User Manual

Metal Purity Tester WTB/AU

User manual no.:
ITKU-78-04-09-12-A

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1. INTENDET USE

Laboratory balances **WTB/AU** series, featuring special design of the container and dedicated software, allow for density determination of metals. Application of the density determining method provides the following options:

- Determination of carat value of gold,
- Density determination of platinum,
- Density determination of other metals.

The software enables distinguishing precious metals from counterfeited by density determination of a sample.

The standard design of the balances, includes temperature sensor TB-1, which is used for temperature measurement of the liquid.

Additional functions:

- Measuring units: [g], [oz],
- Supplementary units: [K], [cm^3], [g/cm^3], [oz/gal], [°C], [°F], [%],
- autozero function,
- setting baud rate,
- continuous data transmission for RS 232,
- automatic operation for RS 232,
- designating minimum mass for function operation,
- automatic tare,
- memory of tare,
- manual inserting of tare value,
- automatic scale switch-off,
- user adjustment,
- display backlight.

2. PRECAUTIONS

2.1. Maintenance

A. Before first use of the balance, it is highly recommended to carefully read this User Manual, and operate the balance as intended.

B. Balances to be decommissioned, should be decommissioned in accordance to valid legal regulations.

2.2. Accumulator / battery pack

Balances **WTB** are devices designed to be powered from **NiMH** batteries (nickel-metal-hydrogen) with rated voltage of **1.2V**, size **R6** and capacities from **1800** to **2800 mAh** charged while plugged to mains without stopping operation.

A balance plugged to mains continuously monitors the battery status and charges it if necessary. After sudden power failure from the mains, the balance automatically switches to accumulator without breaking operation.

In case of an elongated storage period in low temperatures, it is not allowed to fully discharge the batteries which are instrument's standard equipment.

A worn out accumulator can be exchanged to a new one by the authorized service of the manufacturer.

The equipment including accumulators does not belong to your regular household waste. The European legislation requires that electric and electronic equipment be collected and disposed separately from other communal waste with the aim of being recycled.

Notice:
Some symbols on accumulators identify harmful elements/compounds:
Pb = lead,
Cd = cadmium,
Hg = mercury.

3. WARRANTY CONDITIONS

A.   RADWAG feels obliged to repair or exchange all elements that appear to be faulty by production or their construction,

B.   Defining defects of unclear origin defects and means of their elimination can only be realized with assistance of manufacturer and user representatives,

C.   RADWAG does not bear any responsibility for defects, losses or accidents resulting from unauthorized or inadequate performing of production or service processes,

D.   Warranty does not cover:

- Mechanical defects caused by product exploitation other than intended, defects of thermal and chemical origin, defects caused by lightning, overvoltage in the power network or other random event,
- Balance defects if it is utilized contrary to its intended use,
- Balance defects, if service claims removing or destroying product's protective stickers which protect the balance's housing against unauthorized access.
- Mechanical defects or defects caused by liquids and natural wear,
- Balance defects caused by inappropriate setting of a defect of electric power network,
- Defects caused by overloading balance's mechanical measuring system,
- Maintenance activities (cleaning).

E.   Loss of warranty takes place if:

- A repair is carried out outside RADWAG sales office or authorized service point,
- Service claims intrusion into mechanical or electronic construction by unauthorized people,
- Other version of the operating system is installed in a balance,
- The balance does not bear company's protective stickers.

F.   Detailed warranty conditions are listed on a service card.

4. MAIN DIMENSIONS
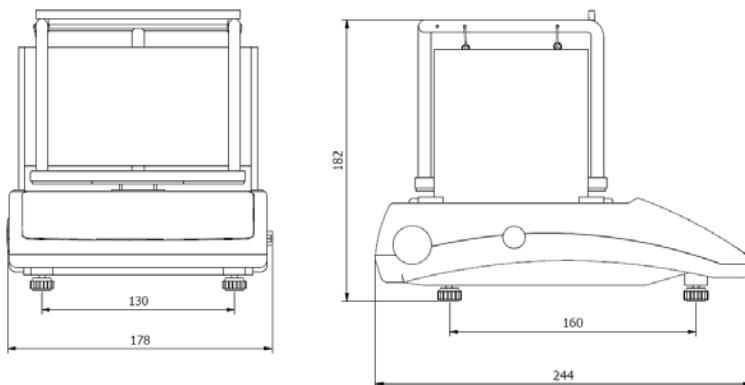
Dimensions of balance WTB/AU series

5. UNPACKING AND ASSEMBLY

   A.   Carefully remove the balance from its packaging,

   B.   Remove the transport protections:
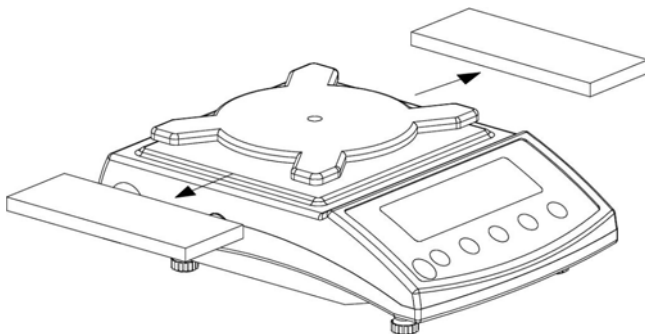
   C.   Gently place the balance in its intended place of use, on an even
        and hard foundation and distant from heat sources,

   D.   Insert the ends of connecting strings of the openwork weighing
        platform (fig. 2) into the openings of the pan's cover plate (fig. 1):
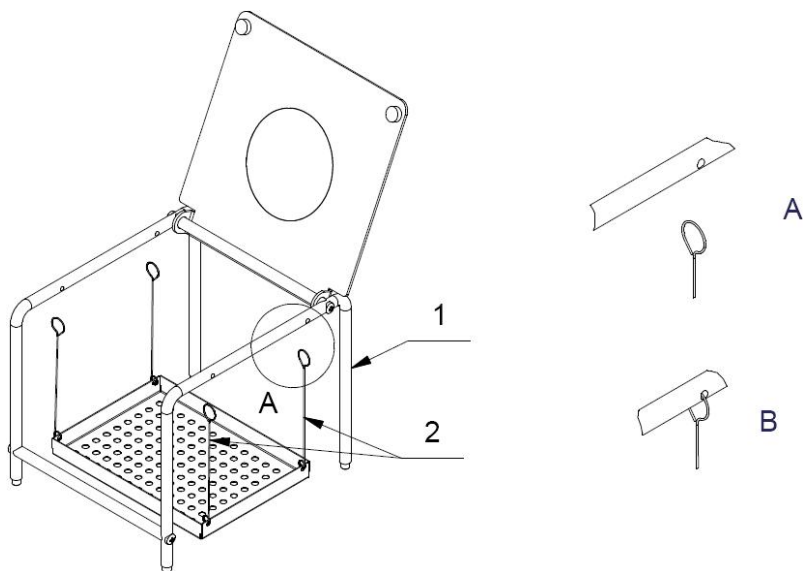
E. Assembly balance components in the following sequence: the basis (fig.4) positioned between the locators (fig.5), and then container for test liquid (fig.3):
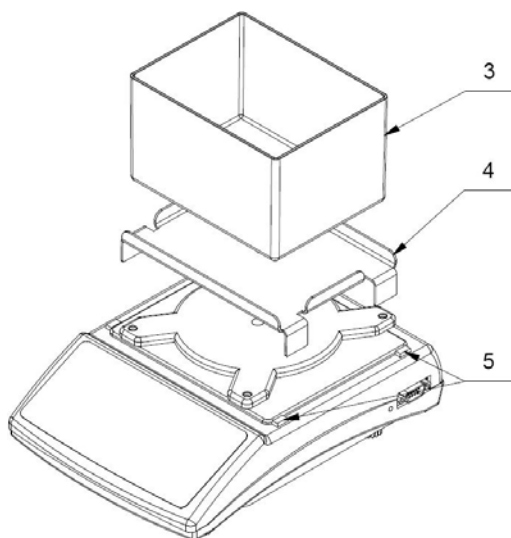
F. Assembly the previously prepared pan's cover plate with installed openwork weighing platform.
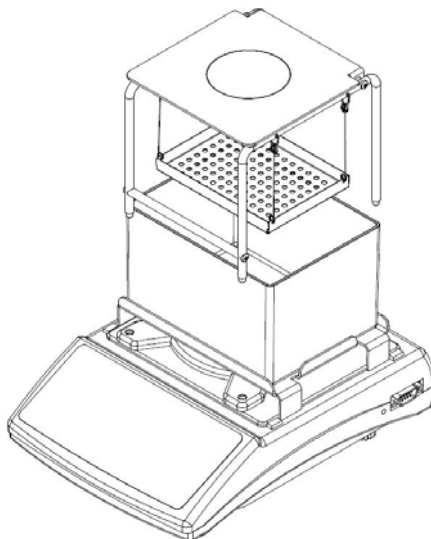
G. Install temperature sensor TB-1 of the liquid:

TB-1 Thermometer

Thermometer clip TB-1-1
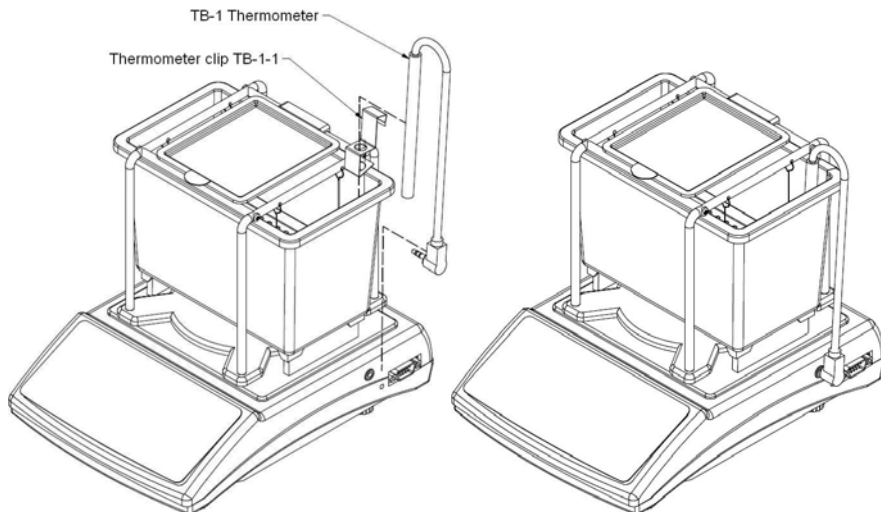
6. START-UP

- After balance unpacking and assembling, the balance has to be leveled. Use balance's adjustable feet and the level located on balance's overlay to level the balance. Screw adjustable feet in a way to set the air bubble of the level in its central location.

level - OK   level incorrect

- Switch on the balance by pressing the [⓪] key – press and hold the key for about 1 sec,

- On switching on, wait until the balance test is completed,

- On test completion, the balance displays **zero indication** and the following pictograms:

$\mathbf{\cdot 0 \cdot}$ - zero indication

◣◢ - stable result

kg - measuring unit

- If the indication is other than zero press ⊙ key.

