

## MULTI MAG OPTICS

## TCZR SERIES

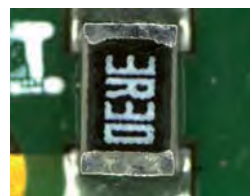
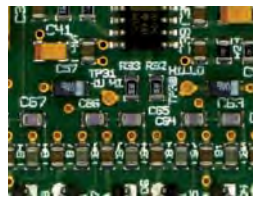
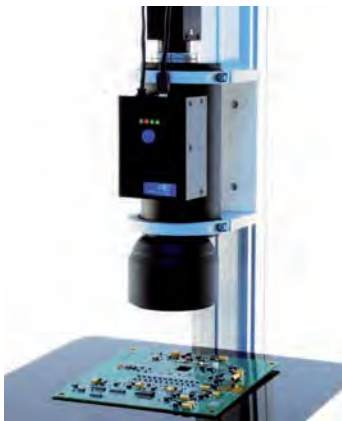
**TCZR Series** is a leading edge optical solution for imaging and measurement applications requiring both the flexibility of zoom lenses and the accuracy of fixed optics.

By means of a very accurate mechanism, these lenses ensure unequalled magnification, focusing and image center stability when switching from a magnification to another, thus avoiding recalibration at any given time.

4 different magnifications, featuring a total range of 8x, can be selected either by means of the onboard control keyboard or via computer through a specific remote control software.

Bi-telecentricity, high resolution and low distortion make these zooms able to perform the same measurement tasks as a fixed magnification telecentric lens.

# 8X Bi-telecentric Zoom lenses with motorized control



Electronic board images taken with TCZR036 at 4 different magnifications



Hard disk arm images taken with TCZR072 at 4 different magnifications



TCZR Series can be coupled with LTCL and LTRN illuminator series

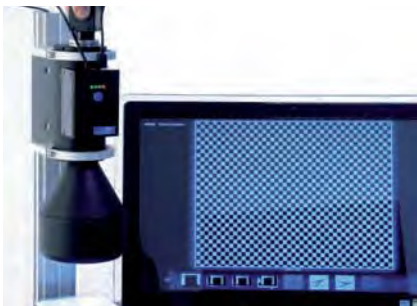
## KEY ADVANTAGES

- 1 **Perfect Magnification contancy:** no need of re-calibration, after zooming
- 2 **Perfect Parfocality:** no need of refocusing when changing magnification
- 3 **Bi-telecentricity:** very accurate measurement is possible
- 4 **Image Center Stability:** each magnification maintains its FOV center
- 5 **Full Motorization control:** zoom magnification is set either manually or via software



## TCZR SERIES

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Follow the pictures to get TCZR optics properly focused.

First of all, set the lens exactly at its nominal working distance, as listed on the specs sheet.

Switch on the 24 V power supply and wait until the system has been re-set. Select the maximum lens magnification ( i.e. 2x for TCZR072 and 4x for TCZR036).

Mount the camera and, while observing a resolution pattern, rotate it until you obtain the best image resolution.

Measure the gap between the camera interface and the lens C-mount and insert the most appropriate number of spacers.

With the camera assembled, adjust the image phase by unscrewing the C-mount set-screws; once you find the right phase, lock the screws.

You are now ready to switch the lens to any available magnification: just touch the button and follow the LED colour code indicating the target zoom position.

part number	magn. (x)	detector type					optical specifications					dimensions														
		1/4"		1/3"		1/2"		1/1.8" ①		2/3"		w.d. (mm)	F/N ②	telecentricity (deg) ④	dist. (%)	field depth (mm) ⑤	CF @ 50 lp/mm %	mount	length (mm)	diameter (mm)						
		w	x	h	w	x	h	w	x	h	w										x	h	w	x	h	
		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)										
<b>object field of view (mm x mm)</b>																										
TCZR 036	0,250	14,4	x	10,8	19,2	x	14,4	25,6	x	19,2	28,5	x	21,5	35,2	x	26,4	60,0	12	<0,05	<0,05	11,0	>40	C	218,0	79	
	0,500	7,2	x	5,4	9,6	x	7,2	12,8	x	9,6	14,3	x	10,7	17,6	x	13,2	...	...	...	<0,04	2,8	>35	...	...	...	
	1,000	3,6	x	2,7	4,8	x	3,6	6,4	x	4,8	7,1	x	5,4	8,8	x	6,6	...	...	...	<0,04	0,7	>40	...	...	...	
	2,000	1,8	x	1,4	2,4	x	1,8	3,2	x	2,4	3,6	x	2,7	4,4	x	3,3	...	...	...	<0,08	0,2	>35	...	...	...	
TCZR 072	0,125	28,8	x	21,6	38,4	x	28,8	51,2	x	38,4	57,0	x	43,0	70,4	x	52,8	153,5	12	<0,05	<0,1	45,0	>35	C	284,0	116	
	0,250	14,4	x	10,8	19,2	x	14,4	25,6	x	19,2	28,5	x	21,5	35,2	x	26,4	...	...	...	<0,08	11,0	>40	...	...	...	
	0,500	7,2	x	5,4	9,6	x	7,2	12,8	x	9,6	14,3	x	10,7	17,6	x	13,2	...	...	...	<0,05	2,8	>40	...	...	...	
	1,000	3,6	x	2,7	4,8	x	3,6	6,4	x	4,8	7,1	x	5,4	8,8	x	6,6	...	...	...	<0,07	0,7	>35	...	...	...	

