



12x Zoom Objektiv mit noch grösserem Zoombereich:

Objektive (auch telezentrische) für Video / Vision Kamera Systeme für Anwendungen in den Bereichen Automation, Maschinenbau, Mikroelektronik, Kontrolle und Uhrenindustrie:

- 12 – facher Vergrößerungsbereich (0,58 – 7,0x)
- Bestes telezentrisches Objektiv mit einem grossen Sehfeld
- Verbesserte Auflösung mit 0,018 – 0,1 NA
- Sehfeld von 0,27mm bis 83mm (Vorsatzobjektive)
- Variabler Arbeitsabstand von 37 – 334mm
- Modularer Aufbau für erhöhte Flexibilität
- Kompakter Aufbau ab: L=145mm / D=48mm
- Solide Industrieausführung (Alu eloxiert)
- Adapter für C- Mount Kameraanschluss
- Koaxiale Beleuchtung möglich
- Fein-Fokussiereinrichtung (optional)

Objectif zoom avec une plage zoom encore plus étendue :

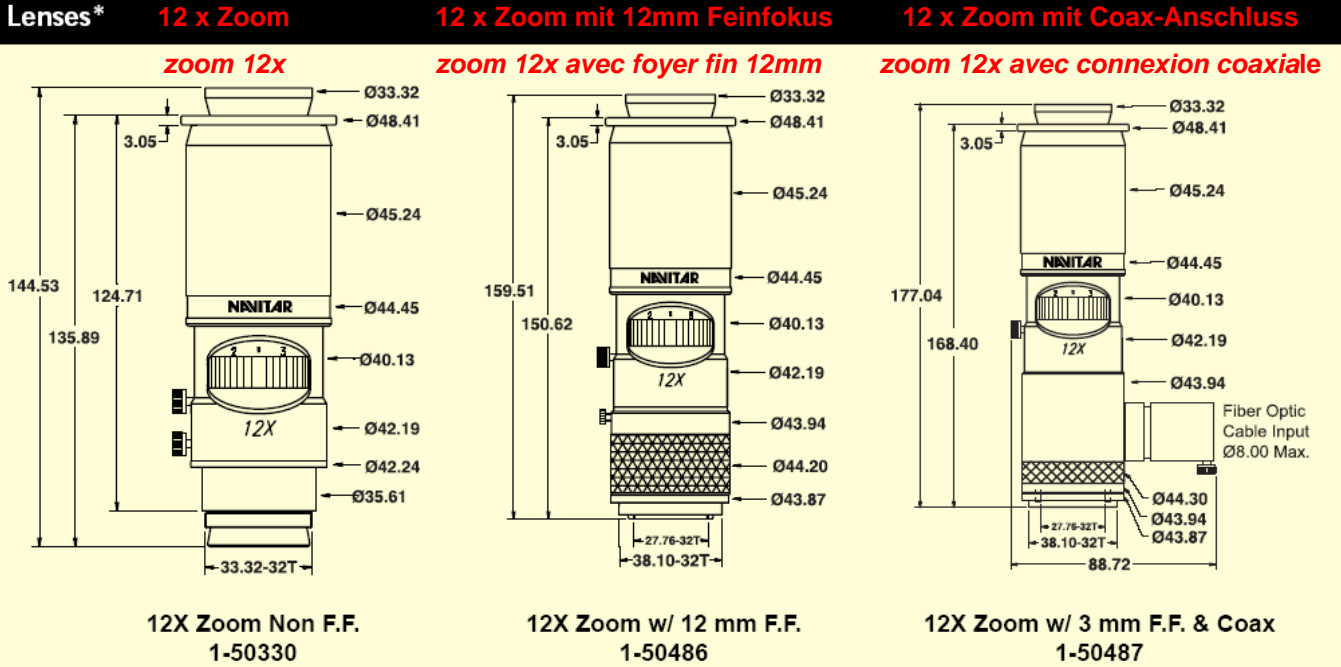
Objectifs (télécentriques également) pour les systèmes-caméras de visualisation, pour les applications dans les domaines de l'automatisation, de la construction de machines, de la microélectronique, de l'assurance qualité et de l'industrie horlogère:

