



CDK .66x Reducer Instructions



200166 - Reducer for CDK 20 and 24



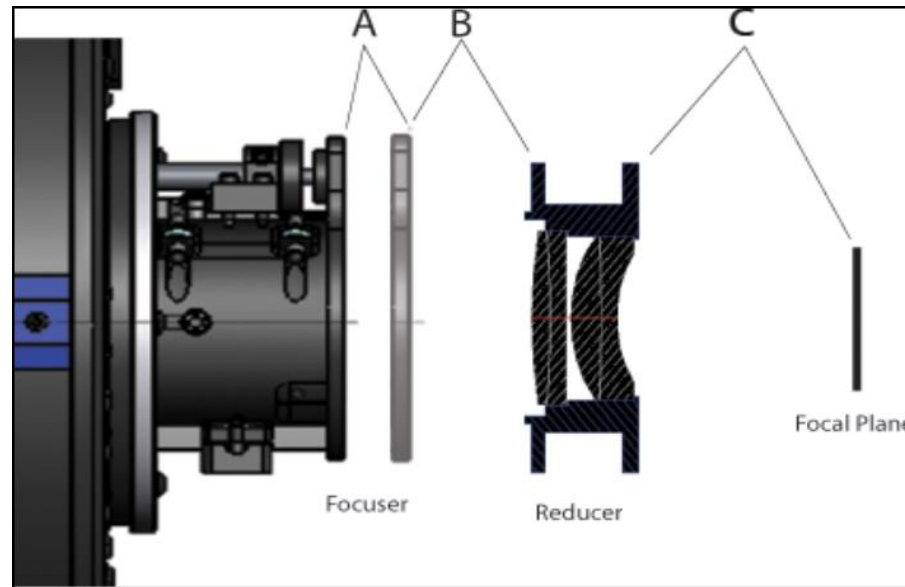
125166 - Reducer for CDK12.5 and 17

Introduction

The PlaneWave CDK .66x Reducer is a high performance reducer designed to work with a flat field telescope like the CDK. Like high performance telescopes, this reducer is sensitive to spacing. The reducer has very limited back focus and uses quite a bit of the telescopes back focus. But for the right camera setup, this is a wonderful accessory that reduces the focal ratio while maintaining the CDK's performance.

There are three different models of reducers that PlaneWave sells. Optically they are identical, but mechanically they are different in order to mount with the different telescopes and PlaneWave focusers. The 125166 is the model for the CDK12.5 and the 200166 is the model for the CDK17, 20 and 24 and there is the 600166 body which is a lower profile body that is used with the IRF90 rotating focuser and can be used with the cameras that use up more back focus.

The backfocus between the reducer and the focal plane is fairly critical in order to get the performance out of the system. The optimal distance from the reducer to the focal plane is 1.85". But you can vary this distance some and still get very good performance. Included in the next couple of pages is a chart showing the performance as you vary the back focal distance and how that affect the focus position.



A is the focuser position, 0 is fully racked in and 1.3" is fully racked out. **B** is the spacing between the reducer and the focuser. **C** is the distance from the reducer to the focal plane.

CDK 12.5

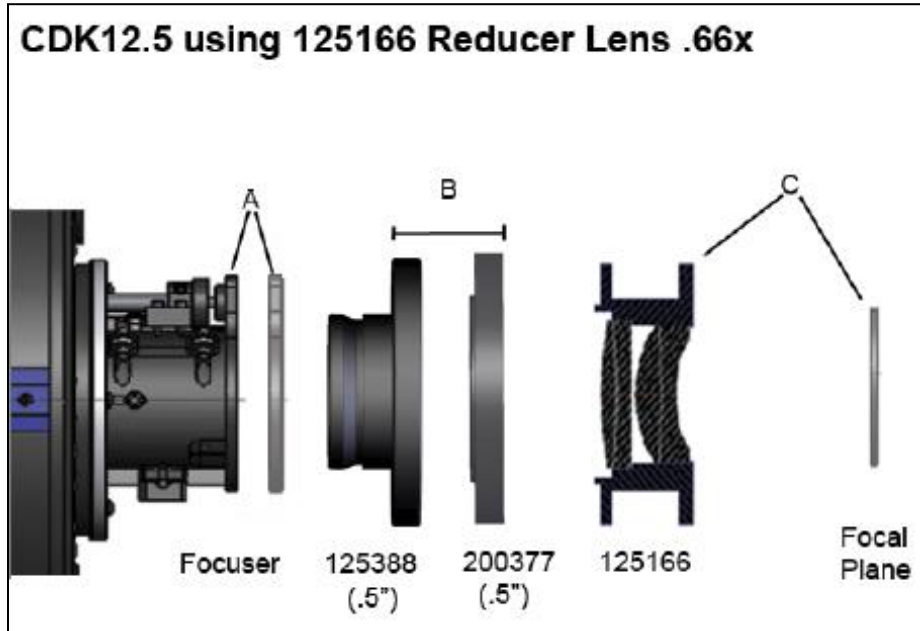
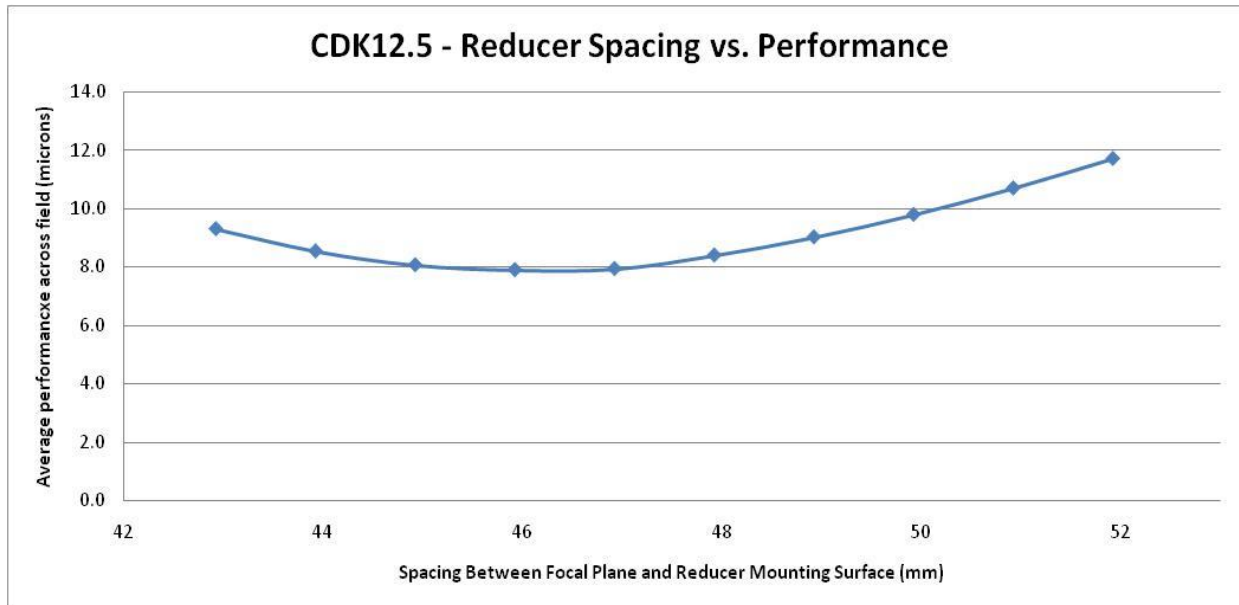


