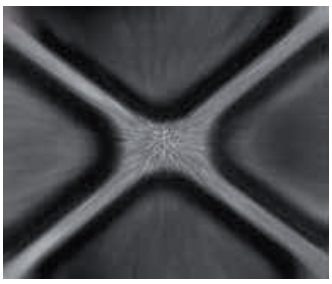
3D Bi-telecentric Lenses with Scheimpflug Adjustment

TCSM Series is a unique family of bi-telecentric lenses for extremely accurate 3D dimensional measurement systems. All TCSM lenses are equipped with a High-precision Scheimpflug adjustment mechanism that suits any type of C-mount camera. Besides achieving very good focus at wide tilt angles, bi-telecentricity also yields incredibly low distortion. Images are linearly compressed only in one direction, thus making 3D-reconstruction very easy and exceptionally accurate. The available magnifications range from 0.5x to 0.1x while the angle of view reaches 30°-45° to meet the measurement needs of triangulation-based techniques. The Scheimpflug mount is pivoted around the detector plane to ensure excellent pointing stability and ease of focus.

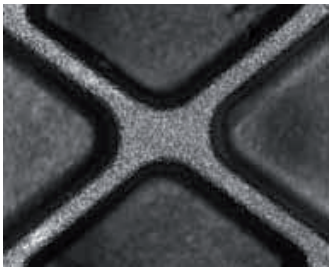
HIGH-END 3D MEASUREMENTS WITH TCSM

TCSM imaging and measuring sloped objects.

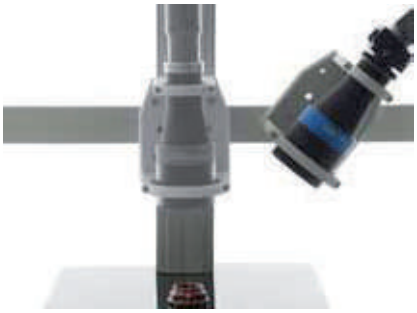


Without tilt adjustment, the object is not homogeneously focused.

Scheimpflug telecentric optics for both projecting and imaging at 90°.



At the Scheimpflug angle, the image becomes homogeneously sharp.



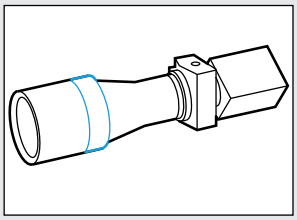
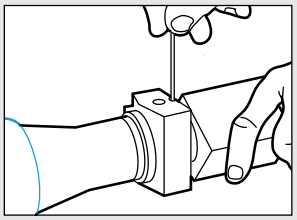
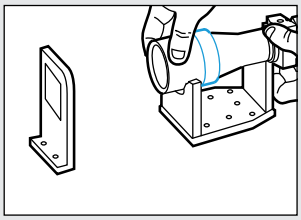
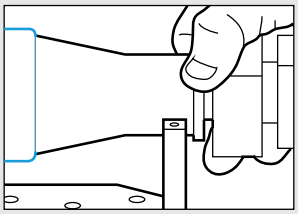
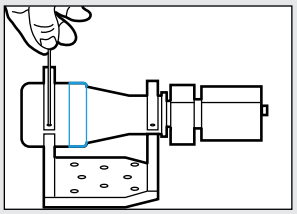
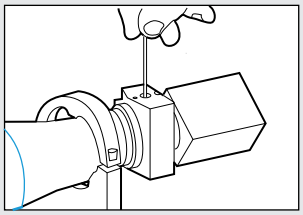
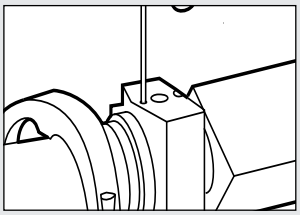
TCSM Series lens for straight telecentric pattern projection.

KEY ADVANTAGES

UNIQUE SCHEIMPFLUG ADJUSTMENT
No other lens can perform oblique measurements.

THE IMAGE IS RADIALLY UNDISTORTED
Linear extension can be perfectly calibrated.

COMPATIBLE WITH ANY C-MOUNT CAMERA
And compliant to the C-mount standard.

