

Lenses

for Machine Vision

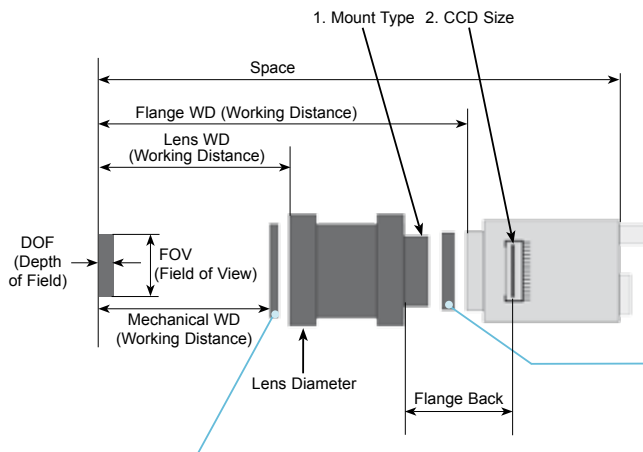


made by



General Informations

Terms and Definitions



Most industrial CCD cameras and lenses use C-mount. But there are some different mounts still used in machine vision application such as CS-mount, NF-mount, F-mount, etc.

Some remote head CCD cameras use special mount with small diameter (12 to 17mm).

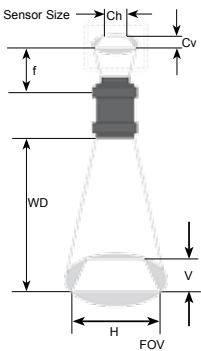
Three chip CCD cameras have a prism in front of the sensor, for this reason mechanical back is shorter (max. 4mm) than single chip CCD cameras.

Rear End Accessories
Extension tubes
Converters

Front End Accessories
Filters (protector, IR cut filter, bandpass, polarizer etc.), prism or mirror

Calculations of Optical Parameters

Optical magnification is "work" done by the lens. Defined as the ratio between the sensor size and the FOV.



Calculation of field of view (FOV)

$$\text{FOV} = \frac{\text{Sensor size (V or H)}}{\text{Optical Mag.}}$$

Calculation of optical magnification

$$\text{Optical Mag.} = \frac{\text{Sensor size (V or H)}}{\text{Required FOV (V or H)}}$$

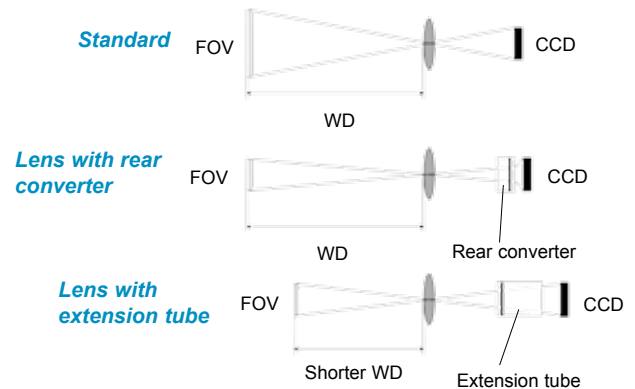
Calculation of focal length (f)

$$f = \frac{\text{WD} \times \text{Cv or Ch}}{\text{FOV (V or H)}}$$

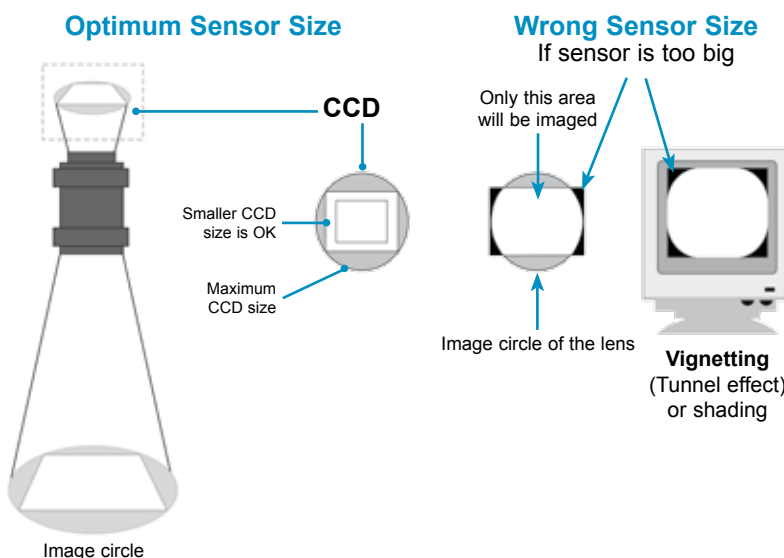
Converters and Extension Tubes

Rear Converter (Extender) is used to obtain smaller FOV without changing WD from the lens original specification. Rear converters are placed between lens and camera.

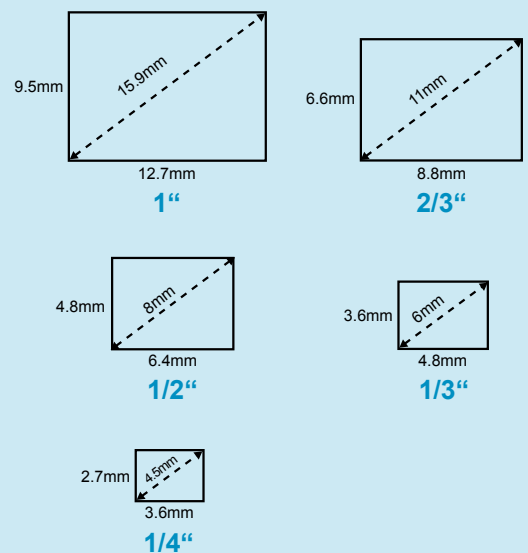
Extension tubes (Spacer) are used for fixed focal length lenses such as CCTV lenses to allow WD shorter than MOD (Minimum Object Distance). Result: A smaller FOV can be obtained by introducing extension tubes between the lens and camera.



