ZWO SEESTAR S50 SMART TELESCOPE

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The ZWO Seestar S50[1] is a smart telescope that allows you to view and capture the wonders of the night sky with ease. It is a compact and portable device that integrates a telescope, an electric focuser, an astronomical camera, and a smart system. The Seestar S50 can be easily controlled with a smartphone or tablet.

The Seestar S50 is one of the latest smart telescopes currently on the market. The other smart telescopes that use Electronic Assisted Astronomy[2] are much more expensive[3].

The S50 includes (in the Box): (Figure 1)

- The ZWO Seestar S50
- A Tripod
- A Solar Filter
- A Carrying Case
- A USB Type-C Charging Cable
- A short Manual

Figure 1 – ZWO Seestar S50

[1] https://www.seestar.com/
[2] Electronically Assisted Astronomy (EAA) is a form of observational astronomy with a telescope that uses a camera instead of an eyepiece. The camera captures a sequence of short exposures, then software stacks and processes the images to be displayed in near-Realtime on a smartphone or tablet.
[3] Unistellar eVscope 2, Vaonis Stellina, Unistellar eVscope eQuinox, Vaonis Vespera, Unistellar eVscope.

The tripod has a total length of 274.5 mm (10.8 inches). If needed, its legs can be extended up to 363 mm (14.29 inches).

The ZWO Seestar can be used with several filters:

- Narrowband Dual-Band filter (20 nm H-alpha and 30 nm OIII)
- Solar filter (580-630 nm bandpass)

The dual-band filter is a light pollution filter and is built into the Seestar. After slewing to the target, the Seestar app will activate or deactivate this filter depending on the object (nebula, cluster, or galaxy). The filter can also be activated or deactivated manually.

The solar filter is a frontal filter that also comes in the box. It can be easily attached to the end of the Seestar's optical tube and should always be used when you image the sun.

A dark filter is also built into the Seestar for image calibration (Dark frames).

Specs

The Seestar S50 has a triplet apochromatic lens[4] and includes a Sony IMX462 CMOS sensor with a resolution of 1920 x 1080 pixels (2 MP). (Figure 2).

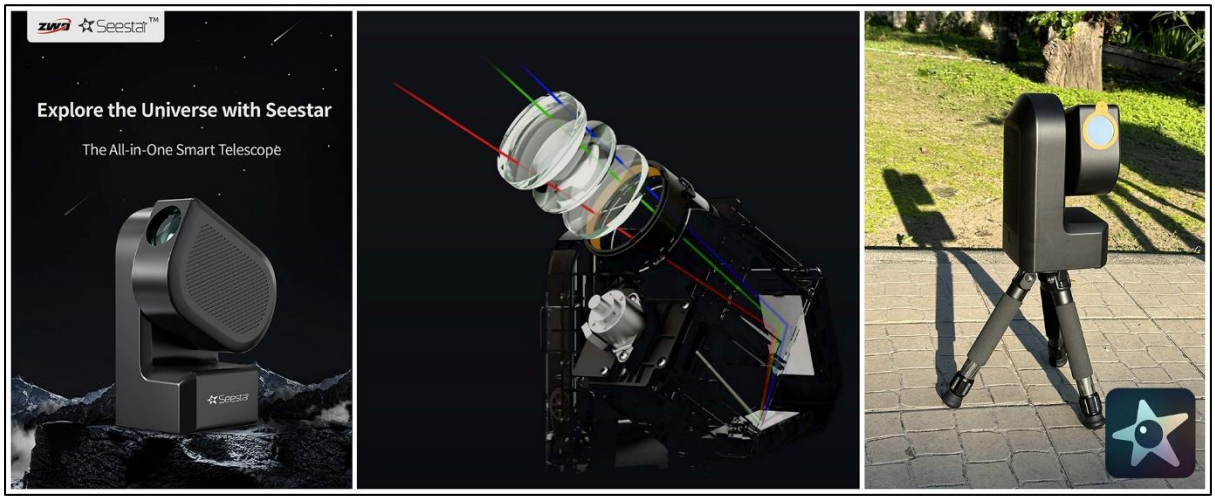


Figure 2 – ZWO Seestar S50 (Specs)

The Seestar can be operated via Bluetooth and Wi-Fi, it has a battery life of approximately 6 hours, and can save images as JPG or FITS. I can also save videos (compressed and Raw). Also built into the Seestar are an electronic focuser, a dew heater, and a filter wheel[5].

