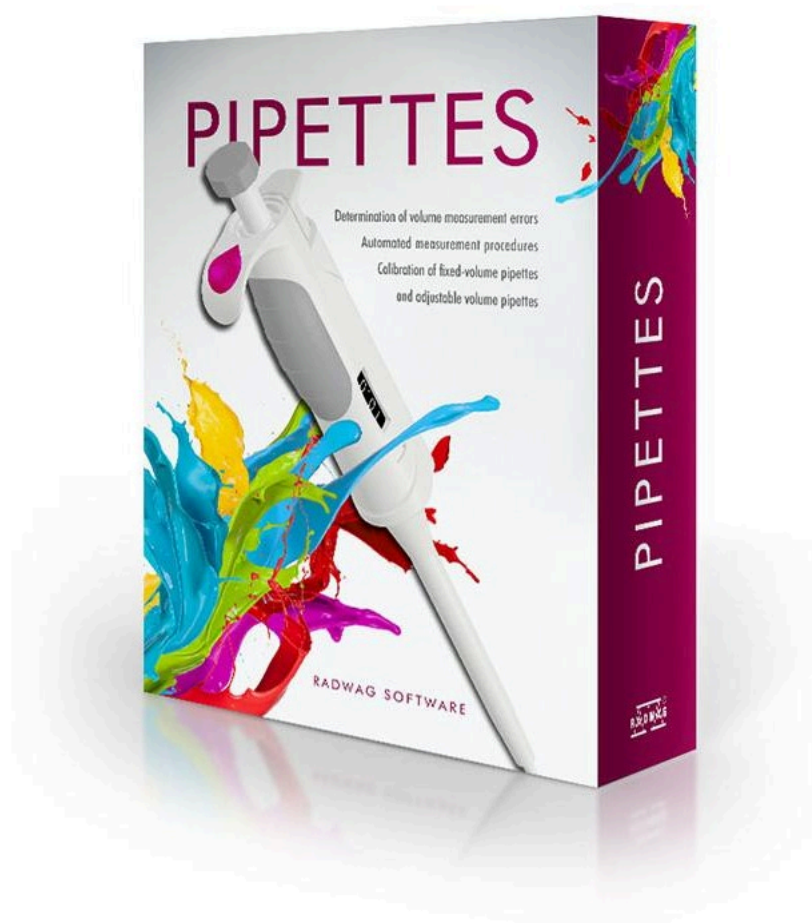


WX-010-0026

Radwag

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There you will find more useful information in an accessible format!

User manual

ITKU-06-10-06-19-EN

PIPETTES

Computer Software

JUNE 2019

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1. INTENDED USE

PIPETY (PIPETTES) software is intended for determining measurement errors of pipettes volume (volumetric instruments) in accordance with ISO 8655 standard.

Main functions:

- Calculating results basing on the measurements:
 - Pipette average volume (channel)
 - e_s systematic error (A accuracy error)
 - CV random error (P repeatability error)
 - Measurement uncertainty (u)
- Calibrating pipettes of:
 - fixed volume – single-channel
 - variable volume – 1, 8 and 12 channels
- Automatic measurement procedures depending on the type of tested pipette,
- Information on pipettes stored in the database:
 - By default, the database includes information on RADWAG-manufactured pipettes
 - Defining pipettes of other manufacturers.
- Storing calibration results in databases (MS Access),
- Creating backup of databases with calibration results,
- Printing pipettes calibration protocols,
- Exporting measurement reports as PDF, MS Word, Excel and other files,
- Determining date of the next calibration,
- Filtering scheduled pipettes calibrations: current week or month,
- Cooperation with balance connected to computer using RS-232 connector:
 - All RADWAG models are based on non-coded communication frame,
 - Possibility to connect balances of other manufacturers,
 - Easy parameters configuration,
 - Hot key for acquiring currently measured mass,
 - Hot key for balance taring.

- Possibility to manually enter measurements values,
- Cooperation with ambient conditions module (thermo-hygro-barometer) connected to RS-232 computer port.

Caution:

1. *Due to the program update, some discrepancies may occur between this user manual's content and the actual state.*
2. *RADWAG does not bear responsibility for the consequences of program operation and any errors resulting from its inappropriate use.*

2. INSTALLATION

2.1. System Requirements

Minimum requirements:

- INTEL or AMD processor $\geq$ 2000 MHz,
- 500 MB of RAM minimum,
- SVGA video card (resolution 1024x768 or more with 24 bits colour depth),
- 2 RS-232 connectors (balance and thermo-hygro-barometer operation),
- Hard drive $\geq$ 50 GB,
- Mouse,
- Keyboard,
- Colour monitor with 1024x768 resolution,
- Windows XP/2000/Vista or later versions,
- Microsoft® .NET Framework 4.0,
- Printer (A4 format),

2.2. Windows 10

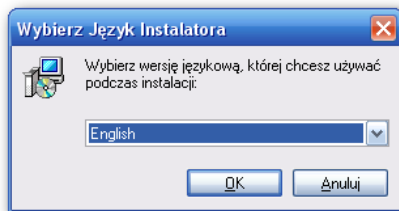
Caution:

*PIPETTES software is not intended to be used properly on an unconfigured version of **WINDOWS 10**.*

2.3. Installation Procedure

In order to install the software, insert the installation CD into the CD-ROM. **PIPETY (PIPETTES)** installer is launched automatically. You can perform the installation manually. To do that, run **<Install_Pipety_X.X.X.exe>** program located in CD main catalogue.

On running, a message box for selecting installation language is displayed:



Press „**OK**” button.

Follow the instructions displayed in next windows.

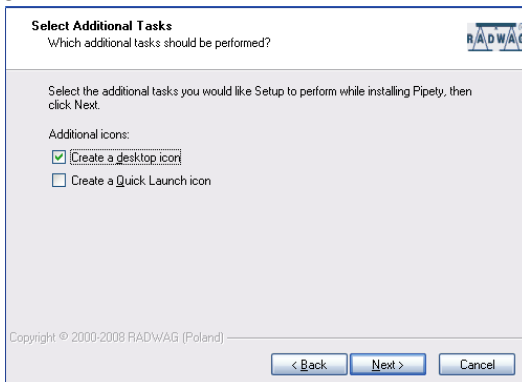
Start-up dialog window:



In order to continue press „**Next**” button.

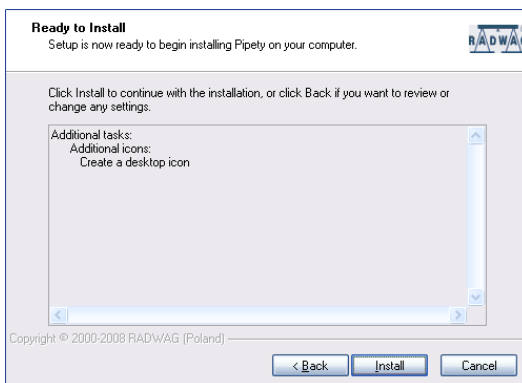
Options: Select check boxes in accordance with your preferences.

Shortcuts Window:



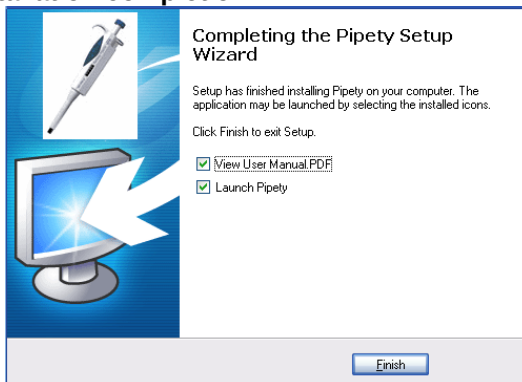
In order to continue press „**Next**” button.

'Ready to Install' window:



Press „**Install**” button to continue.

Window for installation completion:



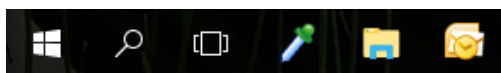
When „**Launch...**” check box is selected, on pressing **Finish** button, **PIPETY (PIPETTES)** program runs automatically.

