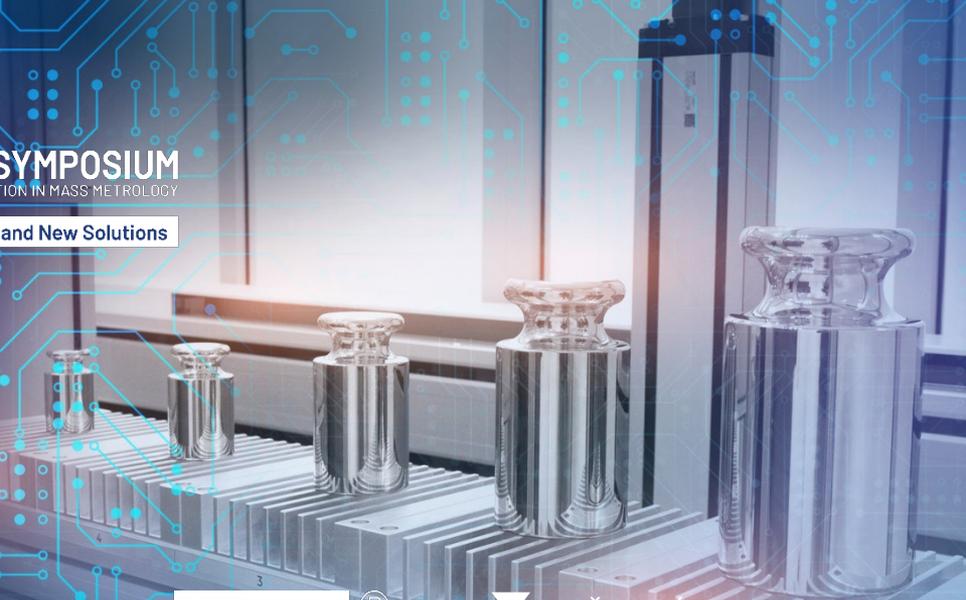




METROLOGY SYMPOSIUM
DIGITALIZATION AND AUTOMATION IN MASS METROLOGY

Third Edition: Future and New Solutions



ČESKÝ
METROLOGICKÝ
INSTITUT

**The station for calibration of single-
and multi-channel piston pipette volumes**



16-18.04.2024, Radom, Poland



METROLOGY SYMPOSIUM

DIGITALIZATION AND AUTOMATION IN MASS METROLOGY

Third Edition: Future and New Solutions



Michał Staniak

A laboratory product manager



Aneta Walaszczyk

A measurement specialist

Presenters

Introduction

Centre for Metrology, Testing and Certification – Measuring Laboratory of RADWAG has the accreditation of the **Polish Centre for Accreditation** within the scope of pipettes calibration from 2009 as the first laboratory in Poland.

In **2023** it obtained the accreditation of the new **ISO 8665-6:2022-11** norm within the scope of the single and multi-channel pipettes calibration.

POLSKIE CENTRUM AKREDYTACJI
POLISH CENTRE FOR ACCREDITATION



Sygnatariusz EA MLA
EA MLA Signatory

CERTYFIKAT AKREDYTACJI
LABORATORIUM WZORCUJĄCEGO
ACCREDITATION CERTIFICATE OF CALIBRATION LABORATORY
Nr AP 069

Potwierdza się, że: / This is to confirm that:

RADWAG WAGI ELEKTRONICZNE
WITOLD LEWANDOWSKI

ul. Toruńska 5, 26-600 Radom
CENTRUM METROLOGII, BADAŃ I CERTYFIKACJI -
LABORATORIUM POMIAROWE
ul. Starowiejska 17A, 26-600 Radom

spełnia wymagania normy PN-EN ISO/IEC 17025:2018-02
meets requirements of the PN-EN ISO/IEC 17025:2018-02 standard

Akredytowana działalność jest określona w Zakresie Akredytacji Nr AP 069
Accredited activity is defined in the Scope of Accreditation No AP 069

