Direct Drive Equatorial Mount
NOVA 120 mount
User manual

Dear customer,

Thank you for purchasing a NOVA 120 mount. This mount will allow you to fully concentrate on sky observation. Tracking accuracy, axis adjustment, slow tracking and multiple troubles that other equipment can generate, can now be forgotten.

In constant search for improvement and innovation, ALCOR-SYSTEM remains open to any remark (available at sales@alcor-system.com)

Do not hesitate to send us any feedbacks, suggestions or questions on our products.

Feel free to share you observations, images or discoveries with us.

Aim of the document:

This manual has been created in order to assist you during physical and software installation of your product.

Mount serial number	
Manufacturing date	

Summary

1 Introduction 6
1.1 Technological breakthroughs 6
1.2 An automated mount 6
2 Unpacking 8
2.1 List of items 8
3 Assembly of the oversized tripod (optional) 10
4 Dimensions of the mount 11
5 Installation of the mount 12
5.1 Interfaces 12
5.1.1 Bottom interface of the mount 12
5.1.2 Upper interface of the mount 14
5.2 Assembly of the mount 16
5.2.1 Bottom flange 16
5.2.2 Assembly of the Equatorial table 18
5.2.3 Pre-set of the mount elevation 18
5.2.4 Passing cables 20
5.2.5 Installation of the DEC axis 22
5.2.6 Finishing cable installation 23
5.2.7 Mount use in alt-azimuth mode 24
5.2.8 The pin lock system 25
5.3 Installing the counterweights 25
5.4 Mounting the optical tube 28
5.5 Balancing 29
5.5.1 Connecting the electronic control box 29
5.5.3 DEC axis 'Front - back' balancing 30
5.5.4 RA axis “Left-Right” balancing 31
5.5.5 RA axis balancing 33
5.6 Polar alignment 33
5.6.1 Azimuth adjustment 34
5.6.2 Elevation adjustment 34
6 Use of the mount 35
6.1 Encoder heads setting 35
7 Nova 120 / 200 Software 37

7.1 Connections & first power up....37
7.1.1 Plugging the control box to the mount....37
7.1.2 -Plugging the Ethernet cable....38
7. 1.3 -Plugging the control Box to the AC....38
7.1.4 First power up – Balancing the telescope on the mount....39
7.1.5 Power up – Checking correct connection....39
7.2 Software installation & mount setup....40
7.2.1 ASCOM platform....40
7.2.2 Nova mount software....41
7.2.3 Nova mount software primary Setup....43
7.2.4 Check connection between PC and mount....49
7.2.5 Nova mount software setup....51
7.2.6 Preliminary precautions before software connection to the mount....53
7.2.7 Starting modes of the mount....54
7.3 Using joystick (or manual hand paddle)....63
7.4 Advanced configuration....66
7.5 Calibration of the position of the mount....67
7.6 Turning OFF the mount....70
7.6.1 AC unplug (Unexpected or voluntary)....70
7.6.12 parking the mount....70
7.7 Polar aligning the mount (King Method)....71
7.8 Sky absolute mount calibration....79
7.8.1 Calibration....79
7.8.2 Position recovery from absolute position....80
7.9 Using the mount with PRISM software....80
7.9.1 Setup....81
7.9.2 Mount software linked to PRISM....83
7.9.3 Slewing telescope & position calibration....85
7.9.4 Parking after observations....87
7.10 Use of the TheSky X bisque software....87
7.10.1 Configuration....87
7.10.2 Link to the mount....95
7.10.3 Mobile objects....96
7.11 Creating / using the pointing and speed models....97
7.12 Advanced operation....98
7.12.1 Changing mount controller default's IP addresses....98
8 Maintenance....98

8.1 General use precautions 98
8.2 Maintenance operator 98

Changes history

Version 1.1	**09/01/2014**	Initial release
Version 1.2	**08/15/2014**	Translation in English language

1 Introduction

1.1 Technological breakthroughs

Inspired from professional telescopes, the Equatorial Mount Nova 120, is equipped with direct-drive motors (Brushless frameless motors). The engines are installed directly on the axes, without any mechanical speed reduction parts. The high torque of the selected motors allows high angular stiffness and wide tolerance during telescope balancing.
Parking brakes are automatically applied on each power off of the mount allowing restarting on a known position and preventing from having to reset the encoders on each power up.

Very high-resolution encoders are used to drive the engines: (13 milli-arcseconds per steps, representing more than 96 million positions per rotation.
This level of accuracy is required to guarantee excellent pointing and tracking precision. The Nova 120 mount is used in the same way as any classical German mount, without any of its flaws:

- Very high tracking accuracy allowing long exposures without the need of guiding.
- The high speed of the mount allows flexibility to focus on temporary phenomena such as gamma ray bursts.
- No adjustment of gear positioning or tangent worm to be performed according to seasons or temperature.
- Very high rigidity thanks to the absence of play and hysteresis, regardless of the temperature.
- Not dust sensitive parts requiring regular maintenance, providing very high reliability and long service life.
- Tracking of moving objects from the sky (Sun, Moon, planet, comets, asteroids, Earth satellites...).
- Very low minimum tracking speed with no DEC back-lash allowing very slow and accurate object tracking.

Thanks to the quality of the mount, 100% of the unguided images are usable during shooting sessions. The user spends more time performing observations, and less on tuning the equipment. The size and the load capacity of the mount (> 100 kg) make it ideal for instruments in the 400-600 mm diameter range, depending on the weight and the length of the optical tube. The top interface of the mount is equipped with many holes to easily attach instruments of varied origins. If necessary, this interface can easily be adapted to a specific instrumentation.

For mobile or fixed installations an optional oversized column tripod is available to position the mount in a more rigid and stable way. Equipped with levelling jacks, the column stand allows moving easily even when the terrain is not flat.

1.2 An automated mount

As not everybody has a perfect observation spot in his garden, the Mount Nova 120 has been developed to be used remotely. The axles provide an inner wire section of 66 mm diameter, allowing all cables to sit inside the mount without risk of wire damage during mount rotations.

In case of accidental position loss of the telescope (mount movement while power off), the encoders embeds absolute markers, allowing to re-initialize position after a limited rotation (10 to 15 °). The communication with the PC is Ethernet based, retained for it reliability and ease to connect to a local network.

The mount software, provided in French & English, can be used in standalone or remotely via the ASCOM protocol. This mount can then be used with any third party software providing better telescope management feature.

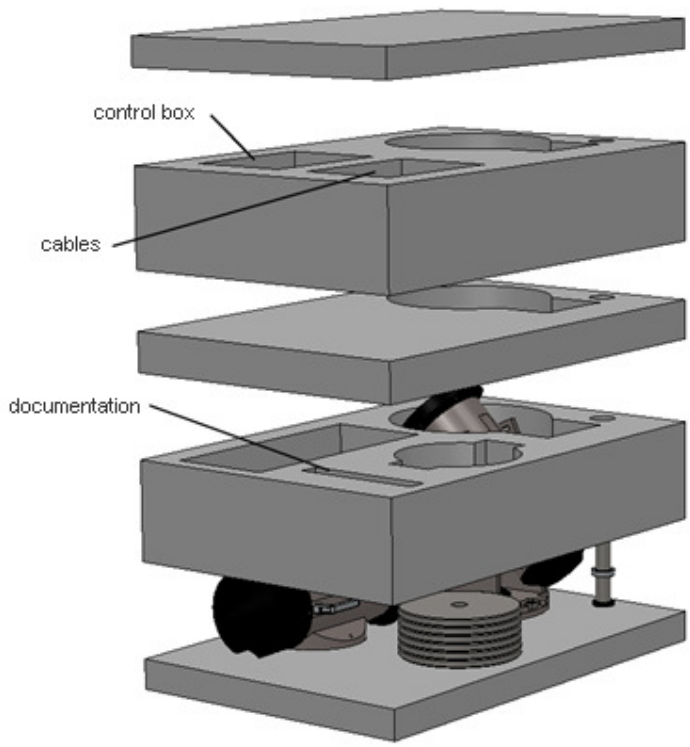
Here is a list of Acronym used in this document:

Acronym	**Meaning**
RA	Right ascension
DEC	Declination
HSHC	Hex socket hex cap screw
LED	Light emitting diode
DB15	15 pins connector used for encoder readout heads

2 Unpacking

The Mount comes in Euro- format pallet box. The crate size is (L)120 cm x (l)80cm x (H)91cm.
The gross weight is approximately 130 kg (+ counterweights weight if included).

The packing is made with stacked layer foams, protecting the elements during transportations.



2.1 List of items

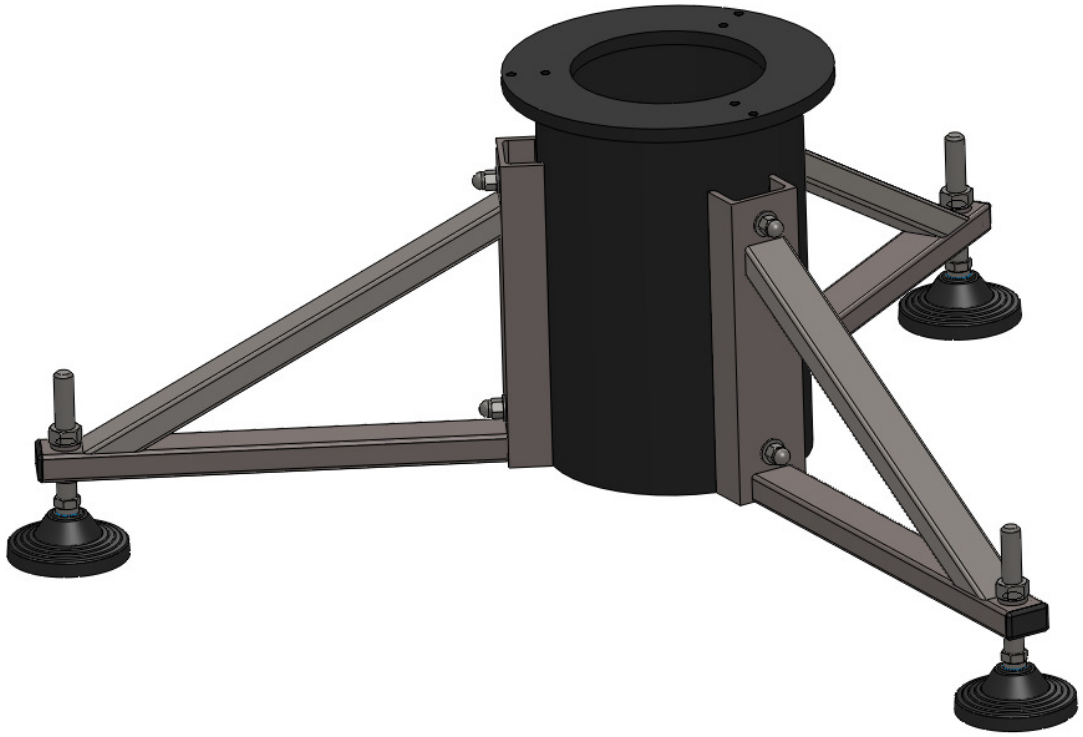
Here is the list of the items coming with the mount:

- Mount control box
- Counterweight arm

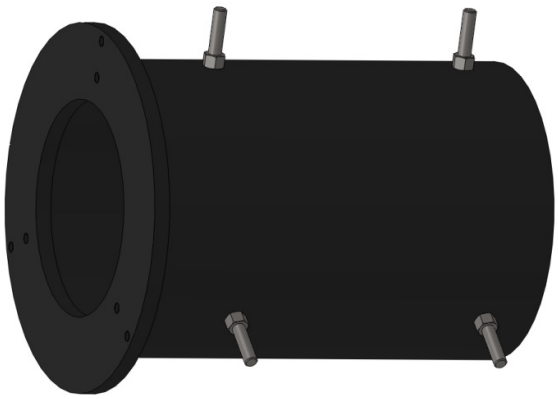
- Counterweights (optional)
- Network cable
- A joystick (wireless if requested)
- 220V / 110V cable (depending on the country of destination)
- RA axis of the mount on the plate
- DEC Axis of the mount
- Documentation, invoices, certificates of conformity.

3 Assembly of the oversized tripod (optional)

Optionally, the Nova 120 frame can be equipped with an oversized column tripod. This tripod is composed of 4 parts: a central column and 3 pods. The center column can be custom made at the desired height in order to match to any configuration.

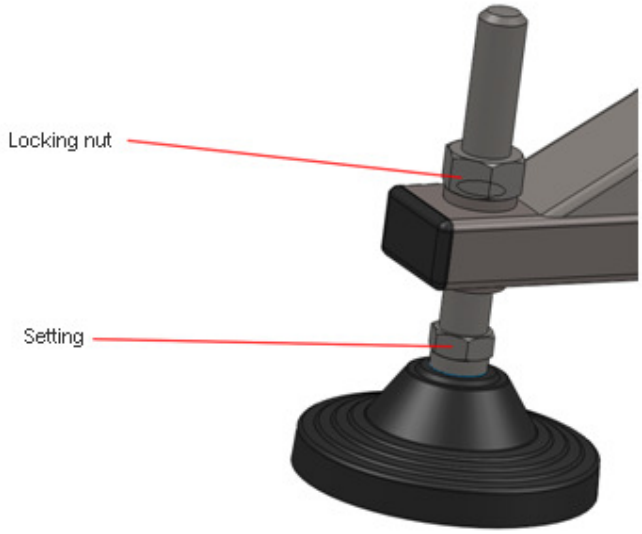


Lay the central column on the ground and fit the first pod on the column thread rods using the locknuts and washers (M12). Tighten strongly the nuts with a 19mm wrench. Rotate the assembly and follow the same process for the 2 remaining pods.



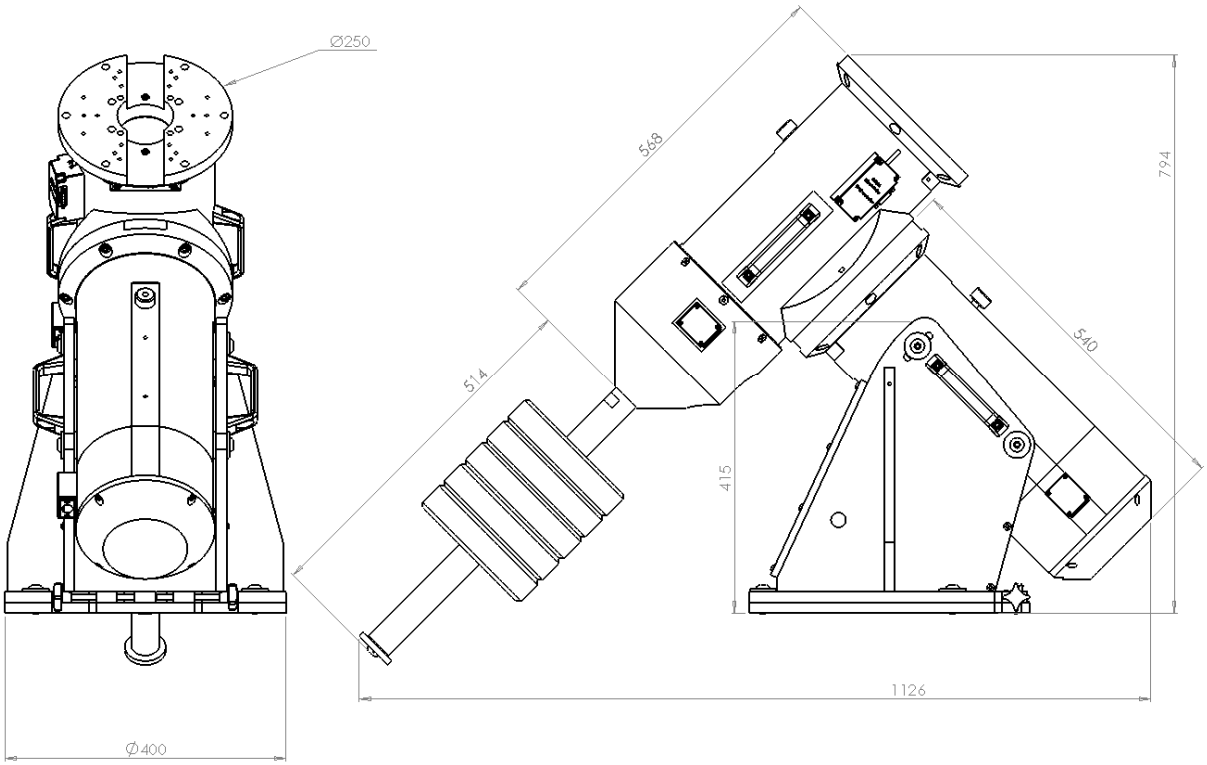
At the end of each pod, an adjustable pier is present. These adjustable feet can be used to compensate a non-flat ground. To adjust each pier, unscrew the upper M20 locking nut with a 30mm flat wrench, and

turn clock wise or counter clock wise the pier (by hand or with a 24mm flat wrench) accordingly to your needs. Once levelled tighten the locking M20 locking nuts (never let loose the locking nuts).



In case of alt-azimuth mount, these adjustable feet can also be used to perform the zenith alignment of the mount. FYI: each pier turn represents an angle of 0.15° or 9 arcmin.

4 Dimensions of the mount

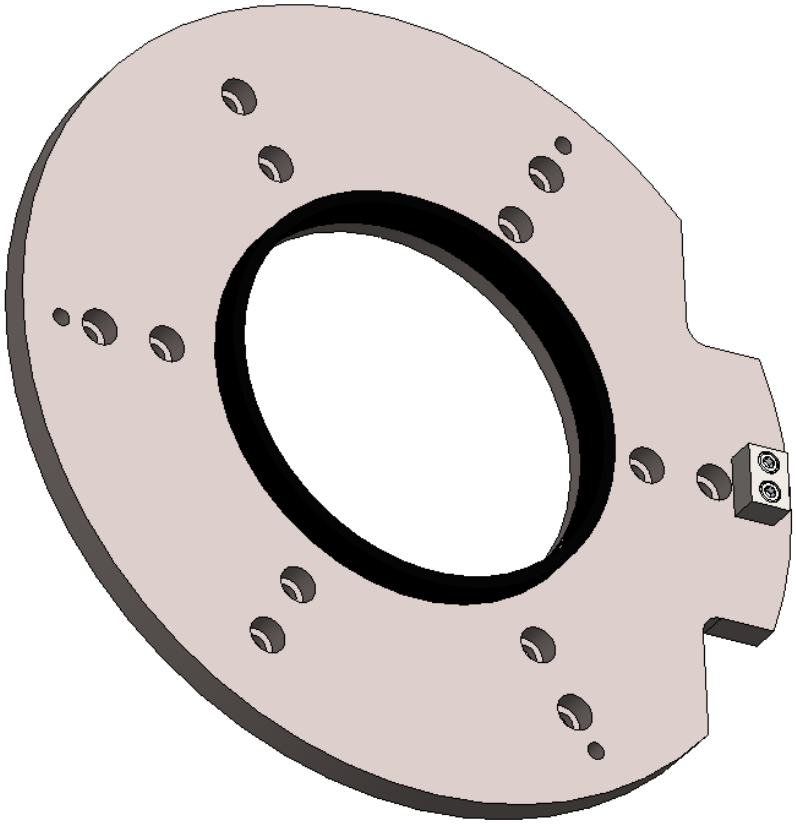


The above picture provides the various dimension of the mount, with setting for 45° latitude.
Note: It is recommended (but not mandatory), when installed in a dome, to align the RA & DEC axis to the dome center.

5 Installation of the mount

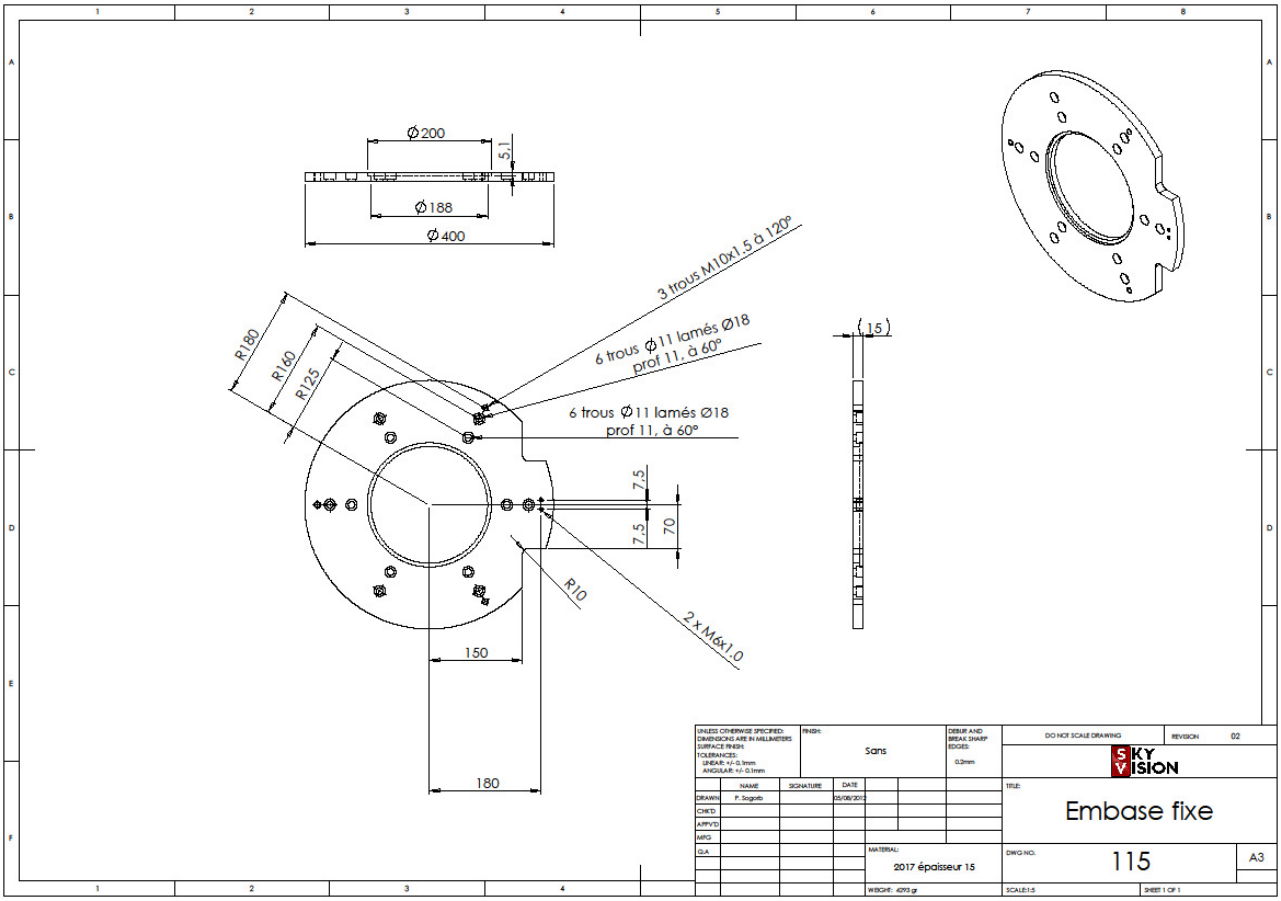
5.1 Interfaces

5.1.1 Bottom interface of the mount



The bottom interface of the Nova mount consists of a circular plate of 400mm diameter. For fixing on the column or on a dedicated stand, this plate has 2 series of 6 holes with counter bores for screws M3 (or HSHC) type M10.
A Ø180mm center hole allows cables passage inside the mount for instrumentations.

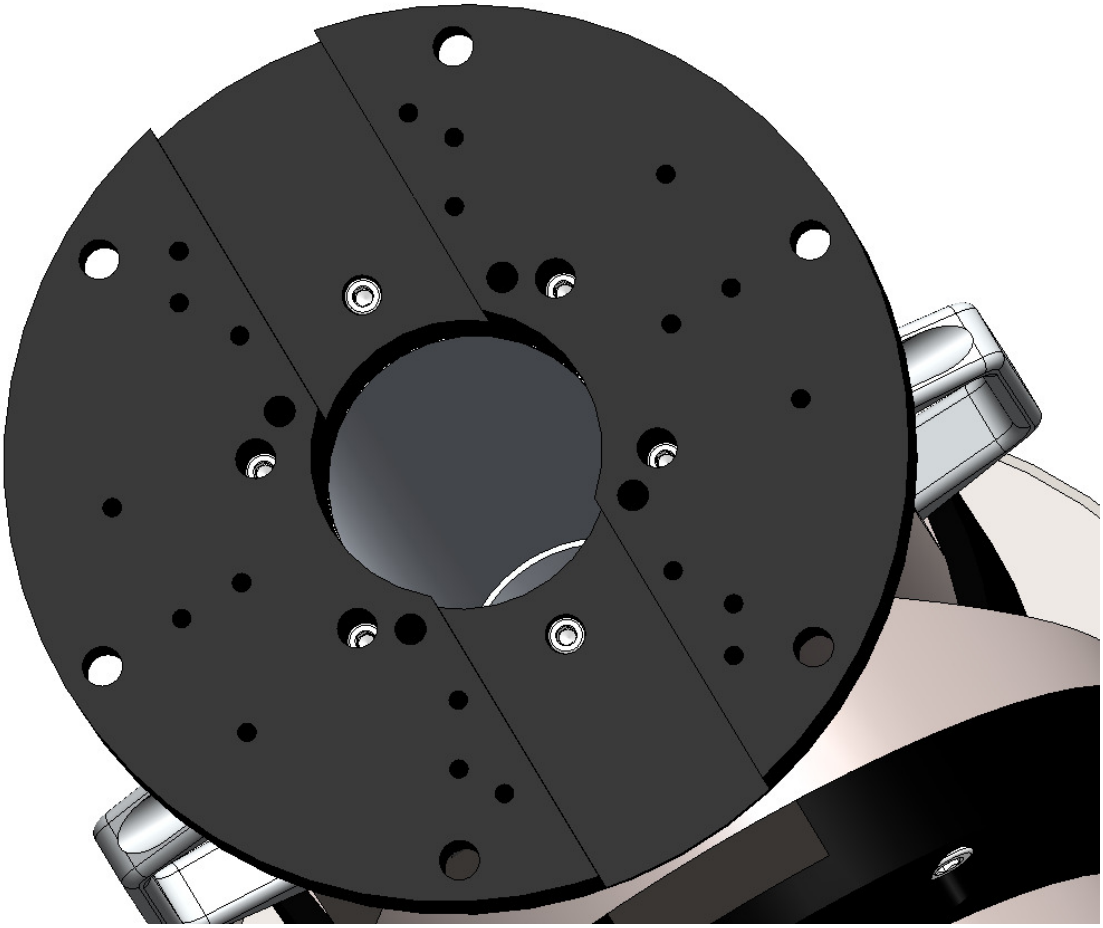
The holes of the inner crown lies on 125mm radius, while those of the outer crown lies at a 160mm radius. This interface allows fixing the mount on the pier column. If this interface is not usable on an existing location, ALCOR SYSTEM can custom-create an interface on demand.



Drawing of the interface to the pier, the holes on 160 and 125 mm radius can be used to attach the mount to a pier.

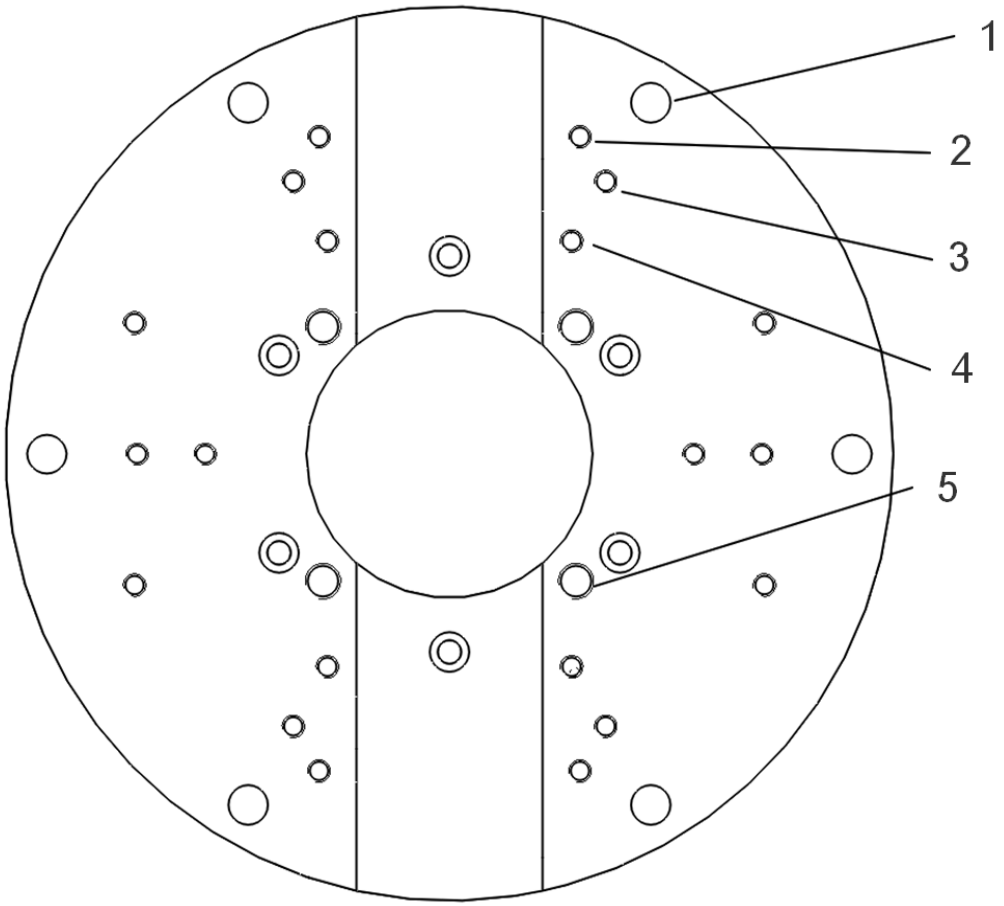
On this plate an end stopper is bolted with two screws. It is used to stop the mount during the polar alignment. It is on this end stopper that the azimuth adjusters will lean on. It is important to put this stopper in the northern direction, if possible with a good accuracy (typically +/-3 °). The azimuth of the mount setting allows adjustment of +/-7 ° of amplitude, so try to be more accurate than 3 ° when this plate will be fixed on the pier. Do not use a magnetic compass, but rather the Polar Star, or the shade of a vertical post at the meridian time of the Sun.

5.1.2 Upper interface of the mount



On the top layer of the mount, 6 type HSHC screws are visible. Note that these screws are used to ensure preload of bearings and are adjusted in factory. Under penalty of cancellation of warranty and damage to the equipment, these screws should **never** be tightened / loosened by the operator.

All the other holes on this piece are used for the mounting of the instrument on the mount. The two visible grooves allow the cable passage of the cables of the telescope and its instrumentation.



Item #	Qty	Description
1	6	Ø11mm holes on 112.5mm radius
2	2	8 UNC ¼-20 threaded holes on 3” ¾ radius (95.25mm) (Paramount pattern)
3	6	UNC ¼-20 threaded holes on 3” 7/16 radius (87.3125mm) (AP1200-1600 pattern)
4	6	UNC ¼-20 threaded holes on 2”11/16 radius (68.2625mm) (AP900-1100 pattern)
5	4	M10 threaded holes on 50mm radius (Takahashi NJP/EM400/EM500 pattern)

The 6 x Ø11 holes with counter bores, located on the outer perimeter of the plate are a standardized mounting interface. This standard, using larger screws and more widely spaced holes should be preferred when using heavy instrumentation.

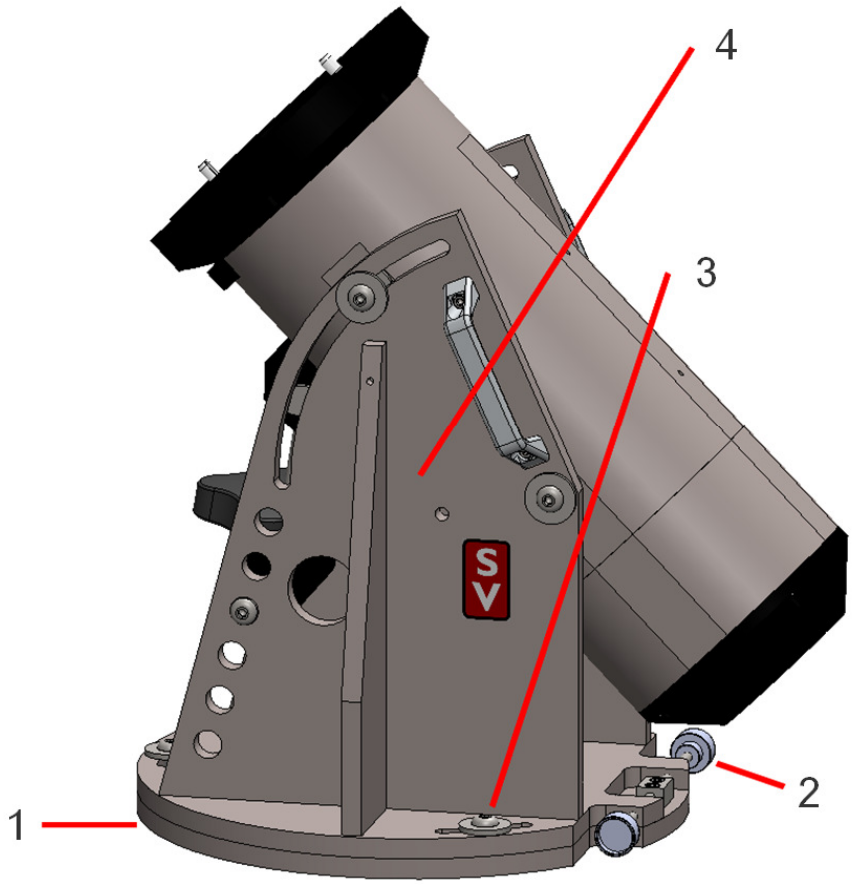
Other threaded holes are done accordingly to other interface standards (Losmandy, Takahashi) allowing the nova 120 to be used with a wide range of instruments with their own dovetail plate.

5.2 Assembly of the mount

5.2.1 Bottom flange

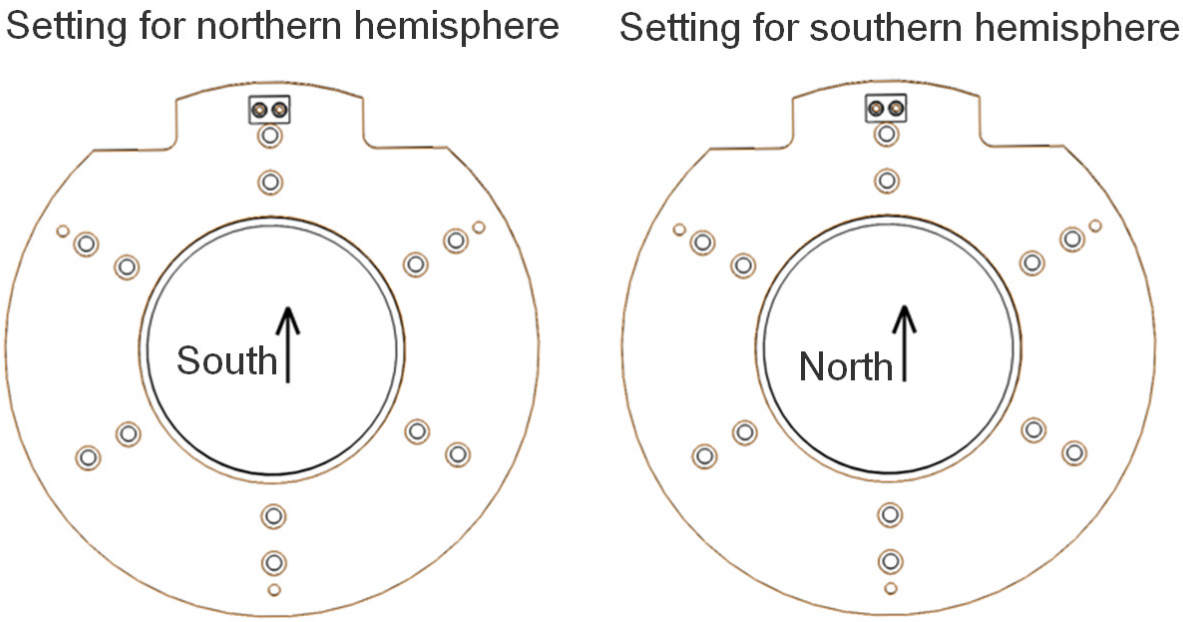
You will need to separate the flange from the equatorial table of the mount. To do so, unscrew the 3 mounting screws and the 2 azimuth setting screws. Unscrew completely to remove them.

The Equatorial table set + right ascension weights about 50 kg. It is possible to manipulate this set manually by using the strong handles located on the side of the equatorial table. It is also possible to use slings in the handles to lift the Assembly using lifting system such as a hoist.



Item #	Description
1	Bottom flange
2	Azimuth setting screws
3	Azimuth locking screws
4	Equatorial table

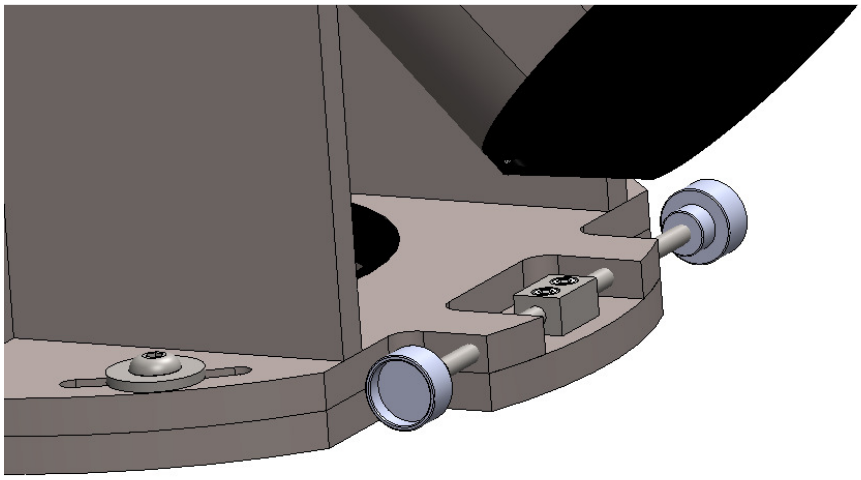
Take care to mount the <u>bottom flange</u> with the stopper in direction of the South for the northern hemisphere or Northern direction for the southern hemisphere, and then fasten it securely. To do this, it is not mandatory to fix a screw in each of the 12 holes of the bottom flange. However, 3 screws located at 120 °, on the internal or external crown, are a minimum for a secure fitment. Put a thin layer of grease between the two plates (the one that is mobile and the one that is fixed). This eases a lot the moving in azimuth and adjustment when polar alignment the mount.



5.2.2 Assembly of the Equatorial table

Once the bottom flange is correctly installed, install the Equatorial table Assembly on top of the lower plate, taking care of the end stopper to be located between equatorial table adjustments. Put grease on the bottom plate so that the top plate can rotate freely in azimuth.

Place then the two adjustments screws and tighten them until they come in contact with the stopper. Fit and tighten then the three screws of the equatorial table.

