

TSI MASS FLOWMETER CALIBRATION CERTIFICATE

APPLICATION NOTE FLOW-009 (US)

Mass Flowmeter Calibration Certificate



Model: 4040 **(a)**
 Serial Number: 40401640001 **(b)**
 Verification date: 29-Sep-2016 **(d)**

Rev: H **(c)**

Summary Status **(e)**
 As-Found
 As-Left
 In Tolerance
 Out of Tolerance

Environmental Conditions **(f)**
 Pressure: 99.5 kPa
 Temperature: 21.2°C

(g) Air Flow

Tolerance: $\pm(1.75\%$ of reading or 0.050 SLPMT) **(h)**

Reference (SLPM)	Measured (SLPM)	Allowable Min	Allowable Max	Range
0.562 (i)	0.548 (j)	0.512 (k)	0.612 (k)	0.583 (k)
2.055	2.042	2.005	2.105	2.109
6.004	5.992	5.899	6.109	6.070
14.50	14.47	14.25	14.75	14.70
28.90	28.89	28.39	29.41	29.44
45.52	45.59	44.72	46.32	46.35
61.57	61.48	60.49	62.65	62.57
79.96	79.94	78.56	81.36	81.62
100.0	100.5	98.29	101.8	100.7
125.1	125.2	122.9	127.3	125.3
160.1	160.4	157.3	162.9	162.9
200.2	200.2	196.7	203.7	196.3
240.0	240.0	235.8	244.2	244.7
280.6	280.7	275.7	285.6	281.3
				286.3
				(l) PASS

(g) Oxygen Flow

Tolerance: $\pm(1.75\%$ of reading or 0.050 SLPMT) **(h)**

Reference (SLPM)	Measured (SLPM)	Allowable Min	Allowable Max	Range
0.533 (i)	0.518 (j)	0.483 (k)	0.583 (k)	0.583 (k)
2.059	2.050	2.009	2.109	2.109
5.966	5.966	5.862	6.070	6.070
14.45	14.46	14.20	14.70	14.70
28.94	28.98	28.43	29.44	29.44
45.55	45.56	44.75	46.35	46.35
61.49	61.44	60.42	62.57	62.57
80.22	80.23	78.81	81.62	81.62
98.98	99.47	97.24	100.7	100.7
125.1	125.3	122.9	127.3	125.3
160.1	160.5	157.3	162.9	162.9
199.8	199.8	196.3	203.3	196.3
240.5	240.7	236.3	244.7	244.7
281.3	281.5	276.4	286.3	281.3
				286.3
				(l) PASS

(m) Temperature

Tolerance: ± 1.000 °C **(h)**

Reference (°C)	Measured (°C)	Allowable Min	Allowable Max	Range
20.94 (i)	20.94 (j)	20.14 (k)	22.14 (k)	22.14 (k)
				(l) PASS

(n) Pressure

Tolerance: ± 0.110 psia **(h)**

Reference (psia)	Measured (psia)	Allowable Min	Allowable Max	Range
14.44 (i)	14.44 (j)	14.33 (k)	14.55 (k)	14.55 (k)
21.55	21.56	21.44	21.66	21.66
				(l) PASS

Internal Calibration Reference(s) **(o)**

Measurement Type	Reference (FC1)	Due for Calibration
Flow	E005063	18-Oct-2016
Pressure	E005064	18-Oct-2016
Temperature	E005065	18-Oct-2016

Verified by: _____

(p) TSI Inc.
 500 Cardigan Rd
 55126 Shoreview USA

*Tolerance specified; whichever is greater

(q) Printed 30-Sep-2016 13:23, Ver 3.5.0.0

TSI does hereby certify that this flowmeter has been calibrated using TSI procedure 10000021269. The calibration of the reference standards maintain national laboratory traceability to National Institute of Standards & Technology (NIST).



- (a) Model**
The model number of the unit under test.
- (b) Serial Number**
The serial number of the unit under test.
- (c) Revision**
The hardware revision level of the unit under test.
- (d) Verification Date**
The date the verification data printed on the Calibration Certificate was taken.
- (e) Summary Status**
The results of the test data shown on the Calibration Certificate.
 - a. As-Found vs. As-Left**
Indicates what stage of the calibration process the data on the Calibration Certificate references to.
 - b. In Tolerance vs. Out of Tolerance**
Indicates if the unit under test was found to be In Tolerance or Pass the calibration test process or Out of Tolerance or Fail the calibration test process.
- (f) Environmental Conditions**
The recorded environmental conditions from the calibrator at the time of the test.
- (g) Gas**
The gas used while collecting the verification data for the table listed below.
- (h) Tolerance**
The allowable variability between the Actual and Measured data that results in a passing test.
- (i) Reference**
This column is the actual flow rate indicated by the flow reference in SLPM.
- (j) Measured**
This column is the flow rate measured by the unit under test in SLPM.
- (k) Allowable Range**
This column shows the Min and Max values that the measured flow can fall between in order to achieve a passing test.
 - a. Min**
The minimum measured flow value that results in a passing test.
 - b. Max**
The maximum measured flow value that results in a passing test.
- (l) Pass or Fail**
Shows if the result of the calibration test for the gas designated at the top of that column was a Pass or Fail.
- (m) Temperature**
This column is the temperature received from the thermistor located within the unit under test.
- (n) Pressure**
This column is the absolute pressure received from the absolute pressure sensor located within the unit under test.
- (o) Internal Calibration References**
Displays the calibration references that TSI used during the verification testing of the unit under test.
 - a. Measurement Type**
Refers to the parameter being tested by the internal calibration reference.
 - b. Reference**
Refers to the TSI internal calibration reference.
 - c. Due for Calibration**
Shows the date that the TSI internal calibration reference is due for calibration.
- (p) Shipping Address**
The TSI Inc. shipping address.
- (q) Print Date**
The date the certificate was printed.

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