36	—	—	—
	2	646	266	—	—	—
	3	687	369	50	—	—
	4	755	466	177	—	—
	5	971	755	539	323	106
	6	1024	843	662	481	299
	7	1057	908	758	609	460
	8	1139	999	859	719	579
	9	1275	1152	1028	904	781

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1A040M3PSAA S8X2A040M3PSAA</b>	1	580	34	—	—	—
	2	716	471	226	—	—
	3	743	533	323	113	—
	4	929	742	556	370	183
	5	988	831	675	518	361
	6	1112	975	839	702	566
	7	1174	1046	917	788	659
	8	1280	1164	1049	933	817
	9	1558	1475	1392	1309	1226

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1B040M2PSAA</b>	1	582	—	—	—	—
	2	815	546	277	8	—
	3	872	639	406	172	—
	4	1001	809	617	424	232
	5	1022	838	654	470	286
	6	1075	917	759	601	442
	7	1132	988	844	700	557
	8	1186	1055	925	795	664
	9	1325	1211	1097	983	869

## Airflow tables

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1B060M3PSAA</b> <b>S8X2B060M3PSAA</b>	1	629	67	—	—	—
	2	987	795	603	411	219
	3	1184	1042	901	759	618
	4	1244	1109	973	837	701
	5	1366	1244	1123	1001	880
	6	1398	1283	1168	1053	938
	7	1479	1374	1270	1165	1061
	8	1547	1447	1348	1248	1148
	9	1634	1541	1449	1357	1264

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1B060M4PSAA</b> <b>S8X2B060M4PSAA</b>	1	707	225	—	—	—
	2	870	617	363	110	—
	3	1073	895	716	538	360
	4	1264	1126	988	850	713
	5	1384	1260	1137	1013	890
	6	1422	1304	1186	1069	951
	7	1555	1452	1348	1244	1141
	8	1658	1559	1460	1361	1262
	9	2047	1971	1895	1818	1743

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1B080M4PSAA</b> <b>S8X2B080M4PSAA</b>	1	633	297	—	—	—
	2	957	800	719	428	213
	3	1220	1080	940	800	660
	4	1403	1298	1192	1087	981
	5	1524	1428	1336	1248	1164
	6	1684	1574	1544	1401	1337
	7	1700	1625	1551	1476	1401
	8	1858	1790	1723	1656	1589
	9	1967	1898	1829	1760	1691

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1C080M5PSAA</b> <b>S8X2C080M5PSAA</b>	1	908	346	—	—	—
	2	964	583	202	—	—
	3	1518	1323	1129	934	740
	4	1638	1455	1271	1087	904
	5	1798	1636	1475	1313	1152
	6	1911	1761	1611	1461	1310
	7	1993	1850	1708	1565	1423
	8	2214	2091	1969	1846	1723
	9	2652	2551	2450	2348	2247

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1C100M5PSAA</b> <b>S8X2C100M5PSAA</b>	1	918	438	—	—	—
	2	1183	950	716	483	249
	3	1709	1546	1383	1220	1057
	4	1771	1676	1581	1486	1391
	5	1931	1793	1656	1518	1380
	6	2028	1898	1768	1638	1508
	7	2177	2057	1938	1818	1699
	8	2351	2246	2141	2036	1931
	9	2609	2522	2434	2347	2260

Furnace Airflow (CFM) Vs. External Static Pressure (in. W.C.)						
Model	Tap	0.1	0.3	0.5	0.7	0.9
<b>S8X1D120M5PSAA</b> <b>S8X2D120M5PSAA</b>	1	857	416	—	—	—
	2	1282	1043	804	565	326
	3	1596	1426	1255	1085	915
	4	1946	1810	1673	1537	1400
	5	2094	1970	1845	1721	1596
	6	2212	2096	1980	1864	1748
	7	2359	2249	2140	2030	1921
	8	2508	2405	2302	2199	2096
	9	2639	2542	2444	2346	2249

# CFM Versus Temperature Rise

**S8X1 Furnaces have one stage heating**

**S8X2 Furnaces have two stage heating. First Stage is Low heating and Second Stage is High heating.**

**Table 1. S8X1**

Model	CFM Versus Temperature Rise																				
	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
S8X1A026M2PSAA	48	39	32																		
S8X1A040M3PSAA		59	49	42	37	33	30	27													
S8X1B040M2PSAA		59	49	42	37	33	30	27													
S8X1B060M3PSAA					56	49	44	40	37	34	32										
S8X1B060M4PSAA					56	49	44	40	37	34	32										
S8X1B080M4PSAA							59	54	49	46	42	40	37	35	33						
S8X1C080M4PSAA							59	54	49	46	42	40	37	35	33						
S8X1C100M5PSAA										57	53	49	46	44	41	39	37	35	34	32	31
S8X1D120M5PSAA												59	56	52	49	47	44	42	40	39	37

**Table 2. S8X2 – Low Heat**

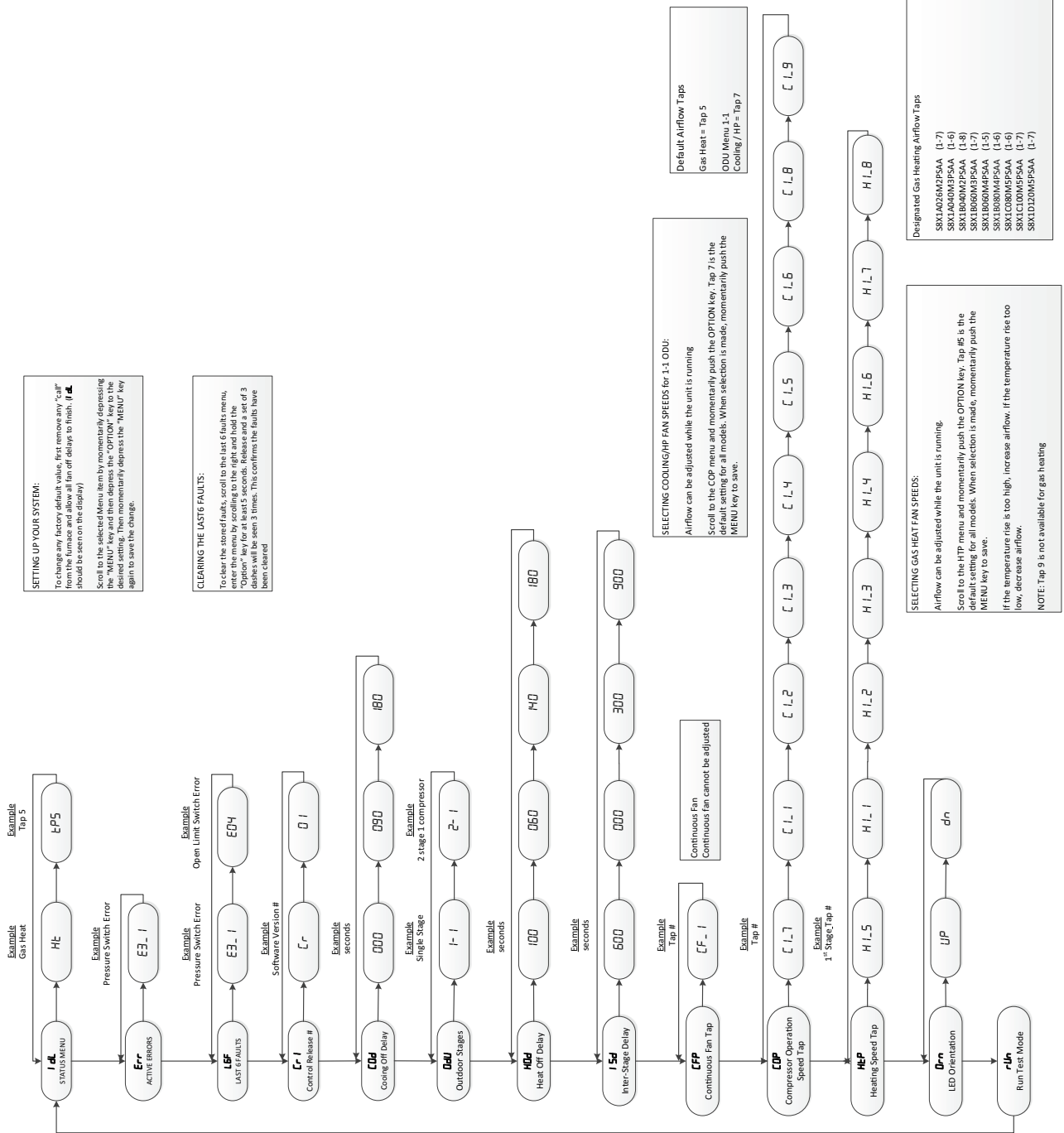
Model	CFM Versus Temperature Rise – First Stage (Low) Heating																				
	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
S8X2A040M3PSAA	48	39	32	28																	
S8X2B060M3PSAA		56	47	40	35	31	28														
S8X2B060M4PSAA		56	47	40	35	31	28														
S8X2B080M4PSAA				55	48	43	39	35	32	30	28										
S8X2C080M5PSAA				55	48	43	39	35	32	30	28										
S8X2C100M5PSAA					60	53	48	44	40	37	34	32	30								
S8X2D120M5PSAA									57	52	48	44	41	39	37	35	33	31			

