

USER FUNCTIONS DESCRIPTION

INSTRUCTION MANUAL SUPPLEMENT

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1. *Special functions availability principles*

All AG and AGN series balances, besides the basic metrological functions: weighing and tare setting, have a set of user special functions.

The standard balance is equipped with:

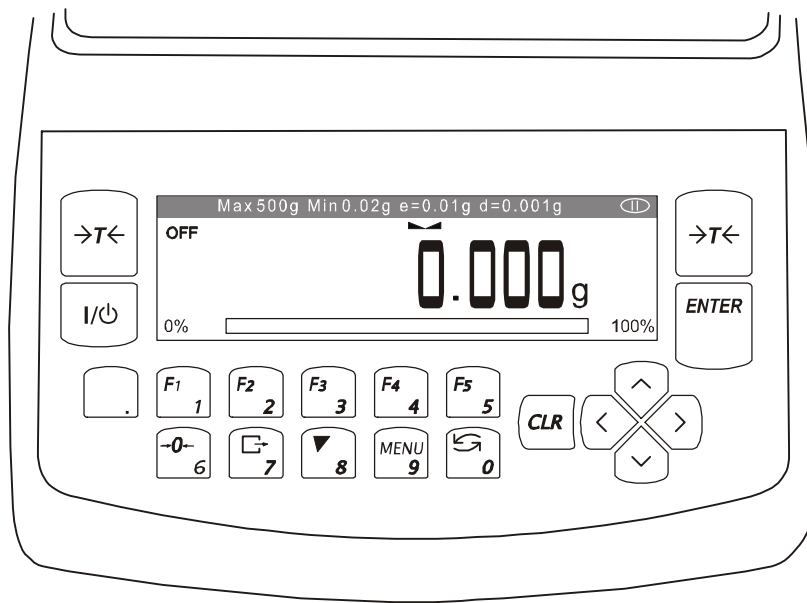
- basic set of user special functions, including:
 - automatic tare
 - pieces counting
 - unit selection
 - percent indication
 - calibration
 - RS232C settings
 - recipe
 - print settings
 - time settings
 - LCD settings

Moreover, the balance on demand may be equipped with:

- additional set of user functions, including:
 - animals weighing
 - maximum and minimum value indication
 - language selection
- function of comparing with preset threshold values
- function of statistical calculations
- function of density measurement

Below all special user functions are described, which have not been described in the instruction manual (exceeding the basic set).

2. Balance keys and indicators description



Keys:

$\rightarrow T \leftarrow$	- tare set (entering of mass subtracted from weighed mass)
$\rightarrow 0 \leftarrow$	- zeroing (option),
ENTER	- confirmation / option selection,
.	- decimal comma,
1/F1 ... 5/F5	- digital / function keys,
6 / $\rightarrow 0 \leftarrow$	- digital key / zeroing (balances for direct settlements),
7 \rightarrow	- digital key / result print (transmission),
8 / \blacktriangledown	- digital key / internal calibration,
9 / MENU	- digital key / menu entering,
0 / X	- digital key / balance operation mode switching,
\wedge	- navigation: go to upper position,
\vee	- navigation: go to lower position,
$>$	- navigation: option enter,
$<$	- navigation: option exit,
I / ϕ	- ON/OFF switch (standby),

Indicators:

indicator \blacksquare	- signals weighing result stabilization,
linear indicator	- balance load indicator (0-100%),
OFF indicator	- appears after switching on with I / ϕ key.

3. Time setting function

This function allows for date and time adjustment for print purposes.

USER FUNCTIONS&OPT.

☐ Autotaring
☐ PCS counting

. . .

☒ Time&date setting

Press *MENU* key, select *Time settings* with cursor and press *ENTER*.

USER FUNCTIONS

1. Time:	09:11:03	
2. Date:	2006-03-31	
3. Exit		

Using \wedge and \vee keys, select the parameter, which is to be set and press *ENTER*.