Ability of the Lens to Support Sensor Size



Area Sensor



Telecentric Lenses VS-TC Series



Telecentric lenses offer parallel main rays to the optical axis. For this reason telecentric lenses eliminate the perspective error when the distance between object and lens changes. Telecentric lenses are ideal for coaxial illumination. Telecentric lenses are mostly used for accurate measurement and offer low distortion, less shading and high resolution. More than 160 different models are available. To select the lens you need, please use the following glossary for **Telecentric Lenses**:

Example VS-TC2-110COM/S: **L-VS - TC 2 - 110 CO M / S**

Telecentric lens _____
 Optical magnification _____
 Working distance mm _____
 Additional specs. _____
 Prepared for coaxial illumination _____
 17mm camera head mount _____
 12mm camera head mount _____

Example:

L-VS-TC2-110 = Telecentric lens, 2x optical magnification, working distance 110mm, C-Mount
 L-VS-TC2-110CO = Telecentric lens, 2x optical magnification, working distance 110mm, C-Mount, **prepared for coaxial illumination**
 L-VS-TC2-110COM = Telecentric lens, 2x optical magnification, working distance 110mm, prepared for coaxial illumination, **17mm camera head mount**
 L-VS-TC2-110COS = Telecentric lens, 2x optical magnification, working distance 110mm, prepared for coaxial illumination, **12mm camera head mount**

Telecentric Lenses

- slim, compact and light-weight design for machine vision
- low distortion, less shading, high resolution
- for measuring, accurate positioning and high-end imaging applications
- high-resolution telecentric lenses for megapixel sensors (C-mount / F-mount)

Telecentric Lenses with High Magnification and Short WD for C-Mount

P.O. Number	Max. Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC1.5-40*	1/2"	C	x1.5	39.5	< 0.05%	16 x 56.8	4.7μ
L-VS-TC2-40*	1/2"	C	x2.0	40	< 0.1%	16 x 38.5	4.7μ
L-VS-TC3-40*	1/2"	C	x3.0	38.1	< 0.1%	16 x 49.7	4.7μ
L-VS-TC4-40*	1/2"	C	x4.0	40	< 0.1%	16 x 45.5	4.7μ
L-VS-TC6-40*	1/2"	C	x6.0	39.5	< 0.1%	16 x 57.4	4.7μ
L-VS-TC8-40*	1/2"	C	x8.0	39.3	< 0.1%	16 x 69.2	4.7μ

* Please add "CO" at P.O. number if you wish preparation for coaxial illumination (f.e. L-VS-TC2-40CO)!

Telecentric Lenses with High Magnification and Middle WD for C-Mount

P.O. Number	Max. Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC08-65CO	1/2"	C	x0.8	65.4	< 0.1%	25 x 99.6	8.4μ
L-VS-TC1-65-16* ¹	1/2"	C	x1.0	65.9	< 0.1%	16 x 95.4	9.5μ
L-VS-TC1.5-70* ¹	2/3"	C	x1.5	69.5	0.06%	16 x 63.0	6.9μ
L-VS-TC2-65* ¹ * ²	2/3"	C	x2.0	66.7	< 0.1%	16 x 63.5	5.1μ
L-VS-TC3-65* ¹ * ²	1/2"	C	x3.0	65.3	0.4%	16 x 59.6	4.7μ
L-VS-TC4-65* ¹ * ²	2/3"	C	x4.0	64.5	0.4%	16 x 68.0	4.6μ
L-VS-TC5-65* ¹ * ²	2/3"	C	x5.0	64.6	< 0.1%	16 x 73.4	4.4μ
L-VS-TC6-65* ¹ * ²	2/3"	C	x6.0	64.5	< 0.1%	16 x 80.5	4.4μ
L-VS-TC8-65* ¹	2/3"	C	x8.0	64.0	< 0.1%	16 x 95.0	4.4μ
L-VS-TC10-65* ¹	1/2"	C	x10.0	63.8	< 0.1%	16 x 109.3	4.4μ

*¹ Please add "CO" at P.O. number if you wish preparation for coaxial illumination (f.e. L-VS-TC2-65CO)!

*² Ask us for version with 75mm WD!!

Telecentric Lenses

Telecentric Lenses with High Magnification and Long WD for C-Mount

P.O. Number	Max.Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC05-150 * ¹	1/2"	C	x0.5	152.2	< 0.1%	30 x 82.0	13.5μ
L-VS-TC1-110 * ¹	1/2"	C	x1.0	113.0	< 0.1%	16 x 79.5	13.4μ
L-VS-TC1.5-110 * ¹	1/2" * ²	C	x1.5	112.6	< 0.1%	16 x 79.0	8.3μ
L-VS-TC2-110 * ¹	1/2" * ²	C	x2.0	110.0	< 0.1%	16 x 87.0	8.3μ
L-VS-TC3-110 * ¹	1/2" * ²	C	x3.0	107.3	< 0.1%	16 x 102.9	8.3μ
L-VS-TC4-110 * ¹	1/2" * ²	C	x4.0	110.0	< 0.1%	16 x 91.4	6.7μ
L-VS-TC6-110 * ¹	1/2" * ²	C	x6.0	109.5	< 0.1%	16 x 118.5	6.7μ
L-VS-TC8-110 * ¹	1/2" * ²	C	x8.0	109.1	< 0.1%	16 x 119.5	6.7μ

*¹ Please add "CO" at P.O. number if you wish preparation for coaxial illumination (f.e. L-VS-TC1-110CO)!

*² For many application also 2/3" sensors are usable!

Telecentric Lenses with High Magnification and Extra Long WD for C-Mount

P.O. Number	Max.Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC08-220CO	1/2"	C	x0.8	232.6	-0,15%	Length 136.4	8.4μ
L-VS-TC1-220CO	1/2"	C	x1.0	220.0	< 0.1%	Length 146.5	6.7μ
L-VS-TC2-220CO	1/2"	C	x2.0	220.0	< 0.1%	Length 163.3	6.7μ
L-VS-TC2-220-16	1/2"	C	x2.0	220.0	< 0.1%	16 x 161.4	14.5μ
L-VS-TC2-220CO-16	1/2"	C	x2.0	220.0	< 0.1%	Length 161.4	14.5μ
L-VS-TC4-220CO	1/2"	C	x4.0	222.5	< 0.1%	Length 137.5	4.9μ
L-VS-TC6-220CO	1/2"	C	x6.0	221.3	< 0.1%	Length 165.3	4.9μ
L-VS-TC8-220CO	1/2"	C	x8.0	220.8	< 0.1%	Length 192.9	4.9μ
L-VS-TC10-220CO	1/2"	C	x10.0	218.4	< 0.1%	Length 221.4	4.9μ
L-VS-TC1-300CO	1/2"	C	x1.0	307.0	0.1%	Length 180	10.5μ
L-VS-TC2-300CO	1/2"	C	x2.0	300.6	0.1%	Length 216.4	10.5μ

