

# User Manual

User manual no.:  
LMI-53-04/09/12/A

BALANCES  
APP/2C  
SERIES

**VETEK**   
*Scandinavia's biggest webshop for scales*



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## 1. TECHNICAL DATA

Balance with external adjustment system	<b>APP 10/2C/1</b>	<b>APP 25/2C/1</b>	<b>APP 30/2C/1</b>	<b>APP 35/2C/1</b>	<b>APP 6/35/2C/1</b>	<b>APP 50/2C/1</b>
Balance with internal adjustment system	<b>APP 10/2C*</b>	<b>APP 25/2C*</b>	<b>APP 30/2C</b>	<b>APP 35/2C</b>	<b>APP 6/35/2C*</b>	-
Max. capacity	10 kg	25 kg	30 kg	35 kg	6/35 kg	50 kg
Tare range	-10 kg	-25 kg	-30 kg	-35 kg	-35 kg	-50 kg
Linearity	± 0,02 g	± 0,1 g	± 0,3 g	± 0,3 g	± 1/5 g	± 0,5 g
Readability	0,01 g	0,1 g	0,1 g	0,1 g	1/5 g	0,1 g
Repeatability	0,01 g	0,1 g	0,1 g	0,1 g	1/5 g	0,15 g
Working temperature	+10 °C - +40 °C					
Power supply	13,5 ÷ 16 V DC / 1,6A					
Sensitivity drift	2 ppm/°C in temperature +15°C - +35°C					
Pan size	347 x 259 mm					

\* - verified balance

## **2. BASIC INFORMATION**

### **2.1. *Intended use***

Precision balance APPC series is designed to determine the weighing value of loads in laboratory environment. It is intended for application as a non-automatic weighing instrument only, i.e. the material to be weighed is manually and carefully placed in the center of the weighing pan. Weighing result should be read only after stable reading has been obtained – stability pictogram is visible on balance's display.

### **2.2. *Inappropriate use***

Do not use the balance as a dynamic weighing instrument. Even if small quantities of weighed material are added or removed from the weighing pan of the instrument, the reading should be taken only after stabilization of the measurement result. Do not place any magnetic materials on the weighing pan, as this can cause damage of the measuring system of the instrument. Be sure to avoid impact shock and overloading the balance in excess of the prescribed maximum measuring range (max capacity), minus any possible tare weight that has been applied. Never use the balance in an environment endangered by an explosion. This balance has not been adjusted for operation in explosive areas. There must not be any modification made to the balance.

### **2.3. *Warranty***

Warranty is not valid at the following:

- Non-observation of the guidelines of this user manual,
- Use of balance other than specified in this manual,
- Alternation to or opening of the device,
- Mechanical damage and damage caused by media, natural water, and tear,
- Inappropriate assembling or defects of electric installation,
- Overloading of the measuring instrument.

## **2.4. *Monitoring metrological parameters of the instrument***

Metrological characteristics of the balance requires periodical inspection carried out by its operator. Inspection frequency is conditioned by ambient conditions in which the balance is used, types of performed processes and accepted quality management system in an organization.

## **2.5. *Data included in this user manual***

Please read the user manual carefully before assembling and startup, even if the user is experienced with this type of weighing instruments.

## **2.6. *Staff training***

This balance should only be operated and maintained by personnel who is trained and experienced in using this type of balances.

# **3. TRANSPORT I STORAGE**

## **3.1. *Delivery check***

Please check the packaging immediately upon delivery and the device during unpacking for any visible signs of external damage.

## **3.2. *Packaging***

Please retain all parts of the original packaging should the balance be transported in the future. Only the original packaging should be used for dispatching the balance. Before packing, disconnect all attached cables and remove any loose/movable parts (weighing pan, anti-draft shields, etc.). Please place balance and its components in their original packaging, and protect them against damage during transport.

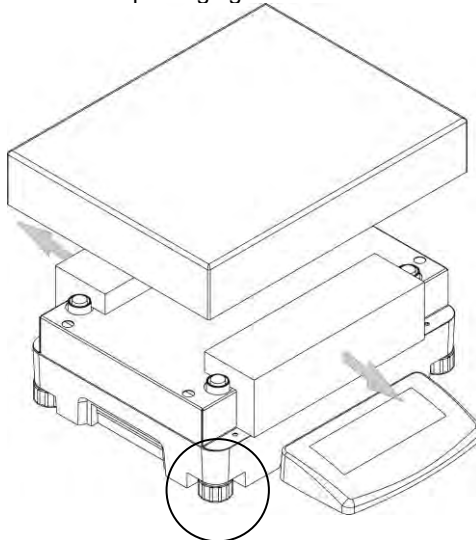
## 4. UNPACKING, ASSEMBLING AND STARTUP

### 4.1. *Assembling and place of use*

- Balance should be stored and used in locations free of vibrations and shakes, free of air movement and dust,  
Ambient air temperature should not exceed the range of:  $+10^{\circ}\text{C} \div +40^{\circ}\text{C}$ ,
- Ambient relative humidity should not exceed 80%,
- During balance operation, ambient temperature in the weighing room should not change more than  $3^{\circ}\text{C}$  within one hour,
- The balance should be located on a stable wall console desk or a stable working table which is not affected by vibrations and distant from heat sources,
- Take special safety measures when weighing magnetic objects, as part of the balance is a strong magnet. Should such loads be weighed, use under hook weighing option, which removes the weighed load from area influenced by the balance's magnet. For assembling the hook for under hook weighing option see the bottom section of balance's housing,
- In order to avoid influence of static electricity on the measurement process, ground the balance's housing. the grounding bolt is located at the back of balance's housing.

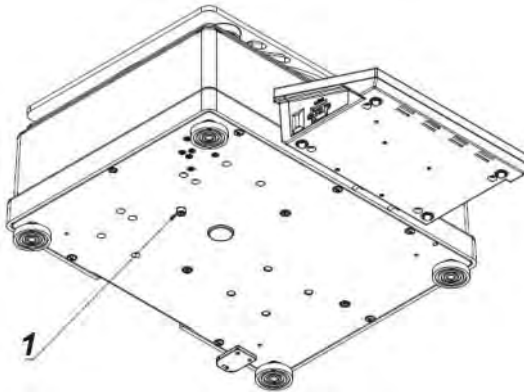
### 4.2. *Unpacking*

Cut protective tape. Carefully remove the balance from its packaging. Remove any accessories from their packaging needed to correct balance operation.

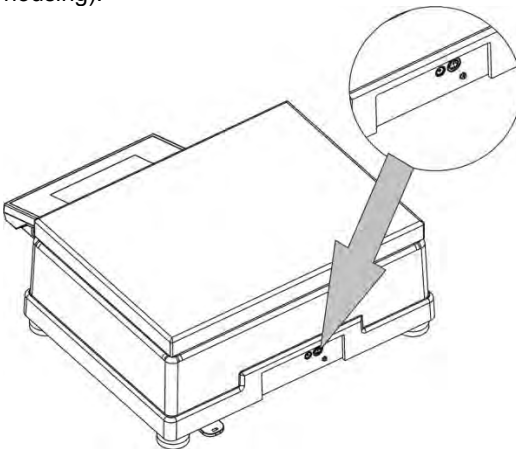




- Remove the weighing pan from balance's housing and remove the transport protections, as shown on above figure.
- After unpacking, unscrew bolt (1) locking balance's adjustment mechanism.

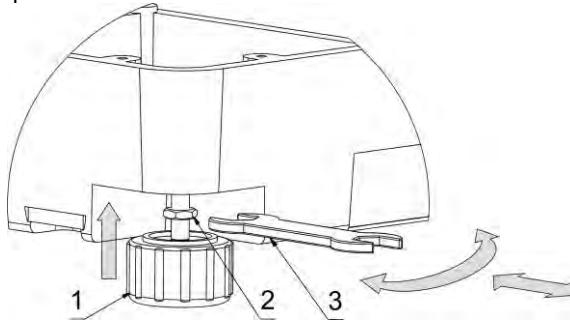


- Assemble the weighing pan.
- Pay attention to correct positioning of the weighing pan on balance's mandrels – the weighing pan must not touch balance's housing, and it should rest steadily.
- After removing transport protections, and assembling the weighing pan connect the terminal to balance's socket located at the back of the housing, and next connect needed peripheral equipment. Only then plug the balance to mains (power socket is located at the back of balance's housing).



- Place the balance in its intended place of use.

- Level the balance by turning its adjustable feet. Then using a wrench (3) tighten up the nut (2) on the adjustable foot (1) to balance's basis until refusal point.



### Setting

Before plugging to mains, level the balance using adjustable feet. Turn the feet in a way that the air bubble of the level is located centrally.

#### 4.3. *Standard delivery components*

- Balance.
- Weighing pan.
- Power adapter.
- User manual.

#### 4.4. *Cleaning*

Balance should be cleaned with damp cloth by gentle wiping the smudges of dirt. In order to clean the weighing pan of the balance, please remove it from the weighing chamber. **Cleaning of the pan when assembled may cause damage of the measuring system of the balance.**

#### 4.5. *Plugging to mains*

**Balance can be plugged to mains only with a power adapter that comes standard with the balance. Nominal power supply of the power adapter (specified on the data plate of the power adapter) should be compatible to the power from mains.** Plug the balance to mains – the plugging socket is located at the back of balance's housing. Balance display will light and show name and number of software, after which balance will display 0.00g (in case of balances with readability 0,01g) or 0.0g (for balances with readability 0,1g). . If indication is other than zero, press **ZERO/TARE** key.

#### 4.6. *Connecting peripheral equipment*

The balance must be unplugged from the mains before connecting or disconnecting any peripheral equipment (printer, PC computer). Use only peripheral equipment recommended by the manufacturer with your balance. These have been ideally coordinated to your balance. On connecting a peripheral device, plug the balance to mains.

### 5. BASIC FUNCTIONS

- **Functions related to measuring unit**

- setting default measuring unit **<StUn>**,
- weighing in grams [g],
- weighing in kilograms [kg],
- weighing in carats [ct],
- weighing in units from beyond **SI** (available only in non-verified balances): lb], [oz], [ozt], [dwt], [t], [mom], [gn],

- **functions related to working modes**

- parts counting **<PcS>**,
- checkweighing (+/- control) **<HiLo>**,
- percent setup **<PrcA>**, **<PrcB>**,
- density determination of solids **<d\_Co>**,
- density determination of liquid **<d\_Li>**,
- totalizing **<Add>**,
- FiLL mode **<FiLL>**

- **functions related to setting a balance to ambient and working conditions at a workstation**

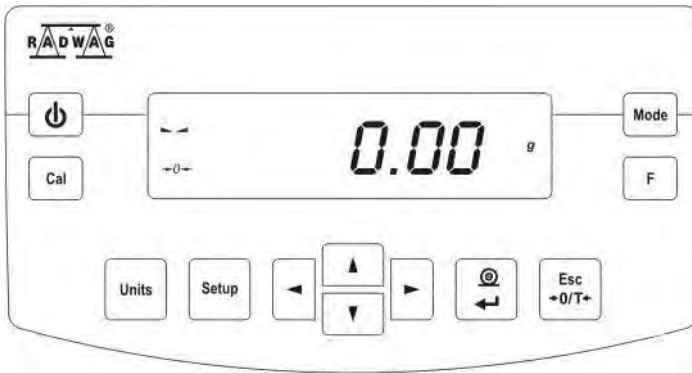
- enabling / disabling autozero system **<Auto>**,
- setting the parameter of measurement result averaging **<AuE>**,
- measurement result value release **<ConF>**,
- weighing mode **<rAPd>**,
- display backlight **<bl>**,
- display brightness **<bLbA>**,
- beep signal (balance reaction on pressing a function key) **<bEEP>**,

- **functions related to use of RS 232 interface**

- setting baud rate **<bAud>**,
- Continuous data transmission in basic measuring unit **<CntA>**,
- Continuous data transmission in current measuring unit **<Cntb>**,
- Automatic operation mode **<rEPL>**.

Balance APPC series can be used to weigh loads under the weighing platform – i.e. under hook weighing option. Balance software enables printing a report from adjustment process containing a set of data on adjustment conditions and criteria (see GLP procedures).

## 6. BALANCE KEYBOARD



**ON/OFF** key enables switching on and off balance's display. If switched off balance components other than the display are powered, and balance is in stand-by mode.



**F** key. Function key, which enables quick entering the settings of an active working mode.



**MODE** key for selecting balance's working mode.



**UNITS** key, changes measuring units.



**PRINT/ENTER** key - Sends current display status to a peripheral device (PRINT) or accepts selected value of a parameter or function (ENTER).



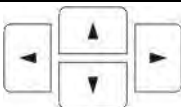
**ESC/ZERO/TARE** key – zeroing / tarring of balance's indication.



**Adjustment** – function key of immediate initiating the adjustment / calibration process.



Function key for entering the main menu of a balance.



Navigating arrows for moving in balance's menu or changing parameter value

## 7. START-UP

When plugged to mains, the balance displays name and number of software, and afterwards proceeds to weighing mode.

### **Balance temperature stabilization period.**

Before start of measuring processes, it is necessary to wait until the balance is thermally stabilized. It is a period of so called balance self-heating. In case of balances APP series self-heating period takes approximately 15 minutes. The specified time interval refers to balances that have been stored in room temperature before plugging to mains.

For balances that were stored in much lower temperatures before plugging to mains (e.g. during winter period) thermal stabilization should last approximately 4 hours.

Correct operation of a balance is possible within temperature range specified in the technical parameters, see point 1. If the balance is placed in area which ambient temperature is out of temperature range specified in the technical data, then balance's display may signal such situation by lighting an appropriate marker (a black triangle).










In case the balance displays the marker, increase or decrease ambient temperature, depending on present temperature value. It is recommended that ambient temperature changes at balance's place of use are very small (slow).

## 8. USER MENU

Balance menu is divided into **7** basic function groups. Each group has individual name.

### *8.1. Moving through user menu*

An operator moves through balance menu using keys on overlay's keyboard:

	<b>Setup</b> key. Entering balance's main menu.
	Selecting group of parameters one by one downwards or changing parameter value by one value downwards.
	Selecting group of parameters one by one upwards or changing parameter value by one value upwards.
	Selecting group of parameters for activating. On pressing the key, the display indicates the first parameter in a selected group.
	Exit to previous menu level, e.g. to main menu.
	<b>Esc/TARE</b> key. Abandon parameter changes.
	<b>PRINT/ENTER</b> key. Accept / confirm introduced changes.