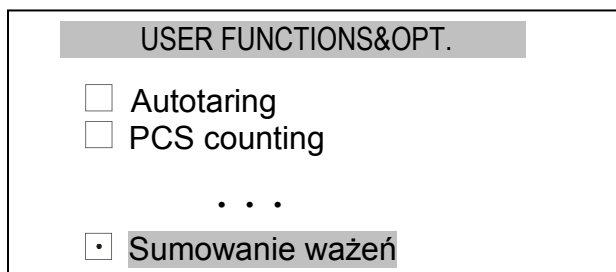
USER FUNCTIONS&OPT. \ TIME&DATE SET

1. Time:	09:11:03	
2. Date:	2006-03-31	
3. Code		
4. Exit		

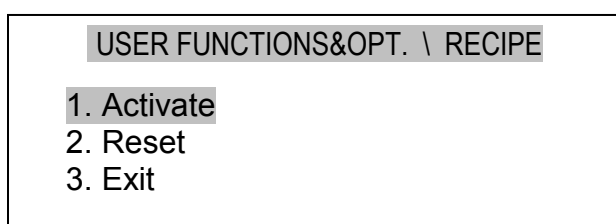
Using the digital keys enter the current values. Confirm by pressing *ENTER*..

4. Recipe function

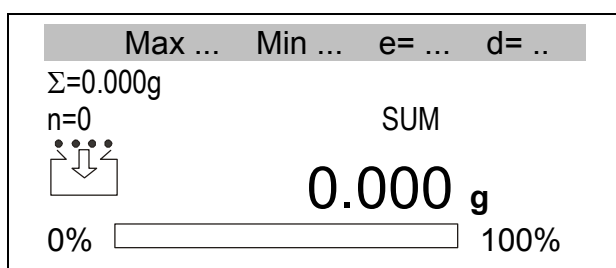
This function allows for weighing few ingredients in sequence in one vessel, with the possibility of continuous reading of summary mass value of all ingredients weighed so far.



Press *MENU* key to enter the user functions menu, select *Result summation* with cursor and press *ENTER*.

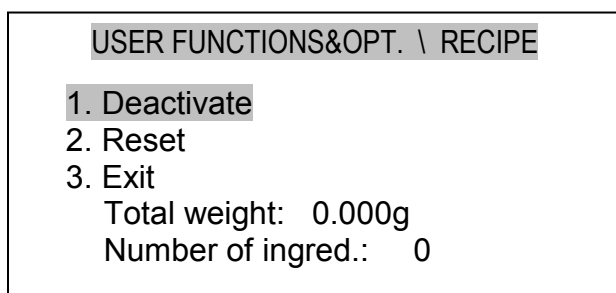


Using \vee and \wedge keys, move cursor to *Activation* and press *ENTER*.



The balance is ready for weighing the successive ingredients, and after each ingredient it is necessary to press $\rightarrow T \leftarrow$ key. It will zero the balance indications. On the left side the sum of previously weighed ingredients (Σ) and their number (n) is displayed.

To read the total mass of all weighed ingredients use *X* key (pressing it again will cause return to ingredient weighing).



To finish the function operation, press *MENU* to enter the user functions menu, select *Recipe* function, and select *Deactivation* option.

5. Animals weighing function

This function allows for weighing of an animal, moving on the balance, by averaging of momentary values, measured by the balance. The samples number and sampling time, as well as operation mode are set by the balance operator.

USER FUNCTIONS&OPT.


☐ Autotaring
☐ PCS counting

. . .

☒ **Animal weighing**


USER FUNCTIONS&OPT. \ ANIMAL

1. Activate
2. Number of samples:
3. Sampling time: 0.1 sek
4. Mode: autom.
5. Start treshold: 5.000g
6. Exit




USER FUNCTIONS&OPT. \ ANIMAL

1. Activate
2. Number of samples:
3. Sampling time: 0.1 sek
4. Mode: <autom.>
5. Start treshold: 5.000g
6. Exit





USER FUNCTIONS&OPT. \ ANIMAL

1. Activate
2. Number of samples:
3. Sampling time: 0.1 sek
4. Mode: autom.
5. Start treshold: 5.000g
6. Exit



Max ... Min ... e= ... d= ..





10.123 g

Result
0% 100%

Press *MENU* key to enter the user functions menu, select *Animals weighing* with cursor and press *ENTER*.

Using \vee and \wedge keys, move cursor to *Samples number*, press *ENTER* and type in the value with digital keys. Finish by pressing *ENTER*.

In the same way set the sampling time (minimum time is 0.1 s).

Move cursor to *Operation mode* and using $<$ and $>$ keys select the process beginning method:

- manual – after pressing *ENTER*,
- autom. – after exceeding *Operation threshold*.

