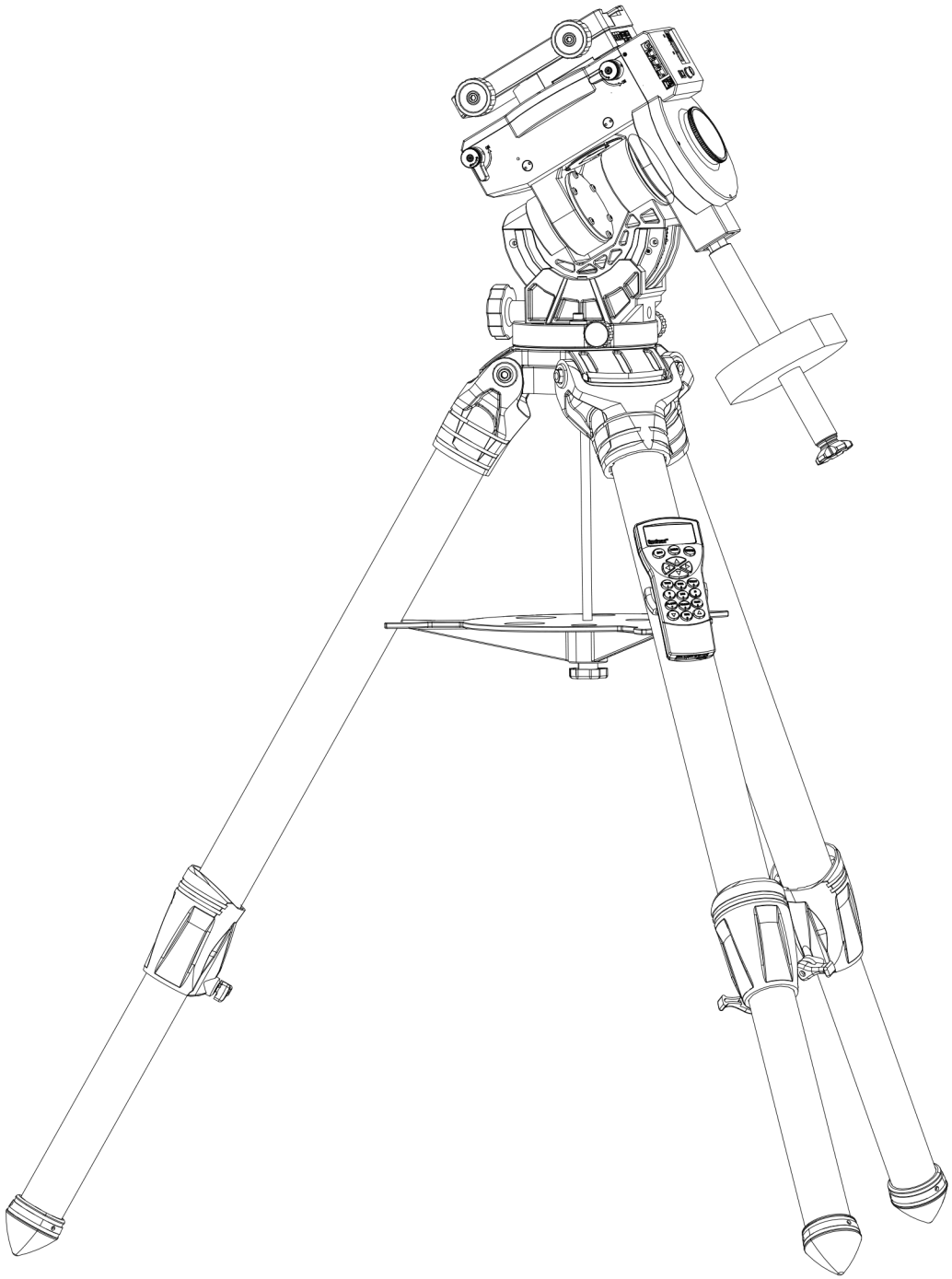
INSTRUCTION MANUAL

CQ350-PRO Mount



CQ350-PRO-V6

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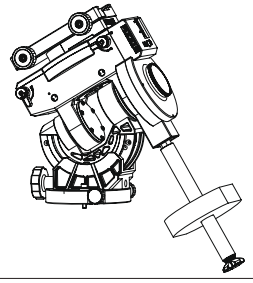
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CQ350-PRO Mount

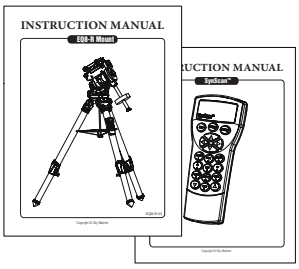
Packing List

Mount Package Includes:

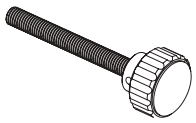
CQ350-PRO Mount x 1



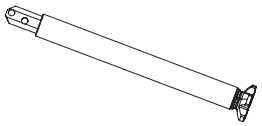
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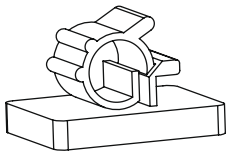
Azimuth Adjustment Knob x 2



Counterweight Shaft x 1



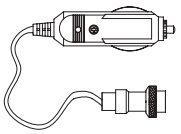
Cable Clamp x 1



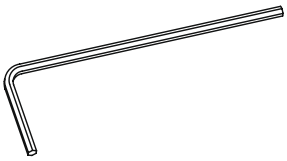
SynScan Hand Control V5 x 1



Power Cable x 1



6 mm Allen Wrench x 1



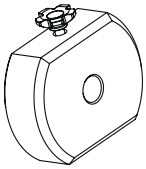
Shutter Release Cable (for Canon EOS) x 1



