

## CALIBRATION CERTIFICATE # 500

Calibration date : 2011-02-23

Certificate issued : 2012-04-18

Company name  
Company address  
City, Province, Canada

Calibration of  
Mass flow meter Brooks SLA5851S S/N : ABCD1

### QUALITY PROGRAM CONFORMANCE

All calibrations are performed in accordance with Polycontrols Laboratory Quality Assurance Manual and conform to ISO/IEC 17025 ó 2005, ISO 9001 ó 2008 and/or other quality requirements defined in customers purchase descriptions.

### TRACEABILITY

The traceability for flow standard to the National Institute of Standards and Technology, NIST, is maintained by Fluke DH Instruments of Phoenix, Arizona and conform to ISO/IEC 17025, ANSI/NCSL Z540-1-1994, ISO-10012-1 and MIL-STD 45662A.

The Calibration Laboratory Assessment Service (CLAS) of the National Research Council of Canada (NRC) has assessed and certified specific calibration capabilities of this laboratory and traceability to the International System of Units (SI) or to standards acceptable to the CLAS program. This certificate of calibration is issued in accordance with the conditions of certification granted by CLAS and the conditions of accreditation granted by the Standards Council of Canada (SCC). Neither CLAS nor SCC guarantee the accuracy of individual calibrations by accredited laboratories.

### CALIBRATION AND MEASUREMENT CAPABILITY

References used for flow calibration have an uncertainty of  $\pm 0.2\%$  of reading for a flow range between 5 SCCM to 10 SLPM,  $\pm 0.3\%$  of reading for a flow range between 10 SLPM to 30 SLPM,  $\pm 0.2\%$  of reading for a flow range between 30 SLPM to 3000 SLPM,  $\pm 0.3\%$  of reading for a flow range above 3000 SLPM to 6000 SLPM and  $\pm 0.5\%$  of reading for a flow range under 5 SCCM down to 1 SCCM. Test and reference uncertainties are given with a coverage factor of 2 for a 95% level of confidence, air or nitrogen equivalent. The test uncertainty ratio (TUR) of this calibration is at least 4:1 unless otherwise stated.

### CONDITION SUMMARY OF THE DEVICE UNDER TEST

Initial conditions	In good condition
Work done	Cleaning and calibration
Results	Initial readings: refer to graphic Final readings in tolerance
Remarks	

\_\_\_\_\_  
Metrologist

\_\_\_\_\_  
Laboratory Manager

### Calibration certificate # 500

Serial Number:	ABCD1	Test stand:	1
Calibration Date:	2011-02-23	Procedure:	POS-CAL-002
Instrument ID:			

### Standard equipment used for initial calibration

Description	Model	Serial #	Traceability	Due date
DHI molbloc (30 slpm)	3E4-VCR-V-Q	2359	1312978800	2012-08-11
DHI molbloc (30 slpm)	3E4-VCR-V-Q	3444	1500129891	2013-01-31
DHI molbloc (10 slpm)	1E4-VCR-V-Q	2969	1500129957	2013-02-02
DHI molbox1	Molbox1	755	1500127420	2012-12-05
Fluke Calibrator	726	9007012	271216	2012-06-15

### Initial specifications of the device under test

### Calibration conditions

Gas	N2	Gas	N2
Operation temperature	20 °C	Ambient temperature	20 °C
Inlet pressure	40 PSIG	Ambient pressure	1013.25 mbar
Outlet pressure	20 PSIG	Gas temperature	22 °C
Reference temperature	21.11 °C	Inlet pressure	40 PSIG
Reference pressure	1013.25 mbar	Outlet pressure	20 PSIG
Range	0-20 SLPM	Correction factor	1
Input/Output signal	4-20 mA	Orientation	Horizontal
Supply	24 VDC	Seals	Viton
Accuracy	±1 % O.R. OR ±0.2 % F.S.	Valve	Viton

