



**Programmable, Microprocessor Based Gas Burner Primary Controls**

# Carlin®

Combustion Technology, Inc.

## Model 60200FR Gas Primary Control Data Sheet

- **On-Board LCD Screen**  
Easy to Understand Icons for Inputs and Outputs  
Displays micro-amp Flame reading  
Display operational information
- **Fault History records last 50 fault cycles to aid the technician in troubleshooting**
- **Field Settable Timings**
- **Pre-purge (0, 10, 30, 90)**
- **Trial for Ignition Time (4, 6)**
- **Post-Purge (0, 10, 15, 30, 60, 120)**
- **Number of Recycles allowed (0, 1, 3)**
- **Serviceman Reset Protection (3)**
- **Low Voltage Terminals**  
TT (can be programmed as Used or Not used)  
Blocked Vent input (contact closure, functions as a low voltage limit)  
CO input (contact closure) required to start C.F.H., lockout if not detected during run  
Alarm output (dry contacts) 24VAC/DC

|   |  |
|---|--|
| <b>Power input (red/white wire)</b>     | 120 VAC, 60 HZ, 9 VA                                   |
| <b>Limit circuit input (black wire)</b> | 120 VAC, 60 HZ   |
| <b>Motor load (orange wire)</b>         | 10 FLA / 60 LRA<br>(reduce by valve and ignition load) |
| <b>Ignitor load (blue wire)</b>         | 120 VAC, 60 HZ, 500 VA                                 |
| <b>Valve load (violet wire)</b>         | 2 amps   |
| <b>Aux</b>                              | 120 VAC, 1 amp   |

|                                      |                             |
|--------------------------------------|-----------------------------|
| <b>Alarm contacts (dry contacts)</b> | 24V, AC/DC, 2A              |
| <b>Operating temperature limits</b>  | +32°F to +140°F             |
| <b>Storage temperature limits</b>    | -40°F to +185°F             |
| <b>Thermostat</b>                    | 24 VAC, 0.1A                |
| <b>Blocked Vent</b>                  | 12 VDC, 2mA                 |
| <b>CO</b>                            | 12 VDC, 2mA                 |
| <b>Agencies</b>                      | UL recognized (US & Canada) |

## Installing and Wiring

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

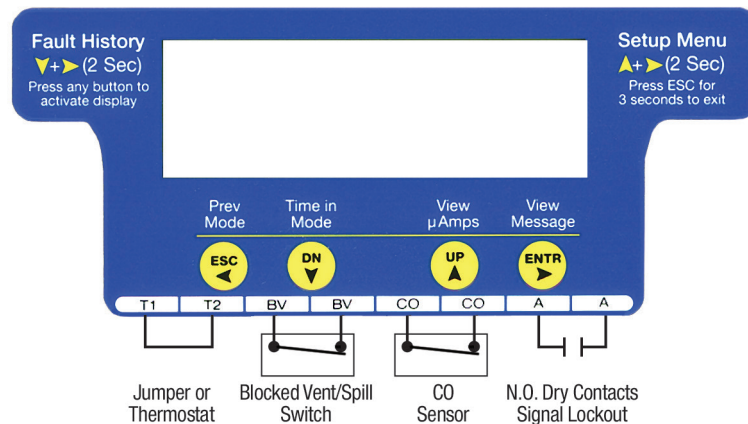
**WARNING** Always disconnect power source before wiring to avoid electrical shock or damage to the control. All wiring must comply with applicable codes and ordinances.

