EHD imaging GmbH

OPTEM

OPTICAL LENS SYSTEMS

INSPECTION | MACHINE VISION | RESEARCH

OPTEM ZOOM 125C

12.5:1 LENS SYSTEM

EXTENDED ZOOM RANGE

Maximum Imaging Versatility

QIOPTIQ

Optics with Intelligence

Qioptiq Imaging Solutions

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EXTENDED ZOOM RANGE AND MODULAR FLEXIBILITY

The Optem® Zoom 125C Optical System is designed to deliver extended micro-imaging zoom performance. The Zoom 125C features the imaging precision and signature modular flexibility that makes Optem Zoom Lens Systems a cornerstone in today's high-tech manufacturing and OEM integrator micro-imaging applications.

Zoom 125C Specs

Zoom Range	12.5:1
Magnification Range	0.52 – 6.5X
Resolution	57 – 300 lp/mm
Numerical Aperture	0.019 – 0.10
Depth-of-Field	1.57 – 0.057 mm
Field-of-View (Low-Mag.)	9.23 x 12.31 mm
Field-of-View (High-Mag.)	0.74 x 0.98 mm
Working Distance	89 mm

Specs shown in order of low to high mag.
Nominal 1X/1X Configuration with 1/2" Camera

NEW FOR ZOOM 125C

IMPROVED Illumination Uniformity

Under continuous refinement, the Zoom 125C has been re-engineered to reduce vignetting at low magnification by as much as 50%. These improvements ensure optimal camera performance, improved algorithmic accuracy and reduced image processing requirements at front-end integration.

NEW LED Coaxial Illuminators

Programmable 1-Watt white-light Coaxial LED Illuminators feature compact design and lightweight cable for streamlined OEM integration. PAGE 4

NEW Infinity Macro Lens

From millimeters to meters... this simple lens converts your Zoom 125C from micro-imaging at close working distances to a powerful macro-imaging lens covering broad fields-of-view from 55mm to infinity. PAGE 4

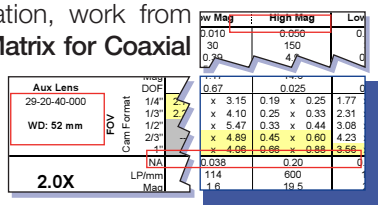
NEW Optem M-Plan APO Objectives

Get the most from your high magnification imaging. Specify the newly expanded line of Optem Long-Working Distance Objectives, including the new M-Plan APO family for exceptional color accuracy and field-flatness. PAGE 4

HOW TO SPECIFY YOUR ZOOM 125 LENS SYSTEM

Follow the seven easy steps below to configure the Zoom 125 Lens System that meets your optical, functional and physical configuration needs.

1 Referring to the **Optical Performance Matrix for Substage or Oblique Illumination** on the back cover, locate your desired performance parameters *(typically field-of-view at high- and low-end zoom as relates to your intended camera format 1/4" – 1")*. If you desire coaxial illumination, work from the **Optical Performance Matrix for Coaxial Illumination.** PAGE 5



2 Cross reference your desired performance block and note the **TV Tube magnification** *(TOP axis)* and **Auxiliary Lens magnification** *(LEFT axis)* to arrive at the combination of magnification components needed to yield your desired field-of-view [FOV]... Consider the varying resolution, depth-of-field and/or working distance factors that are dictated by these components.

3 Once you have determined the **TV Tube** and **Auxiliary Lens magnifications** required, navigate down through the System Diagram (PAGE 6-7) starting from the camera. Select the physical shape of TV Tube and/or camera mount type desired.

4 Select the **Upper Zoom Module** with the functional features you require... Manual, Iris, detent and DC or Stepper Motorized Zoom options are available.

5 Combine the Upper Zoom Module with one of the **Lower Function Modules** that incorporates manual or motorized fine focus and/or coaxial illumination options.

6 Now specify the correct **Auxiliary Lens magnification** to complete the optical components of your Zoom 125C Lens System as dictated in step-1 above. By default, the Zoom 125C delivers a 1X configuration without an Auxiliary Lens.

7 Finally outfit your Zoom 125C Lens System with the appropriate **Coaxial** or **Ringlight Illumination accessories**. If you chose motorized zoom or focus functions, select the appropriate **DC or Stepper controller and power supply**. You may also wish to specify **mounting hardware** to ease integration.

Components of Functional Zoom 125C

- TV Tube (Top Magnification)
- Upper Zoom Module
- Lower Function Module
- Auxiliary Lens (Bottom Magnification)

UPPER ZOOM MODULES

The Upper Zoom Module determines the optomechanical function of your Zoom 125C Lens System… Select from Manual, Detented, and DC or Stepper Motorized.

Manual Zoom – Hand-driven zoom presents an economical 12.5:1 optical system.

Detented Zoom – Obtain specific "stops" throughout the zoom range by selecting the Zoom 125C Module with Detents. Typically used in measuring systems where each position may be calibrated. Pre-set stops are located at 0.6X, 1.0X, 2.0X, 3.0X, 4.0X, 5.0X, and 6.0X.

Motorized Zoom – Provides remote and automatic operation. Available with either DC or Stepper motor drives. The Stepper motor version has a companion RS232 Controller which may be purchased as a free-standing unit or as just the PC board for OEM integration.

Iris-Equipped Zoom Modules – All Zoom 125C Upper Modules are available with an optional integral iris for better control of light level and increased depth-of-field.

LOWER FUNCTION MODULES

Function Modules introduce various illumination and focus options to your Zoom 125C Lens System.

Basic Lower Function Module – The Standard function module houses just the removable A-B Lens Cell yielding the default 1.0X magnification. *(NOTE: All Zoom 125C Lower Function Modules contain an A-B Lens Cell which permits working at finite conjugates)*. With the lens cell removed, the zoom lens works at infinity and will accept infinity-corrected objectives for higher-magnification imaging.

5mm/15mm Focus – Ideal for installations without adjustable support or stage systems, Zoom 125C Fine Focus provides 5mm (coaxial models only) or 15mm (non-coaxial models) fine focus axial distance at the object. Available in manual and motorized.

Coaxial Illumination – Provides a port for the injection of incidental light via LED, Fiber Optic and Halogen Illuminator options. Coaxial Lower Function Modules are available with Internal 5mm Focus in manual or motorized versions. Additionally, each coaxial version is available with a built-in Analyzer for better control in polarized applications.

For all part numbers, ordering information and configuration options, refer to Zoom 125C System Diagram (p. 6-7), or visit the Zoom 125C section of our web site.

ILLUMINATION OPTIONS

The Zoom 125C Lens System offers a variety of illumination options to meet a multitude of imaging requirements.

LED Coaxial Illuminators – Compatible with all Zoom 125C Coaxial Lower Function Modules, new Programmable 1-Watt LED Coaxial Illuminators offer reduced power requirement and heat generation with substantial service life gains.

