Pipet Calibration/Verification Instructions and Reference Tables/Information

Utilize the original pipette documentation or the pipette reference tables to determine the permissible tolerance of the pipette. Document the calibration/verification on the Pipettor Delivery Calibration/Verification Form 400-002-09-F.

1. Annotate the pipette setting and tip that is being used.
2. Fill the pipette with deionized water and deliver its contents into a pre-weighed container on the analytical balance. Do this for a total of 10 deliveries on the scale Note: for large volumes (1000µl or greater) record each weight separately.
3. Record the weight. For increased accuracy it is recommended to add a weight to the scale for very small volumes.
4. For verification, repeat this step for a total of 5 total weights and for large volumes 10 individual weights.
5. For calibration, adjust pipette as needed and repeat to ensure accurate discharge of weight.
6. Determine the average of the weights and ensure it is within allowable tolerances.
7. Repeat steps 2 through 7 for each volume that is used for specific pipette. (note: for the Universal PVV-100 pipette test at upper and lower of the user defined range)
8. Remove pipette from service if it does not meet required specifications. Document pipette concerns on the Maintenance log and notify supervisor.

Pipet	**Tip**	**Tolerance**
Eppendorf Repeater	Fisherbrand 5 ml	±0.8% 0.992 to 1.008
Eppendorf Repeater	Fisherbrand 12.5 ml	±0.7% 2.4825 to 2.5175
Eppendorf Repeater Plus	Combitip advanced Blue	±0.6% 0.994 to 1.006
Eppendorf Repeater Plus	Combitip advanced Green	±0.8% 24.8 to 25.2 and 74.4 to 75.6
Eppendorf Repeater M4	Combitip advanced Blue	±0.6% 0.994 to 1.006
Eppendorf Repeater M4	Combitip advanced Green	±0.8% 24.8 to 25.2 and 74.4 to 75.6
Pipetman 1000	Red box Fisherbrand Clear tip	±3µl 217 to 223
Pipetman 1000	Blue box clear tip	±3.5µl 396.5 to 403.5
Fin 5-50µl	Yellow tip	±1.0% 0.188 to 0.202
Finn 50-250 µl	Yellow tip	±1.0% 0.51 to 0.49
Finn 200-1000 µl	Blue tip	± 1.0% 9.90 to 10.10
PVV-100, 50 µl	Yellow tip	±0.6%: 10 µl 9.94-10.06, 100 µl 99.4-100.6

Multipette® plus · Repeater® plus — Operating manual

7 Technical data

Combitip advanced	Testing volume	Error limits			
		Error			
		Systematic error		Random error	
		± %	± µL	± %	± µL
0.1 mL white	2 µL	±1.6	±0.032	±3.0	±0.06
	20 µL	±1.0	±0.2	±2.0	±0.4
0.2 mL light blue	4 µL	±1.3	±0.052	±2.0	±0.08
	40 µL	±0.8	±0.32	±1.5	±0.6
0.5 mL violet	10 µL	±0.9	±0.09	±1.5	±0.15
	100 µL	±0.8	±0.8	±0.6	±0.6
1 mL yellow	20 µL	±0.9	±0.18	±0.9	±0.18
	200 µL	±0.6	±1.2	±0.4	±0.8
2.5 mL green	50 µL	±0.8	±0.4	±0.8	±0.4
	500 µL	±0.5	±2.5	±0.3	±1.5
5 mL blue	100 µL	±0.6	±0.6	±0.6	±0.6
	1 000 µL	±0.5	±5.0	±0.25	±2.5
10 mL orange	200 µL	±0.5	±1.0	±0.6	±1.2
	2 000 µL	±0.5	±10	±0.25	±5.0
25 mL red	500 µL	±0.4	±2.0	±0.6	±3.0
	5 000 µL	±0.3	±15	±0.25	±12.5
50 mL light grey	1 000 µL	±0.3	±3.0	±0.5	±5.0
	10 000 µL	±0.3	±30	±0.3	±30

Pipetman P / Neo

Pipetman Ultra

Here are comparative tables for maximum permissible errors between ISO 8655 and Gilson. ISO 8655 maximum permissible errors are very wide, so as to have a conformity-basis for all pipettes. At Gilson our knowledge and kno-how allows us to be more stringent, which means the best pipette-performance.

