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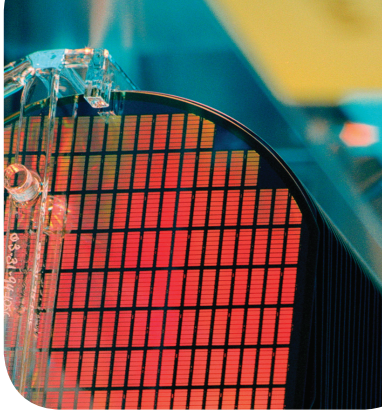

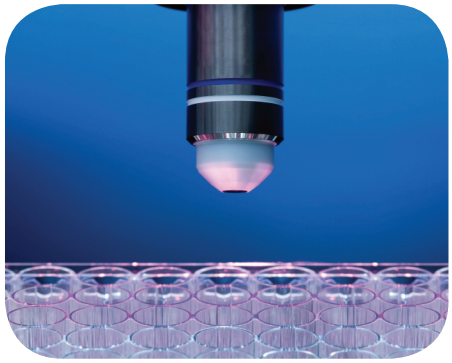

Custom Solutions

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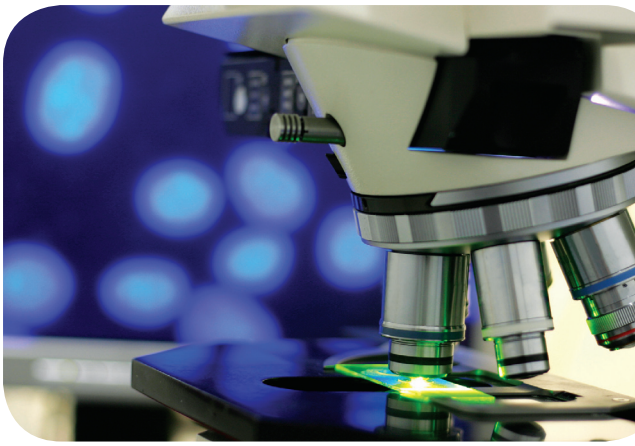
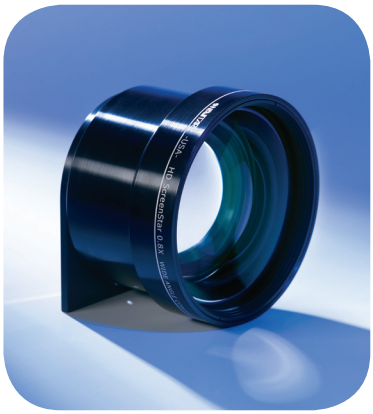


Projection Optics



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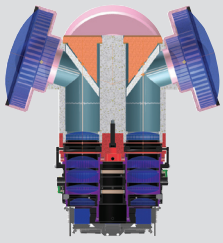
When your optical design project advances past the prototype stages, you can count on Navitar's world beating manufacturing capabilities and customer service to deliver the consistent quality that you need. Navitar has a long history of delivering repeatable performance, month after month, year after year, in every unit that comes off the production line. Our sophisticated solutions are typically found in applications that demand the finest optical surfaces, highest accuracy and tightest tolerances.

If you want to see how our over 45 years of optical expertise can bring your new optical concepts to realization, contact your account manager at 585-359-4000 or email sales@navitar.com.



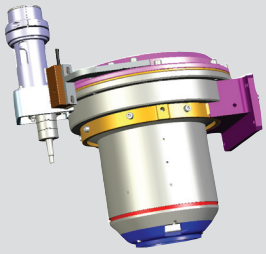


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Table of Contents

Zoom 6000 High Magnification Lenses	4-7
12X High Magnification Lenses	8-11
NIR Lens Systems	12
Motorized Solutions	13
Precise Eye Fixed Lenses	14-15
SWIR Hyperspectral Lenses	16
Fluorescent Imaging Systems	17-19
Large Format Lenses	20-21
Low Magnification Video Lenses	22-24
High Speed Lenses	25
Illumination Products	25
Projection Optics	26-27

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Zoom 6000

A Workhorse to Fit Nearly Any Application

For high magnification applications, the Zoom 6000 series of lenses are the number one choice around the world. Recognized as the industry standard, our versatile 6.5X zoom lenses are designed to give you the magnification powers of traditional microscopes without all the bulk or expense. They are easily integrated, set-up, and configured to your exact application. Compared to the competition, the Navitar Zoom 6000 series offers unmatched optical performance, repeatability and mechanical flexibility.

- Dynamic magnification range of 0.09-228X offers incredible versatility.
- High contrast images and vivid colors help your equipment perform better.
- 0.02-125.68 mm field coverage allows you to view a wide range of parts.
- Working distance can be varied from 34 to 390 mm.
- Add infinity corrected objective lenses to achieve unmatched edge flatness and clarity.
- Available with internal coaxial illumination (part 1-60123). Review matrix for FOV specifications*

Zoom 6000 Field of View Matrix (in mm at nominal W.D.)

Lens Attachment	Working Distance (mm)	Camera Format/ Parameters	.5X Adapter Low - High	.67X Adapter Low - High	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High	5X Adapter Low - High	Resolve Limit (microns) Low-High	Depth of Field (mm) Low-High
0.25X 0.006 - 0.018 1-6044	356 (nominal)	Mag.	0.09X - 0.56X	0.12X - 0.75X	0.18X - 1.13X	.24X - 1.5X	0.35X - 2.25X	.63X - 3.95X	0.88X - 5.62X	27.78 - 9.26	13.89 - 1.54
		Field 1/4"	45.70 - 7.12	34.03 - 5.33	22.85 - 3.56	17.18 - 2.68	11.42 - 1.78	6.53 - 1.02	4.54 - 0.72	27.78 - 9.26	13.89 - 1.54
	220-390 (1) W.D. range	Field 1/3"	68.64 - 10.64	51.12 - 8.04	34.32 - 5.32	25.80 - 4.0	17.16 - 2.66	9.8 - 1.52	6.88 - 1.08	27.78 - 9.26	13.89 - 1.54
		Field 1/2"	91.36 - 14.16	68.06 - 10.66	45.68 - 7.08	34.34 - 5.32	22.84 - 3.54	13.05 - 2.02	9.12 - 1.44	27.78 - 9.26	13.89 - 1.54
		Field 2/3"	91.40 - 19.52	93.62 - 14.66	62.84 - 9.76	47.25 - 7.34	31.42 - 4.88	17.95 - 2.79	12.56 - 1.96	27.78 - 9.26	13.89 - 1.54
0.5X 0.011 - 0.035 1-60110	175 (nominal)	Mag.	0.18X - 1.13X	0.24X - 1.50X	0.35X - 2.25X	.46X - 2.99X	0.70X - 4.50X	1.22X - 7.87X	1.75X - 11.25X	15.15 - 4.76	4.13 - 0.41
		Field 1/4"	22.85 - 3.56	17.02 - 2.66	11.42 - 1.78	8.59 - 1.34	5.71 - 0.89	3.26 - .51	2.28 - 0.36	15.15 - 4.76	4.13 - 0.41
	143-187 (1) W.D. range	Field 1/3"	34.32 - 5.32	25.56 - 4.0	17.16 - 2.67	12.90 - 2.01	8.58 - 1.33	4.90 - 0.76	3.43 - 0.53	15.15 - 4.76	4.13 - 0.41
		Field 1/2"	45.68 - 7.08	34.03 - 5.33	22.85 - 3.56	17.18 - 2.68	11.42 - 1.77	6.58 - 1.02	4.57 - 0.71	15.15 - 4.76	4.13 - 0.41
		Field 2/3"	45.70 - 9.76	46.81 - 7.33	31.43 - 4.89	23.63 - 3.68	15.71 - 2.44	8.98 - 1.40	6.29 - 0.98	15.15 - 4.76	4.13 - 0.41
0.75X 0.017 - 0.053 1-60111	113 (nominal)	Mag.	0.27X - 1.69X	0.35X - 2.25X	0.53X - 3.38X	.70X - 4.49X	1.05X - 6.75X	1.85X - 11.83X	2.63X - 16.88X	9.80 - 3.14	1.73-0.18
		Field 1/4"	15.22 - 2.38	11.34 - 1.78	7.61 - 1.19	5.72 - .89	3.81 - 0.59	2.17 - .34	1.52 - 0.24	9.80 - 3.14	1.73-0.18
	100-119 (1) W.D. range	Field 1/3"	22.86 - 3.56	17.04 - 2.67	11.43 - 1.78	8.59 - 1.34	5.72 - 0.89	3.26 - .51	2.29 - 0.35	9.80 - 3.14	1.73-0.18
		Field 1/2"	30.46 - 4.74	22.69 - 3.56	15.23 - 2.37	11.45 - 1.78	7.62 - 1.19	4.35 - .68	3.05 - 0.47	9.80 - 3.14	1.73-0.18
		Field 2/3"	30.50 - 6.52	31.21 - 4.89	20.95 - 3.26	15.75 - 2.45	10.48 - 1.63	5.98 - .93	4.19 - 0.65	9.80 - 3.14	1.73-0.18
None 0.023 - 0.071	92 (nominal)	Mag.	0.35X - 2.25X	0.47X - 3.00X	0.70X - 4.50X	.93X - 5.89X	1.40X - 9.00X	2.45X - 15.75X	3.50X - 22.50X	7.25 - 2.35	0.95 - 0.10
		Field 1/4"	11.42 - 1.78	8.51 - 1.33	5.71 - 0.89	4.29 - .67	2.86 - 0.45	1.63 - .25	1.14 - 0.18	7.25 - 2.35	0.95 - 0.10
	81-93 (1) W.D. range	Field 1/3"	17.16 - 2.67	12.77 - 2.01	8.58 - 1.33	6.45 - 1.0	4.29 - 0.67	2.45 - .38	1.72 - 0.27	7.25 - 2.35	0.95 - 0.10
		Field 1/2"	22.85 - 3.56	17.01 - 2.67	11.42 - 1.77	8.59 - 1.33	5.71 - 0.89	3.26 - .50	2.28 - 0.36	7.25 - 2.35	0.95 - 0.10
		Field 2/3"	22.90 - 4.89	23.40 - 3.65	15.71 - 2.44	11.81 - 1.83	7.86 - 1.22	4.49 - .70	3.14 - 0.49	7.25 - 2.35	0.95 - 0.10
1.5X 0.034 - 0.106 1-60112	51 (nominal)	Mag.	0.53X - 3.38X	0.71X - 4.50X	1.05X - 6.75X	1.40 - 8.98	2.10X - 13.50X	3.67X - 23.62X	5.25X - 33.75X	4.90 - 1.57	0.43 - 0.04
		Field 1/4"	7.61 - 1.19	5.67 - 0.89	3.81 - 0.59	2.86 - .44	1.91 - 0.30	1.09 - .17	0.76 - 0.12	4.90 - 1.57	0.43 - 0.04
	48-52 (1) W.D. range	Field 1/3"	11.43 - 1.78	8.52 - 1.33	5.72 - 0.89	4.3 - .67	2.86 - 0.44	1.63 - .25	1.14 - 0.18	4.90 - 1.57	0.43 - 0.04
		Field 1/2"	15.23 - 2.37	11.34 - 1.77	7.62 - 1.19	5.73 - .89	3.81 - 0.59	2.18 - .34	1.52 - 0.24	4.90 - 1.57	0.43 - 0.04
		Field 2/3"	15.00 - 3.26	15.60 - 2.44	10.48 - 1.63	7.88 - 1.22	5.24 - 0.81	2.99 - .46	2.10 - 0.33	4.90 - 1.57	0.43 - 0.04
2.0X 0.040 - 0.142 1-60113	36 (nominal)	Mag.	0.70X - 4.50X	0.94X - 6.00X	1.40X - 9.00X	1.86X - 11.97X	2.80X - 18.00X	4.9X - 31.5X	7.00X - 45.00X	3.62 - 1.17	0.24 - 0.02
		Field 1/4"	5.71 - 0.89	4.26 - 0.67	2.86 - 0.45	2.15 - .34	1.43 - 0.23	.82 - .13	0.57 - 0.09	3.62 - 1.17	0.24 - 0.02
	34-37 (1) W.D. range	Field 1/3"	8.58 - 1.33	6.39 - 1.00	4.29 - 0.67	3.22 - .50	2.15 - 0.33	1.22 - .19	0.86 - 0.13	3.62 - 1.17	0.24 - 0.02
		Field 1/2"	11.42 - 1.77	8.51 - 1.33	5.71 - 0.89	4.29 - .67	2.86 - 0.44	1.63 - .25	1.14 - 0.18	3.62 - 1.17	0.24 - 0.02
		Field 2/3"	11.40 - 2.44	11.70 - 1.83	7.86 - 1.22	5.91 - .92	3.93 - 0.61	2.24 - .35	1.57 - 0.24	3.62 - 1.17	0.24 - 0.02

* This section represents the Field of View Matrix for the internal coaxial zoom 1-60123

The above fields of view are measured diagonally in millimeters (Horizontal = Diagonal x 0.8 and Vertical = Diagonal x 0.6). (1) Working distance range when using 12 mm fine focus. Field of view will change with shorter or longer working distances. N.A. varies depending in system magnification.

