

PCHI series

Hole inspection optics for 360° inside view in perfect focus



KEY ADVANTAGES

Perfect focusing of holed objects

Both the walls and the bottom of cavities are imaged in high resolution.

Inside inspection from the outside

No need to put an optical probe into the hole.

Very high field depth

Objects featuring different shapes and dimensions can be imaged by the same lens.

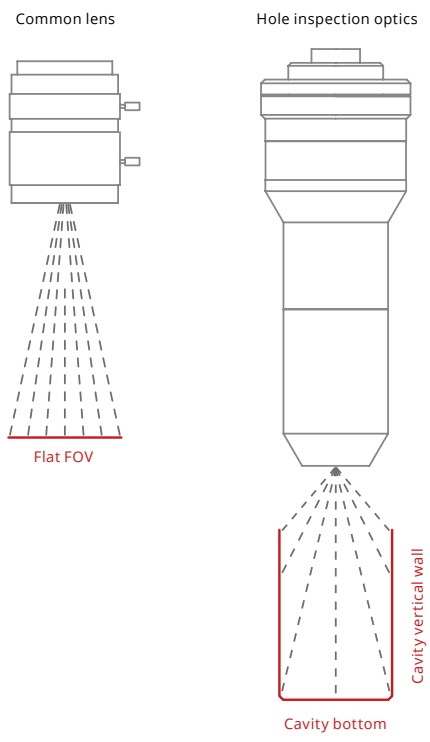
Wide view angle

Sample surfaces are acquired by the lens under a convenient perspective to clearly display their features.

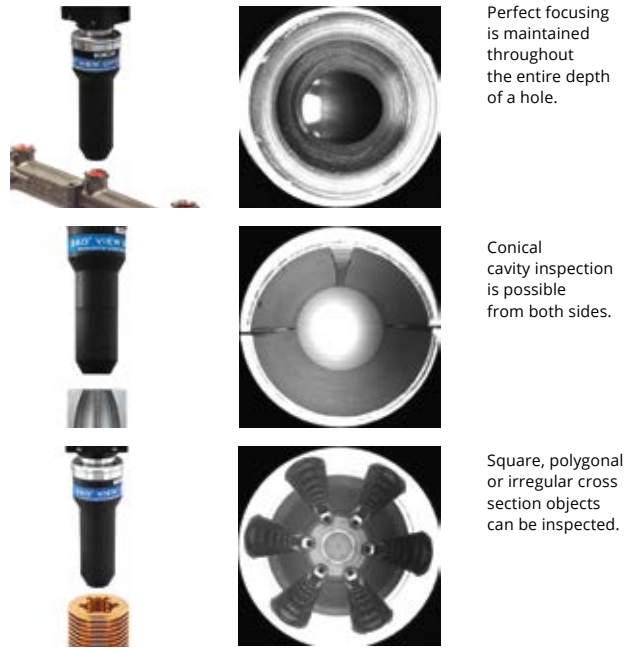
PCHI optics have been developed by Opto Engineering® to easily inspect holes, cavities and containers. Unlike common optics or so called "pinhole lenses" which can only image flat fields of view, hole inspection optics are specifically designed to image both the bottom of a hole and its vertical walls.

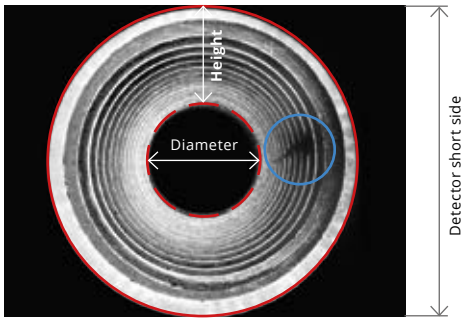
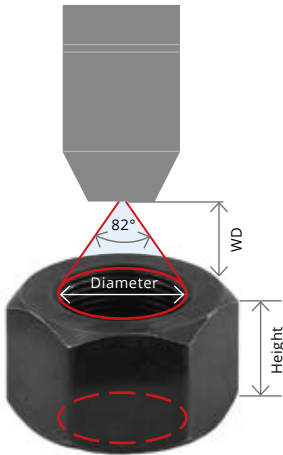
Thanks to the large view angle (>82°) and innovative optical design, these lenses are compatible with a wide range of object diameters and thicknesses. Hole inspection optics are the perfect solution to inspect a variety of different object shapes such as cylinders, cones, holes, bottles or threaded objects.

FULL RANGE OF COMPATIBLE ILLUMINATORS		
	LTLAB2-x	p. 120
	LTRN 075 W45	p. 124
FULL RANGE OF COMPATIBLE STROBE CONTROLLERS		
	LTDV series	p. 222



Sample images taken with PCHI optics





$$r (\%) = \frac{\text{Side view height (px)}}{\text{Detector short side (px)}} * 100$$



Unwrapped image.

Part number		PCHI 013	PCHI 012	PCHI 023
Detector type		1/3"	1/2"	2/3"
Image circle	Ø (mm)	3.6	4.8	6.6
Field of view 1	(diam x height)			
Min	(mm x mm)	10 x 10	10 x 10	10 x 10
Max	(mm x mm)	120 x 190	120 x 190	120 x 190
Optical specifications				
Wavelength range	(nm)	450 .. 650	450 .. 650	450 .. 650
Working distance	(mm)	5 .. 62	5 .. 62	5 .. 35
CTF @ 50 lp/mm	(%)	> 40	> 40	> 30
wF/# 2		4.7	5.8	8.3
Mechanical specifications				
Diameter	(mm)	28.0	28.0	28.0
Length	(mm)	102.0	104.0	108.5
Weight	(g)	250	250	250
Mount		C	C	C

- 1 Cameras with CS- to C-mount adapters, filters or protective windows in front of the sensor or other mechanical constraints in the C-mount can limit the focus range of PCHI0xx lenses. Contact us to check compatibility with your specific camera.
- 2 Working F-number (wF/#): the real F-number of a lens when used as a macro.

Field of view selection chart

PCHI 013, PCHI 012 and PCHI 023 field of view

Hole diameter (mm)	High res. imaging		Normal res. imaging		WD (mm)
	Cavity height (mm)	r (%)	Cavity height (mm)	r (%)	
10	6	23.5	10	28	5
15	8.5	22.5	14.5	29	6.5
20	13	26.5	22	32.5	9
25	18	26	31	33	11
30	22	26	37	32	14
40	31	26.5	53	32	18
50	40	27	68	32	23
60	50	28.5	85	32.5	29
70	60	28	102	33	35
80	75	29.5	120	34	41
100	97	30	155	34.5	52
120	120	31	190	35	62

PCHI optics can image cavities whose diameters and thicknesses span over a wide range of values.

For a given hole diameter, the table on the left lists the maximum cavity height allowed for both high resolution imaging (small pixel sizes) and normal resolution imaging (>5 micron pixels) applications; the "r" ratio indicates how much of the detector area gets covered by the image of the hole inner walls.

The listed working distance values ensure that the object image is exactly inscribed into the short side of the detector, thus maximizing "r" ratio and image resolution.