SkyHub2S (WiFi & Bluetooth & USB) Instruction

Hubble Optics

11-14-2024

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SkyHub2S supports:
1) Bluetooth connection to Android devices and MS Windows devices.

2) Ad-Hoc WiFi connection to Android devices, iOS devices such as iPhone/iPad/iPod/Mac Books and MS Windows **(You must manually enable and setup Ad-Hoc WiFi for Windows 8, 8.1 and 10).**

3) USB/Serial connection to USB connection to MS Windows XP/Vista/7/8 and iOS (Mac Book), and UNIX/Linux.

A 5VDC USB power supply is required for SkyHub2S to operate.

When SkyHub2S is connected to other devices via the USB ports, it will be powered by the connected device via this port.

Thanks to David Ek's wonderful DSC ASCOM driver, you can now enjoy numerous wonderful Windows based planetarium software such as TheSky, Starry Night Pro, Sky Map Pro, MegaStar, Earth-Centered Universe, Cartes du Ciel, Stellarium, and etc., with SkyHub2S.

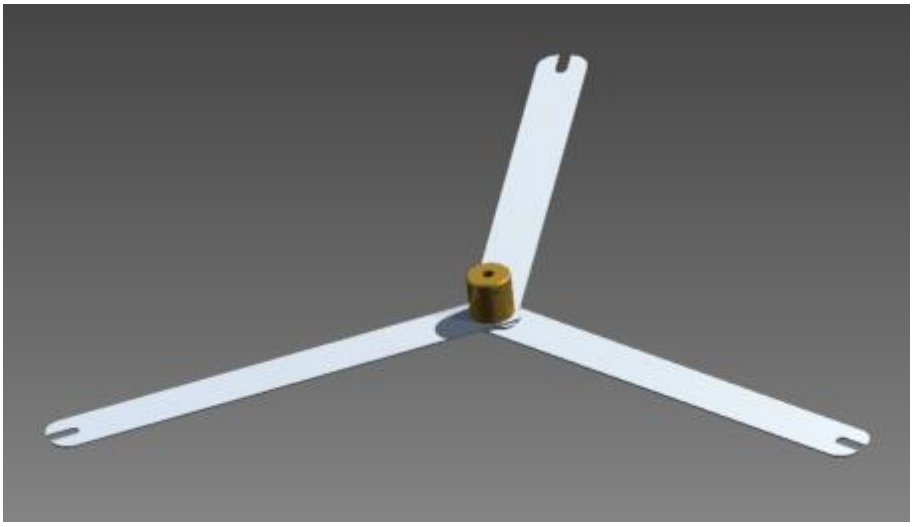
1. Assembly and Installation

1.1 SkyHub2 Assembly

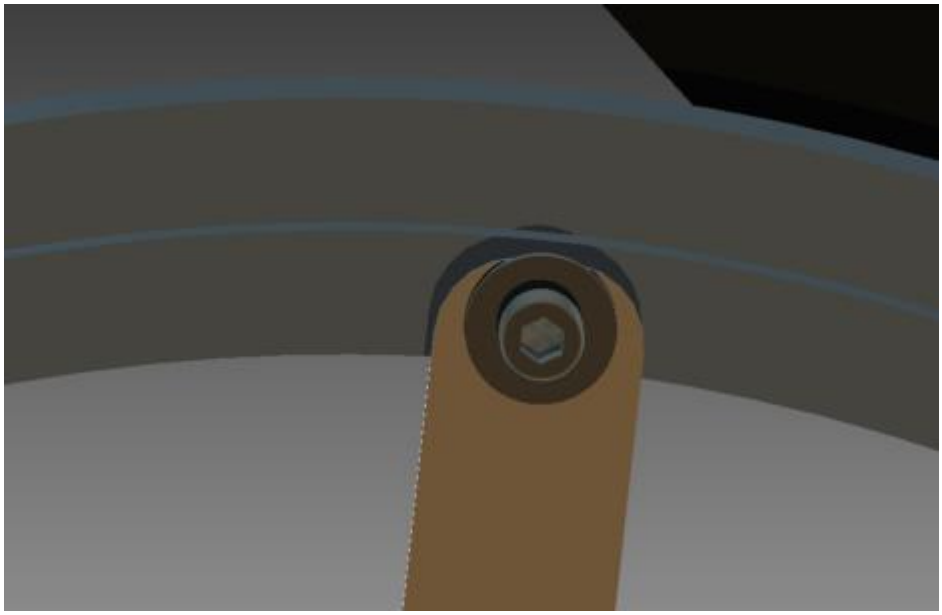
The SkyHub2 is shipped as a Kit, certain simple assembly is expected.

1.2 AZM Encoder Installation

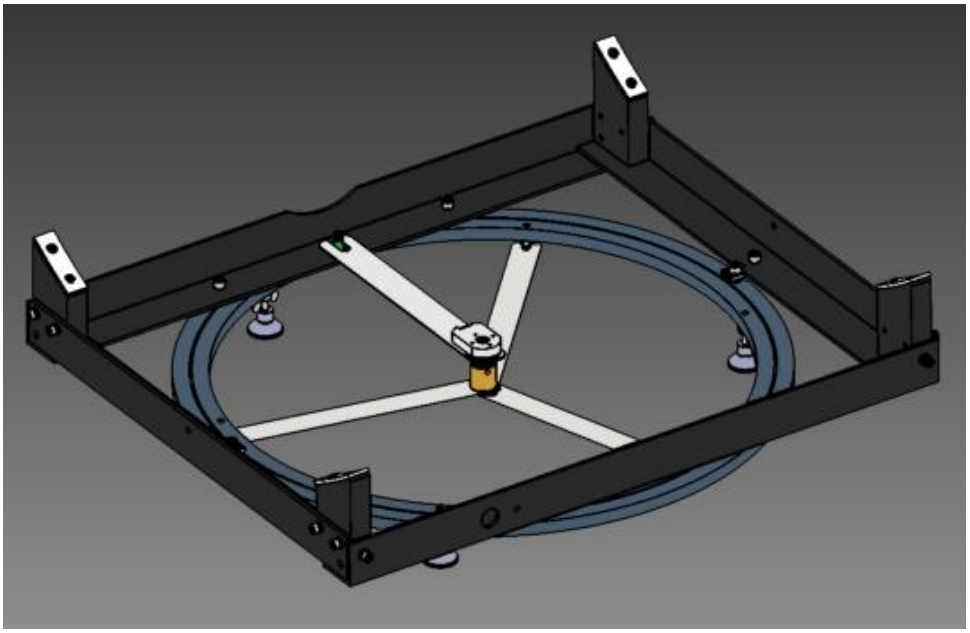
Install the 1” diameter brass Azm encoder housing onto the center holes of the three stainless steel Azimuth spoke arms as shown below using a M6 x10 hex screw. Do not tighten them completely yet.



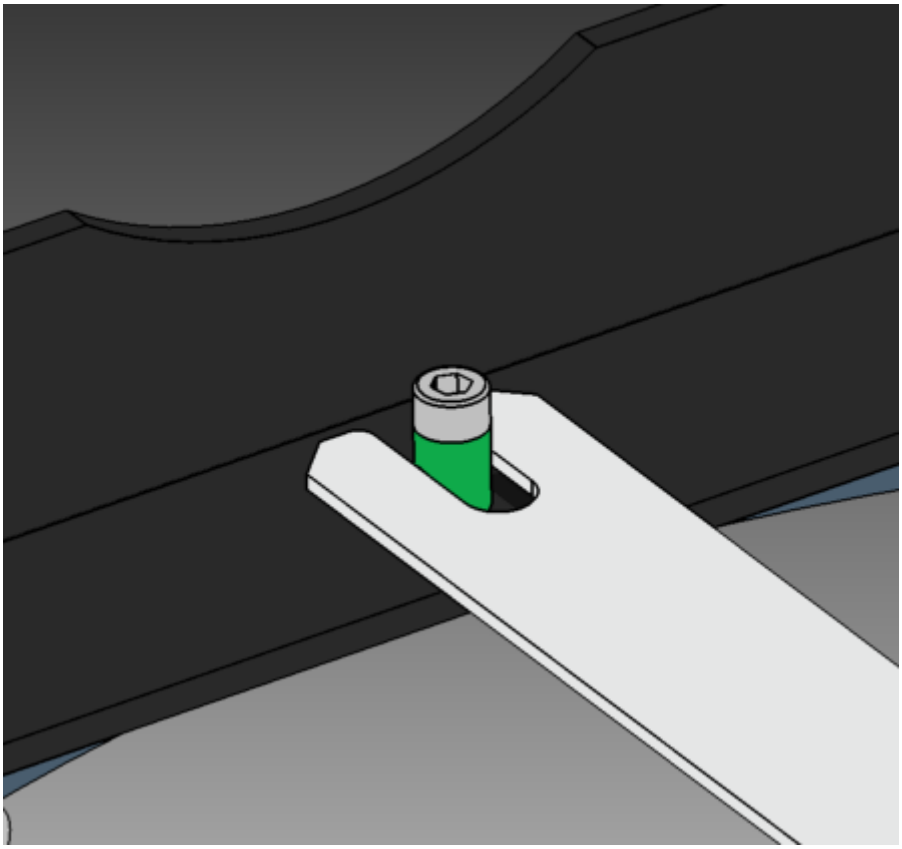
Install the three stainless steel Azimuth spoke arms to the inner Azm bearing ring with three M6 screws. The encoder housing should be precisely placed at the AZ bearing center by making sure the scale readings on all three AZ spoke arms are exactly the same at the edge of the Azm inner bearing. Tighten the M6 screws and the center screw to lock the encoder housing to the Azm spoke arms. If there are no additional holes on your Azm bearing, **you can install the AZ spoke arms in the same three holes used by the footers, and use the same wing nuts to lock the spoke arms.**



Install the Azm encoder arm assembly by carefully inserting the encoder shaft into the center hole of the brass encoder housing. Adjust the depth so the threaded shank of the encoder does not touch the housing. **Tighten the Nylon setscrew on the side of the brass housing onto the shaft**.



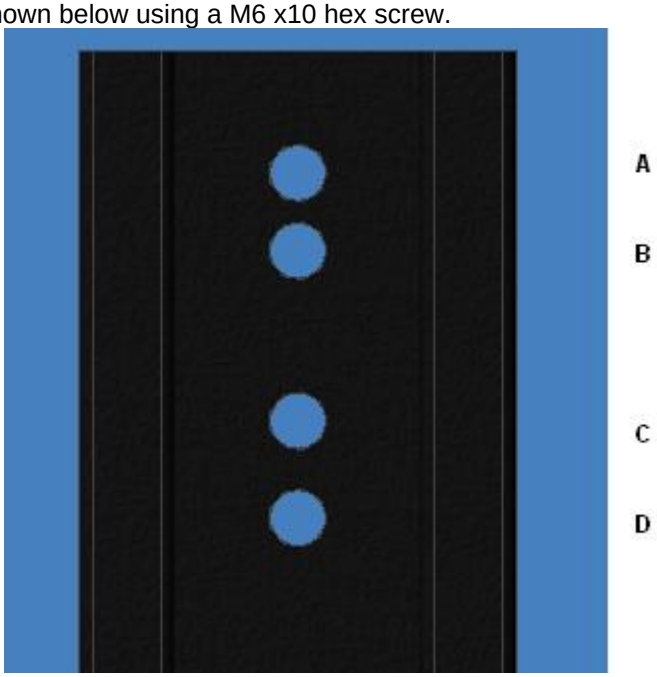
The AZM encoder pivoting arm is restricted by the plastic wrapped M6 screws



