

Operating Manual

MICROBALANCES

- MXA 5
- MXA 5/F
- MXA 11
- MXA 21



Microbalances MXA 5/F (for filter)



**MANUFACTURER
OF ELECTRONIC WEIGHING INSTRUMENTS**

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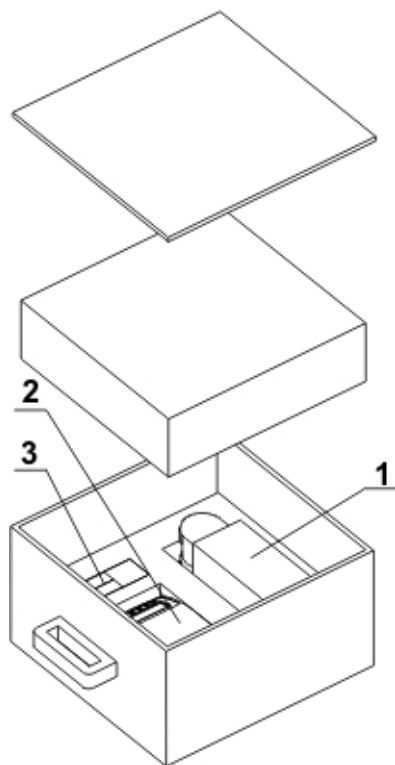
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1. UNWRAPING THE MICROBALANCE

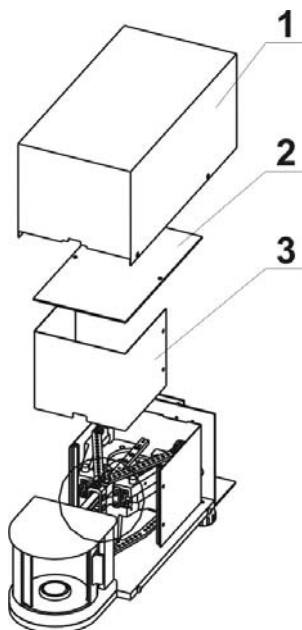
1.1. The microbalance

Take the microbalance out of the box. Remove the protection foam. Set the balance on stable table. Take all components out of the box.



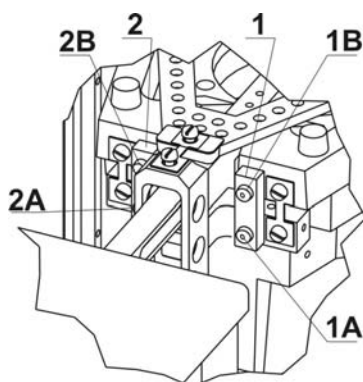
- 1- mechanical module
- 2- electronic module
- 3- box with the components

Out of the box



Completedthe microbalance

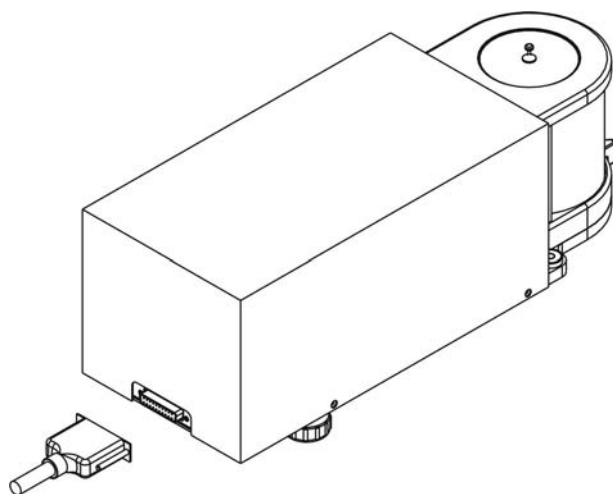
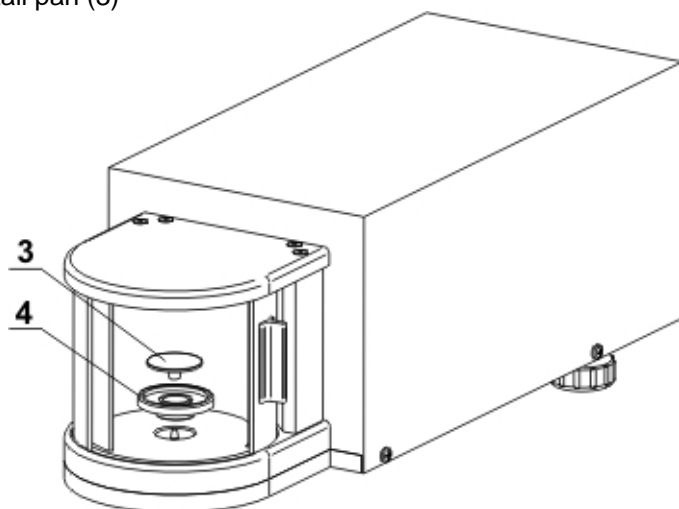
1. Unscrew four bolts on the sides of casing, then carefully remove casing (1).
2. Remove top and front part of inside mechanism shield (2) i (3)



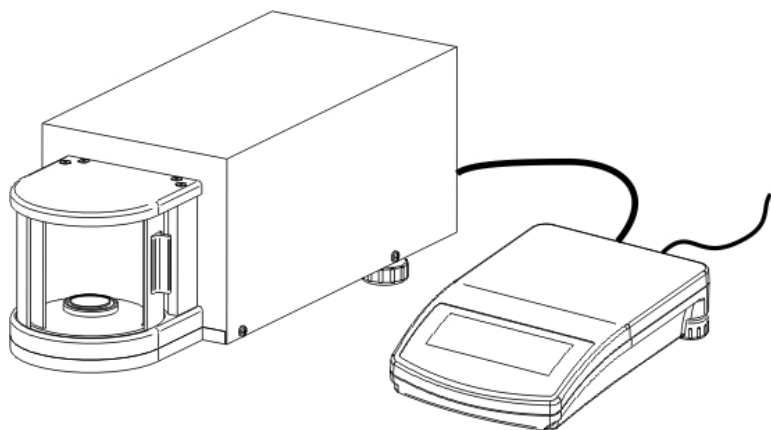
Completedthe microbalance

3. Unscrew and remove carefully holding down block (1) i (2) (As first unscrew clamping screws (1A) i (2A))
4. Assembly inside casing of microbalance.
5. Assembly casing of microbalance.

6. Put breeze shield on (4)
7. Install pan (3)



Completed the microbalance



After assembling all components, slide the glass doors shut and plug in the modules micromicrobalance.

The jack plug is in the rear of the microbalance.

The microbalance is supplied through power pack 230 V AC / 11 V AC. Power pack socket is at the rear of the electronic module.

2. START THE MICROBALANCE UP

2.1. Conditions of proper usage

- Set the microbalance on stable table, far from vibrations
- The microbalance should be replaced far from draughts and air breeze.
- The microbalance should be in stable temperature and humidity room
- The microbalance should be replaced far from sources of
- Temperature in the room $+18^{\circ}\text{C} \div +35^{\circ}\text{C}$
- If the static electricity has influence on the microbalance indications it base should be earthed. Earthing screw is in the rear part of the microbalance base.
- The microbalance should be replaced in leveled position

2.2. Set level up

The microbalance should be leveled. The correct leveling is shown on the level indication installed at rear of the microbalance.



level - OK



level incorrect

2.3 Warming up

Before measurements user should wait until the microbalance reaches temperature stabilization. It is warming up time.

For analytical microbalances , warming-up time is about 4 hour. This periods refers to the microbalances which ware in surrounding temperature (work) before start weighing.

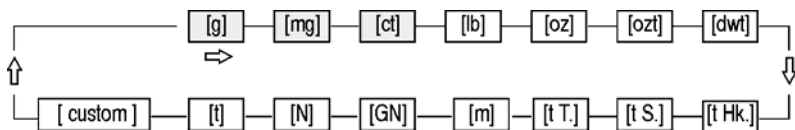
If the microbalances are kept in lower temperature before weighing the warming-up time is about 16 hours.

During warm-up stabilization the indications can change.

3. APPROPRIATION

The microbalances are used to do precise measurements in laboratories. It is possible to do the zero function in all measure range.

The microbalance weights in following units:



Measure units

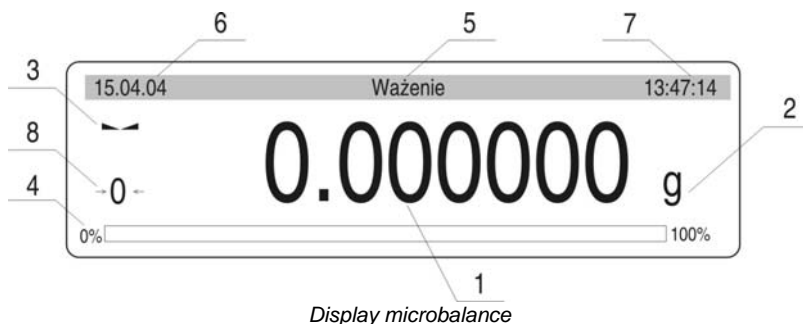
Apart from weighing in various measure units the microbalance also:

- checkweighing
- filling
- percent
- air density
- formulation
- statistics

Measure units and particular functions can be inaccessible for user. It is possible to adapt the microbalance to individual needs and access functions and units which are necessary at this moment.

It is possible to define accessible or noo-accessible in user menu and it is described in further part of the manual.

4. DESCRIPTION OF THE MICROBALANCE - display



1. load mass and quantity of pieces
2. measure unit
3. the result is stable
4. line of max range of the microbalance
5. work mode
6. date
7. time
8. precise ZERO

4.2. Keyboard

Each key is dual-function key. Particular function can be done through. User also can move in the microbalance menu.



Switches the display off.



Function key.



Selects the work mode



Changes measure units



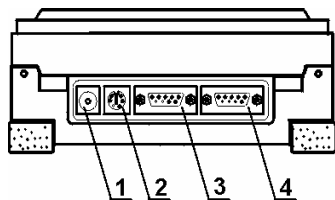
Sends information to external instrument (PRINT) or confirms parameter value or function (ENTER).



Sets indication to zero

Esc

4.3 Connections



1. power adapter socket
2. PS keyboard connector
3. RS 232 port
4. additional display socket

Sockets of the microbalance

5. USER MENU

There are 9 groups in user menu. Each group is named by P letter. Name and contents of each group is presented below.

P1 Calibration

01	internal calibr	| * * * * * |	Function
02	external calibr	| * * * * * |	Function
03	user calibr	| * * * * * |	Function
04	Test calibr	| * * * * * |	Function
05	weight correction	| * * * * * 0.0 |	
06	automatic calibr	| * * * * * 0.3 |	both
07	Aut. Calibr time	| * * * * * 0.3 |	3 hours
08	Report printout	| * * * * * 0.1 |	on

P2 GLP

01	User	| Nowak Jan |	
02	Project	| AR – 65/04 |	
03	time printout	| * * * * * 0.0 |	off
04	date printout	| * * * * * 0.0 |	off
05	User printout	| * * * * * 0.0 |	off
06	Project printout	| * * * * * 0.0 |	off
07	Printout Id	| * * * * * 0.0 |	off
08	Calibration printout	| * * * * * 0.0 |	off

P3 Date/Time

01	Form date	| * * * * * 0 |	D/M/R
02	Form time	| * * * * * 0 |	24 hours
03	Time	| * * * * * |	Function
04	Date	| * * * * * |	Function
05	Display time	| * * * * * 1 |	on
06	Display date	| * * * * * 1 |	on

P4 Readout

01	Filter	|	*****	3	|	middle
02	Med. Filter	|	*****	1	|	enabled
03	Dis. Refresh	|	*****	1	|	0.1 s
04	Autozero	|	*****	1	|	on
05	Last digit	|	*****	1	|	always
06	Negative	|	*****	1	|	disabled
07	Air buoy. Cor	|	*****	1	|	disabled

P5 RS - 232

01	Transm. speed	|	*****	1	|	4800
02	Parity	|	*****	0	|	none
03	Data bits	|	*****	2	|	8 bits
04	Stop bits	|	*****	1	|	1 bit
05	Transm data	|	*****	0	|	none
06	Aut. printout	|	*****	0	|	none
07	Interval	|	*****	1	|	* 0.1 s
08	Min. mass	|	*****	4	|	10 d
09	Print stab	|	*****	1	|	enabled
10	Print to	|	*****	0	|	printer

P6 Printout

01	Numer Print	|	*****	0	|	standard
02	Print 1 start	|	*****	1	|	
03	Print 1 stop	|	*****	1	|	
04	Print 2 start	|	*****	1	|	
05	Print 2 stop	|	*****	1	|	
...	.....	|	*****	0	|	
10	Pr. Edit	|	*****	*	|	function
11	String 1	|	*****	1	|	
...	.....	|	*****	1	|	
89	String 80	|	*****	0	|	

P7 units

01	Grams	| * * * * * 1 |	enabled
02	Miligrams	| * * * * * 1 |	enabled
03	Carats	| * * * * * 1 |	enabled
04	Pounds	| * * * * * 0 |	disabled
05	Ounces	| * * * * * 0 |	disabled
06	Ounces troy	| * * * * * 0 |	disabled
07	Dwt	| * * * * * 0 |	disabled
08	Taele Hk.	| * * * * * 0 |	disabled
09	Taele S.	| * * * * * 0 |	disabled
10	Taele T.	| * * * * * 0 |	disabled
11	Momms	| * * * * * 0 |	disabled
12	Gran	| * * * * * 0 |	disabled
13	Newtons	| * * * * * 0 |	disabled
14	Tical' e	| * * * * * 0 |	disabled
15	user unit	| * * * * * 0 |	disabled
16	factor unit	| * * * * * 1 |	

P8 Work modes

01	Weighing	| * * * * * 1 |	enabled
02	Dosage	| * * * * * 1 |	enabled
03	Deviations	| * * * * * 1 |	enabled
04	Air density	| * * * * * 1 |	enabled
05	Recipes	| * * * * * 1 |	enabled
06	Statistics	| * * * * * 1 |	enabled
07	Standard div	| * * * * * 1 |	enabled

P9 Inne

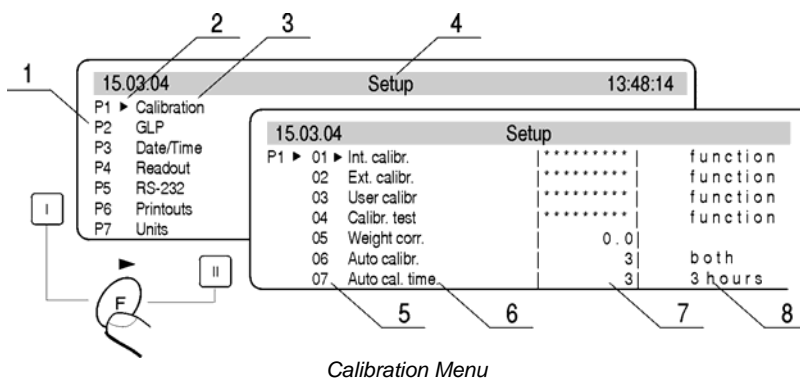
01	ID Setting	| * * * * *	| function
02	Print Aut. ID	| * * * * * 0	| off
03	Signal	| * * * * * 1	| enabled
04	Language	| * * * * * 1	| english
05	Backlight	| * * * * * 1	| on
06	Contrast	| * * * * *	| function
07	Screen server	| * * * * * 0	| enabled
08	Temperature	| * * * * *	| function
09	Microbalance numbe	| 114493 * *	|
10	Program number	| Mxx xx	|
11	Printout par.	| * * * * *	| function
12	Parameter reception	| * * * * *	| function
13	Password protection	| * * * * *	| function

Parameters in user menu are:

- functional – for particular activity eg. the microbalance calibration
- selectable – selects one of few values from the microbalance memory
- noted – changes sets in the microbalance memory eg. Date, time, user number, texts

Menu – graphic version

Press the **F** key to display main menu of the microbalance (display I). Select the submenu whose contents is displayed after pressing the **F** key (display II).