Chart for CDK12.5 using the 125166 Reducer

A (in)	B (in)	C (in)	Performance (microns)**	F-ratio
1.085	1	1.69	9.3	5.38
0.997	1	1.73	8.5	5.36
0.908	1	1.77	8.1	5.34
0.818	1	1.81	7.9	5.32
0.728	1	1.85	7.9	5.30
0.637	1	1.89	8.4	5.28
0.545	1	1.93	9.0	5.26
0.452	1	1.97	9.8	5.25
0.359	1	2.01	10.7	5.23
0.266	1	2.04	11.7	5.21
0.724	0.5	2.1	13.3	5.18
0.572	0.5	2.2	16.3	5.13
0.418	0.5	2.3	19.4	5.09
0.385	0.5	2.35	21.0	5.06

**RMS spot size averaged across the field in Microns



The performance of the reducer as the distance between the reducer and the focal plane is varied. The performance is an average of on-axis, midway in the field and 21mm off-axis. The measurement is in microns. The spot of best performance is 1.85" or 47mm. But even as you move as low as 43mm or as high as 52mm, the performance is still quite good.

CCD Camera and Adapter Configurations

Due to the limitation in backfocus, the CCD equipment that can be used with the reducer is limited. There is not enough room for off-axis guiders so you will need to use a camera with a built in autoguider or need to use a guide scope or need to take unguided exposures. Below are several the spacers required for different telescope and camera combinations.

CDK12.5 and the SBIG - STL Camera

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200362	SecureFit to STL CCD Adapter	0.25"
NA	SBIG STL Camera	1.5"
	Reducer to focal plane distance	1.75"
	Expected performance	8.3um
	Approximate focuser position	0.95"
	Effective focal ratio	f/5.35

CDK12.5 and the SBIG - STL Camera with FW8 Filterwheel

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200362	SecureFit to STL CCD Adapter	0.25"
NA	SBIG STL Camera w/ FW8	1.82"
	Reducer to focal plane distance	2.07"
	Expected performance	12.5 micron
	Approximate focuser position	0.25"
	Effective focal ratio	f/5.19

CDK12.5 and the SBIG - ST Camera Body

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200377	SecureFit 1/2" Spacer	0.5"
200377	SecureFit 1/2" Spacer	0.5"
200397	SecureFit to ST CCD Adapter	0.25"
NA	SBIG ST Camera	.742"
	Reducer to focal plane distance	1.99"
	Expected performance	10.7um
	Approximate focuser position	0.359"
	Effective focal ratio	f/5.23

CDK12.5 and the SBIG - ST Camera and CFW-8

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200397	SecureFit to ST CCD Adapter	0.25"
NA	SBIG ST Camera and CFW8	1.74"
	Reducer to focal plane distance	1.99"
	Expected performance	10.5um
	Approximate focuser position	0.359"
	Effective focal ratio	f/5.23

CDK12.5 and the SBIG - ST Camera and CFW-10

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200377	SecureFit 1/2" Spacer	0.0"
200397	SecureFit to T thread	0.55"
NA	SBIG ST Camera and CFW-10	1.32"
	Reducer to focal plane distance	1.87"
	Expected performance	8.2um
	Approximate focuser position	0.683"
	Effective focal ratio	f/5.29

CDK12.5 and the FLI Proline Camera and CFW4 or 5

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200395	SecureFit 1/2" Extender	0.25"
NA	FLI CFW5, backfocus (.848)	0.848"
NA	FLI Proline Camera	0.877"
	Reducer to focal plane distance	1.975"
	Expected performance	9.4um
	Approximate focuser position	.908"
	Effective focal ratio	f/5.34

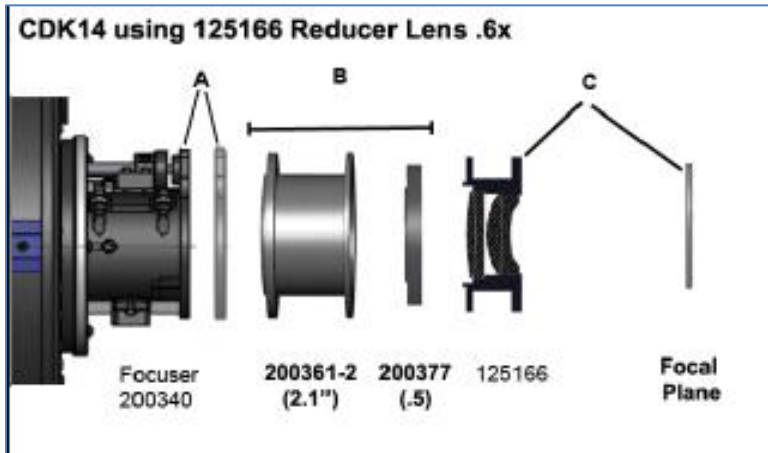
CDK12.5 and the Apogee Alta Camera

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
200377	SecureFit 1/2" Spacer	0.5"
125166	.66x Reducer	NA
200377	SecureFit 1/2" Extender	0.5"
200396	SecureFit to Alta CCD Adapter	0.25"
NA	Apogee Alta Camera	1.008"
	Reducer to focal plane distance	1.76"
	Expected performance	8.2um
	Approximate focuser position	.908"
	Effective focal ratio	f/5.34