SynScan Hand Control Cable x 1

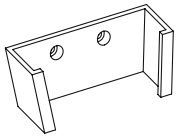


Counterweight x 2



Tripod Package Includes:

Hand Control Bracket x 1



4 mm Allen Wrench x 1



PART I : SETTING UP THE CQ350-PRO MOUNT

1.1 Setting Up the Tripod

1. Spread the three legs of the tripod(Fig 1.1a)(Fig 1.1b).

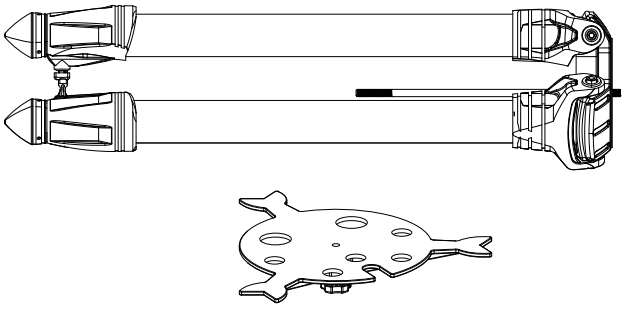


Fig. 1.1a

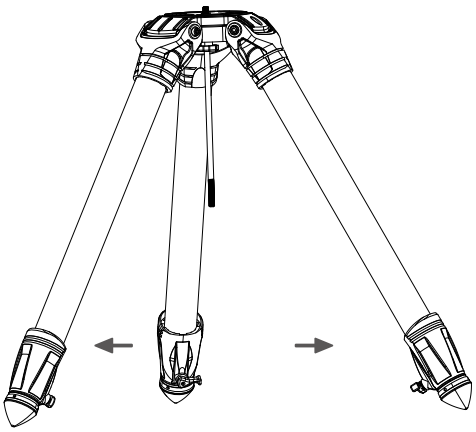


Fig. 1.1b

2. Install the accessory tray and the lower knob on the central rod (Fig 1.1c).
Place the V-shaped indents of the accessory tray against the tripod legs.
Tighten the lower knob loosely to allow turning the upper knob later (Fig 1.1d).

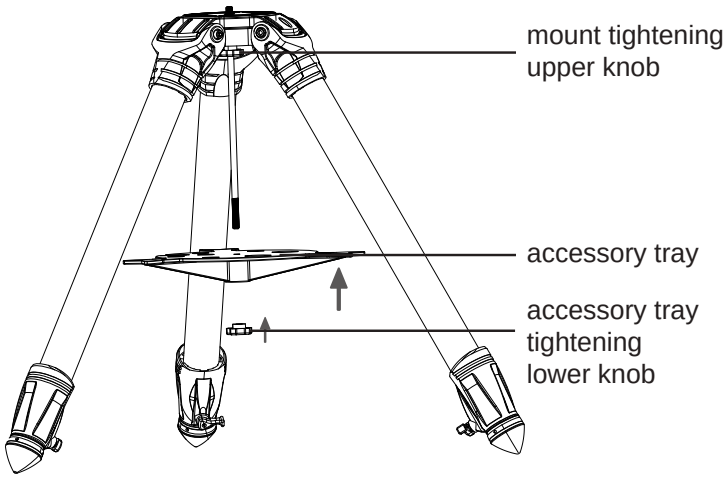


Fig. 1.1c

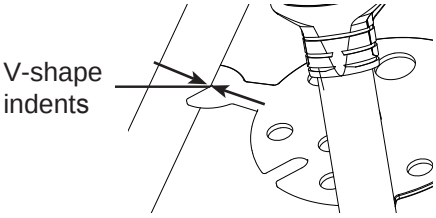


Fig. 1.1d

3. Loosen the 3 clamp levers on the tripod legs to extend the tripod legs to the desired length (Fig 1.1d).

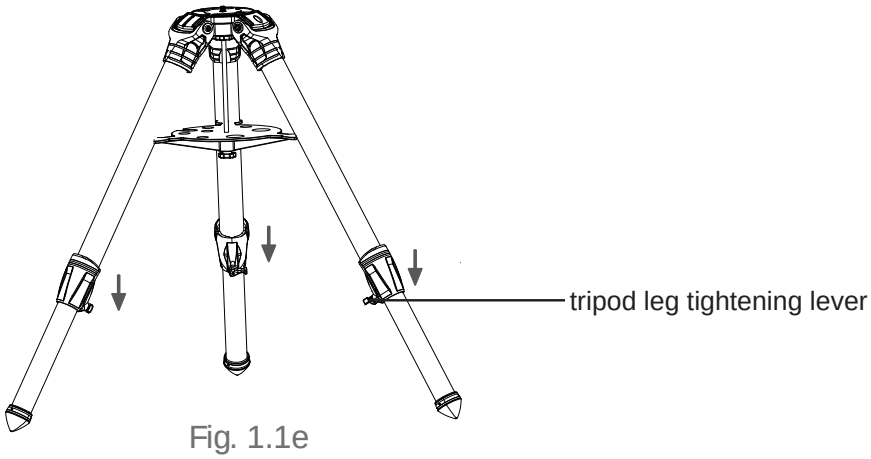


Fig. 1.1e

1.2 Installing the CQ350-PRO Mount on the tripod

1. Screw the two separately supplied azimuth adjustment knobs in the CQ350-PRO mount, but keep sufficient space between the two knob screws to allow for the tripod pin (Fig. 1.2a, 1.2b). Remove the two pre-installed azimuth lockingscrews and washers from the tripod top plate.
2. Align the metal pin on the tripod top with the gap between the two azimuth adjustme knobs while putting the mount on the tripod top. (Fig 1.2b)
3. Pass the 2 azimuth lockingscrews (first through a metal washer and a plastic spacer) through the curved slots on both sides of the equatorial mount base and tighten them loosely onto the tripod platformto secure the mount on the tripod(Fig. 1.2a) .
4. Engage the tripod central rod in the CQ350-PRO mount by turning the tripod upper knob. Turn the knob until it is moderately tightened (*) (Fig 1.2c) If necessary, re-adjust the tripod legs using the bubble level on the mount as a reference.