Name of function groups and their content:

**P1 CAL** [Adjustment/Calibration]

P1.1	iCAL			[internal adjustment]
P1.2	ECAL			[external adjustment]
P1.3	tCAL			[adjustment triggered by temperature]
P1.4	ACAL		both/nonE/tenno/tinnE	[automatic adjustment]
P1.5	CALt		1 h ÷ 12h	[time of automatic adjustment]
P1.6	CALr		YES/no	[report from adjustment]

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**P2 GLP** [Good Laboratory Practice]

P2.1	USr		–	[name of user]
P2.2	PrJ		–	[name of project]
P2.3	Ptin		YES/no	[printout of measurement time]
P2.4	PdAt		YES/no	[printout of measurement date]
P2.5	PUSr		YES/no	[printout of user name]
P2.6	PPrJ		YES/no	[printout of project name]
P2.7	PId		YES/no	[printout of balance's factory no.]
P2.8	PFr		YES/no	[printout of frames]

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**P3 rEAd** [Main user parameters]

P3.1	AuE		Stand/Slouu/FASt	[filtering level]
P3.2	ConF		FASt_rEL/Fast/rEL	[value release]
P3.3	Auto		On/OFF	[autozero]
P3.4	Ldi9		ALuuAYS/neper/uu_StAb	[blinking last digit]
P3.5	rAPd		YES/no	[weighing mode RAPID]

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**P4 Print** [Data transmission – RS 232]

P4.1	bAud		2400/4800/9600/19200	[baud rate]
P4.2	CntA		YES/no	[continuous printout in current measuring unit]
P4.3	Cntb		YES/no	[continuous printout in basic measuring unit]
P4.4	rEPL		YES/no	[manual or automatic operation]
P4.5	PStb		YES/no	[result printout: stable or unstable]
P4.6	Lo		000.0000	[minimum mass threshold for automatic operation]



<b>P5 Unit</b>	[Measuring units]		
P5.1 StUn		g/mg/kg/ct/lb/oz/ozt/dwt/t/mom/G	[basic measuring units – e.g. gram]
P5.2 mg		YES/no	[mg - milligram]
P5.3 µg		YES/no	[kg– kilogram]
P5.4 Ct		YES/no	[ct – carat]
P5.5 lb		YES/no	[lb – pound]
P5.6 oZ		YES/no	[oz – ounce]
P5.7 oZt		YES/no	[ozt – ounce troy]
P5.8 dwt		YES/no	[dwt – pennyweight]
P5.9 t		YES/no	[t – tael]
P5.10 nno		YES/no	[mom - momme]
P5.11 Gr		YES/no	[gr – grain]

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<b>P6 Func</b>	[Working modes]		
P6.1 FFun		ALL/PcS/HiLo/PrcA/Prcb/d_Co/d_Li/Add/FiLL	[working mode selection]
P6.2 PcS		YES/no	[parts counting]
P6.3 HiLo		YES/no	[checkweighing]
P6.4 PrcA		YES/no	[percent setup with reference to weighed standard]
P6.5 Prcb		YES/no	[percent setup with reference to declared standard]
P6.6 d_Co		YES/no	[density determination of solids]
P6.7 d_Li		YES/no	[density determination of liquids]
P6.8 Add		YES/no	[totalizing]
P6.9 FiLL		YES/no	[working mode FiLL]

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<b>P7 othEr</b>	[Other functions]		
P7.1 bL		On/Aut/OFF	[display backlight]
P7.2 bLbA		no/20/30/40/50/60/70/80/90/100	[display brightness]
P7.3 bEEP		On/OFF	[beep sound]
P7.4 PrnS			[printout of balance parameters]

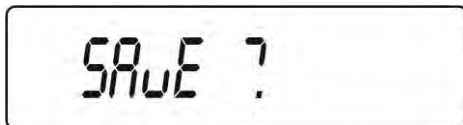
## 8.2. *Return to weighing mode*



### **CAUTION**

Changes introduced in balance memory will be saved on return to weighing with procedure of saving changes.

Press **ESC/TARE** key for several times, until the display shows command **SAVE ?**.




When display indicates the above command for saving changes, press one of below options:

- **PRINT/ENTER** – *save changes*
- or **ESC/TARE** – *abandon introduced changes, and leave to balance menu.*

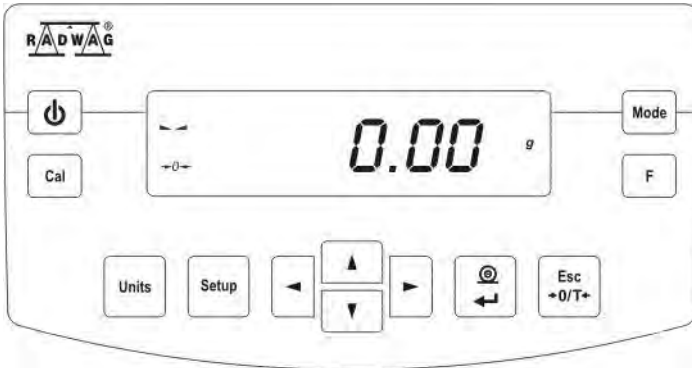
After pressing an appropriate key, balance goes back to weighing mode.

## 9. WEIGHING

Before start of weighing process or in case of essential change of ambient conditions at a workstation (e.g. ambient temperature change at a workstation more than 3°C) the balance requires adjusting. The procedure of balance adjustment is described further in this user manual.

- Before start of weighing procedure, it is recommended to load the balance's weighing pan a few times with mass close to balance max capacity,
- Check if unloaded balance indicates "precise zero" - **0** and whether measurement is stable - , if not press **ESC/TARE** key;
- Press **Units** key to set a measuring unit: [g], [kg], [ct], and also if enabled in factory menu [lb], [oz], [ozt], [dwt], [t], [mom], [gn],
- place weighed object on balance's weighing pan and read result only on stabilization of measurement result,

- mass indication of a load placed on balance's weighing pan can be tarred for multiple times by pressing **ESC/TARE** key ((pay attention not to exceed maximal capacity of a balance by applying multiple tare function),

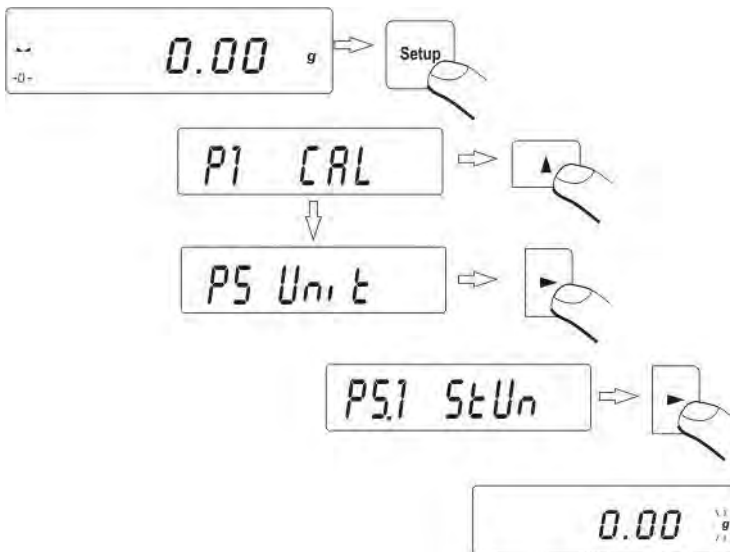



During times between carrying out the following measurement series do not unplug the balance from mains. It is recommended to switch off balance's display by pressing **ON/OFF** key. On repeated pressing of the **ON/OFF** key the balance is ready for operation and carrying out the following measurements.

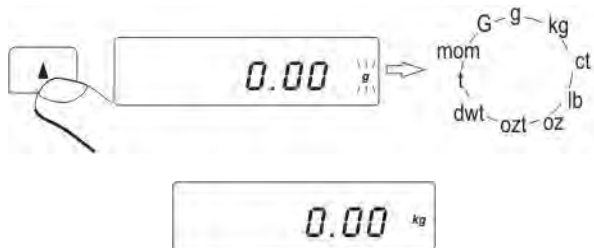
### **9.1. Selection of basic measuring unit**

Function is used to set the measuring unit which will be displayed on balance switching on.

In order to set the measuring unit go to submenu **P5 Units**,



press  key for a few times. The display indicates available measuring units in turns



After selecting the basic measuring unit press **PRINT** key. The balance returns to displaying parameter name.



**Available settings:**

- For verified balances, a user can select from the following measuring units: [g], [kg], [ct]
- For non-verified balances, a user can select from the following measuring units: [g], [kg], [ct], [lb], [oz], [ozt], [dwt], [t], [mom], [gn].

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).



**CAUTION:**

On switching on, the balance will start operating with set basic measuring unit.

### **9.2. *Temporary measuring unit***

Function enables selecting a measuring unit which will be indicated next to mass readout during weighing process. Set measuring unit will be in use from the moment of its activation until its change or switching off and on the balance. Each pressing the **Units** key, causes change of the measuring unit.

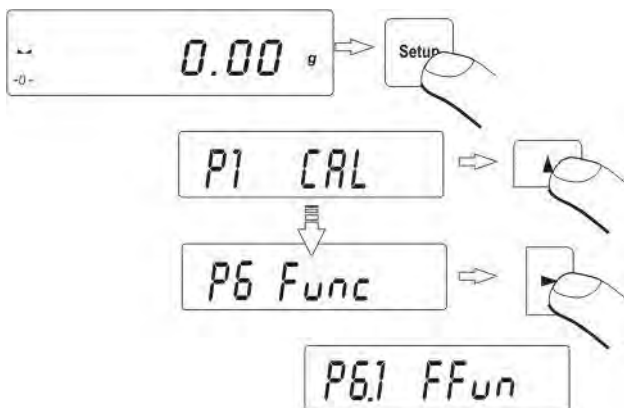
**Available settings:**

- For verified balances, a user can select from the following measuring units: [g], [kg], [ct]
- For non-verified balances, a user can select from the following measuring units: [g], [kg], [ct], [lb], [oz], [ozt], [dwt], [t], [mom], [gn].

### **9.3. *Setting accessibility of balance working modes***

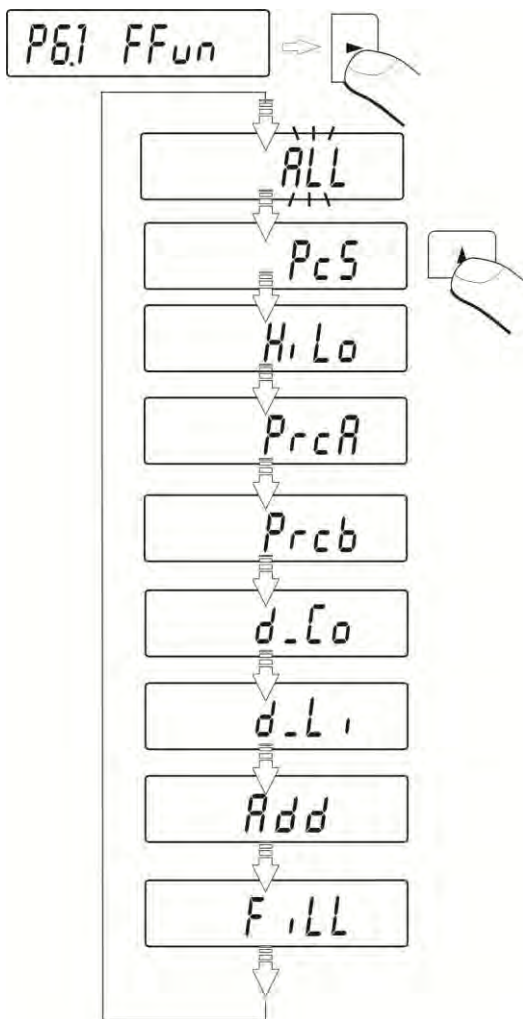
This group of parameters enables the user to declare functions (working modes) which are accessible on pressing of **MODE** key.

Enter group of parameters **P6 Func**,



### 9.3.1. Selection of working modes available for a user

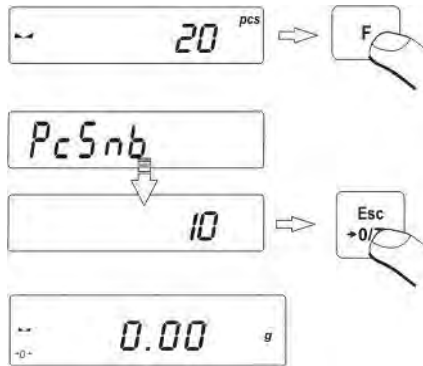
Function enables selecting (by pressing **MODE** key) which working modes are accessible during weighing function – if all – then select (**ALL**) and if only one from all available (described below).



After setting the parameter press **PRINT** key. Balance goes back to displaying submenu name **P6.1 FFun**.

If a mode other than **ALL** is selected, procedure of returning to weighing mode differs from other ones.

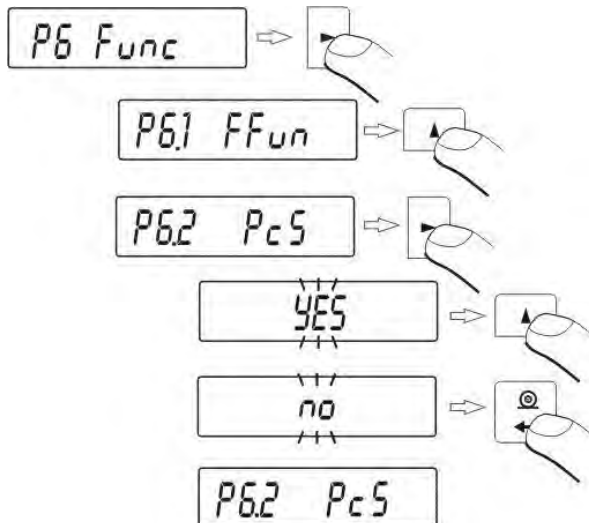
If for instance **PcS** mode is selected, follow procedure in accordance with point 14.1 point, to return to weighing:



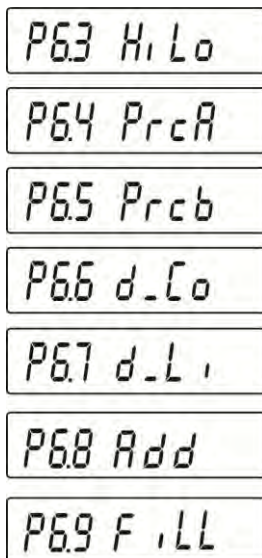
Press **Esc/TARE** key, balance returns to weighing.

### 9.3.2. Means of selecting one of available working modes

Balance user can enable or disable modes which are not used in the weighing process. This provides quicker access to modes used on a balance.







**YES** - mode enabled; **no** - mode disabled

On selecting, press **PRINT** key. The balance returns to displaying submenu name.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

#### 9.4. *Dual range balance (APP 6/35/2C)*

Balance **APP 6/35/2C** series is a dual range weighing instrument. The accuracy of the **I weighing range** is  $d_1=1g$ , and of the **II weighing range** it is  $d_2=5g$ .

Transfer from weighing with the accuracy of the I weighing range to weighing with the accuracy of the II weighing range takes place automatically on exceeding  $Max_1$  point at 6kg (with no operator activity needed). On switching to weighing with the accuracy of the II weighing range, the display signals it by indicating II pictogram on its right side.

From now on the balance weighs mass with the accuracy of the II weighing range.

In order to return to weighing in the accuracy of the I weighing range:

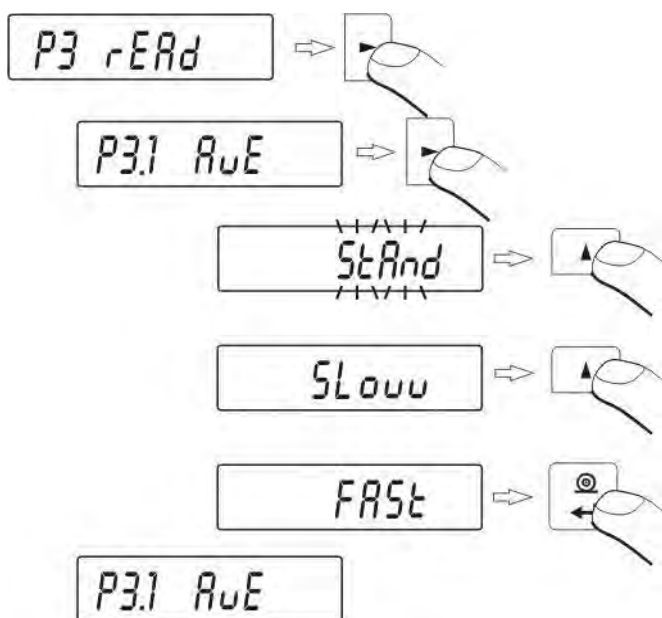
- Take the weighed load off the weighing pan
- As the indication returns to zero and pictograms  $\rightarrow 0 \leftarrow$  and  $\blacktriangle \blacktriangleleft$  are lit press  $\rightarrow 0/T \leftarrow$  key on balance's keyboard.

The balance returns to weighing with the accuracy of the I weighing range  $d_1=1g$  and II weighing range pictogram is blanked.