**Table 3. S8X2 – High Heat**

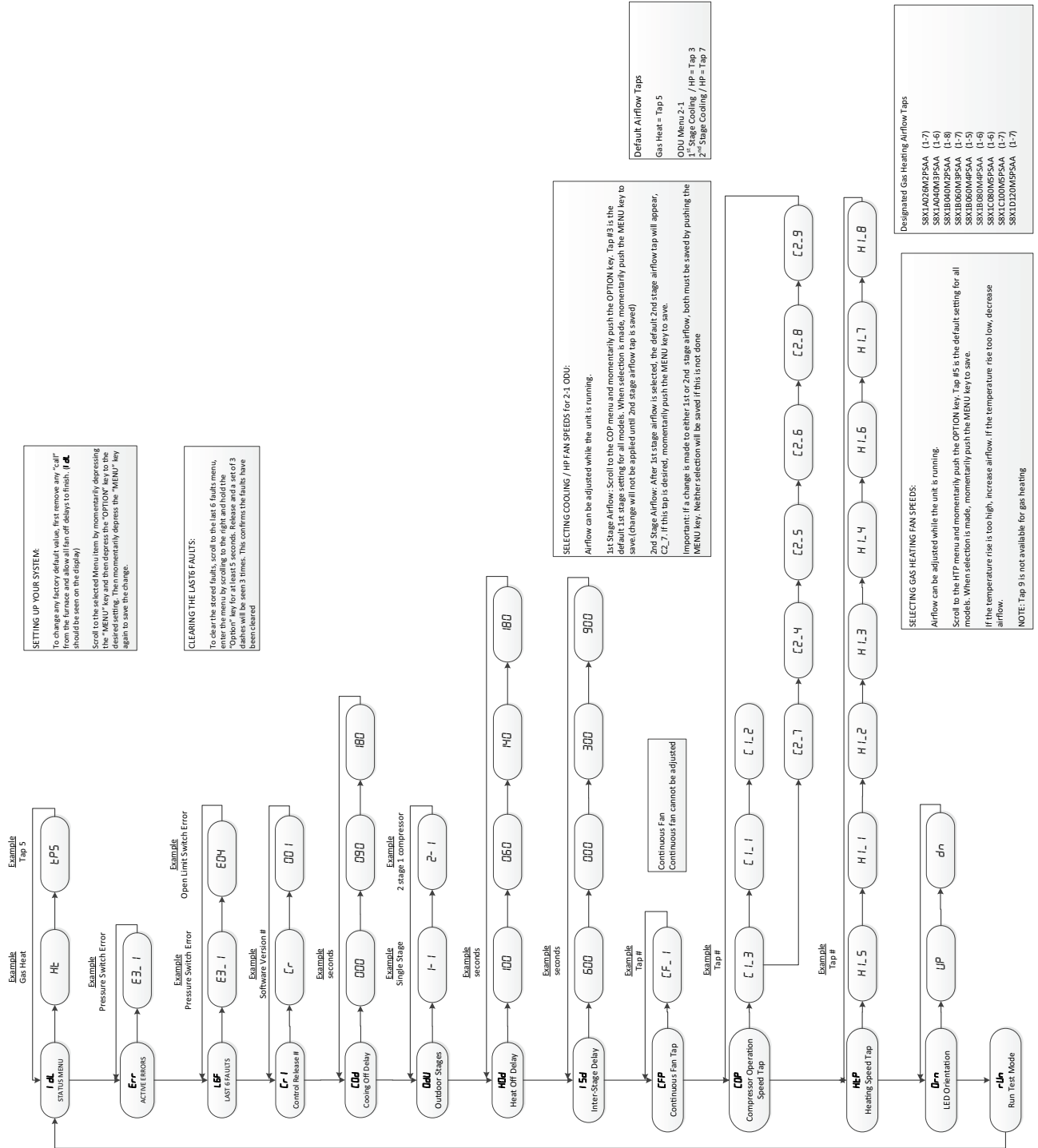
Model	CFM Versus Temperature Rise – Second Stage (High) Heating																				
	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400
S8X2A040M3PSAA		59	49	42	37	33	30	27													
S8X2B060M3PSAA					56	49	44	40	37	34	32										
S8X2B060M4PSAA					56	49	44	40	37	34	32										
S8X2B080M4PSAA							59	54	49	46	42	40	37	35	33						
S8X2C080M4PSAA							59	54	49	46	42	40	37	35	33						
S8X2C100M5PSAA										57	53	49	46	44	41	39	37	35	34	32	31
S8X2D120M5PSAA												59	56	52	49	47	44	42	40	39	37

# Integrated Furnace Control Menu

## S8X1 Control System Menu Single Stage OD

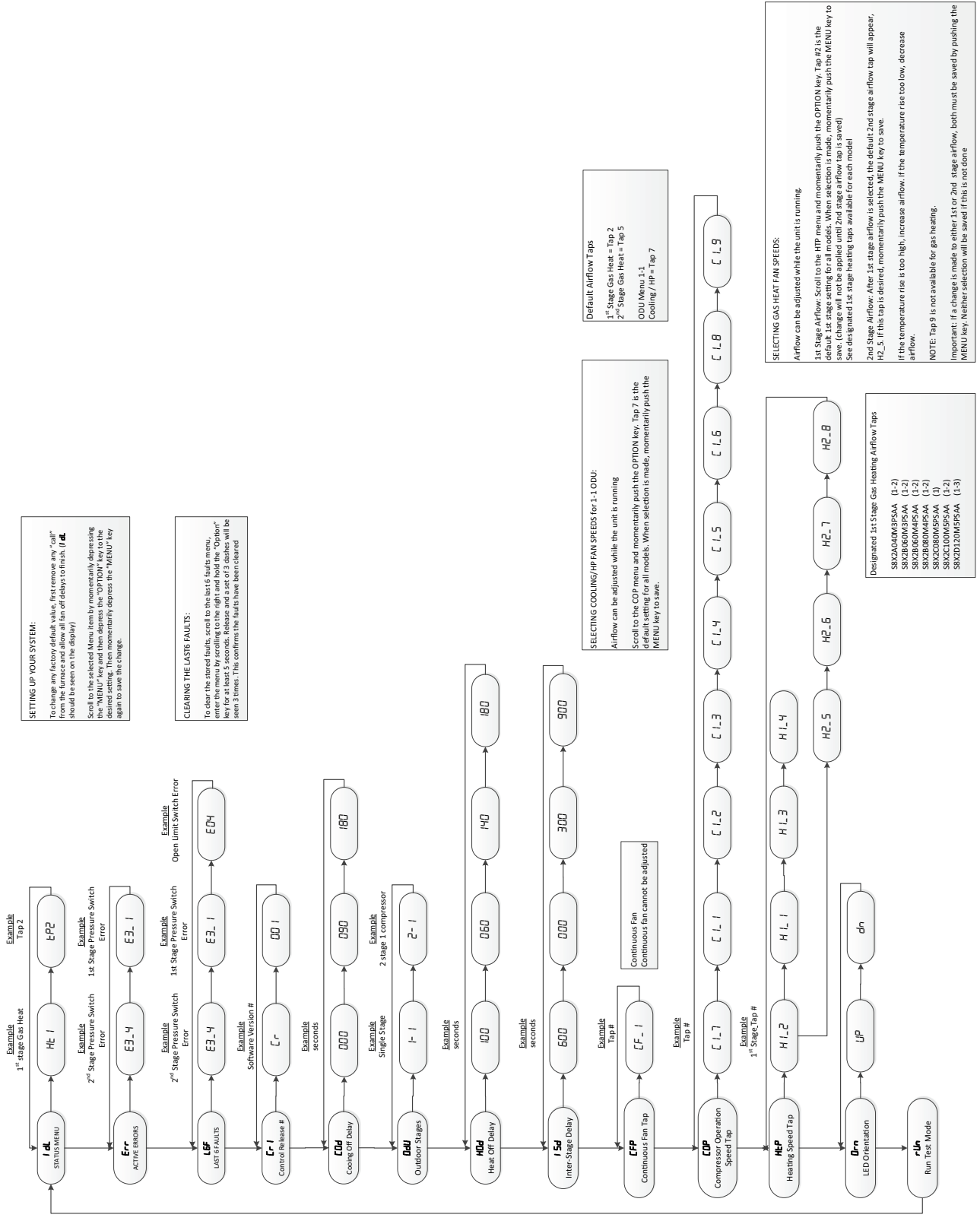


## S8X1 Control System Menu Two Stage OD

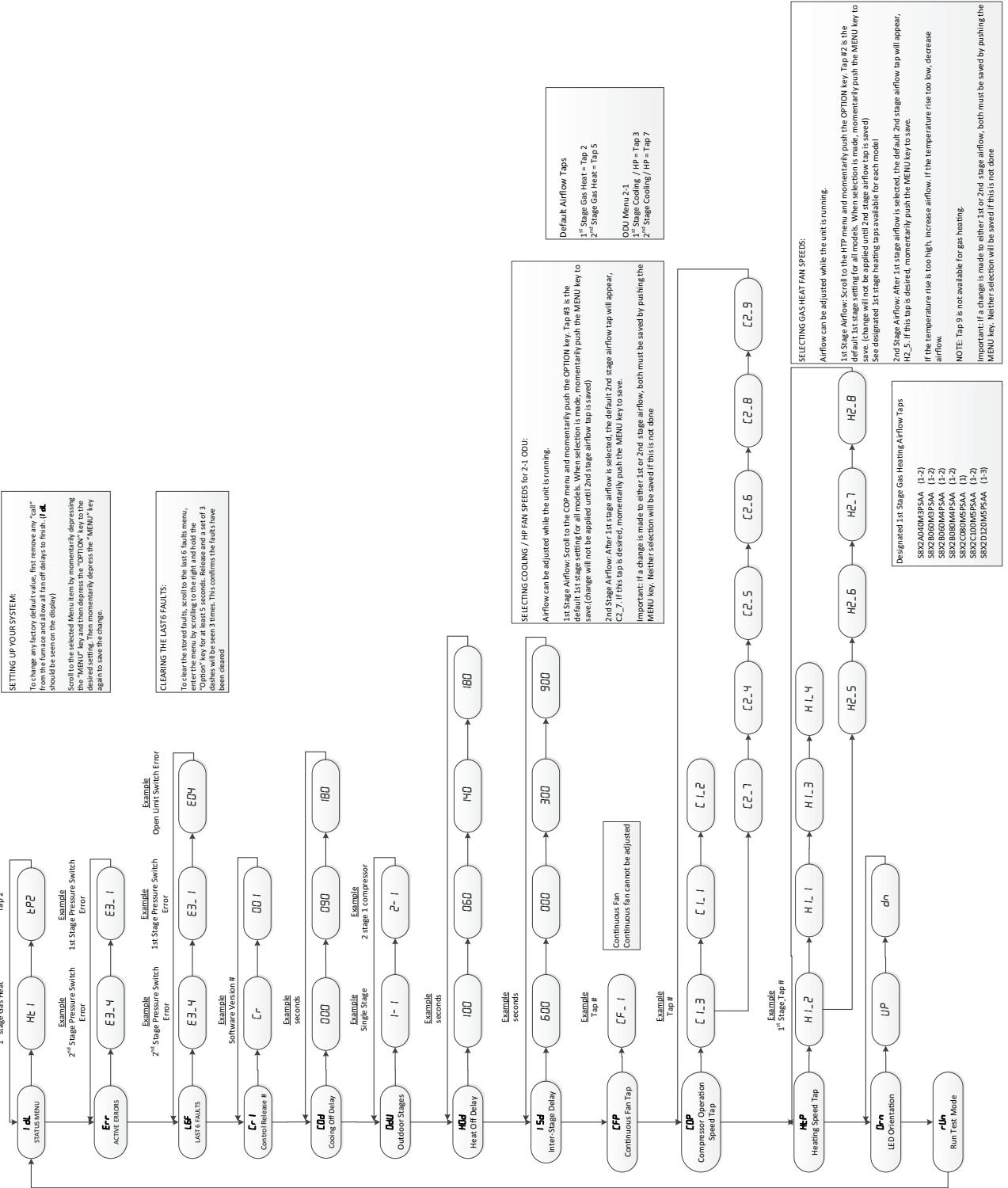




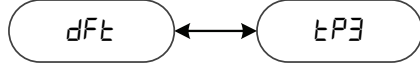
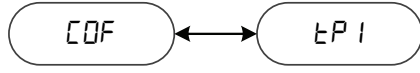
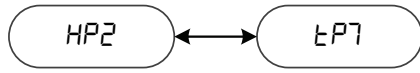
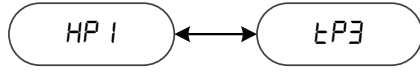
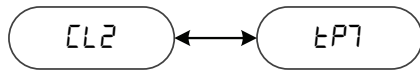
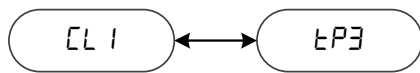
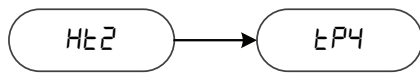
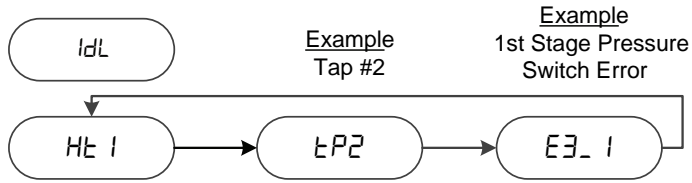
S8X2  
Control System Menu Single Stage OD