3. RUNNING THE SOFTWARE

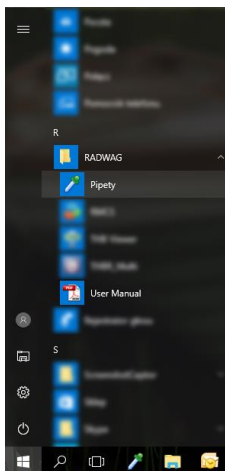
You can run the program using shortcut created on the desktop, if you selected such option during installation.



You can also use a shortcut located on the „**Taskbar**” (option depends on the choice during installation).



By default, the program can be run using the following menu: **START/Programs/RADWAG/Pipettes**.



3.1. Running the Program for the First Time

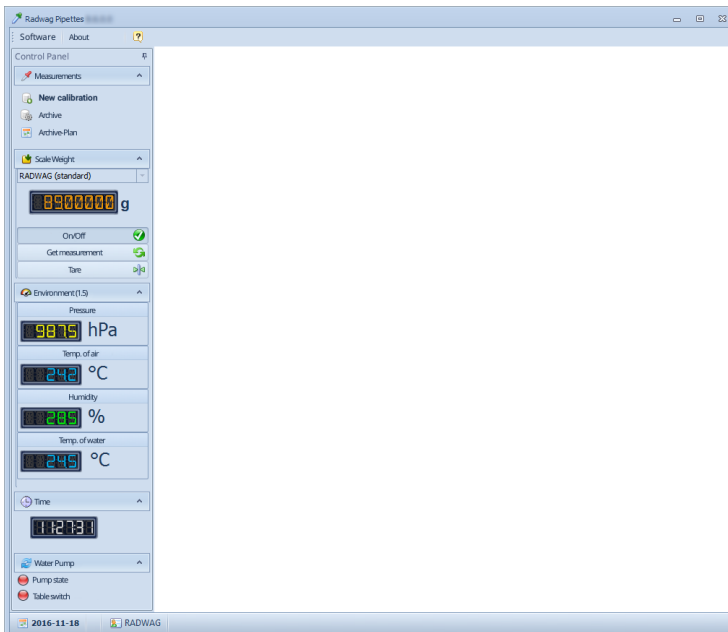
When running the software for the first time, „**User data**” window is displayed. Define the first user of the program.

Give the personal data (name, surname, position). The first operator has to have an administrator permissions level that enables modifying program settings, using its extended functions and adding other operators.

Administrator permissions ☒

3.2. Home Screen

On running the software, its home screen is displayed:



3.2.1. Sections Descriptions

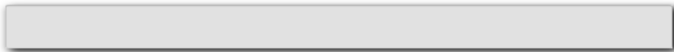
Title bar – displays name and version of the software. The buttons enable minimizing, maximizing and closing the software:



Home screen – navigation menu with access to all software functions:



Viewport – an area in which software windows are displayed:



Control panel – includes information on current measurements, ambient conditions, time, new calibration button and measurements archive.



Where:

New calibration

Archive

On/Off

Press to initiate new calibration process,
Press to read saved measurements,
Press to connect/disconnect serial port.
The pictogram shows current state of the connection,

Get measurement

Press to read indication of connected balance. Additionally, you can use a hot key (F3 by default). The last measurement value is displayed,

Tare

Press to tare the balance. The indication zeroes. On loading the weighing pan, net mass is displayed,

Environment

Area in which all information measured using Thermo-Hygro-Barometer, connected to COM connector of the computer, are displayed,

Time

Area in which the current time is displayed,

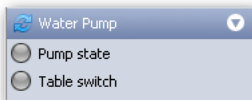
Water Pump

Area in which current state of the pump and the table switch is displayed,

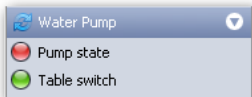
Status bar

Area in which current date is displayed.

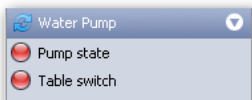
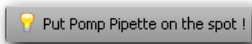
Displaying status in **Water Pump** bookmark:



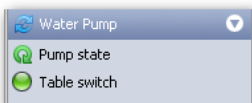
If thermo-hygro-barometer does not communicate with the computer, the warning lights are grey.



If you exceeded pump operation time set in calibration options, the warning light goes red and the table switch light goes green. The following message is displayed in the status bar: 'Put Pump Pipette on the spot!'.



When the pipette is in its place, table switch is not pressed and the water pump is disabled. Both warning lights are red.

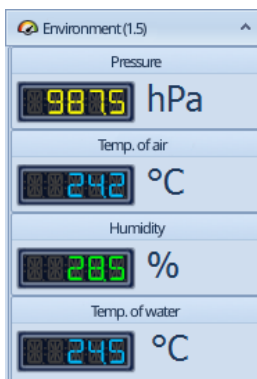


When you pick up the pipette, table switch is pressed and the water pump is enabled. Warning light of table switch is green and the needle that indicates pump state moves clockwise.

Caution:

*Displaying **Water pump** status is disabled for pipettes calibration workstations based on THBR System 2.0.*

No communication between computer and thermo-hygro-barometer is signalled in **Environment** bookmark with „-“ sign.



3.2.2. Operation

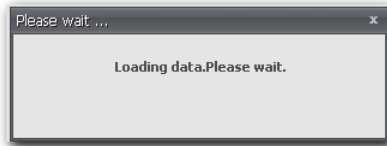
Various child windows can be displayed in the home screen. There are three windows displayed on the example below. Each window is represented by buttons located in the bottom part of the home screen. By pressing the buttons you switch the windows and the title bar is displayed (example: User data).

The screenshot shows the 'User data' window with a title bar and three tabs: 'Address Details', 'Your Logo', and 'Options'. The 'Address Details' tab is active, displaying a form with the following fields: Firm name (Radwag), City (Radom), Postcode (26-600), Street (Bracka 28), Department (Informatyka), Telephone (3848800), E-mail (radwag@radwag.pl), and www (www.radwag.pl). At the bottom of the window, there is a navigation bar with five buttons: 'User', 'Operators', 'Customers', 'Scale', and 'Thermo-higro-barometer'. Five arrows originate from a single point above the 'User' button and point to each of the five buttons in the navigation bar. A 'Save' button is located in the bottom right corner of the window.

Press  button to close the window.

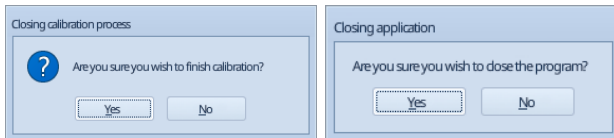
This screenshot shows the same 'User data' window as above, but with an arrow pointing to the close button icon (a small square with an 'x') located in the bottom right corner of the window, next to the 'Save' button.

A message asking you to wait is displayed before opening some of the windows. Such window is automatically closed when the data is ready to be displayed.



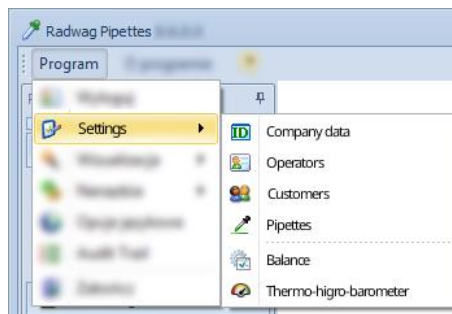
Windows Closing/Shutting Down the Software:

Shutting down the program and closing some windows is preceded by the following message:



4. SETTINGS

To open „**Settings**” menu, press: **Program → Settings**:



Caution:

*All functions of „**Settings**” menu are available only for users with administrator permissions level.*

4.1. Settings

Configuration of user - company - settings. The settings concern data displayed on reports generated by the program.

4.1.1. Address Data

Data from this form is used as a header for pipettes testing report printout.

The screenshot shows a window titled "User data" with three tabs: "Address Details", "Your Logo", and "Options". The "Address Details" tab is selected, displaying a form with the following fields:

Firm name	Radwag		
City	Radom	Postcode	26-600
Street	Bracka 28		
Department	Informatyka		
Telephone	3848800		
E-mail	radwag@radwag.pl		
www	www.radwag.pl		

A "Save" button is located at the bottom right of the form. The window has a "User" tab at the bottom left and a close button (X) at the bottom right.

Fill in all the fields in accordance with the descriptions.
The changes are confirmed and implemented on pressing „**Save**” button.

4.1.2. Company Logo

The option enables setting company logo on printed reports.

