

# ATMOS

Pipette Accuracy Tester

Operation Manual



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## Imprint

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## Contents

Imprint .....	2
Contents .....	3
General Information .....	5
About ATMOS .....	5
Using ATMOS .....	6
Turning on ATMOS .....	6
ATMOS Functions .....	7
Accuracy Function .....	7
Pipette Size Selection Screen .....	7
Measurement screen .....	8
Measurement Procedure .....	9
Results Screen .....	10
Statistics Screen .....	12
Molarity Function .....	14
Dilution Function .....	15
Serial Dilution Function .....	16
Calculator Function .....	17
Settings Screen .....	18
“ReadATMOS” program .....	21
ATMOS Technical Specifications .....	23
Technical Specifications .....	23
Troubleshooting .....	24
Further Information .....	25
Warranty .....	25
Disposal .....	25

## **Disclaimer**

- The Pipette Accuracy Tester ATMOS is designed for the specific use of testing and calibrating air displacement laboratory pipettes and no other use is recommended.
- The user must read and understand this manual before operation.
- This instrument should only be used in a laboratory environment.
- Do not open or attempt to repair the instrument without expressed and explicit instructions from UniPix.
- Do not use the instrument in an atmosphere with a danger of explosion.
- Do not allow unauthorized and/or untrained operators to use this device.
- Do not recharge the instrument in a liquid or humid environment.
- Any misuse will be the sole responsibility of the user/owner and UniPix assumes no implied or inferred liability for direct or consequential damages from this instrument if it is operated or used in any way other than for which it was designed.

## General Information

### About ATMOS

The UniPix ATMOS Pipette Accuracy Tester is an instrument for precise measurement of air displacement pipettes, without need of liquid. It is based on **comparison** with a **calibrated internal reference cavity** in the instrument. It also measures the leak rate of pipettes.



**Never use the instrument with liquid in the pipette tip.  
This will permanently damage the instrument (no repair is possible)!**



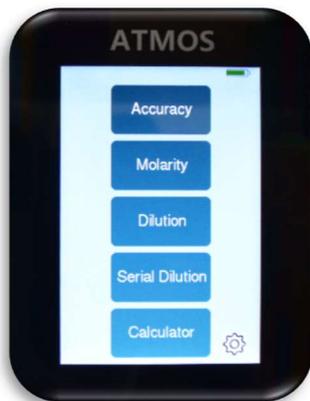
**Allow the internal temperature to stabilize during at least 30 minutes after  
unpacking or moving the instrument from another room.**

- It is recommended to verify that the instrument battery is well charged or to use the instrument with the external power supply connected via the USB cable.
- The instrument is powered by an internal Lithium-Polymer battery which allows continuous operation for more than **6 hours** and several weeks with short daily testing sessions.

## Using ATMOS

### Turning on ATMOS

- Press the **main switch** on the front of the instrument to power on.
- After powering on, the instrument runs a self-test procedure for about 10 seconds.
- The home screen then shows all available functions:



- Accuracy: Precise measurement of air displacement pipettes, in absence of liquid.
  - Molarity: Calculator for molar concentration for your customizable values.
  - Dilution: Calculator for dilution of your solution.
  - Serial dilution: Calculator for serial dilution by pre-defined or customized factors.
  - Calculator: Standard calculator.
  - Settings (gear symbol): See/change basic settings like version/serial number, date/time.
- Select the function you want to use by touching the respective button on the screen. For detailed description on each function, please see below.
  - When not operated, the instrument automatically turns OFF after 3 minutes (duration can be adjusted in settings).
  - To shut down manually, press the main switch on the front of the instrument.

## ATMOS Functions

The ATMOS device offers various functions for daily laboratory work.

Apart from the pipette accuracy measurement, it can also support the user with molarity/dilution/serial dilution calculations and offers a standard calculator.

All functions are described below.

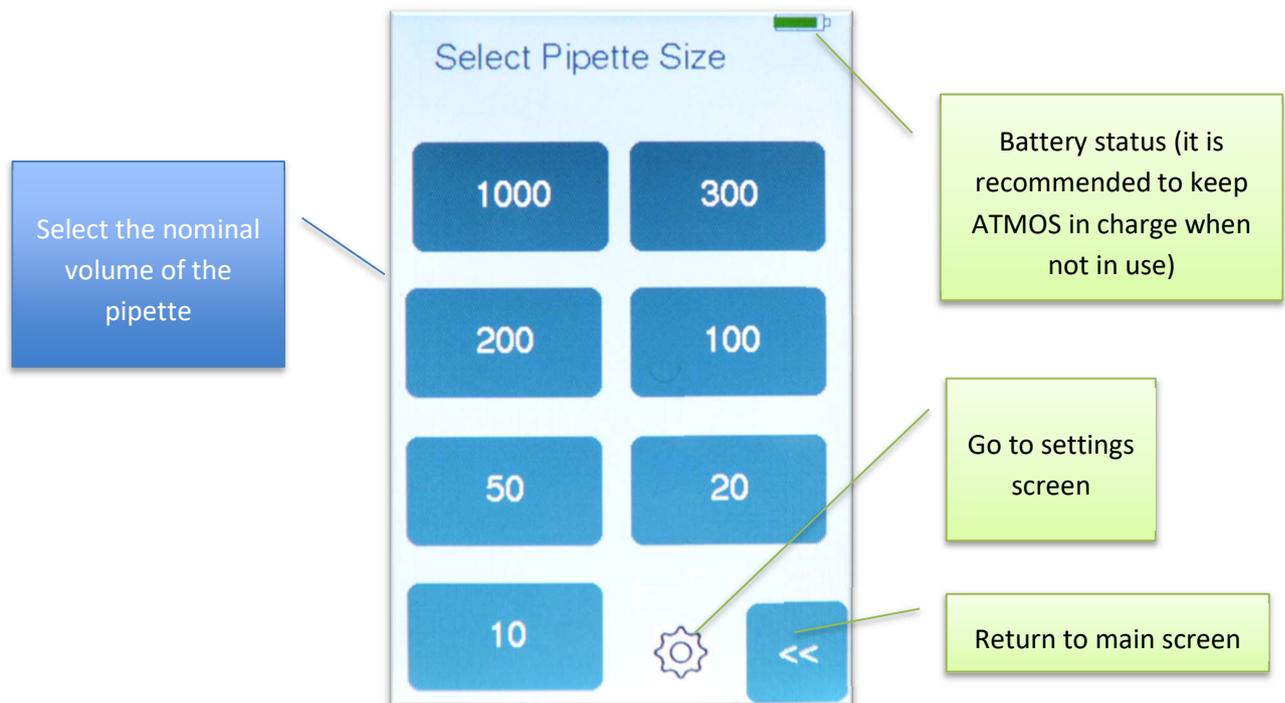
### Accuracy Function

The accuracy function will measure the accuracy of your pipette.

