WandererRotator V2 Series

User Manual (2025.1.1)



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1.Introduction

The WandererRotator Series are designed primarily for adjusting the framing angle of cameras and performing field de-rotation on Alt-Az mounts. Its most outstanding feature is its patented rotational structure, providing exceptional rigidity. Within its load capacity, the rotator ensures absolute zero flex at any angle, eliminating concerns about changes to the focal plane.

The Wanderer Rotator V2 series is available in three models: Mini V2, Lite V2, and Pro V2, corresponding to M54, M68, and M92 thread sizes, respectively.

1.1 Wanderer Rotator Mini V2 (M54)

Within its load capacity, the Wanderer Rotator Mini V2 ensures absolute zero flex at any angle, eliminating concerns about changes to the focal plane. The thickness of the Wanderer Rotator Mini V2 is the thinnest among similar products (only 10mm), while its rotation speed reaches up to 4.5 degrees per second, significantly reducing wait times. Additionally, the Wanderer Rotator Mini V2 features extremely high positional accuracy, with 1142 steps per degree (0.0008 degrees/step), enabling an effective resolution of 0.005 degrees, making precise field de-rotation possible.

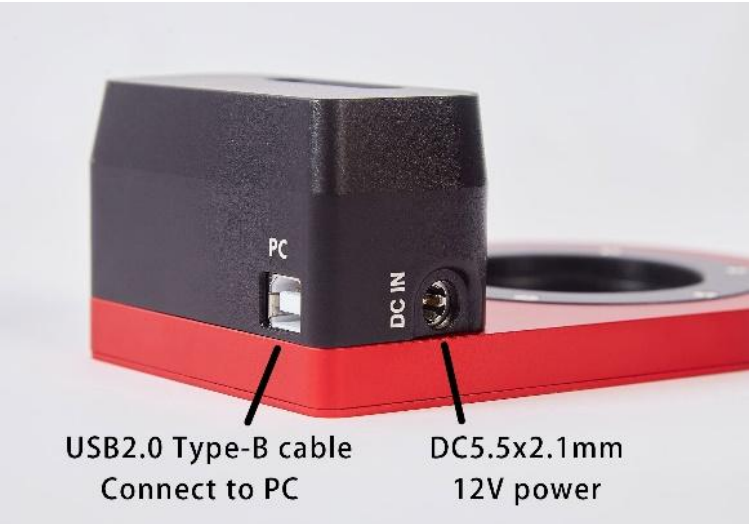


Figure 1

The specifications of WandererRotator Mini V2 are shown in the table below.

Power supply	DC5.5x2.1mm 12V
Power consumption	Less than 0.5A
Connectivity	Type-B USB2.0 cable (included)
Weight	400g
Payload	500cNm or 5kg（Note 1）
Rotation rate	4.5°/s
Thickness	10mm
Steps per degree	1142 steps （0.0008°/step）
Clear aperture	M54
Material	Aluminum alloy
Threaded interface	Both sides M54 female threaded

The dimension of WandererRotator Mini V2 is shown in Figure 2.

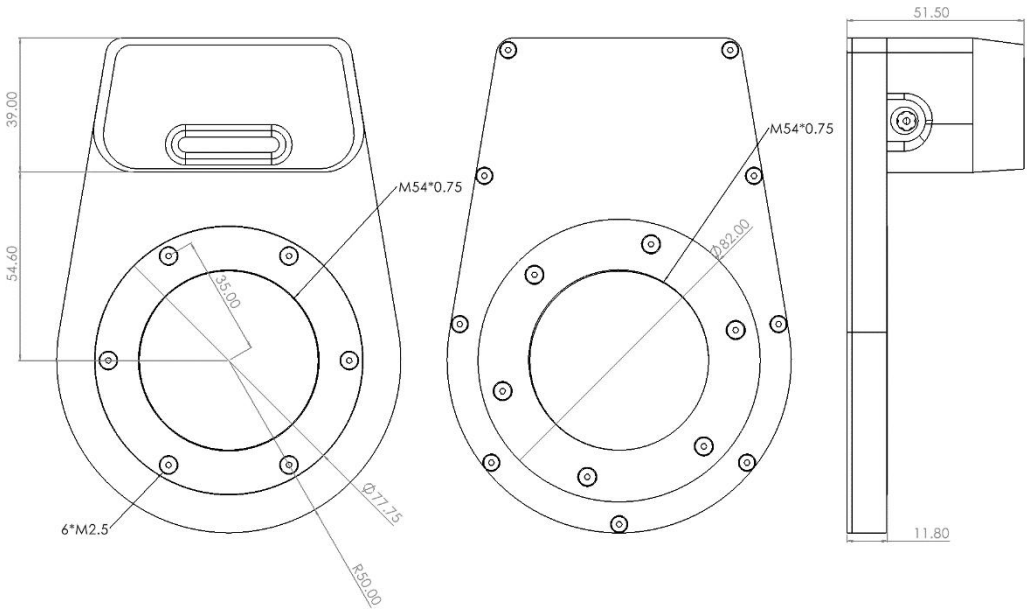


Figure 2　Dimension of WandererRotator Mini V2

Note that in the side view of Figure 2, the thickness of the rotator is 11.8mm, it includes the raised back cover portion (Figure 3). The actual thickness occupied by the rotator is 10mm.



Figure 3

1.2 Wanderer Rotator Lite V2 (M68)

Within its load capacity, the Wanderer Rotator Lite V2 ensures absolute zero flex at any angle, eliminating concerns about changes to the focal plane. The thickness of the Wanderer Rotator Lite V2 is the thinnest among similar products (only 12mm), and its weight is the lightest in its class (550g). Additionally, the Wanderer Rotator Lite V2 boasts extremely high positional accuracy, with 1199 steps per degree (0.0008 degrees/step), enabling an effective resolution of 0.005 degrees, making precise field de-rotation possible.

