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 #:	ML600EM7903	Serial #:	10009715
Description:	ML-600 Universal Syringe Pump	N.I.S.T #:	821/487256-08
		Accuracy:	+/-0.0025mm
		Calibration Due:	05/31/2023

Accuracy Specifications:
+/- 1% Of Reading @ ≥ 30% of Full Stroke Dispense (60mm)
+/- 1.2% Of Reading @ ≥ 5% of Full Stroke Dispense (60mm)
+/- 3% Of Reading @ ≥ 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	0.5895	2.9940	17.9860
2	0.5900	2.9940	17.9860
3	0.5910	2.9940	17.9800
4	0.5915	2.9940	17.9865
5	0.5915	2.9950	17.9890
6	0.5915	2.9955	17.9935
7	0.5920	2.9945	18.0030
8	0.5920	2.9945	18.0105
9	0.5920	2.9950	18.0125
10	0.5925	2.9955	18.0140
% Allowable Precision / % Actual Precision	**1.5% / 0.152%**	**0.5% / 0.019%**	**0.2% / 0.067%**
%Allowable Accuracy / Actual Accuracy	**+/- 3% / -1.463%**	**+/- 1.2% / -0.180%**	**+/- 1% / -0.022%**
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)	9.914	50.207	301.718
Minimum Average Dispense (uL)	9.827	49.766	299.070
%Allowable Accuracy / %Dispense Accuracy @ Maximum Allowable Syringe Diameter	**+/- 3% / -0.863%**	**+/- 1.2% / 0.412%**	**+/- 1% / 0.569%**
%Allowable Accuracy / %Dispense Accuracy @ Minimum Allowable Syringe Diameter	**+/- 3% / -1.756%**	**+/- 1.2% / -0.470%**	**+/- 1% / -0.311%**

*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: 11/11/2022

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

Hamilton Company
4970 Energy Way, Reno
Nevada 89502 USA
Toll Free 800-648-5950
Fax +1-775-856-7259
Telephone +1-775-858-3000

Hamilton Central Europe S.R.L.
str. Hamilton no. 2-4
307210 Giarmata, Romania
Fax +40-356-635-060
Telephone +40-356-635-055

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 #:	ML600EM7903	Serial #:	10009707
Description:	ML-600 Universal Syringe Pump	N.I.S.T #:	821/487256-08
		Accuracy:	+/-0.0025mm
		Calibration Due:	05/31/2023

Accuracy Specifications:
+/- 1% Of Reading @ ≥ 30% of Full Stroke Dispense (60mm)
+/- 1.2% Of Reading @ ≥ 5% of Full Stroke Dispense (60mm)
+/- 3% Of Reading @ ≥ 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	0.5940	2.9895	18.0255
2	0.5940	2.9895	18.0245
3	0.5940	2.9895	18.0245
4	0.5940	2.9905	18.0200
5	0.5945	2.9905	18.0205
6	0.5940	2.9910	18.0190
7	0.5945	2.9910	18.0190
8	0.5940	2.9905	18.0160
9	0.5940	2.9910	18.0140
10	0.5945	2.9905	18.0150
% Allowable Precision / % Actual Precision	**1.5% / 0.039%**	**0.5% / 0.020%**	**0.2% / 0.021%**
%Allowable Accuracy / Actual Accuracy	**+/- 3% / -0.985%**	**+/- 1.2% / -0.323%**	**+/- 1% / 0.110%**
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)	9.961	50.135	302.115
Minimum Average Dispense (uL)	9.874	49.695	299.464
%Allowable Accuracy / %Dispense Accuracy @ Maximum Allowable Syringe Diameter	**+/- 3% / -0.388%**	**+/- 1.2% / 0.270%**	**+/- 1% / 0.700%**
%Allowable Accuracy / %Dispense Accuracy @ Minimum Allowable Syringe Diameter	**+/- 3% / -1.277%**	**+/- 1.2% / -0.613%**	**+/- 1% / -0.179%**

*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: 11/11/2022

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