



# iOptron® iPolar™ Electronic Polar Scope Operation Manual

Product #3339

Ver. 2.04 2019.10

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# 1. Connect iPolar to a PC and Download iPolar Software

- (1) Connect the iPolar Electronic Polar Scope (iPolar) to your computer USB port;
- (2) The iPolar should automatically install the driver if it is the first time connecting to the computer. If not, please make sure the USB cable is plugged in firmly on both ends;
- (3) You should see "iOptron iPolar" under Camera in computer Device Manager;
- (4) Goto [www.ioptron.com](http://www.ioptron.com) to download iPolar software and save on your computer
- (5) The iPolar software needs Windows 7, 8.1, 10 or later version, 32 bit or 64 bit operation system, with .NET Framework 4.8 or later version.

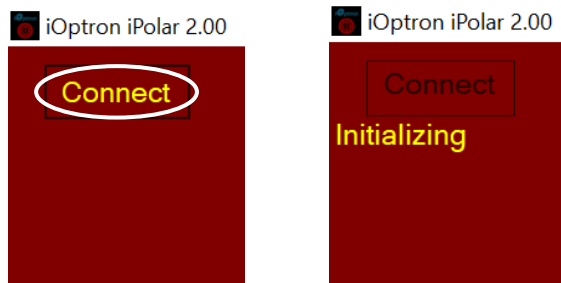
# 2. Polar Alignment

## Step 1: Adjust Equatorial Mount Pointing Direction

Set the counterweight shaft at the lowest point. Adjust the altitude to your latitude. Roughly point the mount to the north (or south if located in southern hemisphere).

## Step 2. Connect iPolar in Software

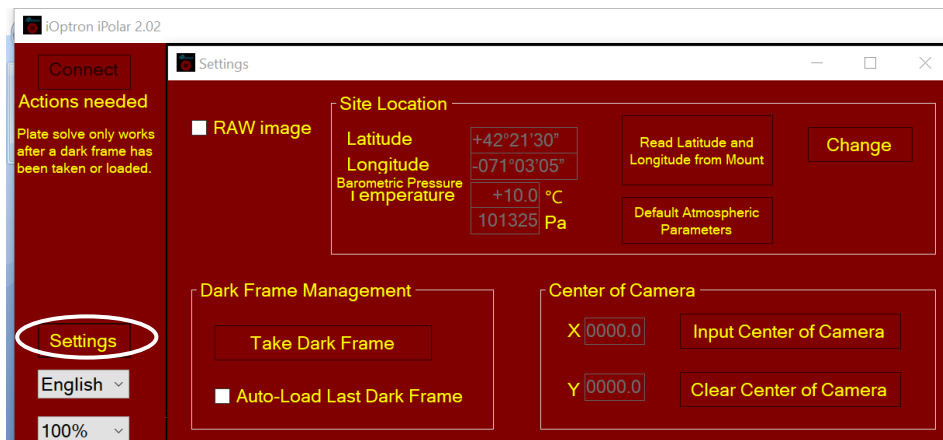
- (1) Run downloaded iPolar Software (**3339\_iOptron\_iPolar.exe**) to bring up the polar alignment main menu. Resize the window to fit your computer screen.
- (2) Click on "**Connect**" button to connect the iPolar to the computer. The software will start to initialize the process if the camera is connected successfully.