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Zoom 6000 Performance Specifications

Zoom 6000 Combinations Lens Attachment + Prime Lens + Adapter	Working Distance	System Magnification		N.A. Objective		Resolve Limit (microns)		Matching Pixel Size (microns)		Depth of Field	
		Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.
0.25x + 6.5X Zoom + 0.5x	356	0.09	0.56	0.006	0.018	27.78	9.26	2.50	5.19	13.89	1.54
0.25x + 6.5X Zoom + 0.67x	356	0.12	0.75	0.006	0.018	27.78	9.26	3.33	6.95	13.89	1.54
0.25x + 6.5X Zoom + 1.0x	356	0.18	1.13	0.006	0.018	27.78	9.26	5.00	10.46	13.89	1.54
0.25x + 6.5X Zoom + 1.33x	356	0.23	1.51	0.006	0.018	27.78	9.26	6.65	13.91	13.89	1.54
0.25x + 6.5X Zoom + 2.0x	356	0.35	2.25	0.006	0.018	27.78	9.26	9.72	20.84	13.89	1.54
0.25x + 6.5X Zoom + 3.5x	356	0.61	3.98	0.006	0.018	27.78	9.26	17.50	36.61	13.89	1.54
0.25x + 6.5X Zoom + 5.0x	356	0.88	5.62	0.006	0.018	27.78	9.26	24.45	52.04	13.89	1.54
0.5x + 6.5X Zoom + 0.5x	175	0.18	1.13	0.011	0.035	15.15	4.76	2.73	5.38	4.13	0.41
0.5x + 6.5X Zoom + 0.67x	175	0.23	1.50	0.011	0.035	15.15	4.76	3.48	7.14	4.13	0.41
0.5x + 6.5X Zoom + 1.0x	175	0.35	2.25	0.011	0.035	15.15	4.76	5.30	10.71	4.13	0.41
0.5x + 6.5X Zoom + 1.33x	175	0.47	3.03	0.011	0.035	15.15	4.76	7.05	14.24	4.13	0.41
0.5x + 6.5X Zoom + 2.0x	175	0.70	4.50	0.011	0.035	15.15	4.76	10.61	21.42	4.13	0.41
0.5x + 6.5X Zoom + 3.5x	175	1.22	7.93	0.011	0.035	15.15	4.76	18.55	37.49	4.13	0.41
0.5x + 6.5X Zoom + 5.0x	175	1.75	11.25	0.011	0.035	15.15	4.76	26.51	53.55	4.13	0.41
0.75x + 6.5X Zoom + 0.5x	113	0.26	1.69	0.017	0.053	9.80	3.14	2.55	5.32	1.73	0.18
0.75x + 6.5X Zoom + 0.67x	113	0.35	2.25	0.017	0.053	9.80	3.14	3.43	7.08	1.73	0.18
0.75x + 6.5X Zoom + 1.0x	113	0.53	3.38	0.017	0.053	9.80	3.14	5.20	10.63	1.73	0.18
0.75x + 6.5X Zoom + 1.33x	113	0.70	4.54	0.017	0.053	9.80	3.14	6.92	14.13	1.73	0.18
0.75x + 6.5X Zoom + 2.0x	113	1.05	6.75	0.017	0.053	9.80	3.14	10.30	21.23	1.73	0.18
0.75x + 6.5X Zoom + 3.5x	113	1.86	12.06	0.017	0.053	9.80	3.14	18.20	37.21	1.73	0.18
0.75x + 6.5X Zoom + 5.0x	113	2.63	16.88	0.017	0.053	9.80	3.14	25.74	53.09	1.73	0.18
None + 6.5X Zoom + 0.5x	92	0.35	2.25	0.023	0.071	7.25	2.35	2.54	5.28	0.95	0.10
None + 6.5X Zoom + 0.67x	92	0.47	3.00	0.023	0.071	7.25	2.35	3.41	7.04	0.95	0.10
None + 6.5X Zoom + 1.0x	92	0.70	4.50	0.023	0.071	7.25	2.35	5.08	10.55	0.95	0.10
None + 6.5X Zoom + 1.33x	92	0.93	6.05	0.023	0.071	7.25	2.35	6.76	14.03	0.95	0.10
None + 6.5X Zoom + 2.0x	92	1.40	9.00	0.023	0.071	7.25	2.35	10.15	21.11	0.95	0.10
None + 6.5X Zoom + 3.5x	92	2.45	15.93	0.023	0.071	7.25	2.35	17.78	36.93	0.95	0.10
None + 6.5X Zoom + 5.0x	92	3.50	22.50	0.023	0.071	7.25	2.35	25.38	52.76	0.95	0.10
1.5x + 6.5X Zoom + 0.5x	51	0.53	3.38	0.034	0.106	4.90	1.57	2.60	5.32	0.43	0.04
1.5x + 6.5X Zoom + 0.67x	51	0.70	4.50	0.034	0.106	4.90	1.57	3.43	7.09	0.43	0.04
1.5x + 6.5X Zoom + 1.0x	51	1.05	6.75	0.034	0.106	4.90	1.57	5.15	10.63	0.43	0.04
1.5x + 6.5X Zoom + 1.33	51	1.40	9.08	0.034	0.106	4.90	1.57	6.85	14.14	0.43	0.04
1.5x + 6.5X Zoom + 2.0x	51	2.10	13.50	0.034	0.106	4.90	1.57	10.29	21.26	0.43	0.04
1.5x + 6.5X Zoom + 3.5x	51	3.68	23.89	0.034	0.106	4.90	1.57	18.03	37.21	0.43	0.04
1.5x + 6.5X Zoom + 5.0x	51	5.25	33.75	0.034	0.106	4.90	1.57	25.73	53.16	0.43	0.04
2.0x + 6.5X Zoom + 0.5x	36	0.70	4.50	0.046	0.142	3.62	1.17	2.54	5.29	0.24	0.02
2.0x + 6.5X Zoom + 0.67x	36	0.94	6.00	0.046	0.142	3.62	1.17	3.41	7.05	0.24	0.02
2.0x + 6.5X Zoom + 1.0x	36	1.40	9.00	0.046	0.142	3.62	1.17	5.08	10.58	0.24	0.02
2.0x + 6.5X Zoom + 1.33	36	1.86	12.10	0.046	0.142	3.62	1.17	6.76	14.07	0.24	0.02
2.0x + 6.5X Zoom + 2.0x	36	2.80	18.00	0.046	0.142	3.62	1.17	10.15	21.15	0.24	0.02
2.0x + 6.5X Zoom + 3.5x	36	4.90	31.85	0.046	0.142	3.62	1.17	17.78	37.03	0.24	0.02
2.0x + 6.5X Zoom + 5.0x	36	7.00	45.00	0.046	0.142	3.62	1.17	25.38	52.88	0.24	0.02

Assumptions:

1. Minimum resolvable feature size is half of the threshold line pair limit. Calculation = 1/(3000 x Lens N.A.)
2. Matching pixel size is that which will permit the minimum feature size to overlap two pixels. Calculation = 1/2(Feature Size x System Magnification)
3. If the matching pixel size is greater than the camera pixel size, the system is "lens limited."
4. If the matching pixel size is less than the camera pixel size, the system is "camera limited."

Zoom 6000 UltraZoom

Combine Infinity-Corrected Objectives for Maximum Resolution and Magnification

Navitar's UltraZoom is a high-performance zoom lens system ideal for semiconductor inspection, flow cytometry, or other high magnification applications. Its advanced design offers high resolution and outstanding contrast. This system incorporates infinity corrected, plan-apochromatic objectives providing long working distances and excellent edge flatness and clarity. Resolution varies from 420 to 1,650 lines per mm, depending on the microscope objective used. The UltraZoom is also available with fine focus and/or co-axial illumination.

Zoom 6000 UltraZoom Field of View Matrix

(for part number's 1-60190, 1-60191, 1-60349 and 1-60350 in mm)

Objective Lens (Mitutoyo) Long WD	Working Distance	Camera Format/ Parameters	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High
5X 0.14 NA* 1-60226	34	Mag.	1.74X - 11.43X	2.3X - 15.0X	3.48X - 22.86X	6.1X - 39.4X
		Field 1/4"	2.30 - 0.35	1.74 - 0.26	1.15 - 0.17	0.65 - 0.1
		Field 1/3"	3.45 - 0.52	2.61 - 0.40	1.72 - 0.26	0.98 - 0.15
		Field 1/2"	(1) 4.05 - 0.70	3.48 - 0.54	2.30 - 0.35	1.31 - 0.20
		Field 2/3"	(1) 4.02 - 0.96	4.0 - 0.74	3.16 - 0.48	1.80 - 0.28
10X 0.28 NA* 1-60227	33	Mag.	3.48X - 22.86X	4.63X - 29.9X	6.96X - 45.72X	12.3X - 78.8X
		Field 1/4"	1.15 - 0.17	0.86 - 0.13	0.57 - 0.09	0.33 - 0.05
		Field 1/3"	1.72 - 0.26	1.30 - 0.20	0.86 - 0.13	0.49 - 0.08
		Field 1/2"	(1) 2.10 - 0.35	1.73 - 0.27	1.15 - 0.17	0.66 - 0.10
		Field 2/3"	(1) 2.10 - 0.48	2.10 - 0.37	1.58 - 0.24	0.9 - 0.14
20X 0.42 NA* 1-60228	20	Mag.	6.96X - 45.72X	9.3X - 59.9X	13.92X - 91.40X	24.5X - 157.6X
		Field 1/4"	0.57 - 0.09	0.43 - 0.07	0.29 - 0.04	0.16 - 0.03
		Field 1/3"	0.86 - 0.13	0.65 - 0.10	0.43 - 0.07	0.25 - 0.04
		Field 1/2"	(1) 1.0 - 0.17	0.86 - 0.14	0.57 - 0.09	0.33 - 0.05
		Field 2/3"	(1) 1.03 - 0.24	1.0 - 0.19	0.79 - 0.12	0.45 - 0.07
50X 0.55 NA* 1-60229	13	Mag.	17.40X - 114.30X	23X-150X	34.80X - 228.60X	61X - 393.8X
		Field 1/4"	0.23 - 0.03	0.17 - 0.03	0.11 - 0.02	0.07 - 0.01
		Field 1/3"	0.30 - 0.05	0.26 - 0.04	0.17 - 0.03	0.10 - 0.015
		Field 1/2"	(1) 0.31 - 0.07	0.30 - 0.05	0.23 - 0.04	0.13 - 0.02
		Field 2/3"	(1) 0.30 - 0.10	0.30 - 0.07	(1) 0.30 - 0.05	0.18 - 0.03

(1) Entire zoom range is not used.
**N.A. at full zoom. N.A. varies with zoom settings.*

High Magnification Accessories

A full line of accessories are available for our Navitar high magnification imaging systems. To learn more visit www.navitar.com or contact your account manager.

- Right Angle Mounts & Attachments
- Adapter Plates
- Laser Injection Port
- Auxiliary Viewing Port
- 2X f-mount Zoom Adapter
- Polarizers
- Analyzer
- Infinity Corrected Objectives
- Aperture Control
- Digital Camera Adapter

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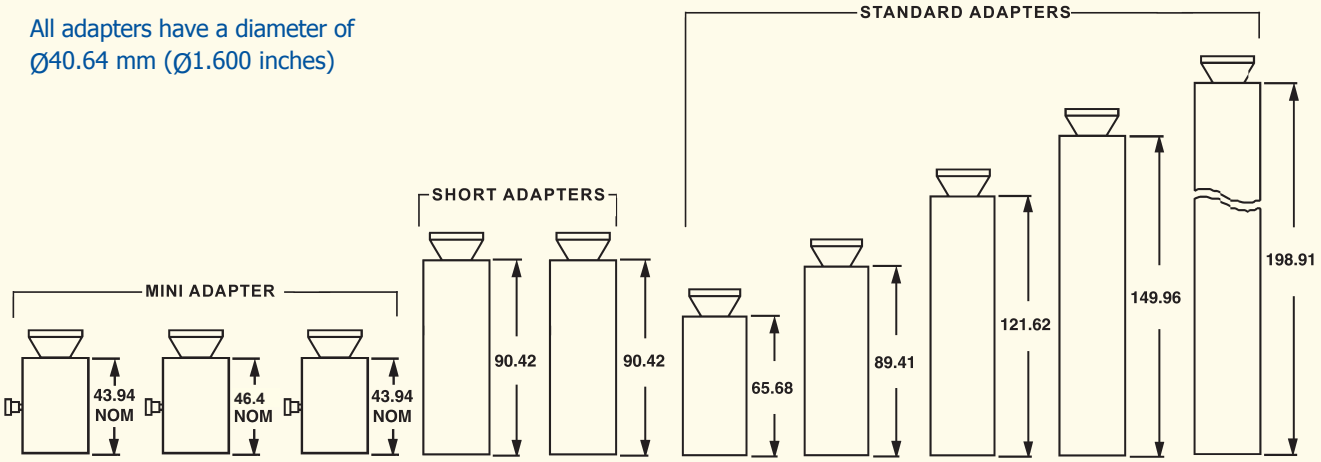
Zoom 6000 System Dimensions

*All measurements are in mm unless otherwise specified.

Navitar offers a wide variety of lenses, adapters and attachments. Dimensions of a few examples are provided here. For a complete listing of lens dimensions, please visit www.navitar com.

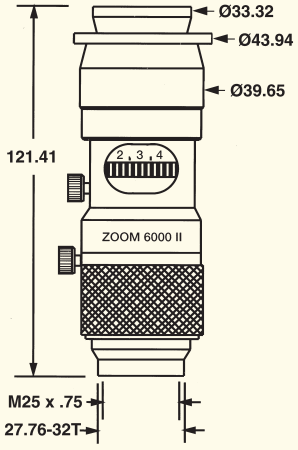
Adapters*

All adapters have a diameter of Ø40.64 mm (Ø1.600 inches)

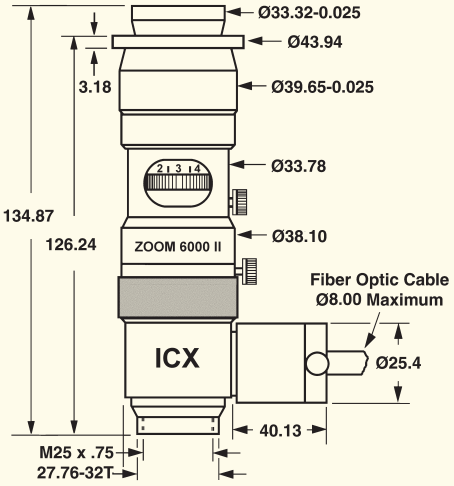


.67X Mini	1X Mini	2X Mini	1X	2X	.5X	.67X	1X	2X	5X
1-61001	1-61400	1-62136	1-6245	1-6233	1-60439	1-6020	1-6015 (1-6218 Tele)	1-6030	1-6105

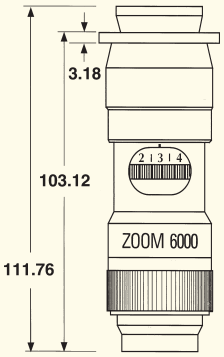
Lenses*



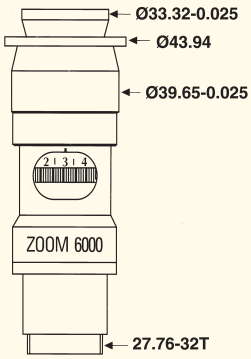
6.5X w/ 12 mm F.F.
1-60135



6.5X w/ 3 mm F.F. & Int. Coax
1-60123

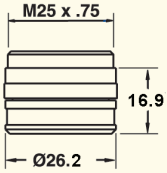


6.5X w/ 3 mm F.F.
1-6232



6.5X
1-6265

Attachments*



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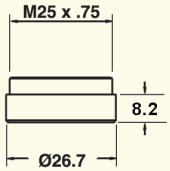
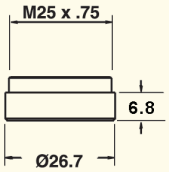
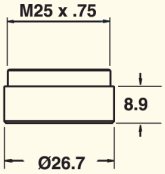
1-6044



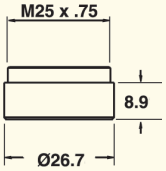
0.5X
1-60110



0.75X
1-60111



1.5X
1-60112



2.0X
1-60113

Full Zoom 6000 system diagrams can be found online at www.navitar.com/systemdiagrams

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12X Zoom

The Highest Combination of Zoom Range & Resolution in an Optical System

For high magnification applications requiring the optimal balance between optical performance, large zoom range and price, the 12X is an ideal choice. The 12X Zoom incorporates all the mechanical flexibility of the Zoom 6000 with extended zoom range, higher N.A. and unbeatable accuracy and repeatability for the most demanding applications. This outstanding combination of zoom range, coupled with larger field coverage, means that you will now be able to view a wider range of parts with a single video inspection system and eliminate the need for bulky microscopes.