Compared to the previous version, the new Wanderer Rotator Lite V2 features a family-style design for enhanced recognizability (Figures 4 and 5). It also adopts a stronger motor.



Figure4



Figure5

The specifications of the Wanderer Rotator Lite V2 are shown in the table below:

Power supply	DC5.5x2.1mm 12V
Power consumption	Less than 0.5A
Connectivity	Type-B USB2.0 cable (included)
Weight	550g
Payload	750cNm or 7.5kg（Note 1）
Rotation rate	3.5°/s
Thickness	12mm
Steps per degree	1199 steps （0.0008°/step）
Clear aperture	M68
Material	Aluminum alloy
Threaded interface	Both sides M68 female threaded

The dimension of WandererRotator Lite V2 is shown in Figure 6.

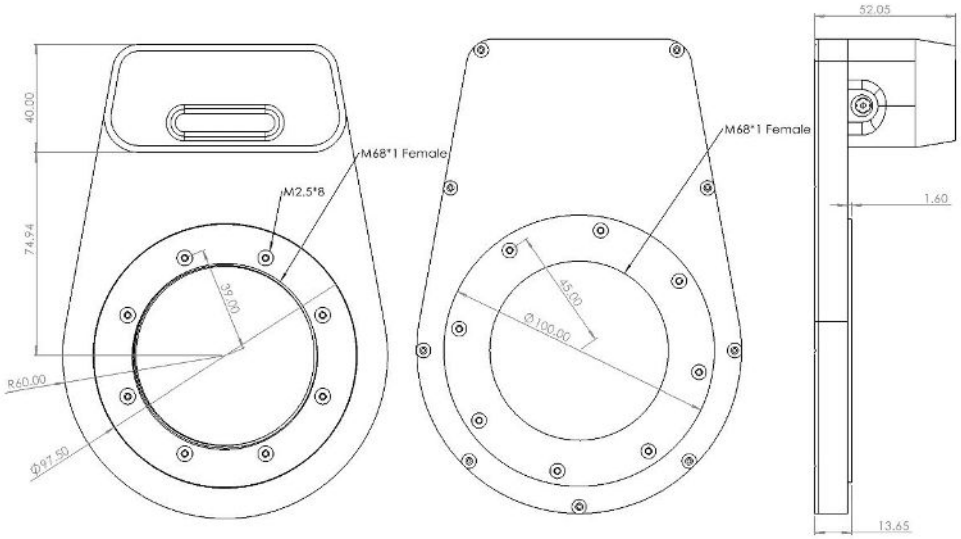


Figure 6 Dimension of WandererRotator Lite V2

Note that in the side view of Figure 6, the thickness of the rotator is 13.65mm, it includes the raised back cover portion (Figure 7). The actual thickness occupied by the rotator is 12mm.



Figure 7

1.3 Wanderer Rotator Pro V2 (M92)

Within its load capacity, the Wanderer Rotator Pro V2 ensures absolute zero flex at any angle, eliminating concerns about changes to the focal plane. The thickness of the Wanderer Rotator Pro V2 is the thinnest in its class (only

16mm). Additionally, it offers extremely high positional accuracy, with 1349 steps per degree (0.0007 degrees/step), enabling an effective resolution of 0.005 degrees, making precise field de-rotation possible.

Compared to the previous version, the Wanderer Rotator Pro V2 features a family-style design for enhanced recognizability (Figures 8 and 9). It also incorporates a stronger motor.



Figure 8



Figure 9

The specifications of the Wanderer Rotator Pro V2 are shown in the table below:

Power supply	DC5.5x2.5mm 12V
Power consumption	Less than 0.5A
Connectivity	Type-B USB2.0 cable (included)
Weight	800g
Payload	1000cNm or 10kg（Note 1）
Rotation rate	3°/s
Thickness	16mm
Steps per degree	1349 steps （0.0007°/step）
Clear aperture	M92
Material	Aluminum alloy
Threaded interface	Both sides M92 female threaded and comes standard with an M92 male thread adapter.

The dimension of WandererRotator Lite V2 is shown in Figure 10.

