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# Operating instructions

## Precision balance

### KERN PWS

Type TPWS-B

Version 1.0

2026-01

en



TPWS-BA-e-2610



# KERN PWS

Version 1.0 2026-01

## Operating instructions Precision balance

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## 1 Technical data

| KERN                                               | PWS 3000-1                                                                                      | PWS 8000-1                            | PWS 800-2                            |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------|--------------------------------------|
| Item number / Type                                 | TPWS 3200-1-B                                                                                   | TPWS 8200-1-B                         | TPWS 820-2-B                         |
| Readability (d)                                    | 0.1 g                                                                                           | 0.1 g                                 | 0.01 g                               |
| Weighing range (max)                               | 3.2 kg                                                                                          | 8.2 kg                                | 820 g                                |
| Reproducibility                                    | 0.1 g                                                                                           | 0.1 g                                 | 0.01 g                               |
| Linearity                                          | 0.2 g                                                                                           | 0.2 g                                 | 0.02 g                               |
| Settling time                                      | 3 s                                                                                             |                                       |                                      |
| Recommended adjustment weight not included (class) | 3 kg (F1)                                                                                       | 2 kg (F1);<br>5 kg (F1)               | 200 g (F1);<br>500 g (F1)            |
| Heating time                                       | 2 hours                                                                                         |                                       |                                      |
| Weight units                                       | g, kg, ct, oz, lb, ozt, dwt, gn, tl (Hong Kong), tl (Singapore, Malaysia), tl (Taiwan), mom, to |                                       |                                      |
| Minimum item weight for piece counting             | 100 mg (under laboratory conditions*)                                                           | 100 mg (under laboratory conditions*) | 10 mg (under laboratory conditions*) |
|                                                    | 1 g (under normal conditions**)                                                                 | 1 g (under normal conditions**)       | 100 mg (under normal conditions**)   |
| Reference quantities for piece counting            | 5, 10, 30, 100                                                                                  |                                       |                                      |
| Weighing plate, stainless steel                    | 190 x 190 mm                                                                                    | 190 x 190 mm                          | ø 140 mm                             |
| Dimensions of housing (W x D x H) [mm]             | 310 x 205 x 85                                                                                  |                                       |                                      |
| Net weight (kg)                                    | 2.6                                                                                             |                                       | 2.0                                  |
| Permissible Ambient conditions                     | 10 °C to + 30 °C                                                                                |                                       |                                      |
| Humidity                                           | 80                                                                                              |                                       |                                      |
| Power supply Input voltage                         | AC 100-240 V, 300 mA 50/60 Hz                                                                   |                                       |                                      |
| Scale input voltage                                | DC 5.95 V,<br>1.0 A                                                                             |                                       |                                      |
| Interfaces                                         | RS-232                                                                                          |                                       |                                      |
| Degree of contamination                            | 2                                                                                               |                                       |                                      |
| Overvoltage category                               | 2                                                                                               |                                       |                                      |
| Altitude                                           | Up to 2000 m                                                                                    |                                       |                                      |
| Protection class                                   | IP65                                                                                            |                                       |                                      |
| Installation location                              | Only in enclosed spaces                                                                         |                                       |                                      |

**\* Smallest part weight for piece counting – under laboratory conditions:**

- Ideal environmental conditions for high-resolution counting
- The parts being counted do not scatter

**\*\* Minimum part weight for piece counting – under normal conditions:**

- Unstable environmental conditions (draughts, vibrations)
- The parts to be counted scatter

## **2 Declaration of conformity**

The current EC/EU declaration of conformity can be found online at:

[www.kern-sohn.com/ce](http://www.kern-sohn.com/ce)

**i** For calibrated scales (= conformity-assessed scales), the declaration of conformity is included in the scope of delivery.

### 3 Device overview

#### 3.1 Components

PWS 3000-1 and PWS 8000-1:

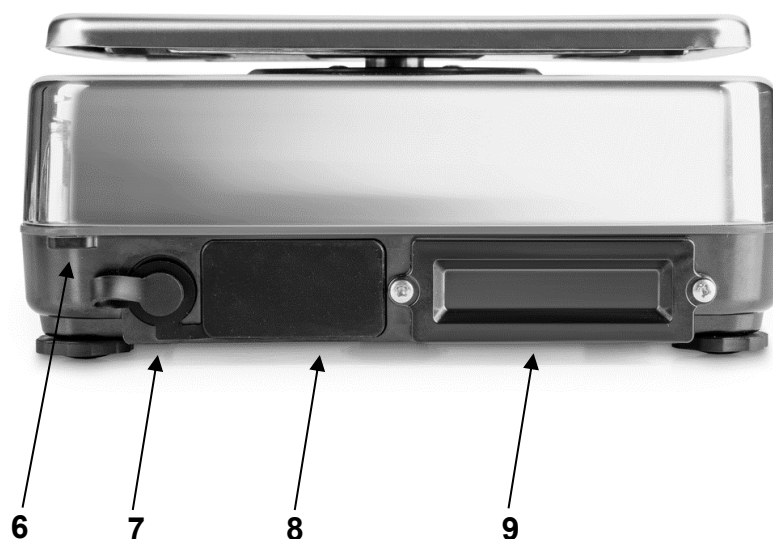


PWS 800-2:



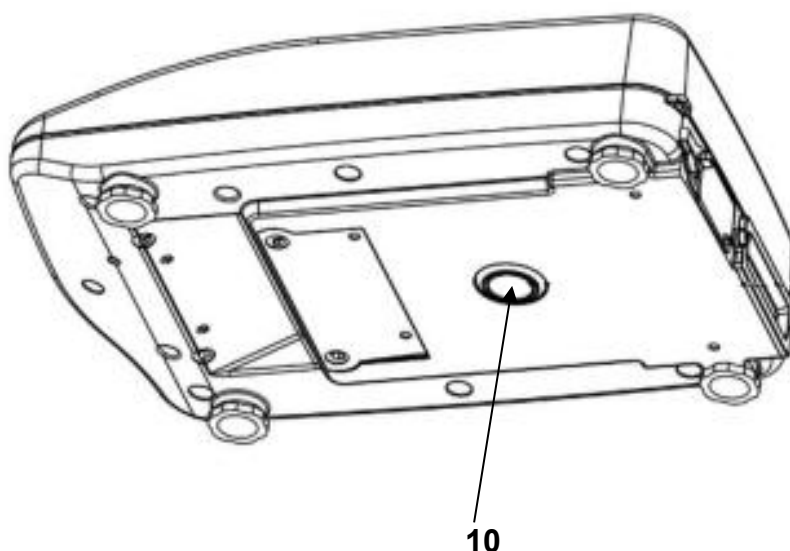
| Item | Description     |
|------|-----------------|
| 1    | Weighing plate  |
| 2    | Keyboard        |
| 3    | Adjustable feet |
| 4    | Display         |
| 5    | Bubble level    |

Rear view (weighing plate in the picture: PWS 3000-1 and PWS 8000-1):



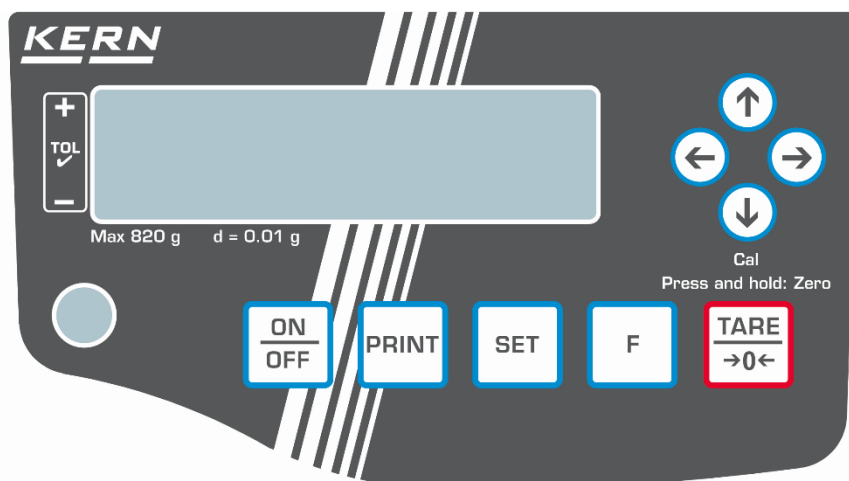
| Item | Description                                                   |
|------|---------------------------------------------------------------|
| 6    | Fastening eyelet for anti-theft device                        |
| 7    | Mains connection with protective cap                          |
| 8    | RS-232C interface with protective cap                         |
| 9    | Battery compartment (battery available as optional accessory) |

View from below:



| Item | Description                        |
|------|------------------------------------|
| 10   | Cover Hook for underfloor weighing |

## 3.2 Keyboard



| Key | Designation | Description                                                                                                |
|-----|-------------|------------------------------------------------------------------------------------------------------------|
|     | [ON/OFF]    | Switch on<br>Switch off                                                                                    |
|     | [PRINT]     | Data output to external device<br>Cancel setting                                                           |
|     | [SET]       | Apply setting                                                                                              |
|     | [F]         | Open menu (press and hold button for approx. 2 seconds)<br>Change display<br>Confirm input                 |
|     | [TARE/ZERO] | Tare (short press) and zero (long press )                                                                  |
|     | [↑ ]        | Select settings upwards<br>Increase numerical input by 1                                                   |
|     | [↓ ]        | Move down through settings<br>Decrease numerical input by 1<br>In weighing mode: Start external adjustment |
|     | [→ ]        | Continue to next menu level<br>Select character position                                                   |
|     | [← ]        | Back menu level<br>Select character position                                                               |

### 3.3 Display



| No. | Display | Designation                            | Description                                                                                                                                          |
|-----|---------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   |         | Stability indicator                    | Displayed when weight is stable                                                                                                                      |
| 2   |         | "Tolerance range weighing" indicator   | Indicates the tolerance range within which the weighing result lies                                                                                  |
| 3   |         | "Animal weighing" indicator            | Indicates the response speed of the scale when weighing animals                                                                                      |
| 4   |         | Asterisk                               | Indicates that weight values can be added together                                                                                                   |
| 5   |         | Minus                                  | Indicates negative values                                                                                                                            |
| 6   |         | Process indicator                      | Indicates that the balance is processing data                                                                                                        |
| 7   |         | "Zero display" indicator               | Indicates zero setting                                                                                                                               |
| 8   |         | Bar graph display                      | Indicates how heavily the weighing plate is loaded in relation to the maximum weighing range<br>Indicates the tolerance range of the weighing result |
| 9   |         | Charge status display                  | Displayed during battery operation                                                                                                                   |
| 10  |         | Gross weight value display             | Displays gross weight                                                                                                                                |
| 11  |         | Data output indicator                  | Displayed when the balance is sending data to an external device.                                                                                    |
| 12  |         | "Animal weighing" indicator            | Displayed when the balance is in animal weighing mode.                                                                                               |
| 13  |         | Net weight value display               | Displayed when the tare weight has been deducted.                                                                                                    |
| 14  |         | "Total" indicator                      | Displayed to show the total sum                                                                                                                      |
| 15  |         | "Count pieces" indicator               | Displayed when piece counting has been activated.                                                                                                    |
| 16  |         | "Coefficient multiplication" indicator | Displayed when coefficient multiplication has been activated                                                                                         |
| 17  |         | "Percentage weighing" indicator        | Displayed when percentage weighing has been activated.                                                                                               |
| 18  |         | "ID number" indicator                  | Lights up when ID is displayed or entered                                                                                                            |
| 19  |         | Gram                                   | Indicates the unit "grams"                                                                                                                           |
| 20  |         | Kilogram                               | Displays the unit "kilogramme"                                                                                                                       |
| 21  |         | Momme                                  | Displays the unit "momme"                                                                                                                            |
| 22  |         | Indicator for different weighing units | Displays different weighing units in different functions                                                                                             |

## **4 Basic information (general)**

### **4.1 Intended use**

The balance you have purchased is designed to determine the weight of items being weighed. It is intended for use as a "non-automatic balance", i.e. the items to be weighed must be placed manually, carefully and centrally on the weighing plate. Once a stable weight value has been reached, the weighing result can be read off.

### **4.2 Improper use**

- Our scales are non-automatic scales and are not intended for use in dynamic weighing processes. However, the scales can also be used for dynamic weighing processes after checking the individual area of application and, in particular, the accuracy requirements of the application.
- Do not leave any permanent load on the weighing plate. This can damage the measuring mechanism.
- It is essential to avoid impacts and overloads of the scale above the specified maximum load (Max), minus any tare load that may already be present. This could damage the scale.
- Never operate the balance in potentially explosive atmospheres. The standard version is not explosion-proof.
- The balance must not be modified in any way. This can lead to incorrect weighing results, safety defects and destruction of the balance.
- The balance may only be used in accordance with the specifications described. Any other areas of use/applications must be approved in writing by KERN.

### **4.3 Warranty**

The warranty shall be void in the event of:

- Failure to observe our specifications in the operating instructions
- Use outside the described applications
- Modification or opening of the device
- Mechanical damage and damage caused by media, liquids natural wear and tear
- Improper installation or electrical installation
- Overloading of the measuring mechanism

### **4.4 Test equipment monitoring**

As part of quality assurance, the metrological properties of the balance and any test weights must be checked at regular intervals. The responsible user must define a suitable interval for this as well as the type and scope of this test. Information regarding the test equipment monitoring of scales and the test weights required for this is available on the KERN website ([www.kern-sohn.com](http://www.kern-sohn.com)). Test weights and scales can be calibrated quickly and cost-effectively at KERN's accredited DKD calibration laboratory (traceable to the national standard).

## 5 Basic safety instructions

### 5.1 Observe the instructions in the operating manual



- ⇒ Read the operating instructions carefully before installation and commissioning, even if you already have experience with KERN scales.

### 5.2 Training of personnel

The device may only be operated and maintained by trained personnel.

## 6 Transport and storage

### 6.1 Inspection upon receipt

Please check the packaging immediately upon receipt and the device upon unpacking for any visible external damage.

### 6.2 Packaging/return transport



- ⇒ Keep all parts of the original packaging for any necessary return transport.
- ⇒ Only use the original packaging for return transport.
- ⇒ Before shipping, disconnect all connected cables and loose/movable parts.
- ⇒ Reattach any transport locks that may have been provided.
- ⇒ Secure all parts, e.g. glass windshield, weighing plate, power supply unit, etc., against slipping and damage.

## **7 Unpacking, installation and commissioning**

### **7.1 Installation location, place of use**

The scales are designed to provide reliable weighing results under normal conditions of use.

You will work accurately and quickly if you choose the right location for your balance.

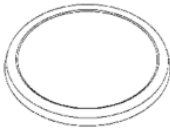
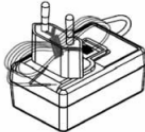
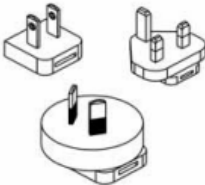
#### **Please note the following at the installation site:**

- Place the scales on a stable, level surface.
- Avoid extreme heat and temperature fluctuations, e.g. by placing the scale next to a heater or in direct sunlight.
- Protect the scales from direct draughts from open windows and doors.
- Avoid vibrations during weighing.
- Protect the scales from high humidity, vapours and dust.
- Do not expose the device to high humidity for long periods of time. Unauthorised condensation (condensation of air humidity on the device) may occur if a cold device is brought into a significantly warmer environment. In this case, allow the device to acclimatise at room temperature for approx. 2 hours after disconnecting it from the mains.
- Avoid static charging of the weighing goods and weighing container.
- Do not operate in areas where there is a risk of explosion or in areas where gases, vapours, mists or dusts may cause an explosion!
- Keep away from chemicals (e.g. liquids or gases) that could attack and damage the inside or outside of the balance.
- Observe the IP protection of the device.
- Electromagnetic fields, static charges (e.g. when weighing/counting plastic parts) and unstable power supplies can cause significant display deviations (incorrect weighing results and damage to the scales). In this case, the location must be changed.

