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# Operating instructions
# Precision balance

## KERN PES/PEJ

Version 2.0
2024-06
GB

TPES-B_TPEJ-B-BA-e-2420

GB

# KERN PES/PEJ

Version 2.0 2024-06

**Operating instructions**

**Precision balance**

Contents


**1 Technical data . . . . . 4**

**2 Declaration of conformity . . . . . 7**

**3 Appliance overview . . . . . 8**

**3.1 Components . . . . . 8**

**3.2 Operating elements . . . . . 10**

**3.3 Keyboard overview . . . . . 11**

3.3.1 Numeric entry . . . . . 12

**3.4 Display . . . . . 13**

**4 Basic Information (General) . . . . . 15**

**4.1 Proper use . . . . . 15**

**4.2 Improper Use . . . . . 15**

**4.3 Warranty . . . . . 15**

**4.4 Monitoring of Test Resources . . . . . 15**

**5 Basic Safety Precautions . . . . . 16**

**5.1 Pay attention to the instructions in the Operation Manual . . . . . 16**

**5.2 Personnel training . . . . . 16**

**6 Transport and storage . . . . . 16**

**6.1 Testing upon acceptance . . . . . 16**

**6.2 Packaging / return transport . . . . . 16**

**7 Unpacking, Installation and Commissioning . . . . . 17**

**7.1 Installation Site, Location of Use . . . . . 17**

**7.2 Unpacking and check . . . . . 18**

**7.3 Assembling, Installation and Levelling . . . . . 19**

7.3.1 Implantation of the balance . . . . . 19

7.3.2 Installation of the wind shield . . . . . 20

**7.4 Mains connection . . . . . 21**

7.4.1 Installation of the mains adapter . . . . . 21

7.4.2 Turning On the Power . . . . . 22

**7.5 Initial Commissioning . . . . . 22**

**7.6 Connection of peripheral appliances . . . . . 22**

**8 Menu . . . . . 23**

**8.1 Menu <Func> . . . . . 23**

8.1.1 Menu overview . . . . . 23

**8.2 Enhanced menu <Func2> . . . . . 24**

8.2.1 Menu overview . . . . . 24

**8.3 Navigation in the menu . . . . . 25**

**9 Basic Operation . . . . . 26**

**9.1 Turn on/off . . . . . 26**

**9.2 Zeroing . . . . . 27**

**9.3 Taring . . . . . 27**

**9.4 Selection of a weighing application** . . . 29
**9.5 Simple weighing** . . . 29
**9.6 Underfloor weighing** . . . 30

**10 Piece counting** . . . 31

**11 Percent weighing** . . . 34

**12 Density determination** . . . 37
**12.1 Density Table for liquids** . . . 41
**12.2 Data output of the specific density to a printer** . . . 42

**13 Weighing with tolerance range** . . . 43
**13.1 Selection of weighing function with tolerance range** . . . 44
**13.2 Set distinction condition** . . . 44
**13.3 Setting the distinction range** . . . 44
**13.4 Set the number of tolerance limits** . . . 45
**13.5 Set distinction method** . . . 45
**13.6 Set acoustic signal** . . . 46
**13.7 Set tolerance display** . . . 46
**13.8 Set data output** . . . 47
**13.9 Setting the tolerance values** . . . 48
13.9.1 Absolute values . . . 48
13.9.2 Differential values . . . 51
**13.10 Weighing the samples** . . . 54

**14 Totalization** . . . 55
**14.1 Select the Totalizing function** . . . 55
**14.2 Using the totalizing function** . . . 56
14.2.1 TOTAL-Adding . . . 56
14.2.2 NET-Adding . . . 57
**14.3 Clear the total sum** . . . 57

**15 Settings** . . . 58
**15.1 Zero-Tracking** . . . 58
**15.2 Stability settings** . . . 58
15.2.1 Sensitivity . . . 58
15.2.2 Display speed . . . 58
**15.3 Bar graph display** . . . 58
**15.4 Automatic Sleep function** . . . 59
**15.5 Setting the weighing units** . . . 60
**15.6 Date and time** . . . 60
15.6.1 Set display format . . . 60
15.6.2 Setting time and date . . . 60
**15.7 Automatic switch-on function** . . . 62

**16 Enhanced settings** . . . 63
**16.1 Balance identification number** . . . 63
**16.2 Measurement incertainty of the external adjustment weight** . . . 64
16.2.1 Enter measurement incertainty . . . 64
16.2.2 Take over measurement deviation . . . 65

**17 Adjustment** . . . 66
**17.1 Adjustment with internal weight** . . . 66
**17.2 Adjustment test with internal weight** . . . 67
**17.3 Adjustment with external weight** . . . 68
**17.4 Adjustment test with external weight** . . . 69
**17.5 Adjustment record** . . . 70

**18 Verification** . . . . . 71

**19 Interfaces** . . . . . 72
**19.1 RS-232C interface for data input and output** . . . . . 72
19.1.1 Technical data . . . . . 72
19.1.2 Interface cable . . . . . 73
**19.2 DIN8P-interface to the data output** . . . . . 73
19.2.1 Technical data . . . . . 73
**19.3 Formats of the data output (6/7-digits)** . . . . . 74
19.3.1 Data composition . . . . . 74
19.3.2 Data description . . . . . 75
**19.4 Formats of the data output (special format 1)** . . . . . 77
19.4.1 Data composition . . . . . 77
19.4.2 Data description . . . . . 77
19.4.3 Error messages . . . . . 78
**19.5 Formats of the data output (special format 2)** . . . . . 79
19.5.1 Data composition . . . . . 79
19.5.2 Data description . . . . . 79
19.5.3 Error messages . . . . . 80
**19.6 Data output formats (CBM)** . . . . . 81
19.6.1 Data composition . . . . . 81
19.6.2 Data description . . . . . 81
**19.7 Data input** . . . . . 84
19.7.1 Input format 1 . . . . . 84
19.7.2 Input format 2 . . . . . 86
**19.8 Response formats** . . . . . 88
19.8.1 A00/Exx Format . . . . . 88
19.8.2 ACK/NAK Format . . . . . 88
**19.9 Communication settings** . . . . . 89
19.9.1 Enable / disable interface and data format . . . . . 89
19.9.2 Change communication settings . . . . . 90
19.9.3 Interval output . . . . . 92
**19.10 Output functions** . . . . . 93
19.10.1 GLP-compliant data output . . . . . 93
19.10.2 Edition of the time stamp . . . . . 94

**20 Servicing, maintenance, disposal** . . . . . 95
**20.1 Cleaning** . . . . . 95
**20.2 Servicing, maintenance** . . . . . 95
**20.3 Disposal** . . . . . 95

**21 Instant help for troubleshooting** . . . . . 96
**21.1 Error messages** . . . . . 97

# 1 Technical data

| KERN | PES 620-3M | PES 2200-2M | PES 4200-2M |
|---|---|---|---|
| Item no./ Type | TPES 620-3-B | TPES 2200-2-B | TPES 4200-2-B |
| Readability (d) | 0.001 g | 0.01 g | 0.01 g |
| Weighing range (max) | 620 g | 2200 g | 4200 g |
| Reproducibility | 0.001 g | 0.01 g | 0.01 g |
| Linearity | 0.003 g | 0.02 g | 0.02 g |
| Stabilization time | 3 s | | |
| Recommended adjustment weight, not added (Category) | 500 g (E2) | 2 kg (F1) | 2 kg (E2);<br>2 kg (E2) |
| Warm-up time | 4 h | 2 h | 4 h |
| Weighing units | g, kg, ct | | |
| Smallest part weight at piece counting | 1 mg (under lab conditions*) | 10 mg (under lab conditions*) | 10 mg (under lab conditions*) |
| | 10 mg (under normal conditions**) | 100 mg (under normal conditions**) | 100 mg (under normal conditions**) |
| Reference quantities at piece counting | 5, 10, 30, 100 | | |
| Weighing plate, stainless steel | 140 x 120 mm | 200 x 200 mm | 200 x 200 mm |
| Dimensions of housing (W x D x H) [mm] | 220 x 333 x 93 | | |
| Net weight | 3.6 kg | 4.4 kg | 4.0 kg |
| Permissible ambient condition | 10 °C to + 30 °C | | |
| Humidity of air | 80 % | | |
| Power supply unit input voltage | AC 100-240 V; 0.6 A; 50/60Hz | | |
| Balance input voltage | 12 V<br>1.0 A | | |
| Interfaces | RS-232, Digital I/O | | |
| Degree of pollution | 2 | | |
| Overtension class | 2 | | |
| Height meter | Up to 2000 m | | |
| Place of installation | Only indoors | | |

| KERN | PES 6200-2M | PES 15000-1M | PES 31000-1M |
|---|---|---|---|
| Item no./ Type | TPES 6200-2-B | TPES 15000-1-B | TPES 31000-1-B |
| Readability (d) | 0.01 g | 0.1 g | 0.1 g |
| Weighing range (max) | 6.2 kg | 15 kg | 31 kg |
| Reproducibility | 0.01 g | 0.1 g | 0.1 g |
| Linearity | 0.03 g | 0,2 g | 0,4 g |
| Stabilization time | 3 s | | |
| Recommended adjustment weight, not added (Category) | 5 kg (E2) | 10 kg (F1);<br>5 kg (F1) | 20 kg (F1);<br>10 kg (F1) |
| Warm-up time | 4 h | 2 h | 2 h |
| Weighing units | g, kg, ct | | |
| Smallest part weight at piece counting | 10 mg (under lab conditions*) | 100 mg (under lab conditions*) | 500 mg (under lab conditions*) |
| | 100 mg (under normal conditions**) | 1 g (under normal conditions**) | 5 g (under normal conditions**) |
| Reference quantities at piece counting | 5, 10, 30, 100 | | |
| Weighing plate, stainless steel | 200 x 200 mm | 200 x 200 mm | 250 x 220 mm |
| Dimensions of housing (W x D x H) [mm] | 220 x 333 x 93 | 220 x 333 x 93 | 260 x 330 x 113 |
| Net weight | 4.4 kg | 4.4 kg | 10 kg |
| Permissible ambient condition | 10 °C to + 30 °C | | |
| Humidity of air | 80 % | | |
| Power supply unit input voltage | AC 100-240 V; 0.6 A; 50/60Hz | | |
| Balance input voltage | 12 V<br>1.0 A | | |
| Interfaces | RS-232, Digital I/O | | |
| Degree of pollution | 2 | | |
| Overtension class | 2 | | |
| Height meter | Up to 2000 m | | |
| Place of installation | Only indoors | | |

| KERN | PEJ 620-3M | PEJ 2200-2M | PEJ 4200-2M |
|---|---|---|---|
| Item no./ Type | TPEJ 620-3M-B | TPEJ 2200-2M-B | TPEJ 4200-2M-B |
| Readability (d) | 0.001 g | 0.01 g | 0.01 g |
| Weighing range (max) | 620 g | 2200 g | 4200 g |
| Reproducibility | 0.001 g | 0.01 g | 0.01 g |
| Linearity | 0.003 g | 0.02 g | 0.02 g |
| Stabilization time | 3 s | | |
| Verification value (e) | 0.01 g | 0.1 g | 0.1 g |
| Verification class | I | II | II |
| Minimum weight (min) | 0.1 g | 0.5 g | 0.5 g |
| Recommended adjustment weight, not added (Category) | internal | | |
| Warm-up time | 4 h | 2 h | 4 h |
| Weighing units | g, kg | g, kg, ct | |
| Smallest part weight at piece counting | 1 mg (under lab conditions*) | 10 mg (under lab conditions*) | 10 mg (under lab conditions*) |
| | 10 mg (under normal conditions**) | 100 mg (under normal conditions**) | 100 mg (under normal conditions**) |
| Reference quantities at piece counting | 5, 10, 30, 100 | | |
| Weighing plate, stainless steel | 140 x 120 mm | 200 x 200 mm | 200 x 200 mm |
| Dimensions of housing (W x D x H) [mm] | 220 x 333 x 93 | | |
| Net weight | 4,4 kg | 7 kg | 7 kg |
| Permissible ambient condition | 10 °C to + 30 °C | | |
| Humidity of air | 80 % | | |
| Mains adapter input voltage | AC 100-240 V; 0.6 A; 50/60Hz | | |
| Balance input voltage | 12 V<br>1.0 A | | |
| Interfaces | RS-232, Digital I/O | | |
| Degree of pollution | 2 | | |
| Overtension class | 2 | | |
| Height meter | Up to 2000 m | | |
| Place of installation | Only indoors | | |

*** * Smallest part weight at piece counting - under lab conditions:**

- There exist perfect environment conditions for high-resolving countings
- The counted parts have no variance

**** Smallest part weight at piece counting - under normal conditions:**

- There are unsteady ambient conditions (draft, vibrations)
- The counted parts are varying

## 2 Declaration of conformity

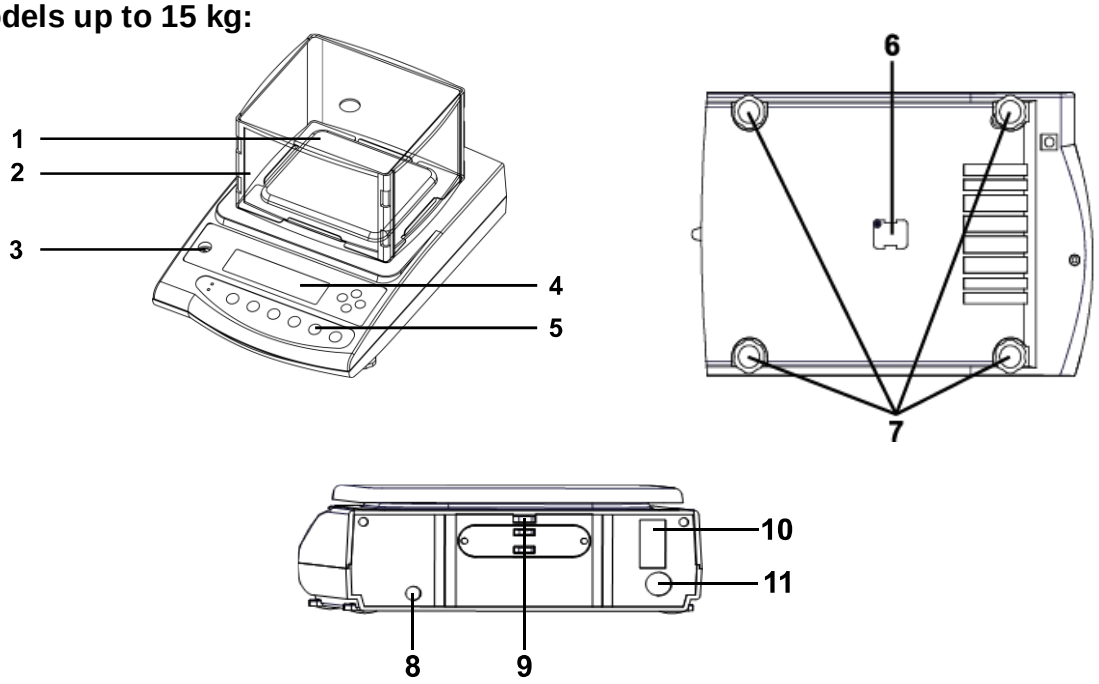
The current EC/EU Conformity declaration can be found online in:

**www.kern-sohn.com/ce**

# 3 Appliance overview

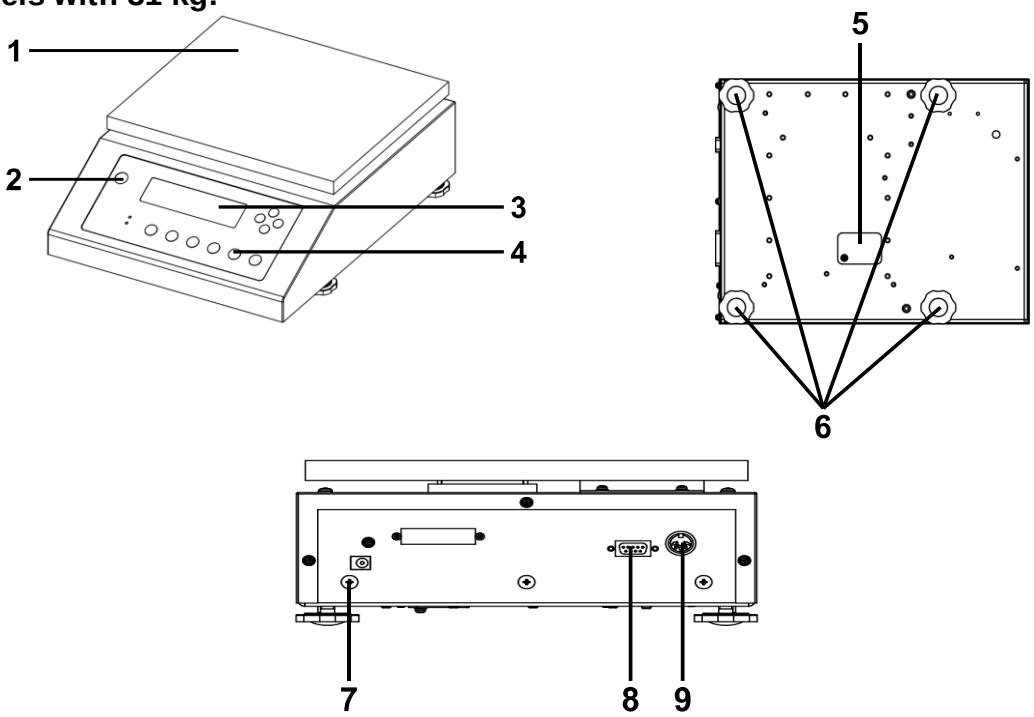
## 3.1 Components

**Models up to 15 kg:**




| Pos. | Designation |
|---|---|
| 1 | Weighing plate |
| 2 | Wind shield (only models with 620 g) |
| 3 | Bubble level |
| 4 | Display |
| 5 | Keyboard |
| 6 | Closing cover for underfloor weighing device |
| 7 | Footscrews |
| 8 | Mains connection |
| 9 | Theft protection |
| 10 | RS232 connection |
| 11 | DIN8P interface |