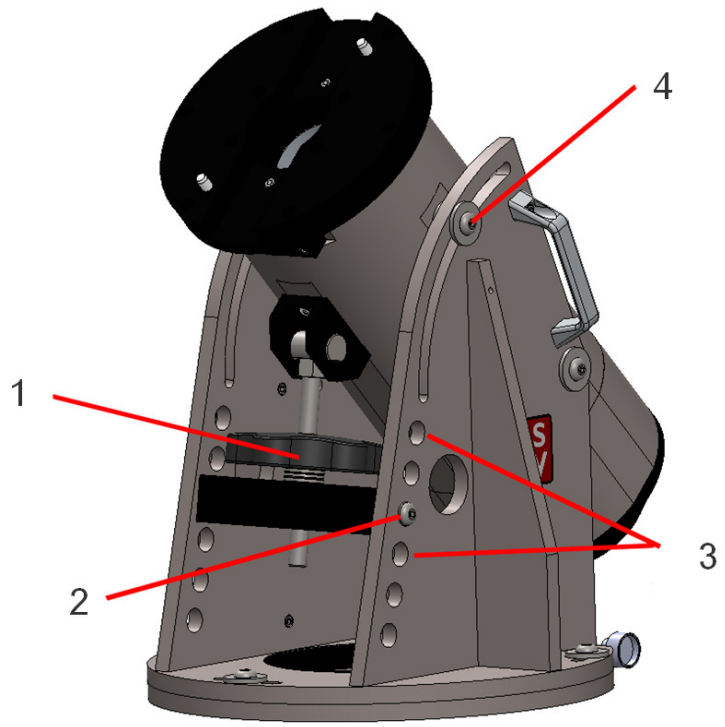


5.2.3 Pre-set of the mount elevation

If you have a large range setting equatorial table, you have to pre-set your mount. Starting from top, the holes in the equatorial table allow different amplitudes on the adjustment of elevation of the mount (setting which must be equal to the latitude of the geographical location):

Hole	Latitude range
Hole # 1 (top)	53 ° to 66 °
Hole # 2	43 ° to 63°
Hole # 3	33 ° to 54 °
Hole # 4	23 ° to 44 °
Hole # 5	17 ° to 34 °
Hole # 6	0 ° to 24 °

(A specific threaded rod is required for elevation settings lower than 18 °).



Item #	Description
1	Elevation setting
2	Pre-set screw
3	Pre-set holes
4	Elevation locking screw

If the pre-set of the elevation needs to be changed, please proceed as follow.

Here is the procedure to follow:

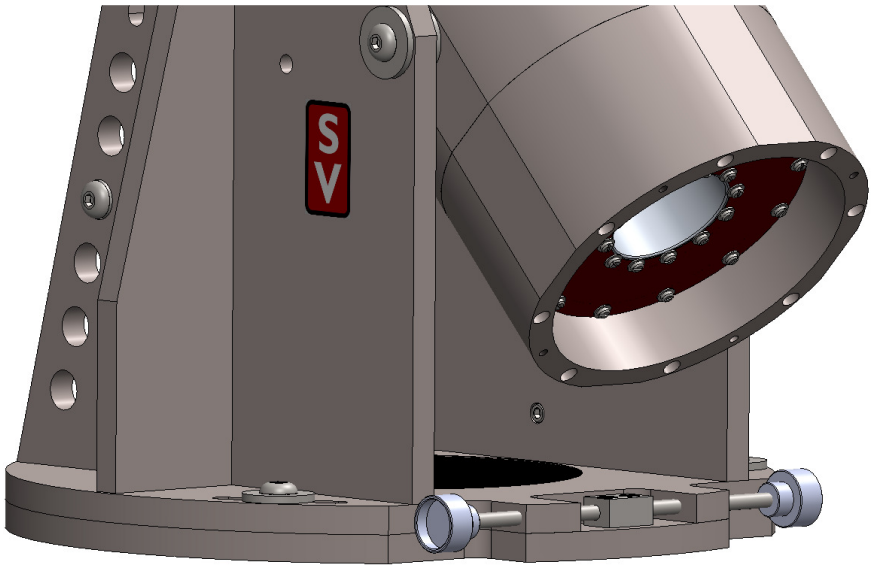
- Loosen the two set screws of the elevation.
- Use the adjusting knob to adjust latitude in the desired direction until reaching stopper.
- Tighten the two elevation setscrews.

- Slightly loosen the adjustment knob so it is no more pushing on the ball stopper.
- Unscrew the two elevation setscrews and exit the sockets. Warning, at this stage the Axle and the stop ball may fall.
- Place the axle in the desired holes, the threaded rod through the stop ball and axle.
- Re-place the bushings and the elevation setscrews.
- Screw the adjusting knob until touching the stopper ball.

If you have a low range setting equatorial table, you mount is already set at the good latitude.

5.2.4 Passing cables

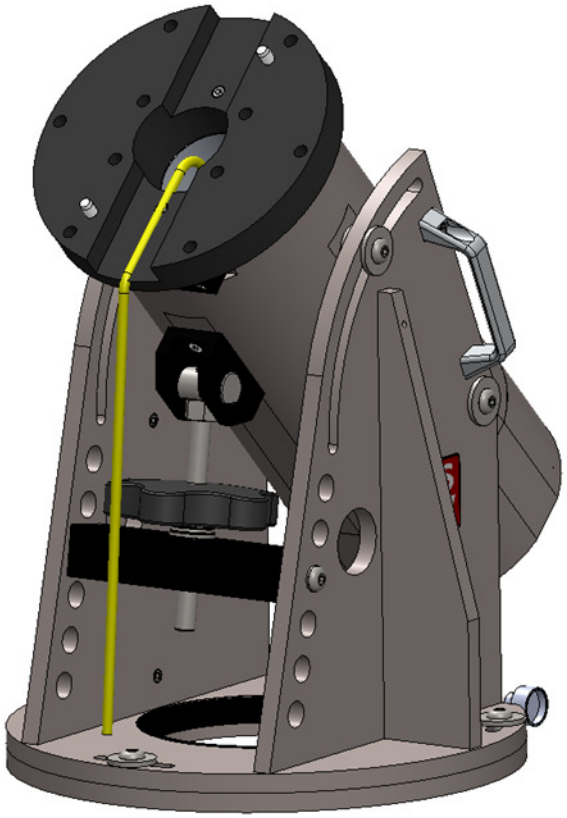
First remove the cover located at the bottom of the right ascension axis, in order to facilitate access. The 4 HSHC M6 screws must unscrew with a 5mm Allen wrench.

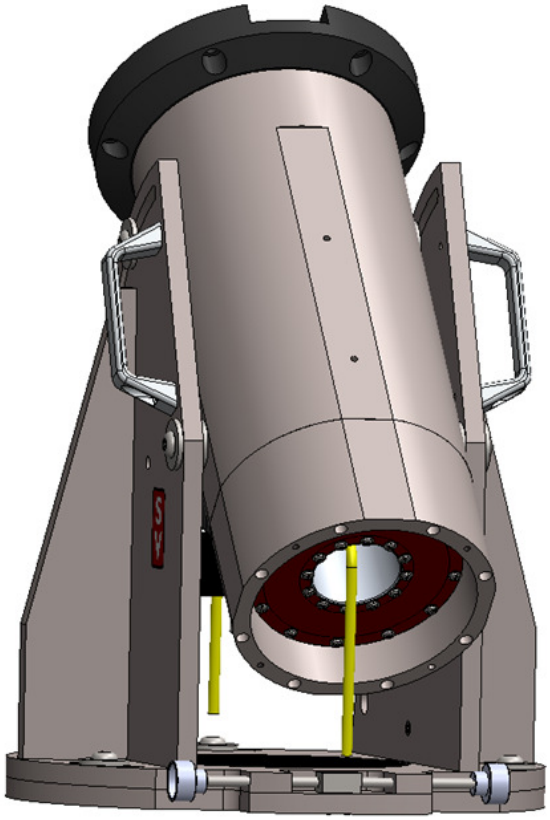


The motor and brake cable:

The left connector fit to control box, and the right one fit on the mount. Take the longer one for declination, and the shorter for right ascension.

Then, the declination motor/brake cable and all the required cables for instrumentation (eye door operator, fans, acquisition camera, guide camera, focuser...) must be passed within the mount as shown on the following pictures:





The yellow cable is for telescope instrumentations, while the black one is the declination motor/brake cable.

Make sure that the cables are routed into the notch in the piece that is at the top of the RA axis. Avoid cable to mix-up.

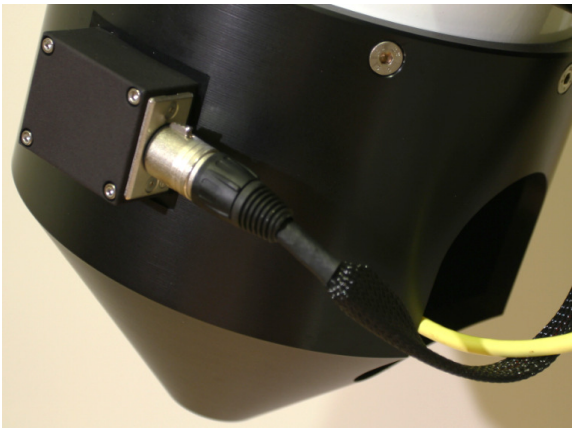
It is recommended to pass more cables than required. Once the mount is assembled, it is still possible, but it is a more delicate operation.

5.2.5 Installation of the DEC axis

To install the declination (DEC) axis on the mount, two people will be required. Prepare 6 x HSHC M10x40 screws and 8mm hex Allen wrench.
First of all, unwind the declination encoder cable.

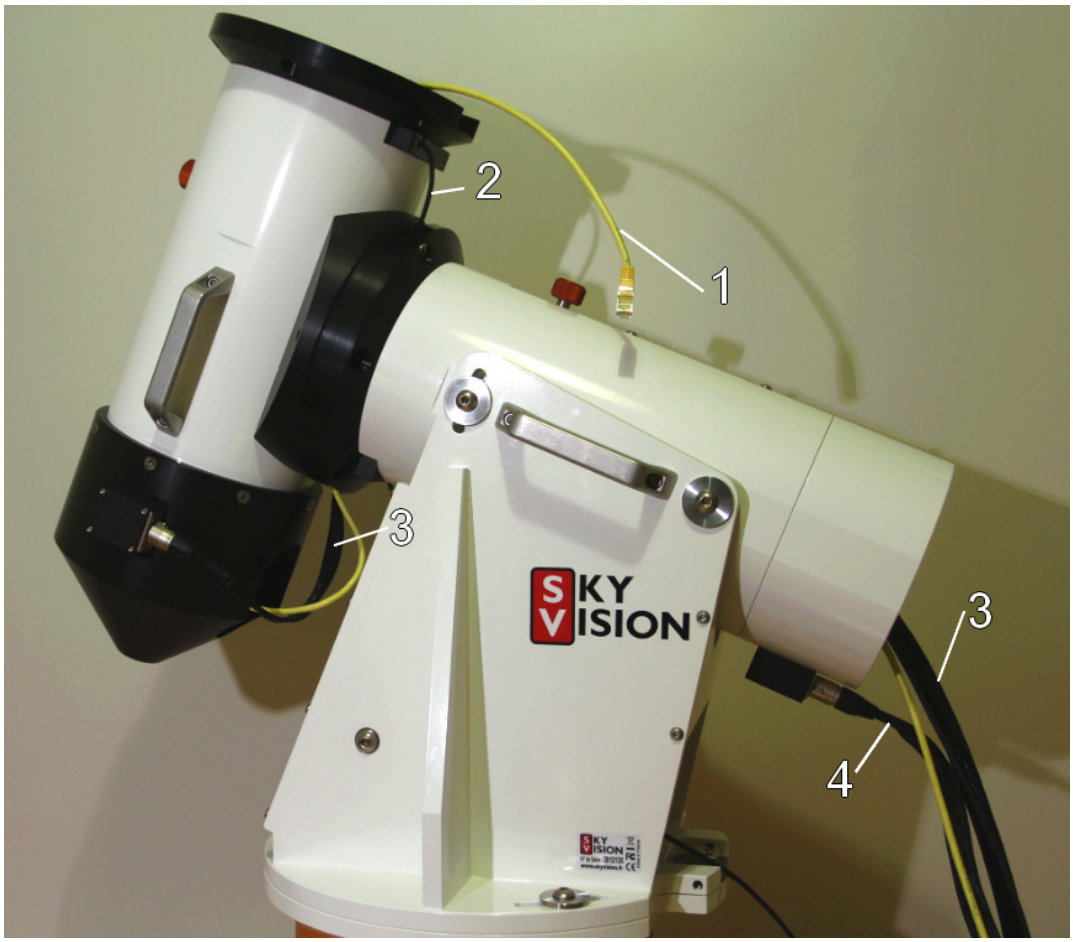
While a person is holding the body of declination (weight = approx. 30 kg) and the approach of the mount, another person takes the cable and passes into the right ascension axis.
Pay close attention to the cable not to be pinched. The motor supply cable must pass through the lower notch, while the declination encoder cable must pass through the opposite notch. Once the body's declination is in place, secure it with the 6 HSHC M10x40 screws.

You can plug the declination motor/brake cable on the mount



5.2.6 Finishing cable installation

It is at this stage, to finish the installation of electric cables for the instrumentation (ccd camera, filter wheel, focuser…). Pass the cables through the hole, which is located in the part supporting the counterweight bar, then route the cables up to the top of the mount. The needed length of cables for RA and DEC axis is 1.6 m.
The DEC axis encoder cable passes through the RA axis and separates on the opposite side joining the other cables in the RA/DEC interface plate.

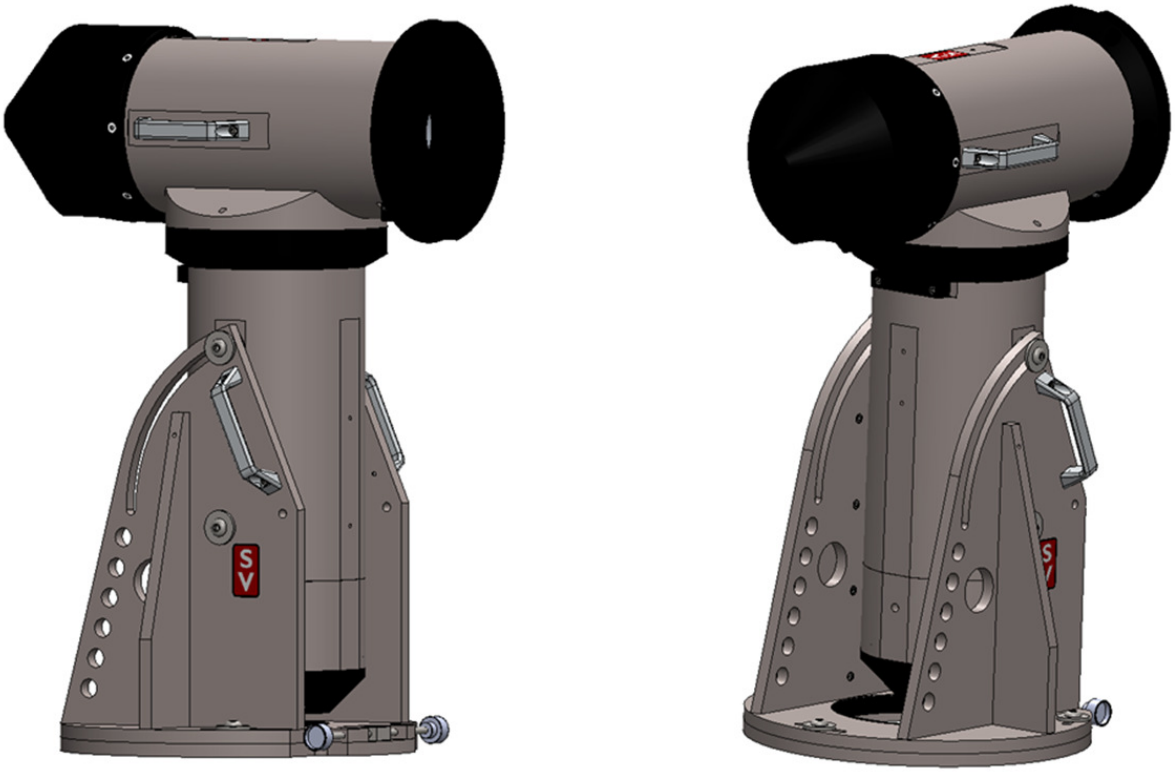


Item #	Description
1	Telescope instrumentation cable(s)
2	Declination encoder cable
3	Declination motor/brake cable
4	Right ascension motor/brake cable

Once the cables are in place, reassemble the cover of the right ascension axis passing all the cables in the cover notch. It is possible to turn the cover before mounting according to the desired orientation of the cable (on side or on top). Cables can then walk along the pier of the mount, or pass through the hole of the Equatorial table and through the pier if hollow.

5.2.7 Mount use in alt-azimuth mode

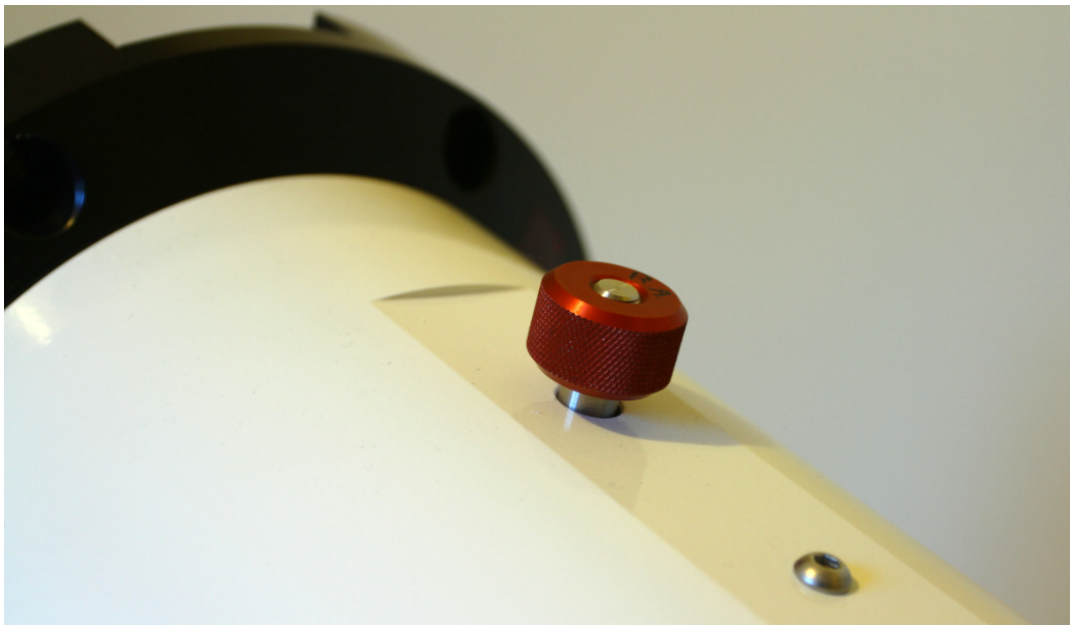
With the large range setting equatorial table, on the side of the equatorial table there are two holes for vertical attachment of the axis of right ascension of the mount. This mounting allows the use of the mount in alt-azimuth mode.

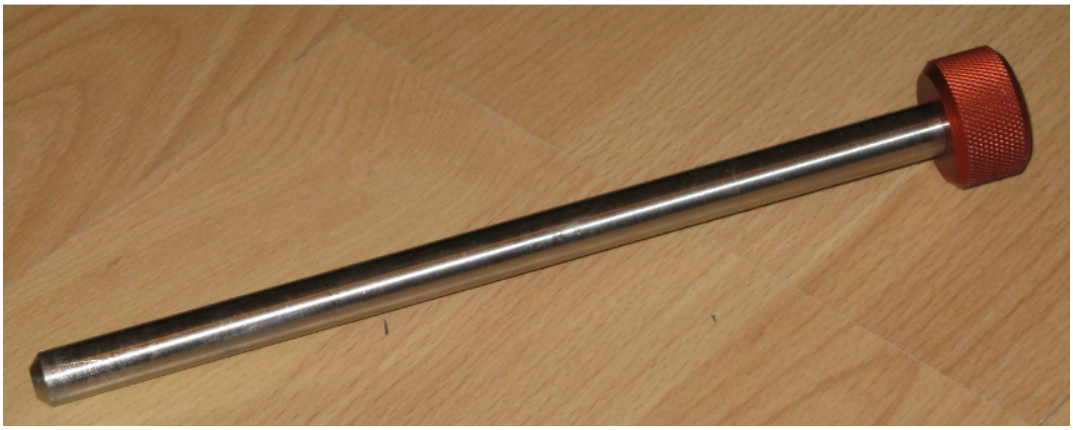


To achieve such installation, it is first required to remove the four screws securing the axis of right ascension to the equatorial table, and replace them in the appropriate holes. The 2 upper screws must be at the higher position in the elevation setting groove
The fine-tuning of the elevation of the mount system as explained in an upper must be removed.
In this configuration the polar alignment is not achievable via the flange. It can be performed via software or eventually with oversized tripod adjusters.

5.2.8 The pin lock system

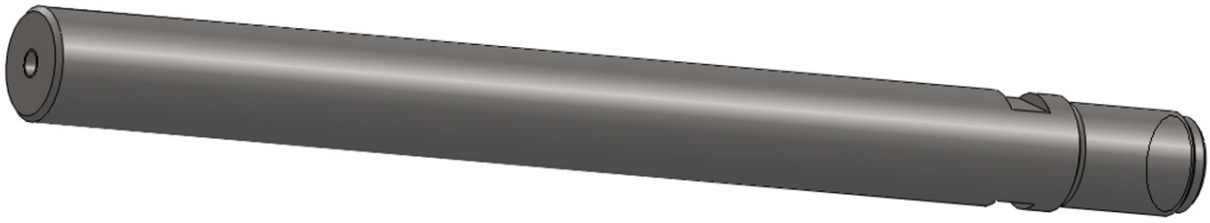
You can find on both axis, a pin lock system. The pin lock have to be used for travel, setup and balancing the mount. There are 8 holes in each axis of the mount, providing 8 locking positions spaced of 45°. Don't forget to remove the pin lock before using the mount.



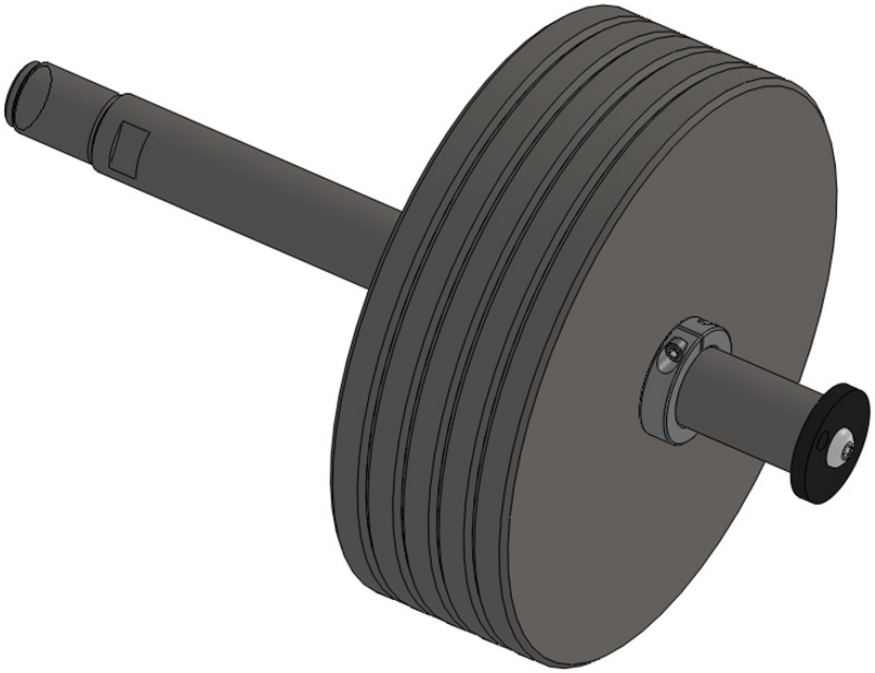


5.3 Installing the counterweights

Counterweight rod is made of 40mm diameter stainless steel and is 500 mm long.



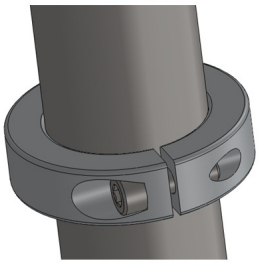
Fix the safety stopper washer on the M10 thread located on the end of the rod. This stopper is used to block a counterweight badly fixed in order to secure the operator and equipment. On the other end of the rod, there is a big diameter thread allowing the rod to be screwed at the end of the declination of the axis mount.
Two machined notches allow the use of a 32 mm flat wrench to unscrew the rod if not possible by hand.



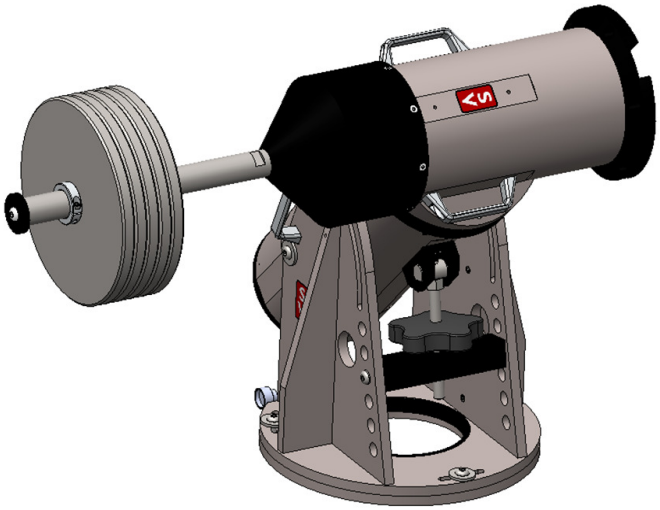
The counterweight weights 10kg per disc. They are securely blocked on the rod by two clamps (one on each side).

Warning: Due to the large weight of the counterweights these steps can be dangerous for the operator. Be extremely careful when handling counterweights.

Fit the rod on the mount first and tighten it manually (no need to use a wrench). Fit the first clamp.



Load the counterweights on the rod. To maintain the rod horizontally, a second person will be required or the rod will need to lay on a solid support, or you can use the right ascension pin lock.



Load as many counterweights as needed according to the weight of the telescope and its equipment. Then fit the second clamp. Finally fit the security washer at the end of the rod. Once the clamp and security washer are tightened, it is possible to release the mount and let the counterweight point toward the ground.

5.4 Mounting the optical tube

The tube is mounted at the end of the DEC axis. The mounting plate used to attach the tube to the mount depends on the used tube.

If the available holes do not allow the correct fitment of the optical tube, a specific interface plate can be machined on demand. It can be a specific dove tail plate for instance.

It is necessary first to install the required amount of counterweights to balance the telescope weight and let the counterweight rod pointing the ground.

Warning: the brakes of the Nova 120 can compensate an unbalance of several tens of newton meter, but not to a tube with no counterweights! A pin lock system is installed to block the RA and DEC axis. Make sure that these pin locks are installed on both axis before mounting the tube.

5.5 Balancing

To optimize the operation of the mount, it is important to perform a correct balancing of the instrument. The balancing is especially important in case of a power cut off. A delay of some tenth of seconds is needed before the brakes to be automatically applied. The best the balancing is the less travel the tube will perform during this time.

Balancing must be particularly neat and will be therefore carried out using a '3-axis' method to ensure balancing is good in all positions of the instrument. Balancing described later in this chapter is the case of an optical tube of newton formula that requires the more complex balancing process.

Start by setting the telescope in observational configuration: fitting of accessories and cables. Open the lenses protective caps and plugs all optical devices. Attach the cables to the optical tube so that they are fixed with respect to the optical tube regardless of the aiming direction.

5.5.1 Connecting the electronic control box

To perform balancing of the telescope, only engines and brakes cable are required to be connected. Connect the general supply cable and press the main switch so that it gets turned on.

Ensure that the two brake release indicator LEDs are off (not lit). If they are set to “ON” (lit), press the switch to enable brakes.

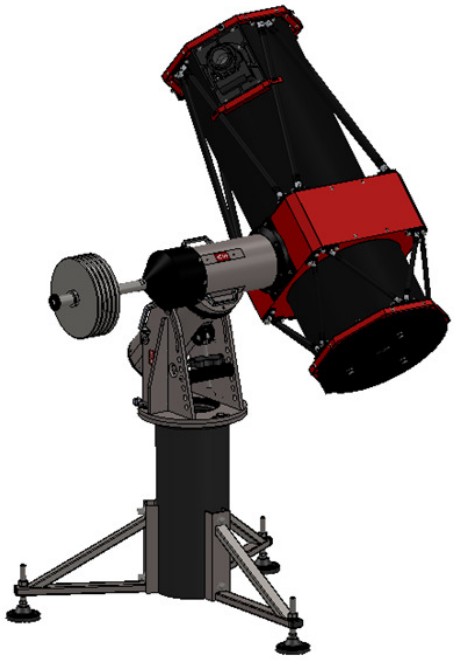
This step is to ensure the brakes are not going to open upon general power ON. In order to prevent axis to rotate freely while the telescope is not yet balanced (and the mount loaded).

Switch off the main AC switch, and then connect the power cables from the motors and brakes.
Caution: do not invert cables and connectors that are identified with the name of each axis of the mount. I.e RA for RA and DEC for DEC.

Do power control box. Now, by pressing the brakes switches (RA and DEC), it will release or tighten the brakes for each axis. This is necessary to achieve a balance of the instrument to have the mount free to rotate and the two LEDs be lit.

5.5.2 Pre-set

Main AC Power control box of the mount while a person secures the telescope (maintain the bar counter weight), Act on the switch that allows releasing the brake of RA axis. Acting on the counterweight bar, rotate the RA axis to bring the counterweigh rod horizontally (at this stage, the position of the declination has no importance and you can use the DEC pin lock if you want).



Translate counterweights to balance the RA axis. The clamper sitting along the counterweight must be well applied against counterweights before tightening, in order to let no back lash between counterweights and clamps.

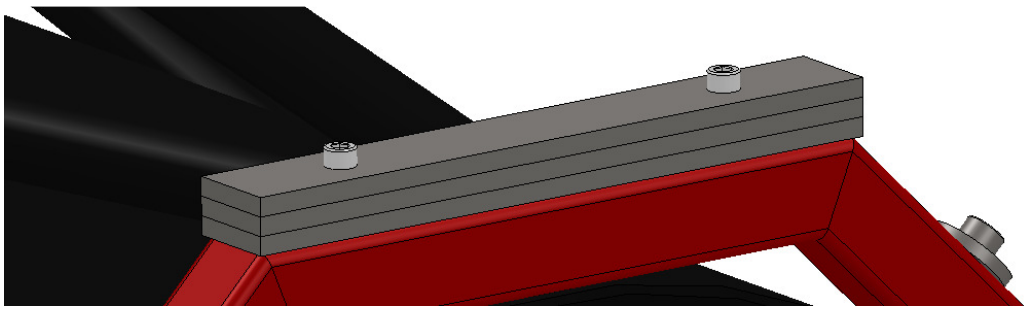
Warning: taking into account the large mass of the counterweight, this operation can be dangerous for the operator. Never loosen the clamper unless the lock washer is attached to the end of the rod.

Once this achieved, re-activate RA brake by operating the switch from the electronic control box of the mount.

5.5.3 DEC axis 'Front - back' balancing

Let the counterweight rod horizontal, RA brake is enabled, remove the DEC pin lock and use the RA pin lock. Loosen the DEC brake, and put the tube in horizontal position (North or South).

Then place long or short balancing small counterweights around the telescope top ring on the side where the telescope is too light. Use M6 screws. Make sure that the length of the screws is adapted the number of used balancing counterweights. Try to distribute the counterweights all around the top ring. Balance must be achieved when the tube is horizontal, do not worry about imbalance in other positions.



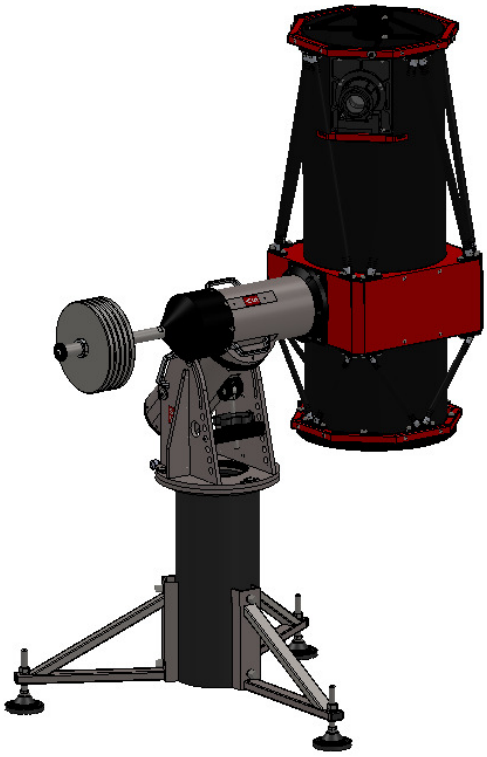
At this stage, a rebalancing of the RA axis can optionally be carried out (lock the declination brake, and release the RA axis brake)

Note that if the telescope is installed on the mount with a dovetail plate, there is no need of balancing counterweights. This setting can be obtained via a translation of the optical tube along the dovetail plate.

5.5.4 RA axis “Left-Right” balancing

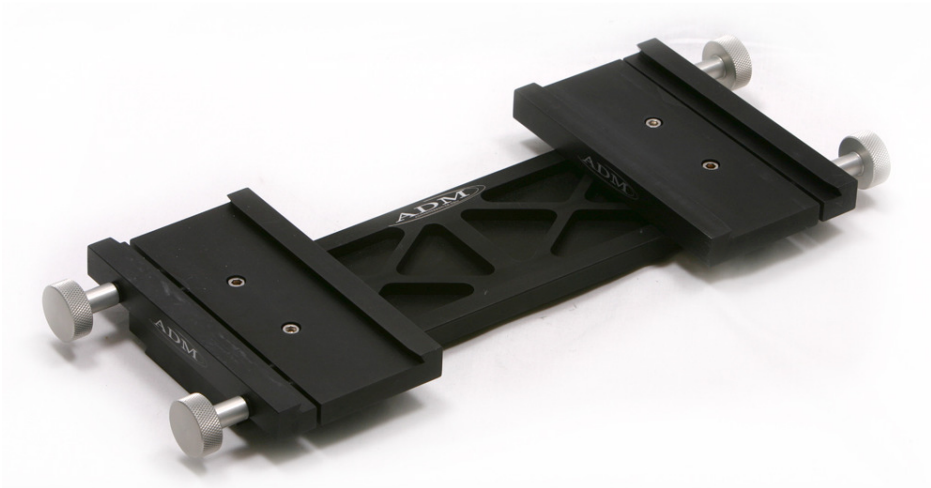
Let the counterweights rod horizontal, RA axis brake applied. While a person secures the telescope, loosen the DEC axis brake, and set the tube in vertical position (towards zenith).

Watch if the telescope tends to move southward or northward. For this setting, add or remove small balancing counterweight on located on the top ring will not be possible. Therefore, play on the distribution of the weights around the top ring.



This setting is especially important in the case of a Newton telescope, with an ocular older is located the side of the tube.
In the case of telescope having secondary convex mirror (Schmidt-Cassegrain, Dall-Karikham, Ritchey-Chrétien...) the natural shape of the telescope should naturally lead to balance into its axis.

But it is, however, useful to balance accessories fitted in piggy back to the main telescope (finder, second instrument, heavy CCD camera...).
If this setting via balancing counterweight is not possible, it is necessary to use fastening system of the optical tube on the mount, via sliding bracket, like a dovetail plate, which is perpendicular to the optical axis of the instrument.



5.5.5 RA axis balancing

Once the DEC is perfectly balanced (horizontal and vertical positions), proceed to final balancing of the RA axis. To do this, engage the DEC axis brake and pin lock, loosen the RA axis brake and move the RA pin lock.

Translate counterweights to balance the right ascension axis. No play must be left between clamps and counterweights before tightening. This is important, because if they move during telescope slews, it can be interpreted as a sock by the controller and led to put the mount in safety mode (mount stopped).

Warning: taking into account the large mass of the counterweight, this operation can be dangerous for the operator. Never loosen the clamps unless the lock washer is attached to the end of the rod.

Once achieved, the balancing of the telescope should be correct regardless of direction of the instrument in the sky. “Correct” means that the telescope mount should not rotate from any position, when the RA and DEC axis brakes are released.

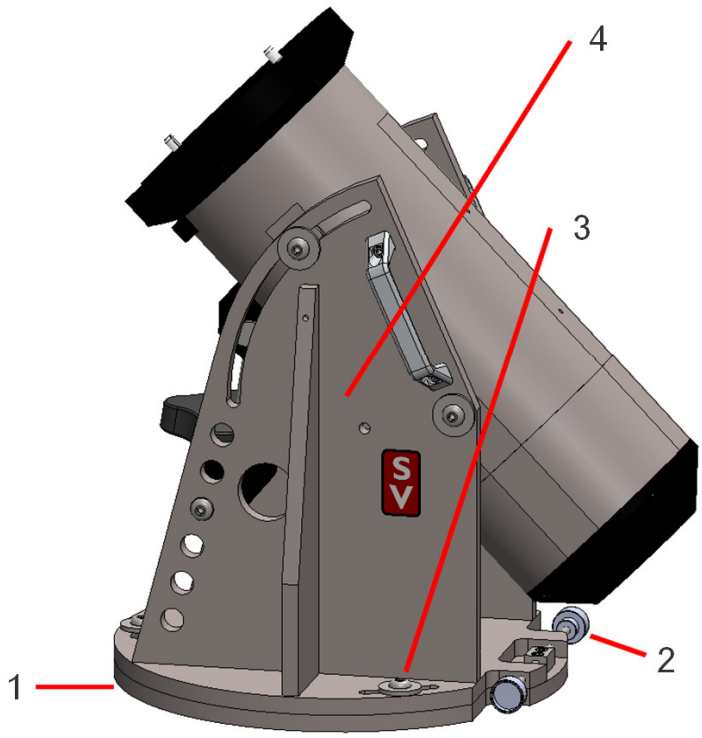
5.6 Polar alignment

The hollow shaft of the RA axis, used for the cable feed through (USB, power, Ethernet, for focuser, camera filter wheel and so on), does not allow mounting of a polar finder in the axis of the mount when populated by such cables.
Nevertheless, this hollow shaft can be used for polar alignment before installing the cables.

However, it is possible to attach a piggy back polar finder at the top of the RA axis.

To refine the polar alignment, KING method can be used. This is camera CCD and software assisted method (please see later in this document).

