

Recalibration of CLINIPET⁺ (CP)

HTL pipettes are calibrated by gravimetric method, using distilled water, at the temperature $20\pm 1^{\circ}\text{C}$, according to EN ISO 8655 standard. If during pipette operation you find that the accuracy error (the difference between the real aspirated volume and the preset volume) exceeds the permissible value given in the Instruction Manual, the pipette recalibration procedure should be carried out. Before starting the recalibration it is necessary to check whether the following requirements have been fulfilled during error determination:

- the ambient temperature, and the temperature of the pipette, tips and water was identical
- the density of the liquid used is close to that of distilled water
- a balance with appropriate sensitivity has been used
- $\text{mg}/\mu\text{l}$ conversion factor has been taken into account

Temperature [$^{\circ}\text{C}$]	Pressure [kPa]		
	95.0	101.3	105.0
20	1.0028	1.0029	1.0029
21	1.0030	1.0031	1.0031
22	1.0032	1.0033	1.0033
23	1.0034	1.0035	1.0036
24	1.0037	1.0038	1.0038
25	1.0039	1.0040	1.0040

Recalibration conditions:

- Ambient temperature and the temperature of the pipette, tips and liquid should be within the range $20\text{-}25^{\circ}\text{C}$ and stabilized during weighing within $\pm 0.5^{\circ}\text{C}$
- Measurements should be conducted using distilled water
- Balance sensitivity should be suitable for the volume to be controlled
- Calculate average aspirated volume [μl]: multiply your weighing result (an average) [mg] by the density coefficient of distilled water [$\mu\text{l}/\text{mg}$], which is related with temperature and pressure, as shown in the following table. Density coefficient values for distilled water are given in the Table 1.

STEP 1. Testing the pipette

1. Perform 5 aspirations, weigh each one and calculate the average value
2. Calculate average aspirated weight [mg]
3. Calculate your result into the volume [μl] - using the calculation table at the top of the page
4. Compare the result with the values from the table, column 3 (see below)

STEP 2. Determination of the value of correction

If the average aspirated volume exceeds the permissible value, the calibration setting must be changed. The adjustment is performed with the calibration key. It's circumference has 24 divisions, which represent the volume adequate to pipette model selected - these values can be found in the table, column 4 and 5.

This is a very precise method of applying the volume correction. The amount of volume (accuracy error) ΔV must be calculated into number of divisions, which will be used then to turn the calibration screw (in the pipette).

STEP 3. Recalibration

1. Remove the pushbutton,
2. Insert the calibration key (with the smaller diameter end) into the orifice, the key should enter the calibration screw located inside the pipette,
3. Turn the key with the number of divisions determined
4. Remove the calibration key and fix the pushbutton back

STEP 4. Checking the pipette

The pipette requires a weighing check after re-calibration - the average volume must be within the permissible range given in the table. If the volume still exceeds the values stated, the recalibration procedure should be repeated.

Model	Pipet volume [μl]	Volume range permitted [μl]	Volume change by turning the key ΔV [μl]	
			by full turn	by 1 division
CP2	2	1.94 - 2.06	0.7	0.029
CP5	5	4.90 - 5.10		
CP7	7	6.90 - 7.10		
CP10	10	9.88 - 10.12		
CP15	15	14.85 - 15.15	1.3	0.054
CP20	20	19.82 - 20.18		
CP25	25	24.775 - 25.225	1.7	0.071
CP30	30	29.73 - 30.27	3.0	0.146
CP40	40	39.64 - 40.36		
CP44.7	44.7	44.30 - 45.10		
CP50	50	49.55 - 50.45		
CP60	60	59.46 - 60.54	7.0	0.29
CP70	70	69.37 - 70.63		
CP75	75	74.325 - 75.675		
CP80	80	79.28 - 80.72		
CP90	90	89.28 - 90.72		
CP100	100	99.2 - 100.8	13.0	0.54
CP120	120	119.04 - 120.96		
CP150	150	148.95 - 151.05		
CP200	200	198.8 - 201.2		
CP200A	200	198.8 - 201.2	31.0	1.29
CP220	220	218.7 - 221.3		
CP250	250	248.5 - 251.5		
CP300	300	298.2 - 301.8		
CP400	400	397.6 - 402.4		
CP450	450	447.3 - 452.7		
CP500	500	497.0 - 503.0		
CP600	600	596.4 - 603.6	60.0	2.5
CP700	700	695.8 - 704.2		
CP750	750	745.5 - 754.5		
CP800	800	795.2 - 804.8		
CP900	900	894.6 - 905.4		
CP1000	1000	994 - 1006		