

TELESTO

USER MANUAL – N.I.N.A.

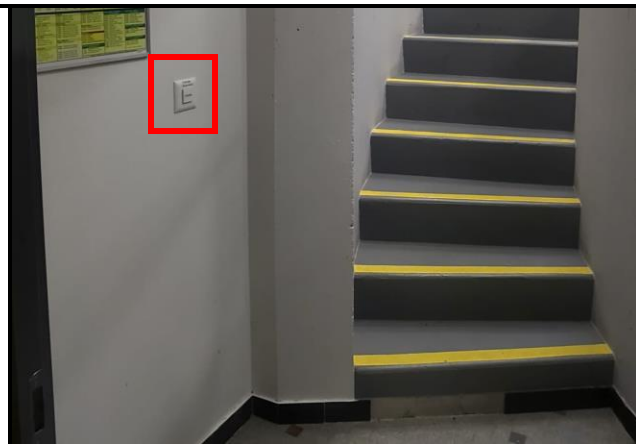
STARTUP

IN THE DOME

0. If it's too dark, switch on the lights in the dome (at the left of the dome entrance)

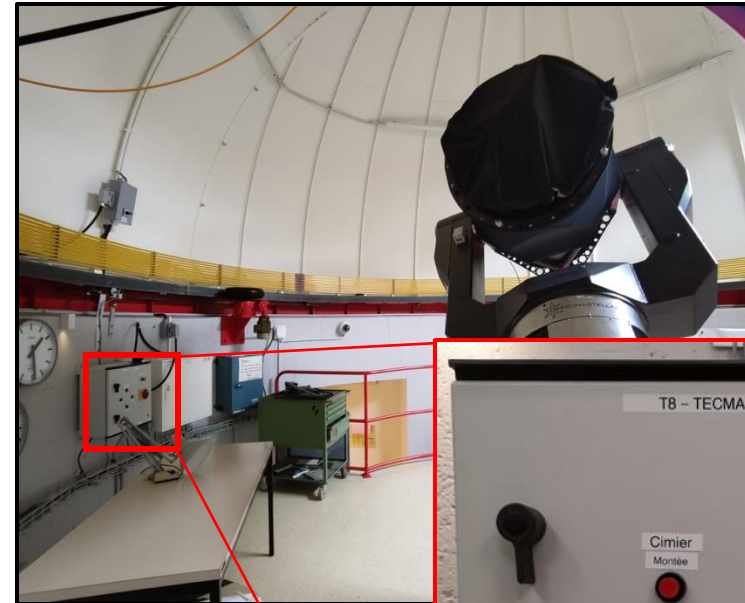


1. Press this button to switch on the lights in the dome



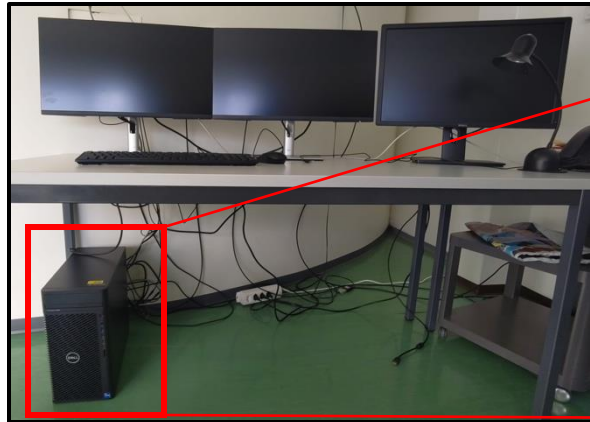
3. Switch off the dome lights and close the door of the dome

2. Make sure that the dome is on 'Auto' and not "Manual". This allows to move the dome directly from the software in the control room.



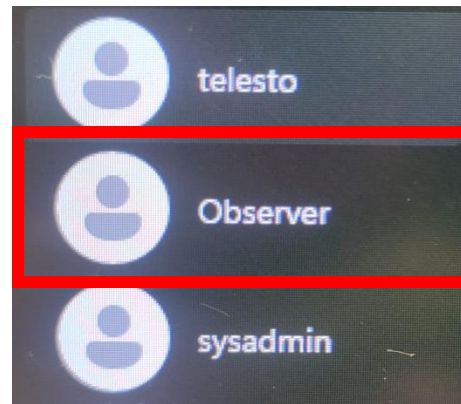
IN THE CONTROL ROOM

4. Turn on the big Dell computer



1. Press this button
to switch on the
computer

5. Select the **Observer** account and log in, the password is **observer1290**



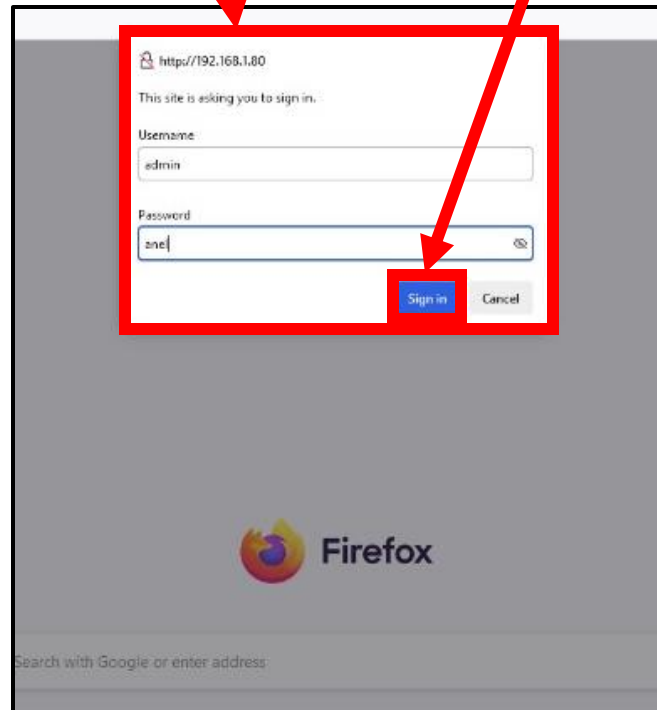
With this account you can not install any software on the computer, so do not try It 😊

6. Switch on the telescope power

1. Open the Power control
(on the top right of the Desktop)



2. A Firefox page will open. The username (edmin) and password (anel) should already be inserted

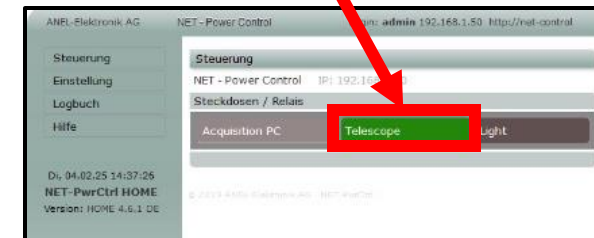


3. Click on 'Sign in'

4. Click on 'Telescope'

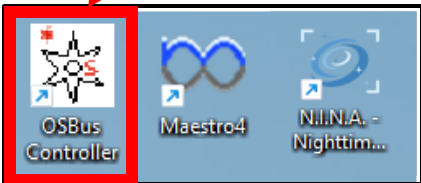


5. All good !

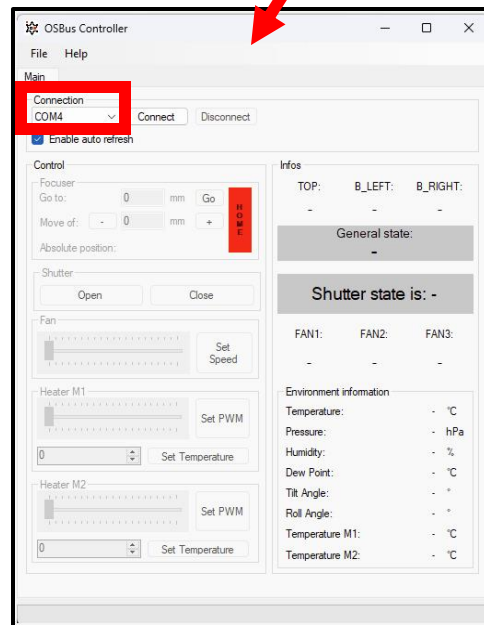


7. Launch the OSBus Controller software and connect it

1. Open OSBus Controller program (on the top right of the Desktop)

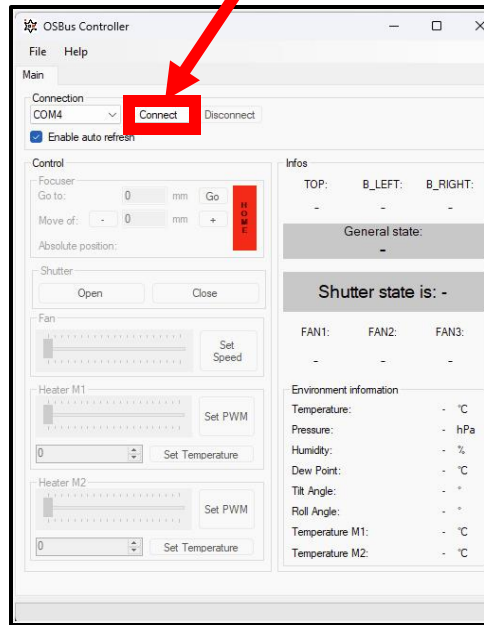


2. Check that the connection is 'COM4'

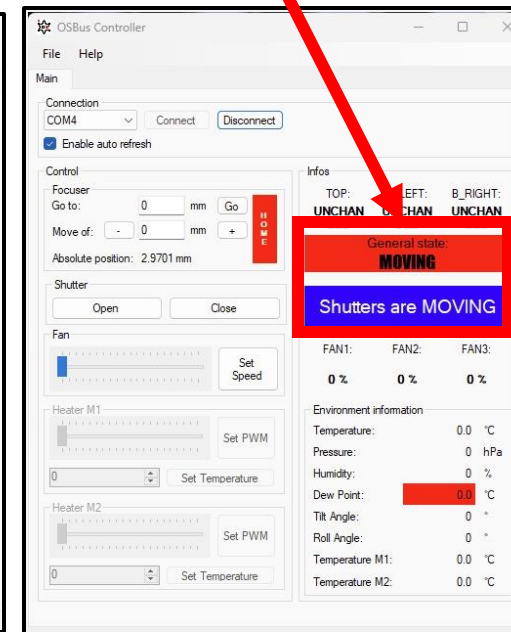


If 'COM4' is not in the list, just reboot the Computer

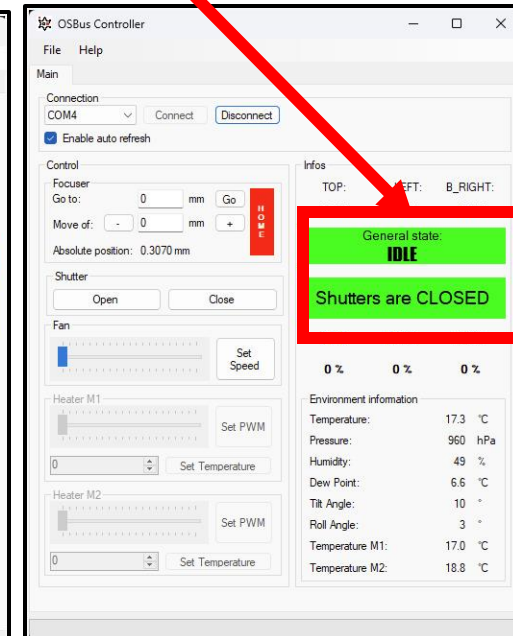
3. Click 'Connect'



