FF80 APO

■ 使用说明书

■ User's Manual

警告
WARNING!!

请不要通过本望远镜直接观察太阳，这样做可能导致瞬间失明，请购买专用太阳观测滤镜或滤膜，来获得最安全的观测指导。通过寻星镜，也可以造成眼睛的严重损害。

DO NOT LOOK AT SUN THROUGH TELESCOPE.
IT WILL CAUSE IRREVERSIBLE DAMAGE TO YOUR EYE.

欢迎使用ZWO FF80 APO
www.zwoastro.com

中文版（简体）

使用产品前请仔细阅读本使用说明书。

FF80 APO是自平场摄星镜，无需额外购买平场镜，避免计算平场镜的后截距或是进行繁琐的连接以达到匹配的距离，可直接接上任意成像配件，合焦后即是最佳拍摄状态，方便快捷，让天文爱好者有更多时间投入到拍摄工作中。用FF80 APO进行目视观测也是非常理想的选择，连接天顶镜配合各种目镜，都能轻松合焦，甚至超高倍观测行星也不在话下。

FF80 APO的光学系统采用了FF系列的光学设计，采用前三后一的四片式镜片组合。其中两块是ED玻璃，能够有效减少色差，提高图像的清晰度。值得一提的是，所有FF系列均为整体化设计而非简单的三片主镜加像场修正镜，离开了任何一片玻璃均不能单独成像，整体设计的优势是有着更合理的结构布局，更好的周边减光控制，更优异的成像表现。

从直观的外形上看，FF80 APO更加小巧。FF80 APO全长450mm，标准装重量4.7kg。所以，如果你的赤道仪载重本身较小或者你厌倦了扛着笨重的长焦比望远镜四处奔波，那么FF80 APO作为一台便携式的折射镜是一个非常不错的选择。

在光学设计上，FF80 APO的有效口径为80mm，焦距为600mm，焦比为f/7.5。虽然和其他短焦比望远镜相比，FF80 APO可以算是长焦比望远镜。但是和市场上常见的f/4和f/5短焦比望远镜或者f/10和f/11长焦比望远镜相比，FF80 APO属于中焦比折射望远镜。所以它是一款复合型的望远镜。

传统的长焦比折射镜由于配件接驳困难而无法进行天文拍摄。只能用于目视行星和月球观测。传统的短焦比折射镜很容易受到球差和色差等问题的干扰，导致最终的成像效果不理想。所以FF80 APO作为一台全新设计的中焦比折射镜，后侧配备一个四段式的转接环，方便用户连接各种类型的配件。即使用户需要用到滤镜抽屉、滤镜轮、OAG、天文相机，都能够轻松连接到FF80 APO上。因此非常适合进行天文拍摄。另外，FF80 APO独特的镜片设计和强大的自平场功能，能够保证周围星点的质量、最终成像的稳定性，大大减少球差和色差对照片的影响。

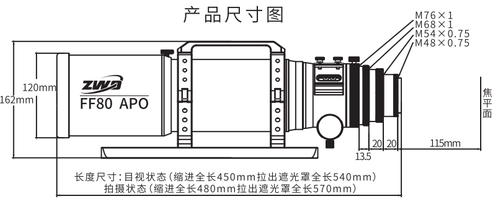
对于新手来说，FF80 APO的设计也非常友好。在连接配件时，从M68×1接口的外螺纹底面算起，到焦平面的距离控制在155mm之内。只要不超过这个连接限制，用户不需要计算后截距。很大程度上降低了新手的操作难度。

ZWO FF80 APO是一款性价比较高的折射式天文望远镜。它在机械外观和光学系统的设计上都有独特的优势。作为中焦比折射镜，兼具短焦比和长焦比望远镜的特点。又凭借自平场和强大的光学性能，充分保证成像效果的稳定性。

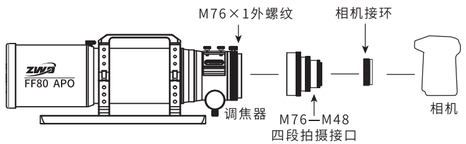
有效口径：80mm
焦距：600mm
焦比：f/7.5
物镜类型：四片式全分离APO（包括两片ED玻璃）
成像圈：44mm
调焦筒缩进状态下后端最长连接长度：
1. 拍摄模式：
   115mm（从M48×0.75外螺纹算起）
   135mm（从M54×0.75外螺纹算起）
   155mm（从M68×1外螺纹算起）
   168.5mm（从M76×1外螺纹算起）
2. 观测模式：
   148mm（从2英寸目镜基座算起）

