solino™

COMPONENTS

The 2011 Catalogue for Machine Vision and Microscopy

www.solino.com

Solutions in Optics

Welcome to the solino Green Line Catalogue

in this third edition of our catalogue for machine vision and microscopy, we focus mainly on our own components, accompanied by those of selected partners.
We, Opto Sonderbedarf, are the company behind solino. Since 1980, we have been a specialist developer and manufacturer of market-leading Optomechatronic Modules, Components and Systems. Solino is the international sales channel for our standard products and those of our certified partners. It stands for Solutions in Optics – designed by Opto. For over 30 years, we have delivered special plug and play solutions ranging from single vision components all the way to complex imaging systems. With this kind of experience, we have established a broad and unique skillset in microscopy and machine vision, and have utilised or integrated many of the components found here in many of our solutions.
Thanks to our comprehensive in-house manufacturing capability, we are able to meet and exceed any production demand – from rapid single unit prototyping all the way to serial production. With our global supply chain, and our expanding partner network, Opto is ready to be your reliable and price sensitive partner for the long term. If you have any questions, just give us a call and we will be pleased to assist you with any level of advice.

For even more Components, Inspection Systems, Analysis Systems and the latest information visit our website:
www.solino.com - www.opto.de

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Opto
1980 - 2010
30 Years of Excellence.


Content

Quotation, Ordering & Terms

We are pleased to provide you with a solution to your specific need. Just call your local partner for a detailed and tailor made quotation.

Terms of business can be found on our webpage. Specifications in this catalogue are current at the time of publication but Opto reserves the right to change these specifications without prior notice. Pictures can show different or other specifications, valid are product details as quoted. Technical information and guidance provided in this catalogue is intended to be useful in the application of Opto products but we do not accept responsibility for its use.

Terms and conditions of sale are specific to each country in which Opto operates and are supplied with all quotations and invoices. Please contact us for additional copies. Nothing in the foregoing statements modifies the Terms and Conditions in effect for each country of operation.

Zero Distortion Macro Lenses

This family of macro lenses is designed to image small objects at very high image resolution and virtually zero distortion. These lenses are typically used for dimensional measurements of mechanical parts, electronic components and board inspection. They are used in printing, microbiology, forensic, and video microscopy applications.

- Distortion <0.01%
- Diameter 35 mm
- C-Mount

Art. No.	Mag.	W.D.	F-No.	L ength	Diameter	FoV 1/3" in mm	FoV 1/2" in mm	FoV 2/3" in mm
100-MC200	2.0x	57 mm	20	141 mm	35 mm	2.4 x 1.8	3.2 x 2.4	4.4 x 3.3
100-MC100	1.0x	79 mm	14	95 mm	35 mm	4.8 x 3.6	6.4 x 4.8	8.8 x 6.6
100-MC075	0.75x	99 mm	12	79 mm	35 mm	6.4 x 4.8	8.5 x 6.4	11.7 x 8.8
100-MC050	0.5x	132 mm	10	66 mm	35 mm	9.6 x 7.2	12.8 x 9.6	17.6 x 13.2
100-MC030	0.3x	199 mm	8.4	56 mm	35 mm	16.0 x 12.0	21.3 x 16.0	29.3 x 22.0

Opto OEM Zoom 7:1

Our unique square design enables easy and versatile mounting options with customisable, built-in threads incorporated into the design, as well as a robust locking mechanism to fix magnification as required. The high-end optical design and the compact mechanics of these zooms make them the first choice for highly specified applications requiring reliable zooming at a reasonable price.

- Fully parfocal
- Adjustable C-Mount
- Optimised parcentricity
- Easy mounting, 4x M4 at 28 x 42 mm

Details

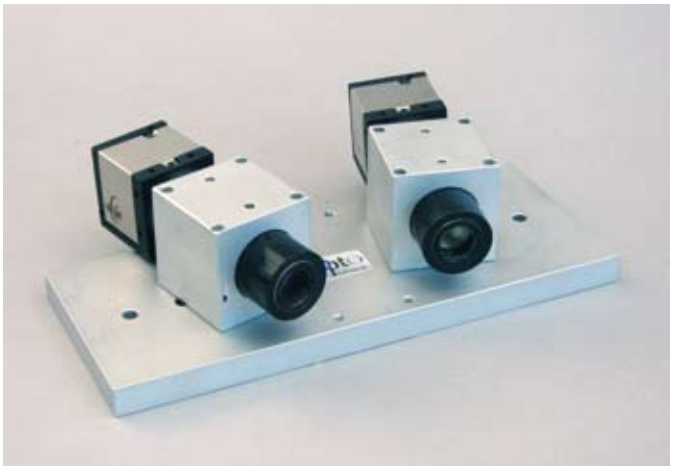
Fix Focus	Internal Focus	Type	Length	WD	Magnification	FOV 1/2" in mm
100-ZOS7-31	100-ZOS7-IF31	Zoom Objective 0.93x - 6.8x	242 mm	77 mm	0.93x - 6.8x	6.9 x 5.1 - 0.9 x 0.7
100-ZOS7-25	100-ZOS7-IF25	Zoom Objective 0.75x - 5.5x	242 mm	95 mm	0.75x - 5.5x	8.5 x 6.4 - 1.1 x 0.8
100-ZOS7-20	100-ZOS7-IF20	Zoom Objective 0.6x - 4.4x	242 mm	114 mm	0.6x - 4.4x	10.6 x 8 - 1.4 x 1.1
100-ZOS7-15	100-ZOS7-IF15	Zoom Objective 0.45x - 3.3x	242 mm	155 mm	0.45x - 3.3x	14.2 x 10.6 - 1.9 x 1.4
100-ZOS7-12	100-ZOS7-IF12	Zoom Objective 0.36x - 2.6x	242 mm	245 mm	0.36x - 2.6x	17.8 x 13.3 - 2.4 x 1.8
100-ZOS7-10	100-ZOS7-IF10	Zoom Objective 0.3x - 2.2x	242 mm	240 mm	0.3x - 2.2x	21.3 x 16 - 2.9 x 2.2
100-ZOS7-06	100-ZOS7-IF06	Zoom Objective 0.18x - 1.3x	242 mm	390 mm	0.18x - 1.3x	35.6 x 26.7 - 4.8 x 3.6

Low distortion high resolution 16mm-Lenses

These lenses have a very compact design making them perfect for machine integration. They offer low distortion, are highly colour corrected and feature high resolutions.
You can combine them with a C-Mount Adapter from the accessories list to achieve an adjustable standard mount version (see magnification chart for range of aproximate magnifications and working distances) or simply use them with your own machine design.

Type	Mag.	Focal Length in mm	F-No.	Viewing Angle	Diameter in mm	Length in mm
100-CO10	0.025x	10	2.8	43°	16	23
100-CO12	0.05x	12	3.3	36°	16	14
100-CO14	0.025x	14	3.5	32°	16	14
100-CO18	0.05x	18	3.5	24°	16	14
100-CO22	0.025x	22	3.5	21°	16	14
100-CO25	0.05x	25	3.5	18°	16	15
100-CO30	0.05x	30	3.5	15°	16	16
100-CO32	0.05x	32	3.5	14°	16	16
100-CO35	0.05x	35	4.0	13°	16	16

C-Mount Adapter for 100-CO Lens	
100-CAD-1605	ID=16 mm, L=5 mm
100-CAD-1610	ID=16 mm, L=10 mm
100-CAD-1620	ID=16 mm, L=20 mm
100-CAD-1640	ID=16 mm, L=40 mm
100-CAD-1660	ID=16 mm, L=60 mm
100-CAD-1670	ID=16 mm, L=70 mm



Magnification Chart

	C-Mount Adapter											
	100-CAD-1605		100-CAD-1610		100-CAD-1620		100-CAD-1640		100-CAD-1660		100-CAD-1670	
Adapter Length:	5 mm		10 mm		20 mm		40 mm		60 mm		70 mm	
Combination ranges	from	to	from	to	from	to	from	to	from	to	from	to
CCD-Objectives												
100-CO10 **WD in mm**	0.02x 500	0.5x 28	0.5x 28	1.0x 10	1.0x 10	4.0x 2.5	-	-	-	-	-	-
100-CO12 **WD in mm**	0.05x 250	0.4x 40	0.4x 40	1.0x 21	1.2x 19	2.0x 15	3.0x 14	-	4.0x 12	5.0x 11	5.5x 10	-
100-CO14 **WD in mm**	0.1x 150	0.2x 80	0.2x 79	0.7x 30	1.0x 24	1.6x 18	2.0x 11	3.0x 15	4.0x 14	-	5.0x 14	
100-CO18 **WD in mm**	0.1x 200	0.15x 135	0.2x 105	0.6x 45	0.7x 40	1.0x 35	1.7x 25	2.0x 24	3.0x 20	-	-	-
100-CO22 **WD in mm**	-	-	0.1x 240	0.3x 90	0.4x 70	0.6x 55	1.0x 35	1.5x 33	2.0x 30	2.5x 27	-	-
100-CO25 **WD in mm**	-	-	0.1x 270	0.15x 195	0.2x 145	0.6x 60	0.8x 43	1.0x 45	2.0x 33		2.5x 30	-
100-CO30 **WD in mm**	-	-	0.x 315	0.2x 165	0.3x 125	0.6x 65	1.0x 55	-	2.0x 30	-	-	-
100-CO32 **WD in mm**	-	-	0.1x 340	0.2x 180	0.3x 125	0.6x 80	1.0x 50	-	1.5x 40	-	2.0x 35	-
100-CO35 **WD in mm**	-	-	0.1x 385	0.2x 205	0.3x 140	0.6x 110	0.5x 90	1.0x 60	-	-	-	-

For orders and more information: T: +49 89 898055 30 F: +49 89 898055 33 info@solino.com

Macro Video Zoom Lens 18–108 mm with Close-Up Lens

The 6:1 Macro Zoom Lens is designed to be attached directly to C-Mount CCD cameras. With optional ´click stop´ detents, this objective is now usable for measuring task applications which require variable fields of view over large areas. This unique objective includes a special „close up" lens that allows it to cover a field of view from 4.3 to 400 mm. They are used for robotics automation, macro machine vision, in line and packaging inspection.

- Zoom Ratio (parfocal): 6:1,
- Focal Length: 18 – 108 mm
- Magnification with „close up" lens:
  0.066 – 0.4 x (max WD) - 0.17 – 1.0 x (min. WD)
- Working distance:
  w/ „close up" lens: 140 – 280 mm
  w/o „close up" lens: 280 mm – ∞
- Field of View based upon a 1/2" CCD
  w/ „close up" lens: from 5.7 x 4.3 up to 96 x 72 mm
  w/o "close up" lens from 14 x 10 up to 400 x 300 mm

Art. No.	Type	Mount	Detents	Weight in g	Iris / Focus	Max. Sensor
100-MZ6	Macro-Zoom Lens	C-Mount	-	600	Manual	2/3"
100-MZD6	Detended Macro-Zoom-Lens	C-Mount	10 click stop positions	780	Manual	2/3"

Accessories

043-640052
Clamp for Macro Video Zoom Lens on Column 25 mm (➔ see page 18)
distance of column axis and optical axis 110 mm

043-640053
Clamp for Macro Video Zoom Lens with 1/4" internal thread; distance between back of clamp and optical axis is 65 mm

Macro Video Zoom Lens Inspection System

The Macro Video Zoom Lens is ideal for macroscopic applications, where viewed objects are bigger than the sensor of the camera and where the inspected field of view may need to be changed frequently. Our detented, or 'click stop' version is ideal for measuring tasks which require accurately reproducible views. We also offer a range of dedicated Macro Stands and specialist illumination for use with this lens. Take a look at our Yellow Line Catalogue for our Inspection Systems which incorporate this lens as a measurement workstation!

Specialised Compact CCD-Objectives

This is a selection of objectives specifically designed for OEM machine integration for niche markets. This family of special lenses have a series of unique features and were initially designed for special custom requirements. For the first time, we now offer these lenses internationally through solino!

