SnapCap – your best Motorized Tubecap/Flat panel Installation Guide, rev09/2017

SnapCap is a motorized tubecap and flat panel (optional) suitable for remote operation. It installs without modification to the telescope tube and needs two simple tools. With its foam padded cap it can hermetically close the OTA and enable taking dark frames and flat field frames.

SnapCap configurations

A) mechanical configuration
   1) Dust Cap only, 90 or 270 deg opening,
   2) Dust Cap and Flat panel, 90 or 270 deg opening.

B) control configuration
   1) Relay box for users with PC controlled switches already installed,
   2) PC control (USB and Bluetooth), allows dimming light and Android access,
   3) ASCOM switch control, (same electronics as ver2, with ascom driver)

Flat panels come in selected diameters (180/150mm, 250/230mm, 350/330mm, 450/420mm) The larger diameter is the white diffusor plate, the smaller the illuminated circle. Consequently, a Snap Cap for a 200mm telescope must have a minimum diameter of 250mm, if a flat panel is needed.
For a dust cap only version, any diameter is possible at an extra charge, the standard ones are in 5 cm steps.

The PC control unit provides full access to your SnapCap from Android devices too

What is in the pack?

After unpacking check if you have the following:
   1) carbon fiber tubecap with arm
   2) motor unit (optionally with 90 or 270 deg rotation)
   3) fixing strap matched to the tube diameter
   4) PC control box with 1,9 m cable (or custom)
   5) flat panel inverter (for units fitted with flat panel)

Units delivered before 03/2017 or ordered for relay opeartion:
   1) carbon fiber tubecap with arm
   2) motor unit (optionally with 90 or 270 deg rotation)
   3) fixing strap matched to the tube diameter
   4) relay control box with 2,5 m cable (or custom)
   5) 3,5mm mono Jack plug (for the 12V power cable)
   6) flat panel inverter (for units fitted with flat panel)
Installation

You can mount SnapCap in 9 simple steps. You need a 2mm allen key (hexagonal) and a medium size Phillips (posidriv) head screwdriver.

1) **Insert the strap into the slot on the motor unit bracket.**

2) **Place the motor unit base on the tube, cca 5 mm from the edge.** Bring the two ends of the strap to meet as shown below. The strap screw must be disengaged (inclined upwards) as in the photo. The motor arm points toward the sky!
3) **Push the strap screw down to make it engage.**

4) **Run the screw in to tighten the strap but leave loose enough to adjust the motor position.**
5) Insert the Cap arm into the 6mm hole on the Motor arm. If it does not fit you either have to unscrew the M4 allen screw on top of the motor arm or adjust the Motor unit closer to the tube edge.

6) Check the distances where you see the red dots and adjust (slide) the Cap arm until they are cca equal.
From model year 2016 onwards, the motor arm has a safety bolt that is intended to save the gears of the speed reducer when the Cap hits an object and is blocked. This bolt is found where the motor arm is inserted on the motor shaft.

The correct amount of tightening will allow the motor to lift (or hold) the Cap against the force of gravity. To test it, orient the motor shaft in the horizontal position and make sure the position of the Cap is maintained in any possible spatial orientation.

Overtightening will reduce the effectiveness of the safety feature and gears may brake. Leaving it loose may lead to slipping of the arm and the Cap may not close/open correctly.

![The Motor Arm safety bolt](image-url)
7) **Lock the allen setscrew with a 2mm allen key.**

8) **Check the distances where you see the red dots.** In the example it is larger on the right, to correct gently push (bend) the Motor bracket in the indicated direction (to the right in the image).

9) **Connect the cables as shown on the electric diagram below.**
Connecting cables

Units ordered with PC control must be connected as shown below (B2 configuration)

- USB to PC
- Motor cable (1,9m)
- Flat Panel (35cm)
- (or use the Bluetooth connection)

12VDC 1,5A, 5,5/2,1mm plug, center positive

Flat Panel  Motor
Units for relay control must be connected as shown below. (B1 configuration)

With the Seletek Firefly relay open, the tube is closed, when the relay closes the tube is open. To switch the unit you can also use the power of any 12VDC accessory that is switched off when the telescope is out of use. The relay draws 50mA max.

DO NOT USE A TENSION HIGHER THAN 12VDC TO POWER THE MOTOR!!!
How to connect cables to a relay

Supply 12VDC, negative to COM1
Supply 12VDC, positive to COM2
Control line negative to NO1
Control line positive to NO2
COIL is energised (relay closed) from PC

How to connect cables to a Dragonfly relay

Control line cable to black relay box
to flat panel (if present)

Power supply 12VDC
Power line direct to black relay box

Using a 3 or 2 pole output terminal is optional.
**PC Control**

The PC control program (Windows OS) can be downloaded [here](#).

Unzip the file (contains an exe and an „inf“ file) and create a desktop icon.

To install the USB driver you need the inf file. Save it in a suitable folder and when Windows is trying to install the driver, show it manually the location.

