EZ-Temp™

Microprocessor
Temperature Controls

Instruction Manual

WARNING **Installer/servicer** — Except where specifically stated otherwise, this manual must be used only by a ***qualified service technician***. Read and follow all instructions in this manual and in the appliance manual. Failure to comply with this or other requirements in this manual could result in severe personal injury, death or substantial property damage.

WARNING This symbol calls out a hazard that could cause severe personal injury, death or substantial property damage if the instructions given are not followed.

NOTICE **Wiring:** Refer to EZ-Temp data sheet for wiring information.

WARNING **Verify ratings:** Verify the ratings of the control meet the requirements of the appliance as specified in the appliance instructions. Refer to the EZ-Temp control data sheet for required electrical supply and load ratings. Verify that the controls, wiring and installation comply with all applicable codes.

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

Scald hazard: Water hotter than 130°F can cause serious burns or death. Follow water heating appliance manufacturer's guidelines when installing temperature limit controls - DO NOT install a control that can be set at a higher temperature than specified. Also verify that the installation includes all water temperature regulating means needed to ensure the safety of building occupants, in compliance with all applicable codes.

Verify operation: Test the controls/appliance to verify the appliance operates as specified in the appliance manual before leaving the installation.

Carlin Combustion Technology, Inc.
70 Maple Street East Longmeadow, MA 01028
Ph 413-525-7700 Fx 413-525-8306

TECH SUPPORT 800-989-2275 carlincombustion.com

Install sensor(s)

To install a new immersion well:

1. Turn off power to the appliance and close isolation valves.
2. Follow appliance instructions to drain the appliance so water line is below the insertion tapping.
3. Remove existing well and sensor. Apply a small amount of pipe dope to the new well and secure in tapping.
4. Insert EZ-Temp sensor into well and secure sensor in place as described in the following.
5. Refill appliance with water, following appliance manual procedures.

WARNING When routing sensor wires, avoid sharp edges and use strain relief bushings at penetrations to prevent movement or electrical shorting of the sensor. Sensor wires are not low voltage, and must be routed in conduit.

Configuration A: Sensor and well only

1. Insert the sensor into well (1) until the sensor (2) tip bottoms in the well socket.
2. EZ-Temp well: Slide the rubber retainer (3) over the sensor wires until it firmly contacts the sensor casing. Slide the retainer washer (4) and the jam nut (5) over the wires. Thread the jam nut into the well until snug.
3. Existing well: Press the sensor retainer plug (11) into the well until it securely holds the sensor wires, to prevent movement of the sensor.

Configuration B: Sensor, EZ-Temp well and J-box

1. Insert the sensor into well (1) until the sensor (2) tip bottoms in the well socket.
2. Slide the rubber retainer (3) over the sensor wires until it firmly contacts the sensor casing. Slide the retainer washer (4) over the wires.
3. Slide the lock washer (8), J-box (7), and jam nut (4) over the wires.
4. Thread the jam nut into the well and tighten to secure the J-box and sensor in place.

Configuration C: Sensor, EZ-Temp well and J-box

1. Remove the center knock-out from one side of the J-box (7).
2. Position the well clamp (10) over the end of the well (9) (sensor not yet installed) and slide the well clamp (10) toward the side of the J-box (9) engaging the keyslot opening with the well undercut.
3. Position the flat washer (12) over the open knockout and install the tensioning screw (13) through the flat washer (12) and into the well clamp (10), tighten.
4. Insert the sensor into well (9) until the sensor (2) tip bottoms in the well socket.
5. Press the sensor retainer plug (11) into the well until it securely holds the sensor wires, to prevent movement of the sensor.

Mount the control

1. Insert sensor wire terminals into the labelled openings on the back of the control. Press into place firmly.
2. Attach the control to the 4x4 J-box or panel mount, as desired.

Wire the control

1. Control wiring (including sensor wires) must be routed through conduit or electrical enclosures. Follow all applicable codes and the appliance manual.
2. Follow the burner and appliance wiring diagrams to connect the control(s) into the appliance limit circuit.
3. For specific applications, contact your Carlin supplier for further information.