- Incredible 12X (0.58-7X) magnification for inspection of a wider range of parts.
- Increased resolution with 0.018-0.1 N.A.
- Variable working distance from 13 to 341 mm.
- Field of view from 0.006 mm to 85.71 mm with attachments.
- Unmatched edge flatness and clarity.
- Works with 1/4", 1/3", 1/2" and 2/3" format cameras.
- The 12X Zoom System utilizes existing Zoom 6000 adapter tubes.
- Available with internal coaxial illumination (part 1-50487). Review matrix for FOV specifications*

12X Zoom Field of View Matrix (in mm)

Lens Attachment	Working Distance	Camera Formats/ Parameters	0.5X Adapter Low-High	0.67X Adapter Low-High	1X Adapter Low-High	1.33X Adapter Low-High	2X Adapter Low-High	3.5X Adapter Low-High	Resolve Limit (Microns) Low-High	Depth of Field (mm) Low-High
0.25X (2)0.005 - 0.025 NA 1-50011	341	Mag.	0.07X - 0.87X	0.10X - 1.20X	0.15X - 1.75X	0.19X - 2.33X	0.29X - 3.50X	0.51X - 6.13X	33.33 - 6.67	20.00 - 0.80
		Field 1/4"	57.14 - 4.59	41.16 - 3.40	27.60 - 2.28	21.05 - 1.72	13. 9 - 1.14	7.84 - 0.65	33.33 - 6.67	20.00 - 0.80
		Field 1/3"	85.71 - 6.89	61.73 - 5.10	41.38 - 3.42	31.57 - 2.57	20.69 - 1.71	11.76 - 0.98	33.33 - 6.67	20.00 - 0.80
		Field 1/2"	—	82.32 - 6.80	55.16 - 4.56	42.10 - 3.43	27.58 - 2.28	15.68 - 1.30	33.33 - 6.67	20.00 - 0.80
		Field 2/3"	—	(1) 72.00 - 9.35	75.88 - 6.28	57.89 - 4.72	37.94 - 3.14	21.56 - 1.79	33.33 - 6.67	20.00 - 0.80
0.5X 0.009 - 0.051 N.A. 1-50012	165	Mag	0.14X - 1.75X	0.20X - 2.40X	0.29X - 3.50X	0.39X - 4.66X	0.58X - 7.00X	1.02X - 12.3X	18.52 - 3.33	6.17 - 0.19
		Field 1/4"	28.57 - 2.28	20.58 - 1.70	13.79 - 1.14	10.25 - 0.86	6.90 - 0.76	3.92 - 0.32	18.52 - 3.33	6.17 - 0.19
		Field 1/3"	42.85 - 3.42	30.87 - 2.55	20.69 - 1.71	15.38 - 1.29	10.34 - 0.86	5.88 - 0.48	18.52 - 3.33	6.17 - 0.19
		Field 1/2"	—	41.16 - 3.40	27.58 - 2.28	20.51 - 1.72	13.79 - 1.14	7.84 -0.65	18.52 - 3.33	6.17 - 0.19
		Field 2/3"	—	(1) 36.0 - 4.68	37.94 - 3.14	28.20 - 2.36	18.97 - 1.57	10.78 - 0.89	18.52 - 3.33	6.17 - 0.19
0.75X 0.014 - 0.076 N.A. 1-50013	108	Mag.	0.22X - 2.62X	0.29X - 3.50X	0.44X - 5.30X	0.58X - 6.98X	0.87X - 10.50X	1.53X - 18.4X	11.90 - 2.22	2.55 - 0.09
		Field 1/4"	18.18 - 1.52	13.72 - 1.14	9.19 - 0.76	6.89 - 0.57	4.60 - 0.38	2.61 - 0.22	11.90 - 2.22	2.55 - 0.09
		Field 1/3"	27.27 - 2.29	20.58 - 1.70	13.79 - 1.14	10.34 - 0.85	6.89 - 0.57	3.92 - 0.32	11.90 - 2.22	2.55 - 0.09
		Field 1/2"	—	27.44 - 2.27	18.34 - 1.52	13.79 - 1.14	9.19 - 0.76	5.22 - 0.43	11.90 - 2.22	2.55 - 0.09
		Field 2/3"	—	(1) 24.30 - 3.12	25.30 - 2.09	18.96 - 1.57	12.64 - 1.05	7.18 - 0.59	11.90 - 2.22	2.55 - 0.09
None 0.019 - 0.101 N.A.	86	Mag.	0.29X - 3.49X	0.39X - 4.70X	0.58X - 7.00X	0.77X - 9.31X	1.16X - 14.00X	2.03X - 24.5X	9.26 - 1.67	1.39 - 0.05
		Field 1/4"	13.79 - 1.14	10.29 - 0.85	6.90 - 0.57	5.19 - 0.43	3.45 - 0.29	1.97 - 0.16	9.26 - 1.67	1.39 - 0.05
		Field 1/3"	20.69 - 1.72	15.44 - 1.28	10.34 - 0.86	7.79 - 0.64	5.18 - 0.43	2.95 - 0.24	9.26 - 1.67	1.39 - 0.05
		Field 1/2"	—	20.58 - 1.70	13.79 - 1.14	10.39 - 0.86	6.90 - 0.57	3.94 - 0.32	9.26 - 1.67	1.39 - 0.05
		Field 2/3"	—	(1) 18.20 - 2.34	18.97 - 1.57	14.28 - 1.18	9.49 - 0.78	5.42 - 0.44	9.26 - 1.67	1.39 - 0.05
1.5X 0.028 - 0.151 N.A. 1-50014	50	Mag.	0.43X - 5.23X	0.58X - 7.00X	0.87X - 10.50X	1.16X - 14.0X	1.74X - 21.00X	3.05X - 36.8X	6.17 - 1.12	0.64 - 0.02
		Field 1/4"	9.30 - 0.76	6.86 - 0.57	4.60 - 0.38	3.44 - 0.28	2.30 - 0.19	1.31 - 0.11	6.17 - 1.12	0.64 - 0.02
		Field 1/3"	13.95 - 1.14	10.29 - 0.85	6.89 - 0.57	5.17 - 0.44	3.45 - 0.29	1.96 - 0.16	6.17 - 1.12	0.64 - 0.02
		Field 1/2"	—	13.72 - 1.13	9.19 - 0.76	6.89 - 0.57	4.60 - 0.38	2.62 - 0.22	6.17 - 1.12	0.64 - 0.02
		Field 2/3"	—	(1) 12.20 - 1.55	12.64 - 1.05	9.48 - 0.78	6.33 - 0.52	3.60 - 0.23	6.17 - 1.12	0.64 - 0.02
2.0X 0.038 - 0.202 N.A. 1-50015	37	Mag.	0.58X - 6.98X	0.78X - 9.40X	1.16X - 14.00X	1.54X - 18.6X	2.32X - 28.00X	4.06X - 49.0X	4.50 - 0.83	0.35 - 0.01
		Field 1/4"	6.89 - 0.57	5.14 - 0.43	3.45 - 0.29	2.59 - 0.21	1.73 - 0.15	0.98 - 0.08	4.50 - 0.83	0.35 - 0.01
		Field 1/3"	10.34 - 0.85	7.72 - 0.64	5.18 - 0.43	3.89 - 0.32	2.59 - 0.22	1.47 - 0.12	4.50 - 0.83	0.35 - 0.01
		Field 1/2"	—	10.29 - 0.85	6.90 - 0.57	5.19 - 0.43	3.45 - 0.29	1.97 - 0.16	4.50 - 0.83	0.35 - 0.01
		Field 2/3"	—	(1) 9.10 - 1.17	9.49 - 0.78	7.14 - 0.59	4.75 - 0.40	2.71 - 0.22	4.50 - 0.83	0.35 - 0.01

* field of view matrix for internal coaxial zoom 1-50487

(1) Vignetting occurs at zoom settings less than 0.9X.
(2) N.A. varies depending on zoom setting.

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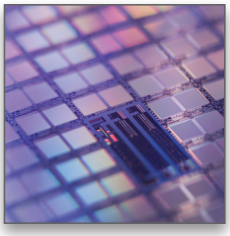
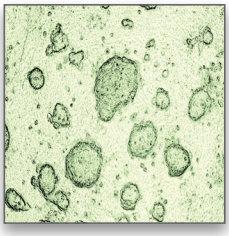
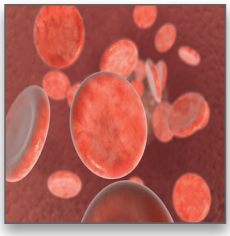
Applications

Navitar high magnification lenses are utilized in a wide variety of biotechnology and nanotechnology applications including gel documentation, particle characterization, DNA sequencing, flow cytometry, AFM, colony picking, cell sorting and live cell imaging. Navitar high magnification systems are also utilized in the semiconductor and electronics industry for automated visual inspection, FPD fabrication, wafer inspection and non-contact measurement.



12X Zoom Performance Specifications

12X Zoom Combinations Lens Attach. + Prime Lens + Adapter	Working Distance	System Mag.		N.A. Objective		Resolve Limit micron		Matching Pixel Size microns		Depth of Field	
		Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.
0.25x + 12X Zoom + 0.5x	341	0.07	0.87	0.005	0.025	33.33	6.67	2.33	5.8	20.00	0.80
0.25x + 12X Zoom + 0.67x	341	0.10	1.17	0.005	0.025	33.33	6.67	3.33	7.80	20.00	0.80
0.25x + 12X Zoom + 1.0x	341	0.15	1.75	0.005	0.025	33.33	6.67	5.00	11.67	20.00	0.80
0.25x + 12X Zoom + 1.33x	341	0.19	2.33	0.005	0.025	33.33	6.67	6.33	15.54	20.00	0.80
0.25x + 12X Zoom + 2.0x	341	0.29	3.50	0.005	0.025	33.33	6.67	9.67	23.34	20.00	0.80
0.25x + 12X Zoom + 3.5x	341	0.51	6.13	0.005	0.025	33.33	6.67	16.99	40.88	20.00	0.80
0.5x + 12X Zoom + 0.5x	165	0.14	1.75	0.009	0.051	18.52	3.33	2.59	5.82	6.17	0.19
0.5x + 12X Zoom + 0.67x	165	0.19	2.35	0.009	0.051	18.52	3.33	3.60	7.68	6.17	0.19
0.5x + 12X Zoom + 1.0x	165	0.29	3.50	0.009	0.051	18.52	3.33	5.38	11.45	6.17	0.19
0.5x + 12X Zoom + 1.33x	165	0.39	4.66	0.009	0.051	18.52	3.33	7.22	15.51	6.17	0.19
0.5x + 12X Zoom + 2.0x	165	0.58	7.00	0.009	0.051	18.52	3.33	10.74	22.89	6.17	0.19
0.5x + 12X Zoom + 3.5x	165	1.02	12.30	0.009	0.051	18.52	3.33	18.89	40.95	6.17	0.19
0.75x + 12X Zoom + 0.5x	108	0.22	2.62	0.014	0.076	11.90	2.22	2.61	5.81	2.55	0.09
0.75x + 12X Zoom + 0.67x	108	0.29	3.52	0.014	0.076	11.90	2.22	3.45	7.73	2.55	0.09
0.75x + 12X Zoom + 1.0x	108	0.44	5.25	0.014	0.076	11.90	2.22	5.24	11.52	2.55	0.09
0.75x + 12X Zoom + 1.33x	108	0.58	6.98	0.014	0.076	11.90	2.22	6.90	15.49	2.55	0.09
0.75x + 12X Zoom + 2.0x	108	0.87	10.50	0.014	0.076	11.90	2.22	10.35	23.05	2.55	0.09
0.75x + 12X Zoom + 3.5x	108	1.53	18.40	0.014	0.076	11.90	2.22	18.20	40.84	2.55	0.09
None + 12X Zoom + 0.5x	86	0.29	3.49	0.019	0.101	9.26	1.67	2.68	5.82	1.39	0.05
None + 12X Zoom + 0.67x	86	0.39	4.69	0.019	0.101	9.26	1.67	3.42	7.74	1.39	0.05
None + 12X Zoom + 1.0x	86	0.58	7.00	0.019	0.101	9.26	1.67	5.09	11.55	1.39	0.05
None + 12X Zoom + 1.33x	86	0.77	9.31	0.019	0.101	9.26	1.67	7.13	15.54	1.39	0.05
None + 12X Zoom + 2.0x	86	1.16	14.00	0.019	0.101	9.26	1.67	10.17	23.10	1.39	0.05
None + 12X Zoom + 3.5x	86	2.03	24.50	0.019	0.101	9.26	1.67	18.79	40.91	1.39	0.05
1.5x + 12X Zoom + 0.5x	50	0.43	5.23	0.028	0.151	6.17	1.12	2.65	5.85	0.64	0.02
1.5x + 12X Zoom + 0.67x	50	0.58	7.04	0.028	0.151	6.17	1.12	3.45	7.78	0.64	0.02
1.5x + 12X Zoom + 1.0x	50	0.87	10.50	0.028	0.151	6.17	1.12	5.18	11.60	0.64	0.02
1.5x + 12X Zoom + 1.33x	50	1.16	14.00	0.028	0.151	6.17	1.12	7.15	15.68	0.64	0.02
1.5x + 12X Zoom + 2.0x	50	1.74	21.00	0.028	0.151	6.17	1.12	10.74	23.34	0.64	0.02
1.5x + 12X Zoom + 3.5x	50	3.05	36.80	0.028	0.151	6.17	1.12	18.81	41.21	0.64	0.02
2.0x + 12X Zoom + 0.5x	37	0.58	6.98	0.038	0.202	4.50	0.83	2.61	5.79	0.35	0.01
2.0x + 12X Zoom + 0.67x	37	0.78	9.38	0.038	0.202	4.50	0.83	3.42	7.79	0.35	0.01
2.0x + 12X Zoom + 1.0x	37	1.16	14.00	0.038	0.202	4.50	0.83	5.09	11.62	0.35	0.01
2.0x + 12X Zoom + 1.33x	37	1.54	18.60	0.038	0.202	4.50	0.83	6.93	15.43	0.35	0.01
2.0x + 12X Zoom + 2.0x	37	2.32	28.00	0.038	0.202	4.50	0.83	10.17	23.24	0.35	0.01
2.0x + 12X Zoom + 3.5x	37	4.06	49.00	0.038	0.202	4.50	0.83	18.27	40.67	0.35	0.01

Assumptions:
1. *Minimum resolvable feature size is half of the threshold line pair limit. Calculation = 1/(3000 x Lens N.A.)*
2. *Matching pixel size is that which will permit the minimum feature size to overlap two pixels. Calculation = 1/2(Feature Size x System Magnification)*
3. *If the matching pixel size is greater than the camera pixel size, the system is "lens limited."*
4. *If the matching pixel size is less than the camera pixel size, the system is "camera limited."*

12X UltraZoom

Combine Infinity-Corrected Objectives for Maximum Resolution and Magnification

The 12X UltraZoom (1-50502) is a high performance system ideal for semiconductor inspection, flow cytometry, or other high magnification applications. Its advanced design offers high resolution and outstanding contrast. This system incorporates infinity corrected objectives to provide long working distances and excellent edge flatness and clarity. The system's resolution exceeds 1,650 lines per mm, depending on the objective used. The UltraZoom is also available with fine focus (1-50504) or with fine focus and coaxial illumination (1-50503).