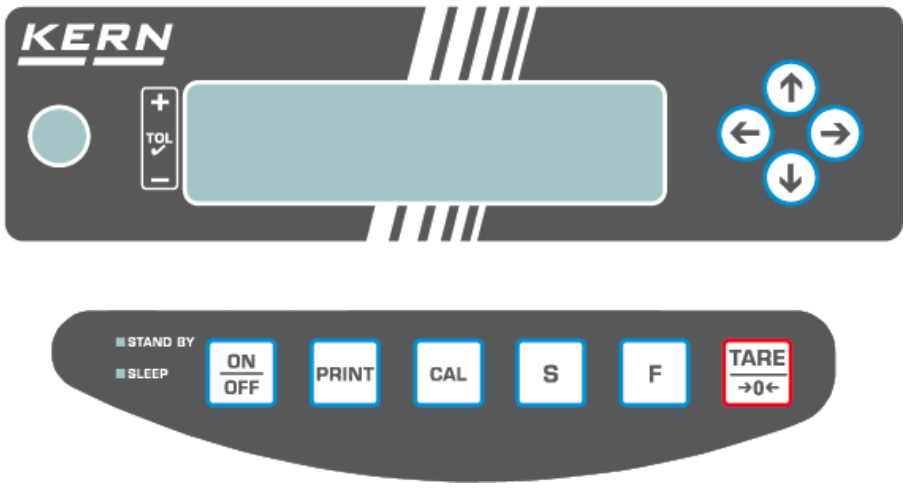
**Models with 31 kg:**



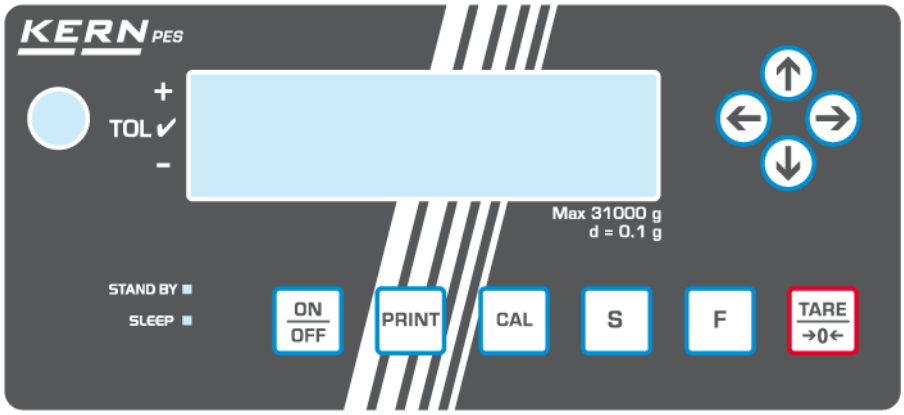

| Pos. | Designation |
|---|---|
| 1 | Weighing plate |
| 2 | Bubble level |
| 3 | Display |
| 4 | Keyboard |
| 5 | Closing cover for underfloor weighing device |
| 6 | Footscrews |
| 7 | Mains connection |
| 8 | RS232 connection |
| 9 | DIN8P interface |

## 3.2 Operating elements

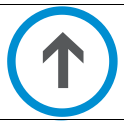
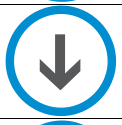
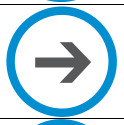
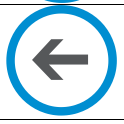
**Models up to 15 kg:**

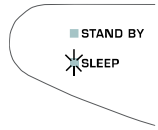



**Models with 31 kg:**



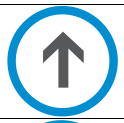
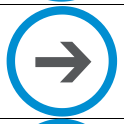
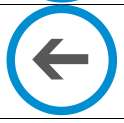
## 3.3 Keyboard overview

| Button | Name | Function in Operating mode | Function in Menu |
|---|---|---|---|
| | **[ON/OFF]** | ➢ Turn on/off | - |
| | **[PRINT]** | ➢ Transmit weighing data via interface | ➢ Cancel setting |
| | **[CAL]** | ➢ Start adjustment or adjustment test | - |
| | **[S]** | ➢ Adding (when function was enabled; press key shortly)<br>➢ Open limit value setting (when weighing with tolerance range has been activated; press key longtime)<br>➢ Open interval setting (when interval output was enabled, press key longtime) | ➢ Take over setting and close menu |
| | **[F]** | ➢ Change display (press key shortly)<br>➢ Call-up menu (press key longtime) | ➢ Navigation key ➔ / Go to next menu level |
| | **[TARE/ZERO]** | ➢ Taring and zeroing | ➢ Navigation key 🡻 / Setting downwards |
|  | **[↑]** | - | • Navigation key 🡹 / Setting upwards |
|  | **[↓]** | - | • Navigation key 🡻 / Setting downwards |
|  | **[→]** | - | • Navigation key ➔ / Go to next menu level |
|  | **[←]** | - | • Navigation key 🡸 / Menu level back |

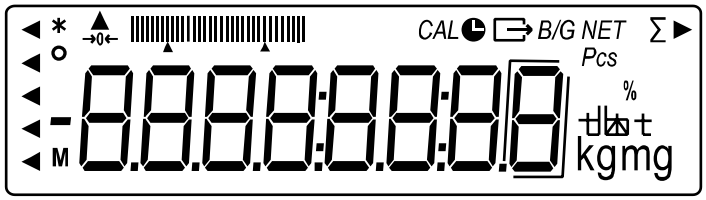
| LED | Designation | Description |
|---|---|---|
| | STAND BY | Illuminated green, if the balance is operated with mains voltage, but being switched off. |
|  | SLEEP | Illuminated red, when the balance is in sleep mode. |

### 3.3.1 Numeric entry

As maximum, the balance can display eight characters

| Button | Function |
|---|---|
| | Cancel input |
| | |
| | Save input and exit |
| | Enter next character |
| | Increase character by 1 |
|  | Increase character by 1 |
| | Decrease character by 1 |
|  | Enter next character |
|  | Select/delete last character |

## 3.4 Display




| No. | Display | Designation | Description |
|---|---|---|---|
| 1 | ◀ | "Tolerance range weighing" indicator | Shows in which tolerance range the weighing result can be found |
| 2 | * | Asterisk | Indicates that weight value can be added |
| 3 | o | Stability display | Is displayed when the weight value is stable |
| 4 | – | Minus | Displays negative values |
| 5 | M | Indicator "Process" | Indicates that the balance is processing data |
| 6 | ▲ | Indicator | Appears in some functions |
| 7 | →0← | Indicator “zero display” | Displays zero position |
| 8 | | Bar graph display | Indicates how much the weighing plate is loaded with respect to the maximum weighing range<br>Shows in which tolerance range the weighing result can be found |
| 9 | *CAL* | Indicator “Adjustment” | Is shown during the adjustment or the adjustment test |
| 10 | | Indicator “Time“ | Is shown during the date and time entry<br>Flashes during the interval output |
| 11 | | Indicator „Data output" | Displayed when the balance is sending data to external device |

| No. | Display | Designation | Description |
|---|---|---|---|
| 12 | B/G | Display gross weight value | Displays gross weight |
| 13 | Net | Display net weight value | Shown when the tare weight has been subtracted |
| 14 | Σ | "Total" indicator | Shown when the total sum is displayed |
| 15 | ▶ | Indicator | Appears in some functions |
| 16 | Pcs | “Piece counting” indicator | Shown when piece counting has been enabled |
| 17 | % | „Percent Weighing“ Indicator | Is shown when percent weighing has been enabled |
| 18 | ｔ | Indicator for different weighing units | Shows different weighing units in different functions |
| 19 | kg | Kilogram | Shows the „Kilogramm“ unit |
| 20 | g | Gram | Shows the „Gram“ unit |
| 21 | mg | Milligram | Shows the „Milligramm“ unit |
| 22 | | Marking of non-verifiable digits | Is displayed for digits that are not relevant to verification |

# 4 Basic Information (General)

## 4.1 Proper use

The balance purchased by you is intended to define the weighing value of weighed goods. It is intended to be used as a “non-automatic balance”, i.e. the material to be weighed is manually and carefully placed in the centre of the weighing pan. As soon as a stable weighing value is reached, the weighing value can be read.

## 4.2 Improper Use

- Our balances are non-automatic balances, not provided for the use in dynamic weighing processes. However, the balances can also be used for dynamic weighing processes after verifying their individual operative range, and here especially the accuracy requirements of the application.
- Do not leave permanent load on the weighing pan. This can damage the measuring mechanism.
- Impacts and overloading exceeding the stated maximum load (max) of the balance, minus a possibly existing tare load, must be strictly avoided. The balance could be damaged.
- Never operate the balance in explosive environment. The serial version is not explosion protected.
- The structure of the balance may not be modified. This may lead to incorrect weighing results, safety-related faults and destruction of the balance.
- The balance may only be used according to the described conditions. Other areas of use must be released by KERN in writing.

## 4.3 Warranty

Warranty claims shall be voided in case:

- Our conditions in the operation manual are ignored
- The appliance is used beyond the described uses
- The appliance is modified or opened
- Mechanical damage or damage by media, liquids, natural wear and tear
- The appliance is improperly set up or incorrectly electrically connected
- The measuring system is overloaded

## 4.4 Monitoring of Test Resources

Within the scope of quality assurance the metrological properties of the balance and of an existing test weight must be checked at regular intervals. The responsible user must define a suitable interval as well as type and scope of this test. Information is available on KERN’s home page (www.kern-sohn.com) with regard to the monitoring of balance test substances and the test weights required for this. In KERN’s accredited DKD calibration laboratory test weights and balances may be calibrated (return to the national standard) fast and at moderate cost.

# 5 Basic Safety Precautions

## 5.1 Pay attention to the instructions in the Operation Manual

⇨ Carefully read this operation manual before setup and commissioning, even if you are already familiar with KERN balances.

## 5.2 Personnel training

The appliance may only be operated and maintained by trained staff.

# 6 Transport and storage

## 6.1 Testing upon acceptance

When receiving the appliance, please check packaging immediately, and the appliance itself when unpacking for possible visible damage.

## 6.2 Packaging / return transport

⇨ Keep all parts of the original packaging for a possibly required return.

⇨ Only use original packaging for returning.

⇨ Prior to dispatch disconnect all cables and remove loose/mobile parts.

⇨ Reattach possibly supplied transport securing devices.

⇨ Secure all parts such as the wind shield, weighing pan, power unit etc. against shifting and damage.

# 7 Unpacking, Installation and Commissioning

## 7.1 Installation Site, Location of Use

The balances are designed in a way that reliable weighing results are achieved in common conditions of use.
You will work accurately and fast, if you select the right location for your balance.

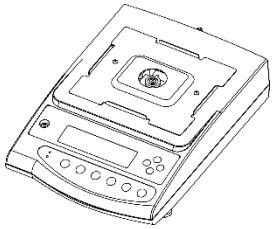
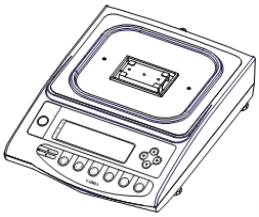
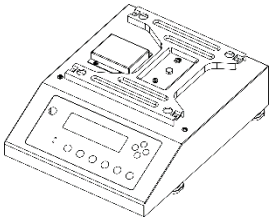
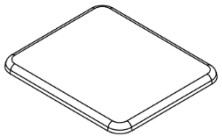
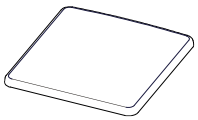
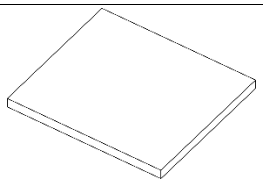
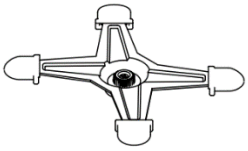
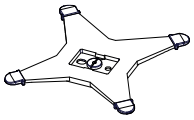
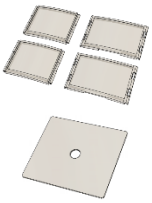
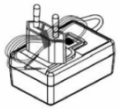
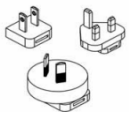
**On the installation site observe the following:**

- Place the balance on a firm, level surface.
- Avoid extreme heat as well as temperature fluctuation e.g. caused by installing next to a radiator or in the direct sunlight.
- Protect the balance against direct draughts due to open windows and doors.
- Avoid jarring during weighing.
- Protect the balance against high humidity, vapours and dust.
- Do not expose the appliance to heavy moisture over a longer time period. Non-permitted condensation (condensation of air humidity on the appliance) may occur if a cold appliance is taken to a considerably warmer environment. In this case, acclimatize the disconnected appliance for ca. 2 hours at room temperature.
- Avoid static charge of weighed goods and weighing container.
- Do not operate in areas with hazard of explosive material or in potentially explosive atmospheres due to materials such as gasses, steams, mists or dusts.
- Keep away chemicals (such as liquids or gasses), which could attack and damage the balance inside or from outside.
- In the event of the occurrence of electromagnetic fields, static charges (e.g., when weighing / counting plastic parts) and unstable power supply, large display deviations (incorrect weighing results, as well as damage to the scale) are possible. Change location or remove source of interference.

## 7.2 Unpacking and check

Remove the appliance and the accessories from the package, set aside the packaging material and install the appliance on the working place. Check if all parts of the scope of delivery are present and free of damage.

**Scope of delivery:**

| Content | Models up to 620 g | Models from 1200 g to 15 kg | Models with 31 kg |
|---|---|---|---|
| 1. Balance |  |  |  |
| 2. Weighing plate |  |  |  |
| 3. Weighing plate support |  |  | already pre-installed |
| 4. Wind shield (4 side parts and 1 upper part) |  | | |
| 5. Mains adapter |  | | |
| 6. Power plug set |  | | |
| 7. Hook / Eyelet | | | |
| 8. Operating instructions | | | |

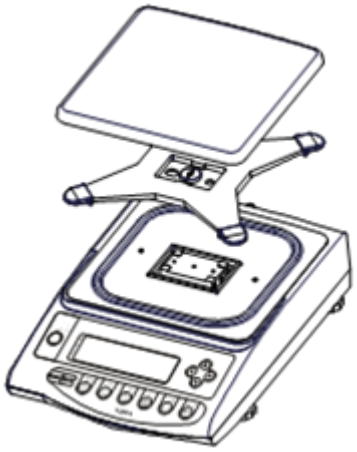
## 7.3 Assembling, Installation and Levelling

The correct implantation site is important for the accuracy of the weighing results of high-resolving precision balances (see chap. 7.1).

### 7.3.1 Implantation of the balance

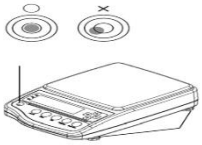
1. Place the weighing plate support of the balance (in PES 31000-1M the weighing plate support is pre-installed)

2. Fix the weighing plate support with the screw



3. Put the weighing plate on the weighing plate support

4. Level balance with foot screws until the air bubble of the water balance is in the prescribed circle

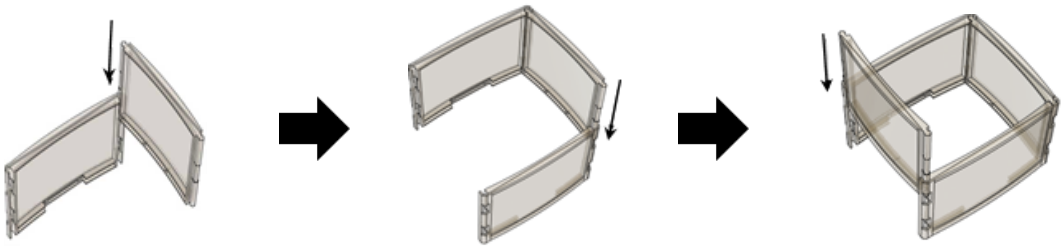


⇨ Check levelling regularly

5. Connect the mains adapter (Installation of the mains adapter: see chap. 7.4.1)

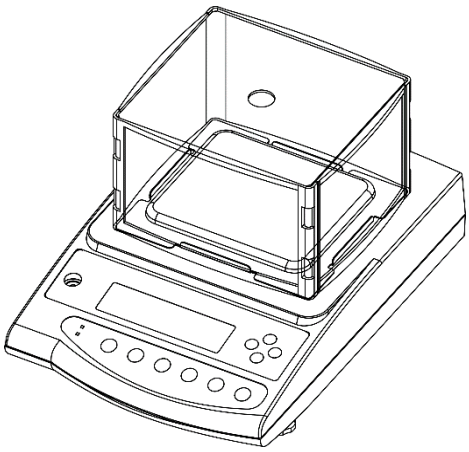
### 7.3.2 Installation of the wind shield

1. Plug the long side parts from above onto the short side parts. Ensure that the sides point upwards with their flat guidance.



2. Plug-on the upper part.

3. Place the wind shield over the weighing plate.



## 7.4 Mains connection

Select the country-specific mains plug and insert it into the mains adapter.

Check, whether the voltage acceptance on the scales is set correctly. The balance may only be connected to the power supply, when the data on the balance (sticker) and the local mains voltage are identical.
Only use KERN original mains adapters. Using other makes requires consent by KERN.

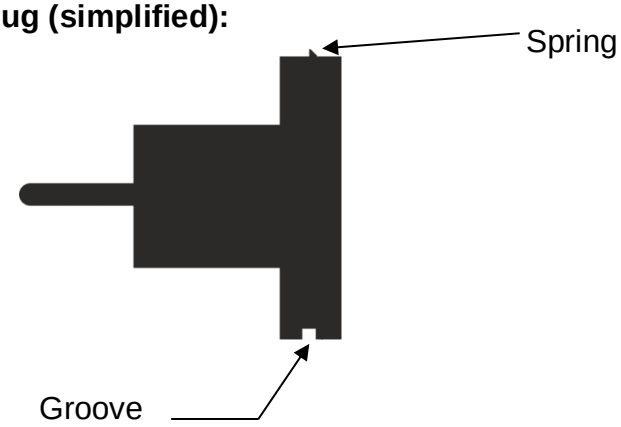
**Important:**

- Prior to start-up check the mains cable for damages.
- Ensure that the mains adapter does not come into contact with liquids.
- The mains plug must be accessible at any time.

