AG600C

AG100C-AG500C

AG1000C-AG4000C

USER MANUAL

AG/C series

File: ER-AGC-108-06-08 AC-4_3 GB

Contents:

1. General description

AG/C series balances are destined for high accuracy weighing in laboratory practice.

Balances are equipped with an internal calibration system for proper accuracy control during operation. The user should also own weight standard of OIML F2 or F1 class for periodical control of the balance (weight value stated in Technical Data sheet) - available separately.

All balances are metrologically tested - calibration or EC verification on demand.

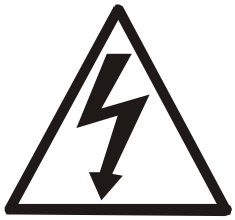
For purposes where EC verification is not required AGZ/C without internal calibration circuit balances are appropriated. In those balances all the functions connected with internal calibration are removed (chapters 9, 11 and 15.5).

NACE classification: 33.20.31.

2. Completeness

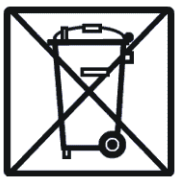
A standard set consist of:
1. Balance
2. Tin floor plate and pan ring,
3. Pan elements:
   - round pan balances (AG100C-AG600C): pan support and pan
   - rectangular pan balances (AG1000C-AG4000C): pan supports (4pcs.) and pan
4. Antiblast glass draft shield with lid (AG100C-AG500C)-option,
5. Feeder ZOLAN model P6VA 12V/800mA (AGZ/C – 12V/500mA),
6. User Manual,
7. Guarantee card.

3. Security rules



To avoid electrical shock or damage of the balance or connected peripheral devices, it is necessary to follow the security rules below.

- All repairs and necessary regulations can be made by authorised personnel only.
- To avoid fire risk use a feeder of an appropriate type (supplied with the balance). Pay attention that supply voltage is compatible with specified technical data.
- Do not use the balance when its cover is opened.
- Do not use the balance in explosive conditions.
- Do not use the balance in high humidity.
- If the balance seems not to operate properly, unplug it from the mains and do not use until checked by authorised service.



According to legal regulations it if forbidden to dispose electronic equipment in waste containers.

- Please return wasted balance to the point of purchase or other company specialised in recycling of wasted electronic components.

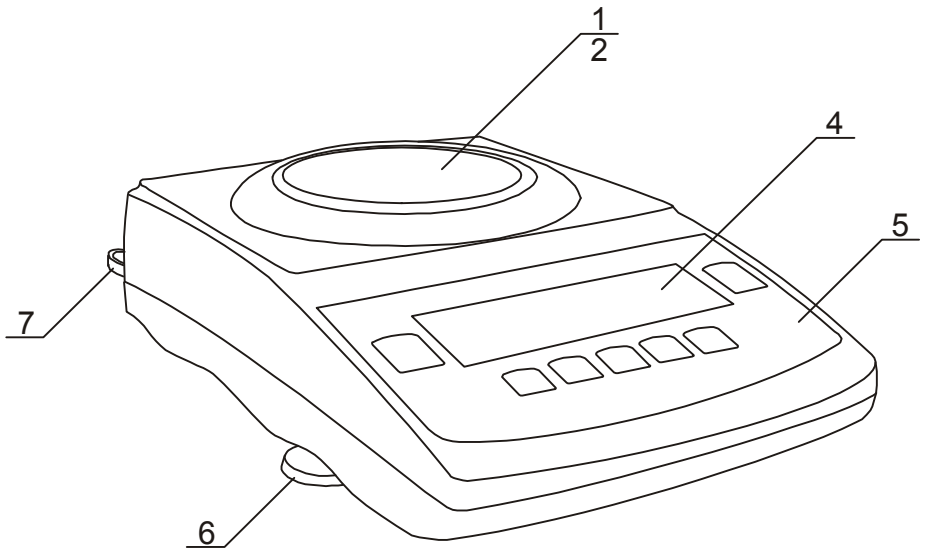
4. Technical data

Type	AG100C AGZ100C	AG200C AGZ200C	AG300C AGZ300C	AG500C AGZ500C
Capacity (Max)	100g	200g	300g	500g
Min load (Min)	0,02g	0,02g	0,02g	0,02g
Reading unit (d)	0,001g	0,001g	0,001g	0,001g
Verification unit (e)	0,01g	0,01g	0,01g	0,01g
Tare range	-100g	-200g	-300g	-500g
Accuracy class	II			
Working temperature	+18 ÷ +33°C			
Weighing time	<8s			
Pan dimension	ϕ115mm			
Balance base dim. (including legs)	215(235)x345x90mm			
Balance weight	5kg			
Power	~230V 50Hz 6VA / =12V 300mA			
Calibration weight (OIML)	F2 100g	F2 200g	F2 200g	F1 500g

Type	AG600C AGZ600C	AG1000C AGZ1000C	AG2000C AGZ2000C	AG3000C AGZ3000C	AG4000C AGZ4000C	AGZ10C
Capacity (Max)	600g	1000g	2000g	3000g	4000g	8000g
Min load (Min)	0,5g	0,5g	0,5g	0,5g	0,5g	5g
Reading unit (d)	0,01g	0,01g	0,01g	0,01g	0,01g	0,1g
Verification unit (e)	0,1g	0,1g	0,1g	0,1g	0,1g	1g
Tare range	-600g	-1000g	-2000g	-3000g	-4000g	-8000g
Accuracy class	II					
Working temperature	+18 ÷ +33°C					
Weighing time	<5s					
Pan dimension	ϕ150mm	165x165 mm				195x180 mm
Balance base dim. (including legs)	215(235)x345x90mm					
Balance weight	5kg					
Power	~230V 50Hz 6VA / =12V 300mA					
Calibration weight (OIML)	F2 500g	F2 1000g	F2 2000g			F2 5000g

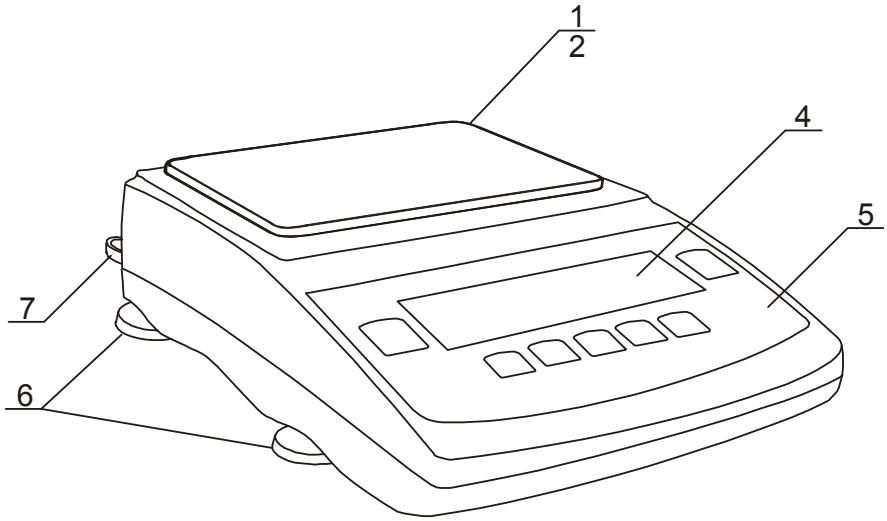
5. General view

Front view (AG100C-AG500C)



