12X Zoom

- Incredible 12X (0.58-7X) magnification for inspection of a wider range of parts.
- Telecentric attachment gives you the world's first parfocal telecentric zoom lens with field coverage up to 50 mm.
- Increased resolution with 0.018-0.1 N.A.
- Variable working distance from 37 to 334 mm.
- Field of view from 0.01 mm to 83 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.

Vertrieb durch:

Polytec GmbH
Polytec Platz 1-7
D-76337 Waldbronn

Tel.: +49(0)7243 / 604-180
E-Mail: bv@polytec.de

12X Zoom

Raising the Standard for Optical Excellence

The Highest Combination of Zoom Range and Resolution in a State-of-the-Art Zoom System

Navitar's 12X Zoom is the next generation in video zoom optics. With a numeric aperture of 0.018 - 0.1 and a nominal zoom range of 0.58 - 7X, the 12X is the only single lens system to provide such a high combination of zoom range and resolution. This outstanding combination of video clarity and zoom range, coupled with unprecedented field coverage, means that you will now be able to view a wider range of parts with a single video inspection system.

Flexible by Design

The 12X Zoom system is designed on a modular basis, offering optical quality and mechanical flexibility. This interchangeable design, combined with a wide range of lens adapters and attachments, allows you to easily choose the magnification, field of view and working distance that best suit your viewing needs. In fact, the 12X Zoom system is even compatible with existing Zoom 6000 adapters.*

All 12X Zoom models have a 12X parfocal zoom lens system with a

high N.A. to achieve higher resolution and improved optical clarity. Working distance can be varied from 37 mm (1.5") to 334 mm (13.2") and fields of view can be achieved from 0.01 mm to 83 mm.

Designed to Increase Productivity

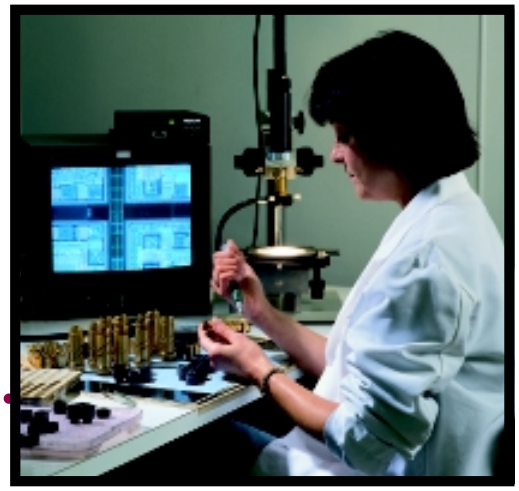
The 12X Zoom system is ideal for use in the inspection of a wide range of products, such as semiconductor chips, PC boards and BGAs.

It increases productivity by eliminating the need to change components to view a wider range of parts. It's easy to use and displays crisp, clear images on any monitor for individual or group viewing.

