

Certificate of Calibration

Device Under Test		Calibration Device	
Model:	ML600 DUAL,SYRINGE PUMP ASSY	Name:	Mitutoyo 543-564A
Part #:	61502-01	Model:	ID-H0560
Serial #:	ML600BE1742	Serial #:	10009711
Description:	ML-600 Universal Syringe Pump	N.I.S.T #:	821/487256-08
		Accuracy:	+/-0.0025mm
		Calibration Due:	05/31/2024

Accuracy Specifications:

- +/- 1% Of Reading @ \geq 30% of Full Stroke Dispense (60mm)
- +/- 1.2% Of Reading @ \geq 5% of Full Stroke Dispense (60mm)
- +/- 3% Of Reading @ \geq 1% of Full Stroke Dispense (60mm)

Right Syringe Drive Calibration Result: **PASS**

Right Syringe Drive Test Data Summary

Command Instance	Actual 1% Stroke 0.600 mm Command	Actual 5% Stroke 3.00 mm Command	Actual 30% Stroke 18.00 mm Command
1	0.5970	2.9980	18.0015
2	0.5965	2.9970	18.0010
3	0.5965	2.9970	18.0045
4	0.5965	2.9975	18.0045
5	0.5970	2.9970	18.0055
6	0.5970	2.9970	18.0055
7	0.5970	2.9970	18.0040
8	0.5970	2.9970	18.0065
9	0.5970	2.9970	18.0065
10	0.5970	2.9975	18.0060
% Allowable Precision / % Actual Precision	1.5% / 0.039%	0.5% / 0.011%	0.2% / 0.010%
% Allowable Accuracy / Actual Accuracy	+/- 3% / -0.528%	+/- 1.2% / -0.093%	+/- 1% / 0.025%
Result	PASS	PASS	PASS

Representative Dispensed Volume, 1mL Syringe*

Description	Actual 1% Stroke 10.000 uL Command	Actual 5% Stroke 50.000 uL Command	Actual 30% Stroke 300.000 uL Command
Maximum Average Dispense (uL)	10.007	50.250	301.860
Minimum Average Dispense (uL)	9.919	49.809	299.210
% Allowable Accuracy / % Dispense Accuracy @ Maximum Allowable Syringe Diameter	+/- 3% / 0.066%	+/- 1.2% / 0.498%	+/- 1% / 0.616%
% Allowable Accuracy / % Dispense Accuracy @ Minimum Allowable Syringe Diameter	+/- 3% / -0.819%	+/- 1.2% / -0.383%	+/- 1% / -0.264%

*Representative Dispensed Volume Table is intended to extrapolate measured linear displacement data to the representative dispensed volume from a Hamilton 1mL syringe. Maximum and minimum volumes are calculated from specified syringe barrel inside diameter limits. Accuracy is shown for barrel maximum and minimum inside diameters. Complete data set for each device is on file at Hamilton Company and available upon request.

Electronic Signature By: 2853

Date of Calibration: 08/22/2023

The product specified above has been calibrated at ambient pressure. The calibration is performed pursuant to ANSI/NCSS Z 540.3.2007, with an unbroken chain of calibrations traceable to N.I.S.T.

Certificate of Calibration

Device Under Test		Calibration Device	
Model:	ML600 DUAL,SYRINGE PUMP ASSY	Name:	Mitutoyo 543-564A
Part #:	61502-01	Model:	ID-H0560
Serial #:	ML600BE1742	Serial #:	10009709
Description:	ML-600 Universal Syringe Pump	N.I.S.T #:	821/487256-08
		Accuracy:	+/-0.0025mm
		Calibration Due:	05/31/2024

Accuracy Specifications:

- +/- 1% Of Reading @ \geq 30% of Full Stroke Dispense (60mm)
- +/- 1.2% Of Reading @ \geq 5% of Full Stroke Dispense (60mm)
- +/- 3% Of Reading @ \geq 1% of Full Stroke Dispense (60mm)

Left Syringe Drive Calibration Result: **PASS**

Left Syringe Drive Test Data Summary

Command Instance	Actual 1% Stroke 0.600 mm Command	Actual 5% Stroke 3.00 mm Command	Actual 30% Stroke 18.00 mm Command
1	0.5995	2.9995	18.0010
2	0.5995	2.9995	18.0005
3	0.5995	3.0000	18.0020
4	0.5995	3.0000	18.0015
5	0.5995	3.0000	18.0015
6	0.5995	3.0000	18.0000
7	0.6000	3.0000	18.0005
8	0.5995	3.0000	18.0005
9	0.6000	3.0000	18.0010
10	0.5995	3.0000	17.9990
% Allowable Precision / % Actual Precision	1.5% / 0.033%	0.5% / 0.007%	0.2% / 0.004%
% Allowable Accuracy / Actual Accuracy	+/- 3% / -0.067%	+/- 1.2% / -0.003%	+/- 1% / 0.004%
Result	PASS	PASS	PASS

Representative Dispensed Volume, 1mL Syringe*

Description	Actual 1% Stroke 10.000 uL Command	Actual 5% Stroke 50.000 uL Command	Actual 30% Stroke 300.000 uL Command
Maximum Average Dispense (uL)	10.053	50.296	301.796
Minimum Average Dispense (uL)	9.965	49.854	299.147
% Allowable Accuracy / % Dispense Accuracy @ Maximum Allowable Syringe Diameter	+/- 3% / 0.525%	+/- 1.2% / 0.588%	+/- 1% / 0.595%
% Allowable Accuracy / % Dispense Accuracy @ Minimum Allowable Syringe Diameter	+/- 3% / -0.356%	+/- 1.2% / -0.293%	+/- 1% / -0.285%

*Representative Dispensed Volume Table is intended to extrapolate measured linear displacement data to the representative dispensed volume from a Hamilton 1mL syringe. Maximum and minimum volumes are calculated from specified syringe barrel inside diameter limits. Accuracy is shown for barrel maximum and minimum inside diameters. Complete data set for each device is on file at Hamilton Company and available upon request.

Electronic Signature By: 2853

Date of Calibration: 08/22/2023

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