CDK12.5 and the Apogee Alta Camera and AFW50

Part Number	Description	Backfocus Used
125388	2.75" to SecureFit Adapter	0.5"
125166	.66x Reducer	NA
200366	SecureFit to SLT CCD Adapter	0.25"
NA	Apogee Alta w/AFW50	2.058"
	Reducer to focal plane distance	2.308"
	Expected performance	19.4um
	Approximate focuser position	0.412"
	Effective focal ratio	f/5.09

CDK 14



**RMS spot size averaged across the field in Microns



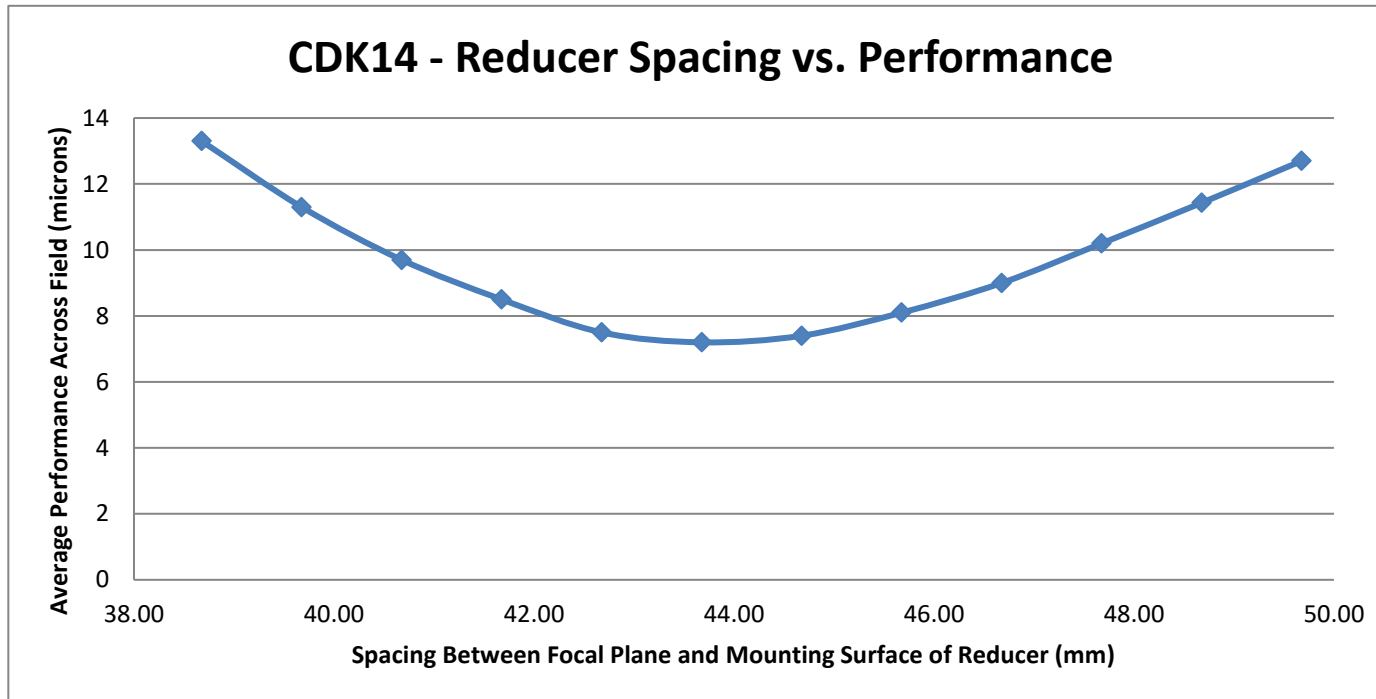
Chart for CDK14 using the 125166 Reducer and 200340 Focuser

A (in)	B (in)	C (in)	Performance (Microns*)	F-ratio
0.715	2.6	1.52	13.3	4.9
1.129	2.1	1.56	11.3	4.9
1.042	2.1	1.60	9.7	4.9
0.956	2.1	1.64	8.5	4.86
0.868	2.1	1.68	7.5	4.85
0.779	2.1	1.72	7.2	4.83
0.691	2.1	1.76	7.4	4.81
0.602	2.1	1.80	8.1	4.79
0.512	2.1	1.84	9	4.78
0.421	2.1	1.88	10.2	4.76
0.330	2.1	1.92	11.43	4.75
0.238	2.1	1.96	12.7	4.73

Chart for CDK14 using the 125166 Reducer and 600180 Rotating Focuser

A (in)	B (in)	C (in)	Performance (Microns*)	F-Ratio
0.215	2.6	1.52	13.3	4.9
0.629	2.1	1.56	11.3	4.9
0.542	2.1	1.60	9.7	4.9
0.456	2.1	1.64	8.5	4.86
0.368	2.1	1.68	7.5	4.85
0.279	2.1	1.72	7.2	4.83
0.191	2.1	1.76	7.4	4.81
0.702	1.5	1.80	8.1	4.79
0.612	1.5	1.84	9	4.78
0.521	1.5	1.88	10.2	4.76
0.430	1.5	1.92	11.43	4.75
0.338	1.5	1.96	12.7	4.73

The performance of the reducer as the distance between the reducer and the focal plane is varied. The performance is an average of on-axis, midway in the field and 21mm off-axis. The measurement is in microns. The spot of best performance is 1.72" or 44mm. But even as you move as low as 39mm or as high as 50mm, the performance is still quite good.



