User Manual

User manual no.
LMI-64-02/01/13/ENG

METAL PURITY DETERMINING KIT

For a balance PS series

BALANCES AND SCALES
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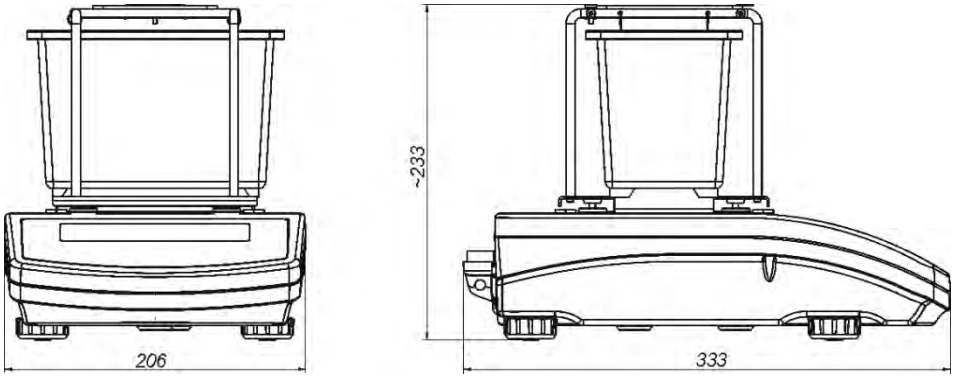
1. DIMENSIONS

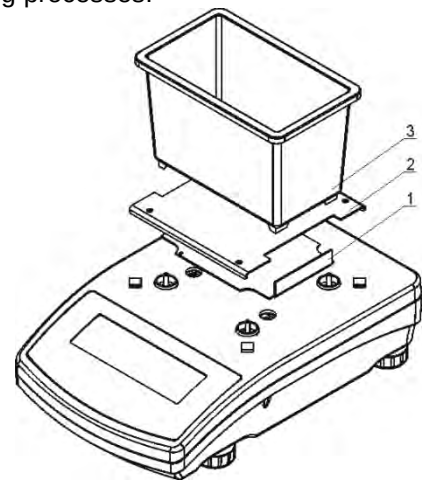


Dimensions of a balance PS X.AU series

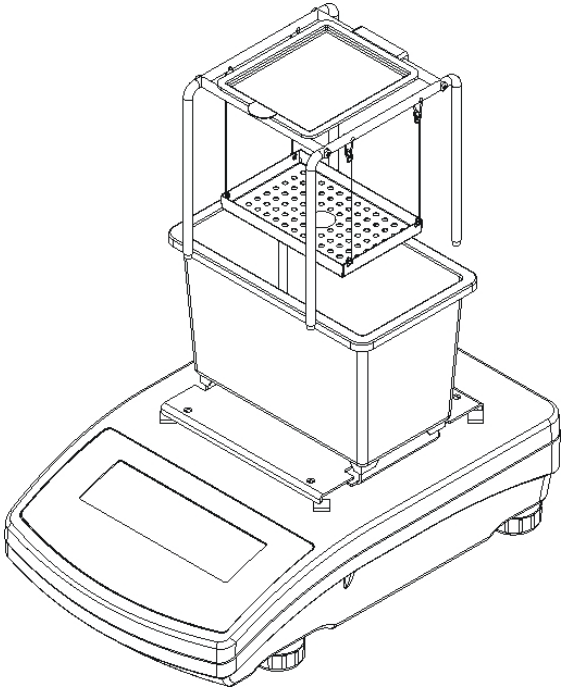
2. KIT ASSEMBLY

A. Remove the standard weighing pan from the balance. Next remove the rubber mandrels positioning the pan and replace them with mandrels without rubber absorbers that are supplied with the kit for determining carat content.