Available in Straight and Right-Angle configurations, Optem Coaxial LEDs feature compact designs and simplified cable management. Driven by a compact single-channel programmable controller, Optem Coaxial LEDs emit brilliant cool light in the visible spectrum and deliver virtually identical optical performance to our traditional Fiber Optic Coaxial Illuminator.

Fiber Optic Coaxial Illuminators – Available with 40 and 60-inch flexible fiber bundles powered by 110V or 220V Optem VSI Fiber Optic Illuminators.

Polarized Light – When imaging highly reflective subjects, Polarizer Modules with built-in Analyzers are available to introduce polarization to both LED and Fiber Optic Coaxial Illumination paths.

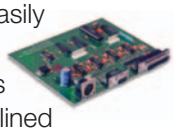
Halogen Illuminators – An economical light source alternative to brighter fiber optic illumination for coaxial Zoom 125C Lower Function Modules.

Fiber Optic Ring Lights – Oblique ringlight Illumination is ideal to better define dimension-rich subjects. Driven with the same VSI Fiber Optic Illuminators as conventional coaxial systems, Optem Ringlights either feature the fiber optic cable exiting the ring horizontally (90° off optical axis), or vertically (30° off optical axis). A special Objective Ring Light is required when incorporating oblique illumination with Optem Objectives.

MOTORIZING YOUR ZOOM 125C

The Zoom 125C Optical System can be specified with motorized zoom and/or focus functions.

Stepper Motor Models – Stepper Motors feature Hall-Effect Sensors to ensure pinpoint mechanical accuracy and repeatability. Homing Sensors establish a "zero" position, permitting programming of setups for multiple work pieces. Control and power are easily integrated through RS232 serial port interface with a Rocker Switch Controller and Windows GUI. An OEM Board is available for more streamlined OEM integration. A Stepper Motor VI library is available for LabVIEW.



DC Motor Models

DC Motors allow continuous movement throughout either the zoom or focus range. Two RS232 Serial ports in the back of the DC Motor Controller accept both zoom and focus motorized functions.

LONG-WORKING DISTANCE OBJECTIVES

Achieve significantly higher magnifications and increased resolution. Combine your Zoom 125C with the expanded line of Optem Infinity-Corrected Objectives.

Optem M-Plan APO – Eliminate Chromatic aberration across exceptionally flat fields for the ultimate in high-magnification accuracy. Select from 2X, 5X, 10X, 20X and 50X Long-Working Distance Objectives. These objectives are exact replacements for Mitutoyo Series 378 Objectives and are ideal for metrology applications.

Optem High-Resolution – Specifically designed to capture maximum resolution at the high-end magnifications of Optem Zoom Lenses, the 5X, 10X and 20X Optem HR Objectives are ideal when every detail counts.

NEW INFINITY MACRO LENS

When macro imaging of broader fields-of-view across longer working distances is required, integrate the new Infinity Macro Lens accessory below a Fine-Focus Module and image from 50mm out to infinity.

For all part numbers, ordering information and configuration options, refer to Zoom 125C System Diagram (p. 6-7), or visit the Zoom 125C section of our web site.