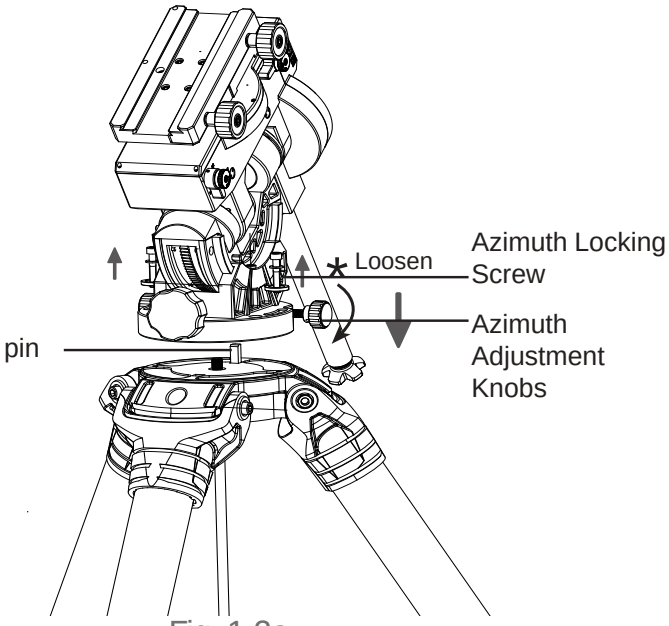


Fig. 1.2a

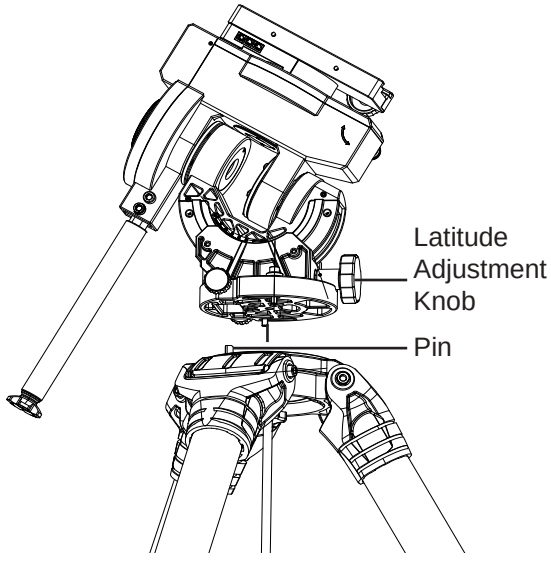


Fig. 1.2b

Fasten the upper knob enough for the mount to be stable, but not too tightly to still allow azimuth fine adjustment with the horizontal azimuth adjustment knobs when operating in polar alignment

Tighten the lower knob (Fig 1.2c).

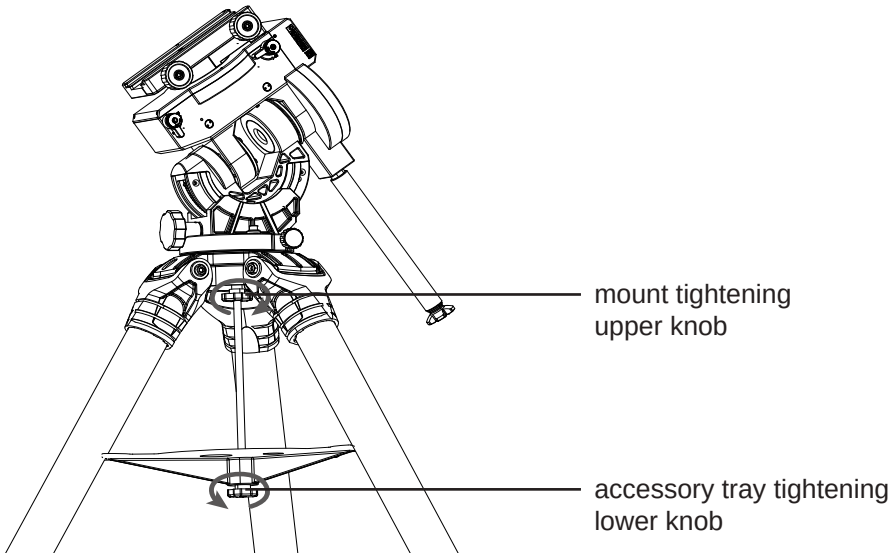


Fig. 1.2c

5. Tighten the two azimuth locking screws onto the tripod platform.
   Again, tighten the bolts enough for the mount to be stable but not too tightly. This is to allow azimuth fine adjustment using the horizontal azimuth adjustment knobs.(Fig. 1.2d)