Akredytacja pozostaje w mocy pod warunkiem przestrzegania
wymagań jednostki akredytującej określonych w kontrakcie Nr AP 069
This accreditation remains in force provided the Laboratory observes
the requirements of Accreditation Body defined in the Contract No AP 069

Akredytacji udzielono dnia 05.11.2004 r.
Accreditation was granted on 05.11.2004



DYREKTOR
POLSKIEGO CENTRUM AKREDYTACJI



LUCYNA OLBORSKA

Warszawa, dnia 4 stycznia 2021 roku

ZAKRES AKREDYTACJI
LABORATORIUM WZORCUJĄCEGO
SCOPE OF ACCREDITATION FOR CALIBRATION LABORATORY
Nr/No AP 069

wydany przez / issued by
POLSKIE CENTRUM AKREDYTACJI
01-382 Warszawa, ul. Szczotkarska 42

Wydanie/Issue No 20 of 11.12.2023

Objętość			
Pipety tłokowe jednocanalowe	do 1 µl	0,050 µl	S Procedura wewnętrzna PW 05 w oparciu o PN-EN ISO 8665-6:2022-11
Pipety tłokowe wielocanalowe	(1 + 2) µl	0,050 µl	
	(2 + 5) µl	0,050 µl	
	(5 + 10) µl	0,050 µl	
	(10 + 20) µl	0,07 µl	
	(20 + 60) µl	0,17 µl	
	(60 + 100) µl	0,27 µl	
	(100 + 300) µl	0,53 µl	
	(300 + 500) µl	1,3 µl	
	(500 + 1000) µl	2,6 µl	
	(1000 + 2500) µl	8,0 µl	
	(2500 + 5000) µl	13 µl	
	(5000 + 10000) µl	20 µl	

Major requirements relating to piston pipettes are regulated by the international norm ISO 8655

ISO 8655-1

Major requirements relating to piston pipettes are regulated by the international norm ISO 8655

– Part 1: Terminology, general requirements and recommendations for use

ISO 8655-2

Piston vessels for volume measurement

Part 2: Piston pipettes

ISO 8655-6

Piston vessels for volume measurement

Part 6: Gravimetric methods for defining of measurement errors

Minimal requirements for scales

Full compliance with ISO 8655-2/2022

Nominal volume of apparatus under test (V)	Resolution (d) mg	Repeatability (s) ^a mg	Expanded uncertainty in use $U(k=2)$ ^{a, b} mg
$0,5 \mu\text{l} \leq V < 20 \mu\text{l}$	0,001 ^c 0,01 ^d	0,006 ^{c, e} 0,03 ^d	0,012 ^{c, e} 0,06 ^d
$20 \mu\text{l} \leq V < 200 \mu\text{l}$	0,01	0,025	0,05
$200 \mu\text{l} \leq V \leq 10 \text{ ml}$	0,1	0,2	0,4
$10 \text{ ml} < V \leq 1\,000 \text{ ml}$	1	2	4
$1\,000 \text{ ml} < V \leq 2\,000 \text{ ml}$	10	10	40

^c Single-channel balance.

^d Multi-channel balance, only valid for multi-channel pipettes. Multi-channel balances of 0,01 mg readability may be used to test multi-channel pipettes with nominal volumes below 20 μl only if the expanded uncertainty in use is less than one-fourth of the maximum permissible systematic error of the apparatus.

Metrological requirements of piston pipettes

Volume of the liquid according to **ISO 8655** is related to mass and the Z rate contingent on liquid temperature and air pressure:

$$V = m \cdot Z$$

where: m - mass multiplied by
 Z - conversion rate [mg/ml]

$$[ml] = [mg] \cdot \frac{1}{\frac{mg}{ml}} \cdot \frac{ml}{\frac{mg}{ml}} = mg \cdot \frac{ml}{mg} = ml$$

Ambient conditions for conducting the measurements

Before starting the procedure, make sure that **ambient temperature, the temperature of pipettes, tips and liquid**

oscillate within the limits of $(20 - 25)^{\circ}\text{C}$ and is maintained during measurements within the limits of $\pm 0,5^{\circ}\text{C}$ **Relative humidity** should be $(50 - 75)\%$.

