



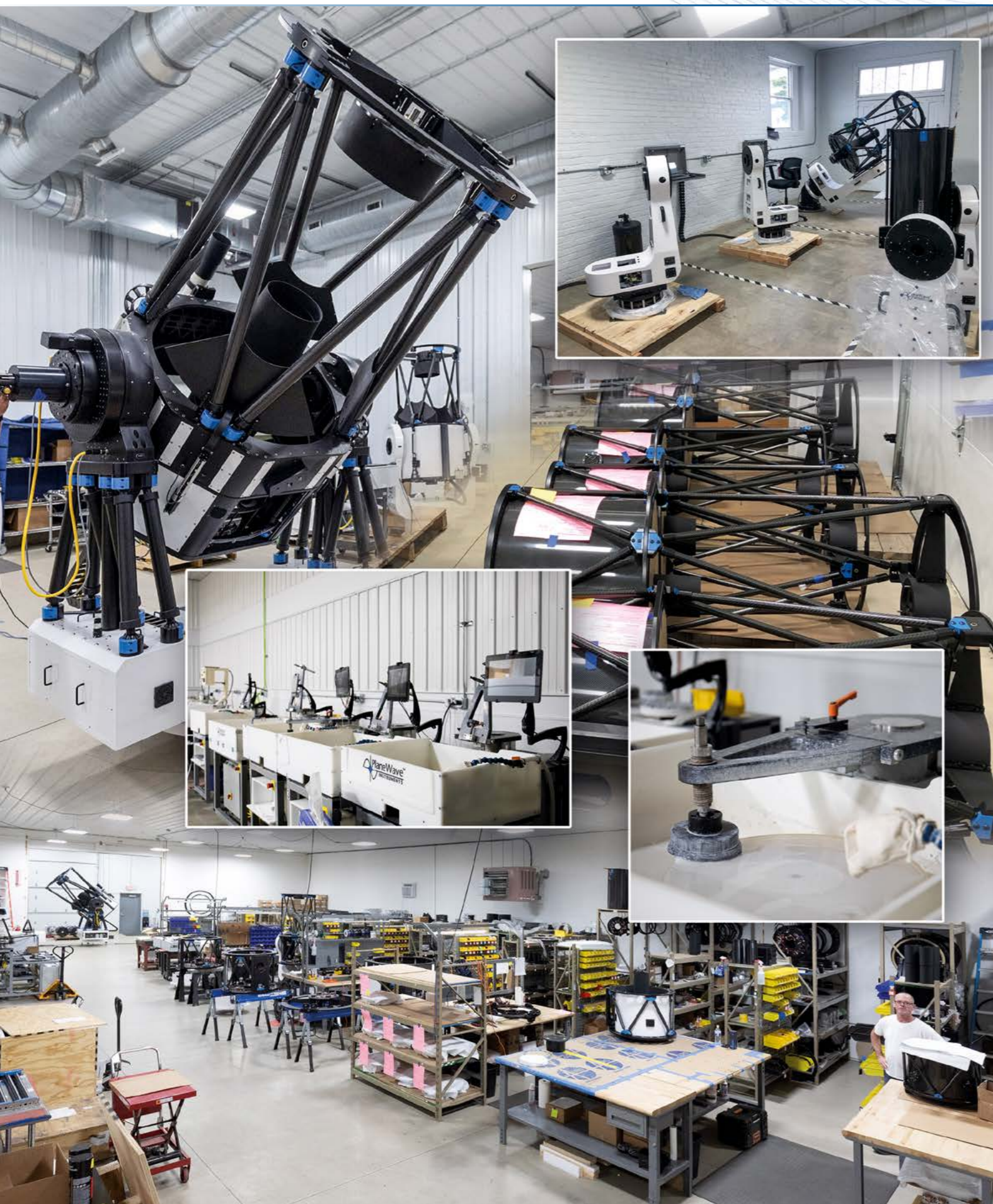
 **PlaneWave**<sup>TM</sup>  
INSTRUMENTS

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**BAADER PLANETARIUM** GMBH

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Founded in 2006, **PlaneWave Instruments** is committed to providing observatory-class products for serious astronomers at an unprecedented value. Developed by PlaneWave, the CDK (Corrected Dall-Kirkham) is a revolutionary telescope, its optical system was designed to excel at imaging on large format CCD cameras while remaining an excellent instrument for visual use.

Created to meet the demands of both the serious imager and visual observer, the CDK is offered at an unprecedented price/performance ratio for a telescope of this quality and aperture. One advantage of the CDK design is its ease of collimation and achievable centering tolerance for a telescope of this class. This assures that the user will get the best possible performance out of the telescope. The end result is a telescope which is free from off-axis coma, off-axis astigmatism, and curvature of field, yielding a perfectly flat field all the way out to the edge of the largest CCD sensors available today. Today PlaneWave makes a full line of CDK and Ritchey-Chrétien (RC) telescopes as well as imaging and observatory class mounts to provide complete imaging systems for both individuals and industry.

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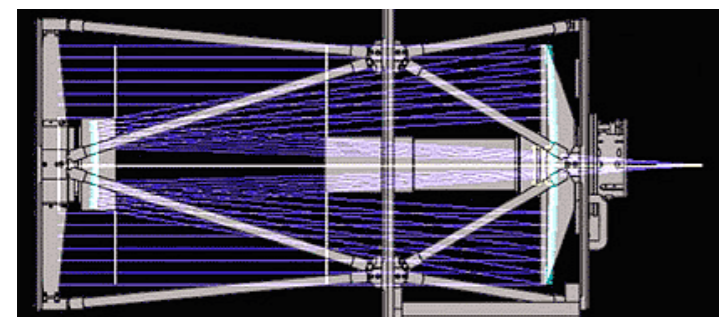
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## THE OPTICAL DESIGN OF CDK TELESCOPES

Shown on the example of CDK20



The CDK [Corrected Dall-Kirkham] telescope is based on an optical design developed by Dave Rowe. The goal of the design is to make an affordable telescope with a large enough imaging plane to take advantage of the large format CCD cameras of today. Most telescope images degrade as you move off-axis from either coma, off-axis astigmatism, or field curvature. The CDK design suffers from none of these problems. The end result is a telescope which is free from off-axis coma, off-axis astigmatism, and curvature of field, yielding a perfectly flat field all the way out to the edge of a 52 mm (respectively 70 mm on most other CDK-optics) image circle. This means pinpoint stars from the center out to the corner of the field of view.



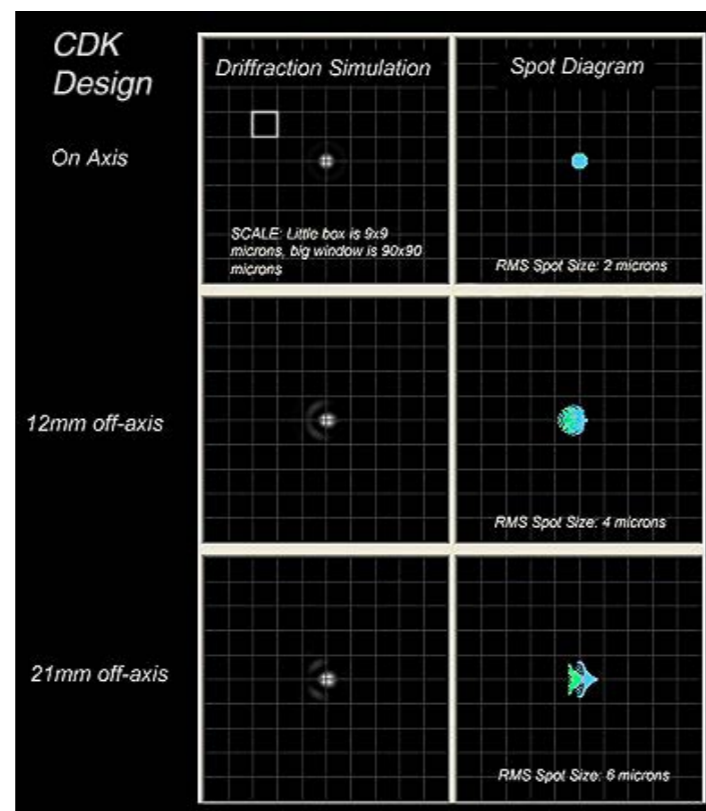
The design is a simple and elegant solution to the problems posed above. The CDK consists of three components:

- an ellipsoidal primary mirror,
- a spherical secondary mirror
- and a lens group.

All these components are optimized to work in concert in order to create superb pinpoint stars across the entire 52 to 70 mm image plane.

### OPTICAL PERFORMANCE

The following graphic shows two simulations showing the CDK's stunning performance. The first is a **diffraction simulation** and the second is a spot diagram. In the diffraction simulation the star images on axis and off-axis are nearly identical. In the spot diagram 21 mm off-axis the spot size is an incredible 6 microns RMS diameter. For 26 mm off-axis, a 52 mm image circle, the RMS spot size is 11 microns. This means the stars across the entire focal plane are going to be pinpoints as small as atmospheric seeing will allow. Both of the simulations take into consideration a flat field, which is a more accurate representation of how the optics would perform on a flat CCD camera chip.



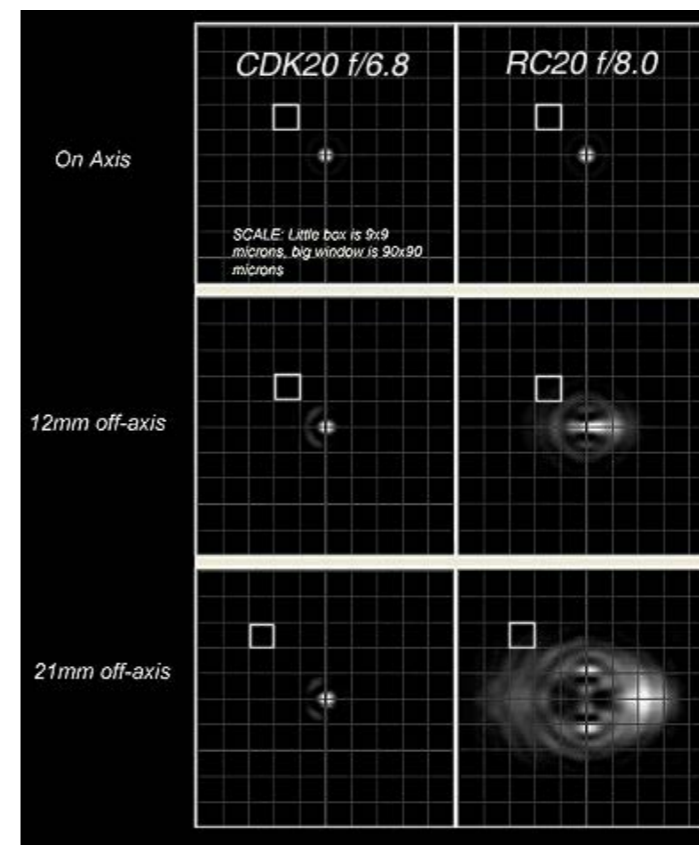
For visual use some amount of field curvature would be allowed since the eye is able to compensate for a curved field. The diffraction simulation was calculated at 585nm. The spot diagram was calculated at the RGB wavelength, respectively at 720-, 555- und 430nm. Many companies show spot diagrams in only one wavelength, however to evaluate chromatic performance multiple wavelengths are required.

### COMPARISON: CDK VS. RITCHEY CHRÉTIEN

The simulation below compares the optical performance of the CDK design to the Ritchey Chrétien (RC) design. The RC design was popularized as an astroimaging telescope due to its use in many professional observatories. Although very difficult and expensive to manufacture and align, the RC is successful in eliminating many of the problems that plague many other designs, namely off-axis coma. However the RC does nothing to eliminate the damaging effects of off-axis astigmatism and field curvature.

The CDK design tackles the off-axis coma problem by integrating a pair of correcting lenses into a two mirror design. The beauty is that this design also corrects for astigmatism and field curvature. Because the lenses are relatively close to the focal plane, and because these lenses work together as a doublet, there is no chromatic aberration. The CDK offers a wide aberration-free, flat field of view that allows the user to take full advantage of the very large imaging chip cameras in the market place today.