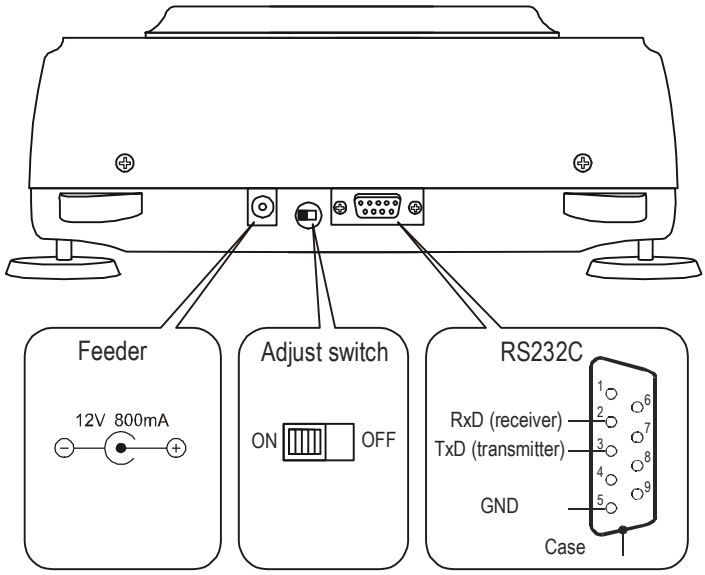
1 – pan
2 – pan support (under pan)
4 – display LCD
5 – keyboard
6 – legs
7 – water-level

Front view (AG1000C-AG4000C, AGZ10C):

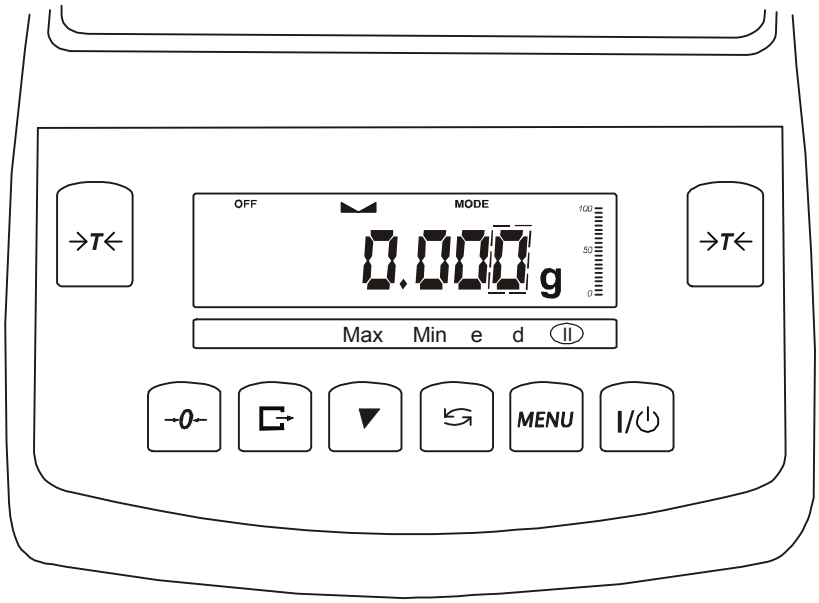


1 – pan
2 – pan supports (under pan)
4 – display LCD
5 – keyboard
6 – legs
7 – water-level

Rear view:


Feeder
12V 800mA
Adjust switch
ON
OFF
RS232C
RxD (receiver)
TxD (transmitter)
GND
Case
1
2
3
4
5
6
7
8
9

6. Keys and indicators

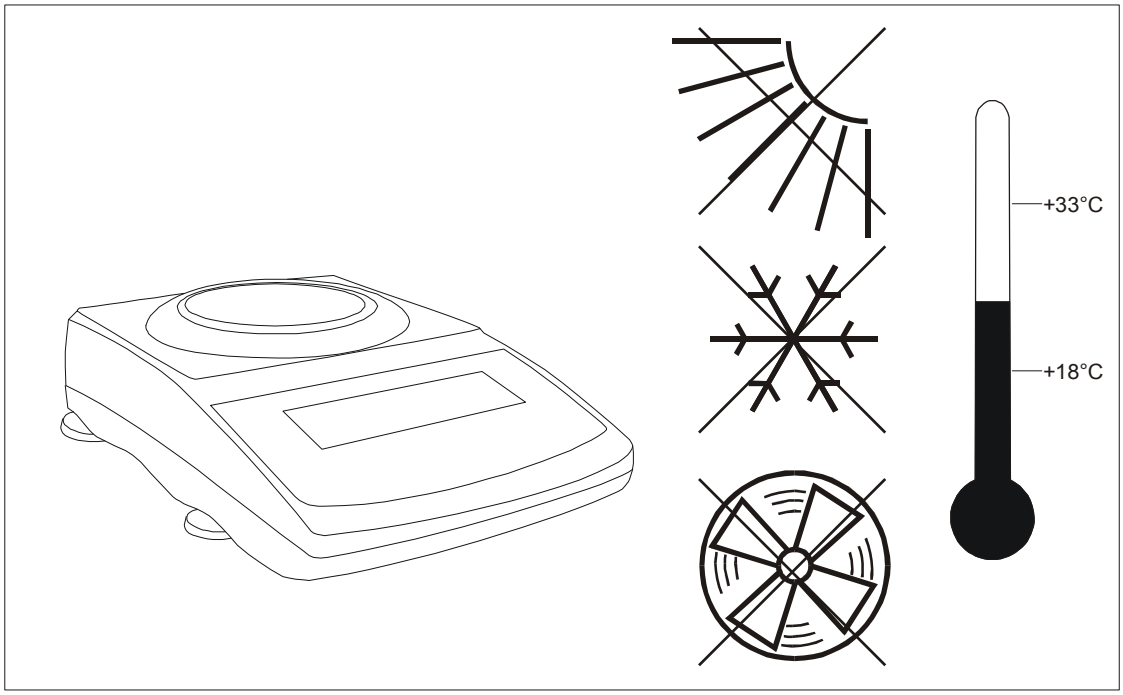


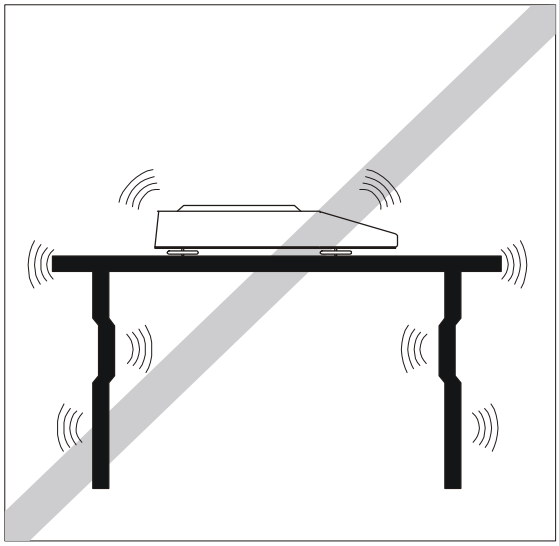
key	→T←	- tare (subtract package weight from weighed mass)
key	→0←	- numeric key / zeroing (balances for direct sale use only),
key	⊏→	- numeric key / data output (print / transmission),
key	▼	- numeric key / internal calibration on and off,
key	↻	- special functions on/off switch,
key	MENU	- numeric key / menu,
key	I/⏻	- switch-on/switch-off (standby),

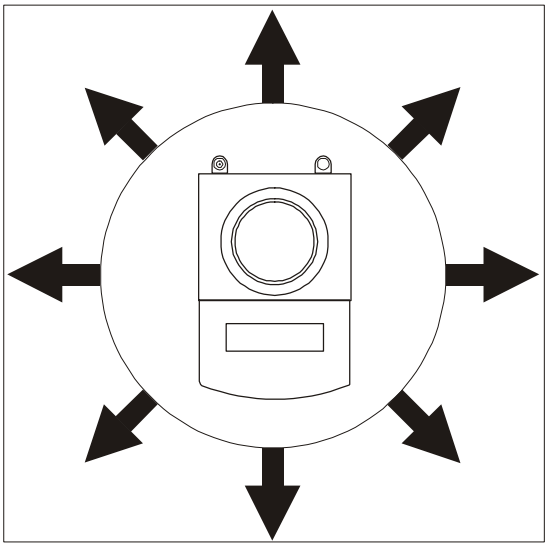
indicator	⌣	- result stabilisation,
bar indicator		- load indicator 0 ÷ 100%,
indicator	OFF	- stand-by mode,
Max, Min, d, e, II		- metrological parameters and accuracy class.

