Carlin®
Combustion Technology, Inc.

EZ-Temp™
MODEL 90000

Microprocessor
Temperature Controls

Data sheet

Specifications

- Carlin's Model 90000 microprocessor-operated, multiple-contact temperature limit controls are available in three configurations, described below. Each model provides two contacts — one for operating limit and one from high limit.

- Refer to separate product listing sheets for pre-defined models, or request a control to meet your specifications, within the available ranges listed below.

	90000B	**Temperature limit control** • Operating and high limit action • Smart manual reset on high limit • 1 electronic sensor • Operating and limit contacts in series
	90000C	**Redundant limit temperature control** • Operating and high limit action • Smart manual reset on high limit • 2 electronic sensors (operating and high limit) • Operating and limit contacts in series
	90000CE	**Combination operating limit and manual reset high limit control** • Independent operating and high limit contacts in series • 2 electronic sensors (operating and high limit) • Lockout on diagnostic failure and limit action • Manual reset from lockout • High limit test function

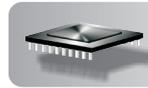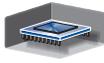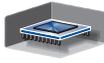| Control model	B, C	CE
Control power input (red-white wire)	120 VAC, 11 VA	
Contacts	2 in series	
Contact rating Full load	120 VAC, 10 AMPS	
Locked rotor	120 VAC, 60 AMPS	
Wires Quantity	3	
120 VAC Hot / Neutral	red-white / white	
Limits **OUT**	black	
Adjustable oper. limit range	Any range between 50°F to 240°F	
Fixed high limit temperature	Any value from 160°F to 240°F	Any value from 160°F to 250°F
Fixed differential (subtractive)	Any value from 5°F to 100°F	
Operating temperature limits	+32°F to +140°F	
Storage temperature limits	−40°F to +185°F	
Agencies	UL **Recognized** United States & Canada	

■ Dynamic Display
Accurately displays temperature setting and error codes

■ Navigation Buttons
Used to navigate through different EZ-Temp modes and settings

■ Indicator LEDS
LEDs to indicate Lockout / Latchup and Call for Heat

■ Multiple sensor option (1 or 2)
(Using individual or dual sensor assemblies)

■ Power-independent lockout
(Power cycling won't reset from lockout or latch-up)

■ Smart manual reset
(Manual reset only if operating limit doesn't open)

■ SMC Technology [1]

■ Serviceman reset protection
(Latch-up after three consecutive lockouts [2])

(1) The 90000 provides two limit relays. Carlin's patented SMC technology (Safety Monitoring Circuit) monitors the contacts of both relays. **Lockout** occurs if a limit relay contact is found closed when it should be open.

(2) 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 licensed technician to troubleshoot and correct burner problems.

Model 90000B, C and CE Diagnostic LED's

LEGEND ● ON   ○ OFF   ☀ BLINKING

R | [ ] [ ] | A Power Off
R | 1 2 5 | A Power On
R | 1 2 5 | A No Call for Heat
R | 1 2 5 | ● A Call for Heat
● R | E 0 1 | A Lockout
☀ R | E 0 1 | A Latchup, red flashes every 2 seconds
☀ R | 1 2 5 | A Primary Relay Warning, red flashes every 5 seconds

Button Press Instructions

Up | Reset | Down

Display Mode — Quickly press the UP or DOWN button to display temperature.

Set Temp Mode — Press and hold UP and DOWN buttons for 5 seconds to enter "Set Temperature" mode.

Press the UP or DOWN button to increase or decrease the "Set Temperature".

Do not press any buttons for 5 seconds to exit the "Set Temperature" mode and save the new temperature.

Diagnostic Mode — Press and holde UP and DOWN buttons during power up to enter "Diagnostic Mode" mode.

Press the DOWN button to move to the next error recorded in the 16 deep error log. When you see an "E – –" displayed, you have reached the end of the log. If you press the DOWN button again, you will cycle back to the beginning of the log.

Press and hold RESET for 3 seconds to clear all recorded logs.

Lockout Mode — Press and hold RESET for 5 seconds to exit Lockout.

Latchup Mode — Press and hold RESET for 30 seconds to exit Latchup.

WARNING **Electrical shock hazard:** Disconnect power to appliance when wiring or servicing any electrical component.

Operation Modes

Power, Off – (No power is applied to the red-white wire)
- All lights and screen will be off.

Power, On – (Power applied to red-white wire)
- System will power on and enter NORMAL OPERATION MODE

Self-test – When power is applied, the 90000 performs a self-test, checking sensor(s) and microprocessor and verifying limit contacts are open. The power-up test lasts from 3 to 5 seconds. The 90000 continues diagnostic checking during the operating cycle as well. Any self-check failure causes a lockout (see below).

Call for Heat – When the temperature at the operating sensor is at or below setpoint minus fixed differential, the control closes the operating relay contacts.

Stand By – When operating sensor reaches setpoint temperature or above, temp control will open the operating relay contacts.

Normal Operation (Mode) – (Initial starting mode)
- The EZ-Temp will display the User Set Temperature.

