CELESTRON 94036 Smart DewHeater and Power Controller 4x Instruction Manual

Contents

CELESTRON 94036 Smart DewHeater and Power Controller 4x

Model **#94036 ENGLISH**

Parts List

1. Smart DewHeater and Power Controller 4x
2. Power cable
3. Tripod leg strap
4. Thermistor cable
5. AUX cable
6. Mount power cable

If you are missing any parts in the Parts List, please contact Celestron Technical Support at www.celestron.com/pages/technical-support for assistance.

Controller Overview

Refer to Figure 2 for an overview of the input jacks, output ports, and features of the Smart DewHeater and Power Controller 4x. **Fig 2-1**

- Dew heater ports

- Bridge
- Power input jack (barrel connector)
- Power input jack (XT60 connector)
- Thermistor ports

  Fig 2-2
- AUX ports
- USB ports
- PC port
- Variable power output port
- Power output ports

  Fig 2-3

The Smart DewHeater and Power Controller 4x provides automatic smart control for up to four dew heater rings or dew heater bands/strips. You can manually set the power for each of the dew heater ports from 0% (off) to 100% (full power).
If you are using a non-Celestron heating band or strip, it will need an RCA-type plug to connect to the controller's heater output ports. You have two options for controlling third party bands/strips:

Mounting the Controller to Your Setup

Mount the controller to your setup using the tripod leg strap provided in the parts list.

Powering the Controller

Connect the power cable to either the barrel connector or the XT60 connector on the controller and connect the other end to a power source.

Connecting to a Celestron Mount

Connect the mount power cable from the controller to the mount's power input jack.

Using the Controller with a Celestron Hand Control

Connect the AUX cable from the controller to the hand control.

Connecting to a PC

Connect a USB cable from the controller's PC port to your computer.

Using the Controller with CPWI Software

You can use the CPWI software to control the Smart DewHeater and Power Controller 4x by connecting it to your PC and selecting it in the software's Equipment menu.

Specifications

The Smart DewHeater and Power Controller 4x can deliver a0 maximum of 84W power (7A max current) for each of its dew heater ports. If a connected dew heater draws more than 84W, the port will automatically shut off to

protect the circuitry. After reducing the load, you can re-enable the port.

Appendix A: Determining Power Supply Requirement Examples

Refer to Appendix A in the user manual for examples on determining power supply requirements for the Smart DewHeater and Power Controller 4x.

Appendix B: Using the 12V DC Power Input as an Output

Refer to Appendix B in the user manual for instructions on using the 12V DC power input as an output.

Congratulations on purchasing the Celestron Smart DewHeater and Power Controller 4x. This controller delivers “smart” and effi cient power usage for up to four of your telescope system’s dew heaters and up to four 12V DC devices while also providing cable management for your setup. Plug all your dew heaters, power cables, and USB cables into the controller. Then you can use one cable to connect them all to your power source and another to connect them to your PC, if desired.
If you prefer not to connect to a PC, simply plug your dew heaters into the controller and power it on. The controller will automatically monitor the ambient temperature and humidity using its integrated environmental sensor. The thermistor port monitors the corrector lens’ temperature and provides only enough power to prevent dew. If you’re using battery power, this “smart” system signifi cantly reduces the heaters’ power consumption, extending battery life. If you would like to manually adjust settings or monitor data, connect to a PC or your Celestron mount’s hand control.
Please read through this entire manual before attempting to use the Smart DewHeater and Power Controller 4x.

Parts List

All included items

1. Smart DewHeater and Power Controller 4x
2. Power cable
3. Tripod leg strap
4. Thermistor cable
5. AUX cable
6. Mount power cable

If you are missing any parts in the Parts List, please contact Celestron Technical Support at www.celestron.com/pages/technical-support for assistance.

Controller Overview

Refer to Figure 2 for an overview of the input jacks, output ports, and features of the Smart DewHeater and Power Controller 4x.

Fig 2-1

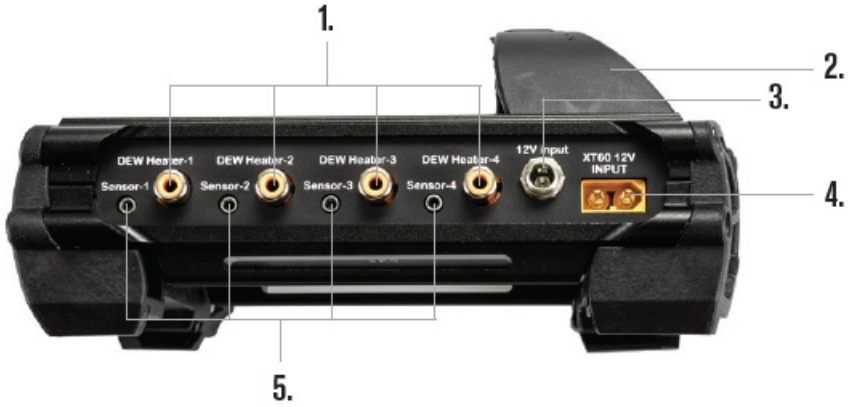


Fig 2-2

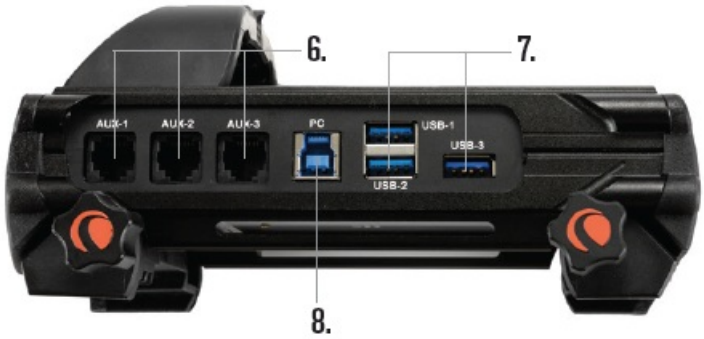
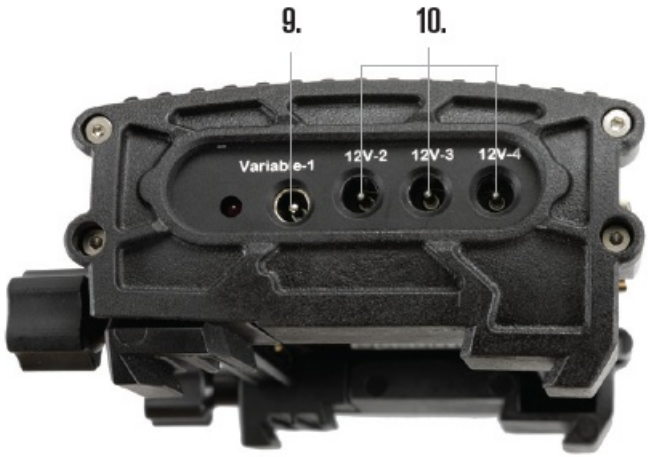


Fig 2-3



1. Dew heater ports
2. Bridge
3. Power input jack (barrel connector)
4. Power input jack (XT60 connector)
5. Thermistor ports
6. AUX ports
7. USB ports
8. PC port
9. Variable power output port

