ICM291 Gas Ignition Control Board

FEATURES

- **Direct Spark Ignition (DSI) control board**
- **Microprocessor-based**
- **Controls combustion, blower and indoor motors; spark ignitor; and the gas valve**
- **Monitors timing, trial for ignition, flame sensing and lockout**
- **100% lockout safety feature**
- **Compatible with LP or Natural Gas**
- **Status LED for fault codes to aid in troubleshooting**
- **Replaces: Carrier LH33WP003A**

SPECIFICATIONS

- **Control voltage:** 24 VAC (18-30 VAC), 60 Hz
- **Line voltage:** 208/230 VAC, 60 Hz
- **Power consumption:** 0.3A plus gas valve current at 24 VAC
- **Operating Temperature:** -40°C (-40°F) to 75°C (176°F)

LED indicators
- **Red LED:** Steady ON- normal operation
  Flashing - fault codes

Timing
- **Pre-purge:** 45 seconds
- **Trial for Ignition:** 5+2 seconds
- **Retry period:** every 20 sec. for 15 min.
- **Lockout:** manual reset
- **Post-purge:** 45 seconds

Inputs
- **Power:** RT and C
- **Thermostat interface:** R, W and G
- **Safety switches:** RS, LS, and CS
- Combustion motor Hall Effect sensor
- Flame Sensing

Outputs
- Spark
- **Gas Valve:** GV
- **Combustion motor:** CM
- **Blower motor:** BM
- **Indoor fan motor:** IFO

Safety Considerations

Only trained personnel should install or service heating equipment. When working with heating equipment, be sure to read and understand all precautions in the documentation, on labels, and on tags that accompany the equipment. Failure to follow all safety guidelines may result in damage to equipment, severe personal injury or death.

Introduction

The **ICM291** DSI gas ignition control replaces the following Carrier model: LH33WP003A. The **ICM291** has incorporated LED diagnostics to assist in troubleshooting. Fault code information can be found in this application guide. Please keep this application guide with the furnace installation manual for future reference.

Electrostatic Discharge (ESD) Precautions

CAUTION!

Use caution when installing and servicing the furnace to avoid and control electrostatic discharge; ESD can impact electronic components. These precautions must be followed to prevent electrostatic discharge from hand tools and personnel. Following the precautions will protect the control from ESD by discharging static electricity buildup to ground.

1. Disconnect all power to the furnace. Do not touch the control or the wiring prior to discharging your body's electrostatic charge to ground.
2. To ground yourself, touch your hand and tools to a clean, metal (unpainted) furnace surface near the control board.
3. Service the furnace after touching the chassis. Your body will recharge with static electricity as you shuffle your feet or move around, and you must reground yourself.
4. Reground yourself if you touch ungrounded items.
5. Before handling a new control, reground yourself; this will protect the control. Store used and new controls in separate containers before touching ungrounded objects.
6. ESD damage can also be prevented by using an ESD service kit.

Remove Existing Control

CAUTION!

To service control, and prior to disconnection, label all wires. Failure to do so may result in wiring errors that can cause dangerous operation.

1. Turn thermostat to OFF position or set it to the lowest possible setting.
2. Turn OFF electrical supply to furnace.
3. Turn OFF gas supply to furnace.

⁂ **CAUTION:** Failure to turn off gas and electric supplies can result in explosion, fire, death, or personal injury.

4. Remove furnace blower and control access doors.
5. Disconnect thermostat wires and humidifier wires (if equipped with a humidifier).
6. Disconnect line voltage, blower, electronic air cleaner wires (if equipped), and transformer wires.
7. Remove screws and any other fasteners, and the old circuit board.
8. Examine control and control box to check for water stains.
9. Make repairs if any sources of water leakage are found. Be sure to check humidifiers, evaporator coils, and vent systems in the area of the control.

Install New Control

1. Ground yourself. When handling circuit board, hold it by the edges.
2. Fasten circuit board with retaining screws.
3. Connect all line voltage, low voltage, and accessory wires.
4. Verify the sequence of operation.