Additional functions of keys:
▼ - next digit,
⊏→ - decimal point,
→T← - next position,
MENU - end.

7. Preparations – working environment



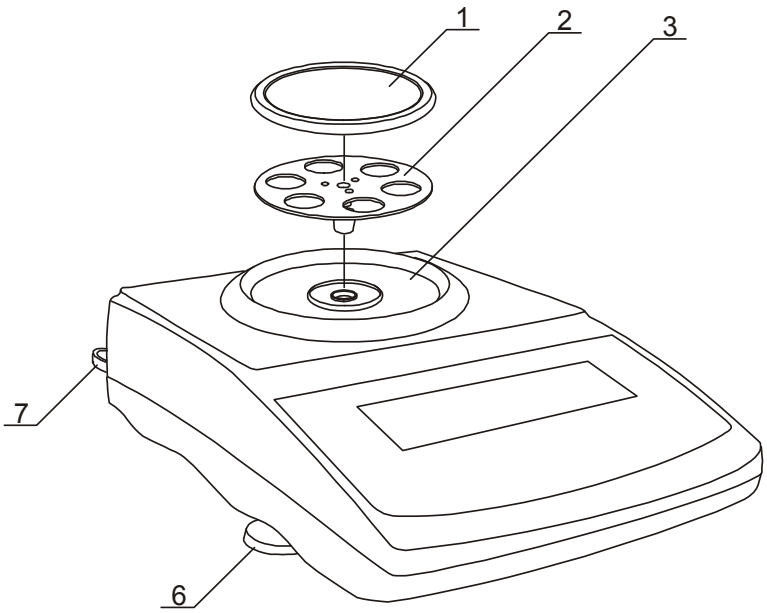




When choosing a location to set up the balance, remember the following rules to ensure proper working conditions and user-friendly operating:

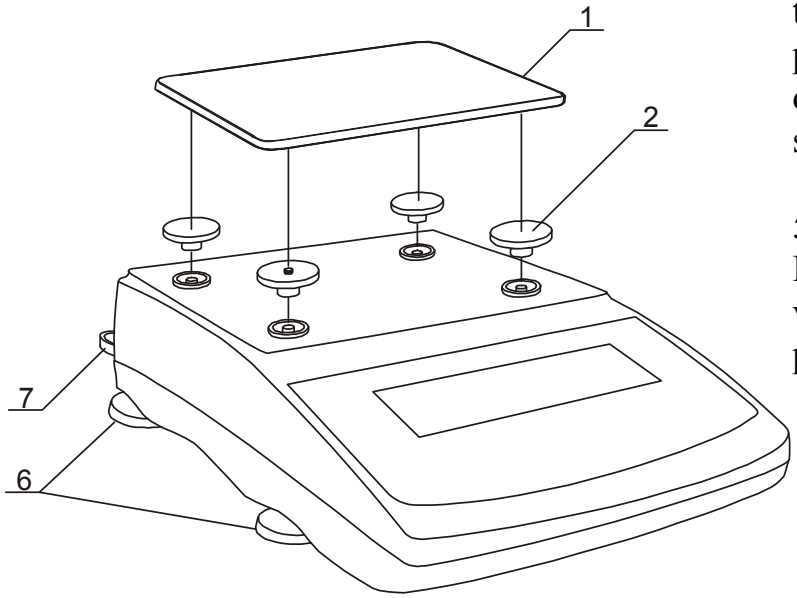
- setup the balance on an even, flat surface leaving necessary room for easy access,
- maintain proper working temperature,
- avoid strong air drafts, vibrations, dust, big temperature changes and humidity over 90%,
- avoid locations with extreme heat radiation and electromagnetic or magnetic fields.

8. Preparation – the balance



1. Take the balance and supplied accessories (a feeder, pan elements) out of the box.
2. Place the balance on a stable ground not affected by mechanical vibrations and airflows.
3. Level the balance with rotating rear legs 6 so that the air bubble in water-level 7 at the back of the balance is in the middle.

4. (for AG100-AG600)
Gently insert the mandrel of pan support 2 into pan socket through the pan ring 3. Put the decorative pan 1 on (AG600 balances have decorative pan joined with pan support).



5. (for AG1000-AG4000)
Place supports 2 on mandrels visible in balance cover hole put pan 1 on supports.

Moisture in the air may condense on the surface of the balance when transferred to the warmer environment. In this case leave the balance for at least 4 hours unplugged from the mains for conditioning to avoid wrong operating or damage of the balance.

9. Operation principles

1. To ensure proper weighing accuracy the balance is equipped with internal calibration system (it doesn't concerne AGZ/C series). The system automatically calibrates the balance every 2 hours and with temperature changes (more than 1°C) without user ingerence. Nevertheless, it is advised to check balance accuracy with weight standard (or other object with known weight) before and after each series of measurements.
2. Weighed sample should be placed in the centre of the pan.
3. In direct sale use (d=e), make sure that zero indicator is displayed. If not, press →*0*← key and wait until zero indication and zero indicator appears. In other balances the key does not operate.
4. The balance is equipped with a tare equal to its range. To tare the balance press →*T*← key. Storing a tare value does not extend measuring range, but only subtracts it from a load placed on a pan. To make weight control easier and to avoid range overdrawing, the balance is equipped with a load indicator (graduated in percentages).
5. Weighing result should be read when the indicator "⌞⌟" lights, which signalises stabilisation of a result.
6. When the balance is not used but it is necessary to be ready to work immediately, it can be switched off by pressing I/⏻ key. The balance reading system is then switched off to "standby" mode (signalled by the indicator "OFF"). To switch the balance on press I/⏻ key. The balance is immediately ready to operate maximum accuracy (after self tests).
7. The mechanism of the balance is a precise device, sensitive to mechanical strokes and shocks.

Before transportation take off the pan (move it slightly and lift it up) and the pan base and preserve from any damages.

Do not overload the balance more then 20% of maximum load (Max).

Do not press a pan with a hand.

8. The balance should not be used to weigh ferromagnetic materials due to accuracy decrease.
9. When the balance is moved to another localisation remember to level the balance and proceed with internal calibration.

