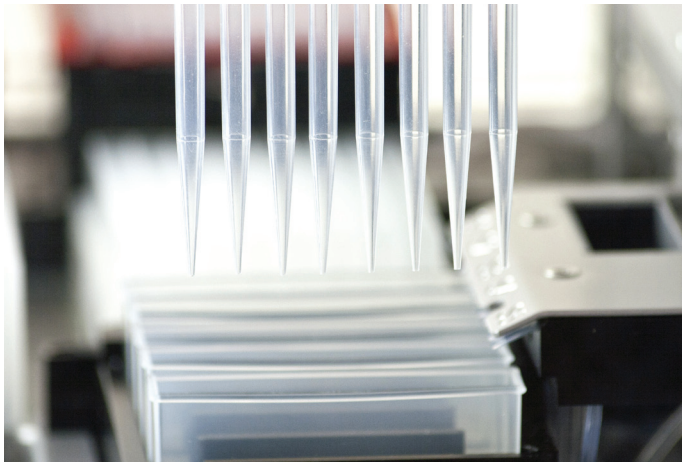
Biotage® Extrahera™ Precision and Accuracy Performance

This document details an example of the pipetting precision and accuracy data for four specified volumes across 24 (4 x 6) positions.

Experimental Design

- Precision and accuracy were tested by separately measuring the volume of 24 transfers of 50 µL, 100 µL, 500 µL and 1000 µL.
- Water was dispensed sequentially (4 channels simultaneously) starting with column 1 (positions A1-D1) and ending with column 6 (positions A6-D6).
- Performance was assessed by measuring the weights of 24 collection tubes before and after the addition of purified water.
- Volume data was generated for each position using temperature corrected density values.



Because of the low volumes and weights involved, correction factors for temperature and evaporation rate were applied:

1. Correction for Evaporation

a. The first 4 tubes (position A1-D1) were re-weighed after all 24 tubes had been measured.

b. Evaporation rate was calculated as the average weight loss measured in these tubes divided by the number of minutes taken for 24 weight measurements.

c. This was then multiplied by the time taken between sample addition and weighing for each tube.

d. The mass of water calculated to have evaporated was then added to the unadjusted weight

2. Temperature Correction

a. Water temperature was measured inside the Extrahera cabinet, to reflect that being dispensed.

b. An accurate density was calculated for water at this temperature.

Table 1. Summary Data

Specified Volume (µL)	Average Measured Volume (µL) n=24	Standard Deviation	Specified Precision (% RSD)	Measured Precision (% RSD)	Specified Accuracy (Error ± %)	Measured Accuracy (Error ± %)
50	50.6	0.20	1.0	0.39	2.0	1.14
100	99.4	0.43	1.0	0.43	2.0	- 0.61
500	497	0.92	1.0	0.18	1.5	- 0.63
1000	997	1.65	1.0	0.17	1.0	- 0.34

Precision and Accuracy with 50 µL Transfer Volume

Table 2. Weight of empty tubes

	1	2	3	4	5	6
A	4.5901	4.6720	4.6421	4.6205	4.6821	4.5972
B	4.6666	4.5714	4.6431	4.6435	4.6114	4.6597
C	4.6391	4.6016	4.6528	4.6554	4.6622	4.6250
D	4.6918	4.6506	4.6739	4.6536	4.6498	4.5853

Table 3. Weight of tubes plus 50 µL deionized water

	1	2	3	4	5	6
A	4.6405	4.7225	4.6923	4.6704	4.7326	4.6477
B	4.7169	4.6218	4.6933	4.6936	4.6617	4.7097
C	4.6892	4.6521	4.7031	4.7057	4.7121	4.6755
D	4.7420	4.7011	4.7243	4.7038	4.7003	4.6356

Table 4. Weight of water (g) unadjusted

	1	2	3	4	5	6
A	0.0504	0.0505	0.0502	0.0499	0.0505	0.0505
B	0.0503	0.0504	0.0502	0.0501	0.0503	0.0500
C	0.0501	0.0505	0.0503	0.0503	0.0499	0.0505
D	0.0502	0.0505	0.0504	0.0502	0.0505	0.0503

Table 5. Weight of water (g) corrected for evaporation between dispensing and weighing (1.929 mg/h)

	1	2	3	4	5	6
A	0.0505	0.0506	0.0503	0.0501	0.0507	0.0507
B	0.0504	0.0505	0.0503	0.0503	0.0505	0.0502
C	0.0502	0.0506	0.0504	0.0505	0.0501	0.0507
D	0.0503	0.0506	0.0506	0.0504	0.0507	0.0505

