Carlin®
Combustion Technology

Model 60200FR Gas Burner Primary Control

Installation and Operating Instructions

For Use By Qualified Service Technicians Only

- **On-Board LCD Screen**
- **Fully Programmable Settings**
- **32 Cycle Fault History**
- **Alarm Contacts**
- **Serviceman Reset Protection**
- **Blocked Vent Protection**
- **Provides Flame Signal in Microamps**
- **Low Voltage Terminals**

Power input
(red/white wire) ..... 120 VAC, 60 HZ, 9 VA

Limit circuit input
(black wire) ..... 120 VAC, 60 HZ

Motor load
(orange wire).....10 FLA / 60 LRA (reduce by valve load)

Ignitor load
(blue wire) ..... 120 VAC, 60 HZ, 500 VA

Valve load
(violet wire)..... 120 VAC, 60 HZ, 2A

Auxiliary..... 120 VAC, 1 amp

Operating voltage.....120 VAC - 132 VAC

Alarm contacts (dry contacts).....24V, AC/DC, 2A

Operating temperature limits.....+32°F to +140°F

Thermostat.....24 VAC, 0.1A

Blocked Vent..... 12 VDC, 2mA

CO..... 12 VDC, 2mA

Agencies..... UL recognized (US & Canada)

It is important that the installation of the oil burner, piping and fittings, safety devices, controls, electrical wiring and equipment be done in accordance with national and/or local regulations of the authorities having jurisdiction over such installation.

FROZEN PIPES/WATER DAMAGE
This is not a freeze protection device. Suitable freeze protection monitoring or other precautions are recommended to protect against ruptured pipes/water damage caused by fuel outage, safety related fault conditions or equipment failure.

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WARNINGS

1. **Warning –** Do not attempt to confirm combustion simply by inspecting the flame visually. You must use combustion test instruments. Failure to properly verify/adjust combustion could allow unsafe operation of the burner, resulting in severe personal injury, death or substantial property damage. Refer to the burner manual for proper setup instructions.
2. **Warning –** Never test an ignitor by placing a screwdriver (or other metallic object) across the high voltage clips. Check ignitors only by observing spark at appliance ignition electrodes, with fuel supply OFF. Using any other method could cause ignitor damage and severe personal injury.
3. **Danger – Fire, explosion, or carbon monoxide hazard.** Water damage can lead to unreliable operation or cause the control to malfunction which could lead to severe personal injury or death. Do not install the control module where it can get wet. Always replace the control if it gets wet or if it has any signs of water residue.
4. **Warning – Electrical shock hazard.** To prevent electrical shock, death, or equipment damage, disconnect power supply before installing or servicing control. Only qualified personnel may install or service this control in accordance with local codes and ordinances. Read instructions completely before proceeding.
5. **Warning – Electrical shock hazard.** The ignition circuit of the control can produce over 10,000 volts which can cause severe injury or death.
6. **Warning – Frozen pipes/water damage.** This is not a freeze protection device. Central heating systems are prone to shut down as a result of power or fuel outages, safety related fault conditions or equipment failure. Installation of freeze protection monitoring or other precautions are recommended for unattended dwellings in climates subject to sustain below-freezing temperatures.
7. **Warning –** All work must be performed by a qualified and licensed professional in accordance with all applicable codes and ordinances.
8. **Notice –** Read these instructions completely before proceeding with the installation.
9. **Notice –** Retain these instructions for future reference.
10. **Notice –** All wiring must comply with the National Electric Code or any other state or local codes or regulations.
11. **Danger – Carbon Monoxide Hazard.** Improper application or use can result in dangerous flue products, such as carbon monoxide, which can escape into the living space causing severe injury or death. All venting must be checked for proper operation before allowing the burner to run.

Hazard Definitions

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

DANGER Indicates presence of hazards that will cause severe personal injury, death or substantial property damage.

WARNING Indicates presence of hazards that will cause severe personal injury, death or substantial property damage.

CAUTION Indicates presence of hazards that will cause minor personal injury or property damage.

NOTICE Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

Installing

WARNING The 60200FR control must be installed and serviced only by a qualified service technician.