7. WARM UP PERIOD

- Proper operation of a balance requires ambient temperature
  +15°C ÷ +30°C;
- On switching on the balance, the warm up period (thermal
  stabilization) takes approximately 60 minutes;
- During thermal stabilization period, display indications may change;
- User should adjust the balance after the warm-up period.
- Changes in ambient temperature and humidity during operation can
  cause errors of indications, and they can be removed by carrying out
  adjustment process.

8. KEYBOARD
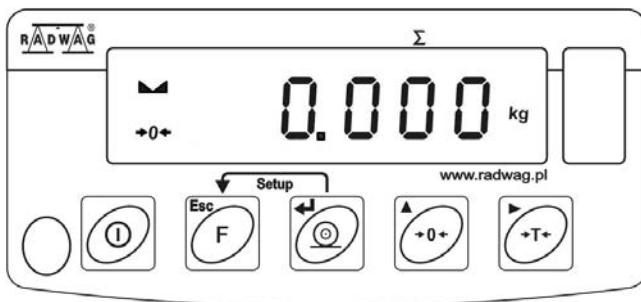
Keyboard of balance WTB/AU series

9. **FUNCTION KEYS**

Switching on/off – press and hold the key for approximately 1 second

Function key (selection of working mode)

Measurement acceptance
Sending a weighing result to RS232 output

Zeroing

Tarring

Caution:

Simultaneous pressing of F + ⏎ *keys, causes change in functioning of the specific keys. The way of their operation is described in details further in this manual.*

10. **DISPLAY INDICATIONS**
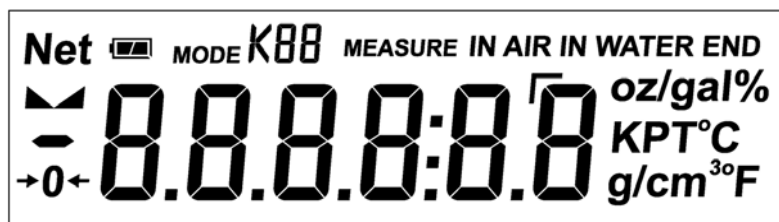
Display of WTB/AU series

No	Text string	Description
1.	*Net*	Balance tarred
2.	→0←	Balance in autozero zone (indication = precise zero)
3.	◣◢	Stable measurement result (result ready for reading)
4.	⬤	Negative (with minus sign) measurement result
5.	🔋	Battery indicator
6.	MODE K88	Indicator of active working mode
7.	**MEASURE**	Weighing status
8.	**IN AIR**	Weighing in the air
9.	**IN WATER**	Weighing in liquid (water)
10.	**END**	Process completed
11.	**oz/gal**	Measuring unit: density
12.	**g/cm³**	Measuring unit: density
13.	**%**	Gold caratage (Percent content of tested metal)
14.	**K**	Proportion of fine gold in an alloy
15.	**PT**	Platinum class
16.	**°C**	Liquid (water) temperature in [°C]
17.	**°F**	Liquid (water) temperature in [°F]
18.	Γ	Last digit marker

11. USER MENU

11.1. Submenus

User's menu is divided into **6** basic submenus. Each group has its own characteristic name preceded by capital letter **P** and a number.

No	Parameter name	Default settings	Description
P1	**rEAd**	**-**	**Mains parameters**
1.1	Fil	3	Setting a filtering level
1.2	Auto	YES	Control of balance's zero indication
1.3	tArA	no	Enabling / Disabling tare function
1.4	Fnnd	YES	Median filter
P2	**Prnt**	**-**	**RS 232 parameters setting**
2.1	Pr_n	StAb	Printout type
2.2	S_Lo	-	Minimal mass threshold
2.3	bAud	9600	Baud rate
2.4	S_rS	8d1SnP	Serial transmission parameters
P3	**Unit**	**-**	**Supplementary unit settings**
3.1	StUn	g	Change of measuring unit: [g] or [oz]
3.2	FLUn	°C	Change of liquid (water) temperature unit: [°C] or [°F]
P4	**Func**	**-**	**Working modes**
4.1	tnnP	-	Declaring liquid (water) temperature in [°C]
4.2	dEnS	-	Declaring solution density in [g/cm^3]
4.3	F-K	-	Testing gold alloy
4.3.1	out	K-1	Selecting gold alloy (K-1: gold / copper / silver; K-2: gold / copper; K-3: gold / silver)
4.3.2	rtK	7 : 3	Copper and Silver % ratio
4.4	F–P	P-1	Testing platinum alloy – alloy selection (P-1: platinum / nickel; P-2: platinum / palladium)
4.5	F-A	-	Testing metal alloy
4.5.1	in	ALL-2	Selecting metal alloy (ALL-2: 2-component alloy; ALL-3: 3-component alloy)
4.5.2	d1	-	Density of the main metal in an alloy
4.5.3	d2	-	Density of the subsidiary (secondary) metal in an alloy
4.5.4	d3	-	Density of the subsidiary (third) metal in an alloy
4.5.5	rtA	5 : 5	% ratio of subsidiary metal in an alloy
P5	**othr**	**-**	**Other parameters**
5.1	bL	Auto	Backlight function (power supply from mains)
5.2	bLbt	70	Backlight function (power supply from batteries)
5.3	bEEP	YES	Beep sound on pressing keys
5.4	t1	Auto	Power save – balance switch off if not operated
5.5	CHr6	YES	Battery charging mode
P6	**CAL**		**User adjustment**
6.1	St_u	-	Determining start mass
6.2	uCAL	-	Balance adjustment

11.2. Moving through user menu

The user moves in the menu by balance's keyboard keys.

11.2.1. Keyboard

Keys	Function
F + ⏎	Entering main menu
F	Selecting working mode Leaving a function without saving changes Moving one level "up" in menu structure
→0← + →T←	Manual inserting tare value in weighing mode Change of digit value by "1" up Scrolling the menu upwards
F + →T←	Check battery status
⏎ + →T←	Toggling between gross / net values
F + →0←	Previewing temperature value
→0←	Changing working mode Selecting a parameter on one menu level Changing the value of an active parameter
→T←	Entering a selected submenu Activating a parameter for modification
⏎	Accepting carried out changes

11.2.2. Return to weighing mode

⚠ The changes made in balance's memory will be permanently saved on returning to weighing mode with procedure of saving changes. Press 🄵 key for several times, until the display indicates **<SAuE?>** communicate. Then press:

⏎ – to save changes or 🄵 – to leave without changes. Pressing one of the above keys causes automatic return to weighing mode.

12. MAIN PARAMETERS

Users can adjust the scale to ambient conditions at a workstation (filtering level) or user needs (autozero operation, tare memory). The parameters are located in submenu **<P1.rEAd>**.

12.1. Setting filtering level

Procedure:

- Enter the submenu **<P1.rEAd>** and then:
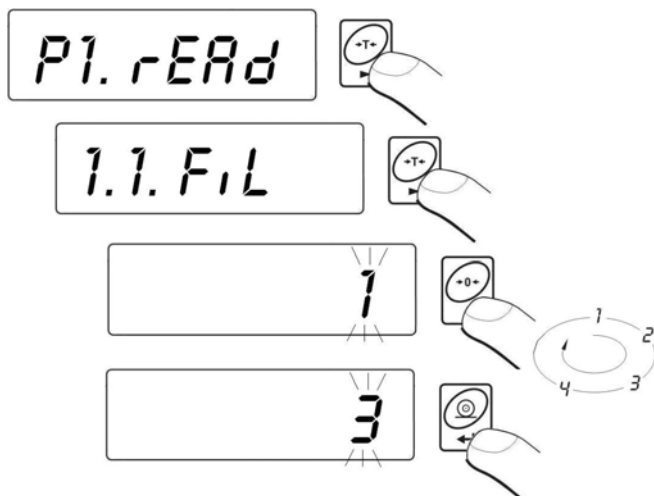
1 - 4   - available filtering level settings

- By pressing ⊙ select required filtering level.

Return to weighing:
        See point – 11.2.2.

Caution:
Filtering level influences stabilization time of a balance.
The higher the filtering level is the longer stabilization time.

12.2. Autozero function

The autozero function has been implemented in order to assure precise indications of a balance. This function controls and corrects **"0"** indication. If enabled, the function continuously compares the results with constant frequency. If two sequential results differ less than the declared value of autozero range, then the balance is automatically zeroed and the pictograms ▬◢ and →0← appear on the displayed.

When AUTOZERO is disabled zero indication is not corrected automatically. However, in particular cases, this function can disrupt the measurement process e.g. slow pouring of liquid or powder on the weighing pan. In this case, it is advisable to disable the autozero function.