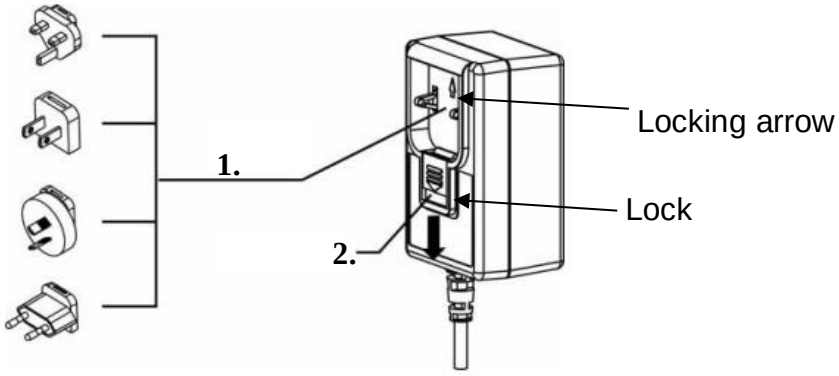
### 7.4.1 Installation of the mains adapter

1. Place the country-specific power plug at a slight angle in the recess of the mains adapter so that the spring points in the direction of the locking arrow of the mains adapter.
2. Push the locking mechanism of the power plug downwards and press the power plug into the recess of the mains adapter. Then release the lock (make sure that the power plug is engaged).

**Side view of the power plug (simplified):**



**Inserting the mains plug into the mains adapter**




### 7.4.2 Turning On the Power

| | |
|---|---|
| | ⇨ Connect the balance to the power supply |
| | ⇨ Switch-on the balance by pressing the **[ON/OFF]**-button |

## 7.5 Initial Commissioning

In order to obtain exact weighing results with the electronic balances, your balance must have reached the operating temperature (see warm-up time chap.1). For this warm-up time the balance must be connected to the power supply (mains connection).
The accuracy of the balance depends on the local acceleration of gravity.
Strictly observe hints in chapter Adjustment.

## 7.6 Connection of peripheral appliances

Before connecting or disconnecting the auxiliary equipment (printer, PC) to the data interface, the balance must be disconnected from mains without fail!
With your balance, only use accessories and peripheral devices by KERN, as they are ideally tuned to your balance.

# 8 Menu

## 8.1 Menu <Func>

**Open menu:**

⇨ Press and hold the **[F]-** key for about 2 seconds.

⇨ Display changes to **<Func>.**

⇨ Release **[F]-** key

If you continue keeping the **[F]** key pressed after the appearance of **<Func>,** the balance will change into another mode. In this case press the **[PRINT]** key to interrupt the action.

### 8.1.1 Menu overview

The balance menu consists of several levels. The first level consists of the main menus. According to the setting you will have access to more menu levels.

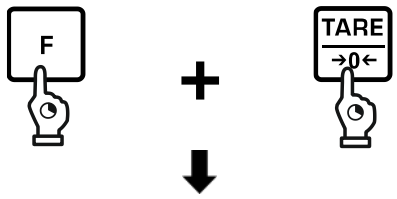
You will find a summary of the setting options in the individual chapters.

| First menu level | Settings | Chapter |
|---|---|---|
| 1. SEt | Selection of a weighing application | 9.4 |
| 2. SEL | Weighing with tolerance range | 13 |
| | Totalization | 14 |
| 3. A0 | Zero-Tracking | 15.1 |
| 4. Sd. | Sensibility (Stability) | 15.2.1 |
| 5. rE. | Display speed (Stability) | 15.2.2 |
| 6. IF. | Communication settings | 19.9 |
| 7. CA | Adjustment functions | 17 |
| 8. bG. | Bar graph display | 15.3 |
| A. AS. | Automatic Sleep function | 15.4 |
| b1. uA | Weighing unit A | 15.5 |
| b3. ub | Weighing unit B (only for simply weighing) | |

| First menu level | Settings | Chapter |
|---|---|---|
| E. GLP | ISO/GLP/GMP compliant data output | 19.10.1 |
| F. dAtE | Display format of the date | 15.6.1 |
| G. to. | Edition of the time stamp | 19.10.2 |
| L. dSt. | Automatic switch-on function | 15.7 |

## 8.2 Enhanced menu <Func2>

**Open menu:**




⇨ Press **[F]-** key and **[TARE/ZERO]** key simultaneously for about 2 seconds.

⇨ When **<Func2>** appears, release the keys

### 8.2.1 Menu overview

The settings **< 2. o.M.P. >** and **< 4. M.E.H. >** are only available for the weighing system **PES**.

| First menu level | Settings | Chapter |
|---|---|---|
| 1. Id | Balance identification number | 16.1 |
| 2. oMP. | Setting the measuring inaccuracy of the external adjustment weight | 16.2.1 |
| 4. MEH. | Takeover the set measuring inaccuracy of the external adjustment weight | 16.2.2 |

### 8.3 Navigation in the menu

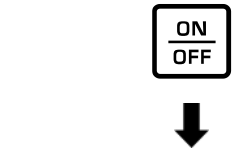
| Button | Designation | Description |
|---|---|---|
| | **[F]** | Open menu (press and hold for about 2 seconds)<br>Next menu level (press shortly) |
| | **[PRINT]** | Close menu<br>Cancel input |
| | **[←]** | Next menu level |
| | **[→]** | Previous menu level |
| | **[↑]** | Setting selection upwards |
| | **[↓]** | Select setting downwards |
| | **[TARE/ZERO]** | Switch through setting selection |
| | **[S]** | Storing settings |

# 9 Basic Operation

## 9.1 Turn on/off

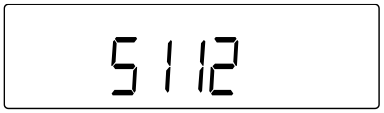
- After switching on, the balance always starts with the last weighing application that was used before switching off.
- The weighing system PEJ carries out an internal adjustment when having been disconnected from mains before switching-on

**Start-up:**




⇨ Press **[ON/OFF]** key

⇨ The display lights up



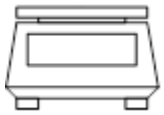

⇨ The software version appears on the display. After disconnection from mains the weighing system PEJ performs an internal adjustment.

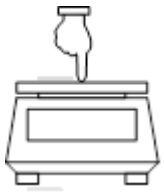
⇨ Wait until the weight display appears

⇨ The display shows zero

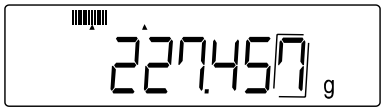
⇨ The balance is now ready for weighing

**Check the display:**

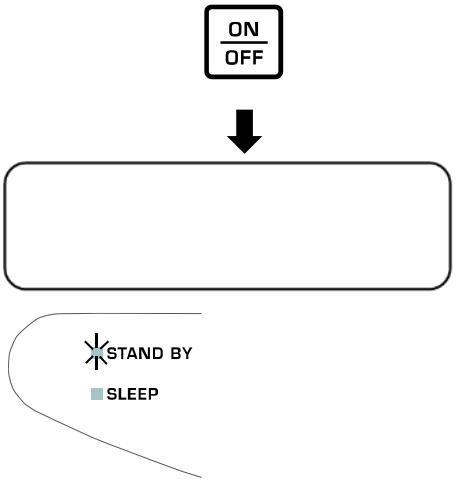




⇨ Touch slightly the weighing plate to check whether the displayed weighing value in the display is changing




**Switching off:**



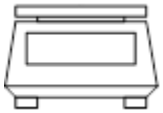

⇨ When the balance is switched-on, press the **[ON/OFF]** key

⇨ The balance display turns off

⇨ STAND BY-LED lighting

### 9.2 Zeroing

> When after pressing the **[TARE/ZERO]** key **<Net>** appears on the display, taring has been carried out instead of zeroing. For more information on taring, see chapter 9.3.



⇨ Unload weighing plate

⇨ Press the **[TARE/ZERO]** key

⇨ The balance performs zeroing

⇨ The display shows the value **<0.0 g>** and the zero indication <**→0←**>.

### 9.3 Taring

The tare weight of any balance container can be tared at the touch of a button, so that the net weight of the weighed goods is displayed during subsequent weighing operations.

> If a tare weight is used, the maximum weighing range for weighed goods is reduced by the value of the tare weight.

⇨ Place an empty weighing container on the weighing plate

⇨ The weight of the weighing container is shown

⇨ Press the **[TARE/ZERO]** key

⇨ The balance tares

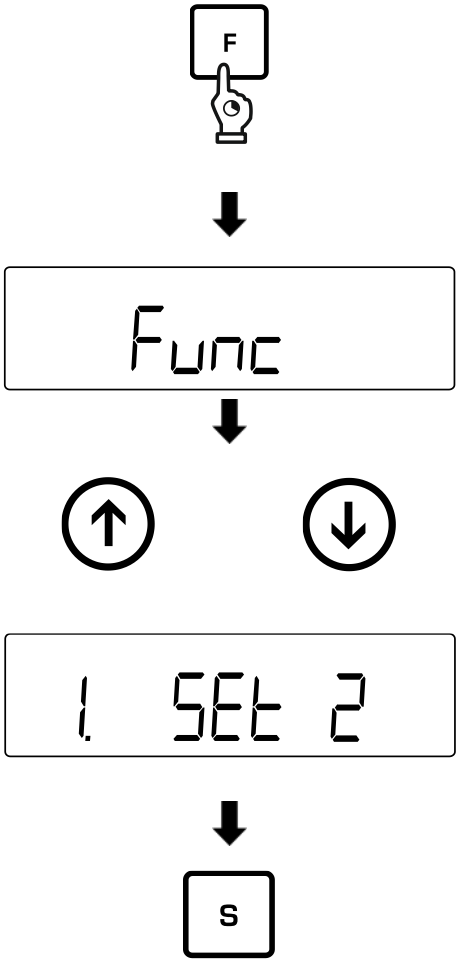
⇨ The display shows the value **<0.0 g>** and the zero display **<Net>.**

⇨ Fill the weighing container with the weighed goods

⇨ Read the net weight of the weighed good

- When the balance is unloaded the saved taring value is displayed with negative sign.
- To clear the stored tare value, unload the weighing plate and press the **[TARE/ZERO]** key.
- The taring process can be repeated any number of times. The limit is reached when the whole weighing range is exhausted.

## 9.4 Selection of a weighing application




⇨ Press and hold the **[F]** key for about 2 seconds.

⇨ Display changes to **<Func>.**

⇨ Release **[F]** key

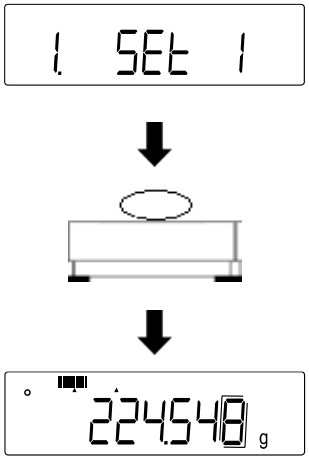
⇨ Use the keys **[↑]** **a**nd **[↓]** (or **[TARE/ZERO] key**) to select the desired weighing application

| | |
|---|---|
| 1. **SEt** „1“. | Simple weighing |
| 1. SEt 2 | Piece counting |
| 1. SEt 3 | Percent weighing |
| 1. SEt 5 | Density determination |

⇨ Press the **[S]** key to confirm the selection and to exit the menu

## 9.5 Simple weighing

| | |
|---|---|
| | If you use a weighing container, it should tared before weighing (see chap. 9.3) |




⇨ Select weighing application **<1. SEt 1>** (selection see chap. 9.4)

⇨ Place weighing goods on the weighing plate or into the weighing container

⇨ Read the weighing result

**Further displays:**
Press the **[F]** key to switch the display on the balance. The display depends on the active weighing application and the enabled auxiliary functions.

| Display sequence | Display | Display on balance |
|---|---|---|
| 1 | Net weight value (unit A) | Net (if tared) |
| 2 | Gross weight value (unit A) | B/G |
| 3 | Net weight value (unit B) | Net (if tared) |
| 4 | Total weight (unit A) | Σ (if totalizing function has been enabled) |

## 9.6 Underfloor weighing

**Models from 1200 g to 15 kg** The hook for the underfloor weighing is available as optional accessory

Objects unsuitable for placing on the weighing scale due to size or shape may be weighed with the help of the flush-mounted platform.
Proceed as follows:

- ⇨ Switch off the balance
- ⇨ Open the closing cover in the balance's bottom.
- ⇨ Place the balance over an opening.
- ⇨ Screw-in the hook completely.
- ⇨ Hook-on the material to be weighed and carry out weighing.

**CAUTION**

- **Always make sure that all attached objects are stable enough to keep safely the desired weighing goods (danger of breaking).**
- **Never suspend loads that exceed the stated maximum load (max) (danger of breaking)**

**Always ensure that there are no persons, animals or objects that might be damaged underneath the load.**

**NOTICE**

**After completing the underfloor weighing the opening on the bottom of the balance must always be closed (dust protection).**

## 10 Piece counting

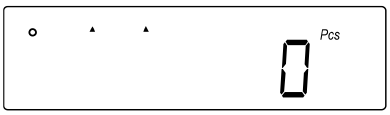
The **piece counting** application allows you to count several pieces placed on the weighing plate.

Before the balance is able to count pieces, it must know the average piece weight, the so-called reference. For this purpose a certain number of the pieces to count must be put on the plate. The balance determines the total weight and divides it by the number of pieces, the so-called reference quantity. Counting is then carried out on the basis of the calculated average piece weight.

As a rule: **The higher the reference quantity the higher the counting exactness.**

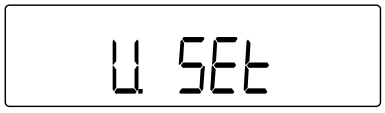
- Use the **[PRINT]** key to cancel the quantity setting
- If you use a weighing container, it should be tared before setting the reference quantity (see chap. 9.3)

⇨ Select weighing application **<1. SEt 2>** (selection see chap. 9.4)




⇨ The display shows **<Pcs>.**

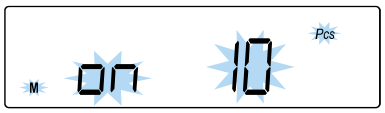
⇨ Press and hold the **[F]** key for about 2 seconds.



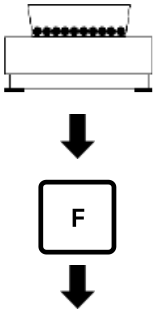

⇨ Display changes to **<U. Set>**
⇨ Release **[F]** key

⇨ The reference quantity is shown and flashes (in this example: **<on 10>**)

⇨ Use the keys **[↑]** and **[↓]** (or **[TARE/ZERO]** key) to select the desired reference quantity



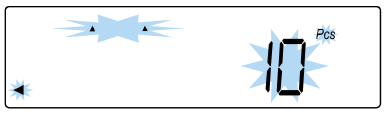

| | |
|---|---|
| on 5 | 5 items |
| on 10 | 10 items |
| on 30 | 30 items |
| on 100 | 100 items |




⇨ Place the number of parts on the weighing plate or in the weighing container according to the entered reference quantity

⇨ Press the **[F]** key to save the weight value of the reference quantity

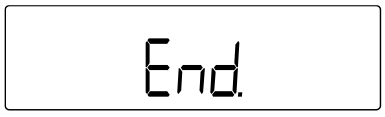
⇨ The reference quantity on the display starts flashing




⇨ Put more reference pieces (quantity must be twice of the reference quantity selected at the beginning → Example: Selected = 10 items, additional reference pieces = 20 items or less)

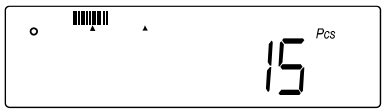
⇨ The stability display appears and an acoustic signal sounds when the weight value of the reference pieces has been stored

⇨ Press the **[F]** key to finish weighing the reference quantity



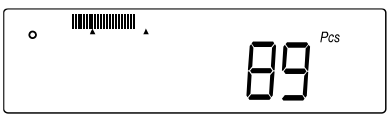

⇨ An acoustic signal sounds and **<End.>** is displayed

⇨




⇨ The display changes into the piece counting mode

⇨ Place more weighing goods on the weighing plate or into the weighing container




⇨ Read off the piece quantity

**When the balance displays <Add>, <Sub> or <L-Err>:**

- **<Add>**: Insufficient quantity of additional samples. Add more samples.
- **<Sub>**: Number of extra samples is too large. Decrease the sample.
- **<L-Err>**: The average piece weight is smaller than the smallest piece weight

**Further displays:**
Press the **[F]** key to switch the display on the balance. The display depends on the active weighing application and the enabled auxiliary functions.

| Display sequence | Display | Display on balance |
|---|---|---|
| 1 | Piece quantity (Pcs) | Net (if tared), Pcs |
| 2 | Total piece quantiy (Pcs) | Pcs, Σ (if totalizing function has been enabled) |
| 3 | Average piece weight (unit A) | Pcs |
| 4 | Total net weight (unit A) | Net (if tared) |

# 11 Percent weighing

The application **Percent weighing** allows to check the weight of a sample in percent, referred to a reference weight.

- If you use a weighing container, it should be tared before setting the reference quantity (see chap. 9.3)
- The readability of the balance automatically adjusts to the reference weight:

| Readability in % | Weight range of the reference weight |
|---|---|
| 1 | Minimum load <= Reference weight < Minimum load x 10 |
| 0.1 | Minimum load x 10 <= Reference weight < Minimum load x 100 |
| 0.01 | Minimum load x 100 <= Reference weight |

| Model | Minimum load for percent weighing |
|---|---|
| TPES 620-3-B | 0.1 g |
| TPES 2200-2-B<br>TPES 4200-2-B<br>TPES 6200-2-B | 1 g |
| TPES 15000-1-B<br>TPES 31000-1-B | 10 g |
| TPEJ 620-3M-B | 0.1 g |
| TPEJ 2200-2M-B | 1 g |
| TPEJ 4200-2M-B | 1 g |

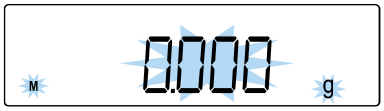
The reference weight can be recorded in two ways:

- Actual value setting method: Weighing the **reference** weight
- Numeric entering of the reference weight

⇨ Select weighing mode **<1. SEt 3>** (selection see chap. 9.4)

⇨ The display shows **<%>**.