COAXIAL ILLUMINATION Zoom 125C Optical Performance Matrix

NOTE: 0.18x and 0.25x Aux Lenses are NOT recommended w/ coaxial illumination

			0.375X TV Tube		0.5X TV Tube		0.67X TV Tube		1.0X TV Tube		1.5X TV Tube		2.0X TV Tube	
			Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag
0.5X Aux Lens 29-20-38-000 WD: 178 mm		NA	0.010	0.050	0.010	0.050	0.010	0.050	0.010	0.000	0.010	0.050	0.010	0.050
		LP/mm	30	150	30	150	30	150	30	0	30	150	30	150
		Mag	0.098	1.2	0.13	1.6	0.17	2.2	0.26	3.3	0.39	4.9	0.52	6.5
		DOF	5.67	0.23	5.67	0.23	5.67	0.23	5.67	#DIV/0!	5.67	0.23	5.67	0.23
	FOV Cam Format	1/4"	9.20 x 12.27	2.26 x 3.02	8.49 x 11.32	1.70 x 2.26	6.87 x 9.15	1.27 x 1.69	5.52 x 7.36	0.85 x 1.13	4.60 x 6.13	0.57 x 0.75	3.94 x 5.26	0.42 x 0.57
		1/3"	10.11 x 13.47	2.95 x 3.94	9.60 x 12.80	2.22 x 2.95	8.27 x 11.02	1.65 x 2.20	6.55 x 8.73	1.11 x 1.48	5.33 x 7.11	0.74 x 0.98	4.50 x 6.00	0.55 x 0.74
		1/2"	-- x --	-- x --	10.11 x 13.47	2.95 x 3.94	9.55 x 12.74	2.20 x 2.94	8.00 x 10.67	1.48 x 1.97	6.40 x 8.53	0.98 x 1.31	5.33 x 7.11	0.74 x 0.98
		2/3"	-- x --	-- x --	-- x --	-- x --	10.37 x 13.83	3.03 x 4.04	8.80 x 11.73	2.03 x 2.71	7.33 x 9.78	1.35 x 1.81	6.00 x 8.00	1.02 x 1.35
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	10.11 x 13.47	2.95 x 3.94	9.14 x 12.19	1.97 x 2.63	8.00 x 10.67	1.48 x 1.97
0.75X Aux Lens 29-20-39-000 WD: 114 mm		NA	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075
		LP/mm	42	225	42	225	42	225	42	225	42	225	42	225
		Mag	0.15	1.8	0.20	2.4	0.26	3.3	0.39	4.9	0.59	7.3	0.78	9.8
		DOF	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10
	FOV Cam Format	1/4"	9.81 x 13.08	1.51 x 2.01	9.20 x 12.27	1.13 x 1.51	7.85 x 10.46	0.85 x 1.13	6.13 x 8.18	0.57 x 0.75	4.72 x 6.29	0.38 x 0.50	3.54 x 4.72	0.28 x 0.38
		1/3"	8.53 x 11.38	1.97 x 2.63	10.67 x 14.22	1.48 x 1.97	8.96 x 11.94	1.10 x 1.47	6.86 x 9.14	0.74 x 0.98	5.33 x 7.11	0.49 x 0.66	4.62 x 6.15	0.37 x 0.49
		1/2"	-- x --	-- x --	8.53 x 11.38	1.97 x 2.63	10.61 x 14.15	1.47 x 1.96	8.00 x 10.67	0.98 x 1.31	7.11 x 9.48	0.66 x 0.88	5.33 x 7.11	0.49 x 0.66
		2/3"	-- x --	-- x --	-- x --	-- x --	8.21 x 10.95	2.02 x 2.69	9.78 x 13.04	1.35 x 1.81	8.38 x 11.17	0.90 x 1.20	6.29 x 8.38	0.68 x 0.90
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	8.53 x 11.38	1.97 x 2.63	9.48 x 12.64	1.31 x 1.75	8.00 x 10.67	0.98 x 1.31
1.0X Config. NO LENS REQ'D WD: 89 mm		NA	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10
		LP/mm	57	300	57	300	57	300	57	300	57	300	57	300
		Mag	0.20	2.4	0.26	3.3	0.35	4.4	0.52	6.5	0.78	9.8	1.0	13.0
		DOF	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057
	FOV Cam Format	1/4"	9.20 x 12.27	1.13 x 1.51	10.62 x 14.15	0.85 x 1.13	7.92 x 10.56	0.63 x 0.85	5.31 x 7.08	0.42 x 0.57	3.54 x 4.72	0.28 x 0.38	2.65 x 3.54	0.21 x 0.28
		1/3"	4.57 x 6.10	1.48 x 1.97	9.00 x 12.00	1.11 x 1.48	10.33 x 13.78	0.83 x 1.10	6.92 x 9.23	0.55 x 0.74	4.62 x 6.15	0.37 x 0.49	3.46 x 4.62	0.28 x 0.37
		1/2"	-- x --	-- x --	4.80 x 6.40	1.48 x 1.97	8.96 x 11.94	1.10 x 1.47	9.23 x 12.31	0.74 x 0.98	6.15 x 8.21	0.49 x 0.66	4.62 x 6.15	0.37 x 0.49
		2/3"	-- x --	-- x --	-- x --	-- x --	4.69 x 6.25	1.52 x 2.02	11.00 x 14.67	1.02 x 1.35	8.46 x 11.28	0.68 x 0.90	6.35 x 8.46	0.51 x 0.68
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	4.80 x 6.40	1.48 x 1.97	10.67 x 14.22	0.98 x 1.31	9.23 x 12.31	0.74 x 0.98
1.5X Aux Lens 29-20-40-000 WD: 52 mm		NA	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15
		LP/mm	87	450	87	450	87	450	87	450	87	450	87	450
		Mag	0.29	3.7	0.39	4.9	0.52	6.5	0.78	9.8	1.17	14.6	1.6	19.5
		DOF	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025
	FOV Cam Format	1/4"	2.73 x 3.63	0.75 x 1.01	3.07 x 4.09	0.57 x 0.75	3.92 x 5.23	0.42 x 0.56	3.54 x 4.72	0.28 x 0.38	2.36 x 3.15	0.19 x 0.25	1.77 x 2.36	0.14 x 0.19
		1/3"	2.29 x 3.05	0.98 x 1.31	2.82 x 3.76	0.74 x 0.98	3.26 x 4.34	0.55 x 0.73	4.62 x 6.15	0.37 x 0.49	3.08 x 4.10	0.25 x 0.33	2.31 x 3.08	0.18 x 0.25
		1/2"	-- x --	-- x --	2.29 x 3.05	0.98 x 1.31	2.81 x 3.75	0.73 x 0.98	3.56 x 4.74	0.49 x 0.66	4.10 x 5.47	0.33 x 0.44	3.08 x 4.10	0.25 x 0.33
		2/3"	-- x --	-- x --	-- x --	-- x --	2.26 x 3.02	1.01 x 1.35	2.93 x 3.91	0.68 x 0.90	3.67 x 4.89	0.45 x 0.60	4.23 x 5.64	0.34 x 0.45
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	2.29 x 3.05	0.98 x 1.31	3.05 x 4.06	0.66 x 0.88	3.56 x 4.74	0.49 x 0.66
2.0X Aux Lens 29-20-41-000 WD: 32 mm		NA	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20