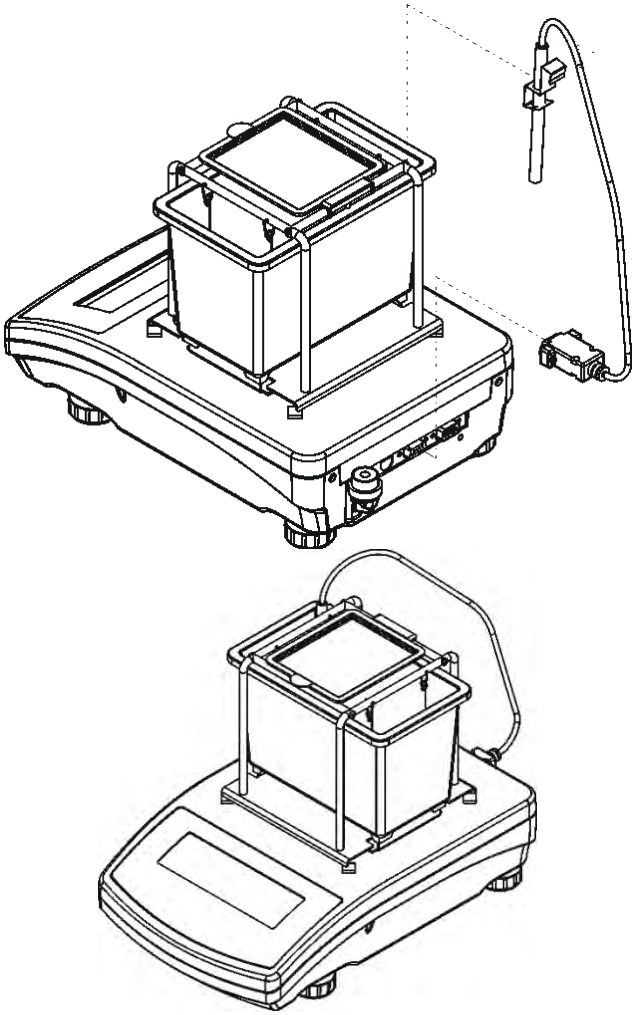
B. Assembly the kit components in the following sequence: basis of the container for liquid (item 1), next place weighing pan basis (item 2) onto the previously assembled mandrels, and finally place the container for liquid (item 3). Fill the container with liquid for carrying out measuring processes.



C. On the weighing pan basis place an assembly with attached grill pan.



D. Assemble liquid temperature sensor TB-2. Pay attention that the sensor probe does not touch the assembly (C) or the grill pan.



Caution: TB-2 thermometer is optional equipment of the kit for determining carat content.

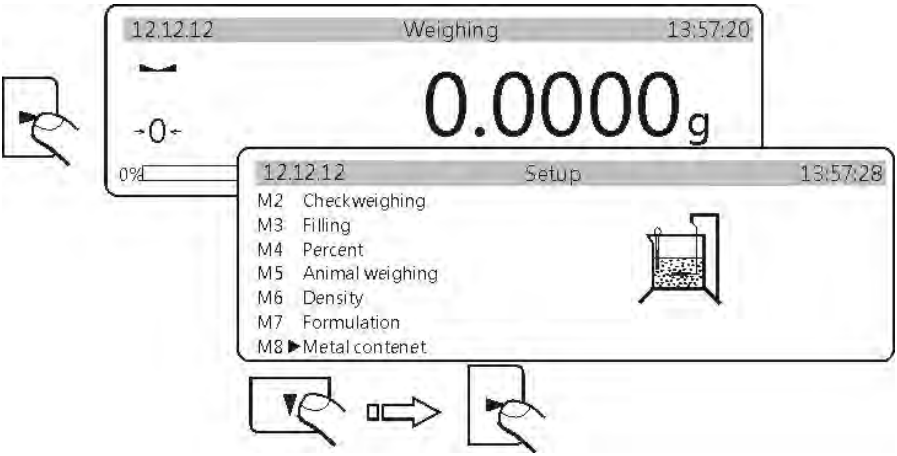
3. METAL PURITY TESTING MODE

A balance **PS X.AU** series implements the following testing procedures in the metal purity testing mode:

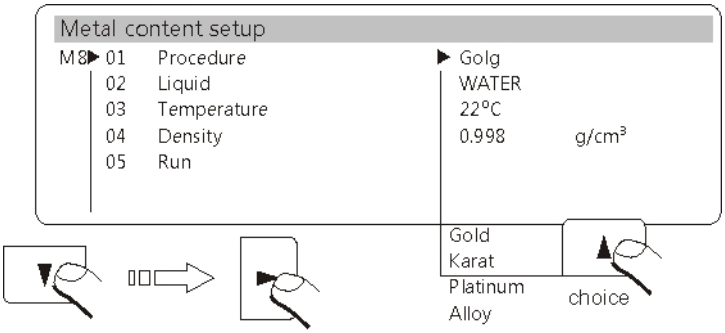
Name	*Description*
Gold	Testing carat content of pure gold
Carat	Testing carat content of gold alloy (gold with additive: Au – Ag - Cu: gold / copper / silver; Au - Cu: gold / copper; Au – Ag: gold / silver)
Platinum	Testing platinum class (platinum with additive: Pt - Ni: platinum / nickel; Pt - Pd: platinum / palladium)
Alloy	Determining percent content of major metal in the tested alloy (ALL-2: 2-component alloy, ALL-3: 3-component alloy)

The parameter settings of each testing procedure is carried out in the submenu of the selected testing mode.

3.1. MODE ACTIVATING



3.2. CARAT CONTENT OF PURE GOLD – MENU



Procedure
Select a testing procedure from balance menu.

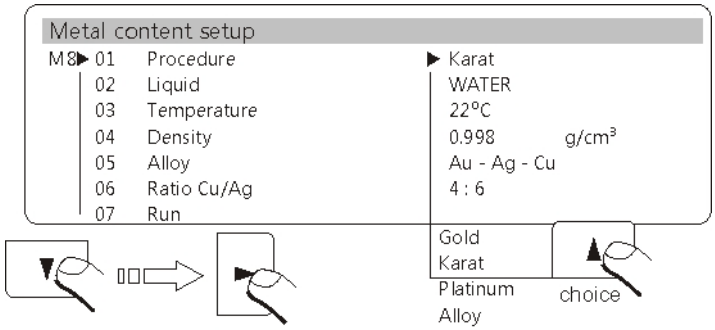
Liquid
Select liquid to be used in the measuring process: distilled water, other liquid with determined density.

Temperature
The temperature value is determined using an external thermometer immersed in the liquid. The temperature value will be considered while calculating the carat content of pure gold.
In case the selected liquid is OTHER enter its density value to balance memory.
If the balance is connected with an external thermometer TB-2 series then its software automatically acquires temperature data from the thermometer. The temperature value is updated in real time. The temperature value is accompanied by a pictogram informing the user on automatic acquiring the temperature value from the plugged thermometer TB-2 series.

Density
Liquid density is dependent on temperature. In case of distilled water the density value is acquired from density tables saved in balance's memory. After specifying distilled water temperature its density is automatically updated.
In case of OTHER liquid the density value has to be entered manually.

Start
Initiate carat content testing process of pure gold.

3.3. CARAT CONTENT OF ALLOYED GOLD – MENU



Out
Alloy type:

- Gold alloyed with silver and copper (mode Au – Ag - Cu),
- Gold alloyed with copper (mode Au - Cu),
- Gold alloyed with silver (mode Au – Ag).

