Carlin™
Combustion Technology, Inc.

MODEL 60200
CAD cell
Microprocessor Oil primary control

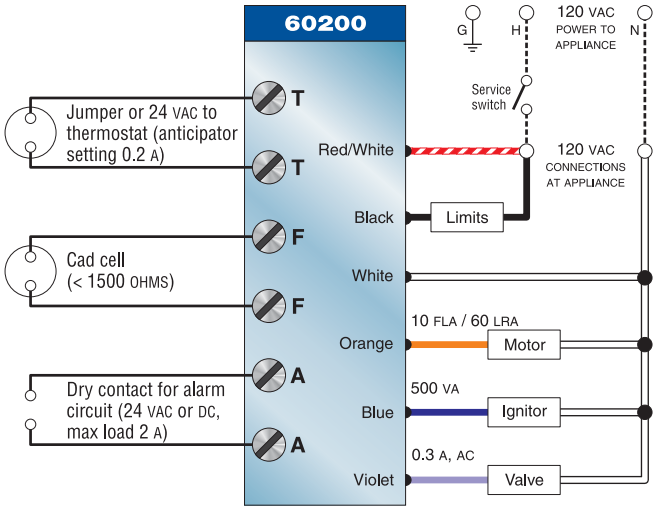
Data sheet

- **Interrupted duty ignition**
- **Recycle on flame failure**
- **Serviceman reset protection**
  (Latch-up after three consecutive lockouts (1))
- **Diagnostic LED's**
- **Valve delay on/motor delay off**
  (Pre/post purge — contact Carlin for available timings)
- **15-second TFI** (trial for ignition)(other timings available)
  (1.3-second flame failure response time (FFRT))
- **Alarm contacts**
- **Thermostat/aquastat compatible**
- ***SMC* Technology** (2)

Power input (red/white wire)	120 VAC, 60 HZ, 9 VA
Limit circuit input (black wire)	120 VAC, 60 HZ
Motor load	10 FLA, 60 LRA
Ignitor load	120 VAC, 60 HZ, 500 VA
Valve load	120 VAC, 60 HZ, 0.3 A
Alarm contacts	24 V, AC/DC, 2 A
Operating temperature limits	+32°F to +140°F
Storage temperature limits	–40°F to +185°F
Thermostat anticipator current	0.2 A, AC
Cad cell resistance — WITH FLAME	R < 1500 OHMS
Agencies	UL recognized (US) CSA certified (Canada)

(1) Latch-up mode shuts down the control after three consecutive lockouts, and requires a special procedure to reset. This ensures the owner will call in a technician to trouble-shoot burner problems.

(2) The 60200 provides two motor relays. Carlin's patented SMC technology (Safety Monitoring Circuit) monitors the contacts of both motor relays. **Lockout** occurs if a motor relay contact is found closed when it should be open. The second motor relay ensures motor shutdown even if the first motor relay fails.



Installing and wiring

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

1. Always disconnect power source before wiring to avoid electrical shock or damage to the control. All wiring must comply with applicable codes and ordinances.
2. Thermostat terminals (T–T) provide a current source. Never apply external power to these terminals under any circumstances.
3. Alarm terminals provide a 24 VAC-rated dry contact, suitable for use with security/fire alarm systems such as Carlin SecureHeat™.

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.

Wiring

- Wiring must comply with local and national electrical codes, and in accordance with the wiring diagram above.

Field checks

1. **Safety timing (TFI) test** — Remove one cad cell wire (F-F). Start burner. After the pre-purge period (valve delay on), the control should lockout within the TFI time limit. Replace cad cell wire.
2. **Flame failure/recycle test** — Start burner. After flame is established (after TFI period), close the oil supply hand valve. This will cause a flame failure sequence as described on the reverse side of this Data sheet. The control should recycle (restart after 65 seconds).
3. If control does not operate as described, check the wiring.

Start-up & operation

WARNING Do not start the burner if the combustion chamber contains oil or oil vapor.

NOTICE Per UL requirements, the control will not turn on if the cad cell senses flame during the self-test. If the cad cell sees light, the control will remain in self-test mode until the cad cell no longer senses light (flame). The amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds.

NOTICE Check 60200 control label for trial for ignition (TFI), pre-purge and post-purge timings.

Ⓐ Ⓡ Power ON Open all manual oil line valves. Close the line switch. (If Red LED turns on constant Ⓡ, control is in lockout. See below to reset.)

Ⓐ Ⓡ Self-test 1 (*Revision B controls only*) The control performs a "boot-up" test to verify internal operation each time power is applied to the red/white wire. About 4 seconds after power application, the amber LED turns on. The test continues for about 6 more seconds. If the test fails, the control turns the amber LED off and repeats this test sequence until successful.

Ⓐ Ⓡ Stand-by (No call for heat) If Self-test 1 is successful, amber LED turns off and control waits for heat call.

Ⓐ Ⓡ Call for heat Set thermostat (or limit) to call for heat. Thermostat circuit must be closed and power coming to black wire from limit circuit.

Self-test 2 The amber LED turns on. For the first 3 to 4 seconds, the control performs a self-test. If the cad cell senses flame, the control repeats this test until flame is no longer detected. During this time, the amber LED will remain on, but blink off momentarily Ⓐ every 3 to 4 seconds. If the control detects motor contacts closed, lockout occurs.