Typical applications for these objectives have included flat panel control, dye sorting, robot control and also biomedical quality inspection. For other special OEM lens designs, please visit Opto's website at www.opto.de

Compact telecentric objectives

- Reproduction scales 1:4 to 1:1
- Object size up to 16 mm
- Object side telecentricity
- Object side NA 0.08 for 1:2
- Diameter 24 mm
- C-Mount

Type	Mag.	W.D. in mm	F-No.	Max. Sensor	Distortion	Length in mm	FoV 1/2" in mm
100-CO24-TC04	0.4x	78	4.8	1/2"	< 1%	28	16.0 x 12.0
100-CO24-TC05	0.5x	68	6	1/2"	< 1%	28	12.8 x 9.6
100-CO24-TC075	0.75x	52	9	1/2"	< 1%	34	8.5 x 6.4
100-CO24-TC10	1.0x	44	12	1/2"	< 0.1%	40	6.4 x 4.8

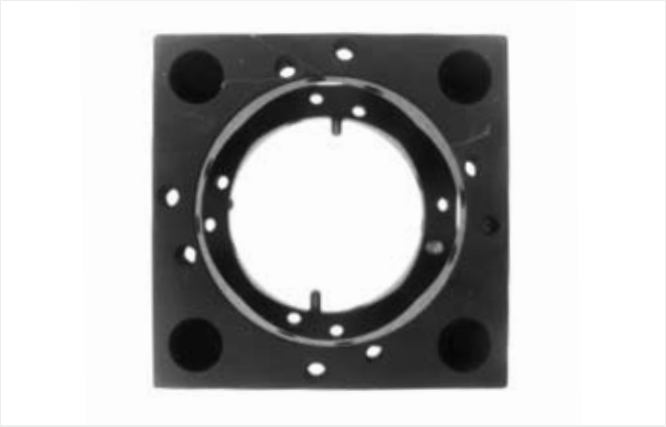
Telecentric Objective NIR 0.4x

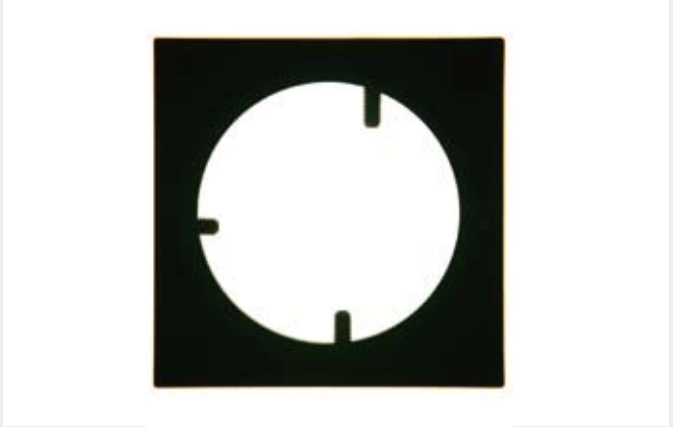
- FoV 15.75mm x 11.75mm @ 1/2"
- Sensors up to 10mm diameter
- Magnification 0.4x, Distortion <0.1%
- Optimum spectral range 1140nm
- also in VIS low distortion
- WD 100mm
- C-Mount
- Length 154 mm, diameter 39.5 mm
- Adjustable Iris, F# 5-9.4

Art. No.: 100-TCNIR-04

Telecentric Lenses

With a normal lens, magnification differs when changing the distance from the lens. Additionally, features which are located at the edge of an image are viewed at a different angle than objects in the centre of the field of view (FoV). Telecentric lenses are used for performing exact measurements of objects because they offer images which represent the exact size of an object regardless of its position within the FoV or its distance from the lens. Like all our products, we offer custom made lenses tailored to your specific needs on request.





Picture of same object taken with endocentric and telecentric lens

For orders and more information: T: +49 89 898055 30 F: +49 89 898055 33 info@solino.com

90° C-Mount Objectives

Due to the basic laws of optics, many optical designs result in objectives with an extended length. Often, when mounted together with a camera, such objectives are simply too big for applications where space is restricted space. With this range of products, Opto offers very high performance in ultra compact packages for OEM machine integration.

10x 90° Coax Objective

- Magnification 10x
- 90° Deflection
- Coax illumination for 4 mm light guides, optional with LED
- Working Distance 2.3 mm
- C-Mount

Art. No.: 045-200157

Twin Field C-Mount Objectives

Twin field objectives are used where two different magnifications of an object have to be rapidly inspected simultaneously. This solution offers a number of benefits over zoom-based systems including: a) the elimination of magnification changing times b) elimination of inaccuracies in zoom positioning, and c) cost reduction. We can build custom solutions tailored exactly to your specific need and budget.

1x / 2.5x Coax Twin Field Objective

- Magnification 1 = 1x, C-Mount
- Magnification 2 = 2.5x, C-Mount
- Working Distance 77mm
- Coaxial illumination with LED white
- Tube distance 60mm
- Power supply not included (043-700020)

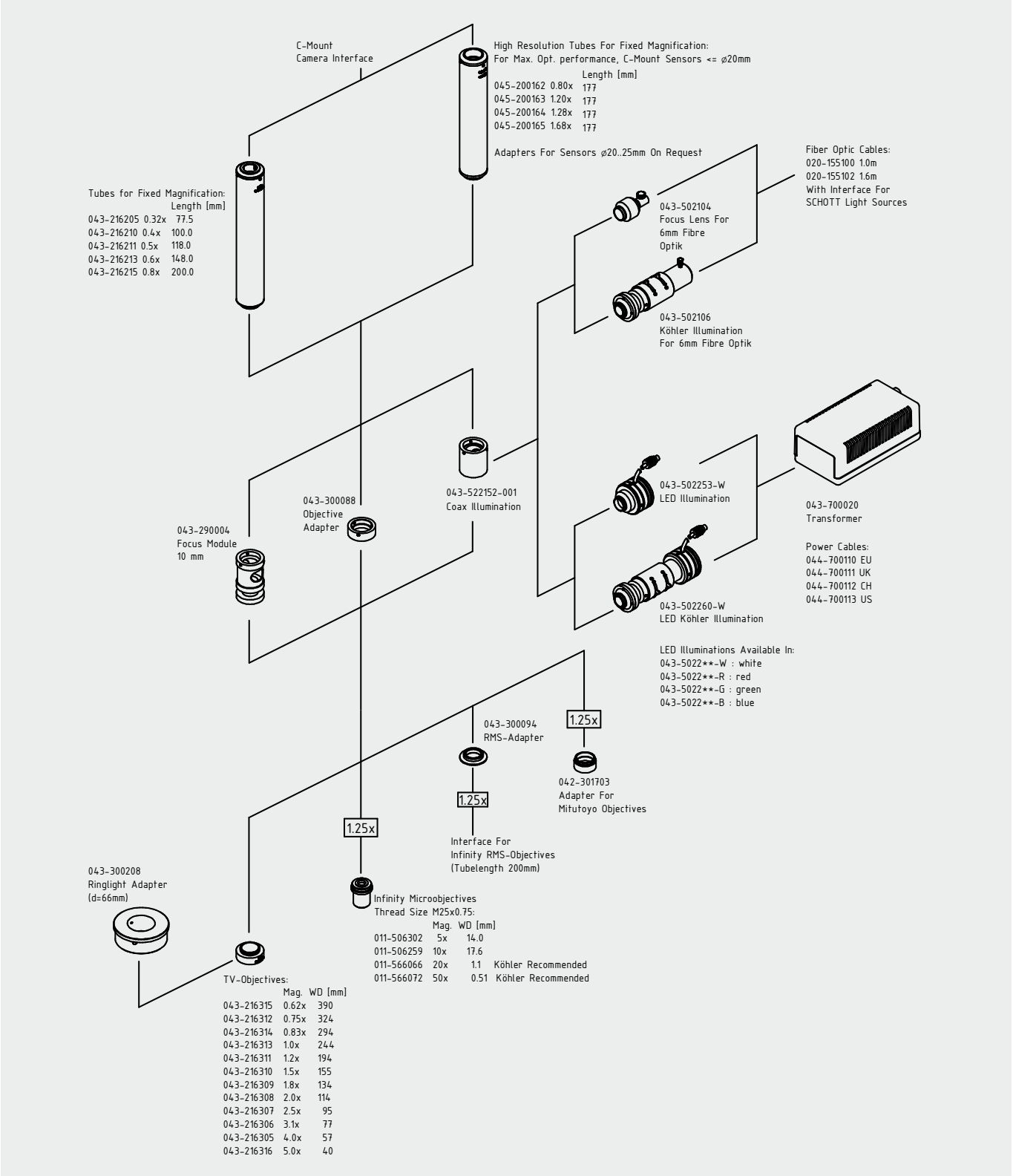
Art. No.: 045-400135

Twinfield Objectives

Fixed Magnification C-Mount Chart

This economical, modular imaging fixed magnification system is a simple and reliable solution for most imaging applications. The new high resolution tubes improve image quality even further and are able to handle sensors up to 25mm in diameter.

All Tubes have diameter 35 mm and have a C-Mount. Detailed design drawings you can find online at www.solino.com
Configuration is very simple: Just pick a Tube and Objective Combination from the Magnification Chart and add a focus module, coax illumination or just the basic adapter.



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Magnification Chart Fixed Mag

		Tubes				
Tube Magnifications	0.32x	0.40x	0.50x	0.60x	0.80x	1.20x
TV-Objectives						
0.62x WD=390 mm	0.20x 31.50 x 23.50	0.25x 25.20 x 18.80	0.30x 21.00 x 15.67	0.38x 16.80 x 12.53	0.50x 12.60 x 9.40	0.75x 8.40 x 6.27
0.75x WD=324 mm	0.24x 25.99 x 20.79	0.30x 20.79 x 15.51	0.36x 17.33 x 12.93	0.45x 13.86 x 10.34	0.61x 10.40 x 7.76	0.91x 6.93 x 5.17
0.83x WD=294 mm	0.27x 23.63 x 17.63	0.33x 18.90 x 14.10	0.40x 15.75 x 11.75	0.50x 12.60 x 9.40	0.67x 9.45 x 7.05	1.00x 6.30 x 4.70
1.0x WD=244 mm	0.32x 19.69 x 14.69	0.40x 15.75 x 11.75	0.48x 13.13 x 9.79	0.60x 10.50 x 7.83	0.80x 7.88 x 5.88	1.20x 5.25 x 3.92
1.2x WD=194 mm	0.40x 15.75 x 11.75	0.50x 12.60 x 9.40	0.60x 10.50 x 7.83	0.75x 8.40 x 6.27	1.00x 6.30 x 4.70	1.50x 4.20 x 3.13
1.5x WD=155 mm	0.50x 12.60 x 9.40	0.63x 10.08 x 7.52	0.75x 8.40 x 6.27	0.94x 6.72 x 5.01	1.25x 5.04 x 3.76	1.88x 3.36 x 2.51
1.8x WD=134 mm	0.57x 11.03 x 8.23	0.71x 8.82 x 6.58	0.86x 7.35 x 5.48	1.07x 5.88 x 4.39	1.43x 4.41 x 3.29	2.14x 2.94 x 2.19
2.0x WD=114 mm	0.67x 9.45 x 7.05	0.83x 7.56 x 5.64	1.00x 6.30 x 4.70	1.25x 5.04 x 3.76	1.67x 3.78 x 2.82	2.50x 2.52 x 1.88
2.5x WD=95 mm	0.80x 7.88 x 5.88	1.00x 6.30 x 4.70	1.20x 5.25 x 3.92	1.50x 4.20 x 3.13	2.00x 3.15 x 2.35	3.00x 2.10 x 1.57
3.1x WD=77 mm	1.00x 6.30 x 4.70	1.25x 5.04 x 3.76	1.50x 4.20 x 3.13	1.88x 3.36 x 2.51	2.50x 2.52 x 1.88	3.75x 1.68 x 1.25
3.7x WD=61 mm	1.14x 5.51 x 4.11	1.43x 4.41 x 3.29	1.71x 3.68 x 2.74	2.14x 2.94 x 2.19	2.86x 2.21 x 1.65	4.29x 1.47 x 1.10
5.0x WD=40 mm	1.60x 3.94 x 2.94	2.00x 3.15 x 2.35	2.40x 2.63 x 1.96	3.00x 2.10 x 1.57	4.00x 1.58 x 1.18	6.00x 1.05 x 0.78
Micro-Objectives (1.25x)						
5.0x WD=14/22.5 mm	2.00x 3.15 x 2.35	2.50x 2.52 x 1.88	3.00x 2.10 x 1.57	3.75x 1.68 x 1.25	5.00x 1.26 x 0.94	7.50x 0.84 x 0.63
10.0x WD=17.6/20.3 mm	4.00x 1.58 x 1.18	5.00x 1.26 x 0.94	6.00x 1.05 x 0.78	7.50x 0.84 x 0.63	10.00x 0.63 x 0.47	15.00x 0.42 x 0.31
20.0x WD=1.1/20.5 mm	8.00x 0.79 x 0.59	10.00x 0.63 x 0.47	12.00x 0.53 x 0.39	15.00x 0.42 x 0.31	20.00x 0.32 x 0.24	30.00x 0.21 x 0.16
50.0x WD=0.51/13.8 mm	20.00x 0.32 x 0.24	25.00x 0.25 x 0.19	30.00x 0.21 x 0.16	37.50x 0.17 x 0.13	50.00x 0.13 x 0.09	75.00x 0.08 x 0.06

Improving Pictures – Köhler Illumination

Köhler allows homogeneous illumination and increased control over the contrast and depth of field of the image.

This is achieved by a system of lenses and irises, which give precise control over the shape of the light entering the objective.