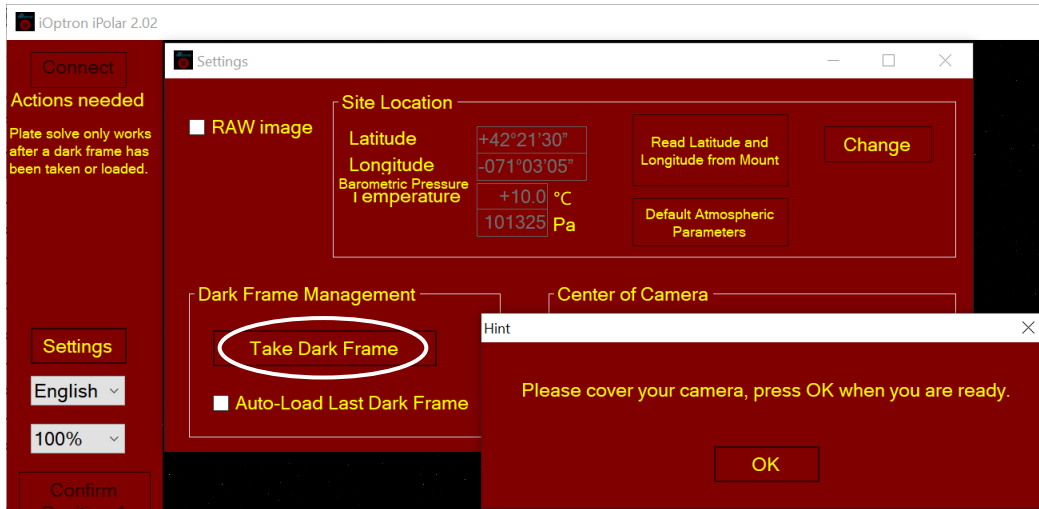
**NOTE:** If the software cannot connect to the camera, please check your computer camera settings. Make sure to change "camera privacy" settings to allow apps to use the camera.

## Step 3. Take Dark Frame

Take the dark frame image of the camera. This will mark the bad pixels of the camera, if there is any, and camera dark current under different ambient temperature. Click on **Settings** to bring up **Settings** window.



Click on **Take Dark Frame**. Follow the instruction on the screen to complete the process.



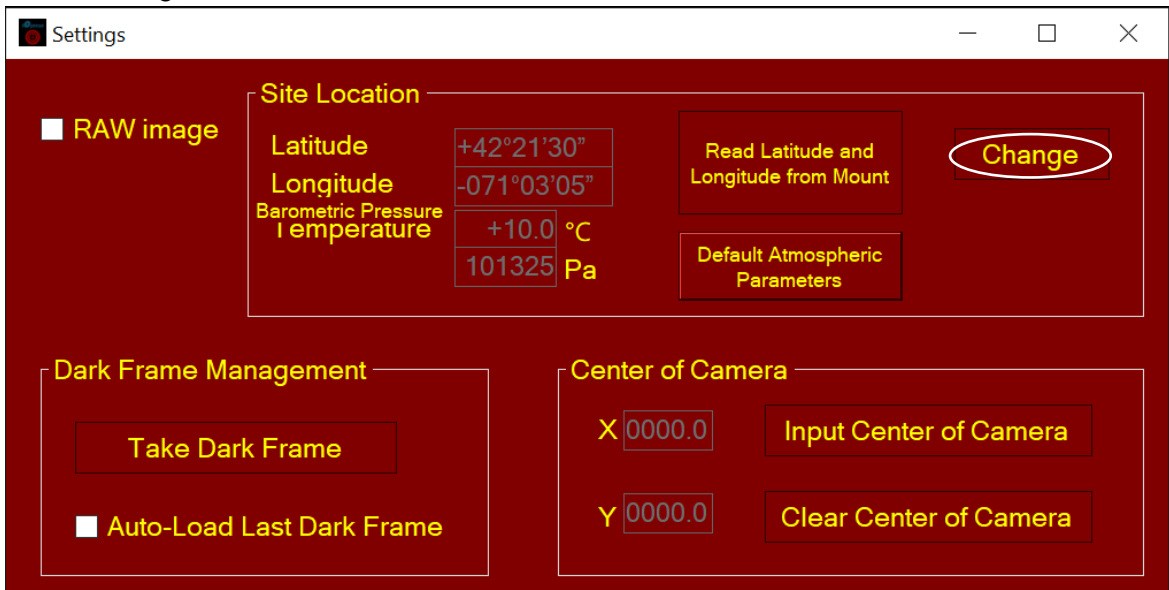
You may check **Auto-Load Last Dark Frame** box to load the dark frame automatically. However, we recommend to take the dark frame when performing polar align since the temperature difference could have large impact on the alignment.