Dedicated solutions of RADWAG company



MYA 5Y.P
Microbalance for
Pipette Calibration



XA 5Y.M.A.P
Microbalance



PSW
Professional Single
Weighing Workstation



AP-12.5Y
Automatic Device for
Multichannel Pipette
Calibration

Full compliance with ISO 8655-2/2022

A multi-channel balance can be used to measure the test volume delivered from all channels in parallel, by aspirating and emptying each channel at the same time and analysing the results of each channel individually. The following variation may be applied to calibrate multi-channel pipettes with more than 12 channels or with 4,5 mm cone distance: use every second cone of the pipette to calibrate the pipette in multiple sets. All channels shall be tested.

If the pipette has more than one row of channels, it may be tested one row at a time.

Each channel can be measured individually, one after another, with a single-channel balance. For this purpose, test liquid shall be aspirated by all channels together and collected from one channel at a time. For the measurement of channel 1, for example, the volume of channel 1 is delivered into the weighing vessel, while the volumes from all other channels are discarded.

AP-12

Automatic Device for Multichannel Pipette Calibration



AP-12.1.5Y
[d]= 0,001 mg



AP-12.5Y
[d]= 0,01 mg



AP-12.5Y

Automatic Device
for Multichannel Pipette Calibration



Why?

- Speed, process automation, cost reduction
- Compliance with ISO 8655-2/2022

AP-12.5Y

Automatic Device
for Multichannel Pipette Calibration



For whom?

- Accredited calibration laboratories
- Calibration centres
- Pipette users
- Pipette manufacturers

AP-12.5Y

Automatic Device
for Multichannel Pipette Calibration



What do you gain?

- Compliance with **ISO 8655-2/2022**
- Time saving - The procedure time is reduced from 6 hours to 1 hour
- Calibration of single and multi-channel pipettes

Advantages

Semi-automatic leveling system

Ergonomic mechanical design

Full compliance with ISO 8655-2/2022

THBS Ambient conditions monitoring

Ambient Light

Editable pipette and report databases



Calibration of 1-12-channel pipettes

Optimised calibration process

Minimum calibration process time

THB W liquid temperature sensor

Automatic Device For Multichannel Pipette Calibration



Single and Multichannel Pipette Calibration

- Calibration of multichannel pipettes from 0.5 μ l and 1-channel pipettes
- Calibration of up to 12-channel fixed-volume and variable-volume pipettes
- Automated calibration

Calibration Weighing Pan



As standard equipment, a weighing pan for checking and calibrating the balance is included.

4 Times Faster



The pump draws water from four measuring vessels at the same time. The procedure time is reduced from 6 hours to 1 hour.

Alerts

The **AP-12.5Y** alerts the user when the balance needs to be leveled or the evaporation ring needs to be filled, as well as when abnormal ambient conditions occur.



