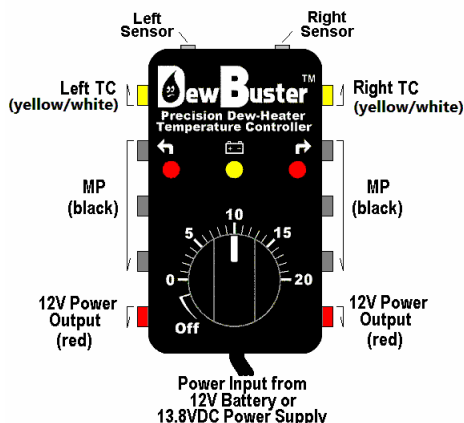
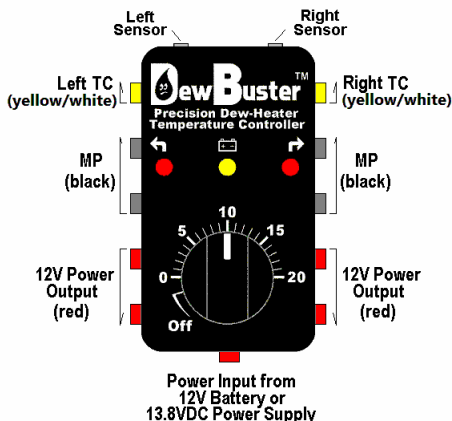


Newtonian DewBuster™ Controller Instructions

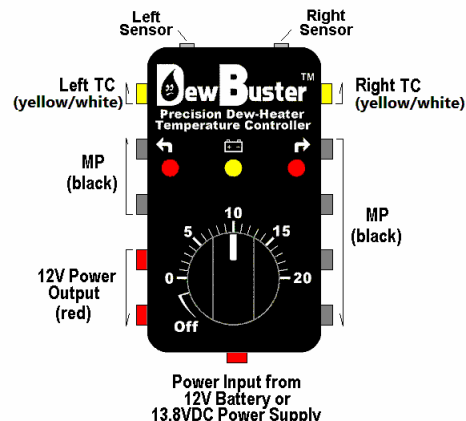
Standard Power Cord Model



Big Dob Model



StarStructure Model



The DewBuster™ Controller is fully compatible with most 12-Volt heating strips that use RCA plugs such as Astrozap, Dew-Not, Kendrick, Thousand Oaks, and home-built heaters using my instructions at www.dewbuster.com (your warranty even covers any damage caused by mistakes building your heaters).

The RCA Jacks are identified by their color code:

COLOR	NAME	FUNCTION
Yellow ¹	TC Output	Sensor plugged in = Temp Control Mode (Temperature Sensor controls output power to heater) Sensor unplugged = Medium Power Mode (output power is same as MP Outputs)
Black	MP Output	Medium Power (40% power when knob set below 13, then ramps up 50%@15°, 75%@20°, 100%@ full CW)
Red	Side 12V Power Output	Unregulated Power Output for 12V accessories (voltage is the same as the power source)
Red	Bottom 12V Input	Power into controller from 12V Battery or 13.8VDC Power Supply

¹ Prior model DewBuster™ Controllers used white RCA Jacks for TC Outputs however the function is the same.

The LED's are optimized for night vision and may be difficult to see in daytime:

LED	FUNCTION
Left Red	Blinks as power is pulsed to left TC output (yellow RCA jack)
Right Red	Blinks as power is pulsed to right TC output (yellow RCA jack)
Center Yellow	OFF when voltage 11 - 15VDC LED flickers when battery <11VDC and stays on when battery is exhausted. If LED flickers when battery is charged or when using a Power Supply then check for loose connections. If LED stays on, check that voltage is 12 – 15 VDC.
Cigarette Plug LED	ON = Voltage present, fuse OK off = no power (check polarity, loose cigarette plug, fuse blown in tip of plug)