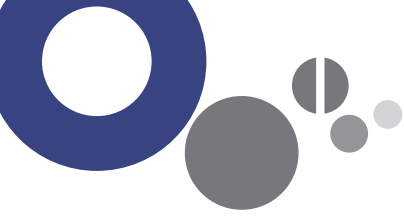
① The 1/1.8" (9 mm diagonal) FOV for TC 12 XX lenses can show some vignetting at the image corners, as the lens is optimized for 1/2" detector (8 mm diagonal)

② 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

③ Working F-number: the real F-number of a lens when used as a macro. Lenses with smaller apertures can be supplied on request

④ Maximum slope of principal rays inside the lens: when converted to millirad, it gives the maximum measurement error for any millimeter of object displacement

⑤ 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



**MULTI MAG OPTICS**

**TCDP SERIES**

**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.

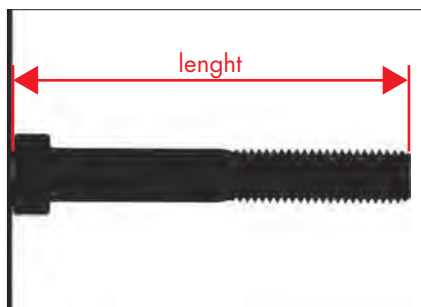
Since this technique doesn't require any moving mechanism, the magnification repeatability is totally assured, thus providing exceptional measurement accuracy with no need of re-calibrating after zooming.

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.

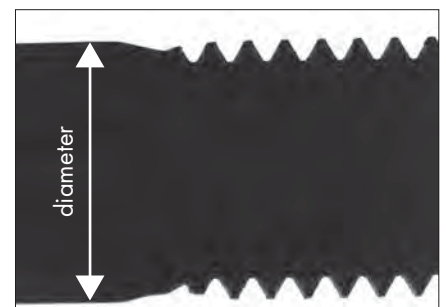
# Double Magnification Bi-telecentric Lenses



A TCDP4X144 imaging a screw with two different cameras



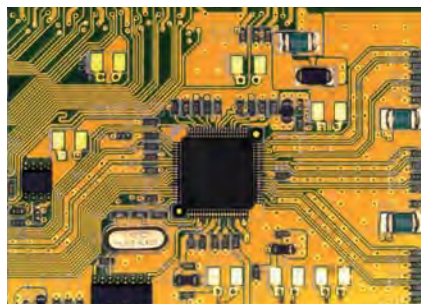
Full FOV image with lens' lower magnification



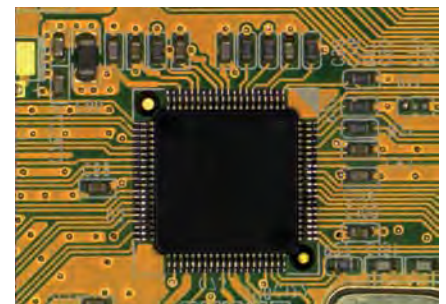
4X magnified image of the object central part



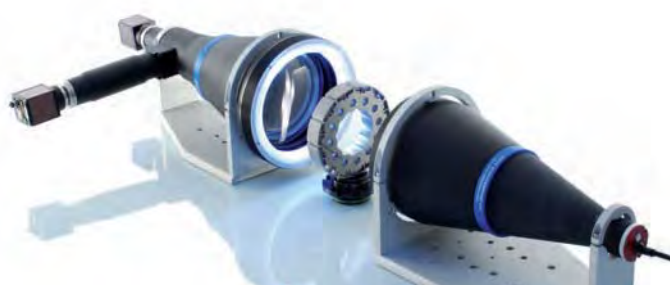
A TCDP2X096 imaging an electronic board with two different cameras



Full FOV image with lens' lower magnification



2X magnified image of the object central part



A TCDP2X096 coupled with an LTCL96 collimator and an LTRN96 ringlight

## 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