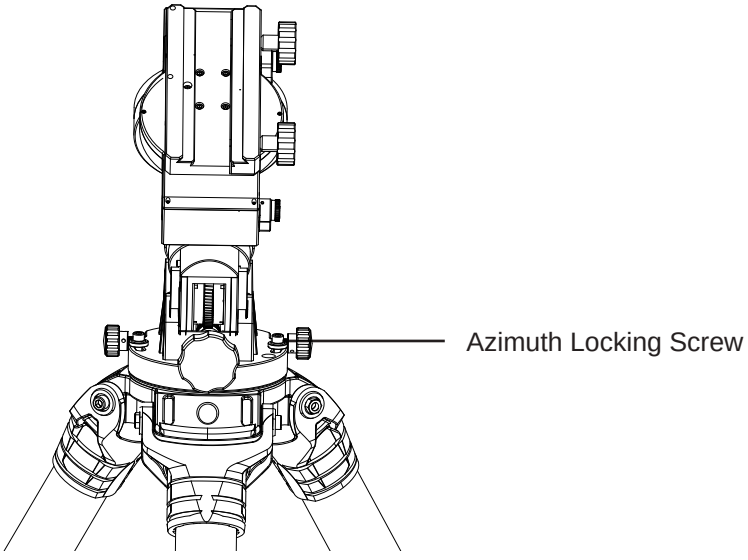


Fig. 1.2d

1.3 Installing the Counterweights

1. Screw the counterweight rod into the mount as shown in Fig. 1.3a (**).
2. Remove the stopper knob at the end of the counterweight rod.
3. Loosen the counterweight's thumb screw and slide the counterweight onto the counterweight rod. Retighten the thumb screw to secure the counterweight on the rod. (Fig. 1.3b)
4. Replace the stopper knob to the end of the counterweight rod.

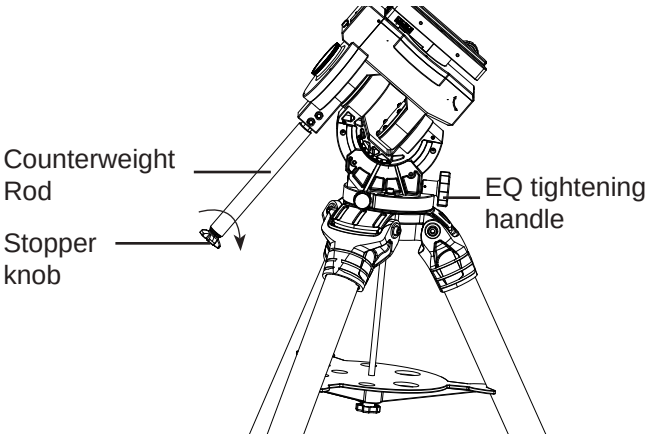


Fig. 1.3a

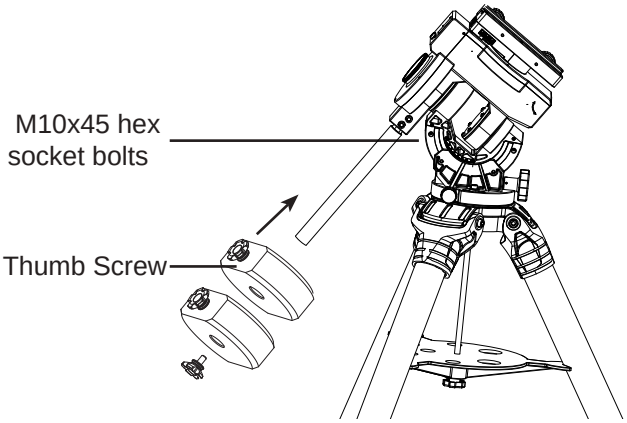


Fig. 1.3b

1.4 Operation of RA and DEC Clutch

To unlock the RA clutch so that the RA axis can be turned by hand: First, unlock the clutch knob by pulling it out while turning it in the ON direction. Then turn the clutch lever to ON. RA axis is now disengaged from the gears and can be freely turned by hand.
To lock the RA clutch so that RA axis can be turned by the motor: First, turn the clutch lever to OFF. Then tighten the clutch knob in the OFF direction until it makes clicking sounds.
WARNING:

- Moving the mount by hand will cause its position on the sky to be lost for the Synscan controller.
- Do not unlock the clutches when the mount has been aligned on reference stars.
- The clutches have to be unlocked for balance testing. Make sure the unbalance is small when unlocking or locking the clutches, to avoid damaging the gears.

The clutch on the DEC axis operates similarly(Fig. 1.4b) .

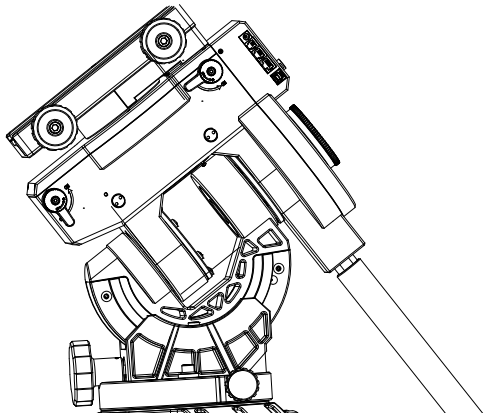


Fig. 1.4a

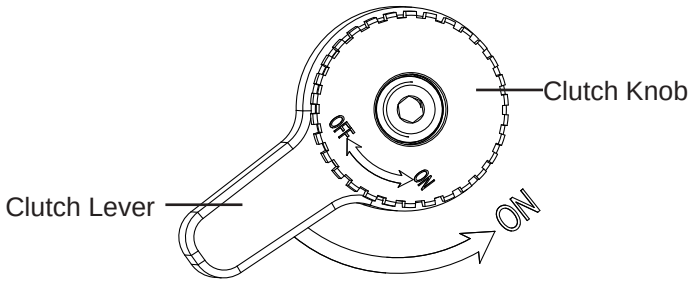


Fig. 1.4b

Strap the hand controller bracket to a tripod leg. Put the hand controller in it (Fig. 1.4c).