Other Specs (Figure 3, 4, 5, 6)

- Weight: 2.5 kg (5.5 lb)
- Height: 257 mm (10.12 inches)
- Width: 142.5 mm (5.61 inches)
- Depth: 130 mm (5.12 inches)

[4] The Seestar has an aperture of 50mm (1.97 inches), a focal length of 250 mm, and a focal ratio of f/5.
[5] Prices: $499 US and 690 € in Europe.

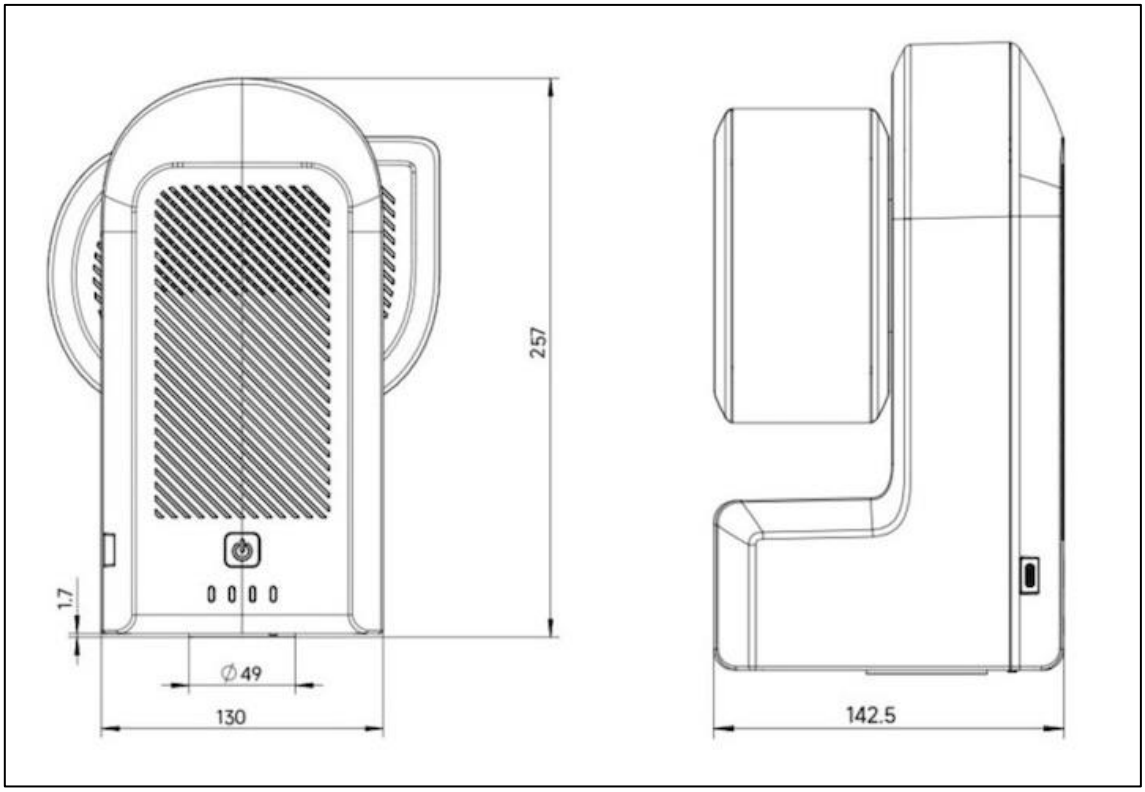


Figure 3 – ZWO Seestar S50 dimensions.

Figure 4 – ZWO Seestar S50 (in the box).

① Charge: Type-C

② Power Button:

Display	Press when power off
Power On	Press and hold for 2s
Power Off	Press and hold for 2s
Forced Shutdown	Press and hold for 6s

③ Power indication: Display the on-off status, Wi-Fi reset status, and working status. Blinking red when the battery is lower than 15%

Scene	Function
Disconnect when power on	Steady yellow
Wi-Fi reset	During the reset process, the power light flashes yellow; End of reset, steady yellow; Reset failed. Blinking red
Low Power (lower than 15%)	Red flashing
Working Status	Steady yellow

④ Wi-Fi Reset Button: Press and hold Wi-Fi Reset Button for 3s until Wi-Fi reset; If you cannot search for Wi-Fi after powering on Seestar S50, you can enable this button

⑤ Tripod connection interface: 3/8" screw thread

⑥ Battery cover: Remove the cover to replace the battery (cover screw specification: M3x8 cross countersunk self-tapping screw)