The plastic wrapped M6 pivoting screw

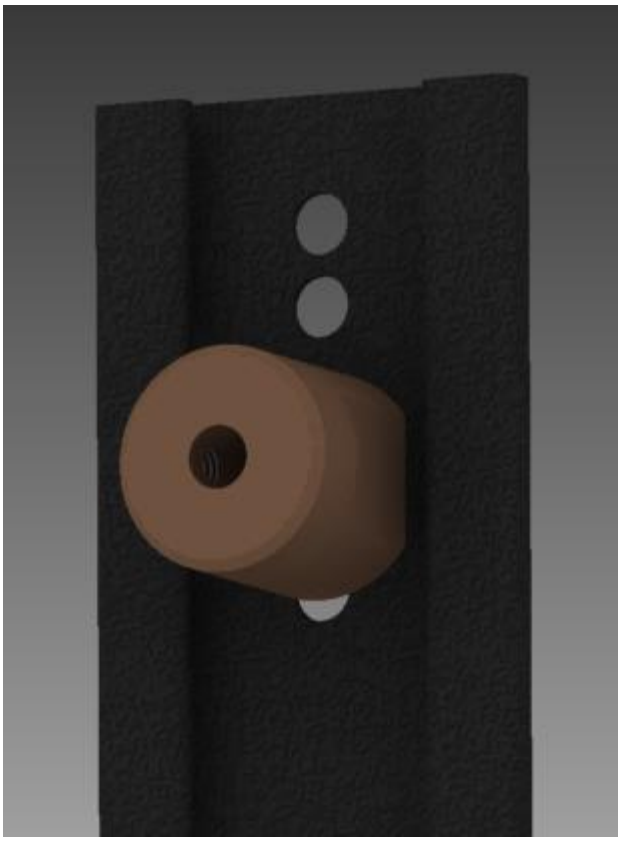
1.3 ALT Encoder Installation

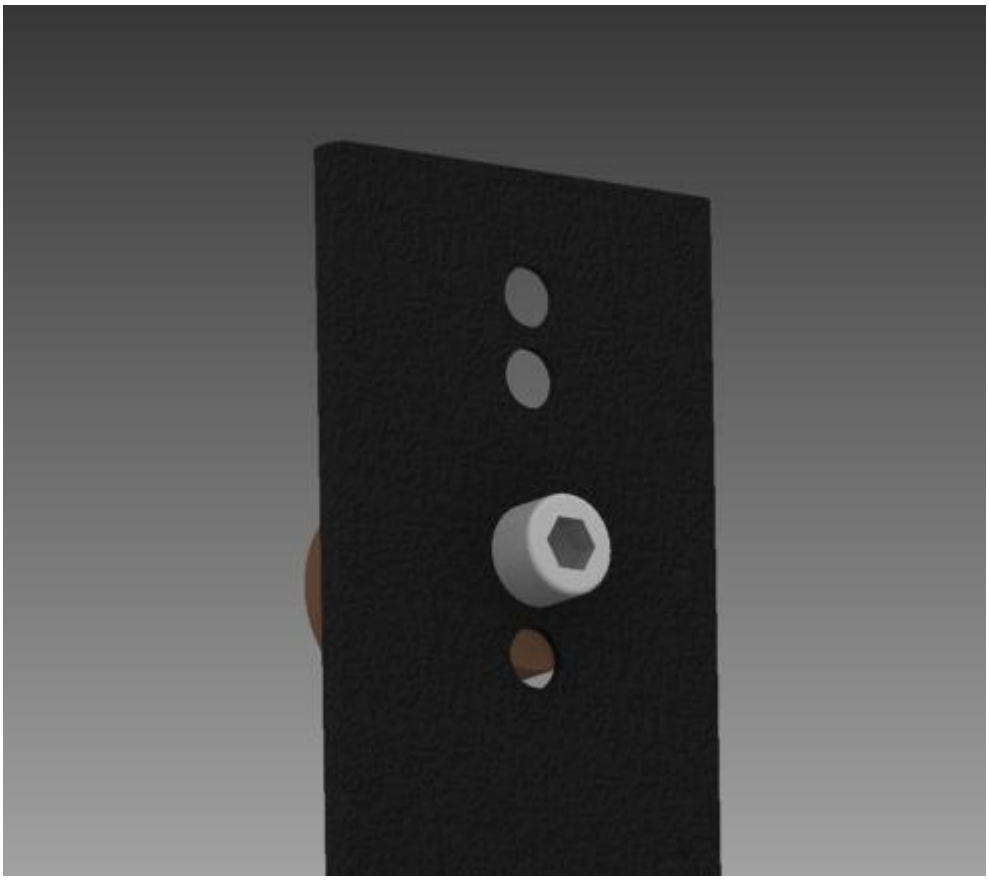
Install the 1” diameter brass AZ encoder housing into the one of center holes of the ALT encoder holder bracket as shown below using a M6 x10 hex screw.

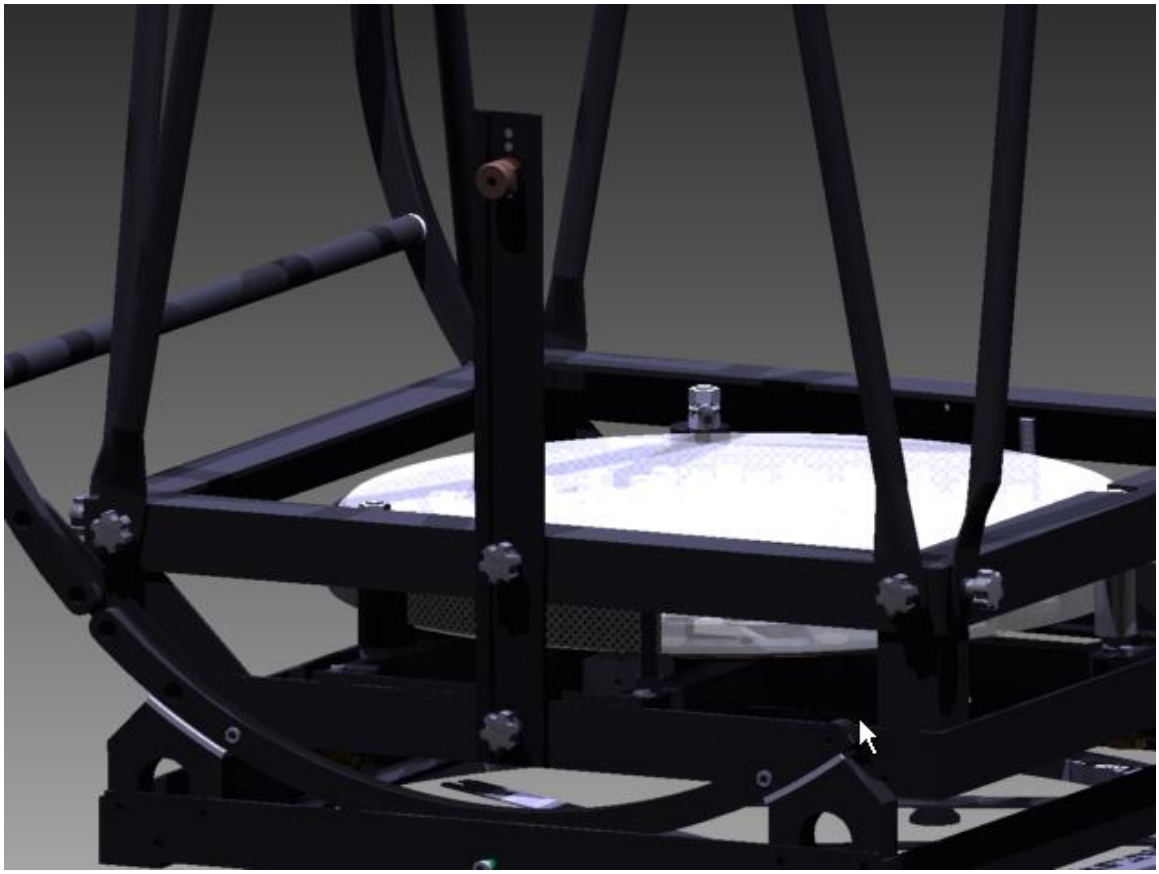


A: for UP12 & UL14
B: for UL16
C: for UL18
D: for UL20, UL24

These are recommended positions; however, you may use different position for your scope to make sure that the encoder is indeed centered at the ALT axis



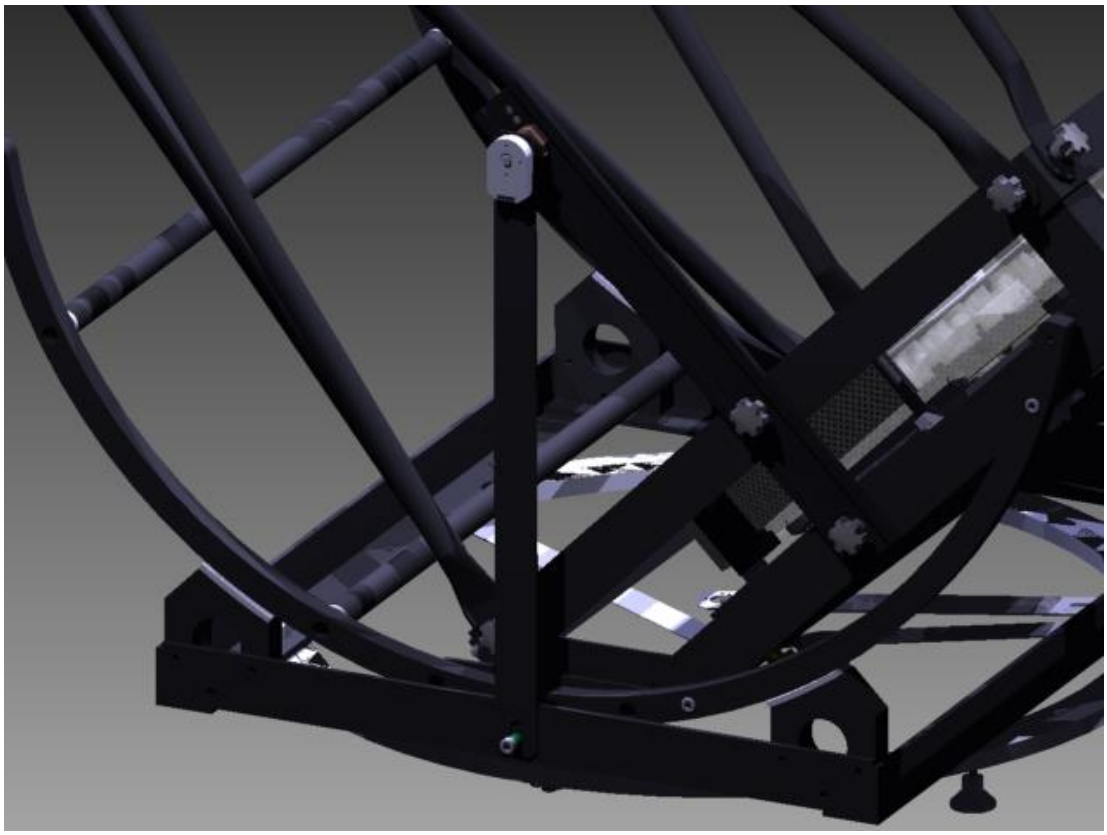


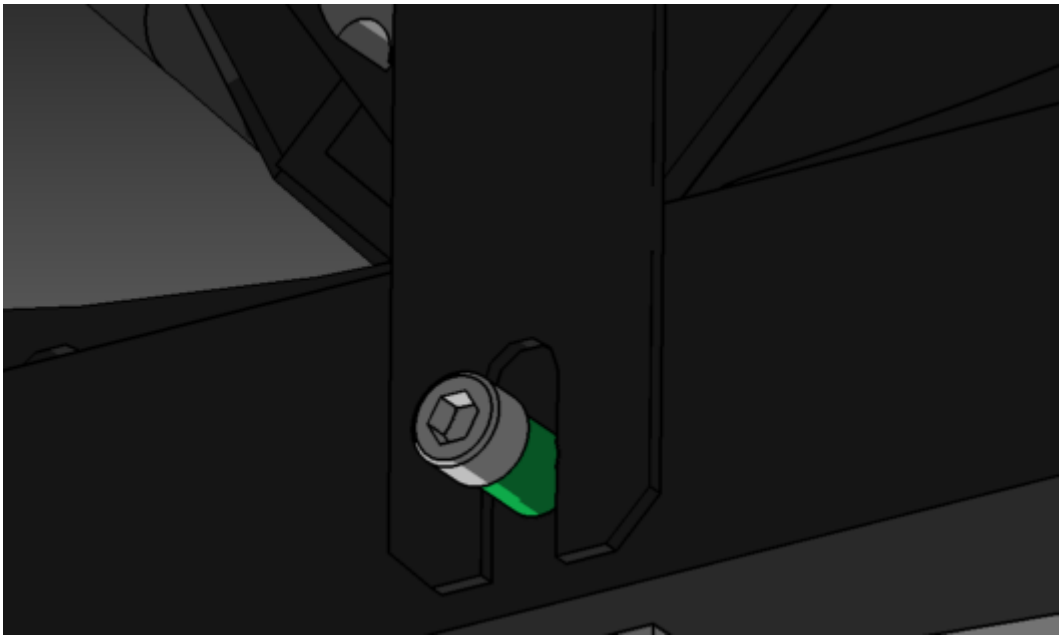


Bolt the ALT encoder holder to the mirror box with the M6 knob screws. (

Install the Azm encoder arm assembly by carefully inserting the encoder shaft into the center hole of the brass encoder housing. Adjust the depth so the threaded shank of the encoder does not touch the housing. **Tighten the Nylon setscrew on side of the brass housing onto the shaft**.

Please note that you will need to reverse the ALT encoder count in the ASCOM drive or in the Sky Safari/Stellarium if you install the ALT encoder on the different side of the scope

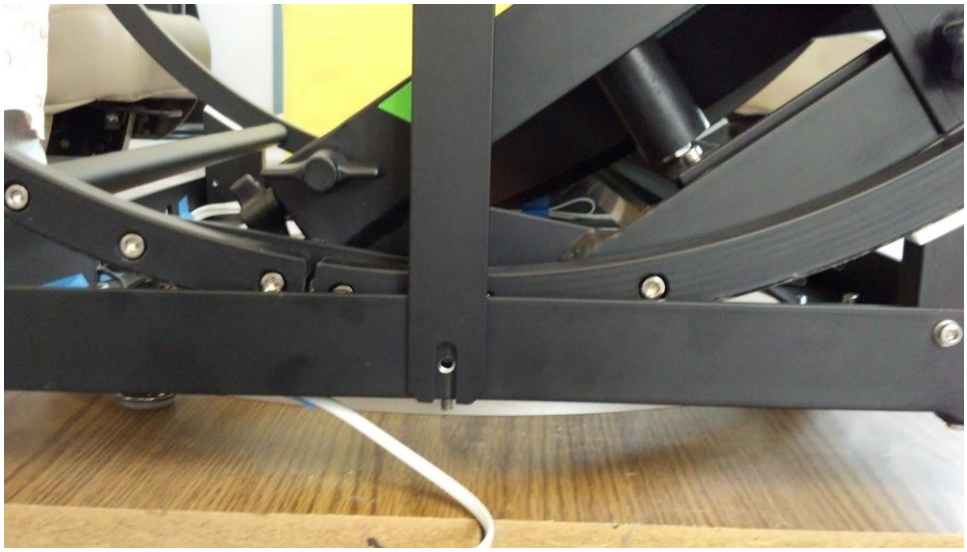




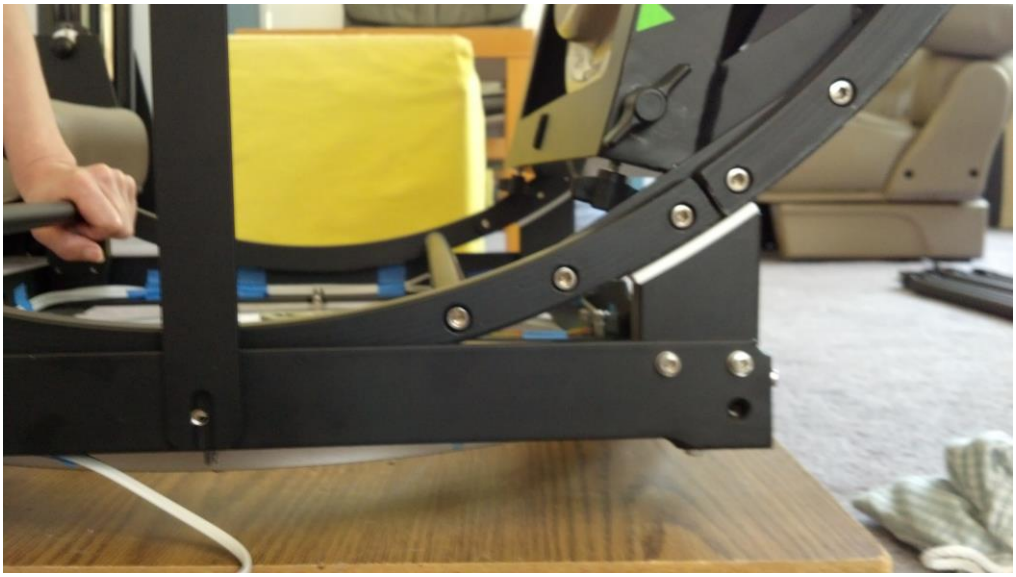
Adjust the ALT encoder bracket position to make sure the encoder is centered at the ALT bearing axis. Here is how to verify that the ALT encoder is perfectly centered:

Once the encoder is perfectly centered to the ALT axis, then set the mirror box to zenith, 45 degree, and then 90 degree orientations; you should then see the pivoting screw hole at the bottom remain at the same location relative to the ALT encoder bracket.