#### Step 4. Set Location and Atmospheric Parameters

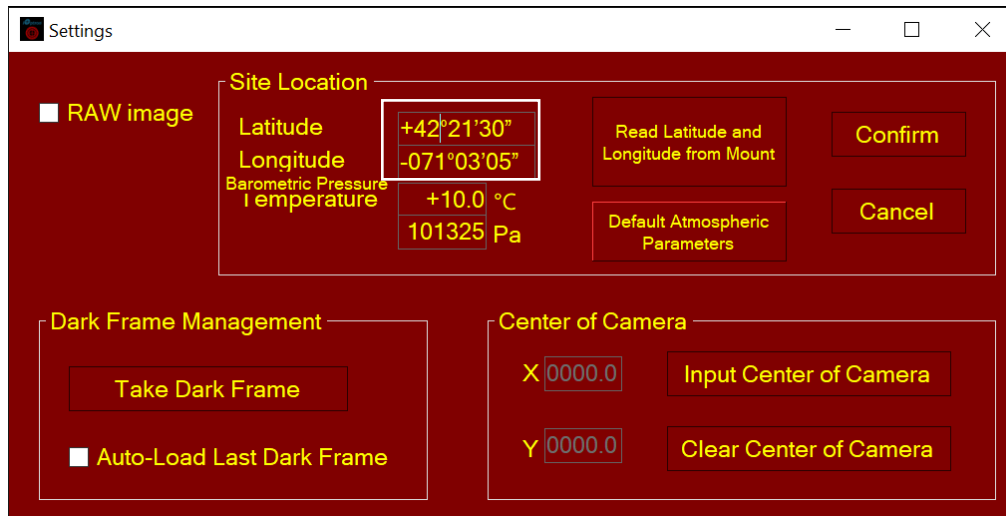
If the observation site is near equators (lower latitude), or is at high elevation (3000 meter or higher above sea level), please enter the barometric pressure and temperature as precise as possible.

