



## Service Report For Request 300451638

**Date Received:** 09 Sep 2022

**Date Completed:** 16 Sep 2022

**Sold-To Customer:** 13955  
Deha-Haan & Wittmer GmbH  
Keltenstrasse 8  
71296 Heimsheim  
Germany

**Ship-To Customer:** 13955  
Gabi Mueller  
Deha-Haan & Wittmer GmbH  
Keltenstrasse 8  
71296 Heimsheim  
Germany

**Customer PO:** 1126

**Service Performed:** CL-4143 Kalibrierung Flowmeter 4143

**Model Serviced:** 4143 Flowmeter, 20 L/min, Air,O2,N2 3/8 inch

**Serial Number:** 41432039003

### CUSTOMER RETURN REASON:

Kalibrieren

**CUSTOMER RETURN REASON CONFIRMED:** YES

**AS FOUND RESULT:** FAIL

### TECHNICIAN:

Mahboob Hussain

### TECHNICIAN'S FINDINGS:

No findings observed.

### TECHNICIAN'S ACTIONS:

The following action items were taken to ensure proper operation:

The unit was cleaned, calibrated and a complete operational checkout was performed.

### TSI STANDARD TASKS PERFORMED:

Through our quality policy we ensure that the best services are available to our customers. Below is a checklist of standard tasks that are performed on your instrument:

- As-Found calibration (if possible)
- Clean/replace mesh screen & o-rings
- End-to-end leak check
- As-Left calibration with NIST/UKAS traceable calibration, including performance evaluation against proprietary TSI calibration bench
- Clean flow sensor & thermistor
- Upgrade firmware (if applicable)
- Clean inlets, flowbody & cover



TSI GmbH  
Neuköllner Straße 4  
52068 Aachen  
Germany

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### TSI QUALITY COMMITMENT

#### TSI VISION

Creating a better world by helping protect people, products and the environment, and by optimizing research and industrial processes.

#### TSI MISSION

TSI provides trusted measurement, application guidance, and data analytics solutions that enable our customers to make informed decisions.

#### OUR QUALITY POLICY

The employees of TSI are committed to meet and, where possible, exceed our customer's requirements for application guidance, precision measurement solutions and data management through the continual improvement of our products and processes.



Thank you for the opportunity to service your instrument.



# Mass Flowmeter Calibration Certificate

Model: 4143  
Serial Number: 41432039003  
As Found date: 16-Sep-2022

Rev: F

Summary Status	
<input checked="" type="checkbox"/> As-Found	<input type="checkbox"/> In Tolerance
<input type="checkbox"/> As-Left	<input checked="" type="checkbox"/> Out of Tolerance

Environmental Conditions
Pressure: 99.9 kPa
Temperature: 20.4 °C

## Air Flow

Tolerance:  $\pm(2.00\%$  of reading or 0.005 SLPM\*)

Reference Measured (SLPM)	Allowable Range	
	Min	Max
0.052	0.047	0.057
0.163	0.158	0.168
0.286	0.280	0.292
0.404	0.411	0.396
1.009	1.024	0.989
1.981	2.006	1.941
3.679	3.724	3.605
7.439	7.507	7.290
14.87	14.93	14.57
19.98	19.99	19.58

FAIL

## Oxygen Flow

Tolerance:  $\pm(2.00\%$  of reading or 0.005 SLPM\*)

Reference Measured (SLPM)	Allowable Range	
	Min	Max
0.049	0.050	0.044
0.153	0.157	0.148
0.287	0.294	0.281
0.455	0.462	0.446
0.992	1.019	0.972
1.992	2.031	1.952
3.730	3.770	3.655
7.486	7.584	7.336
14.95	15.01	14.65
19.95	20.00	19.55

FAIL

## Pressure

Tolerance:  $\pm 0.145$  psia

Reference Measured (psia)	Allowable Range	
	Min	Max
14.49	14.49	14.34
21.84	21.86	21.69

PASS

## Temperature

Tolerance:  $\pm 1.000$  °C

Reference Measured (°C)	Allowable Range	
	Min	Max
20.12	20.49	19.12

PASS

## Internal Calibration Reference(s)

Measurement Type	Reference (FC12)	Due for Calibration
Flow	UKFC12	31-Oct-2022
Pressure	UKFC12P	31-Oct-2022
Temperature	UKFC12T	31-Oct-2022

TSI Std Conditions: 70 °F (21.11 °C) and 14.7 psia

Calibrated by:

Emile Pietersen

TSI Instruments Ltd.  
Stirling Road  
High Wycombe, Bucks HP12 3ST UK

\*Tolerance specified: whichever is greater

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 members of the European co-operation for Accreditation (EA).



# Mass Flowmeter Calibration Certificate

**Model:** 4143  
**Serial Number:** 41432039003  
**Verification date:** 16-Sep-2022

**Rev:** F

Summary Status	
<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	
Pressure:	99.9 kPa
Temperature:	20.6 °C

## Air Flow

Tolerance:  $\pm(1.75\%$  of reading or 0.005 SLPM\*)

Reference Measured (SLPM)	Allowable Range	
	Min	Max
0.052	0.047	0.057
0.164	0.159	0.169
0.285	0.280	0.290
0.403	0.396	0.410
0.998	0.981	1.016
2.011	1.976	2.046
3.732	3.716	3.797
7.436	7.423	7.566
14.97	14.95	15.24
19.95	19.90	20.30
PASS		

## Oxygen Flow

Tolerance:  $\pm(1.75\%$  of reading or 0.005 SLPM\*)

Reference Measured (SLPM)	Allowable Range	
	Min	Max
0.049	0.048	0.054
0.154	0.154	0.159
0.290	0.289	0.295
0.460	0.455	0.468
1.004	1.001	1.022
2.005	1.995	2.040
3.758	3.739	3.824
7.490	7.517	7.621
14.89	14.89	15.16
19.88	19.89	20.23
PASS		

## Pressure

Tolerance:  $\pm 0.110$  psia

Reference Measured (psia)	Allowable Range	
	Min	Max
14.49	14.48	14.60
21.86	21.86	21.97
PASS		

## Temperature

Tolerance:  $\pm 1.000$  °C

Reference Measured (°C)	Allowable Range	
	Min	Max
20.40	20.67	19.40
PASS		

## Internal Calibration Reference(s)

Measurement Type	Reference (FC12)	Due for Calibration
Flow	UKFC12	31-Oct-2022
Pressure	UKFC12P	31-Oct-2022
Temperature	UKFC12T	31-Oct-2022

TSI Std Conditions: 70 °F (21.11 °C) and 14.7 psia

**Calibrated by:**

  
Mahboob Hussain

**TSI Instruments Ltd.**  
**Stirling Road**  
**High Wycombe, Bucks HP12 3ST UK**

\*Tolerance specified: whichever is greater

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