10. Start-up

Leave the pan empty, plug the feeder to the mains (~230V/50Hz) and plug the feeder connector to the 12V power socket at the back of the scale

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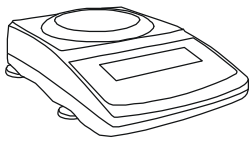


C-1	Basic electronic components tests: *C1, C-2, ... C-6.*
• • •	
C-5	Internal calibration motor test.
▽	
AC-...	Program version.
▽	
-CAL-	Internal calibration start.
▽	
-------	Zeroing
▽	
LOAD C	Internal weight loading.
▽	
C	
▽	
-------	Zeroing.
▽	
0.000g	Ready.

11. Internal calibration

Internal calibration consists in automatic placing of internal standard weight by the balance mechanism and entering the correction in balance software (it doesn't concerne AGZ/C series). The correction is necessary due to different values of gravitational acceleration in place of balance production and operation, and due to balance levelling, temperature changes, etc.
Internal calibration is performed automatically: after each turning on, then every 2 hours of balance operation and after each environment temperature change of more than 1°C. In non-verified balances these values may be changed (calibration options).
Internal calibration process beginning (autocalibration) is signalled by the message - *CAL* -.
If internal calibration is required in any moment of balance operation, empty the pan and press ▼ button.
Until the calibration process is finished, do not perform any actions with the balance. All shocks and vibrations disturb the calibration process, may prolong its time and increase result precision.

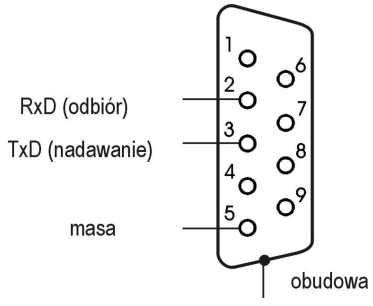
Caution:
For higher reliability, the internal weight is places three times, and the results are compared. Incorrect calibration course is signalled with the message and causes its cancelling. If the balance internal calibration does not assure proper precision, which may be verified by placing the standard weight or object of exactly known weight, contact the service.

12. Testing

To ensure reliable results it is advised to check balance accuracy with an object of precisely known weight before and after each measuring session.
To check a balance with EC verification use a weight standard as stated in Technical Data table for specific balance type (or of better accuracy) with valid calibration certificates. In case permissible error is exceeded please contact an authorised service.

13. Connecting the balance to a computer or a printer

Balance may send data to the computer or printer through RS232C port.



During the operation with computer the balance sends the weighing result after the initiating signal from the computer, or pressing ⊏→ key.
To cooperate with balance, the computer must have the program, enabling the balance data receiving and processing.

AXIS company offers computer programs for cooperation with balances, available on web pages www.axis.pl :

- *Test RS232C*- program for testing balance serial port (full version),
- *ProCell* – program allowing for balance cooperation with Excel spreadsheet and other Windows applications (demo version).

Serial port working modes:

Standard mode
The balance sends weighing result after initialising signal from a computer or after pressing ⮆ key.

Automatic mode (when cooperating with a printer)
The balance sends data automatically after result stabilisation; next transmission is possible after removing previously weighted sample.

To select serial port working mode use "LPt" function (see further part of the manual).

Standard transmission parameters: 8bits, 1stop, no parity, 4800bps. To change transmission parameters use "rS" function (see further part of the manual).

Data transmission protocol description (Long protocol)

1. Standard mode:

Computer→Balance: initialising signal S I CR LF (53h 49h 0Dh 0Ah)
Balance→Computer: balance indication in the following format (16Bytes)

Byte	1	-	sign or space
Byte	2, 11 and 14	-	space
Byte	3÷4	-	digit or space
Byte	5÷9	-	digit, decimal point or space
Byte	10	-	digit
Byte	12	-	k, l, c, p or space
Byte	13	-	g, b, t, c or %
Byte	15	-	CR (0Dh)
Byte	16	-	LF (0Ah)

2. Automatic mode:

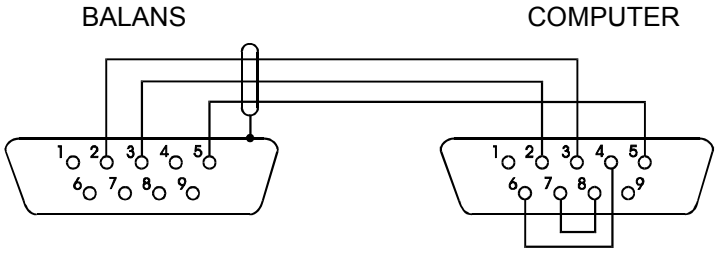
After stabilisation of each weighing result, excluding zero indication, the balance sends 3-digit successive measurement number and a weighing result.

To clear the measurement counter chose automatic mode once more (see LPt function description for further details).

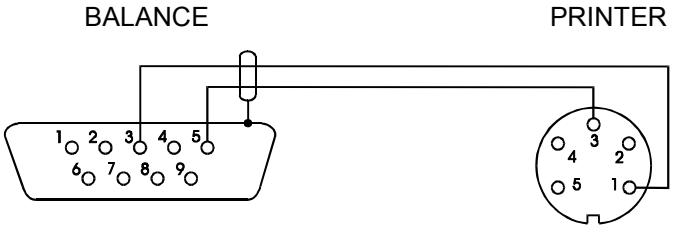
Sample printout:

```
1       1250.5 g
2       1250.0 g
3       1250.1 g
          . . .
```

Connection cable WK-1 *(balance – computer / 9-pin):*



Connection cable WD-1 *(balance - KAFKA printer):*



KAFKA printer internal switches set-up:

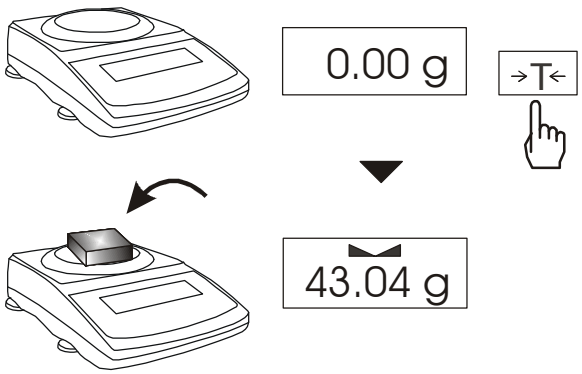
SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8
on	off	on	off	off	on	off	off

14. Basic balance functions

In further part of this manual the following graphical symbols will be used for balance functions description.

- put load on the pan
- put load of the pan
- press a key during indication
- forced change
- automatic change

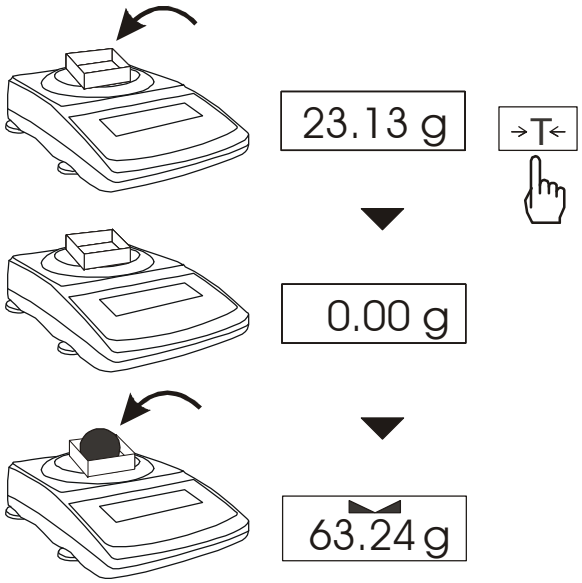
14.1 Normal weighing



When the pan is empty and indication is different than zero press →*T*← key.