⇨ Press and hold the **[F]-** key for about 2 seconds.

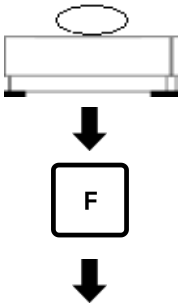


⇨ Display changes to **<P. SEt>**

⇨ Release **[F]** key

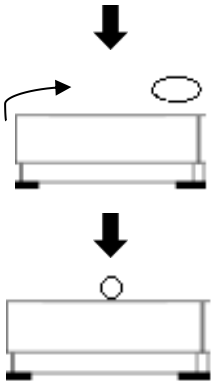
⇨ The last reference weight set flashes on the display

**Actual value setting method:**




⇨ Place reference weight on the weighing plate or into the weighing container

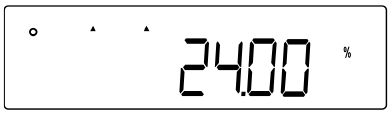
⇨ Press **[F]** key



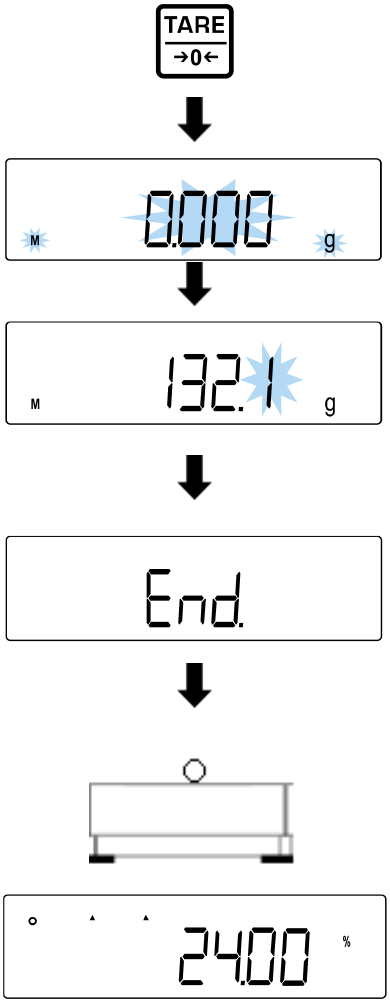
⇨ An acoustic signal sounds and **<End.>** is displayed

⇨ Remove reference weight

⇨ Place the samples on the weighing plate or into the weighing container and read the percentage



**Numerical input of reference weight:**




⇨ Press the **[TARE/ZERO]** key

⇨ **<0 g>** flashes on the display

⇨ Enter reference weight (numeric entry: see chap. 3.3.1)

⇨ An acoustic signal sounds and **<End.>** is displayed

⇨ Put the weighing goods on the weighing plate

⇨ Percentage based on the reference weight is displayed

**Further displays:**

Press the **[F]** key to switch the display on the balance. The display depends on the active weighing application and the enabled auxiliary functions.

| **Display sequence** | **Display** | **Display on balance** |
|---|---|---|
| 1 | Percentage (%) | Net (if tared), % |
| 2 | Total percentage (%) | %, Σ (if totalizing function has been enabled) |
| 3 | Net weight value (unit A) | Net (if tared) |

# 12 Density determination

When measuring the density of solids, the solid is first weighed in air and then in an auxiliary liquid whose density is known. From the weight difference results the buoyancy from where the software calculates the density.
As auxiliary liquid mostly distilled water or ethanol are used, densitiy tables see chap. 12.1.

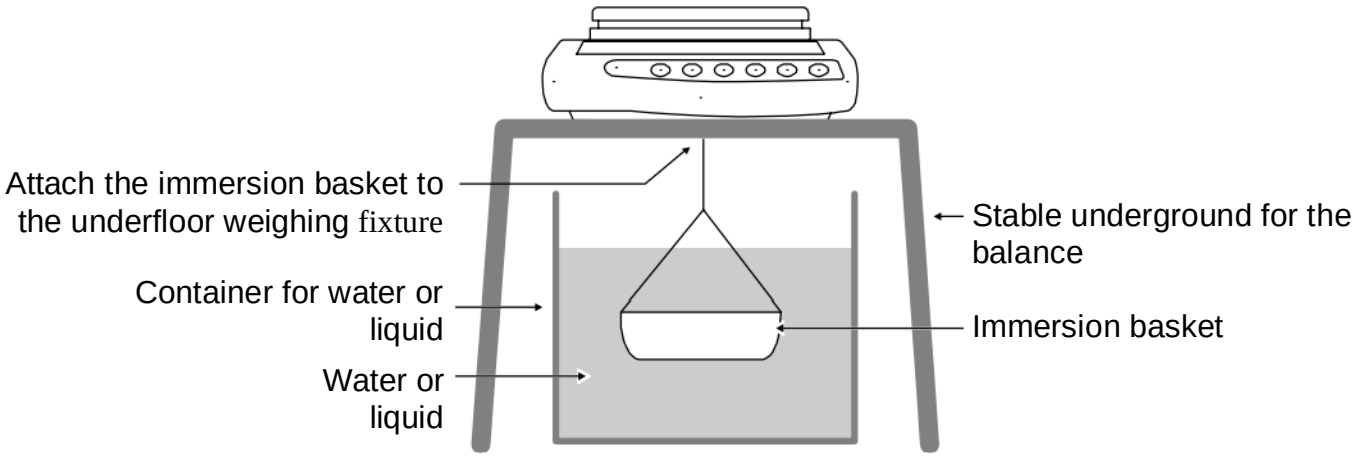
The following steps must be followed to measure the density:

1. Prepare the measuring equipment
2. Select weighing application for density determination
3. Select medium
4. Set water temperature or specific density
5. Weigh sample by underfloorweighing
6. Correction of residual errors due to immersion basket
7. Measure sample

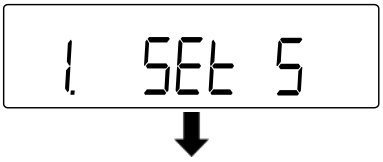
- The hook for the underfloor weighing is available as optional accessory
- Information on this can be found on our homepage:
  www.kern-sohn.com

- After completing the underfloor weighing the opening on the bottom of the balance must always be closed (dust protection).
- The immersion basket must not come into contact with the container

**1. Prepare the measuring equipment**



## 2. Select weighing application for density determination

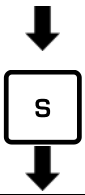



⇨ Select weighing application **<1. SEt 5>** (selection see chap. 9.4)

## 3. Select medium

⇨ Navigate to **<11. MEd.>** and select medium (Navigation in menu: see chap. 8.3)

| | |
|---|---|
| 0 | Water |
| 1 | No water (Other medium) |




⇨ Press the **[S]** key to save settings

⇨ The display shows **<d>**

## 4. Set water temperature or specific density

- The water temperature must be between 0.0 °C and 99.9 °C
- The specific density must be between 0.0001 and 9.9999

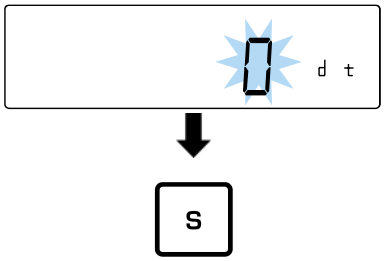
⇨ Press and hold the **[TARE/ZERO]** key.

**When 0 (water) is selected:**

⇨ Display changes to **<d t>** and flashes

⇨ Release the **[TARE/ZERO]** key.

⇨ Press the **[TARE/ZERO]** key to set the water temperature.

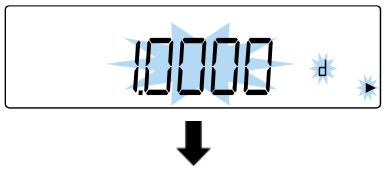



⇨ Enter water temperature (numeric entry: see chap. 3.3.1)




⇨ Press the **[S]** key to save the entry.

**When selecting 1 (No water):**




⇨ Display changes to **<d>** and flashes

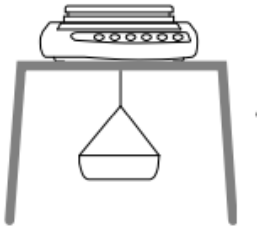
⇨ Release the **[TARE/ZERO]** key.

⇨ Press the **[TARE/ZERO]** key to set the specific density.

⇨ Enter specific density (Numeric entry: see chap. 3.3.1)

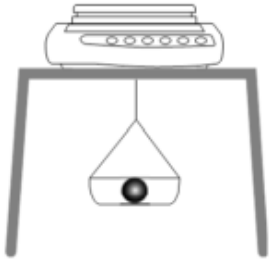
⇨ Press the **[S]** key to save the entry.

## 5. Weigh sample by underfloorweighing



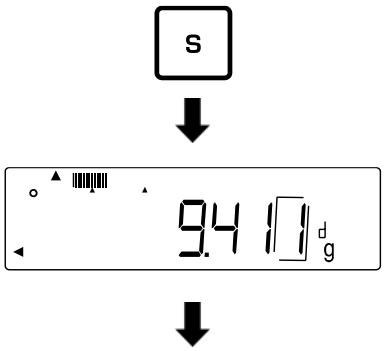
⇨ Attach empty immersion basket to hooks for underfloor weighing.

⇨ Press the **[TARE/ZERO]** key to tare the balance.



⇨ Place sample in the immersion basket

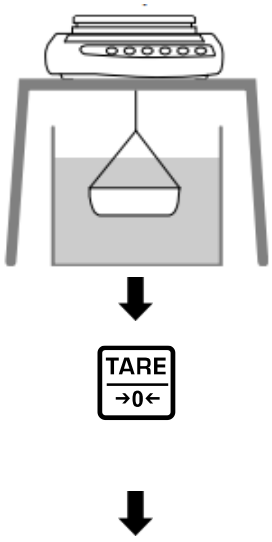
(In this step the sample can also be placed on the weighing plate)




⇨ Press the **[S]** key when the stable weight value is displayed.

⇨ Balance stores weight value and displays **<◀ >**.

## 6. Correction of residual errors due to immersion basket

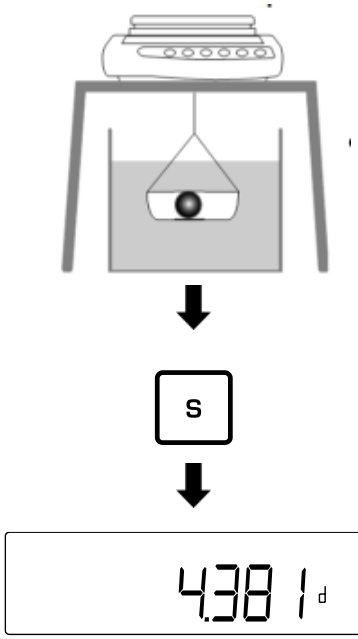



⇨ Place container with water or other liquid under the balance

⇨ Immerse empty immersion basket in the water or liquid

⇨ Press **[TARE/ZERO]** key to tare the balance and correct residual errors of the weighing container

## 7. Measuring the sample




⇨ Place sample in the immersion basket

⇨ Immerse the immersion basket with sample placed upon completely in the water or liquid.

⇨ Press the **[S]** key when the stable weight value is displayed.

⇨ Read off the specific density result

Press the **[S]** key to return to the weight value display. However, you cannot return to the density display. To do this, you must retake the measurement.

### 12.1 Density Table for liquids

| Temperature [°C] | Density ρ [g/cm³] | | |
|---|---|---|---|
| | Water | Ethanol | Methanol |
| 10 | 0.9997 | 0.7978 | 0.8009 |
| 11 | 0.9996 | 0.7969 | 0.8000 |
| 12 | 0.9995 | 0.7961 | 0.7991 |
| 13 | 0.9994 | 0.7953 | 0.7982 |
| 14 | 0.9993 | 0.7944 | 0.7972 |
| 15 | 0.9991 | 0.7935 | 0.7963 |
| 16 | 0.9990 | 0.7927 | 0.7954 |
| 17 | 0.9988 | 0.7918 | 0.7945 |
| 18 | 0.9986 | 0.7909 | 0.7935 |
| 19 | 0.9984 | 0.7901 | 0.7926 |
| 20 | 0.9982 | 0.7893 | 0.7917 |
| 21 | 0.9980 | 0.7884 | 0.7907 |
| 22 | 0.9978 | 0.7876 | 0.7898 |
| 23 | 0.9976 | 0.7867 | 0.7880 |
| 24 | 0.9973 | 0.7859 | 0.7870 |
| 25 | 0.9971 | 0.7851 | 0.7870 |
| 26 | 0.9968 | 0.7842 | 0.7861 |
| 27 | 0.9965 | 0.7833 | 0.7852 |
| 28 | 0.9963 | 0.7824 | 0.7842 |
| 29 | 0.9960 | 0.7816 | 0.7833 |
| 30 | 0.9957 | 0.7808 | 0.7824 |
| 31 | 0.9954 | 0.7800 | 0.7814 |
| 32 | 0.9951 | 0.7791 | 0.7805 |
| 33 | 0.9947 | 0.7783 | 0.7796 |
| 34 | 0.9944 | 0.7774 | 0.7786 |
| 35 | 0.9941 | 0.7766 | 0.7777 |

### 12.2 Data output of the specific density to a printer

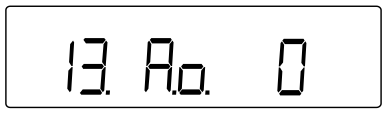
- Further settings can only be made after the weighing application Density measurement has been activated (see chap. 12).
- You need a compatible printer to access these functions. Information on this can be found on our homepage:
  www.kern-sohn.com

**Selecting the data for output:**

⇨ In the menu navigate to **<12.dod.>** and select setting (Navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 0 | Edit specific density |
| 1 | Show all data (Measured density, Weight value, Current water temperature / Specific density) |

**Activate / deactivate automatic printout:**




⇨ Navigate to **<13.Ao.>** in the menu and select setting (Navigate in the menu: see chap. 8.3)

| | |
|---|---|
| 0 | Automatic output disabled (manual output) |
| 1 | Automatic output enabled (output after every concluded density measurement) |

# 13 Weighing with tolerance range

Setting a tolerance range allows you to quickly check whether a weight value is within certain limits.

Either you can determinate one tolerance value only (minimum value as lower limit) or a tolerance range (several limits).

- Weighing with tolerance range is available for the following applications: Weighing, percent weighing, piece counting
- **<2. SEL 0>** is the default setting (function deactivated).

Weight values can be evaluated in two ways when weighing with a tolerance range:

- Evaluation of absolute values
  - The evaluation is based on the permissible maximum and / or minimum value specified.
- Evaluation with difference values
  - The evaluation is based on a specified reference value and the permissible difference values.

**Example:**
A sample may weigh a minimum of 900.0 g and a maximum of 1200.0 g. The table below shows which values must be specified for the respective differentiation methods.

| Distinguishing method | Reference value | Lower tolerance limit | Upper tolerance limit |
|---|---|---|---|
| Absolute values | | 900.0 g | 1200.0 g |
| Differential values | 1000.0 g | - 100.0 g | 200.0 g |

The following steps are needed to use weighing in the tolerance range:

1. Select function (see chap. 13.1)
2. Set differentiation condition (see chap. 13.2)
3. Set differentiation range (see chap. 13.3)
4. Set the number of tolerance limits (see chapter 13.4)
5. Set differentiation method (see chap. 13.5)
6. Activate / deactivate acoustic signal (see chapter 13.6)
7. Set the display of the results presentation (see chap. □)
8. Set the data output (see chap. 13.8.)
9. Set tolerance values (see chap. 13.9)

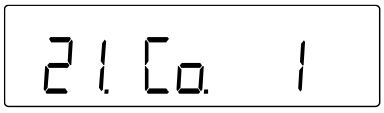
## 13.1 Selection of weighing function with tolerance range

⇨ In the menu select **<2. SEL 2>** (navigation in the menu: see chap. 8.3)

If the add-on function needs to be used at the same time, select **<2. SEL 3>**.

## 13.2 Set distinction condition

The distinction condition defines whether the evaluation of weight values is performed only if there are stable weight values or continuously (in case of fluctuating / non-stable weighing values). The continuous assessment of weight values enables you to follow in real time on the display during dynamic weighing processes (e.g. when filling a container) whether your sample is within the tolerance limits.



