Z-Stack MCP and Detector Initial Start-up and Electrical Test Procedure

**NOTES:** Read the entire start-up procedure before applying any voltages. Refer to Diagram 1 - Typical Wiring Diagrams - for each detection mode. The suggested bias voltage for a Resistive Anode Encoder (RAE) is 300 volts.

**CAUTION:**
Do not exceed 1000V per MCP.
When installing a flange mounted detectors gradually tighten the bolts in a star pattern (DO NOT exceed 20 foot-pounds per bolt). Failure to do so could cause the fiberoptic to crack.

**RECOMMENDATIONS:**
For optimal lifetime, operate the detector at the minimum voltage necessary to obtain a useable signal.
Do not operate the phosphor screen at a higher than recommended potential.

**PROCEDURE**
Make all connections to the assembly. Check all electrical connections for possible shorted or open circuits.
Pump down to $\leq 2\times 10^{-6}$ torr and hold for at least 15 hours.

**VOLTAGE APPLICATION**

**Electron/Negative Ion/UV Photon Detection:** (for a metal anode or Resistive Anode Encoder, skip to section below)

**Phosphor Screen**
Ground the input of the assembly ($V_i$). Apply voltage to the phosphor screen ($V_a$) in $+250V$, 1 minute increments. Stop at $+1.0$ kV.
Apply voltage to the output of the assembly ($V_o$) in $+100V$, 2 minute increments. Stop at $+1.5$ kV.
Increase the voltage to $V_a$ in $+100V$, 5 minute increments to $+3.0$ kV. Wait 5 minutes.
Increase the voltage to $V_a$ in $+100V$, 10 minute increments to $+4.5$ kV. Wait 5 minutes.
Simultaneously increase the voltage to $V_a$ and $V_o$ in $+100V$, 10 minute increments to $+5.2$ kV at $V_a$ and $+2.2$ kV at $V_o$.

**For screens requiring a 5.0 kV potential** - Increase the voltage to $V_a$ in $+100V$, 10 minute increments to $+6.2$ kV. Wait 10 minutes.

**For screens requiring a 5.0 kV potential** - Increase the voltage to $V_a$ in $+50V$, 10 minute increments to $+7.2$ kV. Wait 10 minutes.
Simultaneously increase the voltage to $V_a$ and $V_o$ in $+50V$, 10 minute increments to $+3.0$ kV at $V_o$.
When through using the detector, turn off the voltage to $V_a$. When the voltage drops below $+3.0$ kV, turn off the voltage to $V_o$.

**Metal Anode/Resistive Anode Encoder**
Ground the input of the assembly ($V_i$). Apply the specified anode bias to $V_a$.
Increase the voltage to both $V_a$ and $V_o$ in $+100V$, 2 minute increments by $+1.5$ kV at $V_a$ and to $+1.5$ kV at $V_o$. Wait 5 minutes.
Increase the voltage at $V_o$ and $V_a$ in $+100V$, 5 minute increments to $+1.5$ kV at $V_o$. Wait 10 minutes.
Increase the voltage at $V_o$ and $V_a$ in $+50V$, 5 minute increments to $+3.0$ kV at $V_o$.
When through using the detector, turn off the voltages to $V_o$ and $V_a$. 

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Positive Ion/UV Photon Detection (for a metal anode or Resistive Anode Encoder, skip to section below).

Phosphor Screen
Ground the output of the assembly (V_o). Apply voltage to the phosphor sheen (V_a) in +250V, 1 minute increments. Stop at +1.0 kV.
Apply voltage to the input of the assembly (V_i) in -100V, 2 minute increments. Stop at -1.5 kV.
Increase the voltage to V_a in +100V, 5 minute increments to +2.0 kV. Wait 5 minutes.
Increase the voltage to V_a in +100V, 10 minute increments to +3.0 kV. Wait 5 minutes.
Adjust the voltage to V_i in -100V, 10 minute increments to -2.2 kV.
For screens requiring a 5.0 kV potential - Increase the voltage to V_a in +100V, 10 minute increments to +4.0 kV. Wait 10 minutes.
For screens requiring a 5.0 kV potential - Increase the voltage to V_a in +50V, 10 minute increments to +5.0 kV. Wait 10 minutes.
Adjust the voltage to V_i in -50V, 10 minute increments to -3.0 kV.
When through using the detector, turn off the voltages to the V_i and V_a.

Metal Anode/Resistive Anode Encoder
Ground the output of the assembly (V_o). Apply the specified anode bias to V_a.
Apply voltage to V_i in -100V, 2 minute increments. Stop at -2.2 kV. Wait 2 minutes.
Adjust the voltage at V_i in -100V, 5 minute increments to -2.2 kV. Wait 5 minutes.
Adjust the voltage at V_i in -50V, 10 minute increments to -3.0 kV.
When through using the detector, turn off the voltages to V_i and V_a.

TYPICAL WIRING DIAGRAMS

<table>
<thead>
<tr>
<th></th>
<th>Pulse Mode (metal anode)</th>
<th>Imaging Mode (phosphor screen)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electron/Negative Ion/UV</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V_i</td>
<td>ground</td>
<td>ground</td>
</tr>
<tr>
<td>V_o</td>
<td>3000V</td>
<td>3000V</td>
</tr>
<tr>
<td>V_a</td>
<td>3050V to 3500V</td>
<td>6000V to 8000V</td>
</tr>
</tbody>
</table>

**Positive Ion/UV Photon**

|                  |                           |                                |
| V_i              | -3000V                   | -3000V                         |
| V_o              | ground                   | ground                         |
| V_a              | 50V to 500V              | 3000V to 5000V                 |