4. Wait



5. All good



8. Home the focuser

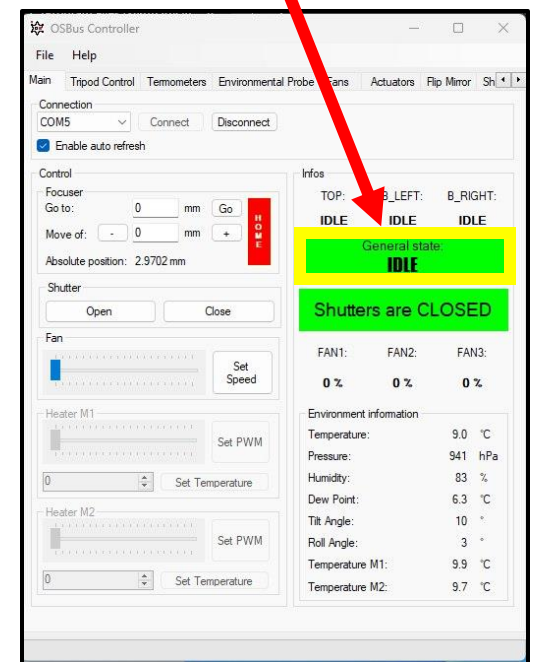
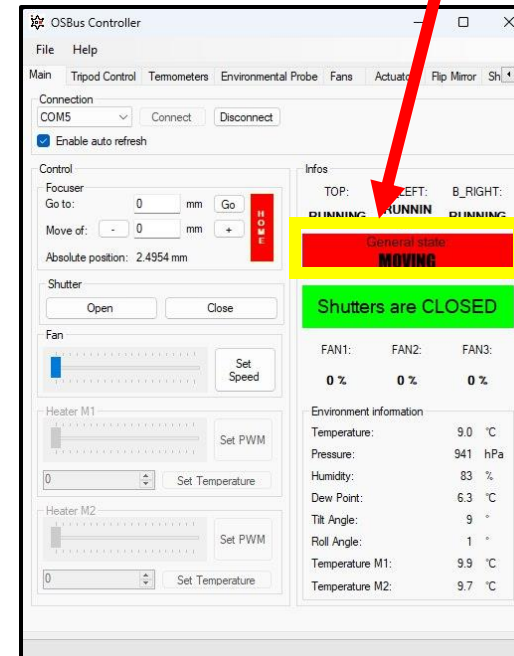
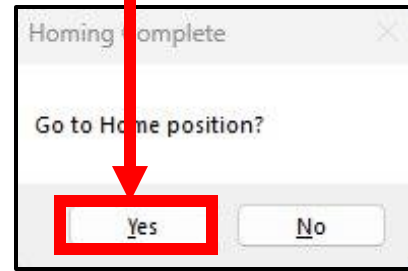
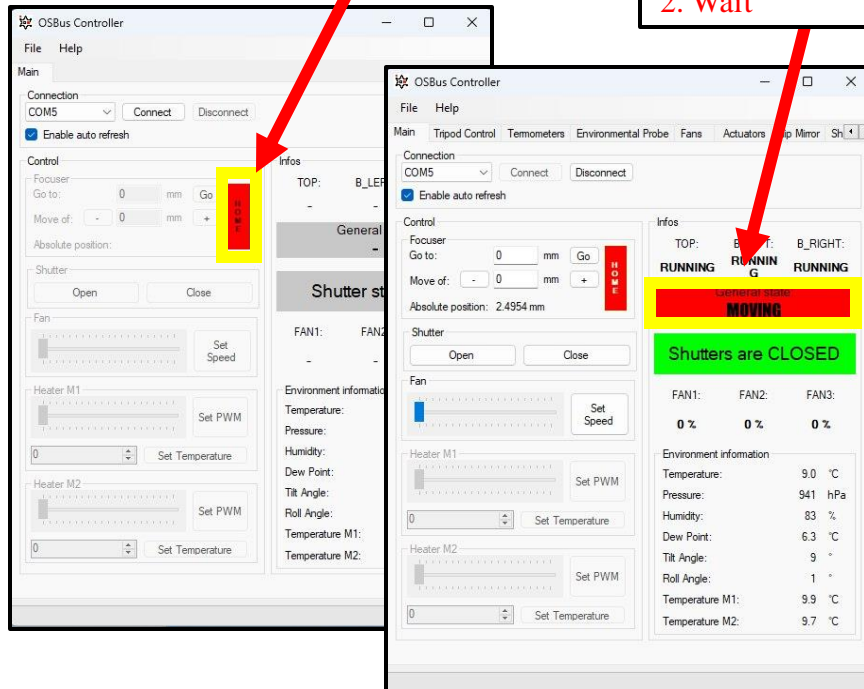
1. Click 'HOME'

2. Wait

3. Click 'Yes'

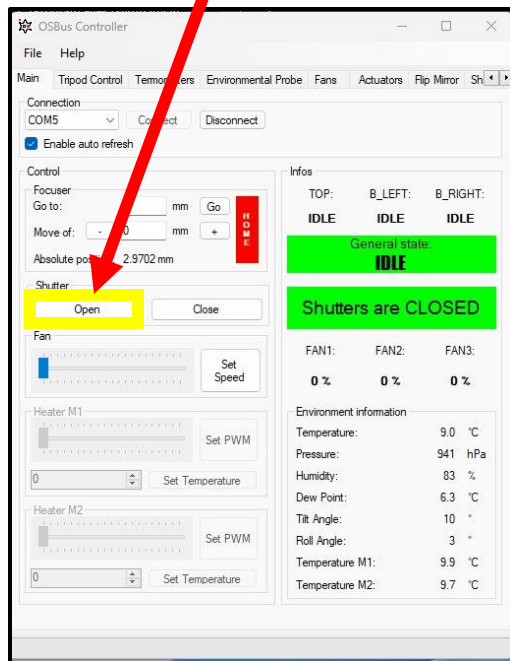
2. Wait

4. Everything is good!

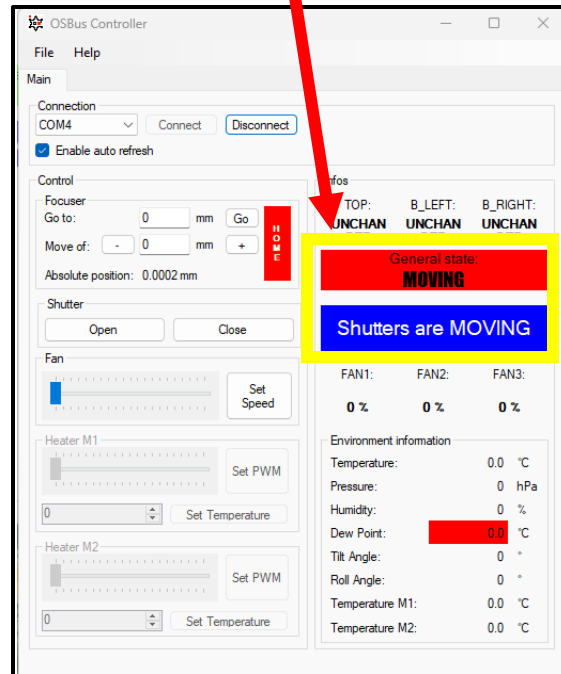


9. Open the shutters and close OSBus

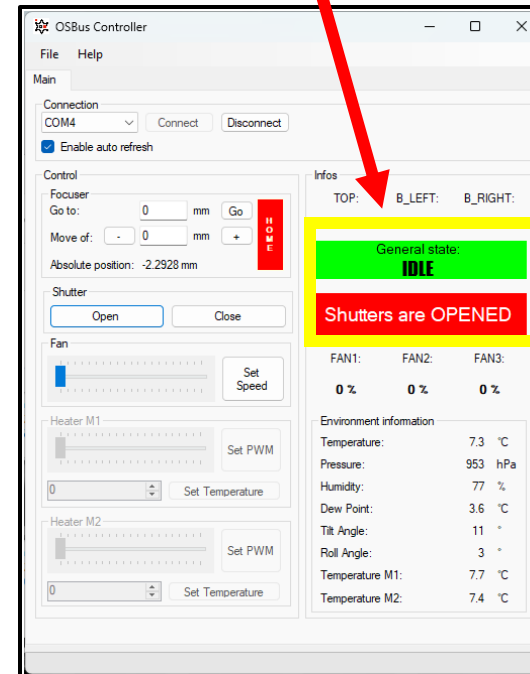
1. Click 'Open'



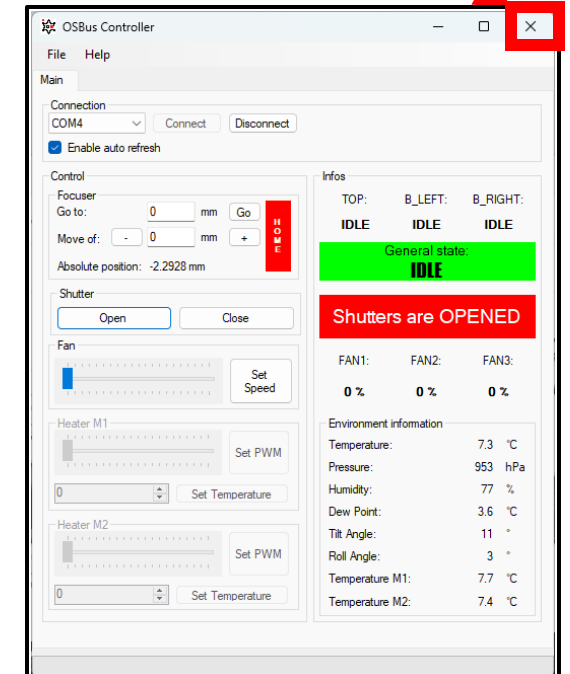
2. Wait



3. Everything is good!



5. Close OSBus



If you get the message 'shutters are MOVING' for too long (more than 2 minutes), it means that they are probably stuck. Open them one by one following the instruction on the troubleshooting page (<https://plone.unige.ch/astrodome/observations/content/troubleshooting>)

10. Open Maestro4 and set date and time

1. Open Maestro4

2. Click on 'Settings'

3. Click on 'For Telescope'

4. Click on 'Site, Time & Date...'

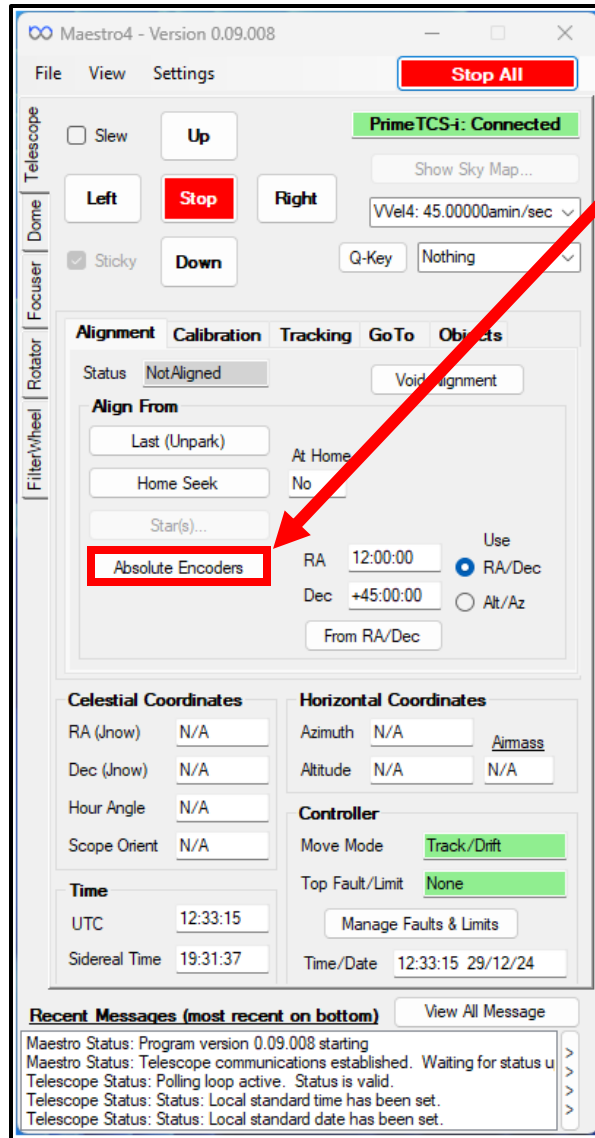
5. Click on 'Set Time & Date from PC'