Mega Pixel Telecentric Lenses for Measurement for C-Mount

P.O. Number	Max.Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC017 * ¹	1/2"	C	x0.17	112.0	0.08%	64 x 89.8	22.3μ (F# 5.6, optional 4 or 8)
L-VS-TC017CO * ¹	1/2"	C	x0.17	112.0	0.08%	64 x 89.8	15.9μ (F# 4.0, optional 5.6 or 8)
L-VS-TC03	1/3"	C	x0.3	58.8	0.05%	30 x 58.5	13.4μ
L-VS-TC06/RC2X	1/3"	C	x0.6	58.8	< 0.1%	30 x 69.8	13.4μ
L-VS-TC022	1/2"	C	x0.22	150	0.05%	50 x 98.3	16.7μ
L-VS-TC025	1/2"	C	x0.25	57.3	< 0.1%	43 x 43.0	11.8μ
L-VS-TCM025-65CO	1/2"	C	x0.25	64.8	0.05%	Length 82.0	9.8μ
L-VS-TCM025-150CO	1/2"	C	x0.25	153.0	0.05%	Length 98.2	14.6
L-VS-TCM05-65	1/2"	C	x0.5	67.6	0.05%	28 x 83.5	8.4μ
L-VS-TCM05-65CO	1/2"	C	x0.5	67.6	0.05%	28 x 83.5	8.4μ
L-VS-TCM075-65CO	1/2"	C	x0.75	66.3	0.05%	Length 85.9	4.5μ
L-VS-TCM075-65CO/S * ²	1/2"	C	x0.75	66.3	0.05%	Length 85.9	4.5μ
L-VS-TCM1-65CO	1/2"	C	x1.0	66.3	0.05%	Length 96.1	6.2μ
L-VS-TCM1-65CO/S * ²	1/2"	C	x1.0	66.3	0.05%	Length 96.1	6.2μ
L-VS-TCM2-65CO	1/2"	C	x2.0	65.0	0.1%	Length 97.5	2.2μ
L-VS-TCM2-65CO/S * ²	1/2"	C	x2.0	65.	0.1%	Length 97.5	2.2μ
L-VS-TCM4-60CO	1/2"	C	x4.0	61.6	0.1%	Length 111.7	2.3μ
L-VS-TCM6-60CO	1/2"	C	x6.0	60.0	0.05%	Length 149.4	2.3μ
L-VS-TCM6-60COL	1/2"	C	x6.0	60.0	0.05%	Length 149.4	2.3μ
VS-TCM10-60CO	1/2"	C	x10.0	60.0	0.05%	Length 203.5	2.3μ
VS-TCM10-60COL * ³	1/2"	C	x10.0	60.0	0.05%	Length 203.5	2.3μ

Designed for 1.1" Sensor

L-VS-TCM4-50CO/C	22mm	C	x4.0	52.4	< 0.1%	Length 133.3	3.3μ
L-VS-TCM5-50CO/C	22mm	C	x5.0	51.5	< 0.1%	Length 150.9	3.3μ
L-VS-TCM6-50CO/C	22mm	C	x6.0	50.9	< 0.1%	Length 168.7	3.3μ

Special Vari Focal Type

L-VS-TCV2-65CO	2/3"	C	x2.0 * ⁴	66.7 +/-1	< 0.1%	Length 62.5	5.1μ
L-VS-TCV4-65CO	2/3"	C	x4.0 * ⁴	64.5 +/-1	< 0.1%	Length 68.0	4.6μ
L-VS-TCV6-65CO	2/3"	C	x6.0 * ⁴	64.5 +/-1	< 0.1%	Length 80.5	4.4μ

Adjustable magnification Type

L-VS-TC0510 * ⁵	2/3"	C	x0.5 – x1.0	120.7 – 164.4	0.01 – 0.04%	50 x 93.0 – 106.0	7.98μ or better
L-VS-TEC50 * ⁶	2/3"	C	x0.5 – x1.0	85 - infinity	< 0.1%	56 x 116.0	

*¹ Filter threat M62.0, P=0.75

*² Iris adjustable!

*³ Like VS-TCM10-60CO, but less space for illumination is needed!

*⁴ Magnification at the centre of focus!

*⁵ Perfect telecentricity for whole range of x0.5 to x1.0, less shading, high resolution

*⁶ Low cost, focal length 50mm, filter threat M37.5 P=0.75

Telecentric Lenses

Telecentric Lens with Built-in White LED and Thin Housing

P.O. Number	Max. Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC2-110COS/C * ¹	1/3"	C	x2.0	110.0	< 0.1%	12 x 87.0	13.4µ
L-VS-TC4-110COS/C * ¹	1/3"	C	x4.0	110.0	< 0.1%	12 x 91.4	11.1µ
L-VS-TC6-110COS/C * ¹	1/3"	C	x6.0	109.5	< 0.1%	12 x 118.3	9.5µ
Additional Right Angle Prism							
L-VS-TC2-80COSL/C * ²	1/3"	C	x2.0	80.0	< 0.1%	12 x 120.0	13.4µ
L-VS-TC4-80COSL/C * ²	1/3"	C	x4.0	80.0	< 0.1%	12 x 124.7	11.1µ
L-VS-TC6-80COSL/C * ²	1/3"	C	x6.0	79.5	< 0.1%	12 x 151.6	9.5µ

*¹ Thin, built-in white LED, prepared for coaxial illumination!

*² Thin, built-in white LED, right angle prism, prepared for coaxial illumination!

Mega Pixel Telecentric Lenses for Measurement for F-Mount

Designed for 10MP and line scan sensors!

P.O. Number	Image Circle	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (L)	Resolution at 550nm
L-VS-TCM4-50CO/F	28mm	F	x4.0	52.4	< 0.1%	104.3	3.3µ
L-VS-TCM5-50CO/F	28mm	F	x5.0	51.5	< 0.1%	122.0	3.3µ
L-VS-TCM6-50CO/F	28mm	F	x6.0	50.9	< 0.1%	139.7	3.3µ
L-VS-TCM075-70CO/F	35mm	F	x0.75	70.2	< 0.1%	143.0	4.8µ
L-VS-TCM075-70CO/FS * ¹	35mm	F	x0.75	70.2 +/-2	< 0.1%	143.0	4.8µ
L-VS-TCM1-70CO/F	35mm	F	x1.0	70.2	< 0.1%	138.5	4.2µ
L-VS-TCM1-70CO/FS * ¹	35mm	F	x1.0	70.2 +/-2	< 0.1%	138.5	4.2µ
L-VS-TCM2-70CO/F	35mm	F	x2.0	68.3	< 0.1%	132.5	4.2µ
L-VS-TCM2-70CO/FS * ¹	35mm	F	x2.0	68.3 +/-2	< 0.1%	132.5	4.2µ

*¹ Iris adjustable!