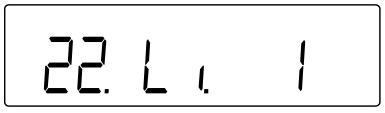

⇨ In the menu navigate to **<21. Co.>** and select distinction condition (Navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 1 | Always |
| 2 | Only with steady weighing value |

## 13.3 Setting the distinction range

The differentiation range determines the weight value from which the scale starts to evaluate this value. If the entire range is set, the balance starts at 0 g. If 5d is set, the evaluation for the weighing systems is carried out according to the following table:

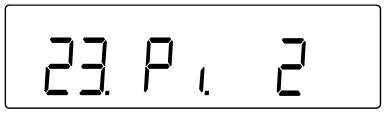
| **Model** | **Minimum weight for assessment** |
|---|---|
| to 620 g | 0,005 g |
| from 2200 g to 6200 g | 0,05 g |
| from 15 kg to 31 kg | 0,5 g |




⇨ In the menu navigate to **<22. Li.>** and select Distinction Area (Navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 0 | +5 d or more |
| 1 | Total range |

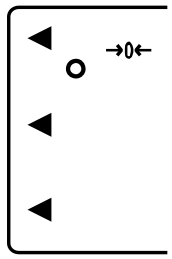
### 13.4 Set the number of tolerance limits




⇨ In the menu navigate to **<23. Pi.>** and select the number of tolerance limits (navigation in the menu: see chap. 8.3)

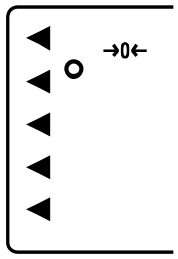
| | |
|---|---|
| 1 | 1 limit (rank 1) * |
| 2 | 2 limits (rank 1 and rank 3) * |
| 3 | 3 limits (rank 1, rank 2, rank 4) ** |
| 4 | 4 limits (rank 1, rank 2, rank 4, rank 5) ** |

*** at <23. Pi.> = 1 or 2:**



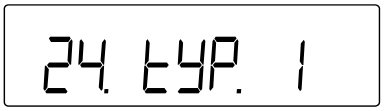
| | | |
|---|---|---|
| Rank 3 (limit 2) | + | Upper tolerance limit exceeded |
| *Rank 2* | **TOL ✓** | Within the tolerance range |
| Rank 1 (limit 1) | - | Lower tolerance limit not reached |

**** at <23. Pi.> = 3 or 4:**



| | | |
|---|---|---|
| Rank 5 (limit 4) | + | Rank 4 < measured value |
| Rank 4 (limit 3) | | Rank 3 ≤ Measured value < Rank 4 |
| *Rank 3* | **TOL ✓** | Rank 2 ≤ Measured value < Rank 3 |
| Rank 2 (limit 2) | | Rank 1 ≤ Measured value < Rank 2 |
| Rank 1 (limit 1) | - | Measured value < Rank 1 |

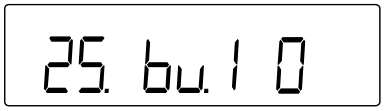
### 13.5 Set distinction method




⇨ In the menu navigate to **<24. tP.>** and select the distinction method (navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 1 | Assessment with absolute values (Setting the absolute values: see chap. 13.9.1) |
| 2 | Assessment with difference values (Setting the difference values: see chap. 13.9.2) |

## 13.6 Set acoustic signal




⇨ In the menu navigate from **<25. bu. 1>** to **<29. bu. 5>** navigieren (Navigation in the menu: see chap. 8.3)

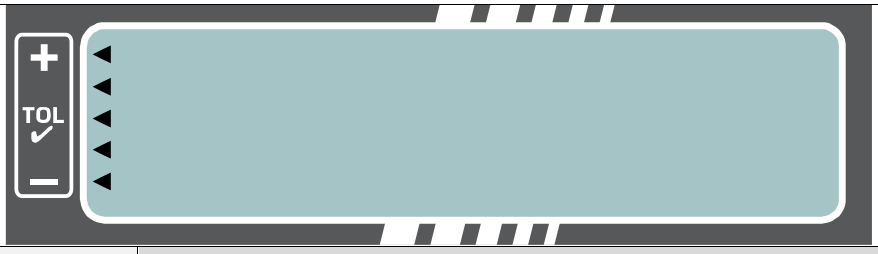
| | |
|---|---|
| 25. bu. 1 | Signal for rank 1 or " **-** " |
| 26. bu. 2 | Signal for rank 2 or " **TOL** ✓ " |
| 27. bu. 3 | Signal for rank 3 or " **+** " |
| 28. bu. 4 | Signal for rank 4 |
| 29. bu. 5 | Signal for rank 5 |

⇨ Select desired setting

| | |
|---|---|
| 0 | Acoustic signal deactivated |
| 1 | Acoustic signal activated |

## 13.7 Set tolerance display

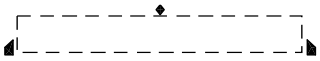
Whether a measured weight value is within certain limits is indicated on the display by an arrow on the left side (see table below or chap. 13.4).



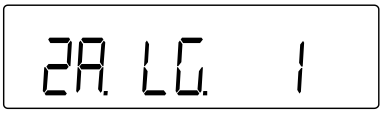

| **Evaluation of the weight value** | **Set tolerance ranges** | |
|---|---|---|
| | 1 Limit | from 2 limits |
| Upper tolerance limit exceeded | | **+** |
| Within the tolerance range | **TOL** ✓ | **TOL** ✓ |
| Lower tolerance limit not reached | **-** | **-** |

The evaluation of the weight value can also be shown on the bar graph display.

> The bar graph display can only be used when 2 limits are set („-„ and „+“).

| **Evaluation of the weight value** | **Bar graph display** |
|---|---|
| Upper tolerance limit exceeded | |
| Within the tolerance range | |
| Lower tolerance limit not reached |  |

**Set the display for tolerance range weighing:**




⇨ In the menu navigate to **<2A. LG.>** and select the distinction method (navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 1 | Arrows |
| 2 | Bargraph (only for 2 limit values) |

## 13.8 Set data output

⇨ In the menu navigate to **<2b. r.o.c.>** and select the distinction method (navigation in the menu: see chap. 8.3)

| | |
|---|---|
| 1 | Continuous data output |
| 2 | Data output on external request |

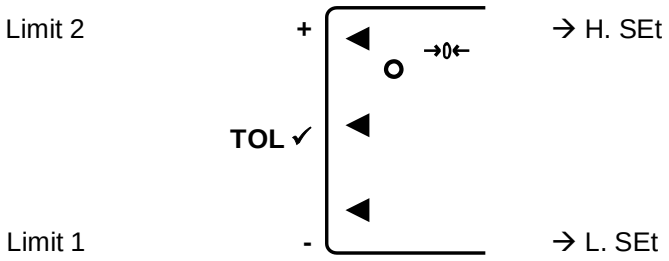
## 13.9 Setting the tolerance values

- Tolerance values can only be saved when the balance is in the measurement mode display
- Set the balance to zero (see chap. 9.2) or tare (see chapter 9.3) the balance before saving tolerance values.

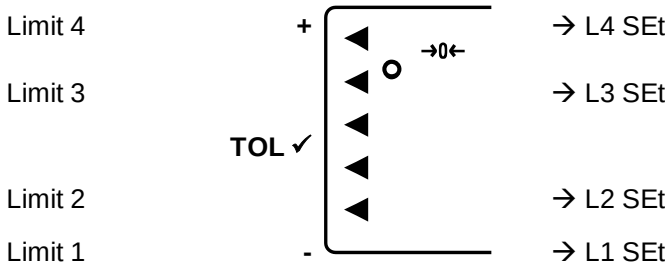
### 13.9.1 Absolute values

For the distinction method setting with absolute values **<24. tYP. 1>** (see chap. 13.5)

**at <23. Pi.> = 1 or 2:**

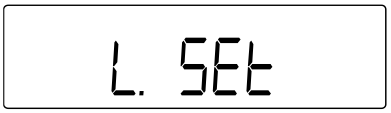



**at <23. Pi.> = 3 or 4:**



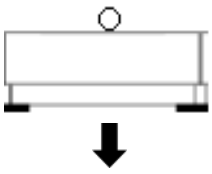

**Actual value setting method:**

⇨ When the balance is in the measuring mode, hold down the **[S]** key for about 2 seconds.




⇨ When **<L. SEt>** or **<L1 SEt>** is displayed, release the **[S] key**

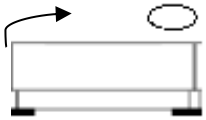
⇨ Last stored value for the lower tolerance limit is appears on the display and flashes (in this example: Weight value)



⇨ Place the reference sample for the tolerance limit on the weighing plate

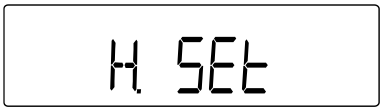
⇨ Press the **[F]** key to save the reference value.

⇨ An acoustic signal sounds and the value of the reference sample is displayed briefly (in this example: Weight value)



⇨ Remove reference sample

**If the number of tolerance limits is more than 1:**

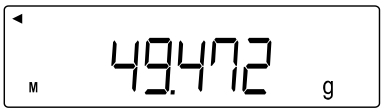



⇨ The display shows **<H. SEt>** (or **<L2 SEt>** … **<L4 SEt>**)

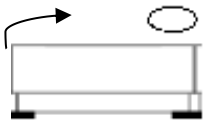
⇨ The last value stored for the tolerance limit is shown and flashes on the display

⇨ Place the reference sample for the tolerance limit on the weighing plate

⇨ Press the **[F]** key to save the reference value.



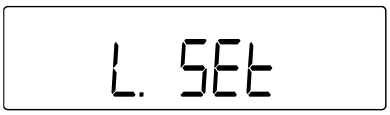

⇨ An acoustic signal sounds and the value of the reference sample is displayed briefly (in this example: Weight value)



⇨ Remove reference sample

**Numeric input:**

⇨ When the balance is in the measuring mode, hold down the **[S]** key for about 2 seconds.




⇨ When **<L. SEt>** or **<L1 SEt>** is displayed, release the **[S] key**

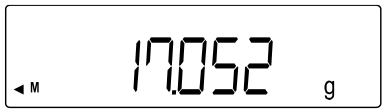
⇨ Last stored value for the lower tolerance limit is appears on the display and flashes (in this example: Weight value)

⇨ Press the **[TARE/ZERO]** key

⇨ **<0 g>** flashes on the display

⇨ Enter tolerance limit (Numeric entry: see chap. 3.3.1)

⇨ Press the **[S]** key




⇨ An acoustic signal sounds and the entered value is displayed briefly (in this example: Weight value)

**If the number of tolerance limits is more than 1:**

⇨ The display shows **<H. SEt>** (or **<L2 SEt>** … **<L4 SEt>**)

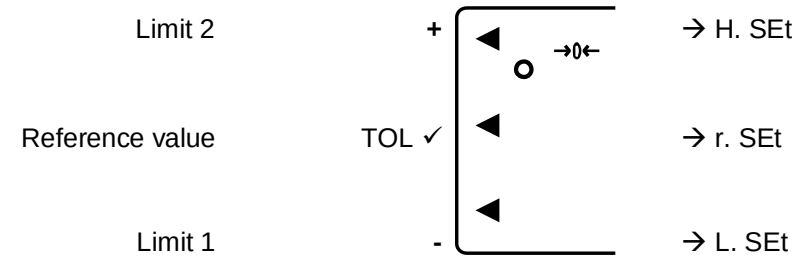
⇨ The last value stored for the tolerance limit is shown and flashes on the display

⇨ Enter tolerance limits as described above

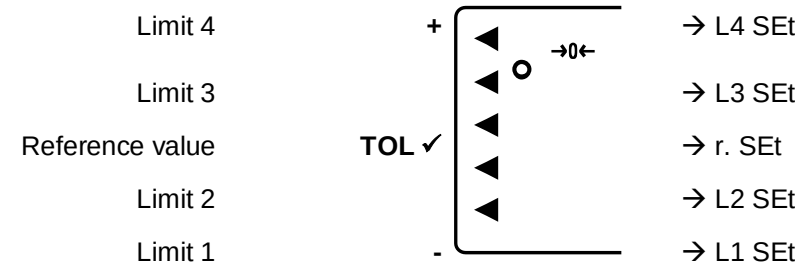
### 13.9.2 Differential values

For the distinction method setting with absolute values **<24. tYP. 2>** (see chap. 13.5)

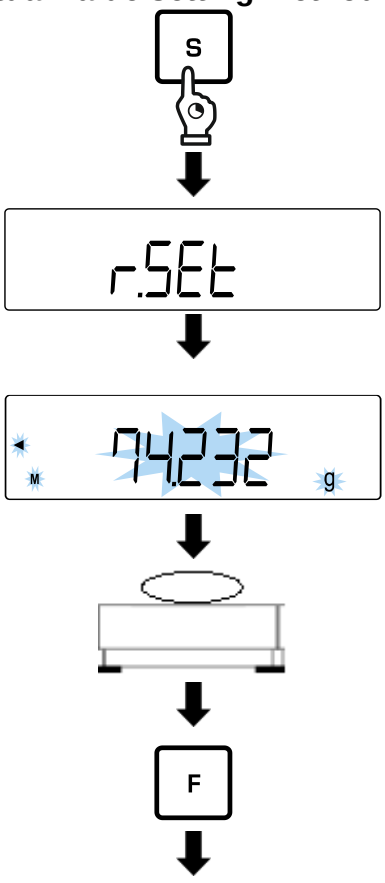
**at <23. Pi.> = 1 or 2:**




**at <23. Pi.> = 3 or 4:**




**Actual value setting method:**



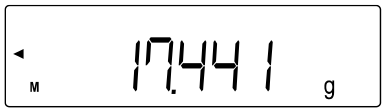

⇨ When the balance is in the measuring mode, hold down the **[S]** key for about 2 seconds.

⇨ Release the **[S]** key when **<r. SEt>** is displayed

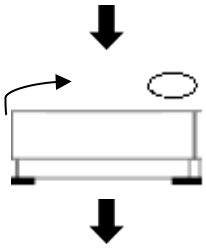
⇨ Last reference value stored for the target weight appears and flashes on the display

⇨ Place reference sample (target weight) on the weighing plate

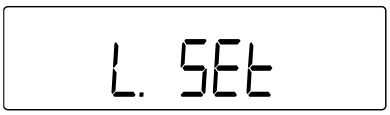
⇨ Press the **[F]** key to save the reference value.




⇨ An acoustic signal sounds and the value of the reference sample is displayed briefly

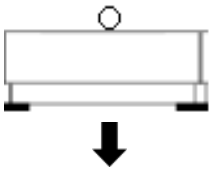


⇨ Remove reference sample



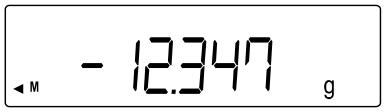

⇨ **<L SET>** or **<L1 SEt>** is displayed

⇨ Last difference to reference sample flashes on the display

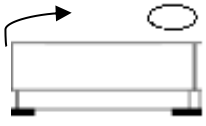


⇨ Place the reference sample for the tolerance limit on the weighing plate

⇨ Press the **[F]** key to save the reference value.

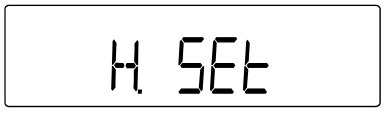



⇨ An acoustic signal sounds and the difference of the reference sample is displayed briefly



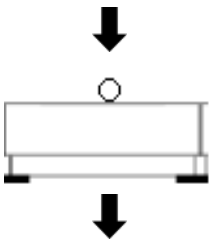
⇨ Remove reference sample

**If the number of tolerance limits is more than 1:**



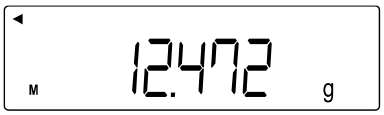

⇨ The display shows **<H. SEt>** (or **<L2 SEt>** … **<L4 SEt>**)

⇨ Last difference to reference sample flashes on the display

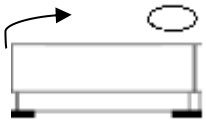


⇨ Place the reference sample for the tolerance limit on the weighing plate

⇨ Press the **[F]** key to save the reference value.




⇨ An acoustic signal sounds and the difference of the reference sample is displayed briefly



⇨ Remove reference sample

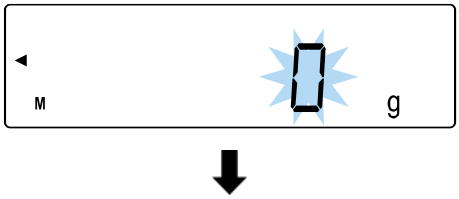
**Numeric input:**

⇨ When the balance is in the measuring mode, hold down the **[S]** key for about 2 seconds.

⇨ Release the **[S]** key when **<r. SEt>** is displayed

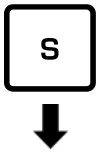
⇨ Last reference value stored for the target weight appears and flashes on the display

⇨ Press the **[TARE/ZERO]** key

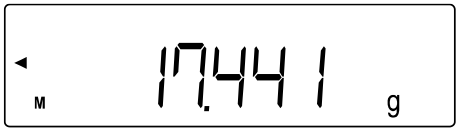



⇨ **<0 g>** flashes on the display

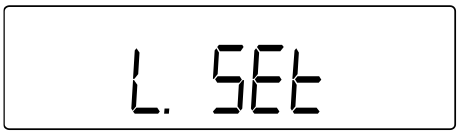
⇨ Enter reference value (target weight) (Numeric entry: see chap. 3.3.1)



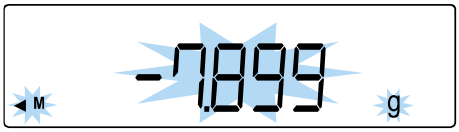

⇨ Press the **[S]** key




⇨ An acoustic signal sounds and the entered value is displayed briefly (in this example: Weight value)

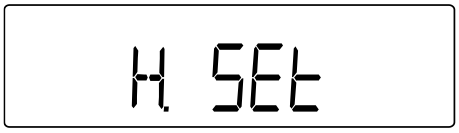



⇨ **<L SET>** or **<L1 SEt>** is displayed




⇨ Last difference to reference sample flashes on the display

⇨ Enter difference of the target weight as described above



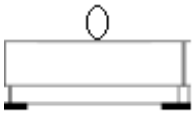

**If the number of tolerance limits is more than 1:**

⇨ The display shows **<H. SEt> (**or **<L2 SEt>** … **<L4 SEt>**)

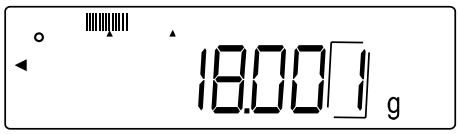
⇨ Last difference to reference sample flashes on the display

⇨ Enter difference of the target weight as described above

## 13.10 Weighing the samples



⇨ Put the weighing goods on the weighing plate




⇨ Evaluation of the value is shown on the display

# 14 Totalization

The **Totalizing** application allows you to weigh different samples and to totalize the weight values. This function can be used for various applications, such as weighing individual batches to determine total stock.

- Totalizing is available for the following applications: Weighing, percent weighing, piece counting
- **<2. SEL 0>** is the default setting (function deactivated).

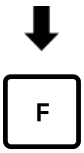
Totalizing can be done in two ways:

- Totalizing individual weight values by replacing the sample on the weighing plate: TOTAL-Adding (see chapter 14.2.1)
- Totalizing of single weighings without exchanging the samples on the weighing plate (balance tares automatically after totalizing): NET-Adding (see chapter 14.2.2)

## 14.1 Select the Totalizing function

⇨ Select **<2. SEL 1>** in the menu (navigation in the menu: see chap. 8.3)

Select **<2. SEL 3>** if the tolerance function needs to be used at the same time

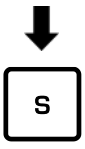



⇨ Press **[F]** key

⇨ The display shows **<2C. Ad.M>**

⇨ Use the keys **[↑]** and **[↓]** (or **[TARE/ZERO]** key) to select the desired reference quantity

| | |
|---|---|
| 1 | TOTAL-Adding: Totalizing individual weighings by replacing the sample on the weighing plate |
| 2 | NET-Adding: Totalize individual weighings without replacing the samples on the weighing plate (balance tares automatically after totalizing) |




⇨ Press the **[S]** key to save settings and return to measuring mode.