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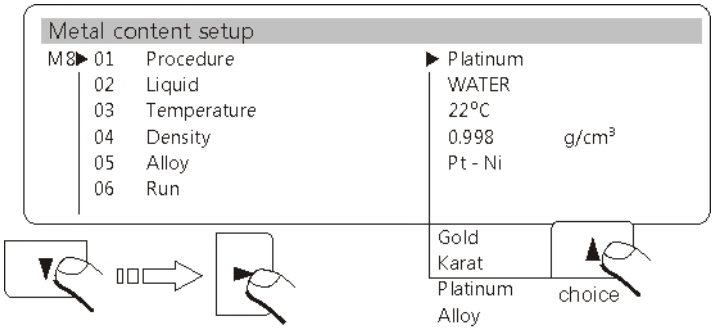
% ratio of copper and silver (refers to Au – Ag - Cu mode only).
Available settings – 4:6, 5:5, 6:4, 7:3.

Other mode settings are coherent with the <Gold> procedure.

3.4. PLATINUM CLASS – MENU



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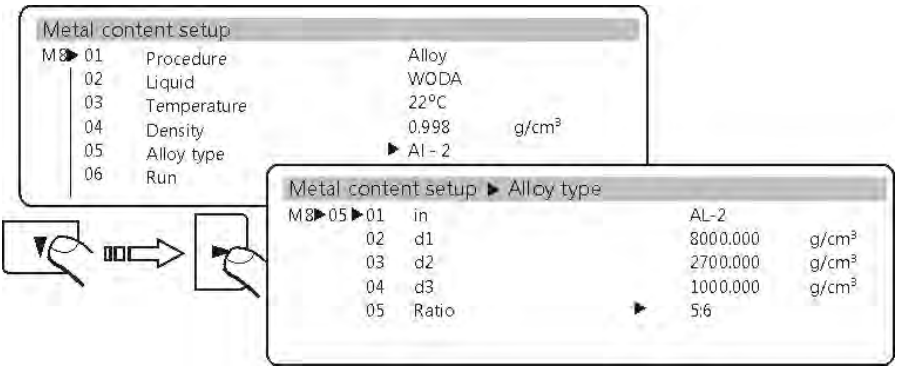
Alloy type:

- Platinum alloyed with nickel (mode **Pt - Ni**),
- Platinum alloyed with palladium (mode **Pt - Pd**),

Other mode settings are coherent with the <Gold> procedure.

3.5. CONTENT OF MAJOR ALLOY COMPONENT – MENU



In – alloy type:

Alloy type	ALL-2	Metal alloy selection (ALL-2: 2-component alloy, ALL-3: 3-component alloy)
d1	-	Density of major metal in an alloy
d2	-	Density of second metal in an alloy
d3	-	Density of third metal in an alloy. Refers to ALL-3 alloy only.
Ratio	5 : 5	% ratio of secondary alloy constituents. Refers to ALL-3 mode only. Available values – 4:6, 5:5, 6:4, 7:3, 8:2

Other mode settings are coherent with the <Gold> procedure.

3.6. DECLARING WATER TEMPERATURE

When the software calculates density of a tested sample, it takes into account data on density of liquid in which the tested sample is weighed. Liquid density is dependent on its temperature. In case of distilled water the density value is acquired from density tables implemented in the balance software (see below table). After specifying water temperature its density is automatically updated and used for the calculation.

°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0	0.99984	0.99990	0.99994	0.99996	0.99997	0.99996	0.99994	0.99990	0.99985	0.99978
10	0.99970	0.99961	0.99949	0.99938	0.99924	0.99910	0.99894	0.99877	0.99860	0.99841
20	0.99820	0.99799	0.99777	0.99754	0.99730	0.99704	0.99678	0.99651	0.99623	0.99594
30	0.99565	0.99534	0.99503	0.99470	0.99437	0.99403	0.99368	0.99333	0.99297	0.99259
40	0.99222	0.99183	0.99144	0.99104	0.99063	0.99021	0.98979	0.98936	0.98893	0.98849
50	0.98804	0.98758	0.98712	0.98665	0.98618	0.98570	0.98521	0.98471	0.98422	0.98371
60	0.98320	0.98268	0.98216	0.98163	0.98110	0.98055	0.98001	0.97946	0.97890	0.97834
70	0.97777	0.97720	0.97662	0.97603	0.97544	0.97485	0.97425	0.97364	0.97303	0.97242
80	0.97180	0.97117	0.97054	0.96991	0.96927	0.96862	0.96797	0.96731	0.96665	0.96600
90	0.96532	0.96465	0.96397	0.96328	0.96259	0.96190	0.96120	0.96050	0.95979	0.95906

