

Mass Flowmeters for Gases



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
- Anaesthesia

Industrial Hygiene

Metrology

Aerosol Science

Fuel Cell

Applications

Quality Assurance

Product Development

Research

Field Service

Process Monitoring

Features

- 4 millisecond flow response
- High accuracy $\pm 2\%$ of reading
- High turndown ratio
- Low pressure drop
- Convenient analogue 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

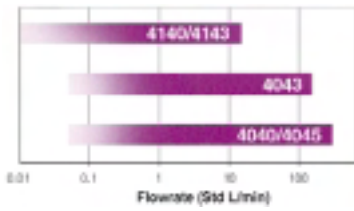
RS232 Interface for digital outputs and configurable device options

- Set analogue output zero and scaling
- Specify start/stop trigger levels for volume measurement
- Set update rate for LCD display
- Set sampling rate for analogue 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

Model Selection Guide for Series 4040 and 4140



	4140/4143	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	6.4 mm	9.525 mm	22 mm ISO tapered	12.7 mm	19.1 mm
Gas Calibrations	Air, O ₂ Air, O ₂ (N ₂ O model 41403 only)	Air, O ₂ Air, O ₂ (N ₂ O model 41433 only)	N ₂ Air, O ₂ N 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	182 × 63 × 53 mm

All Models

Volume Measurement:*	
Range	0.01 to 99.9
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
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.

Included Accessories

AC adapter, RS232 and analogue 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 Carrying Case.



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...

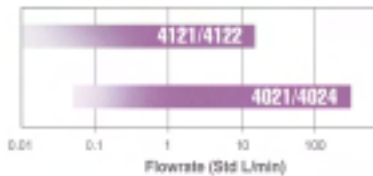
ideal for installed applications!



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	6.4 mm	9.525 mm	22 mm ISO tapered	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	±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	±2% of reading or 0.05 standard L/min, whichever is greater, for air and O ₂ ; ±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	182 × 63 × 38 mm

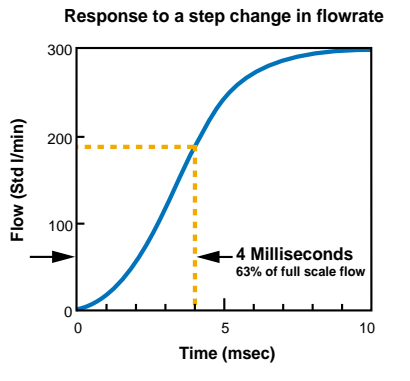
All Models

Volume Measurement*:	
Range	0.01 to 99.9
Accuracy	±2% of reading
Pressure Measurement	not available in Series 4020/4120
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 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 (min-DIN to tinned wire)

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

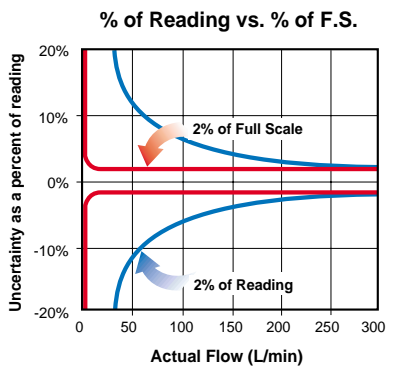
For complete specifications, see Design Guide (P/N 1980430) on Internet at <http://flowmeters.tsi.com> or contact TSI directly.

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



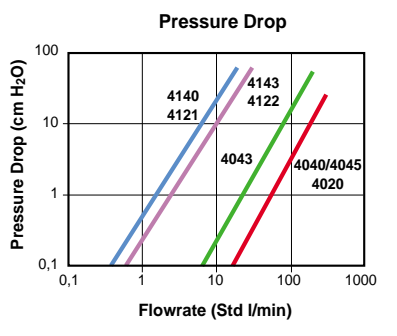
Fast

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 minimises 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.

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 Analysers



Photos courtesy of Respiromics, Inc.

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.

“Buy Online”



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

TSI

TSI UK

Tel: +44 1494 459 200, Fax: +44 1494 459 700, E-Mail: tsiuk@tsi.com

TSI Sweden

Tel: +46 8 595 132 30, Fax: +46 8 595 132 39, E-Mail: tsiab@tsi.com

TSI Germany

Tel: +49 241 523 03 0, Fax: +49 241 523 03 49, E-Mail: tsigmbh@tsi.com

TSI France

Tel: +33 491 952 190, Fax: +33 491 952 191, E-Mail: tsifrance@tsi.com

Contact TSI or visit www.tsi.com for information on specific office locations worldwide or visit www.tsi.com to find your closest TSI representative or distributor.

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