

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)	
<input type="checkbox"/> As-Found	<input checked="" type="checkbox"/> In Tolerance
<input checked="" type="checkbox"/> As-Left	<input type="checkbox"/> 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	Range
		Min	Max
0.562 (i)	0.548 (j)	0.512	0.612 (k)
2.055	2.042	2.005	2.105
6.004	5.992	5.899	6.109
14.50	14.47	14.25	14.75
28.90	28.89	28.39	29.41
45.52	45.59	44.72	46.32
61.57	61.48	60.49	62.65
79.96	79.94	78.56	81.36
100.0	100.5	98.29	101.8
125.1	125.2	122.9	127.3
160.1	160.4	157.3	162.9
200.2	200.2	196.7	203.7
240.0	240.0	235.8	244.2
280.6	280.7	275.7	285.6

(l) PASS

(g) Oxygen Flow

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

Reference (SLPM)	Measured (SLPM)	Allowable	Range
		Min	Max
0.533 (i)	0.518 (j)	0.483	0.563 (k)
2.059	2.050	2.009	2.109
5.966	5.966	5.862	6.070
14.45	14.46	14.20	14.70
28.94	28.98	28.43	29.44
45.55	45.56	44.75	46.35
61.49	61.44	60.42	62.57
80.22	80.23	78.81	81.62
98.98	99.47	97.24	100.7
125.1	125.3	122.9	127.3
160.1	160.5	157.3	162.9
199.8	199.8	196.3	203.3
240.5	240.7	236.3	244.7
281.3	281.5	276.4	286.3

(l) PASS

(m) Temperature

Tolerance: ± 1.000 °C **(h)**

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

(l) PASS

(n) Pressure

Tolerance: ± 0.110 psia **(h)**

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

(l) PASS

Internal Calibration Reference(s) (o)	
Measurement Type	Due for Calibration
Flow	18-Oct-2016
Pressure	18-Oct-2016
Temperature	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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USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
UK	Tel: +44 149 4 459200	China	Tel: +86 10 8219 7688
France	Tel: +33 1 41 19 21 99	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		