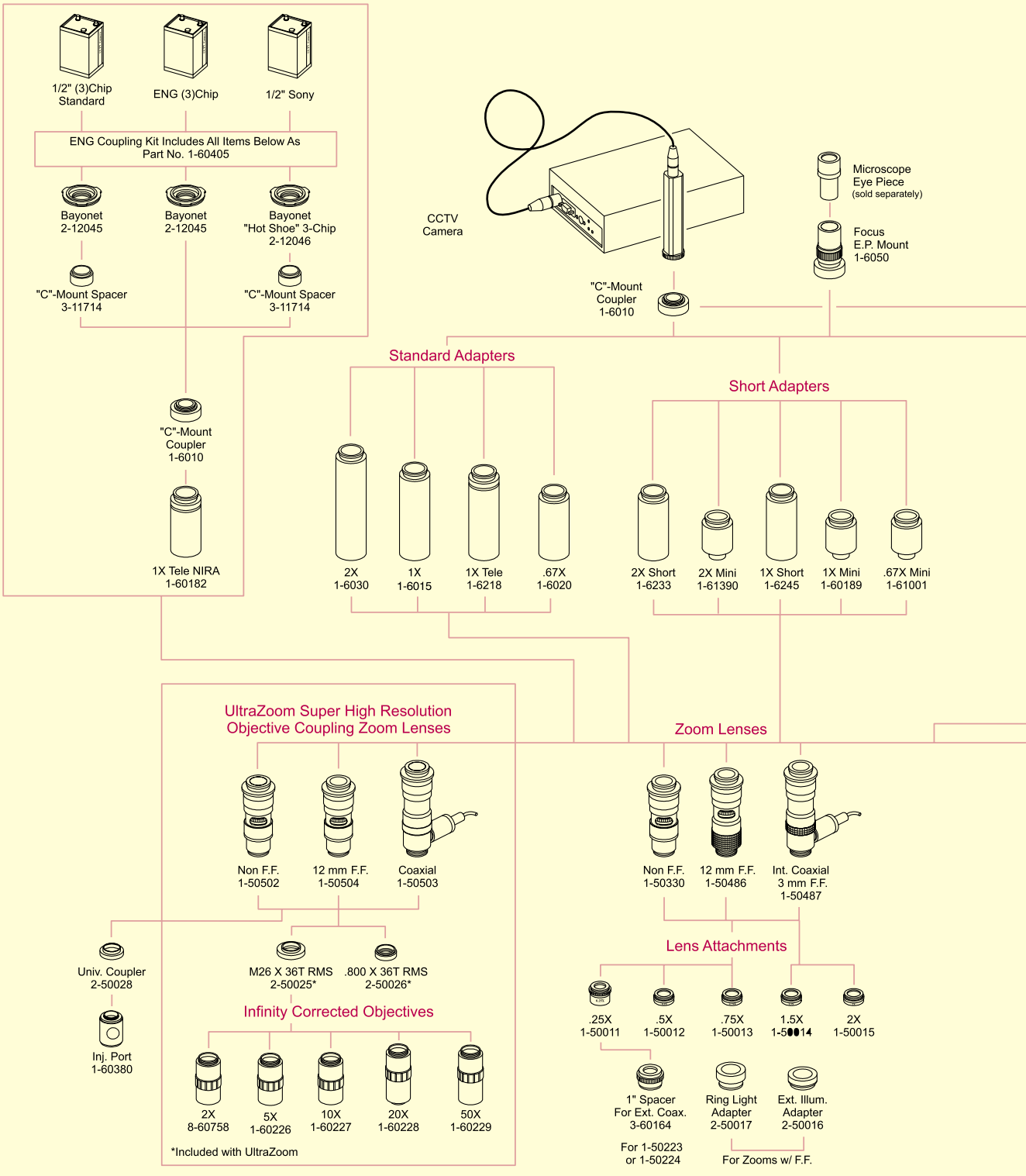
Unbeatable Accuracy

Our 12X Zoom delivers unbeatable accuracy and repeatability for even the toughest die bonding and BGA applications. Superb Navitar optics deliver remarkably high contrast, high resolution video images. The 12:1 zoom ratio provides an incredible magnification range that allows both high magnification for precision measurement and inspection, as well as low magnification for a wider field of view. Bonding, probing, scribing and aligning applications can all be performed better and more accurate than with any other zoom lens on the market.

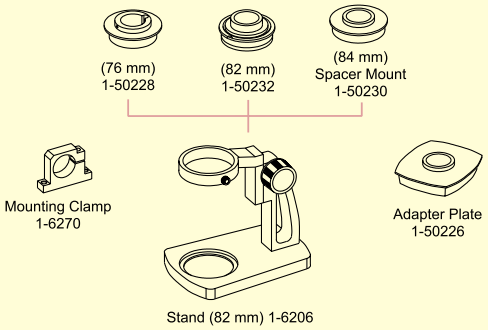
**Adapters are components positioned between the zoom lens and the Camera.*

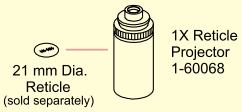


12X Zoom System Diagram

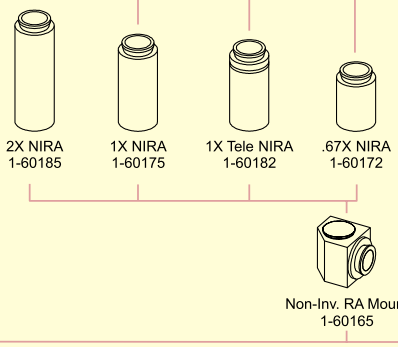


Adapter Plates

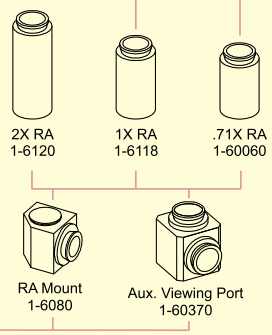




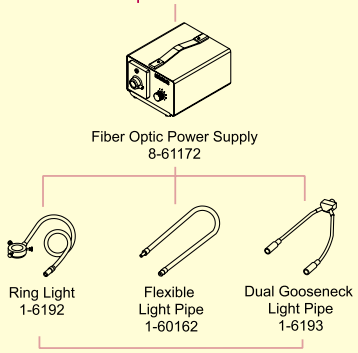
Non-inv. Right Angle Adapters



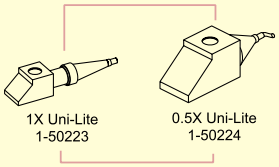
Right Angle Adapters



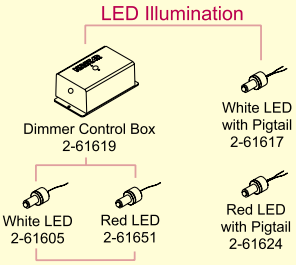
Fiber Optic Illumination**



External Co-axial Illumination

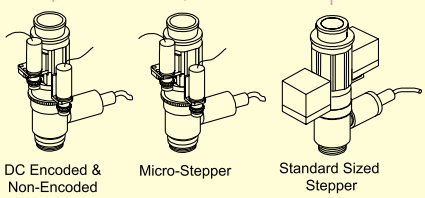


LED Illumination



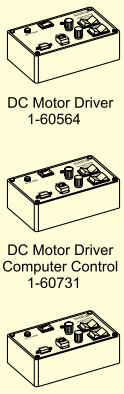
** Additional lighting options available. See the illumination section of the catalog or contact a Navitar sales representative for more information.

Motorized Zoom Options*



* All motorized systems are available with limit switch positioning and co-axial illumination. Motorized options available on zoom, focus or iris.

Motorized Zoom Contol Boxes



NOTE

Detents available on all manual zoom systems.

Iris diaphragm available on all manual zoom lenses.

