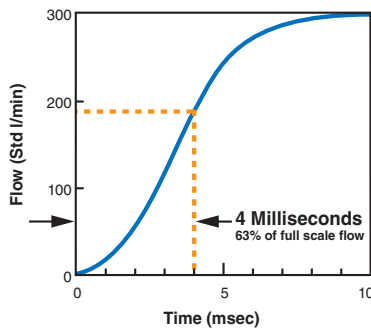


Mass Flowmeters for Gases



Fast, Accurate, Low Pressure Drop for critical measurement applications!

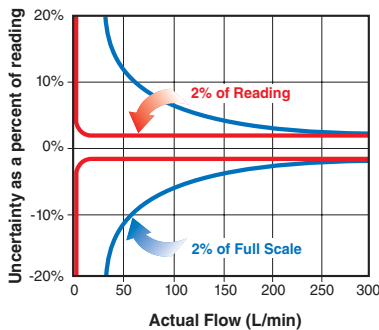
Response to a step change in flowrate



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.

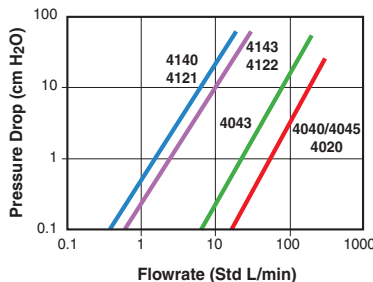
% of Reading vs. % of F.S.



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!

Pressure Drop



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—a platinum film and a thermistor—that are exposed to the flow stream. The platinum sensor is heated and maintained at a constant temperature. Passing flow transfers heat from this sensor in relation to the mass flow rate. The thermistor measures the gas temperature and is used for temperature compensation.

Measure Flow, Pressure, and Temperature ... *all in one instrument!*



Series 4140–Low Flow
Air, O₂, N₂O, N₂

Series 4040–High Flow
Air, O₂, N₂

Industries

Medical

- Ventilators
- Anesthesia

Industrial Hygiene

Metrology

Aerosol Science

Fuel Cell

Features

- 4 millisecond flow response
- High accuracy $\pm 2\%$ of reading
- 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



LabVIEW®
Drivers
Available

Applications

Quality Assurance

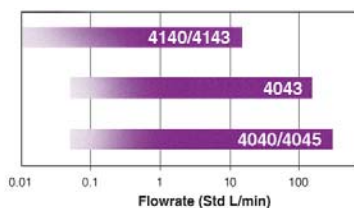
Product Development

Research

Field Service

Process Monitoring

Model Selection Guide for Series 4040 and 4140



| | 4140/41403 | 4143/41433 | 4040 | 4043 | 4045 |
|-----------------------|---|---|---|------------------------|------------------------|
| Flow Range | 0.01-20 Std L/min | 0.01-20 Std L/min | 0-300 Std L/min | 0-200 Std L/min | 0-300 Std L/min |
| Inlet/Outlet Diameter | 0.25 inch (6.4 mm) | 0.375 inch 9.525 mm | 22 mm ISO tapered | 0.50 inch (12.7 mm) | 0.75 inch (19.1 mm) |
| Gas Calibrations | Air, O ₂ , N ₂ (N ₂ O Model 41403 only) | Air, O ₂ , N ₂ (N ₂ O Model 41433 only) | Air, O ₂ Air/O ₂ Mixture, N ₂ | | |
| LCD Display Units | L/min, Std L/min cm ³ /min, Std cm ³ /min | L/min, Std L/min cm ³ /min, Std cm ³ /min | L/min, Std L/min | | |

Specifications

Models 4140/4143 and Models 4040/4043/4045

| | Low Flow—Models 4140/4143 | High Flow—Models 4040/4043/4045 |
|------------------------|--|---|
| Flow Measurement Range | 0.01 to 20 standard L/min | Model 4040 and 4045: 0 to 300 standard L/min Model 4043: 0 to 200 standard L/min |
| Accuracy | ±2% of reading or 0.005 standard L/min, whichever is greater, for air and O ₂ ; ±3% of reading or 0.010 standard L/min, whichever is greater, for N ₂ O (Model 41403 and 41433 only) and N ₂ | ±2% of reading or 0.05 standard L/min, whichever is greater, for air and O ₂ For N ₂ , air/O ₂ mixtures, accuracy is ±3% of reading or 0.1 standard L/min |
| Response | 4 ms to 63% of full scale flow | 4 ms to 63% of full scale flow |
| Overall Dimensions | 127 × 49 × 32 mm (5 × 2 × 1.25 in.) | 182 × 63 × 53 mm (7.2 × 2.5 × 2.1 in.) |

All Models

| | |
|-------------------------|--|
| Volume Measurement* | |
| Range | 0.01 to 99.9 liters |
| Accuracy | ±2% of reading |
| Pressure Measurement | |
| Range | 50 to 199 kPa absolute |
| Accuracy | ±1 kPa |
| Response | < 4 ms to 63% of final value for step change |
| Temperature Measurement | |
| 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 10 VDC flow only, span adjustable via RS232 |
| DC Power Input | 7.5 VDC ±1.5 V, 300 mA max |

* Supplied through RS232 port only.
Specifications subject to change without notice.