Having an aberration free telescope design means nothing if the optics cannot be aligned properly. Many RC owners never get to take full advantage of their instrument's performance because the RC is very difficult to

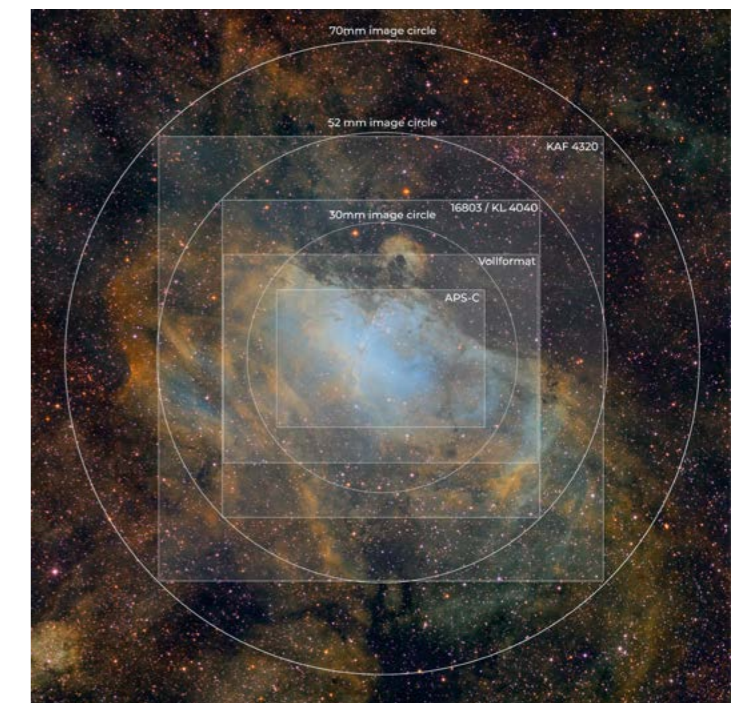


collimate. Aligning the hyperbolic secondary mirror's optical axis to the optical axis of the primary mirror is critical in the RC design, and the tolerances are unforgiving. The secondary mirror of the CDK design is spherical. It has no optical axis and so the centering tolerance of the CDK secondary mirror is comparatively huge. With the help of some very simple tools, the CDK user will be able to set the secondary spacing, collimate the optics and begin enjoying the full performance potential the instrument has to offer within a few minutes.

**The drastic difference in performance between the CDK and the RC is apparent.** The biggest component that degrades the off-axis performance of the RC is the defocus due to field curvature. In many diagrams shown by RC manufacturers, the diagrams look better than this because they are showing a curved field. This is fine for visual use because the eye can compensate for some amount of curvature of field. But CCD arrays are flat and so in order to evaluate the performance a spot diagrams and/or diffraction simulations requires a flat field as shown.

The small squares are 9x9 microns wide, the individual comparative images are 90 micrometers wide. The spot diagrams were calculated for a wavelength of 585 nanometers.

**Furthermore, please note: the CDK design is f/6.8, the RC design is f/8. This is not important for stars, but it can easily reduce the exposure time when photographing extended objects like nebulae.**





# TELESCOPES

(OTA'S ONLY)

from 12,5" to 24"



All technical data on [pages 18/19](#)



Delta Rho 350 Astrograph

- ✓ Delta Rho 350 Astrograph with Fused Silica Optics
- ✓ f/3 focal ratio and 1.050 mm focal length
- ✓ Corrected Cassegrain, with pinpoint stars across a 60 mm image circle (>3 degrees)
- ✓ Fixed Primary Mirror and Secondary Mirror allows easy and quick collimation by tip&tilt
- ✓ Built in primary and secondary dew heaters with temperature sensors
- ✓ Includes heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, and Wrench Set

Requires mandatory shipping crating #1323514



Shown with optional Series-5 focuser and rotator

Prices, further images and technical information in English and German on:

[www.planewave.eu/en/dr350](http://www.planewave.eu/en/dr350)

PLANEWAVE  
**DELTA RHO 350**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323135

## FAST, PORTABLE, AND STABLE WIDEFIELD TELESCOPE

This f/3 Cassegrain focus telescope has an aperture of 350 mm and provides a 1,050 mm focal length for capturing stunning deep sky astrophotography. With a beautifully baffled 60 mm corrected image circle, the Delta Rho 350 is sure to take your astrophotography to greater heights when imaging with large camera sensors without the limitations of prime focus devices. The 80 mm backfocus after the focuser allows a variety of cameras, filter wheels, etc. to be attached to the back of the telescope.

Worried about operating fast systems due to image plane tilt? Need not to worry, the Delta Rho's primary mirror is fixed in place like the CDKs. This makes adjustment very easy. In addition, PlaneWave engineers have designed a new ultra-short derotator and focuser that has an adjustable tip/tilt adapter.

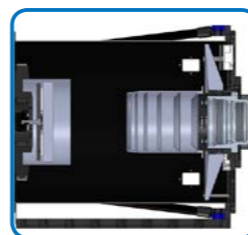
## DELTA RHO 350 SPECIAL FEATURES



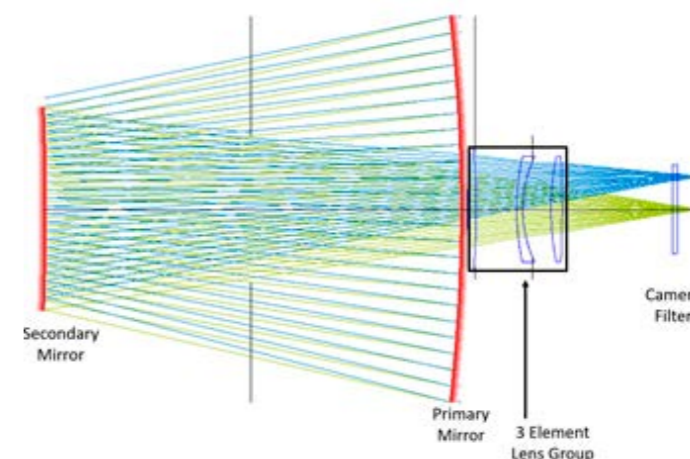
**FAST, SHARP OPTICS** – The Delta Rho optical design was created by PlaneWave's CTO David Rowe with the goal of providing a wide, corrected, field of view that yields pinpoint stars across a 60 mm image circle. The primary and secondary mirrors are composed of fused silica glass, which ensures that changing temperatures do not distort the shape of the mirrors that can degrade image quality.



**CORRECT CASSEGRAIN OPTICAL DESIGN** – The focal plane is set at the back of the Delta Rho 350 so users can install large filterwheels and cameras without blocking the light path, which hinders other fast telescopes in the market.



**ADVANCED BAFFLING** – Our advanced baffling design prevents stray light from entering the light path and adversely affecting your astroimages.



All technical data on [pages 18/19](#)



CDK 12,5 OTA

- ✓ CDK12.5 Telescope with Fused Silica Optics (12.5")
- ✓ f/8 focal ratio and 2.541 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 52 mm image circle
- ✓ Carbon fiber optical tube assembly for rigidity and fast cooling
- ✓ No coma, no off-axis astigmatism, and no field curvature
- ✓ Includes 2,75" Hedrick Focuser, Heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, Cable connector for fan power and Wrench Set, 12V AC Adapter

Requires mandatory shipping crating #1323512

- ✓ CDK14 Telescope with Fused Silica Optics (14")
- ✓ f/7.2 focal ratio and 2.563 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 70 mm image circle
- ✓ Carbon fiber optical tube assembly for rigidity and fast cooling
- ✓ No coma, no off-axis astigmatism, and no field curvature
- ✓ Includes heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, Cable connector for fan power and Wrench Set, 12V AC Adapter

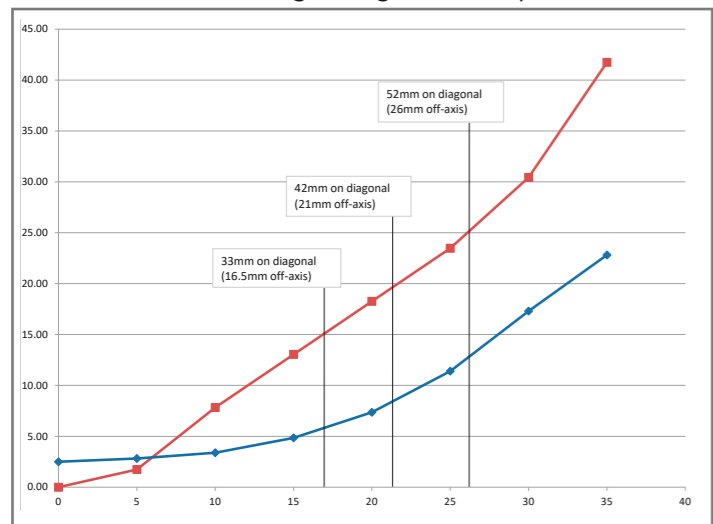
Requires mandatory shipping crating #1323514

All technical data on [pages 18/19](#)

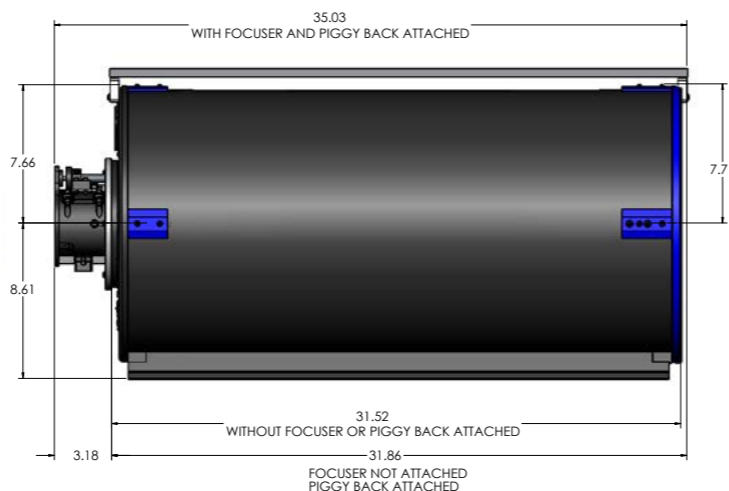


CDK 14 OTA

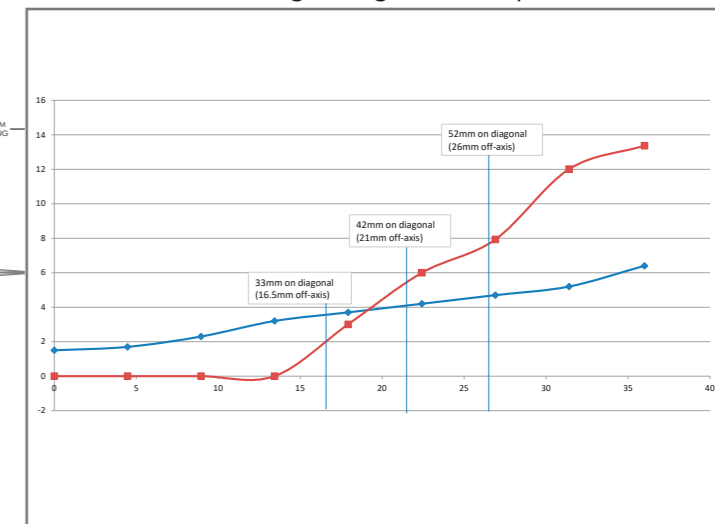
### PlaneWave CDK12.5 – Vignetting and RMS Spot Performance



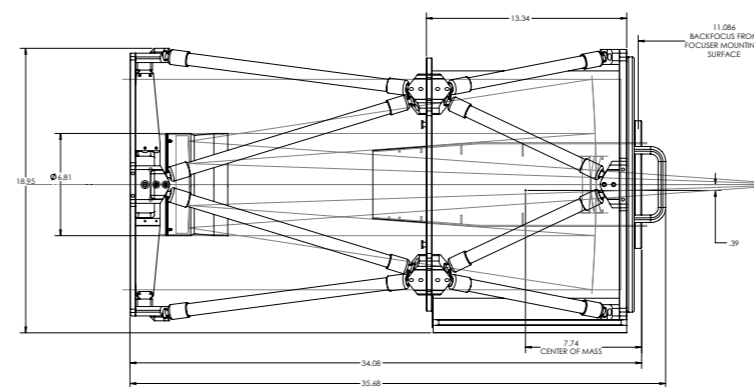
— Vignetting (%) vs. Distance Off-axis (mm) — RMS Spot Size (microns) vs. Distance OFF-axis (mm) **NOTE:** Spot Diagrams calculated at 730, 585, 430 nm



### PlaneWave CDK14 – Vignetting and RMS Spot Performance



— Vignetting (%) vs. Distance Off-axis (mm) — RMS Spot Size (microns) vs. Distance OFF-axis (mm) **NOTE:** Spot Diagrams calculated at 800, 550, 400 nm



Prices, further images and information in English and German on: [www.planewave.eu/en/cdk12](http://www.planewave.eu/en/cdk12)

Prices, further images and information in English and German on: [www.planewave.eu/en/cdk14](http://www.planewave.eu/en/cdk14)