12X UltraZoom Field of View Matrix for 1-50502, 1-50503 and 1-50504 (mm)

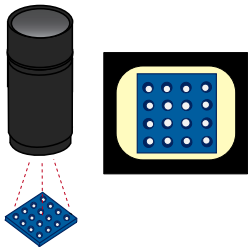
Objective Lens (Mitutoyo) Long W.D.	Working Distance (mm)	Camera Formats/ Parameters	1X Adapter Low - High	1.33X Adapter Low - High	2X Adapter Low - High	3.5X Adapter Low - High
5X 0.14 NA* 1-60226	34	Mag.	(1) 3.57X - 16.66X	(2) 3.26X - 22.16X	2.77X - 33.31X	4.80X - 58.30X
		Field 1/4"	1.12 - 0.24	1.22 - 0.18	1.44 - 0.12	0.83 - 0.07
		Field 1/3"	1.68 - 0.36	1.84 - 0.27	2.17 - 0.18	1.25 - 0.10
		Field 1/2"	2.24 - 0.48	2.45 - 0.36	2.89 - 0.24	1.66 - 0.14
		Field 2/3"	—	2.45 - 0.49	3.97 - 0.33	2.29 - 0.19
10X 0.28 NA* 1-60227	33	Mag.	(1) 7.14X - 33.31X	(2) 6.50X - 44.30X	5.54X - 66.63X	9.70X - 116.60X
		Field 1/4"	0.56 - 0.12	0.61 - 0.09	0.72 - 0.06	0.41 - 0.03
		Field 1/3"	0. 84 - 0.18	0.92 - 0.13	1.08 - 0.09	0.62 - 0.05
		Field 1/2"	1.12 - 0.24	1.23 - 0.18	1.44 - 0.12	0.82 - 0.07
		Field 2/3"	—	1.23 - 0.25	1.99 - 0.17	1.13 - 0.09
20X 0.42 NA* 1-60228	20	Mag.	(1) 14.28X - 64.63X	(2) 13.10X - 85.96X	11.08X - 133.25X	19.40X - 233.20X
		Field 1/4"	0.28 - 0.06	0.30 - 0.04	0.36 - 0.03	0.21 - 0.02
		Field 1/3"	0.42 - 0.09	0.46 - 0.07	0.54 - 0.04	0.31 - 0.03
		Field 1/2"	0.56 - 0.12	0.61 - 0.09	0.72 - 0.06	0.41 - 0.03
		Field 2/3"	—	0.61 - 0.13	0.99 - 0.08	0.57 - 0.05
50X 0.55 NA* 1-60229	13	Mag.	(1) 35.69X - 166.57X	(2) 40.00X - 221.54X	27.50X - 333.13X	48.10X - 583.00X
		Field 1/4"	0.11 - 0.02	0.10 - 0.02	0.14 - 0.01	0.08 - .006
		Field 1/3"	0.17 - 0.04	0.15 - 0.05	0.22 - 0.02	0.12 - 0.01
		Field 1/2"	0.22 - 0.05	0.20 - 0.04	(2) 0.17 - 0.03	0.16 - 0.01
		Field 2/3"	—	0.20 - 0.05	0.40 - 0.03	0.23 - 0.02

Note: This system is not recommended for use with a 2/3" CCD.
(1) Zoom setting at 1.5X.
(2) Zoom setting at 1.0X.
*N.A. at full zoom. N.A. varies with zoom setting.

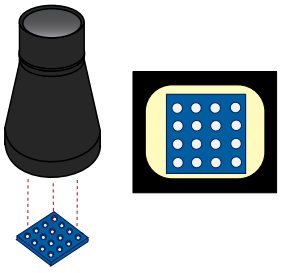
12X Telecentric

Navitar offers a 12X Telecentric zoom system which allows users to reach a true telecentric condition to within 0.3 degrees while maintaining constant perspective and magnification. Ideal for a wide range of applications, including precise dimensional measurement of objects or pattern recognition. There are three telecentric adapters available for use with the 12X Zoom lens, straight (no coax), straight with coax, right angle folded. Each has a working distance of 188 mm. Magnifications range from 0.16X to 1.94X with the upper 1X Adapter and 0.32X to 3.88X with the 2X Adapter. Maximum field of view is 50 mm. An upper 2X F-mount adapter may be used to couple a F-mount camera. Contact us for more information on specifications.

Conventional Lens



12X Telecentric Lens



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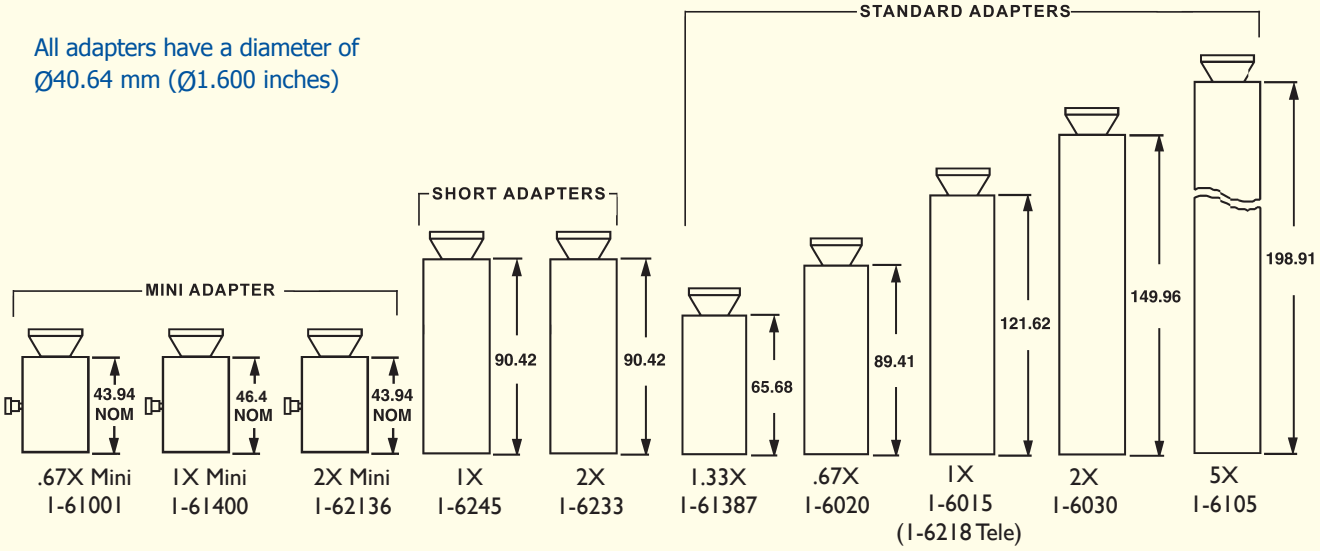
12X Zoom System Dimensions

*All measurements are in mm unless otherwise specified.

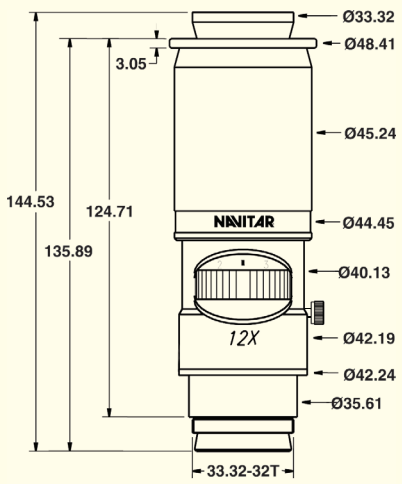
Navitar offers a wide variety of lenses, adapters and attachments. Dimensions of a few examples are provided here. For a complete listing of lens dimensions, please visit www.navitar.com.

Adapters*

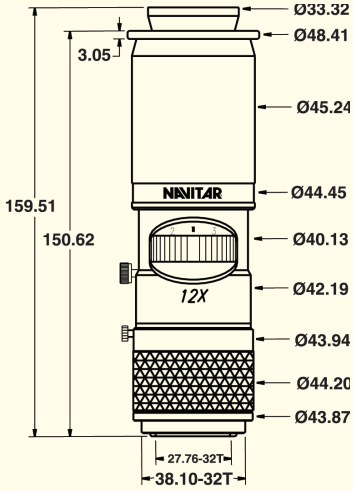
All adapters have a diameter of Ø40.64 mm (Ø1.600 inches)



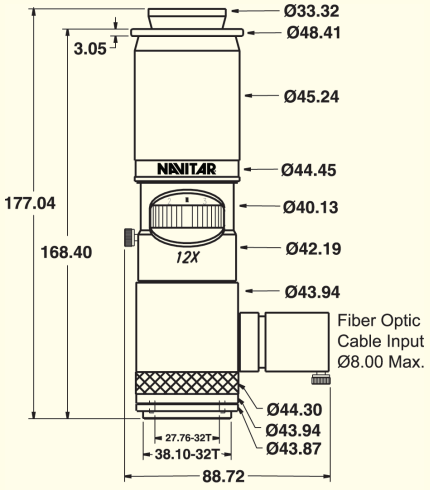
Lenses*



12X Zoom Non F.F.
1-50330

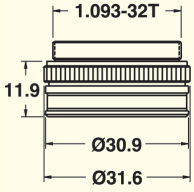


12X Zoom w/ 12 mm F.F.
1-50486

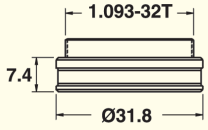


12X Zoom w/ 3 mm F.F. & Coax
1-50487

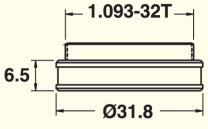
Attachments*



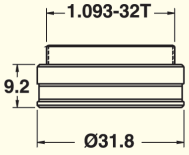
0.25X
1-50011



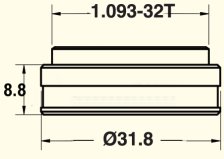
0.5X
1-50012



0.75X
1-50013



1.5X
1-50014



2.0X
1-50015

12X Zoom system diagrams can be found online at www.navitar.com/systemdiagrams

www.digital-usb-microscopes.com
Contact us by phone 1-800-828-6778 or email at info@navitar.com

Differential Interference Contrast Modules

Two Differential Interference Contrast (DIC) modules are available from Navitar:

- DIC Assembly Nikon-High Resolution module (1-63726)
- DIC Assembly module (1-63102).

Both modules can be used on any ultra coax version (zoom or non-zoom) of the Zoom 6000 and 12X Zoom.

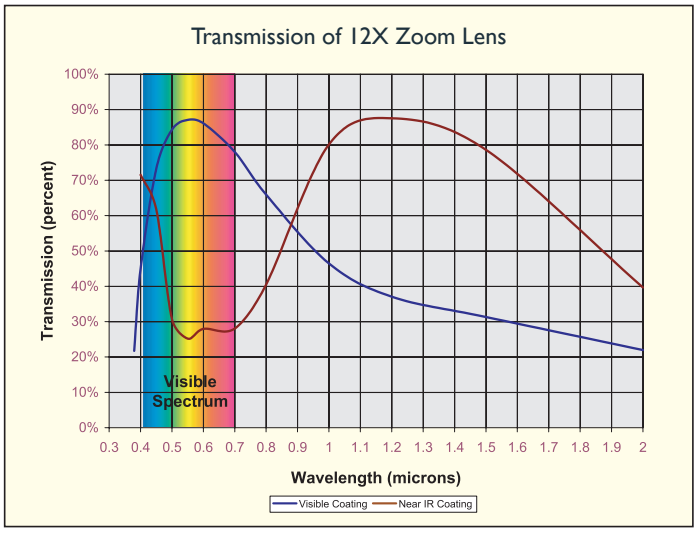
The modules work with object side N.A.'s ranging from 0.05 to 0.50, with optimum performance in the range from 0.15 to 0.4. Lens attachments, operating in the above range will serve for macro applications. Any infinity corrected objectives designed for incident light will suffice for micro. DIC, when used with reflected light, can often be interpreted as a true three-dimensional representation of the surface geometry. It provides a clear distinction between raised and lowered regions in the specimen.

Visit www.navitar.com to learn more about our DIC modules.

NIR Lens Systems

Navitar offers a high magnification Zoom 6000, 12X Zoom and Precise Eye system designed for use in the NIR. Each system has been specifically coated to offer high resolution and unparalleled sensitivity for capturing microscopic images in the near infrared (NIR) wavelength band of 700-1550nm. These modular lens system can be configured to fit nearly any application.

For a complete listing of available NIR parts, please reference our website or contact your Navitar account representative. Body tubes with detents and apertures or motorized are available by custom order.