Always disconnect power source before wiring to avoid electrical shock or damage to the control. All wiring must comply with applicable codes and ordinances.

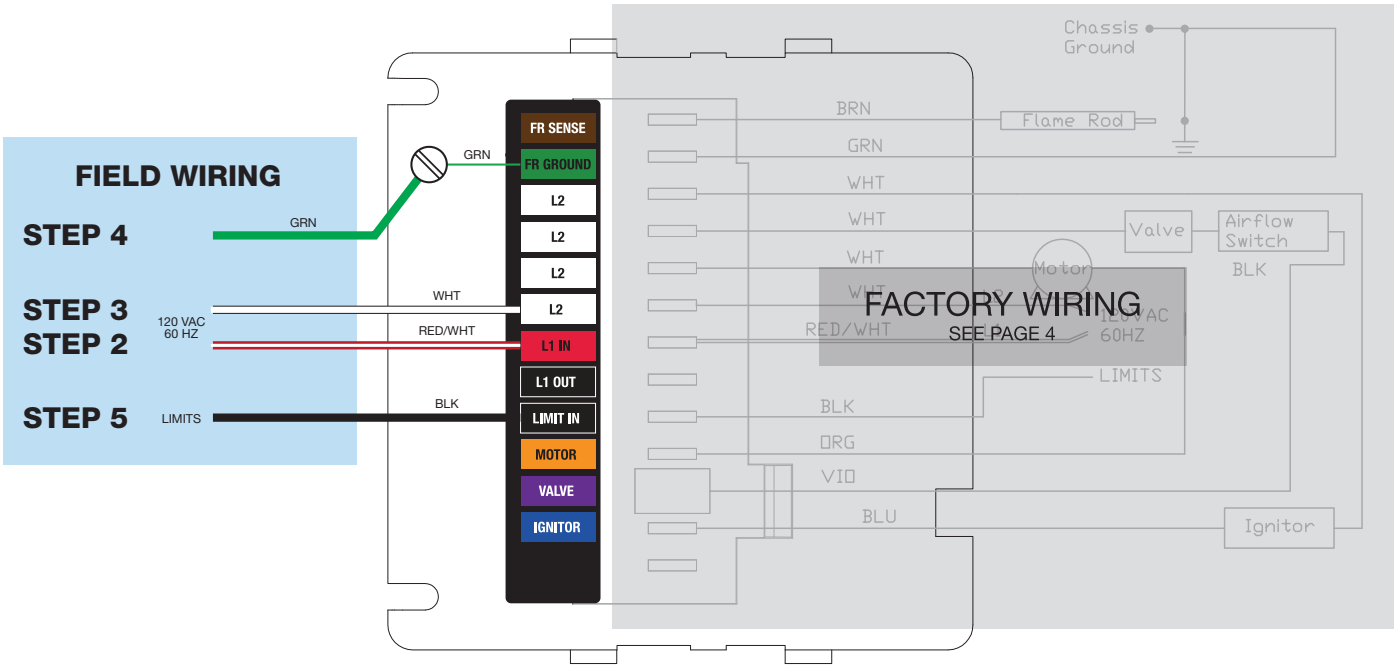
Mounting

The control may be mounted on a 4" x 4" junction box in any convenient location on the burner, furnace or wall. The location must not exceed the ambient temperature limit, 140°F.

Field Wiring

Wiring must comply with local and national electrical codes, and with the wiring diagram.

WARNING Do not connect an external voltage to the thermostat terminals T1 and T2. This will damage the control and may result in a *dangerous* operating condition.



The burner (motor, valve, ignitor, etc.) is prewired at the factory. The following steps are for field wiring.

Step 1 Remove the 60200FR control from the electrical junction box to access the terminal strip located on the bottom of the control.

Step 2 Connect incoming, 120 VAC Hot from the boiler/furnace service switch to the red wire with white stripe attached to (L1 IN). This will supply constant power to the control for post purge (motor delay off) operation and display functionality when in standby mode. Note: If a constant 120 VAC power source from the service switch is not available, connect the red/white wire attached to (L1 IN) to the black wire attached to (LIMIT IN).