### **7.2 Unpacking, scope of delivery**

Remove the device and accessories from the packaging, remove the packaging material and set up the device at the intended workplace. Check that all parts of the scope of delivery are present and undamaged.

**Scope of delivery:**

|                                                          |                                                                                      |
|----------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1. Scale                                                 |    |
| 2. Weighing plate (for PWS 3000-1 and PWS 8000-1)        |    |
| 3. Weighing plate (for PWS 800-2)                        |    |
| 4. Weighing plate holder (for PWS 3000-1 and PWS 8000-1) |   |
| 5. Weighing plate support (for PWS 800-2)                |  |
| 6. Screw for weighing plate support                      |  |
| 7. Power supply                                          |  |
| 8. Mains plug set                                        |  |
| 9. Operating instructions                                |  |

### 7.3 Setup



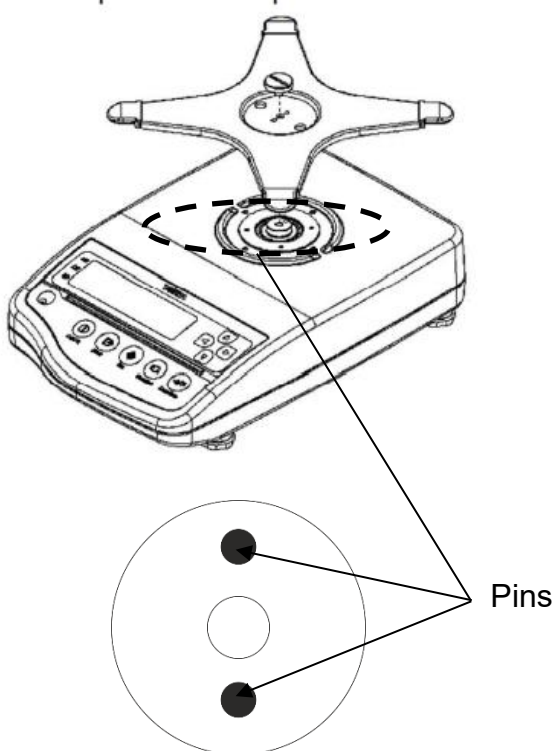
The correct location is crucial for the accuracy of the weighing results of high-resolution precision balances (see chapter 7.1 ).



The IP protection of the balance is only maintained if

- the weighing plate is attached.
- the cover of the underfloor weighing device is attached to the underside.

1. Place the weighing plate support with the holes over the pins on the balance.
2. Secure the weighing plate support with the screw



2. Place the weighing plate on the weighing plate support

**PWS 3000-1 and PWS 8000-1:**



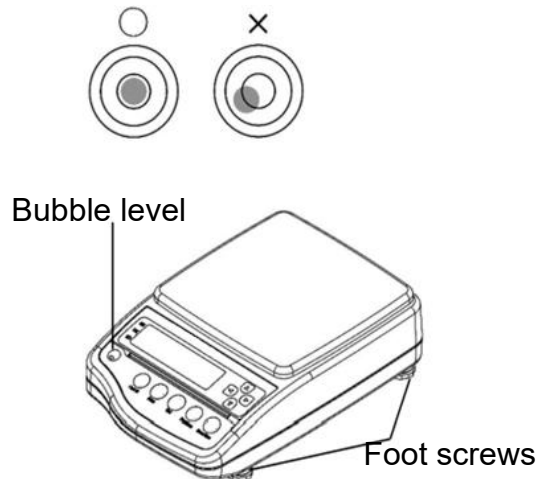
**PWS 800-2:**



3. Connect the power supply unit (for installation of the power supply unit, see chapter "7.5 ")

## 7.4 Levelling

1. Level the balance with the foot screws until the air bubble in the spirit level is in the specified circle



⇒ Check the levelling regularly.

## 7.5 Mains connection



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



Check that the voltage setting on the balance is correct. The balance may only be connected to the mains power supply if the information on the balance (sticker) and the local mains voltage are identical.

Only use original KERN power adapters. The use of other brands requires the approval of KERN.



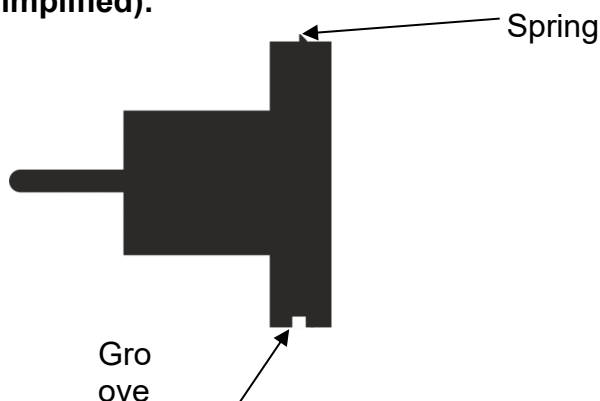
### Important:

- Before use, check the power cord for damage.
- Ensure that the power supply unit and the mains connection do not come into contact with liquids. Cover the mains connection with the protective cap provided when the balance is disconnected from the mains.
- The mains plug must be accessible at all times.

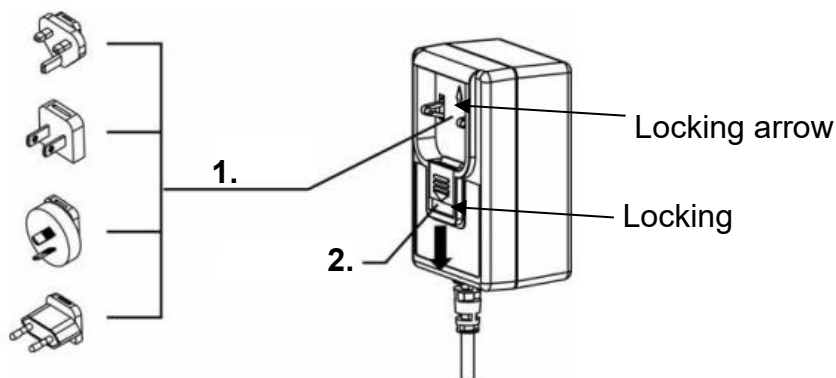
### Installation of the power supply unit:

1. Insert the country-specific mains plug into the recess of the power supply unit at a slight angle so that the spring points in the direction of the locking arrow on the power supply unit.
2. Push the locking mechanism down and press the mains plug into the recess of the power supply unit. Then release the locking mechanism (make sure that the mains plug is locked in place).

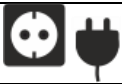
### Side view of power plug (simplified):



### Inserting the mains plug into the power supply unit



#### 7.5.1 Switching on the power supply

|                                                                                     |                                                                |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------|
|  | ⇒ Connecting the scale to the power supply                     |
|  | ⇒ Switch on the balance by pressing the <b>[ON/OFF]</b> button |

#### 7.6 Initial start-up

In order to obtain accurate weighing results with electronic scales, the scales must have reached their operating temperature (see warm-up time, section 1). The balance must be connected to the power supply (mains connection or battery) for this warm-up time. The accuracy of the balance depends on the local gravitational acceleration. It is essential to observe the instructions in the chapter on adjustment (see chapter 19).

## **7.7 Connecting peripheral devices**

Before connecting or disconnecting additional devices (printer, PC) to the data interface, the balance must be disconnected from the mains.

Ensure that the connections of the RS-232C interface and the connection for peripheral devices do not come into contact with liquids. Cover the connections on the device with the protective caps provided when you are not using the connections.

Only use KERN accessories and peripheral devices with your balance, as these are optimally matched to your balance.

## 8 Menu

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



- To open the menu, the scale must be in gram display mode (to switch the display mode, press the **[F]** key).
- For navigation in the menu, see chapter 8.2

### 8.1 Menu overview

The balance menu consists of several levels. The first level consists of the main menus. Depending on the settings, you can access further menu levels.

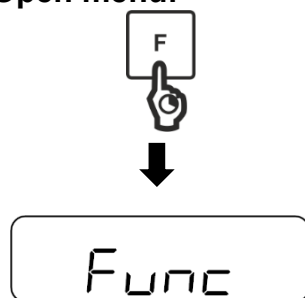
An overview of the setting options can be found in the individual chapters .

| First menu level | Settings                             | Chapter |
|------------------|--------------------------------------|---------|
| 1.5Ee            | Selecting a weighing application     | 9.4     |
| 2.5EL            | Weighing with tolerance range        | 15      |
|                  | Total                                | 16      |
| 3.A.0            | Zero tracking                        | 17.7    |
| 4.5.d.           | Stability settings: Sensitivity      | 17.5.1  |
| 5.rE.            | Response settings                    | 17.6    |
| 6. I.F.          | Communication settings               | 20.7    |
| 7.CA.            | Adjustment functions                 | 19      |
| 8.b.G.           | Bar graph display                    | 17.2    |
| 9.A.P.           | Automatic switch-off function        | 17.8    |
| A.A.b.           | Automatic backlight switch-off       | 17.4.1  |
| b 1.u.A          | Weighing unit A                      | 17.1    |
| b2.d.A           | Readability unit A                   | 18.2    |
| b3.u.b           | Weighing unit B                      | 17.1    |
| E.G.LP           | Printer functions                    | 20.8    |
| H.EA.            | Stabilisation waiting time           | 17.5.2  |
| J.EA.0           | Restoration of last tare value       | 18.3    |
| n.b2.            | Acoustic signal settings             | 17.3    |
| o.b.L.           | Backlight control                    | 17.4.2  |
| PEEA             | Settings for external contact inputs | 20.6    |

## 8.2 Navigating the menu

| Button                                                                              | Designation | Description                                                                         |
|-------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|
|    | [F]         | Open menu (press and hold for approx. 2 seconds)<br>Next menu level (press briefly) |
|    | [PRINT]     | Close menu<br>Cancel entry                                                          |
|    | [←]         | Continue to next menu level                                                         |
|    | [→]         | Previous menu level                                                                 |
|    | [↑]         | Settings selection up                                                               |
|    | [↓]         | Settings selection down                                                             |
|   | [TARE/ZERO] | Cycle through setting options                                                       |
|  | [SET]       | Save settings                                                                       |

Open menu:



⇒ Press and hold the **[F]** button for approx. 2 seconds

⇒ Display changes to **<Func>**

⇒ Release the **[F]** button



If you continue to hold down the **[F]** key after the display changes to **<Func>**, the balance will switch to another mode. In this case, you can press the **[PRINT]** key to cancel the action.

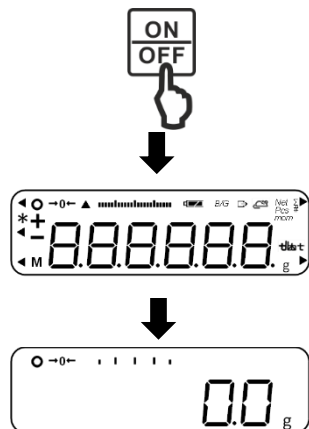
## 9 Basic operation

### 9.1 Switching on/off



After switching on, the balance always starts with the last weighing application that was used before switching off.

#### Switching on:



⇒ Press the **[ON/OFF]** key

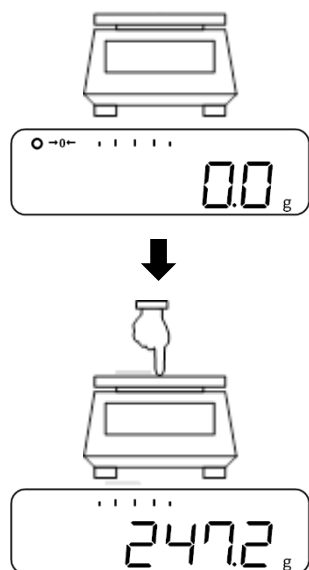
⇒ The display lights up

⇒ Wait until the weight display appears

⇒ Zero is displayed on the display

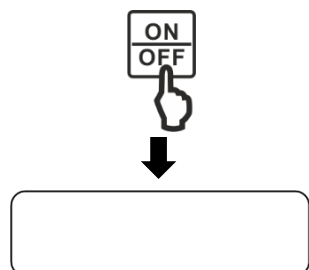
⇒ The scales are now ready for weighing

#### Check the display:



⇒ Press lightly on the weighing plate with your finger to check whether the weight value displayed on the display changes.

#### Switching off:



⇒ When the scale is switched on, press the **[ON/OFF]** button

⇒ The display of the balance switches off

## 9.2 Zero setting



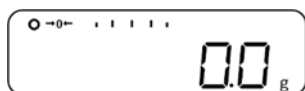
If **<Net>** appears on the display after pressing the **[TARE/ZERO]** key, taring has been performed instead of zeroing. For more information on taring, see chapter 9.3.



⇒ Relieve the weighing plate



⇒ Press the **[TARE/ZERO]** key



⇒ Scale performs zero setting

⇒ The display shows the value **<0.0 g>** and the zero display **<→ 0 ↔>**

## 9.3 Tare

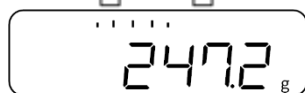
The tare weight of any weighing container can be tared at the touch of a button, so that the net weight of the weighed goods is displayed for subsequent weighings.



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



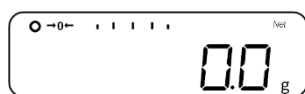
⇒ Place the empty weighing container on the weighing plate



⇒ The weight of the weighing container is displayed

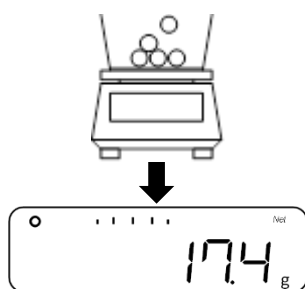


⇒ Press the **[TARE/ZERO]** key



⇒ The balance performs taring

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



⇒ Fill the weighing container with the weighing material

⇒ Read the net weight of the weighing material

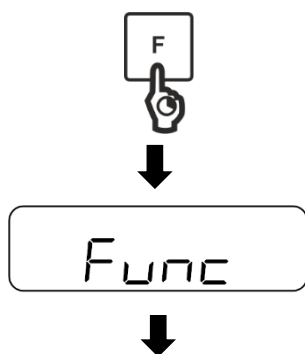


- When the balance is unloaded, the stored tare value is displayed with a negative sign.
- To delete the stored tare value, unload the weighing plate and press the **[TARE/ZERO]** key.
- The taring process can be repeated any number of times. The limit is reached when the entire weighing range is utilised.

#### 9.4 Selecting a weighing application



To open the menu, the scale must be in gram display mode (to switch the display, press the **[F]** key).



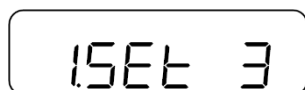
⇒ Press and hold the **[F]** key for approx. 2 seconds.

⇒ Display changes to **<Func>**

⇒ Release the **[F]** key

⇒ Use the **[↑]** and **[↓]** buttons (or the **[TARE/ZERO]** button) to select the desired weighing application.