		LP/mm	114	600	114	600	114	600	114	600	114	600	114	600
		Mag	0.39	4.9	0.52	6.5	0.70	8.7	1.0	13.0	1.6	19.5	2.1	26.0
		DOF	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014
	FOV Cam Format	1/4"	1.67 x 2.23	0.57 x 0.75	1.73 x 2.30	0.42 x 0.57	1.72 x 2.29	0.32 x 0.42	1.73 x 2.30	0.21 x 0.28	1.77 x 2.36	0.14 x 0.19	1.33 x 1.77	0.11 x 0.14
		1/3"	-- x --	-- x --	1.80 x 2.40	0.55 x 0.74	1.68 x 2.24	0.41 x 0.55	1.64 x 2.18	0.28 x 0.37	1.71 x 2.29	0.18 x 0.25	1.73 x 2.31	0.14 x 0.18
		1/2"	-- x --	-- x --	-- x --	-- x --	1.71 x 2.27	0.55 x 0.73	1.71 x 2.29	0.37 x 0.49	1.60 x 2.13	0.25 x 0.33	1.71 x 2.29	0.18 x 0.25
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.74 x 2.32	0.51 x 0.68	1.69 x 2.26	0.34 x 0.45	1.65 x 2.20	0.25 x 0.34
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.78 x 2.37	0.49 x 0.66	1.71 x 2.29	0.37 x 0.49
OPTEM Infinity-Corrected Objectives														
OPTEM 2X M Plan Apo 28-21-02-000 WD: 34 mm		NA	0.018	0.060	0.018	0.060	0.018	0.060	0.018	0.060	0.018	0.060	0.018	0.060
		LP/mm	54	180	54	180	54	180	54	180	54	180	54	180
		Mag	0.19	2.3	0.25	3.1	0.33	4.2	0.50	6.2	0.75	9.4	1.00	12.5
		DOF	1.01	0.19	1.01	0.19	1.01	0.19	1.01	0.19	1.01	0.19	1.01	0.19
	FOV Cam Format	1/4"	3.15 x 4.20	1.18 x 1.57	3.19 x 4.26	0.88 x 1.18	3.30 x 4.40	0.66 x 0.88	4.11 x 5.48	0.44 x 0.59	3.69 x 4.91	0.29 x 0.39	2.76 x 3.68	0.22 x 0.29
		1/3"	-- x --	-- x --	3.13 x 4.17	1.15 x 1.54	3.27 x 4.36	0.86 x 1.15	3.41 x 4.55	0.58 x 0.77	4.81 x 6.41	0.38 x 0.51	3.21 x 4.27	0.29 x 0.38
		1/2"	-- x --	-- x --	-- x --	-- x --	3.16 x 4.22	1.15 x 1.53	3.33 x 4.44	0.77 x 1.03	3.49 x 4.66	0.51 x 0.68	4.81 x 6.41	0.38 x 0.51
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	3.27 x 4.37	1.06 x 1.41	3.32 x 4.43	0.71 x 0.94	3.41 x 4.55	0.53 x 0.71
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	3.22 x 4.29	1.03 x 1.37	3.30 x 4.40	0.77 x 1.03
OPTEM 5X M Plan Apo 28-21-05-000 WD: 32 mm		NA	0.046	0.14	0.046	0.14	0.046	0.14	0.046	0.14	0.046	0.14	0.046	0.14
		LP/mm	180	420	180	420	180	420	180	420	180	420	180	420
		Mag	0.47	5.9	0.62	7.8	0.84	10.45	1.2	15.6	1.9	23.4	2.5	31.2
		DOF	0.27	0.029	0.27	0.029	0.27	0.029	0.27	0.029	0.27	0.029	0.27	0.029
	FOV Cam Format	1/4"	1.28 x 1.70	0.47 x 0.63	1.31 x 1.75	0.35 x 0.47	1.32 x 1.76	0.26 x 0.35	1.64 x 2.19	0.18 x 0.24	1.47 x 1.97	0.12 x 0.16	1.11 x 1.47	0.09 x 0.12
		1/3"	-- x --	-- x --	1.28 x 1.70	0.46 x 0.62	1.32 x 1.75	0.34 x 0.46	1.36 x 1.82	0.23 x 0.31	1.92 x 2.56	0.15 x 0.21	1.28 x 1.71	0.12 x 0.15
		1/2"	-- x --	-- x --	-- x --	-- x --	1.28 x 1.71	0.46 x 0.61	1.33 x 1.78	0.31 x 0.41	1.44 x 1.92	0.21 x 0.27	1.92 x 2.56	0.15 x 0.21
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.31 x 1.75	0.42 x 0.56	1.34 x 1.79	0.28 x 0.38	1.40 x 1.86	0.21 x 0.28
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.30 x 1.73	0.41 x 0.55	1.33 x 1.77	0.31 x 0.41
OPTEM 10X M Plan Apo 28-21-10-000 WD: 33 mm		NA	0.092	0.30	0.092	0.30	0.092	0.30	0.092	0.30	0.092	0.30	0.092	0.30
		LP/mm	343	867	343	867	343	867	343	867	343	867	343	867
		Mag	0.94	11.7	1.2	15.6	1.7	20.9	2.5	31.2	3.7	46.8	5.0	62.4
		DOF	0.040	0.0063	0.040	0.0063	0.040	0.0063	0.040	0.0063	0.040	0.0063	0.040	0.0063
	FOV Cam Format	1/4"	0.64 x 0.85	0.24 x 0.31	0.66 x 0.88	0.18 x 0.24	0.66 x 0.88	0.13 x 0.18	0.82 x 1.10	0.09 x 0.12	0.74 x 0.98	0.06 x 0.08	0.55 x 0.74	0.04 x 0.06
		1/3"	-- x --	-- x --	0.64 x 0.86	0.23 x 0.31	0.66 x 0.88	0.17 x 0.23	0.68 x 0.91	0.12 x 0.15	0.96 x 1.28	0.08 x 0.10	0.64 x 0.85	0.06 x 0.08
		1/2"	-- x --	-- x --	-- x --	-- x --	0.64 x 0.86	0.23 x 0.31	0.67 x 0.89	0.15 x 0.21	0.74 x 0.98	0.10 x 0.14	0.96 x 1.28	0.08 x 0.10
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.65 x 0.87	0.21 x 0.28	0.68 x 0.90	0.14 x 0.19	0.72 x 0.96	0.11 x 0.14
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.65 x 0.86	0.21 x 0.27	0.67 x 0.89	0.15 x 0.21
OPTEM 20X M Plan Apo 28-21-11-000 WD: 20 mm		NA	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39	0.18	0.39
		LP/mm	686	1128	686	1128	686	1128	686	1128	686	1128	686	1128
		Mag	1.9	23.4	2.5	31.2	3.3	41.8	5.0	62.4	7.5	93.6	10.0	125
		DOF	0.010	0.0037	0.010	0.0037	0.010	0.0037	0.010	0.0037	0.010	0.0037	0.010	0.0037
	FOV Cam Format	1/4"	0.33 x 0.43	0.12 x 0.16	0.32 x 0.43	0.09 x 0.12	0.30 x 0.40	0.07 x 0.09	0.26 x 0.35	0.04 x 0.06	0.37 x 0.49	0.03 x 0.04	0.16 x 0.21	0.02 x 0.03