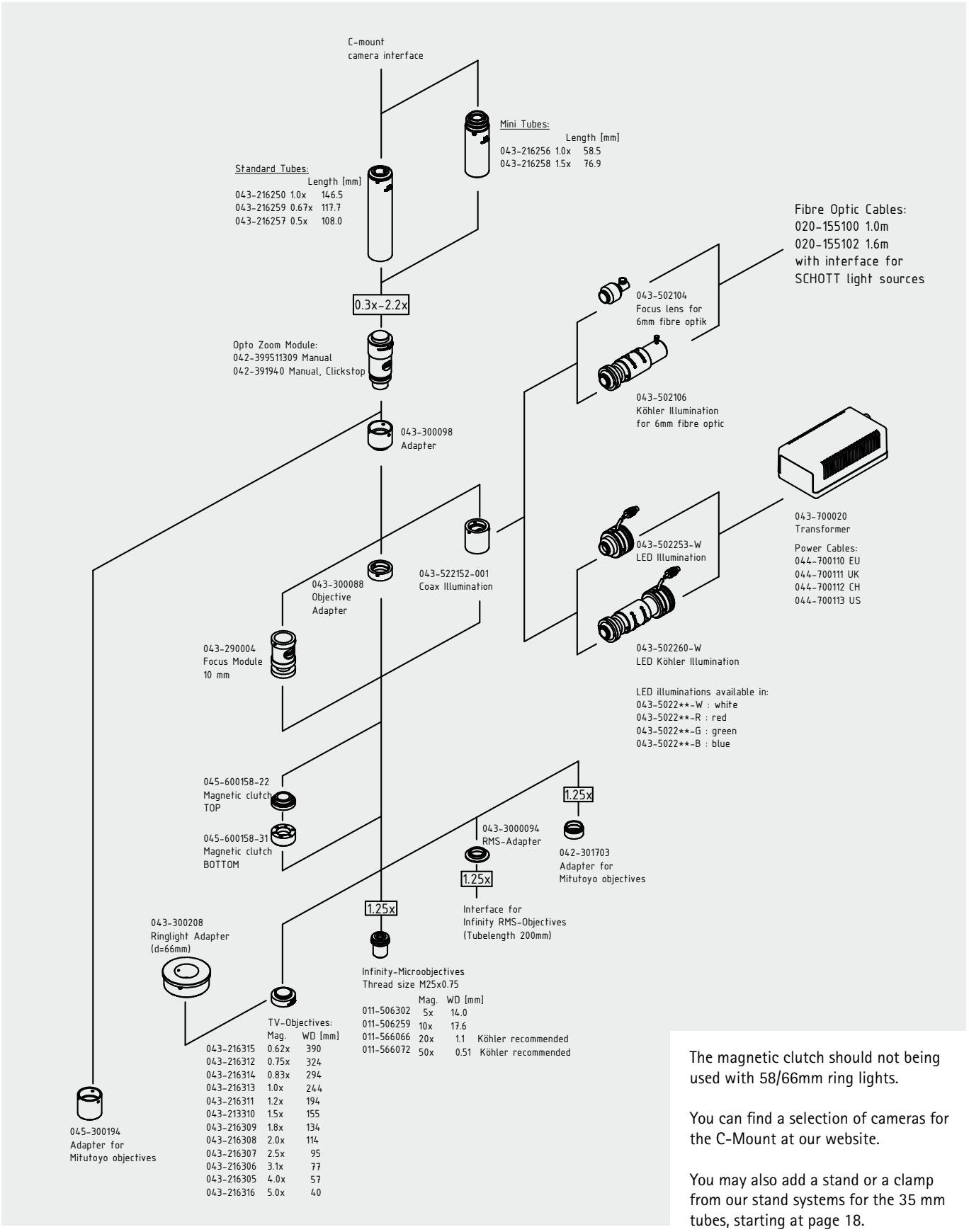
Illumination with Köhler LED
Crisp, high contrast picture

Illumination with coaxial LED
Blurred picture, low contrast

Opto 7:1 Zoom C-Mount Chart

This exceptionally reliable zoom guarantees through it`s modularity a solution for most imaging applications where flexible Magnification is beneficial. All Tubes have diameter 35 mm. Detailed design drawings you can find online at www.solino.com
Motorized versions are available on request.

Configuration is really simple: Locate your field of view in the Magnification Chart to get the Tube / Objective Combination. Try to use always a higher objective magnification instead of a a higher tube. After this it's upt to your choice - detented or plain zoom, focus module, coax illumination or just the basic adapter - its up to you.



The magnetic clutch should not being used with 58/66mm ring lights.

You can find a selection of cameras for the C-Mount at our website.

You may also add a stand or a clamp from our stand systems for the 35 mm tubes, starting at page 18.

Magnification Chart Opto 7:1 Zoom

		Tubes							
Tube Magnifications		0.50x		0.67x		1.00x		1.50x	
Zoom Magnification		Low	High	Low	High	Low	High	Low	High
		0.30x	2.20x	0.30x	2.20x	0.30x	2.20x	0.30x	2.20x
TV-Objectives									
0.62x	Total Mag.	**0.09x**	**0.63x**	**0.12x**	**0.85x**	**0.18x**	**1.27x**	**0.27x**	**1.90x**
WD=390 mm	FOV 1/2" [mm]	52.2 x 70.0	7.4 x 9.9	39.0 x 52.2	5.5 x 7.4	26.1 x 35.0	3.7 x 5.0	17.4 x 23.3	2.5 x 3.3
0.75x	Total Mag.	**0.11x**	**0.77x**	**0.15x**	**1.03x**	**0.22x**	**1.54x**	**0.33x**	**2.30x**
WD=324 mm	FOV 1/2" [mm]	43.1 x 57.8	6.1 x 8.2	32.2 x 43.1	4.6 x 6.1	21.5 x 28.9	3.1 x 4.1	14.4 x 19.3	2.0 x 2.7
0.83x	Total Mag.	**0.12x**	**0.85x**	**0.16x**	**1.13x**	**0.24x**	**1.69x**	**0.36x**	**2.54x**
WD=294 mm	FOV 1/2" [mm]	39.2 x 52.5	5.6 x 7.5	29.2 x 39.2	4.2 x 5.6	19.6 x 26.3	2.8 x 3.7	13.1 x 17.5	1.9 x 2.5
1.0x	Total Mag.	**0.14x**	**1.01x**	**0.19x**	**1.36x**	**0.29x**	**2.03x**	**0.43x**	**3.04x**
WD=244 mm	FOV 1/2" [mm]	32.6 x 43.8	4.6 x 6.2	24.4 x 32.6	3.5 x 4.6	16.3 x 21.9	2.3 x 3.1	10.9 x 14.6	1.5 x 2.1
1.2x	Total Mag.	**0.18x**	**1.27x**	**0.24x**	**1.70x**	**0.36x**	**2.54x**	**0.54x**	**3.80x**
WD=194 mm	FOV 1/2" [mm]	26.1 x 35.0	3.7 x 5.0	19.5 x 26.1	2.8 x 3.7	13.1 x 17.5	1.9 x 2.5	8.7 x 11.7	1.2 x 1.7
1.5x	Total Mag.	**0.23x**	**1.58x**	**0.30x**	**2.12x**	**0.45x**	**3.17x**	**0.68x**	**4.75x**
WD=155 mm	FOV 1/2" [mm]	20.9 x 28.0	3.0 x 4.0	15.6 x 20.9	2.2 x 3.0	10.4 x 14.0	1.5 x 2.0	7.0 x 9.3	1.0 x 1.3
1.8x	Total Mag.	**0.26x**	**1.81x**	**0.51x**	**3.62x**	**0.51x**	**3.62x**	**0.77x**	**5.43x**
WD=134 mm	FOV 1/2" [mm]	18.3 x 24.5	2.6 x 3.5	9.1 x 12.3	1.3 x 1.7	9.1 x 12.3	1.3 x 1.7	6.1 x 8.2	0.9 x 1.2
2.0x	Total Mag.	**0.30x**	**2.11x**	**0.40x**	**2.83x**	**0.60x**	**4.23x**	**0.90x**	**6.34x**
WD=114 mm	FOV 1/2" [mm]	15.7 x 21.0	2.2 x 3.0	11.7 x 15.7	1.7 x 2.2	7.8 x 10.5	1.1 x 1.5	5.2 x 7.0	0.7 x 1.0
2.5x	Total Mag.	**0.36x**	**2.11x**	**0.48x**	**3.40x**	**0.72x**	**4.23x**	**1.08x**	**6.34x**
WD=95 mm	FOV 1/2" [mm]	13.1 x 17.5	2.2 x 3.0	9.7 x 13.1	1.4 x 1.9	6.5 x 8.8	1.1 x 1.5	4.4 x 5.8	0.7 x 1.0
3.1x	Total Mag.	**0.45x**	**3.17x**	**0.60x**	**4.25x**	**0.90x**	**6.34x**	**1.35x**	**9.51x**
WD=77 mm	FOV 1/2" [mm]	10.4 x 14.0	1.5 x 2.0	7.8 x 10.4	1.1 x 1.5	5.2 x 7.0	0.7 x 1.0	3.5 x 4.7	0.5 x 0.7
3.7x	Total Mag.	**0.51x**	**3.62x**	**0.69x**	**4.85x**	**1.03x**	**7.24x**	**1.54x**	**10.86x**
WD=61 mm	FOV 1/2" [mm]	9.1 x 12.3	1.3 x 1.7	6.8 x 9.1	1.0 x 1.3	4.6 x 6.1	0.6 x 0.9	3.0 x 4.1	0.4 x 0.6
5.0x	Total Mag.	**0.72x**	**5.07x**	**0.96x**	**6.79x**	**1.44x**	**10.14x**	**2.16x**	**15.21x**
WD=40 mm	FOV 1/2" [mm]	6.53 x 8.75	0.93 x 1.24	4.87 x 6.53	0.69 x 0.93	3.26 x 4.38	0.46 x 0.62	2.18 x 2.92	0.31 x 0.41
Micro-Objectives (1.25x)									
5.0x	Total Mag.	**0.94x**	**6.88x**	**1.26x**	**9.21x**	**1.88x**	**13.75x**	**2.81x**	**20.63x**
WD=14/22.5 mm	FOV 1/2" [mm]	6.83 x 5.12	0.93 x 0.70	5.09 x 3.82	0.69 x 0.52	3.41 x 2.56	0.47 x 0.35	2.28 x 1.71	0.31 x 0.23
10.0x	Total Mag.	**1.88x**	**13.75x**	**2.51x**	**18.43x**	**3.75x**	**27.50x**	**5.63x**	**41.25x**
WD=17.6/20.3 mm	FOV 1/2" [mm]	3.41 x 2.56	0.47 x 0.35	2.55 x 1.91	0.35 x 0.26	1.71 x 1.28	0.23 x 0.17	1.14 x 0.85	0.16 x 0.12
20.0x	Total Mag.	**3.75x**	**27.50x**	**5.03x**	**36.85x**	**7.50x**	**55.00x**	**11.25x**	**82.50x**
WD=1.1/20.5 mm	FOV 1/2" [mm]	1.71 x 1.28	0.23 x 0.17	1.27 x 0.96	0.17 x 0.13	0.85 x 0.64	0.12 x 0.09	0.57 x 0.43	0.08 x 0.06
50.0x	Total Mag.	**9.38x**	**68.75x**	**12.56x**	**92.13x**	**18.75x**	**137.50x**	**28.13x**	**206.25x**
WD=0.51/13.8 mm	FOV 1/2" [mm]	0.68 x 0.51	0.09 x 0.07	0.51 x 0.38	0.07 x 0.05	0.34 x 0.26	0.05 x 0.03	0.23 x 0.17	0.03 x 0.02

Portable Zoom Microscope with interchangeable C-Mount or eyepiece with height measurement

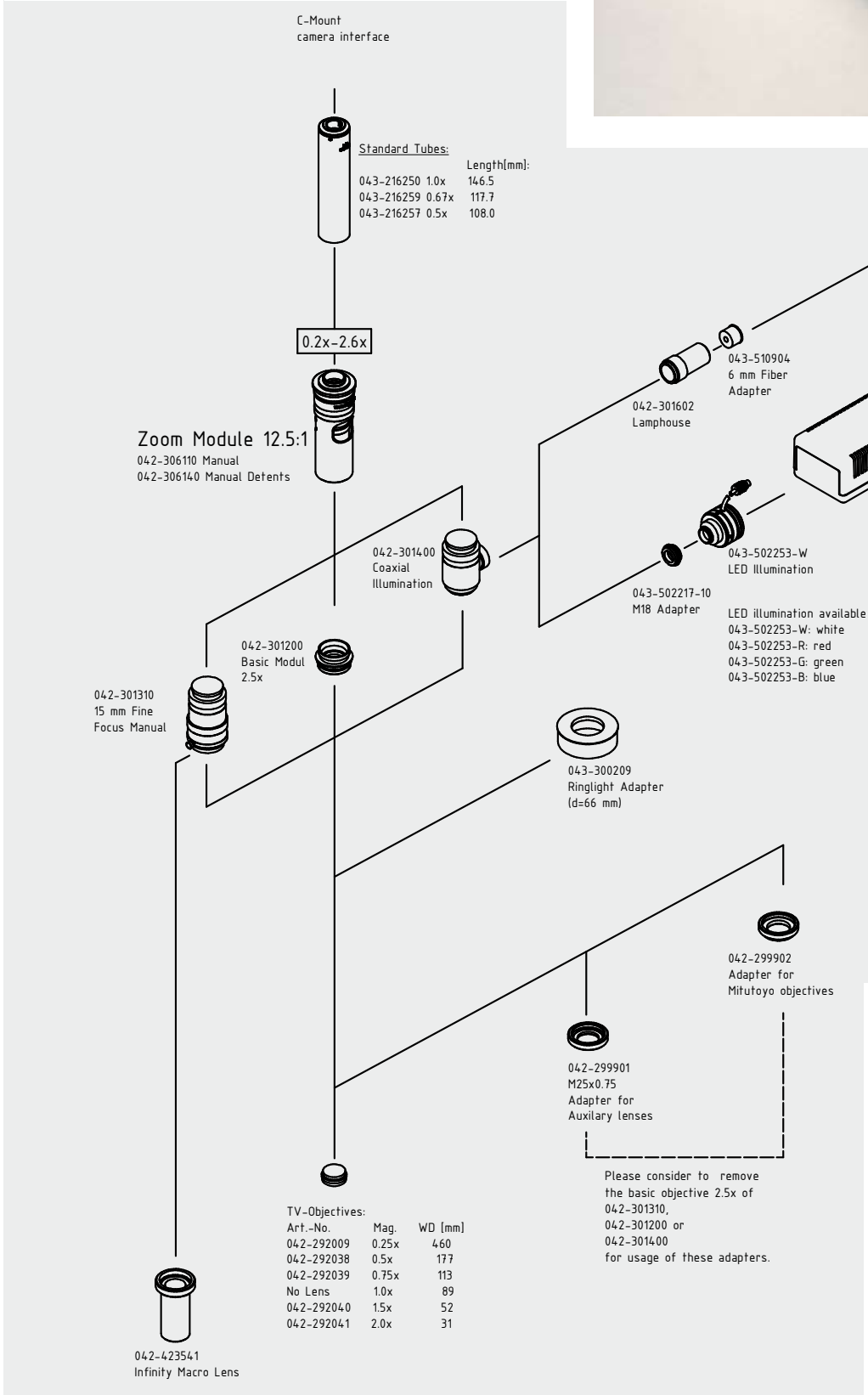
Zoom with click-stops adjustable in three dimensions

Portable Zoom with mount for C-Mount or digital SLR cameras and battery operated illumination

Opto 12.5:1 Zoom Chart

The big brother of our Opto 7:1 Zoom offers an extended zoom range of 12.5:1 with the same reliability, flexibility and optical perfection. With an optional Auxiliary Lens it can also be used as a Macro Lens for various quality inspection applications.