5.6.1 Azimuth adjustment

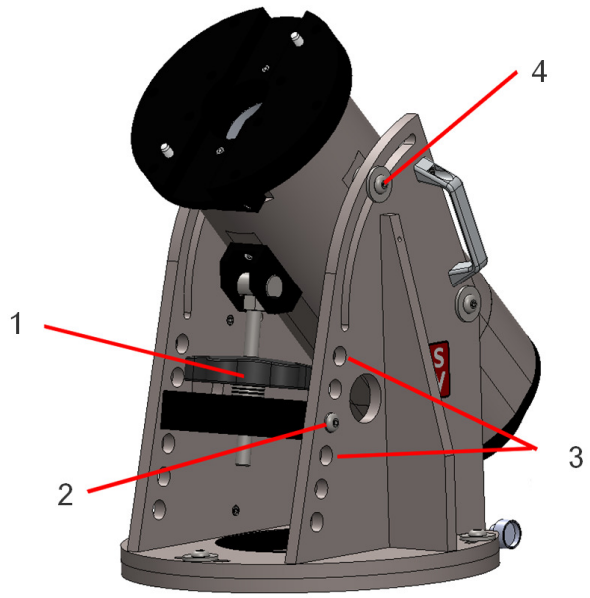


Item	Description
#1	bottom flange
#2	Azimuth setting screws
#3	Azimuth locking screws
#4	Equatorial table

The azimuth position of the mount can be accurately set by adjusting screws located at the base of the mount. When an adjustment is required, the three screws of the equatorial table must be loosened. Then adjust and re-tighten the three screws.

The maximum amplitude of the azimuth rotation is of +/-7 °.
The sensitivity of the azimuth rotation is 0.4 ° (24 arcmin) per screw revolution.
Prior lubrication of the plates allows smoother adjustments.

5.6.2 Elevation adjustment



Item	Description
#1	Elevation setting
#2	Pre-set screw
#3	Pre-set holes
#4	Elevation locking screw

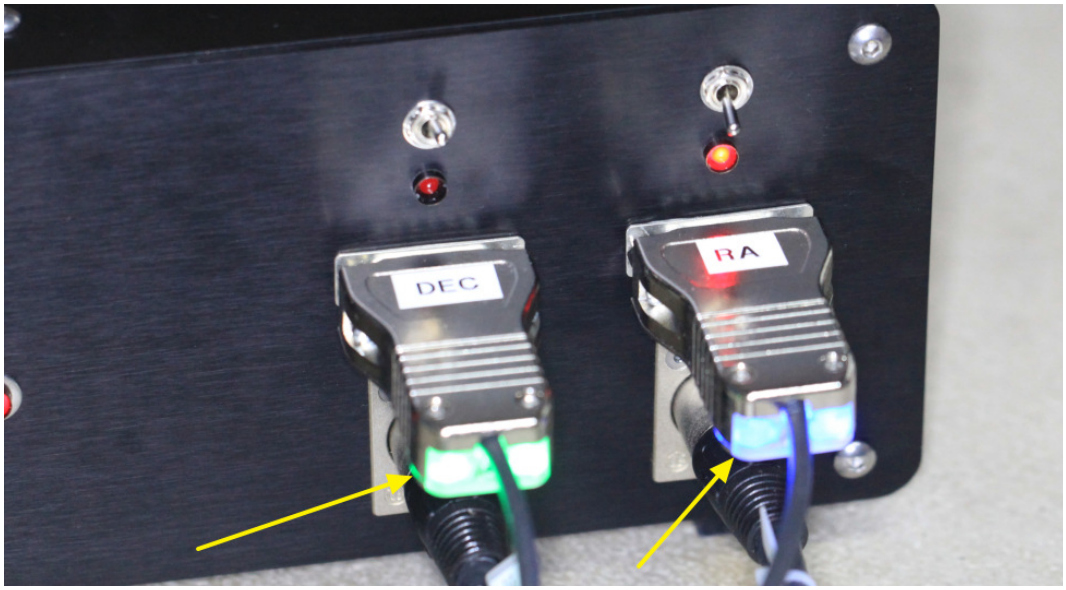
The mount elevation adjustment is performed via the big knob located below the axis of RA axis. When the setting needs be adjusted, the two elevation setscrews must be loosened, adjust and re-tighten the two setscrews. Do not forget to do so!

The maximum amplitude of elevation rotation is approximately +/-10 ° from the mid-position.
The sensitivity of the elevation rotation is approximately 0.57 ° (34 arcmin) per wheel revolution.

It is possible to use a dedicated inclinometer (or embedded into smartphones) for first rough trimming.

6 Use of the mount

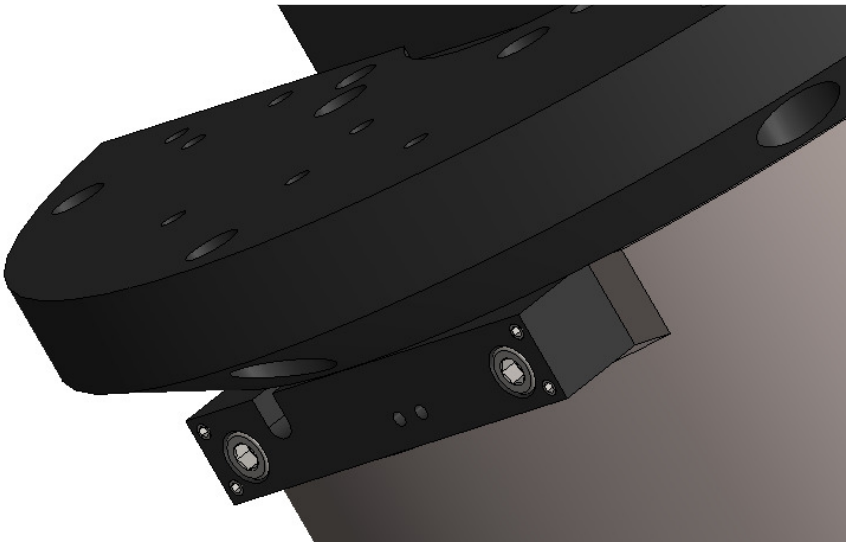
6.1 Encoder heads setting



At the back of the two encoders connectors (DB15) plugged in the front panel of the control box, multicolor LEDs informs the user about the quality of the signal returned by the encoder with respect to the coded ring.

The tuning position of the encoders head is factory set, and no adjustments are supposed to be achieved by the user.
For one complete axis revolution at a low speed (RA or DEC up to 20°/sec) the default factory position tuning ensures that the LEDs light must stay green (or blue, or violet).
It can anyway happen that on some sections an orange light is seen.

If the red color is seen and/or blinks red, then an encoder's head calibration is required. This should not happen and you should contact mount manufacturer about this and how to proceed.



7 Nova 120 / 200 Software

7.1 Connections & first power up

7.1.1 Plugging the control box to the mount

The control box is connected to the mount via 4 connectors:

-2 X 15 pins plugs (in charge of the mount position management).

-2X 9 pins plugs (in charge of the engine / break management).

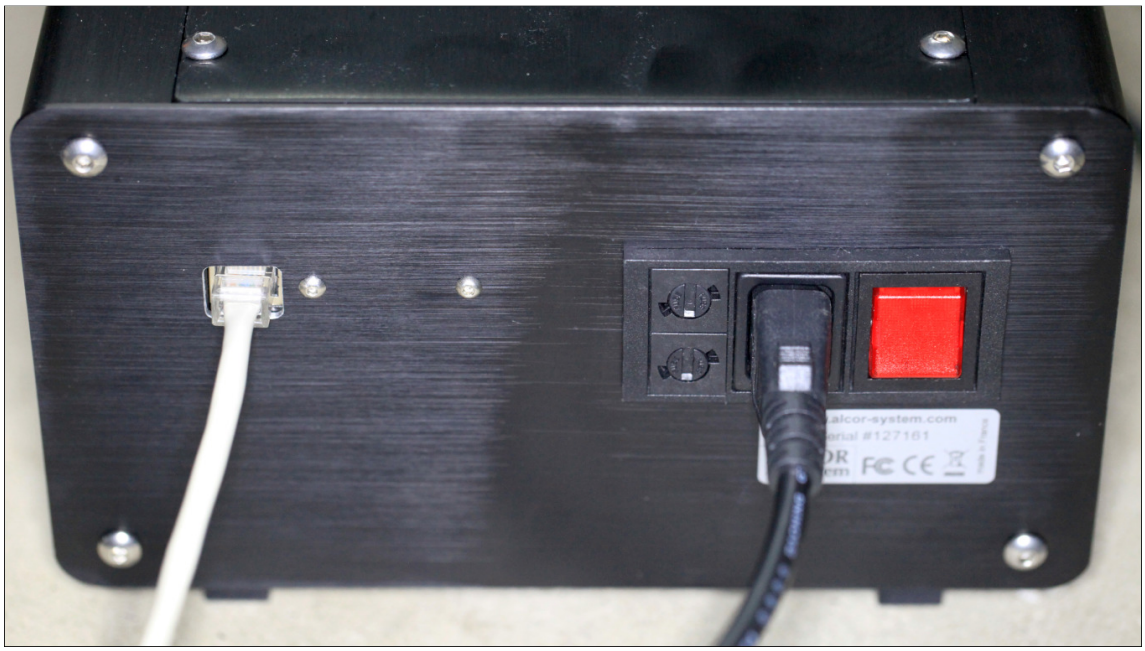
Plug these 4 connectors to the front of the control box.

Warning: Make sure to respect RA and DEC positions between connectors and control box (a wrong plugging would cause no electrical damage but would lead the mount to perform not correctly).

Warning: Never unplug these connectors when the control box is powered ON.

7.1.2 -Plugging the Ethernet cable

On the back of the of the control box, plug the provided Ethernet (RJ45) cable between the control box and your PC that will control the telescope devices.

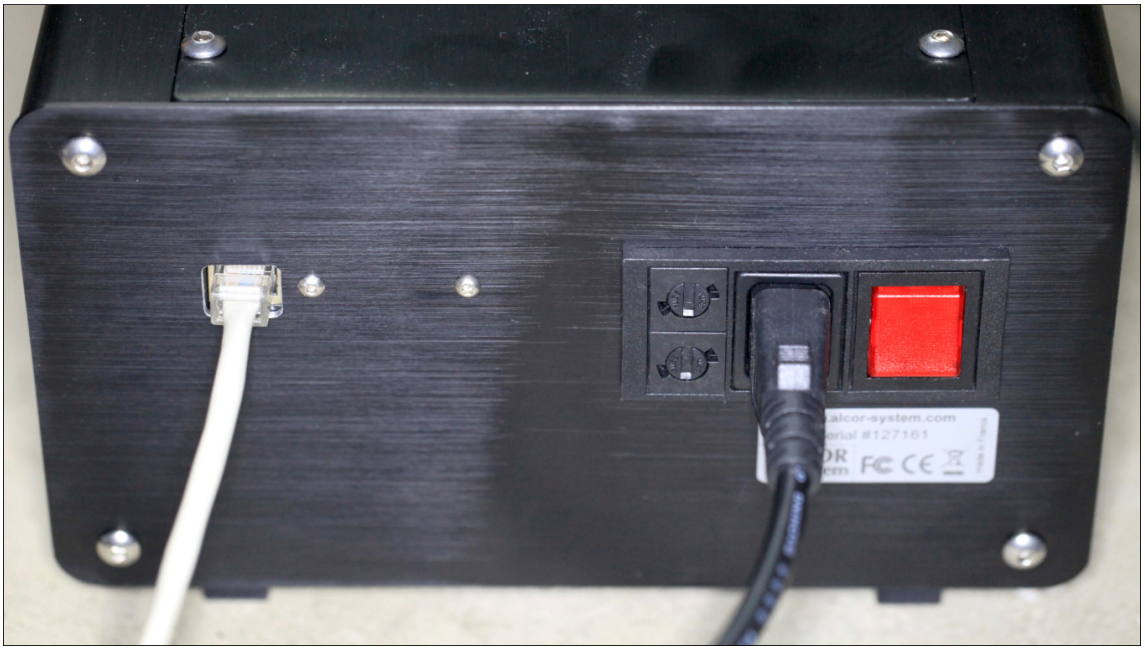


7. 1.3 -Plugging the control Box to the AC

On the back of the control box, plug the provided AC adaptor cable to the box (beside red switch) to a power socket.

NB: 2x 3.15 A fuses are located near the AC connector (always make sure the control box is unplugged from AC before any fuse check / replacement).

Keep the power switch on “OFF” for the moment.



7.1.4 First power up – Balancing the telescope on the mount

Before using the mount you may consider balancing the telescope on the mount (if this operation has already been achieved you can jump to next section):

Manually balancing the telescope on the mount is a key point to obtain best performance and minimum efforts on the mechanical components, and good reliability.

The brakes, that maintain the mount locked are active (barking) when the mount is powered off or when the switches located above each DEC & RA channels are on the upper position (Led turned off) when control box is under power.

NB: the brakes only acts as a security during a potential power cut and ARE NOT a strong locking system to rely on during telescope installation to the mount.

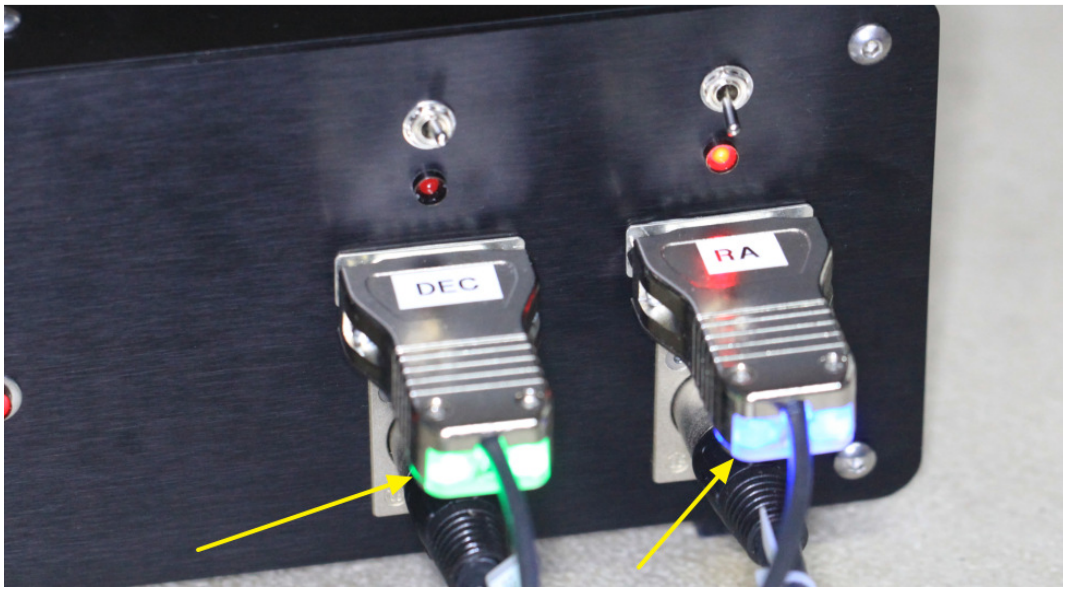
Balancing: Refer to previous “Balancing” chapter

7.1.5 Power up – Checking correct connection

Make sure the 2 front switches are in the upper position (brakes active) and turn ON the control box via the red switch (located behind the box).

At this stage, the two 15 pins connectors should light up in Green (DEC channel) and Blue (RA channel).

Warning: If one of them is blinking Red, switch the box off and make sure all connectors are correctly inserted in the slots. If after connection check the light continue blinking in red this means a default has been detected in the position sensors of the mount (caused by an impact on the mount), no manual intervention is possible, please contact retailer.



7.2 Software installation & mount setup

The NOVA mount is controlled by dedicated software running on a PC platform (Not MAC support for now).

The minimum requirements for the PC computer being:

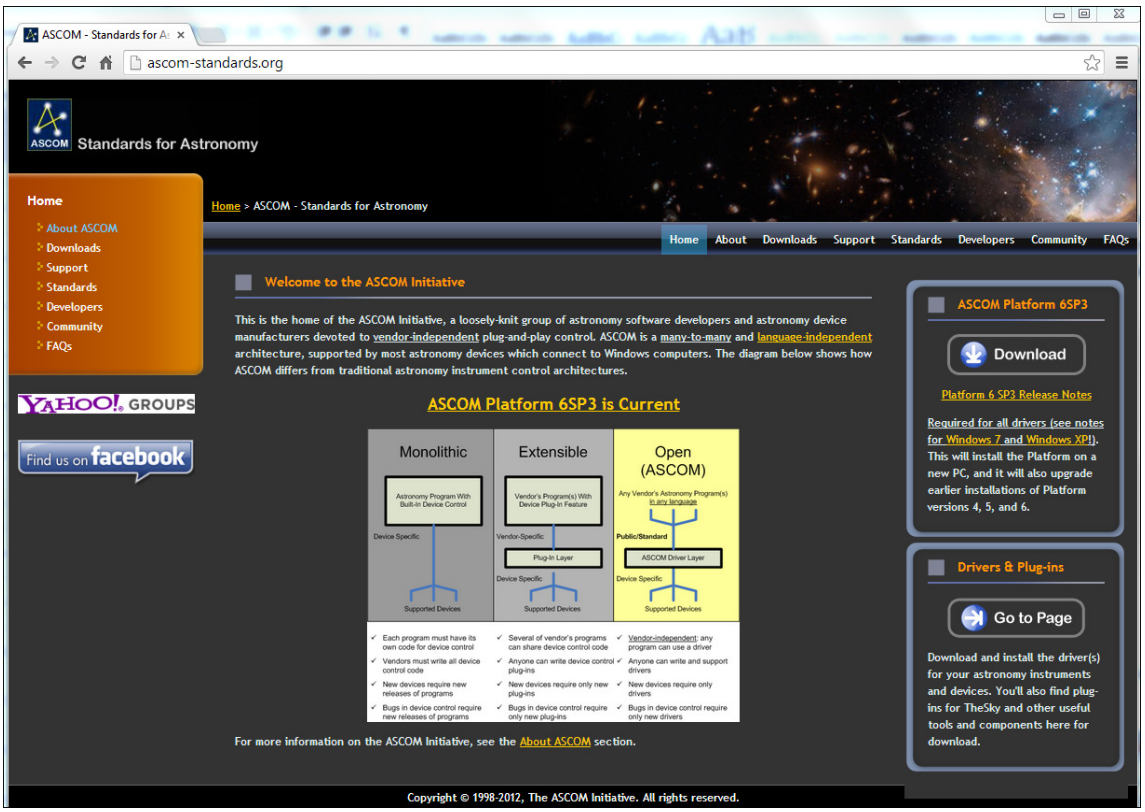
- OS : Windows XP to Windows 8.1
- Pentium processor
- 512 Mo Ram
- 1024x768 pixels screen resolution
- 100 Mb Ethernet port
- TCP IP v4 installed
- USB 1.0 and above

No computing power is required a simple Zbox or NUC PC can do the job.

7.2.1 ASCOM platform

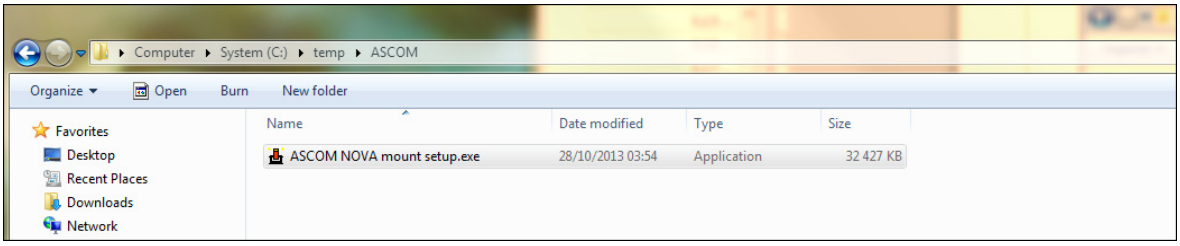
To ensure high-level communication between the mount software and advanced PC control sky chart software, the ASCOM platform needs to be primarily installed.

Go to: http://ascom-standards.org/ and download and install the last updated version.

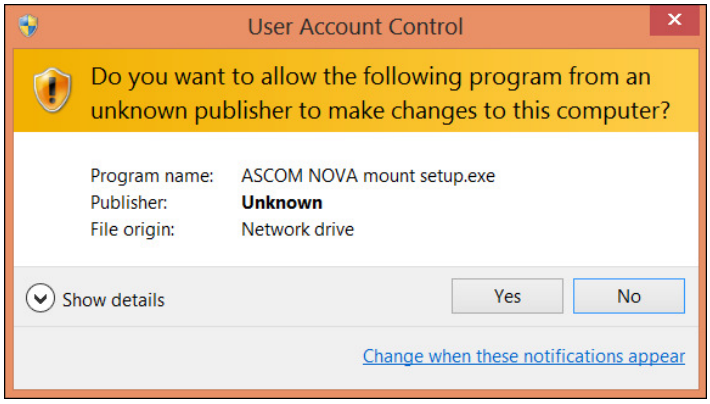


7.2.2 Nova mount software

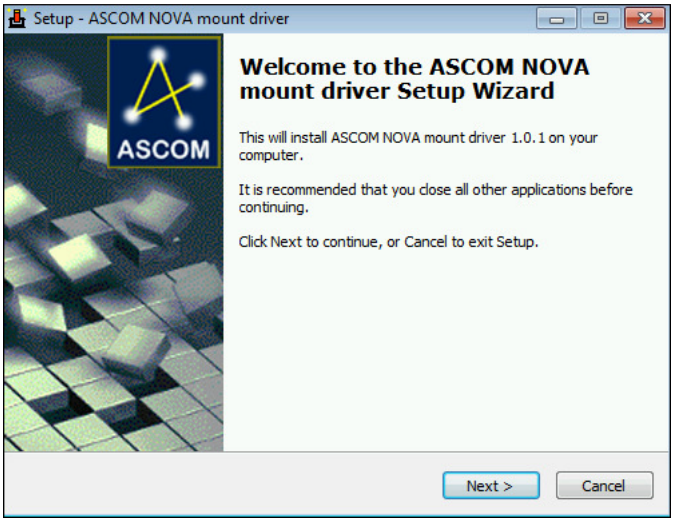
Once the ASCOM platform is installed to the PC, insert the provided CD-ROM or USB key and run the installation as a standard PC application by double clicking on the "***Ascom NOVA mount setup*** " software.



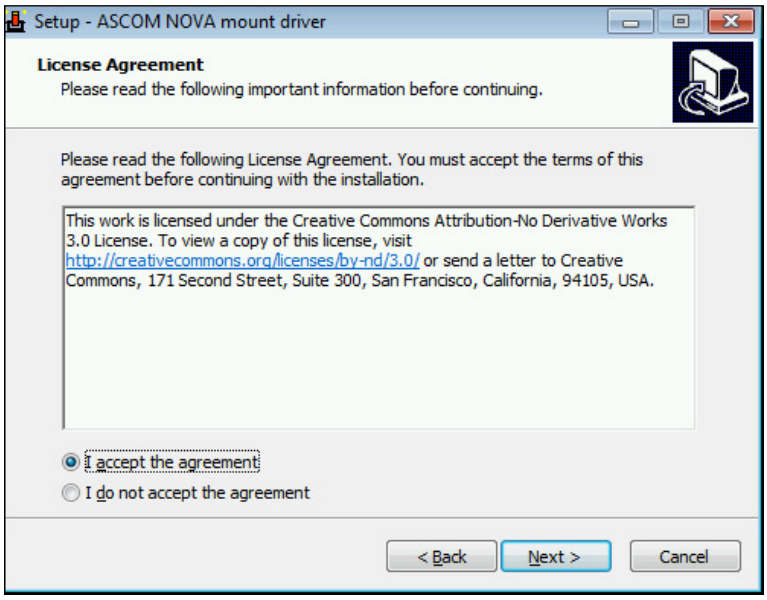
Please follow all installation steps, and click "***Yes***" on the next window:



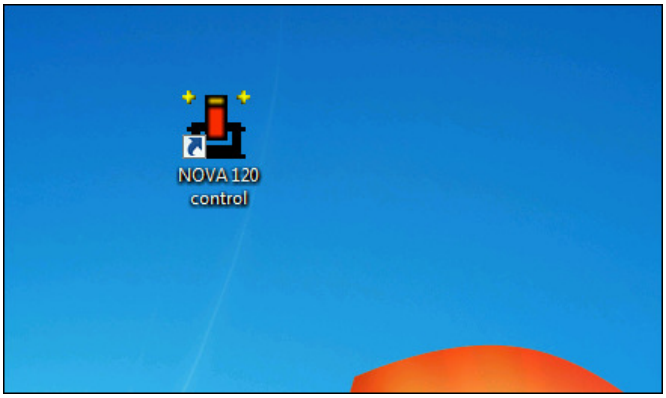
Click "***Next***"



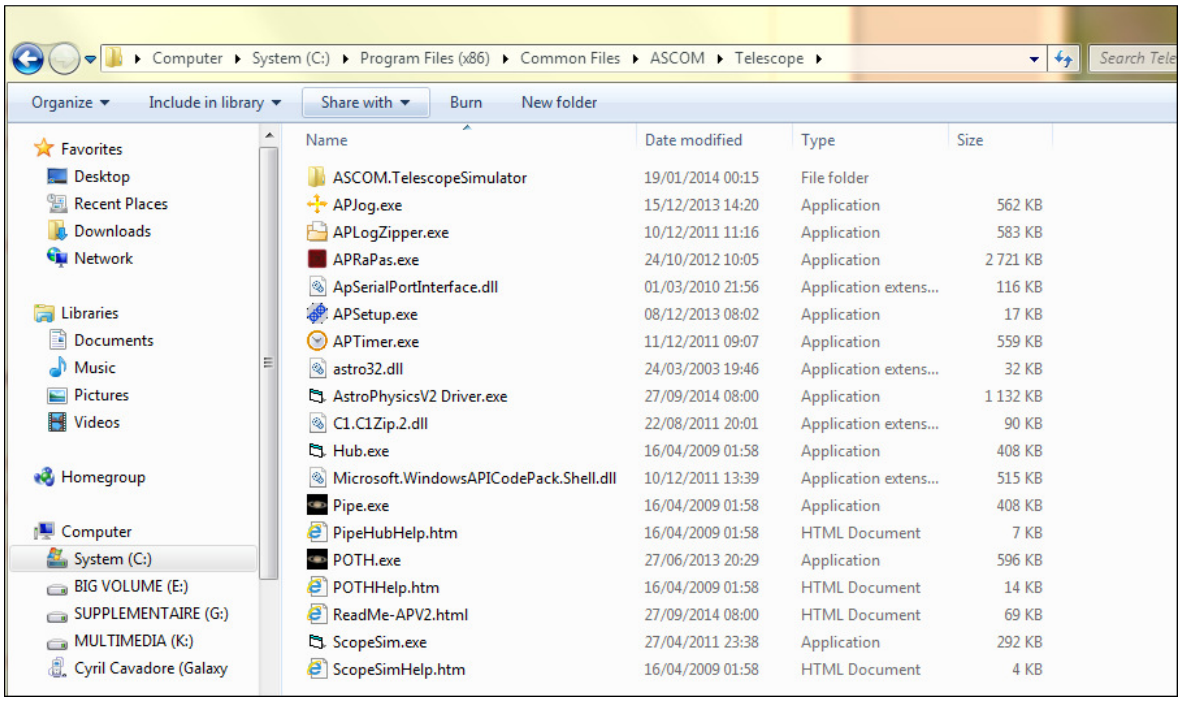
Click "***I accept the agreement***"



Once installed, this desktop shortcut has been created.



Otherwise the program can be launched from the following directory:



By simply double clicking on the “DDR_ASTRO_ASCOM_control.exe”.

Note:

This software is ***mandatory to use the NOVA mount***. It can be use by itself (in a standalone mode) but can also be controlled by other ASCOM compatible software’s such as:

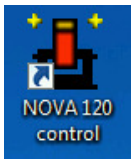
PRISM (from ALCOR-SYSTEM), TheSky, Carte du Ciel, Maxim-DL, ACP, CCD Commander, …

We suggest getting familiar with the mount and its standalone software before trying to control the mount via a third party application as listed above.

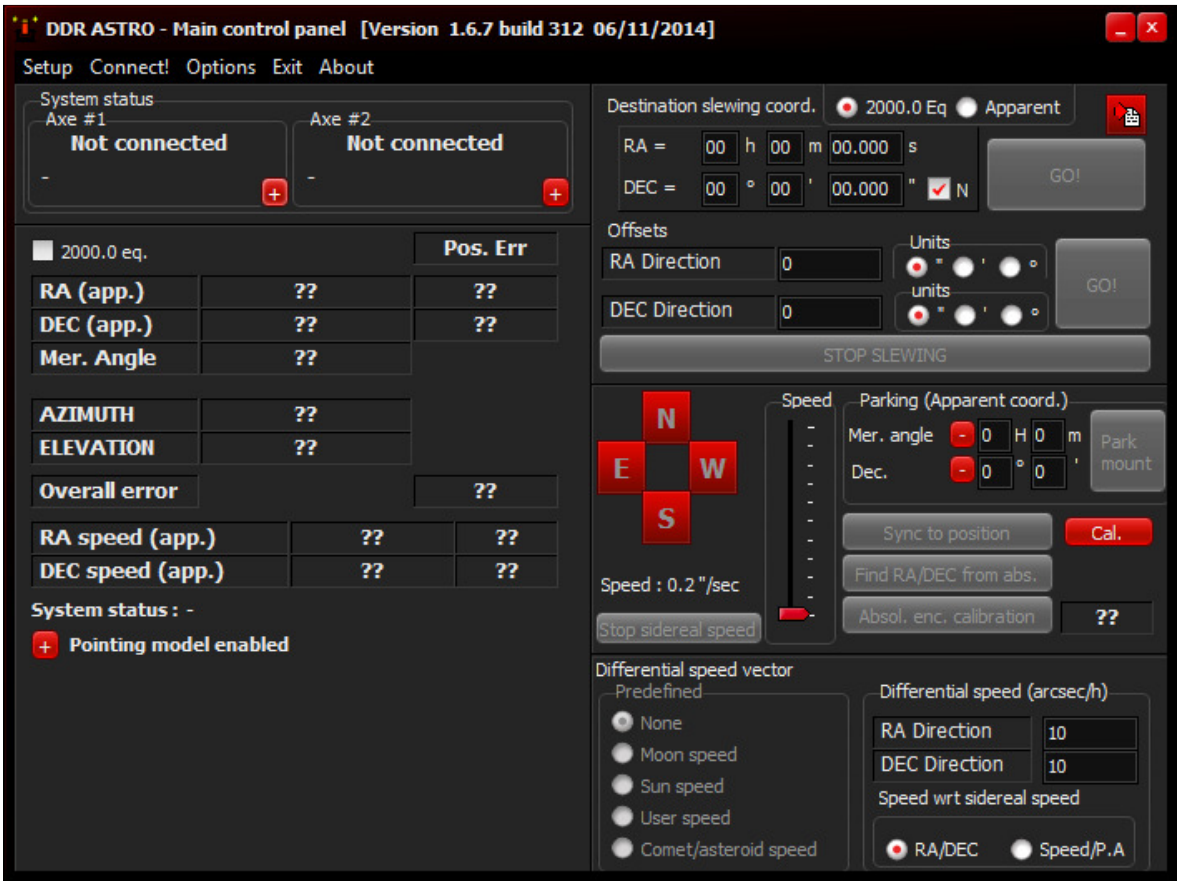
7.2.3 Nova mount software primary Setup

Before using the mount with any other third party application or after any location change of the mount (geographical), this setup process must be performed.

To do so, go through the following steps:

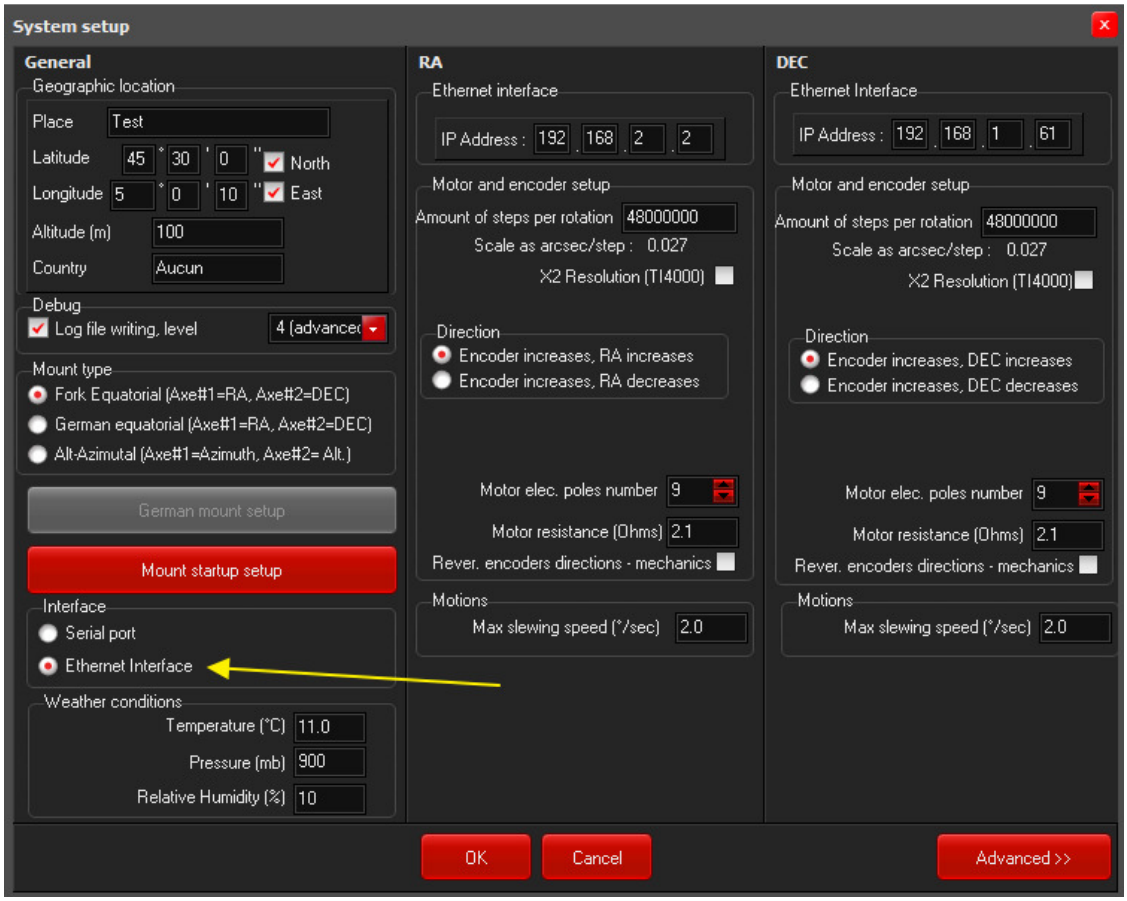
Start the software by clicking on the program icon 

The following screen appears:

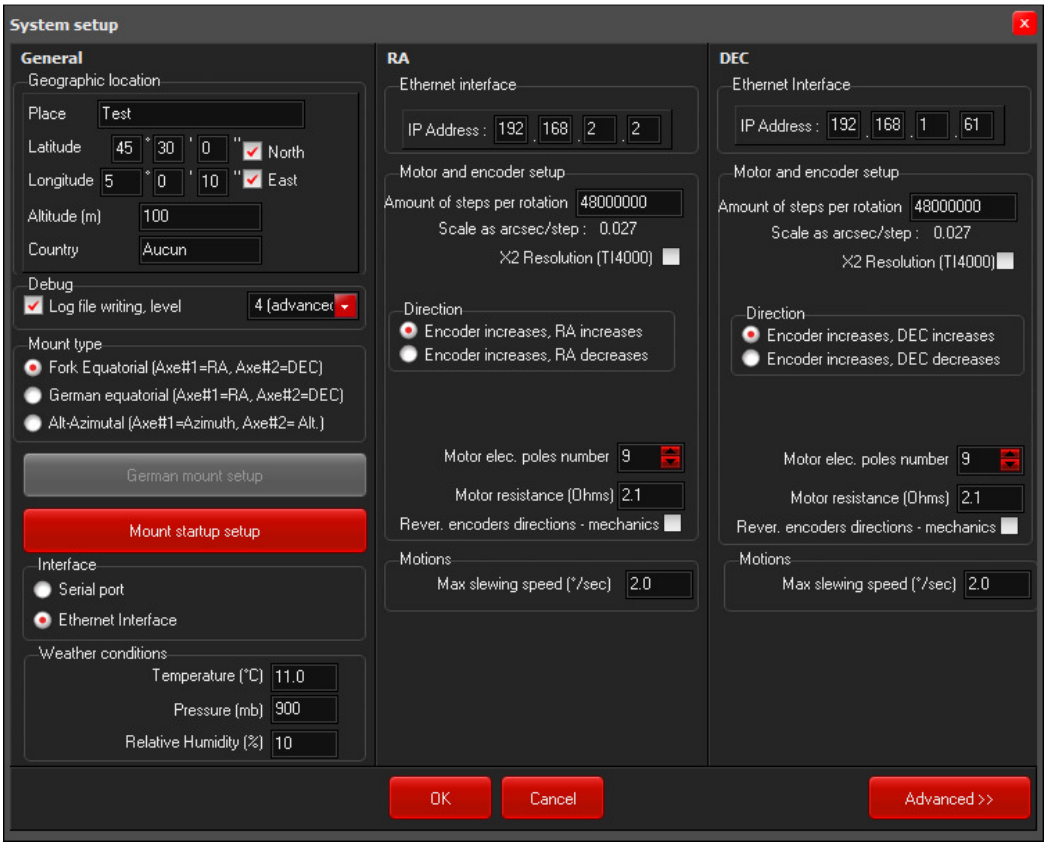


Go to "***Setup***" menu and click on the "***System setup***" menu item.