## 10. BALANCE MAIN PARAMETERS

It is possible to adjust balance's operation to ambient conditions at a workstation (by setting filter range and value release parameters) or user requirements (autozero settings, last digit visibility). These parameters are set in group **P3 rEA**d.

### 10.1. Setting filtering level



- using **UNITS** key to select desired value of filter settings

**StAnd** – (normal) – normal operation conditions

**Sloou** – (slow) – harsh operation conditions - vibrations, etc.

**Fast** – (fast) – good operation conditions – no vibrations, etc.

**Go back to weighing mode with procedure of saving changes**

(see point - 8. 2. – return to weighing).

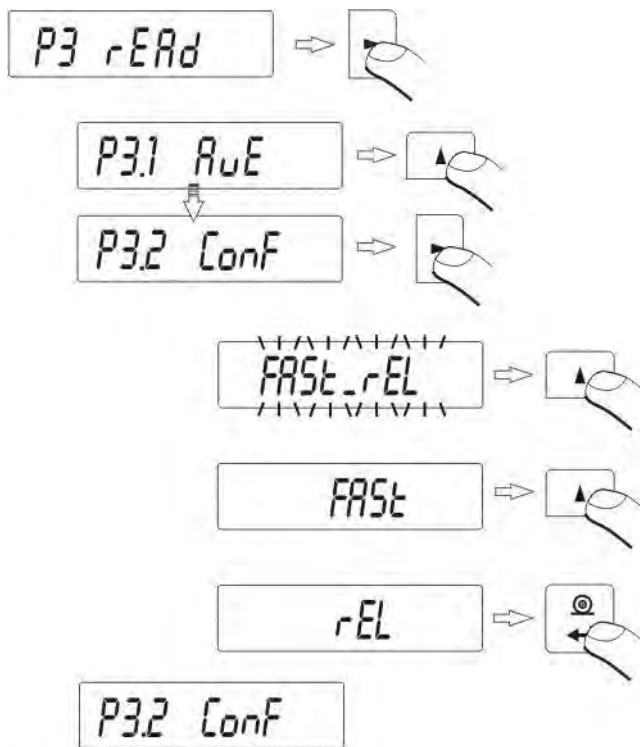


**CAUTION:**

The higher filtering setting the longer weighing time.

## 10.2. Value release

Due to various ambient conditions at workstations, and in order to set balance to present conditions, it is necessary to determine the value release parameter as: **FAST\_rEL**, **Fast** or **rEL**. Depending on selected option, weighing time will be shorter or longer.





**Fast\_rEL** - fast + reliable  
**Fast** - fast  
**rEL** - reliable.

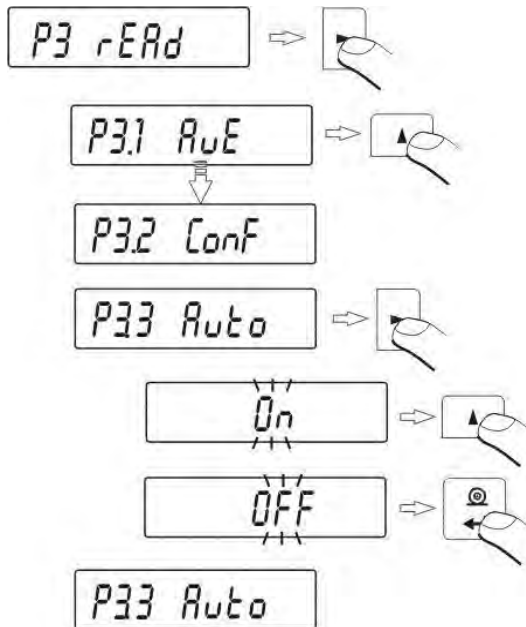
**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

### 10.3. Autozero function

In order to ensure balance's precise mass indication, autozero (**Auto**) software parameter has been introduced. The application of this function is automatic control and correction of zero indication. When function is enabled, it compares balance indications at declared time interval e.g. 1 s, on conditions that weighing pan is unloaded and display indication is close to zero.

If results vary less than declared AUTOZERO range e.g. one division, balance will zero automatically, display marker of stable measurement result  and precise zero marker .

If AUTOZERO function is enabled, then each weighing process starts from precise zero point. There are, however, some cases when this function can be a disturbing factor of measuring process; for instance very slow placing of load on the weighing pan (e.g. load pouring) – in such case system of zero indication correction can also correct actual indication of loaded mass.

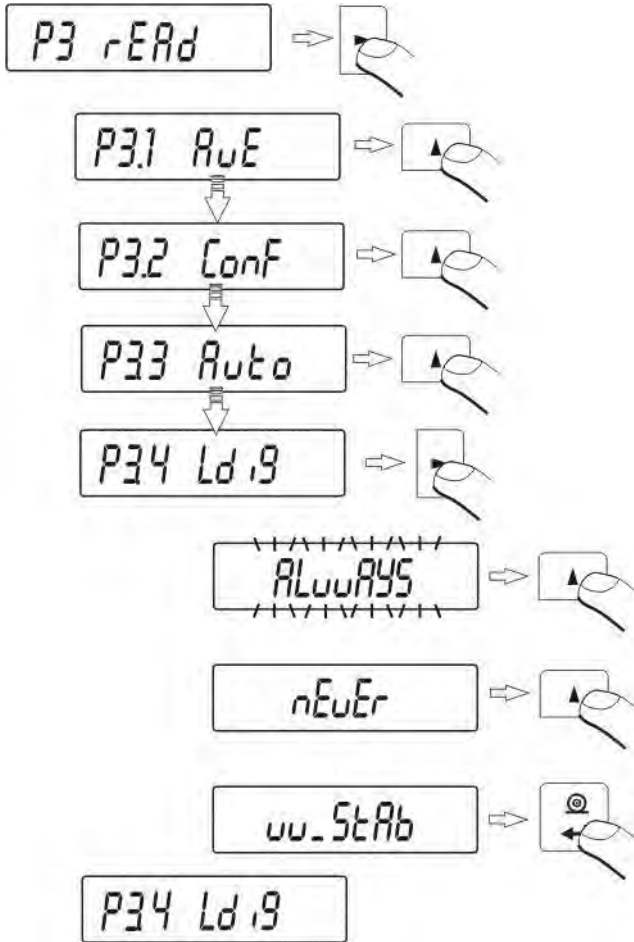


**OFF** - autozero disabled  
**On** - autozero enabled.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

#### 10.4. *Blanking of the last digit on the display*

Function enables blanking of the last displayed digit.



- ALuAYS** - always
- nEuEr** - never
- uu\_StAb** - when measurement result is stabilized.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

### 10.5. Weighing mode RAPID

Weighing mode RAPD is located in menu parameter P3.rEAd and it offers two options:

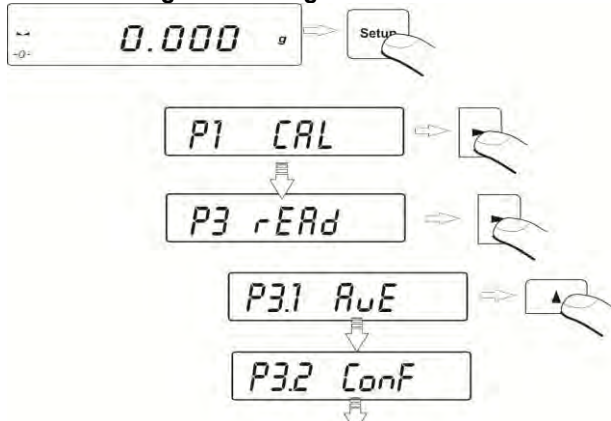
RAPID = NO – balance operates with settings as set in menu AUE and CONF, i.e. standard weighing.

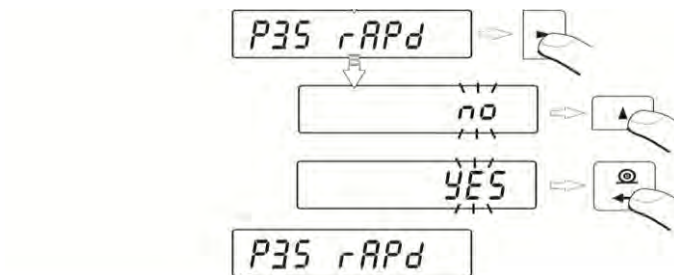
RAPID = YES – (default settings) balance operates with settings specific for software mode “FILL”, and:

- The value of CONF parameter is automatically set to: Fast+rel, independently on previous setting of this parameter;
- The value of AuE parameter is automatically set to: Standard, independently on previous setting of this parameter;
- The value of Stabilization time parameter is automatically decreased (factory setting is decreased by 4). Such parameter setting speeds up the time of stability pictogram ▲▲ appearance on the display.

The values of AuE and CONF parameters are editable if mode rAPd is enabled for setting shorter or longer measurement time.

#### Mode enabling or disabling



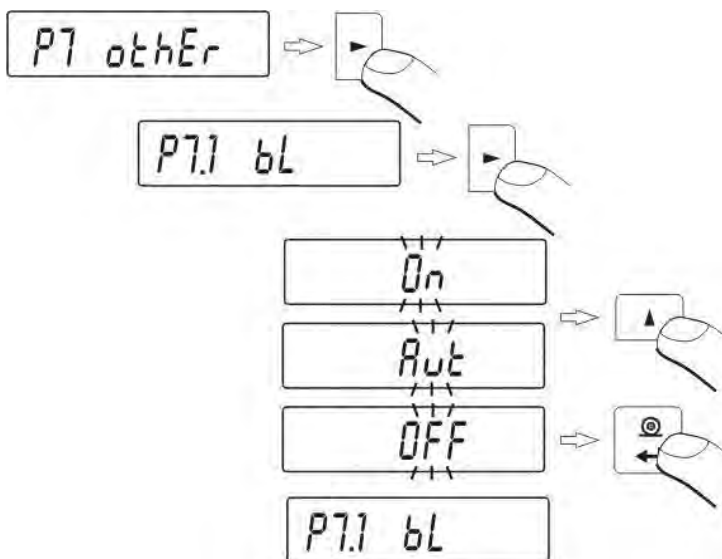


## 11. OTHER PARAMETERS

Balance APPC series features a set of parameters which enable influencing its functionality. The parameters are contained in group: **P7 othEr** and they are: backlight and “beep” signal and printout of all balance parameters through RS 232 port.

In order to edit the above parameters enter menu group **P7 Other**.

### 11.1. Backlight of weighing result (display backlight)



- OFF** – backlight disabled
- On** – backlight enabled
- Aut** – backlight disabled automatically if weighing result does not change within 10 seconds.

**Go back to weighing mode with procedure of saving changes**

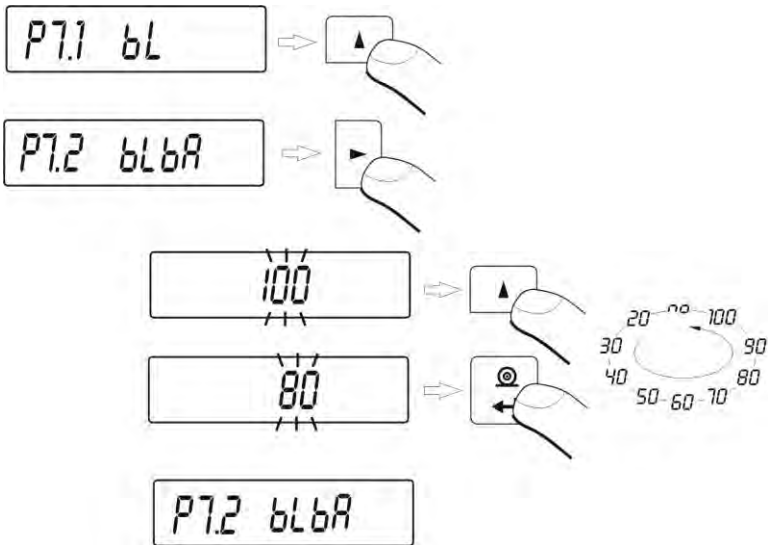
(see point - 8. 2. – return to weighing).

**CAUTION:**



Balance software has implemented option of automatic backlight switch off **bl = Aut.** In case of this setting, the backlight is switched automatically off if weighing results does not change within 10 seconds. Backlight is automatically activated at the moment of weighing result change on balance display.

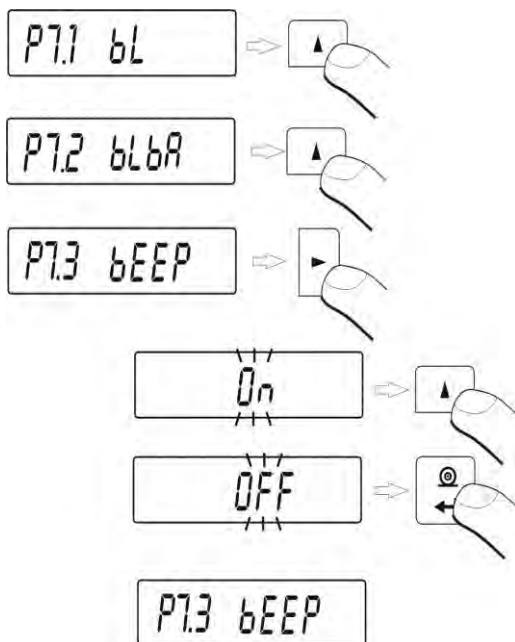
**11.2. Adjusting display brightness**



- 100** - maximum brightness of display backlight
- 20** - minimum brightness of display backlight
- no** - backlight off



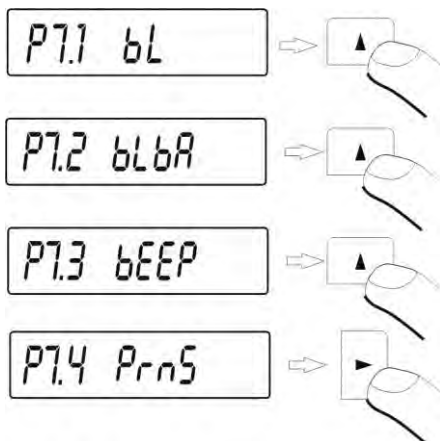
**11.3. "Beep" sound - reaction on pressing function key**



- OFF** - signal of pressing function key disabled
- On** - signal of pressing function key enabled.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. - return to weighing).

**11.4. Printout of all balance parameters through RS 232 port**



After pressing **F** key balance parameters are sent to a peripheral device connected to balance's RS 232 port.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

## 12. BALANCE ADJUSTMENT

As the gravitational acceleration force has different value at various latitudes and altitudes, a balance should be adjusted to present working conditions. This process should take place at the first installation of the instrument on site and at its every re-location – as in case of ambient temperature changes.

In order to ensure the highest weighing accuracy, it is recommended to periodically introduce to balance memory a corrective factor of indications in relation to a mass standard – i.e. balance adjustment.

### Adjustment should be carried out:

- Before the beginning of weighing procedure,
- If long breaks between following measuring series occur
- If temperature inside the balance changes more than: 3°C.

### Types of adjustment:

- Internal automatic adjustment
  - \* triggered by temperature change
  - \* triggered by elapsing time
- Manual internal adjustment
  - \* initiated from balance's keyboard
- Adjustment with external weight
  - \* with declared mass which cannot be modified.



### **CAUTION**

*In case of verified balances (with internal automatic adjustment system) only the automatic internal adjustment and manual internal adjustment system are available for a user.*

*Remember to carry out adjustment process only when there is no load on the weighing pan! In case there is load on the weighing pan, the display will indicate a command **Er1 Hi**. It is comment of unloading the pan.*

*Adjustment process can be aborted if necessary by pressing **Esc/TARE** key.*

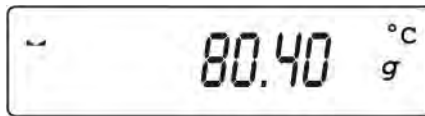
### **12.1. Internal adjustment**

Adjustment process can be initiated automatically or manually.