Click the button "Accuracy" on the main screen.

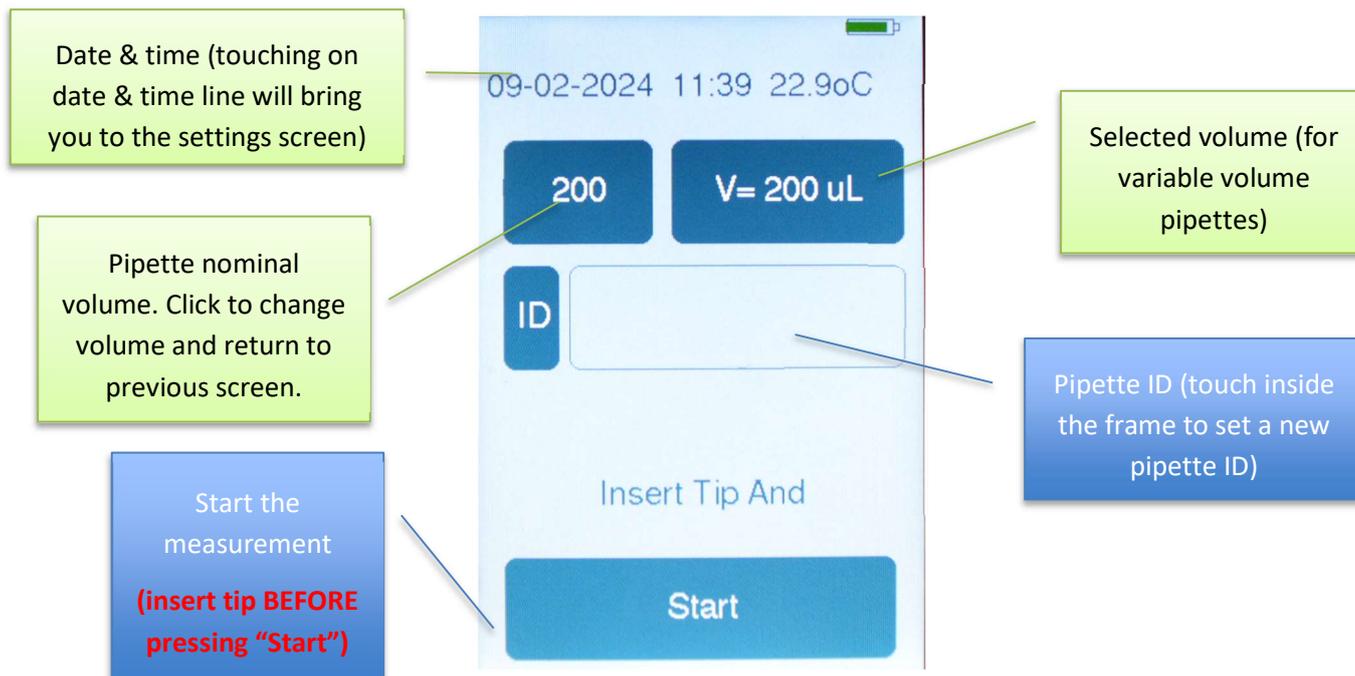
#### Pipette Size Selection Screen

Select the pipette size you are testing (important: select the nominal volume of your pipette!):



## Measurement screen

After pipette selection or after measurements, you will see the measurement screen.



From this screen, you can reach the following functions:

- The **Start** button will initiate the measurement procedure. You can get started immediately, if you work with a fixed volume pipette or with the max. volume of a variable pipette. Please insert the tip (WITHOUT LIQUID) and be ready to actuate the piston BEFORE touching the button.
- The **Pipette size** button (here "200") allows you to select a new pipette model. It will bring you back to the selection screen.
- The **Selected volume** button (here "V=200uL") allows you to select the volume you are actually testing (using a variable volume pipette). The following screen will show up, offering default values and the option for custom values (via "other").



- The **Pipette ID** button allows you to enter a numeric ID that will be stored with the measured data.

## Measurement Procedure

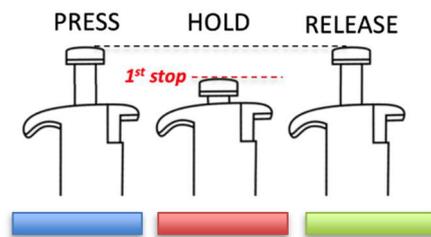
1. Insert the pipette tip firmly in the center port. Hold the pipette vertically and steady, but do not press down the piston.

**NO LIQUID IN THE PIPETTE TIP!** (*Liquid will permanently damage the instrument*)

2. Press the **Start** button, without moving the pipette.



3. **Push the piston** to the first stop, while keeping the tip inserted in the port. Movement of the piston should be done during the **BLUE** phase of progress bar.



4. The **progress bar** at the bottom indicates that the instrument is measuring. **The pipette and the piston should be kept steady when the progress bar is RED.**
5. Release the piston when the progress bar is **GREEN.**

### **! ATTENTION FOR 8-CHANNEL-VERSION!**

Make sure that you hold the pipette horizontally, so that all tips are inserted in the ports equally.

## Results Screen

### 1-channel version

The screenshot shows a results screen with the following data and callouts:

Nb	Result	Leak
5	200.12 uL	0.16%
4	200.13	
3	200.21	
2	199.98	
1	199.90	

Callouts and their descriptions:

- Measurement number:** Points to the 'Nb' column header.
- Leak rate (in volume loss per second):** Points to the 'Leak' column header.
- Measured volume displacement:** Points to the '200.12 uL' value in the current measurement row.
- List of previous measurements (up to 10 values):** Points to the list of previous measurements (rows 4, 3, 2, 1).
- Skip:** This will remove the current measurement (data will not be stored).
- Next:** Start the next measurement (current data will be stored).
- End:** Stop the series (current data will be stored. Average value and STDEV will be displayed).