10. Power output ports

DEW HEATER CONTROL

- The Smart DewHeater and Power Controller 4x provides automatic “smart” control for up to four dew heater rings or dew heater bands/strips.
- If you are using the controller with a Celestron Dew Heater Ring, connect the ring’s power input jack to one of the controller’s dew heater output ports using the extension cable that comes with the ring. Next, plug the included thermistor cable into the ring’s thermistor jack and the corresponding thermistor port on the controller. (Figure 3) The thermistor indicates the Schmidt corrector lens’ temperature. The controller uses this data along with information from the controller’s integrated environment sensor (i.e., ambient temperature and humidity) to provide just the right amount of power to the ring to prevent dew. If you are using battery power, this system greatly increases battery life under most conditions. Once you connect the ring to one of the controller’s dew heater ports, it will begin to heat up (unless the port has been manually disabled, which will be discussed later in this manual).

  manually set the power for each of the dew heater ports from 0% (off) to 100% (full power). We’ll discuss this option in more detail later in the manual.
- If you are using a non-Celestron heating band or strip, it will need an RCA-type plug to connect to the controller’s heater output ports. You have two options for controlling third party bands/strips:

1. You can purchase the optional Thermistor for Celestron Smart DewHeater Controllers to provide automatic smart power control. Connect the heating band to the telescope and connect its plug to one of the dew heater ports. Then, place the tip of the probe thermistor under the heating band so it is secure (you may want to use tape). Connect the thermistor’s plug to the corresponding jack on the controller (Figure 4). The probe thermistor is not as accurate as the Celestron Dew Heater Ring’s built-in thermistor, which contacts the corrector lens directly. Still, it allows for automatic smart control of heating bands/strips.

2. As mentioned above, you can manually set the power output for each dew heater port from 0% to 100%. Each of the dew heater ports can deliver a maximum of 84W power (7A max current), which should be more than enough for most dew heaters. If a connected dew heater draws more than 84W, the port will automatically shut off to protect the circuitry. After reducing the load, you can re-enable the port, a process that we'll discuss later in this manual.

POWER CONTROL

- The Smart DewHeater and Power Controller 4x can provide 12V DC power to up to four external devices. This will allow you to power your mount, camera, focus motor, and other 12V DC accessories with only one power source, which greatly simplifi es the required cable connections.
- To power a 12V DC device, simply connect the device's power input to one of the controller's 12V DC power output ports. The ports require a 12V DC 5.5mm/2.1mm tip positive barrel connector. Power will fl ow through the port as soon as you connect the device; there is no need to turn the port on (unless you disabled the port previously, which we'll discuss later).
- The power port can deliver a maximum of 84W power (7A max current). If a connected device draws more than 84W, the port will automatically shut off to protect the circuitry. After reducing the load, you can re-enable the port, a process that we'll discuss later.
- You can use the supplied mount power cable to power your mount or other 12V DC device from one of the power output ports. This is the cable with 12V DC barrel connectors on both ends (as shown in Figure 1). One end of the mount power cable has an integrated nut on its barrel connector. Thread this onto the power jack on Celestron mounts for the most secure connection.

VARIABLE DC POWER PORT

Power port #1, which has the word "Variable" printed above it, can be adjusted from 3V to 12V (the default setting). We'll cover this process later in the manual. The LED next to the port will illuminate when the voltage is set to a value other than 12V.
Many users choose to use the variable port to power their DSLR cameras, which usually require 8V DC.
Keep in mind that the maximum power draw for the variable DC port is 60W, which is a little less than the other power ports. If a connected device draws more than 60W, then the port will automatically shut off to protect the circuitry. After reducing the load, you will need to re-enable the port before using it again, which we'll discuss later.

USB 3.2 HUB

- The Smart DewHeater and Power Controller 4x features an integrated USB 3.2 hub. You can use the hub to connect up to three USB devices to your computer using only one cable connection, greatly simplifying the setup and cable management.
- To use the USB hub, fi rst connect the controller to your PC using a USB Type-A to USB Type-B cable (also known as a “USB printer cable,” not supplied). Then, plug a USB device into one of the three USB ports on the controller. You will now be able to connect to the device directly from your PC. Each USB port is 5V DC powered, so you can also use the USB ports to charge your smartphone or other devices.
- If you are only using one or two of the USB ports, each port delivers a maximum power of 12.5W (2.5A max @ 5V). If you are using all three of the ports, each port delivers a maximum power of 10.5W (2.1A max @ 5V). The USB hub can supply a total of 31.5W maximum power (6.3A max @ 5V). If the power draw for any of the USB ports exceeds this, the USB port will automatically shut off to protect the circuitry. You can re-enable the USB port once the load is reduced, which we’ll discuss later in this manual.

STATUS LEDS

There are three LEDs on the bridge that indicate the controller’s status:

- The middle LED indicates whether power is fl owing to the controller.
- The LED labeled “Over Current” illuminates if the current draw is greater than the power source can provide. If this happens, either disconnect or reduce power to one of the devices connected to the controller or use a power source capable of delivering more current. You will need to set the max current draw for your power supply for this LED to work properly (as discussed later in this manual).
    - If one of the ports has experienced a short circuit from a connected device, the “Over Current” LED will blink, and the affected port will turn off. You will need to follow the instructions that appear later in the manual to re-enable the port and use it again.
- The LED labeled “Under Voltage” will illuminate if the input power to the controller is less than 11.0V DC. This happens when your battery power supply is nearing the end of its charge. Use a different power source or recharge the battery. The under-voltage LED helps protect your battery from becoming over-drained, which could reduce the battery recharge lifetime.
    - If the input voltage of the power source exceeds 13.8V, all output ports will turn off to protect the circuitry, and the “Under Voltage” LED will blink. Replace the power source with one that supplies less than 13.8V and manually re-enable all the output ports according to the instructions that appear later in this manual.

If you are under dark skies and fi nd the LEDs too bright, you can adjust their brightness. We’ll explain how later in the manual.

ADDITIONAL CIRCUIT PROTECTION

- In addition to the status LEDs’ warnings, the Smart DewHeater and Power Controller 4x features other circuit protection measures to keep your equipment safe.
- If the total power draw of the controller exceeds 240W (20A max current), the controller will automatically shut off. Reduce the load on the controller and manually re-enable the ports using the instructions that appear later in this manual.
- If you accidentally connect the input power source with the improper polarity, the controller will not power on to

prevent circuit damage.

Mounting the Controller to Your Setup

Decide how you want to attach the controller to your telescope setup. There are a few options:

- Use the integrated dovetail clamp to connect the controller to a CG-5/Vixen or CGE/Losmandy dovetail bar. If you have a dovetail bar on your optical tube, this is perhaps the easiest and most convenient way to connect the controller to your setup. Simply loosen the controller's clamping knobs, place the controller's clamps onto the dovetail rail, and then fi rmly tighten the clamping knobs (Figure 5).
- Use the included tripod leg strap to attach the controller to one of your tripod's legs. Insert the strap through the slots in the bottom of the controller's enclosure, wrap the strap around one of the tripod legs, tighten the strap with the buckle, and secure the strap end to itself with the hook-and-loop fasteners on the strap (Figure 6).

