

DOUBLE MAGNIFICATION BI-TELECENTRIC LENSES

TCDP Series are double port bi-telecentric lenses supporting two different cameras to measure objects with different magnification factors. 2X and 4X options are available for imaging one half or one fourth of the full FOV: this can be simply accomplished by switching from one camera to the other with your software application. Since this technique doesn't require any moving mechanism, the magnification repeatability is totally assured, thus providing exceptional measurement accuracy with no need of re-calibrating after zooming. TCDP Series are suitable for any camera up to 2/3" format, they can be mounted on CMHO clamping mechanics and fit Collimated Illuminators and Ring light designed for standard TC Series.

TCDP



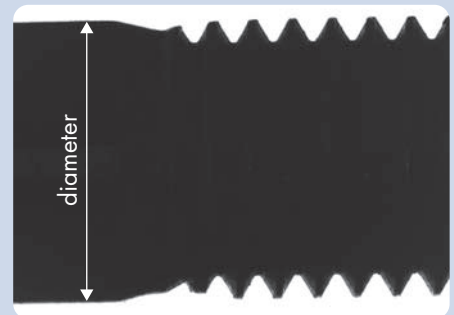
A TCDP2X096 coupled with an LTCL96 collimator and an LTRN96 ringlight



A TCDP4X144 imaging a screw with two different cameras



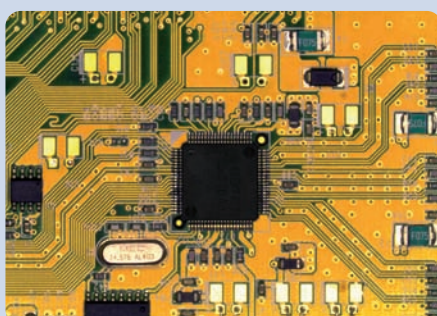
Full FOV image with lens' lower magnification



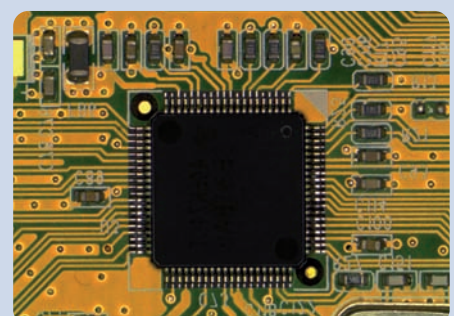
4X magnified image of the object central part



A TCDP2X096 imaging an electronic board with two different cameras



Full FOV image with lens' lower magnification



2X magnified image of the object central part

Key Advantages

- 1 Double FOV and magnification**, for tuning accuracy with flexibility
- 2 No need of re-calibrating**, since the two magnifications are fixed
- 3 No change in image centering** when switching to another FOV

TCDP SERIES



TCDP

Focusing and adjusting the phase of the two cameras is rather simple. First of all, place a reference object at the nominal lens' working distance. Add or subtract spacers to the C-mount until best focus is achieved, then rotate the camera phase by untightening the C-mount set screws.

Once the right phase is found, tighten the set screws and lock the camera phase.

Do the same for the secondary port: find the right number of spacers for achieving the best image resolution and rotate the camera mount to obtain the best angular alignment of the image.