NIR Optical Applications

- Wafer Characterizations
- Laser Beam Profiling
- Optical Components Measurement & Analysis
- Fiber Alignment & Inspection
- Thermal Monitoring and Research
- Industrial Inspection
- Solar Cell Testing
- Food Inspection
- Pharmaceutical Applications

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Motorized Solutions

More Robust Design

Navitar's motorization design, available on the 12X and Zoom 6000 systems, integrates magnetic Hall-Effect sensors to reference position location. Hall-Effect sensors are solid state devices with no moving parts. They are based on the Hall-Effect, named after its discoverer Edwin Hall in 1879. The Hall-Effect sensing mechanism utilizes a magnetic field to trigger a pulse in a semiconductor circuit. Compared to photo-electric sensors, the Hall-Effect sensors are not affected by harsh, dirty or dusty environments, ambient room light, or variation in system voltages.

Users can choose to motorize the zoom and focus axis, or just the zoom. We have three different motor types available:

- 2 Phase Stepping Motor (Faulhaber)
- 5 Phase Stepping Motor (Oriental, Vexta)
- DC Servo with Encoder (Faulhaber)

Integrated Hall-Effect Solid State Sensor Technology

- Unaffected by ambient light
- Unaffected by environmental contamination
- Unaffected by line voltage

Controller Options

HE Manual Motor Controller: Navitar's HE manual motor controller (part # 1-62823) is designed to allow manual operation of any of the Navitar Hall Effect motorized lenses.

Motorized Control System: Motorized controllers feature single or dual axis control via serial RS-232 or USB. Control systems are available as table top or board level for the OEM. Software includes LabVIEW VI and Windows Graphical User Interface "GUI" for simple axis control. Contact us for part numbers and further specifications.

Motorized 6X Zoom Options

Fine Focus Type	Motor Type 2 ø Stepper	5 ø Stepper	Encoded/ Servo
12 mm Motorized Fine Focus	1-62318	1-62314	1-62310
3 mm Motorized Fine Focus w/ Coax*	1-62319	1-62315	1-62311
12 mm Manual Fine Focus	1-62523	1-62521	1-62522
3 mm Manual Fine Focus w/ Coax*	1-62525	1-62526	1-62524
Non Fine Focus, Non Coax	1-62605	1-62604	1-62606
Non Fine Focus w/ Coax*	1-62608	1-62607	1-62609

Motorized 6X UltraZoom Options

Fine Focus Type	Motor Type 2 ø Stepper	5 ø Stepper	Encoded/Servo
12 mm Motorized Fine Focus	1-62316	1-62312	1-62308
3 mm Motorized Fine Focus w/ Coax*	1-62317	1-62313	1-62309
12 mm Manual Fine Focus	1-62517	1-62519	1-62516
3 mm Manual Fine Focus w/ Coax*	1-62639	1-62645	1-62633
Non Fine Focus, Non Coax	1-62637	1-62643	1-62631
Non Fine Focus w/ Coax*	1-62638	1-62644	1-62632

Motorized 12X Zoom Options

Fine Focus Type	Motor Type 2 ø Stepper	5 ø Stepper	Encoded/Servo
12 mm Motorized Fine Focus	1-51188	1-51206	1-51190
3 mm Motorized Fine Focus w/ Coax*	1-51200	1-51204	1-51202
12 mm Manual Fine Focus	1-51319	1-51316	1-51337
3 mm Manual Fine Focus w/ Coax*	1-51311	1-51315	1-51338
Non Fine Focus, Non Coax	1-51314	1-51317	1-51335
Non Fine Focus w/ Coax*	1-51318	1-51306	1-51336

Motorized 12X UltraZoom Options

Fine Focus Type	Motor Type 2 ø Stepper	5 ø Stepper	Encoded/Servo
12 mm Motorized Fine Focus	1-51192	1-51208	1-51194
3 mm Motorized Fine Focus w/ Coax*	1-51196	1-51210	1-51198
12 mm Manual Fine Focus	1-51325	1-51322	1-51333
3 mm Manual Fine Focus w/ Coax*	1-51326	1-51321	1-51334
Non Fine Focus, Non Coax	1-51320	1-51323	1-51331
Non Fine Focus w/ Coax*	1-51324	1-51327	1-51332

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Precise Eye

For high magnification fixed inspection applications without compromise, Navitar's Precise Eye series of lenses are the obvious choice for you. Precise Eye lenses from Navitar are designed to provide superior optical performance and high vibration stability over standard C-mount video lenses.

- High resolution, diffraction-limited f/4.5 optical quality for high precision measurement and inspection.
- Long working distance makes lighting and handling easier.
- Coaxial lighting available for shadow free illumination.
- Compatible with high-magnification infinity corrected objectives (5X, 10X, 20X, 50X).
- Mechanically stable for the most demanding vibration environments.
- Modular design for flexibility.
- Optics attach to any C-mount camera.
- Short tube length (approx. 4 inches) and small diameter (1.25 inches).
- Allows for coaxial illumination and/or 3 mm fine focus.
- High transmission (>70%) over the visible to near IR spectrum.

Precise Eye Field of View Matrix (in mm at nominal working distance)

Lens Attachment	W.D. (mm)	Camera Format & Parameters	0.5X Adapter 1-62088	0.67X Adapter 1-61453	1.0X Adapter 1-61445	1.33X Adapter 1-61448	2.0X Adapter 1-61450
0.25X 0.018 N.A. DOF 1.59 mm 1-6044	310 (nominal) 282-351 (1) W.D. Range	Mag.	0.22X	0.30X	0.45X	0.60X	0.90X
		Field 1/4″	14.2(h) 10.6(v)	10.7(h) 8.0(v)	7.1(h) 5.3(v)	5.3(h) 4.0(v)	3.6(h) 2.7(v)
		Field 1/3″	21.4(h) 16.0(v)	15.9(h) 11.9(v)	10.7(h) 8.0(v)	8.0(h) 6.0(v)	5.3(h) 4.0(v)
		Field 1/2″	28.4(h) 21.4(v)	21.2(h) 15.9(v)	14.2(h) 10.7(v)	10.6(h) 8.0(v)	7.1(h) 5.3(v)
		Field 2/3″	39.2(h) 29.4(v)	—	19.6(h) 14.7(v)	14.7(h) 11.0(v)	—
0.5X 0.035 N.A. DOF 0.40 mm 1-60110	175 (nominal) 170-190 (1) W.D. Range	Mag.	0.45X	0.60X	0.90X	1.2X	1.8X
		Field 1/4″	7.2(h) 5.2(v)	5.3(h) 4.0(v)	3.6(h) 2 .6(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)
		Field 1/3″	10.6(h) 8.0(v)	8.0(h) 6.0(v)	5.3(h) 4.0(v)	4.0(h) 3.0(v)	2.7(h) 2.0(v)
		Field 1/2″	14.2(h) 10.6(v)	10.6(h) 8.0(v)	7.1(h) 5.3(v)	5.3(h) 4.0(v)	3.6(h) 2.7(v)
		Field 2/3″	19.6(h) 14.6(v)	—	9.8(h) 7.3(v)	7.3(h) 5.5(v)	—
0.75X 0.054 N.A. DOF 0.18 mm 1-60111	113 (nominal) 110-120 (1) W.D. Range	Mag.	0.7X	0.90X	1.4X	1.8X	2.7X
		Field 1/4″	4.6(h) 3.6(v)	3.6(h) 2.7(v)	2.3(h) 1.8(v)	1.8(h) 1.3(v)	1.2(h) 0.9(v)
		Field 1/3″	7.2(h) 5.4(v)	5.3(h) 4.0(v)	3.6(h) 2.7(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)
		Field 1/2″	9.4(h) 7.2(v)	7.1(h) 5.3(v)	4.7(h) 3.6(v)	3.6(h) 2.7(v)	2.4(h) 1.8(v)
		Field 2/3″	13.0(h) 9.8(v)	—	6.5(h) 4.9(v)	4.9(h) 3.7(v)	—
None 0.070 N.A. DOF 0.10 mm	92 (nominal) 90-93 (1) W.D. Range	Mag.	0.9X	1.2X	1.8X	2.4X	3.6X
		Field 1/4″	3.6(h) 2.6(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)	1.3(h) 1.0(v)	0.9(h) 0.7(v)
		Field 1/3″	5.4(h) 4.0(v)	4.0(h) 3.0(v)	2.7(h) 2.0(v)	2.0(h) 1.5(v)	1.3(h) 1.0(v)
		Field 1/2″	7.2(h) 5.4(v)	5.3(h) 4.0(v)	3.6(h) 2.7(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)
		Field 2/3″	9.8(h) 7.4(v)	—	4.9(h) 3.7(v)	3.7(h) 2.8(v)	—
1.5X 0.104 N.A. DOF 0.04 mm 1-60112	51 (nominal) 49-51 (1) W.D. Range	Mag.	1.35X	1.8X	2.7X	3.6X	5.4X
		Field 1/4″	2.4(h) 1.8(v)	1.8(h) 1.3(v)	1.2(h) 0.9(v)	0.9(h) 0.7(v)	0.6(h) 0.4(v)
		Field 1/3″	3.6(h) 2.6(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)	1.3(h) 1.0(v)	0.9(h) 0.7(v)
		Field 1/2″	4.8(h) 3.6(v)	3.6(h) 2.7(v)	2.4(h) 1.8(v)	1.8(h) 1.3(v)	1.2(h) 0.9(v)
		Field 2/3″	6.6(h) 4.8(v)	—	3.3(h) 2.4(v)	2.4(h) 1.8(v)	—
2.0X 0.141 N.A. DOF 0.02 mm 1-60113	36 (nominal) 35-36 (1) W.D. Range	Mag.	1.8X	2.4X	3.6X	4.8X	7.2X
		Field 1/4″	1.8(h) 1.4(v)	1.3(h) 1.0(v)	0.9(h) 0.7(v)	0.7(h) 0.5(v)	0.5(h) 0.3(v)
		Field 1/3″	2.6(h) 2.0(v)	2.0(h) 1.5(v)	1.3(h) 1.0(v)	1.0(h) 0.8(v)	0.7(h) 0.5(v)
		Field 1/2″	3.6(h) 2.6(v)	2.7(h) 2.0(v)	1.8(h) 1.3(v)	1.3(h) 1.0(v)	0.9(h) 0.7(v)
		Field 2/3″	4.8(h) 3.6(v)	—	2.4(h) 1.8(v)	1.8(h) 1.4(v)	—

(1) Working distance range when using 3 mm fine focus. Field of view will change with shorter or longer working distances.

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Ultra Precise Eye

Navitar offers a variety of Ultra Precise Eye systems ideal for high magnification applications. The advanced design produces outstanding contrast and precision, while providing higher resolution and magnification than the standard Precise Eye. These systems incorporate infinity corrected objectives to provide long working distances and excellent edge flatness and clarity. The Ultra Precise Eye is also available with fine focus (1-61521) or with fine focus and co-axial illumination (1-61522).

Precise Eye system diagram can be found online at www.navitar.com/systemdiagrams

Ultra Precise Eye Magnification Matrix (in mm)

Infinity Corrected Objective (Mitutoyo)	W.D. (mm)	Camera Format & Parameters	0.5X Adapter 1-62088	0.67X Adapter 1-61453	1.0X Adapter 1-61445	1.33X Adapter 1-61448	2.0X Adapter 1-61450
5X 0.14 N.A. 1-60226	34	Mag.	2.27X	3.05X	4.55X	6.10X	9.10X
		Field 1/4"	1.4(h) 1.06(v)	1.05(h) 0.79(v)	0.70(h) 0.53(v)	0.52(h) 0.39(v)	0.35(h) 0.26(v)
		Field 1/3"	2.12(h) 1.58(v)	1.57(h) 1.18(v)	1.06(h) 0.79(v)	0.79(h) 0.59(v)	0.53(h) 0.40(v)
		Field 1/2"	2.82(h) 2.12(v)	2.10(h) 1.58(v)	1.41(h) 1.06(v)	1.05(h) 0.79(v)	0.70(h) 0.53(v)
		Field 2/3"	—	—	1.93(h) 1.46(v)	1.44(h) 1.08(v)	—
10X 0.28 N.A. 1-60227	33	Mag.	4.55X	6.1X	9.10X	12.2X	18.2X
		Field 1/4"	0.70(h) 0.52(v)	0.52(h) 0.39(v)	0.35(h) 0.26(v)	0.26(h) 0.20(v)	0.18(h) 0.13(v)
		Field 1/3"	1.06(h) 0.80(v)	0.79(h) 0.59(v)	0.53(h) 0.40(v)	0.39(h) 0.30(v)	0.26(h) 0.20(v)
		Field 1/2"	1.40(h) 1.06(v)	1.05(h) 0.79(v)	0.70(h) 0.53(v)	0.52(h) 0.39(v)	0.35(h) 0.26(v)
		Field 2/3"	—	—	0.97(h) 0.73(v)	0.72(h) 0.54(v)	—
20X 0.42 N.A. 1-60228	20	Mag.	9.1X	12.2X	18.2X	24.4X	36.4X
		Field 1/4"	0.36(h) 0.26(v)	0.26(h) 0.20(v)	0.18(h) 0.13(v)	0.13(h) 0.10(v)	0.09(h) 0.07(v)
		Field 1/3"	0.52(h) 0.40(v)	0.39(h) 0.30(v)	0.26(h) 0.20(v)	0.20(h) 0.15(v)	0.13(h) 0.10(v)
		Field 1/2"	0.70(h) 0.52(v)	0.52(h) 0.39(v)	0.35(h) 0.26(v)	0.26(h) 0.20(v)	0.18(h) 0.14(v)
		Field 2/3"	—	—	0.48(h) 0.36(v)	0.36(h) 0.27(v)	—
50X 0.55 N.A. 1-60229	13	Mag.	22.75X	30.5X	45.5X	61.0X	91.0X
		Field 1/4"	0.14(h) 0.10(v)	0.10(h) 0.08(v)	0.07(h) 0.05(v)	0.05(h) 0.04(v)	0.04(h) 0.03(v)
		Field 1/3"	0.22(h) 0.16(v)	0.16(h) 0.12(v)	0.11(h) 0.08(v)	0.08(h) 0.06(v)	0.06(h) 0.04(v)
		Field 1/2"	0.28(h) 0.22(v)	0.21(h) 0.16(v)	0.14(h) 0.11(v)	0.11(h) 0.08(v)	0.07(h) 0.05(v)
		Field 2/3"	—	—	0.19(h) 0.15(v)	0.14(h) 0.11(v)	—

NOTE: The O-I remains constant for each body tube (main assembly) regardless of which infinity corrected objective and adapter are selected: 1-61517 I-O = 219 mm, 1-61521 I-O = 243 mm, 1-61522 I-O = 263 mm

Precise Eye Accessories

Precise Eye Stand & Adapters

Navitar offers different stand adapter plates so you can use our Precise Eye system with various focus mounts, including Nikon, Olympus and Meiji. A mounting clamp is also available for applications where the Precise Eye needs to be mounted within existing equipment.