12X Zoom

12X Zoom Field of View Matrix (in mm)

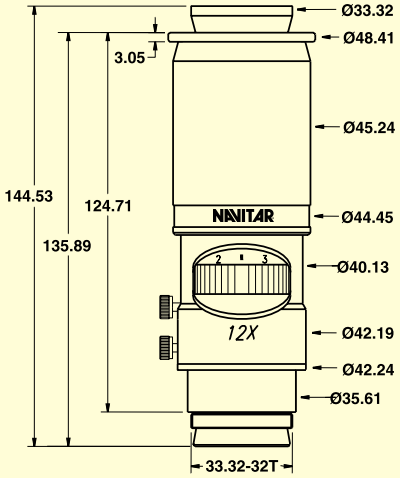
Lens Attachment	Working Distance	Camera Formats/ Parameters	.67X Adapter Low - High	1X Adapter Low - High	2X Adapter Low - High	Resolvable Features (microns) Low - High	Depth of Field (mm) Low - High
0.25X	—	Mag.	0.10X - 1.20X	0.15X - 1.80X	0.29X - 3.50X	36 - 7	47.84 - 1.61
	334	Field 1/4"	41.16 - 3.40	27.60 - 2.28	13.79 - 1.14	36 - 7	47.84 - 1.61
	334	Field 1/3"	61.73 - 5.10	41.38 - 3.42	20.69 - 1.71	36 - 7	47.84 - 1.61
	334	Field 1/2"	82.32 - 6.80	55.16 - 4.56	27.58 - 2.28	36 - 7	47.84 - 1.61
	334	Field 2/3"	(1) 72.00 - 9.35	75.88 - 6.28	37.94 - 3.14	36 - 7	47.84 - 1.61
	334	O-I	608	640	668	36 - 7	47.84 - 1.61
0.5X	—	Mag.	0.20X - 2.40X	0.29X - 3.50X	0.58X - 7.00X	18 - 3	11.93 - 0.40
	160	Field 1/4"	20.58 - 1.70	13.79 - 1.14	6.90 - 0.76	18 - 3	11.93 - 0.40
	160	Field 1/3"	30.87 - 2.55	20.69 - 1.71	10.34 - 0.86	18 - 3	11.93 - 0.40
	160	Field 1/2"	41.16 - 3.40	27.58 - 2.28	13.79 - 1.14	18 - 3	11.93 - 0.40
	160	Field 2/3"	(1) 36.0 - 4.68	37.94 - 3.14	18.97 - 1.57	18 - 3	11.93 - 0.40
	160	O-I	428	460	488	18 - 3	11.93 - 0.40
0.75X	—	Mag.	0.29X - 3.50X	0.44X - 5.30X	0.87X - 10.50X	12 - 2	5.32 - 0.18
	107	Field 1/4"	13.72 - 1.14	9.19 - 0.76	4.60 - 0.38	12 - 2	5.32 - 0.18
	107	Field 1/3"	20.58 - 1.70	13.79 - 1.14	6.89 - 0.57	12 - 2	5.32 - 0.18
	107	Field 1/2"	27.44 - 2.27	18.34 - 1.52	9.19 - 0.76	12 - 2	5.32 - 0.18
	107	Field 2/3"	(1) 24.30 - 3.12	25.30 - 2.09	12.64 - 1.05	12 - 2	5.32 - 0.18
	107	O-I	373	404	433	12 - 2	5.32 - 0.18
None	—	Mag.	0.39X - 4.70X	0.58X - 7.00X	1.16X - 14.00X	9 - 2	2.98 - 0.10
	86	Field 1/4"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29	9 - 2	2.98 - 0.10
	86	Field 1/3"	15.44 - 1.28	10.34 - 0.86	5.18 - 0.43	9 - 2	2.98 - 0.10
	86	Field 1/2"	20.58 - 1.70	13.79 - 1.14	6.90 - 0.57	9 - 2	2.98 - 0.10
	86	Field 2/3"	(1) 18.20 - 2.34	18.97 - 1.57	9.49 - 0.78	9 - 2	2.98 - 0.10
	86	O-I	344	376	404	9 - 2	2.98 - 0.10
1.5X	—	Mag.	0.58X - 7.00X	0.87X - 10.50X	1.74X - 21.00X	6 - 1	1.35 - 0.05
	50	Field 1/4"	6.86 - 0.57	4.60 - 0.38	2.30 - 0.19	6 - 1	1.35 - 0.05
	50	Field 1/3"	10.29 - 0.85	6.89 - 0.57	3.45 - 0.29	6 - 1	1.35 - 0.05
	50	Field 1/2"	13.72 - 1.13	9.19 - 0.76	4.60 - 0.38	6 - 1	1.35 - 0.05
	50	Field 2/3"	(1) 12.20 - 1.55	12.64 - 1.05	6.33 - 0.52	6 - 1	1.35 - 0.05
	50	O-I	317	349	377	6 - 1	1.35 - 0.05
2.0X	—	Mag.	0.78X - 9.40X	1.16X - 14.00X	2.32X - 28.00X	5 - 1	0.75 - 0.03
	37	Field 1/4"	5.14 - 0.43	3.45 - 0.29	1.73 - 0.15	5 - 1	0.75 - 0.03
	37	Field 1/3"	7.72 - 0.64	5.18 - 0.43	2.59 - 0.22	5 - 1	0.75 - 0.03
	37	Field 1/2"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29	5 - 1	0.75 - 0.03
	37	Field 2/3"	(1) 9.10 - 1.17	9.49 - 0.78	4.75 - 0.40	5 - 1	0.75 - 0.03
	37	O-I	304	335	364	5 - 1	0.75 - 0.03

(1) Zoom Setting at 0.9X.