NOTE: Check polarity carefully. If hot and neutral wires are reversed at appliance power source, the control will go to Lockout on flame failure.

Step 3 Connect 120 VAC Neutral to the white wire attached to (L2).

Step 4 Connect the ground wire to the green ground screw inside the junction box. Connect the “FR Ground Terminal” to the green ground screw inside the junction box. Confirm that the junction box is connected to earth ground.
Important: If the ground wire is not secured, the control will not sense flame properly resulting in nuisance lockouts.

Step 5 Connect the boiler/furnace limit output to the black wire connected to (LIMIT IN).

Replacing the old 60200FR control

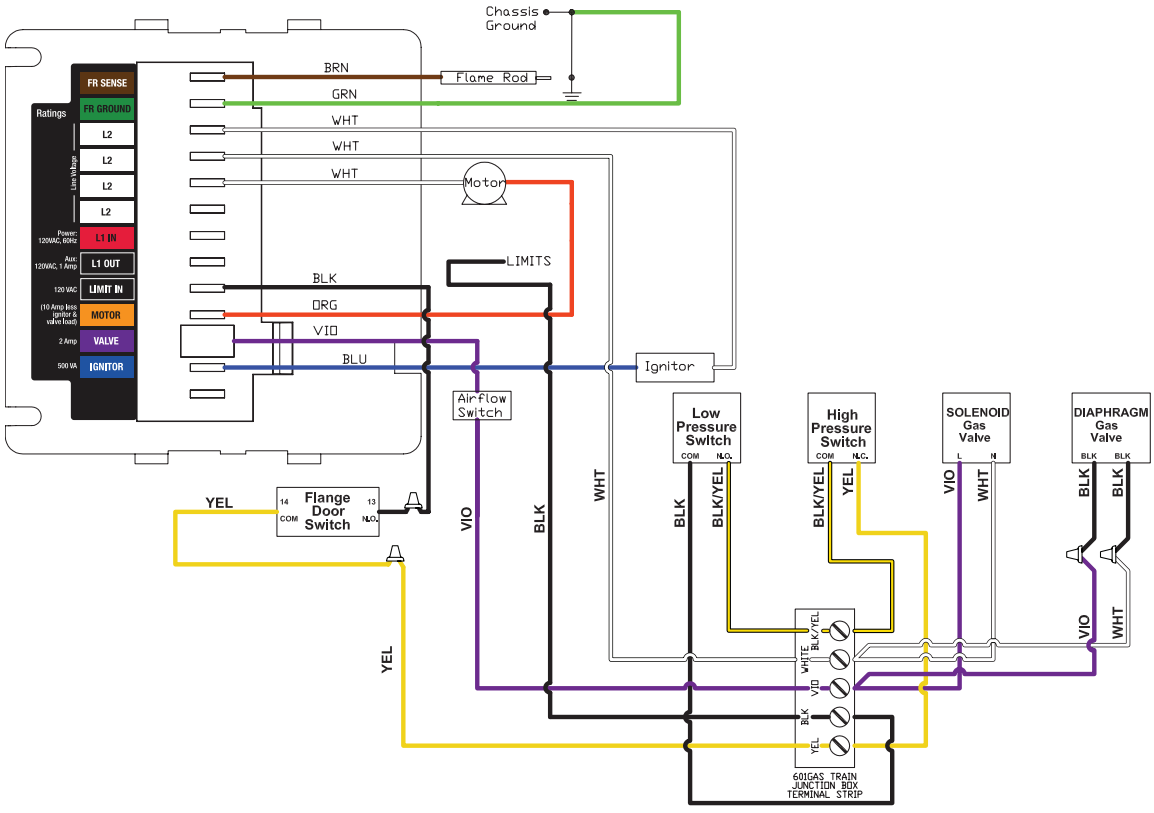
1. Remove old control from J-Box
2. Remove Rajah connector from flame rod wire
3. Wire nut the existing wires to the spade provided wires and connect to control

Wiring

Wiring must comply with local and national electrical codes, and with the wiring diagram.