### 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.

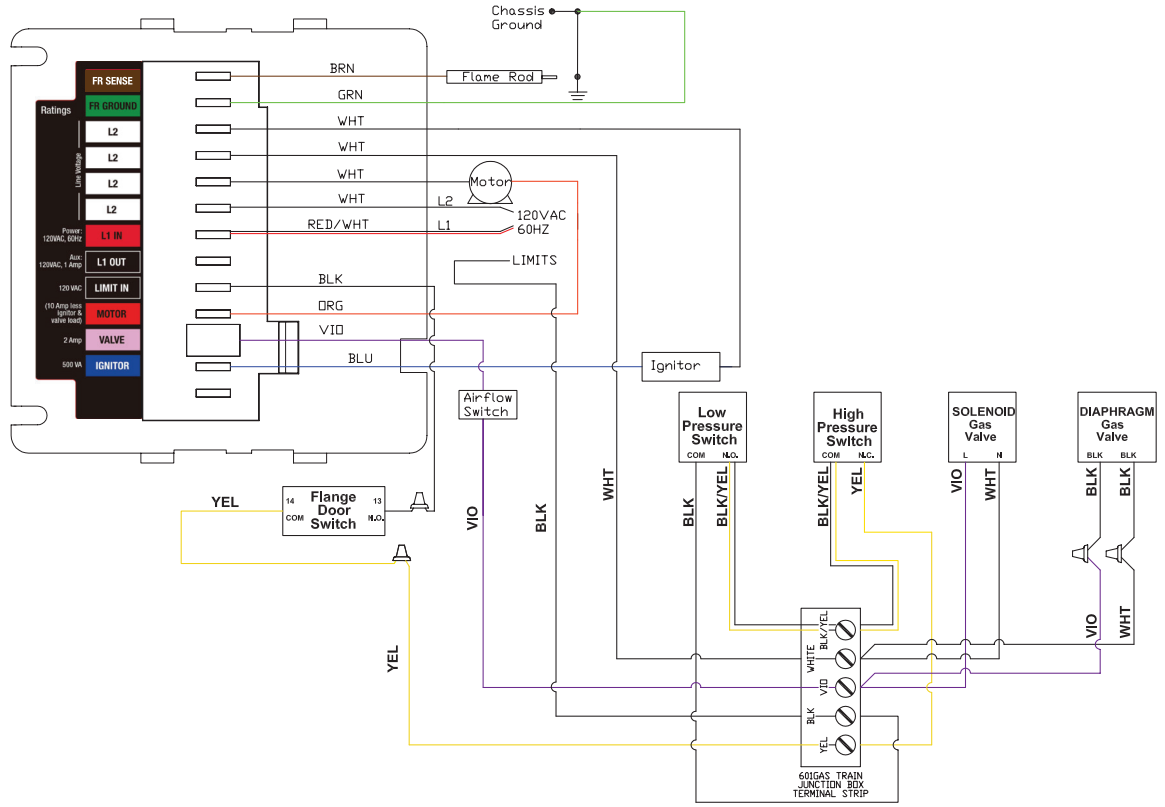
### Low Voltage 60200FR Terminals

- T-T** Thermostat terminals, connect Thermostat or Jumper wire. Terminals provide a current source, never apply external power under any circumstances.
- BV** Blocked Vent terminals, connect blocked vent (spill switch). Terminals provide a current source, never apply external power under any circumstances.
- CO** Carbon Monoxide terminals, connect CO sensor. Terminals provide a current source, never apply external power under any circumstances.
- A-A** Alarm terminals, connect Alarm. Terminals provide a 24 VAC/VDC – rated dry contact, suitable for use with fire/security systems.

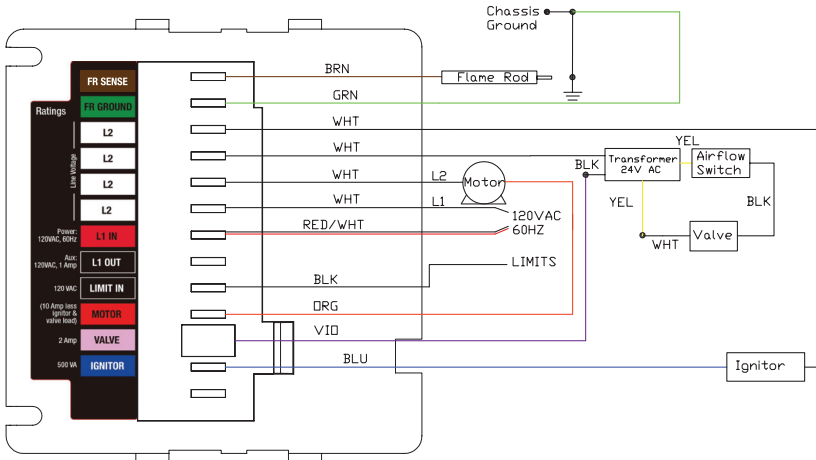


Wiring must comply with local and national electrical codes, and with the wiring diagram.