Telecentric Lenses with High Magnification for 17mm Camera Heads

P.O. Number	Max. Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC1.5-40M *	1/2"	M15.5 P=0.5	x1.5	39.5	< 0.1%	16 x 81.9	4.7µ
L-VS-TC2-40M *	1/2"	M15.5 P=0.5	x2.0	40.0	< 0.1%	16 x 63.7	4.7µ
L-VS-TC3-40M *	1/2"	M15.5 P=0.5	x3.0	38.1	< 0.1%	16 x 74.7	4.7µ
L-VS-TC4-40M *	1/2"	M15.5 P=0.5	x4.0	40.0	< 0.1%	16 x 70.5	4.7µ
L-VS-TC6-40M *	1/2"	M15.5 P=0.5	x6.0	39.5	< 0.1%	16 x 82.4	4.7µ
L-VS-TC8-40M *	1/2"	M15.5 P=0.5	x8.0	39.3	< 0.1%	16 x 94.2	4.7µ
L-VS-TC1.5-70M *	1/2"	M15.5 P=0.5	x1.5	69.5	0.1%	16 x 88	6.9µ
L-VS-TC2-65M *	1/2"	M15.5 P=0.5	x2.0	66.7	0.1%	16 x 88.7	5.1µ
L-VS-TC3-65M *	1/2"	M15.5 P=0.5	x3.0	65.3	0.05%	16 x 59.6	4.7µ
L-VS-TC4-65M *	1/2"	M15.5 P=0.5	x4.0	64.5	0.3%	16 x 93.7	4.6µ
L-VS-TC5-65M *	1/2"	M15.5 P=0.5	x5.0	64.6	0.1%	16 x 98.4	4.4µ
L-VS-TC6-65M *	1/2"	M15.5 P=0.5	x6.0	64.5	0.1%	16 x 105.6	4.4µ
L-VS-TC8-65M *	1/2"	M15.5 P=0.5	x8.0	64.0	0.1%	16 x 120.1	4.4µ
L-VS-TC10-65M *	1/2"	M15.5 P=0.5	x10.0	63.8	0.1%	16 x 134.3	4.4µ
L-VS-TC1-110M *	1/2"	M15.5 P=0.5	x1.0	113.0	< 0.1%	16 x 79.5	13.4µ
L-VS-TC1.5-110M *	1/2"	M15.5 P=0.5	x1.5	112.6	< 0.1%	16 x 104.0	8.3µ
L-VS-TC2-110M *	1/2"	M15.5 P=0.5	x2.0	110.0	< 0.1%	16 x 112.0	8.3µ
L-VS-TC3-110M *	1/2"	M15.5 P=0.5	x3.0	107.3	< 0.1%	16 x 127.9	8.3µ
L-VS-TC4-110M *	1/2"	M15.5 P=0.5	x4.0	110.0	< 0.1%	16 x 116.4	6.7µ
L-VS-TC6-110M *	1/2"	M15.5 P=0.5	x6.0	109.5	< 0.1%	16 x 143.5	6.7µ
L-VS-TC8-110M *	1/2"	M15.5 P=0.5	x8.0	109.1	< 0.1%	16 x 144.5	6.7µ
L-VS-TC2-220M-16 *	1/2"	M15.5 P=0.5	x2.0	220.0	< -0.1%	16 x 186.4	6.7µ

* Please add "CO" before the "M" at the P.O. number if you wish preparation for coaxial illumination (f.e. L-VS-TC1-110COM)!

Telecentric Lenses with High Magnification for 12mm Camera Heads

P.O. Number	Max. Sensor Size	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-TC2-65S *	1/3"	M10.5 P=0.5	x2.0	66.7	< 0.1%	12 x 77.0	6.7µ
L-VS-TC4-65S *	1/3"	M10.5 P=0.5	x4.0	64.5	< 0.1%	12 x 81.5	5.6µ
L-VS-TC6-65S *	1/3"	M10.5 P=0.5	x6.0	64.5	< 0.1%	12 x 94.0	5.6µ
L-VS-TC2-110S *	1/3"	M10.5 P=0.5	x2.0	110.0	< 0.1%	12 x 100.5	13.4µ
L-VS-TC4-110S *	1/3"	M10.5 P=0.5	x4.0	110.0	0.1%	12 x 100.5	11.1µ
L-VS-TC6-110S *	1/3"	M10.5 P=0.5	x6.0	109.5	< 0.1%	12 x 131.8	9.5µ

* Please add "CO" before the "S" at the P.O. number if you wish preparation for coaxial illumination (f.e. L-VS-TC2-65COS)!



Illumination Devices for Coaxial Illuminations

- LED's and high power LED's in red, blue, green and white
- small size, high uniformity, very long lifetime
- light-weight, easy to use if optical system is moved



Illumination Devices for Telecentric Lenses

P. O. No.	Product Description	Source	Remarks
L-IV-14-R	LED lightning for Co-axial illumination	1 red LED	
L-IV-14-W	LED lightning for Co-axial illumination	1 white LED	
L-IV-27-R	LED lightning for Co-axial illumination	7 red LED	
L-IV-27-W	LED lightning for Co-axial illumination	7 white LED	
L-IHV-18RmkII-RZ	Power LED lightning for Co-axial illumination	1 red power LED, 1.4 Watt	High uniformity
L-IHV-18WmkII-RZ	Power LED lightning for Co-axial illumination	1 white power LED, 1.4 Watt	High uniformity
L-IHV-27RmkII-RZ	Power LED lightning for Co-axial illumination	1 red power LED, 2.5 Watt	High power
L-IHV-27WmkII-RZ	Power LED lightning for Co-axial illumination	1 white power LED, 2.5 Watt	High power

Ask for other colours!