Confirm by pressing *ENTER*.

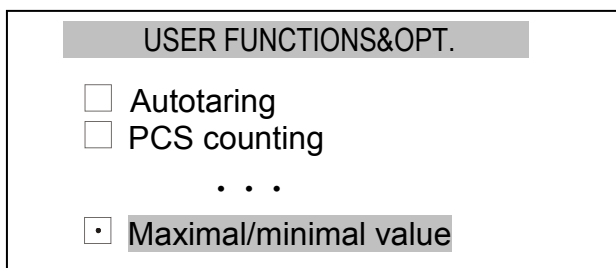
As the *Operation threshold* value enter the value, which will be for sure exceeded after placing the animal on the balance, e.g. 50% of the smallest animal weight.

Using \vee and \wedge keys, move cursor to *Activation* and press *ENTER*.

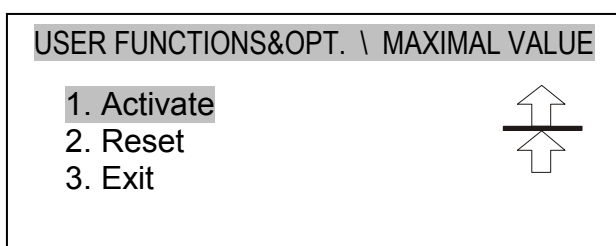
To finish the function operation, press *MENU* to enter the user functions menu, select *Animals weighing* function, and select *Deactivation* option.

6. Maximum and minimum value indication function

This function allows for keeping the maximum value, indicated by the balance, on the display.

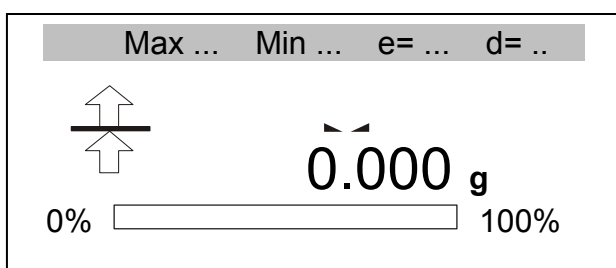


Press *MENU* key to enter the user functions menu, select *Maximum value* with cursor and press *ENTER*.

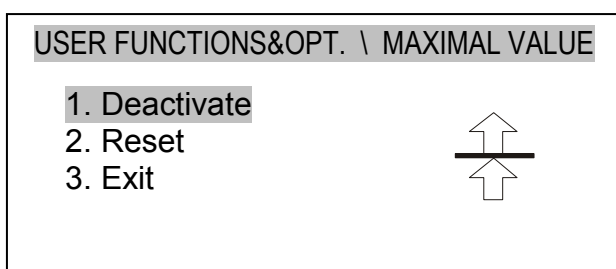


Using \vee and \wedge keys, move cursor to *Activation* and press *ENTER*.

The balance is ready for weighing, but the display keeps the highest value, measured since the function activation or use of *Reset* option.



To read the mass, currently placed on the balance, use *X* key. Reuse of that key cause return to the maximum value.



To finish the function operation, press *MENU* to enter the user functions menu, select *Maximum value* function, and select *Deactivate* option.

7. Function of comparing with preset threshold values

This function allows to compare the weighing result with two, previously programmed values: upper and lower threshold. The comparison result is signalled with the messages *MIN*, *OK* or *MAX* on the display.

If the weighing result is:

- smaller than lower threshold – the balance signals *MIN*,
- between thresholds – the balance signals *OK* and emits acoustic signal,
- bigger than the upper threshold – the balance signals *MAX*.
- smaller than zero threshold (no load) – none of above messages appears.

USER FUNCTIONS&OPT.	
<input type="checkbox"/>	Autotaring
<input type="checkbox"/>	PCS counting
. . .	
<input checked="" type="checkbox"/>	Streshold signalisation

Press *MENU* key to enter the user functions menu, select *Threshold signalling* with cursor and press *ENTER*.

USER FUNCTIONS \ TRESHOLD SIGNAL.	
1. Activate	
2. Zero treshold :	none
3. Min treshold :	none
4. Max treshold :	none
5. Outputs mode :	none
6. Buzzer :	none
7. LCD fashing :	OFF
8. Exit	

Using \vee and \wedge keys, move cursor to *Zero threshold* option and press *ENTER*.