Weighing result should be read when the indicator "▬" lights.

14.2 Weighing with tare



The balance is equipped with tare equal to its range.

15. Special functions description

All balances, beside basic functions like weighing and tare, are equipped with the set of additional functions.
Standard set of special functions include:

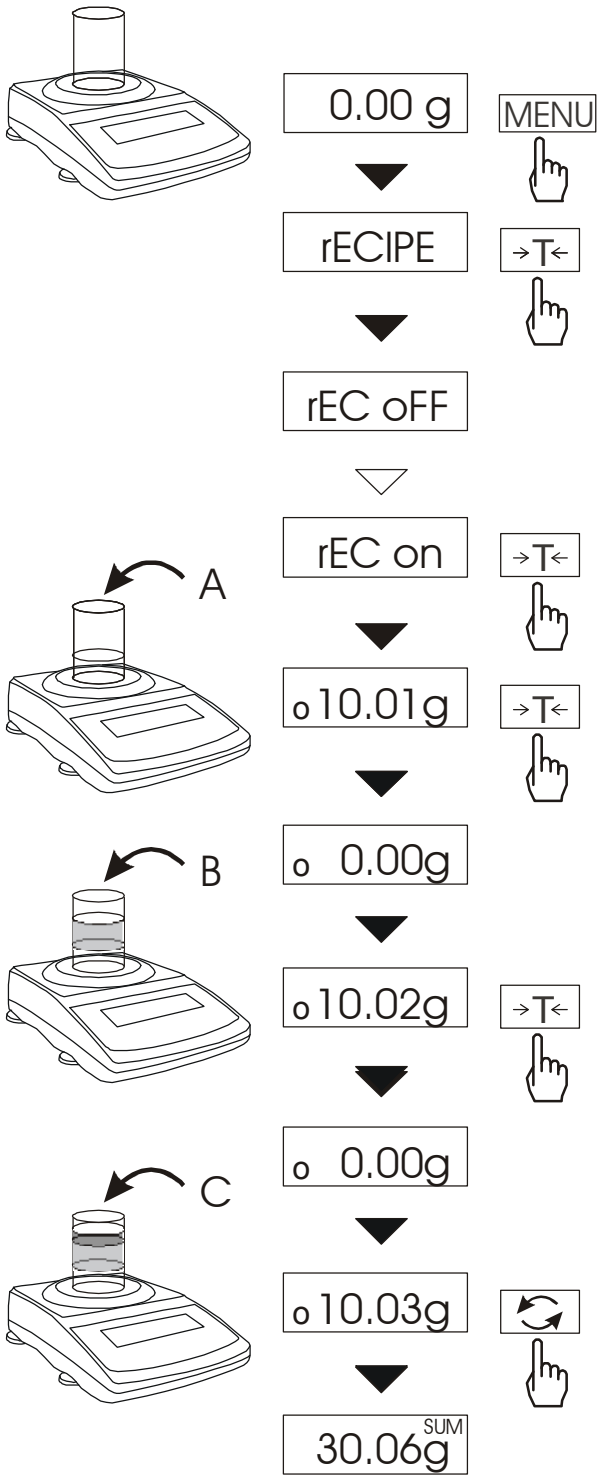
- pieces counting,
- autozeroing,
- serial port working mode setting,
- serial port parameters setting,
- percentage weighing,
- weighing unit change (grams / carats / pounds)
- prescriptions making
- calibration options

Other special functions may be enabled as an option on customer request (described in additional brochure when ordered).

For easy access to the most frequently used functions, use *ACtIV* function to select functions to be displayed in functions menu.

When special function is active, *MODE* indicator is displayed.

15.1. Weigh summing (rECIPE)



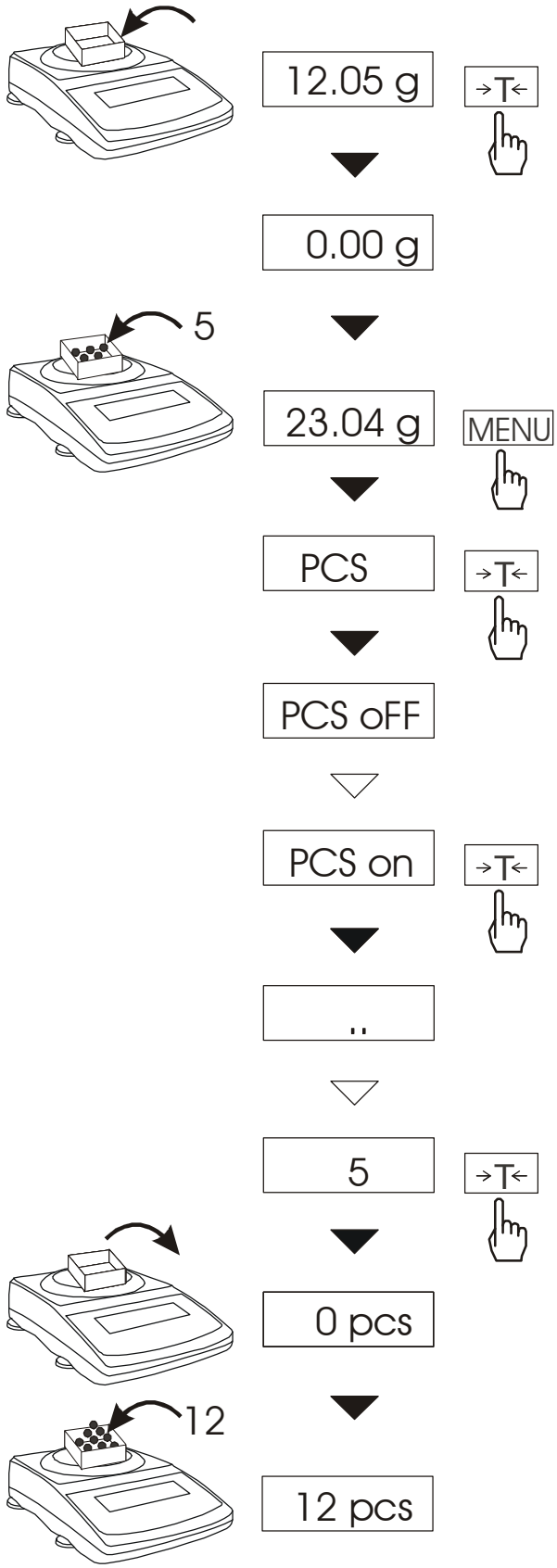
This function enable to weigh few ingredients in one container and to display aggregated sum of all ingredients.
The function has the following options:
-*rEC oFF* – leave the function and display aggregated sum of all ingredients,
-*rEC on* – activate the function,
-*rEC Con* - return to previous series of weighing,
- *out* – exit without change.

Before weighing each ingredient (A, B, C, etc.) remember to tare the balance.

To read aggregated sum of all previously weighed components press ↻ key or use *rEC oFF* option. To return to ingredients weighing press ↻ key again.

Note:
When *rECIPE* function is active, the sign **o** is displayed at the left of the display.
When *rEC oFF* option was used, *SUM* indicator disappears after pressing →*T*← key.

15.2. 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.
In order to bring back displaying in mass units use ↻ key. Using this key once more will cause return to displaying in pieces.
To leave function press *MENU* key and then with *→T←*, key chose *PCS* and *PCS oFF* .

Note:
Err-3 communicate signalises that a sample was not put on a 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).
To chose previously used pieces amount select ".." in first phase.
During pieces counting →T← key function does not change.