Procedure:

- Enter the submenu **<P1.rEAd>** and then:
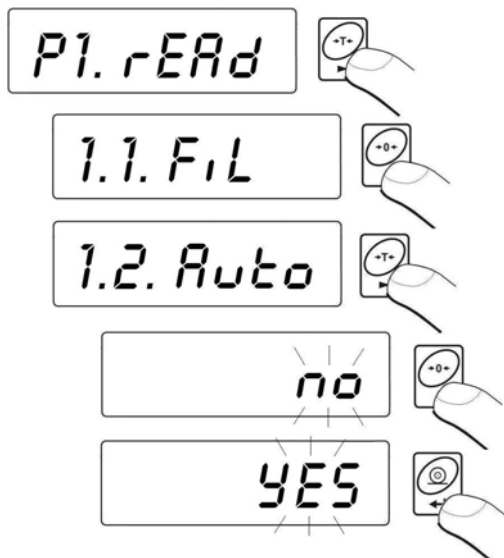
AUTOno	- autozero disabled
AUTOYES	- autozero enabled

Return to weighing:
See - 11.2.2.

12.3. Tare function

This parameters enables the user to configure the tare function.

Procedure:

- Enter the submenu **<P1.rEAd>** and then:
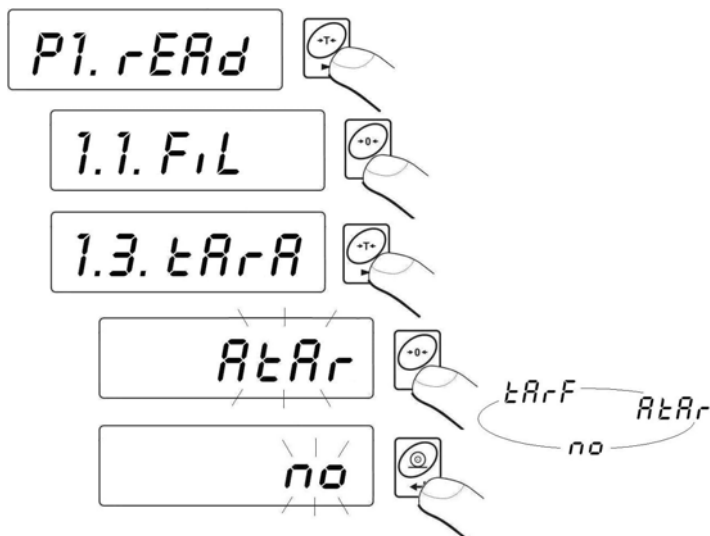
tArA	AtAr	-	**automatic tare function enabled** and tare value is stored in balance memory if unplugged from mains
tArA	no	-	**Standard tare mode** (tarring by pressing ⊙ key);
tArA	tArF	-	**tare memory function** – stores last value of tare in balance memory. It is automatically displayed after starting the balance. Value of tare is displayed with minus sign, and there is **Net** pictogram indicated on the display.

Return to weighing:
        See - 11.2.2.

12.4. Median filter

This filter eliminates short changes (impulses) of measuring signal caused by sudden shocks.

Procedure:

- Enter the submenu **<P1.rEAd>** and then:
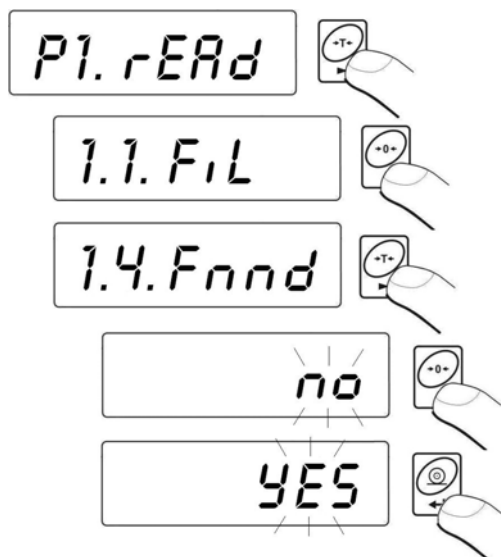
Fnnd	**no**	- filter disabled
Fnnd	**YES**	- filter enabled

Return to weighing:
See - 11.2.2.

13. RS 232 PARAMETERS

External devices connected to RS 232C have to be supplied from the same mains and common electric shock protection. It prevents from appearing a potential difference between zero leads of the two devices. This notice does not apply to the devices that do not use zero leads.

Transmission parameters:

- Baud rate - 2400 ÷ 38400 bit / s
- Data bits - 7,8
- Stop bits - 1,2
- Parity control - no, even, odd

There are four ways of sending data via RS232 interface:

- **Manual** – after pressing key,
- **Automatic** – after stabilizing the indication above **-LO-** threshold
- **Continuous** – after it is enabled in parameter or by a command sent via RS232
- **On external request** - see – "Communication protocol – commands sent from a computer".

The indication can be sent as:

- **stable –** the indication is sent after the balance indication is stabilized.

- **any** – the indication is sent immediately after pressing the key, this state is marked with **<?>** indication in the printout.

13.1. Printout type

This parameter enables selecting type of printout.

Procedure:

- Enter the submenu **<P2.Prnt>** and then:
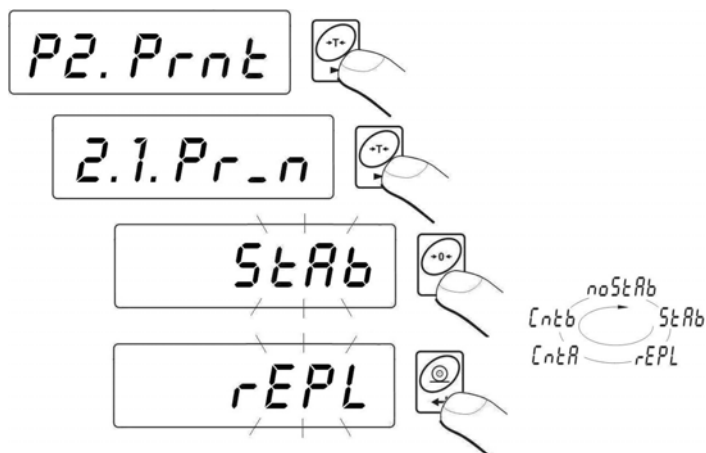
Pr_n	**noStAb**	-	immediate printout
			(not accessible in verified balances)
Pr_n	**StAb**	-	sending stable measurement result
Pr_n	**rEPL**	-	automatic operation
Pr_n	**CntA**	-	continuous transmission in basic measuring
			unit
Pr_n	**Cntb**	-	continuous transmission in current measuring
			unit

Return to weighing:
> *see 11.2.2.*

13.2. Minimal mass threshold

This function is necessary while working with **automatic tare** or **automatic operation** mode.

Automatic tare will not be applied until the indication (gross value) is lower than the value set in **S_Lo** parameter.

In automatic operation measurements (net value) are sent via RS232 when the indication is equal or greater than the value set in **S_Lo** parameter.

Procedure:

- Enter the submenu **<P2.Prnt>** and then:
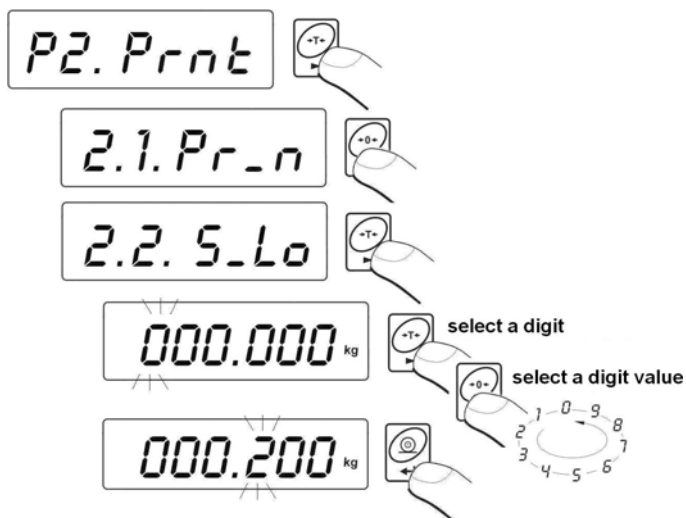
Return to weighing:
see 11.2.2.

13.3. Baud rate

Procedure:

- Enter the submenu **<P2.Prnt>** and then:
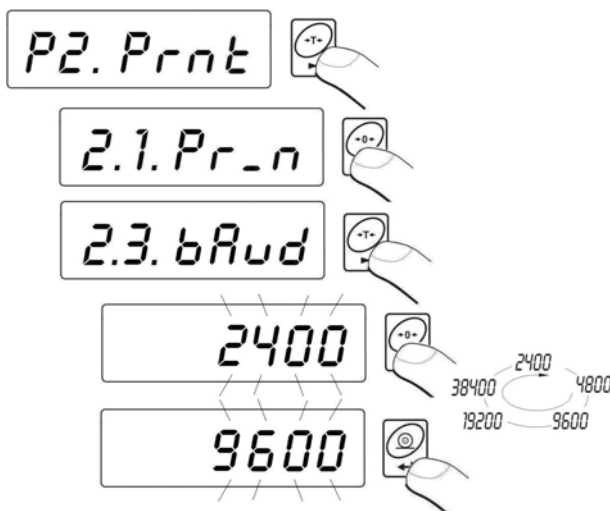
Return to weighing:
see 11.2.2.

13.4. Serial transmission parameters

Procedure:

- Enter the submenu **<P2.Prnt>** and then:
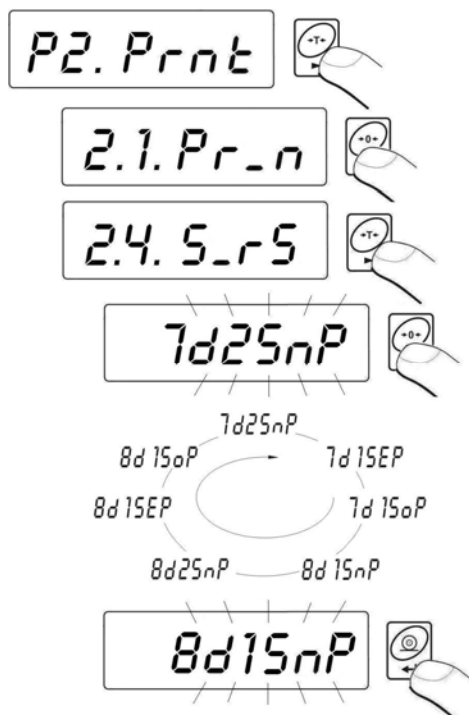
7d2SnP - 7 data bits; 2 stop bits, no parity control
7d1SEP - 7 data bits; 1 stop bit, EVEN parity control
7d1SoP - 7 data bits; 1 stop bit, ODD parity control
8d1SnP - 8 data bits; 1 stop bit, no parity control
8d2SnP - 8 data bits; 2 stop bits, no parity control
8d1SEP - 8 data bits; 1 stop bit, EVEN parity control
8d1SoP - 8 data bits; 1 stop bit, ODD parity control

Return to weighing:
See 11.2.2.