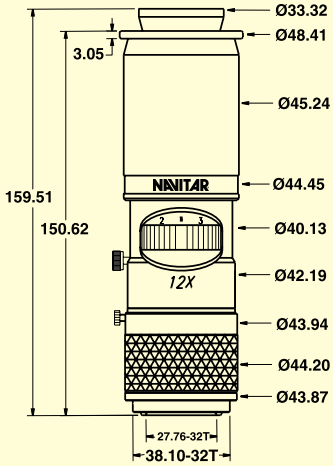
12X Zoom System Dimensions

*****All measurements are in mm unless otherwise specified.

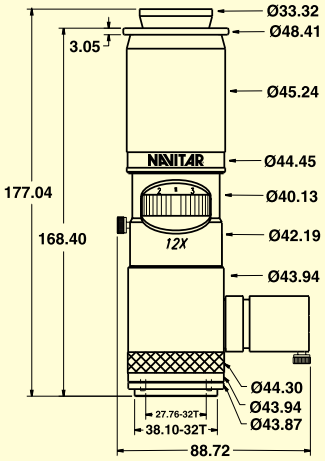
Lenses*



12X Zoom Non F.F.
1-50330



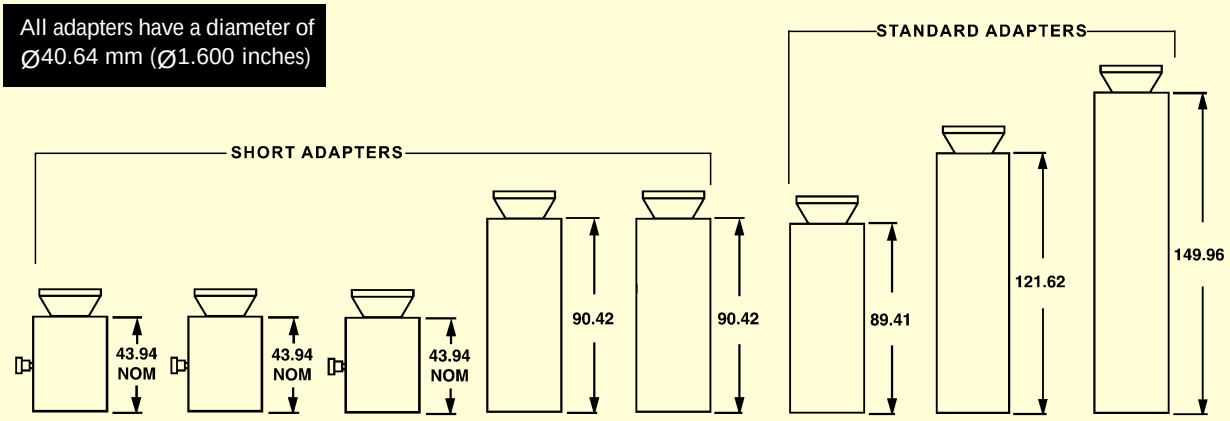
12X Zoom w/ 12 mm F.F.
1-50486



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

Adapters*

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



.67X Mini
1-61001

1X Mini
1-60189

2X Mini
1-61390

1X
1-6245

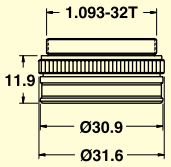
2X
1-6233

.67X
1-6020

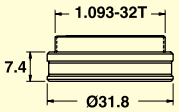
1X
1-6015
(1-6218 Tele)