Mirror Box at Zenith



Mirror Box at 45 degree



Mirror Box close to 90 degree

2. SkyHub2S WiFi, Bluetooth, USB Configuration

When the SkyHub2S is connected to another device via USB, the unit defaults to USB mode. However, wireless modes (WiFi and Bluetooth) remain operational and can be used concurrently unless explicitly disabled.

When connecting the SkyHub2S via USB, it's essential to disable wireless communication to prevent the device from exceeding the current limits of your USB port, which can cause malfunctions or damage. To disable wireless communication, quickly toggle the mode switch on the SkyHub2S within 10 seconds of powering on the unit. This step is highly recommended for USB connectivity to ensure safe and optimal operation of your SkyHub2S.

The device comes pre-configured with the following settings for both WiFi and Bluetooth connectivity:

Device Name: SkyHub2S-xxxx
PassKey: xxxxxxxx
WiFi Configuration:

IP Address: 10.0.0.1
Port: 4030
Operation Mode: Ad-Hoc
Please connect your device to the SkyHub2S using Ad-Hoc mode. The SkyHub2S does not support Station (STA) mode, meaning it cannot connect to an existing WiFi network.

The Device Name and PassKey are indicated on the SkyHub2S case. Altering WiFi settings is unnecessary and discouraged, as it may damage the unit and void the warranty.

Switching between WiFi and Bluetooth modes should be done with the power off to ensure proper configuration.

LED Indicators:

The power LED remains on as long as the SkyHub2S is powered.
Upon boot-up, the status LED flashes **once** for Bluetooth mode and **thrice** for WiFi mode.
Selecting USB-only mode by toggling the mode switch within 10 seconds after powering on causes the status LED to flash **twice**.
If the status LED on the SkyHub2S continues to flash, it indicates that the power supply voltage is insufficient for normal operation.

3. Windows Based PC configuration

Downloading and Installing the EK ASCOM Driver
Visit the EK Files Website: Go to the provided EK Files link to access the ASCOM driver for digital setting circles.

Download the Driver: Look for the download section on the page, and click on the link to download the EK ASCOM driver. Save the file to a location on your computer where you can easily access it, such as your desktop or downloads folder.

Install the Driver: Double-click the downloaded file to start the installation process. Follow the on-screen instructions to complete the installation. Remember to input 8192 for both RA/Azimuth and DEC/Altitude Ticks/rev when prompted, as these are the default settings for the SkyHub2S.

All the ASCOM Windows based planetarium programs such as The Sky , Starry Night expect to communicate with a telescope over a serial port. To make SkyHub2S work with these programs, you can either use the USB/serial connection, or you can use a virtual serial port driver over TCP or Bluetooth.

3.1 USB connection

Use the device manager to find the port number of the SkyHub2S, which maybe changed after each bootup.

3.2 Bluetooth

Please download and install the EK ASCOM following the instruction described at:

https://eksfiles.net/digital-setting-circles/ascom-driver-for-digital-setting-circles/

Please note that by default, both RA/Azimuth and DECAltitude Ticks/rev should be 8192 for the SkyHub2.

Please follow the Windows instruction to pair the SkyHub2 with your Windows:

https://support.microsoft.com/en-us/windows/pair-a-bluetooth-device-in-windows-2be7b51f-6ae9-b757-a3b9-95ee40c3e242

Once Windows Paired with SkyHub2 in Bluetooth mode, you will need to find the COM port the adapter is using. Go to Control Panel>Device Manager . Scroll down to and expand Ports (COM & LPT).

You should see two listingsfor the SkyHub2: Standard Serial over Bluetooth link (COM#). One of the ports (master) is the one you need to select in configuring the EK ASCOM Driver. However, Windows does not tell you which one is the master port, so you have to try both ports to find out which one works.

3.2 WiFi

3.2.1 Ad-Hoc Configuration on Windows

SkyHub2 is Ad-Hoc WiFi server. However, starting from Windows 8, the Ad-Hoc network access is disabled by default. You will need to enable it by default:

SETUP

- Go to "Network and Sharing Center" by right-clicking network icon in notification area
- Click "Set up a new connection or network"
- Double click "Manually connect to a wireless network"
- Enter the SSID of your SkyHub2S SkyHub2S_xxxx (as printed on the cover of your SkyHub2S unit) of your ad-hoc network (as shown by "netsh wlan show networks") into the "Network name" field
- Configure security settings accordingly, i.e. Security type: WPA2-Personal, Encryption: None, Security Key (Passcode printed on the cover)
- Un-check "Start this connection automatically" (important)
- Click "Next", then "Close"
- Run this command in cmd lime as administrator (important, where the SkyHub2xxxx is the SSID as printed on the cover of your SkyHub2):
    - netsh wlan set profileparameter name="SkyHub2xxxx" connectiontype=ibss

CONNECT

After setting up, run this command whenever you want to connect:

```
> netsh wlan connect SkyHub2S_xxxx
```

Replace SkyHub2xxx with the SSID as printed on your unit.

3.2.2 Serial Port over TCP

All the ASCOM Windows based planetarium programs such as The Sky , Starry Night expect to communicate with a telescope over a serial port. To make SkyHub2S work with these programs, you can either use the USB/serial connection, or you can use a virtual serial port driver over TCP - a piece of software that presents SkyHub2S wireless TCP port to other programs as if it were a real serial port.

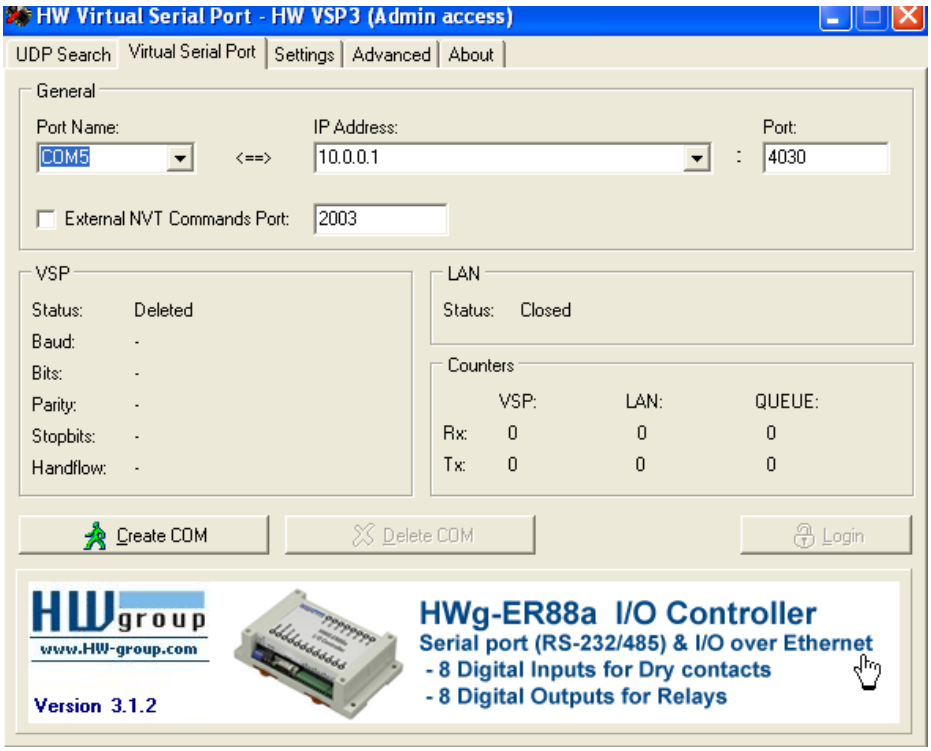
A number of third-party virtual serial port drivers are available, and many of them are free. However, only HW VSP3 (version 3.1.2) has been successfully tested with SkyHub2 on Windows 7, 8.1 and Windows 10 both 32 and 64 bit.

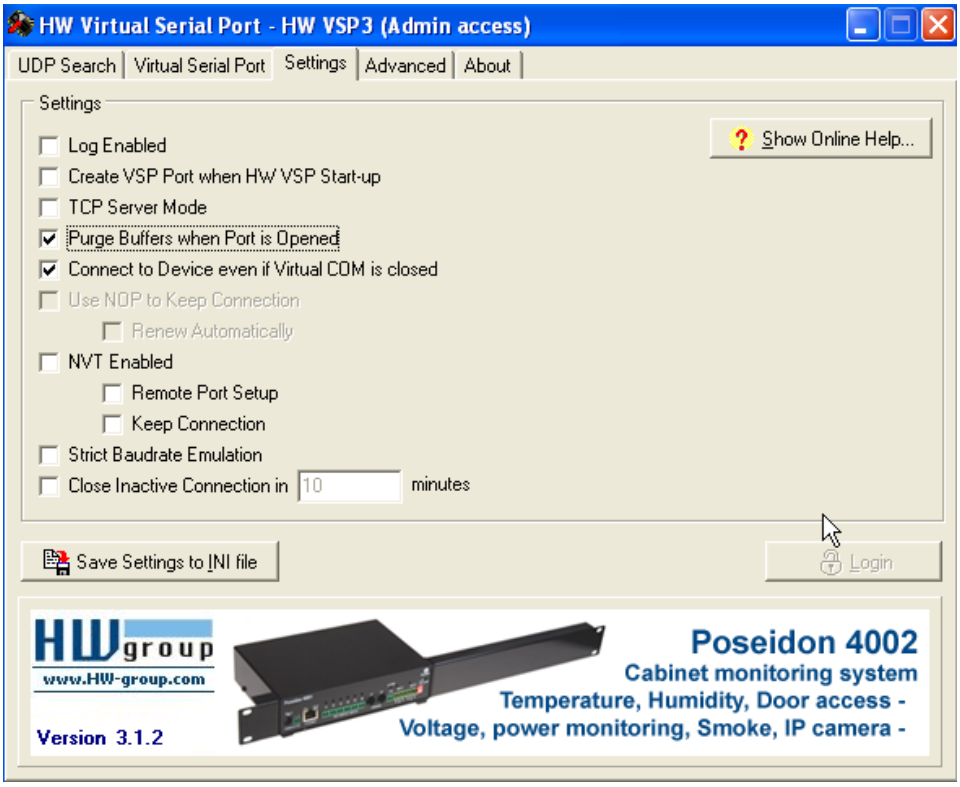
Here is the simple procedure to install and setup the HW VSP3 (3.1.2) virtual serial port.

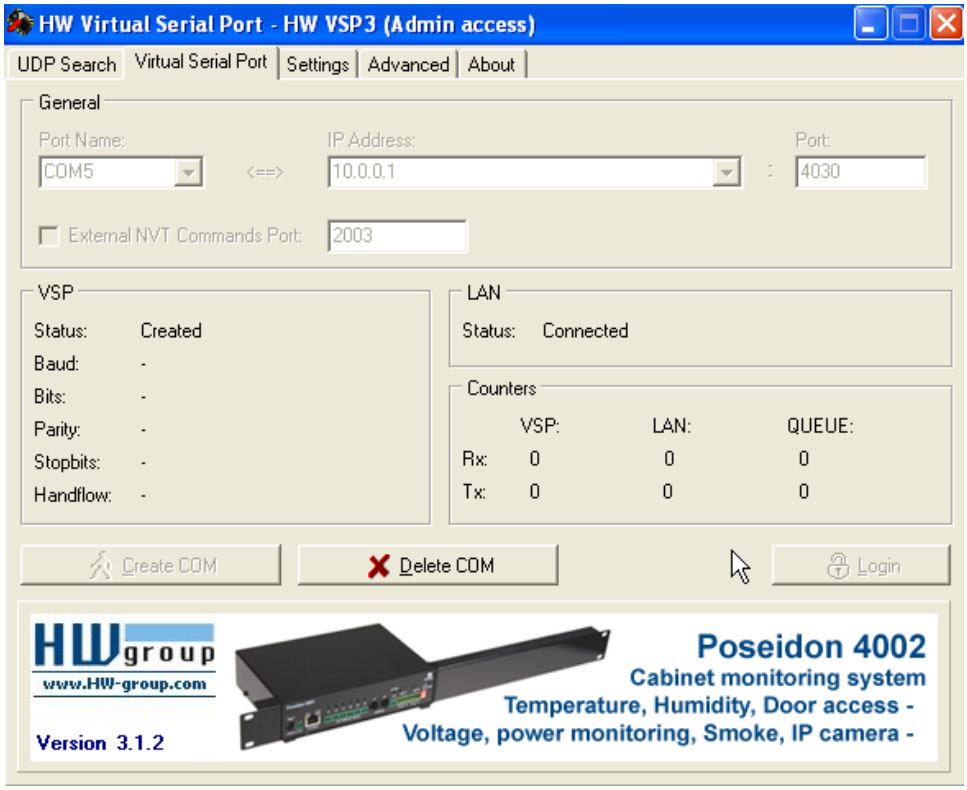
Download it from http://www.hw-group.com/products/hw_vsp/hw_vsp2_en.html

- Make sure to run it as Administrator
- Deselect “NVT enabled”, select “Purge buffers
- Connect to SkyHub2 from Windows Wireless Connection Console
- At the HW VSP, Login first.