		1/3"	-- x --	-- x --	0.33 x 0.43	0.12 x 0.15	0.32 x 0.43	0.09 x 0.11	0.29 x 0.38	0.06 x 0.08	0.28 x 0.37	0.04 x 0.05	0.19 x 0.25	0.03 x 0.04
		1/2"	-- x --	-- x --	-- x --	-- x --	0.33 x 0.43	0.11 x 0.15	0.31 x 0.42	0.08 x 0.10	0.28 x 0.38	0.05 x 0.07	0.28 x 0.37	0.04 x 0.05
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.33 x 0.44	0.11 x 0.14	0.31 x 0.41	0.07 x 0.09	0.29 x 0.38	0.05 x 0.07
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.33 x 0.44	0.10 x 0.14	0.31 x 0.42	0.08 x 0.10
OPTEM 50X M Plan Apo 28-21-50-000 WD: 13 mm		NA	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
		LP/mm	1440	1440	1440	1440	1440	1440	1440	1440	1440	1440	1440	1440
		Mag	4.7	58.5	6.2	78.0	8.4	105	12.5	156	18.7	234	25.0	312
		DOF	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	FOV Cam Format	1/4"	0.14 x 0.19	0.05 x 0.06	0.14 x 0.19	0.04 x 0.05	0.13 x 0.18	0.03 x 0.04	0.12 x 0.15	0.02 x 0.02	0.11 x 0.15	0.01 x 0.02	0.07 x 0.09	0.01 x 0.01
		1/3"	-- x --	-- x --	0.14 x 0.19	0.05 x 0.06	0.14 x 0.18	0.03 x 0.05	0.13 x 0.17	0.02 x 0.03	0.12 x 0.15	0.02 x 0.02	0.08 x 0.10	0.01 x 0.02
		1/2"	-- x --	-- x --	-- x --	-- x --	0.14 x 0.19	0.05 x 0.06	0.13 x 0.18	0.03 x 0.04	0.12 x 0.17	0.02 x 0.03	0.12 x 0.15	0.02 x 0.02
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.14 x 0.19	0.04 x 0.06	0.13 x 0.18	0.03 x 0.04	0.12 x 0.17	0.02 x 0.03
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.14 x 0.19	0.04 x 0.05	0.14 x 0.18	0.03 x 0.04
OPTEM 5X High-Res 28-20-44-000 WD: 34 mm		NA	0.046	0.23	0.046	0.23	0.046	0.23	0.046	0.23	0.046	0.23	0.046	0.23
		LP/mm	171	651	171	651	171	651	171	651	171	651	171	651
		Mag	0.47	5.9	0.62	7.8	0.84	10.45	1.2	15.6	1.9	23.4	2.5	31.2
		DOF	0.16	0.011	0.16	0.011	0.16	0.011	0.16	0.011	0.16	0.011	0.16	0.011
	FOV Cam Format	1/4"	1.39 x 1.86	0.47 x 0.63	1.58 x 2.11	0.35 x 0.47	1.91 x 2.54	0.26 x 0.35	2.21 x 2.95	0.18 x 0.24	1.47 x 1.97	0.12 x 0.16	1.11 x 1.47	0.09 x 0.12
		1/3"	-- x --	-- x --	1.42 x 1.89	0.46 x 0.62	1.60 x 2.13	0.34 x 0.46	2.14 x 2.86	0.23 x 0.31	1.92 x 2.56	0.15 x 0.21	1.28 x 1.71	0.12 x 0.15
		1/2"	-- x --	-- x --	-- x --	-- x --	1.42 x 1.90	0.46 x 0.61	1.67 x 2.22	0.31 x 0.41	2.26 x 3.01	0.21 x 0.27	1.92 x 2.56	0.15 x 0.21
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.45 x 1.93	0.42 x 0.56	1.78 x 2.37	0.28 x 0.38	2.19 x 2.93	0.21 x 0.28
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	1.49 x 1.99	0.41 x 0.55	1.69 x 2.26	0.31 x 0.41
OPTEM 10X High-Res 28-20-45-000 WD: 19 mm		NA	0.092	0.45	0.092	0.45	0.092	0.45	0.092	0.45	0.092	0.45	0.092	0.45
		LP/mm	343	1301	343	1301	343	1301	343	1301	343	1301	343	1301
		Mag	0.94	11.7	1.2	15.6	1.7	20.9	2.5	31.2	3.7	46.8	5.0	62.4
		DOF	0.040	0.0028	0.040	0.0028	0.040	0.0028	0.040	0.0028	0.040	0.0028	0.040	0.0028
	FOV Cam Format	1/4"	0.61 x 0.81	0.24 x 0.31	0.67 x 0.90	0.18 x 0.24	0.72 x 0.95	0.13 x 0.18	0.82 x 1.10	0.09 x 0.12	0.74 x 0.98	0.06 x 0.08	0.55 x 0.74	0.04 x 0.06
		1/3"	-- x --	-- x --	0.62 x 0.82	0.23 x 0.31	0.66 x 0.88	0.17 x 0.23	0.75 x 1.00	0.12 x 0.15	0.96 x 1.28	0.08 x 0.10	0.64 x 0.85	0.06 x 0.08
		1/2"	-- x --	-- x --	-- x --	-- x --	0.62 x 0.83	0.23 x 0.31	0.71 x 0.95	0.15 x 0.21	0.81 x 1.08	0.10 x 0.14	0.96 x 1.28	0.08 x 0.10
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.63 x 0.83	0.21 x 0.28	0.71 x 0.95	0.14 x 0.19	0.79 x 1.06	0.11 x 0.14
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.65 x 0.87	0.21 x 0.27	0.70 x 0.93	0.15 x 0.21
OPTEM 20X High-Res 28-20-46-000 WD: 13 mm		NA	0.18	0.60	0.18	0.60	0.18	0.60	0.18	0.60	0.18	0.60	0.18	0.60
		LP/mm	686	1735	686	1735	686	1735	686	1735	686	1735	686	1735
		Mag	1.9	23.4	2.5	31.2	3.3	41.8	5.0	62.4	7.5	93.6	10.0	125
		DOF	0.010	0.0016	0.010	0.0016	0.010	0.0016	0.010	0.0016	0.010	0.0016	0.010	0.0016
	FOV Cam Format	1/4"	0.31 x 0.42	0.12 x 0.16	0.32 x 0.42	0.09 x 0.12	0.36 x 0.48	0.07 x 0.09	0.48 x 0.64	0.04 x 0.06	0.37 x 0.49	0.03 x 0.04	0.28 x 0.37	0.02 x 0.03
		1/3"	-- x --	-- x --	0.31 x 0.42	0.12 x 0.15	0.32 x 0.43	0.09 x 0.11	0.38 x 0.50	0.06 x 0.08	0.48 x 0.64	0.04 x 0.05	0.32 x 0.43	0.03 x 0.04
		1/2"	-- x --	-- x --	-- x --	-- x --	0.31 x 0.42	0.11 x 0.15	0.33 x 0.44	0.08 x 0.10	0.39 x 0.53	0.05 x 0.07	0.48 x 0.64	0.04 x 0.05
		2/3"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.31 x 0.42	0.11 x 0.14	0.34 x 0.45	0.07 x 0.09	0.38 x 0.51	0.05 x 0.07
		1"	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	-- x --	0.31 x 0.42	0.10 x 0.14	0.33 x 0.44	0.08 x 0.10

