



# **PoleMaster™ Electronic Polar Scope**

## **Installation and User manual**

Product #3338-25, #3338-34, and #3338-60

Ver. 1.0 2015.12

Rev.2.0 2016.2

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## 1. Overview

PoleMaster™ - a high precision, easy to use electric polar scope.

Achieving a high precision polar alignment is not an easy feat. You may spend tens of minutes, if not hours, to have a good polar alignment. After you get everything ready and begin taking exposure, you bumped the mount, and you have to restart from the beginning. An iOptron's Center-balanced Equatorial Mount (CEM), such as CEM25 and CEM60, which equipped with an all time accessible polar scope, will allow you to make a quick and precise polar alignment in a few minutes. However, you still need to bend yourself, or knee down on the ground to perform the polar alignment

The most straight forward way for polar alignment is just to find the true north point and match its position with the rotation center of your R.A. axis. The PoleMaster™ electronic polar scope employs this idea. This device can be installed on front of the R.A. axis. It use a highly sensitivity camera to capture the image of northern sky. The sensitivity is much higher than the naked eye, so it can see not only the Polaris but also those faint stars nearby. Based on the locations of these stars, it can calculate the position of the true position of North Pole. With some sophisticated methods the PoleMaster can also detect the rotation center of the R.A. axis. It will mark the two points on the computer screen, one is the R.A. rotation center, the other is the virtual polar point. Adjust the mount and let them overlap then the pole is well aligned.

PoleMaster™ electronic polar scope provides a quick and easy solution. It gives you a direct and simple way to align with the pole. Within two minutes you could obtain a very high polar alignment precision up to 30 arcsec.

### Features:

- Fast, easy and comfortable
- High precision, up to 30 arcsec
- Easy to find the Polaris with a large FOV
- Compatible to variety of equatorial mount with a proper adapter
- Pole Monitor/align at any time.

## 2. Electronic Polar Scope Assembly

### 2.1. Parts List

#### Parts Included:

- PoleMaster™ Electronic Polar Scope;
- Mini USB cable;
- 1mm hex wrench;
- And **ONE** of following:
  - CEM60 mounting adapter (for CEM60/CEM60EC, P/N #3338-060),



#### **OR**

- iEQ30/45 mounting adapter (for iEQ30/iEQ45/iEQ30Pro/iEQ45Pro, P/N #3338-034),



#### **OR**

- ZEQ25 mounting adapter and 5mm hex wrench (for for CEM25/CEM25EC/ZEQ25, P/N #3338-025)



#### Online Contents:

- PoleMaster™ camera driver
- PoleMaster™ polar alignment software
- This Instruction Manual

## 2.2. Assembly

### 2.2.1. CEM60



Set the mount in Zero Position. Remove the polar scope cover and thread the CEM60 mounting adapter (#3337-060) on. Make sure there is no debris on the thread and the adapter is flush with the opening.



Retreat the thumb screw and insert the electronic polar scope. **Align the USB port to the left side, as shown in the photo.** This will ensure that the image will be moved by altitude and azimuth adjustment accordingly. Tighten the thumb screw to lock the polar scope in place.

### 2.2.2. iEQ/iEQ Pro



Set the mount in Zero Position. Remove the polar scope cover and thread the iEQ30/45 mounting adapter (#3337-034) on.



Retreat the thumb screw and insert the electronic polar scope. **Align the USB port to the left side, as shown in the photo.** Tighten the thumb screw to lock the polar scope in place.

### 2.2.3. CEM25/ZEQ25



Set the mount in Zero Position. Remove the polar scope cover and thread the ZEQ25 mounting adapter (#3337-025) on. If the adapter can't insert into the polar scope opening, insert the 5mm hex key and turn the socket head screw counterclockwise a little.



Push the ZEQ25 mounting adapter all the way into the ZEQ25 polar scope opening. Turn the socket head screw clockwise to tighten the ZEQ25 mounting adapter.



Retreat the thumb screw and insert the electronic polar scope. Align the USB port to the left side, as shown in the photo. Tighten the thumb screw to lock the polar scope in place.