Digital Camera Adapter

Navitar's unique Digital Camera Adapter allows you to couple your digital camera or camcorder to any C-mount or standard SLR lens, microscope or telescope, permitting a digital recording of your subject matter.

Lighting Accessories

Illumination has proven to be one of the most important components when designing a successful imaging system. Navitar thoroughly understands that the correct lighting can only enhance the performance of our industry leading vision systems. Navitar offers:

- LED ring lights
- Brightlight LED coaxial illuminators
- Fiber optic illuminators
- Power supplies

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SWIR Hyperspectral Lenses

Navitar's fixed focal length SWIR Hyperspectral lenses are specifically designed for SWIR (short wave infrared) cameras and applications. SWIR Hyperspectral imaging applications require the optical system to efficiently transmit light in the visible, NIR and SWIR wavelengths. In order to accomplish this task the lens design and coatings must be capable of maintaining a high level of transmission throughout a broad wavelength range. Navitar's SWIR Hyperspectral lenses are capable of offering high resolution images in conditions ranging from bright day light, fog/haze, twilight and dusk.

Navitar Standard SWIR lenses are specially coated for imaging in the SWIR wavelength, and designed to cover 1" (16mm diagonal) sensors. They offer high resolution images and transmission in the 700nm-1900-nm wavelength of 75% or better.

Navitar's newest OptiStar® lenses are designed and optimized for high performance in SWIR applications. These lenses function in the wavelengths of 500nm-1700nm with 90% +/- 5% transmission across the range. These optimized lenses are ideal for dark or night time applications.

Common Applications

- Night/Day Security
- Solar Panel
- Semiconductor
- Wafer Inspection
- Perimeter Surveillance
- Machine Vision
- Medical
- Biometrics
- Aerial Imaging
- Food Sorting

Standard SWIR Lenses - 1" Format for use with 1/2", 2/3" and 1" Cameras

Model	Focal Length (mm)	F-Stop Iris Range	Iris Control	Focus Control	Object Area (mm) at M.O.D. (HxV); 1"	Object Area (mm) at M.O.D. (HxV); 2/3"	Object Area (mm) at M.O.D. (HxV); 1/2"	Focusing Range (meters)	Mount Type
SWIR-8	8	1.4-16	Manual*	Manual*	167 x 123	112 x 82	80 x 59	0.1 - inf.	C
SWIR-12	12.5	1.4-16	Manual*	Manual*	316 x 233	213 x 158	165 x 123	0.3 - inf.	C
SWIR-16	16	1.4-16	Manual*	Manual*	244 x 181	165 x 123	119 x 89	0.3 - inf.	C
SWIR-25	25	1.4-16	Manual*	Manual*	161 x 120	109 x 82	79 x 59	0.3 - inf.	C
SWIR-35	35	1.4-16	Manual*	Manual*	110 x 182	75 x 56	54 x 41	0.3 - inf.	C
SWIR-50	50	1.4-16	Manual*	Manual*	122 x 91	84 x 63	61 x 46	0.5 - inf.	C

** Manual iris and focus with locking screws.*

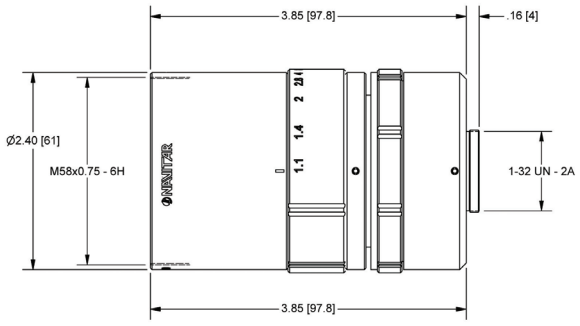
New OptiStar® Lenses - Optimized for 1/2" and 1/3"SWIR Cameras - 1/2" Format

Model	Focal Length (mm)	F-Stop Iris Range	Iris Control	Focus Control	Object Area (mm) at M.O.D. (HxV); 1/2" CCD	Object Area (mm) at M.O.D. (HxV); 1/3" CCD	Focusing Range (meters)	Mount Type
1-18882	25	1.4-11	Manual*	Manual*	194 x 135	146 x 101	1 - inf.	C
1-19179	50	1.1-8	Manual*	Manual*	102 x 78	77 x 59	1 - inf.	C

** Manual iris and focus with locking screws.*

Custom Built SWIR Lens Experience

Navitar offers custom designed SWIR solutions. Our most recent project was a custom lens built for a camera manufacturer. The completed system detects visible, near infrared (NIR) and short wave infrared (SWIR) wavelengths, i.e. 500nm to 1600nm. The custom design was a F/1.35, 25mm, c-mount lens. Contact your account manager for a custom SWIR quote.



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Fluorescent Imaging System

ZFL Fluorescent Video Scope

Navitar's Video ZFL Scope is a Macro/Micro fluorescence vision system that utilizes interchangeable professional fluorescence cubes and internal focus to create an image. It is a simple means of doing very sophisticated task-oriented fluorescence imaging without the expense and complexity associated with a fully-loaded research microscope.

Features

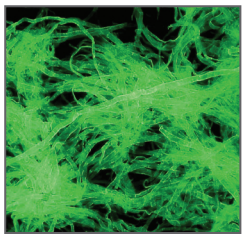
- Utilizes interchangeable professional fluorescence cubes to create images compatible with most existing camera systems.
- Much lower cost and smaller (more compact) than a traditional microscope.
- Field of view up to 9.2 mm with a 2/3" CCD in macro mode.
- Micro mode utilizes professional infinity corrected objectives.
- Remote UV light source includes a long-life metal halide bulb.
- Zoom and fixed systems available. Fine focus included with both systems.

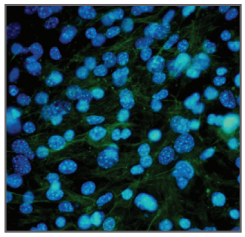
Common Applications

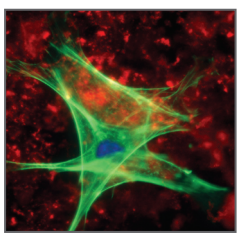
- Flow Cytometry
- Live Cell Imaging
- Laser Confocal Imaging
- Cell Sorting
- DNA Sequencing
- Gel Documentation
- Colony Picking
- Mass Spectrometry
- Air & Water Pollution Testing
- Forensic Examination

ZFL Field of View Matrix

Lens Attachment	Working Distance	Camera Format	1x Mini or T-Mount	1.33x Mini	2x Mini, F-Mount or Standard
0.75x	108	Magnification	.75x	1.08x	1.75x
		Field 1/4"	4.3 x3.2	3.2 x 2.4	2.1 x 1.6
		Field 1/3"	4.8 x 6.4	3.6 x 4.8	2.4 x3.2
		Field 1/2"	6.4 x 8.5	2.7 x 6.4	3.2 x 4.2
		Field 2/3"	11.7 x 8.8	8.8 x 6.5	none
None	86	Magnification	1x	1.33x	2.0x
		Field 1/4"	3.2 x 2.4	2.4 x 1.8	1.6 x 1.2
		Field 1/3"	3.6 x 4.8	2.7 x 3.6	1.8 x2.4
		Field 1/2"	4.8 x 6.4	3.6 x 4.8	2.4 x 3.2
		Field 2/3"	8.8 x 6.6	6.6 x 4.9	none
1.5x	50	Magnification	1.5x	2.83x	3.5x
		Field 1/4"	2.1 x 1.6	1.6 x 1.2	1.0 x 0.8
		Field 1/3"	2.4 x3.2	1.8 x 2.4	1.2 x 1.6
		Field 1/2"	3.2 x 4.3	2.4 x3.2	1.6 x 2.1
		Field 2/3"	5.8 x4.4	4.4 x 3.2	none
2.0x	37	Magnification	2.0x	3.33x	4.0x
		Field 1/4"	1.6 x 1.2	1.2 x 0.9	0.8 x 0.6
		Field 1/3"	1.8 x 2.4	1.3 x 1.8	0.9 x 1.2
		Field 1/2"	2.4 x 3.2	1.8 x 2.4	1.2 x 1.6
		Field 2/3"	4.4 x 3.3	3.3 x 2.5	none

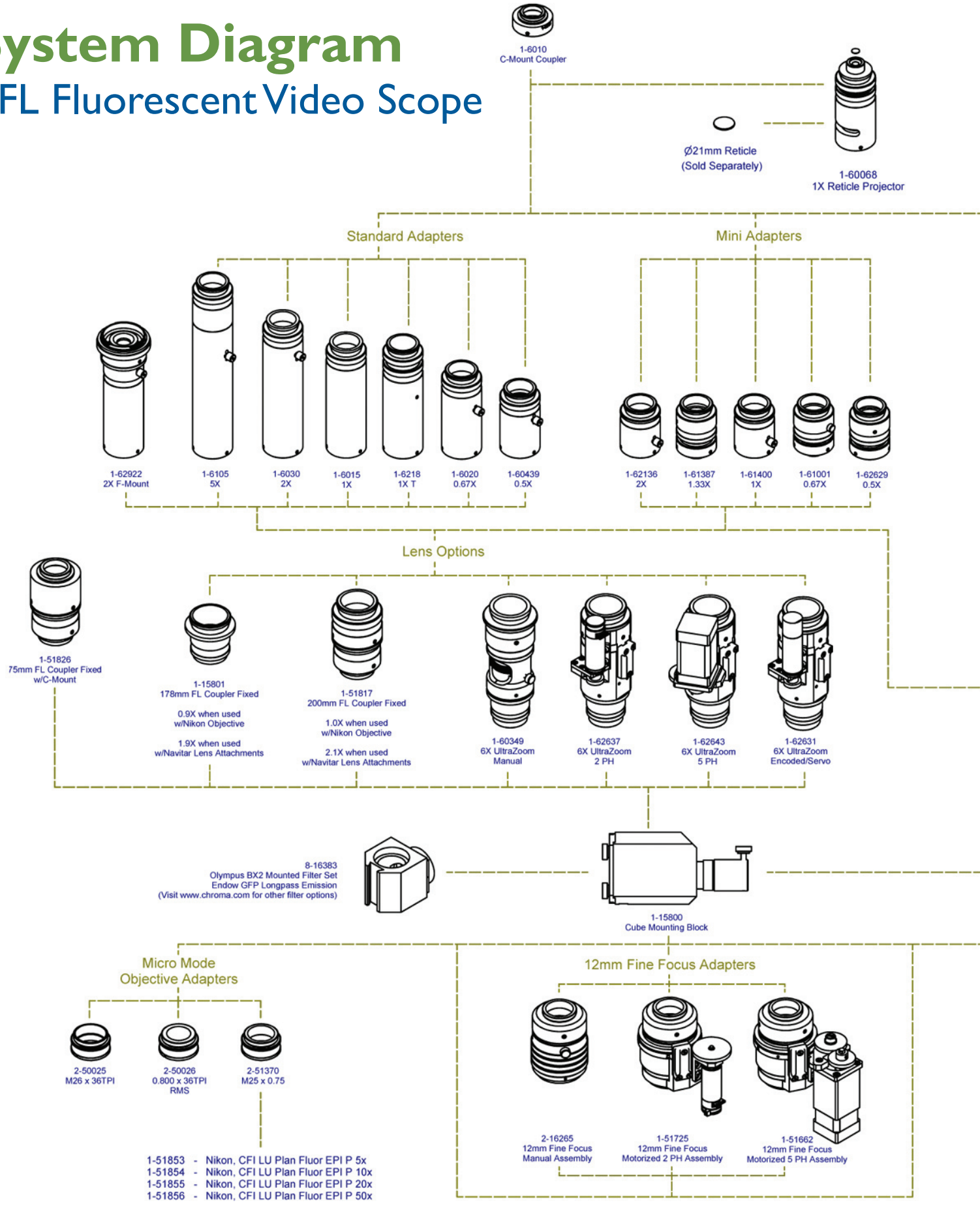






System Diagram

ZFL Fluorescent Video Scope



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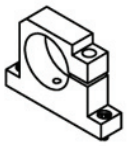
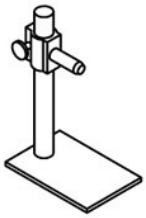
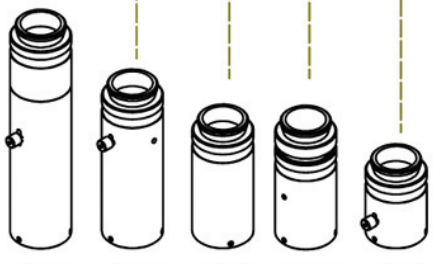
Adapter Plate & Stand


1-6270
Mounting Clamp

3-15818
Mounting Block Support

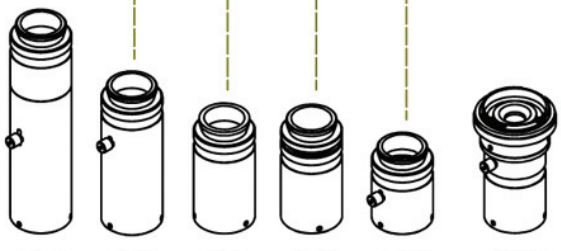

2-14048
Stand

Non-Inv. Right Angle Adapters


1-60188 5X
1-60185 2X
1-60175 1X
1-60182 1X T
1-60172 0.67X

1-60165
NIRA Mount w/Prism

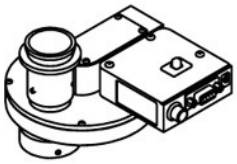
Right Angle Adapters


1-6187 5X
1-6120 2X
1-6118 1X
1-61997 1X T
1-60060 0.71X
1-63218 2X F-Mount

1-6080
Right Angle Mount

1-60816
Analyzer

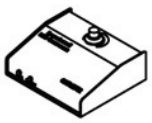
1-60370
Aux. Viewing Port


1-64070
Adapter Tube w/Filter Wheel

1-64071
Filter Wheel Adapter

Light Sources

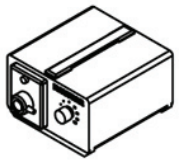
BrightLight II
1-51451 White, 5500K, 2.6/4W
1-51452 White, 5500K, 4.8W
1-51453 Green, 530nm, 4.8W
1-51454 Cyan, 505nm, 4.8W
1-51455 Blue, 470nm, 4.8W
1-51456 Royal Blue, 455nm, 4.8W


1-62802
BrightLight II Power Supply

3-17185
Guide Bushing*

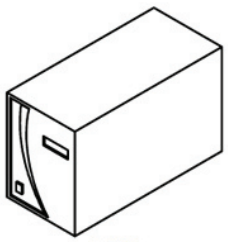
3-15807
Guide Bushing*

1-60162
Flexible Light Pipe for Coax
0.717 Input Ferrule, 3 ft Length


8-61172
120V Fiber Optic Power Supply
150W EKE Lamp, 0.720" Fiber Receptacle

1-17931
Beam Attenuator

8-15820
Liquid Light Guide
1 Meter Long


1-15799
UV Light Source
For use with Liquid Light Guide

Macro Mode Lens

2-50145
1X Converter Lens

Lens Attachments

1-50012 0.5X
1-50013 0.75X
1-50014 1.5X
1-50015 2X

* Included with 1-15800

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Contact us by phone 1-585-359-4000 or email at info@navitar.com

Large Format Lenses

Navitar large format lenses meet the demands for high center to edge resolution, low distortion, and application specific F-numbers. These lenses are not modified video lenses. We have designed these lenses to match the performance abilities of the high end "megapixel" type cameras.