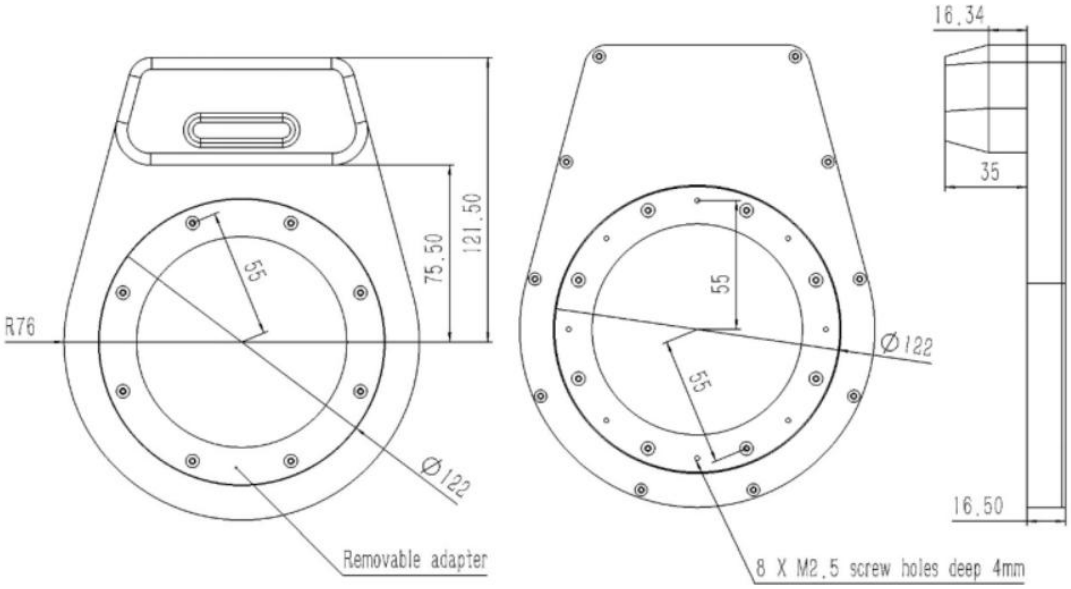


Figure10 Dimension of WandererRotator Pro V2

Note that in the side view of Figure 10, the thickness of the rotator is 16.5mm, it includes the raised back cover portion (Figure 11). The actual thickness occupied by the rotator is 16mm.

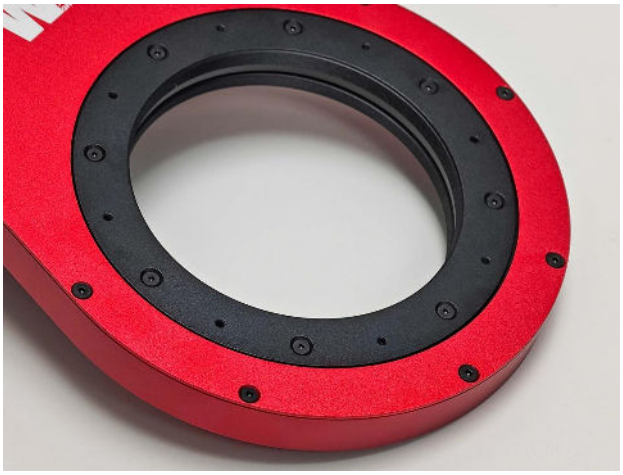


Figure 11

2.Installation and use

Connect the rotator to the PC using the included USB data cable and supply 12V power.

The rotator connects to the telescope via threading, with the protruding side typically facing the telescope (Figure 12).



Figure 12

The **WandererRotator Mini V2** comes standard with dual-sided M54 female threads. The adapter on the protruding side of the rotator is secured with six M2.5 screws and can be removed (see Figure 2). Users with special requirements can customize the adapter.

The **WandererRotator Lite V2** comes standard with dual-sided M68 female threads. The adapter on the protruding side is secured with eight M2.5 screws and can be removed (see Figure 6). Users with special requirements can customize the adapter.

The **WandererRotator Pro V2** comes standard with dual-sided M92 female threads. The adapter on the protruding side is secured with eight M2.5 screws and can be removed (see Figure 10). Users with special requirements can customize the adapter. Additionally, the WandererRotator Pro V2 also

includes a standard M92 male thread adapter, which can be secured to either side of the rotator using screws.

Important Note:

WandererRotator Mini V2: Due to its ultra-thin design, the depth of the M54 female threads on both sides is only 5mm. When connecting M54 male thread adapters to the rotator, ensure that the thread length is less than or equal to 5mm (4mm is recommended). If M54 male threads are installed on both sides, the combined length of both male threads should be less than 10mm. If the male threads are too long, use spacers to prevent damage to the rotator.

WandererRotator Lite V2: Similar to WandererRotator Mini V2 mentioned above, the depth of the M68 female threads on both sides is **6mm**.

WandererRotator Pro V2: Similar to WandererRotator Mini V2 mentioned above, the depth of the M92 female threads on both sides is **8mm**.

2.1 Driver installation

Visit the official website www.wandererastro.com to download the WandererEmpire software (Figure 5).



Figure5

2.2 Connecting the Rotator (Using N.I.N.A. as an Example)

After installing WandererEmpire, double-click to open the software. In the left-side menu, locate and select the "WandererRotator" option (Figure 6).

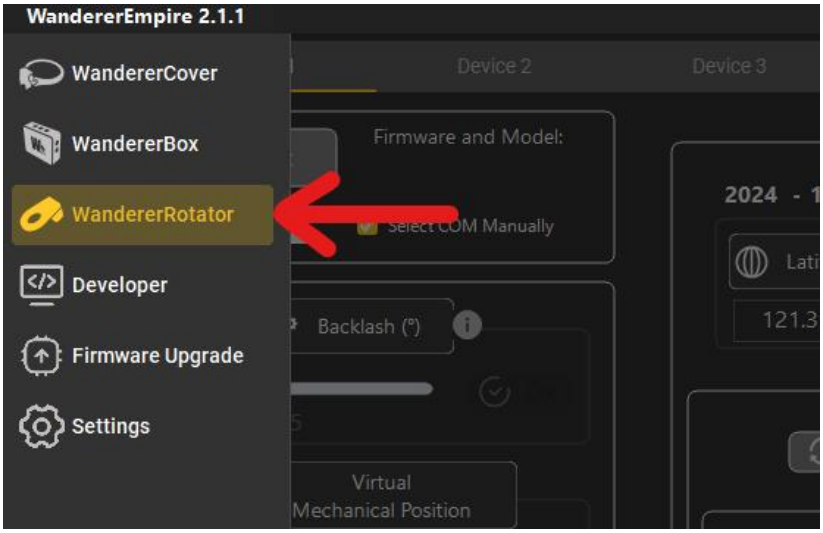


Figure6

At the top of the interface, you will see options labeled "Device 1," "Device 2," and "Device 3." This indicates that WandererEmpire supports simultaneous connections for **up to three Wanderer rotators**. If you need to operate more than three rotators on a single PC, please contact us (Email: skywatcherwsl2000@gmail.com, Frank Wang).