USER FUNCTIONS \ TRESHOLD SIGNAL.	
1. Activate	
2. Zero treshold :	5
3. Min treshold :	none
4. Max treshold :	none
5. Outputs mode :	none
6. Buzzer :	none
7. LCD fashing :	OFF
8. Exit	

Enter the indications value, below which the balance is considered unloaded (no signalisation) and press *ENTER*.

In the same way enter the values for *Min threshold* and *Max threshold*.

USER FUNCTIONS \ TRESHOLD SIGNAL.	
1. Activate	
2. Zero treshold :	5g
3. Min treshold :	90g
4. Max treshold :	110g
5. Outputs mode :	<signalling>
6. Buzzer :	stable OK
7. LCD fashing :	OFF
8. Exit	

The *Outputs mode* option is used for setting the THRESHOLDS connection operation mode (see below). The appropriate mode is selected with $<$ and $>$ keys, confirmation – with *ENTER* key.

USER FUNCTIONS \ TRESHOLD SIGNAL.

1. Activate
2. Zero treshold : 5g
3. Min treshold : 90g
4. Max treshold : 110g
5. Outputs mode : signalling
6. Buzzer : <stable OK>
7. LCD fashing : OFF
8. Exit



Buzzer option is used for selection of acoustic signalling method. Selection of *Stable OK* option means acoustic signal activation after indications stabilisation in range signalled as *OK*. It is possible to activate the signal immediately after exceeding the threshold, or total signal deactivation.

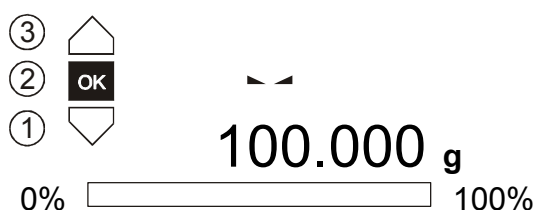
USER FUNCTIONS \ TRESHOLD SIGNAL.

1. Activate
2. Zero treshold : 5g
3. Min treshold : 90g
4. Max treshold : 110g
5. Outputs mode : signalling
6. Buzzer : stable OK
7. LCD fashing : OFF
8. Exit



To start working with thresholds signalling, move cursor to *Activate* option and press *ENTER*.

Max ... Min ... e= ... d= ..



After each loading, the result of comparing with thresholds is signalled.

USER FUNCTIONS \ TRESHOLD SIGNAL.

1. Deactivate
2. Zero treshold : 5g
3. Min treshold : 90g
4. Max treshold : 110g
5. Outputs mode : signalling
6. Buzzer : stable OK
7. LCD fashing : OFF
8. Exit

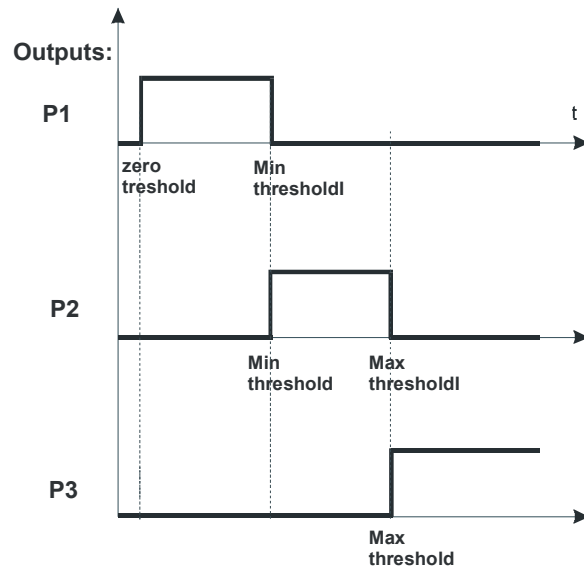
To finish the function operation, press *MENU* to enter the user functions menu, select *Threshold signalling* function, and select *Deactivation* option.

If the balance is equipped with *THRESHOLDS* control connection, the comparison result may be used to control the external optical signalling device, or other external devices.