14. SETTING SUPPLEMENTARY UNITS

The balance enables setting the following supplementary units:

- Measuring unit: grams [g] or ounces [oz],
- Liquid (water) temperature unit: [°C] or [°F].

Changes of supplementary units are carried out in submenu **<P3.Unit>**.

The procedure of changing the measuring unit:

- Enter the submenu **<P3.Unit>** and then:

$$P3. \; Unit$$

$$3.1. \; StUn$$

$$0.000 \; g$$
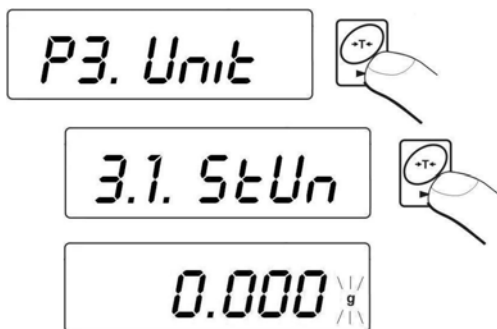
- Measuring units are changed by pressing ⌖ key:

$$0.000 \; g$$

- Accept changes by pressing ⌖ key and exit to weighing mode with saving inserted changes.

The procedure of changing liquid (water) temperature unit:

- Enter the submenu **<P3.Unit>** and then:
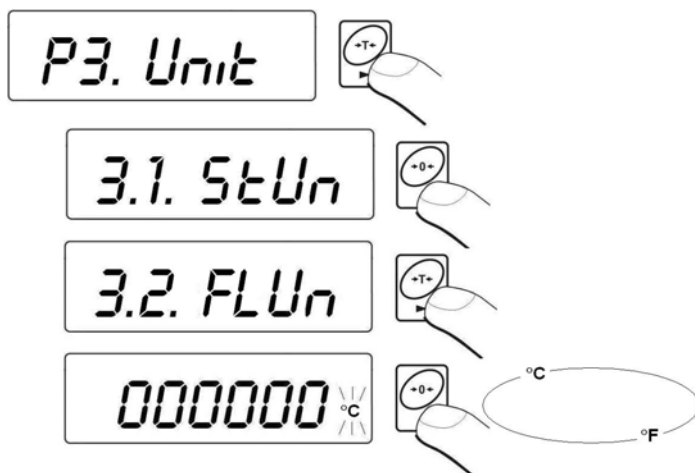
- Accept changes by pressing ⌾ key and exit to weighing mode with saving inserted changes.

15. OTHER PARAMETERS

The balance enables setting parameters which have impact on balance operation. The parameter are grouped in submenu **<P5.othr>**, including such options as: e.g. backlight and beep signal.

Enter the submenu **<P5.othr>** according to chapter 11.2.

15.1. Backlight function

Program recognizes the means of balance supply (mains or battery) and automatically selects the operating mode of backlight function:

   bl – from mains
   blbt – by batteries or rechargeable battery pack

15.1.1. Backlight if supplied from mains

Procedure:

- Enter the submenu **<P5.othr>** and then:
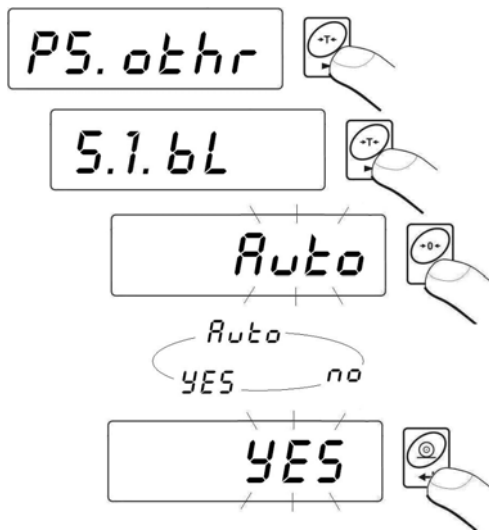
bL	**no**	-	backlight disabled
bL	**YES**	-	backlight enabled
bL	**Auto**	-	backlight disabled automatically if indication is stable for about 10 seconds

Return to weighing:
See 11.2.2.

Notice:
When bl=Auto, and the indication has not changed for 10s, the backlight is automatically disabled. The backlight is automatically enabled on change of mass indication on the display.

15.1.2. Backlight if supplied by batteries

The user can set backlight intensity between 0% to 100%.
The lower the intensity, the longer balance's operation time without recharging or exchanging the batteries. When the intensity is set to zero it functions in AUTO mode (described above).

Procedure:

- Enter the submenu **<P5.othr>** and then:
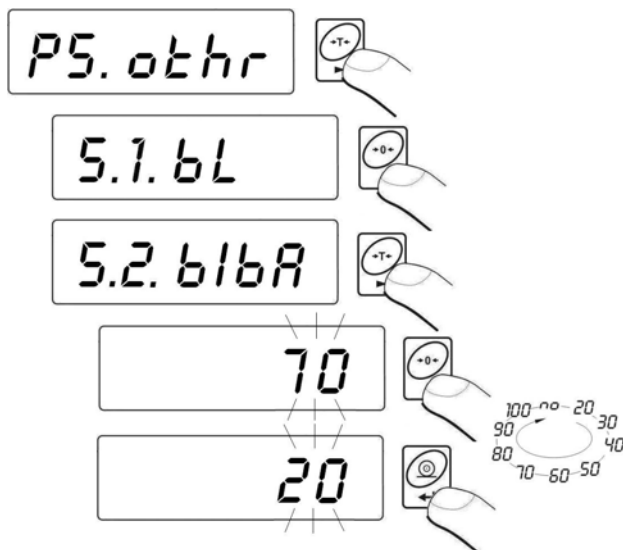
Return to weighing:
> *See 11.2.2.*

Notice:
The more intense the backlight, the shorter the balance operates on batteries.

15.2. "Beep" signal – balance reaction for pressing a function key

Procedure:

- Enter the submenu **<P5.othr>** and then:
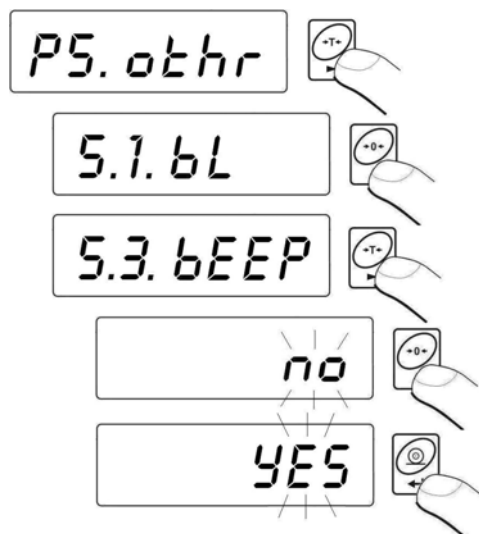
bEEP **no** - disabled
bEEP **YES** - enabled

Return to weighing:
> *See 11.2.2.*

15.3. Automatic switch-off

This function is essential for saving the battery power. The balance's display is switched off automatically if (function **t1 = YES**) no weighing appears within 5 minutes. (the mass indication does not change on the display). In case this function disrupts the operation (e.g. long lasting weighing procedure) or while working with balance plugged to mains, the function can be disabled.

Operation according to active power supply:

Setting	Operation	
	Mains	**Batteries/accumulator**
t1 = 0	disabled	disabled
t1 = YES	enabled	enabled
t1 = Auto *	disabled	enabled

* automatic enabling/disabling according to the source of power.

Procedure:

- Enter the submenu **<P5.othr>** and then:
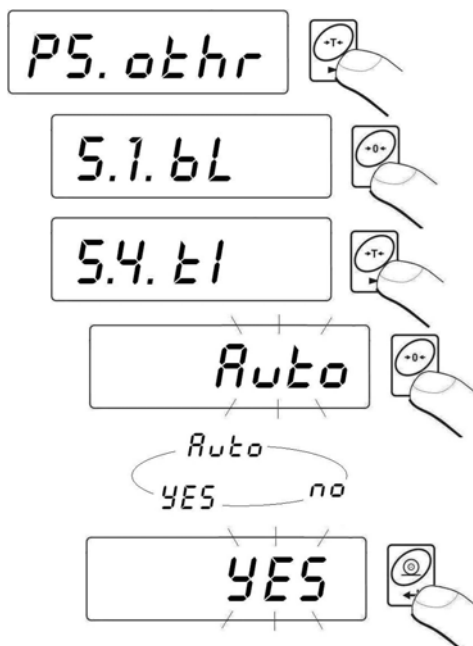
Returnto weighing:
> *See 11.2.2.*

15.4. Battery voltage level check

While supplying from batteries, the current voltage level is measured. Is the voltage becomes too low, it is signaled by pictogram 🔋 appearing on the display, and it denotes the need to charge the batteries / accumulators or exchange the batteries..

15.4.1. Checking the batteries

This function enables checking the level of power supply from batteries.
The option is enabled if:

- Weighing mode is enabled;
- Battery supply is enabled in balance parameters.

Procedure:
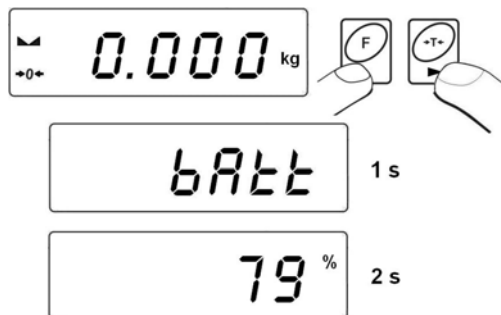
After displaying the charge level of batteries (in percentage) the software returns to weighing.