- |          |                            |
|----------|----------------------------|
| 1. SEt 1 | Simple weighing            |
| 1. SEt 2 | Piece counting             |
| 1. SEt 3 | Percentage weighing        |
| 1. SEt 4 | Coefficient multiplication |
| 1. SEt 5 | Density determination      |
| 1. SEt 6 | Weighing animals           |

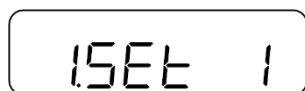


⇒ Press the **[SET]** key to confirm your selection

## 9.5 Simple weighing



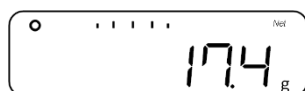
If you are using a weighing container, you should tare it before weighing (see chapter 9.3 )



⇒ Select weighing application **<1. SEt 1>** (for selection, see chapter 9.4 )



⇒ Place the weighing material on the weighing plate or in the weighing container



⇒ Read the weighing result

### Additional displays:

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

| Display sequence | Display                     | Display on the balance |
|------------------|-----------------------------|------------------------|
| 1                | Net weight value (unit A)   | Net                    |
| 2                | Gross weight value (unit A) | B/G                    |
| 3                | Net weight value (unit B)   | Net                    |
| 4                | Total weight (unit A)       | $\Sigma$               |

## 9.6 Numerical input

Tolerance limits, reference weight values, coefficients, temperature values, specific density and the balance identification number can be entered manually on the balance.



- Whether the entry of a decimal point for weight values is permitted depends on the readability of the balance.  
**Example:** Readability (d) = 0.1 g → Permitted input: One decimal place; Impermitted input: More than one decimal place → Balance rounds up or down
- The balance can display a maximum of six characters

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

## 10 Counting

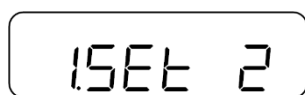
The **piece counting** application allows you to count multiple parts placed on the weighing plate.

Before the balance can count parts, it must know the average piece weight, known as the reference. To do this, a certain number of the parts to be counted must be placed on the weighing plate. The balance determines the total weight and divides it by the number of parts, known as the reference piece count. The count is then performed based on the calculated average piece weight.

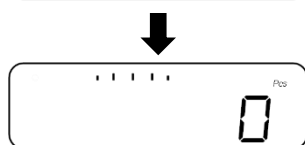
The following applies here: **the higher the reference piece count, the greater the counting accuracy.**



- The **[PRINT]** key can be used to cancel the piece count setting.
- If you are using a weighing container, it should be tared before setting the reference piece count (see chapter 9.3).
- The acoustic signal only sounds if it has been activated (for settings, see chapter 17.3).



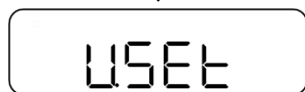
⇒ Weighing application **< 1.SET 2>** (for selection, see chapter 9.4).



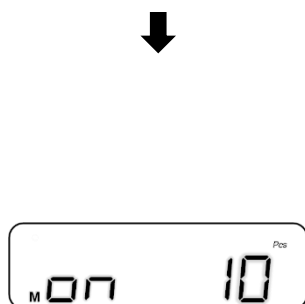
⇒ **<Pcs>** appears on the display.



⇒ Press and hold the **[F]** key for approx. 2 seconds



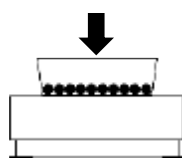
⇒ The display changes to **<U. SET>**  
⇒ Release the **[F]** key



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

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

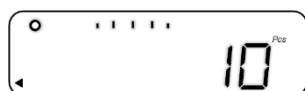
|        |            |
|--------|------------|
| on 5   | 5 pieces   |
| on 10  | 10 pieces  |
| on 30  | 30 pieces  |
| on 100 | 100 pieces |



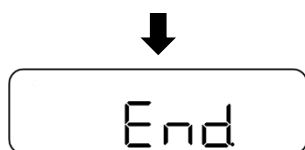


- ⇒ Place the number of parts corresponding to the reference quantity entered on the weighing plate or in the weighing container.
- ⇒ Press the **[F]** key to save the weight value of the reference number of pieces

### Simple SCS (optional; press the **[F]** key to enter measuring mode):



- ⇒ The reference number on the display starts flashing
- ⇒ Place additional reference pieces on the weighing plate (the number of pieces may be a maximum of three times the number of reference pieces selected at the beginning → Example: Selected = 10 pieces, additional reference pieces = 30 pieces or less)
- ⇒ Stability indicator appears and acoustic signal sounds (if activated, see section 17.3.1 ) when the weight value of the reference pieces has been saved
- ⇒ Press the **[F]** key to end weighing of the reference number of pieces.



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



- ⇒ Display changes to piece counting mode



- ⇒ Place further weighing material on the weighing plate or in the weighing container



- ⇒ Read the number of pieces

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



- **<Add>**: The number of additional samples is too small. Add more samples.
- **<Sub>**: Number of additional samples is too large. Reduce the sample.
- **<L-Err>**: Average piece weight is less than the smallest piece weight

#### **Additional displays:**

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

| Display sequence | Display                      | Display on the balance |
|------------------|------------------------------|------------------------|
| 1                | Number of pieces (Pcs)       | Net                    |
| 2                | Total quantity (pcs)         | $\Sigma$               |
| 3                | Average unit weight (unit A) | Pcs                    |
| 4                | Net weight value (unit A)    | Net                    |

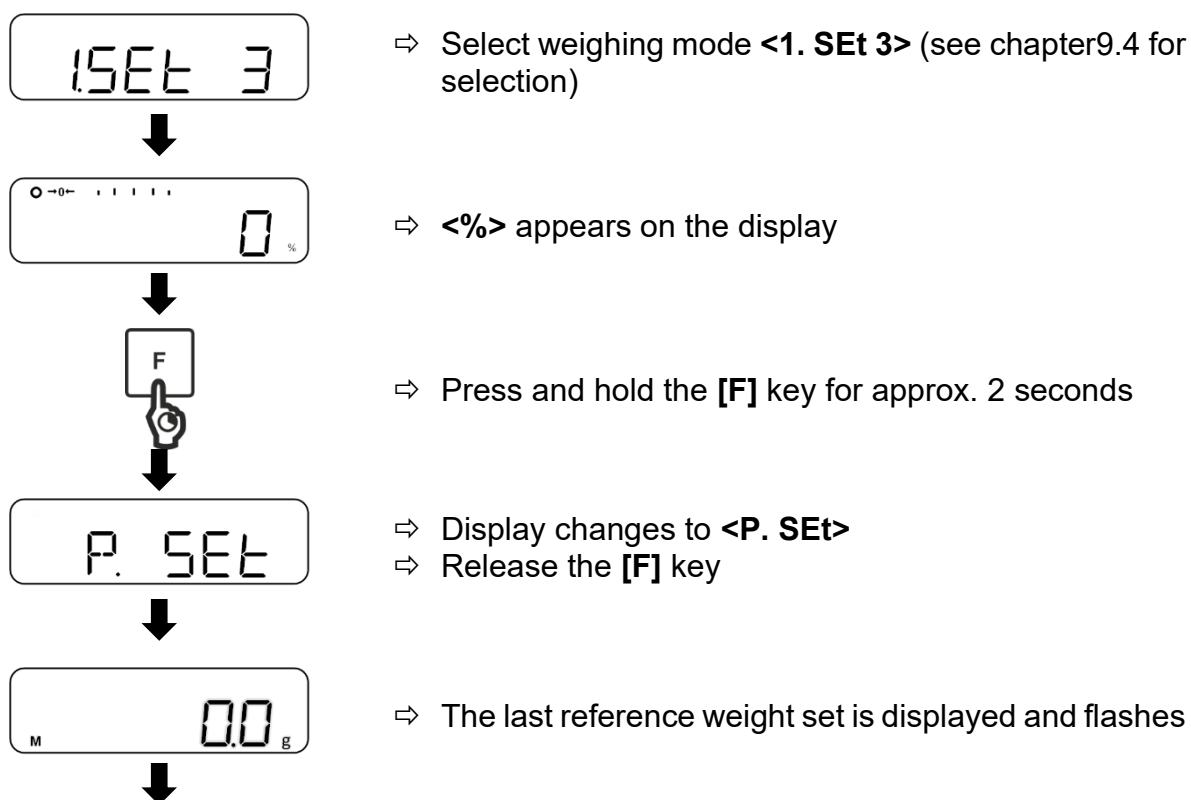
## 11 Percentage weighing

The **percentage weighing** application allows you to check the weight of a sample in percent, relative to a reference weight.

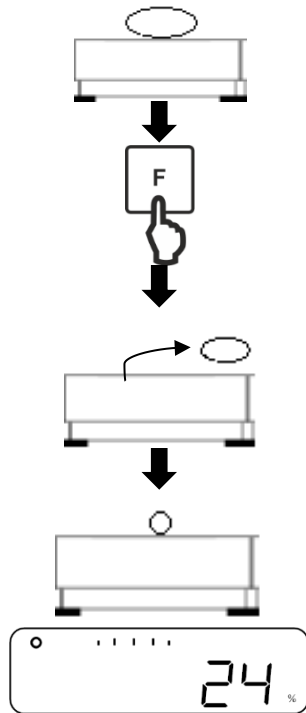
|          |                                                                                                                                                                                                                                                                     |                                                            |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>i</b> | <ul style="list-style-type: none"> <li>If you are using a weighing container, you should tare it before setting the reference number of pieces (see Chapter 9.3).</li> <li>The readability of the balance automatically adjusts to the reference weight:</li> </ul> |                                                            |
|          | <b>Readability in %</b>                                                                                                                                                                                                                                             | <b>Weight range of the reference weight</b>                |
|          | 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                     |
|          | <b>Model</b>                                                                                                                                                                                                                                                        | <b>Minimum load for percentage weighing</b>                |
|          | PWS 800-2                                                                                                                                                                                                                                                           | 1 g                                                        |
|          | PWS 3000-1 and<br>PWS 8000-1                                                                                                                                                                                                                                        | 10                                                         |

The reference weight can be recorded in two ways:

- Actual value setting method: Weighing the reference weight
- Numerical entry of the reference weight



### Actual value setting method:



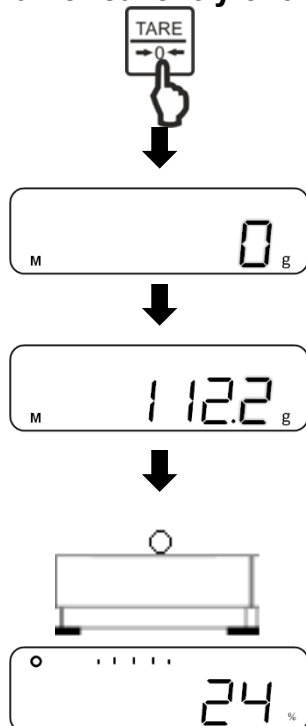
⇒ Place the reference weight on the weighing plate or in the weighing container

⇒ Press the **[F]** key

⇒ Remove the reference weight

⇒ Place samples on the weighing plate or in the weighing container and read the percentage value

### Numerical entry of the reference weight:



⇒ Press the **[TARE/ZERO]** key

⇒ **<0 g>** is displayed and flashes

⇒ Enter the reference weight (numerical entry: see section 0 )

⇒ Place the weighing material on the weighing plate

⇒ Percentage relative to the reference weight is displayed

**Additional displays:**

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

| <b>Display sequence</b> | <b>Display</b>            | <b>Display on the balance</b> |
|-------------------------|---------------------------|-------------------------------|
| 1                       | Percentage value (%)      | Net                           |
| 2                       | Total percentage (%)      | $\Sigma$                      |
| 3                       | Net weight value (unit A) | Net                           |

## 12 Coefficient multiplication

The **coefficient multiplication** application allows you to multiply the weight of a sample by a preset value. The result is shown on the display.



The readability of the balance depends on the coefficient entered.



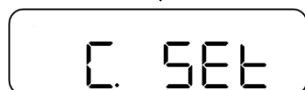
⇒ Weighing mode **< 1.SET 4>** Select (see chapter 9.4 for selection)



⇒ **<#>** appears on the display



⇒ Press and hold the **[F]** key for approx. 2 seconds



⇒ The display changes to **<C. SEt>**  
⇒ Release the **[F]** key



⇒ The last coefficient set is displayed and flashes



⇒ Press the **[TARE/ZERO]** key



⇒ Enter coefficients (numerical entry: see section 0 )

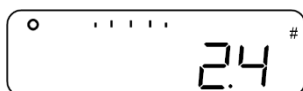


⇒ Press the **[SET]** key to save the coefficients



⇒ Place the sample on the weighing plate





⇒ The weight value is multiplied by the coefficient and the result is shown on the display

### Additional displays:

Press the **[F]** key to switch the display on the balance. In addition, various additional functions can be activated depending on the weighing application.

| Display sequence | Display                   | Display on the balance |
|------------------|---------------------------|------------------------|
| 1                | Multiplied value (#)      | Net                    |
| 2                | Total value (#)           | $\Sigma$               |
| 3                | Net weight value (unit A) | Net                    |

### 13 Density determination

When determining the density of solids, the solid is first weighed in air and then in an auxiliary liquid whose density is known. The difference in weight difference, the software calculates the density. Distilled water or ethanol are usually used as the auxiliary liquid; density 13.1 .

The following steps are necessary to determine density:

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

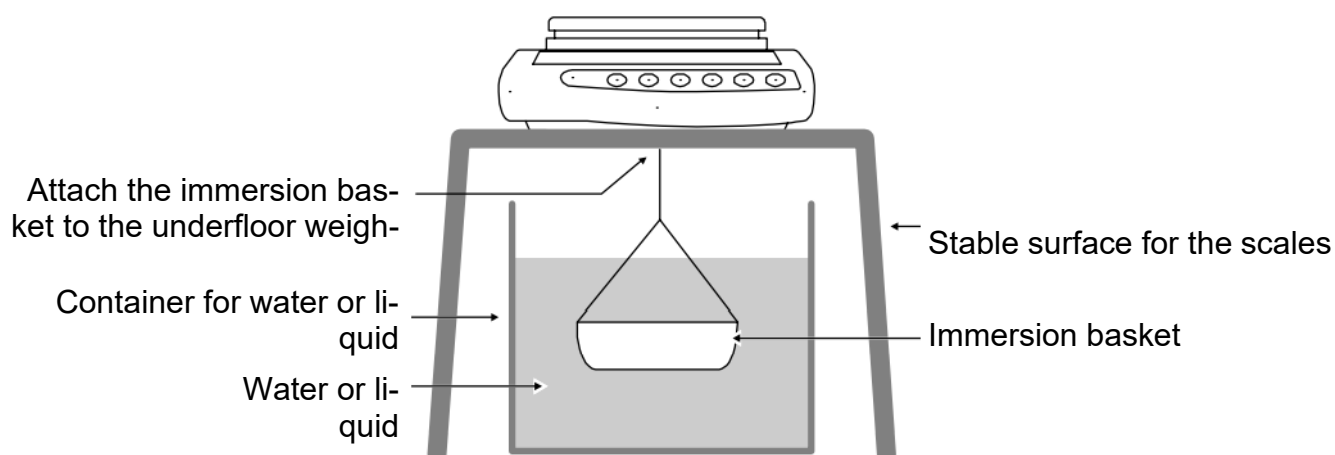


- The hook for underfloor weighing is available as an optional accessory
- You can find information on this on our homepage:  
[www.kern-sohn.com](http://www.kern-sohn.com)

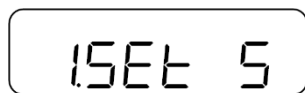


- After completing the underfloor weighing process, the opening in the base of the scales must be closed again (dust protection).
- During underfloor weighing, the scale is not IP65 protected.
- The immersion basket must not touch the container.