Platinum Large Format Sensor Lenses

Designed for the most demanding applications and for use with today's line scan and area scan cameras, our Platinum series of lenses provide high center to edge resolution, low distortion, and application specific F-numbers. With the Navitar Platinum series, you can count on getting remarkably better resolution and performance than standard camera lenses and enlarging lenses.

25 mm Lens Magnification Specifications

Mag.	Object Size	W.D.	Spot Size	Image MTF Cut-off	Object MTF Cut-off	Object N.A.	Image N.A.	Object Side Depth of Field
0.50X	84.8	45	6.5µ	140	70	0.0212	0.0425	1.1
0.34X	127.2	70	5.6µ	160	50	0.0159	0.0476	1.9
0.20X	212	120	5.2µ	190	38	0.0105	0.0526	4.5
0.14X	318	183	4.8µ	200	25	0.0074	0.0556	9.1
0.10X	424	245	4.8µ	200	20	0.0057	0.0572	15.4

*Measurements are in millimeters unless otherwise specified.

50 mm Lens Magnification Specifications

Mag.	Object Size	Object W.D.	Object MTF at 40% Contrast Lp/mm	Image MTF at 40% Contrast Lp/mm	Object N.A.	Image N.A.	Object Side Depth of Field (microns)
16 mm Sensor Lens							
-1/7X	112	318	> 7	> 50	0.063	0.438	+/- 70
-1/10X	160	466	> 5	> 50	0.045	0.455	+/- 135
-1/14X	224	660	> 3.6	> 50	0.033	0.467	+/- 250
22 mm Sensor Lens							
-1/10X	220	500	> 5	> 50	0.044	0.44	+/- 144
-1/20X	440	1000	> 2.5	> 50	0.023	0.46	+/- 525

Raptar & Raptar Pro Large Format Sensor Lenses

The 50 mm Raptar is an alternative to the traditional SLR camera lenses which are not manufactured to withstand environments traditionally found in industrial applications. Navitar's newest large format lens, the 1X Raptar Pro, has been designed specifically for large area and line scan sensors. The lens offers improved MTF over the Raptar lens series, strong relative illumination and zero distortion over a 90 mm field of view.

Available Raptar Series Lenses

Part #	Lens Mount	Focal Length (mm)	Aperture Range	Focusing Range	Angular Field (Diag. / Horiz.	FIlter Thread Size	Iris Control
1-18820	F	50	f/2 - f/22	0.5m - infinity	46.0° / 37.0°	M58 x 0.75	Manual
1-18890	M42	50	f/2 - f/22	0.5m - infinity	46.0° / 37.0°	M58 x 0.75	Manual

Available Raptar Pro Lenses

Part #	Lens	f/Stop Range	Magnification Range	Lens Dimensions	Sensor Coverage Size	Angle of View (degrees)	Focus Control	Zoom Control	Iris Control
1-17494	86 mm f/4.0	4.0 - 22	1X	76Ø X 95	90 mm	28	Manual	NA	Manual

Raptar Pro system diagrams can be found online at www.navitar.com/systemdiagrams

www.digital-usb-microscopes.com

Rodagon Lenses by Rodenstock

The Rodagon series of lenses are a high quality and flexible choice for line scan cameras. They were originally designed as enlarging lenses and can accommodate 1" and larger format CCD sensors. They are optimal for close focus applications and several camera adapter options are available.

Details

- Supports Large Format CCDs
- Several Camera Adapter Options Available
- Ideal for Line Scan Cameras
- Close Focus Distance

Part #	Effective Focal Length (mm)	f #	Min Focus Distance (mm)	F-Mount Mag Range	Non F-Mount Mag Range
1-17170	28	2.8	36	NA	0.58 - 1.49
1-17171	36	4.0	44	NA	0.24 - 1.67
1-17172	50	2.8	155	0.62 - 1.12	0 - 1.49
1-17173	60	4.0	655	0.27 - 1.14	0 - 1.39
1-17174	80	4.0	580	0 - 0.96	0 - 0.86
1-17175	105	5.6	974	0 - 0.71	0 - 0.40
1-17176	135	5.6	2128	0 - 0.35	0 - 0.12

Zeiss Lenses

Zeiss ZF lenses offer the image quality associated with professional photography for technical and industrial applications. Zeiss ZF lenses are compatible with the Nikon F-Bayonet, the globally recognized standard for high-resolution industrial cameras with large format image sensors with sizes over one inch.

With focal lengths of 25, 35, 85 and 100 mm these lenses are suitable for use in machine vision, automation, quality inspection and measuring tasks. The lenses feature high image definition, color purity, stray light absorption, and excellent distortion correction.

Ziess ZF - I Lenses

Part #	Description	Format (mm)	Effective Focal Length (mm)	f #	Iris
1-18808	Distagon T 4.0/18 ZF-I	45	18	4.0	Manual
1-18809	Distagon T 2.8/21 ZF-I	45	21	2.8	Manual
1-18810	Distagon T 2.8/25 ZF-I	45	25	2.8	Manual
1-18811	Distagon T 2.8/28 ZF-I	45	28	2.0	Manual
1-18812	Distagon T 20/35 ZF-I	45	35	2.0	Manual
1-18813	Planar T 1.5/50 ZF-I	45	50	1.4	Manual
1-18814	Marko Planar T 2.0/50 ZF-I	45	50	2.0	Manual
1-18815	Planar T 1.4/85 ZF-I	45	85	1.4	Manual
1-18816	Marko Planar T 2.0/100 ZF-I	45	100	2.0	Manual

Ziess ZF - IR Lenses

Part #	Description	Format (mm)	Effective Focal Length (mm)	f #	Iris
1-18817	Distagon T 2.8/25 ZF-IR	45	25	2.8	Manual
1-18818	Distagon T 1.4/50 ZF-IR	45	50	1.4	Manual
1-18810	Distagon T 1.4/85 ZF-IR	45	85	1.4	Manual

Navitar Machine Vision Lenses

Navitar low magnification CCTV lens offerings are the benchmark against which all CCTV video lenses should be measured. Quality construction, coupled with precision engineering, result in high resolution, sharp, optically precise video optics. We offer a complete range of imaging lenses for every industrial and robotic image processing application.

- Up to 3K sensor coverage
- High resolution
- Low distortion
- Megapixel lenses
- High speed lenses
- Affordable pricing

1" Format Lenses

Part #	Focal Length	F-Stop Iris Range	Focusing Range	Object Area (mm) at M.O.D. 1"	Object Area (mm) at M.O.D. 2/3"	Object Area (mm) at M.O.D. 1/2"	Object Area (mm) at M.O.D. 1/3"	Object Area (mm) at M.O.D. 1/4"
1" Megapixel Fixed Focal Length Lenses								
NMV-8M1	8	1.4 - 16	0.1 - inf.	196 x 143	130 x 96	93 x 69	70 x 52	47 x 35
NMV-12M1	12	1.4 - 16	0.3 - inf.	331 x 244	223 x 165	160 x 119	120 x 89	80 x 59
NMV-16M1	16	1.4 - 16	0.3 - inf.	252 x 186	170 x 127	123 x 92	92 x 69	62 x 46
NMV-25M1	25	1.4 - 16	0.3 - inf.	161 x 120	109 x 82	79 x 59	59 x 44	39 x 29
NMV-35M1	35	1.4 - 16	0.3 - inf.	110 x 82	75 x 56	54 x 41	40 x 31	27 x 20
NMV-50M1	50	1.4 - 16	0.5 - inf.	122 x 91	84 x 63	61 x 46	46 x 34	30 x 23
NMV-75M1	75	1.8 - 16	1.0 - inf.	80 x 60	55 x 41	40 x 30	30 x 22	20 x 15
1" High Speed Fixed Focal Length Lenses								
DO-1795	17	0.95 - 16	0.5 - inf.	363 x 272	250 - 187	182 x 136	136 X 102	91 x 68
DO-2595	25	0.95 - 16	0.5 - inf.	243 x 182	167 x 125	121 x 91	91 x 68	60 x 45
DO-5095	50	0.95 - 16	0.6 - inf.	140 x 105	97 x 72	70 x 53	53 x 40	35 x 26
1" Fixed Focal Length Lenses								
DO-1213	12.5	1.3 - Close	0.3 - inf.	338 x 251	229 x 171	165 x 123	123 x 92	82 x 61
DO-2514	25	1.4 - Close	0.5 - inf.	241 x 180	165 x 123	120 x 90	90 x 67	60 x 45
DO-5018	50	1.8 - Close	1.0 - inf.	255 x 190	174 x 130	126 x 71	95 x 71	63 x 47
1" Zoom Lenses								
DOZ-10X16	16-160	2.0 - Close	1.5 - inf.	Wide 1418 x 970 Tele 120 x 92	Wide 974 x 666 Tele 82 x 63	Wide 709 x 485 Tele 60 x 46	Wide 531 x 363 Tele 45 x 34	Wide 354 x 242 Tele 30 x 23

2/3" Megapixel Fixed Focal Length Lenses

2/3" Format Lenses

Part #	Focal Length	F-Stop Iris Range	Focusing Range	Object Area (mm) at M.O.D. 2/3"	Object Area (mm) at M.O.D. 1/2"	Object Area (mm) at M.O.D. 1/3"	Object Area (mm) at M.O.D. 1/4"
2/3" Megapixel Fixed Focal Length Lenses							
NMV-5M23	5	2.8 - 16	0.05 - inf.	196.8 x 147.6	110 x 105	82 x 78	55 x 52
NMV-8M23	8	1.4 - close	0.12 - inf.	117.3 x 88	84 x 63	63 x 47	49 x 31
NMV-12M23	12	1.4 - close	0.15 - inf.	110 x 82.5	79 x 59	59 x 44	39 x 29
NMV-16M23	16	1.4 - 16	0.2 - inf.	112.8 x 84.4	80 x 60	60 x 45	40 x 30
NMV-25M23	25	1.4 - 16	0.2 - inf.	71.1 x 53.3	51 x 38	38 x 28	25 x 14
NMV-35M23	35	2.0 - 16	0.2- inf.	47.9 x 35.8	33 x 26	25 x 19	16 x 13
NMV-50M23	50	2.8 - 22	0.2 - inf.	29.3 x 21.9	21 x 16	16 x 12	10 x 8

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2/3" Format Lenses (continued)

Part #	Focal Length	F-Stop Iris Range	Focusing Range	Object Area (mm) at M.O.D. 2/3"	Object Area (mm) at M.O.D. 1/2"	Object Area (mm) at M.O.D. 1/3"	Object Area (mm) at M.O.D. 1/4"
2/3" Fixed Focal Length Lenses							
NMV-6	6	1.4 - 16	0.1 - inf.	367 x 251	264 x 181	198 x 136	132 x 90
NMV-8	8	1.4 - 16	0.1 - inf.	260 x 184	187 x 132	140 x 99	93 x 66
NMV-12	12	1.4 - 16	0.1 - inf.	237 x 173	170 x 125	127 x 93	85 x 62
NMV-16	16	1.4 - 16	0.2 - inf.	111.8 x 82.6	80 x 60	60 x 45	40 x 30
NMV-25	25	1.6 - 16	0.2 - inf.	119 x 89	86 x 64	64 x 48	43 x 32
NMV-35	35	1.6 - 16	0.35 - inf.	126.6 x 94.7	91 x 68	68 x 51	45 x 34
NMV-50	50	2.0 - 22	0.5 - inf.	85 x 63.6	61 x 46	46 x 34	30 x 23
NMV-75	75	2.5 - 22	1.2 - inf.	50.8 x 38.1	37 x 27	28 x 20	18 x 13
NMV-100	100	2.8 - 32	2.0 - inf.	36.8 x 27.6	27 x 20	20 x 15	13 x 10
NAV - 1614	16	1.4 - 16	0.25 - inf.	119 x 89	87 x 65	65 x 49	43 x 32
DO-2514	25	1.4 - 16	0.25 - inf.	72 x 54	52 x 39	39 x 29	26 x 19
NAV-3520	35	2.0 - 22	0.25 - inf.	46 x 34	33 x 25	25 x 19	17 x 13
NAV-5028	50	2.8 - 22	0.5 - inf.	66 x 50	48 x 36	36 x 27	24 x 18
DO-1614	16	1.4 - Close	0.3 - inf.	163 x 122	-	88 x 66	59 x 44
DO-1616CWO	16	1.6	0.3 - inf.	170 x 126	122 x 91	91 x 68	61 x 45
2/3" Zoom Lenses							
DOZ - 11110	11 - 110 (10X)	1.8 - Close	1.3 - inf.	Wide 995 x 736 Tele 100 x 75	Wide 713 x 531 Tele 73 x 55	Wide 531 x 396 Tele 55 x 41	Wide 356 x 265 Tele 36 x 27

1/2" Format Lenses

Part #	Focal Length	F-Stop Iris Range	Focusing Range	Object Area (mm) at M.O.D. 1/2"	Object Area (mm) at M.O.D. 1/3"	Object Area (mm) at M.O.D. 1/4"
1/2" Wide Angle Fixed Focal Length Lenses						
NMV-4WA	3.5	1.4 - 16	0.2 - inf.	396 x 247	297 x 185	198 x 123
NMV-5WA	4.5	1.4 - 16	0.2 - inf.	260 x 180	195 x 135	130 x 90
NMV-6WA	6	1.4 - 16	0.2 - inf.	174 x 128	130 x 96	87 x 64
NMV-12WA	12	1.4 - 16	0.3 - inf.	167 x 123	125 x 92	83 x 61
1/2" Fixed Focal Length Lenses						
NAV-614	6	1.4-16	0.5 - inf.	176 x 130	132 x 97	88 x 65
DO-1212	12	1.2 - Close	0.3 - inf.	162 x 120	120 x 90	81 x 60
1/2" Zoom Lens						
DOZ- 6X8.5	8.5-51	1.2 -Close	1.0 - inf.	Wide 696 x 521 Tele 119 x 90	Wide 521 x 390 Tele 90 x 68	Wide 348 x 260 Tele 59 x 45

1/3" Format Lenses

Part #	Focal Length	F-Stop Iris Range	Focusing Range	Mount Type	Object Area (mm) at M.O.D. 1/3"	Object Area (mm) at M.O.D. 1/4"
1/3" Fixed Focal Length Lenses						
DO-2814	2.8	1.4 - Close	0.3 - inf.	CS	579 x 414	386 x 276
DO-412	4	1.2 - Close	0.3 - inf.	CS	373 x 275	248 x 183
DO-812	8	1.4 - Close	0.3 - inf.	CS	183 x 36	122 x 90
1/3" Zoom Lenses						
DOZ-2X4	4 - 8	1.4 - Close	Near - Far	CS	Wide 386 x 281 Tele 196 x 147	Wide 257 x 187 Tele 130 x 98

Zoom 7000 Series

Zoom 7000

The Zoom 7000 is a close- focusing macro video lens which is versatile and specifically designed to be used in applications where objects over 1" in diameter must be imaged. It offers unsurpassed clarity and parfocal zoom capabilities and is compatible with cameras 2/3" or smaller.