## S8X2 Control System Menu Two Stage OD



## S8X1 - S8X2 System Status Menu



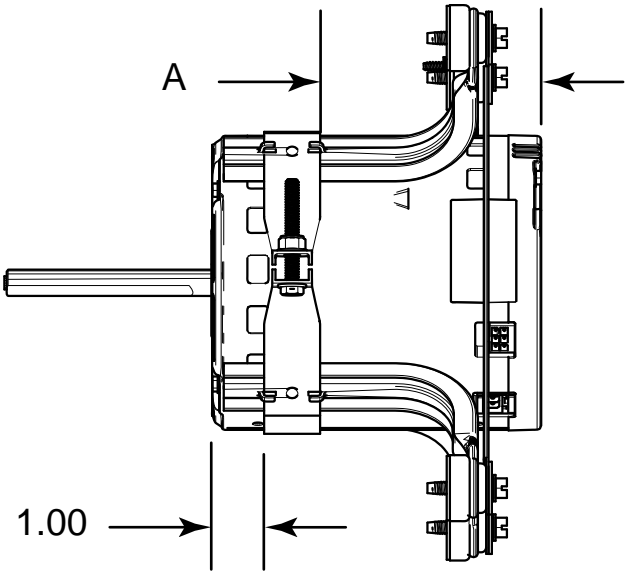
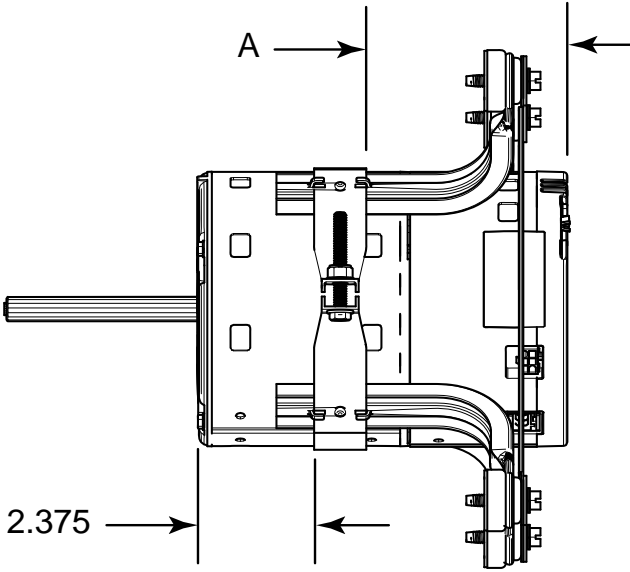
- IdL* = Idle, no demand for cooling, heating, or fan  
*Ht1* = Demand for 1st stage gas heat (*Ht* = S8X1)  
*Ht2* = Demand for 2nd gas heat  
*CL1* = Demand for 1st stage cooling (*CP1* = S8X1)  
*CL2* = Demand for 2nd stage cooling (*CP2* = S8X1)  
*HP1* = Demand for 1st stage gas heat pump (*CP1* = S8X1)  
*HP2* = Demand for 2nd stage heat pump (*CP2* = S8X1)  
*CDF* = Demand for continuous fan  
*dFt* = Demand for outdoor unit defrost, furnace running in gas heat mode  
*tP1-9* = Tap selected for airflow

**Note:**

1. The menu status displayed is solely dependent on the input of 24VAC that is applied to the low voltage terminal strip.
2. The status will alternate between the system mode and the airflow request every 2 seconds.
3. If an error occurs, an E\*. \* will alternately flash with the system mode and airflow request. See first example.

# Belly Band Location

Distance from belly band to the front face of motor for minimum vibration

 <p>Blower housing and wheel removed from view for clarity.</p>	Furnace Model	Dimension "A" (inches)
	A026	3.5 (3-1/2)
	A040	3.75 (3-3/4)
	B040	3.5 (3-1/2)
	B060 3 ton	3.75 (3-3/4)
	B060 4 ton	4.25 (4-1/4)
B080	4.25 (4-1/4)	
 <p>Blower housing and wheel removed from view for clarity.</p>	Furnace Model	Dimension "A" (inches)
	C080	4.125 (4-1/8)
	C100	4.125 (4-1/8)
	D120	4.125 (4-1/8)

# Troubleshooting

The following pages include troubleshooting flowcharts in reference for the 1 Stage S8X1 and 2 Stage S8X2 families of furnaces only.

The information contained is for reference only and does not cover all scenarios or problems that may be encountered.

ONLY qualified technicians should attempt to install, troubleshoot, or repair this appliance.

Failure to follow all cautions and /or warnings could result in personal or property damage, including death.

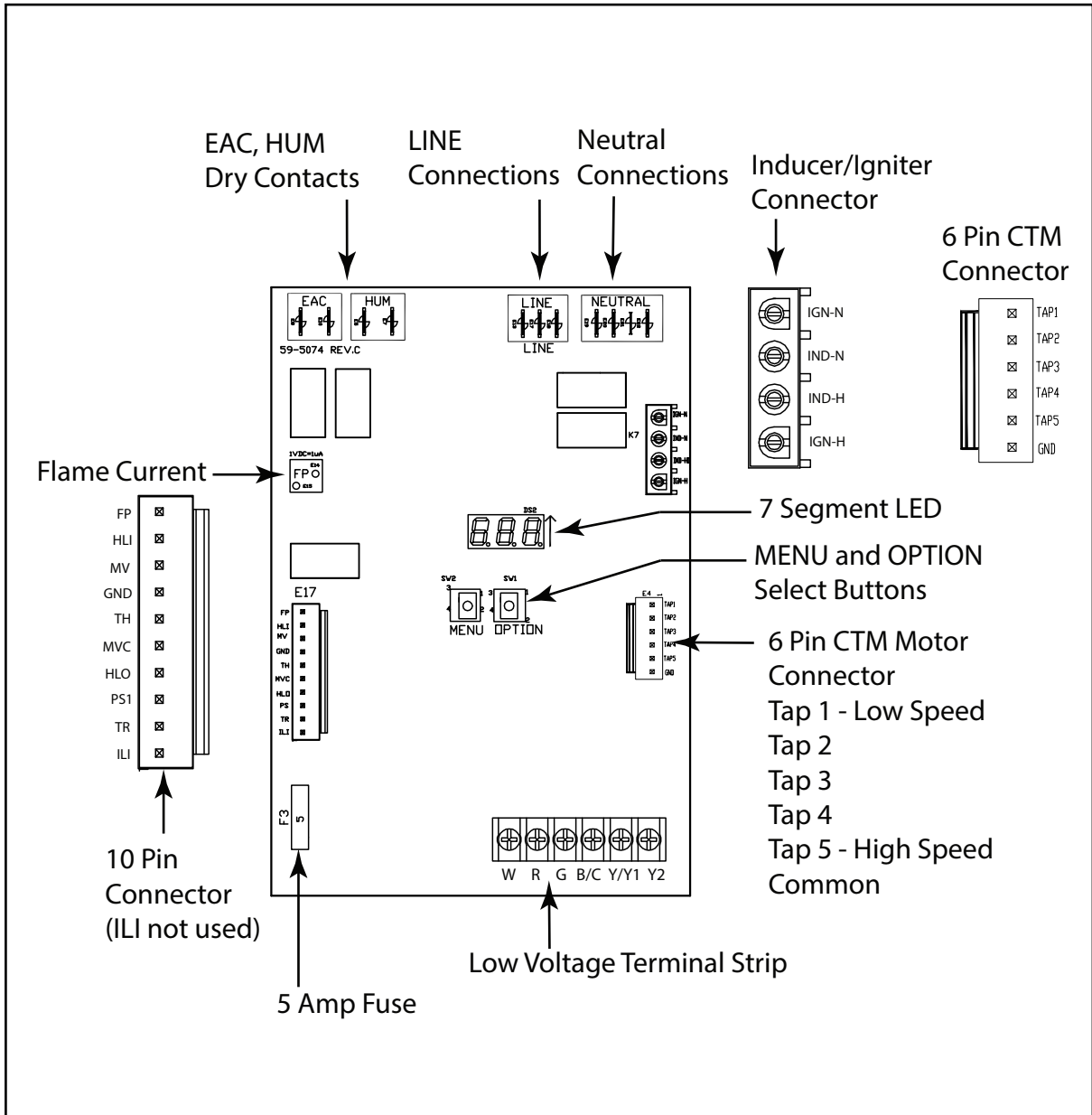
## Troubleshooting Flowchart Index

IFC Component Layout

### Error Codes

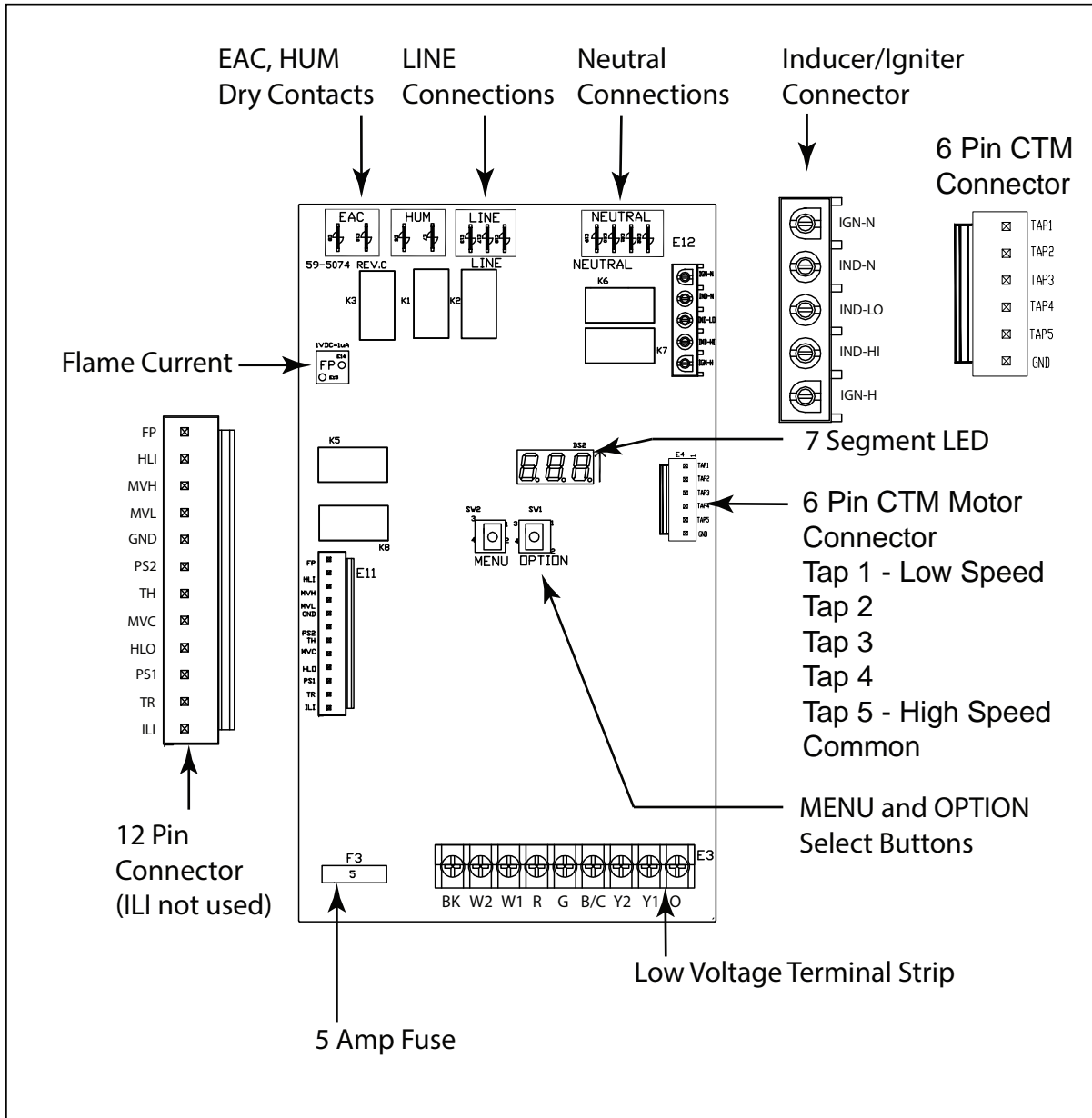
- E01 – Internal failure
- E2.1 – Retries Exceeded (flame never sensed)
- E2.2 – Recycles Exceeded (loss of flame after being sensed)
- E2.3 – 1<sup>st</sup> Stage Gas Valve energized when it should not be (10 times)
- E3.1 – Shorted Pressure Switch, 1<sup>st</sup> Stage
- E3.2 – Open Pressure Switch, 1<sup>st</sup> Stage
- E3.3 – Shorted Pressure Switch, 2<sup>nd</sup> Stage
- E3.4 – Open Pressure Switch, 2<sup>nd</sup> Stage
- E04 – Open Thermal Limit
- E05 – Flame Detected , should not be present
- E6.1 – Reversed Polarity (High Voltage)
- E6.2 – Faulty Ground
- E6.3 – Igniter Circuit
- E07 – 1<sup>st</sup> Stage Gas Valve (MVL) energized when it should not be
- E08 – Flame Current Low, operation allowed
- E11 – See troubleshooting Instructions
- E12 – Open fuse