part number	magn. (X)	detector type										optical specifications					dimensions										
		1/4"		1/3"		1/2"		1/1.8"		2/3"		w.d.	F/N	telecentricity	dist.	field depth	CF@	mount	length	diameter	weight						
		w	x	h	w	x	h	w	x	h	w	x	h	w	x	h	(mm)	(mm)	(deg)	(%)	(mm)	70 lp/mm %	(mm)	(mm)	(g)		
		3,6	x	2,7	4,8	x	3,6	6,4	x	4,8	7,13	x	5,37	8,8	x	6,6											
		(mm)		(mm)	(mm)		(mm)	(mm)		(mm)	(mm)		(mm)	(mm)		(mm)											
		object field of view (mm x mm)																									
TCDP 2X 096	0,093	38,5	x	28,9	51,4	x	38,5	68,5	x	51,4	76,3	x	57,5	94,2	x	70,7	279,6	8	<0,1	<0,08	77	>30	C	337,0	143	3200	
	0,186	19,3	x	14,5	25,7	x	19,3	34,3	x	25,7	38,2	x	28,8	47,1	x	35,4	...	12	<0,08	<0,05	29	>40	...	...	(175)	...
TCDP 4X 096	0,093	38,5	x	28,9	51,4	x	38,5	68,5	x	51,4	76,3	x	57,5	94,2	x	70,7	279,6	8	<0,1	<0,08	77	>30	C	337,0	143	3400	
	0,372	9,6	x	7,2	12,9	x	9,6	17,1	x	12,9	19,1	x	14,4	23,6	x	17,7	...	12	<0,08	<0,07	7	>40	...	...	(264)	...
TCDP 2X 120	0,072	50,3	x	37,7	67,0	x	50,3	89,4	x	67,0	99,5	x	75,0	122,9	x	92,2	336,5	8	<0,1	<0,1	131	>30	C	423,0	180	6000	
	0,144	25,2	x	18,9	33,5	x	25,2	44,7	x	33,5	49,8	x	37,5	61,5	x	46,1	...	12	<0,08	<0,05	49	>35	...	...	(194)	...
TCDP 4X 120	0,072	50,3	x	37,7	67,0	x	50,3	89,4	x	67,0	99,5	x	75,0	122,9	x	92,2	336,5	8	<0,1	<0,1	131	>30	C	423,0	180	6200	
	0,288	12,6	x	9,4	16,8	x	12,6	22,4	x	16,8	24,9	x	18,8	30,7	x	23,1	...	12	<0,08	<0,05	12	>35	...	...	(282)	...
TCDP 2X 144	0,061	58,9	x	44,2	78,6	x	58,9	104,8	x	78,6	116,7	x	87,9	144,0	x	108,0	398	8	<0,1	<0,05	180	>30	C	483,0	200	7300	
	0,122	29,5	x	22,1	39,3	x	29,5	52,4	x	39,3	58,4	x	44,0	72,0	x	54,0	...	12	<0,08	<0,04	68	>35	...	...	(204)	...
TCDP 4X 144	0,061	58,9	x	44,2	78,6	x	58,9	104,8	x	78,6	116,7	x	87,9	144,0	x	108,0	398	8	<0,1	<0,05	180	>30	C	483,0	200	7500	
	0,244	14,7	x	11,1	19,7	x	14,7	26,2	x	19,7	29,2	x	22,0	36,0	x	27,0	...	12	<0,08	<0,05	17	>35	...	...	(292)	...
TCDP 2X 192	0,046	78,7	x	59,0	104,9	x	78,7	139,8	x	104,9	155,7	x	117,3	192,3	x	144,2	531	8	<0,1	<0,07	320	>30	C	623,0	260	12000	
	0,092	39,4	x	29,5	52,5	x	39,4	69,9	x	52,5	77,9	x	58,7	96,2	x	72,1	...	12	<0,08	<0,03	120	>35	...	...	...	...
TCDP 4X 192	0,046	78,7	x	59,0	104,9	x	78,7	139,8	x	104,9	155,7	x	117,3	192,3	x	144,2	531	8	<0,1	<0,07	320	>30	C	623,0	260	12200	
	0,184	19,7	x	14,8	26,2	x	19,7	35,0	x	26,2	38,9	x	29,3	48,1	x	36,1	...	12	<0,08	<0,05	30	>35	...	...	...	...
TCDP 2X 240	0,037	98,1	x	73,6	130,8	x	98,1	174,4	x	130,8	194,3	x	146,3	239,8	x	179,9	500	8	<0,1	<0,06	498	>30	C	776,0	322	19200	
	0,074	49,1	x	36,8	65,4	x	49,1	87,2	x	65,4	97,2	x	73,2	119,9	x	90,0	...	12	<0,08	<0,15	187	>45	...	...	...	...
TCDP 4X 240	0,037	98,1	x	73,6	130,8	x	98,1	174,4	x	130,8	194,3	x	146,3	239,8	x	179,9	500	8	<0,1	<0,06	498	>30	C	776,0	322	19400	
	0,148	24,5	x	18,4	32,7	x	24,5	43,6	x	32,7	48,6	x	36,6	60,0	x	45,0	...	12	<0,08	<0,08	47	>45	...	...	...	...

1 Working Distance: distance between the front lens and the object. Set this distance within +/- 3% of the nominal value for maximum resolution and minimum distortion

2 Working F-number: the real F-number of a lens when used as a macro. Lenses with smaller apertures can be supplied on request

3 Maximum slope of principal rays inside the lens: when converted to millirad, it gives the maximum measurement error for any millimeter of object displacement

4 At the borders of the field depth the image can be still used for measurement but, to get a very sharp image, only half of the nominal field depth should be considered