- gamme de grossissement 12 fois (0,58–7,0x)
- objectif télécentrique perfectionné avec un grand champ de vision
- résolution améliorée avec 0,018-0,1NA
- champ de vision de 0,27mm à 83 mm (objectifs additionnelles)
- distance de travail variable de 37-334mm conception
- modulaire pour une flexibilité accrue
- construction compacte à partir de: L=145mm / D=48mm
- version industrielle robuste (en aluminium éloxé)
- adaptateur pour branchement de caméras monture-C
- possibilité d'éclairage coaxial
- dispositif de focalisation fine (optionnel)



12X Zoom System Dimensions

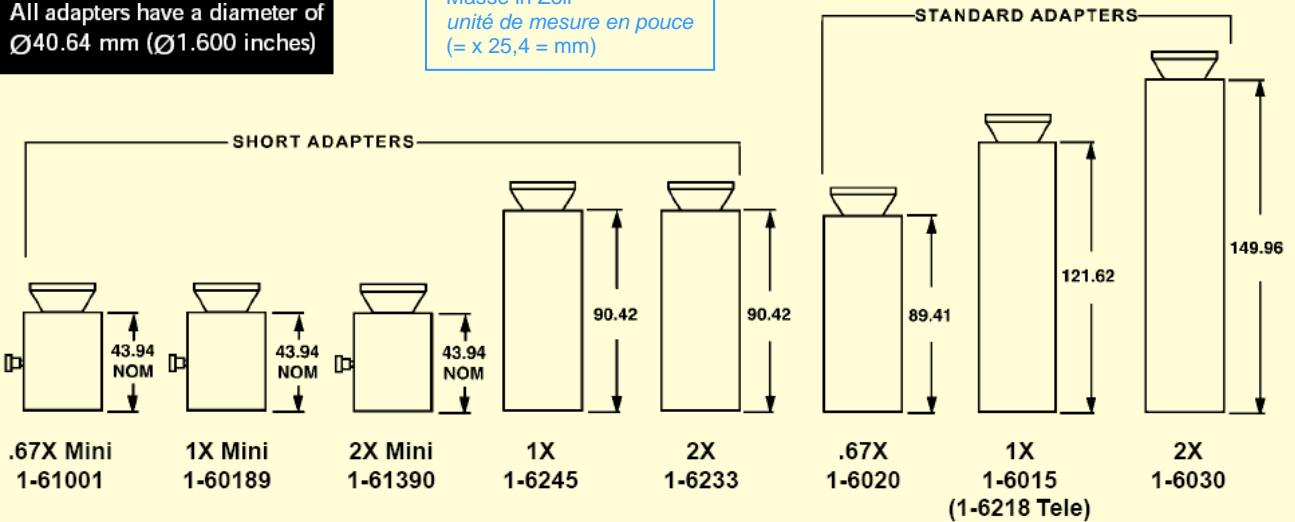
*All measurements are in mm unless otherwise specified.



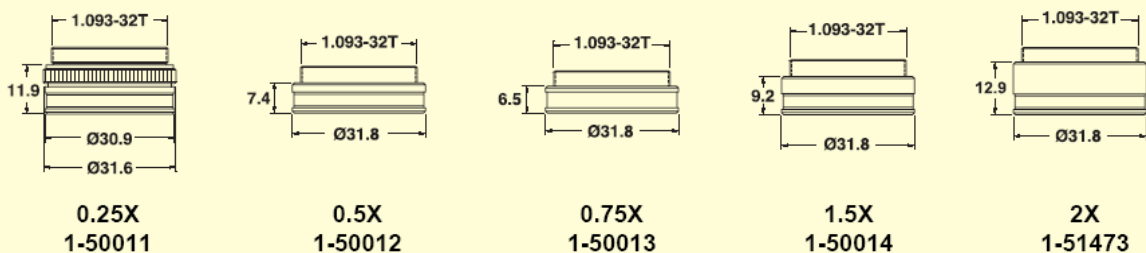
Adapters*

All adapters have a diameter of $\varnothing 40.64$ mm ($\varnothing 1.600$ inches)

Masse in Zoll
unité de mesure en pouce
(= x 25,4 = mm)