Motorized versions are available on request.



Configuration is very simple: Just pick a Tube / Objective Combination from the Magnification Chart, select either a detented or plain zoom version and add a focus module, coax illumination or just the basic adapter.

You can find a selection of cameras fitting onto the C-Mount at our website www.solino.com/green_line/ to get a fully working system. To complete it you may also add a stand or a clamp from our stand systems further down the catalogue.

Magnification Chart Opto 12.5:1 Zoom System

Tube Magnifications	0.50x		0.67x		1.00x	
Zoom Magnification	Low	High	Low	High	Low	High
	0.26x	3.2x	0.35x	4.3x	0.52x	6.50x
Auxiliary Lenses						
0.18x (no spacer) WD 468 mm	**0.047x**	**0.59x**	**0.063x**	**0.78x**	**0.094x**	**1.2x**
FoV [mm]	76.19x101.59*	8.21x10.94*	76.54x102.05	6.12x8.16**	51.28x68.38**	4.1x5.47
0.25x (w/ spacer) WD 310 mm	**0.065x**	**0.81x**	**0.087x**	**1.09x**	**0.13x**	**1.6x**
FoV [mm]	54.86x73.14*	5.91x7.88*	55.11x73.14**	4.41x5.88**	36.92x49.23	2.95x3.94
0.5x WD 178 mm	**0.13x**	**1.6x**	**0.17x**	**2.2x**	**0.26x**	**3.3x**
FoV [mm]	27.43x36.57*	2.95x3.94*	27.55x36.74**	2.20x2.94**	18.46x24.62	1.48x1.97
0.75x WD 114 mm	**0.20x**	**2.4x**	**0.26x**	**3.3x**	**0.39x**	**4.9x**
FoV [mm]	18.29x24.38*	1.97x2.63*	18.37x24.49	1.47x1.96**	12.31x16.41**	0.98x1.31
1.0x (no lens) WD 89 mm	**0.26x**	**3.3x**	**0.35x**	**4.4x**	**0.52x**	**6.5x**
FoV [mm]	13.71x18.29*	1.48x1.97*	13.78x18.37	1.10x1.47**	9.23x12.31**	0.74x0.98
1.5x WD 52 mm	**0.39x**	**4.9x**	**0.52x**	**6.5x**	**0.78x**	**9.8x**
FoV [mm]	9.14x12.19*	0.98x1.31*	9.18x12.25	0.73x0.98**	6.15x8.21**	0.49x0.66
2.0x WD 32 mm	**0.52x**	**6.5x**	**0.70x**	**8.70x**	**1.0x**	**13.0x**
FoV [mm]	6.86x9.14*	0.74x0.98*	6.89x9.18	0.55x0.73**	4.62x6.15**	0.37x0.49

* Limited vignetting may occur with 1/2" chip cameras, fully recommended only with 1/3" chip cameras or smaller
For use of coaxial illumination vignetting may occur with all combinations marked * with camera chips bigger 1/4", for combinations marked ** with camera chips bigger 1/3"

Applications

12.5:1 Zoom with Adaption of a 90° deflection and a micro objective

The zoom is available as manual version, with detents or on request also motorized

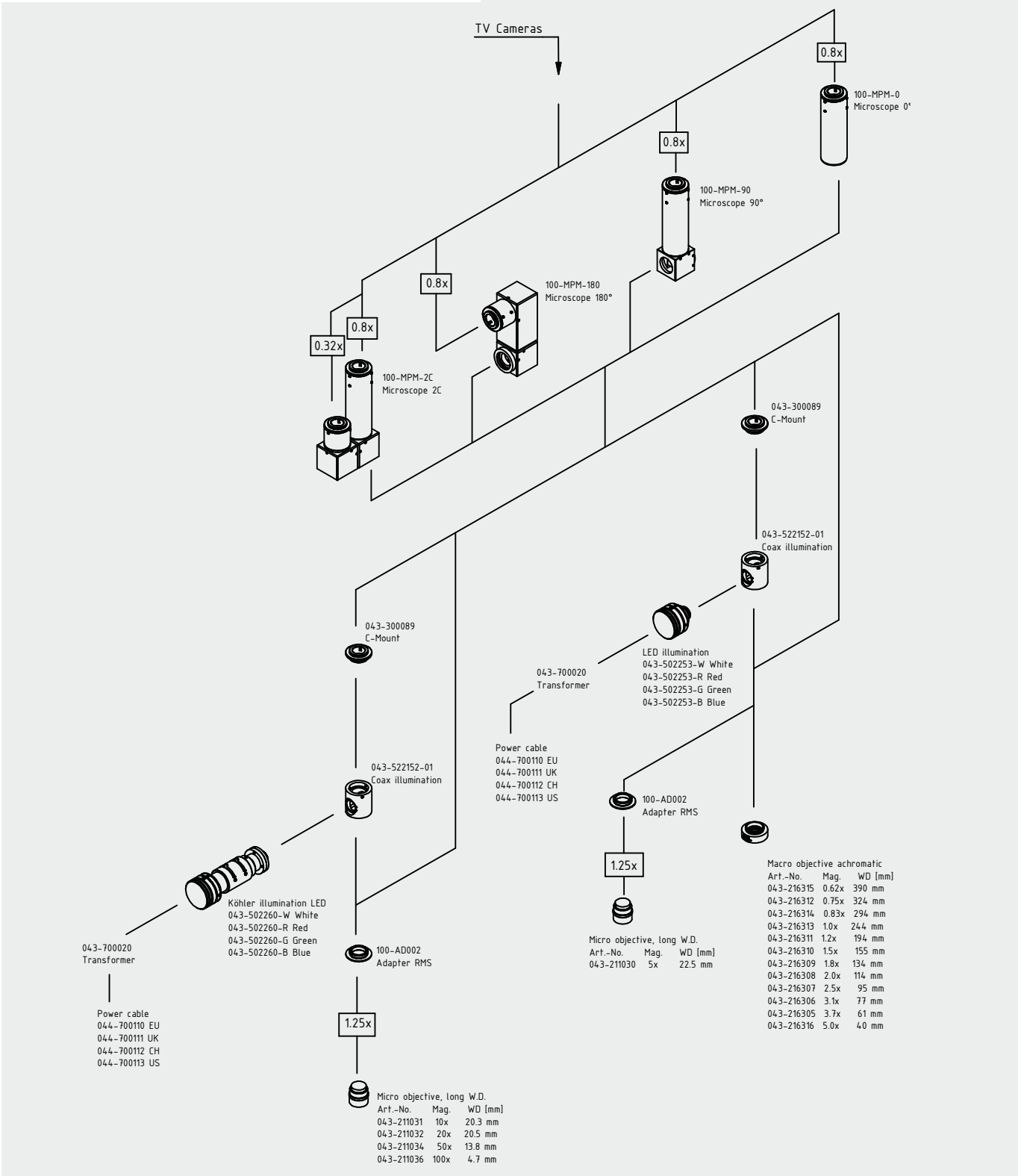
Perfect where small details and large overview are needed without moving the object

Multi-Purpose OEM Microscopes

These unique optics fulfil the need in industry and biomed for automated and miniaturized microscopy solutions. Our range of Solino microscopes enables the integration of miniaturized industrial microscopes into in-line inspection systems or other machines. Combined with Micro objectives these units are fully working microscopes. All bodies are equipped with a C-Mount thread and are optimised for up to 2/3" Sensors.

These microscopes are typically used for quality control implementations, in AOI machines or high throughput analysis machines. The magnification of the microscopes is 0.8x. The 100-MPM-2C has two camera ports with magnifications 0.8x and 0.32x, enabling camera images to show the same sample but with two different magnifications.

For detailed design drawings visit www.solino.com
Specialised custom made versions are available at www.opto.de



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Magnification Chart OEM Microscopes

		Tubes	
Tube Magnifications		**0.32x**	**0.80x**
TV-Objectives			
0.62x	Total Mag.	**0.20x**	**0.50x**
WD=390 mm	FOV 1/2" [mm]	31.50 x 23.50	12.60 x 9.40
0.75x	Total Mag.	**0.24x**	**0.61x**
WD=324 mm	FOV 1/2" [mm]	25.99 x 20.79	10.40 x 7.76
0.83x	Total Mag.	**0.27x**	**0.67x**
WD=294 mm	FOV 1/2" [mm]	23.63 x 17.63	9.45 x 7.05
1.0x	Total Mag.	**0.32x**	0.80x
WD=244 mm	FOV 1/2" [mm]	19.69 x 14.69	7.88 x 5.88
1.2x	Total Mag.	**0.40x**	**1.00x**
WD=194 mm	FOV 1/2" [mm]	15.75 x 11.75	6.30 x 4.70
1.5x	Total Mag.	**0.50x**	**1.25x**
WD=155 mm	FOV 1/2" [mm]	12.60 x 9.40	5.04 x 3.76
1.8x	Total Mag.	**0.57x**	**1.43x**
WD=134 mm	FOV 1/2" [mm]	11.03 x 8.23	4.41 x 3.29
2.0x	Total Mag.	**0.67x**	**1.67x**
WD=114 mm	FOV 1/2" [mm]	9.45 x 7.05	3.78 x 2.82
2.5x	Total Mag.	**0.80x**	2.00x
WD=95 mm	FOV 1/2" [mm]	7.88 x 5.88	3.15 x 2.35
3.1x	Total Mag.	**1.00x**	**2.50x**
WD=77 mm	FOV 1/2" [mm]	6.30 x 4.70	2.52 x 1.88
3.7x	Total Mag.	**1.14x**	2.86x
WD=61 mm	FOV 1/2" [mm]	5.51 x 4.11	2.21 x 1.65
5.0x	Total Mag.	**1.60x**	4.00x
WD=40 mm	FOV 1/2" [mm]	3.94 x 2.94	1.58 x 1.18
Micro-Objectives (1.25x)			
5.0x	Total Mag.	**2.00x**	5.00x
WD=22.5 mm	FOV 1/2" [mm]	3.15 x 2.35	1.26 x 0.94
10.0x	Total Mag.	**4.00x**	**10.00x**
WD=20.3 mm	FOV 1/2" [mm]	1.58 x 1.18	0.63 x 0.47
20.0x	Total Mag.	**8.00x**	**20.00x**
WD=20.5 mm	FOV 1/2" [mm]	0.79 x 0.59	0.32 x 0.24
50.0x	Total Mag.	**20.00x**	**50.00x**
WD=13.8 mm	FOV 1/2" [mm]	0.32 x 0.24	0.13 x 0.09

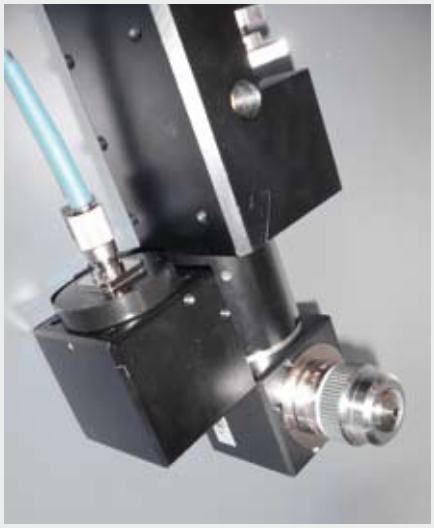
100-MPM-2C

100-MPM-90

100-MPM-180

100-MPM-0

Applications



Infinity corrected long working distance objectives

Optimised for use with Automated Analytical Microscopes, Infinity-Corrected Objectives achieve significantly higher magnifications and increased resolutions. The objectives provide a high quality plain achromatic design. All objectives feature standard M26 x 36T (Mitutoyo thread) threads for a wide compatibility.

Art. No.	Description	WD in mm	NA
100-MO02-0534	Micro Objective 2x/0.055 WD34 Infinity	34	0.055
100-MO05-1344	Micro Objective 5x/0.13 WD44 Infinity	44	0.13
100-MO10-2834	Micro Objective 10x/0.28 WD34 Infinity	34	0.28
100-MO20-2931	Micro Objective 20x/0.29 WD31 Infinity	31	0.29
100-MO50-4221	Micro Objective 50x/0.42 WD21 Infinity	21	0.42

Compact infinity corrected objectives

These objectives have an optimal price and performance ratio and come with a standardised RMS-thread and a correction length of 45 mm. The 20x, 40x and 100x are spring-loaded to prevent damage. Oil Immersion is recommended for the 100x objective.