Fig 5

- If your tripod's accessory tray is large enough, you can place the controller on the tray. If you choose this method, keep in mind that the controller will not be secured in place. Be careful to avoid forceful cable pulls.

Fig 6

NOTE: DO NOT PLACE THE CONTROLLER ON THE GROUND! Water and dirt can potentially enter the controller and may cause electrical problems

USING THE BRIDGE FOR CABLE MANAGEMENT

The bridge on the enclosure houses the controller's environmental sensor, isolating it from radiant heat to provide the most accurate ambient temperature and humidity data. We also designed the bridge to help with cable management. You can run cables underneath the bridge to keep them captive and organized (Figure 7). Simply insert the cable end underneath the bridge and pull it through until there is enough slack to connect the cable's plug to the corresponding port on the controller

Fig 7

Powering the Controller

You will need a suitable 12V DC power supply for the Smart DewHeater and Power Controller 4x. The appropriate power supply will depend on the equipment you have plugged into the controller
The maximum power the controller can deliver is 240W (20A max current @ 12V DC), but many use cases require less power. Before choosing a power supply, determine the approximate amount of power needed for your setup and how much battery capacity you'll need for your observing session

Helpful formulas:

- Voltage (in Volts) x Current (in Amps) = Power (in Watts)
- Current (in Amps) x Time (in hours) = Battery current capacity (in Amp-hours) required
    - Power (in Watts) x Time (in hours) = Battery power capacity (in Watt-hours) required

The maximum input voltage for the power input jack is 13.8V DC. Make sure your power supply's output voltage does not exceed this.
If more than 13.8V DC is supplied, all output ports will automatically shut off to protect the circuitry, and the "Over Voltage" status LED on the enclosure's bridge will blink.

Choose from the following power options:

- For up to 120W power (10A max current), the Celestron PowerTank

Lithium Pro or Celestron PowerTank 17Ah is a great choice. Using the power cable supplied with the controller, connect the cigarettelighter plug to the battery and the XT60 connector to the controller (Figure 8).

- If operating close to the full 10A load, you'll need a battery with more capacity than the PowerTanks to run your setup all night
- If you are running high loads from a portable setup, consider a 12V DC "marine battery" from a third-party vendor. These batteries can easily provide 240W (20A @ 12VDC) and have enough capacity to run your setup all night. You may need to connect directly to the battery's terminals using a battery terminal-to-XT60 adapter (not supplied).
- If you do not need to be portable, connect to an AC power outlet using an AC-to-12V DC adapter. If your setup requires 60W power or less (5A current or less), you can use Celestron's AC Adapter- 5A. Connect the adapter's output cable to the controller's barrel connector power input jack, thread the connector to the exterior of the jack for a secure connection, and then plug the adapter into an AC power outlet (Figure 9).

If you need 5A (60W) of power or less for your setup, and you have access to an AC power outlet, you can use the Celestron AC Adapter-5A to power the controller. Use the threaded barrel connector for the most secure connection

- **WARNING**: THE MAXIMUM POWER THE BARREL CONNECTOR INPUT JACK CAN ACCEPT IS 120W (10A MAX CURRENT @ 12V). If you require more power than this, you must use the XT60 power input jack. If the devices connected to the controller require more than a total of 120W power (10A current) and a power source capable of delivering more than 120W is connected to the input jack, you could damage the controller.

- If you want to use AC power and the controller needs more than 120W (10A current), you must use the controller's XT60 power input jack. You'll need to purchase an AC-to-DC power supply and connect it to the XT60 jack. You may need to connect directly to the power supply's terminals using a terminals-to-XT60 adapter (not supplied). The XT60 power input jack can handle a maximum power input of 240W (20A max current). If the controller requires more than 20A, it will automatically shut down.
    - If the output voltage for the AC-to-DC power supply is variable, make sure to set it to 12V before connecting the controller.

Refer to Appendix A for example power supply setups.

- Once you have chosen your power supply, you will need to set the maximum current draw for your power supply using the Celestron hand control or CPWI (discussed later in this manual). Then, if the controller draws more current than your specifi ed maximum, the "Over Current" LED will illuminate. By default, the maximum current draw is 2.0A, which is relatively low. So, if you have not set the maximum current draw for your power source, this LED may turn on prematurely.
- When you connect power to the power input jack, the controller is on.
- Power should fl ow through the ports.

Connecting to a Celestron Mount

- If you are using the Smart DewHeater and Power Controller 4x with a Celestron mount, you can connect it to the mount to change settings and monitor data with the mount's hand control. This is an excellent option for setups without a PC connection.
- Before using your telescope's hand control with the Smart DewHeater and Power Controller 4x, you may need to update your hand control's fi rmware. For the NexStar+ hand control, you'll need fi rmware version 5.33.1333 or greater. For the StarSense hand control, you'll need fi rmware version 1.22.21333 or greater. You can check your fi rmware version number by pressing the MENU button and using the SCROLL and ENTER buttons to navigate to Hand Control>Get Version Info.
- Use the Celestron Firmware Manager (CFM) software to update the fi rmware if needed. You'll fi nd the latest version here: **https://www.celestron.com/pages/drivers-and-software**
- To use the NexStar+ or StarSense hand control, connect the supplied AUX cable to an AUX port on the Celestron mount and an AUX port on the Smart DewHeater and Power Controller 4x. Then, plug the mount's hand control into the mount as you usually would.
- Alternatively, you can connect the hand control directly to one of the controller's AUX ports. You can also use the included mount power cable to power your mount from the power output port (Figure 10).
  NOTE: Power does not fl ow to the AUX ports unless a Celestron mount is connected to one of the AUX ports and turned on. If you do not have a Celestron mount connected, a hand control plugged directly into one of the AUX ports will not receive power.

Using the Controller with a Celestron Hand Control

Once connected, you can change settings and monitor data using the NexStar+ or StarSense hand control. To do this, turn on the mount, press the MENU button on the hand control, navigate to the Dew Heater menu using the SCROLL buttons, and press ENTER. Now, use the SCROLL buttons to view the Dew Heater menu options, and press ENTER to select.
Figure 11 shows the Dew Heater menu tree

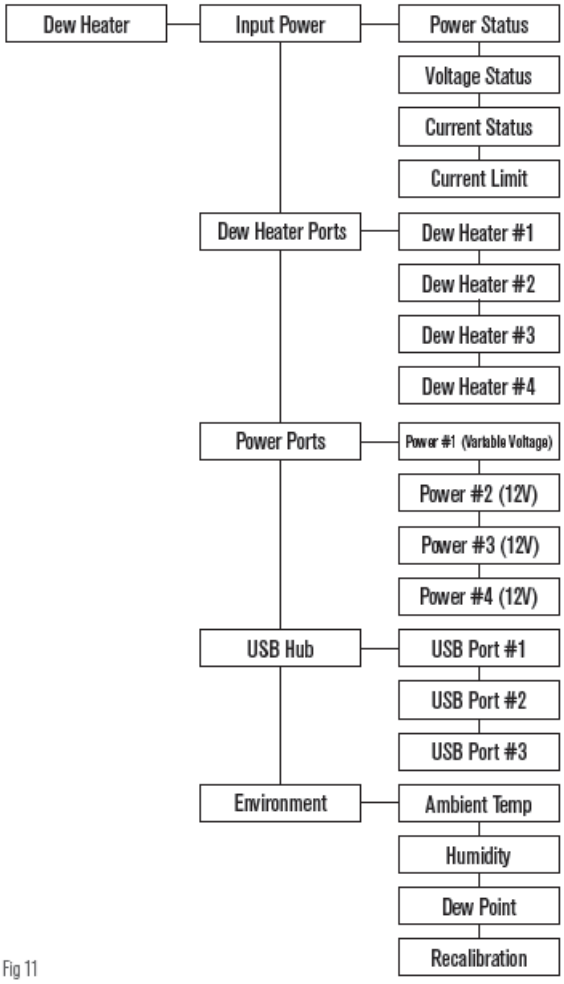


Fig 11

NOTE: If you are using the StarSense hand control, you will need to use the SCROLL buttons to see the entire text for some menu selections.