Set the control

1. Follow the appliance manual to set the correct limit temperature for the appliance. To adjust the EZ-Temp control:
   - Insert a screwdriver into the setting slot and rotate until the indicator points to the desired temperature.
2. Test the operation of the appliance and the new limit control(s) to verify correct operation.
3. NOTE: EZ-Temp controls have a subtractive differential — control contacts trigger when the temperature setting is reached. Contacts reset after temperature drops below setpoint minus the differential amount.

Configurations

Carlin EZ-Temp components are available in the following configurations, allowing use with existing wells in addition to EZ-Temp wells.

Surface-mount sensors are also available.

- **Control kits**

  EZ-Temp controls mount to a standard 4x4 J-box or can be panel mounted. Control kits include the control and sensor(s) (item 2) plus hardware needed for mounting to an existing well (items 10 and 11). To obtain an EZ-Temp well and hardware, obtain an EZ-Temp well kit, below.

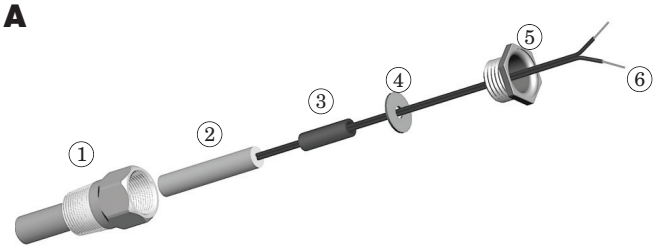
- **Well kits**

  EZ-Temp wells are available in the sizes shown below. Well kits include a well (item 1), rubber sensor retainer (item 3), retainer washer (item 4), jam nut (item 5), and J-box lock washer (item 8).

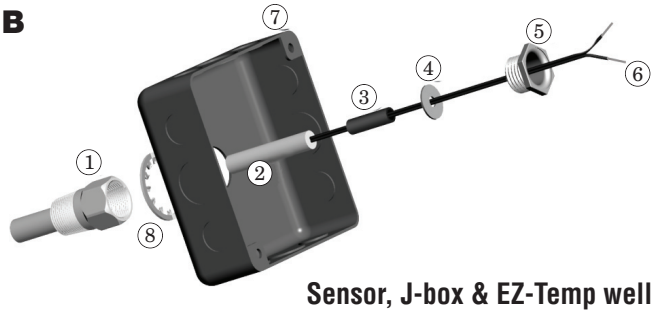
- **Sensor Kits**

  Sensor kits include only the sensor (item 2). Sensors are available in single and dual configurations (two sensors in the same assembly). For controls that use multiple sensors, obtain separate sensor kits or a sensor kit and a dual sensor.

A

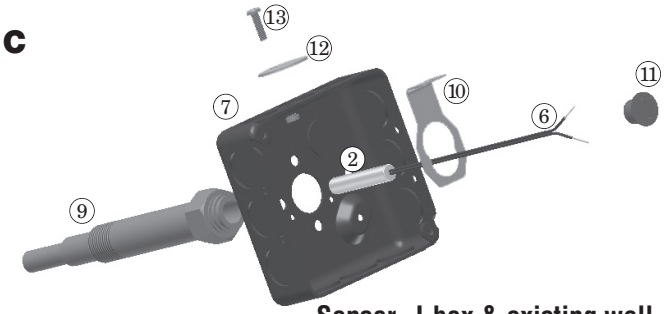


B



Sensor, J-box & EZ-Temp well

C



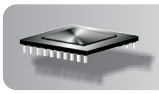
Sensor, J-box & existing well

① EZ-Temp well	⑧ Lock washer
② EZ-Temp sensor	⑨ Existing well
③ EPDM rubber retainer	⑩ Well clamp
④ Retainer washer	⑪ Sensor retainer plug
⑤ Jam nut	⑫ Flat washer
⑥ Sensor leads	⑬ Tensioning screw
⑦ J-box, 4 x 4	

Carlin part number MNEZT Rev. 09/11/2008

Carlin™ Combustion Technology, Inc.