S8X1 IFC Component Layout

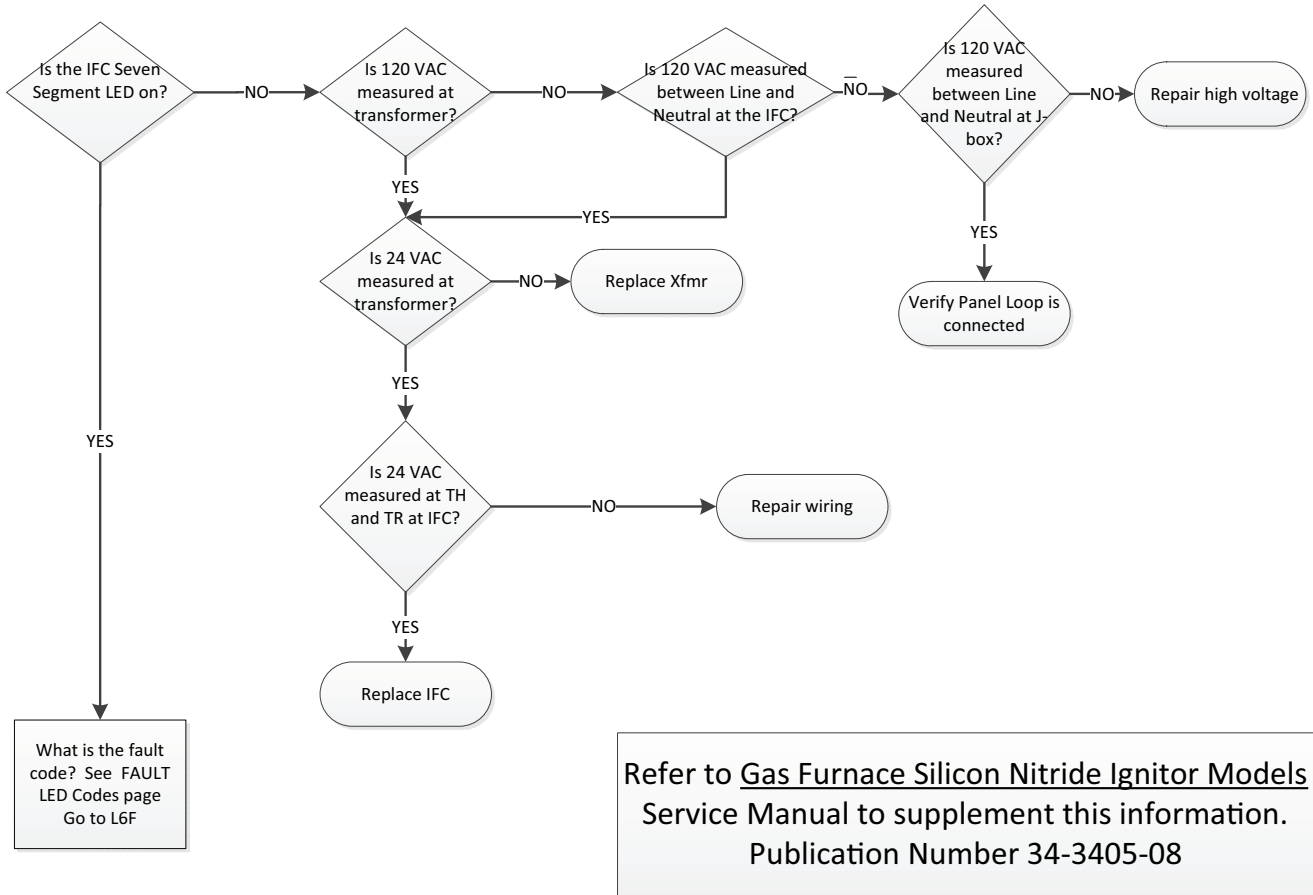




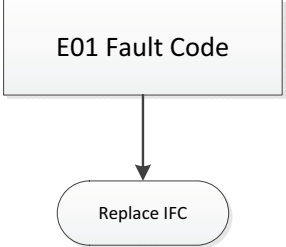
S8X2 IFC Component Layout



GETTING STARTED



DEFINITION :  
Internal Failure of the Control Board

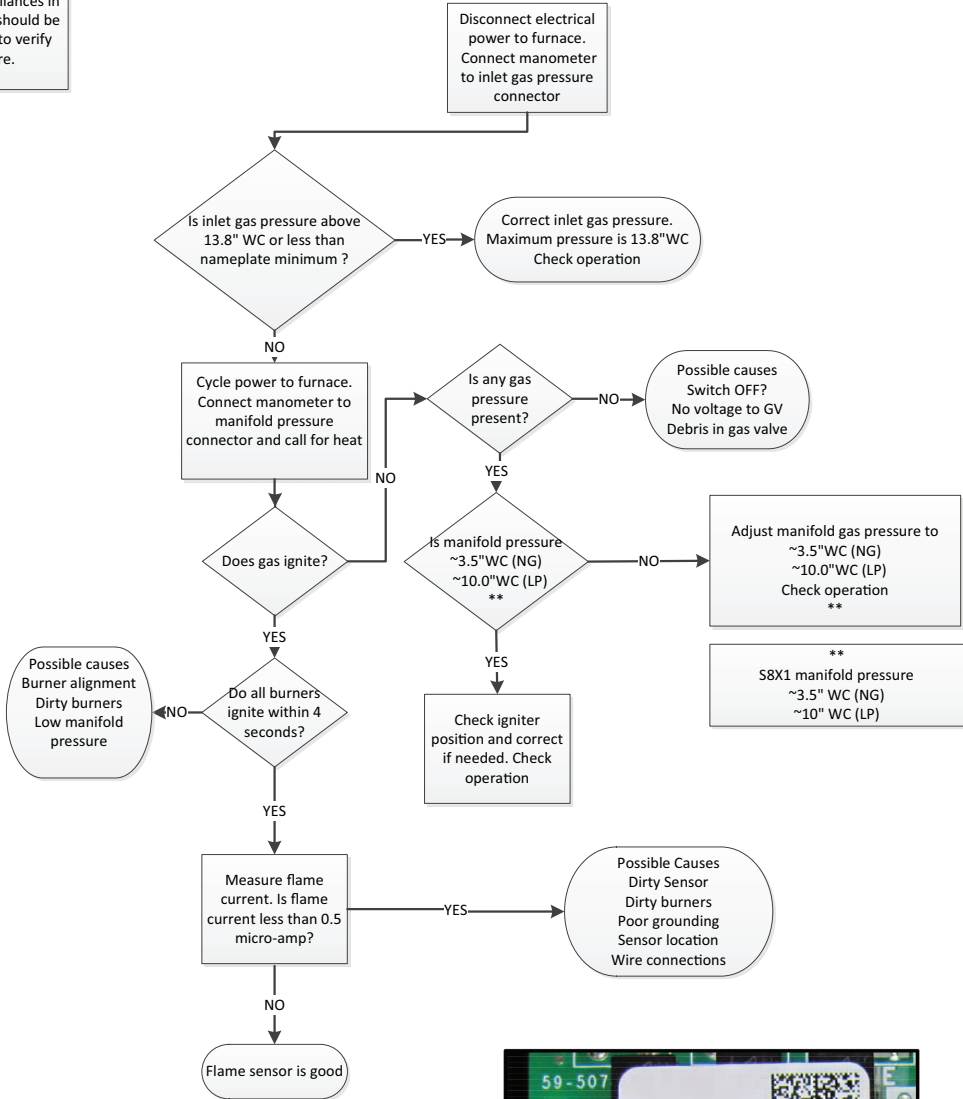


**DEFINITION**  
 RETRY Lock Out = 3 unsuccessful tries for ignition within a single call for heat. Lockout period is for one hour

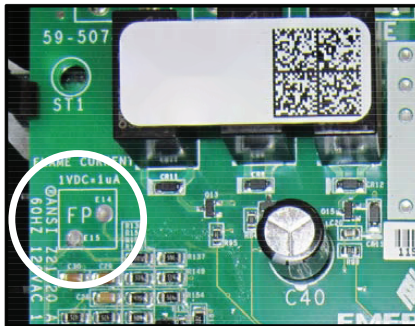
**Flame has never been sensed**

All gas appliances in the home should be turned on to verify gas pressure.

