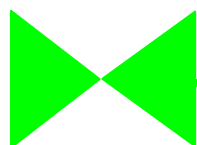


- Manual

SATEX SA 230



PRECISION BALANCE



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General

Thank you for purchasing this SATEX precision balance !
This scale is equipped with reliable technology and has user friendly operational software.
You will use it many times and it will prove itself to be an easy, speedy and accurate tool.

If any questions arise that are not described in this manual, please address yourselves to your SATEX supplier, have a look at our website : www.satex.nl or send your questions per email to : info@satex.nl

Application

The SA 230 precision balance is designed for accurate weighing, for counting of articles and weighing in %.
The scale is meant for use in dry, inside conditions. Humidity should be avoided.
Pay attention to the maximum temperature limits in use. Prevent for moisture and dirt and avoid heat and sun radiation.
The scale is designed for internal weighing and is not allowed for use for trade purposes (sales of products).

Take care of a stable position of the scale. Place it in accurate level position with the help of the 4 levelling feet and the level indicator in the front panel.
Important : all 4 of the feet should carry the scale equally.

Safety

Please read this manual thoroughly before start using the scale.
The supplier does not accept any responsibility if the guidelines of this manual are not observed.

Before any work is done on the scale, power connections from the mains adaptor and the internal battery should be interrupted. Warranty is void if the scale is opened anyhow.
The instrument fulfils the requirements laid down in the EG regulations 89/336/EEG and 73/23/EEG for electromagnetic compatibility. Exceeding of the maximum values, laid down in these regulations, must be avoided.

Reading values may be incorrect if strong electromagnetic fields are applied on to the scale.
After removal of these influences the scale can be used normally again. Sometimes switching off and on again of the scale is required. Electrostatic discharges may cause fatal damage to the scale and should be avoided at all times. I.e. a proper earth connection of the scale and the place of erection is required in such cases.

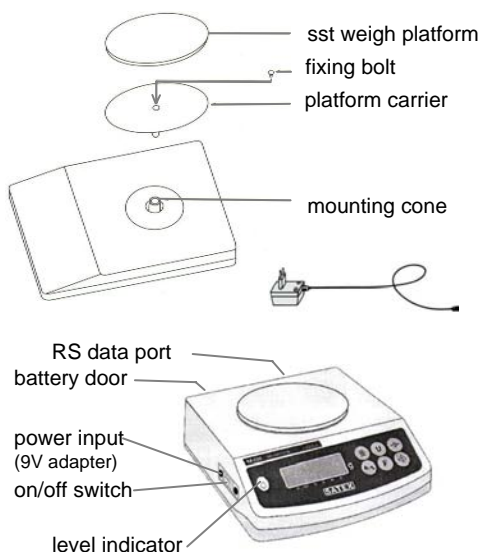
The mains adaptor has no special protection against humidity and water and should not come into contact with it. In case this has happened, or the adaptor shows any external damage, the adaptor should not be used any longer.

The built in lead battery should, if it has to be replaced, be disposed off as small chemical waste, not to be added to normal waste.

Maintenance

Except from regular cleaning with a slightly humid cloth and a not aggressive detergent, further maintenance is not required.
However it makes sense to check the scale's weighing accuracy with regular intervals, using accurate calibration weights. If necessary the scale may be adjusted with the "quick calibration function" if the deviation is not more than 0.5 % away from the actual weight value. If this proves to be more, the complete calibration procedure should be accomplished.

Start up



- Unpack the parts :
 - weighing scale
 - weighing platform (Ø 12 cm or 18 x14 cm)
 - platform carrier, incl. M3x16 bolt and hex. key
 - mains adaptor in carton
- Remove with a turning movement the rubber protection lid that is placed over the mounting cone.
- Place the platform carrier with a slight turning movement in the mounting cone and fix it with the M3 bolt. **Do not turn on too heavily!** Before removal of the platform, first turn it carefully.
- Set the scale level by means of the 4 levelling feet and the level indicator. Arrange for a stable position of the scale.
- Plug in the mains adaptor and operate the on / off switch (leeg weegvlak!).
- The scale sets automatically zero and is ready for use now.

Caused by differences in temperature it may last until 10 minutes before the reading of the weight is completely accurate.

Place the articles to be weighed carefully on the weigh platform. Prevent for bumping against and overloading of the weighing platform. The loadcell down under it may be damaged seriously.