Sequence of Operation

A W call from the T'stat will engage the combustion motor. Ignition sequence begins, gas valve and spark are engaged, providing that system safety switches (RS, LS, and CS) are closed and there is feedback from the combustion motor Hall Effect sensor. The blower and indoor motors will engage 45 seconds after flame is established and sensed. They disengage 45 seconds after W call is satisfied.

A G call from the T'stat will engage blower and indoor motors right away. They disengage 25 seconds after G call is removed.

Troubleshooting Tips

Flame not established

1. If flame is not established during the 5+2 initial sequence then the control will start the next trial for ignition in 20 seconds.
2. The attempt to ignite will continue for 15 minutes before the respective fault code is triggered and ignition trials are stopped.
3. The gas valve is energized only during the ignition sequence of 5+2 seconds.
4. Blower and indoor fan motors are off until flame is established and 45 seconds later.

Flame out

1. Flame out is considered when flame is lost during heating.
2. When W signal is present and flame is sensed out then the spark will start right away.
3. If flame is not established on the immediate sequence (2 above) then the control will continue attempts every 20 seconds for 15 minutes before the respective fault code is triggered and ignition trials are stopped.
4. Blower & indoor fan motors will continue running during flame out scenario for 15 mins. + 45 secs.
5. Combustion motor remains on throughout the flame out scenario.

Flame out of sequence

1. Flame out of sequence represents a scenario when flame is sensed while W signal is not present.
2. Combustion, blower and indoor fan motors will be engaged (if not already running) right away and keep running for as long as the fault condition is present.
3. The unit is operable but will display the fault code constantly until replaced by another fault code or power reset.