PLANEWAVE CDK 12,5  
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#1323212Q



#1323212IQ

PLANEWAVE CDK 14  
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FOLLOWING VERSIONS



#1323214Q



#1323214IQ

All technical data on [pages 18/19](#)

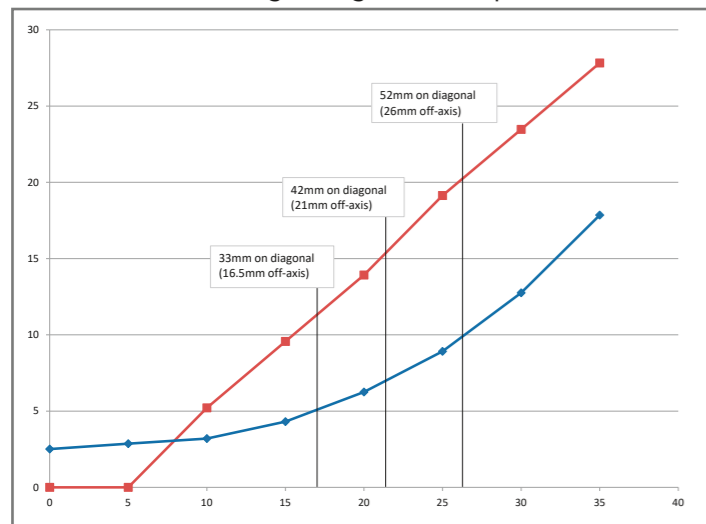


CDK 17 OTA

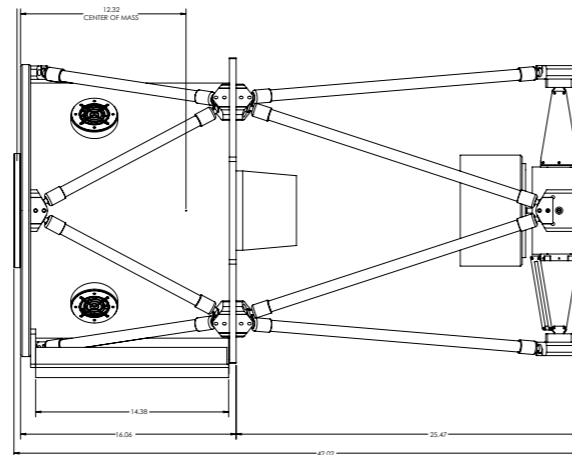
- ✓ CDK17 Telescope with Fused Silica Optics (17")
- ✓ f/6.8 focal ratio and 2.939 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 70 mm image circle
- ✓ Carbon fiber optical tube assembly for rigidity and fast cooling
- ✓ No coma, no off-axis astigmatism, and no field curvature
- ✓ Includes heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, 12V AC Adapter

Requires mandatory shipping crating #1323517

PlaneWave CDK17- Vignetting and RMS Spot Performance



NOTE: Spot Diagrams calculated at 730, 585, 430 nm



- ✓ CDK20 Telescope with Fused Silica Optics (20")
- ✓ f/6.8 focal ratio and 3.454 mm focal length  
#1323222FQ Long BF: f/7.77 and 3951 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 52 mm image circle
- ✓ Carbon fiber optical tube assembly for rigidity and fast cooling
- ✓ No coma, no off-axis astigmatism, and no field curvature
- ✓ Includes heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, 12V AC Adapter

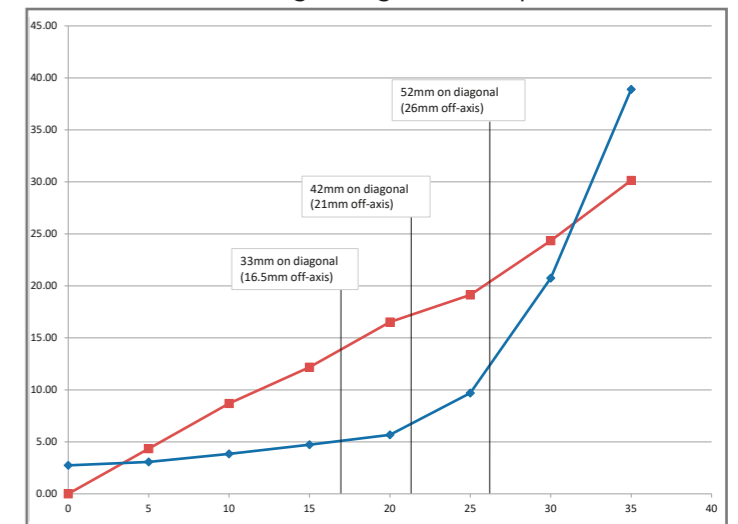
Requires mandatory shipping crating #1323520

All technical data on [pages 18/19](#)

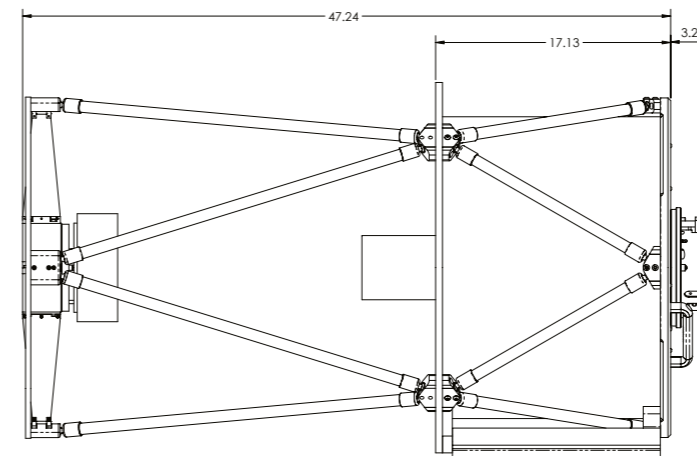


CDK 20 OTA

PlaneWave CDK20 - Vignetting and RMS Spot Performance



NOTE: Spot Diagrams calculated at 730, 585, 430 nm



Prices, further images and information in English and German on: [www.planewave.eu/en/cdk17](http://www.planewave.eu/en/cdk17)

Prices, further images and information in English and German on: [www.planewave.eu/en/cdk20](http://www.planewave.eu/en/cdk20)

PLANEWAVE CDK 17  
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#1323217Q



#1323217IQ

PLANEWAVE CDK 20  
IS AVAILABLE IN THE  
FOLLOWING VERSIONS



#1323220Q



#1323222FQ



#1323220IQ

All technical data on [pages 18/19](#)

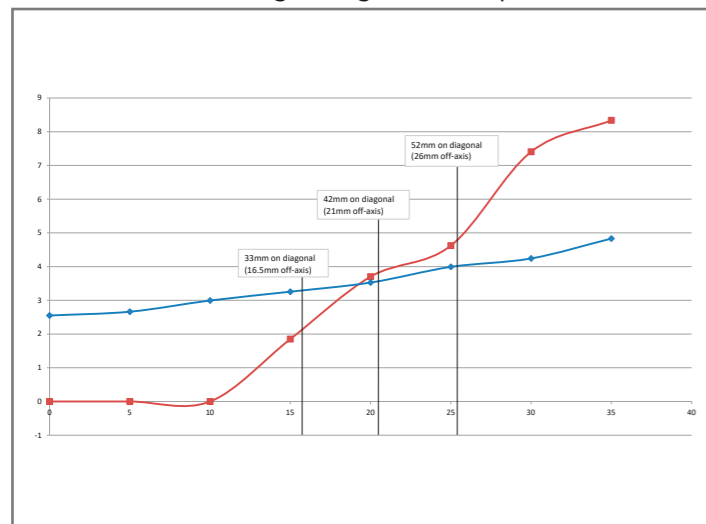


CDK / RC 24 OTA

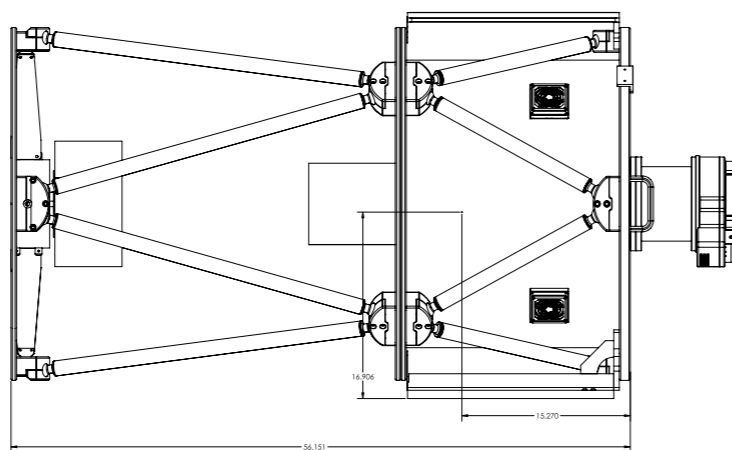
- ✓ 24" CDK/RC Telescope with Fused Silica Optics
- ✓ **CDK:** f/6.5 focal ratio and 3.962 mm focal length  
**RC:** f/10.6 focal ratio and 6.469 mm focal length
- ✓ **CDK:** pinpoint stars across a 70 mm image circle  
**RC:** pinpoint stars across a 52 mm image circle
- ✓ Carbon fiber optical tube assembly for rigidity and fast cooling
- ✓ No coma, no off-axis astigmatism, and no field curvature
- ✓ Includes heating elements for dew prevention, OTA Cover, Flashdrive with Software/Instructions, 12V AC Adapter (please check website for RC included items)

Requires mandatory shipping crating #1323524

PlaneWave CDK24- Vignetting and RMS Spot Performance



— Vignetting (%) vs. Distance OFF-axis (mm) — RMS Spot Size (microns) vs. Distance OFF-axis (mm) **NOTE:** Spot Diagrams calculated at 730, 585, 430 nm



## STANDARD FEATURES FOR ALL CDK TELESCOPES



**COOLING FANS** – Three cooling fans on the backplate pull air through the telescope and by the primary mirror (on some CDK' also three additional fans on the side of the optical tube blow air across the primary to ensure a boundary layer of air does not distort images). These fans help the telescope reach thermal equilibrium quickly, further reducing any distortion in images due to temperature variations. They are controlled by a switch on the optical tube, or via PWI3 software with the optional *Electronic Focus Accessory (EFA Kit)*.



**CARBON FIBER TRUSS DESIGN** – Minimizes thermal expansion which causes focus shift as temperature changes during an imaging session. Carbon fiber also reaches ambient temperatures quickly and is extremely lightweight and rigid to help ensure excellent imaging data is produced.



**FUSED SILICA OPTICS** – Fused silica (quartz) has a coefficient of thermal expansion six times lower than Borosilicate (Pyrex) glass, which means that as it cools down, fused silica preserves its shape to a high degree of accuracy. This translates into consistent optical performance and unchanging focus as temperature changes.



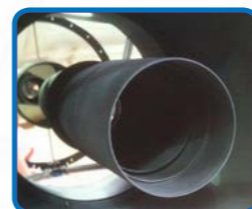
**DELTA-T READY** – for added dew prevention, the CDK's are internally wired with polyimide film heater pads and temperature sensors, ready to be controlled with the optional *Delta-T controller* via PlaneWave Interface 3 software.



**DOVETAIL EXPANSION JOINT** – Allows for the difference in thermal expansion between carbon fiber and aluminum. The expansion joint allows the aluminum dovetail to expand and contract without stressing the carbon fiber lower truss. This results in images that are not distorted due to expansion, or contraction of the optical tube materials.



**OPTICAL TESTING AND ADJUSTING** – Each optical component of PlaneWave's systems goes through an extensive process of figuring, testing and inspection to guarantee excellent and stable performance from every produced telescope. PlaneWave Instruments technicians use a custom optical metrology measurement system to generate a precision surface wavefront map for every mirror at each stage of the manufacturing process.



**3D PRINTED BAFFLES** – PlaneWave uses digital 3D printing technology to produce lightweight baffle tubes. 3D printers add successive layers of material to construct a baffle system with precision positioned internal stray light baffles to minimize vignetting and maximize image contrast. Quality baffling makes an incredible difference in overall image quality, so we ensured an optimal design was created for our telescopes.