6. All good!

The screenshots illustrate the following steps:

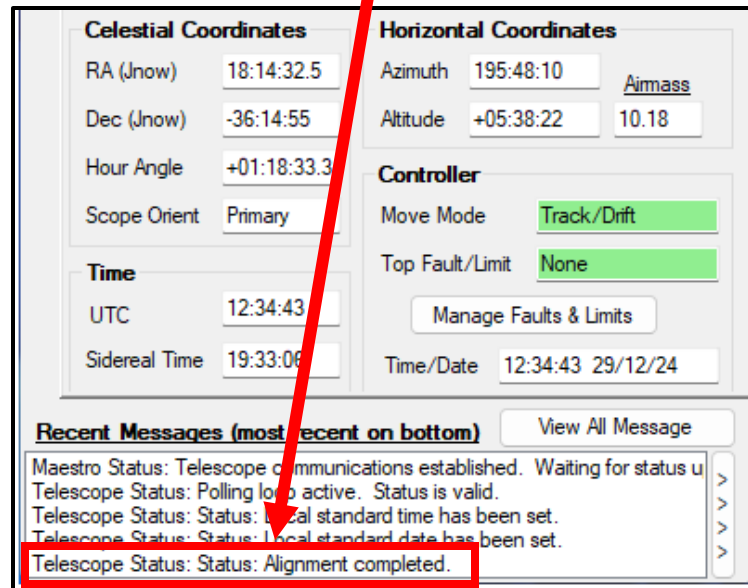
- Opening the Maestro4 application from the desktop.
- Clicking on the 'Settings' menu in the Maestro4 window.
- Clicking on 'For Telescope' in the Settings menu.
- Clicking on 'Site, Time & Date...' in the sub-menu.
- Clicking on 'Set Time & Date from PC' in the 'Telescope Site, Time & Date' dialog.
- Verifying the status in the main Maestro4 interface, where the 'PrimeTCS4: Connected' status is shown, and the message log at the bottom confirms: 'Telescope Status: Status: Local standard time has been set.' and 'Telescope Status: Status: Local standard date has been set.'