#### Enter Manually

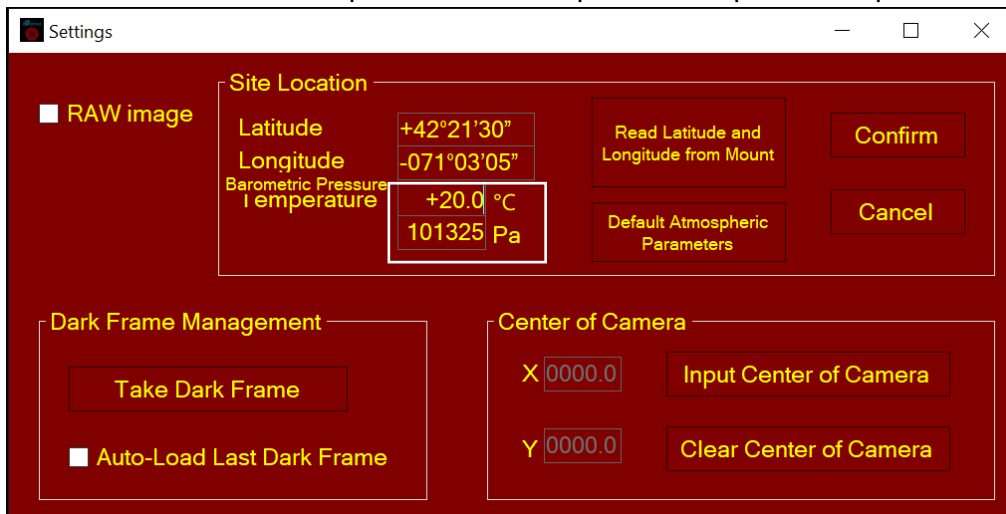
- (1) Click on Change button



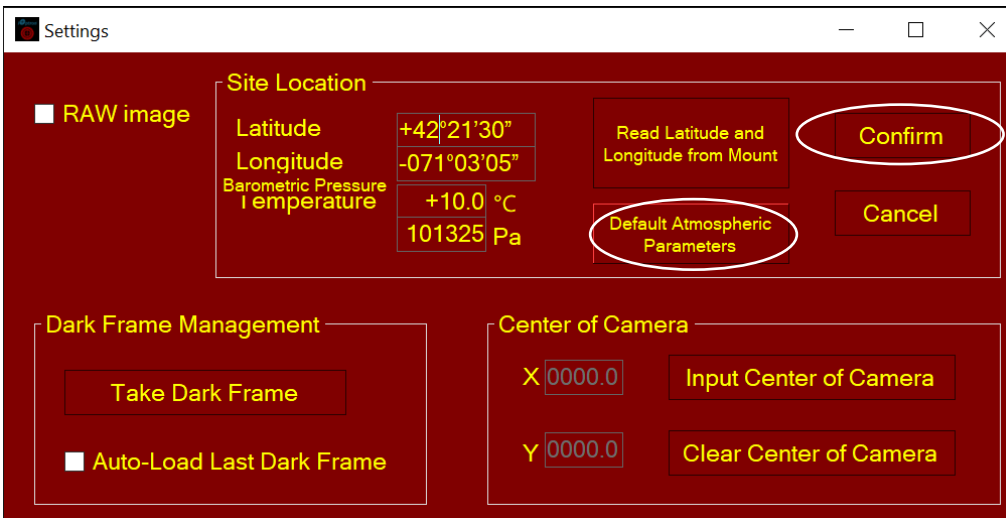
- (2) Enter location info, *i.e.*, latitude and longitude number (GPS coordinates). Northern hemisphere is "+", southern "-" for latitude; eastern "+", western "-" for longitude



- (3) Enter atmospheric parameters, *i.e.*, temperature and barometric pressure. If the observation site is near equators (lower latitude), or is at high elevation (3000 meter or higher above sea level), please enter the barometric pressure and temperature as precise as possible.



Otherwise you may choose default atmospheric settings, just click on **Default Atmospheric Parameters**. The default value is 10°C and 101325Pa.

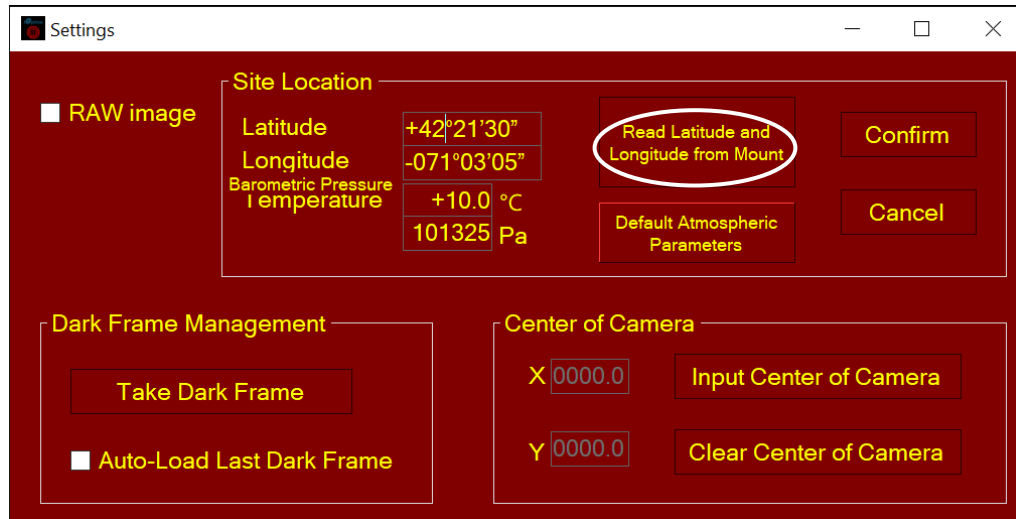


- (4) Click **Confirm** to complete the location setting.