**2.1 Fault Code**



There are two flame sense pads located on the IFC, marked "FP". To measure flame current, use a VOM set to DC volts. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3.0 VDC)

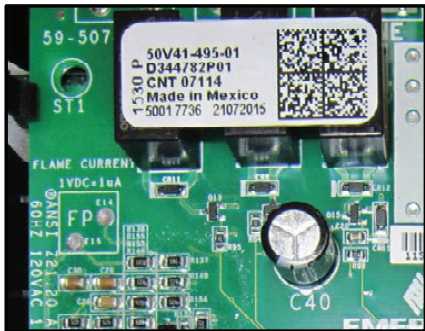
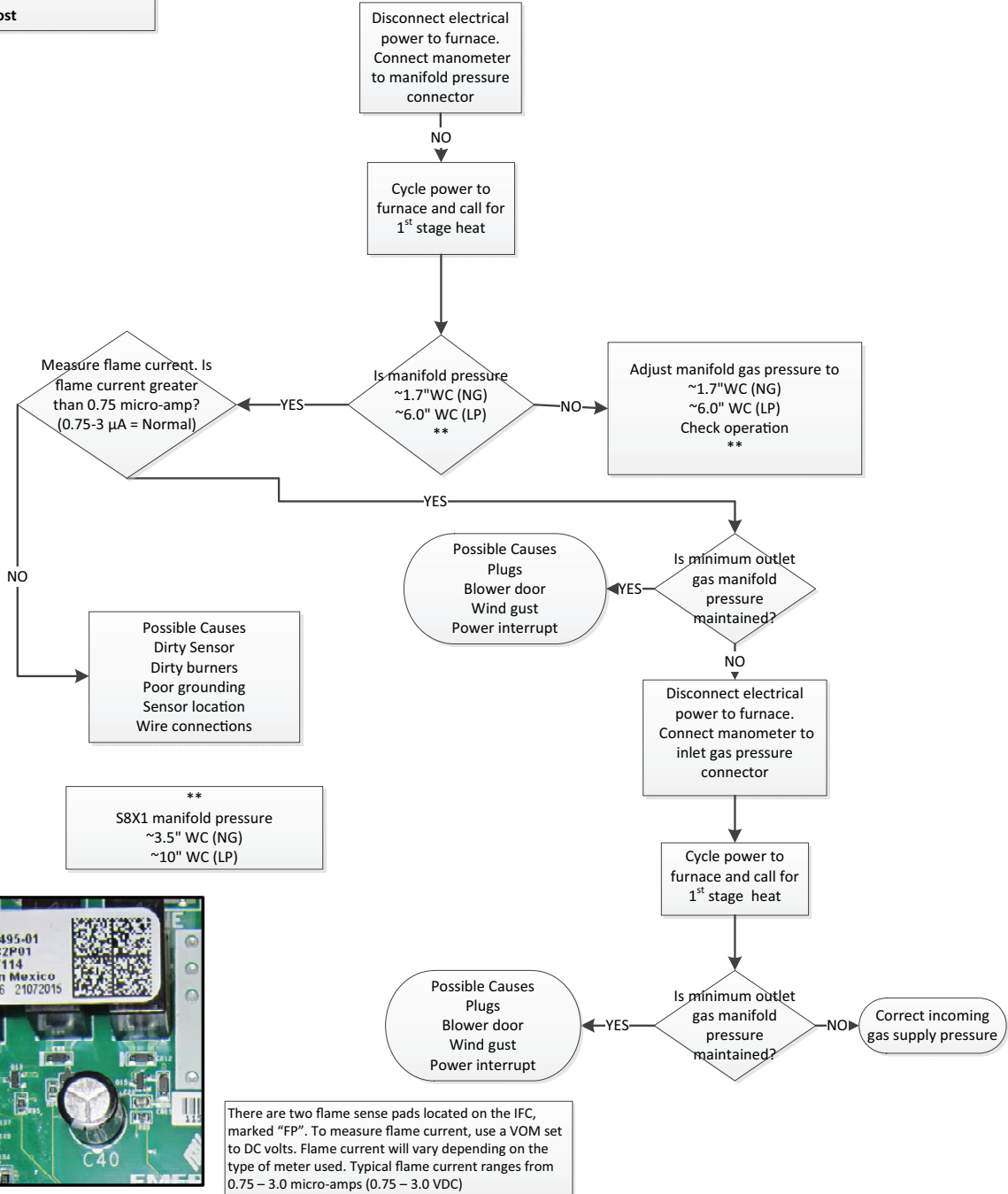


# Troubleshooting

**DEFINITION**  
 RECYCLE Lock Out = 10 recycles within a single call for heat. Lockout period is for one hour.  
**Flame is sensed & then lost**

Turn all gas appliances on

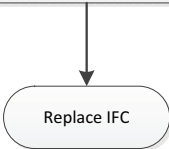
## 2.2 Fault Code



There are two flame sense pads located on the IFC, marked "FP". To measure flame current, use a VOM set to DC volts. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3.0 VDC)

**DEFINITION**  
 1<sup>st</sup> Stage Gas Valve not energized when it should be 10 times within the same call for heat .  
**24VAC not sensed on MVL 10 times**

## 2.3 Fault Code



**DEFINITION**

An error has occurred with the PS, indicating that the pressure switch is closed when it should be open.

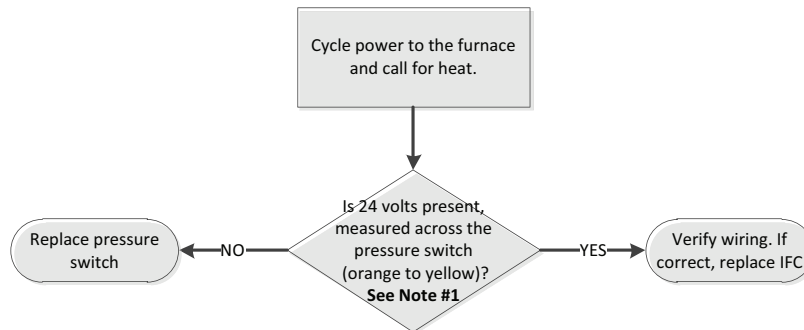
**In most cases, the pressure switch is not the problem. If winds are in excess of 15mph, a 90 degree elbow may be required to inhibit the switch from closing**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

**Note #1**

24 volts = Open Switch  
0 volts = Closed Switch

3.1 Fault Code



# Troubleshooting

**DEFINITION**  
An error has occurred with the PS1 indicating that the pressure switch is either open when it should be closed.

**In most cases, the pressure switch is not the problem.**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

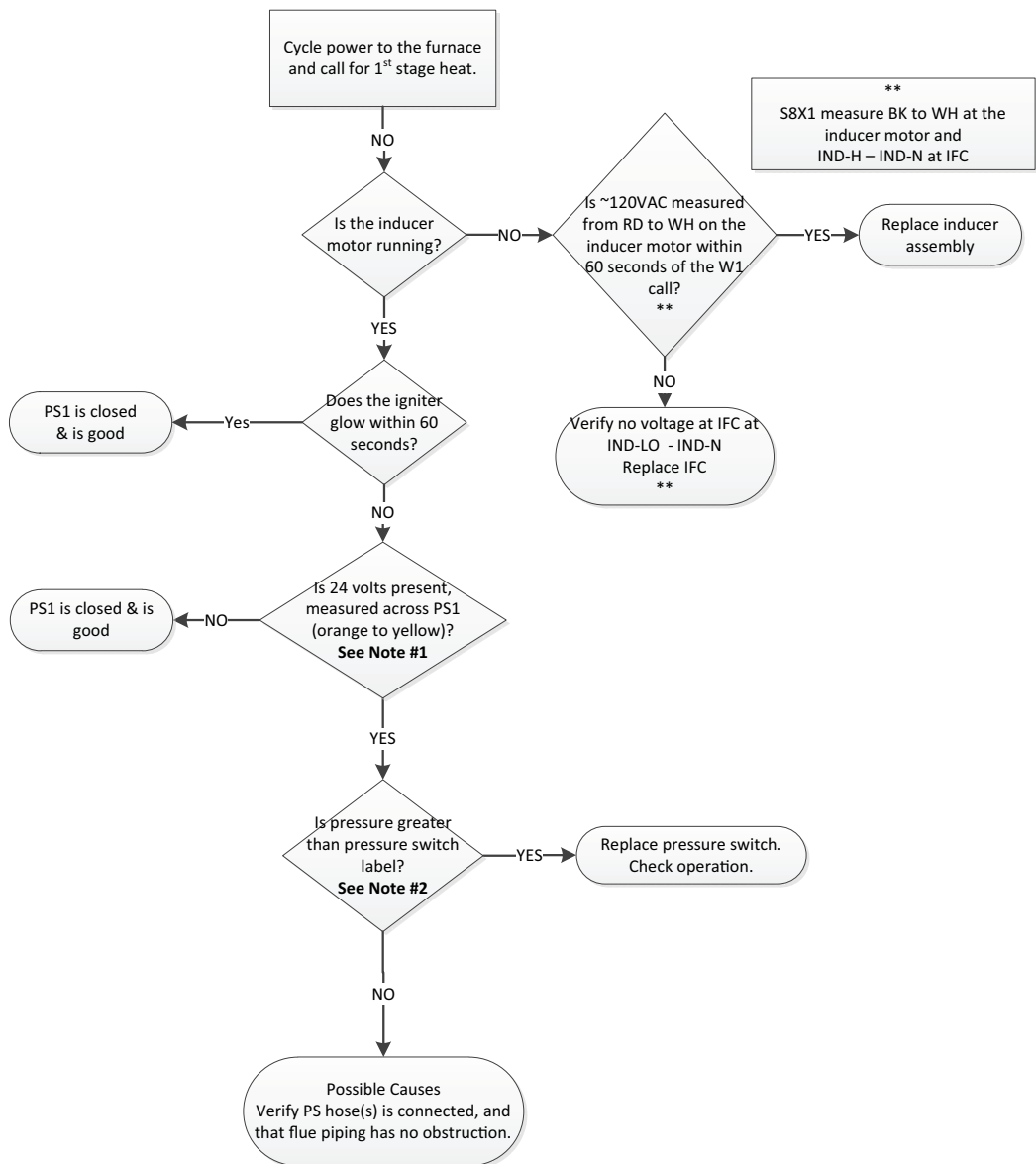
PS1 Open errors can occasionally happen when wind gusts occur.

S8X2 Only  
The IFC will attempt to close both PS1 and PS2 and operate on 2<sup>nd</sup> stage during such an event.

## 3.2 Fault Code

**Note #1**  
24 volts = Open Switch  
0 volts = Closed Switch

**Note #2**  
Measured pressure is negative, greater than refers to magnitude only.



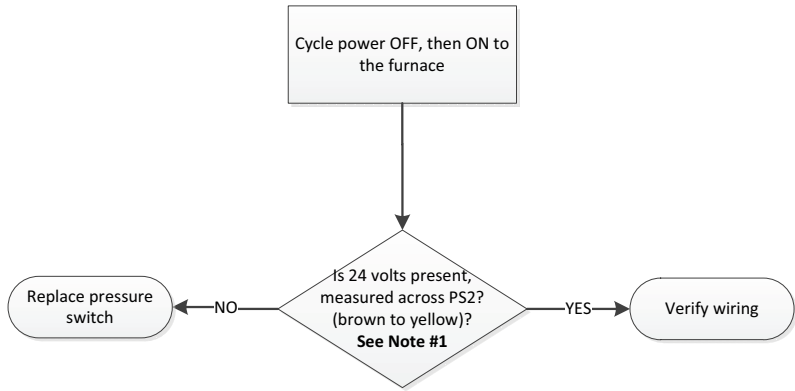
**DEFINITION**  
An error has occurred with the PS2, indicating that the pressure switch is closed when it should be open.

**In most cases, the pressure switch is not the problem.**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

### 3.3 Fault Code

**Note #1**  
24 volts = Open Switch  
0 volts = Closed Switch



# Troubleshooting

**DEFINITION**

An error has occurred with the PS1 indicating that the pressure switch is either open when it should be closed.

**In most cases, the pressure switch is not the problem.**

**NOTE:** Verify pressure switch wiring and tube routing are correct.

## 3.4 Fault Code

**Note #1**

24 volts = Open Switch  
0 volts = Closed Switch

**Note #2**

Measured pressure is negative, greater than refers to magnitude only.