CDK 17

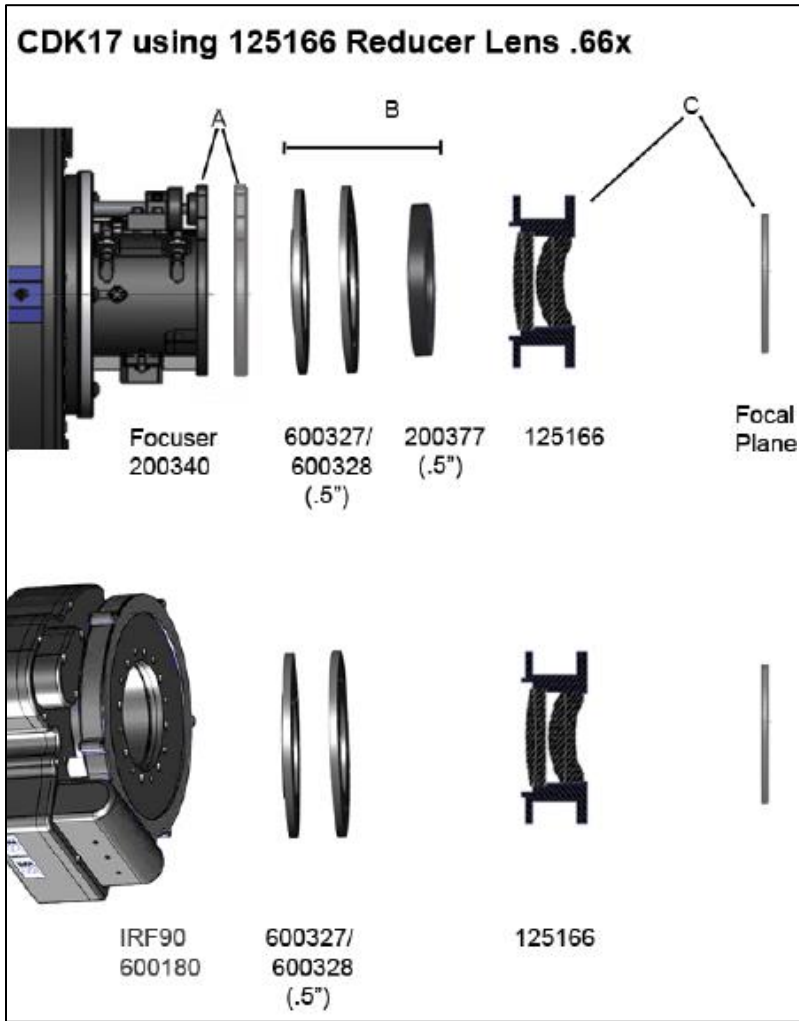
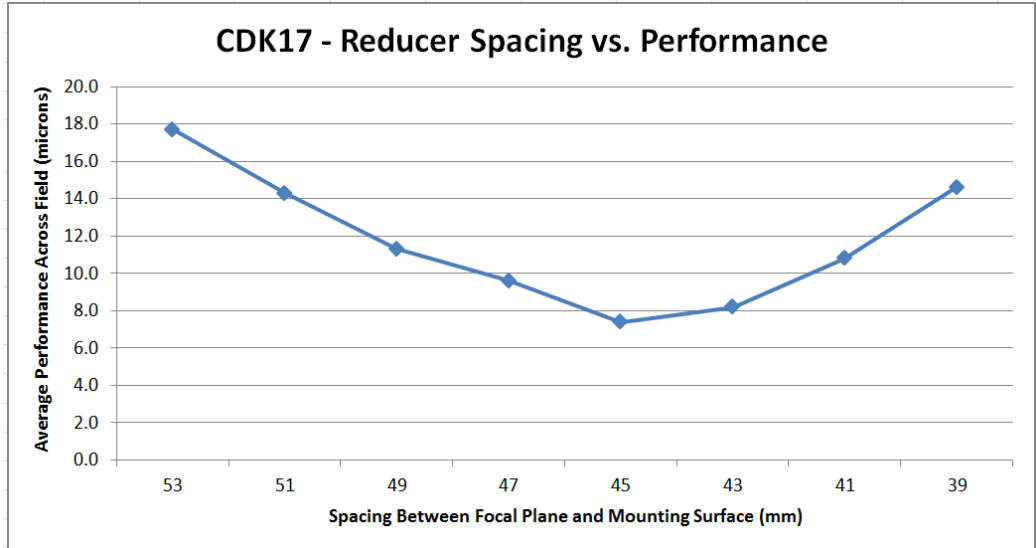


Chart for CDK17 (10.24" back focus) using the 125166 Reducer

A (in)	B (in)	C (in)	Performance (Microns)**	F-ratio
0.265	1 (.5 for IRF90)	2.08	17.7	4.41
0.452	1 (.5 for IRF90)	2.01	14.3	4.44
0.637	1 (.5 for IRF90)	1.93	11.3	4.48
0.818	1 (.5 for IRF90)	1.85	9.6	4.50
1.000	1 (.5 for IRF90)	1.77	7.4	4.50
0.677	1.5 (1 for IRF90)	1.69	8.2	4.57
0.852	1.5 (1 for IRF90)	1.61	10.8	4.60
1.025	1.5 (1 for IRF90)	1.54	14.6	4.63

**RMS spot size averaged across the field in Microns

The performance of the reducer as the distance between the reducer and the focal plane is varied. The performance is an average of on-axis, midway in the field and 21mm off-axis. The measurement is in microns. The spot of best performance is 1.85" or 47mm. But even as you move as low as 43mm or as high as 52mm, the performance is still quite good.



CCD Camera and Adapter Configurations

Due to the limitation in backfocus, the CCD equipment that can be used with the reducer is limited. There is not enough room for off-axis guiders so you will need to use a camera with a built in autoguider or need to use a guidescope or need to take unguided exposures. Below are several the spacers required for different telescope and camera combinations

CDK17 and the SBIG - STL Camera

Part Number	Description	Backfocus Used
125166	.66x Reducer NA	
200362	SecureFit to SLT CCD Adapter	0.25"
NA	SBIG STL Camera	1.5"
	Reducer to focal plane distance	1.75"
	Expected performance	7.4um
	Approximate focuser position	1.0"
	Effective focal ratio	f/4.50

CDK17 and the SBIG - STL Camera with FW8 Filterwheel

Part Number	Description	Backfocus Used
125166	.66x Reducer NA	
200362	SecureFit to SLT CCD Adapter	0.25"
NA	SBIG STL Camera w/ FW8	1.82"
	Reducer to focal plane distance	2.07"
	Expected performance	17.7um
	Approximate focuser position	.265"
	Effective focal ratio	f/4.41