- At the HW VSP => Virtual Serial Port Tab, entering the IP Address as 10.0.0.1, port as 4030, a Port Name (COM5 as example; you should use an unused COM port by checking Device Manager-> Ports (COM & LPT));
- At the HW VSP => Settings tab, select “Purge Buffers when Port is Opened” , “Connect to Devices even if Virtual COM is closed” and make sure deselect “NVT Enabled”
- Then hit “Create COM” button in the Virtual Serial Port” tab, it should response with a message “Virtual serial port COM5 created”




HW Virtual Serial Port - HW VSP3 (Admin access)
UDP Search
Virtual Serial Port
Settings
Advanced
About
Settings
Show Online Help...
Log Enabled
Create VSP Port when HW VSP Start-up
TCP Server Mode
Purge Buffers when Port is Opened
Connect to Device even if Virtual COM is closed
Use NOP to Keep Connection
Renew Automatically
NVT Enabled
Remote Port Setup
Keep Connection
Strict Baudrate Emulation
Close Inactive Connection in
10
minutes
Save Settings to INI file
Login
HW group
www.HW-group.com
Version 3.1.2
Poseidon 4002
Cabinet monitoring system
Temperature, Humidity, Door access -
Voltage, power monitoring, Smoke, IP camera -

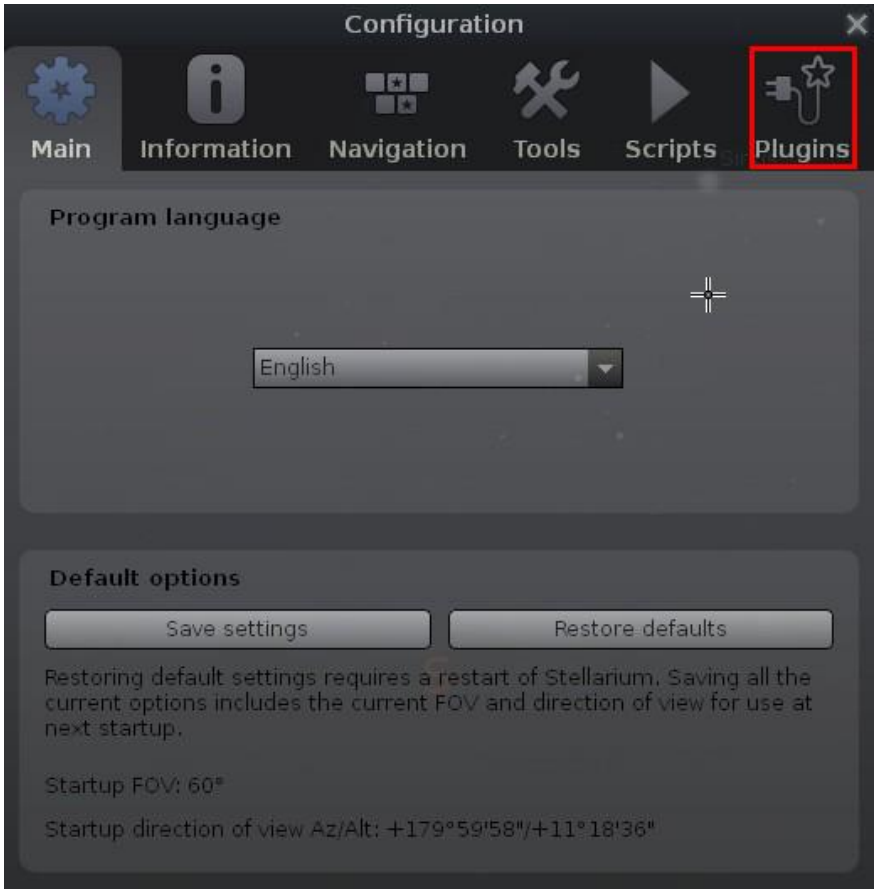

HW Virtual Serial Port - HW VSP3 (Admin access)
UDP Search
Virtual Serial Port
Settings
Advanced
About
General
Port Name:
COM5
<==>
IP Address:
10.0.0.1
Port:
4030
External NVT Commands Port:
2003
VSP
Status: Created
Baud: -
Bits: -
Parity: -
Stopbits: -
Handflow: -
LAN
Status: Connected
Counters
VSP:
LAN:
QUEUE:
Rx: 0 0 0
Tx: 0 0 0
Create COM
Delete COM
Login
HW group
www.HW-group.com
Version 3.1.2
Poseidon 4002
Cabinet monitoring system
Temperature, Humidity, Door access -
Voltage, power monitoring, Smoke, IP camera -

You can also use com0com instead of HW VSP3 - which is an open-source virtual serial port driver for Windows. Also free, but not nearly as easy to set up as HW VSP3. You need to install and configure both the com0com and com2tcp pieces.

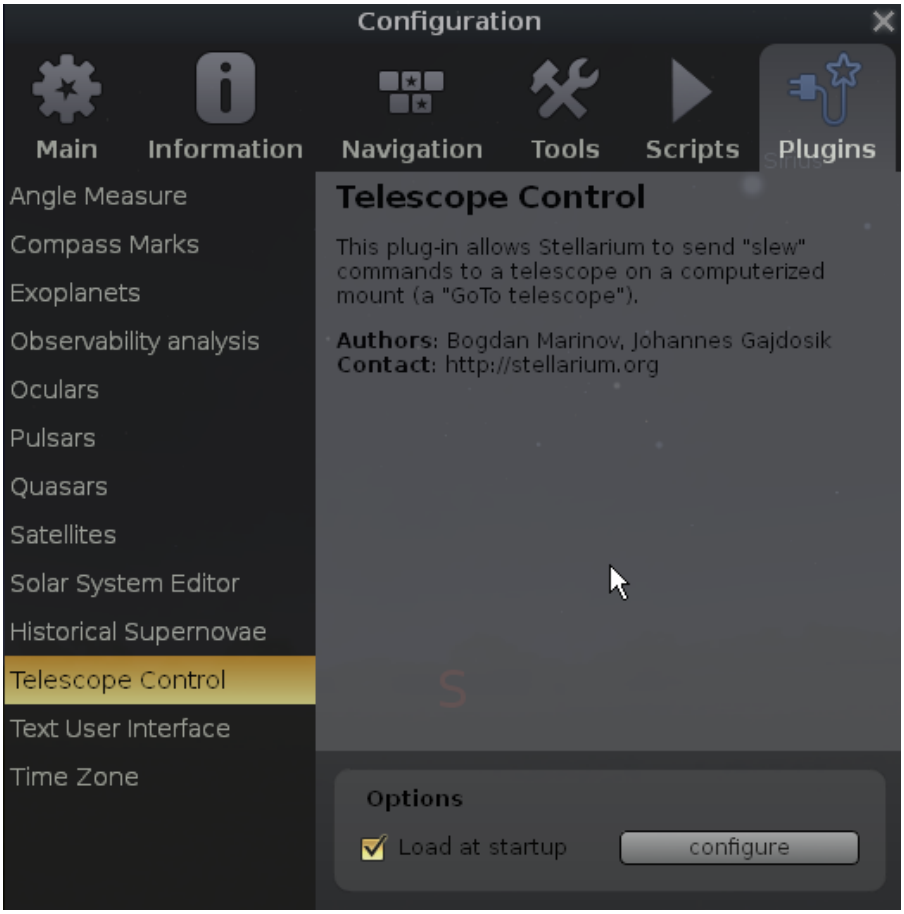
David Snay of Astronomy Technology Today magazine has written a step-by-step guide to Connecting to a Telescope Through SkyFi via COM2TCP. You can download a PDF of Dave's guide by clicking this link. Please remember to replace the SkyFi with the SSID of your SkyHub2 unit.

4. Stellarium

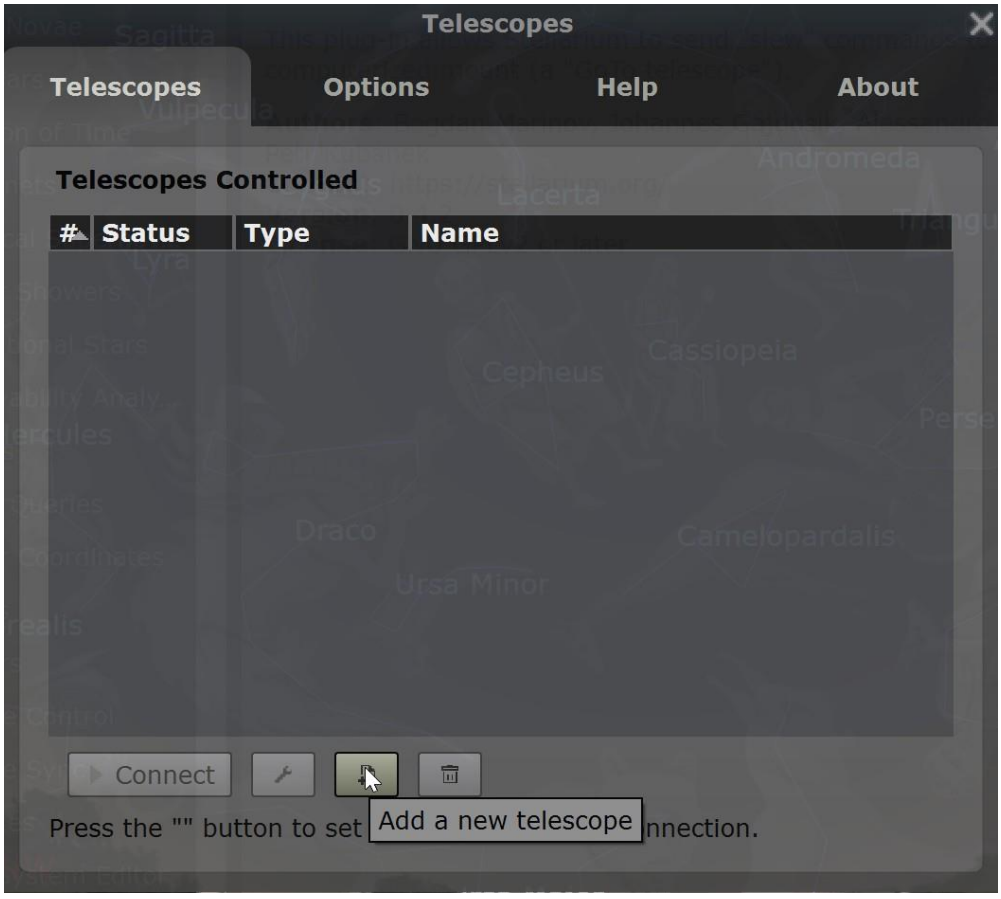
Download and install the Stellarium v.019.3 or later releases which with direct ASCOM support. Then open Stellarium, and click Configuration window.



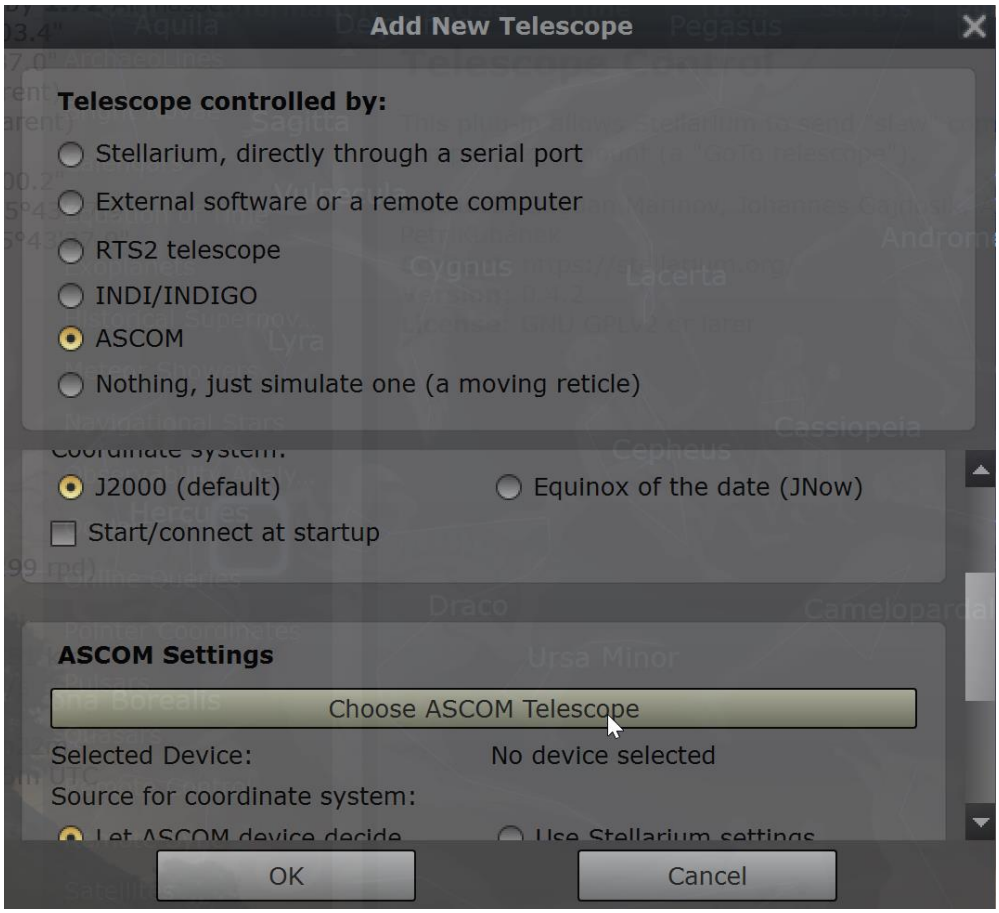
Then click Plugins.