#### 1. Prepare the measuring equipment

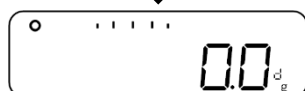


## 2. Select weighing application for density determination



⇒ Select weighing application **<1. SEt 5>** (see chapter 9.4 for selection)

## 3. Select medium



⇒ Navigate to **<11. Md.>** and select medium (for menu navigation, see chapter 8.2 )

0 | Water

1 | No water (other medium)

⇒ Press the **[SET]** button to save the settings

⇒ **<d>** appears on the display

## 4. Set the water temperature or specific density

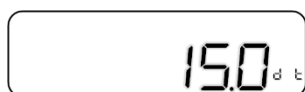


- The water temperature must be between 0 °C and 99.9 °C
- The specific gravity must be between 0.0001 and 9.999



⇒ Hold down the **[TARE/ZERO]** key

### **When selecting 0 (water):**



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

⇒ Release the **[TARE/ZERO]** button

⇒ Press the **[TARE/ZERO]** button to set the water temperature

⇒ Enter the water temperature (numerical entry: see section 0 )



⇒ Press the **[SET]** button to save the entry

#### When selecting 1 (no water):



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

⇒ Release the **[TARE/ZERO]** key



⇒ Press the **[TARE/ZERO]** button to set the specific density

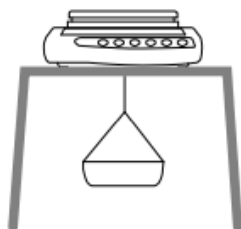


⇒ Enter specific gravity (numerical entry: see section 0 )



⇒ Press the **[SET]** button to save your entry

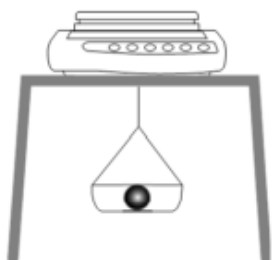
#### 5. Weigh the sample using underfloor weighing



⇒ Attach the empty immersion basket to the hook for underfloor weighing

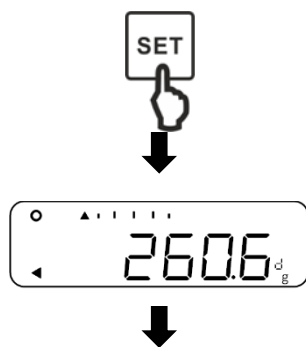


⇒ Press the **[TARE/ZERO]** key to tare the balance



⇒ Place the sample in the immersion basket  
(In this step, it is also possible to place the sample on the weighing plate)

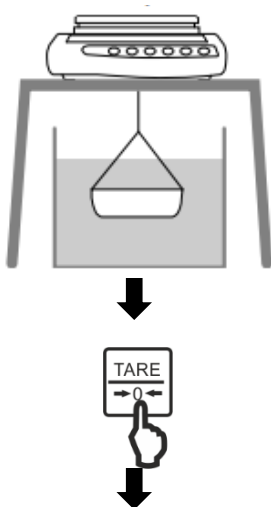




⇒ Press the **[SET]** key when a stable weight value is displayed

⇒ The balance saves the weight value and displays <<>

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

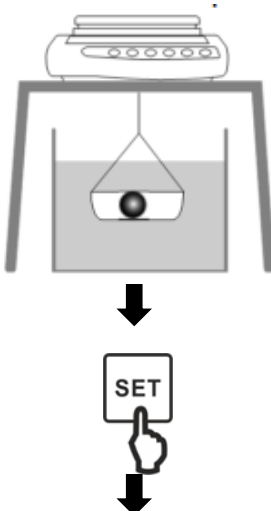


⇒ Place a container with water or another liquid under the balance

⇒ Immerse the empty immersion basket in the water or liquid

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

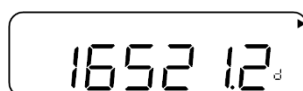
## **7. Measure the sample**



⇒ Place the sample in the immersion basket

⇒ Immerse the immersion basket with the sample completely in the water or liquid

⇒ Press the **[SET]** key when a stable weight value is displayed



⇒ Read the result for the specific density



Press the **[SET]** button to return to the weight value display. However, it is not possible to return to the density display. To do so, you must repeat the measurement.

### 13.1 Density table for liquids

| Temperature [°C] | Density $\rho$ [g/cm <sup>3</sup> ] |         |          |
|------------------|-------------------------------------|---------|----------|
|                  | 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   |

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



- Further settings can only be made once the density determination weighing application has been activated (see section 13 ).
- You need a compatible printer for these functions. You can find information on this on our homepage:  
[www.kern-sohn.com](http://www.kern-sohn.com)

### Selecting the data to be output:



⇒ Navigate to the menu for **< 12.do.>** and select the setting (navigation in the menu: see chapter 8.2 )

- |   |  |                                                                                              |
|---|--|----------------------------------------------------------------------------------------------|
| 0 |  | Output only measured density and weight value                                                |
| 1 |  | Output all data (measured density, weight value, current water temperature/specific density) |

### Activate/deactivate automatic output:



⇒ Navigate to the menu at **< 13.Ao.>** and select Settings (navigation in the menu: see section 8.2 )

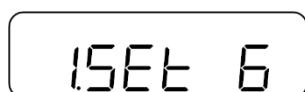
- |   |  |                              |
|---|--|------------------------------|
| 0 |  | Automatic output deactivated |
| 1 |  | Automatic output activated   |

## 14 Animal weighing

The **Animal Weighing** application allows you to measure animals or samples that move during the measurement. If the weight fluctuations are within a set weight range, the weight value is "frozen" and shown on the display.



- If you are using a weighing container, it should be tared before weighing (see chapter 9.3).
- If the animal moves too much, it may not be possible to "freeze" the weight value.
- Only the gram weighing unit is available for this function.
- As the stability detection range is wider in this function, the weighing results may be inaccurate compared to the actual weight values.



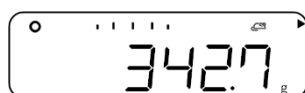
⇒ Select weighing application **<1. SEt 6>** (see chapter 9.4 for selection).



⇒ The display shows 

⇒ Press the **[SET]** key to set the response of the balance

- ▶ (top) Slow response (animal moves a lot)
- ▶ (middle) Medium reaction (animal moves moderately)
- ▶ (bottom) fast reaction (animal does not move at all / hardly moves)



⇒ Place animal on weighing plate

⇒ If the weight fluctuation fits within the weight range, the weight value is "frozen" and the scale displays **<h>**.

### 14.1 Further settings



Further settings can only be made once the animal weighing application has been activated (see chapter 14)

### 14.1.1 Auto tare

If auto tare has been activated, a tare range is automatically set after the animal has been removed from the weighing plate and the weight fluctuations are within a specified range.

If Auto Tare has been deactivated, the value is "frozen" until the **[TARE/ZERO]** key is pressed.



⇒ Navigate to the **<14. At.>** menu and select the setting (navigation in the menu: see section 8.2 )

- |   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

### 14.1.2 Data output



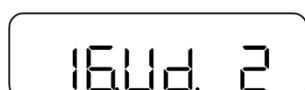
⇒ Navigate to the menu **<15. Ho.>** and select the setting (navigation in the menu: see chapter 8.2 )

- |   |                                                            |
|---|------------------------------------------------------------|
| 0 | Deactivated                                                |
| 1 | Enabled (one-time automatic output when value is "frozen") |

### 14.1.3 Set weight range



By changing the readability (d), the stability detection range can also be changed by using **<16.Wd>** in combination.

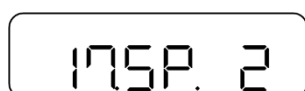


⇒ Navigate to the **<16. Wd.>** menu and select the setting (navigation in the menu: see chapter 8.2 )

- |   |      |
|---|------|
| 1 | 20d  |
| 2 | 50d  |
| 3 | 100d |

### 14.1.4 Setting the scale's response

The balance response can also be set in the menu.



⇒ Navigate to **<17. SP.>** in the menu and select the setting (navigation in the menu: see chapter 8.2 )

- |   |                                                          |
|---|----------------------------------------------------------|
| 1 | Fast response (animal does not move at all/barely moves) |
| 2 | Medium reaction (animal moves moderately)                |
| 3 | Slow reaction (animal moves a lot)                       |

## 15 Weighing with tolerance range

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

You can either specify a single tolerance value (minimum value as the lower limit) or a tolerance range (minimum and maximum values as the lower and upper limits).



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

When weighing with a tolerance range, weight values can be evaluated in two ways:

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

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

To use weighing within the tolerance range, the following steps are necessary:

1. Select function (see chapter15.1 )
2. Set differentiation condition (see chapter15.2 )
3. Set the differentiation range (see chapter15.3 )
4. Set the number of tolerance limits (see chapter15.4 )
5. Set the differentiation method (see chapter15.5 )
6. Activate/deactivate acoustic signal (see chapter15.6 )
7. Set tolerance values (see chapter15.7 )
8. Set the display of the results (see chapter15.8 )

### 15.1 Select the weighing function with tolerance range



⇒ Select in the menu for **<2. SEL 2>** (navigation in the menu: see chapter8.2 )

If the totalisation function is to be used at the same time, select **<2. SEL 3>**

## 15.2 Set differentiation condition

The differentiation condition determines whether weight values are only evaluated when the weighing values are stable or continuously (when the weighing values fluctuate/are not stable). Continuous evaluation of the weighing values allows you to monitor in real time on the display whether your weighed material is within the tolerance limits during dynamic weighing processes (e.g. when filling a container).



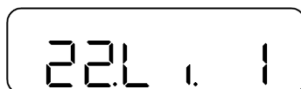
⇒ Navigate to the **<21. Co.>** menu and select the differentiation condition (for menu navigation, see chapter 8.2 ).

- |   |                                        |
|---|----------------------------------------|
| 1 | Always                                 |
| 2 | Only when the weighing value is stable |

## 15.3 Set differentiation range

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

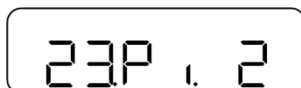
| Model                  | Minimum weight for evaluation |
|------------------------|-------------------------------|
| PWS 3000-1, PWS 8000-1 | 0.5 g                         |
| PWS 800-2              | 0.05 g                        |



⇒ Navigate to **<22. Li.>** in the menu and select the differentiation range (navigation in the menu: see section 8.2 ).

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

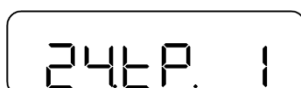
## 15.4 Set the number of tolerance limits



⇒ Navigate to the **<23. Pi.>** menu and select the number of tolerance limits (for menu navigation, see section 8.2 ).

- |   |                                  |
|---|----------------------------------|
| 1 | Lower tolerance limit only       |
| 2 | Upper and lower tolerance limits |

## 15.5 Set differentiation method



⇒ Navigate to the **<24. tP.>** menu and select the differentiation method (navigation in the menu: see section 8.2 ).

- |   |                                                                              |
|---|------------------------------------------------------------------------------|
| 1 | Evaluation of absolute values (setting absolute values: see chapter 15.7.1 ) |
|---|------------------------------------------------------------------------------|

## 15.6 Set acoustic signal



⇒ Navigate to menu **<25. b. 1>**, **<26. b. 2>** or **<27. b. 3>** (navigation in the menu: see section 8.2)

|          |                                                                   |
|----------|-------------------------------------------------------------------|
| 25. b. 1 | Buzzer for falling below the lower tolerance limit                |
| 26. b. 2 | Buzzer for when the weighing result is within the tolerance range |
| 27. b. 3 | Buzzer for exceeding the upper tolerance limit                    |

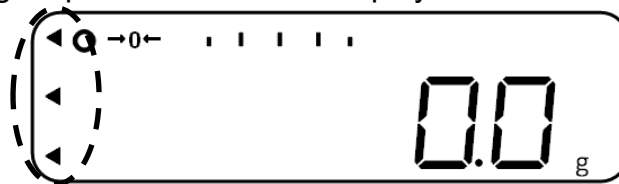
⇒ Select the desired setting

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

## 15.7 Setting the tolerance values



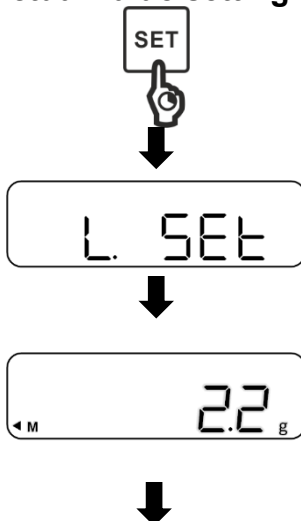
- Tolerance values can only be saved when the balance is in measurement mode.
- Before saving tolerance values, perform a zero setting (see section 9.2) or taring (see section 9.3) of the balance
- If the tolerance limits are not divided according to their magnitude (e.g. the lower tolerance limit is greater than the upper tolerance limit), three indicators light up on the left of the display:



In this case, re-enter the tolerance limits.