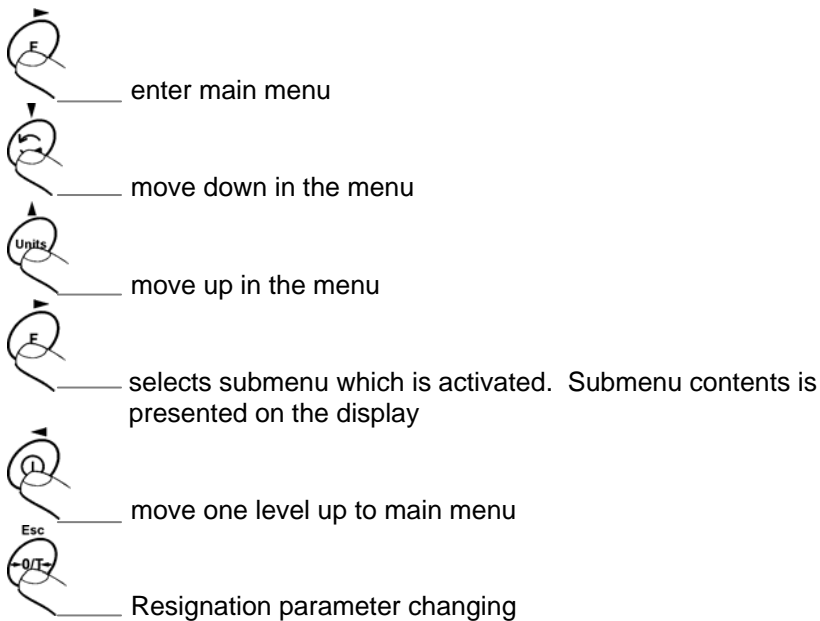
- 1 – main menu number
- 2 – indication of the function selection
- 3 – function name
- 4 – currently used function
- 5 – submenu number
- 6 – submenu name
- 7 – attribute of the menu
- 8 – value of the attribute

5.1. Move in user menu

User moves in the menu by

- the microbalance keyboard
- PS keyboard,
- Communicates from computer to the microbalance

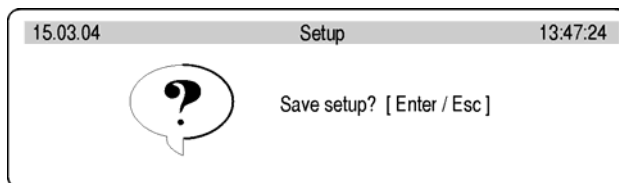
5.1.1. The microbalance keyboard



5.1.2. Return to weighing function



Introduced changes are recorded after return to weighing mode and confirm changes. Press the ESC key many times. If following question appears on the display press: ENTER – confirm or ESC – cancel















Return to weighing









5.1.3. PS computer keyboard

Each key on the microbalance keyboard has its equivalent on the PS keyboard:





- for functions

	Description	keyboard
	Switch on/off the microbalance display	
	Move to the microbalance menu	
	Selects work mode	
	Selects measure unit	
	PRINT	
	TARE	

- for direction keys

	Move up	
	Move to level up	
	Sets selected parameter	
	Move down	

- for ENTER / PRINT keys and ESC

	Confirm changes	
	Cancel and leave function without changes	

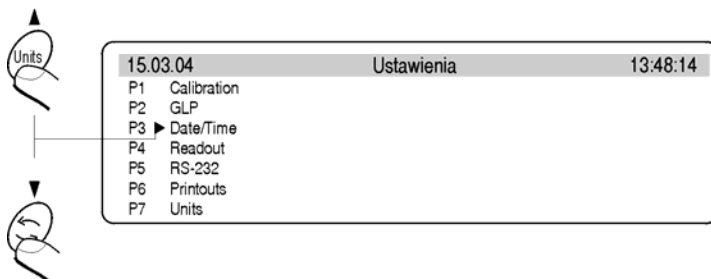
5.1.4. By means of virtual keyboard through RS 232

Most of the functions are done by the microbalance desk or PS keyboard. They are also done by sending orders computer – microbalance.

This commands enables to move in the microbalance manu and control the microbalance work. The list of the commands is at the end of the manual.

5.2 User menu

The menu is presented in p. 5. Press the F key in weighing level. Main menu is presented on the display. Select the submenu which is modified.

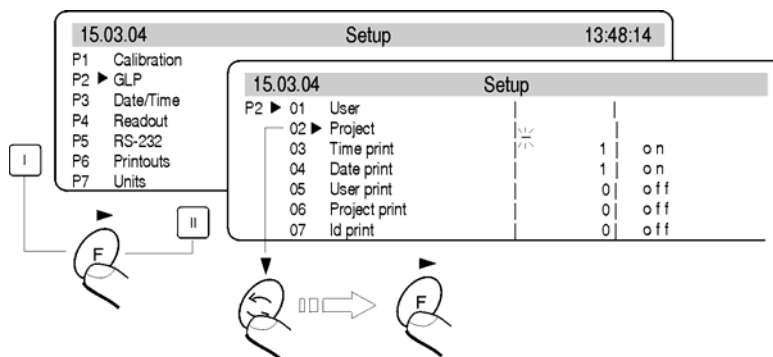


Main menu – submenu selection

If the menu is modified press the **F** key. Selected menu appears on the display. Select what will be changed in this submenu (activate). Select through keys presented on the Draw above. Press the F key.

Reaction of the microbalance:

- Activity of the microbalance (eg. the microbalance calibration) is done for submenu described as Function
- Attribute activation for submenu which is indicated (digit flashing means the value can be changed and some signs can be written)



The microbalance submenu

6. WEIGHING

Following conditions must be fulfilled to get reliable results:

- Stable temperature
- Stable ground
- Proper parameters for external conditions

- 1 Before measurements or for essential changes of the external conditions (if the temperature changes more than 0,4°C/h) calibrate the microbalance in accordance with p. 7.1.
- 2 Before measurements load the pan and check if the microbalance show „precise zero” – displayed $\rightarrow 0 \leftarrow$ in down left corner of the display (only if the parameter P4 06 Autozero has the value 1: yes) and check if the measurement is stable – $\blacksquare \blacktriangleleft$ is displayed in right up corner of the display. If the microbalance does not show zero press the key



- 3 If the conditions are unfavourable (no stable result) lines appear on the display. After settled time the microbalance returns to weighing mode without set up to zero. In this case wait until the conditions stabilize and press **Esc** again
- 4 By the **Units** key select measure unit. Put the load on the pan and after stabilization read out the result. If measure unit user wants to use is not displayed during pressing the **Units** key check if it has access attribute.
- 5 The indication can be set to zero many times. Sum of loads noted in the microbalance memory cannot be higher than max capacity.
- 6 Between following measurements do not unplugged the microbalance. The microbalance should be switched off by the **ON/OFF** key. After pressing the key again the microbalance is ready to work without warm stabilization.

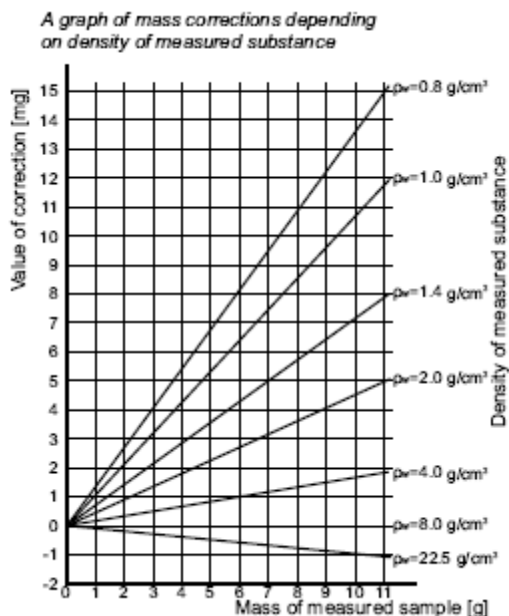
6.1. Air buoyancy correction

AIM OF FUNCTION:

The application allows for correction of measuring errors during:

1. Measuring mass of substances which density differs substantially from density of standard weight with which the balance was calibrated. As standard the balance is calibrated with steel standard weight with density $\sim 8,0 \text{ g/cm}^3$ or brass standard weights $\sim 8,7 \text{ g/cm}^3$. If any other materials are measured, the following ratio should be considered.

Below schema presents the corrections for mass depending on the density of measured substance, assuming that density of air is stable: $1,2 \text{ kg/m}^3$.



2. The checking of sample mass within a few hours when this mass is relatively stable (no substantial changes). It is assumed that the influence for final measurement result is on changes in density of air which is result of changes of air pressure, temperature and humidity.

FUNCTION PERFORMANCE:

Function allows for two ways of application of air buoyancy correction.

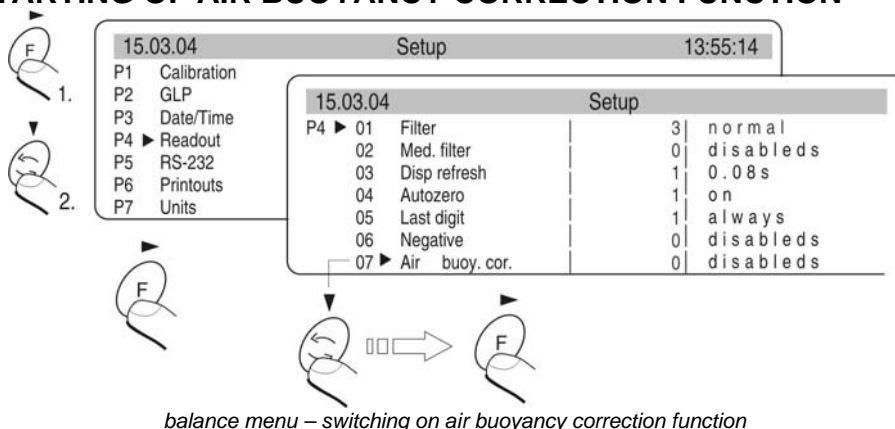
1. Inserting into memory known value of density of air and known value of density of measured sample. After inserting these values the application automatically calculates correction factor for measured mass and causes correct re-calculation of sample mass. In order to avoid any errors the re-calculated mass indication is marked with special symbol indicated in the display and on printout.

2. Semi-automatic determining of value of air density by the balance and inserting known value of sample density. Determining air density is performed by a special set of two standard weights. One of them is manufactured of steel the other one of aluminum. Resting on the indications of the balance for both weights, the application automatically calculates the density of air and this value is stored in memory of the weighing instrument. Then the user should insert the density of measured sample to the memory. After inserting this values, the application automatically calculates the corrective factor for measured mass and displays corrected mass of sample.

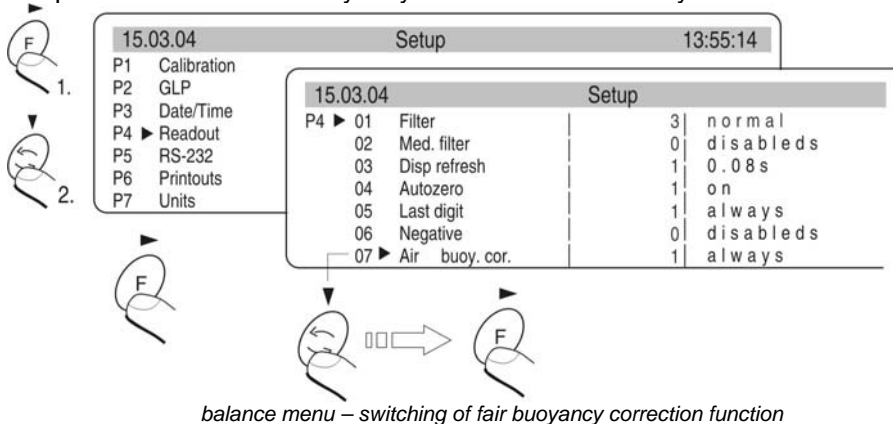
As previously, the value of corrected mass is marked with special symbol exposed on the display and in the printout.

The procedure of air buoyancy correction can be switched on and off from user menu level. This application can function with other modes of balance (checkweighing, filling, etc.) In order to make the measurements reliable, the user should be familiar with methods of measurement and characteristics of measured substance which relates to surrounding environment. Density of air in room where the measurements are performed and density of measured substances should also be known.