Attachments*





Zoom 12x Objectives Technical Data

12X Zoom Performance Specifications

12X Zoom Combinations (Lens Attach. + Prime Lens + Adapter Tube)	W.D.	System Mag.		N.A. -obj-		Feature Size (microns)		Pixel Size (microns)		Depth of Field (mm)	
		Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag
0.25x + 12X + 0.67x	341	0.10	1.17	0.005	0.025	66.66	13.34	3.33	7.80	20.00	0.80
0.25x + 12X + 1.0x	341	0.15	1.75	0.005	0.025	66.66	13.34	5.00	11.67	20.00	0.80
0.25x + 12X + 2.0x	341	0.29	3.50	0.005	0.025	66.66	13.34	9.67	23.34	20.00	0.80
0.5x + 12X + 0.67x	165	0.19	2.35	0.009	0.051	37.04	6.54	3.60	7.68	6.17	0.19
0.5x + 12X + 1.0x	165	0.29	3.50	0.009	0.051	37.04	6.54	5.38	11.45	6.17	0.19
0.5x + 12X + 2.0x	165	0.58	7.00	0.009	0.051	37.04	6.54	10.74	22.89	6.17	0.19
0.75x + 12X + 0.67x	108	0.29	3.52	0.014	0.076	23.80	4.39	3.45	7.73	2.55	0.09
0.75x + 12X + 1.0x	108	0.44	5.25	0.014	0.076	23.80	4.39	5.24	11.52	2.55	0.09
0.75x + 12X + 2.0x	108	0.87	10.50	0.014	0.076	23.80	4.39	10.35	23.05	2.55	0.09
None + 12X + 0.67x	86	0.39	4.69	0.019	0.101	17.54	3.30	3.42	7.74	1.39	0.05
None + 12X + 1.0x	86	0.58	7.00	0.019	0.101	17.54	3.30	5.09	11.55	1.39	0.05
None + 12X + 2.0x	86	1.16	14.00	0.019	0.101	17.54	3.30	10.17	23.10	1.39	0.05
1.5x + 12X + 0.67x	50	0.58	7.04	0.028	0.151	11.90	2.21	3.45	7.78	0.64	0.02
1.5x + 12X + 1.0x	50	0.87	10.50	0.028	0.151	11.90	2.21	5.18	11.60	0.64	0.02
1.5x + 12X + 2.0x	50	1.74	21.00	0.025	0.151	11.90	2.21	10.74	23.34	0.64	0.02
2.0x + 12X + 0.67x	32	0.78	9.38	0.038	0.202	8.77	1.66	3.42	7.79	0.35	0.01
2.0x + 12X + 1.0x	32	1.16	14.00	0.038	0.202	8.77	1.66	5.07	11.62	0.35	0.01
2.0x + 12X + 2.0x	32	2.32	28.00	0.038	0.202	8.77	1.66	10.17	23.34	0.35	0.01

Assumptions:

1. Minimum resolvable feature size is half of the threshold line pair limit. Calculation = $1/(3000 \times \text{Lens N.A.})$
 2. Matching pixel size is that which will permit the minimum feature size to overlap two pixels. Calculation = $1/2(\text{Feature Size} \times \text{System Magnification})$
 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."
- Ryf AG Grenchen, 8/2005



Zoom 12x Objectives Technical Data

12X Zoom System Field of View Matrix (in mm)