EZ-Temp™ MODEL 90000



Microprocessor Temperature Controls

Data sheet

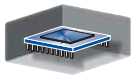
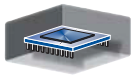
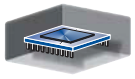
- **Multiple sensor option (1 or 2)**
  (Using individual and/or dual sensor assemblies)
- **Easy remote sense**
  (Electronic sensors, wired to control)
- **Smart manual reset**
  (Manual reset only if operating limit doesn't open)
- **Serviceman reset protection**
  (Latch-up after three consecutive lockouts (1))
- **Power-independent lockout**
  (Power cycling won't reset from lockout or latch-up)
- **Diagnostic LED's**
  (Power, call for heat, and lockout/latchup)
- ***SMC* Technology** (2)

(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 licensed technician to troubleshoot and correct burner problems.

(2) 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.

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.

	**90000A**	**Dual limit temperature control** • operating and high limit action • smart manual reset on high limit • 2 sensors (oper. and high limit) • 1 contact — operating limit • 1 contact — high limit
	**90000B**	**Redundant limit temperature control** • operating and high limit • smart manual reset on high limit • 1 sensor • oper. and limit contacts in series
	**90000C**	**Redundant limit temperature control** • operating and high limit action • smart manual reset on high limit • 2 sensors (oper. and high limit) • oper. and limit contacts in series

Control model		A	B	C
Control power input (red-white wire)		120 VAC, 11 VA		
Contacts		2 independent	2 in series	2 in series
Contact rating	Full load Locked rotor	120 VAC, 10 AMPS 120 VAC, 60 AMPS		
Wires	Quantity	6	3	3
	120 VAC Hot / Neutral	red-white / white		
	Oper. limit **IN** / **OUT**	black-green / black	NA	NA
	High limit **IN** / **OUT**	black-red / black-yellow	NA	NA
	Limits **OUT**	NA	black	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		
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 & ULC **recognized** component United States & Canada		

Model 90000A, B & C diagnostic LED's

GREEN	(G) – OFF	G – ON *Power* G – **FLASHING** *Latch-up*
RED	(R) – OFF	R – ON *Lockout*
AMBER	(A) – OFF	A – ON *Control call for heat*

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

Operation

(See wiring diagrams below for wiring connections.)

G R A	**Power OFF**	With no power applied to the red-white wire, all lights are off. Power can be wired directly from appliance 120 VAC terminal to maintain power at all times. Or jumper red-white wire and black-green wire to cycle power with the appliance limit circuit.
G R A	**Power ON**	When power is applied to the red-white wire, the green LED turns on.
G R A	**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 checing during the operating cycle as well. Any self-check failure causes a lockout (see below).
G R A	**Operate**	If the temperature at the operating sensor(s) is below setpoint by at least the fixed differential, the control closes the operating limit contacts. The amber LED turns on.
G R A	**Stand-by**	When the operating sensor(s) see setpoint temperature or above, the 90000 opens the operating limit contact. The amber LED turns off.
G R A	**Limit action**	If the high limit sensor(s) see a temperature above high limit setting, the 90000 opens the high limit contacts, turns on the red LED and checks the operating limit contacts. If the operating limit contacts are open, the control will automatically reset when temperature drops below high limit setting minus differential. The high limit contacts close and the red LED turns off.
G R A	**Lockout**	If the high limit sensor(s) sees a temperature above high limit setting and the 90000 finds the operating limit contacts closed, the red LED turns on and **lockout** occurs. (Lockout also occurs on any diagnostic test failure.) When the temperature drops below high limit setting minus differential, reset the control by pressing the manual reset button. The control will not reset by cycling power off and on.
G R A	**Latch-up**	If the 90000 locks out three consecutive times, it enters latch-up. Reset from latch-up requires a special procedure, intended to require ***licensed serviceman intervention***. During latch-up, the red LED stays on and the green LED flashes. Reset as follows:
G R A	.....	Temperature must be less than high limit setting minus differential.
G R A	.....	Hold reset button at least 10 seconds. The green LED flashes faster.
G R A	.....	Continue holding button another 20 seconds. The control resets and the red LED turns off.

NOTICE Power must flow through the contacts in the direction shown. Changing flow direction will cause the control to lockout or fail to operate.

Configurations

- **Control kits** — 90000 controls mount to a standard 4x4 J-box, supplied with the control. Mount the box directly to a well (new or existing) with hardware supplied, or panel mount. See below for dimensions.
- **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 in single and dual configurations.