Power Supply for Coaxial Illuminations

- LED's and high power LED's in red, blue, green and white
- small size, high uniformity, very long lifetime
- light-weight, easy to use if optical system is moved

Power Supply for Coaxial Illuminations

Type		Remark
L-IDPW-10D"x" *1	LED Power Supply(~240V)	2 Channel, 10Watt, external ON/OFF control terminal
L-IDPW-30D"x" *1	LED Power Supply(~240V)	2 Channel, 30Watt, external ON/OFF control terminal
L-IDPW-50D"x" *1	LED Power Supply(~240V)	2 Channel, 50Watt, external ON/OFF control terminal
L-IDPW-100D"x" *1	LED Power Supply(~240V)	2 Channel, 100Watt, external ON/OFF control terminal
L-IDPW-10M4"x" *1	LED Power Supply(~240V)	4 Channel, 10Watt, external ON/OFF control terminal
L-IDPW-30M4"x" *1	LED Power Supply(~240V)	4 Channel, 30Watt, external ON/OFF control terminal
L-IDPW-50M4"x" *1	LED Power Supply(~240V)	4 Channel, 50Watt, external ON/OFF control terminal
L-IDPW-100M4"x" *1	LED Power Supply(~240V)	4 Channel, 100Watt, external ON/OFF control terminal

*1 Please add for "x" V for knob controlled and H for driver controlled (adjustment with screw-driver / f.e. L-IDPW-10DH)!

CCTV / High Resolution Lenses



SV-Series – CCTV Standard Lenses

- wide range (3.5mm to 100mm)
- fixing screws for focus and iris
- compact size
- rugged housing

CCTV Lenses with Lock-Screws for Focus and Iris

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)	Filter Threat
L-SV-03514	1/2"	C	f=3.5mm	F:1.4-(C)	200	31.0 x 30.5	
L-SV-04514	1/2"	C	f=4.5mm	F:1.4-(C)	200	31.0 x 29.5	
L-SV-0614	1/2"	C	f=6mm	F:1.4-16-(C)	200	30.0 x 30.0	M27 P=0.5
L-SV-0813	2/3"	C	f=8mm	F:1.3-16-(C)	200	29.0 x 34.5	M25.5 P=0.5
L-SV-1214	1/2"	C	f=12mm	F:1.4-16-(C)	300	30.0 x 34.5	M27 P=0.5
L-SV-1614	2/3"	C	f=16mm	F:1.4-16-(C)	400	30.0 x 24.5	M27 P=0.5
L-SV-2514	1"	C	f=25mm	F:1.4-16-(C)	500	30.0 x 24.4	M27 P=0.5
L-SV-3519	2/3"	C	f=35mm	F:1.9-16-(C)	500	30.0 x 29.1	M27 P=0.5
L-SV-5018	2/3"	C	f=50mm	F:1.8-16-(C)	1.000	32.0 x 37.3	M30.5 P=0.5
L-SV-7527	2/3"	C	f=75mm	F:2.7-22-(C)	1.000	32.0 x 42.5	M30.5 P=0.5
L-SV-10035	2/3"	C	f=100mm	F:3.5-22-(C)	1.000	32.0 x 44.2	M30.5 P=0.5



M-Series – Machine Vision High Resolution Lenses

- specially designed for machine vision applications with short working distance (optimized at approx. 200mm WD)
- shock and vibration resistant (lock screws with locking nuts)
- 5 models (6, 16, 25, 35, 50mm)

High Resolution M-Series with Lock-Screws for Focus and Iris

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)	Filter Threat	Center Resolution
L-SV-M0614	1/2"	C	f=6mm	F:1.4-16-(C)	200	32.0 x 37.5	M30.5 P=0.5	140lp/mm
L-SV-M1614	2/3"	C	f=16mm	F:1.4-16	250	29.0 x 30.0	M25.5 P=0.5	100lp/mm
L-SV-M2514	2/3"	C	f=25mm	F:1.4-16	250	29.0 x 31.5	M25.5 P=0.5	140lp/mm
L-SV-M3520	2/3"	C	f=35mm	F:2.0-22	250	29.0 x 38.5	M25.5 P=0.5	140lp/mm
L-SV-M5028	2/3"	C	f=50mm	F:2.8-22	500	29.0 x 38.5	M25.5 P=0.5	140lp/mm



MP-Series – Mega Pixel CCTV Lenses

- SV-MP Series offers high resolution (more than 100lp/mm in entire FOV)
- low distortion
- lock screws for focus and iris

High Resolution MP-Series with Lock-Screws for Focus and Iris

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)	Filter Threat	Field Resolution
L-SV-0514MP	2/3"	C	f=5mm	F:1.4-16-(C)	300	44.5 x 45.5	M30.5 P=0.5	100lp/mm or more
L-SV-0814MP	2/3"	C	f=8mm	F:1.4-16(C)	100	33.5 x 28.2	M30.5 P=0.5	100lp/mm or more
L-SV-1214MP	2/3"	C	f=12mm	F:1.4-16(C)	150	33.5 x 28.2	M30.5 P=0.5	100lp/mm or more
L-SV-1614MP	2/3"	C	f=16mm	F:1.4-16(C)	300	33.5 x 28.2	M30.5 P=0.5	100lp/mm or more
L-SV-2514MP	2/3"	C	f=25mm	F:1.4-16(C)	300	33.5 x 36.0	M30.5 P=0.5	100lp/mm or more
L-SV-5018MP	2/3"	C	f=50mm	F:1.8-16(C)	500	33.5 x 38.1	M30.5 P=0.5	100lp/mm or more

Lenses for Large Sensors / Distortionless Lenses



SV-L-Series for 1" CCD's

- especially designed for large sensors
- small F-number, large aperture
- usable for low-light situations

L-Series for 1" Sensor with Lock-Screws for Focus and Iris

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)	Filter Threat
L-SV-L12513	1"	C	f=12.5mm	F:1.3-C	300	47.0 x 59.0	M43 P=0.75
L-SV-L2514	1"	C	f=25mm	F:1.4-C	500	45.0 x 28.0	M43 P=0.75
L-SV-L5013	1"	C	f=50mm	F:1.3-C	1.000	52.0 x 52.0	M49 P=0.75
L-SV-L5018	1"	C	f=50mm	F:1.8-C	1.000	42.0 x 48.5	M40.5 P=0.5
L-SV-L7513	1"	C	f=75mm	F:1.3-C	1.000	60.0 x 71.3	M58 P=0.75



VS-LD-Series – Distortionless Macro Lenses

- especially designed for macro applications
- changeable magnification, working distance brightness
- iris with click balls
- nearly no tv-distortion
- compact size, little shading