The screenshot shows a window titled "Company data" with three tabs: "Address data", "Your logo", and "Options". The "Your logo" tab is selected, displaying a form with the following elements:

- A checked checkbox: "Use the logo image in the report"
- A preview of the Radwag logo (stylized blue text "RADWAG" with a registered trademark symbol).
- A "Select image file ..." button with a folder icon.
- A "Delete" button with a red X icon.
- A "Save" button at the bottom right.

The window has a "User" tab at the bottom left and a close button (X) at the bottom right.

On pressing „**Select image file**” button, select graphic file that is to be displayed in the left upper corner of each report.

Press „**Delete**” button to set RADWAG logo.

4.1.3. Options

Company data

Address data

Your logo

Options

☒ Calculate uncertainty according to ISO/TR 20461

Save

User

x

There is one option available. While selected, it runs automatic uncertainty calculation in accordance with the ISO/TR 20461 standard.

4.1.4. CMC

The CMC uncertainty table enables entering uncertainties for individual volumes to the software in accordance with the accreditation obtained by the laboratory.

Address data

Your logo

Options

CMC

Password Preferences

+

Add

-

Delete

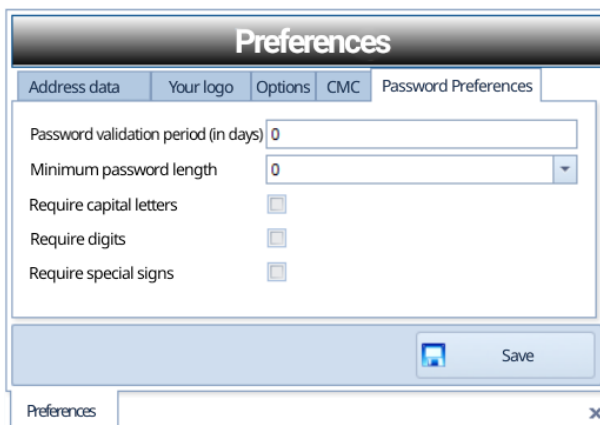
Additional Information

Accreditation - CMC Uncertainty		
Range up to: Volume [μl]	CMC Uncertainty [μl] - Pipette	CMC Uncertainty [μl] - Dispenser
1 μl	0,05 μl	
2 μl	0,05 μl	
5 μl	0,05 μl	
10 μl	0,05 μl	
20 μl	0,07 μl	
50 μl	17 μl	
100 μl	0,27 μl	
200 μl	0,53 μl	
500 μl	1,3 μl	
1 000 μl	2,6 μl	
2 000 μl	5,3 μl	
5 000 μl	13 μl	
10 000 μl	20 μl	

Save

4.1.5. Password Settings

Pipettes software enables precise determination of requirements for setting the password.



The screenshot shows a 'Preferences' window with a tabbed interface. The 'Password Preferences' tab is selected. It contains the following settings:

- Address data
- Your logo
- Options
- CMC
- Password Preferences (selected)

Inside the 'Password Preferences' tab, there are five settings:

- Password validation period (in days): 0
- Minimum password length: 0
- Require capital letters: ☐
- Require digits: ☐
- Require special signs: ☐

At the bottom right of the dialog is a 'Save' button with a floppy disk icon. The window title bar says 'Preferences' and has a close button (X) on the right.

Password validation period (in days) – after specified time determined in days user password is no longer valid;

Minimum password length – minimum quantity of characters required for a password to be accepted

Require capital letters – the password has to contain both uppercase and lowercase letters to be accepted

Require digits – the password has to contain digits to be accepted

Require special signs – the password has to contain special characters (e.g. dash, exclamation mark) to be accepted

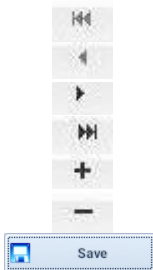
4.2. Operators

Operators are people carrying out pipettes calibrations. In „**Operators**” column you can enter unique names (name, surname, aliases, etc.).

Operator Definition				
First and Last Name	Administrator Field	Operators Post	Range of duties	Calibrations Performed
test admin	☒	test		0
RADWAG	☒	test		0
nonadmin	☐	test		0

Operators

Where:



Press to go to the top of the records list

Press to go to the previous record

Press to go to the next record

Press to go to the bottom of the records list

Press to add operator

Press to delete operator

Press to save changes

Fill in „**Operators Post**” and „**Range of duties**” fields. „**Calibrations performed**” field specifies number of calibrations carried out by an operator and is automatically calculated by the program.

While adding or editing an operator you can grant him administrator permissions level that enables the following actions: adding new operators, changing software settings, connecting with devices, changing language, previewing audit trial, base optimizing and others.

4.3. Customers

In *customers base* window you get access to customers database. The customers can be assigned to carried out testing procedures. Entered information on a customer is placed on the report.

Customers base					
Client code	Company	Address	Organisational unit	Additional information	Remarks
▶	-	-	-	-	-

⏮
◀
Client 1 of 1
▶
⏭
Edit
Add
Delete

Where:

⏮
◀
▶
⏭

+ Add
- Delete
Edit

Press to go to the top of the customers list

Press to go to the previous customer

Press to go to the next customer

Press to go to the bottom of the customers list

Press to add customer

Press to delete customer

Press to change information on customer

CAUTION!

„ID, Company, Address” fields have to be filled in. “ID” field is unique.

Defining a Customer

Edit

Identifier

Company

Address

Organisational unit

Additional information

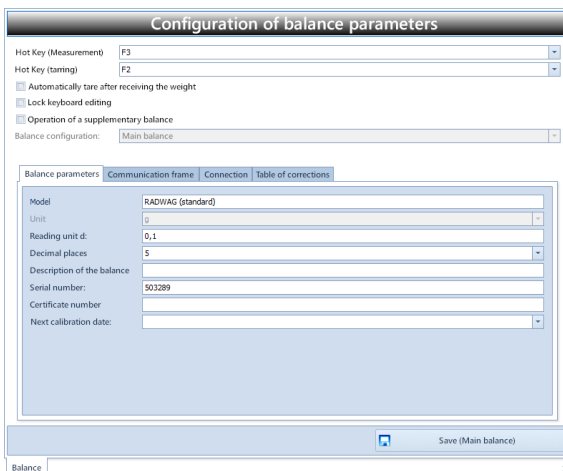
Remarks

Save

On filling in all crucial information on customers, press „**Save**” button to confirm the changes.

4.4. Balance

Parameters configuration of balance used for pipettes testing procedure. The range of configuration enables cooperation with balances of other manufacturers. Changes in configuration are to be implemented on pressing „**Save**” button.



Hot Key (Measurement)

To send command for mass readout, press:

1.  button located in the home screen of the control panel,
2. a hot key.

In order to use option 2, select a hot key. The program enables ascribing function keys from **F1** up to **F12**.

Tare Command

There are two methods of taring the balance:

1. By pressing tare button or by configuring the balance (the balance is tared automatically after the measurement),
2. By sending tare command from a computer.

This configuration refers to **point 4.3.2** of this user manual. Analogously, as for „**End of Frame ident.**”, define the character (characters) that are to be send to the balance as a taring command.

For RADWAG-manufacture balances it is as follows:

Example for RADWAG balances: **Char(84)** it is: **T**

Which in configuration is: **Dec: 084 Text: T**

The following options are send to the balance: **Char(84) + Char(13) + Char(10)**

Where **Char(13) + Char(10)** is a definition of frame end.

Hot key (Taring)

There are two methods of sending a taring command:

1.  button located in the home screen of the control panel,
2. a hot key.

In order to use option 2, select a hot key. The program enables ascribing function keys from **F1** up to **F12**.

Hot Key (Measurement)	F3
Hot Key (tarring)	F2

Enable Additional Scales

Field **Enable additional scales** enables using additional balance.

Field **Scales config** enables selecting the balance (main or additional) to which parameters changes of the following bookmarks refer to: **Balance data**, **Communication frame**, **Connection** and **Correction table**.