Choose "***Ethernet Interface***"



The mount controller uses <u>two</u> IP addresses to control the 2 axis (RA/DEC). By default the IP addresses are set to: **192.168.1.60 & 192.168.1.61**

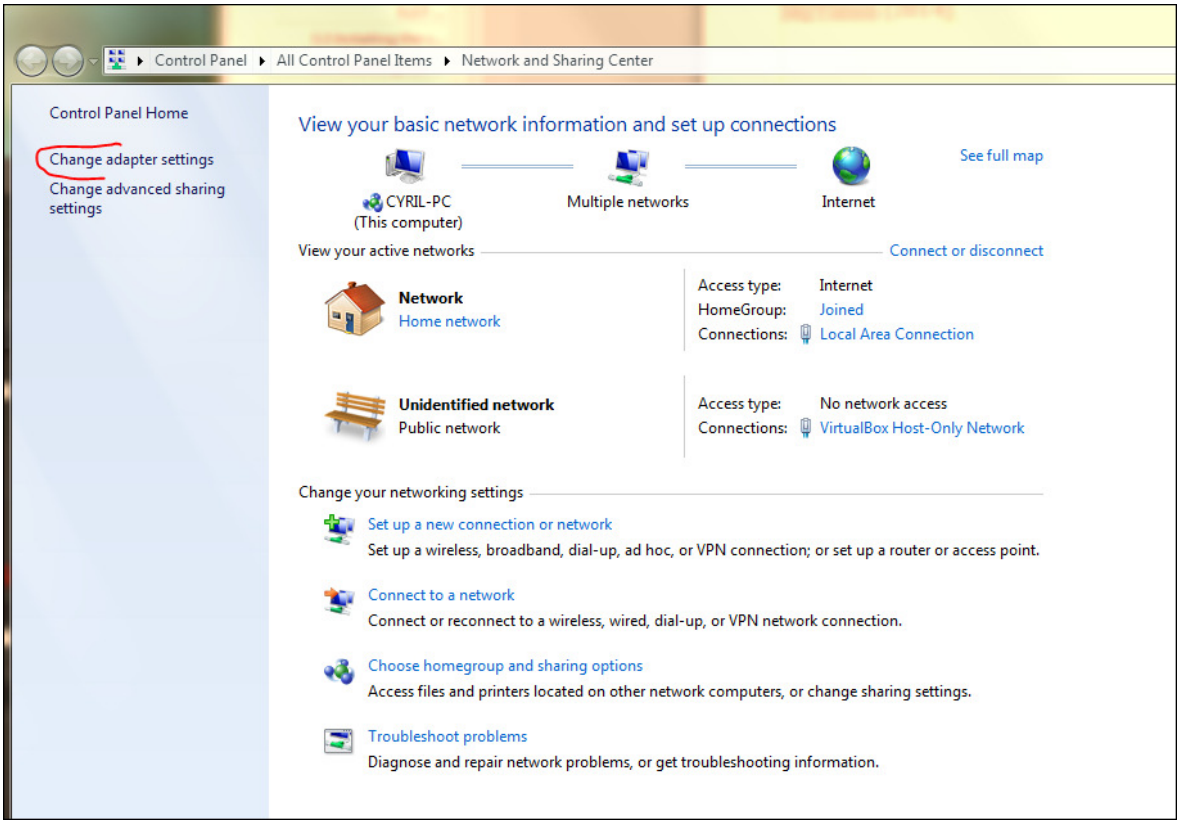


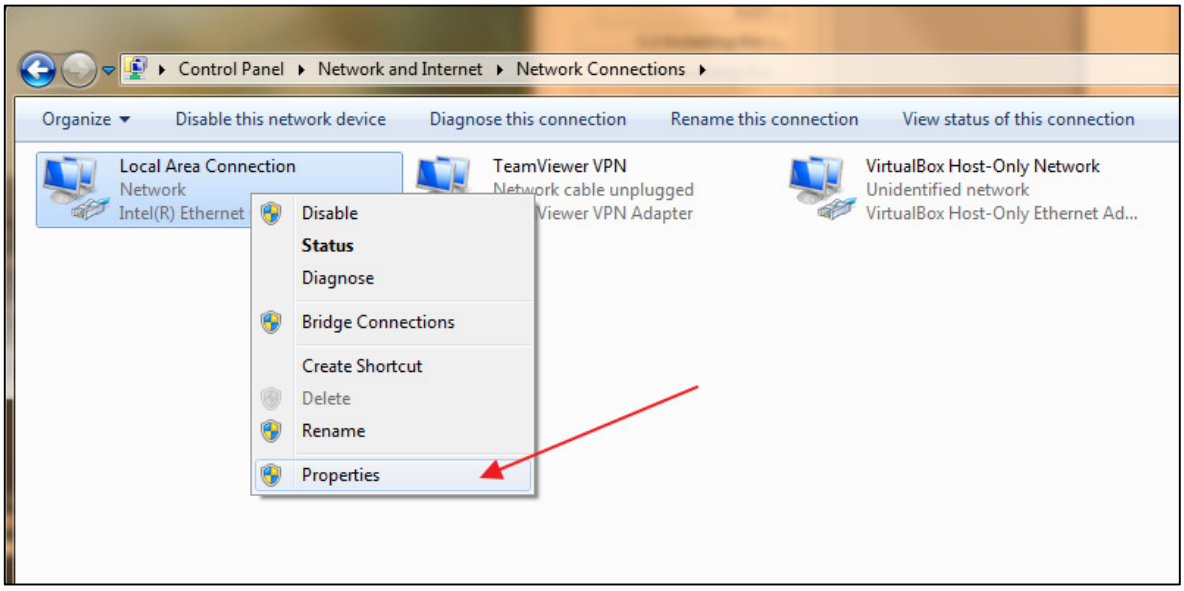
To change IP addresses of the mount controller box, please see appendix.

To prevent from any conflict between the mount software/controller and your Local Area Network (LAN) you must make sure that none of LAN IP addresses of any device within this LAN are the same from the one used by the mount controller box.

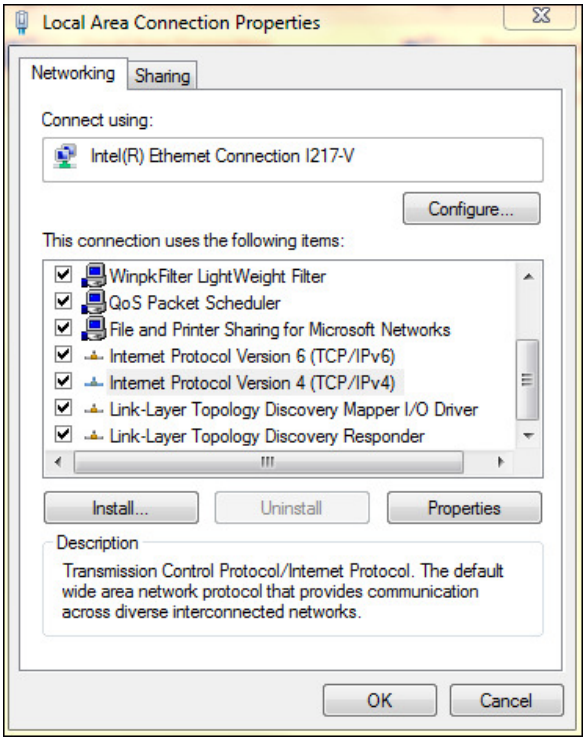
The PC that controls the mount must be within the same subnet as the mount controller IP addresses.

Regarding the PC that will control the mount, go to "***Control Panel***" / "***Network and sharing center***". Then click on "***Change adapter settings***". (This path is only valid for Windows 7 and upper)

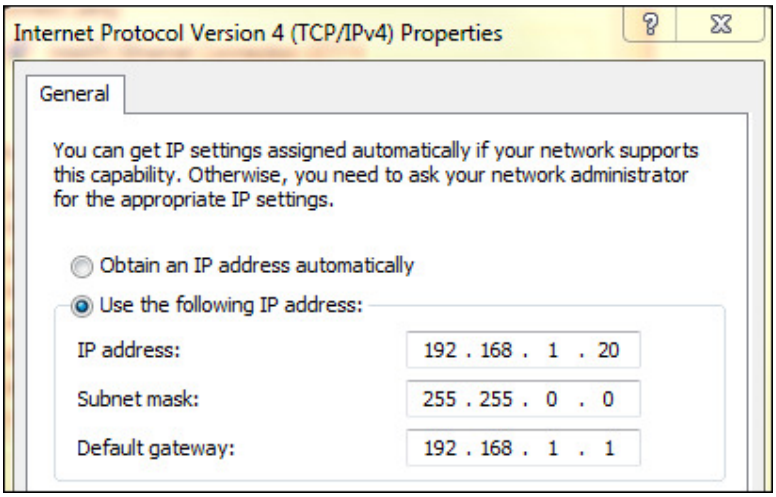




Open properties of the TCP/IPV4 Item.

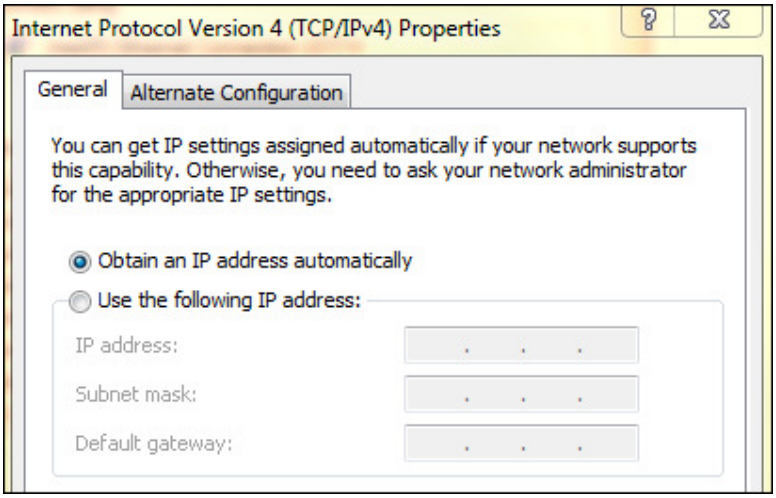


You now need to ensure that the IP address in use by your PC is different from **192.168.1.60 and 192.168.1.61, but must be on the 192.168.1.x subnet, be as follows for instance:**



You can use fixed IP address for your PC or use DHCP (Dynamic IP address DHCP). But ensure that the provided IP address by the DHCP server will never be the same as the two one used by the controller!

The mount controller cannot use DCHP IP address scheme, but you can use DHCP address scheme for your PC.



Warning: Again, the IP address must be different between the software and the LAN settings ***BUT*** the sub-network mask must be compatible.
Example: if the LAN IP is 192.168.002. XXX then the mount would not be seen.

In this case you can change LAN IP address or the IP addresses in use in the NOVA software as shown above.

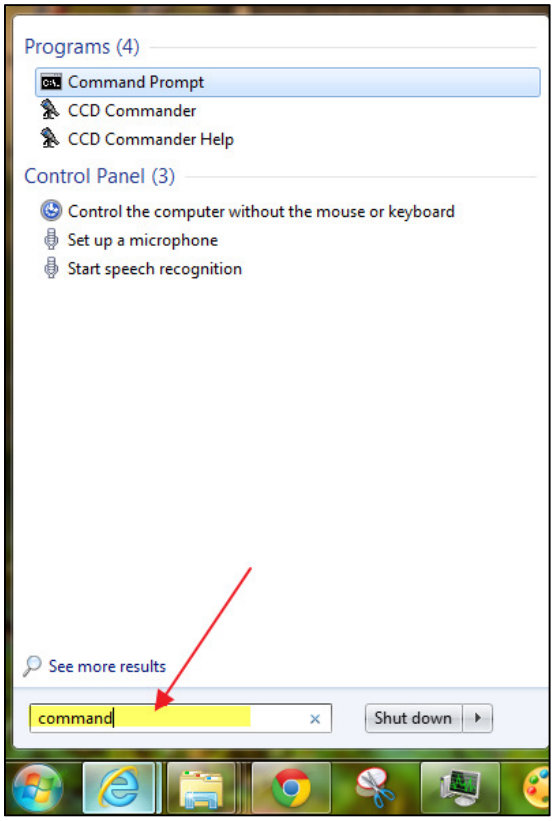
Once these items checked, it is possible to check correct communication between the PC and the mount.

7.2.4 Check connection between PC and mount

This step allows a quick validation of the communication between the PC and the mount.

Turn the control box “ON”.

In windows launch the “***Command***” console.



Once the console opened, type the following command:

« ping 192.168.1.61 –n 10000 »

```
C:\Users\cavadore>ping 192.168.1.61 -n 10000

Pinging 192.168.1.61 with 32 bytes of data:
Reply from 192.168.1.61: bytes=32 time=9ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255
Reply from 192.168.1.61: bytes=32 time=3ms TTL=255

Ping statistics for 192.168.1.61:
    Packets: Sent = 10, Received = 10, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 9ms, Average = 3ms
Control-C
^C
C:\Users\cavadore>
```

The mount is supposed to “reply” as above:

« Reply from 192.168.1.61 : bytes=32 time=9ms TTL=255 »

The other axis can be tested by typing in the following command:

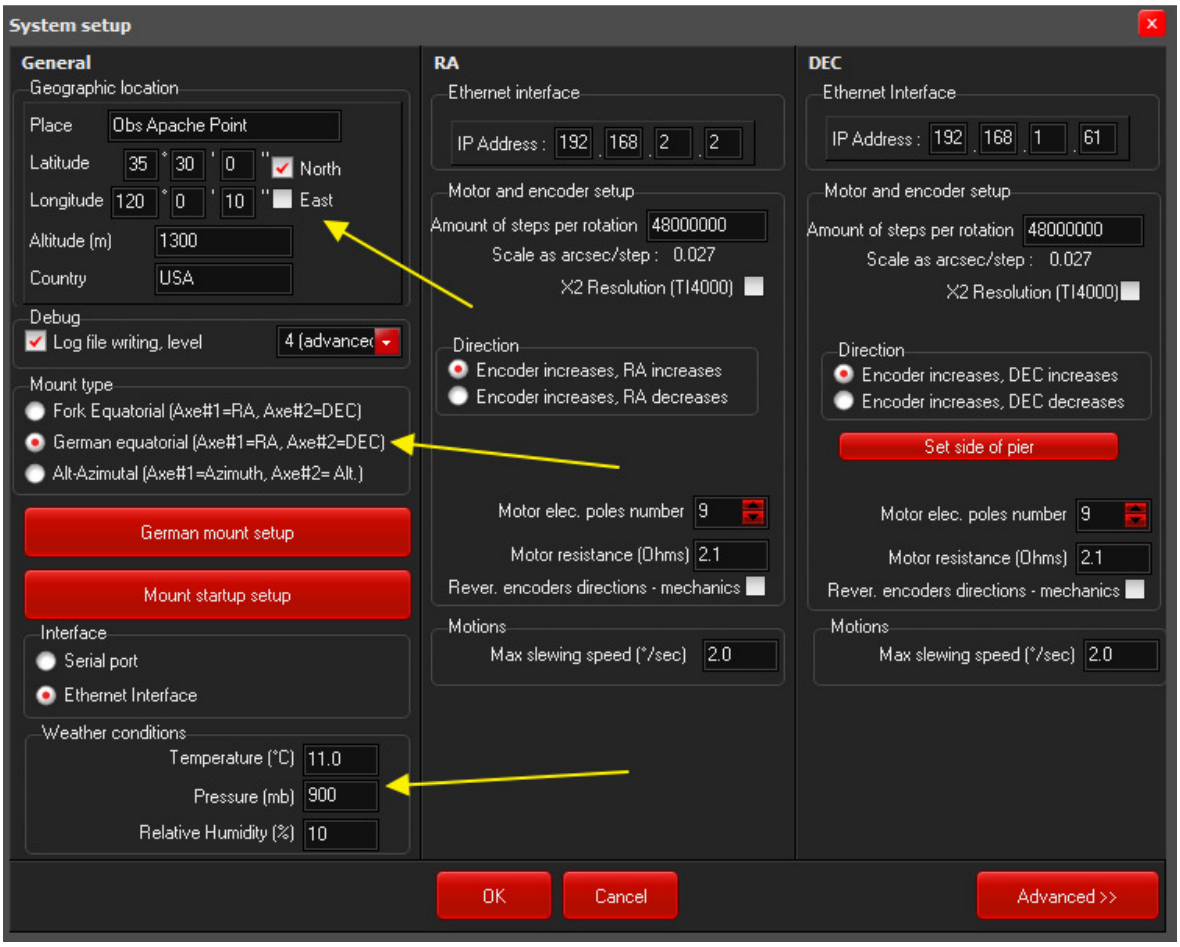
« ping 192.168.1.60 –n 10000 »

<u>Note:</u>

To change the IP addresses of the RA & DEC axis (other than 192.168.1.60 and 192.168.1.61), the modification must be achieved in the control box via a documented procedure.

7.2.5 Nova mount software setup

At this stage the geo-localization of the mount must be entered in the software.



In case of use of a NOVA 120, let the amount of positions per turn set to 48,000,000 for both axis and let the checkbox "***Encoder increases, RA increases***" checked (and same as DEC).

Let the amount of engine poles and resistance to be 9 and 4.1 Ohms.

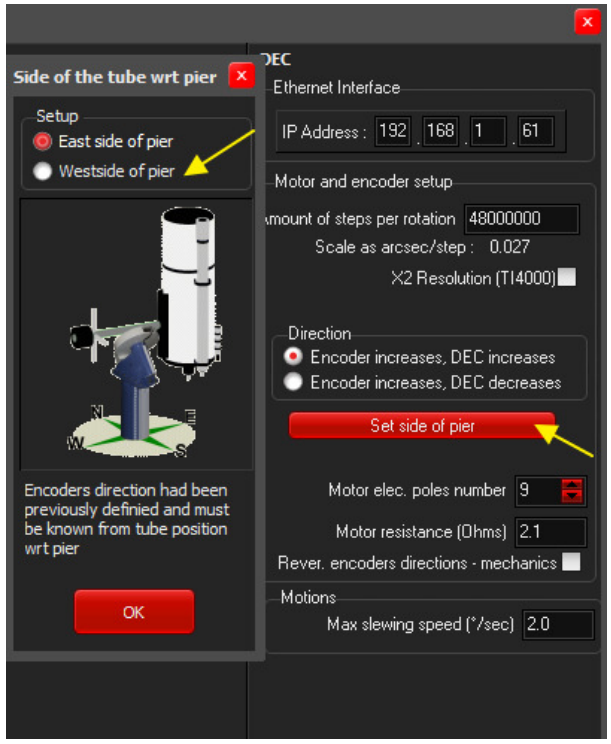
To start safe with the mount, let a maximum pointing speed of 2°/sec (despite it can go far much faster!).

<u>Warning:</u>

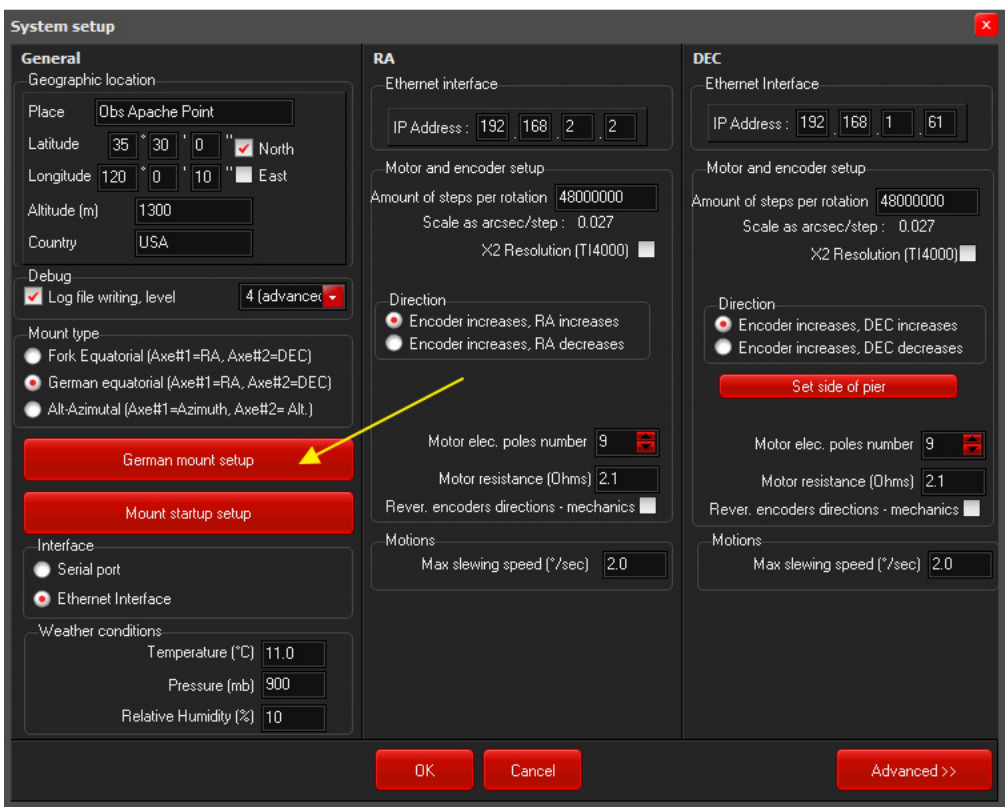
The encoder rotation direction for the DEC axis for a German mount is only valid if side of pier has been defined!

In case of a German mount, NOVA 120, click on "***Set side of pier***" button and make sure the checkbox "***West side of pier***" is checked.

If mount supplied after Dec 2014, X2 resolution TI 4000 must be checked and steps by rotation doubled to 96,000,000



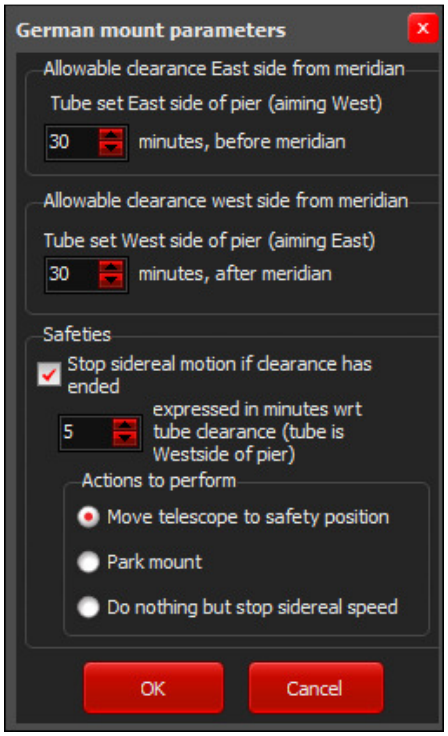
Finally click on ***"German mount setup"***



This screen defines the motion limits of the mount.

- The margin before and after the meridian used for the mount meridian flip to happen.

- A safety that prevents the mount to collides with the pier when the mount is near the meridian in sidereal tracking. In this case, the mount will stop and prompt the user to aim a safe target direction, to park the mount or to stop sidereal tracking.



7.2.6 Preliminary precautions before software connection to the mount

<u>Warning:</u>

If the mount has triggered a fatal error, a reboot (Switch OFF and ON) of the control box is required and a restart on the reference marks (**Mode #1**) is mandatory.

The restart on **mode #4** is also possible; please refer to the relevant section.

In case of error (most likely the mount has hurt something, or close loop PID parameters not being appropriate) the following message will be displayed (at least the axis RA-DEC responsible or the error is reported):

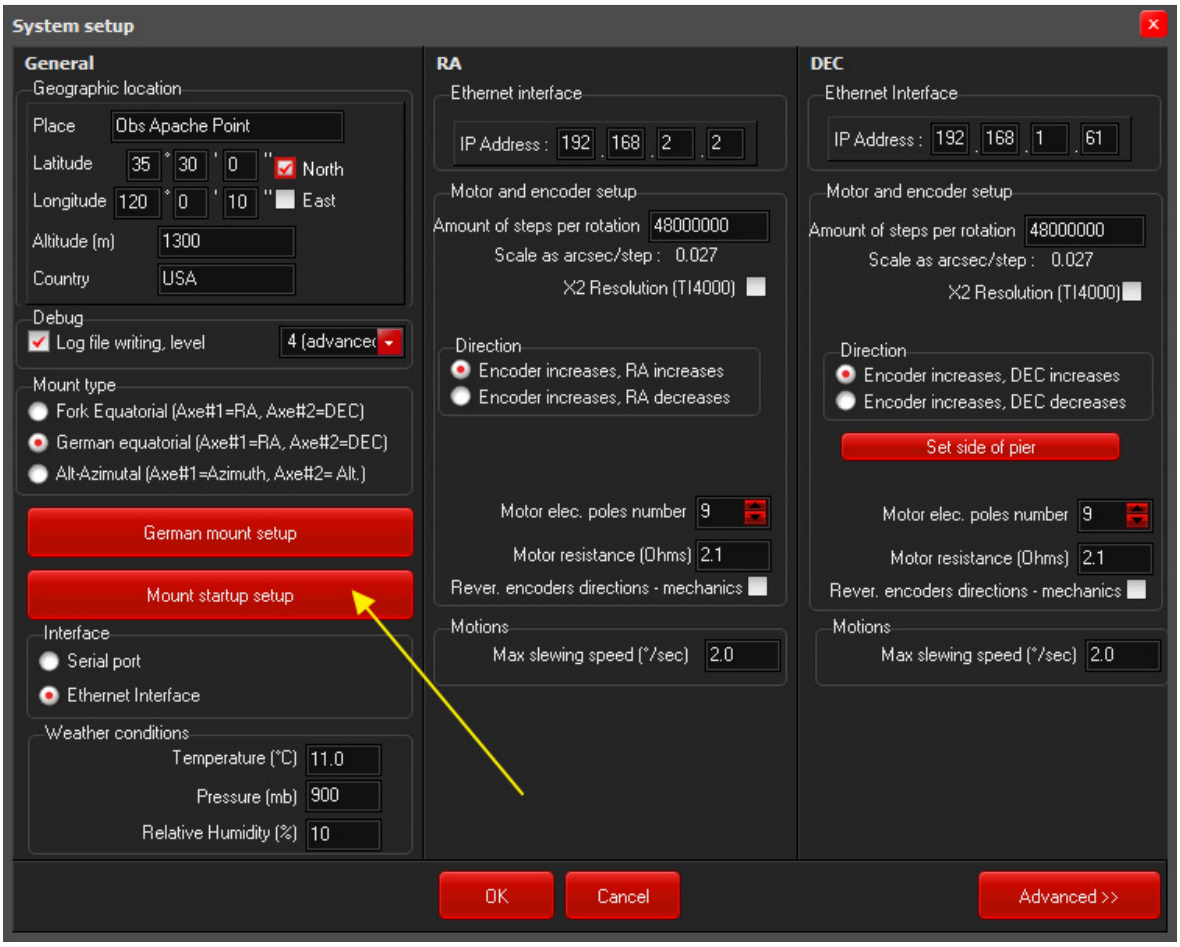
"An unknown error has occurred! The connection with the system has been halted, it is highly recommended to power cycle the control box, re-position the mount & telescope to the reference marks and to re-connect".

The root causes of these messages can either be wrong parameters, wrong starting mode, mistake on the engine sensors, the mount that has hurt the pier…
These root causes will be mentioned in the upcoming section.

7.2.7 Starting modes of the mount

This section is very important to understand and read. A direct drive mount is different from a gear/worm old fashion mount. If the procedures are not strictly applied during start-up, there are important chances that the mount turns back to "**Safety mode**" making it unusable.

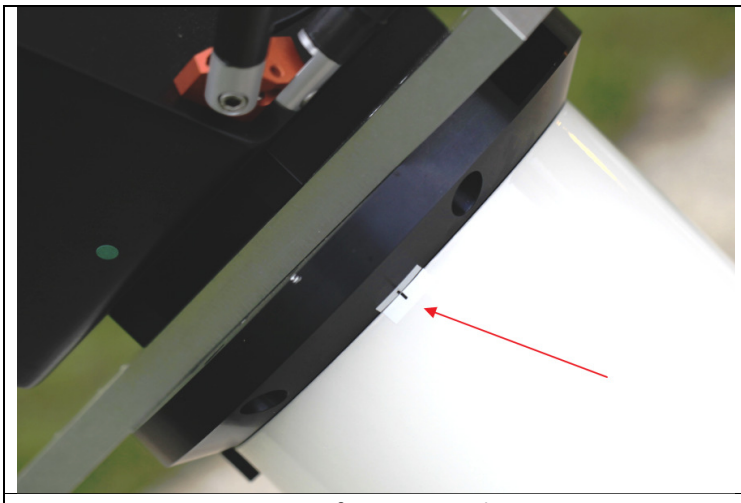
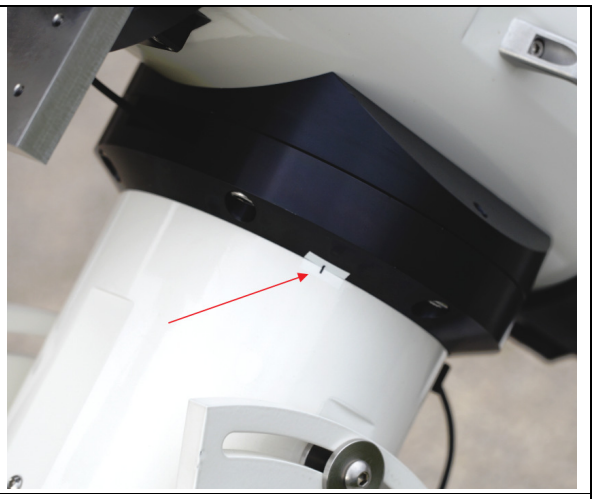
Click here:



The mount can follow 4 start modes:

7.2.7.1 Start Mode #1

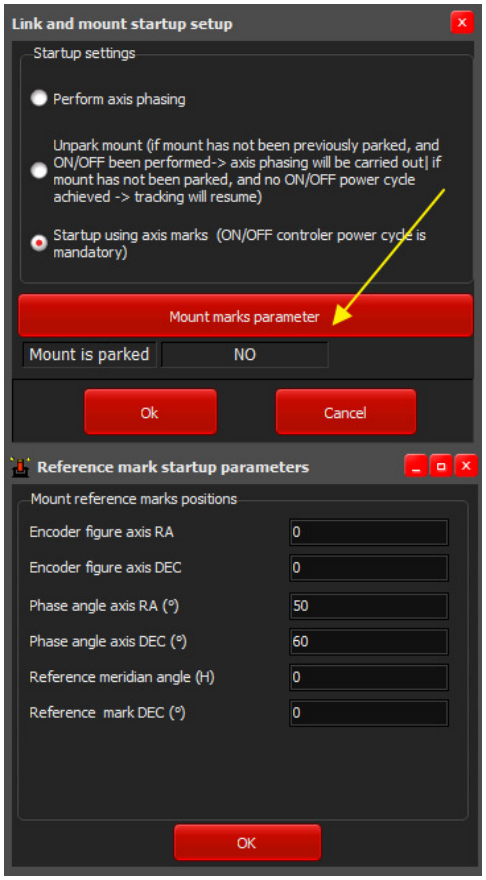
Start with reference marks aligned.

	
DEC reference mark	RA reference mark

The mount start-up in this mode is only possible if the control box has been power cycled. If the control box is already powered and if the mount has already been connected to software this starting mode will not be applicable. So be aware.

It is highly recommended to balance the 2 axis of the telescope to go through this step.

To start in mode #1 click on "***Startup using axis marks***" as follows:



Let all the encoder values of DEC & RA set to “0” (or with any value this doesn’t matter)

Enter the values of the phase angles RA & DEC.

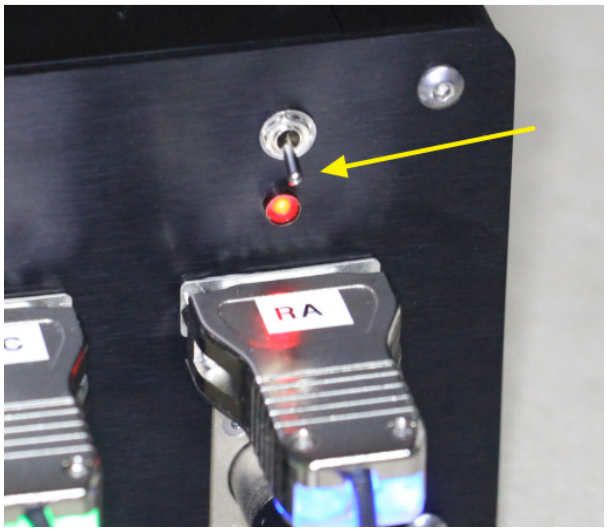
Enter the meridian angle of the marks. These values will be kept forever and never change in the course of the time.

These values are provided on the acceptance document coming with the mount from the manufacturer. These values can vary from a mount to another. It is possible to refine these values once the mount is positioned.
Let’s now manually set to mount to the reference marks.

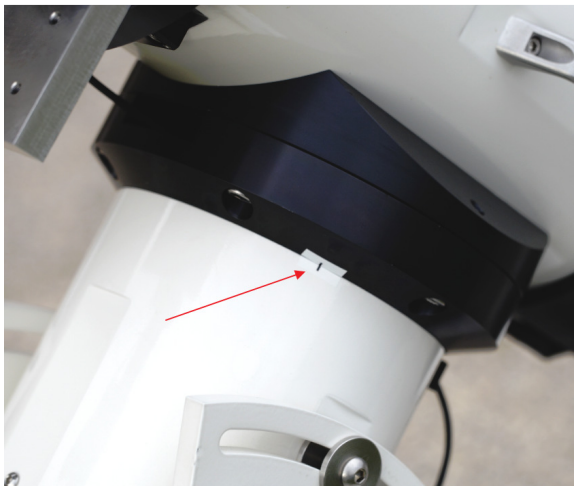
Switch the control Box OFF (if not already done).

Switch the control box to ON

Release the brake of the RA axis by pulling down the switch located above the RA connector, a red LED lights up.



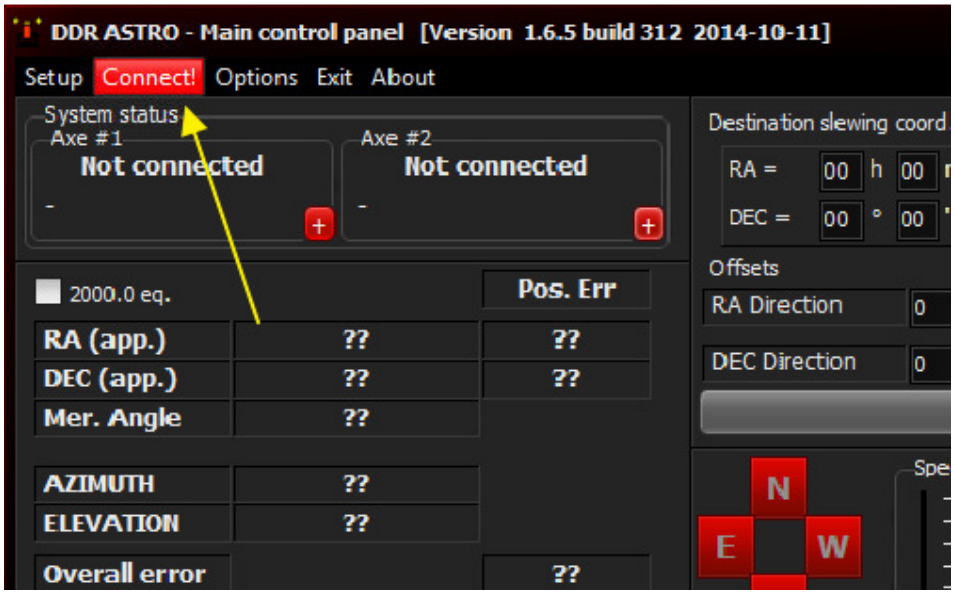
Rotate the mount to bring the RA axis on the reference mark (accuracy can be +/-1 mm).

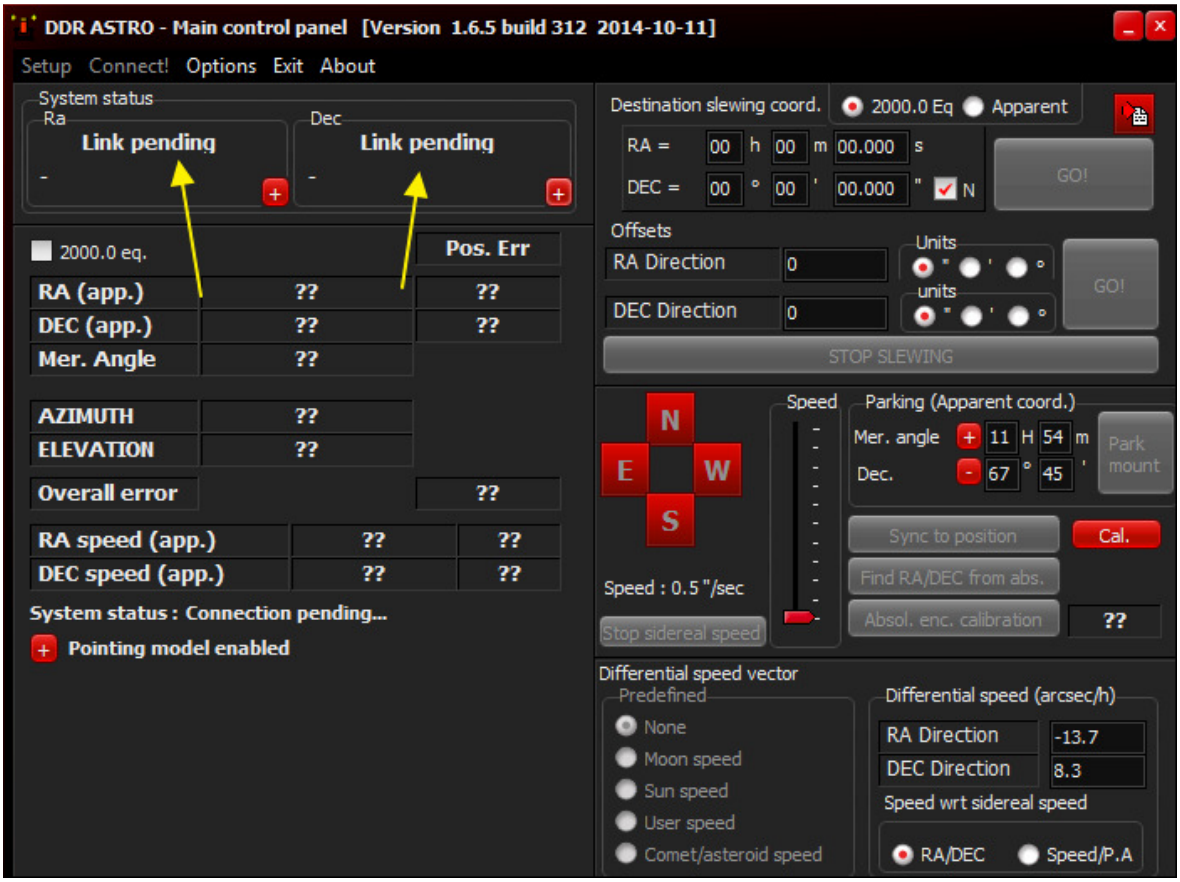


Re-engage the brake by pulling up the switch located above the RA connector (LED turns off).

Run the same procedure on the DEC axis.

