

## BALANCE INSTRUCTION MANUAL

SERIES 4B/F

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## 1. General description

Balances from 4B/F series in basic version from lacquered steel, with SE-01/A/18 meter, are designed for operation in foundation structures, in light environmental conditions.

Balances from 4B/F series from stainless steel, with SE-01/A/18 meter, are designed for operation in foundation structures, in hard environmental conditions.

All balances are tested in respect of metrology. According to order, balances may be verified or calibrated.

EC verification (conformity assessment) of balances is required for special applications, mentioned in Ministry of Labour and Social Policy decree from 11.12.2003 (trade, tariffs, pharmacy recipes, medical and pharmaceutical analysis, packing of goods). For other applications it is recommended to replace verification with calibration.

Verified balances have the following verification features:

- protection stamps, located on balance meter and converters connection box (installed under the bearing surface).
- Office of Measures marks and green metrological mark, located on the rating plate.

EC verification is valid for 25 months from 1st of December of year, when the EC verification took place, under condition of stamp integrity.

Balances classification (PKWiU code) 29.24.23.

Certificates:



Certificate  
of type approval  
no. PL 04 020



Certificate  
DIN EN ISO 9001:2000  
no. 78 100 6386  
(AXIS management system)

## 2. Completion

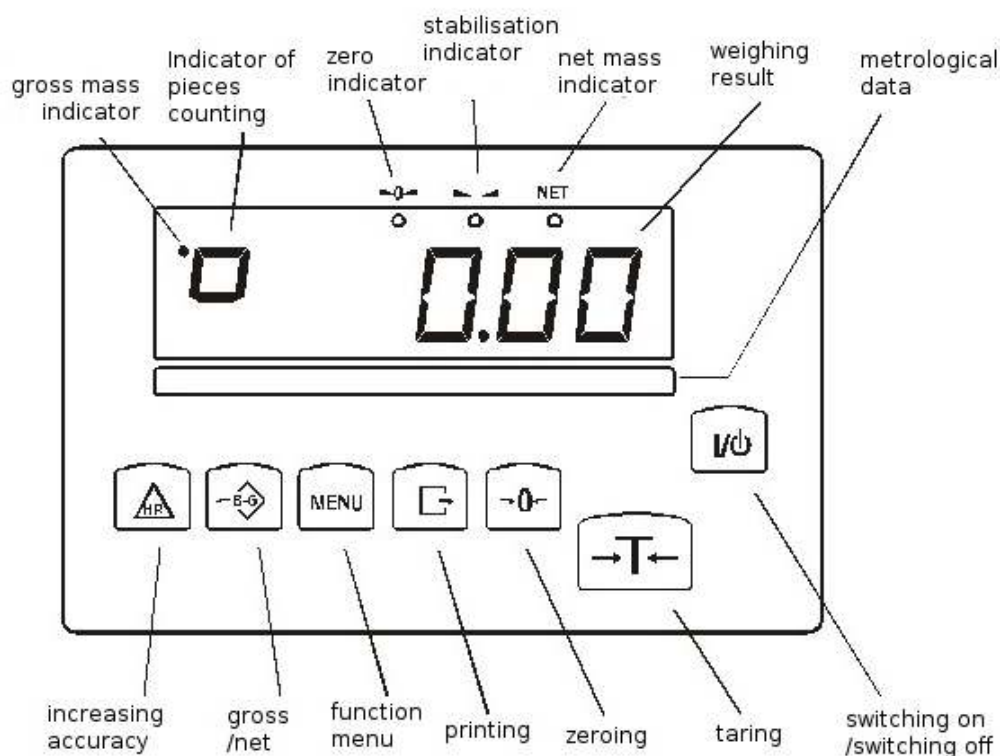
Basic set includes:

1. Bearing surface and balance meter, connected permanently with cable
2. RS232C connector (only 4B/FN balances)
3. Instruction manual
4. Warranty

## 3. Technical data

Balance type	4B300F(N)	4B600F(N)	4B1500F(N)	4B2000F(N)	4B3000F(N)
Maximum load (Max)	300kg	600kg	1500kg	2000kg	3000kg
Reading graduation (d)	100g	200g	500g	1kg	1kg
Verification graduation (e)	100g	200g	500g	1kg	1kg
Minimum load (Min)	2kg	4kg	10kg	20kg	20kg
Tare set range	-300kg	-600kg	-1500kg	-2000kg	-3000kg
Precision class	III				
Operational temperature	-10÷40°C				
Weighing time	<3s				
Foundation depth	128mm				
Platform dimensions: Balance weight:					
1000x1000mm 140kg	•	•	•		
1250x1250mm 170kg	•	•	•	•	
1500x1500mm 210kg		•	•	•	•
1500x2000mm 300kg					•
Display cable length	4m				
Power supply	~230V, 50Hz, 8VA				
Meter protection rating	SE-01/A/18 - no IP, SE-01/N/18 - IP65				
Sensors protection rating	IP68				

#### 4. Balance keys and indicators

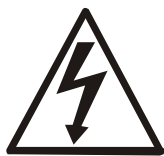


key	I/O	- ON/OFF switch (standby),
key	→T←	- tare setting (entering of mass subtracted from weighed mass),
key	B/G	- gross weight indication,
key	→0←	- zeroing,
key	MENU	- special functions menu,
key	→	- result print,
key	HR	- weight indication resolution increasing,
indicator	→0←	- zero indicator (for unloaded balance),
indicator	—	- signals weighing result stabilization,
indicator	NET	- net weight (after →T← key use),
indicator	.	- gross weight (after B/G key use),
indicator	□	- pieces counting function indicator (indications in pieces)

*Additionally in LCD display version:*

indicator	MODE	- special function activation menu,
indicator	bar	- balance load indicator (0-100%),
indicator	WYL	- balance switched off with I/O key (standby),
indicator	B/G	- gross weight (after B/G key use),
indicator	pcs	- indications in pieces

## 5. Safety principles



It is necessary to become familiar with safety principles shown below, which are necessary to avoid electric shock and damage of balance or connected devices.

- **Maintain caution while opening the pan. It is suggested to carefully hold the pan while opening.**
- Repairs and necessary adjustments must be performed by qualified personnel only
- To avoid fire hazard, use only typical supply cable, and supply voltage must be consistent with technical data.
- For the balance supply use the socket with protective contact.
- Do not use balance when the cover is removed.
- Do not use balance in explosive atmosphere.
- Do not use balance in locations with high humidity, when the cover does not have special protections for N type.
- In case of damage suspicion, switch the balance off and do not use it until it is tested in professional service company.

## 6. Principles of used balance treatment



According to valid regulations regarding natural environment protection do not place used electronic devices in containers with common waste.

- Used balance after operation period may be transferred to units authorized for collection of used electronic equipment, or to place of purchase.

## 7. Foundation preparation

### **CAUTION!**

*Decision of substrate reinforcing and density is taken by building works designer.*

*All dimensions are in millimetres.*

During foundation preparation follow the principles below:

1. Foundation and feet under balance legs should be made from concrete. Foundation bottom thickness should not be smaller than 100 mm.
2. Foundation bottom inclination angle (shown in fig. 1 on page 8) should be at least 3%.
3. Keep the same level for all feet.
4. Level the foundation frame, keeping perpendicularity of sides and equality of diagonals.
5. Diameter of PVC pipe for cables to connection box should be at least 50 mm.
6. Keep the area free from reinforcing bars as shown in fig. 2 on page 8.
7. Foundation external and internal dimensions, proper for various platform dimensions are shown in table below.

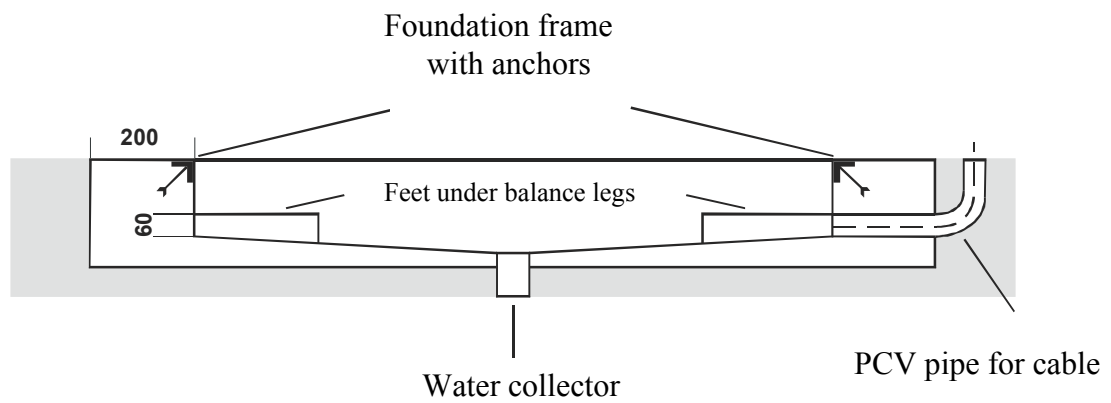
Balance type	Platform dimensions [mm]	Foundation internal dimensions (WxLxH) [mm]	Foundation external dimensions (WxL) [mm]
4B300FN	800x800	820x820x110	1220x1220
4B300FN	1000x1000	1020x1020x110	1420x1420
4B300FN	1250x1250	1270x1270x110	1670x1670
4B600FN	800x800	820x820x110	1220x1220
4B600FN	1000x1000	1020x1020x110	1420x1420
4B600FN	1250x1250	1270x1270x110	1670x1670
4B1500FN	1250x1250	1270x1270x110	1670x1670
4B1500FN	1500x1500	1520x1520x128	1920x1920
4B2000FN	1250x1250	1270x1270x128	1670x1670
4B2000FN	1500x1500	1520x1520x128	1920x1920
4B3000FN	1500x1500	1520x1520x128	1920x1920
4B3000FN	1500x2000	1520x2020x128	1920x2420



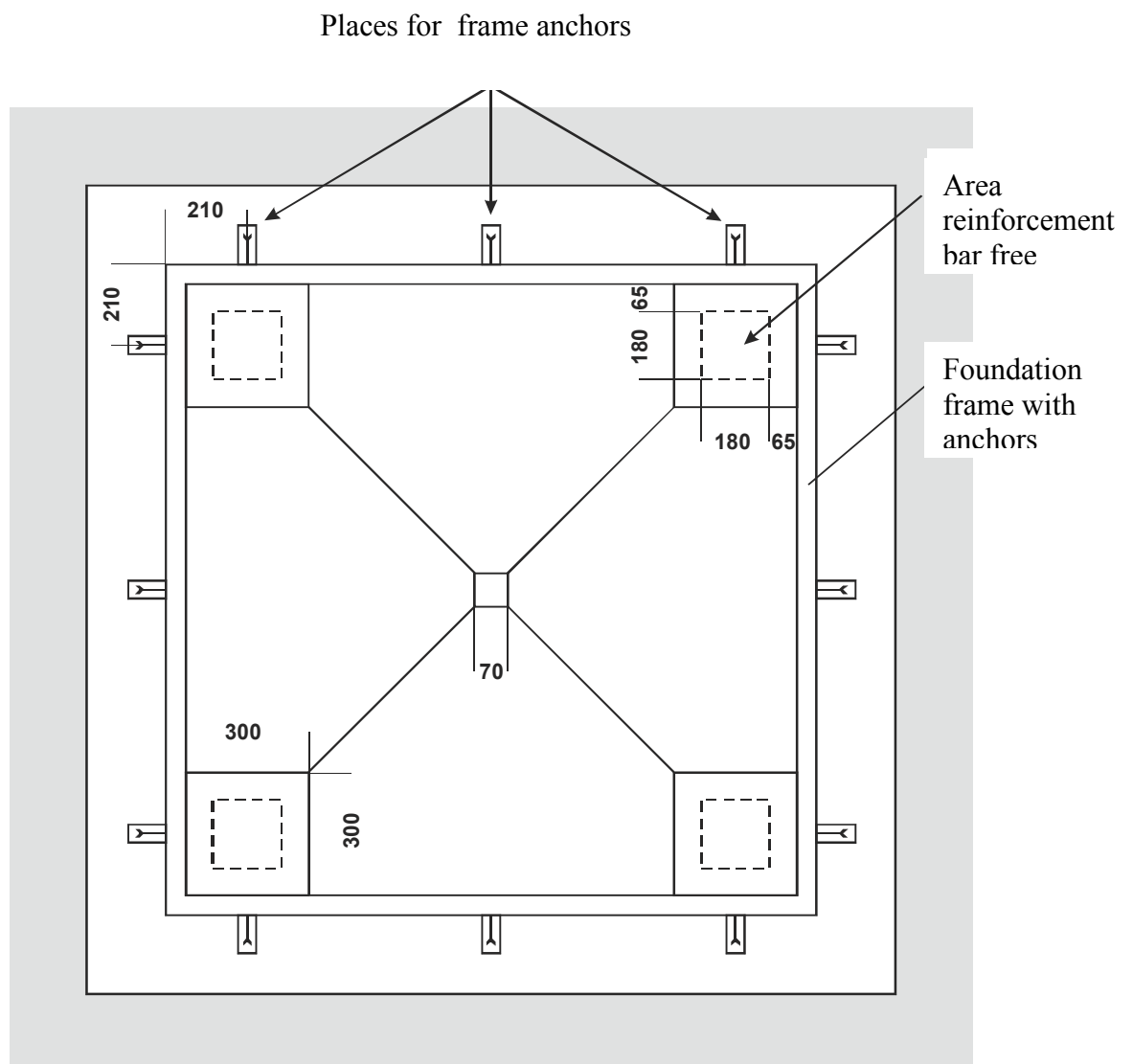
**Keep all dimensions, shown in drawings and table.**