☒ Operation of a supplementary balance

Balance configuration:

4.4.1. Balance Data

Window with basic information on the balance:

The screenshot shows a software window titled 'Balance parameters' with four tabs: 'Balance parameters' (selected), 'Communication frame', 'Connection', and 'Table of corrections'. The main area contains the following fields:

Model	RADWAG (standard)
Unit	g
Reading unit d:	0,1
Decimal places	5
Description of the balance	
Serial number:	
Certificate number	
Next calibration date:	

Field „**Model**” (MANUFACTURER-BALANCE NAME) used on printouts of pipettes testing reports.

In „**Unit**” field, a constant measurement unit - gram - is displayed:

A close-up of the 'Unit' field in the software interface, showing a dropdown menu with the value 'g' selected.

Caution:

The software uses mass unit defined in this field to read mass value. It results from the fact that different manufacturers send information on mass unit in different ways. Mass unit during pipettes testing procedure is selected automatically.

In „**Reading unit**” field enter balance sensitivity - „d” parameter (verification unit). This field serves information purposes exclusively and it is not used on printouts.

In „**Decimal places**” field select number of decimal places for measurements carried out on the balance.

In „**Lock editing manually**” field lock measurements editing option. The option is disabled by default. To deselect an option, enter service password.

4.4.2. Communication Frame

Defining method of communication with the balance.

The screenshot shows a software window with four tabs: 'Balance parameters', 'Communication frame', 'Connection', and 'Table of corrections'. The 'Communication frame' tab is active. It contains three input fields: 'End of Frame Identifier' with the value 'HEX: [13] [10]', 'Read Mass Command' with the value 'S', and 'Tare command' with the value 'T'. Each field has a small menu icon (three dots) to its right. Below these fields is a large, empty light blue rectangular area.

End of Frame Identifier

While collecting data, the program has to recognise when the balance finishes sending the response (data packet - frame). Define the value using  button. Press it to display editor window:

The 'Data Frame Formatting' dialog box has two main sections: 'Available markers' on the left and 'Selected markers' on the right. The 'Available markers' list contains items from 'Dec: 000 Text:' to 'Dec: 014 Text:'. 'Dec: 000 Text:' is selected with a dashed border, and 'Dec: 012 Text:' has a mouse cursor over it. Between the lists are two arrow buttons: a right-pointing arrow and a left-pointing arrow. The 'Selected markers' list on the right contains 'Dec: 013 Text:' and 'Dec: 010 Text:'. At the bottom of the dialog is a 'Save' button with a floppy disk icon.

Data format **Dec: <number> Text: <character>** means:

- <number>** - decimal value of a character (byte),
- <character>** - ANSI string (byte).

Example for RADWAG balances:

Char(13) + Char(10) that is: [CR] Carriage Return + [LF] Line Feed

Which in configuration is: **Dec: 013 Text: <none>**
 Dec: 010 Text: <none>

(**Selected markers**) list located on the right contains characters interpreted as the end of the frame. The order of characters is crucial.

In order **to add** another character as the last one on the list, select item from the list on the right and press:  (add) button.

In order **to delete** selected character, select item from the (**Selected markers**) list and press:  (delete) button.

Changes in configuration are implemented on pressing „**Save**” button.

Read Mass Command

There are two methods of sending data to the software:

1. When you manually press the button (e.g. Print, Enter) or when balance configuration enables sending the mass automatically on measurement stabilization,
2. By sending tare command from a computer.

This configuration refers to **point 4.3.2** of this user manual. Analogously as for „**End of Frame ident.**”, define the character (characters) that are to be send to the balance as a command for sending currently measured mass.

For RADWAG-manufacture balances it is as follows:

Example for RADWAG balances: **Char(83)** is: **S**

Which in configuration is: **Dec: 083 Text: S**

The following options are send to the balance: **Char(83) + Char(13) + Char(10)**

Where **Char(13) + Char(10)** is a definition of frame end.

4.4.3. Connection

Defining communication parameters for the balance. Connect the balance to COM serial port. Configure the parameters in accordance with the description.

The screenshot shows a software window with four tabs: 'Balance parameters', 'Communication frame', 'Connection' (selected), and 'Table of corrections'. The 'Connection' tab contains a 'Communication type' dropdown set to 'RS232'. Below this is a section titled 'RS232 parameters' with the following settings:

Parameter	Value
COM Port	COM3
Baud rate	9600
Databits	8
Parity	None
Stop bits	One
Handshake	None

COM Serial Port

List of available serial ports numbers is displayed. Select port used by the balance.

Baud Rate

List of available baud rates is displayed. Selected value has to be the same as the one set in the balance.

Data Bits, Parity, Stop Bits, Handshaking

List of available parameters values is displayed. Selected values have to be the same as the ones set in the balance. Last parameter is disabled.

Changes in configuration are implemented on pressing „**Save**” button.

4.4.4. Corrections Table

The table enables defining corrections for measurement results.

Balance parameters		Communication frame		Connection		Table of corrections	
Calibration point [g]				Correction [g]		Uncertainty of measurement [g]	

+ Add
- Delete
💾 Save

4.5. Pipettes

Carrying out calibration requires defining a pipette, determining its limiting errors, volume and quantity of test measurements. Information on pipettes is saved to the database in order to improve testing procedure.

Pipette database

Pipettes
Models

Drag the column here to group

Manufacturer	Model	Type	Symbol	Range	Unit	Measur/channel	Read un	Tips	Batcher
Eppendorf	4700	Constant volume	60	60	µl		10	0	0
Eppendorf	4700	Constant volume	75	75	µl		10	0	0
Radwag	RP-AF	Constant volume	5	5	µl		10	0	300
Radwag	RP-AF	Constant volume	10	10	µl		10	0	300
Radwag	RP-AF	Constant volume	25	25	µl		10	0	300
Radwag	RP-AF	Constant volume	50	50	µl		10	0	300
Radwag	RP-AF	Constant volume	100	100	µl		10	0	300
Radwag	RP-AF	Constant volume	200	200	µl		10	0	300
Radwag	RP-AF	Constant volume	250	250	µl		10	0	1000
Radwag	RP-AF	Constant volume	500	500	µl		10	0	1000
Radwag	RP-AF	Constant volume	1000	1000	µl		10	0	1000
Bibby Sterlin	Pressmatic 2000	Constant volume	0,4 - 2	0,4 - 2	ml		10	0	0
Radwag	RP-AF	Constant volume	5000	5000	µl		10	0	5000
Eppendorf	4700	Constant volume	80	80	µl		10	0	0

⏪
◀ Pipette 8 of 499 ▶
⏩

🔍
Edit
+ Add
- Delete

📊
Volume measurement

Tested volume	Permissible accuracy error [%]	Permissible repeatability error [%]
100	0.7	0.25
500	0.6	0.2
1000	0.6	0.2

4.5.1. RADWAG Pipettes

There is a predefined base of RADWAG - manufactured pipettes in the software.

• RP-AV Variable-volume pipettes

Range	Increment	Tested volume	Accuracy error	Repeatability error	Tips
[μ l]	[μ l]	[μ l]	[%]	[%]	
0.5-10	0.1	1	2.50	1.50	10
		10	1.00	0.80	
2-20	0.1	2	2.00	0.80	10
		20	1.80	0.60	
5-50	0.5	5	2.00	2.00	300
		50	0.60	0.30	
10-100	0.5	10	3.00	1.50	300
		100	0.80	0.15	
20-200	1	20	0.60	0.60	300
		200	0.50	0.15	
100-1000	5	100	2.00	0.70	1000
		1000	0.60	0.20	
500-5000	50	500	0.70	0.30	5000
		5000	0.50	0.15	

• RP-PV Variable-volume pipettes

Range	Increment	Tested volume	Accuracy error	Repeatability error	Tips
[μ l]	[μ l]	[μ l]	[%]	[%]	
0.2-2,5	0.01	0.25	2.50	1.50	10
		2.5	1.00	0.80	
0.5-10	0.1	1	2.50	1.50	10
		10	1.00	0.80	
2-20	0.1	2	2.00	0.80	10
		20	1.80	0.60	
5-50	0.5	5	2.00	2.00	300
		50	0.60	0.30	
10-100	0.5	10	3.00	1.50	300
		100	0.80	0.15	

20-200	1	20	0.60	0.60	300
		200	0.50	0.15	
100-1000	5	100	2.00	0.70	1000
		1000	0.60	0.20	
500-5000	50	500	0.70	0.30	5000
		5000	0.50	0.15	