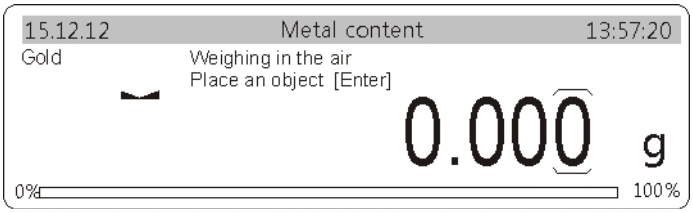
If a balance is connected with an external thermometer TB-2 series then its software automatically acquires temperature data from the thermometer. The temperature value is updated in real time. The temperature value is accompanied by a pictogram informing the user on automatic acquiring the temperature value from the plugged thermometer TB-2 series.

4. TESTING CARAT CONTENT OF PURE GOLD

Testing mode <**GOLD>** enables checking the purity of gold for the carat content from 9.0K (37.5% of pure gold) to 24.0K (100% of pure gold).

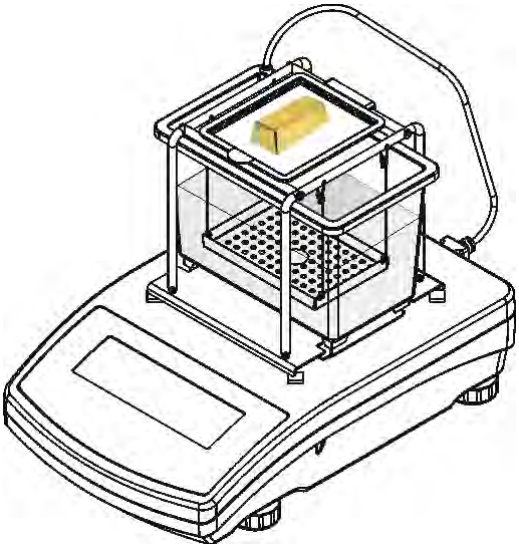
Testing procedure:

- Select mode **<GOLD>** which opens the main window of the working mode:

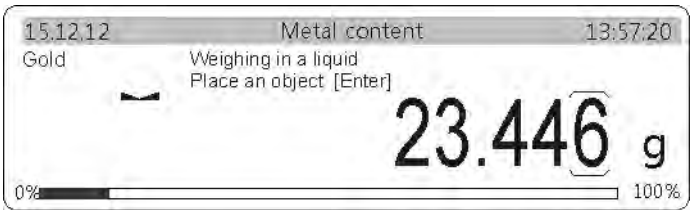


- If the indicated mass value is other than zero press Esc →0/T← button (zeroing function).

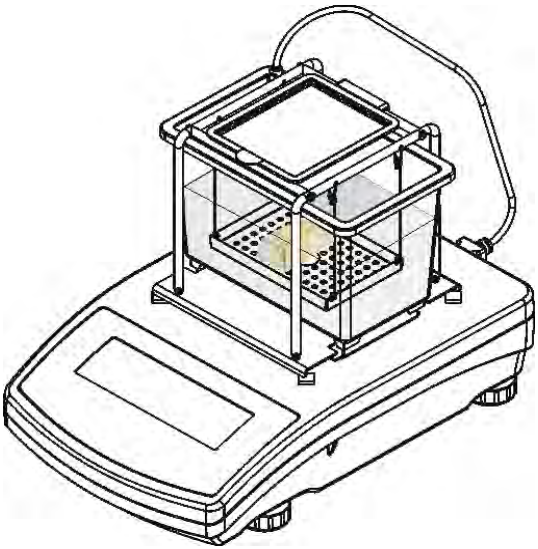
- Place the sample to be tested on the pan assembly (weighing in the air) and on stabilization of measuring result press button,