Check, if necessary, the accuracy with an accurate calibration weight. Using the "quick calibration button" the scale may be re-adjusted in a few seconds.

At first start up the built in battery may be not completely loaded. Re-load the battery by leaving the scale for at least 8 hours with a connected mains adaptor.

Technical specifications

Weighing capacities

- 300 g x 0,01 g division
- 600 g x 0,01 g ,,
- 600 g x 0,02 g ,,
- 1200 g x 0,02 g ,,
- 1550 g x 0,05 g ,,
- 3100 g x 0,1 g ,,

} weigh platform Ø 12 cm

} weigh platform 18 x 14 cm

+ of - 2 divisions

Accuracy

Environmental temperature

Housing

Power supply

Operational time on battery

Battery charging time

Automatic switch off

Display back light

RS data port (option)

in operation: +5° ... +35° C, in stock: -10° ... + 55°C

ABS with steel base plate, IP 54 closed,

dimensions 213 x 193 x 66 mm (lxwxh), weight 1,9 kg

mains adaptor 230 VAC 50 Hz 60 mA, output 9 VDC 500 mA

75 / 15 hours without / with display backup lightning switched on

minimal 8 hours for a full charge

settable: auto switch off after 5, 10, 20, 30 minutes standstill

or switched on continuously

settable: on, off, or automatic switch on as soon as weigh platform is loaded with weight (reading > 0)

2400 / 9600 Bd (settable), 8 data bits, 1 stop bit, no parity,

CR and LF, fixed string 12 bytes, decimal dot and the

g (gram) sign included, 9-pole male D-connector

Display: operating keys reading

Front panel



Set zero of the gross weight value, range + and - 2 % of weighing capacity.



Tare = set zero within the full weighing capacity



Switch to the counting program and % weigh function



Start printer or data transmission to computer
Quick calibration key after 3 seconds



Switching over from number of pieces (or %) to weight reading, and vice versa



Switching between weight units (gram - ounce . .)



Underneath the display a number of symbols may be pointed at by an arrow in the display to show that this function is active.

See example : reading is exact zero

(backlight is switched on)

The symbols represent the following functions:

- 0← reading is exact zero (gross and net)
- NET reading is net (tare in operation)
- % reading indicating in %
- ▲ reading indicating a number of pieces
- MD reading is not stable (MD = Motion Detector)
- U reading is in another weight unit as: gram

Switching on



The on/off switch is located at the left side of the housing.

On switching on the display shows: "Lod . . ." (Loading)



During the start up sequence the display counts backwards from 999999 to 000000 .



After that the type number appears: SA 230.

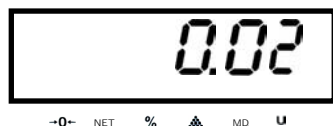
As soon as exact standstill of the weight signal is present, the scale will set itself automatically at zero


Only at exact standstill the arrow to the MD symbol will disappear and the weight reading goes to zero. The arrow at "0" now appears.



After maximal 10 minutes warming up time the measuring system is stabilized and the scale is ready to be used.

Zero setting




If the unloaded weigh platform not presents a "zero" reading, operate the  key. The zero setting range is max 2% of the weighing capacity.

If more than 2 % zero setting is required, switch the scale off and on again. The zero range then is 10%. (see: error reports)

Tare

(taring is setting zero over the complete weighing range)



Place f.e. empty carton on the platform and operate key:  .

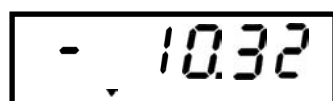
After standstill the reading sets zero.


The arrow at NET indicates a tare value is in operation: reading is net value. This may be repeated up to the maximum weighing capacity.

Delete a tare with empty weigh platform, operating key:  .

Plus / minus weighing

(in weighing mode only)







Place an article with the correct weight on the platform, operate key:  . The reading sets zero. The NET arrow appears.


Now place the article to be checked and read the deviation in + of - .

Delete a tare with empty weigh platform, operating key:  .