The result screen shows the following data:

**Nb:** Measurement number. Up to 10 measurements can be shown.

**RESULT:** Measured volume displacement of each measurement.

**Leak rate:** Expressed in volume loss per second. A leak above 1%/sec of test volume indicates a leaky pipette, or leaky tip connection (or a bad insertion of the tip into ATMOS port).

The following actions are possible:

**SKIP:** This will remove the current measurement. It will not be stored in the memory.

**NEXT:** This will start the next measurement. The current measurement will be stored in the memory.

**END:** This will stop the series and display statistics (possible only after a minimum of 3 measurements). Usually, 3 measurements are enough to get a good estimate of pipette performance.

## 8-channel version

The screenshot shows a measurement screen with the following data:

Measurement number	Result	Leak %
1	50.09 uL	0.87
2	50.38 uL	0.13
3	50.37 uL	0.20
4	50.59 uL	0.04
5	50.50 uL	0.11
6	50.50 uL	0.03
7	50.39 uL	0.13
8	50.18 uL	0.09

At the top of the screen, it displays  $P = 50$ ,  $V = 50$ , and a battery icon. Below the table, there are three buttons: **Skip**, **Next**, and **End**.

Callouts explain the following elements:

- Measurement number:** Points to the 'N=1' label above the first row.
- Number of channel:** Points to the '4' in the first column of the table.
- Leak rate per channel (in volume loss per second):** Points to the '0.87' in the 'Leak %' column of the first row.
- Measured volume displacement:** Points to the '50.09 uL' in the 'Result' column of the first row.
- Skip:** This will remove the current measurement (data will not be stored).
- Next:** Start the next measurement (current data will be stored).
- End:** Stop the series (current data will be stored. Average value and STDEV will be displayed).

The result screen shows the following data:

**N:** Measurement number.

**RESULT:** Measured volume displacement for each of the 8 channels.

**Leak rate:** Expressed in volume loss per second per channel. A leak above 1%/sec of test volume indicates a leaky pipette, or leaky tip connection (or a bad insertion of the tip into ATMOS port).

The following actions are possible:

**SKIP:** This will remove the current measurement. It will not be stored in the memory.

**NEXT:** This will start the next measurement. The current V measurement will be stored in the memory.

**END:** This will stop the series and display statistics (possible only after a minimum of 3 measurements). Usually, 3 measurements are enough to get a good estimate of pipette performance.

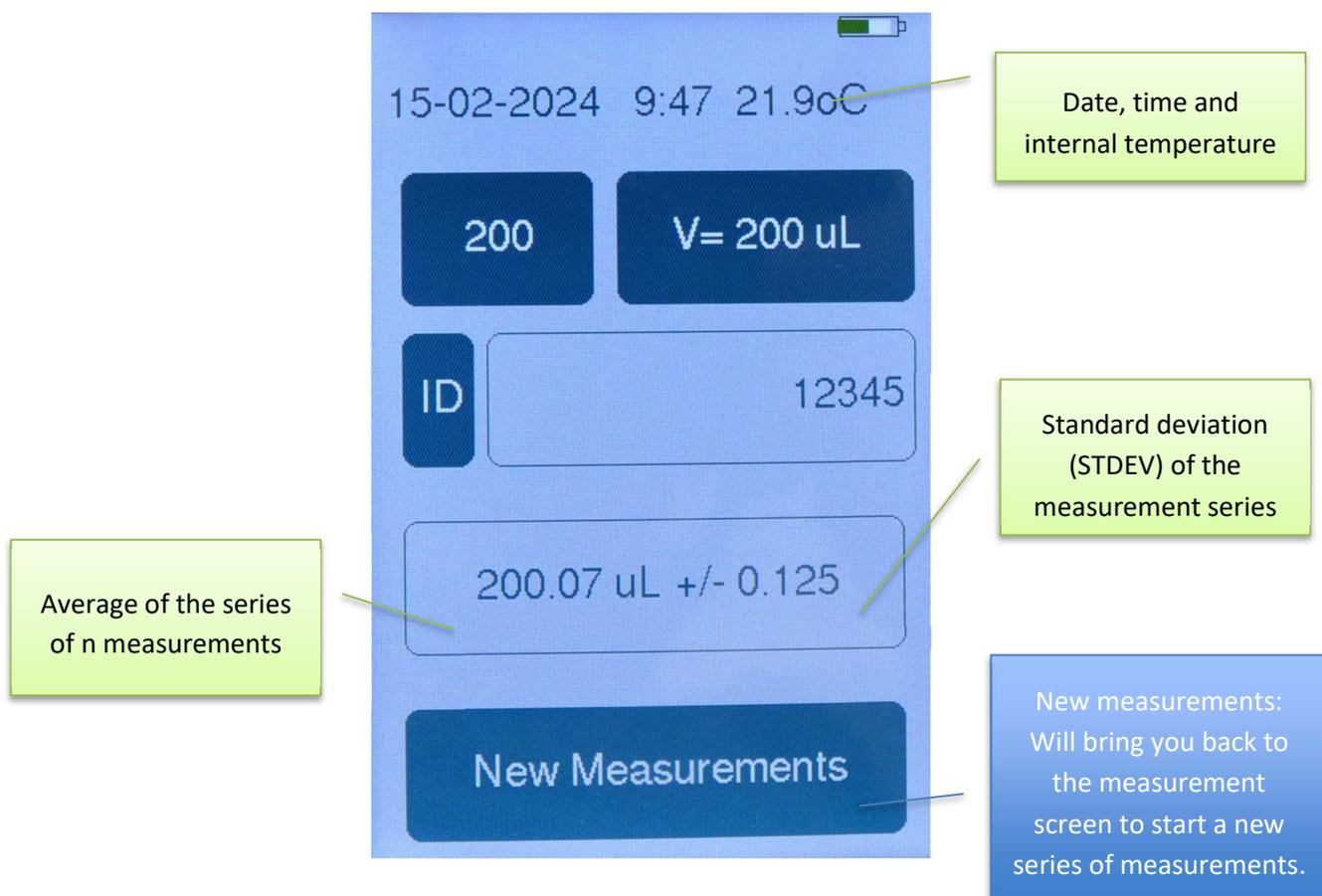
### The reasons for bad results can be:

- *Bad insertion of the tip into the port.*
- *User not following instructions during the measurement process.*
- *A totally non-functional pipette.*
- *A very leaky pipette or tip connection.*

## Statistics Screen

### 1-channel version

This screen is shown after clicking the “END” button after min. 3 measurements.