INPUT POWER
Select this to monitor the power draw from the devices connected to the controller. You can also check the input current from the power source and set the maximum current draw. Use the SCROLL buttons on the hand control to choose from the following options, and press ENTER to select

- **Power Status** – Displays the power draw from the devices connected to the controller.
- **Voltage Status** – Displays the voltage provided by the input power source.
- **Current Status –** Displays the current the devices connected to the controller are using.
- **Current Limit** – This menu allows you to set the maximum current for the power source. When the current draw from connected devices exceeds this amount, the “Over Current” LED on the controller’s bridge will illuminate.
- Press ENTER to set the current limit from 1.0A to 20.0A. Press ENTER when done.
- **NOTE**: If you exceed the current limit and the “Over Current” LED turns on, you need to disconnect a device from the controller or use another power source that can supply more current. If you use another power supply, make sure to change the current limit

DEW HEATER PORTS

This option displays the power draw for each dew heater port. If you do not wish to use the automatic “smart” control for the dew heaters, this is where you can manually set the power output for each dew heater port.

After selecting Dew Heater Ports from the menu, you can scroll to the four heater ports. The LCD on the hand control will display whether each port is in Manual or Auto mode and the power draw on the port at that moment. To change from Auto mode to Manual mode, select the port using the SCROLL buttons, then press ENTER. Then use the SCROLL buttons to choose between Manual Mode and Automatic mode, and press ENTER.

- If you select Manual Mode, you need to specify a desired Power Level. This is a number between 0 and 100—the percentage of maximum power to the dew heater connected to the port. Once you have entered your desired value, press ENTER.
    - To turn a dew heater port off, select the dew heater port, change to Manual Mode, and set the Power Level to 0%.
- If you select Automatic Mode, you will need to set the aggression level. This is a number from 1 (lowest aggression) to 10 (highest aggression) that indicates how active the smart dew controller is when preventing dew. A higher aggression setting will use more power but will provide the highest level of dew prevention during changing environmental conditions. In general, you can use a lower aggression setting for warmer, drier, or windier observing sites and smaller telescope apertures. Conversely, use a higher aggression setting for cooler, more humid observing sites and larger telescope apertures.
- If you are unsure of which aggression setting to use, try 5 (the default setting). After you have set the aggression, press ENTER.

POWER PORTS

- This selection allows you to monitor the power output to any devices connected to each of the power ports. You can also adjust the voltage for the variable power output port or disable any power ports that you want to turn off. The ports are numbered from left to right, so the output port labeled “Variable” is power port #1, while the one on the far right is power port #4 (Figure 2). Power ports #2-4 provide 12V DC power. The variable power port can provide between 3.0V-11.0V or 12.0V DC.
- After selecting “Power Ports” from the Dew Heater menu, you can scroll through the list of four power output ports. For each power port that is enabled and has a device connected, the LCD on the hand control will display the power draw.
- To disable power to the port and turn off a connected device, press ENTER for the selected port. The LCD screen will then display, “Disable port?” If you want to disable power output to the port, press ENTER. If you do not want to disable power, press BACK.
- To re-enable power to a port and turn a connected device back on, simply scroll to the desired port and press ENTER.
- For power port #1—the variable power output port—you can adjust the output voltage from 3.0V DC to 11.0V DC, or 12V DC (the default). To do this, scroll to power port #1 and press ENTER. When the “Disable port?” message appears, press one of the SCROLL buttons. “Change Voltage” will appear on the LCD. Press ENTER, and you can adjust the output voltage. When you are fi nished, press ENTER. You will now see the new voltage setting on the top line of the LCD. If the variable power port is set to anything other than 12V, the LED next to the variable output port on the controller will illuminate.
- **WARNING**: When you are using the variable output power port, make sure to set the voltage to the device’s required voltage before plugging it into the controller. Otherwise, you could supply the device with an improper voltage and potentially damage your device.

USB HUB

- This selection allows you to monitor the power output to any devices connected to each of the USB ports. You can also disable any USB ports that you want to turn off. The ports are numbered from left to right and from top to bottom (Figure 2).
- After selecting “USB Hub” from the Dew Heater menu, you can scroll through the list of three USB ports. For each USB port that is enabled and has a device connected, the LCD on the hand control will display the power draw.
- To disable power to a USB port and turn off a connected device, press ENTER for the selected USB port. The LCD screen will then display “Disable port?” – if you want to disable power output to the USB port, press ENTER. If you do not want to disable power, then press BACK. To re-enable power to the USB port to turn a connected device back on, simply scroll to the desired USB port that is disabled and press ENTER.

ENVIRONMENT

This selection allows you to view the data from the environmental sensor. This is also where you can recalibrate the sensor for optimal performance. Use the SCROLL buttons on the hand control to choose from the following options and press ENTER to select.

- Ambient Temperature – Displays the ambient air temperature.
- Humidity – Displays the relative humidity.
- Dew point – Displays the dew point, a value is calculated in real-time using ambient temperature and humidity data. If the lens’ temperature drops below the number displayed, dew will form on its surface.
- Recalibration – To begin recalibration of the environmental sensor, select this option and press ENTER. The sensor will heat up to evaporate any moisture accumulated on it, providing the most accurate sensor readings. Recalibration takes about 10 minutes from when you press ENTER to when the sensor has cooled back to ambient temperature. We recommend recalibrating the environmental sensor periodically, especially if the sensor has not been used in a while or has been stored in humid conditions.
- If you check the ambient temperature or humidity during recalibration, the display will report the values last detected before recalibration began.

RE˜ENABLING A DISABLED PORT

As discussed previously, the controller’s ports automatically shut off if one of the ports draws more than 84A (7A max current) or if the total load on the controller exceeds 240W (20A max current). To re-enable a port after it has been automatically disabled:

- First, reduce the load on the controller.
- To select the disabled port, press MENU, scroll to “Dew Heater,” and press ENTER. Then scroll to “Dew Heater Port”, “Power Port,” or “USB Port” and press ENTER. Then scroll to the affected port.
- The LCD screen will display “Reset Fuse?” Press ENTER to re-enable the port.

NOTE: If the total load on the controller exceeds 240W (20A max current), you will need to re-enable all the ports.