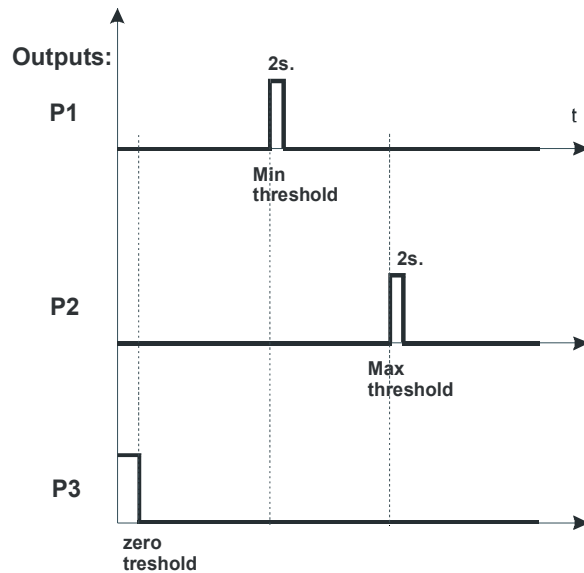
On the outputs *P1* and *P2* the short-circuit states appear, which depend on comparison results of balance indications with threshold values. The available operation modes are shown on the states chart.

THRESHOLDS outputs states chart (with increasing balance load):

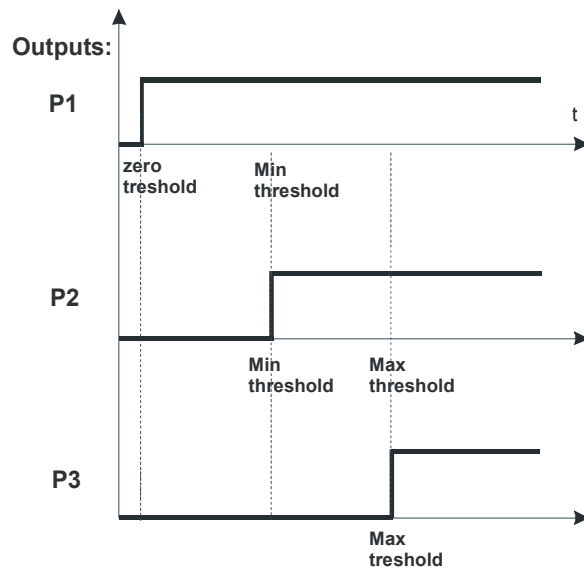
1. *Signalling device mode*:



2. *Impulse mode*
(approx. 2 sec.):



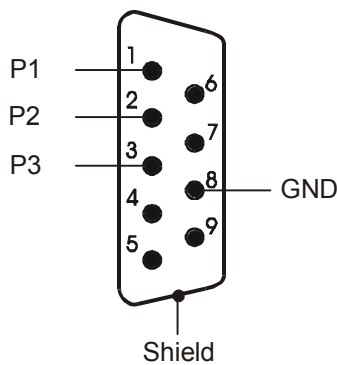
3. *Level mode*:



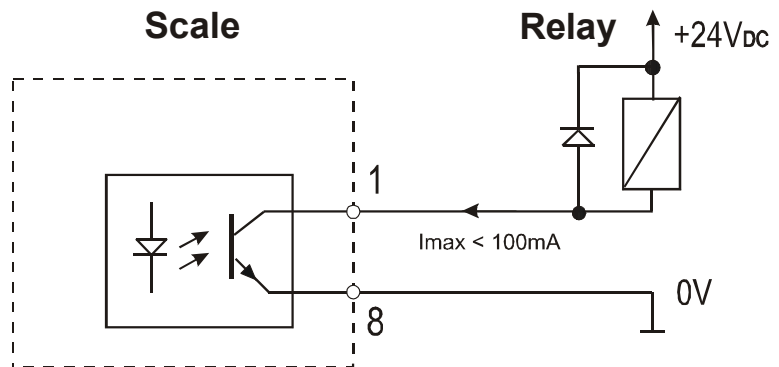
The *THRESHOLDS* connection contains three transistor outputs P1, P2 and P3 of open collector type, with load capacity 100mA/24V. The connected relays are not supplied from the balance and require additional 24V power supply unit. The relays inputs must be protected with diodes, e.g. 1N4148.

The balance producer offers ready electronic PCB MS3K/P, which contains RM96P relays with input voltage DC24V and output: AC250V, 8A.

THRESHOLD connection



Scheme for connecting the single relay to
THRESHOLDS connection output



8. *Language selection function*

This function allows for language selection for messages and print purposes.

USER FUNCTIONS&OPT.