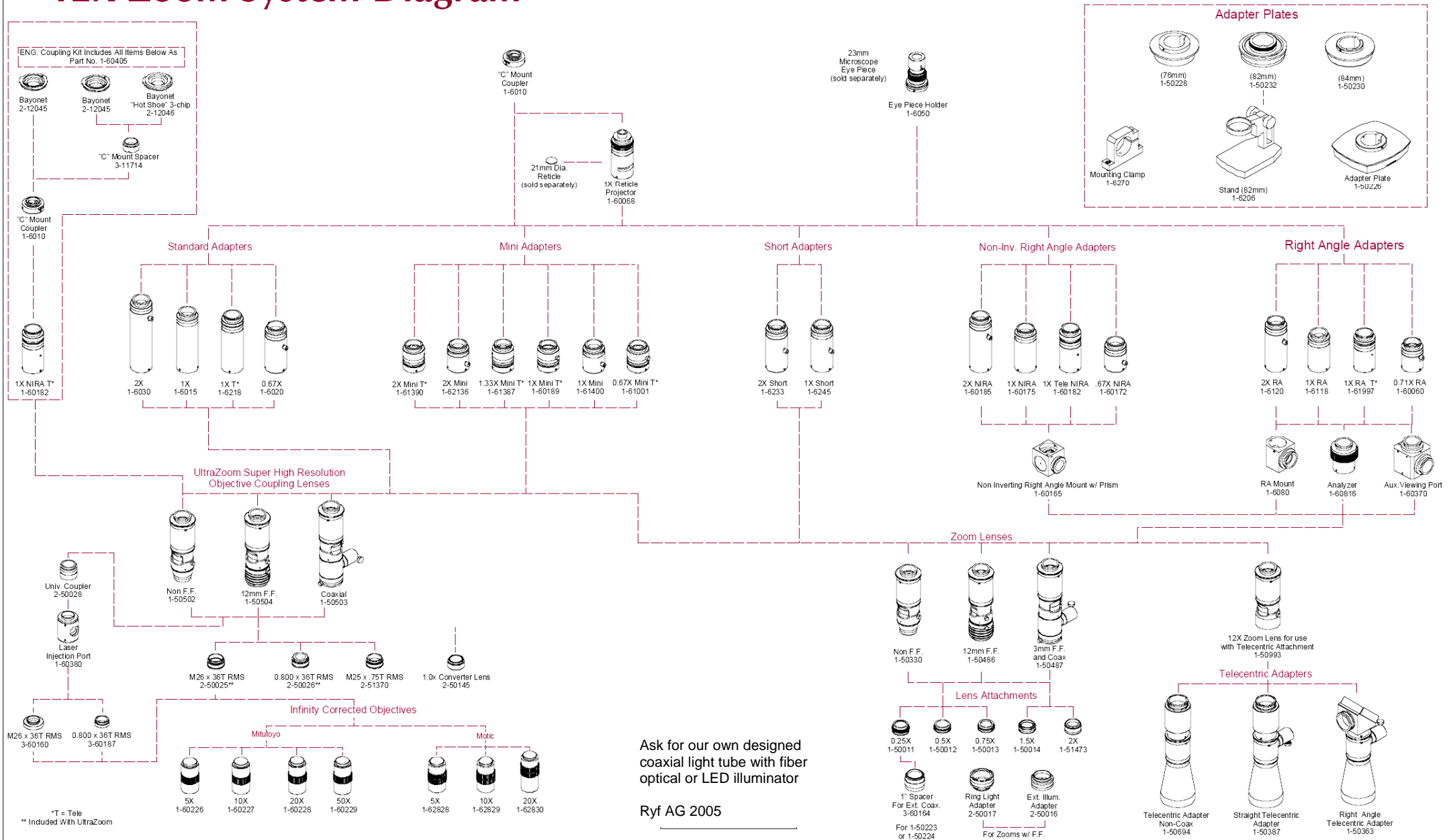
Lens Attach.	W.D.	Camera Formats/ Parameters*	0.67X Adapter Low-High	1X Adapter Low-High	2X Adapter Low-High	Resolve Limit (microns) Low-High	Depth of Field (mm) Low-High
0.25X 0.025 N.A. 1-50011	341	Mag.	0.10X - 1.20X	0.15X - 1.75X	0.29X - 3.50X	72 - 14	20.00 - 0.80
		Field 1/4"	41.16 - 3.40	27.60 - 2.28	13.79 - 1.14	72 - 14	20.00 - 0.80
		Field 1/3"	61.73 - 5.10	41.38 - 3.42	20.69 - 1.71	72 - 14	20.00 - 0.80
		Field 1/2"	82.32 - 6.80	55.16 - 4.56	27.58 - 2.28	72 - 14	20.00 - 0.80
		Field 2/3"	(1) 72.00 - 9.35	75.88 - 6.28	37.94 - 3.14	72 - 14	20.00 - 0.80
0.5X 0.050 N.A. 1-50012	165	Mag.	0.20X - 2.40X	0.29X - 3.50X	0.58X - 7.00X	36 - 6	6.17 - 0.19
		Field 1/4"	20.58 - 1.70	13.79 - 1.14	6.90 - 0.76	36 - 6	6.17 - 0.19
		Field 1/3"	30.87 - 2.55	20.69 - 1.71	10.34 - 0.86	36 - 6	6.17 - 0.19
		Field 1/2"	41.16 - 3.40	27.58 - 2.28	13.79 - 1.14	36 - 6	6.17 - 0.19
		Field 2/3"	(1) 36.0 - 4.68	37.94 - 3.14	18.97 - 1.57	36 - 6	6.17 - 0.19
0.75X 0.075 N.A. 1.50013	108	Mag.	0.29X - 3.50X	0.44X - 5.30X	0.87X - 10.50X	24 - 4	2.55 - 0.09
		Field 1/4"	13.72 - 1.14	9.19 - 0.76	4.60 - 0.38	24 - 4	2.55 - 0.09
		Field 1/3"	20.58 - 1.70	13.79 - 1.14	6.89 - 0.57	24 - 4	2.55 - 0.09