- **RP-AF Fixed-volume pipettes**

Volume	Accuracy error	Repeatability error	Tips
[μ l]	[%]	[%]	
5	1.30	1.20	300
10	0.80	0.80	300
25	0.50	0.30	300
50	0.50	0.30	300
100	0.50	0.30	300
200	0.40	0.20	300
250	0.40	0.20	1000
500	0.30	0.20	1000
1000	0.30	0.20	1000
2000	0.30	0.20	5000
5000	0.30	0.20	5000

- **RP-PF Fixed-volume pipettes**

Volume	Accuracy error	Repeatability error	Tips
[μ l]	[%]	[%]	
5	1.30	1.20	300
10	0.80	0.80	300
25	0.50	0.30	300
50	0.50	0.30	300
100	0.50	0.30	300
200	0.40	0.20	300
250	0.40	0.20	1000
500	0.30	0.20	1000
1000	0.30	0.20	1000
2000	0.30	0.20	5000
5000	0.30	0.20	5000

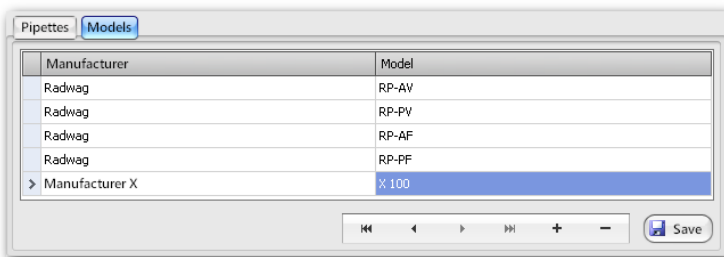
4.5.2. Defining Pipettes

The program enables:

- defining manufacturers of pipettes and its models,
- defining new pipettes of different manufacturers,
- deleting existing pipettes in pipettes base,
- editing existing pipettes in pipettes base.

Manufacturers

Press „**Models**” bookmark to modify information on manufacturers.



The record consists of two fields (Manufacturer and Model) that are to be edited directly in the table.

Press   buttons to add or delete a record. Press „**Save**” button to implement changes.

PIPETTES

Press „**Pipettes**” bookmark. Entered records are modified in two tables:

- Basic data:

Drag the column here to group										
Manufacturer	Model	Type	Symbol	Range	Unit	Measur/channel	Read un	Tips	Batcher	
Eppendorf	4700	Constant volume	60	60	µl	10	0	0		▲
Eppendorf	4700	Constant volume	75	75	µl	10	0	0		
Radwag	RP-AF	Constant volume	5	5	µl	10	0	300		■
Radwag	RP-AF	Constant volume	10	10	µl	10	0	300		
Radwag	RP-AF	Constant volume	25	25	µl	10	0	300		■
Radwag	RP-AF	Constant volume	50	50	µl	10	0	300		
Radwag	RP-AF	Constant volume	100	100	µl	10	0	300		■
Radwag	RP-AF	Constant volume	200	200	µl	10	0	300		
Radwag	RP-AF	Constant volume	250	250	µl	10	0	1000		■
Radwag	RP-AF	Constant volume	500	500	µl	10	0	1000		
Radwag	RP-AF	Constant volume	1000	1000	µl	10	0	1000		■
Bibby Sterilin	Pressmatic 2000	Constant volume	0,4 - 2	0,4 - 2	ml	10	0	0		
Radwag	RP-AF	Constant volume	5000	5000	µl	10	0	5000		▼
Eppendorf	4700	Constant volume	80	80	µl	10	0	0		

  Pipette 8 of 499    Edit  Add  Delete

- Tested volumes data:

Volume measurement			
Tested volume	Permissible accuracy error [%]		Permissible repeatability error [%]
100	0.7		0.25
500	0.6		0.2
1000	0.6		0.2

On pressing  button, window with tested volumes is closed.

Adding Pipettes

In order to add a new pipette, press „**Add**” button and fill in the required fields in both tables

Deleting Pipettes

In order to delete a pipette, press „**Delete**” button.

The changes are confirmed and implemented on pressing „**Save**” button.

Editing Pipettes

Select a pipette from the main table and fill in all fields:

- **Model** – select model from the list or create a new one (*Models* bookmark),
- **Type** – select pipette type (definitions are not to be edited),
- **Symbol, Range, Unit, Reading unit, Tips,**
- **Measurements per canal** – enter value from 3 to 15. The value determines quantity of carried out mass measurements for each tested tip.
- **This is feeder** – select the field if a pipette is a dispenser.
Changing the parameter causes changing the name of report header.

On entering basic data about a pipette, go to „**Tested volumes**” and determine the quantity and parameters of the volumes that are to be tested. The quantity of volume records depends on pipette type - see the table below.

No.	Type	Volumes quantity
1	Variable 1 channel	2-3
2	Variable 8 channels	2-3
3	Variable 12 channels	2-3
4	Fixed volume	1

Enter „**Permissible systematic error**” and „**Permissible random error**”.

The changes are confirmed and implemented on pressing „**Save**” button.

4.6. Thermo-Hygro-Barometer

The software can be integrated with RADWAG ambient conditions module. It is a device intended for temperature, humidity and atmospheric pressure measurement.

In „**Device data**” bookmark set manufacturer, name of a device and its serial number taken from the data plate.

Configuration of thermo-hygro-barometer parameters

Device data
Sensors
Pump
Connection

☒ Turn on the device
 Lock value modification ☐
 Manufacturer: Radwag
 Device name: Thermo-Hygro-Barometer
 Serial number: A109567
 Certificate number:
 Pressure resolution [hPa]
 Humidity resolution [%]
 Air temp. resolution [°C]
 Water temp. resolution [°C]
 Next calibration date:

Save

In „**Sensors**” bookmark set active sensors and a button for refreshing indications of each parameter.

Individually set sensors for:

- atmospheric pressure,
- humidity,
- air temperature,
- water temperature.

Configuration of thermo-hygro-barometer parameters

Device data
Sensors
Pump
Connection

Name	Correction	Resolution	Uncertainty
☒ Pressure [hPa]	0	0	0
☒ Humidity [%]	0	0	0
☒ Air temperature [°C]	0	0	0
☒ Water temperature [°C]	0	0	0

Hot Key (refresh rate) F5

Save

In „**Pump**” bookmark set pump control and accessibility of **Water pump** bookmark located in the home screen.

Configuration of thermo-hygro-barometer parameters

Device data | Sensors | Pump | Connection

☒ Pump control

Save

Caution:

Setting pump control does not apply to pipettes calibration workstation based on THBR System 2.0.

In „**Connection**” bookmark set RS232 port, to which the balance is connected, and the baud rate for 57600 value (by default).

Configuration of thermo-hygro-barometer parameters

Device data | Sensors | Pump | Connection

COM Port: COM3

Baud rate: 115200

Save

„**Calibration**” bookmark enables calibration of ambient conditions module and is available for RADWAG employee exclusively on entering a password.

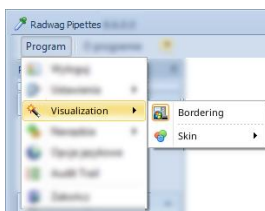
4.6.1. TECHNICAL SPECIFICATIONS

Technical specifications of ambient conditions module:

Measured temperature range	-10 °C ÷ 85 °C
Temperature measurement accuracy	d=0.1 °C error ≤ ±0.4 °C (15 °C ÷ 30 °C)
Measured pressure range	850 ÷ 1050 hPa
Pressure measurement accuracy	D=1hPa error ≤ 5 hPa
Measured humidity range	0 ÷ 100%
Humidity measurement accuracy	d=1% error ≤ 10%
TH-W Water temperature sensor	measurement of liquid temperature (3 m long cable)
TH-AH Air temperature and humidity sensor	measurement of air temperature and humidity (3 m long cable)
Operating temperature	-10 °C ÷ 40 °C
Housing	Plastic
Power supply	230 V AC / 11 V AC, 50 Hz
Communication interfaces	RS232
Dimensions (in mm) without handle	131×68×34
Mass	0.75 kg

5. VISUALIZATION MENU

In order to access „**Visualization**” menu press: **Program → Visualization**:



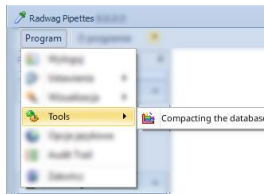
There are two available functions:

- **Bordering** – changes the style of windows bordering
- **Skin** – enables selecting graphic style of the windows.

