

# TTC-001

## Users Manual

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## 1. CONNECTOR/PIN-OUT ASSIGNMENTS

CONNECTOR PIN	TYPE	SIGNAL FUNCTION	SIGNAL LEVEL/LIMIT
J2	¼ Tab Male	Sensor #1 input	100K Thermistor
J3	¼ Tab Male	Sensor #1 input	100K Thermistor
J4	¼ Tab Male	230 VAC	230 +10%/+15%
J5	¼ Tab Male	115 VAC	115 +10%/-15%
J6	¼ Tab Male	VAC COM	Neutral power line
K1 COM	¼ Tab Male	HEAT COM.	7A-115/230VAC
K1 N.O.	¼ Tab Male	Heat N.O.	7A-115/230VAC
K2 COM	¼ Tab Male	Fan COM.	1/3 HP- 115/230VAC
K2 N.O.	¼ Tab Male	Fan N.O.	1/3 HP- 115/230VAC

## 2. SOFTWARE FEATURES

- Set Cook-Function Mode
  - Set Cook Temperature
  - Set Cook Time
  - Set Hold Temperature
  - Set Pulse Time
  - Display Oven Temperature
- Cook Mode
  - Display Cook Temperature
  - Display Oven Temperature
  - Display Hold Temperature
  - Hold "Display 'HOLd'"
  - Hold "Display Hold Time"
  - Done
- Programming

## 3 Typical TTC-001 Timed Cooking Application

Here's a brief description of a typical TTC-001 application without temperature hold:

- Operator powers on unit. Heat control begins. The setpoint that was used during the last power-on is used for control.
- Operator enters the cooking temperature.
- Operator enters the cooking time
- Operator waits for the oven to preheat to the cooking temperature
- Controller prompts the operator by displaying "LOAd" and sounds the beeper
- Operator loads product into oven and starts the cook cycle by pressing the START/STOP Key.
- Controller starts to countdown the cooking time.
- When cooking time counts down to zero, controller flashes "done" and sounds the beeper in sync continuously

## 4 Typical TTC-001 Timed Cooking Application With Temperature hold

Here's a brief description of a typical TTC-001 application with temperature hold:

- Operator powers on unit. Heat control begins. The setpoint that was used during last power-on is used for control
- Operator enters the cooking temperature.

- Operator enters the cooking time.
- Operator enters the holding temperature
- Operator waits for the oven to preheat to the cooking temperature
- Controller prompts the operator by displaying "LOAd" and sounds the beeper
- Operator loads product into oven and starts the cook cycle by pressing the START/STOP Key
- Controller starts to countdown the cooking time.
- When cooking time counts down to zero, controller beeps three times and displays "HOLd" and the Holding temperature is used for control.
- When the oven reaches the holding temperature, controller beeps once and starts the counting down the elapsed holding time.

## 5 Typical TTC-001 Timed Cooking Application With Pulse Mode

Here's a brief description of a typical TTC-001 application with Pulse Mode:

- Operator powers unit. Heat control begins. The setpoint that was used during last power-on is used for control.
- Operator enters the cooking temperature.
- Operator enters the cooking time
- Operator enters a Pulse Time
- Operator waits for the oven to preheat to the cooking temperature
- Controller prompts the operator by displaying "LOAd" and sounds the beeper
- Operator loads product into oven and starts the cook cycle by pressing the START/STOP Key
- Controller starts to countdown the cooking time.
- Controller cycles the heat and fan on then off in intervals of 30 seconds on and 30 seconds off as long as there is demand for heat. If heat is not demanded, then both the heat and fan are turned off
- When the Pulse Time has elapsed, cycling of the heat and fan is disabled and normal on/off control resumes.
- When cooking time counts down to zero, controller flashes "done" and sounds the beeper in sync continuously.

## 6 Programming the TTC-001 Controller

- Setting the control temperature offset
- Setting the time format, oven type, and temperature scale
- Displays the number of hardware resets.

The convection fan and heater is always turned off in this mode.

## Control Temperature Offset

Since the temperature sensor is not mounted on the cooking service, the temperature it senses is not the actual cooking temperature. Adding or subtracting an offset to the temperature sensed by the sensor can approximate the actual cooking surface temperature.

The temperature offset can be adjusted from -50 to + 50 degrees Fahrenheit.

## Time Format, Oven Type, and Temperature Scale

### Time Format:

The TTC-001 supports two different time formats: HH:MM and MM:SS.