15.4.2. Battery discharge pictogram

The symbol (bat low) [battery low] switches on when the voltage level decreases to 18% of the accepted voltage level. In such case change or charge the batteries/accumulators.

Low level of batteries:

- Pictogram ▮▮ is visible on the display,
- If the batteries are not exchanged / charged, the balance will switch off automatically to protect against excessive batteries discharge,
- Charging is signaled by flickering pictogram ▮▮ (flickering interval is about 2 seconds) on the display.

15.4.3. Accumulator charging option

This function allows to switch to charging algorithm for **NiMH** batteries:

a) Parameter **<CHr6>** set to **<no>:**

- Pictogram ▭ does not appear, charging disabled.

- During software initializing, after turning on **„bAtt"**.

b) Parameter **<CHr6>** set to **<YES>:**

- Pictogram ▭ flickers slowly (interval about 2 seconds), charging is enabled.

- Message **„nImh"** appears on the display,

- In case of damaging accumulators or their absence, the pictogram ▭ flickers quickly (interval about 0.5 sec).

Caution:
Balance comes standard with a set of rechargeable batteries
NiMH R6 (AA) and a power adapter.

Procedure:

- Enter the submenu **<P5.othr>** and then:
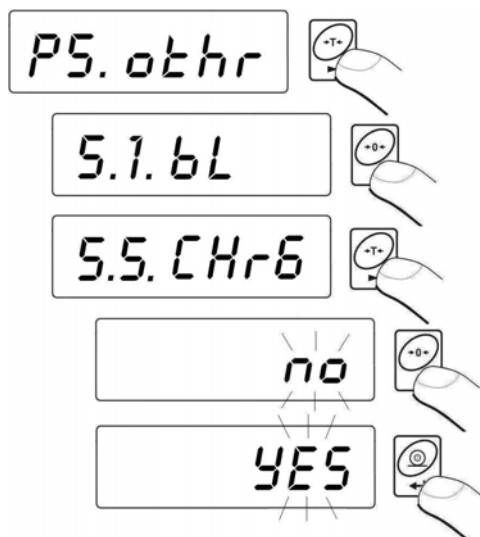
| CHr6 YES | - enabled |
| CHr6 no | - disabled |

Return to weighing:
> *See 11.2.2.*

15.4.4. Formatting rechargeable battery pack

The indicator features a brand new battery pack comprising NiMH R6 (AA) batteries and a power adapter. The batteries need formatting after first powering up. It is crucial for batteries lifetime to undertake this process. Formatting requires first full charging the batteries, followed by total discharging (without meantime charging).

 Procedure:

1. Supply the indicator from mains.
2. Charge batteries for 12 hours (charging time of 2200mAh batteries).
3. After 12 hours unplug from mains.
4. Use the device up to the moment of its automatic switch off due to low battery level.
5. Repeat the process of charging starting from point 1.

Caution:
Batteries reach their optimal capacity after three cycles of full charging and discharging.

16. WORKING MODES

Balance series **WTB/AU** feature the following working modes:

Symbol	Name
B	Weighing
G	Caratage (Testing carat content of pure gold)
K	Caratage (Testing carat content of gold alloy (gold with admixture of silver / copper / silver and copper)
P	Testing platinum class (platinum with admixture of nickel or admixture of palladium)
A	Determining percent content of main metal in a tested alloy (2 or 3 component alloys)
S	Determining density of other metals

Working modes are configurable in submenu **<P4.Func>**, which feature special functions enabling adjusting balance operation to user needs and requirements. The above described modes are described further in this user manual.

16.1. Working mode selection

While in the main window of the weighing mode press ⒡ key, which displays a message **<SELECt>** and flickering pictogram of active working mode:

Press ⓪ key to select required working mode and accept it by pressing ⓪ key. The software automatically returns to the main window.

16.2. Declaring liquid (water) temperature

Each working mode, except for **mode B** (Weighing), includes density of liquid (water) in relation to declared temperature (see below table).

°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

Declaring liquid (water) temperature is carried out in parameter **<P4.1.tnnP>**.

Procedure:

- Enter the submenu **<P4.Func>** and then:
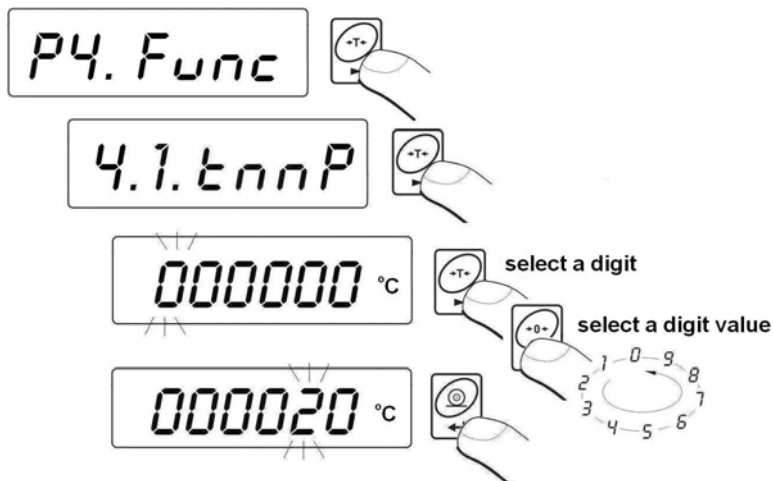
Return to weighing:
See 11.2.2.

16.3. Declaring density of liquid

In case the testing procedure applies liquid other than water (e.g. glycerin), it is possible to declare liquid's density in submenu **<P4.2.dEnS>**.

Caution:
*In case of declaring density of liquid in submenu **<P4.2.dEnS>**, the temperature of water declared in parameter **<P4.1.tnnP>** is neglected by the balance software.*

Procedure:

- Enter the submenu **<P4.Func>** and then:
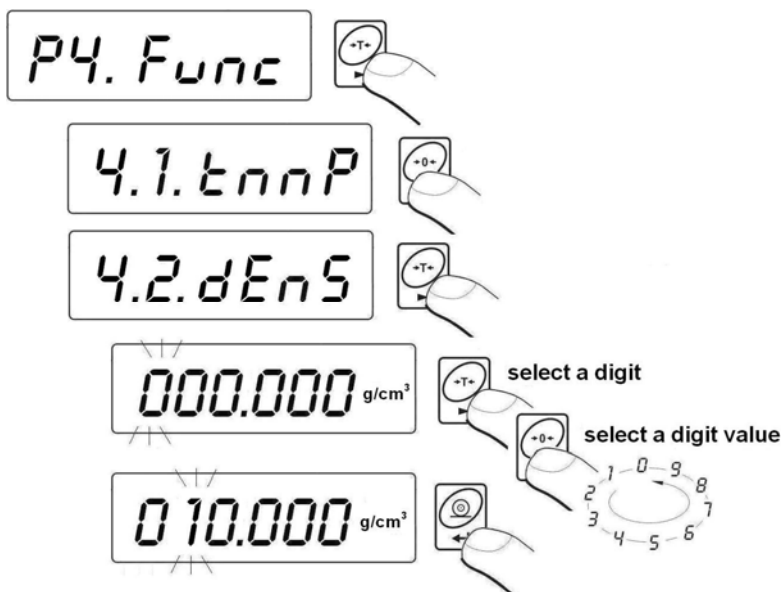
Return to weighing:
See 11.2.2.

16.4. Basic weighing process

16.4.1. Tarring

In order to determine the net mass load the packaging on balance's weighing pan.

After measurement stabilization press ⌖ key (**Net** pictogram is displayed in the upper left corner and zero mass indication appears).
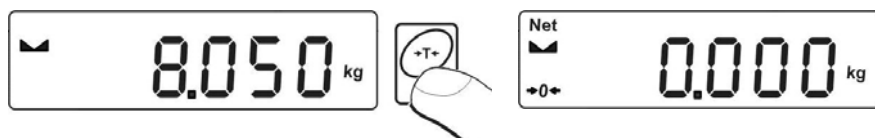
After placing a load on the weighing pan, the net mass is measured. Tarring is possible within the balance's whole measuring range. After unloading the weighing pan, the display indicates total tarred value with minus sign.
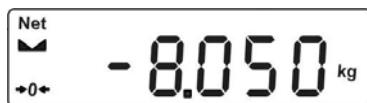
Caution:
Tarring cannot be carried out when a negative or zero value is being displayed. In such case message <Err3> appears on the display and short audible signal is emitted.

16.4.2. Inserting tare value

The balance enables manual inserting of tare value. While in weighing mode press:

- simultaneously ⬭ and ⬭ keys,
- the display indicates:
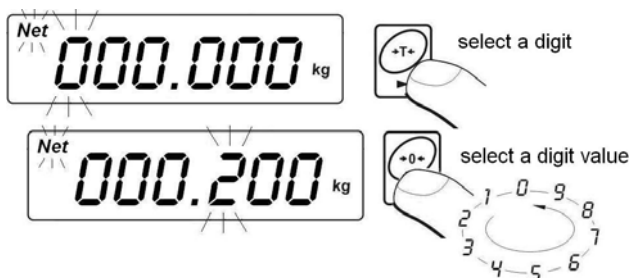
- Using ⬭ and ⬭ keys set **tare value**,
- Press ⬭ key,
- The software returns to weighing mode. The inserted tare value is visible on the display with **"–"** sign,
- Tare can be inserted anytime in weighing mode.

Caution:
It is not possible to insert a new tare value if tare value is already set in balance's memory and it is greater than zero. In such case, the display indicates an error <Err3> message and a short audible signal is emitted.

16.4.3. Zeroing

To **ZERO** the indication press: ⬚ key.

The balance's display shows mass indication equal to zero, and pictograms
$\rightarrow0\leftarrow$ and ◣◢ appear.
Zeroing is an activity equal to setting a new zero point, comprehended by
the balance as the precise zero point. Zeroing is accessible only with stable
display status.

Caution:
*Zeroing of display indication is possible only within the ±2% range from
balance's maximal capacity.*
*If zeroed value is more than the ±2% of balance's maximal capacity, the
display indicates <Err2> message and short audible signal is emitted.*

16.5. Weighing

It is the balance's standard working mode (marked as: **mode B**)
on the display, which enables carrying out regular weighing processes.