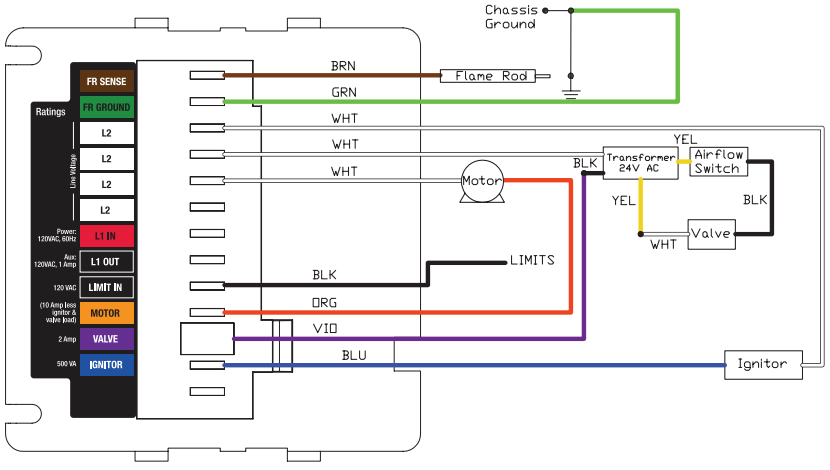
Commercial Gas Train 120V FACTORY WIRING

FOR FIELD WIRING SEE PAGE 3



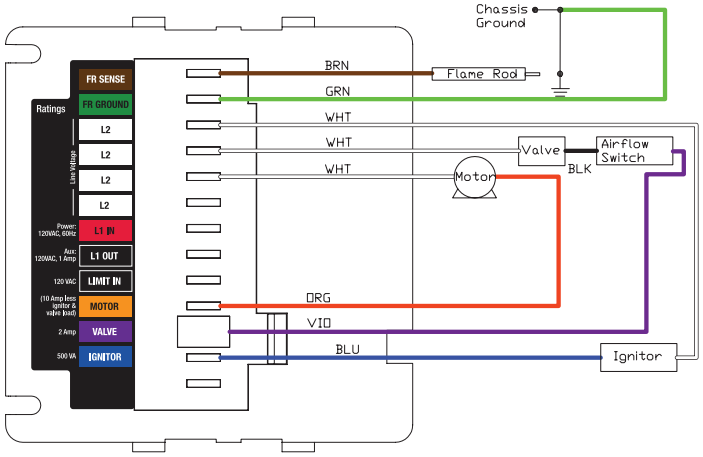
EZGas Pro 24V FACTORY WIRING

FOR FIELD WIRING SEE PAGE 3

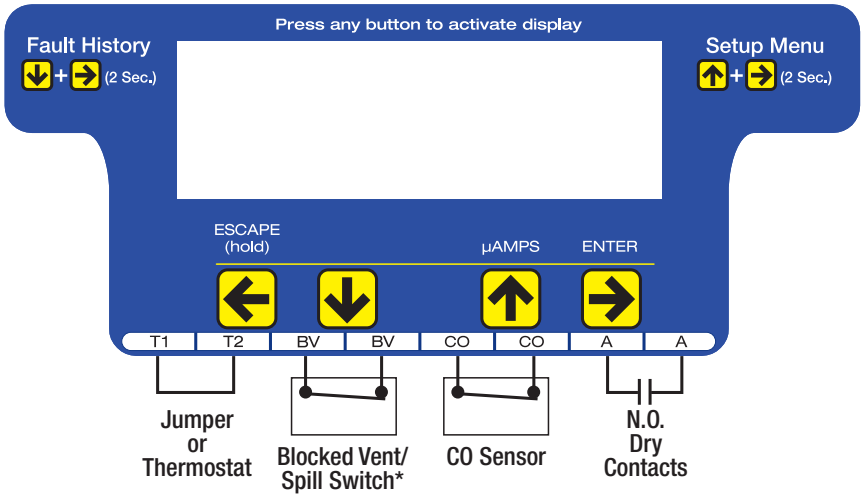


EZGas 120V FACTORY WIRING

FOR FIELD WIRING SEE PAGE 3



Low Voltage Wiring



*__Blocked Vent/Spill Switch Operation:__ During each run cycle, the BV contacts will be checked beginning 30 seconds after ignition. If the BV contacts open (indicating the spill switch has detected a blocked vent), the control will shut down the burner. The control will either recycle the burner or will go immediately into Lockout dependent on the Allowed Recycle setting. The spill switch must be closed within 2 seconds on a call for heat. If not, it will retry 2 times before control goes into Lockout.