11. Click on “Absolute encoders” and minimize Maestro (do not close it)

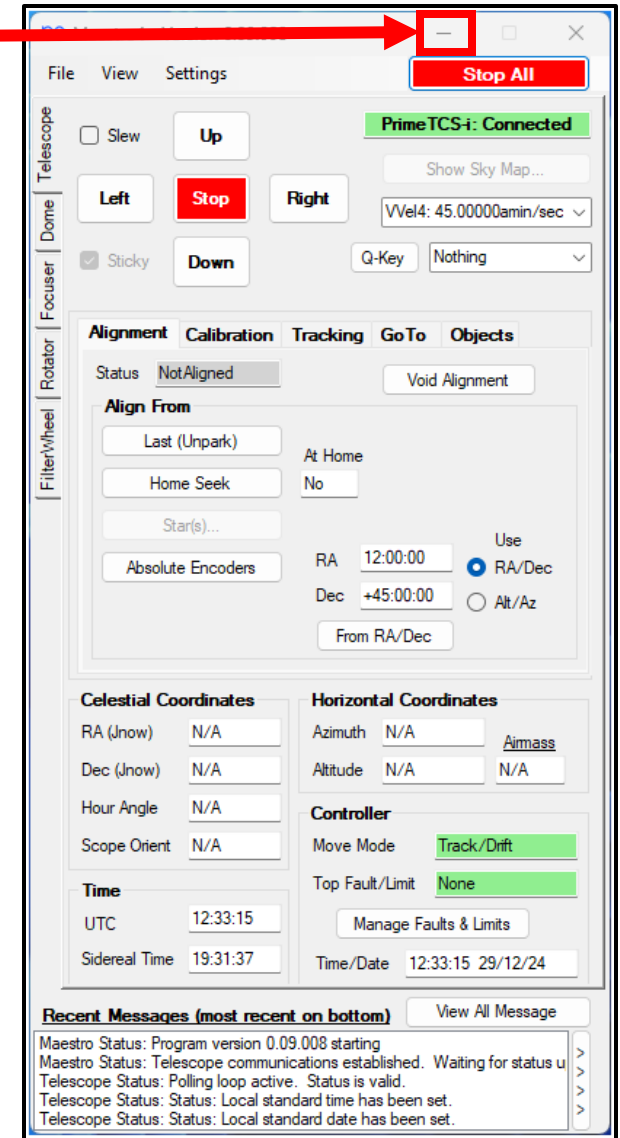


1. Click on 'Absolute encoders'

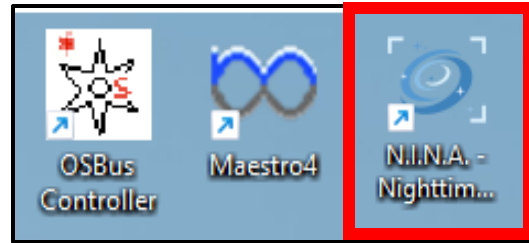
2. All good



3. Minimize Maestro

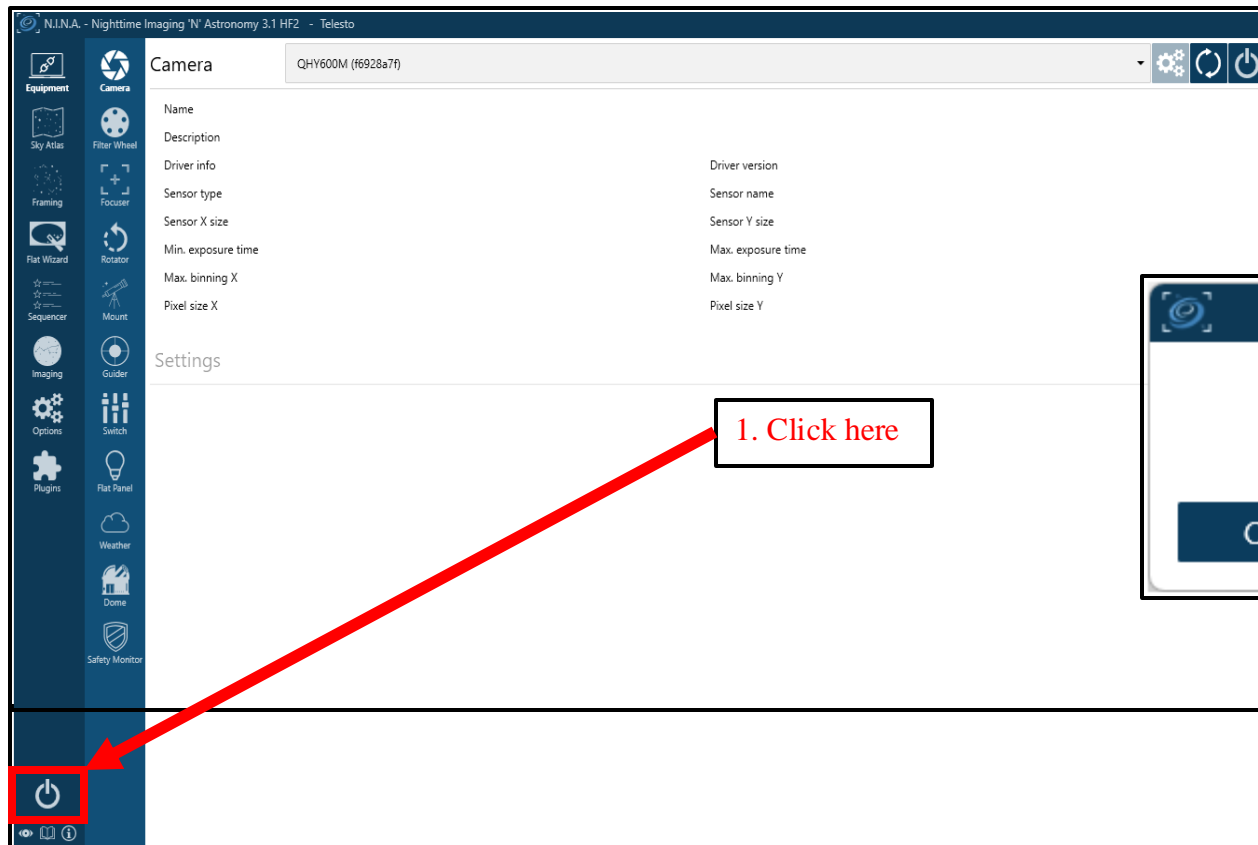


12. Open NINA



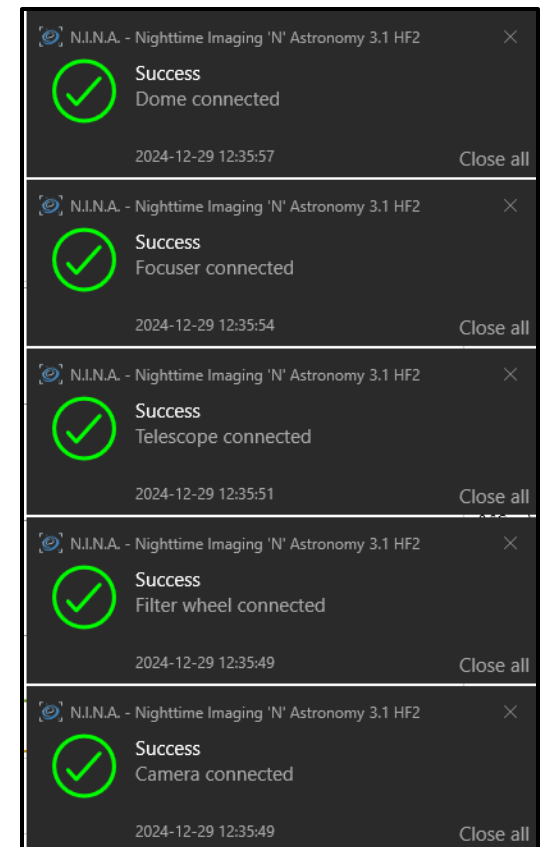
13. Connect all devices

3. Wait until all the tabs appear...All good!



1. Click here

2. Click 'OK'



13. Disconnect and reconnect the focuser

1. Click on 'Equipment'

2. Click on 'Focuser'

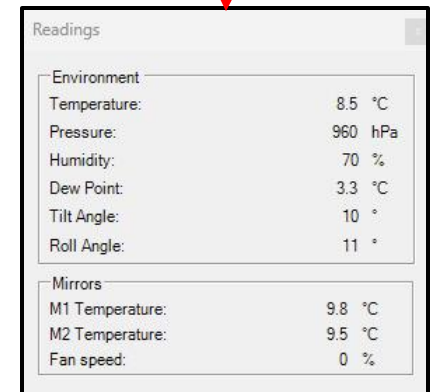
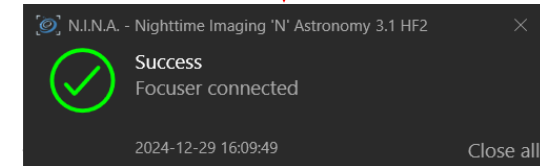
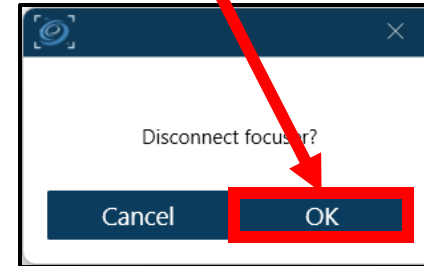
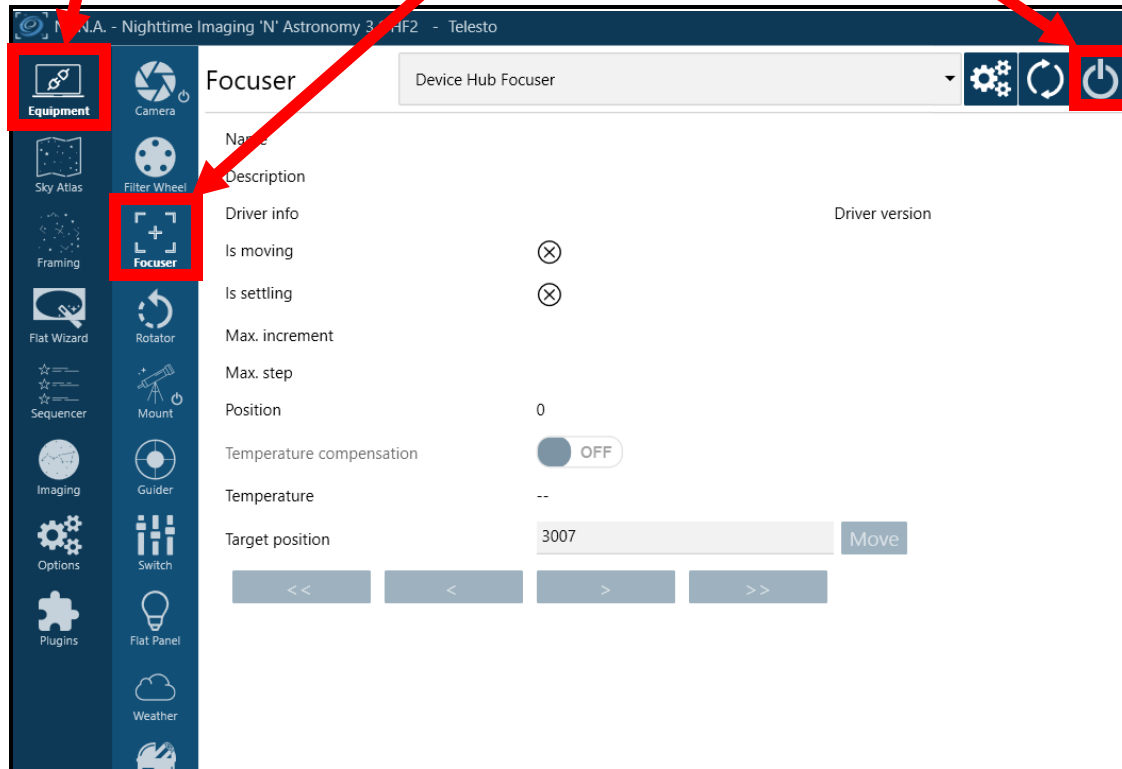
3. Click here to disconnect

4. Click 'OK'

5. Click again to connect

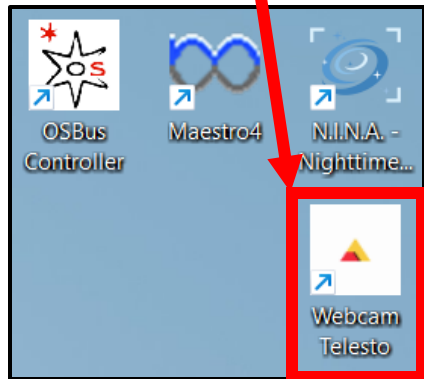
6. All good!

7. This window appears.
These are the physical
values of the CCD.



14. Find home position and open the dome

1. You can check that the dome and the telescope positions by clicking here to open the live camera inside the dome



2. Click on 'Equipment'

2. Click on 'Dome'

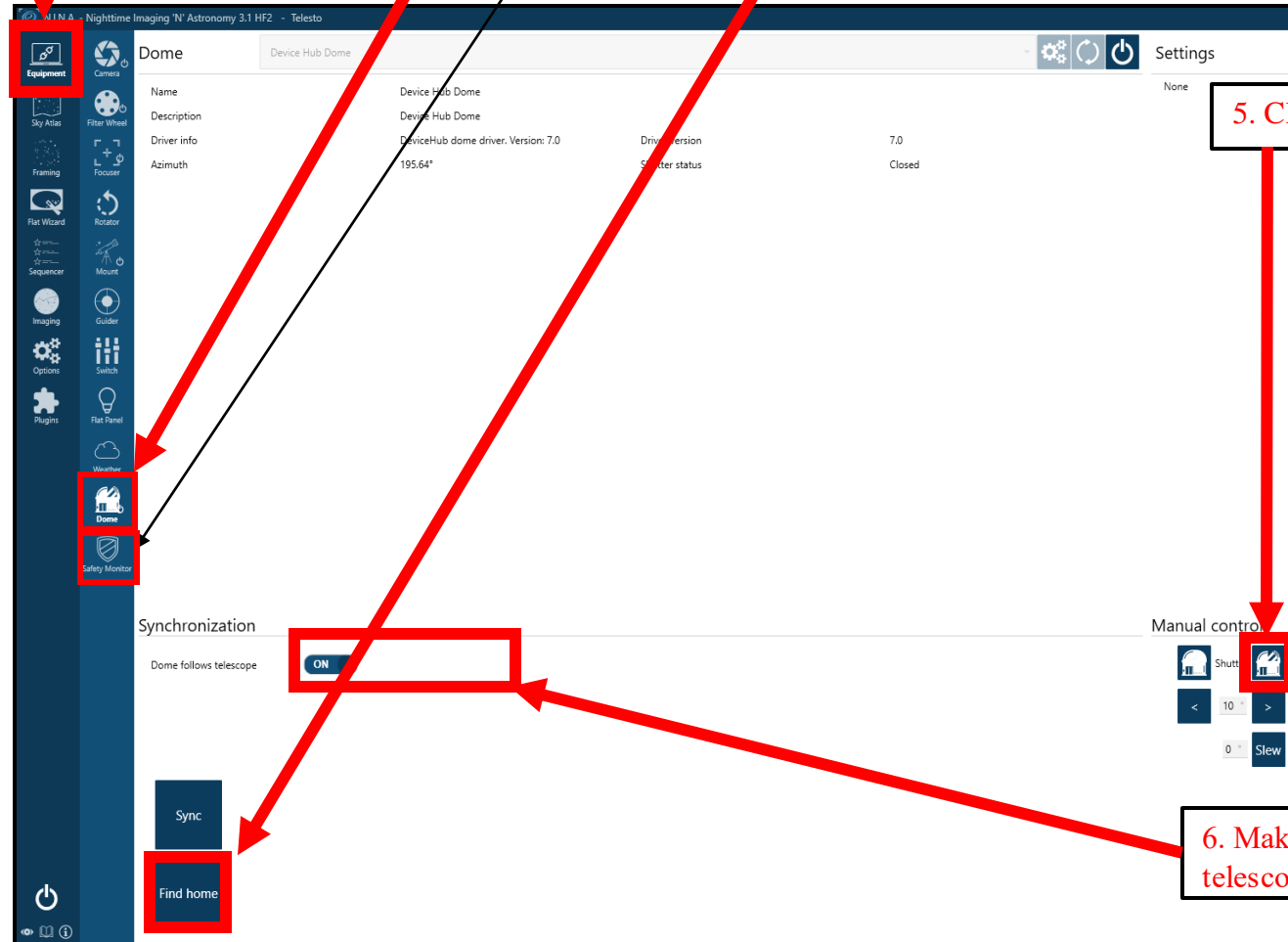
3. Click on 'Find Home'

4. When you click on 'Find Home', the Dome will make one full turn to calibrate the spatial coordinates

5. Click here to open the dome

6. Make sure that 'Dome follows telescope' is ON

If the dome does not move, disconnect the Safety Monitor (the same as you disconnected the focuser), do NOT connect it again and go on with the manual



END STARTUP

OBSERVATIONS

For more information on how to use N.I.N.A., please refer to this [documentation](#)

CHOOSING A TARGET

1. Select the the Sky Atlas tab

N.I.N.A. Nighttime Imaging 'N' Astronomy 3.1 HF2 - Telesto

Object name (e.g. M 31)

▼ Observation

Date 2024-12-29

Altitude Any

▼ Apparent size

↔ From 5 arcsec

↔ Through 30 arcsec

▶ Moon

▶ Object type

▶ Constellation

▶ Coordinates

▶ Surface brightness

▶ Apparent magnitude

Order by Size

Descending

Items per page 50

Search

2. Choose all the parameters of the targets you might be interested in

- **ALTITUDE:** minimum altitude in a given time range (we suggest minimum of 20° , which is the tree level)
- **APPARENT SIZE:** apparent size of the object. Our camera has a field of view of about 30 arcmin
- **OBJECT TYPE:** select the type of objects you are interested in (stars, clusters, galaxies etc.)

ETC (play around)

3. Click on 'Search'

A list of possible targets will appear on the right

1. Here you see the altitude of the objects during the night (we suggest to observe targets when they are above 20°)

2. Click on 'Set for framing assistant' to have more information about that target and to point it

Name	Details	Altitude	
NGC 4042	<div><div>RA 12:02:47 Dec 20° 09' 48"</div><div>Type GALXY Constellation COM</div><div>Moon 096° Light 16.4 Mags 99.9 Size 6.00"</div></div>		<div>Add target to sequence</div> <div><div>Set for framing assistant</div></div> <div>Slew</div>
NGC 2686-2 NGC 2686B	<div><div>RA 08:55:01 Dec 49° 08' 33"</div><div>Type GALXY Constellation UMA</div><div>Moon 139° Light 16 Mags 99.9 Size 6.00"</div></div>		<div>Add target to sequence</div> <div>Set for framing assistant</div> <div>Slew</div>
IC 3469	<div><div>RA 12:32:11 Dec 25° 48' 10"</div><div>Type GALXY Constellation COM</div><div>Moon 093° Light 99.9 Mags 99.9 Size 6.78"</div></div>		<div>Add target to sequence</div> <div>Set for framing assistant</div> <div>Slew</div>
IC 503	<div><div>RA 08:22:11 Dec 03° 16' 05"</div><div>Type GALXY Constellation HYA</div><div>Moon 135° Light 13.66 Mags 99.9 Size 7.98"</div></div>		<div>Add target to sequence</div> <div>Set for framing assistant</div> <div>Slew</div>

POINTING THE TELESCOPE ON YOUR TARGET

If the centering (plate solve) does not work, probably you are out of focus. Firstly, do an autofocus (next 2 slides) and then slew and center to the object

1. Go in the 'Framing' tab

2. Click on 'Slew and center'

3. A window like this will appear. It will take few pictures to center the target

The screenshot displays the software interface for telescope pointing. On the left, the 'Framing' tab is selected in the sidebar. The main panel shows the 'Coordinates' section for the 'Andromeda Nebula' with RA 0 h 42 m 44.3 s and Dec 41 d 16 m 7.5 s. Below this, the 'Camera parameter' section lists Width 9600, Height 6422, Pixel size 3.76 μm, and Focal length 2280 mm. The 'Targets' section shows Horizontal panels 1 and Vertical panels 1. A red box highlights the 'Slew and center' button in the 'Targets' section. A red arrow points from the 'Slew and center' button to a window titled 'Slew and center'. This window contains fields for Center RA, Center RA HMS, Center Dec, Center Dec DMS, Radius, Pixel scale, Rotation, Epoch, Error distance, RA error, RA error (px), Dec error, and Dec error (px). At the bottom of the window, there is a 'Slew' button and a row of buttons: Time, Succ, RA, Dec, Error distance, RA error, Dec error, RA errorDec, and Rotation. The background of the interface is a star chart showing the Andromeda Nebula and surrounding stars like NGC 221, M 32, NGC 221, NGC 224, NGC 205, and M 10. A red box highlights the 'Slew and center' button in the 'Targets' section.