If the measurement result is other than zero – press ⬚ key (balance
zeroing).

Place weighed object on balance's weighing pan. As stability marker ◣◢
is displayed, read measurement result.

At the same time the weighing measurement can be printed on a

connected printer by pressing button ⬚ .

16.6. Testing carat content of pure gold

Working mode **MODE G** enables testing pure gold for its caratage from
9.0K (37.5% of gold content) to 24.0K (100% of gold content).

Procedure:

- Select working mode **<mode G>** in accordance with point 16.1 of this
  user manual. The main window of the working mode is displayed:

- If measurement result is other than zero press ⊙ key (balance zeroing).

- Load tested sample on the top weighing pan (weighing in the air, flickering command **IN AIR**) and on stabilization of measurement result press ⊚ key.

- Simultaneously the following command is displayed:

- Unload the tested sample from the top weighing pan,

- After the indication returns to **ZERO** place the tested sample in the container with liquid (water) (weighing in liquid, flickering command **IN WATER**) and on stabilization of measurement result press ⊚ key,

- Simultaneously, for approximately 2 seconds the software displays liquid's temperature value, and a window on process completion appears (message **END**):

- The following test results are displayed on pressing ⊙ key.

Test results:

- Gold caratage **[K]**,
- Percent content of gold in tested sample **[%]**,
- Density of tested sample **[g/cm³]**,
- Volume of tested sample **[cm³]**,
- Liquid temperature **[°C]**,
- Mass of weighed sample in the air **[g]**,
- Mass of weighed sample in liquid (water) **[g]**.

At the same time the test results can be printed on a connected printer

by pressing button ⟦image of print button⟧.

16.7. Testing carat content of gold alloy

Working mode **MODE K** enables testing one of three gold alloys:

- Gold with admixture of silver and copper (mode **K-1**),
- Gold with admixture of copper (mode **K-2**),
- Gold with admixture of silver (mode **K-3**).

16.7.1. Mode's local settings

Local settings of **MODE K** are grouped in submenu **<P4.3.F-K>**:

No.	Parameter name	Default settings	Description
4.3.1	out	K-1	Gold alloy selection (K-1: gold / copper / silver; K-2: gold / copper; K-3: gold / silver)
4.3.2	rtK	7 : 3	% ratio of copper and silver (in K-1 alloy). Available settings – 4:6, 5:5, 6:4, 7:3

16.7.2. Table of gold alloy density

The table contains the density values of subsidiary components in an alloy with regards to gold caratage in a tested sample:

Gold caratage [K]	% content	Density of metal alloy [g/cm^3]			Range of sample density [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

16.7.3. Testing procedure

- Select working mode **<mode K>** in accordance with point 16.1 of this user manual, after which the main window of selected working mode is displayed:

- If measurement result is other than zero press key (balance zeroing).

- Load tested sample on the top weighing pan (weighing in the air, flickering command **IN AIR**) and on stabilization of measurement result press key,

- Simultaneously the following command is displayed:

- Unload the tested sample from the top weighing pan,

- After the indication returns to **ZERO** place the tested sample in the container with liquid (water) (weighing in liquid, flickering command

  IN WATER) and on stabilization of measurement result press ⊚ key,

- Simultaneously, for approximately 2 seconds the software displays liquid's temperature value, and a window on process completion appears (message **END**):

MODE $K-1$ MEASURE   END

$$18.0\,K$$

- The following test results are displayed on pressing $\boxed{→0→}$ key.

Test results:

- Caratage of gold alloy* **[K]**,
- Percent content of gold in tested alloy* **[%]**,
- Density of tested sample **[g/cm^3]**,
- Volume of tested sample **[cm^3]**,
- Liquid temperature **[°C]**,
- Mass of weighed sample in the air **[g]**,
- Mass of weighed sample in liquid (water) **[g]**.

*) – alloy type is set in parameter **<P4.3.1.out>**.

At the same time the test results can be printed on a connected printer

by pressing button ⊚.

16.8. Testing platinum class

Working mode **MODE P** enables testing one of two platinum alloys:

- Platinum with admixture of nickel (mode **P-1**),
- Platinum with admixture of palladium (mode **P-2**).

16.8.1. Mode's local settings

Local settings of **MODE P** are grouped in submenu **<P4.4.F-P>**:

No.	Parameter name	Default settings	Description
4.4	F–P	P-1	Testing platinum alloy – alloy selection (P-1: platinum / nickel; P-2: platinum / palladium)

16.8.2. Table of platinum alloy density

The table contains the density values of subsidiary components in an alloy with regards to platinum class in a tested sample:

Platinum class [PT]	% content	Density of metal alloy [g/cm^3]		Range of sample density [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

16.8.3. Testing procedure

- Select working mode **<mode P>** in accordance with point 16.1 of this user manual, after which the main window of selected working mode is displayed:

- If measurement result is other than zero press ⊙ key (balance zeroing).

- Load tested sample on the top weighing pan (weighing in the air, flickering command **IN AIR**) and on stabilization of measurement result press ⟨⊚⟩ key,

- Simultaneously the following command is displayed:

MODE P MEASURE **IN AIR IN WATER**

$$9.63_g$$

- Unload the tested sample from the top weighing pan,

- After the indication returns to **ZERO** place the tested sample in the container with liquid (water) (weighing in liquid, flickering command **IN WATER**) and on stabilization of measurement result press ⟨⊚⟩ key,

- Simultaneously, for approximately 2 seconds the software displays liquid's temperature value, and a window on process completion appears (message **END**):

MODE $P-1$ MEASURE   **END**

$$950 \text{ PT}$$

- The following test results are displayed on pressing ⟨→0←⟩ key.

Test results:

- Platinum alloy class* **[PT]**,
- Percent content of platinum in tested alloy* **[%]**,
- Density of tested sample **[g/cm^3]**,
- Volume of tested sample **[cm^3]**,
- Liquid temperature **[ºC]**,
- Mass of weighed sample in the air **[g]**,
- Mass of weighed sample in liquid (water) **[g]**.

*) - alloy type is set in parameter **<P4.4.F-P>**.

At the same time the test results can be printed on a connected printer by pressing button ⏻.

16.9. Determining percent content of main metal in a tested alloy

Working mode **MODE A** enables determining percent content of main metal in a 2 or 3 component alloy.

16.9.1. Mode's local settings

Local settings of **MODE A** are grouped in submenu **<P4.5.F-A>**:

No.	Parameter name	Default settings	Description
4.5.1	in	ALL-2	Metal alloy selection (ALL-2: 2-components alloy, ALL-3: 3-components alloy)
4.5.2	d1	-	Density of main metal in an alloy
4.5.3	d2	-	Density of subsidiary (second) metal in an alloy
4.5.4	d3	-	Density of subsidiary (third) metal in an alloy. In case of alloy ALL-3.
4.5.5	rtA	5 : 5	% ratio of subsidiary metals in an alloy. In case of alloy ALL-3. Available settings – 4:6, 5:5, 6:4, 7:3, 8:2

16.9.2. Testing procedure

- Select working mode **<mode A>** in accordance with point 16.1 of this user manual, after which the main window of selected working mode is displayed:

- If measurement result is other than zero press ⏻ key (balance zeroing).

- Load tested sample on the top weighing pan (weighing in the air, flickering command **IN AIR**) and on stabilization of measurement result press ⟨⟩ key,

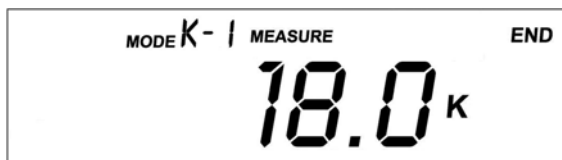- Simultaneously the following command is displayed:

- Unload the tested sample from the top weighing pan,

- After the indication returns to **ZERO** place the tested sample in the container with liquid (water) (weighing in liquid, flickering command **IN WATER**) and on stabilization of measurement result press ⟨⟩ key,

- Simultaneously, for approximately 2 seconds the software displays liquid's temperature value, and a window on process completion appears (message **END**):

- The following test results are displayed on pressing ⟨→0←⟩ key.

Test results:

- Percent content of main metal in an alloy* **[%]**,
- Density of tested sample **[g/cm³]**,
- Volume of tested sample **[cm³]**,
- Liquid temperature **[°C]**,
- Mass of weighed sample in the air **[g]**,
- Mass of weighed sample in liquid (water) **[g]**.

*) - alloy type is set in parameter **<P4.5.1.in>**.

At the same time the test results can be printed on a connected printer by pressing button ⌾.

16.10. Determining density of other metals

Working mode **MODE S** enables determining density of other metals.

Procedure:

- Select working mode **<mode S>** in accordance with point 16.1 of this user manual, after which the main window of selected working mode is displayed:

- If measurement result is other than zero press ⌾ key (balance zeroing).

- Load tested sample on the top weighing pan (weighing in the air, flickering command **IN AIR**) and on stabilization of measurement result press ⌾ key,

- Simultaneously the following command is displayed:

- Unload the tested sample from the top weighing pan,

- After the indication returns to **ZERO** place the tested sample in the container with liquid (water) (weighing in liquid, flickering command **IN WATER**) and on stabilization of measurement result press ⊚ key,

- Simultaneously, for approximately 2 seconds the software displays liquid's temperature value, and a window on process completion appears (message **END**):

- The following test results are displayed on pressing →0← key.

Test results:

- Density of tested sample **[g/cm³]**,
- Volume of tested sample **[cm³]**,
- Liquid temperature **[°C]**,
- Mass of weighed sample in the air **[g]**,
- Mass of weighed sample in liquid (water) **[g]**.

At the same time the test results can be printed on a connected printer by pressing button ⊚.

17. USER ADJUSTMENT

Only for non-verified scales

Confirmation of high weighing accuracy requires periodical correcting of adjustment factor stored in the balance's memory – this process is known as balance adjustment. Adjustment should be carried out on balance start of operation or if dynamic change of temperature occurs. Before carrying out adjustment procedure remove load from the weighing pan.