HH:MM is the Hour/Minute format. In this format, HH represent the hours and MM represents the minute values. If HH is less than 10, then the MSD is blank. The colon is always flashing while a running time is displayed in this format. While making adjustments in this format, the colon is flashing.

MM:SS refers to the Minute/Second format. In this format, MM represents the minute's value and SS represent the second's value. If MM is less than 10, then the MSD displays a leading zero. The colon is always flashing while working or displaying in this format.

The time format of a running time value (one that's either counting up or down) can be identified by the state of the colon. If the colon is flashing, then the displayed time is in HH:MM format. Otherwise, it is in MM:SS format.

The time format of a static time value (one that the operator can make adjustment to) can be identified by the presence or absence of the leading zero when display time values less than 10:00. For the HH:MM format, all time values less than 10:00 are displayed without a leading zero. The MM:SS format will always display a leading zero while displaying time values less than 10:00.

While displaying a running time value, the TTC-001 software automatically chooses the appropriate time format to get the maximum resolution.

### Oven Type:

The oven can be programmed to be of electric type or gas type. Selecting the oven type selects one of two dead-bands used by the temperature control algorithm.

### Temperature Scale:

The TTC-001 software supports Fahrenheit as well as Celsius temperature scales.

## Programming Procedure

Programming procedure:

1. Enter the Set Cook-Function Mode
2. Enter a cook time of 1 minute
3. Enter a cook temperature of 151 degrees F if current temperature scale is F. Or enter a cook temperature of 66 degrees C if current temperature scale is C.
4. Simultaneously press and hold the START/STOP and TEMP keys momentarily

5. The controller acknowledges Programming mode entry by displaying the software version as long the START/STOP and TEMP keys are held down
6. Release both keys
7. Controller will display '2NdL'
8. Press any key
9. Controller displays one of the Time/Oven Type/Temperature Scale selections from Table 1.
10. Use the encoder to make a selection to setup the time format, oven type, and temperature scale.
11. Press any key to enter the new selection. Once a key is pressed, the new selection is stored.
12. Controller alternatively displays the word 'OFFS' with the current offset value. Use the encoder to enter a new offset value. The offset value is accompanied by the letters 'F' and 'C' to indicate the current temperature scale
13. Press any key to enter the new offset value. Once a key is pressed, the new offset value is stored
14. Controller displays "XXXr". Where XXX is the number of resets occurred. To reset this number to zero, press and hold the START/STOP key while momentarily press the PULSE key.
15. Press any key.
16. Controller resets it and enters power mode.

Display Digits				Description
MSD	3 <sup>rd</sup> Digit	2 <sup>nd</sup> Digit	LSD	
H	E	o	C	Hours/minutes, electric oven, Celsius scale
H	E	o	F	Hours/minutes, electric oven, Fahrenheit scale
		o	C	Minutes/seconds, gas oven, Celsius scale
		o	F	Minutes/seconds, gas oven, Fahrenheit scale
H		o	C	Hours/minutes, gas oven, Celsius scale
H		o	F	Hours/minutes, gas oven, Fahrenheit scale
	E	o	C	Minutes/seconds, electric oven, Celsius scale
	E	o	F	Minutes/seconds, electric oven, Fahrenheit scale

**Table 1: Time/Oven Type/Temperature Scale Selections**

## 7 Front Panel Key Operation

The TTC-001 has five switch inputs and a binary encoder.

The names of the keys are:

START/STOP Use to start and stop cook cycles

TIME	Use to enter the Set Cook Time
HOLD	Use to enter the Set Hold Temperature, to display the hold temperature, or to enable/disable Hold Mode
TEMP	Use to enter Set Cook Temperature or to display the Cook Temperature or actual oven temperature
PULSE	Use to enter the Set Pulse Time or to enable / disable Pulse Mode

The TTC-001 provides an audible feedback for every key press.

## 8 Controlled Outputs

The TTC-001 has these controlled outputs:

<b>Heat Relay</b>	This relay controls the heater. It is turned on and off at the command of the on/off temperature control algorithm. However, whenever the convection fan is in its off cycle in Pulse Mode, this output is always turned off. There is a 2-second minimum off time with this relay. Therefore, the off cycle in the Pulse Mode is 2 seconds or longer.
<b>Convection Fan Relay</b>	This relay controls the convection fan. When Pulse Mode is not active, this relay is always energized in the Operational mode. When Pulse Mode is active, then this relay is energized in cycles of 50% on time with a duty cycle of 60 seconds. This relay is always turned off in Programming Mode.