Megapixel Distortionless Macro Lenses

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)	Filter Threat	TV Distortion
L-VS-LD10	1/2"	C	f=10mm	F:2.2-C	89.3-500.1	32.0 x 25.8	M27 P=0.5	< -0.05%
L-VS-LD25	2/3"	C	f=25mm	F:1.9-C	90.8-190.5	32.0 x 26.35-30.5	M27 P=0.5	< +0.02%
L-VS-LD35	2/3"	C	f=35mm	F:1.8-C	95.7-142.4	32.0 x 36.5-43.5	M27 P=0.5	< -0.03%
L-VS-LD50	2/3"	C	f=50mm	F:2.5-C	213-503.7	32.0 x 46.4-53.7	M27 P=0.5	< +0.05%
L-VS-LD75	2/3"	C	f=75mm	F:3.5-C	245.9-527.7	32.0 x 70.8-85.5	M27 P=0.5	< -0.02%

SV-PH Series Pinhole Lenses

P. O. No.	Max. Sensor Size	Mount	Focal Length	F-Stop	MOD in mm	Dimension in mm (ØDxL)
L-SV-PH085	2/3"	C	f=8.5mm	F:2.8	0.9	20.5 x 86.7
L-SV-PH04	1/2"	C	f=4mm	F:2.5	0.2	23 x 121.6



VS-MC-Series – Machine Vision Macro Lenses

- especially designed housings for machine vision use
- vibration resistant, less shading, high resolution very small distortions
- UV and IR lenses available

Vibration-Resistent Macro Lens (Megapixel Distortionless)

P. O. No.	Max. Sensor Size	Mount	Optical Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)
L-VS-MC0510 *1	2/3"	C	x0.5 – x1.0	75.2 – 121.2	0%	Length 49.4 – 72.5
L-VS-MC0510S *2	2/3"	C	x0.5 – x1.0	72.3 – 118.3	0%	31 x 64.5 – 87.6
L-VS-MC024	2/3"	C	x0.24 – x0.8	121.2 – 213.3	< 0.1%	Length 49.3 – 65.9
L-VS-MC024S *2	2/3"	C	x0.24 – x0.8	118.3 – 210.4	< 0.1%	31 x 52.2 – 68.8
L-VS-MC0103	1/2"	C	x0.1 – x0.3	182.7 – 489.7	< 0.1%	Length 42.9 – 52.1
L-VS-MC0510-"x" *3	2/3"	C	x0.5 – x1.0	75.2 – 121.2	0%	Length 49.4 – 72.5

Macro Lenses / Zoom Lenses

L-VS-MC0510S-UV *4	1/2"	C	x0.5x – x1.0	72.3 – 118.3	< –0.01%	31 x 52.3 – 79.9
L-VS-MC00303S-UV *4	1/2"	C	x0.03x – x0.3	45 – 527	< –0.01%	32 x 22
L-VS-MC2-65UV365 *5	1/2"	C	x2.0	64	< 0.1%	16 x 62.9
L-VS-MC3-65UV365 *5	1/2"	C	x3.0	65.3	< 0.1%	26.5 x 87
L-VS-MC0510IR *6	2/3"	C	x0.5 – x1.0	80.4 – 126.4	< –0.01%	Length 59.4 - 82.4
L-VS-MC05-CMT	2/3"	C	x0.5	120	< –0.05%	16 x 62.9
L-VS-MC075-CMT	2/3"	C	x0.75	89	< –0.05%	16 x 74.4
L-VS-MC10-CMT	2/3"	C	x1.0	74	< –0.05%	16 x 85.9
L-VS-MC03S *2	1/3"	C	x0.3	49.9	< –0.05%	28.5 x 20
L-VS-MC03-150	1/2"	C	x0.3	158	< 0.05%	24 x 48
L-VS-MC08-50	1/2"	C	x0.825	49.4	< 0.1%	18 x 29
L-VS-MC10-70	1/2"	C	x1.0	70	< 0.05%	18 x 57.2

*1 2.0x magnification optional!

*2 Adjustable iris!

*3 Fixed iris! Choose between 1 and 9mm! Please enter wished number for the "x"!

*4 Optimized for UV (320-420nm)!

*5 Optimized for UV 365nm!

*6 Optimized for IR (650nm – 950nm)!

Macro Lenses for 17mm Camera Heads

P. O. No.	Max. Sensor Size	Mount	Optical Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution
L-VS-MC0410-M155	1/2"	M15.5, P=0.5	x0.4 – 1.0x	75.2 – 121.2	0%	23 x 81.5 – 109.5	X0.5 = 10.8μ, x1.0 = 6.7μ
L-VS-MC0103-M155	1/2"	M15.5, P=0.5	x0.1 – 0.3x	182.7 – 489.7	0%	23 x 67.8 – 77.0	X0.1 = 22.3μ, x0.3 = 7.2μ
L-VS-MC05-M155	1/2"	M15.5, P=0.5	x0.5	120	-0.05%	16 x 87.9	10.8μ
L-VS-MC075-M155	1/2"	M15.5, P=0.5	x0.75	89	-0.05%	16 x 99.4	8.6μ
L-VS-MC10-M155	1/2"	M15.5, P=0.5	x1.0	74	-0.05%	16 x 110.9	6.7μ

Macro Lenses for 12mm Camera Heads

P. O. No.	Max. Sensor Size	Mount	Optical Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution
L-VS-MC0410-S105	1/3"	M10.5, P=0.5	x0.4 – 1.0x	75.2 – 121.2	0%	23 x 69.9 – 97.9	X0.5 = 10.8μ, x1.0 = 6.7μ
L-VS-MC0103-S105	1/3"	M10.5, P=0.5	x0.1 – 0.3x	182.7 – 489.7	0%	23 x 56.2 – 65.4	X0.1 = 22.3μ, x0.3 = 7.2μ



VSZ-Series – Macro Zoom Lenses

- different zoom lenses and lens systems
- especially designed for macro
- small in size, high resolution, long WD
- 0,3 to 9x optical magnification

Macro Zoom Lenses Series VSZ and Accessories

P. O. No.	Max. Sensor Size	Mount	Optical Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Filter Threat
Telecentric Megapixel Zoom							
L-VSZ-M07545	1/2"	C	x0.75 +/-5% - x4.5 +/-5%	95.25 +/-4	0.1 – 0.03%	46 x 184	M30.5 P=0.5
L-VSZ-M07545CO	1/2"	C	x0.75 +/-5% - x4.5 +/-5%	95.25 +/-4	0.1 – 0.03%	46 x 204	M30.5 P=0.5