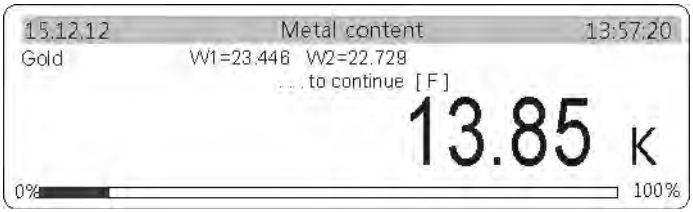
- The texts on the display change and indicate the following command:



- Unload the tested sample from the pan assembly,
- As the mass indication returns to **ZERO** place the tested sample on the grill pan located in the container and immersed in the liquid (weighing in liquid). On stabilization of measuring result press button,



- The texts on the display change and inform on finishing the testing process with simultaneous displaying the carat content of tested gold:



After completing the testing procedure the balance automatically sends a report with process summary and measurement result to be printed on a connected printer.

Multiple pressing of  button enables repeated printing of the report.

5. TESTING CARAT CONTENT OF ALLOYED GOLD

Testing mode **<KARAT>** enables checking one of three gold alloys:

- Gold alloyed with silver and copper (mode Au – Ag - Cu),
- Gold alloyed with copper (mode Au – Cu),
- Gold alloyed with silver (mode Au – Ag).

Mode local settings

Before starting the measuring process set testing mode parameters:

No.	Parameter name	Initial settings	Description
4.3.1	Alloy	Au – Ag - Cu	Select alloyed gold (Au – Ag - Cu: gold / copper / silver; Au – Cu: gold / copper; Au – Ag: gold / silver)
4.3.2	Ratio Cu/Ag	7 : 3	% ratio of copper and silver (refers to Au – Ag - Cu alloy only). Available values – 4:6, 5:5, 6:4, 7:3

Alloyed gold density table

The table represents the density value of alloy minor constituents dependent on gold carat content in the tested sample:

Gold caratage [K]	Content %	Alloyed metal density [g/cm^3]			Sample density range [g/cm^3]
		Copper and silver	Copper	Silver	
24	100 / 100	19.32	19.32	19.32	19.13 ~ 19.51
22	91.6 / 100	17.73	17.63	18.06	17.45 ~ 18.24
20	83.4 / 100	16.42	16.19	16.94	16.03 ~ 17.11
18	75.0 / 100	15.24	14.99	15.96	14.84 ~ 16.12
14	58.4 / 100	13.38	13.04	14.30	12.91 ~ 14.44
10	41.7 / 100	11.91	11.54	12.96	11.42 ~ 13.09

Testing procedure

- Select procedure **<CARAT>** which opens the main window of the working mode:
- If the indicated mass value is other than zero press 

button (zeroing function).
- Place the sample to be tested on the pan assembly (weighing in the air) and on stabilization of measuring result press  button,
- Unload the tested sample from the pan assembly,
- As the mass indication returns to **ZERO** place the tested sample on the grill pan located in the container and immersed in the liquid (weighing in liquid). On stabilization of measuring result press  button,
- A window on testing process completion is displayed,
- After completing the testing procedure the balance automatically sends a report with process summary and measurement result to be printed on a connected printer.
- Multiple pressing of  button enables repeated printing of the report.