Then choose Telescope Control, and then click “configure” button.

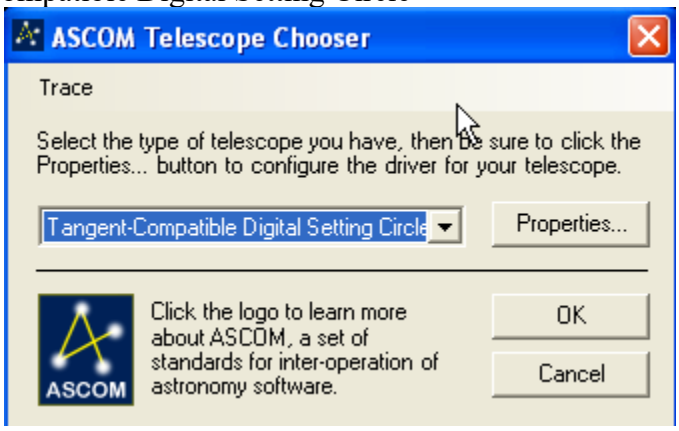


Then choose “Telescope” tab, and then click “Add” button to add a telescope.



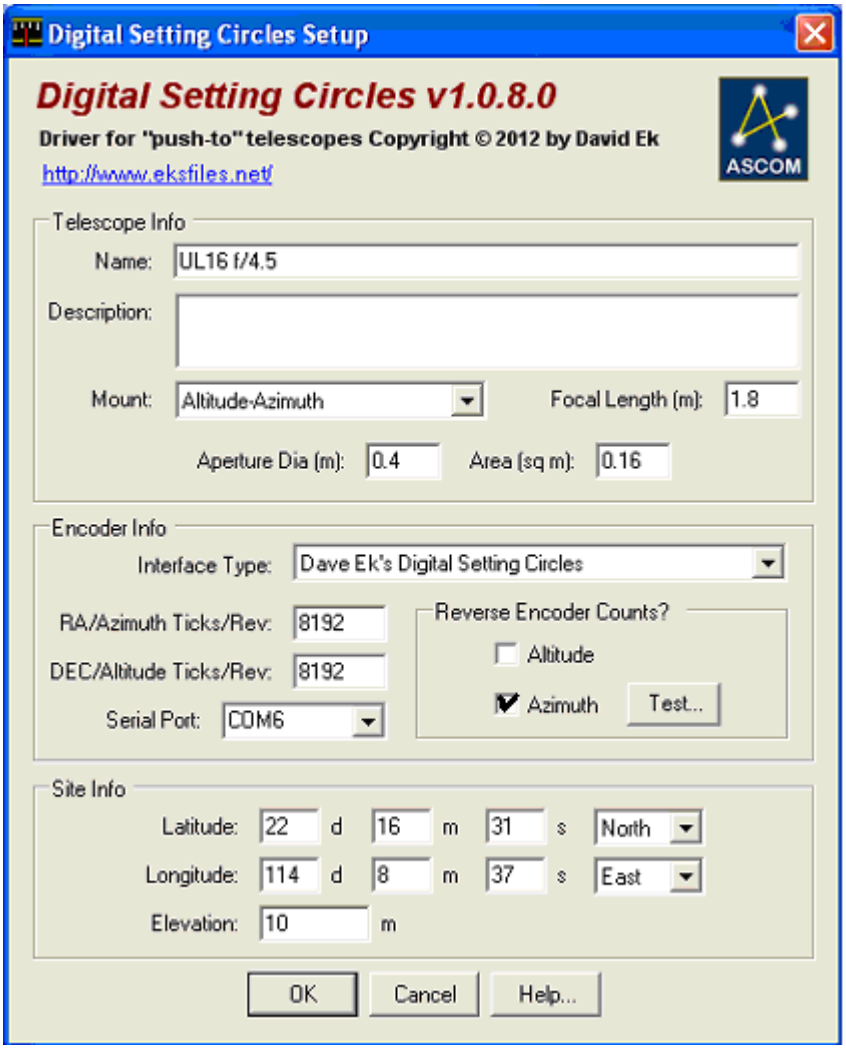
Then, you must choose “ASCOM” and click "Choose ASCOM Telescope". It will lead to the Configuration of EK ASCOM Driver.

Select “Tangent-Compatible Digital Setting Circle”

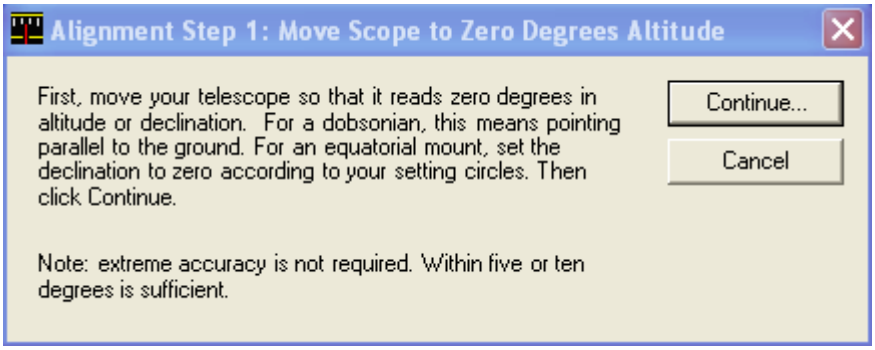


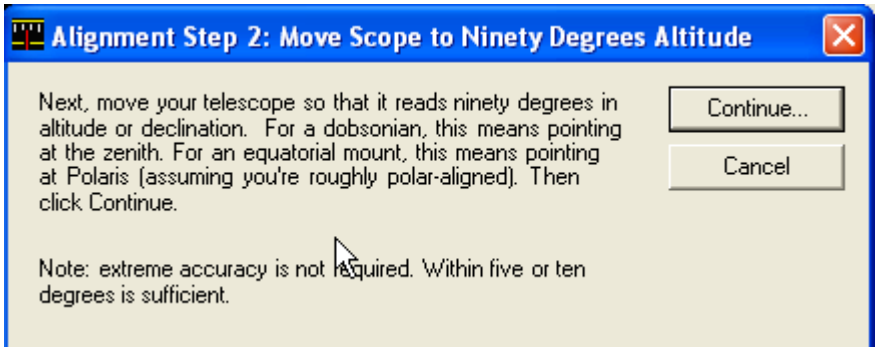
Then click the “**Properties**” button, and set the following options to:
Interface Type: Dave EK’s Digital Setting Circles.

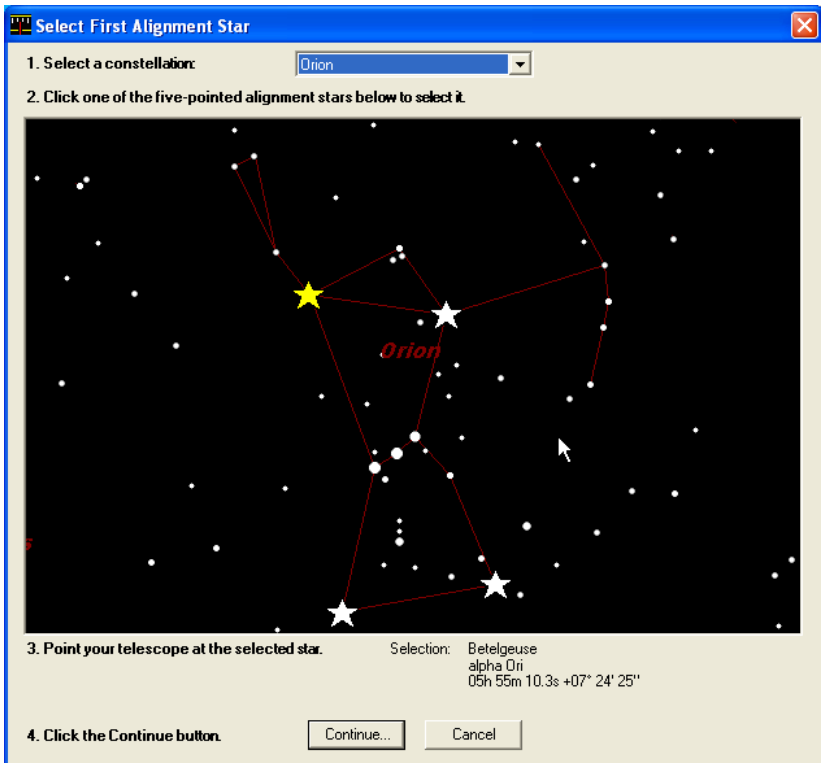
RA/Azimuth Ticks/Rev: **8192**
DEC/Altitude Ticks/Rev: **8192**
Reverse the encoder count for the Azimuth
Serial Port: COM6 (as an example)

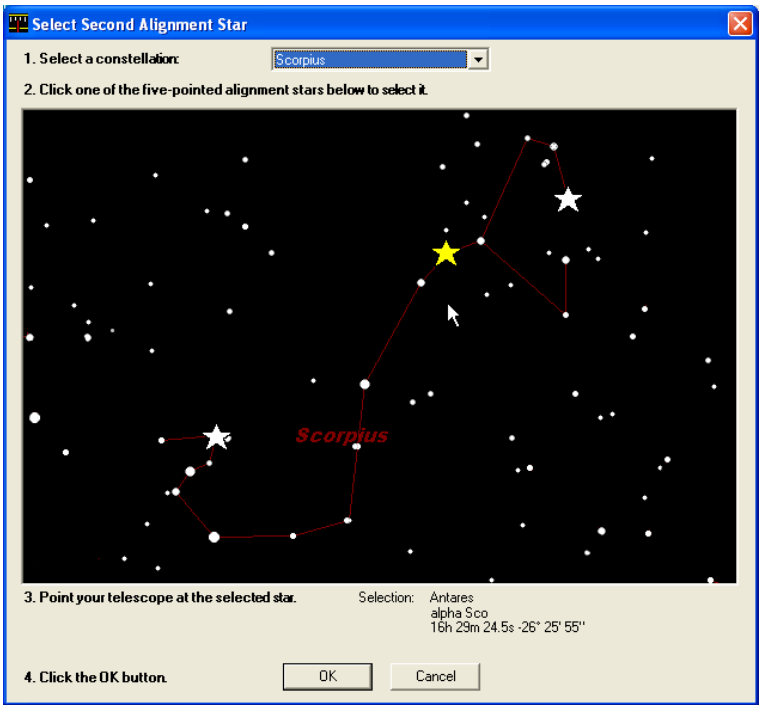


Then, click “Connect” button, and follow the procedure prompted on the screens:

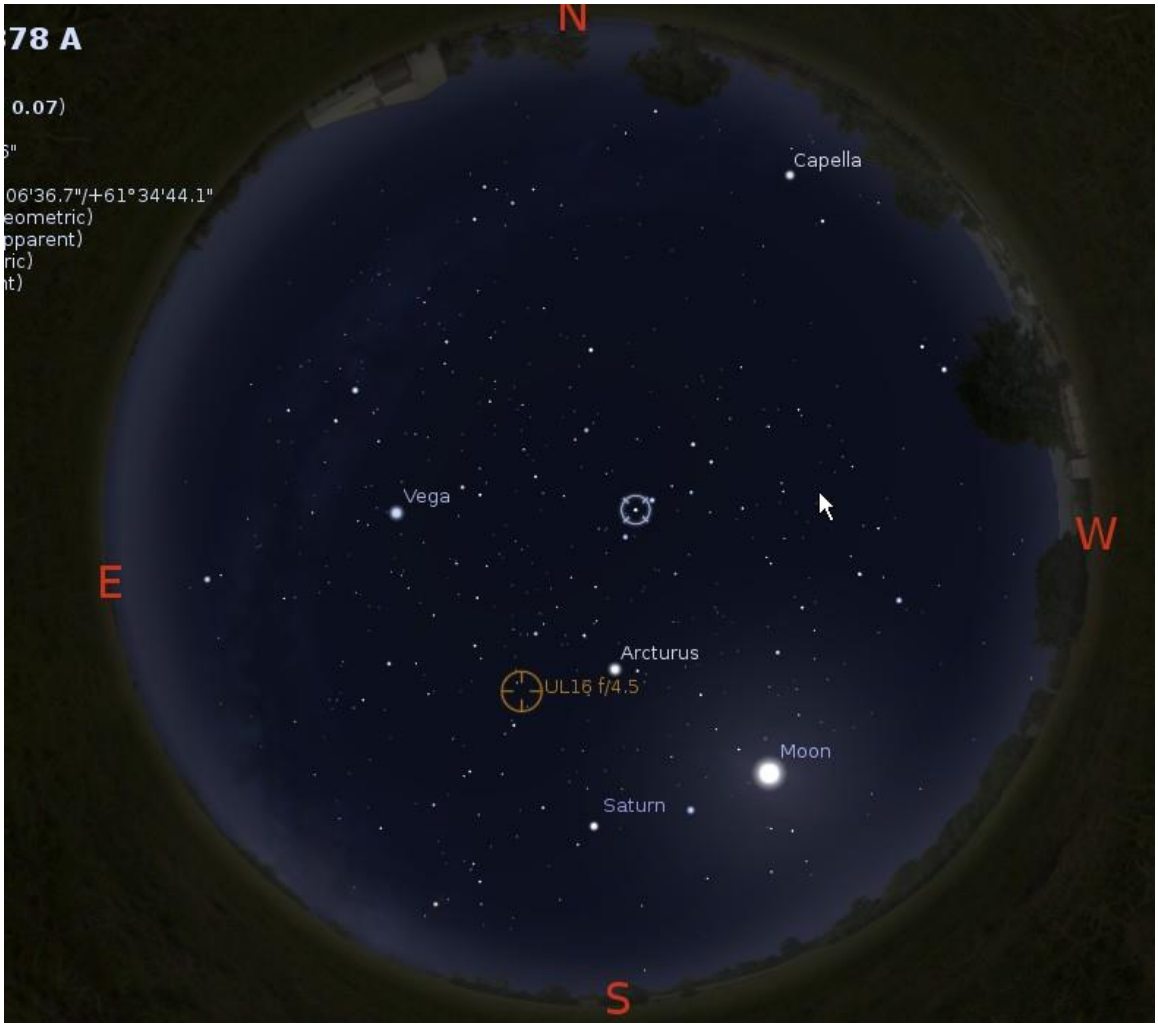

Alignment Step 1: Move Scope to Zero Degrees Altitude
First, move your telescope so that it reads zero degrees in altitude or declination. For a dobsonian, this means pointing parallel to the ground. For an equatorial mount, set the declination to zero according to your setting circles. Then click Continue.
Note: extreme accuracy is not required. Within five or ten degrees is sufficient.
Continue...
Cancel


