

**Custom Heaters & Research
Digital Controller**

Model Number DTC-10



Instruction Manual

Description

Digital electronic temperature controller with the following features –

- Temperature Range of 0 to 300 Degrees Celsius with manufacturer configured User Range.
- PT100 Sensor
- Large Illuminated LCD Display
- Tough Thick Wall ABS Enclosure
- Large Membrane Keypad suitable for use whilst wearing gloves.
- User configured Fahrenheit or Celsius Display.
- Cycle timer with User Selectable Delayed Start until the required temperature is reached.
- User adjustable Hysteresis.
- User adjustable Temperature Offset.
- Fail Safe on Sensor Open Circuit.
- Relay Contact Protection Circuitry.
- 90V to 230V AC 50-60Hz Supply.
- 16 Amp Relay Contacts.

Intended Use

This TC (Temperature Controller) is intended for use in conjunction with Custom Heaters & Research range of Heating Elements and Jackets, and will normally be supplied attached and electrically connected to it.

Connection to any other element or device is not advised as it could pose a fire or electrocution risk and is likely to invalidate any warranty.

Electrical Safety

The TC must be installed by a fully qualified electrician and be connected via a Fused, Switched and RCD protected 50-60Hz AC supply of between 90 and 230 Volts. No earth is required. The fuse rating is dependent on the element used and will be advised by Custom Heaters & Research when the TC is supplied. **Note** that the electronics has its own overload protection but there is no internal fuse for the element supply.

Note that the output to the element is never fully isolated from the mains even when the output relay is off.

Although it is not advised, should you wish to connect an alternative element and/or PT100 sensor to the TC, it is essential to ensure that the element chosen has additional thermal protection within it to protect from overheating in the event of a fault. Also, ensure that the correct rating of fuse is used. If in any doubt, ask a fully qualified electrician or contact Custom Heaters & Research. Please also note that the PT100 sensor must be kept fully isolated from the Supply.

The TC contains no user serviceable components and must be isolated from the supply before any attempt is made to open the case and connect or disconnect the supply, the element or the PT100 sensor.

Note that the case is not waterproof or water resistant so must be kept dry.

Disposal

At the end of its useful life, this equipment should not be disposed of with normal waste but should be recycled according to local regulations. If in doubt, please contact Custom Heaters and Research.

Power On/Off

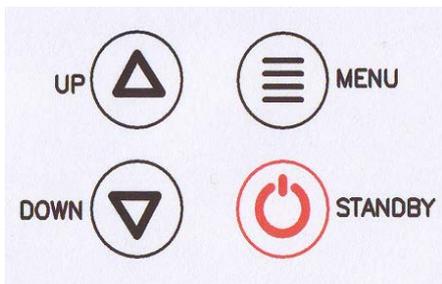
The TC does not have an on/off switch. It has a Standby key which when depressed for 2 seconds puts the TC into a low power state, switches the display backlight off and the temperature control function will cease. A short press of the Standby key brings the TC out of standby. The standby state does not fully isolate the output from the supply so under no circumstances should the TC be dismantled or the element connected or disconnected whilst it is in the standby state.

Power Loss

If the TC loses power at any time, when the power returns the TC will return to the state it was in just before the power was lost.

Adjusting the Controller Settings

The controller settings can be adjusted using the Membrane Key Pad on the front panel. Description of the keys on the keypad -



Main Screen

This is the main screen, which displays the actual temperature from the sensor.

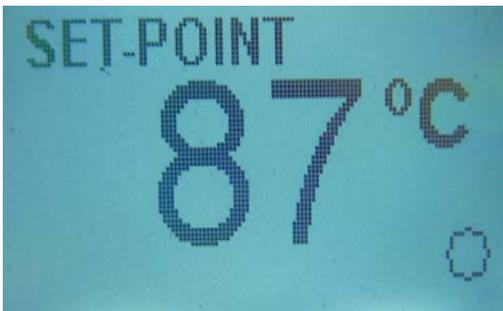


The box on the lower right of the screen is filled when heating is on –



Set-Point Screen

From the main screen, pressing and holding either the  or  key for approximately 2 seconds will enable the Temperature Set Point to be displayed and changed. Holding either key will increase or decrease the Set Point until the required value is reached, this value must be within the temperature range that has been factory set.

