

# HCalory Coolant Heater Controller v2

V1.1

29JAN23

UPDATE 29JAN23: I revisited the ad under which I bought this on AliExpress and found new photos of the controller which indicates it has been updated to replace Chinese alarm characters with English. Photo included with mine below. Background text is only faintly readable.

This instruction manual is researched, written and copywritten by me. The information herein has been derived from information in the 'water-heated parking heater' manual provided with the HCalory product I purchased but the manual has no identified source or marking. This 'manual' is a poorly written Chinese translation covering several different controls, not including this one. I have used the control concepts in the manual to extrapolate and verify operation of this control. This document may be freely used and distributed at no cost but must maintain my attribution.

I have endeavored to be clear, describing the operation of this control and have verified my findings through operation of the control with the exception of the error codes. If you find any errors in my documentation, please let me know and I will update my document.

## DESCRIPTION

This control panel has no markings other than the front. It operates a 5kw diesel coolant heater presumably made but at least labeled by HCalory. The heater is approximately a copy of an Espar D5E. The coolant heater is designed to use diesel fuel to heat engine coolant to preheat a diesel engine, allowing it to start more easily in cold weather. These type heaters are also used to provide hydronic heating for water and space heating in vehicles and RV's. Buttons are referred to as 'On/off', 'Set', '+', '-' respectively.

## GENERAL FUNCTION

1) Starting, the unit begins circulating combustion air and coolant. The glow plug preheats for 60s.



- 2) After 60s, the fuel pump starts and combustion begins to warm the coolant.
- 3) There are two methods for regulating heater operation; time/temperature or temperature only. 'Temperature' refers to the operating temperature of the coolant (only), not the living space or device being heated. This control has no capacity to monitor temperatures other than its own internal operation.
- 4) Under time/temperature regulation, the burner will run once for 10, 20, 30, 40, 50 or 60 minutes, then shut down. It will also shut down if coolant temperature reaches 90C(194F) at any point before the time allotted expires. The burner runs at full capacity till coolant temperature reaches 80C(176F) after which fuel flow slows to avoid overheating.
- 5) In temperature only mode, the heater will run indefinitely as long as the maximum temperature is never reached.
- 6) Automatic restart is an option in both regulation modes. If maximum temperature is reached and burner shutdown occurs, the run timer is suspended. Coolant continues to circulate until its cools to a 'restart temperature' and the ignition cycle starts again. As the burner restarts, the timer resumes until elapsed time is completed. In temperature only mode, shutdown and restart can continue indefinitely.

## CONTROL DISPLAY MODES

- 1) 'Sleep' – control is powered but display is dark. [default]
- 2) 'Standby' – control is powered and display illuminated (current time). [returns to 'sleep' in 30s if no keys a pressed]. The **Set Time** character will be lit if a timer program is active.
- 3) 'Program' – control displays flashing settings for a short period, allowing parameter changes. [returns to 'standby', without saving in 60s if no keys are pressed]. The **Set Time** character will flash if modifying a timer.
- 4) 'Operate' – heater is operating (current temperature/remaining runtime),[toggle display using +/-]. The **Operate** character will be lit when the heater is running.
- 5) 'Data' – displays heater ROM information and sensor data while running.
- 6) The **Remote** character will operate when receiving transmissions from the remote control.

## OPERATION

\* These instructions do not cover the operation of the remote control. The control panel is the key to setting operation and the remote control (probably different types) has fewer capabilities that can be discerned once the system is programmed and verified at the control panel.

- 1) Start heater
  - a) In 'sleep', press any key to make the display 'standby' (current time).
  - b) Long press 'on/off', (current temperature) [chimes and begins start procedure]. The coolant pump starts and the system begins a self-test followed by the combustion fan starting and a 60 second glow plug preheat before the fuel pump starts. Display shows coolant temperature. Ignition is confirmed when temperature rises. If the first ignition cycle faults, a second will be automatically attempted before halting and displaying a fault.
- 2) Stop heater

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- a) Unit is in 'operate' (current temperature)
- b) Long press 'on/off', (oFF), [chimes, and enters shutdown procedure]. The burner shuts down by shutting off the fuel pump. The fan runs for 3 minutes after the fuel pump stops. The coolant pump runs till coolant temperature reduces to 50C.

## PROGRAMMING

\*The word 'press' means a short press. When a long press is needed, 'long press' will be stated. The expected display result is shown in parenthesis (). Notes are displayed in brackets [].