Optional Parts for VSZ-M Series

L-VSZ-M03X			Front converter x0.225 - x1.35	306.9		33 x 7.5	M30.5 P=0.5
L-VSZ-M05X			Front converter x0.375 - x2.25	180.8		33 x 7.5	M30.5 P=0.5
L-VSZ-M07X			Front converter x0.525 - x3.15	127.2		33 x 7.5	M30.5 P=0.5
L-VSZ-M14X			Front converter x1.05 - x6.3	58.9		33 x 9.0	M30.5 P=0.5
L-VSZ-M20X			Front converter x1.5 - x9.0	38.2		33 x 9.0	M30.5 P=0.5
L-VSZ-MKD1			Stand for VSZ-M series				

1:10 Zoom

L-VSZ-00808 *1	1/2"	C	x0.022 – x0.84	150 – 450	Max. 1.75%	48 x 98.5	M46 P=0.75
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1:3 Megapixel Zoom

L-VSZ-0310MP *2	2/3"	C	x0.3 – x1.0	90	x0.3 = +0.02%, x1.0 = -1.78%	36 x 79.5	M34 P=0.5
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Zoom Lenses / Line Scan Lenses

P. O. No.	Max. Sensor Size	Mount	Optical Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Filter Threat
1:4 Zoom							
L-VSZ-002	1/2"	C	x0.02 – x0.24	300 – 750		25 x 80.9 – 84.9	
L-VSZ-004	1/2"	C	x0.04 – x0.48	300 – 750		25x 90.8 – 96.1	
L-VSZ-007	1/2"	C	x0.07 – x0.42	150 – 210		25 x 84.0 – 89.2	
L-VSZ-014	1/2"	C	x0.14 – x0.8	150 – 210		25 x 87.8 – 91.8	
L-VSZ-020	1/2"	C	x0.2 – x1.1	55 – 70		25 x 89.4 – 97.0	
L-VSZ-027	1/2"	C	x0.27 – x1.2	45 – 50		25 x 89.4 – 93.2	
L-VSZ-040	1/2"	C	x0.4 – x2.1	55 – 70		25 x 96.3 – 103.9	
L-VSZ-054	1/2"	C	x0.54 – x2.4	45 – 50		25 x 96.3 – 100.1	

*1 Center 80, field 40lp/mm resolution!

*2 Field 125lp/mm or more resolution!



VS-L-Series – Lenses for Line Scan Sensors

- high resolution, high contrast, low distortion
- C-mount or F-mount (max. sensor size 35mm)
- optical magnification from 0,1x to 4,5x

Low Distortion Lens for Line Scan Sensor (High Magnification)

P. O. No.	Image Circle	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Filter Threat	Resolution at 550nm
L-VS-L1035	35mm	None	x0.1 – x4.5					
L-VS-L0104R/F	35mm	F	x0.1 – x0.4	174.3 – 639.75	0%	54 x 59.2 – 77.8	M43 P=0.75	X0.1 = 23.9μ, x0.4 = 7.6μ
L-VS-L0104R/C	23mm	C	x0.1 – x0.4	174.3 – 639.75	0%	54 x 88.1 – 106.7	M43 P=0.75	X0.1 = 23.9μ, x0.4 = 7.6μ
L-VS-L0410R/F	35mm	F	x0.4 – x1.0	242.84 – 298.69	0%	54 x 84.1 – 115.1	M43 P=0.75	X0.4 = 7.6μ, x1.0 = 4.3μ
L-VS-L0410R/C	23mm	C	x0.4 – x1.0	242.84 – 298.69	0%	54 x 113.0 – 144.0	M43 P=0.75	X0.4 = 7.6μ, x1.0 = 4.3μ
L-VS-L1020/F	35mm	F	x1.0 – x2.0	76.1 – 107.1	< 0.1%	54 x 89.2 – 151.2	M43 P0.75	X1.0 = 4.3μ, x2.0 = 3.3μ
L-VS-L1020/C	23mm	C	x1.0 – x2.0	76.1 – 107.1	< 0.1%	54 x 118.1 – 180.1	M43 P0.75	X1.0 = 4.3μ, x2.0 = 3.3μ
L-VS-L25/F *1	35mm	F	x2.5 +/-5%	69.8		54 x 182.3	M43 P=0.75	3μ
L-VS-L25/C	23mm	C	x2.5 +/-5%	69.8		54 x 211.2	M43 P=0.75	3μ
VS-L30/F *2	35mm	F	x3.0 – x3.3	65.7		54 x 213.3	M43 P=0.75	2.9μ
L-VS-L30/C	23mm	C	x3.0 – x3.3	65.7		54 x 242.2	M43 P=0.75	2.9μ
VS-L35/F *3	35mm	F	x3.5 – x3.8	62.8		54 x 244.3	M43 P=0.75	2.8μ
L-VS-L35/C	23mm	C	x3.5 – x3.8	62.8		54 x 273.2	M43 P=0.75	2.8μ
VS-L40/F *4	35mm	F	x4.0 – x4.2	60.5		54 x 275.3	M43 P=0.75	2.72μ
L-VS-L40/C	23mm	C	x4.0 – x4.2	60.5		54 x 304.2	M43 P=0.75	2.72μ
VS-L45/F *5	35mm	F	x4.5 – x4.7	58.8		54 x 306.4	M43 P=0.75	2.66μ
L-VS-L45/C	23mm	C	x4.5 – x4.7	58.8		54 x 335.3	M43 P=0.75	2.66μ

*1 F = 62.06mm, FOV with 35mm line sensor = 14mm!

*2 F = 62.06mm, FOV with 35mm line sensor = 11.6mm!

*3 F = 62.06mm, FOV with 35mm line sensor = 10.0mm!

*4 F = 62.06mm, FOV with 35mm line sensor = 8.75mm!

*5 F = 62.06mm, FOV with 35mm line sensor = 7.77mm!

Low Distortion Lens for Line Scan and Large Area Sensors (Low Magnification)

P. O. No.	Image Circle	Mount	Magnification	WD in mm	TV Distortion	Dimension in mm (ØDxL)	Resolution at 550nm
L-VS-L01F	35mm	F	x0.1 – x0.14	336 – 468	< –0.1%	55.5 x 45.4	14.5μ
L-VS-L01C	22mm	C	x0.1 – x0.14	336 – 468	< –0.1%	55.5 x 74.3	14.5μ

Industrial Microscopes / Mirrors, Prisms and Penta Prisms



VS-MS-Series – Industrial Microscopes

- industrial microscope with optical magnification from 2.5x – 100x
- high quality objective lenses
- single or dual camera combination

Microscope Unit

P. O. No.	Mount	Magnification	Product Description
Standard Model			
L-VS-MS1	C		C-mount unit for microscope objectives (for f200mm)
L-VS-MS1/0.5x	C	x0.5	x0.5 C-mount unit for microscope objectives (for f200mm)
L-VS-MS2L	C		Right angle C-mount unit for microscope objectives (for f200mm)
L-VS-MS1/10-2CAM	C		Like L-VS-MS1, but prepared for two C-Mount camera connections

Microscope Unit Lenses and Accessories

P. O. No.	Remarks
L-VS-MSL"X"*	Available magnification 5x, 10x, 20x, 40x, 50x, 60x, 100x
LA-VS-MS-KD	Microscope stand with micrometer

* Please enter instead of "X" number of magnification (f.e. "L-VS-MSL5x" for 5x magnification)!