**Careless and inaccurate foundation preparation may make balance installation impossible or cause its improper operation!**



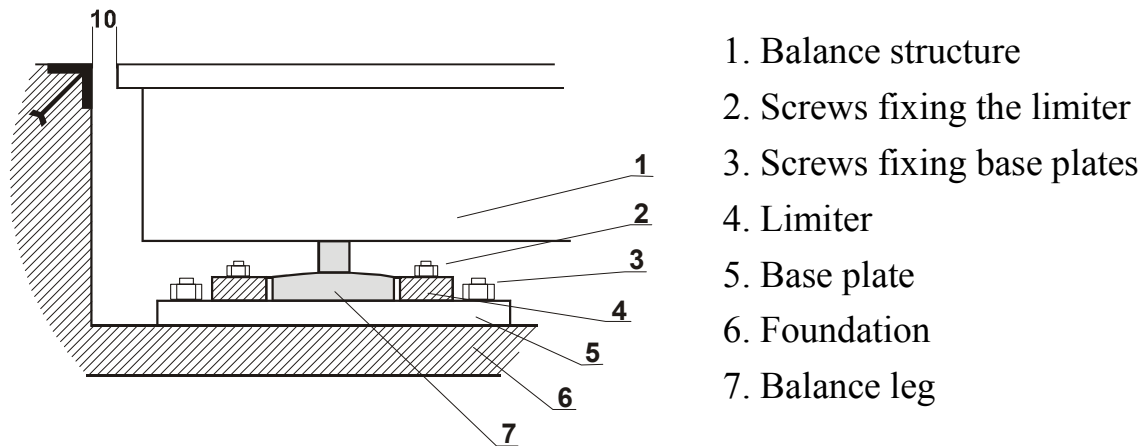
**Fig.1 Foundation – crosssection**



**Fig. 2 Foundation – view from above**



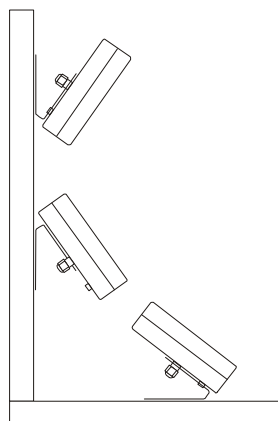
## 8. Balance installation



1. Prepare the foundation (7) according to guidelines (section 6) and engineering technique principles.
2. Put the balances base plates (5) freely in the foundation.
3. Place limiters plates (4) on plates (5). Connect both plates with M8 screws (2) so they cannot move in respect to each other, but to allow for limiters (4) manoeuvring.
4. Unscrew screws fixing the balance upper plate.
5. Put the balance structure (1) in the foundation, so legs (7) fit vertically in the limiters (4) holes.
6. Place upper plate on balance structure and lightly screw in the fixing screws.
7. Check the upper plate location in the foundation – level in relation to foundation edge and distance from the edges (fig. 1).
8. When needed, shift the plates (5) or put spacers beneath them, made from sheet with dimensions of plate.
9. If the position of upper plate is correct, carefully remove it to not move plates (5). Check if legs (7) are straight.
10. Carefully remove balance structure (1) from foundation to not move plates (5).
11. Fix plates (5) with supplied screws with steel pins.
12. Adjust possible displacements with plates (4) position, so legs are located centrally and vertically in plates (4) holes. Tightly screw plates (5) and (4).
13. Put balance structure (1) in place.
14. Place the upper plate and fix it with screws, beginning from holes in the upper plate centre.



**Connecting cable must be laid freely!**



15. Unpack the balance. Attach meter to the wall or desktop, choosing one of three methods.

16. Connect the supply cable plug to socket with protective contact with unloaded balance, which will cause autotests performing and after indication stabilization displaying of zero indication.

## 9. Balance start

Connecting of supply plug to socket of  $\sim 230\text{V}/50\text{Hz}$  installation with unloaded balance will cause the following sequence of actions:

88888



C-1

...

C-6



b-...



0.00

Display test

Tests of basic electronic subassemblies, ended with messages: *C1*, *C-2*, ... *C-6*.

Displaying of software version.

Ready for operation.

## 10. Operation principles

1. Before each measurement the balance should be properly zeroed, which is signalled by "→0←" indicator. If the zero indication is not shown when the balance is unloaded, or "----" is displayed, press the "→0←" key.
2. The balance enables tare setting in the whole measuring range. It is performed by pressing "→T←" key.
3. Weighed mass should be placed in the platform centre.



***Do not drop weighed objects on the platform.***



***Do not overload the balance over 20% of maximum load.***

4. The weighing result should be read during the "┐" indicator lighting, which indicates the result stabilization.
5. When there is no weighing, but the balance should be ready for operation, it may be switched off by I/⊙ key. It causes the balance reading system deactivation and entering the standby mode. Balance turning on is performed by pressing "I/⊙" key.
6. Protect the balance from dust, aggressive dusts and liquids. For cleaning purposes use water and dry it.

***Maintain caution while opening the pan. It is suggested to carefully hold the pan while opening!***

## 11. Balance test

During balance operation, in order to confirm its efficiency, it is recommended to check the weighing precision by putting an object of exactly known weight before and after series of measurements.

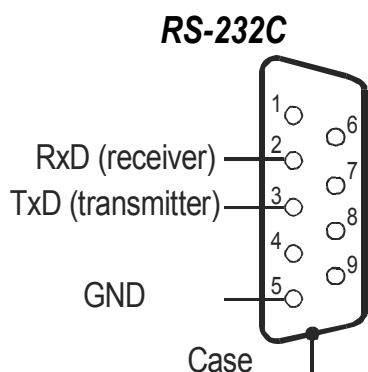
For testing of verified balances use weight standard, having valid standardization certificates. In case of allowable measurement error exceeding contact authorized service company to perform balance adjustment.

## 12. Balance adjustment



Balance adjustment must be performed by authorized service company only, as it is connected with necessity of seals breaching, required for warranty purposes.

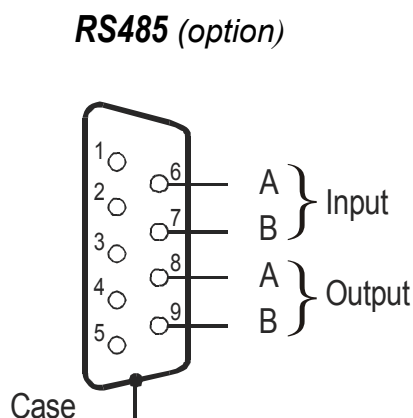
## 13. Connection with computer, printer or label printer



The scale is equipped with RS232C or RS485 (optional), which can be used to connect external devices such as a computer or a printer. Detailed way of communication data is defined by one of protocol:

- *LonG* – protocol to printer and computer
- *ELtron* – protocol to label printer


When cooperating with a printer data is sent automatically after result stabilisation, but next transmission is possible after removing previously weighted sample.



When protocol *Long* is chosen scale sends result of weighting under the influence of initializing signal from computer, or after pressing a key.

When automatic transmission mode is chosen (function *PrInt*), a printer data is sent automatically after result stabilisation, but next transmission is possible after removing previously weighted sample. The scale sends following information: successive number of weighing, date and time (if clock module is installed) and weighing result.

During transmission *Print* is displayed. It is also possible by scale to display text message sent from computer confirming received information.

Scale with *Eltron* protocol sending record of data after pressed  key.

The scale sends following information: number of label, date and time (if clock module is installed ) and weighing result. During transmission communicate Label is displayed.


In special features scale can be equipped in second RS232 interface for additional functions, ex. continuous transmitting of indications to second display.

Computer must have a special program for cooperation with data from a scale. Programs offer is available on [www.axis.pl/en](http://www.axis.pl/en) internet site.

### ***Detailed protocol description***

#### ***LonG protocol***

Communication parameters: 8 bits, 1 stop bit, no parity, baud rate 4800bps,

- Readout of scale indication ( corresponds to pressing  key

Computer→Scale: **S I CR LF** (53h 49h 0Dh 0Ah),

Scale→Computer: scale response according to description below (16 bytes):

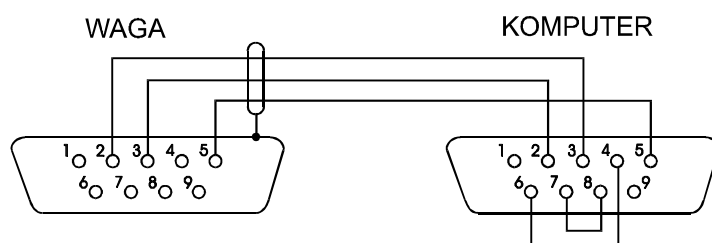
Byte 1	- sign „-” or space
Byte 2	- space
Byte 3÷4	- digit or space
Byte 5÷9	- digit, decimal point or space
Byte 10	- digit
Byte 11	- space
Byte 12	- k, l, c, p or space
Byte 13	- g, b, t, c or %
Byte 14	- space
Byte 15	- CR
Byte 16	- LF

#### ***Attention:***


Network number different than zero (F..rS / nr function) changes scale working mode: communication with a computer is possible after logging the scale in with 02h scale number command. To log the scale out use 03h command.

For example: Using a program to test RS232 interface ( program is available on [www.axis.pl](http://www.axis.pl) in computer programs section) for scale number 1 please write: *\$0201* to log in, then *SI*, and write: *\$03* to close communication.

- Asking for scale presence in system (testing scale connection with computer):  
 Computer→Scale: **S J** CR LF (53h 4Ah 0Dh 0Ah),  
 Scale→Computer: **M J** CR LF (4Dh 4Ah 0Dh 0Ah),
- Displaying a sign on scale display (text message from computer):  
 Computer→Scale: **S N** n n X X X X X X CR LF (53h 4Eh 0Dh 0Ah),  
 nn-displaying time in seconds; XXXXXX- signs to display  
 Scale→Computer: **M N** CR LF (4Dh 4Eh 0Dh 0Ah),
- Scale tarring (calling  $\rightarrow T \leftarrow$  key press) :  
 Computer→Scale: **S T** CR LF (53h 54h 0Dh 0Ah),  
 Scale→Computer: without response,
- Scale zeroing (calling  $\rightarrow 0 \leftarrow$  key press):  
 Computer→Scale: **S Z** CR LF (53h 5Ah 0Dh 0Ah),  
 Scale →Computer: without response,
- Scale turning on / off (calling  $I/\phi$  key press):  
 Computer→Scale: **S S** CR LF (53h 53h 0Dh 0Ah),  
 Scale →Computer: without response,
- Entering to special function menu (calling *MENU* key press):  
 Computer→Scale: **S F** CR LF (53h 46h 0Dh 0Ah),  
 Scale →Computer: without response,
- Setting low threshold value (option):  
 Computer→Scale: **S L** *DI...DN* CR LF (53h 4Ch *DI...DN* 0Dh 0Ah)  
*DI...DN* – threshold value, maximum 8 characters („-” – negative value, digits,  
 dot – decimal separator), number of digits after dot should be the same as on  
 scale display,  
 Scale →Computer: without response,
- Example:
  - in order to set low threshold 1000g in scale B1.5 (d=0.5g) the following order  
 should be sent:  
**S L 1 0 0 0 . 0** CR LF (53h 4Ch 31h 30h 30h 30h 2Eh 30h 0Dh 0Ah),
  - in order to set low threshold 100kg in scale B150 (d=50g) the following order  
 should be sent:  
**S L 1 0 0 . 0 0** CR LF (53h 4Ch 31h 30h 30h 2Eh 30h 30h 0Dh 0Ah),),
- Setting high threshold value (option):  
 Computer→Scale: **S H** *DI...DN* CR LF (53h 48h *DI...DN* 0Dh 0Ah),  
*DI...DN* – threshold value (see )  
 Scale →Computer: without response.