Manual means of activating adjustment procedure is realized by pressing **CAL** key on balance's keyboard. System of automatic adjustment will carry out the process fully automatically inform the operator on successive process stages.

### **Cycle of automatic adjustment process:**

- balance software detects necessity of carry out adjustment and signalizes it by Celsius degree pictogram or by black colour pictogram on balance display,



- since pictogram occurrence, time interval of 5 minutes is counted within which weighing procedure can be completed,
- as the 5 minutes time elapses, balance display indicates message **CAL\_30** and starts counting down from 30..29..28 to 0 (indicated value is the counter),



- balance user has 30 seconds to make a decision:
  - in order to start adjustment, do not take any actions,
  - in order to complete weighing procedure, press **ESC/TARE** key, If pressed, balance returns to weighing procedure and displays last weighing result. In 5 minutes balance will again indicate **CAL\_30** message
- the adjustment process can be postponed for multiple times, but it needs to be stressed that long postponing of adjustment may be a reason of bigger errors of weighing process. The errors are effect of temperature changes and as a consequence changes of balance sensitivity.

**Automatic adjustment process takes place in three different cases:**

- adjustment on plugging the balance to mains. After approximately 6 minutes from plugging the balance to mains, it automatically initiates adjustment process,
- adjustment triggered by temperature changes. Balance APPC series is equipped with very precise system for monitoring temperature. At each adjustment process, the temperature is saved in system. The next adjustment is automatically initiated if temperature changes more than 3°C from last saved temperature.



- adjustment triggered by elapsing time. It is possible to declare time intervals which are a criteria for balance adjustment. Accessible settings are: adjustment after 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 hours since last carried out adjustment procedure,



**CAUTION**



*Declaring time interval for balance adjustment is available only in non-verified balances. In case of verified balances the time interval between following adjustments is set for 3 hours.*

**12.2. Menu adjustments settings**

**P1 CAL**

P1.1	iCAL		
P1.2	ECAL		
P1.3	tCAL		
P1.4	ACAL		both
P1.5	CALt		1 h
P1.6	CALr		YES

- **P1.1 iCAL – internal adjustment**

Start of internal adjustment process. Adjustment is conducted automatically, and no operator assistance is required. If weighing pan of the balance is loaded, balance will display a command to unload the weighing pan. If weighing pan is loaded with relatively small mass (up to 4 % of balance max capacity) than adjustment process will be carried out automatically, but measuring results may differ by the amount that was present on balance weighing pan.



- **P1.2 ECAL – External adjustment (with an external weight)**

adjustment with external weight, which value is saved in factory menu of balance, function unavailable in verified balances.



balances with internal adjustment



balances with external adjustment

- **P1.3 tCAL – Adjustment test**

mass comparison of internal adjustment weight with its value saved in balance memory.



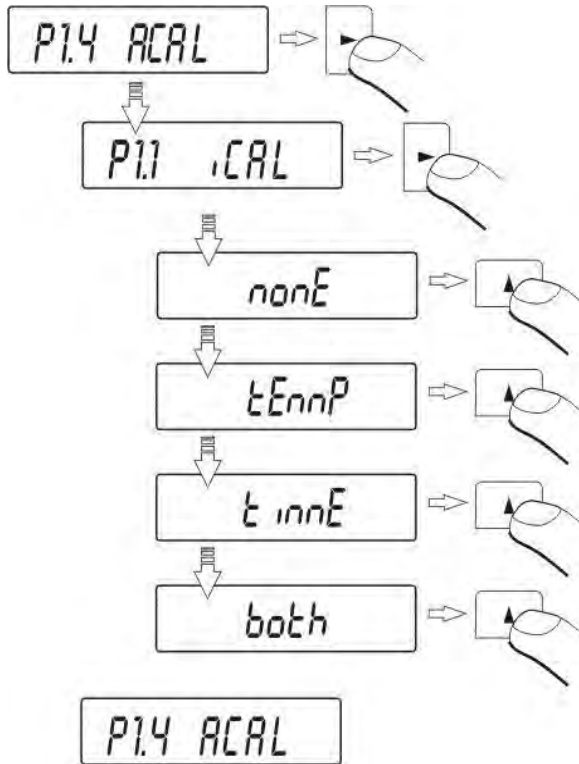
balances with internal adjustment



balances with external adjustment

- **P1.4 ACAL – Automatic adjustment (balance with internal adjustment system)**

determination of factor, which conditions start of automatic internal adjustment.

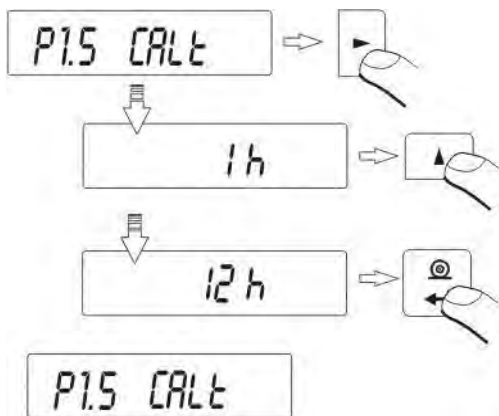


**nonE**  
**tEmP**  
**timE**  
**both**

- none of factors will cause start of adjustment
- adjustment triggered by change of temperature
- adjustment triggered by time interval set in
- adjustment triggered by time and temperature.

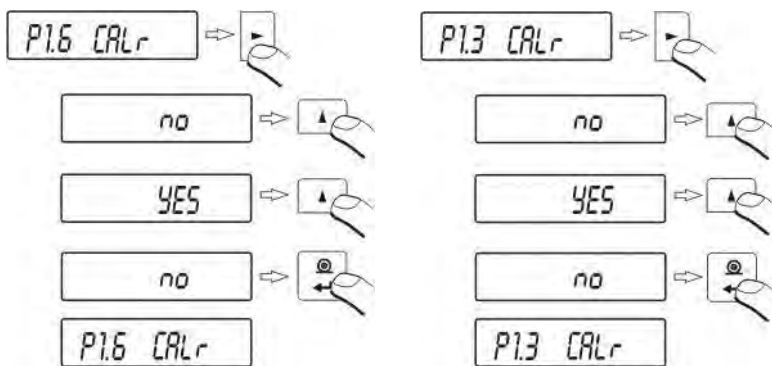
- **P1.5 CALt - Time of automatic adjustment (balances with internal adjustment system)**

Determination of time interval, after which automatic adjustment process is initiated.



- **P1.6 CALr – printout of adjustment report**

Printout activated on completion of automatic adjustment procedure.



balances with internal adjustment

balances with external adjustment

- no** – report printout disabled
- YES** – report printout enabled

**Go back to weighing mode with procedure of saving changes**

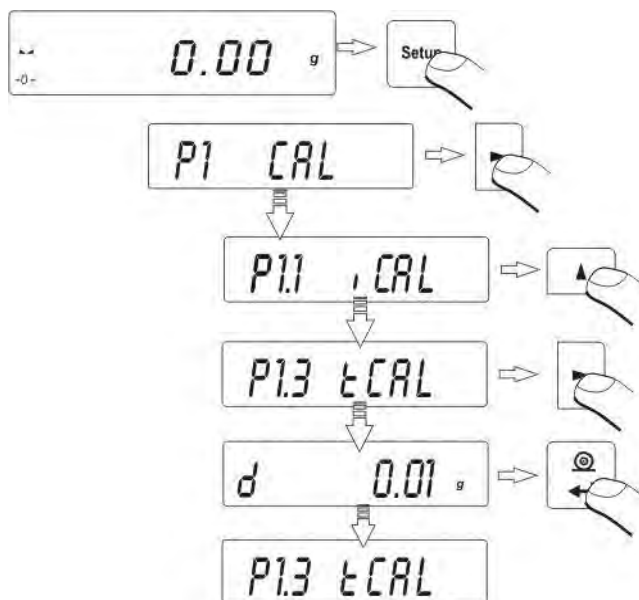
(see point - 8. 2. – return to weighing).



## 12.3. Adjustment test

### 12.3.1. Balances with internal adjustment system

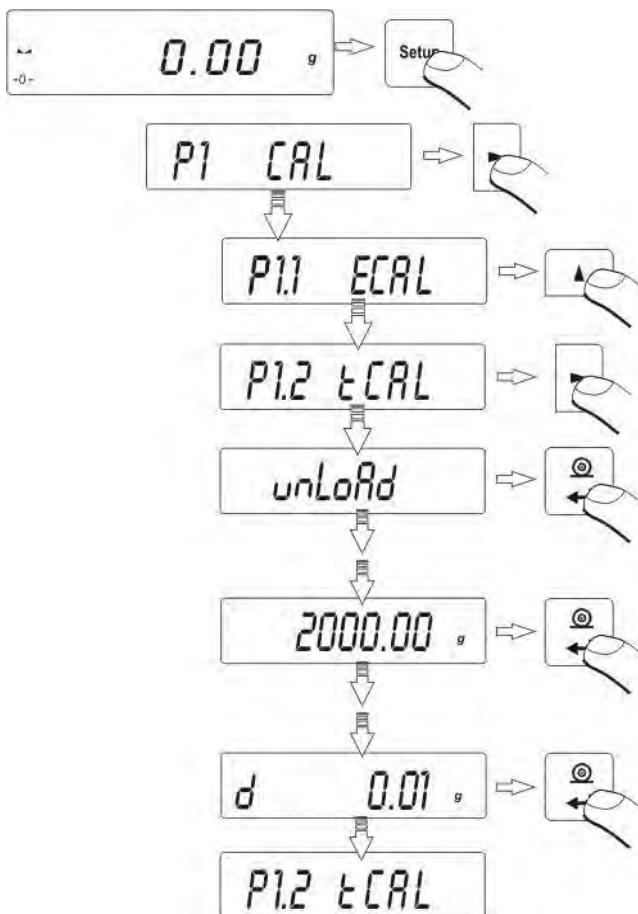
Adjustment test is a comparison of internal adjustment weight with its value stored in balance's memory. This process is automatic and its result is shown on the display (if a balance is connected to a computer or a printer through RS 232 socket, data on adjustment test is printout). Press **ESC/TARE** key to return to previous display.



**Go back to weighing mode with procedure of saving changes (see point - 8. 2. – return to weighing).**

### 12.3.2. Balances with external adjustment system

It is mass comparison of external adjustment weight with its value stored in balance's memory during adjustment process. This process is automatic and its result is shown on the display (if a balance is connected to a computer or a printer through RS 232 socket, data on adjustment test is printout). Press **ESC/TARE** key to return to previous screen.

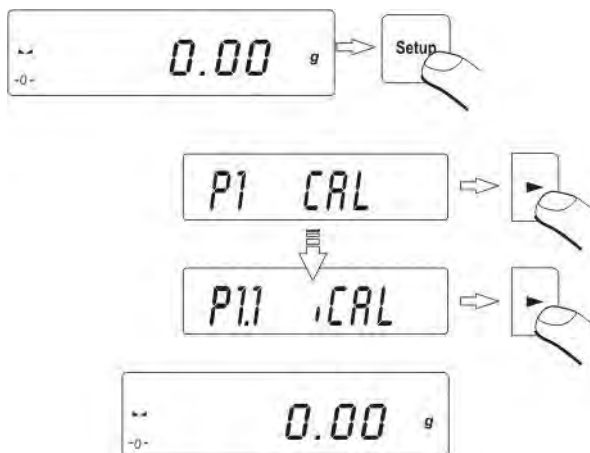


**Go back to weighing mode with procedure of saving changes (see point - 8. 2. – return to weighing).**

## 12.4. Manual adjustment

### 12.4.1. Internal adjustment

Press **Cal** key or follow below guidelines



The balance performs internal adjustment automatically. During adjustment process do not load the weighing pan with any load.

On completion of adjustment process, balance saves its result in memory and returns to weighing mode.

#### **CAUTION:**

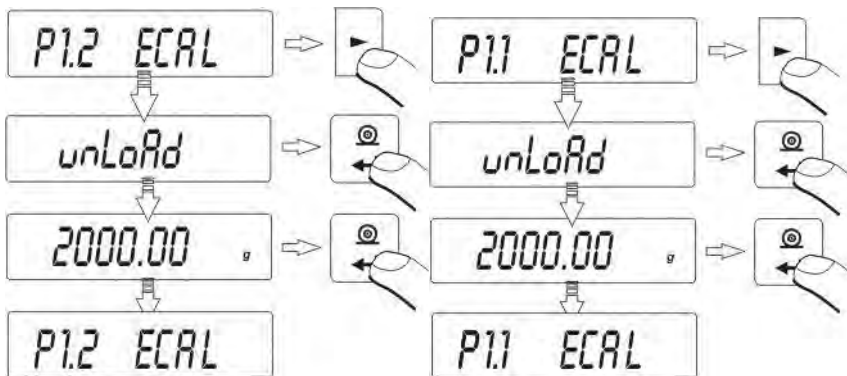


- Press **ESC/Tare** key to abort adjustment process
- If during adjustment process, weighing pan of a balance is loaded, than balance display will show order informing on error occurrence. Adjustment process will be stopped. As weighing pan is unloaded, the adjustment process will continue and complete.

### 12.4.2. External adjustment

External adjustment in balances APPC series should be carried out with an external mass standard / weight class F<sub>2</sub>

Start of external adjustment process,



Balances with internal adjustment

balances with external adjustment

Balance will display a command ordering unloading of weighing pan **unLoAd** (weighing pan should be empty). When weighing pan is unloaded, press **PRINT** key. The balance determines mass of empty pan. Place an external adjustment weight with mass determined on balance's display and press **PRINT** key. On completing adjustment process the balance returns to submenu.

#### Go back to weighing mode with procedure of saving changes

(see point - 8. 2. – return to weighing).



If a balance is verified, then user does not access to carrying out external adjustment process.

### 12.5. Adjustment report printout

On completion of any type of adjustment process, the balance enables preparing a report from adjustment process. The report can be printed on a connected printer and sent to a computer and saved in a form of file for records. Printout process is described in details in point 9.2 of this user manual. The user can select between two options.

- no** – report is not printed
- YES** – report is printed

Remember, that if the parameter is set for **YES**, then a report is generated and sent automatically.

Content of report from adjustment process depends on settings of GLP parameters. Any option in the GLP submenu which attribute is YES is included in a report from adjustment process.

## **P2 GLP – Good Laboratory Practice**

P2.1	uSr		
P2.2	PrJ		
P2.3	Ptin		YES
P2.4	PdAt		YES
P2.5	PuSr		YES
P2.6	PPrJ		YES
P2.7	PId		YES
P2.8	PFr		YES

Apart from information set in menu group the report contains:

- Mass of adjustment weight stored in balance's memory from last carried out adjustment;
- Mass of adjustment weight determined in current adjustment process;
- Adjustment deviation, i.e. difference between the two mass records.

```

*** Automatic calibration report ***
Date   : 09/02/2007
Time   : 11:21:39
User Id : 12345678
Project Id: 87654321
Balance Id: 114493

Calibr. : Automatic
Difference: - 0.02 g

Name .....

```

### 13. DETERMINING CONTENT OF A PRINTOUT FOR GLP PROCEDURE

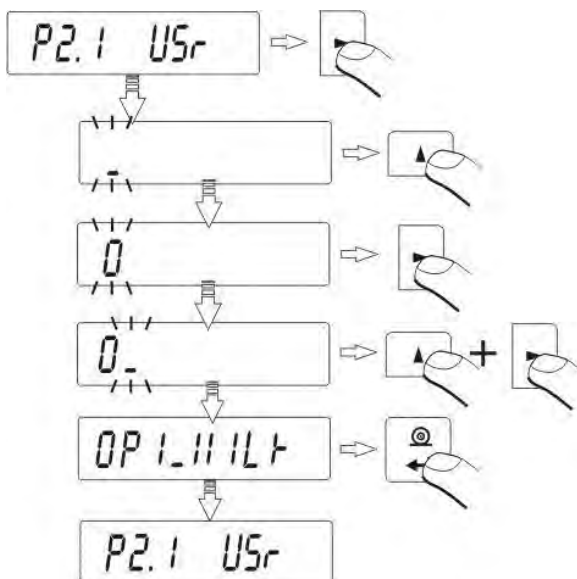
**P2 GLP** is group of the parameters which enables declaring variables that are present on an adjustment printout and printout activated after a measurement.

