

Pipette Management Solutions by A&D



For quick checking of pipette airtightness...
Leak Tester: AD-1690

To protect research results from the threat of nonconformities



For verification of pipette accuracy and precision...
*Pipette Accuracy Testers:
BM Series + BM-014, etc.*

For easy implementation of daily and periodic pipette checks...
Pipette Professional: AD-1695



A&D ...Clearly a Better Value
A&D Company, Limited
<http://www.aandd.jp>

*What If You Were Told to Create a Pipette Management SOP*¹ Within Three Weeks?*

**1 Standard Operating Procedure*

Today, what with GLP and ISO, researchers are in increasing need of sustainable ways to verify the quality and performance of their pipettes in-house. The problem is, however, that many of them would be at a loss as to what exactly they should put into actual practice. Wouldn't you be too?

Not to worry, though. A&D provides the following powerful solutions that you can use to introduce a simple, viable SOP for pipette management.

For Daily Checks

Leak Tester AD-1690



Pipette failures typically occur due to degraded parts in the lower section of the pipette like the o-ring, piston, and tip holder compromising the pipette's airtightness. By depressurizing (to -20 kPa) inside the pipette, the AD-1690 can determine whether an air leak exists in a matter of seconds, allowing you to quickly sort out troubled pipettes.

A&D suggests that for everyday inspection, this leak test along with some quick appearance and function checkups will suffice for most users.

Advantages

- ✓ Takes only seconds to tell whether the pipette has a leak
- ✓ Changes pressure by evacuating air instead of injecting it*², so that no dust enters the pipette being tested
- ✓ Easily replaceable air filter, which protects the AD-1690 from dust when it intakes air
- ✓ Equipped with an RS-232C interface to output test results to an external device such as the AD-1695 Pipette Professional (see later pages)
- ✓ Four attachments and one adapter tube provided to fit various tip sizes and shapes



Air filter unit

*² A pressurization method is available upon request.

For Periodic Checks

Pipette Accuracy Testers



AD-4212B-PT



AD-4212A-PT



FX-300i-PT

In addition to the daily check, you are advised to inspect the pipettes' actual performance from time to time. For that purpose, A&D's pipette accuracy testers are useful. The test procedure follows the gravimetric method*³ and allows compliance with ISO8655.

*³ Obtains the pipette volume based on the mass of purified water dispensed from the pipette

Advantages

- ✓ Automatic mass-to-volume conversions and judgments for accuracy and repeatability using the special “WinCT-Pipette” software
- ✓ Judgments by your preferred criteria – manufacturer specifications, ISO8655, or your own
- ✓ Outputs the test results in an A4 or letter-size report format for documentation requirements
- ✓ A liquid thermometer, evaporation trap, and calibration weight with a pair of tweezers included as standard
- ✓ Comes packed neatly in a handy carrying case for use in multiple places*4*5

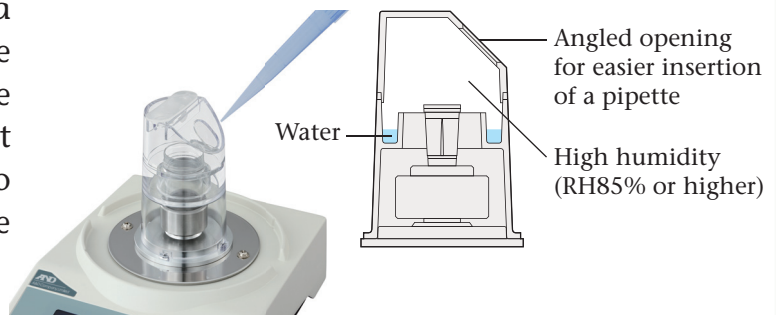
*4 For the AD-4212B-PT, AD-4212A-PT, and FX-300i-PT only

*5 Not advisable when using the 0.001 mg range of the AD-4212B-PT

Evaporation Trap★

The evaporation trap maintains a high humidity inside the device and thereby minimizes the evaporation of the test liquid that causes measurement errors. It is no longer necessary to increase the humidity of an entire room.