Alignment Step 2: Move Scope to Ninety Degrees Altitude
Next, move your telescope so that it reads ninety degrees in altitude or declination. For a dobsonian, this means pointing at the zenith. For an equatorial mount, this means pointing at Polaris (assuming you're roughly polar-aligned). Then click Continue.
Note: extreme accuracy is not required. Within five or ten degrees is sufficient.
Continue...
Cancel


Select First Alignment Star
1. Select a constellation:
Orion
2. Click one of the five-pointed alignment stars below to select it.
Orion
3. Point your telescope at the selected star.
Selection: Betelgeuse
alpha Ori
05h 55m 10.3s +07° 24' 25"
4. Click the Continue button.
Continue...
Cancel

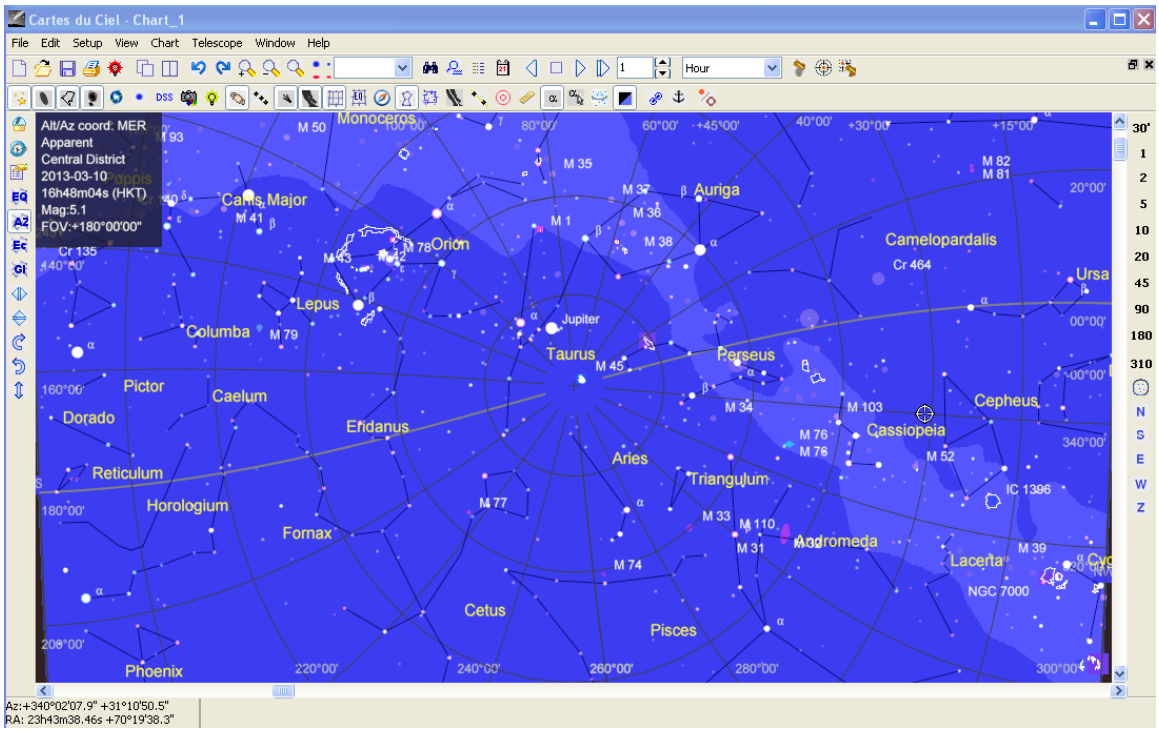


Once you complete the alignment procedure, you are ready to use Stellarium with your SkyHub2!

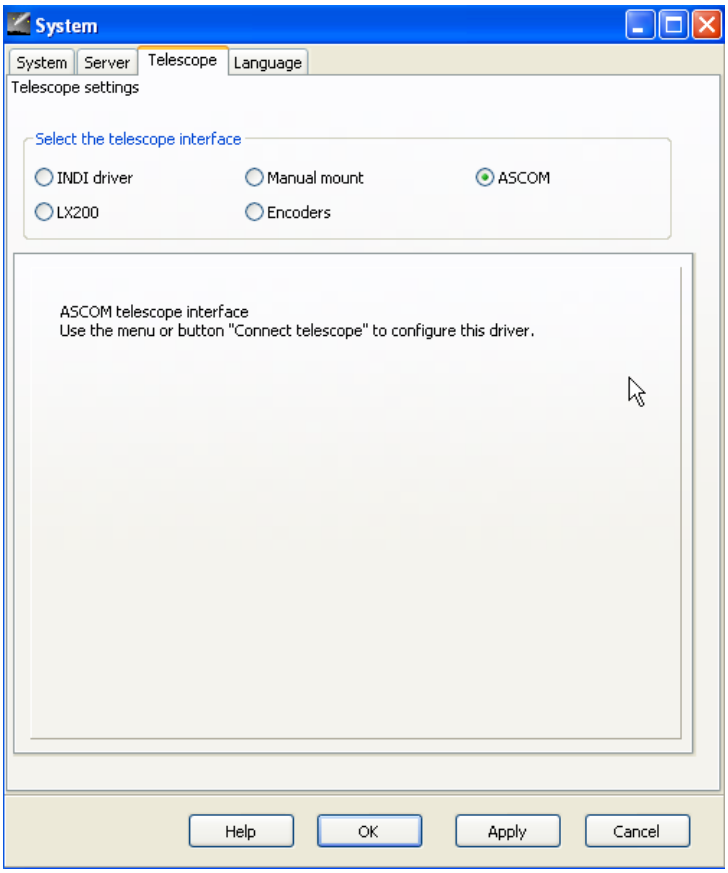


5. Cartes du Ciel

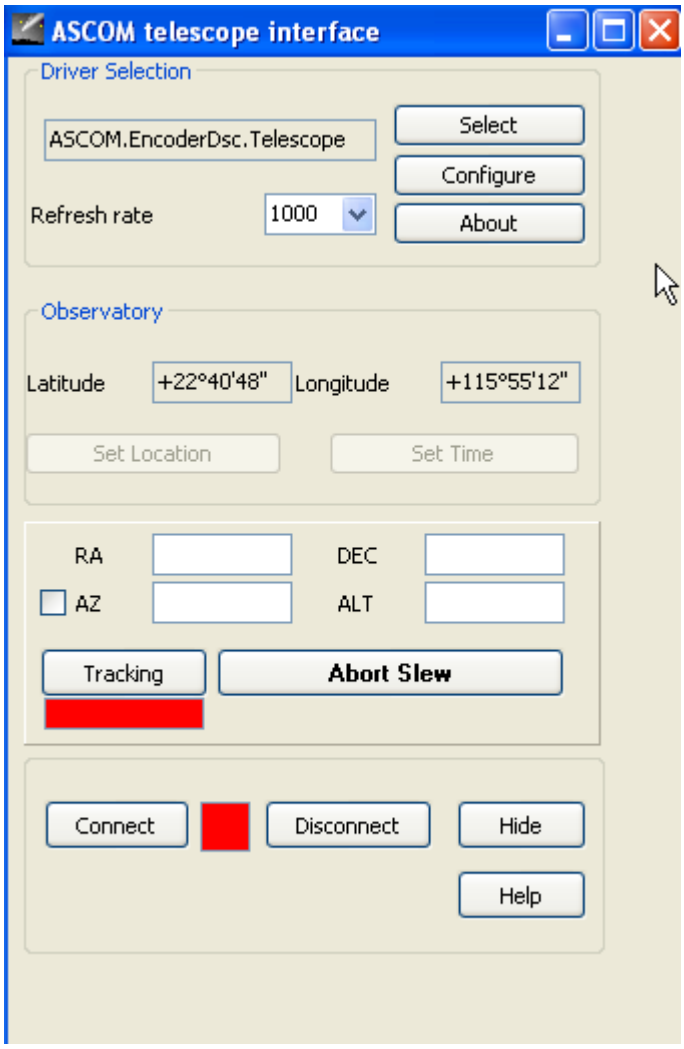
Cartes du Ciel requires the ASCOM platform in order to work with SkyHub2S. You need to install the ASCOM platform and EK DSC ASCOM driver as outlined in section 2.



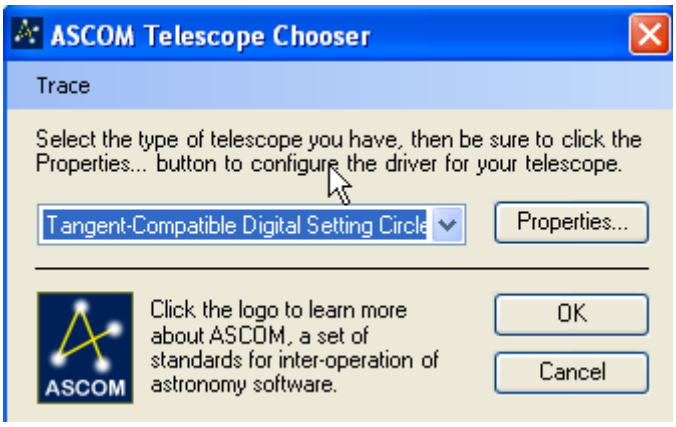
Then download and install the latest Cartes du Ciel (3.8 at this time). After you start Cartes du Ciel, choose “Telescope settings…” from the Telescope menu and then click on “ASCOM” on the “Telescope” tab.



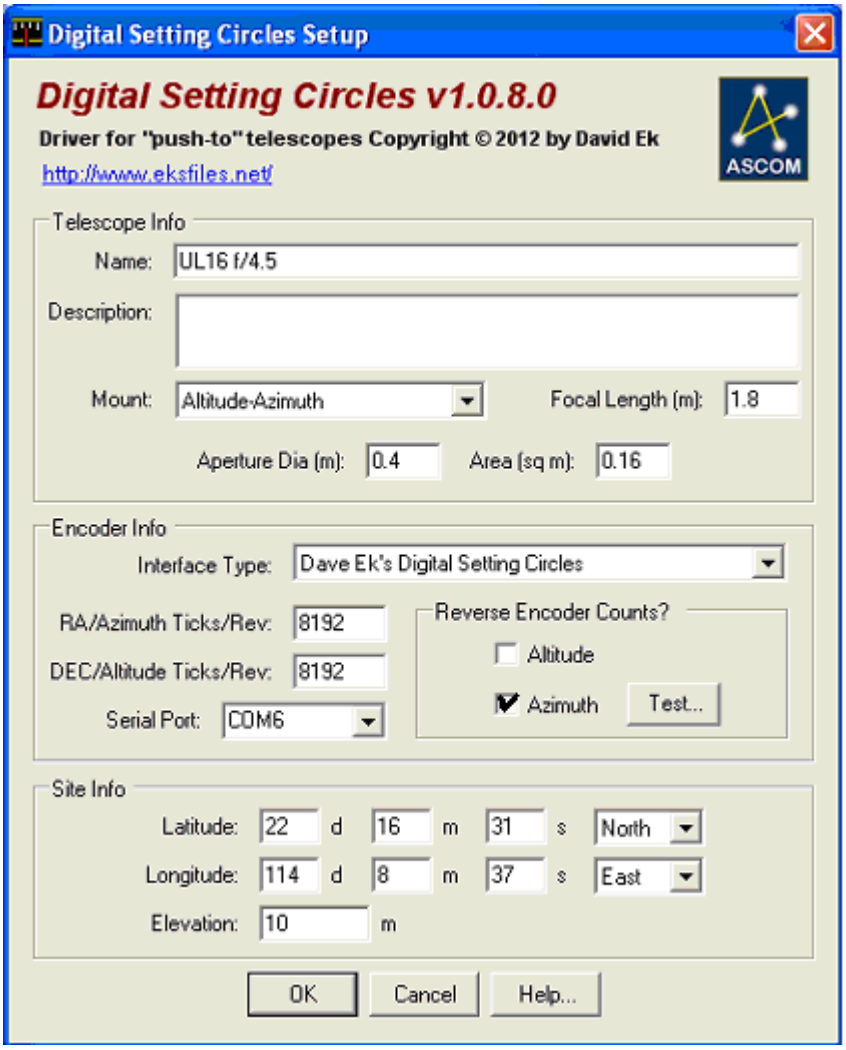
Next, select “Control panel…” from the Telescope menu. The Control panel will appear:



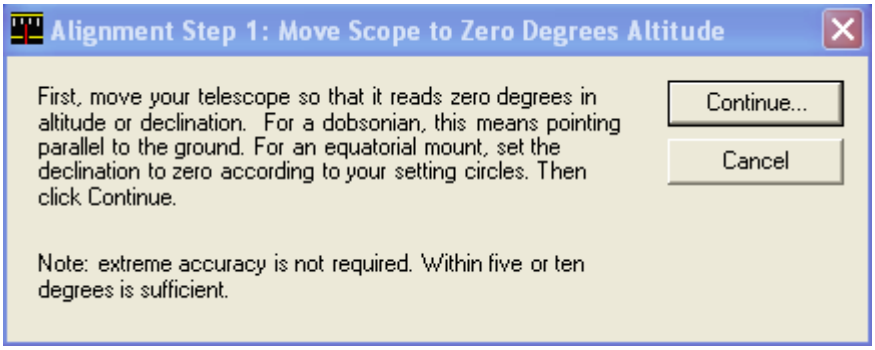
In this window, you should click the Select button to access the ASCOM Telescope Chooser to choose “Tangent-Compatible Digital Setting Circle”.