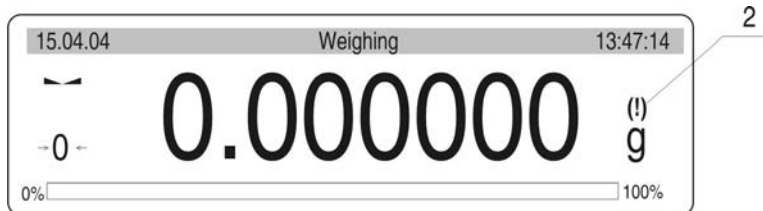
STARTING OF AIR BUOYANCY CORRECTION FUNCTION



Set parameter P4 07 air buoyancy correction for value 1 yes



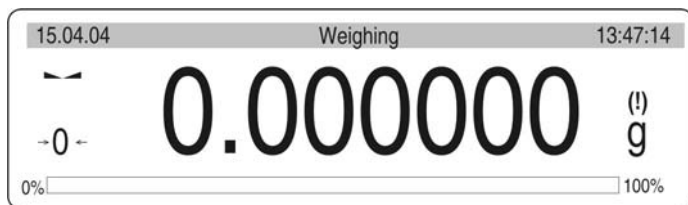
After going back to weighing mode with procedure of saving the changes, the display will indicate additional symbol (!) – 2 visible on below picture. From this moment, the mass will be corrected according to air buoyancy and density of the sample.



balance menu – switching on the function for air buoyancy correction

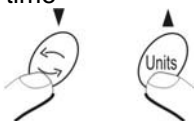
In order to make the result corrected by a proper value, the proper values of air density and density of measured sample should be entered into the memory of the microbalance.

Procedure of introducing such parameters:



display look for air buoyancy correction being switched on

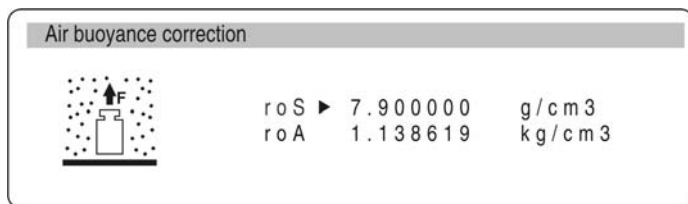
Press these buttons at the same time



function keys for inserting sample density value and air density value

If a PC keyboard is connected to the microbalance, the same function is activated by pressing **[insert]** button.

A proper window will be displayed, where density values can be inserted.



display look – inserting density values for a sample and air

After inserting the values, please go back to weighing mode by pressing **ENTER** button.

6.2. Log-in function

The operator has own access code to internal menu. The password system is defined by administrator. Password can contain max 6 digits.

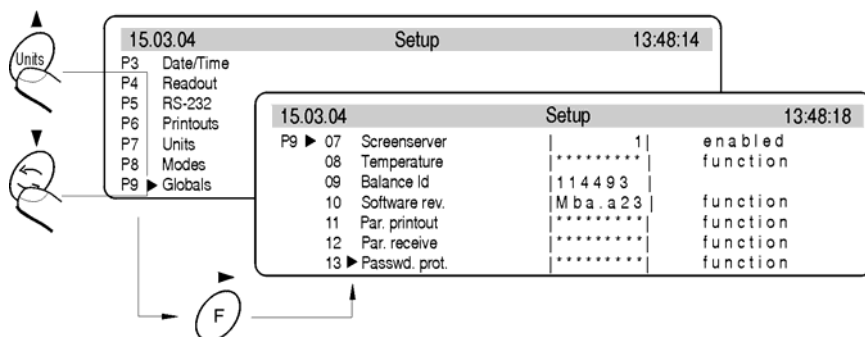
The microbalance program enables to declare:

- One administrator who is authorised to use all sets and programme functions, change the passwords – own and user
- One user who is authorised to sets and the microbalance functions determined by administrator

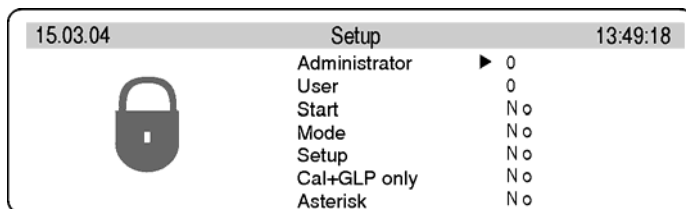
Setting password and access authorization

- After set the password and access parameters (parameter P9 13 Password protection) write the password for administrator
- If the administrator password is different from "0" the program wants administrator password during enter for the parameter P9 13 Password protection.
- Every enter this parameter the software demands administrator password, after writting correct password it is possible to set the parameter P9 13 Password protection
- Dependly on setting the password is shown as digits or stars (start value each digit = 0)

According to p. 5.1.1 of the manual enter the menu **P9 Inne**



Password – activation the function



Menu password protection

- **Administrator**
line to write administrator who has access to all set up
- **User**
line to write user password. User who has access to setting with NO attribute (are not protected by password)
- **Start up**
If it is settled on YES during start the microbalance up user must write access password (administrator or user)
- **Functions**
If it is settled on NO (not protected by password) user can use implemented functions in the microbalance.
- **Set up**
If it is set up on NO (not protected by password) user can change setting in the microbalance
- **Only Kal+GLP**
If it is set up on YES user can perform the calibration and calibration report
- **Stars**
If it is settled on YES during start the microbalance up password is hidden under starts

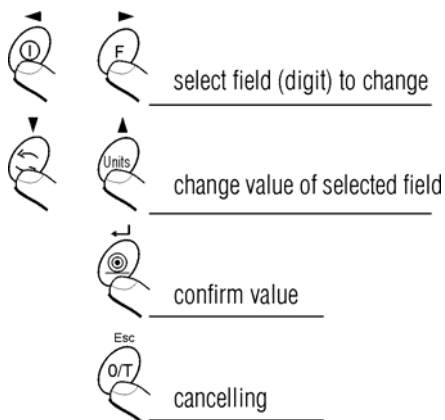
Administrator password

Write the password for administrator (max 6 digits) and user. Each administrator has access to all functions in the microbalance. User has access to microbalance possibilities in accordance with above description. Please, remember the password. If you set YES for „Start up” function the password must be written after switch the microbalance on.

If the password is not correct using the microbalance is not possible.

To write the password in use keys described on the drawing 2. or PS/2 keyboard (it can be connected to the microbalance port).

Set up the attributes for other options dependly on authorizations for user.



The keys – introducing the values in the menu

7. MICROBALANCE CALIBRATION

To ensure high precision of weighing corrective factor in relation to standard mass must be noted in the balance memory periodically – it is the balance calibration.

Calibration should be performed when:

- The weighing is started,
- Long breaks are between following measure series
- Temperature inside the balance changes more than: 0,3°C

Kind of calibration:

- Internal automatic calibration
 - * started if temperature changes
 - * started if the time changes
- Manual internal calibration
 - * started by the balance keyboard
- Calibration made with external weight
 - * with declared mass which cannot be modified
 - * with any mass which should be given before the calibration process



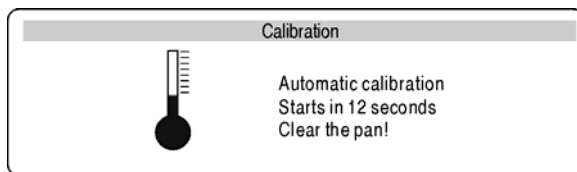
Perform the calibration when there is no load on the pan!

7.1. Automatic balance calibration

It is performed when:

- Period of time passes from last calibration
- temperature changes for settled value by manufacturer
* for other microbalances is 0,3°C.

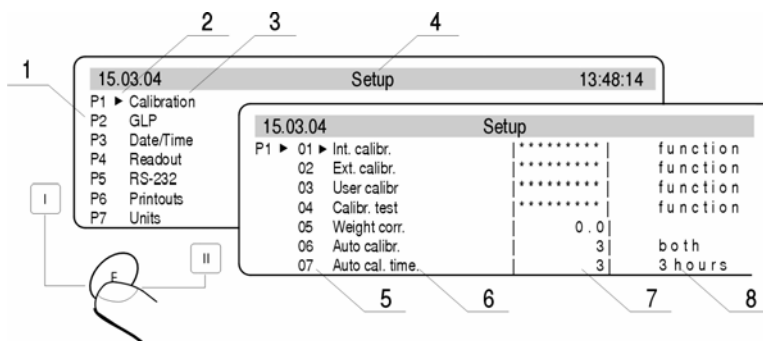
Following information appears on the display:



automatic calibration – display

Time delay in starting the calibration up enables user to yes load off the pan untill the measurements are performed. If the T/O key is pressed the calibration process is stopped.

Set up automatic calibration



Set up automatic balance calibration

- 1 – main menu number
- 2 – function selection factor
- 3 – function name
- 4 – name of actual activity
- 5 – selects factor to autocalibration (time / temp.)
- 6 – declaring autocalibration time
- 7 – value of factors for autocalibration
- 8 – value of time for autocalibration

if the values for factor and autocalibration time also descriptions for them changes (on the drawing field No 9. and No 10.)

01 Internal calibration

Start internal calibration process, the process is automatically without operator interference, if there is load on the pan the display shows order to remove the load

02 External calibration

calibration performed by external mass, its value is recorded in factory menu, function inadmissible in verified microbalances

03 User calibration

calibration performed with any mass which must be introduced before the calibration, function inadmissible in verified microbalances

04 Calibration test

comparison internal calibration mass with its value recorded in the balance memory

05 Weight code

correct value of internal calibration mass, function inadmissible in verified balances

06 Automatic calibration

determine factor which decides about start automatic internal calibration

- 0 non – non of the factors causes start of the calibration
- 1 time – calibration in relation to time determined in p. 07
- 2 temperature – calibration in relation to changes of surrounding temperature
- 3 both – calibration in relation to changes of time and temperature

07 Automatic calibration time

Determination of time automatic calibration starts up

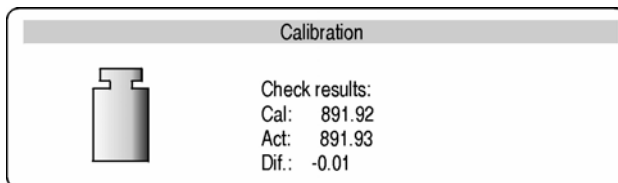
Return to weighing



The changes are recorded when the microbalance returns to weighing mode with the recording the changes. Press the ESC many times. Following question appears on the display. Select one of the options : ENTER – record / ESC – cancell
(see *Return to weighing* p. 5.1.2. *Return to weighing*)

7.2. Calibration test

Internal calibration mass is compared to its value in the balance memory. This process is automatic. Its result is shown on the display.



The calibration test

Cal. – value of internal calibration mass

Akt. – result of weighing internal calibration mass

Diff – difference between two values

Return to weighing



Changes are recorded only after return to weighing mode and confirmation the changes. Press the ESC key many times. Following question appears on the display. Select one of the options: ENTER – confirmation / ESC – cancel.

(see Return to weighing. p.. 5.1.2. Return to weighing)

7.3. Manual calibration

7.3.1. Internal calibration

1. Enter submenu P1 – Calibration.
2. Select the function 01 Internal calibration.
3. Press the F key.
4. The balance perform the calibration automatically. During this calibration do not load the pan.
5. After this process the balance records results of the calibration in the memory and returns to weighing mode.

- *Pressing the ESC key stops the calibration process*
- *If during the calibration load is on the pan display show order about error. The calibration process is stopped. After take load off the calibration process is finished.*

7.3.2. External calibration

The external calibration should be performed with external mass class:

- E₁

List of weights for separate balances is included in technical specification in the final part of the manual.

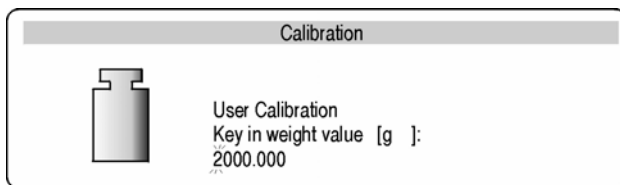
1. Move to submenu P1 – Calibration.
2. Select the function 02 external calibration
3. Press the F key.
4. Order to yes the load off the pan appears on the display (no load on the pan). After yesing load off the pan press the ENTER key.
5. The balance determines mass of empty pan
6. Put load and press the ENTER
7. After the calibration the balance returns to submenu P1 - Calibration
8. Return to weighing – as in the point 5.1.2.

7.3.3. Calibration performed by user

Calibration performed by user with any external weight class:

- E₁

- Enter menu group P1 Calibration. Select the parameter 03 user calibration
- Press the **F** key. The balance displays order to note calibration mass. The first digit flashes and it can be changed.



User calibration – declaring value of weight

- Record new external mass by functional keys (in accordance with p. 5.1.1 of the manual)
- Confirm the mass. The balance starts calibration and shows orders on the display.
- The balance determines mass of empty pan and shows order to put this mass
- After put the weight on the pan confirm by the **Enter**.
- After this procedure balance returns to menu to group P1 Calibration.
- In accordance with previous point start weighing mode.

7.4. Calibration report printout

After calibration user can receive the calibration report. The report can be printed on connected printer and sent to computer or recorded in file.

P1 08 Report printout : 1:yes – report is printed

P1 08 Report printout: 0:no – report is not printed

If the parameter has the value 1 the report is generated and sent automatically.

15.03.04		Setup	
P1 ▶	02	Ext. calibr.	***** function
	03	User calibr	***** function
	04	Calibr. test	***** function
	05	Weight corr.	0.0
	06	Auto calibr.	3 both
	07	Auto cal. time	3 3 hours
	08 ▶	Print report	1 on

Submenu calibration

Contents of report depends on setting in submenu GLP. All options with YES attribute are printed.

15.03.04		Setup		13:55:14
P1	Calibration			
P2 ▶	GLP			
P3	Date/Time			
P4	Readout			
P5	RS-232			
P6	Printouts			
P7	Units			

15.03.04		Setup	
P2 ▶	01	User	Nowak
	02	Project	AKY-54
	03	Time print	1 on
	04	Date print	1 on
	05 ▶	User print	0 off
	06	Project print	0 off
	07	Id print	0 off

Submenu GLP - setting

Apart from information settled in menu group the report contains: calibration mass remembered by balance after last calibration (description Old:), calibration mass determined during actual calibration (description: Calibration) and deviation of the calibration (description Deviation:) – difference between these two masses.