☐ Autotaring
☐ PCS counting

. . .

☒ **Language**

Exit

Press *MENU* key, select *Language selection* with cursor and press *ENTER*.

USER FUNCTIONS&OPT. \ LANGUAGE

☒ **Polish**
☐ English
☐ German
☐ Russian
☐ Ukrainian
☐ Czech
☐ Spanish
☐ French
☐ Exit

Using *^* and *v* keys, select proper language and press *ENTER*.

9. Statistical calculations function

This function allows for calculations of mean value, standard deviation, relative standard deviation, maximum and minimum value, and making the histogram of performed series of measurements.

USER FUNCTIONS&OPT.

☐ Autotaring
☐ PCS counting


. . .

☒ **Statistic**

USER FUNCTIONS&OPT.\ STATISTIC

1. Activate
2. Reset
3. **Mode:**
4. Printout:
5. Exit


autom.
ON



USER FUNCTIONS&OPT.\ STATISTIC

1. Activate
2. Reset
3. **Mode:**
4. Printout:
5. Exit


<autom.>
ON




USER FUNCTIONS&OPT.\ STATISTIC

1. **Activate**
2. Reset
3. Mode:
4. Printout:
5. Exit

autom.
ON



Max ... Min ... e= ... d= ..

n=1

AUTO
0% 100%

0.000 g

Press *MENU* key to enter the user functions menu, select *Statistics* with cursor and press *ENTER*.

Using keys \vee and \wedge move cursor to *Operation mode*, and using $<$ and $>$ keys select the process beginning method:

- manual – after pressing *ENTER*,
- autom. – after indications stabilization.

Confirm by pressing *ENTER*.

When required, move cursor to *Print* and select:

- ON – printing of successive measurements,
- OFF – successive measurements without printing.


Confirm by pressing *ENTER*.

Using \vee and \wedge keys, move cursor to *Activate* and press *ENTER*.

The balance is ready for the series of samples measurements, for which the statistical parameters will be calculated.

To perform the measurement just put the sample, wait for stabilization and remove sample. The successive results are sent to the printer.

STATYSTYKA - WYNIKI



Number of samples =
 Average value =
 Stand. deviation =
 Relative deviation =
 Minimal value =
 Maximal value =

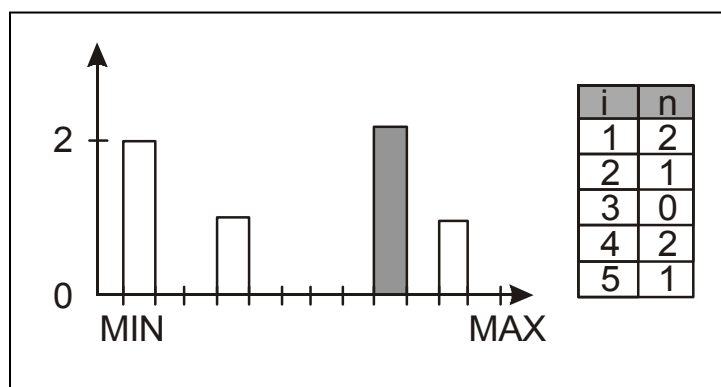
F1 PRINT
F2 CHART
F3 DONE
F5 EXIT

To read the statistical parameters, press *MENU* key. It will display report *STATISTICS – RESULTS*.

1	7,5476
2	7,5480
3	7,1902
4	6,8227
5	6,4719

Number of samples =	5
Average value =	7.11608 g
Stand. deviation =	0.93771 g
Relative deviation =	13.18 %
Minimal value =	6.4719 g
Maximal value =	7.5480 g

The individual measurements results are printed during performing (option: *Print ON*). After pressing *F1* key the statistical parameters are printed.



F2 key prints the histogram. Table on the left shows division into subranges (*i*) and numbers of samples (*n*) in the individual subranges. Return to report displaying takes place after pressing *CLR* key.

To finish the function operation, press *MENU* to enter the user functions menu, select *Statistics* function, and select *Deactivation* option.