Art. No.	Description	WD in mm	NA
100-MO04-PL	Micro Objective 4x/0.10 WD17.41 Infinity	17.41	0.10
100-MO10-PL	Micro Objective 10x/0.25 WD16.29 Infinity	16.29	0.25
100-MO20-PL	Micro Objective 20x/0.45 WD1.06 Infinity	1.06	0.45
100-MO40-PL	Micro Objective 40x/0.65 WD0.7 Infinity	0.7	0.65
100-MO100-PL	Micro Objective 100x/1.25 Oil WD0.33 Infinity	0.33	1.25 Oil

High resolution infinity corrected objectives

High performance - competitive price. These objectives feature a standardised M25x0.75 thread and a correction length of 45 mm. They are ideal for incident light applications.

Art. No.	Description	WD in mm	NA
011-506302	Objective N Plan 5x	14	0.12
011-506259	Objective N Plan 10x	17.6	0.25
011-566066	Objective N Plan Epi 20x	1.1	0.40
011-566072	Objective N Plan EPI 50x	0.51	0.75

Infinity corrected long working distance macro objectives

These compact objectives are optimised for their working distance and are infinity corrected. All feature standard M25x0.75 threads for compatibility with most microscopes. They fit the Multi Purpose Microscopes, Fixed Mag. and Zoom Objectives (➔ page 14, 8, 10).

Art. No.	Description	WD in mm	NA
043-216315	Macro Objective Achromatic 0.62x	390	0.03
043-216312	Macro Objective Achromatic 0.75x	324	0.03
043-216314	Macro Objective Achromatic 0.83x	294	0.04
043-216313	Macro Objective Achromatic 1.0x	244	0.05
043-216311	Macro Objective Achromatic 1.2x	194	0.06
043-216310	Macro Objective Achromatic 1.5x	155	0.07
043-216309	Macro Objective Achromatic 1.8x	134	0.08
043-216308	Macro Objective Achromatic 2.0x	114	0.10
043-216307	Macro Objective Achromatic 2.5x	95	0.12
043-216306	Macro Objective Achromatic 3.1x	77	0.17

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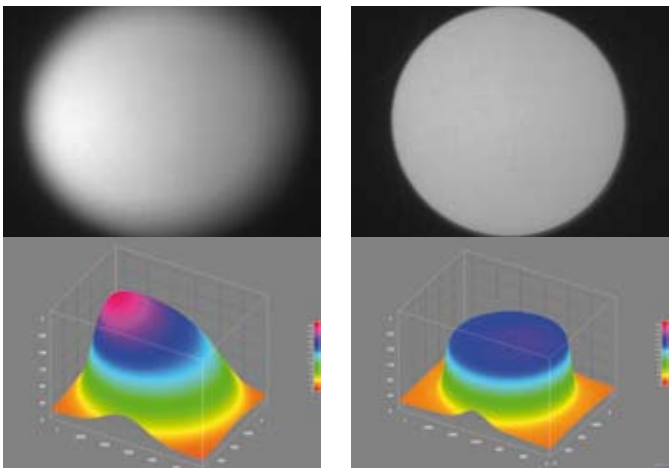
Homogeneous Spot Light

These unique spots use a beam homogenizer based on chirped micro lens technology to generate extremely homogeneous and sharply delimited spot illumination. For image processing in time-critical applications this feature can eliminate the need for additional shading correction. Easy positioning can be achieved using our jointed couplers on page 24.

They are available in white, red, green and blue and have a working distance from 200mm (80mm Spot diameter) to 300mm (110mm Spot).



Same spotlight without (left) and with homogenisator (right)

Art. No.	Type
100-SP-H-W	Homogeneous White Spot, natural white
100-SP-H-R	Homogeneous Red Spot 625 nm
100-SP-H-G	Homogeneous Green Spot 525 nm
100-SP-H-B	Homogeneous Blue Spot 465 nm
043-700020	Power supply for LED-Spots

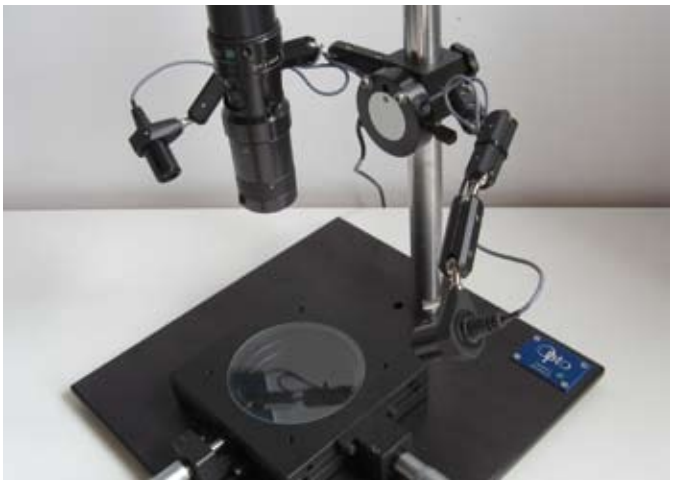
LED Ring Light

These ring lights feature latest LED technology with 5,600 K and a integrated controller inside the ring light to keep your desk free. They are fanless and therefore vibration free. They mount 66 mm diameter and have a wide range power supply (100-240V). The Plus version is additionally controllable in segments.

Art. No.	Type
020-600200	Easy LED Ring Light; 45 LED's; separate controllers for dimming and on/off; W.D. 55-135 mm
020-600300	Easy LED Ring Light Plus; 48 LED's; separate controllers for dimming, segments and on/off; W.D. 50-130 mm
020-400550	Polarising Filter Set for Easy LED Ring Light
020-400570	Diffuser for Easy LED Ring Light

LED focussable double spot

- 2 branches, length 380 mm
- Lights focusable, spot size Ø at 50 mm distance adjustable between 30-70 mm
- 6 step adjustable light intensity
- Universal power supply included

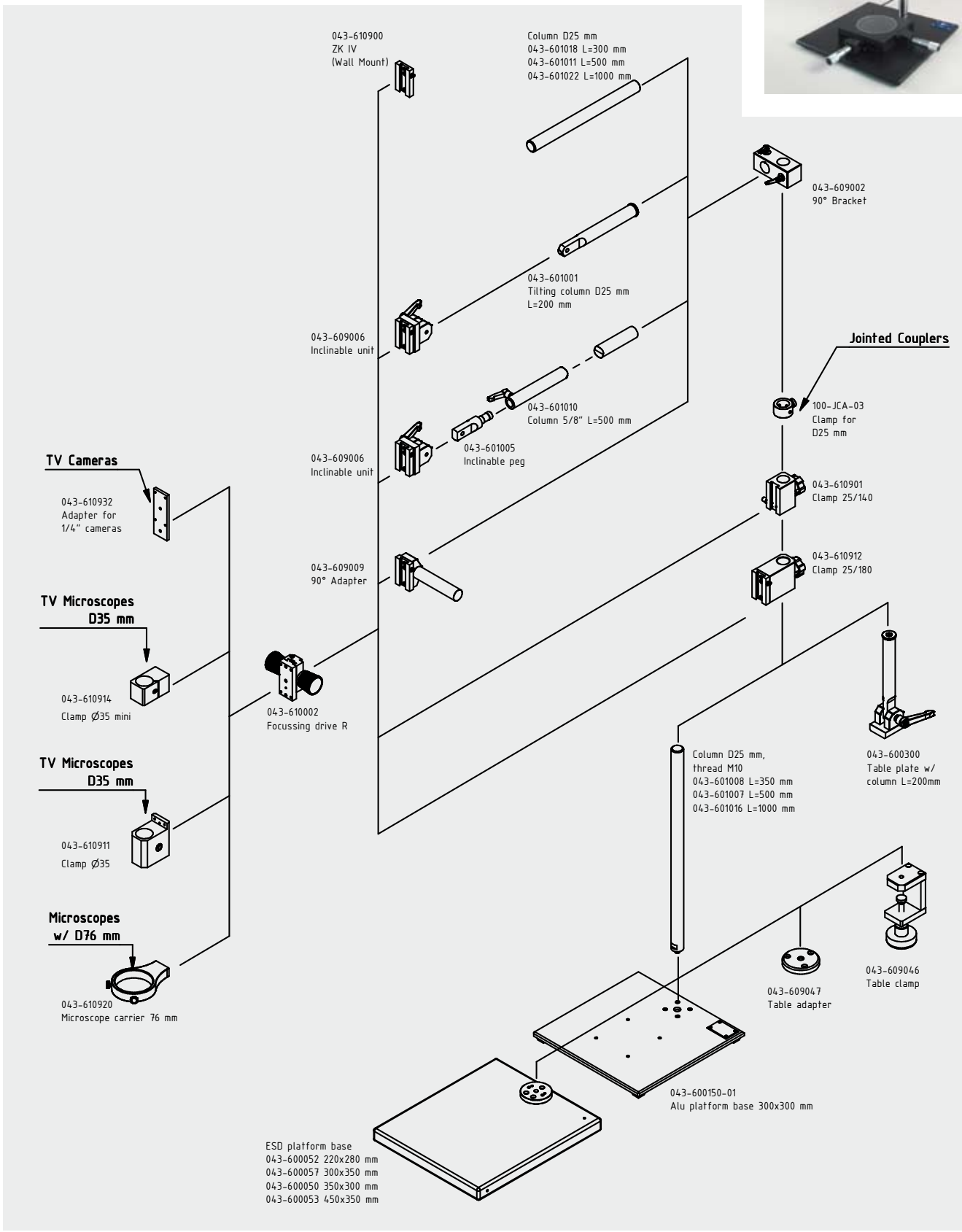


Art. No.	Type
100-GOL-1	Two Single Spots, flexible version
100-JCA-15	Clamp for 25mm Column with 2x M6 threads for jointed couplers (see page 30) and threads for fixing 100-GOL-1 base

25 mm Column Stand Chart

This stand system is one of our most popular and longest standing product lines, with many thousand units manufactured and supplied to date.
For the highest quality method of reliably, economical mounting of your instruments, look no further.

This modular mechanical assembly chart presents a wide variety of different ways to mount focussing cameras, Stereo microscopes or any of our Fixed Magnification and Zoom C-Mount Microscopes from pages 8 - 12.



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25 mm Column Stand

Our 25 mm column system offers a wide variety of combinations. These stands also provide the basis of a number of our very popular and compact "Quality Inspection Workstations", as shown in our Yellow Line Catalogue.

Our stands are particularly well suited to applications where space restrictions exist or where a quick, manual change due to different object heights is required. Applications included restoration, dentistry, tool inspection, electronic board inspection, and general microscopy.

If you need help with the configuration or for a custom solution just give us a call or contact info@solino.com.

Stand System For Almost Every Application

Mounting a High-Speed microscope performing quality checks in a production line

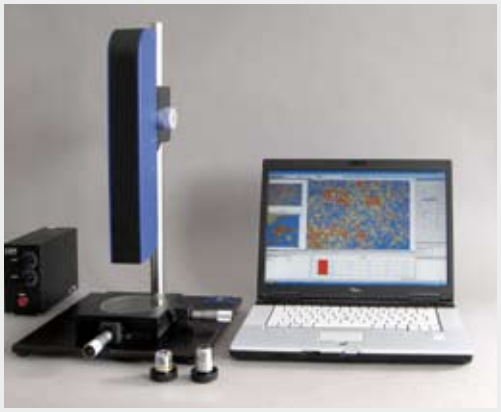
TV Inspection System 0.45x - 3.3x Alu LED (➔ 043-103110, Yellow Line Catalogue)

ESD Stand with stereo microscope mount and gliding stage (➔ page 27)

76 mm Mount for Stereomicroscopes onto 25 mm column (043-610920 + 043-610002 + 043-610901)

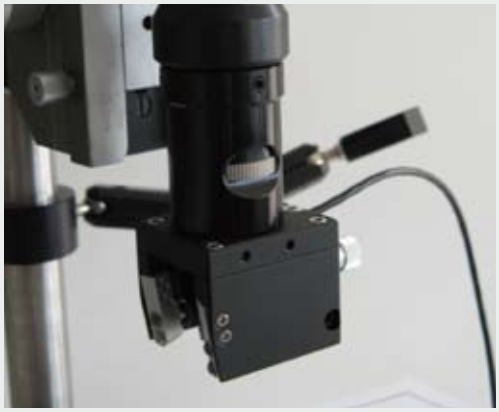
Measuring system for height measurements with manual measuring stage (➔ page 26)

Totally flexible setup for a TV microscope used in a laboratory



Microscope setup for material analysis with special software (➔ Orange Line Catalogue)

Long columns are ideal as macro stand (➔ page 5 lens and mount)