PSW

Professional Single Weighing Workstation



PSW

Professional Single Weighing Workstation

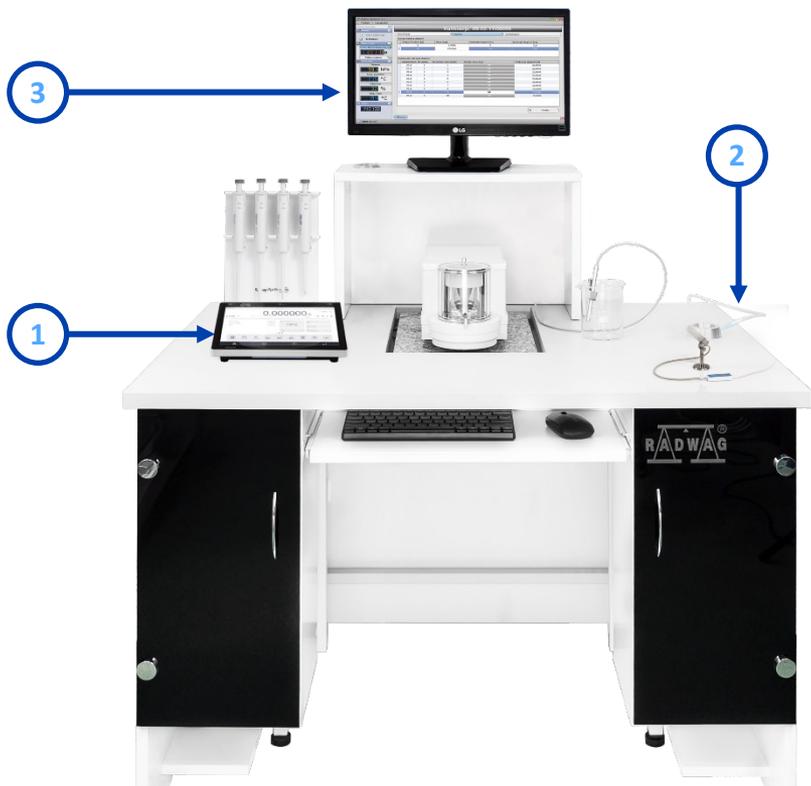
To assure metrological traceability and meet all requirements arising from the measuring equipment supervision, and for the sake of easier and faster calibration of pipettes, RADWAG provides an effective and ergonomic automatic pipette calibration by the operator using the complex pipette calibration station.

Intended use:

Calibration of automatic piston pipettes:

- of a fixed volume
- of a variable volume

PSW Professional Single Weighing Workstation



PSW

Professional Single Weighing Workstation

The working station is composed of three modules:

1. Measuring module
2. Environmental module
3. Computational module

PSW

Professional Single Weighing Workstation

AMBIENT CONDITIONS

The station is equipped with a thermohygrobarometer that allows monitoring ambient conditions on an ongoing basis.



1. Water temperature measurement probe
2. Probe for measuring temperature, humidity and pressure

Other balances



MYA 5Y.P
Microbalance for
Pipette Calibration



XA 5Y.M.A.P
Microbalance



XA 5Y.A
Analytical Balances



XA 5Y
Analytical Balances

Other balances



XA 5Y.A
Analytical Balances



XA 5Y
Analytical Balances

**XA17 - Adapter for Pipette
Calibration**



**XA100 - Adapter for Pipettes
calibration 100 ml XA 5Y.A**



Nominal volume of apparatus under test V	Resolution (d) mg	Repeatability (s) ³ mg	Recommended balance														
			Microbalances					Analytical balances									
0,5 µl ≤ V < 20 µl	0,001 ^c , 0,01 ^d	0,006 ^c , 0,03 ^d	MYA 21.5Y	XA 6/21.5Y.M.A XA 6/21.5Y.M	XA 21.5Y.M.A XA 21.5Y.M	XA 21/52.5Y.M.A XA 21/52.5Y.M	XA 53.5Y.M.A XA 53.5Y.M	XA 52.5Y	XA 110.5Y	XA 82/220.5Y.A XA 82/220.5Y	XA 120/250.5Y.A XA 120/250.5Y	XA 17	XA 17	XA 17	XA 100	XA 17	XA 100
20 µl ≤ V < 200 µl	0,01	0,025															
200 µl ≤ V ≤ 10 ml	0,1	0,2															
Adapter for pipette calibration			MY 11	XA 11	XA 11	XA 11	XA 11	XA 17	XA 17	XA 17	XA 100	XA 17	XA 17	XA 17	XA 100	XA 17	XA 100
Maximum vessel capacity			11 ml	11 ml	11 ml	11 ml	11 ml	17 ml	17 ml	17 ml	100 ml	17 ml	17 ml	17 ml	100 ml	17 ml	100 ml
Weighing vessel mass			~ 10 g	~ 10 g	~ 10 g	~ 10 g	~ 10 g	~ 11 g	~ 11 g	~ 11 g	~ 65 g	~ 11 g	~ 11 g	~ 11 g	~ 65 g	~ 11 g	~ 65 g



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**Thank you for
your attention**

www.radwag.com