It shows:

- Current date, time, and ambient temperature
- Information on the pipette (P and volume) pre-defined by user
- ID: numeric ID pre-defined by user
- Average volume of the series of n measurements and standard deviation (STDEV) of the measurement series

*The **New measurements** button will bring you back to the measurement screen, where you can start a new series of measurements.*

## 8-channel version

This screen is shown after clicking the “END” button after min. 3 measurements.

The screenshot shows a measurement screen with the following data and controls:

- Selected volume:** V = 50 uL
- Number of measurements:** N = 5
- Average for each individual channel of the series of n measurements:** The table below shows the average volume for each of the 8 channels.
- Standard deviation (STDEV) of the measurement series:** The table below shows the standard deviation for each of the 8 channels.
- New Measurements button:** A blue button at the bottom that will bring you back to the measurement screen to start a new series of measurements.

Channel	Average	+/-
1	50.47 uL	0.29
2	50.42 uL	0.25
3	50.62 uL	0.21
4	50.79 uL	0.12
5	50.73 uL	0.14
6	50.70 uL	0.11
7	50.60 uL	0.15
8	50.41 uL	0.17

It shows:

- Selected volume
- Average volume for each individual channel of the series of n measurements and standard deviation (STDEV) of the measurement series per channel

The **New measurements** button will bring you back to the measurement screen, where you can start a new series of measurements.

## Molarity Function

This tool is designed to support you in calculating the molar concentration of your solution.

Click on the button “Molarity” on the main screen to start a calculation.

The screenshot shows the 'Molarity Calculator' app interface. It features a central display area with a chemical structure of a pyridine derivative, a laboratory flask, and a hand holding a pipette. The interface includes several input fields and buttons:

- Molecular weight:** A callout box points to the '450 MW' field.
- Weight of compound:** A callout box points to the '2.4 mg' field.
- Volume of final solution:** A callout box points to the '0.5 mL' field, which is highlighted with a green border.
- Solution concentration:** A callout box points to the '10 mM' field.
- Move green frame:** A callout box points to the 'R' button.
- Return to main screen:** A callout box points to the '<<' button.

To enter the desired values, click in the field and type in your numbers (a number keyboard is displayed).

**Please note: the “Enter” button is: <<.**

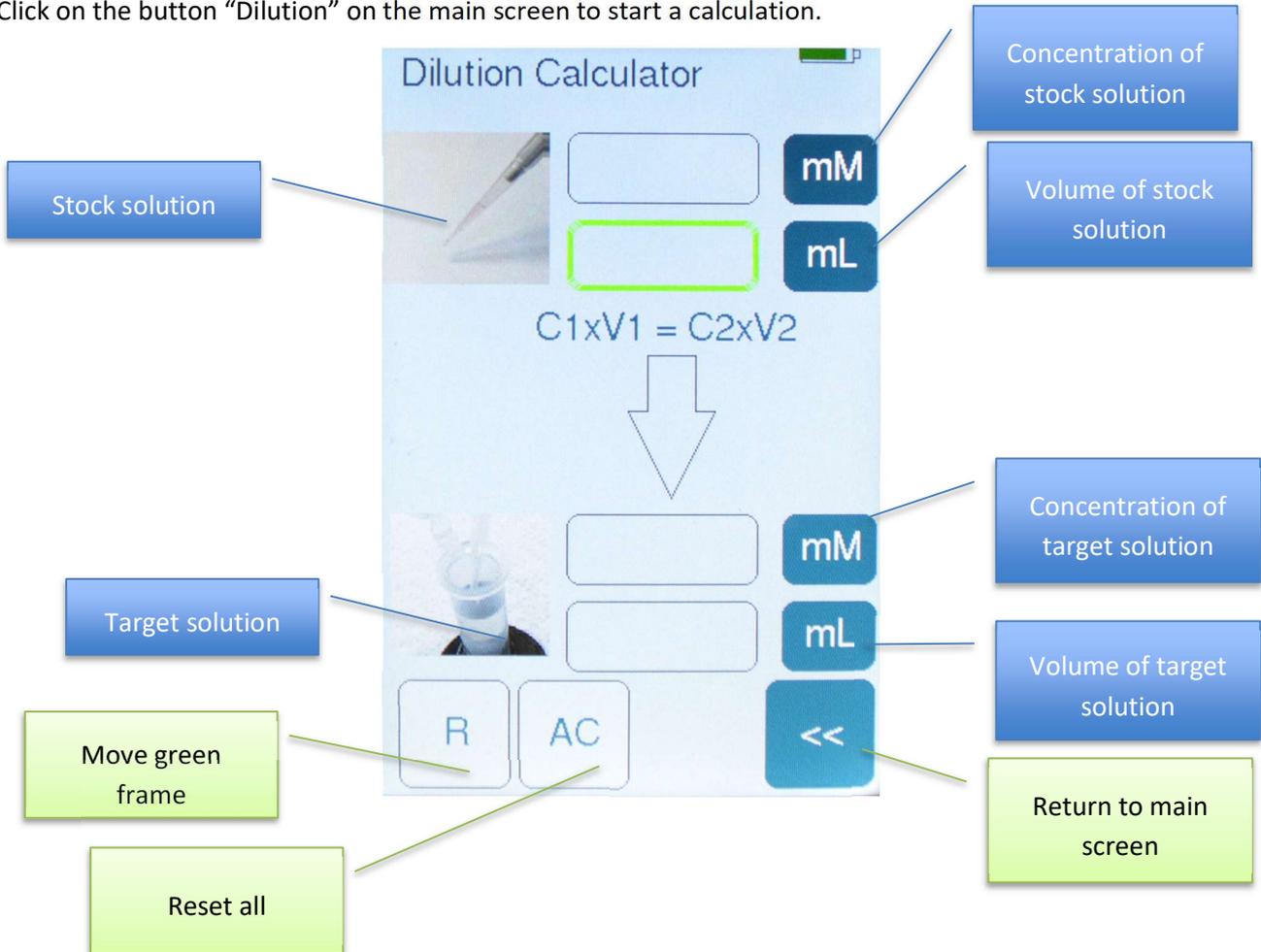
The **green frame** indicates the value that is calculated. To move it (and change the value you want to calculate), press the button “R” on the lower left side of the screen.

Measurement unit of any of the values can be adjusted by clicking on the respective unit (e.g., click on “mL” to change to “ $\mu$ L”).