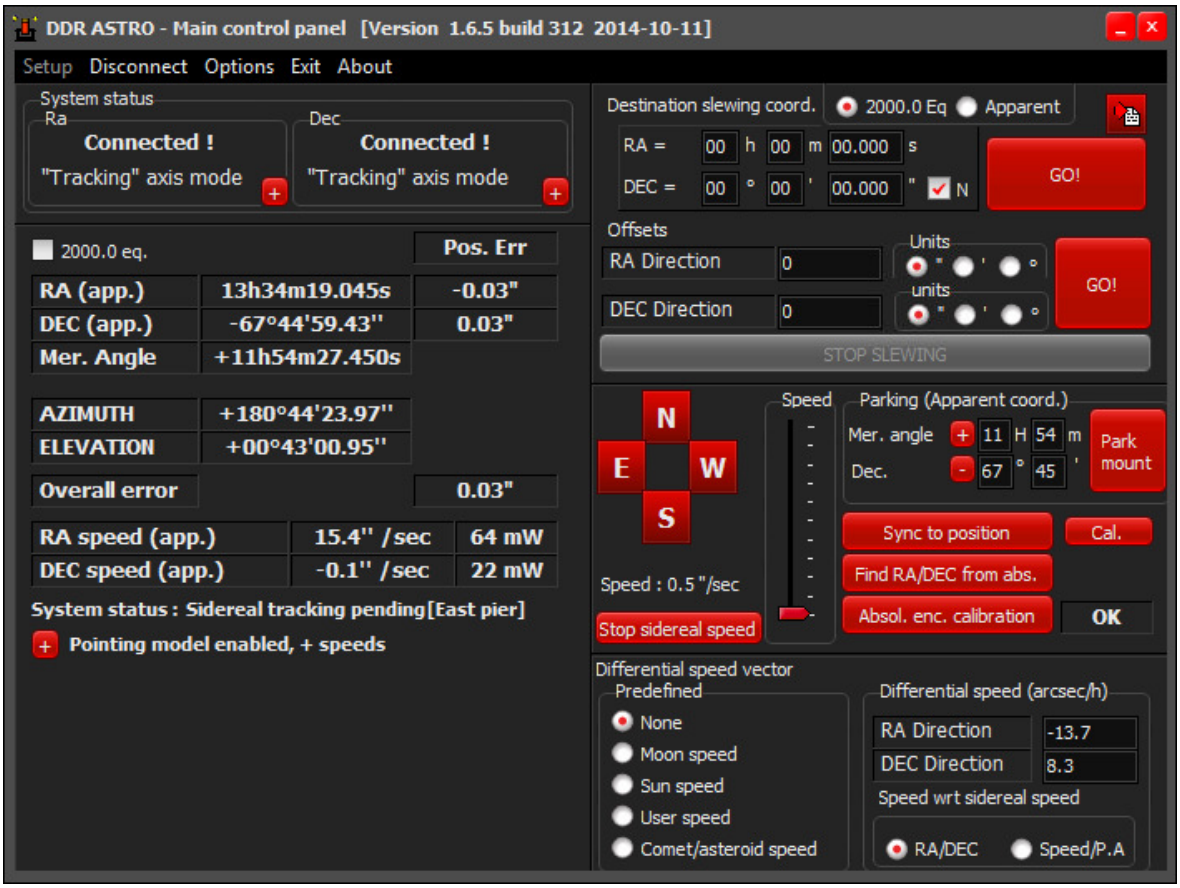
Once these operations carried out, come back to the main control panel (software) and click to "***Connect!***"





The following message is displayed to confirm that the mount has been positioned to the reference marks.

Once connected, the control panel changes to this display mode (buttons are “de-grayed”).



The engines turns on (a specific noise is supposed to be heard) and the brakes are automatically released, the mount is ready to be used.

Note:

In this starting mode, the positioning of the mount is not very precise (1 to 3 °) and on sky calibration is recommended.

Warning:

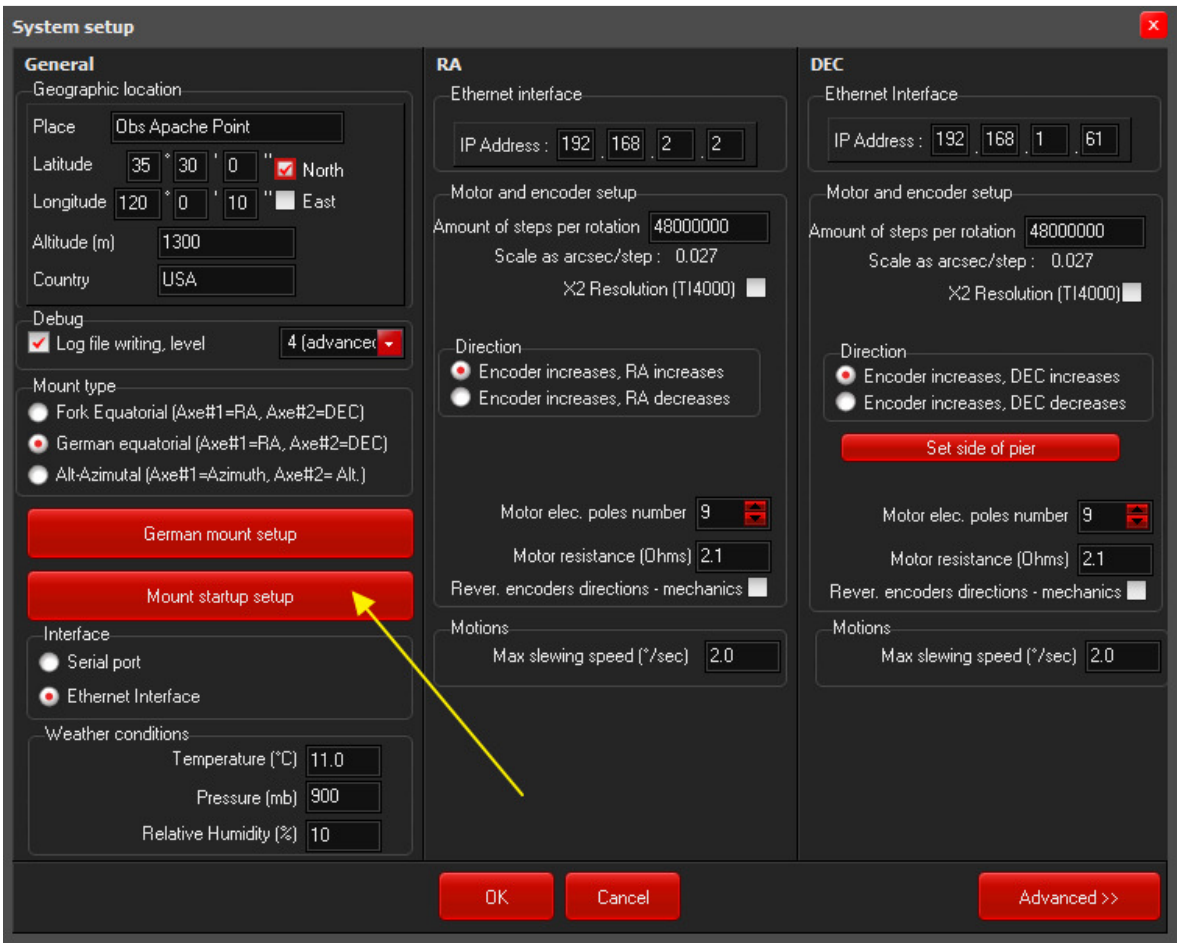
- If the mount is not located to the reference marks or if the settings of the marks are not correct the engines will turn off and the brakes will be re-engaged and the mount will change to safety mode.
- If the control box has been turned off unexpectedly with telescope not in the parking position, the mode #1 (or eventually #4) will be the mode to use on next startup.

7.2.7.2 Start Mode #2

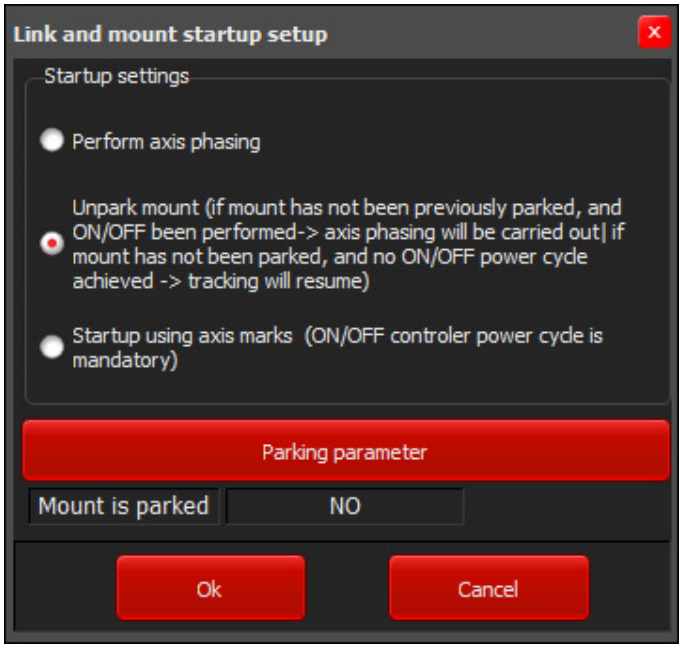
Start-up after mount has been parked.

To use this starting mode, the mount needs to have preliminary been set to parking position with the DDR ASTRO software or with another third party software handling this feature. (Please refer to the “Turn the mount Off” section for more information).

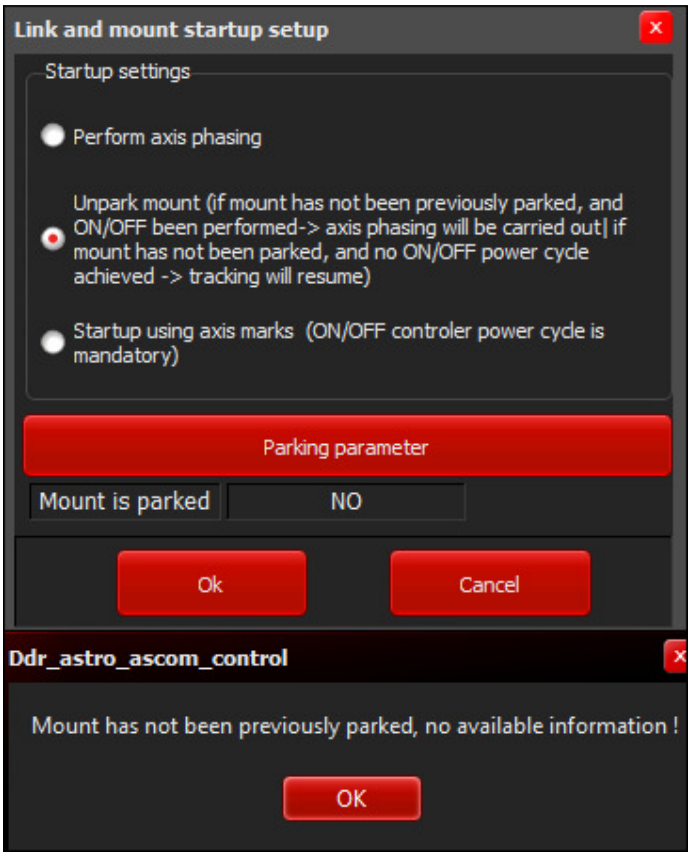
To know whether the mount has been previously set to parking position, click on this button:



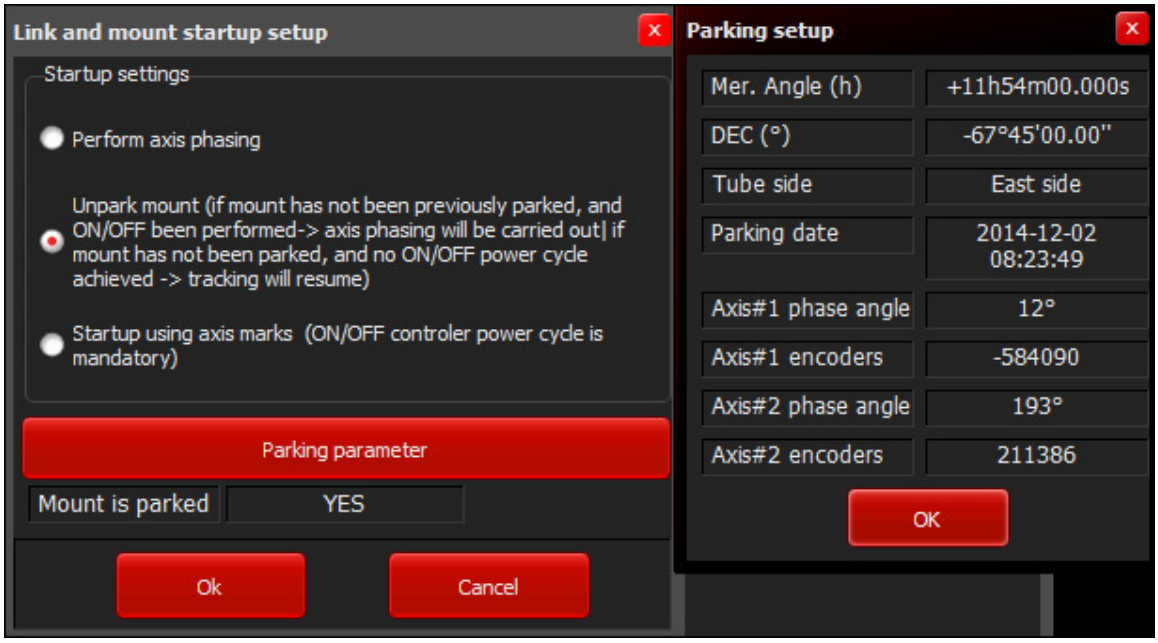
Then the second button from top:



The software can indicate whether the mount has been previously parked by clicking on the "***Parking parameters***" button.



If the mount has been previously parked the following information are displayed:



If the mount is connected in this mode, the telescope knows exactly its position in the sky.

Warning:

If the telescope has been parked and then manually rotated and re-positioned with the brakes released in a different position than the parking position, the start-up can cause an error. In this case, the start must be performed in mode #1 (reference marks).

7.2.7.3 Start Mode #3

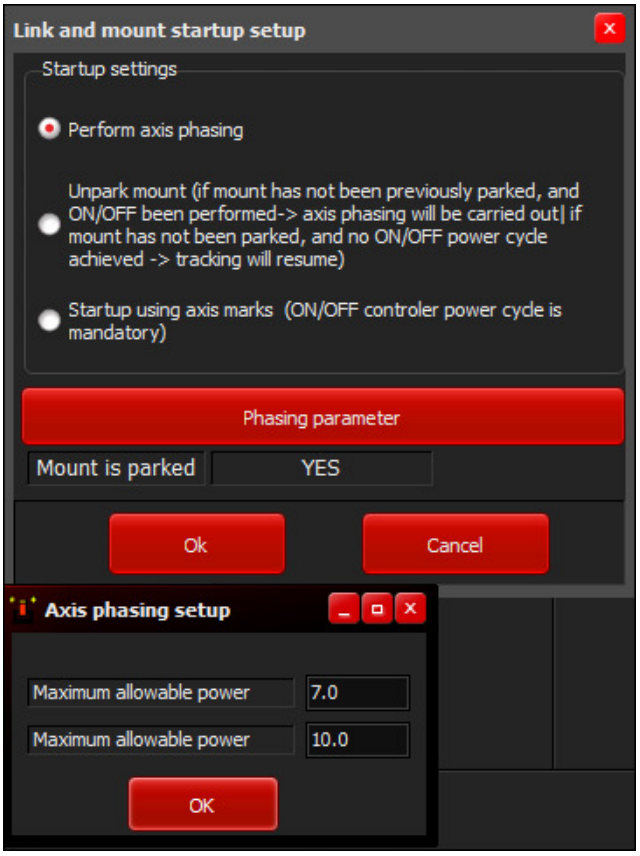
Starts in “resume mode” (Mount already in tracking or control box already initialized).

This mode cancels and workarounds the other three start-up modes (#1, #2 or# 4) if the software founds the control box already initialized, under tracking or in sidereal stop. This start-up mode is automatic.

This is the typical start mode used when the software has been normally closed (no errors and no parking applied) and the control box still under power.

7.2.7.4 Start Mode #4

This mode is supposed to be used only in case of power failure and lack of personal assistant to re-position the mount to the reference marks, preventing the start in mode #1. This is the mode to be used in remote operation in case of error.



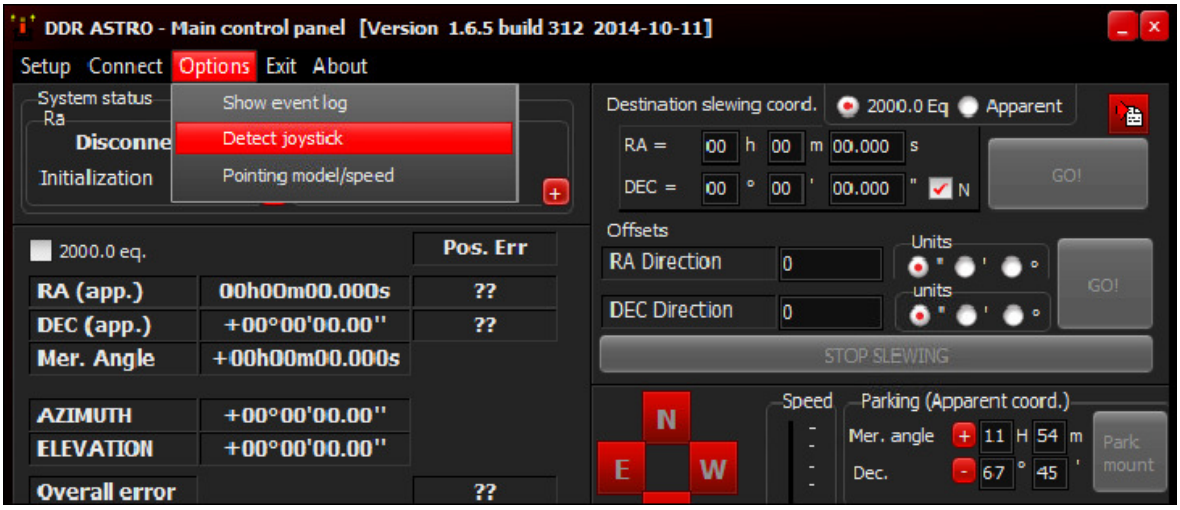
Warning:

- The telescope will move (couple of degrees) during this start-up mode. Several brakes activations and releases will be performed.
- This start-up mode can fail if the power range settings are not adapted (too small figures for instance). This would lead to the mount to turn in “Safety mode”. If it occurs, switch back to start-up mode #1 that will always works.

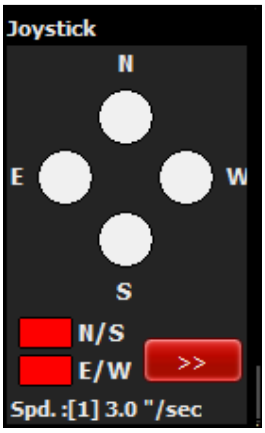
7.3 Using joystick (or manual hand paddle)

The joystick allows the free motion of the mount without having to stare the control software. The joystick can be plugged at any time on the USB port of the PC, even if the software is already connected to the mount.

In this case, it is enabled it as follows:

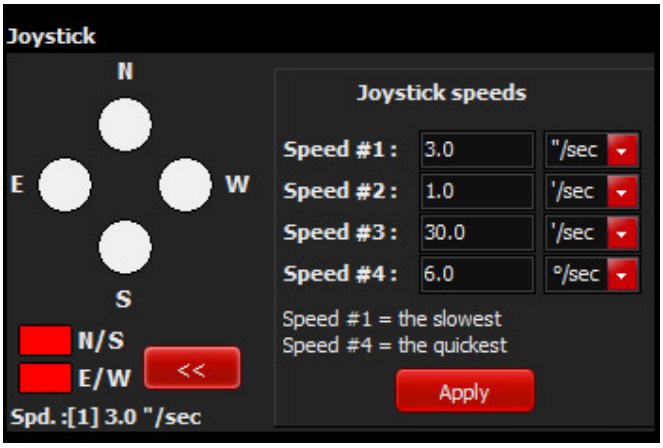


As soon as the joystick is connected, or after software launch if already connected, this form will be displayed:



It is possible to control the motion of the mount / telescope in 4 different directions (East, West, North and South) at 4 different speeds. This can be important for maintenance or visual observations.

The speeds (#1 to #4) can be changed by editing the "***Joystick speeds***".



Hereafter, there is a view of the joystick (actually a USB Xbox 360 controller, wired or wireless). This shows how the buttons works.

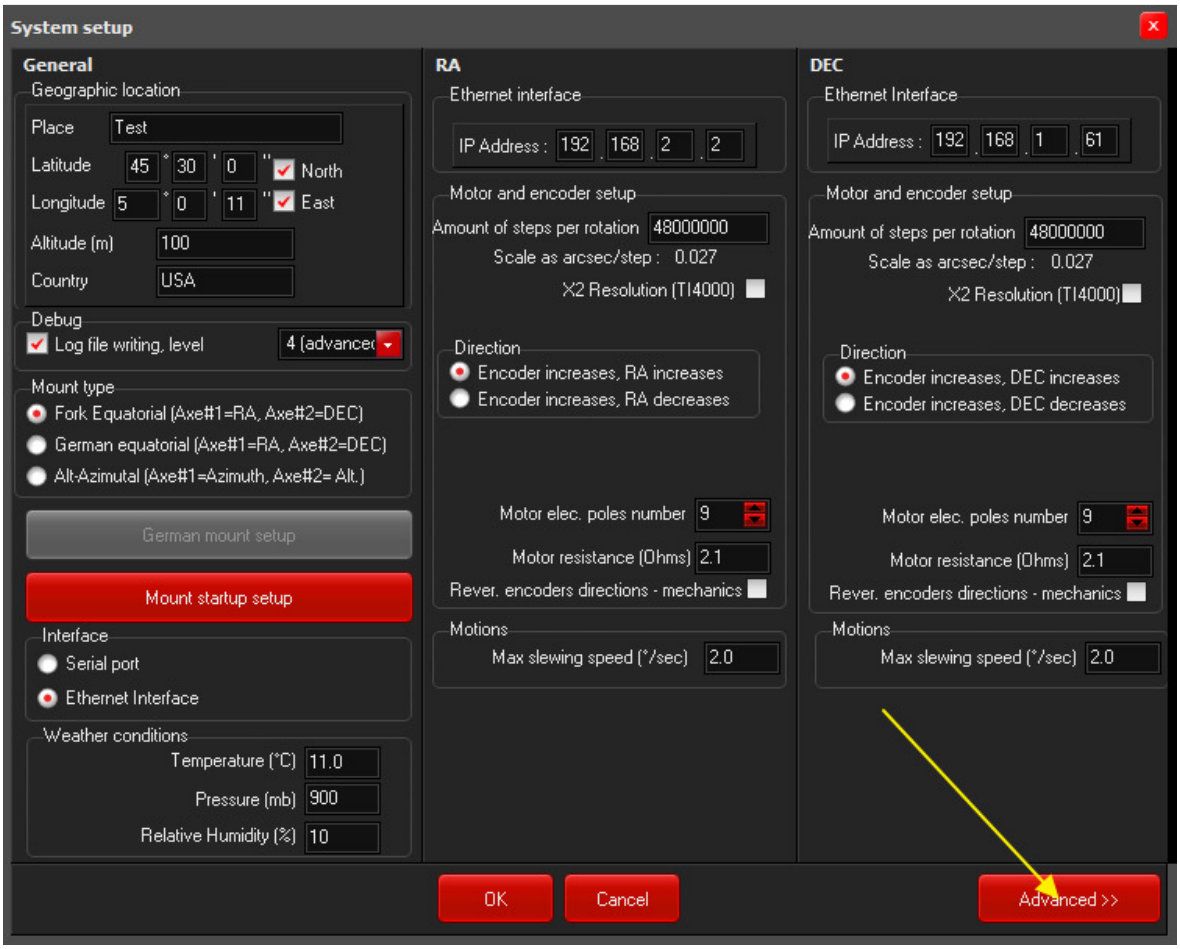
The current speed to be applied is set with the 4 color buttons: X, Y, A and B located top right of the joystick.

Speed	Joystick button
1 (Slowest by default)	X
4 (Fastest by default)	Y
2	A
3	B

<u>Note:</u>

The 2 other multidirectional joysticks on the controller are not yet assigned to any function but are planned to be in further versions of the software.

7.4 Advanced configuration



The advanced configuration allows editing the safety values that triggers the “Safety mode” (Turning Off the 2 engines and activating the brakes).

The safety mode can be triggered by various elements: An out of range force impact, wrong start-up settings or wrong engine encoder’s settings.

This parameter is given in coding positions. Here in the example, the value is set to 10000, meaning 10000 x 0.027”, equivalent to an impact or a tracking misalignment of 270” I.e. 4.5 arcmin. The form computes these figures anyway.

If this figure is set to a too low value, the mount will turn in safety mode at any little user manipulation on eyepieces, small impacts, or wind shake.

If this figure is set to a too high value, the mount could enter into bouncing motion according to the weight (or inertia momentum) of the supported devices.

The choice of the motion acceleration, expressed in degrees per squared seconds is important. For example a setting at 1.5°/ sec², means that after 1 second the mount rotated at a speed of 1.5°/s and 3°/s after 2 seconds.

If the value is too low, the telescope could be too slow in reaching it cruise speed on given targets.

If the value is too high, it could lead the mount to turn in safety mode because of PID not well set.

Warning:

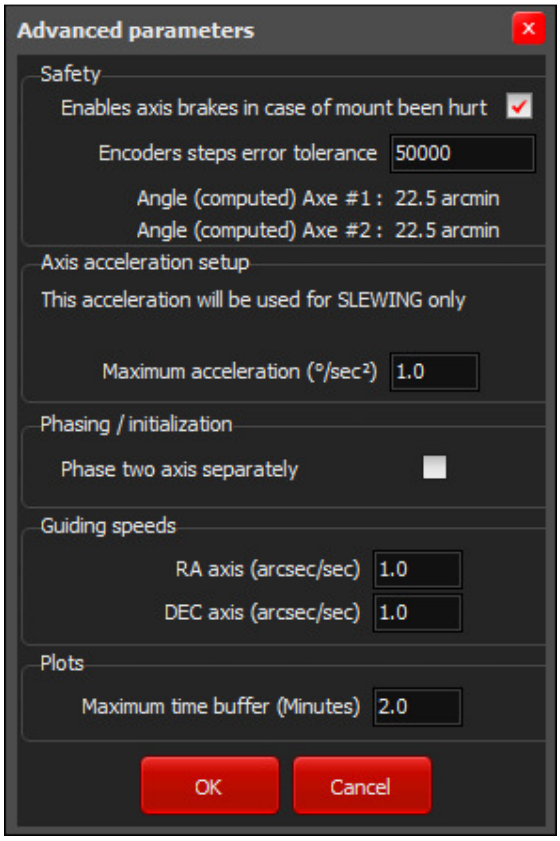
Be very careful with this acceleration value, do not set a too high value, it can vary according to the load of the mount (moment of inertia).

The last value is related to the recall tracking speeds triggered by the PULSEGUIDE function coming from third party software ASCOM compliant.

If this value is set to a too low value, the mount would hardly compensate the tracking drifts and lead to a very long “PULSEGUIDE” or tracking errors.

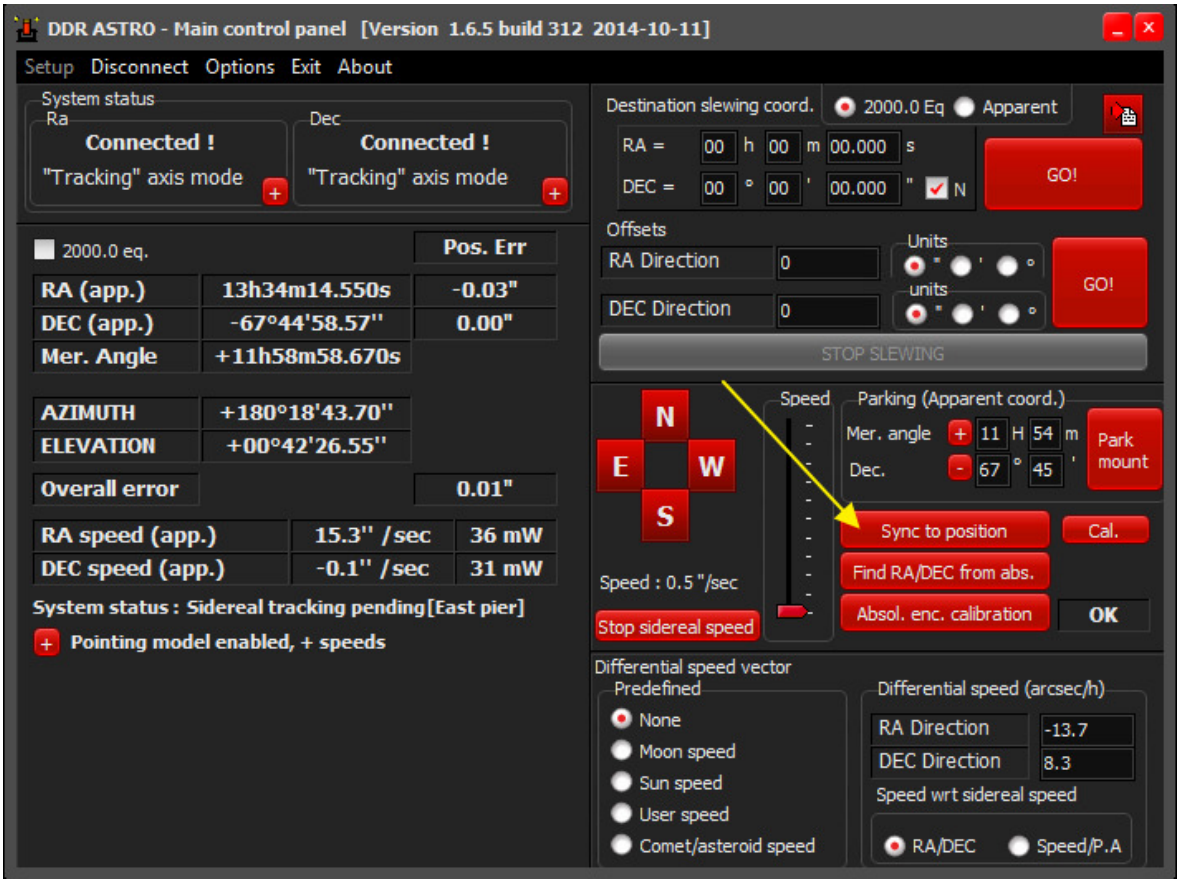
If this value is too high, bouncing and oscillations could occur during tracking.

It shall be noted that very few customers uses guiding cameras, and thus this feature.

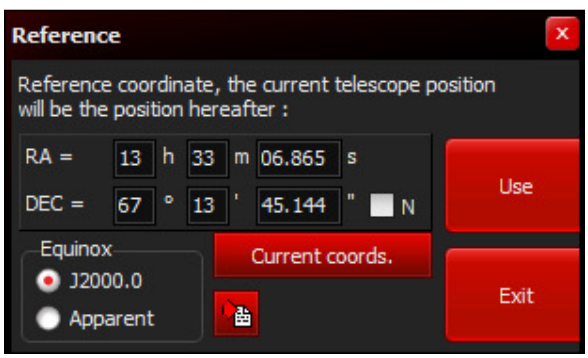


7.5 Calibration of the position of the mount

With an eyepiece or/ and CCD camera, focus on a star whose the coordinates are known. Slew to the target with the joystick (or hand paddle).

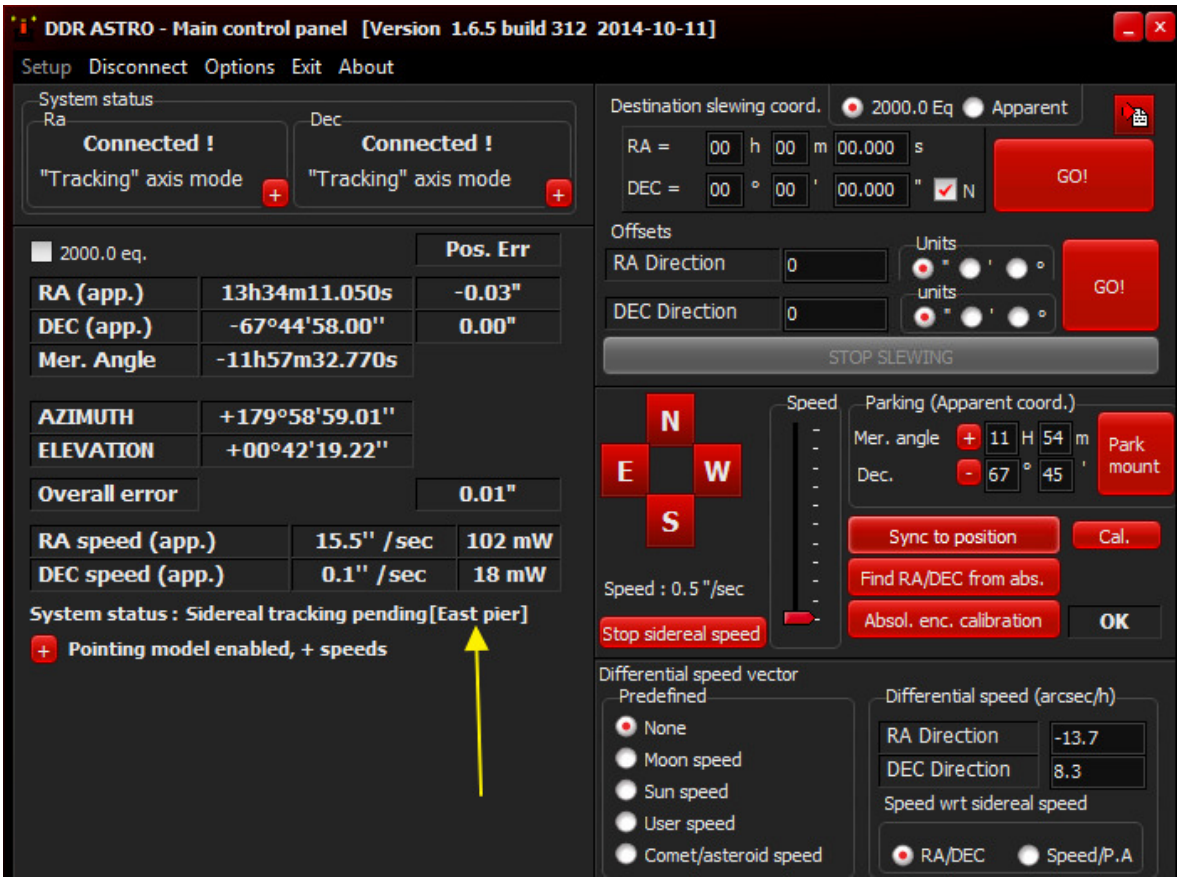


Then click on "***Sync to position***" and enter a coordinate with the relevant equinox (J2000 or Observed place).



In case of a German mount (mandatory), indicate on what side is the telescope tube versus the mount pier. Do not make a mistake with this, in that case better not to be close to the polar axis (i.e. |DEC| > 60°)

The information concerning the current side of the tube with respect to the pier is located in the main control panel.



Warning:

With a German mount, a wrong setting of “side of pier” could lead the mount to move on the DEC axis into the wrong direction, and have the tube aiming toward the ground, hit the pillar... in any case the mount will stop, brakes enabled and puts itself in “Safety mode”.

7.6 Turning OFF the mount

7.6.1 AC unplug (Unexpected or voluntary)

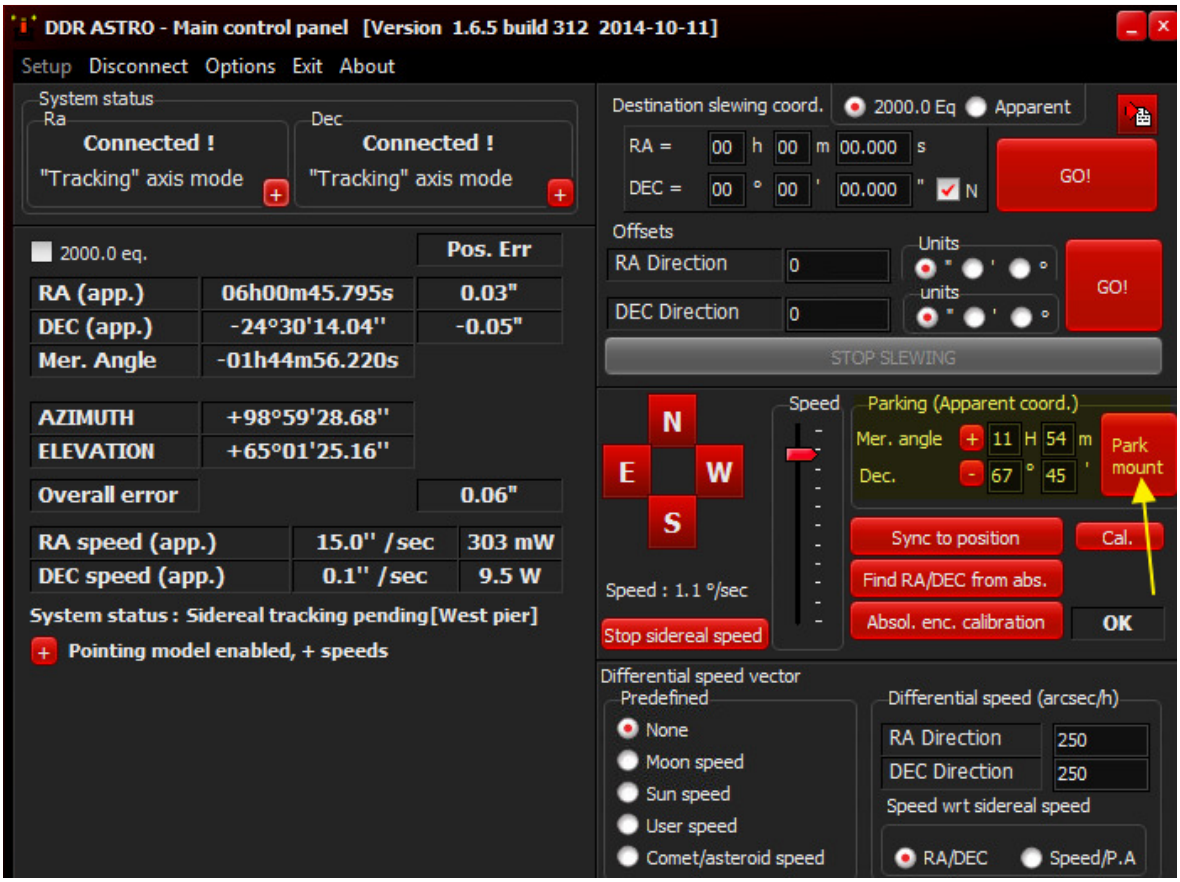
Unplugging the AC from the mount during operations is not recommended but does not lead to any permanent damage of the components. Engines will stop and brakes automatically activated.

At this stage, the mount software will emit warnings and errors messages; it will be required to close it and perform a power cycle.