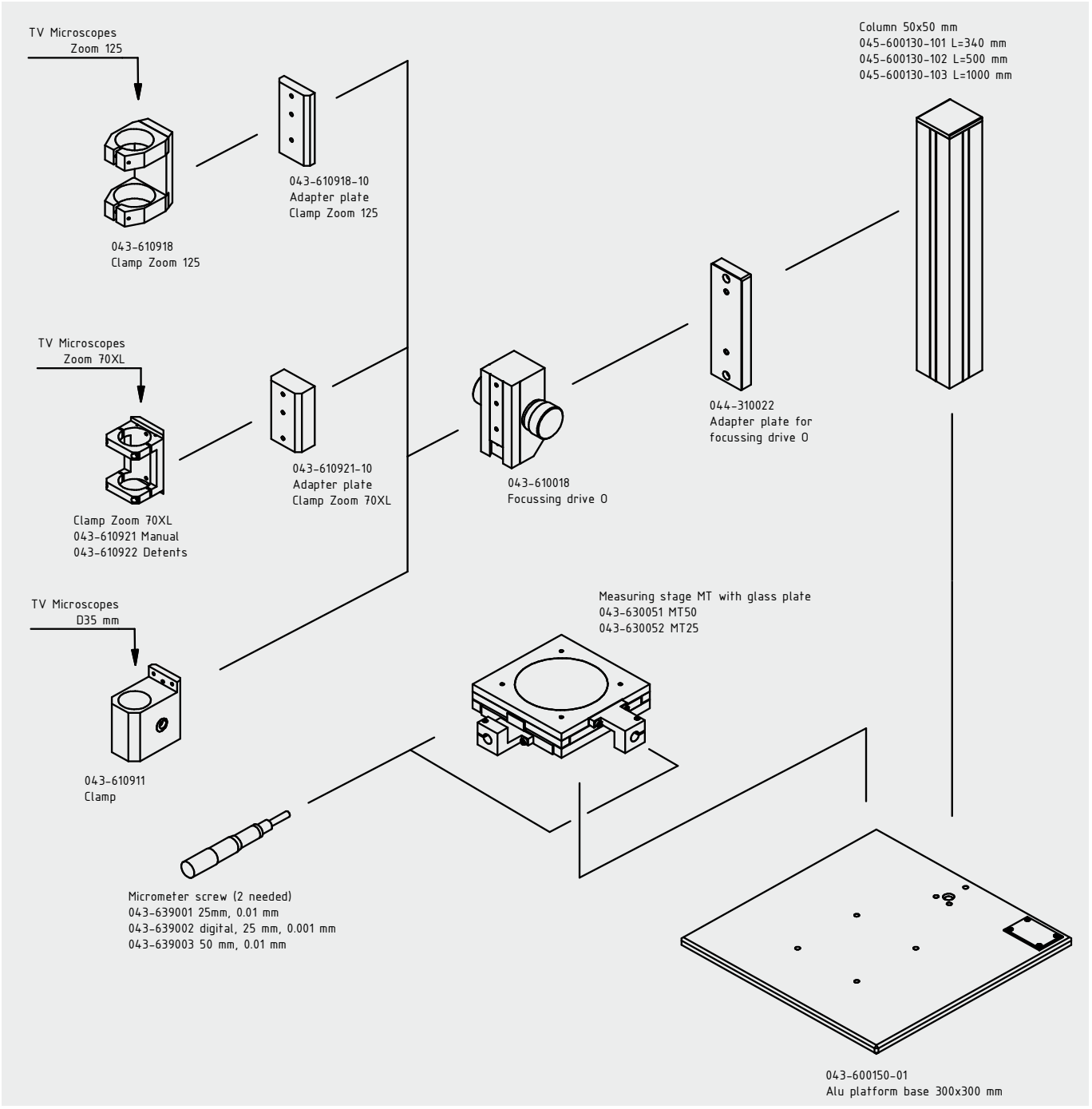


Flexible mounting of microscope with 7° viewing adapter with integrated white LED illumination.

Measurement Stand System

This solution was developed in order to enable precise measurements to be performed during microscopic analysis. The main element to this is our unique focussing drive 'O' with a combined precision coarse and fine focus mechanism. The stability of the system allows use of micro objectives up to 50x. Travel range of this focus drive is 70 mm. Combined with a measuring stage and a 35 mm TV Microscope (Fixed Mag. or Zoom) it is possible to build a complete measurement machine able to effectively perform optical measurements to sub µm precision!

This system can be easily adjusted to accommodate a wide variety of sample heights, from flat all the way to 600 mm in height!



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5/8" Pin Adapter Interface

The 5/8" pin adapter is a versatile mounting device commonly used in applications where the microscope needs to be flexible regarding position and angle. It is widely used in the semiconductor market and other machine integration applications. Also used with our mobile floor stand system on page 23.

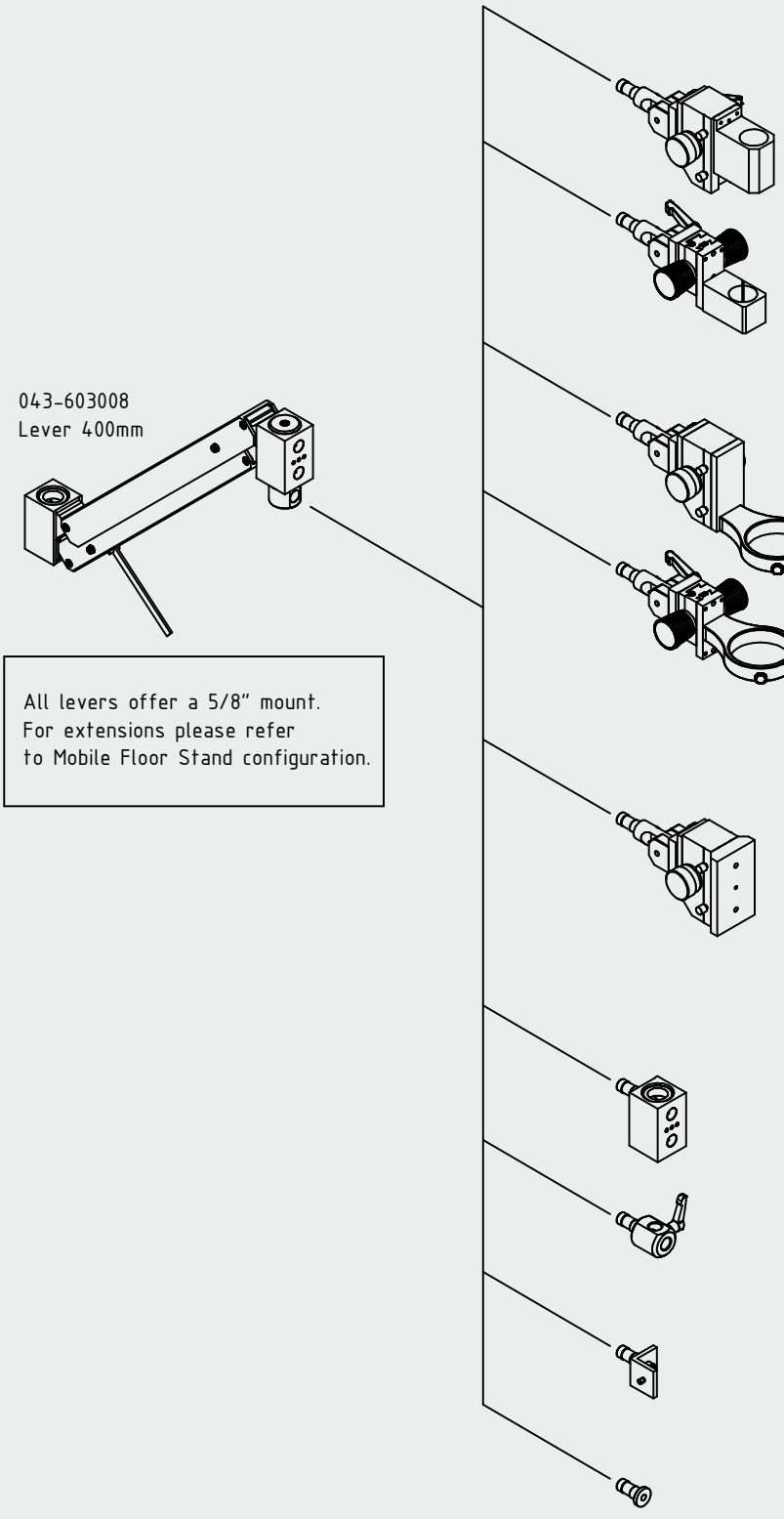
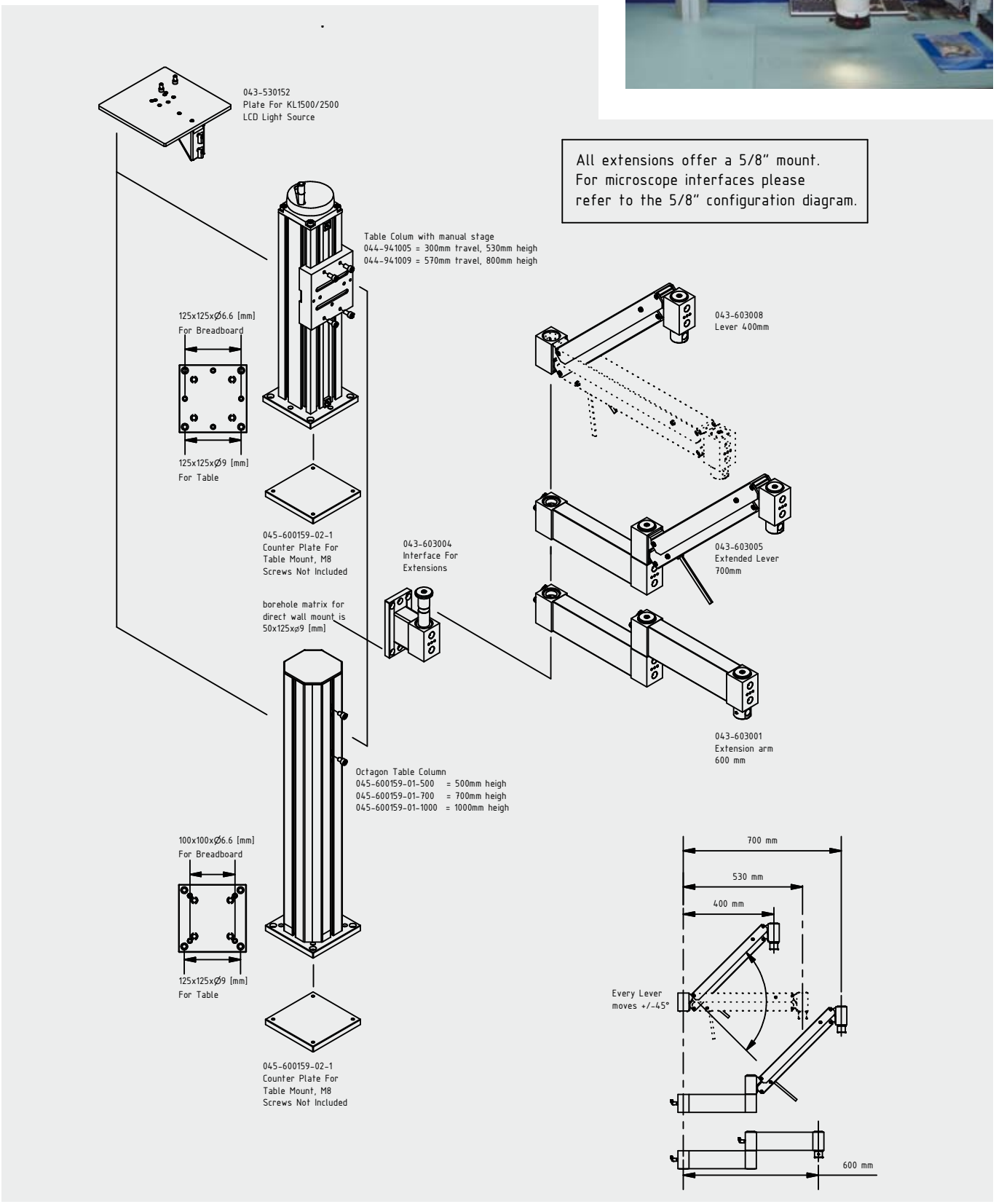


Table Mounted Stand

Our space saving Table Mounted Stand gives you back your bench space, enabling ultra-stable microscopic inspection without the use of bulky stands. Our system enables a microscope to be effortlessly positioned and locked anywhere over the work area – even over the edge of the bench! The system is available with a number of accessories, including arm extension, height adjust, and even a light source pillar mounting for the ultimate in flexible, clutter free inspection!

Ask your local Opto Partner for a taylor made system in order to perfectly fit your needs.