If you know the COM port of the rotator (the COM port can be found in Device Manager; Wanderer devices have a CH340 suffix), select "Select COM Manually" and choose the COM port from the dropdown menu on the left (Figure 7). Click **Connect**, and WandererEmpire will automatically identify and display the rotator's model and firmware version.

If you are unsure which COM port to select, deselect "Select COM Manually" and click **Connect**. WandererEmpire will sequentially search for the COM port associated with the Wanderer rotator and connect automatically.If your computer has multiple COM ports, this process might be slow and could result in connection failures. Once WandererEmpire automatically identifies the

correct COM port, it is recommended to enable "Select COM Manually" and select the identified COM port to speed up future connections.

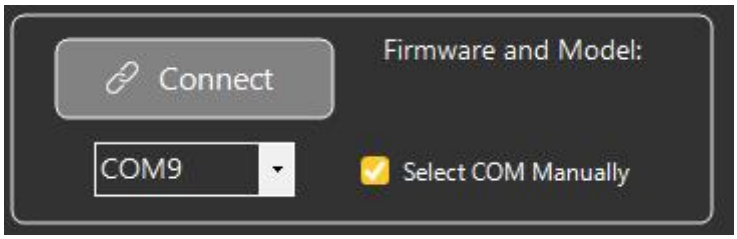


Figure7

Next, locate the corresponding ASCOM device driver in N.I.N.A. If you connected the rotator under the "Device 1" option in WandererEmpire, select **WandererEmpire Device 1** in N.I.N.A. (Figure 8). Similarly, for devices 2 and 3, select **WandererEmpire Device 2** and **WandererEmpire Device 3**, respectively.

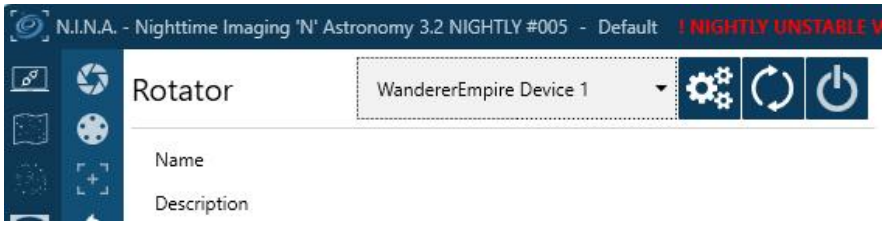


Figure8

Simply click **Connect** , and the ASCOM driver will establish communication with WandererEmpire. Once connected, operations in N.I.N.A. will be synchronized and equivalent to those in WandererEmpire. For example, if you rotate the rotator using N.I.N.A., you will see the angle in WandererEmpire update simultaneously.

After completing the steps above, for subsequent connections, you only need to click **Connect** in N.I.N.A. The ASCOM driver will automatically launch WandererEmpire and connect the device using the saved configuration, eliminating the need to manually open WandererEmpire.

2.3 Phd2 Configuration

If using the OAG, the rotation will also cause the angle of the guide camera to change, invalidating the guiding calibration data. In this case, you need to connect the rotator in PHD2 so that PHD2 can adjust the guiding calibration data based on the rotator's angle, avoiding the need for recalibration.

In PHD2's connection interface, click **More Equipment** (Figure 9) to find the option to connect the rotator (Figure 10). Select the same driver as used in N.I.N.A., and simply click **Connect**.

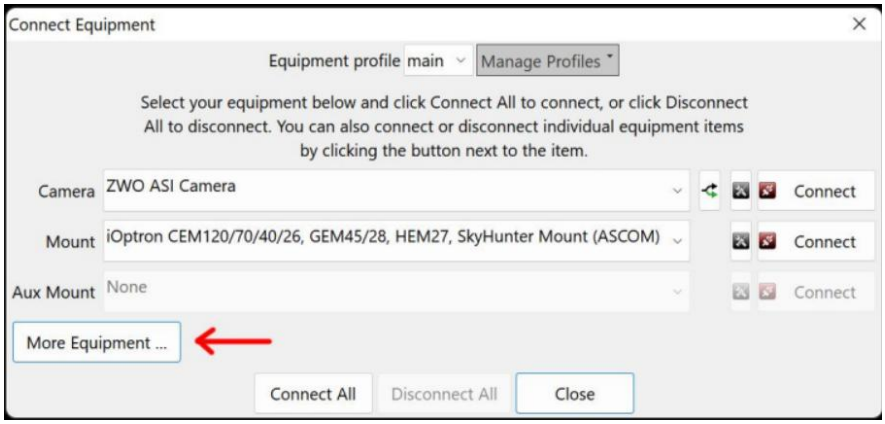


Figure9

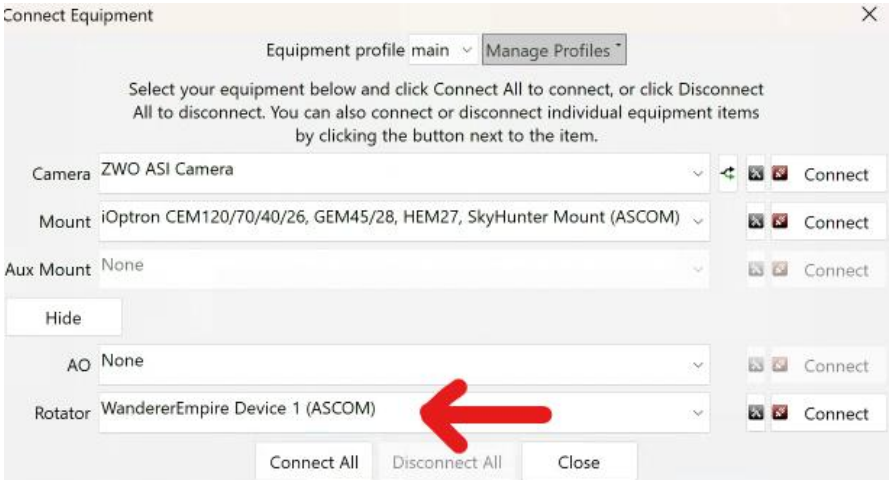


Figure10

After connecting the rotator, perform a guiding calibration in PHD2. Once the rotator rotates to a certain angle, guiding should continue to function normally.

