

Particle Imaging and Classification

Overview:

Our Continuous Particle Imaging and Classification Sensor (CPICS) provides unprecedented *in situ* aquatic microscopy of seawater, freshwater and laboratory samples. Using darkfield illumination, the CPICS-1000-0.9x captures high-resolution color images, showing features as small as 0.04 mm and as large as 12 mm while the CPICS-1000-0.268x resolves 0.1 to 50 mm. Research has shown that color information is key to high-accuracy automated classification while also providing important physiological information such as pigmentation due to grazing on phytoplankton. Because of its open-flow approach to water sampling, delicate structures of plankton and particles remain completely intact as do predator-prey interactions.

Applications:

The CPICS-1000-0.9x is the ideal choice for imaging particles and plankton in a stand-alone package that may be deployed on a CTD rosette, stationary observatory, or autonomous vehicle. The CPICS-1000-0.9x or 0.268x configuration provides embedded Region of Interest (ROI) extraction, and optional ROI classification while cabled to shore to an external DICE. Additional environmental sensors can be interfaced with CPICS-1000 for a complete stand-alone package.

Combined with other sensors in our OceanCube® multi-instrument observatory, and using our DICE® analysis hardware/software with state-of-the-art classifiers such as Convolutional Deep Neural Networks (CDNN), the CPICS-1000 can provide scientists with quicker and greater insight into the aquatic environment. This can be used to investigate distributions of plankton species and marine snow particles as a function of time, temperature, or other observational data.

Whether for scientific research, aquaculture, or municipal drinking water health and safety, the CPICS-1000 is the tool that can help get results quickly and accurately.

Specifications:

Illumination	
Source:	High output LED ring array
Duration:	50 µs
Pressure Rating	
CPICS-1000-0.9x	1000 m
CPICS-1000-0.268x	
Camera system	
Color resolution:	24-bit
Image resolution:	12.3 Megapixels (4096 x 3000)
Frame rate:	1 to 12 fps
Target acquisition and storage (software included)	
Camera control:	Exposure, gain, gamma, RGB intensity, frame rate
Target extraction:	Focus and size thresholds
Embedded processor:	NVIDIA Jetson TX2
Image analysis (requires DICE)	
Classification:	Taxon level (e.g. copepod) on DICE
Hardware/Software	DICE Jetson TX2 processor with AI Software
Data communication	
Medium:	Ethernet or RS232 (for additional sensors)
Power	
DC input:	12 V cabled or battery
Power:	12 watts
Battery Life	Std. battery: 6 - 8h (19.2 Ah)
Connector on housing:	SubConn DBH13M
Dimensions	
Length x Diameter:	74 cm x 12 cm
Weight	
In air:	5.4 kg
In water:	4.3 kg



Magnification	NA	WD	Image Height (mm)	Image Width (mm)	Depth of Field (mm)	Liquid Sample			
						Volume	Rate (fps)	Hourly Volume	Daily Volume
0.9x	0.045	175	11	15	2	330 µL	10	11.8 L/h	285 L/d
0.268x	0.012	110	35.8	47.8	16	27 mL	10	972 L/h	23.3 m ³ /d

Product specifications subject to change without notice.

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