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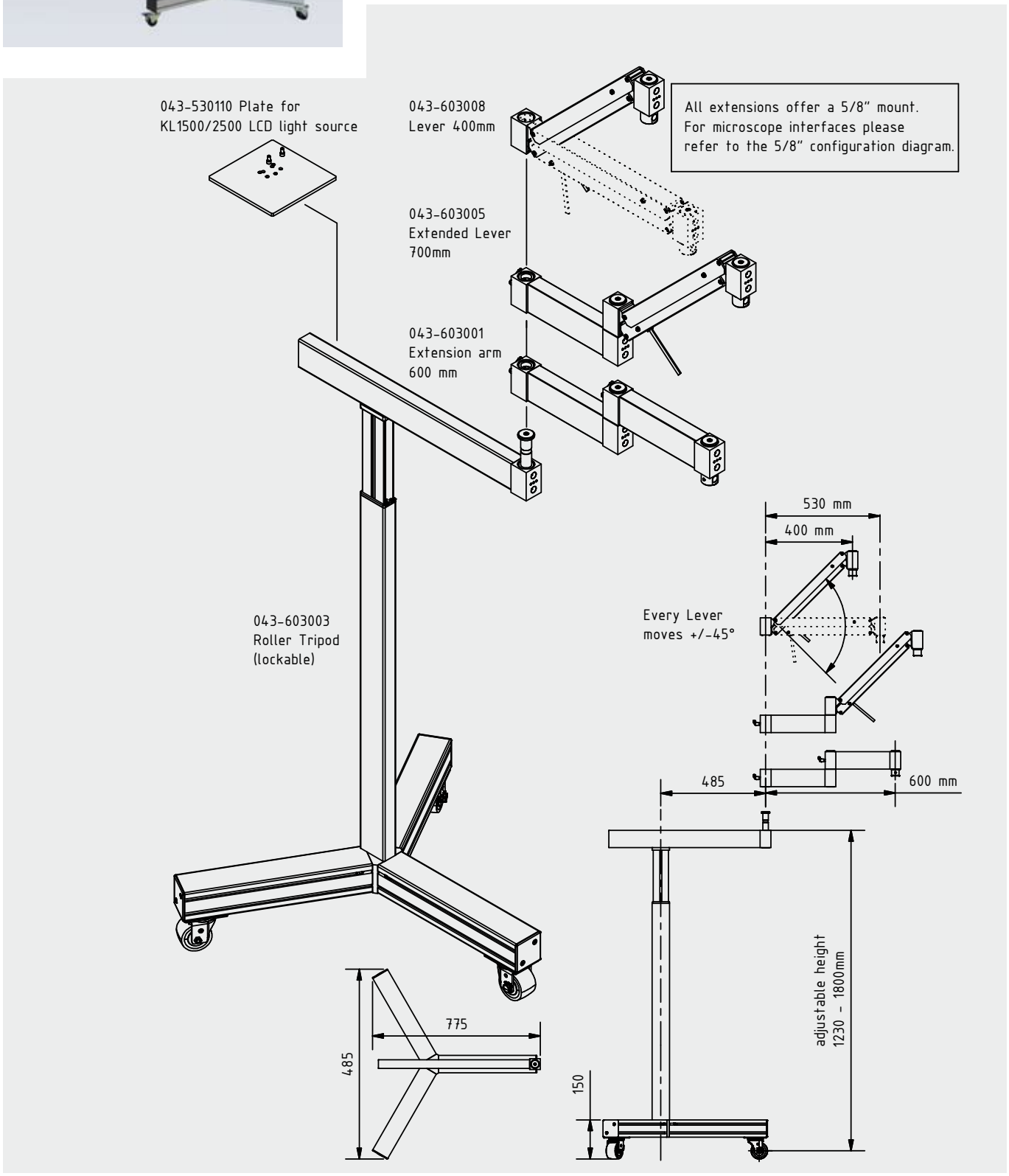
Mobile Floor Stand

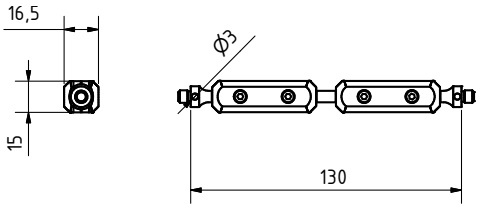
Opto's Mobile Floor Stands enable ultra-stable, mobile inspection in any location. Our unique rock-solid stand with lockable wheels features a height adjustable column and a useful platform on top of the column which can be used for light sources or tools.

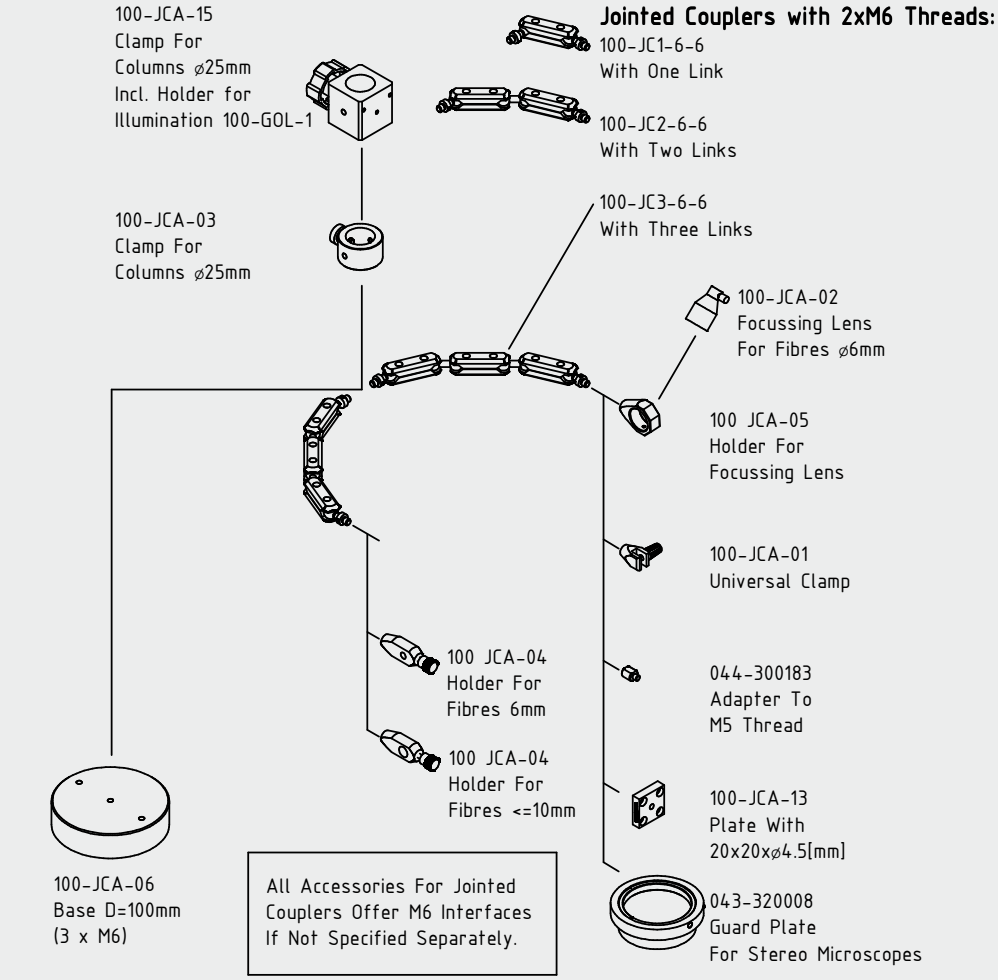
For effortless height positioning, the optional scissor arm features an adjustable gas lift mechanism providing adjustability and perfect stability at all times. Commonly used with a stereo microscope, this stand can easily mount other inspection systems or tools. Our unique instrument locking plate mechanism also allows stereo microscopes to be used inverted in complete safety!

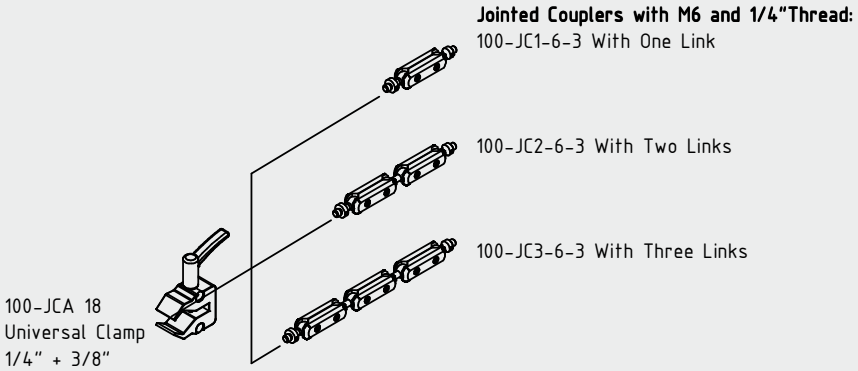


Jointed Coupler

Jointed couplers are used for precise attachment of accessories, such as illumination accessories or filters to optical equipment. They are highly resistant to vibration and offer a reliable fixation for your accessories. Equipped with different types of threads they are flexible for mounting fibres, LEDs and cameras. A nickel plated version is available on request. With their new improved design there are now even easier to fix.







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Accessories

100-JCA-01
Universal clamp with M6 thread for jointed coupler, clamping width 6 mm

100-JCA-02
Focussing lens for fibre cables with up to 6 mm end tip-diameters, outer diameter 21 mm

100-JCA-03
Clamp for diameter 25 mm with two M6 threads for jointed couplers

100-JCA-06
Base D=100 mm with 3x M6 threads for jointed couplers

100-JCA-05
Holder for focussing lens 100-JCA-02, diameter 21 mm, M6 thread for jointed coupler

010-445654
Adapter for M6 thread jointed coupler to M5 outter thread

043-320008
Universal guard plate holder with guard plate, clamp diameter 58/66 mm, 2 threads M6, ability to mount D=66 mm ring light

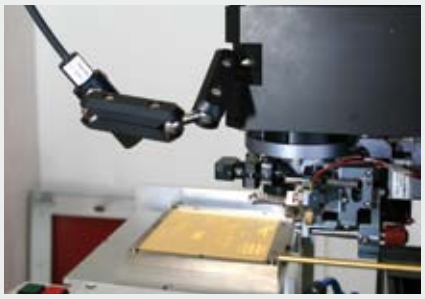
100-JCA-13
Fixation plate for Jointed Couplers onto flat surfaces with 4 M4-Screws (screws not included)

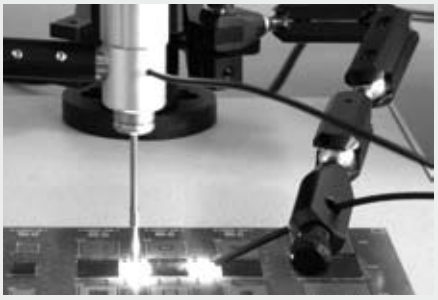
100-JCA-18
Universal clamp with 1/4" and 3/8" thread for jointed couplers enabling it to grip round or flat tube/pole surfaces from 12 up to 40 mm

100-JCA-04
Holder for fibre cable with up to 6 mm end tip diameters, with M6 thread for jointed coupler

100-JCA-07
Holder for fibre cable with up to 10 mm end tip diameters, with M6 thread for jointed coupler

Universial And Flexible But Easy Adjustable Fixation - Jointed Couplers



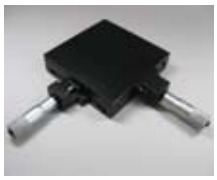


Measuring Stages

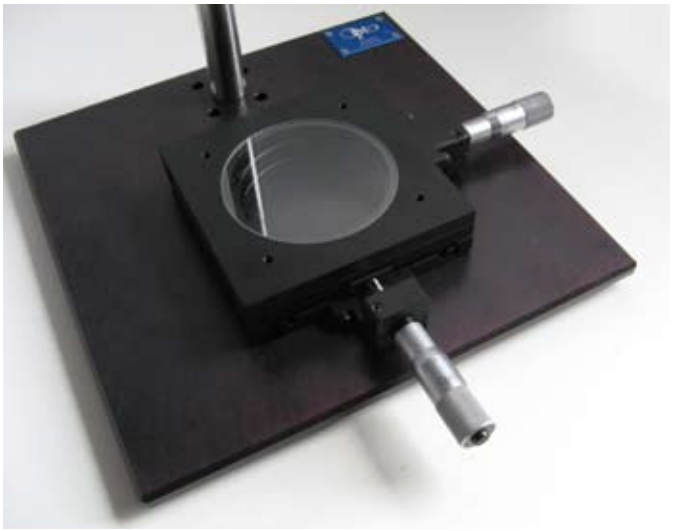
The measuring stages are compact and very flexible in use. Their accuracy depends on the equipped micrometers screw up to 0.001 mm. All stages are black coated and have 4 M5 threads in the bottomside to mount the stages on flat surfaces or tables.

100-MS50-DIG

100-MS25-DIG



100-MS25-AN



Art. No.	Description	Travel Range	Screw Graduation	Heigth	Load capacity
100-MS25-AN	Measuring Stage 25x25 mm Analog, Plain Stage	25 x 25 mm	0.01 mm	35 mm	10 kg
100-MS25-DIG	Measuring Stage 25x25 mm Digital, Plain Stage	25 x 25 mm	0.001 mm	35 mm	10 kg
100-MS25-GAN	Measuring Stage 25x25 mm Analog, Glass Plate	25 x 25 mm	0.01 mm	35 mm	10 kg
100-MS25-GDIG	Measuring Stage 25x25 mm Digital, Glass Plate	25 x 25 mm	0.001 mm	35 mm	10 kg
100-MS50-AN	Measuring Stage 50x50 mm Analog, Plain Stage	50 x 50 mm	0.01 mm	35 mm	10 kg
100-MS50-DIG	Measuring Stage 50x50 mm Digital, Plain Stage	50 x 50 mm	0.001 mm	60 mm	10 kg
100-MS50-GAN	Measuring Stage 50x50 mm Analog, Glass Plate	50 x 50 mm	0.01 mm	35 mm	10 kg
100-MS50-GDIG	Measuring Stage 50x50 mm Digital, Glass Plate	50 x 50 mm	0.001 mm	60 mm	10 kg

Focusing Blocks

Focus blocks enable optical devices to be positioned vertically with the turn of a hand wheel. Bilateral drive knobs make the work more efficient and economical. The coarse drive allows fast focusing, fine drives ensure accurate positioning at high magnifications.

