Out of Liquid Demo Module

Thermal Mass Flow Demo Module

Optimal for various “Out of Liquid” flow applications

Benefits & Characteristics

- Single supply 5 V\textsubscript{DC}
- No contact between sensor and liquid
- Suitable for aggressive liquids
- Adjustable by customer

Illustration\textsuperscript{1)}

\textsuperscript{1)} For actual size, see dimensions

Technical Data

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube dimensions (L x Ø\textsubscript{OUTER} x (Ø\textsubscript{INNER}) in mm):</td>
<td>40 x 4 x (3.8)</td>
</tr>
<tr>
<td>PCB dimensions (L x W x H in mm):</td>
<td>25 x 58 x 12</td>
</tr>
<tr>
<td>Operating measuring range:</td>
<td>0 ml/min to 3000 ml/min (4 m/s)</td>
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<tr>
<td>Response time (t_{90}):</td>
<td>&lt; 300 ms (at step from 0 to 1000 ml/min)</td>
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<tr>
<td>Warm-up time:</td>
<td>&lt; 30 s</td>
</tr>
<tr>
<td>Connection (PCB to tube):</td>
<td>Cu/Ag-wire, PTFE insulated, AWG 30/19, 50 mm</td>
</tr>
<tr>
<td>Heater: (R_{H}(0 , ^{\circ}C)):</td>
<td>50 Ω ±1 %</td>
</tr>
<tr>
<td>Temperature sensor: (R_{S}(0 , ^{\circ}C)):</td>
<td>1000 Ω ±1 %</td>
</tr>
<tr>
<td>Connection (module):</td>
<td>Screw terminal</td>
</tr>
<tr>
<td>Supply voltage:</td>
<td>5 V\textsubscript{DC} ±5 %</td>
</tr>
<tr>
<td>Current consumption:</td>
<td>1.5 A (maximal)</td>
</tr>
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</table>
Analogue output, non linear

<table>
<thead>
<tr>
<th>0 V&lt;sub&gt;dc&lt;/sub&gt; to &lt; 5.0 V&lt;sub&gt;dc&lt;/sub&gt;</th>
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</table>

Tube material: Stainless steel

### Adjustment Procedure (if necessary)

1. Power up the module
2. Start pump to fill up the system (tube) with liquid
3. Wait until output signal is stable (about 30 s)
4. Adjust potentiometer R1 to a heater voltage of about 8 to 10 V<sub>dc</sub> at TP1
5. Apply a known flow (for example 200 ml/min)
6. Measure analog output voltage at J2 Pin2 (should be in the range of 2.0 to 2.5 V<sub>dc</sub> at 200 ml/min)
7. Adjust R1 for desired output voltage
8. Stop flow
9. Check if analog output voltage at J2 Pin2 is < 0.1 V<sub>dc</sub>
10. If not, push the offset buttons repeatedly to adjust output voltage and LED’s so only the green LED is ON and voltage is below 0.1 V<sub>dc</sub>
11. Apply flow again and check output voltage
12. This output signal is the non-linearized flow signal
Typical Flow Curve (water)

![Flow Curve Diagram]

Order Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Code/Order</th>
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<tbody>
<tr>
<td>OOL Demo Unit V2.0</td>
<td>P1K0/050.232.2K.C.050.M.U.S</td>
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<tr>
<td>Order code</td>
<td>160.00005</td>
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<td>Order code</td>
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Additional Documents

<table>
<thead>
<tr>
<th>Name</th>
<th>Document name</th>
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<tbody>
<tr>
<td>Data Sheet</td>
<td>DFOOL_E</td>
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</tbody>
</table>

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