2X
1-6030

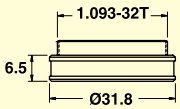
Attachments*



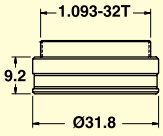
0.25X
1-50011



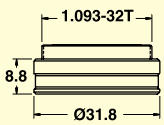
0.5X
1-50012



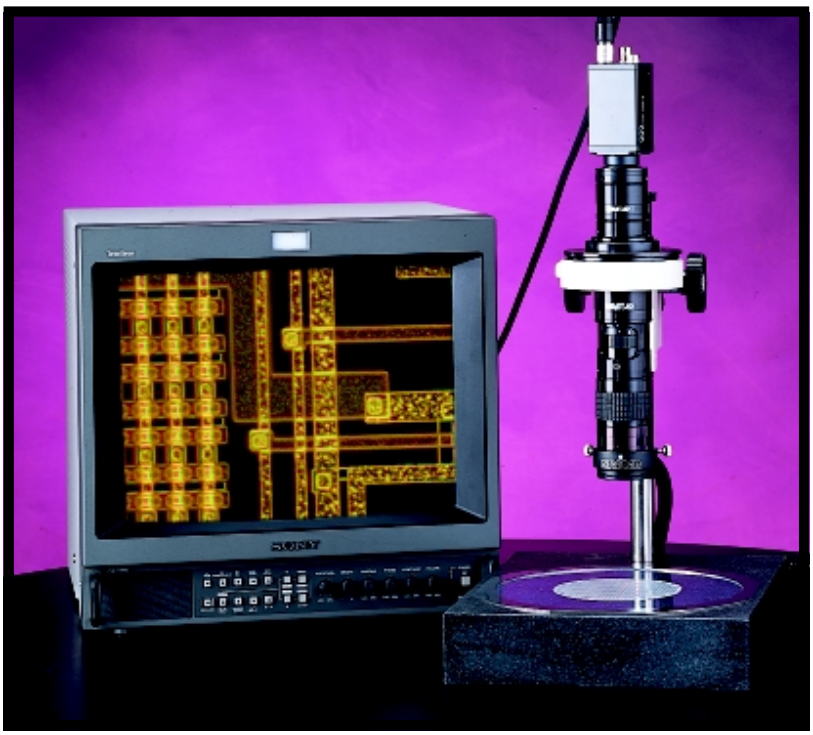
0.75X
1-50013



1.5X
1-50014



2X
1-50015

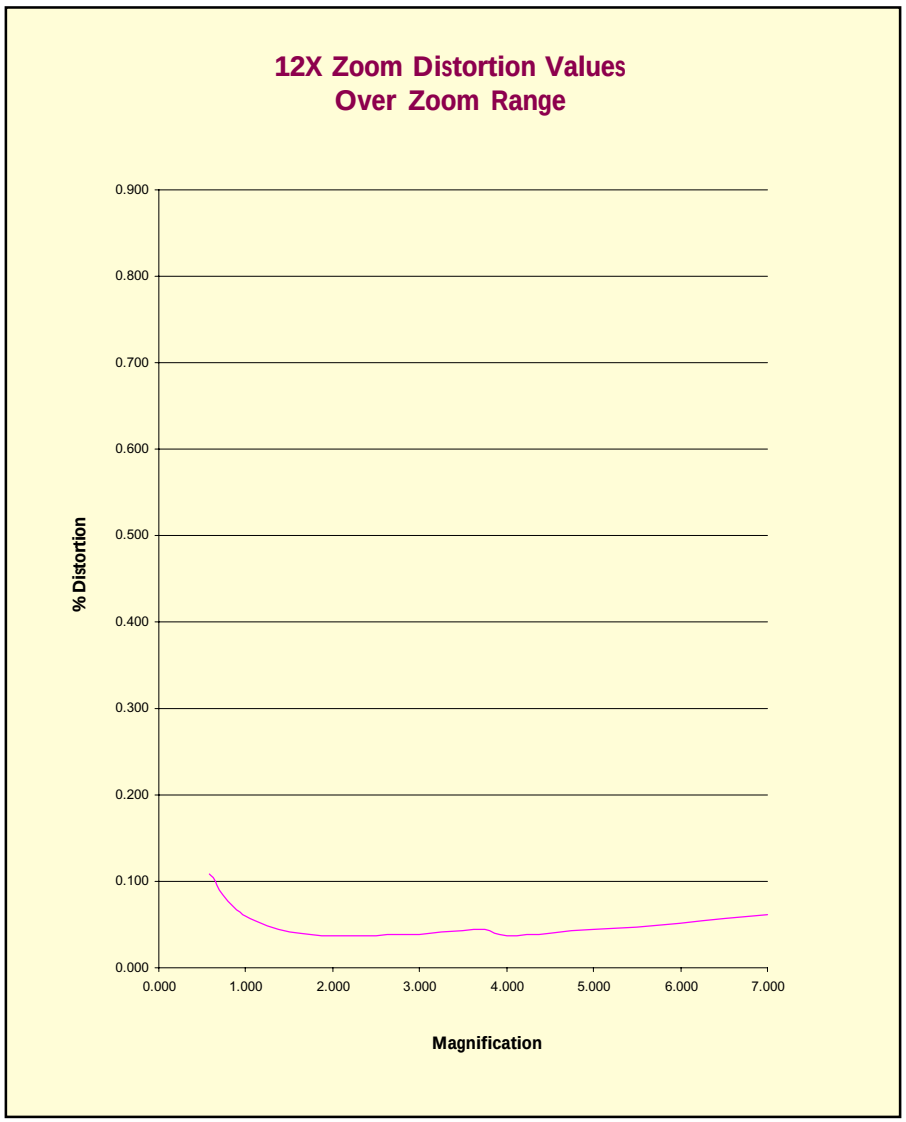


12X Zoom Specifications

12X Zoom Combinations	W.D.	MTF Cutoff Frequency (lp/mm)		Object -to-Image Dis. (mm)	Resolvable Features (microns)		Matching Pixel Size (microns)		Depth of Field (mm)	
Attachment + Zoom + Adapter Tube		Low Mag.	High Mag.		Low Mag.	High Mag.	Low Mag.	High Mag.	Low Mag.	High Mag.
0.25x + 12X Zoom + 0.67x	334	14	75	608	36	7	4	8	47.84	1.61
0.25x + 12X Zoom + 1.0x	334	14	75	640	36	7	5	12	47.84	1.61
0.25x + 12X Zoom + 2.0x	334	14	75	668	36	7	11	25	47.84	1.61
0.5x + 12X Zoom + 0.67x	160	27	150	428	18	3	4	8	11.93	0.40
0.5x + 12X Zoom + 1.0x	160	27	150	460	18	3	5	12	11.93	0.40
0.5x + 12X Zoom + 2.0x	160	27	150	488	18	3	11	25	11.93	0.40
0.75x + 12X Zoom + 0.67x	107	41	225	373	12	2	4	8	5.32	0.18
0.75x + 12X Zoom + 1.0x	107	41	225	404	12	2	5	12	5.32	0.18
0.75x + 12X Zoom + 2.0x	107	41	225	433	12	2	11	25	5.32	0.18
None + 12X Zoom + 0.67x	86	55	300	344	9	2	4	8	2.98	0.10
None + 12X Zoom + 1.0x	86	55	300	376	9	2	5	12	2.98	0.10
None + 12X Zoom + 2.0x	86	55	300	404	9	2	11	25	2.98	0.10
1.5x + 12X Zoom + 0.67x	50	82	446	317	6	1	4	8	1.35	0.05
1.5x + 12X Zoom + 1.0x	50	82	446	349	6	1	5	12	1.35	0.05
1.5x + 12X Zoom + 2.0x	50	82	446	377	6	1	11	25	1.35	0.05
2.0x + 12X Zoom + 0.67x	37	110	600	304	5	1	4	8	0.75	0.03
2.0x + 12X Zoom + 1.0x	37	110	600	335	5	1	5	12	0.75	0.03
2.0x + 12X Zoom + 2.0x	37	110	600	364	5	1	11	25	0.75	0.03

12X Zoom
Distortion Percentage

Magnification	% Distortion
0.580	0.109
0.600	0.107
0.650	0.100
0.700	0.089
0.800	0.077
0.900	0.068
1.000	0.060
1.250	0.048
1.500	0.042
1.750	0.039
2.000	0.038
2.250	0.037
2.500	0.037
2.750	0.038
3.000	0.039
3.250	0.041
3.500	0.042
3.750	0.044
4.000	0.037
4.499	0.040
4.999	0.044
5.499	0.047
5.998	0.051
6.497	0.057
6.995	0.062



12X Motorized Zoom

A motorized 12X Zoom is an excellent solution for highly automated applications. Choose from a variety of configurations to find the one that best suits your specific needs.