## Dilution Function

The dilution function will support you in calculating the values for diluting a solution.

Click on the button “Dilution” on the main screen to start a calculation.



In the example on the screen above, you want to compute the required volume of your stock solution.

Click in the field you want to modify. A number keyboard opens, and you can insert your numbers.

Please note: the button << is “Enter”.

The green frame indicates the value that is calculated. To change the value you want to calculate, press the button “R” on the lower left side of the display.

The button “AC” will reset all values.

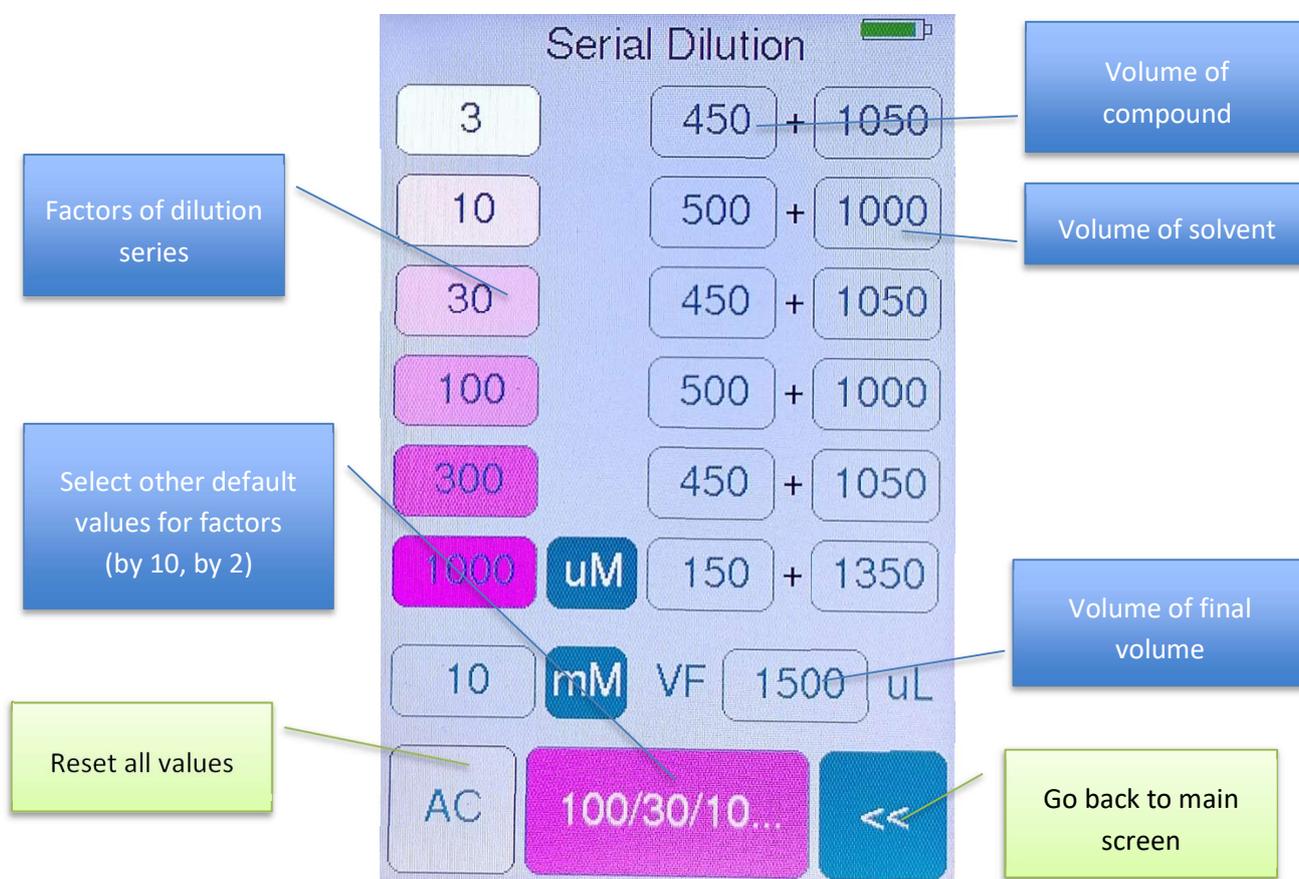
The button “<<” returns to main screen.

You can change the measurement unit of all 4 values by clicking on the unit (e.g., click on “mL” to change to “ $\mu$ L”).

## Serial Dilution Function

This function is designed to simplify the preparation of a serial dilution.

Click on the button “Serial Dilution” on the main screen to start a calculation.



The serial dilution calculator helps you calculate up to 6 concentrations.

The left, pink column shows the dilution factors. On the right, you see the volumes of compound + solvent.

The default final volume is 1500 $\mu$ L. To change this value, click on the number (“1500”). A number keyboard opens, and you can insert your custom volume.

Please note: the button << is “Enter”.

The default calculation is a dilution by 3. By clicking on the pink button on the bottom of the display, you can select other default factors (by 10 or by 2). If you want to use customized values, click on the pink numbers in the left column. A number keyboard will show up and you can overwrite the default values.