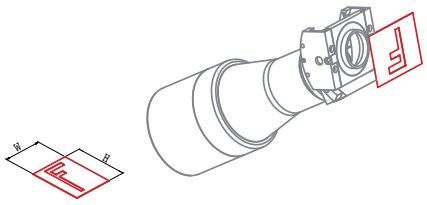








Setting-up the Scheimpflug mount is easy. First, screw the lens into the camera C-mount just like with any common lens. Then loosen the lens C-mount adaptor by unscrewing the set-screws and tune the lens phase to the proper position; tighten the set-screws to look the setting.

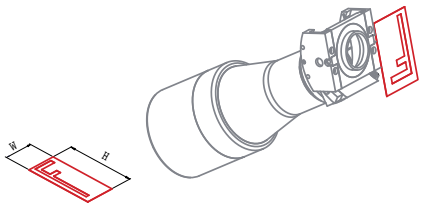
Use the Opto Engineering's CMHO series mounts to clamp the lens. Once the lens is mounted, adjust the focus until the image at the center of the detector is sharp and lock the focus adjustment with the counter-flange.

With the lens mounted and well focused, adjust the tilt control on the side of the Scheimpflug mount by means of a screwdriver. It might be required to perform a second fine focusing of the lens in order to obtain the best configuration. When the tilt angle is set, lock the mount in place by screwing the set-screws.

