

# Certificate of Calibration

<u>Device Under Test</u>		<u>Calibration Device</u>	
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:	05/31/2025

**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	0.5960	2.9980	18.0250
2	0.5955	2.9985	18.0260
3	0.5955	2.9985	18.0265
4	0.5960	2.9990	18.0275
5	0.5960	2.9985	18.0280
6	0.5960	2.9985	18.0275
7	0.5965	2.9995	18.0275
8	0.5965	2.9995	18.0275
9	0.5965	2.9995	18.0280
10	0.5965	2.9995	18.0270
<b>% Allowable Precision / % Actual Precision</b>	<b>1.5% / 0.062%</b>	<b>0.5% / 0.018%</b>	<b>0.2% / 0.005%</b>
<b>%Allowable Accuracy / Actual Accuracy</b>	<b>+/- 3% / -0.654%</b>	<b>+/- 1.2% / -0.037%</b>	<b>+/- 1% / 0.150%</b>
<b>Result</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**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)	9.994	50.279	302.237
Minimum Average Dispense (uL)	9.906	49.838	299.584
<b>%Allowable Accuracy / %Dispense Accuracy @ Maximum Allowable Syringe Diameter</b>	<b>+/- 3% / -0.059%</b>	<b>+/- 1.2% / 0.554%</b>	<b>+/- 1% / 0.740%</b>
<b>%Allowable Accuracy / %Dispense Accuracy @ Minimum Allowable Syringe Diameter</b>	<b>+/- 3% / -0.945%</b>	<b>+/- 1.2% / -0.326%</b>	<b>+/- 1% / -0.139%</b>

\*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: 10/07/2024

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.



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F-533 REV. A

P/N 2297-01 (Rev. F)



# 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:	05/31/2025

**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	0.5955	3.0005	18.0105
2	0.5970	3.0005	18.0100
3	0.5980	3.0005	18.0100
4	0.5980	3.0000	18.0100
5	0.5980	3.0005	18.0095
6	0.5980	3.0000	18.0090
7	0.5985	3.0005	18.0085
8	0.5985	3.0005	18.0085
9	0.5985	3.0005	18.0085
10	0.5985	3.0005	18.0080
<b>% Allowable Precision / % Actual Precision</b>	<b>1.5% / 0.151%</b>	<b>0.5% / 0.007%</b>	<b>0.2% / 0.004%</b>
<b>%Allowable Accuracy / Actual Accuracy</b>	<b>+/- 3% / -0.360%</b>	<b>+/- 1.2% / 0.013%</b>	<b>+/- 1% / 0.051%</b>
<b>Result</b>	<b>PASS</b>	<b>PASS</b>	<b>PASS</b>

**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)	10.023	50.304	301.938
Minimum Average Dispense (uL)	9.935	49.862	299.288
<b>%Allowable Accuracy / %Dispense Accuracy @ Maximum Allowable Syringe Diameter</b>	<b>+/- 3% / 0.233%</b>	<b>+/- 1.2% / 0.604%</b>	<b>+/- 1% / 0.642%</b>
<b>%Allowable Accuracy / %Dispense Accuracy @ Minimum Allowable Syringe Diameter</b>	<b>+/- 3% / -0.650%</b>	<b>+/- 1.2% / -0.276%</b>	<b>+/- 1% / -0.238%</b>

\*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.

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