#### P2 GLP

P2.1	USr		
P2.2	PrJ		
P2.3	Ptin		YES
P2.4	PdAt		YES
P2.5	PUSr		YES
P2.6	PPrJ		YES
P2.7	PId		YES
P2.8	PFr		YES

- **P2.1 USr**

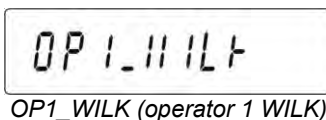
The parameter enables determining name of a operator who works with the balance. User name contains maximally 8 alphanumeric characters. The name is inserted using **navigating arrows (keys)** on balance's keyboard and **PRINT** key.



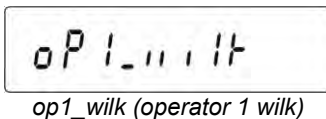
Accessible characters and their equivalents displayed by a balance:

-	0	1	2	3	4	5	6	7	8	9		
0	1	2	3	4	5	6	7	8	9			
A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
a	b	c	d	e	f	g	h	i	j	k	l	m
n	o	p	q	r	s	t	u	v	w	x	y	z

An instance of a user name inserted to a balance using capital letters takes below form:



An instance of a user name inserted to a balance using small letters takes below form:



- **P2.2 PrJ**

The parameter enables determining name of a project (e.g. related to a specific type of weighing process).

An instance of project name inserted to a balance using capital letters takes below form:



An instance of project name inserted to a balance using small letters takes below form:



*prradwag*

- **P2.3 Ptin**

Option determining presence of measurement time on a printout (data on measurement time is acquired from a connected printer).

- **P2.4 PdAt**

Option determining presence of measurement date on a printout (measurement date is acquired from a connected printer).

- **P2.5 PUSr**

Option determining presence of user name on a printout.

- **P2.6 PPrJ**

Option determining presence of project name on a printout.

- **P2.7 PId**

Option determining presence of balance factory number on a printout.

- **P2.8 PFr**

Option enabling printing frames on a printout.

For above parameters please select one of two available settings:

**no** – variable absent on a printout

**YES** – variable present on a printout

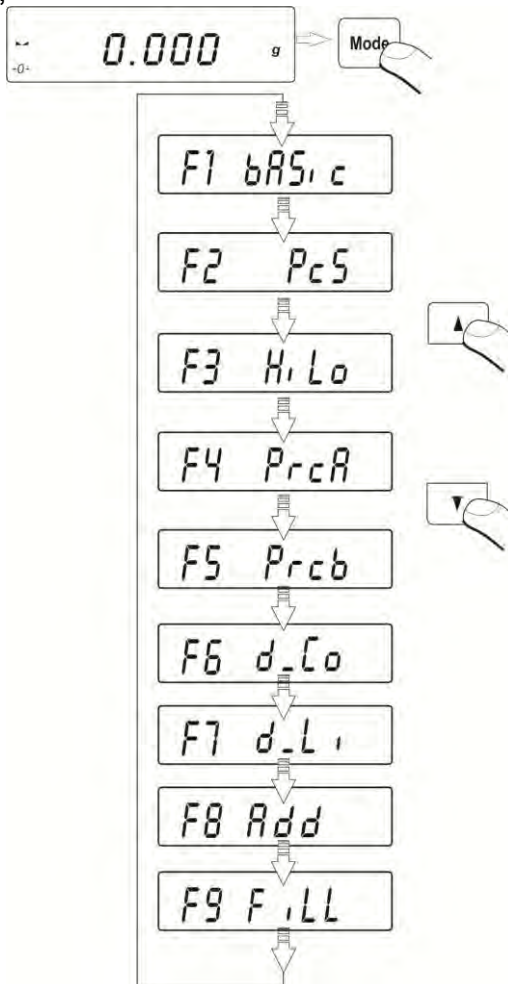
**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).





## 14. BALANCE WORKING MODES

- Weighing mode - **bASic**
- Parts counting - **PcS**
- Checkweighing - **HiLo**
- Percent setup with reference mass – **PrcA** or **PrcB**
- Density determination of solids - **d\_Co**; Density determination of liquids - **d\_Li**.
- Totalizing – **Add**
- Working mode - **FiLL**

Press **MODE** key,

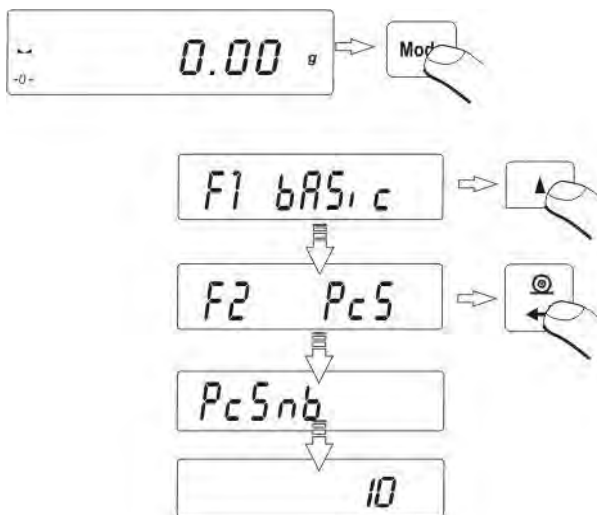


Pressing **MODE** key causes displaying the first of available modes. Each next pressing of  or  key causes displaying name of next available mode. The way of setting a working mode is described in further section of this manual.

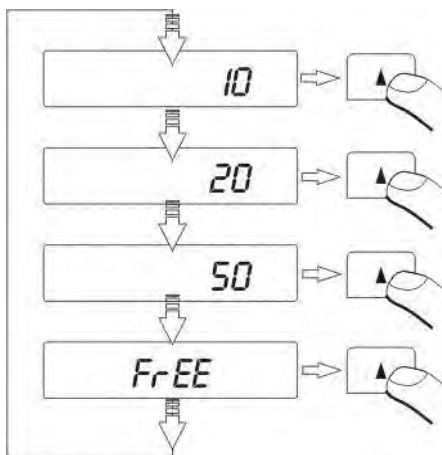
### 14.1. *Parts counting of the same unit mass*

Balance in its standard version is equipped with an option for counting parts and small objects of the same unit mass. Parts counting mode does not cooperate with other working modes of balance APPC series.

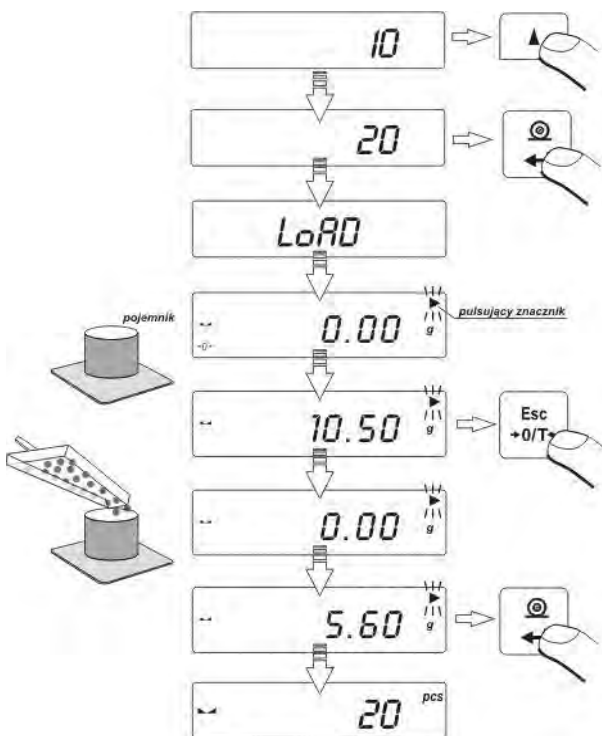
- Enable **PcS** mode,



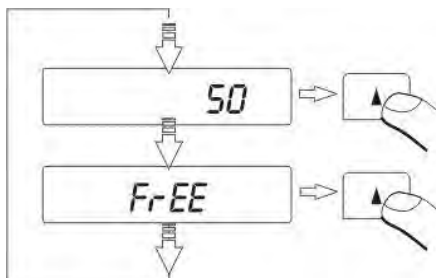
- Press  key to set sample quantity: **10**, **20**, **50** or **FrEE**,




- in order to select one of the options, e.g. 20 pcs press **ENTER/PRINT** key and as the display indicates value “20” proceed as shown on below figure,




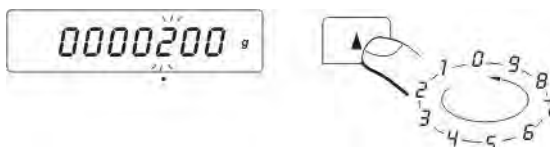
- If option **FrEE** (sample quantity is declared by a user) is selected, insert sample quantity used for determining mass of single part,



Press  key to select a digit to be altered,



Use  key to select digit value,



- Accept inserted value by pressing **PRINT** key,
- Display indicates a command **LoAd** – load the weighing pan with as many details as inserted while determining sample quantity,

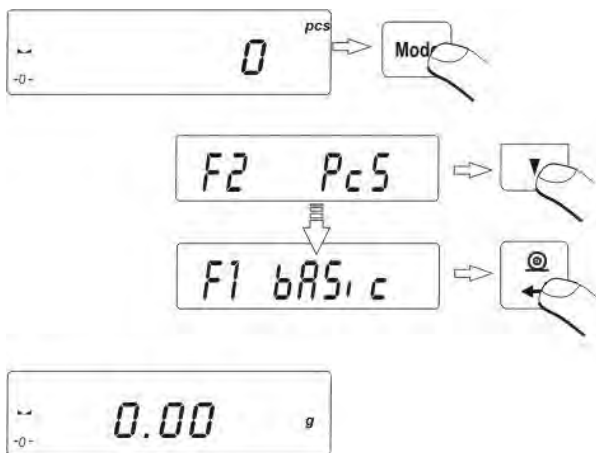
LoAd

- Press **PRINT** key – balance indicates sample's quantity (**pcs** pictogram is visible on the display),


200 pcs

- add remaining parts, the display indicates their total quantity.

## Return to weighing

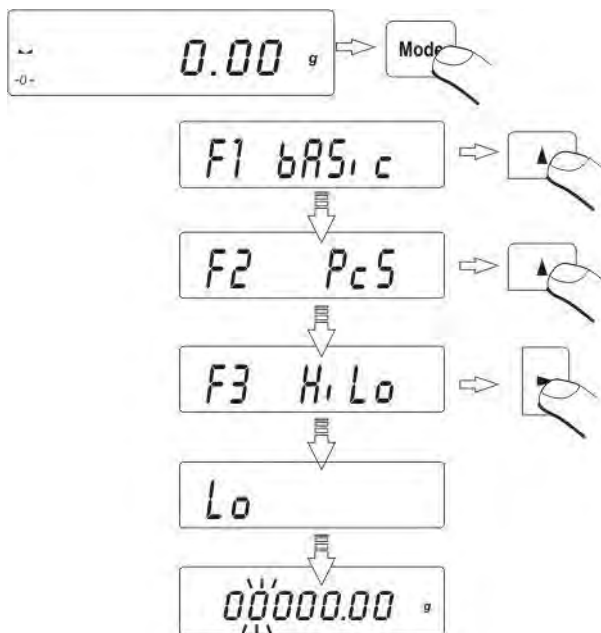


### CAUTION:

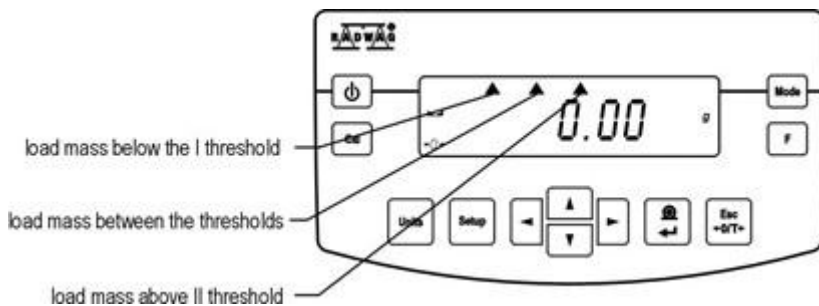
While determining sample quantity, and before accepting it, it is necessary to wait until stable measurement pictogram  is displayed. Only if visible on balance's display, it is allowed to accept the declared quantity of parts by pressing **PRINT** key. Otherwise balance will not accept the measurement.

## 14.2. Checkweighing (HiLo) with reference to set standard

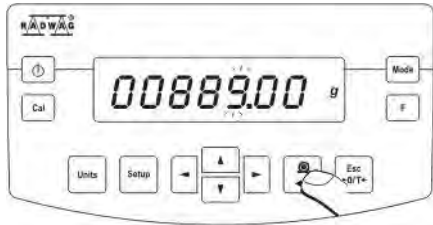
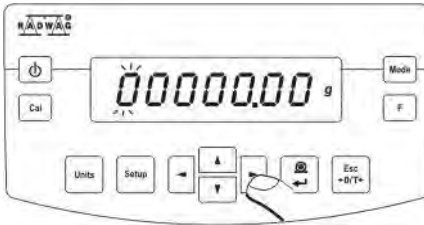
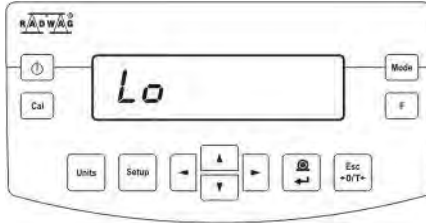
- Enter the checkweighing mode,



During setting limit values the following relations occur:



## SET LOW LIMIT (LOW THRESHOLD)



- digit selection;

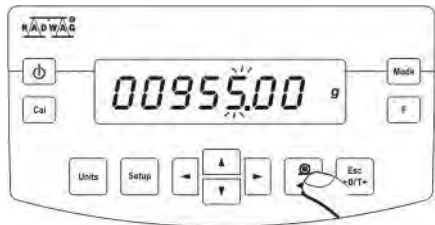
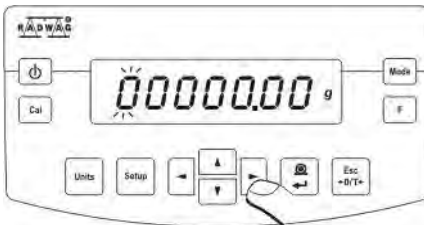
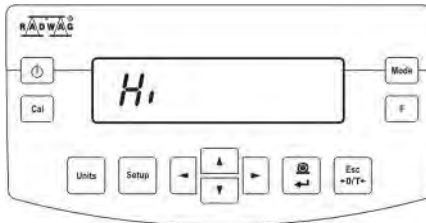


- set digit value;



- accept inserted digit value

## SET HIGH LIMIT (HIGH THRESHOLD)



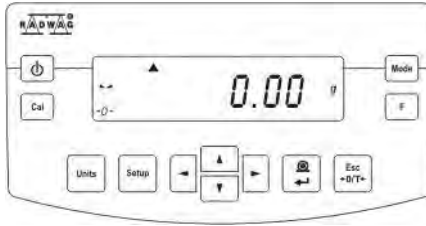
- digit selection;



- set digit value;



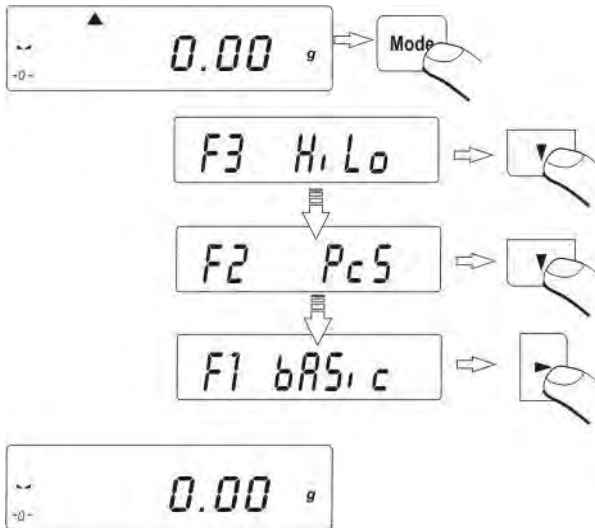
- accept inserted digit value



**CAUTION:**

*If by mistake the value of low threshold is set higher than high threshold, balance will indicate error message and return to weighing.*

**Return to weighing:**



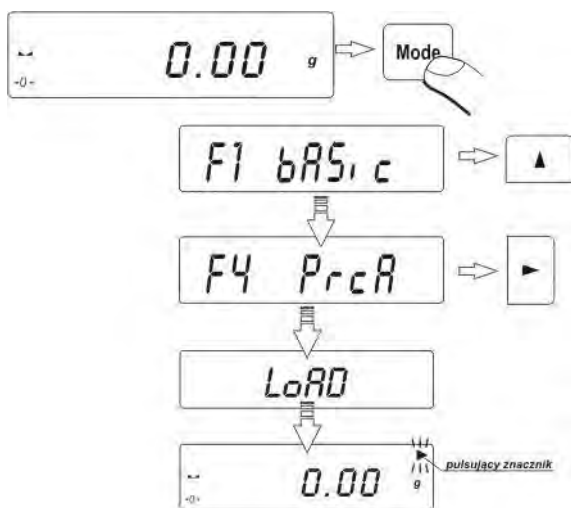


### 14.3. Percent setup with reference mass

Balance software enables controlling deviation (in %) of weighed loads with determined reference mass. Mass of a reference load can be determined by its weighing (**PercA**) or entered to balance memory by a user (**PercB**).