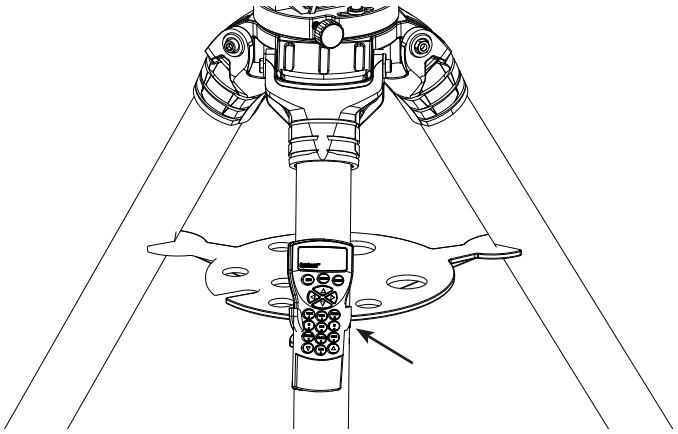


Fig. 1.4c

(**) Important remark: the CQ350-PRO mount has the possibility of mounting the counter-weight
rod under two different angles. One possibility is the straight position, and the other possibility is the forward angled position. When introducing the rod in the mount, the two locking screws of the mount must be aligned with the threaded holes in the rod. Rotating the rod 180° allows to change alignment of the threaded holes, and thus the angle of the rod in the mount.

1.5 Installing the Telescope

1. Before installing a telescope, ensure:
   - The counterweight rod is pointing straight down.
   - All counterweights have been moved to the end of the counterweight rod.
   - The R.A. axis is secured by tightening the R.A. Clutch Lever
2. Mount the optical tube with the tube pointing in the same direction as the arrow inscribed in the dovetail cradle(Fig. 1.5).

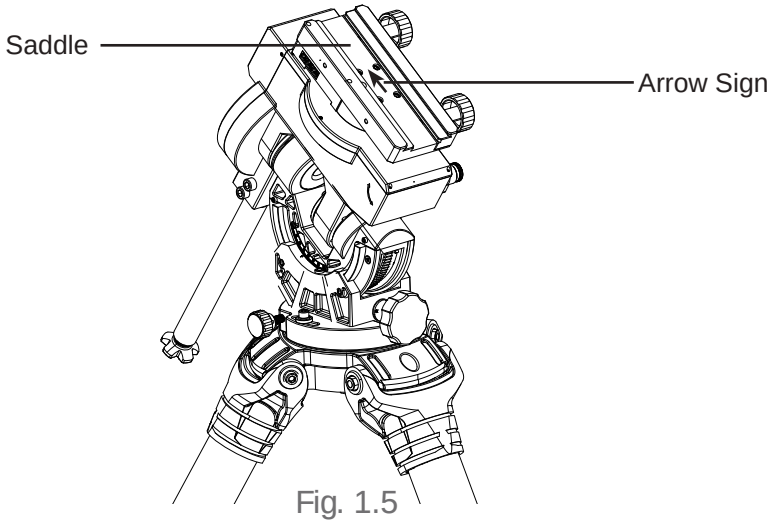


Fig. 1.5

1.6 Balancing the Mount

Once the counterweight and the telescope have been installed, the mount should be balanced to reduce stress on the motor drive system, as well as to ensure smooth and accurate operation.

1. Unlock the R.A. clutch and rotate the R.A. axis until the counterweight rod is parallel to the ground. Re-lock the R.A. clutch.
2. Unlock the Dec. clutch and rotate the Dec. axis until the telescope is parallel to the ground. Re-lock the Dec. clutch.
3. Loosen the thumb screws on the counterweights.
4. Hold the counterweight rod with one hand, unlock the R.A. clutch and adjust the counterweights along the rod until the mount is able to remain stationary without support. Tighten the thumb screws on the counterweights again.
5. Rotate the R.A. axis; the mount should remain relatively balanced along different angles. Once this is confirmed, return the mount to its original position described in Step 1 and re-lock the R.A. clutch.
6. Hold the telescope with one hand and unlock the Dec. clutch.
7. Slowly let go of the telescope and check for any rotational movements. If there is movement, slide the dovetail bar in the saddle to find a balancing position at which the telescope can remain stationary without support.
8. It is also recommended to check and balance the telescope about the declination axis with the telescope pointing upwards.