-- Limited vignetting at low magnifications

-- Configuration not recommended

ZOOM 125C PERFORMANCE SPECIFICATIONS

ZOOM 125C SYSTEM DIAGRAM

Flange Mounts
(for manual versions)

30-15-06-000
76mm O.D. FLANGE MOUNT
(OLYMPUS, NIKON, LEICA)

30-15-02-000
82mm O.D. FLANGE MOUNT
(UNITRON)

30-15-03-000
83mm O.D. FLANGE MOUNT
(GENERIC)

30-15-04-000
84mm O.D. FLANGE MOUNT
(MEIJI)

30-15-00-000
FLAT FLANGE MOUNT
(for Manual versions)

Tube Clamp Mounts
(for motorized versions)

30-25-76-000
76mm O.D. TUBE CLAMP
(OLYMPUS, NIKON, LEICA)

30-25-82-000
82mm O.D. TUBE CLAMP
(UNITRON)

30-25-83-000
83mm O.D. TUBE CLAMP
(GENERIC)

30-25-84-000
84mm O.D. TUBE CLAMP
(MEIJI)

30-65-34-000
FLAT MOUNT
(for Motorized versions)

29-50-10-000
UNIVERSAL CLAMP
(top view)

Right-Angle TV Tubes

29-90-86-000 – 0.5X RA
29-90-87-000 – 0.67X RA
29-90-74-000 – 1.0X RA
29-90-88-000 – 1.5X RA
29-90-89-000 – 2.0X RA

29-90-81-000
1.0X U-BEND
TV TUBE

U-Bend TV Tube

Mini TV Tubes

29-90-26-000
0.5X MINI
TV TUBE

29-90-27-000
0.67X MINI
TV TUBE

29-90-90-000
1.0X MINI
TV TUBE

Upper Zoom Modules

30-61-10-000
MANUAL

30-61-11-000
MANUAL w/IRIS

30-61-40-000
MANUAL DETENT

30-61-41-000
MANUAL DENENT w/IRIS

30-16-40-000
40" FLEX
BUNDLE

30-16-60-000
60" FLEX
BUNDLE

29-60-83-000
VSI 110 ILLUMINATOR
110 VOLT / 150 WATT

29-60-84-000
VSI 220 ILLUMINATOR
220VOLT / 150 WATT

Illumination

30-16-01-000
10mm
ADAPTER

30-16-02-000
FIBER OPTIC
LAMPHOUSE

29-69-13-000
RIGHT ANGLE
COAX ADAPTER

30-13-10-000
15mm FINE FOCUS
MANUAL

30-13-20-000
15mm FINE FOCUS
DC MOTOR

30-13-37-000
15mm FINE FOCUS
STEPPING MOTOR
HALL-EFFECT SENSOR

30-12-00-000
BASIC

396010-810
SINGLE-CHANNEL
PROGRAMMABLE
LED CONTROLLER

30-60-10-000
STRAIGHT
1-WATT COAXIAL LED

NEW

29-69-02-000
POLARIZER

NEW

27-60-07-000
110/6 VOLT VARIABLE

27-60-17-000
220/6 VOLT VARIABLE

30-60-20-000
RIGHT-ANGLE
1-WATT COAXIAL LED

29-69-20-000
M25x0.75
VARIABLE MAG/WD
RING-LIGHT
ADAPTER

NEW

42-35-41-000
INFINITY
MACRO LENS

29-20-09-000
0.18X / 0.25X
CONVERTIBLE
AUX LENS

29-69-21-000
FIXED MAG/WD
RING-LIGHT
ADAPTER

29-99-59-000
RIGHT ANGLE
ADAPTER

29-60-09-000
10 WATT
HALOGEN LAMP

29-69-14-000
HALOGEN
LAMPHOUSE

29-60-81-000
HORIZONTAL RING LIGHT

30-16-70-000
VERTICAL RING LIGHT

Zoom 125C System Diagram

CAMERA

Standard TV Tubes

- **29-90-28-000** 1.5X MINI TV TUBE
- **29-90-29-000** 2.0X MINI TV TUBE
- **29-90-82-000** 0.38X TV TUBE
- **29-90-70-000** 0.5X TV TUBE
- **29-90-71-000** 0.67X TV TUBE
- **29-90-72-000** 1.0X TV TUBE
- **29-90-73-000** 1.5X TV TUBE
- **29-90-80-000** 2.0X TV TUBE

Non-Inverting Right-Angle TV Tubes

29-90-92-000 – 0.5X NIRA
29-90-93-000 – 0.67X NIRA
29-90-94-000 – 1.0X NIRA
29-90-95-000 – 1.5X NIRA
29-90-96-000 – 2.0X NIRA

Bayonet TV Tubes

29-77-04-000 – 1.0X F-MOUNT BAYONET
29-77-02-000 – 1.0X 1/2" ENG BAYONET
29-77-03-000 – 1.0X 2/3" ENG BAYONET
29-77-01-000 – 1.0X 1/2" SONY BAYONET

- **30-61-20-000** DC MOTOR
- **30-61-21-000** DC MOTOR w/IRIS
- **30-61-37-000** STEPPING MOTOR HALL-EFFECT SENSOR
- **30-61-38-000** STEPPING MOTOR HALL EFFECT SENSOR w/IRIS

Motorization Control & Power Supply

DC MOTOR

- **28-80-18-000** 110V TRANSFORMER
- **28-80-19-000** 220V TRANSFORMER
- **30-17-20-000** DC MOTOR DRIVER

STEPPER MOTOR

- **30-17-70-000** STEPPING MOTOR DRIVER
- **30-17-74-000** HALL EFFECT SENSOR JUNCTION BOX
- **30-17-75-000** STEPPING MOTOR O.E.M. BOARD
- **30-17-31-000** UNIV. TRANSFORMER (100-240V, 50-60Hz)
- **30-70-01-000** (N. AMER CORD)
- **30-17-36-000** (EUR CORD)
- **30-17-33-000** (UK CORD)

Lower Function Modules

- **30-14-00-000** COAX ILLUMINATOR NO FOCUS
- **30-14-03-000** COAX W/ANALYZER NO FOCUS
- **30-14-10-000** COAX ILLUMINATOR 5mm FOCUS
- **30-14-13-000** COAX W/ANALYZER 5mm FOCUS
- **30-14-20-000** COAX ILLUMINATOR DC MOTORIZED FOCUS
- **30-14-23-000** COAX W/ANALYZER DC MOTORIZED FOCUS
- **30-14-37-000** COAX ILLUMINATOR STEPPER MOTOR FOCUS HALL-EFFECT SENSOR
- **30-14-38-000** COAX W/ANALYZER STEPPER MOTOR FOCUS HALL-EFFECT SENSOR

Magnification

Auxiliary Lenses

- **29-20-38-000** 0.5X AUX LENS
- **29-20-39-000** 0.75X AUX LENS
- **29-20-40-000** 1.5X AUX LENS
- **29-20-41-000** 2.0X AUX LENS

- **29-99-01-000** 1.437x32T - M25x0.75T ADAPTER
- **30-17-01-000** MALE/FEMALE THREAD 0.5X AUX LENS
- **30-17-02-000** MALE/FEMALE THREAD 0.75X RA AUX LENS
- **29-69-01-000** 1/4 WAVE PLATE
- **29-99-03-000** 1.437 x 32T – 0.800 x 36T OBJECTIVE ADAPTER
- **30-17-04-000** 25mm – 0.800 x 36T OBJECTIVE ADAPTER (for Focus Modules)
- **29-99-02-000** 1.437x32T – M26 x 36T OBJECTIVE ADAPTER
- **30-17-03-000** 25mm – M26 x 36T OBJECTIVE ADAPTER (for Focus Modules)

NIKON/OLYMPUS | MITUTOYO | OPTEM

30-16-50-000 OBJECTIVE RING LIGHT

NEW

Optem® LWD Objectives

28-21-02-000 - 2X M PLAN APO
28-21-05-000 - 5X M PLAN APO
28-21-10-000 - 10X M PLAN APO
28-21-11-000 - 20X M PLAN APO
28-21-50-000 - 50X M PLAN APO

28-20-44-000 - 5X HIGH-RES
28-20-45-000 - 10X HIGH-RES
28-20-46-000 - 20X HIGH-RES

= optomechanical path
= illumination path
= power/controls path

For an online archive of nominal component dimensions, downloadable schematics, and optical performance specifications, visit the Zoom 125C Section of our web site.