100-FB-BL

043-610018

100-FB-OP

043-610002

100-FB-W

Art. No.	Description	Travel	Load capacity	Fine focus	Rough focus
100-FB-BL	**Focusing block fine+coarse light** Separate ergonomical knobs, compact design	70 mm	2 kg	2 mm	70 mm
043-210018	**Focusing block O coarse medium** For objectives up to 50x, accessories and stand solutions ➔ page 21/20	70 mm	7 kg	2 mm	70 mm
100-FB-W	**Focusing block W coarse heavy** Smooth operation of heavy weights, applicable in every position	65 mm	25 kg	None	65 mm
043-610002	**Focusing block R coarse medium** Stepless adjustable friction and ergonomic knobs, accessories ➔ page 18/21	59 mm	10 kg	None	59 mm
100-FB-OP	**Focusing block OP fine+coarse heavy** Heavy duty with less than 1µm resolution and repeatability through 50mm travel	50 mm	50 kg	50 mm	50 mm

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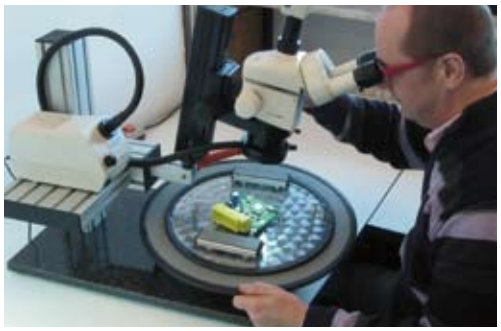


Tilting tables

Our rotation tables are designed for control and inspection work on printed circuit board assemblies. In combination with a Stereo or TV Microscope they form an energonomic repair station. You can turn the sample 360° and tilt it maximum 30°

Metal Versions

These tables come with a magnetic fixation to place and fasten PCB boards and magnetic handrests. A vacuum pump and a foot switch allow fixation of the tilting table in every desired position.

043-631003 /04 /06

Art. No.	Description	Weight in Kg
043-631006	Tilting table 300mm, metal, vacuum	6
043-631004	Tilting table 400mm, metal, vacuum	6.5
043-631003	Tilting table 450mm, metal, vacuum	7

Compact Version

The compact versions come with a rubber surface cover, which prevents any movement of the examined sample.

043-631001/02

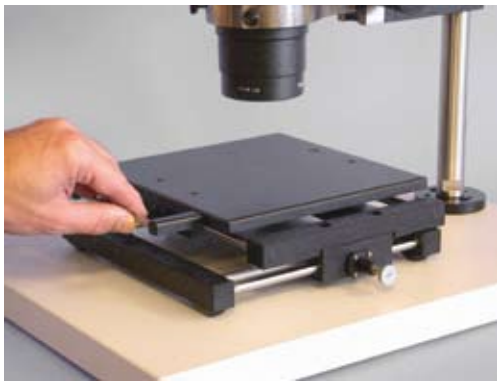
Art. No.	Description	Weight in Kg
043-631001	Tilting table 150mm, rubber surface	1
043-631002	Tilting table 200mm, rubber surface	1

Granite Version

Its heavy weight and the ESD surface are the highlights of this version. The ESD rubber surface cover has a diameter of 300 mm.

043-631005

Art. No.	Description	Weight in Kg
043-631005	Granite Tilting Table 400 mm	7



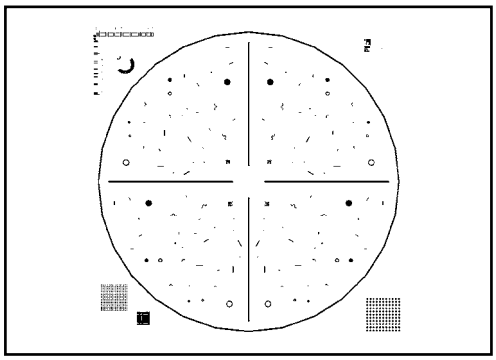
Gliding stages

For the control of large flat samples such as electronic boards, we recommend the use of gliding stages. This easy to handle positioning device significantly increases the effectiveness of inspection operations.
The construction is solid and the movement smooth and precise, featuring locks in X & Y for additional functionality. The tables are delivered with rubber feet for stable positioning on slippery surfaces.

Art. No.	Travel range in mm	Height in mm	Length in mm	Width in mm	Weight in Kg
100-GS100-01	100x100	91	300	270	7
100-GS200-01	200x200	91	450	370	10
100-GS300-02	300x150	96	570	380	14
100-GS400-03	400x250	96	680	500	18

Accessories

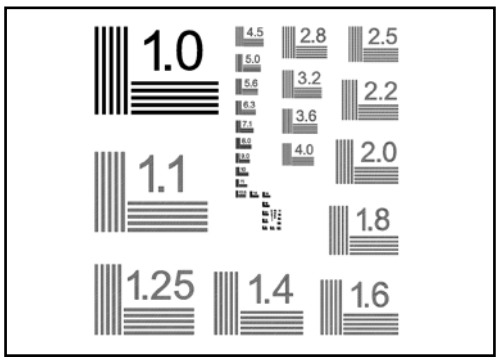
Clamp for electronic boards
Fitting for 100-GS400-03
Order Number: 046-601220



Particle Standard Target

The Target allows the calibration of measurement functions in microscopes. A field of objects in different forms and sizes allow the user to check: rectangles, ellipsis, circles, rings and even fibre-shaped objects. To determine optical distortions there are three different sized arrays of cross-targets. The smallest Object is as small as 5µm.

Art. No.	Description	Dimensions
100-TA001	Particle Standard Target	70x70x2mm



Resolution Test Target Lp/mm

This Resolution test target is NBS tested. It consists of 49 Line tests, each with 5 perpendicular and horizontal lines. The distances varies between 1 and 250 line pairs per mm. The length of the Line is 12 times the thickness.

Art. No.	Description	Dimensions
100-TA005	Resolution Test Target	70x70x3mm

Stage Micrometer

The stage micrometer is a helpfull tool for calibration purposes. It comes with a 50 mm scale with 0.1 and 0.01 mm graduation.

Art. No.	Description
010-310345	Stage Micrometer

Optic cleaning set

Small dust "specks" are annoying, waste time and can interfere with detailed laboratory work. These tiny particles are difficult to remove from microscope and camera lenses, viewfinders and optical instruments.
The cleaning kit includes an anti-static lens and optics brush, an anti-static microfibre cleaning cloth, precision cleaning solution for effective oil and residue removement, and a special tool for picking up dust specks.

Art. No.	Description
100-CS-1	Optic cleaning set

C-Mount Extender

C-Mount Extender 1.5x **100-EX15**
C-Mount Extender 2.0x **100-EX20**
C-Mount Extender 2.5x **100-EX25**
C-Mount Extender 3.0x **100-EX30**
C-Mount Extender 4.0x **100-EX40**

CS-Mount –> C-Mount Adapter **043-300087**
for use of C-Mount objectives in CS-Mount cameras

For orders and more information: T: +49 89 898055 30 F: +49 89 898055 33 info@solino.com

Find more at www.solino.com

Accompanying the selection in this catalogue we offer you more products and accessories on our growing internet portal solino.com. A small selection what you will find:

CCTV Objectives

A selection of C-Mount lenses with a very good price/performance ratio in a compact and light weight format

M12 Objectives

M12 or S-Mount lenses are ultra compact and offer a extraordinary price/performance ratio perfect for machine integration

Microscopy Illumination

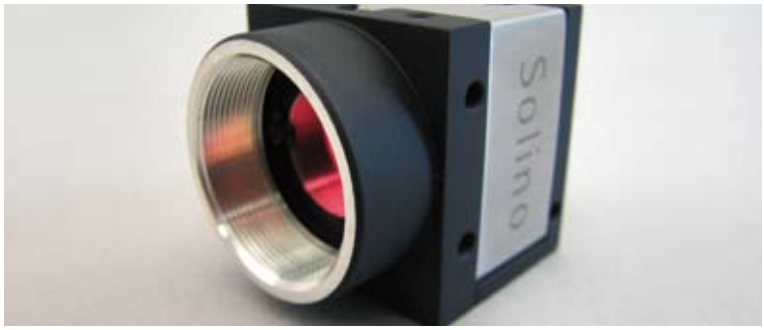
Next to cold light sources and their accessories we offer as well fluorescent and LED illuminations

Machine Vision Illumination

Spots, ring lights, back lights, line lights - LED's in all colors, shapes and sizes

Cameras

Our selection of USB and GigE cameras from standard to high resolution to high speed for machine vision and microscopy



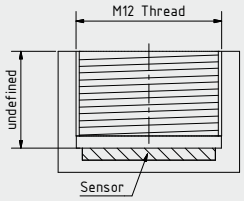
Basic Knowledge

The market offers a wide range of Lenses, Illumination and Image Processing solutions. Here at Opto, we have the application knowledge to help you to find the right solution for your task.

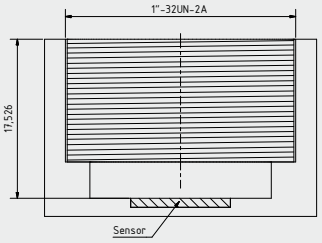
In addition, as many of the parts you see here are manufactured by us, we can easily create new solutions specific to your requirement. We can even help you to integrate your solution into your environment.

Common camera threads:

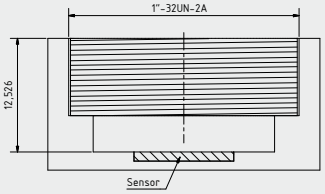
M12 / S – Mount
- straight mounts on camera boards
- un-specified back focal length



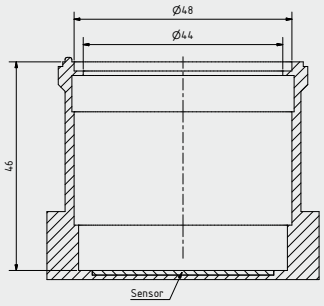
C – Mount
- Most common mount
- Exact mount regarding image distance



CS – Mount
- Same specification as C-Mount
- With a 5 mm spacer adaptable to C-Mount



F – Mount
- Nikon standard (Nikkor)
- Interchangeable, mainly used for line scan cameras
- Precise bayonet mount



Sensor dimension:

Sensor	Photosensitive area	Diagonal
1"	12.8 x 9.6 mm²	16 mm
2/3"	8.8 x 6.6 mm²	11 mm
1/2"	6.4 x 4.8 mm²	8 mm
1/3"	4.8 x 3.6 mm²	6 mm

Width to height proportion is normally 4 : 3.
The real measurements can vary between manufacturers and models, so please refer to the datasheet of your camera.

Dark Field vs. Bright Field Illumination

Darkfield Illumination
This illumination technique is mainly used for detecting surface defects, scratches or engravings on reflective objects. Light is introduced at very flat angles resulting in strong shadows.

Bright Field Illumination
This is the most common type of illumination and is created Coaxially, or with Ring Lights or Spotlights. It is used to inspect details on plain surfaces. Light is introduced at a very steep angle.

Important optical Terms:

- **Focal Length (f)**
  Distance between middle of lens and focus of collimated light
- **Depth Of Field (DOF)**
  The range which appears to be in focus
- **Distortion**
  Deviation from rectilinear projection
- **Field Of View (FOV)**
  Area of an object displayed on chip
- **F-Number**
  Defines the amount of light which can pass through an imaging system - high F-Number means less light and large DOF and vice versa
- **Magnification**
  Ratio between object and image
- **Magnification on screen**
  $\textit{Magnification of the optical system} \times \frac{\textit{screen diagonal}}{\text{camera diagonal}}$
- **Resolution**
  Closest distance between two black lines that can be seperated
- **Working Distance (WD)**
  Distance between end of lens and object

Our Custom Solutions and Standard Products are integrated innovatively in medical, industrial and scientific vision applications

Opto develops and manufacture client driven optomechatronic Modules, Components and Systems in quantities ranging from one-off prototypes to full scale production. Our vision is to be a leading supplier of the most innovative vision solutions to the most demanding inspection applications.

Components

for Machine Vision and Microscopy

Inspection Systems

for Quality Control andMeasurement

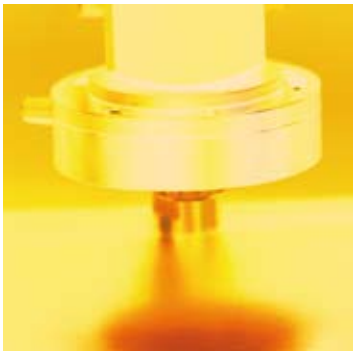
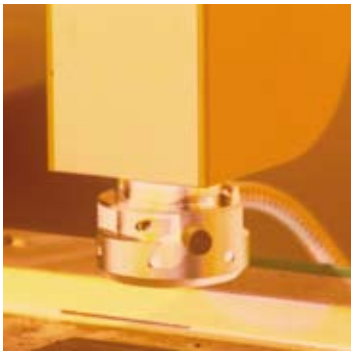
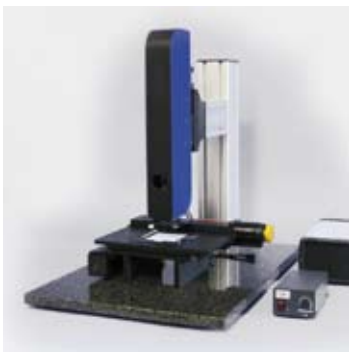


Image Analysis Systems

for Industrial Material Science





Custom Solutions

Opto develops and manufactures in quantities ranging from one-off prototypes to full scale production.

OEM Modules

Plug and Play Imaging Modules for Machine Builders consisting of Optics, Mechanics, Illumination and Sensors.

Customised Machines

Development and Production of complete Inspection / Vision Systems in partnership with Customer

Custom Production

Design and Build to print of Mechanics and Optics

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