17.1. Adjustment

Procedure:

- Enter submenu **<P6.CAL>** and then:
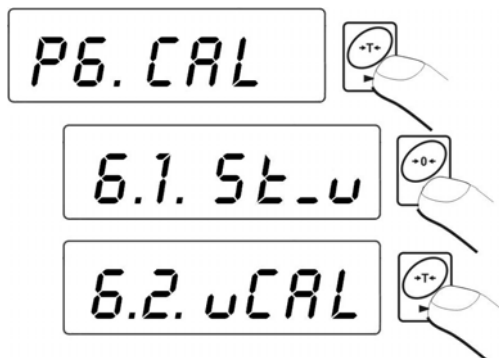
- The following messages will be displayed:
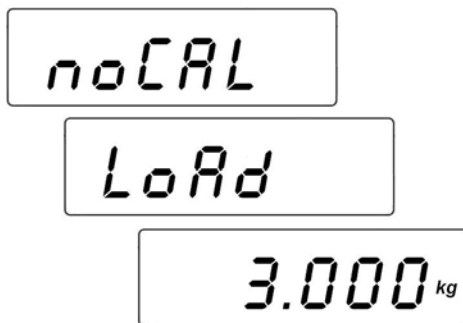
- During this time the balance adjusts its start mass, and after completing the procedure, the mass of adjustment weight is displayed (e.g. **3.000 kg**),

- Place the required weight on the weighing pan,

- Adjustment process starts automatically after loading the adequate weight on the weighing pan, the process is signaled by indicating the following message on the display:
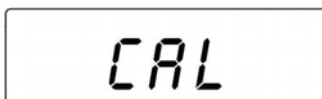
- The completion of the adjustment procedure is signaled by the following message:

$$unLoAd$$

- Take off the adjustment weight from the weighing pan, after which message **<donE>** is displayed for approximately 1s and the software returns to the adjustment submenu:

$$donE$$

$$6.2. uCAL$$

- Adjustment process can be aborted at optional moment by pressing

Esc $\boxed{F}$ key which is signaled by displaying the following message:

$$Abort$$

- Return to weighing with procedure of saving changes.

Caution:
*If the adjustment process (span adjustment) lasts longer than 15 seconds, error message **<Err8>** is displayed and short audible signal is emitted.*

Press Esc $\boxed{F}$ key to repeat adjustment procedure under more stable ambient conditions!

17.2. Start mass adjustment

If the balance does not require the full adjusting process it is possible to adjust the start mass only.

Procedure:

- Enter the submenu **<P6.CAL>** and then:

$$P6.CAL$$

$$6.1.\;St\_u$$
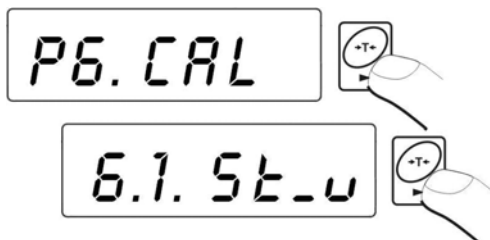
- The display will indicate the following message

$$StCAL$$

$$donE$$
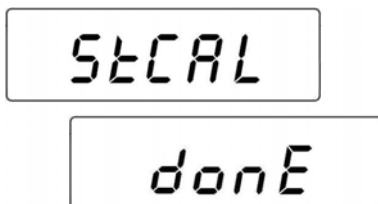
- After completing start mass adjustment the following message appears:

$$6.1.\;St\_u$$
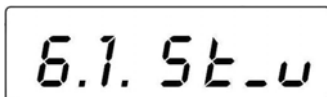
- The process of start mass adjustment can be aborted by pressing

   F key, which is signaled on the display by a message:

$$Abort$$
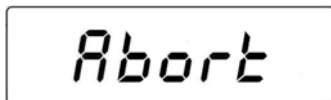
- Return to weighing with procedure of saving changes.

Return to weighing:
See 11.2.2.

Caution:

*If the start mass adjustment lasts longer than 15 seconds lasts longer than 15 seconds, error message **<Err8>** is displayed and short audible signal is emitted. Press ⊙ key repeat adjustment procedure under more stable ambient conditions!*

18. COOPERATION WITH PRINTER

Each time the ⊙ key is pressed a current mass value together with measuring units is sent to RS 232 interface.

Depending on setting of **STAB** parameter, the printout is released with stable or unstable (temporary) value. Depending on setting of **REPL** parameter, printout is automatic or manual.

Balance WTB/AU enables cooperating with one of the following printers **KAFKA** series:

  a) KAFKA
  Printout of weighing result and measuring unit only.

  b) KAFKA 1/Z
  This printer features an internal real time clock.
  In addition to mass and measuring unit, both date and time can be printed.

  c) KAFKA SQ S
  This printer features an internal real time clock and possibility of running statistics from measurements. Statistic contents: quantity of samples, total mass of weighed samples, average value, standard deviation, variation factor, min value, max value, difference max – min.

Cable diagrams:

Cable: balance – Kafka printer
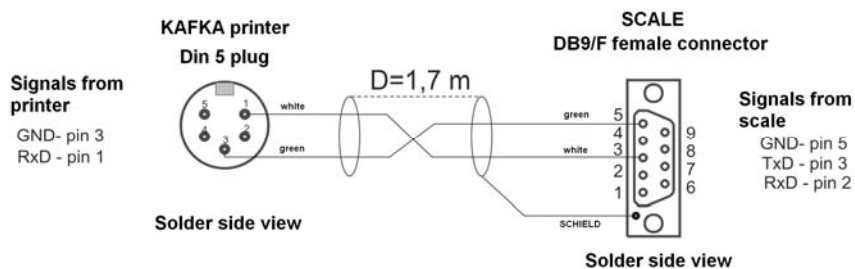
19. COOPERATION WITH COMPUTER

Balance WTB/AU series enables communicating with a computer. Sending weighing results to a computer can be carried out:

- **manually** - after pressing [key icon] key,
- **in continuous way** - after function activating or sending an appropriate command,
- **automatically** - After stabilizing the indication
- **on the request from the computer** - After sending a control command

Cable diagrams:

Cable: balance – computer
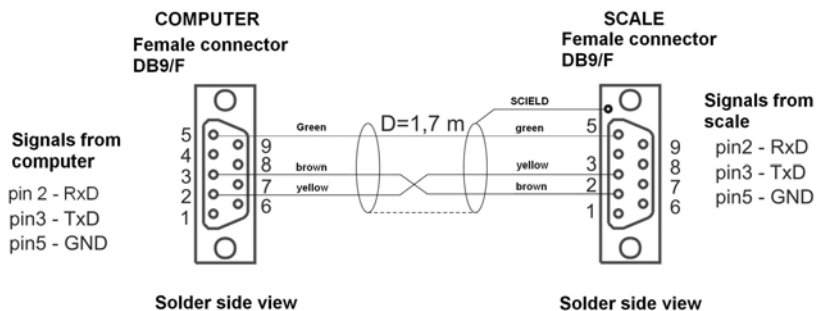
20. COOPERATION WITH TEMPERATURE SENSOR

The standard design of the balances, includes temperature sensor TB-1, which is used for temperature measurement of the liquid.

Connecting the temperature sensor to the balance is automatically confirmed by a message **<SnS on>** visible on the display. Simultaneously, the temperature value used during the process of sample weighing in liquid is automatically acquired from the connected sensor.

Disconnecting the sensor is automatically signaled by a message **<SnS oF>** visible on balance's display. Simultaneously, the temperature value used during the process of sample weighing in liquid is acquired from parameter **<P4.1. tcnP>**.

21. COMMUNICATION PROTOCOL

21.1. General information

A. A character based communication protocol balance-terminal is designed for establishing communication between a RADWAG balance and a peripheral devices via RS 232 interface.

B. It consists of commands sent from a peripheral device to the balance and responses from the balance.

C. Responses are sent from the balance on each receipt of a command as a reaction for a specific command.

D. Commands forming the communication protocol enable obtaining data on balance's status and influencing its operation, e.g.: request measurement results from the balance, zero indication, etc.

21.2. A set of commands for RS interfaces

Commands	Description of commands
Z	Zero balance
T	Tare balance
TO	Give tare value
S	Send stable measurement result in basic measuring unit
SI	Immediately send measurement result in basic measuring unit
SU	Send stable measurement result in current measuring unit
SUI	Immediately send measurement result in current measuring unit
C1	Switch on continuous transmission in basic measuring unit
C0	Switch off continuous transmission in basic measuring unit
CU1	Switch on continuous transmission in current measuring unit
CU0	Switch off continuous transmission in current measuring unit
PC	Send all implemented commands

Caution:

1. *Each command must end with CR LF characters;*
2. *The best policy for communication is not sending another command until the former answer has been received.*

21.3. Responses format for commands sent from computer level

On receipt of a command, the terminal sends a response in one of the following formats:

XX_A CR LF	command understood and in progress
XX_D CR LF	command carried out (appears only after the command XX_A)
XX_I CR LF	command understood but not accessible at this moment
XX _ ^ CR LF	command understood but max range is exceeded
XX _ v CR LF	command understood but min range is exceeded
XX _ OK CR LF	Command carried out (completed)
ES_CR LF	Command not recognized

XX _ E CR LF	an error occurred on command carrying out (time limit exceeded while waiting for stable measurement result (time limit is balance's characteristic parameter)

XX   - stands for a name of sent command
_   - substitutes spaces

21.4. Command's description

21.4.1. Zero balance

Format **Z CR LF**

Accessible responses:

Z_A CR LF   - command understood and in progress
Z_D CR LF   - command carried out
Z_A CR LF   - command understood and in progress
Z_^ CR LF   - command understood but zeroing range exceeded
Z_A CR LF   - command understood and in progress
Z_E CR LF   - time limit exceeded while waiting for stable measurement result
Z_I CR LF   - command understood but not accessible at this moment

21.4.2. Tare balance

Format: **T CR LF**

Accessible responses:

T_A CR LF   - command understood and in progress
T_D CR LF   - command carried out
T_A CR LF   - command understood and in progress
T_v CR LF   - command understood but tarring range exceeded
T_A CR LF   - command understood and in progress
T_E CR LF   - time limit exceeded while waiting for stable measurement result
T_I CR LF   - command understood but not accessible at this moment

21.4.3. Give tare value

Format: **TO CR LF**

Response: **TO_TARA CR LF** - command carried out

Frame format:

1	2	3	4	5-6	7-15	16	17	18	19	20	21
T	O	space	stability marker	space	tare	space		unit		CR	LF

> **Tare**   - 9 characters with right justification
> **Unit**   - 3 characters with left justification

21.4.4. Send stable measurement result in basic measuring unit

Format: **S CR LF**

Accessible responses:

S_A CR LF	- command understood and in progress
S_E CR LF	- time limit exceeded while waiting for stable measurement result
S_I CR LF	- command understood but not accessible at this moment
S_A CR LF	- command understood and in progress
MASS FRAME	- response is mass value in basic measuring unit

Frame format:

1	2-3	4	5	6	7-15	16	17	18	19	20	21
S	space	stability marker	space	sign	mass	space		unit		CR	LF

Example:

S CR LF – command sent from a computer

S _ A CR LF - command understood and in progress

S _ _ _ _ - _ _ _ _ _ _ 8 . 5 _ g _ _ CR LF - command carried out, response is mass value in basic measuring unit.