**Connecting cable WK-1 (scale – computer / 9-pin interface):****Protocol ELTRON description**

Communication parameters: 8bits, 1stop, no parity, 9600bps,

- After use  key scale send:

Scale→Label printer : EPL-2 language instruction to initialize print of label:

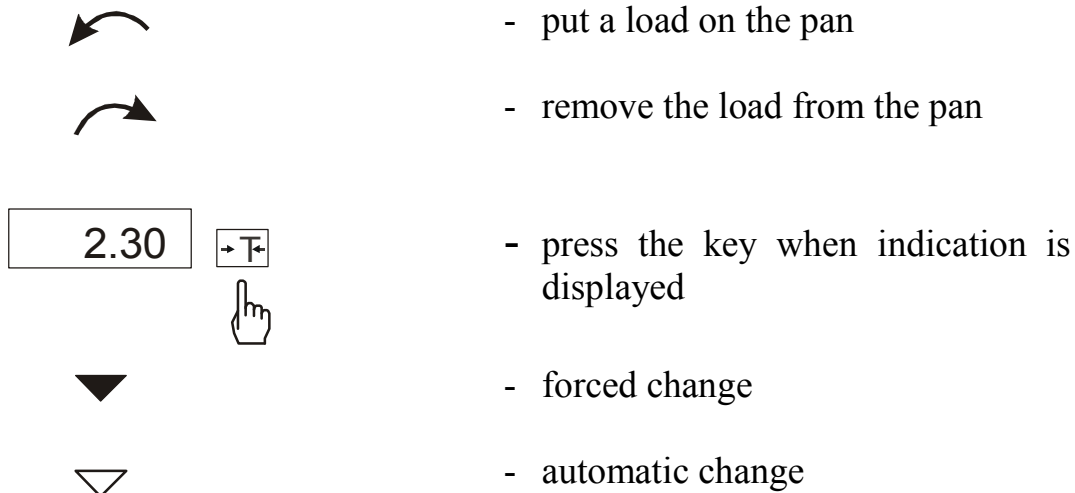
US	- control instruction
FR"0001"	- number of labels
?	- starting instruction
hh:mm	- 5 signs: hours:minutes
yyyy.mm.dd	- 10 signs: year.month.day
mass + unit	- 10 signs: scale indicate + mass unit
P1	- ending instruction

**Attention:**

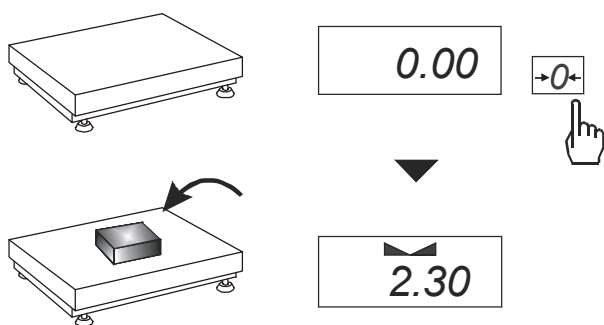
1. It is possible to place a constant signs (company name, product name).
2. The default number of label's is 0001 (label number 1). Different numbers of label are possible by using a *LABEL* function.
3. Label formula must be saved in printer – label formula must be designed in computer (by Zebra Designer program) and saved in printer.
4. Parameters and protocol of transmission must be compatible with printer label.

## 14. Basic function

To make clear how to manage with each function, in further part of instruction descriptions are replaced with pictures.



### 14.1 Normal weighing

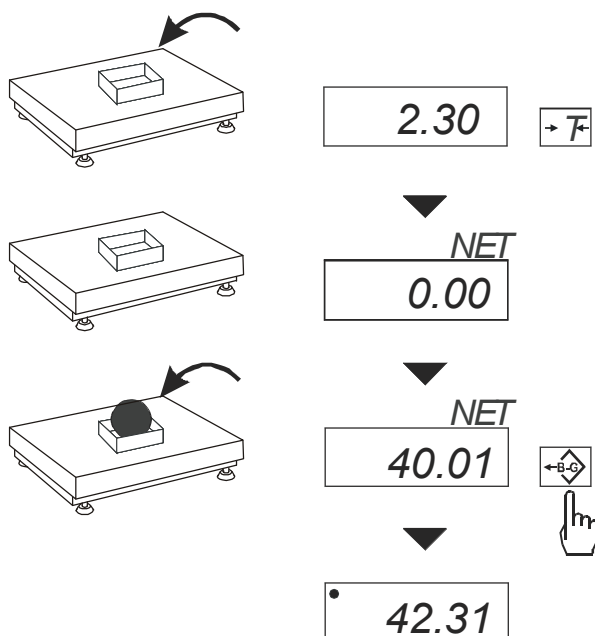


Press  $\rightarrow 0 \leftarrow$  key ( $\rightarrow T \leftarrow$  key in non-legalized scales), which zeros the scale, operates only when the pan is empty.

Weighing result should be read when the indicator " $\blacktriangle \blacktriangle$ " lights.



## 14.2 Weighing with tare



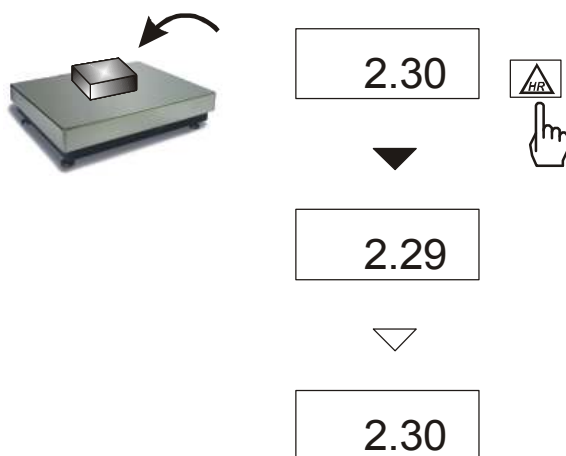
The scale is equipped with tare equal to its range.

Joint value tare and mass net can not cross a maximum of scale.

To display gross weight press *B/G* key.

**Note:**  
Press *B/G* key to return to net weight indication.

## 14.3 Increased readability



Press *HR* key to display the weighing result (for 5s.) with the highest readability possible. This function is especially helpful in scales with legal verification with  $d=e$ .

The weighing result with increased readability can be used for informational purposes only and cannot be printed or sent to a computer with **PC** key.

## 15. **Special functions description**

List of available functions:

- ❑ menu customization function (*ACtIV*),
- ❑ removal of all function from menu (*dEFAUL*).
- ❑ autozeroing function (*AutoZE*),
- ❑ pieces counting function (*PCS*),
- ❑ function for setting serial port working (*PrInt*)
- ❑ function for setting serial port (*Port*)
- ❑ entering tare function (*tArE*)
- ❑ recipe weighing function (*rECIPE*),
- ❑ weighing large animals function (*LOC*)
- ❑ force measuring function (*nEWto*)
- ❑ maximum value indication function (*UP*)
- ❑ anti-disturbance filter function (*FILtEr*)
- ❑ average calculating function (*AVErA*)
- ❑ percentage weighing function (*PErC*),
- ❑ extended calibration function (*CALib*)
- ❑ setting time of stabilisation function (*Stb*)
- ❑ selecting label number function (*LabEL*)
- ❑ automatic switching off scale function (*AutoOF*)
- ❑ entering reference zero (*Zero*)
- ❑ determining solids and liquids density function (*dEnSI*t)
- ❑ calculator for good packaging control (*tP*) - option\*
- ❑ statistical calculations (*StAt*)- option\*
- ❑ paperweight calculation function (*PAP*) - option\*

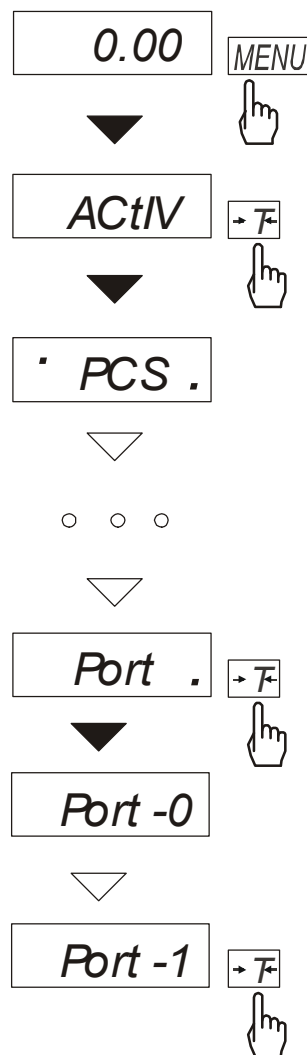
function with additional equipment require:

- options with the clock:
  - setting current date and time function (*dAtE*)
  - total weight function (*totAL*)
- options with the transoptors connectors:
  - checkweighing function (*thr*)

\* Functions offered with special version of scale software (with limited possibility of using other special functions).

User create own menu by choosing function in *ACtIV* function (described in chapter 14.1).

### 15.1 Menu customization function (*ACTIV* and *dEFAULT*)



Among available user functions it is possible to select these, which should be displayed after pressing *MENU* key. It allows avoiding displaying whole list of available functions, which makes operation time longer.

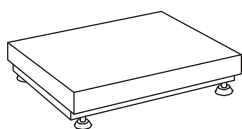
Operation sequence shown in the pictures on the left causes adding function for setting serial interface RS232C parameters (*Port*) to function menu.

After switching on *ACTIV* function a dot is displayed on the right side (to distinguish from regular menu). Chosen functions are displayed with a dot on the left side.

In every moment, it is possible to restore primary (manufacture) settings choosing *dEFAULT* special function.

In order to remove function from menu in the last operation in place of selecting *Port -1* choose *Port -0*.

## 15.2 Autozeroing function (AutoZE)



0.01 MENU



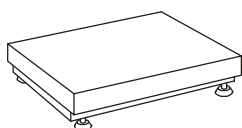
AutoZE →T←



Aut-0



Aut-1 →T←



▪ 0.00

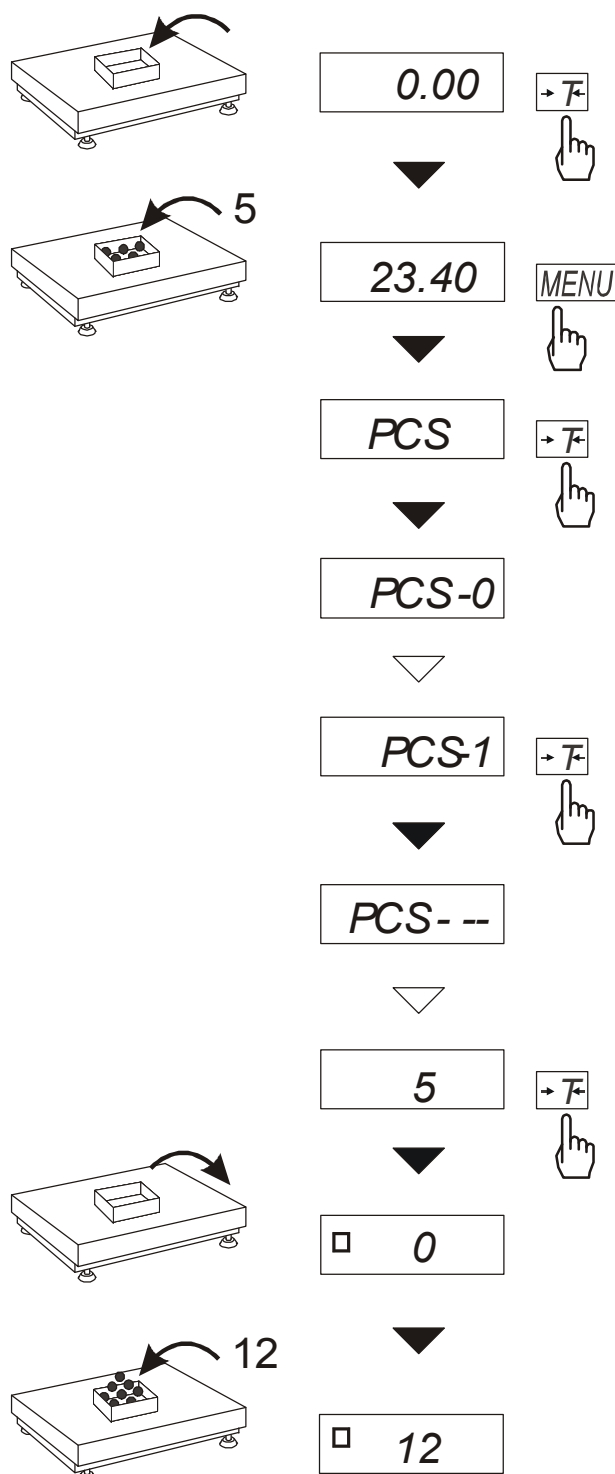
When *F..-Aut* function is activated, the scale automatically ensures stable zero indication if the pan is empty or if zero indication was acquired by pressing  $\rightarrow T \leftarrow$  key.

To leave the function press *MENU* key, then with  $\rightarrow T \leftarrow$  key chose *AutoZE* and *Aut-0*.

Note:

*Autozeroing function is activated automatically for 10 min. after switching-on.*

### 15.3 Pieces counting (PCS)



This function enables to count identical pieces, e.g. turnbuckles or buttons.