Prices, further images and information in English and German on: [www.planewave.eu/en/cdk24](http://www.planewave.eu/en/cdk24)

PLANEWAVE RC/CDK 24  
IS AVAILABLE IN THE  
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#1323224Q



#1323224IQ



#1323226Q



## RECOMMENDED PLANEWAVE ACCESSORIES

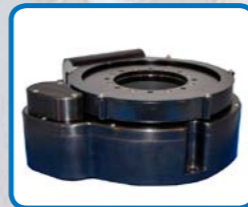
### DELTA-T HEATER (CDK12,5: #1329112 / 14: #1329110 / 17: #1329117 / 20: #1329120 / 24: #1329124)

- have Full Control of Primary and Secondary Heater using PlaneWave Interface (PWI 3) Software
- Monitor current temperature of primary mirror, secondary mirror and surrounding ambient temperature
- Automatically maintains mirror temperature set point as outside temperature changes
- Displays real time graph of all temperature sensors



### IRF 90 – INTEGRATED ROTATING FOCUSER #1329070

Large capacity Integrated Focuser and Rotator. The Focuser is capable of lifting 40 lbs (18 kg) with a range 30 mm (30000 microns). It has a 90 mm aperture with a range of 365 degrees with hardstops to eliminate any chance of cord wrap. The IRF90 is compatible with CDK14 – CDK700. It requires a standard Electronic Focuser Assembly (EFA-Kit) and the software PlaneWave Interface and ASCOM drivers.



### 3.5" HEDRICK FOCUSER #1329050

Heavy duty no-slip focuser capable of handling an imaging payload of up to 20lbs (9,1 kg). The focus tube runs on 5 bearings and is driven by a leadscrew so there is no chance of slipping. Focus may be automated through a computer using PlaneWave's EFA Kit add-on. The focuser comes with pre-installed motor that can be controlled with the EFA hand control or PWI PC software. The draw tube travel is 1.3 inch.



### EFA KIT (ELECTRONIC FOCUS ACCESSORY)

(CDK 12,5: #1329020 / 14: #1329020 / 17: #1329024 / 20: #1329020 / 24: #1329024)

The EFA Kit automates focusing (on optional Hedrick focuser), monitors temperature (on optional Delta T Dew Heater), and controls fans built-in to CDK telescopes. The EFA control box can be mounted to the back plate of any CDK telescope. The EFA Kit plugs into the temperature sensors and fan control wires that come standard with each telescope. A Hand Control is provided to control a optional Focuser or Rotator when standing at the eyepiece. The EFA kit comes with PlaneWave Interface (PWI), a software package that controls all external devices from a PC. All the cables are provided to attach the EFA kit to a PC. The EFA kit is ASCOM compatible.



### SERIES-5 FOCUSER #1329210

The Series-5 focuser is a large capacity focuser with a clear aperture of 5" and only 1.675" of occupied backfocus, for use with Alt/Az or equatorially mounted systems. It is capable of lifting 40 lbs (18 kg) with a travel range of 16.5 mm (16500 microns). The Series-5 focuser can be stacked with the Series-5 rotator for a complete focusing rotator solution (combined 2.78" of occupied backfocus).



### SERIES-5 ROTATOR #1329215

The Series-5 rotator is a large capacity rotator with a clear aperture of 5" and only 1.105" of occupied backfocus, for use with Alt/Az or equatorially mounted systems. It is capable of lifting 40 lbs (18 kg) with a travel range of 700 degrees between mechanical hardstops. The Series-5 rotator can be stacked with the Series-5 focuser for a complete focusing rotator solution (combined 2.78" of occupied backfocus).

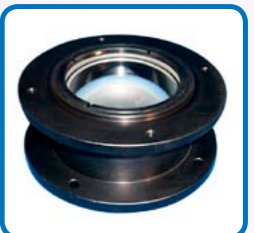


requires **Series-5 Controller #1329200**

### OPTICAL REDUCERS 0.6x AND 0.7x

(CDK 12,5 – 17: #1326012 / CDK 20 - 24: #1326020 / CDK700: #1326013 / PW1000: #1326014)

With the range of High End and High Power Optical Reducers, Planewave is offering a unique ability for all Telescope sizes, to adopt the telescope to the needs of the customer or the site. Just adding these Optical Reducer Lenses make every CDK a different Telescope for a completely different application, while maintaining the original Optical configuration. Changing from F6.8 to F4.5 w/o any loss in collimation is as easy as changing to another camera.



### SECURE-FIT ADAPTERS (available for all CDK's in many different versions)

The SecureFit System is Planewaves entirely proprietary adapter system to connect equipment onto their telescopes. It offers a wide variety of spacers and adapters to set every camera and equipment in perfect distance to the focal plain of the telescopes.

The unique advantage is the clever and "Secure" fastening mechanism with four bolts for unmatched fastening and no unscrewing as is happens with large finethreads under heavy load. In addition to that, all adapters are equipped with a mating centering Ring, which guarantees the adaptation is free of decentration and tilting. Mated with the very wide internal diameter of up to 3.25", which offers a great and reflection free lightpath, the SecureFit system ranks in the top class of adaptation for highest demands in astronomy equipment.



### TIP-TILT ADAPTERS

(CDK 14: #1323714 / 17: #1323717 / 20: #1323720 / 24: #1323724 / CDK700: 1323728)

A new line of Tip Tilt Adapters which can be mounted on various places in the lightpath of a CDK, allows the user to make slitlest corrections in the tilt in case a camera chip or custom-made adapter is not perfectly planeparalel to the flat field of the telescope.



### LIGHT SHROUD SPANDEX

(CDK 14: #1323714 / 17: #1323717 / 20: #1323720 / 24: #1323724 / CDK700: 1323728)

This is a lightweight light shroud made of Spandex fabric that blocks out stray light from the side and protects the main mirror from dust. The fabric is made breathable, in order to retain the telescopes open truss structure, which reduces wind vulnerability

Indispensable for daylight imaging work, otherwise you endanger yourself and others.



All prices, information and many additional accessories can be found in English and German on:

[www.planewave.eu/accessories](http://www.planewave.eu/accessories)



Telescope	DR350	CDK12,5	CDK14	CDK17	CDK20	CDK24	RC24
<b>Aperture</b>	350 mm (13.78")	12.5" (318 mm)	14" (356 mm)	17" (432 mm)	20" (508 mm)	24" (610 mm)	
<b>Optical Design</b>	Corrected Dall-Kirkham <b>CDK</b>	✓ #1323212Q	✓ #1323214Q	✓ #1323217Q	✓ #1323220Q #1323222FQ	✓ #1323224Q	
	Infra-Red Dall-Kirkham <b>IRDK</b>	✓ #1323212IQ	✓ #1323214IQ	✓ #1323217IQ	✓ #1323220IQ	✓ #1323224IQ	
	Corrected Cassegrain <b>CC</b> / Ritchey-Chrétien <b>RC</b>	✓ #1323135					✓ #1323226Q
<b>Focal length</b>	1050 mm (41.3")	2541 mm (100")	2563 mm (101")	2939 mm (115.7")	3454 mm (136") - 3951 mm (155") -	3962 mm (156")	6469 mm (254.7")
<b>Focal ratio</b>	f/3	f/8	f/7.2	f/6.8	f/6.8 - f/7.77	f/6.5	f/10.6
<b>Central Obstruction</b>	by surface area	31.4%	17.64%	23.5%	23.7%	15.21%	8.99%
	by prim. mirror Ø	56%	42%	48.5%	48.6%	39%	30%
<b>Backfocus from</b>	mounting surface	5.6" (142.24 mm)	10.45" (265 mm)	11.09" (282 mm)	10.24" (260 mm)	8.8" (223 mm) - 10.7" (272 mm) -	14.1" (358 mm)
	racked-in focuser	3.12" (79.27 mm)	7.2" (183 mm)	8.09" (206 mm)	7.24" (184 mm)	5.8" (147 mm) - 7.2" (183 mm) -	7.3" (185.4 mm)
<b>Weight</b> (w. el. focuser & dovetail)	46 lbs (21 kg)	48.5 lbs (22 kg)	48 lbs (22 kg)	106 lbs (48 kg)	140 lbs (63.5 kg)	240 lbs (108.9 kg)	
<b>OTA Length</b>	23 inch (584 mm)	31 inch (787 mm)	35 inch (889 mm)	42 inch (1,067 mm)	47 inch (1,194 mm)	56 inch (1,422 mm)	
<b>Optical Performance</b>	RMS on-axis	4.9 micron	2.77 micron	1.84 micron	1.81 micron	2.97 micron - 2.87 micron -	0.073 micron
	RMS at off-axis 1	6.2 µ at 23 mm	3.8 µ at 13 mm	3.1 µ at 13 mm	3.1 µ at 13 mm	4.0 µ at 13 mm	31.2 µ at 20.4 mm
	RMS at off-axis 2	7.6 µ at 30 mm	12.0 µ at 26 mm	6.0 µ at 35 mm	6.0 µ at 35 mm	11.8 µ at 26 mm	49.5 µ at 26 mm
<b>Telescope Cage</b>	Upper Cage	Carbon fiber truss poles with carbon fiber shroud	Carbon fiber optical tube	Carbon fiber truss			
	Lower Cage	Carbon fiber truss with carbon fiber light shroud					
<b>Optimal field of view</b>	60 mm Image Circle	52 mm Image Circle	70 mm Image Circle	70 mm Image Circle	52 mm Image Circle	70 mm Image Circle	52 mm Image Circle
<b>Mirror Material</b>	Fused Silica (quartz)						

## PRIMARY MIRROR

Optical Diameter	DR350	CDK12,5	CDK14	CDK17	CDK20	CDK24	RC24
<b>Optical Diameter</b>	13.78" (350 mm)	12.5" (318 mm)	14" (356 mm)	17" (432 mm)	20" (508 mm)	24" (610 mm)	
<b>Outer Diameter</b>	14.5" (468.3 mm)	13" (330 mm)	14.5" (368.3 mm)	17.5" (445 mm)	20.5" (521 mm)	24.5" (622 mm)	
<b>Shape</b>	Prolate Ellipsoid						Hyperbolic
<b>Coating</b>	Enhanced Aluminum - 96%						

## SECONDARY MIRROR

Diameter	DR350	CDK12,5	CDK14	CDK17	CDK20	CDK24	RC24
<b>Diameter</b>	7.48" (190 mm)	4.65" (118 mm)	6.5" (165 mm)	7.48" (190 mm)	7.5" (191 mm)	9.45" (240 mm)	6.89" (175 mm)
<b>Shape</b>	Spherical						Hyperbolic
<b>Coating</b>	Enhanced Aluminum - 96%						

## LENS GROUP

Diameter	DR350	CDK12,5	CDK14	CDK17	CDK20	CDK24	RC24
<b>Diameter</b>	110 mm (4.33")	70 mm (2.76")	95 mm (3.7")	105 mm (4.13")	90 mm (3.54")	135 mm (5.31")	—
<b>Number of lenses</b>	3	2	2	2	2	2	—
<b>Coating</b>	Broadband AR Coatings (less than .5% reflected from 400 to 700nm)						

Telescope	CDK700	RC700	PW1000	RC1000
<b>Aperture</b>	700 mm (27.56")	700 mm (27.56")	1000 mm (39.37")	
<b>Optical Design</b>	Corrected Dall-Kirkham <b>CDK</b>	Ritchey-Chrétien <b>RC</b>	Corrected Dall-Kirkham <b>CDK</b>	
<b>Focal length</b>	4,540 mm (178.74")	8,410 mm (178.74")	6,000 mm (2368.22")	
<b>Focal ratio</b>	f/6.6	f/12	f/6	
<b>Central Obstruction</b> by prim. mirror Ø	47%	< 30%	47%	
<b>Backfocus from mounting surface</b>	12.2 inch (309 mm)	12.48 inch (317 mm)	14.55 inch (370 mm)	
<b>Weight</b>	1,200 lbs (544 kg)	2,500 lbs (544 kg)	2,600 lbs (1,179 kg)	
<b>OTA Tube</b>	Dual truss structure with Nasmyth focus			
<b>Optical Performance</b>	RMS on-axis	1.8 micron at 25 mm	0.16 micron on-axis	2.81 micron on-axis
	RMS at off-axis 1	4.4 micron at 21 mm	9.85 micron at 11.74 mm	3.88 micron at 35 mm
	RMS at off-axis 2	6.8 micron at 35 mm	28.7 micron at 20.55 mm	4.43 micron at 50 mm
<b>Dimensions</b>	93.73" H x 43.25" W x 39" D	92.25" H x 52" W x 36" D	135" H x 72" W x 45"	
<b>Focus Position</b>	Nasmyth Focus		Dual Nasmyth Focus Ports	
<b>Fully Baffled Field</b>	60 mm	41 mm	100 mm	
<b>Image Scale</b>	22 microns per arcsecond	41.8 micron per arcsecond	29 microns per arcsecond at f/6	
<b>Optimal Field of view</b>	70 mm (0.68 degrees)	41 mm	100 mm (1.0 degrees)	
<b>Mirror Material</b>	Fused Silica (quartz)			