Connecting to a PC

- It may be most convenient for some setups to connect the Smart DewHeater and Power Controller 4x to a PC

to adjust settings and monitor data. This is especially true if you are already using a PC to control your mount or any imaging cameras or guiding cameras.

- To use a wired connection, you will need a USB Type A-to-Type B cable (not supplied). Plug into the PC port on the controller and a USB port on your PC. Once you turn the controller on, the computer should recognize it.
- To connect a PC to the controller wirelessly using the optional SkyPortal WiFi Module, you will need a Celestron mount and the WiFi module accessory (sold separately). Plug the WiFi module into an AUX port on the mount. Connect another AUX port on the mount to one of the AUX ports on the controller using the supplied AUX cable. You can also use the included mount power cable to power your mount from one of the power output ports (Figure 12). Once all the cables are connected, turn on the mount.

- If you are using a Celestron mount with the SkyPortal WiFi Module, you can connect to the controller via WiFi through the mount using the supplied AUX cable. You can also use the included mount power cable to power your mount from the power output port.
  NOTE: If your mount only has one AUX port, you'll need to purchase the optional AUX Port Splitter. This converts the mount's single AUX port into two.

Using the Controller with CPWI Software

- If you are already controlling your telescope or camera from a computer, you will love controlling the Smart DewHeater and Power Controller 4x with our free Celestron CPWI software. To download the latest version, visit: **https://www.celestron.com/pages/celestron-pwi-telescope-control-software**
- Install the software and open CPWI. Select "Start" if the opening window appears. Then, click on the "Connection" icon in the upper-left corner of the screen. If you are using a wired connection, select "Mount USB." If you are using the SkyPortal WiFi Module, click on the "Connection" icon and then select "WiFi." CPWI should fi nd and connect to the controller. Once connected, the Dew Heater icon will appear in the selection menu on the left side of the screen.
- Selecting the Dew Heater icon will display the Dew Heater menu (Figure 13). The fi rst line in the Dew Heater

menu indicates the total power draw for any devices connected to the controller. To see more data, click Overview.

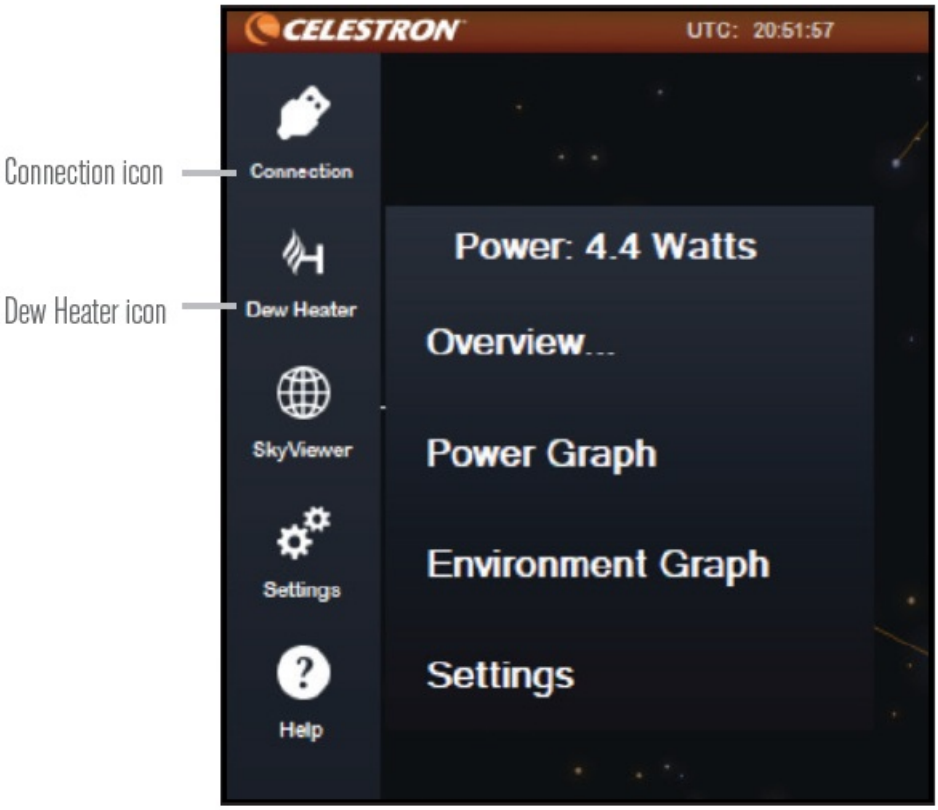


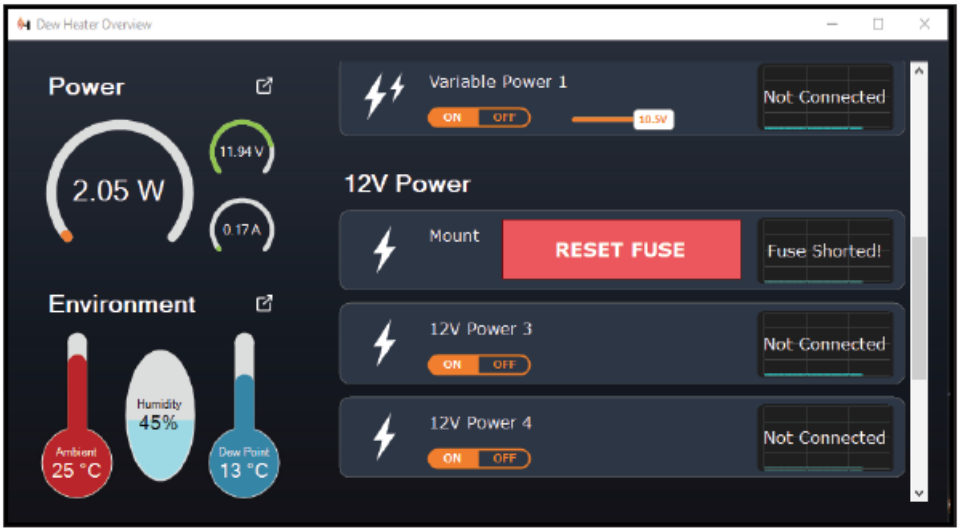
Fig 13
CPWI Dew Heater menu

OVERVIEW

- The Overview screen displays the power draw for each port on the controller (Figure 14). The icons beside any ports currently in use will turn orange with the power draw over time in the small graph to the right. In the upper-left corner of the Overview screen, you can see the total power and current draw from the controller and the input voltage from the power source. Below that, you can see the ambient temperature and humidity data from the environmental sensor and the calculated dew point.

Fig 14
Overview screen

- The Overview menu is also where you can turn power to each output port on or off, including the power ports, the dew heater ports, and USB ports. Simply click the “On/Off” button under the port you wish to adjust. When you click the button, the icon to its left will turn either orange (on) or white (off). This is a great way to adjust power to individual devices in your setup, especially if you are controlling your telescope remotely.
- As discussed previously, the controller will automatically shut off its ports if there is too much load on one of the ports (greater than 84W) or if the total load on the controller exceeds 240W (20A max current). If this happens, the Fuse Blown Notifi cation will appear, and you will see a “RESET FUSE” box next to the affected port(s) in the Overview screen (Figure 15). To re-enable a port after it has been automatically disabled, fi rst reduce the load on the port as needed. Then, click on the “RESET FUSE” box to re-enable power to the port.