						LONG DETECTOR SIDE HORIZONTAL						LONG DETECTOR SIDE VERTICAL					
	Object Tilt	Mount Tilt	Working Distance	Horizontal Mag	Vertical Mag	1/3″		1/2″		2/3″		1/3″		1/2″		2/3″	
						4,8 x 3,6	6,4 x 4,8	8,8 x 6,6	3,6 x 4,8	4,8 x 6,4	6,6 x 8,8
	(deg)	(deg)	(mm)	(x)	(x)	(mm x mm)			(mm x mm)		
						FIELD OF VIEW (mm x mm)			FIELD OF VIEW (mm x mm)		
TCSM016	0,0°	0,0°	45,3	0,528	0,528	9,1 x 6,8	12,1 x 9,1	16,7 x 12,5	6,8 x 9,1	9,1 x 12,1	12,5 x 16,7
	10,0°	5,3°		0,528	0,522	9,1 x 6,9	12,1 x 9,2	16,7 x 12,6	6,8 x 9,2	9,1 x 12,3	12,5 x 16,9
	20,0°	10,9°		0,528	0,506	9,1 x 7,1	12,1 x 9,5	16,7 x 13,1	6,8 x 9,5	9,1 x 12,7	12,5 x 17,4
	30,0°	17,0°		0,528	0,478	9,1 x 7,5	12,1 x 10,1	16,7 x 13,8	6,8 x 10,0	9,1 x 13,4	12,5 x 18,4
TCSM024	0,0°	0,0°	69,2	0,350	0,350	13,7 x 10,3	18,3 x 13,7	25,1 x 18,9	10,3 x 13,7	13,7 x 18,3	18,9 x 25,1
	15,0°	5,4°		0,350	0,338	13,7 x 10,6	18,3 x 14,2	25,1 x 19,5	10,3 x 14,2	13,7 x 18,9	18,9 x 26,0
	30,0°	11,4°		0,350	0,308	13,7 x 11,7	18,3 x 15,6	25,1 x 21,4	10,3 x 15,6	13,7 x 20,8	18,9 x 28,5
	45,0°	19,3°		0,350	0,262	13,7 x 13,7	18,3 x 18,3	25,1 x 25,2	10,3 x 18,3	13,7 x 24,4	18,9 x 33,6
TCSM036	0,0°	0,0°	103,5	0,243	0,243	19,7 x 14,8	26,3 x 19,7	36,2 x 27,1	14,8 x 19,7	19,7 x 26,3	27,1 x 36,2
	15,0°	3,7°		0,243	0,235	19,7 x 15,3	26,3 x 20,4	36,2 x 28,1	14,8 x 20,4	19,7 x 27,2	27,1 x 37,4
	30,0°	8,0°		0,243	0,213	19,7 x 17,0	26,3 x 22,6	36,2 x 31,1	14,8 x 22,6	19,7 x 30,1	27,1 x 41,4
	45,0°	13,6°		0,243	0,177	19,7 x 20,4	26,3 x 27,2	36,2 x 37,4	14,8 x 27,1	19,7 x 36,2	27,1 x 49,7
TCSM048	0,0°	0,0°	134,6	0,185	0,185	26,0 x 19,5	34,7 x 26,0	47,7 x 35,7	19,5 x 26,0	26,0 x 34,7	35,7 x 47,7
	15,0°	2,8°		0,185	0,181	26,0 x 20,1	34,7 x 26,8	47,7 x 36,9	19,5 x 26,5	26,0 x 35,3	35,7 x 48,6
	30,0°	6,1°		0,185	0,161	26,0 x 22,4	34,7 x 29,9	47,7 x 41,1	19,5 x 29,8	26,0 x 39,8	35,7 x 54,7
	45,0°	10,5°		0,185	0,133	26,0 x 27,1	34,7 x 36,2	47,7 x 49,8	19,5 x 36,1	26,0 x 48,2	35,7 x 66,2
TCSM056	0,0°	0,0°	159,3	0,157	0,157	30,6 x 22,9	40,8 x 30,6	56,1 x 42,0	22,9 x 30,6	30,6 x 40,8	42,0 x 56,1
	15,0°	2,4°		0,157	0,152	30,6 x 23,7	40,8 x 31,7	56,1 x 43,5	22,9 x 31,6	30,6 x 42,2	42,0 x 58,0
	30,0°	5,1°		0,157	0,136	30,6 x 26,4	40,8 x 35,2	56,1 x 48,4	22,9 x 35,2	30,6 x 46,9	42,0 x 64,5
	45,0°	8,8°		0,157	0,112	30,6 x 32,1	40,8 x 42,8	56,1 x 58,8	22,9 x 42,8	30,6 x 57,0	42,0 x 78,4
TCSM064	0,0°	0,0°	182,0	0,137	0,137	34,9 x 26,2	46,6 x 34,9	64,0 x 48,0	26,2 x 34,9	34,9 x 46,6	48,0 x 64,0
	15,0°	2,1°		0,137	0,133	34,9 x 27,1	46,6 x 36,2	64,0 x 49,8	26,2 x 36,1	34,9 x 48,2	48,0 x 66,3
	30,0°	4,5°		0,137	0,119	34,9 x 30,2	46,6 x 40,3	64,0 x 55,4	26,2 x 40,2	34,9 x 53,6	48,0 x 73,7
	45,0°	7,8°		0,137	0,098	34,9 x 36,8	46,6 x 49,0	64,0 x 67,4	26,2 x 49,0	34,9 x 65,3	48,0 x 89,8
TCSM080	0,0°	0,0°	227,0	0,110	0,110	43,6 x 32,7	58,2 x 43,6	80,0 x 60,0	32,7 x 43,6	43,6 x 58,2	60,0 x 80,0
	15,0°	1,7°		0,110	0,107	43,6 x 33,8	58,2 x 45,0	80,0 x 61,9	32,7 x 45,0	43,6 x 60,0	60,0 x 82,5
	30,0°	3,6°		0,110	0,096	43,6 x 37,6	58,2 x 50,2	80,0 x 69,0	32,7 x 50,2	43,6 x 67,0	60,0 x 92,1
	45,0°	6,3°		0,110	0,078	43,6 x 45,9	58,2 x 61,2	80,0 x 84,2	32,7 x 61,2	43,6 x 81,7	60,0 x 112,3
TCSM096	0,0°	0,0°	279,0	0,093	0,093	51,4 x 38,5	68,5 x 51,4	94,2 x 70,7	38,5 x 51,4	51,4 x 68,5	70,7 x 94,2
	15,0°	1,4°		0,093	0,090	51,4 x 39,9	68,5 x 53,2	94,2 x 73,1	38,5 x 53,2	51,4 x 70,9	70,7 x 97,5
	30,0°	3,1°		0,093	0,081	51,4 x 44,4	68,5 x 59,2	94,2 x 81,5	38,5 x 59,2	51,4 x 79,0	70,7 x 108,6
	45,0°	5,3°		0,093	0,066	51,4 x 54,4	68,5 x 72,5	94,2 x 99,7	38,5 x 72,4	51,4 x 96,6	70,7 x 132,8



Field of View with detector's long side set horizontal.



Field of View with detector's long side set vertical.