## MECHANICAL STRUCTURE

Component	CDK700	RC700	PW1000	RC1000
<b>Fork Assembly</b>	Single piece U-shaped fork arm assembly for maximum stiffness	Space-frame for maximum stiffness	Space frame steel truss, Base with Welded stainless steel torsion box	
<b>Azimuth Bearing</b>	20" diameter thrust bearing	22.7" diameter slew-ring bearing	Dual 11.125" tapered roller bearings	
<b>Altitude Bearing</b>	2 x 8.5" OD ball bearings	4x 6.5" 4 way loaded ball bearings (2x each pre-loaded on motor / non-motor side)	3 x 9.5" 4-way ball bearings	
<b>Optical Tube</b>	Dual truss structure with Nasmyth focus			
<b>Instrument Payload</b>	300 lbs on each Nasmyth port without focuser and rotator)		300 lbs (150 ft-lbs) - mounted on the field de-rotator plate	

## MOTION CONTROL

Component	CDK700	RC700	PW1000	RC1000
<b>Motor Control</b>	Industrial grade Parker brushless motor control system and built in electronics	Industrial grade Elmo brushless motor control system and built in electronics	Industrial grade Parker brushless motor control system and built in electronics	
<b>Motor (Azimuth &amp; Altitude)</b>	Direct Drive 3 Phase Axial-Flux Torque Motor			
<b>Encoder (Azimuth &amp; Altitude)</b>	10 inch disk built into the azimuth and altitude axes with stainless steel encoder tape on the circumference with reader yields 16 million counts per revolution of the telescope.  This translates to about 0.08 arcsecond resolution.	255 mm stainless steel encoder ring with read-head yields 67.1 million counts per revolution of the telescope.  This translates to about 0.019 arc-second resolution.	Absolute encoder with a resolution of 0.005 arcseconds (268 million counts per revolution)	
<b>Motor Torque</b>	Approximately 30 ft-lbs continuous; 60 ft-lbs peak	Approximately 170 ft-lbs continuous (Azimuth motor)	Greater than 200 ft-lbs of peak torque	
<b>Drive Electronics</b>	Capable of controlling up to 4 high speed encoders, limit switch inputs, homing switch inputs, controls two additional motors for accessories, two brake outputs and 16 digital and 2 analog inputs	Elmo Motion Control Systems drives	Controls the altitude and azimuth motors and encoders, 2 direct drive de-rotators with absolute encoders, 4 fans zones, 3 dew heater zones, two focusers, an array of temperature sensors, M3 port selector, primary mirror covers and magnetic axis deceleration	
<b>Telescope Control Software</b>	Incorporates PointXP mount modeling software by Dave Rowe. All ASCOM compatible.	PlaneWave Interface 4 (PWI4) Software. Incorporates PointXP mount modeling software and All Sky PlateSolve, both by Dave Rowe. Also includes automatic focusing, dew heater control, primary mirror cover control, dome control and provides HTTP and ASCOM control interfaces. Linux and Windows compatible.		

## SYSTEM PERFORMANCE

Performance Metric	CDK700	RC700	PW1000	RC1000
<b>Pointing Accuracy (all-sky RMS)</b>	10 arcsecond RMS with PointXP Model		Better than 10 arcsecond RMS with PointXP Model	
<b>Pointing Precision</b>	2 arcsecond	2 arcsecond at sidereal velocity		
<b>Open Loop Tracking Accuracy</b>	<1 arcsecond error over 10 minute period	< 0.2 arcseconds over a 10 seconds period at sidereal velocity	<1 arcsecond error over a 10 min. period at sidereal velocity	
<b>System Natural Frequency</b>	10 Hz or greater			
<b>Field De-Rotator Accuracy</b>	3 microns of peak to peak error at 35 mm off-axis over 1 hour of tracking (18 arc sec)			

Coming soon



L-Series Mount Telescopes not included

## MOUNT SYSTEM

Mount type	Alt-Az or Equatorial configuration
Mount weight	L-350: 110 lbs (50 kg) L-500: 257 lbs (100 kg) L-600: 338 lbs (153 kg)
Payload Capacity (kg)	L-350: 100 lbs (45 kg) – for CDK 12,5 / 14 L-500: 200 lbs (91 kg) – for CDK 17 / 20 L-600: 300 lbs (136 kg) – for CDK 24
Latitude range	0 to 90 degrees, Northern and Southern hemispheres
Cable management	Equipment cables can be wired through mount

## MOTION CONTROL

Motor Control	Industrial grade brushless motor control system and built in electronics
Motor	Azimuth and Altitude: Direct Drive 3 Phase Axial-Flux Torque Motors
Encoder	152 mm disk built into the azimuth and altitude axes with stainless steel encoder on the circumference with reader yields 18,880,000 counts per revolution of the telescope. This translates to about 0.069 arcsecond resolution.
Motor Torque	Approximately 20 ft-lbs continuous; 50 ft-lbs peak

## SYSTEM PERFORMANCE

Pointing accuracy	<10 arcseconds RMS with PointXP Model
Pointing precision	2 arcsecond
Tracking accuracy	< .3 arcsecond error over 5 minute period
System natural frequency	10 Hz or greater

## CONTROL SYSTEM

Control System Electronics	PlaneWave Interface dual axis telescope control
Software	PlaneWave Interface (PWI4). Incorporates PointXP mount modeling software by Dave Rowe All ASCOM compatible.
Homing Sensors	Home position sensors are included allowing the mount can find its home position on power up. (L-500)
Slew speeds	20 degrees per second (standard); 50 degrees per second (maximum), both axes
Power requirements	Accepts 120 VAC. Supplied with 12VDC 15A Regulated Power Adapter (L-500)

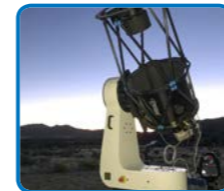
## PLANEWAVE L-SERIES DIRECT DRIVE MOUNT

The L-Series combines versatility, simplicity and affordability by combining all the technology of our Observatory class telescopes into a compact stand-alone mount. In its Alt/Az configuration it is considerably more compact than its equatorial counterpart, allowing a larger telescope to fit in a smaller enclosure.

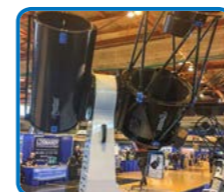
The mass it takes to make a rigid alt/az mount is substantially less, leading to cost savings. Unlike German Equatorial mounts, there are no meridian flips to deal with, and no large protruding counterweights to create a dangerous hazard in a public observatory. Alt/Az is more intuitive to use and no polar alignment is needed. Besides, it is the way the pros do it!



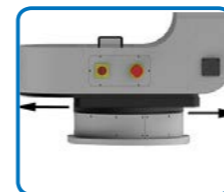
## L-SERIES SPECIAL FEATURES



**INCREDIBLE SLEW SPEED** – The direct drive motors can move the telescope at speeds up to 50 degrees per second for tracking satellites or just to minimize target acquisition time.



**DUAL MOUNTING BRACKET** – PlaneWave style mounting bracket to hold CDK17/20 onto inside of fork arm with additional option of mounting a scope on the outside of the fork arm. Optional dovetail clamp required.



**AZIMUTH DOVETAIL BALANCE SYSTEM** – For precise center of gravity balance whether in Alt-Az or Equatorial configuration.



**THROUGH THE MOUNT CABLING** – Access panels in the fork arm and azimuth axis allow for camera equipment cabling through the inside of the mount.



**DIRECT DRIVE MOTORS AND ENCODERS** – no gears to cause backlash and periodic error. With high-resolution encoders providing the feedback for the direct drive motors, not only will the telescope track without periodic error or have any backlash at all, but the mount will be able to counter against wind gusts. The direct drive motors can move the telescope at incredible speeds for tracking satellites or just to minimize target acquisition time.



**OPTIONAL: POLAR WEDGES FOR ALL LATITUDES AVAILABLE** – Add to the versatility of your L-Series Direct Drive mount with PlaneWave's EQ-wedge for precise polar alignment and tracking accuracy. Each wedge is made for your specific latitude and has an alignment range of +/- 3 degrees. Uses oversized fine thread adjustment screws and brass tightening nuts for fine latitude adjustment.

Prices, further images and technical information in English and German on:

[www.planewave.eu/en/l-mount](http://www.planewave.eu/en/l-mount)

PLANEWAVE L-MOUNT IS AVAILABLE IN THE FOLLOWING VERSIONS



#1321102



#1321100



#1321101

# OBSERVATORY TELESCOPE SYSTEMS (MOUNT & OPTICS)

## CDK 300

[www.planewave.eu](http://www.planewave.eu)

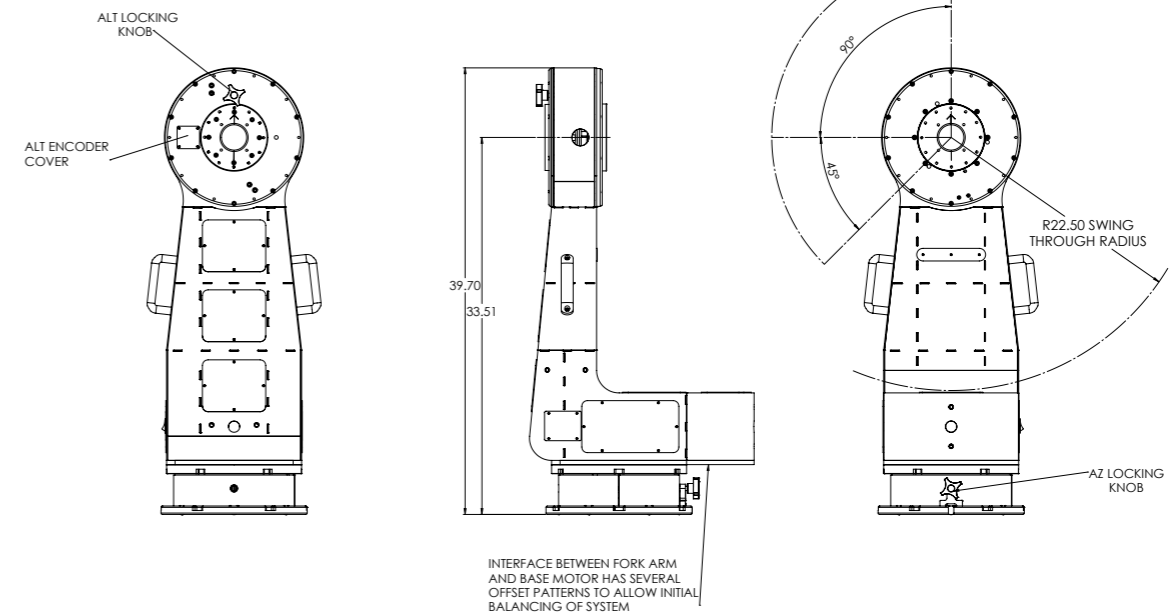
### OBSERVATORY TELESCOPE SYSTEM (MOUNT & OPTICS)

Set consisting of:

**CDK12,5**, 12.5" (0.32 m) f/8 Corrected Dall-Kirkham. The telescope has a dual carbon-fiber truss design, with 3 cooling fans ejecting air from the back of the telescope, and 4 fans blowing across the boundary layer of the mirror's surface. [More Information on page 10](#)



**L-350 Direct Drive Mount**, with 100 lbs (45 kg) loading capacity. Incredible slew speed, dual-mounting options, Azimuth dovetail balance system, through the mount cabling, Direct-Drive motors/encoders and much more. [More Information on pages 20/21](#)



Prices, further images and technical information in English and German on:

[www.planewave.eu/en/cdk300](http://www.planewave.eu/en/cdk300)

#### MORE INFO:

CDK-Features.....page 15  
Accessories.....page 16/17  
Technical data.....page 18/19

**PLANEWAVE CDK 300**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323230Q





CDK 350 Telescope System

### OBSERVATORY TELESCOPE SYSTEM (MOUNT & OPTICS)

Set consisting of:

**CDK14**, 14 inch (0.35 m) f/7.2 Corrected Dall-Kirkham. The telescope features 3 cooling fans ejecting air from the back of the telescope. *More Information on [page 11](#)*

**L-350 Direct Drive Mount**, with 100 lbs (45 kg) loading capacity. Incredible slew speed, dual-mounting options, Azimuth dovetail balance system, through the mount cabling, Direct-Drive motors/encoders and much more. *More Information on [pages 20/21](#)*



### OBSERVATORY TELESCOPE SYSTEM (MOUNT & OPTICS)

Set consisting of:

