

CERTIFICATE OF CALIBRATION

A UKAS accredited Calibration Laboratory No 0698

ISSUED BY: Sartorius UK Limited
DATE OF ISSUE: 13 July 2017
CERTIFICATE NUMBER: MB_4445_1



Sartorius UK Limited
T/A Pipette Doctor
Longmead Business Centre
Epsom
Surrey
KT19 9QQ

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Approved Signatory Name:

Richard Gibson-Brown, Andy Vaughan,
Michael Bicknell, Hugo Jansen van Vuuren

Signature:

Client:

Sartorius UK Limited
T/A Pipette Doctor
Longmead Business Centre
Epsom, Surrey
KT19 9QQ

Calibration Date: July 13, 2017

Location: Epsom Laboratory

Device Description:

Make: Sartorius
Volume: 100 - 1000 µL
Model: mLINE
Serial Number: 14619169

Calibration Method

The device was calibrated by filling it with AnalaR NORMAPUR water, produced with reversed osmosis and CDI, and determining the weight of water delivered in general accordance with ISO 8655. Delivery was by the forward pipetting technique (Discharge by one full movement of the piston) and by "touching off" when aspirating.

The calibration was carried out by aspirating the indicated volume 10 times
The disposable tips used during the calibration were supplied by the Service Centre

Balance:	Sartorius	Tip Manufacturer:	Biohit
Serial Number:	32203363	Tip Type:	Biohit Standard Tip
Certificate Number:	MSA225S_220g_2103	Tip Volume:	1000 µl

Table of Results

The table of results can be found on the continuation page(s)

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements

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Calibration Type: Pre Calibration "As Found"

Set Volume in μL	100	500	1000
Corrected Values in μL	100.0593	499.1032	995.4384
	99.9390	498.7823	995.3181
	99.9189	498.8926	995.2178
	100.1396	498.6619	995.3181
	100.1095	498.7823	994.9871
	100.2098	498.5416	994.8668
	100.0894	498.8324	995.0774
	100.0192	498.7923	995.5187
	99.9761	499.1032	995.0674
	99.8939	499.0430	994.9771
	Mean	100.04	μL 498.85
Standard Deviation	0.10	μL 0.19	μL 0.22
Inaccuracy	0.035	% -0.23	% -0.48
Imprecision	0.10	% 0.037	% 0.022
Uncertainty	0.45 μL	1.45 μL	3.03 μL

Environmental Conditions:

Barometric Pressure: 1025 hPa
Temperature: 20.2 Celsius
Z Correction Factor: 1.0029

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Calibration Results

Set Volume in μL	100	500	1000
Corrected Values in μL	100.4104	499.6749	997.4442
	100.4404	499.7050	997.3339
	100.4505	499.6548	997.3139
	100.4204	499.5946	997.2537
	100.3301	499.6348	997.2838
	100.3502	499.5746	997.1885
	100.3803	499.7150	997.2687
	100.7614	499.6147	997.1594
	100.4003	499.6488	997.2376
	100.4214	499.6117	997.2096
Mean	100.44	μL 499.64	μL 997.27
Standard Deviation	0.12	μL 0.046	μL 0.082
Inaccuracy	0.44	% -0.071	% -0.27
Imprecision	0.12	% 0.0092	% 0.0082
Uncertainty	0.47 μL	1.4 μL	3 μL

Calibrated In Accordance With: ISO8655 Specification (Maximum permissible errors)
(Not taking into account the uncertainties of measurements stated above.)

Environmental Conditions:

Barometric Pressure: 1025 hPa
Temperature: 20.2 Celsius
Z Correction Factor: 1.0029

Additional Comments:

Test Specification:

100 μL : Inaccuracy \pm 8%, Imprecision \leq 3%
 500 μL : Inaccuracy \pm 1.6%, Imprecision \leq 0.6%
 1000 μL : Inaccuracy \pm 0.8%, Imprecision \leq 0.3%

The disposable tips were not changed between aliquots
 This pipette was adjusted prior to calibration

Calibrator: Michael Bicknell

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