## 9 CONTROL SPECIFICATIONS

- ON/OFF with selectable +/- 0.5°F or +/- 2.0°F @ symmetrical dead-band.
- Two second minimum heat demand OFF time.
- Push-to-read oven temperature
- Last set points restored on power-up.
- TIME: Range: 1 sec. - 12 hours.
- Accuracy:  $\pm 0.75\%$  @ 0 - 80°C ambient,  $\pm 3.0\%$  @ 80 - 85°C ambient.
- Two 2nd level range options:

00 HR: 00 MIN to 12 HR: 00 MIN range  
00 MIN: 00 SEC to 59 MIN: 59 SEC range

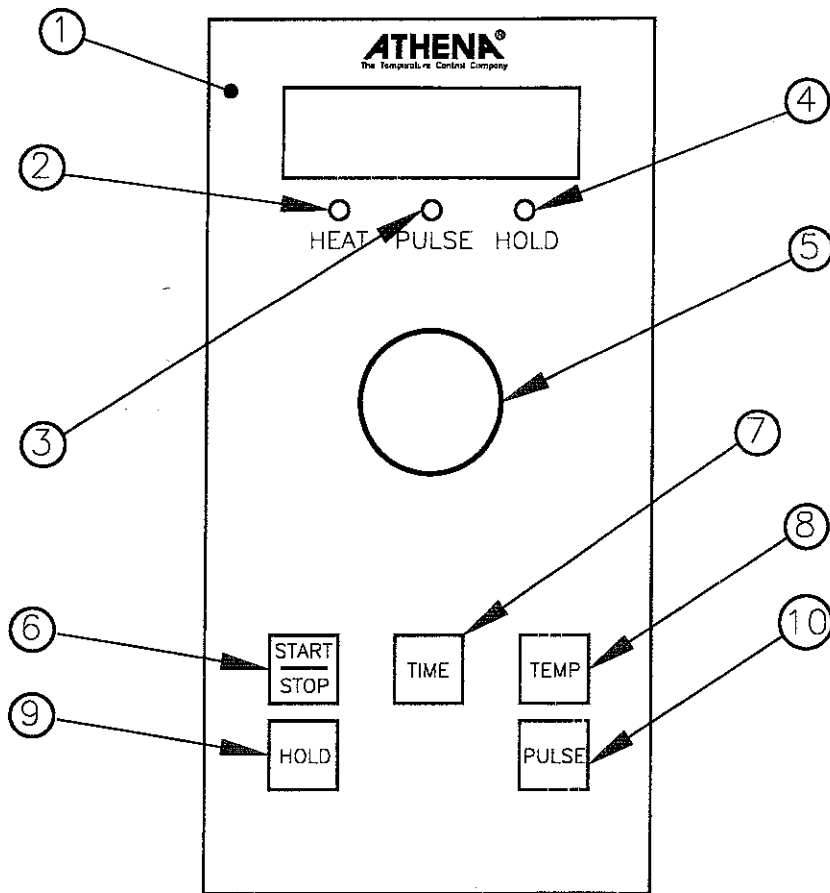
- Last initiated cook time restored on power up.
- Pulse Fan Mode: Convection fan pulses on & off with a 60 second period.
- Heat demand is inhibited during the fan 'off' time.



- PCB: Conformal coat with the exception of connector, encoder, and terminal areas

## 10 Limits and Defaults

Parameter	Low Limit	High Limit	Initial power-on Default
Cook Setpoint	150°F	500°F	150°F
Hold Setpoint	150°F	450°F	150°F
Process Variable Offset	-50°F	50°F	0°F
Time	0 Second	12 Hours	0:00
Heat Off Time	2-3 seconds	Unlimited	N/A
Pulse Fan On Cycle	30 Seconds	30 Seconds	N/A
Pulse Fan Off Cycle	2-3 Seconds	30 Seconds	N/A
Gas Oven Dead-band	+/- 2.0°F (Fixed)	-	-
Electric Oven Dead-band	+/- 0.5°F (Fixed)	-	-



## SOLID STATE DIGITAL CONTROL CONTROLS IDENTIFICATION

### 1) DISPLAY

Displays time or temperature and other information related to oven function.

### 2) HEAT LAMP

Lights when heater is on.

### 3) PULSE LAMP

Lights when Pulsed Fan Mode is turned on.

### 4) HOLD LAMP

Lights when Hold Mode is turned on.

### 5) DIAL

Used to enter set points in display.

### 6) START/STOP KEY

Starts or stops the timer.

### 7) TIME KEY

Used to show time in the display.

### 8) TEMP KEY

Used to show set temperature in the display.