### 2.3. Focusing PoleMaster Polar Scope

Each PoleMaster's lens is focused manually before shipping from factory. Shall the needs for refocusing arises, e.g., stars are not sufficiently small and tight, please follow the steps below to focus the lens:

- 1) Point the PoleMaster on bright stars
- 2) Holder the front protective tube by rotation and turn CCW to remove it
- 3) Use a M1 hex key to unscrew the set screw (focus locking screw) on the side of the lens barrel




- 4) Turn the lens slowly until the star is well focused
- 5) Retighten the set screw and reinstall the protective tube removed.

### 3. Install the Software and Use the Polar Scope

There are two software need to be downloaded: One is Camera Driver that will provide the interface between the PoleMaster Camera and your computer. The other is the PoleMaster application software that will help you to do the polar alignment.

- 1) Download and save PoleMaster camera driver on your computer. Install it by click on the downloaded file;

- 2) Download and save PoleMaster polar alignment application software on your computer. Install it by double click on the downloaded file. There will be a PoleMaster icon on your computer desktop 
- 3) Setup your equatorial mount at Zero Position (or Up North Park Position). Roughly level the mount (precise leveling via bubble is not needed). Point towards the north as you normally do during polar alignment process, if you are located in northern hemisphere. Adjust the mount latitude to match your location.
- 4) Launch PoleMaster application. Click on the **Connect** button on the top menu bar. If the PoleMaster is connected to the computer correctly, the other function buttons, such as **Region Selection**, will be turning active. Select your region and adjust the camera **Exposure** and **Gain** to display many stars near the Polaris. As PoleMaster has a very large field of view (FOV) of 11°X8°, Polaris should be readily shown on screen which should be the brightest star in the FOV;
- 5) The application will assist you to confirm the Polaris (or Sigma Octane) using the Template from the **Tools** pull-down menu.
- 6) Follow the on screen instructions to perform coarse (Rough) polar alignment. The accuracy achievable in this stage is around a few arcminutes. Now you can start to observe;
- 7) If a higher alignment precision is needed, follow the on-screen instructions to perform fine polar alignment. The maximum alignment accuracy achievable after this stage is 30 arcseconds.

**Note:**

- 1) Current version is suitable for use from November 2015 till June 2016.
- 2) The software has an option to correct the atmospheric refraction effect at low latitude. If you are at latitude lower than 30°, you may activate the correction from **Tools** pull-down menu.

- 3) The software supports the southern hemisphere. You may display a star template for either northern or southern hemisphere by pulling down the **Tool** menu.
- 4) Under severe light pollution sky or when transparency is low, PoleMaster may fail to perform plate solving when some faint target stars are invisible.

## 4. Maintenance and Servicing

### 4.1. Maintenance

The PoleMaster™ electronic polar scope is designed to be maintenance free, except the camera driver and/or application firmware upgrade. Do not drop the camera. Do not plug the camera using a different cable. Clean the lens only with lint-free cloth and optical lens cleaner, when needed. Use a damp cloth to clean the camera outside. Do not use solvent.

### 4.2. iOptron Customer Service

If you have any question concerning your mount, contact iOptron Customer Service Department. Customer Service hours are 9:00 AM to 5:00 PM, Eastern Time, Monday through Friday. In the unlikely event that the mount requires factory servicing or repairing, write or call iOptron Customer Service Department first to receive a RMA# before returning the mount to the factory. Please provide details as to the nature of the problem as well as your name, address, e-mail address, purchase info and daytime telephone number. We have found that most problems can be resolved by e-mails or telephone calls. So please contact iOptron first to avoid returning the mount for repair.

It is recommended to send technical questions to [support@ioptron.com](mailto:support@ioptron.com) or call in the U.S. 1.781.569.0200.

## 5. Product End of Life Disposal Instructions

This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local



environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where

you can drop off your waste equipment for recycling, please contact your local waste recycle/disposal service or the product representative.

## 6. FAQ

### ***6.1. Why the calculated pole position is jumping slightly?***

Atmospheric agitation will cause the star position changed a little and cause the results jumping slightly. You can watch the most common position of the calculated positions and based on this position to adjust the mount.

In a low signal to noise condition, such as the background light pollution is heavy or a lot of cloud which will cause the star control is not good, the calculation random error may increase and the jumping will be bigger than expected.

If the jumping is very big, or sometime all over the image, you need to check if there are correct stars in the two green rectangle box. Make sure the correct stars are in them.