6. TESTING PLATINUM CLASS

Testing mode <**PLATINUM>** enables checking one of two platinum alloys:

- Platinum alloyed with nickel (mode **Pt - Ni**),
- Platinum alloyed with palladium (mode **Pt - Pd**),

Mode local settings

Before starting the measuring process set testing mode parameters:

No.	Parameter name	Initial settings	Description
4.4	Alloy	Pt - Ni	Testing alloyed platinum – alloy selection (Pt - Ni: platinum / nickel; Pt - Pd: platinum / palladium)

Alloyed platinum density table

The table represents the density value of alloy minor constituents dependent on platinum class in the tested sample:

Platinum class [PT]	Content %	Alloyed metal density [g/cm^3]		Sample density range [g/cm^3]
		Nickel	Palladium	
1000	100 / 100	21.45	21.45	21.24 ~ 21.66
950	95.0 / 100	20.04	20.64	19.84 ~ 20.85
900	90.0 / 100	18.80	19.88	18.61 ~ 20.08
850	85.0 / 100	17.71	19.18	17.53 ~ 19.38
800	80.0 / 100	16.73	18.53	16.56 ~ 18.72
750	75.0 / 100	15.86	17.92	15.70 ~ 18.10

Testing procedure

- Select procedure **<PLATINUM>,** which opens the main window of the working mode:
- If the indicated mass value is other than zero press 

button (zeroing function).
- Place the sample to be tested on the pan assembly (weighing in the air) and on stabilization of measuring result press  button,

- Unload the tested sample from the pan assembly,
- As the mass indication returns to **ZERO** place the tested sample on the grill pan located in the container and immersed in the liquid (weighing in liquid). On stabilization of measuring result press  button,
- A window on testing process completion is displayed,
- After completing the testing procedure the balance automatically sends a report with process summary and measurement result to be printed on a connected printer.
- Multiple pressing of  button enables repeated printing of the report.

7. DETERMINING PERCENT CONTENT OF MAJOR ALLOY COMPONENT IN A TESTED SAMPLE

Testing mode <**ALLOY**> enables determining percent content of major metal in a 2-component or 3-component alloy.

Mode local settings

Before starting the measuring process set testing mode parameters:

No.	Parameter name	Initial settings	Description
4.5.1	Alloy type	ALL-2	Select alloyed metal type (ALL-2: 2-component alloy, ALL-3: 3-component alloy)
4.5.2	d1	-	Density of major metal in an alloy
4.5.3	d2	-	Density of second metal in an alloy
4.5.4	d3	-	Density of third metal in an alloy. Refers to ALL-3 alloy only.
4.5.5	Ratio	5 : 5	% ratio of secondary alloy constituents. Refers to ALL-3 mode only. Available values – 4:6, 5:5, 6:4, 7:3, 8:2

Testing procedure

- Select mode **<ALLOY>**, which opens the main window of the working mode:
- If the indicated mass value is other than zero press 

button (zeroing function).
- Place the sample to be tested on the pan assembly (weighing in the air) and on stabilization of measuring result press  button,
- Unload the tested sample from the pan assembly,
- As the mass indication returns to **ZERO** place the tested sample on the grill pan located in the container and immersed in the liquid (weighing in liquid). On stabilization of measuring result press  button,
- A window on testing process completion is displayed,

- After completing the testing procedure the balance automatically sends a report with process summary and measurement result to be printed on a connected printer.
- Multiple pressing of  button enables repeated printing of the report.

8. TYPICAL REPORT TEMPLATES

Carat content
Procedure: Gold

Air.: 101.8[1] g
Liquid: 99.7[3] g
Temperature: 22 °C
Density: 19.36 g/cm3
Volume: 2.08 cm3
Percent: 100.00 %
Carat content: 24.00 K

Carat content
Procedure: Carat K-2 Au – Cu

Air.: 217.1[7] g
Liquid: 199.9[7] g
Temperature: 22 °C
Density: 12.60 g/cm3
Volume: 17.24 cm3
Percent: 54.14 %
Carat content: 12.99 K

Carat content
Procedure: Platinum Pt - Ni

Air.: 210.0[0] g
Liquid: 199.9[9] g
Temperature: 22 °C
Density: 20.93 g/cm3
Volume: 10.03 cm3
Percent: 98.25 %
PT class: 982.46 PT

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