Counting pieces






1. First count by hand a number of articles: 10, 20, 50, 100 or 200 pieces.
The lighter the article, the more should be used for an accurate reference weighing.
2. Take care of a precise zero reading (0 arrow "on") and standstill (MD arrow "off") of the reading, and place the pre-counted articles in one time on the weighing platform. Not too careful to prevent for auto zero effects.
3. Operate key: . The numbers that are available for the reference weighing now automatically are shown on the display one after the other.
Operate key:  again at the moment the right number is displayed.
4. The scale is now counting the number of articles, the display shows the number of pieces. The arrow at  shows the counting mode is in operation.
5. With key  may be switched from counting mode to weighing mode and back. In the weighing mode the article weight is kept memorized.


For counting a new article, return to the weighing mode by key:  and start with point 1 of this sequence.

Note: in this program it is not possible to count correct negative numbers after taring

% weighing



1. Take care of a precise zero reading (0 arrow "on") and standstill (MD arrow "off") of the reading.
2. Place a weight (article) of exact 100% of the required weight on the weigh platform.
3. Operate key: . After the reference numbers for the counting procedure the value 100.0 appears and the arrow at % switches on
As long as this 100.0 is displayed, operate key: 
4. The scale is now weighing in % of the 100% value that just has been entered. The display shows this percentage with an accuracy of 0,1%.
The arrow at % shows the percentage mode is in operation.
5. With key  may be switched from % mode to weighing mode and back. In the weighing mode the % weight is kept memorized.

For working with a new 100% reference, operate key  for returning to the weighing mode and start at point 1 of this sequence.

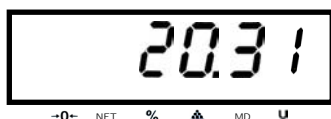
Note: in this program incorrect values occur if, after taring, a decreasing weight is applied.

Printing Transmit data (in the weighing mode only, string protocol see page 12)

In the menu "program" 4 functions of the RS 232 comport may be selected :

0. switched off

1. printing (or transmission to PC) after operating key :



Transmission starts as:

- on pressing the key the reading has come to a standstill (MD arrow is "off")
- after the previous transmission the reading has been zero at least once
- the reading is gross > 2 divisions
- the scale is not in the counting or % mode.

A short "beep" confirms the execution of the transmission. A long "beep" signals that the transmission has not been performed.

2. automatic 1 x printing (or transmission to PC) after each weighing

Transmission starts as:

- the reading has come to a standstill (MD arrow is "off")
- after the previous transmission the reading has been zero at least once
- the reading is gross > 2 divisions
- the scale is not in the counting or % mode.

3. continuous transmission

Continuous transmission is executed with 5 Hz speed, as long as the scale is in the weighing mode and the gross reading is not negative.

Menu "program"

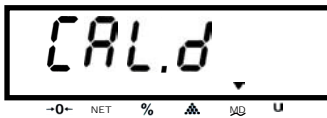



The "program" mode is made accessible by pressing key **U** during switching on the scale with the on/off switch.

As soon as the display shows : CAL release the key.

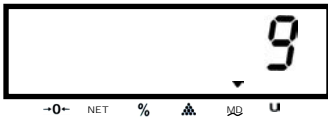
Press key **U** again to enter into the first menu function.

After this, press key **F** to step to the next menu functions.



The menu "program" may always be closed down by operating key  3 x , all the time with 1 second interval.

Weight units



There are 8 weight units available.

As long as the unit : g (gram) has been selected, the key : **U** is disabled during normal operation of the scale, to prevent for accidental use of this function.

g gram

G grain

o ounce

d dwt

t troy ounce

c carat

r taiwan teal

h hong kong
jewelery teal

With key **U** the available units may be shown one by one.

With key **F** the shown unit may be selected, after that the program will automatically step to the next menu function.

If another unit than g (gram) has been selected, in normal operational mode the key **U** may be used to switch from g (gram) to the other unit and back.

During this switching over shortly the symbol of the new unit is showed in the display.

After switching the scale off and on again the preset unit is kept memorized.

Automatic zero setting

(Auto 0, keeps reading automatically on zero)



off



1 division



2 divisions

The automatic zero setting may be switched off, or may be set active within 1 of 2 divisions around the real zero.

With key **U** the available choices may be shown one by one.

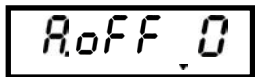
With key **F** the shown choice may be selected, after that the program will automatically step to the next menu function.

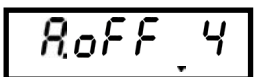
It is advised to deselect the auto zero if slow, small dosings starting from zero are regular procedures. This prevents for unwanted auto zero actions.