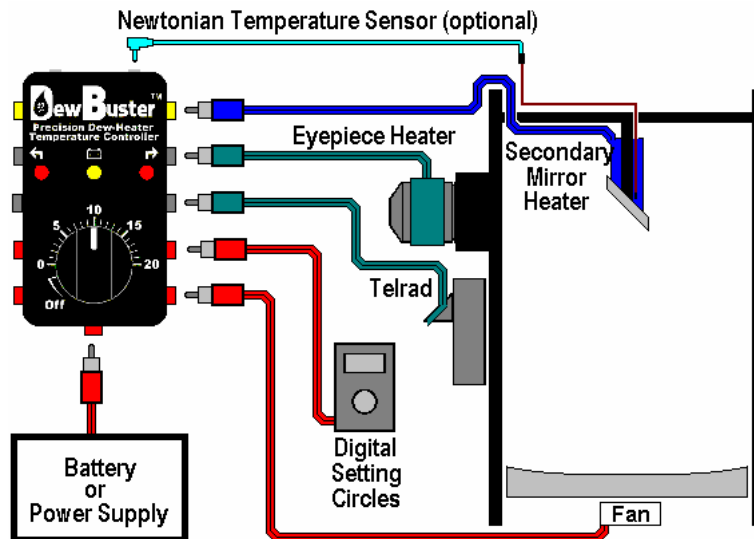
Plug secondary mirror heater into either TC output (yellow). If no temperature sensor is plugged into that side, the TC Output switches to Medium Power Mode and operates as described below. A Newtonian Temperature Sensor (sold separately at www.dewbuster.com) may be used to improve telescope performance. When plugged in the TC Output switches to Temperature Control Mode and the sensor controls power to keep mirror warmer than the air by the amount the control knob is set to (5 = 5°F warmer than the air). See page 4 of this manual for sensor installation instructions.
NOTE: AstroSystems Dew Guard needs steady 12V so plug it into a 12V Power output, not a TC or MP output.

The black Medium Power (MP) outputs are intended for auxiliary heaters that do not affect telescope performance such as finderscope, eyepiece, Telrad, etc. These do not need Temperature control so they are run at a constant 40% power level when the DewBuster™ Controller is set below 15° which will prevent dew under normal conditions. If additional heat is ever needed the control knob can be set higher to raise the MP power level as follows:

CONTROL KNOB SETTING	0° to 14°	16°	18°	20°	Fully Clockwise
MP OUTPUT POWER	40%	50%	60%	70%	100%

The red 12V Power Outputs may be used to power 12V accessories (inner terminal is +). They are fused but not regulated (voltage will be the same as your power source) and remain powered even when the controller is turned off or the Low Battery detection shuts the heaters off.

The unit is fully protected from reverse polarity, over-current, and shorted heaters (see TROUBLESHOOTING section), and you may plug and unplug heaters and sensors while the controller is operating. Your DewBuster™ Controller should be powered from a 12V battery or 13.8VDC Power Supply. Controllers without a power cord have an RCA type 12V Input jack to receive power and a 10 Amp self-resetting PTC fuse inside. Controllers with cigarette plugs have a replaceable glass fuse in the tip of the plug. All other controllers have a 16A self-resetting PTC fuse inside. When the battery gets weak (about 11V) the yellow Low Battery light will start to flash. You can unplug less critical heaters and accessories to conserve power and the reduced load may raise battery voltage enough that the yellow light goes out for a time. As the battery weakens further the yellow light brightens and TC and MP heater power are gradually reduced (red lights become dimmer) to prevent running the battery below 10.5V and damaging it. Note: If the yellow LED comes on with a fully charged battery then you have a poor connection, a shorted heater (try unplugging heaters one at a time), or your battery is at the end of its lifespan (if it recharges quickly it is not storing much energy).



INSTALLATION:

- Connect secondary mirror heater to yellow output jack.
- If optional Newtonian Temperature Sensor is used, plug it into the Temperature Input jack on same side.
- Install remaining heater strips and plug into any Medium Power output.
- Connect power cord or 12V Input jack (on bottom of controller) to your power source.
- If desired, plug any 12V accessories into the red 12V Output jacks on the sides.

TURNING ON:

- Turn control knob to desired setting (first time users try 5 degrees).
- Medium Power outputs will operate at 40%.
- If a Temperature Sensor is being used, the associated red LED may initially stay on (warming up) or off (cooling down), but should eventually start blinking when the heater reaches the correct temperature.
- The yellow Battery Warning LED should not illuminate with a fully charged battery.

DETERMINING TEMPERATURE SETTING:

- If a temperature sensor is being used, the ideal temperature setting of the control knob is the lowest setting that never allows dew formation. This setting will deliver the best telescope images while preventing dew from forming under all conditions. Once you learn the ideal setting for your telescope, just set it there each night and forget about it.
- As a starting point set the control knob to 5 degrees. Unless dew forms, operate at this setting for the entire first night. Then try setting it a degree lower each subsequent night until dew forms or you get to 1 degree.
- If dew forms then your setting is too low. Clear the dew as outlined in the next section, Dew Burn-Off, then plug the Temperature Sensor back in and set the control knob a degree higher than where it was when the dew formed.