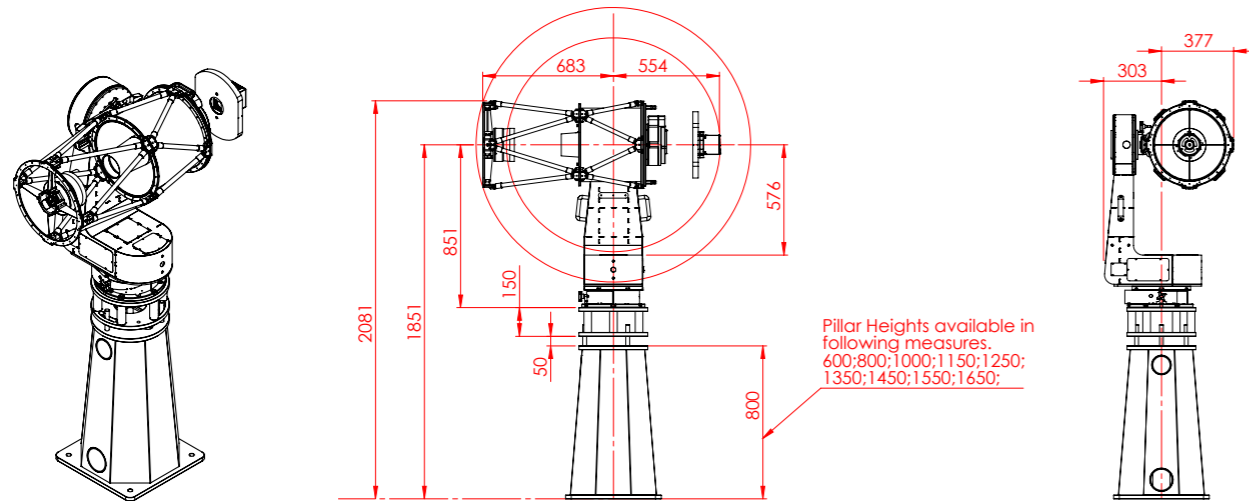
**CDK17**, 17" (0.43 m) f/6.8 Corrected Dall-Kirkham. The telescope has a dual carbon-fiber truss design, with 3 cooling fans ejecting air from the back of the telescope, and 4 fans blowing across the boundary layer of the mirror's surface. *More Information on [page 12](#)*

**L-500 Direct Drive Mount**, with 200 lbs (91 kg) loading capacity. Incredible slew speed, dual-mounting options, Azimuth dovetail balance system, through the mount cabling, Direct-Drive motors/encoders and much more. *More Information on [pages 20/21](#)*



CDK 400 Telescope System

CDK350 on Baader Heavy Pillar (BHP)



Prices, further images and technical information in English and German on:  
[www.planewave.eu/en/cdk350](http://www.planewave.eu/en/cdk350)

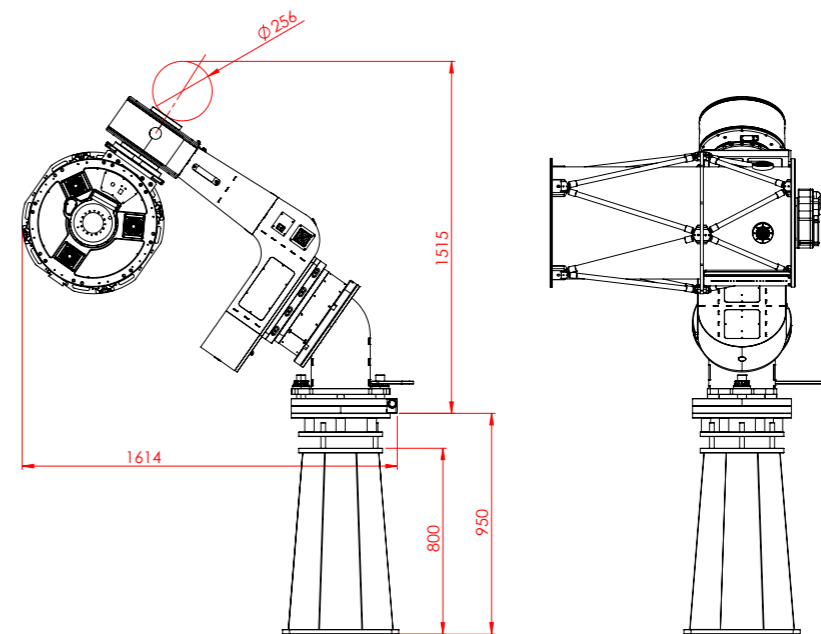
PLANEWAVE **CDK 350**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323235Q

**MORE INFO:**  
CDK-Features.....page 15  
Accessories.....page 16/17  
Technical data.....page 18/19

CDK400 on Baader Heavy Pillar (BHP)  
with optional polar wedge



Prices, further images and technical information in English and German on:  
[www.planewave.eu/en/cdk400](http://www.planewave.eu/en/cdk400)

PLANEWAVE **CDK 400**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323240Q



CDK 500 Telescope System

## OBSERVATORY TELESCOPE SYSTEM (MOUNT & OPTICS)

Set consisting of:

**CDK20**, 20 inch (0.51 m) f/6.8 Corrected Dall-Kirkham. The telescope has a dual carbon-fiber truss design, with 3 cooling fans ejecting air from the back of the telescope. [More Information on page 13](#)



**L-500 Direct Drive Mount**, with 200 lbs (91 kg) loading capacity. Incredible slew speed, dual-mounting options, Azimuth dovetail balance system, through the mount cabling, Direct-Drive motors/encoders and much more. [More Information on pages 20/21](#)



## OBSERVATORY TELESCOPE SYSTEM (MOUNT & OPTICS)

Set consisting of:

**CDK24**, 24" (0.61 m) f/6.5 Corrected Dall-Kirkham. The telescope has a dual truss design, with 3 cooling fans for the back of the primary mirror and 4 fans for the front surface of the primary mirror. [More Information on page 14](#)



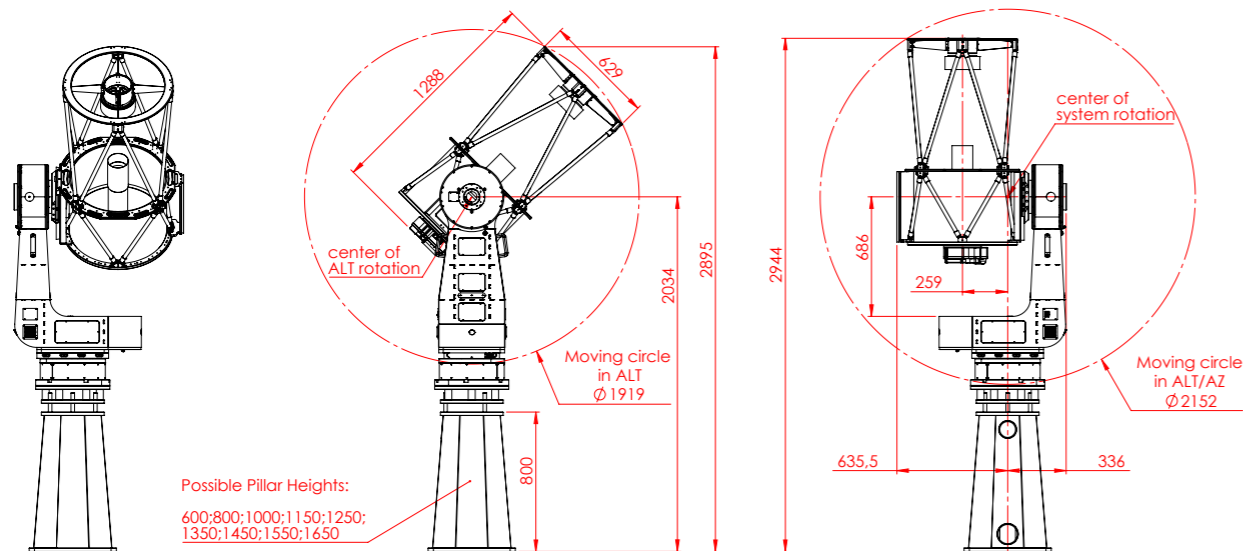
**L-600 Direct Drive Mount**, with 300 lbs (136 kg) loading capacity. Incredible slew speed, dual-mounting options, Azimuth dovetail balance system, through the mount cabling, Direct-Drive motors/encoders and much more. [More Information on pages 20/21](#)



CDK 600 Telescope System

Polar Wedge not included

CDK500 on Baader Heavy Pillar (BHP)



Prices, further images and technical information in English and German on: [www.planewave.eu/en/cdk500](http://www.planewave.eu/en/cdk500)

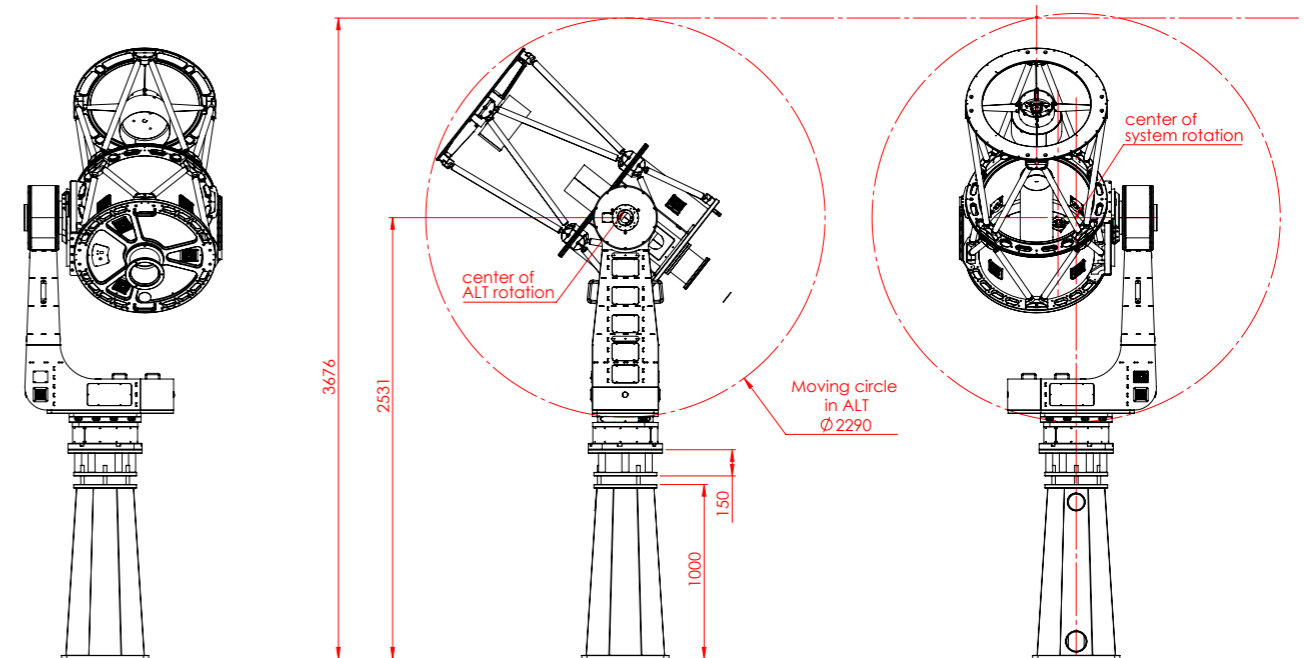
PLANEWAVE **CDK 500**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323250Q

**MORE INFO:**  
CDK-Features.....page 15  
Accessories.....page 16/17  
Technical data.....page 18/19

CDK600 on Baader Heavy Pillar (BHP)



Prices, further images and technical information in English and German on: [www.planewave.eu/en/cdk600](http://www.planewave.eu/en/cdk600)

PLANEWAVE **CDK 600**  
IS AVAILABLE IN THE  
FOLLOWING VERSION



#1323260Q



CDK 700 Telescope System

- ✓ CDK700 Observatory Telescope System (27.56")
- ✓ f/6.5 focal ratio and 4.540 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 70 mm image circle (0.68 degree)
- ✓ Compact Alt/Az design with dual Nasmyth ports allowing multiple instrumentation payloads to be installed on the telescope
- ✓ Integrated direct drive mount with optical encoders, zero periodic error, zero backlash, and minimal maintenance due to the lack of gears
- ✓ Slew speeds up to 50 degrees/sec for satellite tracking and fast target acquisition

Requires mandatory shipping crating #1323507



RC 700 Telescope System

- ✓ RC700 Observatory Telescope System (27.56")
- ✓ f/12 focal ratio and 8.410 mm focal length
- ✓ Ritchey-Chrétien design, with optimized central obstruction < 30 % for improved image contrast
- ✓ Dual Nasmyth focus ports, each capable of holding over 300 lbs, paired with a PlaneWave Interface 4 (PWI4) software controllable tertiary mirror
- ✓ Direct-drive motors on each axis providing up to 50 degrees/second of smooth, fast, and virtually silent slewing of the telescope with zero backlash and zero periodic error
- ✓ On-axis 26-bit absolute encoders coupled to each axis for precise pointing and stable LEO satellite tracking.