Customized Microscope Unit for Machine Vision

P. O. No.	Max. Sensor Size	Mount	Mag.	WD in mm	Resolution at 550nm	Product Description
L-VS-MS10x-CO *1	1/2"	C	10x	20.3	1.6μ	C-Mount adapter unit with Nikon SLWD-Plan10x
L-VS-MS10x-COL *2	1/2"	C	10x	20.3	1.6μ	C-Mount adapter unit with Nikon SLWD-Plan10x
L-VS-MS"xx"x-CO		C				Customized C-Mount model unit with selected objective lens
L-VS-MS"xx"x-COL		C				Customized right angle C-Mount model unit with selected objective lens

*1 Prepared for coaxial illumination!

*2 Prepared for coaxial illumination, right angle prism!



VS-PZ-Series – Mirrors, Prisms, Penta Prisms

- wide range of offset prisms, 90° prisms, penta prisms, mirrors
- customized products available

Options and Accessories | Prisms and Half Mirrors

P. O. No.	Type	Lens dia.	Lens type	Remarks
L-VS-PZ12-1	Right angle prism	12mm	VS-TC series	Inverted image
L-VS-PZ16-1	Right angle prism	16mm	VS-TC series	Inverted image
L-VS-PZ30-1	Right angle prism	30mm	VS-TC series	Inverted image
L-VS-PZ16PT	Penta prism	16mm	VS-TC series	No inverted image!
L-VS-PZ12PT	Penta prism	12mm	VS-TC series	No inverted image!
L-VS-PZ16-OF5	Off-set prism	16mm	VS-TC series	No inverted image!
L-VS-PZ12-OF5	Off-set prism	12mm	VS-TC series	No inverted image!
L-VS-PZ16-3R	Off-set right angle prism, right side	16mm	VS-TC series	No inverted image!
L-VS-PZ16-3L	Off-set right angle prism, left side	16mm	VS-TC series	No inverted image!
L-VS-PZ16-2(90°)	Right-angle prism	16mm	VS-TC series	Inverted image
L-VS-PZ16-4(90°)	Right-angle prism	16mm	VS-TC series	Inverted image, round housing
L-VS-PZ255-2	Right-angle roof prism	M25.5 P=0.5	SV, SV-LD, SV-MP, 1:4 Macro Zoom Series	
L-VS-PZ270-2	Right-angle roof prism	M27.0 P=0.5	SV, SV-LD, SV-MP, 1:4 Macro Zoom Series	
L-VS-PZ305-2	Right-angle roof prism	M30.5 P=0.5	SV, SV-LD, SV-MP, 1:4 Macro Zoom Series	
L-VS-PZ-C270	Right-angle mirror	M27 P=0.5	SV, SV-LD, SV-MP, 1:4 Macro Zoom Series	Inverted image!
L-VS-PZ-C305	Right-angle mirror	M30.5 P=0.5	SV, SV-LD, SV-MP, 1:4 Macro Zoom Series	Inverted image!

Vignette or shading will occur at low magnification!

Rear Converter Lenses

Rear Converter Lenses (TV Extender)

P. O. No.	Product Description	Available Mag.	Remarks
L-SV-"xxx" *	Rear converter	1.5x, 2.0x, 2.5x, 3.0x, 4.0x, 5.0x	
LA-SV-1.5XNB	Rear converter	1.5x	For high resolution lenses
LA-SV-2.0XNB	Rear converter	2.0x	For high resolution lenses

* Please add instead of "xxx" wished magnification (f.e. 2.5x = L-SV-2-5x or 2.0x = L-SV-2X)!

Extension Tubes

Extension Tubes (Close-up Rings)

P. O. No.	Product Description	Available Length
LA-SV-EXR	Kit of seven extension tubes(0.5/1/2/5/10/20/40mm)	
LA-SV-EXR"xxx"	Extension tube	0.2/0.5/1.0/2.0/5.0/10.0/15.0/20.0/22.0/25.5/30.0/40.0/50.0/100.0mm
LA-SV-EXR1520	Changeable tube	Length=15 – 20mm
LA-SV-EXR3042	Changeable tube	Length=30 – 42mm

Please enter instead of "xxx" wished length (fe. 20.0mm = SV-EXR20, or 0.2mm = SV-EXR02)!



Filters

- all kinds of filters available
- available in every common filter size

Filters

P. O. No.	Product Description	Available Filter Threat
LA-SV-GA-"xxx" *	UV-cut glass filter	M22.5, M25.5, M27.0, M34.5, M37.5, M43.0, M46.0
LA-SV-PL-"xxx" *	Polarizing filter	M25.5, M27.0, M30.5, M34.5, M35.5, M37.5, M43.0, M62.0
LA-SV-ND50-270	Neutral density filter, 50% transmittance	M27.0
LA-SV-ND25-270	Neutral density filter 25% transmittance	M27.0
LA-SV-ND12-270	Neutral density filter 12.5% transmittance	M27.0
LA-SV-R60-"xxx" *	Red filter R60	M25.5, M27.0, M30.5
LA-SV-R64-"xxx" *	Red filter R64	M25.5, M27.0, M30.5
LA-SV-G533-"xxx" *	Green filter G533	M25.5, M27.0, M30.5
LA-SV-B440-"xxx" *	Blue filter B440	M25.5, M27.0, M30.5
LA-SV-UV330-"xxx" *	UV transmissible filter 330nm	M25.5, M27.0, M30.5
LA-SV-IR-"xxx" *	IR cut filter	M25.5, M27.0, M30.5
LA-SV-VC700-"xxx" *	Visual wavelength cut filter for IR applications	M25.5, M27.0, M30.5

* Please enter instead of "xxx" wished filter threat (fe. 22.5mm UV-cut filter = SV-GA-225)!

Other types of filters and different thread sizes are also available.

Please ask for specifications!

Contact

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