DC or Stepper Controlled

Navitar configures DC motors that allow continuous movement throughout the zoom or focus range. The zoom and focus functions are gear-driven with power supplied by individual 12 volt DC motors. Each gear train includes an all-metal slip clutch to prevent damage.

Stepper motors allow fine incremental movements or steps. This permits the user to program the exact desired location along the zoom or focus axis. A variety of optical and mechanical limit switches can be included to enhance the overall performance of the system.

Motorized Options

- Motorized zoom.
- Motorized focus.
- Stepping motors of various profiles.
- DC servo motors with or without magnetic encoders.
- Optical limit switches.
- Mechanical limit switches.
- Manual control boxes for DC motors.

Custom designs are also available at the customer's request.

Motorized Zoom Control Boxes

If you are using our Motorized 12X Zoom, you may need a Motorized Zoom Control Box to control the system's zoom and focus. Navitar's zoom control boxes have dual controls for zoom and focus and use a wall transformer for power. Motor speed is regulated by separate rheostats on the control panel.

Manual Driver Box (1-60564)

Individual momentary rocker switches control both zoom and focus. Remote switch closure access is available through a 9-pin d-sub connector on the panel.

Manual/Computer Driver Box (1-60731)

This unit is similar to the 1-60564 with the addition of internal relays in the remote circuit. These relays allow you to make closures using a suitably equipped computer* without damaging the computer circuits.

Computer Controlled Encoded Feedback Driver Box (1-60737)

This control box is similar to the 1-60731 with the addition of power inputs to the magnetic encoders and pulse transmitting leads. A remote 15-pin connector with isolating relays permits both driving and signal pickup with a suitably equipped computer*.

**Motor driver board required.*

12X Internal Co-axial Zoom

Navitar's 12X Zoom with Internal Co-axial Illumination (1-50487) is ideal for applications involving highly reflective surfaces, such as wafers and polished samples. Designed to provide even illumination for higher magnification applications, it provides extremely detailed resolution under incident lighting, particularly when a high resolution camera is used. Any light source and cable with an output-end mounting diameter of .312" may be used. For more information on fiber optic illumination, see page 53.

12X Zoom Field of View Matrix for Internal Co-axial Zoom 1-50487 (mm)

Lens Attachment	Working Distance	Camera Formats/ Parameters	.67X Adapter Low - High	1X Adapter Low - High	2X Adapter Low - High
None	—	Mag.	0.39X - 4.70X	0.58X - 7.00X	1.16X - 14.00X
	86	Field 1/4"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29
	86	Field 1/3"	15.44 - 1.28	10.34 - 0.86	5.18 - 0.43
	86	Field 1/2"	20.58 - 1.70	13.79 - 1.14	6.90 - 0.57
	86	Field 2/3"	(1) 16.00 - 2.34	18.97 - 1.57	9.49 - 0.78
	86	O-I	368	400	428
1.5X	—	Mag.	0.58X - 7.00X	0.87X - 10.50X	1.74X - 21.00X
	50	Field 1/4"	6.86 - 0.57	4.60 - 0.38	2.30 - 0.19
	50	Field 1/3"	10.29 - 0.85	6.89 - 0.57	3.45 - 0.29
	50	Field 1/2"	13.72 - 1.13	9.19 - 0.76	4.60 - 0.38
	50	Field 2/3"	(1) 11.00 - 1.55	12.64 - 1.05	6.33 - 0.52
	50	O-I	341	373	401
2.0X	—	Mag.	0.78X - 9.40X	1.16X - 14.00X	2.32X - 28.00X
	37	Field 1/4"	5.14 - 0.43	3.45 - 0.29	1.73 - 0.15
	37	Field 1/3"	7.72 - 0.64	5.18 - 0.43	2.59 - 0.22
	37	Field 1/2"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29
	37	Field 2/3"	(2) 5.00 - 1.17	9.49 - 0.78	4.75 - 0.40
	37	O-I	328	359	388

(1) Zoom Setting at 1.0=X. (2) Zoom Setting at 1.6X

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 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 co-axial illumination (1-50503).

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

Objective Lens (Mitutoyo) Ultra Long W.D.	Working Distance	Camera Formats/ Parameters	1X Adapter Low - High	2X Adapter Low - High
2X 0.055 NA 1-60758	—	Mag.	0.52X - 6.40X	1.04X - 12.80X
	34	Field 1/4"	7.69 - 0.63	3.85 - 0.31
	34	Field 1/3"	11.54 - 0.94	5.77 - 0.47
	34	Field 1/2"	15.38 - 1.25	7.69 - 0.63
	34	Field 2/3"	21.15 - 1.72	10.58 - 0.86
5X 0.14 NA 1-60226	—	Mag.	1.30X - 16.00X	2.60X - 32.00X
	34	Field 1/4"	3.08 - 0.25	1.54 - 0.13
	34	Field 1/3"	4.62 - 0.38	2.31 - 0.19
	34	Field 1/2"	6.15 - 0.50	3.08 - 0.25
	34	Field 2/3"	8.46 - 0.69	4.23 - 0.34
10X 0.28 NA 1-60227	—	Mag.	2.60X - 32.00X	5.20X - 64.00X
	33	Field 1/4"	1.54 - 0.13	0.77 - 0.06
	33	Field 1/3"	2.31 - 0.19	1.15 - 0.09
	33	Field 1/2"	3.08 - 0.25	1.54 - 0.13
	33	Field 2/3"	4.23 - 0.34	2.12 - 0.17
20X 0.42 NA 1-60228	—	Mag.	5.20X - 64.00X	10.40X - 128.00X
	20	Field 1/4"	0.77 - 0.06	0.38 - 0.03
	20	Field 1/3"	1.15 - 0.09	0.58 - 0.05
	20	Field 1/2"	1.54 - 0.13	0.77 - 0.06
	20	Field 2/3"	2.12 - 0.17	1.06 - 0.09
50X 0.55 NA 1-60229	—	Mag.	13.00X - 160.00X	26.00X - 320.00X
	13	Field 1/4"	0.31 - 0.03	0.15 - 0.01
	13	Field 1/3"	0.46 - 0.04	0.23 - 0.02
	13	Field 1/2"	0.62 - 0.05	0.31 - 0.03
	13	Field 2/3"	0.85 - 0.07	0.42 - 0.04