Shown with optional Carrying Case.

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 for Series 4040 and 4140

| | |
|------------|--|
| PN 4199 | Battery Pack/Stand (6 AA batteries included) |
| PN 1319201 | Carrying Case for Models 4140/4143 |
| PN 1319176 | Carrying Case for Models 4040/4043/4045 |



Shown with optional Battery Pack/Stand

For complete specifications, see Operation Manual (P/N 1980339) on Internet at <http://flowmeters.tsi.com> "Downloads" or contact TSI directly.

Flow Measurement Solutions

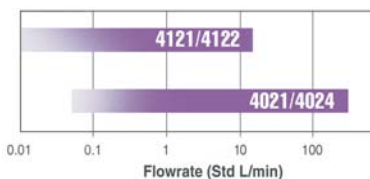
...ideal for installed applications



Series 4120—Low Flow
Air, O₂, N₂

Series 4020—High Flow
Air, O₂, N₂

Model Selection Guide for Series 4020 and 4120



| | 4121y | 4122y | 4021y | 4024y |
|-----------------------|--|------------------------|----------------------|------------------------|
| Flow Range | 0.01 to 20 Std L/min | | 0 to 300 Std L/min | |
| Inlet/Outlet Diameter | 0.25 inch (6.4 mm) | 0.375 inch 9.525 mm | 22 mm ISO tapered | 0.75 inch (19.1 mm) |
| Gas Calibrations | Air $\gamma=1$ Oxygen $\gamma=2$ Nitrogen $\gamma=6$ | | | |

Note: When ordering, change “y” to 1 for Air; 2 for Oxygen, or 6 for Nitrogen

Specifications

Models 4121y, 4122y, 4021y, and 4024y

| | Low Flow—Models 4121/4122 | High Flow—Models 4021/4024 |
|---------------------------------------|--|--|
| Flow Measurement | | |
| Range | 0.01 to 20 standard L/min | 0 to 300 standard L/min |
| Accuracy | $\pm 2\%$ of reading or 0.005 standard L/min whichever is greater, for air and O ₂ $\pm 3\%$ of reading or 0.010 standard L/min whichever is greater, for N ₂ | $\pm 2\%$ of reading or 0.05 standard L/min, whichever is greater, for air and O ₂ ; $\pm 3\%$ of reading or 0.1 standard L/min whichever is greater, for N ₂ |
| Response | 4 ms to 63% of full scale flow | 4 ms to 63% of full scale flow |
| Overall Dimensions | 127 × 49 × 29 mm (5 × 2 × 1.1 in.) | 182 × 63 × 38 mm (7.2 × 2.5 × 1.5 in.) |
| Volume Measurement* | All Models | |
| Range | 0.01 to 99.9 liters | |
| Accuracy | $\pm 2\%$ of reading | |
| Pressure Measurement | not available in Series 4020/4120 | |
| Temperature Measurement* | | |
| Range | 0 to 50°C | |
| Accuracy | $\pm 1^\circ\text{C}$ 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 flow only, span adjustable via RS232 | |
| Digital Output | RS232 | |
| DC Power Input (user supplied) | 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) | |

* Supplied through RS232 port only.
Specifications subject to change without notice.

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

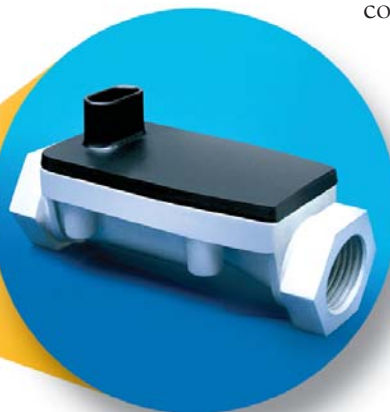
Other Flowmeter Products from TSI.

OEM Flow Sensors



TSI High Performance OEM Flow Sensors are specifically designed to measure air and gases in embedded applications. No correction for changes in temperature or atmosphere is needed. The standard design and 100% calibration saves engineering time, reduces

costs and gets your products to market faster.



Flow Analyzers



The TSI Certifier® FA Test System for Gas Flow Analysis is the first truly portable device for measuring flow, pressure, oxygen concentration and multiple breathing parameters needed for testing medical devices in institutional, home care, field service and laboratory applications.

Photos courtesy of Respiromics Inc.

“Buy Online”



Many products are available for purchase online at <http://flowmeters.tsi.com>.

TSI

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For current information
<http://flowmeters.tsi.com>