ZOOM 125C PERFORMANCE SPECIFICATIONS

SUBSTAGE/OBLIQUE ILLUMINATION Zoom 125C Optical Performance Matrix

			0.375X TV Tube		0.5X TV Tube		0.67X TV Tube		1.0X TV Tube		1.5X TV Tube		2.0X TV Tube	
			Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag	Low Mag	High Mag
0.18X		NA	0.0035	0.015	0.0035	0.015	0.0035	0.015	0.0035	0.015	0.0035	0.015	0.0035	0.015
Aux Lens		LP/mm	11	45	11	45	11	45	11	45	11	45	11	45
		Mag	0.035	0.44	0.047	0.59	0.063	0.78	0.094	1.2	0.14	1.8	0.19	2.3
		DOF	46.29	2.52	46.29	2.52	46.29	2.52	46.29	2.52	46.29	2.52	46.29	2.52
29-20-09-000	FOV Cam Format	1/4"	78.63 x 104.84	6.29 x 8.39	58.97 x 78.63	4.72 x 6.29	44.01 x 58.68	3.52 x 4.69	29.49 x 39.32	2.36 x 3.15	19.66 x 26.21	1.57 x 2.10	14.74 x 19.66	1.18 1.57
		1/3"	76.19 x 101.59	8.21 x 10.94	76.92 x 102.56	6.15 x 8.21	57.41 x 76.54	4.59 x 6.12	38.46 x 51.28	3.08 x 4.10	25.64 x 34.19	2.05 x 2.74	19.23 x 25.64	1.54 2.05
WD: 468 mm		1/2"	35.56 x 47.41	10.94 x 14.59	76.19 x 101.59	8.21 x 10.94	76.54 x 102.05	6.12 x 8.16	51.28 x 68.38	4.10 x 5.47	34.19 x 45.58	2.74 x 3.65	25.64 x 34.19	2.05 2.74
		2/3"	-- x --	-- x --	33.33 x 44.44	11.28 x 15.04	68.41 x 91.21	8.42 x 11.23	70.51 x 94.02	5.64 x 7.52	47.01 x 62.68	3.76 x 5.01	35.26 x 47.01	2.82 3.76
		1"	-- x --	-- x --	-- x --	-- x --	28.43 x 37.91	12.25 x 16.33	76.19 x 101.59	8.21 x 10.94	68.38 x 91.17	5.47 x 7.29	51.28 x 68.38	4.10 5.47
0.25X		NA	0.0048	0.025	0.0048	0.025	0.0048	0.025	0.0048	0.025	0.0048	0.025	0.0048	0.025
Aux Lens		LP/mm	14	75	14	75	14	75	14	75	14	75	14	75
		Mag	0.049	0.61	0.065	0.81	0.087	1.09	0.130	1.6	0.20	2.4	0.26	3.3
		DOF	24.61	0.91	24.61	0.91	24.61	0.91	24.61	0.91	24.61	0.91	24.61	0.91
29-20-09-000	FOV Cam Format	1/4"	56.62 x 75.49	4.53 x 6.04	42.46 x 56.62	3.40 x 4.53	31.69 x 42.25	2.54 x 3.38	21.23 x 28.31	1.70 x 2.26	14.15 x 18.87	1.13 x 1.51	10.62 x 14.15	0.85 1.13
		1/3"	54.86 x 73.14	5.91 x 7.88	55.38 x 73.85	4.43 x 5.91	41.33 x 55.11	3.31 x 4.41	27.69 x 36.92	2.22 x 2.95	18.46 x 24.62	1.48 x 1.97	13.85 x 18.46	1.11 1.48
WD: 310 mm		1/2"	25.60 x 34.13	7.88 x 10.50	54.86 x 73.14	5.91 x 7.88	55.11 x 73.48	4.41 x 5.88	36.92 x 49.23	2.95 x 3.94	24.62 x 32.82	1.97 x 2.63	18.46 x 24.62	1.48 1.97
		2/3"	-- x --	-- x --	24.00 x 32.00	8.12 x 10.83	49.25 x 65.67	6.06 x 8.08	50.77 x 67.69	4.06 x 5.42	33.85 x 45.13	2.71 x 3.61	25.38 x 33.85	2.03 2.71
		1"	-- x --	-- x --	-- x --	-- x --	20.47 x 27.29	8.82 x 11.76	54.86 x 73.14	5.91 x 7.88	49.23 x 65.64	3.94 x 5.25	36.92 x 49.23	2.95 3.94
0.5X		NA	0.010	0.050	0.010	0.050	0.010	0.050	0.010	0.000	0.010	0.050	0.010	0.050
Aux Lens		LP/mm	30	150	30	150	30	150	30	0	30	150	30	150
		Mag	0.098	1.2	0.13	1.6	0.17	2.2	0.26	3.3	0.39	4.9	0.52	6.5
		DOF	5.67	0.23	5.67	0.23	5.67	0.23	5.67	#DIV/0!	5.67	0.23	5.67	0.23
29-20-38-000	FOV Cam Format	1/4"	28.31 x 37.74	2.26 x 3.02	21.23 x 28.31	1.70 x 2.26	15.84 x 21.13	1.27 x 1.69	10.62 x 14.15	0.85 x 1.13	7.08 x 9.44	0.57 x 0.75	5.31 x 7.08	0.42 0.57
		1/3"	27.43 x 36.57	2.95 x 3.94	27.69 x 36.92	2.22 x 2.95	20.67 x 27.55	1.65 x 2.20	13.85 x 18.46	1.11 x 1.48	9.23 x 12.31	0.74 x 0.98	6.92 x 9.23	0.55 0.74
WD: 178 mm		1/2"	12.80 x 17.07	3.94 x 5.25	27.43 x 36.57	2.95 x 3.94	27.55 x 36.74	2.20 x 2.94	18.46 x 24.62	1.48 x 1.97	12.31 x 16.41	0.98 x 1.31	9.23 x 12.31	0.74 0.98
		2/3"	-- x --	-- x --	12.00 x 16.00	4.06 x 5.42	24.63 x 32.84	3.03 x 4.04	25.38 x 33.85	2.03 x 2.71	16.92 x 22.56	1.35 x 1.81	12.69 x 16.92	1.02 1.35
		1"	-- x --	-- x --	-- x --	-- x --	10.23 x 13.65	4.41 x 5.88	27.43 x 36.57	2.95 x 3.94	24.62 x 32.82	1.97 x 2.63	18.46 x 24.62	1.48 1.97
0.75X		NA	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075	0.014	0.075
Aux Lens		LP/mm	42	225	42	225	42	225	42	225	42	225	42	225
		Mag	0.15	1.8	0.20	2.4	0.26	3.3	0.39	4.9	0.59	7.3	0.78	9.8
		DOF	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10	2.89	0.10
29-20-39-000	FOV Cam Format	1/4"	18.87 x 25.16	1.51 x 2.01	14.15 x 18.87	1.13 x 1.51	10.56 x 14.08	0.85 x 1.13	7.08 x 9.44	0.57 x 0.75	4.72 x 6.29	0.38 x 0.50	3.54 x 4.72	0.28 0.38