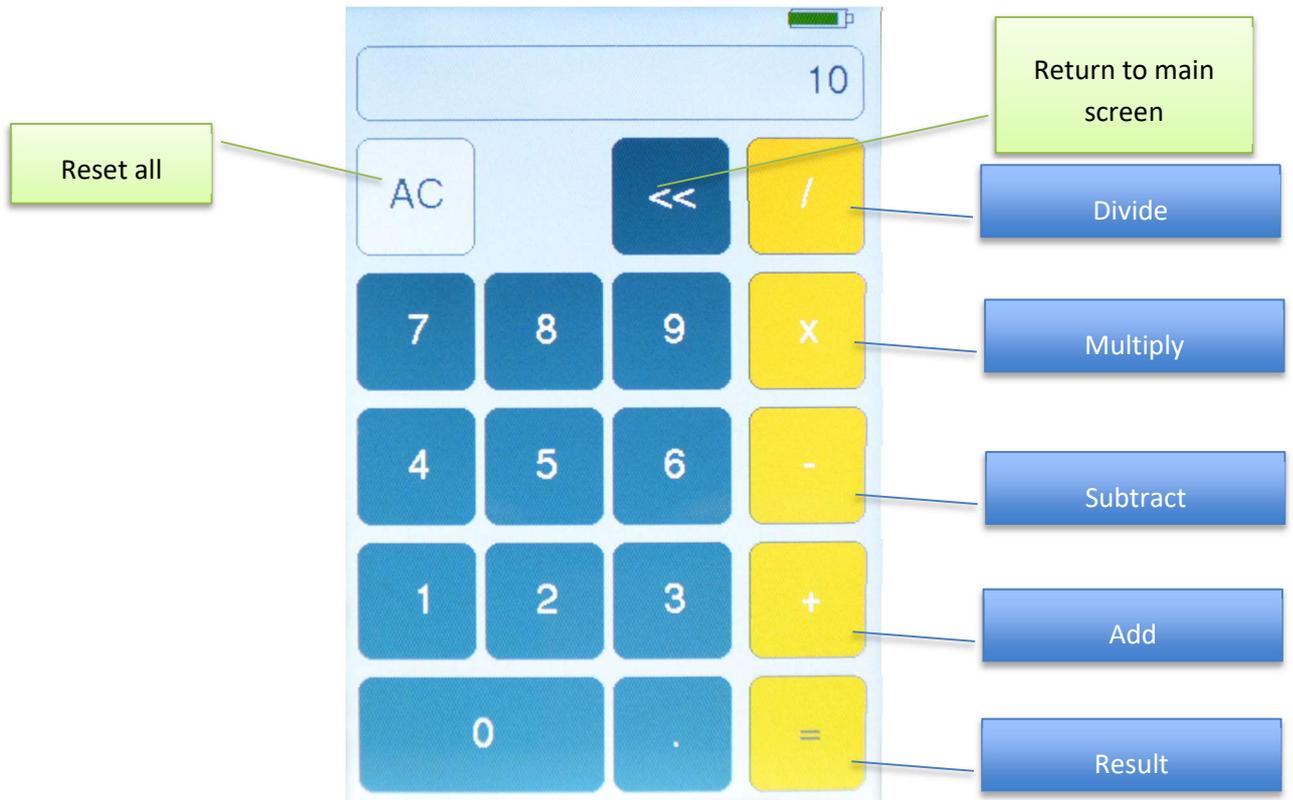
The button “AC” will reset all values.

You can change the measurement units by clicking on the unit (e.g., click on “mL” to change to “ $\mu$ L”).

## Calculator Function

The calculator function offers a standard calculator.

Click on the button “Calculator” on the main screen to start the tool.



A standard numbers keyboard shows up and you can calculate:

/ → Divide

x → Multiply

- → Subtract

+ → Add

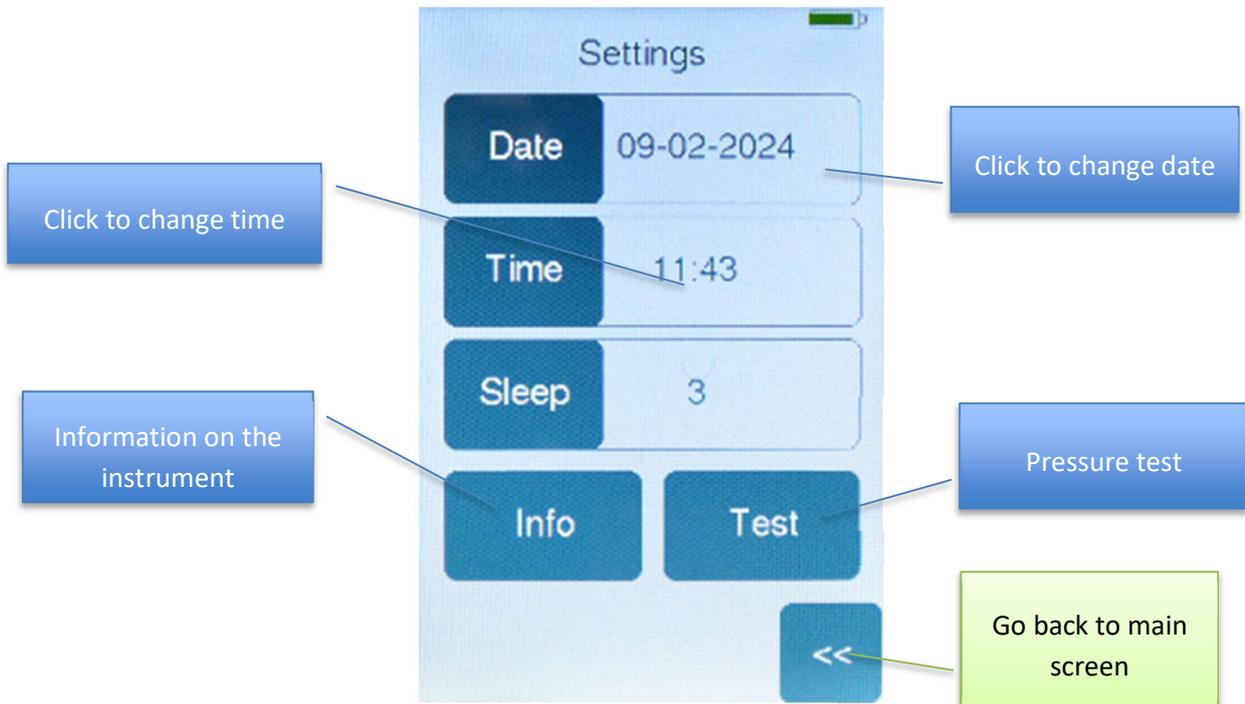
= → Result

The button “AC” resets all values.

The button “<<” returns to the main screen.

## Settings Screen

The **Settings** screen can be reached by touching the **gear symbol** on the lower right corner of the main screen.



### Date

To change the date, click on the button "Date". You will be asked to type in the date in the following order:

1. Year
2. Month
3. Day

Please note: Each value must be entered with **2 digits** (YY MM DD). There is no need to confirm the values. Typing the second digit will automatically confirm your input.

### Time

To change the time, click on the button "Time". You will be asked to type in the time in the following order:

1. Hour
2. Minute

Please note: ATMOS runs on 24h. Each value must be entered with **2 digits** (hh mm). There is no need to confirm the values. Typing the second digit will automatically confirm your input.

### Sleep

By default, ATMOS will stay turned on for 3 minutes when not in use. To change the duration, click on the button "Sleep" and change the number. The max. duration is 60 minutes.

## Info

Clicking on the button “Info” will give you information on your instrument.