Connect the Arduino card to the PC and 12VDC power.

Complete the driver installation.

Double click the desktop icon and you will see this screen. (at right)

To see the available ports click at the arrow of the COM port window.

Open Windows device manager, right click the port created for Arduino, click Properties/Settings and set the port speed to 38400.

Click Connect after selecting the correct port number.

After a successful connection you will see this screen. (at right)

Clicking the appropriate buttons will open/close your SnapCap and control the flat panel.

To control brightness drag the slider.

You can always reach the manual from the Help menu.

If you want to control your SnapCap as an ASCOM SWITCH, install [THIS](#) driver. It will create 2 switches, one for the cap, one for the light.

If you control your Snap Cap from an automation program, DO NOT run the PC application because it will block the COM port.
The Bluetooth (BT) connection is automatically available if the device is powered up. The USB cable does not need to be connected (but it can be).

The BT connection can be used to:

**Substitute the USB cable** and connect to a PC with a BT module. The pairing code of the Snap Cap BT module is **1234**. You must pair it to your PC and select the virtual serial port created by the BT module on your PC.

**Connect to an Android Smartphone** using a BT connection App (e.g.: BlueTooth Serial Controller). You can use these Apps to configure buttons for Snap Cap. The App must allow HEXadecimal format for the commands.

Commands for using in Android Smartphone Apps (set hexadecimal format):

```
Open: 8, Close: 9 , Flat ON: 3 , Flat OFF: 4, Brighter:6, Dim: 7
```

The complete command list is available [here](#).

**ASCOM switch control**

*(discontinued, only for reference)*

The ASCOM switch is an Arduino based 4 channel switch, as shown below. (B3 configuration)

![ASCOM Switch](image)

Your SnapCap ordered with an ASCOM switch will come with the correct cables to connect the flat panel inverter and the motor control box (1m standard length).

You have to install the ASCOM switch driver (developed by Tim Long of Tigra Astronomy) and have the driver information copied to your PC for the Arduino board (zipped with the driver).

You must have a program that supports the use of ASCOM switches for controlling equipment.

The suggested connection scheme for the ASCOM switch is shown below.
The control box is used to invert motor polarity, it can share the 12VDC supply with the ASCOM switch module. **You have two free switches left for your other equipment.**

**Practical product information**

An example for a Snap Cap with relay control box, without flat panel

For tubes from 400 to 600 mm we offer a cap made of 2 semi circles. Providing a central hole for secondary supports is possible.
Models with a flat panel for more than 21 cm optics are equipped with a reinforced support mechanism as shown below and next page. Remember to lock the motor arm safety bolt.

This is the anti-swivel bar, place it between the M8 nut and the plastic ball joint.

Adjust center distance by turning the M8 bar in and out, as the red arrow shows.

After the adjustment LOCK the 2pc M8 nuts as shown (13mm key)

Below you see the anti-rotation lock of the double model.

You can slide it as the arrow shows and lock it in the correct position.
The power cable of the flat panel must be fixed to the arms as shown below. Control several open/close cycles to make sure the cable will not be pulled on because once it gets torn from the flat panel it will not be possible to solder it back.
When all the cables are connected, test the unit. If the fit is not tight enough slide the Motor unit away from the tube edge until the cap gives a good fit. If the motor oscillates (stops and starts repeatedly) at the closed position, slide the Motor unit towards the tube edge slightly (2mm) and try again.

Tighten the strap after you have adjusted the motor so that it stays in position securely.

Fix the cables securely and in a way that they do not interfere with the movement of the cap, especially if a flat panel is present. Test your cable routing by opening/closing a few times. Video manuals:

https://youtu.be/vGN4tSmvfVo
https://www.youtube.com/watch?v=A5E24wDOajY

Here is a video featuring the assembly of a 2 flap/270 degree version. (Jure Stare)

This product does not need maintenance, however I recommend checking the strap tightness and the setscrews after cca 300 cycles of operation.

SnapCap closes/opens in cca 8 seconds. If the tube rim is regular and smooth the 3mm foam fitted to the aluminium plate ensures hermetic sealing of your OTA.

When Snap Cap is out of use, the power line can also be turned off. Obviously it will not be possible either to open or to close the Cap without switching it on again.

The correctly connect the cables of the relay box model you are supposed to have a clear understanding of the basic principles of electricity. If you are unsure, please consult an electrician.

Flat panel brightness values measured at F3.5 with a SX Trius 694 (60% average QE).

<table>
<thead>
<tr>
<th>Target ADU 35000 (bias compensated)</th>
<th>Min light (5%)</th>
<th>25% setting</th>
<th>Max light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ha 12nm filter</td>
<td>Signal insufficient</td>
<td>10 sec</td>
<td>6.8sec</td>
</tr>
<tr>
<td>CLS filter</td>
<td>4.4sec</td>
<td>0.32sec</td>
<td>0.21sec</td>
</tr>
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www.geminitelescope.com

https://www.youtube.com/watch?v=MjxEemXfu64

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