*** Internal calibration report ***	
Date	: 16/04/2004
Time	: 15:24:39
Balance Id	: 114493
Calibr	: 891.9[3] g
Old	: 891.9[4] g
Difference	: - 0.0[1] g
User Id	: Nowak
Project Id	: AKY-54
Name	.....

Example of balance calibration report

8. SETTING PRINTOUTS FOR GLP PROCEDURES

P2 GLP is group of the parameters which declares factors on the calibration printout. For fields:

- user (max 8 alphanumerical signs)
- design (max 8 alphanumerical signs)

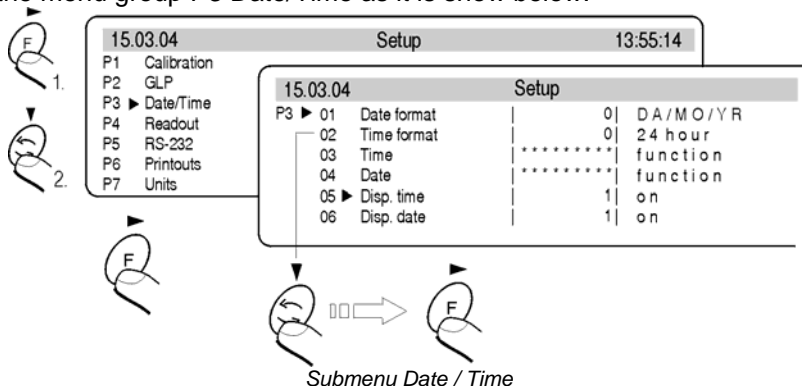
introduce names by the microbalance keyboard or the PS/2 keyboard. For the rest select:

- 1 no (do not print during report)
- 0 yes (print during report)

Main view of the GLP submenu is presented on drawing 19, page 24. If you use the PS/2 keyboard see what dependences are between the microbalance keyboard and PS/2 keyboard (p. 5.1.2)

9. SETTING TIME AND DATE

The microbalance has real time clock whose parameters can be modified. Enter the menu group P3 Date/Time as it is show below:



01 Date form

There are two possibilities:

- 1 format date Month/Day/Year
- 0 format date Day/Month/Year

After selection proper value confirm by the ENTER key.

02 Time form

There are two possibilities:

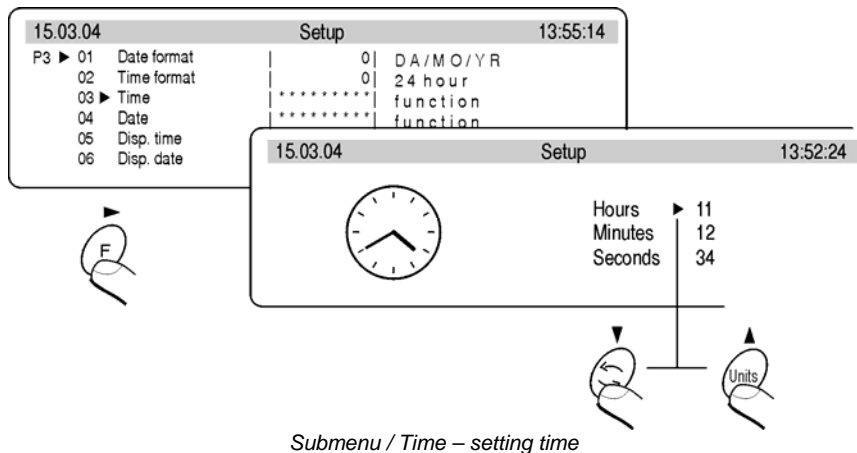
- 1 time form 12 h
- 0 time form 24 h

After selection press the ENTER to confirm.

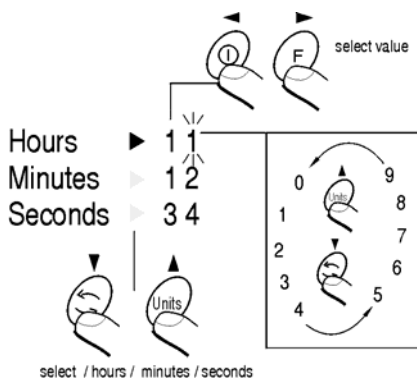
12 h form is distinguished by the letters PM or AM on the printouts.

03 Time

Enter setting the parameter 03 Time by the F key in accordance with below scheme.



Replace the marker next to the value which will be changed (Hour, Minute, Second). Confirm with the **F** key. Change the numerical values with Mode and Units keys.



Submenu Date / Time – setting time – steering keys

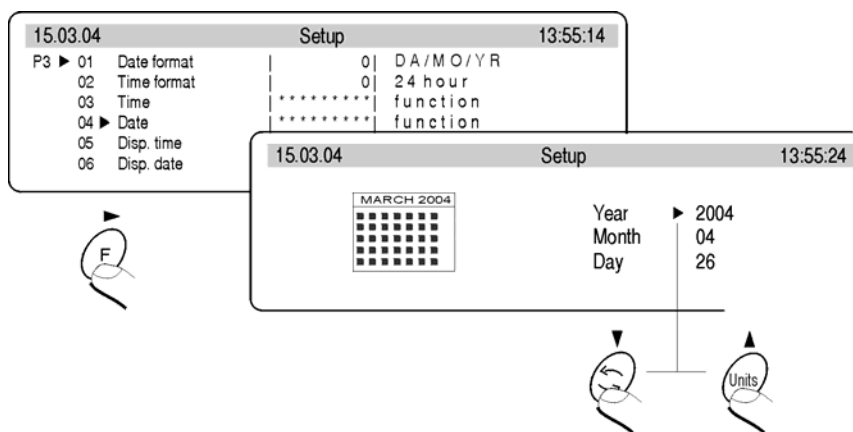
Confirm settled value (last change digit stops flashing)

Repeat above activities for following values. After setting new values for time press the ENTER key. The microbalance returns to submenu P3 Date/Time and displayed time changes.

After setting time return to weighing mode in accordance to p. 5.1.1 of the manual.

04 Date

Set the parameter 04 Date with the F key. In accordance with previous description (03 Time) set actual date. After setting date return to weighing mode as it is presented in p. 5.1.2 of the manual.



Submenu Date / Time – setting date

05 Display time

for the value 1 – YES on top graph time is displayed, for the value 0 – NO, time is not displayed.

05 Display date

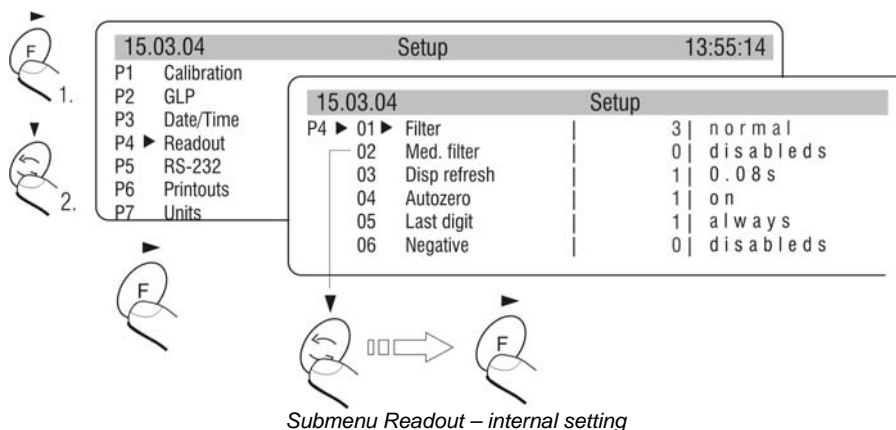
For the value 1 – YES date is displayed on top graph, for the value 0 – NO, date is not displayed.

Return to weighing

(see - 5.1.2. – Return to weighing)

10. SETTING THE PARAMETERS

User can adjust the microbalance to existing conditions (filter) and own needs (autozero, displaying last digit) by means of parameters in group <P4 Readout>.



10.1 Setting filter

Dependly on conditions set the filter. If the conditions are conductive set the filter as very fast (value of the parameter 01 Filter 1) and if the conditions are bad (vibrations, draught) set the filter as slowly or very slowly (value of the parameter 01 Filtr at 4 or 5). Efficiency of filter is different for range of weighing. The filter works slower during getting to weighed mass. It works faster when mass is the settled filter range (parameter filter range accessed only from service menu – user does not have access).

10.2. Mediane filter setting



Mediane filter eliminates singular big disturbances. The speed of filter can be determined after set digital value. For zero option filter function is switched off – only filter described in p. 10.1 works.

10.3 Set the display refreshing time

This parameter determines period of time which the display refreshes in. Information on the display is compared to information which is sent by the microbalance processor about load on the pan. For higher values of the refreshing parameter indirect not stable mass indications are not presented on the display during putting on and yesing off the load. For low values all changes in mass during weighing are visible – it enables to dosage liquids and solids. The refreshing time is settled in seconds.

10.4 Set autozero working

To ensure precise indications programmable function „AUTOZERO” is in the microbalance. This function controls automatically and corrects zero indication of the microbalance.

If the function is active following results in declared periods of time are compared eg. each 1s. If these results differs at less value than declared range AUTOZERA eg. 1 interval the microbalance sets to zero automatically and  and  appears on the display.

If the AUTOZERO function is active each measurement starts at precise zero every time. In special cases this function disturbs in the measurements eg. when the load is put on the pan very slowly (pouring substance). In this case correcting system of zero indication can correct also indication of real load mass.

AUTOZERA is switched on and off in the parameter P4 03 in accordance with p. 5.1.1 of the manual.

15.5. Displaying last digit

10.5. Last digit

To ensure comfort of work with the microbalance user determines (dependly on needs) if last digit should be displayed and when. One of the following values can be selected:

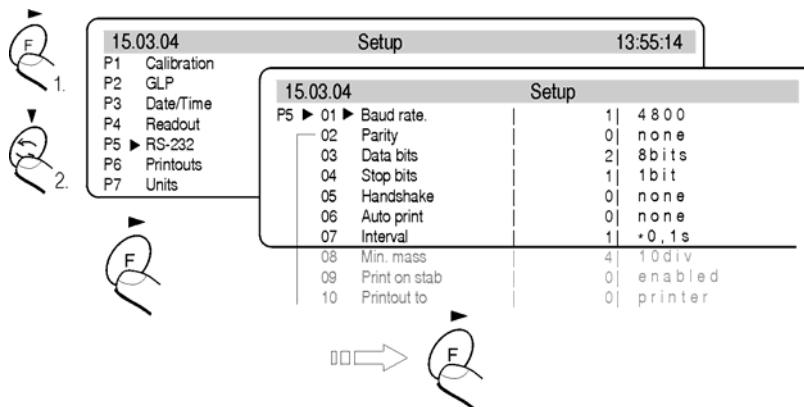
– 0 never; 1 always; 2 when stab

10.6. Negative

Function sets way of laying-out descriptions on the display .Function should be set depending on used display .

11. FUNCTIONS IN USING RS 232 PORT

User can set the parameters necessary for correct communication microbalance with computer or printer.



Submenu RS 232 - setting

Parameter No and name	Parameter value	Parameter No and name	Parameter value
01 Speed of transmission	0 : 2400; 1 : 4800; 2 : 9600; 3 : 19200	06 Automatic printout	0 : no; 1 : constance; 2 : with brakes; 3 : for stable.
02 Parity	0 : no; 1 : see; 2 : dont see	07 Interval	Interval it is defined how often microbalance sends indications through RS 232 port. It is counted on base on form for the parameter x 0.1 s = time yestu-interval). Value from 1 to 9999 can be written.
03 Date bits	1 : 7 bits; 2 : 8 bits		
04 Stop bits	1 : 1 bit; 2 : 2 bits	08 Print stable	0 : no; 1 : yes
05 Transmission control	0 : no; 1 : RTS/CTS; 2 : XON/XOFF	09 printout to	0 : printer; 1 : computer

After setting correct values return to weighing mode as it is described in p. 5.1.2 of the manual.

For value 1 : computer parameter 09 Printout to, for printouts the last digit of indication is omitted.

12. PRINTOUTS

This function is used to make not standard printouts and select type of printout. Precise description for printouts is described in p.17.

13. ACCESS TO MASS UNITS

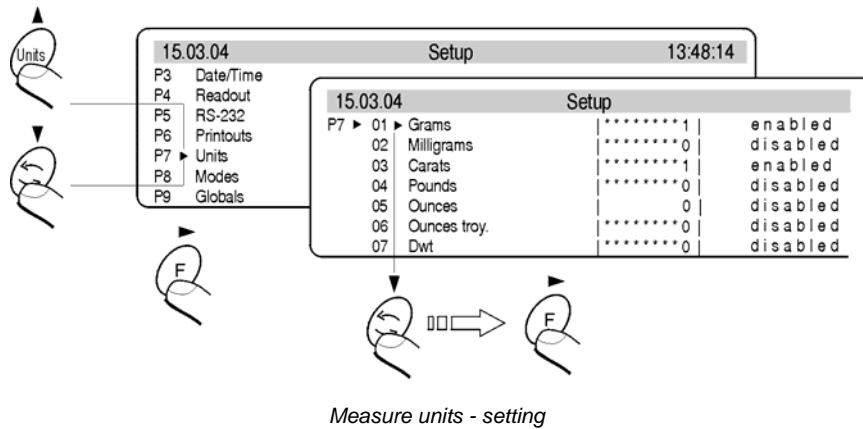
In this group of parameters user declares mass units which are accessible for operator directly under the key **Units**.

All units which value of the parameters is set up at 1: yes are accessible from the level of switching between units.