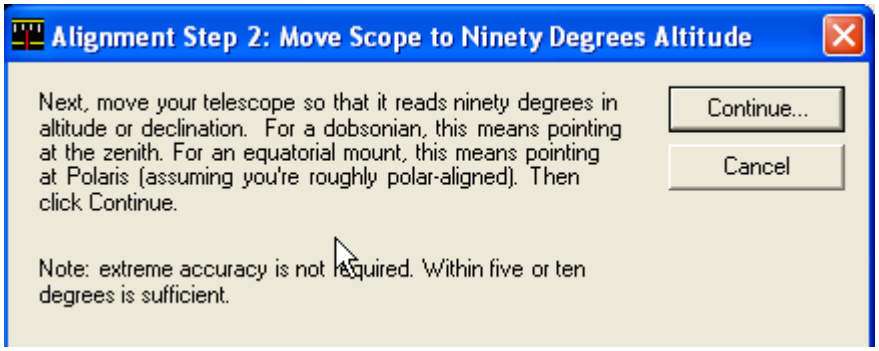


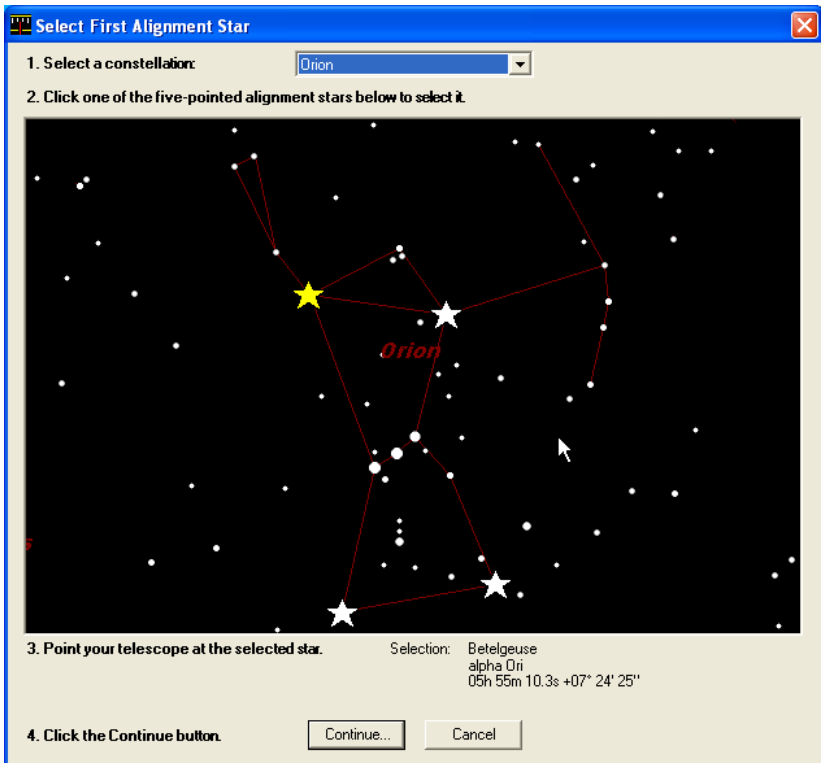
Then click the "**Properties**" button, and set the following options to:
Interface Type: Dave EK's Digital Setting Circles.
RA/Azimuth Ticks/Rev: 8192
DEC/Altitude Ticks/Rev: 8192
Reverse the encoder count for the Azimuth
Serial Port: COM6 (an example)

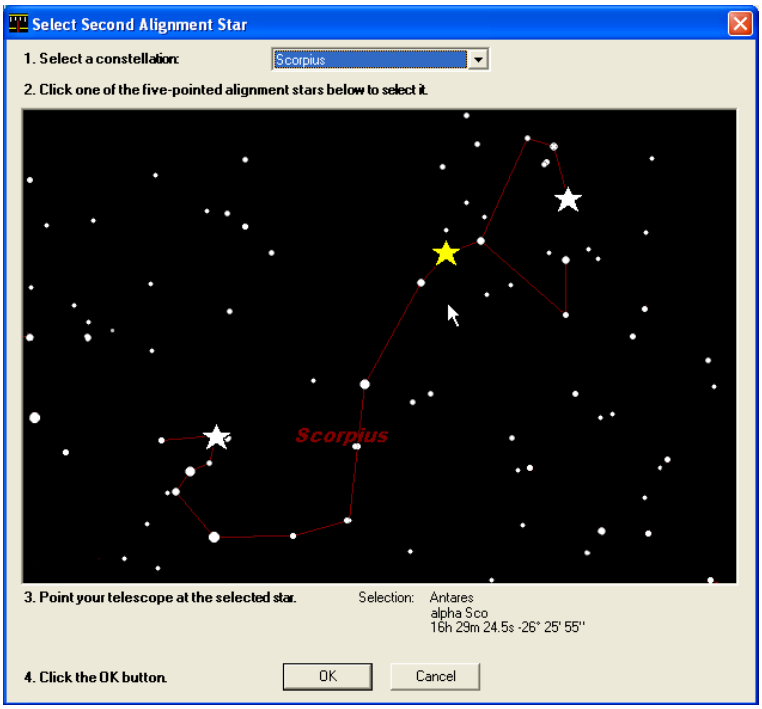


Then, click "Connect" button, and follow the procedure prompted on the screens:


Alignment Step 1: Move Scope to Zero Degrees Altitude
First, move your telescope so that it reads zero degrees in altitude or declination. For a dobsonian, this means pointing parallel to the ground. For an equatorial mount, set the declination to zero according to your setting circles. Then click Continue.
Note: extreme accuracy is not required. Within five or ten degrees is sufficient.
Continue...
Cancel


Alignment Step 2: Move Scope to Ninety Degrees Altitude
Next, move your telescope so that it reads ninety degrees in altitude or declination. For a dobsonian, this means pointing at the zenith. For an equatorial mount, this means pointing at Polaris (assuming you're roughly polar-aligned). Then click Continue.
Note: extreme accuracy is not required. Within five or ten degrees is sufficient.
Continue...
Cancel


Select First Alignment Star
1. Select a constellation:
Orion
2. Click one of the five-pointed alignment stars below to select it.
Orion
3. Point your telescope at the selected star.
Selection:
Betelgeuse
alpha Ori
05h 55m 10.3s +07° 24' 25"
4. Click the Continue button.
Continue...
Cancel



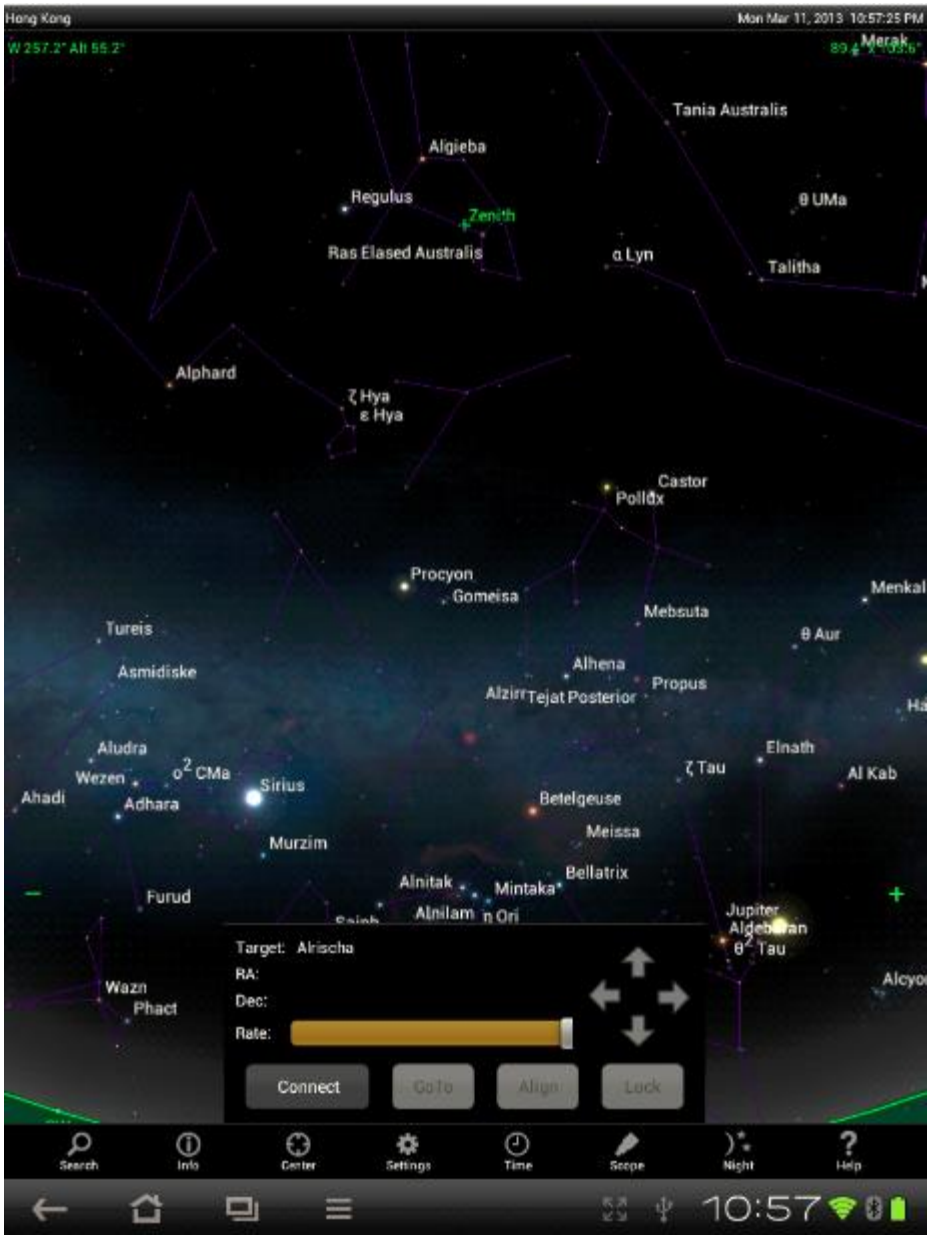
Once you complete the alignment procedure, you are ready to use Cartes du Ciel with your SkyHub!

6. Sky Safari

Here is the online Sky Safari Manual:
http://www.southernstars.com/support/manual/index.html

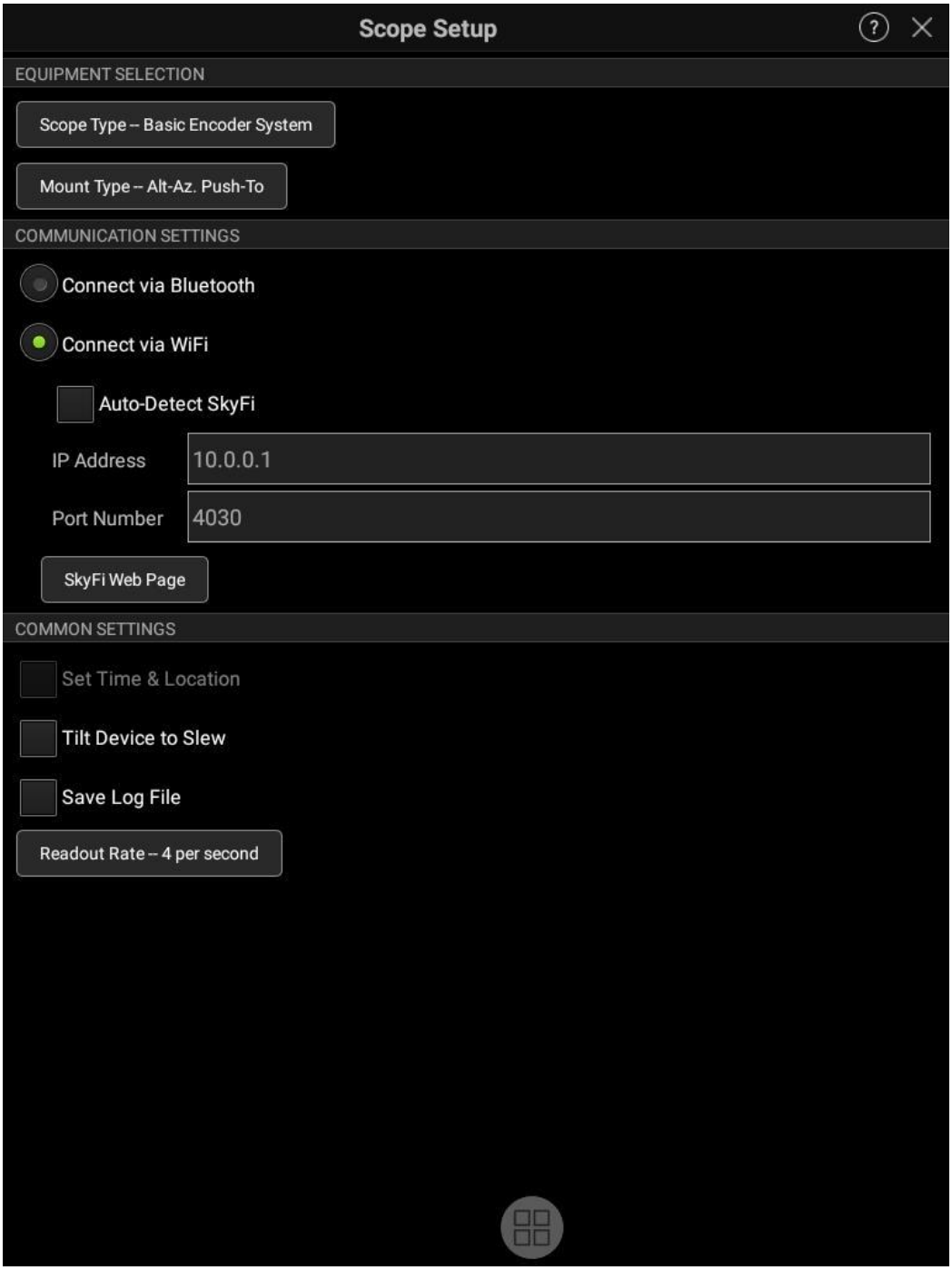
First that you need make sure that your Android device has the built in Wifi support. Go to the System Setting menu of your device to turn on the WiFi, then try to find and connect with SkyHubXXXX

After you have installed the Sky Safari on your device. You need to change the **Settings** of the Sky Safari. Open the Sky Safari **Setting** menu, and open the **Telescope Setup** sub menu.