New settings are saved automatically.

6. TOOLS MENU

In order to access „**Tools**” menu press: **Program → Tools**:



There is one option available:

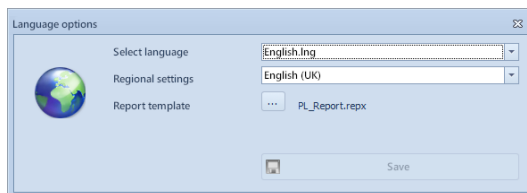
- **Compacting the database** – compacting database containing pipettes tests,

Caution:

*All functions of „**Tools**” menu are available only for users with administrator permissions level.*

7. LANGUAGE MENU

In „**Language**” menu set the language of the software. On selecting a language, press „**Save**” button and restart the software.



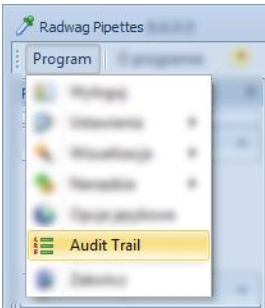
List of languages:

- English
- French
- German
- Italian
- Polish

Caution:

You can change the language only when you have administrator permissions level.

8. AUDIT TRAIL



Located in **Program** menu **Audit trail** registers all operations carried out in the software. User with administrator permissions can review and search displayed information.

A screenshot of the 'Audit Trail' window in the software. It features a 'Print' button and a table with columns for Time, User, Action, and Comment. The table contains a list of system events such as logins, software start-ups, shut-downs, and parameter modifications by users like RADWAG and test admin.

Time	User	Action	Comment
2016-11-21 11:00:59	RADWAG	Login	
2016-11-21 11:00:51		Software start up	
2016-11-21 11:00:43	test admin	Software shut down	
2016-11-21 10:57:04	test admin	Modifying the balance parameters	Main balance
2016-11-21 09:48:44	test admin	Login	
2016-11-21 09:48:16		Software start up	
2016-11-18 16:01:21	test admin	Software shut down	
2016-11-18 14:07:01	test admin	Login	
2016-11-18 14:06:54		Software start up	
2016-11-18 14:06:51	RADWAG	Software shut down	
2016-11-18 14:06:09	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 14:05:10	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 14:05:03	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 13:31:46	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 13:31:44	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 11:50:19	RADWAG	Login	
2016-11-18 11:50:11		Software start up	
2016-11-18 11:50:07	RADWAG	Software shut down	

Press **Print** **Print** to preview and print.

View

File View Background

75%

--- Audit Trail ---

Time	User	Action	Comment
2016-11-21 11:00:59	RADWAG	Login	
2016-11-21 11:00:51		Software start up	
2016-11-21 11:00:43	test_admin	Software shut down	
2016-11-21 10:57:04	test_admin	Modifying the balance parameters	Main balance
2016-11-21 09:48:44	test_admin	Login	
2016-11-21 09:48:16		Software start up	
2016-11-18 16:01:21	test_admin	Software shut down	
2016-11-18 14:07:01	test_admin	Login	
2016-11-18 14:06:54		Software start up	
2016-11-18 14:06:51	RADWAG	Software shut down	
2016-11-18 14:06:09	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 14:05:10	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 14:05:03	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 13:31:46	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 13:31:44	RADWAG	Modifying the balance parameters	Additional balance
2016-11-18 11:50:19	RADWAG	Login	
2016-11-18 11:50:11		Software start up	
2016-11-18 11:50:07	RADWAG	Software shut down	
2016-11-18 10:16:48	RADWAG	Login	
2016-11-18 10:16:40		Software start up	
2016-11-18 10:16:34	RADWAG	Software shut down	
2016-11-18 08:06:49	RADWAG	Login	
2016-11-18 08:06:41		Software start up	
2016-11-18 08:05:33	RADWAG	Software shut down	

Page 1 of 2

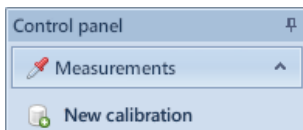
75%

Caution:

The function is available when you have administrator permissions level.

9. NEW CALIBRATION

Testing pipettes calibration is a basic function of the software. Press „**New calibration**” button located in the Control panel to access the function:



Window with „**Specification**” bookmark is displayed:

Calibration procedure

Specification

Pipette data

Select pipette

General	
Manufacture	
Model	
Type	
Symbol	
Batcher	
Details	
Range	
Reading unit	
Tips	
Unit	
Meas. p. char	
Coef. of expa	
Measuring channels	
Volume	
Error A (%)	
Error CV (%)	

Initial environmental conditions

Temperature [°C] ✖

Pressure [hPa] ✖

Humidity [%] ✖

Temp. of water [°C] ✖

Z coefficient [ml/g]

Y coefficient

Thermo-hygro-barom Fill parameters

Information

Pipette's serial no. ✖

Registration no.

test admin

Client [Select]

Apply settings
 Σ Recalculate
 Save
 Report

Where:

Pipette serial no.*

Identification no.

Operator *

Client

Temperature [°C] *

Pressure [hPa] *

Z factor [ml/g]

Humidity [%]

Temp. of water [°C]

Evaporation factor [K]

Fill in parameters

Unique serial number of pipette manufacturer, Identification number of a pipette (within the company)

Data of an operator carrying out calibration process,

Customer for whom the calibration is carried out,

Ambient temperature,

Atmospheric pressure,

Z factor is calculated automatically (table with factors is to be found further down this user manual),

Ambient humidity, 50% by default,

Temperature of the water,

Default value 1.

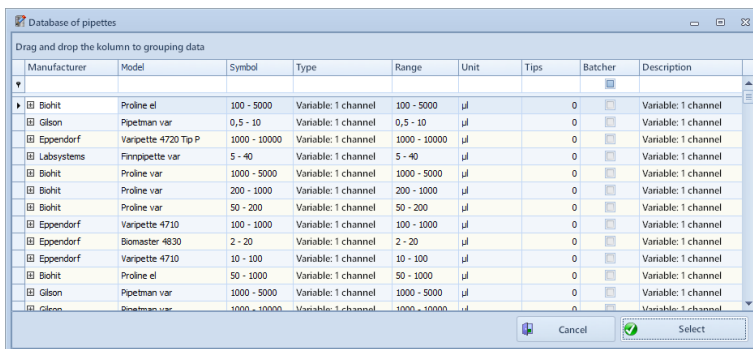
Press to fill the fields with ambient conditions taken from the ambient conditions module.

***) - Obligatory to be filled in**

9.1. Specification

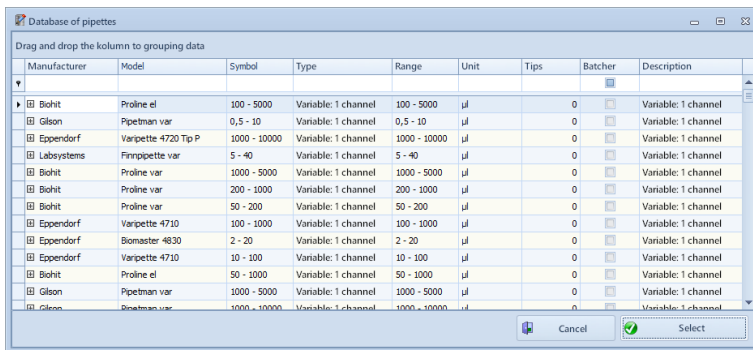
Prior starting calibration process, fill in all the required fields:

1. Press  **Select pipette** button to select pipette defined in the database:

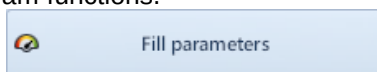


Select a pipette and press „**Select**” button to confirm.

While searching for a pipette you can use grouping option. You can group the pipettes by Models. To do that, press and drag Model's column header to “Drag and drop column to group data” area:



2. Fill in all necessary data (marked with an asterisk). If the software cooperates with thermo-hygro-barometer, press „**Fill in parameters**” button to load the parameters from the device to the fields in program. Readout update is possible on pressing F5 button or any other button configured in program functions.