A measurement is performed in two phases:

- first phase - single piece weight calculation on the basis of defined pieces amount (5, 10, 20, 50, 100, 200 or 500 pieces),
- second phase – pieces counting.

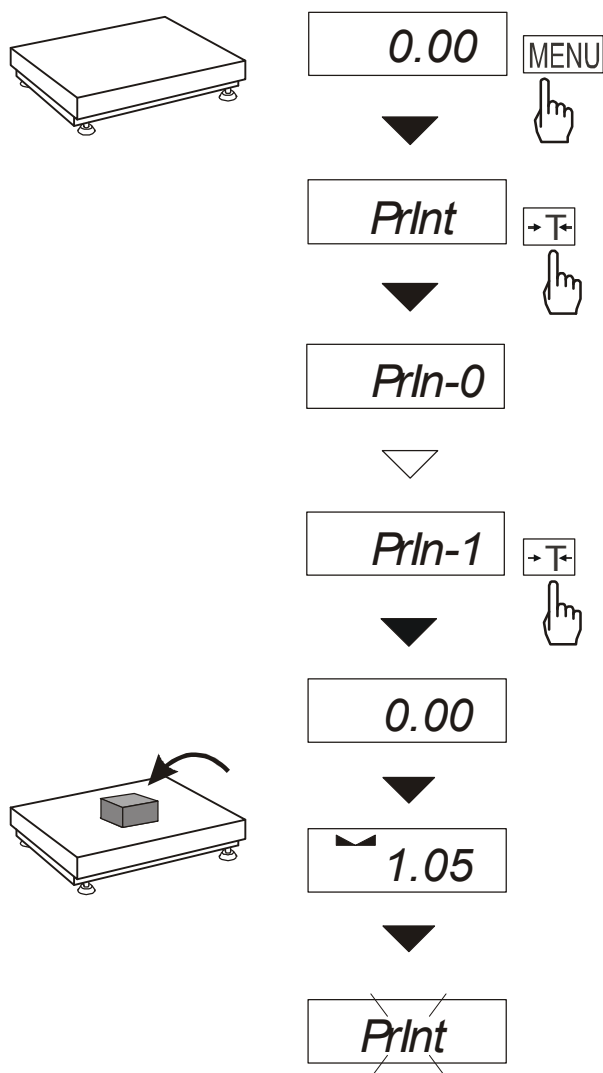
It is advised that single piece weight is not less than one reading unit and sample weight used in first phase is bigger than 100 reading units.

To leave function press *MENU* key and then with  $\rightarrow T \leftarrow$  key chose *PCS* and *PCS-0*.


**Note:**


1. *Err-3* communicate signalises that a sample was not put on the pan. The same communicate appears if single piece weight is less than one reading unit (it is possible to count pieces but measuring error is bigger).
2. To chose previously used pieces amount select " \_ \_ " in first phase (in case no value was chosen, error communicate appears)
3. During pieces counting  $\rightarrow T \leftarrow$  key function does not change.
4. In scales equipped with LCD display, weighing unit is visible and "□" sign is replaced with "pcs".

## 15.4 Printer cooperation settings (PrInt)

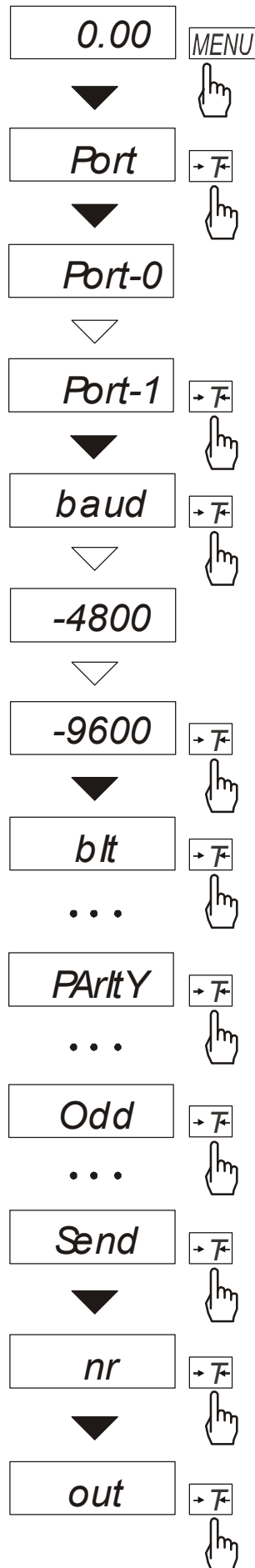


Activate the function for automatic serial port working mode (cooperation with a printer).


After activation the scale prints a header. Weighing result with a successive measurement number is printed automatically after result stabilisation (without using  key).

To select computer cooperation mode ( key activated and weighing results without successive numbers) press **MENU** key, then with **→T←** key chose **PrIn-0** and **PrIn-1**.

## 15.5 Serial port parameters setting (Port)



The function enables to set the following transmission parameters (standard parameters underlined:

- transmission protocol (*Prot*):  
LonG - printer,  
ELtron – label printer,
- transmission speed (*bAud*: 1200, 4800, 9600, ...),
- the number of bits in a byte (*bit*: 7, 8),
- parity control (*PARtY*: 0, 1; *Odd*: 0, 1),
- network number when working in multistand computer system (when working as a single scale the value should be “0”),
- continuous transmission – without using  key, approx. 10 results per second (*SEnd*: 0, 1).

Protocol *Eltron* automatically activated function *LABEL*.

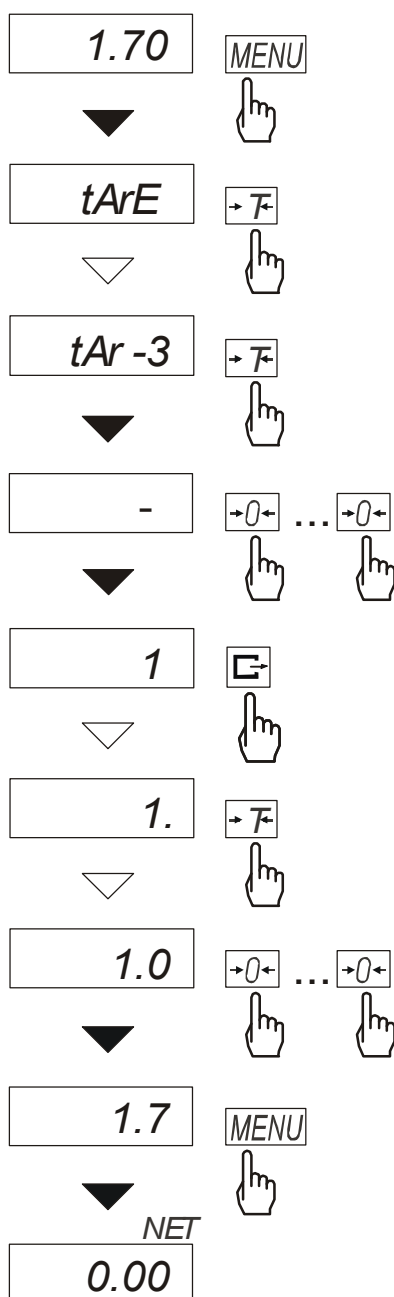
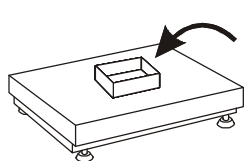
To set desired transmission parameters activate *Port* function, choose appropriate parameter and press  $\rightarrow T \leftarrow$  key to accept needed parameter value. The example at the left presents how to set transmission speed value to 9600bps.

To leave the function choose *out* option.

## 15.6 Constant tare (tArE)

This function enables to measure gross weight of a sample placed in a container of a known weigh value (stored in the memory) and to display calculated net weight of the sample. Tare value is recalled from the memory with  $\rightarrow 0 \leftarrow$  key when the pan is empty. Tare value may be entered using the keypad or by sampling container weight from the pan.

### Operation sequence:



The following options are possible:

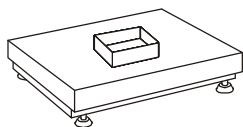
- *tAr-0* – leave the function,
- *tAr-1* – activate the function with the previous tare value,
- *tAr-2* – sample tare value from the pan,
- *tAr-3* – enter tare value with keys:  $\rightarrow 0 \leftarrow$ ,  $\rightarrow T \leftarrow$  and *MENU*
- *tAr-4* – printout a setting value of tare

If the function is active, *NET* indicator is displayed.

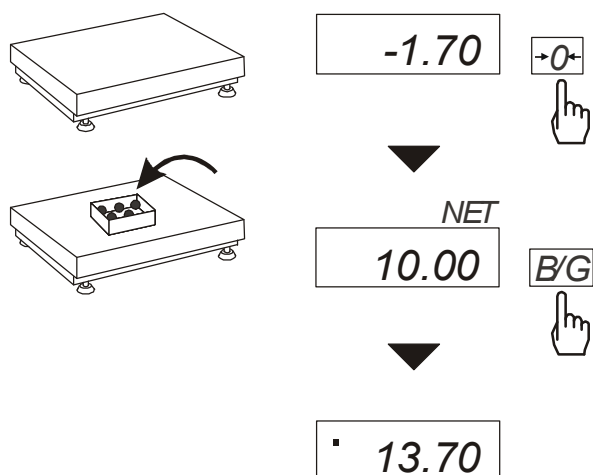
Options *tAr-1* enables to activate the function with previous tare value after leaving the function with *tAr-0* option.

#### Note:

Tare value is stored in memory also after unplugging the scale from the mains.





**Weighing with constant tare:**

When *tAr* function is activated, press **→0←** key to zero the indication and to recall tare value from the memory. Tare value is displayed with "–" sign.

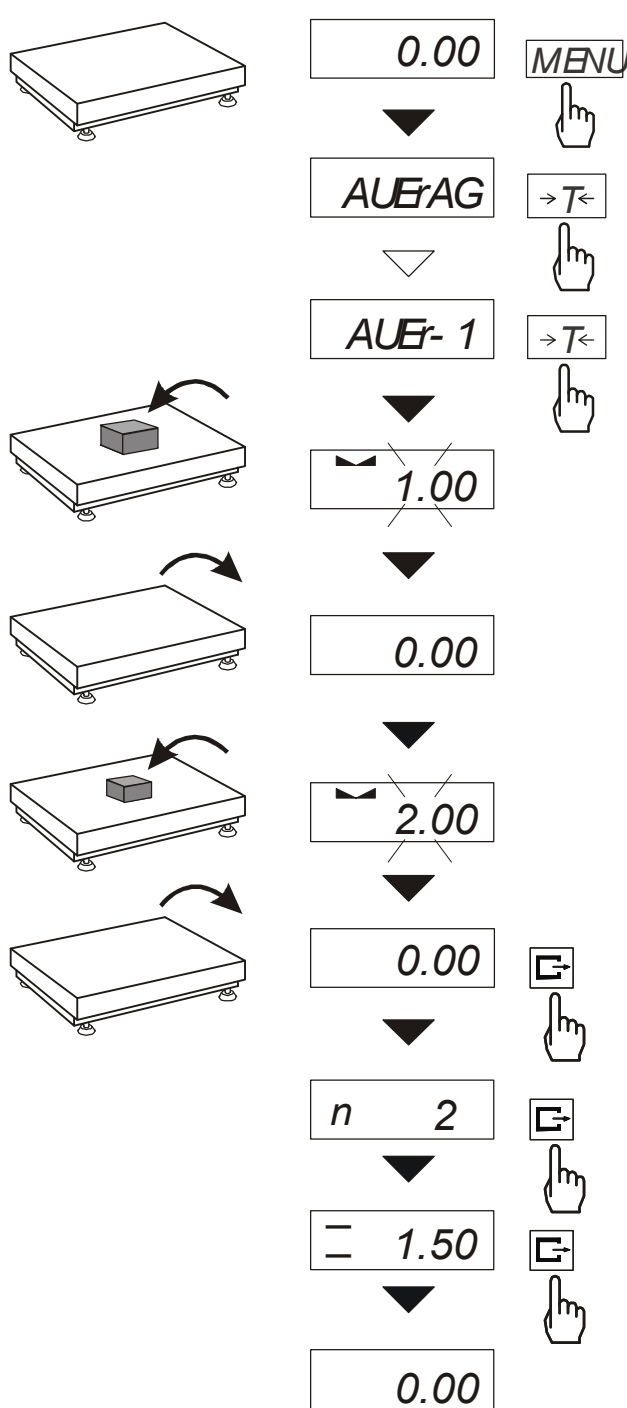
**B/G** key enables for instant switching between net and gross weight.

**Note:**

When the pan is empty **→T←** key does not operate – to tare the scale use **→0←** key.

## 15.7 Average calculation function (AVERAG)

The function allows for calculating average value of performed measurement series. During series of measurements successive results are registered automatically when scale indication is stabilised.



Press **MENU** key and select **AUErAG** pressing **→T←** key.

