## Technical Data for **Whisper Series** Mass Flow Controllers

**250 SLPM** full scale through **1000 SLPM** full scale

Standard specifications. Consult Alicat for available options.

### SENSOR AND CONTROL PERFORMANCE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass Flow Accuracy at calibration conditions</td>
<td>±0.8% of reading and ±0.2% of full scale</td>
</tr>
<tr>
<td>High Accuracy Option</td>
<td>±0.4% of reading and ±0.2% of full scale</td>
</tr>
<tr>
<td>Repeatability (2σ)</td>
<td>±(0.2% of reading + 0.02% of full scale)</td>
</tr>
<tr>
<td>Steady State Control Range</td>
<td>0.5–100% of full scale</td>
</tr>
<tr>
<td>Typical Control Response Time</td>
<td>150 ms to 63% of step change (T63), user adjustable</td>
</tr>
</tbody>
</table>

#### Valve Function

- Normally Closed

#### Temperature Sensitivity

- Mass flow zero shift and span shift: 0.03% of full scale per °C from 25°C
- Mass flow zero shift and span shift: ±(0.08% of reading + 0.02% of full scale) per atmosphere from calibration conditions

#### Operating Temperature Range

- −10–60°C (expanded range available)

#### Pressure Sensitivity

- Mass flow zero shift and span shift: ±0.1 PSIA

#### Operating Pressure Full Scale

- 60 PSIA

### MECHANICAL

#### Minimum Operating Pressure

- 11.5 PSIA common mode pressure (lower operating pressures available)
- Differential pressure must exceed model pressure drop, see below for details

#### Maximum Operating Pressure

- Damage possible above 80 PSIA common mode pressure
- Damage possible above 15 PSID differential pressure

#### Ingress Protection

- IP40 (consult Alicat for weatherproofing options)

#### Humidity Range

- 0–95%, non-condensing

#### Wetted Materials

- 302 / 303 / 304 / 410 stainless steel, Viton®, heat-cured silicone rubber, glass-reinforced polyphenylene sulfide, heat-cured epoxy, alumina, gold, silicon, glass

### COMMUNICATIONS

#### Analog I/O Options

- 4–20 mA, 0–5 VDC, 1–5 VDC, 0–10 VDC

#### Digital I/O Options

- RS-232 Serial by default
- RS-485 Serial, Modbus RTU (over RS-232 or RS-485), Modbus TCP/IP, DeviceNet, EtherCAT, EtherNet/IP, Profinet

#### Electrical Connection Options

- 6 pin locking, 8 pin mini-DIN, 8 pin M12, DB-9, DB-15

#### Power Requirements

- MCRW: 24 VDC, 1 A
- MCRWH: 24–30 VDC, 2 A
- Add 40 mA if equipped with 4–20 mA output

#### Digital Data Update Rate

- 40 Hz at 19200 baud

#### Analog Data Update Rate

- 1 kHz

#### Display Update Rate

- 10 Hz

#### Analog Signal Accuracy

- ±0.1% of full scale additional uncertainty

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1. Stated accuracy is after tare under equilibrium conditions. Extreme gas behavior (especially near state boundaries) can introduce additional flow uncertainties.
2. Achievable steady state control may be limited by user-configurable PID tuning and process conditions. Dynamic control performance is also limited by control response time, which may vary with the flow rate.
3. Indication response time includes user-adjustable averaging up to 255 ms.
4. Consult the individual operating bulletins for specific industrial protocol power requirements and data transmission specifications.
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### FEATURES

<table>
<thead>
<tr>
<th>STP Reference Conditions</th>
<th>25°C and 1 atm (default), user configurable</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTP Reference Conditions</td>
<td>0°C and 1 atm (default), user configurable</td>
</tr>
<tr>
<td>Monochrome LCD or Color TFT Display with integrated touchpad</td>
<td>Simultaneously displays mass flow, volumetric flow, temperature, and pressure</td>
</tr>
<tr>
<td>Gas Select*</td>
<td>98 user selectable gases stored internally. Each gas optimized to match NIST’s REFPROP 10 gas property calculations across the operating temperature and pressure ranges for highest accuracy.</td>
</tr>
<tr>
<td>COMPOSER®</td>
<td>20 user definable gas mixes. Each mix may have up to 5 gases with 0.01% precision.</td>
</tr>
</tbody>
</table>

### RANGE SPECIFIC SPECIFICATIONS

<table>
<thead>
<tr>
<th>Full scale flow</th>
<th>Type</th>
<th>Pressure drop at full scale flow venting to atmosphere</th>
<th>Process connections</th>
<th>Mount tap size</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 SLPM</td>
<td>MCRW</td>
<td>0.69 PSID</td>
<td>¼&quot; NPT Female</td>
<td>4× 8-32 UNC 0.328 in [8.33 mm]</td>
</tr>
<tr>
<td>500 SLPM</td>
<td>MCRW</td>
<td>0.69 PSID</td>
<td>¼&quot; NPT Female</td>
<td>4× 8-32 UNC 0.330 in [8.38 mm]</td>
</tr>
<tr>
<td>1000 SLPM</td>
<td>MCRWH</td>
<td>1.65 PSID</td>
<td>2&quot; NPT Female</td>
<td>4× 8-32 UNC 0.300 in [7.62 mm]</td>
</tr>
</tbody>
</table>

5 Default valve venting to atmosphere.

6 Consult Alicat for available process connection options, such as: Compression, face seal, push-to-connect, BSPP, SAE, or Swagelok® (including tube, VCO, and VCR).

### DIMENSIONS

<table>
<thead>
<tr>
<th>Full scale flow</th>
<th>Type</th>
<th>Weight</th>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 SLPM</td>
<td>MCRW</td>
<td>≈ 9.0 lb</td>
<td>5.495 in</td>
<td>7.275 in</td>
<td>2.250 in</td>
<td>1.120 in</td>
<td>1.125 in</td>
<td>1.175 in</td>
<td>1.425 in</td>
<td>4.025 in</td>
<td>6.525 in</td>
<td>0.375 in</td>
<td>1.875 in</td>
<td>0.200 in</td>
<td>2.700 in</td>
</tr>
<tr>
<td>500 SLPM</td>
<td>MCRW</td>
<td>≈ 12.0 lb</td>
<td>5.495 in</td>
<td>8.100 in</td>
<td>2.900 in</td>
<td>1.120 in</td>
<td>1.450 in</td>
<td>0.200 in</td>
<td>2.700 in</td>
<td>4.250 in</td>
<td>6.750 in</td>
<td>0.700 in</td>
<td>2.000 in</td>
<td>0.200 in</td>
<td>2.700 in</td>
</tr>
<tr>
<td>1000 SLPM</td>
<td>MCRWH</td>
<td>≈ 28.0 lb</td>
<td>5.495 in</td>
<td>9.800 in</td>
<td>3.840 in</td>
<td>1.450 in</td>
<td>1.920 in</td>
<td>0.295 in</td>
<td>3.545 in</td>
<td>5.958 in</td>
<td>8.455 in</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Alicat.com/mcw

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500 SLPM

1000 SLPM

Representative Examples