If guiding does not work correctly after rotation, try enabling the **Reverse sign of angle** option under the "Other Devices" section in **Advanced Settings** (Figure 11).



Figure11

2.4 Set the Backlash

The default backlash setting is 0.5°, which usually does not require adjustment. However, if you observe that the rotator makes multiple small movements without changing the resolved angle during imaging, you may need to increase the backlash setting.

How to Measure Backlash:

1. Set the backlash to **0**.
2. Rotate the rotator clockwise by a significant angle (at least 5°) and note the plate-solved sky angle **A**.
3. Rotate the rotator counterclockwise by 2° and note the plate-solved sky angle **B**.
4. Backlash = 2°− | A−B |

Setting Backlash:

The backlash value should be slightly less than the measured value. For instance, if the measured backlash is 0.76°, set the backlash to 0.7° instead of 0.8°.

2.5 Set Reverse

If the rotator fails to rotate to the specified angle after multiple attempts during plate solve and there is a large deviation, it means that you need to check the reverse.

Whether to check the reverse depends on your imaging software and optical system. For example, in most cases, if you are using a refracting telescope, the protruding side of the rotator motor is facing the sky, and you use N.I.N.A 3.0 and above, you do not need to check the reverse. If you use N.I.N.A 2.3 and below, you need to check the reverse. Or if you turn the protruding side of the rotator toward the camera, you also need to check the reverse.

2.6 Set the Zero Position

The rotator has no mechanical zero and requires the user to specify a virtual zero position. If you need to set a new zero, click "Set current position as Zero" to set the current position to zero. Note that when the rotator stalls due to cable wrap, please reset the zero.

The principle of zero setting: the rotator should be able to rotate 360 degrees (or at least 180 degrees if you limit the mechanical range in N.I.N.A.) from the zero without cable wrap. Note that the mechanical zero does not need to coincide with 0 degrees of the sky angle, it has nothing to do with the sky angle.

3.Firmware Upgrade

The firmware upgrade feature has been integrated into WandererEmire. Click on the left-side menu to access the firmware upgrade interface (Figure 12). We recommend carefully reading the firmware upload tutorial on the right side of the interface.

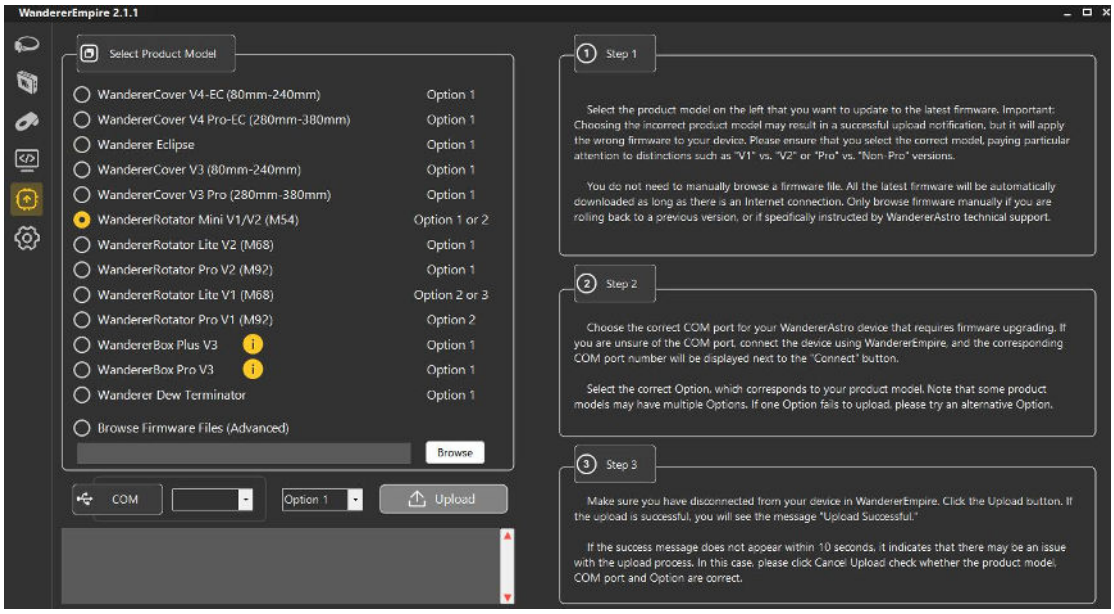


Figure12

On the left side of the interface, select the corresponded rotator model (Figure 13).