The following will be shown successively on display:

- **AUEr-0** – leaving function,
- **AUEr-1** – measurement with average calculation..

Select **AUEr-1**. It will allow weighing with simultaneous storing results into summing register for average calculation

Measurement registration is performed automatically in the moment when scale indication becomes stable. Short time displaying of „- -” denotes that load can be taken off and new one can be put on. Results above scale Min are registered only. Number of measurements is limited to 9999.

In order to read average value **↵** key should be used.

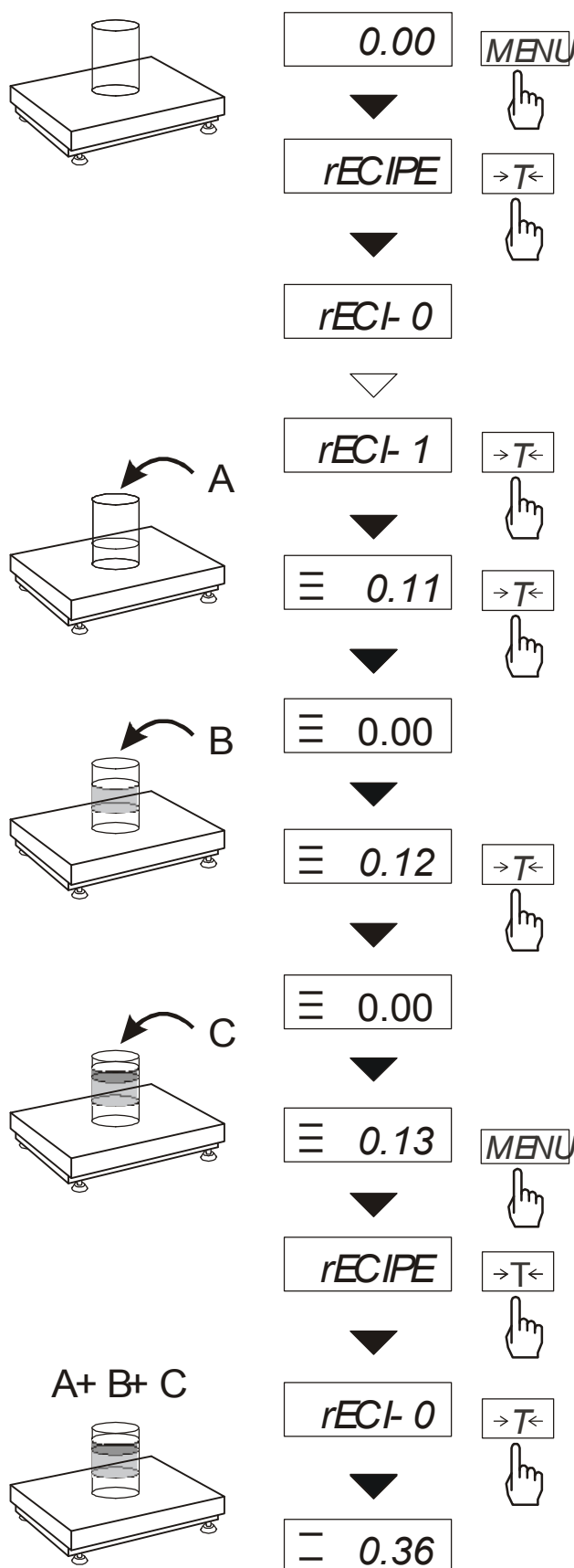
- first pressing causes displaying number of measurements (n).
- second displaying causes displaying average value (=).
- third pressing allows continuing average calculation.

If a printer is connected to scale the following report will be printed :

Date: ...	Time. ...
MEASUREMENS No	= ...
AVERAGE VALUE	= ...

In order to finish calculation press **MENU** key, and then select **AUEr i AUEr-0**.

## 15.8 Recipe weighing function (*RECIPE*)



This function allows for separate weighing of several ingredients in one container with a possibility of control total weight of all weighed components.

The function has the following options:

- *rECI-0* – leave the function with possibility of reading to read total weight,
- *rECI-1* – start recipe weighing
- *rECI-2* – continue previous recipe.

When preparing a recipe successive ingredients (A, B, C, etc.) are weighed each time starting from zero indication. In order to allow this after weighing of each ingredient tare the scale.

After weighing of several ingredients reading total weight is possible (despite scale taring). In order to do that press *MENU* key, select *rECIPE* function once more and use *rECI-0* option.

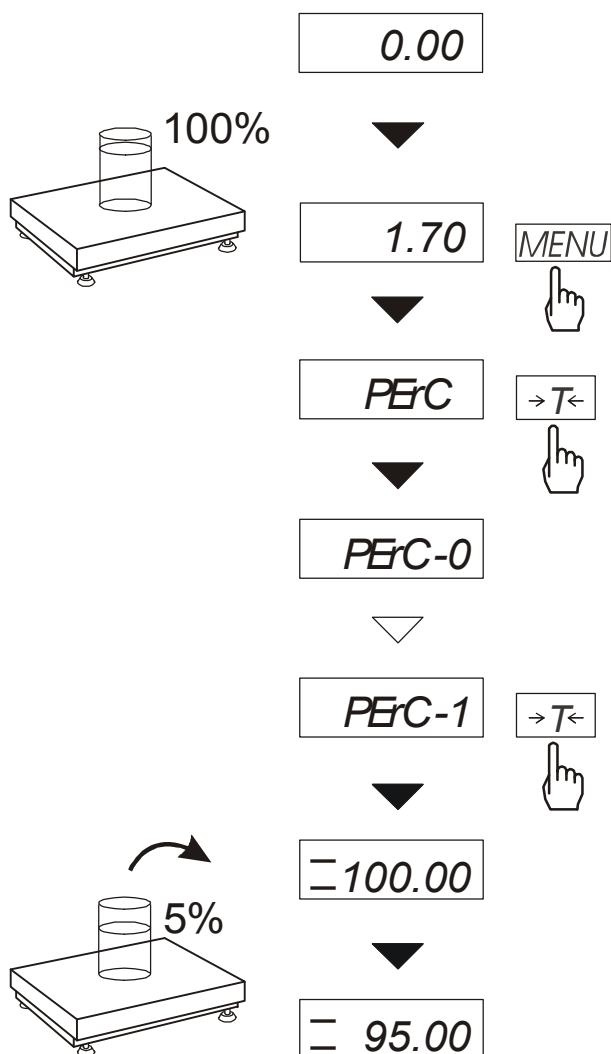
Sign „**≡**” signals total weight indication. Recipe is finished when **→T←** key is pressed.

When „**≡**” sign is displayed recipe continuing is possible. *rECI-2* option is used for that.

### Note:

Sign „**≡**” on the left side of display informs about *rECIPE* function activity.

## 15.9 Percentage weighing function (PErC)



This function allows displaying weighing result in percents.

A measurement is performed in two phases:

- first phase – weighing a reference sample (100%),
- second phase – measuring specific sample as a percentage of the reference sample.

Weighing result is displayed in different format, depending on the weight value of reference sample. For weight values of reference sample 0÷3,5% of weighing range result is displayed in format *100*, for range 3,5÷35% - in format *100.0*, and above 35% - in format *100.00*.

„%” sign is replaced with „ $\frac{\square}{\square}$ ” indicator.

The function has the following options:

- *PErC-0* – disable the function,
- *PErC-1* – set current scale indication as 100% and activate percentage weighing,
- *PErC-2* – continue percentage weighing after exiting to normal weighing.

### Note:

During percentage weighing **→T←** key has its normal function.

### 15.10 Anti-disturbance filter function (*FILtEr*)



This function allows using digital filter with selected intensity during weighing. Filter reduces the influence of mechanical vibrations (air blasts, base vibrations) on measurement result.

Press *MENU* key and select *FILtEr* pressing **→T←** key.

The following options will be shown successively on display:

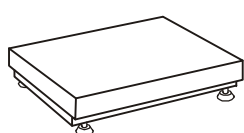
- *FIL-0* – work without
- *FIL-1* - filter I (weak)
- *FIL-2* - filter II (medium)
- *FIL-3* - filter III (sharp)
- *FIL-4* - filter IV (very sharp)

Select one of four filters. This will cause starting weighing with selected filter.

In order to go back to normal weighing use *MENU* key once more and choose *FILtEr* and *FIL-0*.

### 15.11 Function for maximum value indication (UP)

This function allows holding on display maximum value shown by the scale in a while.



0.00

MENU



Before measurement scale should be tared.

UP

→T←



After using MENU key and selecting UP

function the highest mass result will be hold on display.

UP 0



UP 1

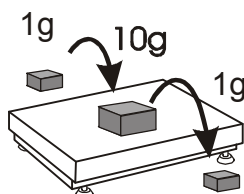
→T←



Pressing →T← key will cause result zeroing.

**Note:**

Autozeroing function and the stabilisation indicator are deactivated when UP function is running. Weighing result is continuously averaged from 5 measurements.



1.00

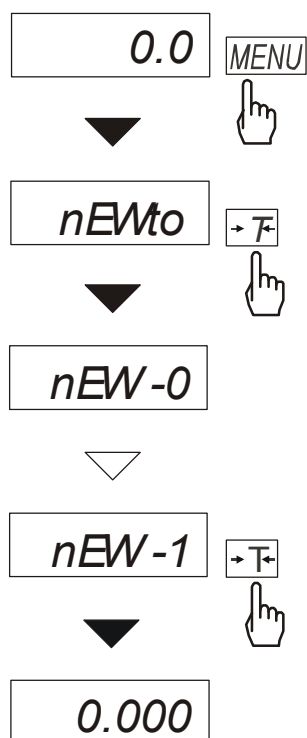


10.00



10.00

### 15.12 Force measuring function (*nEWto*)



Function activation causes displaying result in force units (N).

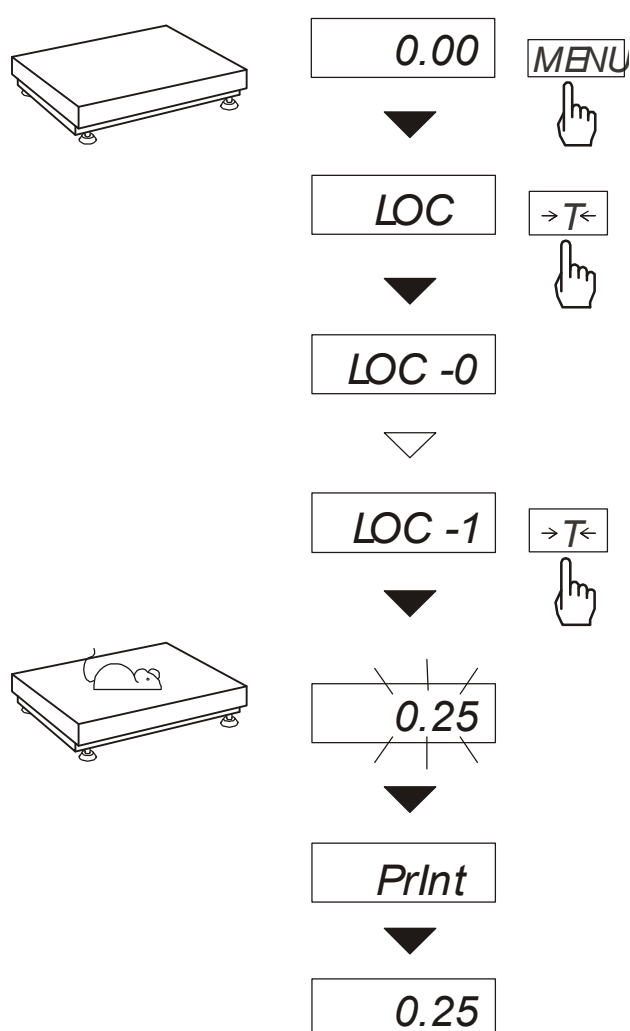
Press *MENU* key.

Using **→T←** key choose *NEWto* function, and then *NEW-1*.

*Note:* 1N≈0,1019kg

### 15.13 Function for weighing large animals (LOC)

The function allows weighing animal moving on the scale.



Press **MENU** key.

When **LOC** function is displayed press **→T←** key.

The following options appear on display successively:

- **LOC-0** – leave the function,
- **LOC-1** – automatic weighing after loading the scale,
- **LOC-2** – the measurement initiated manually by pressing **↵** key.

When **LOC-1F..-1** is displayed press **→T←** key.

Tare the scale using **→T←** key if necessary and place the animal on the pan.

Wait until the weighing result is averaged – scale display will be blinking. Then scale will show stable averaged result and will send it through serial port. Final result is displayed on the display and send via serial port to computer or printer.

The result remains on display for about 30 second.

#### **Important notes:**

1. The loads less than Min are not averaged.
2. In the case when placing the animal takes more than 5s, it is advised to use **LOC-2** option (measurement initiated manually). It will allow performing measurement in right moment pressing **↵** key.