10. Density measurement function

This function allows for determination of solid body density, upon the basis of weight in the air and weight of material immersed in liquid of known density, according to the formula:

$$\rho = \frac{m_1}{m_1 - m_2} * \rho_{\text{liquid}}$$

where:

m_1 -mass in the air

m_2 -mass in the liquid

The measurement consists of two phases:

Phase I – solid body sample measurement in the air

Phase II – measurement with immersion in the liquid

This function also allows for determination of liquid density, upon the basis of plunger weight (with known density) in the air and tested liquid. The following formula is used:

$$\rho = \frac{m_1 - m_2}{V}$$

where:

m_1 -plunger mass in the air

m_2 -plunger mass in the liquid

V – plunger volume

The plunger volume is indicated on its hanger.

This measurement also takes place in two phases:

Phase I – plunger measurement in the air

Phase II – measurement with immersion in the liquid

More comprehensive description is delivered with the *Hydro Set*.

10.1 Solid body density determination

USER FUNCTIONS	
<input type="checkbox"/>	Autotaring
<input type="checkbox"/>	PCS counting
. . .	
<input checked="" type="checkbox"/>	Density measurement
<input type="checkbox"/>	. . .

Suspend the trays and tare scale pressing button $\rightarrow T \leftarrow$.

Press button *Menu*, select *Density measurement* with cursor and press *ENTER*..

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : solid
3.	Liquid type : water 20.0°C
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

Select *Material type* with cursor and press *ENTER*.. Use > and < keys to choose *solid* material and press *ENTER*

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : solid
3.	Liquid type : water 20.0°C
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

Select *Liquid type* with cursor and press *ENTER*.

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : solid
3.	Liquid type : < water >
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

When is used distilled water please use > and < keys and select *water*. If is used a different liquid - please choose *different*, and press *ENTER*.

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : solid
3.	Liquid type : water T= 20.0
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

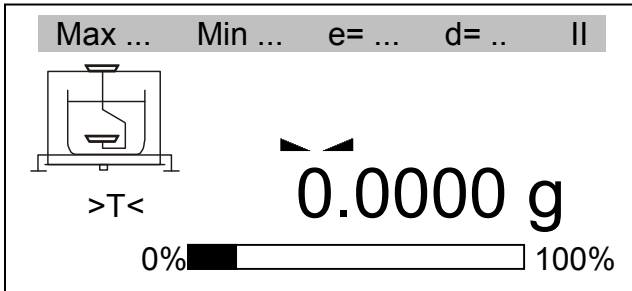
If is used distilled water please write current temperature of water. This is necessary to calculate a correct value of density – require accuracy is 0,5 degree. If is used a different liquid please write accurate density value this liquid on the present temperature.

Finish the procedure pressing *ENTER*.

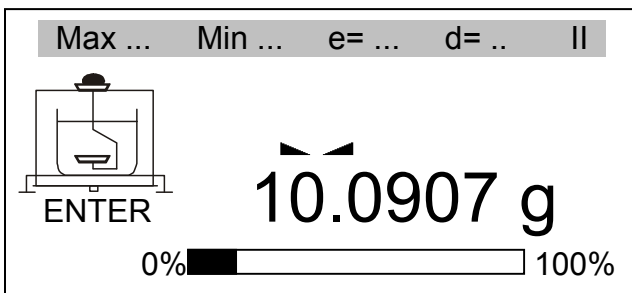
USER FUNCTIONS / DENSITY

1. **Activate**
2. Material type : solid
3. Liquid type : water T= 20.0°C
4. Liquid density : 0.99820g/cm³
5. Report printout
6. Exit

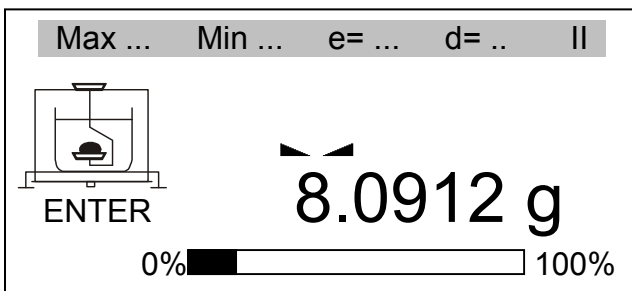
Select *Activate* with cursor and Press *ENTER*.



Press $\rightarrow T \leftarrow$ to taring scale



Put the examine solid body on upper tray (measurement in the air) and press *ENTER*.



Put the examine solid body on lower tray (measurement in the liquid) and press *ENTER*.

Result of measurement is displayed on the screen.