### ***6.2. When installing PoleMaster, does it need be parallel to the R.A. rotate axis?***

No, it does need. Approximately aligned to the RA axis is ok. The rotating center is

determined by calculation while rotating the mount.

### ***6.3. How to use in low latitude area?***

At low latitude, the atmospheric refraction will cause the Pole Position not on the geometric position we are seeing. This effect has been taken into account when calculating the Pole Position in version V108 and later.

### ***6.4. When use the mouse to click on the star, do I need to move the mouse onto the star precisely?***

No, you don't need to. The software will calculate the star position rather than use the mouse cursor XY position

### ***6.5. Why some star is not round?***

The lens used in PoleMaster is working at maximum F-STOP. It has some optic aberration and will cause some star not round. However, it usually won't affect the calculation because the software use the weighted centroid algorithm to determined the star position.

### ***6.6. When using the PoleMaster, should I stop the mount RA tracing?***

No. It is best to keep the mount tracing while using the PoleMaster.

## Appendix A. Technical Specifications

Field of View (FOV)	11 degree X 8 degree
Alignment Precision (Coarse)	5 arcmin approx.
Alignment Precision (Max.)	30 arcsec
Optical	25mm focal length
Image Capture Device	MT9M034
Chip Size	1/3 inch
Pixel Number	1.2 million (1280X960)
Pixel Size	3.75 $\mu$ mX3.75 $\mu$ m
Interface	Mini USB2.0
Power Consumption	~ 0.35 Watt (~70mA)
Software	PoleMaster Software
Operation System	Windows XP/ Vista/ 7 /8 /8.1 /10
Warranty	One year limited



## Appendix B. Software Version History

### Camera Driver

V150915

### PoleMaster Software

#### V109

- Initial Release

#### V110

- Optimized UI interface.
- Updated Japanese translation

#### V114

- Added astronomical refraction calibration function
- Added Southern Hemisphere Support.
- Added manual adjustment for the two rectangle position squares after the mount GOTO.
- Added the zoom function for the main image to fit the window
- Fixed the zoom image get chaos issue in left toolbox

## IOPTRON ONE YEAR TELESCOPE, MOUNT, AND CONTROLLER WARRANTY

A. iOptron warrants your telescope, mount, or controller to be free from defects in materials and workmanship for one year. iOptron will repair or replace such product or part which, upon inspection by iOptron, is found to be defective in materials or workmanship. As a condition to the obligation of iOptron to repair or replace such product, the product must be returned to iOptron together with proof-of-purchase satisfactory to iOptron.

B. The Proper Return Merchant Authorization Number must be obtained from iOptron in advance of return. Call iOptron at 1.781.569.0200 to receive the RMA number to be displayed on the outside of your shipping container.

All returns must be accompanied by a written statement stating the name, address, and daytime telephone number of the owner, together with a brief description of any claimed defects. Parts or product for which replacement is made shall become the property of iOptron.

The customer shall be responsible for all costs of transportation and insurance, both to and from the factory of iOptron, and shall be required to prepay such costs.

iOptron shall use reasonable efforts to repair or replace any telescope, mount, or controller covered by this warranty within thirty days of receipt. In the event repair or replacement shall require more than thirty days, iOptron shall notify the customer accordingly. iOptron reserves the right to replace any product which has been discontinued from its product line with a new product of comparable value and function.

This warranty shall be void and of no force of effect in the event a covered product has been modified in design or function, or subjected to abuse, misuse, mishandling or unauthorized repair. Further, product malfunction or deterioration due to normal wear is not covered by this warranty.

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Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

iOptron reserves the right to modify or discontinue, without prior notice to you, any model or style telescope.

If warranty problems arise, or if you need assistance in using your telescope, mount, or controller contact:

iOptron Corporation  
Customer Service Department  
6E Gill Street  
Woburn, MA 01801  
[www.ioptron.com](http://www.ioptron.com)  
support@ioptron.com  
Tel. (781)569-0200  
Fax. (781)935-2860  
Monday-Friday 9AM-5PM EST

NOTE: This warranty is valid to U.S.A. and Canadian customers who have purchased this product from an authorized iOptron dealer in the U.S.A. or Canada or directly from iOptron.

Warranty outside the U.S.A. and Canada is valid only to customers who purchased from an iOptron Distributor or Authorized iOptron Dealer in the specific country. Please contact them for any warranty.