### 15.7.1 Absolute values

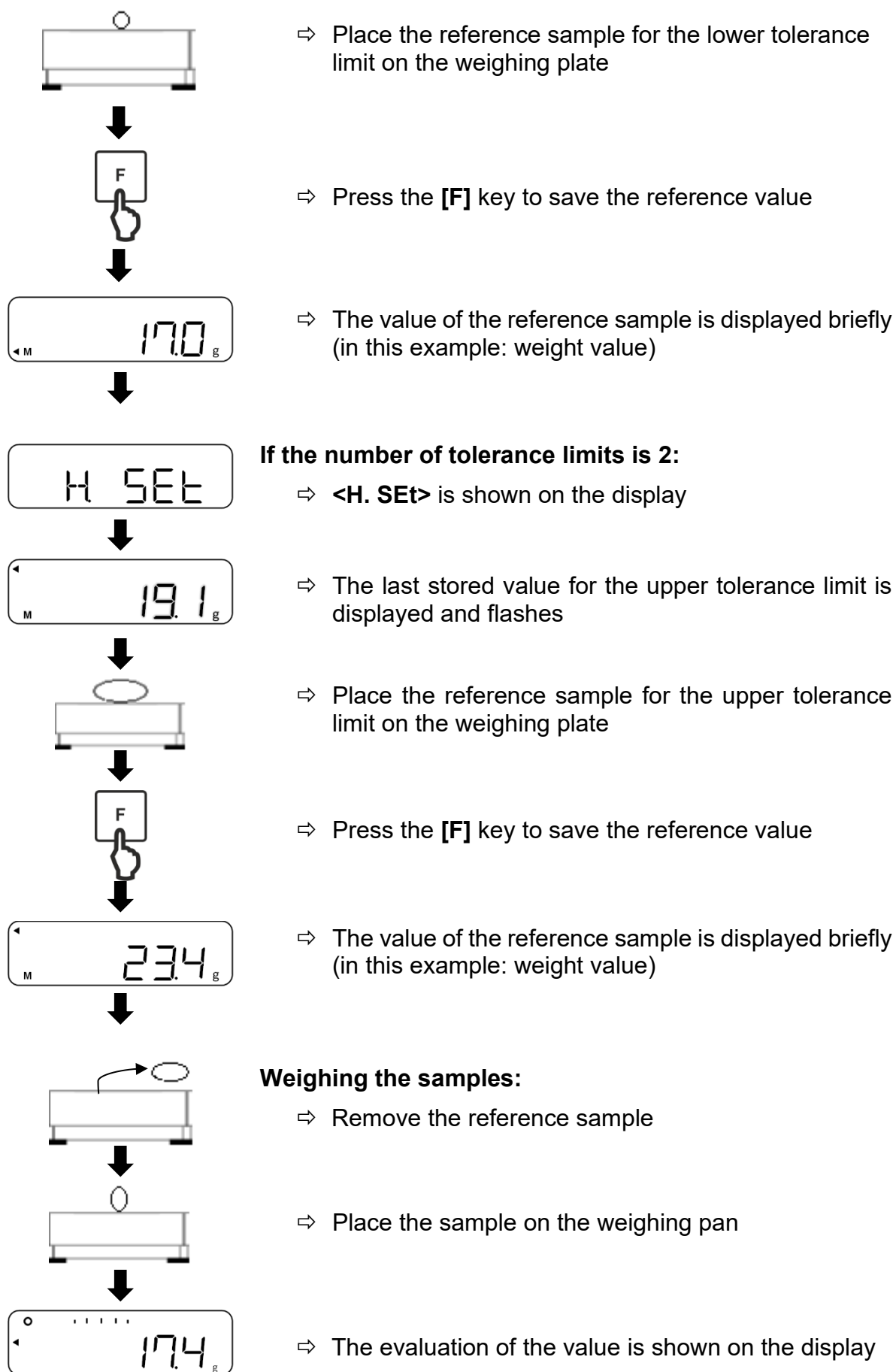
**Actual value setting method:**



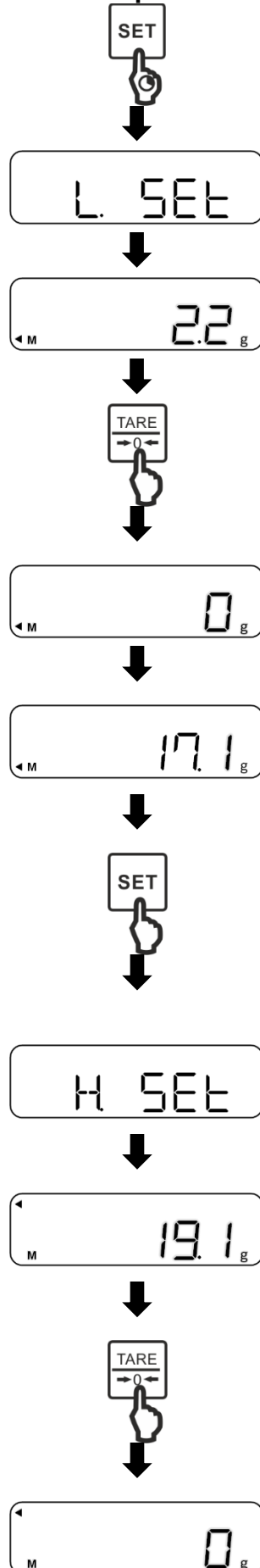
⇒ When the balance is in measuring mode, press and hold the **[SET]** key for approx. 2 seconds

⇒ When **<L. SEt>** is displayed, release the **[SET]** key.

⇒ The last stored value for the lower tolerance limit is displayed and flashes (in this example: weight value).



### Numeric input:



⇒ When the balance is in measuring mode, press and hold the **[SET]** key for approx. 2 seconds

⇒ When **<L. SET>** is displayed, release the **[SET]** key

⇒ The last stored value for the lower tolerance limit is displayed and flashes

⇒ Press the **[TARE/ZERO]** key

⇒ **<0>** is displayed and flashes

⇒ Enter the lower tolerance limit (numerical entry: see section 0 ).

⇒ Press the **[SET]** key to save the entry

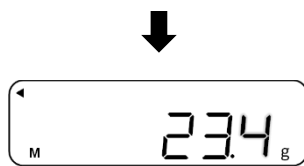
### If the number of tolerance limits is 2:

⇒ The display shows **<H. SET >**

⇒ The last stored value for the upper tolerance limit is displayed and flashes

⇒ Press the **[TARE/ZERO]** button

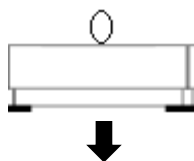
⇒ **<0>** is displayed and flashes



⇒ Enter the upper tolerance limit (numerical entry: see section 0 )

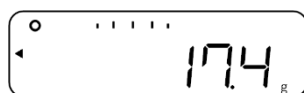


⇒ Press the **[SET]** key to save the entry



### Weighing the samples:

⇒ Place the sample on the weighing plate



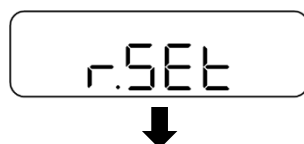
⇒ The evaluation of the value is shown on the display

### 15.7.2 Difference values

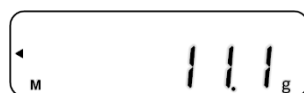
#### Actual value adjustment method:



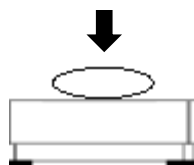
⇒ When the balance is in measuring mode, press and hold the **[SET]** key for approx. 2 seconds



⇒ When **<r. Set>** is displayed, release the **[SET]** key



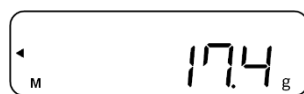
⇒ The last stored reference value is displayed and flashes



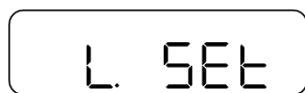
⇒ Place the reference sample (target weight) on the weighing plate



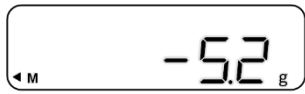
⇒ Press the **[F]** key to save the reference value



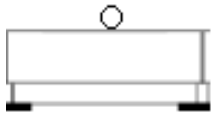
⇒ The value of the reference sample is displayed briefly



⇒ <L. SEt> is displayed



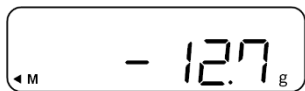
⇒ The last difference to the reference sample is displayed and flashes



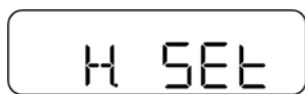
⇒ Place the reference sample for the lower tolerance limit on the weighing pan



⇒ Press the **[F]** key to save the reference value

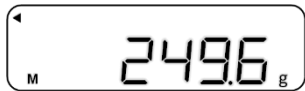


⇒ Difference to reference sample is displayed briefly



#### If the number of tolerance limits is 2:

⇒ The display shows <H. SEt>



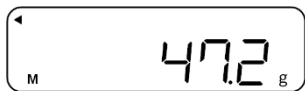
⇒ The final difference to the reference sample is displayed and flashes



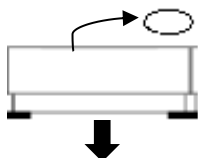
⇒ Place the reference sample for the upper tolerance limit on the weighing plate



⇒ Press the **[F]** key to save the reference value

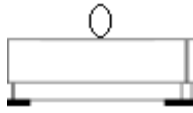


⇒ Difference to reference sample is displayed briefly

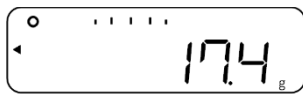


#### Weighing the samples:

⇒ Remove the reference sample



⇒ Place the sample on the weighing pan

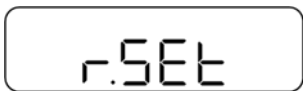


⇒ The evaluation of the value is shown on the display

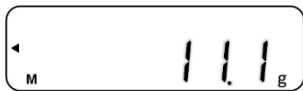
### Numerical input:



⇒ When the balance is in measuring mode, press and hold the **[SET]** key for approx. 2 seconds



⇒ When **<r. SEt>** is displayed, release the **[SET]** key



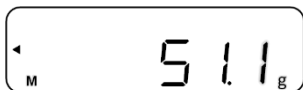
⇒ The last stored reference value is displayed and flashes



⇒ Press the **[TARE/ZERO]** button



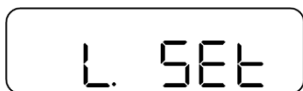
⇒ **<0>** is displayed and flashes



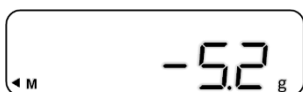
⇒ Enter the reference value (target weight) (numerical entry: see section 0 )



⇒ Press the **[SET]** key to save the entry



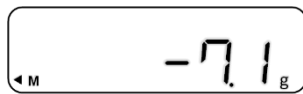
⇒ **< L. SEt>** is displayed



⇒ The last difference (lower tolerance limit) to the reference value is displayed and flashes



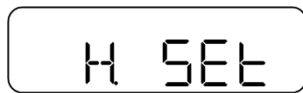
⇒ Press the **[TARE/ZERO]** key



⇒ Enter the difference as the lower tolerance limit (numerical entry: see chapter0 )



⇒ Press the **[SET]** key to save the entry



**If the number of tolerance limits is 2:**

⇒ The display shows **<H. SEt >**



⇒ The last difference (upper tolerance limit) from the reference value is displayed and flashes



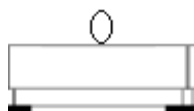
⇒ Press the **[TARE/ZERO]** key



⇒ Enter the difference as the upper tolerance limit (numerical entry: see chapter0 )

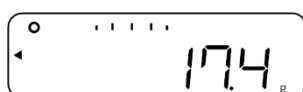


⇒ Press the **[SET]** key to save the entry



**Weighing the samples:**

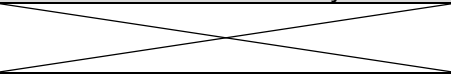
⇒ Place the sample on the weighing plate



⇒ The evaluation of the value is shown on the display

## 15.8 Setting the display to show the result

An arrow on the left-hand side of the display indicates whether a measured weight value is within certain limits (see table below).

|  |                                                                                   |                           |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------|
| Assessment of the weight value                                                     | Set tolerance ranges                                                              |                           |
|                                                                                    | Minimum value only                                                                | Minimum and maximum value |
| Upper tolerance limit exceeded                                                     |  | +                         |
| Within tolerance range                                                             | TOL<br>✓                                                                          | TOL<br>✓                  |
| Lower tolerance limit not reached                                                  | -                                                                                 | -                         |

The weight value can also be assessed using the bar graph display.

|                                                                                                                                                                         |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  The bar graph display can only be used if a minimum and maximum value have been set. |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

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

### Setting the display for tolerance range weighing:



⇒ Navigate to the **<2A.LG>** menu and select the setting (navigation in the menu: see section 8.2 )

- 1 | Arrows
- 2 | Bar graph display

## 16 Sum

The **Summation** application allows you to weigh different samples and add up the weight values. This function can be used, for example, to weigh individual batches in order to determine the total stock.



- Summation is available for the following applications: weighing, percentage weighing, piece counting and coefficient multiplication.
- The default setting is **<2. SEL 0>** (function deactivated).

Summing can be done in two ways:

- Adding up individual weighings by replacing the sample on the weighing plate: TOTAL adding (see chapter 16.2.1)
- Adding up individual weighings without replacing the samples on the weighing pan (balance tared automatically after adding): NET adding (see chapter 16.2.2)

### 16.1 Selecting the summing function



- ⇒ Select **<2. SEL 1>** in the menu (navigation in the menu: see chapter 8.2)  
If the tolerance function is to be used at the same time, select **<2. SEL 3>**



- ⇒ Press the **[F]** key



- ⇒ The display shows **"< 2C.Ad. ">**
- ⇒ Use the **[↑]** and **[↓]** keys (or the **[TARE/ZERO]** key) to select the desired reference quantity

- |   |                                                                                                                                         |
|---|-----------------------------------------------------------------------------------------------------------------------------------------|
| 1 | TOTAL adding: Adding up individual weighings by replacing the sample on the weighing plate                                              |
| 2 | NET adding: Adding up individual weighings without replacing the samples on the weighing pan (balance tared automatically after adding) |



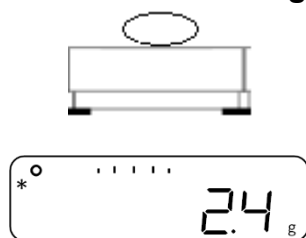
- ⇒ Press the **[SET]** key to save the settings and return to measuring mode.

## 16.2 Using the summing function



- The error message **<t-Err>** appears if you have not placed the samples correctly (for more information, see chapter 22.1).
- The stabilisation waiting time (see chapter 17.5.2) allows you to set whether the balance should wait for a stable weight value before totaling.

### 16.2.1 TOTAL adding



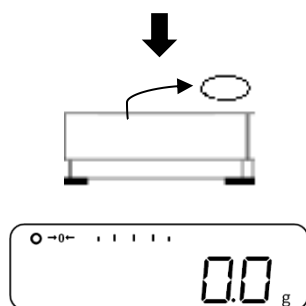
- ⇒ Set the balance to **< 2C.Ad. 1>** (see chapter 16).
- ⇒ Place the first sample on the weighing plate and wait until an asterisk **<\*>** appears on the display



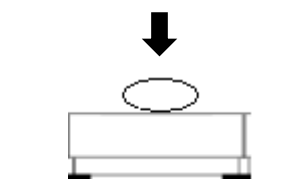
- ⇒ Press the **[SET]** key



- ⇒ The weight value is saved
- ⇒ **<Σ>** is briefly displayed together with the weight total

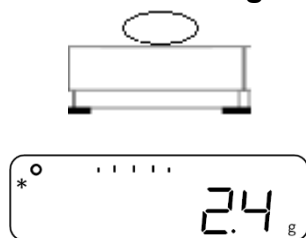


- ⇒ Remove the sample from the weighing plate (the balance automatically returns to zero)
- ⇒ Wait until the scales display **<0>**

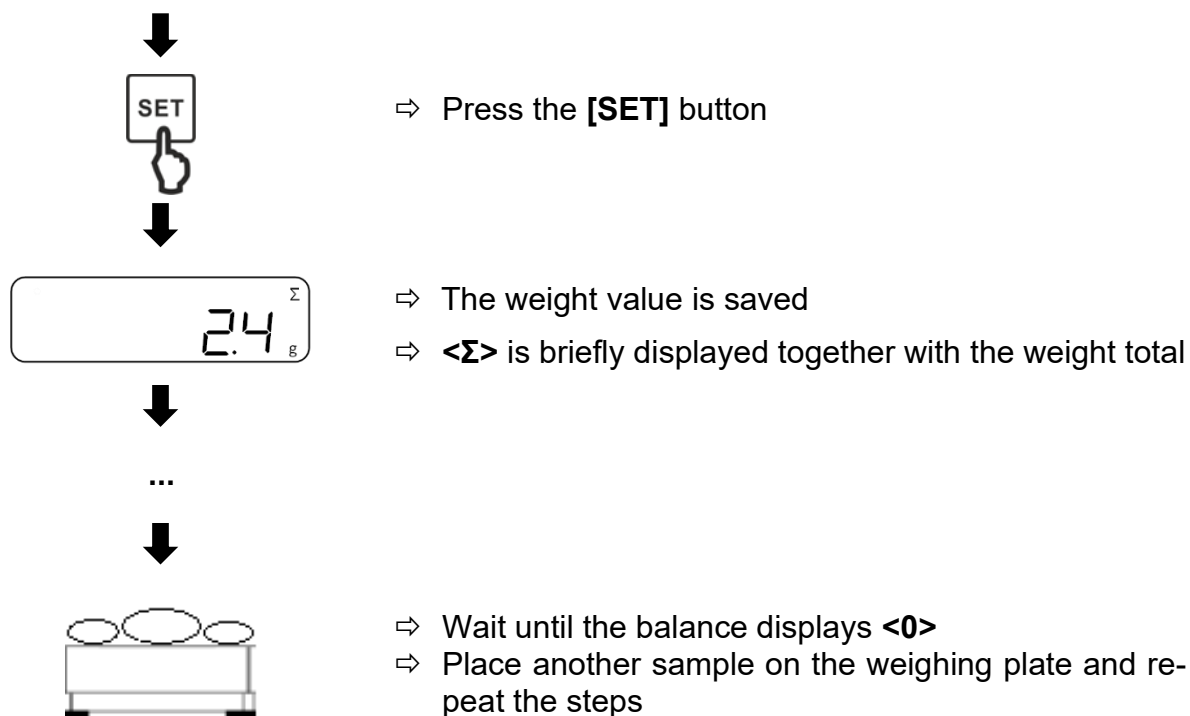


- ⇒ Place a new sample on the weighing pan and repeat the steps

### 16.2.2 NET adding



- ⇒ Set the balance to **< 2C.Ad. 2>** (see chapter 16)
- ⇒ Place the first sample on the weighing plate and wait until an asterisk **<\*>** appears on the display