### Initial readings

Device under test		Flow reference	Calculated Error	Acceptable Error	TUR
mA	SLPM	SLPM	SLPM	SLPM	
4.000	0.000	0.0000			
4.800	1.000	1.0240	-0.024	0.040	>4
5.600	2.000	2.0245	-0.025	0.040	>4
8.000	5.000	5.0146	-0.015	0.050	>4
12.000	10.000	10.0345	-0.034	0.100	3.32
16.000	15.000	15.1100	-0.110	0.151	3.32
20.000	20.000	20.2500	-0.250	0.203	3.32

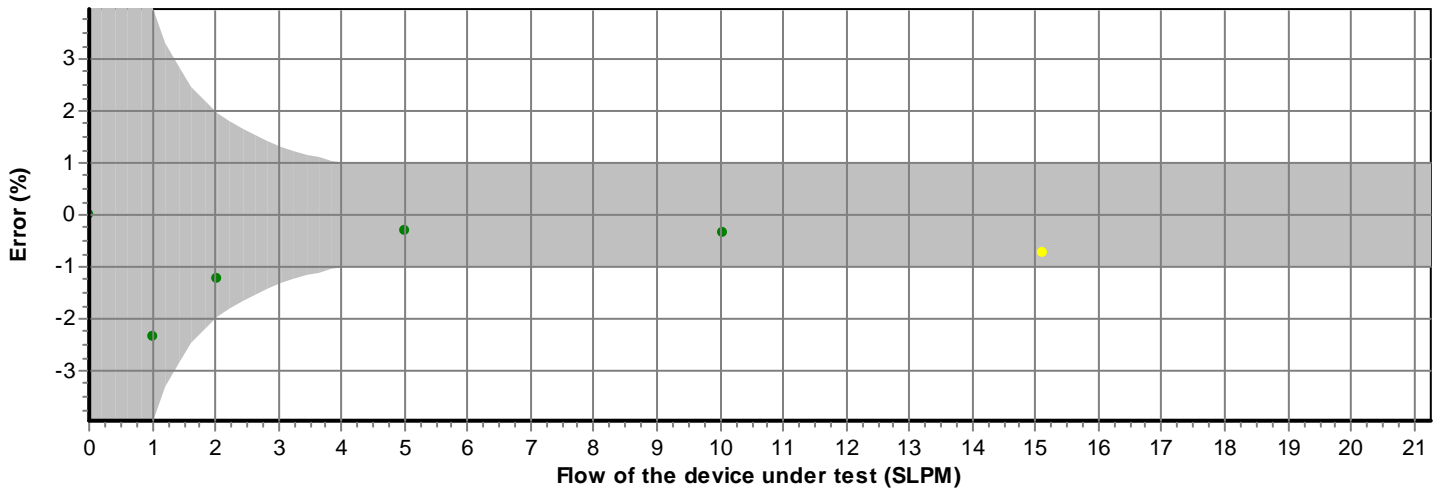
PC  
Metrologist

Signature

## Calibration certificate # 500

Serial Number:	ABCD1	Test stand:	1
Calibration Date:	2011-02-23	Procedure:	POS-CAL-002
Instrument ID:			

### Initial results



- The measurement result is within the specification limit when the measurement uncertainty is taken into account
- The measurement result is outside the specification limit when the measurement uncertainty is taken into account
- It is not possible to state compliance using a 95 % coverage probability for the expanded uncertainty although the measurement result is below the limit (ILAC G8)

PC \_\_\_\_\_  
Metrologist

\_\_\_\_\_  
Signature

## Calibration certificate # 500

Serial Number:	ABCD1	Test stand:	1
Calibration date:	2011-02-23	Procedure:	POS-CAL-002
Instrument ID:			

## Standard equipment used for final calibration

Description	Model	Serial #	Traceability	Due date
DHI molbloc (10 slpm H2)	5E3-VCR-V-Q	2473	1500127617	2012-12-02
DHI molbloc (30 slpm)	3E4-VCR-V-Q	2359	1312978800	2012-08-11
DHI molbox1	Molbox1	755	1500127420	2012-12-05
Fluke Calibrator	726	9007012	271216	2012-06-15