NOTE: If using a manual reset blocked vent spill switch, the control will lock out with the display reading BV Switch Open.

WARNING Do not start the burner if the combustion chamber contains gas.

View or Change Control Settings

NOTE: The settings mode cannot be accessed during a run cycle, the burner must be in standby mode (or Lockout) to enter setup.

To enter the Settings Mode: Press the ↑ and → buttons simultaneously for 2 seconds. The display will show –

```
Settings Press →
To Exit Hold ←
```

To View Current Settings: Press the → button to scroll through all Setting Modes (see table at the top of page 5 for Setting Mode options). The second line of the screen will display the current setting for each Setting Mode –

```
Pre-Purge
        30 Seconds
```

Pressing the → button again will leave the setting as is and move to the next option –

```
Trial for Ign
        4 Seconds
```

To Change a Setting: Scroll to the desired Setting Mode option using the → button (as described in table on page 5), then press the ↑ or ↓ button to scroll through the available Settings. When the desired setting is displayed on the screen press the → / **ENTER** button. The display will briefly indicate that the new setting has been "Entered" and the new setting will replace the previous setting on the second line of the screen. Continue pressing the → button to view the current setting for all options or ↓ button to make any desired changes.

```
Trial for Ign
        6 Seconds
```

To Exit the Setup Menu: Press the ← / **ESCAPE** button for 3 seconds. **NOTE:** The control will automatically exit the Setup menu after 30 seconds of inactivity or by a call for heat.

AVAILABLE SETTINGS

PRESS THE → BUTTON TO VIEW DIFFERENT SETTING MODES

SETTING MODE OPTIONS	Pre-Purge†	Trial for Ignition	Post-Purge	Allowed Recycles††	TT Jumpered Internal**	Clear Fault History	Restore Factory Defaults
PRESS THE ↑ → BUTTONS TO CHANGE SETTINGS	0 Sec	4 Sec	0 Sec	None*	Yes	Yes	Yes
	10 Sec	6 Sec	10 Sec	1	No	No	No
	30 Sec		15 Sec	3			
	90 Sec		30 Sec				
			60 Sec				
			2 min				

Shaded box = default setting.

*MA Code ("N" models) are non-recycling and will lock out on flame failure.

**Changing this setting to 'Yes', with limits powered will exit Settings mode and result in immediate 'Call For Heat'.

†If flame is sensed during Pre-Purge, control will go to Lockout immediately – except when Pre-Purge is set to 0 Sec.

††If TFI fails after first recycle, control will lockout, regardless of "Allowed Recycles" setting.

Setup Menu Definitions

- **Pre-Purge:** Time period motor and ignitor are on prior to Trial for Ignition. **Note:** If flame is sensed during Pre-Purge, control will go to Lockout immediately.
- **Trial for Ignition:** Flame-establishing period during ignition. If flame is not established, the control will recycle. The next cycle will be a set 60 second Pre-Purge. If TFI fails on the next cycle, control will go to Lockout.
- **Post-Purge:** Time period the motor is on after the Call for Heat is satisfied to allow for evacuation of combustion gases. A call for heat during Post-Purge will result in a recycle.
- **Allowed Recycles:** Number of Recycles allowed during a single Call for Heat prior to Lockout.
- **TT Jumpered Internal:** Allows TT to be "jumpered" by software program.
- **Clear Fault History:** Allows all prior burner fault conditions stored in control to be cleared.
- **Restore Factory Defaults:** Allows all factory defaults to be restored in control (refer to settings shaded in gray in the table above). Will reset and reboot control .

Operating Sequence

With power to the control and the gas valve open, set thermostat (and limit) to call for heat. **NOTE:** The thermostat circuit must be closed and power must be coming to black wire from limit circuit.

During **Pre-Purge,** the motor starts.