Model (Reference)	Volume (µL)	Maximum Permissible Errors Gilson Systematic error (µL)	Gilson Random error (µL)	ISO 8655 Systematic error (µL)	ISO 8655 Random error (µL)
P2 (F144801)	Min 0.2	± 0.024	⩽ 0.012	± 0.08	⩽ 0.04
P2N (F144561)	0.5	± 0.025	⩽ 0.012	± 0.08	⩽ 0.04
U2 (F21021)	Max. 2	± 0.030	⩽ 0.014	± 0.08	⩽ 0.04
P10 (F144802)	Min. 1	± 0.025	⩽ 0.012	± 0.12	⩽ 0.08
P10N (F144562)	5	± 0.075	⩽ 0.030	± 0.12	⩽ 0.08
U10 (F21022)	Max 10	± 0.100	⩽ 0.040	± 0.12	⩽ 0.08
P20 (F123600)	Min. 2	± 0.10	⩽ 0.03	± 0.20	⩽ 0.10
P20N (F144563)	5	± 0.10	⩽ 0.04	± 0.20	⩽ 0.10
U20 (F21023)	10	± 0.10	⩽ 0.05	± 0.20	⩽ 0.10
	Max. 20	± 0.20	⩽ 0.06	± 0.20	⩽ 0.10
P100 (F123615)	Min. 10	± 0.35	⩽ 0.10	± 0.80	⩽ 0.30
P100N (F144564)	20	± 0.35	⩽ 0.10	± 0.80	⩽ 0.30
U100 (F21024)	50	± 0.40	⩽ 0.12	± 0.80	⩽ 0.30
	Max. 100	± 0.80	⩽ 0.15	± 0.80	⩽ 0.30
P200 (F123601)	Min. 20	± 0.50	⩽ 0.20	± 1.60	⩽ 0.60
P200N (F144565)	50	± 0.50	⩽ 0.20	± 1.60	⩽ 0.60
U200 (F21025)	100	± 0.80	⩽ 0.25	± 1.60	⩽ 0.60
	Max. 200	± 1.60	⩽ 0.30	± 1.60	⩽ 0.60
P1000 (F123602)	Min. 100	± 3	⩽ 0.6	± 8	⩽ 3.0
P1000N (F144566)	200	± 3	⩽ 0.6	± 8	⩽ 3.0
U1000 (F21026)	500	± 4	⩽ 1.0	± 8	⩽ 3.0
	Max. 1000	± 8	⩽ 1.5	± 8	⩽ 3.0

eppendorf

11. Technical Data

Repeater 4780	Inaccuracy %	Imprecision %
Combitips 0.5 ml 10 - 50 µl	± 1.5	± 1.0 to ± 0.6
Combitips 1.25 ml 25 - 125 µl	± 1.2	± 0.8 to ± 0.5
Combitips 2.5 ml 50 - 250 µl	± 1.0	± 0.6 to ± 0.4
Combitips 5.0 ml 100 - 500 µl	± 0.8	± 0.5 to ± 0.3
Combitips 12.5 ml 250 - 1250 µl	± 0.7	± 0.5 to ± 0.2

Universal PVV-100 10-100 µl

Range	Volume µl	Inaccuracy ±%	Inaccuracy µl	Imprecision cv±%	Imprecision µl
0.2 µl - 2 µl	2	2	.04	1.2	0.024
0.5 µl - 10 µl	10	1	0.1	0.5	0.05
2 µl - 20 µl	20	0.8	0.16	0.4	0.08
5 µl- 50 µl	50	0.8	0.4	0.4	0.2
10 µl - 100 µl	100	0.6	0.6	0.2	0.2
20 µl- 200 µl	200	0.6	1.2	0.2	0.4
100 µl- 1 ml	1000	0.6	6	0.2	2
0.5 ml - 5 ml	5000	0.6	30	0.2	10
1 ml -10 ml	10000	0.6	60	0.2	20

CALIBRATION OF FINNPIPETTE

PRINCIPLE

The pipette is calibrated with water "to deliver", when used according to the instructions. The pipettes are calibrated at the factory. Ordinarily no recalibration is necessary, but the pipettes are constructed to permit recalibration. The calibration is performed at 22°C and the following volume settings:

Finnpipette 11	10 µl
Finnpipette 12	50 µl
Finnpipette 13	200 µl
Finnpipette 14	1000 µl

PROCEDURE

1. Set the volume according to the table.
2. Fill the pipette with water and deliver its contents into a preweighed small beaker or other container on the analytical balance.
3. Record the weight to the nearest tenth of a milligram.
4. If the delivered volume differs from the set volume by more than 1 per cent, adjustment should be made by turning the calibration screw (02.05), clockwise, if the obtained volume was smaller, counterclockwise, if it was larger than the setting. Use calibration tool No. 1114.
5. Note that the thread of the calibration screw is approximetely the same as for volume adjustment. The amount of correction required can therefore be estimated from the circular scale or part 06.05.
6. After adjustment recheck the volume as in points 1—3. If the pipette delivers correctly at the set volume, it will automatically do so at all other volumes of its range, due to its construction.
7. If a more accurate estimate of the delivered volume is desired, several weighings as describel in points 1—3 may be performed.
8. If parts 10.05 and/or 01.05 have been exchanged, the pipette must be recalibrated after reassembly, since it is the distance between the part 03.05 and the knob 01.05 that determines the volume delivered.
9. Obviously the pipette can be calibrated for other solutions or liquids than water.