全长：
  450mm（含1.25英寸接口缩进状态）480mm（加拍摄连接管缩进状态）
  540mm（含1.25英寸接口伸长状态）570mm（加拍摄连接管伸长状态）
本体重量：3.9kg
标准装重量：4.7kg
末端接口：M76×1-M68×1
  M68×1-M54×0.75
  M54×0.75-M54×0.75
  M54×0.75-M48×0.75（内置M48×0.75滤镜螺纹）
四段式拍摄连接管末端接口：M48×0.75
标配：FF80 APO本体一个，抱箍一对，提手一个，Vixen窄型鸠尾板一个，四段式拍摄连接管一套，说明书一份

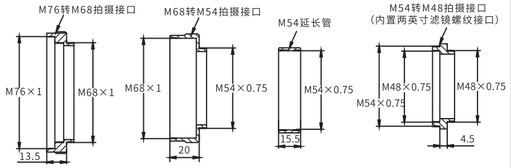
产品尺寸图



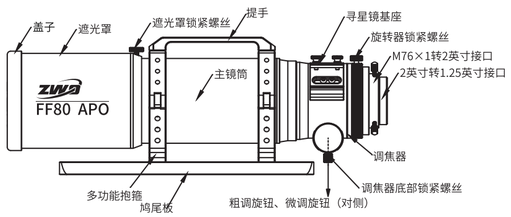
相机连接示意图



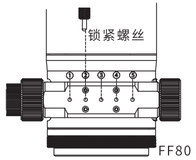
四段式拍摄连接管



部件图



锁紧螺丝示意图

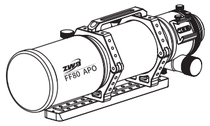


②底部锁紧螺孔
③底部承载调节螺孔（内有M4小螺丝）

使用EAF时拆卸底部锁紧螺丝
①②④⑤螺孔均可用于EAF支架安装

FF80 APO调焦器

包装含有



FF80 APO本体一个，抱箍一对，提手一个，
Vixen窄型鸠尾板一个，
四段式拍摄连接管一套，说明书一份



说明书

English

Instructions for use

The FF80 APO is a refractive astrograph with the powerful flatfield optical design which saves you from the expensive cost of a field flattener. It eliminates the trouble of calculating the back focus distance of the flattener and connecting various accessories to achieve that distance. You can just connect any possible accessories you need as long as the target is focused. This makes the whole setting up process much more convenient, and saves your time, allowing you to pay more attention to the image shooting itself. It will also be an ideal telescope if you want to do visual astronomy. Directly connect the star diagonal to the eyepieces, you' ll see focusing is such an easy thing then. Planetary observation in high magnification is also piece of cake!

FF80 APO inherits the optical design of the FF- family, adopting a 3+1 quadruplet lens structure which contains two pieces of ED glass that can effectively reduce chromatic aberration and enhance clarity and sharpness. It' s worth mentioning that all astrographs from FF- family come with an integrated lens combination rather than simply placing three major lenses and a corrector together in a line. In another word, the whole optical system cannot solely perform without any piece of these lenses. This structure design leads to a more rational lens arrangement, better vignette control and superior image quality.

At the first glance, ZWO FF80 APO is much more compact. FF80 APO is 450mm in length and gross weight 4.7kg. So if your equatorial mount is not capable of holding heavy telescopes, or if you are quite tired of carrying a bulky long focal-ratio telescope around, then FF80 APO may be a great option.

In terms of the optical design, FF80 APO is 80mm in its aperture diameter and 600mm in focal length. Thus its focal ratio is f/7.5. It' s actually a medium focal ratio telescope compared with those f/4 and f/5 short focal ratios or f/10 and f/11 long focal ratios. So FF80 APO is a compact halfway house.

The traditional long-focal-ratio astrographs are used only for observation due to the troublesome accessory connection. And those short-focal-ratio astrographs consistently suffer a lot from chromatic or spherical aberrations. As a great mixture, FF80 APO is equipped with a 4-piece adapter, convenient for users to connect different types of accessories. So it' s a great helper in astrophotography. Besides, its special lens deign and powerful flatfield capacity make a crucial contribution to the high-quality imaging results, greatly reducing the impact of spherical and chromatic aberrations.