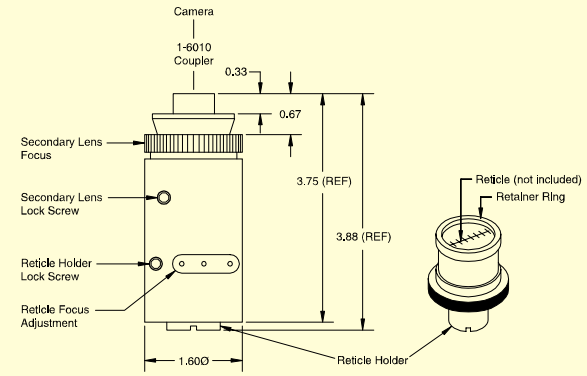
12X Detented Zoom System

Navitar's Detented 12X Zoom was specifically developed for the comparator/metrology market. It provides seven discrete detented positions in the zoom travel. Nominal positions at 1X, 2X, 3X, 4X, 5X, 6X and 7X on the zoom scale allow the end user to make an exact calibration repeatable within 0.05%. To order a detented zoom system, place a "D" after the standard part number.

Reticle Projector

The Reticle Projector (1-60068) provides a means for superimposing a reticle (crosshair, micrometer scale, custom graphic) over the video image on the monitor. The information on the reticle must be contained to the size of the sensor. For example, if a 1/2" camera sensor is used, the reticle must have the information in a 4.8 x 6.4 mm area to be seen on the monitor. This reticle can then be used as a targeting device for measuring, machining, etc. 21 mm reticle required. Sold separately.

Reticle Projector



Advantages of Using a Reticle

- Enables quick identification of minute dimensions in small parts.
- Costs less than an electronic crosshair generator.
- The lines can be calibrated at various magnifications and assigned measuring values.
- Reticle pattern can be rotated on its center line to align with workpiece.

12X Telecentric

The World's First Parfocal Telecentric Zoom Lens

The 12X Telecentric Zoom system allows users to reach a true telecentric condition to within less than 0.3° while maintaining constant perspective and magnification. This means that even if the object is slightly out of focus, the size of the image will not change. The 12X Telecentric Zoom provides field coverage from 50 mm down to 4 mm and the coaxial illumination allows clear viewing, even when working with mirror-like surfaces.

Wide Magnification Range and Ultra Long Working Distance

In the past, a telecentric lens was defined as having fixed magnification. Not anymore! The Navitar 12X Telecentric Zoom lens allows you to zoom in and focus over a wide variety of magnifications with a higher level of accuracy than you ever thought possible. The 12X Telecentric provides adjustable focal lengths over a 0.16X to 1.94X magnification range. You no longer have to be limited by telecentric lenses that only offer fixed magnification. Now you have field coverage from 50 mm down to 4 mm at a 166 mm working distance.

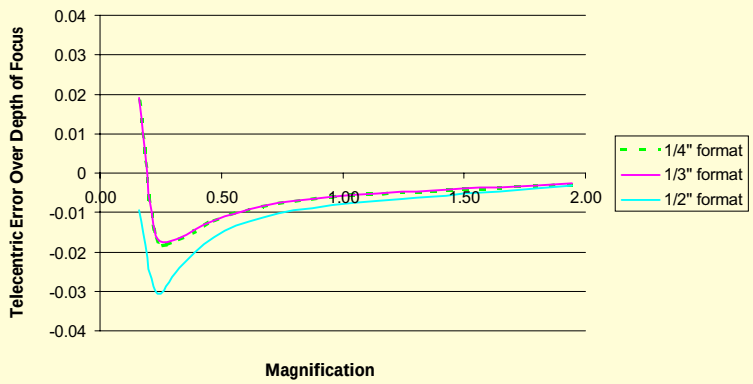
No Need to Change Lenses

The easily adjustable field of view and magnification allow our Navitar 12X Telecentric lens to adjust to meet your exact requirements. It's no longer necessary to change lenses, mix and match base lenses with attachment lenses or recalibrate. One lens, the 12X Telecentric, really does it all!

Wide Range of Applications

Specifically designed for precise dimensional measurement of objects or pattern recognition, the 12X Telecentric Zoom has many applications. It's ideal for measuring three-dimensional objects with deep features, such as precision parts and electrical connector pins and contacts. It's also the perfect lens for viewing inconsistently placed parts on a conveyer belt.

