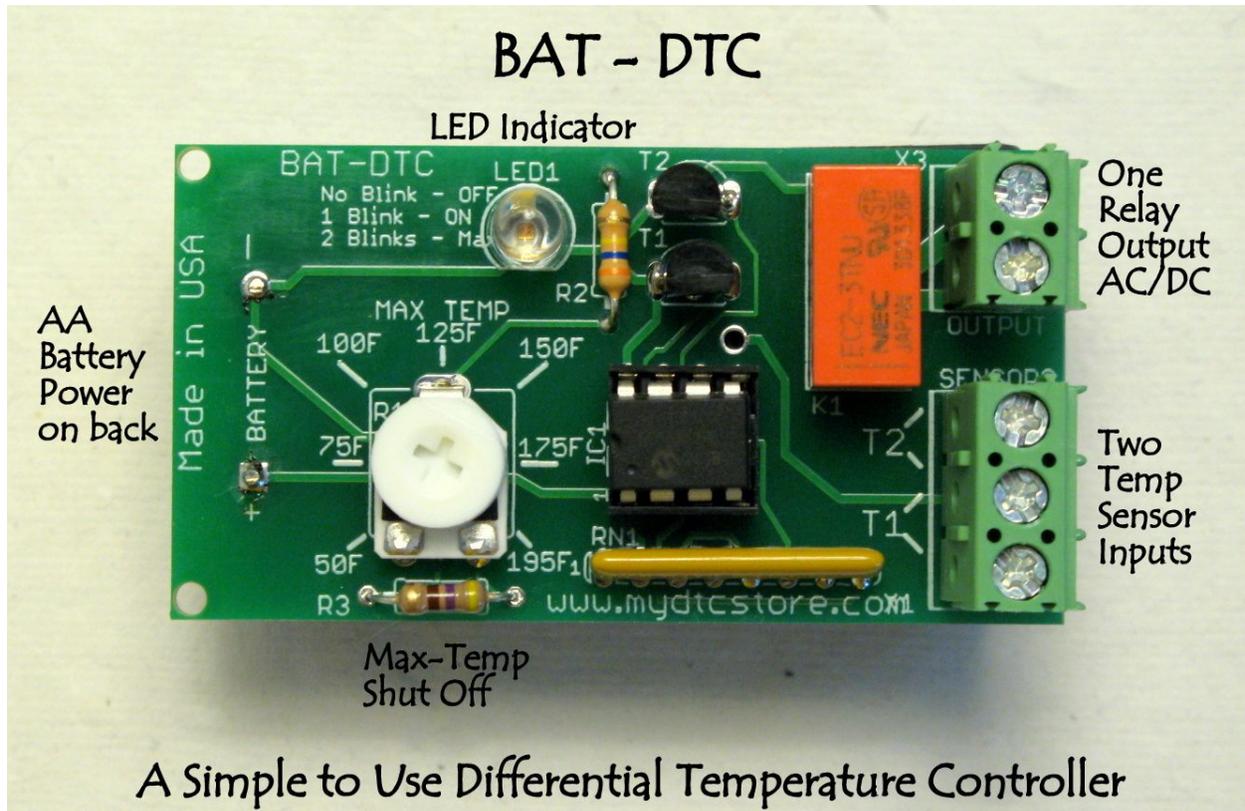


# BATDTC User Manual

Rev 1 - 8/28/16 - BCS



The BATDTC is a reliable, simple to use battery powered differential temperature controller. It can be used to control solar hot water and solar air heating applications, attic cooling and heating, and root cellar cooling. The BATDTC uses (2) AA batteries for powering and will operate three years on standard alkaline AA batteries.

## In normal operating mode:

The controller will close the onboard relay when:

$T1 > T2 + 5F$  so long as  $T2 < \text{High Temp Shutdown}$  selected

The controller will open the onboard relay contacts when

$T1 > T2 + 1F$  or if  $T2 > \text{High Temp Shutdown}$  selected

### **In root cellar mode:**

The controller will close the onboard relay when:

$$T1 > T2 + 5F \text{ so long as } T1 > 40F$$

The controller will open the onboard relay contacts when

$$T1 \geq T2 + 1F \text{ or if } T1 \leq 40F$$

Note: See drawing on how to put into root cellar mode on page 3.

### **Specifications:**

**Two (2) Temperature Sensor Inputs (Range -40 - 210 F)**

Input T1 connects to heating source (solar collector)

Input T2 connects to heating storage (hot water tank)

Note: For cooling root cellars use T1 for root cellar, T2 for outside air.

**One Relay Output, dry contacts (2 Amp, 30VDC max or 120/240VAC)**

### **Maximum Temperature Shutoff Setable Potentiometer:**

**In normal mode:**

Set this potentiometer with a screw driver to select the maximum temperature for your hot water tank temperature. The flat spot on the dial is what it is aiming toward.

When the setpoint threshold is reached on the T2 input sensor, the BATDTC will keep the output relay off until it drops ~2F below the setpoint to avoid short cycling.