SELECTING FOCUS & FILTER

The screenshot shows a software interface with a sidebar on the left containing icons for Equipment, Sky Atlas, Framing, Flat Wizard, Sequencer, **Imaging** (highlighted with a red box), Options, and Plugins. The main window displays the 'Focuser' settings. At the top of the Focuser panel, there are icons for various functions. Below these, the 'Focuser' section contains the following controls:

- 'Is moving' and 'Is settling' status indicators, each with a circled 'X'.
- 'Position' field: 5300 (highlighted with a red box).
- 'Temperature' field: 2.40 °C.
- 'Temperature comp.' toggle: OFF.
- 'Target position' field: 5300 (highlighted with a red box).
- 'Move' button (highlighted with a red box).
- 'Camera' dropdown: Focuser (highlighted with a red box).
- 'Filter Wheel' section with 'Active filter' dropdown: B (highlighted with a red box) and a 'Change' button (highlighted with a red box).

Red arrows point from text boxes to these specific elements in the interface:

- 1. Go in the 'Imaging' tab (points to the Imaging icon in the sidebar).
- 2. Click on 'Focuser' (points to the Focuser icon in the top toolbar).
- 3. This is the current position of the focus (points to the 'Position' field showing 5300).
- 4. Choose the focus (we suggest 5300) (points to the 'Target position' field showing 5300).
- 5. Click on 'Move' to move the focus (points to the 'Move' button).
- 2. Choose the filter (points to the 'Active filter' dropdown showing B).
- 3. Click on 'Change' to change the filter (points to the 'Change' button).

AUTOFOCUS

If the autofocus fails, you are probably too far from the good value. Set the focus to 5300 (previous slide), and then redo the autofocus

1. Go in the 'Imaging' tab

2. Click on 'Autofocus'

3. Click on 'Start autofocus'

4. It will take few images to adjust the focus

The screenshot displays the N.I.N.A. - Nighttime Imaging software interface. The 'Imaging' tab is selected in the left sidebar. The main window shows a live image of a star field. The 'Autofocus' window is open, displaying a graph of focus value versus time. The 'Start autofocus' button is highlighted. The 'Statistics' window shows various camera parameters. The 'Image History' window shows a list of captured images. The 'Sequence' window shows the current sequence details.

Imaging Tab:

- Gain: 25
- Offset: 10
- Cooling: 15.29%
- Sensor temp.: -10.00 °C / -10.00 °C
- Target temperature: -10 °C
- Min. Duration: 0 min
- Warming: 0 min

Statistics:

Width	Height
9576	6388
Mean	165.34
Median	164.00
Min	0 (44x)
#Stars	77
Bit depth	16
Gain	25
SD	80.61
MAD	17.00
Max	65535 (13x)
HFR	6.05
HFR SD	0.33
Offset	10

Autofocus Graph:

The graph shows focus value (Y-axis, 5000 to 5400) versus time (X-axis, 19:30:22 to 19:30:28). The focus value starts at approximately 5350, drops to a minimum of about 5200, and then rises back to 5350.

Image History:

Duration	Mean	HFR	Filter
60.00s	171	6.25	R
60.00s	168	6.09	R
60.00s	171	5.34	R
60.00s	180	7.12	V
60.00s	176	6.47	V
60.00s	181	5.65	V
60.00s	176	7.37	V
60.00s	172	5.98	V
60.00s	172	6.43	V
60.00s	171	7.22	V
60.00s	165	6.05	V

Sequence:

1 / 1

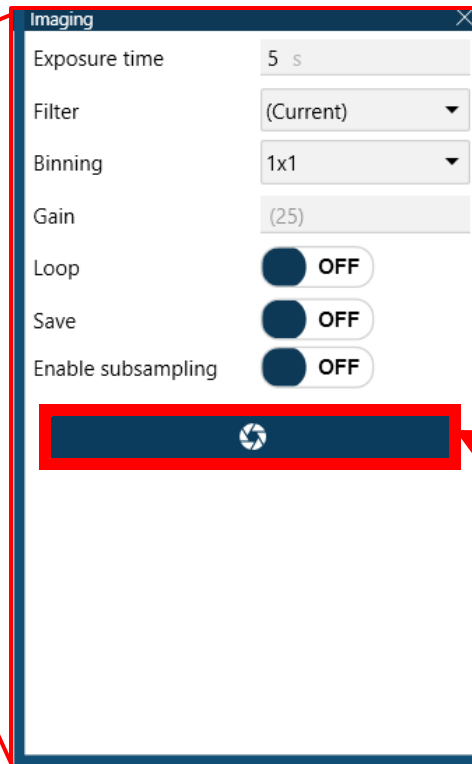
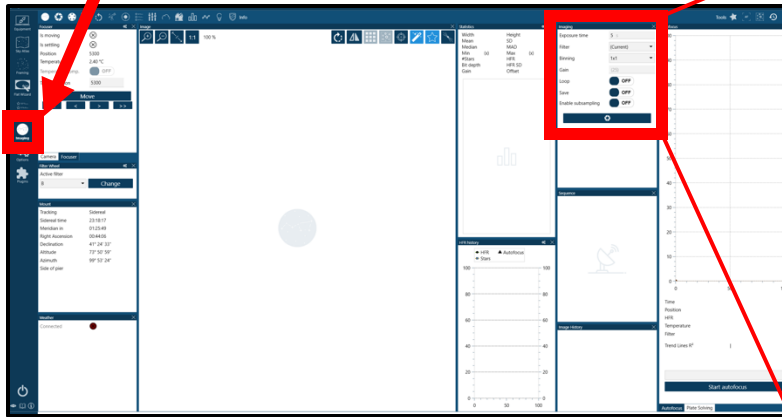
Estimated finish time: 19:51:00

Active sequence details:

Target	Mode	Exposure time	Type	Filter	Binning	Gain	Offset
Andromeda Nebula	One after another	60 s	LIGHT	V	1x1	(25)	(10)

TACKLING A PICTURE

1. Go in the 'Imaging' tab



2. Choose all the properties that you want:

- **EXPOSURE TIME:** time of the frame exposure in seconds
- **FILTER:** filter to be used for the capture
- **BINNING:** type of binning when pixels are read (lower binning is more precise, but takes longer time).
- **GAIN:** the conversion between the number of electrons ("e-") recorded by the camera and the number of digital units
- **LOOP:** if you want to take images in loop
- **SAVE:** if you want to save the taken images
- **ENABLE SUBSAMPLING:** if you want the camera's image to be downsampled (reduced in resolution). We suggest to leave it OFF

3. Click here to take a picture

TAKING A SEQUENCE OF TARGETS AND PICTURES

There is the option to take multiple consecutive pictures

1. In the Sky Atlas tab choose the target you want to observe

2. To add a target in a sequence of observations click on 'Add target to sequence' and then 'Legacy Sequencer'

The screenshot shows the N.I.N.A. - Nighttime Imaging 'N' Astronomy 3.1 HF2 software interface. The interface is divided into several panels. On the left is a sidebar with icons for Sky Atlas, Framing, Flat Wizard, Sequencer, Imaging, Options, and Plugins. The 'Sky Atlas' icon is highlighted with a red box and a red arrow pointing to it from the first instruction box. The main panel displays a list of astronomical targets with their details and transit graphs. The targets listed are IC 2184, NGC 81 (NPM1G +22 016), Abell 76 (PK 50-36.1), MCG 7-31-44 (NGC 5896), and NGC 5867. Each target has a small image, its RA, Dec, Type, Constellation, and Altitude graph. The 'MCG 7-31-44 (NGC 5896)' target is highlighted with a blue background. On the right side of the main panel, there is a vertical stack of buttons for each target: 'Add target to sequence', 'Set for framing assistant', and 'Slew'. The 'Add target to sequence' button for the highlighted target is highlighted with a red box and a red arrow pointing to it from the second instruction box. Below this button, there is a dropdown menu with 'Legacy Sequencer' and 'Sequencer' options. The 'Legacy Sequencer' option is highlighted with a red box.

Name	RA	Dec	Type	Constellation	Altitude
IC 2184	07:29:27	72° 07' 51"	GALCL	CAM	Transit north
NGC 81 NPM1G +22 016	00:21:13	22° 22' 58"	GALXY	AND	Transit south
Abell 76 PK 50-36.1	21:30:04	-02° 48' 29"	GALXY	AQR	Transit south
MCG 7-31-44 NGC 5896	15:13:51	42° 01' 27"	GALXY	BOO	Transit south
NGC 5867	15:06:24	55° 43' 54"	GALXY	DRA	Transit north

1. Go in the 'Sequencer' tab

2. Here is the list of the targets in your sequence

The screenshot displays the 'Sequencer' tab in the N.I.A. software. The interface is divided into several sections. At the top, 'Target Set Start Options' includes 'Cool Camera' (ON), 'Unpark Mount' (ON), and 'Meridian' (OFF). 'Target Set End Options' includes 'Warm Camera' (ON) and 'Park Mount' (ON). Below these, 'Target Options' shows 'Slew to target' (ON) and 'Center target' (ON). The 'Autofocus' section has 'On start' (ON) and 'On filter change' (ON). A table at the bottom lists targets with columns for Progress, Total #, Time, Type, Filter, Binning, Dither, Dither every #, Gain, and Offset. The 'Enabled' toggle for the first target is highlighted. On the right, a graph shows the transit path of M 31, with a peak at 85° labeled 'Transit south'.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 10	10	180 s	LIGHT	B	1x1	ON	1	(25)	(10)
ON	0 / 10	10	180 s	LIGHT	V	1x1	ON	1	(25)	(10)
ON	0 / 10	10	180 s	LIGHT	R	1x1	ON	1	(25)	(10)

3. We suggest you to set ON all the parameters in the yellow rectangles:

- **Cool camera:** allow the camera to cool down before starting a target
- **Unpark Mount:** unpark the mount before starting a target
- **Warm Camera:** allow the camera to warm up at the end of a target
- **Slew to target:** slew the telescope + dome to the target
- **Center target:** take few pictures to better center the target in the field of view
- **Autofocus on start:** autofocus the camera before starting a target
- **Autofocus on filter change:** autofocus the camera when a filter is changed
- **Enabled:** enable that list of exposures to be taken

List of options for a set of pictures (click two times at a value to change it)

- **Progress:** number of picture that have been taken out of the total #
- **Total #:** number of pictures to be taken with the chosen options
- **Time:** exposure time (we suggest not to go above 180s)
- **Type:** type of picture (BIAS, DARK, FLAT, LIGHT = chosen target)
- **Filter:** filter to use
- **Binning:** binning of the pixels (lower binning is slower, but has higher resolution)
- **Dither:** slightly shift the camera between one picture and another (it helps to remove bad pixels of systematic pattern during postprocessing)
- **Dither every #:** after how many images the camera is slightly shifted
- **Gain:** conversion between electrons and digital units (25 is the unitary value)
- **Offset:** offset to apply to every pixel (useful to avoid negative values of the read-out-noise)



Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
<input type="checkbox"/>	0 / 10	10	180 s	LIGHT	B	1x1	<input checked="" type="checkbox"/>	1	(25)	(10)
<input type="checkbox"/>	0 / 10	10	180 s	LIGHT	V	1x1	<input checked="" type="checkbox"/>	1	(25)	(10)
<input type="checkbox"/>	0 / 10	10	180 s	LIGHT	R	1x1	<input checked="" type="checkbox"/>	1	(25)	(10)

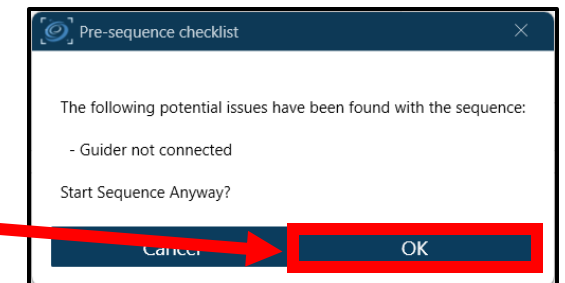
Toolbar icons: Back, Add (+), Delete (trash), Refresh, Up, Down, Save, Print, Zoom, Start Sequence (play button).