#### 14.3.1. Reference mass determined by weighing

- Enter the **PrcA** mode:

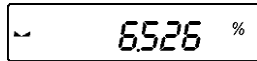


- on balance weighing pan place a load which mass will be accepted as the reference,
- press **PRINT** to accept this working mode,



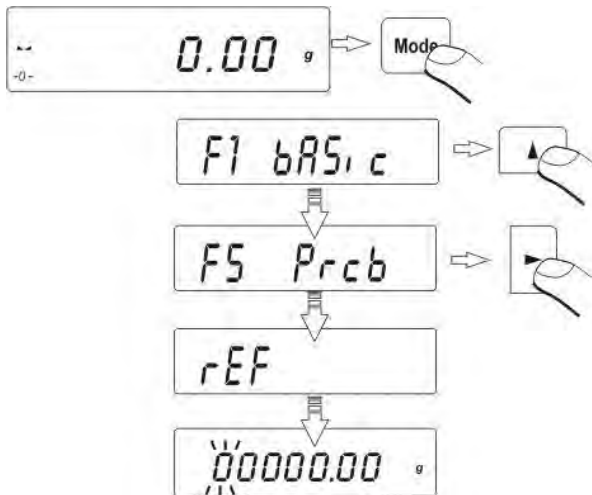
- after few seconds indication **100,00%** will be displayed.

From now on the display will not indicate mass of weighed load but deviation of mass placed on the pan in relation to the reference (in %).



### 14.3.2. Reference mass inserted to balance memory by a user

- Enter the **PrcB** mode:

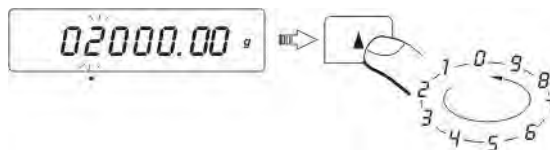


- Display will indicate as above,
- Using function keys:

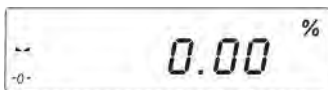
Select a digit



Select digit value

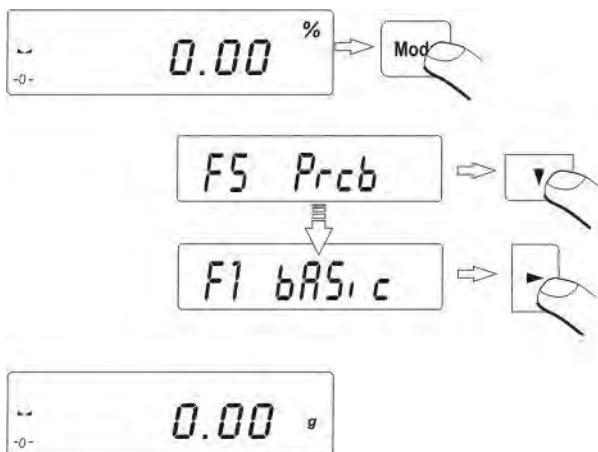


- Determine the **value of reference mass**, insert it to balance memory and accept it by pressing **PRINT** key – display will indicate: **0,00 %**



From now on the display will not indicate mass of weighed load but deviation of mass placed on the pan in relation to the reference (in %).

### Return to weighing



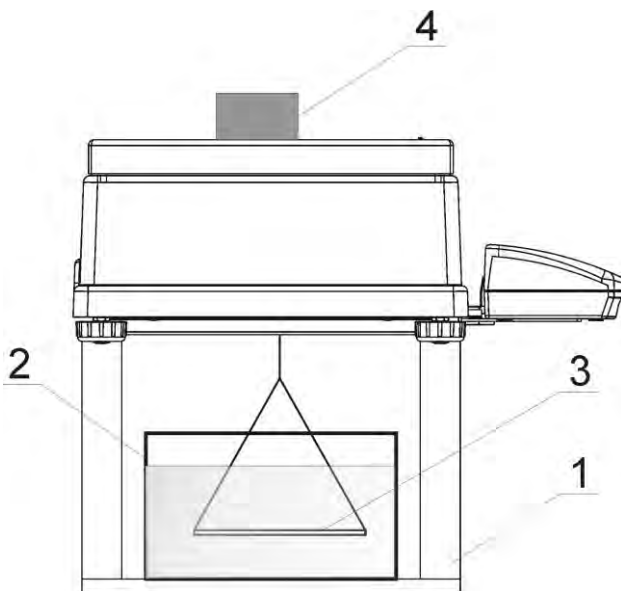
#### **14.4. Density determination of solids and liquids**

The software enables determining density of solids (with determined dimensions) and liquids.

Before carrying out density determining process, it is necessary to place a balance on a dedicated rack which provides access to assembling a hook in the bottom section of the balance (the rack is additional equipment of a balance, and it is manufactured on individual client's order). Using the opening in the bottom of balance's housing dedicated for under hook weighing assembly a special weighing pan for density measurement process (the pan for density determination is additional equipment of a balance, and it is manufactured on individual client's order). Assembling procedure is provided in point 17 of this user manual.

Additionally, use a vessel for water to test density of a solid or liquid.

An example of a density determining kit assembled on a balance APPC series:



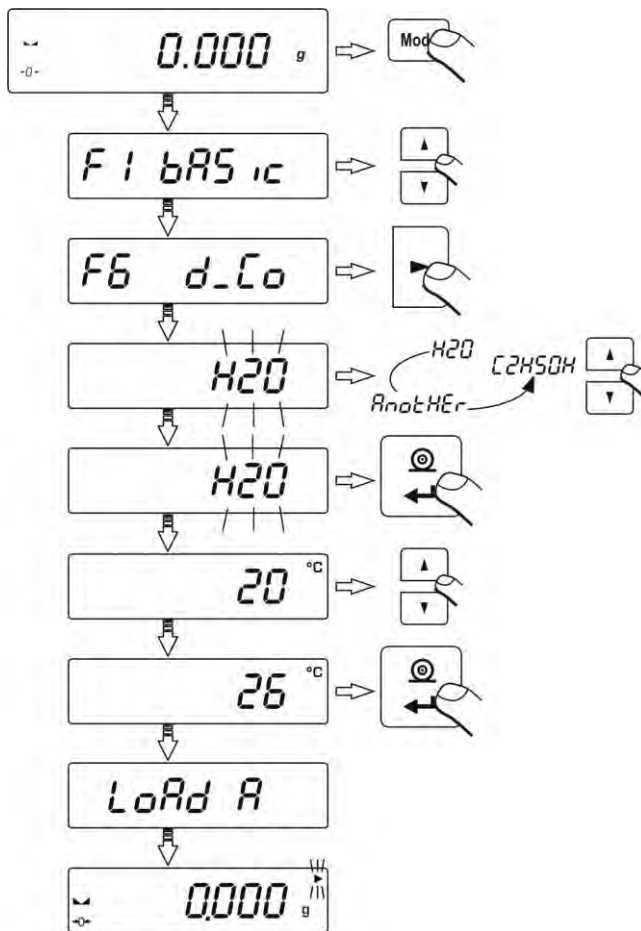
1. Rack
2. Vessel with liquid of determined density
3. Weighing pan
4. Tested sample

*Caution: the density kit presented above is additional equipment of a balance APPC series and it is supplied only on client's individual order).*

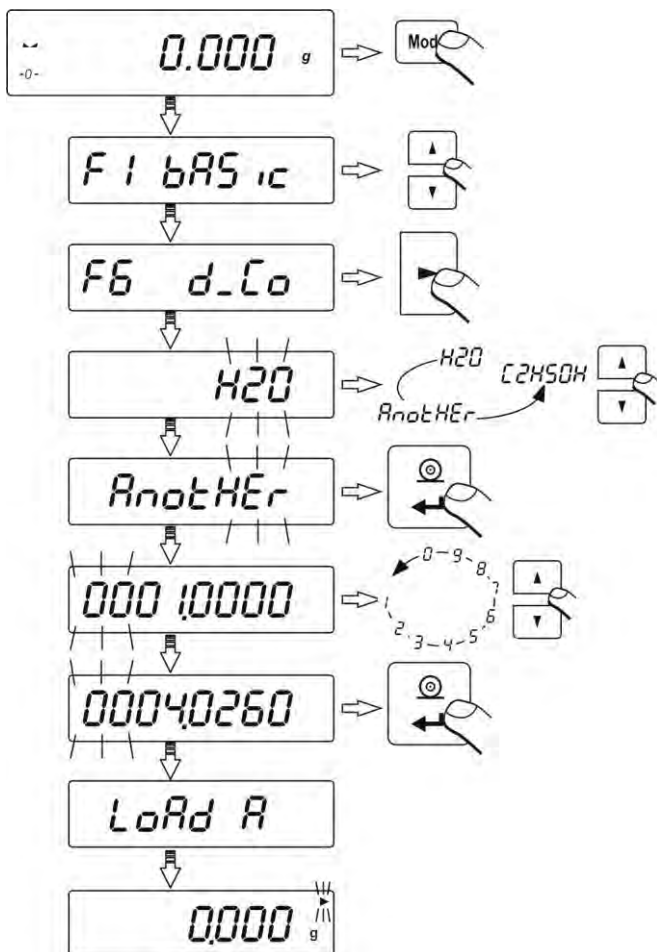
### 14.4.1. Density determination of solids

Procedure:

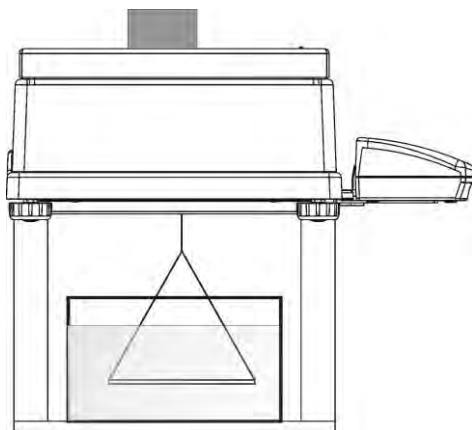
- Press **Mode** key, then use navigating arrows to select submenu **F6 d\_Co**,
- Select one of the 3 available liquid types **H2O** (distilled water), **C2H5OH** (spirit 100% ± 0.1% in temp. 20°C) or **Another** (other liquid with known density),
- for **H2O** and **C2H5OH**, give liquid temperature value and follow instructions given on below figure:



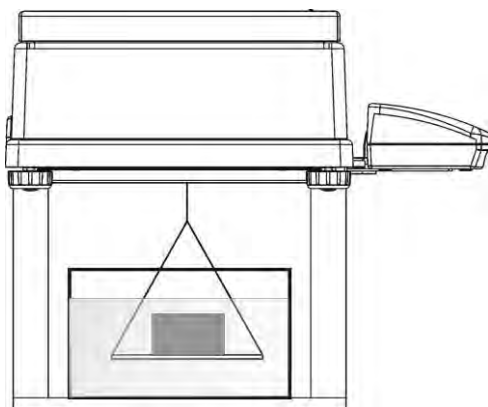
- For selected liquid: **Another**, give liquid's density and follow the instructions given on below figure:

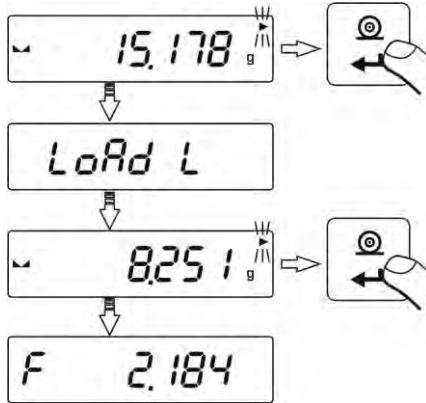


- After selecting liquid type the balance displays command **Load A** and zero indication (if indication on balance's display is other than zero, press **ESC/ZERO/TARE** key),
- Then load the sample on the top weighing pan (as indicated on below figure), and weigh the sample in the air:



- When the balance displays stability marker press **Print/Enter** key,
- When the balance displays command **Load L** – load the sample on the bottom weighing pan of the density kit (in the liquid). After displaying stability marker press **Print/Enter** key,



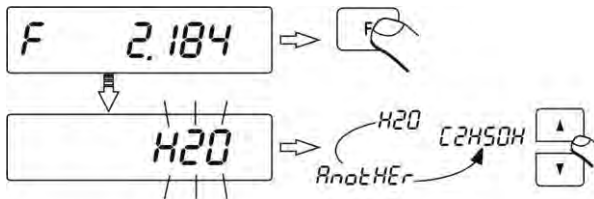


- The balance displays density measurement result expressed in  $[g/cm^3]$ .