3. Make sure the data is correct. In order to go to the next step: „**CALIBRATION - weighing**”, press the following button:



The program automatically gives a unique calibration number, e.g.

Calibration: 08-09-18/00018

9.2. Calibration - Weighing

On confirming the settings in „**Specification**” bookmark the three following bookmarks are displayed: „**Weighings**”, „**Final ambient conditions**” and „**Results/report**”:

Calibration: 16-12-12/00005									
Specification		Weighing		Final environmental conditions		Results/report			
Select volume for testing									
Volume research [µl]	Mass [g]	Acceptable error A [%]		Acceptable error CV [%]					
100	0,099 516	0,5		0,3					
Weighing for selected volume									
Volume	Canal no.	Measures no. (on canal)	Weight measured [g]	Volume count [µl]	Pressure	Tempe...	Humid...	Temper...	
100 µl	1	1	512,0	514489,5802	990,3	26,52	24,2	28,23	
100 µl	1	2	527,0	529562,5171	990,2	26,52	24,2	28,23	
100 µl	1	3	527,0	529562,5171	990,4	26,52	24,2	28,23	
100 µl	1	4	512,0	514489,5802	990,4	26,52	24,3	28,23	
100 µl	1	5	527,0	529562,5171	990,4	26,52	24,4	28,23	
100 µl	1	6	542,0	544635,4540	990,3	26,52	24,6	28,23	
100 µl	1	7	542,0	544635,4540	990,3	26,52	24,7	28,23	
100 µl	1	8	527,0	529562,5171	990,3	26,56	24,7	28,23	
100 µl	1	9	512,0	514489,5802	990,4	26,56	24,5	28,27	
100 µl	1	10	505,0	507455,5430	990,3	26,56	24,5	28,27	

Σ Recalculate
Save
Report

There are two tables in the window:

- „**Select volume for testing**” - the table contains volume quantity and parameters to be tested,
- „**Weighing for selected volume**” - contains measurement data of all channels for selected volume.

Start the calibration process by selecting the volume that is to be tested. By default the program selects the first volume in the table.

9.2.1. Entering Mass Value

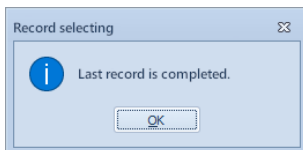
In „**Weighings for selected volume**” table select the record for which mass value is to be entered. There are two methods of entering the values:

1. Manually, on unlocking this option in balance settings,
2. Using connection with the balance - read „**Communication frame**” chapter, sections: „**Weighing request command**” and „**Hot key**”.

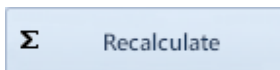
In case of **manual entering of the values** of read masses, you enter the data in „**Mass measurement**” column and go to next measurement records for all volumes.

In case of **connection with the balance** the value of read mass is automatically entered into selected weighing record in „**Weighings for selected volume**” table.

On filling in the weighing, the software automatically selects next record. If the record is the last in the tested volume column, the first record of the next volume is ascribed to it. This cycle is repeated until reaching the last weighing in the last tested volume. The following message is displayed:



On calibration completion or during the process, the following button for recalculating current state of entered masses values is available:



9.2.2. Results/Report

Prior activation of „**Results/report**” bookmark, it is **obligatory** to press „**Recalculate**” button. The window with results is divided into two sections:

1. **The intermediate results** – presenting records for each tested channel,
2. **Summary** – presenting summary of all measurements as one parameter: Status = **ACCEPTED** or **DISCARD**.

Calibration: 09-03-13/00001

Specification		Weighting		Results/report	
Tested item					
Volume	1 µl	10 µl			
Canal	1	1			
Countings					
Average volume	1,0000	10,0000			
Precision error A [%]	0,00	0,00			
Precision error A	0,0000	0,0000			
Repeating error CV [%]	0,00	0,00			
Repeating error CV	0,0000	0,0000			
Intermediate results					
Range A	OK	OK			
Range CV	OK	OK			
Summary					
Calibration result			Next calibration date: 2009-04-13		
Status: ACCEPTED			Calibration date: 2009-03-13 13:05:35		
Information			Remarks		
Document No.	09-03-13/00001				
Pipettes serial no.	SN123456				
Norm	ISO 8655				
Performer	Administrator				
Calibration date	2009-03-13				
Σ Recalculate			Save		Report

In „**Next calibration date**” you can enter the date of next calibration. This date is used for filtering scheduled calibrations. By default, next calibration is scheduled to be carried out in a month.

„**Comments**” field contains comments useful when the calibration is rejected.

The example below presents calibration rejected because of exceeding **CV** limiting error (repeatability error) for 20ul volume in channel 1.

Tested item		
Volume	1 µl	10 µl
Canal	1	1
Countings		
Average volume	1,0000	10,0561
Precision error A [%]	-0,0004	0,5607
Precision error A	0,0000	0,0561
Repeating error CV [%]	0,0000	1,6266
Repeating error CV	0,0000	0,1636
Intermediate results		
Range A	OK	OK
Range CV	OK	Error
Summary		
Calibration result		Next calibration date: 200
Status: DISCARD		Ca
Information		13
Document No.	09-03-13/00001	

Saving Calibration Results

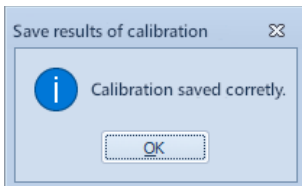
In order to save the calibration to database press the following button:



Caution:

The results are not saved until you press the button. You can press the button repeatedly to make sure that there would be no data loss caused by any unpredicted computer malfunction.

The following message is displayed on saving the data:



On saving the results, the button for previewing calibration document is displayed:



9.2.3. Calibration Report Printout

The window presented below displays an exemplary report and a toolbar. Toolbar description:



press to activate quick printout on a default printer



press to save and reopen a printout in a format dedicated for such type of reports



press to export printout to the following document formats: PDF, HTML, Excel, CSV, Text, Image

An example of pipette calibration report:



Printing: 13-03-2009

Firm: **Radwag**
 Department: **Informatyka**
 Street: **Bracka 28**
 Postcode / City: **26-600 Radom**
 Telephone: **3848800**
 E-mail: **radwag@radwag.pl**
 WWW: **www.radwag.pl**

PIPETTE CALIBRATION REPORT

Current calibration	Document No.	Operator	Calibration date	CALIBRATION RESULT
	09-03-13/00001	Administrator	2009-03-13 13:05:35	DISCARD

PIPETTES DATA

Manufacturer: Radwag
 Model/symbol: RP-AV / 10
 Range/scale/tips: 0,5-10 / 0,1 / 10
 Type: Variable: 1 channel
 Unit: µl
 Serial No: **SN123456**

ENVIRONMENT CONDITIONS

Air temperature [°C]: 15
 Pressure [hPa]: 1000
 Humidity [%]: 0
 Z factor [ml/g]: 1,002
 Evaporation factor K: 1
 Temp. of water [°C]: 0

INTERMEDIATE RESULTS

Volume [µl]		Weight [mg]		Norm, precision error [%]		Norm, repeating error [%]	
1,00		0,9980		2,5		1,5	
Canal No / measure	Average volume [µl]	Prec. err. [%]	Repeat. err. [%]	Result A	Result CV		
Canal 1	1,0000	-0,0004	0,0000	☒	☒		
1,00	1,00	1,00	1,00	1,00	1,00		

Volume [µl]		Weight [mg]		Norm, precision error [%]		Norm, repeating error [%]	
10,00		9,9800		1		0,8	
Canal No / measure	Average volume [µl]	Prec. err. [%]	Repeat. err. [%]	Result A	Result CV		
Canal 1	10,0561	0,5607	1,6266	☒	☐		
9,98	9,98	9,98	9,98	9,98	10,50	10,00	10,00

SUMMARY

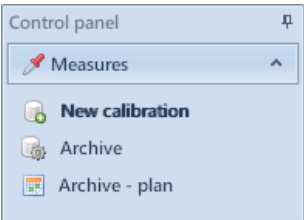
Calibration Ground of calibration: Ex Weights per canal: 10 Weights unit: mg Next calibration: 2009-04-13 13:05:35 Remarks: Calibration date: 2009-03-13 13:05:35	Scale Name/model: RADWAG (standard) Unit: g	Thermo-higro-barometer Manufacturer: Radwag Name/Type: Thermo-Higro-Barometer Serial No: 000000
--	---	--

Operator: Administrator

Operators signature

10. ARCHIVE

To access this menu press „**Archive**” button located in Control panel:



The table containing all carried out calibration processes is displayed.