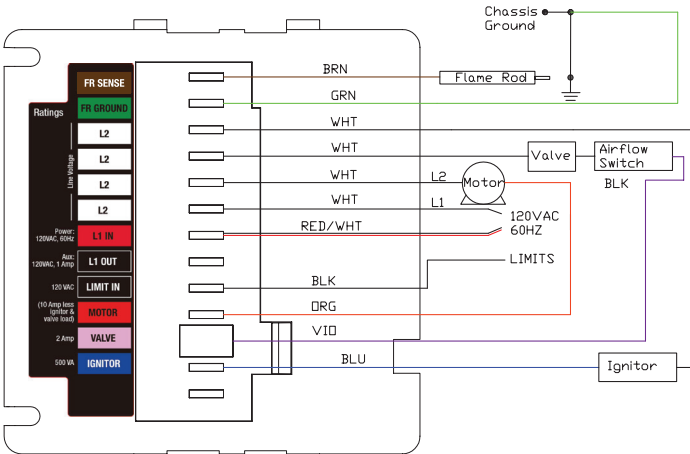
**Commercial Gas Train 120V**



**EZGas Pro 24V**



**EZGas 120V**



# Programming and Setup

## Definitions:

**Blocked Vent (BV):** The blocked vent switch must be closed before the control will attempt to start a call for heat. Then the control will continuously check for a blocked vent condition starting 30 seconds after TFI (in Flame Proven). If the blocked vent switch is open, indicating a blocked vent, the control will shut down and go into recycle (subject to the Allowed Recycle setting). Lockout occurs if the blockage persists and the Allowed Recycles setting is reached during any call for heat.

If the blocked vent switch opens after 30 seconds into the Flame Proven the control will shut down within 2 seconds and will be permitted to recycle (subject to the Allowed Recycle setting). Lockout occurs if the blockage persists and the Allowed Recycles setting is reached during any call for heat. If using a manual reset blocked vent spill switch, the control will remain in standby with the display reading BV Switch Open.

**Call for Heat (C.F.H.):** TT on + Limit In on + BV on + CO on

**Pre-Purge:** Time period the motor is on prior to T.F.I.

**Trial for Ignition: (T.F.I.):** Burner Flame Establishing period

**Post-Purge:** Time period the motor is on after a Call for Heat has been satisfied

**Post-Purge Interrupt:** Time at which the 120 second Post-purge will be interrupted if a C.F.H. occurs during the Post-purge.

**Allowed Recycles:** Number of Recycles allowed during a single C.F.H. prior to lockout due to flame loss.

**TT Used:** Select "NO" when not using TT, select "YES" when using TT

**Baseline Reset:** Resets the baseline statistics used by the fault history

**Factory Default:** Resets ALL settings to the "Factory Defaults"

| Pre-Purge* | T.F.I.* | Post-Purge* | Post-Purge Interrupt* | Allowed Recycles | TT Used | Reset Baseline | Factory Default |
|------------|---------|-------------|-----------------------|------------------|---------|----------------|-----------------|
|            |         | 120         |                       |                  |         |                |                 |
|            |         | 60          |                       |                  |         |                |                 |
| 90         |         | 30          |                       |                  |         |                |                 |
| 30         |         | 15          |                       | 3                |         |                |                 |
| 10         | 6       | 10          | 60                    | 1                | Yes     | Yes            | Yes             |
| 0          | 4       | 0           | Never                 | None†            | No      | No             | No              |

Shaded box = default settings

\*In seconds

†MA code ("N" models) are non-recycling and will lock out on flame failure

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

## Button Functions

### Reset

1. Return to Standby from other operating states. Press for ½ second
2. Reset control from Lockout. Press for 1 second
3. Reset control from Latch-up. Press for 30 second

### Display Control

#### ESC / ◀

- Display previous Operating State from Operating screen.
- Exit Log or Setup screen to Operating screen with 3 second press.
- Scroll through recent fault in Log screen.
- Scroll to previous parameter in Setup screen.
- Reject parameter change from Setup screen. Displays UNCHANGED on line 2 then after 2 sec, displays parameter with unchanged value.

#### DN / ▼

- Display Time on line 2 of Operating screen.
- Scroll down when in Log or Setup screen.

#### UP / ▲

- Display Flame Rod – μAmps on line 2 of Operating screen.
- Scroll up when in Log or Setup screen.

#### ENTR / ▶

- Display status/fault messages on line 2 from Operating screen.
- Move to less recent fault in Log screen.
- Move to next parameter in Setup screen.
- Accept parameter change from Setup screen. Displays ENTERED on line 2 then after 2 sec, displays parameter with changed value.

#### UP / ▲ & ENTR / ▶ for 3 seconds

- Enter Setup screen.

#### DN / ▼ & ENTR / ▶ for 3 seconds

- Enter Fault History screen.

#### DN / ▼ & UP / ▲ for 3 seconds

- Enter Diagnostic screen to display Load Current sensed and Line voltage.