## Final specifications of the device under test

## Calibration conditions

Gas	N2	Gas	N2
Operation temperature	20 °C	Ambient temperature	20 °C
Inlet pressure	40 PSIG	Ambient pressure	1013.25 mbar
Outlet pressure	20 PSIG	Gas temperature	20 °C
Reference temperature	21.11 °C	Inlet pressure	40 PSIG
Reference pressure	1013.25 mbar	Outlet pressure	20 PSIG
Range	0-20 SLPM	Correction factor	1
Input/Output signal	4-20 mA	Orientation	Horizontal
Supply	24 VDC	Seals	Viton
Accuracy	±1 % O.R. OR ±0.2 % F.S.	Valve	Viton

## Final readings

Device under test		Flow reference	Calculated Error	Acceptable Error	TUR
mA	SLPM	SLPM	SLPM	SLPM	
4.000	0.000	0.0010			
4.800	1.000	0.9941	0.006	0.040	>4
5.600	2.000	1.9905	0.010	0.040	>4
8.000	5.000	4.9810	0.019	0.050	>4
12.000	10.000	9.9746	0.025	0.100	3.32
16.000	15.000	14.9504	0.050	0.150	3.32
20.000	20.000	19.9715	0.029	0.200	3.32

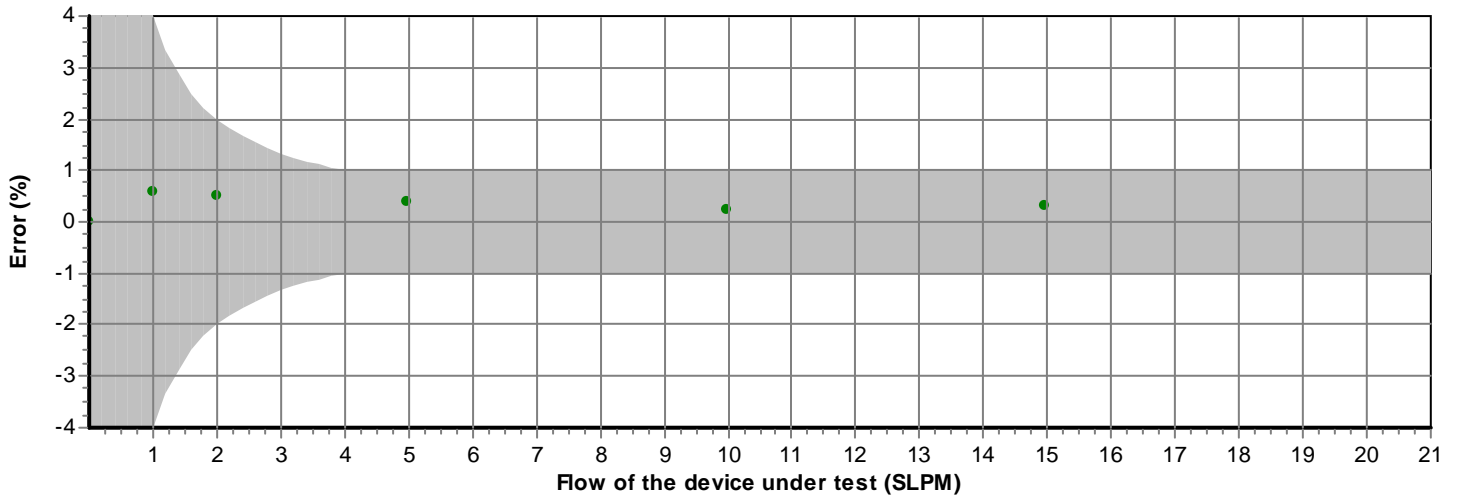
PC  
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Signature

## Calibration certificate # 500

Serial Number:	ABCD1	Test stand:	1
Calibration date:	2011-02-23	Procedure:	POS-CAL-002
Instrument ID:			

### Final results



- The measurement result is within the specification limit when the measurement uncertainty is taken into account
- The measurement result is outside the specification limit when the measurement uncertainty is taken into account
- It is not possible to state compliance using a 95 % coverage probability for the expanded uncertainty although the measurement result is below the limit (ILAC G8)

PC \_\_\_\_\_  
Metrologist

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Signature