Automatic switch off

(battery saving)

This "Auto off" function switches off the scale automatically after . . minutes of standstill (not active in the "program" mode).





- 0 = auto off switched off
- 1 = 5 minutes
- 2 = 10 minutes
- 3 = 20 minutes
- 4 = 30 minutes


With key **U** the available times may be shown one by one.

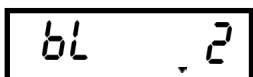
With key **F** the shown choice may be selected, after that the program will automatically step to the next menu function.

Back Light display

(battery saving)

The back lightning of the display may be selected as:





- 0 = always off
- 1 = always on
- 2 = automatically switching on at loading (reading > 0)

With key **U** the available choices may be shown one by one.

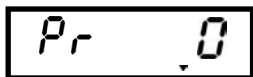
With key **F** the shown choice may be selected, after that the program will automatically step to the next menu function.

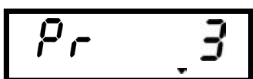
Printing / transmission mode


in weighing mode only

(RS 232 comport is optional)

Transmission of data via the RS 232 port may be selected as:





- 0 = switched off
- 1 = 1 x transmission (printing) at, after standstill, operating key : 
- 2 = 1 x automatic transmission after every weighing (passed zero and standstill again)
- 3 = continuous transmission at 5 Hz

With key **U** the available choices may be shown one by one.

With key **F** the shown choice may be selected, after that the program will automatically step to the next menu function.

Baud rate

(RS 232 comport is optional)

The Baud rate may be selected as:

- 2400 Bd
- 9600 Bd

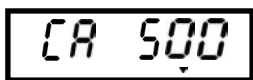
With key **U** the available choices may be shown one by one.

With key **F** the shown choice may be selected, after that the program will automatically step to the next menu function.

Calibration weight

The “one key quick calibration function” requires the selection of a fixed weight value, used for this quick calibration procedure.

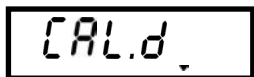
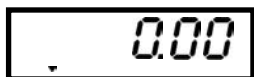
Depending of the weighing capacity of the scale there is the following selecting available, that will be shown in the display



Capacity type of scale	Choice of calibration weights
300 g	100, 200 , 300 g
600 g	200, 400, 500 , 600 g
1200 g	500, 1000 , 1200 g
1550 g	500, 1000 , 1500 g
3100 g	1000, 2000 , 3000 g

With key **U** the available weight values may be shown one by one.

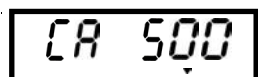
The figures in this table indicated as **fat** will realise the best accuracy for that scale, in relation to the full weighing range.
Make use of weights with sufficient accuracy, at least class M1.


With key **F** the shown weight may be selected, after that the program will automatically terminate the “menu program” : CAL.d appears.

Operate key :  to return to the weighing mode.

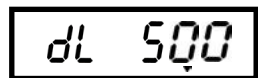
Quick - Calibration



start

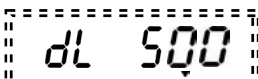
Keep key :  pressed for longer as 3 seconds.

The display will show during a few seconds the value of the required, accurate calibration weight, f.e.: 500 gram.



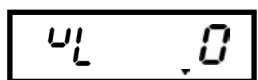
download weight

Now the display asks for putting this weight upon the platform: dL. 500



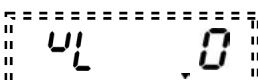
display flashes

After putting the weight in place, the display will flash during some seconds, waiting for standstill and calculating the adjustment.



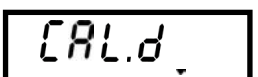
unload weight

As the display stops flashing, weight adjustment has been done. The display shows: ^uL , the calibration weight may be taken off the platform.



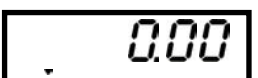
display flashes

After taking off the weight, the display again flashes for some seconds and the zero value will be adjusted.



completed


The calibration procedure is done now : CAL.d , the scale automatically switches back to the weighing mode.



dL = down Load
uL = un Load
CAL.d = Calibration done

Complete Weight Calibration




- 1 The "program" mode is made accessible by pressing key  during switching on the scale with the on/off switch. As soon as the display shows : CAL release the key.