- Fig 15
- If the power draw on a port exceeds the maximum for the port, then the port will automatically shut off. To re-

enable the port, click the RESET FUSE box once the load on the affected port has been reduced.

NOTE: If the total load on the controller exceeds 240W (20A max current), you will need to re-enable all ports.

- You can also set the voltage of the variable power port here. Simply move the slider in the Variable Voltage Power section of the screen to the desired value.

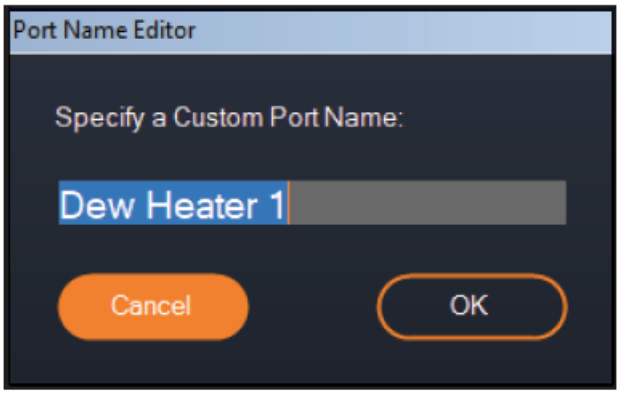
  WARNING: When you are using the variable output power port, make sure to set the voltage before plugging your device into the controller. Otherwise, you could supply the device with power of an improper voltage and damage your device.

Under each Dew Heater port, you'll fi nd buttons to change from Auto "smart" control mode to Manual control mode:

- If you select Manual Mode, you need to indicate the desired power level. This is a number between 0 and 100—the percentage of maximum power to the dew heater connected to the port.
  - To turn a dew heater port off, select Manual control and set the slider to 0%.
- If you select Automatic Mode, you will need to set the "aggression" level. This is a number from 1 (lowest aggression) to 10 (highest aggression) that indicates how active the controller is when preventing dew. A higher aggression setting will use more power but will provide the highest level of dew prevention during changing environmental conditions. In general, you can use a lower aggression setting for warmer, drier, or windier observing sites and smaller telescope apertures. Conversely, use a higher aggression setting for cooler, more humid observing sites and larger telescope apertures.

  If you are unsure of which aggression setting to use, try 5 (the default setting).

You can rename each port in the Overview screen by clicking on the name of the port. The Port Name Editor window will appear (Figure 16), and you can enter the new name. Click the OK button when done, and the new name will appear for the port. This will help you keep your controls organized, as you can rename each port for the connected device. For example, you can rename your ports "8-inch Dew Heater Ring" or "CGX Mount."



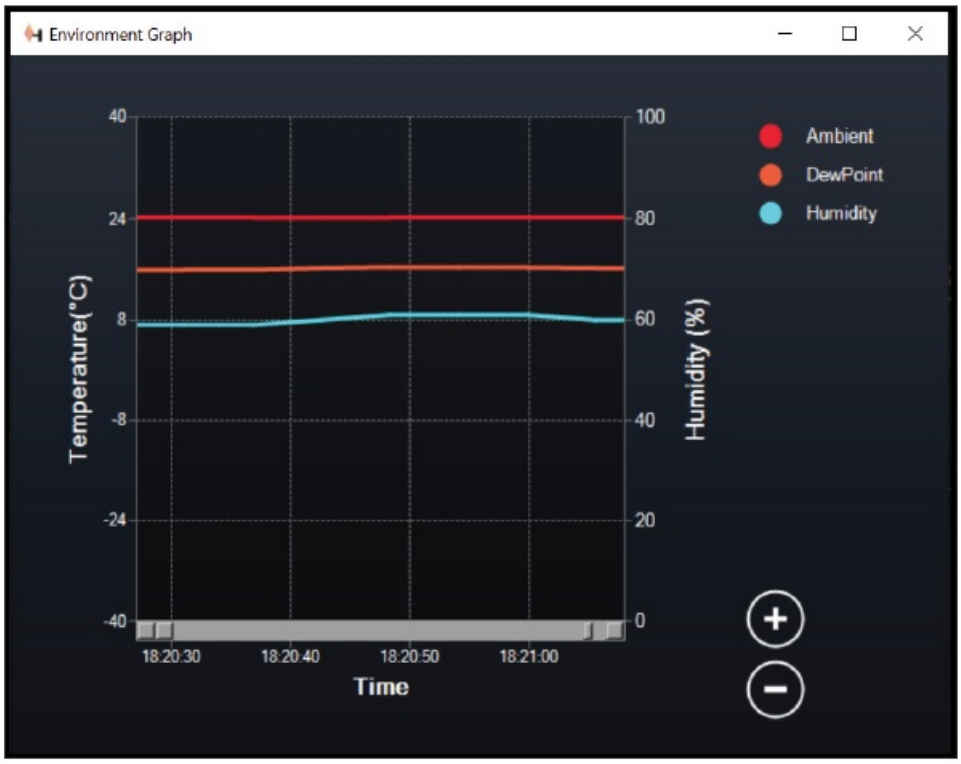
POWER GRAPH

- Select "Power Graph" from the Dew Heater menu to bring up the Power Graph window (Figure 17). You can also access the Power Graph directly from the Overview screen by clicking on the shortcut arrow icon next to the word "Power" on the upper-left side of the Overview screen. The Power Graph shows power usage over time for all devviced connected to the controller.