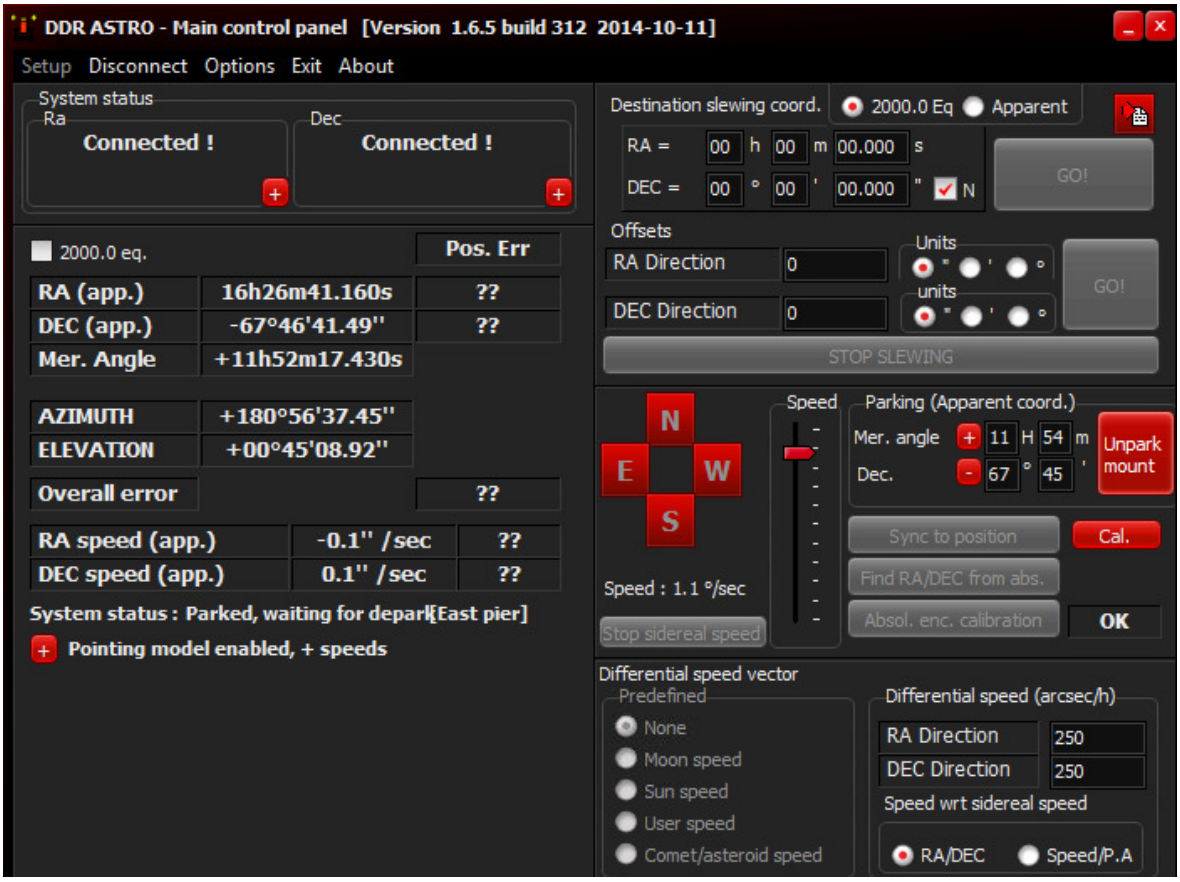
The re-start of the mount will need to be performed via mode #1 or #4.

7.6.12 parking the mount

The best way to turn OFF the mount after your observation run is to park it. The user needs to provide meridian angle and declination (a positive meridian angle defines a position on the west side).



The telescope / mount will move to the parking position, stops the sidereal motion, and will enable the brakes when the parking positon is reached. The software changes status (most buttons and control are grayed).



At this stage it is possible to click on "***Disconnect***" or directly close the software.

After that, the control box can be turned OFF. Re-starting the mount can be performed with Mode #2 (Parking startup).

The parking can also be achieved by third party software such as PRISM or The Sky.

The mount can be turned ON immediately by clicking on "***Unpark mount***" (if disconnected has not been triggered)

Warning: the mount shall never be moved manually after parking! If so the mount needs to be restarted from the marks (Mode #1 or #4) otherwise an error will occur on next start-up!

7.7 Polar aligning the mount (King Method)

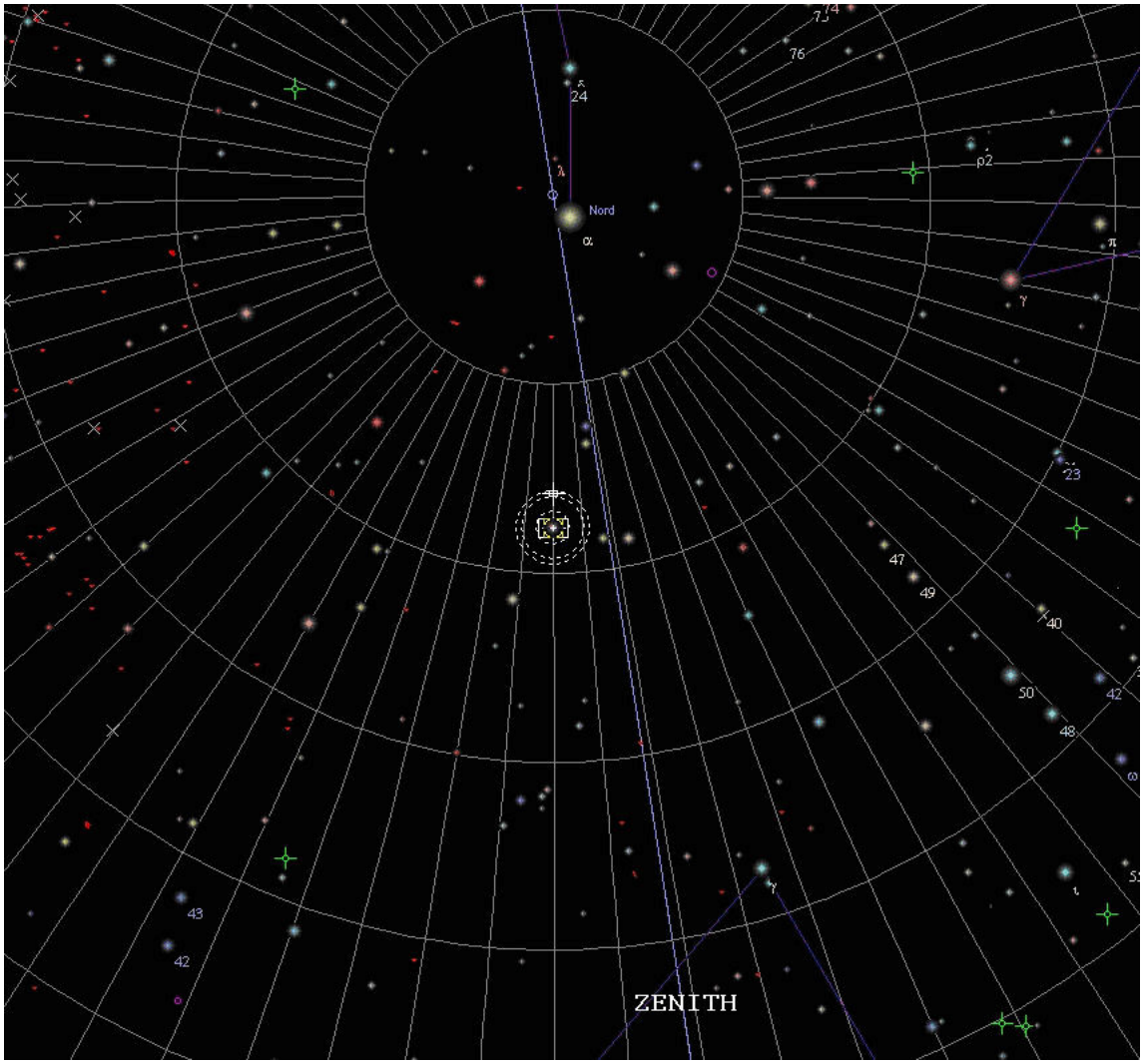
An optional polar finder can be used on the RA axis of the mount to achieve quickly the polar alignment.

A very precise polar alignment can also be performed following the **King method.**

First, the mount will need to be oriented (azimuth & elevation) with a greater precision than 1° around the celestial North Pole (for northern hemisphere locations) or the celestial South Pole (for southern hemisphere locations).

This can be achieved with a 5mv laser installed on the right hand side of the mount, targeting a star close to the celestial pole (α Umi, σ octans).
A CCD camera will need to be installed on the telescope, the CCD camera axis being set vertically (North / south) and horizontally (east / west). This is very important!

Then set the X, Y mirrors of the CCD camera in the software, in order to have the north on top and east on the left of the image.



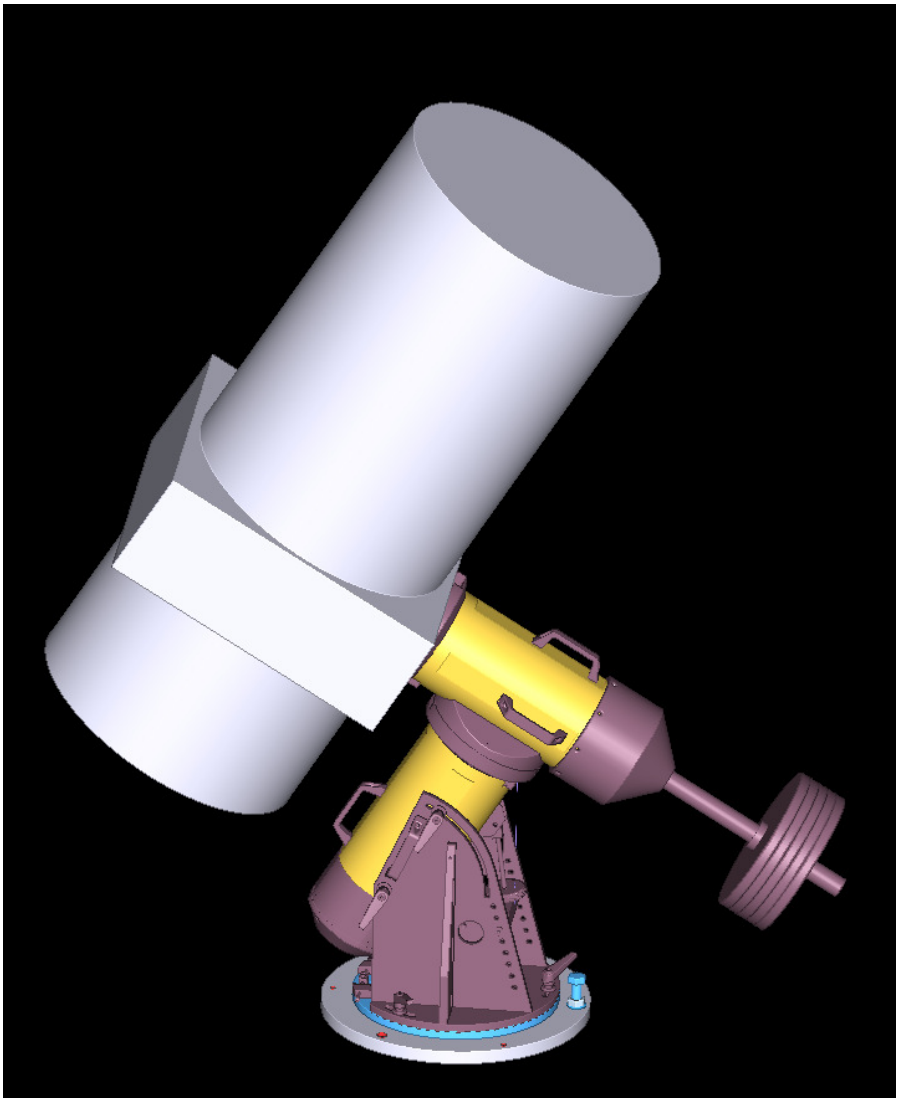
With Prism software or the mount software (or any other), target/point the telescope near the North Pole (for northern hemisphere) at a declination greater than +86° (or South lower than -86°) with a meridian angle of -6h.

Find a star bright enough allowing 10s exposure with no saturation, and having good visibility on the other hand.

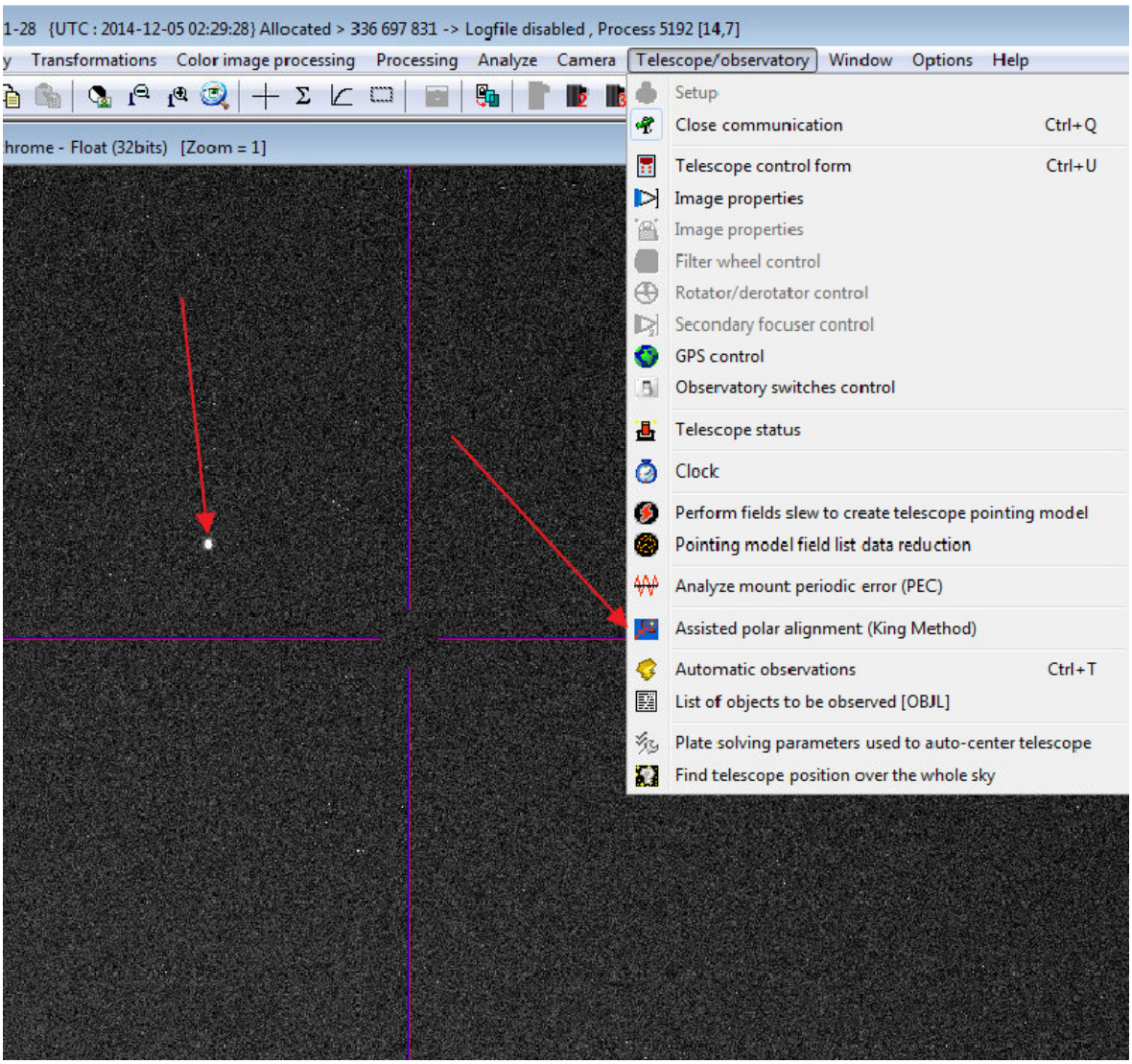
Do not forget to disable any pointing model speeds, or any custom slow speed if any, otherwise this will fail!

Then loosen the azimuth & latitude holding screws of the mount.

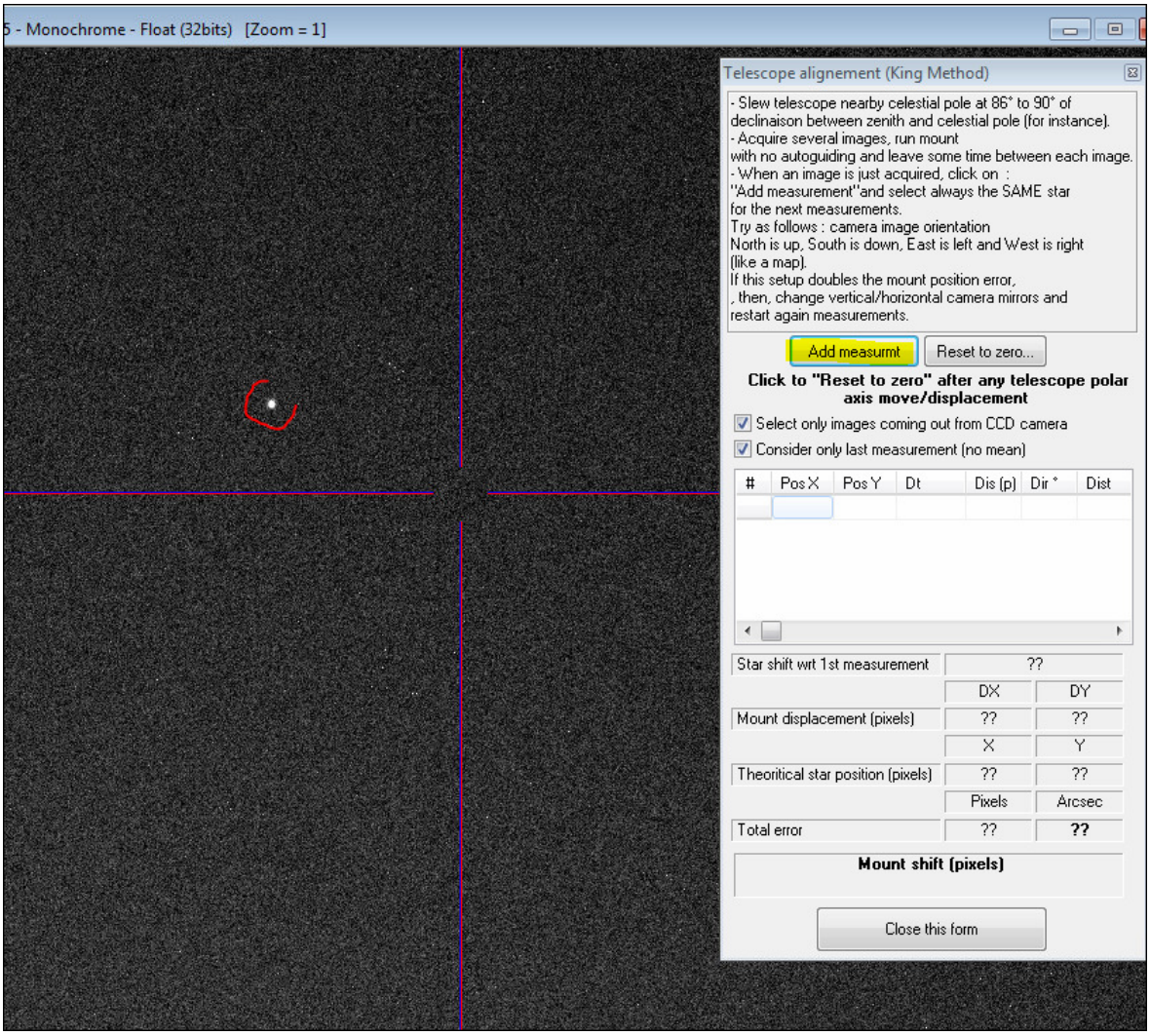
Telescope and mount will look as follows:



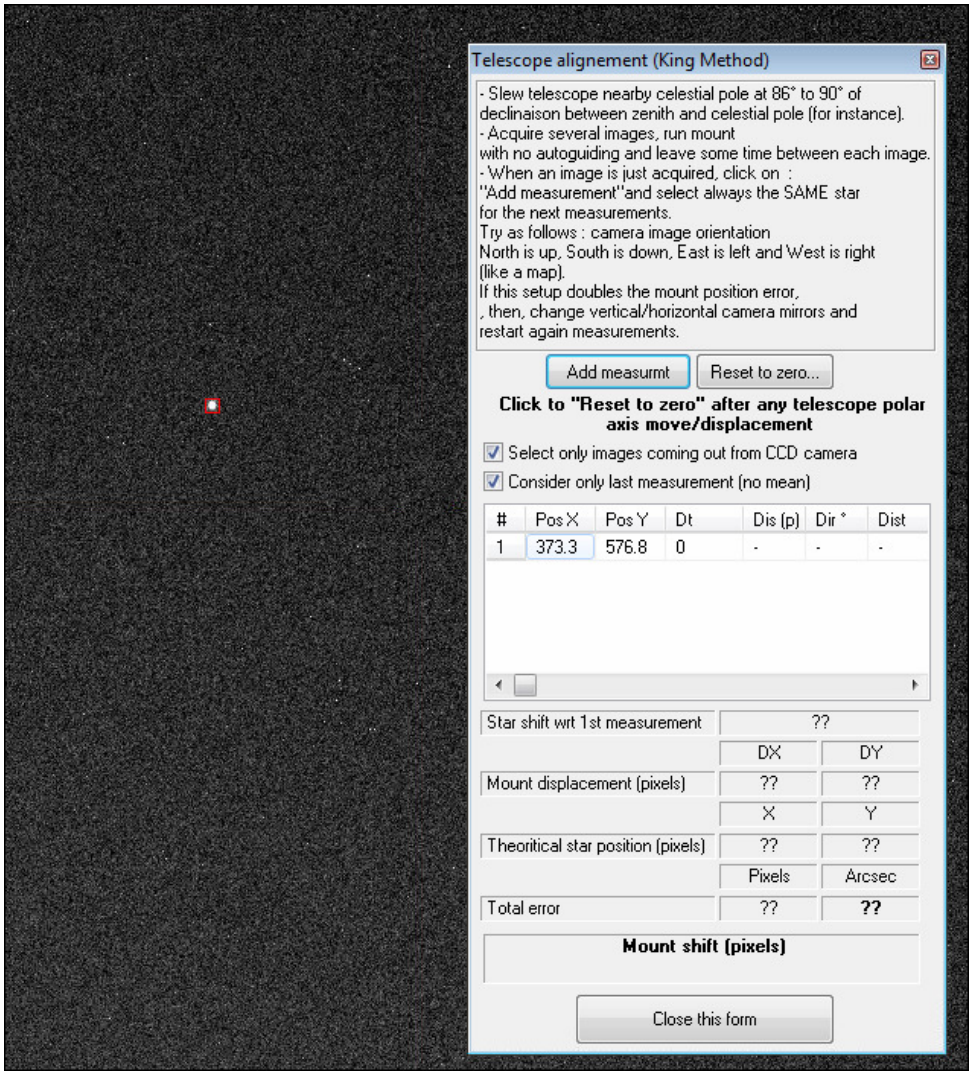
Using PRISM software, run a second acquisition with the CCD camera, then go to the "***Telescope/Observatory*** "and "***Assisted polar alignment (King method)***" menu.



A measurement sheet is displayed. Click on "***Add measurmt***", a cursor appears; select a star that will be kept during the entire here after procedure.



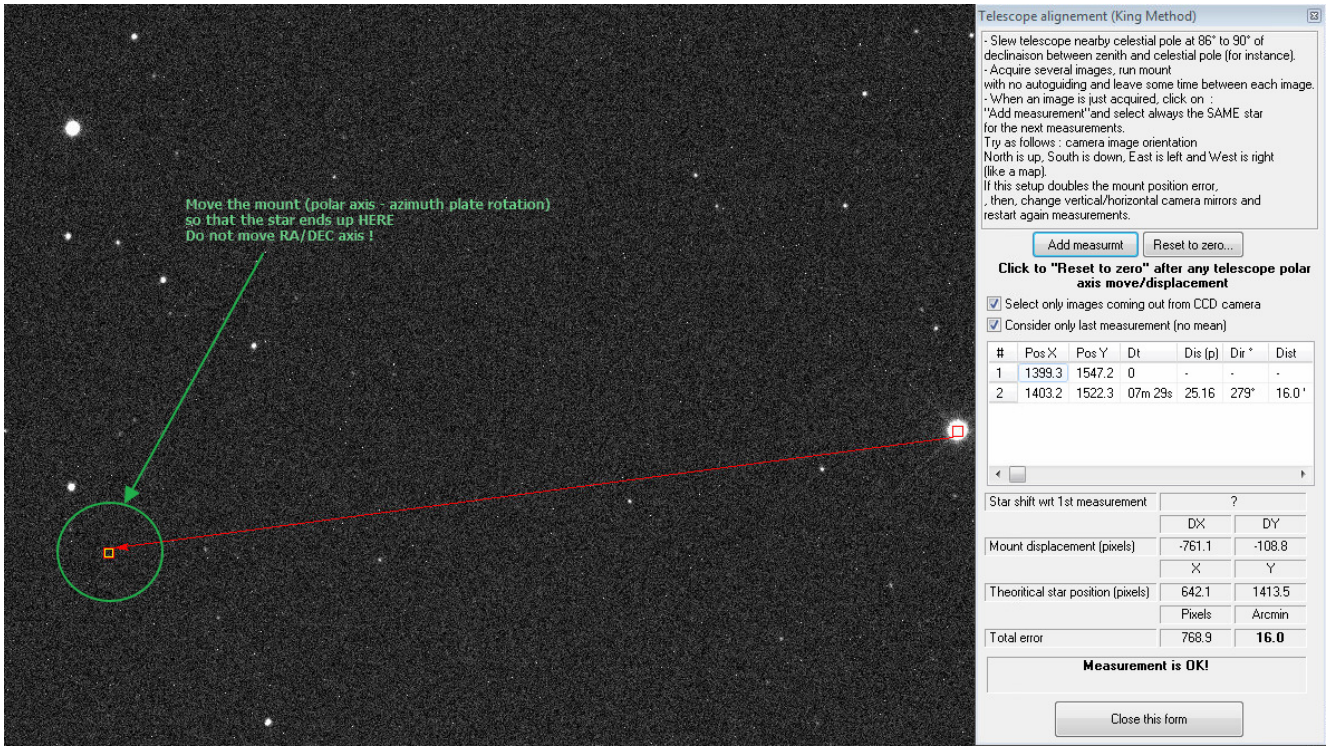
A red square is displayed around the selected star and its actual position is recorded.



Wait a few minutes before performing a new CCD camera acquisition.
Click on "***Add measurmt***", a cursor appears, select the **<u>same star</u>**.

Since the mount has a slight polar alignment error, the star will move a bit, the position shift will be used in performing calculation of the polar alignment error.

The software displays an arrow that materializes and quantifies in arc minutes the movement of the star to be applied to the mount (Azimuth and elevation).



This motion is achievable only with the azimuth & latitude movements of the mount. To do so use the mount screws for positioning the RA axis.

NEVER move the DEC and RA axis during this procedure!

It is required to know the direction of these movements (azimuth/elevation) in the CCD image. The orientation of the mount on the time angle equal to -6H allows getting these movements to be parallel with the X and Y axis of the picture. This is for simplification.

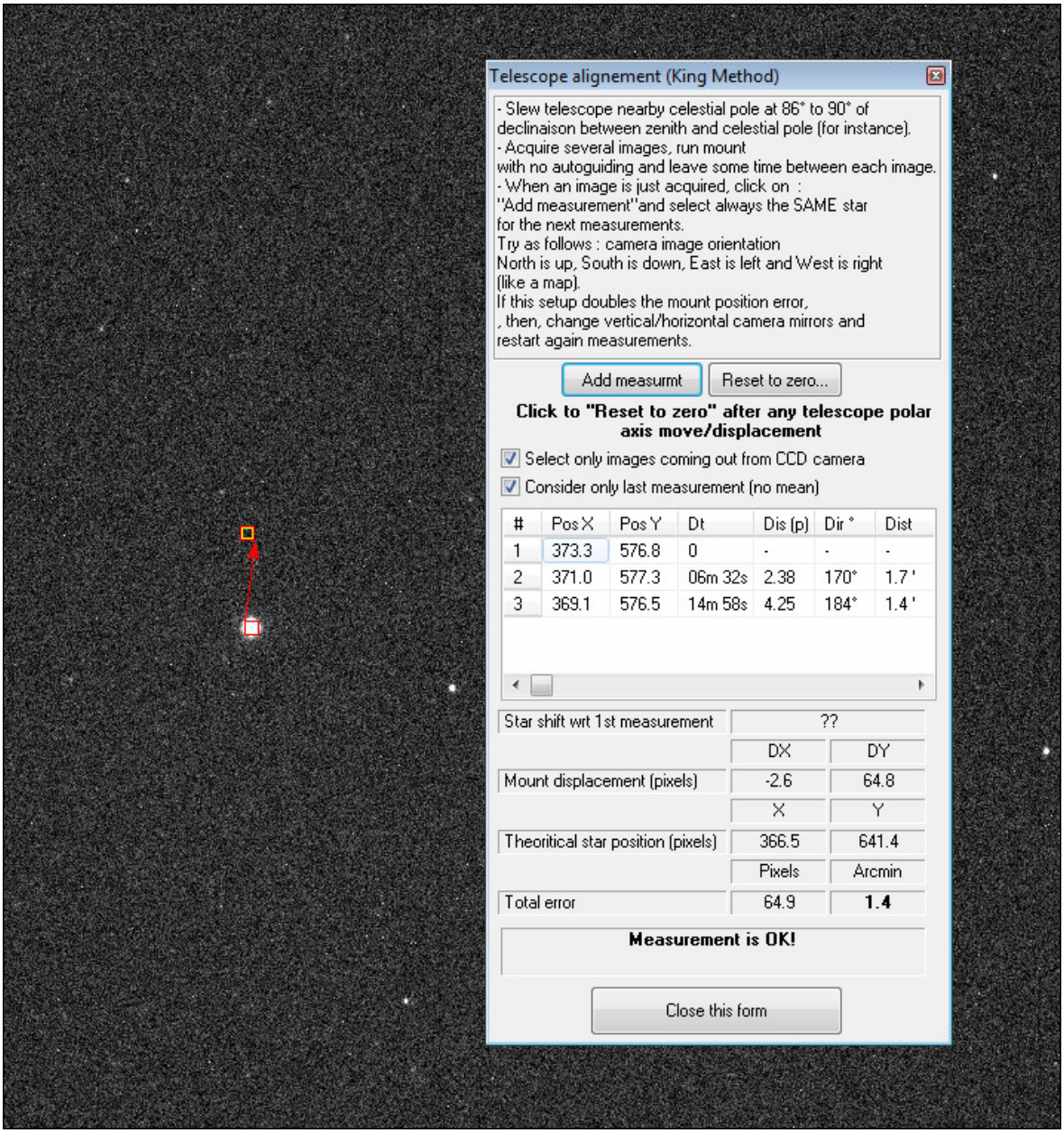
One turn of azimuth screw generates a shift of **24 arcmin**, and one turn on the latitude screw generates a shift of **31 arcmin** on the mount's elevation axis.

In the example picture, a 16 arcmin shift vector is shown.

If the arrow of the vector ends up outside the picture, the mount needs to be moved to get the star on the side of the picture. The procedure will need to be restarted using another star.

Use a CCD camera with the widest field of view.

Once vector arrow is pointing on the star (after moving the mount azimuth and elevation axis), click on "***Reset to zero***", and perform an image acquisition.
Then, click on "***Add measurmt***".
Wait a few minute and re perform an acquisition and click on "***Add measurmt***" on the same star.
Avoid too crowed star field, such as Milky Way. Confusion may arise.



Again, a shift vector is displayed. The length of this vector should decrease step by step, if not, the CCD camera orientation is not correct, or the "***Reset to zero***" button has been forgotten.

The picture above shows that the polar alignment error has been reduced from 16 to 1.4 arcmin. Less than 2 arcmin is a good performance, less than 1 arcmin polar alignment is very good and less than 30 arcsec is excellent!

<u>Warning</u>:

The more the mount will have reduced polar alignment error, the longer the image to image intervals will need to be. Up to 15 minutes can required between two measurements when the mount RA axis is at less than 1 minute of the pole.

Do not try to refine lower than 30 arcsec from the pole, and try to be better than 1.5 arcmin error; the pointing model will take care of better performance latter even at these accuracies.

Once the procedure ended, do not forget to tighten the holding screws of the mount!

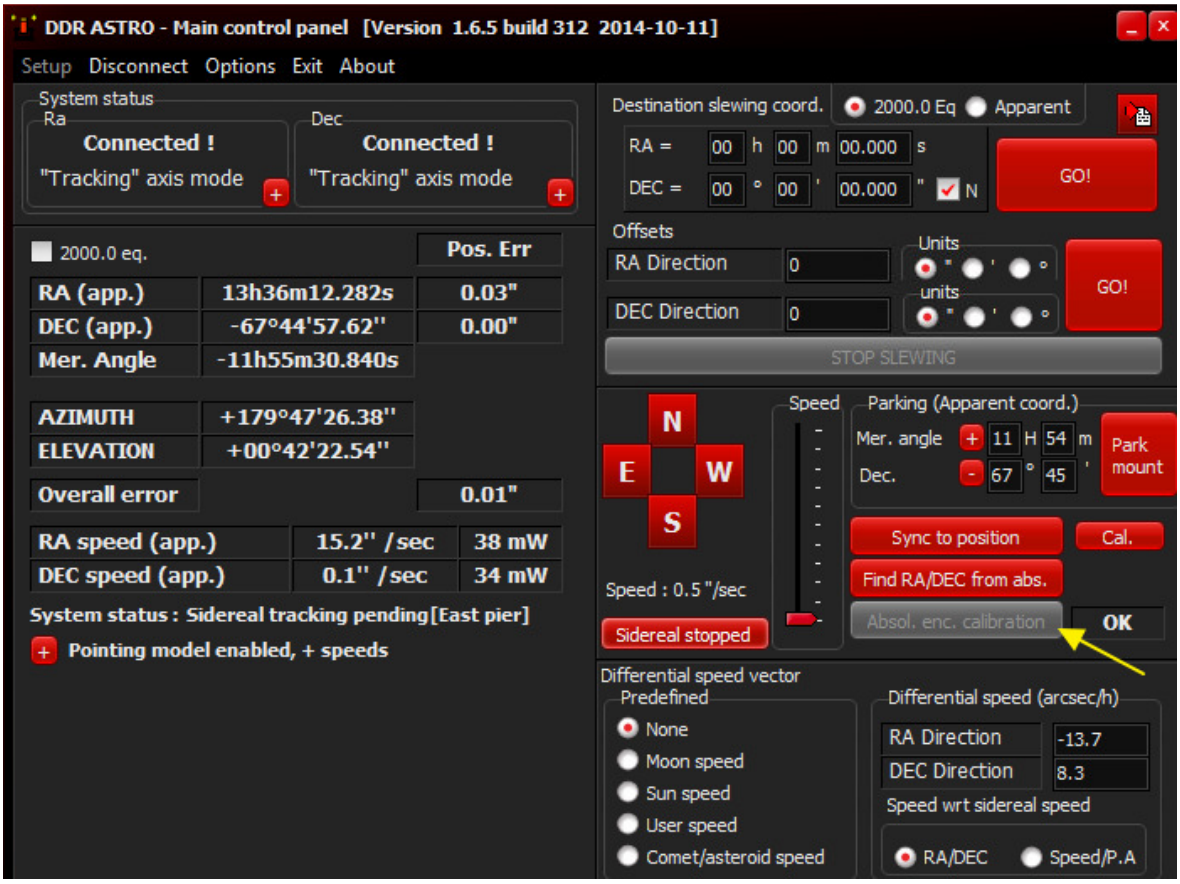
7.8 Sky absolute mount calibration.

7.8.1 Calibration

The mount does not contain absolute encoder, but semi-absolute. It is then possible to calibrate definitely these encoders using the sky. The polar alignment must be correct (polar axis at less than 2 arcmin from the pole).

It is also required that the telescope position precision to the sky is already greater than 15 arcsec. This is not an issue with a good polar alignment and even with no pointing model.

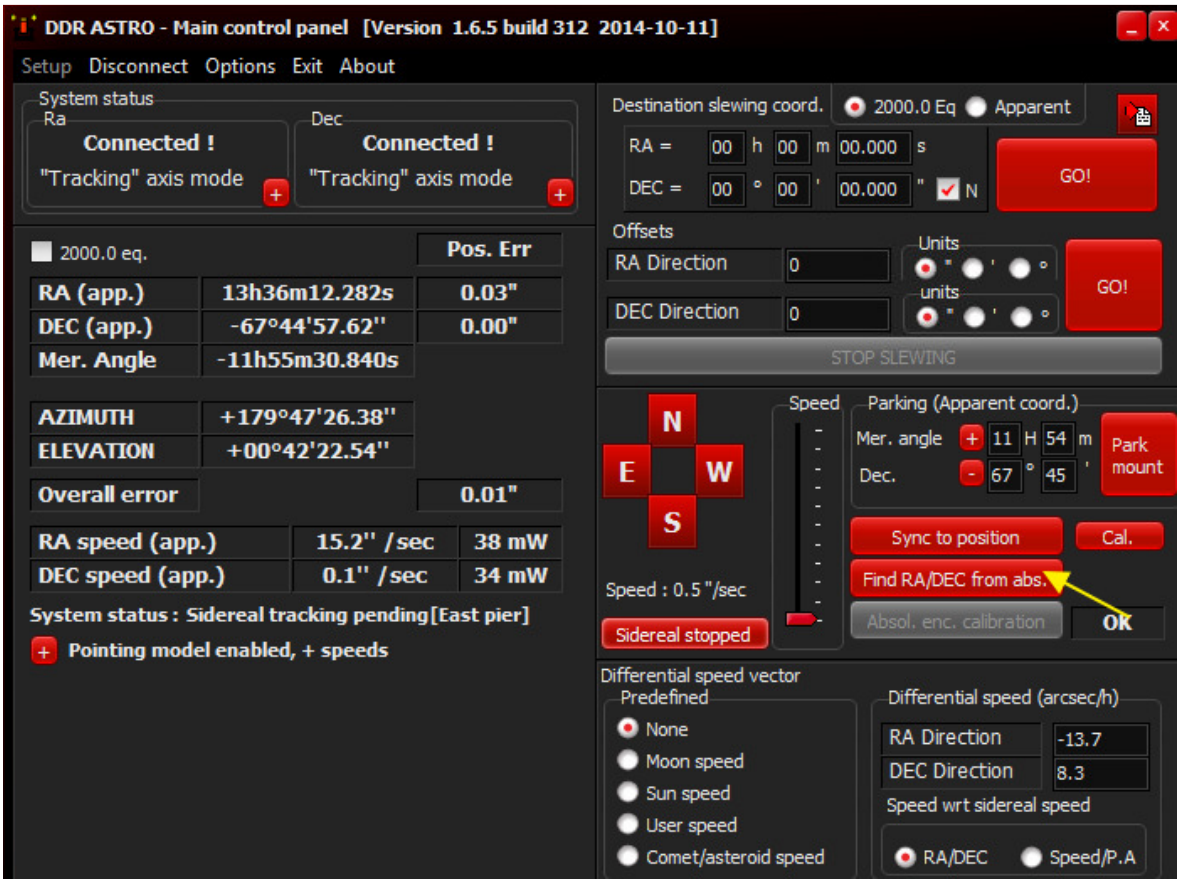
The procedure is simple: Click to the "***Absol. Enc. calibration***" button, the telescope moves a little (15° west in RA direction and 15° DEC direction). The procedure is over (and definitively performed as soon as the mount is not physically moved from a different location).



An “***OK***” message appears on the control interface on the right hand side of the “***Absol. Enc. calibration***” button.

Warning:
During this procedure the telescope will rotate by 15° around RA/DEC the axis, make sure the tube will not hurt the mount pier when using a German mount. Otherwise the procedure will result in error, and mount put in “***Safety mode***”.

7.8.2 Position recovery from absolute position



If for any reason the position of the telescope in the sky is lost, it is possible to find it back precisely (better than 15”) by clicking on the “***Find RA/DEC from abs***.” button. The telescope moves 15° west in RA direction and 15° on DEC to catch up reference marks embedded to the encoder.
Once procedure achieved, in case of a German mount, the system returns to the relative position to the pier automatically (tube east or tube west).

Warning:
During this procedure the telescope will turn by 15° around its axis, make sure the tube does not hurt the mount pier when using a German mount.