CDK17 and the SBIG - STXL Camera

Part Number	Description	Backfocus Used
125166	.66x Reducer NA	
600335	SecureFit to STX CCD Adapter	0.722"
NA	SBIG STXL Camera	1.158"
	Reducer to focal plane distance	1.88"
	Expected performance	9.6um
	Approximate focuser position	.818"
	Effective focal ratio	f/4.50

CDK17 and the Apogee Alta Camera

Part Number	Description	Backfocus Used
125166	.66x Reducer NA	
200377	SecureFit 1/2" Spacer	0.5"
200396	SecureFit to Alta CCD Adapter	0.25"
NA	Apogee Alta Camera	1.008"
	Reducer to focal plane distance	1.76"
	Expected performance	7.4um
	Approximate focuser position	1.0"
	Effective focal ratio	f/4.50

CDK17 and the FLI Proline Camera and CFW4 or 5

Part Number	Description	Backfocus Used
125166	.66x Reducer NA	
200395	SecureFit to FLI CCD Adapter	0.25"
NA	FLI CFW5, backfocus (.848)	0.848"
NA	FLI Proline Camera	0.877"
	Reducer to focal plane distance	1.975"
	Expected performance	12.8um
	Approximate focuser position	.545"
	Effective focal ratio	f/4.46

CDK20/24

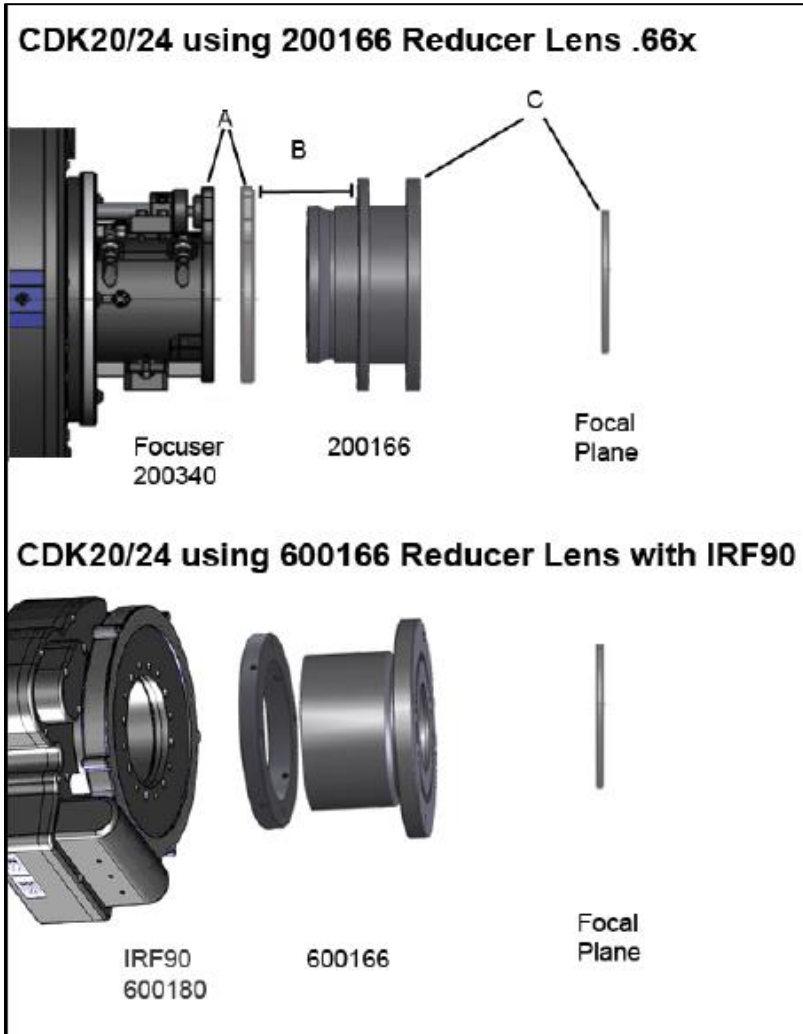


Chart for CDK20 and CDK24 using the 200166 Reducer

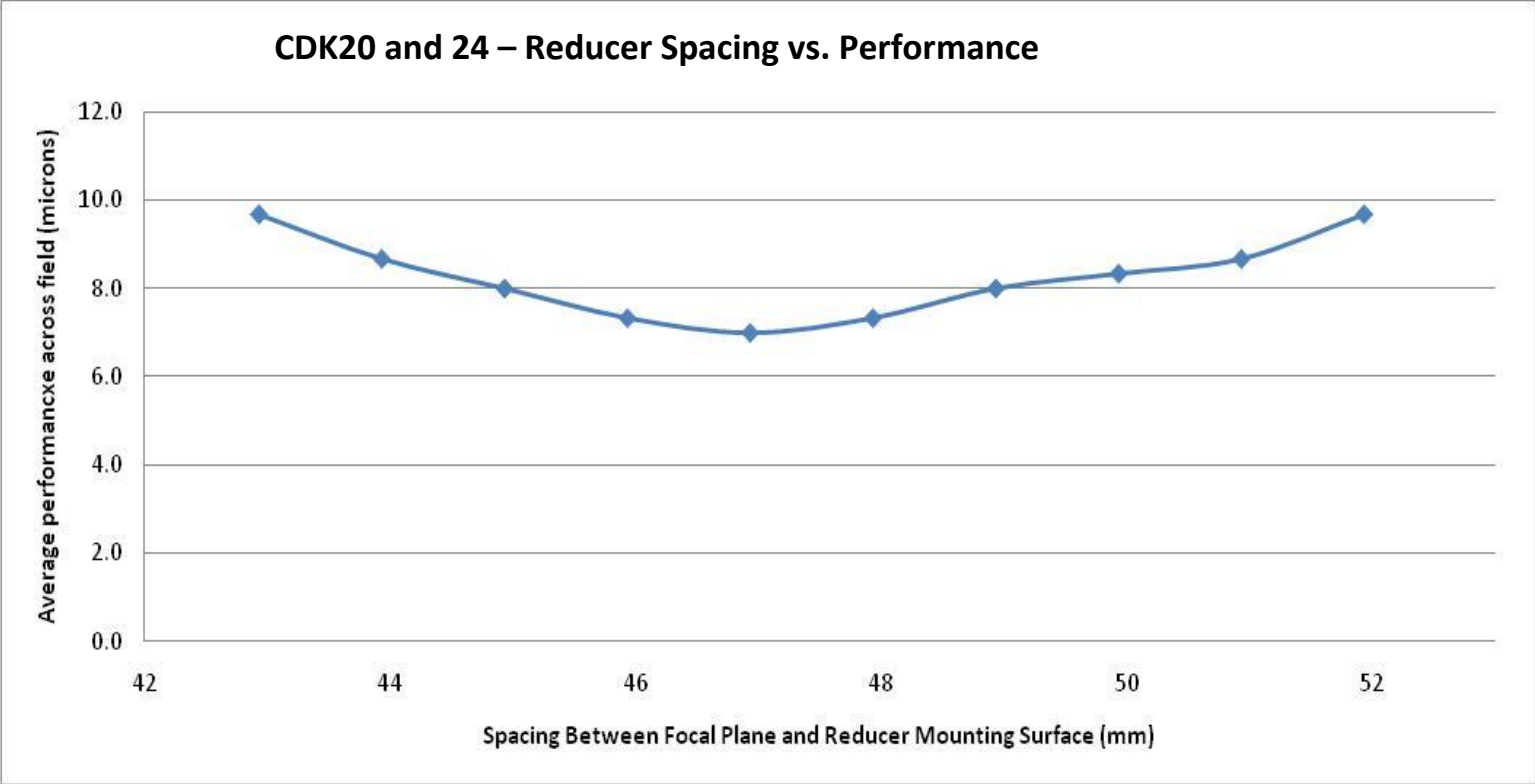
A (in)	B (In)	C (in)	Performance (Microns)**	F-ratio
0.846	0	1.69	9.7	4.57
0.758	0	1.73	8.7	4.56
0.670	0	1.77	8.0	4.54
0.580	0	1.81	7.3	4.53
0.490	0	1.85	7.0	4.51
0.399	0	1.89	7.3	4.49
0.308	0	1.93	8.0	4.48
0.216	0	1.97	8.3	4.46
0.123	0	2.01	8.7	4.45
0.030	0	2.04	9.7	4.43