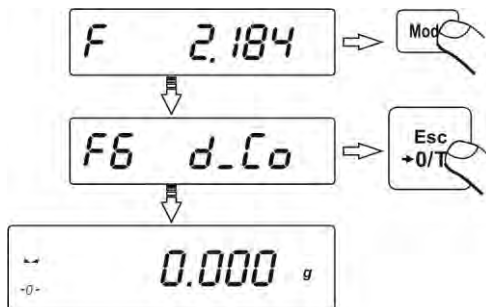
**CAUTION:**

*Pay special attention to presence of air bubbles during measuring process. If air bubbles are on sample's surface during measuring process, they may be a source of unreliable measurements.*

To carry out repeated liquid selection, press **F** key:

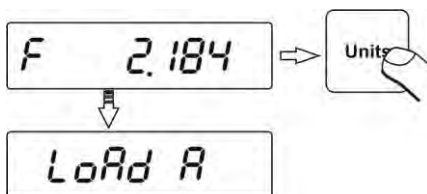


To return to weighing mode press **Mode** key, and then **Zero/Tare** key:





In order to weigh a sample again, press **Units** key:

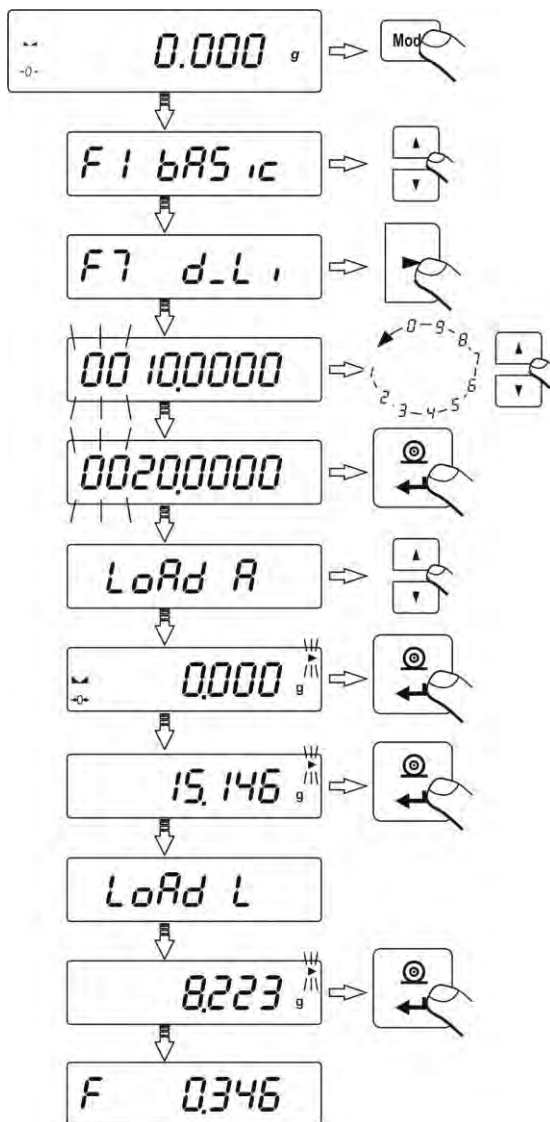


#### 14.4.2. Density determination of liquids

Basic element for determining density of liquids is a glass sinker with precisely determined volume. Before starting liquid density determination, insert the value of sinker's volume to balance memory. In order to measure the density of liquid, first determine mass of the sinker in the air. Then measure mass of the same sinker in tested liquid.

Procedure:

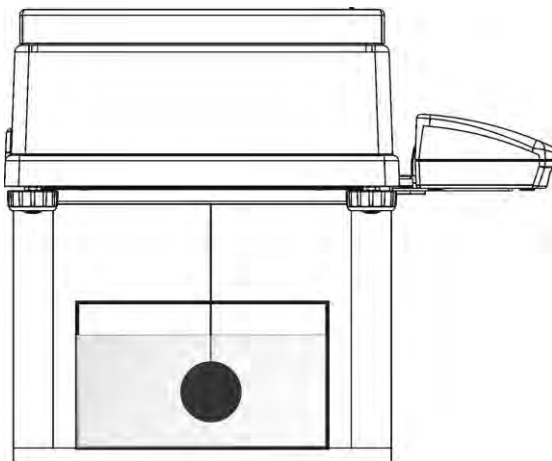
- Press **Mode** key, then using navigating arrows go to submenu **F7 d\_Li**,
- Insert sinker's volume that is specified on its hook,



- After inserting sinker's volume and storing the data in balance's memory (using **Print/Enter** key), balance's display indicates a command **Load A** and zero (if the indication is other than zero, press **ESC/ZERO/TARE** key),
- Hang the sinker on the density kit and in the air to determine its mass in the air,



- When the balance indicates stable measurement pictogram press **Print/Enter** key,
- As the display indicates a command **Load L** – place the beaker with tested liquid on the rack's basis under the balance and hang the sinker on the hook. The sinker has to be fully immersed in the tested liquid,

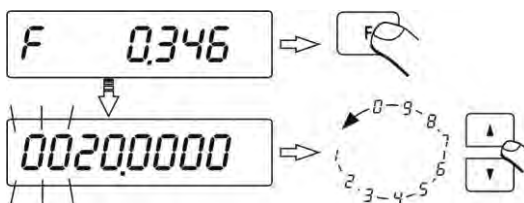


- Then determine the density measurement result by pressing **Print/Enter** key; the balance indicates the density of tested liquid in  $[g/cm^3]$ .

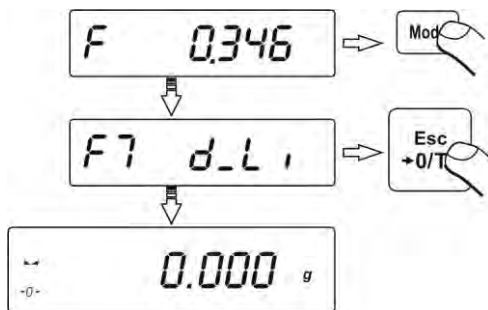
**CAUTION:**

*Pay special attention to presence of air bubbles during measuring process. If air bubbles are on sample's surface during measuring process, they may be a source of unreliable measurements.*

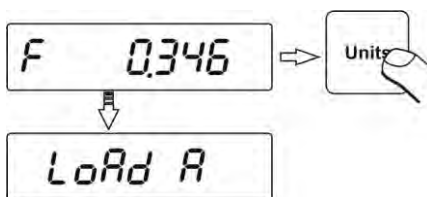
To repeat inserting sinker's volume procedure press **F** key:



To return to weighing mode press **Mode** key, and then **Zero/Tare** key:



In order to once again weigh the sinker in the air press **Units** key:



## 14.5. Totalizing

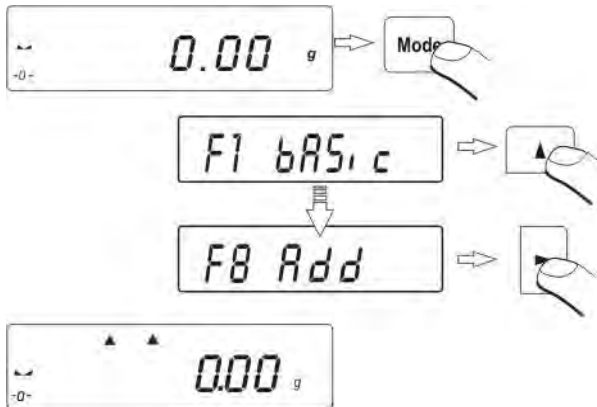
Totalizing mode is basically adding the following components in order to prepare a mixture. After adding following component of the mixture, the balance totalizes mass of the mixture and exposes its total mass on the display. During totalizing process mass of each added component is sent through RS232 interface to a connected computer or a printer (e.g. Kafka printer).



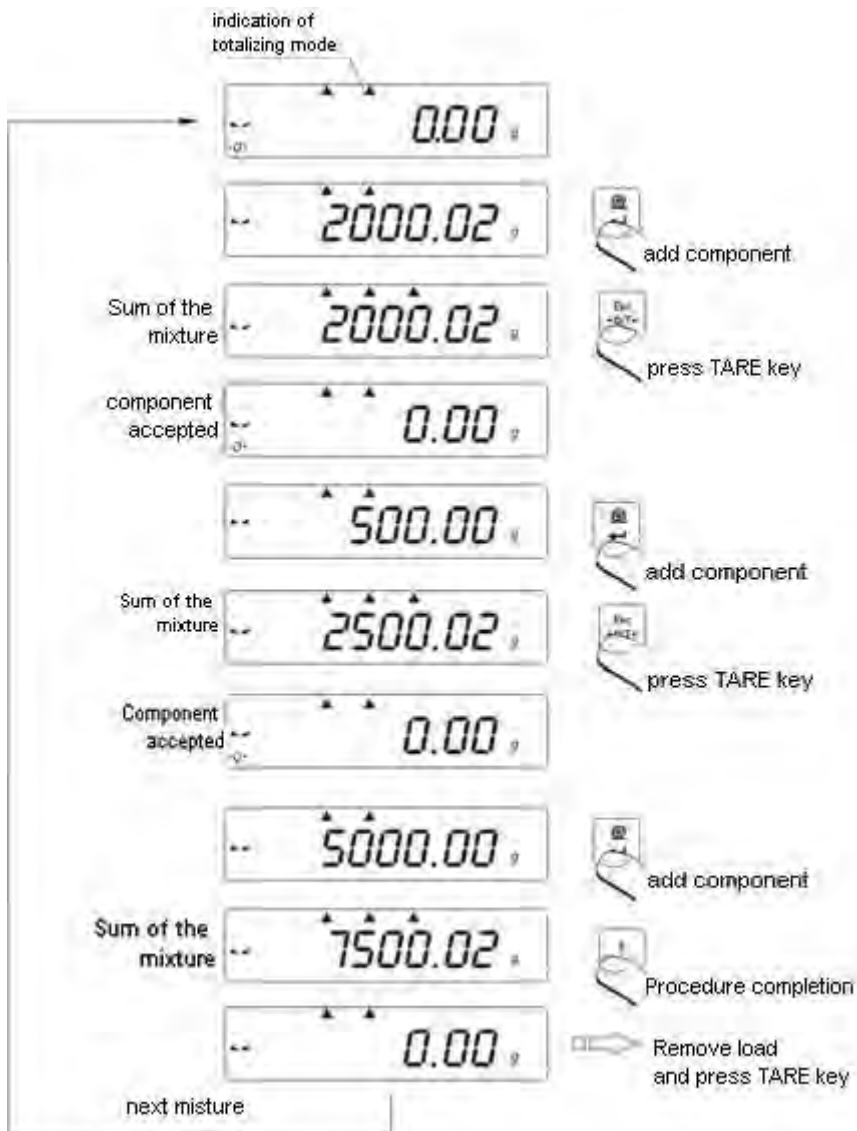
### CAUTION

*Totalizing mode functions only in grams.*

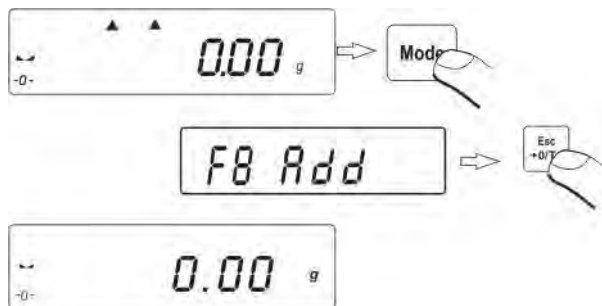
Enter the working mode **Add** (Totalizing):



Black pictograms indicate that the working mode “Totalizing” is enabled.



## Return to weighing mode



## 14.6. Working mode FILL

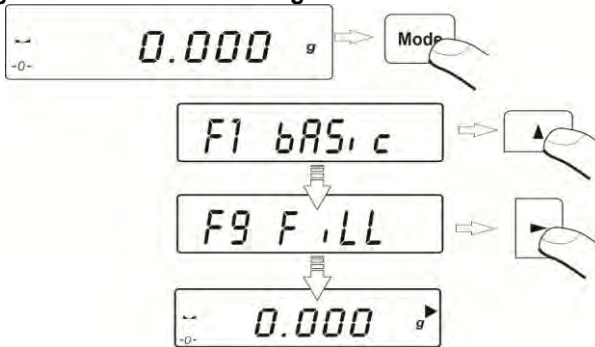
Working mode FiLL enables two settings:

FiLL = NO – mode disabled, i.e. not available in the working modes.

FiLL = YES – mode enabled, i.e. available in the working modes.

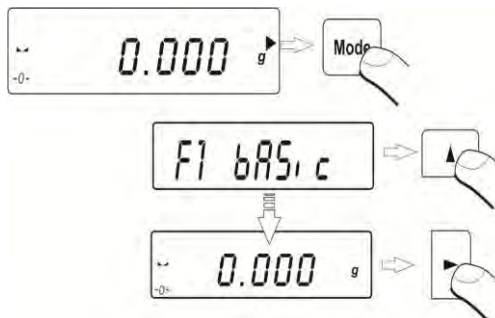
If FiLL is enabled, then the balance operates with settings, that are stored in balance's settings as default and ensuring quicker operation. The settings automatically decrease Autozero range to 1 reading interval. Mode activation is signaled by a black triangle pictogram visible on display's right hand side (and above the measuring unit). Working mode FiLL is set to YES as default, thus it is accessible in the working modes. The mode can be disabled from the working modes by setting it to NO. To disable FiLL mode, set availability of working mode FiLL to NO in balance's menu.

### Enabling FiLL mode in the working modes



The balance operates in accordance with the settings of AUE and CONF options. The options enable setting shorter or longer measurement time.

### Disabling FiLL mode



On disabling FiLL mode, the measurement are carried out in accordance with user settings.



## 15. RS 232 FUNCTIONS

### P4 Print

P4.1	bAud		4800
P4.2	CntA		YES
P4.3	CntB		YES
P4.4	rEPI		YES
P4.5	PStb		YES
P4.6	Lo		0.005

P4.1 **bAud** - baud rate setting (speed of transmission)

P4.2 **CntA** - continuous data transmission in basic measuring unit

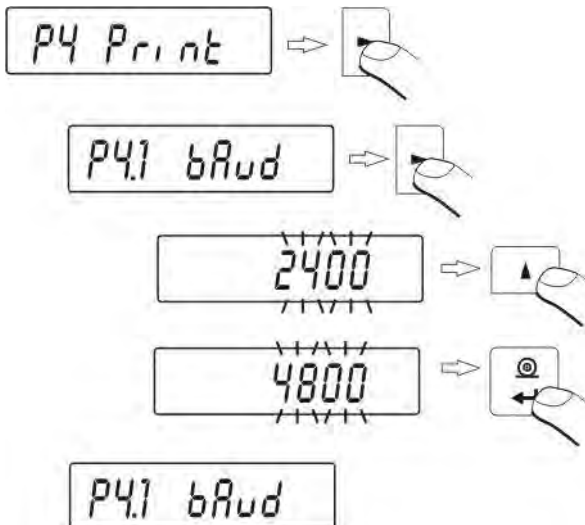
P4.3 **CntB** - continuous data transmission in current measuring unit

P4.4 **rEPI** - setting operation mode for RS 232 output (manual / automatic)

P4.5 **PStb** - stable / unstable measurement for RS 232 transmission

P4.6 **Lo** - minimal mass required for activation of automatic printout

### 15.1. Baud rate



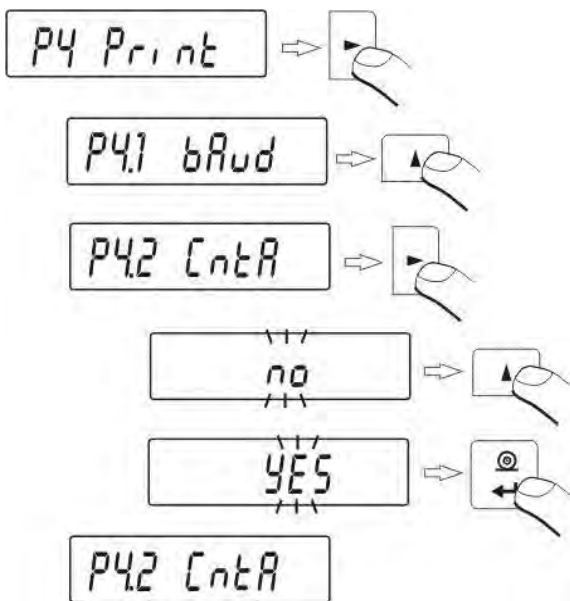
Select required baud rate value

- 2400 bit/s
- 4800 bit/s
- 9600 bit/s
- 19200 bit/s.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