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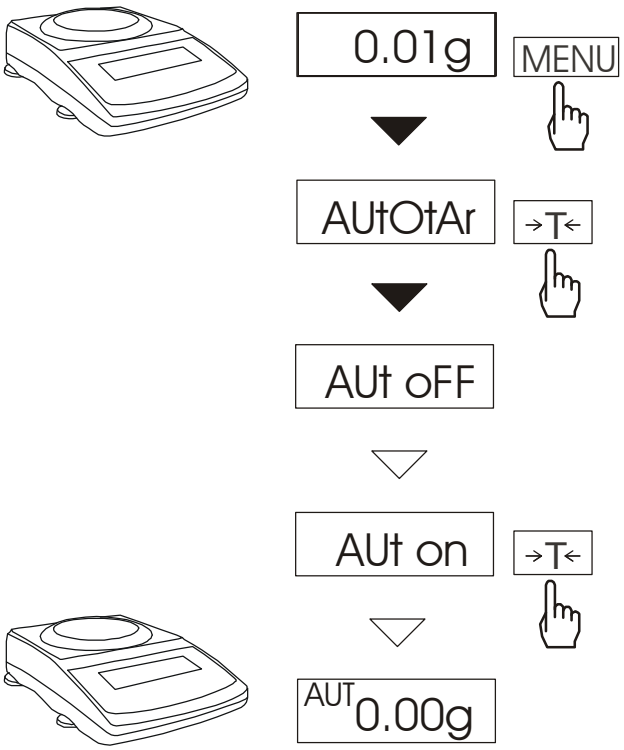
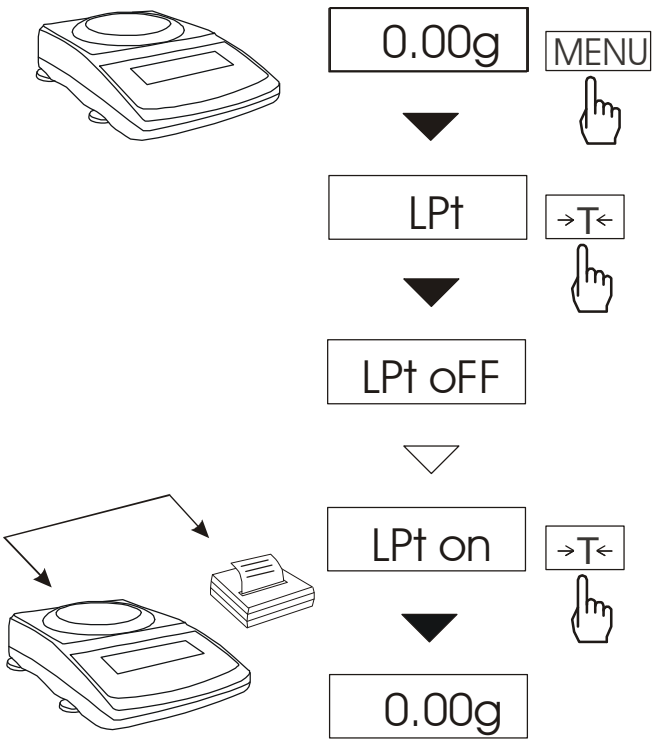
15.3. Autozeroing (AUtOtAr)



When AUtotAr function is activated, a balance automatically keeps zero indication if a pan is empty or if zero indication is acquired by pressing →*T*← key.
To leave the function press *MENU* key, then with →*T*← key chose *AUtOtAr* and *AUt oFF* .

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

15.4 Serial port working mode selection (LPt)

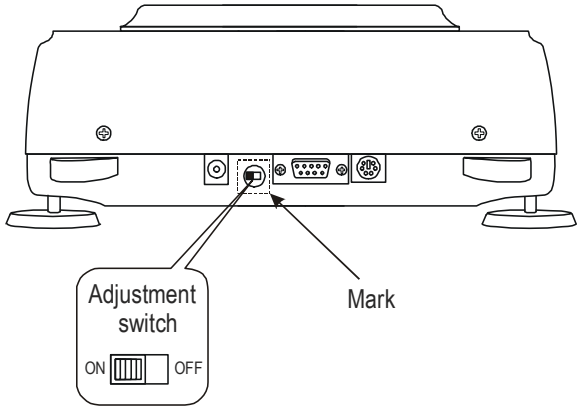


This function enables to select serial port working mode.
When function is active, weighing result with successive number is printed automatically after putting and replacing weighed sample (after result stabilisation).
In order to change working mode (to work with a computer) press *MENU* key, then with →*T*← key chose *LPt* and *LPt oFF*. Weighing result is send only after pressing ⮆ key and result stabilisation (without successive measurement number).

15.5. External calibration / calibration options

Calibration with external weight standard in verified balances should be performed in case balance indications exceed permissible error. To calibrate the balance a service centre should use calibration weight as stated in Technical Data table (or of better accuracy) with valid calibration certificate.

Calibration of EC verified balance requires to destroy a mark for protecting an access to adjustment switch and results in loosing its EC verification. To renew EC verification of a balance, contact with service or notified body is necessary.

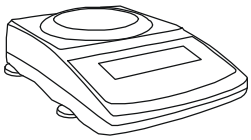


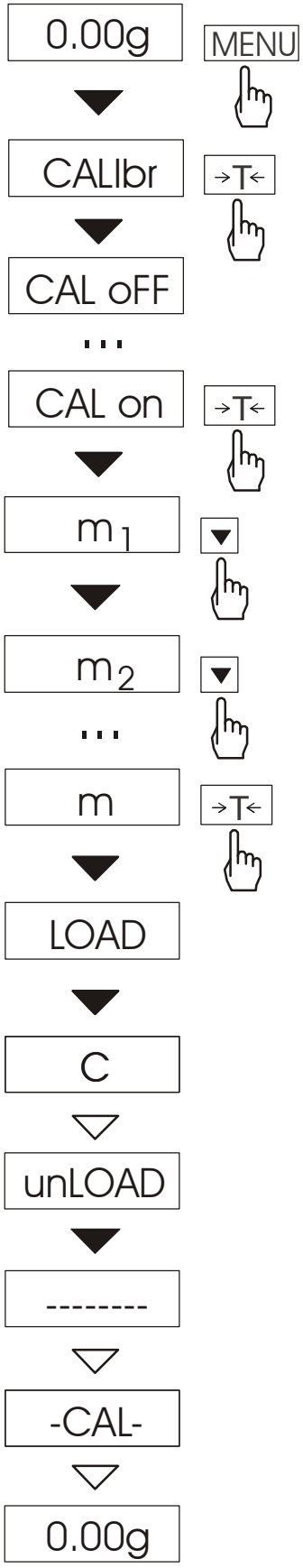
In EC verified balances executing a calibration requires to change adjustment switch position, which is placed behind the mark (sticker) of a notified body. An access to the switch is possible only after the mark is removed, which causes loosing EC verification of the scale. To renew EC verification of a balance, contact with service or notified body is necessary.

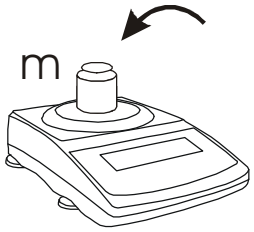
In EC verified balances with a thin screwdriver set adjustment switch to *ON* position (balance displays the message “Pr on” and makes a sound).

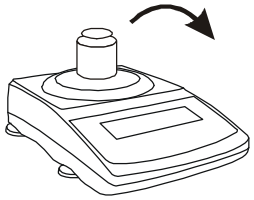
Caution: It causes loosing EC verification!