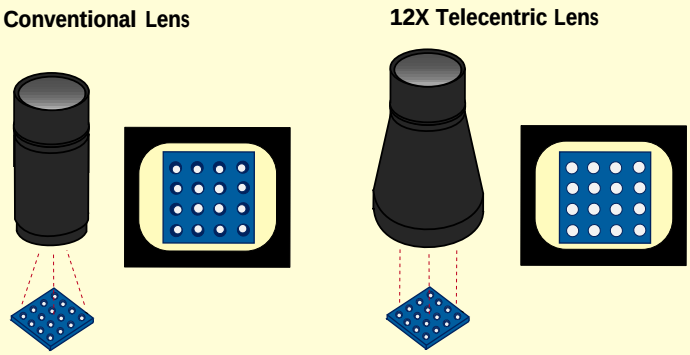
12X Telecentric Accuracy



Telecentric Advantages Over Conventional Lenses

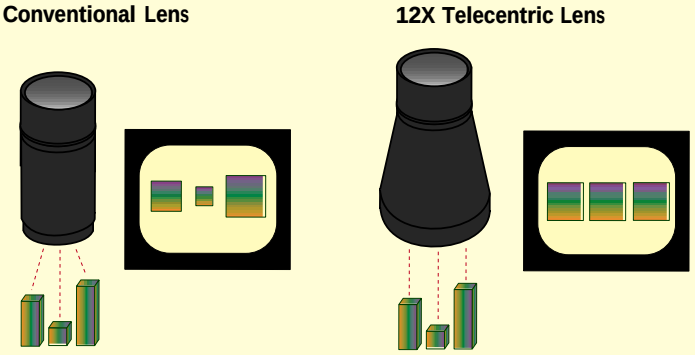
Constant Perspective for the Highest Degree of Accuracy

Navitar's 12X Telecentric lens is designed for "straight on" viewing of objects across the entire field of view. Images are not distorted and features are easy to examine. Conventional lenses view objects at different angles across the field of view. This changes the viewing perspective and can distort the size and shape of the object, making it difficult to view features accurately.



Constant Magnification Reduces Magnification Errors

Magnification in the Navitar 12X Telecentric, unlike conventional lenses, is independent of working distance. Magnification remains constant regardless of how close or far away an object is from the camera. This reduces magnifications errors and greatly extends gauging depths of field. Conventional lenses, however, view objects that are closer to the camera as larger than objects that are farther away.



12X Telecentric Lens Specifications

Mag.	Telecentric Error (degrees)			Object N.A.	Image N.A.	Object Depth of Focus (mm)	Telecentric Error (mm)			Object Size			Approx. MTF (lp/mm)	Resolvable Features (microns)
	1/4"	1/3"	1/2"				1/4"	1/3"	1/2"	1/4"	1/3"	1/2"		
0.16	0.05	0.06	-0.03	0.005	0.032	38.8	0.018	0.020	-0.009	25.0	37.3	49.7	15	33
0.23	-0.10	-0.09	-0.18	0.007	0.031	19.4	-0.017	-0.016	-0.030	17.4	26.1	34.8	22	23
0.33	-0.19	-0.18	-0.27	0.010	0.030	10.3	-0.016	-0.016	-0.024	12.1	18.2	24.3	30	17
0.47	-0.23	-0.23	-0.31	0.013	0.028	6.0	-0.012	-0.012	-0.016	8.5	12.8	17.0	39	13
0.67	-0.25	-0.25	-0.34	0.016	0.024	3.8	-0.008	-0.008	-0.011	5.9	8.9	11.9	49	10
0.96	-0.27	-0.27	-0.36	0.020	0.021	2.6	-0.006	-0.006	-0.008	4.2	6.3	8.4	59	8
1.36	-0.29	-0.29	-0.38	0.024	0.017	1.8	-0.004	-0.005	-0.006	2.9	4.4	5.9	71	7
1.94	-0.25	-0.24	-0.29	0.028	0.015	1.3	-0.003	-0.003	-0.003	2.1	3.1	4.1	84	6

Distortion < 0.1% for all magnifications. Working Distance = 166 mm for all magnifications.

12X Accessories

Right Angle Attachment

The RA Attachment (1-6080) introduces a 90° bend in the optical axis, shortening the overall length of the system. The resulting image will be mirrored, thus erect and read backwards from right to left when viewed with a camera. The 12X System uses the RA Adapters 1-60060 (.71X), 1-6118 (1X) and 1-6120 (2X).

Non-Inverting RA Attachment

The Non-Inverting RA Attachment (1-60165), like the 1-6080, introduces a 90° bend in the optical axis. The use of a penta prism results in an image that is erect and reads left to right. The 12X Zoom system utilizes the NIRA Adapters 1-60172 (.67X), 1-60182 (1X Tele), 1-60175 (1X) and 1-60185 (2X).

Zoom Adapter Plates

Navitar offers a variety of different microscope converter plates so that you can use your zoom system with Nikon, Olympus, Meiji, Bausch & Lomb and Leica focus mounts.

Auxiliary Viewing Port

The Auxiliary Viewing Port (1-60370) provides a second output port for an additional camera or for direct vision using an eyepiece. A 50/50 beam splitter cube is used for minimal image degradation. This assembly has an optical path length so only the RA Adapter (1-60060, 1-6118, 1-6120, 1-6187) will provide a parfocal image. Adapters are required in both vertical and horizontal viewing arms.

3-Chip Capability

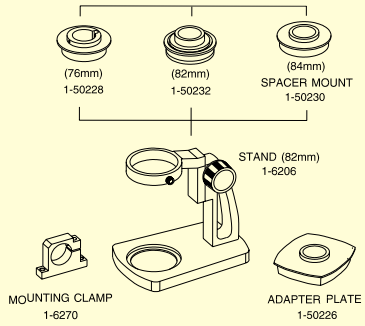
Navitar offers the capability of coupling new higher resolution 3-chip cameras to the 12X Zoom. All 3-chip, non c-mount cameras require the 1-6010 coupler and the 1-60182 adapter to work with the 12X Zoom. The bayonet and spacer requirements are determined by the specific camera format being used.

3-Chip Requirements

Camera Format	Requirements		
	Flange Dist.	Bayonet	Spacer
ENG (2/3")	48 mm	2-12045	–
3-Chip (1/2") Hitachi™ HV-C10 or equal	35.74 mm	2-12045	3-11714
3-Chip (1/2") Sony Hot Shoe™	38 mm	2-12046	3-11714

Assuming that one of the two available bayonets or C-thread is the means of mounting, may be possible to accomodate other flange distances that fall between the extremes.

Adapter Plates



3-Chip Requirements