Following **Pre-Purge,** the control advances to a 3 second **Pre-Ignition**

During **Pre-Ignition,** the ignitor turns on and enters **Trial for Ignition.**

During **Trial for Ignition,** the gas valve opens. When flame is detected, the screen will briefly display "Flame Detected" and then procedes to **Burner Running**

When the Call for Heat ends (or a limit control interrupts the burner circuit), the gas valve will turn off. The motor remains on for the **Post-Purge** period. When the **Post-Purge** timer expires, the control returns to **Standby** mode awaiting the next call for heat.

SEE STATUS ICONS – PAGE 8

Fault History

The 60200FR stores information from the last 32 cycles in which a fault condition occurred. To Enter the Fault History , simultaneously press and hold the ↓ and → buttons for 2 seconds. The display below will appear –

```
View 13 Faults →
To Exit Hold ←
```

Press the → button to scroll through the history of fault conditions. Fault 1 is the most recent cycle in which a fault occurred. To view faults experienced in earlier run cycles, continue to press the → button. The control will display Fault 2 followed by Fault 3, etc.

```
Fault 1 Details ↓
View Fault 2 →
```

To view the details of any fault (ex. Fault 1 in the screen above), press the ↓ button to see the Fault Message.

```
Fault 1 Message
No Flame Check Vlv
```

Press the ↓ button again to determine how many cycles ago the fault occurred.

```
Fault 1
XXXX cycles ago
```

Press the ↓ button again to determine if the fault resulted in a Lockout or a recycle.

```
Fault 1 Result
Lockout
```

Press the ↓ button again to examine the Microamps at the time of the fault.

```
Fault 1
0.1 uAmps
```

Continue pressing the ↓ button to examine the following information recorded during the fault cycle.

- Line Voltage
- Motor Amps (OK or Low)
- Ignitor Amps (OK or Low)
- Valve Amps (OK or Low)
- Recycle (Yes or No)
- Burn Time
- Flame Delay

On any fault detail screen listed above, the → button can be pressed to view the same data in the previous fault cycle. For example, if in Fault 1 (the most recent fault), the Ignitor Amps were low, by pressing the → button, the Ignitor Amps in Fault 2 (the previous fault cycle) will be displayed.

```
Fault 1
Ignitor Amps Low
```

```
Fault 2
Ignitor Amps OK
```

To Exit Fault History: Press and hold the ← / **ESCAPE** button for 3 seconds at any time.

Total/Run History

In addition to the Fault History (left),the 60200FR also logs the total run history of the control. To enter this menu, simultaneously press the ← and → buttons for 3 seconds. The display below will appear.

```
Total History ↓
To Exit Hold ←
```

To Exit Total History: Press and hold the ← / **ESCAPE** button for 3 seconds at any time.

Press ↓ button to scroll through the history which includes:

- Total On Time
- Total Burn Time
- Total Burner Run Cycles
- Faults Cleared (cycles ago)
- Max Line Volts
- Min Line Volts
- Total Recycles

FAULT HISTORY

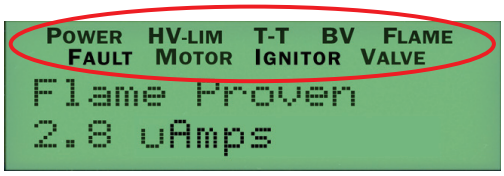
NOTE: Fault information in chart is representation only.

PRESS THE → BUTTON TO VIEW NEXT FAULT

PRESS THE ↓ ↑ BUTTONS TO VIEW FAULT DETAILS

	FAULT 1	FAULT 2	FAULT 3	FAULT 4	FAULT 5
Message	No Flame ck vlv	No Flame ck MTR	No Flame ck IGN	No Flame ck vlv	No Flame ck vlv
Cycles Ago	2	3	4	5	6
Result	Lockout	Lockout	Lockout	Lockout	Lockout
µAmps	0.1	0.1	0.1	0.1	0.1
Line Volts	114	114	114	114	114
Motor Amps	OK	Low	OK	OK	OK
Ignitor Amps	OK	OK	Low	OK	OK
Valve Amps	Low	OK	OK	Low	Low
Recycle Y/N	No	No	No	No	No
Burn Time	5 sec	5 sec	5 sec	5 sec	5 sec
Flame Delay	4 sec	4 sec	4 sec	4 sec	4 sec

Status Icons



Status Icons will appear at the top of the 60200FR display to indicate the control's current operating condition.

