PCBP series

Boroscopic probes for panoramic cavity imaging and measurement from inside

KEY ADVANTAGES

Inspection of cavities from inside
Hidden internal features and defects are clearly viewed.

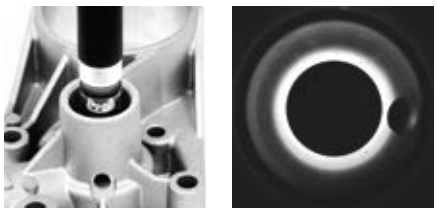
High resolution
The catadioptric design enables the detection of tiny defects over a very wide view angle.

Flaw detection
Coarse deformations revealed using direct illumination.

Surface defect enhancement
Mixing direct and indirect illumination makes it possible to emphasize tiny and scarcely visible defects.

PCBP probes are used to inspect holed objects such as engine parts, containers and tubes whose hidden features can only be controlled by introducing a probe into the cavity.
The catadioptric (refracting + reflecting) optical design ensures much higher resolution than fiber-based probes and enables the complete 360° inner view of the entire cavity. Boroscopic probes are intended to be handled by a robot arm or S.C.A.R.A. in order to scan even the deepest cavities. Built-in illumination keeps the device very compact and makes it suitable for simple 3D applications by means of panoramic triangulation techniques.

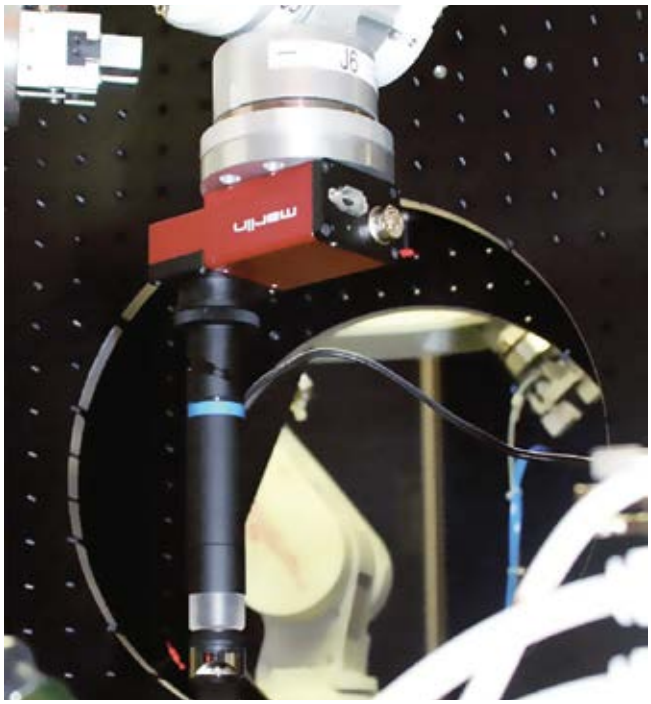
Sample images taken with a PCBP optics



Inspection of holed parts of an engine.

Tube scanning for integrity inspection.

Defect and impurities detection inside containers.



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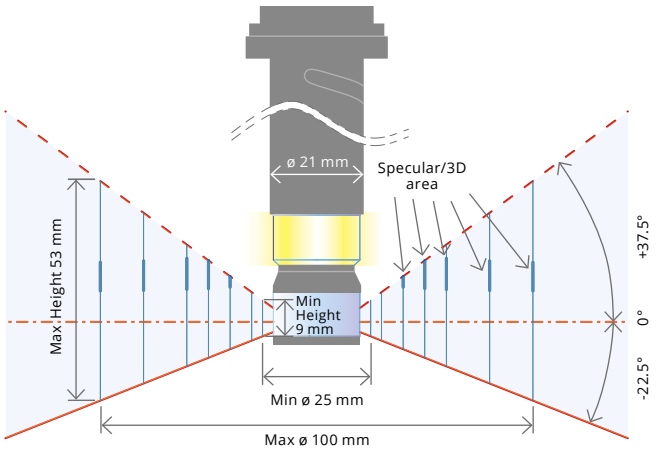

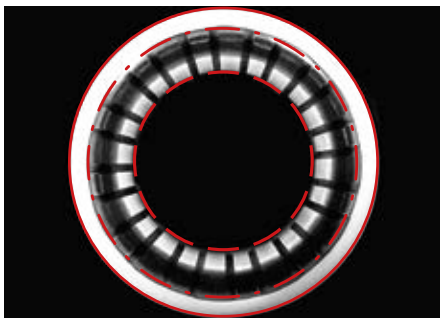

Unwrapped image.

PCBP probes can image cavities whose diameter ranges from 25 mm to 100 mm and over: the table below shows the inspection range allowed.

Inspection area

Diameter (mm)	Height (mm)
25	9
30	12
40	18
50	23
60	29
80	41
100	53

An integrated LED source illuminates the cavity both diffusely and directly (specular illumination). The diagram on the left shows the different illumination areas. Diffused illumination is used for defect detection and component inspection.

Direct/specular illumination can be efficiently used to check for surface deformation on metal and highly reflective objects as well as to measure the hole diameter.

The image of the cavity covers around 50% of the detector height; the continuous red line indicates the bottom view of the cavity (-22.5°), the dashed line shows the upper view (+37.5°) while the dash-dotted line refers to the lateral view (0°).

Part number		PCBP 013	PCBP 012
Detector type		**1/3"**	**1/2"**
Image circle	Ø (mm)	3.6	4.8
Field of view	**(diam x height)**		
Min	(mm x mm)	25 x 9	25 x 9
Max	(mm x mm)	100 x 53	100 x 53
Optical specifications			
Wavelength range	(nm)	450 .. 650	450 .. 650
Viewing angle	(deg)	60	60
CTF @ 50 lp/mm	(%)	> 25	> 20
F/#		14	16
Mechanical specifications			
Diameter	(mm)	21	21
Length	(mm)	167	137
Weight	(g)	113	92
Mount		C	C
Electrical specifications			
LED Voltage	(V)	16 .. 24	16 .. 24
LED Power	(W)	< 2.0	< 2.0

The LED illumination device is integrated into the unit. The optical tip of the probe **PCBPTIP** can be easily replaced in case of damage.

The best focus is achieved by means of a lockable focusing mechanism. Power supply cables exit the device nearby the C-mount.