## 15.2. Continuous transmission

### 15.2.1. Continuous transmission in basic measuring unit

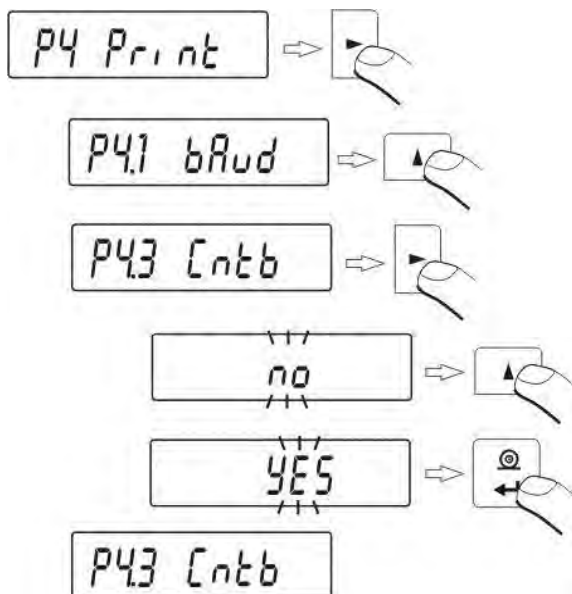


**no** – continuous transmission disabled

**YES** – continuous transmission enabled.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

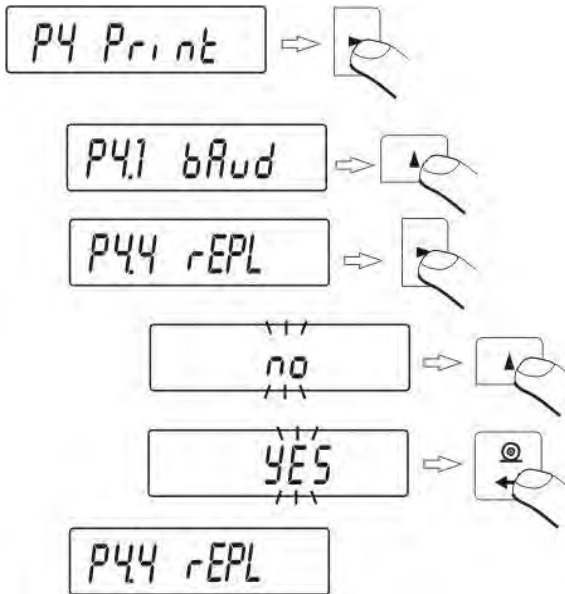
## 15.2.2. Continuous transmission – in current measuring unit



**no** – continuous transmission disabled  
**YES** – continuous transmission enabled.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

### 15.3. Setting operation mode for RS 232 interface



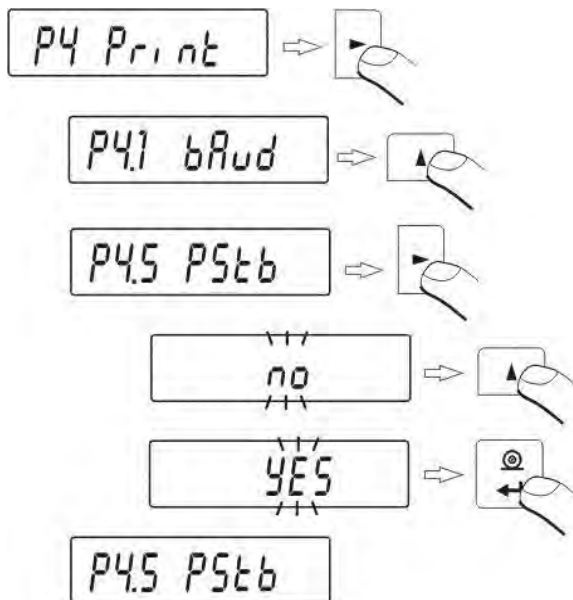
- no** - manual operation (enabled on pressing **PRINT** key)  
**YES** - automatic operation (enabled on stabilization of weighing result).

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

**Automatic operation takes place according to the following scheme:**

- press **Esc/TARE** key to zero the balance (display will indicate pictograms of stable measurement  $\blacktriangle\blacktriangle$  and precise zero  $\text{0}^*$ )
- place the load, balance will send first stable measurement through the RS232 interface
- remove the weighed load from the weighing pan,
- next measurement can be conducted if a weighing result equals +/- 50 reading units from zero (it is not necessary to reach precise zero to start another measurement).

**15.4. Determination of data type sent through RS 232 output**

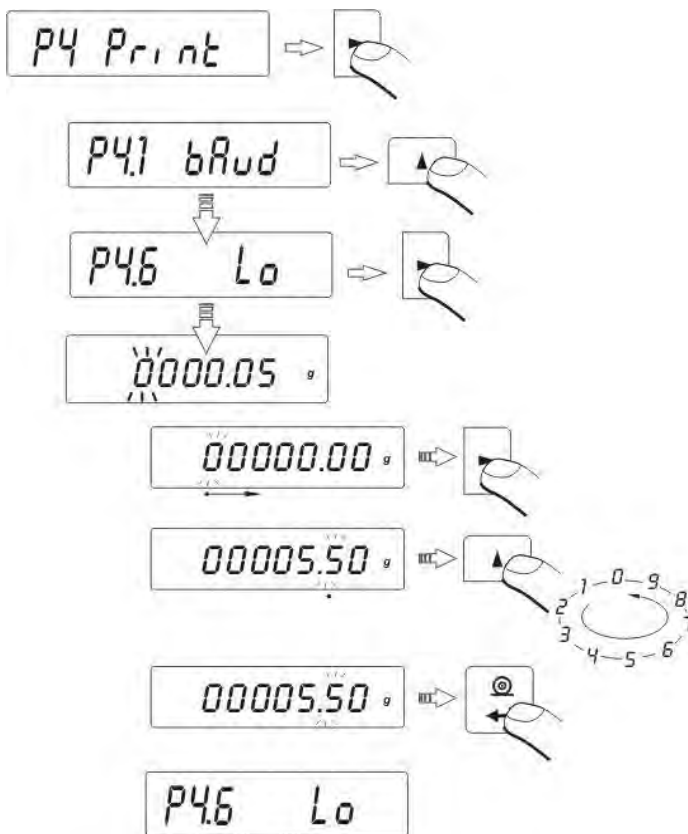




- no** - sending stable or instantaneous (unstable) measuring result
- YES** - sending stable weighing result.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).

### 15.5. Minimal mass required for activation of automatic printout

Balance software is equipped with a function for setting **automatic operation**. While in automatic operation, data will not be transmitted through RS 232 to a connected computer or printer until mass reading is above **Lo** value.

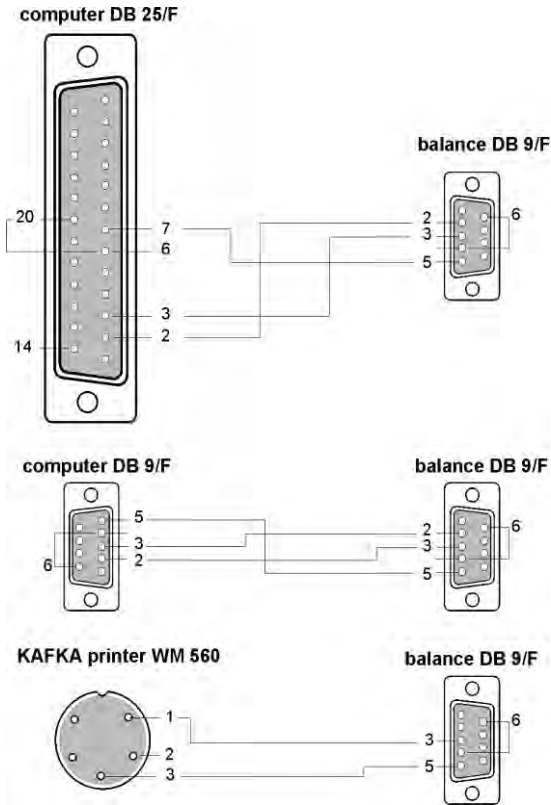


- Press  key to select a digit which should be changed;
- Press  key to change value of selected digit.

**Go back to weighing mode with procedure of saving changes**  
(see point - 8. 2. – return to weighing).



## 16.1. Cross-section through connecting conductors



### BALANCE

2 (RxD)  
 3 (TxD)  
 4 (DTR)  
 5 (GND)  
 6 (DSR)  
 7 (RTS)  
 8 (CTS)

### COMPUTER

3 (TxD)  
 2 (RxD)  
 6 (DSR)  
 5 (GND)  
 6 (DTR)  
 8 (CTS)  
 7 (RTS)



## 16.2. *Printing date with specified date and time*

Every weighing result can be printed with specification of measurement date and time. The presence of date and time on a printout is conditioned by connection of printers type **Kafka 1/Z** or **Kafka SQ S** to a balance.

When connected, go to balance menu and set parameters from group **P2 GLP**:

**PdAt**                - **YES**  
**Ptin**                - **YES**

## 16.3. *Cooperation with statistic printer Kafka SQS*

On connecting a statistic printer **KAFKA SQ S** to a balance, it is possible to carry out statistics from completed measurements. An instance of a printout including statistics from series of measurement:

1	9:02:15	+	7.0016	g
2	9:02:39	+	5.0152	g
3	9:02:58	+	12.0171	g
4	9:03:15	+	9.9937	g
5	9:03:34	+	12.0169	g
6	9:03:48	+	22.0111	g

Date 13.09.2001 Time 9:04

<i>n</i>	6		<i>number of samples</i>
<i>sum x</i>	68.0556	g	<i>total mass of samples</i>
$\bar{x}$	11.34260	g	<i>average value</i>
<i>s</i>	5.92328	g	<i>standard deviation</i>
<i>srel</i>	52.22	%	<i>variance factor</i>
<i>min</i>	5.0152	g	<i>min value</i>
<i>max</i>	22.0111	g	<i>max value</i>
<i>R</i>	16.9959	g	<i>max – min difference</i>

## 16.4. *Format of data sending*

Weighing result can be sent to a peripheral device by pressing **PRINT** key on a balance keyboard or by setting a control command from computer level.

### 16.4.1. Format of data sent on pressing of PRINT key

Depending on setting of **P4.5 PStb** parameter only stable measurement or instantaneous mass indication will be sent.



#### **CAUTION:**

For verified balances printout of instantaneous measurement data is blocked.

Printout format

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

stability marker – [space] if stable

– [?] if unstable

– [^] if there is an error of range exceeding on +

– [v] if there is an error of range exceeding on -

sign

– [space] for positive values or [-] for negative values

mass

– 9 marks alignment to the right

unit

– 3 marks alignment to the left

### 16.4.2. Format of data sent as response for commands generated from a computer

On receipt of a command, balance responds with:

XX\_A CR LF – command understood, in progress

XX\_I CR LF – command understood, but currently not available

XX\_^ CR LF – command understood, but max range is exceeded

XX\_v CR LF – command understood, but min range is exceeded

XX\_E CR LF – error occurred while carrying out the command – time limit exceeded while waiting for stable measurement result (time limit is characteristic parameter of balance)

XX – name of command

And followed by:

1 – 3	4	5	6	7	8 – 16	17	18 - 20	21	22
command	space	stability marker	space	sign	mass	space	unit	CR	LF

- Command – 1 ÷ 3 characters
- stability marker – [space] if stable  
– [?] if unstable  
– [^] if there is an error of range exceeding on +  
– [v] if there is an error of range exceeding on -
- sign – [space] for positive values or [-] for negative values
- mass – 9 marks alignment to the right
- unit – 3 marks alignment to the left

## 17. UNDER HOOK WEIGHING

In standard analytical and precision balances loads can be weighed under the weighing pan. Such means of operation requires placing a balance on a uplifted position.

For under hook weighing follow below procedure:

- Place a balance on an optional rack enabling assembling a hook under balance's mechanism (opening in bottom section of balance's housing) (the rack does not come standard with a balance),
- Remove plastic hole plug in basis of a balance,
- There is suspension place for hook visible in the hole – the suspension is installed permanently to balance mechanism,
- In the opening install a dedicated weighing pan for under hook weighing (the weighing pan for under hook weighing option does not come standard with a balance),
- Weigh loads using under hook weighing option,
- On completing under hook weighing process, close the hole in balance basis with plastic hole plug.

### CAUTION:

**The suspension for hook must not be turned, twisted or manipulated in any direction. Such actions may cause damage to balance mechanism.**

Mass of all additional elements of under hook weighing kit, like: the hook, weighing pan, string, etc. should be zeroed by pressing **Esc/TARE** key.



## 18. LIST OF COMMANDS COMPUTER – BALANCE

- **Function**      **TARE**  
Command        **T CR LF** (balance tarring)
  
- **Function**      **ZERO**  
Command        **Z CR LF** (balance zeroing)
  
- **Function**      **IMMEDIATELY SEND WEIGHING RESULT IN BASIC MEASURING UNIT**  
Command        **SI CR LF** (immediately send of balance indication)
  
- **Function**      **SEND WEIGHING RESULT IN BASIC MEASURING UNIT**  
Command        **S CR LF** (send result when stable)
  
- **Function**      **SEND WEIGHING RESULT IN CURRENT MEASURING UNIT**  
Command        **SU CR LF** (send result with current unit when stable)
  
- **Function**      **IMMEDIATELY SEND WEIGHING RESULT IN CURRENT MEASURING UNIT**  
Command        **SUI CR LF** (send result in current unit now – do not wait for stable reading)
  
- **Function**      **CONTINUOUS TRANSMISSION IN BASIC MEASURING UNIT**  
Command        **C1 CR LF** (start continuous transmission in basic unit)
  
- **Function**      **END OF CONTINUOUS TRANSMISSION IN BASIC MEASURING UNIT**  
Command        **C0 CR LF** (finish continuous transmission in basic unit)
  
- **Function**      **CONTINUOUS TRANSMISSION IN CURRENT MEASURING UNIT**  
Command        **CU1 CR LF** (start continuous transmission in current unit)
  
- **Function**      **END OF CONTINUOUS TRANSMISSION IN BASIC MEASURING UNIT**  
Command        **U0 CR LF** (finish continuous transmission in current unit)



### **CAUTION**

*If a non-existing or incorrect command finished with CR LF will be sent to a balance, it responses with ES CR LF. Space between characters should be omitted, as they are added only for the purpose of proper legibility.*

## 19. ERROR MESSAGES

**Er1 Hi** – mass out of range on balance start and adjustment

**Er2 nuLL** – value from AD converter  $\leq 0$  ( $A/D \leq 0$ )

**Er3 FuL1** – values from A/D converter  $\geq$  maximal converter range ( $A/D \geq 0$ )

**Er4 FuL2** – maximal capacity of the balance exceeded (over load)

**Er5 rout** – mass value out of range (during adjustment, determining reference for sample quantity and percent setup, etc.),

**Er7 tout** – timeout error for zeroing and tarring

**Er8 outr** – enter value (from keyboard level) out of range (setting thresholds / limits values)

**Er9 Lock** – function blocked (e.g. by LFT),

**Er10 cal** – adjustment error (change of mass or incorrect mass of adjustment weight / mass standard).

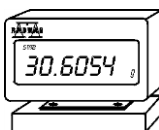
## 20. ADDITIONAL EQUIPMENT

### 20.1. *Anti-Vibration table*



It is a very stable basis which eliminates all kinds of vibration and ground shakes. The inner part of the table holds a marble plate, which is a foundation for balance positioning.

### 20.2. *Additional display*



Features: Length of conductor between additional display and balance – 1,5m, plastic casing, possibility of tilting the additional display head.

### 20.3. *Computer software*



**PW-WIN 2004** – gathering data. Data is gathered in tabular or chart format. It is possible to calculate statistics from a series of weighing records.



**RAD-KEY 2000** – implements a set of commands for controlling a balance, e.g. tarring, start of continuous transmission, cyclic commands set to a balance.



**REC-FS 2000** – application for control of formulas. It enables creation of a formula, declare tolerance limits for each ingredient and measure mass of each ingredient of a formula.

*Number of instruction:  
LMI-53-03/05/12/A*