Features

- Working distance 5" to infinity.
- Parfocal over entire zoom range.
- Highest mag. 1.1X at 5" (at camera).

Zoom 7010

The Navitar Zoom 7010 Macro Zoom lens is specifically designed for use with a 1/3" or smaller camera and has a 10X zoom ratio. The 10X Macro Zoom lens allows close-up image capture without extension tubes or close-up lenses and the up-to-10X magnification variable (zooming) capability allows small objects to be expanded for close-up observation.

Features

- Imaging at distances from 7-12".
- Working distance of 16" to infinity when the built-in close-up lens is removed.
- Very high resolution.
- C-mount is standard.

Zoom 7000E

The Zoom 7000E system is specifically designed for use in educational applications where industrial inspection and imaging features are less essential. It offers a 6:1 zoom ratio over a focal range of 12.5 mm to 75 mm. The Zoom 7000E system incorporates many of the features of the Zoom 7000 and 7010 systems at an attractive price.

Features

- Eliminates eyestrain from prolonged microscope viewing.
- Can be used as a video overhead projector.
- Provides high-resolution color images.
- Works under room light conditions.

7000 Series Lens Specifications

Part #	Format	EFL (mm)	F-Stop	Iris Control	Object Area at M.O.D. (HxV) 2/3"	Object Area at M.O.D. (HxV) 1/2"	Object Area at M.O.D. (HxV) 1/3"	Object Area at M.O.D. (HxV) 1/4"	Filter Diameter	Mount
Zoom 7000	2/3"	18.0 - 108.0	2.5	manual	Wide 252 x 195 Tele 31 x 24	Wide 183 x 42 Tele 31 x 24	Wide 138 x 106 Tele 23 x 18	Wide 91 x 71 Tele 15 x 12	Ø52 P=0.75	C
Zoom 7000E	2/3"	12.5 - 75.0	1.80	manual	Wide 504 x 378 Tele 83 x 64	Wide 367 x 275 Tele 60 x 45	Wide 274 x 206 Tele 45 x 34	Wide 183 x 137 Tele 30 x 22	Ø49 P=0.75	C
Zoom 7010	1/3"	8.5 x 90.0	2.50	manual	-	-	Wide 170 x 127.8 Tele 16.8 x 12.6 w/ out closeup lens	Wide 11 x 127.8 Tele 11 x 8 w/ out close up lens	Ø27 P=0.5	C

Fujinon & Dyotar Video Lenses

Navitar offers a wide range of Fujinon & Dyotar video lenses. Fujinon lenses are ideal for the growing number of video imaging applications in which a single, constant magnification factor and a fixed working distance are required to maximize contrast and performance. Dyotar provides image quality of your machine vision application without moving up to an expensive lens. Dyotars are optimized for higher magnifications and better resolution than standard fixed focal length CCTV video lenses. Designed and developed for large format cameras, Dyotar lenses provide accurate imaging on large linear detector arrays, as well as unparalleled quality on smaller video formats. These lenses produce a flat field with low distortion.

To view our full line of Fujinon and Dyotar lenses visit www.navitar.com or call your account manager for more information.

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Learn more and visit us on the web at www.navitar.com

High Speed Lenses

Navitar high speed fixed focal length lenses work with CCD & CMOS cameras. Our C-Mount, 1" format lenses are designed for 17, 25 and 50 mm focal lengths and are well suited for low light applications.

Common Applications

- Digital Microscopy
- Chemiluminescence
- Digital X-ray
- Motion Analysis
- Transport Inspection
- High Speed Bottle Inspection

Navitar 1" Format High Speed Lenses

Model	Focal Length (mm)	F-Stop Iris Range	Iris Control	Focus Control	Object Area (mm) at M.O.D. (HxV); 1"	Object Area (mm) at M.O.D. (HxV); 2/3"	Object Area (mm) at M.O.D. (HxV); 1/2"	Object Area (mm) at M.O.D. (HxV); 1/3"	Object Area (mm) at M.O.D. (HxV); 1/4	Focusing Range (meters)
DO-1795	17	0.95 - 16	Manual*	Manual*	363 x 272	250 x 187	182 x 136	136 x 102	91 x 68	0.5 - inf.
DO-2595	25	0.95 - 16	Manual*	Manual*	243 x 182	167 x 125	121 x 91	91 x 68	60 x 45	0.5 - inf.
DO-5095	50	0.95 - 16	Manual*	Manual*	140 x 105	97 x 72	70 x 53	53 x 40	35 x 26	0.6 - inf.

** Manual iris and focus with locking screws.*

Illumination Products

Illumination has proven to be one of the most important components when designing a successful imaging system. Navitar thoroughly understands that the correct lighting can only enhance the performance of our industry leading vision systems.

Fiber Optic Illumination

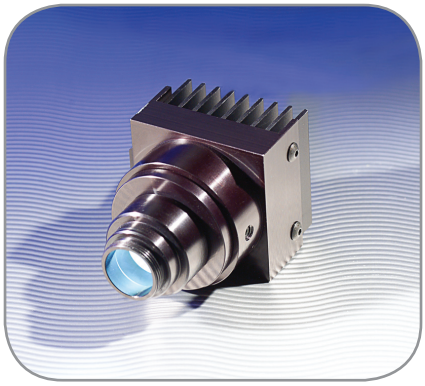
Fiber optic illuminators are the most versatile illuminators on the market today. They consist of a high-powered light source which can be used with ring lights or flexible light pipes for oblique or co-axial illumination.

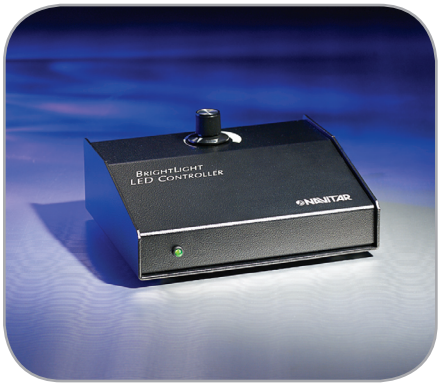
Navitar offers a series of high intensity fiber optic illuminators and accessories that allow you to position your light for best possible viewing. These fiber optic illuminators consist of a Halogen illumination system with a variable light intensity control. They accept a single or dual light pipe or an attachable ring light for illuminating a wider area. These illuminators offer low operating temperature and low noise output.

- Fiber optic illuminators
- LED ring lights
- BrightLight LED coaxial illuminators
- External & internal coaxial illumination

LED Illumination

Our LED-based ring lights and coaxial lights were designed with careful consideration for the standard working distances that most of our customers use. The components are low profile and provide bright, even illumination to compliment the performance of your vision system.





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Navitar Projection Optics

Navitar produces projection lenses that help you overcome the limitations of standard manufacturer projectors. Our lenses let you place the projector almost anywhere while maintaining high quality images.

With Navitar, you get more than just a projector lens.

We offer customers:

- Lifetime product warranty
- 45-Day evaluation program
- No-hassle return policy
- Exceptional customer service
- Affordable pricing
- Extensive product line
- Expert industry knowledge

Markets We Serve

3D/4D Theater
Cinema Advertising
Consumer Electronics
Corporate
Digital and Retail Signage
Education
Government & Military Communication
Home Theater
Interactive Projection & Amusement
MRI Projection Applications
Portable Presentation
Worship Facilities
Rental and Staging
Training & Simulation
Planetarium

Projector Types

Navitar lenses are available for numerous projector brands and models including Sony, JVC, Sanyo, Christie, Epson, Hitachi and Mitsubishi are compatible with a variety of formats and resolutions:

Formats	Resolutions
LCD	720p
D-ILA	1080p
LCOS	2K
Single Chip DLP	4K
3-Chip DLP	WXGA
SXRD	SXGA+

Coming Soon...

The following two lenses are currently in the development & prototype stage at Navitar:

New HemiStar lens for use with 0.65" single chip DLP projectors and resolution of 1920x1200 WUXGA such as the InFocus IN5534L with 7000 lumens.

New HemiStar lens for use with 0.67" single chip DLP projectors with a resolution of 1280x800 WXGA such as the Panasonic PT-DW6300ULS with 6000 lumens.

Custom Projection Optics

Navitar offers custom optical projection lens solutions. Our design team of optical, mechanical and electrical engineers have years of experience and are ready to design and seamlessly integrate a custom projection lens into your system. Our most recent custom design project experience is detailed below.

4K Projection Lenses

We recently designed lenses for Sony and JVC 4K projectors. The Sony lens had a 0.8:1 throw ratio and offers a vertical lens shift of +/- 20%, and allows users to closely stack 2 projectors. The widest lens Sony offers for this projector is a 0.9:1 ratio. Also, recently developed was a long throw zoom lens for JVC with a 2.1-5.0:1 throw ratio.

Military Simulation Optics

A set of custom designed lenses were built with throw ratios of 0.9:1, 1:1 and 1.2:1. The lenses were used in JVC and Sony projectors for military flight simulators. The lenses provided bright, sharp images and perfect color registration all the way to the four corners of the projected image.

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NuView® Replacement Lenses

Replaces the existing prime lens of your projector.

NuView projection lenses replace the existing prime lens of a projector allowing you to use your projector in a variety of new applications. With a wide selection of stock and custom designed long-throw zoom and wide-angle lenses to choose from, we are sure to have a replacement lens solution for your application, screen size or projection distance. NuView lenses produce the bright, sharp images you need at a price you can afford.

NuView Long Throw Lenses

- Enable you to increase projection distance and move your projector farther from the screen.
- The zoom feature allows you to choose your projection distance and image size by simply rotating the lens.
- Focal lengths range from 2"-18.3"/ 50mm-464mm

NuView Wide Angle Fixed Focal Lenses

- Utilized in rear screen applications
- Produce much larger images for front projection
- Focal lengths range from .47"-1.2" /11.9-30mm
- Increase your present image size with out moving the projector

ScreenStar® Conversion Lenses

Sits in front of your projector's prime lens.

ScreenStar conversion lenses sit in front of your projector's standard lens to increase your picture size or increase throw distance by 20-50%. These lenses decrease the overall cost of installations by allowing you to reduce the number of projectors.

Standard ScreenStar Lenses

Part #	Description	Image Conversion
SSW065	0.65X wide angle converter	50% larger image
SSW08	0.8X wide angle converter	25% larger image
SST120	1.20X telephoto converter	17% smaller image
SST150	1.50X telephoto converter	33% smaller image
SST300	3.00X telephoto converter	67% smaller image

High Definition -HD ScreenStar Lenses

Part #	Description	Image Conversion
HDSSW065	0.65X HD wide angle converter	50% larger image
HDSSW08	0.8X HD wide angle converter	25% larger image

Mini ScreenStar Lenses

Part #	Description	Image Conversion
SSC065	0.65X mini wide angle converter	50% larger image
SSC08	0.8X mini wide angle converter	25% larger image
SSC125	1.25X mini telephoto converter	20% larger image

HemiStar® Dome Lenses

Cutting Edge Solutions for Dome & Non-Flat Surfaces.

Navitar has leapfrogged the current dome lens optical technologies to offer a single lens dome presentation solution for customers that require higher resolution on screen. The Navitar HemiStar projection lens offers multi-purpose solutions:

180 Degree Solutions for Dome & Planetarium Presentations ▪ 360 Degree Solutions for Spherical Ball and Globe Presentations ▪ Non Flat and Irregular Shaped Surface Projection

Specifications:

- 180 x 180 degrees field of view
- 6.75 mm focal length
- F# 3.05
- Can be placed on-axis and off-axis
- 1:1 throw ratio with 1.3" (33mm) format projector
- Optimal projection distance of 15" (381mm) to infinity
- 95% center to edge relative illumination

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NAVITAR®

Imaging Solutions

Products:

- High Mag Imaging
- Motorized Systems
- Fluorescent Imaging
- UV Imaging
- SWIR Imaging
- Large Format Lenses
- Low Mag Video Lenses
- High Speed Lenses

Markets Served:

- Semiconductor
- Electronics
- Biotechnology
- Medical
- Flat Panel Display
- Food & Beverage
- Government & Military
- Fiber Optics & Telecom

Projection Optics

Products:

- NuView® Replacement Lenses
- ScreenStar® Conversion Lenses
- HemiStar® Dome and Non-Flat Surface Lenses

Markets Served:

- Planetarium
- Corporate
- Training & Simulation
- Education
- Worship Facilities
- Interactive Display
- Home Theater
- Amusement Park Attractions

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Phone: 585-359-4000 **Toll Free:** 800-828-6778 **Fax:** 585-359-4999
Email: info@navitar.com **Web:** www.navitar.com

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