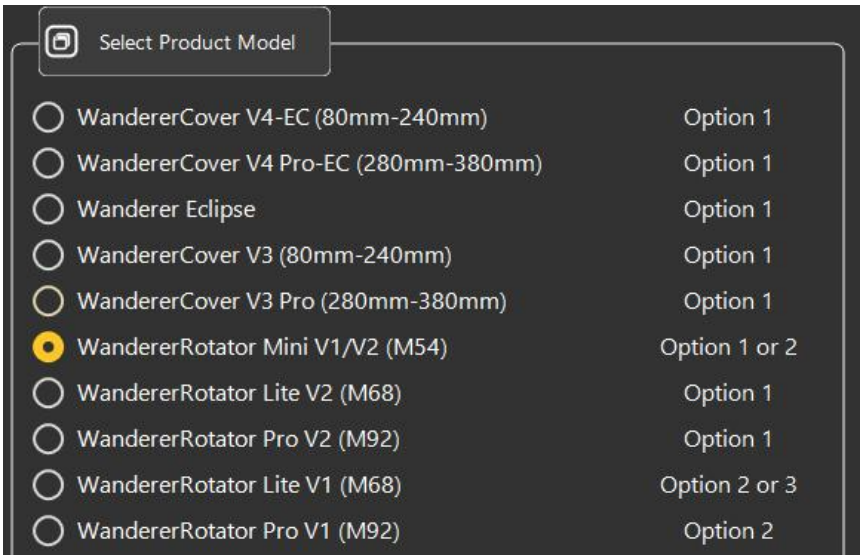


Figure13

Below, select the correct COM port (if unsure, refer to Chapter 2.2 to automatically search for and note the COM port) and the correct Option (Figure 14). For V2 rotators, select Option 1; for V1 rotators, most require Option 1, though a few may need Option 2. After completing the settings, click "Upload." Upon successful upload, the dialog box will confirm that the upload was successful. Please note that before the upload, you need to disconnect from the rotator in WandererEmire, or it will result in an error indicating a failure to open the COM port.



Figure14

4. Field De-Rotation

The WandererRotator series support field de-rotation for users of Alt-Azimuth mounts, which can play a significant role in planetary photography and enable longer exposure times in deep-sky imaging. Thanks to its ultra-high rotation precision of 0.0008 degrees per step, the de-rotation results of the WandererRotator is outstanding.

4.1 Basic Settings

WandererEmpire must know the geographic coordinates (latitude and longitude) of the device to enable field de-rotation. Please enable location services and check "Allow desktop apps to access your location information" under "Settings-Privacy&Security-Location" (Win11 Figure 15). This allows WandererEmpire to automatically retrieve the device's geographic coordinates upon startup.

Additionally, you can manually input the coordinates of your observing location (Figure 16) if needed.

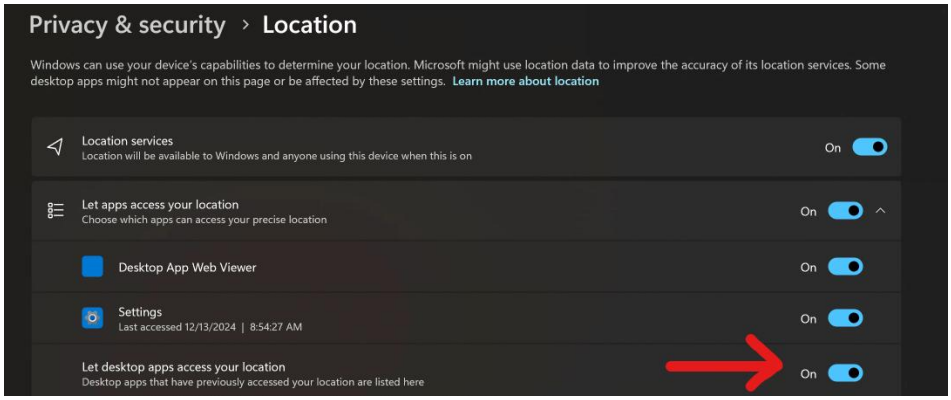


Figure15



Figure16

4.2 Get the RA/DEC of the target

WandererEmpire also requires the Right Ascension (RA) and Declination (DEC) coordinates of your target to complete field de-rotation. There are three methods to obtain these coordinates:

1. **Manually input the coordinates** (Figure 17).



Figure17

2. **Sync coordinates from Stellarium software**.

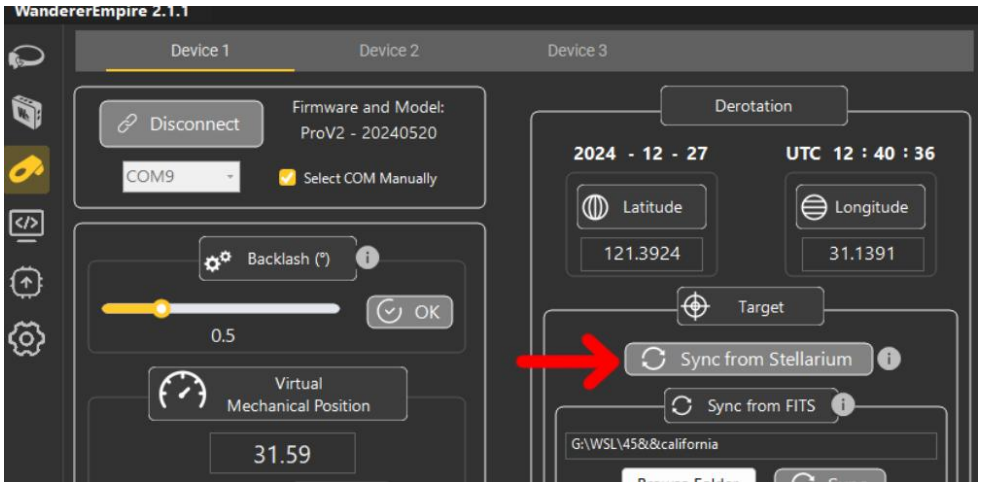


Figure18

If you want to sync target coordinates from Stellarium, install the Remote Control plugin (Settings — Plugins) in Stellarium, and ensure the plugin is set to load at startup (Figure 19). After restarting Stellarium, enable the Remote Control plugin (Figure 20), center the target, and click “Sync from Stellarium” in WandererEmpire (Figure 18) to complete the coordinate sync.