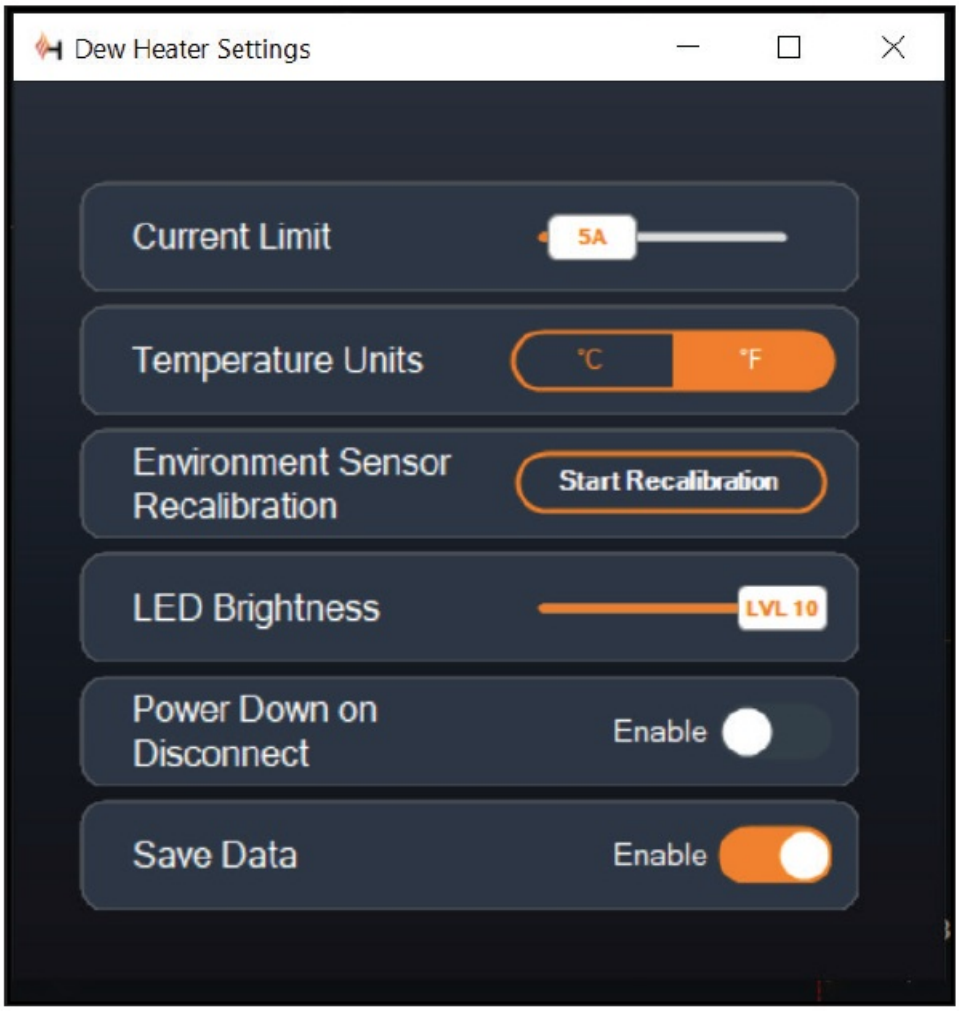
- Each color line on the graph represents a different port. If you wish to change the color for a port, mouse over the port and right-click. You can hide a port from the graph by clicking on the circle to the left of the port's name. To re-enable its line on the graph, simply click on the circle again.
- To "zoom in" to a specifi c time range on the graph to see more detail, use the "+" and "-" circles at the bottom right of the graph. You can also "pinch to zoom" if you have a touchpad or use your mouse's scroll wheel to zoom in and out. Use the slider that appears at the bottom of the graph to fi nd a particular time range.

ENVIRONMENT GRAPH

Select "Environment Graph" from the Dew Heater menu to bring up the Environment Graph window (Figure 18). You can also access the Environment Graph directly from the Overview screen by clicking on the shortcut arrow icon next to the word "Environment" on the left side of the Overview screen.



- This graph shows the ambient air temperature, humidity, and calculated dew point over time. The air temperature and dew point use the temperature scale on the left of the graph. Humidity uses the % humidity scale on the right of the graph. Each color line on the graph represents a different value.
- If you wish to change the color for a value, mouse over it and right-click. You can hide a value from the graph by clicking on the circle to the left of the value’s name on the graph. To re-enable its line on the graph, simply click on the circle again.
- To “zoom in” to a specifi c time range on the graph to see more detail, use the “+” and “-” circles at the bottom right of the graph. You can also use “pinch to zoom” if you have a touchpad or use your mouse’s scroll wheel to zoom in and out of time ranges. Use the slider that appears at the bottom of the graph to fi nd a particular time range.
- To change temperature units from degrees Fahrenheit (default) to degrees Celsius, use the “Settings” selection from the Dew Heater menu.



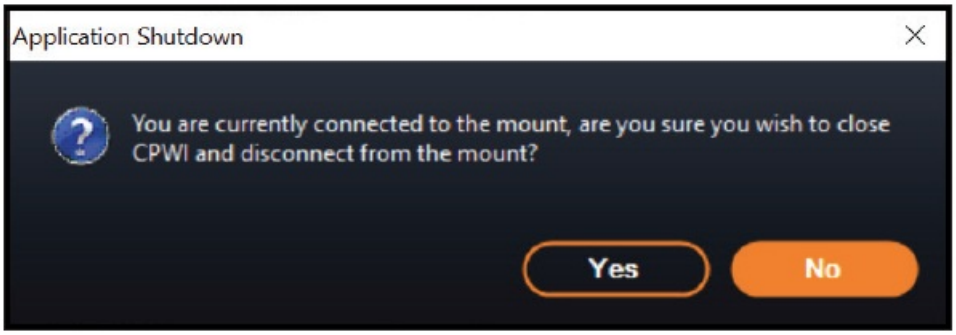
SETTINGS

The “Settings” selection from the Dew Heater menu brings up the Dew Heater Settings window (Figure 19).

- Current Limit
  - Use the slider to set the maximum current for the power supply you are using. If the power draw from the controller exceeds the set max current, the “Over Current” LED on the controller enclosure’s bridge will light up. If this occurs, you will need to reduce the power draw by turning down or turning off devices connected to the controller. (Alternatively, you can use another power supply capable of providing more current. If you do this, make sure to adjust the current limit accordingly.)
- Temperature Units
  - Change the units of temperature in CPWI using the °C and°F buttons.
- Environment Sensor Recalibration
  - Use the “Start Recalibration” button to recalibrate the environmental sensor. This heats the sensor to evaporate any moisture that has accumulated on it. Recalibration helps provide the most accurate sensor readings. It takes about 10 minutes for the sensor to heat up and cool back down. We recommend recalibrating the environmental sensor periodically, especially if the sensor has not been used in a while or has been stored in humid conditions. This will help provide the most effi cient power usage for the dew heaters.
  - If you check the ambient temperature or humidity during recalibration, the display will report the values last detected before recalibration began.

- LED Brightness
    - Set the brightness of the LEDs on the controller using the slider. One is the dimmest setting, and ten is the brightest.
- Power Down on Disconnect
    - You can choose to power off all connected devices when you disconnect the controller from CPWI. To do this, click the Enable button. When you reconnect CPWI, all ports will turn back on. If you do not enable this feature, power will fl ow through the controller as usual when you disconnect from CPWI.
- Save Data
    - This feature allows you to export the raw data from the controller in a .CSV format, which you can open in Microsoft Excel or Google Sheets. If you select this option, you can find the saved .CSV file in this folder on your PC: Documents\Celestron\CPWI

To disconnect from the Smart DewHeater and Power Controller 4x at the end of an observing session, you can either close CPWI and the Application Shutdown window will appear (Figure 20), or you can select the “Connection” icon in the upper-left corner and select “Disconnect.” If you have selected “Power Down on Disconnect” from the Dew Heater>Settings menu, all devices connected to the controller will turn off. Otherwise, power will continue to fl ow through the controller’s ports as usual.