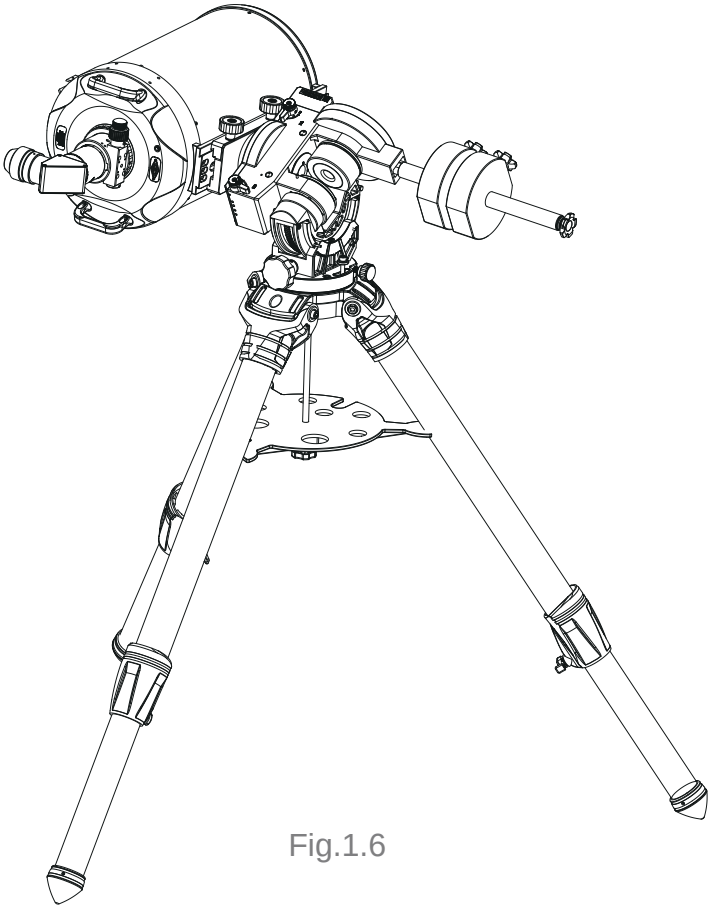


Fig.1.6

PART II : POLAR ALIGNMENT

Prior to operating the CQ350-PRO mount, it must be polar-aligned.

2.1 Prepare the Mount for Polar Alignment

1. Set up the CQ350-PRO mount, counterweights, and telescope as described in **PART I.** It is recommended to polar-align the CQ350-PRO mount with all equipment installed.
2. Slightly loosen the tripod's upper knob and both azimuth locking screws and then use the azimuth adjustment knobs to put the azimuth locking screws to the middle of the slots (Fig 2.1a). Tighten the azimuth locking screws slightly.
3. Loosen the arch locking screws (Fig 2.1a) on both sides of the CQ350-PRO mount, and then tighten them slightly.
4. Tighten the tripod's upper knob and then loosen it by 1/4 of a turn.
5. Move the tripod to roughly align the R.A. axis to true north (or south for observing in south-ern hemisphere).
6. Install the handle on the latitude jackscrew and use it to set the latitude dial reading to local latitude (Fig 2.1a).

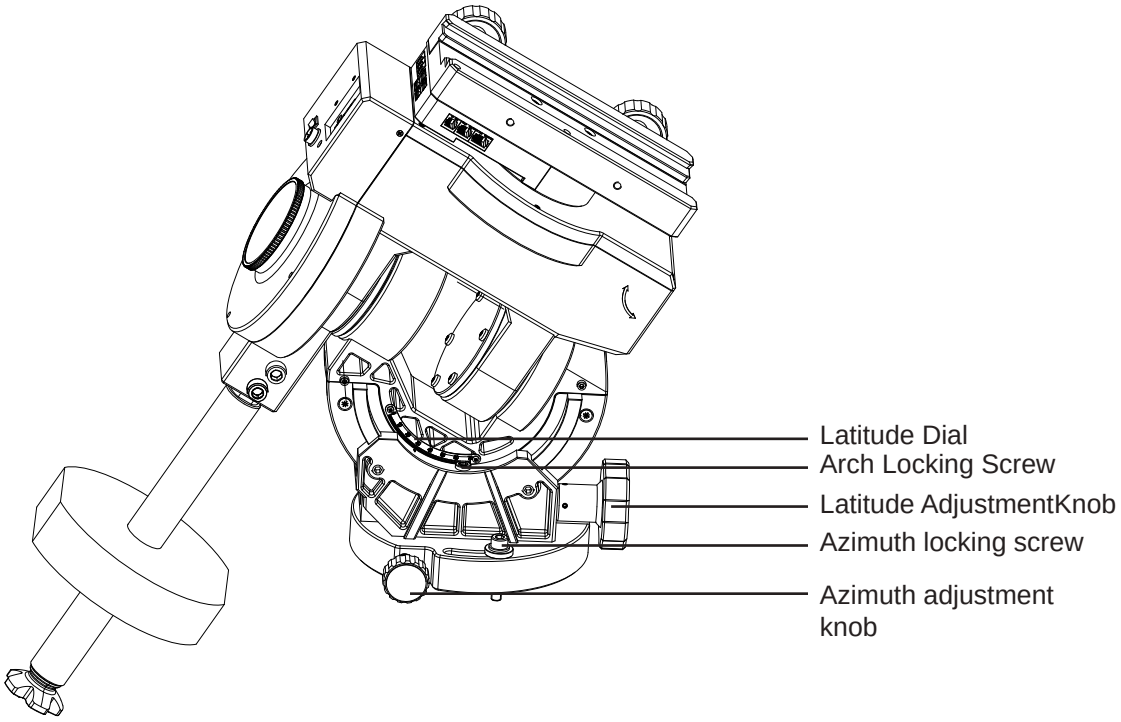


Fig. 2.1a

2.2 Polar Alignment of the CQ350-PRO mount

The Please refer to the Synscan instruction manual as for the Synscan aided polar alignment procedure.

PART III : ELECTRONIC CONTROL INTERFACE

3.1 Control Panel

The control panel of the CQ350-PRO Mount is shown below:

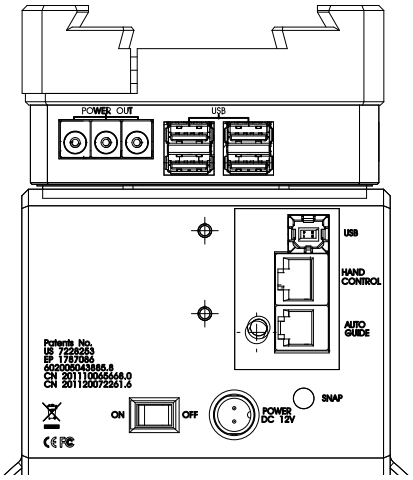


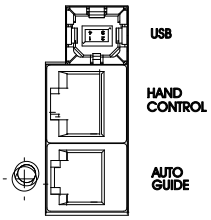
Fig. 3.1

3.2 Panel Interface Components:



POWER: This is a connector from which the mount and the hand control get power supply. To connect to a power supply, align the index on both the plug of the cord and the outlet on the panel, and then insert the plug. Screw the knurled cap of the plug on the connector to secure the plug on the panel.