DEW BURN-OFF - It takes much more heat to clear dew than to prevent it from forming in the first place. To remove dew, unplug the Temperature Sensor and turn the control knob fully clockwise. All outputs will go to full power (red LED's on). After the dew clears, plug the Temperature Sensor back in and return the control knob to a slightly higher setting than when the dew formed. If a Temperature Sensor is not being used, you may set the control knob to 15 or higher which will send more power to the heaters (see table at bottom of page 1). If you have only one item that is dewing up then the heater on it may be too small to adequately heat it.

Troubleshooting Problems

Symptom	Most Likely Cause
Secondary mirror dewing	<ul style="list-style-type: none"> Control knob set too low.
Yellow Low Battery LED on constantly	<ul style="list-style-type: none"> Battery or Power Supply is outside of 10.5VDC to 15VDC operating range. Draining battery below 10.5V can damage it. Voltage above 15V can damage your heaters.
Low Battery LED flickers	<ul style="list-style-type: none"> Battery low on charge, LED blinks longer as battery discharges. If battery is fully charged then check for loose connections on power wiring and that battery is large enough to supply the Amps needed for your heaters. If using a power supply, ensure that it is sufficient to supply enough Amps for your heaters.
No LED's lit.	<ul style="list-style-type: none"> Is your power source providing DC power? Check that polarity is not reversed. LED may be difficult to see during daylight (optimized for night time). Cigarette Plug models have a fuse in tip of cigarette plug. If LED on cigarette plug is not lit then either there is no power or fuse is blown. Non-cigarette plug models have a solid state PST fuse inside DewBuster. If tripped, correct problem and fuse will self reset after a few minutes. See "One red LED will not illuminate" below.
One red LED will not illuminate	<ul style="list-style-type: none"> A shorted heater will cause that output to shut off (red LED stays off). Unplug Temperature Sensor(s) and all heaters. If red LED's blink, plug heaters into top left (or top right) TC output one at a time. If any heater causes Red LED to stop blinking it has a short in it. This is easy to fix per Technical Support article "Repair Shorted Heater" at www.dewbuster.com
Red LED of Temperature Controlled heater stays on constantly.	<ul style="list-style-type: none"> Scope Sensor pulled away from mirror and not measuring temperature. When first turned on the red LED may stay on for a few minutes while the mirror is warming up to set temperature, but LED should blink after mirror warms up. Check that heater is positioned against the part of telescope being warmed and is sufficient in size to provide enough heat. Air Sensor (page 2 Fig.1) is too close to a warm object like a heater strip or your body.
Battery runs down very quickly	<ul style="list-style-type: none"> Shorted heater (see Technical Support article "Repair Shorted Heater" at www.dewbuster.com). Insufficient battery capacity (AH / Amps = Hours). Ex., 4AH battery with heaters that drain 2 Amps is $4AH / 2A = 2$ hours of run time. If dead battery recharges very quickly it is not storing energy and should be replaced.

Warranty and Technical Support

Your DewBuster™ Controller is warranted for 5 years from the date your telescope was delivered. If it fails for any reason, contact Ron Keating for return instructions. I will expedite the repair to minimize the time you are without your controller. Failures beyond the warranty period will be repaired at a flat-rate fee. Contact me for a quote.

Ron Keating
269 St. Andrews Blvd., Laplace, LA 70068

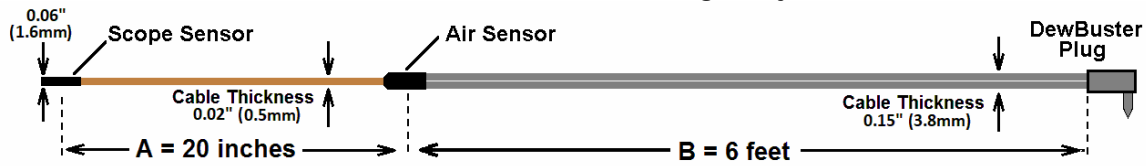
E-mail address changes frequently due to spam so go to:

www.dewbuster.com

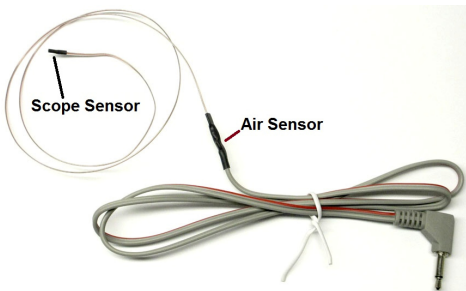
and click on CONTACT ME for current e-mail address.

