

What you need to know to select the right Channel Electron Multiplier

Channel electron multipliers (or Channeltron * as they are sometimes called) are high gain devices for amplifying a range of electronic signals under a vacuum environment.

Typical channel electron multipliers will amplify electrons by gains of up to 10 to power 8. These devices can amplify very weak signal sources and can be used to detect a wide range of particles such as electrons, protons, UV photons and very low energy X-rays.

What types of electron multipliers are available?

The electron multipliers fall into two groups:-

- 1) Single channel electron multipliers in either glass or ceramic
- 2) Micro channel electron multiplier plates

What are the benefits of each of these types?

If you want to do purely particle counting or current amplification then the single channel electron multiplier is the device to use. It is a single amplifying channel usually in the shape of a spiral which can amplify each incoming electron by up to 10 to the power 8.

A micro channel plate is used normally where spatial data is required and its prime use is in night viewing devices such as night viewing goggles or weapon sights. They are also used in some types of mass spectrometers. Their gain is generally lower than single channel types typically no more than 10 to power 4.

What is the difference between ceramic and glass electron multipliers?

Historically glass multipliers have been lower in price than ceramic types however that difference has been eroded in recent years and the ceramic ones are now only slightly more expensive. However if price is the main consideration the glass ones are still cheaper.

Technically the two types are very similar in performance. The ceramic ones are more sturdy and robust particularly on the larger coned types. Also the ceramic ones are more easily built into arrays. The mounting of the glass multipliers needs to be done with great care to ensure the cones are not damaged or broken.

How do I mount micro channel plates?

The mounting of micro channel plates is not easy. Unless you have experience at doing this you may like to buy a ready mounted assembly from us. Please inform one of our sales staff of your requirements. We will be pleased to prepare a quote for you. We can offer single or double plate arrays with phosphor screen or high resistive

anode output if required. We can also mount the whole assembly on a “conflat” flange.

The advantage of mounting two channel plates in tandem is to increase the gain of the micro channel plate assembly to somewhere in the order of 10 to power 7.

If you wish to mount your own channel plates take great care to make the electrical contacts well as poor electrical contacts will increase the noise and other effects greatly.

What are the typical applications for single channel electron multipliers?

This type of multiplier is used in

- Space applications
- Scientific experiments in pulse counting
- Current amplification
- Mass spectrometers
- Time of flight spectrometers

It is worthwhile mentioning that there are two types of single channel electron multipliers. Analogue and pulse counting types. The analogue multipliers have been designed for mass spectrometer. Have considerably lower resistance from the conventional pulse counting types and give maximum collection efficiency at the output of the multiplier. Most of this series of multipliers are provided with a collector assembly and have a mount that is specifically designed for mounting into the spectrometer system.

What are the typical applications for micro channel plates?

Micro channel plates are used in

- Night vision goggles
- Night vision scopes
- Weapon Sights
- Mass spectrometers
- Atomic force spectrometers
- Time of flight spectrometers

How can I power my electron multipliers?

All electron multipliers are high voltage but a lower current device so power consumption is very low. While the typical operating voltage can be in the range of 1200 – 1800 volts the output current is just a few micro amps so the overall power consumption is extremely low.

What sizes of electron multipliers and micro channel plates are available?

Electron multipliers are available with input cone diameters from 2mm to 15mm diameter. They are also available with a number of different channel diameters and

analogue multipliers for mass spectrometer applications can be provided with metal/ceramic housings. Typical channel length to diameter is around 120:1

Micro channel plates have surface areas typically of 25, 36 and 46mm diameter although other sizes are also available and up to 100 x 100mm square plates are offered. Typical channel length to diameter ratios are 40:1 which is commonly called single thickness plates however 80:1 types are also offered (commonly known as double thickness) By using double thickness plates you can ensure the input particles are fully saturated in the channels of the multiplier. Plates normally have around 10-12 micron channel diameters and the channels are set at an angle of around 13 deg to the perpendicular face.

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