




### General

**ProtoStar** diagonal mount assemblies with the anti-dew heater feature installed can be identified by the recessed LED light on the face of the spider hub. There is also a wire connecting the spider hub and diagonal head assembly.

The anti-dew heater is designed to operate on voltages up to 13 VDC. The heater will take 10-15 minutes to reach an equilibrium temperature.

When reading the following installation guidelines, **remember that all installations must make provisions for fuse protection in the circuit.** Failure to follow this recommendation could result in damage to your telescope or even injury. 

### Installation

Two of the spider vanes also function as the conductors supplying power to the heater. One vane is marked with a red dot and should be connected to +12 Volts (positive on the battery or power source). The other vane is marked with a white spot and should be connected to the ground (negative on the battery or power source). The heater will still function if these connections are reversed, though the LED power indicator light will not operate. **Figure 1** shows the general schematic for wiring the circuit.

Metal telescope tubes will require that each of the conducting vanes be electrically isolated from the tube to prevent a short circuit in the system. This is most easily accomplished through the use of the supplied plastic bushings or similar insulators. For safety reasons, it is not recommended to use the telescope tube as the common ground; a separate wire should be run to the ground vane.

Always fuse protect your installation. A 1.0 amp automotive-style fuse is recommended for all **ProtoStar** heated diagonal mounts.

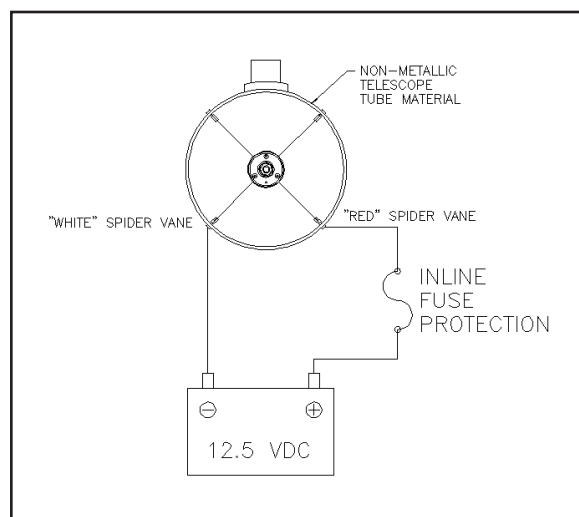



FIGURE 1  
Basic Wiring Diagram

### Common Wiring Methods


The simplest installation is to run external wiring from the vane mounting screws directly to a 12 volt battery or DC power supply (*Note: exceeding this voltage can result in premature failure of the heating element and/or the LED power indicator light*).

If you are heating other elements of the telescope (primary optics, focusers, viewfinders, etc.), the external wiring option can get untidy and complicated. A better solution is to permanently wire all of the heated elements to one point on the telescope. One two-conductor plug can be installed that will power all heater accessories.

### Rotating Range of the Diagonal Head

On heated models, the diagonal head can be rotated within a 60 degree range. **It is important not to force the rotation beyond the stops, as damage to the heater wire can result.** If the secondary mirror cannot be rotated into the proper position, you will need to index the clutch around by a step (120 degrees, or 1/3 revolution). Simply loosen the three collimation screws until they are not in contact with the clutch disk, and then index the clutch around until it is properly seated and engaged with the collimations screws. 

### Assembly and Disassembly

Separate the diagonal head assembly from the spider by first removing the tensioning nut. Pull the diagonal head out of the spider hub while rotating enough to unwind the heater wire. Once separate, gently work the heater wire connector plug apart by pulling on the plug body only. **Do not disconnect the plug by pulling on the wires,** as damage to the connector plug could result. 

Reverse the steps to reconnect. Wind the wire around the diagonal holder's stem by rotating the diagonal head as you insert it into the spider hub. Do not wrap the wire too tightly around the stem, as the connector could be pulled apart or be damaged. Before tightening the tensioning nut, make sure the three collimation screws are properly seated in the recesses on the clutch disk.

## Using Heated Diagonal Mounts

If you suspect conditions will be favorable for the formation of dew, it is recommended that you begin with and maintain a low level of heat throughout your observing session. It requires much less power to keep dew from condensing on optics than it does to remove it after it has formed. For this reason, a variable-type power controller is helpful. Applying full power to the heater will drain your field battery faster. Switched, or “duty cycle,” variable controllers (such as the one used with *Kendrick Dew Removal* systems) are recommended over variable resistor controllers since they will be more energy efficient.

If dew is already present on the secondary mirror, provide full power (12 volts max) to the heater and allow 15-25 minutes for the condensation to disappear. Never wipe your optics with a cloth.

There are several dew heater systems on the market. **Protostar** diagonal mounts have been tested with all of the common commercial heater controllers, and in general will work well with any direct current (DC) 12 volt-based system.

## Safety Notes

In addition to providing fuse protection (see above), the following safety items should be remembered.

- Remember that when the heater is powered, two adjacent spider vanes will be “hot”, or conducting current. Though the amount of current is very small and not dangerous, you should still disconnect power if you plan to do work inside the telescope tube. Always collimate the secondary mirror with the unit unpowered.
- Though **Protostar** diagonal mounts are corrosion resistant, do not operate the anti-dew heater if the telescope is visibly wet or has just been washed. Heavy moisture can condense around the wiring plugs and cause short circuits. If a fuse blows during use, inspect the telescope and determine the cause before attempting to power the unit again.

## Technical Assistance

If you have a special application, or a question not covered in this paper, feel free to call us for free technical support. We want your **Protostar** diagonal mount to perform trouble-free as much as you do. Call (614)-855-5341 between 9:00 AM and 5:00 PM (Eastern Time Zone) and we will be glad to help you as we are able to.