RESULTS

Mass in the air : 10.0907g
 Mass in the liquid : 8.0912g
 Mass density : 5.0373g/cm³
 Density with comp. : 5.0363g/cm³

F1 PRINT **F3 DONE** **F5 EXIT**

Scale enumerated density with the compensation of influence air density - (*Density with comp.*), too.

Press *F1* to printed a result.

Press *F5* or *ENTER* to started next measurement.

Press *F3* to finished density measurement.

10.2 Liquid density determination

USER FUNCTIONS	
<input type="checkbox"/>	Autotaring
<input type="checkbox"/>	PCS counting
. . .	
<input checked="" type="checkbox"/>	Density measurement
. . .	

Suspend the trays and tare scale pressing button $\rightarrow T \leftarrow$.

Press button *Menu*, select *Density measurement* with cursor and press *ENTER*..

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : solid
3.	Liquid type : water 20.0°C
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

Select *Material type* with cursor and press *ENTER*.

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : <liquid>
3.	Liquid type : water 20.0°C
4.	Liquid density : 0.99820g/cm3
5.	Report printout
6.	Exit

Use > and < keys to choose *Liquid* material and press *ENTER*.

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : liquid
3.	Plunger volume : 0.00000 cm3
4.	Report printout
5.	Exit

Use > and < keys to choose *Plunger volume* and press *ENTER*

USER FUNCTIONS / DENSITY	
1.	Activate
2.	Material type : liquid
3.	Plunger volume: 5.00000 cm3
4.	Report printout
5.	Exit

Please write value of plunger volume and press *ENTER*.

Attention: Plunger volume is wrote on his hanger.

USER FUNCTIONS / DENSITY

1. Activate
2. Material type : liquid
3. Plunger volume: 5.00000 cm³
4. Report printout
5. Exit

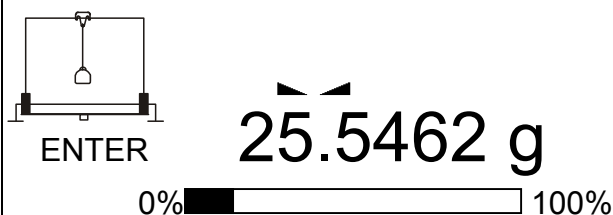
Select *Activate* with cursor and Press *ENTER*.

Max ... Min ... e= ... d= .. II



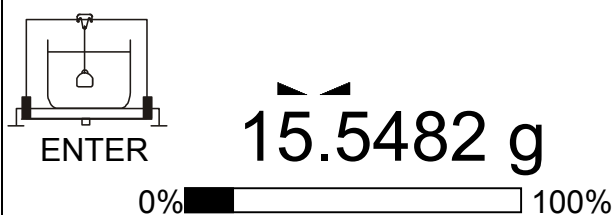
Press $\rightarrow T \leftarrow$ to taring scale

Max ... Min ... e= ... d= .. II



Suspend the plunger (measurement in the air) and press Enter. Please not immerse plunger in the liquid on this stage.

Max ... Min ... e= ... d= .. II



Suspend the plunger and immerse in beaker with examine liquid (measurement in the liquid) and press *ENTER*.

RESULTS

Mass in the air : 25.5462g
 Mass in the liquid : 15.5482g
 Liquid density : 1.9848g/cm³
 Density with comp. : 1.9839g/cm³

F1 PRINT F3 DONE F5 EXIT

Result of measurement is displayed on the screen (*Liquid density*).

Scale enumerated density with the compensation of influence air density - (*Density with comp.*), too.

Press *F1* to printed a result.

Press *F5* or *ENTER* to started next measurement.

Press *F3* to finished density measurement..

10.3. Density measurement report

To print the measurement results, connect the printer to RS232C connection of the balance. The connection method is described in the instruction manual.

USER FUNCTIONS / DENSITY	
1. Activate	
2. Material type	: solid
3. Liquid type	: water 20.0°C
4. Liquid density	: 0.99820g/cm ³
5. Report printout	
6. Exit	

After each measurement the print may be performed by pressing *F1* key (it is also possible to select *Report print* option and press *ENTER*).

Print example:

Measurement number	=	
Mass in the air	=	g
Mass in the liquid	=	g
Density ...	=	g/cm ³
Density with comp.	=	g/ cm ³
Water density	=	g/cm ³
Water temperature	=	°C



Notice