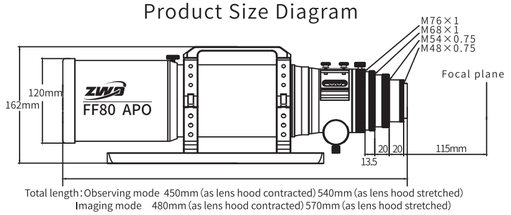
FF80 APO is also a novice-friendly device. Keep in mind that the distance from the base of M68×1 to the focal plane is 155mm, and you can literally attach any accessories within this limit. You don' t have to calculate your back focus distance which effectively simplifies the operation.

ZWO FF80 APO is a cost-effective refractor. It boasts special and fantastic vantages in both mechanical and optical design.

As an f/7.5 refractor, it can function well by virtue of its flatfield ability and rigorous optical performance.

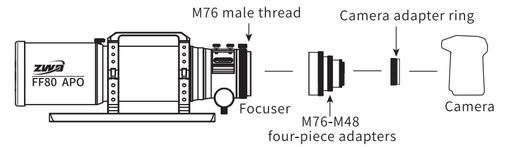
Aperture size：80mm
Focal length：600mm
Focal ratio：f/7.5
Objective lens：Quadruplet air-spaced APO (including two ED glasses)
Image circle：44mm
Maximum accessory connection (with the focuser fully retreated)：
1. Imaging mode:
   115mm (from the base of M48×0.75 male thread)
   135mm (from the base of M54×0.75 male thread)
   155mm (from the base of M68×1male thread)
   168.5mm (from the base of M76×1 male thread)
2. Observing mode:
   148mm (from the end of 2" eyepiece holder)
Total length：
450mm (including 1.25" eyepiece holder as dew shield contracted)
540mm (including 1.25" eyepiece holder as dew shield fully stretched)
480mm (including the 4-piece adapter as dew shield contracted)
570mm (including the 4-piece adapter as dew shield fully stretched)
Net weight：3.9kg
Gross weight：4.7kg
Rear-end thread type：
   M76×1-M68×1
   M68×1-M54×0.75
   M54×0.75-M54×0.75
   M54×0.75-M48×0.75 (M48×0.75 filter thread inside)
Standard package items：an FF80 APO OTA, a pair of tube rings, a handle, a Vixen dovetail plate, a set of 4-piece photographic adapters, a manual

Product Size Diagram

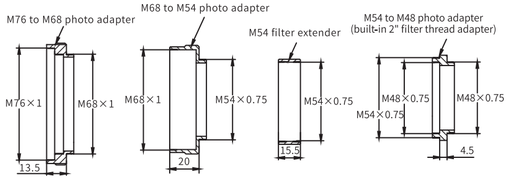


Total length：Observing mode 450mm (as lens hood contracted) 540mm (as lens hood stretched)
Imaging mode 480mm (as lens hood contracted) 570mm (as lens hood stretched)

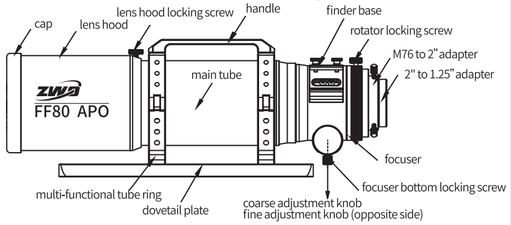
Connection Diagram of Camera



Four-piece Adapters Diagram

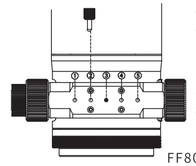


Product Parts Diagram



The Locking Screw Position Diagram

Bottom locking screw

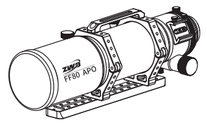


②Bottom locking screw
③Bottom load adjustment screw hole
(contains M4 small screws)

Remove the bottom lock screws when using the EAF
①②④⑤screw holes all can be used for EAF bracket mounting

FF80 APO focuser

Items in FF80 APO Packaging



an FF80 APO OTA, a pair of tube rings, a handle, a Vixen dovetail plate, a set of 4-piece photographic adapters, a manual



User's Manual