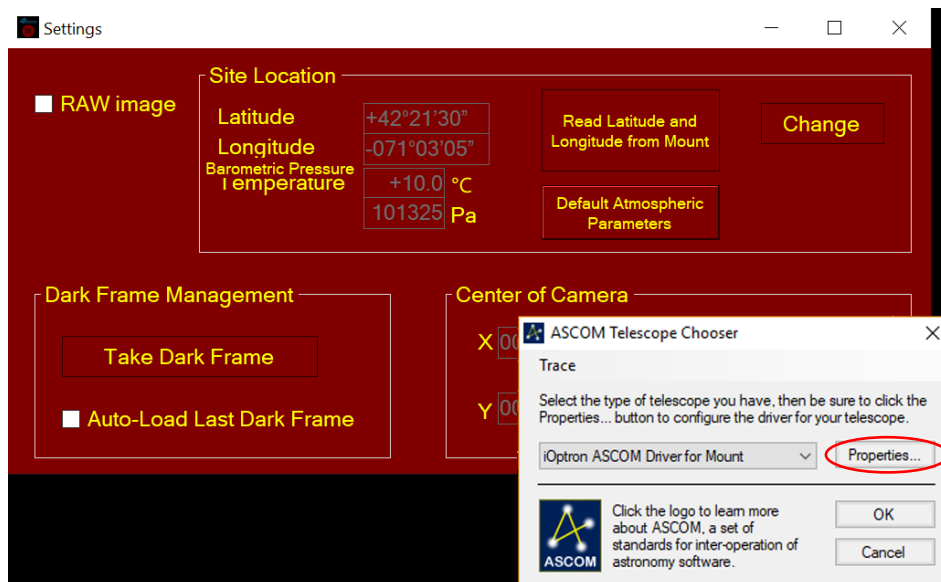
## Read from an ASCOM Supported iOptron Mount for Location Info

**NOTE:** You'll need latest firmware and iOptron Commander, as well as .NET 4.8 and beyond. Make sure the mount is connected to the computer via ASCOM.

- (1) Click on **Settings**
- (2) Click on **Read Location from Mounts**



- (3) An ASCOM Telescope Chooser window will occur, if the mount is ASCOM supported and connected to the computer. Select correct mount ASCOM driver from the pull-down menu and click OK.



- (4) Click **OK** to complete the location setting.

## **Step 4. Calibration the Camera**

The calibration process will tell the software if the iPolar is aligned to the mount RA axle after installation. Calibration is only needed when:

- (1) First time use iPolar;

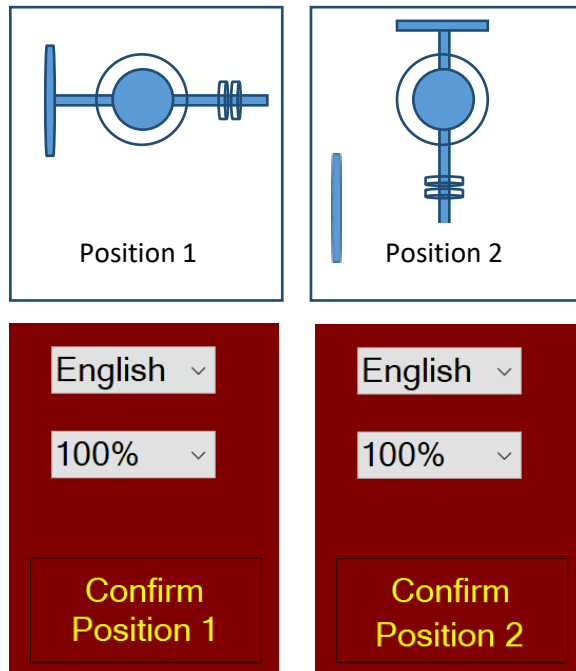
- (2) iPolar is adjusted (removed, rotated, etc); or
- (3) You are suspect that the alignment is off.

**NOTE:** You may need to click on **Clear Center of Camera** in order to perform a new calibration.

### iPolar Rotating With Mount RA Axis

For most EQ mounts, the iPolar can be rotated with the RA axis. The camera center of the iPolar/RA axis can be determined with two individual positions that separated by 45 degrees or larger.