Operations sequence:

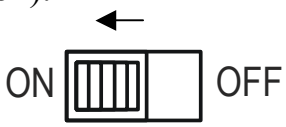








Remove the protective mark from the calibration switch at the back of the balance (option).



Switch to "*Pr ON*" position using small screwdriver (signalised on the display).

Press *MENU* key to call functions menu and to choose *CALIbr* with →*T*← key.
Calibration function options:
- *CAL oFF* – turn autocalibration off
- *CAL on* – start calibration with external weight
- *CAL Prn* – print calibration report (see next page)
- *Set t* – set time interval between successive autocalibrations
- *Set ℃* - set temperature difference which exceeded starts autocalibration

Press press →*T*← to choose *CAL on*.

Press ▼ key several times to choose calibration weight value. To accept press →*T*← button.

When *LOAD* communicate put a calibration weight on the pan and press →*T*← button.

Wait until calibration process is finished.

When *unLOAD* communicate appears remove the calibration weight from the pan.

Wait until zeroing is finished.

Wait until internal calibration is finished.

Change calibration switch position – "*Pr ON*" communicate should not be displayed (option).

The report printout example:

Date: ... Time: …

CALIBRATION REPORT

FACTORY NUMBER: ...

PROGRAM NUMBER: ...

CALIBRATION PRIMARY MASS: ...

CALIBRATION MASS: ...

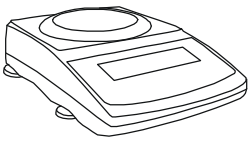
DIFFERECE MASS: ...

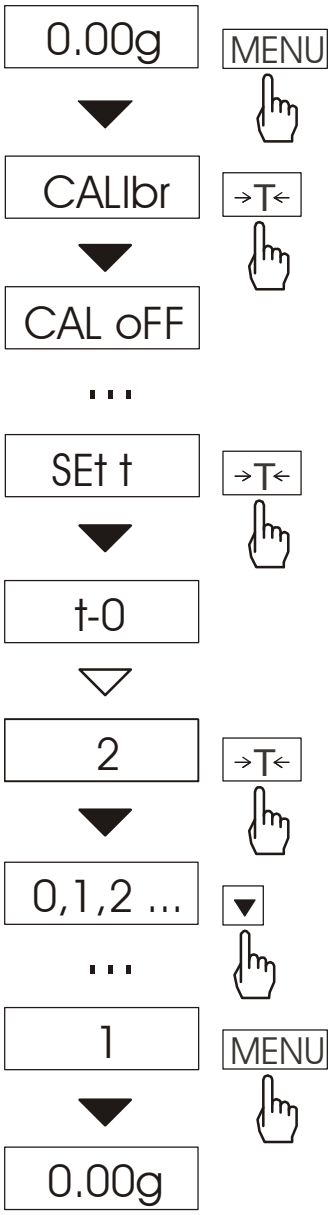
- internal weight value registered during factory calibration ,
- internal weight value registered during last calibration ,
- difference between internal weight values: factory value–current value (diagnosis).

Internal calibration options

Internal calibration is performed automatically after each start-up, also in defined time intervals and temperature changes (it doesn't concerne AGZ/C series).
To calibrate the balance with internal weight, simply empty the pan and press ▼ key.
The beginning of internal calibration is signalised with "–CAL–" communicate on the display.

Internal calibration settings (time intervals and temperature changes)





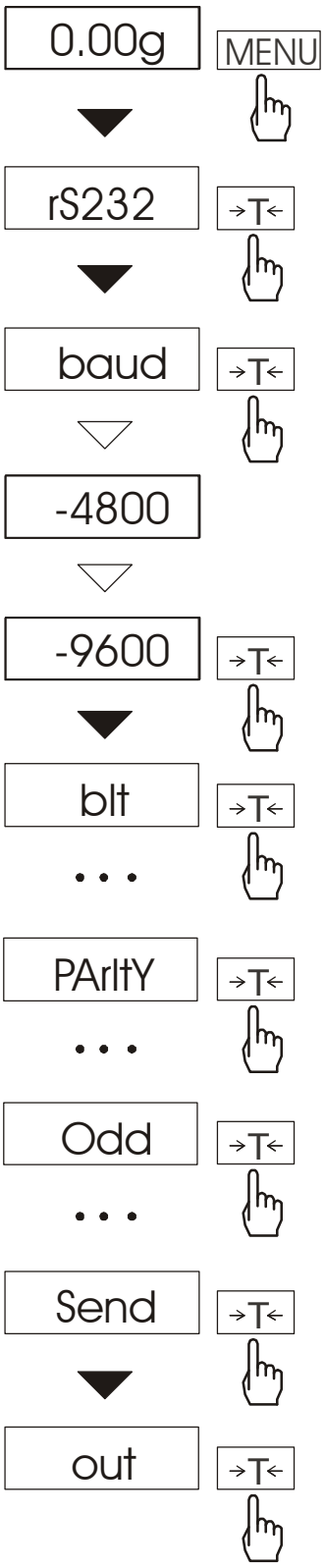
Press *MENU* key to call functions menu and to choose *CALIbr* with →*T*← key.
Calibration function options:
- *CAL oFF* – turn autocalibration off
- *CAL on* – start calibration with external weight
- *CAL Prn* – print calibration report
- *Set t* – set time interval between successive autocalibrations
- *Set ℃* - set temperature difference which exceeded starts autocalibration

When *Set t* is displayed press →*T*← key. Successive time interval values appears, to accelerate press ▼ key several times.
Choose required value with →*T*← key.

Similarly, when *Set ℃* is displayed, press →*T*← key and select temperature difference value.

Set t and *Set ℃* options allow to read previously written values and to write the new ones. To exit without saving changes choose *t-0* or *℃-0*.

15.6 Serial port setting (rS232)



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

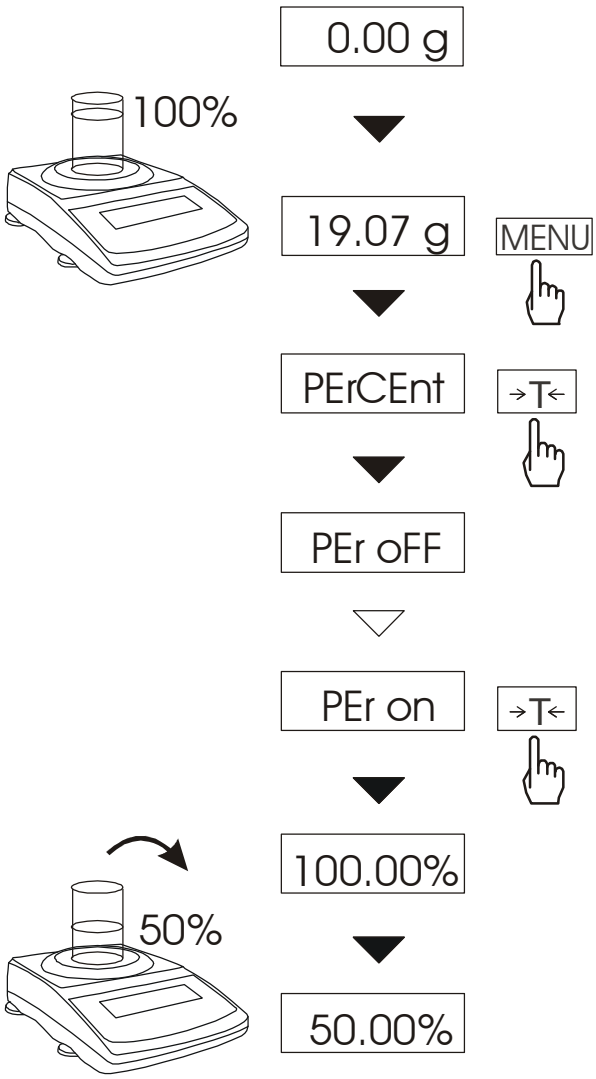
- transmission speed (bAud: 1200, 4800, 9600),
- the number of bits in a byte (bit: 7, 8),
- parity control (PArItY: 0, 1; Odd: 0, 1),
- network number when working in multistand computer system (when working as a single scale the value should be "0")
- continuous transmission – without using ⮆ key, approx. 10 results per second (SEnd: 0, 1).