⑦ Pre-filter interface: If you are observing the sun, make sure to install a solar filter on this interface

Figure 5 – ZWO Seestar S50 (Specs)

2. Performance Paramenters

Product model	Seestar S50
Sensor	IMX462
Resolution	1080 x 1920
Aperture	50mm
Focal ratio	f/5
Focal length	250mm
Optical lens	Apochromatic triplet
Working distance	30m~∞
Storage	64GB
Transmission	Wi-Fi/USB-C/Bluetooth
Wi-Fi	5G/2.4G
WiFi range	≤10m
Bluetooth range	≤5m
Working temperature	-10°C-40°C （Forced shutdown when temperature is over 60°C）
Charging temperature	0-40°C
Mount type	Alt- azimuth
Slew rate	20X- 1440X
Zero position	Mechanical
Battery capacity	6000mAh
Connection port	3/8-20 inch
Net weight	2.5kg
Power input	Type-C
Wi-Fi reset	Yes
Size	142.5 X 130 X 257

Figure 6 – ZWO Seestar S50 (Specs)

Figure 7 – Installing the Solar Filter.

Operation of the Seestar S50

1. Level the tripod using the included bubble level
2. Screw the Seestar on the tripod
3. For solar observation install the solar filter (Figure 7)
4. Power the Seestar (press and hold the power button for 2s)

For better GoTo accuracy the tripod should be levelled using the Seestar app (Figure 8). When the difference is less than 3°, it is adjusted to a reasonable range. The smaller the value, the better[6].

Figure 8 – Levelling the tripod.

Seestar App (Figure 9)

The Seestar App includes five tabs (Seestar, SkyAtlas, Community, Nearby, Me):

The first Tab (Seestar) includes:

1. Connection (main dashboard). Lens Fog removal (anti-Dew), Wi-Fi, Firmware, Device info
2. Weather conditions from your location and moon phase
3. Four imaging modes: Stargazing, Solar, Lunar, Scenery
4. Recommendations of targets that can be imaged on a particular night

The second Tab includes a Sky Atlas. You can use this tab to slew the Seestar to a given object. The GoTo function will aim the smart telescope to target and centre it using plate solving.

Using the third tab you can share your images with the Seestar Community. The Nearby tab will open a map showing where other "Nearby" Seestar images were taken. The "Me" tab shows your profile and the images you decide to share with the Seestar Community.

Imaging with the Seestar S50

Imaging the Sun[7] and Moon with the Seestar is extremely easy. Choose the Solar or Lunar Tab and chose Find Sun or Find Moon (Figure 10). To image the Deep-Sky choose the Stargazing Tab. The Seestar S50 is not suitable for planetary imaging.

[6] Modulation level is a necessary condition for GoTo and tracking.
[7] To image the Sun **the solar filter must be attached**.

