Mass Flowmeters for Gases
Measure Flow, Pressure, and Temperature ... all in one instrument!

Features
- 4 millisecond flow response
- ±2% of reading for high accuracy
- High turndown ratio
- Low pressure drop
- Convenient analog output of flowrate
- Versatile digital output of flowrate, volume, pressure, temperature
- Built-in temperature and pressure compensation
- NIST-traceable calibration certificate included at no additional cost

RS232 Interface for digital outputs and configurable device options
- Set analog output zero and scaling
- Specify start/stop trigger levels for volume measurement
- Set update rate for LCD display
- Set sampling rate for analog and digital outputs
- Select gas calibration
- Select either standard or volumetric flow measurement
- Set display units for Model 4140/4143 to L/min or cm³/min
- Compute volume

Industries
- Medical
  - Ventilators
  - Anesthesia
- Industrial Hygiene
- Metrology
- Aerosol Science
- Fuel Cell

Applications
- Quality Assurance
- Product Development
- Research
- Field Service
- Process Monitoring
Fast, Accurate, Low Pressure Drop for critical measurement applications!

**Fast**
Fast 4 millisecond response ensures accuracy in fluctuating flows. This fast response is ideal for closed-loop control systems and integrated volume measurements. Pressure and temperature measurements are also extremely fast.

**Accurate**
A flowmeter specified as ±2 percent of Full Scale is most accurate at full scale. If full scale is 300 L/min, then the uncertainty for all readings is ±6 L/min. TSI flowmeters are specified as ±2 percent of Reading and have an uncertainty of ±2 percent of the actual reading from full scale all the way down to a specified lower limit. TSI flowmeters, therefore, provide dependable accuracy over a wide range of flowrates. One TSI flowmeter covers the same range as three or more “percent of full scale” devices...with better accuracy at all points!

**Low Pressure Drop**
Low pressure drop minimizes flow circuit back pressure and its impact on the system under test.

How a TSI Thermal Flowmeter Works
TSI thermal mass flowmeters incorporate two sensors that are exposed to the flow stream. A platinum film sensor is heated and maintained at a constant temperature. Passing flow transfers heat from this sensor in relation to the mass flow rate. A thermistor measures the gas temperature and is used for temperature compensation.
## Specifications

### Models 4140/4143 and Models 4040/4043/4045

<table>
<thead>
<tr>
<th>Parameter</th>
<th>4140/41403</th>
<th>4143/41433</th>
<th>4040</th>
<th>4043</th>
<th>4045</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flow Measurement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.01 to 20 standard L/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±2% of reading or 0.005 standard L/min, whichever is greater, for air and O2; ±3% of reading or 0.010 standard L/min, whichever is greater, for N2 and N2O (Model 41433 only) and N2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>4 ms to 63% of full scale flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Dimensions</strong></td>
<td>127 × 49 × 32 mm (5 × 2 × 1.25 in.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Volume Measurement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0.01 to 99.9 liters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±2% of reading</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pressure Measurement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>50 to 199 kPa absolute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±1 kPa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>&lt;4 ms to 63% of final value for step change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature Measurement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0 to 50°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±1°C at flows greater than 1 standard L/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>&lt;75 ms to 63% of final value for step change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Analog Output</strong></td>
<td>0 to 10 VDC, zero and span adjustable via RS232</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DC Power Input</strong></td>
<td>7.5 VDC ±1.5 V, 300 mA max</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications subject to change without notice. Complete specifications listed in manual. *Supplied through RS232 port only.

### Included Accessories
- AC adapter, RS232 and analog interface cables, particulate filter, operator’s manual, serial command set manual, and a NIST-traceable calibration certificate.

### Optional Accessories
- PN 1319201 Carrying Case for Models 4140/4143
- PN 1319176 Carrying Case for Models 4040/4043/4045

Additional detailed specifications available in Operators Manuals on internet at [http://flowmeters.tsi.com](http://flowmeters.tsi.com) or contact TSI directly.
Specifications
Models 4121y, 4122y, 4021y, and 4024y

Flow Measurement

<table>
<thead>
<tr>
<th></th>
<th>4121y</th>
<th>4122y</th>
<th>4021y</th>
<th>4024y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Range</td>
<td>0.01 to 20 Std L/min</td>
<td>0.01 to 300 Std L/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlet/Outlet Diameter</td>
<td>0.25 inch (6.4 mm)</td>
<td>0.375 inch (9.525 mm)</td>
<td>22 mm ISO tapered</td>
<td>0.75 inch (19.1 mm)</td>
</tr>
<tr>
<td>Gas Calibrations</td>
<td>Air y=1</td>
<td>Oxygen y=2</td>
<td>Nitrogen y=6</td>
<td></td>
</tr>
</tbody>
</table>

Low Flow–Models 4121/4122
Flow Range: 0.01 to 20 standard L/min
Accuracy: ±2% of reading or 0.005 standard L/min whichever is greater, for air and O₂
±3% of reading or 0.010 standard L/min whichever is greater, for N₂
Response: 4 ms to 63% of full scale flow
Overall Dimensions: 127 × 49 × 29 mm (5 × 2 × 1.1 in.)

High Flow–Models 4021/4024
Flow Range: 0 to 300 standard L/min
Accuracy: ±2% of reading or 0.05 standard L/min whichever is greater, for air and O₂
±3% of reading or 0.1 standard L/min whichever is greater, for N₂
Response: 4 ms to 63% of full scale flow
Overall Dimensions: 182 × 63 × 38 mm (7.2 × 2.5 × 1.5 in.)

Volume Measurement (supplied through RS232 port only)
Range: 0.01 to 99.9 liters
Accuracy: ±2% of reading

Temperature Measurement (supplied through RS232 port only)
Range: 0 to 50°C
Accuracy: ±1°C at flows greater than 1 standard L/min
Response: <75 ms to 63% of final value for step change

Analog Output
0 to 4 VDC, zero and span adjustable via RS232

Digital Output
RS232

DC Power Input
5.0 VDC ±0.25 V, 300 mA max

Recommended Filtration
HEPA-grade filter

Accessories
RS232 and analog interface cable (mini-DIN to tinned wire)

Specifications subject to change without notice.

For complete specifications, see Design Guide (P/N 1980430) on Internet at https://flowmeters.tsi.com or contact TSI directly.