### 15.14 Checkweighing function (*thr*)

This function allows comparing weighing result with two programmed reference values: lower and upper threshold. Comparison result is signalled with indicators (MIN, OK, MAX) and sound signal generated when threshold values are exceeded.

If comparison result is:

- smaller than lower threshold – the scale signals MIN (yellow colour),
- between threshold values - the scale signals OK (green colour, with the short sound signal),
- greater than upper threshold - the scale signals MAX (red colour, long sound signal).

The checkweighing results can be use to control:

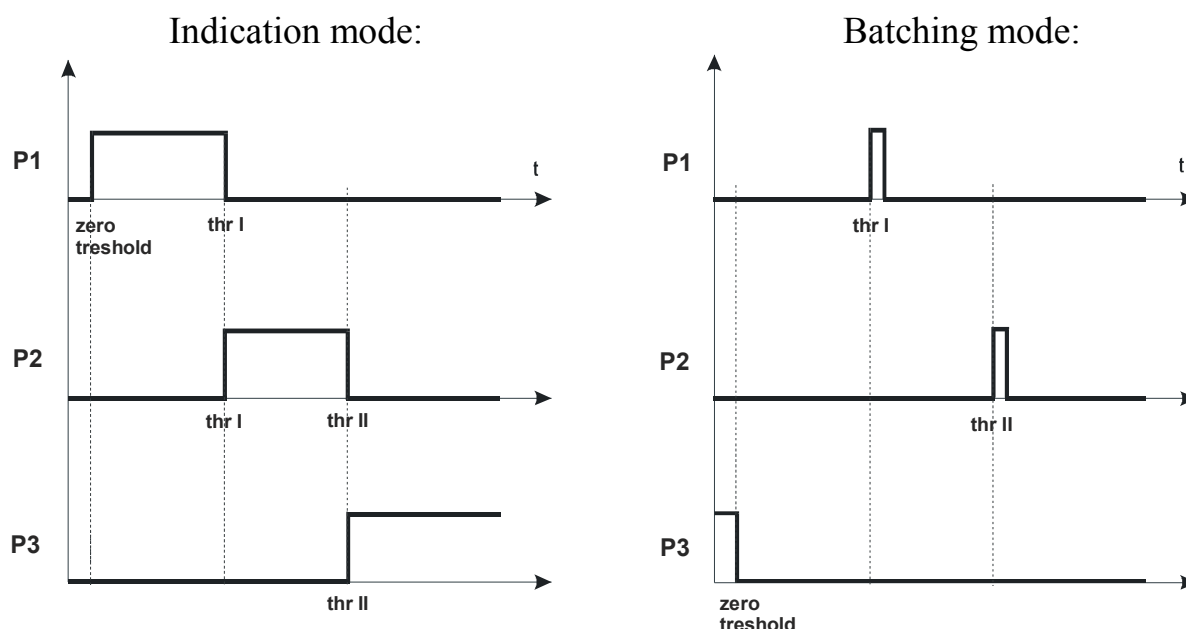
- optical indicator (*Indication mode*),
- batching devices (*Batching mode*).

-

Standard scale is set for cooperation with optical indicator.

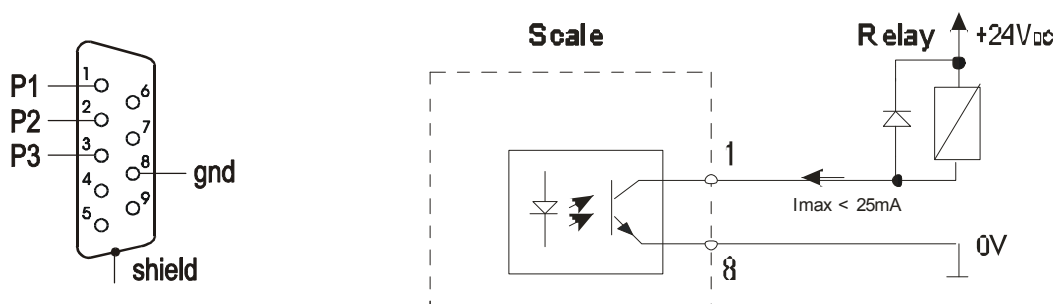
On outputs P1-P3 (*Relays socket*) short-circuit states appear as result of comparison scale indication with threshold values.

On the chart below output states are shown during increasing load on the scale for both working modes:



In *Batching* mode on P1 (thr I) and P2 (thr II) outputs short-circuit impulses appears for time of 0,5s. On P3 (zero) output short-circuit state appears when indication does not exceed threshold value signalling zero load.

*Relays connection diagram:*

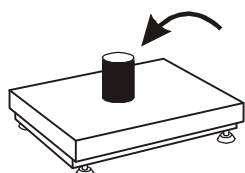
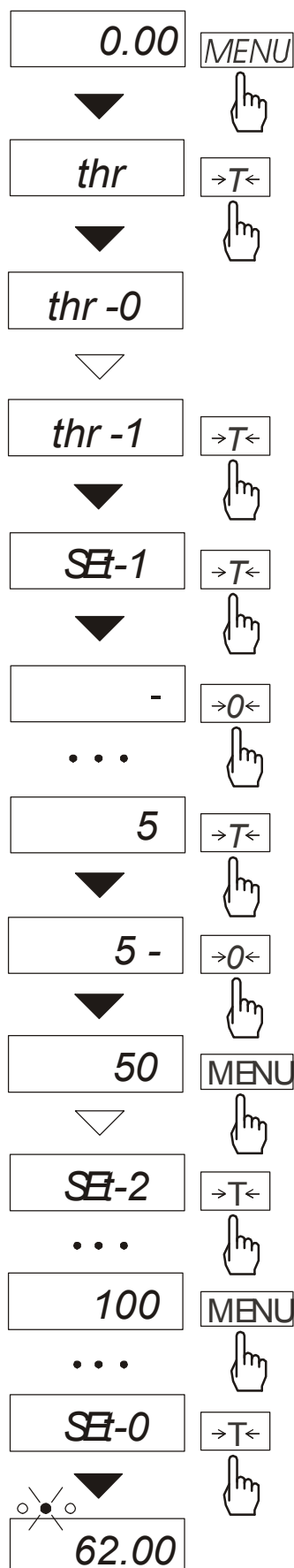
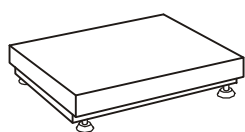


*Relays* output is the open collector transistor output with load capacity 25mA / 24V. Transmitter inputs must be protected with diodes, e.g. 1N4148.

It is advised to use MS3K/P electronic board (sold separately), consisting of RM96P transmitters, with DC24V input voltage and AC250V, 3A output.

***Important notes:***

1. After switching the scale on, both thresholds are set to maximum values.
2. When setting upper threshold value, pay attention that its value is not below lower threshold value.
3. Setting lower and upper threshold value is possible after sending appropriate orders from computer, what is described in scale user manual.

**Operation sequence:**

Press *MENU* key and choose *thr* pressing  $\rightarrow T \leftarrow$  key.

The following options are displayed successively:

- *thr-0* – deactivate the function,
- *thr-1* – activate the function,
- *thr-P* – check last threshold values (press  $\square$  key several times),
- *thr-t* – choose *Relays* socket mode:
  - 0 – exit to weighing
  - 1 – *Batching* mode
  - 2 – *Indication* mode.

Choose *thr-1* option using  $\rightarrow T \leftarrow$  key. The following options for entering thresholds are displayed:

- *SEt-0* – go to weighing with signalling threshold excess,
- *SEt-1* – set lower threshold value,
- *SEt-2* – set upper threshold value,
- *SEt-3* – set zero signalisation threshold.

Using  $\rightarrow T \leftarrow$  key select *SEt-1* option.

Set lower threshold value using the following keys:

- $\rightarrow 0 \leftarrow$  – digit increase,
- $\square$  – decimal point,
- $\rightarrow T \leftarrow$  – move to next digit,
- MENU* – finish.

Then select *SEt-2* option and enter upper threshold value.

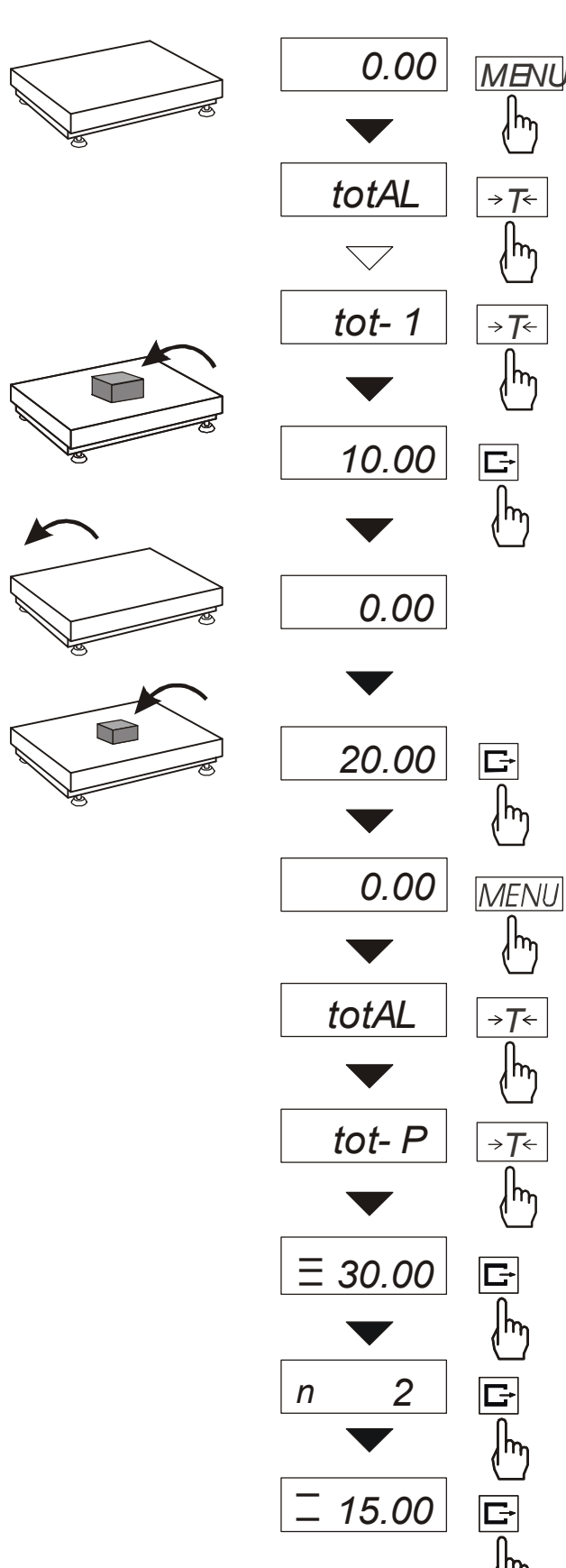
Choosing *Set-0* option will cause starting work with signalisation of exceeding thresholds and zero.

To change *Relays* socket mode use *thr-t* option. Default option is *Indication*.

To leave the function, press *MENU* key and then choose *thr* and *thr-0* options.

### 15.15 Total weight function (totAL)

The function allows calculating total weight for series of measurements, which can be greater than scale capacity. It allows calculating total weight as well as average value.



Press **MENU** key.

When **totAL** is displayed press **→T←** key.

The following options appear successively:

- **tot-P** - report printout without clearing total register,
- **tot-0** - clearing total register, report printout and leaving the function,
- **tot-1** - working with receipt printout after each measurement,
- **tot-2** - working without receipt printout.

Press **→T←** key when **tot-1** is displayed. Perform measurement series pressing **↵** key for storing results into total register.

In order to print and display results enter to function choosing **total** and **tot-P** option from menu

The results are display in the following sequence:

- total weight (**≡**)
  - number of registered measurements (**n**),
  - average value (**≡**),
- regarding that moving to display successive result is performed after pressing **↵** key.

In order to go back to total weighing without zeroing total register press **↵** key third time.

To leave the function with clearing total register, select *total* function from menu and choose *tot-0* option. When It will cause the scale prints the communicate informing about clearing registers.