- 2 Press one after the other the following key's:




The display shows now: rA 1 of : rA 0. Select with the key: 
1 = 0,5% tolerance check on "quick calibration" is in operation
0 = 0,5% tolerance check on "quick calibration" is disabled



- 3 Press key : . The internal measuring value of the empty platform is displayed. This value should be between 10.000 en 40.000 .




- 4 Press key :  as soon as the reading has come to a standstill. The zero value is entered now.



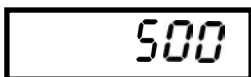
- 5 Put on the platform an accurate calibration weight. See table below. The available values in this program are dependent of the weighing capacity of the scale.


Weighing capacity type of scale	Choice of the calibration weight
300 g	100, 200 , 300 g
600 g	200, 400, 500 , 600 g
1200 g	500, 1000 , 1200 g
1550 g	500, 1000 , 1500 g
3100 g	1000, 2000 , 3000 g

The figures in this table indicated as **fat** will realise the best accuracy for that scale, in relation to the full weighing range. Make use of weights with sufficient accuracy, at least class M1.

- 6 Press key :  as soon as the reading has come to a standstill.

Now the available calibration values are show one after another on the display.



- 7 Press again key  if the correct value is displayed.

After a few seconds the calibration value is calculated and entered.

The calibration procedure will terminate now automatically. The scale switches back to the weighing mode.




Switch the scale off and on again.

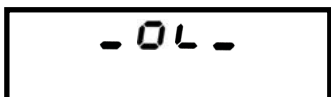
Errors and reports



After switching on Lod . . . stays displayed. The zero value is too low. Check the presence and correct position of the platform and carrier. Possibly the loadcell is damaged. Execute a complete calibration procedure.



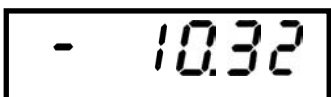
During the start up procedure the display shows for a longer time: SA 230. The scale is in motion (f.e. vibrations) or the value of the calibrated zero has been changed. Execute the Complete Weight Calibration procedure (pag. 10) up to (and included) point 4, in order to establish a new zero value. Switch off the scale and on again. Check the weighing accuracy with a accurate weight. If not correct, execute the Complete Calibration Procedure to the end (point 7).



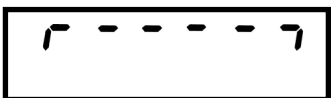
During the start up procedure the display shows: ol ("over load"). The weigh platform is loaded with a weight > 10% of the weighing capacity and will not set zero. Remove the load. Possibly the loadcell is damaged.



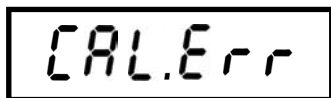
The scale does not sets zero operating the "zero" key. However setting zero via the "tare" key is working. The weight value proves to be outside the zero limits (+ and - 2% of weighing capacity). Switch the scale off and on again, so a new zero value may be entered.



Reading is gross negative. Zeroing and taring not possible. The scale has been switched on with a load on the platform and has set itself at zero with that load. The load has been removed and now the reading is gross negative and incorrect. Switch the scale off and on again with an empty weighing platform.



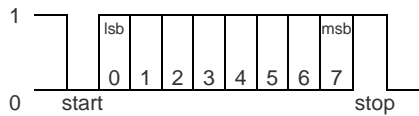
The scale is loaded above its weighing capacity. Remove the overload. Possibly the loadcell is damaged.



Shortly displayed after a "quick calibration" with a calibration weight that deviates more than 0,5% from the last adjustment. This "quick calibration" has not been entered. The scales switches back to the weighing mode immediately, with the previous adjustments. Execute a complete calibration procedure.

RS 232 comport Data communication (option)

Tabel 1 Byte Format



Baud rate 2400 / 9600 settable
 Parity none
 Data bits 8
 Codes CR and LF

Connector DB-09 Male:

Pin 1, 3, 4, 6, 7, 8, 9 NC
 Pin 2 TXD
 Pin 5 GND

Tabel 2 String Format 12 bytes

nr. 1 2 3 4 5 6 7 8 9 10 11 12
 a x x x x b x x c g CR LF

a = òr a blank, òr a minus sign
 x = blanks and/or weight figures (no preceding zero's)
 b = decimal dot *) (example of a scale with two figures after the dot)
 c = fixed blank
 g = weight unit: gram (with other units the string is longer)

*) With other weighing capacities the position of the dot will be adapted to the number of figures after the dot.