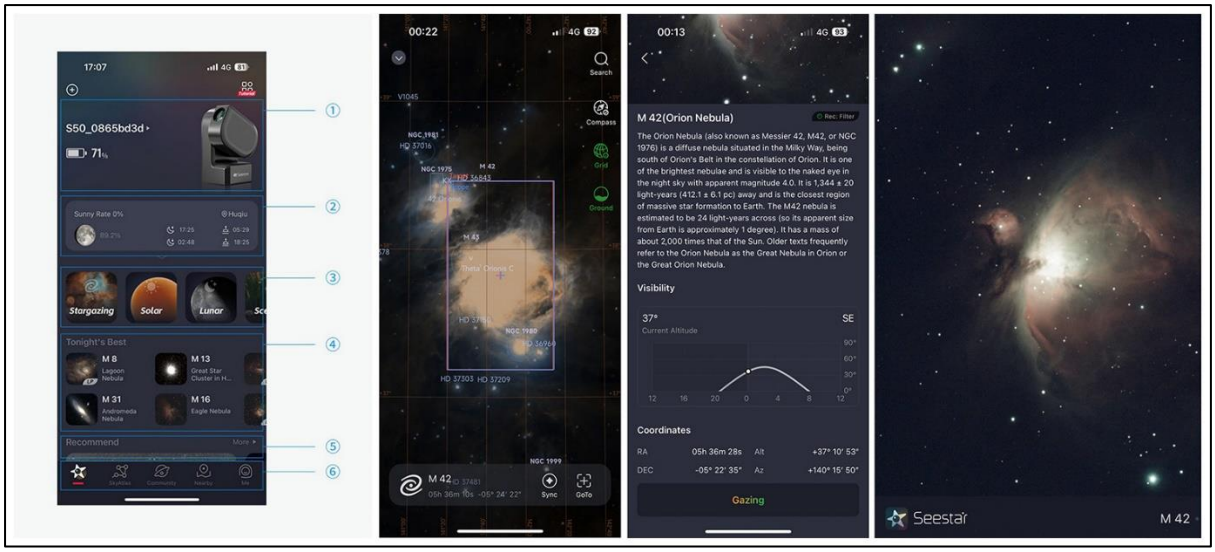


Figure 9. Seestar App: 1- Device; 2- Weather; 3- Mode; 4- Recommendations; 5- Navigation Bar; Bottom Navigation Tabs.

Figure 10. Solar imaging.

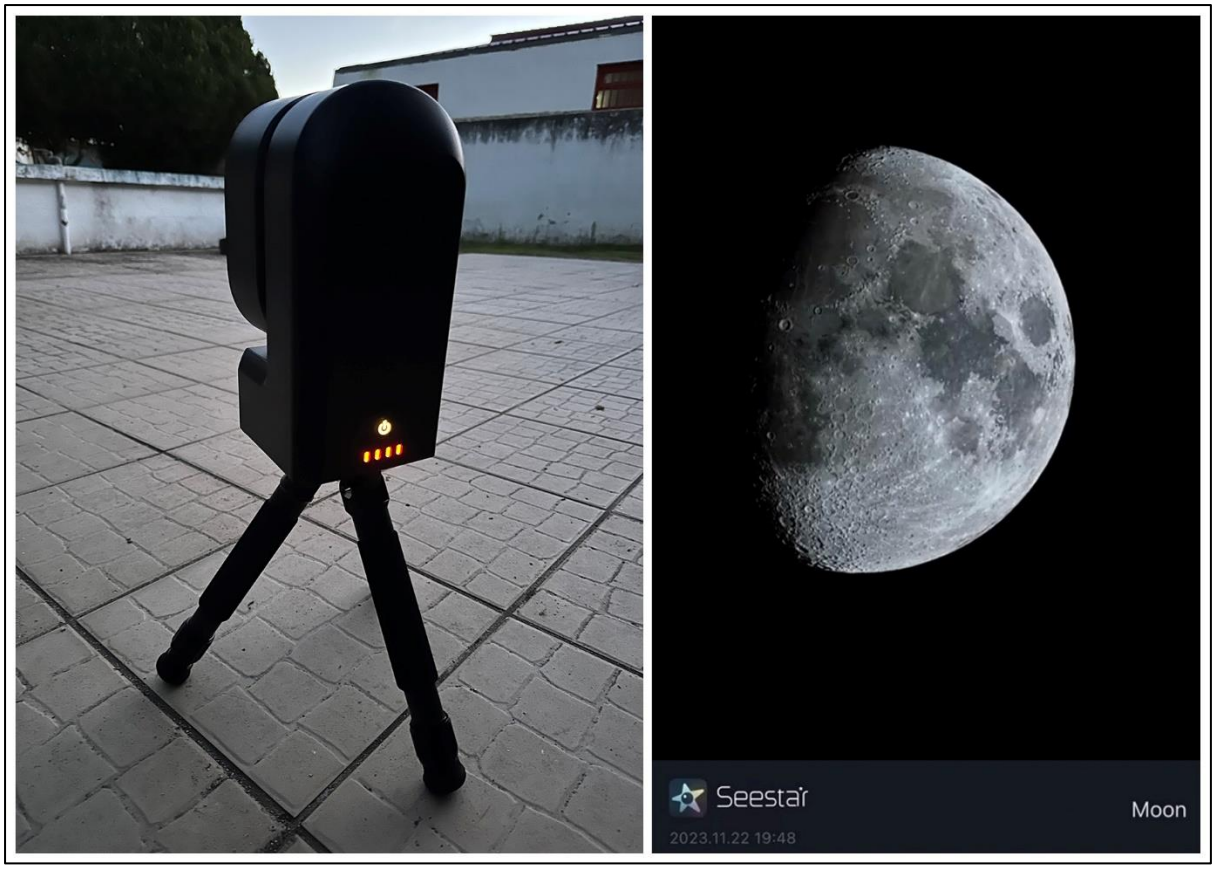


Figure 11. Lunar imaging.