## 14.2 Using the totalizing function

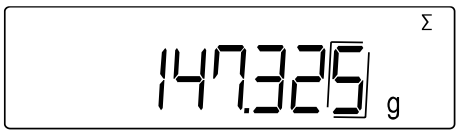
The error message **<t-Err>** appears if you have not placed the samples correctly (More information: see chap. 21.1)

### 14.2.1 TOTAL-Adding

⇨ Set the balance to **<2C. Ad.M 1>** (see chap. 14)

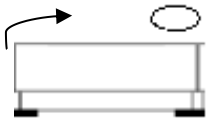
⇨ Place the first sample on the weighing plate and wait until the display shows an asterisk **<*>**.

⇨ Press the **[S]** key




⇨ Weight value is stored

⇨ An acoustic signal sounds and **<Σ>** is briefly displayed together with the weight total



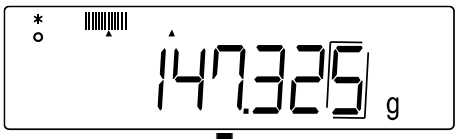
⇨ Remove sample from weighing plate (balance performs automatic zeroing)

⇨ Wait until the balance shows **<0>**.

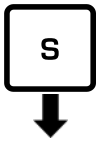
⇨ Place new sample on weighing plate and repeat steps

### 14.2.2 NET-Adding

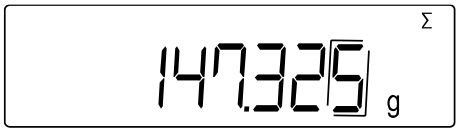
⇨ Set balance to **<2C.Ad.M 2>** (see chap. 14)




⇨ Place the first sample on the weighing plate and wait until the display shows an asterisk <*>.




⇨ Press the **[S]** key




⇨ Weight value is stored

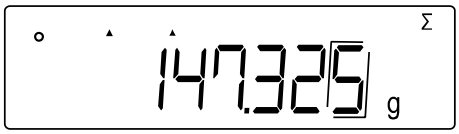
⇨ An acoustic signal sounds and **<Σ>** is briefly displayed together with the weight total

. . .

⇨ Wait until the balance shows **<0>**.

⇨ Place another sample on the weighing plate and repeat steps

### 14.3 Clear the total sum




- With the balance in measuring mode, press the **[F]** key repeatedly until the display shows **<Σ>** .

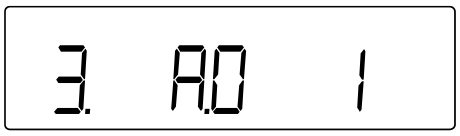
⇨ Press the **[TARE/ZERO]** key

# 15 Settings

- Press and hold the **[F]** key for about 2 seconds until **<Func>** is displayed.
- Navigation in menu see chap. 8.3

## 15.1 Zero-Tracking

Small weight variations (e.g. due to particles on the weighing plate) can be automatically tared by zero tracking.



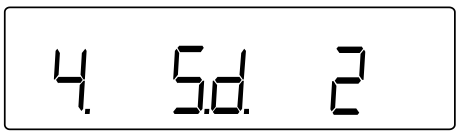

⇨ Navigate to **<3. A.0>** in the menu and select the setting.

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

## 15.2 Stability settings

The stability settings influence the evaluation of weight fluctuations on the weighing plate and to what extent the weight value is displayed as a stable value.

### 15.2.1 Sensitivity

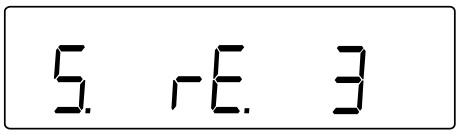



⇨ In the menu navigate to **<4. Sd.>** and select sensitivity.

| | |
|---|---|
| 2 | Strong sensitivity (quiet environment) |
| 3 | Normal sensitivity (default) |
| 4 | Weak sensitiy (busy environment) |

### 15.2.2 Display speed

The display speed allows you to adjust the balance to the environmental conditions. The display speed affects the stability display of the balance.

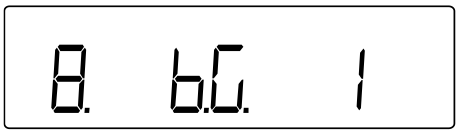



⇨ In the menu navigate to **<5. rE.>** and select Display speed.

| | |
|---|---|
| 0 | Very fast (very quiet environment) |
| 1 | Fast (quiet environment) |
| 2 | Normal |
| 3 | Slow (busy environment) |

## 15.3 Bar graph display

The balance's bar graph display shows how much the weighing plate is loaded with respect to its weighing range.



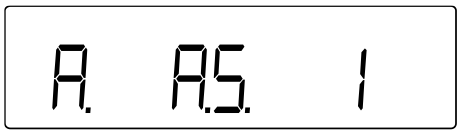

⇨ Navigate to **<8. b.G.>** in the menu and select display setting

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

## 15.4 Automatic Sleep function

If the automatic sleep function is activated, the balance will automatically switch off the display if it has not been used after a period of 3 minutes.

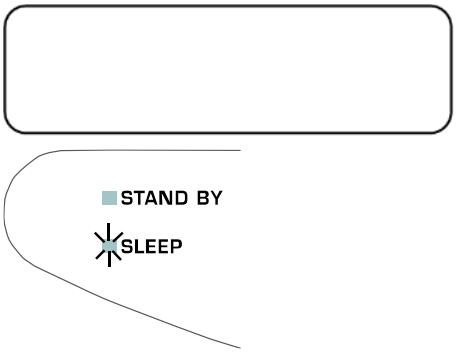
- Sleep mode of the balance is not enabled,
  - when the menu of the balance is open
  - when there are weighing goods on the weighing plate and the value is instable.
- Exit the sleep mode when touching the weighing plate or pressing a key
- During sleep mode, data can de edited




⇨ In the menu navigate to **<9. A.S.>** and select the setting.

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

**When sleep mode is activated:**



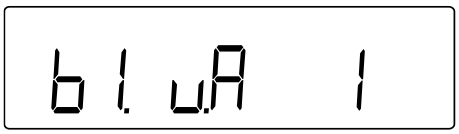

⇨ The balance display turns off after 3 minutes

⇨ SLEEP LED glowing

## 15.5 Setting the weighing units

Two weighing units (A and B) can be set on the balance. During weighing, the display can be switched between these two units by pressing the **[F]** key.

- Unit A can be used for all weighing applications.
- Unit B can be used for simple weighing only




or

⇨ In the menu navigate to **<b1.u.A>** or **<b3.ub>**.

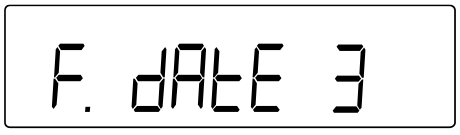
| | |
|---|---|
| <b1.u.A> | Set unit A |
| <b3.ub> | Set unit B |

⇨ Select setting

| | |
|---|---|
| 0 | Disabled (setting only available for unit B). |
| 1 | g (gram) |
| 2 | kg (kilogram) |
| 4 | ct (carat) |

## 15.6 Date and time

### 15.6.1 Set display format




⇨ In the menu navigate to **<F. dAtE>** and select the setting.

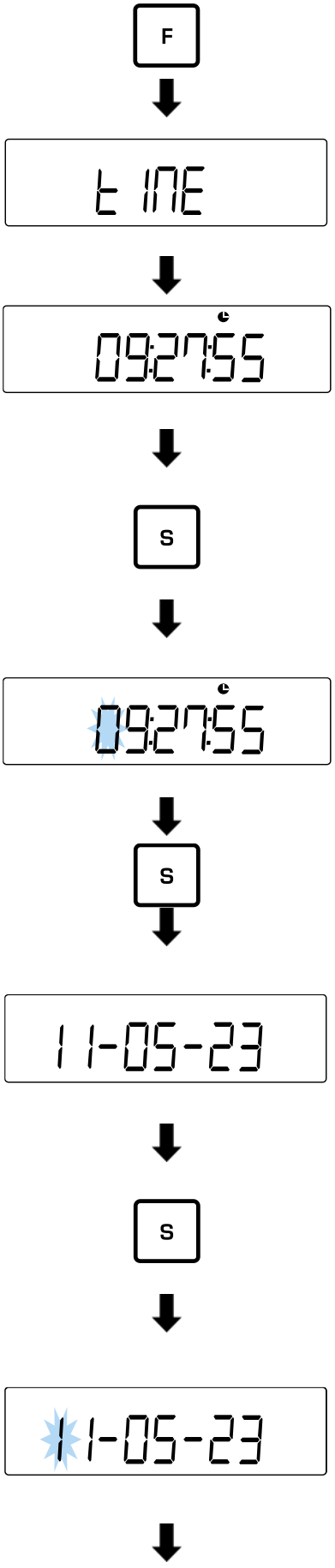
| | |
|---|---|
| 1 | Year - Month - Day |
| 2 | Month - Day - Year |
| 3 | Day - Month - Year |

### 15.6.2 Setting time and date

⇨ Press and hold the **[F]** key for about 5 seconds.

⇨ The display changes to **<Func>** and then **<d-SEt>**

⇨ Release **[F]** key




⇨ Press **[F]** key

**Enter time:**

⇨ The display changes to **<tIME>** and then to the clock-time display (24-hours format)

⇨ Use the **[TARE/ZERO]** key to set the seconds to 00 and round them up or down to the next minute

⇨ Press the **[S]** key to reach to the time setting (using the **[F]** key you can directly reach to the date setting)

⇨ Enter time:

Hours:Minutes:Seconds

Numeric input: see chapter 3.3.1)

⇨ Press the **[S]** key to save the time.

**Enter date:**

⇨ The display changes to **<dAtE>** and then to the date display (display format: see chapter 15.6.1)

⇨ Press the **[S]** key to reach to the date setting (using the **[F]** key you can skip the setting and return to weighing mode)

⇨ Enter date

Sequence is depending on the display format

Numeric input: see chapter 3.3.1)

⇨ Press the **[S]** key to save settings and return to weighing mode

### 15.7 Automatic switch-on function

If the automatic power-on function is enabled, the balance will switch on automatically when it is connected to the mains. Users then no longer need to press the **[ON/OFF]** key. This function e.g. cannot be used,
when the balance is used connected to other appliances.

⇨ In the menu navigate to **<L. d.St.>** and select setting

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

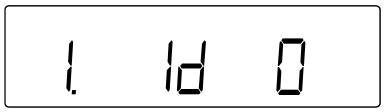
# 16 Enhanced settings

- Press **[F]** key and **[TARE/ZERO]** key simultaneously for about 2 seconds until **<Func2>** appears
- Navigation in menu see chap. 8.3

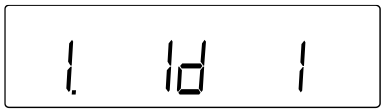
## 16.1 Balance identification number

Your balance can be distinguished from other balances by assigning a balance identification number (ID). The identification number is edited on the adjustment record.

A maximum of 6 characters can be assigned for that ID




⇨ In the enhanced menu select **<1. Id 1>**

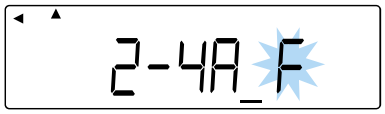


⇨ Press the **[S]** key

⇨ The balance's ID is displayed on the balance.

⇨ Press the **[TARE/ZERO]** key

⇨ The first input digit flashes




⇨ Enter ID (Numeric entry: see chap. 9.6) 0-9, A-F, -, blank)

⇨ Press the **[S]** key

⇨ An acoustic signal sounds and the balance returns into weighing mode

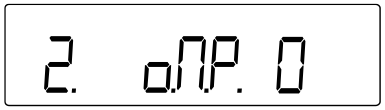
## 16.2 Measurement incertainty of the external adjustment weight

The measurement incertainty indicates the deviation of the display from the external adjustment weight. By entering the measuring incertainty, this deviation from the adjustment or the adjustment test can be taken into account with an external adjustment weight. By that way a more exact adjustment can be possible.

**Measurement incertainty = Displayed weight - Nominal value**

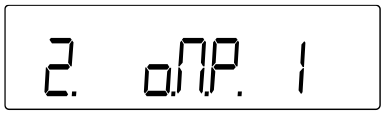
- These functions are only available for the **PES** weighing system.
- If more than one adjustment weight is used, the deviations must be totalized and entered as total measurement incertainty
- The measurement incertainty must not be more than +/- 100 mg. **Otherwise the error message <r-Err> appears.**

### 16.2.1 Enter measurement incertainty




⇨ In the enhanced menu navigate to **<2. o.M.P.>** and select the setting

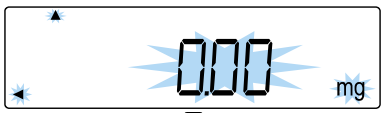
| | |
|---|---|
| 0 | Not enter |
| 1 | Enter measurement incertainty |




**Measurement incertainty entered:**

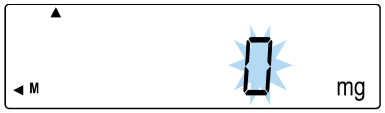
⇨ Select <2.**o.M.P. 1>**

⇨ Press the **[S]** key




⇨ The last value stored for the measurement incertainty is shown in mg and flashes

⇨ Press the **[TARE/ZERO]** key



⇨ **<0 mg>** is displayed and flashes

⇨ Enter measurement incertainty in mg (numeric input: see chap. 3.3.1)

⇨ Press the **[S]** key

⇨ An acoustic signal sounds and the measurement incertainty is displayed briefly.

⇨ The balance returns to weighing mode

### 16.2.2 Take over measurement deviation

⇨ In the enhanced menu navigate to **<4. M.E.H.>** and select the setting

| | |
|---|---|
| 0 | Do not take over |
| 1 | Take over the measurement incertainty from the adjustment or the adjustment test with external adjustment weight |

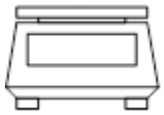
# 17 Adjustment

As the acceleration value due to gravity is not the same at every location on earth, each balance must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the balance has not already been adjusted to the location in the factory).
This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature. To receive accurate measuring values it is also recommended to adjust the balance periodically in weighing operation.

- Observe stable environmental conditions. A warm up time (see chapter 1) is required for stabilization.
- Ensure that there are no objects on the weighing plate.
- Avoid vibration and air draught.
- Always carry out adjustment with the standard weighing plate in place.
- The adjustment record is printed if an optional printer is connected and the GLP function has been activated.

## 17.1 Adjustment with internal weight

- This function is only available for the following weighing system: **PEJ**
- **Cancel the process by pressing the [PRINT] key**



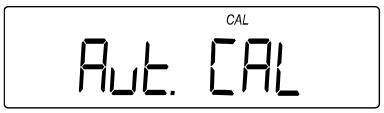
⇨ Unload weighing plate

⇨ Select **<7. CA. 1>** in the menu (navigation in the menu: see chapter 8.3)

⇨ Press the **[S]** key

⇨ The balance returns to weighing mode

⇨ Press the **[CAL]** key to start internal adjustment.

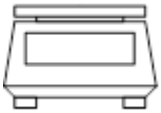



⇨ Various messages are shown on the display one after another: **<Aut. CAL>** → **<WAIt>** → **<CH. 0>** → **<CH. F.S.>** → **<buSy>** → **<End>**

⇨ When the balance returns to the weighing mode, the internal adjustment is finished

### 17.2 Adjustment test with internal weight

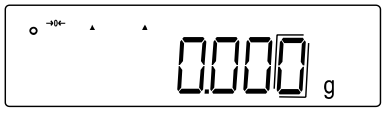
- This function is only available for the following weighing system: **PEJ**
- **Cancel the process by pressing the [PRINT] key**



⇨ Unload weighing plate

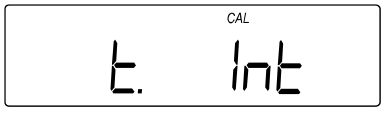
⇨ Select **<7. CA. 2>** in the menu (navigation in the menu: see chapter 8.3)

⇨ Press the **[S]** key




⇨ The balance returns to weighing mode

⇨ Press the **[CAL]** key to start internal adjustment test.



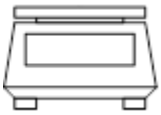

⇨ Various messages are shown on the display one after another: **<t. Int>** → **<t. 0>** → **<t. F.S.>** → **<dIFF>**

⇨ The difference value between the adjustment weight and the actual weight value is shown (measuring incertainty)

⇨ Press any key to return to the weighing mode.

### 17.3 Adjustment with external weight

- This function is not available for the following weighing systems: **PEJ 2200-2M, PEJ 4200-2M**



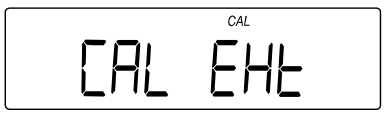
⇨ Unload weighing plate

⇨ Select **<7. CA. 3>** in the menu (navigation in the menu: see chapter 8.3)

⇨ Press the **[S]** key

⇨ The balance returns to weighing mode

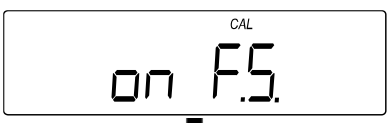
⇨ Press the **[CAL]** key to start the external adjustment.




⇨ The balance performs an automatic zero setting

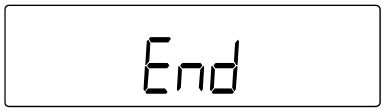
⇨ Various messages are shown on the display one after another: **<CAL EXt>** → **<on 0>** (when **<PuSH F>** appears, press **[F]** key)

...




⇨ The message **<on F.S.>** is displayed when zeroing is complete

⇨ Place the adjustment weight centrally on the weighing plate.