Start the RA axis of the mount from first position, click on **Confirm Position 1**. Rotate the RA axis more than 45 degrees and click on **Confirm Position 2**. The start and end positions can be arbitrary.



**NOTE:** If **Confirm Position** button not active, please click on **Clear Center of Camera** to erase the data stored.

### iPolar Not Rotating With Mount RA Axis

For those mounts that the polar scope does not rotate with the RA axis, such as SkyTracker and SkyTracker Pro, the camera center can be determined by turn the iPolar manually.

- (1) After insert iPolar into polar scope mounting hole, tighten polar scope locking screw to secure it. Click **Confirm Position 1**.
- (2) Release polar scope locking screw. Turn iPolar 45 degree or more. Tighten the screw. Click **Confirm Position 2**.

### Input Rotation Center

You may also manually enter the rotation center, X=480, Y=640, for rough alignment if you are sure the iPolar camera center is not far away from the mount RA axis.

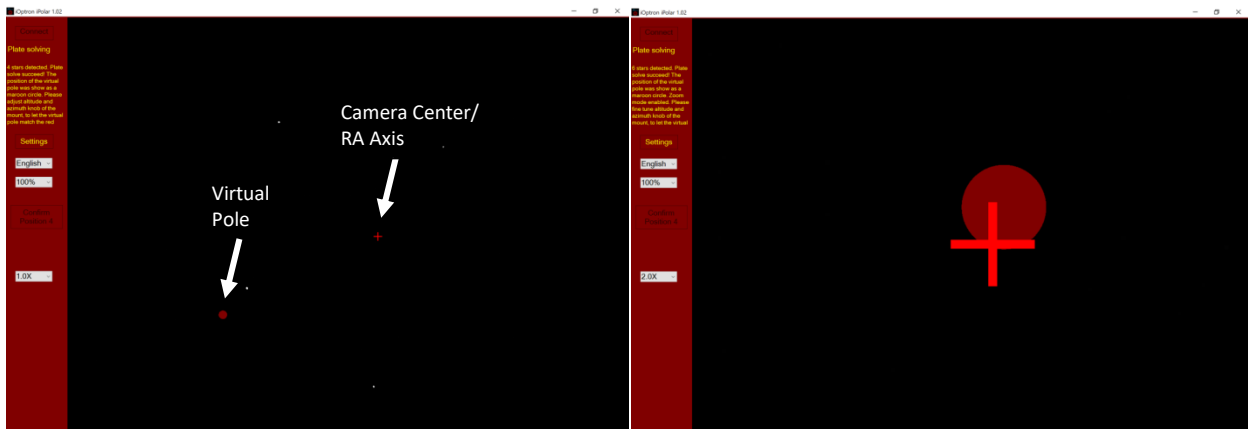
## Step 5. Plate Solving and Polar Alignment

If the iPolar has been calibrated, there will be a bright red cross on the screen, which is the polar scope camera center/mount RA axis. The alignment software will perform plate solving near the pole star area. There is no need to see the pole star.