**RMS spot size averaged across the field in Microns

Chart for CDK20 and CDK24 using the 600166 Reducer with IRF90

A (in)	B (In)	C (in)	Performance (Microns)**	F-ratio
1.41*	.9	1.62	10.26	4.4
1.31*	.9	1.68	9.27	4.38
1.23	.9	1.72	8.72	4.37
1.14	.9	1.76	8.64	4.35
1.05	.9	1.80	9.01	4.34
0.96	.9	1.83	9.76	4.32
0.874	.9	1.87	10.69	4.31

**RMS spot size averaged across the field in Microns
 *A spacer is required to reach this backfocus



CCD Camera and Adapter Configurations

Due to the limitation in backfocus, the CCD equipment that can be used with the reducer is limited. There is not enough room for off-axis guiders so you will need to use a camera with a built in autoguider or need to use a guide scope or need to take unguided exposures. Below are several the spacers required for different telescope and camera combinations

CDK20 and CDK24 and the SBIG - STL Camera

Part Number	Description	Backfocus Used
200166	.66x Reducer NA	
200362	SecureFit to SLT CCD Adapter	0.25"
NA	SBIG STL Camera	1.5"
	Reducer to focal plane distance	1.75"
	Expected performance	8.4um
	Approximate focuser position	.714"
	Effective focal ratio	f/4.55

CDK20 and CDK24 and the SBIG - STXL Camera

Part Number	Description	Backfocus Used
200166	.66x Reducer NA	
600335	SecureFit to STX CCD Adapter	0.722"
NA	SBIG STXL Camera	1.158"
	Reducer to focal plane distance	1.88"
	Expected performance	7.3um
	Approximate focuser position	.399"
	Effective focal ratio	f/4.49

CDK20 and 24 and the SBIG - STL Camera with FW8 Filterwheel

Part Number	Description	Backfocus Used
200166	.66x Reducer NA	
200362	SecureFit to SLT CCD Adapter	0.25"
NA	SBIG STL Camera w/ FW8	1.82"
	Reducer to focal plane distance	2.07"

DOES NOT REACH FOCUS AT PRESENT

CDK20 and CDK24 and the Apogee Alta Camera

Part Number	Description	Backfocus Used
200166	.66x Reducer NA	
200377	SecureFit 1/2" Spacer	0.5"
200396	SecureFit to Alta CCD Adapter	0.25"
NA	Apogee Alta Camera	1.008"
	Reducer to focal plane distance	1.76"
	Expected performance	8.1um
	Approximate focuser position	.670"
	Effective focal ratio	f/4.54

CDK20 & 24 and the FLI Proline Camera and CFW4 or 5

Part Number	Description	Backfocus Used
200166	.66x Reducer	NA
200395	SecureFit to FLI CCD Adapter	0.25"
NA	FLI CFW5, backfocus (.848)	0.848"
NA	FLI Proline Camera	0.877"
	Reducer to focal plane distance	1.975"
	Expected performance	8.3um
	Approximate focuser position	.216"
	Effective focal ratio	f/4.46

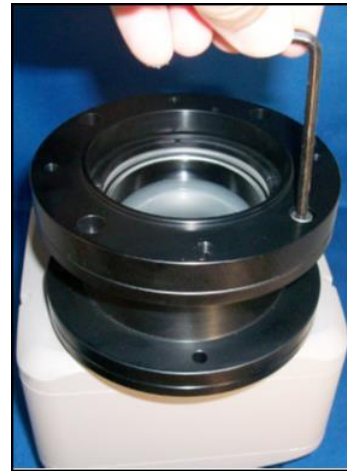
Installing the STL Camera with the 125166 reducer to a CDK12.5



1 - Attach the 200362 (the SecureFit STL CCD Adapter) to the STL camera body.



2 - Attach the 125166 Reducer to the 200362 with the four 10-32 SHC screws provided.



3 - Attach the 200377 SecureFit 1/2" Extender to the 125166 reducer with the four 10-32 SHC screws provided.



4 - Attach the 125388, the 2.75" to SecureFit Adapter to the 1/2" Extender with the four 10-32 SHC screws provided.