Optional Newtonian Temperature Sensor

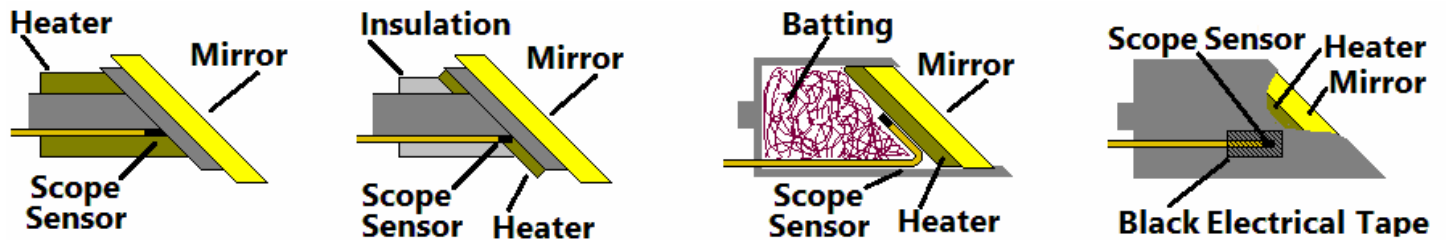
NOTE: Never heat the primary mirror because it will distort the perfect figure resulting in blurred images. A cooling fan on the back of the mirror will keep it at ambient air temperature and prevent dew. If you have an open tube Newtonian it must have a shroud to reduce heat loss to the night sky.



The Air Sensor and Scope Sensors are interconnected by a 20 inch long wire (dimension A). The wire has a very small diameter to allow routing it along the spider vane with minimal light obstruction. It may be painted or taped over if desired. If the wire is longer than needed, do not attempt to shorten it; simply bundle the extra near the Air Sensor so that it will not block the optical path (e-mail me when ordering and I can customize both A and B dimensions to suit your needs). The 6-foot long gray wire between the Air Sensor and DewBuster plug (dimension B) is plain copper wire so you may cut it to add a connector at the tube wall if you would like (maintain polarity).



The Temperature Sensor combines both air and telescope sensors into a single cable. An SCT/Refractor version is also available for use with heater strips (clips onto and held in place by heater strip). The Newtonian version (shown on left) does not have a clip so the user must fasten it in place by other means as described below. The **Scope Sensor** measures the mirror temperature and should be positioned as close to the mirror as possible. The **Air Sensor** must be exposed to the outside air and should not directly touch any part of the telescope (leave a small air space between the Air Sensor and any part of the telescope). Only the sensors (black bands) measure temperature, the small diameter brown wire that connects them may be taped-to or wrapped around any part of the telescope without affecting temperature measurement.



Shown above are examples of Scope Sensor placement on Newtonian secondary mirrors. Ideally the sensor would be glued (Silicone RTV works well) or taped (black electrical tape works well) directly to the back of the mirror, however this is not always practical. The sensor can be placed on the stalk which will be close to the mirror temperature since they are glued together. The 1st diagram shows a wrap-around heater with the sensor placed inside and as close to the mirror as possible. The 2nd diagram shows a flat heater glued to the mirror mount with the sensor placed as close to the heater as possible and wrapped with insulation to help retain heat. The 3rd diagram shows a cell-mounted secondary mirror with heater glued to the mirror. The sensor is placed inside and as close to the heater as possible. The batting inside of the mirror cell acts as an insulator so the sensor temperature will be very close to the mirror/heater temperature. The 4th diagram is the same mirror cell as the 3rd, but the user did not wish to disassemble the mirror holder so they taped the sensor to the outside of the mirror cell with black electrical tape. This method will not control mirror temperature as precisely as the 3rd diagram, but it will work. Although the diagrams show Newtonians, the principles also apply to other types of secondary mirror holders.

After attaching the Scope Sensor, route the small diameter wire along the spider vane and locate the Air Sensor outside of the optical path. Typically the Air Sensor is located inside the tube to shield it from your body heat. Leave a small air gap between the sensor and any part of the telescope so that the sensor can accurately measure air temperature. The diagram at right shows an example of how the cable can be routed.