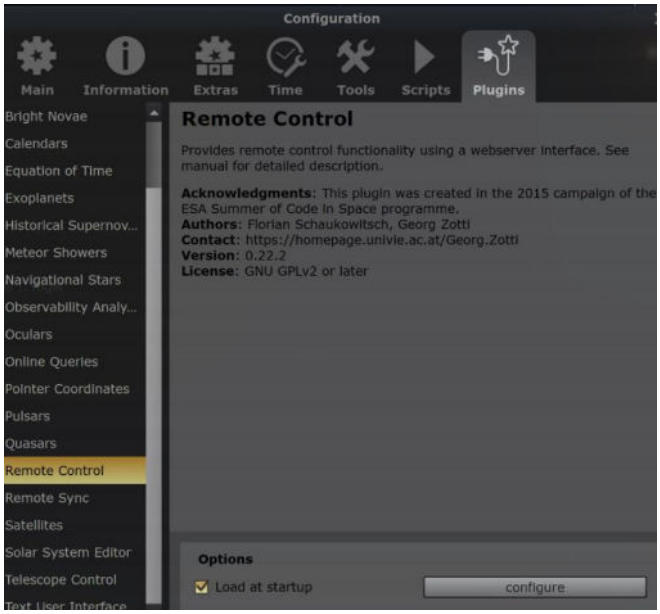


Figure19

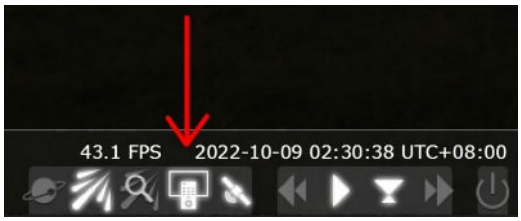


Figure20

3. Extract coordinates from saved FITS files.

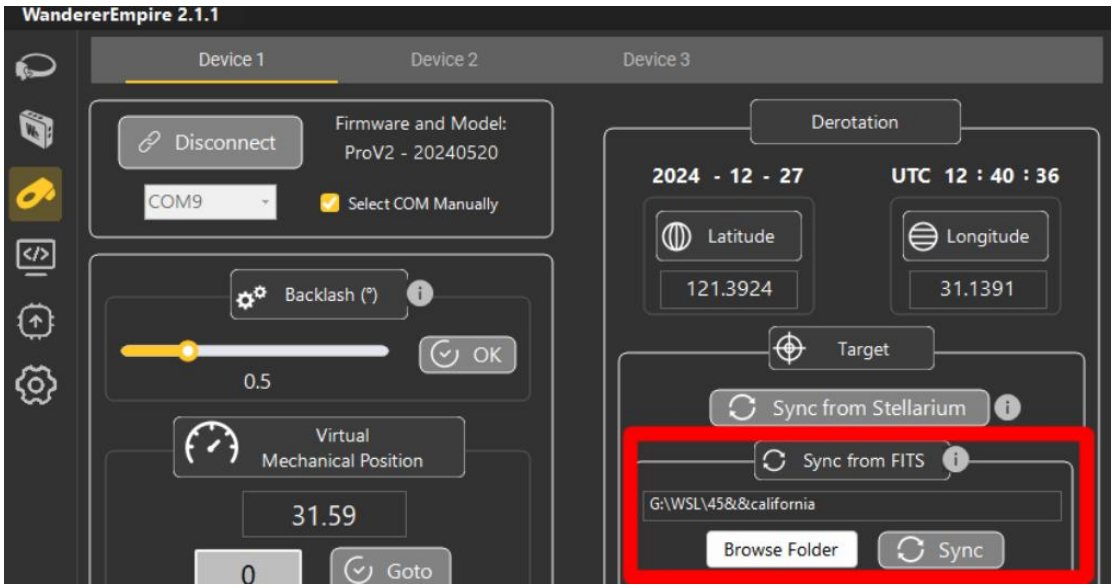


Figure21

FITS files captured by your cooled camera contain the center coordinates of the images. WandererEmpire can read these coordinates. Click "Select

Folder" to choose the folder containing your saved images (or parent folder). Then, click "Sync," and WandererEmpire will automatically sync the coordinate information from the latest FITS files in the **selected folder and its subfolders** (Figure 21).

4.3 Start Field De-Rotation

Once everything is ready, click "Start De-Rotation" . The de-rotation rate will refresh in real-time, and no additional user action is required.

Additionally, you can fine-tune the de-rotation rate using the "De-Rotation Rate Correction" feature to achieve more precise results.

During de-rotation, if the rate is negative and the mechanical angle of the rotator is near 0 degrees, the rotator will pause de-rotation and automatically rotate 180 degrees before resuming to prevent cable wrap. Similarly, if the rate is positive and the mechanical angle is near 360 degrees, the rotator will pause de-rotation and rotate -180 degrees before resuming to avoid cable wrap. We recommend disabling mechanical angle limits (setting the mechanical angle range to full) in N.I.N.A to prevent conflicts.

When the target is very close to the zenith (86 degrees or above), due to the fast field rotation rate, de-rotation may not yield optimal results. It is suggested to wait until the target's altitude drops below 86 degrees before proceeding with imaging.

4.4 Automatic Field De-Rotation Imaging (Using N.I.N.A Advanced Sequence)

With the Device Actions and Commands plugin, WandererRotator can achieve fully automated field de-rotation within N.I.N.A’s advanced sequence workflow.

