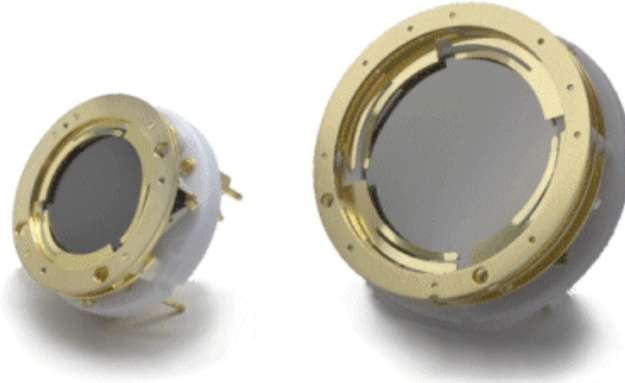



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System Manual

3300 SERIES MCP/RAE SENSOR HEADS



The 3300 Series are Open-face, MicroChannel Plate-based (MCP), Resistive Anode Encoder (RAE) position sensitive detector heads for charged-particles and energetic photons detection, including electrons, positrons, ions, energetic neutrals, EUV and soft x-rays, on standard or coated (e.g. CsI, KBr) MCP surface, operated in vacuum (fully UHV-compatible). The position sensitive MCP/RAE detector heads are fabricated using precision alumina ceramic and gold-plated stainless steel for maximum UHV compatibility vacuum pressures; better than 10^{-6} are typically required for operation of these detectors).

In operation, single incoming events (particles or photons) impact the MCP detector surface and result in an electron cascade, with the multiplication gain factor dependent on the number and type of MCP's, the bias voltage and the MCP configuration. With proper biasing, the MCP's operate in a gain-saturated mode to help ensure a relatively constant gain from event-to-event in order to optimize the position sensitivity and spatial resolution of these MCP imaging detectors.

The resulting charge packet from the MCP stage is electrostatically focused on the charge-division anode. The charge packet disperses linearly to the four corners of this resistive anoded encoder and the four pulse signals are processed by separate charge-sensitive preamplifiers, shaper amplifiers and discriminators. The X and Y spatial coordinates of each detected event, corresponding to a single incoming particle or photon, are then computed from the ratio of charge pulse amplitudes.

Sensor heads are offered in circular active areas of 25 mm, 40 mm and 75 mm diameter, and also a 74 x 93mm rectangular active area. Standard and high spatial-resolution versions are available. Standard resolution versions achieve 100 resolution elements (1/100 of active dimension) across each axis. High-resolution versions achieve 400 resolution elements (1/400 of active dimension).

These versions differ primarily in the number of MCP stages and the corresponding electron gain. In these systems, FWHM spatial resolution (position blur or point-spread distribution for the reported position of a statistically large number of events) is the result of event-to-event position jitter caused by slight variations in the computed spatial position of successively imaged events. For fixed noise, higher MCP gain reduces the effect of this position jitter, improving fractional position resolution.

Spatial position linearity is typically within 5% of true position (of sensor active dimension, fixed pattern). Background count rate are typically less than 10 events per second integrated over the entire image area. Bias voltage requirements for the microchannel plates and position sensitive RAE encoder must be provided by external 2-3 kV (3-4 kV for high resolution versions) power supply and resistive biasing network.

Open-Face Sensor Heads, 3300 Series

Selection Guide

Model	Active Area	# of	Spatial Resolution	Spatial Resoluton	Overall sensor
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	Diameter	MCPs	(resolvable elements)	(approximate mm)	diameter
3390	25mm	2	100	0.25 mm	2.0 inch (50.8 mm)
3391-010	25mm	3	400	0.063 mm	2.0 inch (50.8 mm)
3394	40mm	2	100	0.40 mm	2.9 inch (73.7 mm)
3395-010	40mm	3	400	0.10mm	2.9 inch (73.7 mm)
3392	75mm	2	100	0.75 mm	5.5 inch (139.7 mm)
3398	80x100mm	2 or 3	100	0.79 mm	5.8 inch (147.4 mm)

Options, 3300 Series

Electrically Isolated Front Rings (option 001/SE)

Electrically isolated ring options provide an additional metal ring approximately 0.125 inches (3.1 mm) in front of the standard front ring of the sensor which is at the electrical potential of the first MCP input surface. This added ring may be used for either mounting the sensor (to an aperture plate, for example, that may be at a different electrical potential than the first MCP input surface) or used for mounting an accelerating or retarding grid or other device in front of the sensor.

Coated MCP Options

CsI, KBr or similar coatings can be applied to input MCP surface to enhance detection efficiency for soft x-ray and vacuum uv applications. Coating and thickness can range from approximately 3000 Å to 18000 Å.

Options	
Model	Description
Option 001/SE	Add electrically isolated front ring
Option CsI	CsI or KBr coating applied to input MCP surface

HV Power Supplies, Bias Voltage Dividers, Vacuum Flanges and Cable Sets are also available.

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 Quantar Technology Incorporated - 2620A Mission Street, Santa Cruz, CA 95060-5703
 Tel/FAX: 831-429-5227 · www.quantar.com