Firmware

Serial Number

VRef & VInt → Calibration values (pre-defined by UniPix)

## Test

To perform a self-test of the instrument, please click on the button “Test”.

You will see the following screen:



P= measured pressure

Pref= reference pressure

T1: temperature on sensor 1

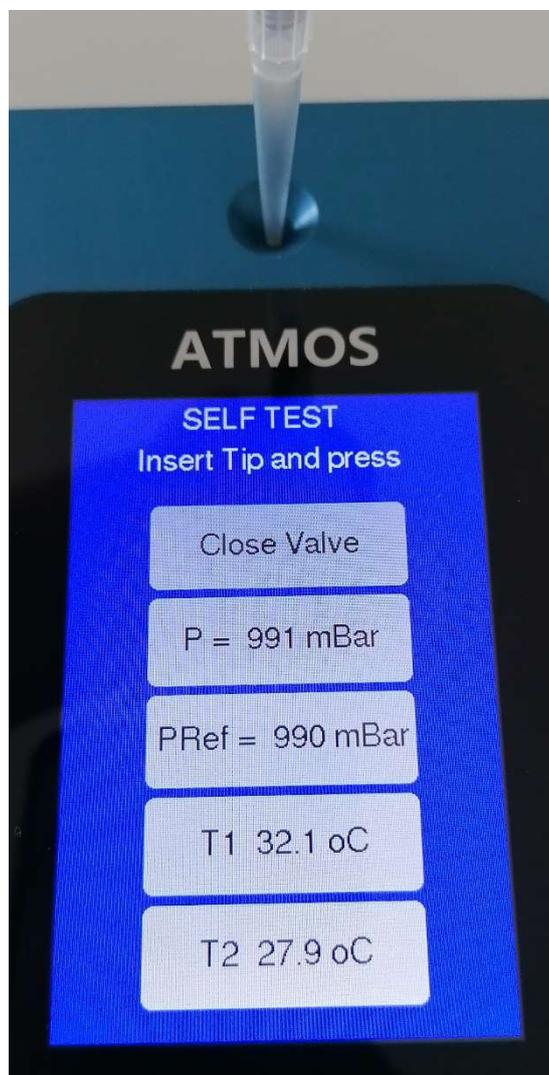
T2: temperature on sensor 2

The values of P and Pref should be similar.

Now insert a tip and press the piston to the first stop. The measured pressure will increase.



Press the button “Open Valve”. You will hear a click.



Both pressure values will approach each other again. They should be very similar. If this is the case, the self-test of the device was successful, and it runs correctly.

If the values differ, please run the test again, maybe with a different pipette.

If the test is still unsuccessful, please contact UniPix or your local salesperson.

## “ReadATMOS” program

ReadATMOS is a program which allows downloading data from the ATMOS instrument via a USB cable.

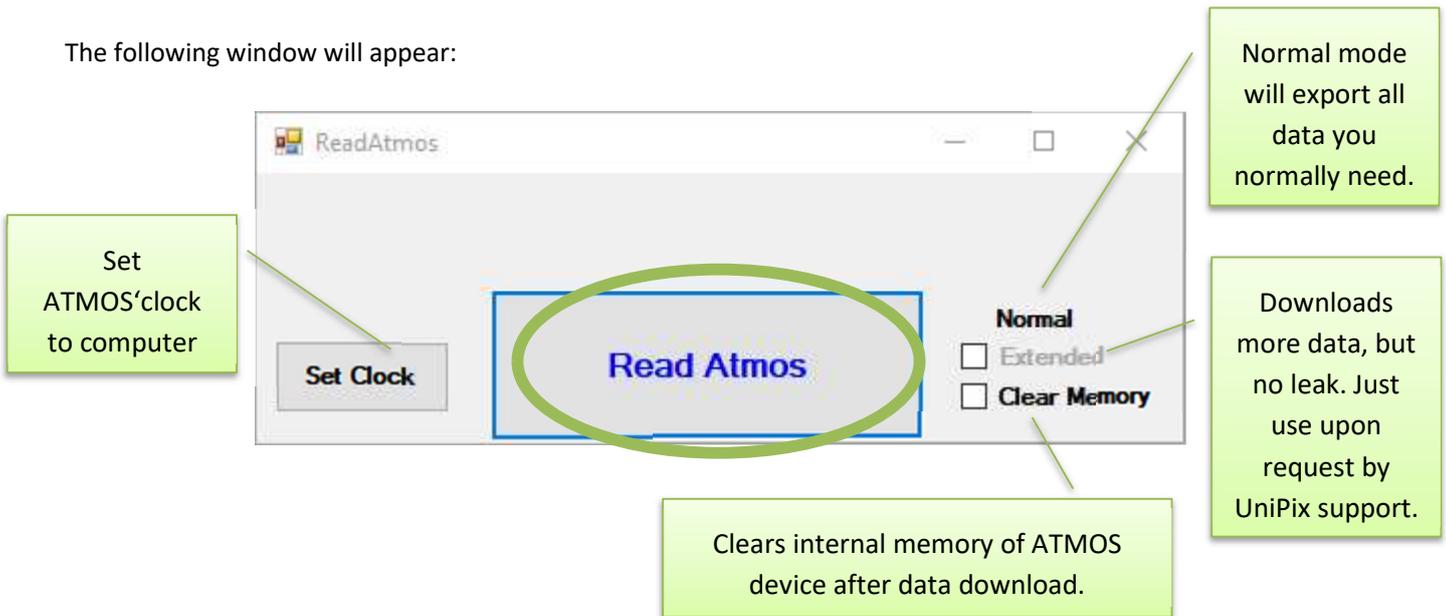
Download the “ReadATMOS” program from the website <https://www.unipix-atmos.com/atmos/downloads/>.

Verify that your ATMOS device is **connected** to the computer and **turned on**. Then start “ReadATMOS” on your computer. The following window appears.



First click the button “Connect ATMOS” to establish the connection between your ATMOS device and your computer.