For units described as 09 Taele Hk., 10 Taele S., 11 Taele T . there are following dependences:

- If all of them have attribute 1: yes the microbalance show only first of them 09 Taele Hk

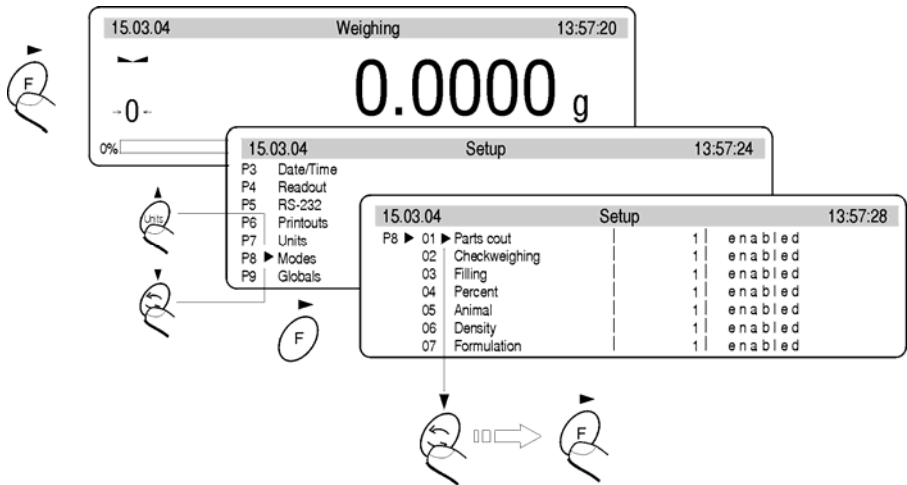
If the measurement is done in units 11 Taele T set the attribute 0 : no for two previous Enter group of the parameters P7 Units according to p. 5.2.7.



After set proper values of the parameters return to weighing mode in accordance to p 5.1.2 of the manual.

14. SETTING ACCESSIBILITY OF THE WORK MODES

In this group of parameters user declares work modes which are accessible for operator after pressing Mode key.



The microbalance functions - setting

All work modes values of the parameters are 1: yes are accessible from the level of switching between work modes. The changes of the parameters can be done according to p. 5.1.1 of the manual.

15. OTHER PARAMETERS

User can set parameters have influence on work with microbalance in group of the parameters P9 Others eg. beep signals etc. Enter submenu group P9 Others the same as in pakt. 14.

01 ID Setting

it includes 6 digits 6 codes which can be used during printouts for product specification, operator, batch etc.

02 Aut. Printout ID

for the option YES all digit codes are printed, for option NO the codes are not printed.

03 Signal

beep signal for pressing keys

04 Language

selection of languages

05 Backlight

switch on/off the backlight

06 Contrast

changes contrast – after entering this function a window appears, by means of keys on the microbalance contrast on the display can be changed

07 Screen server

if the screen server is switched on displayed values disappear after settled time and if displayed value of the measurement does not change.

08 Temperature

it is information about temperature which is registered by temperature sensor in the microbalance. Return to the menu – press the ESC key

09 The microbalance number

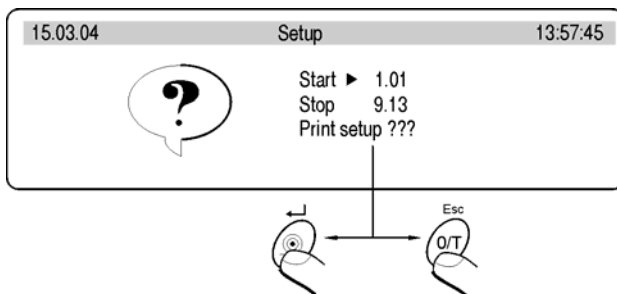
it is only information about factory number of the microbalance

10 The number of the program

it is information about program number of the microbalance

11 Printout of the parameters

if the function is active the microbalance parameters in user menu are printed. User gives numbers of the parameters which should be printed.



Submenu Others - printing setting

After confirmation parameters are printed through RS 232 port, actually sent settled user parameters in the microbalance

12 The parameter reception

If the functions are activated all parameters of the microbalance are received through RS 232. After reception the microbalance informs user how many parameters are accepted, how many are changed, how many were declared incorrectly and how many were not accepted by the software.

Printing and reception of the parameters is very easy and fast procedure of introducing new setting. After printing actual parameters to file in the computer user changes the parameters very fastly and without any problems. User sends new corrected setting to the microbalance software. After these changes the microbalance accepts new set up. User must know all parameters and computer operation very well.

13 Password protection

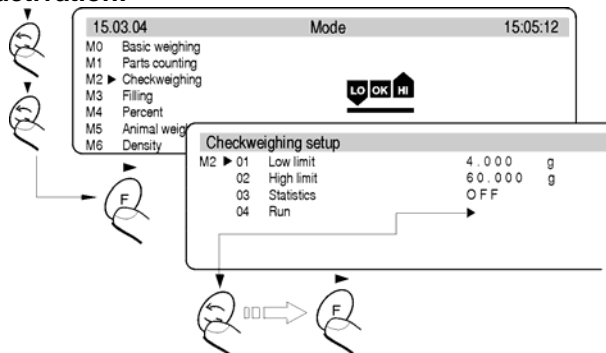
this submenu contains options about access password for administrator and user (see 6.1.)

16. USING WORK MODES

16.1. Checkweighing

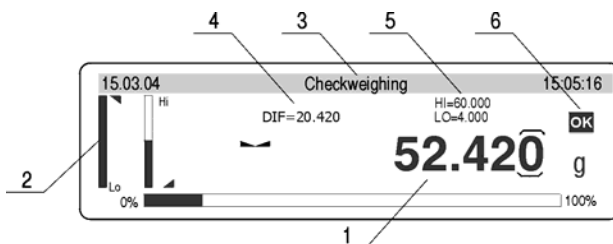
The sample is weighed precisely when the limits of weighing are settled. The process is shown (side graphs) and controlled.

The function activation:



Checkweighing – the function activation

Display



Checkweighing – display view

- 1 – result
- 2 – bargraph
- 3 – function name
- 4 – difference between mass of weighed load and middle of tolerance field (HI/LO)
- 5 – value of low (LO) and (HI) high limit
- 6 – graphs which presents weighing range



Remember to set the parameter

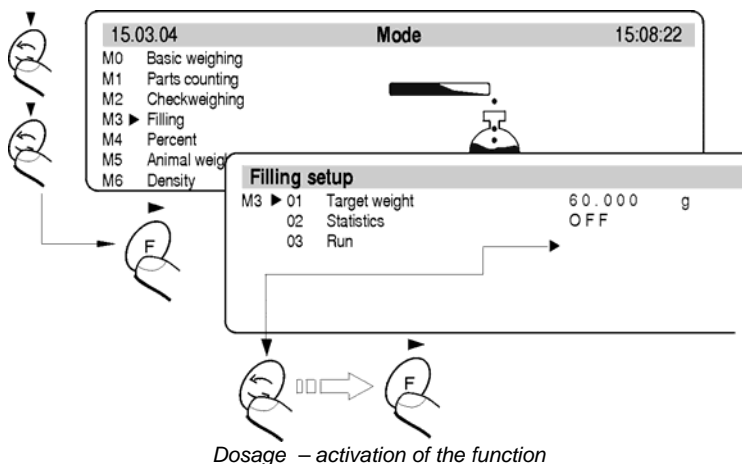
02 High limit firstly. The microbalance program checks if the values are correct and if they are in measure range.

If settled values of the parameters are incorrect the microbalance shows command about error and returns to setting parameters without changes.

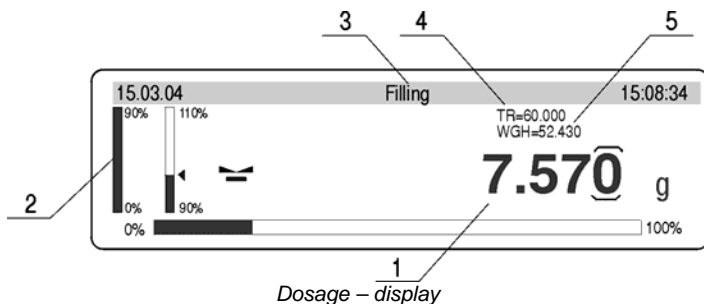
16.2. Filling

During dosage (pouring) load mass is filled up till the settled mass is reached. Before the procedure set the standard mass which is upper stage of the dosage.

Activation of the function



Display



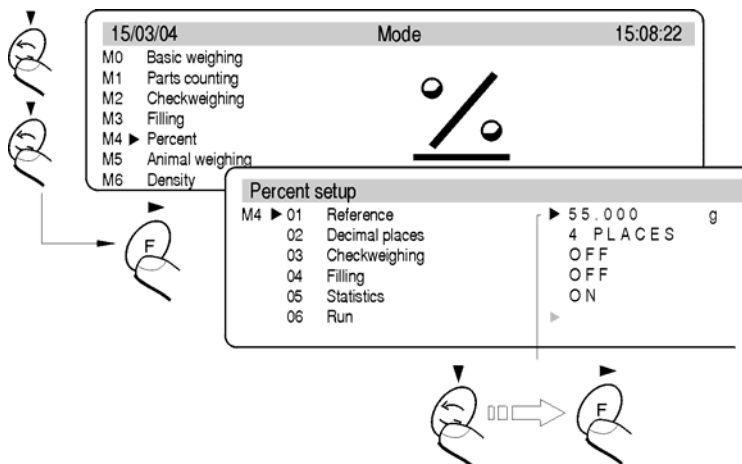
- 1 – mass which should be added
- 2 – graphs
- 3 – function name
- 4 – TR reference value mass which is declared
(see M3 01 Reference mass)
- 5 – WGH mass on the pan

16.3. Percents

This function compares load mass to standard mass which value should be given. The result of this operation is displayed in percentages.

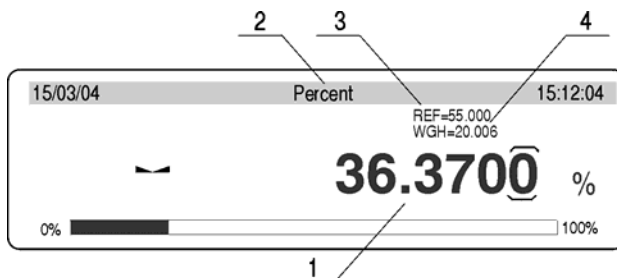
Following functions: dosage, weighing, statistics can cooperate with deviation function.

Activation of the function



Percents – activation of the function

Display



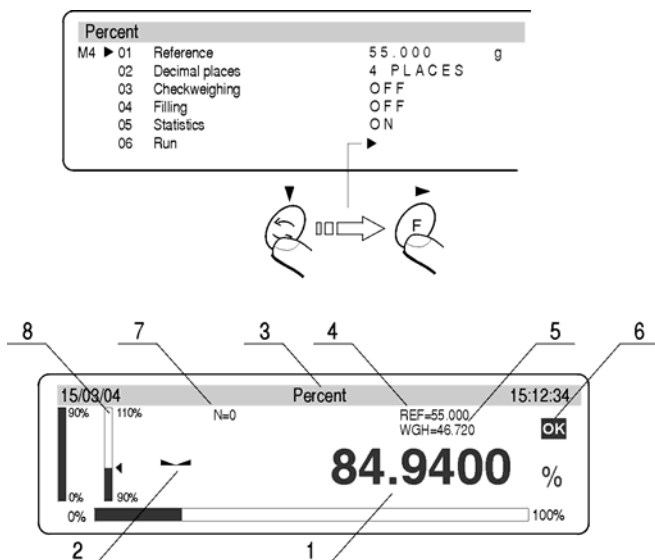
Percents – display

- 1 – percentage value, proportion of the mass on the pan and standard mass
- 2 – function name
- 3 – REF masa odnosienia (see – M4 01)
- 4 – WGH mass on the pan

Cooperation of the deviations with other functions

During activation of the function set option YES for parameters M4 03, 04, 05. Select field START and start work.

- after setting function Dosage YES give up and down stage as % values
- after setting function Dosage YES give the mass value in %
- after selecting Statistics select field Cancel and cancel previous statistics and change the attribute NO into attribute YES. Confirm this option and press the key Enter.

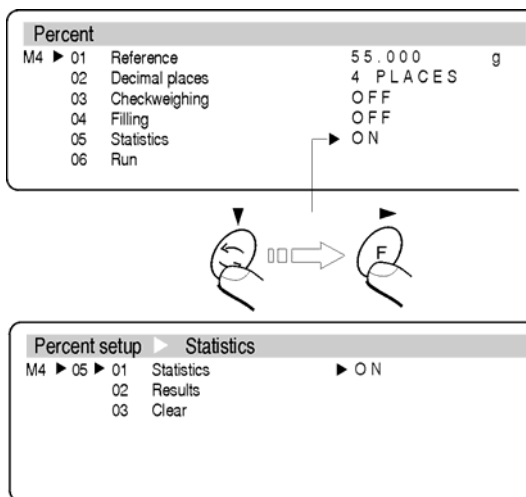


Percents – cooperation with ther functions

- 1 – percentage value relation of the load on the pan to reference mass
- 2 – stable measurement sign
- 3 – function name
- 4 – REF reference mass
- 5 – WGH mass on the pan
- 6 – graph which presents weighighn range where the weighing range is
- 7 – statistics (N=0 – no measurements)
- 8 – active function dosage (load mass between 90 – 110%)

After measurements eg. 10 (quantity of measurements N=10) user can see results of statistics of made measurements.

- Enter work mode
- Select the parameter 05 Statistics
- Pressing the F key and enter the parameter 05 Statistics
- Select the parameter 02 Results
- Enter function of showing statistics results
- After pressing the ENTER statistics result can be printed
- Return to statistics submenu and higher levels – key **ESC**



Percents – cooperation with other functions - Statistics

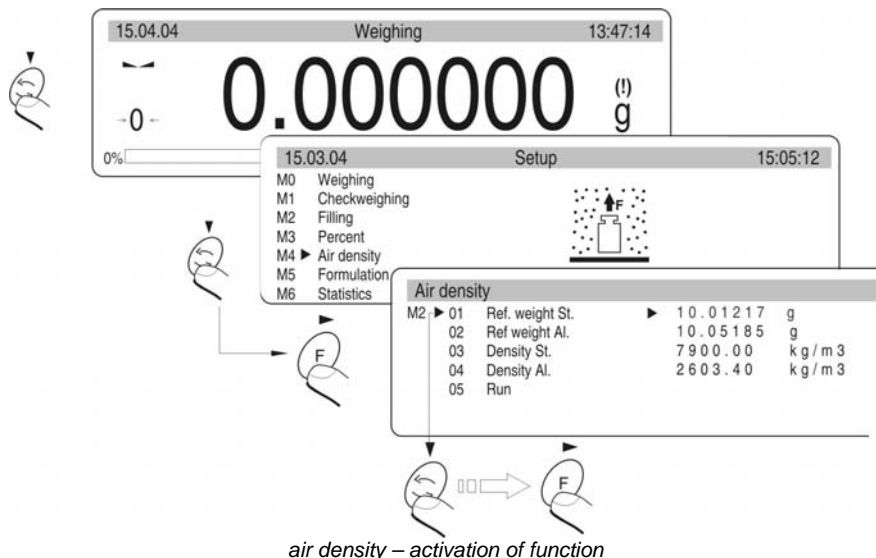
16.4 Air density

Before starting the procedure, please first switch off the function of AIR BUOYANCY CORRECTION, if it was in use before.

