

MCP and Open MCP Detectors Handling and Usage Instructions

Handling

The Micro Channel Plate (MCP) and its assemblies are high vacuum devices, and as such should never be touched with bare hands. Please use powder-free vinyl or latex gloves when handling.

The MCP and its assemblies are constructed of fragile glass and ceramic components. To prevent damage, avoid mechanical impact on them.

The open MCP detectors should be handled in an environment that meets clean room standards regarding: oil, moisture and dust particles in the air. If dust gets on the MCP or its assembly, blow it off with a jet of clean dry air or nitrogen. Never blow on it with your breath.

Storage

The MCP assembly is delivered in a sealed package. Do not open it until required for use or a suitable storage facility is available. The sealed package in which the detector is delivered is not suitable for extended storage over and above the delivery time. Therefore the detector should be stored in one of the below-mentioned environments when not in use for long periods:

After opening, it should be stored in either:

- Vacuum less than $1 \cdot 10^{-1}$ Torr, free from oil which continuous pumping, or
- dry nitrogen flow (dew point -60 °C) or argon circulated through a $0,5 \mu\text{m}$ filter.

Maximum Baking Temperature

Maximum baking temperature should be coordinated with GIDS GmbH, as different open MCP detectors have different maximum baking temperatures. For bare MCP the baking temperature should not exceed 350 °C.

First-time operation

Before starting operation of the MCP detector, the system has to be mounted in a vacuum chamber and evacuated to a pressure of 10^{-6} mbar or better (10^{-8} mbar recommended). Please check the pressure while ramping up the voltage as

described below. If the vacuum decreases, turn down the voltage and wait until the required vacuum level is reached again.

The procedure is simple but operator has to be very careful, the main point is to prevent spark happening between MCP-out and the SCREEN during first start-up and voltage raising.

1. Connect MCP-in and MCP-out together.
2. Connect a μ -Amperemeter (with spark protection, see next page) to the connected MCP line to measure dark current to ground.
3. Without applying any input signal, increase the voltage on the screen/anode gradually in steps of 100 V. Wait for a while after each step. If the dark current surges, or if sparks are observed, shut off the high voltage immediately, wait for a while and then reapply the voltage as described. Reach the desired voltage (4,0 kV maximum for screen, 3,0 kV maximum for metal anode).
4. Drop down the voltage and disconnect the MCP short circuit.
5. To condition the MCP, connect a μ -Amperemeter (with spark protection) at the screen to measure dark current.
6. Without applying any input signal, increase the voltage on the MCP gradually in steps of 100 V. Wait for a while after each step. If the dark current surges, or if sparks are observed, shut off the high voltage immediately, wait for a while and then reapply the voltage as described. The recommended conditioning voltage is 200 V above your desired operating voltage but should never exceed the maximum voltages of single MCP 40:1 setup = maximum voltage 1,0 kV single MCP 60:1 setup = maximum voltage 1,2 kV; double MCP 40:1 setup = maximum voltage 2,0 kV double MCP 60:1 setup = maximum voltage 2,4 kV.
7. Once the recommended conditioning voltage is reached, operate the MCP at this voltage for a few hours without applying input signal.
8. Drop down the voltage.
9. For normal operation raise the screen/anode voltage to 3.0 kV.
10. Raise the MCP voltage to 1,5 kV for double MCP setup (0,6 kV for single MCP setup); readjust the potential difference between MCP and Screen/Anode to 3,0 kV.
11. Apply the input signal, if the screen/signal out is too high, readjust voltage on MCP for lower gain by lowering the voltage on MCP, take care that the potential difference between MCP-out and Screen cannot be more than 4,0 kV and between MCP-out and metal anode cannot be more than 3,0 kV. If the

screen/signal out is poor then increase MCP gain by increasing the voltage on MCP and readjusting the potential difference between MCP-out and the Screen.

12. Working on maximum allowed voltages may result in high dark current and may shorten the MCP life. Under voltage the operating temperature should be below 50 °C .

A simple spark protection circuit consists of two fast, low capacity diodes (1N4151) and resistor as shown in the drawing below.

Normal Operation

After the first-time operation is performed (as described above), input signal may be applied. Start at low gain and gradually increase the gain to the desired level. Under voltage the operating temperature should be below 50 °C.

Protection Circuit