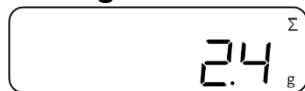
### 16.3 Display or delete the total

#### Displaying the total sum:



- ⇒ When the balance is in measuring mode, press the **[F]** key repeatedly until **<Σ>** appears on the display

#### Deleting the total:



- ⇒ When the balance is in measuring mode, press the **[F]** key repeatedly until **<Σ>** appears on the display



- ⇒ Press the **[TARE/ZERO]** key

## 17 Settings for operation and operating behaviour

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



For navigation in the menu, see chapter 8.2

### 17.1 Setting of 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.



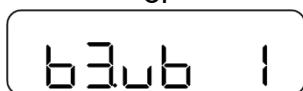
- ⇒ Unit A can be used for all weighing applications
- ⇒ Unit B can only be used for simple weighing

⇒ Navigate to the menu for **<b1.u.A>** or **<b3.ub>**

|                       |            |
|-----------------------|------------|
| <b>&lt;b1.u.A&gt;</b> | Set unit A |
| <b>&lt;b3.ub&gt;</b>  | Set unit B |



or

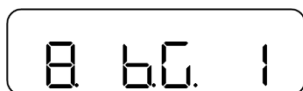


⇒ Select setting

|   |                                                 |
|---|-------------------------------------------------|
| 0 | Deactivated (setting only available for unit B) |
| 1 | g (grams)                                       |
| 2 | kg (kilogram)                                   |
| 4 | ct (carat)                                      |
| 5 | ounce                                           |
| 6 | Pound                                           |
| 7 | troy ounce                                      |
| 8 | Pennyweight                                     |
| 9 | Grain                                           |
| A | Hong Kong tael                                  |
| b | Singapore-Malaysia tael                         |
| C | Taiwan tael                                     |
| d | Momme                                           |
| E | Indian tola                                     |

### 17.2 Bar graph display

The bar graph display shows how heavily the weighing plate is loaded in relation to its weighing range.



⇒ Navigate to the **<8. b.G.>** menu and select Display setting

- |   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

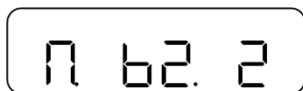
### 17.3 Acoustic signal

The acoustic signal complements the display on the scales and can assist you in your work.

The scales can be set to emit an acoustic signal in the following cases:

- Unit weight has been updated in the Simple SCS function
- Weight value has been added
- An error message appears
- Low battery level (for scales with batteries)
- Weight value was evaluated within the tolerance range during weighing

#### 17.3.1 Activating/deactivating the acoustic signal



⇒ Navigate to the **<M. b2.>** menu and select the setting

- |   |                                                 |
|---|-------------------------------------------------|
| 0 | Deactivated                                     |
| 1 | Activated (acoustic signal in the above cases)  |
| 2 | When a button is pressed and in the above cases |

#### 17.3.2 Setting the pitch of the acoustic signal



⇒ Activate acoustic signal (see section 17.3.1 )

⇒ Navigate to the **<M1. tn.>** menu and select the setting

- |   |        |
|---|--------|
| 1 | Low    |
| 2 | Medium |
| 3 | High   |

### 17.4 Backlight

The backlight allows you to read the display more easily. The backlight can be switched off automatically if the scales are not used for more than three minutes.



- The backlight will not switch off in the following cases:
  - when the scale menu is open
  - if there is something on the weighing plate and the value is unstable
- The backlighting switches back on automatically when the balance is used

#### 17.4.1 Automatic switch-off of the backlight



⇒ Navigate to the **<A. A.b.>** menu and select the response setting

- |   |                                          |
|---|------------------------------------------|
| 0 | No automatic switch-off                  |
| 1 | Automatic switch-off after three minutes |

#### 17.4.2 Backlight control



⇒ Navigate to **<o. b.L.>** in the menu and select the response setting

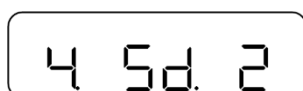
- |   |                                                                      |
|---|----------------------------------------------------------------------|
| 0 | Disabled                                                             |
| 1 | Enabled                                                              |
|   | Activated when the scale is operated with mains voltage              |
| 2 | Deactivated when the balance is operated with rechargeable batteries |

#### 17.5 Stability settings

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

The following applies: **The higher the set value, the greater the weight fluctuations can be before the weight value is displayed as stable.**

##### 17.5.1 Sensitivity



⇒ Navigate to the **<4. Sd.>** menu and select Sensitivity

- |   |                                       |
|---|---------------------------------------|
| 1 | Very high sensitivity                 |
| 2 | Higher sensitivity (default)          |
| 3 | Lower sensitivity (default)           |
| 4 | Very low sensitivity (anti-vibration) |

##### 17.5.2 Stabilisation waiting time

The balance can be set to display the weight value even if it is not yet stable after zeroing or taring.



⇒ Navigate to the **<H. tA.>** menu and select sensitivity

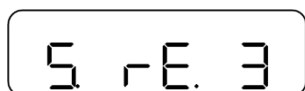
- |   |             |
|---|-------------|
| 1 | Deactivated |
| 2 | Activated   |

## 17.6 Response settings

The reaction settings allow you to adjust the balance to the environmental conditions. The reaction setting influences the stability display of the balance.

The following applies: **The higher the set value, the less sensitive the balance is to environmental influences (e.g. wind or vibrations) and the more stable the weight value displayed.**

⇒ Navigate to the **<5. rE.>** menu and select the reaction setting



- |   |                                       |
|---|---------------------------------------|
| 0 | Sensitive                             |
| 1 | Very high sensitivity                 |
| 2 | High sensitivity                      |
| 3 | Normal                                |
| 4 | Low sensitivity                       |
| 5 | Very low sensitivity (anti-vibration) |

## 17.7 Zero tracking

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

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



- |   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

## 17.8 Automatic switch-off function

When the automatic switch-off function is activated, the scale switches off automatically if it is not used for a period of 5 minutes.



- This function can only be used when the scale is powered by rechargeable batteries.
- The scale will not switch off automatically
  - if the scale menu is open
  - if there is material on the weighing plate and the value is unstable



⇒ Navigate to the **<9. A.P.>** menu and select the setting

- |   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

## 18 System settings

Settings on the scale can be adjusted via the menu by pressing the **[F]** key.



For navigation in the menu, see chapter 8.2

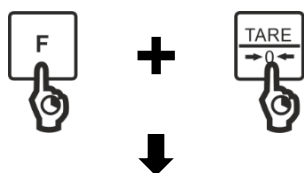
### 18.1 Scale identification number

Assigning a scale identification number allows you to distinguish your scale from other scales. The scale identification number is issued with the adjustment protocol.



A maximum of 6 characters can be assigned for the scale identification number.

#### Setting the scale identification number:



⇒ Press the **[F]** key and the **[TARE/ZERO]** key simultaneously for approx. 2 seconds.



⇒ When **<Func 2>** is displayed, release the keys



⇒ **< 1. Id 0>** appears on the display.



⇒ Select setting 1

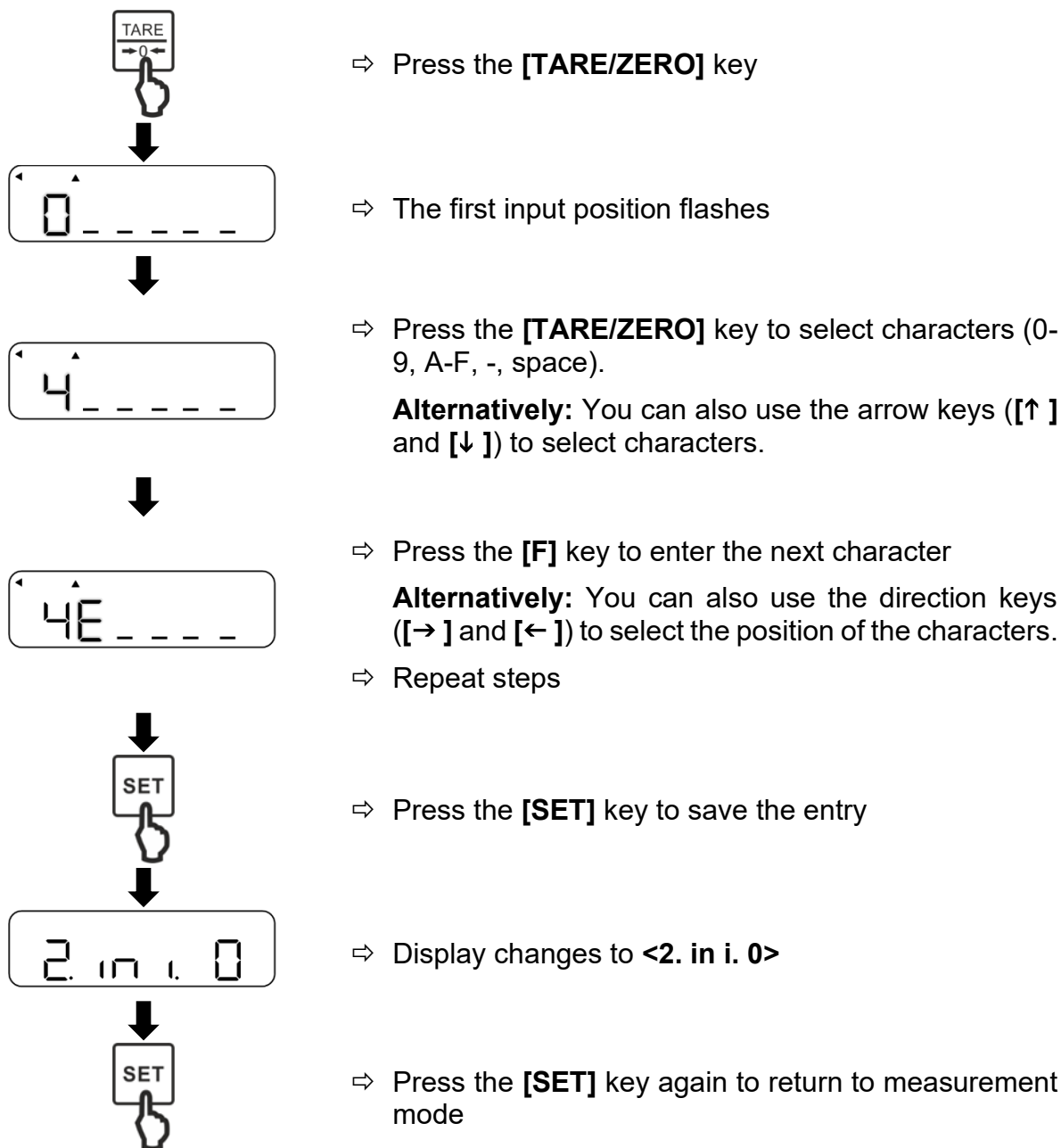


⇒ Press the **[F]** key



#### Enter the scale identification number:

⇒ The balance identification number is displayed on the balance

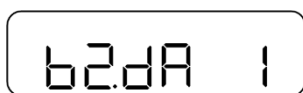


## 18.2 Readability

The higher the readability is set, the less the scale is affected by external influences. In addition, the scale value stabilises more quickly.



- The permissible readability differs depending on the weighing unit (see sections 18.2.1 and 18.2.2).
- For unit A and unit B (setting the weighing unit: see chapter 17.1), the readability can be set individually.



⇒ Navigate to the **<b2. dA>** menu and select readability

b2. dA | Readability for unit A

⇒ Select readability (see sections 18.2.1 and 18.2.2 )

### 18.2.1 Readability for PWS 800-2

| Setting                 | 1       | 2       | 3       | 4      | 5      |
|-------------------------|---------|---------|---------|--------|--------|
| gram                    | 0.01    | 0.02    | 0.05    | 0.1    | 0.2    |
| Kilogram                | 0.00001 | 0.00002 | 0.00005 | 0.0001 | 0.0002 |
| Carat                   | 0.05    | 0.1     | 0.2     | 0.5    | 1      |
| Ounce                   | 0.0005  | 0.001   | 0.002   | 0.005  | 0.01   |
| Pound                   | 0.00005 | 0.0001  | 0.0002  | 0.0005 | 0.001  |
| Troy ounce              | 0.0005  | 0.001   | 0.002   | 0.005  | 0.01   |
| Penny weight            | 0.01    | 0.02    | 0.05    | 0.1    | 0.2    |
| Grain                   | 0.2     | 0.5     | 1       | 2      | 5      |
| Hong Kong tael          | 0.0005  | 0.001   | 0.002   | 0.005  | 0.01   |
| Singapore-Malaysia tael | 0.0005  | 0.001   | 0.002   | 0.005  | 0.01   |
| Taiwanese tael          | 0.0005  | 0.001   | 0.002   | 0.005  | 0.01   |
| Momme                   | 0.005   | 0.01    | 0.02    | 0.05   | 0.1    |
| Indian tola             | 0.001   | 0.002   | 0.005   | 0.01   | 0.02   |

### 18.2.2 Readability for PWS 3000-1 and PWS 8000-1

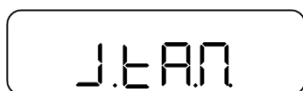
| Setting                 | 1      | 2      | 3      | 4     | 5     |
|-------------------------|--------|--------|--------|-------|-------|
| gram                    | 0.1    | 0.2    | 0.5    | 1     | 2     |
| Kilogram                | 0.0001 | 0.0002 | 0.0005 | 0.001 | 0.002 |
| Carat                   | 0.5    | 1      | 2      | 5     | 10    |
| Ounce                   | 0.005  | 0.01   | 0.02   | 0.05  | 0.1   |
| Pound                   | 0.0005 | 0.001  | 0.002  | 0.005 | 0.01  |
| Troy ounce              | 0.005  | 0.01   | 0.02   | 0.05  | 0.1   |
| Penny weight            | 0.1    | 0.2    | 0.5    | 1     | 2     |
| Grain                   | 2      | 5      | 10     | 10    | 10    |
| Hong Kong tael          | 0.005  | 0.01   | 0.02   | 0.05  | 0.1   |
| Singapore-Malaysia tael | 0.005  | 0.01   | 0.02   | 0.05  | 0     |
| Taiwan tael             | 0.005  | 0.01   | 0.02   | 0.05  | 0.1   |
| Momme                   | 0.05   | 0.1    | 0.2    | 0.5   | 1     |
| Indian tola             | 0.01   | 0.02   | 0.05   | 0.1   | 0.2   |

### 18.3 Restoring the last tare value

The balance offers the option of restoring the last tare value used before the balance was switched off when it is switched on again. If this function is activated, there is no need to tare again if the same tare weight is used, e.g. in the event of a power failure.



If the weighing plate is continuously loaded over a longer period of time, this can lead to incorrect weighing results.