Ⓐ Ⓡ Burner on After the self-test, amber LED turns off. The ***ignitor*** starts, followed 1 second later by the ***motor***. (This delay compensates for sluggish start-up of some AC transformers.)

Ⓐ Ⓡ Pre-purge The ***oil valve*** opens after the valve delay-on period (pre-purge). (For oil valve delay on operation, wire oil valve to the violet lead. If not using an oil valve, cap the violet lead to automatically disable pre-purge and post-purge.)

Ⓐ Ⓡ TFI The cad cell must sense flame within the TFI time limit (trial for ignition). After cad cell senses flame, the ignitor stays on another 10 seconds (flame stabilization period).

Ⓐ Ⓡ Run The burner continues firing during call for heat if the cad cell senses flame. Both LED's are off during normal running.

Ⓐ Ⓡ Lockout If cad cell does not sense flame within the TFI time limit after burner starts, **lockout** occurs. The control turns the red LED on constant, and closes the ***alarm*** contact.

To **Reset** Push in and hold reset button for 1 second, then release.

Ⓐ Ⓡ Latch-up If the control locks out **3 times** during a single call for heat, **latch-up** occurs. The control turns on both the amber and red LED's constant. You must use the special procedure below to reset the control after latch-up.

WARNING **Reset after latch-up — *Only a qualified service technician should attempt to reset the control after latch-up. The problem that caused the repeated burner problems must be corrected before returning the burner to normal operation.***

Ⓐ Ⓡ Push in and hold the reset button for about 10 seconds. The amber and red LED's will begin to flash alternately.

Ⓐ Ⓡ After the LED's begin flashing, continue holding the reset button for about another 20 seconds. The LED's will turn off. Release the reset button and the control will restart. (Releasing the button before the LED's turn off will cause the control to remain in latch-up.)

NOTICE The 60200 control will not reset from lockout or latch-up if power is interrupted.

Ⓐ Ⓡ Flame failure If the cad cell loses flame signal during operation (after the TFI), the red LED flashes. The ***oil valve*** closes within 2 seconds. The ***motor*** remains on for the motor delay off period, then shuts off. (If no oil valve is wired to the control, the burner shuts down within 2 seconds.) **Recycle**: Control waits for 65 seconds (with red LED flashing), then begins again at **Self-test 2**. Red LED goes off Ⓡ.

Ⓐ Ⓡ Post-purge Set thermostat (or aquastat) to stop call for heat. The ***oil valve*** (if installed) will turn off within 2 seconds. The ***motor*** remains on for the motor delay off period (post-purge), then turns off. (If no oil valve is wired to the control, the burner shuts off within 2 seconds after end of call for heat. There is no post-purge.)

Ⓐ Ⓡ Stand-by Control remains in stand-by mode until limit circuit sends power to the black wire and thermostat circuit closes (call for heat).

Model 60200 diagnostic LED's

Ⓡ – Red **OFF** Ⓡ – Red **ON** Ⓡ – Red **FLASHING**

Ⓐ – Amber **OFF** Ⓐ – Amber **ON** Ⓐ – Amber **FLASHING**

Ⓐ – Amber **BLINKING** (blinks off momentarily every 3 to 4 seconds)

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
- Red LED will be on. Press the reset button for 1 second.
- If the control returns immediately to lockout, the Safety Monitoring Circuit may have detected an internal control problem. Replace the control.

Ⓐ Ⓡ CAD cell seeing light
- Amber LED blinks off each 3 to 4 seconds. Remove one yellow lead from FF terminal on the control.
  If the amber ***LED remains on*** Ⓐ with a wire detached, the control is defective.
  If amber ***LED goes off*** Ⓐ, control is OK, and:
  - light is leaking into the burner housing, *OR*
  - CAD cell is defective, *OR*
  - there is a problem with the CAD cell wiring or holder.
  - If appliance was recently shut down, CAD cell may see residual hot spots in chamber.

  To troubleshoot:
  - **Check CAD cell** by unplugging it and measuring the resistance across its pins: dark resistance at least 50 KOHMS; room light resistance less than 10 KOHMS. Replace if necessary. If the CAD cell functions properly, reinstall the cell and close the burner housing.
  - **Check for stray light** by measuring the CAD cell resistance looking into the inactive combustion chamber. It should read at least 50 KOHMS.

Repeated flame failures (Ⓐ Ⓡ *flashing red LED*)

Check for:
- CAD cell is defective.
- Air leaking into oil line causing flame out — Check oil line connections and filter gasket.
- Defective nozzle causing flame to be erratic — Change nozzle.
- 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.

Control locks out after TFI (Ⓐ Ⓡ *red LED on*)

Check for:
- No oil to burner — Check oil supply, filter, lines.
- Shorted electrodes — Inspect for cracked porcelain and replace as needed.
- Poor spark — Check electrode spacing and condition per burner manual. Replace or realign if necessary.
- Nozzle clogged — Replace nozzle.
- Airflow too high — Check air band setting.
- Ignitor module defective — Replace if no spark.
- CAD cell defective.
- Oil valve stuck in closed position.
- Check wiring connections.