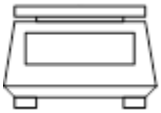

⇨ Various messages are shown on the display one after another: **<buSy>** → **<End>**

⇨ The balance returns to weighing mode

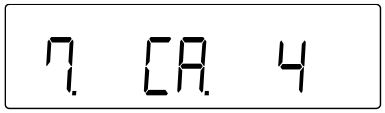
⇨ Unload weighing plate

### 17.4 Adjustment test with external weight

- **Cancel the process by pressing the [PRINT] key**



⇨ Unload weighing plate

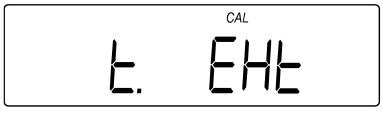



⇨ Select **<7. CA. 4>** in the menu (navigation in the menu: see chapter 8.3)

⇨ Press the **[S]** key

⇨ The balance returns to weighing mode

⇨ Press the **[CAL]** key to start internal adjustment test.




⇨ The balance performs an automatic zero setting

...

⇨ The message **<on F.S.>** is displayed when zeroing is complete

⇨ Place the adjustment weight centrally on the weighing plate.

⇨ The difference value between the adjustment weight and the actual weight value is shown (measuring incertainty)

⇨ Press any key to return to the weighing mode.

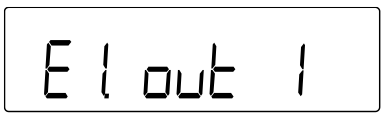
### 17.5 Adjustment record

**Enable / disable edition of the weighing log:**

⇨ Navigate to **<E. GLP>** in the menu and select the setting.

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

**Enable/disable adjustment record / adjustment test log:**

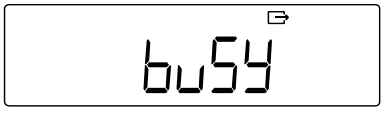



⇨ In the menu select **<E. GLP 1>**

⇨ Navigate to **<E1. out>** in the menu and select the setting.

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled (output after every adjustment / adjustment test) |

**Log output after adjustment or adjustment test:**




⇨ After adjustment or adjustment test **<buSy>** appears on the balance

⇨ The display disappears as soon as the data output has finished

# 18 Verification

**General:**
According to EU directive 2014/23/EU balances must be officially verified if they are used as follows (legally controlled area):

- For commercial transactions if the price of goods is determined by weighing.
- For the production of medicines in pharmacies as well as for analyses in the medical and pharmaceutical laboratory.
- For official purposes
- For manufacturing final packages

In cases of doubt, please contact your local trade in standard.

Balances in the legally controlled area (-> verified balances) must keep the error limits in the verification validity period - normally they are the double of the verification error limits.
When this verification validity period expires, a re-verification must be carried out. Should be necessary an adjustment of the balance to keep the verification error limits to satisfy the reverification requirements, this is not deemed a warranty case.

**Verification notes**:
An EU type approval exists for balances described in their technical data as verifiable. If the balance is used where obligation to verify exists as described above, it must be verified and re-verified at regular intervals.
Re-verification of a balance is carried out according to the respective national regulations. The validity for verification of balances in Germany is e.g. 2 years.
The legal regulation of the country where the balance is used must be observed!

**Verification of the balance is invalid without the seal.**
The seal marks attached on balances with type approval point out that the balance may only be opened and serviced by trained and authorised specialist staff. If the seal mark is destroyed, verification looses its validity. Please observe all national laws and legal regulations. In Germany a re-verification will be necessary.

# 19 Interfaces

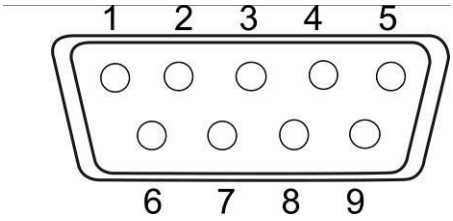
The balance can communicate with external peripherals using the interface. Data can be sent to a printer, PC or control displays. In the same way, control commands and data inputs may occur via the connected devices (such as PC, keyboard, barcode reader).

## 19.1 RS-232C interface for data input and output

The balance is equipped as per standard with an RS232C interface to connect a peripheral device (e.g. printer or computer).

### 19.1.1 Technical data

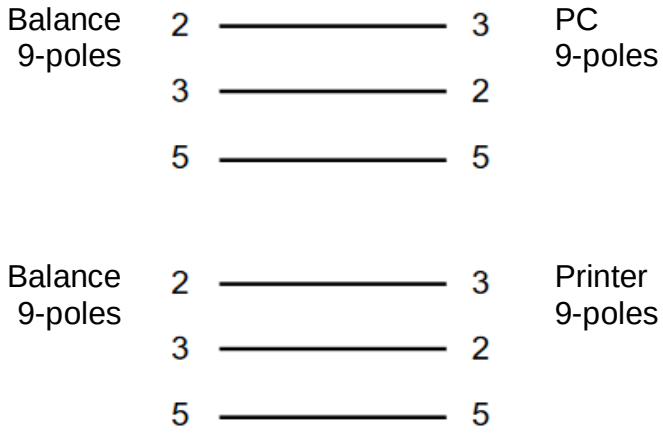
| | |
|---|---|
| **Connection** | 9 pin d-subminiature bushing |
| **Baud rate** | 1200/2400/4800/9600/19200 optional |
| **Parity** | Empty / Odd number / Even number |




**Pin connection:**

| Pin nr. | Signal | Input/Output | Function |
|---|---|---|---|
| 1 | - | - | - |
| 2 | RXD | Input | Receive data |
| 3 | TXD | Output | Edit data |
| 4 | DTR | Output | HIGH (when scale is switched on) |
| 5 | GND | - | Signal ground |
| 6 | - | - | - |
| 7 | - | - | - |
| 8 | - | - | - |
| 9 | - | - | - |

### 19.1.2 Interface cable

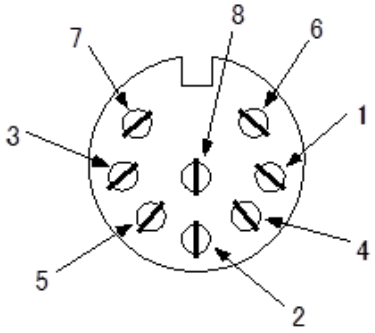



## 19.2 DIN8P-interface to the data output

As per standard the balance is equipped with a DIN8P-interface. This duplicates the data output of the RS232C-interface.

### 19.2.1 Technical data

| | |
|---|---|
| **Connection** | DIN8P |
| **Baud rate** | 1200/2400/4800/9600/19200 optional |
| **Parity** | Empty / Odd number / Even number |




**Pin connection:**

| Pin nr. | Signal | Input/Output | Function |
|---|---|---|---|
| 1 | EXT.TARE | Input | External tare subtraction or zeroing |
| 2 | - | - | - |
| 3 | - | - | - |
| 4 | TXD | Output | Edit data |
| 5 | GND | - | Signal ground |
| 6 | - | - | - |
| 7 | - | - | - |
| 8 | - | - | - |

The tare subtraction can be performed by an external device by connecting a contact or a transistor switch between pin 1 (EXT. TARE) and pin 5 (GND). A switch-on time of at least 400 ms must be observed (open-circuit voltage: 15 V when the scale is switched off, leakage current: 20 mA, when it is switched on).

## 19.3 Formats of the data output (6/7-digits)

- These data formats are only available for the **PES** weighing system.

### 19.3.1 Data composition

- **6-digit data format**
  Consisting of 14 characters, including the end characters (CR= 0DH, LF= 0AH)*.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | U1 | U2 | S1 | S2 | CR | LF |

- **7-digit data format**
  Consisting of 15 characters, including the end characters (CR= 0DH, LF= 0AH)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | U1 | U2 | S1 | S2 | CR | LF |

*** End characters:** CR = paragraph, LF = line

### 19.3.2 Data description

**Presign:**

P1 = 1 character

| P1 | Code | Significance |
|---|---|---|
| + | 2BH | Data is 0 or positive |
| - | 2DH | Data is negative |

**Numeric data:**

| D1-D7/D8/D9 | Code | Significance |
|---|---|---|
| 0 – 9 | 30H – 39H | Numbers 0 to 9 |
| . | 2EH | Decimal point (position not fixed) |
| *Sp* | 20H | Space before numeric data<br>If numeric data does not contain a decimal point, a space is output at the least significant digit and no decimal point is output |
| / | 2FH | Separator character inserted to the left of the non-verification-relevant digit |

**Sp* = space

**Units:**

U1, U2 = 2 characters: To indicate the unit of the numerical data

| U1 | U2 | Code (U1) | Code (U2) | Significance | Symbol |
|---|---|---|---|---|---|
| *Sp* | G | 20H | 47H | Gram | g |
| K | G | 4BH | 47H | Kilogram | kg |
| C | T | 43H | 54H | Carat | ct |
| P | C | 50H | 43H | Pieces | Pcs |
| *Sp* | % | 20H | 25H | Percent | % |

**Sp* = space

**Result evaluation for weighing with tolerance range:**

S1 = 1 character

| S1 | Code | Significance |
|---|---|---|
| L | 4CH | Below lower tolerance limit (LOW / -) |
| G | 47H | Within tolerance range (OK / TOL ✓) |
| H | 48H | Upper tolerance limit exceeded (HIGH / +) |
| 1 | 31H | 1. Limit |
| 2 | 32H | 2. Limit |
| 3 | 33H | 3. Limit |
| 4 | 34H | 4. Limit |
| 5 | 35H | 5. Limit |
| T | 54H | Total |
| U | 55H | Piece weight |
| *Sp* | 20H | No evaluation result or data type specified |
| d | 64H | Gross |

**Sp* = space

**Status of data:**

S2 = 1 character

| S2 | Code | Significance |
|---|---|---|
| S | 53H | Data stable |
| U | 55H | Data not stable |
| E | 45H | Data error, all data except S2 unreliable |
| *Sp* | 20H | No special status |

**Sp* = space

## 19.4 Formats of the data output (special format 1)

These data formats are only available for the **PES** weighing system.

### 19.4.1 Data composition

Consists of 14 characters, including the end characters (CR= 0DH, LF= 0AH) *.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1 | *Sp* | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | *Sp* | U1 | U2 | U3 | CR | LF |
| Polarity | Blank | Measurement data (incl. Decimal point) | | | | | | | | Blank | Unit | | | End characters | |

*** End characters:** CR = paragraph, LF = line

### 19.4.2 Data description

**Presign:**

P1 = 1 character

| P1 | Code | Significance |
|---|---|---|
| + | 2BH | Data is 0 or positive |
| - | 2DH | Data is negative |

**Numeric data:**

| (D1-D8): | Code | Significance |
|---|---|---|
| 0 – 9 | 30H – 39H | Numbers 0 to 9 |
| . | 2EH | Decimal point (position not fixed) |
| *Sp* | 20H | Space before numeric data<br>If numeric data does not contain a decimal point, a space is output at the least significant digit and no decimal point is output |
| / | 2FH | Separator character inserted to the left of the non-verification-relevant digit |

**Sp* = space

**Units:**

U1, U2, U3 = 3 characters: To indicate the unit of the numerical data

| U1 | U2 | U3 | Code (U1) | Code (U2) | Code (U3) | Significance | Symbol |
|---|---|---|---|---|---|---|---|
| g | *Sp* | *Sp* | 67H | 20H | 20H | Gram | g |
| k | g | *Sp* | 6BH | 67H | 20H | Kilogramm | kg |
| c | t | *Sp* | 63H | 74H | 20H | Carat | ct |
| p | c | s | 70H | 63H | 73H | Pieces | Pcs |
| % | *Sp* | *Sp* | 25H | 20H | 20H | Percent | % |
| *Sp* | *Sp* | *Sp* | 20H | 20H | 20H | Data instable | <0> is not displayed |

**Sp* = space

### 19.4.3 Error messages

**<o-Err>:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | H | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | CR | LF |

**<u-Err>:**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | L | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | CR | LF |

## 19.5 Formats of the data output (special format 2)

These data formats are only available for the **PES** weighing system.

### 19.5.1 Data composition

Consists of 14 characters, including the end characters (CR= 0DH, LF= 0AH) *.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | S2 | S3 | *Sp* | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | *Sp* | U1 | U2 | U3 | CR | LF |
| Status | | | Blank | Measurement data (incl. polarity and decimal point) | | | | | | | | | | Blank | Unit | | | End characters | |

*** End characters:** CR = paragraph, LF = line

### 19.5.2 Data description

**Status:**

S1, S2, S3 = 3 characters

| S1 | S2 | S3 | Code (S1) | Code (S2) | Code (S3) | Significance |
|---|---|---|---|---|---|---|
| S | *Sp* | S | 53H | 20H | 53H | Data are stable |
| S | *Sp* | D | 53H | 20H | 44H | Data are instable |

**Numeric data:**

10 characters, right justified

| D1-D10 | Code | Significance |
|---|---|---|
| - | 2DH | Negative data |
| 0 – 9 | 30H – 39H | Numbers 0 to 9 |
| . | 2EH | Decimal point (position not fixed) |
| *Sp* | 20H | Space before numeric data<br>If numeric data does not contain a decimal point, a space is output at the least significant digit and no decimal point is output |
| / | 2FH | Separator character inserted to the left of the non-verification-relevant digit |

**Sp* = space

**Units:**

U1, U2, U3 = 3 characters, variable length: To indicate the unit of the numerical data

| U1 | U2 | U3 | Code (U1) | Code (U2) | Code (U3) | Significance | Symbol |
|---|---|---|---|---|---|---|---|
| g | | | 67H | | | Gram | g |
| k | g | | 6BH | 67H | | Kilogram | kg |
| c | t | | 63H | 74H | | Carat | ct |
| p | c | s | 70H | 63H | 73H | Pieces | Pcs |
| % | | | 25H | | | Percent | % |

**Sp* = space

### 19.5.3 Error messages

**<o-Err>:**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| S | *Sp* | + | CR | LF |

**<u-Err>:**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| S | *Sp* | - | CR | LF |

## 19.6 Data output formats (CBM)

### 19.6.1 Data composition

- **26-digit data format**
  Consists of 26 characters, including the end characters (CR= 0DH, LF= 0AH) *.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | C1 | *Sp* | T1 | T2 | T3 | T4 | T5 | T6 | D1 | D2 | D3 | D4 |

| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | U1 | U2 | *Sp* | CR | LF |

- **ERROR**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | * | *Sp* | E | R | R | O | R | *Sp* | * | * | * | * |

| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * | * | * | * | * | * | * | * | * | * | *Sp* | CR | LF |

*** End characters:** CR = paragraph, LF = line

### 19.6.2 Data description

**Status:**

S1 = 1 character

| S1 | Code (S1) | Significance |
|---|---|---|
| *Sp* | 20H | Data are stable |
| * | 2AH | Data are instable |

**Result evaluation for weighing with tolerance range:**

C1 = 1 character

| S1 | Code | Significance |
|---|---|---|
| *Sp* | 20H | Within the tolerance range (OK / TOL ✓) or no evaluation result or data type indicated |
| H | 48H | Upper tolerance limit exceeded (HIGH / +) |
| L | 4CH | Below lower tolerance limit (LOW / -) |
| 1 | 31H | 1. Limit |
| 2 | 32H | 2. Limit |
| 3 | 33H | 3. Limit |
| 4 | 34H | 4. Limit |
| 5 | 35H | 5. Limit |

**Sp* = space

**Data type**

T1 - T6 = 1 - 6 characters

**For PEJ:**

| T1 | T2 | T3 | T4 | T5 | T6 | Code | | | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | T1 | T2 | T3 | T4 | T5 | T6 | |
| *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | 20H | 20H | 20H | 20H | 20H | 20H | Net weight (not tared) |
| N | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | 4EH | 20H | 20H | 20H | 20H | 20H | Net weight (tared) |
| T | O | T | A | L | *Sp* | 54H | 4FH | 54H | 41H | 4CH | 20H | Total |
| G | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | 47H | 20H | 20H | 20H | 20H | 20H | Gross weight |
| U | N | I | T | *Sp* | *Sp* | 55H | 4EH | 49H | 54H | 20H | 20H | Piece weight |

**Sp* = space

**For PES:**

| T1 | T2 | T3 | T4 | T5 | T6 | Code | | | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | T1 | T2 | T3 | T4 | T5 | T6 | |
| *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | 20H | 20H | 20H | 20H | 20H | 20H | Net weight |
| T | O | T | A | L | *Sp* | 54H | 4FH | 54H | 41H | 4CH | 20H | Total |
| G | *Sp* | *Sp* | *Sp* | *Sp* | *Sp* | 47H | 20H | 20H | 20H | 20H | 20H | Gross weight |
| U | N | I | T | *Sp* | *Sp* | 55H | 4EH | 49H | 54H | 20H | 20H | Piece weight |

**Sp* = space

**Numeric data:**

D1 – D12: 1 – 12 characters

| D1-D12 | Code | Significance |
|---|---|---|
| + | 2BH | 0 or positive data |
| - | 2DH | Negative data |
| 0 – 9 | 30H – 39H | Numbers 0 to 9<br>0 also used for zero padding |
| . | 2EH | Decimal point (position not fixed) |
| [ | 5BH | Number between brackets „ **[** “ and “ **]** “ marks the non-relevant digit for verification |
| ] | 5DH | |
| *Sp* | 20H | Space before numeric data<br>If numeric data does not contain a decimal point, a space is output at the least significant digit and no decimal point is output |

**Sp* = space

**Units:**

U1, U2 = 2 characters

| U1 | U2 | Code (U1) | Code (U2) | Significance | Symbol |
|---|---|---|---|---|---|
| *Sp* | g | 20H | 67H | Gram | g |
| k | g | 6BH | 67H | Kilogram | kg |
| c | t | 63H | 74H | Carat | ct |
| P | C | 50H | 43H | Pieces | Pcs |
| *Sp* | % | 20H | 25H | Percent | % |

**Sp* = space

## 19.7 Data input

- Pay attention to upper and lower case letters when entering data
- Wait for the balance to respond between two entries

### 19.7.1 Input format 1

**Input format:**

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| C1 | C2 | CR | LF |

**Example of permanent output:**

⇨ Input: O0

**Zeroing / taring, data output:**

| C1 | C2 | Code (C1) | Code (C2) | Significance |
|---|---|---|---|---|
| T | *Sp* | 54H | 20H | Set to zero/taring |
| O | 0 | 4FH | 30H | End output |
| O | 1 | 4FH | 31H | Permanent output |
| O | 2 | 4FH | 32H | Continuous output only for stable values (interruption of output for unstable values). |
| O | 3 | 4FH | 33H | Press **[PRINT]** key for one-time output |
| O | 4 | 4FH | 34H | Automatic output when weighing plate is loaded again and value is stable |
| O | 5 | 4FH | 35H | One-time output whenever value is stable (no output for unstable values) |
| O | 6 | 4FH | 36H | Continuous output for unstable values (interruption of output when value is stable → stable value is output once) |
| O | 7 | 4FH | 37H | Press **[PRINT]** key for one-time output at stable values (no output at unstable values) |
| O | 8 | 4FH | 38H | Single output |
| O | 9 | 4FH | 39H | One-time output at stable value |
| O | A | 4FH | 41H | Output in any preset time interval |
| O | B | 4FH | 42H | Output in any preadjusted time interval when value is stable (interruption of the output at instable values) |

**Sp* = space

| **Response:** | |
|---|---|
| A00: | Input successful |
| E01: | Input Error |
| E02: | Error at the time interval setting |
| E04: | Taring or zeroing cannot be carried out (range exceeded, weight error, ...) |

- Commands O8 and O9 are used to request data.
- After entering O8 or O9, the scale returns O0.
- Commands O0 to O7 are executed after activation until the scale is turned off. The output settings are reset to factory settings when the balance is switched on again.
- The commands OA and OB start the interval ouput. If they are entered again, the interval output will be finished.