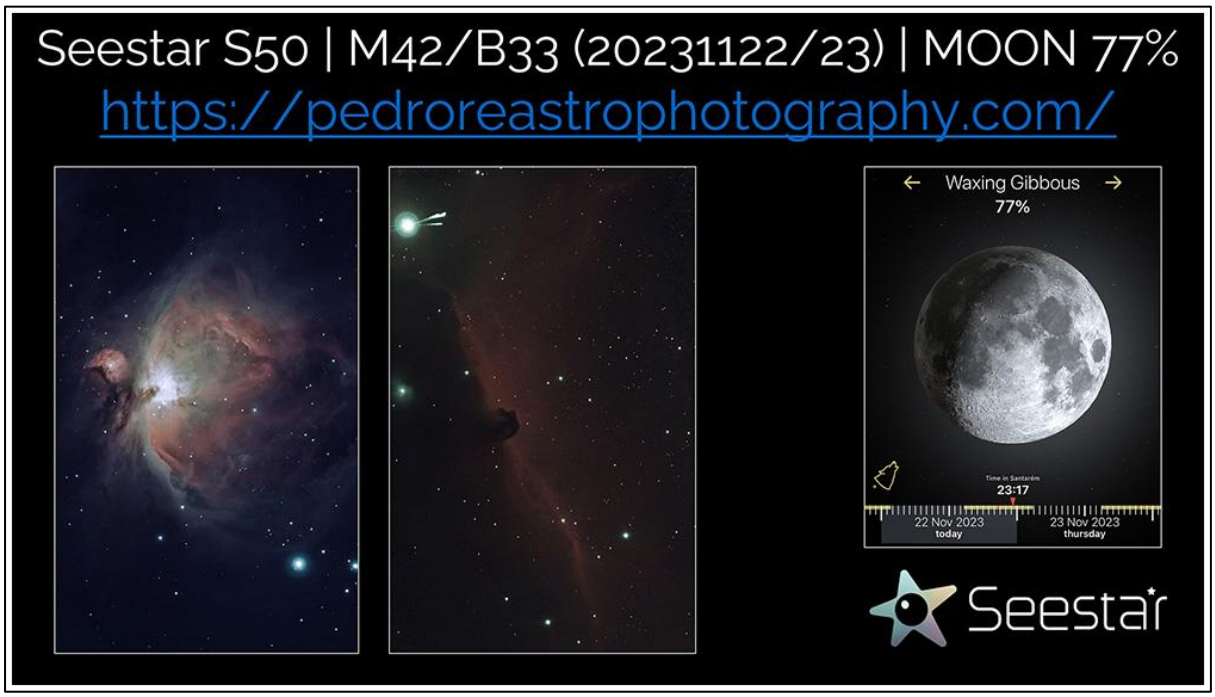
Figure 12- First light with the ZWO Seestar S50, Sun, M71, M15, M45, M42 (20231118).

Youtube Videos

https://youtu.be/4LA2Mdn6QtQ
Seestar S50 | Solar imaging | Pedro RÉ
Pedro RE' (20231118)
https://pedroreastrophotography.com/

https://youtu.be/CVQwySaYqB0
Seestar S50 | First Light (20231118) | Pedro RÉ
https://pedroreastrophotography.com/

https://youtu.be/EfDVvdMLh1E
Seestar S50 | Solar imaging (20231119) | Pedro RÉ
https://pedroreastrophotography.com/



https://youtu.be/tstPFcVlvlk
Seestar S50 | M42/B33 (20231122/23) | MOON 77% | Pedro RÉ
https://pedroreastrophotography.com/

https://youtu.be/hD41dEK5-Cc
Seestar S50 | Lunar imaging (20231122/23) | Pedro RÉ
https://pedroreastrophotography.com/

https://youtu.be/ilGCy1I31F4
Seestar S50 | Solar imaging (20231123) | Pedro RÉ
https://pedroreastrophotography.com/

https://youtu.be/hqgaSoiyt4k
Seestar S50 | Solar imaging (20231124) | Pedro RÉ
https://pedroreastrophotography.com/

PROS

1. Light weight and easy to use
2. Quick setup
3. Not expensive for a smart scope
4. Excellent app

CONS

1. Although it produces nice images (Sun, Moon and Deep sky) it does not compete with other astrophotographic rigs (*e.g.* equatorial mounts)
2. The apochromatic objective is not colour free
3. The dual band filter produces noticeable halos on bright stars
4. Not suitable to image the planets (short focal length and short focal ratio)