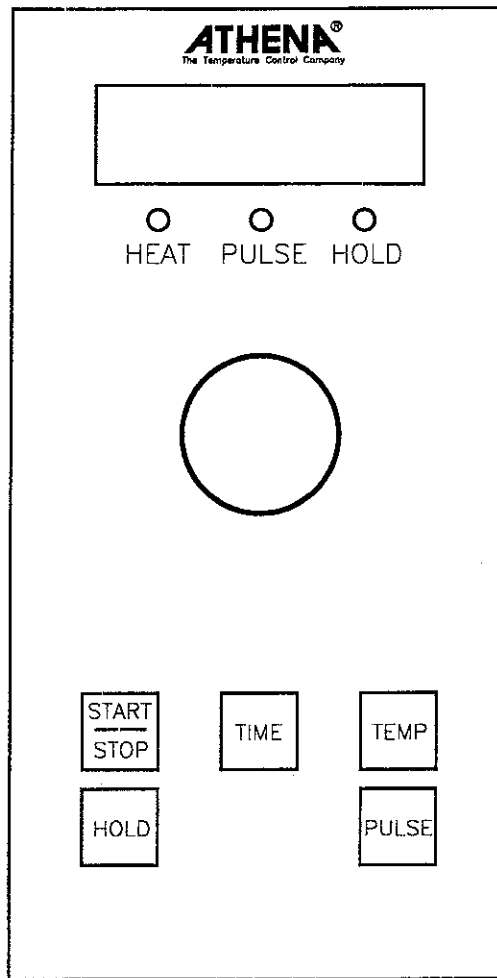
NOTE: Actual temperature is shown while the TEMP key is held down.

### 9) HOLD KEY

Turns Hold Mode off.

### 10) PULSE KEY

Turns Pulse Mode on or off.



## SOLID STATE DIGITAL CONTROL

### CONTROL DESCRIPTION

The solid state control panel is an easy to use control package featuring precise temperature controls and a digital display window which alternately shows the cooking time or temperature. The control includes two speed fan, fan delay/Pulse Plus, and holding capabilities

### Fan Delay/Pulse Plus

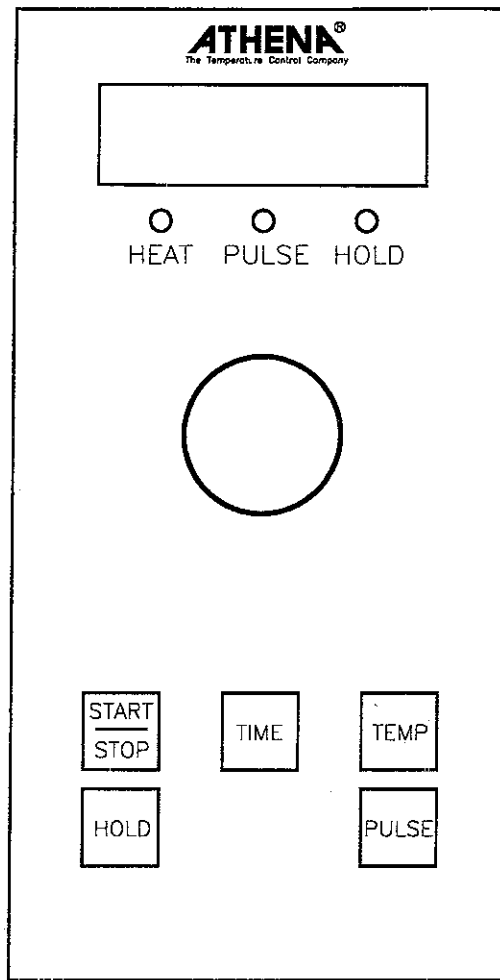
This feature allows the fan to cycle on and off every 30 seconds. Liquid batter bakery items "set up" flawlessly without airflow interference. Recommended for muffins and cakes.

### Hold

A separate time and temperature setting allows the oven to switch into a holding mode after the cooking timer expires. The hold feature adds versatility to the oven by permitting one step cooking and holding. The digital readout displays total hold time as it counts up.

Now that you are familiar with the features of the control, please read on for operational directions and procedures.

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## SOLID STATE DIGITAL CONTROL DISPLAY MESSAGES

### LOAD

Indicates that the oven has reached the set temperature and is ready to be loaded with product.

### dONE

Indicates that the timer has counted down to 00:00. dONE can be turned off by pushing START/STOP.

### HOLD

Indicates that the timer has counted down to 00:00 and is waiting for the oven temperature.

### PrOb

Indicates a problem has occurred which requires a service technician.  
*or an open Probe.*