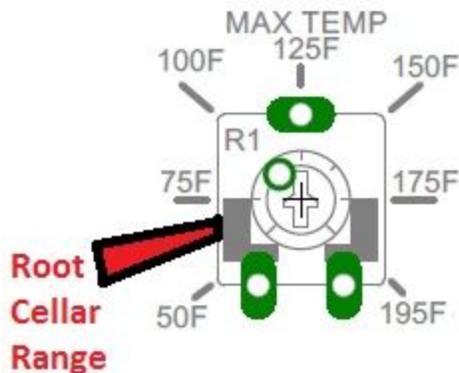
The setpoint can be adjusted from 70F - 195F in normal mode.

In root cellar mode, the value is fixed at 40F automatically.

**To put into root cellar mode:**

Set the max temperature potentiometer to approximately 60F. This will make the controller use the root cellar mode. Anything above 70F is normal mode of operation.

**Diagram: Setting for Root Cellar Mode**



Adjust the MAX TEMP Potentiometer in the temp range of 65F-55F to select root cellar mode. Avoid setting the temperature all the way to 50F as it will affect the LED operation.

**One Relay Output:**

One dry relay contact rated for up-to 30VDC @ 2A or 120VAC/240VAC @ 2A. Use this to switch DC or AC power to your load device (circulation pump, vent fan, etc). Always use a fuse in line with power to load device. See wiring example for more info. The relay is updated once every ~15 seconds in normal operation.

## LED Indicator:

The red LED indicator will blink as follows:

# Blinks	How Often	Cause
1	Whenever relay turns on	Relay changes state to ON
1	Whenever relay turns off	Relay changes state to OFF
1	About once a minute	Relay is ON
2	About once a minute	High Temperature Value Exceeded
3	About once a minute	Bad Sensor Detected, Relay OFF
4	About once a minute	Root Cellar < 40F, Relay OFF

## Battery Holder (on the back):

Install (2) AA Batteries in holder. Battery life in normal operation is approx 3 years. Observe battery polarity when installing. The unit will blink LED 6 times when batteries are installed in normal operation, 10 times if Max Temperature < 65F for root cellar mode. The max temperature setting and therefore the mode can be changed while the controller is running at anytime. Remove batteries when storing. Replace batteries every three years even if still working.

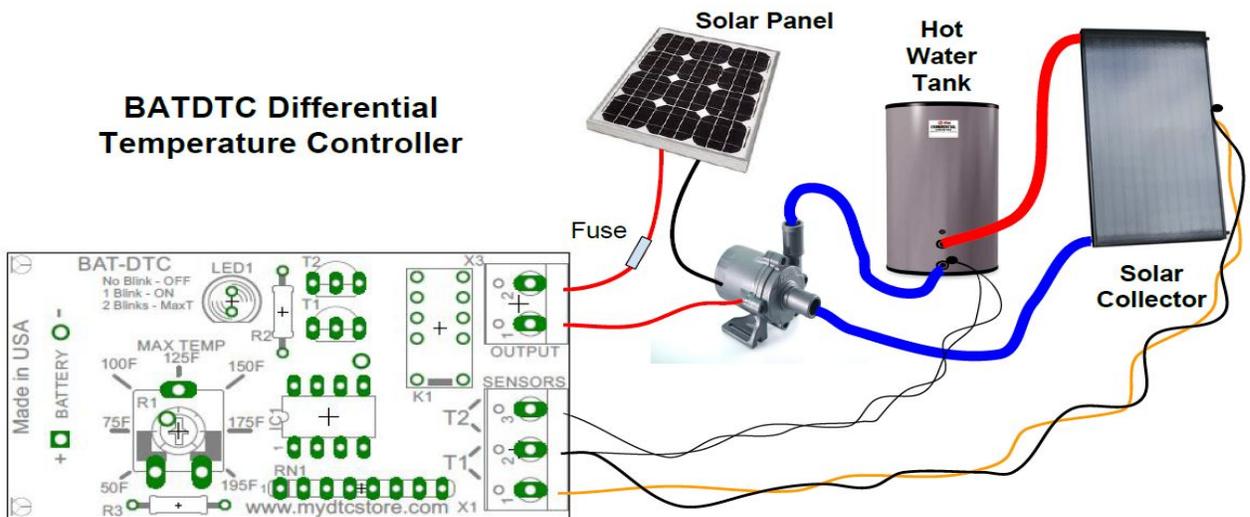


**Ambient Temperature Range:** The BATDTC will operate from -25F - 158F.

**BATDTC Board Dimension:**

The BATDTC is approximately 2.4 inches x 1.3 inches.  
It's about 1 inch thick with the battery pack on the back.