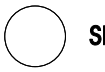
POWER Switch: Turns on and off the power to the mount and hand controller.



USB: It provides a USB-to-Serial connection for controlling the mount.
HAND CONTROL: This RJ-45 8-pins outlet is for connecting a SynScan hand controller or a SynScan Wi-Fi dongle.
AUTO GUIDE: This RJ-12 6-pins outlet is for connecting an autoguider. It is compatible with any autoguider with a ST-4 type interface.

LED: The LED beside the Autoguide port serves as a power-on/status indicator.

1. Steady on: Power voltage is normal.
2. Slow flashing: Power voltage is low; continuing to operate the mount may damage the battery (if a 12V lead-acid battery is in use).
3. Fast flashing: Power voltage is extremely low; continuing to operate the mount may damage the battery and the motor controller in the mount.



SNAP:This is a stereo outlet for connecting to a camera's remote control port.

3.3 Pinout of the Interfaces:

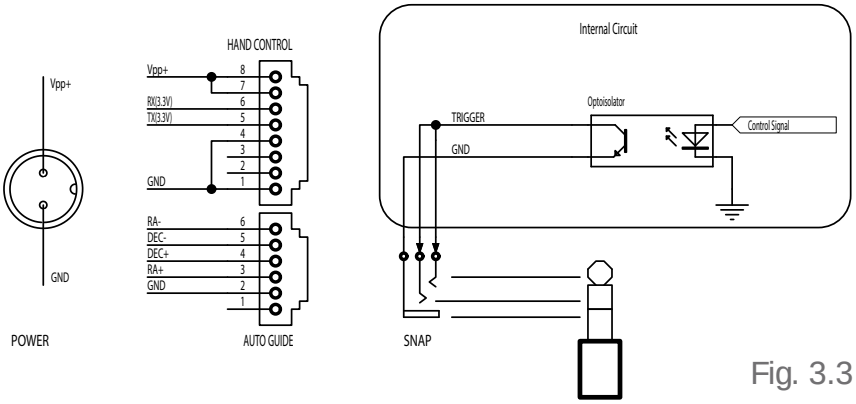


Fig. 3.3

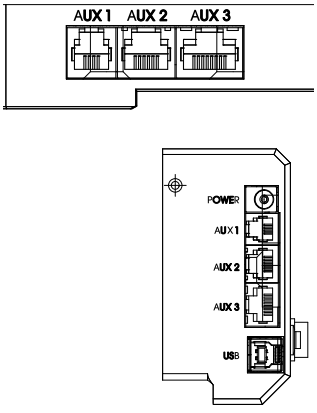
Note:

- The SNAP port provides two trigger signals to the stereo plug. Some cameras need both "Shutter" and "Focus" signals.
- The camera control cable shipped with the CQ350-PRO mount is for a Canon EOS series DSLR camera. Cable for other cameras is optional and can be ordered separately.

3.4 Power Supply Requirements

- Output Voltage: DC 11V (minimum) to DC 16V (maximum), higher voltage is preferred. Voltage not in this range might cause permanent damage to the motor controller or the hand controller.
- Output Power: 55W (minimum).
- Do not use an un-regulated AC-to-DC adapter. A Skywatcher AC-to-DC switching power supply(13.7V/4A) for GOTO mount is highly recommended.
- If the power voltage is too low, the motor controller will stop the motors automatically.

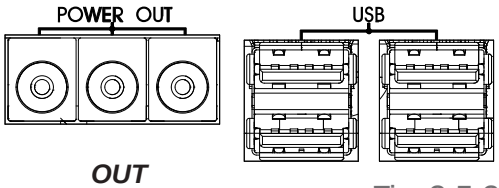
3.5 Cable Management System



OUT
Aux. I/O

IN
USB,
Aux. I/O,
Aux. Power

Fig. 3.5.1



OUT
Aux. Power,
USB

Fig. 3.5.2

- **IN - Auxiliary Power**:
  - 2.0mm I.D, 5.5mm O.D., central positive.
  - DC 6V to DC 24V, 5A.
  - It also powers the USB hub.
- **IN - USB**:
  - USB Type B receptacle.
  - Connect to a USB port of a host computer using the supplied USB cables and/or USB hub.
  - Can drive the USB hub for less than 0.4A payload.
- **Auxiliary I/O**:
  - Straight connections for the paired RJ10, RJ12 and RJ45 modular jacks.
  - 0.5 A maximum current each pin.
- **OUT - Auxiliary Power**:
  - 2.0mm I.D, 5.5mm O.D., central positive.
  - 4A/Outlet, 4A in total.
- **OUT - USB**:
  - USB Type A receptacle.
  - 0.9A/Port if powered by an auxiliary power supply.
  - 0.4A total output if powered by host USB port.

PART IV : CQ350-PRO MOUNT FEATURES

4.1 SynScan Telescope Control System

Our customers have the following options on controlling the CQ350-PRO mount:

- SynScan hand controller.
- SynScan Pro application for Windows (Free download from www.skywatcher.com) or SynScan Pro application for Android (Free download from Google Play), using built-in USB or optional SynScan Wi-Fi dongle.
- SynScan Pro app for iOS (Free download from App Store), using an optional SynScan Wi-Fi dongle.