Specifications

- **Weight:** 1.4 lbs
- **Dimensions:** 7” L x 4.5” W x 3.25” H
- **Enclosure:** Aluminum, fan cooled, integrated dovetail clamps and tripod strap
- **Power Input (XT60):** 12V DC nominal, 13.8V DC max input voltage, 20A max input current
- **Power Input (barrel connector):** 12V DC nominal, 13.8V DC max input voltage, 10A max input current, 5.5mm/2.1mm tip positive threaded barrel connector
- **Power Outputs:** 3x 12V DC, 5.5mm/2.1mm tip positive barrel connector, 7A max output current for each port
- **Variable Power Output**: 12V DC default, can be set to 3.0-11.0V DC or 12V DC, 5.5mm/2.1mm tip positive barrel connector, 5A max output current, indicator LED
- **Dew Heater Outputs:** 4x RCA jacks, 12V DC, 7A max output current for each port
- **Thermistor Jacks**: 4x 2.5mm Audio jack, compatible with Celestron Dew Heater Rings and optional Celestron Thermistor for Smart DewHeater Controllers
- **PC Port**: USB Type B, USB 3.2
- **USB Hub**: 3x USB 3.2 Type A, powered (up to 2.5A)
- **AUX Ports**: 3x AUX ports, compatible with Celestron mounts and other Celestron products
- **Environmental Sensor**: Integrated, gives ambient temperature and humidity data, can be recalibrated for best performance
- **Circuit protection:** internally resettable fuses for each port, reverse polarity protection, under voltage, over

voltage, under current, over current

- **Firmware:** Upgradeable thorough Celestron Firmware Manager (CFM) software
- **XT60 Power cable**: XT60 plug on one end, cigarette-lighter plug on other end, 20A fuse, 14 gauge wire

Appendix A: Determining Power Supply Requirement Examples
EXAMPLE SETUP #1 ° SIMPLE SETUP

- Celestron 8” Dew Heater Ring connected to dew heater port #1
  - Max current draw of 8” Dew Heater Ring = 1.7A
  - Max power required for 8” Dew Heater Ring = 12V x 1.7A = 20.4W
- Celestron Advanced VX EQ mount connected to power port #2
  - Max current draw for Advanced VX EQ mount when slewing at highest speed = approximately 2.0A
  - Max power required for Advanced VX when slewing at max speed = 12V x 2.0A = 24.0W
- Smartphone connected to USB port #1 (for purposes of charging smartphone)
  - Keep in mind that the USB ports supply 5V DC (which is the USB standard), while all the other ports supply 12V DC
  - Smartphone current draw when charging = 2.1A
  - Power required for smartphone when charging = 5V x 2.1A = 10.5W

In this example, the total max power required by the controller would be about 55W.

- If you have access to AC power, then the Celestron’s AC Adapter-5A can handle up to 60W and would be a good choice for powering the controller.
- For portable setups, the Celestron PowerTank Lithium Pro can provide up to 120W power (10A max current), so it would work well with this example setup.
  - Since the battery capacity of the PowerTank Lithium Pro is 158.7 Watt-hours, and the controller will use approximately 55 watts power, the battery should last almost 3 hours when all the devices are drawing full power. Suppose you are using auto smart control for the dew heater ring. In that case, you can expect the battery to last signifi cantly longer since the ring will probably not be operating continuously at max power. Similarly, if you are not repeatedly slewing the telescope at its highest speed, then the power consumed by the mount will be much less, further extending battery charge life.

IMAGING SETUP

- Celestron 11” Dew Heater Ring connected to dew heater port #1
  - Max current draw of 11” Dew Heater Ring = 2.5A
  - Max power required for 11” Dew Heater Ring = 12V x 2.5A = 30.0W
- Other manufacturer’s heating band/strip for guidescope connected to dew heater port #2
  - Max current draw for heating band/strip for guidescope = approximately 1.0A
  - Max power required for heating band/strip for guidescope = 12V x 1.0A = 12.0W
- Celestron CGX EQ mount connected to power port #2
  - Max current draw for CGX EQ mount when slewing at highest speed = approximately 3.0A
  - Max power required for CGX EQ mount when slewing at max speed = 12V x 3.0A = 36.0W
- Cooled CMOS camera connected to USB port #1

    - Keep in mind that the USB ports supply 5V DC (the USB standard), while all the other ports supply 12V DC
    - Cooled CMOS camera current draw = 0.3A
    - Power required for cooled CMOS camera = 5V x 0.3A = 1.5W
- Cooled CMOS camera's thermoelectric cooler (TEC) connected to power port #3
    - Max current draw for cooled CMOS camera's thermoelectric cooler (TEC) = 3.0A
    - M ax power required for cooled CMOS camera's thermoelectric cooler (TEC) = 12V x 3.0A = 36.0W
- CMOS guide camera connected to USB port #2
    - Keep in mind that the USB ports supply 5V DC (the USB standard), while all the other ports supply 12V DC
    - CMOS guide camera current draw = 0.3A
    - Power required for CMOS guide camera = 5V x 0.3A = 1.5W
- Celestron Focus Motor connected to USB port #3
    - Keep in mind that the USB ports supply 5V DC (the USB standard), while all the other ports supply 12V DC
    - Max current draw for Celestron Focus Motor = approximately 1.0A
    - Max power required for Celestron Focus Motor = 5V x 1.0A = 5.0W

In this example, the total max power required by the controller would be about 122W.

- Since the max power required by the controller is greater than 120W (10A max current), you can only use the XT60 power input jack to power the controller.
- If you have access to AC power, you could use a high-power AC-to-DC power supply to power the controller.
    - If the output voltage for the AC-to-DC power supply is variable, make sure to set it to 12V before connecting it to the controller.
- For portable setups, we recommend fi nding a 12V DC "marine battery" or other portable 12V DC battery capable of providing over 122W power.
    - If you plan to image all night (8 hours) with this setup, you would need a marine battery with a capacity of 122W x 8 hours = 976 Watt-hours (i.e. approximately 82 amp-hours @ 12V DC).

Appendix B: Using the Barrel Connector Power Input Jack as a Power Output Port

If you are using the XT60 power input jack to power the controller, the barrel connector power input jack can function as an additional, yet unregulated, 12V DC power output port. Power output will fl ow, uninterrupted, through this port when the controller is connected to a power source through the XT60 power input jack.
You can use the barrel connector to keep one device powered on when using the "Power Down on Disconnect" functionality in CPWI. Output power will turn off to all ports except the barrel connector power input jack. For example, if you are powering the controller through the XT60 power input jack, you can power your telescope from the barrel connector power input jack, and the telescope will stay on when you disconnect from CPWI if you are using the "Power Down on Disconnect" feature.
The maximum power that the barrel connector power input jack can handle is 120W (10A max current). Since the power output is unregulated for this jack, if you attempt to power a device requiring more than 120W from the barrel connector power input jack, you may damage the controller. So only use the barrel connector power input jack for output power if you are sure that the connected device will use less than 120W.
WARNING: DO NOT ATTEMPT TO CONNECT INPUT POWER TO THE XT60 JACK AND BARREL CONNECTOR JACK AT THE SAME TIME! Use only one or the other. Otherwise, you could damage the power supply.

FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Please note that changes or modifi cations not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Product design and specifi cations are subject to change without prior notifi cation. This product is designed and intended for use by those 14 years of age and older.

celestron.com/pages/warranty

Documents / Resources

	CELESTRON 94036 Smart DewHeater and Power Controller 4x [pdf] Instruction Manual 94036 Smart DewHeater and Power Controller 4x, 94036, Smart DewHeater and Power Controller 4x, DewHeater and Power Controller 4x, Power Controller 4x, Controller 4x

References

- Drivers and Software | Celestron
- Technical Support | Celestron
- Warranty | Celestron
- Technical Support | Celestron