Determining should be performed with special set of two pieces of standard weights. One of them is manufactured from stainless steel, the other from aluminum.

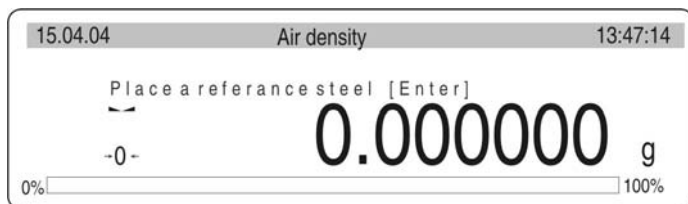
Procedure of determining the values

1. enter into density function



2. after entering the setting of function, enter the data (masses and density values) into respective fields
3. after inserting the data please initiate the procedure

Act accordingly to the below description



air density – determining procedure

Put on the weighing pan the steel standard mass.

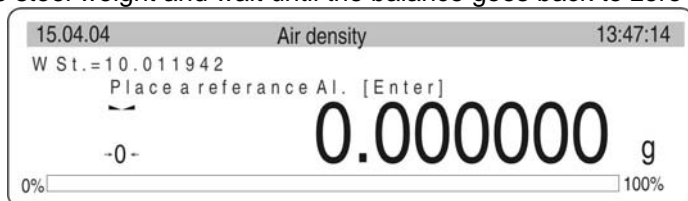


air density – determining procedure

After stabilization of the result please press ENTER

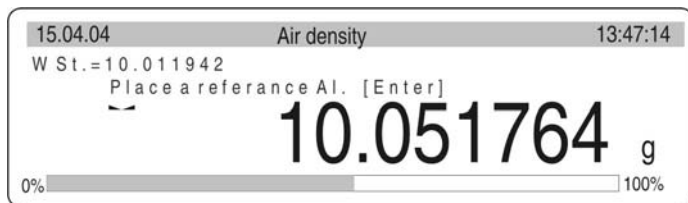
The display will show New information: mass of steel standard weight and order for placing aluminum standard weight on the weighing pan.

Take off the steel weight and wait until the balance goes back to zero indication.



air density – determining procedure

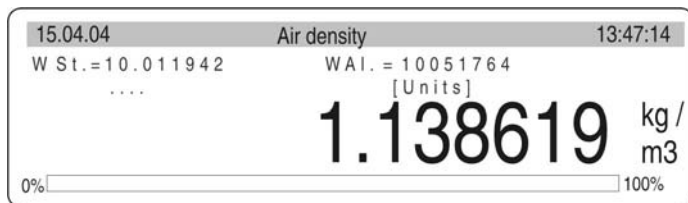
Put aluminum weight on the weighing pan.



air density – determining procedure

After stabilization of the result please press ENTER

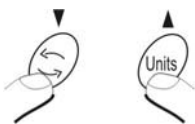
The balance will display the result of air density



air density – determining procedure

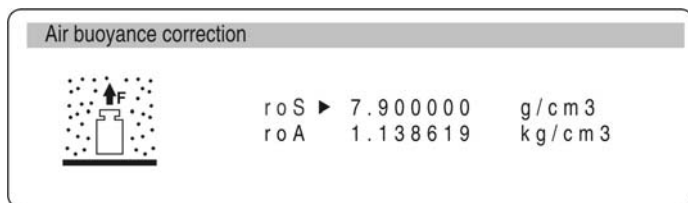
In this case you can:

- start the procedure from the beginning (press Units button)
- go back to weighing mode without saving the determined air density in the memory of the balance (buttons MODE and choice of function WEIGHING)
- save the air density to the memory of the balance



press simultaneously buttons:

The balance will display window for inserting the density value and sample density with simultaneous inserting the determined air density In a respective place – roA.



air density – display look with entered values

Next, you can go back to weighing mode and switch on the operation of air buoyancy correction function.

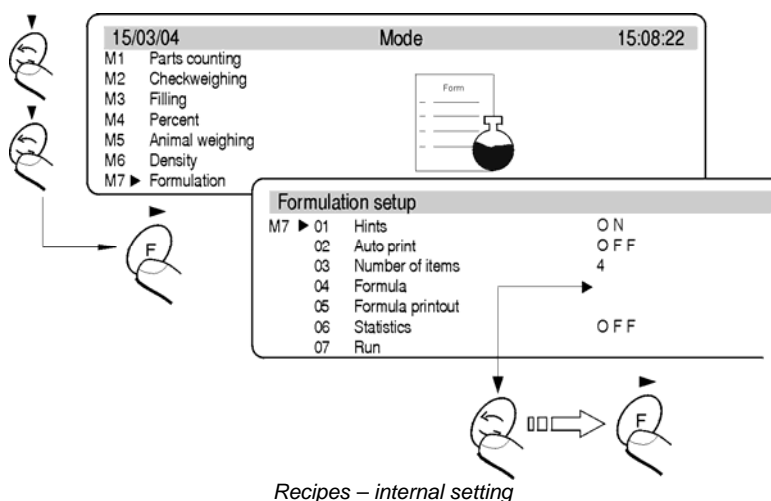
16.5. Formulation

This function is used to make mixtures under recipes. This function is recommended to use in drug-stores. The program is equipped with calculate memory. The microbalance remembers singular component mass and sum of weighed components.

Following information are presented on the display in this work mode:

1. load mass on the pan
2. actual weighed component name (max 10 signs)
3. mass which should be measured for actual weighed component „WGH”
4. quantity of components which is weighed in the mixture „IC”
5. components mass already weighed „SUM”

The function activation



parameter 01 Prompts

after set the parameter at YES the microbalance displays names and singular components mass recorded in the parameter 04 Recipe on the graphic display

parameter 02 Automatic printout

after set the parameter at YES the microbalance sends value on printer or computer through RS port after confirmation mas sof each component

parameter 03 Quantity of components

user determines quantity of components the mixture should include (max 20 signs)

parameter 04 Recipe

after set this parameter following submenu is displayed. In this submenu user can write names (not more than 10 signs) and set (standard mass) of each component in the mixture

parameter 05 Recipe printout

This function prints composition of the mixture on connected printer. There are names and setting of particular component and total contents of the mixture.
parameter 06 Statistics

parameter 06 01 Statistics

switch on (YES) or switch off (NO) statistic counting

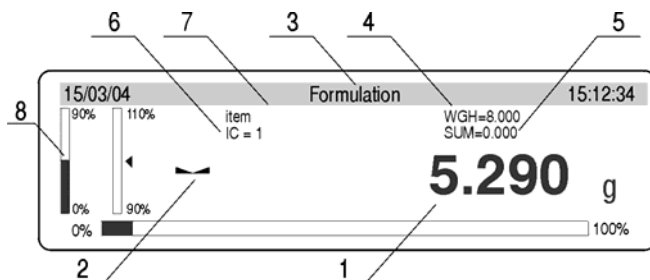
Attention:

Statistics counting refers only to total mass of prepared mixtures (singular components mass are not counted).

parameter 07 Start

enter work modes Recipes

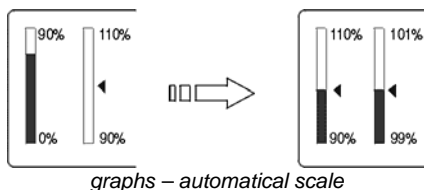
Information on the graphic display for recipes



Recipes – functions

- 1 – mass which is actually on the pan.
- 2 – stable measurement sing
- 3 – function name
- 4 – settled mass of the weighed component in the parameter 04 Recipe

- 5 – Sum of weighed components of the mixture which are in calculate memory of the microbalance
- 6 – quantity of weighed components in the recipe
- 7 – name of weighed component
- 8 – sige graphs. Information how much left to gain settled component is presented on these graphs.



Procedure of preparing mixtures – according to recorded components and their mass in the microbalance memory

Write names and components mass in the parameter 04 Recipe. Remember about the dependences:

- there cannot be more than 10 signs
- confirm each name by the **ENTER** key and write mass which will be in the mixture

Receptury

M7 ▶ 01	Hints	O N
02	Auto print	O N
03	Number of items	4
04	Formula	
05	Formula printout	
06	Statistics	O N
07	Run	

press
Enter

Formulation setup ▶ Formula			
M7 ▶ 04 ▶ 001	item	01	8.000 g
002	item	0 2	12.000 g
003	skladnik	3	6.000 g
004	item	04	45.000 g
005	item	05	1.000 g
006	item	06	1.000 g
007	item	07	1.000 g

Declared recipes

- total mass of the mixture together with the container cannot be bigger than max capacity of the microbalance
 - there cannot be more than 20 components in the mixture
 - Write quantity of components in the parameter 03 Quantity of components
 - Quantity of components cannot be higher than 20 pcs
 - The program records mixture contents in order they were introduced in the parameter 04 Recipes. If user writes 10 components in the parameter 04 Recipes and set 8 for quantity of components the program finishes preparation of the mixture after weighing 8 components.
 - The microbalance program creates mixture in order of recorded components in the parameter 04 Recipes and starts from the component 1 and finishes at settled component in the parameter 03 Quantity of components
 - If the documentation is printed set the parameter 02 Automatic printout at 1 : YES. After confirmation of each component (key UNITS) their mass are printed on connected printer or computer.
- Set the parameter 01 Prompts at 1 : YES
 - Enter function Recipes by pressing the ENTER key
 - Tare container mass to the microbalance memory
 - Weight first component (mass in the WGH)
 - Press the UNITS key. Mass of component 1 is recorded in the microbalance memory. The information on the display changes: component 2, mass WGH, IC=1, SUM=. . . .
 - Information on the display is settle do zero.
 - Repeat it for all components
 - After weighing last component and write its mass to the microbalance memory (the UNITS key) total mass of mixture and prompts to following steps are displayed.

Procedure of making mixtures without recording components and their mass date in the microbalance memory

If documentation of preparing mixture is printed set the parameter 02 Printout at 1 : YES.

If mass of each component is confirmed (key UNITS) each mass with their names is printed on connected printer or computer.

- Set the parameter 01 Prompts at the value 0 : NO
- Enter function Recipes by pressing ENTER
- Tare container mass to the microbalance memory
- Pour component 1 to the container – in relation to information about mixture
- Press the UNITS key. Mass of component 1 is recorded in the microbalance memory. The information on the display changes: IC=1, SUM=. . . The indication is set to zero. Press the key Units
- Repeat it for all components of the mixture
- After write last component press the →0/T←. Procedure of making mixtures is finished. Sum of mixture is kept on the display.

Statistics counting

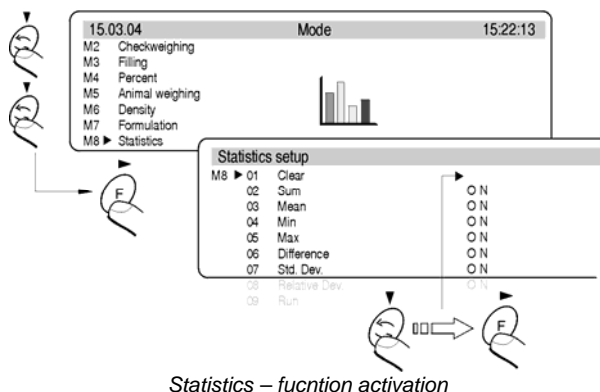
Statistics counting relate only to making mixtures (particular mass components are not included in the counting).

If user performs statistic counting in this work mode:

1. enter the parameter 06 Statistics
2. cancel previous results of statistic counting
3. set the parameter 06 01 Statistics at YES
4. enter work mode for preparing mixtures
5. perform measurement series
6. enter the parameter 06 Statistics again
7. enter the parameter 06 02 Results
8. to print results press the key PRINT

16.6. Statistics

Activation

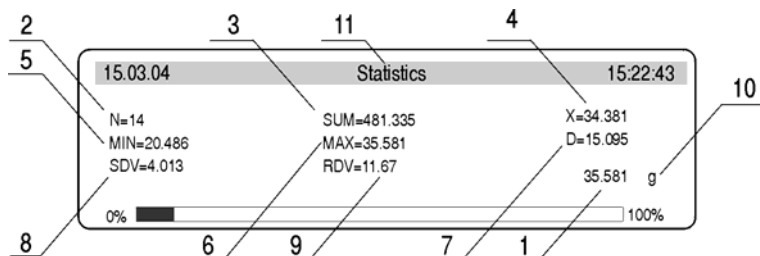


Results of previous statistics should be removed after function activation. It is realized through option **M8 01 Cancel**.

All statistic data are actualized after writing the following measurement to the microbalance memory. Following measurement is written to series after load is put on the pan, stabilization of the result (measure unit is displayed) and after pressing **ENTER**.

User decides what statistic data are presented on the graphic display during measurements by setting their activity in the submenu of work mode (values which are set for YES are active). Independently on setting (YES/ NO), during final result (the key UNITS) the printout contains full statistics.