Table 6. Water volume (mL) allowing for a density of 0.99754 g/mL at 23 °C

	1	2	3	4	5	6
A	0.0506	0.0507	0.0504	0.0502	0.0508	0.0508
B	0.0505	0.0506	0.0505	0.0504	0.0506	0.0504
C	0.0503	0.0507	0.0506	0.0506	0.0502	0.0509
D	0.0504	0.0507	0.0507	0.0505	0.0508	0.0507

Precision and Accuracy with 100 µL Transfer Volume

Table 7. Weight of empty tubes

	1	2	3	4	5	6
A	4.5909	4.6719	4.6422	4.6205	4.6823	4.5974
B	4.6667	4.5715	4.6366	4.6437	4.6115	4.6506
C	4.6392	4.6019	4.6528	4.6552	4.6622	4.6250
D	4.6818	4.6508	4.6739	4.6493	4.6498	4.5853

Table 8. Weight of tubes plus 100 µL deionized water

	1	2	3	4	5	6
A	4.6890	4.7710	4.7408	4.7191	4.7810	4.6959
B	4.7657	4.6706	4.7348	4.7424	4.7100	4.7492
C	4.7383	4.7008	4.7521	4.7549	4.7616	4.7246
D	4.7808	4.7499	4.7731	4.7485	4.7491	4.6844

Table 9. Weight of water (g) unadjusted

	1	2	3	4	5	6
A	0.0981	0.0991	0.0986	0.0986	0.0987	0.0985
B	0.0990	0.0991	0.0982	0.0987	0.0985	0.0986
C	0.0991	0.0989	0.0993	0.0997	0.0994	0.0996
D	0.0990	0.0991	0.0992	0.0992	0.0993	0.0991

Table 10. Weight of water (g) corrected for evaporation between dispensing and weighing (2.357 mg/h)

	1	2	3	4	5	6
A	0.0982	0.0992	0.0988	0.0988	0.0989	0.0988
B	0.0991	0.0992	0.0984	0.0989	0.0987	0.0989
C	0.0992	0.0990	0.0995	0.0999	0.0996	0.0999
D	0.0991	0.0993	0.0994	0.0994	0.0996	0.0994

Table 11. Water volume (mL) allowing for a density of 0.997422 g/mL at 23.5 °C

	1	2	3	4	5	6
A	0.0984	0.0995	0.0990	0.0990	0.0992	0.0990
B	0.0993	0.0995	0.0986	0.0992	0.0990	0.0991
C	0.0995	0.0993	0.0997	0.1002	0.0999	0.1001
D	0.0994	0.0995	0.0996	0.0997	0.0998	0.0997

Precision and Accuracy with 500 µL Transfer Volume

Table 12. Weight of empty tubes

	1	2	3	4	5	6
A	4.5906	4.6720	4.6423	4.6205	4.6822	4.5977
B	4.6668	4.5717	4.6362	4.6436	4.6113	4.6511
C	4.6393	4.6018	4.6526	4.6555	4.6620	4.6250
D	4.6817	4.6508	4.6739	4.6496	4.6497	4.5853

Table 13. Weight of tubes plus 500 µL deionized water

	1	2	3	4	5	6
A	5.0840	5.1665	5.1366	5.1153	5.1770	5.0922
B	5.1608	5.0661	5.1314	5.1391	5.1070	5.1466
C	5.1341	5.0971	5.1485	5.1515	5.1585	5.1215
D	5.1763	5.1461	5.1699	5.1451	5.1461	5.0816

Table 14. Weight of water (g) unadjusted

	1	2	3	4	5	6
A	0.4934	0.4945	0.4943	0.4948	0.4948	0.4945
B	0.4940	0.4944	0.4952	0.4955	0.4957	0.4955
C	0.4948	0.4953	0.4959	0.4960	0.4965	0.4965
D	0.4946	0.4953	0.4960	0.4955	0.4964	0.4963

Table 15. Weight of water (g) corrected for evaporation between dispensing and weighing (3.429 mg/h)

	1	2	3	4	5	6
A	0.4935	0.4947	0.4945	0.4951	0.4951	0.4949
B	0.4941	0.4946	0.4954	0.4958	0.4960	0.4959
C	0.4949	0.4955	0.4962	0.4963	0.4969	0.4969
D	0.4948	0.4955	0.4963	0.4958	0.4968	0.4967