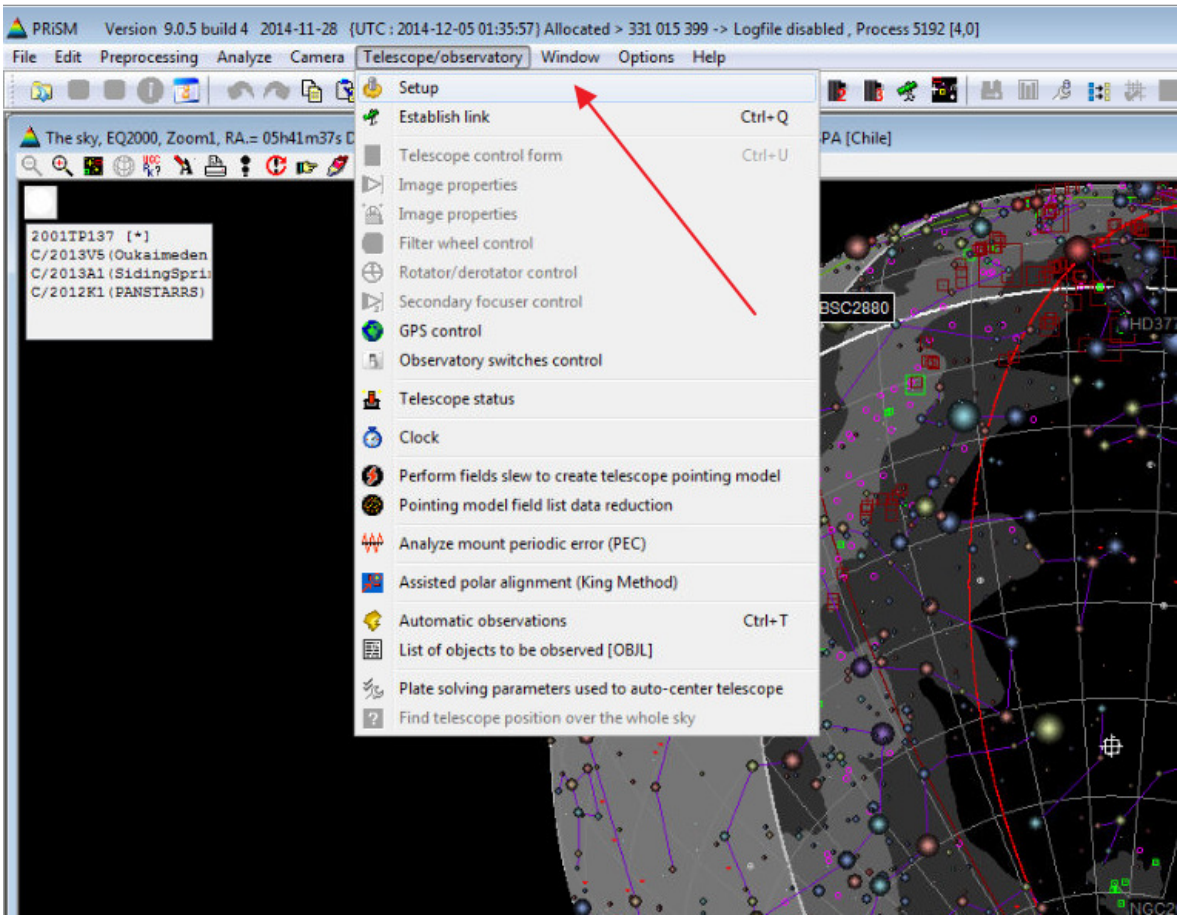
7.9 Using the mount with PRISM software

PRISM software is sold by ALCOR-SYSTEM Company

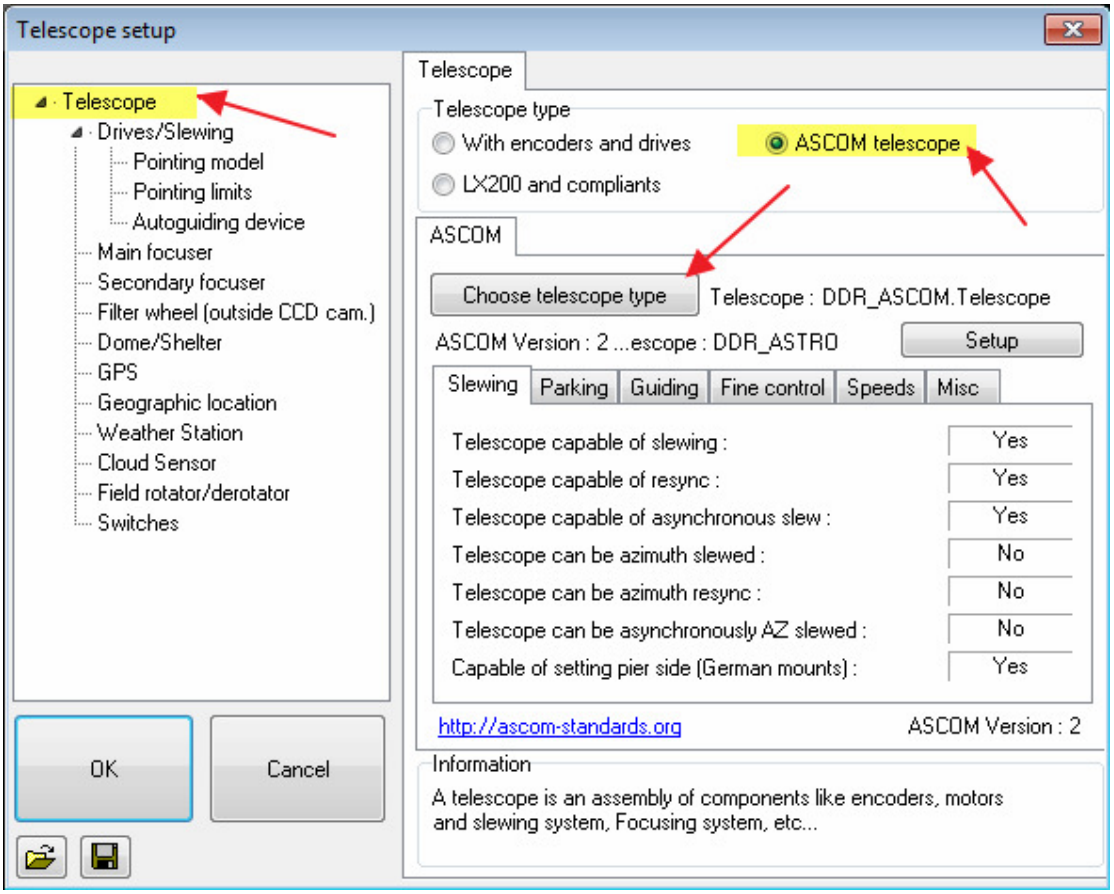
Note:
The current document cannot be considered as an alternative to the PRISM software documentation. Nevertheless, a good knowledge of the PRISM software is highly recommended.

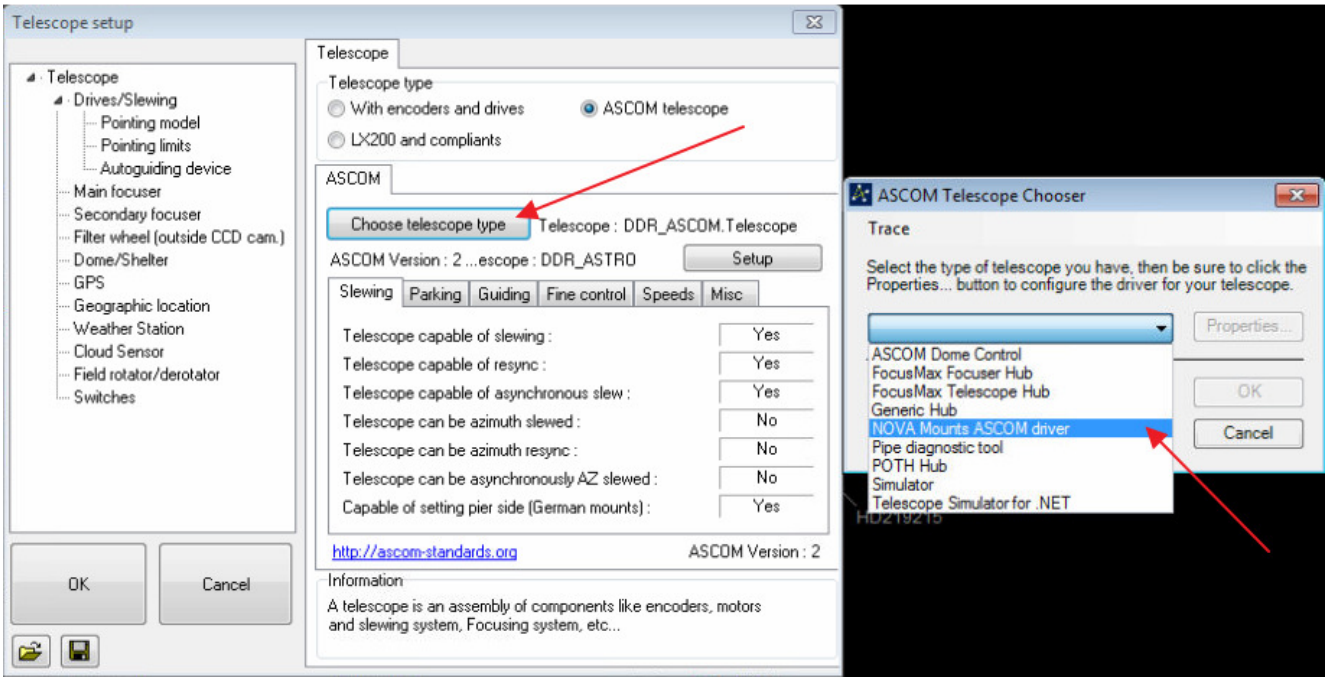
7.9.1 Setup

Setup is performed following the next screens copies:

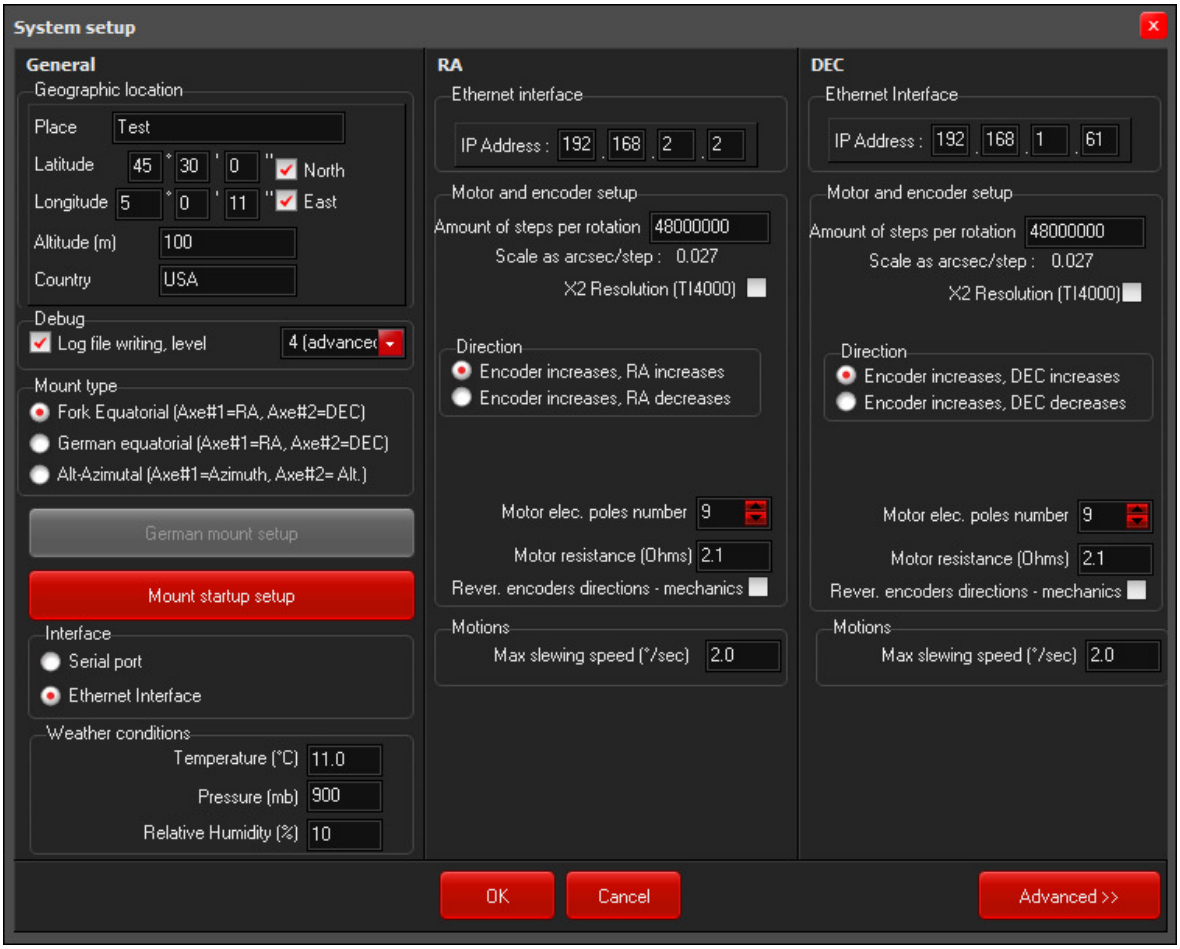


NOVA mount software and ASCOM platform must be installed first!



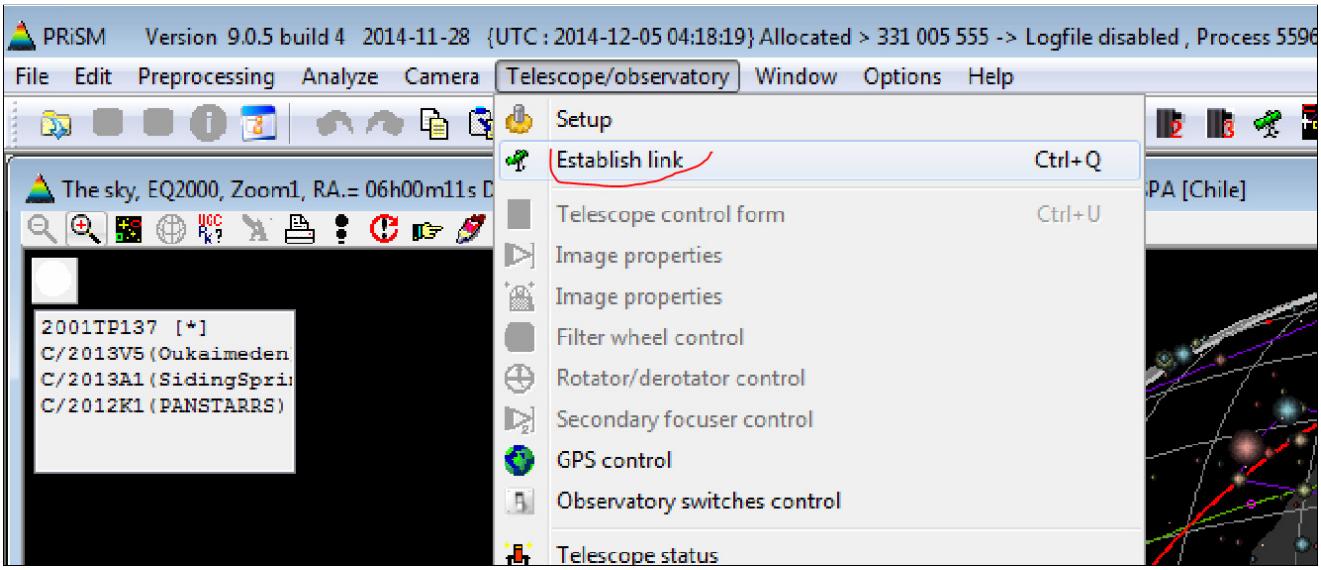


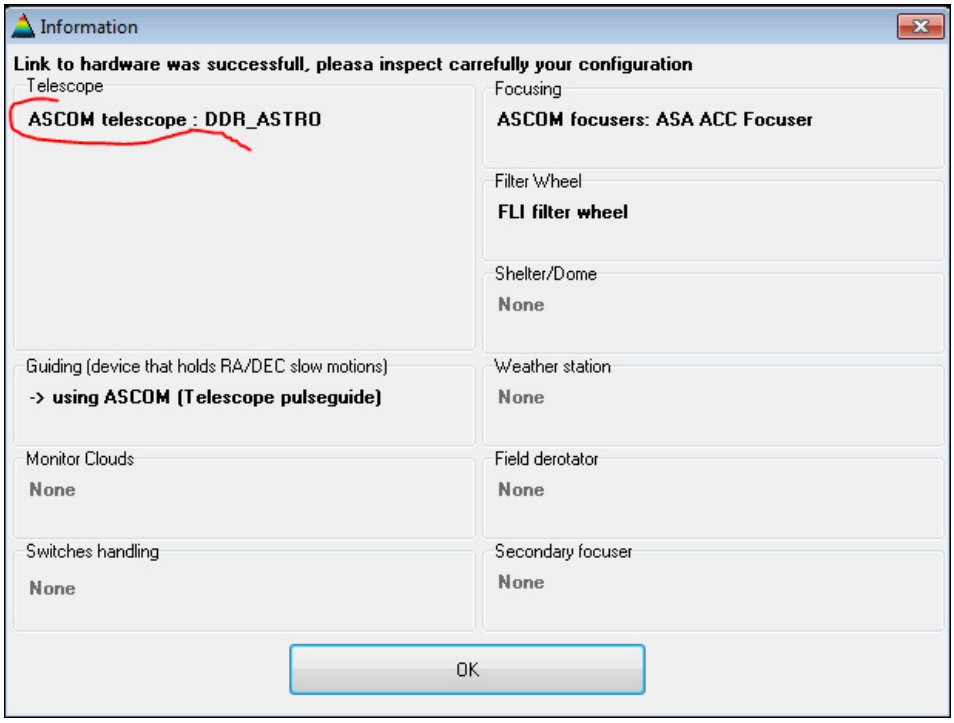
Setup form of the NOVA mount software appears, if "***Setup***" button is clicked.



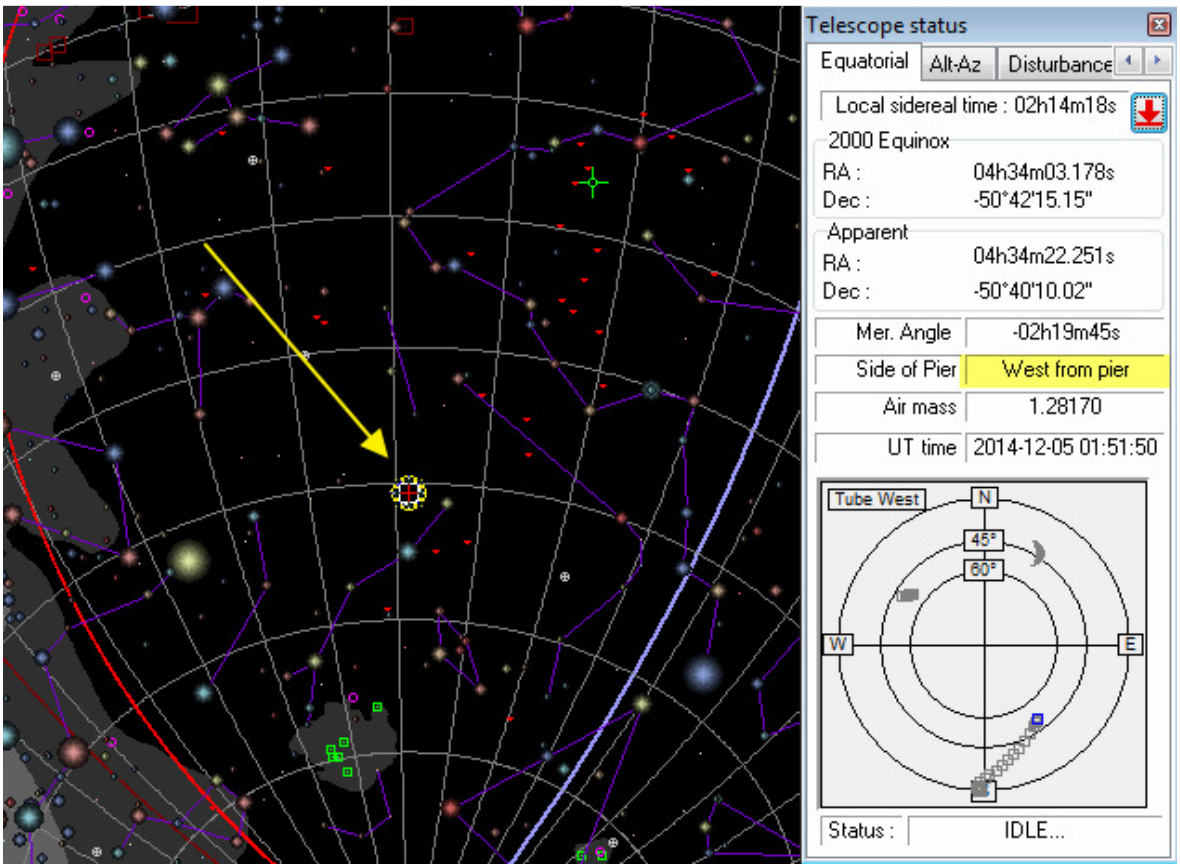
7.9.2 Mount software linked to PRISM

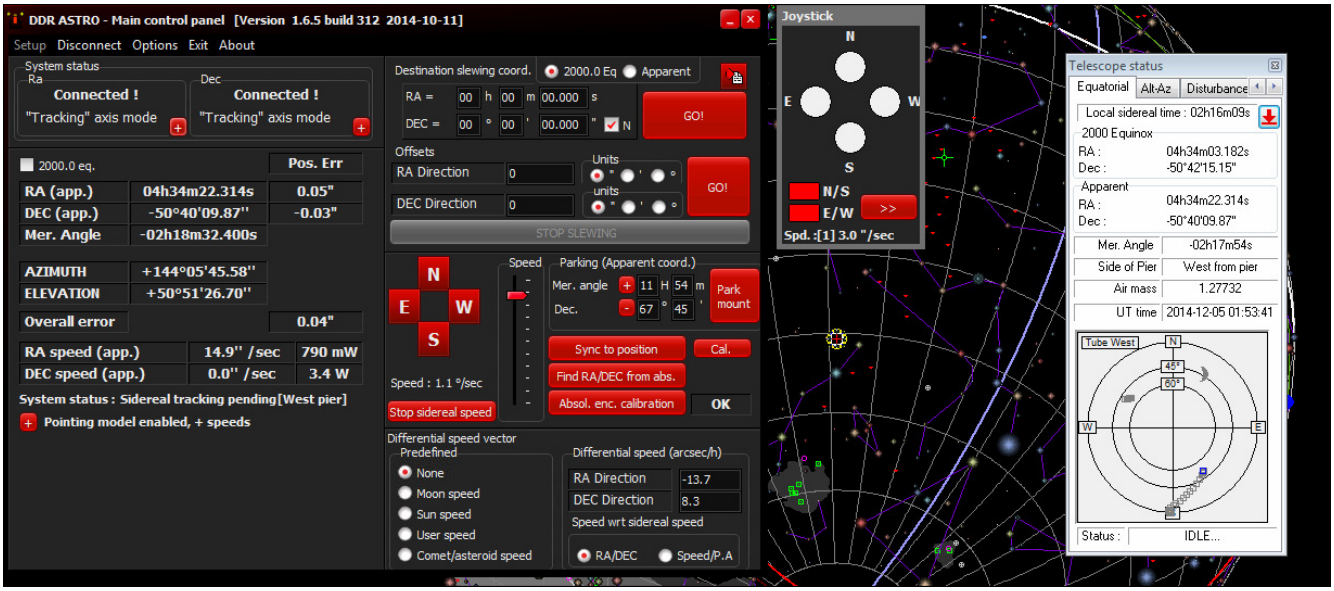
Once this has been set up, please follow the next menu to connect PRISM to the mount.





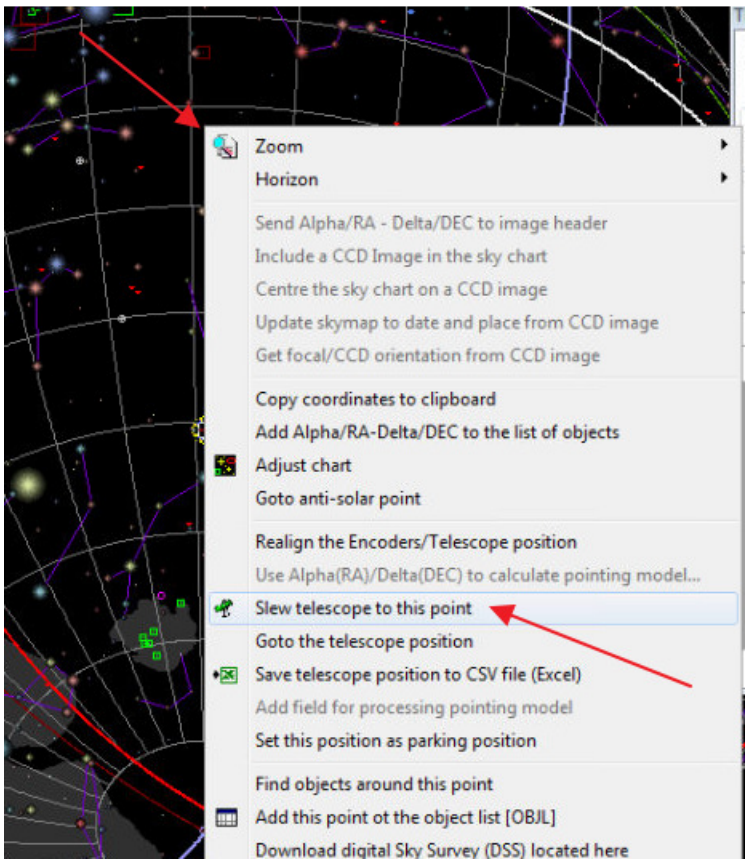
A status form appears stating that everything went fine. The mount software is started automatically and will stay opened until PRISM disconnects from it. In case of a German mount, the system returns to the relative side of pier (tube east or tube west).



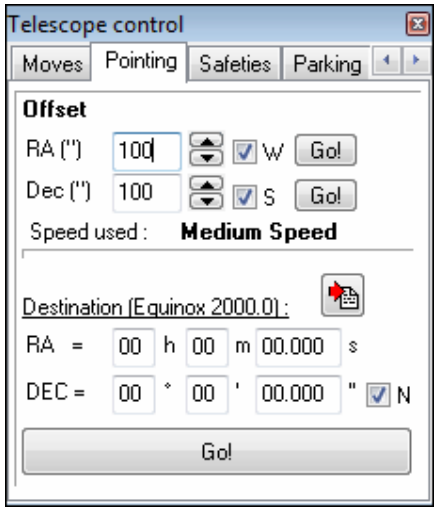


7.9.3 Slewing telescope & position calibration

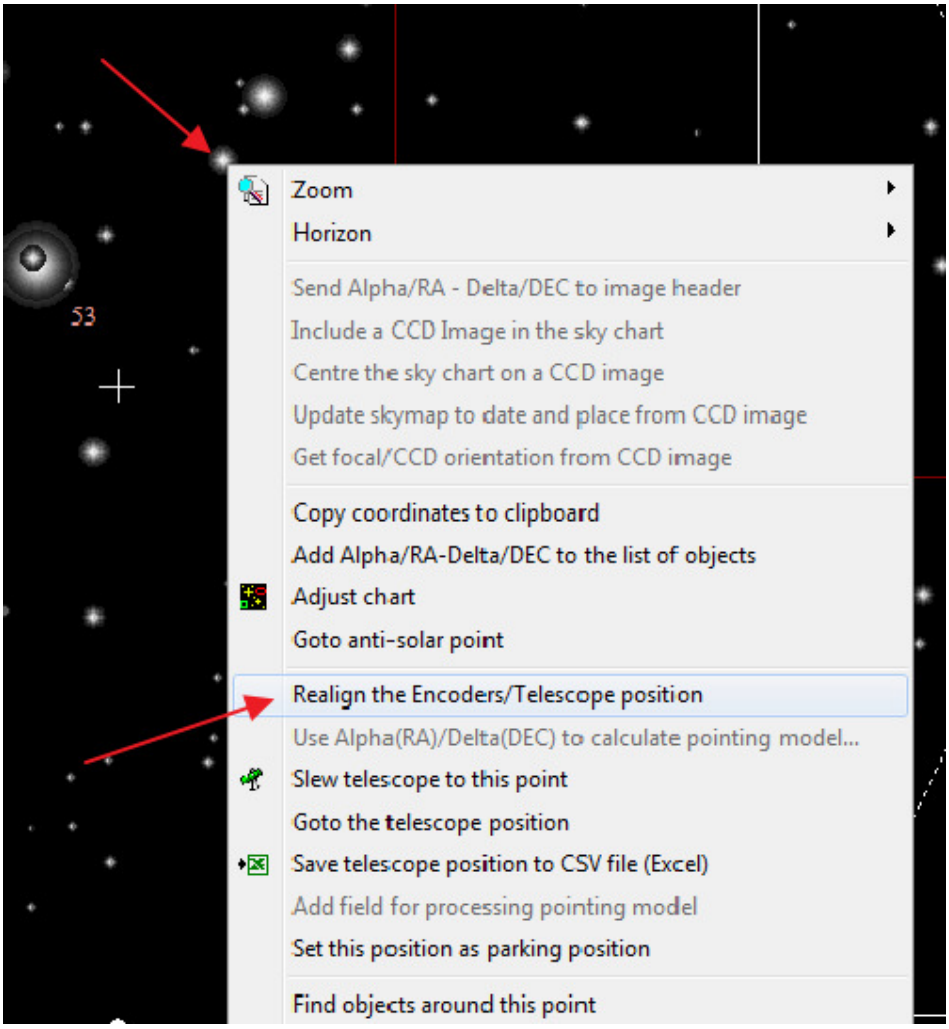
Slewing the telescope to a target is straightforward; the right click on sky map shows a pop up menu, the top left corner (that was the last mouse position) indicates where to slew the telescope at.



Using the form hereafter, the user can manually enter true coordinates.



Mount coordinate synchronization is performed the same way, by right mouse click to the target.

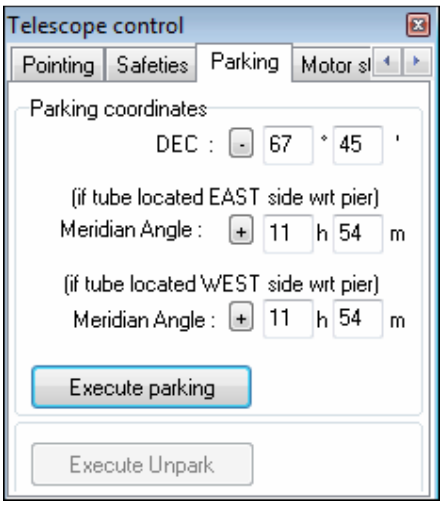


Warning:

For German mounts, synchronizing the mount with the sky map via PRISM is sending RA / DEC coordinates but never the side of pier. This is forbidden by ASCOM protocol. To change or update this information, you need to use the control panel of the mount software.
Be very careful regarding telescope side of pier, if badly set the tube could point toward the ground.

7.9.4 Parking after observations

PRISM has a dedicated panel to perform it depending where the tube is located with respect to the pier.



7.10 Use of the TheSky X bisque software

Note:
The current document cannot be considered as an alternative to the TheSky X software documentation.
A good knowledge of this software is highly recommended.

Warning:
Make sure to use an administrator profile to install the following updates and correctives.

7.10.1 Configuration

The 10.2.0 (or after) version of the TheSky X software must be installed to be able to access the mount via the ASCOM platform (Previous version of TheSky are not supporting the ASCOM platform).

The **X2AscomTelescope(1.0.3)Setup.exe** package is available from the CD or USB key provided with mount in the “TheSky” directory. This must be installed. This is a communication interface of the X2 protocol from TheSky toward the ASCOM interface. This is possible that latest SkyX implements this package by default. Please, do not hesitate to contact Software Bisque Company for more information about ASCOM compliance.

The next step consists in declaring in registry the DCOM of the ASCOM driver of the mount for TheSkyX.

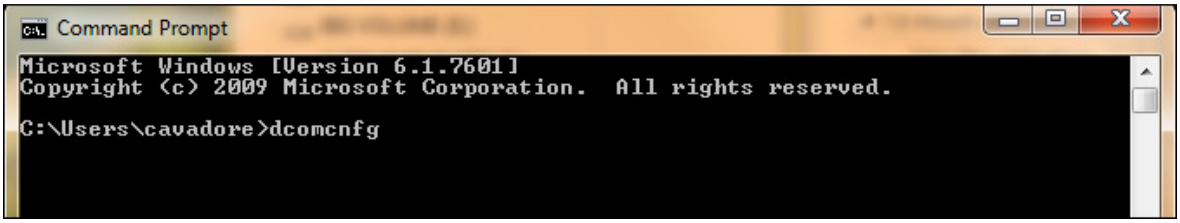
Click twice on the files stored on the CD or USB key (Open TheSkyX folder 32 or 64bits according to your operating system version). A message that tells you to merge this information with the current database registry will be displayed.

RegisterDCOM_ASCOM_DDR_32bits.reg

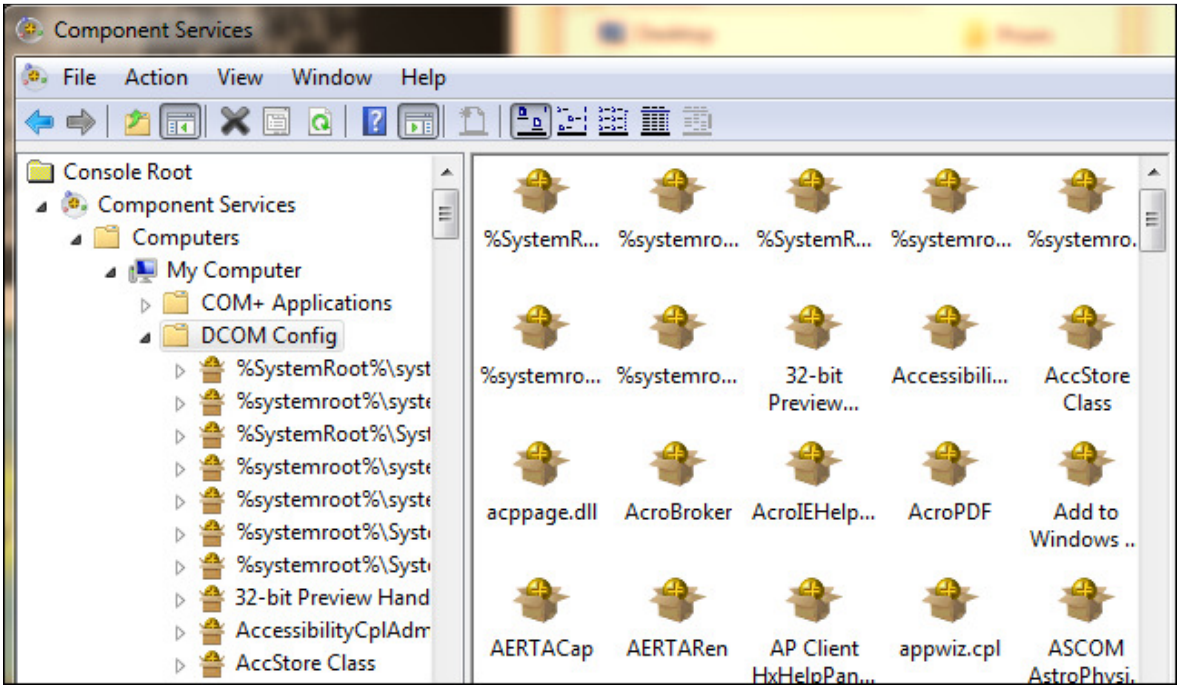
RegisterDCOM_ASCOM_DDR_32bits.reg

Check the "***OK***" button on all installation screens / steps.

Open command console ad type in the following command: ***dcomcnfg***

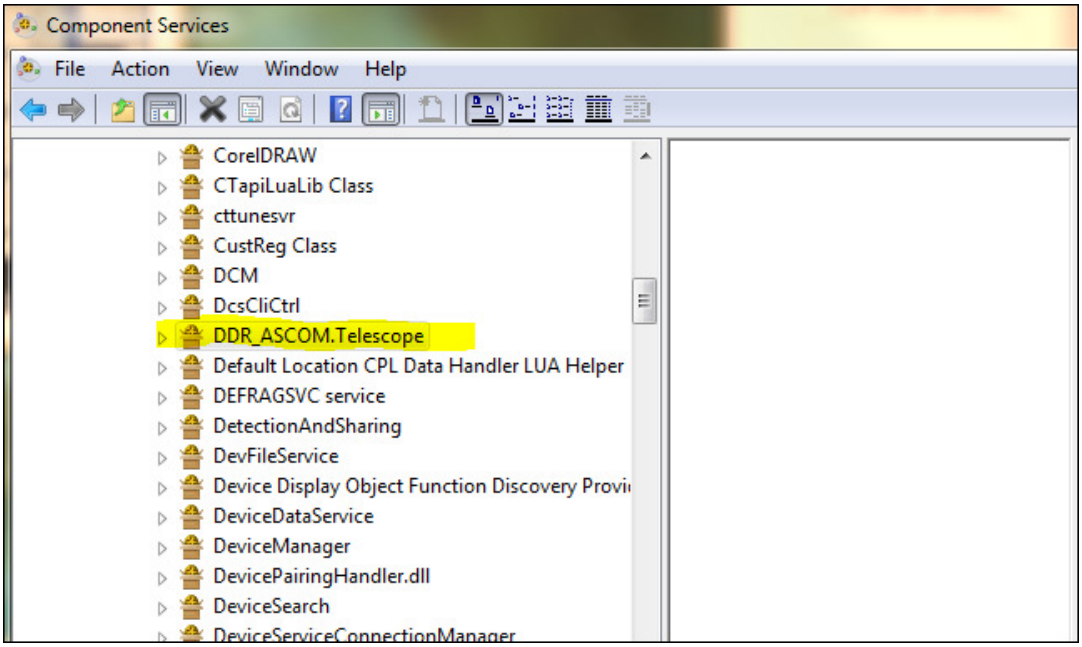


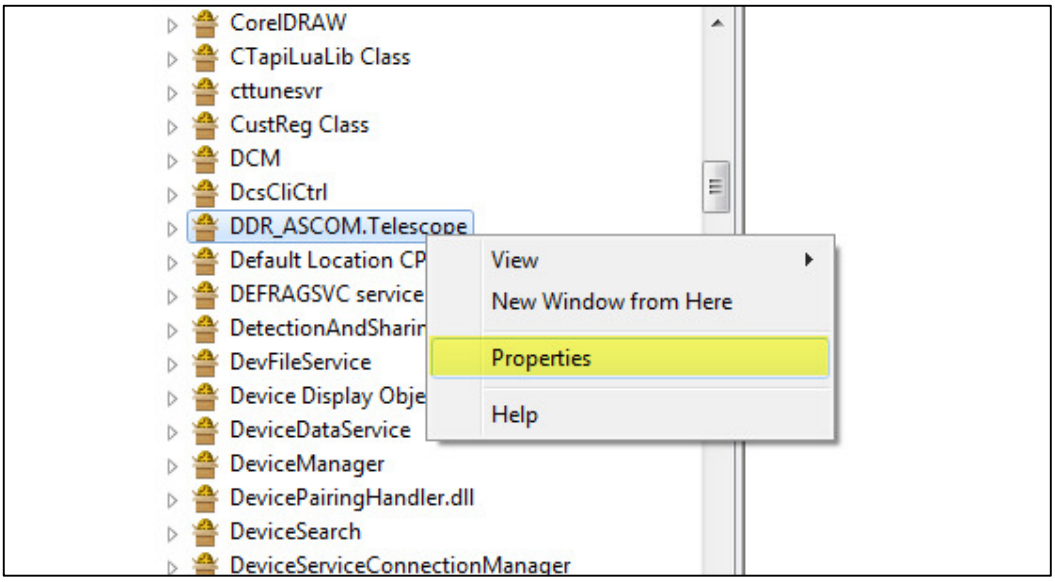
The following interface should be displayed, browse the "DCOM configuration" folder.