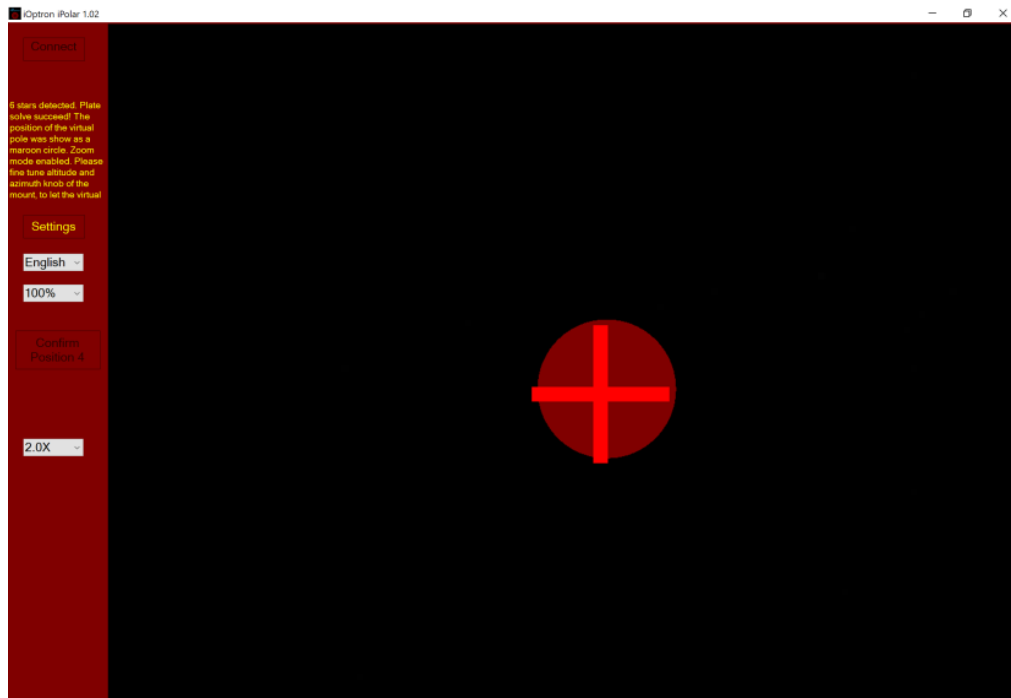
The camera will take the images, enhance the stars and darken the background, remove the noise and plate solving the area. It will display the pole with a dark **RED DOT**.

If there are not enough stars, or there are too many stars, you may adjust the exposure time and/or gains to make sure at least 4 stars can be detected.

Adjust the altitude and azimuth screws to move the **RED DOT** towards **RED CROSS**. The image will be enlarged when they are moving close.

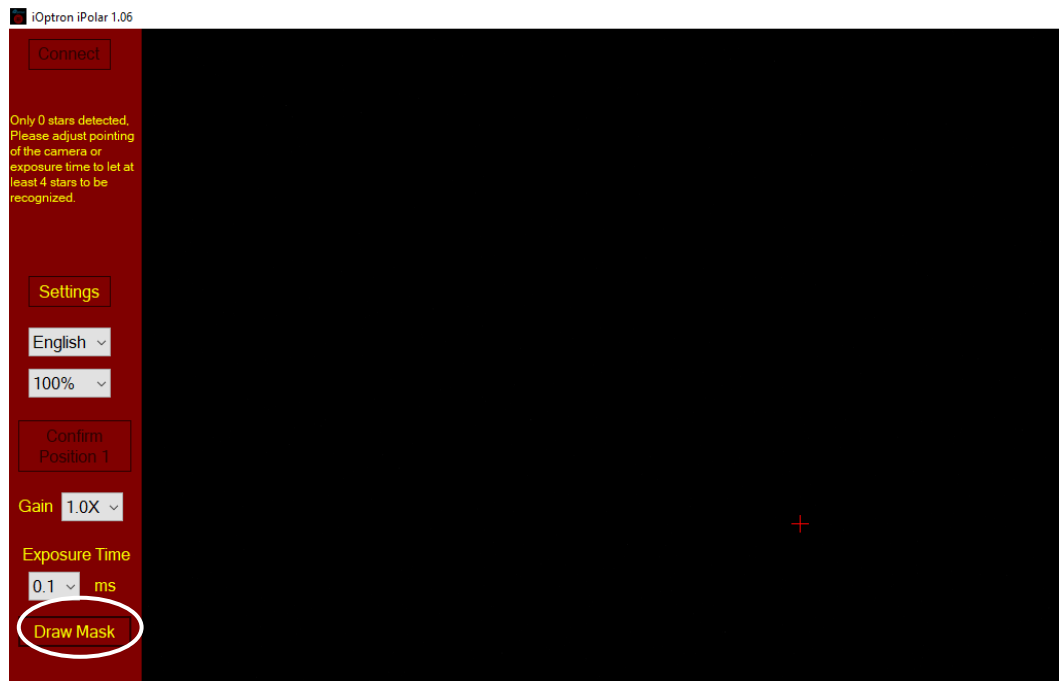


When **RED DOT** fully covers **RED CROSS**, the pole alignment is done.