<i>N</i>	: 5	(quantity of weights)
<i>SUM</i>	: 161.121 g	(all components total mass)
<i>X</i>	: 32.224 g	(average mass of weighed components)
<i>MIN</i>	: 20.486 g	(min mass)
<i>MAX</i>	: 35.578 g	(max mass)
<i>D</i>	: 15.092 g	(difference between Max- Min)
<i>SDV</i>	: 6.581 g	(standard deviation)
<i>RDV</i>	: 20.4 %	(variation factor)



Statistics – display for series of measurement

1. mass on the pan
2. measurement number in measurement series
3. sum of all weighed components in measurement series
4. average mass of weighed components in the series
5. mass of the lightest component in measurement series
6. mass of the heaviest component in measurement series
7. difference between the lightest and the heaviest component in measurement series
8. value of counted standard deviation
9. value of variation factor
10. measure unit [g]
11. work mode

16.7. Standard deviation for comparator

Function enables to determine standard deviation for comparator .

Standard deviation is determined by series of measurements ABBA or ABA where:

A – controlling standard mass

B – tested standard mass

Number of series ABBA or ABA is set by user in functions setting (from 1 to 20).

Results are calculated by software according to below tables and formulas.

For ABBA series

LP.	A	B	B	A	$r = B_{sr} - A_{sr}$
1					r_1
2					r_2
3					r_3
4					r_4
5					r_5
.....					...
n					r_n

For ABA series

LP.	A	B	A	$r = B - A_{sr}$
1				r_1
2				r_2
3				r_3
4				r_4
5				r_5
.....				...
n				r_n

Calculate standard deviation by determining in turns:

differences of indications ABBA or ABA for each series of measurements:

$$r_i = \bar{B} - \bar{A}$$

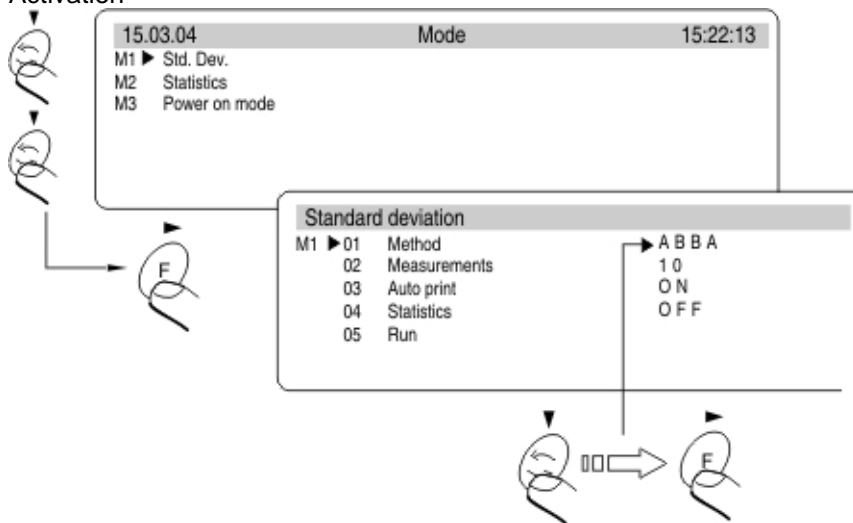
average value of indications differences ABBA or ABA- r_i

$$\bar{r}_i = \frac{1}{n} \sum_{i=1}^n r_i$$

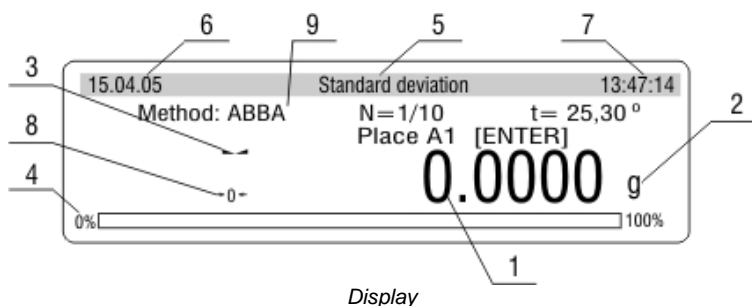
Standard deviation

$$s^2 = \frac{1}{n} \sum_{i=1}^n (r_i - \bar{r}_i)^2$$

Activation



The comparator functions - setting



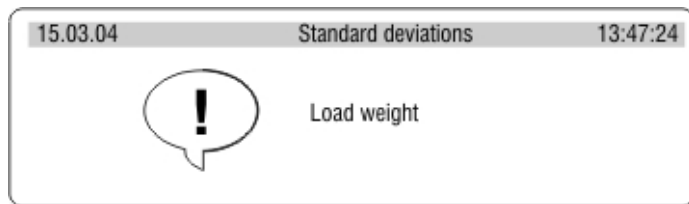
1. load mass and quantity of pieces
2. measure unit
3. the result is stable
4. line of max range of the comparator
5. work mode
6. date
7. time
8. precise ZERO
9. display concerning settings and procedure for selected working mode

Before starting the procedure select:

- method of determining deviation - ABBA or ABA,
- declare number of tests for measurements series – n

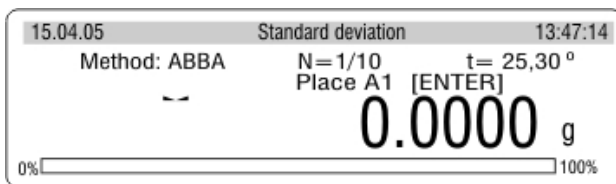
„description concerns ABBA method”



After setting the option enter the procedure . The display will show:



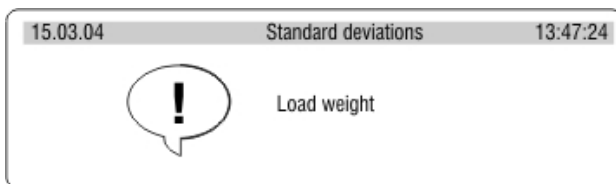
Display

Place calibration mass on the pan „A”

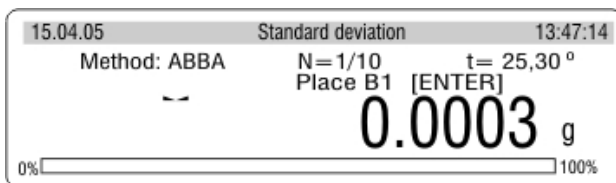




when marker  appears press  key . Descriptions on the display concerning weighed calibration mass B1 will change.

Remove calibration mass „A”, display will show:

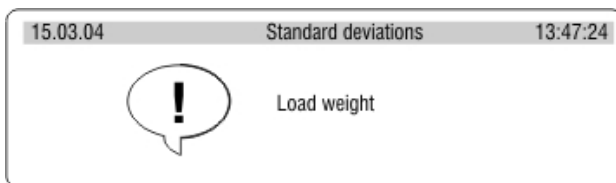


Place on the pan calibration mass „B”

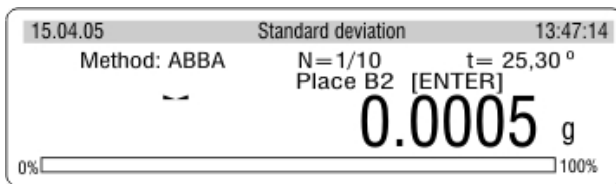




when marker  appears press  key. Description on the display concerning calibration mass B2 will change.

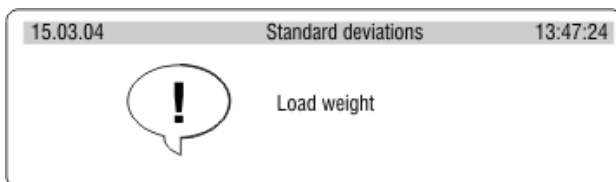
Remove calibration mass „B”, display will show:



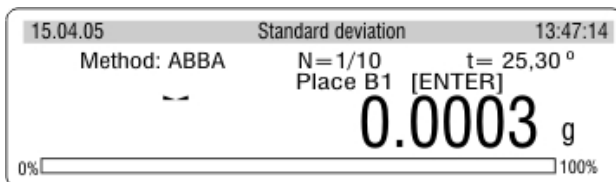
Place again on the pan calibration mass „B”



when marker  appears press  key . Description on the display concerning calibration mass A2 will change.
Remove calibration mass „B”, the display will show:



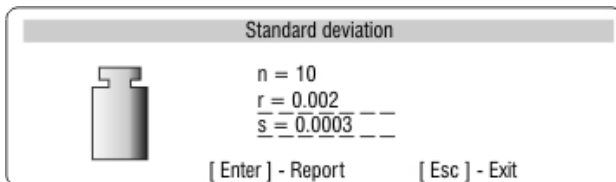
Place on the pan calibration mass „A”



when marker  appears press  key .

Description on the display concerning weighted calibration mass A2 and number of measurements in series N=2/10 will change.

Repeat measurements for in quantity of series declared in function settings.
After approval of last measurement in series , software will display summary.



From level of this window it is possible to print final report including particular measurements and final data.

Look of exemplary report:

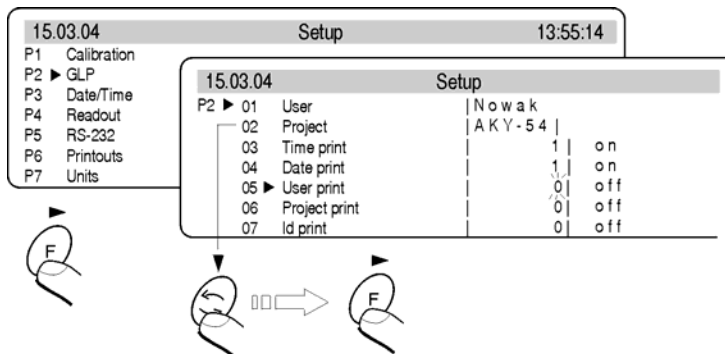
n	:A	:B	:B	:A	:r
1	:-0.0008	:-0.0032	:-0.0038	:-0.0005	:-0.0029
2	:-0.0002	:-0.0037	:-0.0035	:-0.0001	:-0.0035
3	: 0.0001	:-0.0035	:-0.0034	: 0.0000	:-0.0035
4	: 0.0003	:-0.0033	:-0.0032	: 0.0004	:-0.0036
5	:-0.0002	:-0.0033	:-0.0032	:-0.0001	:-0.0031
6	: 0.0000	:-0.0035	:-0.0036	: 0.0001	:-0.0036
7	: 0.0001	:-0.0038	:-0.0037	: 0.0005	:-0.0041
8	:-0.0004	:-0.0033	:-0.0034	:-0.0002	:-0.0031
9	:-0.0002	:-0.0033	:-0.0035	:-0.0004	:-0.0031
10	: 0.0003	:-0.0034	:-0.0035	: 0.0003	:-0.0038
n = 10					
r = -0.0034					
s = 0.00035					

Finally report

17. KINDS OF PRINTOUTS

17.1. Standard printout

There are 2 types of printouts. First of them is standard printout. It includes result of weighing and all variables which have attribute YES in GLP submenu. In User and Project fields names should be written.



Declaration of variables to printout – submenu GLP

Example of standard printout

```

Date   : 13/09/2004
Time   : 16:30:50
User Id : Nowak
Project Id : tabletka
Balance Id : 117436
Last calibration:
-----
09/09/2004  12:23
automatic calibration
Diff.: 0.001 g
-----
13.829 g
    
```

Example of standard printout (all option settled on YES – printed)

```

Date      : 13/09/2004
User Id   : Nowak
Project Id : tabletka
Balance Id : 117436
13.838 g
    
```

Example of standard printout

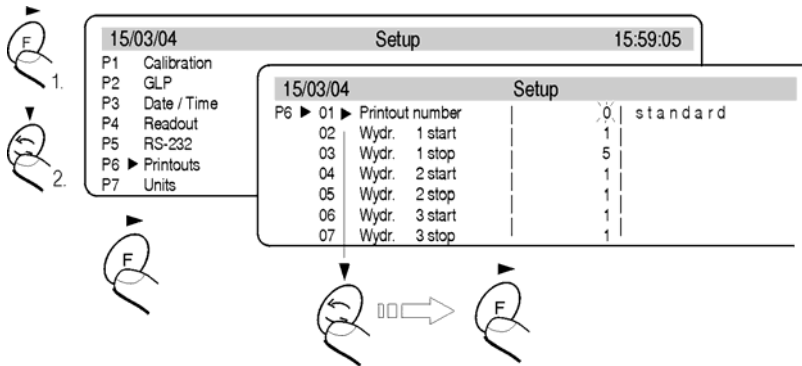
Question mark before load mass means that the result is not stable.

17.2. Non-standard printout

Procedure of creating non-standard printouts:

- user can create own 4 printouts,
- give the number of the text which starts the printout eg. Printout 1 Start – 1 and text number which finishes the printout eg. Printout 1 Stop – 40. In this case texts from 1 to 40 are printed.
- And then write text in the lines 1 ÷ 40.
It is recommended to use PC keyboard what is simpler and faster way.
- Non-standard printouts can overlap each other:
 - Printout 1 Start – 1
 - Printout 1 Stop – 40
 - Printout 2 Start – 20
 - Printout 2 Stop – 40
- **Non-standard printout can be created by Edition of the printout.**

During manual writing give all special signs as CRLF, tabulator etc. If function Printout Edition is used all these values can be selected in form of ready elements. They are transmitted from one side **Line of selection** to the other window **Printout**



Menu printouts – the function activation

Non-standard printout can include:

- Variable dependently on work mode and other user necessities (mass, date, Project No)
- Stable texts in user menu
- Non-standard printout can include not more than 640 signs recorded as 80 texts 8 signs each (from the parameter Text 1 to Text 80). User can design 4 non-standard printouts

17.2.1 Texts

Variables in all modes and with the same values

%%	Printout of „%” singular sign
%N	Actual net mass in basic unit
%d	Actual date
%t	Actual time
%i	The microbalance number
%R	The program number
%P	The Project number
%U	The user number
%F	Actual function name – work mode
%C	Date and time of last calibration
%K	Kind of last calibration
%I	Deviation of last calibration
%1	Code 1
%2	Code 2
%3	Code 3
%4	Code 4
%5	Code 5
%6	Code 6

Variables dependent on used work mode

Variable	Description	Mod where the variable is active
%W	1 piece mass	COUNTING PIECES
%H	Top stage	WEIGHING
%L	Down Stage	
%Z	Standard mass	DOSAGE
%B	Reference mass	DEVIATIONS
%A	Filter	WEIGHING ANIMALS
%b	Stage	

%i	Liquid	MEASUREMENT OF DENSITY
%p	Procedure	
%c	Temperature	
%a	Density of liquid	
%v	Float capacity	

Statistic variables in all modes apart from basic weighing

%n	The measurement number
%x	Average value
%S	Sum
%m	Min value
%M	Max value
%D	Difference between max and min value
%s	Standard deviation
%r	Variation factor

Variable in all modes which value depends on the mode

%V – Mass in actual unit. Value connected to work mode eg. counting pieces for mode Counting pieces or deviation from standard mass in % for mode Deviation

Special signs used to create special printouts

\\	Singular sign „\”
\c	CRLF
\r	CR
\n	LF
\t	Tabulator
\s	skip to next „string”
\0	End of the printout

Each text (Text 1 ÷ 89 Text 80) can include max 8 signs (letters, digits, special signs, spaces). To write long sentence create it using 8 signs texts. User can use special signs to include variables dependently on own necessities.