Requires mandatory shipping crating #1323507



#1323270Q

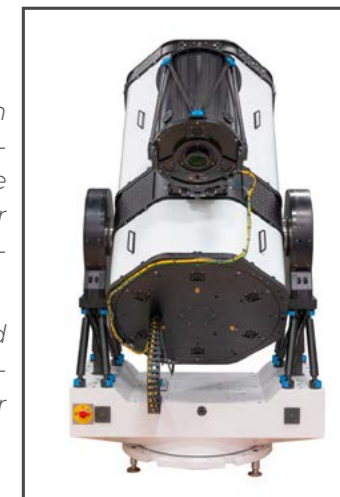


#1323272Q

## 0.7 METER OBSERVATORY TELESCOPE SYSTEM

The CDK/RC 700 is a complete observatory class telescope and direct drive alt-azimuth mounting system, designed and engineered by PlaneWave. With a 70 mm image circle, the CDK700 is designed to excel at imaging on large format CCD cameras. The optical system utilizes a Nasmyth focus through both altitude bearings allowing your camera or eyepiece to remain at a fixed height while holding heavy instruments without needing to rebalance the optical tube assembly.

Instrumentation can be installed on both sides of the fork mount and easily accessed using the included rotating tertiary mirror system. With direct drive motors, high resolution encoders and zero backlash or periodic error the CDK700 sets a new standard for small observatory telescopes.

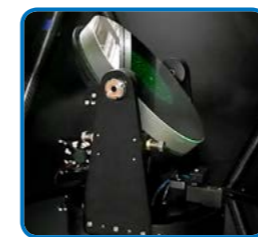


RC 700 Telescope System

## CDK/RC 700 SPECIAL FEATURES



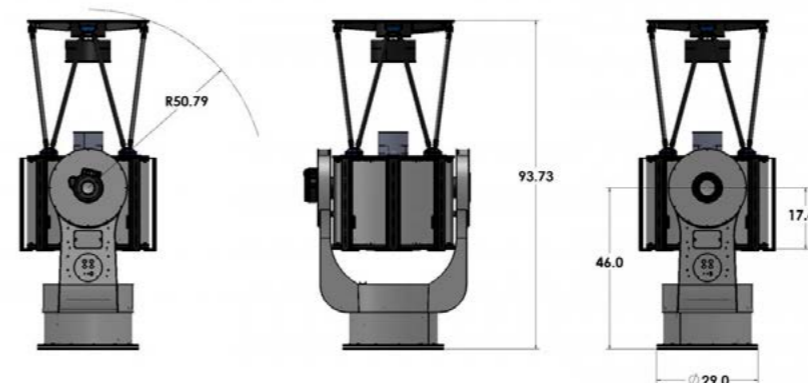
**NASMYTH FOCUS** – Dual Nasmyth Focus along the altitude axis eliminates balancing issues as you change out equipment. Eyepieces remain at a constant wheelchair-accessible height, greatly simplifying access to the telescope for public observatories. Includes the IRF90 field de-rotator/focuser which de-rotates the field and allows for long exposure Alt-Az tracking.



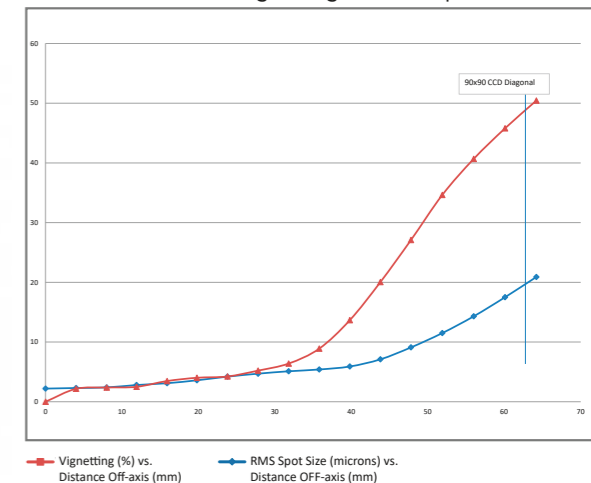
**ROTATING TERTIARY MIRROR** – The CDK700 includes an integrated rotator for the tertiary mirror, with magnetic locks to position the mirror precisely for either Nasmyth focus position. The rotator can move from one port to the other in under 10 seconds, allowing observers to easily transition between imaging and visual use.



**DIRECT DRIVE MOTORS AND ENCODERS** – Direct Drive motors mean there are no gears to cause backlash and periodic error. With high-resolution encoders providing the feedback for the direct drive motors, not only will the telescope track without periodic error or have any backlash at all, but the mount will be able to counter against wind gusts. The direct drive motors can move the telescope at incredible speeds for tracking satellites or just to minimize target acquisition time.



PlaneWave CDK700- Vignetting and RMS Spot Performance



Prices, further images and information in English and German on: [www.planewave.eu/en/cdk700](http://www.planewave.eu/en/cdk700)

PLANEWAVE CDK/RC 700 IS AVAILABLE IN THE FOLLOWING VERSIONS



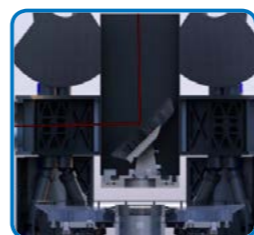
- ✓ PW1000 Observatory Telescope System (39.37")
- ✓ f/6 focal ratio and 6.000 mm focal length
- ✓ Corrected Dall-Kirkham, with pinpoint stars across a 100 mm image circle (1 degree)
- ✓ Compact Alt/Az design with dual Nasmyth ports allowing multiple instrumentation payloads to be installed on the telescope
- ✓ Integrated direct drive mount with absolute encoders, zero periodic error, zero backlash, and minimal maintenance due to the lack of gears
- ✓ Slew speeds up to 50 degrees/sec for satellite tracking and fast target acquisition

Requires mandatory shipping crating #1323510

## 1 METER OBSERVATORY TELESCOPE SYSTEM

The PW1000 is a complete 1-meter observatory class telescope and direct drive alt-azimuth mounting system, designed and engineered by PlaneWave. With a diffraction limited 100 mm image circle, the PW1000 is designed to excel at imaging on the largest format CCD cameras available today. Light-weighted optics are made of zero expansion Fused Silica (quartz) materials for excellent thermal stability and maximum throughput. The optical system utilizes a Nasmyth focus through both altitude bearings allowing instrumentation to be installed on both sides of the fork mount that is easily accessed using the included rotating tertiary mirror system. With direct drive motors, high resolution encoders and zero backlash or periodic error the PW1000 sets a new standard in 1-meter class observatory telescopes.

## PW1000 SPECIAL FEATURES



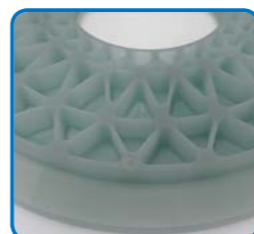
**DUAL NASMYTH FOCUS PORTS** – Dual Nasmyth Focus along the altitude axis eliminates balancing issues when you change equipment. Eyepieces remain at a constant wheelchair-accessible height, greatly simplifying access to the telescope for public observatories. The computer-controlled tertiary mirror allows either Nasmyth port to be selected in just a few seconds, allowing observers to easily transition between imaging and visual use, or other instrumentation.



**ROTATING TERTIARY MIRROR** – The PW-1000 includes an integrated rotator for the tertiary mirror, with magnetic locks to position the mirror precisely for either Nasmyth focus position. The rotator can move from one port to the other in less than 10 seconds, allowing observers to easily transition between imaging and visual use.



**DIRECT DRIVE MOTORS AND ENCODERS** – Direct Drive motors and absolute on-axis encoders eliminate the need for reduction gears, thereby eliminating backlash and periodic error. With high-resolution encoders providing the feedback for the direct drive motors, not only will the telescope track without periodic error and backlash, the mount will also counter wind gusts with precise servo feedback. The direct drive motors can move the telescope at incredible speeds for tracking satellites or just to minimize target acquisition time



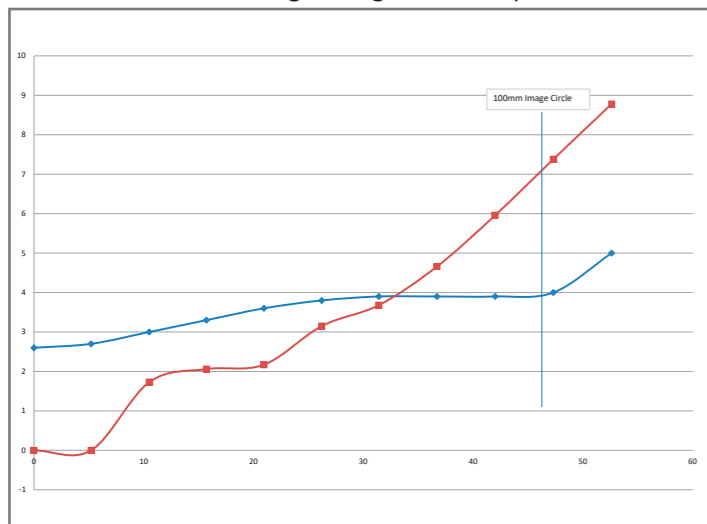
**LIGHT-WEIGHT FUSED SILICA OPTICS** – Fused Silica (quartz) has a coefficient of thermal expansion six times lower than Borosilicate (Pyrex) glass, which means that while it cools down, fused silica preserves its shape to a high degree of accuracy. This translates into consistent optical performance and unchanging focus over temperature changes.



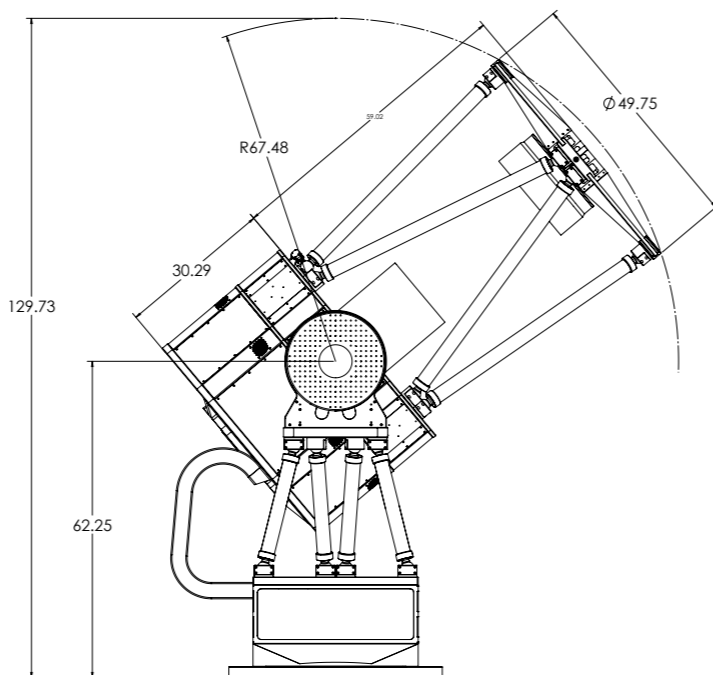
**AUTOMATED PRIMARY MIRROR SHUTTER** – Protects the primary mirror from unwanted dust and moisture with this integrated four shutter automated system, fully controllable with PlaneWave's PWI software.