POWER Indicates that the control is powered (flashes if voltage is too low or too high)

HV LIM Indicates that the burner limit circuit is powered.

TT Displayed when the TT terminals are physically jumpered, jumpered in the set-up menu, or when thermostat is calling for heat.

BV Monitors the BV contacts where a Blocked Vent Switch (Spill Switch) is connected. (Flashes if the Spill Switch contacts are open – indicating that the vent is blocked). See Blocked Vent Operation below for more information.

FLAME Indicates the control is sensing flame

FAULT Flashes in unison with other status icons indicating a problem exists in that area

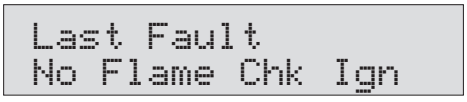
MOTOR Indicates that the motor is energized (flashes if motor not detected)

IGNITOR Indicates that the ignitor is energized (flashes if ignitor not detected)

VALVE Indicates that the gas valve is energized (on entry to pump prime will flash if not detected)

Service and Troubleshooting

Last Fault Display: When the control is reset from a Lockout condition, if the burner resumes normal operation, the screen will toggle the last fault and its cause for five days (longer duration if control is not wired for constant power). This feature is designed to allow the service technician to easily see what caused the condition in the event the homeowner reset the control prior to their arrival. The screen will alternate between displaying what the last fault was and displaying how to clear the message **hold ESC for 3 seconds.**



Toggle

Display Voltage and Current: Press ↑ + ↓ for 3 seconds to display real time voltage and current.

Lockout: If Lockout occurs, the screen turns on, the fault icon flashes and a fault message is displayed on the screen. **To Reset** Push in and hold the red **Reset** button for 1 second, then release. **NOTE:** Recycling power to the control will not reset it from it from a Lockout condition.

Two fault conditions result in an immediate Lockout. These include; Flame detected during pre-purge and flame failure during Trial for Ignition (during second cycle, following recycle). All other faults will result in a Recycle (unless the Allowed Recycles is set to 'None' in the Set-up Menu). A **Recycle** results in the burner shutting down for 60 seconds then resuming operation in Standby (if there is no Call for Heat) or initiating the Operating Sequence above (if there is a Call for Heat).

Latch-up: If the control locks out 3 times during a single Call for Heat, Latch-Up will be displayed on screen.
To Reset the control after latch-up, press and hold the red Reset button for 30 seconds. **WARNING: Only a qualified service technician should attempt to reset the control after latch-up. The problem that caused the repeat lockouts must be corrected before returning the burner to normal operation. NOTE:** Recycling power to the control will not reset it from it from a latch-up condition.

Burner will not fire

- Valve lead voltage on too early. Correct bad connection.
- Motor relay welded. If valve has no voltage, and line voltage is okay (102 - 132 VAC), the issue is a welded motor relay. Replace the control.
- Motor current less than 0.2 Amps.

Blocked vent – not recycling:

- Recycle only works on non-manual reset vent switch

Repeated flame failures

Check for:

- Excessive airflow or draft causing flame to leave burner head- check for proper air band setting and draft.
- Excessive back pressure causing flame to be erratic – check appliance and flue for sooting/plugging.
- "Flame rod shorted" message in Lockout – defective flame rod assembly.

Control locks out at end of TFI

- No fuel to burner – check fuel supply lines.
- Shorted electrodes – inspect for cracked porcelain and replace as needed.
- Airflow too high – check air band setting.
- Ignitor module defective – replace if no spark.
- Check wiring connections.
- Flame rod shorted to ground or defective.
- FAIL TFI - RECYCLE: Control Attempted TFI, failed, recycled, and failed for a 2nd cycle.

Control remains in Standby during a call for heat

The 60200FR control needs to have an input voltage of 102 VAC to 132 VAC to function properly. When voltage to the control is out of range, the control will revert to or remain in standby mode until the voltage is restored to an acceptable operating level.

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