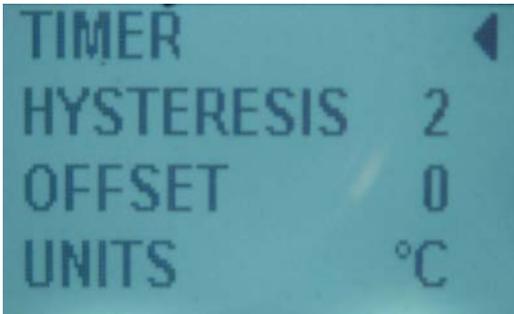


If neither key is pressed for approximately 5 seconds, the TC will return to the main screen and display the current process temperature.



Settings Menu

Pressing and holding the  key for approximately 2 seconds whilst on the main screen will display the settings menu -

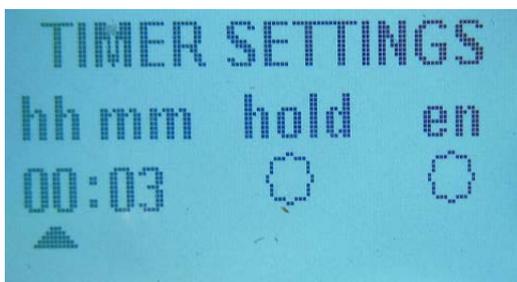


Once this screen is displayed, subsequent presses of the  key will move the arrow so that it points to each menu item in turn.  the  key is pressed whilst the arrow points to the Units option, the screen will be closed and the TC will return to the main screen.

In the settings menu, when the  or  key is pressed, the item pointed to by the arrow can be edited.

Timer Settings

Pressing the  or  key whilst the arrow points to the Timer option will open another screen where the Timer settings can be viewed or changed.



These are the settings for the Heating Cycle Timer. With these options enabled, the TC will function normally for a specific time and then go into an additional standby mode.

With the arrow positioned under the "hh" box the hour value can be set using the  or  keys. Once the hours are set, press the  key again to move the arrow under the "mm" box and the minutes can be set in the same way.

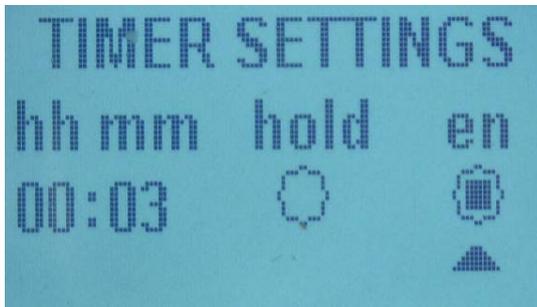
Press the  key again and the arrow moves to below the hold (Timer Hold Enable) box -



With “Hold” enabled the timer will not start until the temperature set point is reached. If “Hold” is disabled then the timer will begin as soon as the TC returns to run mode. Toggle between enabled and disabled using the Δ or ∇ keys.

Timer Hold is enabled when the box is filled and disabled when the box is empty.

Press the \equiv key again and the arrow moves to below the en (Timer Enable) box –



Toggle between enabled and disabled using the Δ or ∇ keys.

The timer is enabled when the box is filled and disabled when the box is empty.

If the Timer has been enabled, when you return to the main screen it will look like the following image with the timer period displayed on the top left of the screen –



The timer will start counting down whilst the temperature is being maintained until the timer reaches zero.

If the Timer and Timer Hold have both been enabled, then the screen will display a ‘h’ next to the timer display.

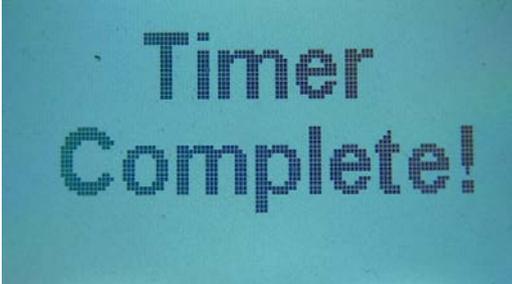


In this mode, the timer will only start once the required temperature has been reached. Note that the ‘h’ will only be visible until the timer starts.

The timer will then start counting down whilst the temperature is being maintained until the timer reaches zero.

In both modes, the colon between the hours and minutes will flash to indicate that the timer is running.

Once the timer reaches zero, the temperature control function will cease, the screen will flash and the following image will be displayed-



To continue from this point, press the  key and the screen will display two options -



You can either select the restart option, which will start the timing cycle again with the same programmed timings, or revert to the standard mode that disables the timer and returns the controller to the normal run mode. If different timer settings are required for the next process then "Revert To Standard Mode" should be selected and the timings modified as detailed above.