Default parameters underlined.

To set desired transmission parameters activate *rs232* function, choose appropriate parameter and press →T← 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.

15.7 Percentage weighing (PErCEnt)



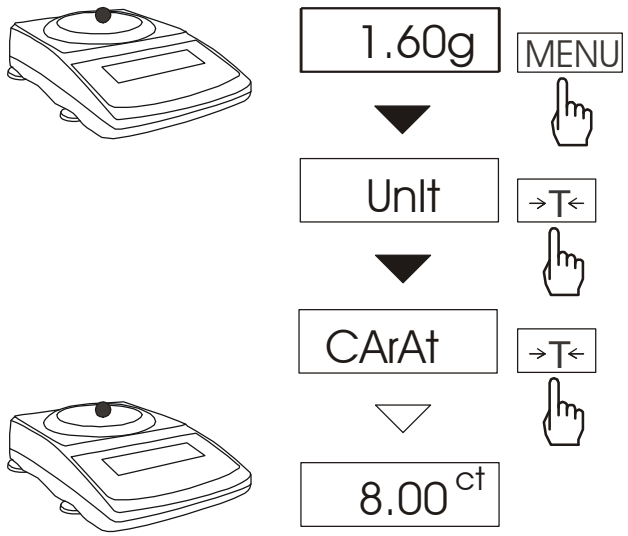
This function enables to display weighing result as a percentage of a reference sample.
A measurement is performed in two phases:
- first phase – weighing a reference sample,
- second phase – measuring specific sample as a percentage of the reference sample.

Weighing result is displayed in different format, depending on the reference sample weight value. For values of 0÷3,5% of weighing range the format is "100.0", for values 3,5÷35% it is "100.00" and 35÷100% - "100.00"
The function has the following options:
- *PEr oFF* – disables the function,
- *PEr on* – stores current indication as 100% and activates percentage weighing,
- *out* – exit without change.

In order to bring back displaying in mass units use ⇄ key. Using this key once more will cause return to displaying in percents.

Note:
When the function is activated →T← key function does not change.

15.8 Weighing unit selection (UnIt)



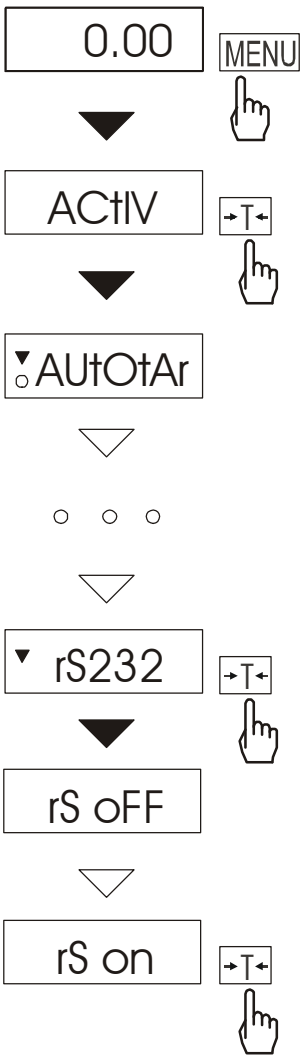
Use this function to choose weighing unit:

- carats (1 ct= 0,2 g),
- pounds (1 lb=0,454kg),
- grams.

The example at the left presents how to set carats as weighing unit.

In order to bring back displaying in grams use ↻ key. Using this key once more will cause return to displaying in chosen units.

15.9 Function Menu customisation (ACtIV)



This function enables to select special functions that will be displayed after pressing MENU key. Easy access to the most useful functions will shorten operation time and make work more comfortable.

To differ *ActIV* function from the function menu, ▼ indicator is displayed at the left side of the display.

Operation sequence shown on the picture, presents how to add RS232C parameters setting function (*rS232)* to the Function Menu.

To remove a function from the Function Menu choose *rS oFF* in the last operation.

16. Maintenance and repairs of small defects

1. The balance should be kept clean.
2. Take care that no dirt gets between the casing and the pan. If found any, remove the pan (lift it up), remove dirt and then replace the pan.
3. In case of improper operation caused by short-lasting power supply decay, unplug the balance from the mains and then plug it again after few seconds.
4. To calibrate the balance contact nearest service.
5. It is forbidden to make any repairs by unauthorised persons.
6. To repair the balance, please contact our nearest service.

Error communicates:

Communicate	Possible cause	Remedy
C-1...6 (over 1 min.)	selftests failed	if displayed more than 1 minute, contact an authorised service
L	pan missing	put the pan on
	mechanical damage	contact an authorised service
H	overloading	remove the load from the pan
	mechanical damage	contact an authorised service
◣ ◢ indicator does not appear	unstable ground vibrations air flows	place the balance on a stable ground not affected by mechanical vibrations and airflows
	balance damage	contact an authorised service
- - - - - -	taring in progress	as above

Declaration of Conformity

We:

AXIS Spółka z o.o. 80-125 Gdańsk, ul. Kartuska 375B

confirm with all responsibility that AG/C and AGZ/C series balances:

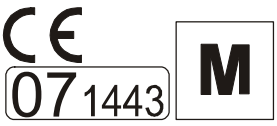
AG100C, AG200C, AG300C, AG500C and
AG600C, AG1000C, AG2000C, AG3000C, AG4000C
AGZ100C, AGZ200C, AGZ300C, AGZ500C,
AGZ600C, AGZ1000C, AGZ2000C, AGZ3000C and AGZ4000C

marked with CE mark comply the following:

1. EN 55022 standard *Limits and methods of measurement of radio disturbance characteristics of information technology equipment* and IEC 61000-4-3 Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test, harmonised with the Council Directive 89/336/EEC.

Additionally balances AG/C series with following marking on the name plate:

- a sticker with two-digit number of the year in which the mark was affixed and the number of the Notified Body



- a green metrology sticker with “M” mark
- a protective seal affixed by the Notified Body

comply with requirements stipulated on the Type-Approval Certificate TCM 128/06-4428 and for verification to comply with:

2. En 45501 *Metrological aspects of non-automatic weighing instruments* harmonised with the Council Directive 90/384/EEC amended with 93/68/EEC.

Additional information
- Conformity evaluation for the Council Directive 89/336/EEC were carried out by Laboratorium Badawcze Oddziału Instytutu Elektrotechniki w Gdańsku
- Type-Approval Certificate no. TCM 128/06-4428 was issued by Česky Metrologicky Institut Brno (Notified Body no. 1383).

Gdańsk, 15.01.2007
Per pro Director of AXIS Ltd:

Production Manager Jan Kończak

Signature

Notes