★ Patent pending



WinCT-Pipette

Main screen

The screenshot shows the WinCT-Pipette software interface. It includes sections for 'Specifications', 'Measured Values', and 'Measurement Results' for three different pipette volumes (50, 100, and 200 µL). The 'Measurement Results' section shows mean, absolute error, relative error, and judgment for each volume.

Test report

Pipette Accuracy Test Results			
1. Pipette Information Manufacturer: ABC Model: Model-200 Serial No.: P-1234		2. Balance Information Manufacturer: A&D Company Limited Model: AD4212B-101 Serial No.: T010001	
3. Measurement Environment Humidity: 29 (%) Temperature: 22.9 (°C) (Water Temperature): 10.2 (°C) Barometric Pressure: 1017.6 (hPa)		Conversion Factor: 1.0035 (µL/mg) Evaporation Trap: Used	
4. Specifications			
Pipette Volume	Measuring Point (1)	Measuring Point (2)	Measuring Point (3)
50 (µL)	100 (µL)	200 (µL)	200 (µL)
Accuracy	1.6 (µL)	1.6 (µL)	1.6 (µL)
Absolute Error	3.2 (%)	1.6 (%)	1.6 (%)
Relative Error	0.6 (µL)	0.6 (µL)	0.6 (µL)
Repeatability	1.2 (%)	0.6 (%)	0.6 (%)
S.D.			
C.V.			
5. Measured Values			
No.	Measuring Point (1)	Measuring Point (2)	Measuring Point (3)
	(µL)	(mg)	(µL)
1	49.72	49.55	99.49
2	49.74	49.57	99.25
3	49.60	49.43	99.11
4	49.88	49.71	99.22
5	49.74	49.57	99.40
6	49.72	49.55	99.33
7	49.64	49.47	99.38
8	49.90	49.53	99.42
9	49.88	49.71	99.28
10	49.80	49.63	99.38
6. Measurement Results			
Number of Measurements	Measuring Point (1)	Measuring Point (2)	Measuring Point (3)
10 (times)	10 (times)	10 (times)	10 (times)
Accuracy	Mean	Mean	Mean
	49.752 (µL)	99.325 (µL)	199.563 (µL)
	-0.248 (µL)	-0.675 (µL)	-0.437 (µL)
	-0.498 (%)	-0.675 (%)	-0.218 (%)
Judgment	Pass	Pass	Pass
Repeatability	S.D.	0.092 (µL)	0.110 (µL)
	C.V.	0.184 (%)	0.111 (%)
Judgment	Pass	Pass	Pass
7. Test Information			
Test No.	QV-001	Signature: _____	
Test Date	2/4/2009		
Operator	Mr.P		
Test Administration	Calibration room		
Remarks	Used Distilled water		

WinCT-Pipette automatically determines the Z (conversion) factor based on the entered test liquid (i.e. purified water) temperature and barometric pressure, which is then used to calculate volumes from the mass values transmitted from the balance.

Information for each pipette (including manufacturer, model, and default conditions and specifications) can be saved and retrieved for later testing.*6

*6 It is recommended that the database be backed up on a regular basis.

Also available...

Micro Analytical Balances Pipette Accuracy Testing Kit *BM Series + BM-014*

The BM-014 can be used with any model of the BM series (both 5 mL and 30 mL cups are provided). This setup is ideal if you also want to use the balance for purposes other than pipette accuracy testing as an ordinary analytical balance.



Recommended Models in Accordance With ISO8655

Pipette Nominal Volume ^{†1} (μL)	ISO8655 Requirements (Gravimetric Method)				Balance Readability mg	Recommended Models		
	Maximum Permissible Error							
	Accuracy (Systematic Error)		Repeatability (Random Error)					
	$\pm\%$	$\pm\mu\text{L}$	%	μL				
1	5.0	0.05	5	0.05	0.001	BM-20/22 + BM-014		(\blacklozenge 2)
2	4.0	0.08	2	0.04				
5	2.5	0.125	1.5	0.075				
10	1.2	0.12	0.8	0.08				
20	1.0	0.2	0.5	0.1	0.01		BM-252 + BM-014	AD-4212B-PT
50	1.0	0.5	0.4	0.2				
100	0.8	0.8	0.3	0.3				
200	0.8	1.6	0.3	0.6	0.1	BM-200/300/500 + BM-014 or AD-4212A-PT		
500	0.8	4.0	0.3	1.5				
1000	0.8	8.0	0.3	3.0				
2000	0.8	16	0.3	6.0				
5000	0.8	40	0.3	15.0				
10000	0.6	60	0.3	30.0				
Daily inspection, simplified verification					1 ^{†3}	FX-300i-PT		