The form of receipt after each measurement:

Date: ...	Time. ...
measurement no	weight
measurement no	weight

Report form:

Date: ...	Time. ...
TOTAL WEIGHT	=
NUMBER OF SAMPLES	=
AVERAGE VALUE	=

**Note:**

*When the scale has not an internal clock, Date and Time do not appear on printout.*

*Maximum number of measurements 99 999.*

*Maximum total load 99 999 000d.*

*The weighing unit of the total value from the register (Total) is the same as the weighing unit stated on the keypad or is 1000 times greater, what is signalled by "o" indicator at the left of the display.*

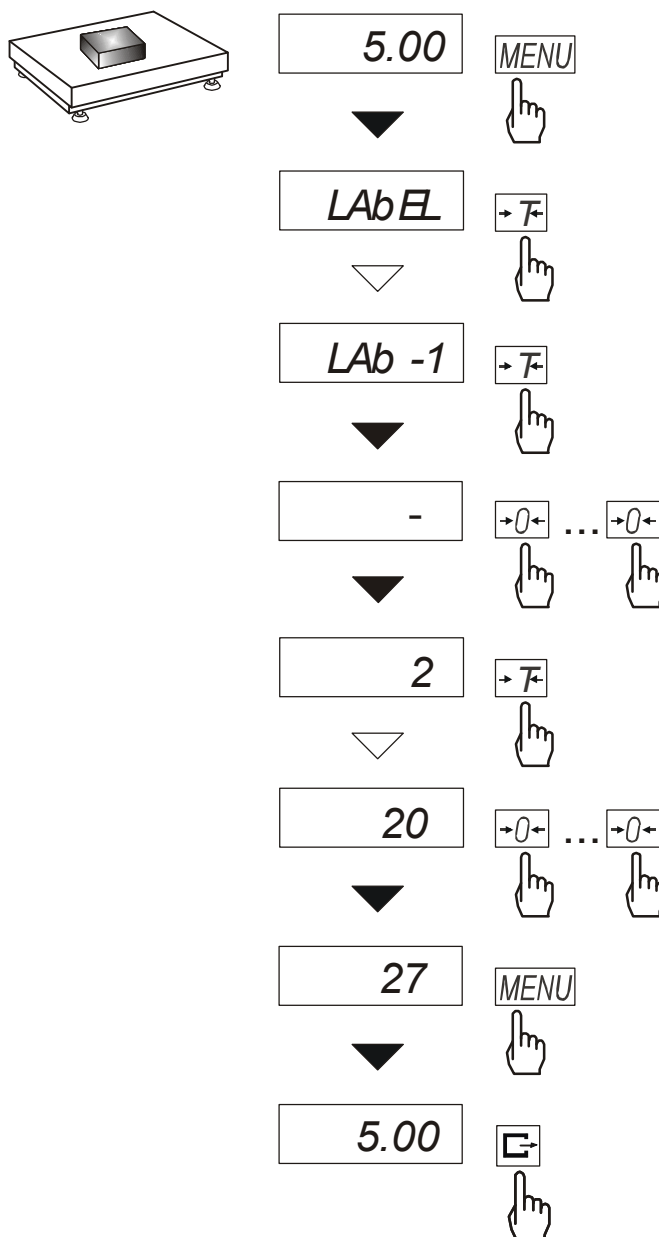
*If the registered value is too big to be displayed, "E" communicate appears on the display.*

*If the number of series is too high and cannot be displayed, "Err1" communicate appears on the display.*



### 15.17 Function for selecting label number (LAbEL)

The function appears in scales with *ELTRON* data transmission protocol. This protocol allows printing scale indication and optionally date and time on label printer, as variable texts. Other data, e.g. company address, product name, its bar code can appear on label as constant fields. Label forms used by user, named as a numeric value (max. 4 digits) should be previously stored in printer memory according to printer user manual. Choosing label form is performed by entering label number using *LAbEL* function.



Press *MENU* key.

When *LAbEL* is displayed press →T← key.


The following options appear successively on display:

- *LAb-0* – leave without changes,
- *LAb-1* – enter label number,

Using →T← key select *LAb- 1*.

For entering label number the following keys should be used:

- 0← – increase digit,
- T← – move to next digit,
- MENU* – finish entering.

After putting load on and pressing  key data is sent to a printer.

Format of data sent to label printer:

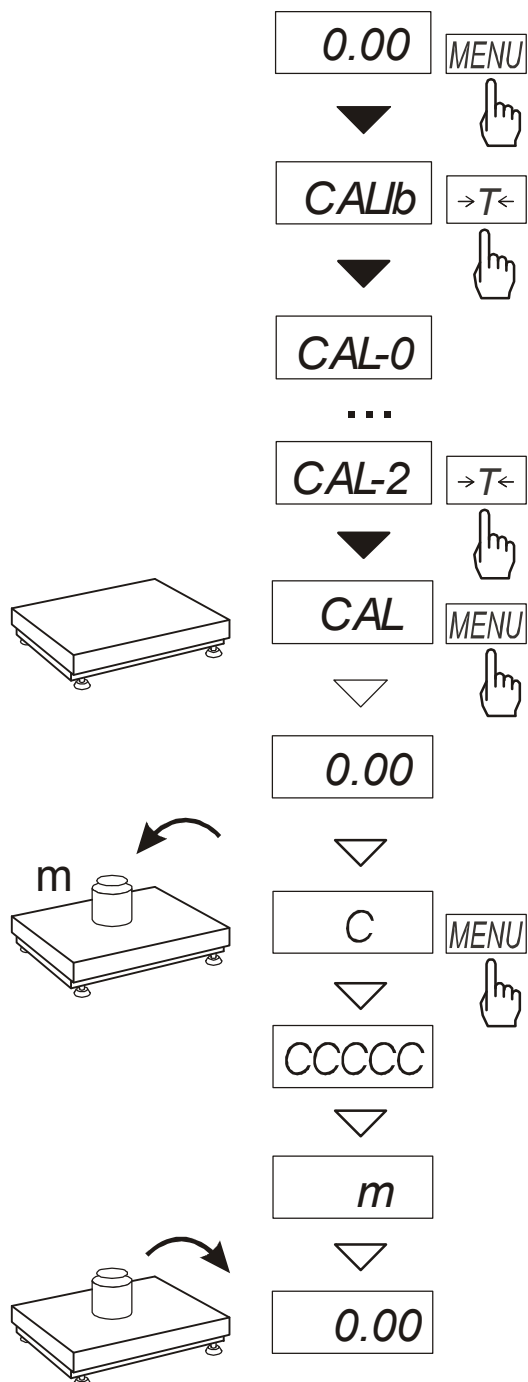
US	(55 53 0D 0A)
FR"0001"	(46 52 22 30 30 30 31 22 0D 0A)
?	(3F 0D 0A)
00:00	(30 30 3A 30 30 0D 0A)
2000.00.00	(32 30 30 30 2E 30 30 2E 30 30 0D 0A)

### 15.18 External calibration (CALib)

**Note:** This function is enabled in non legalized scales only.

Calibration of sensitivity should be make when aaccuracy of scale is not satisfactory. Could use standard mass equal of maximum range of scale (*Max*).

#### Operation sequence:



Press *MENU* key to call functions menu and to choose *CALibr* with **→T←** key.

The following options appear successively on display:

- *CAL-0* – leave without calibration,
- *CAL-1* – quick calibration – without confirms by *MENU* key,
- *CAL-2* – calibration with confirms
- *out* – leave without changes

Press *MENU* when communicate *CAL-2* is display.

Confirm readiness to calibration by press *MENU* key – pan must be empty.

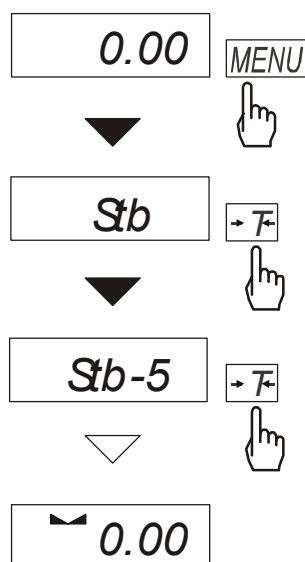
When communicate *C* is display put a standard mass (equal of maximum) to a pan and press *MENU* key.

Wait to end of calibration process.



### 15.19 Setting time of stabilization function (*Stb*)

The function allows changing stabilisation time of scale indication and connected with it the time of waiting for starting result printout on a printer connected to the scale.



Press *MENU* key.

When *Stb* is displayed press  $\rightarrow T \leftarrow$  key.

The following options appear successively on display:

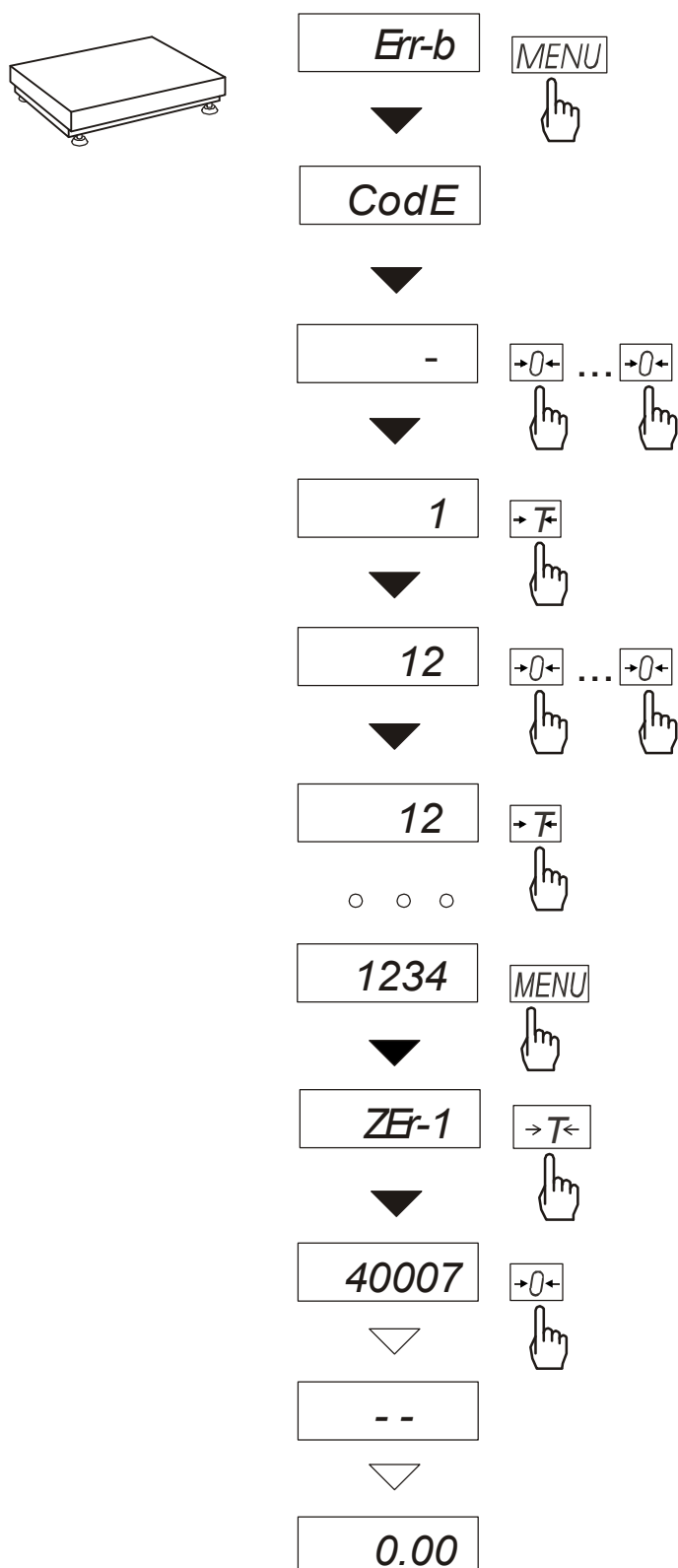
- *Stb-0* – deactivate the function,
- *Stb-1* – the longest stabilisation time,
- *Stb-2* – long stabilisation time,
- *Stb-3* – medium stabilisation time,
- *Stb-4* – shorter stabilisation time,
- *Stb-5* – the shortest stabilisation time.

After choosing one of the options weighing with activated filter is started.. In order to go back to normal work of the scale choose *Stb-0* option.

## 15.20 Entering reference zero function (Zero)

**Note:** This function is enabled in non legalized scales only.

ZER function allows entering new value of reference zero (value referred to empty pan) without need of contacting with authorised service centre.



Press **MENU** key while **Err-b** is displayed.

**Zero** function will be activated automatically.

After **CodE** communicate disappears insert access code to function (in new scale 1234). The following options appear successively on display:

**ZEr-0** – activate function,

**ZEr-1** – enter new zero value,

**ZEr-2** – enter new protecting code.

Using **→T←** key, choose **ZEr-1** and direct result from A/C converter will appear on scale display.

When the pan is empty press **→0←** key. Wait for finishing zeroing process.

In order to change access code use **ZEr-2** option. Entering value is performed similarly as with **ZEr-1** option.

It is also possible to use function in standard way:

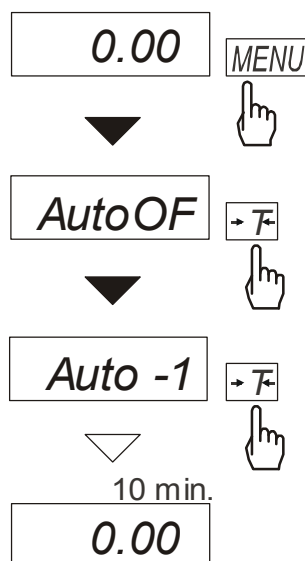
Activate **Zero** function using **ACtIV** function.

Press **MENU** key.

When **ZEr-0** is displayed press **→T←** key and so on.