The following window will appear:



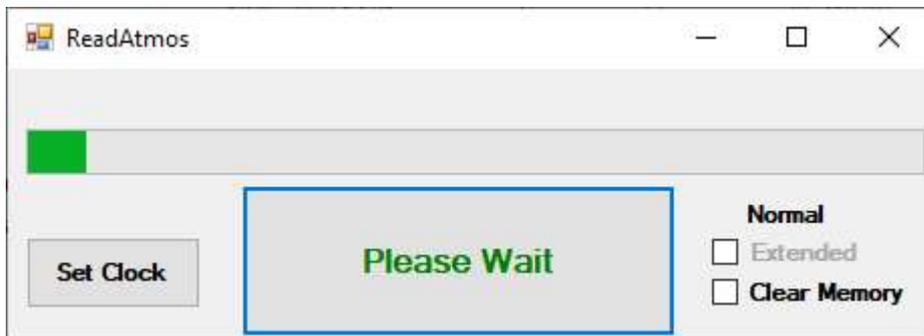
Choose your action:

- Set clock: Will set the internal clock of your ATMOS device to the clock of your computer.
- Download mode (Normal or extended): Standard setting is “Normal”. This will download all the data you normally need (measured volumes, leak, temperature). The “extended mode” will download more data, but no leak. Please only use on request by UniPix support.
- Clear memory: Selecting this box will clear the internal memory of your ATMOS device after data download. If you leave it un-checked, the data will stay on the internal memory of your device. There is no need to remove the data. ATMOS’ storage is large enough for several thousand measurements.

Click “Read ATMOS” to start the download.

A new window will show up and you will be asked for a name and location for your Excel file. Please select the storage location and enter a file name. Then click “Save”.

After pushing the “Save” button, the “ReadATMOS” program will download data from ATMOS. The green bar shows the progress.



When the download is finished, the program quits automatically. You can now open the Excel sheet.

Data will be presented like the following example:

**1-channel version :**

	A	B	C	D	E
1	Date = 27:2:2024	Time = 11:7:32	T = 23.2 oC		
2	Pipette-ID	VCal	oC	dV	Leak %
3		200	23,25	200,44	0,140
4		200	23,31	200,51	0,131
5		200	23,31	200,54	0,157
6		200	23,31	200,44	0,122
7		200	23,38	200,55	0,122
8					

**8-channel version :**

	A	B	C	D	E	F	G	H	I	J	K	L
1	Date = 27:2:2024	Time = 11:4:5	T = 22.0 oC									
2	Pipette-ID	VCal	oC	dV	dV1	dV2	dV3	dV4	dV5	dV6	dV7	dV8
3		300	22	1422,21	300,52	299,53	300,16	299,67	299,79	299,81	299,1	299,13
4		300	22,06	1421,34	300,58	299,98	300,46	300,08	300,22	300,21	299,83	300,2
5		300	22,06	1420,37	300,6	300,19	300,59	300,22	300,38	300,4	300,12	300,52
6		300	22,19	1419,14	300,29	300	300,35	300,09	300,32	300,2	299,98	300,44
7		300	22,25	1418,25	300,51	300,32	300,64	300,38	300,59	300,52	300,4	300,85
8												

## ATMOS Technical Specifications

Maximum accuracy error formula:  $\pm E = (4\% * dV) + 0.1 \text{ } [\mu\text{l}]$

<i>P = nominal pipette volume</i>		<b>Absolute accuracy (= trueness)</b>	<b>Repeatability (= precision)</b>
P=1000	1000 $\mu\text{l}$	$\pm 4 \mu\text{l}$	$\pm 1.5 \mu\text{l}$
P=200	200 $\mu\text{l}$	$\pm 0.4 \mu\text{l}$	$\pm 0.3 \mu\text{l}$
P=100	100 $\mu\text{l}$	$\pm 0.5 \mu\text{l}$	$\pm 0.15 \mu\text{l}$
P=20	20 $\mu\text{l}$	$\pm 0.18 \mu\text{l}$	$\pm 0.05 \mu\text{l}$
P=10	10 $\mu\text{l}$	$\pm 0.14 \mu\text{l}$	$\pm 0.06 \mu\text{l}$

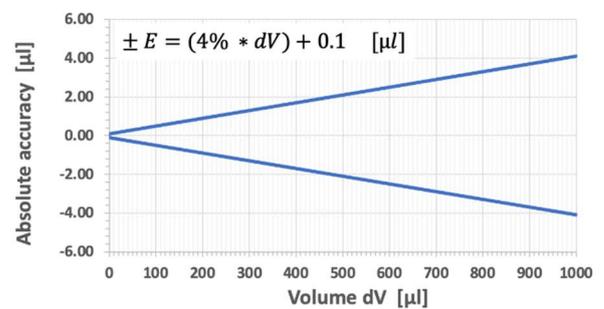
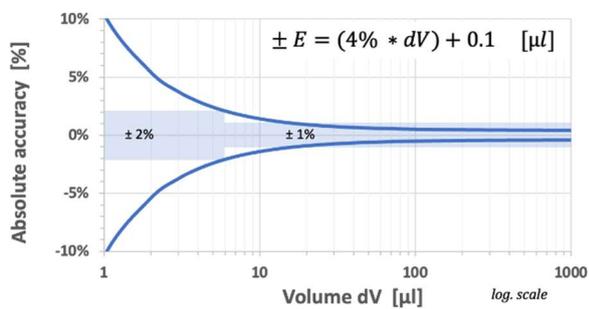


Figure: Atmos accuracy in function of tested volume displacement

## Technical Specifications

Dimensions	125 x 85 x 30 mm
Weight	420 g
Power supply	5V DC, 2A
Battery	2000 mAh, Lithium-Polymer
Operational temp.	from 10 °C to 40°C
Altitude	from sea level up to 3500m

## Troubleshooting

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
No power	Low battery	Connect to power supply.
	Instrument turned OFF after unused period	Press main switch.
Poor reproducibility	Bad manipulation	First check with another pipette.  Refer to user manual for proper operation.
	Dirty or damaged tip port	Clean (no liquid!) or contact your salesperson.
	Very bad pipette	Verify tip and try another pipette.
Software shows error message when starting	Device is not connected or not turned on	Connect ATMOS via USB cable and turn it on. Then start the software again.
Software shows error message when downloading	No data stored on device	Perform and store min. 3 measurements.

## Further Information

### Warranty

UniPix shall not be retained liable for any consequences of improper handling, use, servicing, operating or unauthorized repairs of the instrument or the consequences of normal wear and tear as well as the failure to follow the instructions of the operating manual. UniPix shall not be liable for damage resulting from any actions other than those described in the operating manual or following the use of non-original replacement parts.

### Disposal

Storage batteries and electronic devices must be disposed of separately from household trash (mixed municipal waste) at the end of their service life.