All the above options support ASCOM telescope control platform.

4.2 Batch Exposures Function

The CQ350-PRO mount is equipped with a SNAP port which can control the shutter release of a camera. Working with the SynScan hand control's "Camera Control" function, a user can take batch exposures when doing astrophotography. Up to 8 groups of "Exposure-time & Frames" combinations can be set on the SynScan hand controller. For detailed information, refer to the SynScan hand control's instruction manual.

4.3 Auto-Home Function

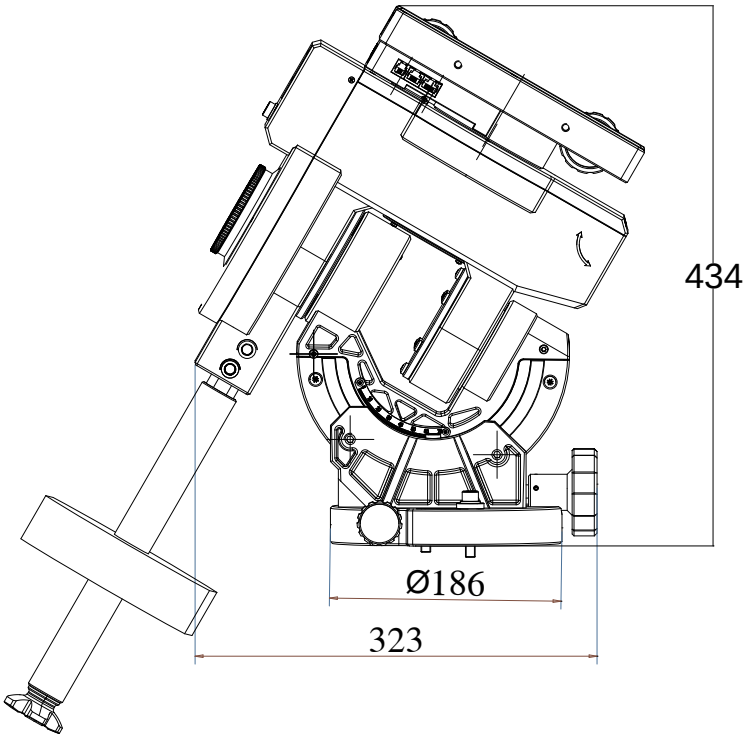
The CQ350-PRO mount is equipped with two home position sensors. Working with the Syn-Scan hand controller, the mount can be placed to the same home position after turning on the power. For detailed information, refer to the SynScan hand control's instruction manual.

4.4 Hard Stops

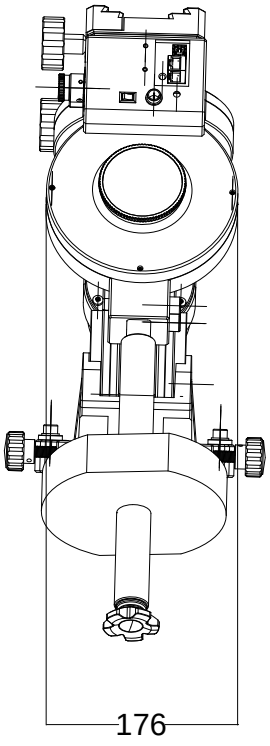
To protect mechanical parts, OTA and internal wiring, the CQ350-PRO mount has internal hard stop for both R.A. axis and declination axis.

APPENDIX: DIMENSIONS

Dimensions:



Mount



Mount

APPENDIX: SPECIFICATIONS

Specifications:

Product Name	CQ350-PRO Mount
Mount Type	German Equatorial Mount
Payload (Rated for astrophotography; counterweights excluded)	35kg
Latitude Adjustment Range	10º to 72º
Azimuth Adjustment Range	±15 º
Weight (Tripod excluded)	18.5 kg
Counterweight	2 x 10kg/ea.
Counterweight Rod	2.6kg
Power Requirement	DC11~16V(Higher voltage preferred), 55W
Motor	1.8 º Hybrid Stepper Motor
RA Transmission	308:1 Worm Drive 256 Micro-step/1.8º Stepper Motor Drive
RA Gear Diameter	155mm
RA Driving Resolution	55,193,600 Counts/Rev., approx. 0.023 arc-second
Maximum Slewing Speed	4 degrees/second
Tracking Rate	Sidereal rate, solar rate, lunar rate
Tracking Mode	Equatorial mode
Auto-guiding Speed	0.125X, 0.25X, 0.5X, 0.75X, 1X
GOTO Controller	SynScan hand control, SynScan Pro App
Database	42000+ Objects
Celestial Object Catalog	Messier, NGC, IC, SAO, Caldwell, Double Star, Variable Star, Named Star, Planets

Note: The above specifications may be changed without advance notice.

CQ350-PRO Mount



NEVER USE YOUR TELESCOPE TO LOOK DIRECTLY AT THE SUN. PERMANENT EYE DAMAGE WILL RESULT. USE A PROPER SOLAR FILTER FIRMLY MOUNTED ON THE FRONT OF THE TELESCOPE FOR VIEWING THE SUN. WHEN OBSERVING THE SUN, PLACE A DUST CAP OVER YOUR FINDERSCOPE OR REMOVE IT TO PROTECT YOU FROM ACCIDENTAL EXPOSURE. NEVER USE AN EYEPIECE-TYPE SOLAR FILTER AND NEVER USE YOUR TELESCOPE TO PROJECT SUNLIGHT ONTO ANOTHER SURFACE, THE INTERNAL HEAT BUILD-UP WILL DAMAGE THE TELESCOPE OPTICAL ELEMENTS.