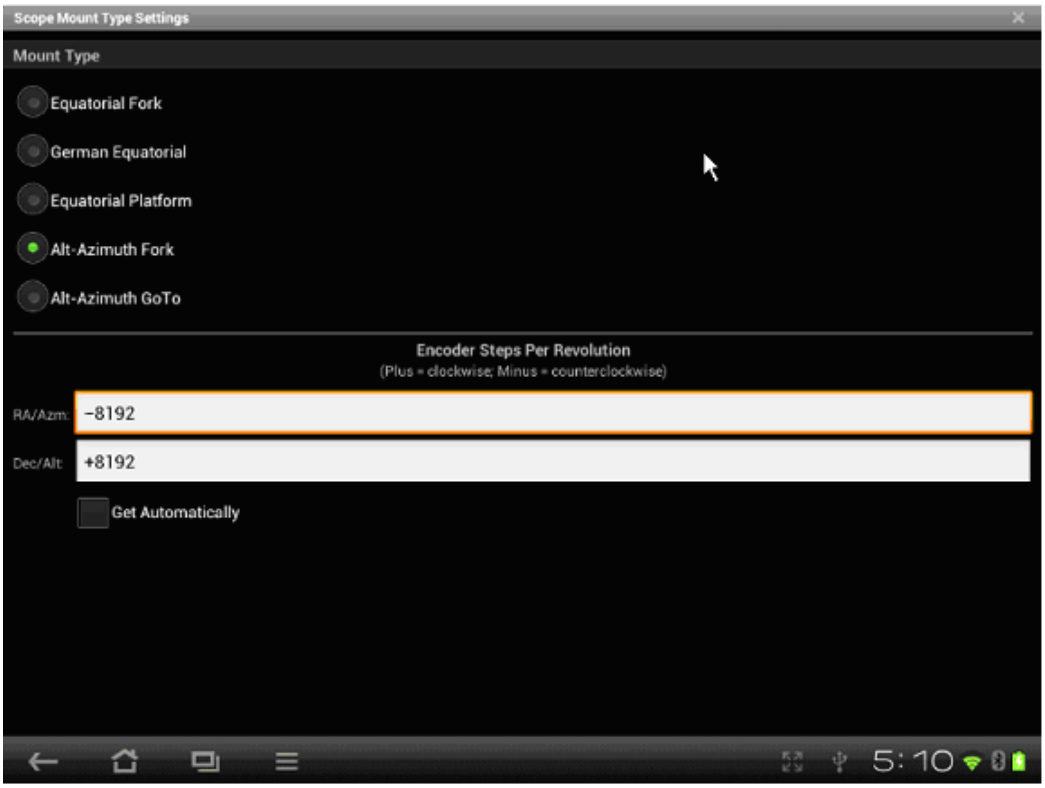
Change the **Scope Type** to: **Basic Encoder System**

Change the Communication Settings to either **“Connect via WiFi” or "Connect via Bluetooth". If connected via WiFi. Please do NOT check "Auto Detect SkyFi". If you accidently check "Auto Detect SkyFi"; then you may need to check "Connect via Bluetooth", and check "Coonect via WiFi" again to uncheck the "Auto Detect SkyFi".**

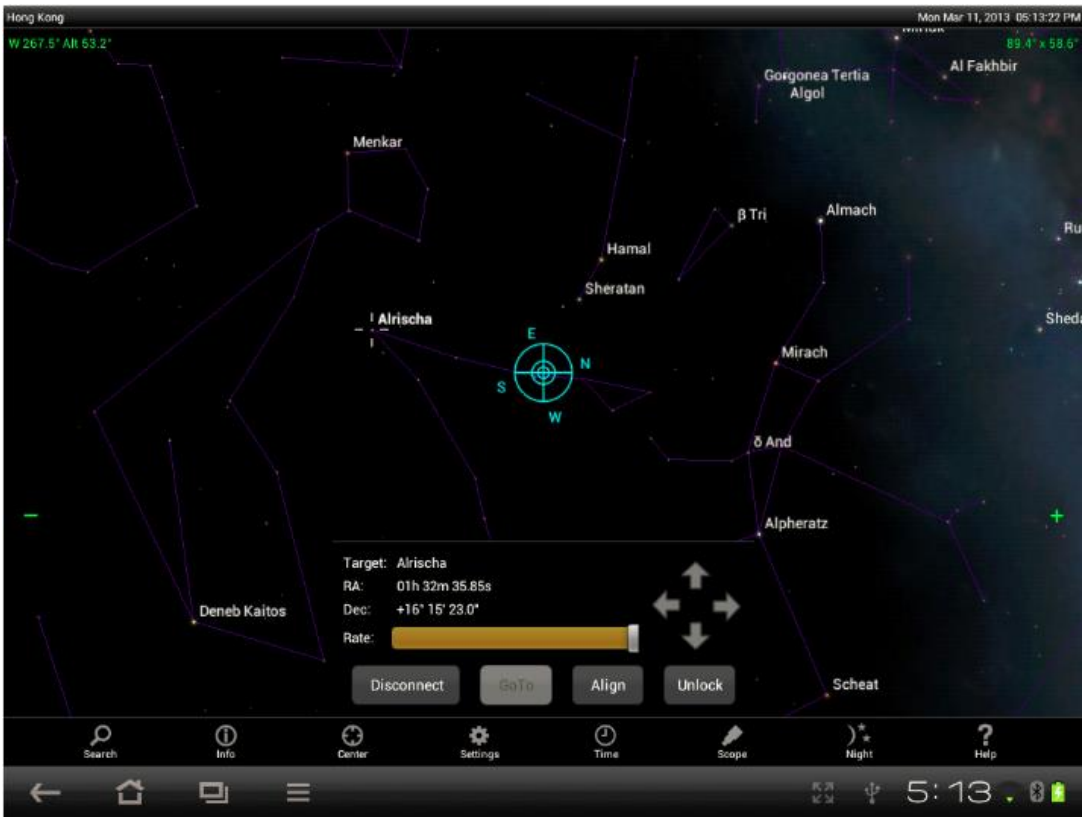


In the Mount Type sub menu, choose "**Alt-Az. Push To**" for Hubble UL.

Then enter the encoder resolution as **-8192** for RA/Aam and **+8192** Dec/Alt, and make sure that you un-check (OFF) the "Get Automatically"!



Then back to the main screen of the Sky Safari and press **"Connect",** you should hear a "Ding" after a little while and the scope icon should appear. Now your scope ha been connected to Sky Safari, and your ready to do Alignment. You should do a single star alignment, and then optionally a two star alignment. Then you are ready to have to use the Sky Safari to double your enjoyment and fun with Heavens.



7. Specification

Power Supply: 5VDC USB power.

The SkyHub2 is pre-configured with the following parameters:

Device Name: **SkyHub2S_XXXX (XXXX is a 4 digits number, such as 1357)**
Passcode: **XXXXXXXX**

Encoders: 8192 Tick/Revolution (Other resolution encoders are supported too)
Two revolutionary, 8192 PPR, low power consumption, ball bearing encoders. Come with encoder cables, encoders adapters brackets for Hubble UL12, 14, 16, 18 , 20 a 24.

Ad-Hoc WiFi: It will work on iPad/iPod/iTouch/iPhone/Android based devices/MS Windows systems with WiFi interface. Please note that Ad-Hoc access must be enabled manually on Windows 8.1 and Windows 10!

Bluetooth: It will support Bluetooth connection to Windows and Android devices.

LEDs: Power LED, Status LED

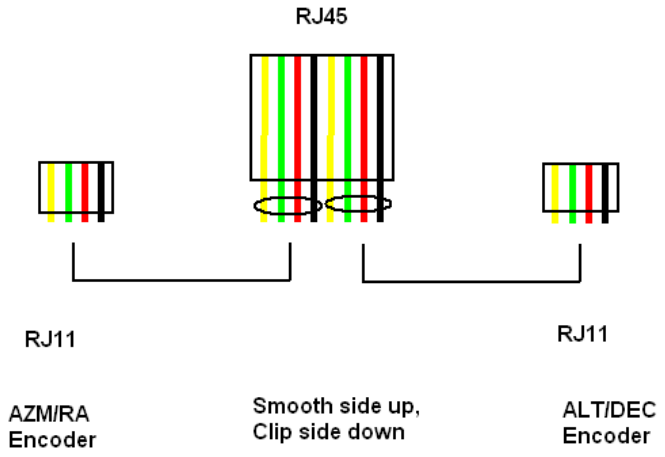
5VDC USB battery is required (not provided). You may order this one from Amazon.

It works with **many Planetarium applications** on iPhone/iPad/iPod (WiFi), Android devices (WiFi/Bluetooth), Mac books (WiFi), and MS Windows (Bluetooth/WiFi).

Sky Safari (Pro) is **Not included**.

Items included in the complete SkyHub2 package:
#1: SkyHub2S CPU Board, QTY:1
#2: SkyHub2S Enclosure Box, QTY:1
#3: Encoder Y Cable, QTY:1
#4: ALT encoder and pivoting arm assembly with cable, QTY: 1
#5: AZM encoder pivoting arm assembly with cable, QTY:1
#6: ALT encoder holder bracket, QTY:1
#7: AZM encoder holder brackets, QTY :1
#8: ALT encoder M6 knob screws, QTY:2
#9: ALT/AZM encoder plastic wrapped M6 pivoting screws, QTY:2
#10: AZM encoder bracket installation screws (M6 X 16), QTY:3
~~#11: External 9VDC Power Cage, QTY:1~~
~~#12: Internal/External 9VDC Power Cable, QTY:1~~
~~#13: Power Extension Cable, QTY:1~~

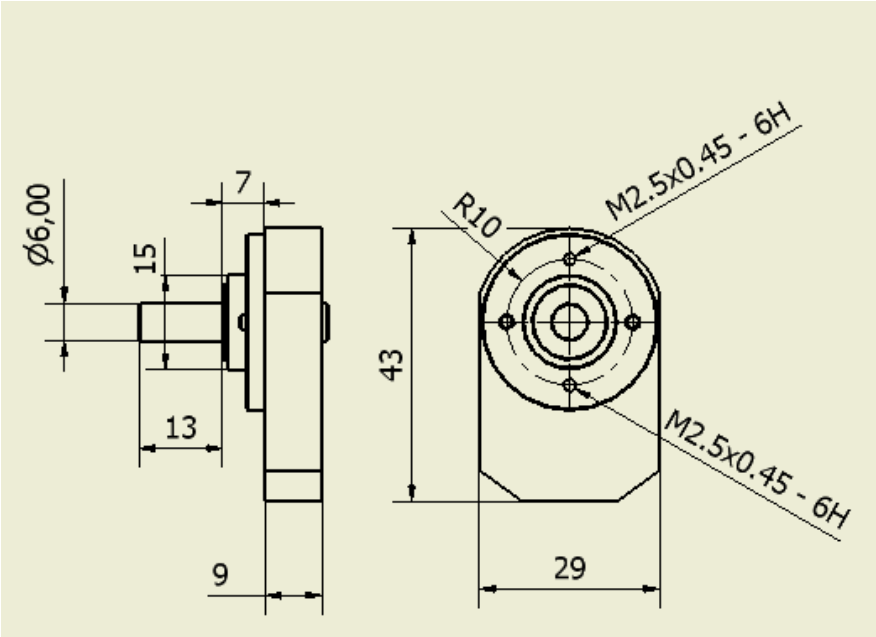
Encoder Cable Pin Out:



Encoder Connections

G: Black, Ground
X: Not used
A: Red, A Channel
5V: Green, +5V
B:, Yellew: B Channel

Encoder Dimensions:



9. Limited Warranty

Optel Engineering Group Inc. (Hubble Optics), Seller, warrants to the original purchaser only, that goods sold will be free of material defects in design, materials and workmanship for a period of 6 months following the date of shipment by Seller to Buyer. Seller will repair or replace, or refund the purchase price as to, goods that do not conform to the foregoing warranty, provided the cause of the nonconformity does not arise from or relate to modification, misuse, or abuse by the customer, and provided a warranty claim. Repair or replacement of the product or refund of the purchase price, at Seller's sole option, shall be the Buyer's exclusive remedies. Seller shall not be responsible for any indirect, special or consequential damages arising from use of the products. Goods subject to this warranty must be shipped postage pre-paid by Buyer to the Seller.

If the products have been damaged by modification, lightning, faulty wiring, moisture, or other misuse, the warranty is void.

Specifications Subject to Change Without Notice.