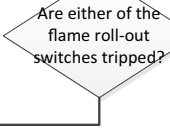
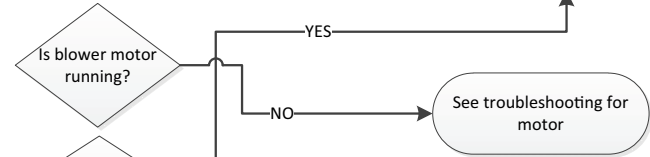




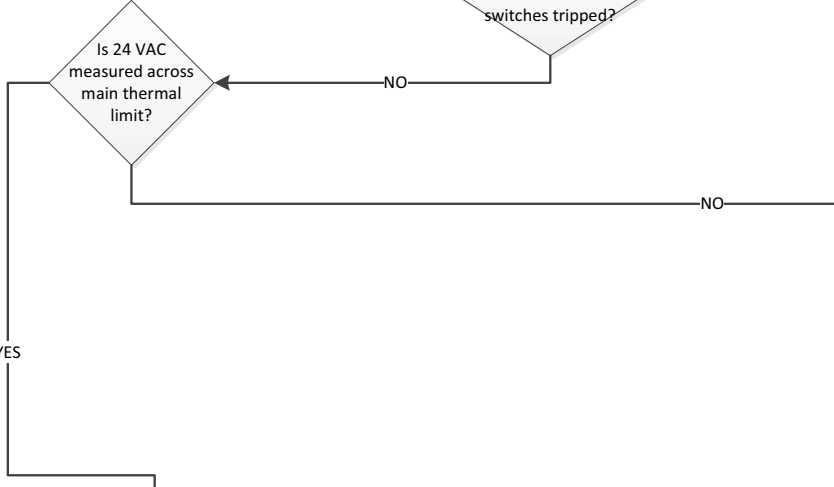
**DEFINITION**  
Limit switches are safety devices that will open when an abnormal high temperature has been sensed. REMOVE ALL JUMPER WIRING TO SWITCHES!  
Under no circumstances, shall these switches be left jumpered when not troubleshooting.  
Verify filters and blower wheels are clean

## 4.0 Fault Code

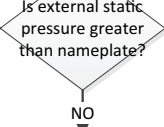
See next page for additional 4 flash faults



Note:  
S8X2 will need to be checked in both 1<sup>st</sup> & 2<sup>nd</sup> stage operation.

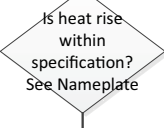


Correct application or duct issues.  
Check operation

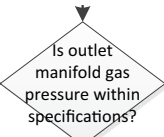


Return air temperature is above max limit

Check for loose insulation or other objects within furnace air stream



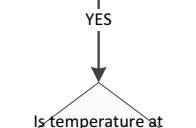
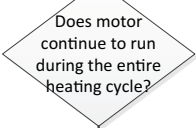
Correct gas pressure  
Check operation



Make sure any temperature measuring devices (thermocouples, dial thermometers) used to estimate limit temperature are within 1/4 inch of limit disc

Replace high limit switch

### Reverse flow switch checkout

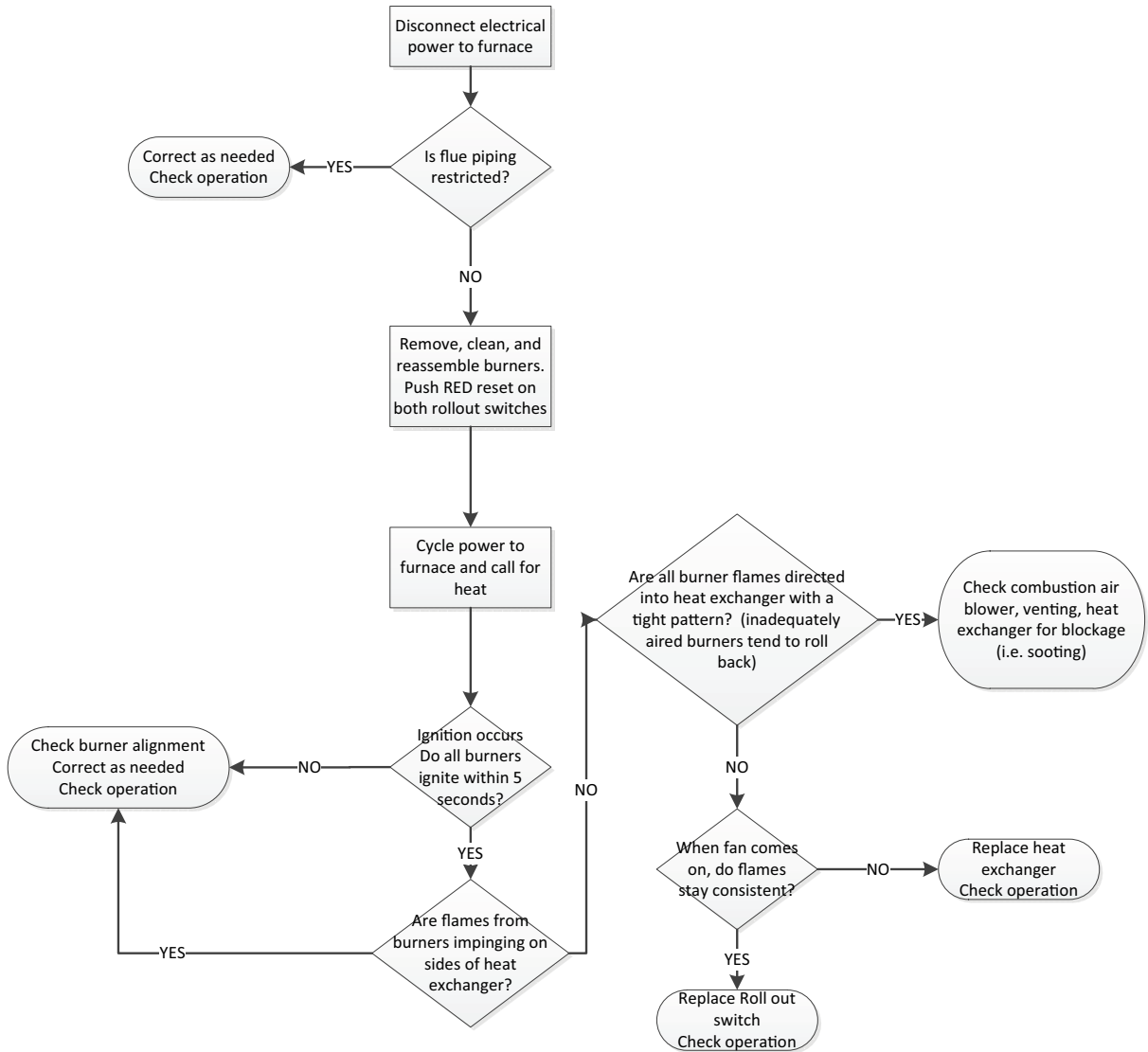


Increase blower off delay

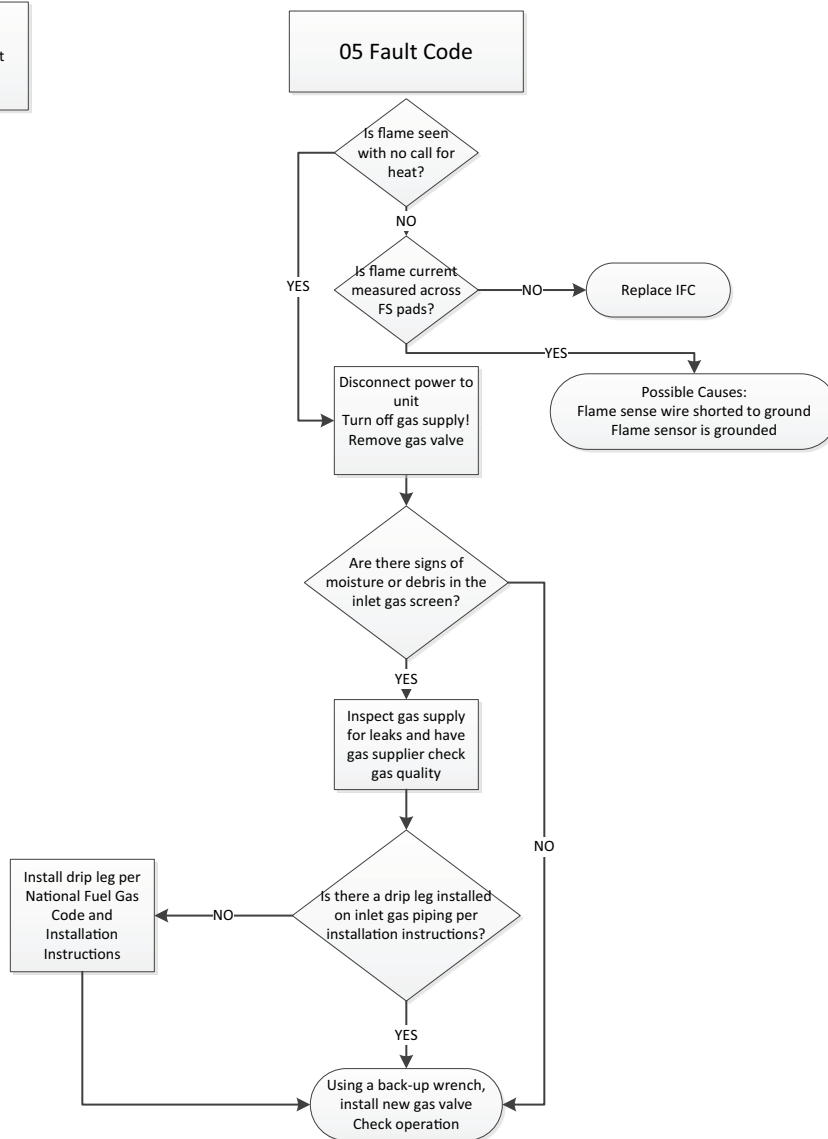
**DEFINITION:**

Limit switches are safety devices that will open when an abnormal high temperature has been sensed.  
**REMOVE ALL JUMPER WIRING TO SWITCHES!**  
 Under no circumstances, shall these switches be left jumpered when not troubleshooting.