Click here if you want to add a set of pictures for that specific target

Click here to delete that set of pictures

Click here to start the sequence

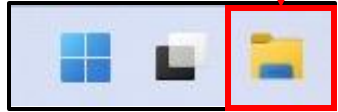
A window like this will appear, click 'OK'



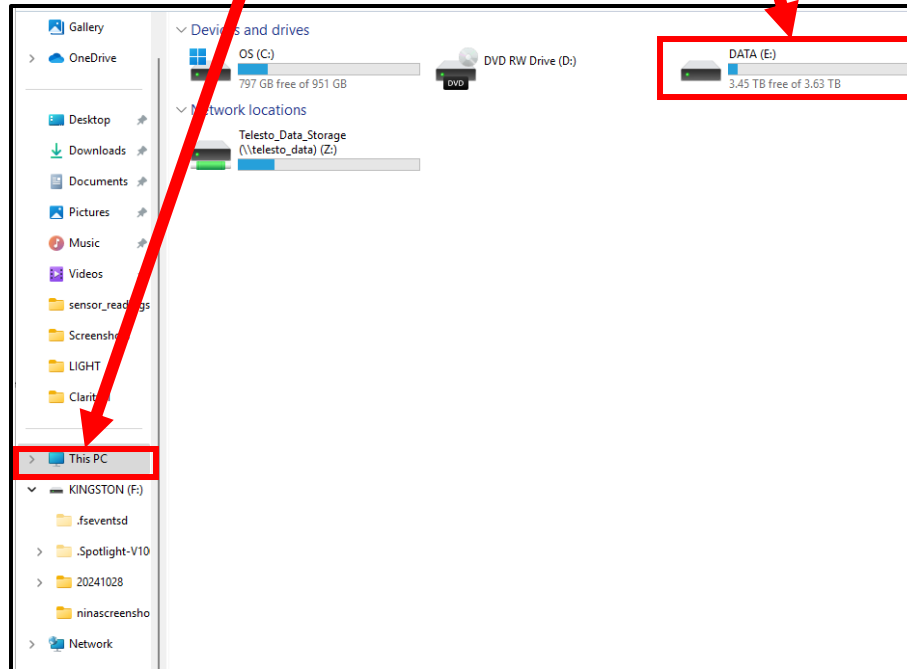
DATA STORAGE

Data (pictures) are automatically saved in as fits files. They are stored in the following path:

1. Select the folder icon in the bottom bar of the screen

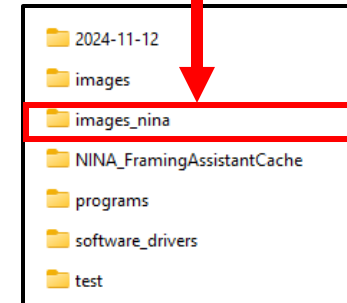


2. Click on 'This PC'



3. Select 'DATA (E:)'

4. Select 'images_nina'



3. Your data are stored in the folder of your observing date.

For example, the folder 2024-12-04 will contain images taken on the 4th of December 2024



2024-12-04	04/12/2024 18:41	File folder
2024-12-26	26/12/2024 20:38	File folder

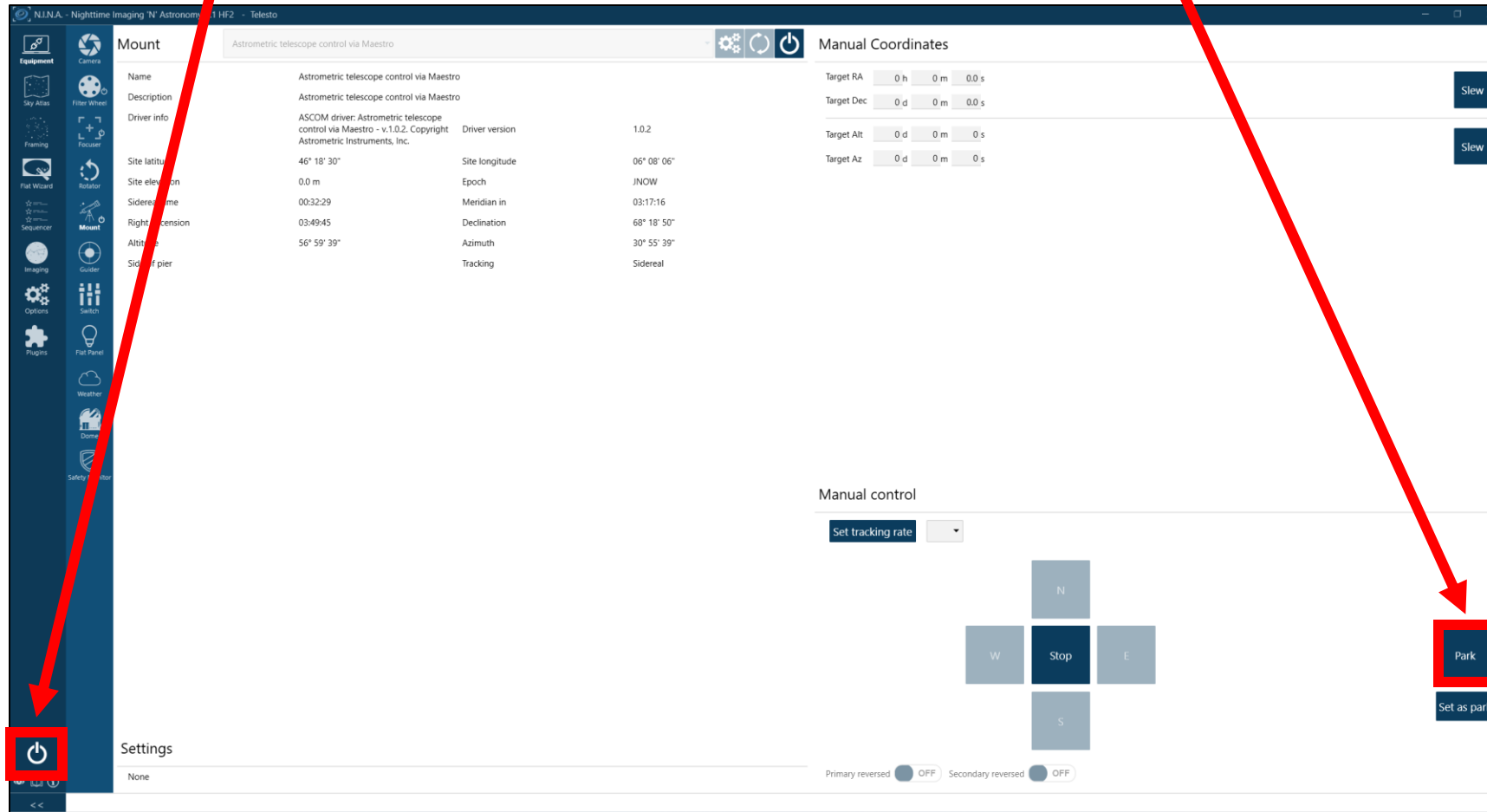
END OF THE NIGHT

IN THE CONTROL ROOM

1. Park the telescope

1. Go in the 'Equipment' tab

2. Click on 'Park'



2. Park the dome

1. Go in the 'Equipment' tab

2. Click on 'Dome'

3. Click on 'Park' (it will both park and close the dome)

The screenshot shows the NINA software interface. The left sidebar contains various icons for different equipment and functions. The 'Equipment' tab is selected, and the 'Dome' icon is highlighted. The main panel displays the 'Dome' configuration page, which includes a table of dome parameters and a 'Manual control' section. The 'Park' button is highlighted in the bottom right corner.

Name	Device Hub Dome
Description	Device Hub Dome
Driver info	Device Hub dome driver, Version: 7.0
Driver version	7.0
Shutter status	Closed
Azimuth	180.00°

Manual control

Shutter

< 10 >

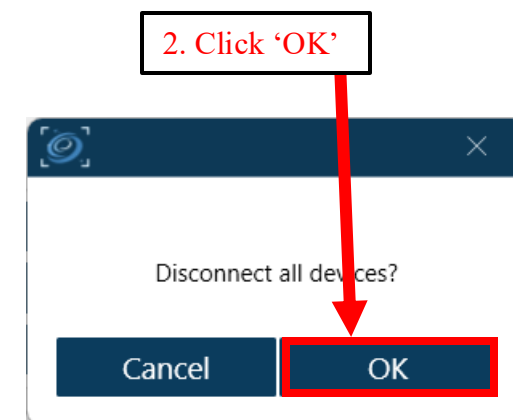
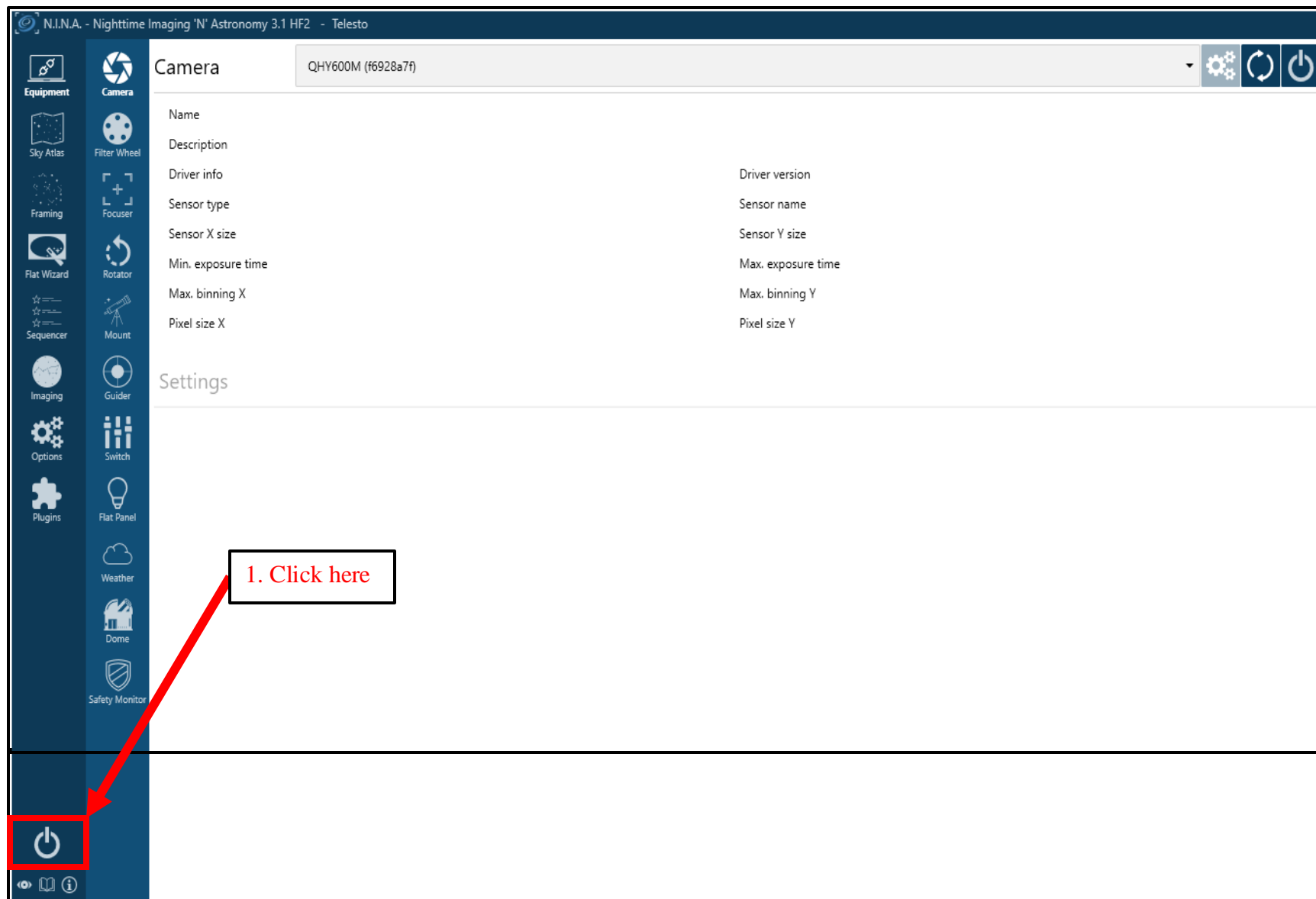
0 Slew