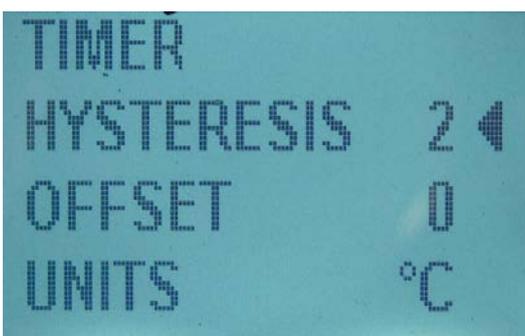
Toggle between the two options by pressing the  or  keys.

The option currently selected will have the box filled. Enter the option by pressing the  key. The unit will return to the main screen with the selected option enabled and the temperature control function will resume.

Other Menu Options

The other Menu Options can be changed as follows –

Hysteresis

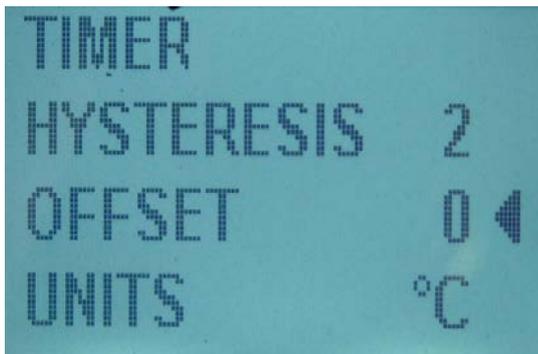


The hysteresis is the temperature difference (in degrees) between the point at which the heating switches off and switches on again. The heating will always switch off at the programmed set point and will switch back on at the set point minus the hysteresis value. The hysteresis range is 1 to 9 with a default value of 5

Selecting a lower number will give the best accuracy but the heater will switch on and off more often and this can reduce the life of the relay. If accuracy is less important then it is recommended to use a higher number.

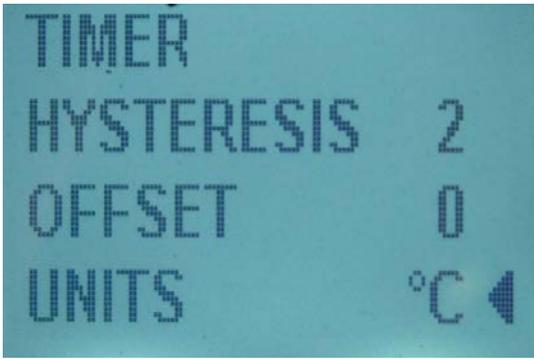
Whilst the arrow on the screen points to the Hysteresis option, you can use the   keys to change the setting.

Offset



When the arrow on the screen points to the Offset option, you can use the Up or Down keys to change the setting. The Offset is used to correct for the difference between the temperature displayed and the actual temperature of the product being heated. This difference can occur because the sensor of the TC is fitted directly to the heater and so in some applications the actual temperature of the product being heated can be different do to heat losses. The Offset value can be varied between -10 and +10 but the value required can only be determined by testing of the application.

Units



Whilst the arrow on the screen points to the Units option, you can use the   keys to toggle the setting between C (Celsius) and F (Fahrenheit).

Pressing the  key at this point will return you to the main screen

If no keys are pressed for at least 10 seconds whilst the TC is in any of the setting menu's it will return to the main screen.

Standby

The TC can be put into Standby by holding the  key down for 2 seconds. The screen will display "STANDBY". The temperature control function will cease and the backlight will go off.

Pressing the  key whilst the TC is in Standby mode will switch the backlight on again and the TC will return to normal.

Screen Contrast

Whilst the TC is in standby mode, the contrast of the screen can be changed using the Up or Down keys.

Faults

The TC is able to detect a PT100 sensor open circuit or disconnection as well as some other internal faults that could possibly arise.

If the sensor or any other fault is detected, the temperature control function will cease, the screen will flash and a description of the fault will be displayed.

If a fault does develop, then please isolate the TC from the supply and contact Custom Heaters & Research for advice, noting the description of the fault.

Specifications

Product Classification: Class 2 (No earth)

Supply Voltage: 90 to 230 AC 50-60Hz

Electronics Supply Current: 100mA

Maximum Relay Current: 16Amps

Temperature Sensor: 2, 3 or 4 wire PT100

Temperature Control Range: 0 to 300 Degrees Celsius

Measurement Range: -18 to 350 Degrees Celsius

Temperature Adjustment: 1 Degree Celsius

Accuracy: +- 0.5% +- 1 Degree Celsius

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