### 15.21 Automatic switching off the scale function (AutoOF)

The function is helpful in scales supplied from accumulator. The function causes scale to switch off automatically after c.a. 10 minutes of not using it. Switching function on causes last entered zero and tare values are remembered in scale memory. After next start-up of the scale these values are restored.



Press *MENU* key.

When *AutoOF* is displayed press **→T←** key.

The following options appear successively on display:

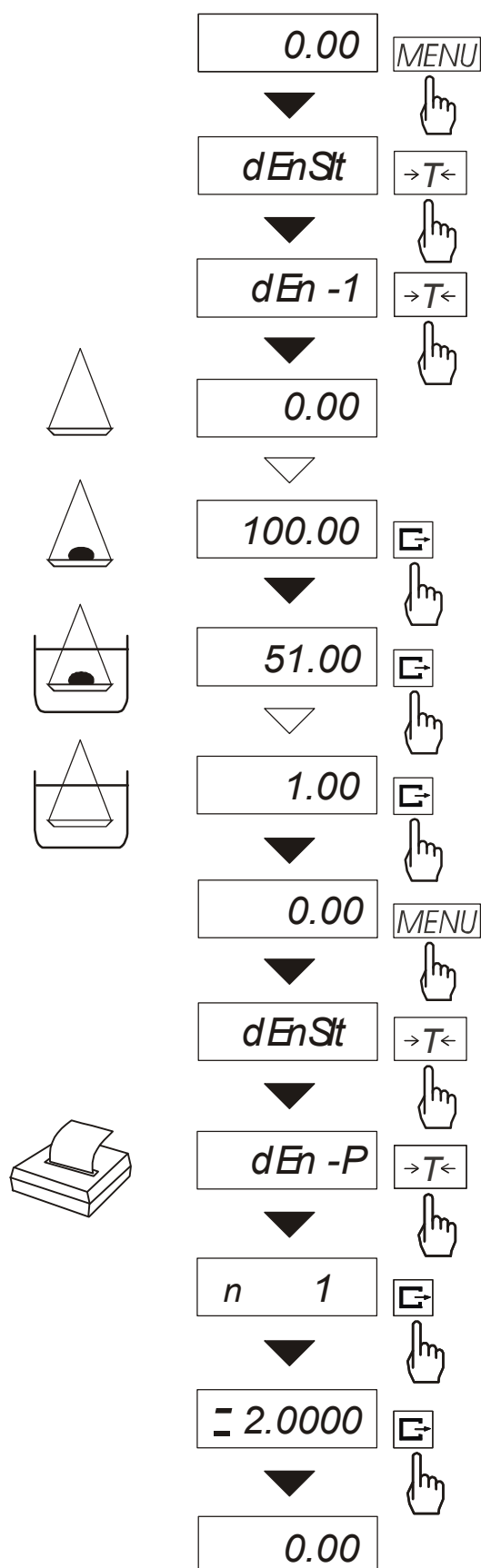
*Auto-0* – activate function,

*Auto-1* – deactivate function.

After function activation scale will control changes of its indications. If the scale will not be used and scale indications will not be changing, after time of c.a. 10 minutes the scale will switch off remembering its settings (zero and tare).

Switching on the scale is performed after pressing **I/⏻** key.

## 15.22 Density determining function (dEnSlt)



The function allows determining solid density basing on its weight in the air and in liquid of known density using the formula below:

$$g = \frac{m_1}{m_1 - m_2 + m_3} * g_{\text{liquid}}$$

where:  $m_1$ -weight in the air

$m_2$ - weight in liquid

$m_3$ - hanger weight

$g_{\text{liquid}}$  – liquid density

By default:

$$g_{\text{liquid}} = 1 \text{ g/cm}^3$$

(for distilled water).

When using liquid other than distilled water, choose *dEnSlt* from menu and use *dEn-2* option to enter liquid density taking into consideration its temperature.

To enter value use the following keys:

**→0←** - digit increase,

**↵** - decimal point,

**→T←** - move to next digit,

**MENU** - finish.

The measurement is performed in three phases:

-measurement in the air,

-measurement in liquid,

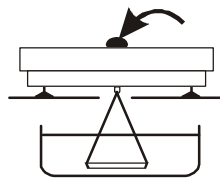
-hanger weighing

To read density determination result, enter *dEnSlt* function menu and use *dEn-P* option. First pressing **↵** key causes displaying successive measurement number. Second pressing **↵** key causes displaying and printing result, and then going to the next density measurement.

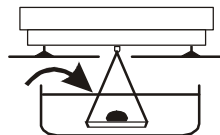
If a printer is connected to the scale, printout of solid density measurement results will be performed in the following form:

Date: ...	Time: ...
MEASUREMENT No. =	
WEIGHT in air =	g
WEIGHT in liquid =	g
HANGER WEIGHT =	g
LOAD DENSITY =	$\text{g/cm}^3$
LIQUID DENSITY =	$\text{g/cm}^3$

It is recommended to use pan hanging below balance, weighing in the air and in liquid is performed then in the following way.



Phase I: measurement in the air.



Phase II: measurement in liquid.

**Successive results will be printed in table**  
with indication of their values using "\*" character  
referred to limit values.

1. After performing last measurement  
"END" text will appear and summarising report of  
control results will be printed:

PLACE OF  
CONTROL: .....

Date: ... Time: ...

CONTROL NO.: .....

SCALE TYPE : ...

FACTORY NO. : ...

BATCH SIZE : ...

VALUE Qn : ...

VALUE Qn-T1 : ...

VALUE Qn-2T1 : ...

Qn-2T1 Qn Qn+2T1

... g \*

... g \*

.....

2. In order to finish working with the function and reset  
results register, press *MENU* key, and when "F..-tP"  
and "F..-0" is displayed press →T← key.

**Note:** Activating TP function causes that indicators  
signal exceeding limit values Qn-2T1 and Qn+2T1.

Date: ... Time: ...

MEASUREMENT COUNT = ...

QUALIFYING AVERAGE = ...

STANDARD DEVIAT. S = ...

\*HISTOGRAM\*

<Qn-2T1 -n<sub>2T1</sub>

Qn-2T1 -----

A n<sub>A</sub> █

B n<sub>B</sub> █

C n<sub>C</sub> █

D n<sub>D</sub> █

E n<sub>E</sub> █

F n<sub>F</sub> █

G n<sub>G</sub> █

H n<sub>H</sub> █

I n<sub>I</sub> █

J n<sub>J</sub> █

Qn-2T1 -----

>Qn-2T1 +n<sub>2T1</sub> █

RESULT : ...

CONTROLLER : \_\_\_\_\_

## 15.23 Statistical calculations function (StAt)

**Attention:** Function is available on demand and it replaces other special functions.

This function evaluates from series of measurements (max 500) statistical parameters of weighting process. Adding successively measurements to register is automatic and it occurs after the scale is loaded and its indications stabilize.

After each loading printout is made with: number of measurements, result, date and time.

Next measurement is made after taking off earlier load.

For the obtained measurements series the scale evaluates:

- n                                      - number of samples
- sum x                                - sum of all samples  $sum\_x = \sum x_n$
- $\bar{x}$                                       -average value (sum x)/n
- min                                    -minimal value from n samples
- max                                    -maximal value from n samples
- max-min                              -maximal value minus minima value
- S                                        -standard deviation  $S = \sqrt{\frac{1}{(n-1)} \sum_n (x_n - \bar{x})^2}$
- srel                                    -variance factor  $srel = \frac{S}{\bar{x}}$

Statistical calculations results can be printed.

### Order of operations:

1. Press *MENU* key.
2. When *F..-StA* is displayed press  $\rightarrow T \leftarrow$  key.  
The following options are displayed:
  - *F..-P* – statistical data printout,
  - *F..-0* - out of function, register zeroing, statistic data printout,
  - *F..-I* - enter or continue function,
3. Press  $\rightarrow T \leftarrow$  key when *F..-I* is displayed.
4. Put on successively objects on pan, (remove after indication stabilization) in order to add them to measurement register.
5. In order to obtain printed statistical results from measurements series press *MENU* key.  
When sign *F..-StA* is displayed, press  $\rightarrow T \leftarrow$  key.

When *F..-P* is displayed press again  $\rightarrow T \leftarrow$  key.






### ***Maintenance and small repairs***

1. Keep the balance clean.
2. Take care, for during the operation some impurities may enter under balance base and into sensors vicinity. In case of impurities finding remove them.
3. In case of improper operation due to short power failure, switch off the balance by unplugging the power cable from the socket, and plug it again after a few seconds.
4. The message “Err-b”, displayed after switching on the unloaded balance, indicates the balance sensor mechanical damage.
5. All repairs must be performed by the authorized personnel.
6. To perform the repair contact the nearest service point.

### ***Emergency messages:***

Message	Reason	Recommendation
<i>C-1 ... 6 (over 1min.)</i>	autotest negative result	contact the service
<b><i>Err-b</i></b>	balance loaded during turning on	remove load from the balance
	balance sensor mechanical failure	contact the service
<i>l</i>	balance mechanical failure	contact the service
<i>H</i>	balance overload	remove load from the balance
	balance mechanical failure	contact the service
indicator does not work 	balance unstable, base vibrations, air blasts	place the balance in location, assuring the indications stability
	balance damage	contact the service
- - - - -	tare setting not finished	contact the service
- -	tare setting unsuccessful (too low load or B/G pressed)	zero the balance or pres B/G again
- -	zeroing with too high load	set the tare

## Declaration of Conformity

We:

**AXIS** Spółka z o.o. 80-125 Gdańsk, ul.Kartuska 375B declare with full responsibility, that the  
balances:

*4B300F, 4B600F, 4B1500F, 4B2000F, 4B3000F i 4B6000F  
oraz 4B300FN, 4B600FN, 4B1500FN, 4B2000FN, 4B3000FN i 4B6000FN*

marked with CE mark are consistent with:

1. Standard PN-EN 61010-1:2004 Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements harmonized with the directive 73/23/EEC (Low Voltage Directive),
2. Standard PN-EN 55022:2000 Electromagnetic compatibility (EMC) – Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement, and PN-IEC 61000-4-3 Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques - Radio-frequency electromagnetic field immunity test, harmonized with 89/336/EEC directive (electromagnetic compatibility).

Moreover, balances with the following information on rating plates:

- sticker with two digits of year of conformity assessment and with number of notified unit, performing the assessment,
- green metrological marking M,
- protective mark from notified unit



are made according to certificate of approval EC no. PL 04 020 and have EC verification, confirming conformity with:

3. Standard PN-EN 45501 Specification for metrological aspects of non-automatic weighing instruments, issued in December 1999, harmonized with the 90/384/EEC council directive, changed by 93/68/EEC council directive).

### Additional information

- Conformity evaluation for the Council Directive 73/23/EEG and 89/336/EEG were carried out by Laboratorium Badawcze Oddziału Instytutu Elektrotechniki w Gdańsku, accredited to PCA.
- Approval certificate no. PL 04 020, issued by Central Office Of Measures in Warsaw (Notified Unit No. 1440).

Gdańsk, 9th of January, 2008

Authorized by the Director AXIS Sp. z o.o.:

Production manager      mgr inż. Jan Kończak

A handwritten signature in black ink, appearing to read 'M. Kończak', is written over a horizontal line. Below the line, the word 'Signature' is printed.

## Appendix A

### ***Information's concerning double-range scale (options)***

#### **1. General description**

Double-range scale's have capability of work with greatest accuracy in bottom measuring range part. Weighing of smallest mass is more precise.

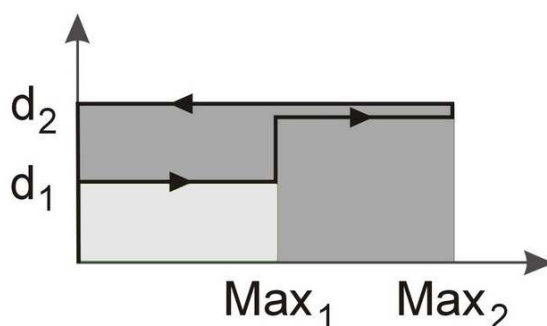
This type of scale's have two measurement range:

- $Max_1$  - 50 % of maximum load (mostly),
  - $Max_2$  – 100% of maximum load,
- and adequate reads digit:  $d_1$  i  $d_2$  ( $d_1 < d_2$ ).

Double-range options causes change of scale's operation:

- after turn on (in small mass range 0-  $Max_1$ ) scale displays result with reading unit  $d_1$ ,
- when the load pass the  $Max_1$  scale changes reading unit on  $d_2$ ; from this moment scale displays result with reading unit  $d_2$  on all measure range (0-  $Max_2$ ),

return to unit  $d_1$  is succeed after zeroing the scale ( $\rightarrow 0 \leftarrow$  key), or when all mass is removed from pan (indicator " $\rightarrow 0 \leftarrow$ ").



#### **2. Double-range scale parameters**

Range and graduation values are represented on nominal table on the scale.

***NOTES***