PlaneWave PW1000– Vignetting and RMS Spot Performance



— Vignetting (%) vs. Distance Off-axis (mm) — RMS Spot Size (microns) vs. Distance OFF-axis (mm)



Prices, further images and information in English and German on: [www.planewave.eu/en/pw1000](http://www.planewave.eu/en/pw1000)

PLANEWAVE PW-1000  
IS AVAILABLE IN THE  
FOLLOWING VERSIONS

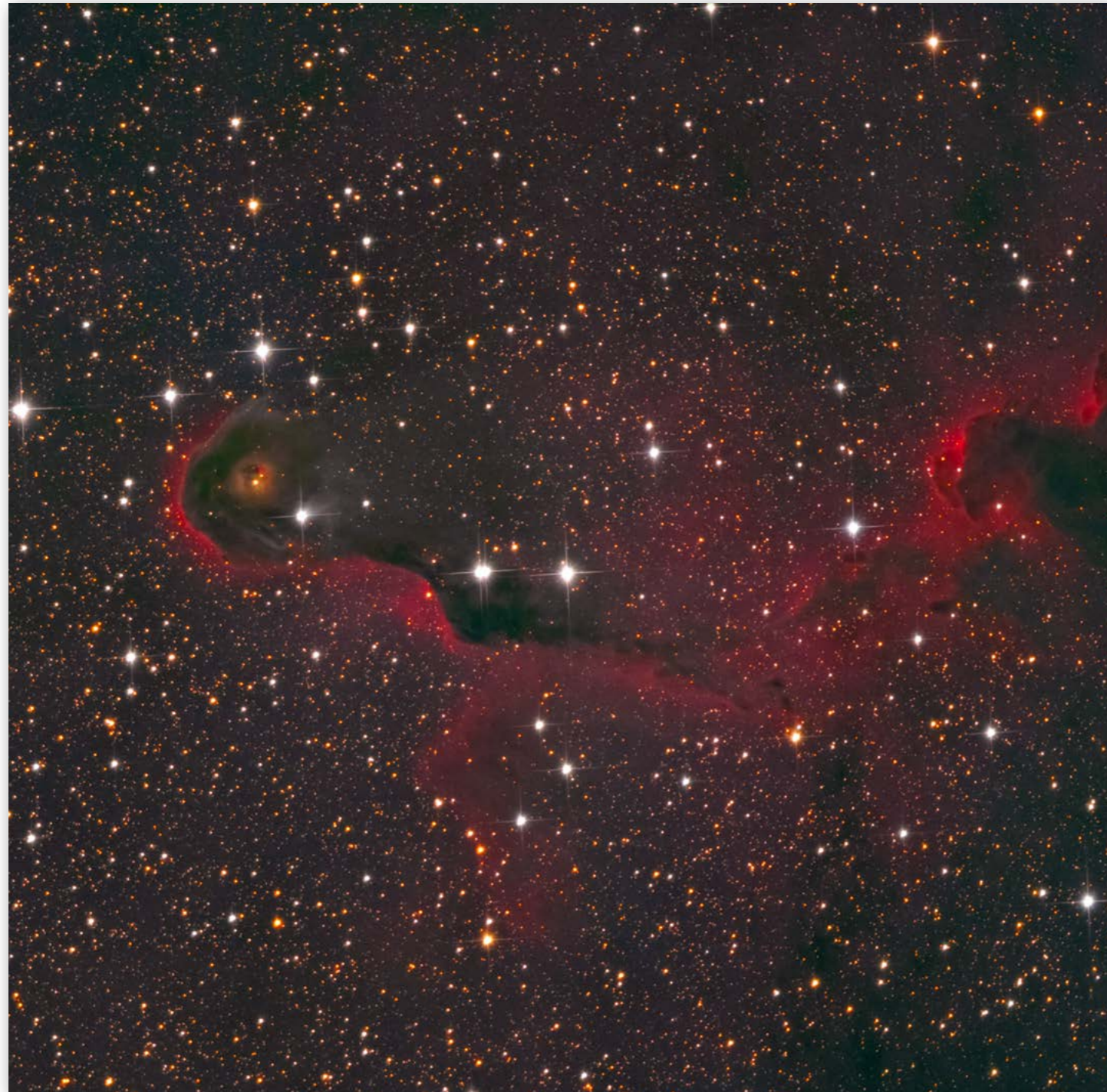


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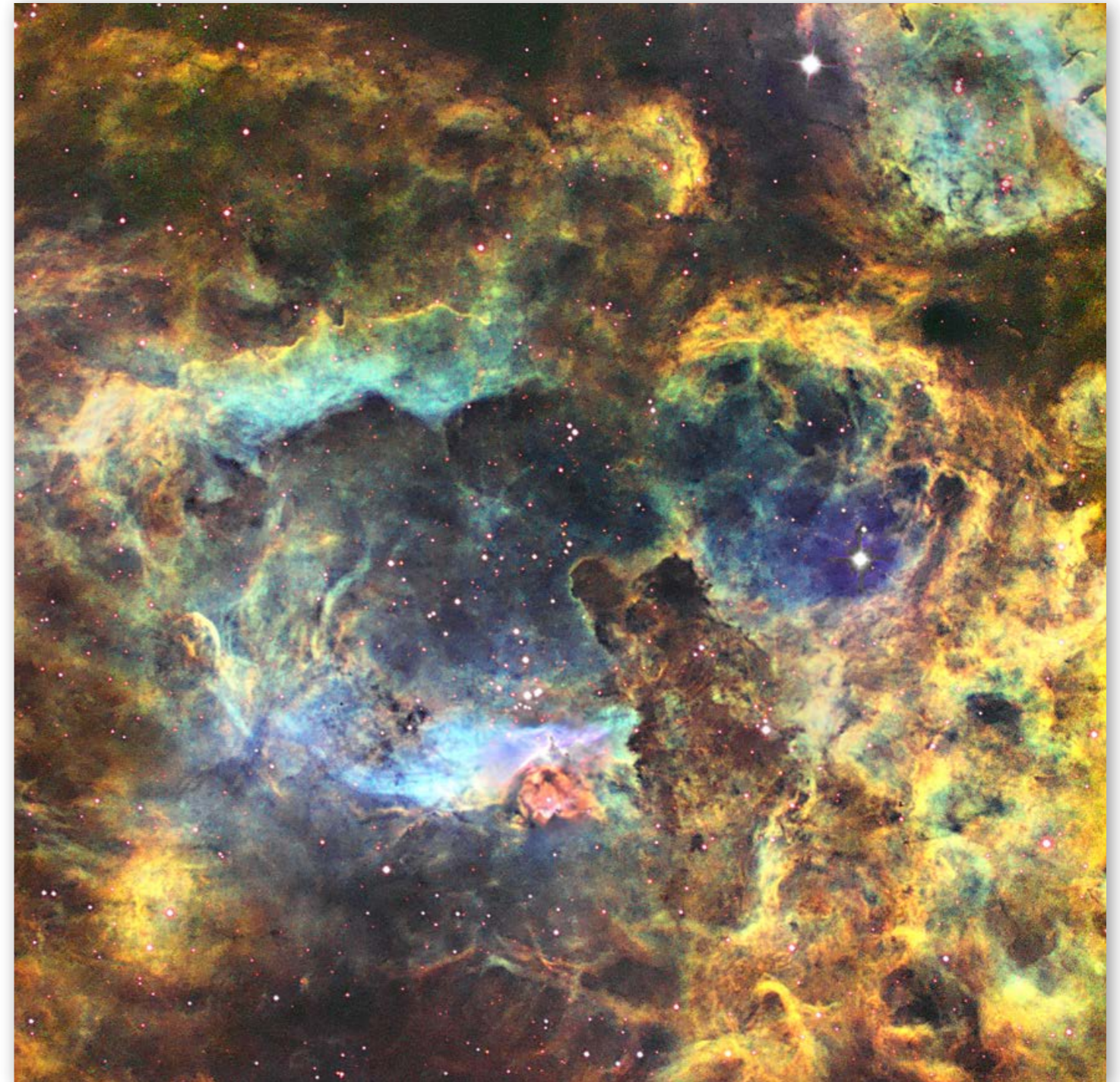


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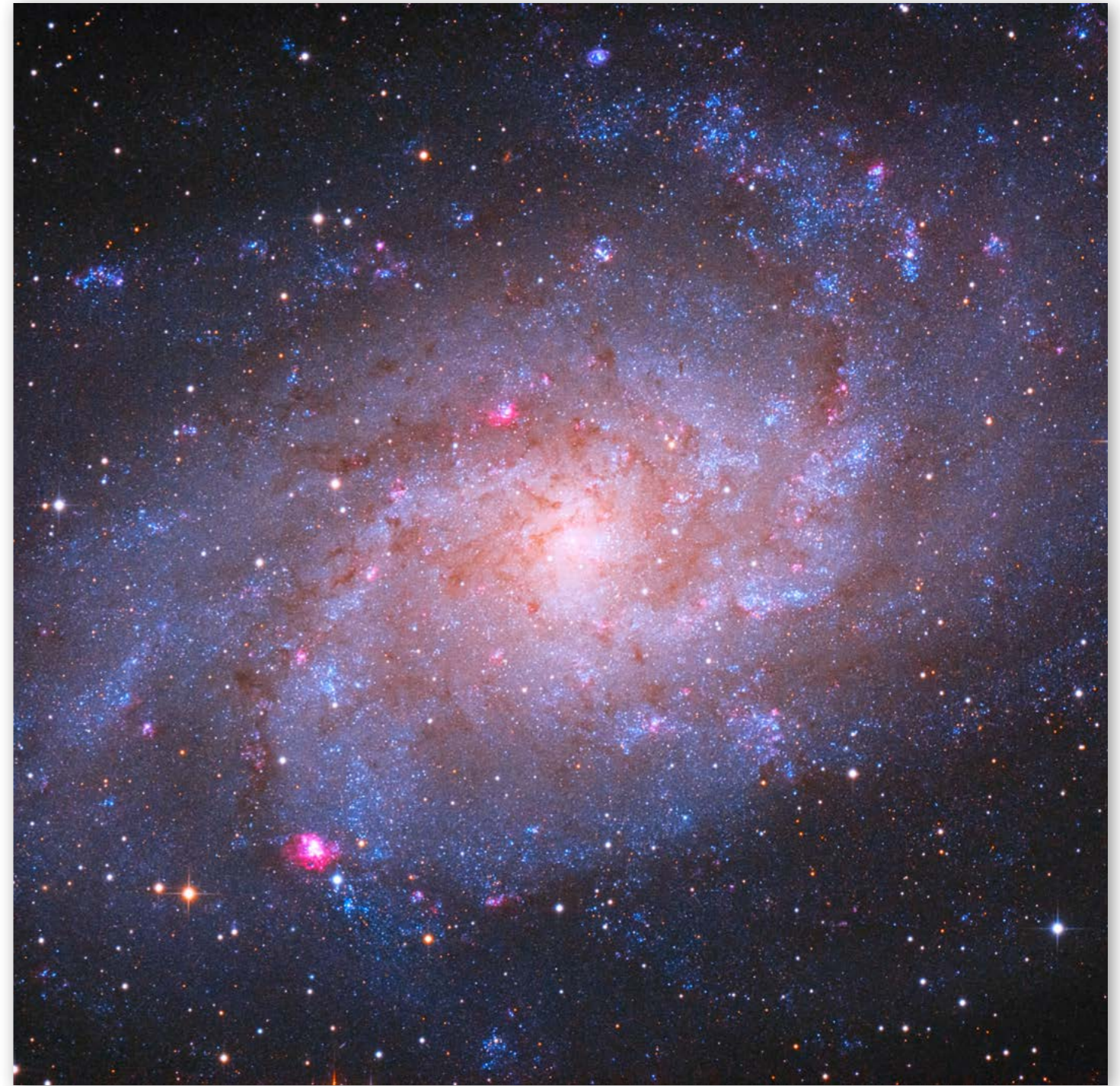
Author	© Christoph Kaltseis
Object	IC 1396
Telescope	PlaneWave CDK12,5
Location	La Palma
Camera	QHY 600M Pro-L
Exposures	180sec each (14x luminance, 8x RGB), 111min total



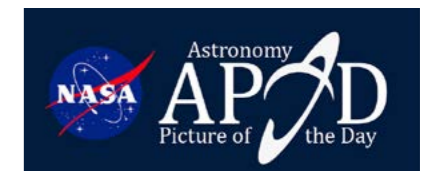
Author	© John Ebersole
Object	Lobster Nebula (NGC 6357) in HST Narrowband Palette
Telescope	PlaneWave CDK700
Location	iTelescope, Siding Spring, Australia
Camera	FLI PLO 9000
Filters	Astrodon 6nm Ha, OIII, SII
Exposures	Ha - 100 min 1x1, OIII - 120 min 2x2, SII - 80 min 2x2



Author	© Bill Snyder
Object	Wizard Nebula (NGC 7380)
Telescope	PlaneWave CDK17
Location	SRO Sierra Remote Observatories
Camera	SBIG STXL 11002 with AO-X
Filters	Astrodon 3nm Ha, OIII, SII
Exposures	Ha – 10 hrs, OIII – 5.5 hrs, SII – 7.5 hrs. 30 min subs



Author	© Christoph Kaltseis
Object	M33
Telescope	PlaneWave CDK14
Location	Sarleinsbach, Upper Austria, 562mm
Camera	Nikon D810A, 0.39" resolution per Pixel
Exposures	16x480s @ ISO800 in RGB



APOD on September 27th, 2018  
<https://apod.nasa.gov/apod/ap180927.html>



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specializes in erecting  
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utilizing mainly PlaneWave CDK-,  
IRDK- and RC- telescopes with pro-  
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