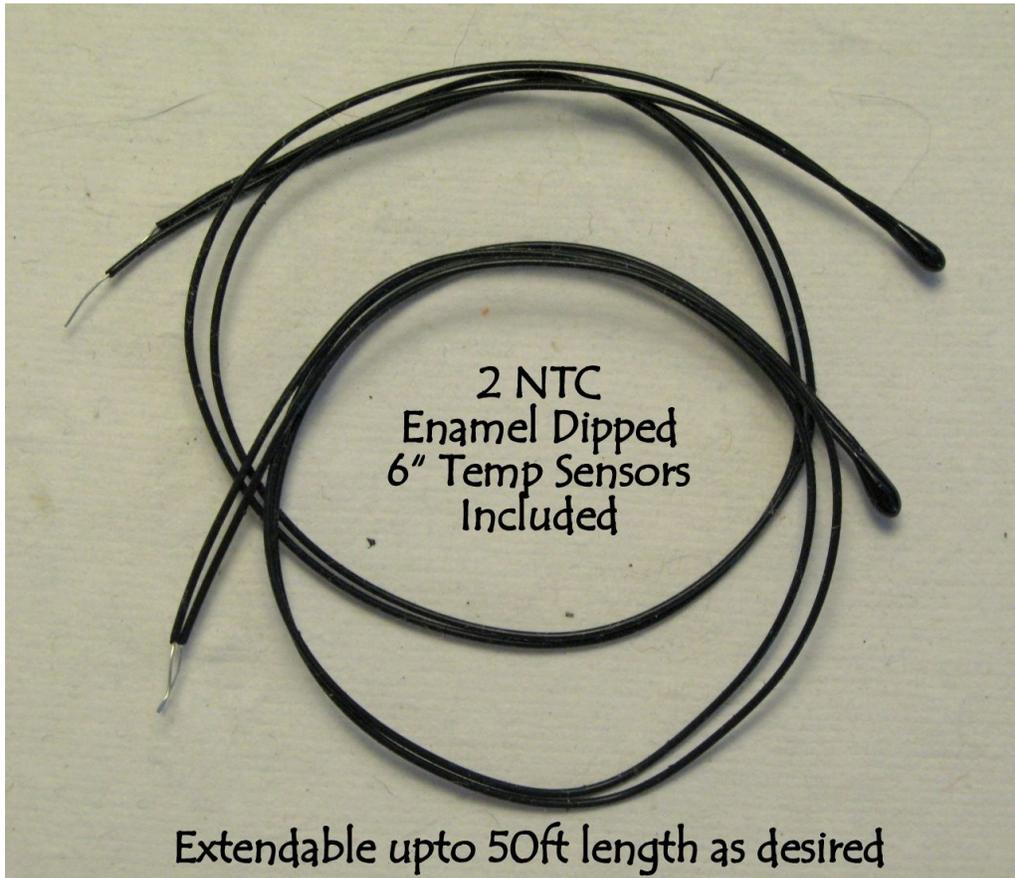
**Wiring Example: Solar Powered Remote Solar Hot Water Application**



- T1 - Collector Temp Input**
- T2 - Tank Temp Input**
- Output - In line with power to load (AC or DC loads ok upto 3A)**
- Set Max Temp to desired maximum tank temperature**
- For Root Cellar Mode, set Max Temp <~ 65F, T1 in root cellar**

The BATDTC relay output operates as a switch just like in your house. When the controller turns on the relay the contacts of the relay are connected together. When the relay is OFF the contacts of the relay are disconnected. The BATDTC relay can switch both AC or DC loads up-to 2A nominal. Always use a fuse in line with the power to your load device. Observe all applicable electrical local codes.

## BATDTC Temp Sensors



The BATDTC comes with two temperature sensors. You can extend them up-to 50ft without problems. Use twisted pair wire like telephone wire, or ethernet cable for best results. They are water resistant, enamel dipped sensors, but are not waterproof. Do not submerge for long periods unless they are potted in waterproof material. Their small size makes it easy to mount them in a well, ring lug with some RTV, or POT them in a piece of copper tubing for submersion.

Additional temp sensors are available from the website.

### **Installation Notes:**

1. BATDTC must be kept dry if placed outside.
2. T1 and T2 temperature sensors are water resistant, but not water proof. Do not submerge for long periods unless they are potted in waterproof material. Additional sensors @ [www.mydtcstore.com](http://www.mydtcstore.com)
3. Temperature sensors can be extended upto 50ft with no problem. Nominal 75F resistance is ~100Kohms.
4. The temperature sensors are enamel dipped. They can be mounted in a ring lug with RTV/Silicon or potted if desired for submersion.
5. If the controller stops working, replace batteries, verify connectivity to T1 and T2 sensors.
6. In root cellar mode, relay will shut-off at ~ 40F and below.
7. If Max Temp is set to 50F, LED may not illuminate.
8. If storing, remove batteries from holder.

### **Troubleshooting:**

1. If the LED is blinking three times every minute, one of the sensors is disconnected or damaged. Check your connections and replace sensor if necessary.
2. If the LED is blinking twice every minute, the maximum temperature setpoint has been reached and the output is being forced off.
3. If the controller is not functional, check and replace batteries. Batteries should be at least 2.4V between the two battery posts where the "Battery" label is on the printed circuit board. Batteries less than 2.4 VDC should be immediately replaced.
4. Hot Water tank is not getting up to maximum temperature. Check setting of Max Temp potentiometer on board and adjust to a higher temperature if necessary.

### **MADE IN USA:**

All controllers are designed and built in the USA.

Contact: Email questions to [smith100griggs@gmail.com](mailto:smith100griggs@gmail.com)