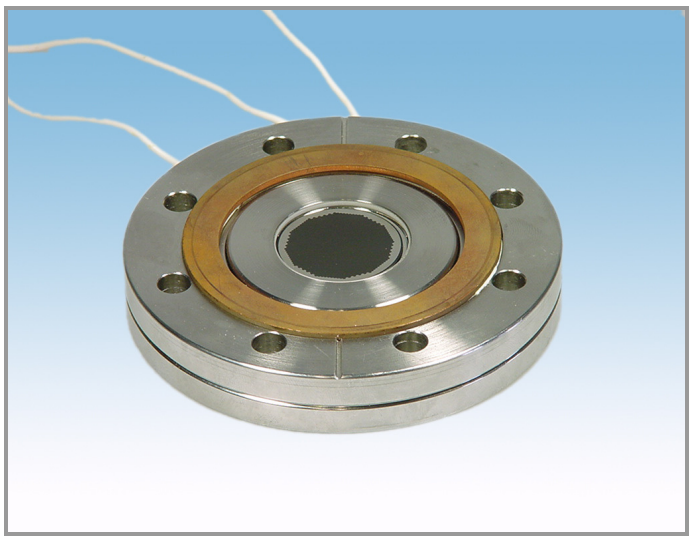
MCP Detector Systems



Vacuum Imaging and Counting System

Applications

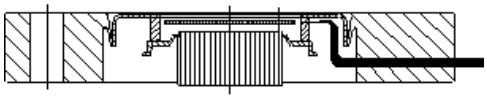
- Mass Spectrometer
- Electron detection
- X-Ray Detection
- UV Detection
- Heavy Ion detection
- Time of flight measurements
- Beam monitoring and adjustment

Features

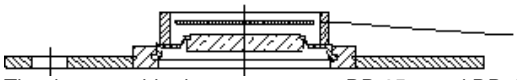
- Single and double MCP versions
- Screens with P43, P46 and P47 (other scintillators on request)
- Taper coupling to CCD possible
- Fiber optic- or glass output window
- Version with metal anode available
- Magnetic free MCP detectors development

Open MCP Detectors

As manufacturer of 25 mm and 40 mm proximity focused MCP image intensifiers, ProxiVision also offers a broad variety of open detector systems. When using these systems, a two-dimensional image of electrons, ionized particles, X-rays and UV-radiation is possible. Open MCP detector systems are specially suitable for the energy range from 10 eV ... 1000 eV (approx. 120 nm ... 1 nm). In addition to a large number of special designs according to the needs of our customers, 2 standard types exist for 25 mm and 40 mm microchannel plates.



The open detector systems OD 25... and OD 40... with precisely closed up CF-flanges that can be used as a vacuum window. The electrical connections are led to the atmospheric side.



The demountable detector systems DD 25... and DD 40... that can be used within a high vacuum container. The supports of the luminous screen and the MCP are designed in such a manner that all components can be individually assembled and dismounted

Each standard type is available with 1 or 2 microchannel plates. Clear glass or fiber optic plates are used as a substrate for the screen that can be covered with P43, P46 or P47 phosphor alternatively (other phosphor types on request). At the vacuum side, only mounting components made of glass, metal or ceramics are used. The maximum heating temperature of the OD types is limited to 100°C because of the isolation material while the DD types can be even used in UHV applications with bake temperatures up to 350°C.

A transparent and highly conductive ITO layer also known as NESA coating is applied onto the screen substrate in order to avoid electrostatic charges.

Special Types

- Taper coupling of the OD types onto a CCD or a row of diodes.
- Aluminum reflection layer on top of the phosphor screen.
- Magnetic free MCP detectors development possible
- Metallized anode availabe.

Nomenclature

MCP Detector with precisely closed up CF-flange		OD				
Demountable **MCP Detector**		DD				
Useful Diameter	25 mm		25			
	40 mm		40			
Output Window	clear glass			61		
	fiber optic			62		
	metal anode			60		
Phosphor Screens	P 43				Z	
	P 46				X	
	P 47				Y	
Special Types	double MCP					-V
	high resolution MCP´s					-HR

Example:
OD 2562 Z-V-HR

OD 25	Open MCP detector system with 25 mm useful diameter
62	Fiber optic output window
Z	P 43 phosphor screen
-V-HR	Double MCP in V-stack-assembly with high resolution MCP´s

Efficiency

	Energy / Wavelength	Efficiency
Electrons	100 eV ... 500 eV 500 eV ... 4 keV 4 keV ... 100 keV	10 % ... 50 % 50 % ... 75 % ... 50 % 50 % ... 10 %
Ions	500 eV ... 3 keV 3 keV ... 10 keV 10 keV ... 50 keV 50 keV ... 200 keV	5 % ... 40 % 40 % ... 70 % 70 % ... 80 % ... 70 % 70 % ... 40 %
Soft X-ray / UV-Radiation	0.2 nm ... 30 nm 30 nm ... 115 nm 115 nm ... 150 nm	3 % ... 16 % 16 % ... 8 % 8 % ... 2 %

The efficiency of particles and radiation to release electrons from the MCP depends on the energy and the wavelength, respectively. If high energetic particles are to be detected, an energy discriminating foil or layer may be applied between the beam and the MCP detector system in order to increase the MCP´s sensitivity to these high energetic particles.

MCP Electron Multiplication

MCP Voltage (V)	Single MCP (el/el)	Double MCP (el/el)
500	6	
600	12	
700	90	
800	350	
900	1500	
1000	5500	
1300		$3 \cdot 10^3$
1400		$9.5 \cdot 10^3$
1500		$3 \cdot 10^4$
1600		$9.5 \cdot 10^4$
1700		$3 \cdot 10^5$

Quantum Efficiency of Phosphor Screens

Phosphor Type	P 43	P 46	P 47	for 6 keV Electrons
On Fiber Optic Window	95	45	105	photons/electron

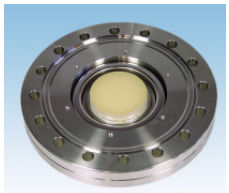
A roughly 40% higher efficiency is obtained with clear glass output screens.

In general the MCP detector screen consists of ITO layer and phosphor layer. The efficiency can be increased max. 30% at 6 kV screen voltage with an aluminum reflection layer on top of the phosphor . But such an aluminum layer is only advisable if clean room conditions can be guaranteed in the vacuum chamber. Be aware that one particle may destroy the aluminum reflection layer and may cause a short circuit to the MCP. This may destroy the MCP detector or a part of it.

Power Supplies

Suitable high voltage power supplies are available for safe operation of the open MCP detector systems.

Fiber Optic Windows



The open MCP detectors OD 2562 and OD 4062 with fiberoptic output windows are also available without microchannel plate and phosphor screen as fiber optic vacuum windows types VF 25 (useful diameter 25 mm) and VF 40 (useful diameter 40 mm).
They can be used for example to lead optical fibers out of a vacuum chamber. It is also possible to coat the fiber optic window with a phosphor for the direct detection of X-ray´s, UV-light and electrons. If a CCD camera is fiber optically coupled to the window you are able to use that setup as camera System for electron microscope.

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