## Screen Information

The first line on the LCD screen shows the controls Firmware version at power up then will show the operating state. The screen turns off after 30 minutes and will turn on if the control goes to lockout or if any button is pushed

**Power On:** Open all manual gas valves. Close the line switch.

The screen displays the firmware version for 5 seconds

- “Version”
  - Display program version info for 5 seconds
- “Startup”
  - 3 sec of self-tests to verify internal operation, including a flame rod calibration (when the circuit looks at the flame rod signal at standby and uses this value to compare to when the control knows that the flame should be present). Once the tests pass, the control goes to “Standby”
- “Standby”
  - Normal state, wait for a CFH.
  - If fault message “BV Switch Open” or “CO Switch Open” is displayed, control will remain in standby even if there is a call for heat

**Call for Heat (CFH):** Set the Thermostat (TT) to Call for Heat, The BV, CO and Limit In must be closed to initiate a call for heat

- “Pre-Purge”
  - Turn on the burner motor
  - Motor on, Ignitor & Valve off
- “Pre-Ignition”
  - Ignitor turns on to establish spark prior to the gas valve(s) opening
  - Motor on, ignitor on, valve off
- “Trial for Ignition”
  - Motor on, Ignitor on, Valve(s) on
  - The ignitor turns off at the end of the TFI time and the flame rod must sense flame. Lockout if no flame detected
- “Flame Proven”
  - Maintain the burner on until the CFH is satisfied
  - Motor on, Ignitor off, Valve(s) on
- “Post-Purge”
  - Enter from Flame Proven when the CFH is satisfied.
  - TT or HV-Limit open.
  - Or if flame is lost during flame proven
  - Motor on, Ignitor off, Valve(s) off
- “Recycle”
  - Occurs on flame loss in flame proven
  - Motor off, Ignitor off, Valve(s) off for 60 sec. or lockout if the recycle limit has been reached (see setup)
- “Lockout”
  - Motor off, Ignitor off, Valve off, Alarm on
  - No flame detected at the end of TFI
  - Flame is detected during Pre-purge, Pre-ignition or Post-purge
  - CO input not detected during Pre-purge, Pre-ignition, TFI or Post-purge
  - BV input not detected during Pre-purge, Pre-ignition, TFI or Post-purge
  - Motor, ignitor or valve relay weld detected
  - If the control is miswired causing voltage to be detected on the outputs terminals, motor, ignitor or valve, when not expected
  - Recycle limit count has been reached

When a lockout occurs, the screen turns on, the fault icon flashes and a fault message is displayed. The screen will cycle every 4 seconds between 2 displays, one giving the fault message and one giving the amount of time in the lockout state. For example, if the cause was loss of the CO input the fault icon would flash and the message would read “CO detected.” After 4 seconds, the time in the lockout state “secs or mins” will be displayed. This cycle will continue until the fault is resolved.

| <i>Fault Message</i> | <i>Possible causes</i>  |
|----------------------|---|
| NO FLAME             | No flame detected. Cause unknown.                               |
| RECYCLE LIMIT        | Exceeded “Recycles” setpoint limit                              |
| MOTOR POWERED        | Motor relay welded or miswired                                  |
| IGNITOR POWERED      | Ignitor relay welded or miswired                                |
| VALVE POWERED        | Valve relay welded or miswired                                  |
| CO SWITCH OPEN       | CO switch detected open indicating CO detected                  |
| BV SWITCH OPEN       | BV switch detected open indicating a blocked vent               |
| FLAME IN PREPURGE    | Flame detected in prepurge                                      |
| NO MOTOR POWER       | Motor has no power (no 120volts present when there should be)   |
| NO IGNITOR POWER     | Ignitor has no power (no 120volts present when there should be) |
| NO VALVE POWER       | Valve has no power (no 120volts present when there should be)   |
| FLAME IN PREIGN      | Flame detected in preignition                                   |
| FLAME DETECTED       | Flame detected in postpurge or recycle                          |

To Reset from Lockout, press and hold the reset button for 1 second

“Latch-up” If the control locks out 3 times during a single call for heat, latch-up occurs. The control may be reset from latch-up by holding the reset button down for 30 seconds, unless in permanent latch-up.

A permanent latch-up occurs when a relay weld is detected and cannot be corrected. When this occurs, the display will read “Latchup Replace Control”.

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# Operating and Fault History

## The 60200FR stores operating history

The first line contains the parameter listed below.

The second line contains the Value and Units if appropriate.

Lines starting with "Total" are not reset by Baseline Reset.

All other lines are reset using "Reset Baseline" setpoint.