		1/3"	18.29 x 24.38	1.97 x 2.63	18.46 x 24.62	1.48 x 1.97	13.78 x 18.37	1.10 x 1.47	9.23 x 12.31	0.74 x 0.98	6.15 x 8.21	0.49 x 0.66	4.62 x 6.15	0.37 0.49
WD: 114 mm		1/2"	8.53 x 11.38	2.63 x 3.50	18.29 x 24.38	1.97 x 2.63	18.37 x 24.49	1.47 x 1.96	12.31 x 16.41	0.98 x 1.31	8.21 x 10.94	0.66 x 0.88	6.15 x 8.21	0.49 0.66
		2/3"	-- x --	-- x --	8.00 x 10.67	2.71 x 3.61	16.42 x 21.89	2.02 x 2.69	16.92 x 22.56	1.35 x 1.81	11.28 x 15.04	0.90 x 1.20	8.46 x 11.28	0.68 0.90
		1"	-- x --	-- x --	-- x --	-- x --	6.82 x 9.10	2.94 x 3.92	18.29 x 24.38	1.97 x 2.63	16.41 x 21.88	1.31 x 1.75	12.31 x 16.41	0.98 1.31
1.0X Config.		NA	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10	0.019	0.10
NO LENS REQ'D		LP/mm	57	300	57	300	57	300	57	300	57	300	57	300
		Mag	0.20	2.4	0.26	3.3	0.35	4.4	0.52	6.5	0.78	9.8	1.0	13.0
		DOF	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057	1.57	0.057
WD: 89 mm	FOV Cam Format	1/4"	14.15 x 18.87	1.13 x 1.51	10.62 x 14.15	0.85 x 1.13	7.92 x 10.56	0.63 x 0.85	5.31 x 7.08	0.42 x 0.57	3.54 x 4.72	0.28 x 0.38	2.65 x 3.54	0.21 0.28
		1/3"	13.71 x 18.29	1.48 x 1.97	13.85 x 18.46	1.11 x 1.48	10.33 x 13.78	0.83 x 1.10	6.92 x 9.23	0.55 x 0.74	4.62 x 6.15	0.37 x 0.49	3.46 x 4.62	0.28 0.37
		1/2"	6.40 x 8.53	1.97 x 2.63	13.71 x 18.29	1.48 x 1.97	13.78 x 18.37	1.10 x 1.47	9.23 x 12.31	0.74 x 0.98	6.15 x 8.21	0.49 x 0.66	4.62 x 6.15	0.37 0.49
		2/3"	-- x --	-- x --	6.00 x 8.00	2.03 x 2.71	12.31 x 16.42	1.52 x 2.02	12.69 x 16.92	1.02 x 1.35	8.46 x 11.28	0.68 x 0.90	6.35 x 8.46	0.51 0.68
		1"	-- x --	-- x --	-- x --	-- x --	5.12 x 6.82	2.20 x 2.94	13.71 x 18.29	1.48 x 1.97	12.31 x 16.41	0.98 x 1.31	9.23 x 12.31	0.74 0.98
1.5X		NA	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15	0.029	0.15
Aux Lens		LP/mm	87	450	87	450	87	450	87	450	87	450	87	450
		Mag	0.29	3.7	0.39	4.9	0.52	6.5	0.78	9.8	1.17	14.6	1.6	19.5
		DOF	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025	0.67	0.025
29-20-40-000	FOV Cam Format	1/4"	9.44 x 12.58	0.75 x 1.01	7.08 x 9.44	0.57 x 0.75	5.28 x 7.04	0.42 x 0.56	3.54 x 4.72	0.28 x 0.38	2.36 x 3.15	0.19 x 0.25	1.77 x 2.36	0.14 0.19
		1/3"	9.14 x 12.19	0.98 x 1.31	9.23 x 12.31	0.74 x 0.98	6.89 x 9.18	0.55 x 0.73	4.62 x 6.15	0.37 x 0.49	3.08 x 4.10	0.25 x 0.33	2.31 x 3.08	0.18 0.25
WD: 52 mm		1/2"	4.27 x 5.69	1.31 x 1.75	9.14 x 12.19	0.98 x 1.31	9.18 x 12.25	0.73 x 0.98	6.15 x 8.21	0.49 x 0.66	4.10 x 5.47	0.33 x 0.44	3.08 x 4.10	0.25 0.33
		2/3"	-- x --	-- x --	4.00 x 5.33	1.35 x 1.81	8.21 x 10.95	1.01 x 1.35	8.46 x 11.28	0.68 x 0.90	5.64 x 7.52	0.45 x 0.60	4.23 x 5.64	0.34 0.45
		1"	-- x --	-- x --	-- x --	-- x --	3.41 x 4.55	1.47 x 1.96	9.14 x 12.19	0.98 x 1.31	8.21 x 10.94	0.66 x 0.88	6.15 x 8.21	0.49 0.66
2.0X		NA	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20	0.038	0.20
Aux Lens		LP/mm	114	600	114	600	114	600	114	600	114	600	114	600
		Mag	0.39	4.9	0.52	6.5	0.70	8.7	1.0	13.0	1.6	19.5	2.1	26.0
		DOF	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014	0.39	0.014
29-20-41-000	FOV Cam Format	1/4"	7.08 x 9.44	0.57 x 0.75	5.31 x 7.08	0.42 x 0.57	3.96 x 5.28	0.32 x 0.42	2.65 x 3.54	0.21 x 0.28	1.77 x 2.36	0.14 x 0.19	1.33 x 1.77	0.11 0.14
		1/3"	6.86 x 9.14	0.74 x 0.98	6.92 x 9.23	0.55 x 0.74	5.17 x 6.89	0.41 x 0.55	3.46 x 4.62	0.28 x 0.37	2.31 x 3.08	0.18 x 0.25	1.73 x 2.31	0.14 0.18
WD: 32 mm		1/2"	3.20 x 4.27	0.98 x 1.31	6.86 x 9.14	0.74 x 0.98	6.89 x 9.18	0.55 x 0.73	4.62 x 6.15	0.37 x 0.49	3.08 x 4.10	0.25 x 0.33	2.31 x 3.08	0.18 0.25
		2/3"	-- x --	-- x --	3.00 x 4.00	1.02 x 1.35	6.16 x 8.21	0.76 x 1.01	6.35 x 8.46	0.51 x 0.68	4.23 x 5.64	0.34 x 0.45	3.17 x 4.23	0.25 0.34
		1"	-- x --	-- x --	-- x --	-- x --	2.56 x 3.41	1.10 x 1.47	6.86 x 9.14	0.74 x 0.98	6.15 x 8.21	0.49 x 0.66	4.62 x 6.15	0.37 0.49

-- Limited vignetting at low magnifications

-- Configuration not recommended

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