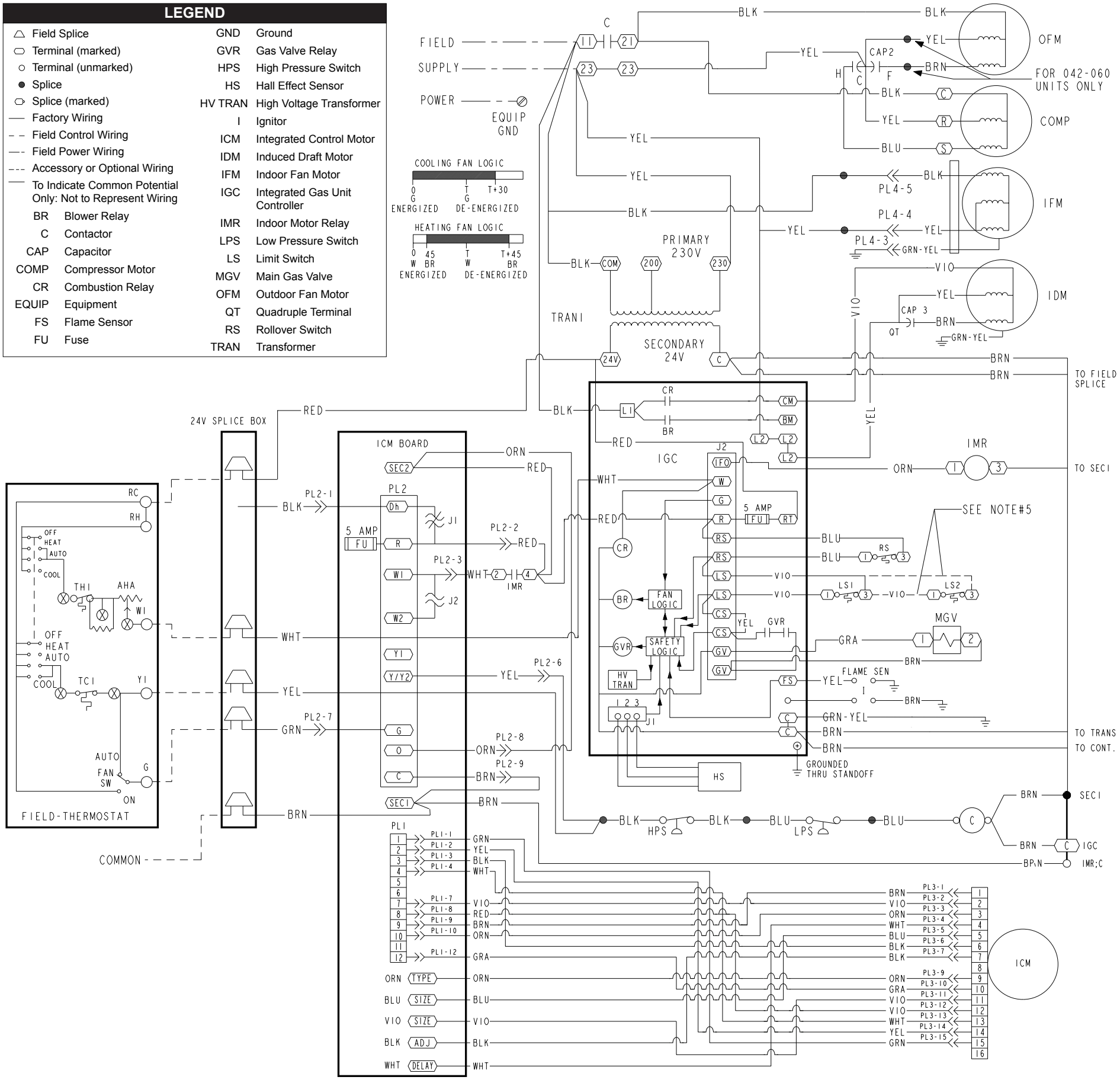
No signal from the Hall affect sensor

1. On a W call, if the input from the Hall affect sensor (RA0) is not present for more than a minute, then the combustion motor will continue running endlessly and the respective fault is flashed.
2. During running state if the input from the Hall affect sensor is not sensed then the gas valve will shut off right away, blower and indoor fan motors will continue running for 30 seconds and then turn off, combustion motor runs continuously.

LED Fault Codes

# Of Flashes represents Constant ON Normal operation	Results
1	The control has modified the fan on delay to 0 and off delay to 3 mins. due to sensing LS trip within 10 minutes of a call
2	a) LS is open due to high temperature (fan isn't working scenario) b) The unit will not start a trial for ignition until the switch closes back
3	a) Flame sensed out of sequence. b) The unit is operable, however will display this fault code until power reset or another code
4	a) LS opened 4 consecutive times during a call for heating b) The fault code is reset on the next W call
5	a) Ignition lockout. The control tried unsuccessfully to ignite for 15 mins. b) The unit will not operate. Requires power reset
6	a) The combustion motor is not sensed running OR CS open b) The unit will not operate. Requires power reset
7	a) RS tripped b) The unit will not operate. Requires power reset
8	a) Unusual gas valve response

Typical Wiring Diagram



Testing the Inducer Motor

Testing the Inducer Motor Hall Effect switch using a Voltmeter capable of reading DC Voltage

- With the three wire plug connected and power applied , use a Voltmeter set to DCV and connect the **negative (-) meter lead to pin 3** and the **positive lead (+) to pin 1**.Carefully rotate the inducer draft motor by hand 180 degrees and the reading should be **less than 1 Volt DC**. Continue to rotate the motor through 180 degrees towards 360 degrees. The voltage should increase to a reading between **6.5 VDC and 9VDC** at the full 360 degree mark. If the first reading is less than 1VDC or the second reading is not between 6.5 & 9 VDC, you should replace the sensor.
- Next, move the **positive lead of the meter to pin 2** leaving the **negative lead on pin 3**. Take a reading with your DCV meter and the reading should measure between **16.5VDC and 21VDC**. Replace the sensor if the reading is not in range.
- If Code 6 flashes on the board, check for continuity across the jumper at J2. The jumper should not be cut and should have full continuity.