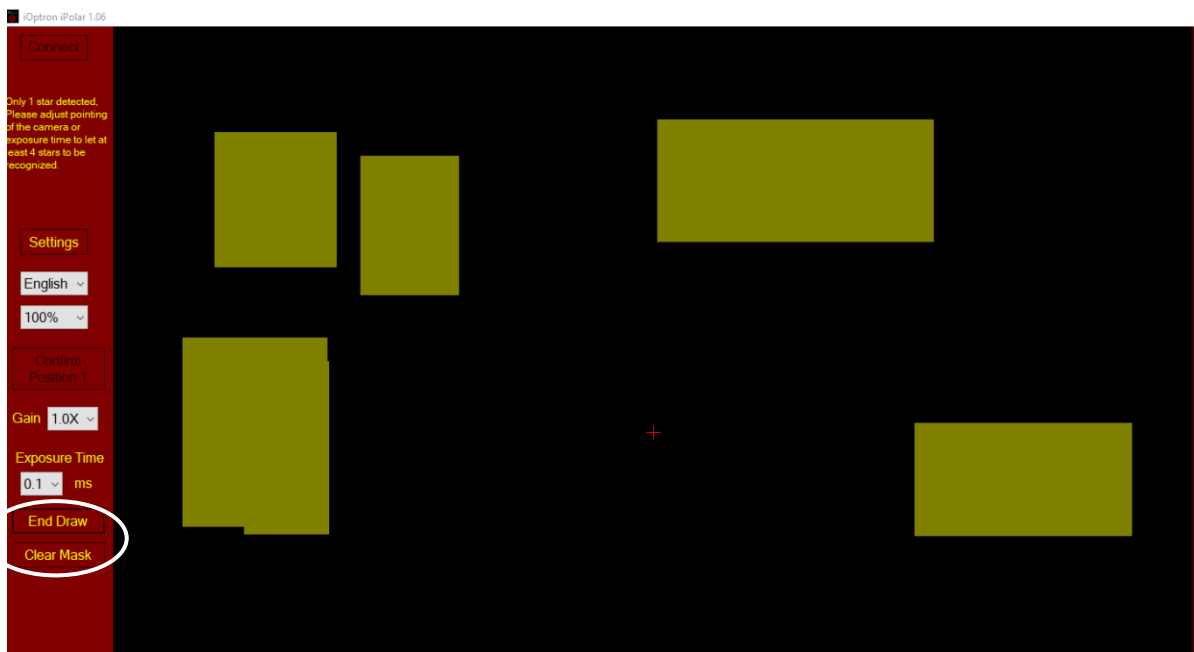


If there are some tree branches or part of the building get in front of the iPolar camera (click on **Settings=>RAW image** to check), you may use the **Draw Mask** function to cover those part from plate solving (*uncheck RAW image before masking*):

(1) Click on **Draw Mask**



- (2) Move the mouse cursor to the starting corner of the area that you want to ignore, click the mouse button
- (3) Move to ending corner and click the mouse. A green rectangular will show on the screen.
- (4) Select another area as needed.
- (5) Click on **END Draw** to confirm, or **Clear Mask** to clear all the masks.





## **Software Update Log:**

**V1.04** April 18, 2019

Initial release.

**V1.06** May 30, 2019

- Improvement on determine rotation center;
- Add Mask function for plate solving;
- Display maroon arrow when the virtual pole is out of screen;
- Now display incorrect latitude or longitude when the value is invalid;
- Fixed a bug about displaying "Confirm Position 4";
- When crosshair is already exists, no longer able to click "Confirm Position";
- Now prompt turn off "RAW image" when polar aligning;
- Now have a logger (%localappdata%\iOptron iPolar\Log\);
- Other bug fix

**V2.02** September 8, 2019

- Fixed a bug in plate solving;
- Improved virtual pole display;
- Improved on determining RA axis/Center of camera

**V2.02** October 28, 2019

- Improved plate solving;
- Fixed a bug in position display