		Field 1/2"	27.44 - 2.27	18.34 - 1.52	9.19 - 0.76	24 - 4	2.55 - 0.09
		Field 2/3"	(1) 24.30 - 3.12	25.30 - 2.09	12.64 - 1.05	24 - 4	2.55 - 0.09
None 0.10 N.A.	86	Mag.	0.39X - 4.70X	0.58X - 7.00X	1.16X - 14.00X	18 - 4	1.39 - 0.05
		Field 1/4"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29	18 - 4	1.39 - 0.05
		Field 1/3"	15.44 - 1.28	10.34 - 0.86	5.18 - 0.43	18 - 4	1.39 - 0.05
		Field 1/2"	20.58 - 1.70	13.79 - 1.14	6.90 - 0.57	18 - 4	1.39 - 0.05
		Field 2/3"	(1) 18.20 - 2.34	18.97 - 1.57	9.49 - 0.78	18 - 4	1.39 - 0.05
1.5X 0.15 N.A. 1-50014	50	Mag.	0.58X - 7.00X	0.87X - 10.50X	1.74X - 21.00X	12 - 2	0.64 - 0.02
		Field 1/4"	6.86 - 0.57	4.60 - 0.38	2.30 - 0.19	12 - 2	0.64 - 0.02
		Field 1/3"	10.29 - 0.85	6.89 - 0.57	3.45 - 0.29	12 - 2	0.64 - 0.02
		Field 1/2"	13.72 - 1.13	9.19 - 0.76	4.60 - 0.38	12 - 2	0.64 - 0.02
		Field 2/3"	(1) 12.20 - 1.55	12.64 - 1.05	6.33 - 0.52	12 - 2	0.64 - 0.02
2.0X 0.20 N.A. 1-51473	32	Mag.	0.78X - 9.40X	1.16X - 14.00X	2.32X - 28.00X	10 - 2	0.35 - 0.01
		Field 1/4"	5.14 - 0.43	3.45 - 0.29	1.73 - 0.15	10 - 2	0.35 - 0.01
		Field 1/3"	7.72 - 0.64	5.18 - 0.43	2.59 - 0.22	10 - 2	0.35 - 0.01
		Field 1/2"	10.29 - 0.85	6.90 - 0.57	3.45 - 0.29	10 - 2	0.35 - 0.01
		Field 2/3"	(1) 9.10 - 1.17	9.49 - 0.78	4.75 - 0.40	10 - 2	0.35 - 0.01