⇒ Navigate to the menu for **< L.t.A.M. >** and select Settings

|   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

#### 18.4 Restore factory settings

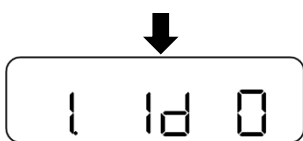
When the scale is restored to factory settings, all settings are reset.



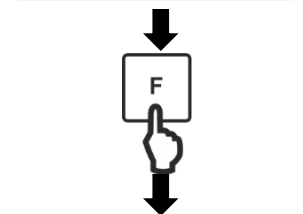
⇒ Press the **[F]** key and the **[TARE/ZERO]** key simultaneously for approx. 2 seconds.



⇒ When **<Func 2>** is displayed, release the keys



⇒ **<1. Id 0>** appears on the display

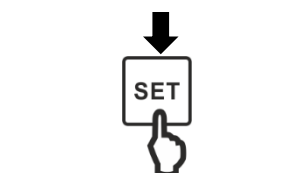


⇒ Press the **[F]** key to navigate to **<2. ini.>**



⇒ Select the desired setting

|   |                          |
|---|--------------------------|
| 0 | Cancel                   |
| 1 | Restore factory settings |



⇒ Press the **[SET]** button

⇒ The balance returns to measuring mode

## 19 Adjustment

Since the value of gravitational acceleration is not the same everywhere on Earth, the balance must be adjusted

– in accordance with the underlying physical weighing principle – at the place of installation.

The location must be adjusted to the prevailing gravitational acceleration (only if the balance has not already been adjusted at the factory for the installation site).

This adjustment process must be carried out during initial commissioning, after each change of location and in the event of fluctuations in the ambient temperature. In order to obtain accurate readings, it is also advisable to adjust the balance periodically during weighing operation.



- Ensure stable ambient conditions. A warm-up period (see section 1) is required for stabilisation.
- Ensure that there are no objects on the weighing plate.
- Avoid vibrations and air currents.
- Only perform adjustment with the standard weighing plate in place.
- When an optional printer is connected and the GLP function is activated, the adjustment protocol is printed.

### 19.1 Adjustment



- You can cancel the adjustment process by pressing any key (except the **[F]** key) during adjustment.
- The error messages "< " "1-Err>" or "<2-Err>" appear if you have not placed the correct adjustment weight on the balance (for more information, see section 22.1).
- Setting <7. CA. 0> deactivates the adjustment function.



⇒ Select <7CA. 3> in the menu (navigation in the menu: see section 8.2 )



⇒ Press the **[SET]** button



⇒ Hold down the **[F]** key until <CAL> appears on the display

⇒ Release the **[F]** button



on 0



on F.S.



on F.S.



End

- ⇒ The message **<on 0>** appears on the display and starts flashing
- ⇒ The balance performs a zero adjustment

- ⇒ Once zeroing is complete, the message **<on F.S.>** appears on the display

- ⇒ Place the adjustment weight in the centre of the weighing plate

- ⇒ The message **<on F.S.>** appears on the display and begins to flash
- ⇒ The adjustment starts

- ⇒ **When <End> appears on the balance, the adjustment is complete**
- ⇒ **The balance returns to measuring mode**
- ⇒ Remove the load from the weighing plate

## 19.2 Calibration test

7 CA. 4



tEst



- ⇒ Select **<7.CA. 4>** in the menu (navigation in the menu: see section 8.2 )

- ⇒ Press the **[SET]** key
- ⇒ The balance returns to measuring mode

- ⇒ Hold down the **[F]** key for approx. 2 seconds

- ⇒ Display changes to **<tEst>**
- ⇒ Release the **[F]** key

onF.S



d IFF

⇒ **<on 0>** and **<on F.S.>** appear consecutively on the display

⇒ When the balance displays **<on F.S.>**, place the adjustment weight on the weighing plate

⇒ The adjustment test starts automatically

⇒ The display first shows **<d IFF>** and then the difference between the adjustment weight and the actual weight value

⇒ Press any key to return to measurement mode

## 20 Interfaces

The scale can communicate with external peripheral devices via the interface. Data can be output to a printer, PC or control display. Conversely, control commands and data entries can be made via the connected devices (e.g. PC, keyboard, barcode reader).

### 20.1 RS232C interface for data input and output

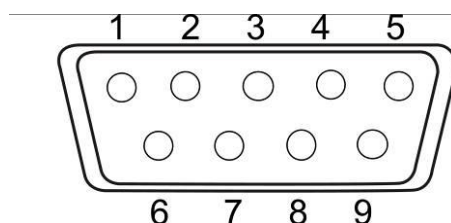
The scale is equipped with an RS232C interface as standard for connecting a peripheral device (e.g. printer or computer).  
peripheral device (e.g. printer or computer).

#### 20.1.1 Technical data

**Connection** 9-pin D-subminiature socket

**Baud rate**

**Parity** None / Odd / Even



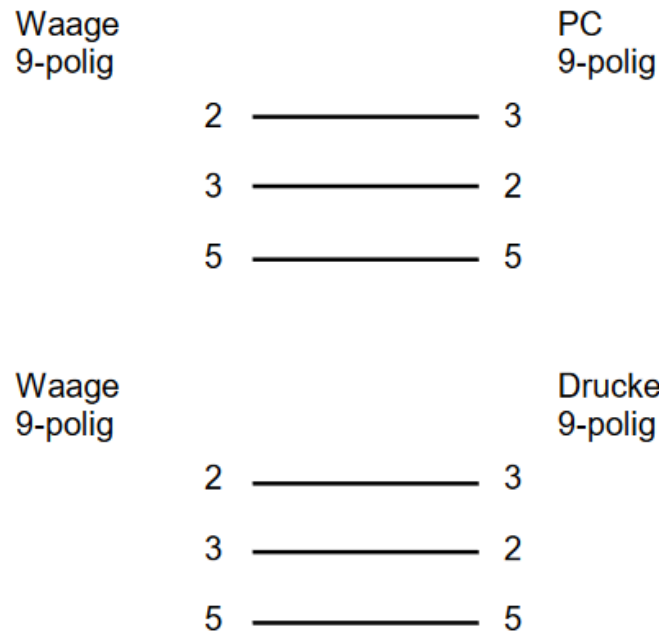
#### Pin assignment:

| Pin no. | Signal    | Input/Output | Function                                    |
|---------|-----------|--------------|---------------------------------------------|
| 1       | -         | -            | -                                           |
| 2       | RXD       | Input        | Receive data                                |
| 3       | TXD       | Output       | Output data                                 |
| 4       | DTR       | Output       | HIGH (when scales are switched on)          |
| 5       | GND       | -            | Signal ground                               |
| 6       | -         | -            | -                                           |
| 7       | -         | -            | -                                           |
| 8       | -         | -            | -                                           |
| 9       | EXT. TARE | Input        | External contact input for tare subtraction |



Tare subtraction can be performed by an external device by connecting a contact or transistor switch between pin 9 (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).

## 20.1.2 Interface cable



## 20.2 Data output formats

### 20.2.1 Data composition e (CSP)

- **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 |

- **Extended 7-digit data format**

- o Extended version of the 7-digit data format
- o Data length can be 7 to 9 bits
- o Stop bit length can be 1 to 2 bits
- o If you have set the output language to Japanese, the data length is automatically 8 bits

### 20.2.2 Data description

**Sign:**

P1 = 1 character

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

**Numerical data:**

| D1-D7/D8 | Code      | Meaning                                                                                                                                                            |
|----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 – 9    | 30H – 39H | Numbers 0 to 9                                                                                                                                                     |
| .        | 2EH       | Decimal point (position not fixed)                                                                                                                                 |
| Sp       | 20H       | Space before numerical data<br>If numerical data does not contain a decimal point, a space is output at the least significant position instead of a decimal point. |

\*Sp = space

**Units:**

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

| U1 | U2 | Code (U1) | Code (U2) | Meaning                 | Symbol                  |
|----|----|-----------|-----------|-------------------------|-------------------------|
| Sp | G  | 20H       | 47H       | gram                    | g                       |
| K  | G  | 4BH       | 47H       | Kilogram                | kg                      |
| C  | T  | 43H       | 54H       | Carat                   | ct                      |
| O  | C  | 4FH       | 5AH       | Ounce                   | oz                      |
| L  | B  | 4CH       | 42H       | Pound                   | lb                      |
| O  | T  | 4FH       | 54H       | troy ounce              | ozt                     |
| D  | W  | 44H       | 57H       | Penny weight            | dwt                     |
| G  | R  | 47H       | 52H       | Grain                   | ► (bottom right)        |
| T  | L  | 54H       | 4CH       | Hong Kong tael          | tl                      |
| T  | L  | 54H       | 4CH       | Singapore-Malaysia Tael | tl and ► (top right)    |
| T  | L  | 54H       | 4CH       | Taiwan tael             | tl and ► (centre right) |
| M  | O  | 4DH       | 4FH       | Momme                   | mom                     |
| t  | o  | 74H       | 6FH       | Indian Tola             | to                      |
| P  | C  | 50H       | 43H       | Pieces                  | Pcs                     |
| Sp | %  | 20H       | 25H       | Percentage              | %                       |
| Sp | #  | 20H       | 23H       | Calculation results     | #                       |

\*Sp = space

## Result evaluation for weighing with tolerance range:

S1 = 1 character

| S1 | Code | Meaning                                     |
|----|------|---------------------------------------------|
| L  | 4CH  | Below lower tolerance limit (LOW)           |
| G  | 47H  | Within tolerance range (OK)                 |
| H  | 48H  | Upper tolerance limit exceeded (HIGH)       |
| T  | 54H  | Total                                       |
| U  | 55H  | Unit weight                                 |
| Sp | 20H  | No evaluation result or data type specified |
| d  | 64H  | Gross                                       |

\*Sp = space

## Data status:

S2 = 1 character

| S2 | Code | Meaning                                   |
|----|------|-------------------------------------------|
| 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

## 20.3 Data output formats (CBM)

### 20.3.1 Data composition

#### Measurement results:

- **26-digit data format**

Consisting of 26 characters, including 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 |

\*Sp = space

## Error messages:

- **26-digit data format**

Consisting of 26 characters, including the end characters (CR= 0DH, LF= 0AH)\*

|    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |
| *  | *  | Sp | E  | R  | R  | R  | R  | Sp | *  | *  | *  | *  |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| *  | *  | *  | *  | *  | *  | *  | *  | *  | *  | Sp | CR | LF |

\*Sp = space

## Other data (date, time, etc.):

- The end characters (CR= 0DH, LF= 0AH) are appended to the messages "M1, M2, ... Mn".

|    |    |     |    |     |     |
|----|----|-----|----|-----|-----|
| 1  | 2  | ... | n  | n+1 | n+2 |
| M1 | M2 | ... | Mn | CR  | LF  |

## 20.3.2 Data description

### Status of the data:

S1 = 1 character

| S1 | Code | Meaning       |
|----|------|---------------|
| Sp | 20H  | Data stable   |
| *  | 2AH  | Data unstable |

\*Sp = space

### Result of tolerance range weighing:

C1 = 1 character

| C1 | Code | Meaning                               |
|----|------|---------------------------------------|
| Sp | 20H  | Within tolerance range (OK)           |
| H  | 48H  | Upper tolerance limit exceeded (HIGH) |
| L  | 4CH  | Lower tolerance limit exceeded (LOW)  |

\*Sp = Space

**Data type:**

T1 – T6 = 1 - 6 characters

| T1 | T2 | T3 | T4 | T5 | T6 | Code |     |     |     |     |     | Meaning                        |
|----|----|----|----|----|----|------|-----|-----|-----|-----|-----|--------------------------------|
|    |    |    |    |    |    | T1   | T2  | T3  | T4  | T5  | T6  |                                |
| Sp | Sp | Sp | Sp | Sp | Sp | 20H  | 20H | 20H | 20H | 20H | 20H | Net weight <41A STATUS>: <OFF> |
| N  | Sp | Sp | Sp | Sp | Sp | 4EH  | 20H | 20H | 20H | 20H | 20H | Net weight <41A STATUS>: <ON>  |
| P  | T  | Sp | Sp | Sp | Sp | 50H  | 54H | 20H | 20H | 20H | 20H | PRE-TARE value                 |
| T  | Sp | Sp | Sp | Sp | Sp | 54H  | 20H | 20H | 20H | 20H | 20H | Tare weight value              |
| 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 | Unit weight                    |

\*Sp = Space

**Numerical data:**

D1 – D12: 1 – 12 characters

| D1 – D12 | Code      | Meaning                                                                                                                                   |
|----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------|
| +        | 2BH       | Zero or positive values                                                                                                                   |
| -        | 2DH       | Negative values                                                                                                                           |
| 0 - 9    | 30H – 39H | Numbers 0 to 9<br>0 also used for zero padding                                                                                            |
| .        | 2EH       | Decimal point                                                                                                                             |
| D1 – D12 | Code      | Meaning                                                                                                                                   |
| [        | 5BH       | The number between the brackets " [ " and " ] " indicates the non-calibration-relevant position                                           |
| ]        | 5DH       |                                                                                                                                           |
| Sp       | 20H       | Spaces fill the upper part of the data<br>Output to the least significant digit if there is no decimal point<br>Unused higher-order digit |

\*Sp = space

## Units:

U1, U2 = 2 characters

| U1 | U2 | Code (U1) | Code (U2) | Meaning                    |
|----|----|-----------|-----------|----------------------------|
| Sp | g  | 20H       | 67H       | gram                       |
| k  | g  | 6BH       | 67H       | kilogram                   |
| c  | t  | 63H       | 74H       | carat                      |
| m  | o  | 6DH       | 6FH       | Momme                      |
| o  | z  | 6FH       | 7AH       | ounce                      |
| l  | b  | 6CH       | 62H       | pound                      |
| O  | T  | 4FH       | 54H       | troy ounce                 |
| d  | w  | 64H       | 77H       | Penny weight               |
| t  | l  | 74H       | 6CH       | Hong Kong tael             |
| t  | l  | 74H       | 6CH       | Singapore-Malaysia tael    |
| t  | l  | 74H       | 6CH       | Taiwan tael                |
| t  | o  | 74H       | 6FH       | Indian Tola                |
| P  | C  | 50H       | 43H       | Quantity                   |
| Sp | %  | 20H       | 25H       | Percentage                 |
| Sp | #  | 20H       | 23H       | Coefficient multiplication |

\*Sp = space

\* **End characters:** CR = carriage return, LF = line feed

## 20.4 Data entry



- Pay attention to upper and lower case when entering data
- Wait for the balance to respond before making another entry

### 20.4.1 Input format

#### Input format:

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

#### Example of input for continuous output:

⇒ Input: O1

**Zero setting / taring, data output:**

| C1 | C2 | Code (C1) | Code (C2) | Meaning                                                                                                   |
|----|----|-----------|-----------|-----------------------------------------------------------------------------------------------------------|
| T  | Sp | 54H       | 20H       | Tare                                                                                                      |
| Z  | Sp | 5AH       | 20H       | Zero setting                                                                                              |
| O  | 0  | 4FH       | 30H       | End output                                                                                                |
| O  | 1  | 4FH       | 31H       | Permanent output                                                                                          |
| O  | 2  | 4FH       | 32H       | Continuous output only for stable values (output interrupted for unstable values)                         |
| O  | 3  | 4FH       | 33H       | Press the <b>[PRINT]</b> 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 the value is stable (no output for unstable values)                              |
| O  | 6  | 4FH       | 36H       | Permanent output for unstable values (output interrupted for stable values → stable value is output once) |
| O  | 7  | 4FH       | 37H       | Press the <b>[PRINT]</b> key for one-time output with stable values (no output with unstable values)      |
| O  | 8  | 4FH       | 38H       | One-time output                                                                                           |
| O  | 9  | 4FH       | 39H       | One-off issue with stable value                                                                           |

\*Sp = space

| <b>Answer:</b> |                                                                            |
|----------------|----------------------------------------------------------------------------|
| A00            | Input successful                                                           |
| E01            | Input error                                                                |
| E04            | Taring or zeroing cannot be performed (range exceeded, weight error, etc.) |



- The O8 and O9 commands are used to request data.
- After entering O8 or O9, the balance returns O0.
- Commands O0 to O7 are executed after activation until the balance is switched off. When the balance is switched on again, the output settings are reset to factory settings.