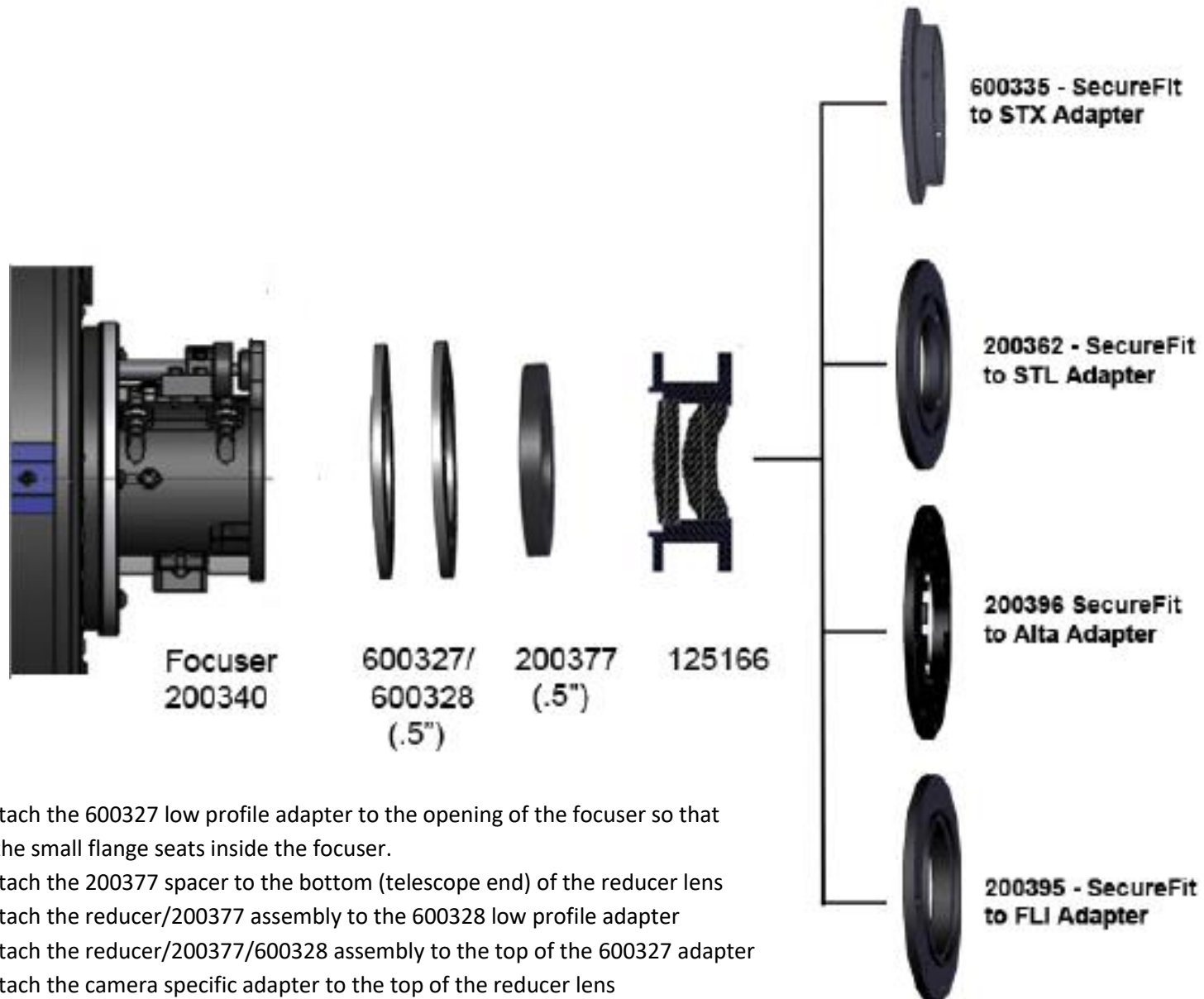


5 - Insert the 2.75" to SecureFit Adapter into the 2.75" focuser securing with the two set screws on the focuser.



6 - The attached assembly.

Installing the 125166 Reducer onto a CDK17



Installing the 200166 Reducer onto a CDK20/24 and SBIG STL



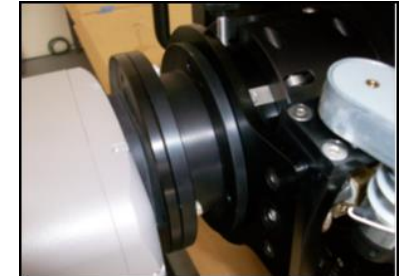
1 - Attach the 200362 (the SecureFit STL CCD Adapter) to the STL camera body.



2 - Attach the 200166 Reducer to the SecureFit CCD Adapters using the four 10-32 SHC screws provided.

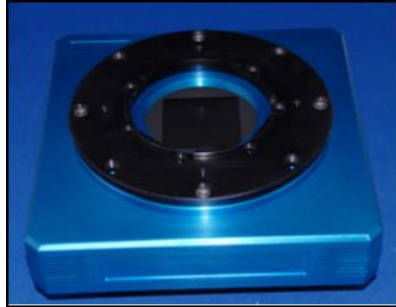


3 - Insert the 3.5" to barrel of the 200166 Reducer into the 3.5" focuser securing with the two set screws on the focuser.

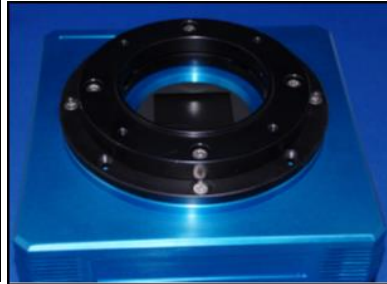


4 - The installed system

Installing the 200166 Reducer onto a CDK20/24 and Apogee



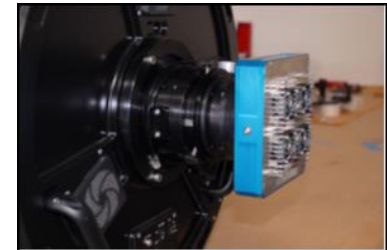
1 - Attach the 200396, the SecureFit STL CCD Adapter, to the Alta camera body with the screws provided.