(1) Vignetting occurs at zoom settings less than 0.9X.



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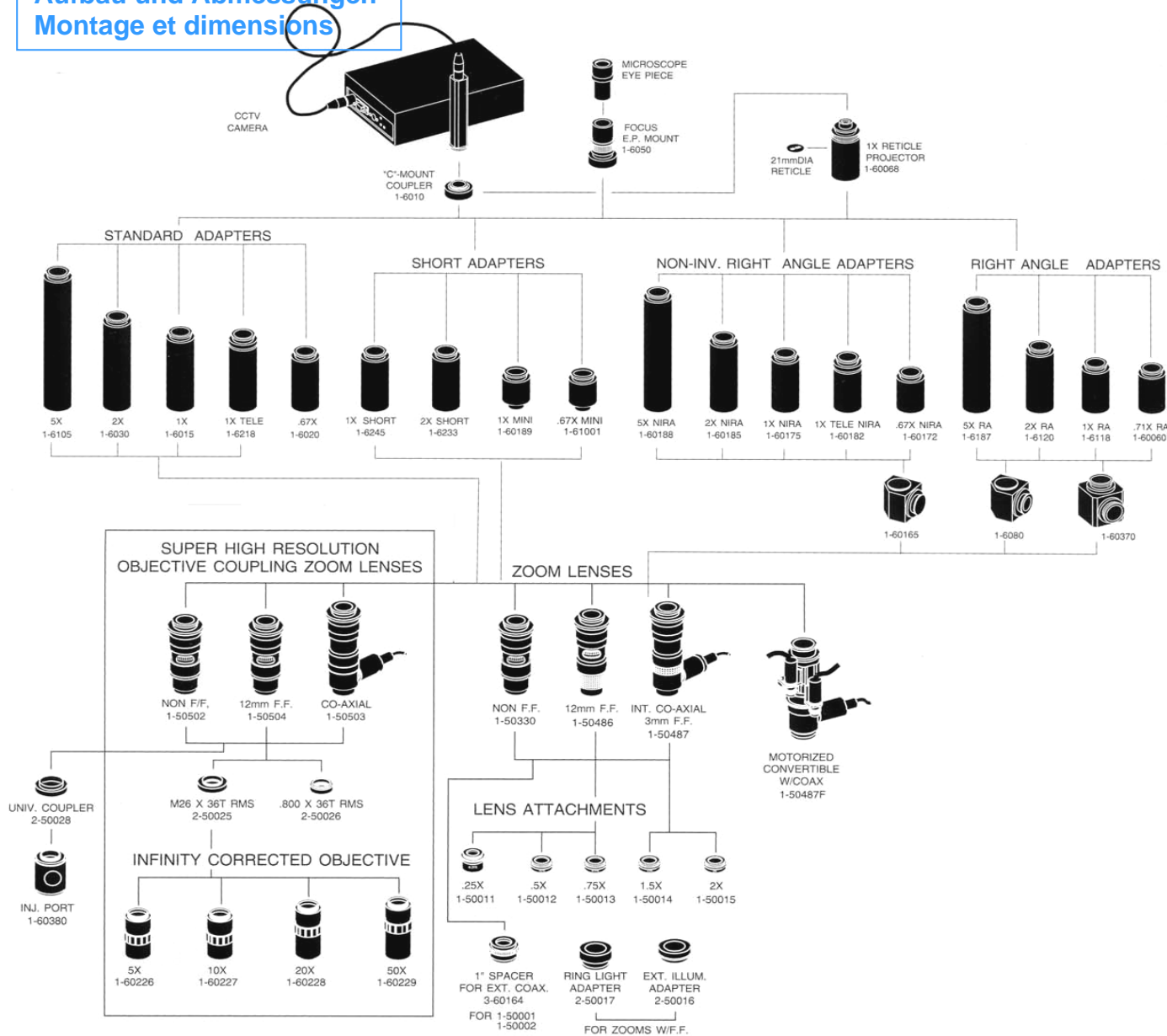
12X Zoom System Diagram





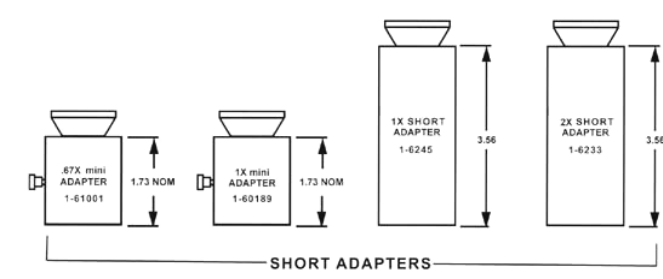
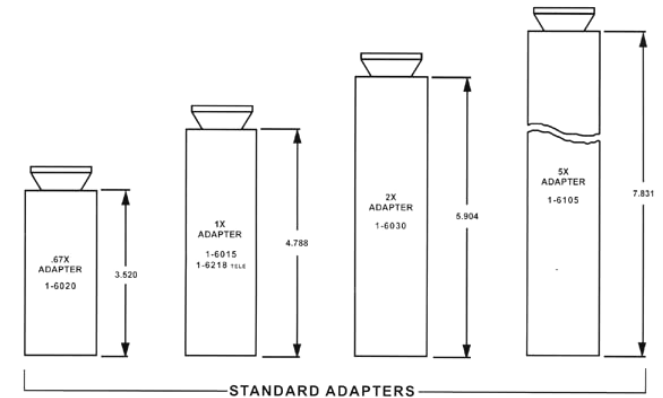
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**Aufbau und Abmessungen
 Montage et dimensions**