- 1) Set Current Time [mandatory only if scheduled startups are to be used]
  - a) Press any key to bring the display from 'sleep' mode to 'standby' (current time)
  - b) Press 'set' (current hour flashes), use '+' or '-' to change the hour.
  - c) Press 'set' (current minute flashes), use '+' or '-' to change the minute.
    - i) Long press 'set' to save the setting (new current time) or 'on/off' to exit without saving (old current time).
- 2) Option 1: Set time based operating parameters. [The heater can operate on time/temperature or temperature only regulation]. Time parameters include a start time [same time every day] and run time [10-60 minutes].
  - a) Daily automatic startup time; The heater will start at this time, each day, and run till it meets either time or max temperature limit, whichever is first.
    - i) Press any key to bring the display from 'sleep' mode to 'standby' (current time)
    - ii) Press '+' once to parameter 1 of 4, the 'daily start time', (--:--). A blank time means no start time is set. If only manual starts are desired, go to step 2b).
    - iii) To set daily start time, press 'set' [hour will begin flashing] and use '+' and '-' to set the hour, then press 'set' [minute will begin flashing] and use '+' and '-' to set the minute when the automatic heating cycle is to start.
    - iv) Long press 'set' to save the new start time (new start time) or press 'on/off' to cancel (old start time)
  - b) Operating time for each startup; Heater will run for this number of minutes each time it starts whether started manually or by schedule. It will shut off on max temperature [90C] if reached before time elapses.
    - i) Press any key to bring the display from 'standby' mode to 'active' (current time)
    - ii) Press '+' twice to parameter 2 of 4, 'run time' (--:10). Press 'set' [display will begin flashing] and use '+' and '-' to select the operating time from 10-60 min in 10 min increments.
    - iii) Long press 'set' to save the selection or press 'on/off' to exit without saving. (current time)
- 3) Option 2: Set time-unlimited operation [Replaces time of 'daily startup' and prevents 'run timer' from affecting operation.] The heater will only shut off manually or on maximum temperature.
  - i) Press any key to bring the display from 'sleep' mode to 'standby', (current time)
  - ii) Press '+' once to parameter 1 of 4, the 'daily start time', (--:--). To set unlimited time, press 'set' [display will begin flashing] then '+' or '-' to set (--:--). [All numerical data means some time-of-day start using the 24 hour clock. 00:00 means start time is at midnight]
  - iii) Long press 'set' to save the setting or 'on/off' to exit without saving. (current time)

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- 4) Option 3: Enable Auto-restart. This allows the heater to automatically restart after it has shut down by reaching maximum temperature. [This will not operate a second or successive, time regulated interval if the first interval has expired. It WILL continue the first interval that was interrupted by a high temperature shutdown and operate till the timed interval is completed, even if requiring multiple shutdown/restart cycles. Interval time is only counted during heater operation]. This requires setting both a 'restart temperature' and enabling 'automatic restarts'. [After high temperature shutdown and through the next restart, the coolant pump runs continuously, circulating coolant where heat can be distributed.]
- a) Set 'restart temperature' [After the unit shuts down at 90C, the coolant pump continues to circulate coolant, gradually losing heat. When it reaches this temperature, the heater will restart IF 'auto restart' is enabled].
- Press any key to bring the display from 'sleep' mode to 'standby', (current time)
  - Press '+' three times to parameter 3 of 4, 'restart temperature' (80C). Press 'set' [display will begin flashing] and use '+' or '-' to select the temperature the coolant must reach before the heater restarts.
  - Long press 'set' to save the setting or 'on/off' to exit without saving. (current time)
- b) Turn on/off automatic restarts [Reignites the heater after a temperature limit shutdown and cooling period to the 'restart temperature'.]
- Press any key to bring the display from 'sleep' mode to 'standby', (current time)
  - Press '+' four times to parameter 4 of 4, 'automatic restart' (A-oF). Press 'set' [display will begin flashing] and use '+' or '-' to change the parameter to (A-oN).
  - Long press 'set' to save the setting or 'on/off' to exit without saving. (current time)

**FAULTS:** Illuminates a the fault character at lower left and a feature character in the top row. Displays error code in ('E-##')

Code	Fault	Code	Fault
E-01	Secondary start failed	E-08	Fan
E-02	Flameout	E-09	Water Pump
E-03	Abnormal voltage	E-10	Glow plug
E-04	Furnace temp high	E-11	Low coolant
E-05	Water temp temp high	E-16	Key Error
E-06	High limit temp	E-17	Start failed
E-07	Fuel Pump	E-18	Stop failed

To view heater ROM data; in 'operating', long press '+' AND '-' together to enter 'data' display. '+' OR '-' scrolls through settings.

- Host version: (v000)
- Failure code: (E-00)
- Host status code: (0H00)
- Shell temperature: (t-01) auto scrolls to (075C)

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- 5) Exhaust temperature: (t-02) auto scrolls to (055C)
- 6) Supply voltage: (##V)
- 7) Water pump current: (2-5A) means "2.5A"

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