\blacklozenge 1 The maximum volume selectable for variable volume pipettes

\blacklozenge 2 Please select the BM-20/22 + BM-014 if you will mainly use the 0.001 mg range, as it will provide much greater stability.

\blacklozenge 3 The minimum weighing value, 1 mg, approximately corresponds to 1 μL . If a pipette volume is 1000 μL , a test can be performed with a resolution of 0.1%. If 200 μL , 0.5%.

Note) Make sure that the measurement environment is free from vibration, drafts, rapid temperature/humidity changes, etc.

Single Channel Electronic Pipettes

MPA Series



Supposing that some of your pipettes have been found inaccurate by your periodic check, what should you do? If you use the MPA series, it is easy to correct deviations by yourself. All you have to do is simply input the actual dispensed volume measured by a pipette accuracy tester into the pipette.*

★ Patent pending

... Still not comfortable enough with what you should do? Then how about getting some professional help?

For “Guided” Checks

Pipette Professional AD-1695



Stop dwelling on how to put the said tasks and tools in order by yourself. Leave everything to the AD-1695. All you have to do is follow the displayed instructions and touch the screen to enter necessary information, commands, selections, etc., so you can perform daily and periodic checks in ways already laid out by A&D for you.

Daily check (basic check) function

		Met	Not met	
Exterior appearance	Dirt, stains	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pipette Select
	Scratches, rust, damage to parts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Moving parts	Operation button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pipette Select
	Volume meter	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	Ejector	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

For daily checks, you are simply asked to determine whether the condition is “met” or “not met” for each check item. The check items include those which A&D recommends as the most basic ones to confirm that the pipette meets proper conditions for use.

		Met	Not met	
Leak	Use an AD-1690 (leak tester) AD-1690 COM 1 Result -19.9kPa Start PASS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pipette Select Mini printer COM 3 Print USB PDF
	When water is aspirated and left inside, no drops form on the end of the pipette. When water is aspirated and the pipette tip is dipped into the liquid container, the liquid level inside the tip does not drop.			

To perform an air leak test, you can choose (and are encouraged) to connect and use the AD-1690 Leak Tester, which the AD-1695 can control and capture the result from to make the met/not met judgment promptly and automatically.*7

*7 Testing without the AD-1690 also possible (albeit time-consuming and often difficult to judge)

Periodic check (volume test) function

The AD-1695 enables you to easily test for pipette volume accuracy and repeatability by connecting it to one of A&D's balances*⁸. All the key functions provided by WinCT-Pipette are also available on the AD-1695, so that you can complete both the basic check and volume test one after another without using a PC.

*⁸ Either the pipette accuracy testers or the BM series with BM-014 are strongly recommended, as they come with an evaporation trap and other useful accessories.

Reporting results

The daily and periodic check results can be output to a USB flash drive in PDF report formats. A reference number, location name, and operator name can be added as necessary.

It is also possible to output the results directly to a standard mini printer.*⁹

*⁹ In simplified formats

Daily check report (PDF)

Periodic check report (PDF)

Pipette registration/selection and spec configuration

Up to 300 pipettes' information (manufacturer, model, serial number, and maximum volume) with volume test conditions and specifications can be registered in the AD-1695, which you can select and readout when conducting daily and periodic checks.

The registered information of the pipette checked will be automatically reflected in the output reports.

Glossary and quick manual

You can quickly call up the on-screen explanations of terms that are relevant or used on the AD-1695. There is also an on-screen instruction manual available for each of the daily check, periodic check, and pipette registration/selection operations. It will tell you what to do as you touch the number in the respective section.

With these functions, most of the time you are not required to look for or refer to any other resource for understanding and operating the AD-1695.