Display – (How to enter = Pressing UP or DOWN key in NORMAL MODE)
- In DISPLAY MODE, the EZ-Temp will display current temperature reading for 5 seconds, then return to NORMAL OPERATION

Setting – (How to enter = Hold up and down buttons for 3 seconds while in NORMAL OPERATION)
- In SETTING MODE, the user is able to adjust the operating limit (via setting the set temperature). Once in this mode, the display will begin flashing the current set temperature. The display will increase one degree per UP or DOWN button push or 10 degrees per second when the button is held.

Diagnostic – (How to enter = Power up the system with the UP and DOWN buttons depressed. Once buttons are released, the system will move into diagnostic mode)
- DIAGNOSTIC MODE displays recorded error codes. When powered in this mode, the display will show the newest recorded error code. As the DOWN key is pressed, the system will display error codes from newest to the oldest. When there are no more codes to display, the EZ-Temp will show a "ε – –" to indicate end of error codes. If the user continues to push the down button, the system will go back to the newest error code and begin displaying the error codes again from newest to oldest. The only way to exit this mode is to power cycle the system. To clear error codes (while in diagnostic mode), push and hold reset button for 3 seconds. To clear error codes (while in diagnostic mode), push and hold RESET button for 3 seconds.

High Limit Temp – Fixed temp where the control will soft lockout (model dependent) and display "HL".

High Limit Test – (How to enter = In NORMAL OPERATION, hold RESET, UP and DOWN buttons for 3 seconds)
- During this operation, the current temperature reading followed by higher temperatures will flash until the high limit temperature is reached. The Red LED will turn on (Solid = Lockout; Blinking = Latchup) and the E05 error code will display. Press the reset button for 3 seconds, if in lockout, or 30 seconds if in Latchup, to return to normal operation.

Soft Lockout – (When any temperature sensor goes out of range or the system has detected a high temp condition and the operating relay contacts are open)
- When in this state, it will display error code or "HL" but will leave the lockout LED off. If the condition that caused the soft lockout clears, the system will return to normal operation.

Lockout – (Numerous Error Codes)
- The EZ-Temp will enter this state when an unsafe condition has occurred and the user must intervene and put the system in a safe state. Lockout can be cleared by pressing the RESET button for 3 seconds.

Latchup – (Occurs after 3 LOCKOUTS have been detected)
- The system will enter a safe mode and will not exit the mode without user intervention. You can exit latchup mode by depressing the RESET button for thirty seconds. By exiting this way, the system will reset the lockout count back to zero.

Set Temp – The target temperature of the appliance.

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Configurations

Mounting – 90000 controls mount to any standard well. Mount the 90000 directly to a well (new or existing) with hardware supplied in the separate well mounting kit.

Well Kits – Wells for 90000 sensors are available in the sizes shown below. Well kits include sensor mounting hardware designed to hold sensor securely in position.

Sensors – Sensors are available separately for the 90000.
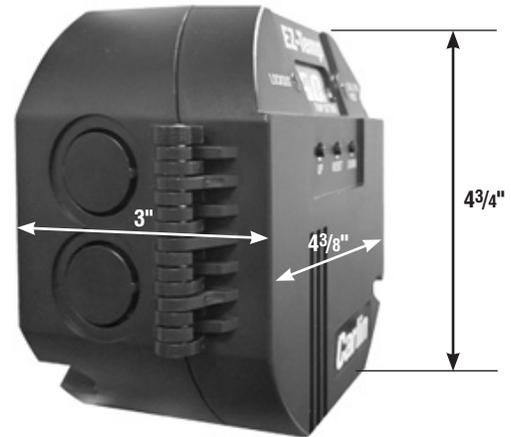
Error Codes

Error Code	Reason
01	Primary (K2) relay is welded on. **Note:** If the control is reset from error code 01, the red LED will flash every 5 seconds indicating the control must be replaced.
02	Primary & Safety relays (K1 and K2) on. The control cannot be reset from error code 02 and must be replaced.
03	Primary & Safety relays (K1 and K2) are off. **Note:** If this error is detected, the control will show error code **03** and enter soft lockout two times to try and resolve the issue. If the problem persists the control will enter hard lockout.
05	Simulated High Temp lockout
06	Temp is above set high temp but below thermistor high (250°F)

Error Code	Reason
20	Temp sensor 1 out of range failure
21	Temp sensor 2 out of range failure
22	High limit temp sensor out of range failure
23	Temp sensor 1 pin is open
24	Temp sensor 2 pin is open
25	High limit temp sensor is open

10, 11, 12, 13, 14, 15	Internal hardware safety failure – unit should be replaced. Contact customer service for additional information. 1-800-989-2275

90000B

White

Red/White

High Limt

Operating limit

Black

Sensor

G

G

N

120 VAC
CONNECTIONS
AT APPLIANCE

120 VAC
POWER TO
APPLIANCE

Service
switch

H

Dual limit OUT

IMPORTANT: Strip sensor lead length to 0.34

90000 C, CE

White

Red/White

High Limt

Operating limit

Black

High limit

Limit sensor

G

G

N

120 VAC
CONNECTIONS
AT APPLIANCE

120 VAC
POWER TO
APPLIANCE

Service
switch

H

Dual limit OUT

To high limit sensor

To operating limit sensor

IMPORTANT: Strip sensor lead lengths to 0.34

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