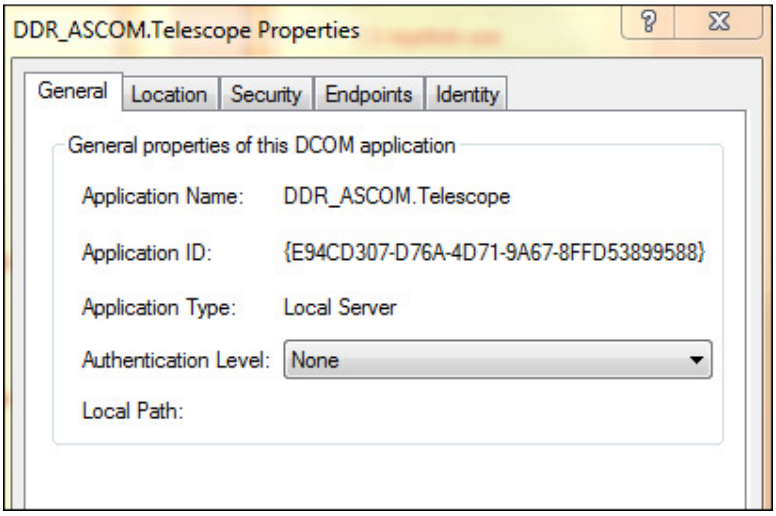


Find the "***DDR_ASCOM.Telescope***"

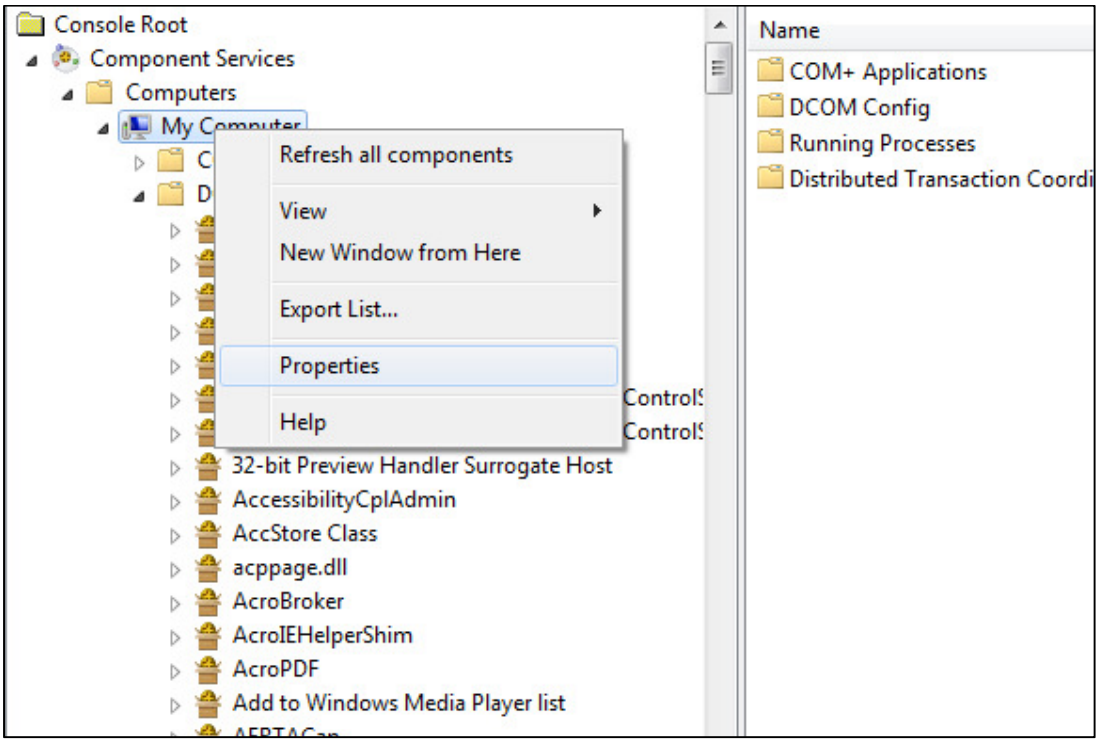
Check in the properties of "***DDR_ASCOM.Telescope***" that the windows and sub tabs opens correctly.


Component Services
File Action View Window Help
CorelDRAW
CTapiLuaLib Class
cttunesvr
CustReg Class
DCM
DcsCliCtrl
DDR_ASCOM.Telescope
Default Location CPL Data Handler LUA Helper
DEFRAGSVC service
DetectionAndSharing
DevFileService
Device Display Object Function Discovery Provi
DeviceDataService
DeviceManager
DevicePairingHandler.dll
DeviceSearch
DeviceServiceConnectionManager

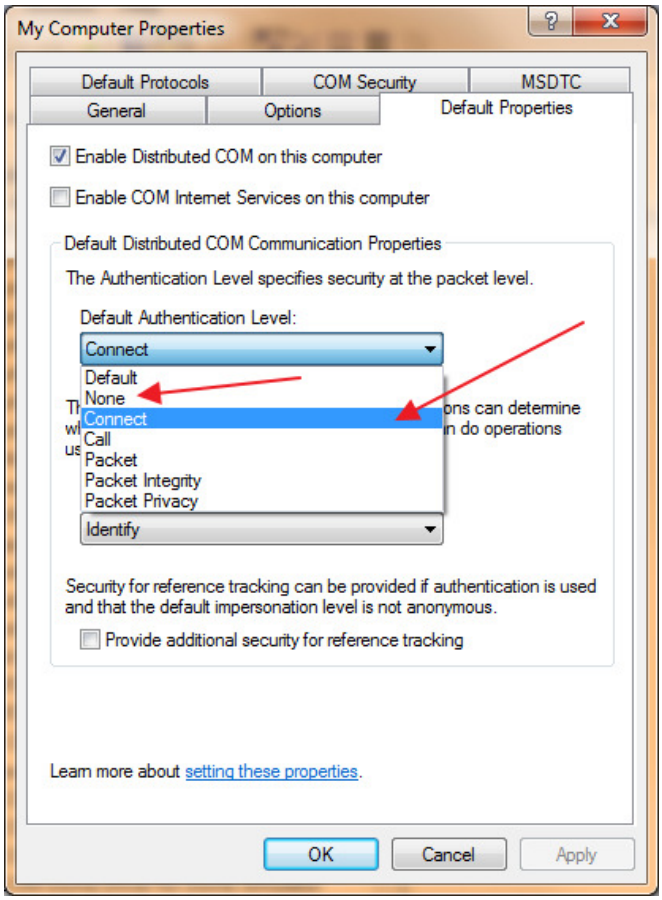

CorelDRAW
CTapiLuaLib Class
cttunesvr
CustReg Class
DCM
DcsCliCtrl
DDR_ASCOM.Telescope
Default Location CP
DEFRAGSVC service
DetectionAndSharin
DevFileService
Device Display Obje
DeviceDataService
DeviceManager
DevicePairingHandler.dll
DeviceSearch
DeviceServiceConnectionManager
View
New Window from Here
Properties
Help

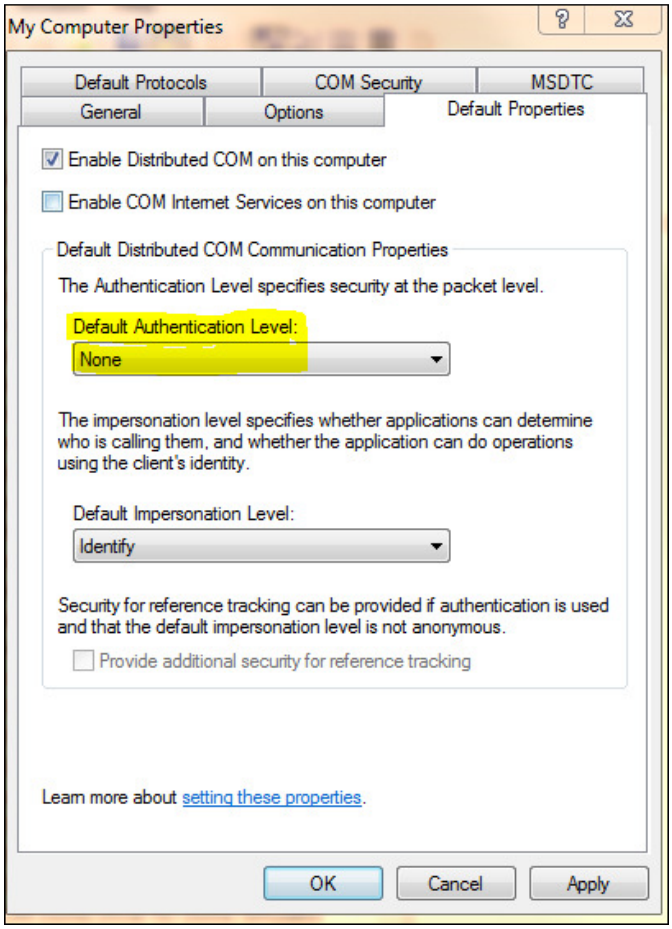

DDR_ASCOM.Telescope Properties
General
Location
Security
Endpoints
Identity
General properties of this DCOM application
Application Name: DDR_ASCOM.Telescope
Application ID: {E94CD307-D76A-4D71-9A67-8FFD53899588}
Application Type: Local Server
Authentication Level: None
Local Path:

Then in "***My Computer***", open "***Properties***".



Change the default authentication level from "***Default***" or "***Connections***" to "***None***".





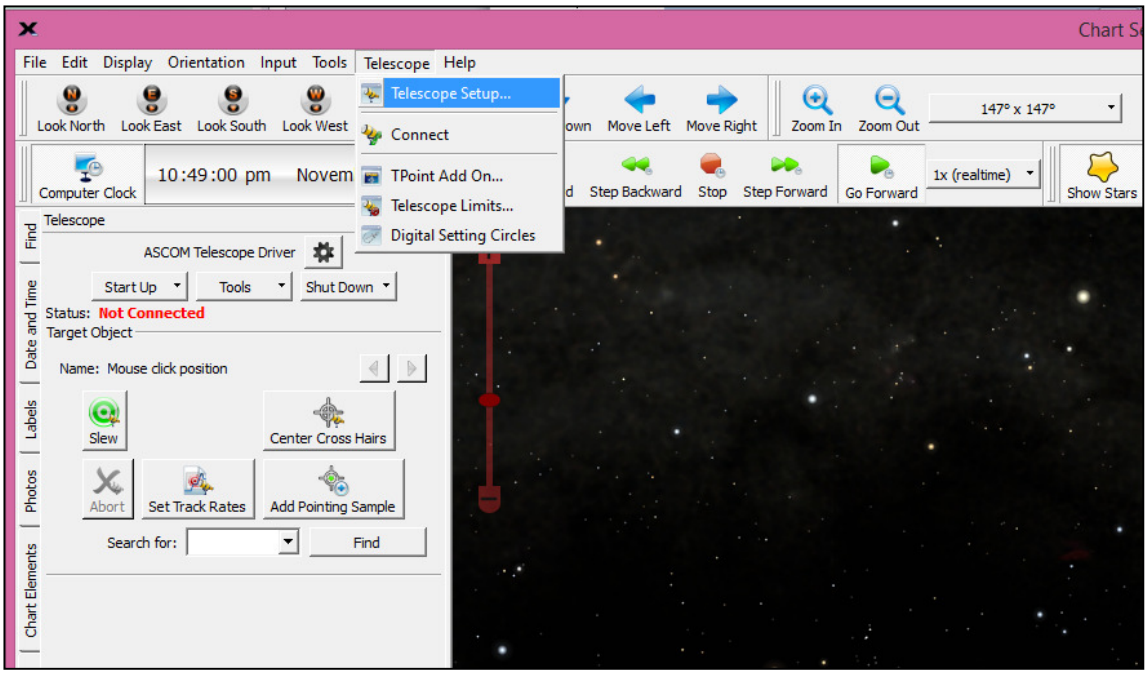
It is no required to reboot the system, only wait up to 3 minutes for the system to update this new configuration.

If the modification is not performed, the TheSky X software might not connect properly to the ASCOM driver of the mount and the following error message could be displayed:

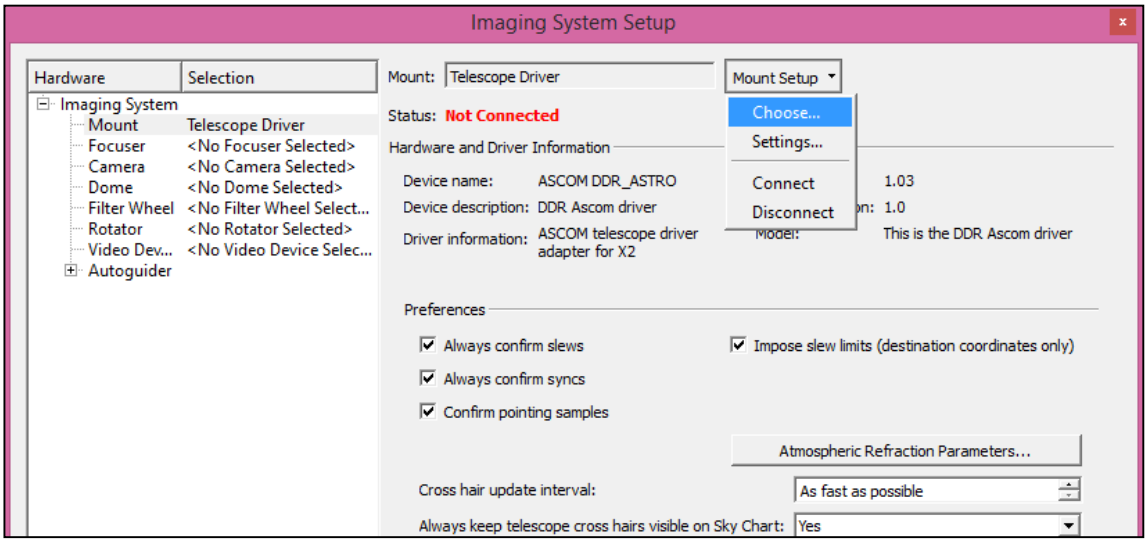
Failed to load driver : DDR_ASCOM.Telescope "0x80070005"

As previously said, these (painful) stages described above might not be necessary anymore for the latest versions of the SkyX.

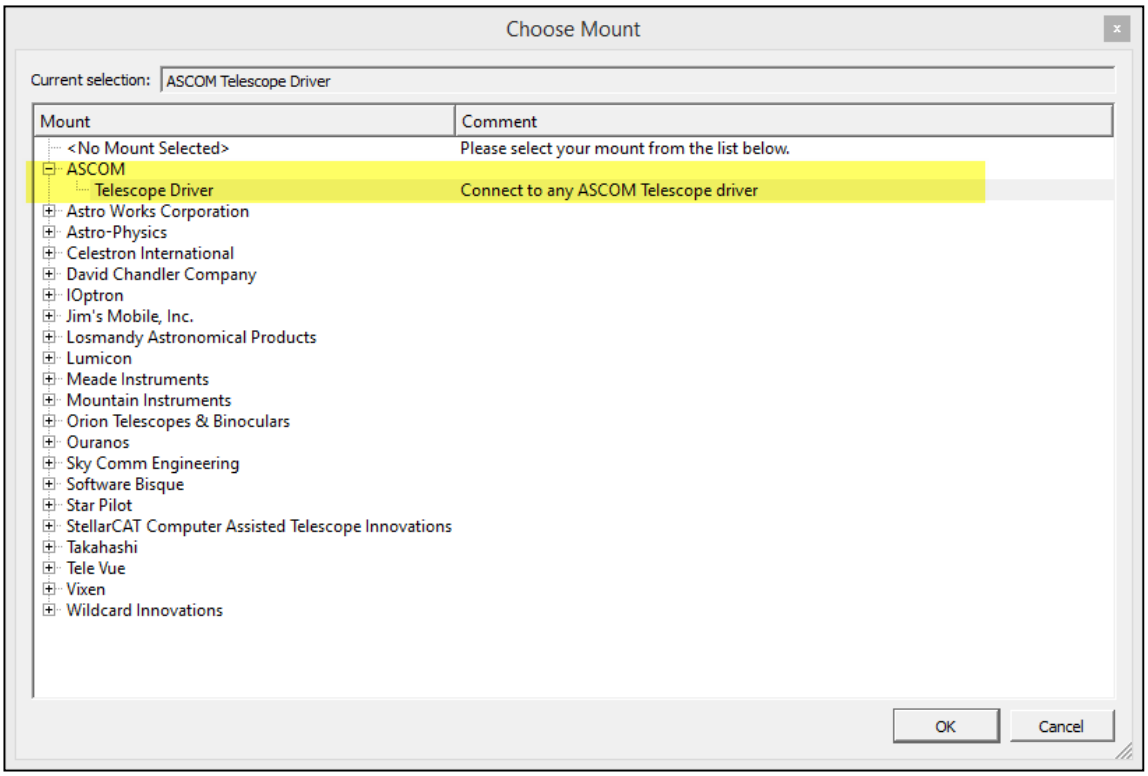
At this stage, you can launch the **TheSky X** software and go to the "***Telescope setup…***" menu.



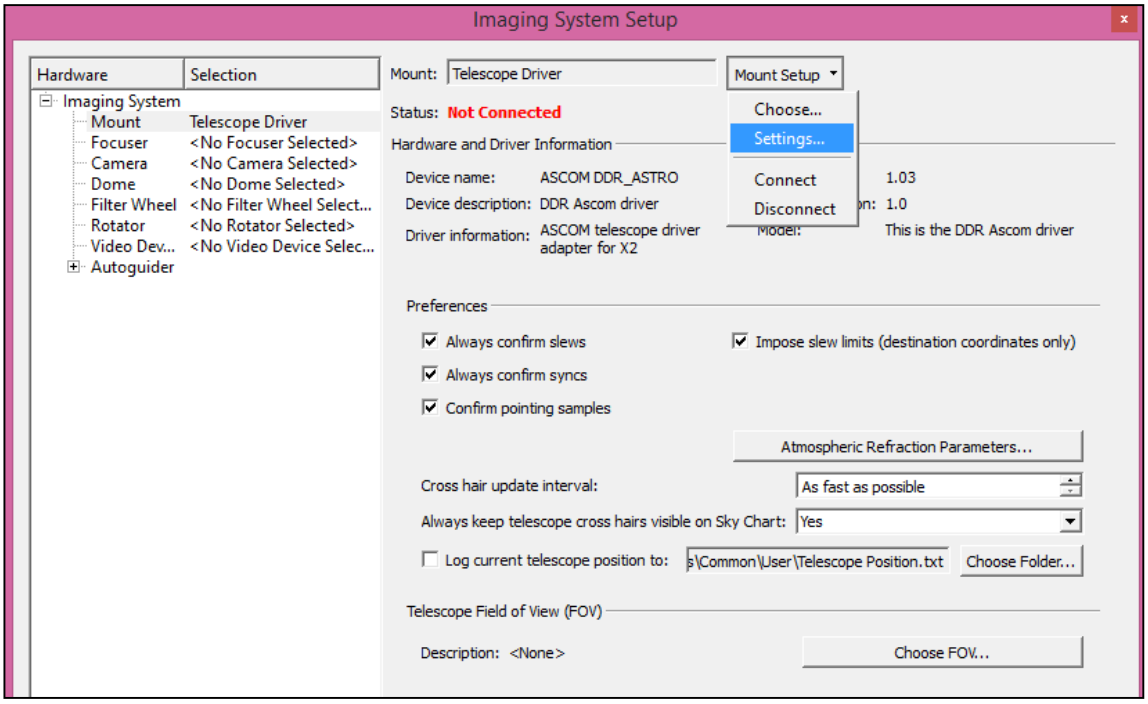
Then, select "***Mount Telescope Driver***" and click on "***Choose***".



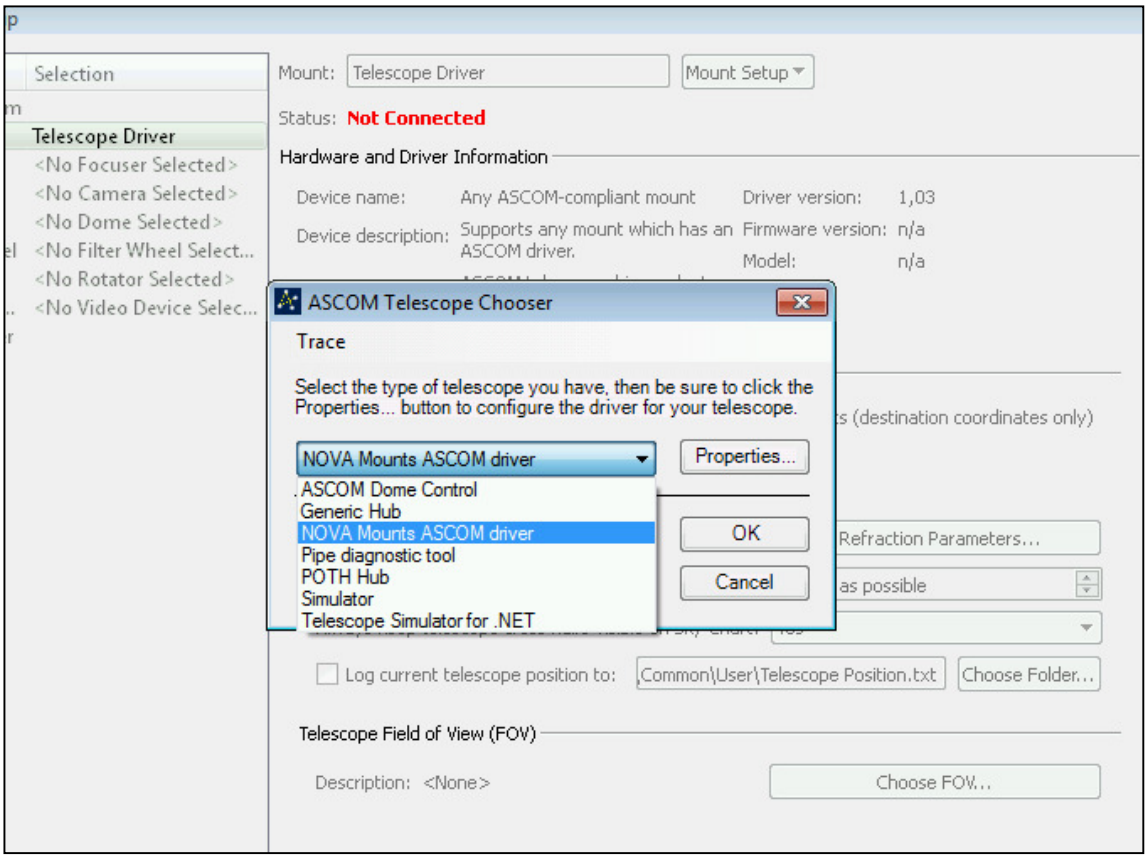
This window is displayed, select the ASCOM category and click "***OK***"



Choose "***Settings*** "and the "***ASCOM Telescope chooser***"

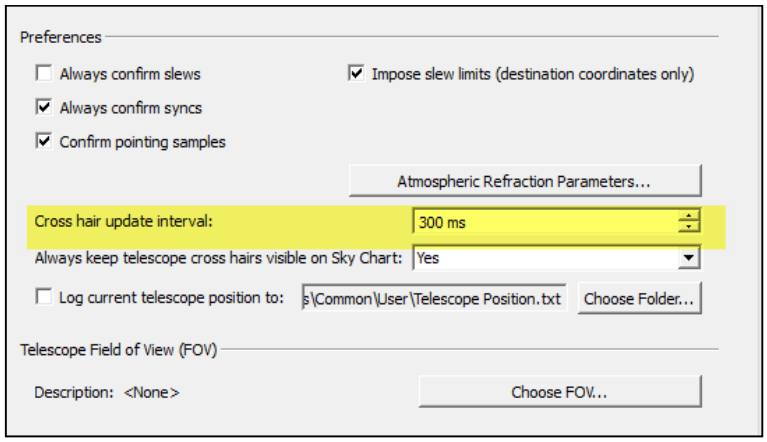


Roll out the top-down list and choose the "***NOVA Mounts ASCOM driver***"

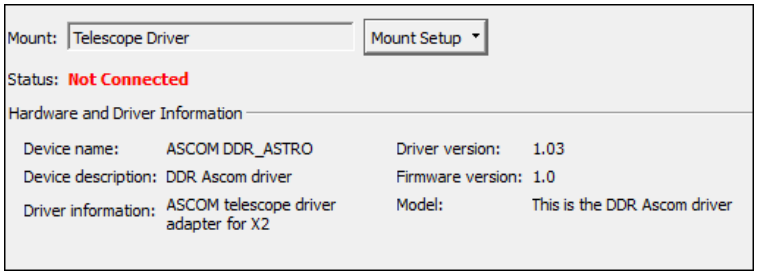


At this stage, click on "***Properties***" and the NOVA standard configuration screen will be displayed. Check configuration, it must be identical to the one provided at the beginning of this document, when the mount has been configured.

Click on "***OK***" on the configuration sheet. Change the value of the "***Cross hair update interval***" item from "***As fast as possible***" to "***300ms***".

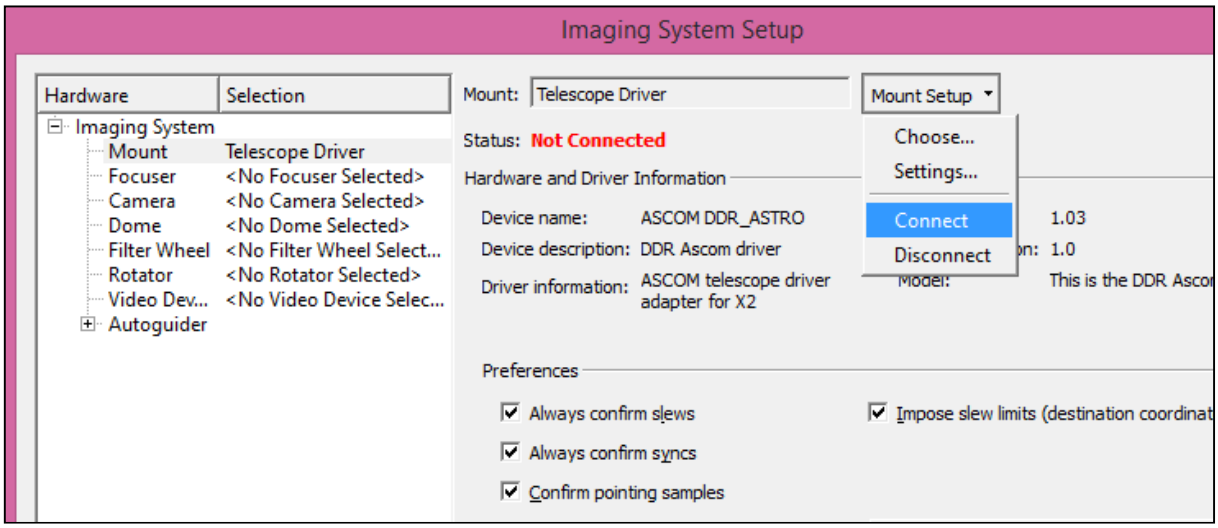


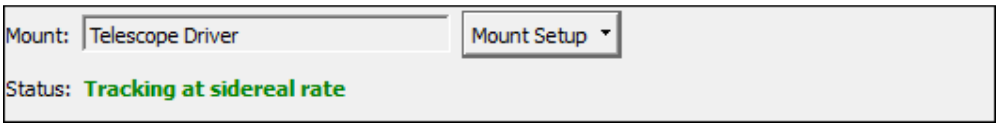
At this stage, the mount is ready to be connected to **TheSky X**.



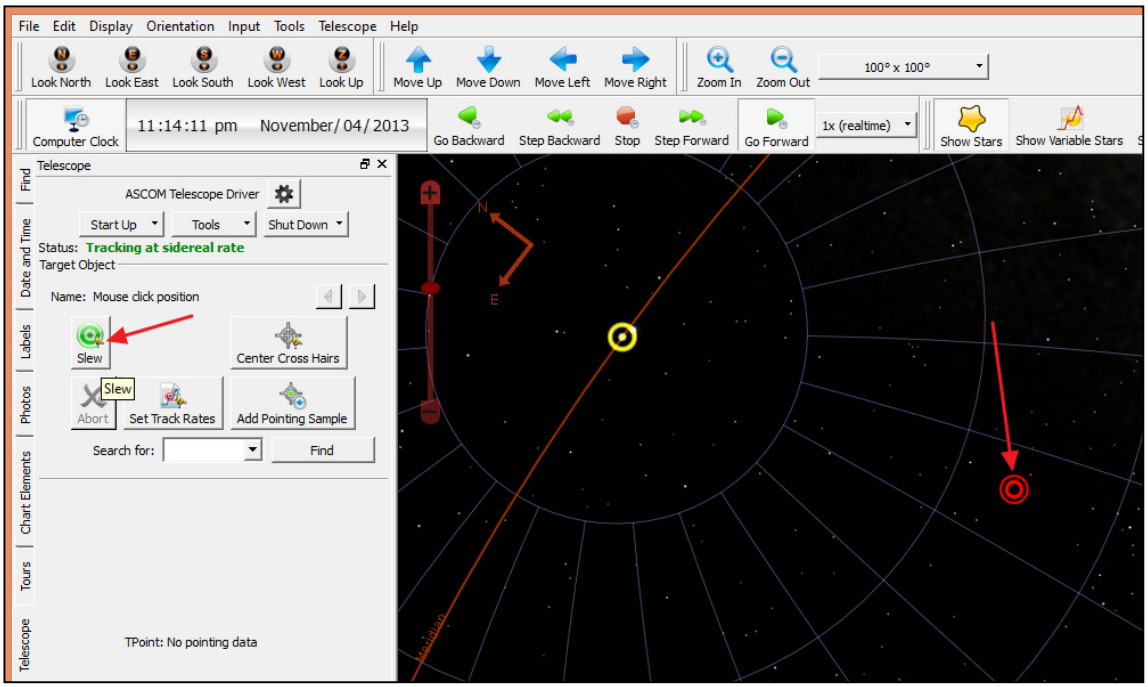
7.10.2 Link to the mount

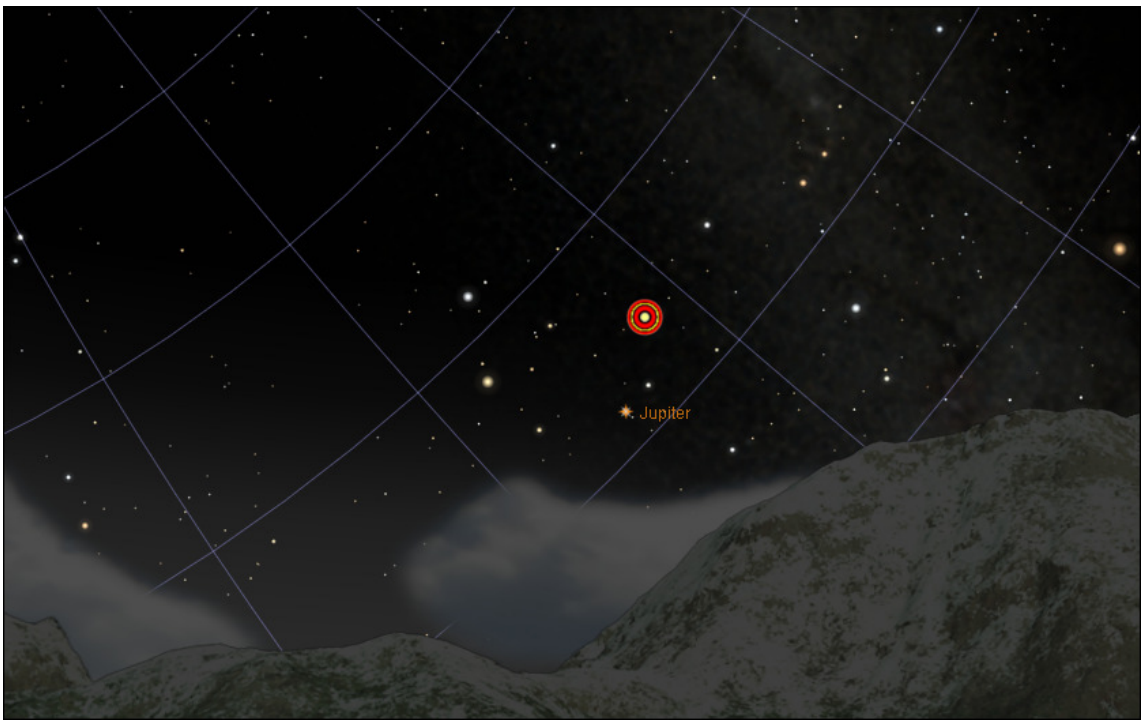
Just follows the next screen copies





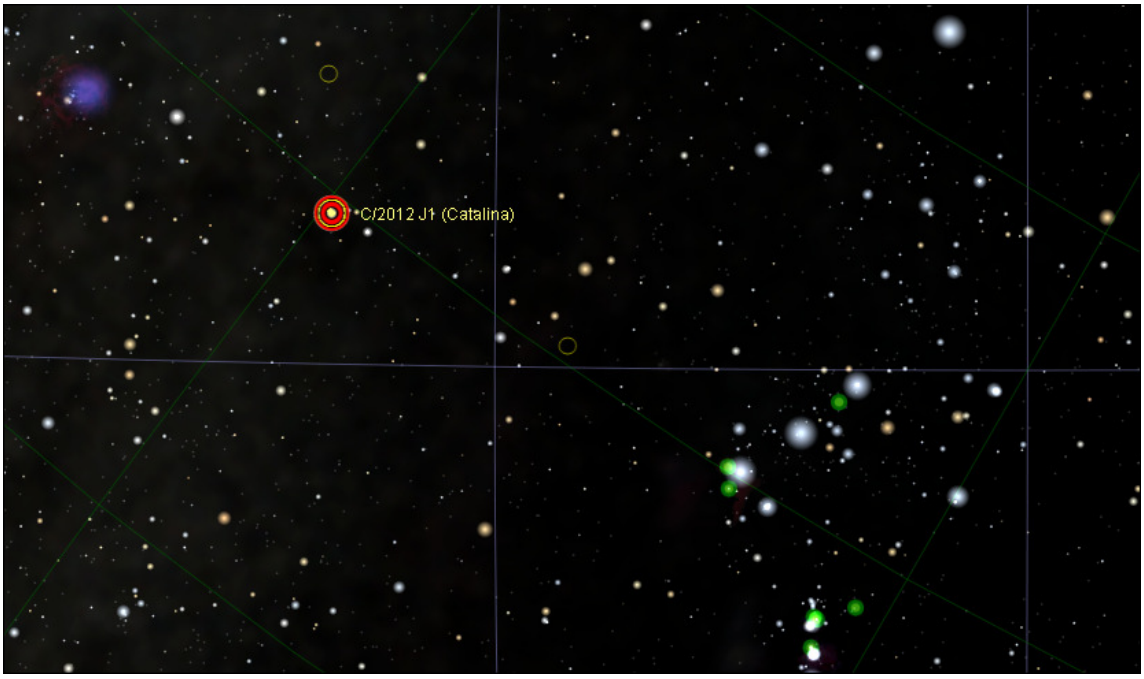
Then slewing the mount using the SkyX is possible. This is not the purpose of this document to go into details about this. Please refer to the SkyX documentation on how to slew/use telescope.



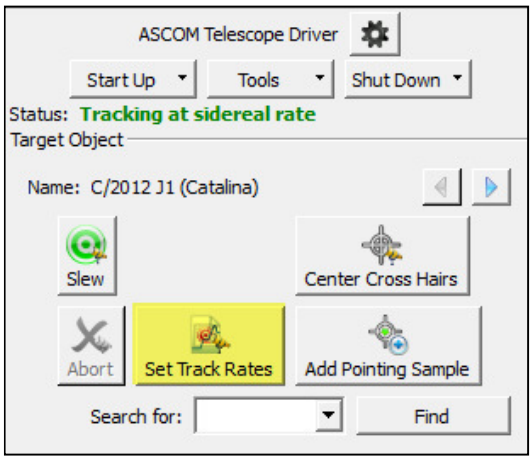


7.10.3 Mobile objects

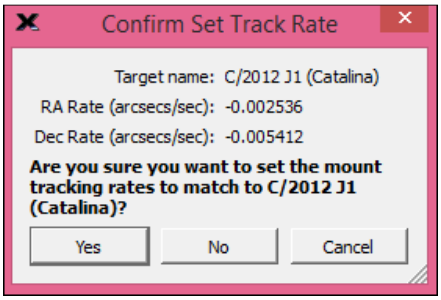
The mount can follow / track slow motion objects via the TheSkyX software. Slew to a comet for example.



Then click "***Set Tack Rates***"



Confirm for the speeds changes to be performed, and the mount will track at the speed of the comet (can be an asteroid also).



7.11 Creating / using the pointing and speed models

Pointing model allows better pointing accuracy and to use speed model that will enhance tracking accuracy of the mount.

The pointing model of the mount is based on TPOINT model; please look at this for more information http://www.tpsoft.demon.co.uk/pointing.htm

The mode of operation is described in an appendix document

7.12 Advanced operation

These operations require a good skill of experience, please carefully read this section before starting.

7.12.1 Changing mount controller default's IP addresses

The mode of operation is described in an appendix document to change IP addresses from defaults (192.168.1.60 and 192.168.1.61)

8 Maintenance

Given that this mount has no mechanical element of transmission (no gear, no worms); its maintenance is extremely simple. Nothing needs to be oiled or tuned according the seasons or temperature changes. This is a maintenance free product.

8.1 General use precautions

If cables run through the axles of the mount, avoid performing several turns. Cables could be damaged, unplugged or create very high stress on engines.

8.2 Maintenance operator

Do not rotate the mount with the brakes applied. The mount can be rotated with the active brakes because they work by friction and braking torque is not infinite.

Please perform the best possible tube balancing in RA and DEC axis, the mount can accommodate for a slight unbalance , but for a large one, it may lead to get motor very hot due to large current amount to compensate for unbalancing. Also, the axis is less stiff when compensating for large unbalance.

Do not disassemble the encoders heads, their adjustment may be long in case of a non-experienced user, the adjustment factory made and is optimum.

-oOo-