**Adapter Masse
 (Durchmesser d = 40,6mm)**

**Dimensions tube d'adaptation
 (diam. d = 40.6mm)**





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Zoom 12x Telecentric Telezentrisch / télécentrique

12X Telecentric Zoom

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 188 mm working distance.

No Need to Change Lenses

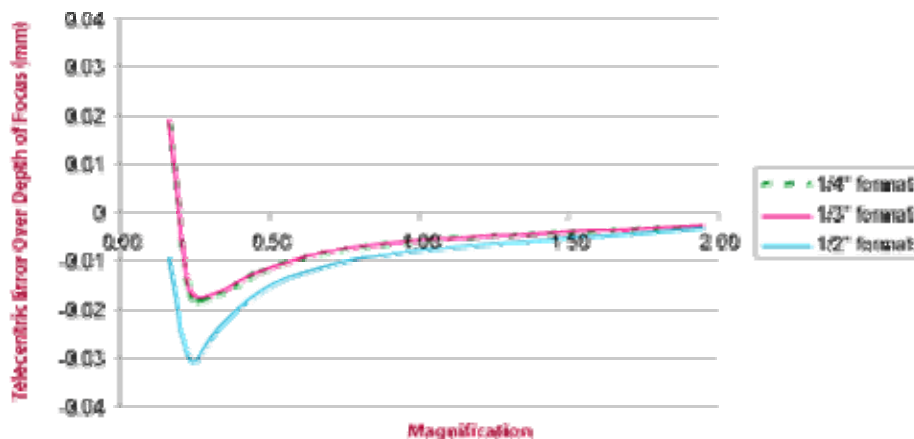
The easily adjustable field of view and magnification allow our Navitar 12X Telecentric lens to adjust to meet your exact requirements. It's no longer necessary to change lenses, mix and match base lenses with attachment lenses or recalibrate. One lens, the 12X Telecentric, really does it all!

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



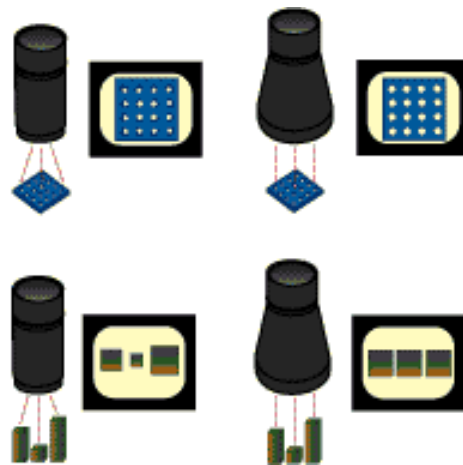
Telecentric Advantages Over Conventional Lenses

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 magnification 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

Magnification	Telecentric Error (degrees)			Object N.A.	Image N.A.	Object Depth of Focus (mm)	Telecentric Error (mm)			Object Size			Approximate MTF (lp/mm)	Resolvable Features (microns)
	1/4" Format	1/3" Format	1/2" Format				1/4" Format	1/3" Format	1/2" Format	1/4" Format	1/3" Format	1/2" Format		
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 = 188 mm for all magnifications

Reticule Projector tube:

The Reticule Projector (1-60068) provides a means for superimposing a reticule (crosshair, micrometer scale, custom graphic) over the video image on the monitor. The information on the reticule must be contained to the size of the sensor. For example, if a 1/2" camera sensor is used, the reticule must have the information in a 4.8 x 6.4 mm area to be seen on the monitor. This reticule can then be used as a targeting device for measuring, machining, etc. (Reticules must be 21 mm in diameter and are sold separately see Ryf's Reticules brochures.)

Advantages of Using a Reticule	
•	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.
•	Reticule pattern can be rotated on its center line to align with workpiece.



Reticule Projector tube Outline Drawing