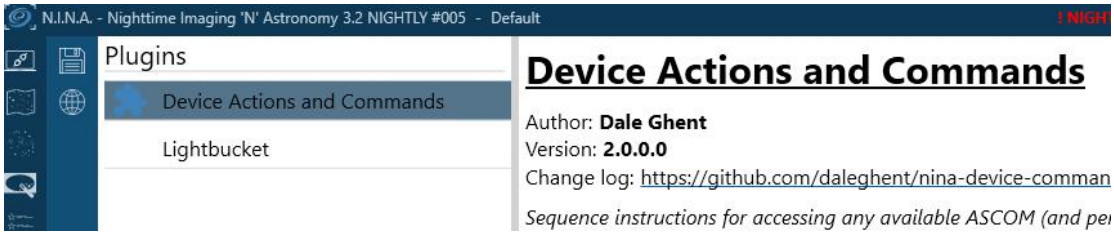


Figure22

WandererRotator offers 3 key actions in Device Actions: Start De-Rotation, Stop De-Rotation, and Sync Coordinates to WandererEmpire. By using these actions correctly, you can automate the entire imaging workflow. Parameters of the Actions are all not required.

A typical sequence template is shown in Figure 23:

1. First, perform a “Slew, Center, and Rotate” to complete the Goto and framing process.
2. Capture an image of any exposure duration, then wait 5 seconds to ensure the image is saved locally.
3. Execute the "Sync Coordinates to WandererEmpire" action. This syncs the RA/DEC coordinates of that image to WandererEmpire (ensure the image save directory is set as described in Section 4.2).
4. Finally, execute the "Start De-Rotation" action to begin imaging with de-rotation enabled.
5. Once imaging is complete, use the "Stop De-Rotation" action to conclude the process.

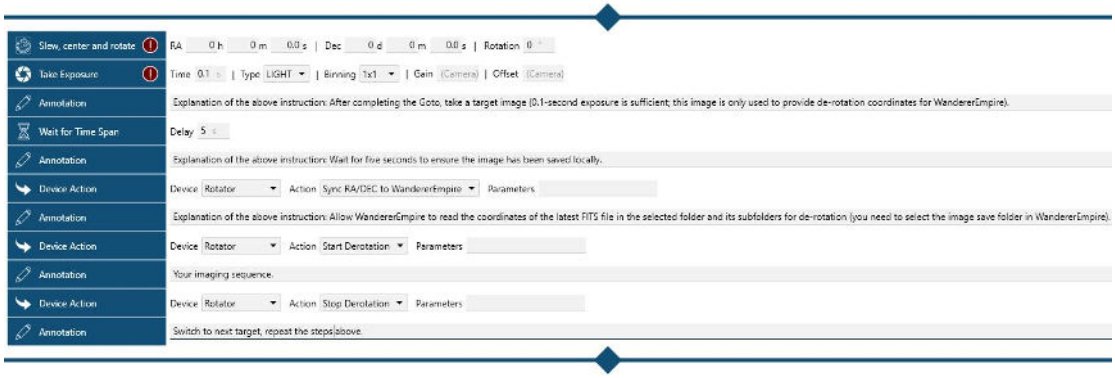


Figure23

Please note that NINA can only load the Action after the device is connected. Therefore, you need to connect the ASCOM driver first and load the sequence to see the Actions, or you will only see blank Action (Figure 24).

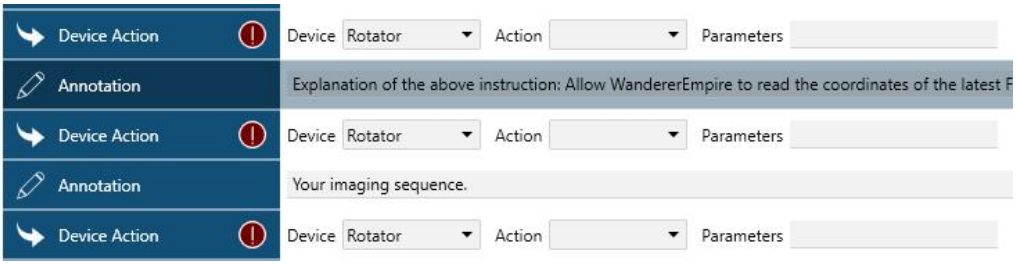


Figure24

5.FAQs

Q: What is the rotation precision of the Wanderer Rotator Mini?

A: The Wanderer Rotator Mini features an ultra-high resolution of 0.0008 degrees per step. Based on multiple tests and user feedback, if backlash settings are properly configured (generally leaving the default settings), the rotator can achieve a precision of better than 0.02 degrees after two iterations of plate solve.

Q: Is the Wanderer Rotator Mini capable of withstanding low temperatures?

A: Yes. The Wanderer Rotator Mini uses high-quality lubricants that can handle temperatures as low as -40 degrees Celsius. In our tests, the rotator was placed in a -20-degree freezer for 72 hours and continued to function normally.

Q: Does field de-rotation require re-shooting flat frames after rotation?

A: Yes. Therefore, we recommend using our WandererCovers. However, if you are using a refracting telescope, you may be able to use the same flat frames for different rotation angles.

Q: Does the Wanderer Rotator Mini affect the focal plane?

A: The unique magnetic structure of the Wanderer Rotator Mini ensures perfect alignment at any angle, allowing you to consider the entire CAA as a single unit.

Q: Can the Wanderer Rotator Mini be used for field de-rotation on Alt-Azimuth mounts or Dobsonian telescopes?

A: Absolutely! The Wanderer Rotator Mini supports field de-rotation and can achieve fully automated de-rotation sequences in N.I.N.A.

Q: Why does the rotator keep rotating and cannot reach the specified angle during Plate Solve?

A: This means you are using the wrong Reverse setting.

Note 1: Calculations are based on a load balance distance of 10 cm from the rotator.