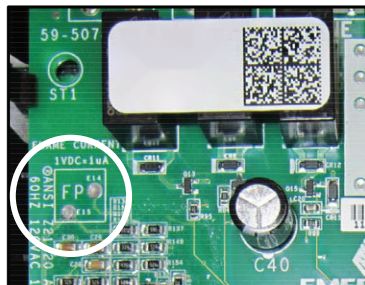
## 4.0 Fault Code Flame Rollout



**DEFINITION:**  
Flame is sensed when it should not be.

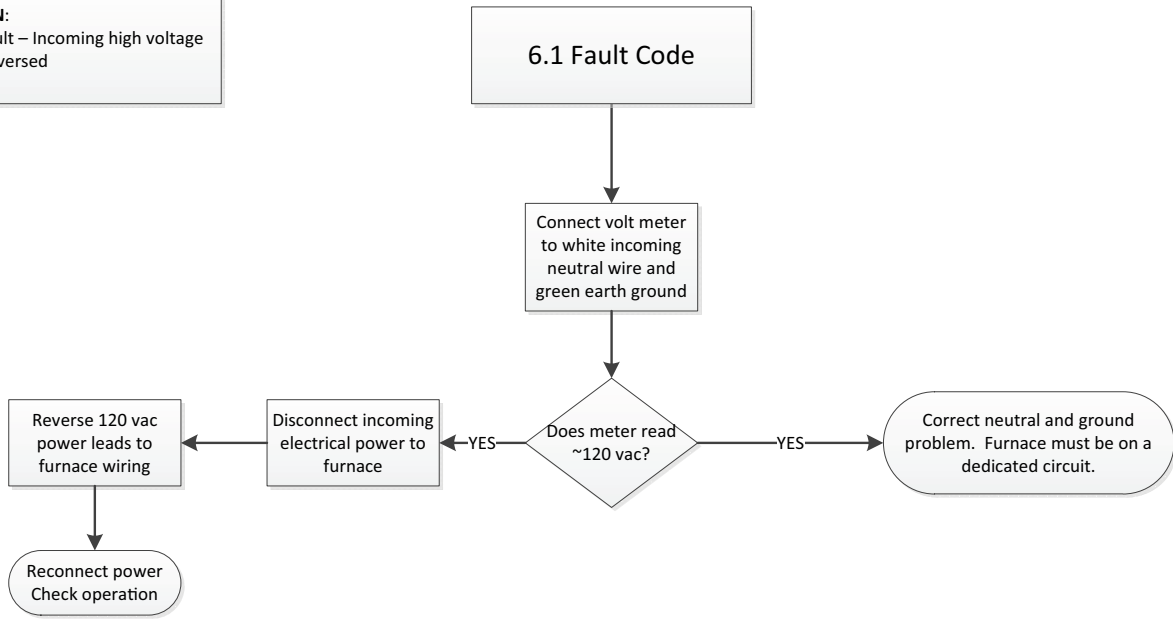


There are two flame sense pads located on the IFC, marked "FP". To measure flame current, use a VOM set to DC volts. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3.0 VDC)



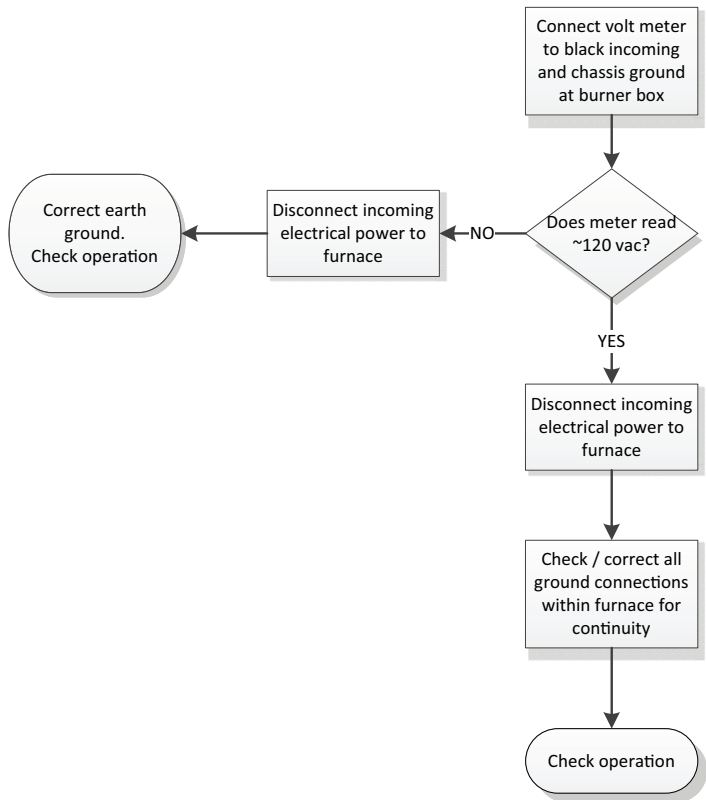
# Troubleshooting

**DEFINITION:**  
Polarity Fault – Incoming high voltage wiring is reversed



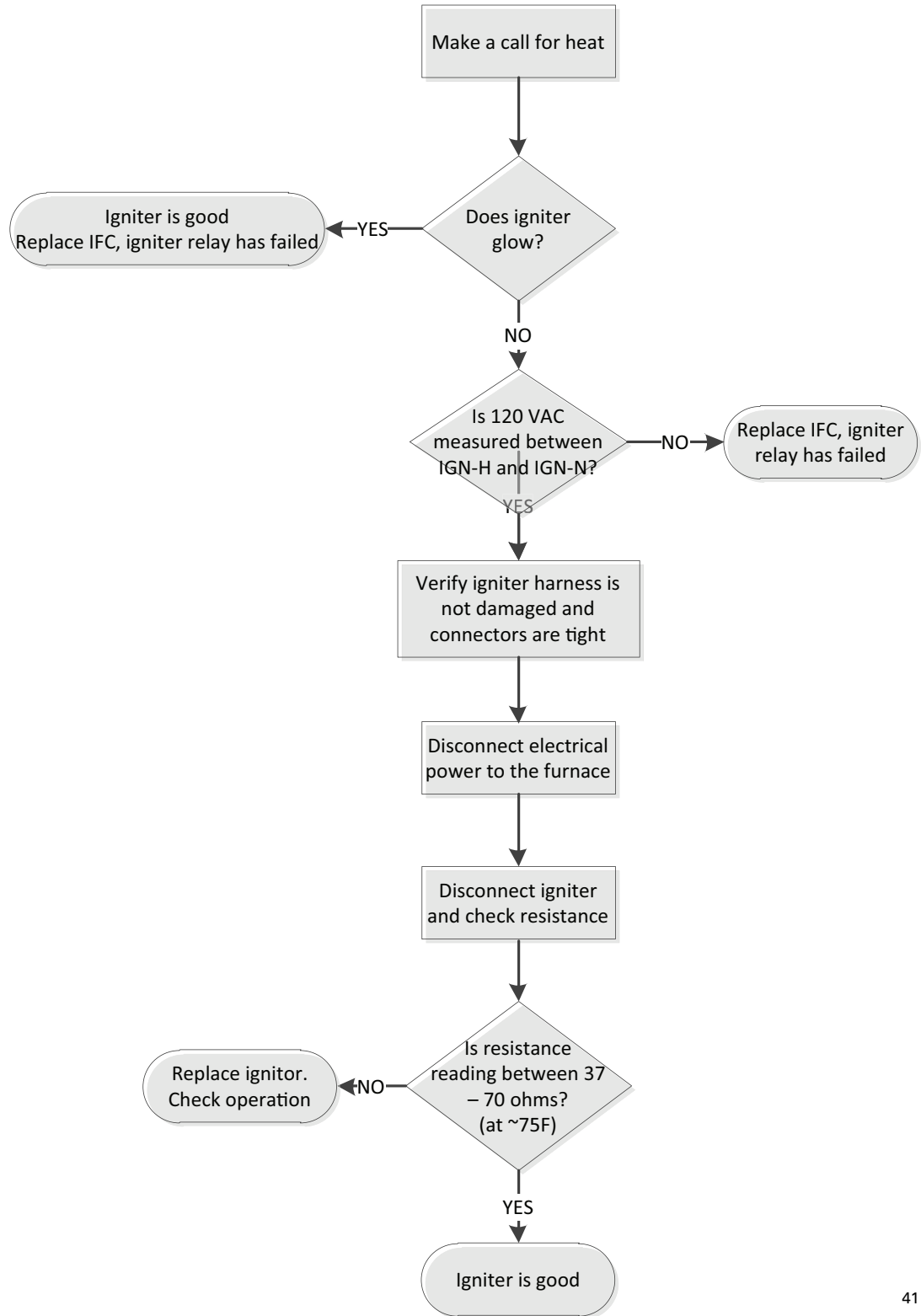
**DEFINITION:**  
Ground Fault - Incoming or chassis ground connection is not sensed

**6.2 Fault Code**

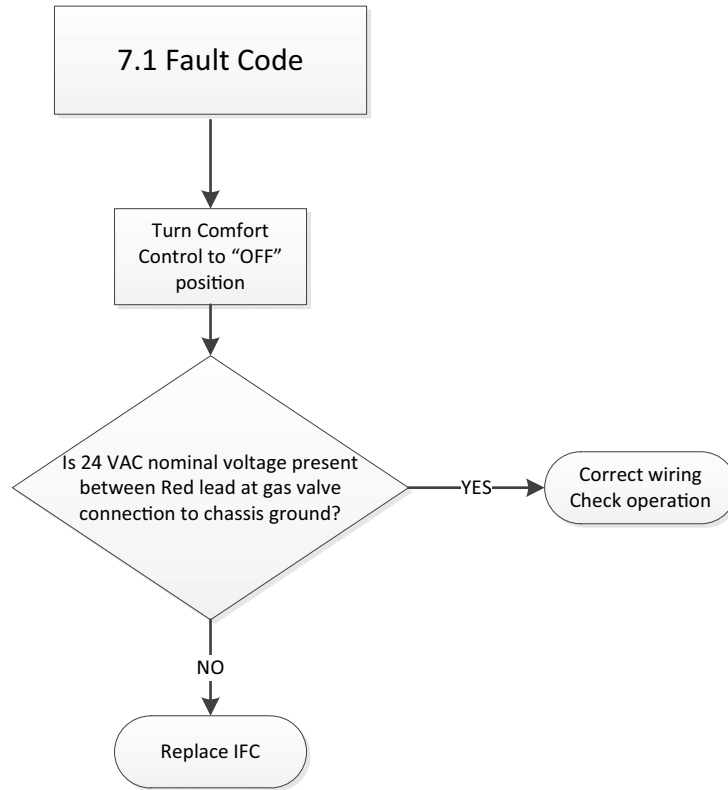


**DEFINITION:**  
 Igniter Relay Fault – The control board has sensed that the igniter relay has stuck closed  
 Ignitor Fault – The control board has sensed that the ignitor circuit is open or shorted.

6.3 Fault Code

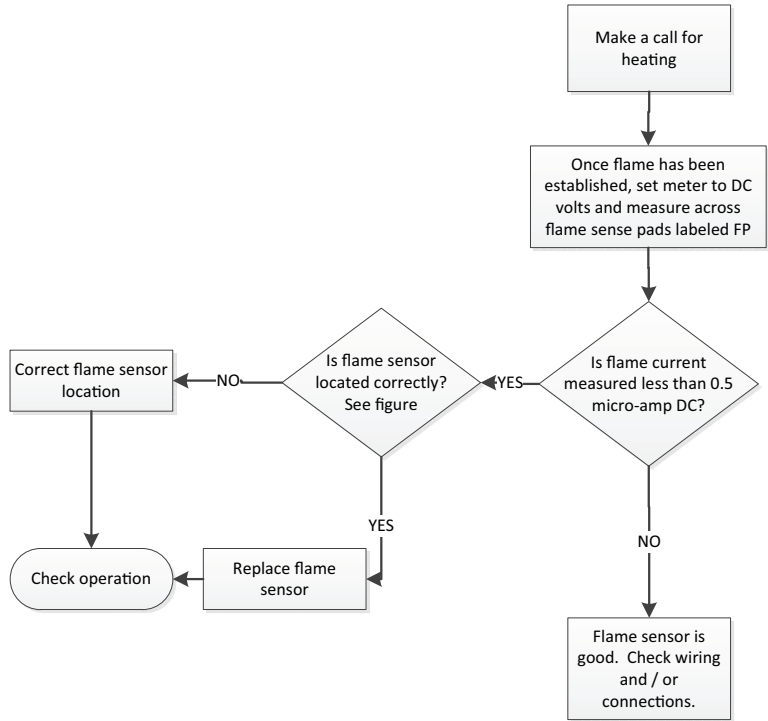


DEFINITION: External Gas Valve  
Circuit Error (24 volts is present  
when it should not be present)