Functions:

- Browsing and filtering (searching) carried out calibrations,
- Printing reports from carried out pipettes calibrations,
- Browsing pipettes to be calibrated,
- Carrying out new calibrations based on already existing ones.

Archive calibrations

Drag and drop the column to grouping data

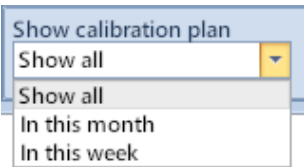
Cal. data	Cal. result	Next calibration	Document no.	Model	Symbol	Serial no.	Registration no.	Pipette type	Range	Unit	Batcher	Client
18.11.2016	☐	18.05.2017	16-11-18/00002	RP-AF	100	112233		Fixed volume	100	µl	☐	
18.11.2016	☐	18.05.2017	16-11-18/00001	RP-AF	10	112233	-	Fixed volume	10	µl	☐	

Show scheduled calibrations
Show all ☐ ☒ Show advanced filter

Report

10.1. Scheduled Adjustments

On displaying the form, the calibrations scheduled for current month are displayed. You can filter calibrations in three ways, as it is shown below:



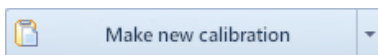
Where:

- Show all** - displaying all calibrations regardless the scheduled date
- This month** - displaying calibrations scheduled for current month (default setting)
- This week** - displaying calibrations scheduled for current week

10.2. Calibration Start

In this menu, you can start new calibration process.

In order to use this function, select a calibration record of specified pipette and press:



This option is useful for managing scheduled calibrations.

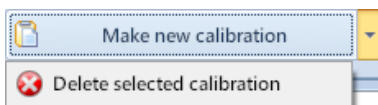
With scheduled date of pipette calibration, on using the above-presented button, a form of new calibration is automatically filled in with parameters of selected pipette including its serial number.

Caution:

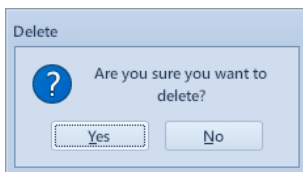
The option is available only when there is no calibration carried out in the moment.

10.3. Deleting Selected Calibrations

Displayed calibrations can be deleted from the archive using „**Delete the selected calibration**” option that is to be found in a menu next to „**Make new calibration**”.



On pressing „**Delete the selected calibration**” option, a message box for confirmation is displayed. On confirmation, selected records are deleted.



Caution:

The function is available when you are logged in and have administrator permissions level.

Caution:

Deleting calibration from the archive is irreversible.

10.4. Filtering

The table, displaying carried out calibrations, filters the records. First record in a table (in the picture marked red) contains filtered fields. The filtering fields are empty by default. It means, that all available records are displayed.

In order to filter, select ☒ Show advanced filter field. Next, enter some values into the columns (fields) and select type of displayed calibration results.

Displaying calibration results:

- | | |
|-------------------------------------|-------------------------|
| ☒ | - all calibrations |
| ☐ | - rejected calibrations |
| ☒ | - accepted calibrations |

Displaying type of calibrated device:

- | | |
|-------------------------------------|-------------|
| ☒ | - show all |
| ☐ | - pipette |
| ☒ | - dispenser |

Using filtering option, bar with information on currently used filtering parameters is displayed in the bottom part of the table (in the picture marked green).

Archive calibrations

Drag and drop the column to grouping data

Cal. data	Cal. result	Next calibration	Document no.	Model	Symbol	Serial no.	Registration no.	Pipette type	Range	Unit	Batcher	Client
▼ 18.11.2016	☐										☐	
▶ 18.11.2016	☐	18.05.2017	16-11-18/00002	RP-AF	100	112233		Fixed volume	100	µl	☐	
18.11.2016	☐	18.05.2017	16-11-18/00001	RP-AF	10	112233	-	Fixed volume	10	µl	☐	

✕ ☒ Starts with([Cal. data], '18.11.2016') Edit filter

Show scheduled calibrations
 Show all ☒ Show advanced filter

Make new calibration Report

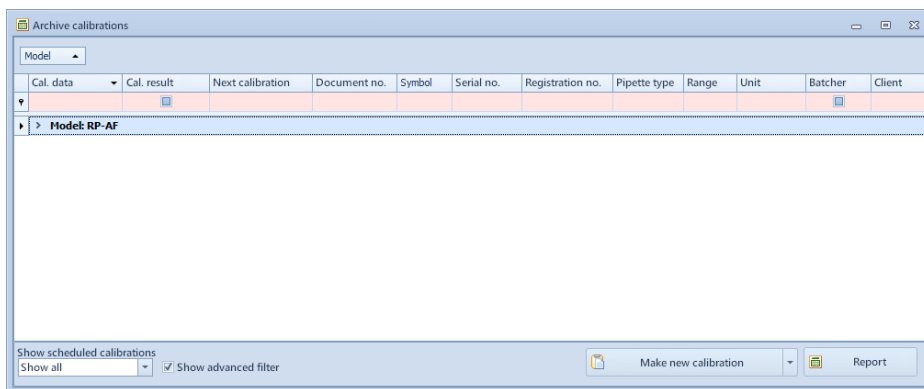
This example is to be interpreted as follows:

Display records, where „**Next calibration**” = **2010-02-11**
 and „**Model**” starts with **rp** value,

The following columns are filtered:

- Calibration date
- Calibration result
- Next calibration
- Document No.
- Model
- Symbol
- Pipette serial no.
- Identification no.
- Pipette type
- Range
- Unit
- Dispenser
- Client

You can use grouping function to find certain pipette. In order to group pipettes by „**Model**”, press and drag „**Model**” column header to the „**Drag and drop column to group data**” field.



10.5. Printing

Select calibration record that is to be printed.

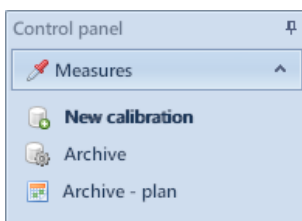
Press  **Report** button to display calibration printout preview.

For more information on report options, go to the following chapter:

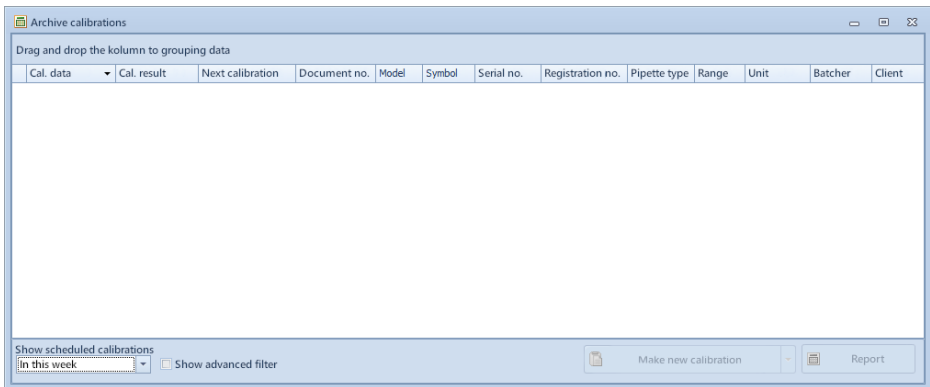
Calibration– weighing> Calibration report printout.

11. REVIEW ARCHIVE

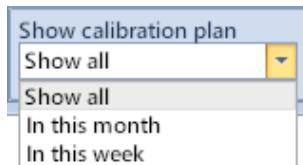
To access this function, press „**Archive-schedule**” button located in the Control panel:



„**Review archive**” function displays archive window and disables function for adding and deleting records and generating reports.



„**Review archive**” enables immediate previewing of carried out tasks with the filter set to the current week by default.



12. RECALCULATION COEFFICIENT

Z factor value is calculated using the following formula:

$$Z = \frac{1}{\rho_b} \bullet \frac{\rho_b - \rho_a}{\rho_w - \rho_a}$$

ρ_b - liquid standard density (constant 8000 kg/m³)

ρ_a - air density

ρ_w - water density