21.4.5. Immediately send measurement result in basic measuring unit

Format: **SI CR LF**

Accessible responses:

SI_I CR LF   - command understood but not accessible at this moment

MASS FRAME   - response is immediate with mass value in basic weighing unit

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability marker	space	sign	mass	space		unit		CR	LF

Example:

S I CR LF – command sent from a computer
S I _ ? _ _ _ _ _ _ _ 1 8 . 5 _ k g _ CR LF - command carried out, immediate response of mass value in basic weighing unit

21.4.6. Send stable measurement result in current weighing unit

Format: **SU CR LF**

Accessible responses:

SU_A CR LF   - command understood and in progress
SU_E CR LF   - time limit exceeded while waiting for stable measurement result

SU_I CR LF   - command understood but not accessible at this moment

SU_A CR LF   - command understood and in progress
MASS FRAME   - response is mass value in current measuring unit

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	space	stability marker	space	sign	mass	space		unit		CR	LF

Example:

S U CR LF – command from a computer
S U _ A CR LF – command understood and in progress
S U _ _ _ - _ _ 1 7 2 . 1 3 5 _ N _ _ CR LF - command carried out,
response is mass value in current measuring unit.

21.4.7. Immediately send measurement result in current measuring unit

Format: **SUI CR LF**

Accessible responses:

SUI_I CR LF - command understood but not accessible at this moment
MASS FRAME - mass value in current measuring unit is returned immediately

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability marker	space	sign	mass	space	unit			CR	LF

Example:

S U I CR LF – command from a computer
S U I ? _ - _ _ _ 5 8 . 2 3 7 _ k g _ CR LF - command carried out,
immediate response of mass value in current measuring unit
Where: _ - space

21.4.8. Switch on continuous transmission in basic measuring unit

Format: **C1 CR LF**

Accessible responses:

C1_I CR LF - command understood but not accessible at this moment
C1_A CR LF - command understood and in progress
MASS FRAME - response is mass value in basic measuring unit

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability marker	space	sign	mass	space		unit		CR	LF

21.4.9. Switch off continuous transmission in basic measuring unit

Format: **C0 CR LF**

Accessible responses:

C0_I CR LF   - command understood but not accessible at this moment
C0_A CR LF   - command understood and in progress

21.4.10. Switch on continuous transmission in current measuring unit

Format: **CU1 CR LF**

Accessible responses:

CU1_I CR LF   - command understood but not accessible at this moment

CU1_A CR LF   - command understood and in progress
MASS FRAME   - response is mass value in current measuring unit

Frame format:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability marker	space	sign	mass	space		unit		CR	LF

21.4.11. Switch off continuous transmission in current measuring unit

Format: **CU0 CR LF**

Accessible responses:

CU0_I CR LF   - command understood but not accessible at this moment
CU0_A CR LF   - command understood and in progress

21.4.12. Send all implemented commands

Format: **PC CR LF**

Accessible responses:

PC_- >_Z,T, TO,S,SI,SU,SUI,C1,C0,CU1,CU0,PC – command carried out, terminal has sent all implemented commands.

21.5. Manual printouts / automatic printouts

Balance WTB/AU series enables generating manual or automatic printouts.

- Manual printouts: press ⌖ key on stabilization of indication (measurement result),.

- Automatic printouts is generated automatically, and enabled on loading a weighed object on weighing pan and stabilization of measurement result.

Caution:
If a balance is verified, printouts of immediate values (unstable indications) are blocked.

Format of mass printout:

1	2	3	4 -12	13	14	15	16	17	18
stability marker	space	sign	mass	space	unit			CR	LF

Stability marker	[space] if stable
	[?] if unstable
	[^] if error of exceeding range to "+" occurs
	[v] if error of exceeding range to "-" occurs
sign	[space] for positive values or
	[-] for negative values
mass	9 characters with decimal point and right justification
unit	3 characters with decimal point and left justification
command	3 characters with left justification

Example 1:

_ _ _ _ _ _ 1 8 3 2 . 0 _ g _ _ CR LF – a printout generated from a balance on pressing ENTER/PRINT key.

Example 2:

? _ - _ _ _ _ 2 . 2 3 7 _ l b _ CR LF a printout generated from a balance on pressing ENTER/PRINT key.

Example 3:

^ _ _ _ _ _ _ 0 . 0 0 0 _ k g _ CR LF - a printout generated from a balance on pressing ENTER/PRINT key.

21.6. Continuous transmission

The balance enables operating in continuous transmission mode.
The mode is enabled or disabled in balance parameters or using RS232 commands.

The frame format sent by the balance in case of setting
<P2.Prnt> parameter to **CntA**:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	I	space	stability marker	space	sign	mass	space		Unit		CR	LF

Stability marker	[space] if stable	
	[?] if unstable	
	[^] if error of exceeding range to "+" occurs	
	[v] if error of exceeding range to "-" occurs	
sign	[space] for positive values or	
	[-] for negative values	
mass	9 characters with decimal point and right justification	
unit	3 characters with decimal point and left justification	
command	3 characters with left justification	

The frame format sent by the balance in case of setting
<P2.Prnt> parameter to **Cntb**:

1	2	3	4	5	6	7-15	16	17	18	19	20	21
S	U	I	stability marker	space	sign	mass	space		unit		CR	LF

22. ERROR MESSAGES

Err2 - Value beyond the zero range

Err3 - Value beyond the tare range

Err4 - Adjustment mass or start mass beyond the acceptable range (±1% for weight, ±10 for start mass)

Err8 - Tarring / Zeroing operation time exceeded

Err10 - Accepting zero mass indication.

Accepting mass measured in liquid (water), that is above / equal to mass weighed in the air

Err11 - Density of subsidiary metals (determined by the software) is higher than density of the main metal. Refers to **Mode A** (3-component alloy)

LO - Caratage of pure gold is determined below the value of 9.00K (37,50%). Refers to **Mode G**.

Density of platinum alloy is lower than density of subsidiary metals. Refers to **Mode P**.

Determined density of metal alloy is below declared density values of subsidiary metals **d1**, **d2**. Refers to **Mode A** (2-component alloy)

HI - Determined density of metal alloy is above the declared density values of subsidiary metals **d1**, **d2**. Refers to **Mode A** (2-component alloy)

null - Zero value from the AD converter

FULL 2 - Measurement range (Max. capacity) exceeded

LH - Start mass error, the mass on the weighing pan assembly is beyond the acceptable range (-5% to +15% of start mass)

Caution:

1. *Errors: **Err2**, **Err3**, **Err4**, **Err5**, **Err8**, **Err10**, **Err11**, **LO**, **HI**, **null**, that appear on the display are also accompanied by a short beep sound (about 1 sec.);*

2. *Error **FULL2** that appears on the display is also accompanied by a continuous sound until the cause of error disappears.*

23. TECHNICAL PARAMETERS

Scale type:	WTB 600 AU	WTB 1200 AU
Max capacity	600g	600g
Accuracy of mass reading	0,01g	0,01g
Tare range	-600g	-1200g
Accuracy of gold caratage reading	0,1K	
Accuracy of density reading	0,001g/cm^3	
Accuracy of volume reading	0,001cm^3	
Accuracy of % content reading	0,01%	
Accuracy of platinum class reading	1PT (1-1000PT)	
Repeatability	0,03g	
Linearity	±0,03g	
Stabilization time	3 sec	
Pan size	125 x 145mm	
Working temperature	+15°C to +30°C	
Power supply	230V AC 50Hz / 11V AC, 6×AA NiMH	
Average operation time on batteries	35h	
Display	LCD (with backlight)	
Interface	RS 232	
Dimensions	244x178x182mm	

24. TROUBLE SHOOTING

Problem	Cause	Solution
Balance does not turn on	Discharged batteries	Connect to mains or change batteries
	No batteries (not installed or improperly installed)	Check the correctness of installation (polarization)
The balance turns off automatically	"t1" set to „YES" (Power saving mode)	Go to submenu "othr" and change "5.4 t1" to "no"
After turning on „LH" message on the display	Load on balance's weighing pan during powering up	Unload the pan. The balance should indicate zero.

25. ADDITIONAL EQUIPMENT

Accessories:

- KAFKA printer cable - **P0136**,
- Computer cable - **P0108**,
- EPSON printer cable - **P0151**,
- Power cord for car lighter 12V DC - **K0047**,
- Thermal printer - **KAFKA**,
- Dot matrix printer - **EPSON**,
- Current loop in plastic housing - **AP2-1**,
- RS232 / RS485 converter - **KR-01**,
- RS232 / Ethernet converter - **KR-04**,
- Stainless steel anti-vibrating table- **SAL/N**,
- Powder coated mild steel anti-vibrating table- **SAL/M**,
- Mass standards with accessories.

Computer software:

- "**RAD-KEY**" computer software,
- "**PW-WIN**" computer software.

MANUFACTURER

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