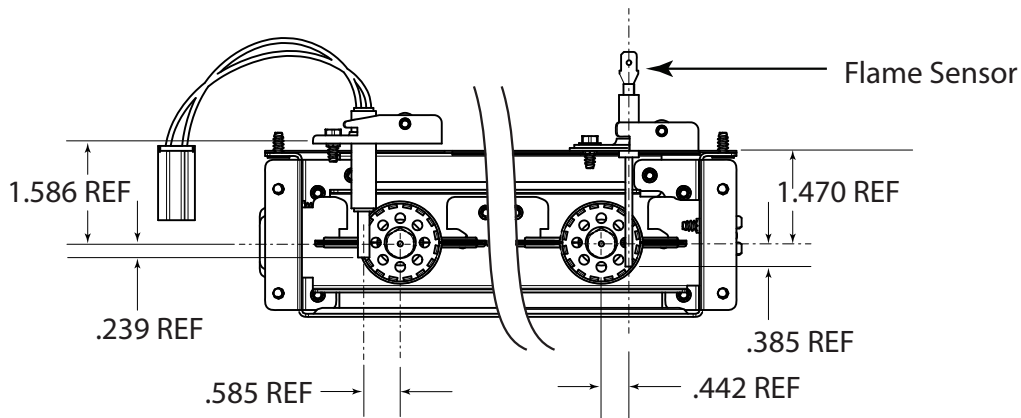


**DEFINITION:**  
The flame sense current is less than 0.5 micro-amp DC

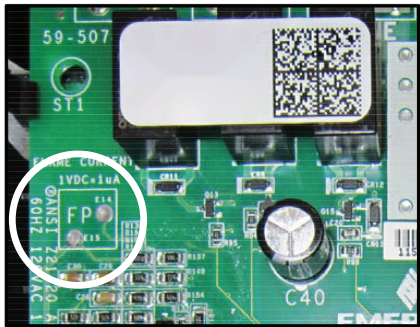
08 Fault Code



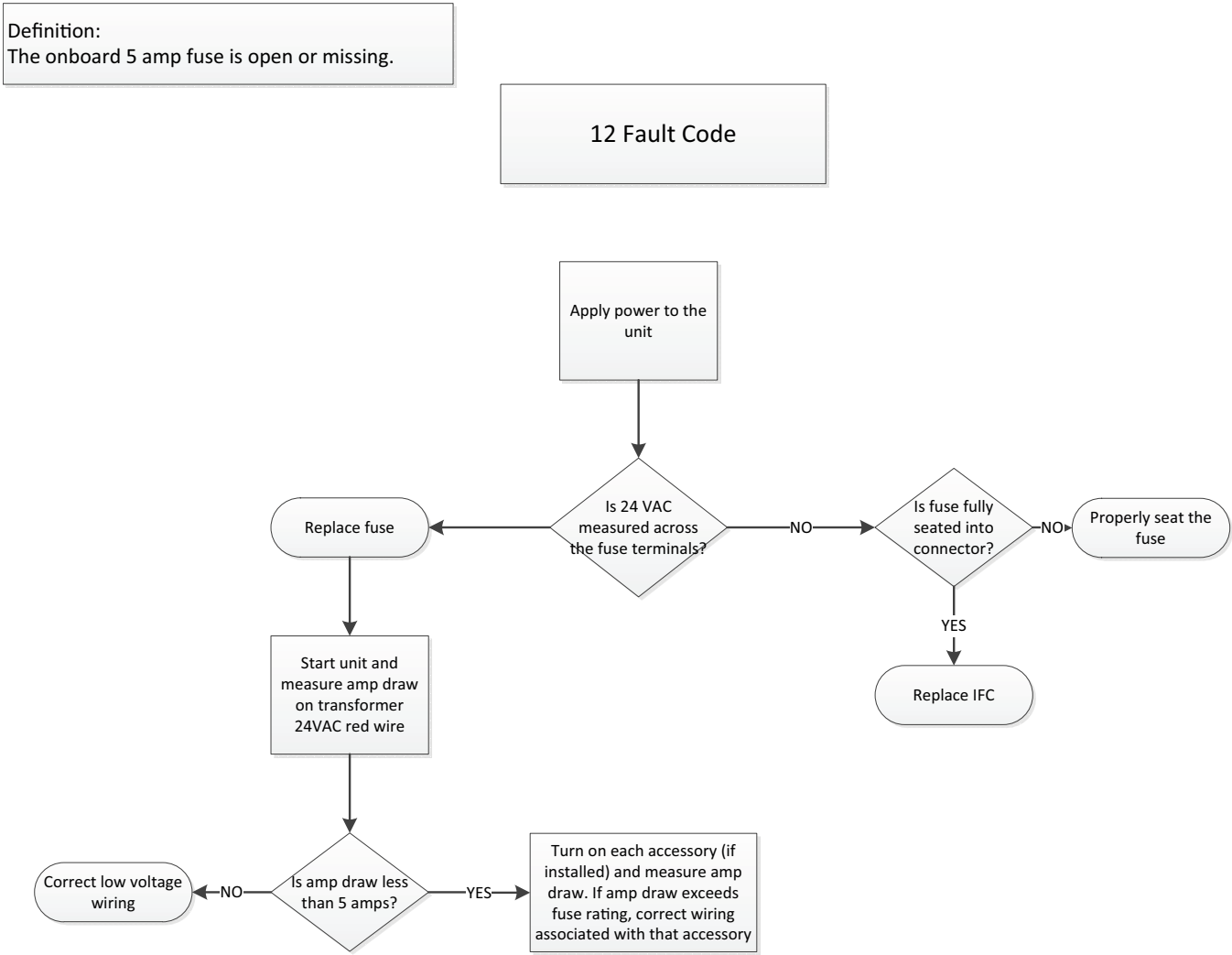
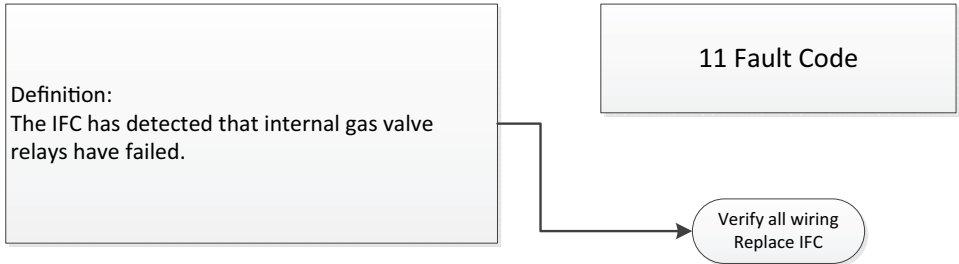
There are two flame sense pads located on the IFC, marked "FP". To measure flame current, use a VOM set to DC volts. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3.0 VDC)



There are two flame sense pads located on the IFC, marked "FP". To measure flame current, use a VOM set to DC volts. Flame current will vary depending on the type of meter used. Typical flame current ranges from 0.75 – 3.0 micro-amps (0.75 – 3.0 VDC)



# Troubleshooting





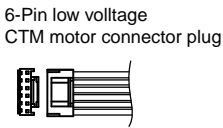
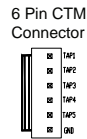
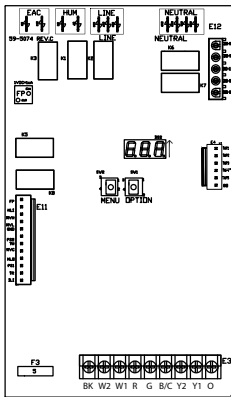
Continuous FAN on this unit is limited to TAP 1 only. No field adjustment can be made. If troubleshooting other speed taps, use the method as outlined below using the voltages listed for the tap number being used

### Constant Torque Motor Troubleshooting

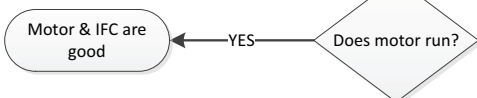
Ensure power is applied to the unit and Seven Segment LED's are ON with no active error codes

Turn fan to ON at thermostat and verify that COF and TP1 alternately appear on the seven segment display

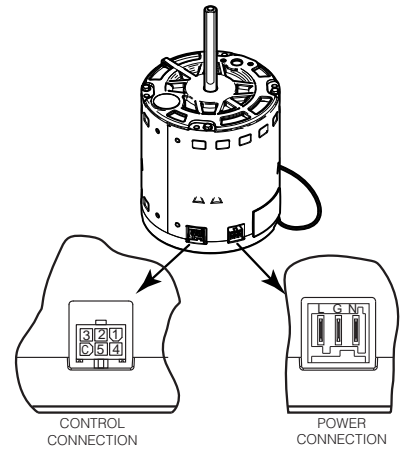
1. Remove the 6-pin low voltage connector from the IFC
2. Apply 24 VAC to Common tap (Blue) and any speed tap on the CTM motor 6-pin plug. The motor should run.



6 Pin CTM Motor Connector  
 Tap 1 - Low Speed  
 Tap 2  
 Tap 3  
 Tap 4  
 Tap 5 - High Speed  
 Common



If voltage is not present, remove 6 pin connector from IFC and re-check. If voltage is present, verify voltage at panel connectors and at motor. If voltage is present at the motor, replace motor

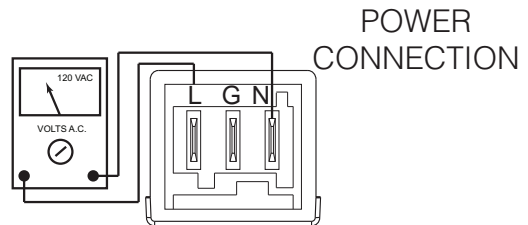
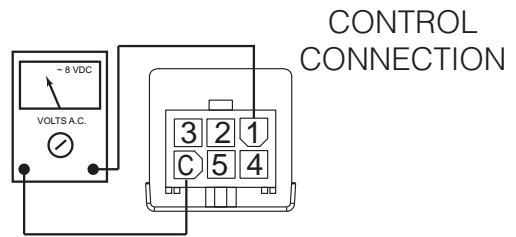


#### S8X1 - S8X2 CTM Output Voltage

RD/W	Tap 1
YL/W	Tap 2
BL/W	Tap 3
BK/W	Tap 4
OR/W	Tap 5
BLUE	24v C

Tap 1	~ 8vdc	
Tap 2	~ 8vdc	
Tap 3	~ 18vdc	
Tap 4	~ 8vdc	
Tap 5	~ 18vdc	
Tap 6 (1+2)	~ 8vdc	~ 8vdc
Tap 7 (1+3)	~ 8vdc	~ 18vdc
Tap 8 (1+4)	~ 8vdc	~ 8vdc
Tap 9 (1+5)	~ 8vdc	~ 18vdc

All Voltages Reference Ground



# Part List

<ul style="list-style-type: none"><li>• Igniter</li><li>• Flame Sensor</li><li>• In-shot Burner(s)</li><li>• Gas Valve</li></ul>	<ul style="list-style-type: none"><li>• Inducer Assembly</li><li>• Blower Motor</li><li>• Blower Wheel</li><li>• IFC (Integrated Furnace Control)</li></ul>	<ul style="list-style-type: none"><li>• Pressure Switch(es)</li><li>• Main Thermal Limit</li><li>• Roll-Out Switch(es)</li><li>• Reverse Air Switch(es)</li></ul>
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