Example 1:

Max mass cannot be higher than 11.250 g!

If user write this sentence uses 640 signs grouped in adjacent lines of the text. Set up following texts and write 8 signs in each of them untill the sentence finishes.

Parameter number	Text							
	1	2	3	4	5	6	7	8
19 Text 10	M	a	s	a		m	a	k
20 Text 11	s	y	m	a	l	n	a	
21 Text 12	n	i	e		m	o	ž	e
22 Text 13	p	r	z	e	k	r	a	c
23 Text 14	z	a	ć		1	1	.	2
24 Text 15	5	5	0		g	!		

Example 2:

Zakład Mechaniki Precyzyjnej „RADWAG”

Date:

Time:

Load mass:






*****Signature:*****

<actual work mode>

Set following texts and write 8 signs in each of them until it is finished.

Parameter number	Text							
	1	2	3	4	5	6	7	8
25 Text 16	Z	a	k	ł	a	d		M
26 Text 17	e	c	h	a	n	i	k	i
27 Text 18		P	r	e	c	y	z	y
28 Text 19	j	n	e	j		„	R	A
29 Text 20	D	W	A	G	„	\	c	D
30 Text 21	a	t	a	:	%	d	\	c
31 Text 22	G	o	d	z	i	n	a	:
32 Text 23	%	t	\	r	\	n	M	a
33 Text 24	s	a		ł	a	d	u	n
34 Text 25	k	u	:	%	N	\	c	\
35 Text 26	c	*	*	*	*	*	P	o
36 Text 27	d	p	i	s	:	.	.	.
37 Text 28	.	.	.	.	.	.	.	\
38 Text 29	c	*	*	*	%	F	*	*
39 Text 30	*							

– **On the microbalance desk**

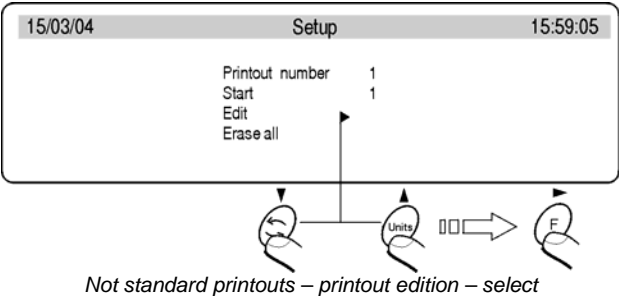
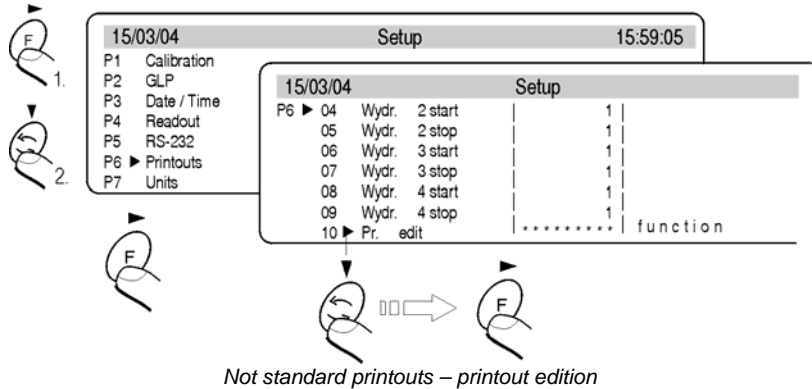
	Move up through digits, letters and signs
	Move down through digits, letters and signs
	Determine sign to change and move right (if the key is pressed flashing sign is moved in right direction. If no sign is written this key makes space in the text)
	Determine sign to change and move left (after this key is pressed flashing sign is cancelled)
	Confirm the text

– **On PS/2 keyboard**

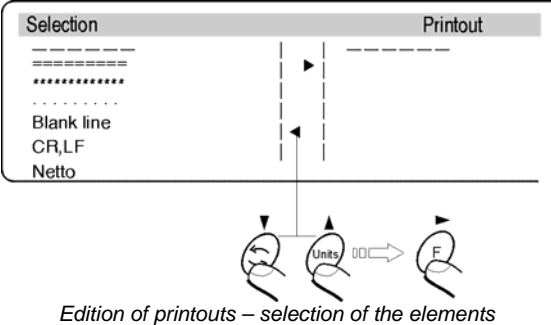
Press F2 to enter main menu. Press F3 to set parameters indications next to group P6 Printouts and press F2 to enter menu group and then select parameter. Press F2 to activate the procedure of writing the text. By means of keyboard write the text (max 8 signs) and confirm by Enter. Repeat this procedure for the rest of the texts.
Description of the computer keyboard is in the p. 5.1.3

17.2.2. Composing texts by Edition function

The function activation



After activation of the function select printout number (1-4) and beginning of writting the texts in (range from text 1 to text 80). Then select the option Edition to edite (create) printout or cancell all (remove all printouts).



To select following fields use keys **Units** and **Mode**. To print field press the **F** key. After the edition press ENTER/PRINT. Display shows question if printout should be done – press ENTER/PRINT again.

17.2.3 select non-standard printouts

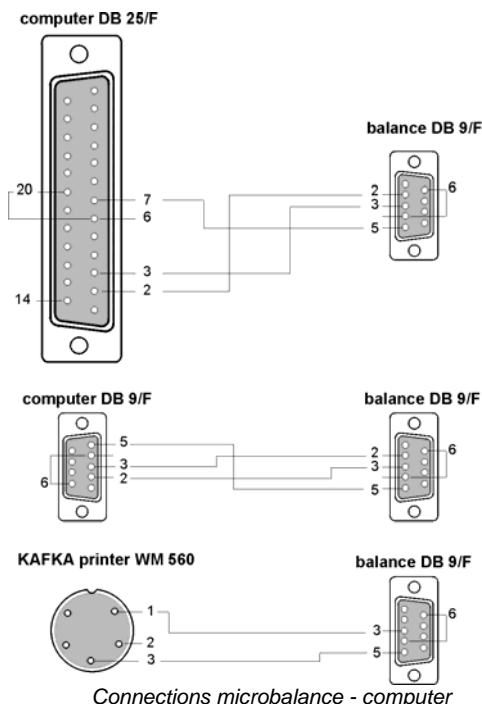
if STANDARD printout is selected – there will be only result and variables declared in the GLP (see p. 17.1 Standard printout. Declaration of the variables to printout – submenu GLP).

If non-standard printout is printed select kind of the printout (1-4) and give the beginning and end of the printout.

18. COOPERATION WITH PRINTER OR COMPUTER

To send the information on the display with the unit of measure to the computer or printer, press the < **PRINT** > key. 9600 bit/s is the default setting for the speed of transmission. If the peripheral unit has a different speed of transmission, you may change the speed of transmission in the microbalance menu. (see p. 15 of the manual)

18.1. Connections



The microbalance connection DB 9/F – The computer connection DB 9/F (with control of sending date)

<u>Microbalance</u>	<u>Computer</u>
2 (RxD)	3 (TxD)
3 (TxD)	2 (RxD)
4 (DTR)	6 DSR
5 (GND)	5 (GND)
6 (DSR)	6 (DTR)
7 (RTS)	8 (CTS)
8 (CTS)	7 (RTS)

19. CONNECTING ADDITIONAL KEYS

It is possible to connect external tare and print buttons by special luster through port RS232.

Printer or computer can be connected to the cluster.

Connected elements are not standard accesories of the microbalance.

20. LIST OF COMMUNICATIONS COMPUTER - MICROBALANCE

Function	RESET INTERFACE
Command	R CR LF (zero actual orders, restore factory setting)
Function	SEND ALL COMMANDS FROM THE MICROBALANCE
Command	PC CR LF (all recorded information in commands in the microbalance programme are sent from the microbalance)
Function	SEND THE RESULT IN BASIC UNIT
Command	S CR LF (result is sent from the microbalance in basic interval after stability)
Function	SEND RESULT IN BASIC UNIT IMMEDIATELY
Command	SI CR LF
Function	SEND THE RESULT IN ACTUAL INTERVAL
Command	SU CR LF (result in actaul unit is sent from the microbalance after stability)
Function	SEND RESULT IN ACTUAL INTERVAL IMMEDIATELY
Command	SUI CR LF
Function	ZERO THE MICROBALANCE
Command	Z CR LF (set the microbalance to zero after it reaches stability)

Function Command	ZERO IMMEDIATELY ZI CR LF
Function Command	TARE WHEN STABLE T CR LF
Function Command	TARE THE MICROBALANCE IMMEDIATELY TI CR LF
Function Command	SWITCH CONSTANCE TRANSMISSION OFF IN BASIC INTERVAL C0 CR LF
Function Command	SWITCH CONSTANCE TRANSMISSION IN BASIC INTERVAL C1 CR LF
Function Command	SWITCH CONSTANCE TRANSMISSION OFF IN ACTUAL INTERVAL CU0 CR LF
Function Command	SWITCH CONSTANCE TRANSMISSION ON IN ACTUAL INTERVAL Comand CU1 CR LF
Function Command	NUMBER OF THE MICROBALANCE NB CR LF
Function Command	RANGE OF WEIGHIGN FS CR LF
Function Command	PROGRAM VERSION RV CR LF
Function Command	WRITE OR CHANGE DATE IN THE MICROBALANCE PD CR LF (the microbalance sends settled date or the date is changed)
Function Command	WRITE NEW OR CHANGE TIME IN THE MICROBALANCE PD CR LF (the microbalance sends settled time or this time is changed)
Function Command	WRITE ACTUAL WORK MODE PM CR LF
Function Command	SEND SETUP PS CR LF (all microbalance setup is sent – printout of the parameters)
Function Command	SOUND SIGNAL – „BEEP“ B CR LF (sound beep is switched on)
Function Command	SEND LAST ERROR CODE ER CR LF (last order of the error is sent)

Function Command	DISPLAY STRING DS CR LF (signs are show on the display)
Function Command	CANCEL STRING CS CR LF (cancells string and restores previous state of the display)
Function Command	DISPLAY HEADLINE DH CR LF (sinus are displayed in top headline of the display)
Function Command	CANCEL HEADLINE CH CR LF (cancells information in the top healine)
Function Command	CANCEL HEADLINE DF CR LF (displays signs in the bottom headline)
Function Command	CANCEL HEADLINE CF CR LF (cancells information in bottom headline)
Function Command	PERFORM INTERNAL CALIBRATION CL CR LF
Function Command	BLOCK THE KEYBOARD KL CR LF
Function Command	UNBLOCK THE KEYBOARD KU CR LF
Function Command	SWITCH „ECHO“ OFF FOR THE KEYBOARD E0 CR LF (keys codes are switched off)
Function Command	SWITCH „ECHO“ ON FOR THE KEYBOARD E1 CR LF
Function Command	SWITCH THE MICROBALANCE OFF O0 CR LF (the same as ON/OFF)
Function Command	SWITCH THE MICROBALANCE ON O1 CR LF (the same as ON/OFF)
Function Command	SWITCH AUTOZERO OFF A0 CR LF
Function Command	SWITCH AUTOZERO ON A1 CR LF

If command which is not listed or with error and with CRLF at the end the command is returned in E S CR LF form. Spaces in the forms should be omitted ,

21. TECHNICAL PARAMETERS

	MXA 5	MXA 5	MXA 11	MXA 21
Max capacity	5g	5g	11g	21g
Accuracy	1µg	1µg		
Tare range	- 5g	- 5g	- 11g	- 21g
Pan size	Ø 70	Ø 30		
Stabilization time	25s	20s		
Temperature	+ 18 °C - + 35 °C			
Power supply	230V , 50 Hz, 8VA / 11V AC			

22. COMMANDS ABOUT ERRORS

Order	Error number	Error description
"control sum error"	1.1	Errors during data transmission
"A/D Error"	1.2	Converter error
"Exceed range"	2.1	Exceed max measure range of the microbalance
" Exceed range "	2.2	Exceed max measure range of the microbalance
"A/D Null"	2.3	No divisions from converter
"A/D Full"	2.4	Exceed max value converter intervals
"Tara/Zero above the range"	2.5	Exceed admissible tare or zero value
"Tara above the range "	2.6	Exceed admissible tare value for the microbalances
"Zero above the range"	2.7	Exceed zero range for the microbalances
"Result > 4% Max"	2.8	To high start mass (start the microbalance up with load on the pan)
"Result > 1% Max"	2.9	Difference between determined calibration mass and calibration mass recorded in the microbalance memory higher than (difference >1%)
"Piece < 1 Div"	2.10	Singular mass value in counting pieces function less than actual scale interval
Piece < 10 Div"	2.11	Mass on the pan during determining mass of singular piece in the function of counting pieces less than 10 actual scale intervals
"Ref < 1000 Div"	2.12	Value of reference mass in the function deviations is less than 1000 actual scale intervals
"above the range"	3.1	The parameter value above the range
"Faulty value"	3.2	Inadmissible value of the parameter
"Blocked - DRH"	3.3	The parameter cannot be changed (Function DRH active in the factory menu)
"Writing error "	4.1	Errors during data transmission to printer or computer
" Party error"	4.2	
" Frame error"	4.3	
"stopped transmission CTS"	4.4	
" stopped transmission XOFF"	4.5	
"incorrect date"	5.1	Faulty date
"Exceed time"	6.1	Exceed admissible time during for an operation (eg. zero)

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