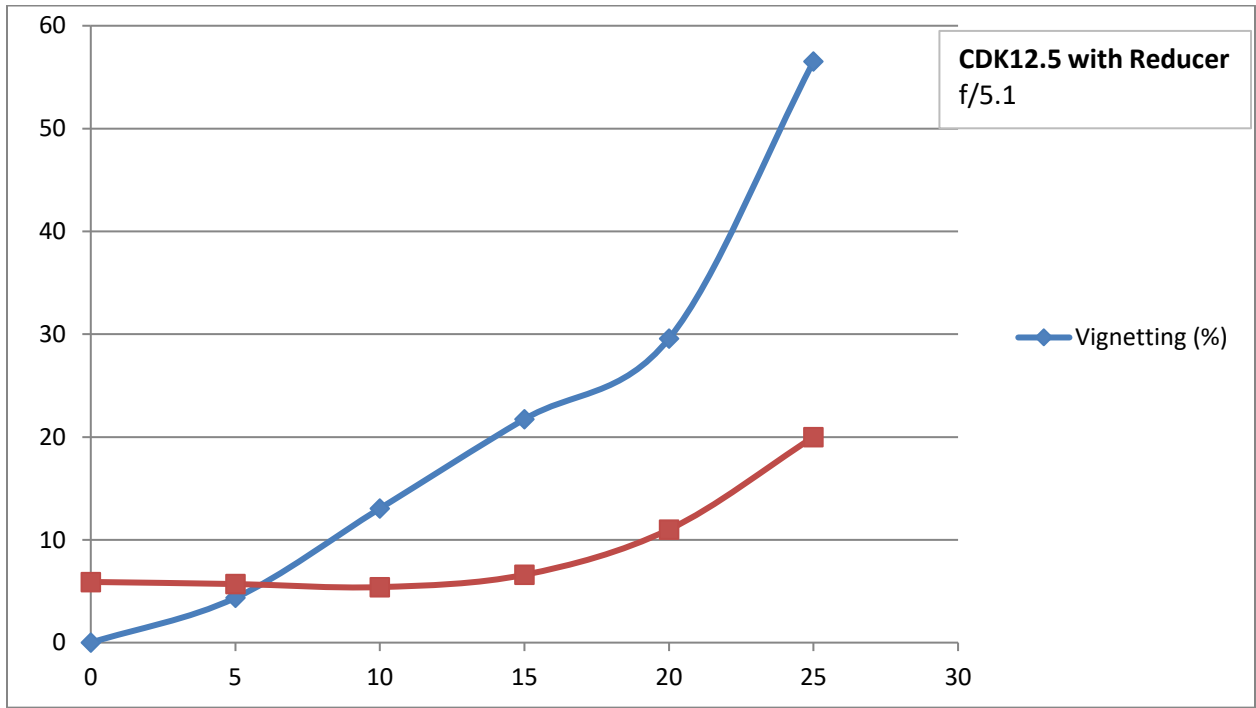
2 - Attach the 200377 SecureFit 1/2" Extender to the SecureFit CCD Adapter using the four 10-32 SHC screws provided.

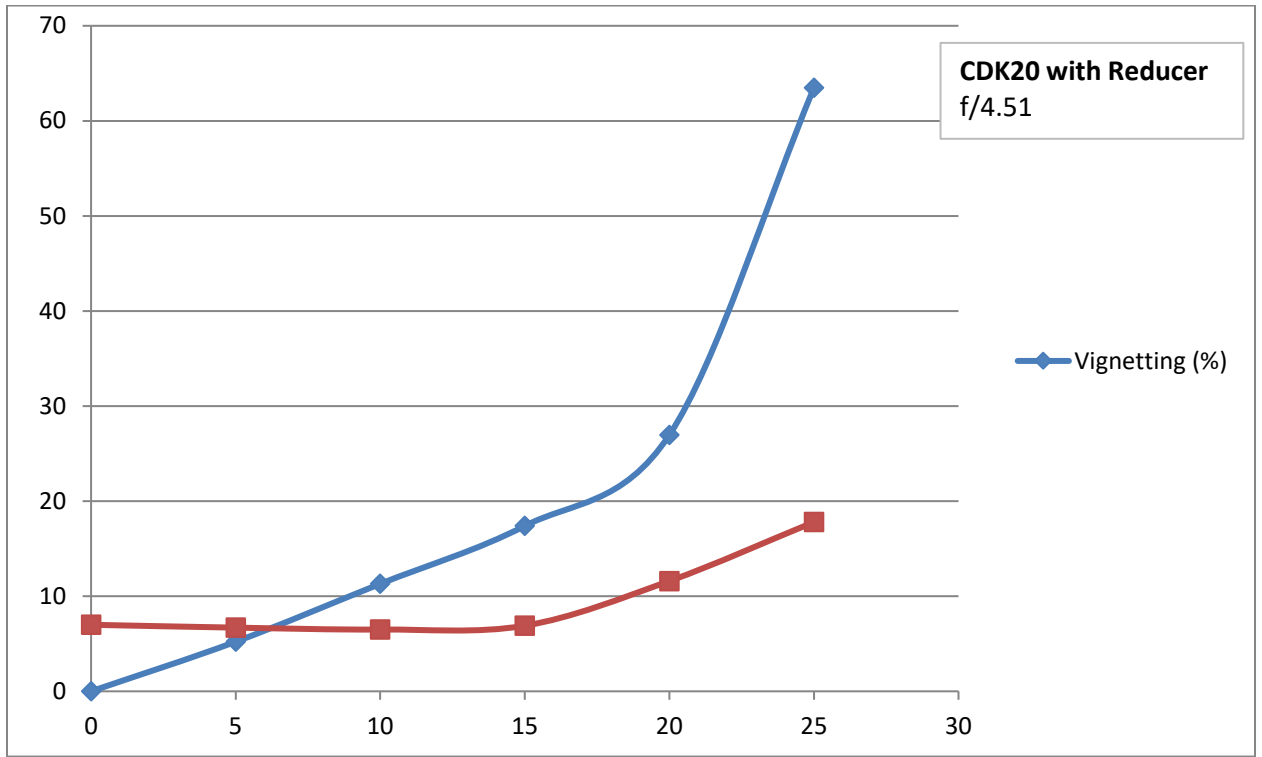


3 - Attach the 200166 Reducer to the SecureFit CCD Adapters using the four 10-32 SHC screws provided.



4 - Insert the 3.5" to barrel of the 200166 Reducer into the 3.5" focuser securing with the two set screws on the focuser.





Updated 09/27/2013