**Weighing functions:**

- The weighing function that can be activated by entering a mode depends on the weighing application currently in use on the balance (see mode table).
- Mode 3 can only be activated when the totalizing function has been activated.
- If no unit B has been defined, mode 4 activates simple weighing

| C1 | C2 | Code (C1) | Code (C2) | Significance |
|---|---|---|---|---|
| M | 1 | 4DH | 31H | Set mode 1 |
| M | 2 | 4DH | 32H | Set mode 2 |
| M | 3 | 4DH | 33H | Set mode 3 |
| M | 4 | 4DH | 34H | Set mode 4 |

| Mode | Simple weighing | Piece counting | Percent weighing | Density determination |
|---|---|---|---|---|
| 1 | Net weight value (unit A) | Net weight value (unit A) | Net weight value (unit A) | Error |
| 2 | Gross weight value (unit A) | Piece counting | Percent weighing | Error |
| 3 | Total sum Weight | Total sum Quantity | Total sum percent | Error |
| 4 | Net weight (unit B) | Average piece weight | Error | Error |

**Date and time:**

| C1 | C2 | Code (C1) | Code (C2) | Significance |
|---|---|---|---|---|
| D | D | 44H | 44H | Output date |
| D | T | 44H | 54H | Output time |

| **Response:** | |
|---|---|
| A00: | Input successful |
| E01: | Input Error |
| E02: | Error |

**Adjustment / Adjustment test:**

The commands C1 to C4 do not function when **<7. CA. 0>** is set.

| C1 | C2 | Code (C1) | Code (C2) | Significance |
|---|---|---|---|---|
| C | 0 | 43H | 30H | Deactivate entries |
| C | 1 | 43H | 31H | Perform internal semi-automatic adjustment |
| C | 2 | 43H | 32H | Perform internal adjustment test |
| C | 3 | 43H | 33H | Perform adjustment with external weight |
| C | 4 | 43H | 34H | Perform adjustment test with external weight |

| **Response:** | |
|---|---|
| A00 | Input successful |
| E01 | Input Error |
| E02 | Function has been disabled |
| E03 | Cancelled |
| E04 | Incorrect execution |

### 19.7.2 Input format 2

**Input format (variable length):**

| 1 | 2 | 3 | 4 | … | … | … | n |
|---|---|---|---|---|---|---|---|
| C1 | C2 | , | D1 | … | Dn | CR | LF |

**Example for input of a 2nd limit (2nd limit = 120 g):**

⇨ Input: LB,120.0

**Example for entering a time for interval output (output every 12 hours, 34 minutes, and 56 seconds):**

⇨ Input: IA,12,34,56 (delimitation by commas).

Be careful not to enter any weighing units (e.g. g).

**Set interval output:**

| C1 | C2 | Code (C1) | Code (C2) | Significance | D1 … D8 |
|---|---|---|---|---|---|
| I | A | 49H | 41H | Set interval output | Time interval-input: hh,mm,ss<br><br>(hh = hours, mm = minutes, ss = seconds → separated by commas) |

**Set tolerance values:**

| C1 | C2 | Code (C1) | Code (C2) | Significance | D1 … Dn |
|---|---|---|---|---|---|
| L | A | 4CH | 41H | 1. Limit | Numeric value |
| L | B | 4CH | 42H | 2. Limit | Numeric value |
| L | C | 4CH | 43H | Reference value (target value) | Numeric value |
| L | D | 4CH | 44H | 3. Limit | Numeric value |
| L | E | 4CH | 45H | 4. Limit | Numeric value |

## 19.8 Response formats

| Response | |
|---|---|
| **A00/Exx Format** | **ACK/NAK Format** |
| A00: Normal answer<br>E00-E99: Incorrect answer | ACK: Normal answer<br>NAK: Incorrect answer |

### 19.8.1 A00/Exx Format

Consists of 5 characters, including the end characters (CR= 0DH, LF= 0AH) *.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| A1 | A2 | A3 | CR | LF |

*** End characters:** CR = paragraph, LF = line

**Commands:**

| A1 | A2 | A3 | Code (A1) | Code (A2) | Code (A3) | Significance |
|---|---|---|---|---|---|---|
| A | 0 | 0 | 41H | 30H | 30H | Normal answer |
| E | 0-9 | 0-9 | 45H | 30H<br>↓<br>39H | 30H<br>↓<br>39H | Incorrect answer |

### 19.8.2 ACK/NAK Format

Consists of one character (without end characters).

| 1 |
|---|
| A1 |

**Commands:**

| A1 | Code (A1) | Significance |
|---|---|---|
| ACK | 06H | Normal answer |
| NAK | 15H | Incorrect answer |

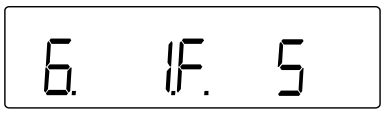
## 19.9 Communication settings

Settings on the balance can be changed via the menu by pressing the **[F]** key.

For navigation in the menu see chapter 8.3

### 19.9.1 Enable / disable interface and data format

The settings 1, 2, 3, 41 and 42 are only available for the weighing system **PES**.




⇨ Navigate to **<6. I.F.>** in the menu and select data format

| | |
|---|---|
| 0 | Deactivate the interface |
| 1 | 6-digit data format |
| 2 | 7-digit data format |
| 3 | Extended 7-digit data format |
| 4 | Special data formats |
| 41 | Special format 1 |
| 42 | Special format 2 |
| 5 | CBM-format |

### 19.9.2 Change communication settings

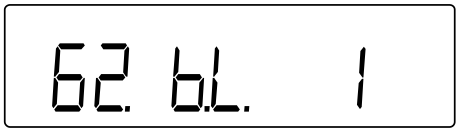
The communication settings can only be made after the interface having been activated (see chap. 19.9.1).

**Set output condition:**

⇨ Navigate to **<61.oc.>** in the menu and select the desired setting.

| | |
|---|---|
| 0 | End output |
| 1 | Permanent output |
| 2 | Continuous output only for stable values (interruption of output for unstable values). |
| 3 | One-time output when **[PRINT]** key is pressed |
| 4 | Automatic output (One-time output when the value is stable. The next output for another sample occurs when the reading is stabilised to less than or equal to zero by unloading, zero adjustment or tare subtraction). |
| 5 | One-time output whenever value is stable (no output for unstable values) |
| 6 | Continuous output for unstable values (interruption of output when value is stable → stable value is output once) |
| 7 | Press **[PRINT]** key for one-time output at stable values (no output at unstable values) |
| A | Output in any preadjusted time interval → see chap. 19.9.3 |
| b | Output in any preadjusted time interval when value is stable (interruption of the output at instable values) → see chap. 19.9.3 |

**Set baud rate:**

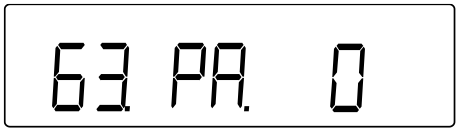



⇨ Navigate to **<62.bL.>** in the menu and select the desired setting.

| | |
|---|---|
| 1 | 1200 bps |
| 2 | 2400 bps |
| 3 | 4800 bps |
| 4 | 9600 bps |
| 5 | 19200 bps |

**Set parity:**

Parity can only be set if the interface is set to 2 or 3 (see chapter 19.9.1).




⇨ Navigate to **<63.PA.>** in the menu and select the desired setting

| | |
|---|---|
| 0 | Empty |
| 1 | Odd |
| 2 | Even |

**Set the data length:**

The data length can only be set if the interface has been set to 3 (see chapter 19.9.1).

⇨ In the menu navigate to **<64.dL.>** and select the desired setting

| | |
|---|---|
| 7 | 7 Bit |
| 8 | 8 Bit |

**Set stop bit:**

⇨ In the menu navigate to **<65.St.>** and select the desired setting

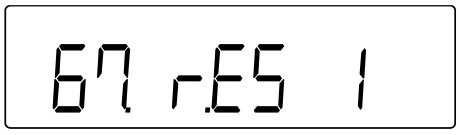
| | |
|---|---|
| 1 | 1 Bit |
| 2 | 2 Bit |

**Set handling of blank digits:**

⇨ Navigate to **<66.nu.>** in the menu and select the desired setting

| | |
|---|---|
| 0 | Fill with 0 (30H) |
| 1 | Fill with blank line (20H) |

**Set response format:**




⇨ In the menu navigate to **<67.rS.>** and select the desired setting

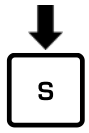
| | |
|---|---|
| 1 | Format: A00/Exx |
| 2 | Format: ACK/NAK |

### 19.9.3 Interval output

**Setting output interval:**

⇨ Navigate to **<61.oc.>** in the menu and select the desired setting.

| | |
|---|---|
| A | Output in any preset time interval |
| b | Output in any preadjusted time interval when value is stable (interruption of the output at instable values) |




⇨ Press and hold the **[S]** key for about 5 seconds.

⇨ The display changes to **<d-SEt>** and then **<Int.VAL>**

⇨ Release **[S]** key

⇨ Enter output interval:

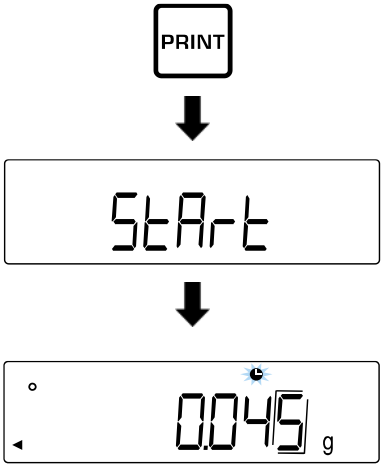
Hours:Minutes:Seconds

Numeric input: see chapter 3.3.1)

⇨ Press the **[S]** key to save the output interval.

⇨ An acoustic signal sounds and the balance returns into weighing mode

**Start the interval output:**




⇨ Press **[PRINT]** key

⇨ Display changes to **<StArt>**

⇨ The balance returns to weighing mode

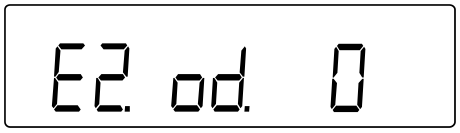
⇨ The clock symbol appears on the display to indicate the interval output

To finish the interval output, press the **[PRINT]** key again

## 19.10 Output functions

### 19.10.1 GLP-compliant data output

**Enable / disable ISO / GLP / GMP compliant log:**

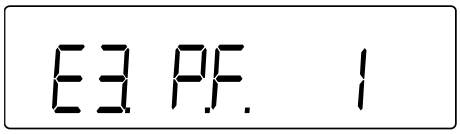



⇨ In the menu select **<E. GLP 1>**

⇨ In the menu navigate to **<E2. od.>** and select setting

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled |

**Setting the output language:**

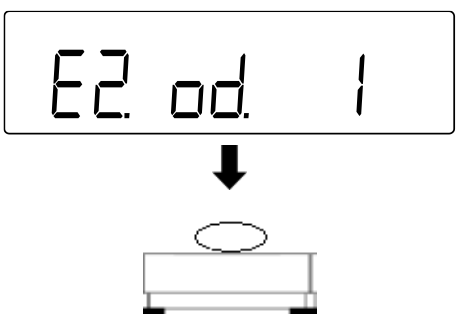



⇨ In the menu select **<E. GLP 1>**

⇨ In the menu navigate to **<E3. P.F.>** and select setting

| | |
|---|---|
| 1 | English |
| 2 | Japanese (Katakana) |

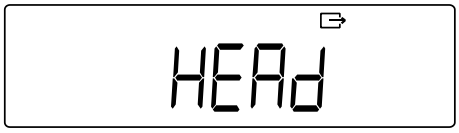
**Output of the GLP-compliant weighing log:**




⇨ In the menu select **<E2. od. 1>**

⇨ Carry out weighing

⇨ Press and hold the **[PRINT]** key.




⇨ **<HEad>** is displayed

⇨ Head line is issued

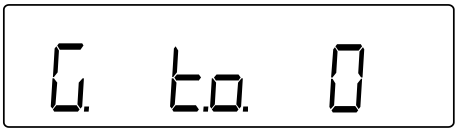
⇨ Weighing data are issued according to the settings of the data output (see chap. 19.9.2)

⇨ When the data output is finished, keep the **[PRINT]** key pressed

⇨ **<Foot>** is displayed

⇨ Foot line is edited

### 19.10.2 Edition of the time stamp




⇨ In the menu navigate to **<G. t.o.>** and select the setting.

| | |
|---|---|
| 0 | Disabled |
| 1 | Enabled (time stamp issued with the weighing data) |

# 20 Servicing, maintenance, disposal

Before any maintenance, cleaning and repair work disconnect the appliance from the operating voltage.

## 20.1 Cleaning

Do not use aggressive cleaning agents (solvents or similar) - just use a cloth moistened with mild soapy water. Ensure that no liquid penetrates into the appliance. Polish with a dry soft cloth.
Loose residue sample/powder can be removed carefully with a brush or manual vacuum cleaner.
**Spilled weighing goods must be removed immediately.**

- ⇨ Clean stainless-steel parts with a soft cloth soaked in a cleaning agent suitable for stainless steel.
- ⇨ Do not use cleaning agents that contain caustic soda, acetic acid, hydrochloric acid, sulphuric acid or citric acid on stainless steel parts.
- ⇨ Do not use metal brushes or cleaning sponges of steel wool, as this causes superficial corrosion.

## 20.2 Servicing, maintenance

- ⇨ The appliance may only be opened by qualified service technicians authorised by KERN.
- ⇨ Before opening, disconnect from power supply.

## 20.3 Disposal

Disposal of packaging and appliance must be carried out by operator according to valid national or regional law of the location where the appliance is used.

# 21 Instant help for troubleshooting

In case of an error in the program process, briefly turn off the balance and disconnect from power supply. The weighing process must then be restarted from the beginning.

| Fault | Possible cause |
|---|---|
| The weight display does not glow | • The balance is not switched on<br>• The mains supply connection has been interrupted (mains cable not plugged in/faulty).<br>• Power supply interrupted. |
| The displayed weight is permanently changing | • Draught/air movement<br>• Table/floor vibrations<br>• Weighing plate has contact with other objects<br>• Electromagnetic fields / static charging (choose different location/switch off interfering device if possible) |
| The weighing result is obviously wrong | • The display of the balance is not at zero<br>• Adjustment is no longer correct<br>• The balance is on an uneven surface<br>• Great fluctuations in temperature<br>• Electromagnetic fields / static charging (choose different location/switch off interfering device if possible) |
| The weighing result is wrong after the adjustment | • Adjustment was not carried out under stable ambient conditions.<br>• Differences in weight between the adjustment weight and the weight used for testing |
| The display does not change when the M symbol flashes | • Draught/air movement<br>• Table/floor vibrations<br>• Weighing plate has contact with other objects<br>• Electromagnetic fields / static charging (choose different location/switch off interfering device if possible) |

Should other error messages occur, switch balance off and then on again.
If the error message remains inform manufacturer.

## 21.1 Error messages

| Error message | Description | Possible causes / repair |
|---|---|---|
| o-Err | • Maximum weighing range exceeded | • Split sample and weigh individually<br>• Use lighter tare weight |
| u-Err | • Negative load is below the minimum weighing range | • Weighing plate or weighing plate carrier incorrectly adjusted<br>• Check whether the balance is touching other objects |
| L-Err | • Weight value of the sample when setting the reference weight in piece counting mode is too low | • Use samples / reference weights with higher weight value (lowest piece weight, minimum load) |
| t-Err | • The [S] key was pressed, although <*> has not been displayed | • Observe the totalizing procedure according to the Operating instructions |
| c-Err | • System error | • Inform the retailer. |
| b-Err | | |
| d-Err | | |
| I-Err | • The weight value of the adjustment weight is less than 50 % of the weighing capacity.<br>• The external adjustment weight is less than 95 % of the weighing range when calibrating the internal adjustment weight | • Use a adjustment weight with a weight value as close as possible to the weighing capacity. |
| 2-Err | • Error > 1.0 % at adjustment test with external weight | |
| 3-Err | • Weighing plate is loaded during the internal adjustment | • Unload the weighing plate and repeat the internal adjustment |
| 4-Err | • Error > 1.0 % at the internal adjustment | • Perform internal adjustment again |
| r-Err | • The input value for the measurement incertainty of the external adjustment weight at <2. o.M.P.> exceeds the maximum setting range of +/- 100 mg | • Use adjustment weights with poor deviation |
| A-Err | • Faulty end of the internal adjustment | • Perform internal adjustment again |