Stop

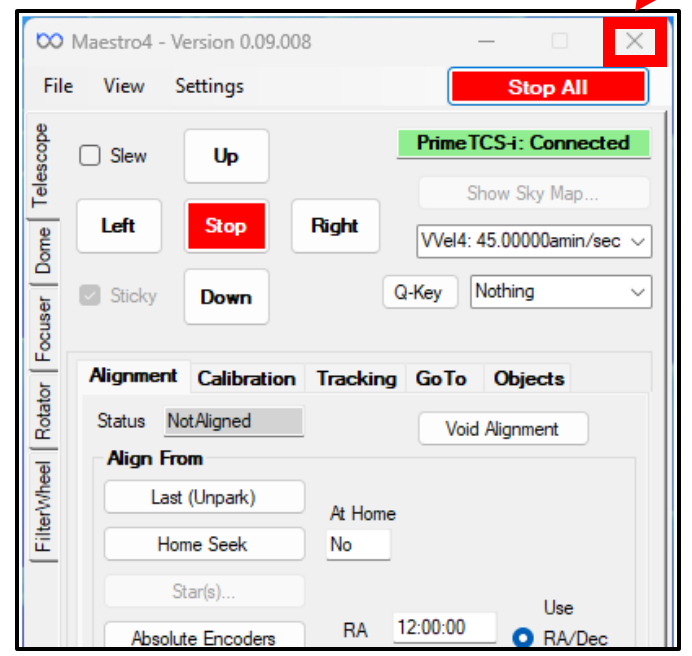
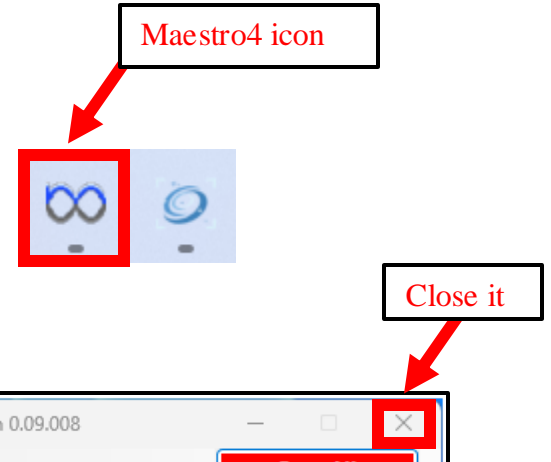
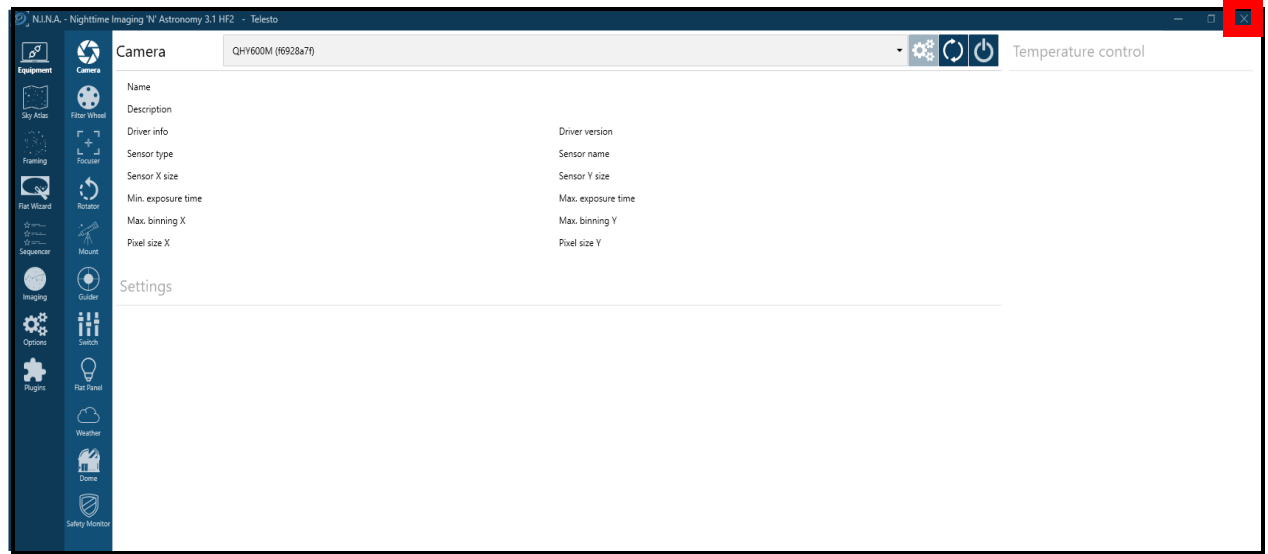
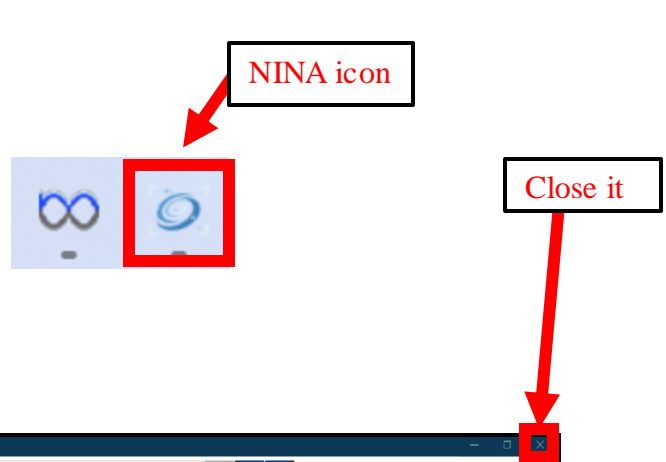
Park

Set as park

3. Disconnect all devices in NINA



4. Close NINA and Maestro



5. Close the Shutters in the OSBus Controller

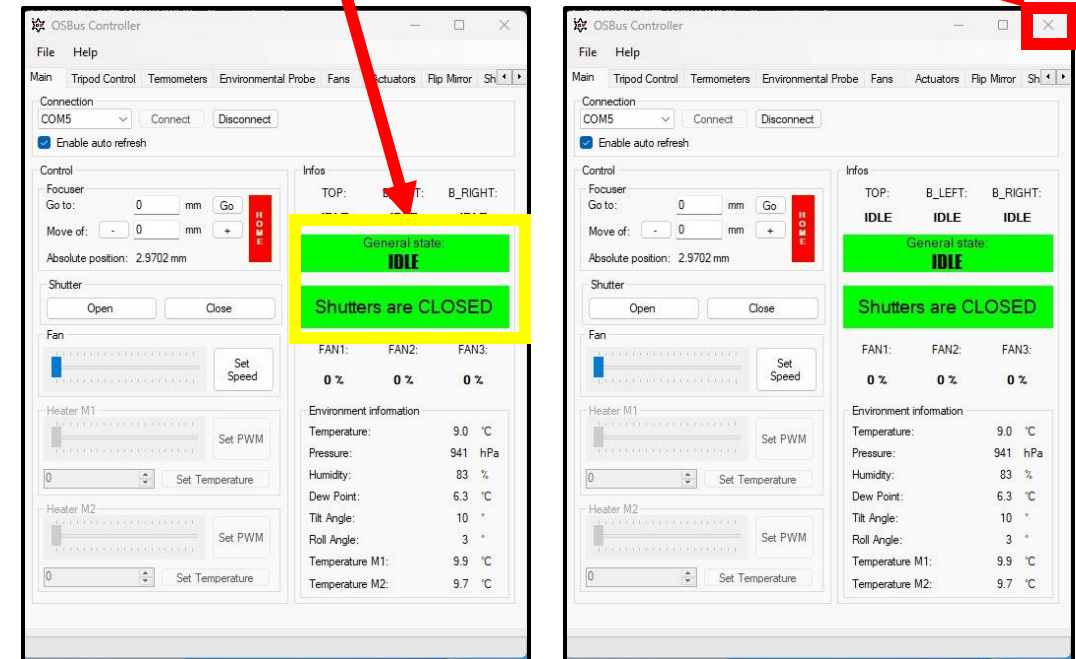
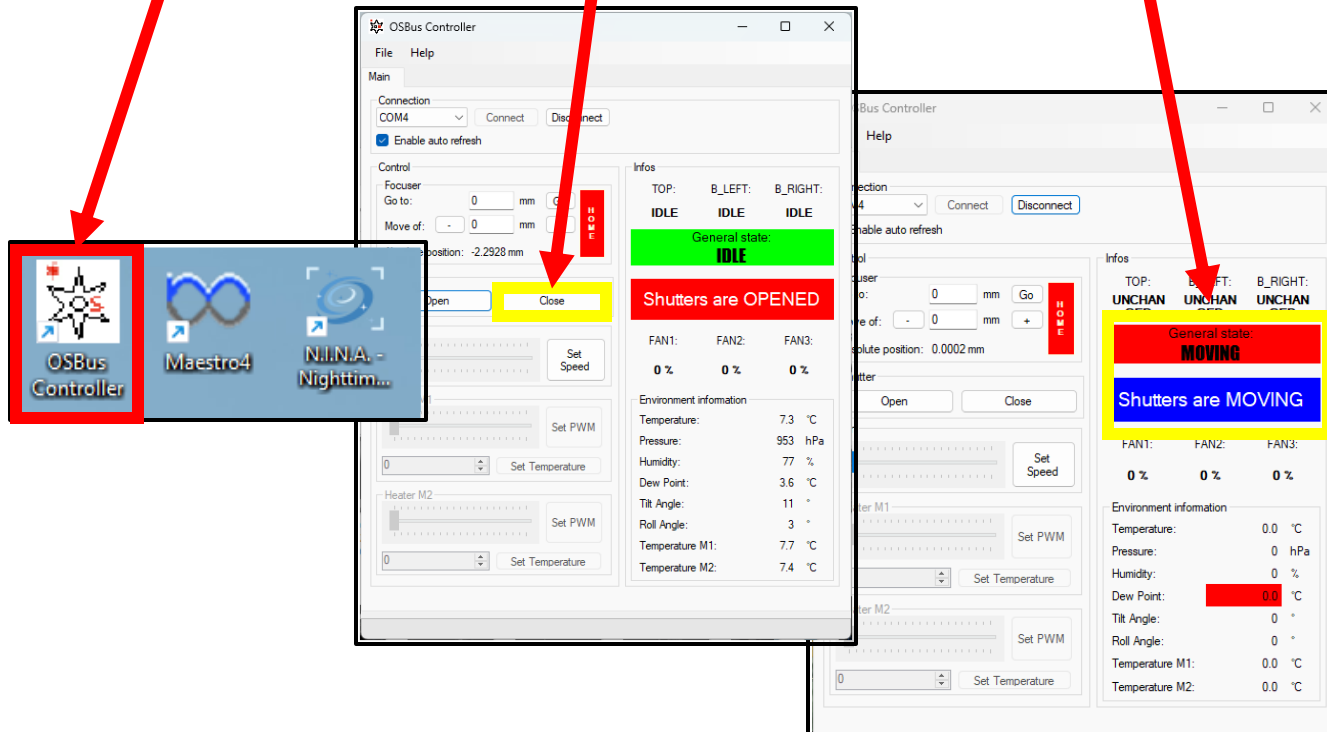
1. Open OSBus Controller

