

Recalibration of DISCOVERY Pro (DP) single and multichannel pipettes

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

Set the "calibration volume" - suggested the minimal volume of the pipette, as shown in the table 2 and lock the volume setting knob (press it down).

Note 1: During the weighing and then recalibration, the knob should stay locked at all the time.

Note 2: It is forbidden to use (turn) the knob while in calibration mode (calibration switch set in upper position "CAL")! Otherwise the pipette volume will be altered (unnoticed), the recalibration procedure will have to be repeated.

	Pipette volume range [μl]	Calibration volume [μl]	Volume range permitted [μl]
singlechannel	0.1 - 2	0.2	0.176 - 0.224
	0.5 - 10	0.5	0.48 - 0.52
	2 - 20	2	1.92 - 2.08
	10 - 100	10	9.84 - 10.16
	20 - 200	20	19.76 - 20.24
multichannel	100 - 1000	100	98.4 - 101.6
	1 - 10	1	0.92 - 1.08
	5 - 50	5	4.8 - 5.2
	20 - 200	20	19.6 - 20.4
	50	49.2 - 50.8	

1. Perform 5 aspirations, weigh each one and calculate the average value (3 series for multichannel models)
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

STEP 2. Recalibration

If the average aspirated volume exceeds the permissible value, it should be corrected by adjusting the counter display - setting the 'real' volume obtained during weighing [μl].

Counter adjustment is performed with the calibration key.

1. Remove the ejector button (with calibration key)
2. Set the calibration switch in upper position (marked with CAL symbol)
3. Insert the calibration key (cross-end inside) into the orifice, so it matches with the calibration screw of the counter
4. Turn the key so as the volume indicated by the counter equals the average calculated volume
5. Remove the key and set the switch in lower position
6. Place the cap on the ejector button

STEP 3. 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.