**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 if the summing function has been activated.
- If no unit B has been defined, mode 4 activates simple weighing.

| C1 | C2 | Code (C1) | Code (C2) | Meaning    |
|----|----|-----------|-----------|------------|
| 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 table |                 |                     |                     |                       |                 |
|------------|-----------------|---------------------|---------------------|-----------------------|-----------------|
| Mode       | Simple weighing | Counting            | Percentage weighing | Density determination | Animal weighing |
| 1          | Weighing        | Weighing weight     | Weighing weight     | Error                 | Error           |
| 2          | Gross weight    | Counting            | Percentage weighing | Error                 | Error           |
| 3          | Add up weight   | Summing pieces      | Add up percentages  | Error                 | Error           |
| 4          | Display unit B  | Average unit weight | Error               | Error                 | Error           |

| Answer: |                  |
|---------|------------------|
| A00     | Input successful |
| E01     | Input error      |
| E02     | Error            |

#### Adjustment/adjustment test:

| C1 | C2 | Code (C1) | Code (C2) | Meaning                                      |
|----|----|-----------|-----------|----------------------------------------------|
| C  | 0  | 43H       | 30H       | Deactivate entries                           |
| C  | 3  | 43H       | 33H       | Perform adjustment with external weight      |
| C  | 4  | 43H       | 34H       | Perform adjustment test with external weight |

| Answer: |                         |
|---------|-------------------------|
| A00     | Input successful        |
| E01     | Input error             |
| E02     | Function is deactivated |
| E03     | Cancelled               |
| E04     | Execution not correct   |

## 20.5 Response formats

| Answer                                          |                                              |
|-------------------------------------------------|----------------------------------------------|
| A00 / Exx format                                | ACK / NAK format                             |
| A00: Normal response<br>E01: Incorrect response | ACK: Normal response<br>NAK: Faulty response |

### 20.5.1 A00/Exx format

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

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

\* End characters: CR = carriage return, LF = line feed

#### Commands:

| A1 | A2 | A3 | Code (A1) | Code (A2) | Code (A3) | Meaning          |
|----|----|----|-----------|-----------|-----------|------------------|
| A  | 0  | 0  | 41H       | 30H       | 30H       | Normal response  |
| E  | 0  | 1  | 45H       | 30H       | 31H       | Incorrect answer |

### 20.5.2 ACK/NAK format

Consists of one character (without end character)

1

A1

#### Commands:

| A1  | Code (A1) | Meaning            |
|-----|-----------|--------------------|
| ACK | 06H       | Normal response    |
| NAK | 15H       | Incorrect response |

### 20.6 External contact input

Settings on the scale can be adjusted via the menu by pressing the **[F]** key.



For navigation in the menu, see chapter 8.2

P.E.tA

⇒ Navigate to the menu for **< P. E.tA >** and select the function assignment for the external contact input.

- |   |                       |
|---|-----------------------|
| 0 | Deactivate            |
| 1 | Tare subtraction      |
| 2 | Zero point adjustment |

## 20.7 Communication settings

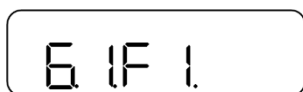
Settings on the balance can be adjusted via the menu by pressing the **[F]** key.



For navigation in the menu, see chapter 8.2

### 20.7.1 Activating/deactivating the interface and data format

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



- |   |                              |
|---|------------------------------|
| 0 | Deactivating the interface   |
| 1 | 6-digit data format          |
| 2 | 7-digit data format          |
| 3 | Extended 7-digit data format |
| 4 | CBM format                   |

### 20.7.2 Configuring communication settings



The communication settings can only be configured once the interface has been activated (see section 20.7.1).

## Set output condition:

6 loc. 7

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

- |   |                                                                                                                                                                                                                                 |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | End output                                                                                                                                                                                                                      |
| 1 | Continuous output                                                                                                                                                                                                               |
| 2 | Permanent output only for stable values (output interrupted for unstable values)                                                                                                                                                |
| 3 | One-time output when the <b>[PRINT]</b> key is pressed                                                                                                                                                                          |
| 4 | Automatic output (one-time output when the value is stable. The next output for another sample occurs as soon as the display is stabilised to less than or equal to zero by relief, zero point adjustment or tare subtraction). |
| 5 | Single output whenever the value is stable (no output for unstable values)                                                                                                                                                      |
| 6 | Continuous output for unstable values (output is interrupted when the value is stable → , the stable value is output once).                                                                                                     |
| 7 | Press the <b>[PRINT]</b> key for one-time output when values are stable (no output when values are unstable)                                                                                                                    |

## Set baud rate

62bL. 1

⇒ Navigate to the **<62.bL.>** 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 has been set to 2 or 3 (see section 20.7.1 ).

63PA. 0

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

- |   |       |
|---|-------|
| 0 | Blank |
| 1 | Odd   |
| 2 | Even  |

### Set data length:



The data length can only be set if the interface has been set to 3 (see section 20.7.1).

64dL. 8

⇒ Navigate to the **<64.dL.>** menu and select the desired setting

- |   |  |        |
|---|--|--------|
| 7 |  | 7 bits |
| 8 |  | 8 bits |

### Set stop bit:

65St. 2

⇒ Navigate to the **<65.St.>** menu and select the desired setting

- |   |  |        |
|---|--|--------|
| 1 |  | 1 bit  |
| 2 |  | 2 bits |

### Set how to handle empty digits:

66nu. 0

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

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

### Set response format:

67rS. 1

⇒ Navigate to the **<67.rS.>** menu and select the desired setting.

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

## 20.8 Printer functions

Weighing data can be exchanged with connected peripheral devices via the interfaces

Output can be sent to a printer, PC or control displays. Conversely, control commands and data entries can be made via the connected devices (e.g. PC, keyboard, barcode reader).



- The output of date and time depends on the printer used. Information on this can be found on our homepage:  
[www.kern-sohn.com](http://www.kern-sohn.com)

### Activating output to peripheral devices:



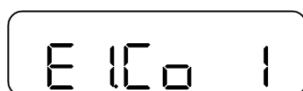
⇒ Navigate to the **<E.GLP>** menu and select the setting

|   |             |
|---|-------------|
| 0 | Deactivated |
| 1 | Enabled     |

### 20.8.1 Output of the adjustment test result

The balance offers the option of automatically outputting the result via the interface after calibration or after the calibration test.

⇒ **<E.GLP 1 Select>** (see section 20.8 )



⇒ Navigate to the **<E1.Co>** menu and select the setting

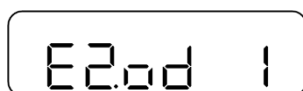
|   |                              |
|---|------------------------------|
| 0 | Automatic output deactivated |
| 1 | Automatic output enabled     |

### 20.8.2 Output of measurement results

The balance offers the option of outputting measurement results via the interface.

#### Activating the output of measurement results:

⇒ Select **<E.GLP 1>** (see section 20.8 )



⇒ Navigate to the **<E2.od>** menu and select the setting

|   |                              |
|---|------------------------------|
| 0 | Automatic output deactivated |
| 1 | Automatic output enabled     |

#### Output of measurement results:

##### Print header:



⇒ Hold down the **[PRINT]** button

##### Print measurement results:



⇒ Place the item to be weighed on the weighing plate

⇒ Press the **[PRINT]** key

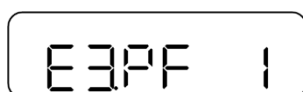
##### Print footer:



⇒ When the measurement of the weighing material is complete, press and hold the **[PRINT]** key

### 20.8.3 Set the output language

⇒ Set **<E.GLP>** to 1 (see chapter 20.8 )



⇒ Navigate to the **<E3.PF>** menu and select the setting

|   |          |
|---|----------|
| 1 | English  |
| 2 | Japanese |

## 21 Maintenance, servicing, disposal



Disconnect the device from the mains before carrying out any maintenance, cleaning or repair work.

### 21.1 Cleaning

- ⇒ Observe IP protection
- ⇒ Do not use aggressive cleaning agents (solvents, etc.), but only a cloth moistened with mild soapy water.
- ⇒ Wipe with a dry, soft cloth
- ⇒ Do not use cleaning agents containing caustic soda, vinegar, salt, sulphur or citric acid on stainless steel parts.
- ⇒ Clean stainless steel parts with a soft cloth soaked in a cleaning agent suitable for stainless steel
- ⇒ Ensure that no liquid penetrates the appliance.
- ⇒ Do not use metal brushes or steel wool cleaning sponges, as these cause surface corrosion.
- ⇒ Loose sample residues/powder can be carefully removed with a brush or hand vacuum cleaner.
- ⇒ Remove spilled material immediately

### 21.2 Maintenance

- ⇒ The device may only be opened by trained service technicians authorised by KERN
- ⇒ Disconnect from the mains before opening.

### 21.3 Disposal

The disposal of packaging and the device must be carried out by the operator in accordance with the applicable national or regional law of the place of use.

## 22 Minor troubleshooting

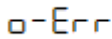
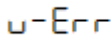
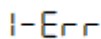
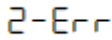
In the event of a malfunction in the programme sequence, the balance should be switched off briefly and disconnected from the mains.  
mains. The weighing process must then be restarted from the beginning

| Fault                                              | Possible cause                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The weight display does not light up               | <ul style="list-style-type: none"><li>• The scale is not switched on</li><li>• The connection to the mains is interrupted (mains cable not plugged in/defective)</li><li>• The mains power supply has failed</li><li>• The batteries/rechargeable batteries are inserted incorrectly or are empty</li><li>• No batteries/rechargeable batteries are inserted</li></ul> |
| The weight display changes continuously            | <ul style="list-style-type: none"><li>• Draughts/air movements</li><li>• Vibrations of the table/floor</li><li>• The weighing plate is in contact with foreign objects</li><li>• Electromagnetic fields/static charge (choose a different location/switch off any interfering devices if possible)</li></ul>                                                           |
| The weighing result is obviously incorrect         | <ul style="list-style-type: none"><li>• The scale display is not set to zero</li><li>• The calibration is no longer correct</li><li>• The balance is not level</li><li>• There are significant temperature fluctuations</li><li>• Electromagnetic fields/static charge (choose a different location/switch off any interfering devices if possible)</li></ul>          |
| The weighing result is incorrect after calibration | <ul style="list-style-type: none"><li>• The adjustment was not carried out under stable environmental conditions</li><li>• Weight differences between the calibration weight and the weight used for testing</li></ul>                                                                                                                                                 |

| Fault                                                                                       | Possible cause                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The display does not change when the M symbol flashes                                       | <ul style="list-style-type: none"> <li>• Draught/air movement</li> <li>• Vibrations of the table/floor</li> <li>• The weighing plate is in contact with foreign objects</li> <li>• Electromagnetic fields/static charge (choose a different installation location/switch off interfering devices if possible)</li> </ul> |
| The battery symbol flashes                                                                  | <ul style="list-style-type: none"> <li>• The charge level of the batteries/rechargeable batteries is low</li> </ul>                                                                                                                                                                                                      |
| The display switches off when the scales are operated with batteries/rechargeable batteries | <ul style="list-style-type: none"> <li>• The automatic switch-off function is activated</li> </ul>                                                                                                                                                                                                                       |

If other error messages appear, switch the scales off and on again.  
If the error message persists, notify the manufacturer.

## 22.1 Error messages

| Error message                                                                       | Description                                                                                                                                                      | Possible causes / Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• Maximum weighing range exceeded</li> <li>• The total exceeds the maximum number of characters on the display</li> </ul> | <ul style="list-style-type: none"> <li>• Divide the sample and weigh it individually</li> <li>• Use a lighter tare weight</li> <li>• Delete the result of the calculation and perform the calculation again (pay attention to the display)</li> <li>• The unit conversion coefficient is too small. Use a larger coefficient.</li> <li>• If the error message persists even though there is nothing on the weighing plate, notify the dealer.</li> </ul> |
|  | <ul style="list-style-type: none"> <li>• Negative load is below the minimum weighing range</li> </ul>                                                            | <ul style="list-style-type: none"> <li>• Weighing plate or weighing plate support incorrectly adjusted</li> <li>• Check whether the scale is touching other objects</li> <li>• If the error message persists even though the weighing plate and weighing plate support are correctly adjusted, notify the dealer.</li> </ul>                                                                                                                             |
|  | <ul style="list-style-type: none"> <li>• Weight value of the calibration weight is less than 50% of the weighing capacity</li> </ul>                             | <ul style="list-style-type: none"> <li>• Use an adjustment weight whose weight value is as close as possible to the weighing capacity</li> </ul>                                                                                                                                                                                                                                                                                                         |
| Error message                                                                       | Description                                                                                                                                                      | Possible causes / Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|  | <ul style="list-style-type: none"> <li>• Error &gt; 1.0% during adjustment or the balance is faulty</li> </ul>                                                   | <ul style="list-style-type: none"> <li>• Use the correct adjustment weight and ensure</li> </ul>                                                                                                                                                                                                                                                                                                                                                         |

|        |                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |                                                                                                                                                                                                                                                                                          | that there are no other objects on the weighing plate. Repeat the adjustment.                                                                                                                                                                                  |
| b-Err  | <ul style="list-style-type: none"> <li>Scale is subject to static charge or noise</li> </ul>                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Disconnect the power supply unit from the mains voltage, reconnect it and restart the scales</li> <li>If the error message persists, electronic components may be damaged. In this case, notify your dealer.</li> </ul> |
| d-Err  |                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                |
| L-Err  | <ul style="list-style-type: none"> <li>The weight value of the sample when setting the reference weight in piece counting mode is too low</li> <li>The weight value of the reference weight in percentage weighing mode is too low</li> </ul>                                            | <ul style="list-style-type: none"> <li>Use samples/reference weights with a higher weight value (smallest piece weight, minimum load)</li> </ul>                                                                                                               |
| t-Err  | <ul style="list-style-type: none"> <li>When totalling, the previous sample was not removed before further samples were placed on the balance</li> <li>When totalling, parts of the sample were removed or an attempt was made to execute the function without adding a sample</li> </ul> | <ul style="list-style-type: none"> <li>First remove the previous sample before placing the next sample</li> <li>Summing is not possible if 0 or negative values are displayed. Place the sample to execute the function.</li> </ul>                            |
| E1-Err | <ul style="list-style-type: none"> <li>No detection by the weighing sensor</li> </ul>                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>Disconnect the power supply from the mains voltage, reconnect it and restart the balance</li> <li>If the error message persists, electronic components may be damaged. In this case, notify your dealer.</li> </ul>     |
| E2-Err | <ul style="list-style-type: none"> <li>The balance is unstable and cannot perform zero setting or tare subtraction when switched on</li> </ul>                                                                                                                                           | <ul style="list-style-type: none"> <li>The balance is exposed to environmental conditions (e.g. wind or vibrations)</li> <li>Set up the balance in a different location</li> </ul>                                                                             |