1. Click 'Close'

2. Wait

3. Everything is good!

5. Close OSBus

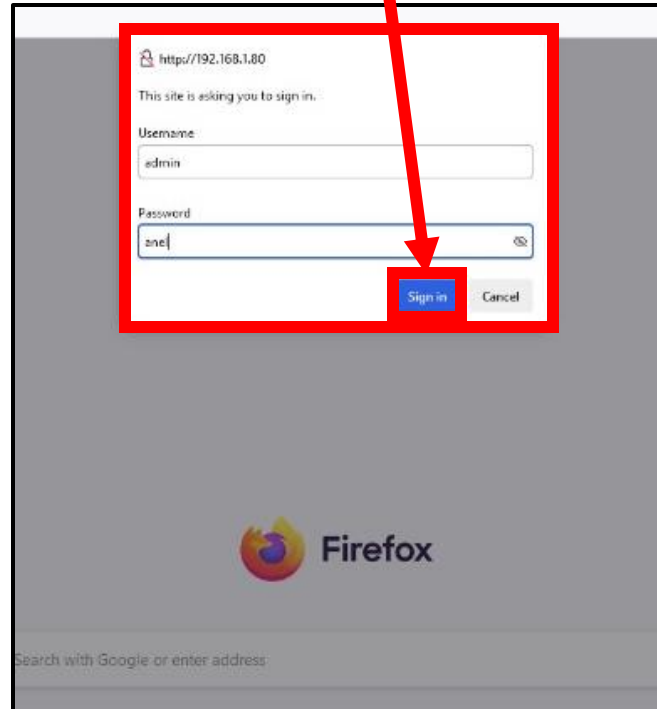


6. Shut down the telescope power

1. Open the Power control
(on the top right of the
Desktop)



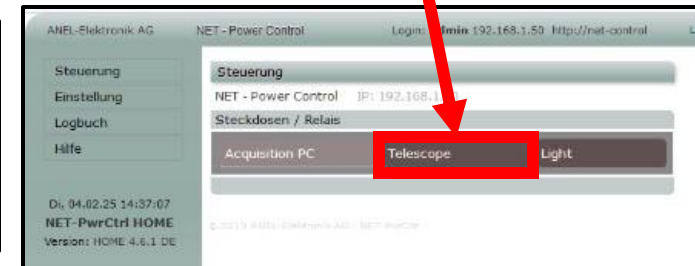
2. Click on 'Sign in'



3. Click on 'Telescope'

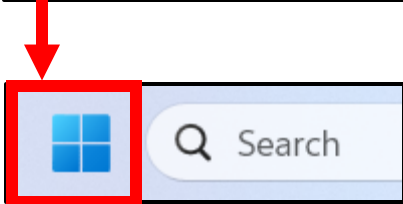


4. All good !

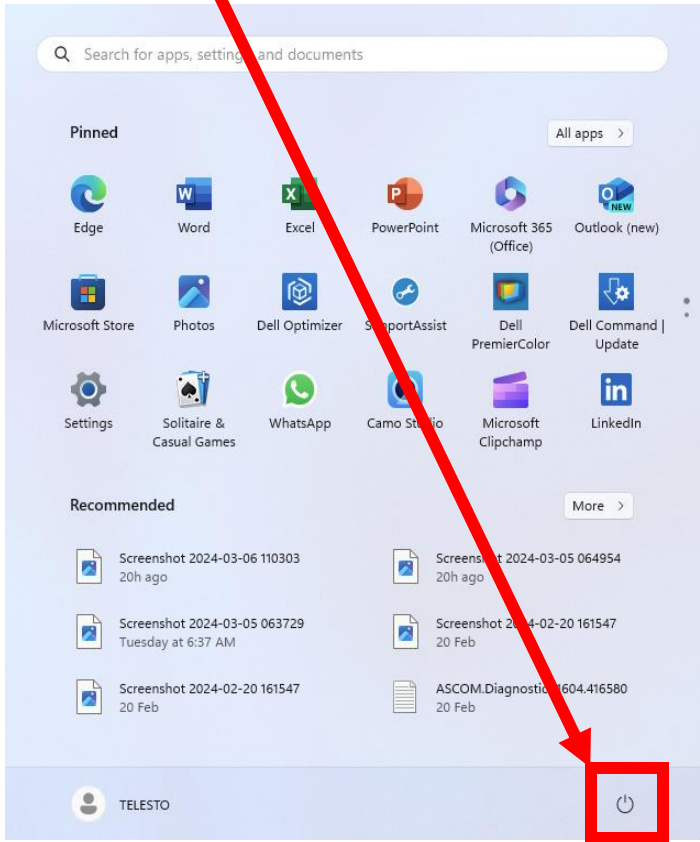


7. Shut down the computer

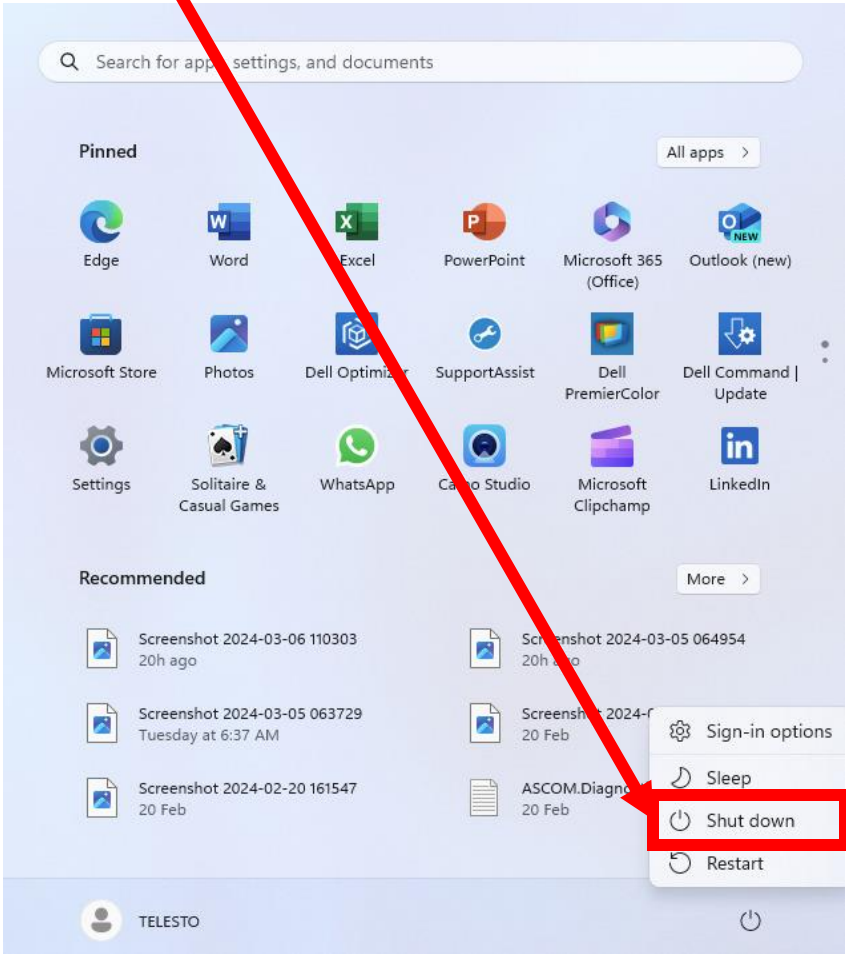
Select the Windows icon in the bottom bar of the screen



Click on the switching off button



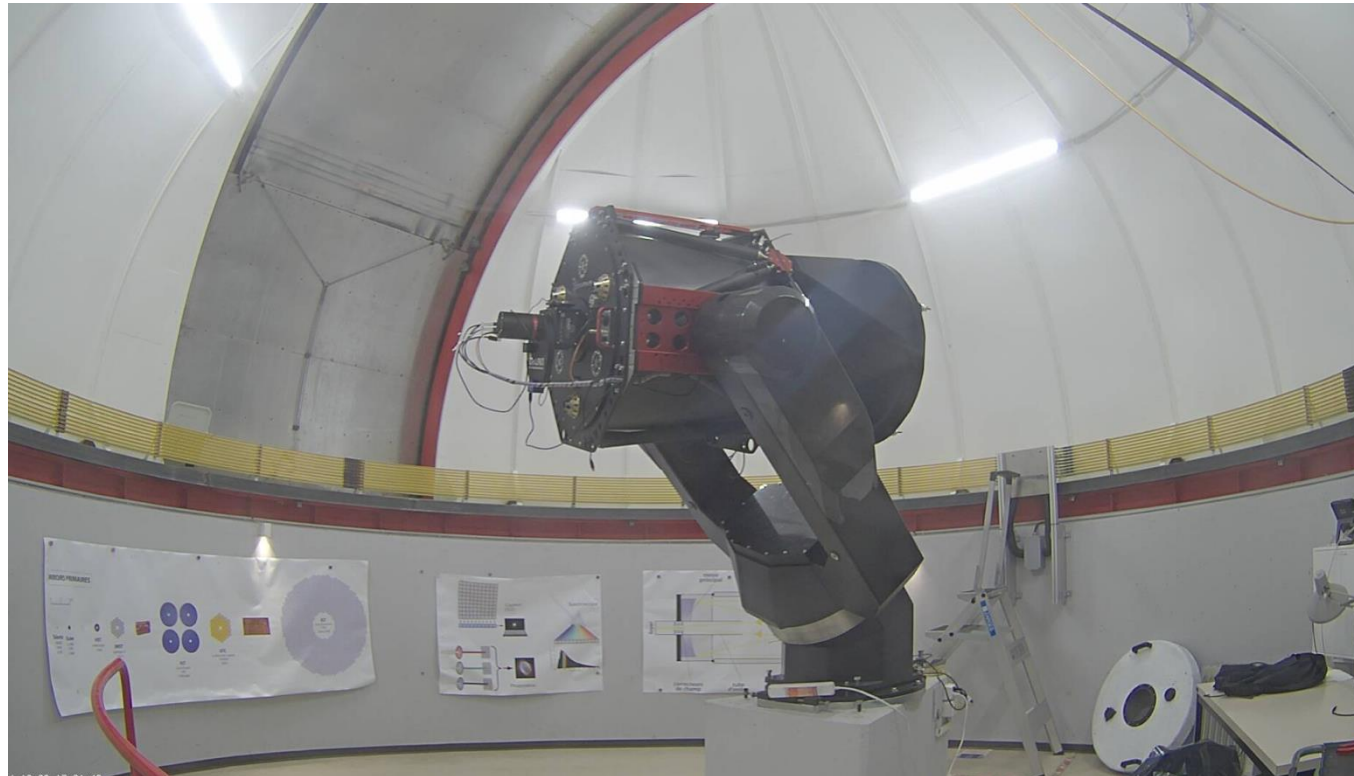
Click on 'Shut down'



IN THE DOME

1. Verify by eye that everything is fine:

- Check that the dome is closed
- Check that the telescope and the dome are parked. A corrected parking position is shown in the picture below (from the live camera). The dome aperture is above the ELT poster. The telescope is facing the ladder.



Be sure all lights in the building are switched off (Dome, Telesto control room, and stairs)

**HAVE SWEET
DREAMS**