Specifications

AD-1690 (Leak Tester)

Depressurization value	-20 kPa ± 20% (Fixed)
Pressure change tolerance inside the main unit	+0.2 kPa / 10 seconds
Leak judgment conditions	Pressure change tolerance: From +0.1 to +20 kPa (Increment: 0.1 kPa)
	Monitoring time: From 1 second (Increment: 0.5 seconds)
Pump operation time	Up to 6 seconds
Power supply	AC adapter
Dimensions	231 (W) × 126 (D) × 78 (H) mm
Net weight	Approx. 570 g

Options & Accessories

AD-1690-01	Replacement tube set (Adapter × 1, attachment × 4, adapter tube × 1)
AD-1690-02	Replacement filter set (Filter unit × 1, filter element × 10)
AD-1690-015	Carrying case* ⁱ
AD-1682	Rechargeable battery unit
AD-1688	Weighing data logger* ⁱⁱ

*ⁱ For the AD-1690 and its AC adapter with additional space for the AD-1682

*ⁱⁱ Leak test data can also be stored

Pipette Accuracy Testers*ⁱⁱⁱ

Models	AD-4212B-PT	AD-4212A-PT	FX-300i-PT
Weighing capacity* ^{iv}	5.1 g / 31 g / 110 g* ^v	110 g	320 g
Minimum weighing value	0.001 mg / 0.01 mg / 0.1 mg	0.1 mg	1 mg
Linearity	±0.05 mg / ±0.05 mg / ±0.2 mg	±0.3 mg	±2 mg
Repeatability (standard deviation)	0.015 mg / 0.05 mg / 0.1 mg	0.15 mg	1 mg
Dimensions	Weighing unit: 80 (W) × 230 (D) × 200 (H) mm Display (with a stand): 237 (W) × 150 (D) × 155 (H) mm		193 (W) × 262.5 (D) × 190 (H) mm
Standard accessories* ^v	<ul style="list-style-type: none"> • Instruction manual • Balance including the weighing pan unit, breeze break, AC adapter and AC adapter ID label • Calibration weight with a pair of tweezers • Evaporation trap • Sample cup with holder (30 mL × 2 / 5 mL × 2) • Liquid thermometer • USB communications kit (USB converter, RS-232C cable, Instruction manual) • WinCT-Pipette (CD-ROM) • Carrying case with a shoulder belt and key 		
Power consumption	Approx. 11VA (supplied to the AC adapter)		
Carrying case dimensions	470 (W) × 150 (D) × 355 (H) mm		
Weight (with all accessories in a case)	Approx. 7.6 kg	Approx. 7.2 kg	Approx. 6.4 kg

*ⁱⁱⁱ Please refer to the dedicated brochure for the specifications of the BM series of micro analytical balances.

*^{iv} When the balance weighing pan is used

*^v The AD-4212B-PT is equipped with a smart range function. The minimum weighing value will switch to 0.01 mg or 0.1 mg automatically when the mass value exceeds 5.1 g or 31 g respectively but can be reset to 0.001 mg by pressing the RE-ZERO (tare) key.

Options & Accessories AD-1683 Static eliminator AD-1687 Weighing environment logger
AD-1684A Electrostatic field meter

AD-1695 (Pipette Professional)

Display	TFT color LCD with backlight (7 inches, 800 × 480 dots)
LCD backlight brightness	Adjustable to 10 levels* ^{vi}
Data transmission	RS-232C × 3, USB (1.1) × 2* ^{vii}
Operating environment	5 to 40°C (41 to 104°F), 85% RH or less (no condensation)
Power consumption	Approx. 30 VA (supplied to the AC adapter)
External dimensions	203 (W) × 153 (D) × 58 (H) mm, excluding protrusions
Net weight	Approx. 1.1 kg
Standard accessories	Instruction manual, Touch pen with holder, AC adapter, three balance connection cables (D-Sub 9-9, D-Sub 9-25, D-Sub 9-DIN 7), Stand attachment

*^{vi} Set to the maximum brightness by default *^{vii} For inserting USB flash drives (the two slots cannot be used at the same time)



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