### "Fault Cycles"

- Number of fault cycles in log (50 max, then oldest is discarded)

### "Total Cycles"

- Total Number of CFH cycles since control was put into service

### "Total Run Time" (Motor on)

- Total Motor on time since control was put into service

### "Total Burn Time" (Valve on)

- Total Valve on time since control was put into service

### "Total On time"

- Total time since control was put into service

### "Baseline time"

- Elapsed time since baseline was reset

### "Max Line Volts"

- Highest line volts recorded since baseline reset

### "Min Line Volts"

- Lowest line volts recorded since baseline reset

### "Recycles"

- Total Recycles since baseline reset

### "Run Time" (Motor on)

- Total Motor on time since baseline reset

### "Burn Time" (Valve on)

- Total Valve on time since baseline reset

### "CFH Cycles"

- Number of CFH cycles since baseline was reset

## The 60200FR stores information from the last 50 fault cycles in a fault log with 1 being the latest fault

### Fault Message

- The message that accompanied this fault
- If it was a Lockout message, the cycle is faulted

### End State

- The last operating state before returning to Standby
- If not Post Purge or Flame Proven, the cycle is faulted

### Flame Rod $\mu$ A

- The FR current on entry to Lockout or Standby
- If the FR current is outside its limits, the cycle is faulted

### Line Volts

- Running average of detected Line Volts at end of CFH cycle
- If <102 or >132, cycle is faulted

### Motor Current

- " - " if current has not been determined yet
- "Ok" if current is known and above limit
- "Low" if current is known and below limit  
Low current causes the cycle to be faulted

### Ignitor Current

- " - " if current has not been determined yet
- "Ok" if current is known and above limit
- "Low" if current is known and below limit  
Low current causes the cycle to be faulted

### Valve Current

- " - " if current has not been determined yet
- "Ok" if current is known and above limit
- "Low" if current is known and below limit  
Low current causes the cycle to be faulted

### Recycle

- "Yes" if a recycle occurred in CFH cycle  
A recycle causes the cycle to be faulted
- "No"

### Run time

- Time motor output is on during this cycle

### Burn time

- Time valve output is on during this cycle

### CFH Cycle, enter at this row on column change

- The CFH cycle during which this fault occurred
- "1" if first cycle after baseline was reset

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# Status Icons

## Line 1 Inputs

### "POWER"

- On if 120 VAC power detected
- Flash if Voltage is over 132 VAC or less than 102 VAC

### "HV-LIM": High Voltage Limit string input

- On if an input detected on the High Voltage Limit input terminals

### "BV": Blocked Vent, Low Voltage Limit string input

- On if BV input detected on the Low Voltage Limit input terminals

### "T-T": Thermostat input

- On if the T-T current is above the TT closed threshold
- Turn on if T-T used "NO" is selected

### "FLAME": Detected using Flame Rod

- On if DC uAmps in flame rod is at or above the flame detect threshold >0.8 $\mu$ A

## Line 2 Outputs

### "FAULT"

- Fault detected, alarm output on. Always flashes when activated

### "MOTOR"

- On with Motor output
- Flash if running and Low current detected
- Flash if suspected motor fault

### "IGNITOR"

- On with Igniter output
- Flash if running and Low current detected
- Flash if suspected Igniter fault

### "VALVE"

- On with Valve output
- Flash if running and Low current detected
- Flash if suspected Valve fault

# Service & Troubleshooting

## Burner (control) will not come on

### No power to control

- Check line voltage to the control (at least 102 VAC).
- Check all electrical connections.

### Control is in lockout

- Press the reset button for 1 second.

### Other no start problems

- Line voltage <90 VAC. Check line voltage. >132VAC
- Motor relay welded. If valve/ignitor has no voltage, and line voltage OK, the issue is a welded motor relay. Replace the control.
- Reversed 120 VAC polarity – make sure hot and neutral lines are not reversed on incoming lines.
- Check T-T, BV, CO and HV limit inputs.

## 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.
- Defective flame rod assembly.

## Control locks out at end of TFI

### Check for:

- No gas to burner – check gas supply. Verify gas pressure is no higher than allowed for gas valve (usually 1/2 psig or 14" water column).
- Shorted electrodes (shorted to burner head or diffuser) – inspect for cracked porcelain and replace as needed.
- Poor spark – check electrode spacing and condition per burner manual. Replace or realign if necessary.
- Airflow too high – check air band setting.
- Ignitor module defective – replace if no spark.
- Check wiring connections.
- Flame rod shorted to ground or defective.

## 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.

TECH SUPPORT HOTLINE 800-989-2275

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