Table 16. Water volume (mL) allowing for a density of 0.9973 g/mL at 24 °C

	1	2	3	4	5	6
A	0.4949	0.4960	0.4959	0.4964	0.4965	0.4962
B	0.4955	0.4959	0.4968	0.4971	0.4974	0.4972
C	0.4963	0.4968	0.4975	0.4977	0.4982	0.4983
D	0.4961	0.4969	0.4976	0.4972	0.4981	0.4981

Precision and Accuracy with 1000 µL Transfer Volume

Table 17. Weight of empty tubes

	1	2	3	4	5	6
A	4.5901	4.6718	4.6421	4.6209	4.6822	4.5975
B	4.6667	4.5715	4.6365	4.6439	4.6113	4.651
C	4.6393	4.6021	4.6528	4.6556	4.6623	4.6251
D	4.6817	4.6506	4.6738	4.6494	4.6498	4.5853

Table 18. Weight of tubes plus 1000 µL deionized water

	1	2	3	4	5	6
A	5.5808	5.6631	5.6334	5.6127	5.6752	5.5904
B	5.6582	5.5636	5.6296	5.6375	5.6060	5.6452
C	5.6321	5.5949	5.6474	5.6506	5.6584	5.6212
D	5.6736	5.6426	5.6671	5.6433	5.6447	5.5805

Table 19. Weight of water (g) unadjusted

	1	2	3	4	5	6
A	0.9907	0.9913	0.9913	0.9918	0.9930	0.9929
B	0.9915	0.9921	0.9931	0.9936	0.9947	0.9942
C	0.9928	0.9928	0.9946	0.9950	0.9961	0.9961
D	0.9919	0.9920	0.9933	0.9939	0.9949	0.9952

Table 20. Weight of water (g) corrected for evaporation between dispensing and weighing (4.071 mg/h))

	1	2	3	4	5	6
A	0.9909	0.9915	0.9916	0.9921	0.9934	0.9934
B	0.9917	0.9923	0.9934	0.9940	0.9951	0.9947
C	0.9930	0.9931	0.9949	0.9954	0.9965	0.9966
D	0.9921	0.9923	0.9936	0.9943	0.9954	0.9957

Table 21. Water volume (mL) allowing for a density of 0.997 g/mL at 25.2 °C

	1	2	3	4	5	6
A	0.9939	0.9945	0.9946	0.9951	0.9964	0.9963
B	0.9947	0.9953	0.9964	0.9970	0.9981	0.9977
C	0.9960	0.9961	0.9979	0.9984	0.9995	0.9996
D	0.9951	0.9953	0.9966	0.9973	0.9984	0.9987

Ordering Information

Description	Part Number	Quantity
Biotage Extrahera	414001	1
Configuration Kit 96 Positions	414007	1
Configuration Kit 24 Positions	414008	1
Service Agreement - Priority - Extrahera	SER-EX-SAP	
Service Agreement - Limited - Extrahera	SER-EX-SAL	
First Year Maintenance Package Extrahera	SER-EX-FYMP	
Installation Extrahera	SER-EX-IN	
IV/OV on site Extrahera	SER-EX-IVOV	
Biotage Disposable Tips 1000 µL Clear	414141	10 x Pk/96
Column Rack 24 x 6 mL (tabless)	413640SP	1
Column Rack 24 x 3 mL	414174SP	1
Column Rack 24 x 1 mL	414169SP	1
Column Rack 96 x 1 mL (tabless)	414253SP	1
Sample Rack 16 x 100 mm 24 Positions	414254SP	1
Sample Rack 13 x 100 mm 24 Positions	414255SP	1
Sample Rack 12 x 75 mm 24 Positions	414256SP	1
Collection Rack 18 mm 24 Positions	414257SP	1
Vacuum Pump ME1C, 100 to 230VAC 50/60Hz	356330	1
96-well Collection plate, 1 mL	121-5202	Pk/50
96-well Collection plate, 2 mL	121-5203	Pk/50
12 x 75 mm Test Tubes, Uncapped	C44651	Pk/1000
13 x 100 mm Test Tubes, Uncapped	C40707	Pk/1000
16 x 100 mm Test Tubes, Uncapped	C40708	Pk/1000
Solvent Reservoir 25 mL	414045SP	Pk/25
Flow Through Plate 24	414203SP	1
Flow Through Plate 96	414201SP	1

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